EXIT

NISSAN

2001 ELECTRONIC

Service Information

Pathfinder

R50 Series

SERVICE MANUAL



Nissan North America, Inc.

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SMA *Service Manual Amendments*

NISSAN PATHFINDER

MODEL R50 SERIES

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FOREWORD

This manual contains maintenance and repair procedures for the 2001 Nissan PATHFINDER.

In order to assure your safety and the efficient functioning of the vehicle, this manual should be read thoroughly. It is especially important that the PRECAUTIONS in the GI section be completely understood before starting any repair task.

All information in this manual is based on the latest product information at the time of publication. The right is reserved to make changes in specifications and methods at any time without notice.

IMPORTANT SAFETY NOTICE

The proper performance of service is essential for both the safety of the technician and the efficient functioning of the vehicle.
The service methods in this Service Manual are described in such a manner that the service may be performed safely and accurately.
Service varies with the procedures used, the skills of the technician and the tools and parts available. Accordingly, anyone using service procedures, tools or parts which are not specifically recommended by NISSAN must first be completely satisfied that neither parsonal safety nor the vehicle's safety will be jeopardized by the service method selected.

NISSAN MOTOR CO., LTD.
Overseas Service Department
Tokyo, Japan

PLEASE HELP MAKE THIS SERVICE MANUAL BETTER!

Your comments are important to NISSAN and will help us to improve our Service Manuals.
Use this form to report any issues or comments you may have regarding our Service Manuals.
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SERVICE MANUAL: Model: _____ **Year:** _____

PUBLICATION NO. (Please photocopy back cover): _____

VEHICLE INFORMATION VIN: _____ **Production Date:** _____

Please describe any issues or problems in detail:
Page number(s) _____ *Note: Please include a copy of each page, marked with your comments.*

_____
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Are the trouble diagnosis procedures logical and easy to use? (circle your answer) YES NO
If no, what page number(s)?_____*Note: Please include a copy of each page, marked with your comments.*
Please describe the issue or problem in detail: _____

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Is the organization of the manual clear and easy to follow? (circle your answer) YES NO
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What information should be included in NISSAN Service Manuals to better support you in servicing or repairing customer vehicles?

_____
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_____

DATE: _____ YOUR NAME: _____ POSITION: _____
DEALER: _____ DEALER NO.: _____ ADDRESS: _____
CITY:_____ STATE/PROV./COUNTRY: _____ ZIP/POSTAL CODE: _____

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Precautions

NAGI0001

Observe the following precautions to ensure safe and proper servicing. These precautions are not described in each individual section.


SGI646

PRECAUTIONS FOR SUPPLEMENTAL RESTRAINT SYSTEM (SRS) "AIR BAG" AND "SEAT BELT PRE-TENSIONER"

NAGI0001S01

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL R50 is as follows:

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.**

PRECAUTIONS FOR NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)

NAGI0001S08

NVIS (NATS) will immobilize the engine if someone tries to start it without the registered key of NVIS (NATS).
Both of the originally supplied ignition key IDs have been NVIS (NATS) registered.

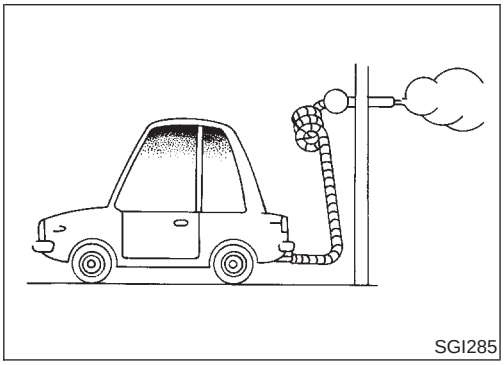
The security indicator is located on the instrument panel. The indicator blinks when the ignition switch is in "OFF" or "ACC" position. Therefore, NVIS (NATS) warns outsiders that the vehicle is equipped with the anti-theft system.

- When NVIS (NATS) detects trouble, the security indicator lamp lights up while ignition switch is in "ON" position.
  This lighting up indicates that the anti-theft is not functioning, so prompt service is required.
- When servicing NVIS (NATS) (trouble diagnoses, system initialization and additional registration of other NVIS (NATS) ignition key IDs), CONSULT-II hardware and CONSULT-II NVIS (NATS) software is necessary.
  Regarding the procedures of NVIS (NATS) initialization and NVIS (NATS) ignition key ID registration, refer to CONSULT-II operation manual, IVIS/NVIS.

Therefore, CONSULT-II NVIS (NATS) software (program card and operation manual) must be kept strictly confidential to maintain the integrity of the anti-theft function.

- When servicing NVIS (NATS) (trouble diagnoses, system initialization and additional registration of other NVIS (NATS) ignition key IDs), it may be necessary to re-register original key identification. Therefore, be sure to receive all keys from vehicle owner.
  A maximum of five key IDs can be registered into NVIS (NATS).
- When failing to start the engine first time using the key of NVIS (NATS) (for example, when interference is caused by another NVIS (NATS) key, an automated full road device or automated payment device on the key ring), restart as follows.

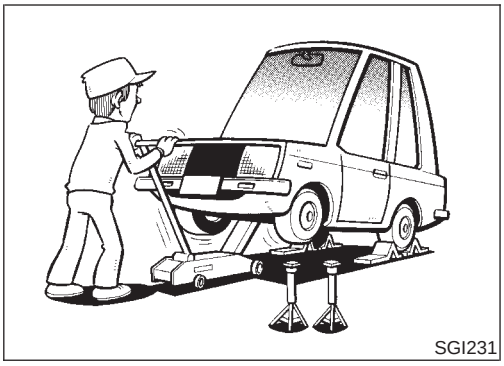
a) Leave the ignition switch in "ON" position for approximately 5 seconds.
b) Turn ignition switch to "OFF" or "LOCK" position and wait approximately 5 seconds.
c) Repeat step 1 and 2.
d) Restart the engine while holding the device (which may have caused the interference) separate from the registered NVIS (NATS) key. If the no start condition re-occurs, NISSAN recommends placing the registered nats key on a separate key ring to avoid interference from other devices.


SGI285

GENERAL PRECAUTIONS

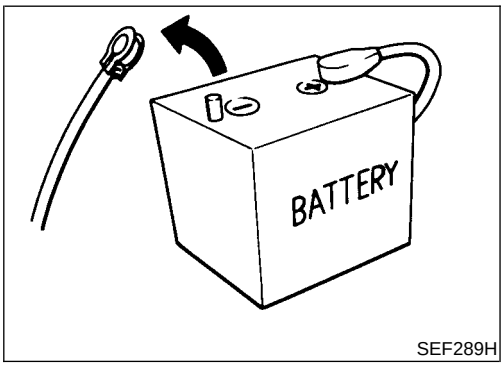
NAGI0001S02

- Do not operate the engine for an extended period of time without proper exhaust ventilation.
  Keep the work area well ventilated and free of any inflammable materials. Special care should be taken when handling any inflammable or poisonous materials, such as gasoline, refrigerant gas, etc. When working in a pit or other enclosed area, be sure to properly ventilate the area before working with hazardous materials.
  Do not smoke while working on the vehicle.



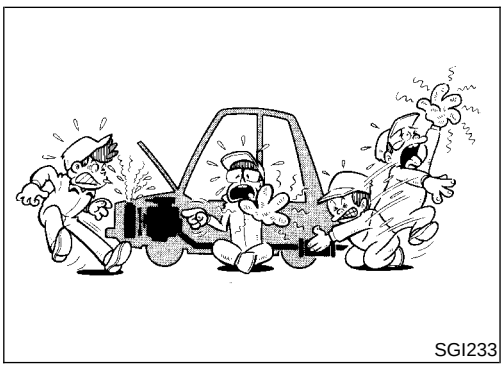
SGI231

- Before jacking up the vehicle, apply wheel chocks or other tire blocks to the wheels to prevent the vehicle from moving. After jacking up the vehicle, support the vehicle weight with safety stands at the points designated for proper lifting before working on the vehicle.
  These operations should be done on a level surface.
- When removing a heavy component such as the engine or transaxle/transmission, be careful not to lose your balance and drop it. Also, do not allow it to strike adjacent parts, especially the brake tubes and master cylinder.



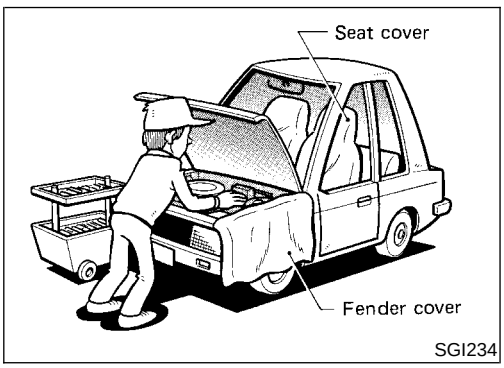
SEF289H

- Before starting repairs which do not require battery power:
  Turn off ignition switch.
  Disconnect the negative battery terminal.



SGI233

- To prevent serious burns:
  Avoid contact with hot metal parts.
  Do not remove the radiator cap when the engine is hot.



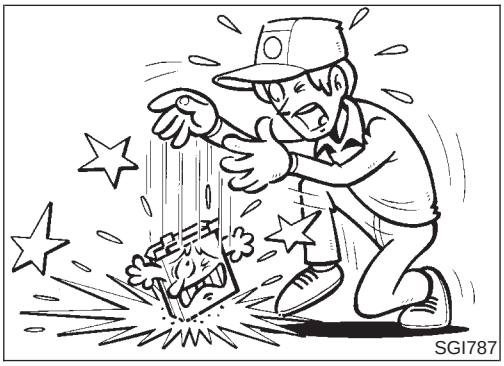
SGI234

- Before servicing the vehicle:
  Protect fenders, upholstery and carpeting with appropriate covers.
  Take caution that keys, buckles or buttons do not scratch paint.
- Clean all disassembled parts in the designated liquid or solvent prior to inspection or assembly.
- Replace oil seals, gaskets, packings, O-rings, locking washers, cotter pins, self-locking nuts, etc. with new ones.
- Replace inner and outer races of tapered roller bearings and needle bearings as a set.
- Arrange the disassembled parts in accordance with their assembled locations and sequence.
- Do not touch the terminals of electrical components which use microcomputers (such as ECMs).
  Static electricity may damage internal electronic components.

- After disconnecting vacuum or air hoses, attach a tag to indicate the proper connection.
- Use only the fluids and lubricants specified in this manual.
- Use approved bonding agent, sealants or their equivalents when required.
- Use tools and recommended special tools where specified for safe and efficient service repairs.
- When repairing the fuel, oil, water, vacuum or exhaust systems, check all affected lines for leaks.
- Dispose of drained oil or the solvent used for cleaning parts in an appropriate manner.

WARNING:

To prevenvt ECM from storing the diagnostic trouble codes, do not carelessly disconnect the harness connectors which are related to the engine control system and TCM (Transmission Control Module) system. The connectors should be disconnected only when working according to the WORK FLOW of TROUBLE DIAGNOSES in EC and AT sections.


SGI787

PRECAUTIONS FOR MULTIPORT FUEL INJECTION SYSTEM OR ENGINE CONTROL SYSTEM

NAGI0001S03

- Before connecting or disconnecting any harness connector for the multiport fuel injection system or ECM (Engine Control Module):
  Turn ignition switch to OFF position.
  Disconnect negative battery terminal.
  Otherwise, there may be damage to ECM.
- Before disconnecting pressurized fuel line from fuel pump to injectors, be sure to release fuel pressure.
- Be careful not to jar components such as ECM and mass air flow sensor.

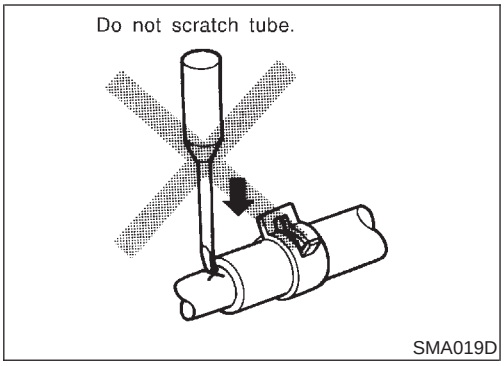
PRECAUTIONS FOR THREE WAY CATALYST

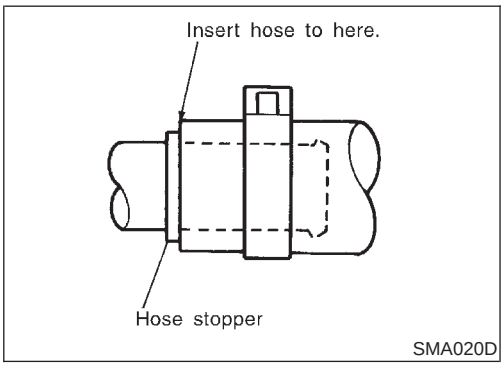
NAGI0001S04

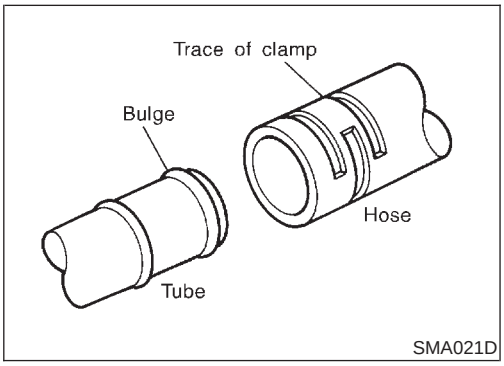
If a large amount of unburned fuel flows into the catalyst, the catalyst temperature will be excessively high. To prevent this, follow the instructions below:

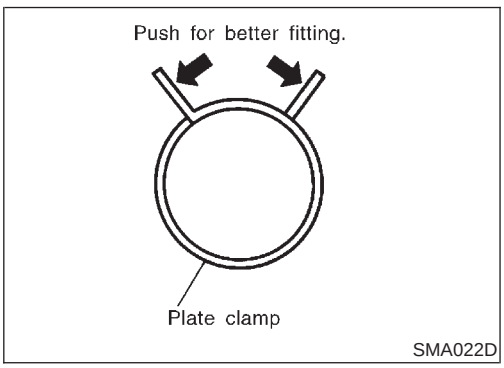
- Use unleaded gasoline only. Leaded gasoline will seriously damage the three way catalyst.
- When checking for ignition spark or measuring engine compression, make tests quickly and only when necessary.
- Do not run engine when the fuel tank level is low, otherwise the engine may misfire causing damage to the catalyst.

Do not place the vehicle on flammable material. Keep flammable material off the exhaust pipe and the three way catalyst.









PRECAUTIONS FOR HOSES

NAGI0001S10

Hose Removal and Installation

NAGI0001S1001

- To prevent damage to rubber hose, do not pry off rubber hose with tapered tool or screwdriver.

- To reinstall the rubber hose securely, make sure of hose insertion length and clamp orientation. (If tube is equipped with hose stopper, insert rubber hose into tube until it butts up against hose stopper.)

Hose Clamping

NAGI0001S1002

- If old rubber hose is re-used, install hose clamp in its original position (at the indentation where the old clamp was). If there is a trace of tube bulging left on the old rubber hose, align rubber hose at that position.
- Discard old clamps; replace with new ones.

- After installing leaf spring clamps, apply force to them in the direction of the arrow, tightening rubber hose equally all around.

PRECAUTIONS FOR ENGINE OILS

NAGI0001S05

Prolonged and repeated contact with used engine oil may cause skin cancer. Try to avoid direct skin contact with used oil.
If skin contact is made, wash thoroughly with soap or hand cleaner as soon as possible.

Health Protection Precautions

NAGI0001S0501

- Avoid prolonged and repeated contact with oils, particularly used engine oils.
- Wear protective clothing, including impervious gloves where practicable.

- Do not put oily rags in pockets.
- Avoid contaminating clothes, particularly underpants, with oil.
- Heavily soiled clothing and oil-impregnated footwear should not be worn. Overalls must be cleaned regularly.
- First Aid treatment should be obtained immediately for open cuts and wounds.
- Use barrier creams, applying them before each work period, to help the removal of oil from the skin.
- Wash with soap and water to ensure all oil is removed (skin cleansers and nail brushes will help). Preparations containing lanolin replace the natural skin oils which have been removed.
- Do not use gasoline, kerosine, diesel fuel, gas oil, thinners or solvents for cleaning skin.
- If skin disorders develop, obtain medical advice without delay.
- Where practicable, degrease components prior to handling.
- Where there is a risk of eye contact, eye protection should be worn, for example, chemical goggles or face shields; in addition an eye wash facility should be provided.

Environmental Protection Precautions

NAGI0001S0502

Burning used engine oil in small space heaters or boilers can be recommended only for units of approved design. The heating system must meet the requirements of HM Inspectorate of Pollution for small burners of less than 0.4 MW. If in doubt check with the appropriate local authority and/or manufacturer of the approved appliance.

Dispose of used oil and used oil filters through authorized waste disposal contractors to licensed waste disposal sites, or to the waste oil reclamation trade. If in doubt, contact the local authority for advice on disposal facilities.

It is illegal to pour used oil on to the ground, down sewers or drains, or into water courses.

The regulations concerning pollution vary between regions.

PRECAUTIONS FOR FUEL

NAGI0001S06

Use unleaded gasoline with an octane rating of at least 87 AKI (Anti-Knock Index) number (research octane number 91).

CAUTION:

Do not use leaded gasoline. Using leaded gasoline will damage the three way catalyst.

Using a fuel other than that specified could adversely affect the emission control devices and systems, and could also affect the warranty coverage validity.

PRECAUTIONS FOR AIR CONDITIONING

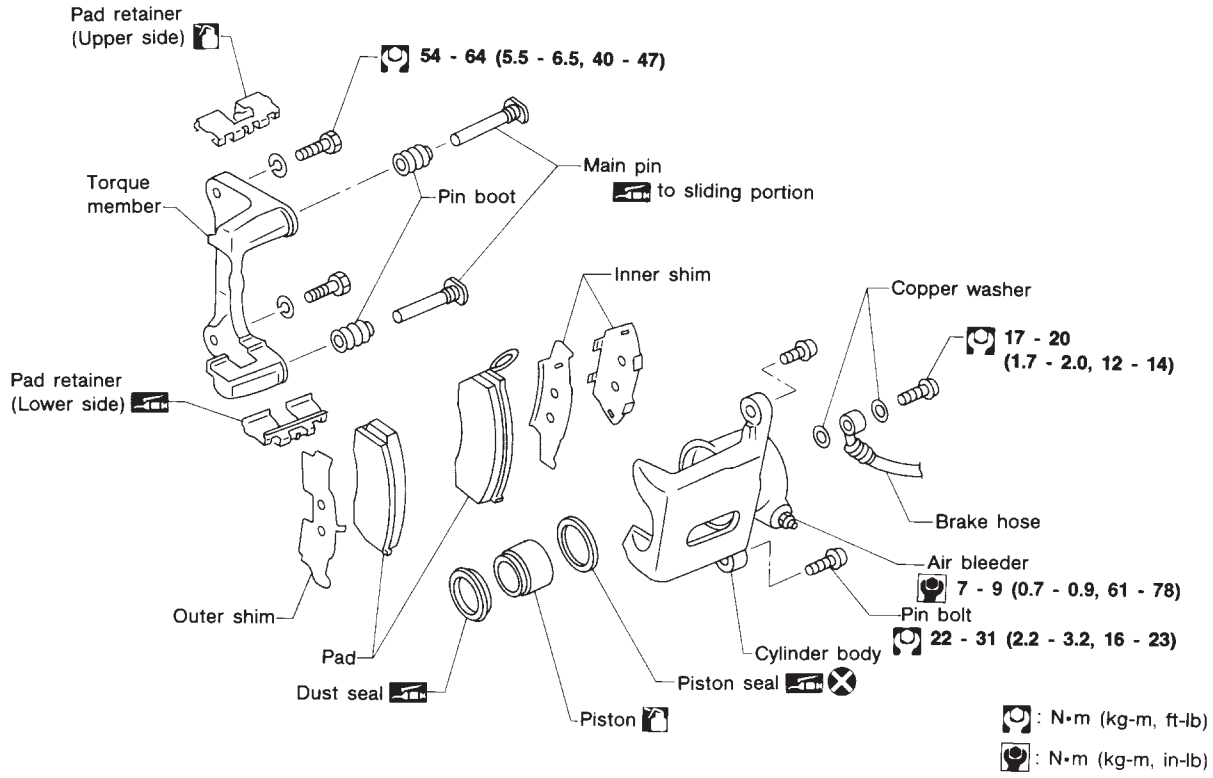
NAGI0001S07

Use an approved refrigerant recovery unit any time the air conditioning system must be discharged. Refer to HA-111, "HFC-134a (R-134a) Service Procedure" for specific instructions.

- The captions **WARNING** and **CAUTION** warn you of steps that must be followed to prevent personal injury and/or damage to some part of the vehicle.
  WARNING indicates the possibility of personal injury if instructions are not followed.
  CAUTION indicates the possibility of component damage if instructions are not followed.
  BOLD TYPED STATEMENTS except **WARNING** and **CAUTION** give you helpful information.
- **ALPHABETICAL INDEX** is provided at the end of this manual so that you can rapidly find the item and page you are searching for.
- **A QUICK REFERENCE INDEX**, a black tab (e.g. BR) is provided on the first page. You can quickly find the first page of each section by mating it to the section's black tab.
- **THE CONTENTS** are listed on the first page of each section.
- **THE TITLE** is indicated on the upper portion of each page and shows the part or system.
- **THE PAGE NUMBER** of each section consists of two letters which designate the particular section and a number (e.g. "BR-5").
- **THE LARGE ILLUSTRATIONS** are exploded views (See below.) and contain tightening torques, lubrication points, section number of the **PARTS CATALOG** (e.g. SEC. 440) and other information necessary to perform repairs.
  The illustrations should be used in reference to service matters only. When ordering parts, refer to the appropriate **PARTS CATALOG**.

"Example"

SEC. 440



- **THE SMALL ILLUSTRATIONS** show the important steps such as inspection, use of special tools, knacks of work and hidden or tricky steps which are not shown in the previous large illustrations.
  Assembly, inspection and adjustment procedures for the complicated units such as the automatic transaxle or transmission, etc. are presented in a step-by-step format where necessary.
- The **UNITS** given in this manual are primarily expressed as the SI UNIT (International System of Unit), and alternatively expressed in the metric system and in the yard/pound system.
  "Example"
  Tightening torque:
  59 - 78 N·m (6.0 - 8.0 kg-m, 43 - 58 ft-lb)
- **TROUBLE DIAGNOSES** are included in sections dealing with complicated components.

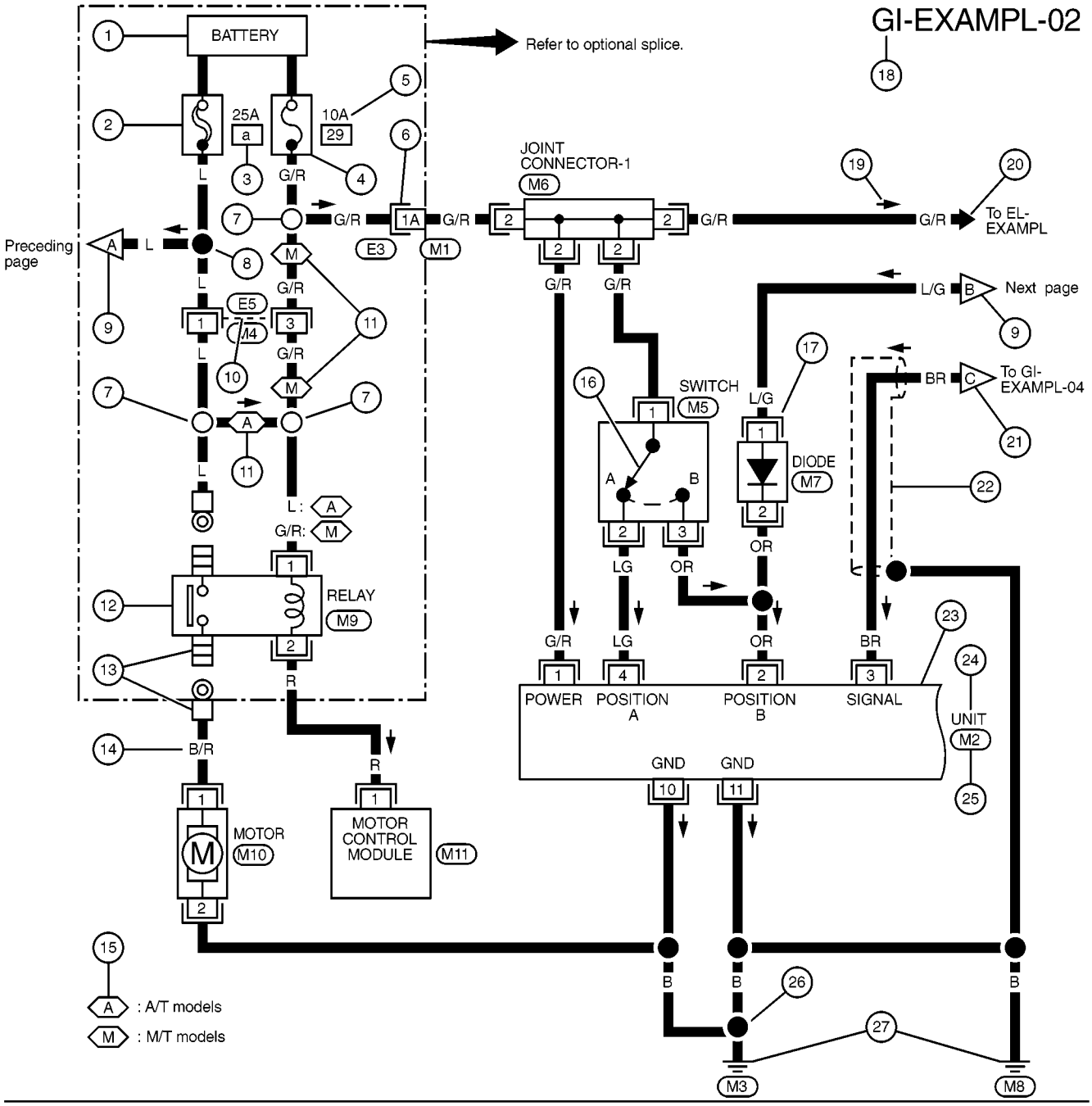
- **SERVICE DATA AND SPECIFICATIONS** are contained at the end of each section for quick reference of data.
- The following **SYMBOLS AND ABBREVIATIONS** are used:

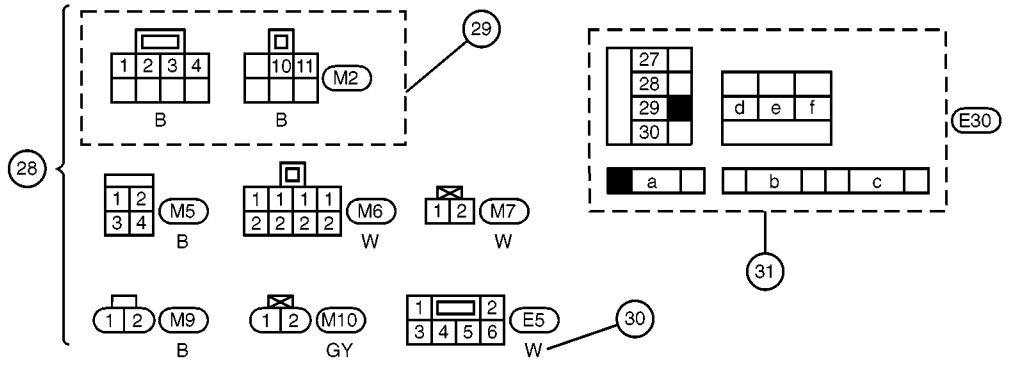
SYMBOL	ABBREVIATION	SYMBOL	ABBREVIATION
	Tightening torque	2WD	2-Wheel Drive
	Should be lubricated with grease. Unless otherwise indicated, use recommended multi-purpose grease.	A/C	Air Conditioner
	Should be lubricated with oil.	P/S	Power Steering
	Sealing point	SST	Special Service Tools
	Checking point	SAE	Society of Automotive Engineers, Inc.
	Always replace after every disassembly.	ATF	Automatic Transmission Fluid
 Ⓟ	Apply petroleum jelly.	D_1	Drive range 1st gear
	Apply ATF.	D_2	Drive range 2nd gear
★	Select with proper thickness.	D_3	Drive range 3rd gear
☆	Adjustment is required.	D_4	Drive range 4th gear
SDS	Service Data and Specifications	OD	Overdrive
LH, RH	Left-Hand, Right-Hand	2_2	2nd range 2nd gear
FR, RR	Front, Rear	2_1	2nd range 1st gear
M/T	Manual Transaxle/Transmission	1_2	1st range 2nd gear
A/T	Automatic Transaxle/Transmission	1_1	1st range 1st gear
 , 4WD	4-Wheel Drive		

Sample/Wiring Diagram — EXAMPL —

NAGI0003S01

- For Description, refer to GI-13.



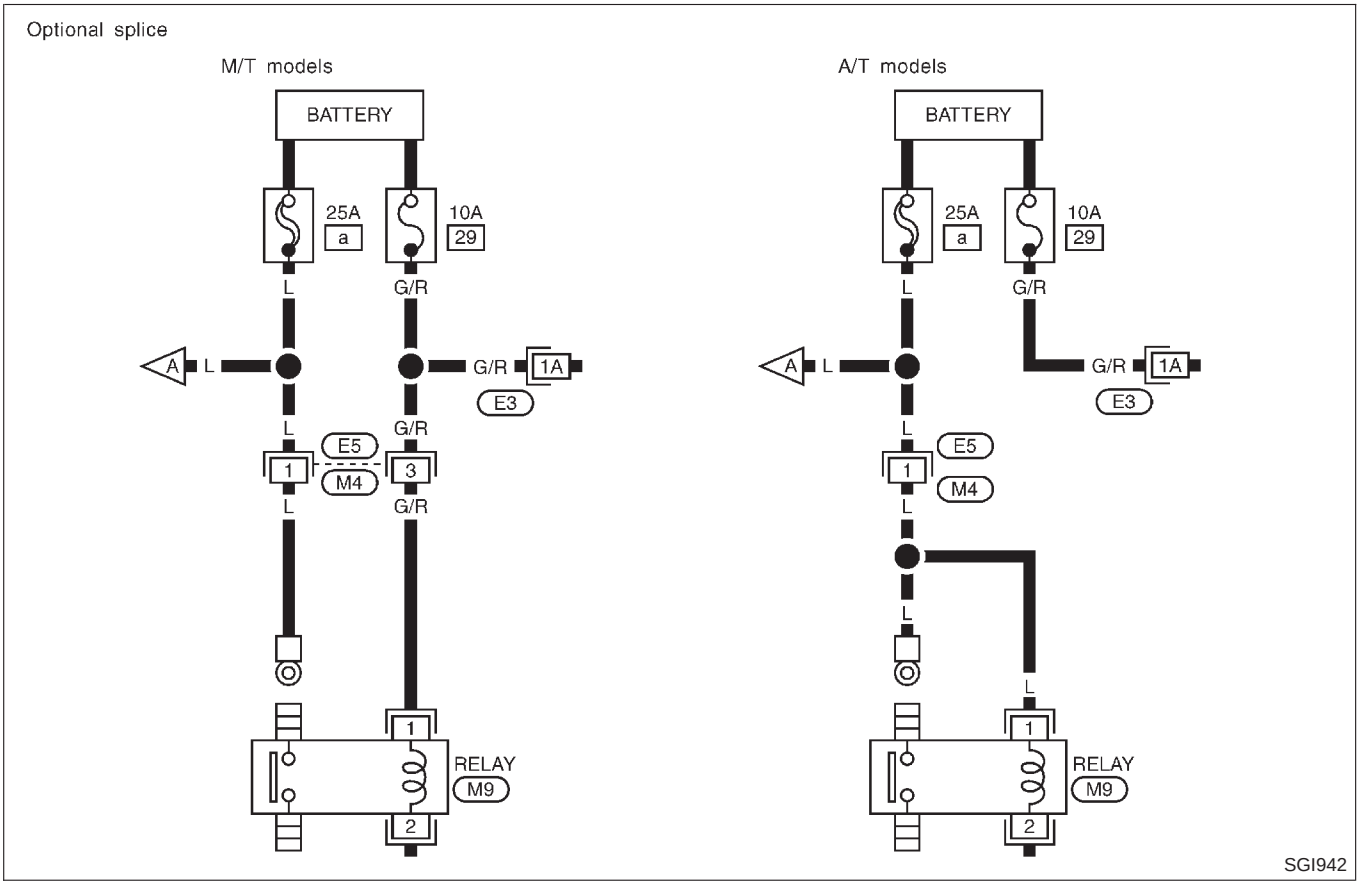


SGI134A

OPTIONAL SPLICE

NAGI0003S0101

Optional splice



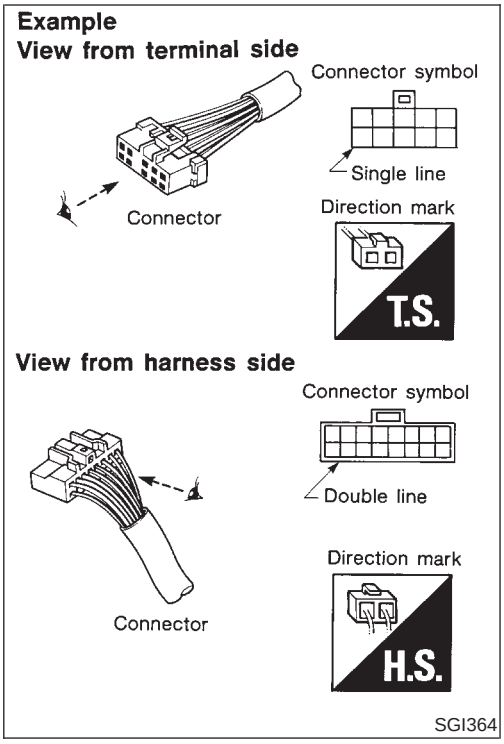
Description

=NAGI0003S02

Number	Item	Description
1	Power condition	• This shows the condition when the system receives battery positive voltage (can be operated).
2	Fusible link	• The double line shows that this is a fusible link. • The open circle shows current flow in, and the shaded circle shows current flow out.
3	Fusible link/fuse location	• This shows the location of the fusible link or fuse in the fusible link or fuse box. For arrangement, refer to EL-10, “POWER SUPPLY ROUTING”.
4	Fuse	• The single line shows that this is a fuse. • The open circle shows current flow in, and the shaded circle shows current flow out.
5	Current rating	• This shows the current rating of the fusible link or fuse.
6	Connectors	• This shows that connector E3 is female and connector M1 is male. • The G/R wire is located in the 1A terminal of both connectors. • Terminal number with an alphabet (1A, 5B, etc.) indicates that the connector is SMJ connector. Refer to GI-19.
7	Optional splice	• The open circle shows that the splice is optional depending on vehicle application.
8	Splice	• The shaded circle shows that the splice is always on the vehicle.
9	Page crossing	• This arrow shows that the circuit continues to an adjacent page. • The A will match with the A on the preceding or next page.
10	Common connector	• The dotted lines between terminals show that these terminals are part of the same connector.
11	Option abbreviation	• This shows that the circuit is optional depending on vehicle application.
12	Relay	• This shows an internal representation of the relay. For details, refer to EL-7, “STANDARDIZED RELAY”.
13	Connectors	• This shows that the connector is connected to the body or a terminal with bolt or nut.
14	Wire color	• This shows a code for the color of the wire. B = Black W = White R = Red G = Green L = Blue Y = Yellow LG = Light Green BR = Brown OR = Orange P = Pink PU = Purple GY = Gray SB = Sky Blue CH = Dark Brown DG = Dark Green When the wire color is striped, the base color is given first, followed by the stripe color as shown below: Example: L/W = Blue with White Stripe
15	Option description	• This shows a description of the option abbreviation used on the page.
16	Switch	• This shows that continuity exists between terminals 1 and 2 when the switch is in the A position. Continuity exists between terminals 1 and 3 when the switch is in the B position.
17	Assembly parts	• Connector terminal in component shows that it is a harness incorporated assembly.
18	Cell code	• This identifies each page of the wiring diagram by section, system and wiring diagram page number.
19	Current flow arrow	• Arrow indicates electric current flow, especially where the direction of standard flow (vertically downward or horizontally from left to right) is difficult to follow. • A double arrow “ ↔ ” shows that current can flow in either direction depending on circuit operation.
20	System branch	• This shows that the system branches to another system identified by cell code (section and system).

Description (Cont'd)

Number	Item	Description
21	Page crossing	• This arrow shows that the circuit continues to another page identified by cell code. • The C will match with the C on another page within the system other than the next or preceding pages.
22	Shielded line	• The line enclosed by broken line circle shows shield wire.
23	Component box in wave line	• This shows that another part of the component is also shown on another page (indicated by wave line) within the system.
24	Component name	• This shows the name of a component.
25	Connector number	• This shows the connector number. • The letter shows which harness the connector is located in. • Example: **M**: main harness. For detail and to locate the connector, refer to EL-378, "Main Harness". A coordinate grid is included for complex harnesses to aid in locating connectors.
26	Ground (GND)	• The line spliced and grounded under wire color shows that ground line is spliced at the grounded connector.
27	Ground (GND)	• This shows the ground connection.
28	Connector views	• This area shows the connector faces of the components in the wiring diagram on the page.
29	Common component	• Connectors enclosed in broken line show that these connectors belong to the same component.
30	Connector color	• This shows a code for the color of the connector. For code meaning, refer to wire color codes, Number 14 of this chart.
31	Fusible link and fuse box	• This shows the arrangement of fusible link(s) and fuse(s), used for connector views of "POWER SUPPLY ROUTING" in EL section. The open square shows current flow in, and the shaded square shows current flow out.
32	Reference area	• This shows that more information on the Super Multiple Junction (SMJ) and Joint Connectors (J/C) exists on the foldout page. Refer to GI-19 for details.

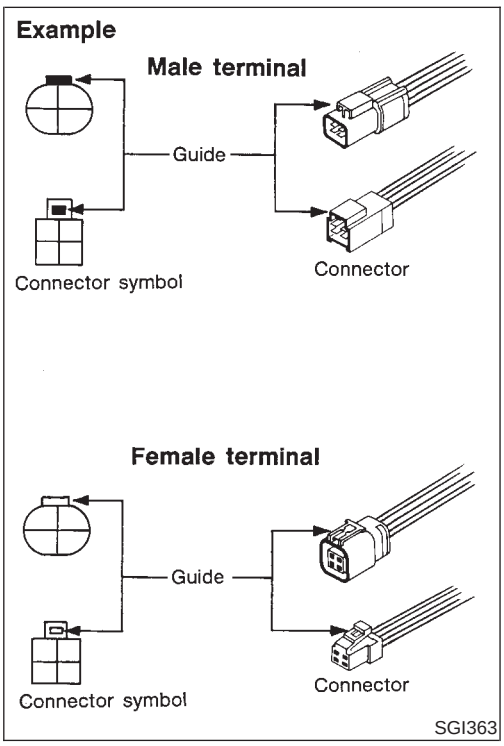


CONNECTOR SYMBOLS

=NAGI0003S0201

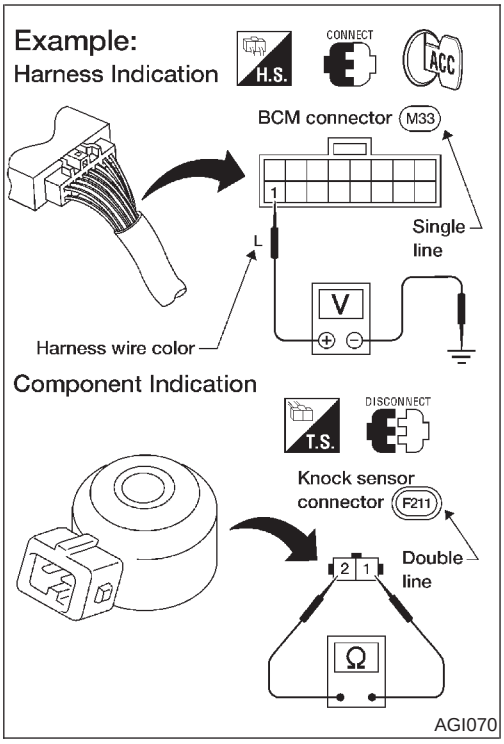
Most of connector symbols in wiring diagrams are shown from the terminal side.

- Connector symbols shown from the terminal side are enclosed by a single line and followed by the direction mark.
- Connector symbols shown from the harness side are enclosed by a double line and followed by the direction mark.



- Male and female terminals
  Connector guides for male terminals are shown in black and female terminals in white in wiring diagrams.

Description (Cont'd)



HARNESS INDICATION

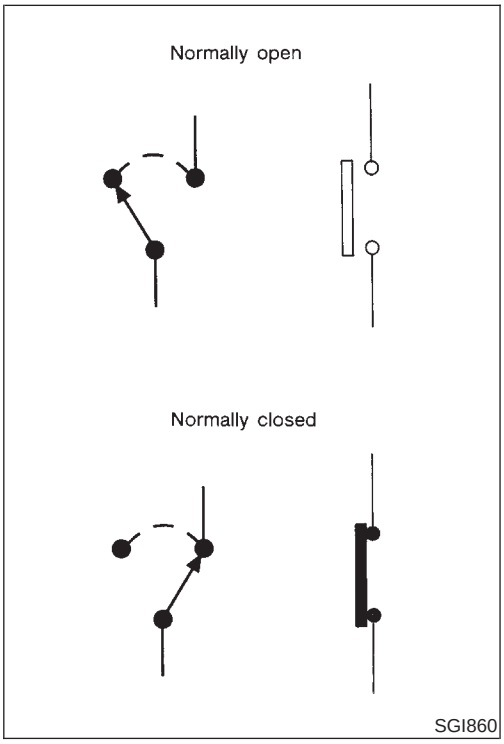
NAGI0003S0206

- Letter designations next to test meter probe indicate harness (connector) wire color.
- Connector numbers in a single circle M33 indicate harness connectors.

COMPONENT INDICATION

NAGI0003S0207

- Connector numbers in a double circle F211 indicate component connectors.



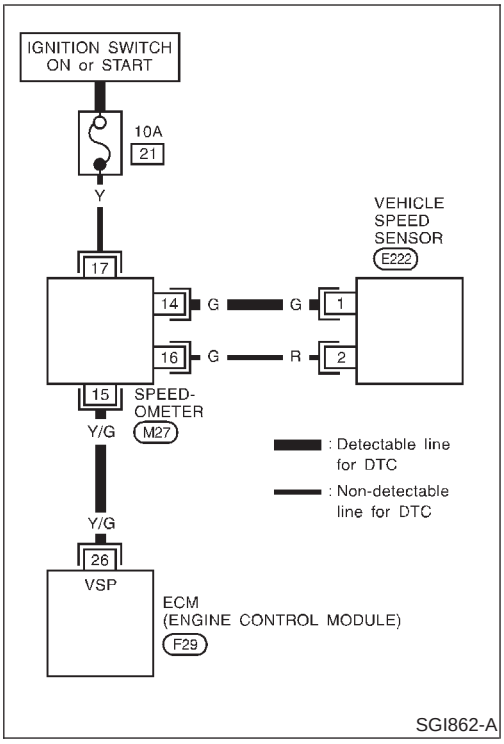
SWITCH POSITIONS

NAGI0003S0202

Switches are shown in wiring diagrams as if the vehicle is in the normal condition.

A vehicle is in the normal condition when:

- ignition switch is OFF,
- doors, hood and trunk lid/back door are closed,
- pedals are not depressed, and
- parking brake is released.



DETECTABLE LINES AND NON-DETECTABLE LINES

NAGI0003S0203

In some wiring diagrams, two kinds of lines, representing wires, with different weight are used.

- A line with regular weight (wider line) represents a "detectable line for DTC (Diagnostic Trouble Code)". A "detectable line for DTC" is a circuit in which ECM (Engine Control Module) can detect its malfunctions with the on board diagnostic system.
- A line with less weight (thinner line) represents a "non-detectable line for DTC". A "non-detectable line for DTC" is a circuit in which ECM cannot detect its malfunctions with the on board diagnostic system.

MULTIPLE SWITCH

=NAGI0003S0204

The continuity of multiple switch is described in two ways as shown below.

- The switch chart is used in schematic diagrams.
- The switch diagram is used in wiring diagrams.

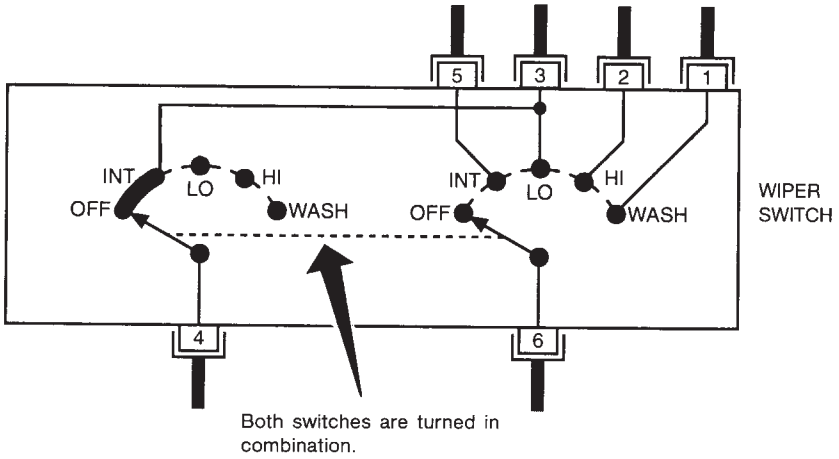
Example

(SWITCH CHART)

WIPER SWITCH

	OFF	INT	LO	HI	WASH
1					○
2				○	
3	○	○	○		
4	○	○			
5		○			
6		○	○	○	○

(SWITCH DIAGRAM)



Continuity circuit of wiper switch

SWITCH POSITION	CONTINUITY CIRCUIT
OFF	3 - 4
INT	3 - 4, 5 - 6
LO	3 - 6
HI	2 - 6
WASH	1 - 6

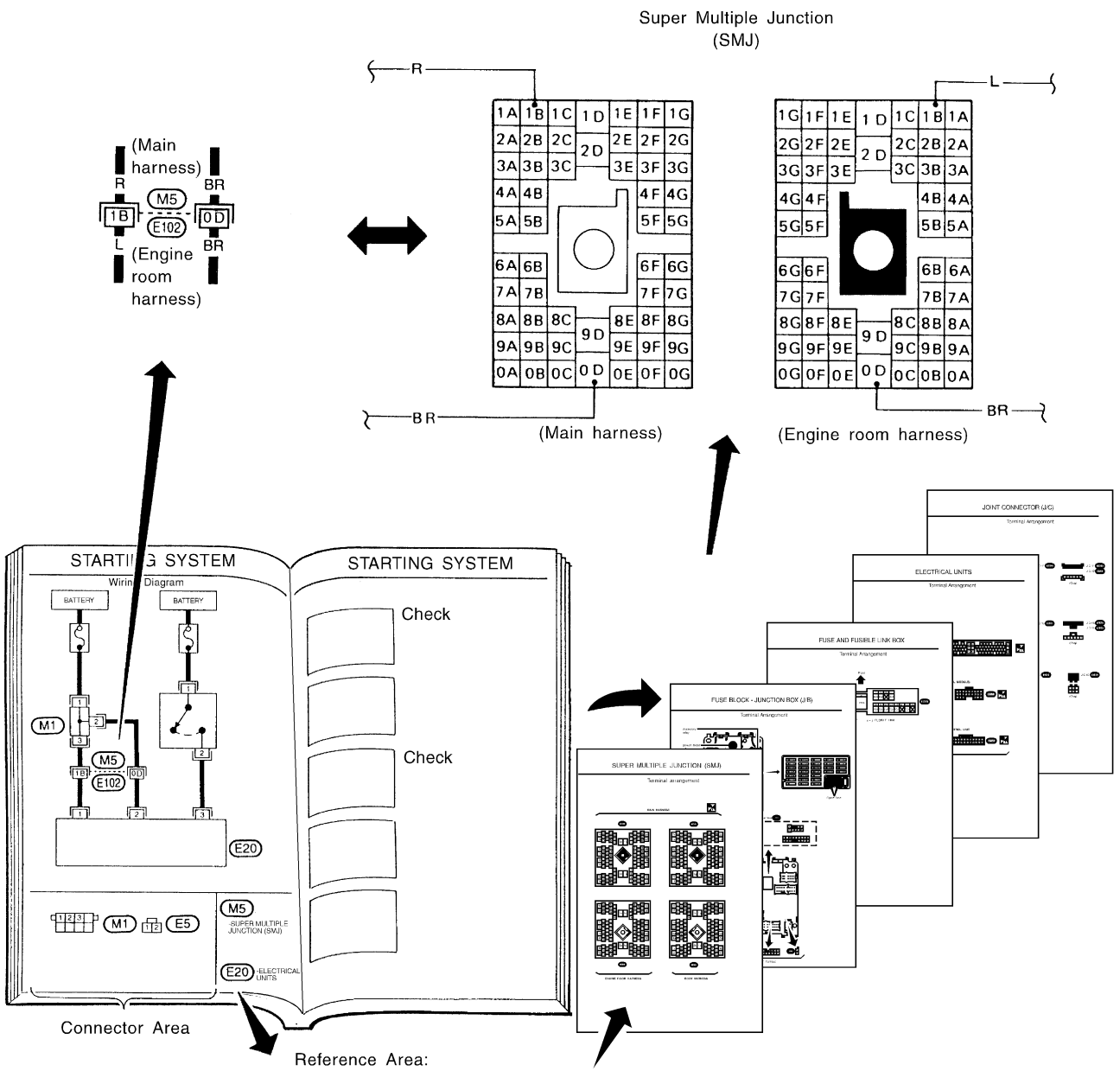
SGI875

REFERENCE AREA

=NAGI0003S0208

The Reference Area of the wiring diagram contains references to additional electrical reference pages at the end of the manual. If connector numbers and titles are shown in the Reference Area of the wiring diagram, these connector symbols are not shown in the Connector Area.

Example



Super multiple junction (SMJ)

In a wiring diagram, the SMJ connectors include a letter of the alphabet in the terminal number.

SMJ connector numbers are shown in the Reference Area of the wiring diagram. SMJ terminal arrangement can be found on the electrical reference pages at the end of the manual. For terminal arrangement of these connectors, refer to the "SUPER MULTIPLE JUNCTION (SMJ)" electrical reference page at the end of the

manual.

Fuse block — Junction box (J/B)

Fuse block — Junction box (J/B) connector number is shown in the Reference Area of the wiring diagram. For connector terminal and fuse arrangement, refer to the "FUSE BLOCK — Junction Box (J/B)" electrical reference page at the end of the manual.

Fuse and fusible link box

For fuse arrangement in the fuse and fusible link box, refer to the "FUSE AND FUSIBLE LINK BOX" electrical reference page at the end of the manual.

Electrical units

Electrical unit connector symbols are shown in the Connector Area of the wiring diagram.

However, when there is not enough space to show the connector terminal arrangement in the Connector Area of the wiring diagram, the electrical unit connector number is shown in the Reference Area of the wiring diagram. For electrical unit connector terminal arrangement, refer to the "ELECTRICAL UNITS" electrical reference page at the end of the manual. Most of the electrical unit connectors on this page are shown from the harness side of the connector.

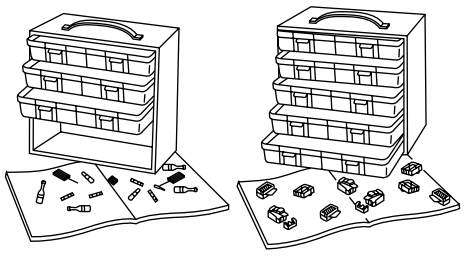
Joint connector

Joint connector symbols are shown in the connector area of the wiring diagram. For connector internal wiring layout and joint connector terminal arrangement, refer to the "JOINT CONNECTOR (J/C)" electrical reference page at the end of the manual.

Connector and Terminal Pin Kit

NAGI0011S01

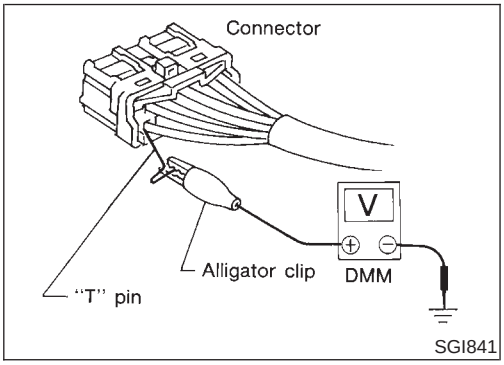
Use the connector and terminal pin kit listed below when replacing connectors or terminals.
The connector and terminal pin kit contains some of the most commonly used NISSAN connectors and terminals.

Tool number (Kent-Moore No.) Tool name	Description
— (J38751-95NI) Connector and terminal pin kit — (J42992-98KIT) OBD Terminal Repair Kit	J42992-98KIT J38751-95NI  AGI121

How to Probe Connectors

NAGI0011S02

Connector damage and an intermittent connection can result from improperly probing of the connector during circuit checks.
The probe of a digital multimeter (DMM) may not correctly fit the connector cavity. To correctly probe the connector, follow the procedures below using a “T” pin. For the best contact grasp the “T” pin using an alligator clip.



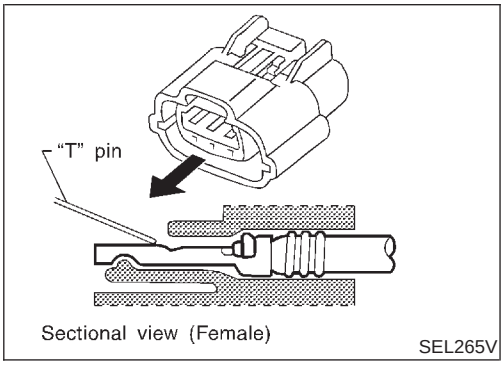
SGI841

PROBING FROM HARNESS SIDE

NAGI0011S0201

Standard type (not waterproof type) connector should be probed from harness side with “T” pin.

- **If the connector has a rear cover such as a ECM connector, remove the rear cover before probing the terminal.**
- **Do not probe waterproof connector from harness side. Damage to the seal between wire and connector may result.**



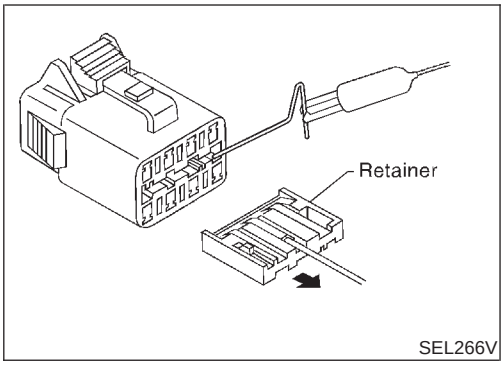
SEL265V

PROBING FROM TERMINAL SIDE

NAGI0011S0202

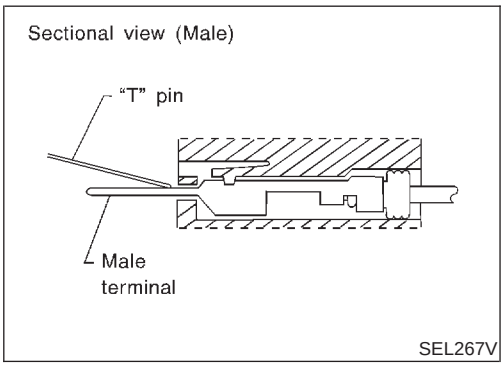
Female Terminal

- There is a small notch above each female terminal. Probe each terminal with the “T” pin through the notch.
  Do not insert any object other than the same type male terminal into female terminal.



SEL266V

- Some connectors do not have a notch above each terminal. To probe each terminal, remove the connector retainer to make contact space for probing.



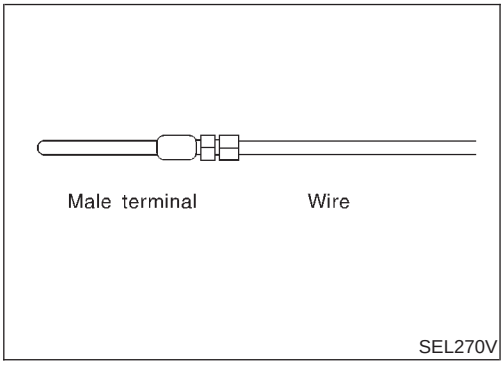
SEL267V

Male Terminal
Carefully probe the contact surface of each terminal using a "T" pin.
Do not bend terminal.

How to Check Enlarged Contact Spring of Terminal

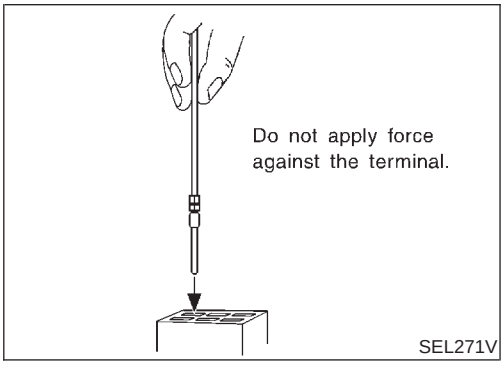
NAGI0011S03

An enlarged contact spring of a terminal may create intermittent signals in the circuit.
If the intermittent open circuit occurs, follow the procedure below to inspect for open wires and enlarged contact spring of female terminal.



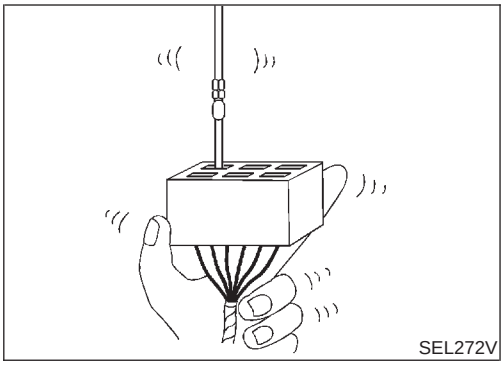
SEL270V

1. Assemble a male terminal and approx. 10 cm (3.9 in) of wire.
   Use a male terminal which matches the female terminal.
2. Disconnect the suspected faulty connector and hold it terminal side up.

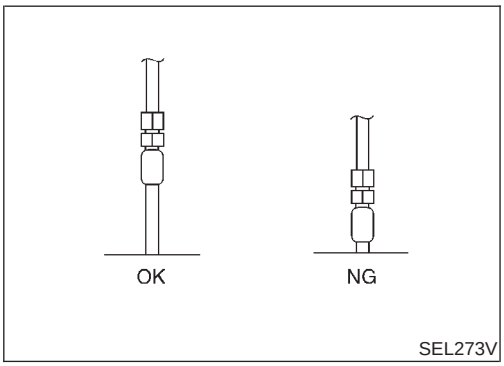


SEL271V

3. While holding the wire of the male terminal, try to insert the male terminal into the female terminal.
   Do not force the male terminal into the female terminal with your hands.

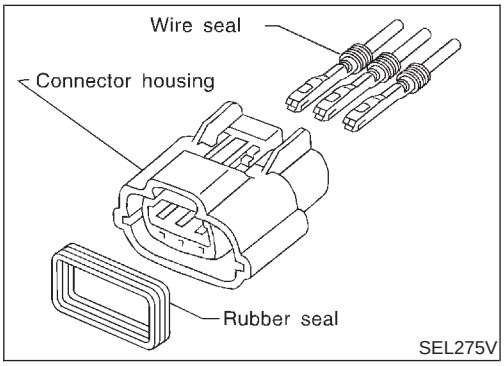

SEL272V

4. While moving the connector, check whether the male terminal can be easily inserted or not.



SEL273V

- If the male terminal can be easily inserted into the female terminal, replace the female terminal.



SEL275V

Waterproof Connector Inspection

NAGI0011S04

If water enters the connector, it can short interior circuits. This may lead to intermittent problems.
Check the following items to maintain the original waterproof characteristics.

RUBBER SEAL INSPECTION

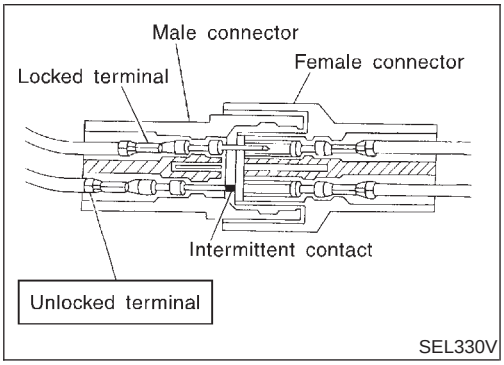
NAGI0011S0401

- Most waterproof connectors are provided with a rubber seal between the male and female connectors. If the seal is missing, the waterproof performance may not meet specifications.
- The rubber seal may come off when connectors are disconnected. Whenever connectors are reconnected, make sure the rubber seal is properly installed on either side of male or female connector.

WIRE SEAL INSPECTION

NAGI0011S0402

The wire seal must be installed on the wire insertion area of a waterproof connector. Be sure that the seal is installed properly.



SEL330V

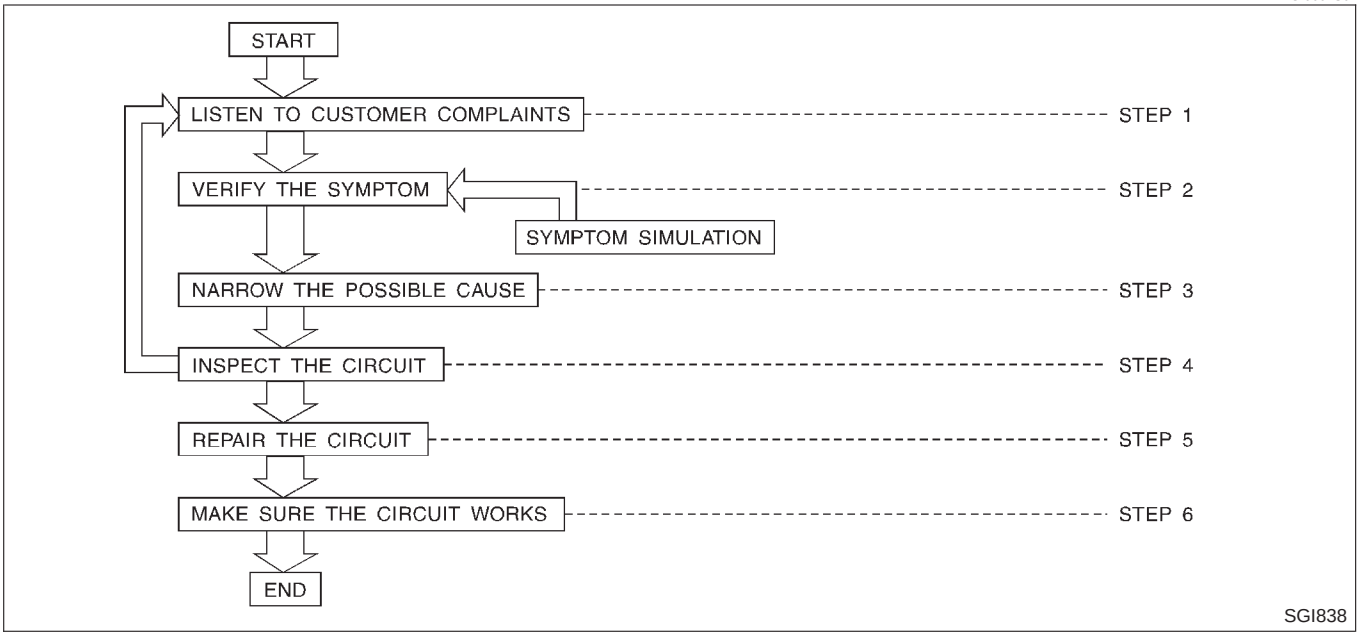
Terminal Lock Inspection

NAGI0011S05

Check for unlocked terminals by pulling wire at the end of connector. An unlocked terminal may create intermittent signals in the circuit.

Work Flow

NAGI0004S01



STEP	DESCRIPTION	
STEP 1	Get detailed information about the conditions and the environment when the incident occurred. The following are key pieces of information required to make a good analysis:	
	WHAT	Vehicle Model, Engine, Transmission and the System (i.e. Radio).
	WHEN	Date, Time of Day, Weather Conditions, Frequency.
	WHERE	Road Conditions, Altitude and Traffic Situation.
	HOW	System Symptoms, Operating Conditions (Other Components Interaction). Service History and if any After Market Accessories have been installed.
STEP 2	Operate the system, road test if necessary. Verify the parameter of the incident. If the problem can not be duplicated, refer to “Incident Simulation Tests” next page.	
STEP 3	Get the proper diagnosis materials together including: POWER SUPPLY ROUTING System Operation Descriptions Applicable Service Manual Sections Check for any Service Bulletin. Identify where to begin diagnosis based upon your knowledge of the system operation and the customer comments.	
STEP 4	Inspect the system for mechanical binding, loose connectors or wiring damage. Determine which circuits and components are involved and diagnose using the Power Supply Routing and Harness Layouts.	
STEP 5	Repair or replace the incident circuit or component.	
STEP 6	Operate the system in all modes. Verify the system works properly under all conditions. Make sure you have not inadvertently created a new incident during your diagnosis or repair steps.	

Incident Simulation Tests

NAGI0004S02

INTRODUCTION

NAGI0004S0201

Sometimes the symptom is not present when the vehicle is brought in for service. If possible, re-create the conditions present at the time of the incident. Doing so may help avoid a No Trouble Found Diagnosis. The following section illustrates ways to simulate the conditions/environment under which the owner experiences an electrical incident.

The section is broken into the six following topics:

- Vehicle vibration
- Heat sensitive
- Freezing
- Water intrusion
- Electrical load
- Cold or hot start up

Get a thorough description of the incident from the customer. It is important for simulating the conditions of the problem.

VEHICLE VIBRATION

NAGI0004S0202

The problem may occur or become worse while driving on a rough road or when engine is vibrating (idle with A/C on). In such a case, you will want to check for a vibration related condition. Refer to the illustration below.

Connectors & Harness

Determine which connectors and wiring harness would affect the electrical system you are inspecting. **Gently** shake each connector and harness while monitoring the system for the incident you are trying to duplicate. This test may indicate a loose or poor electrical connection.

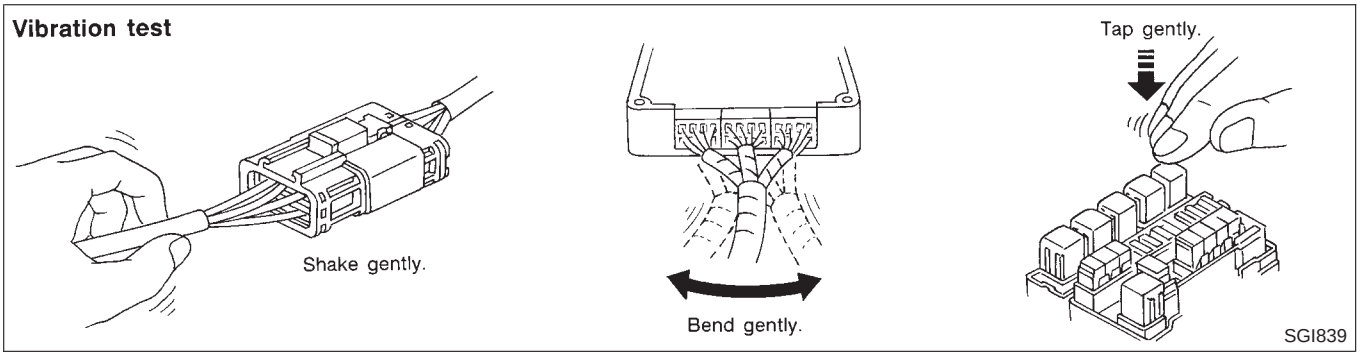
Hint

Connectors can be exposed to moisture. It is possible to get a thin film of corrosion on the connector terminals. A visual inspection may not reveal this without disconnecting the connector. If the problem occurs intermittently, perhaps the problem is caused by corrosion. It is a good idea to disconnect, inspect and clean the terminals on related connectors in the system.

Sensors & Relays

Gently apply a slight vibration to sensors and relays in the system you are inspecting.

This test may indicate a loose or poorly mounted sensor or relay.



Engine Compartment

There are several reasons a vehicle or engine vibration could cause an electrical complaint. Some of the things to check for are:

- Connectors not fully seated.
- Wiring harness not long enough and is being stressed due to engine vibrations or rocking.
- Wires laying across brackets or moving components.
- Loose, dirty or corroded ground wires.
- Wires routed too close to hot components.

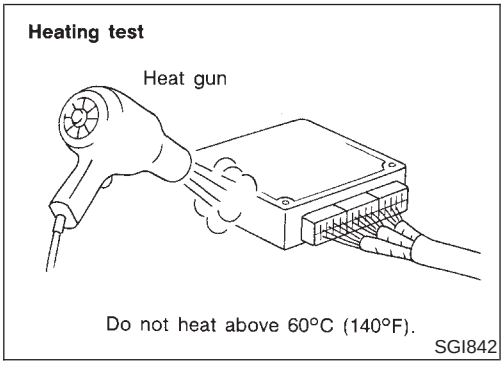
To inspect components under the hood, start by verifying the integrity of ground connections. (Refer to GROUND INSPECTION described later.) First check that the system is properly grounded. Then check for loose connection by **gently shaking** the wiring or components as previously explained. Using the wiring diagrams inspect the wiring for continuity.

Behind The Instrument Panel

An improperly routed or improperly clamped harness can become pinched during accessory installation. Vehicle vibration can aggravate a harness which is routed along a bracket or near a screw.

Under Seating Areas

An unclamped or loose harness can cause wiring to be pinched by seat components (such as slide guides) during vehicle vibration. If the wiring runs under seating areas, inspect wire routing for possible damage or pinching.



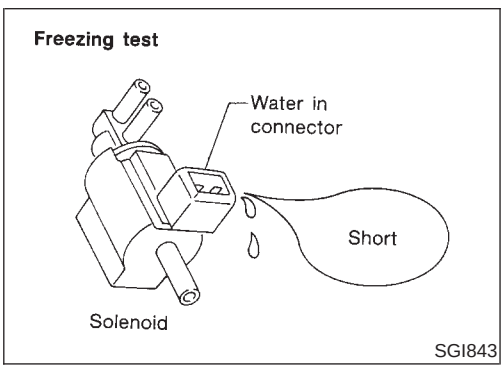
HEAT SENSITIVE

NAGI0004S0203

The owner's problem may occur during hot weather or after car has sat for a short time. In such cases you will want to check for a heat sensitive condition.

To determine if an electrical component is heat sensitive, heat the component with a heat gun or equivalent.

Do not heat components above 60°C (140°F). If incident occurs while heating the unit, either replace or properly insulate the component.



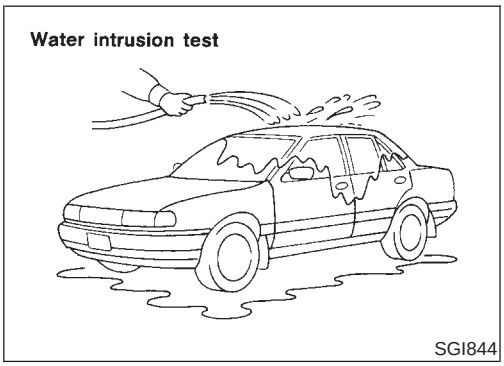
FREEZING

NAGI0004S0204

The customer may indicate the incident goes away after the car warms up (winter time). The cause could be related to water freezing somewhere in the wiring/electrical system.

There are two methods to check for this. The first is to arrange for the owner to leave his car overnight. Make sure it will get cold enough to demonstrate his complaint. Leave the car parked outside overnight. In the morning, do a quick and thorough diagnosis of those electrical components which could be affected.

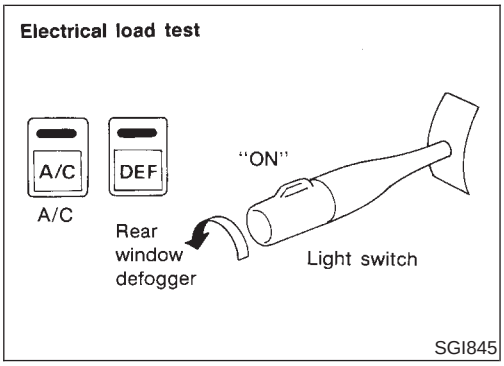
The second method is to put the suspect component into a freezer long enough for any water to freeze. Reinstall the part into the car and check for the reoccurrence of the incident. If it occurs, repair or replace the component.



WATER INTRUSION

NAGI0004S0205

The incident may occur only during high humidity or in rainy/snowy weather. In such cases the incident could be caused by water intrusion on an electrical part. This can be simulated by soaking the car or running it through a car wash.
Do not spray water directly on any electrical components.



ELECTRICAL LOAD

NAGI0004S0206

The incident may be electrical load sensitive. Perform diagnosis with all accessories (including A/C, rear window defogger, radio, fog lamps) turned on.

COLD OR HOT START UP

NAGI0004S0207

On some occasions an electrical incident may occur only when the car is started cold. Or it may occur when the car is restarted hot shortly after being turned off. In these cases you may have to keep the car overnight to make a proper diagnosis.

Circuit Inspection

NAGI0004S03

INTRODUCTION

NAGI0004S0302

In general, testing electrical circuits is an easy task if it is approached in a logical and organized method. Before beginning it is important to have all available information on the system to be tested. Also, get a thorough understanding of system operation. Then you will be able to use the appropriate equipment and follow the correct test procedure.
You may have to simulate vehicle vibrations while testing electrical components. **Gently shake** the wiring harness or electrical component to do this.

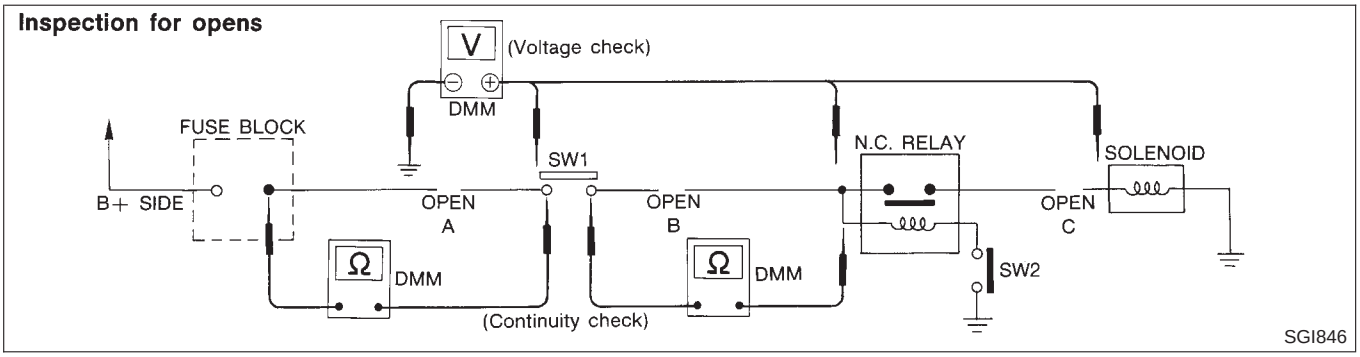
OPEN	A circuit is open when there is no continuity through a section of the circuit.	
SHORT	There are two types of shorts.	
	• SHORT CIRCUIT	When a circuit contacts another circuit and causes the normal resistance to change.
	• SHORT TO GROUND	When a circuit contacts a ground source and grounds the circuit.

NOTE:
Refer to "HOW TO CHECK TERMINAL" in GI-21 to probe or check terminal.

TESTING FOR "OPENS" IN THE CIRCUIT

NAGI0004S0303

Before you begin to diagnose and test the system, you should rough sketch a schematic of the system. This will help you to logically walk through the diagnosis process. Drawing the sketch will also reinforce your working knowledge of the system.



Continuity Check Method

The continuity check is used to find an open in the circuit. The Digital Multimeter (DMM) set on the resistance function will indicate an open circuit as over limit (OL, no beep tone or no ohms symbol). Make sure to always start with the DMM at the highest resistance level.

To help in understanding the diagnosis of open circuits please refer to the schematic above.

1) Disconnect the battery negative cable.
2) Start at one end of the circuit and work your way to the other end. (At the fuse block in this example)
3) Connect one probe of the DMM to the fuse block terminal on the load side.
4) Connect the other probe to the fuse block (power) side of SW1. Little or no resistance will indicate that portion of the circuit has good continuity. If there were an open in the circuit, the DMM would indicate an over limit or infinite resistance condition. (point A)
5) Connect the probes between SW1 and the relay. Little or no resistance will indicate that portion of the circuit has good continuity. If there were an open in the circuit, the DMM would indicate an over limit or infinite resistance condition. (point B)
6) Connect the probes between the relay and the solenoid. Little or no resistance will indicate that portion of the circuit has good continuity. If there were an open in the circuit, the DMM would indicate an over limit or infinite resistance condition. (point C)

Any circuit can be diagnosed using the approach in the above example.

Voltage Check Method

To help in understanding the diagnosis of open circuits please refer to the previous schematic.

In any powered circuit, an open can be found by methodically checking the system for the presence of voltage. This is done by switching the DMM to the voltage function.

1) Connect one probe of the DMM to a known good ground.
2) Begin probing at one end of the circuit and work your way to the other end.
3) With SW1 open, probe at SW1 to check for voltage.
   voltage; open is further down the circuit than SW1.
   no voltage; open is between fuse block and SW1 (point A).
4) Close SW1 and probe at relay.

voltage; open is further down the circuit than the relay.
no voltage; open is between SW1 and relay (point B).

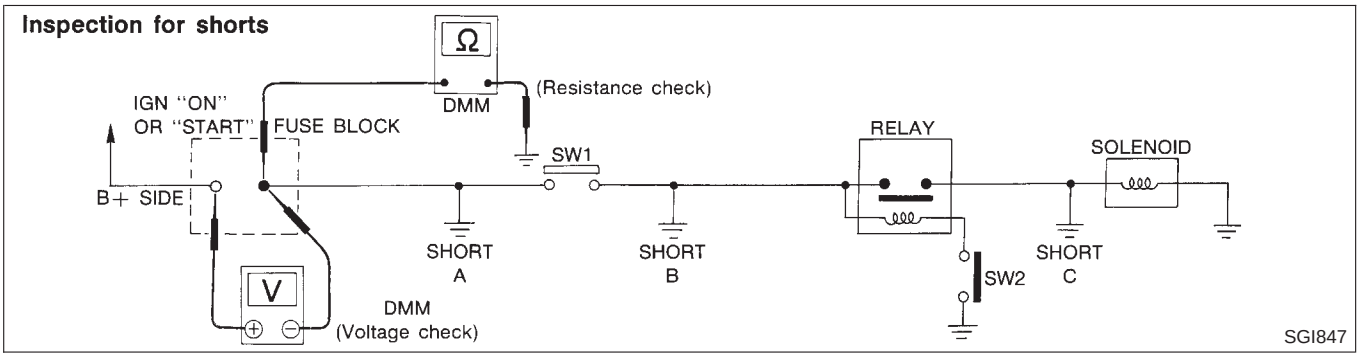
5) Close the relay and probe at the solenoid.
voltage; open is further down the circuit than the solenoid.
no voltage; open is between relay and solenoid (point C).

Any powered circuit can be diagnosed using the approach in the above example.

TESTING FOR "SHORTS" IN THE CIRCUIT

NAGI0004S0304

To simplify the discussion of shorts in the system please refer to the schematic below.



Resistance Check Method

1) Disconnect the battery negative cable and remove the blown fuse.
2) Disconnect all loads (SW1 open, relay disconnected and solenoid disconnected) powered through the fuse.
3) Connect one probe of the ohmmeter to the load side of the fuse terminal. Connect the other probe to a known good ground.
4) With SW1 open, check for continuity.
continuity; short is between fuse terminal and SW1 (point A).
no continuity; short is further down the circuit than SW1.
5) Close SW1 and disconnect the relay. Put probes at the load side of fuse terminal and a known good ground. Then, check for continuity.
continuity; short is between SW1 and the relay (point B).
no continuity; short is further down the circuit than the relay.
6) Close SW1 and jump the relay contacts with jumper wire. Put probes at the load side of fuse terminal and a known good ground. Then, check for continuity.
continuity; short is between relay and solenoid (point C).
no continuity; check solenoid, retrace steps.

Voltage Check Method

1) Remove the blown fuse and disconnect all loads (i.e. SW1 open, relay disconnected and solenoid disconnected) powered through the fuse.
2) Turn the ignition key to the ON or START position. Verify battery voltage at the B + side of the fuse terminal (one lead on the B + terminal side of the fuse block and one lead on a known good ground).
3) With SW1 open and the DMM leads across both fuse terminals, check for voltage.
voltage; short is between fuse block and SW1 (point A).
no voltage; short is further down the circuit than SW1.
4) With SW1 closed, relay and solenoid disconnected and the DMM leads across both fuse terminals, check for voltage.
voltage; short is between SW1 and the relay (point B).

no voltage; short is further down the circuit than the relay.

5) With SW1 closed, relay contacts jumped with fused jumper wire check for voltage.
voltage; short is down the circuit of the relay or between the relay and the disconnected solenoid (point C).
no voltage; retrace steps and check power to fuse block.

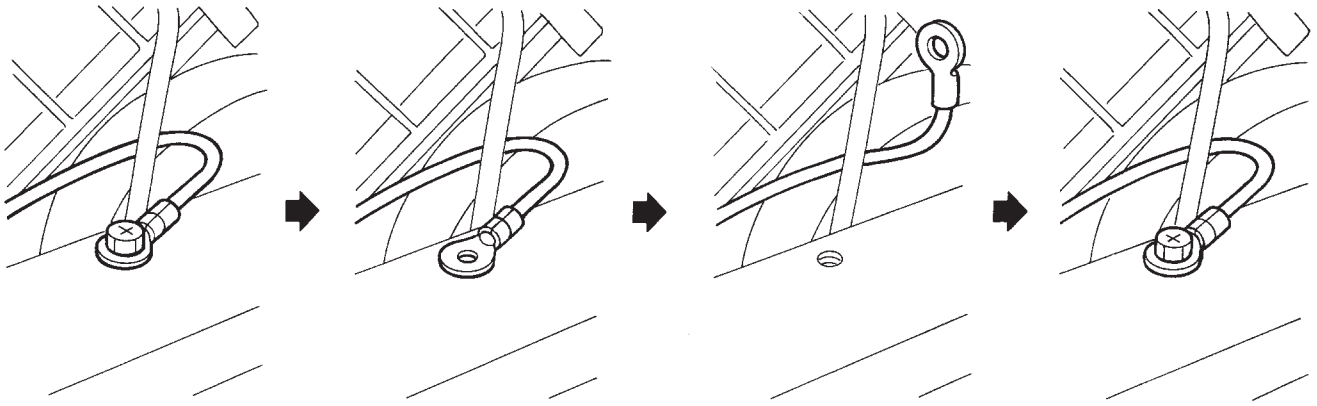
GROUND INSPECTION

NAGI0004S0305

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

1) Remove the ground bolt or screw.
2) Inspect all mating surfaces for tarnish, dirt, rust, etc.
3) Clean as required to assure good contact.
4) Reinstall bolt or screw securely.
5) Inspect for "add-on" accessories which may be interfering with the ground circuit.
6) If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

Ground Inspection



SGI853

VOLTAGE DROP TESTS

NAGI0004S0306

Voltage drop tests are often used to find components or circuits which have excessive resistance. A voltage drop in a circuit is caused by a resistance **when the circuit is in operation**.
Check the wire in the illustration. When measuring resistance with ohmmeter, contact by a single strand of wire will give reading of 0 ohms. This would indicate a good circuit. When the circuit operates, this single strand of wire is not able to carry the current. The single

strand will have a high resistance to the current. This will be picked up as a slight voltage drop.
Unwanted resistance can be caused by many situations as follows:

- Undersized wiring (single strand example)
- Corrosion on switch contacts
- Loose wire connections or splices.

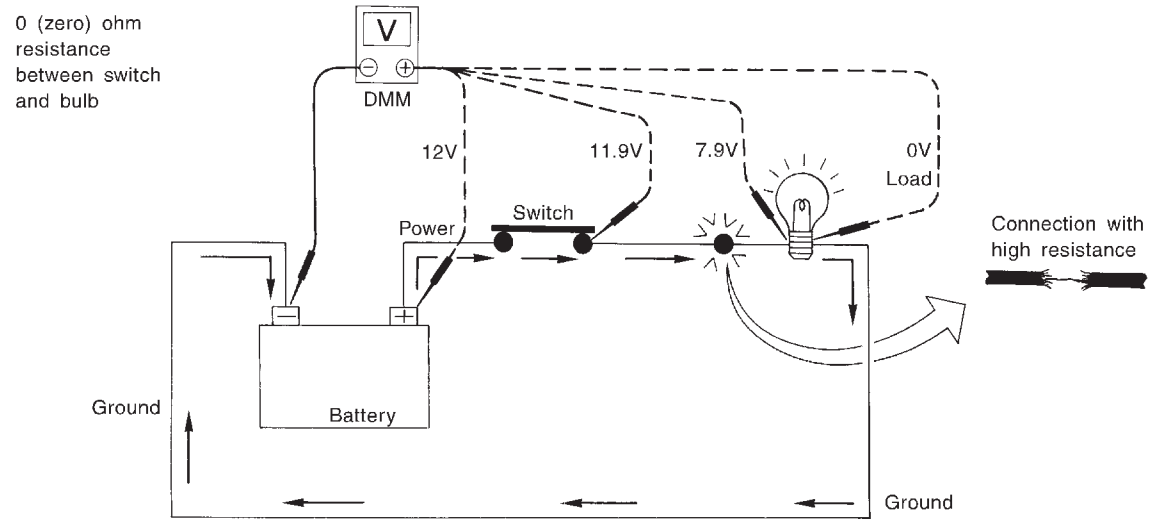
If repairs are needed always use wire that is of the same or larger gauge.

Measuring Voltage Drop — Accumulated Method

1) Connect the voltmeter across the connector or part of the circuit you want to check. The positive lead of the voltmeter should be closer to power and the negative lead closer to ground.
2) Operate the circuit.
3) The voltmeter will indicate how many volts are being used to "push" current through that part of the circuit.

Note in the illustration that there is an excessive 4.1 volt drop between the battery and the bulb.

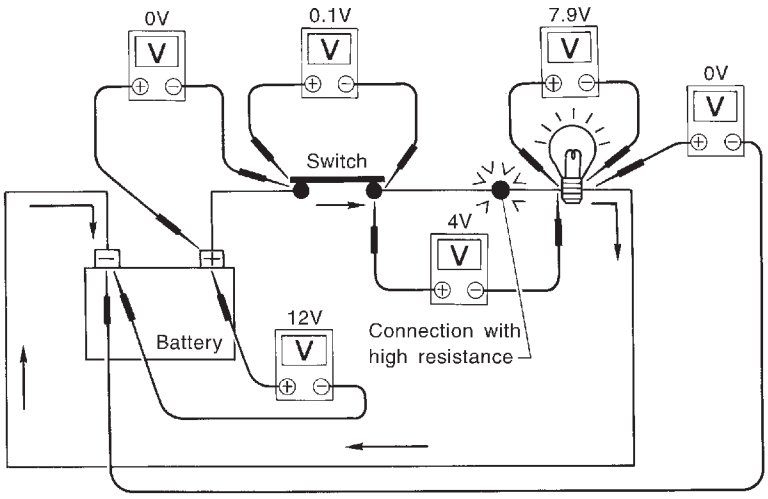
Symptom: Dim bulb or no operation



SGI974

Measuring Voltage Drop — Step by Step

The step by step method is most useful for isolating excessive drops in low voltage systems (such as those in "Computer Controlled Systems").
Circuits in the "Computer Controlled System" operate on very low amperage.
The (Computer Controlled) system operations can be adversely affected by any variation in resistance in the system. Such resistance variation may be caused by poor connection, improper installation, improper wire gauge or corrosion.
The step by step voltage drop test can identify a component or wire with too much resistance.



1. Connect the voltmeter as shown, starting at the battery and working your way around the circuit.
2. An unusually large voltage drop will indicate a component or wire that needs to be repaired. As you can see the illustration above, the poor connection causes a 4 volt drop.

The chart that follows illustrates some maximum allowable voltage drops. These values are given as a guideline, the exact value for each component may vary.

COMPONENT	VOLTAGE DROP
Wire	negligible < .001 volts
Ground Connections	Approx. 0.1 volts
Switch Contacts	Approx. 0.3 volts

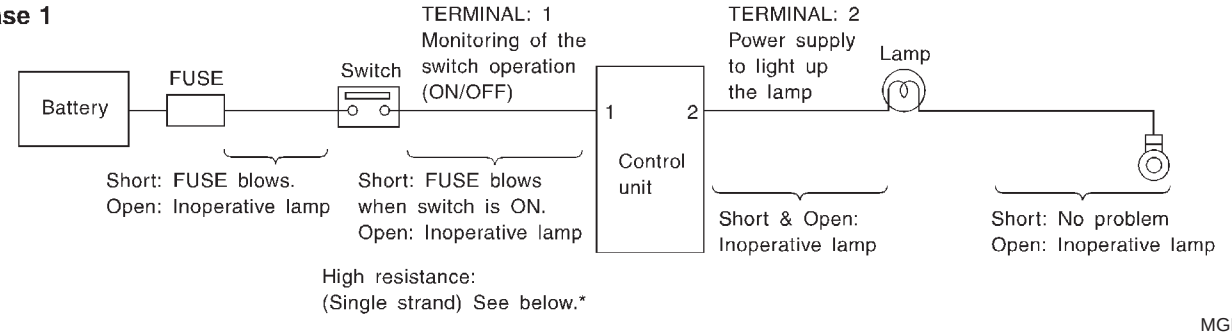
SGI854

CONTROL UNIT CIRCUIT TEST

NAGI0004S0307

System Description: When the switch is ON, the control unit lights up the lamp.

Case 1



MGI034A

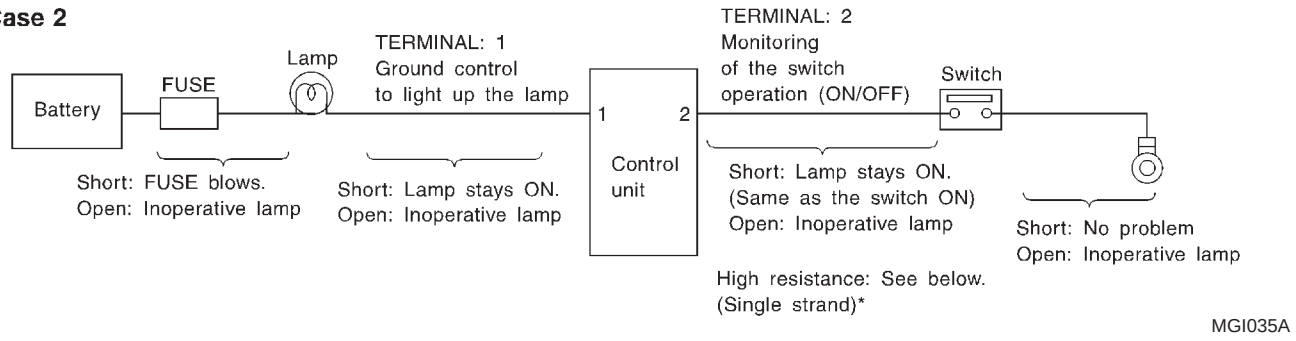
Input-output voltage chart

Pin No.	Item	Condition	Voltage value V	In case of high resistance such as single strand V*
1	Switch	Switch ON	Battery voltage	Lower than battery voltage Approx. 8 (Example)
		Switch OFF	Approx. 0	Approx. 0
2	Lamp	Switch ON	Battery voltage	Approx. 0 (Inoperative lamp)
		Switch OFF	Approx. 0	Approx. 0

The voltage value is based on the body ground.

* : If high resistance exists in the switch side circuit (caused by a single strand), terminal 1 does not detect battery voltage. Control unit does not detect the switch is ON even if the switch does not turn ON. Therefore, the control unit does not supply power to light up the lamp.

Case 2



MGI035A

Input-output voltage chart

Pin No.	Item	Condition	Voltage value V	In case of high resistance such as single strand V*
1	Lamp	Switch ON	Approx. 0	Battery voltage (Inoperative lamp)
		Switch OFF	Battery voltage	Battery voltage
2	Switch	Switch ON	Approx. 0	Higher than 0 Approx. 4 (Example)
		Switch OFF	Approx. 5	Approx. 5

The voltage value is based on the body ground.

* : If high resistance exists in the switch side circuit (caused by a single strand), terminal 2 does not detect approx. 0V. Control unit does not detect the switch is ON even if the switch does not turn ON. Therefore, the control unit does not control ground to light up the lamp.

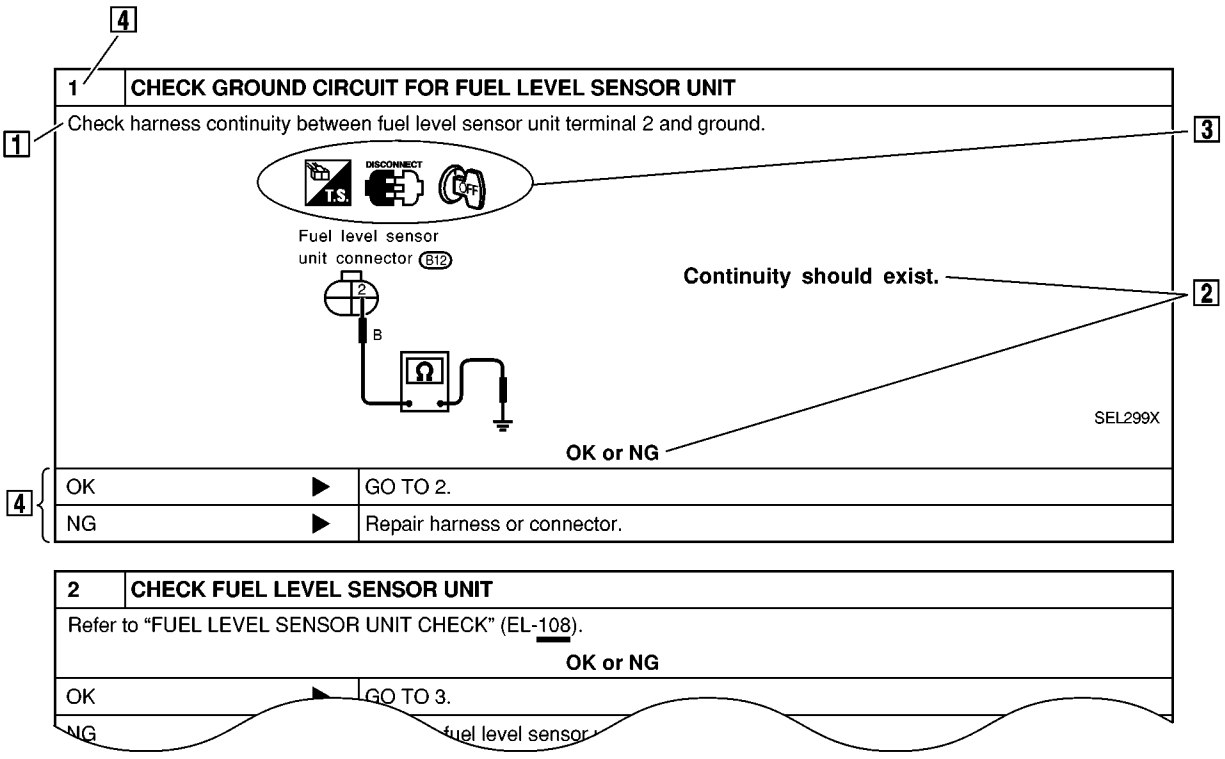
NOTICE:
Trouble diagnoses indicates work procedures required to diagnose problems effectively. Observe the following instructions before diagnosing.

1) **Before performing trouble diagnoses, read the "Preliminary Check", the "Symptom Chart" or the "Work Flow".**
2) **After repairs, re-check that the problem has been completely eliminated.**
3) **Refer to Component Parts and Harness Connector Location for the Systems described in each section for identification/location of components and harness connectors.**
4) **Refer to the Circuit Diagram for quick pinpoint check.**
   If you need to check circuit continuity between harness connectors in more detail, such as when a sub-harness is used, refer to Wiring Diagram in each individual section and Harness Layout in EL section for identification of harness connectors.
5) **When checking circuit continuity, ignition switch should be OFF.**
6) **Before checking voltage at connectors, check battery voltage.**
7) **After accomplishing the Diagnostic Procedures and Electrical Components Inspection, make sure that all harness connectors are reconnected as they were.**

How to Follow Test Groups in Trouble Diagnoses

NAGI0005S01

Example



SGI138A

1) **Work and diagnostic procedure**
Start to diagnose a problem using procedures indicated in enclosed test groups.

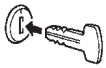
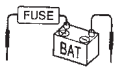
2) **Questions and required results.**
Questions and required results are indicated in bold type in test group.
The meaning of are as follows:
   a. Battery voltage → 11 - 14V or approximately 12V
   b. Voltage: Approximately 0V → Less than 1V

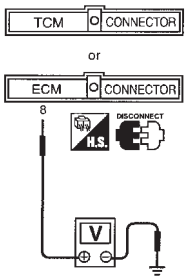
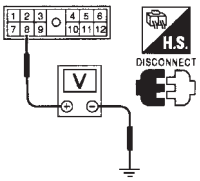
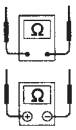
3) **Symbol used in illustration**
Symbols included in illustrations refer to measurements or procedures. Before diagnosing a problem, familiarize yourself with each symbol. Refer to "CONNECTOR SYMBOLS" (GI-15) and "Key to Symbols Signifying Measurements or Procedures" (GI-36).

4) **Action items**
Next action for each test group is indicated based on result of each question. Test group number is shown in the left upper portion of each test group.

Key to Symbols Signifying Measurements or Procedures

NAGI0005S02

Symbol	Symbol explanation	Symbol	Symbol explanation
	Check after disconnecting the connector to be measured.		Procedure with Generic Scan Tool (GST, OBD-II scan tool)
	Check after connecting the connector to be measured.		Procedure without CONSULT-II or GST
	Insert key into ignition switch.		A/C switch is “OFF”.
	Remove key from ignition switch.		A/C switch is “ON”.
	Turn ignition switch to “OFF” position.		REC switch is “ON”.
	Turn ignition switch to “ON” position.		REC switch is “OFF”.
	Turn ignition switch to “START” position.		Fan switch is “ON”. (At any position except for “OFF” position)
	Turn ignition switch from “OFF” to “ACC” position.		Fan switch is “OFF”.
	Turn ignition switch from “ACC” to “OFF” position.		Apply positive voltage from battery with fuse directly to components.
	Turn ignition switch from “OFF” to “ON” position.		Drive vehicle.
	Turn ignition switch from “ON” to “OFF” position.		Disconnect battery negative cable.
	Do not start engine, or check with engine stopped.		Depress brake pedal.
	Start engine, or check with engine running.		Release brake pedal.
	Apply parking brake.		Depress accelerator pedal.
	Release parking brake.		Release accelerator pedal.

Symbol	Symbol explanation	Symbol	Symbol explanation
	Check after engine is warmed up sufficiently.		Pin terminal check for SMJ type ECM and TCM connectors. **For details regarding the terminal arrangement, refer to the "ELECTRICAL UNITS" electrical reference page at the end of the manual.** 
	Voltage should be measured with a voltmeter.		
	Circuit resistance should be measured with an ohmmeter.		
	Current should be measured with an ammeter.		
	Procedure with CONSULT-II		
	Procedure without CONSULT-II		

Function and System Application

NAGI0006S01

Diagnostic test mode	Function	ENGINE	ALL-MODE 4WD	A/T	ABS	AIR BAG	NVIS (NATS)*	SMART EN-TRANCE
Work support	This mode enables a technician to adjust some devices faster and more accurate by following the indications on CONSULT-II.	x	x	—	—	—	—	—
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.	x	x	x	x	x	x	—
Trouble diagnostic record	Current self-diagnostic results and all trouble diagnostic records previously stored can be read.	—	—	—	—	x	—	—
ECU discriminated No.	Classification number of a replacement ECU can be read to prevent an incorrect ECU from being installed.	—	—	—	—	x	—	—
Data monitor	Input/Output data in the ECU (ECM) can be read.	x	x	x	x	—	—	—
DTC work support	This mode enables a technician to set operating conditions to confirm self-diagnosis status/results.	—	—	x	—	—	—	—
Data monitor (Spec.)	The specified values will be displayed when OK/NG judgement is difficult for the DATA MONITOR items by Bar-chart and LIne Graph.	x	—	—	—	—	—	—
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.	x	—	—	x	—	—	—
ECU (ECM) part number	ECU (ECM) part number can be read.	x	x	x	x	—	—	—
Control unit initialization	All registered ignition key IDs in NATS components can be initialized and new IDs can be registered.	—	—	—	—	—	x	—
SRT & DTC confirmation	The results of SRT (System Readiness Test) and the self-diagnosis status/results can be confirmed.	x	—	—	—	—	—	—
REMO CONT ID SET UP	A maximum of four IDs (identifications) can be registered in the memory using the remote controller. These IDs can be also be confirmed and erased as required.	—	—	—	—	—	—	x

x: Applicable

*: NVIS (NATS) [NISSAN Vehicle Immobilizer System (Nissan Anti-Theft System)]

Nickel Metal Hydride Battery Replacement

NAGI0006S06

CONSULT-II contains a nickel metal hydride battery. When replacing the battery obey the following:

WARNING:

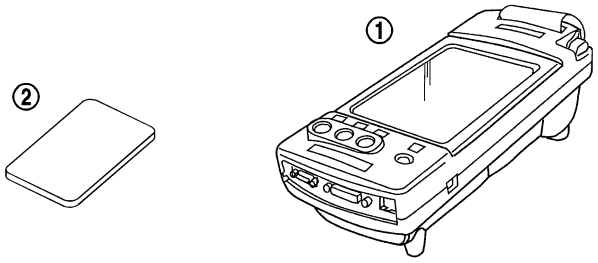
Replace the nickel metal hydride battery with Genuine CONSULT-II battery only. Use of another battery may present a risk of fire or explosion. The battery may present a fire or chemical burn hazard if mistreated. Do not recharge, disassemble of dispose of in fire.

Keep the battery out of reach of children and discard used battery conforming to the local regulations.

Checking Equipment

=NAGI0006S07

When ordering the below equipment, contact your NISSAN/INFINITI distributor.

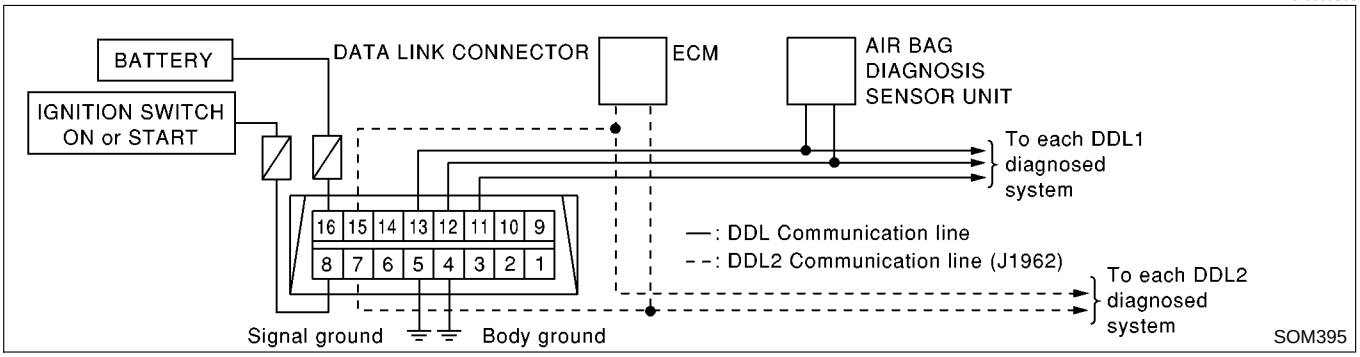
Tool name	Description
NISSAN CONSULT-II ① CONSULT-II unit (Tester internal soft: Resident version 3.2.0) and accessories ② Program card AED99C (Version 3.0) and UEN99A (For NVIS) To confirm the best combination of these softwares, refer to CONSULT-II Operation Manual.	 SGI100A

NOTE:

- **The CONSULT-II must be used in conjunction with a program card. CONSULT-II does not require loading (Initialization) procedure.**
- **Be sure the CONSULT-II is turned off before installing or removing a program card.**

CONSULT-II Data Link Connector (DLC) Circuit

NAGI0006S08



INSPECTION PROCEDURE

NAGI0006S0801

If the CONSULT-II cannot diagnose the system properly, check the following items.

Symptom	Check item
CONSULT-II cannot access any system.	• CONSULT-II DLC power supply circuit (Terminal 8) and ground circuit (Terminal 4) (For detailed circuit, refer to EC-646, “MIL & DATA LINK CONNECTORS”.) • CONSULT-II (DDL) cable
CONSULT-II cannot access individual system. (Other systems can be accessed.)	• CONSULT-II program card (Check the approprite CONSULT-II program card for the system. Refer to “Checking Equipment” above.) • Power supply and ground circuit for the control unite of the system (For detailed circuit, refer to wiring diagram for each system.) • Open or short circuit between the system and CONSULT-II DLC (For detailed circuit, refer to wiring diagram for each system.)

Model Variation

NAGI0007S01

2WD

NAGI0007S0101

Destination	Body	Grade	Engine	VQ35DE	
			Transmission	FS5R30A (Manual)	RE4R01A (Automatic)
			Differential carrier	H233B	H233B
U.S.A.	Wagon	XE	4-door	—	TLJULRAR50EUA
	Wide	SE		VLJULTFR50EUA	VLJULTAR50EUA
		LE		—	VLJULVAR50EUA

4WD

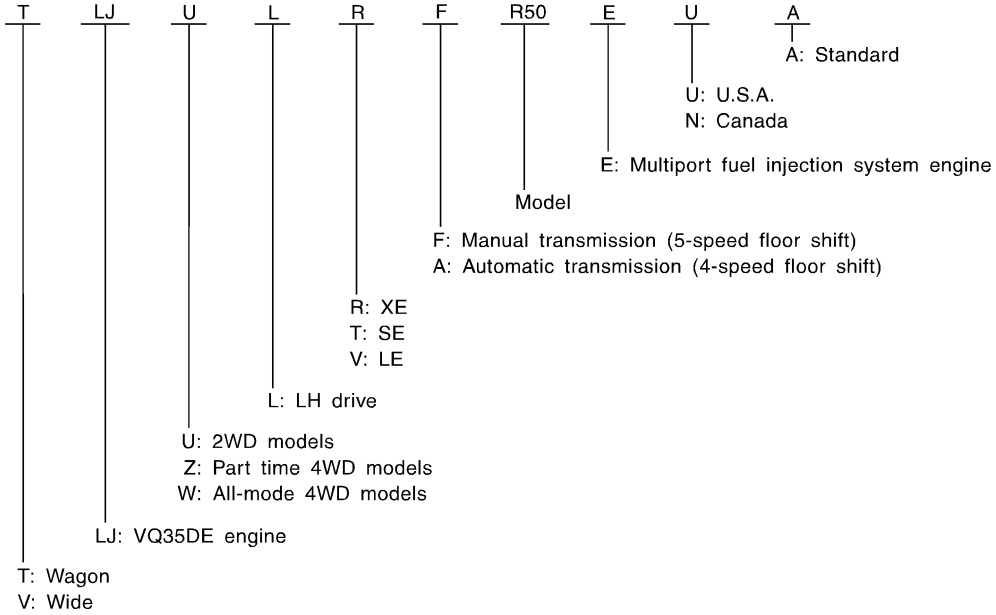
NAGI0007S0102

Destination	Body	Grade	Engine		VQ35DE			
			Transmission		FS5R30A (Manual)		RE4R01A (Automatic)	
			Differential carrier		Front R200A	Rear H233B	Front R200A	Rear H233B
U.S.A.	Wagon	XE	4-door	Transfer	*1	TLJZLRFR50EUA	*1	TLJZLRAR50EUA
	Wide	SE				VLJZLTFR50EUA		VLJZLTAR50EUA
		LE				—		VLJZLVAR50EUA
Canada	Wagon	XE				TLJZLRFR50ENA		TLJZLRAR50ENA
	Wide	SE				VLJZLTFR50ENA	*2	VLJWLTAR50ENA
		LE				—		VLJWLVAR50ENA

*1 TX10A (Part time 4WD models)
*2 ATX14A (All-mode 4WD models)

PREFIX AND SUFFIX DESIGNATIONS

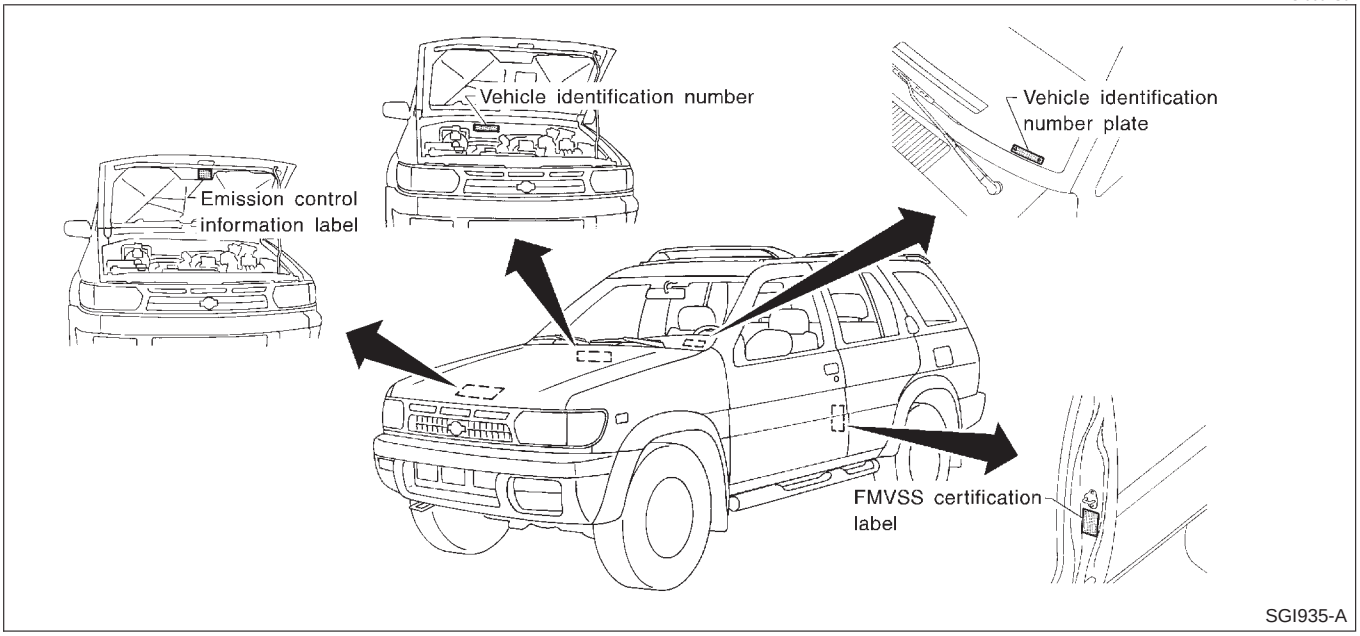
NAGI0007S0103



MGI037AB

Identification Number

NAGI0007S02



SGI935-A

VEHICLE IDENTIFICATION NUMBER ARRANGEMENT

NAGI0007S0201

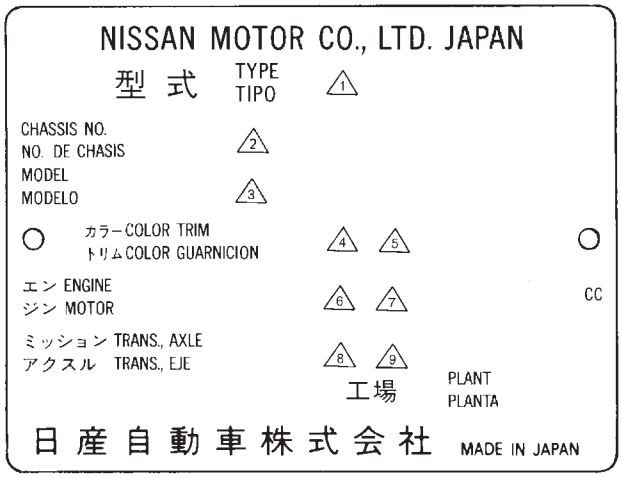
JN8 D R 0 7 Y * I W 500001

- 500001: Vehicle serial number
- W: Manufacturing plant
  - W: Kyushu
- I: Model year
  - I: 2001 model year
- *: Check digit (0 to 9 or X)
  - The code for the check digit is determined by mathematical computation.
- Y: Gross vehicle weight rating
  - X: Standard (2WD)
  - Y: Standard (4WD)
- 7: Body type
  - 7: 4-door wagon
  - 8: Van
- 0: Model change
- R: Vehicle line
  - R: Nissan Pathfinder (R50)
- D: Engine type
  - D: VQ35DE
- JN8: Manufacturer
  - JN6: Japan produced truck
  - JN8: Japan produced multi-purpose vehicle

SGI067AD

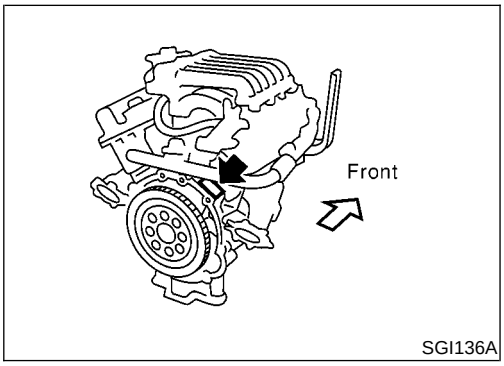
IDENTIFICATION PLATE

NAGI0007S0202



1 Type
2 Vehicle identification number (Chassis number)
3 Model
4 Body color code
5 Trim color code
6 Engine model
7 Engine displacement
8 Transmission model
9 Axle model

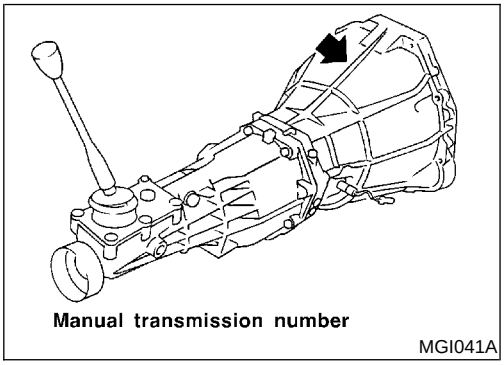
MGI039A



SGI136A

ENGINE SERIAL NUMBER

NAGI0007S0203



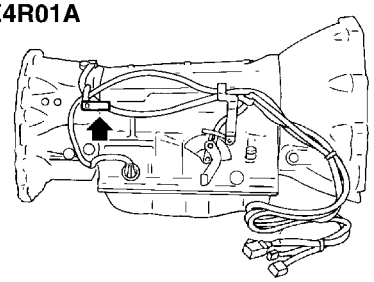
Manual transmission number

MGI041A

MANUAL TRANSMISSION NUMBER

NAGI0007S0204

RE4R01A

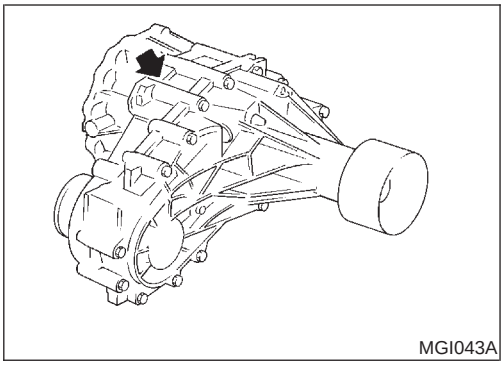


Automatic transmission number

MGI042A

AUTOMATIC TRANSMISSION NUMBER

NAGI0007S0205


MGI043A

TRANSFER SERIAL NUMBER

NAGI0007S0206

Dimensions

NAGI0007S03

Unit: mm (in)

	Wagon*2	Wide*3
	VQ35DE	
Overall length*1	4,640 (182.7)	
Overall width	1,770 (69.7)	1,820 (71.7)
Overall height	1,730 (68.1)	1,725 (67.9)
Front tread	1,480 (58.3)	1,540 (60.6)
Rear tread	1,485 (58.5)	1,545 (60.8)
Wheelbase	2,700 (106.3)	

*1: On spare tire carrier equipped models, the spare tire carrier adds 240 mm (9.45 in) to the overall length.
*2: XE models
*3: SE models and LE wide models

Wheels & Tires

NAGI0007S04

	Road wheel/offset mm (in)	Tire	Spare tire size
4x2 PATHFINDER	16 x 7JJ Aluminum/50 (1.97)*1 16 x 7JJ Aluminum/20 (0.79)*2	P245/70R16 106S*1 P255/65R16 106S*2	P245/70R16 106S*1 P255/65R16 106S*2 215/80R16 103S*3
4x4 PATHFINDER	16 x 7JJ Aluminum/50 (1.97)*1 16 x 7JJ Aluminum/20 (0.79)*2	P245/70R16 106S*1 P255/65R16 106S*2	P245/70R16 106S*1 P255/65R16 106S*2

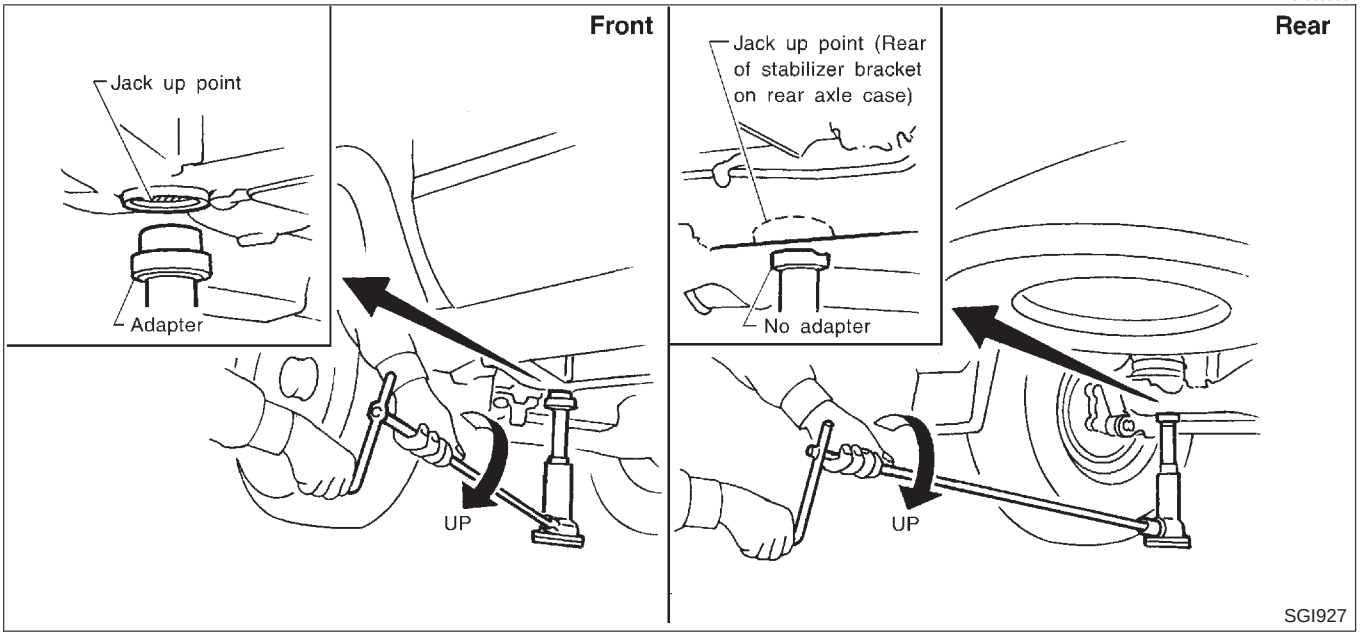
*1: XE models
*2: SE models and LE models
*3: If so equipped (US only)

WARNING:

- **Never get under the vehicle while it is supported only by the jack. Always use safety stands to support the frame when you have to get under the vehicle.**
- **Place wheel chocks at both front and back of the wheels on the ground.**

Screw Jack

NAGI0008S01

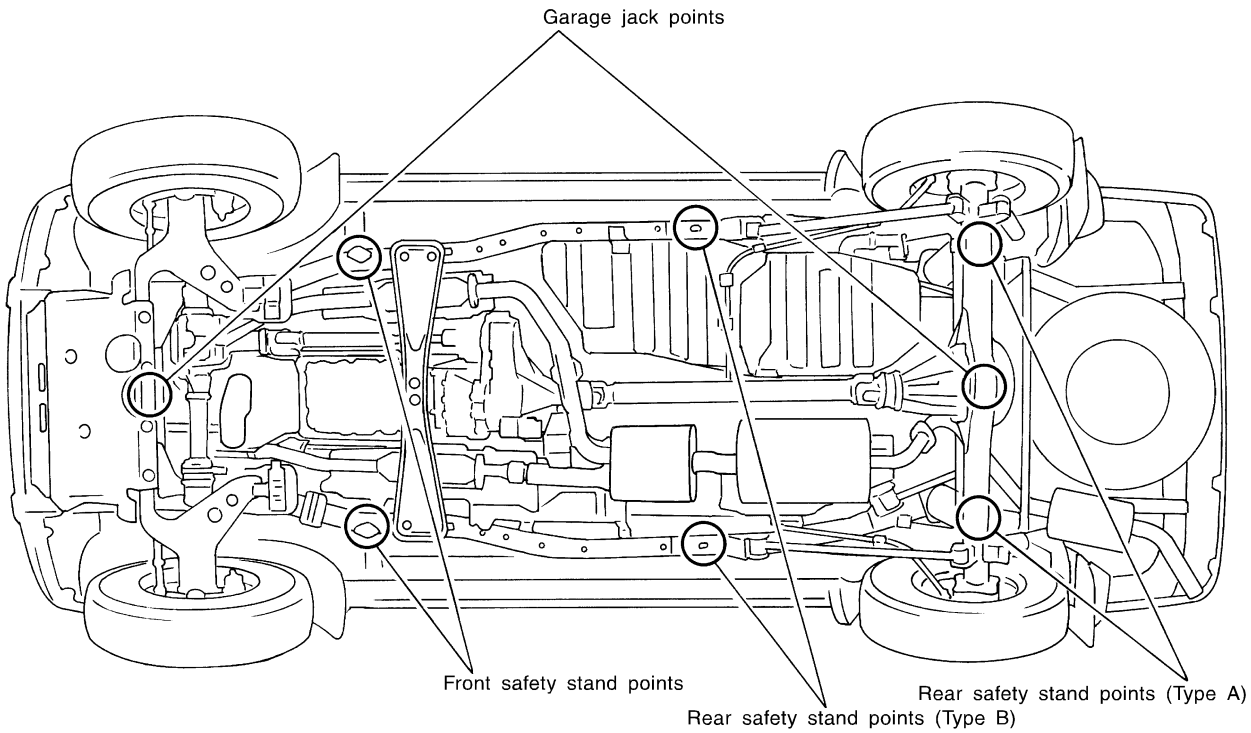


Garage Jack and Safety Stand

=NAGI0008S02

CAUTION:

Place a wooden or rubber block between safety stand and vehicle body when the supporting body is flat.



Notes:

(1) Front and rear safety stand points (Type A) are the same as screw jack points.

(2) Rear safety stand points (Type B) are the same as rear 2-pole lift points.

SGI130A

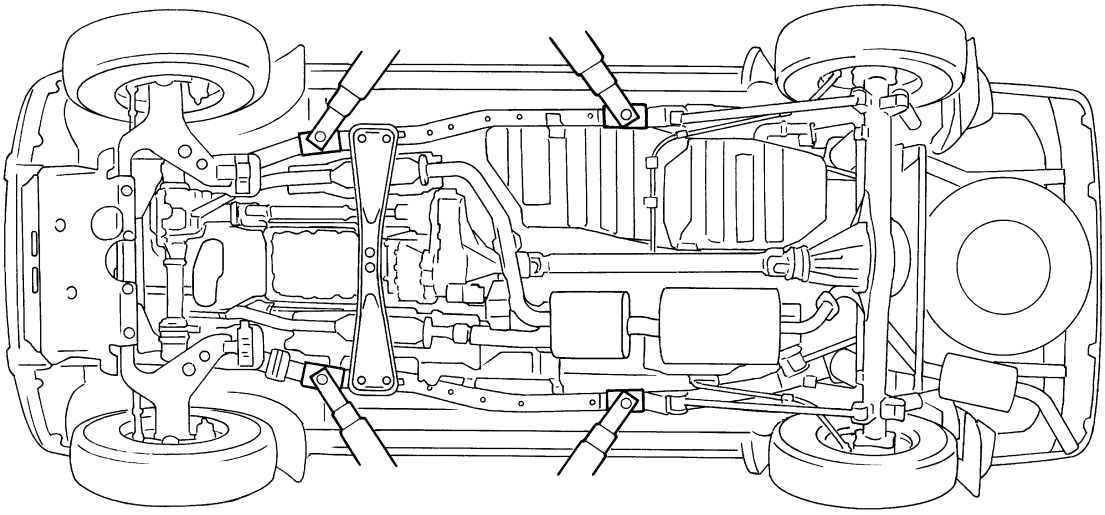
2-pole Lift

=NAGI0008S03

WARNING:

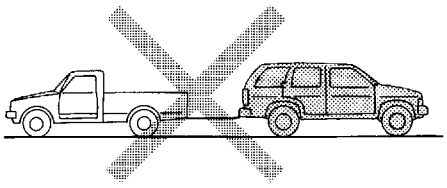
When lifting the vehicle, open the lift arms as wide as possible and ensure that the front and rear of the vehicle are well balanced.

When setting the lift arm, do not allow the arm to contact the brake tubes, brake cable and fuel lines.



Note: Lift-up points are the same as front safety stand points and rear safety stand points (Type B).

SGI131A



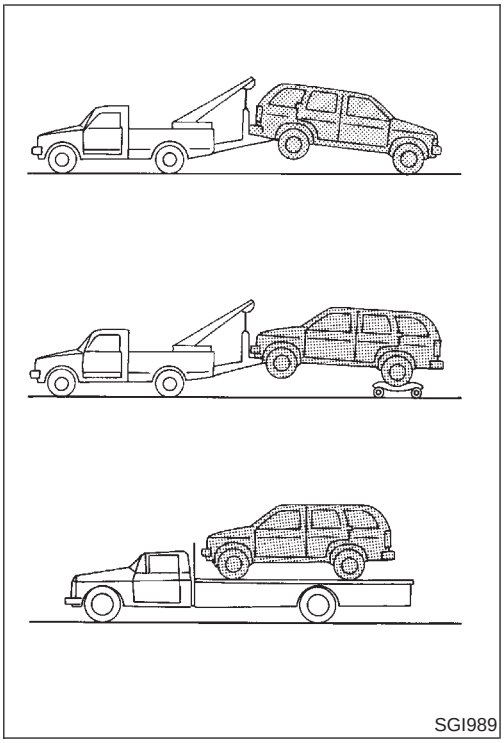
SGI988

Tow Truck Towing

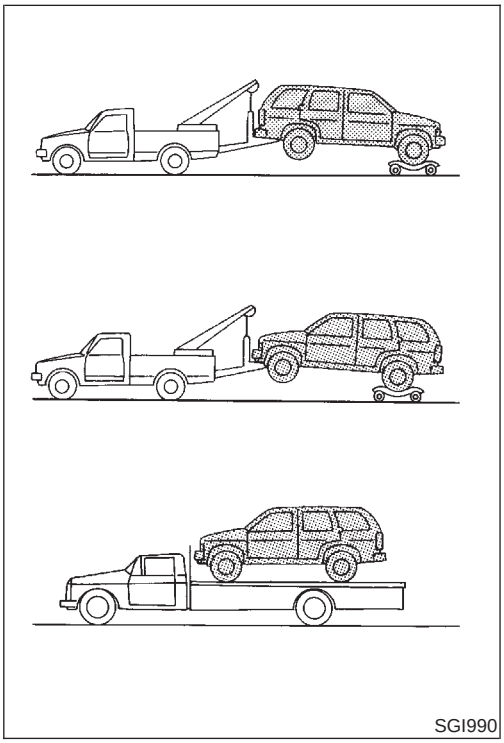
NAGI0008S04

CAUTION:

- **All applicable state or Provincial (in Canada) laws and local laws regarding the towing operation must be obeyed.**
- **It is necessary to use proper towing equipment to avoid possible damage to the vehicle during towing operation. Towing is in accordance with Towing Procedure Manual at dealer.**
- **Always attach safety chains before towing.**
- **When towing, make sure that the transmission, steering system and power train are in good order. If any unit is damaged, dollies must be used.**
- **Never tow an automatic transmission model from the rear (that is backward) with four wheels on the ground as this may cause serious and expensive damage to the transmission.**



SGI989



SGI990

2WD MODELS

NAGI0008S0401

NISSAN recommends that vehicle be towed with the driving (rear) wheels off the ground as illustrated.

CAUTION:

- **When towing manual or automatic transmission models with the front wheels on the ground: Turn the ignition key to the OFF position and secure the steering wheel in a straightahead position with a rope or similar device. Never place the ignition key in the LOCK position. This will result in damage to the steering lock mechanism.**
- **When towing manual transmission models with the rear wheels on the ground or four wheels on the ground (if you do not use towing dollies): Always release the parking brake and move the transmission shift lever to the N (neutral) position.**

Observe the following restricted towing speeds and distances.

Manual transmission models:

- **Speed: Below 95 km/h (59 MPH)**
- **Distance: Less than 800 km (500 miles)**

If the speed or distance must necessarily be greater, remove the propeller shaft beforehand to prevent damage to the transmission.

PART TIME 4WD MODELS

NAGI0008S0402

NISSAN recommends that a dolly be used as illustrated when towing 4WD models.

CAUTION:

If towing with the front wheels on the ground or with the rear wheels on the ground (if you do not use towing dollies) is necessary: Move the transfer case shift lever into the 2H position.

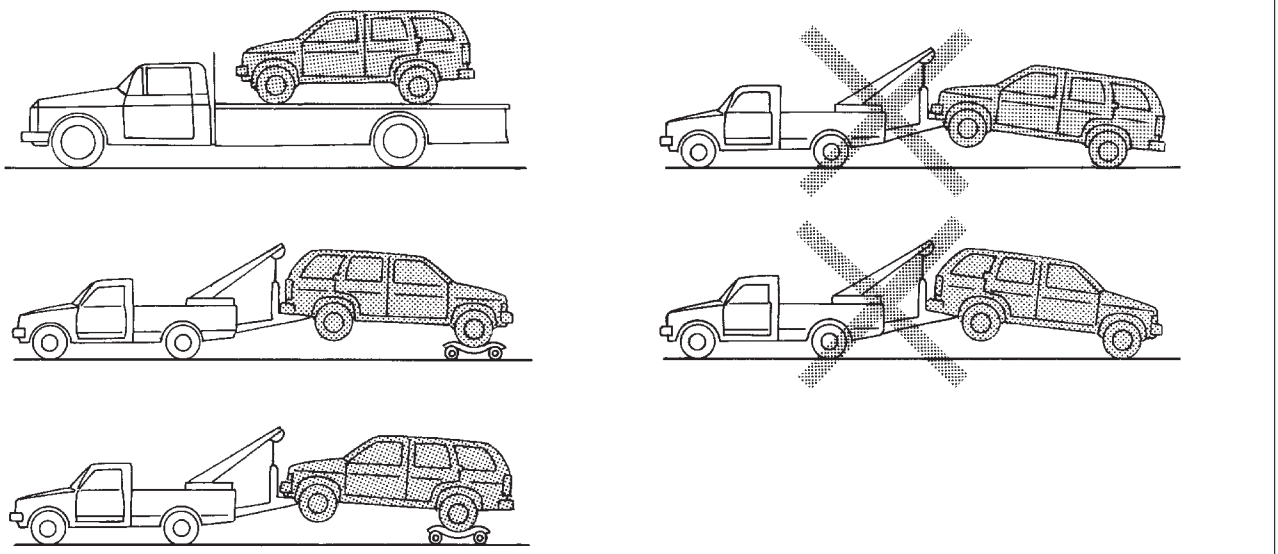
- **When towing with the front wheels on the ground: On manual transmission models to move the shift lever to the N (neutral) position, turn the ignition key to the OFF position and secure the steering wheel in a straightahead position with a rope or similar device.**
  On automatic transmission models to move the selector lever to N (neutral) position, turn the ignition key to the ACC position. After moving the selector lever to the N (neutral) position, turn the ignition key to the OFF position and secure the steering wheel in a straightahead position with a rope or similar device.
  Never place the ignition key in the LOCK position. This will result in damage to the steering lock mechanism.
- **When towing manual transmission models with the rear wheels on the ground or four wheels on the ground: Always release the parking brake and move the transmission shift lever to the N (neutral) position.**

Observe the following restricted towing speeds and distances.

Manual transmission models:

- **Speed: Below 95 km/h (59 MPH)**
- **Distance: Less than 800 km (500 miles)**

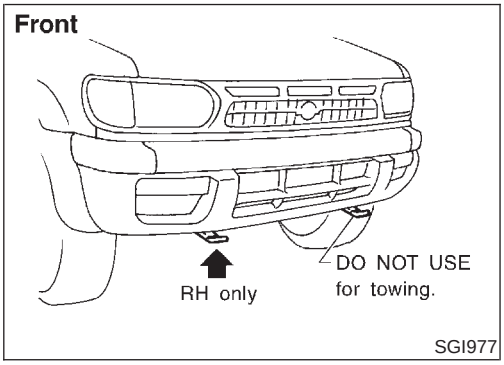
If the speed or distance must necessarily be greater, remove the front and rear propeller shafts beforehand to prevent damage to the transmission.


SGI950

ALL-MODE 4WD MODELS

NAGI0008S0404

NISSAN recommends that a dolly or a flat bed truck be used as illustrated when towing all-mode 4WD models.



SGI977

VEHICLE RECOVERY

NAGI0008S0403

- Use the towing **hook** only, not other parts of the vehicle. Otherwise, the vehicle body will be damaged.
- Use the towing hook **only** to free a vehicle stuck in sand, snow, mud, etc. **Never** tow the vehicle for a long distance using only the towing hook.
- The towing hook is under tremendous force when used to free a stuck vehicle. Always pull the cable straight out from the front or rear of the vehicle. **Never** pull on the hook at a sideways angle.
- Stand clear of a stuck vehicle.

TIGHTENING TORQUE OF STANDARD BOLTS

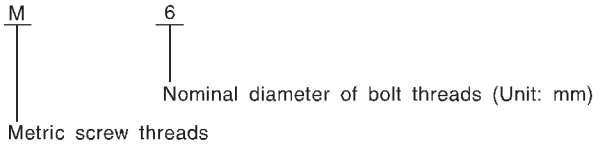
Grade	Bolt size	Bolt diameter * mm	Pitch mm	Tightening torque (Without lubricant)							
				Hexagon head bolt				Hexagon flange bolt			
				N·m	kg-m	ft-lb	in-lb	N·m	kg-m	ft-lb	in-lb
4T	M6	6.0	1.0	5.1	0.52	3.8	45.1	6.1	0.62	4.5	53.8
	M8	8.0	1.25	13	1.3	9	—	15	1.5	11	—
			1.0	13	1.3	9	—	16	1.6	12	—
	M10	10.0	1.5	25	2.5	18	—	29	3.0	22	—
			1.25	25	2.6	19	—	30	3.1	22	—
	M12	12.0	1.75	42	4.3	31	—	51	5.2	38	—
			1.25	46	4.7	34	—	56	5.7	41	—
	M14	14.0	1.5	74	7.5	54	—	88	9.0	65	—
7T	M6	6.0	1.0	8.4	0.86	6.2	74.6	10	1.0	7	87
	M8	8.0	1.25	21	2.1	15	—	25	2.5	18	—
			1.0	22	2.2	16	—	26	2.7	20	—
	M10	10.0	1.5	41	4.2	30	—	48	4.9	35	—
			1.25	43	4.4	32	—	51	5.2	38	—
	M12	12.0	1.75	71	7.2	52	—	84	8.6	62	—
			1.25	77	7.9	57	—	92	9.4	68	—
	M14	14.0	1.5	127	13.0	94	—	147	15.0	108	—
9T	M6	6.0	1.0	12	1.2	9	—	15	1.5	11	—
	M8	8.0	1.25	29	3.0	22	—	35	3.6	26	—
			1.0	31	3.2	23	—	37	3.8	27	—
	M10	10.0	1.5	59	6.0	43	—	70	7.1	51	—
			1.25	62	6.3	46	—	74	7.5	54	—
	M12	12.0	1.75	98	10.0	72	—	118	12.0	87	—
			1.25	108	11.0	80	—	137	14.0	101	—
	M14	14.0	1.5	177	18.0	130	—	206	21.0	152	—

*: Nominal diameter

1) **Special parts are excluded.**

2) **This standard is applicable to bolts having the following marks embossed on the bolt head.**

Grade	Mark
4T	4
7T	7
9T	9



MGI044A

SAE J1930 Terminology List

NAGI0010S01

All emission related terms used in this publication in accordance with SAE J1930 are listed. Accordingly, new terms, new acronyms/abbreviations and old terms are listed in the following chart.

NEW TERM	NEW ACRONYM / ABBREVIATION	OLD TERM
Air cleaner	ACL	Air cleaner
Barometric pressure	BARO	***
Barometric pressure sensor-BCDD	BAROS-BCDD	BCDD
Camshaft position	CMP	***
Camshaft position sensor	CMPS	Crank angle sensor
Canister	***	Canister
Carburetor	CARB	Carburetor
Charge air cooler	CAC	Intercooler
Closed loop	CL	Closed loop
Closed throttle position switch	CTP switch	Idle switch
Clutch pedal position switch	CPP switch	Clutch switch
Continuous fuel injection system	CFI system	***
Continuous trap oxidizer system	CTOX system	***
Crankshaft position	CKP	***
Crankshaft position sensor	CKPS	***
Data link connector	DLC	***
Diagnostic test mode	DTM	Diagnostic mode
Diagnostic test mode selector	DTM selector	Diagnostic mode selector
Diagnostic test mode I	DTM I	Mode I
Diagnostic test mode II	DTM II	Mode II
Diagnostic trouble code	DTC	Malfunction code
Direct fuel injection system	DFI system	***
Distributor ignition system	DI system	Ignition timing control
Early fuel evaporation-mixture heater	EFE-mixture heater	Mixture heater
Early fuel evaporation system	EFE system	Mixture heater control
Electrically erasable programmable read only memory	EEPROM	***
Electronic ignition system	EI system	Ignition timing control
Engine control	EC	***
Engine control module	ECM	ECCS control unit
Engine coolant temperature	ECT	Engine temperature
Engine coolant temperature sensor	ECTS	Engine temperature sensor
Engine modification	EM	***
Engine speed	RPM	Engine speed
Erasable programmable read only memory	EPROM	***

NEW TERM	NEW ACRONYM / ABBREVIATION	OLD TERM
Evaporative emission canister	EVAP canister	Canister
Evaporative emission system	EVAP system	Canister control solenoid valve
Exhaust gas recirculation valve	EGR valve	EGR valve
Exhaust gas recirculation control-BPT valve	EGRC-BPT valve	BPT valve
Exhaust gas recirculation control-solenoid valve	EGRC-solenoid valve	EGR control solenoid valve
Exhaust gas recirculation temperature sensor	EGRT sensor	Exhaust gas temperature sensor
EGR temperature sensor		
Flash electrically erasable programmable read only memory	FEEPROM	***
Flash erasable programmable read only memory	FEPROM	***
Flexible fuel sensor	FFS	***
Flexible fuel system	FF system	***
Fuel pressure regulator	***	Pressure regulator
Fuel pressure regulator control solenoid valve	***	PRVR control solenoid valve
Fuel tank temperature sensor	FTT	Tank fuel temperature sensor
Fuel trim	FT	***
Heated Oxygen sensor	HO2S	Exhaust gas sensor
Idle air control system	IAC system	Idle speed control
Idle air control valve-air regulator	IACV-air regulator	Air regulator
Idle air control valve-auxiliary air control valve	IACV-AAC valve	Auxiliary air control (AAC) valve
Idle air control valve-FICD solenoid valve	IACV-FICD solenoid valve	FICD solenoid valve
Idle air control valve-idle up control solenoid valve	IACV-idle up control solenoid valve	Idle up control solenoid valve
Idle speed control-FI pot	ISC-FI pot	FI pot
Idle speed control system	ISC system	***
Ignition control	IC	***
Ignition control module	ICM	***
Indirect fuel injection system	IFI system	***
Intake air	IA	Air
Intake air temperature sensor	IAT sensor	Air temperature sensor
Knock	***	Detonation
Knock sensor	KS	Detonation sensor
Malfunction indicator lamp	MIL	Check engine light
Manifold absolute pressure	MAP	***
Manifold absolute pressure sensor	MAPS	***

SAE J1930 Terminology List (Cont'd)

NEW TERM	NEW ACRONYM / ABBREVIATION	OLD TERM
Manifold differential pressure	MDP	***
Manifold differential pressure sensor	MDPS	***
Manifold surface temperature	MST	***
Manifold surface temperature sensor	MSTS	***
Manifold vacuum zone	MVZ	***
Manifold vacuum zone sensor	MVZS	***
Mass air flow sensor	MAFS	Air flow meter
Mixture control solenoid valve	MC solenoid valve	Air-fuel ratio control solenoid valve
Multiport fuel injection System	MFI system	Fuel injection control
Neutral position switch	***	Neutral switch
Nonvolatile random access memory	NVRAM	***
On board diagnostic system	OBD system	Self-diagnosis
Open loop	OL	Open loop
Oxidation catalyst	OC	Catalyst
Oxidation catalytic converter system	OC system	***
Oxygen sensor	O2S	Exhaust gas sensor
Park position switch	***	Park switch
Park/neutral position switch	PNP switch	Park/neutral switch
Periodic trap oxidizer system	PTOX system	***
Positive crankcase ventilation	PCV	Positive crankcase ventilation
Positive crankcase ventilation valve	PCV valve	PCV valve
Powertrain control module	PCM	***
Programmable read only memory	PROM	***
Pulsed secondary air injection control solenoid valve	PAIRC solenoid valve	AIV control solenoid valve
Pulsed secondary air injection system	PAIR system	Air induction valve (AIV) control
Pulsed secondary air injection valve	PAIR valve	Air induction valve
Random access memory	RAM	***
Read only memory	ROM	***
Scan tool	ST	***
Secondary air injection pump	AIR pump	***
Secondary air injection system	AIR system	***
Sequential multiport fuel injection system	SFI system	Sequential fuel injection
Service reminder indicator	SRI	***
Simultaneous multiport fuel injection system	***	Simultaneous fuel injection
Smoke puff limiter system	SPL system	***
Supercharger	SC	***

NEW TERM	NEW ACRONYM / ABBREVIATION	OLD TERM
Supercharger bypass	SCB	***
System readiness test	SRT	***
Thermal vacuum valve	TVV	Thermal vacuum valve
Three way catalyst	TWC	Catalyst
Three way catalytic converter system	TWC system	***
Three way + oxidation catalyst	TWC + OC	Catalyst
Three way + oxidation catalytic converter system	TWC + OC system	***
Throttle body	TB	Throttle chamber SPI body
Throttle body fuel injection system	TBI system	Fuel injection control
Throttle position	TP	Throttle position
Throttle position sensor	TPS	Throttle sensor
Throttle position switch	TP switch	Throttle switch
Torque converter clutch solenoid valve	TCC solenoid valve	Lock-up cancel solenoid Lock-up solenoid
Transmission control module	TCM	A/T control unit
Turbocharger	TC	Turbocharger
Vehicle speed sensor	VSS	Vehicle speed sensor
Volume air flow sensor	VAFS	Air flow meter
Warm up oxidation catalyst	WU-OC	Catalyst
Warm up oxidation catalytic converter system	WU-OC system	***
Warm up three way catalyst	WU-TWC	Catalyst
Warm up three way catalytic converter system	WU-TWC system	***
Wide open throttle position switch	WOTP switch	Full switch

NOTES

MAINTENANCE

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Precautions for Supplemental Restraint System (SRS) “AIR BAG”

NAMA0001

The Supplemental Restraint System such as “AIR BAG” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL R50 is as follows:

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

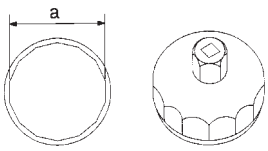
WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.**

Special Service Tool

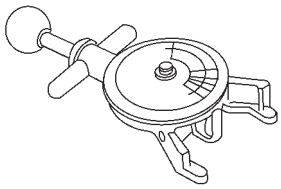
NAMA0002

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
KV10115801 (J38956) Oil filter cap wrench	 NT375 Removing oil filter **a: 64.3 mm (2.531 in)**

Commercial Service Tool

NAMA0045

Tool name (Kent-Moore No.)	Description
Belt tension gauge (BT3373-F)	 AMA126 Checking drive belt tension

GENERAL MAINTENANCE

General maintenance includes those items which should be checked during the normal day-to-day operation of the vehicle. They are essential if the vehicle is to continue operating properly. The owners can perform checks and inspections themselves or they can have their NISSAN dealers do them.

OUTSIDE THE VEHICLE

The maintenance items listed here should be performed from time to time, unless otherwise specified.

Item		Reference page
Tires	Check the pressure with a gauge periodically when at a service station, including the spare, and adjust to the specified pressure if necessary. Check carefully for damage, cuts or excessive wear.	—
Wheel nuts	When checking the tires, make sure no nuts are missing, and check for any loose nuts. Tighten if necessary.	—
Tire rotation	Tires should be rotated every 12,000 km (7,500 miles).	MA-27
Wheel alignment and balance	If the vehicle pulls to either side while driving on a straight and level road, or if you detect uneven or abnormal tire wear, there may be a need for wheel alignment. If the steering wheel or seat vibrates at normal highway speeds, wheel balancing may be needed.	MA-26, SU-7, “Front Wheel Alignment”
Windshield wiper blades	Check for cracks or wear if they do not wipe properly.	—
Doors and engine hood	Check that all doors and the engine hood operate smoothly as well as the trunk lid and back hatch. Also make sure that all latches lock securely. Lubricate if necessary. Make sure that the secondary latch keeps the hood from opening when the primary latch is released. When driving in areas using road salt or other corrosive materials, check lubrication frequently.	MA-29

INSIDE THE VEHICLE

The maintenance items listed here should be checked on a regular basis, such as when performing periodic maintenance, cleaning the vehicle, etc.

Item		Reference page
Lamps	Make sure that the headlamps, stop lamps, tail lamps, turn signal lamps, and other lamps are all operating properly and installed securely. Also check headlamp aim.	—
Warning lamps and buzzers/chimes	Make sure that all warning lamps and buzzers/chimes are operating properly.	—
Windshield wiper and washer	Check that the wipers and washer operate properly and that the wipers do not streak.	—
Windshield defroster	Check that the air comes out of the defroster outlets properly and in sufficient quantity when operating the heater or air conditioning.	—
Steering wheel	Check that it has the specified play. Be sure to check for changes in the steering condition, such as excessive play, hard steering or strange noises. **Free play: Less than 35 mm (1.38 in)**	—
Seats	Check seat position controls such as seat adjusters, seatback recliner, etc. to make sure they operate smoothly and that all latches lock securely in every position. Check that the head restrains move up and down smoothly and that the locks (if equipped) hold securely in all latched positions. Check that the latches lock securely for folding-down rear seatbacks.	—
Seat belts	Check that all parts of the seat belt system (e.g. buckles, anchors, adjusters and retractors) operate properly and smoothly and are installed securely. Check the belt webbing for cuts, fraying, wear or damage.	MA-30 RS-7, “Seat Belt Inspection”
Clutch pedal	Make sure the pedal operates smoothly and check that it has the proper free play.	CL-6, “Adjusting Clutch Pedal”
Brakes	Check that the brake does not pull the vehicle to one side when applied.	—

Item		Reference page
Brake pedal and booster	Check the pedal for smooth operation and make sure it has the proper distance under it when depressed fully. Check the brake booster function. Be sure to keep floor mats away from the pedal.	Refer to BR-14, “Brake Pedal and Bracket” and “Brake Booster”
Parking brake	Check that the lever has the proper travel and make sure that the vehicle is held securely on a fairly steep hill when only the parking brake is applied.	Refer to BR-31, “Parking Brake Control”
Automatic transmission “Park” mechanism	Check that the lock release button on the selector lever operates properly and smoothly. On a fairly steep hill check that the vehicle is held securely with the selector lever in the “P” position without applying any brakes.	—

UNDER THE HOOD AND VEHICLE

The maintenance items listed here should be checked periodically (e.g. each time you check the engine oil or refuel).

Item		Reference page
Windshield washer fluid	Check that there is adequate fluid in the tank.	—
Engine coolant level	Check the coolant level when the engine is cold.	MA-16
Radiator and hoses	Check the front of the radiator and clean off any dirt, insects, leaves, etc., that may have accumulated. Make sure the hoses have no cracks, deformation, deterioration or loose connections.	—
Brake and clutch fluid levels	Make sure that the brake and clutch fluid levels are between the “MAX” and “MIN” lines on the reservoir.	MA-22, 27
Battery	Check the fluid level in each cell. It should be between the “MAX” and “MIN” lines.	—
Engine drive belts	Make sure that no belt is frayed, worn, cracked or oily.	MA-14
Engine oil level	Check the level on the dipstick after parking the vehicle on a level spot and turning off the engine.	MA-19
Power steering fluid level and lines	Check the level on the dipstick with the engine off. Check the lines for improper attachment, leaks, cracks, etc.	MA-29
Automatic transmission fluid level	Check the level on the dipstick after putting the selector lever in “P” with the engine idling.	MA-23
Exhaust system	Make sure there are no loose supports, cracks or holes. If the sound of the exhaust seems unusual or there is a smell of exhaust fumes, immediately locate the trouble and correct it.	MA-22
Underbody	The underbody is frequently exposed to corrosive substances such as those used on icy roads or to control dust. It is very important to remove these substances, otherwise rust will form on the floor pan, frame, fuel lines and around the exhaust system. At the end of winter, the underbody should be thoroughly flushed with plain water, being careful to clean those areas where mud and dirt can easily accumulate.	—
Fluid leaks	Check under the vehicle for fuel, oil, water or other fluid leaks after the vehicle has been parked for a while. Water dripping from the air conditioner after use is normal. If you should notice any leaks or gasoline fumes are evident, check for the cause and correct it immediately.	—

PERIODIC MAINTENANCE

Two different maintenance schedules are provided, and should be used, depending upon the conditions in which the vehicle is mainly operated. **After 60,000 miles (96,000 km) or 48 months, continue the periodic maintenance at the same mileage/time intervals.**

Schedule 1	Follow Periodic Maintenance Schedule 1 if your driving habits frequently includes one or more of the following driving conditions: ● Repeated short trips of less than 5 miles (8 km). ● Repeated short trips of less than 10 miles (16 km) with outside temperatures remaining below freezing. ● Operating in hot weather in stop-and-go “rush hour” traffic. ● Extensive idling and/or low speed driving for long distances, such as police, taxi or door-to-door delivery use. ● Driving in dusty conditions. ● Driving on rough, muddy, or salt spread roads. ● Towing a trailer, using a camper or a car-top carrier.	Emission Control System Maintenance	MA-8
		Chassis and Body Maintenance	MA-9
Schedule 2	Follow Periodic Maintenance Schedule 2 if none of the driving conditions shown in Schedule 1 apply to your driving habits.	Emission Control System Maintenance	MA-10
		Chassis and Body Maintenance	MA-11

Maintenance for off-road driving (4x4 only)

Whenever you drive off-road through sand, mud or water, more frequent maintenance may be required of the following items:

▲ Brake pads and discs
▲ Brake lining and drums
▲ Brake lines and hoses
▲ Wheel bearing grease
▲ Differential, transmission and transfer oil
▲ Steering linkage
▲ Propeller shaft and drive shafts
▲ Air cleaner filter
▲ Clutch housing (Check water entry. Refer to MA-23.)

Abbreviations: R = Replace. I = Inspect. Correct or replace if necessary. [ ]: At the mileage intervals only

MAINTENANCE OPERATION		MAINTENANCE INTERVAL																Reference Section - Page or - Content Title
Perform at number of miles, kilometers or months, whichever comes first.	Miles x 1,000 (km x 1,000) Months	3.75 (6) 3	7.5 (12) 6	11.25 (18) 9	15 (24) 12	18.75 (30) 15	22.5 (36) 18	26.25 (42) 21	30 (48) 24	33.75 (54) 27	37.5 (60) 30	41.25 (66) 33	45 (72) 36	48.75 (78) 39	52.5 (84) 42	56.25 (90) 45	60 (96) 48	
Drive belts									I*								I*	MA-14
Air cleaner filter	NOTE (1)								[R]								[R]	MA-18
EVAP vapor lines									I*								I*	MA-21
Fuel lines									I*								I*	MA-17
Fuel filter*	NOTE (2)																	MA-17
Engine coolant	NOTE (3)																R*	MA-15
Engine oil		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	MA-19
Engine oil filter (Use part No. 15208-31U00 or equivalent.)		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	MA-19
Spark plugs (PLATINUM-TIPPED type)		Replace every 105,000 miles (169,000 km)																MA-20
Intake & exhaust valve clearance*	NOTE (4)																	EM-53

NOTE:

(1) If operating mainly in dusty conditions, more frequent maintenance may be required.

(2) When the filter becomes clogged, the vehicle speed cannot be increased as the driver wishes. In such an event, replace the filter.

(3) After 60,000 miles (96,000 km) or 48 months, replace every 30,000 miles (48,000 km) or 24 months.

(4) If valve noise increases, inspect valve clearance.

★ Maintenance items and intervals with "*" are recommended by NISSAN for reliable vehicle operation. The owner need not perform such maintenance in order to maintain the emission warranty or manufacturer recall liability. Other maintenance items and intervals are required.

NAMA0004S01
NAMA0004S0101

Abbreviations: R = Replace. I = Inspect. Correct or replace if necessary. L = Lubricate.

MAINTENANCE OPERATION			MAINTENANCE INTERVAL																Reference Section - Page or - Content Title
Perform at number of miles, kilometers or months, whichever comes first.		Miles x 1,000 (km x 1,000) Months	3.75 (6) 3	7.5 (12) 6	11.25 (18) 9	15 (24) 12	18.75 (30) 15	22.5 (36) 18	26.25 (42) 21	30 (48) 24	33.75 (54) 27	37.5 (60) 30	41.25 (66) 33	45 (72) 36	48.75 (78) 39	52.5 (84) 42	56.25 (90) 45	60 (96) 48	
Brake lines & cables						I				I				I				I	MA-27
Brake pads, rotors, drums & linings				I		I		I		I		I		I		I		I	MA-27, 28
Automatic transmission, (all-mode 4WD) transfer fluid, manual transmission & differential gear oil (exc. LSD)		NOTE (1)				I				I				I				I	MA-22, 23, 24, 26
LSD gear oil		NOTE (1)				I				R				I				R	MA-26
Steering gear, linkage & transfer gear, axle & suspension parts				I		I		I		I		I		I		I		I	MA-28 NOTE (6)
Tire rotation		NOTE (2)																	MA-5
Drive shaft boots (4x4)				I		I		I		I		I		I		I		I	AX-12, "Drive Shaft"
Propeller shaft		NOTE (3)		L		L		L		L		L		L		L		L	MA-25
"Front wheel bearing grease"	4x2									I								I	AX-4, "Front Wheel Bearing"
Front wheel bearing grease	4x4	NOTE (4)				I				R				I				R	AX-4, "Front Wheel Bearing"
Exhaust system				I		I		I		I		I		I		I		I	MA-22
Supplemental air bag systems		NOTE (5)																	RS-14, "Maintenance Items"
ASCD vacuum hoses						I				I				I				I	EL-255, "ASCD ACTUATOR/PUMP CHECK", "Trouble Diagnoses"

NOTE:

(1) If towing a trailer, using a camper or a car-top carrier, or driving on rough or muddy roads, change (not just inspect) oil (exc. LSD) at every 30,000 miles (48,000 km) or 24 months, and change LSD gear oil every 15,000 miles (24,000 km) or 12 months.

(2) Refer to "Tire rotation" under the "GENERAL MAINTENANCE" heading earlier in this section.

(3) The propeller shaft should be re-greased after being immersed in water.

(4) If operating frequently in water, replace grease every 3,750 miles (6,000 km) or 3 months.

(5) Inspect the air bag system 10 years after the date of manufacture noted on the FMVSS certification label.

(6) Refer to SU-6, "Front Suspension Parts" and SU-18, "Rear Suspension Parts", AX-3, "Front Axle Parts" and AX-19, "Rear Axle Parts".

NAMA0004S0102

Abbreviations: R = Replace. I = Inspect. Correct or replace if necessary. [ ]: At the mileage intervals only

MAINTENANCE OPERATION		MAINTENANCE INTERVAL								Reference Section - Page or - Content Title
Perform at number of miles, kilometers or months, whichever comes first.	Miles x 1,000 (km x 1,000) Months	7.5 (12) 6	15 (24) 12	22.5 (36) 18	30 (48) 24	37.5 (60) 30	45 (72) 36	52.5 (84) 42	60 (96) 48	
Drive belts					I*				I*	MA-14
Air cleaner filter					[R]				[R]	MA-18
EVAP vapor lines					I*				I*	MA-21
Fuel lines					I*				I*	MA-17
Fuel filter*	NOTE (1)									MA-17
Engine coolant	NOTE (2)								R*	MA-15
Engine oil		R	R	R	R	R	R	R	R	MA-19
Engine oil filter (Use part No. 15208-31U00 or equivalent.)		R	R	R	R	R	R	R	R	MA-19
Spark plugs (PLATINUM-TIPPED type)		Replace every 105,000 miles (169,000 km)								MA-20
Intake & exhaust valve clearance*	NOTE (3)									EM-53

NOTE:

(1) When the filter becomes clogged, the vehicle speed cannot be increased as the driver wishes. In such an event, replace the filter.

(2) After 60,000 miles (96,000 km) or 48 months, replace every 30,000 miles (48,000 km) or 24 months.

(3) If valve noise increases, inspect valve clearance.

★ Maintenance items and intervals with "*" are recommended by NISSAN for reliable vehicle operation. The owner need not perform such maintenance in order to maintain the emission warranty or manufacturer recall liability. Other maintenance items and intervals are required.

NAMA0004S02
NAMA0004S0201

Abbreviations: R = Replace. I = Inspect. Correct or replace if necessary. L = Lubricate.

MAINTENANCE OPERATION		MAINTENANCE INTERVAL								Reference Section - Page or - Content Title
Perform at number of miles, kilometers or months, whichever comes first.	Miles x 1,000 (km x 1,000) Months	7.5 (12) 6	15 (24) 12	22.5 (36) 18	30 (48) 24	37.5 (60) 30	45 (72) 36	52.5 (84) 42	60 (96) 48	
Brake lines & cables			I		I		I		I	MA-27
Brake pads, rotors, drums & linings			I		I		I		I	MA-27, 28
Automatic transmission, (all-mode 4WD) transfer fluid, manual transmission & differential gear oil (exc. LSD)			I		I		I		I	MA-22, 23, 24, 26
LSD gear oil			I		R		I		R	MA-26
Steering gear, linkage & transfer gear, axle & suspension parts					I				I	MA-28 NOTE (4)
Tire rotation	NOTE (1)									MA-5
Drive shaft boots (4x4)			I		I		I		I	AX-12, "Drive Shaft"
Propeller shaft	NOTE (2)		L		L		L		L	MA-25
Front wheel bearing grease (4x2)					I				I	AX-4, "Front Wheel Bearing"
Front wheel bearing grease (4x4)			I		R		I		R	AX-4, "Front Wheel Bearing"
Exhaust system					I				I	MA-22
Supplemental air bag systems	NOTE (3)									RS-14, "Maintenance Items"
ASCD vacuum hoses			I		I		I		I	EL-255, "ASCD ACTUATOR/ PUMP CHECK", "Trouble Diagnoses"

NOTE:

(1) Refer to "Tire rotation" under the "GENERAL MAINTENANCE" heading earlier in this section.

(2) The propeller shaft should be re-greased after being immersed in water.

(3) Inspect the air bag system 10 years after the date of manufacture noted on the FMVSS certification label.

(4) Refer to SU-6, "Front Suspension Parts" and SU-18, "Rear Suspension Parts", AX-3, "Front Axle Parts" and AX-19, "Rear Axle Parts".

NAMA0004S0202

Fluids and Lubricants

NAMA0005S01

			Capacity (Approximate)			Recommended Fluids/Lubricants
			US measure	Imp measure	Liter	
Engine oil	Drain and refill	With oil filter	5-1/4 qt	4-3/8 qt	5.0	• API Certification Mark*1 • API grade SG/SH, Energy Conserving I & II or API grade SJ, Energy Conserving*1 • ILSAC grade GF-I & GF-II*1
		Without oil filter	5-1/8 qt	4-1/4 qt	4.8	
	Dry engine (Engine overhaul)		7-1/4 qt	6 qt	6.8	
Cooling system (With reservoir)			9-3/4 qt	8-1/8 qt	9.2	Genuine Nissan anti-freeze coolant or equivalent
Manual transmission gear oil	2WD		5-7/8 pt	4-7/8 pt	2.8	API GL-4, Viscosity SAE 75W-90 only
	4WD		10-3/4 pt	9 pt	5.1	
Transfer fluid	Part time 4WD model		2-3/8 qt	2 qt	2.2	Nissan Matic “D” (Continental U.S. and Alaska) or Canada NISSAN Automatic Transmission Fluid*2 or API GL-4*1
	All-mode 4WD model		3-1/8 qt	2-5/8 qt	3.0	Nissan Matic “D” (Continental U.S. and Alaska) or Canada NISSAN Automatic Transmission Fluid*2
Differential carrier gear oil	Front (4WD)		3-7/8 pt	3-1/4 pt	1.85	Standard differential gear: API GL-5*1 Limited-slip differential (LSD) gear: Use only LSD gear oil API GL-5 and SAE 80W-90*4 approved for Nissan LSD*5.
	Rear		5-7/8 pt	4-7/8 pt	2.8	
Automatic transmission fluid	2WD		9 qt	7-1/2 qt	8.5	Nissan Matic “D” (Continental U.S. and Alaska) or Canada NISSAN Automatic Transmission Fluid*2
	4WD					
Power steering fluid			—	—	—	Genuine NISSAN PSF II or equivalent*6
Brake and clutch fluid			—	—	—	Genuine Nissan Brake Fluid*3 or equivalent DOT 3 (U.S. FMVSS No. 116)
Propeller shaft grease			—	—	—	NLGI No. 2 (Molybdenum disulphide lithium soap base)
Multi-purpose grease			—	—	—	NLGI No. 2 (Lithium soap base)

*1: For further details, see “SAE Viscosity Number”.

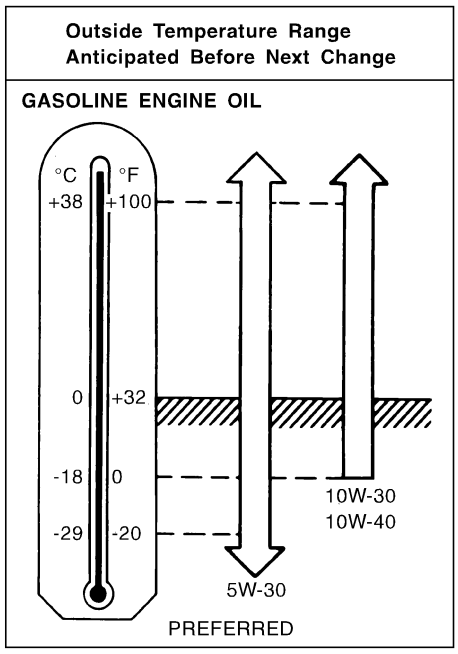
*2: DEXRON™ III/MERCON™ or equivalent may also be used. Outside the continental United States and Alaska contact a NISSAN dealership for more information regarding suitable fluids, including recommended brand(s) of DEXRON™ III/MERCON™ Automatic Transmission Fluid.

*3: Available in mainland U.S.A. through your NISSAN dealer.

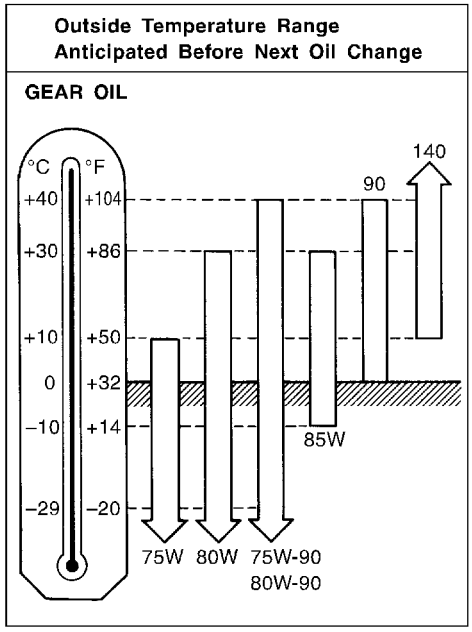
*4: SAE 90 is acceptable in ambient temperatures above −18°C (0°F).

*5: Contact a NISSAN dealer for a list of approved oils.

*6: Genuine NISSAN PSF, Canada NISSAN Automatic Transmission Fluid, DEXRON™ III/MERCON™ or equivalent ATF may also be used.



MMA117AA



MMA118A

Outside temperature down to		Anti-freeze	Demineralized water or distilled water
°C	°F		
–35	–30	50%	50%

SMA947CA

SAE Viscosity Number

NAMA0005S02

GASOLINE ENGINE OIL

NAMA0005S0201

SAE 5W-30 viscosity oil is preferred for all ambient temperatures. SAE 10W-30, 10W-40 viscosity oil may be used if the ambient temperature is above −18°C (0°F).

GEAR OIL

NAMA0005S0202

75W-90 for transfer, and 80W-90 for differential are preferable.

Anti-freeze Coolant Mixture Ratio

NAMA0005S03

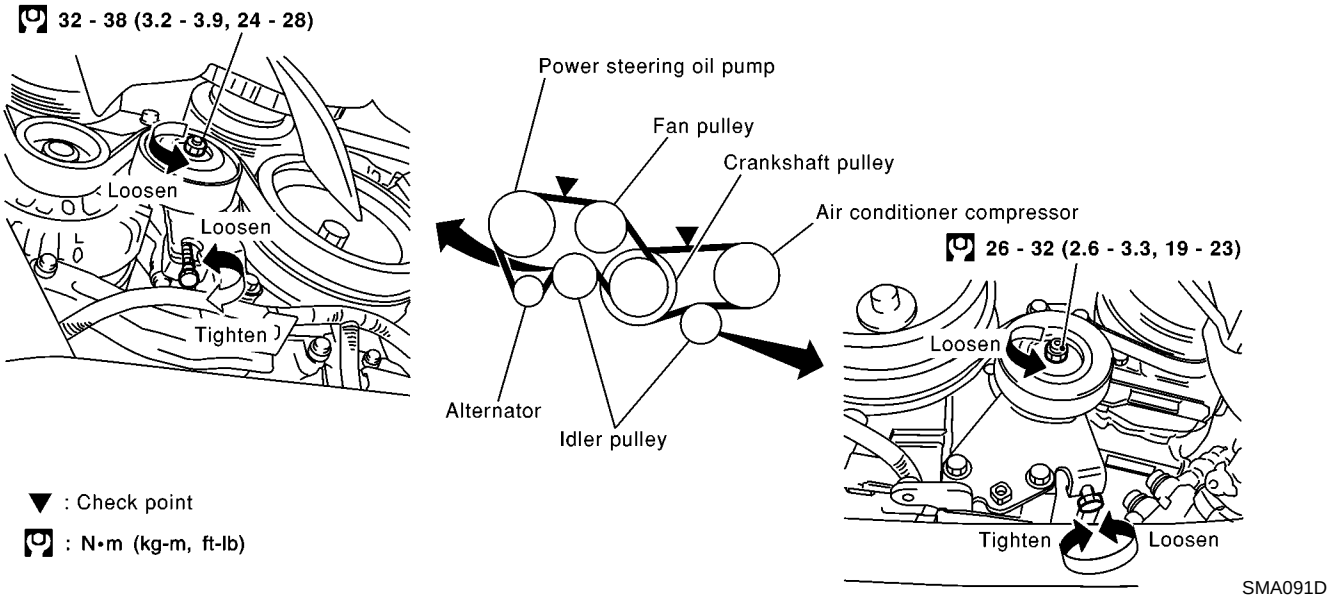
The engine cooling system is filled at the factory with a high-quality, year-round, anti-freeze coolant solution. The anti-freeze solution contains rust and corrosion inhibitors. Therefore, additional cooling system additives are not necessary.

CAUTION:

When adding or replacing coolant, be sure to use only a Genuine Nissan anti-freeze coolant or equivalent with the proper mixture ratio of 50% anti-freeze and 50% demineralized water/ distilled water. Other types of coolant solutions may damage your engine cooling system.

Checking Drive Belts

NAMA0049



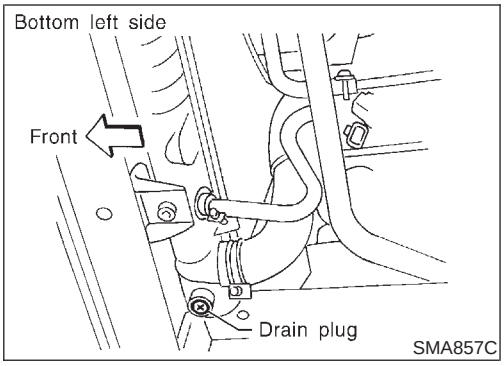
1. Inspect belt for cracks, fraying, wear and oil. If necessary, replace.
2. Inspect drive belt deflection or tension at a point on the belt midway between pulleys.
3. Check belt tension using belt tension gauge (BT3373-F or equivalent).

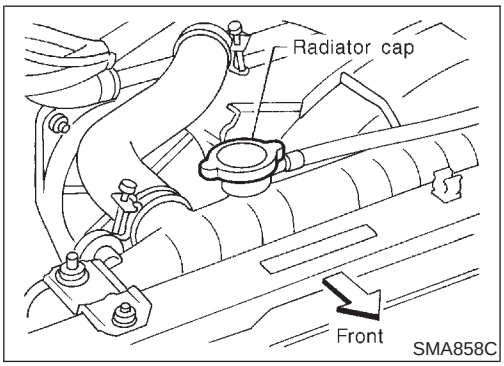
Inspect drive belt deflection or tension when engine is cold. Adjust if belt deflections exceed the limit or if belt tension is not within specifications.

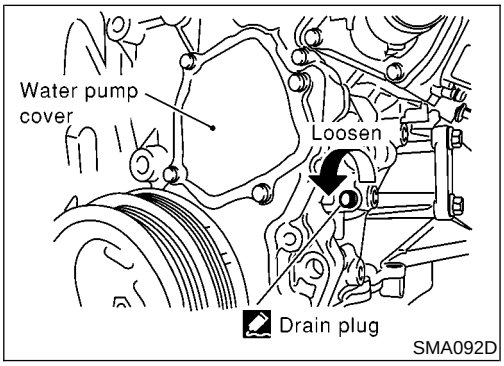
Belt deflection and tension

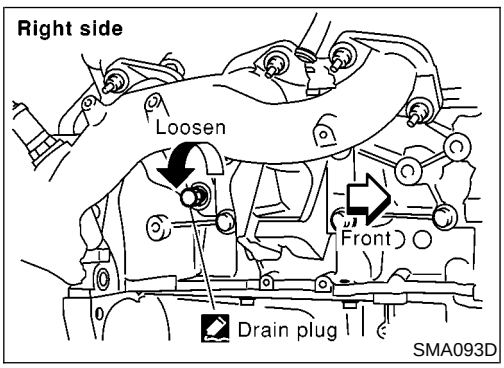
	Deflection adjustment			Unit: mm (in)	Tension adjustment *1			Unit: N (kg, lb)
	Used belt		New belt		Used belt		New belt	
	Limit	After adjustment			Limit	After adjustment		
Alternator Power steering oil pump Fan	7 (0.28)	4 - 5 (0.16 - 0.20)	3.5 - 4.5 (0.138 - 0.177)		294 (30, 66)	730 - 818 (74.4 - 83.5, 164 - 184)	838 - 926 (85.4 - 94.5, 188 - 208)	
Air conditioner compressor	12 (0.47)	9 - 10 (0.35 - 0.39)	8 - 9 (0.31 - 0.35)		196 (20, 44)	348 - 436 (35.5 - 44.5, 78 - 98)	470 - 559 (47.9 - 57.0, 106 - 126)	
Applied pushing force	98 N (10 kg, 22 lb)				—			

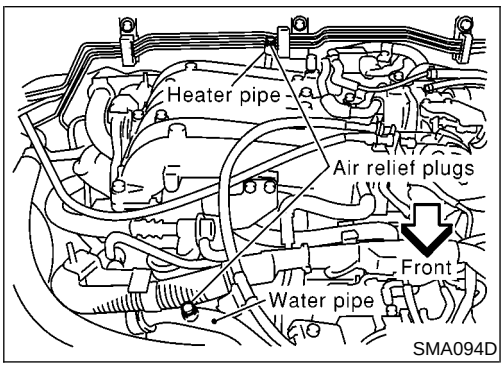
*1 If belt tension gauge cannot be installed at check points shown, check drive belt tension at a different location on the belt.











Changing Engine Coolant

NAMA0050

WARNING:

To avoid the danger of being scalded, never change the coolant when the engine is hot.

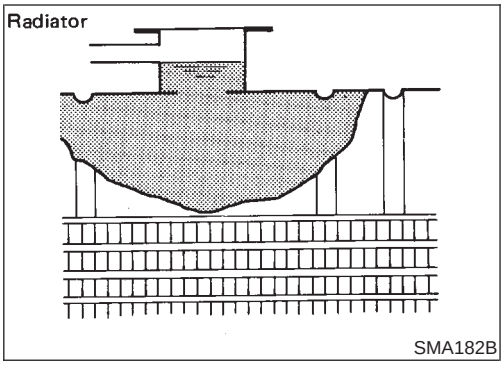
—DRAINING ENGINE COOLANT—

NAMA0050S01

1. Set air conditioning system as follows to prevent coolant from remaining in the system.
   a. Turn ignition switch “ON” and set temperature controller to maximum hot position.
   b. Wait 10 seconds before turning ignition switch “OFF”.
2. Open radiator drain plug at the bottom of radiator.
3. Remove radiator filler cap.
   Remove reservoir tank, drain coolant, then clean reservoir tank.
   Install it temporarily.

- **Be careful not to allow coolant to contact drive belts.**

4. Open drain plugs on right side of cylinder block and water pump side, then open air relief plugs to drain coolant.
5. Check drained coolant for contaminants such as rust, coorrosion or discoloration. If contaminated flush engine cooling system, “Refer to FLUSHING COOLING SYSTEM”, MA-17.



—REFILLING ENGINE COOLANT—

NAMA0050S02

1. Install reservoir tank, radiator drain plug, and cylinder block drain plugs.

- **Apply sealant to the thread of cylinder block drain plugs.**

: 8 - 11 N·m (0.8 - 1.2 kg-m, 70 - 104 in-lb) Front side

: 18 - 21 N·m (1.8 - 2.2 kg-m, 13 - 15 ft-lb) Right side

2. Fill coolant up to the top of the radiator mouth. While filling, tighten each air bleeding plug from where coolant overflows. Fill in the coolant again up to top of the mouth.
3. Fill reservoir tank with coolant up to the MAX level and install radiator cap.

Air relief plugs:

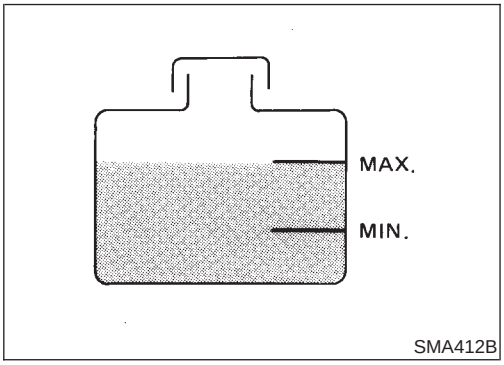
: 6.7 - 7.9 N·m (0.68 - 0.81 kg-m, 59 - 70 in-lb)

Use Geniune Nissan antifreeze coolant or equivalent mixed with demineralized water/distilled water.

For coolant mixture ratio, refer to "RECOMMENDED FLUIDS AND LUBRICANTS", MA-13.

Coolant capacity (Without reservoir tank):

8.6 ℓ (9-1/8 US qt, 7-5/8 Imp qt)



Reservoir tank capacity (for MAX level):

0.6 ℓ (5/8 US qt, 1/2 Imp qt)

Pour coolant through coolant filler neck slowly to allow air in system to escape.

4. Warm up engine to normal operating temperature.
5. Run engine at 3,000 rpm for 10 seconds and return to idle speed.

- Repeat 2 or 3 times.

Watch coolant temperature gauge so as not to overheat the engine.

6. Stop engine and cool it down.

- Cool down using a fan to reduce the time.

7. Remove the radiator filler cap and check coolant level.

- If necessary, refill radiator up to filler neck with coolant.

8. Refill reservoir tank to Max line with coolant.
9. Repeat steps 4 through step 8 two or more times.
10. Warm up engine, and check for sound of coolant flow while running engine from idle up to 3,000 rpm with heater temperature control set at several positions between COOL and HOT.

- Sound may be noticeable at heater water cock.

11. If sound is heard, bleed air from cooling system by repeating

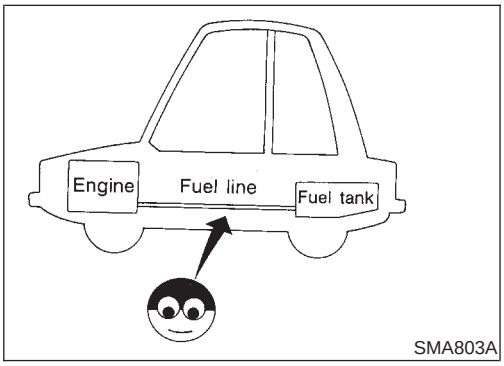
steps 4 through 8 until coolant level no longer drops.

- **Clean excess coolant from engine.**

—FLUSHING COOLING SYSTEM—

NAMA0050S03

1. Open air relief plug.
2. Fill radiator with water until water spills from the air relief holes, then close air relief plugs. Fill radiator and reservoir tank with water and reinstall radiator cap.
3. Run engine and warm it up to normal operating temperature.
4. Rev engine two or three times under no-load.
5. Stop engine and wait until it cools down.
6. Drain water.
7. Repeat steps 1 through 6 until clear water begins to drain from radiator.

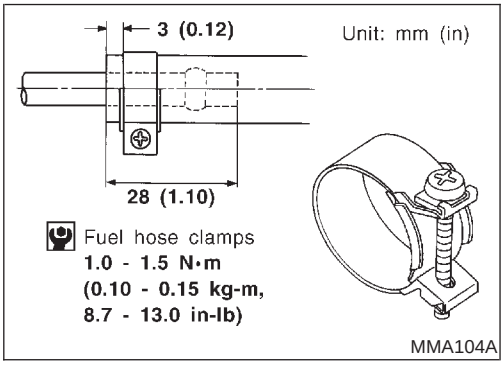


SMA803A

Checking Fuel Lines

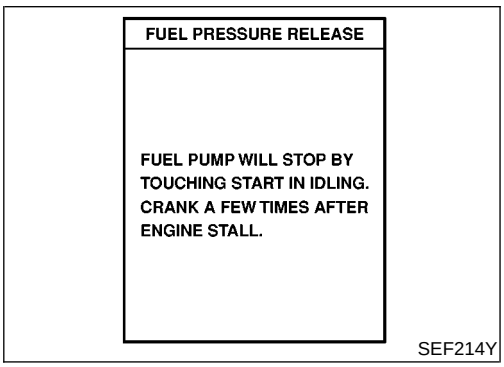
NAMA0051

Inspect fuel lines and tank for improper attachment, leaks, cracks, damage, loose connections, chafing or deterioration.
If necessary, repair or replace faulty parts.



MMA104A

CAUTION:
Tighten high-pressure rubber hose clamp so that clamp end is 3 mm (0.12 in) from hose end.
Tightening torque specifications are the same for all rubber hose clamps.
Ensure that screw does not contact adjacent parts.



SEF214Y

Changing Fuel Filter

NAMA0052

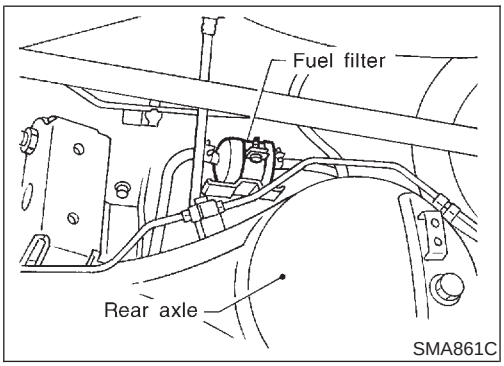
WARNING:
Before removing fuel filter, release fuel pressure from fuel line.

WITH CONSULT-II

NAMA0052S01

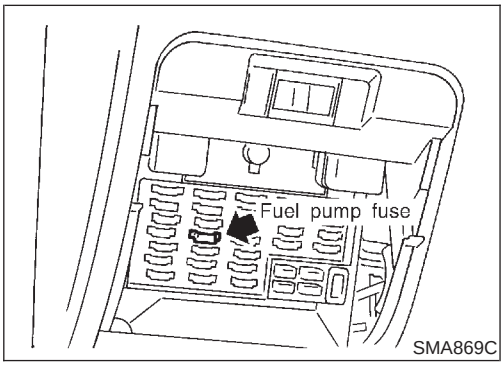
1. Turn ignition switch "ON".
2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-II.
3. Start engine.
4. After engine stalls, crank engine two or three times to release all fuel pressure.

5. Turn ignition switch "OFF".



6. Loosen fuel hose clamps.
7. Replace fuel filter.

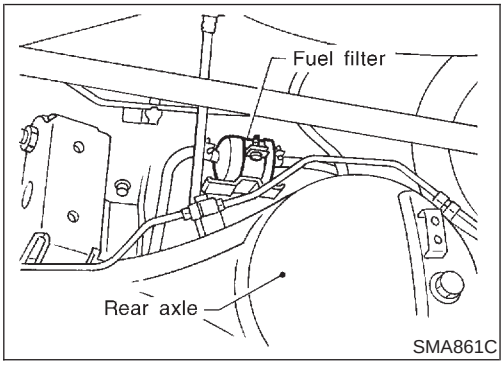
- **Be careful not to spill fuel over engine compartment. Place a shop towel to absorb fuel.**
- **Use a high-pressure type fuel filter. Do not use a synthetic resinous fuel filter.**
- **When tightening fuel hose clamps, refer to "Checking Fuel Lines".**



⊗ WITHOUT CONSULT-II

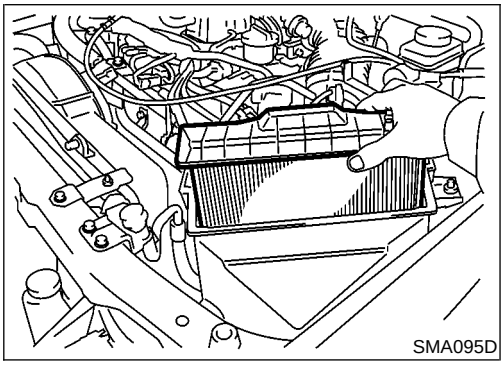
NAMA0052S02

1. Remove fuel pump fuse located in fuse box.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch "OFF" and install fuel pump fuse.



5. Loosen fuel hose clamps.
6. Replace fuel filter.

- **Be careful not to spill fuel over engine compartment. Place a shop towel to absorb fuel.**
- **Use a high-pressure type fuel filter. Do not use a synthetic resinous fuel filter.**
- **When tightening fuel hose clamps, refer to "Checking Fuel Lines".**



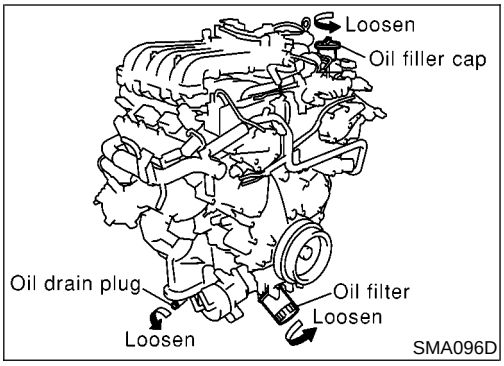
Changing Air Cleaner Filter

NAMA0053

VISCOUS PAPER TYPE

NAMA0053S01

The viscous paper type filter does not need cleaning between replacement intervals.



Changing Engine Oil

NAMA0054

WARNING:

- **Be careful not to burn yourself, as the engine oil is hot.**
- **Prolonged and repeated contact with used engine oil may cause skin cancer; try to avoid direct skin contact with used oil. If skin contact is made, wash thoroughly with soap or hand cleaner as soon as possible.**

1. Warm up engine, and check for oil leakage from engine components.
2. Stop engine and wait for more than 10 minutes.
3. Remove drain plug and oil filler cap.
4. Drain oil and refill with new engine oil.

Oil specification and viscosity

- API grade SG or SH, Energy Conserving I & II or API grade SJ, Energy Conserving
- API Certification Mark
- ILSAC grade GF-I & GF-II
- See “RECOMMENDED FLUIDS AND LUBRICANTS”, MA-12.

Oil capacity (Approximately):

Unit: ℓ (US qt, Imp qt)

Drain and refill	With oil filter change	5.0 (5-1/4, 4-3/8)
	Without oil filter change	4.8 (5-1/8, 4-1/4)
Dry engine (engine overhaul)		6.8 (7-1/4, 6)

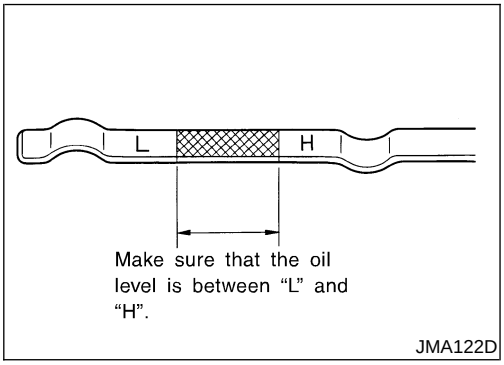
CAUTION:

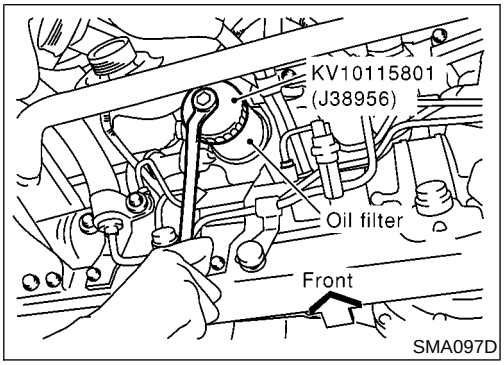
- **Be sure to clean drain plug and install with new washer.**

  Oil pan drain plug:

  : 29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)
- **The refill capacity depends on the oil temperature and drain time. Use these specifications for reference only. Always use the dipstick to determine when the proper amount of oil is in the engine.**

5. Warm up engine and check area around drain plug and oil filter for oil leakage.
6. Stop engine and wait for more than 10 minutes.
7. Check oil level.





Changing Oil Filter

NAMA0055

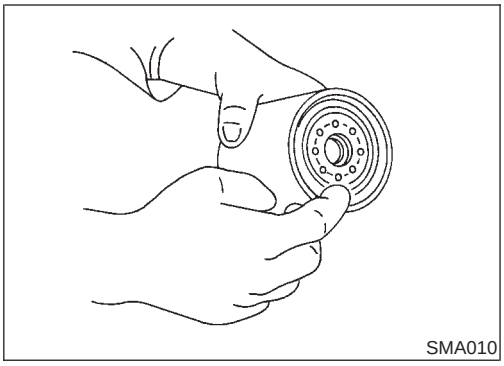
1. Remove oil filter with Tool.

WARNING:

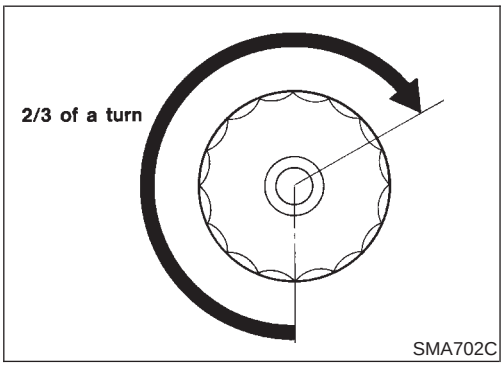
Be careful not to burn yourself, as the engine and engine oil are hot.

The filter is a full-flow cartridge type and is provided with a relief valve.

Refer to LC-8, “Oil Filter”.


SMA010

2. Clean oil filter mounting surface on cylinder block. Coat rubber seal of new oil filter with engine oil.



SMA702C

3. Screw in the oil filter until a slight resistance is felt, then tighten an additional 2/3 turn.
4. Add engine oil.

Refer to MA-19, "Changing Engine Oil".

- **Clean excess oil from engine.**

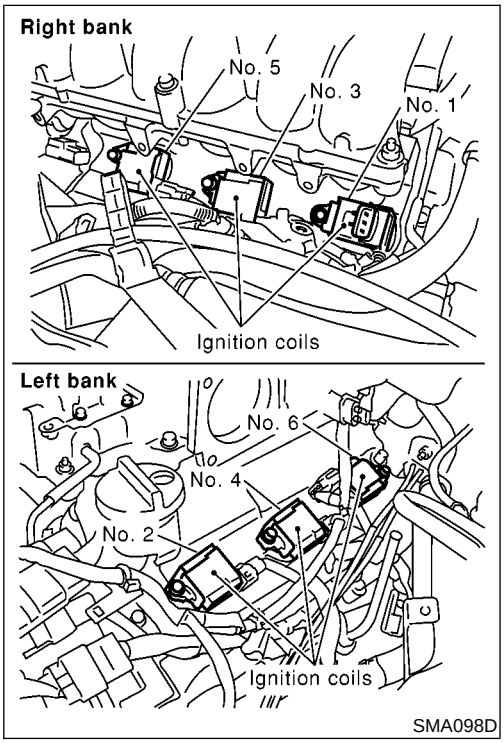
Changing Spark Plugs

NAMA0056

1. Remove engine cover.
2. Remove throttle wires.
3. Remove air duct with air cleaner assembly.
4. Disconnect harness connectors and harness brackets around ignition coil sides.
5. Remove throttle body. (Only when removing the No. 4 cylinder spark plug)
6. Disconnect ignition coil harness connectors.
7. Loosen ignition coil fixing bolts and pull out coil from intake manifold connector.

Ignition coil:

: 8.5 - 10.7 N·m (0.86 - 1.1 kg-m, 75 - 95 in-lb)



SMA098D

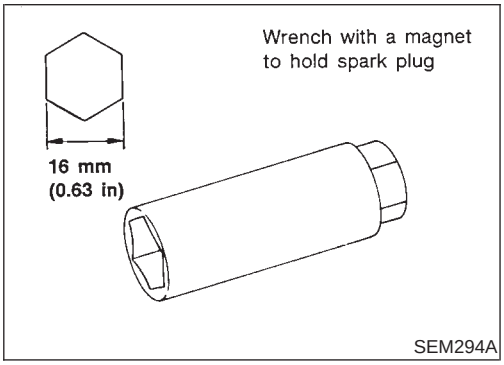
8. Check type and gap of new spark plug.

Spark plug type:

	Symbol	Make
Standard type	PLFR5A-11	NGK
Cold type	PLFR6A-11	NGK
Hot type	PLFR4A-11	NGK

Gap (Nominal): 1.1 mm (0.043 in)

Spark plug:



SEM294A

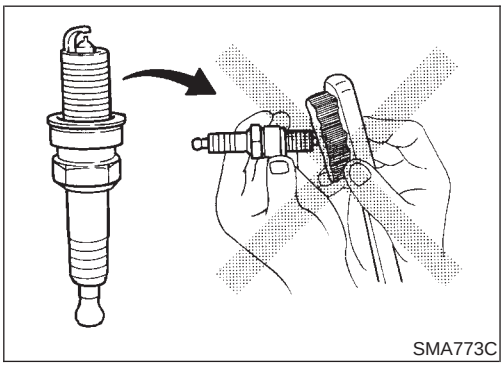
: 20 - 29 N·m (2.0 - 3.0 kg-m, 14 - 22 ft-lb)

Use standard type spark plug for normal condition.
The hot type spark plug is suitable when fouling may occur with the standard type spark plug such as:

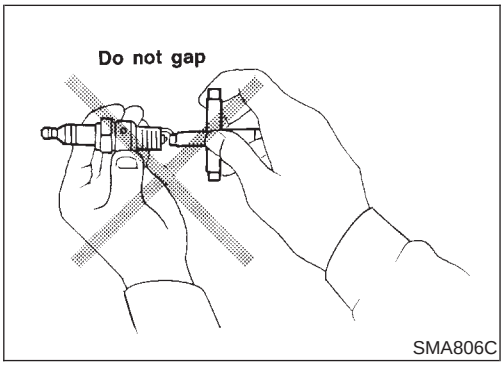
- frequent engine starts
- low ambient temperatures

The cold type spark plug is suitable when spark knock may occur with the standard type spark plug such as:

- extended highway driving
- frequent high engine revolution


SMA773C

- **Do not use a wire brush for cleaning.**
- **If plug tip is covered with carbon, spark plug cleaner may be used.**
  Cleaner air pressure:
  Less than 588 kPa (6 kg/cm^2, 85 psi)
  Cleaning time:
  Less than 20 seconds



SMA806C

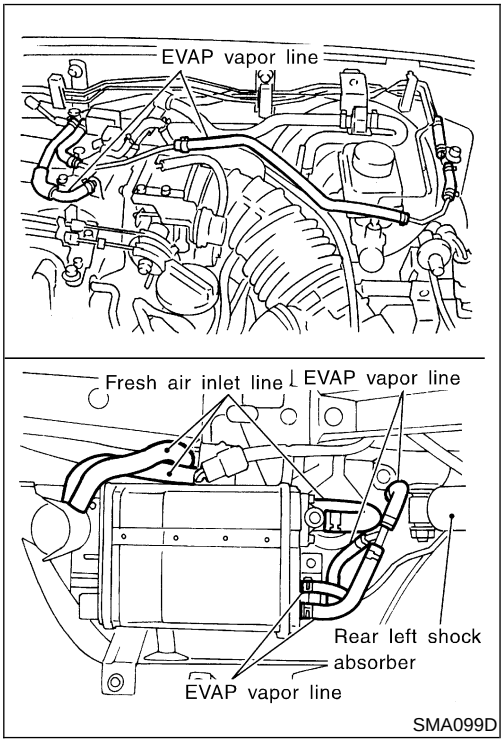
- **Checking and adjusting plug gap is not required between change intervals.**

Checking EVAP Vapor Lines

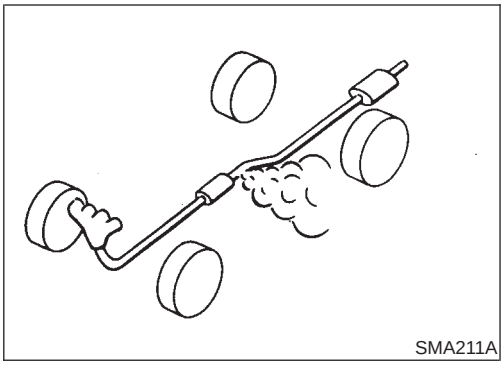
NAMA0057

1. Visually inspect EVAP vapor lines for improper attachment, cracks, damage, loose connections, chafing or deterioration.
2. Inspect vacuum relief valve of fuel tank filler cap for clogging, sticking, etc.

Refer to EC-XX, "EVAPORATIVE EMISSION SYSTEM".



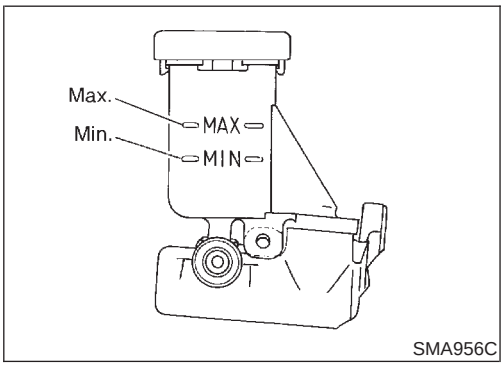
SMA099D


SMA211A

Checking Exhaust System

NAMA0019

Check exhaust pipes, muffler and mounting for improper attachment, leaks, cracks, damage, loose connections, chafing or deterioration.

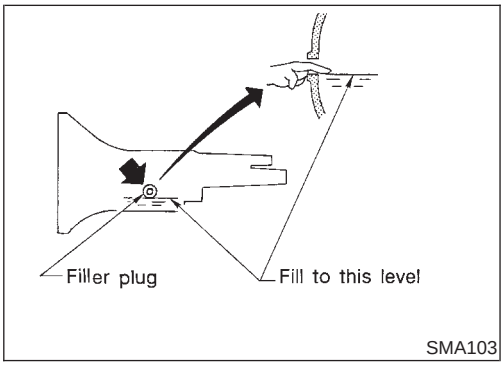


SMA956C

Checking Clutch Fluid Level and Leaks

NAMA0020

If fluid level is extremely low, check clutch system for leaks.



SMA103

Checking M/T Oil

NAMA0021

Check for oil leakage and oil level.

Never start engine while checking oil level.

Filler plug:

: 25 - 34 N·m (2.5 - 3.5 kg-m, 18 - 25 ft-lb)

Changing M/T Oil

NAMA0022

1. Drain oil from drain plug and refill with new gear oil.
2. Check oil level.

Oil grade and viscosity:

API GL-4. Refer to “Fluids and Lubricants”, “RECOMMENDED FLUIDS AND LUBRICANTS”, MA-12.

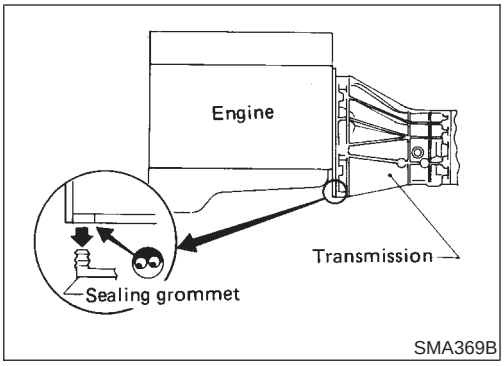
Oil capacity:

2WD 2.8 ℓ (5-7/8 US pt, 4-7/8 Imp pt)

4WD 5.1 ℓ (10-3/4 US pt, 9 Imp pt)

Drain plug:

: 25 - 34 N·m (2.5 - 3.5 kg-m, 18 - 25 ft-lb)

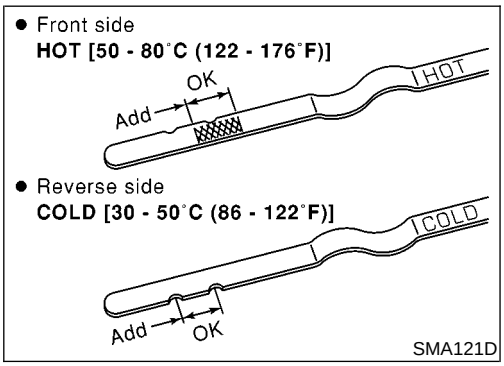


SMA369B

Checking Water Entry — For 4WD models with M/T

NAMA0023

Check water entry in the clutch housing by removing the sealing grommet, whenever driving in deep water or mud.



SMA121D

Checking A/T Fluid

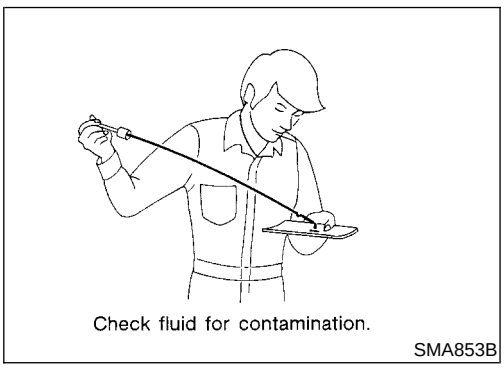
NAMA0024

1. Warm up engine.
2. Check for fluid leakage.
3. Before driving, fluid level can be checked at fluid temperatures of 30 to 50°C (86 to 122°F) using “COLD” range on dipstick.

a. Park vehicle on level surface and set parking brake.
b. Start engine and move selector lever through each gear position. Leave selector lever in “P” position.
c. Check fluid level with engine idling.
d. Remove dipstick and note reading. If level is at low side of either range, and fluid to the charging pipe.
e. Re-insert dipstick into charging pipe as far as it will go.
f. Remove dipstick and note reading. If reading is at low side of range, add fluid to the charging pipe.

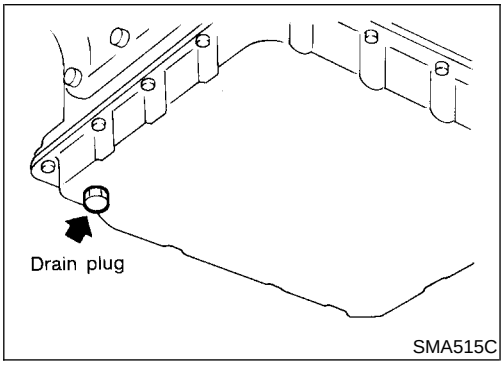
Do not overfill.

4. Drive vehicle for approximately 5 minutes in urban areas.
5. Re-check fluid level at fluid temperatures of 50 to 80°C (122 to 176°F) using “HOT” range on dipstick.


Check fluid for contamination.
SMA853B

6. Check fluid condition.

- If fluid is very dark or smells burned, refer to AT section for checking operation of A/T. Flush cooling system after repair of A/T.
- If A/T fluid contains frictional material (clutches, bands, etc.), replace radiator and flush cooler line using cleaning solvent and compressed air after repair of A/T. Refer to LC-20, “Radiator”.



SMA515C

Changing A/T Fluid

NAMA0025

1. Warm up A/T fluid.
2. Stop engine.
3. Drain A/T fluid from drain plug and refill with new A/T fluid. Always refill same volume with drained fluid.

Fluid grade:

Nissan Matic “D” (Continental U.S. and Alaska) or Canada NISSAN Automatic Transmission Fluid. Refer to “RECOMMENDED FLUIDS AND LUBRICANTS”, MA-12.

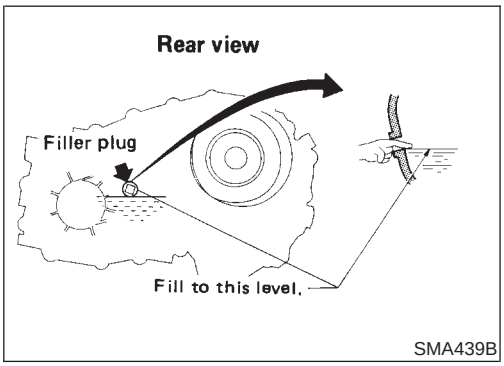
Fluid capacity (With torque converter):

2WD, 4WD 8.5 ℓ (9 US qt, 7-1/2 Imp qt)

Drain plug:

: 29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)

4. Run engine at idle speed for five minutes.
5. Check fluid level and condition. Refer to MA-23, " Checking A/T Fluid". If fluid is still dirty, repeat steps 2 through 5.



Checking Part Time 4WD Transfer Fluid

NAMA0026

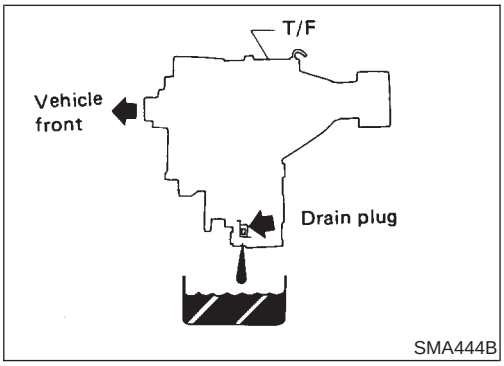
Check for fluid leakage and fluid level.

A/T fluid is used for the transfer in the factory.

Never start engine while checking fluid level.

Filler plug:

: 25 - 34 N·m (2.5 - 3.5 kg-m, 18 - 25 ft-lb)



Changing Part Time 4WD Transfer Fluid

NAMA0027

When changing transfer fluid completely, A/T fluid may be used.

Fluid grade:

Nissan Matic "D" (Continental U.S. and Alaska) or Canada NISSAN Automatic Transmission Fluid or API GL-4.

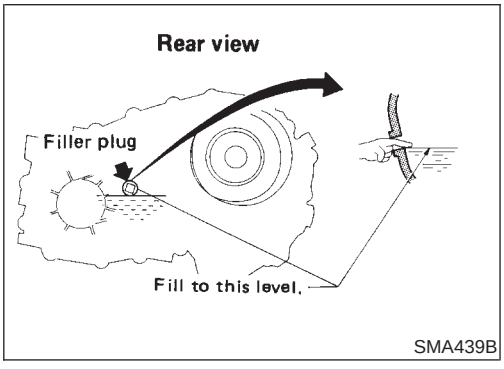
Refer to "Fluids and Lubricants", "RECOMMENDED FLUIDS AND LUBRICANTS", MA-12.

Fluid capacity:

2.2 ℓ (2-3/8 US qt, 2 Imp qt)

Drain plug:

: 25 - 34 N·m (2.5 - 3.5 kg-m, 18 - 25 ft-lb)



Checking All-mode 4WD Transfer Fluid

NAMA0047

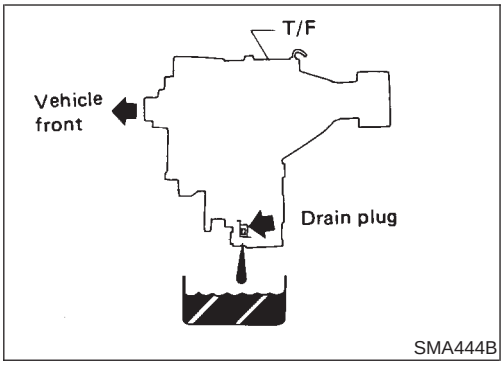
Check for oil leakage and fluid level.

A/T fluid is used for the all-mode 4WD transfer in the factory.

Never start engine while checking fluid level.

Filler plug:

: 10 - 20 N·m (1.0 - 2.0 kg-m, 87 - 174 in-lb)



Changing All-mode 4WD Transfer Fluid

NAMA0048

When changing all-mode 4WD transfer fluid completely, A/T fluid may be used.

Fluid grade:

Nissan Matic "D" (Continental U.S. and Alaska) or Canada NISSAN Automatic Transmission Fluid

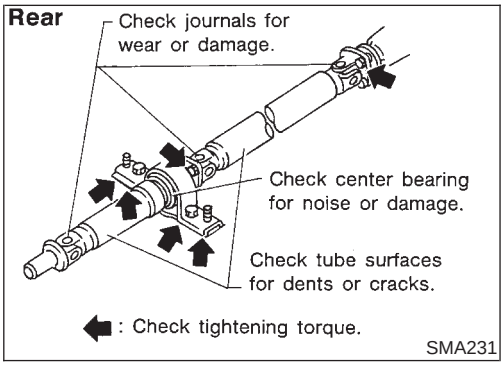
Refer to "Fluids and Lubricants", "RECOMMENDED FLUIDS AND LUBRICANTS", MA-12.

Fluid capacity:

3.0 ℓ (3-1/8 US qt, 2-5/8 Imp qt)

Drain plug:

: 10 - 20 N·m (1.0 - 2.0 kg-m, 87 - 174 in-lb)

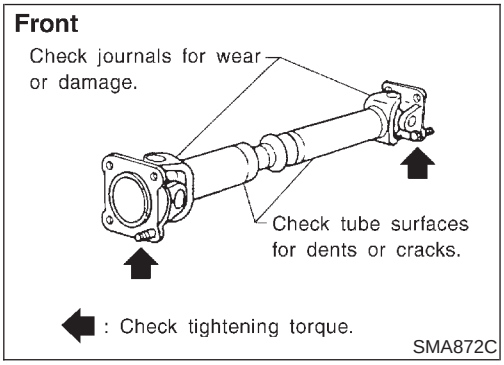


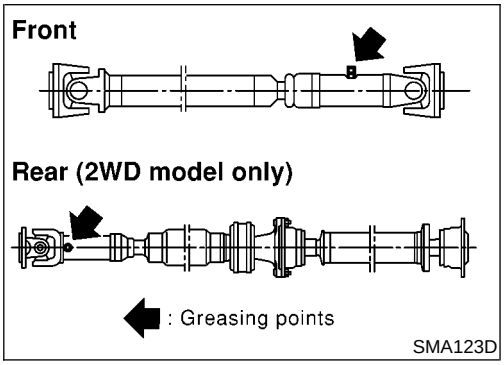
Checking Propeller Shaft

NAMA0028

Check propeller shaft for damage, looseness or grease leakage.

Tightening torque: Refer to PD-8, "Propeller shaft vibration".





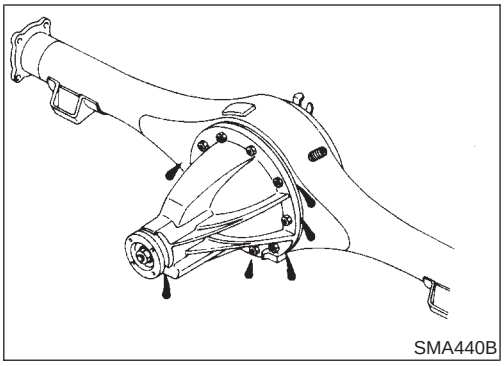
Greasing Propeller Shaft

NAMA0029

Apply specified grease to nipples provided on propeller shaft.

Grease grade:

Refer to "RECOMMENDED FLUIDS AND LUBRICANTS", MA-12.


SMA440B

Checking Differential Gear Oil

NAMA0030

Check for oil leakage and oil level.

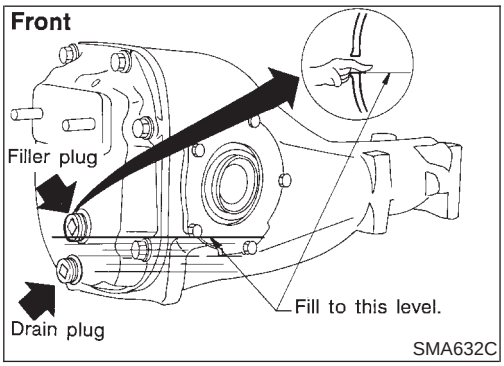
Filler plug:

Front

: 39 - 59 N·m (4 - 6 kg-m, 29 - 43 ft-lb)

Rear

: 59 - 118 N·m (6 - 12 kg-m, 43 - 87 ft-lb)



SMA632C

Changing Differential Gear Oil

NAMA0031

1. Drain oil from drain plug and refill with new gear oil.
2. Check oil level.

Oil grade and viscosity:

See “RECOMMENDED FLUIDS AND LUBRICATNS”, MA-12, 13.

Oil capacity:

Front

1.85ℓ (3-7/8 US pt, 3-1/4 Imp pt)

Rear

2.8ℓ (5-7/8 US pt, 4-7/8 Imp pt)

Filler plug:

Front

: 39 - 59 N·m (4 - 6 kg-m, 29 - 43 ft-lb)

Rear

: 59 - 118 N·m (6 - 12 kg-m, 43 - 87 ft-lb)

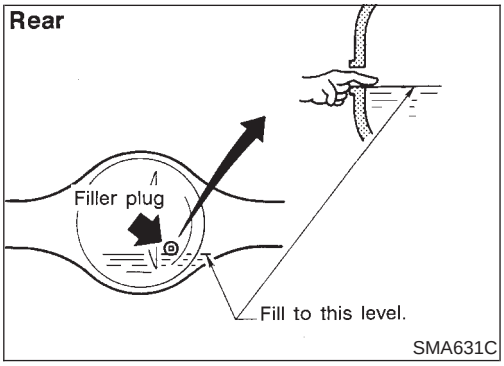
Drain plug:

Front

: 59 - 98 N·m (6 - 10 kg-m, 43 - 72 ft-lb)

Rear

: 59 - 118 N·m (6 - 12 kg-m, 43 - 87 ft-lb)



SMA631C

LIMITED-SLIP DIFFERENTIAL GEAR

NAMA0031S01

- Use only approved limited-slip differential gear oil.
- Limited-slip differential identification.

1. Lift both rear wheels off the ground.
2. Turn one rear wheel by hand.
3. If both rear wheels turn in the same direction simultaneously, vehicle is equipped with limited-slip differential.

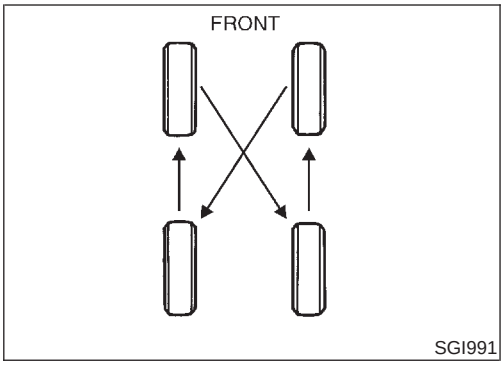
Balancing Wheels

NAMA0032

Adjust wheel balance using the road wheel center.

Wheel balance (Maximum allowable unbalance):

Refer to SDS, MA-31.



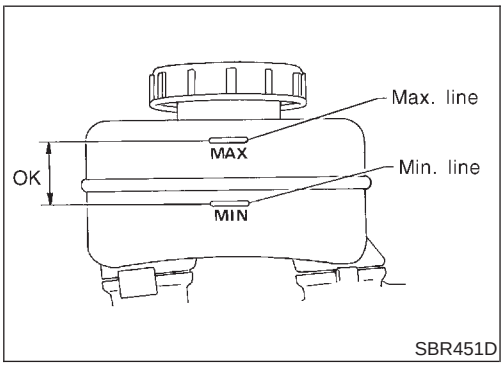
SGI991

Tire Rotation

NAMA0033

- **After rotating the tires, adjust the tire pressure.**
- **Retighten the wheel nuts after the vehicle has been driven for the 1,000 km (600 miles). (also in cases of a flat tire, etc.)**

Wheel nuts:
: 118 - 147 N·m (12 - 15 kg-m, 87 - 108 ft-lb)

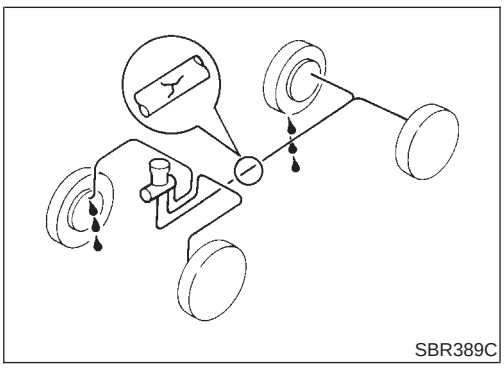


SBR451D

Checking Brake Fluid Level and Leaks

NAMA0034

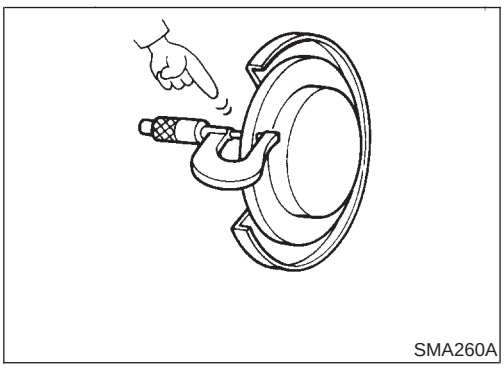
If fluid level is extremely low, check brake system for leaks.


SBR389C

Checking Brake Lines and Cables

NAMA0035

Check brake fluid lines and parking brake cables for improper attachment, leaks, chafing, abrasions and deterioration.


SMA260A

Checking Disc Brake

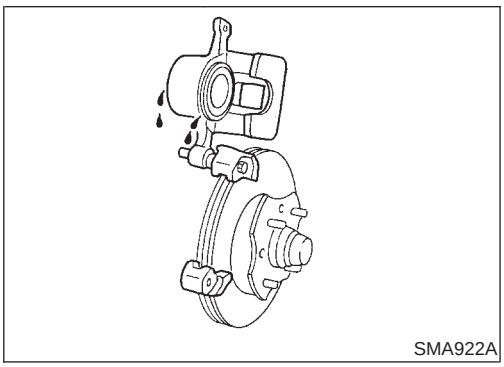
NAMA0036

ROTOR

NAMA0036S01

Check condition and thickness.

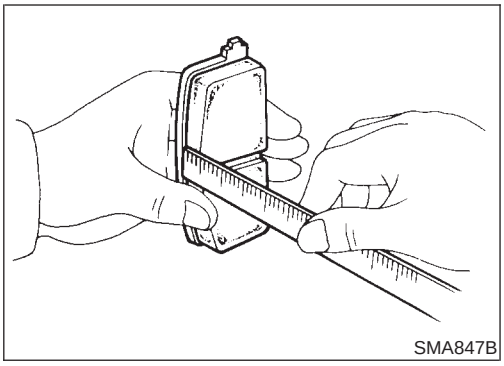
Standard thickness:
28 mm (1.10 in)
Minimum thickness:
26 mm (1.02 in)


SMA922A

CALIPER

NAMA0036S02

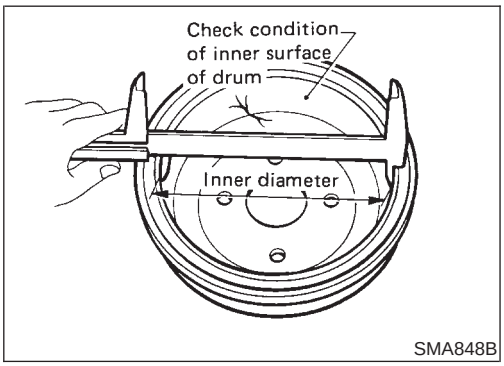
Check for leakage.


SMA847B

PAD
NAMA0036S03

Check wear or damage.

Standard thickness:
11 mm (0.43 in)
Minimum thickness: 2 mm (0.08 in)



SMA848B

Checking Drum Brake
NAMA0037

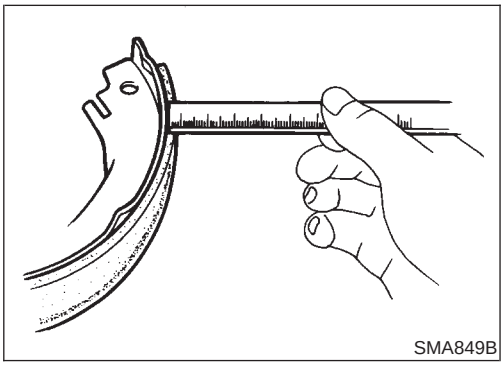
WHEEL CYLINDER
NAMA0037S01

Check for leakage.

DRUM
NAMA0037S02

Check condition and inner surface.

Standard inner diameter:
295 mm (11.61 in)
Drum repair limit (Inner diameter):
296.5 mm (11.67 in)


SMA849B

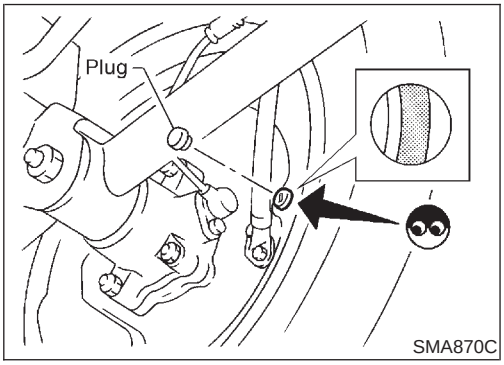
LINING
NAMA0037S03

Check wear or damage.

Standard thickness:
6.1 mm (0.24 in)
Lining wear limit (Minimum thickness):
1.5 mm (0.059 in)

TEMPORARY METHOD FOR CHECKING LINING WEAR
NAMA0037S04

Remove inspection hole plug and check for lining wear.



SMA870C

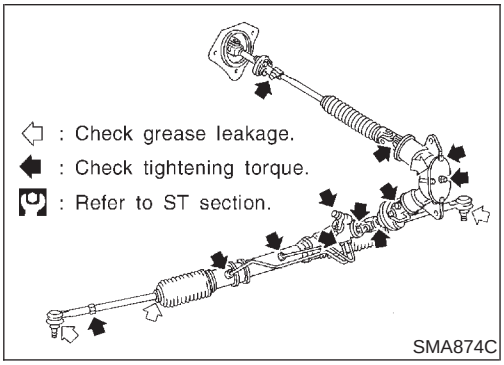
Checking Steering Gear, Linkage and Transfer Gear
NAMA0038

STEERING GEAR
NAMA0038S01

- Check gear housing and boots for looseness, damage and grease leakage.
- Check connection with steering column for looseness.

STEERING LINKAGE
NAMA0038S02

- Check ball joint, dust cover and other component parts for looseness, wear, damage and grease leakage.

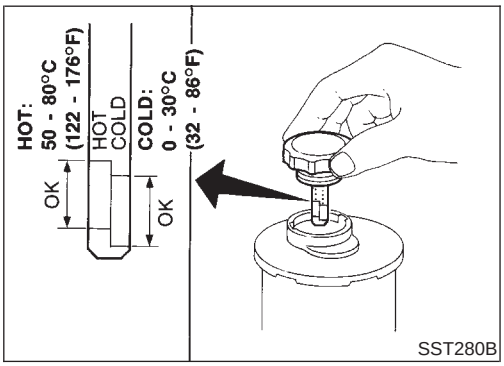


SMA874C

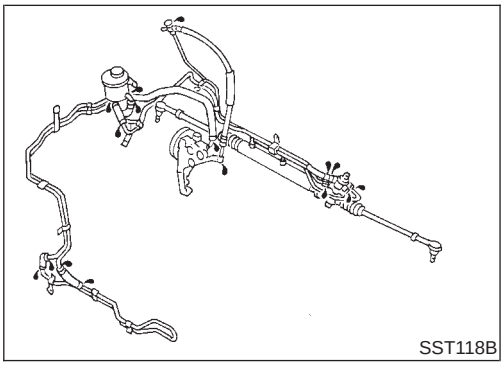
STEERING TRANSFER GEAR

NAMA0038S03

- Check gear box for looseness, damage and grease leakage.



SST280B


SST118B

Checking Power Steering Fluid and Lines

NAMA0039

CHECKING FLUID LEVEL

NAMA0039S01

- Check fluid level with engine off.
- Check fluid level with dipstick on reservoir cap. Use "HOT" range at fluid temperatures of 50 to 80°C (122 to 176°F). Use "COLD" range at fluid temperatures of 0 to 30°C (32 to 86°F).

CAUTION:

- **Do not overfill.**
- **Recommended fluid is Genuine NISSAN PSF II or equivalent. Refer to "RECOMMENDED FLUIDS AND LUBRICANTS", MA-12.**

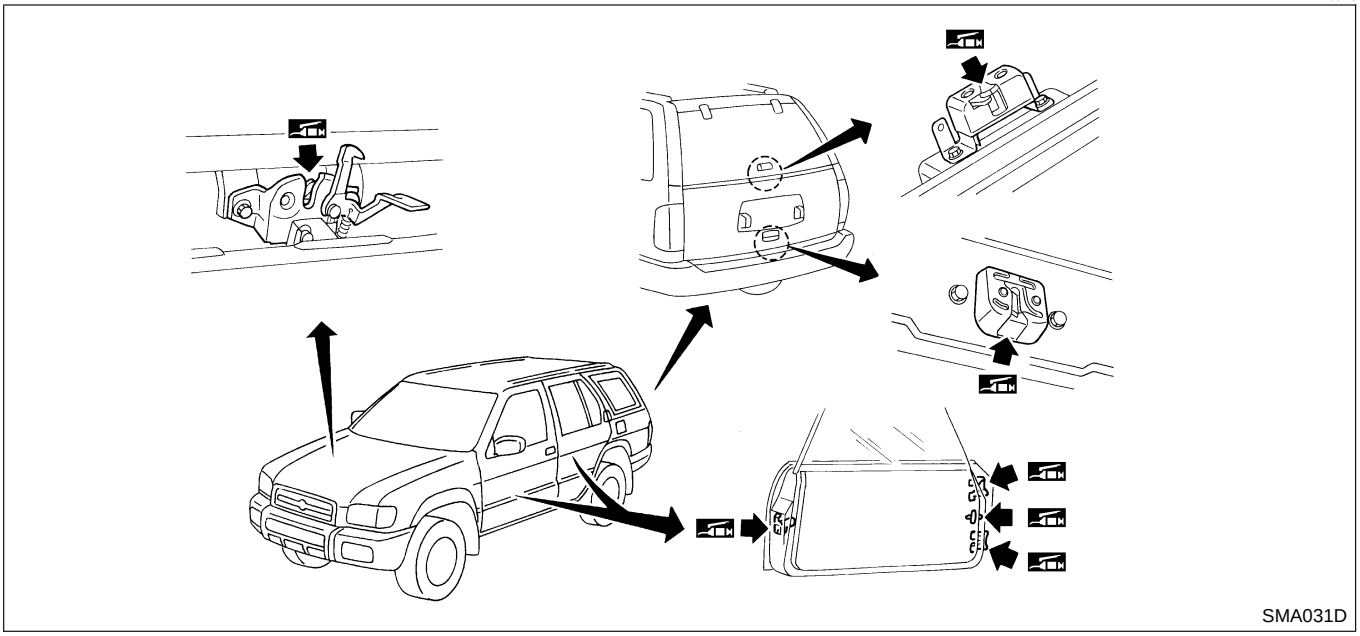
CHECKING LINES

NAMA0039S02

- Check lines for improper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.
- Check rack boots for accumulation of power steering fluid.

Lubricating Locks, Hinges and Hood Latches

NAMA0040


SMA031D

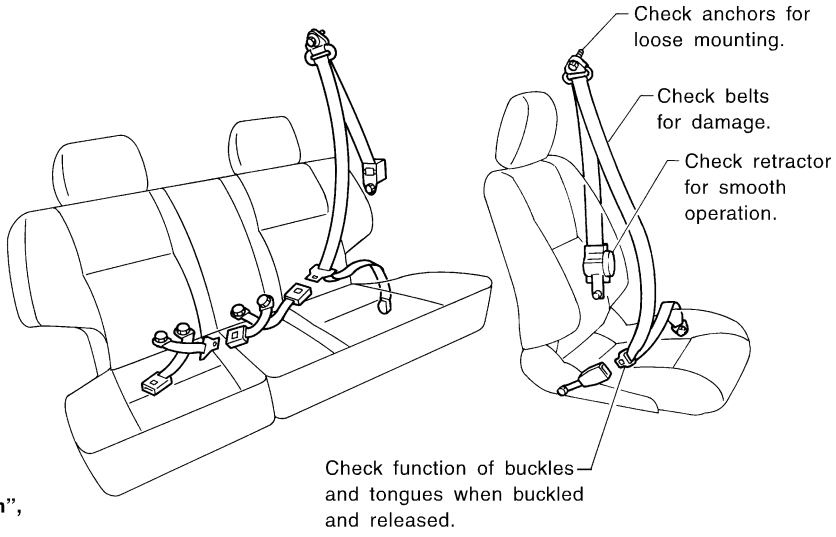
Checking Seat Belts, Buckles, Retractors, Anchors and Adjusters

NAMA0041

CAUTION:

- **After any collision, inspect all seat belt assemblies, including retractors and other attached hardwares (i.e. anchor bolt, guide rail set). Nissan recommends to replace all seat belt assemblies in use during a collision, unless not damaged and properly operating after minor collision. Also inspect seat belt assemblies not in use during a collision, and replace if damaged or improperly operating. Seat belt pre-tensioner should be replaced even if the seat belts are not in use during a frontal collision where the driver and passenger air bags are deployed.**
- **If any component of seat belt assembly is questionable, do not repair. Replace as seat belt assembly.**
- **If webbing is cut, frayed, or damaged, replace belt assembly.**
- **Never oil tongue and buckle.**
- **Use a genuine seat belt assembly.**

For details, refer to "Seat Belt Inspection", "SEAT BELTS" in RS section.



Anchor bolt

43.1 - 54.9 N·m (4.4 - 5.6 kg-m, 32 - 40 ft-lb)

SMA854CD

Engine Maintenance

DRIVE BELT DEFLECTION

NAMA0058
Unit: mm (in)

	Used belt deflection		Deflection of new belt
	Limit	Deflection after adjustment	
Alternator Power steering oil pump Fan	7 (0.28)	4 - 5 (0.16 - 0.20)	3.5 - 4.5 (0.138 - 0.177)
Air conditioner compressor	12 (0.47)	9 - 10 (0.35 - 0.39)	8 - 9 (0.31 - 0.35)
Applied pushing force	98 N (10 kg, 22 lb)		

DRIVE BELT TENSION

NAMA0059
Unit: N (kg, lb)

	Used belt		New belt
	Limit	After adjustment	
Generator Power steering oil pump Fan	294 (30, 66)	730 - 818 (74.4 - 83.5, 164 - 184)	838 - 926 (85.4 - 94.5, 188 - 208)
Air conditioner compressor	196 (20, 44)	348 - 436 (35.5 - 44.5, 78 - 98)	470 - 559 (47.9 - 57.0, 106 - 126)

SPARK PLUG TYPE

NAMA0060

	Symbol	Make
Standard type	PLFR5A-11	NGK
Cold type	PLFR6A-11	NGK
Hot type	PLFR4A-11	NGK
Plug gap (Nominal)	1.1 mm (0.043 in)	

Chassis and Body Maintenance

WHEEL BALANCE

NAMA0044

Maximum allowable unbalance	Dynamic (At rim flange) g (oz)	10 (0.35) (one side)
	Static g (oz)	20 (0.71)

NOTES

ENGINE MECHANICAL

SECTION EM

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Parts Requiring Angular Tightening

NAEM0001

- Use an angle wrench for the final tightening of the following engine parts:

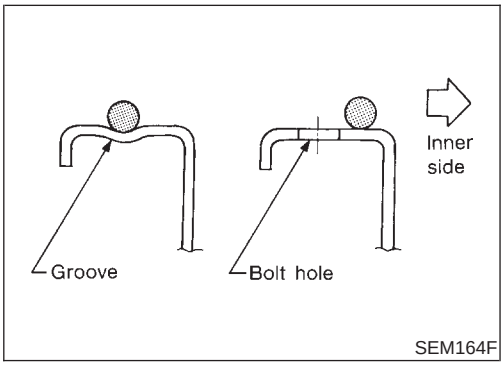
a) Cylinder head bolts
b) Main bearing cap bolts
c) Connecting rod cap bolts
d) Crankshaft pulley bolt

- Do not use a torque value for final tightening.
- The torque value for these parts are for a preliminary step.
- Ensure thread and seat surfaces are clean and coated with engine oil.

Liquid Gasket Application Procedure

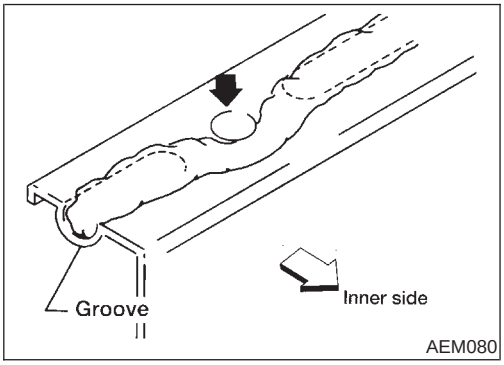
NAEM0002

1. **Use a scraper to remove all traces of old liquid gasket from mating surfaces and grooves. Also, completely clean any oil from these areas.**
2. **Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine RTV silicone sealant Part No. 999MP-A7007 or equivalent.)**
   - Be sure liquid gasket diameter is as specified.



SEM164F

3. **Apply liquid gasket around the inner side of bolt holes (unless otherwise specified).**
4. **Assembly should be done within 5 minutes after coating.**
5. **Wait at least 30 minutes before refilling engine oil and engine coolant.**

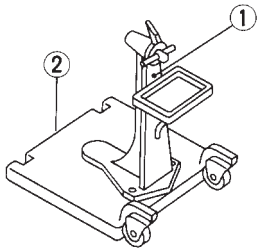
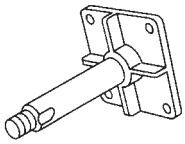
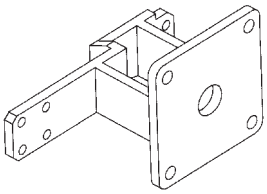
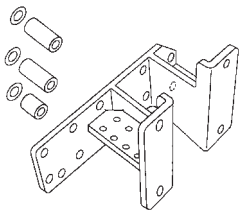
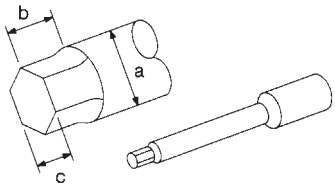
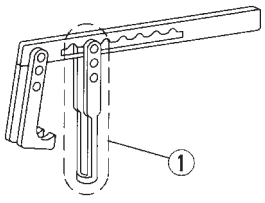


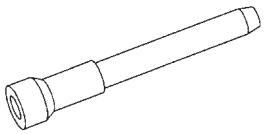
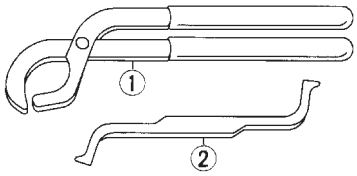
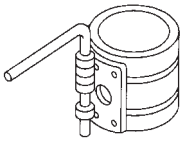
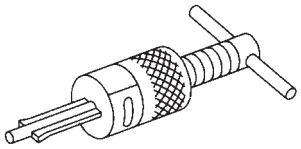
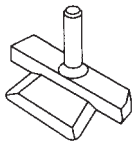
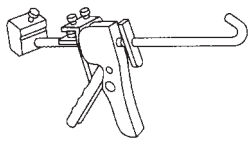
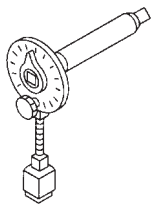
AEM080

Special Service Tools

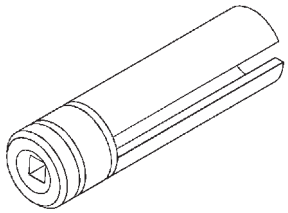
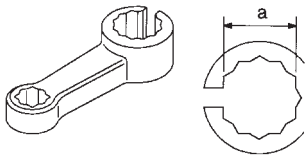
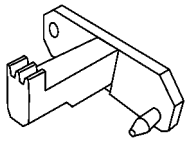
NAEM0003

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
ST0501S000 (—) Engine stand assembly 1 ST05011000 (—) Engine stand 2 ST05012000 (—) Base	 NT042	Disassembling and assembling
KV10106500 (—) Engine stand shaft	 NT028	
KV10117000 (J41262) Engine sub-attachment	 NT373	KV10117000 has been replaced with KV10117001 (KV10117000 is no longer in production, but it is usable).
KV10117001 (—) Engine sub-attachment	 NT372	Installing on the cylinder block
ST10120000 (J24239-01) Cylinder head bolt wrench	 NT583	Loosening and tightening cylinder head bolt **a: 13 (0.51) dia.** **b: 12 (0.47)** **c: 10 (0.39)** Unit: mm (in)
KV10116200 (J26336-A) Valve spring compressor 1 KV10115900 (J26336-20) Attachment	 NT022	Disassembling valve mechanism

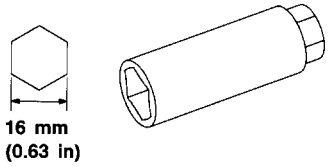
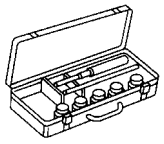
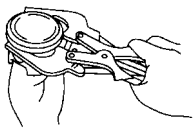
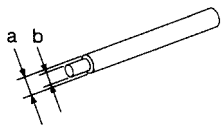
Tool number (Kent-Moore No.) Tool name	Description	
(J39386) Valve oil seal drift	 NT024	Installing valve oil seal
KV101151S0 (J38972) Lifter stopper set 1 KV10115110 (J38972-1) Camshaft pliers 2 KV10115120 (J38972-2) Lifter stopper	 NT041	Changing shims
EM03470000 (J8037) Piston ring compressor	 NT044	Installing piston assembly into cylinder bore
ST16610001 (J23907) Pilot bushing puller	 NT045	Removing crankshaft pilot bushing
KV10111100 (J37228) Seal cutter	 NT046	Removing steel oil pan and rear timing chain case
WS39930000 (—) Tube presser	 NT052	Pressing the tube of liquid gasket
KV10112100 (BT8653-A) Angle wrench	 NT014	Tightening bolts for bearing cap, cylinder head, etc.

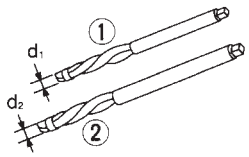
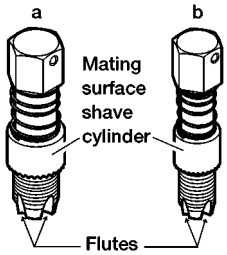
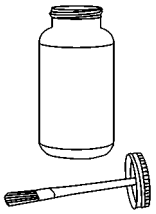
Special Service Tools (Cont'd)

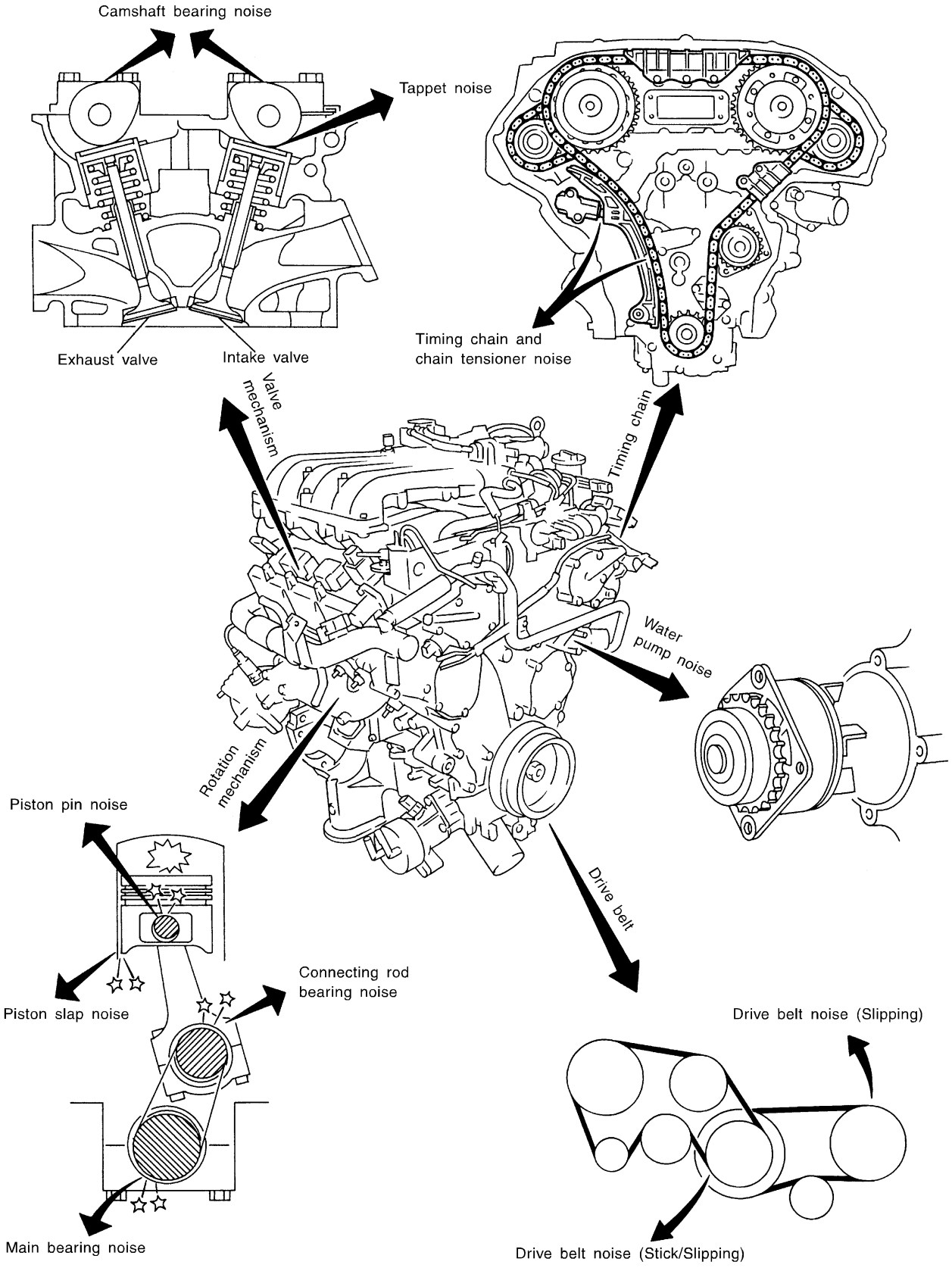
Tool number (Kent-Moore No.) Tool name	Description	
KV10117100 (J3647-A) Heated oxygen sensor wrench	 NT379	Loosening or tightening heated oxygen sensor **For 22 mm (0.87 in) hexagon nut**
KV10114400 (J38365) Heated oxygen sensor wrench	 NT636	Loosening or tightening rear heated oxygen sensor **a: 22 mm (0.87 in)**
KV10117700 (J44716) Ring gear stopper	 NT822	Removing and installing crankshaft pulley

Commercial Service Tools

NAEM0004

Tool number (Kent-Moore No.) Tool name	Description	
Spark plug wrench	 NT047	Removing and installing spark plug
Valve seat cutter set	 NT048	Finishing valve seat dimensions
Piston ring expander	 NT030	Removing and installing piston ring
Valve guide drift	 NT015	Removing and installing valve guide **Intake & Exhaust:** **a = 9.5 mm (0.374 in) dia.** **b = 5.5 mm (0.217 in) dia.**

Tool number (Kent-Moore No.) Tool name	Description	
Valve guide reamer	 NT016	Reaming valve guide 1 or hole for oversize valve guide 2 **Intake & Exhaust:** **d_1 = 6.0 mm (0.236 in) dia.** **d_2 = 10.2 mm (0.402 in) dia.**
(J-43897-18) (J-43897-12) Oxygen sensor thread cleaner	 AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor (Use with anti-seize lubricant shown below.) **a = J-43897-18 (18 mm dia.) for zirconia oxygen sensor** **b = J-43897-12 (12 mm dia.) for titania oxygen sensor**
Anti-seize lubricant (Permatex 133AR or equivalent meeting MIL specification MIL-A-907)	 AEM489	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads


Camshaft bearing noise
Tappet noise
Exhaust valve
Intake valve
Timing chain and chain tensioner noise
Valve mechanism
Timing chain
Water pump noise
Rotation mechanism
Piston pin noise
Piston slap noise
Connecting rod bearing noise
Main bearing noise
Drive belt
Drive belt noise (Slipping)
Drive belt noise (Stick/Slipping)

SEM472G

NVH Troubleshooting — Engine Noise

NAEM0005S01

Use the chart below to help you find the cause of the symptom.

1. Locate the area where noise occurs.
2. Confirm the type of noise.
3. Specify the operating condition of engine.
4. Check specified noise source.

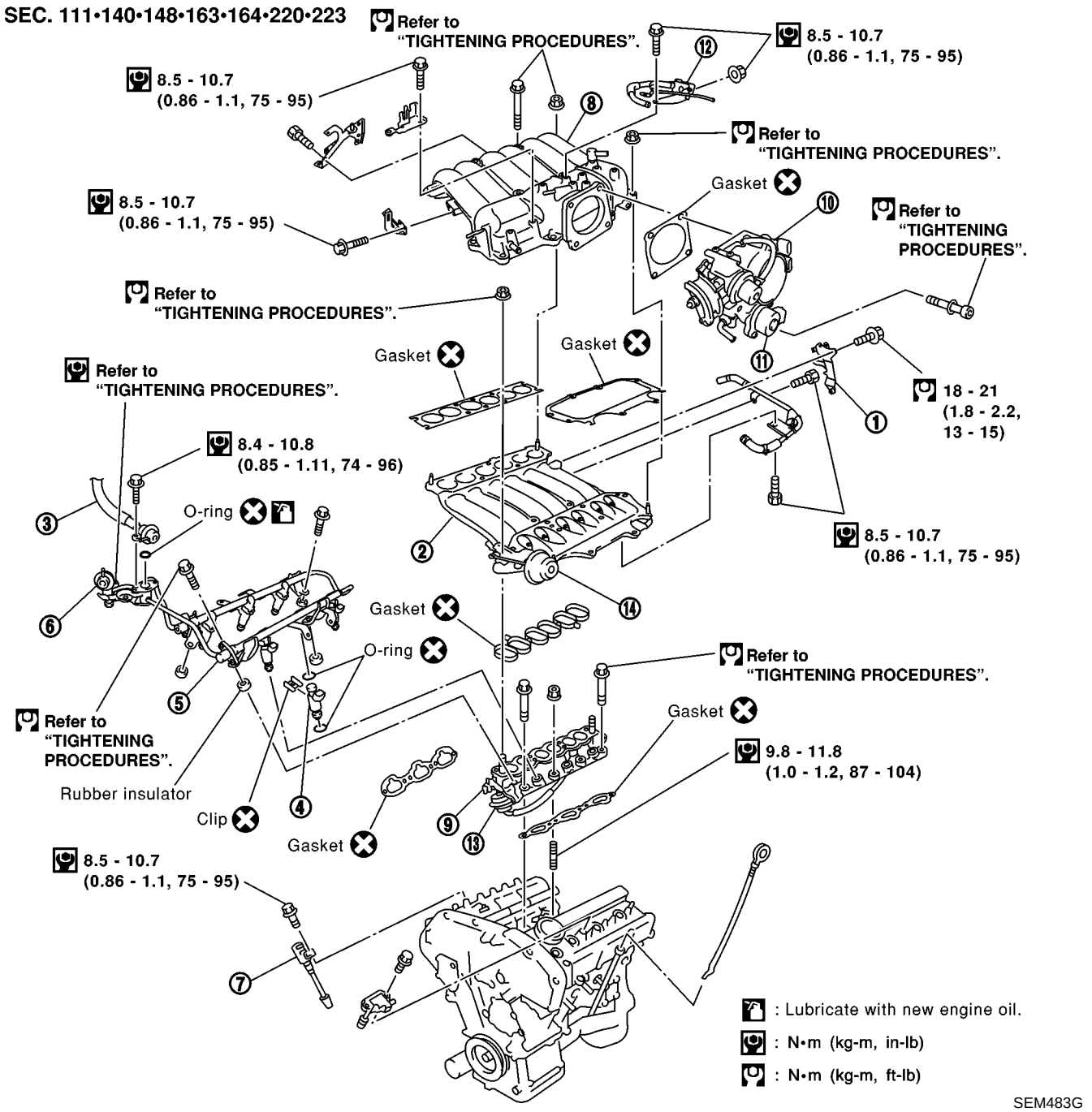
If necessary, repair or replace these parts.

Location of noise	Type of noise	Operating condition of engine						Source of noise	Check item	Reference page
		Before warm-up	After warm-up	When starting	When idling	When racing	While driving			
Top of engine Rocker cover Cylinder head	Ticking or clicking	C	A	—	A	B	—	Tappet noise	Valve clearance	EM-55
	Rattle	C	A	—	A	B	C	Camshaft bearing noise	Camshaft journal clearance Camshaft runout	EM-43, 43
Crankshaft pulley Cylinder block (Side of engine) Oil pan	Slap or knock	—	A	—	B	B	—	Piston pin noise	Piston and piston pin clearance Connecting rod bushing clearance	EM-64, 71
	Slap or rap	A	—	—	B	B	A	Piston slap noise	Piston-to-bore clearance Piston ring side clearance Piston ring end gap Connecting rod bend and torsion	EM-65, 65, 66, 67
	Knock	A	B	C	B	B	B	Connecting rod bearing noise	Connecting rod bushing clearance (Small end) Connecting rod bearing clearance (Big end)	EM-71, 70
	Knock	A	B	—	A	B	C	Main bearing noise	Main bearing oil clearance Crankshaft runout	EM-68, 68
Front of engine Timing chain cover	Tapping or ticking	A	A	—	B	B	B	Timing chain and chain tensioner noise	Timing chain cracks and wear Timing chain tensioner operation	EM-29, 20
Front of engine	Squeaking or fizzing	A	B	—	B	—	C	Other drive belts (Sticking or slipping)	Drive belts deflection	MA section (“Checking Drive Belts”, “ENGINE MAINTENANCE”)
	Creaking	A	B	A	B	A	B	Other drive belts (Slipping)	Idler pulley bearing operation	
	Squall Creak	A	B	—	B	A	B	Water pump noise	Water pump operation	LC section (“Water Pump Inspection”, “ENGINE COOLING SYSTEM”)

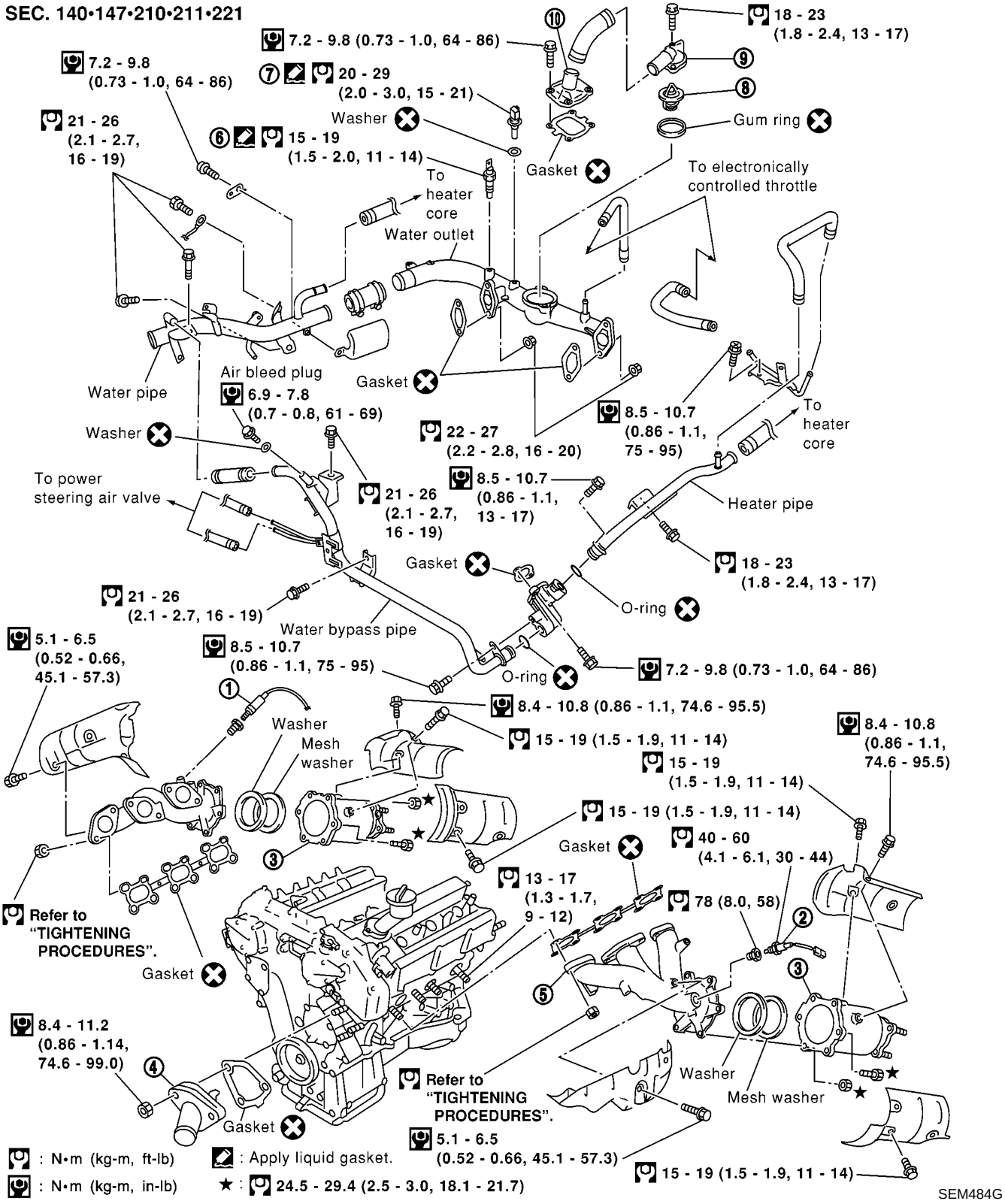
A: Closely related B: Related C: Sometimes related —: Not related

Removal and Installation

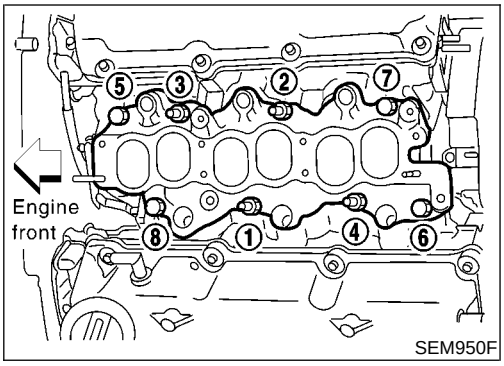
NAEM0006



1. Intake manifold collector support
2. Lower intake manifold collector
3. Fuel damper and fuel feed hose assembly
4. Injector
5. Fuel tube assembly
6. Fuel pressure regulator
7. Ignition coil with power transistor
8. Upper intake manifold collector
9. Intake manifold
10. Throttle body
11. IACV-AAC valve
12. EVAP canister purge volume control solenoid valve
13. Swirl control valve
14. Variable induction air control valve control actuator (A/T)



1. Heated oxygen sensor 1 (front) (bank 1)
2. Heated oxygen sensor 1 (front) (bank 2)
3. TWC (manifold)
4. Thermostat with water inlet
5. Exhaust manifold
6. Thermal transmitter
7. Engine coolant temperature
8. Water control valve
9. Water outlet housing
10. Cylinder block water outlet



SEM950F

TIGHTENING PROCEDURES

NAEM0006S01

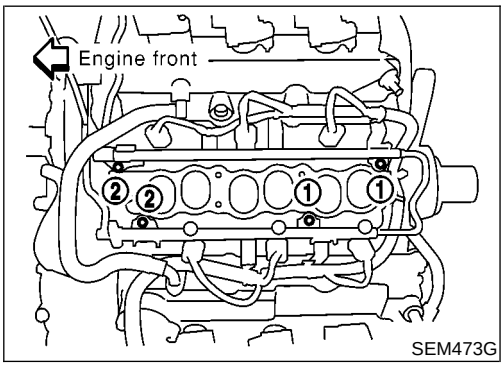
Intake Manifold

NAEM0006S0101

- **Tighten in numerical order shown in the figure.**

1. Tighten all bolts and nuts to 5 to 10 N·m (0.5 to 1.0 kg-m, 44 to 86 in-lb).
2. Finally tighten all bolts and nuts to 26 to 31 N·m (2.7 to 3.2 kg-m, 20 to 23 ft-lb).

- Tighten all bolts and nuts to the final torque, evenly dividing the tightening into at least five steps.



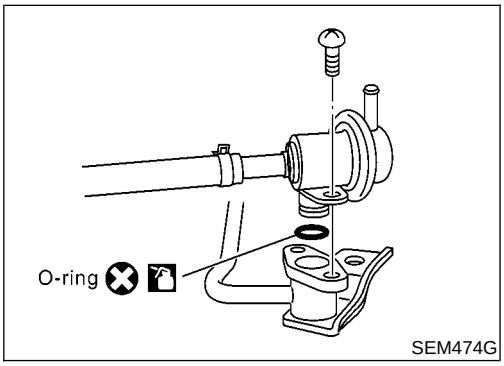
SEM473G

Fuel Tube

NAEM0006S0102

- **Tighten in numerical order shown in the figure.**

1. Tighten all bolts to 9.3 to 10.8 N·m (0.95 to 1.1 kg-m, 83 to 95 in-lb).
2. Then tighten all bolts to 21 to 26 N·m (2.1 to 2.7 kg-m, 15 to 20 ft-lb).



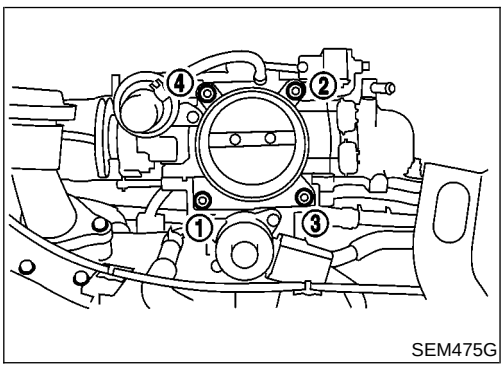
SEM474G

Fuel Pressure Regulator

NAEM0006S0103

Tighten fuel pressure regulator to 2.9 to 3.8 N·m (0.3 to 0.39 kg-m, 26.0 to 33.9 in-lb).

- **Tighten screws evenly several times to have the fuel pressure regulator tightened at the specified torque.**
- **Always replace O-ring with new ones.**
- **Lubricate O-ring with new engine oil.**



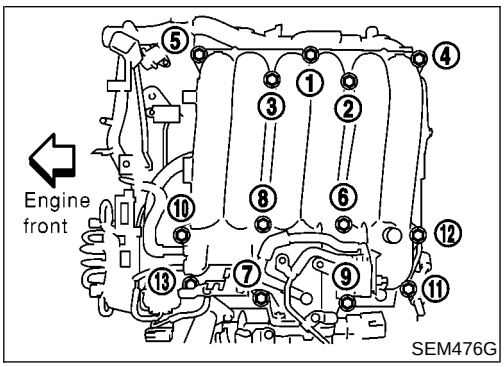
SEM475G

Throttle Body

NAEM0006S0105

- **Tighten in numerical order shown in the figure.**

1. Tighten all bolts to 8.8 to 10.8 N·m (0.9 to 1.1 kg-m, 79 to 95 in-lb).
2. Then tighten all bolts to 18 to 21 N·m (1.8 to 2.2 kg-m, 13 to 15 ft-lb).

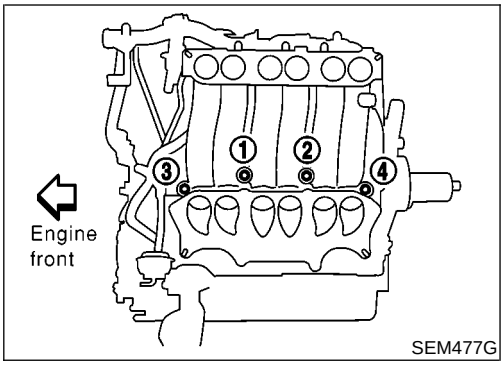


SEM476G

Upper Intake Manifold Collector

NAEM0006S0107

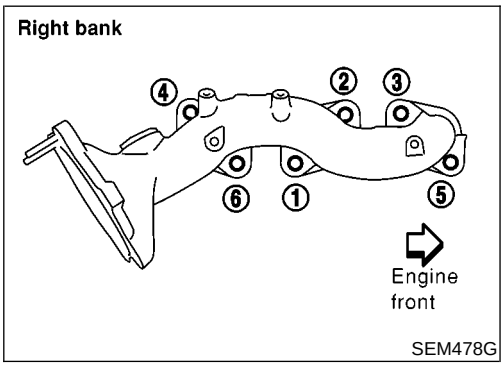
Tighten bolts and nuts to 18 to 21 N·m (1.8 to 2.2 kg-m, 13 to 15 ft-lb) in numerical order shown in the figure.



Lower Intake Manifold Collector

NAEM0006S0108

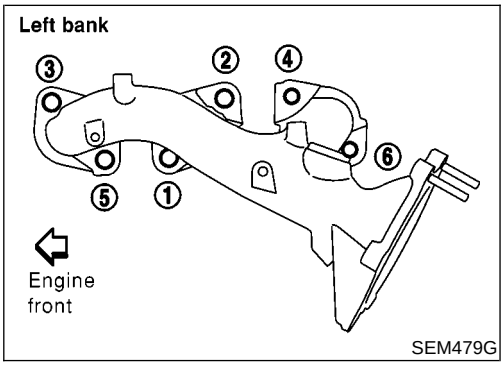
Tighten bolts and nuts to 18 to 21 N·m (1.8 to 2.2 kg-m, 13 to 15 ft-lb) in numerical order shown in the figure.



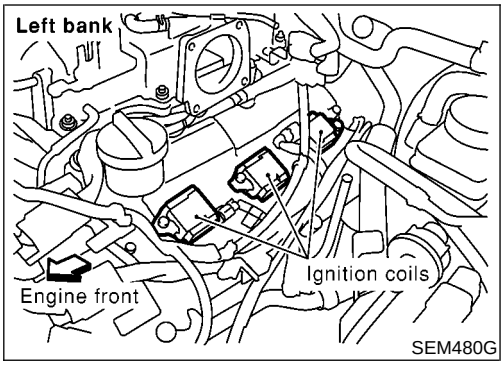
Exhaust Manifold

NAEM0006S0109

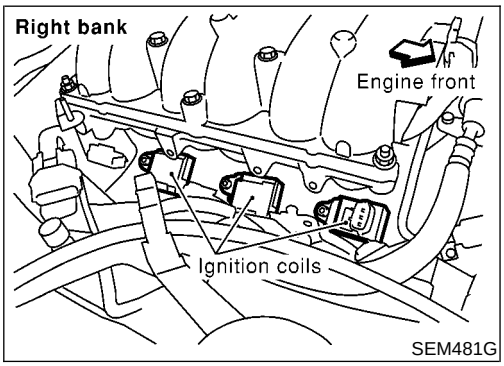
Tighten nuts to 28 to 32 N·m (2.9 to 3.3 kg-m, 21 to 24 ft-lb) in numerical order shown in the figure.



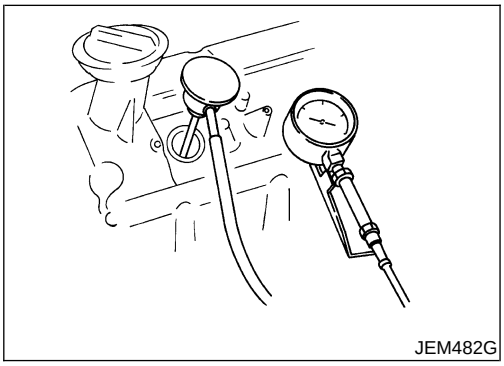
MEASUREMENT OF COMPRESSION PRESSURE



SEM480G



SEM481G


JEM482G


20 mm (0.79 in) dia.

Use compressor tester whose end (rubber portion) is less than 20 mm (0.79 in) dia. Otherwise, it may be caught by cylinder head during removal.

SEM387C

1. Warm up engine.
2. Turn ignition switch OFF.
3. Release fuel pressure.
   Refer to EC-39, “Fuel Pressure Release”.
4. Remove engine cover and throttle wire.
5. Remove air duct with air cleaner case.
6. Remove harness connectors and harness brackets around ignition coils.
7. Remove throttle body.
8. Disconnect ignition coil with power transistor harness connectors, then remove ignition coils.
9. Remove all spark plugs.

- Clean area around plug with compressed air before removing the spark plug.

10. Attach a compression tester to No. 1 cylinder.
11. Depress accelerator pedal fully to keep throttle valve wide open.
12. Crank engine and record highest gauge indication.
13. Repeat the measurement on each cylinder as shown above.

- **Always use a fully-charged battery to obtain specified engine speed.**

Unit: kPa (kg/cm^2, psi)/rpm

Standard	Minimum	Difference limit between cylinders
1,275 (13.0, 185)/300	981 (10.0, 142)/300	98 (1.0, 14)/300

14. If compression in one or more cylinders is low:

a. Pour a small amount of engine oil into cylinders through spark plug holes.

b. Retest compression.

- **If adding oil helps compression, piston rings may be worn or damaged. If so, replace piston rings after checking piston.**
- **If pressure stays low, a valve may be sticking or seating improperly. Inspect and repair valve and valve seat. (Refer to SDS, EM-77 and EM-80.) If valve or valve seat is damaged excessively, replace them.**
- **If compression stays low in two cylinders that are next to each other:**

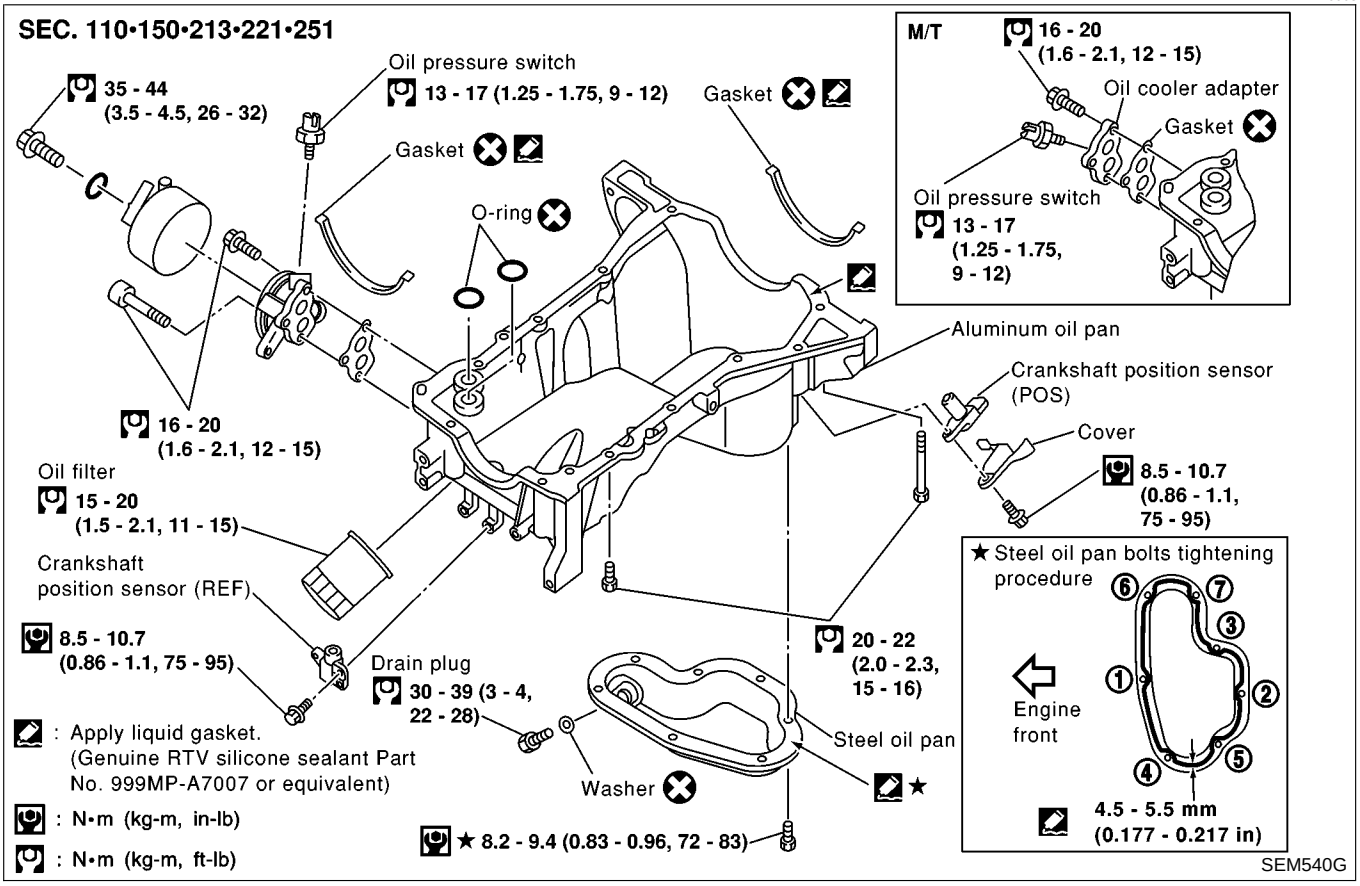
a) The cylinder head gasket may be leaking, or

b) Both cylinders may have valve component damage. Inspect and repair as necessary.

15. Install parts in reverse order of removal.
16. Perform “Self-diagnosis Procedure” referring to EC-71, “How to Erase DTC” if any DTC appears.

Components

NAEM0008



Removal

NAEM0009

WARNING:

- **Place vehicle on a flat and solid surface.**
- **You should not remove oil pan until exhaust system and cooling system have completely cooled off. Otherwise, you may burn yourself and/or fire may break out in the fuel line.**
- **When removing front engine mounting nuts, lift up slightly engine for safety work.**

CAUTION:

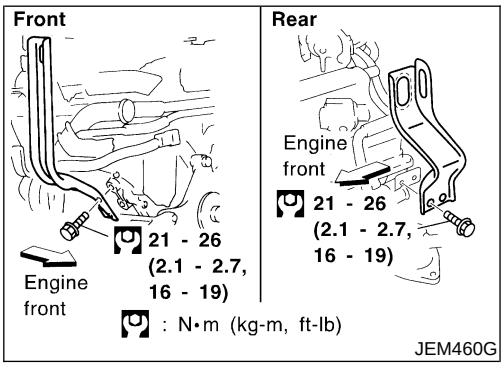
When removing the aluminum oil pan from engine, first remove the crankshaft position sensors (POS and REF) from the assembly.

Be careful not to damage sensor edges and signal plate teeth.

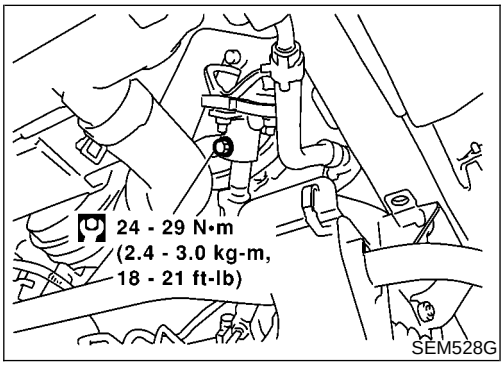
1. Remove front RH and LH wheels.
2. Remove battery.
3. Remove oil level gauge.
4. Remove engine undercover.
5. Remove suspension member stay.
6. Drain engine coolant from radiator drain plug.
7. Disconnect A/T oil cooler hoses. (A/T)
8. Drain engine oil.

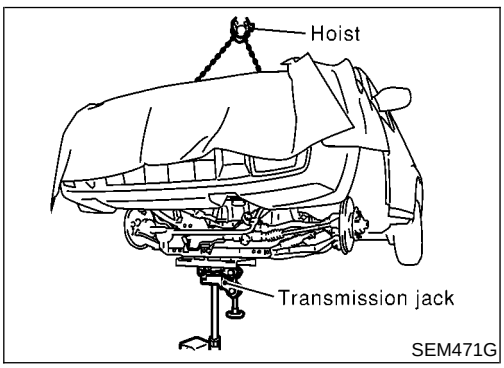
Removal (Cont'd)

9. Remove the crankshaft position sensors (REF and POS).
10. Remove drive belts and idler pulley with bracket.
11. Remove power steering oil pump, then put it aside holding with a suitable wire.
12. Remove alternator.

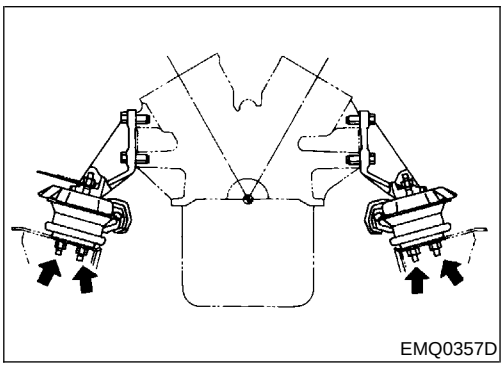


13. Install engine slingers.
14. Remove front propeller shaft. (4WD)
    Refer to PD-8, "Removal and Installation".
15. Remove exhaust front tube heat insulators, then remove rear heat oxygen sensors.
16. Remove exhaust front tube from both sides.
    Refer to FE-8, "Removal and Installation".
17. Remove front final drive. (4WD)
    Refer to PD-19, "Removal and Installation".
18. Remove starter motor.
19. Disconnect oil pressure switch harness connector.
20. Loosen and disconnect the bolts fixing the steering column assembly lower joint and the power steering gear.

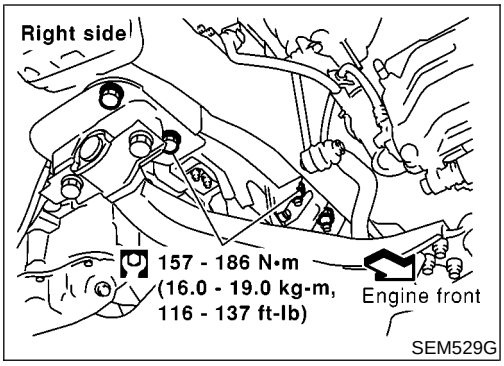




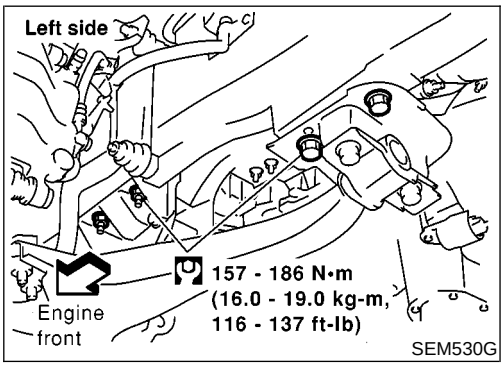
21. Set a suitable transmission jack under the front suspension member and hoist engine with engine slingers.

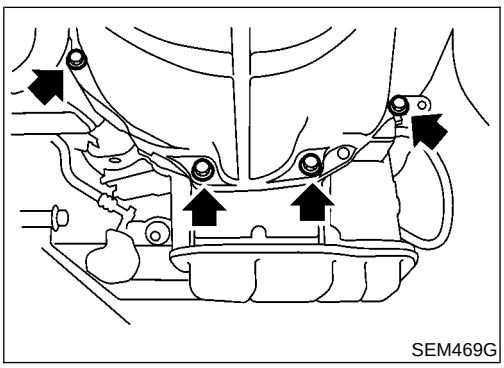


22. Remove front engine mounting nuts from both sides.

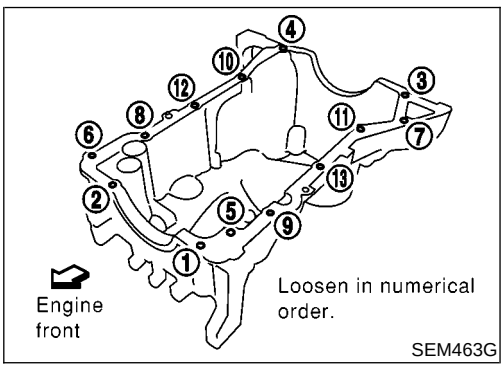


23. Remove front suspension member bolts.
24. Lower the transmission jack carefully to secure clearance between the oil pan and suspension member.
25. Remove A/T oil cooler tube. (A/T)
26. Remove water hose and tube. (A/T)

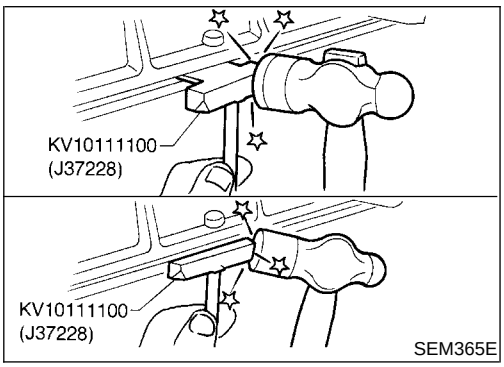




27. Remove the four engine-to-transmission bolts.



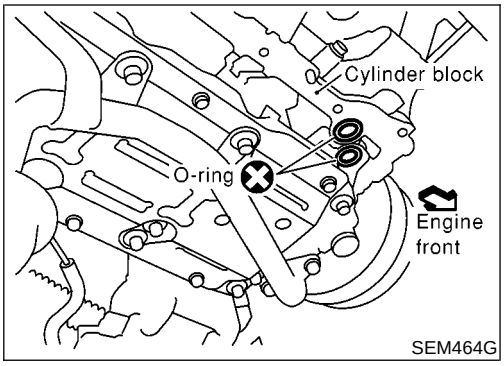
28. Remove aluminum oil pan bolts in numerical order.



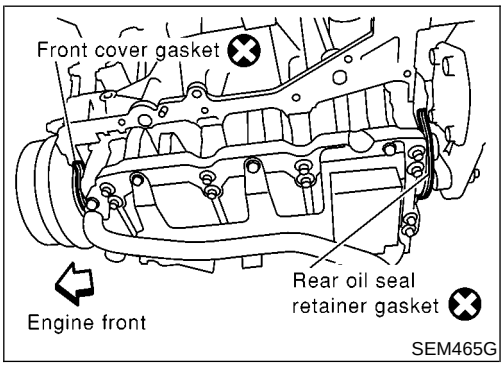
29. Remove aluminum oil pan.
a. Insert tool between aluminum oil pan and cylinder block.
- **Be careful not to damage aluminum mating surface.**
- **Do not insert screwdriver, or oil pan flange will be deformed.**

b. Slide tool by tapping its side with a hammer.

Removal (Cont'd)



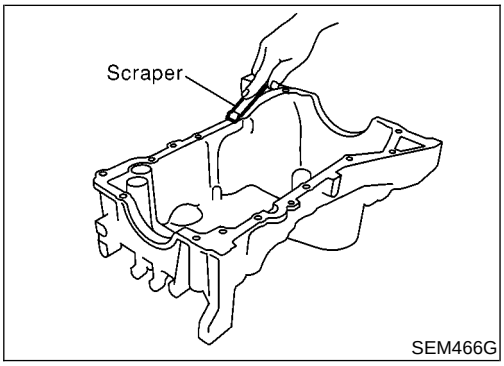
30. Remove O-rings from cylinder block and oil pump body.



31. Remove front cover gasket and rear oil seal retainer gasket.

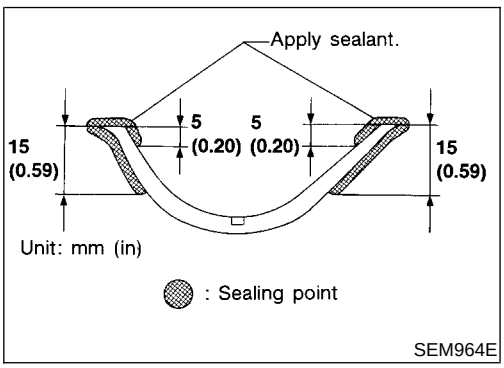
Installation

NAEM0010

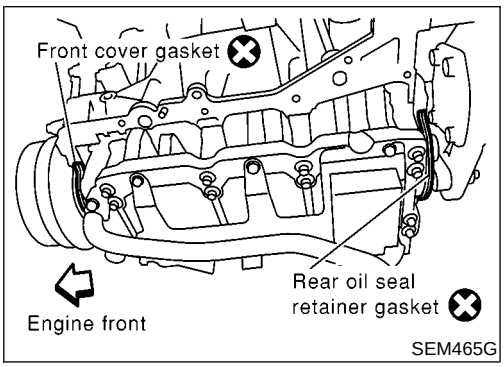


1. Before installing oil pan, remove old liquid gasket from mating surface using a scraper.

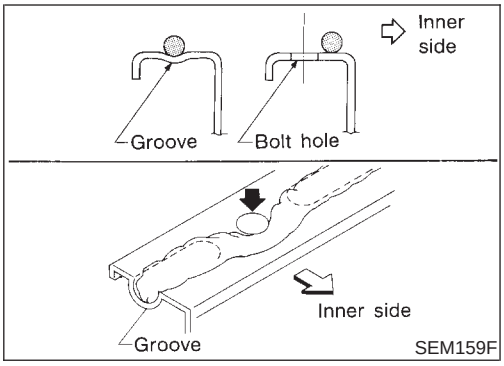
- **Also remove old liquid gasket from mating surface of cylinder block.**
- **Remove old liquid gasket from the bolt hole and thread.**



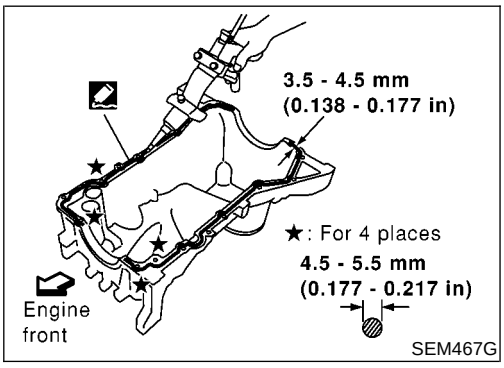
2. Apply sealant to front cover gasket and rear oil seal retainer gasket.



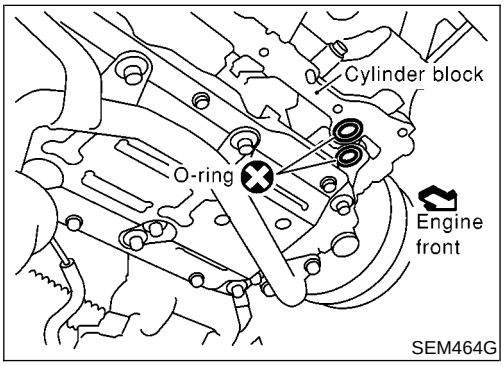
3. Install front cover gasket and rear oil seal retainer gasket.



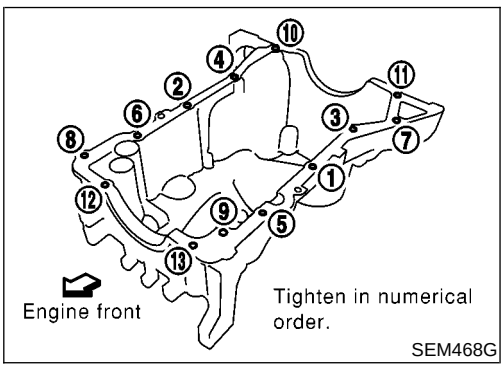
4. Apply a continuous bead of liquid gasket to mating surface of aluminum oil pan.
- **Use Genuine RTV silicone sealant Part No. 999MP-A7007 or equivalent.**



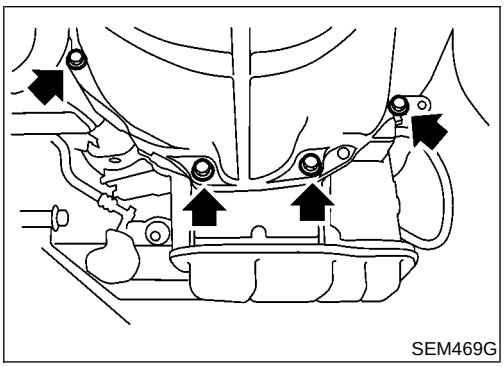
5. Apply liquid gasket to inner sealing surface as shown in figure.
- **Be sure liquid gasket is 4.0 to 5.0 mm (0.157 to 0.197 in) or 4.5 to 5.5 mm (0.177 to 0.217 in) wide.**
- **Attaching should be done within 5 minutes after coating.**



6. Install O-rings, cylinder block and oil pump body.



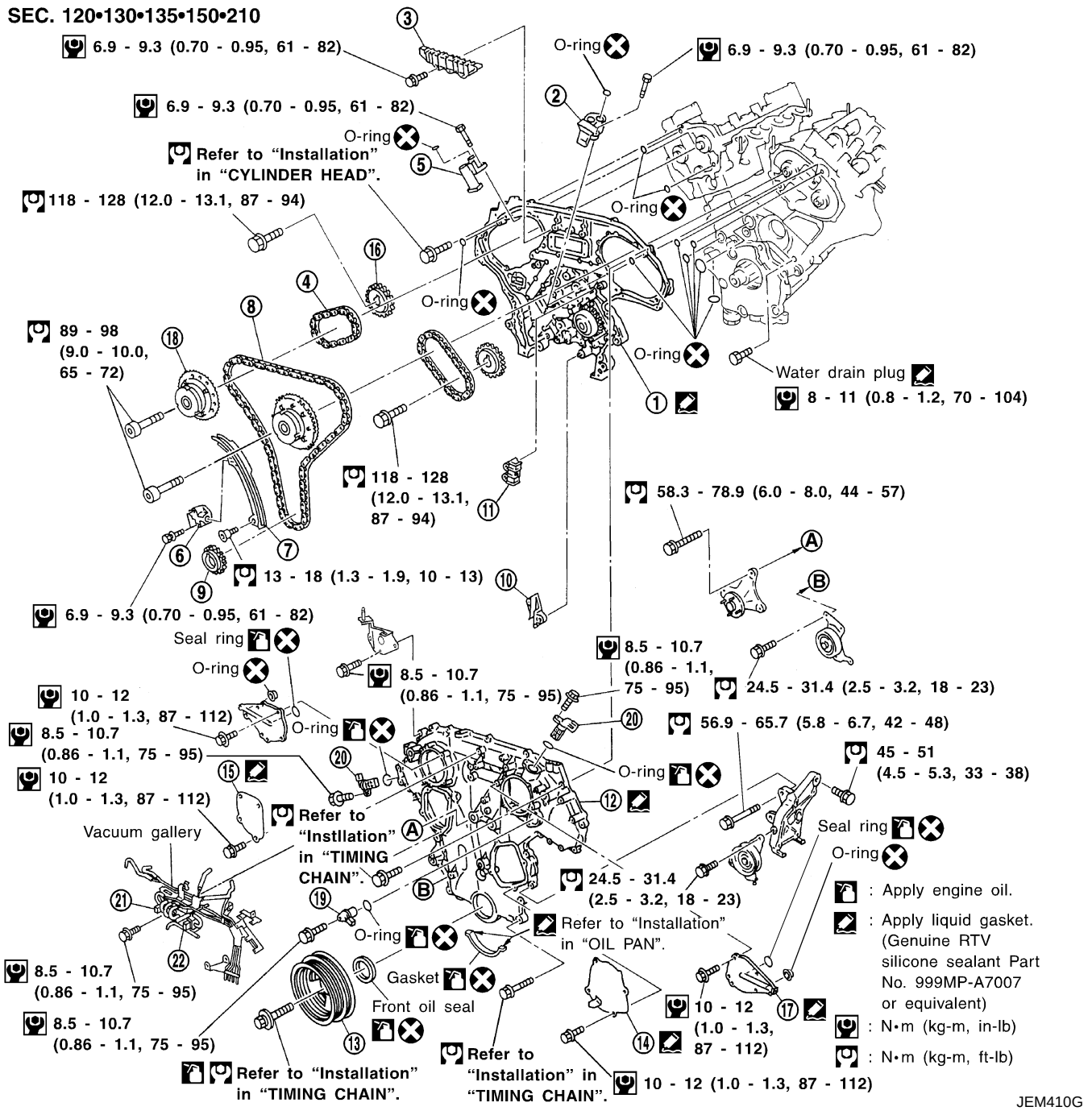
7. Install aluminum oil pan.
- Tighten bolts in numerical order.
- **Wait at least 30 minutes before refilling engine oil.**



8. Install the four engine-to-transmission bolts. For tightening torque, refer to AT-278 or MT-12, "Installation".
9. Reinstall in the revrse order of removal.

Components

NAEM0011



1. Rear timing chain case
2. Left camshaft chain tensioner
3. Internal guide
4. Timing chain (Secondary)
5. Right camshaft chain tensioner
6. Timing chain tensioner
7. Slack guide
8. Timing chain (Primary)
9. Crankshaft sprocket
10. Lower tension guide
11. Upper tension guide
12. Front timing chain case
13. Crankshaft pulley
14. Water pump cover
15. Chain tensioner cover
16. Exhaust camshaft sprocket
17. CVTC cover
18. Intake camshaft sprocket
19. PHASE sensor
20. CVTC sensor
21. Variable induction air control valve control solenoid valve (A/T)
22. Swirl control valve control solenoid valve

POSITION FOR APPLYING LIQUID GASKET

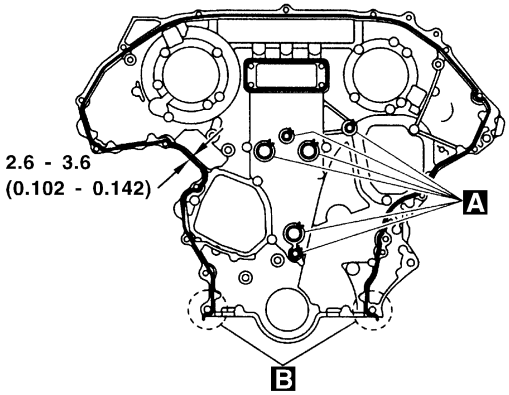
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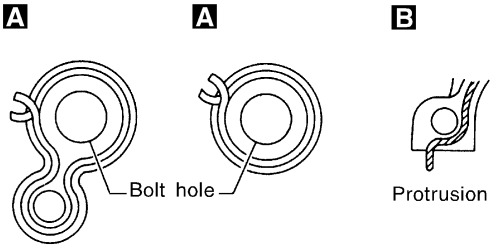
Refer to "Installation" in "OIL PAN", EM-18.

- **Before installation, wipe off the protruding sealant.**

Components (Cont'd)

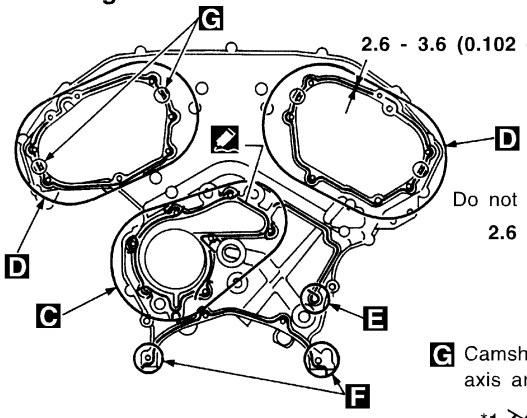
Front timing chain case

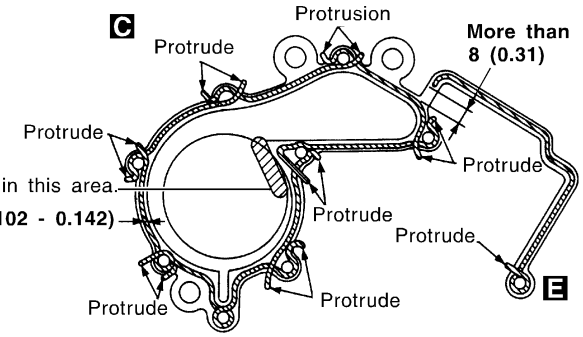


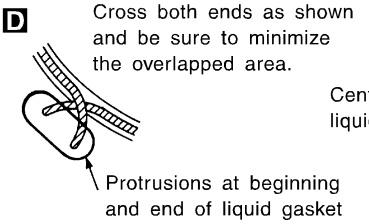


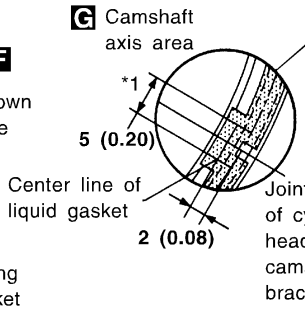
Sealant protrusion away from bolt hole

Rear timing chain case

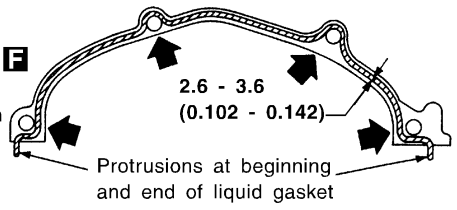






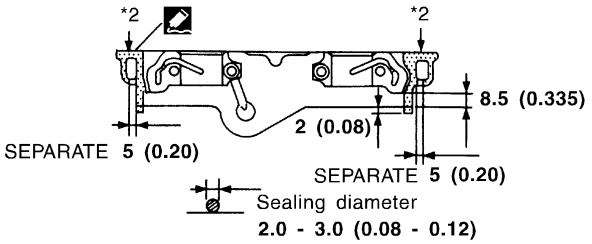


: Run along bolt hole outer side.



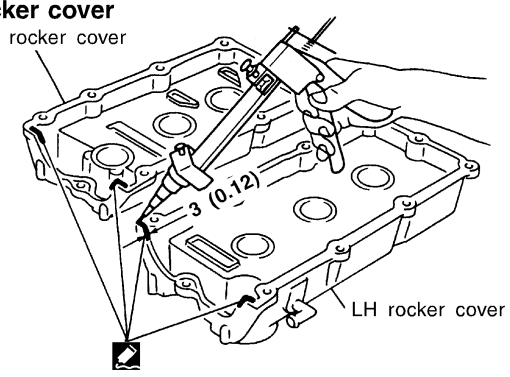
*1: Apply liquid gasket to the chamfered surface between camshaft bracket and cylinder head.

Camshaft bracket



*2: Remove the protruding sealant from front face.
(Remove the hardened sealant from surface only.)

Rocker cover



Unit: mm (in)

SEM411G

CAUTION:

- **After removing timing chain, do not turn crankshaft and camshaft separately, or valves will strike piston heads.**
- **When installing camshafts, chain tensioners, oil seals, or other sliding parts, lubricate contacting surfaces with new engine oil.**
- **Apply new engine oil to bolt threads and seat surfaces when installing camshaft sprockets and crankshaft pulley.**
- **Before disconnecting fuel hose, release fuel pressure. Refer to EC-39, "Fuel Pressure Release".**
- **Be careful not to damage sensor edges.**
- **Do not spill engine coolant on drive belts.**

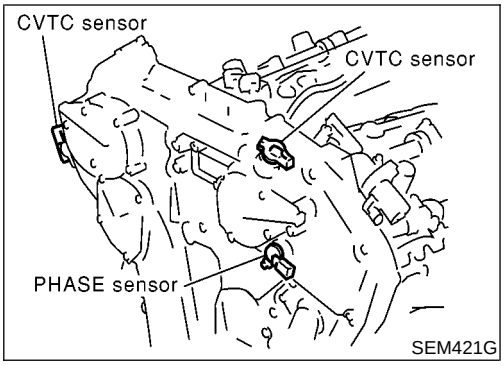
Removal

NAEM0012

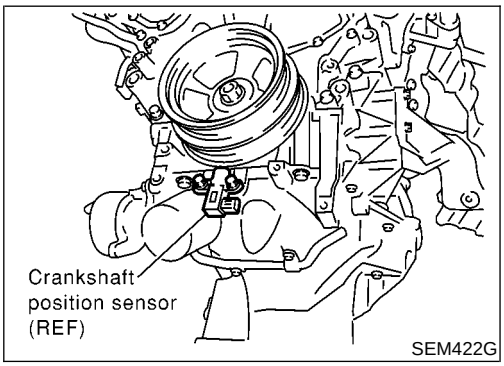
1. Release fuel pressure.
   Refer to EC-39, "Fuel Pressure Release".
2. Remove battery.
3. Remove radiator.
   Refer to LC-20, "REMOVAL AND INSTALLATION".
4. Drain engine oil.
5. Remove drive belts and idler pulley with brackets.
6. Remove cooling fan with bracket.
7. Remove engine cover.
8. Remove air duct with air cleaner case, collector, blow-by hose, vacuum hoses, fuel hoses, water hoses, wires, harnesses, connectors and so on.
9. Remove the air compressor, and tie it down using rope or the like to keep it from interfering.
10. Remove the power steering oil pump and reservoir tank. Tie them down using rope or the like to keep them from interfering.
11. Remove alternator.
12. Remove the following.

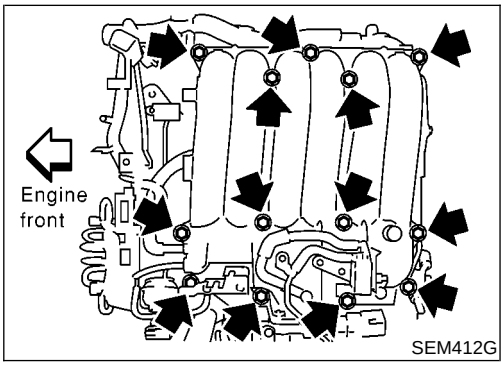
- Vacuum gallery
- Water bypass pipe
- Brackets

Removal (Cont'd)

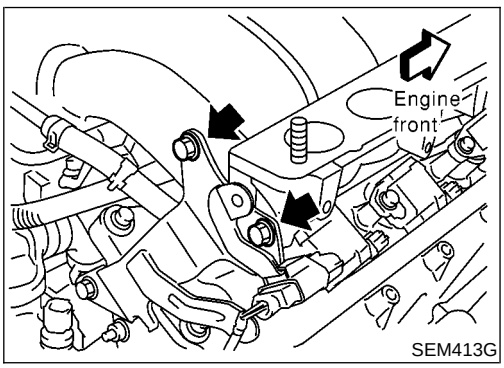


13. Remove camshaft position sensor (PHASE), CVTC sensors and crankshaft position sensor (REF).
- Avoid impact such as dropping.
- Do not disassemble the components.
- Do not place them on areas where iron powder may adhere.
- Keep away from the objects susceptible to magnetism.

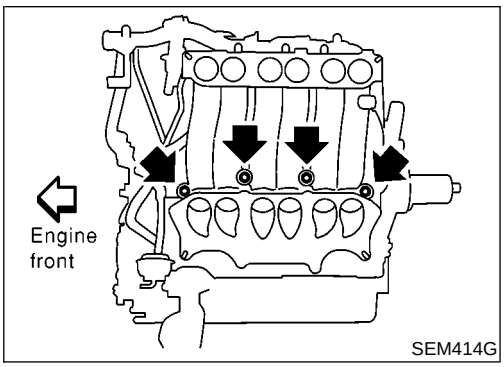




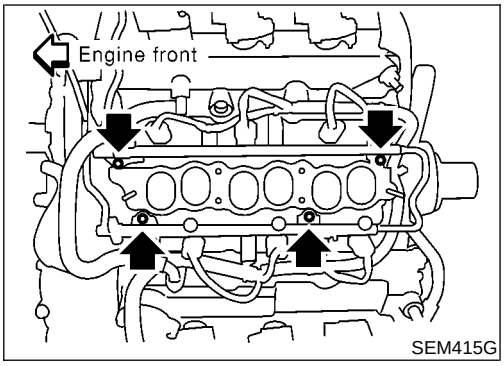
14. Remove upper intake manifold collector in reverse order of installation. Refer to EM-12, "Upper Intake Manifold Collector".



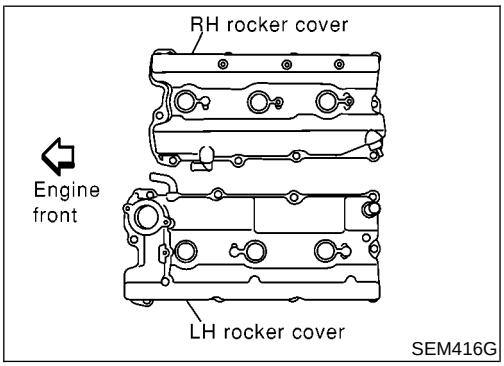
15. Remove intake manifold collector support bolts.



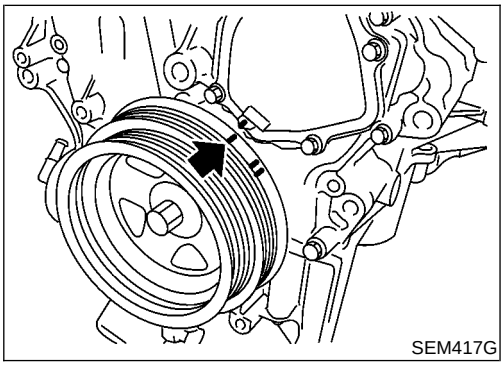
16. Remove lower intake manifold collector in reverse order of installation. Refer to EM-13, "Lower Intake Manifold Collector".



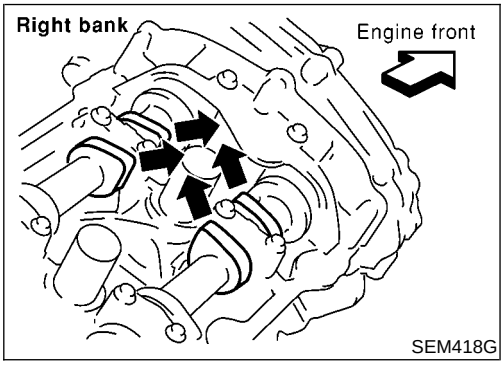
17. Disconnect injector harness connectors.
18. Remove fuel tube assembly in reverse order of installation. Refer to EM-12, "Fuel Tube".



19. Remove ignition coils.
20. Remove RH and LH rocker covers from cylinder head.

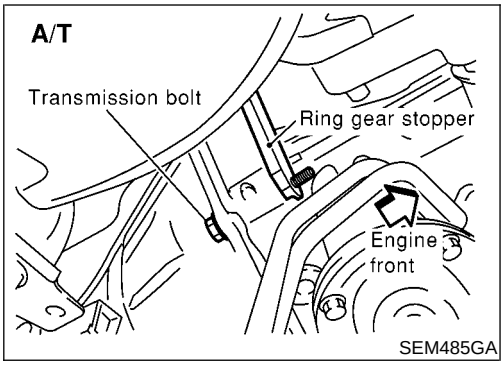


21. Set No. 1 piston at TDC on the compression stroke by rotating crankshaft.
- Align pointer with TDC mark on crankshaft pulley.

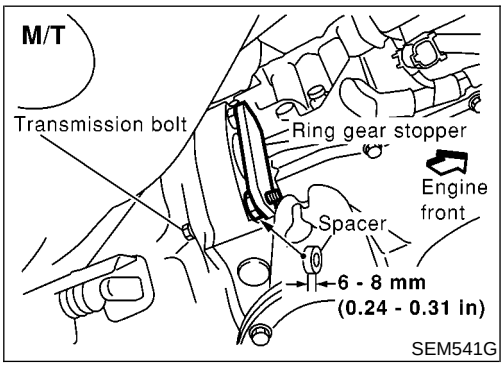


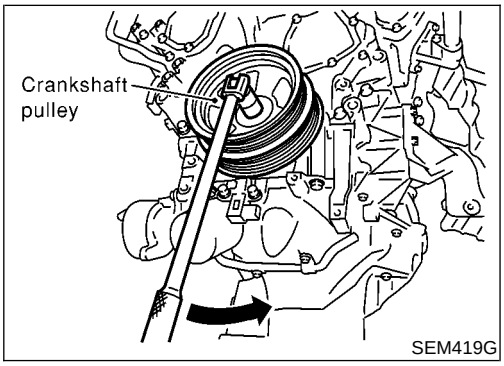
- Check that intake and exhaust cam nose on No. 1 cylinder are installed as shown left.
  If not, turn the crankshaft one revolution (360°) and align as above.

Removal (Cont'd)

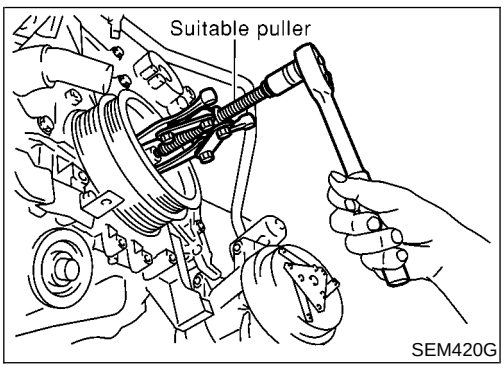


22. Remove starter motor, and set ring gear stopper using the mounting bolt hole.
- **Be careful not to damage the signal plate teeth.**

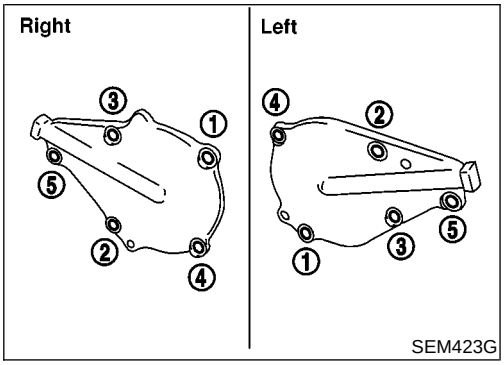




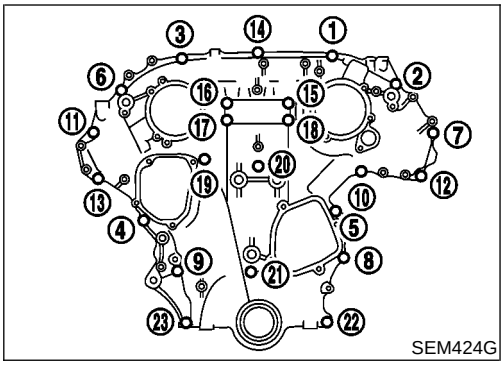
23. Loosen the crankshaft pulley bolt.



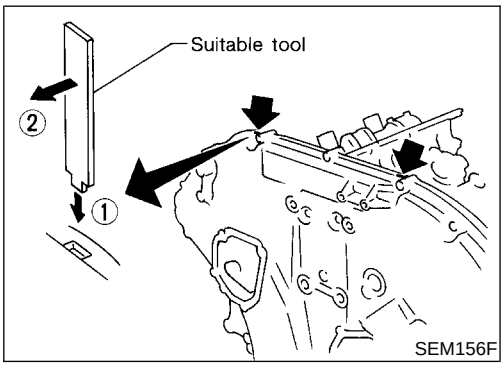
24. Remove crankshaft pulley with a suitable puller.
25. Remove aluminum oil pan.
Refer to EM-15, "Removal".
26. Temporarily install the suspension member bolts and engine mounting nuts.



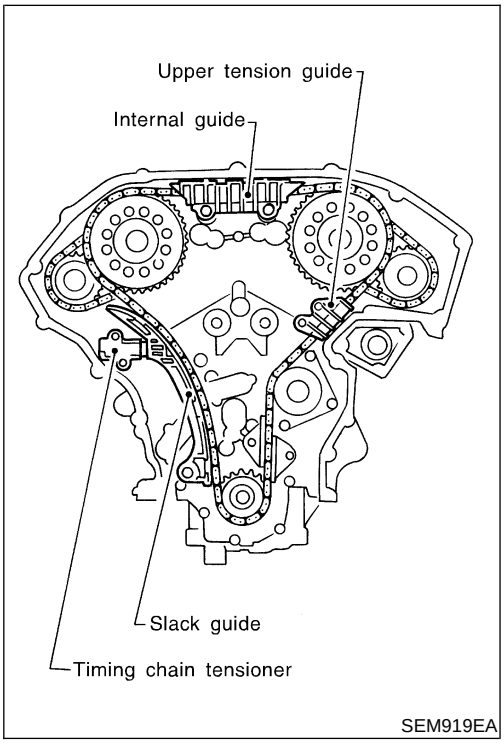
27. Remove CVTC covers.
- **Loosen bolts in numerical order as shown in the figure.**
- In the cover, the shaft is engaged with the center hole of the intake cam sprocket. Remove it straight out until the engagement comes off.



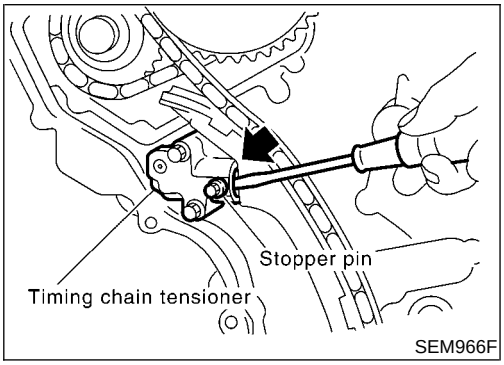
28. Remove front timing chain case bolts.
- **Loosen bolts in numerical order as shown in the figure.**



29. Remove front timing chain case.
- **Do not scratch sealing surfaces.**

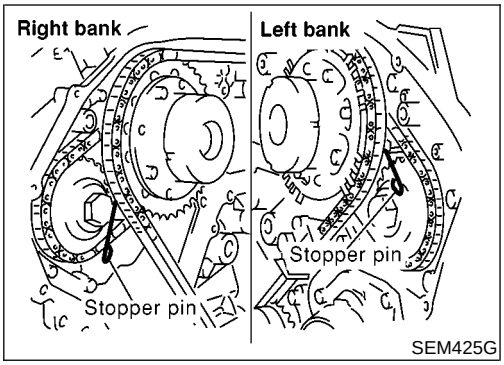


30. Remove internal chain guide.
31. Remove upper tension guide.
32. Remove timing chain tensioner and slack guide.

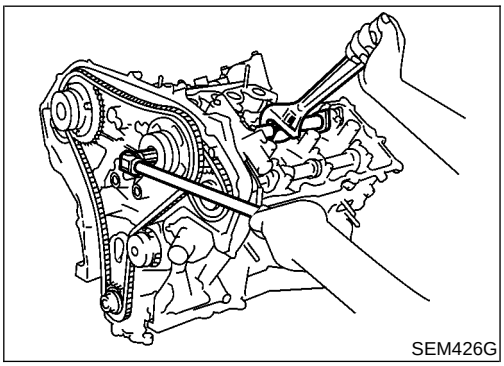


- Remove timing chain tensioner. (Push piston and insert a suitable pin into pinhole.)

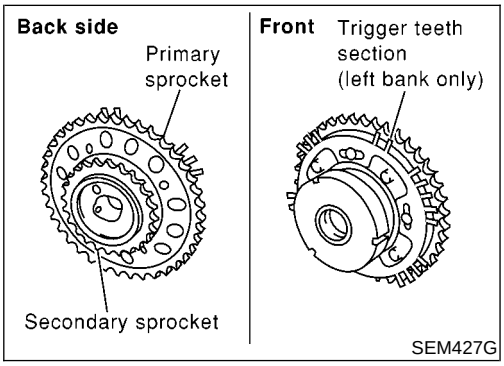
Removal (Cont'd)



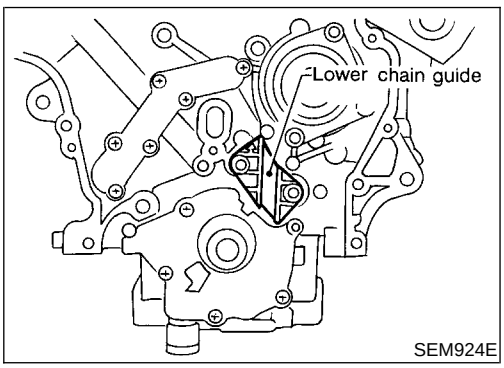
33. Attach a suitable stopper pin to RH and LH camshaft chain tensioners.



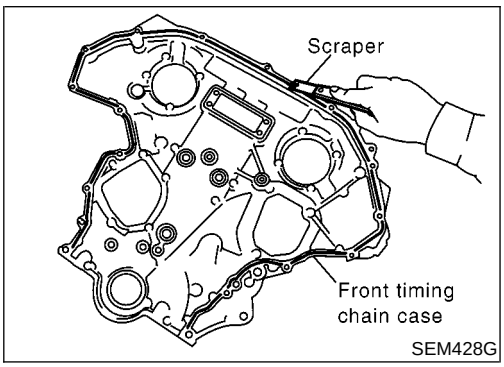
34. Remove intake and exhaust camshaft sprocket bolts.
- **Apply paint to timing chain and camshaft sprockets for alignment during installation.**
- **Secure the hexagonal head of the camshaft using a spanner to loosen mounting bolts.**



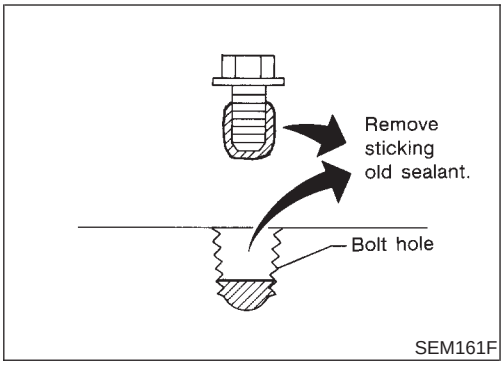
35. Remove primary and secondary timing chains along with the camshaft sprockets.
- Do not disassemble the intake camshaft sprocket.
- Avoid damaging the signal mark protrusion area at the front of the left bank intake camshaft sprocket. Keep it away from magnetized objects.



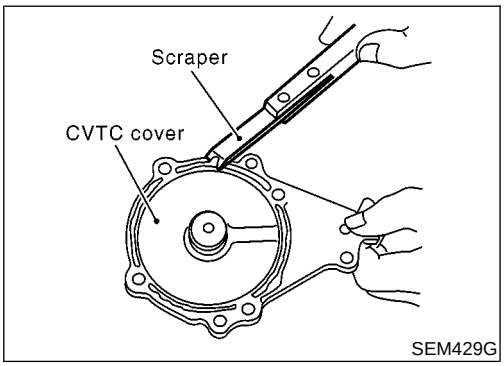
36. Remove lower chain guide.
37. Remove crankshaft sprocket.



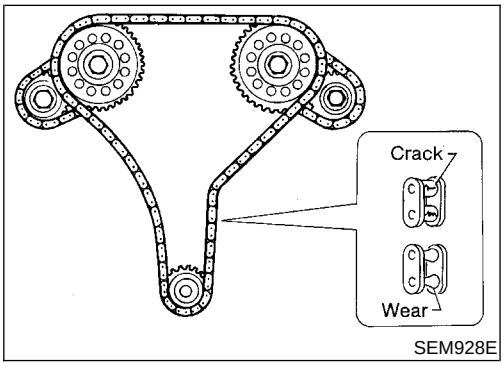
38. Use a scraper to remove all traces of liquid gasket from front timing chain case.



- **Remove old liquid gasket from the bolt hole and thread.**



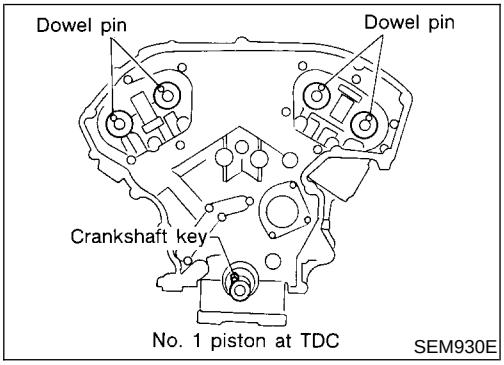
39. Use a scraper to remove all traces of liquid gasket from CVTC cover.



Inspection

NAEM0013

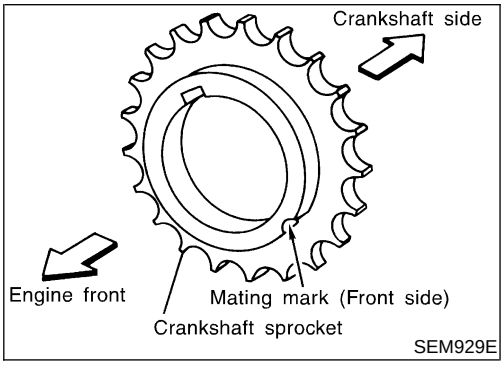
Check for cracks and excessive wear at roller links. Replace chain if necessary.



Installation

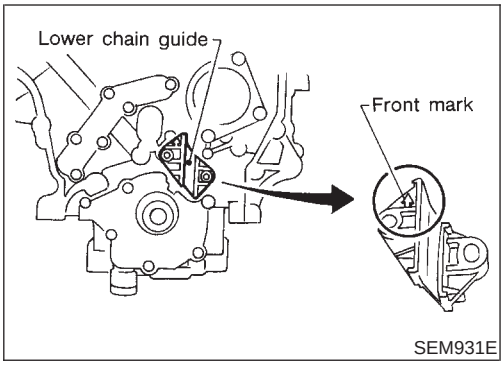
NAEM0014

1. Position crankshaft so that No. 1 piston is set at TDC on compression stroke.

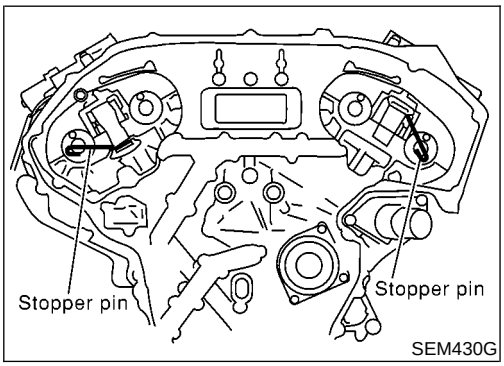


2. Install crankshaft sprocket on crankshaft.

- **Make sure that mating marks on crankshaft sprocket face front of engine.**

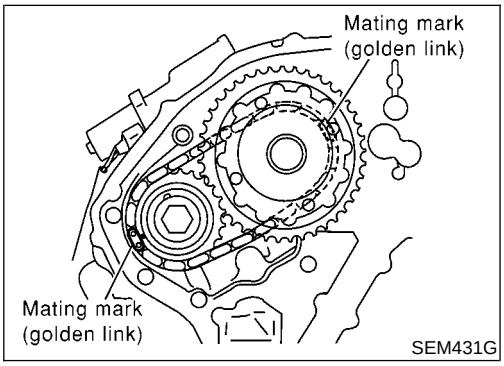


3. Install lower chain guide on dowel pin, with front mark on the guide facing upside.



4. Press and shrink the secondary chain tensioner sleeve, and fix it using stopper pins.

- Lubricate threads and seat surfaces of camshaft sprocket bolts with new engine oil.

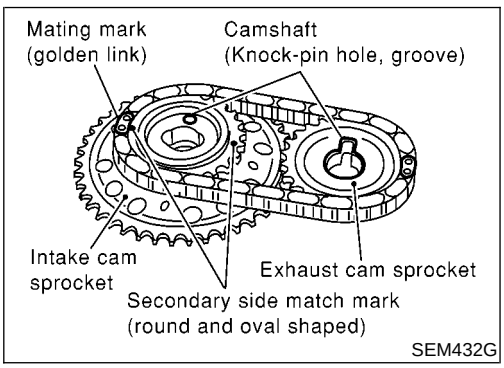


5. Install secondary timing chain and sprocket to one of the banks (Right bank shown in the figure) as described below.

a. Align mating marks (golden links) on secondary timing chain with those (punched marks) on the intake and exhaust sprockets.

b. Align camshaft knock pins with the sprocket groove and hole.

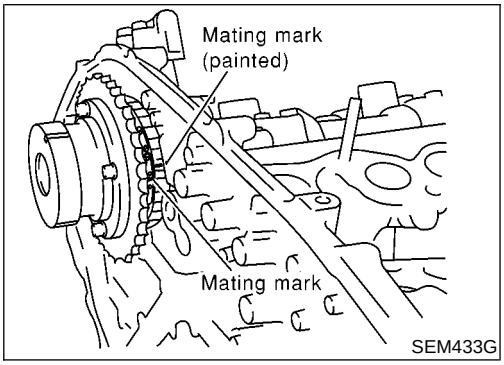
- Because camshaft sprocket mounting bolts are tightened in step 7, perform manual tightening to the extent necessary to keep camshaft knock pin from dislocating.



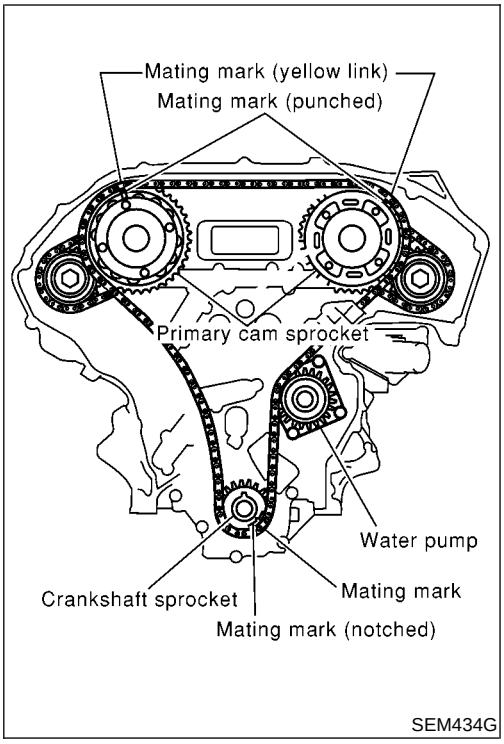
- Matching marks of the intake sprocket are on the back side of the secondary sprockets. There are two types of the marks; round and oval types, which should be used for right and left banks respectively.

  Right bank: Round

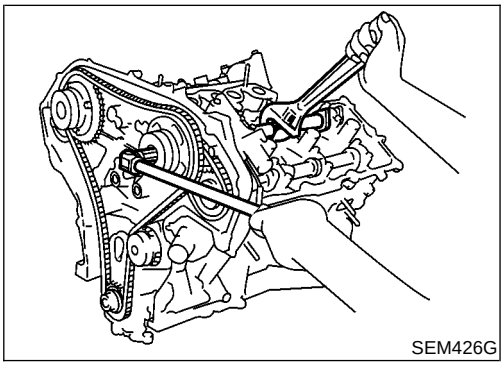
  Left bank: Oval



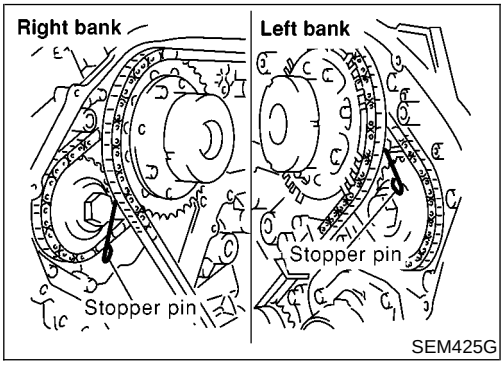
- It may be difficult to visually check the dislocation of mating marks during and after installation. To make the matching easier, make a mating mark on the sprocket teeth in advance using paint.



6. Install secondary timing chain and sprocket to the other bank. Install primary timing chain at the same time.
- Installation of the secondary timing chain follows the procedure described in step 5.
- Install primary timing chain so that mating mark (punched) on camshaft sprocket is aligned with that (yellow link) on the timing chain, and mating mark (notched) on crankshaft sprocket is aligned with that on the timing chain, respectively.
- When it is difficult to align mating marks of the primary timing chain with each sprocket, gradually turn the camshaft hexagonal head using a spanner so it is aligned with the mating mark.
- During alignment, be careful to prevent dislocation of mating marks on the secondary timing chain.

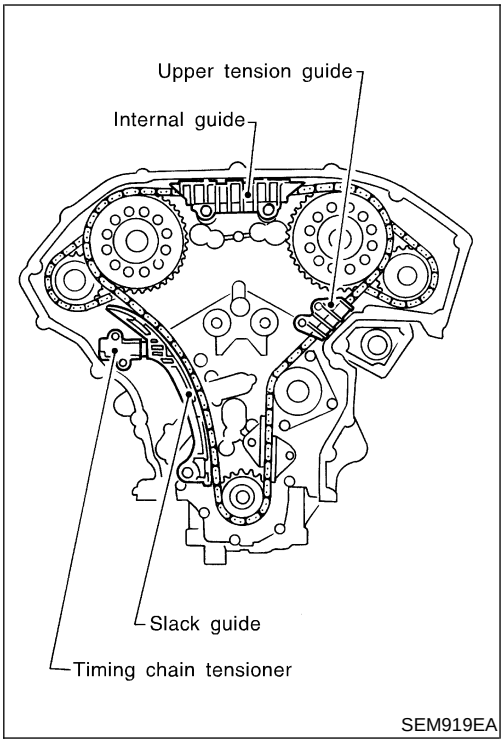


7. After confirming the mating marks are aligned, tighten the camshaft sprocket mounting bolts.
- Secure the camshaft hexagonal head using a spanner to tighten mounting bolts.

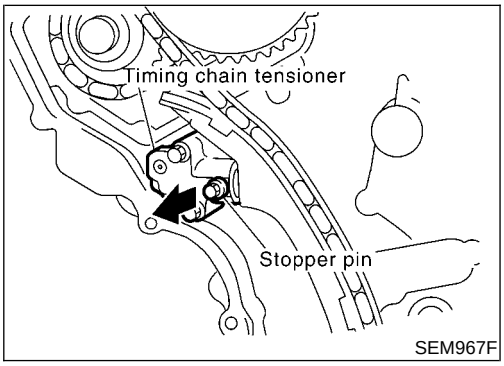


8. Pull out the stopper pin from the secondary timing chain tensioner.

Installation (Cont'd)

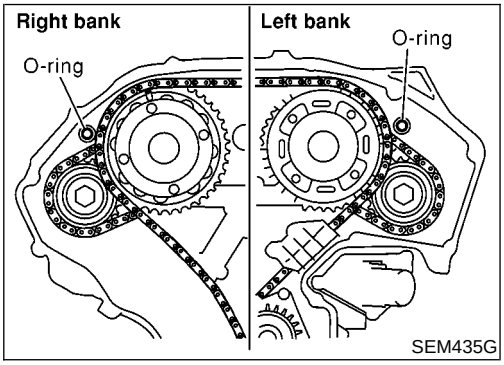


9. Install internal guide.
10. Install upper tension guide and slack guide.



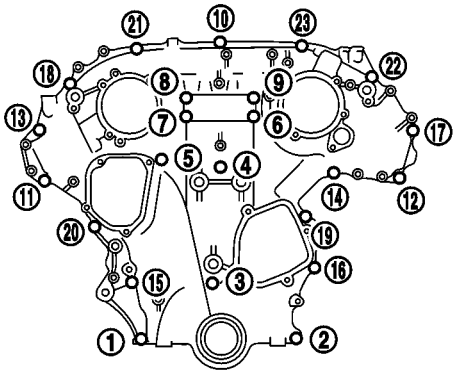
11. Install timing chain tensioner, then remove the stopper pin.

- **When installing the timing chain tensioner, engine oil should be applied to the oil hole and tensioner.**



12. Install O-rings on rear timing chain case.
13. Apply liquid gasket to front timing chain case.

- Refer to "POSITION FOR APPLYING LIQUID GASKET", EM-21.
- **Before installation, wipe off the protruding sealant.**

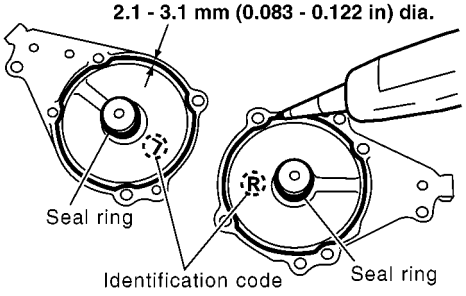


① - ② 8 mm dia. bolts
25.5 - 31.4 N•m
(2.6 - 3.2 kg-m, 18.8 - 23.1 ft-lb)
③ - ㉓ 6 mm dia. bolts
11.8 - 13.7 N•m
(1.2 - 1.4 kg-m, 8.7 - 10.1 ft-lb)

SEM436G

14. Install rear case pin into dowel pin hole on front timing chain case.
15. Tighten bolts to the specified torque in order shown in the figure.

- **Leave the bolts unattended for 30 minutes or more after tightening.**

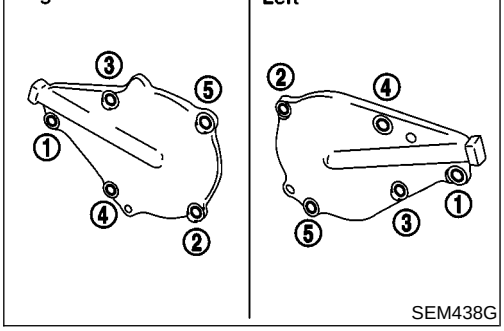


SEM437G

16. Install CVTC cover.

a. Install O-rings at front timing chain case.
b. Install seal ring at CVTC covers.
c. Apply liquid gasket to CVTC covers.
Use genuine RTV silicone sealant Part No. 999MP-A7007 or equivalent.

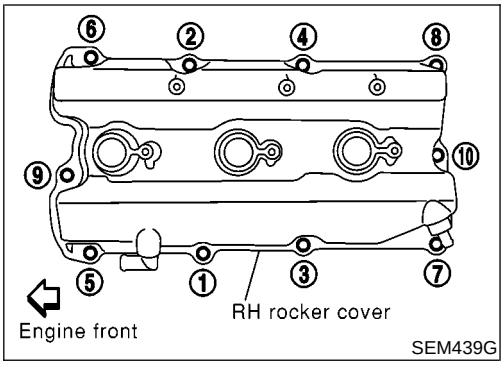
- Being careful not to move the seal ring from the installation groove, align the dowel pins on the chain case with the holes to install the CVTC cover.



SEM438G

- Tighten in numerical order as shown in the figure.

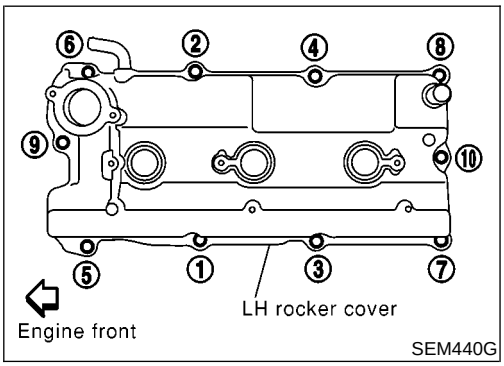
Installation (Cont'd)

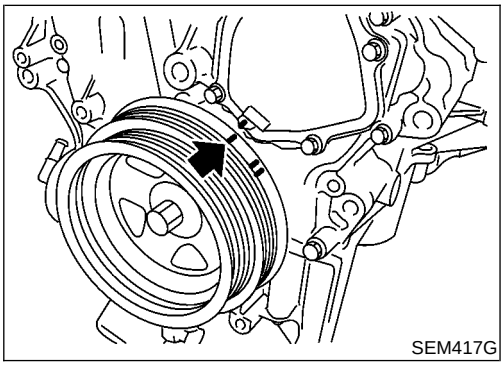


17. Install RH and LH rocker covers.
Rocker cover tightening procedure:
- **Tighten in numerical order as shown in the figure.**

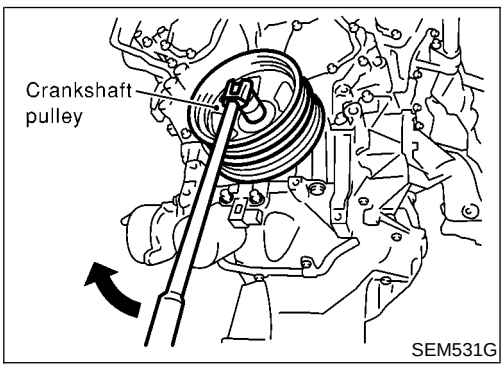
a. Tighten bolts 1 to 10 in that order to 6.9 to 8.8 N·m (0.7 to 0.9 kg-m, 61 to 78 in-lb).
b. Then tighten bolts 1 to 10 as indicated in figure to 6.9 to 8.8 N·m (0.7 to 0.9 kg-m, 61 to 78 in-lb).

18. Hang engine using the right and left side engine slingers with a suitable hoist.
19. Set a suitable transmission jack under the suspension member.
20. Remove right and left side engine mounting nuts.
21. Remove right and left side suspension member bolts.
22. Install aluminum oil pan. Refer to EM-18, "Installation".
23. Set ring gear stopper using the mounting bolt hole.
- Be careful not to damage the signal plate teeth.



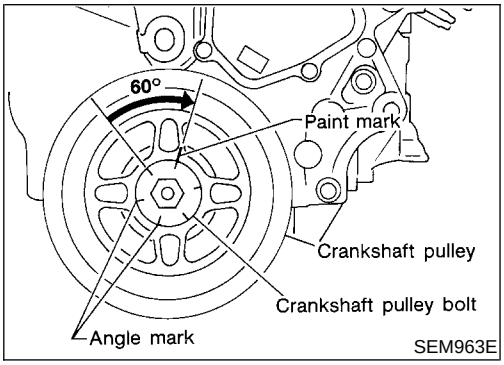


24. Install crankshaft pulley to crankshaft.
- Align pointer with TDC mark on crankshaft pulley.



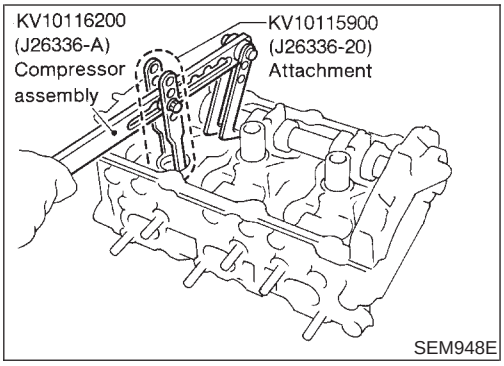
25. Install crankshaft pulley bolt.
- **Lubricate thread and seat surface of the bolt with new engine oil.**

a. Tighten to 39 to 49 N·m (4.0 to 5.0 kg-m, 29 to 36 ft-lb).
b. Put a paint mark on the crankshaft pulley.



c. Again tighten by turning 60° to 66°, about the angle from one hexagon bolt head corner to another.
26. Install camshaft position sensor (PHASE), crankshaft position sensors (REF)/(POS) and CVTC sensors.
27. Reinstall removed parts in the reverse order of removal.
- When installing fuel tube and intake manifold collectors, refer to EM-12, "TIGHTENING PROCEDURES".
- **After starting engine, keep idling for three minutes. Then rev engine up to 3,000 rpm under no load to purge air from the high-pressure chamber of the chain tensioners. The engine may produce a rattling noise. This indicates that**

air still remains in the chamber and is not a matter of concern.



Replacement

NAEM0015

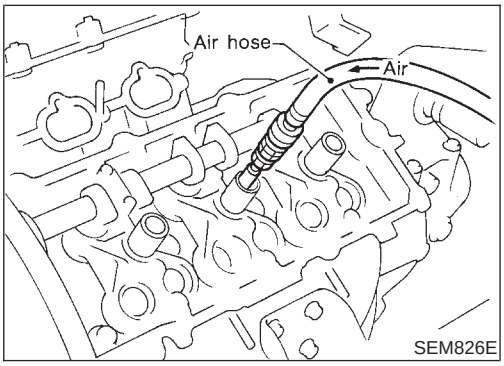
CAUTION:

When removing the oil pans, oil pump assembly and timing chain from engine, first remove the camshaft position sensor (PHASE), CVTC sensor and the crankshaft position sensors (REF)/(POS) from the assembly.
Be careful not to damage sensor edges.

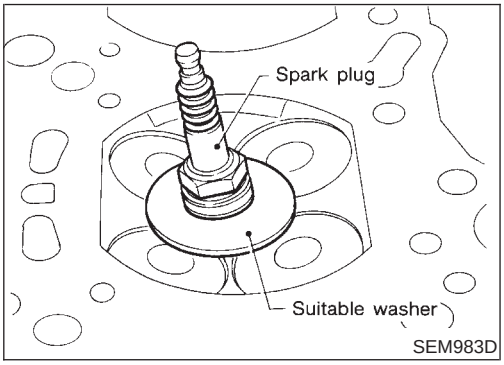
VALVE OIL SEAL

NAEM0015S01

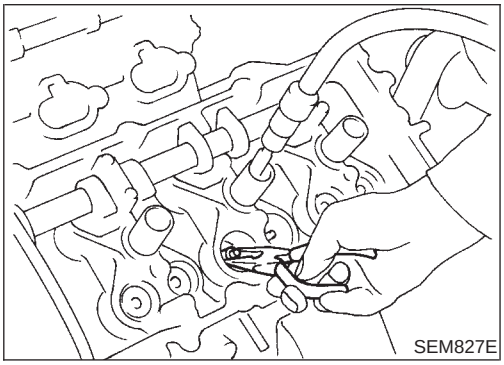
1. Remove timing chain. Refer to “Removal, EM-23.
2. Remove camshaft brackets and camshaft. Refer to “Disassembly”, EM-42.
3. Remove valve lifters and shims.
4. Remove valve spring with Tool.
5. Reinstall any parts removed in reverse order of removal.
   Before removing valve spring, fix valve as follows.
   Method A:
   Piston concerned should be set at TDC to prevent valve from falling.



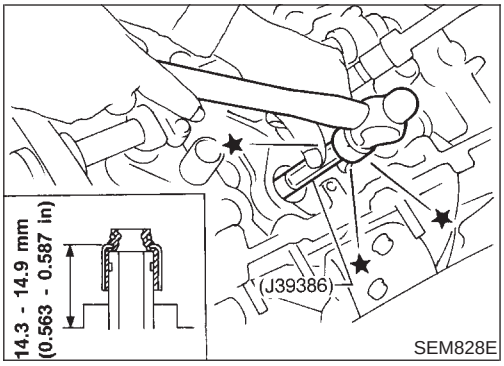
Method B:
Remove spark plug, then install air hose adapter into spark plug hole and apply air pressure to hold valves in place. Apply a pressure of 490 kPa (5 kg/cm^2, 71 psi).



Method C:
Install spark plug with suitable washer into spark plug hole from combustion chamber side.



6. Remove valve oil seal.



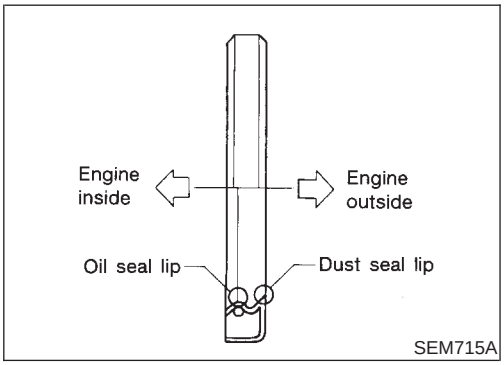
SEM828E

7. Apply engine oil to new valve oil seal and install it with Tool.

OIL SEAL INSTALLATION DIRECTION

NAEM0015S02

- Install new oil seal in the direction shown in the figure.



SEM715A

FRONT OIL SEAL

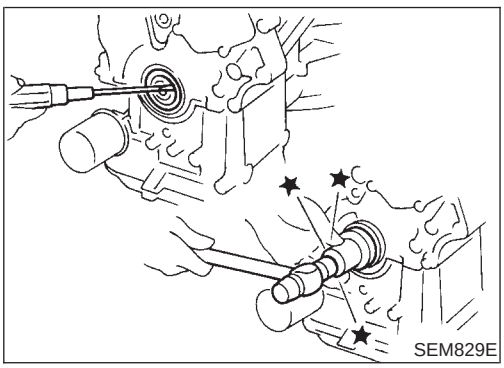
NAEM0015S03

1. Remove the following parts:
- Engine undercover
- Suspension member stay
- Drive belts
- Crankshaft position sensor (REF)

Be careful not to damage sensor edge.

- Crankshaft pulley
- Radiator
- Cooling fan

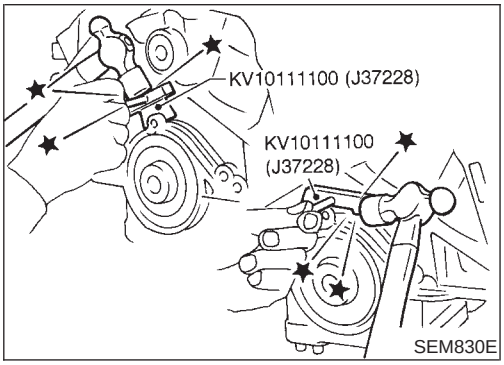
2. Remove front oil seal using a suitable tool.
Be careful not to scratch front cover.
3. Apply engine oil to new oil seal and install it using a suitable tool.


SEM829E

REAR OIL SEAL

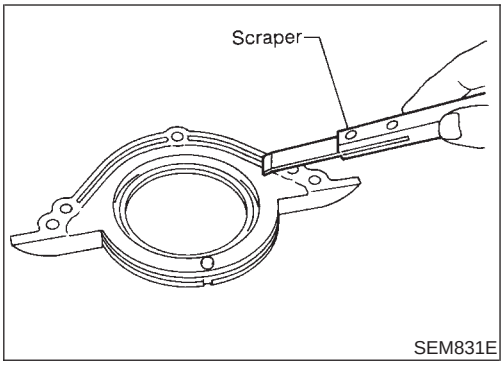
NAEM0015S04

1. Remove transmission. Refer to MT-10 or AT-277, "Removal".
2. Remove flywheel or drive plate.
3. Remove oil pan. Refer to EM-15.
4. Remove rear oil seal retainer.

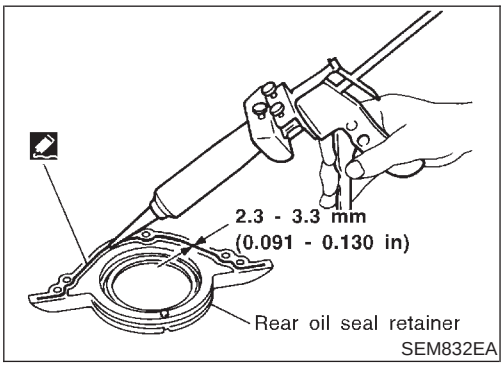


SEM830E

Replacement (Cont'd)



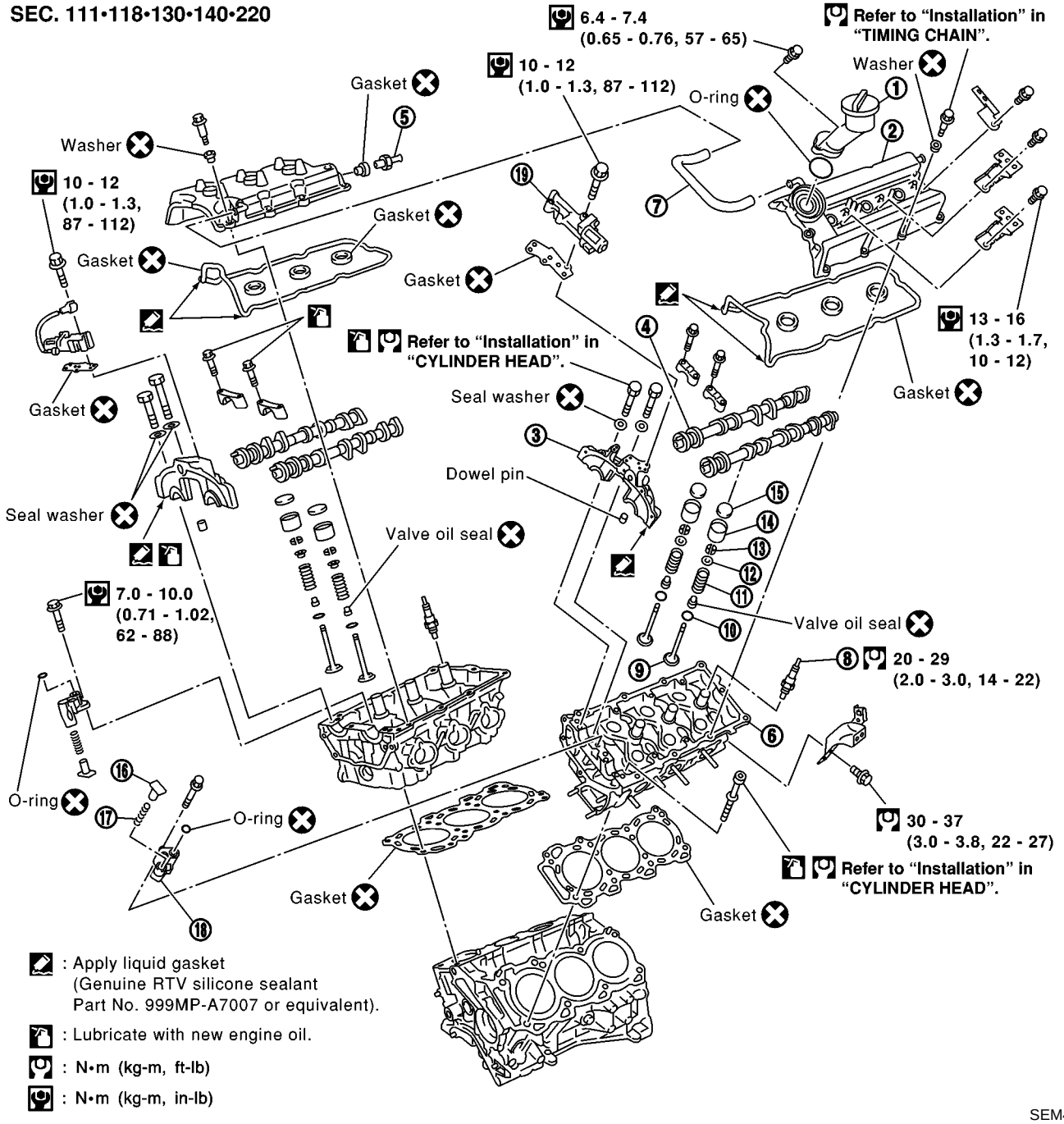
5. Remove old liquid gasket using scraper.
- **Remove old liquid gasket from the bolt hole and thread.**



6. Apply liquid gasket to rear oil seal retainer.

Components

NAEM0016



SEM441G

1. Oil filler cap
2. Rocker cover
3. Camshaft bracket
4. Camshaft
5. PCV valve
6. Cylinder head
7. Blow-by hose
8. Spark plug
9. Valve
10. Valve spring seat
11. Valve spring
12. Valve spring retainer
13. Valve collet
14. Valve lifter
15. Shim
16. Chain tensioner
17. Spring
18. Tensioner sleeve
19. CVTC valve

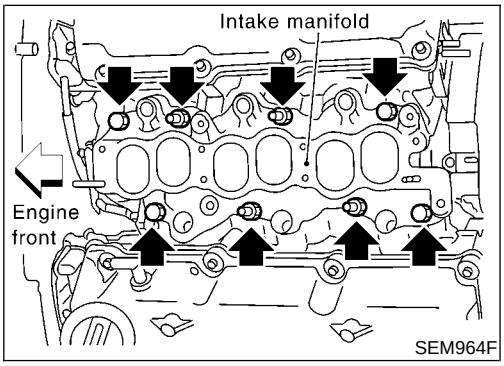
CAUTION:

- **When installing camshafts, chain tensioners, oil seals, or other sliding parts, lubricate contacting surfaces with new engine oil.**
- **Apply new engine oil to threads and seat surfaces when installing cylinder head, camshaft sprocket, crankshaft pulley, and camshaft bracket.**
- **Attach tags to valve lifters so as not to mix them up.**

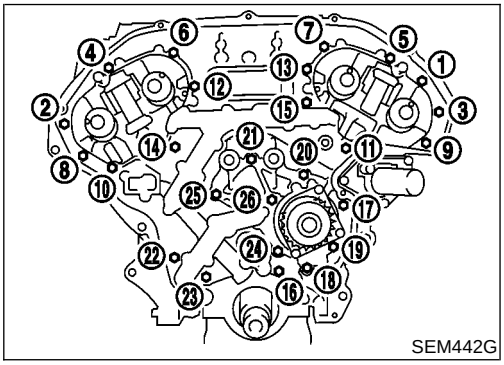
Removal

NAEM0017

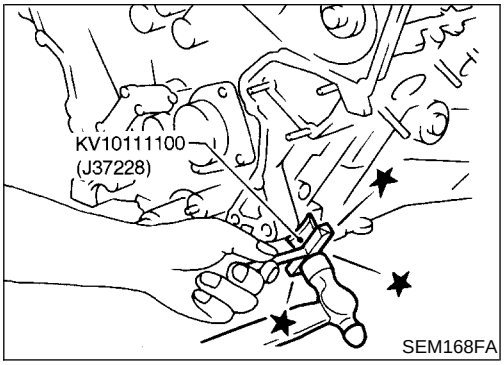
1. Remove engine from vehicle. Refer to EM-58, "Removal and Installation".
2. Remove exhaust manifolds in reverse order of installation. Refer to EM-13, "Exhaust Manifold".
3. Place engine on a work stand.
4. Remove aluminum oil pan. Refer to EM-15, "Removal".
5. Remove timing chain. Refer to EM-23, "Removal".



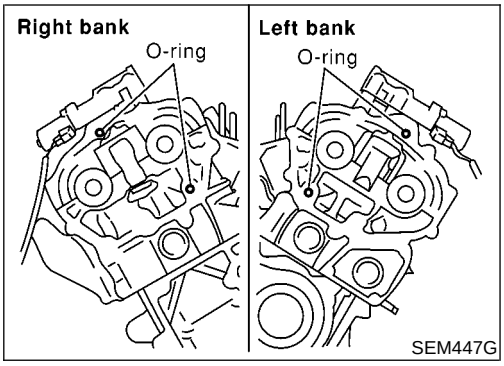
6. Remove intake manifold in reverse order of installation. Refer to "TIGHTENING PROCEDURES", EM-12.
7. Remove water outlet.



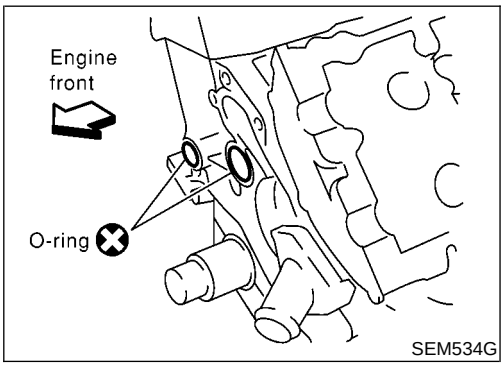
8. Remove rear timing chain case bolts.
- Loosen in numerical order as shown in the figure.



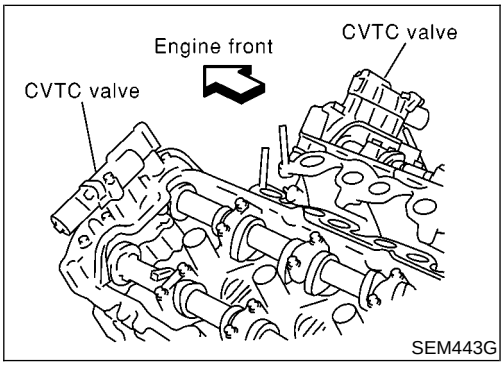
9. Remove rear timing chain case.



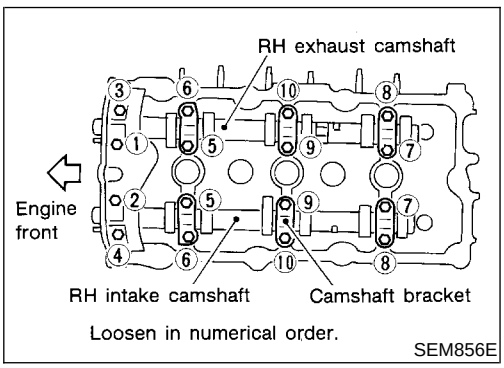
10. Remove O-rings to cylinder head.



11. Remove O-rings to cylinder block.



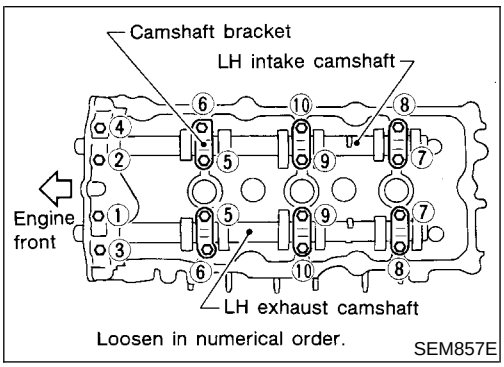
12. Remove CVTC valves.



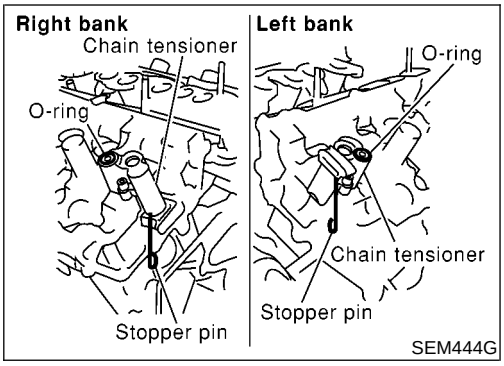
13. Remove intake and exhaust camshafts and camshaft brackets.

- Equally loosen camshaft bracket bolts in several steps in the numerical order shown in the figure.

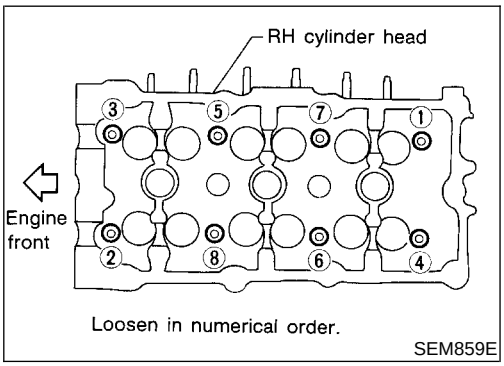
  For reinstallation, be sure to put marks on camshaft bracket before removal.



Removal (Cont'd)

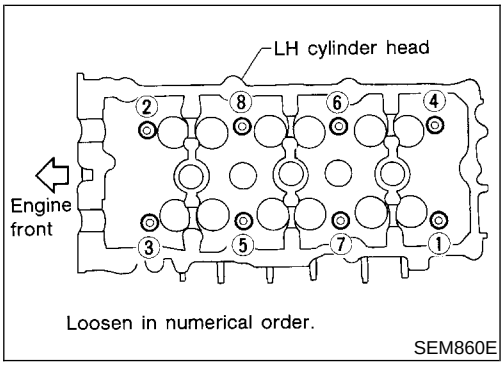


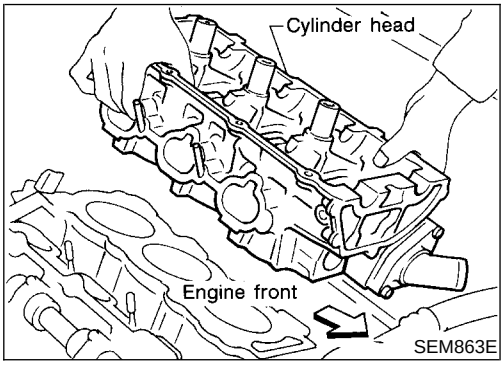
14. Remove RH and LH camshaft chain tensioners from cylinder head.



15. Remove cylinder head bolts.

- **Cylinder head bolts should be loosened in two or three steps.**
- **A warped or cracked cylinder head could result from removing in incorrect order.**





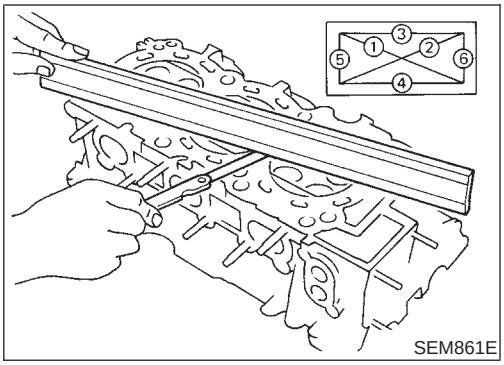
16. Remove cylinder head.

Disassembly

NAEM0043

Remove valve component parts.
Refer to EM-36, "VALVE OIL SEAL".

- Check the clearance before removing the valve guide. Refer to EM-44, "VALVE GUIDE CLEARANCE".



SEM861E

Inspection

NAEM0019

CYLINDER HEAD DISTORTION

NAEM0019S01

Clean surface of cylinder head.
Use a reliable straightedge and feeler gauge to check the flatness of cylinder head surface.
Check along six positions shown in the figure.

Head surface flatness: Limit 0.1 mm (0.004 in)

If beyond the specified limit, resurface or replace it.
The limit for cylinder head resurfacing is determined by the cylinder block resurfacing.

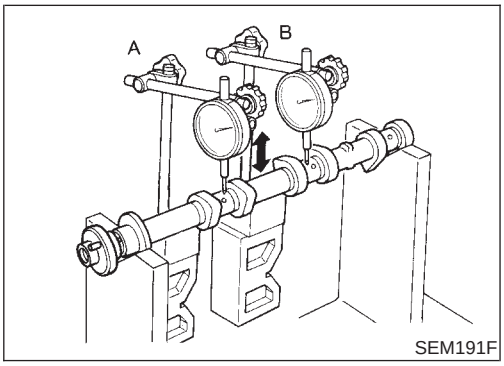
Resurfacing limit:

Amount of cylinder head resurfacing is "A".
Amount of cylinder block resurfacing is "B".
The maximum limit : A + B = 0.2 mm (0.008 in)

After resurfacing cylinder head, check that camshaft rotates freely by hand. If resistance is felt, cylinder head must be replaced.

Nominal cylinder head height:

126.3 - 126.5 mm (4.972 - 4.980 in)



SEM191F

CAMSHAFT VISUAL CHECK

NAEM0019S02

Check camshaft for scratches, seizure and wear.

CAMSHAFT RUNOUT

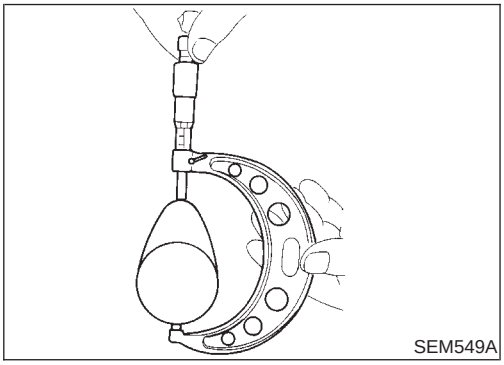
NAEM0019S03

1. Measure camshaft runout at A and B as shown in the figure.

Runout (Total indicator reading):

Limit 0.05 mm (0.0020 in)

2. If it exceeds the limit, replace camshaft.


SEM549A

CAMSHAFT CAM HEIGHT

NAEM0019S04

1. Measure camshaft cam height.

Standard cam height:

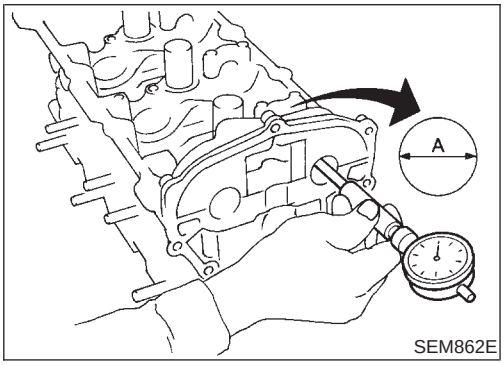
Intake and exhaust

44.465 - 44.655 mm (1.7506 - 1.7581 in)

Cam wear limit:

0.2 mm (0.008 in)

2. If wear is beyond the limit, replace camshaft.



SEM862E

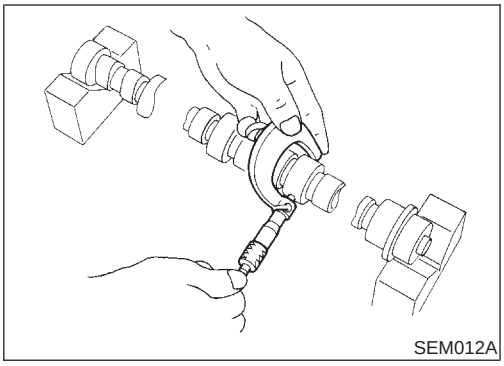
CAMSHAFT JOURNAL CLEARANCE

NAEM0019S05

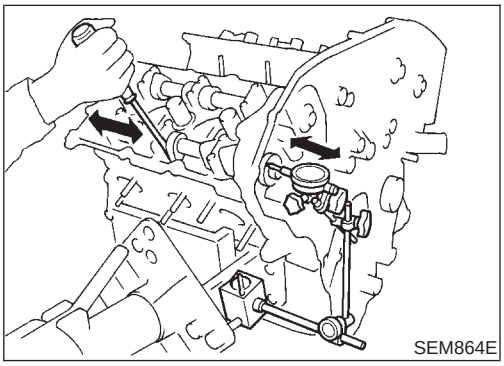
1. Install camshaft bracket and tighten bolts to the specified torque.
2. Measure inner diameter "A" of camshaft bearing.

Standard inner diameter:

No. 1: 26.000 - 26.021 mm (1.0236 - 1.0244 in)
No. 2, 3, 4: 23.500 - 23.521 mm (0.9252 - 0.9260 in)


SEM012A

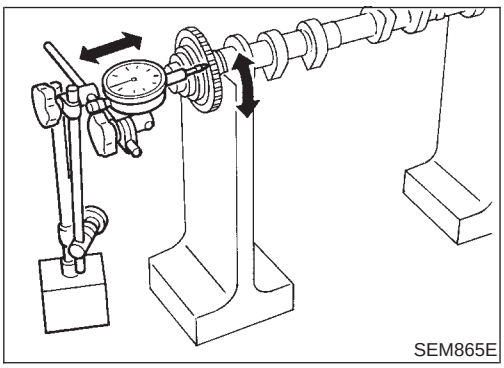
3. Measure outer diameter of camshaft journal.
   Standard outer diameter:
   No. 1: 25.935 - 25.955 mm (1.0211 - 1.0218 in)
   No. 2, 3, 4: 23.445 - 23.465 mm (0.9230 - 0.9238 in)
4. If clearance exceeds the limit, replace camshaft and/or cylinder head.
   Camshaft journal clearance:
   Standard
   No. 1: 0.045 - 0.086 mm (0.0018 - 0.0034 in)
   No. 2, 3, 4: 0.035 - 0.076 mm (0.0014 - 0.0030 in)
   Limit
   0.15 mm (0.0059 in)


SEM864E

CAMSHAFT END PLAY

NAEM0019S06

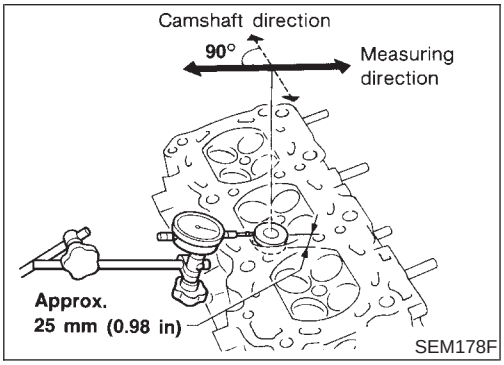
1. Install camshaft in cylinder head.
2. Measure camshaft end play.
   Camshaft end play:
   Standard
   0.115 - 0.188 mm (0.0045 - 0.0074 in)
   Limit
   0.24 mm (0.0094 in)


SEM865E

CAMSHAFT SPROCKET RUNOUT

NAEM0019S07

1. Install sprocket on camshaft.
2. Measure camshaft sprocket runout.
   Runout (Total indicator reading):
   Less than 0.15 mm (0.0059 in)
3. If it exceeds the limit, replace camshaft sprocket.

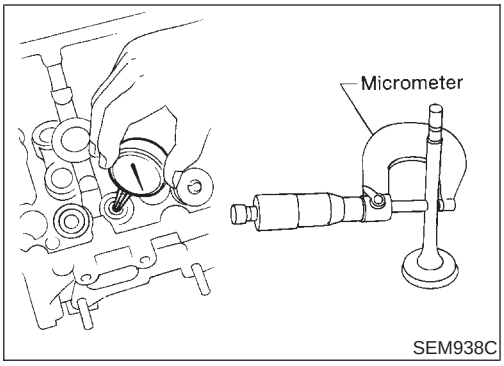


SEM178F

VALVE GUIDE CLEARANCE

NAEM0019S08

1. Measure valve deflection as shown in the figure. (Valve and valve guide mostly wear in this direction.)
   Valve deflection limit (Dial gauge reading):
   Intake 0.24 mm (0.0094 in)
   Exhaust 0.28 mm (0.0110 in)



SEM938C

2. If it exceeds the limit, check valve to valve guide clearance.
a. Measure valve stem diameter and valve guide inner diameter.
b. Check that clearance is within specification.

Valve to valve guide clearance limit:

Intake 0.08 mm (0.0031 in)

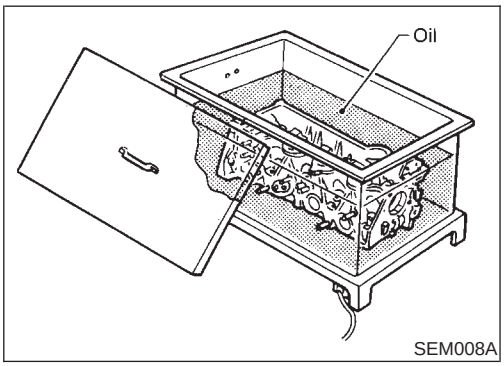
Exhaust 0.1 mm (0.004 in)

c. If it exceeds the limit, replace valve or valve guide.

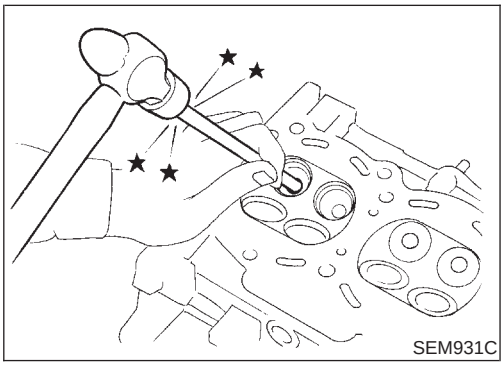
VALVE GUIDE REPLACEMENT

NAEM0019S09

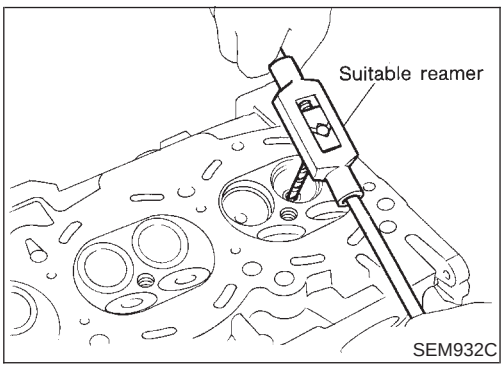
1. To remove valve guide, heat cylinder head to 110 to 130°C (230 to 266°F) by soaking in heated oil.



SEM008A


SEM931C

2. Drive out valve guide with a press [under a 20 kN (2 ton, 2.2 US ton, 2.0 Imp ton) pressure] or hammer and suitable tool.

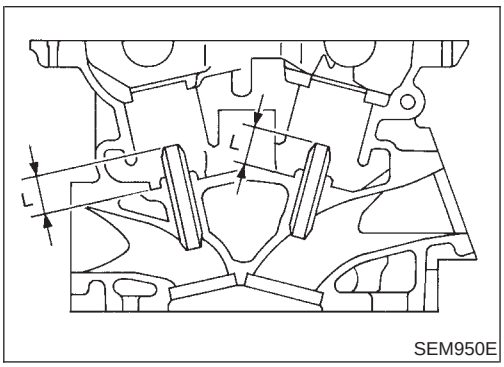


SEM932C

3. Ream cylinder head valve guide hole.

Valve guide hole diameter (for service parts):

10.175 - 10.196 mm (0.4006 - 0.4014 in)



SEM950E

4. Heat cylinder head to 110 to 130°C (230 to 266°F) and press service valve guide onto cylinder head.

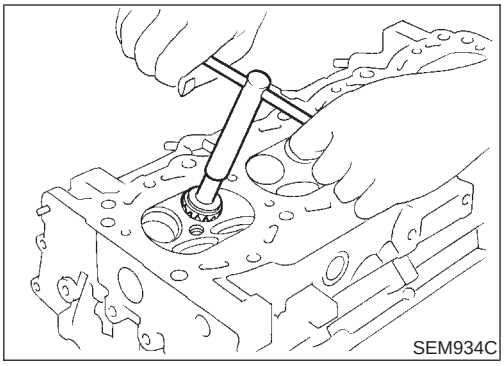
Projection "L":

12.6 - 12.8 mm (0.496 - 0.504 in)

5. Ream valve guide.

Finished size:

6.000 - 6.018 mm (0.2362 - 0.2369 in)

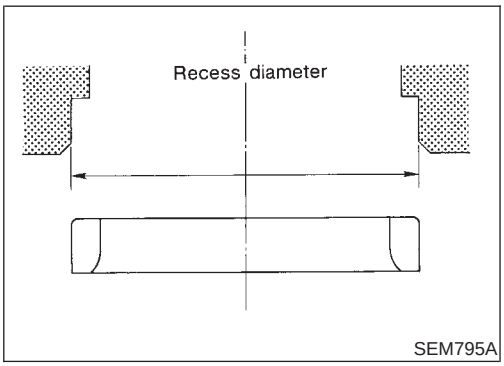

SEM934C

VALVE SEATS

NAEM0019S10

Check valve seats for any evidence of pitting at valve contact surface, and reseat or replace if it has worn out excessively.

- **Before repairing valve seats, check valve and valve guide for wear. If they have worn, replace them. Then correct valve seat.**
- **Use both hands to cut uniformly.**



SEM795A

REPLACING VALVE SEAT FOR SERVICE PARTS

NAEM0019S11

1. Bore out old seat until it collapses. Boring should not continue beyond the bottom face of the seat recess in cylinder head. Set the machine depth stop to ensure this.
2. Ream cylinder head recess for service valve seat.

   Oversize [0.5 mm (0.020 in)]:

   Intake 38.500 - 38.516 mm (1.5157 - 1.5164 in)

   Exhaust 32.700 - 32.716 mm (1.2874 - 1.2880 in)

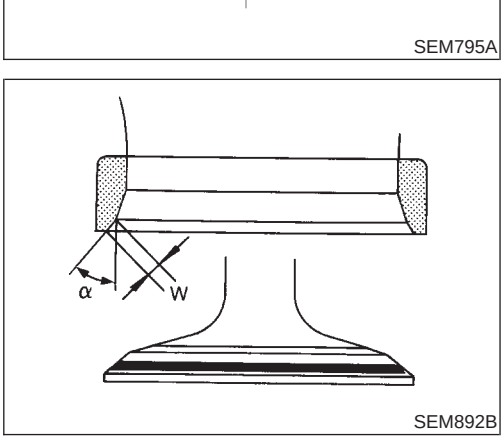
   Be sure to ream in circles concentric to the valve guide center.
   This will enable valve seat to fit correctly.
3. Heat cylinder head to 110 to 130°C (230 to 266°F) by soaking in heated oil.
4. Press fit valve seat until it seats on the bottom.
5. Cut or grind valve seat using suitable tool to the specified dimensions as shown in SDS (EM-80).
6. After cutting, lap valve seat with abrasive compound.
7. Check valve seating condition.

   Seat face angle "α": 45°

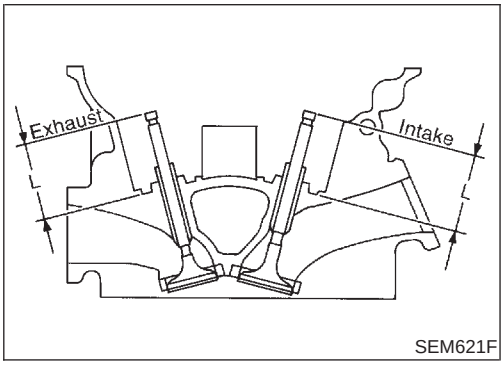
   Contacting width "W":

   Intake 1.09 - 1.31 mm (0.0429 - 0.0516 in)

   Exhaust 1.29 - 1.51 mm (0.0508 - 0.0594 in)



SEM892B



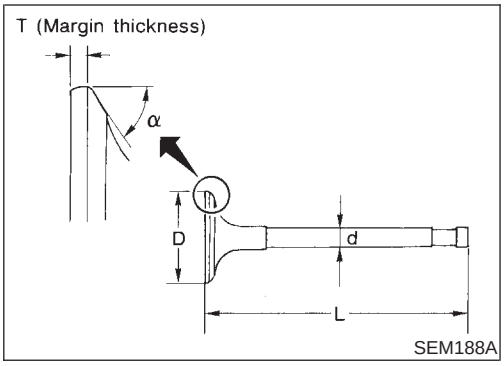
SEM621F

8. Use a depth gauge to measure the distance between the mounting surface of the cylinder head spring seat and the valve stem end. If the distance is shorter than specified, repeat step 5 above to adjust it. If it is longer, replace the valve seat with a new one.

   Valve seat resurface limit "L":

   Intake 41.07 - 41.67 mm (1.6169 - 1.6405 in)

   Exhaust 41.00 - 41.60 mm (1.6142 - 1.6378 in)



SEM188A

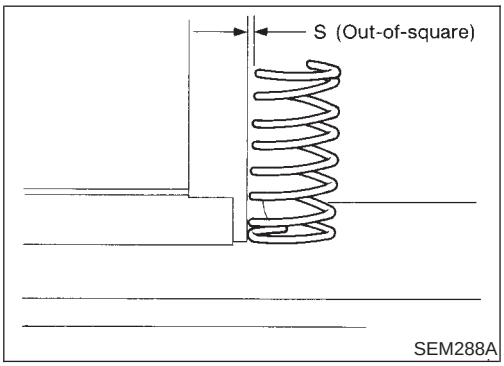
VALVE DIMENSIONS

NAEM0019S12

Check dimensions of each valve. For dimensions, refer to SDS (EM-77).

When valve head has been worn down to 0.5 mm (0.020 in) in margin thickness, replace valve.

Grinding allowance for valve stem tip is 0.2 mm (0.008 in) or less.



SEM288A

VALVE SPRING

NAEM0019S13

Squareness

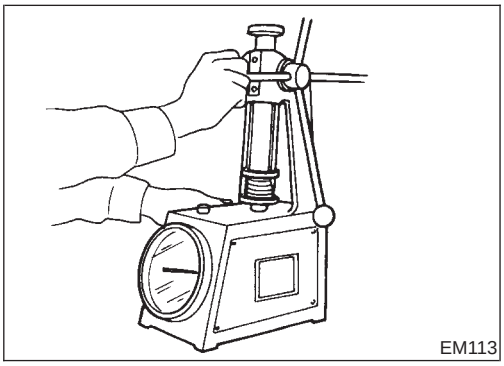
NAEM0019S1301

1. Measure dimension "S".

   Out-of-square "S":

   Less than 2.0 mm (0.079 in)

2. If it exceeds the limit, replace spring.


EM113

Pressure

NAEM0019S1302

Check valve spring pressure at specified spring height.

Pressure:

Standard

202 N (20.6 kg, 45.4 lb) at height 37.0 mm (1.457 in)

Limit

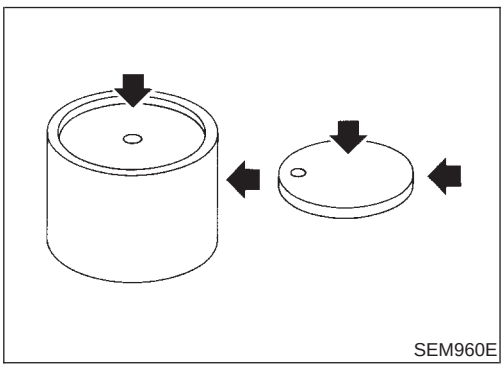
More than 436 N (44.5 kg, 98.1 lb) at height 28.2 mm (1.110 in)

If it exceeds the limit, replace spring.

VALVE LIFTER

NAEM0019S14

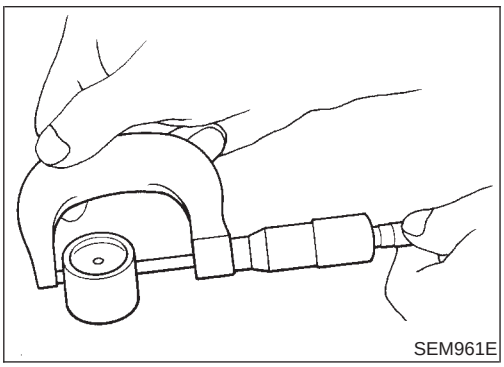
1. Check contact and sliding surfaces for wear or scratches.

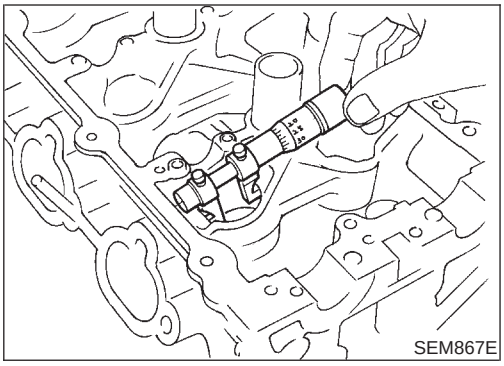

SEM960E

2. Check diameter of valve lifter and valve lifter guide bore.

   Valve lifter outer diameter:

   34.960 - 34.975 mm (1.3764 - 1.3770 in)


SEM961E


SEM867E

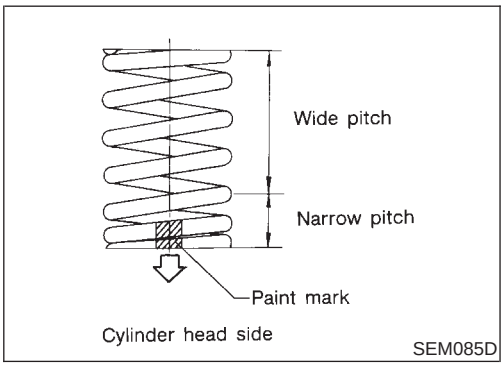
Lifter guide bore diameter:
35.000 - 35.021 mm (1.3780 - 1.3788 in)

Assembly

NAEM0020

1. Install valve component parts.

- **Always use new valve oil seal. Refer to "VALVE OIL SEAL", EM-36.**
- **Before installing valve oil seal, install valve spring seat.**
- **Install valve spring (uneven pitch type) with its narrow pitch side toward cylinder head side (paint mark).**
- After installing valve component parts, tap valve stem tip with plastic hammer to assure a proper fit.



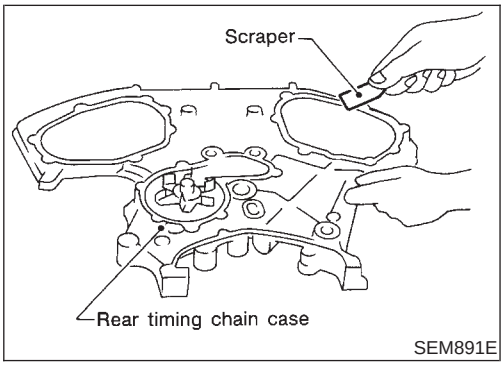
SEM085D

Installation

NAEM0021

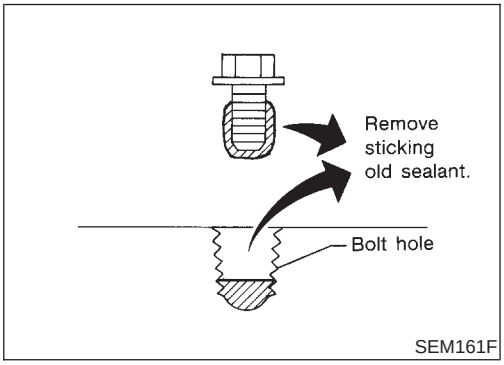
1. Before installing rear timing chain case, remove old liquid gasket from mating surface using a scraper.

- Also remove old liquid gasket from mating surface of cylinder block.



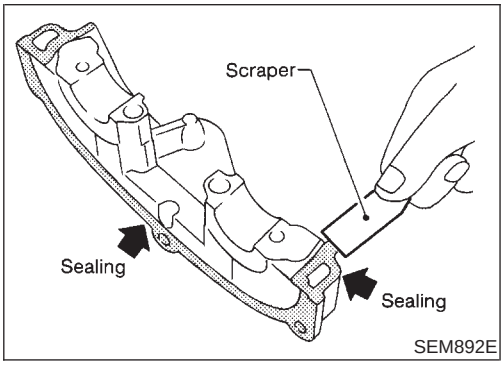
SEM891E

- **Remove old liquid gasket from the bolt hole and thread.**

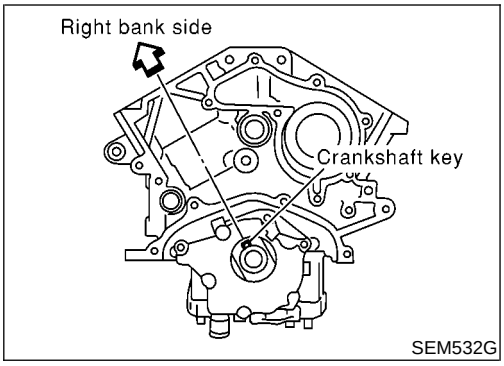


SEM161F

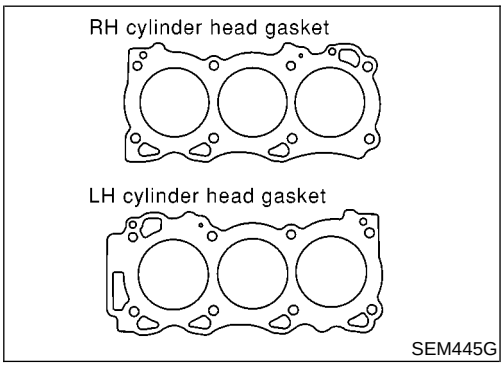
2. Before installing cam bracket, remove old liquid gasket from mating surface using a scraper.



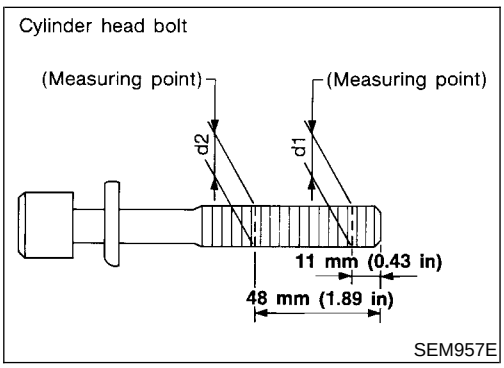
SEM892E



3. Before installing the cylinder head gasket, be sure that No. 1 cylinder is at TDC.
- At this time, the crankshaft key should face toward the right bank.



4. Install cylinder heads with new gaskets.
- **Do not rotate crankshaft and camshaft separately, or valves will strike piston heads.**



CAUTION:

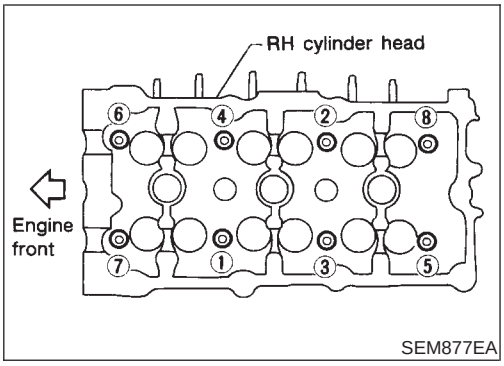
Cylinder head bolts are tightened by plastic zone tightening method. Whenever the size difference between d1 and d2 exceeds the limit, replace them with new ones.

Limit (d1 - d2):

0.11 mm (0.0043 in)

- **Lubricate threads and seat surfaces of the bolts with new engine oil.**

Installation (Cont'd)

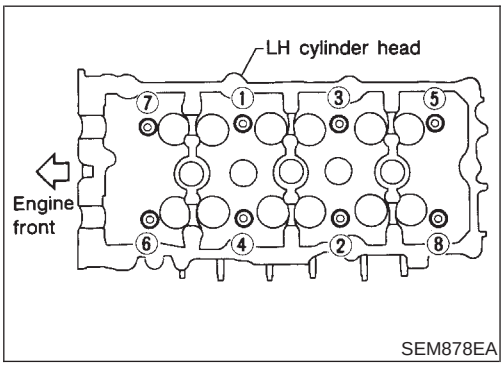


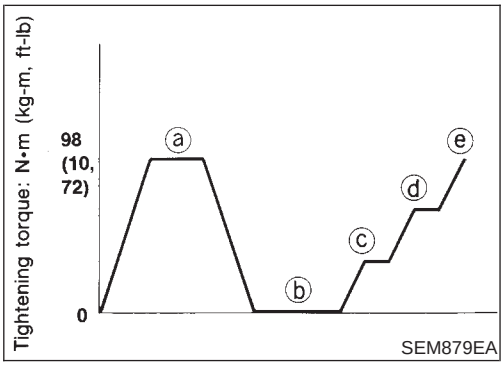
5. Install cylinder head outside bolts.

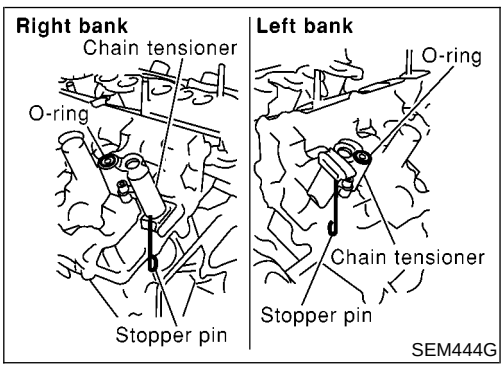
- **Tightening procedure:**

a. **Tighten all bolts to 98 N·m (10 kg-m, 72 ft-lb).**
b. **Completely loosen all bolts.**
c. **Tighten all bolts to 34 to 44 N·m (3.5 to 4.5 kg-m, 25 to 33 ft-lb).**
d. **Turn all bolts 90 to 95 degrees clockwise.**
e. **Turn all bolts 90 to 95 degrees clockwise.**

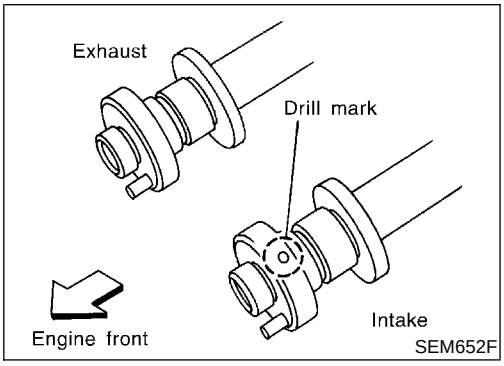
- **Tighten in numerical order shown in the figure.**





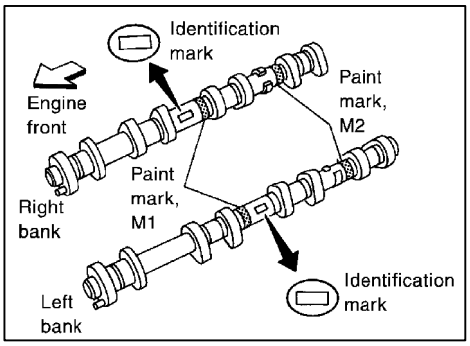


6. Install camshaft chain tensioners on both sides of cylinder head.



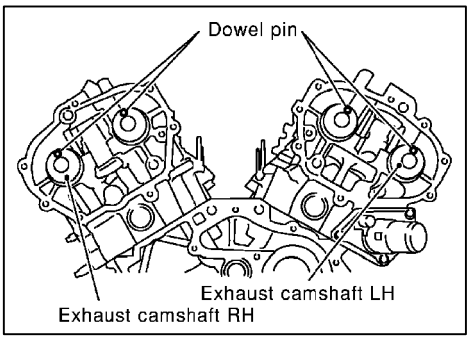
7. Install exhaust and intake camshafts and camshaft brackets.

- **Intake camshaft has a drill mark on camshaft sprocket mounting flange. Install it on the intake side.**

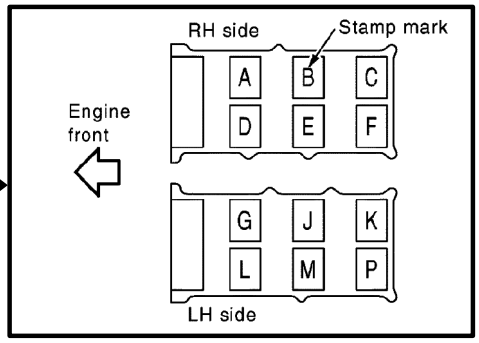


- Identification marks are present on camshafts.

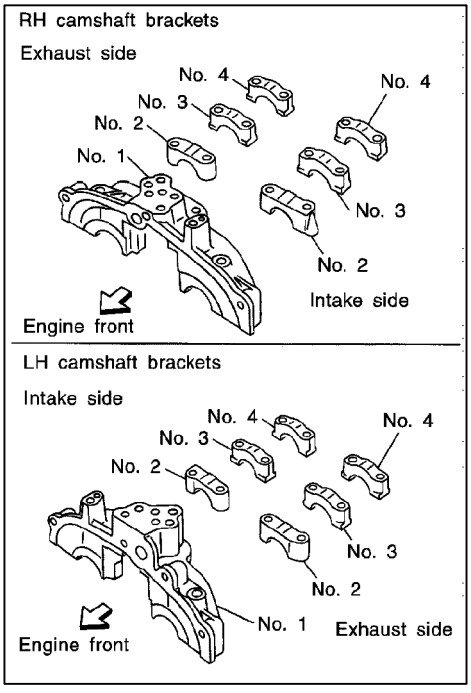
Bank	INT/EXH	ID mark	Drill mark	Paint mark	
				M1	M2
RH	INT	R3	Yes	Yes	No
	EXH	R3	No	No	Yes
LH	INT	L3	Yes	Yes	No
	EXH	L3	No	No	Yes

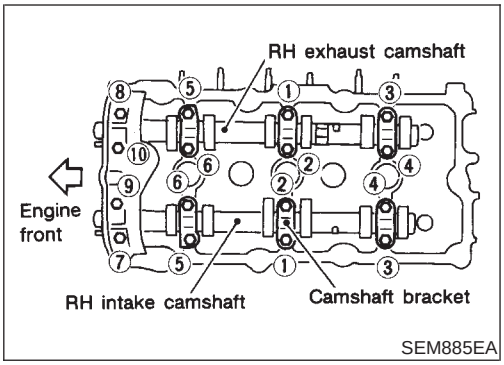


- Position camshaft
  RH exhaust camshaft dowel pin at about 10 o'clock
  LH exhaust camshaft dowel pin at about 2 o'clock



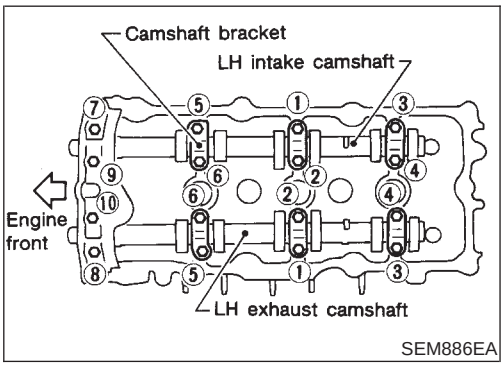
8. Before installing camshaft brackets, apply sealant to mating surface of No. 1 journal head.
- Use Genuine RTV silicone sealant Part No. 999MP-A7007 or equivalent.
- Refer to "POSITION FOR APPLYING LIQUID GASKET", EM-21.
- Install camshaft brackets in their original positions.
  Align stamp mark as shown in the figure. ⬅
- If any part of valve assembly or camshaft is replaced, check valve clearance according to reference data. After completing assembly check valve clearance. Refer to "Checking" and "Adjusting" in "VALVE CLEARANCE", EM-53 and 55.
  Reference data valve clearance (Cold):
  Intake
  0.26 - 0.34 mm (0.010 - 0.013 in)
  Exhaust
  0.29 - 0.37 mm (0.011 - 0.015 in)
- Lubricate threads and seat surfaces of camshaft bracket bolts with new engine oil before installing them.



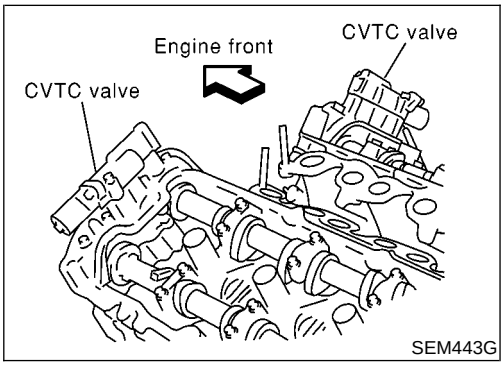


- Tighten the camshaft brackets in the following steps.

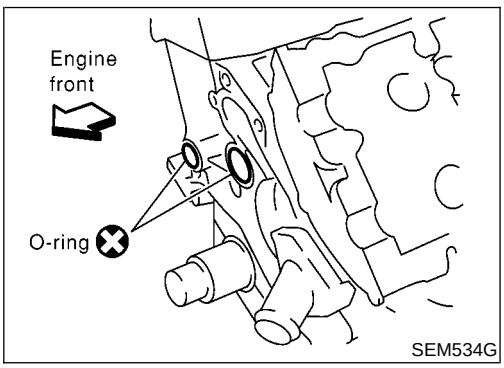
Step	Tightening torque	Tightening order
1	1.96 N·m (0.2 kg-m, 17 in-lb)	Tighten in the order of 7 to 10, then tighten 1 to 6.
2	5.88 N·m (0.6 kg-m, 52 in-lb)	Tighten in the numerical order.
3	9.02 - 11.8 N·m (0.92 - 1.20 kg-m, 79.9 - 104.2 in-lb)	Tighten in the numerical order.



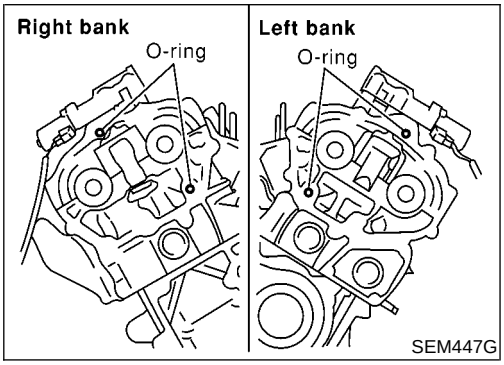
9. Install CVTC valves.



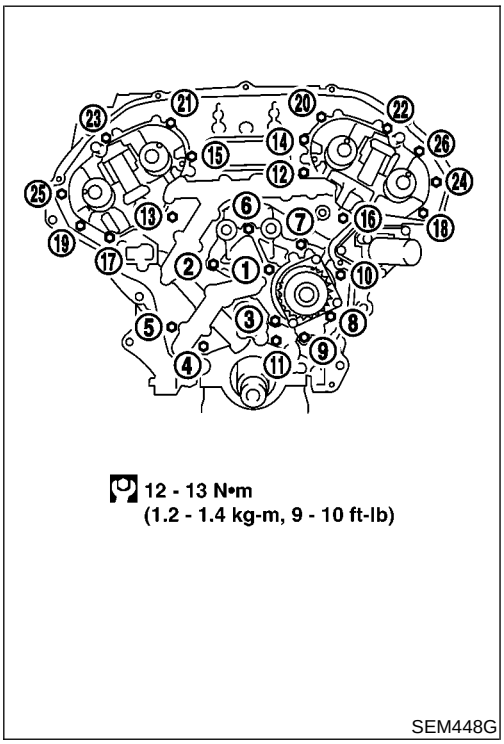
10. Install O-rings to cylinder block.



11. Install O-rings to cylinder head.



12. Apply sealant to the hatched portion of rear timing chain case.
- Apply continuous bead of liquid gasket to mating surface of rear timing chain case.
  Refer to "POSITION FOR APPLYING LIQUID GASKET", EM-21.
- **Before installation, wipe off the protruding sealant.**



13. Align rear timing chain case with dowel pins, then install on cylinder head and block.
14. Tighten rear chain case bolts.
a. Tighten bolts in numerical order shown in the figure.
b. Repeat above step a.
15. Reinstall all removed parts in reverse order of removal.

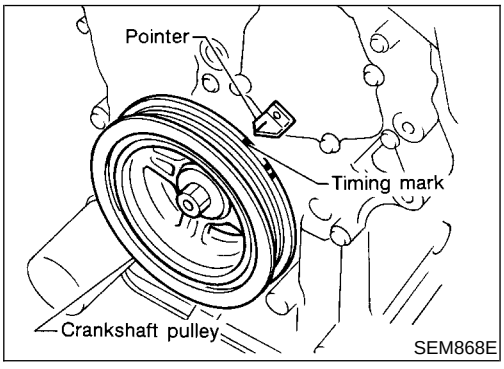
Valve Clearance

NAEM0022

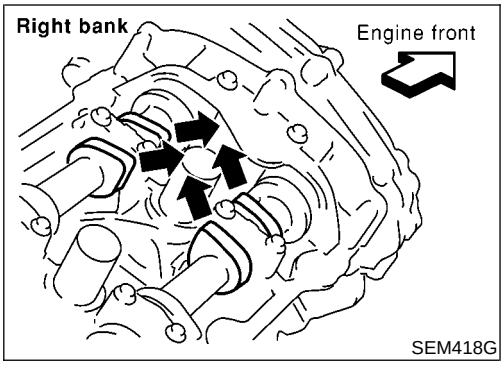
CHECKING

NAEM0022S01

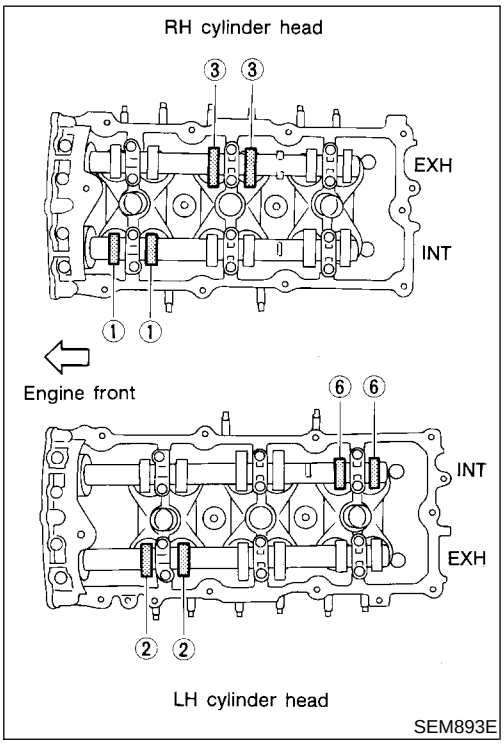
Check valve clearance while engine is cold and not running.



1. Remove engine cover.
2. Remove air duct with air cleaner case, collectors, hoses, wires, harnesses, connectors and so on.
3. Remove intake manifold collectors.
4. Remove ignition coils and spark plugs.
5. Remove RH and LH rocker covers.
6. Set No. 1 cylinder at TDC on its compression stroke.
- Align pointer with TDC mark on crankshaft pulley.

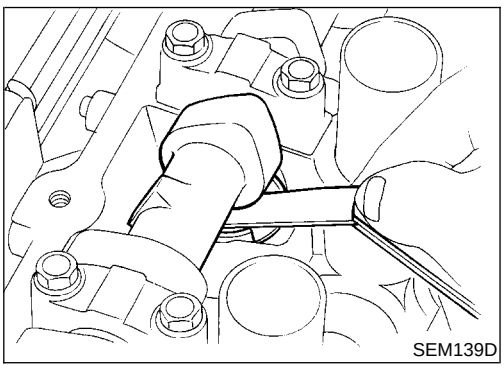


- Check that valve lifters on No. 1 cylinder are loose and valve lifters on No. 4 are tight.
  If not, turn crankshaft one revolution (360°) and align as above.



7. Check only those valves shown in the figure.

Crank position	Valve											
	No. 1		No. 2		No. 3		No. 4		No. 5		No. 6	
	INT	EXH	INT	EXH	INT	EXH	INT	EXH	INT	EXH	INT	EXH
No. 1 TDC	○			○		○					○	



- Using a feeler gauge, measure clearance between valve lifter and camshaft.
- Record any valve clearance measurements which are out of specification. They will be used later to determine the required replacement adjusting shim.

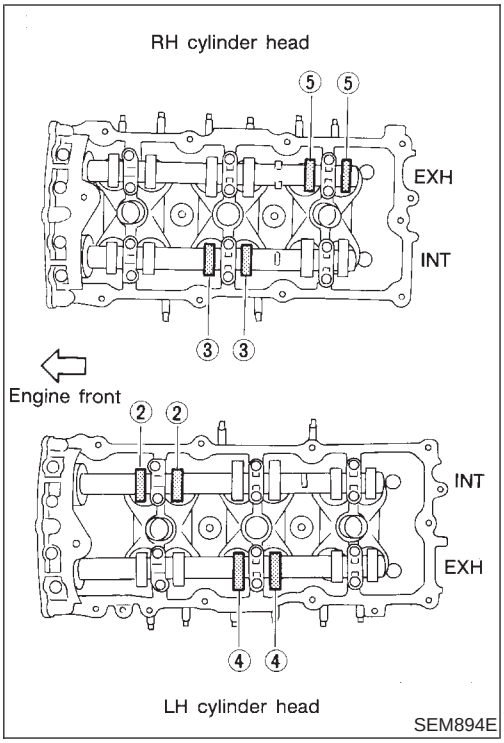
Valve clearance for checking (Cold):

Intake

0.26 - 0.34 mm (0.010 - 0.013 in)

Exhaust

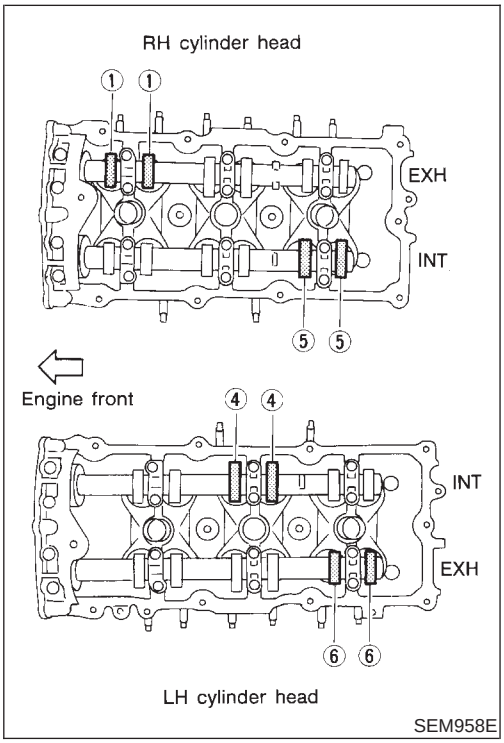
0.29 - 0.37 mm (0.011 - 0.015 in)



SEM894E

8. Turn crankshaft 240° and align as above.
9. Set No. 3 cylinder at TDC on its compression stroke.
10. Check only those valves shown in the figure.

Crank position	Valve											
	No. 1		No. 2		No. 3		No. 4		No. 5		No. 6	
	INT	EXH	INT	EXH	INT	EXH	INT	EXH	INT	EXH	INT	EXH
No. 3 TDC			○		○			○		○		



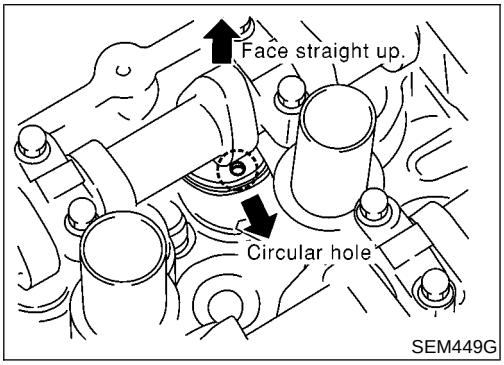
SEM958E

11. Turn crankshaft 240° and align as above.
12. Set No. 5 cylinder at TDC on its compression stroke.
13. Check only those valves shown in the figure.

Crank position	Valve											
	No. 1		No. 2		No. 3		No. 4		No. 5		No. 6	
	INT	EXH	INT	EXH	INT	EXH	INT	EXH	INT	EXH	INT	EXH
No. 5 TDC		○					○		○			○

14. If all valve clearances are within specification, install the following parts. If they are out of specification, adjust the valve clearances.

- Intake manifold collectors
- RH and LH rocker covers
- All spark plugs
- All ignition coils



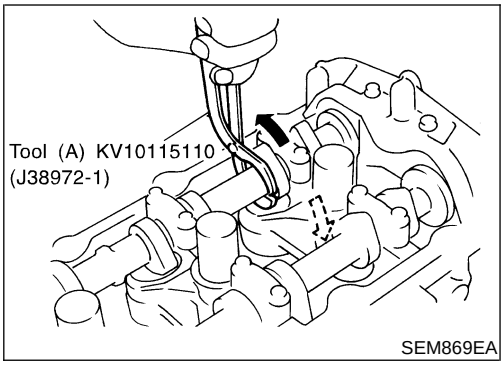
SEM449G

ADJUSTING

NAEM0022S02

Adjust valve clearance while engine is cold.

1. Turn crankshaft, to position cam lobe on camshaft of valve that must be adjusted upward.
2. Thoroughly wipe off engine oil around adjusting shim using a rag.
3. Using a extra-fine screwdriver, turn the round hole of the adjusting shim in the direction of the arrow.

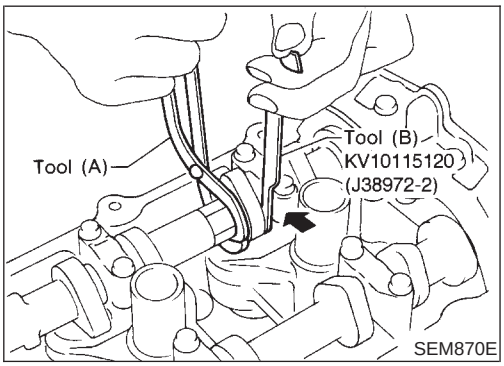


4. Place Tool (A) around camshaft as shown in figure.
Before placing Tool (A), rotate notch toward center of cylinder head (See figure.), to simplify shim removal later.

CAUTION:

Be careful not to damage cam surface with Tool (A).

5. Rotate Tool (A) (See figure.) so that valve lifter is pushed down.

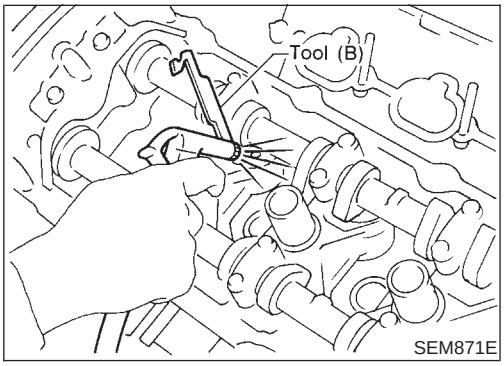


6. Place Tool (B) between camshaft and the edge of the valve lifter to retain valve lifter.

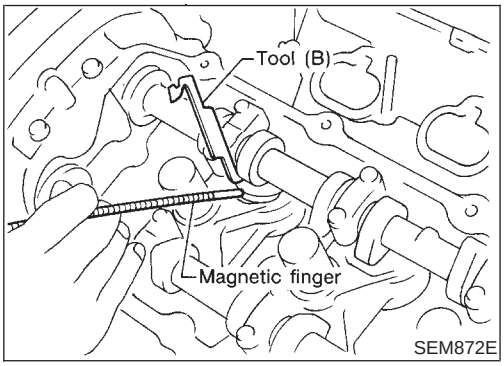
CAUTION:

- **Tool (B) must be placed as close to camshaft bracket as possible.**
- **Be careful not to damage cam surface with Tool (B).**

7. Remove Tool (A).



8. Blow air into the hole to separate adjusting shim from valve lifter.



9. Remove adjusting shim using a small screwdriver and a magnetic finger.
10. Determine replacement adjusting shim size following formula.

- Using a micrometer determine thickness of removed shim.
- Calculate thickness of new adjusting shim so valve clearance comes within specified values.
  R = Thickness of removed shim
  N = Thickness of new shim
  M = Measured valve clearance

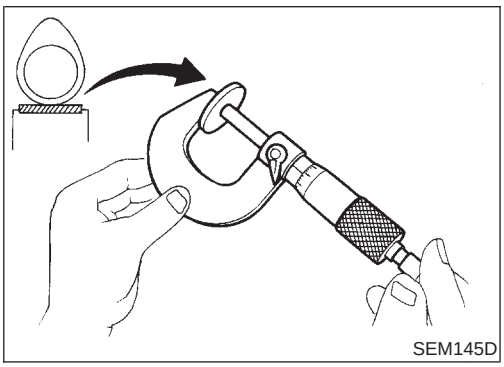
  Intake:

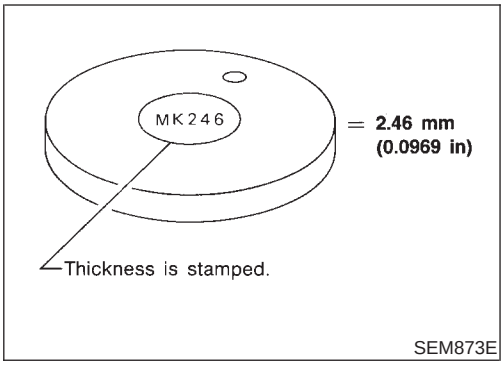
  N = R + [M − 0.30 mm (0.0118 in)]

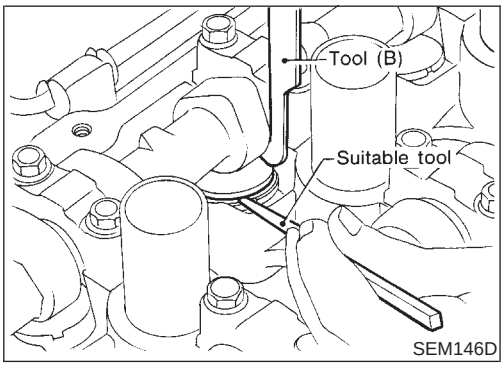
  Exhaust:

  N = R + [M − 0.33 mm (0.0130 in)]

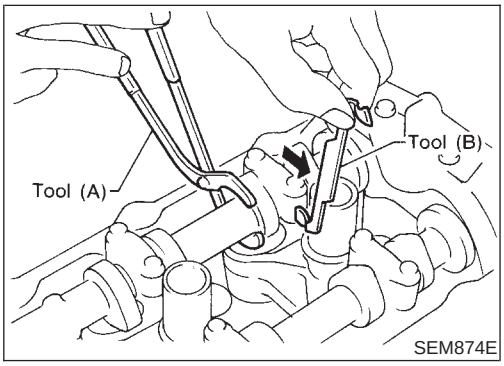
  Shims are available in 64 sizes from 2.32 mm (0.0913 in) to 2.95 mm (0.1161 in), in steps of 0.01 mm (0.0004 in).
- Select new shim with thickness as close as possible to calculated value.







11. Install new shim using a suitable tool.
- **Install with the surface on which the thickness is stamped facing down.**



12. Place Tool (A) as mentioned in steps 2 and 3.
13. Remove Tool (B).
14. Remove Tool (A).
15. Recheck valve clearance.

Valve clearance:

Unit: mm (in)

	Cold	Hot* (reference data)
Intake	0.26 - 0.34 (0.010 - 0.013)	0.304 - 0.416 (0.012 - 0.016)
Exhaust	0.29 - 0.37 (0.011 - 0.015)	0.308 - 0.432 (0.012 - 0.017)

*: Approximately 80°C (176°F)

Removal and Installation

NAEM0042

WARNING:

- **Situate vehicle on a flat and solid surface.**
- **Place chocks at front and back of rear wheels.**
- **Do not remove engine until exhaust system has completely cooled off. Otherwise, you may burn yourself and/or fire may break out in fuel line.**
- **For safety during subsequent steps, the tension of wires should be slackened against the engine.**
- **Before disconnecting fuel hose, release fuel pressure from fuel line.**
  Refer to EC-39, "Fuel Pressure Release".
- **Before removing front axle from transmission, place safety stands under designated front supporting points. Refer to GI section for lifting points and towing.**
- **Be sure to hoist engine and transmission in a safe manner.**
- **For engines not equipped with engine slingers, attach proper slingers and bolts described in PARTS CATALOG.**

CAUTION:

- **When lifting engine, be careful not to strike adjacent parts, especially accelerator wire casing, brake lines, and brake master cylinder.**
- **In hoisting the engine, always use engine slingers in a safe manner.**
- **Before separating engine and transmission, remove crankshaft position sensor (POS) from the assembly.**
- **Always take extra care not to damage edge of crankshaft position sensor (POS), or ring gear teeth.**

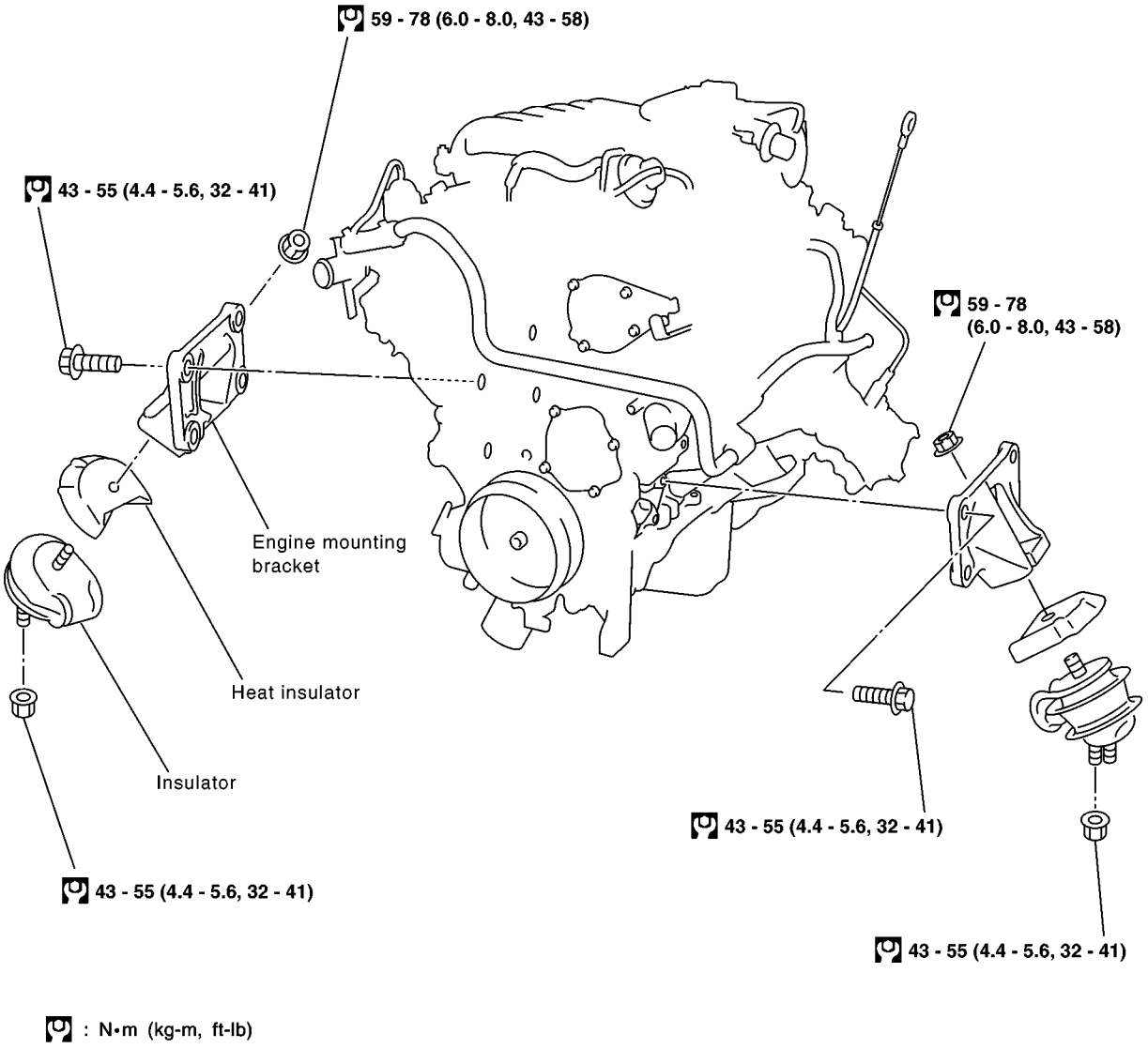
REMOVAL

Front Engine Mounting

NAEM0042S01

NAEM0042S0101

SEC. 112

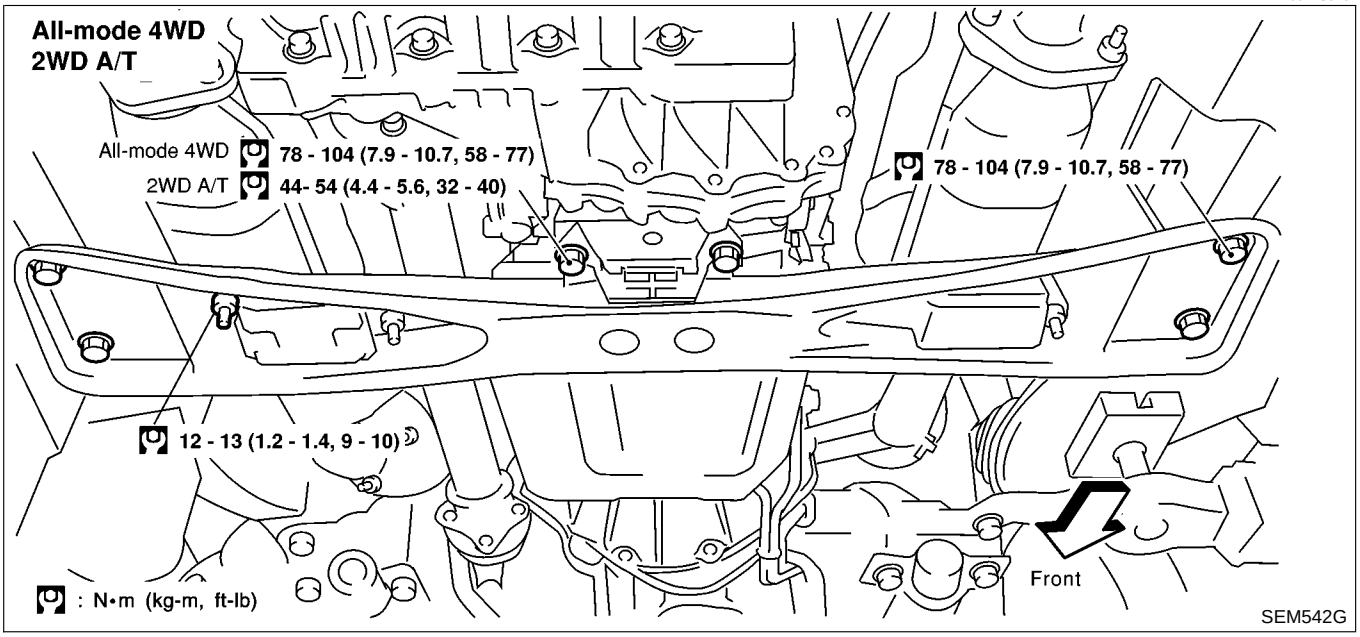


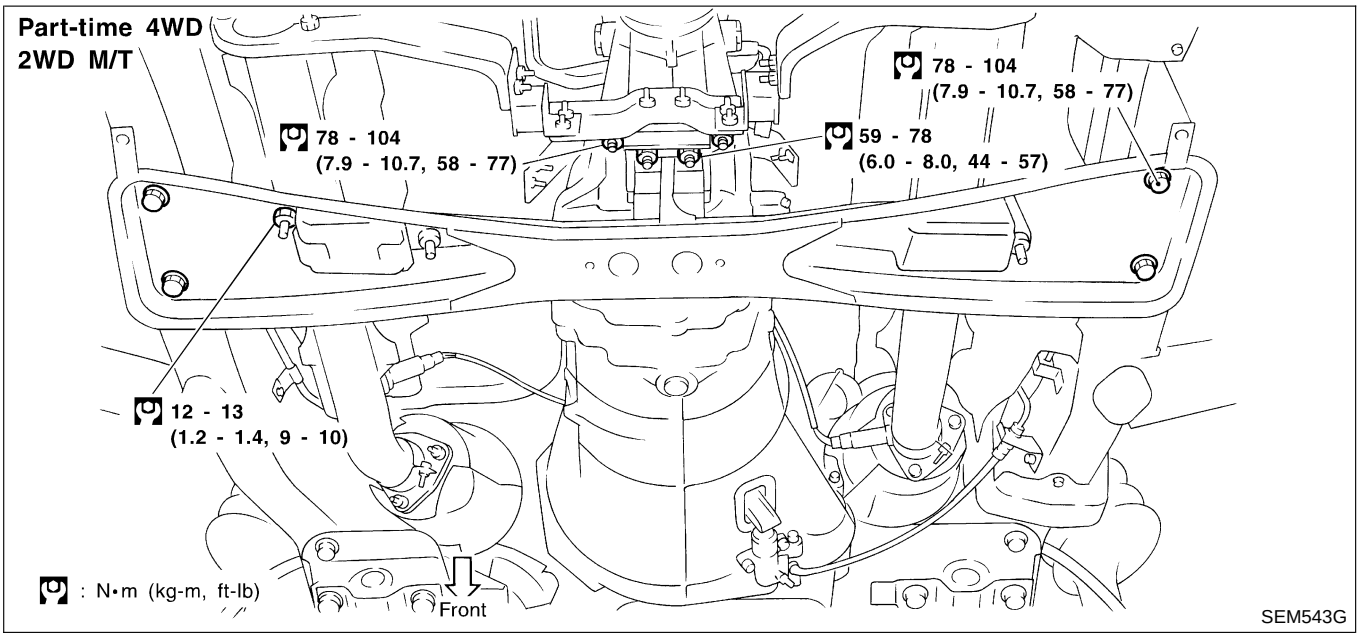
: N•m (kg-m, ft-lb)

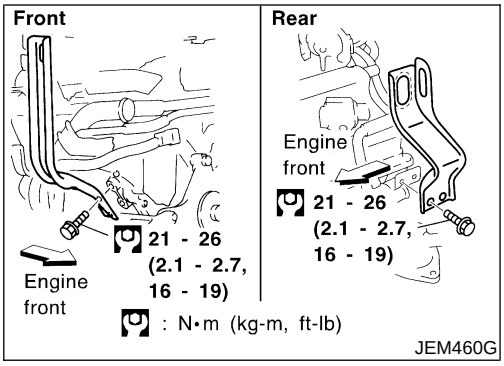
SEM458G

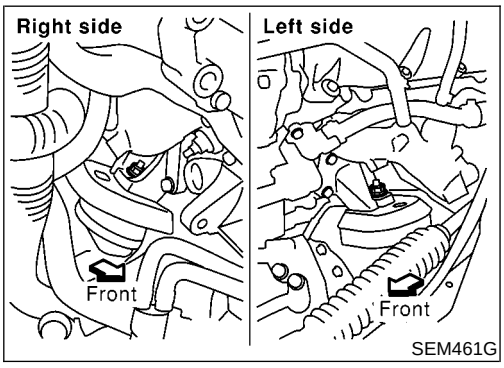
Rear Engine Mounting

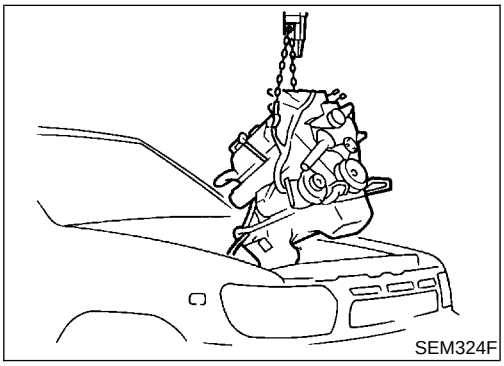
NAEM0042S0102











1. Release fuel pressure.
   Refer to EC-39, "Fuel pressure release".
2. Remove engine hood and front RH and LH wheels.
3. Remove engine undercover and suspension member stay.
4. Drain coolant from radiator.
5. Remove the following parts.
- Radiator shroud
- Radiator
- Cooling fan
- Drive belts
- Battery
- Engine cover
- Throttle wires

6. Air duct with air cleaner case.
7. Disconnect vacuum hoses, fuel hoses, heater hoses, EVAP canister hoses, harnesses, connectors and so on.
8. Remove air conditioner compressor from bracket, then put it aside holding with a suitable wire.
9. Remove power steering oil pump and reservoir tank with bracket, then put it aside holding with a suitable wire.
10. Remove alternator.
11. Remove exhaust front tube heat insulators, then remove rear heated oxygen sensors.
12. Remove exhaust front and rear tubes.
    Refer to FE-8, "Removal and Installation".
13. Remove transmission.
    Refer to AT-277, MT-10, "Removal".
14. Remove TWC (manifold) heat insulators, then remove TWC (manifold).
15. Install engine slingers.
16. Hoist engine with engine slingers and remove front engine mounting nuts.
17. Remove engine from vehicle.

INSTALLATION

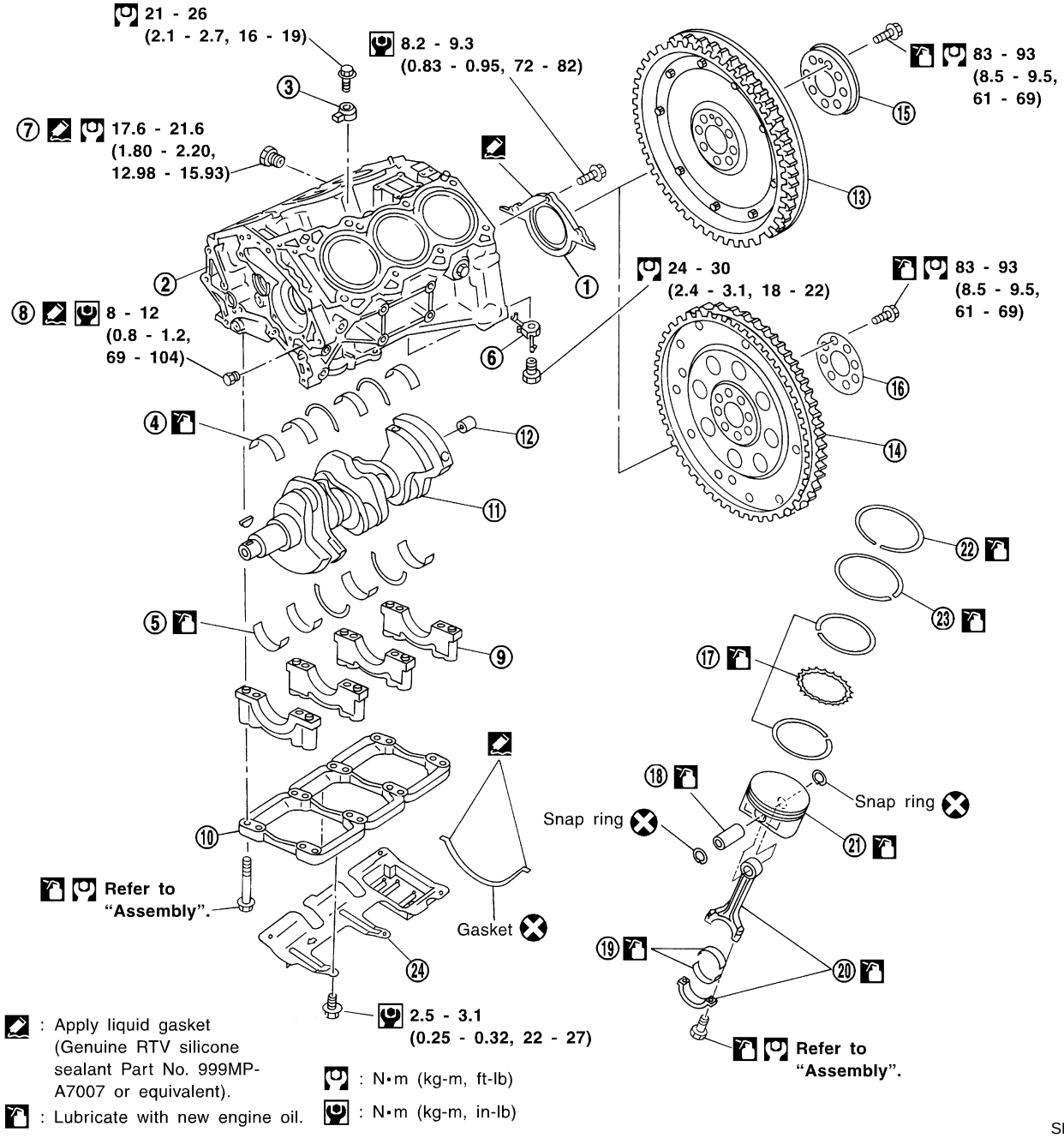
NAEM0042S02

Installation is in the reverse order of removal.

Components

NAEM0024

SEC. 110•120•226

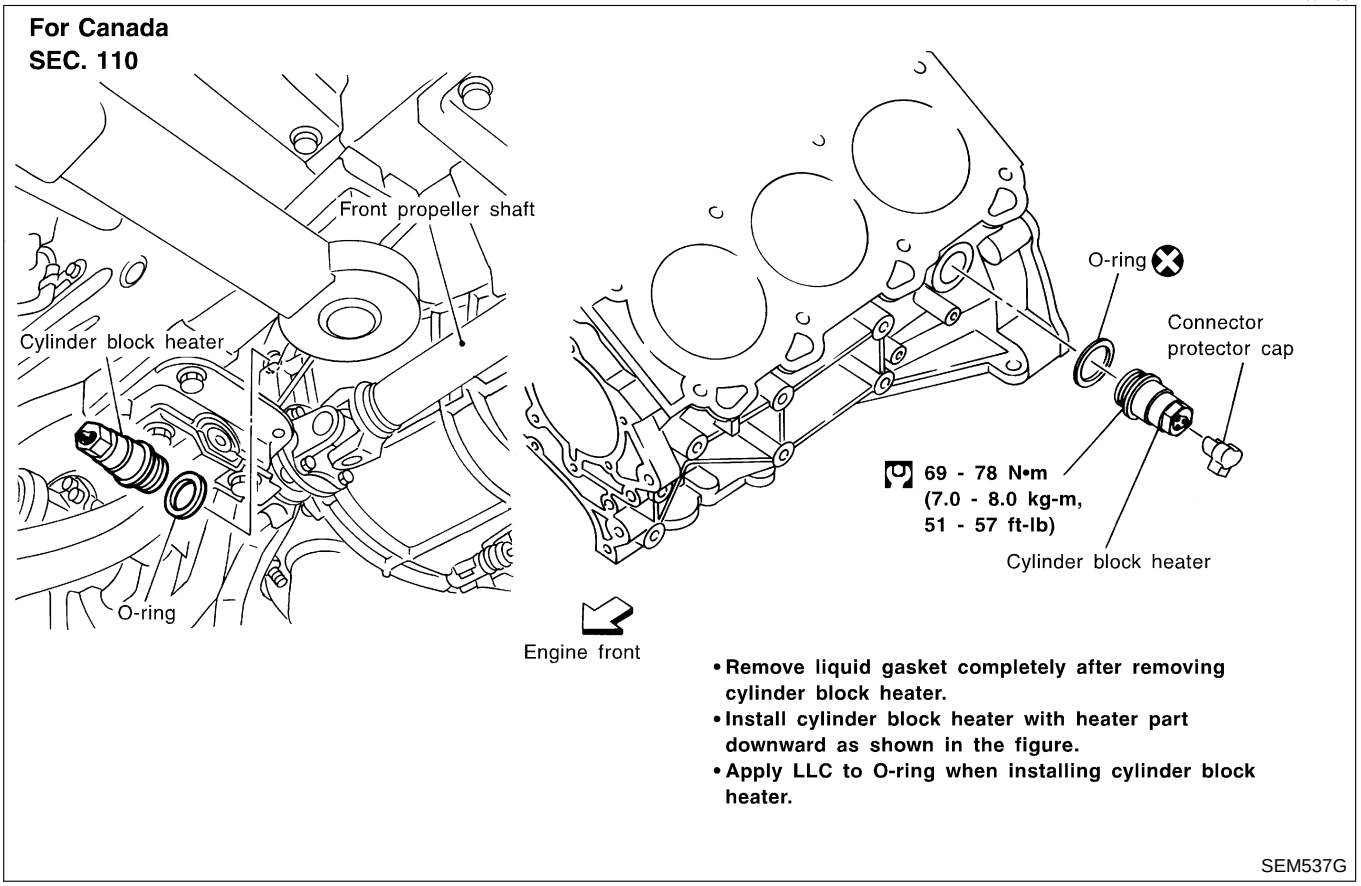


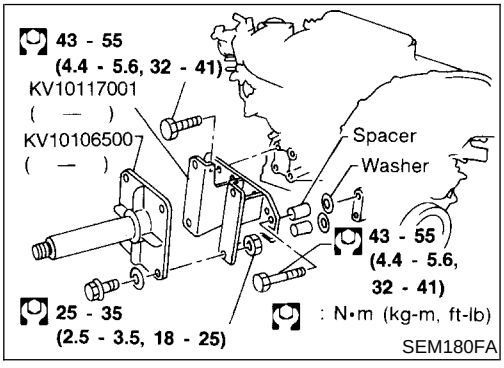
SEM450GA

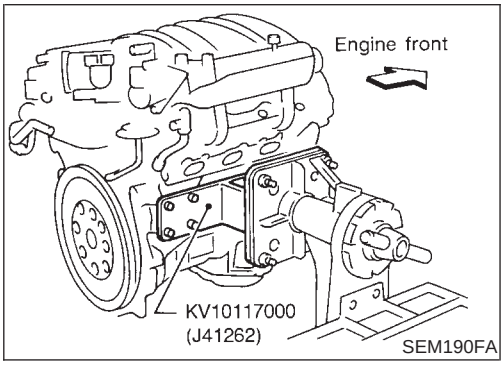
1. Rear oil seal retainer
2. Cylinder block
3. Knock sensor
4. Upper main bearing
5. Lower main bearing
6. Oil jet
7. Water drain plug (RH side)
8. Water drain plug (Water pump side)
9. Main bearing cap
10. Main bearing beam
11. Crankshaft
12. Pilot bushing or pilot converter
13. Flywheel with signal plate (M/T models)
14. Drive plate with signal plate (A/T model)
15. Flywheel reinforce plate
16. Drive plate reinforce plate
17. Oil ring
18. Piston pin
19. Connecting rod bearing
20. Connecting rod
21. Piston
22. Top ring
23. 2nd ring
24. Baffle plate

CYLINDER BLOCK HEATER

NAEM0024S02







Removal and Installation

NAEM0025

CAUTION:

- **When installing bearings, pistons, or other sliding parts, lubricate contacting surfaces with new engine oil.**
- **Place removed parts such as bearings and bearing caps in their proper order and direction.**
- **When installing connecting rod nuts, and main bearing cap bolts, apply new engine oil to threads and seating surfaces.**
- **Do not allow any magnetic materials to contact the signal plate teeth of flywheel or drive plate.**

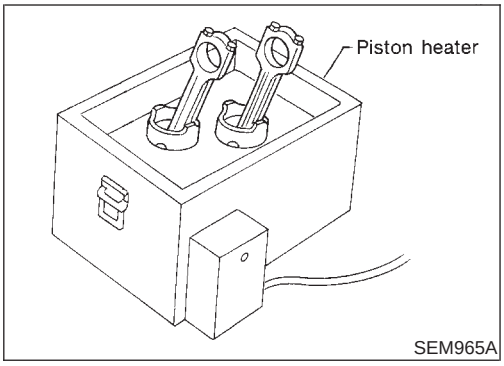
Disassembly

NAEM0026

PISTON, CRANKSHAFT AND OIL JET

NAEM0026S01

1. Remove engine. Refer to "Removal and Installation", EM-58.
2. Place engine on a work stand.
3. Drain coolant and oil.
4. Remove oil pan. Refer to "Removal", EM-15.
5. Remove timing chain. Refer to "Removal", EM-23.
6. Remove cylinder head. Refer to "Removal", EM-23.

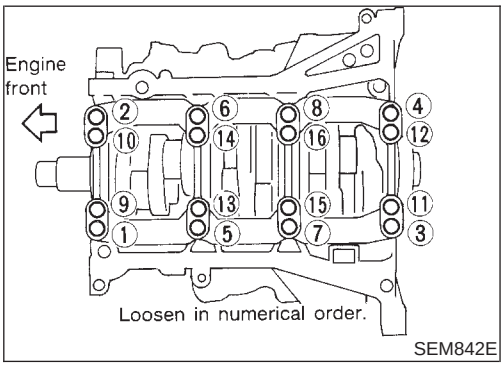


SEM965A

7. Remove pistons with connecting rods.
- When disassembling piston and connecting rod, remove snap ring first, then heat piston to 60 to 70°C (140 to 158°F).

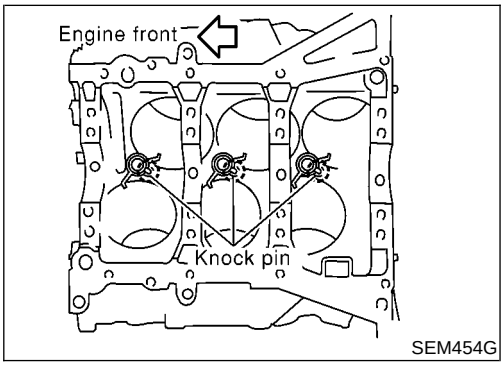
8. Remove rear oil seal retainer.

CAUTION:
- **When piston rings are not replaced, make sure that piston rings are mounted in their original positions.**
- **When replacing piston rings, if there is no punchmark, install with either side up.**



SEM842E

9. Loosen bolts in numerical order as shown and remove main bearing beam, bearing cap and crankshaft.
- **Before removing bearing beam and bearing cap, measure crankshaft end play. Refer to EM-72.**
- **Bolts should be loosened in two or three steps.**



SEM454G

10. Remove oil jets.

Inspection

PISTON AND PISTON PIN CLEARANCE

NAEM0027

NAEM0027S01

1. Measure inner diameter of piston pin hole “dp”.

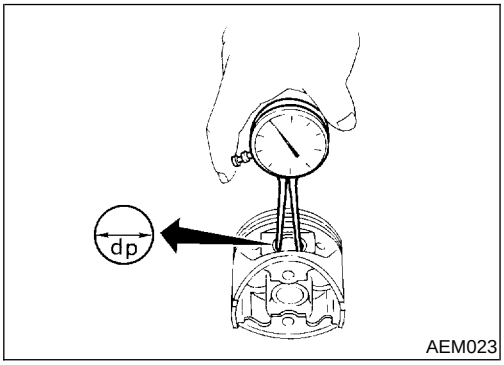
Standard diameter “dp”:

Grade No. 0

21.993 - 21.999 mm (0.8659 - 0.8661 in)

Grade No. 1

21.999 - 22.005 mm (0.8661 - 0.8663 in)



AEM023

2. Measure outer diameter of piston pin “Dp”.

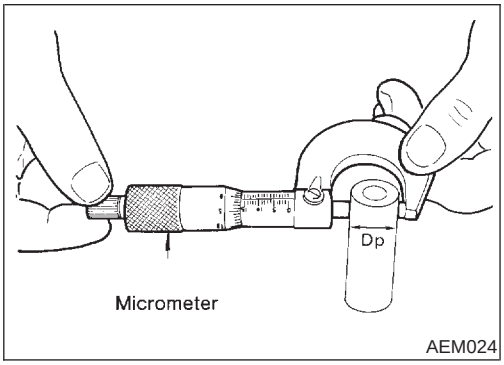
Standard diameter “Dp”:

Grade No. 0

21.989 - 21.995 mm (0.8657 - 0.8659 in)

Grade No. 1

21.995 - 22.001 mm (0.8659 - 0.8662 in)

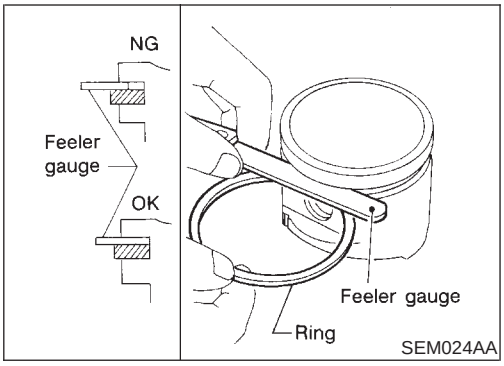


AEM024

3. Calculate interference fit of piston pin to piston.

Dp − dp = 0.002 - 0.006 mm (0.0001 - 0.0002 in)

If it exceeds the above value, replace piston assembly with pin.



PISTON RING SIDE CLEARANCE

NAEM0027S02

Side clearance:

Top ring

0.040 - 0.080 mm (0.0016 - 0.0031 in)

2nd ring

0.030 - 0.070 mm (0.0012 - 0.0028 in)

Oil ring

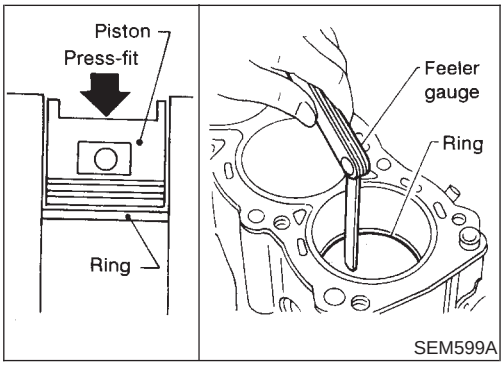
0.015 - 0.050 mm (0.0006 - 0.0020 in)

Max. limit of side clearance:

Top ring 0.11 mm (0.0043 in)

2nd ring 0.1 mm (0.004 in)

If out of specification, replace piston ring. If clearance exceeds maximum limit with new ring, replace piston.



PISTON RING END GAP

NAEM0027S03

End gap:

Top ring 0.23 - 0.33 mm (0.0091 - 0.0130 in)

2nd ring 0.33 - 0.48 mm (0.0130 - 0.0189 in)

Oil ring 0.20 - 0.80 mm (0.0079 - 0.0315 in)

Max. limit of ring gap:

Top ring 0.54 mm (0.0213 in)

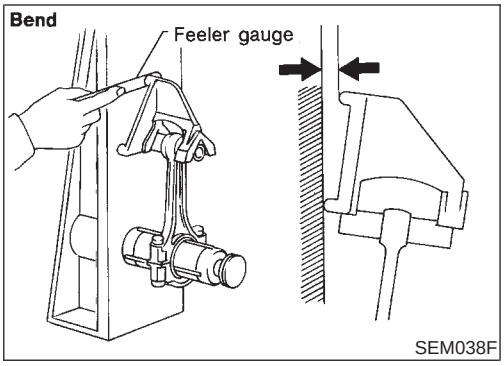
2nd ring 0.80 mm (0.0315 in)

Oil ring 0.95 mm (0.0374 in)

If out of specification, replace piston ring. If gap still exceeds the limit even with a new ring, do the following. Rebore cylinder and use oversized piston and piston rings.

Refer to SDS (EM-83).

- When replacing the piston, check the cylinder block surface for scratches or seizure. If scratches or seizure is found, hone or replace the cylinder block.



CONNECTING ROD BEND AND TORSION

NAEM0027S04

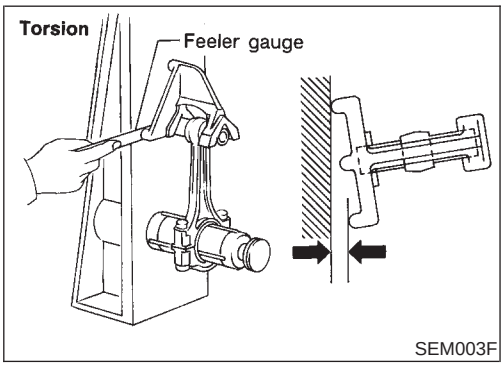
Bend:

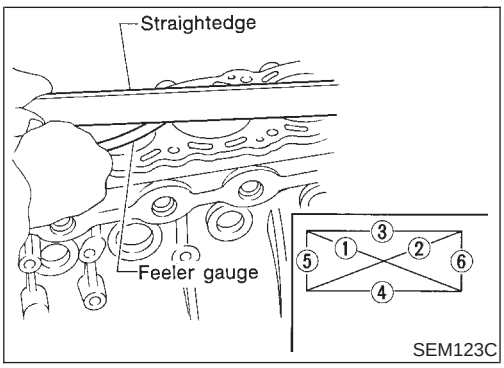
Limit 0.15 mm (0.0059 in)
per 100 mm (3.94 in) length

Torsion:

Limit 0.30 mm (0.0118 in)
per 100 mm (3.94 in) length

If it exceeds the limit, replace connecting rod assembly.

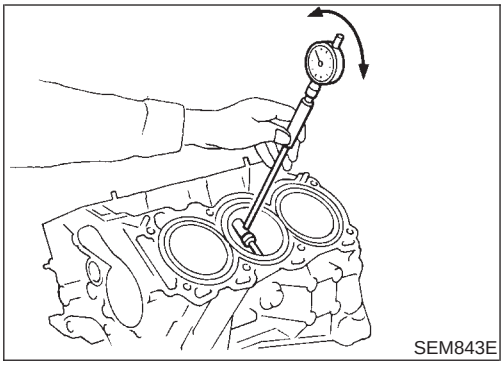


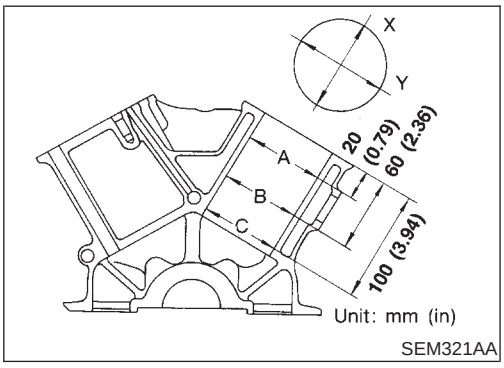


CYLINDER BLOCK DISTORTION AND WEAR

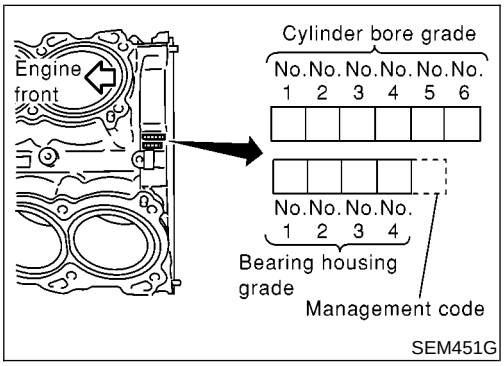
NAEM0027S05

- Clean upper surface of cylinder block.
  Use a reliable straightedge and feeler gauge to check the flatness of cylinder block surface.
  Check along six positions shown in the figure.
  Distortion limit: 0.10 mm (0.0039 in)
- If out of specification, resurface it. The limit for cylinder block resurfacing is determined by cylinder head resurfacing in engine.
  Resurfacing limit:
  Amount of cylinder head resurfacing is "A".
  Amount of cylinder block resurfacing is "B".
  The maximum limit is as follows:
  A + B = 0.2 mm (0.008 in)
  Nominal cylinder block height from crankshaft center:
  214.95 - 215.05 mm (8.4626 - 8.4665 in)
  Refer to SDS (EM-82).
- If necessary, replace cylinder block.

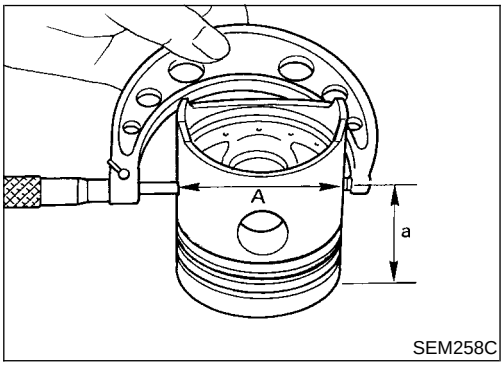

SEM843E



SEM321AA



SEM451G



SEM258C

PISTON-TO-BORE CLEARANCE

NAEM0027S06

1. Using a bore gauge, measure cylinder bore for wear, out-of-round and taper.

Cylinder bore inner diameter

Grade No.	Standard inner diameter	Wear limit
No. 1	95.500 - 95.510 mm (3.7598 - 3.7602 in)	0.20 mm (0.0079 in)
No. 2	95.510 - 95.520 mm (3.7602 - 3.7606 in)	
No. 3	95.520 - 95.530 mm (3.7606 - 3.7610 in)	

If it exceeds the limit, rebore all cylinders. Replace cylinder block if necessary.

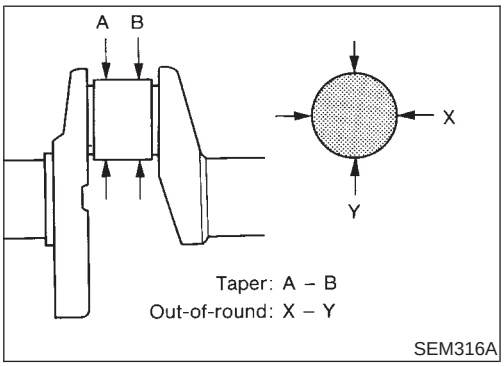
Out-of-round (X − Y):
Limit 0.015 mm (0.0006 in)
Taper (A − B − C):
Limit 0.015 mm (0.0006 in)

2. Check for scratches and seizure. If seizure is found, hone it.

- **If both cylinder block and piston are replaced with new ones, select piston of the same grade number punched on cylinder block rear position. These numbers are punched in either Arabic or Roman numerals.**

3. Measure piston skirt diameter.
Piston diameter "A": Refer to SDS (EM-83).
Measuring point "a" (Distance from the top):
41.0 mm (1.61 in)
4. Check that piston-to-bore clearance is within specification.
Piston-to-bore clearance "B":
0.010 - 0.030 mm (0.0004 - 0.0012 in)
5. Determine piston oversize according to amount of cylinder wear.
Oversize pistons are available for service.
Refer to SDS (EM-83).
6. Cylinder bore size is determined by adding piston-to-bore clearance to piston diameter "A".
Rebored size calculation: D = A + B − C
where,
D: Bored diameter
A: Piston diameter as measured
B: Piston-to-bore clearance
C: Honing allowance 0.02 mm (0.0008 in)
7. Install main bearing caps, and tighten to the specified torque. Otherwise, cylinder bores may be distorted in final assembly.

8. Cut cylinder bores.
- **When any cylinder needs boring, all other cylinders must also be bored.**
- **Do not cut too much out of cylinder bore at a time. Cut only 0.05 mm (0.0020 in) or so in diameter at a time.**
9. Hone cylinders to obtain specified piston-to-bore clearance.
10. Measure finished cylinder bore for out-of-round and taper.
- **Measurement should be done after cylinder bore cools down.**

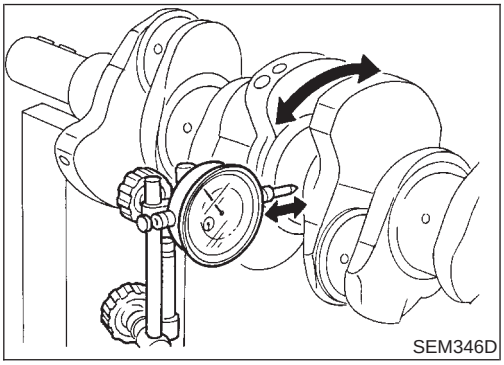


CRANKSHAFT

NAEM0027S07

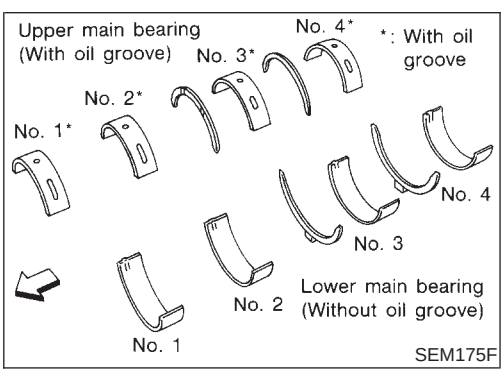
1. Check crankshaft main and pin journals for score, wear or cracks.
2. With a micrometer, measure journals for taper and out-of-round.

Out-of-round (X − Y):
Standard
0.002 mm (0.0001 in)
Taper (A − B):
Standard
0.002 mm (0.0001 in)



3. Measure crankshaft runout.

Runout (Total indicator reading):
Limit 0.10 mm (0.0039 in)



BEARING CLEARANCE

NAEM0027S08

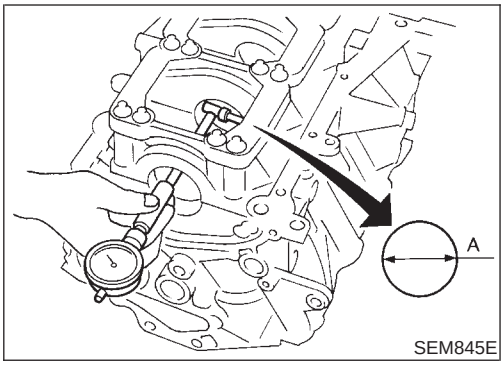
- Use either of the following two methods, however, method "A" gives more reliable results and is preferable.

Method A (Using bore gauge & micrometer)

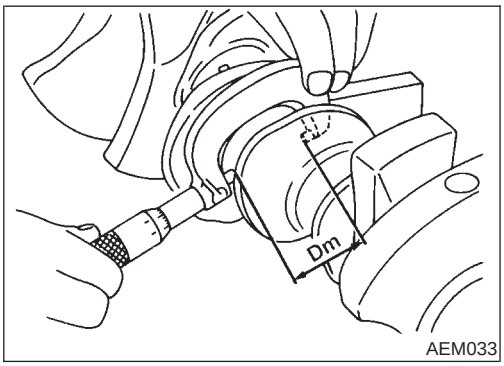
Main bearing

NAEM0027S0801

1. Set main bearings in their proper positions on cylinder block and main bearing cap.

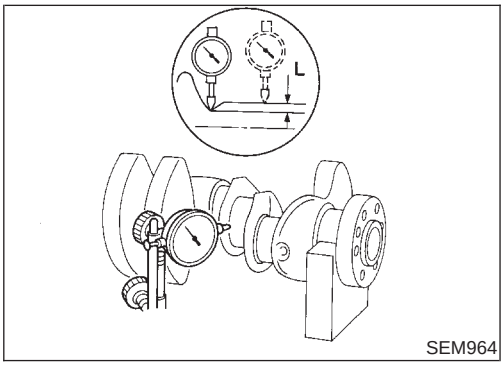


2. Install main bearing cap and bearing beam to cylinder block. **Tighten all bolts in correct order.**
3. Measure inner diameters "A" of each main bearing.

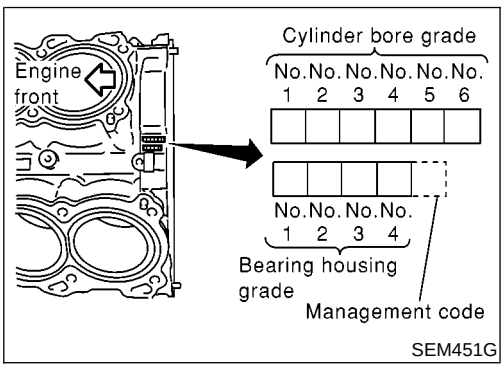


4. Measure outer diameters "Dm" of each crankshaft main journal.
5. Calculate main bearing clearance.
   Main bearing clearance = A − Dm
   Standard: 0.035 - 0.045 mm (0.0014 - 0.0018 in)
   Limit: 0.065 mm (0.0026 in)

- If it exceeds the limit, replace bearing.
- If clearance cannot be adjusted using any standard bearing grade, grind crankshaft journal and use undersized bearing.

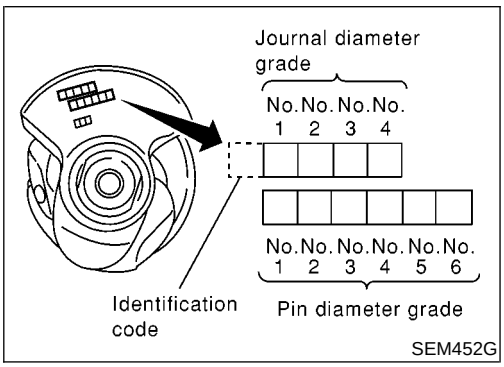


a. When grinding crankshaft journal, confirm that "L" dimension in fillet roll is more than the specified limit.
   "L": 0.1 mm (0.004 in)
b. Refer to SDS for grinding crankshaft and available service parts.



6. If crankshaft or cylinder block is replaced with a new one, select thickness of main bearings as follows:

a. Grade number of each cylinder block main journal is punched on the respective cylinder block. These numbers are punched in either Arabic or Alphabet. Refer to SDS, EM-82.
   If measured diameter is out of grade punched, decide suitable grade using table in SDS.

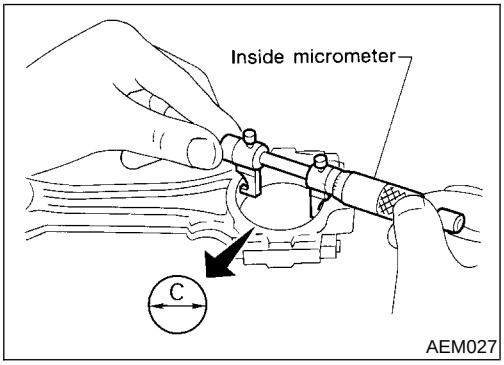


b. Grade number of each crankshaft main journal is punched on the respective crankshaft. These numbers are punched in either Arabic or Alphabet. Refer to SDS, EM-85.
   If measured diameter is out of grade punched, decide suitable grade using table in SDS.
c. Select main bearing with suitable thickness according to the following table.
   Refer to "SDS", EM-86, for available main bearings.

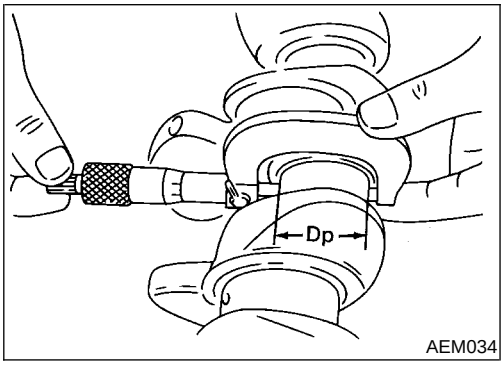
Main bearing selection table

Crankshaft main journal: Mark	Crankshaft main journal: Axle diameter	Cylinder block main journal: Hole diameter	A 63.993 - 63.994	B 63.994 - 63.995	C 63.995 - 63.996	D 63.996 - 63.997	E 63.997 - 63.998	F 63.998 - 63.999	G 63.999 - 64.000	H 64.000 - 64.001	J 64.001 - 64.002	K 64.002 - 64.003	L 64.003 - 64.004	M 64.004 - 64.005	N 64.005 - 64.006	P 64.006 - 64.007	R 64.007 - 64.008	S 64.008 - 64.009	T 64.009 - 64.010	U 64.010 - 64.011	V 64.011 - 64.012	W 64.012 - 64.013	X 64.013 - 64.014	Y 64.014 - 64.015	4 64.015 - 64.016	7 64.016 - 64.017
A	59.975 - 59.974		0	0	0	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34
B	59.974 - 59.973		0	0	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4
C	59.973 - 59.972		0	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4
D	59.972 - 59.971		01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4
E	59.971 - 59.970		01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45
F	59.970 - 59.969		01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45
G	59.969 - 59.968		1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45
H	59.968 - 59.967		1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5
J	59.967 - 59.966		1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5
K	59.966 - 59.965		12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5
L	59.965 - 59.964		12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56
M	59.964 - 59.963		12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56
N	59.963 - 59.962		2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56
P	59.962 - 59.961		2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6
R	59.961 - 59.960		2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6
S	59.960 - 59.959		23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6
T	59.959 - 59.958		23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67
U	59.958 - 59.957		23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67
V	59.957 - 59.956		3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67
W	59.956 - 59.955		3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67	7
X	59.955 - 59.954		3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67	7	7
Y	59.954 - 59.953		34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67	7	7	7
4	59.953 - 59.952		34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67	7	7	7	X
7	59.952 - 59.951		34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67	7	7	7	X	X

SEM280G



AEM027

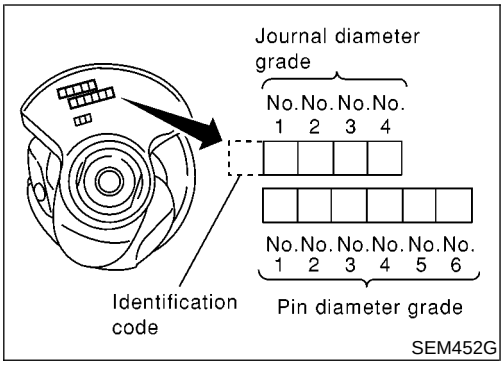


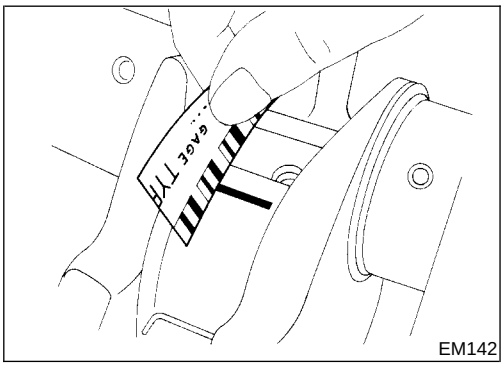
AEM034

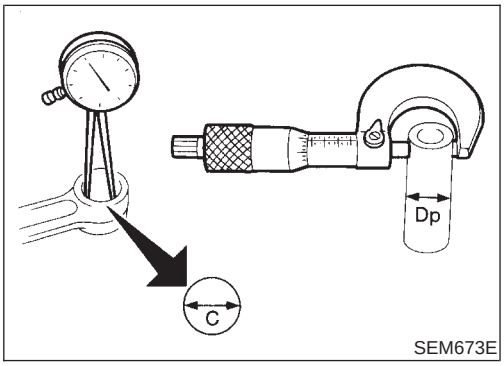
Connecting Rod Bearing (Big end)

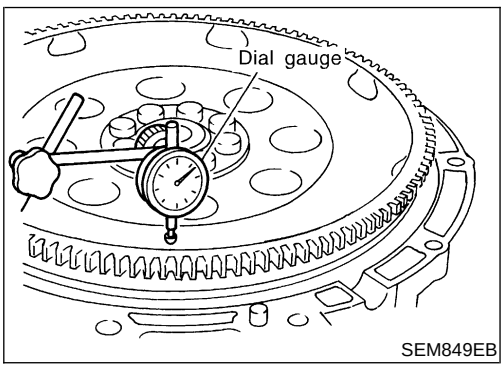
NAEM0027S0802

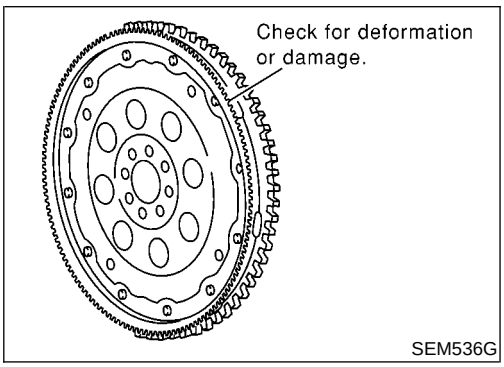
1. Install connecting rod bearing to connecting rod and cap.
2. Install connecting rod cap to connecting rod.
   Tighten bolts to the specified torque.
3. Measure inner diameter "C" of connecting rod.
4. Measure outer diameter "Dp" of each crankshaft pin journal.
5. Calculate connecting rod bearing clearance.
   Connecting rod bearing clearance = C − Dp
   Standard: 0.034 - 0.059 mm (0.0013 - 0.0023 in)
   Limit: 0.070 mm (0.0028 in)
6. If it exceeds the limit, replace bearing.
7. If clearance cannot be adjusted within the standard of any bearing, grind crankshaft journal and use undersized bearing. Refer to "BEARING CLEARANCE — Main bearing", EM-68.











8. If crankshaft is replaced with a new one, select connecting rod bearing according to the following table.
   Connecting rod bearing grade number (Identification color):
   These numbers are punched in either Arabic or Roman numerals.

Crankshaft pin journal grade number	Connecting rod bearing grade number
0	0 (Black)
1	1 (Brown)
2	2 (Green)

Method B (Using plastigage)

CAUTION:

- **Do not turn crankshaft or connecting rod while plastigage is being inserted.**
- **When bearing clearance exceeds the specified limit, ensure that the proper bearing has been installed. If incorrect bearing clearance exists, use a thicker or undersized main bearing to ensure specified clearance.**

CONNECTING ROD BUSHING CLEARANCE (SMALL END)

NAEM0027S09

1. Measure inner diameter "C" of bushing.
2. Measure outer diameter "Dp" of piston pin.
3. Calculate connecting rod bushing clearance.
   Connecting rod bushing clearance = C − Dp
   Standard: 0.005 - 0.017 mm (0.0002 - 0.0007 in)
   Limit: 0.030 mm (0.0012 in)
   If it exceeds the limit, replace connecting rod assembly or connecting rod bushing and/or piston set with pin.

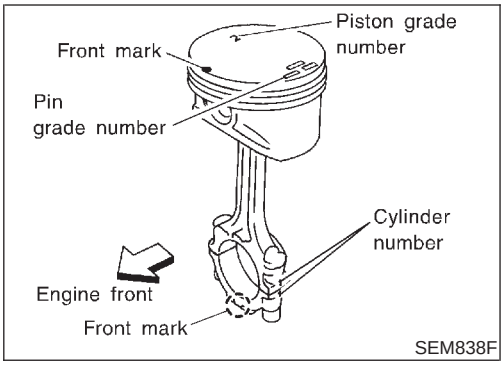
FLYWHEEL/DRIVE PLATE RUNOUT

NAEM0027S11

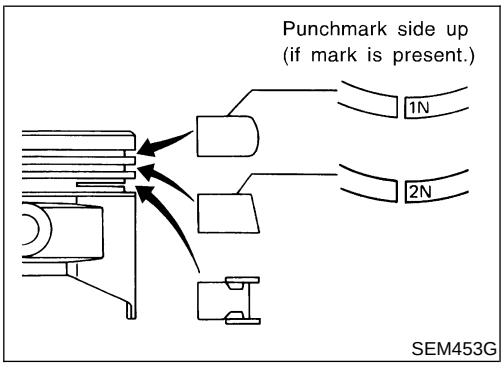
Runout (Total indicator reading):
Flywheel (M/T model)
Less than 0.15 mm (0.0059 in)
Drive plate (A/T model)
Less than 0.15 mm (0.0059 in)

CAUTION:

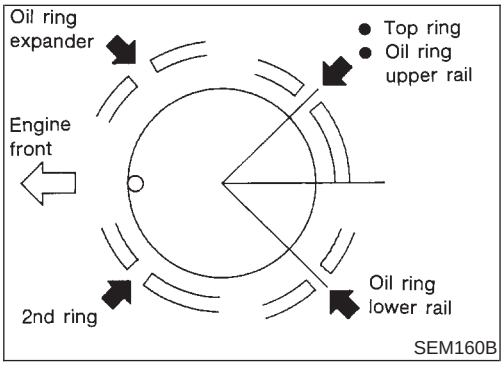
- **The signal plate is built into the flywheel assembly. Be careful not to damage the signal plate, especially the teeth.**
- **Check the drive plate and signal plate for deformation or cracks.**
- **Never place the flywheel assembly with the signal plate facing down.**
- **Keep any magnetized objects away from the signal plate.**
- **Do not allow any magnetic materials to contact the signal plate teeth.**
- **Do not surface flywheel. Replace as necessary.**



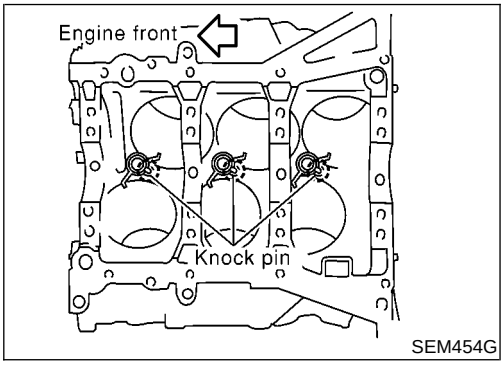
SEM838F



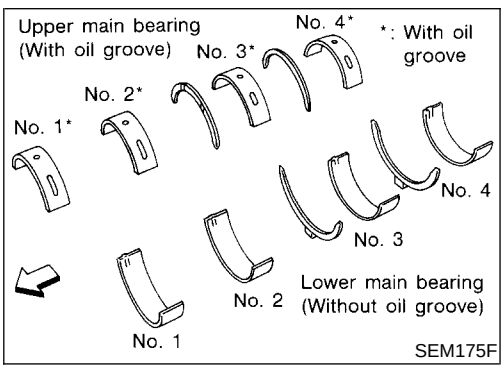
SEM453G



SEM160B



SEM454G



SEM175F

Assembly

NAEM0028

PISTON

NAEM0028S01

1. Install new snap ring on one side of piston pin hole.
2. Heat piston to 60 to 70°C (140 to 158°F) and assemble piston, piston pin, connecting rod and new snap ring.

- **Align the direction of piston and connecting rod.**
- **Numbers stamped on connecting rod and cap correspond to each cylinder.**
- **After assembly, make sure connecting rod swings smoothly.**

3. Set piston rings as shown.

CAUTION:

- **When piston rings are not replaced, make sure that piston rings are mounted in their original positions.**
- **When replacing piston rings, these without punchmarks, present, piston rings can be mounted with either side up.**

- **Align piston rings so that end gaps are positioned as shown in the figure.**

OIL JET

NAEM0028S05

1. Install oil jets.

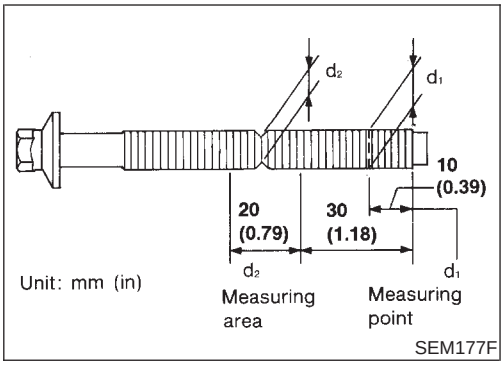
- Insert oil jet knock pin into the cylinder block knock pin hole, and tighten the mounting bolts.

CRANKSHAFT

NAEM0028S02

1. Set main bearings in their proper positions on cylinder block and main bearing beam.

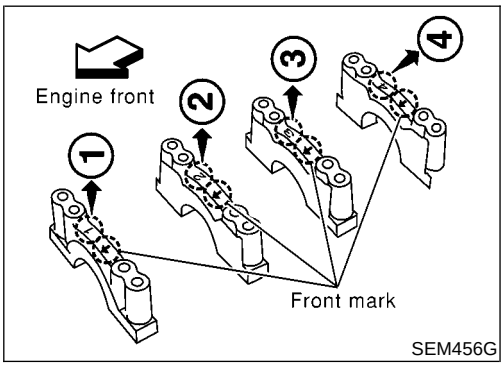
- **Confirm that correct main bearings are used. Refer to “Inspection” of this section.**



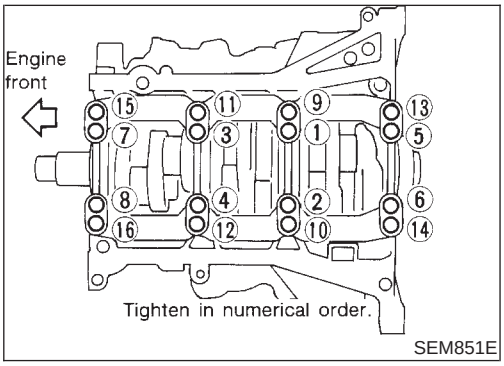
SEM177F

2. Instructions for re-use of main bearing cap bolts.

- **A plastic zone tightening method is used for tightening main bearing cap bolts. Measure d1 and d2 as shown in the figure.**
  d2: Select minimum diameter in the measuring area.
  If the difference between d1 and d2 exceeds the limit, replace the bolts with new ones.
  Limit (d1 - d2): 0.11 mm (0.0043 in)



SEM456G



SEM851E

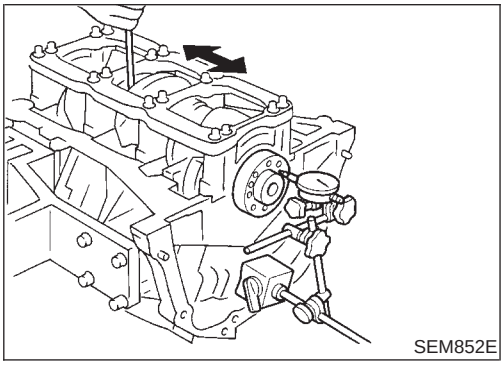
3. After installing crankshaft, main bearing cap, main bearing beam and bearing cap bolts, tighten bearing cap bolts in numerical order as shown.

- **Make sure that the front mark on the main bearing beam faces the front of the engine.**
- **Tightening procedure**

a) **Tighten all bolts to 32 to 38 N·m (3.3 to 3.9 kg-m, 24 to 28 ft-lb).**

b) **Turn all bolts 90 to 95 degrees clockwise with angle wrench.**

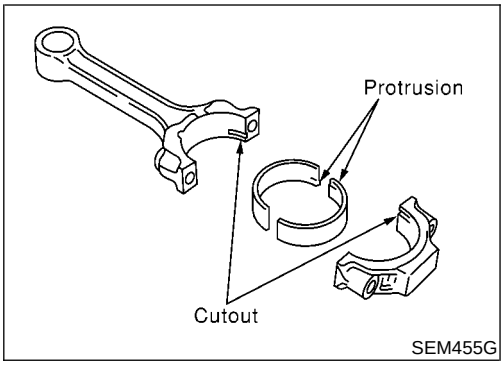
- **Prior to tightening bearing cap bolts, place bearing beam in its proper position by shifting crankshaft in the axial direction.**
- **After securing bearing cap bolts, make sure crankshaft turns smoothly by hand.**
- **Lubricate threads and seat surfaces of the bolts with new engine oil.**


SEM852E

4. Measure crankshaft end play.

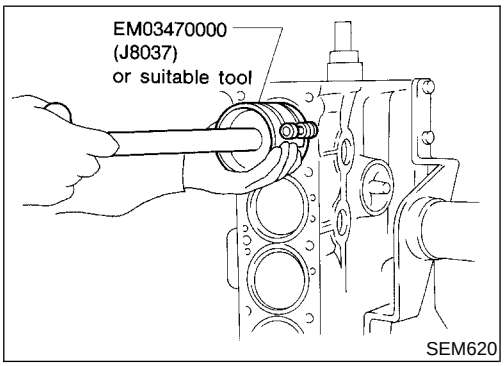
Crankshaft end play:
Standard
0.10 - 0.25 mm (0.0039 - 0.0098 in)
Limit
0.30 mm (0.0118 in)

If beyond the limit, replace bearing with a new one.



5. Install connecting rod bearings in connecting rods and connecting rod caps.

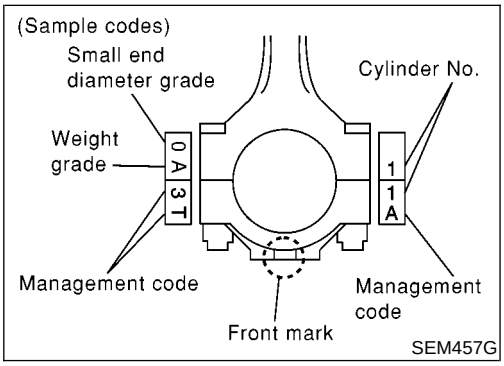
- **Confirm that correct bearings are used.**



6. Install pistons with connecting rods.

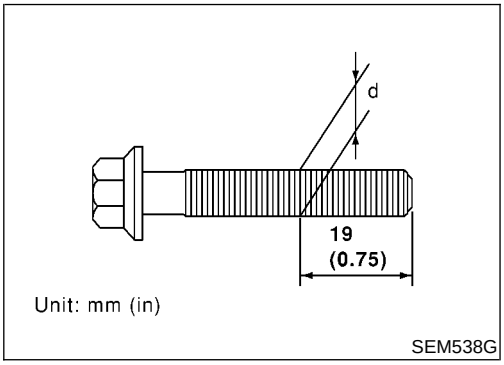
a. Install them into corresponding cylinders with Tool.

- **Be careful not to scratch cylinder wall with the connecting rod.**
- **Arrange so that front mark on piston head faces toward engine front.**



b. Install connecting rod caps.

- **Lubricate threads and seat surfaces with new engine oil.**
- Install so that the cylinder number stamped on the connecting rod agrees with that stamped on cap side.
- Make sure that front mark on the connecting rod cap faces the front of the engine.



c. Re-use connecting rod cap bolts as follows.

- Make sure that the bolts can be smoothly screwed-in to the end manually.
- If not, measure the outer diameter "d" shown in the figure.

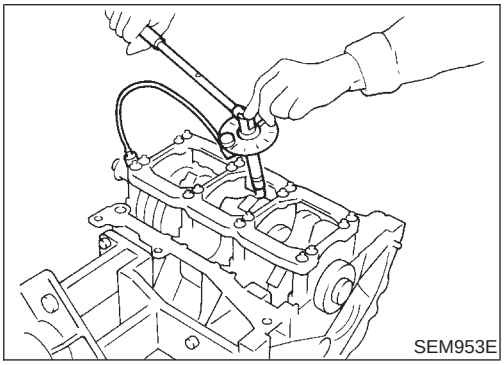
Outer diameter "d" of connecting rod cap bolt:

Standard

7.90 - 8.00 mm (0.3110 - 0.3150 in)

Limit

7.75 mm (0.3051 in)

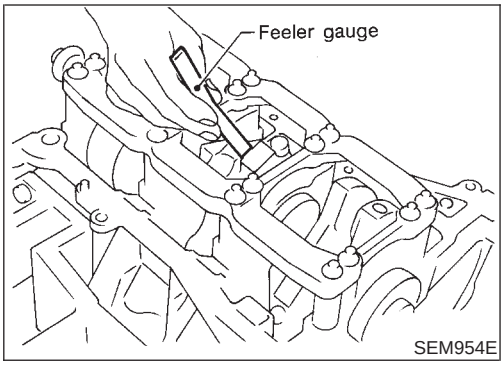


d. Tighten connecting rod cap bolts to the specified torque.

Connecting rod cap bolt:

(1) Tighten nuts to 19 to 21 N·m (1.9 to 2.1 kg-m, 14 to 15 ft-lb).

(2) Turn nuts 90 to 95 degrees clockwise with angle wrench.



7. Measure connecting rod side clearance.

Connecting rod side clearance:

Standard

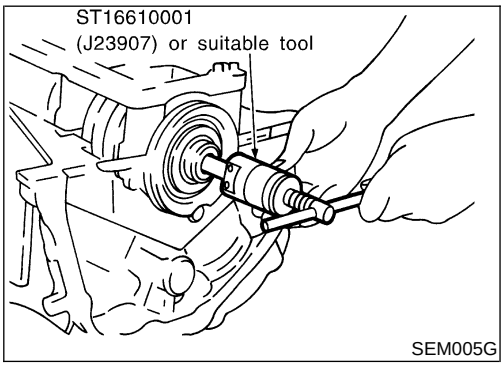
0.20 - 0.35 mm (0.0079 - 0.0138 in)

Limit

0.40 mm (0.0157 in)

If beyond the limit, replace connecting rod and/or crankshaft.

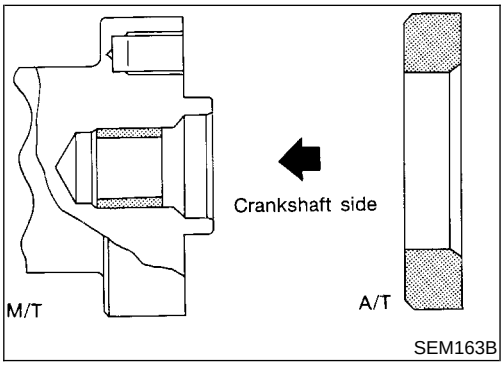
8. Install rear oil seal retainer.



REPLACEMENT OF PILOT BUSHING (M/T) OR PILOT CONVERTER (A/T)

NAEM0028S04

1. Remove pilot bushing or pilot converter using tool or suitable tool.



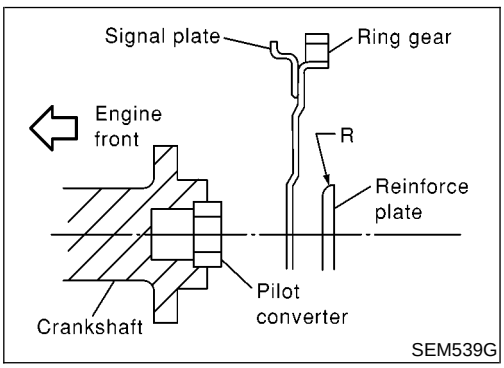
2. Install pilot bushing or pilot converter as shown.

FLYWHEEL/DRIVE PLATE

NAEM0028S06

Install drive plate.

- Install the drive plate and reinforce plate in the direction shown in the figure.
- Secure the crankshaft using a ring gear stopper.
- Tighten the installation bolts crosswise over several times.



General Specifications

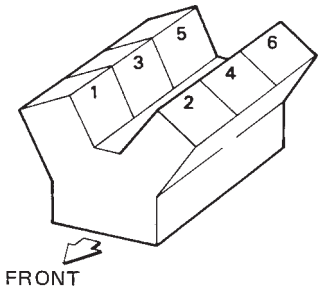
NAEM0029

Cylinder arrangement		V-6
Displacement cm^3 (cu in)		3,498 (213.45)
Bore and stroke mm (in)		95.5 x 81.4 (3.760 x 3.205)
Valve arrangement		DOHC
Firing order		1-2-3-4-5-6
Number of piston rings	Compression	2
	Oil	1
Number of main bearings		4
Compression ratio		10.0

Compression Pressure

NAEM0030

Unit: kPa (kg/cm^2, psi)/300 rpm

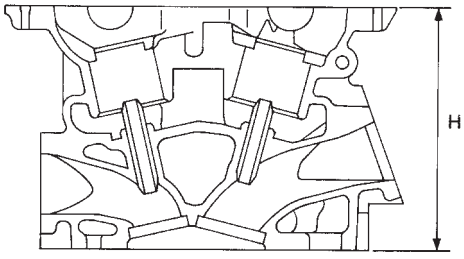
Compression pressure	Standard	1,275 (13.0, 185)
	Minimum	981 (10.0, 142)
	Differential limit between cylinders	98 (1.0, 14)
Cylinder number	 SEM713A	

Cylinder Head

NAEM0031

Unit: mm (in)

	Standard	Limit
Head surface distortion	Less than 0.03 (0.0012)	0.1 (0.004)



Nominal cylinder head height:
H = 126.3 - 126.5 mm (4.972 - 4.980 in)

SEM949E

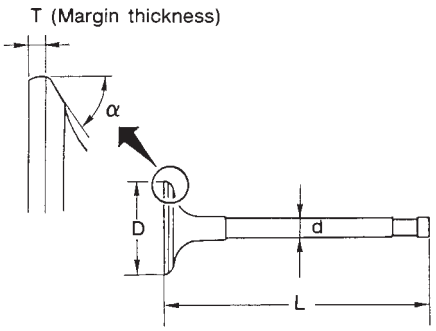
Valve

VALVE

NAEM0032

NAEM0032S01

Unit: mm (in)



SEM188

Valve head diameter “D”	Intake	37.0 - 37.3 (1.4567 - 1.4685)
	Exhaust	31.2 - 31.5 (1.228 - 1.240)
Valve length “L”	Intake	96.12 - 96.62 (3.7842 - 3.8039)
	Exhaust	93.65 - 94.15 (3.6870 - 3.7067)
Valve stem diameter “d”	Intake	5.965 - 5.980 (0.2348 - 0.2354)
	Exhaust	5.945 - 5.960 (0.2341 - 0.2346)
Valve seat angle “α”	Intake	45°15′ - 45°45′
	Exhaust	
Valve margin “T”	Intake	1.15 - 1.45 (0.0453 - 0.0571)
	Exhaust	1.45 - 1.75 (0.0571 - 0.0689)
Valve margin “T” limit		More than 0.5 (0.020)
Valve stem end surface grinding limit		Less than 0.2 (0.008)

VALVE CLEARANCE

NAEM0032S02

Unit: mm (in)

	Cold	Hot* (reference data)
Intake	0.26 - 0.34 (0.010 - 0.013)	0.304 - 0.416 (0.012 - 0.016)
Exhaust	0.29 - 0.37 (0.011 - 0.015)	0.308 - 0.432 (0.012 - 0.017)

*: Approximately 80°C (176°F)

AVAILABLE SHIMS

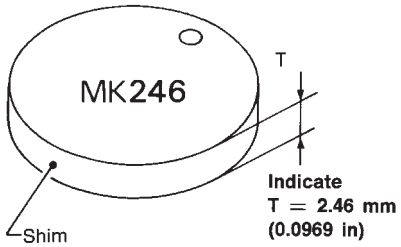
NAEM0032S03

Thickness mm (in)	Identification mark
2.32 (0.0913)	232
2.33 (0.0917)	233
2.34 (0.0921)	234
2.35 (0.0925)	235
2.36 (0.0929)	236
2.37 (0.0933)	237
2.38 (0.0937)	238
2.39 (0.0941)	239
2.40 (0.0945)	240
2.41 (0.0949)	241

Valve (Cont'd)

Thickness mm (in)	Identification mark
2.42 (0.0953)	242
2.43 (0.0957)	243
2.44 (0.0961)	244
2.45 (0.0965)	245
2.46 (0.0969)	246
2.47 (0.0972)	247
2.48 (0.0976)	248
2.49 (0.0980)	249
2.50 (0.0984)	250
2.51 (0.0988)	251
2.52 (0.0992)	252
2.53 (0.0996)	253
2.54 (0.1000)	254
2.55 (0.1004)	255
2.56 (0.1008)	256
2.57 (0.1012)	257
2.58 (0.1016)	258
2.59 (0.1020)	259
2.60 (0.1024)	260
2.61 (0.1028)	261
2.62 (0.1031)	262
2.63 (0.1035)	263
2.64 (0.1039)	264
2.65 (0.1043)	265
2.66 (0.1047)	266
2.67 (0.1051)	267
2.68 (0.1055)	268
2.69 (0.1059)	269
2.70 (0.1063)	270
2.71 (0.1067)	271
2.72 (0.1071)	272
2.73 (0.1075)	273
2.74 (0.1079)	274
2.75 (0.1083)	275
2.76 (0.1087)	276
2.77 (0.1091)	277
2.78 (0.1094)	278
2.79 (0.1098)	279
2.80 (0.1102)	280
2.81 (0.1106)	281

Thickness mm (in)	Identification mark
2.82 (0.1110)	282
2.83 (0.1114)	283
2.84 (0.1118)	284
2.85 (0.1122)	285
2.86 (0.1126)	286
2.87 (0.1130)	287
2.88 (0.1134)	288
2.89 (0.1138)	289
2.90 (0.1142)	290
2.91 (0.1146)	291
2.92 (0.1150)	292
2.93 (0.1154)	293
2.94 (0.1157)	294
2.95 (0.1161)	295



SEM966E

VALVE SPRING

NAEM0032S04

Free height mm (in)		47.10 (1.8543)
Pressure N (kg, lb) at height mm (in)	Standard	202 (20.6, 45.4) at 37.0 (1.457)
	Limit	436 (44.5, 98.1) at 28.2 (1.110)
Out-of-square mm (in)		Less than 2.0 (0.079)

VALVE LIFTER

NAEM0032S05

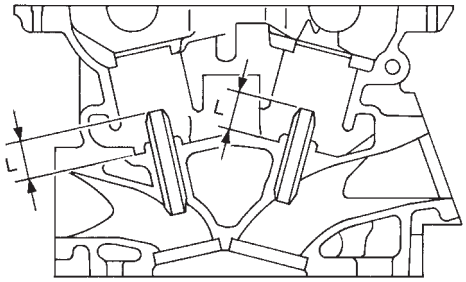
Unit: mm (in)

Valve lifter outer diameter	34.960 - 34.975 (1.3764 - 1.3770)
Lifter guide inner diameter	35.000 - 35.021 (1.3780 - 1.3788)
Clearance between lifter and lifter guide	0.025 - 0.061 (0.0010 - 0.0024)

VALVE GUIDE

NAEM0032S06

Unit: mm (in)



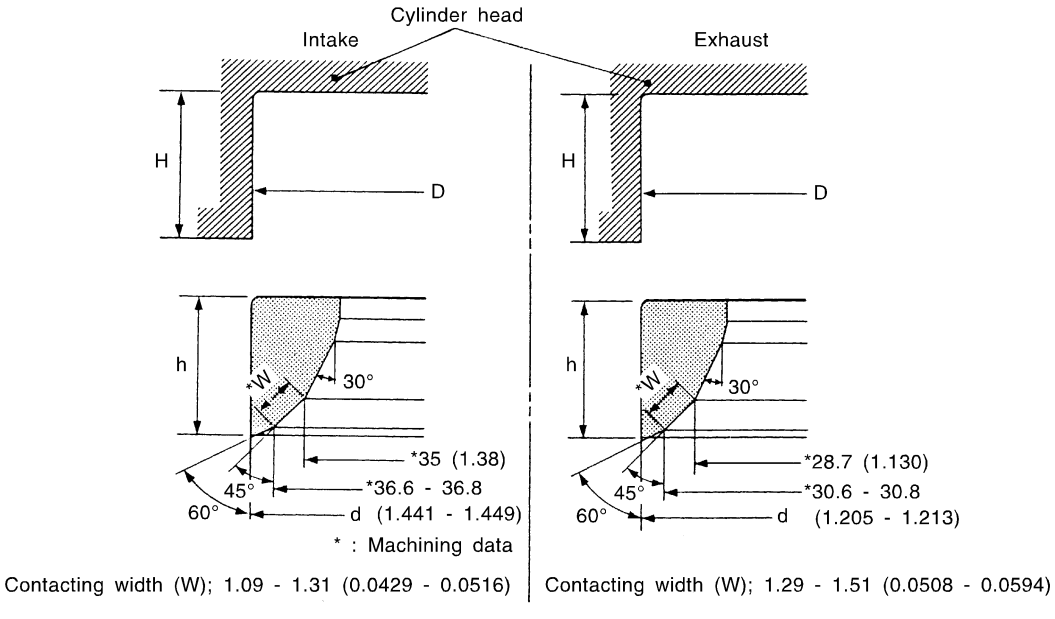
SEM950E

		Standard	Service
Valve guide	Outer diameter	10.023 - 10.034 (0.3946 - 0.3950)	10.223 - 10.234 (0.4025 - 0.4029)
Valve guide	Inner diameter (Finished size)	6.000 - 6.018 (0.2362 - 0.2369)	
Cylinder head valve guide hole diameter		9.975 - 9.996 (0.3927 - 0.3935)	10.175 - 10.196 (0.4006 - 0.4014)
Interference fit of valve guide		0.027 - 0.059 (0.0011 - 0.0023)	
		Standard	Max. tolerance
Stem to guide clearance	Intake	0.020 - 0.053 (0.0008 - 0.0021)	0.08 (0.0031)
	Exhaust	0.040 - 0.073 (0.0016 - 0.0029)	0.1 (0.004)
Valve deflection limit	Intake	—	0.24 (0.0094)
	Exhaust	—	0.28 (0.0110)
Projection length "L"		12.6 - 12.8 (0.496 - 0.504)	

Valve Seat

NAEM0033

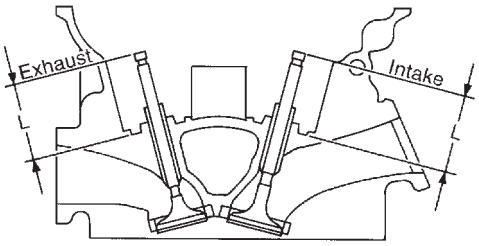
Unit: mm (in)



Contacting width (W); 1.09 - 1.31 (0.0429 - 0.0516)

Contacting width (W); 1.29 - 1.51 (0.0508 - 0.0594)

SEM021EB



SEM621F

		Standard	Service
Cylinder head seat recess diameter (D)	Intake	38.000 - 38.016 (1.4961 - 1.4967)	38.500 - 38.516 (1.5157 - 1.5164)
	Exhaust	32.200 - 32.216 (1.2677 - 1.2683)	32.700 - 32.716 (1.2874 - 1.2880)
Valve seat interference fit	Intake	0.081 - 0.113 (0.0032 - 0.0044)	
	Exhaust	0.064 - 0.096 (0.0025 - 0.0038)	
Valve seat outer diameter (d)	Intake	38.097 - 38.113 (1.4999 - 1.5005)	38.597 - 38.613 (1.5196 - 1.5202)
	Exhaust	32.280 - 32.296 (1.2709 - 1.2715)	32.780 - 32.796 (1.2905 - 1.2912)
Height (h)	Intake	5.9 - 6.0 (0.232 - 0.236)	5.05 - 5.15 (0.1988 - 0.2028)
	Exhaust	5.9 - 6.0 (0.232 - 0.236)	4.95 - 5.05 (0.1949 - 0.1988)
Depth (H)		5.9 - 6.1 (0.232 - 0.240)	
Depth (L)	Intake	41.07 - 41.67 (1.6169 - 1.6405)	
	Exhaust	41.00 - 41.60 (1.6142 - 1.6378)	

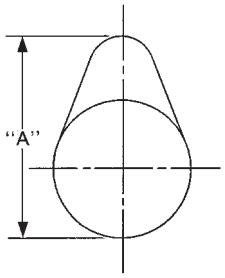
Camshaft and Camshaft Bearing

NAEM0034

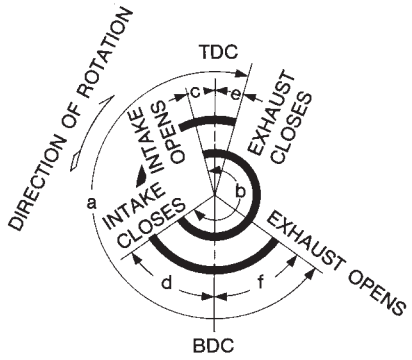
Unit: mm (in)

	Standard	Limit
Camshaft journal to bearing clearance	No. 1 0.045 - 0.086 (0.0018 - 0.0034) No. 2, 3, 4 0.035 - 0.076 (0.0014 - 0.0030)	0.15 (0.0059)
Inner diameter of camshaft bearing	No. 1 26.000 - 26.021 (1.0236 - 1.0244) No. 2, 3, 4 23.500 - 23.521 (0.9252 - 0.9260)	—
Outer diameter of camshaft journal	No. 1 25.935 - 25.955 (1.0211 - 1.0218) No. 2, 3, 4 23.445 - 23.465 (0.9230 - 0.9238)	—
Camshaft runout [TIR*]	Less than 0.02 (0.0008)	0.05 (0.0020)
Camshaft sprocket runout [TIR*]	Less than 0.15 (0.0059)	—
Camshaft end play	0.115 - 0.188 (0.0045 - 0.0074)	0.24 (0.0094)

*: Total indicator reading



EM671

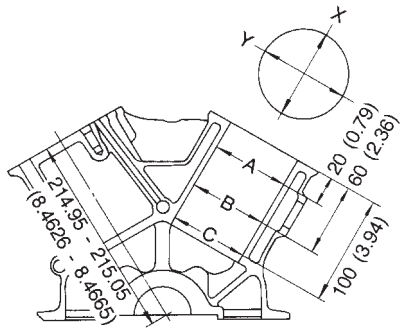
Cam height "A"	Intake and exhaust	44.465 - 44.655 (1.7506 - 1.7581)
Wear limit of cam height		0.2 (0.008)
Valve timing		

Unit: degree

a	b	c	d	e	f
232	230	–3	53	6	46

Cylinder Block

NAEM0035
Unit: mm (in)



SEM022EA

Surface flatness	Standard			Less than 0.03 (0.0012)
	Limit			0.10 (0.0039)
Cylinder bore	Inner diameter	Standard	Grade No. 1	95.500 - 95.510 (3.7598 - 3.7602)
			Grade No. 2	95.510 - 95.520 (3.7602 - 3.7606)
			Grade No. 3	95.520 - 95.530 (3.7606 - 3.7610)
		Wear limit		0.20 (0.0079)
Out-of-round (X − Y)				Less than 0.015 (0.0006)
Taper (A − B − C)				Less than 0.015 (0.0006)

Main journal inner diameter grade (Without bearing)	Grade No. A	63.993 - 63.994 (2.5194 - 2.5194)
	Grade No. B	63.994 - 63.995 (2.5194 - 2.5195)
	Grade No. C	63.995 - 63.996 (2.5195 - 2.5195)
	Grade No. D	63.996 - 63.997 (2.5195 - 2.5196)
	Grade No. E	63.997 - 63.998 (2.5196 - 2.5196)
	Grade No. F	63.998 - 63.999 (2.5196 - 2.5196)
	Grade No. G	63.999 - 64.000 (2.5196 - 2.5197)
	Grade No. H	64.000 - 64.001 (2.5197 - 2.5197)
	Grade No. J	64.001 - 64.002 (2.5197 - 2.5198)
	Grade No. K	64.002 - 64.003 (2.5198 - 2.5198)
	Grade No. L	64.003 - 64.004 (2.5198 - 2.5198)
	Grade No. M	64.004 - 64.005 (2.5198 - 2.5199)
	Grade No. N	64.005 - 64.006 (2.5199 - 2.5199)
	Grade No. P	64.006 - 64.007 (2.5199 - 2.5200)
	Grade No. R	64.007 - 64.008 (2.5200 - 2.5200)
	Grade No. S	64.008 - 64.009 (2.5200 - 2.5200)
	Grade No. T	64.009 - 64.010 (2.5200 - 2.5201)
	Grade No. U	64.010 - 64.011 (2.5201 - 2.5201)
	Grade No. V	64.011 - 64.012 (2.5201 - 2.5202)
	Grade No. W	64.012 - 64.013 (2.5202 - 2.5202)
	Grade No. X	64.013 - 64.014 (2.5202 - 2.5202)
	Grade No. Y	64.014 - 64.015 (2.5202 - 2.5203)
	Grade No. 4	64.015 - 64.016 (2.5203 - 2.5203)
	Grade No. 7	64.016 - 64.017 (2.5203 - 2.5203)
Difference in inner diameter between cylinders	Standard	Less than 0.03 (0.0012)

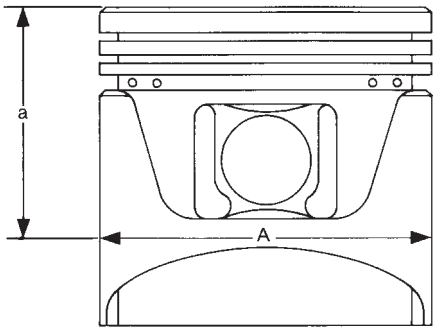
Piston, Piston Ring and Piston Pin

NAEM0036

AVAILABLE PISTON

NAEM0036S01

Unit: mm (in)



SEM882E

Piston skirt diameter "A"	Standard	Grade No. 1	95.480 - 95.490 (3.7590 - 3.7594)
		Grade No. 2	95.490 - 95.500 (3.7594 - 3.7598)
		Grade No. 3	95.500 - 95.510 (3.7598 - 3.7602)
		0.20 (0.0079) oversize (Service)	95.680 - 95.710 (3.7669 - 3.7681)
"a" dimension			41.0 (1.614)
Piston pin hole diameter		Grade No. 0	21.993 - 21.999 (0.8659 - 0.8661)
		Grade No. 1	21.999 - 22.005 (0.8661 - 0.8663)
Piston clearance to cylinder block			0.010 - 0.030 (0.0004 - 0.0012)

PISTON RING

=NAEM0036S02
Unit: mm (in)

		Standard	Limit
Side clearance	Top	0.040 - 0.080 (0.0016 - 0.0031)	0.11 (0.0043)
	2nd	0.030 - 0.070 (0.0012 - 0.0028)	0.1 (0.004)
	Oil ring	0.015 - 0.050 (0.0006 - 0.0020)	—
End gap	Top	0.23 - 0.33 (0.0091 - 0.0130)	0.54 (0.0213)
	2nd	0.33 - 0.48 (0.0130 - 0.0189)	0.80 (0.0315)
	Oil (rail ring)	0.20 - 0.80 (0.0079 - 0.0315)	0.95 (0.0374)

PISTON PIN

NAEM0036S03
Unit: mm (in)

Piston pin outer diameter	Grade No. 0	21.989 - 21.995 (0.8657 - 0.8659)
	Grade No. 1	21.995 - 22.001 (0.8659 - 0.8662)
Interference fit of piston pin to piston		0.002 - 0.006 (0.0001 - 0.0002)
Piston pin to connecting rod bushing clearance	Standard	0.005 - 0.017 (0.0002 - 0.0007)
	Limit	0.030 (0.0012)

*: Values measured at ambient temperature of 20°C (68°F)

Connecting Rod

NAEM0037
Unit: mm (in)

Center distance		144.15 - 144.25 (5.6752 - 5.6791)
Bend [per 100 (3.94)]	Limit	0.15 (0.0059)
Torsion [per 100 (3.94)]	Limit	0.30 (0.0118)
Connecting rod small end inner diameter		23.980 - 24.000 (0.9441 - 0.9449)
Piston pin bushing inner diameter*	Grade No. 0	22.000 - 22.006 (0.8661 - 0.8664)
	Grade No. 1	22.006 - 22.012 (0.8664 - 0.8666)
Connecting rod big end inner diameter		55.000 - 55.013 (2.1654 - 2.1659)
Side clearance	Standard	0.20 - 0.35 (0.0079 - 0.0138)
	Limit	0.40 (0.0157)

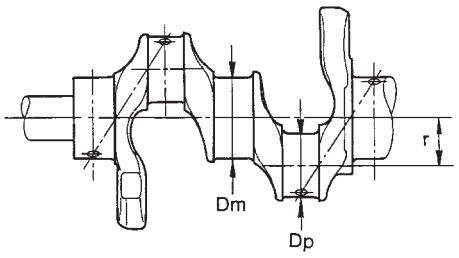
*: After installing in connecting rod

Crankshaft

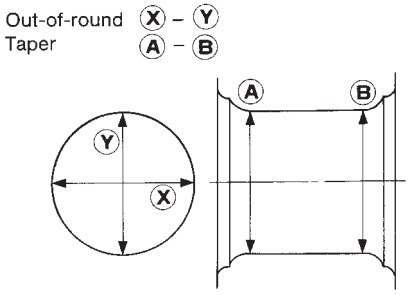
NAEM0038

Unit: mm (in)

Main journal dia. “Dm” grade	Grade No. A	59.975 - 59.974 (2.3612 - 2.3612)
	Grade No. B	59.974 - 59.973 (2.3612 - 2.3611)
	Grade No. C	59.973 - 59.972 (2.3611 - 2.3611)
	Grade No. D	59.972 - 59.971 (2.3611 - 2.3611)
	Grade No. E	59.971 - 59.970 (2.3611 - 2.3610)
	Grade No. F	59.970 - 59.969 (2.3610 - 2.3610)
	Grade No. G	59.969 - 59.968 (2.3610 - 2.3609)
	Grade No. H	59.968 - 59.967 (2.3609 - 2.3609)
	Grade No. J	59.967 - 59.966 (2.3609 - 2.3609)
	Grade No. K	59.966 - 59.965 (2.3609 - 2.3608)
	Grade No. L	59.965 - 59.964 (2.3608 - 2.3608)
	Grade No. M	59.964 - 59.963 (2.3608 - 2.3607)
	Grade No. N	59.963 - 59.962 (2.3607 - 2.3607)
	Grade No. P	59.962 - 59.961 (2.3607 - 2.3607)
	Grade No. R	59.961 - 59.960 (2.3607 - 2.3606)
	Grade No. S	59.960 - 59.959 (2.3606 - 2.3606)
	Grade No. T	59.959 - 59.958 (2.3606 - 2.3605)
	Grade No. U	59.958 - 59.957 (2.3605 - 2.3605)
	Grade No. V	59.957 - 59.956 (2.3605 - 2.3605)
	Grade No. W	59.956 - 59.955 (2.3605 - 2.3604)
	Grade No. X	59.955 - 59.954 (2.3604 - 2.3604)
	Grade No. Y	59.954 - 59.953 (2.3604 - 2.3603)
	Grade No. 4	59.953 - 59.952 (2.3603 - 2.3603)
	Grade No. 7	59.952 - 59.951 (2.3603 - 2.3603)
Pin journal dia. “Dp”	Grade No. 0	51.968 - 51.974 (2.0460 - 2.0462)
	Grade No. 1	51.962 - 51.968 (2.0457 - 2.0460)
	Grade No. 2	51.956 - 51.962 (2.0445 - 2.0457)
Center distance “r”		40.36 - 40.44 (1.5890 - 1.5921)
Out-of-round (X − Y)	Standard	Less than 0.002 (0.0001)
Taper (A − B)	Standard	Less than 0.002 (0.0001)
Runout [TIR*]	Limit	Less than 0.10 (0.0039)
Free end play	Standard	0.10 - 0.25 (0.0039 - 0.0098)
	Limit	0.30 (0.0118)



SEM645

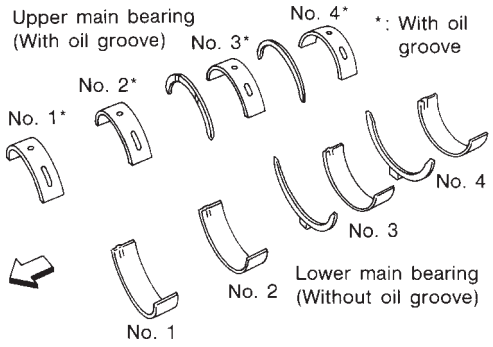


EM715

*: Total indicator reading

Available Main Bearing

NAEM0039



SEM175F

Grade number		Thickness "T" mm (in)	Width "W" mm (in)	Identification color (UPR/LWR)	Remarks
0		2.000 - 2.003 (0.0787 - 0.0789)	19.9 - 20.1 (0.783 - 0.791)	Black	Grade is the same for upper and lower bearings.
1		2.003 - 2.006 (0.0789 - 0.0790)		Brown	
2		2.006 - 2.009 (0.0790 - 0.0791)		Green	
3		2.009 - 2.012 (0.0791 - 0.0792)		Yellow	
4		2.012 - 2.015 (0.0792 - 0.0793)		Blue	
5		2.015 - 2.018 (0.0793 - 0.0794)		Pink	
6		2.018 - 2.021 (0.0794 - 0.0796)		Purple	
7		2.021 - 2.024 (0.0796 - 0.0797)		White	
01	UPP	2.003 - 2.006 (0.0789 - 0.0790)		Brown/Black	Grade is different for upper and lower bearings.
	LWR	2.000 - 2.003 (0.0787 - 0.0789)			
12	UPR	2.006 - 2.009 (0.0790 - 0.0791)		Green/Brown	
	LWR	2.003 - 2.006 (0.0789 - 0.0790)			
23	UPR	2.009 - 2.012 (0.0791 - 0.0792)		Yellow/Green	
	LWR	2.006 - 2.009 (0.0790 - 0.0791)			
34	UPR	2.012 - 2.015 (0.0792 - 0.0793)		Blue/Yellow	
	LWR	2.009 - 2.012 (0.0791 - 0.0792)			
45	UPR	2.015 - 2.018 (0.0793 - 0.0794)		Pink/Blue	
	LWR	2.012 - 2.015 (0.0792 - 0.0793)			
56	UPR	2.018 - 2.021 (0.0794 - 0.0796)		Purple/Pink	
	LWR	2.015 - 2.018 (0.0793 - 0.0794)			
67	UPR	2.021 - 2.024 (0.0796 - 0.0797)		White/Purple	
	LWR	2.018 - 2.021 (0.0794 - 0.0796)			

UNDERSIZE

NAEM0039S01

Unit: mm (in)

	Thickness	Main journal diameter "Dm"
0.25 (0.0098)	2.132 - 2.140 (0.0839 - 0.0843)	Grind so that bearing clearance is the specified value.

Available Connecting Rod Bearing

NAEM0040

CONNECTING ROD BEARING

NAEM0040S01

Grade number	Thickness "T" mm (in)	Identification color (mark)
0	1.500 - 1.503 (0.0591 - 0.0592)	Black
1	1.503 - 1.506 (0.0592 - 0.0593)	Brown
2	1.506 - 1.509 (0.0593 - 0.0594)	Green

UNDERSIZE

NAEM0040S02

Unit: mm (in)

	Thickness	Crank pin journal diameter "Dp"
0.25 (0.0098)	1.626 - 1.634 (0.0640 - 0.0643)	Grind so that bearing clearance is the specified value.

Miscellaneous Components

NAEM0041

Unit: mm (in)

Flywheel runout [TIR]*	Less than 0.15 (0.0059)
Drive plate runout [TIR]*	Less than 0.15 (0.0059)

*: Total indicator reading

BEARING CLEARANCE

NAEM0041S01

Unit: mm (in)

Main bearing clearance	Standard	0.035 - 0.045 (0.0014 - 0.0018)
	Limit	0.065 (0.0026)
Connecting rod bearing clearance	Standard	0.034 - 0.059 (0.0013 - 0.0023)
	Limit	0.070 (0.0028)

NOTES

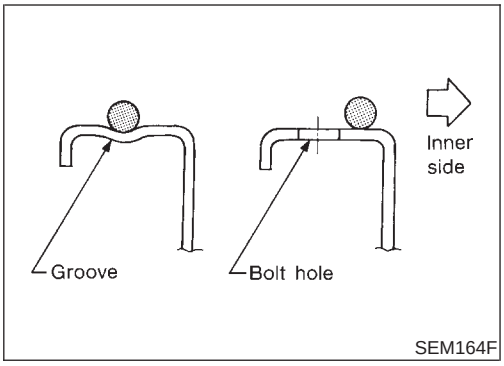
ENGINE LUBRICATION & COOLING SYSTEMS

SECTION LC

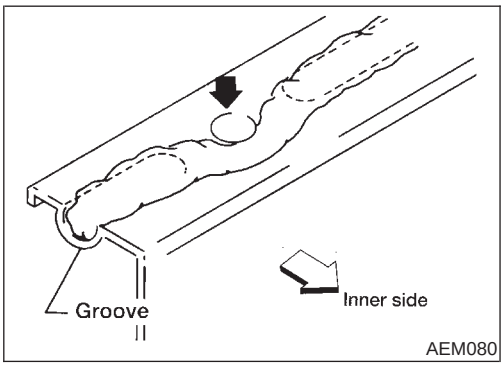
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SEM164F



AEM080

Precautions

LIQUID GASKET APPLICATION PROCEDURE

NALC0001

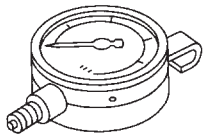
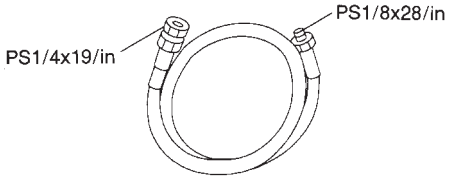
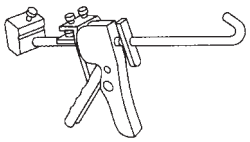
1. Use a scraper to remove all traces of old liquid gasket from mating surfaces and grooves. Also, completely clean any oil from these areas.
2. Apply a continuous bead of liquid gasket to mating surfaces. **(Use Genuine RTV silicone sealant Part No. 999MP-A7007 or equivalent.)**
   - For oil pan, be sure liquid gasket diameter is 4.0 to 5.0 mm (0.157 to 0.197 in).
   - For areas except oil pan, be sure liquid gasket diameter is 2.0 to 3.0 mm (0.079 to 0.118 in).
3. Apply liquid gasket around the inner side of bolt holes (unless otherwise specified).
4. Assembly should be done within 5 minutes after coating.
5. Wait at least 30 minutes before refilling engine oil and engine coolant.

Preparation

SPECIAL SERVICE TOOLS

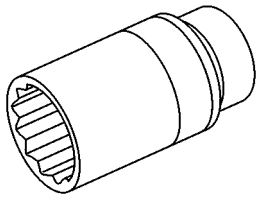
NALC0002

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
ST25051001 (J25695-1) Oil pressure gauge	 NT050	
ST25052000 (J25695-2) Hose	 NT559	Adapting oil pressure gauge to upper oil pan
WS39930000 (—) Tube pressure	 NT052	Pressing the tube of liquid gasket

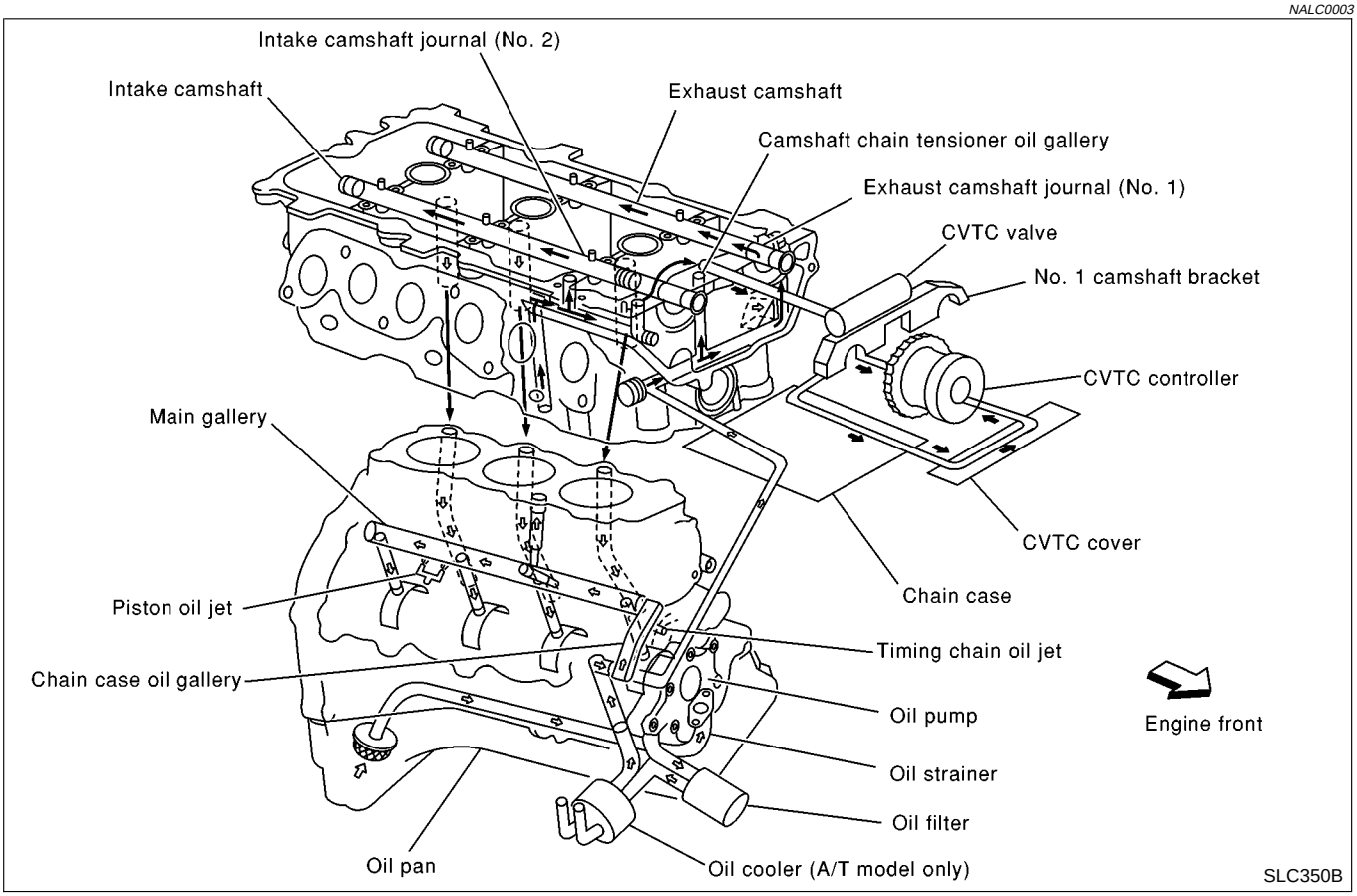
COMMERCIAL SERVICE TOOL

NALC0040

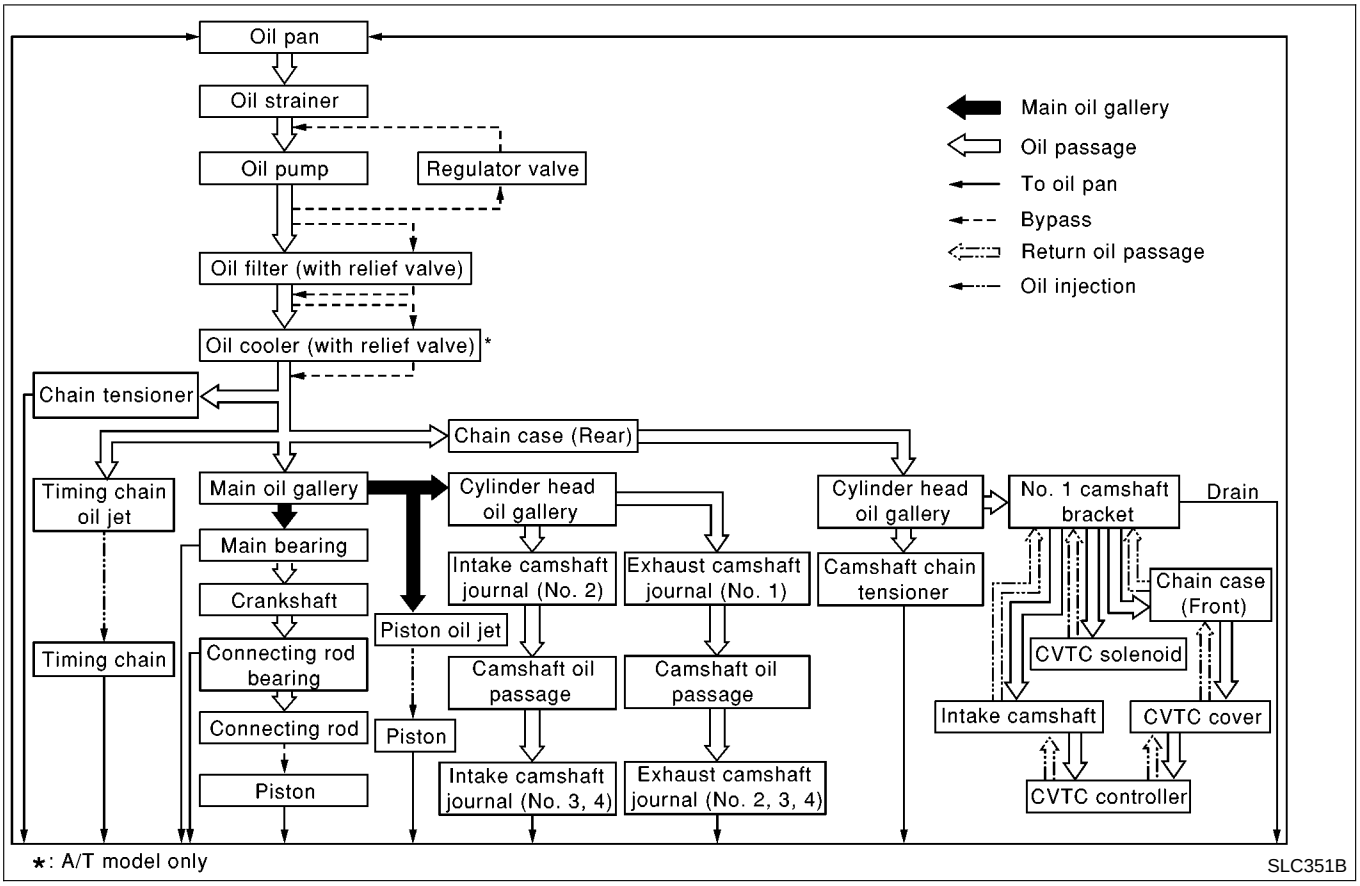
Tool name	Description
Deep socket	 NT818 Removing and installing oil pressure switch Deep socket 26 mm, 3/8 drive

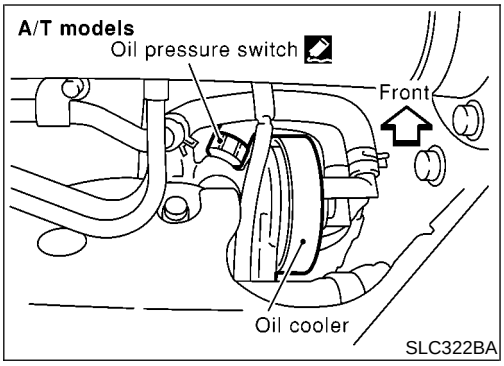
Lubrication Circuit

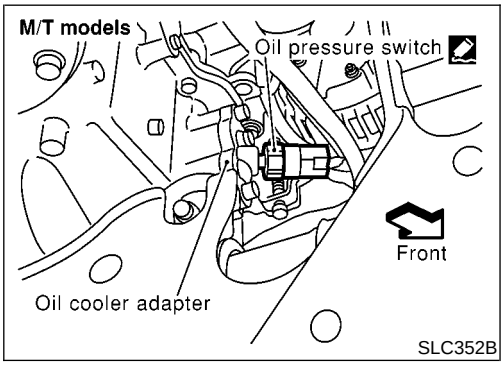
NALC0003

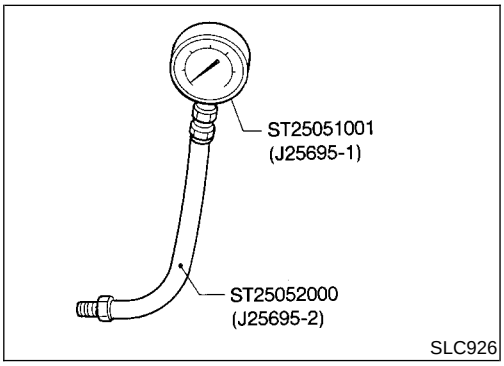


Lubrication Circuit (Cont'd)









Oil Pressure Check

NALC0004

WARNING:

- **Be careful not to burn yourself, as the engine and oil may be hot.**
- **Oil pressure check should be done in "Parking position".**

1. Check oil level.
2. Disconnect oil pressure switch harness connector.
3. Remove oil pressure switch using a deep socket. (Commercial service tool)
4. Install pressure gauge.
5. Start engine and warm it up to normal operating temperature.
6. Check oil pressure with engine running under no-load.

Engine speed rpm	Approximate discharge pressure kPa (kg/cm^2, psi)
Idle speed 2,000	More than 98 (1.0, 14) 294 (3.0, 43)

If difference is extreme, check oil passage and oil pump for oil leaks.

7. After the inspections, install the oil pressure switch as follows.

a. Remove the old sealant adhering to switch and engine.

b. Apply Genuine RTV silicone sealant Part No. 999MP-A7007 or equivalent to the thread and tighten.

13 - 17 N·m (1.25 - 1.75 kg-m, 9 - 12 ft-lb)

Oil Pump

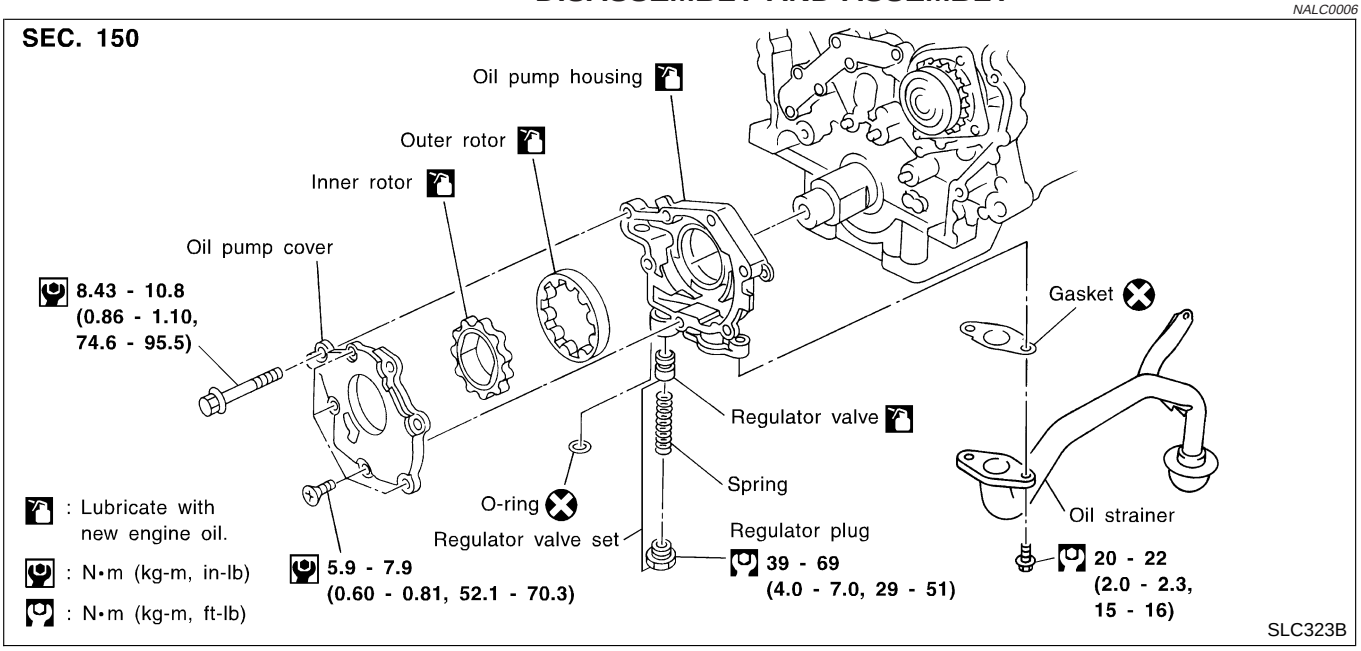
REMOVAL AND INSTALLATION

=NALC0005

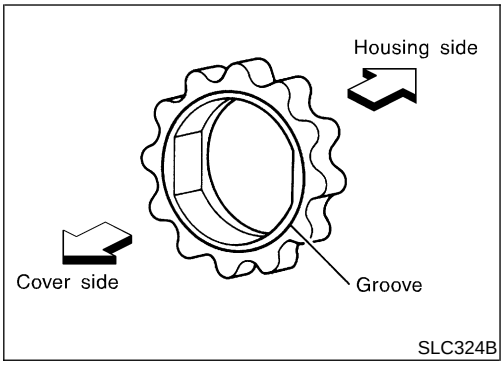
1. Remove timing chain. Refer to EM-23, “Removal”.
2. Remove oil pump assembly.
- Inspect the oil pump after removing it.
3. Reinstall any parts removed in reverse order of removal.

DISASSEMBLY AND ASSEMBLY

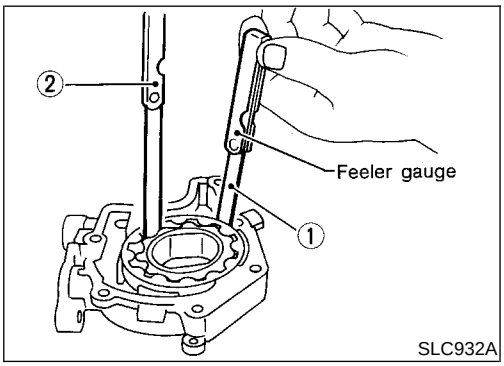
NALC0006



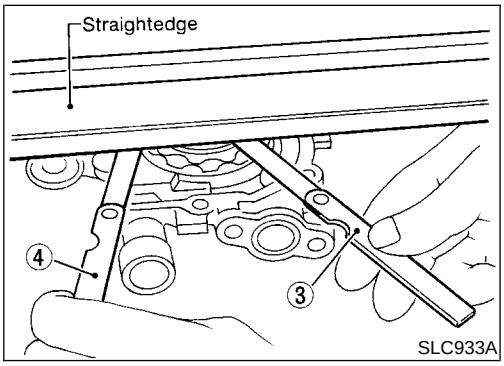
- **When installing oil pump, apply engine oil to rotors.**



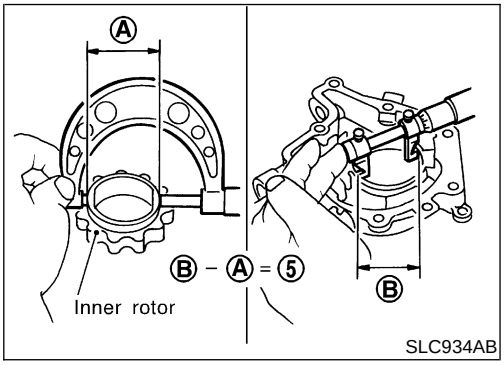
SLC324B



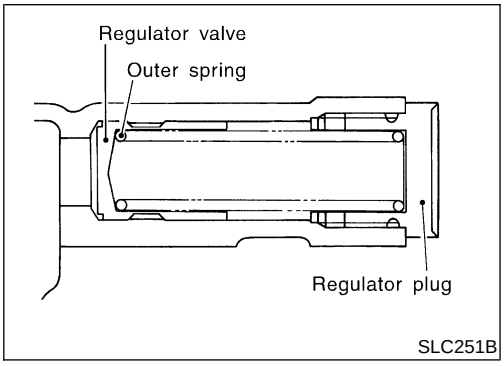
SLC932A



SLC933A



SLC934AB



SLC251B

OIL PUMP INSPECTION

NALC0007

- **Install oil pump with the groove of the inner rotor facing the oil pump cover.**

Using a feeler gauge, straightedge and micrometers, check the following clearances:

Unit: mm (in)

Body to outer rotor radial clearance 1	0.114 - 0.200 (0.0045 - 0.0079)
Inner rotor to outer gear tip clearance 2	Below 0.18 (0.0071)
Body to inner rotor axial clearance 3	0.030 - 0.070 (0.0012 - 0.0028)
Body to outer rotor axial clearance 4	0.050 - 0.110 (0.0020 - 0.0043)
Inner rotor to brazed portion of housing clearance 5	0.045 - 0.091 (0.0018 - 0.0036)

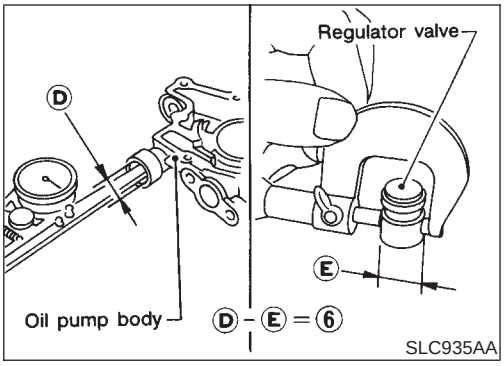
- **If the tip clearance (2) exceeds the limit, replace rotor set.**
- **If body to rotor clearances (1, 3, 4, 5) exceed the limit, replace oil pump body assembly.**

REGULATOR VALVE INSPECTION

NALC0008

1. Visually inspect components for wear and damage.
2. Check oil pressure regulator valve sliding surface and valve spring.
3. Coat regulator valve with engine oil. Check that it falls smoothly into the valve hole by its own weight.

If damaged, replace regulator valve set or oil pump body.

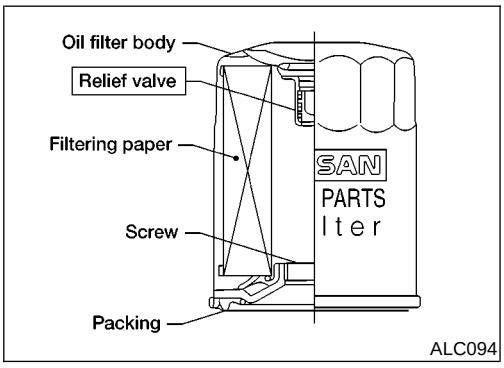


4. Check regulator valve to oil pump body clearance.

Clearance:

6 : 0.040 - 0.097 mm (0.0016 - 0.0038 in)

If it exceeds the limit, replace oil pump body.



OIL FILTER

NALC0009

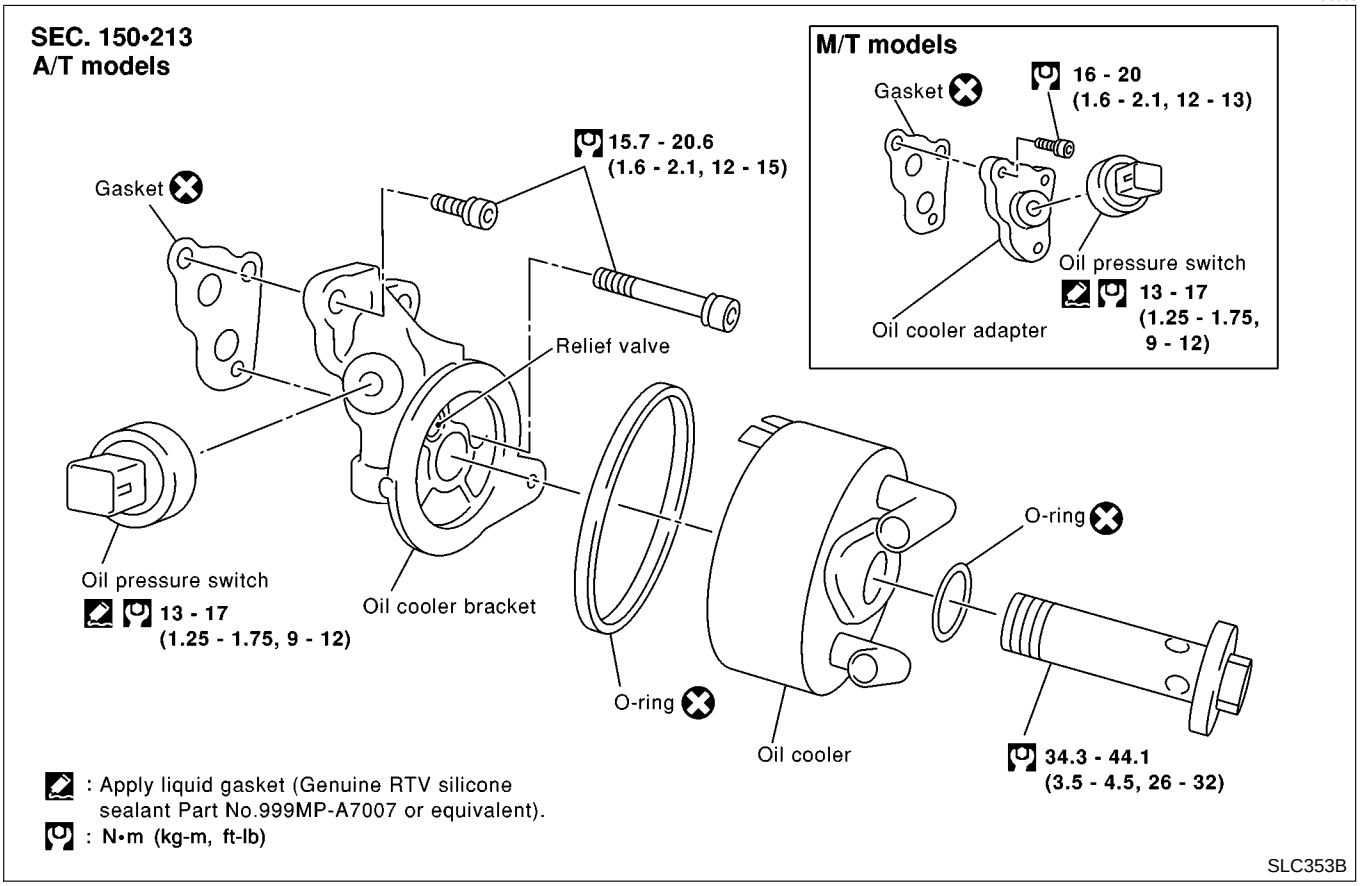
The oil filter is a small, full-flow cartridge type and is provided with a relief valve.

- **Use Tool specified in MA-19 for changing oil filter.**

Oil Cooler

REMOVAL AND INSTALLATION

NALC0036

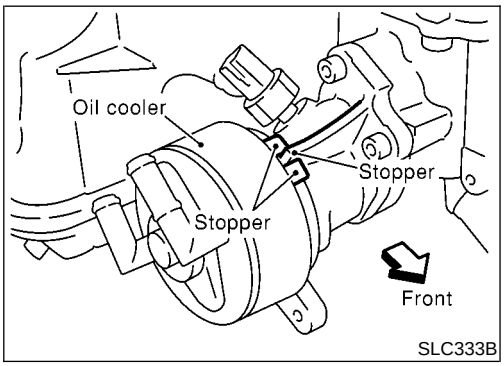


1. Drain engine oil and coolant.

- **Do not spill coolant on the drive belt.**

2. Remove oil cooler.

- Inspect the oil cooler after removing it.



3. Installation is in reverse order of removal.

- **When installing the oil cooler, align the oil cooler stopper with the stopper of the oil cooler bracket.**

INSPECTION

NALC0037

Oil Cooler

NALC0037S01

1. Check oil cooler for cracks.
2. Check oil cooler for clogging by blowing through coolant inlet. If necessary, replace oil cooler assembly.

Oil Pressure Relief Valve

NALC0037S02

Inspect oil pressure relief valve for movement, cracks and breaks by pushing the ball. If replacement is necessary, remove valve by prying it out with a suitable tool. Install a new valve in place by tapping it.

Service Data and Specifications (SDS)

OIL PRESSURE

NALC0010

Engine speed rpm	Approximate discharge pressure kPa (kg/cm^2, psi)
Idle speed 2,000	More than 98 (1.0, 14) 294 (3.0, 43)

REGULATOR VALVE

NALC0011

Unit: mm (in)

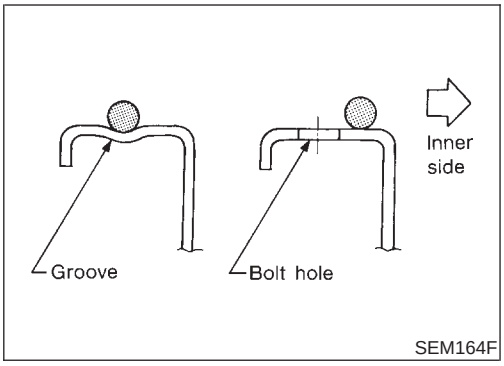
Regulator valve to oil pump cover clearance	0.040 - 0.097 (0.0016 - 0.0038)

OIL PUMP

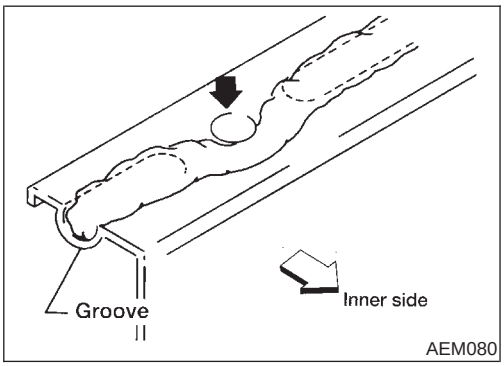
NALC0012

Unit: mm (in)

Body to outer rotor radial clearance	0.114 - 0.200 (0.0045 - 0.0079)
Inner rotor to outer rotor tip clearance	Below 0.18 (0.0071)
Body to inner rotor axial clearance	0.030 - 0.070 (0.0012 - 0.0028)
Body to outer rotor axial clearance	0.050 - 0.110 (0.0020 - 0.0043)
Inner rotor to brazed portion of housing clearance	0.045 - 0.091 (0.0018 - 0.0036)



SEM164F



AEM080

Precautions

LIQUID GASKET APPLICATION PROCEDURE

NALC0013

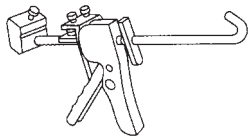
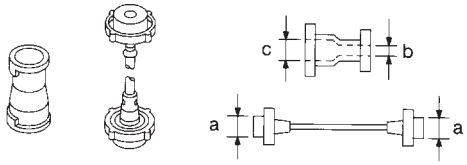
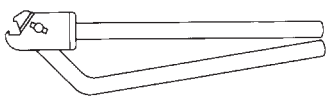
1. Use a scraper to remove all traces of old liquid gasket from mating surfaces and grooves. Also, completely clean any oil from these areas.
2. Apply a continuous bead of liquid gasket to mating surfaces. **(Use Genuine RTV silicone sealant Part No. 999MP-A7007 or equivalent.)**
   - For oil pan, be sure liquid gasket diameter is 4.0 to 5.0 mm (0.157 to 0.197 in).
   - For areas except oil pan, be sure liquid gasket diameter is 2.0 to 3.0 mm (0.079 to 0.118 in).
3. Apply liquid gasket around the inner side of bolt holes (unless otherwise specified).
4. Assembly should be done within 5 minutes after coating.
5. Wait at least 30 minutes before refilling engine oil and engine coolant.

Preparation

SPECIAL SERVICE TOOLS

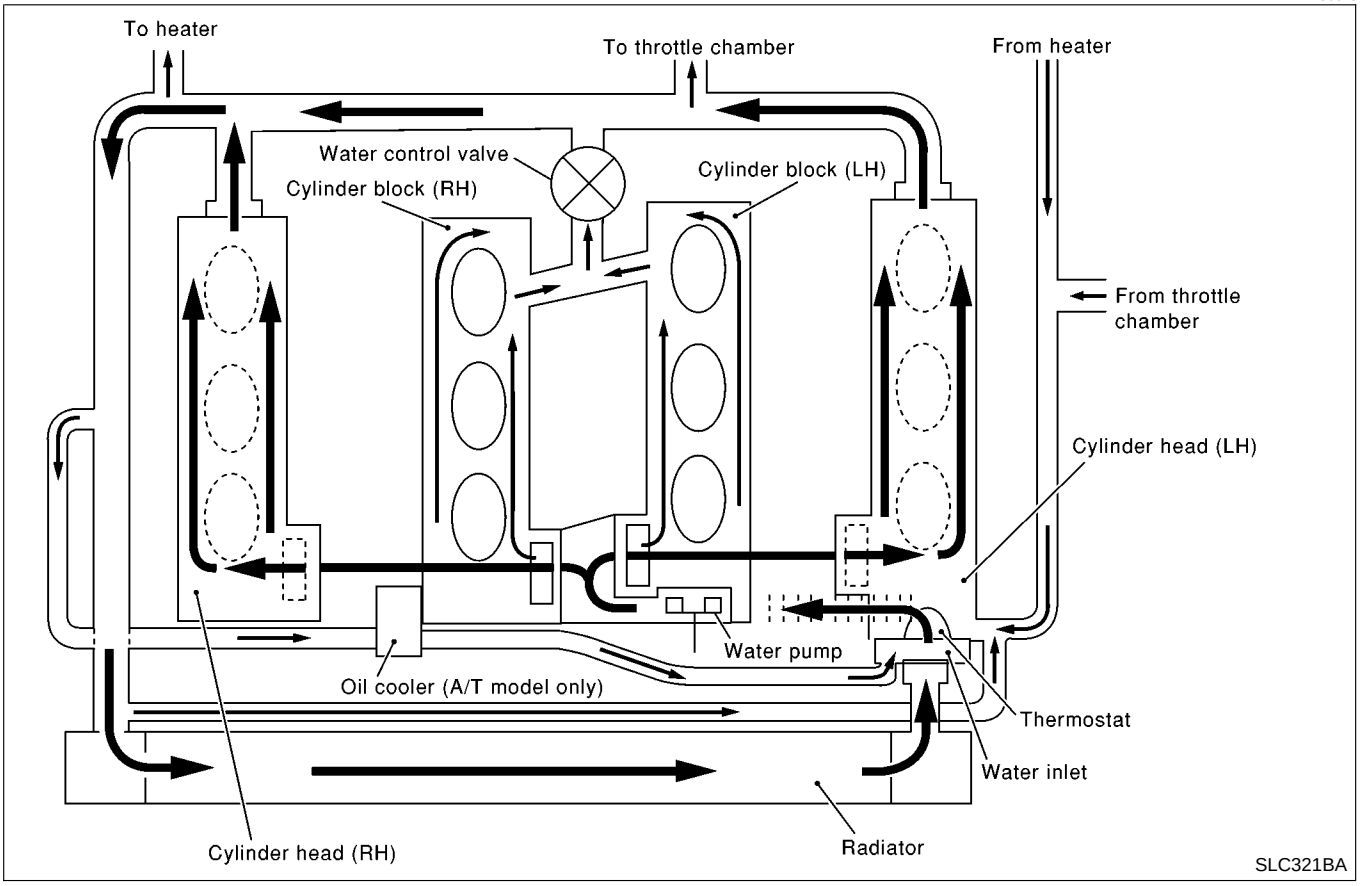
NALC0014

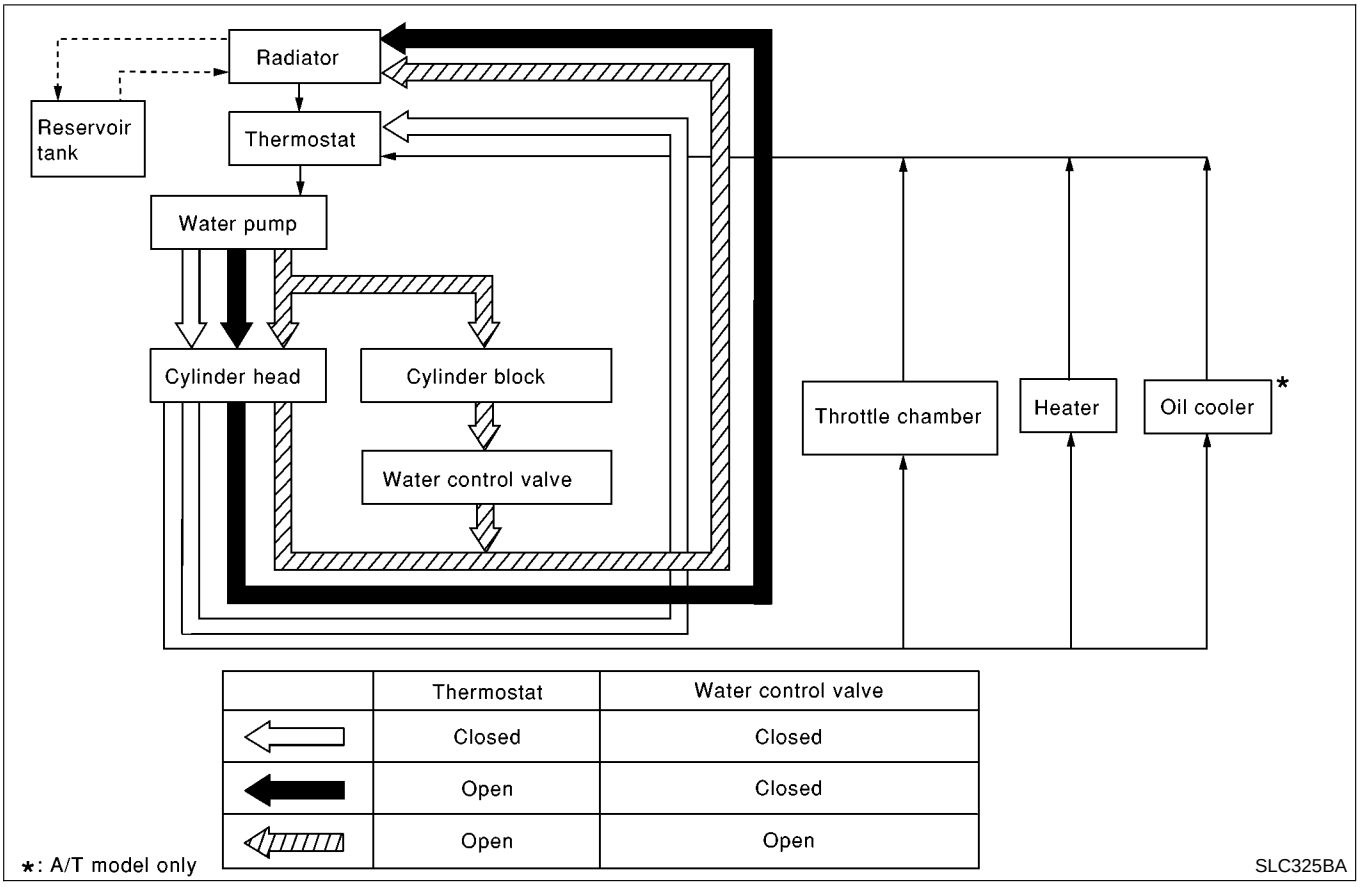
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
WS39930000 (—) Tube pressure	 NT052	Pressing the tube of liquid gasket
EG17650301 (J33984-A) Radiator cap tester adapter	 NT564	Adapting radiator cap tester to radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)
KV99103510 (—) Radiator plate pliers A	 NT224	Installing radiator upper and lower tanks
KV99103520 (—) Radiator plate pliers B	 NT225	Removing radiator upper and lower tanks

Cooling Circuit

NALC0015





	Thermostat	Water control valve
⇦	Closed	Closed
⬅	Open	Closed
⇦	Open	Open

*: A/T model only

System Check

NALC0016

WARNING:

Never remove the radiator cap when the engine is hot; serious burns could be caused by high pressure fluid escaping from the radiator.
Wrap a thick cloth around the cap and carefully remove it by turning it a quarter turn to allow built-up pressure to escape and then turn the cap all the way off.

CHECKING COOLING SYSTEM HOSES

NALC0016S01

Check hoses for improper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.

CHECKING RADIATOR

NALC0016S02

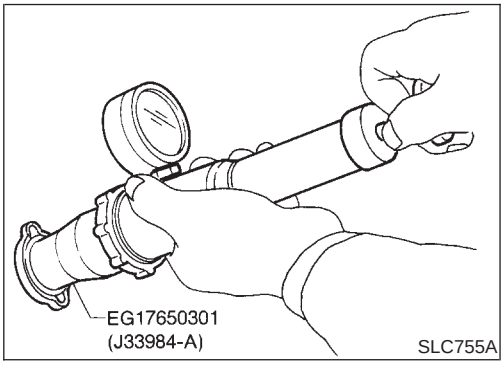
Check radiator for mud or clogging. If necessary, clean radiator as follows.

- Be careful not to bend or damage the radiator fins.
- When radiator is cleaned without removal, remove all surrounding parts such as cooling fan, radiator shroud and horns. Then tape the harness and connectors to prevent water from entering.

1. Apply water by hose to the back side of the radiator core vertically downward.
2. Apply water again to all radiator core surfaces once per minute.
3. Stop washing if any stains no longer flow out from the radiator.
4. Blow air into the back side of radiator core vertically downward.

- Use compressed air lower than 490 kPa (5 kg/cm^2, 71 psi) and keep distance more than 30 cm (11.8 in).

5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.

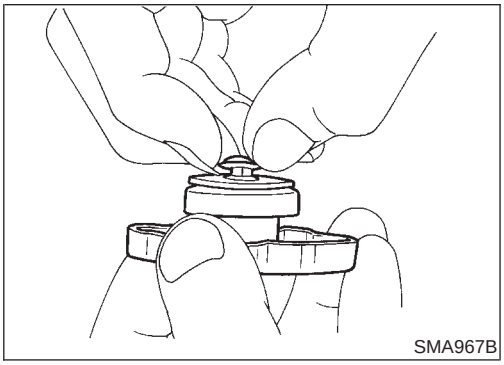


CHECKING RADIATOR CAP

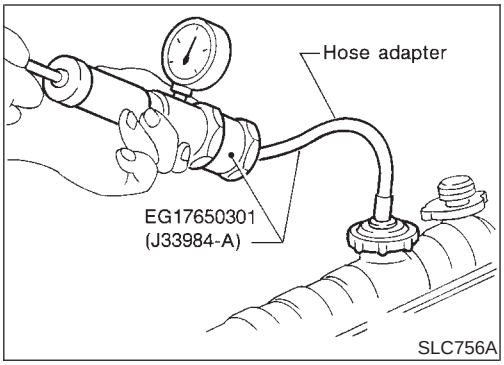
NALC0016S03

To check radiator cap, apply pressure to cap with a tester.

Radiator cap relief pressure:
Standard
78 - 98 kPa
(0.8 - 1.0 kg/cm^2, 11 - 14 psi)
Limit
59 - 98 kPa
(0.6 - 1.0 kg/cm^2, 9 - 14 psi)



Pull the negative pressure valve to open it.
Check that it closes completely when released.



CHECKING COOLING SYSTEM FOR LEAKS

NALC0016S04

To check for leakage, apply pressure to the cooling system with a tester.

Testing pressure:
157 kPa (1.6 kg/cm^2, 23 psi)

CAUTION:
Higher than the specified pressure may cause radiator damage.

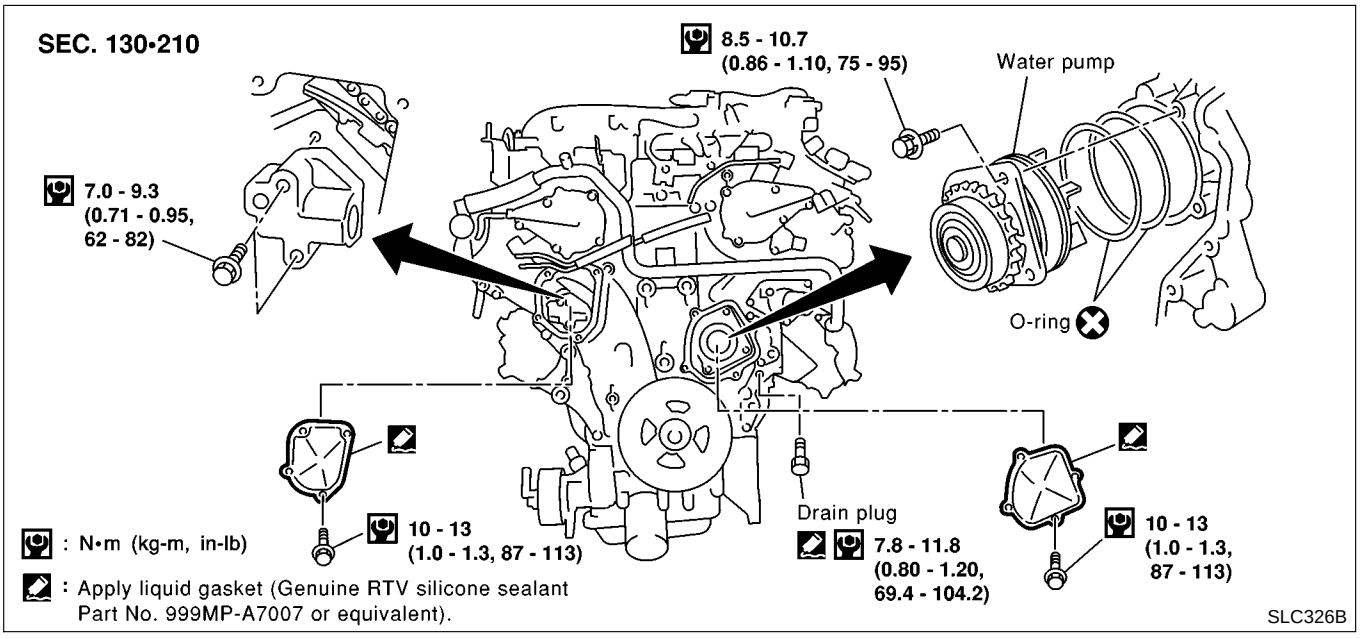
Water Pump

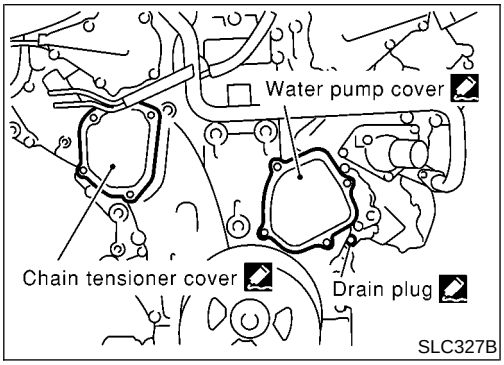
REMOVAL AND INSTALLATION

NALC0017

CAUTION:

- **When removing water pump assembly, be careful not to get coolant on drive belt.**
- **Water pump cannot be disassembled and should be replaced as a unit.**
- **After installing water pump, connect hose and clamp securely, then check for leaks using radiator cap tester.**

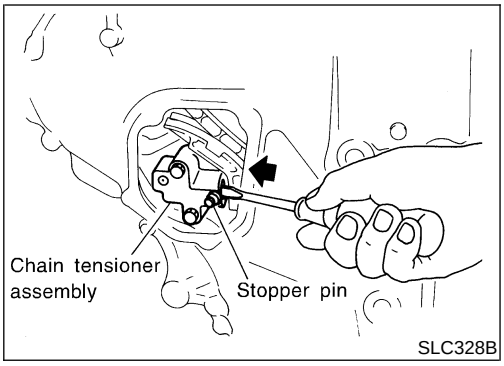




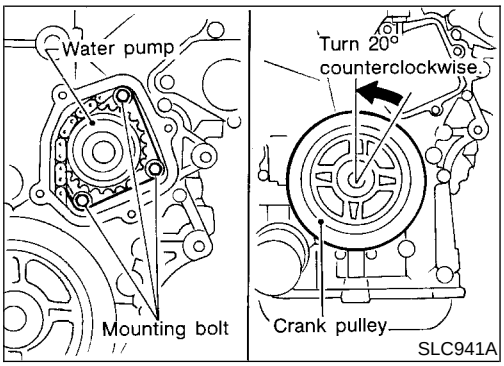
REMOVAL

NALC0018

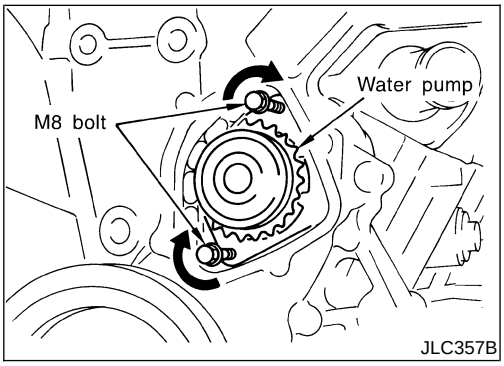
1. Remove undercover.
2. Remove suspension member stay.
3. Drain coolant from radiator.
4. Remove radiator shrouds.
5. Remove drive belts.
6. Remove cooling fan.
7. Remove water drain plug on water pump side of cylinder block.
8. Remove chain tensioner cover and water pump cover.



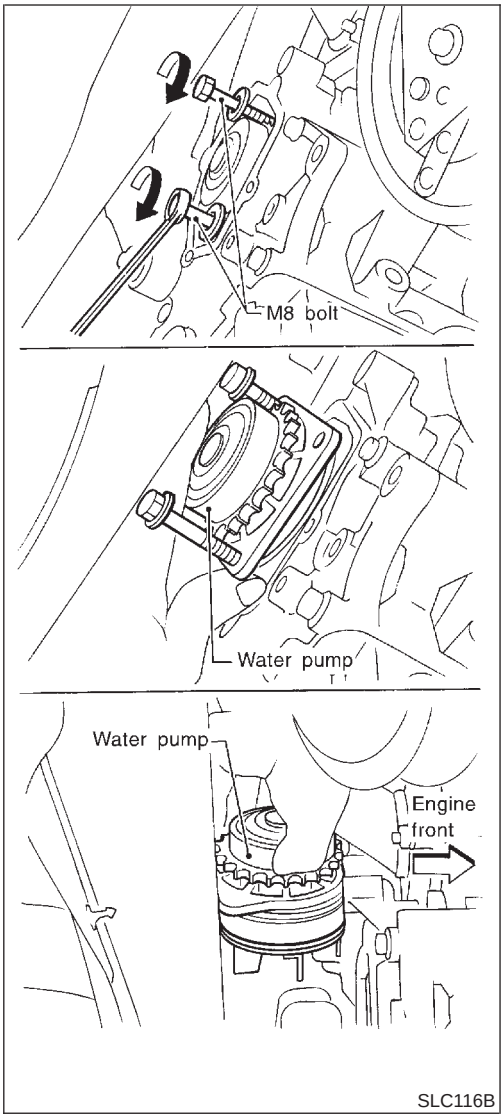
9. Pushing timing chain tensioner sleeve, apply a stopper pin so it does not return. Then remove the chain tensioner assembly.



10. Remove the 3 water pump fixing bolts. Secure a gap between water pump gear and timing chain, by turning crankshaft pulley 20° backwards.

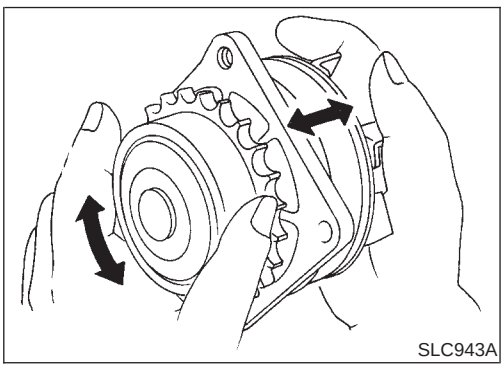


11. Put M8 bolts to two water pump fixing bolt holes.



12. Tighten M8 bolts by turning half turn alternately until they reach timing chain rear case.
- In order to prevent damages to water pump or timing chain rear case, do not tighten one bolt continuously. Always turn each bolt half turn each time.

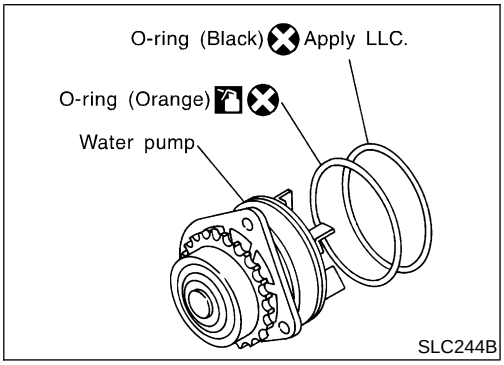
13. Lift up water pump and remove it.
- When lifting up water pump, do not allow water pump gear to hit timing chain.



INSPECTION

NALC0019

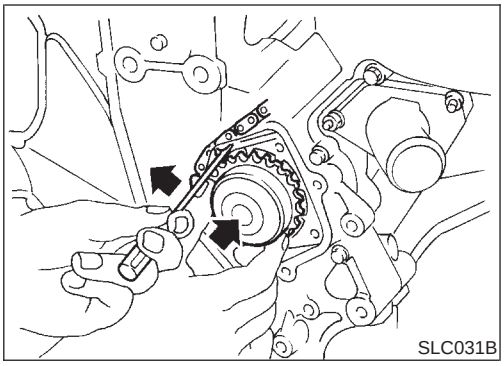
1. Check for badly rusted or corroded body assembly.
2. Check for rough operation due to excessive end play.



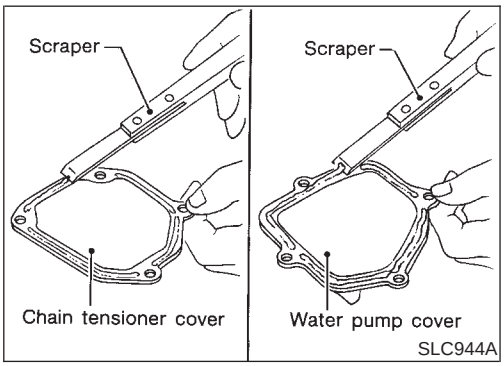
INSTALLATION

NALC0020

1. Apply engine oil and coolant to O-rings as shown in the figure.

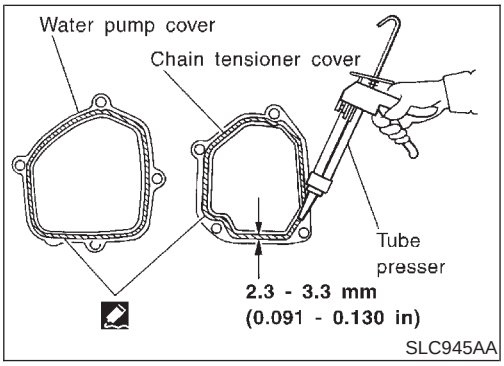

SLC031B

2. Install water pump.
- **Do not allow cylinder block to nip O-rings when installing water pump.**



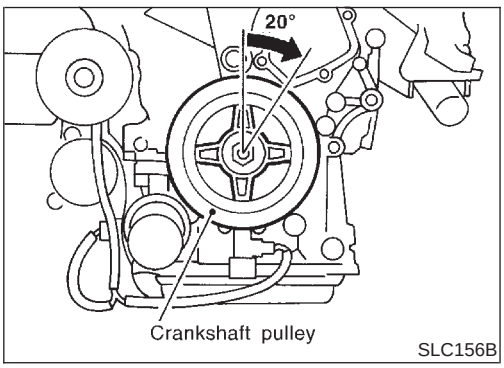
SLC944A

3. Before installing, remove all traces of liquid gasket from mating surface of water pump cover and chain tensioner cover using a scraper.
Also remove traces of liquid gasket from mating surface of front cover.



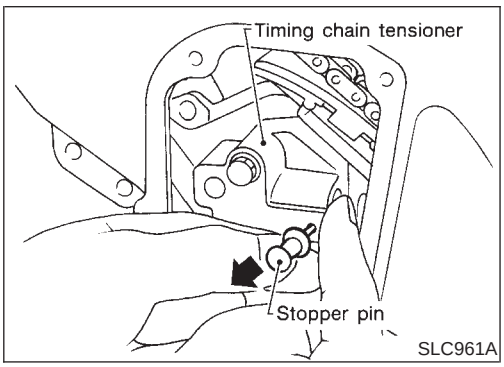
SLC945AA

4. Apply a continuous bead of liquid gasket to mating surface of chain tensioner cover and water pump cover.



SLC156B

5. Return the crankshaft pulley to its original position by turning it 20° forward.



SLC961A

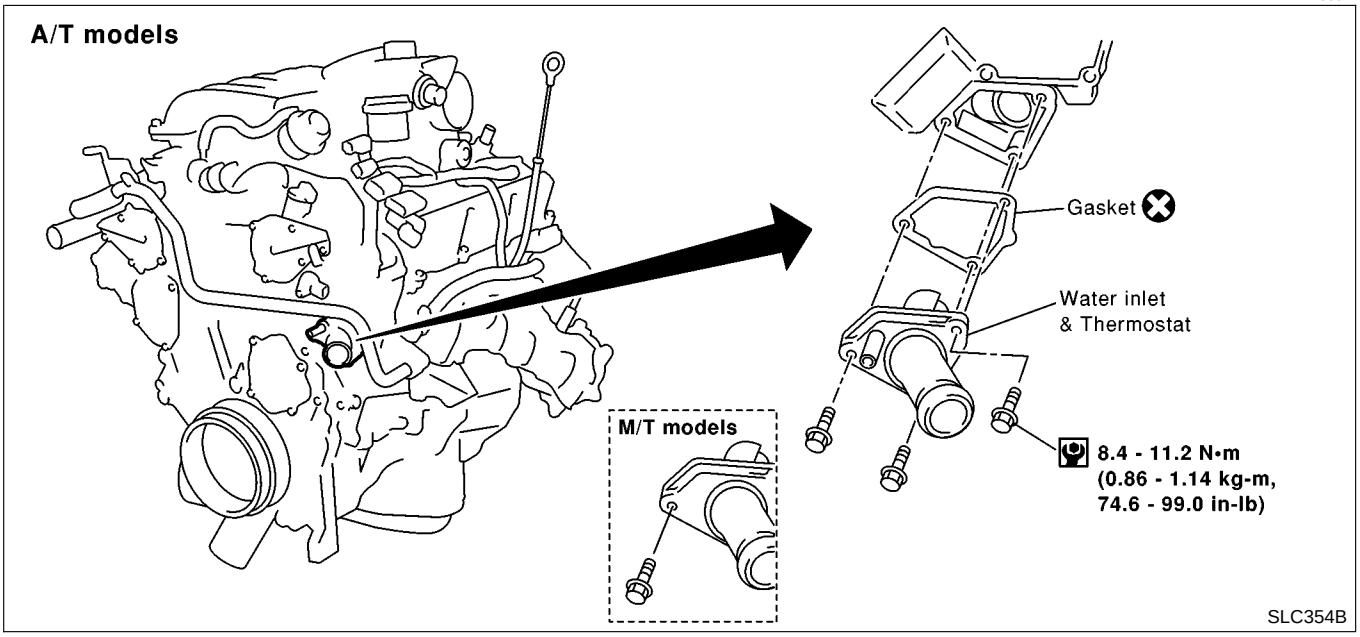
6. Install timing chain tensioner, then remove the stopper pin.
- **When installing the timing chain tensioner, engine oil should be applied to the oil hole and tensioner.**
- **After starting engine, let idle for three minutes, then rev engine up to 3,000 rpm under no load to purge air from the high-pressure chamber of the chain tensioners. The engine may produce a rattling noise. This indicates that air still remains in the chamber and is not a matter of concern.**

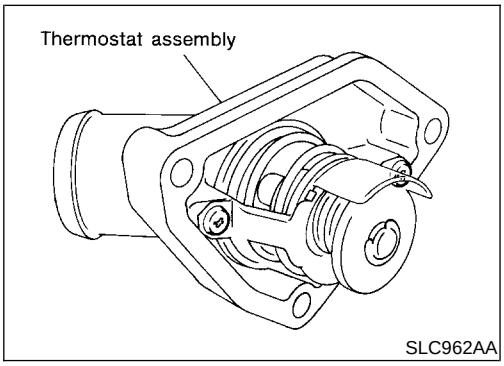
7. Reinstall any parts removed in reverse order of removal.

Thermostat

REMOVAL AND INSTALLATION

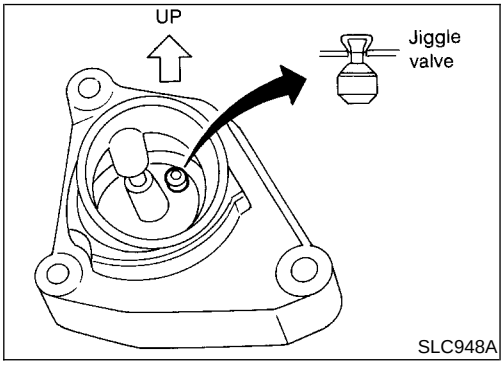
NALC0021





1. Remove undercover.
2. Remove suspension member stay.
3. Drain coolant from radiator.
4. Remove drive belts.
5. Remove water drain plug on water pump side of cylinder block.
6. Disconnect lower radiator hose.
7. Remove water inlet and thermostat assembly.

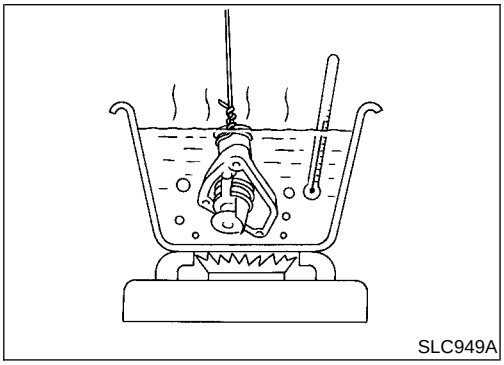
- **Do not disassemble water inlet and thermostat. Replace them as a unit, if necessary.**



8. Install thermostat with jiggle valve facing upward.

- **After installation, run engine for a few minutes, and check for leaks.**
- **Be careful not to spill coolant over engine compartment. Use a rag to absorb coolant.**

9. Reinstall any removed parts in reverse order of removal.



INSPECTION

NALC0022

1. Check valve seating condition at ordinary room temperatures. It should seat tightly.
2. Check valve opening temperature and maximum valve lift.

	Standard
Valve opening temperature	76.5°C (170°F)
Valve lift	More than 8.6 mm/90°C (0.339 in/194°F)

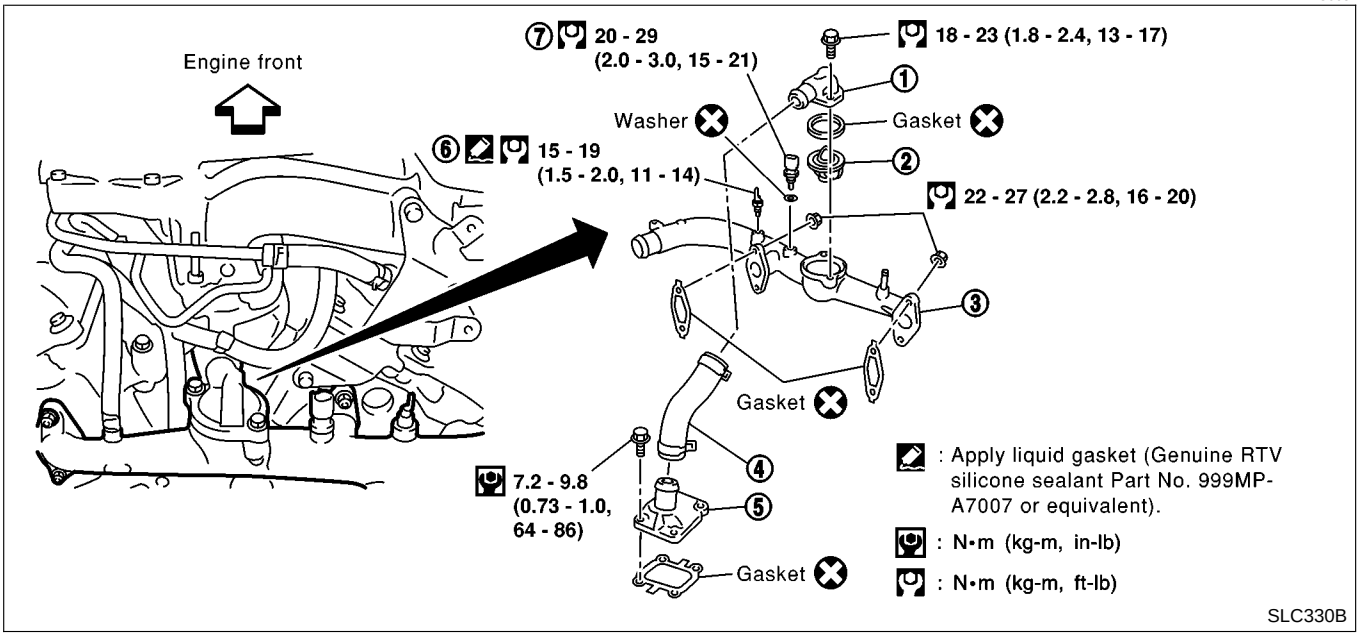
3. Then check if valve closes at 5°C (9°F) below valve opening

temperature.

Water Control Valve

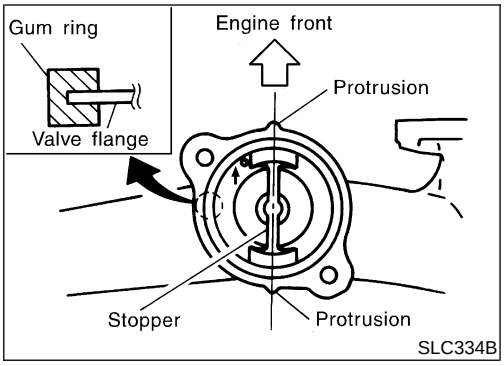
REMOVAL AND INSTALLATION

NALC0032



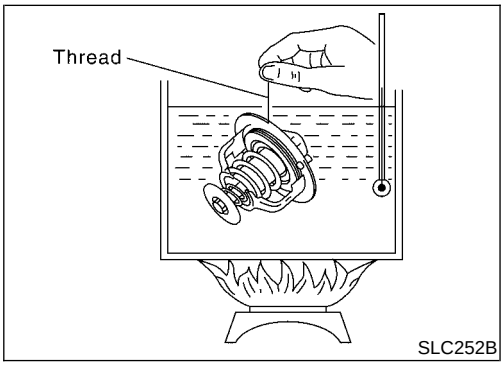
1. Water outlet housing
2. Water control valve
3. Water outlet
4. Water hose
5. Cylinder block water outlet
6. Thermal transmitter
7. Engine coolant temperature sensor

1. Release fuel pressure.
   Refer to EC-39, "Fuel Pressure Release".
2. Remove undercover.
3. Remove suspension member stay.
4. Drain coolant from radiator.
5. Remove engine cover.
6. Remove air duct with air cleaner assembly.
7. Disconnect wires, hoses, harness and so on.
8. Remove upper intake manifold corrector.
9. Remove intake manifold corrector support bolts.
10. Remove lower intake manifold corrector.
11. Disconnect injector harness connectors.
12. Remove injector tube.
13. Remove intake manifold.
14. Remove water outlet housing and water control valve.



15. Install water control valve and water outlet housing.
a. Install gum ring to thermostat.
b. Point the arrow on the upper surface of the valve to the front of the engine, and also be sure to install the protrusions and the valve stopper so that they are aligned in a straight line.
16. Reinstall any removed parts in reverse order of removal.

- **When installing intake manifold, injector tube and intake manifold collectors, refer to EM-12, "TIGHTENING PROCEDURES".**
- **After installation, run engine for a few minutes, and check for leaks.**
- **Be careful not to spill coolant over engine compartment. Use a rag to absorb coolant.**



INSPECTION

NALC0033

1. Check valve seating condition at ordinary room temperatures. It should seat tightly.
2. Check valve opening temperature and maximum valve lift.

	Standard
Valve opening temperature	95°C (203°F)
Valve lift	More than 8.0 mm/108°C (0.315 in/226°F)

3. Then check if valve closes at 5°C (9°F) below valve opening temperature.

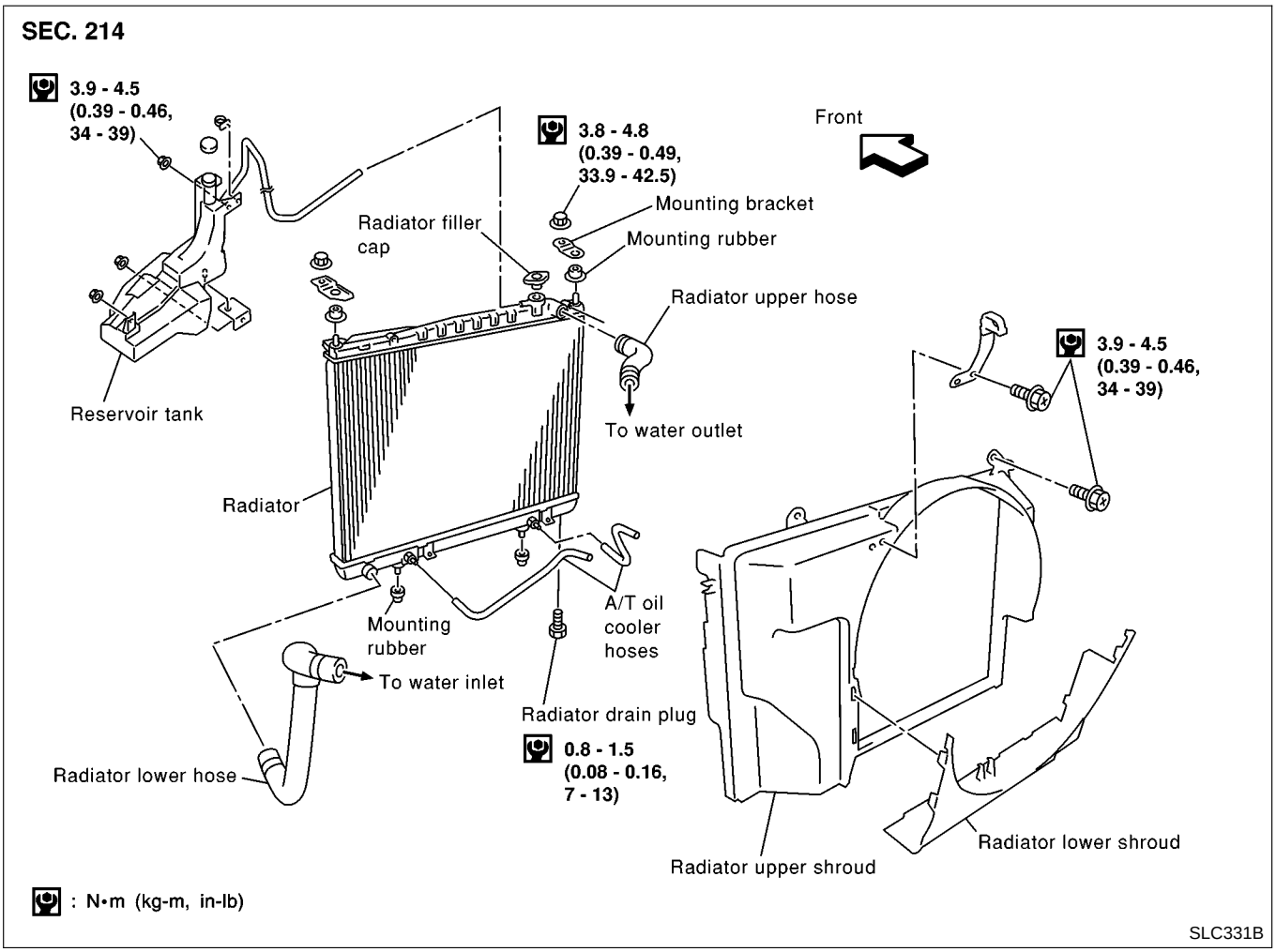
Radiator

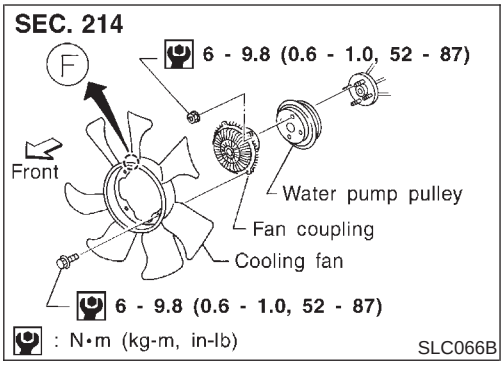
REMOVAL AND INSTALLATION

=NALC0023

1. Remove undercover.
2. Remove suspension member stay.
3. Drain coolant from radiator.
4. Disconnect radiator upper and lower hoses.
5. Remove upper and lower radiator shroud.
6. Remove A/T oil cooler hoses. (A/T)
7. Disconnect reservoir tank hose.
8. Remove radiator mounting bracket.
9. Remove radiator.
10. After repairing or replacing radiator, install any part removed in reverse order of removal.

When filling radiator with coolant, refer to MA-15, “Changing Engine Coolant”.



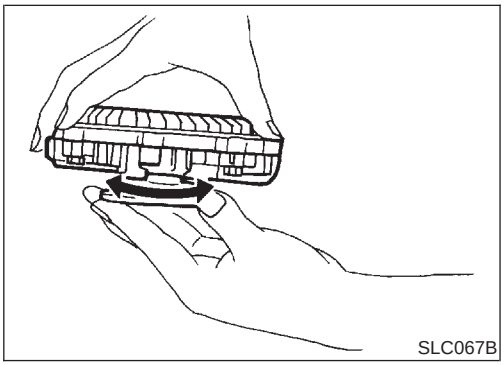


Cooling Fan (Crankshaft driven)

REMOVAL AND INSTALLATION

=NALC0038

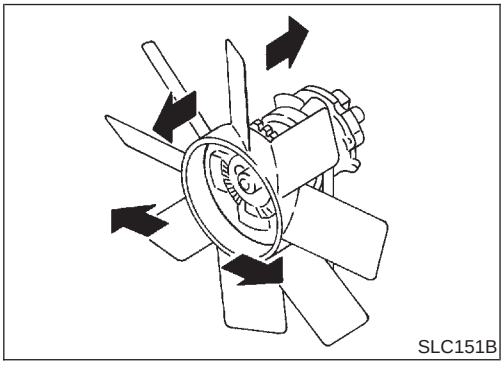
- Do not release the drive belt tension by removing the fan/water pump pulley.
- Fan coupling cannot be disassembled and should be replaced as a unit. If front mark **F** is present, install fan so that side marked **F** faces the front.
- Install the drive belt only after the fan and fan coupling to water pump flange bolts/nuts have been properly torqued.
- Proper alignment of these components is essential. Improper alignment will cause them to wobble and may eventually cause the fan to separate from the water pump causing extensive damage.



INSPECTION

NALC0039

Check fan coupling for rough operation, wobbling, oil leakage or bent bimetal.



After assembly, verify the fan does not wobble or flap while the engine is running.

WARNING:

- **When the engine is running, keep hands and clothing away from moving parts such as drive belts and fan.**

Refilling Engine Coolant

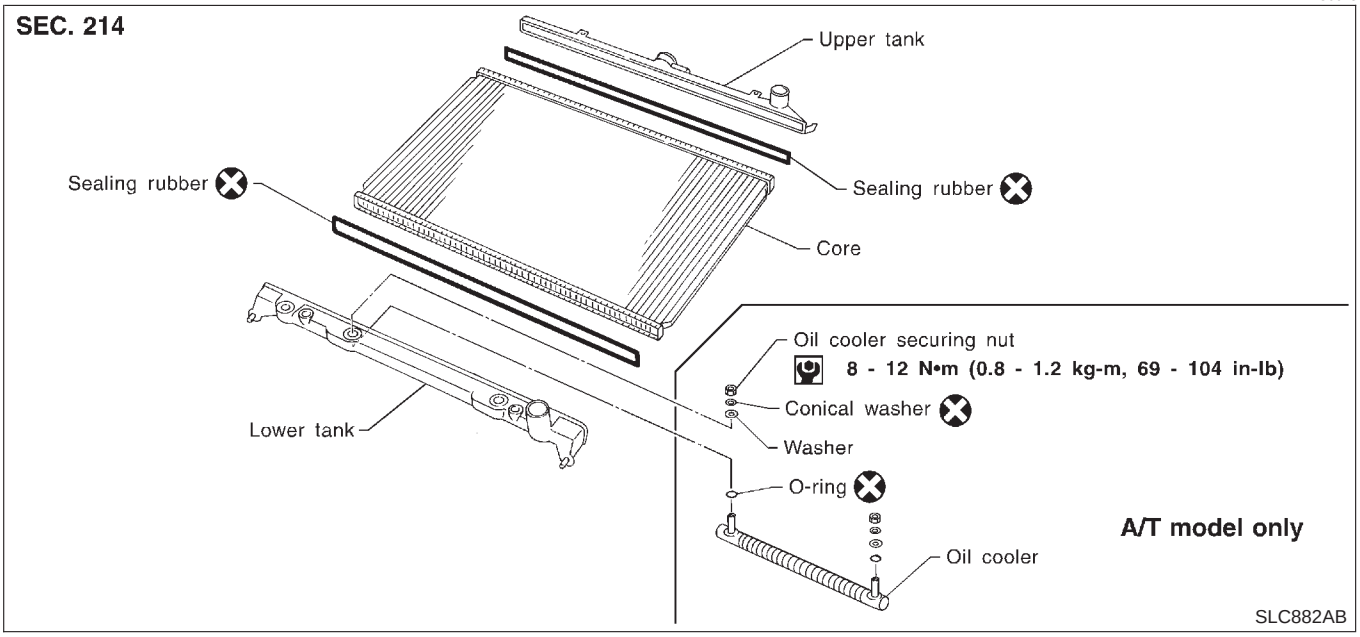
NALC0034

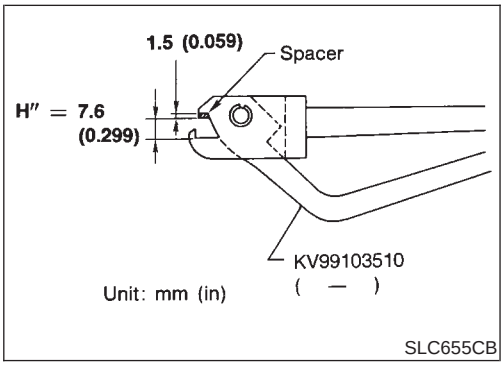
For details on refilling engine coolant, refer to MA-16, “REFILLING ENGINE COOLANT”.

Radiator (Aluminum type)

PREPARATION

NALC0025



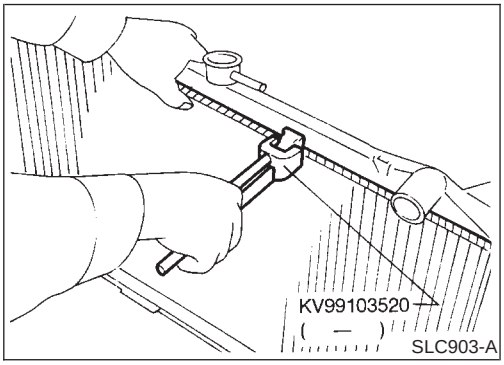


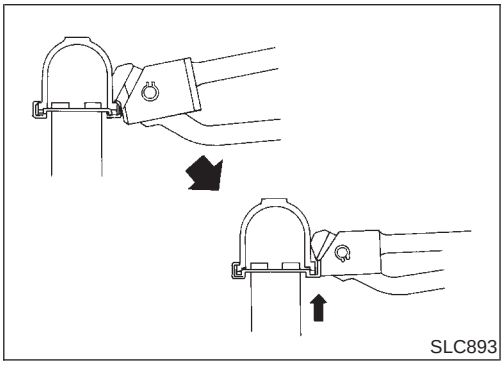
1. Attach the spacer to the tip of the radiator plate pliers A. Spacer specification: 1.5 mm (0.059 in) thick x 18 mm (0.71 in) wide x 8.5 mm (0.335 in) long.
2. Make sure that when radiator plate pliers A are closed dimension H″ is approx. 7.6 mm (0.299 in).
3. Adjust dimension H″ with the spacer, if necessary.

DISASSEMBLY

NALC0026

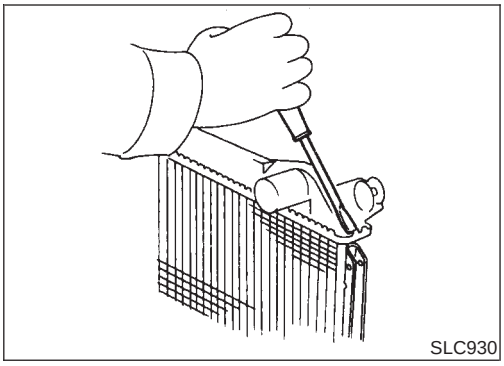
1. Remove tank with Tool.





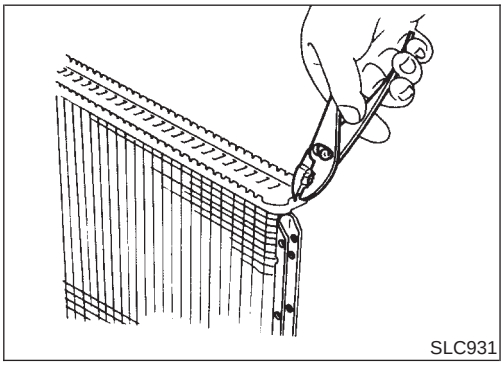
- Grip the crimped edge and bend it upwards so that Tool slips off.

Do not bend excessively.


SLC930

- In areas where Tool cannot be used, use a screwdriver to bend the edge up.

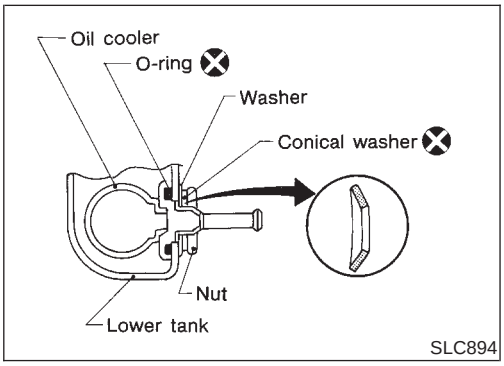
Be careful not to damage tank.


SLC931

2. Make sure the edge stands straight up.
3. Remove oil cooler from tank.

ASSEMBLY

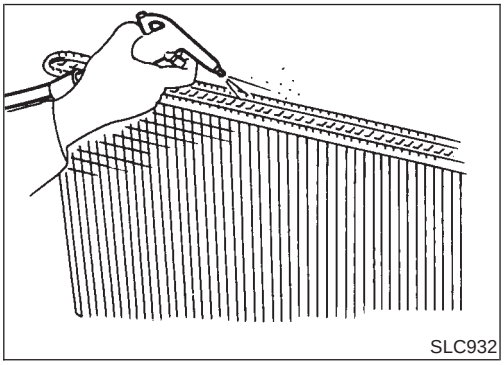
NALC0027



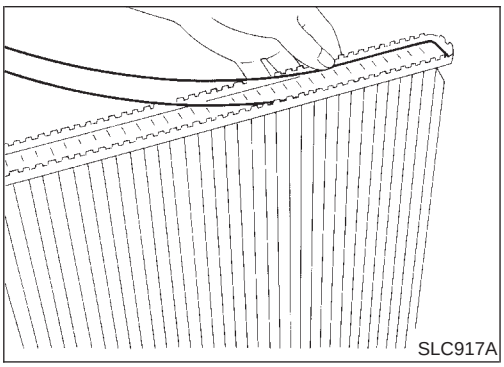
SLC894

1. Install oil cooler.

Pay attention to direction of conical washer.

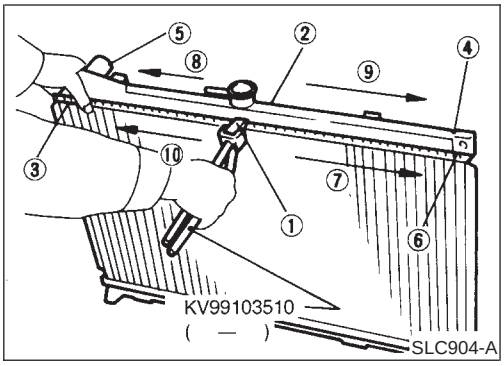

SLC932

2. Clean contact portion of tank.

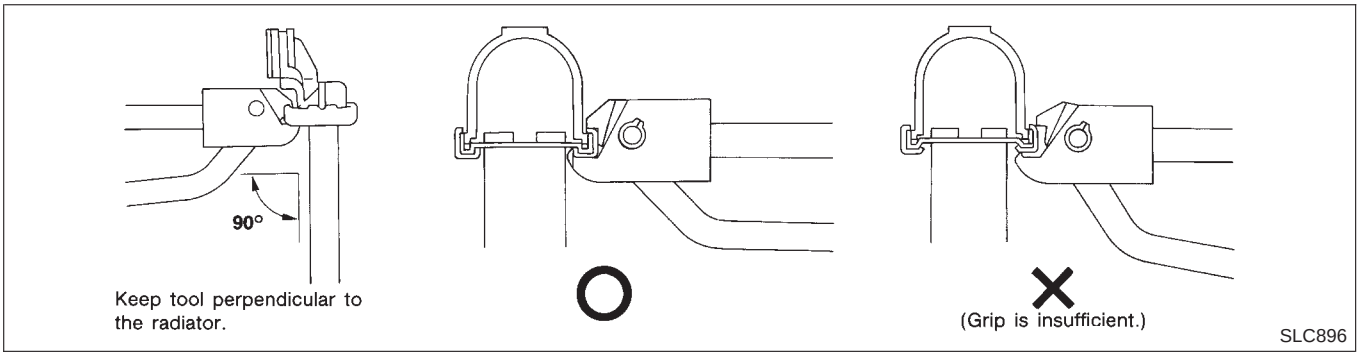

SLC917A

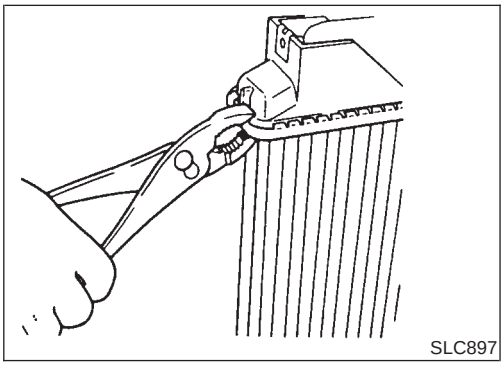
3. Install sealing rubber.

Push it in with fingers.
Be careful not to twist sealing rubber.

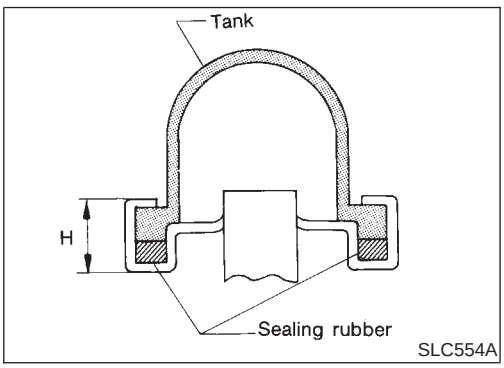


4. Caulk tank in specified sequence with Tool.



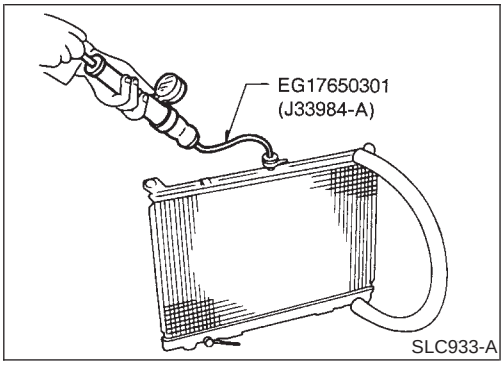


- Use pliers in the locations where Tool cannot be used.



5. Make sure that the rim is completely crimped down.
   Standard height "H":
   8.0 - 8.4 mm (0.315 - 0.331 in)
6. Confirm that there is no leakage.

Refer to Inspection.



INSPECTION

NALC0028

Apply pressure with Tool.

Specified pressure value:
157 kPa (1.6 kg/cm^2, 23 psi)

WARNING:
To prevent the risk of the hose coming undone while under pressure, securely fasten it down with a hose clamp. Attach a hose to the oil cooler as well.

Overheating Cause Analysis

NALC0029

	Symptom		Check items	
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—
		Thermostat stuck closed	—	
		Damaged fins	Dust contamination or paper clogging	
			Mechanical damage	
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)	
	Reduced air flow	Cooling fan does not operate	—	—
		High resistance to fan rotation		
		Damaged fan blades		
	Damaged radiator shroud	—	—	—
	Improper coolant mixture ratio	—	—	—
	Poor coolant quality	—	—	—
	Insufficient coolant	Coolant leaks	Cooling hose	Loose clamp
				Cracked hose
			Water pump	Poor sealing
			Radiator cap	Loose
				Poor sealing
			Radiator	O-ring for damage, deterioration or improper fitting
				Cracked radiator tank
				Cracked radiator core
			Reservoir tank	Cracked reservoir tank
		Overflowing reservoir tank	Exhaust gas leaks into cooling system	Cylinder head deterioration
				Cylinder head gasket deterioration

Overheating Cause Analysis (Cont'd)

	Symptom		Check items	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load
				Driving in low gear for extended time
				Driving at extremely high speed
			Powertrain system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes	
			Improper ignition timing	
	Blocked or restricted air flow	Blocked bumper	—	—
		Blocked radiator grille	Installed car brassiere	
			Mud contamination or paper clogging	
		Blocked radiator	—	
		Blocked condenser	—	
		Installed large fog lamp		

Service Data and Specifications (SDS)

THERMOSTAT

NALC0030

Valve opening temperature	76.5°C (170°F)
Valve lift	More than 8.6 mm/90°C (0.339 in/194°F)

WATER CONTROL VALVE

NALC0035

Valve opening temperature	95°C (203°F)
Valve lift	More than 8.0 mm/108°C (0.315 in/226°F)

RADIATOR

NALC0031

Unit: kPa (kg/cm^2, psi)

Cap relief pressure	Standard	78 - 98 (0.8 - 1.0, 11 - 14)
	Limit	59 - 98 (0.6 - 1.0, 9 - 14)
Leakage test pressure		157 (1.6, 23)

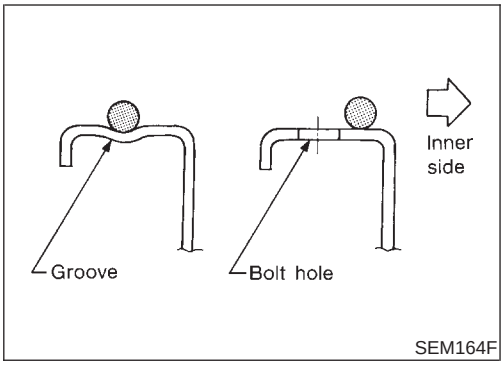
ENGINE LUBRICATION & COOLING SYSTEMS

SECTION LC

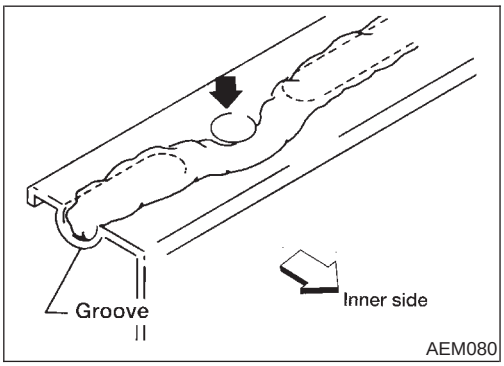
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SEM164F



AEM080

Precautions

LIQUID GASKET APPLICATION PROCEDURE

NALC0001

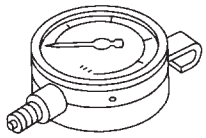
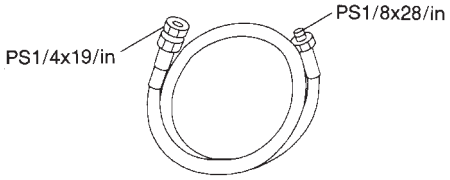
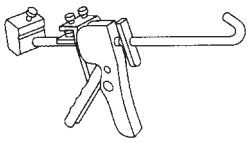
1. Use a scraper to remove all traces of old liquid gasket from mating surfaces and grooves. Also, completely clean any oil from these areas.
2. Apply a continuous bead of liquid gasket to mating surfaces. **(Use Genuine RTV silicone sealant Part No. 999MP-A7007 or equivalent.)**
   - For oil pan, be sure liquid gasket diameter is 4.0 to 5.0 mm (0.157 to 0.197 in).
   - For areas except oil pan, be sure liquid gasket diameter is 2.0 to 3.0 mm (0.079 to 0.118 in).
3. Apply liquid gasket around the inner side of bolt holes (unless otherwise specified).
4. Assembly should be done within 5 minutes after coating.
5. Wait at least 30 minutes before refilling engine oil and engine coolant.

Preparation

SPECIAL SERVICE TOOLS

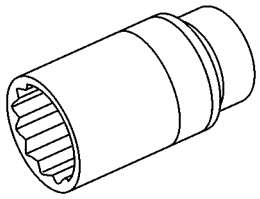
NALC0002

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
ST25051001 (J25695-1) Oil pressure gauge	 NT050	
ST25052000 (J25695-2) Hose	 NT559	Adapting oil pressure gauge to upper oil pan
WS39930000 (—) Tube pressure	 NT052	Pressing the tube of liquid gasket

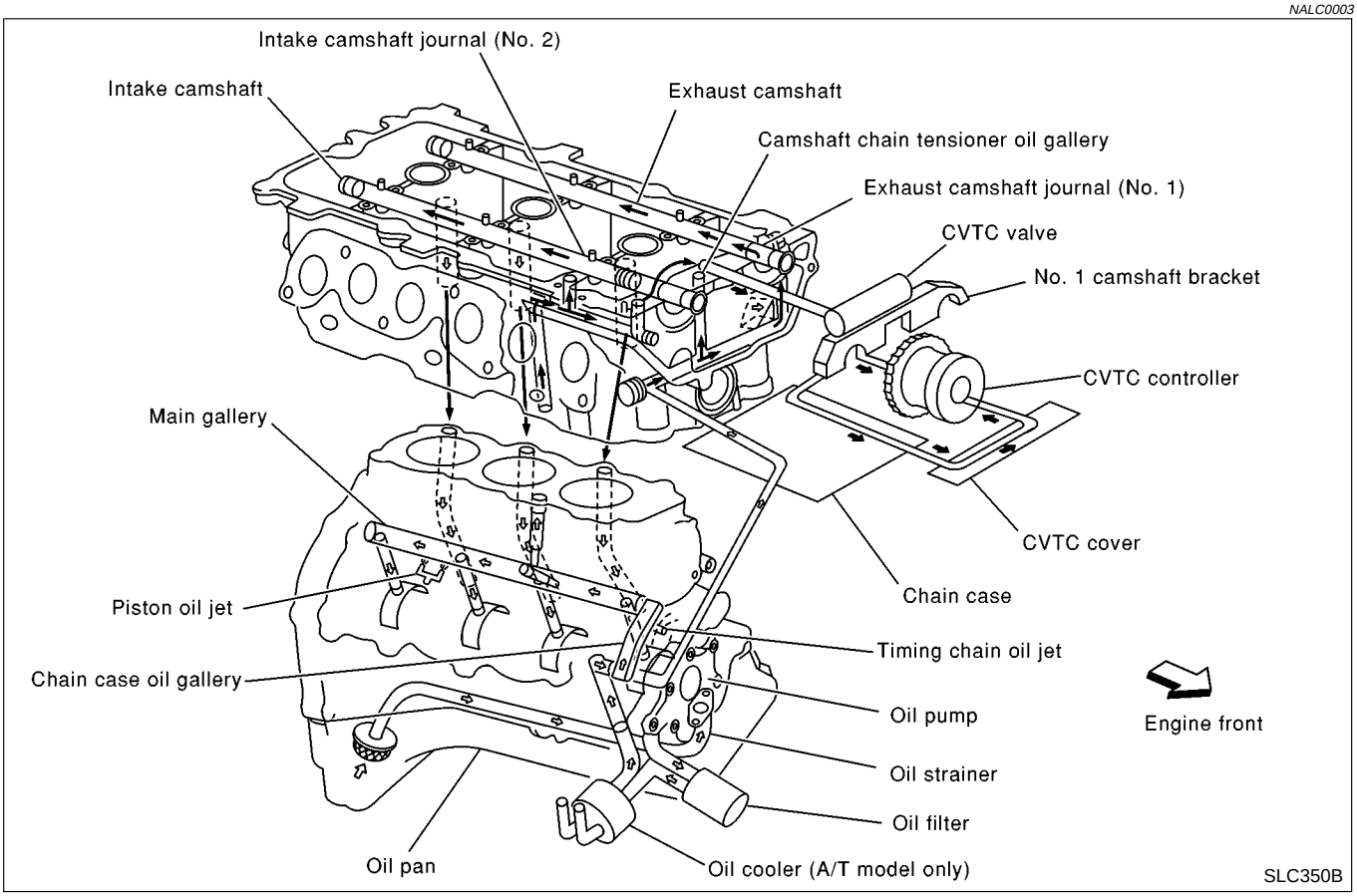
COMMERCIAL SERVICE TOOL

NALC0040

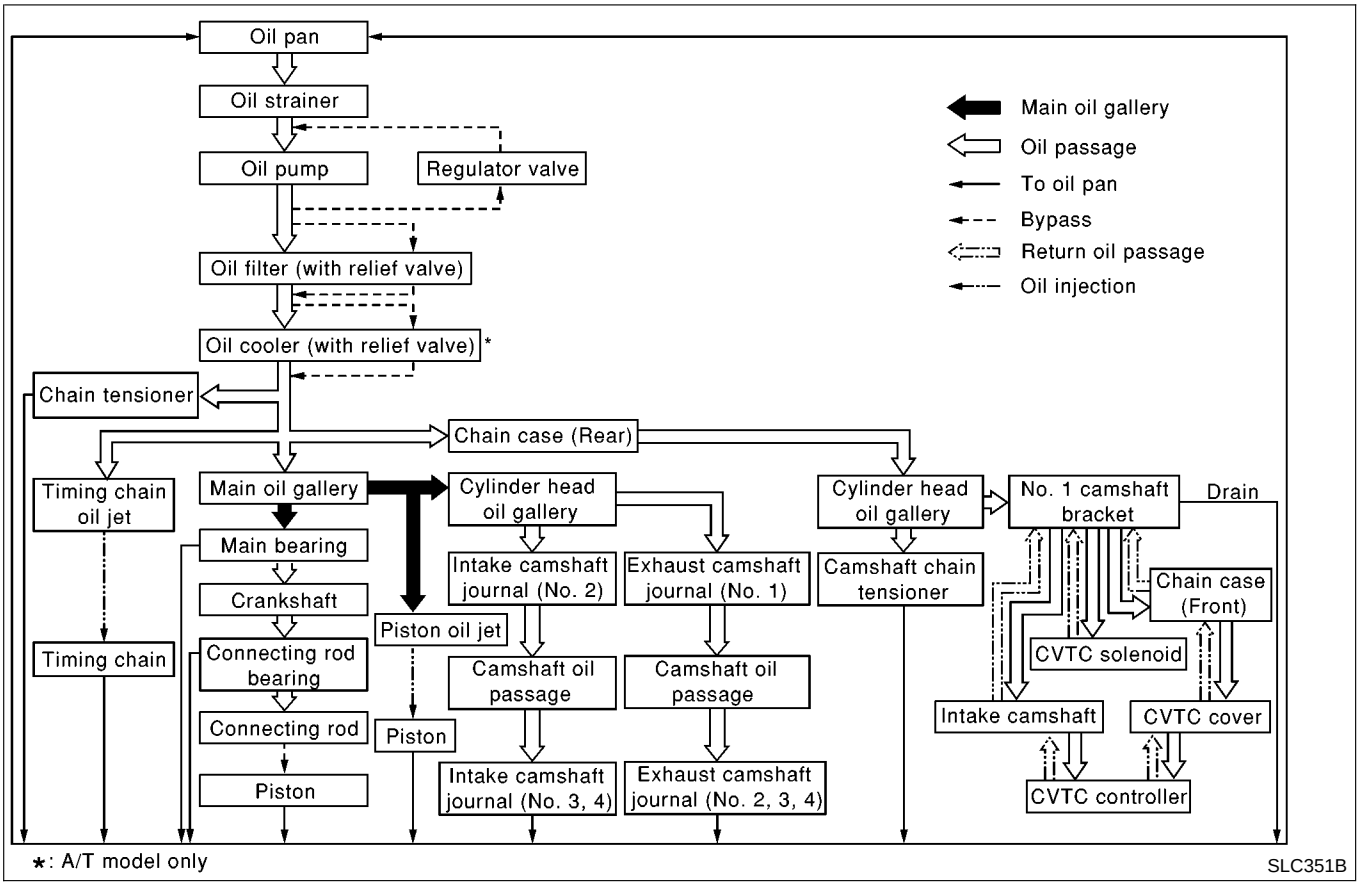
Tool name	Description
Deep socket	 NT818 Removing and installing oil pressure switch Deep socket 26 mm, 3/8 drive

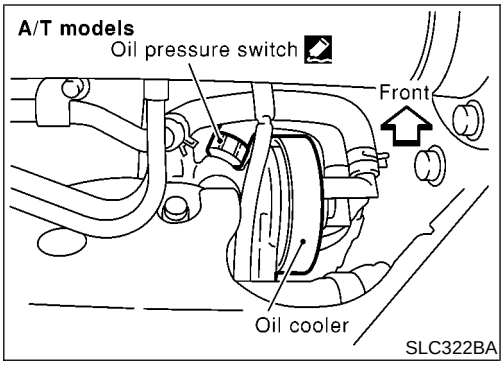
Lubrication Circuit

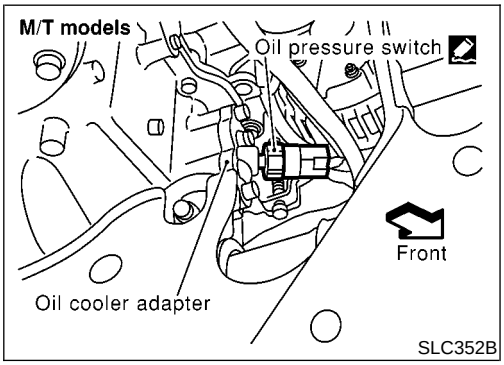
NALC0003

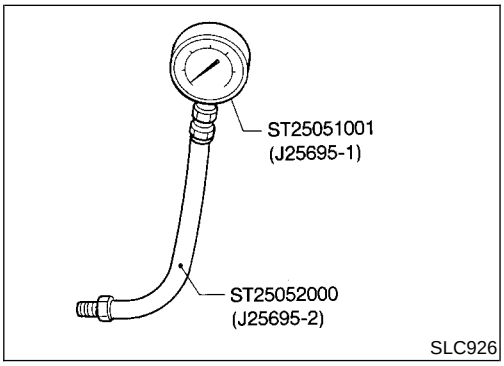


Lubrication Circuit (Cont'd)









Oil Pressure Check

NALC0004

WARNING:

- **Be careful not to burn yourself, as the engine and oil may be hot.**
- **Oil pressure check should be done in "Parking position".**

1. Check oil level.
2. Disconnect oil pressure switch harness connector.
3. Remove oil pressure switch using a deep socket. (Commercial service tool)
4. Install pressure gauge.
5. Start engine and warm it up to normal operating temperature.
6. Check oil pressure with engine running under no-load.

Engine speed rpm	Approximate discharge pressure kPa (kg/cm^2, psi)
Idle speed 2,000	More than 98 (1.0, 14) 294 (3.0, 43)

If difference is extreme, check oil passage and oil pump for oil leaks.

7. After the inspections, install the oil pressure switch as follows.

a. Remove the old sealant adhering to switch and engine.

b. Apply Genuine RTV silicone sealant Part No. 999MP-A7007 or equivalent to the thread and tighten.

13 - 17 N·m (1.25 - 1.75 kg-m, 9 - 12 ft-lb)

Oil Pump

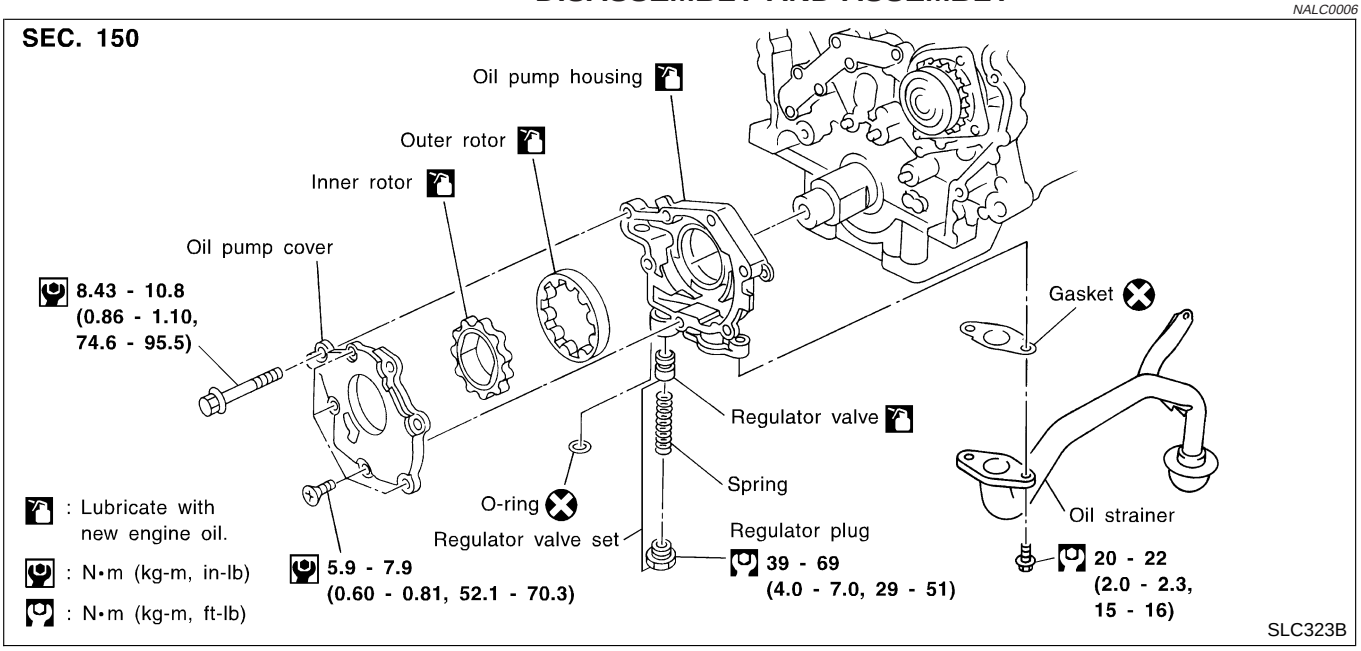
REMOVAL AND INSTALLATION

=NALC0005

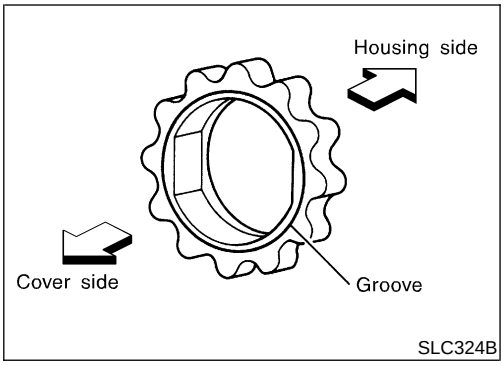
1. Remove timing chain. Refer to EM-23, “Removal”.
2. Remove oil pump assembly.
- Inspect the oil pump after removing it.
3. Reinstall any parts removed in reverse order of removal.

DISASSEMBLY AND ASSEMBLY

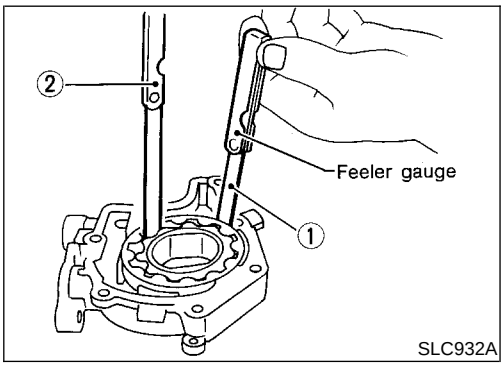
NALC0006



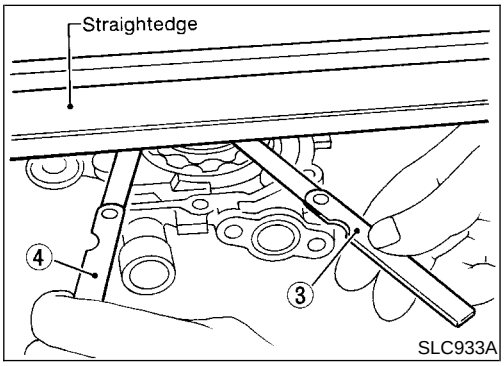
- **When installing oil pump, apply engine oil to rotors.**



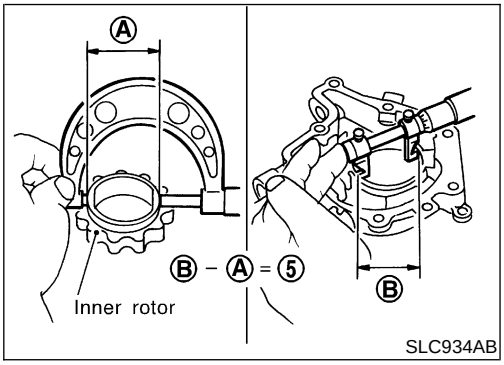
SLC324B



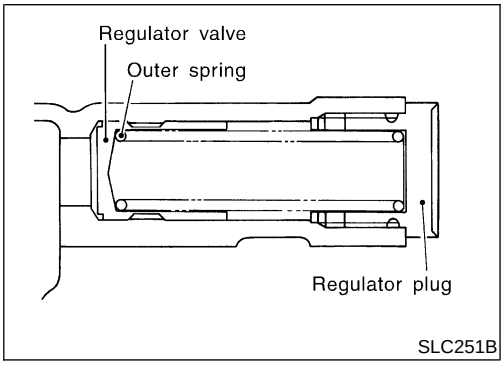
SLC932A



SLC933A



SLC934AB



SLC251B

OIL PUMP INSPECTION

NALC0007

- **Install oil pump with the groove of the inner rotor facing the oil pump cover.**

Using a feeler gauge, straightedge and micrometers, check the following clearances:

Unit: mm (in)

Body to outer rotor radial clearance 1	0.114 - 0.200 (0.0045 - 0.0079)
Inner rotor to outer gear tip clearance 2	Below 0.18 (0.0071)
Body to inner rotor axial clearance 3	0.030 - 0.070 (0.0012 - 0.0028)
Body to outer rotor axial clearance 4	0.050 - 0.110 (0.0020 - 0.0043)
Inner rotor to brazed portion of housing clearance 5	0.045 - 0.091 (0.0018 - 0.0036)

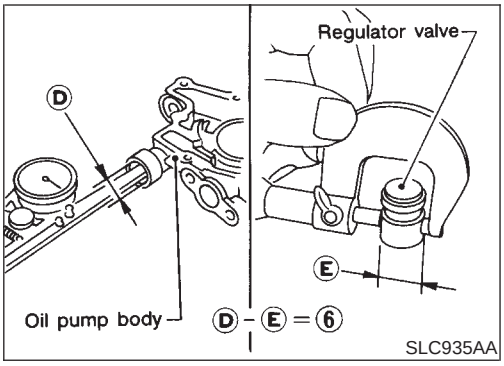
- **If the tip clearance (2) exceeds the limit, replace rotor set.**
- **If body to rotor clearances (1, 3, 4, 5) exceed the limit, replace oil pump body assembly.**

REGULATOR VALVE INSPECTION

NALC0008

1. Visually inspect components for wear and damage.
2. Check oil pressure regulator valve sliding surface and valve spring.
3. Coat regulator valve with engine oil. Check that it falls smoothly into the valve hole by its own weight.

If damaged, replace regulator valve set or oil pump body.

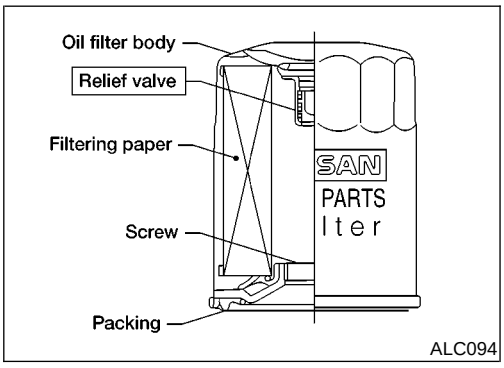


4. Check regulator valve to oil pump body clearance.

Clearance:

6 : 0.040 - 0.097 mm (0.0016 - 0.0038 in)

If it exceeds the limit, replace oil pump body.



OIL FILTER

NALC0009

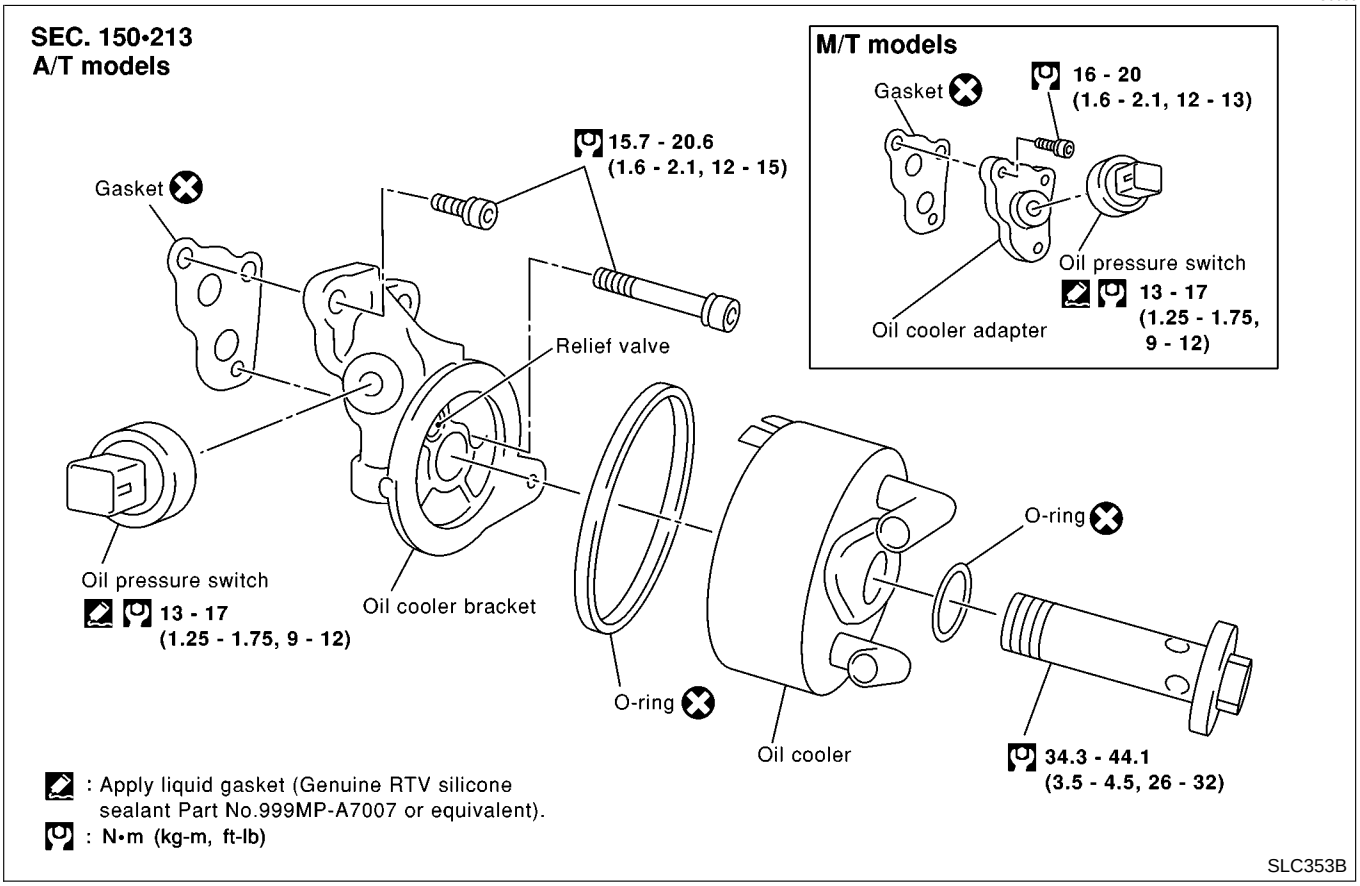
The oil filter is a small, full-flow cartridge type and is provided with a relief valve.

- **Use Tool specified in MA-19 for changing oil filter.**

Oil Cooler

REMOVAL AND INSTALLATION

NALC0036

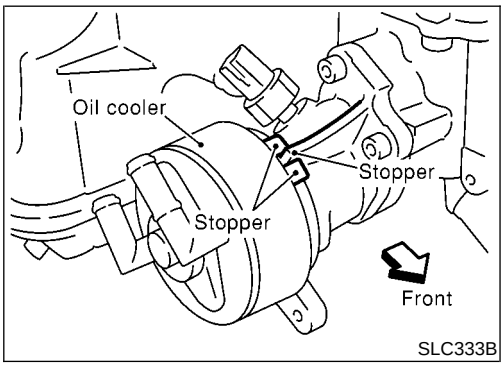


1. Drain engine oil and coolant.

- **Do not spill coolant on the drive belt.**

2. Remove oil cooler.

- Inspect the oil cooler after removing it.



3. Installation is in reverse order of removal.

- **When installing the oil cooler, align the oil cooler stopper with the stopper of the oil cooler bracket.**

INSPECTION

NALC0037

Oil Cooler

NALC0037S01

1. Check oil cooler for cracks.
2. Check oil cooler for clogging by blowing through coolant inlet. If necessary, replace oil cooler assembly.

Oil Pressure Relief Valve

NALC0037S02

Inspect oil pressure relief valve for movement, cracks and breaks by pushing the ball. If replacement is necessary, remove valve by prying it out with a suitable tool. Install a new valve in place by tapping it.

Service Data and Specifications (SDS)

OIL PRESSURE

NALC0010

Engine speed rpm	Approximate discharge pressure kPa (kg/cm^2, psi)
Idle speed 2,000	More than 98 (1.0, 14) 294 (3.0, 43)

REGULATOR VALVE

NALC0011

Unit: mm (in)

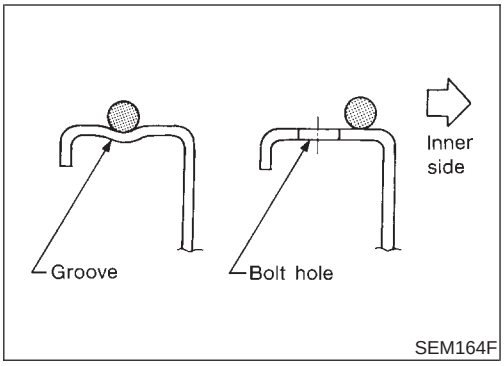
Regulator valve to oil pump cover clearance	0.040 - 0.097 (0.0016 - 0.0038)

OIL PUMP

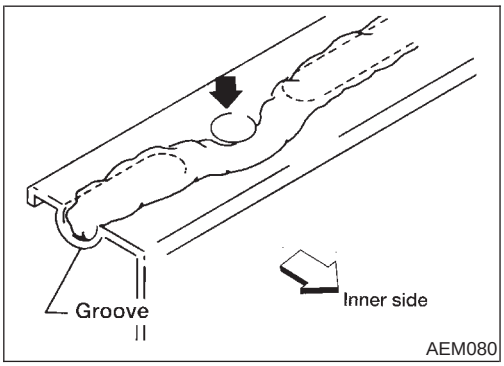
NALC0012

Unit: mm (in)

Body to outer rotor radial clearance	0.114 - 0.200 (0.0045 - 0.0079)
Inner rotor to outer rotor tip clearance	Below 0.18 (0.0071)
Body to inner rotor axial clearance	0.030 - 0.070 (0.0012 - 0.0028)
Body to outer rotor axial clearance	0.050 - 0.110 (0.0020 - 0.0043)
Inner rotor to brazed portion of housing clearance	0.045 - 0.091 (0.0018 - 0.0036)



SEM164F



AEM080

Precautions

LIQUID GASKET APPLICATION PROCEDURE

NALC0013

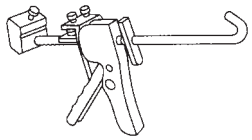
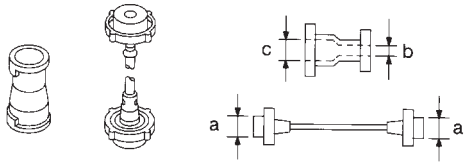
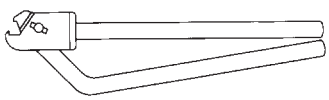
1. Use a scraper to remove all traces of old liquid gasket from mating surfaces and grooves. Also, completely clean any oil from these areas.
2. Apply a continuous bead of liquid gasket to mating surfaces. **(Use Genuine RTV silicone sealant Part No. 999MP-A7007 or equivalent.)**
   - For oil pan, be sure liquid gasket diameter is 4.0 to 5.0 mm (0.157 to 0.197 in).
   - For areas except oil pan, be sure liquid gasket diameter is 2.0 to 3.0 mm (0.079 to 0.118 in).
3. Apply liquid gasket around the inner side of bolt holes (unless otherwise specified).
4. Assembly should be done within 5 minutes after coating.
5. Wait at least 30 minutes before refilling engine oil and engine coolant.

Preparation

SPECIAL SERVICE TOOLS

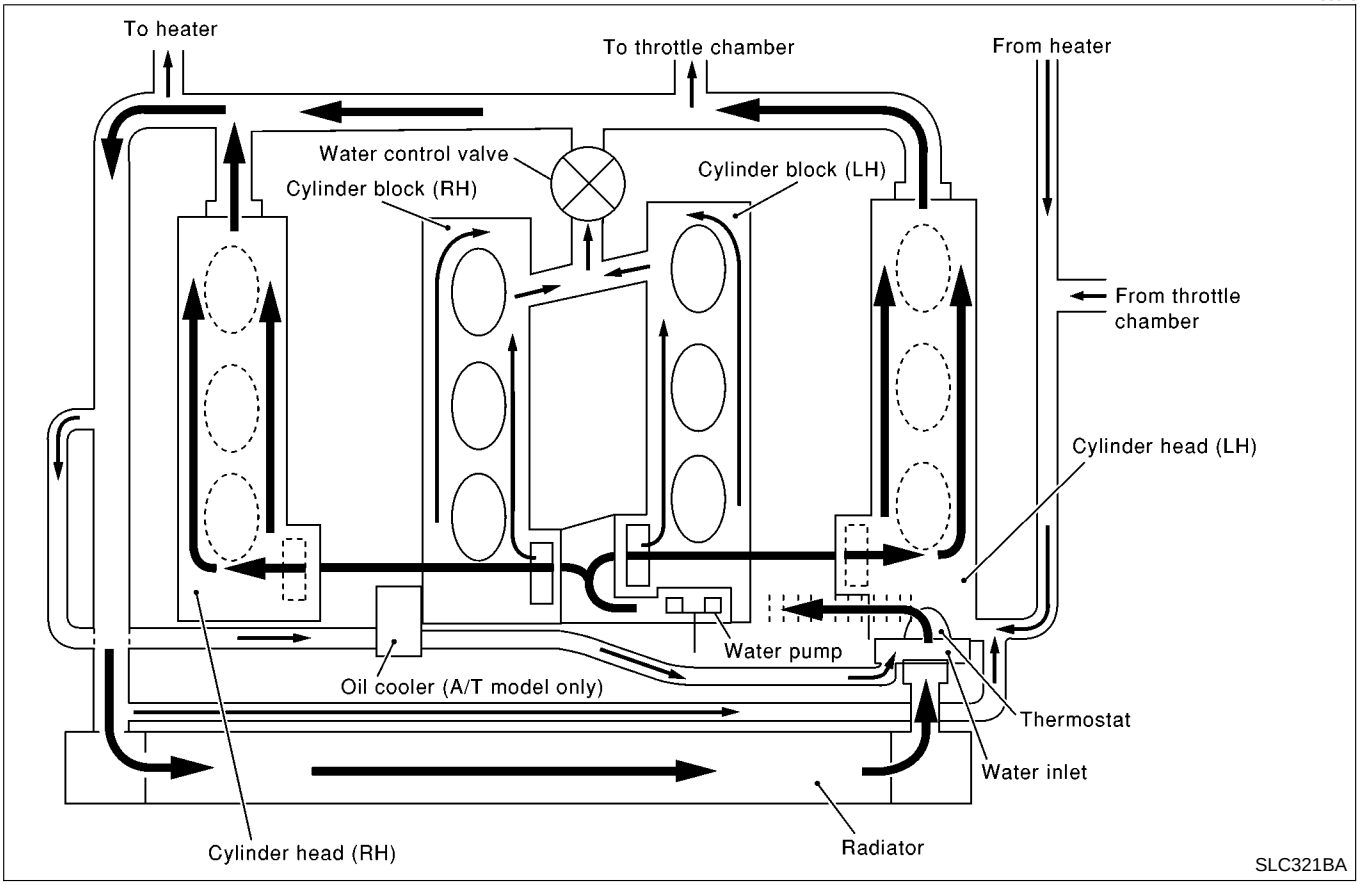
NALC0014

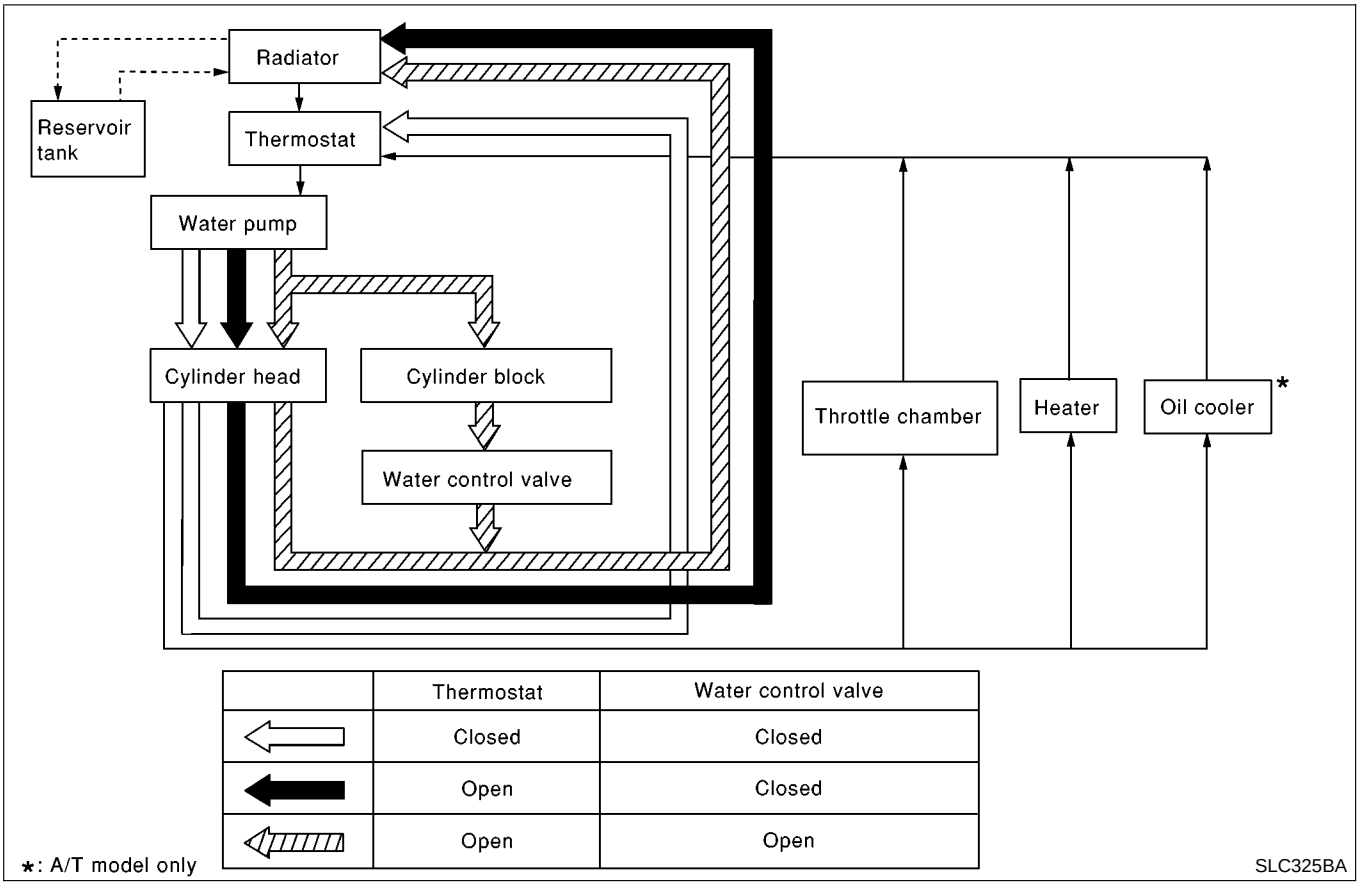
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
WS39930000 (—) Tube pressure	 NT052	Pressing the tube of liquid gasket
EG17650301 (J33984-A) Radiator cap tester adapter	 NT564	Adapting radiator cap tester to radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)
KV99103510 (—) Radiator plate pliers A	 NT224	Installing radiator upper and lower tanks
KV99103520 (—) Radiator plate pliers B	 NT225	Removing radiator upper and lower tanks

Cooling Circuit

NALC0015





	Thermostat	Water control valve
⇦	Closed	Closed
⬅	Open	Closed
⇦	Open	Open

*: A/T model only

System Check

NALC0016

WARNING:

Never remove the radiator cap when the engine is hot; serious burns could be caused by high pressure fluid escaping from the radiator.
Wrap a thick cloth around the cap and carefully remove it by turning it a quarter turn to allow built-up pressure to escape and then turn the cap all the way off.

CHECKING COOLING SYSTEM HOSES

NALC0016S01

Check hoses for improper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.

CHECKING RADIATOR

NALC0016S02

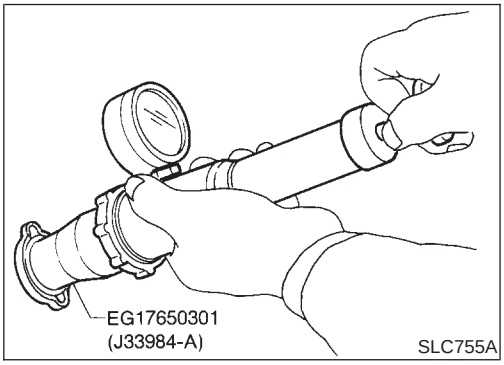
Check radiator for mud or clogging. If necessary, clean radiator as follows.

- Be careful not to bend or damage the radiator fins.
- When radiator is cleaned without removal, remove all surrounding parts such as cooling fan, radiator shroud and horns. Then tape the harness and connectors to prevent water from entering.

1. Apply water by hose to the back side of the radiator core vertically downward.
2. Apply water again to all radiator core surfaces once per minute.
3. Stop washing if any stains no longer flow out from the radiator.
4. Blow air into the back side of radiator core vertically downward.

- Use compressed air lower than 490 kPa (5 kg/cm^2, 71 psi) and keep distance more than 30 cm (11.8 in).

5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.

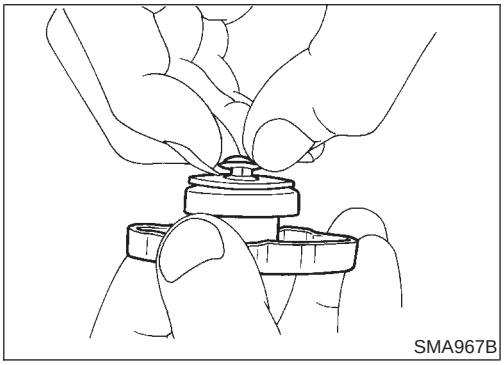


CHECKING RADIATOR CAP

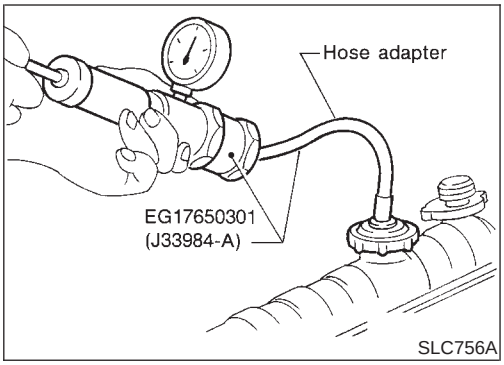
NALC0016S03

To check radiator cap, apply pressure to cap with a tester.

Radiator cap relief pressure:
Standard
78 - 98 kPa
(0.8 - 1.0 kg/cm^2, 11 - 14 psi)
Limit
59 - 98 kPa
(0.6 - 1.0 kg/cm^2, 9 - 14 psi)



Pull the negative pressure valve to open it.
Check that it closes completely when released.



CHECKING COOLING SYSTEM FOR LEAKS

NALC0016S04

To check for leakage, apply pressure to the cooling system with a tester.

Testing pressure:
157 kPa (1.6 kg/cm^2, 23 psi)

CAUTION:
Higher than the specified pressure may cause radiator damage.

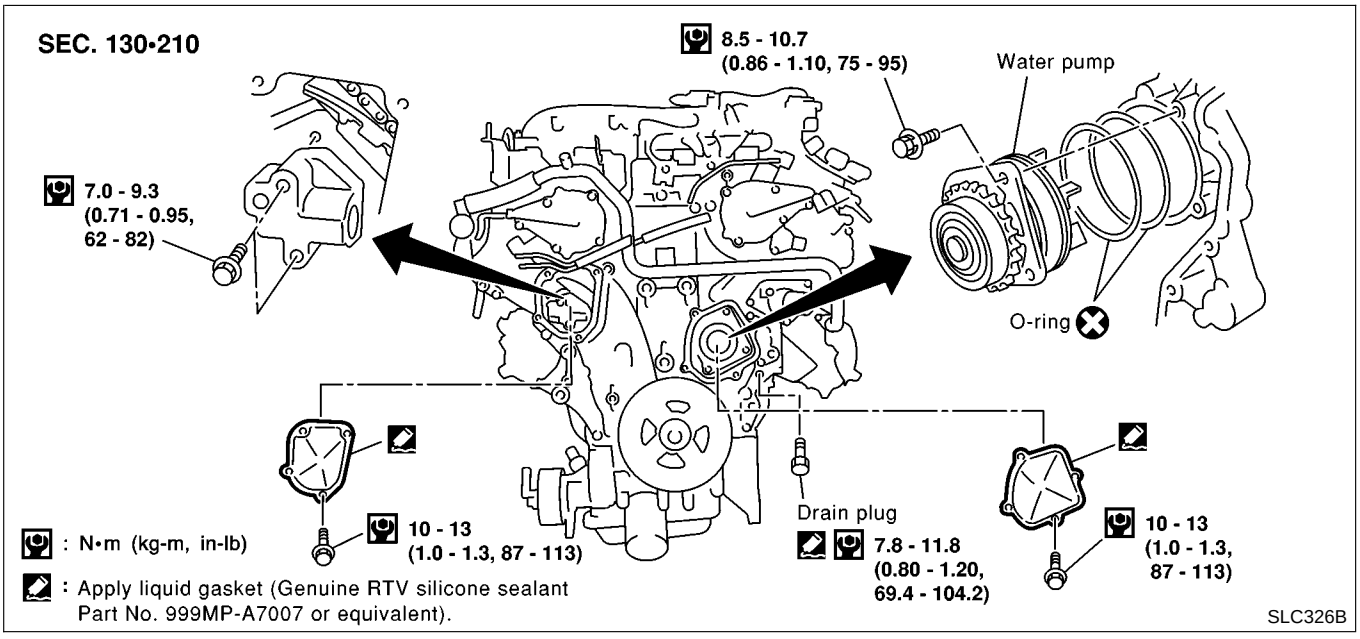
Water Pump

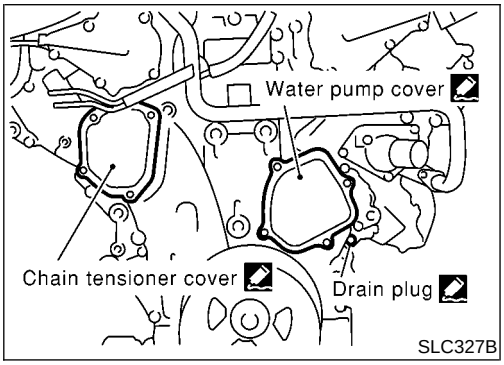
REMOVAL AND INSTALLATION

NALC0017

CAUTION:

- **When removing water pump assembly, be careful not to get coolant on drive belt.**
- **Water pump cannot be disassembled and should be replaced as a unit.**
- **After installing water pump, connect hose and clamp securely, then check for leaks using radiator cap tester.**

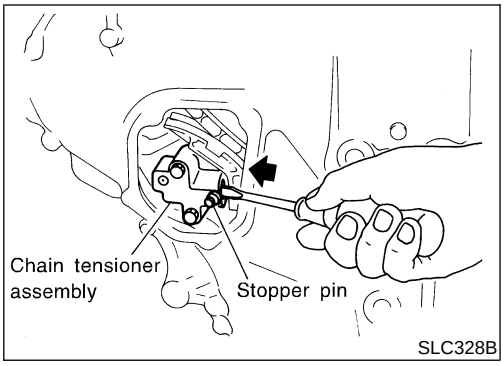




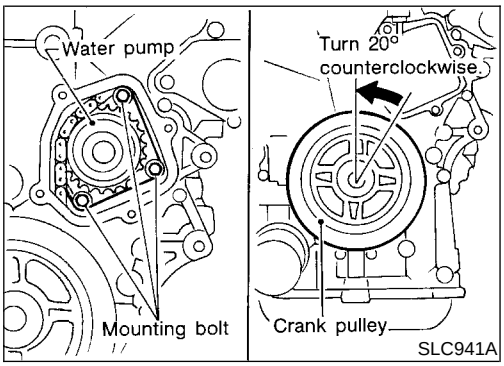
REMOVAL

NALC0018

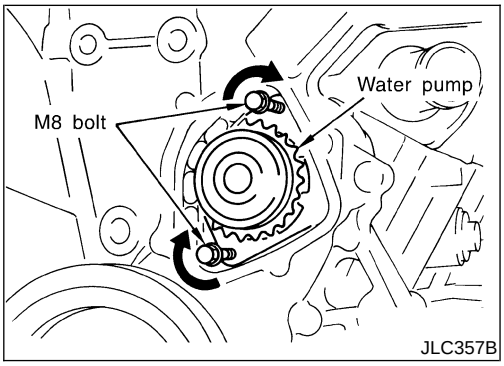
1. Remove undercover.
2. Remove suspension member stay.
3. Drain coolant from radiator.
4. Remove radiator shrouds.
5. Remove drive belts.
6. Remove cooling fan.
7. Remove water drain plug on water pump side of cylinder block.
8. Remove chain tensioner cover and water pump cover.



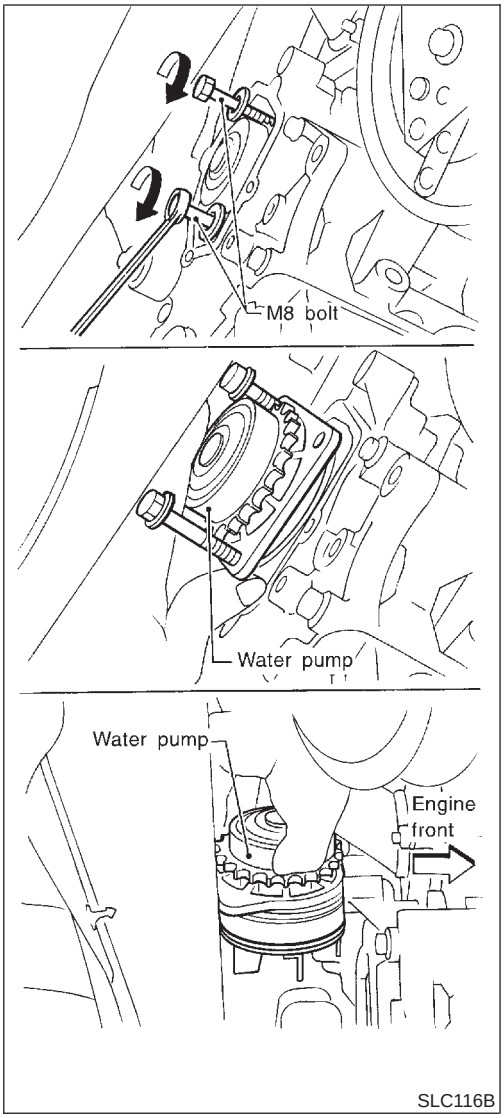
9. Pushing timing chain tensioner sleeve, apply a stopper pin so it does not return. Then remove the chain tensioner assembly.



10. Remove the 3 water pump fixing bolts. Secure a gap between water pump gear and timing chain, by turning crankshaft pulley 20° backwards.

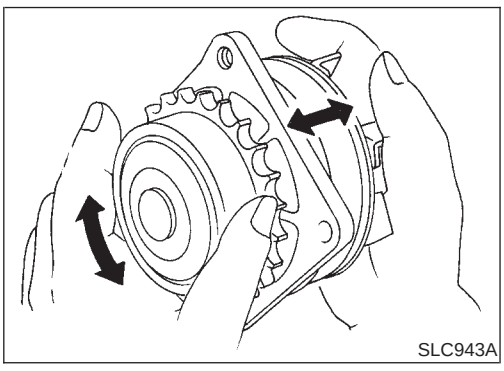


11. Put M8 bolts to two water pump fixing bolt holes.



12. Tighten M8 bolts by turning half turn alternately until they reach timing chain rear case.
- In order to prevent damages to water pump or timing chain rear case, do not tighten one bolt continuously. Always turn each bolt half turn each time.

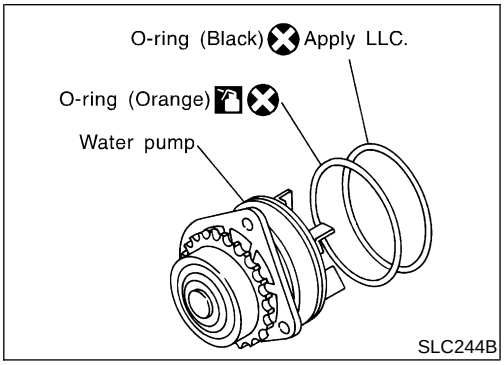
13. Lift up water pump and remove it.
- When lifting up water pump, do not allow water pump gear to hit timing chain.



INSPECTION

NALC0019

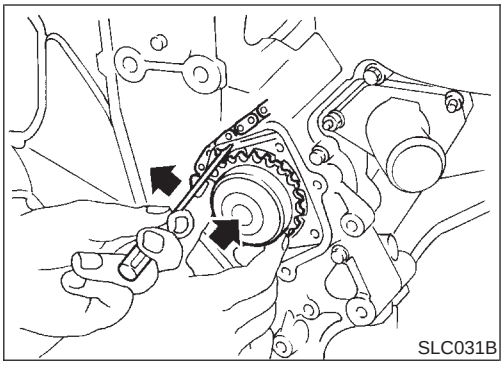
1. Check for badly rusted or corroded body assembly.
2. Check for rough operation due to excessive end play.



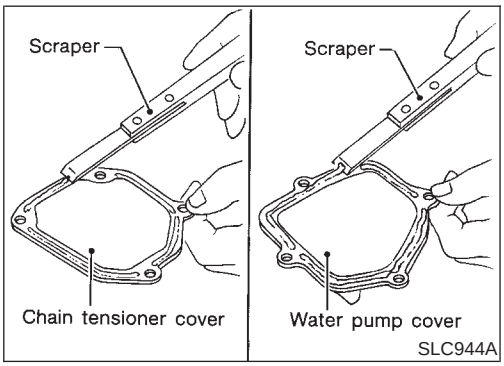
INSTALLATION

NALC0020

1. Apply engine oil and coolant to O-rings as shown in the figure.

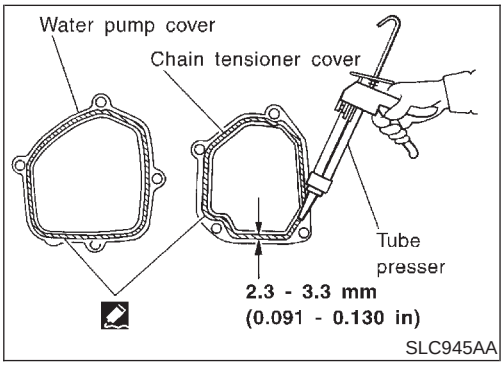

SLC031B

2. Install water pump.
- **Do not allow cylinder block to nip O-rings when installing water pump.**



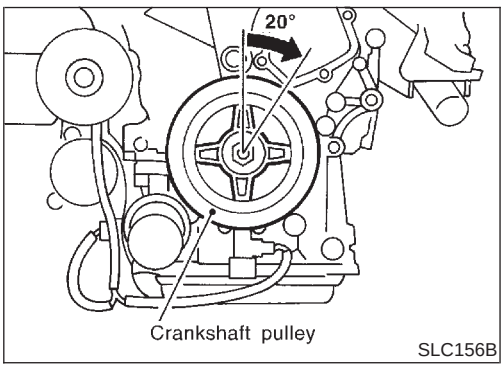
SLC944A

3. Before installing, remove all traces of liquid gasket from mating surface of water pump cover and chain tensioner cover using a scraper.
Also remove traces of liquid gasket from mating surface of front cover.



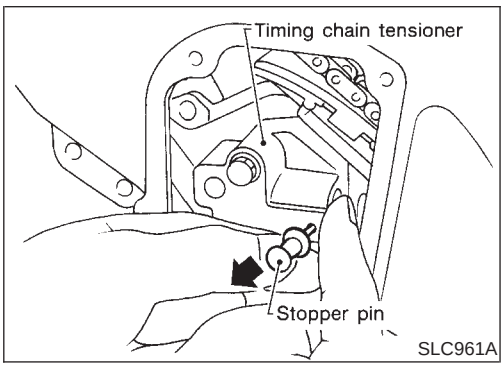
SLC945AA

4. Apply a continuous bead of liquid gasket to mating surface of chain tensioner cover and water pump cover.



SLC156B

5. Return the crankshaft pulley to its original position by turning it 20° forward.



SLC961A

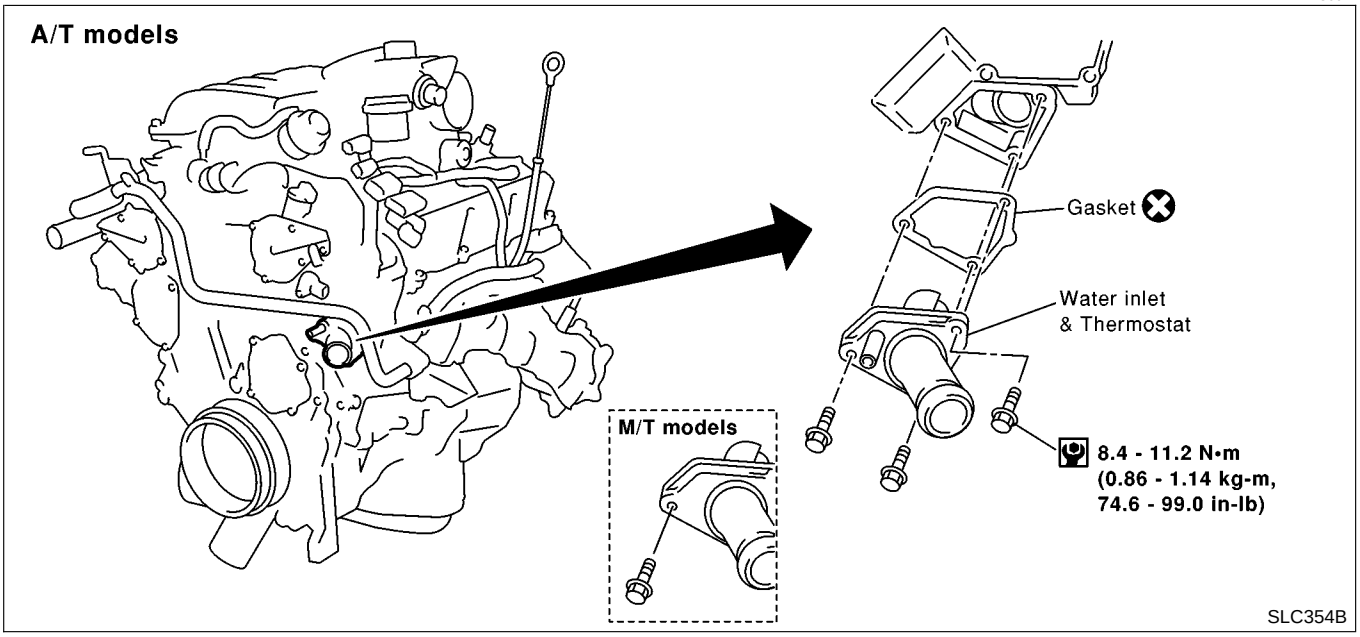
6. Install timing chain tensioner, then remove the stopper pin.
- **When installing the timing chain tensioner, engine oil should be applied to the oil hole and tensioner.**
- **After starting engine, let idle for three minutes, then rev engine up to 3,000 rpm under no load to purge air from the high-pressure chamber of the chain tensioners. The engine may produce a rattling noise. This indicates that air still remains in the chamber and is not a matter of concern.**

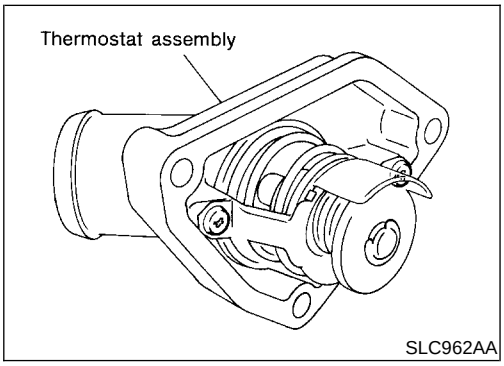
7. Reinstall any parts removed in reverse order of removal.

Thermostat

REMOVAL AND INSTALLATION

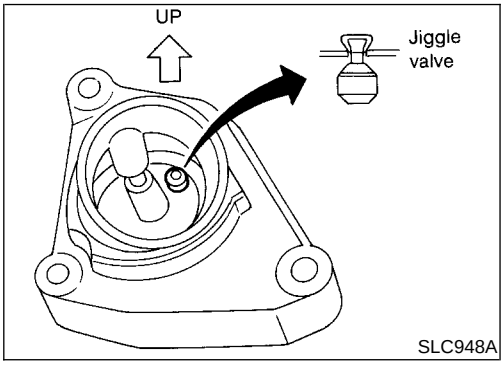
NALC0021





1. Remove undercover.
2. Remove suspension member stay.
3. Drain coolant from radiator.
4. Remove drive belts.
5. Remove water drain plug on water pump side of cylinder block.
6. Disconnect lower radiator hose.
7. Remove water inlet and thermostat assembly.

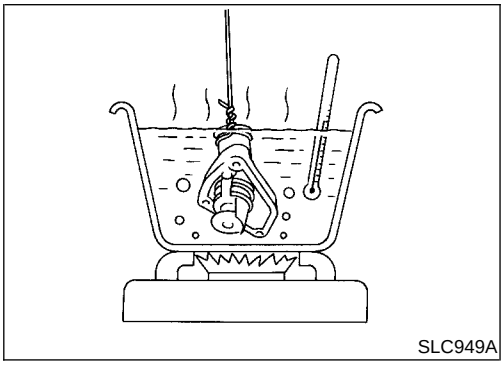
- **Do not disassemble water inlet and thermostat. Replace them as a unit, if necessary.**



8. Install thermostat with jiggle valve facing upward.

- **After installation, run engine for a few minutes, and check for leaks.**
- **Be careful not to spill coolant over engine compartment. Use a rag to absorb coolant.**

9. Reinstall any removed parts in reverse order of removal.



INSPECTION

NALC0022

1. Check valve seating condition at ordinary room temperatures. It should seat tightly.
2. Check valve opening temperature and maximum valve lift.

	Standard
Valve opening temperature	76.5°C (170°F)
Valve lift	More than 8.6 mm/90°C (0.339 in/194°F)

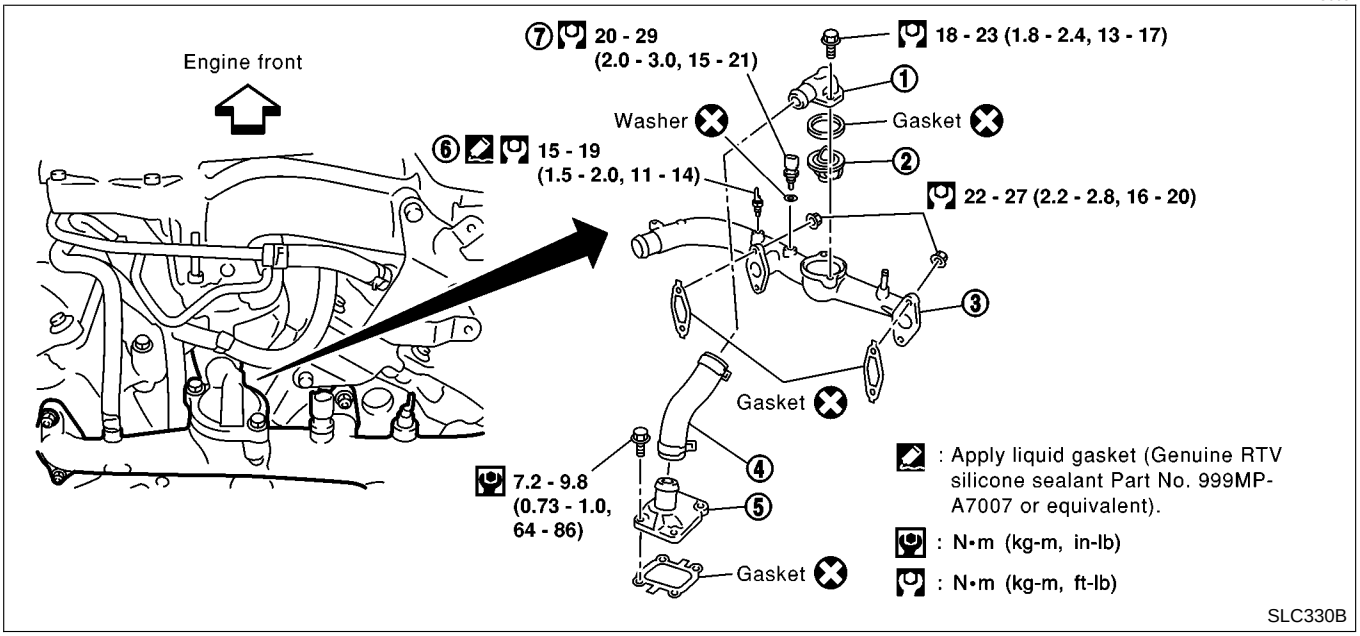
3. Then check if valve closes at 5°C (9°F) below valve opening

temperature.

Water Control Valve

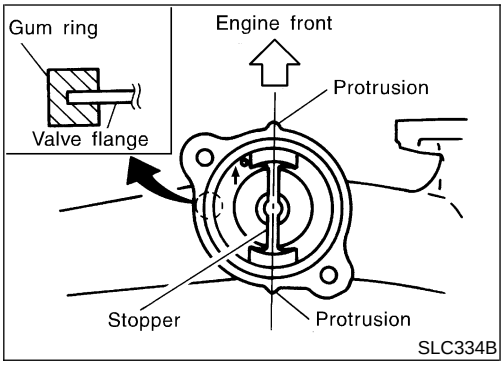
REMOVAL AND INSTALLATION

NALC0032



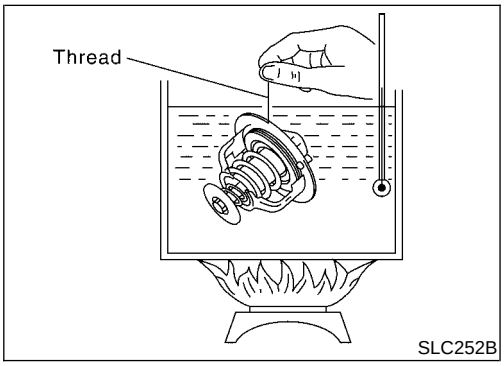
1. Water outlet housing
2. Water control valve
3. Water outlet
4. Water hose
5. Cylinder block water outlet
6. Thermal transmitter
7. Engine coolant temperature sensor

1. Release fuel pressure.
   Refer to EC-39, "Fuel Pressure Release".
2. Remove undercover.
3. Remove suspension member stay.
4. Drain coolant from radiator.
5. Remove engine cover.
6. Remove air duct with air cleaner assembly.
7. Disconnect wires, hoses, harness and so on.
8. Remove upper intake manifold corrector.
9. Remove intake manifold corrector support bolts.
10. Remove lower intake manifold corrector.
11. Disconnect injector harness connectors.
12. Remove injector tube.
13. Remove intake manifold.
14. Remove water outlet housing and water control valve.



15. Install water control valve and water outlet housing.
a. Install gum ring to thermostat.
b. Point the arrow on the upper surface of the valve to the front of the engine, and also be sure to install the protrusions and the valve stopper so that they are aligned in a straight line.
16. Reinstall any removed parts in reverse order of removal.

- **When installing intake manifold, injector tube and intake manifold collectors, refer to EM-12, "TIGHTENING PROCEDURES".**
- **After installation, run engine for a few minutes, and check for leaks.**
- **Be careful not to spill coolant over engine compartment. Use a rag to absorb coolant.**



INSPECTION

NALC0033

1. Check valve seating condition at ordinary room temperatures. It should seat tightly.
2. Check valve opening temperature and maximum valve lift.

	Standard
Valve opening temperature	95°C (203°F)
Valve lift	More than 8.0 mm/108°C (0.315 in/226°F)

3. Then check if valve closes at 5°C (9°F) below valve opening temperature.

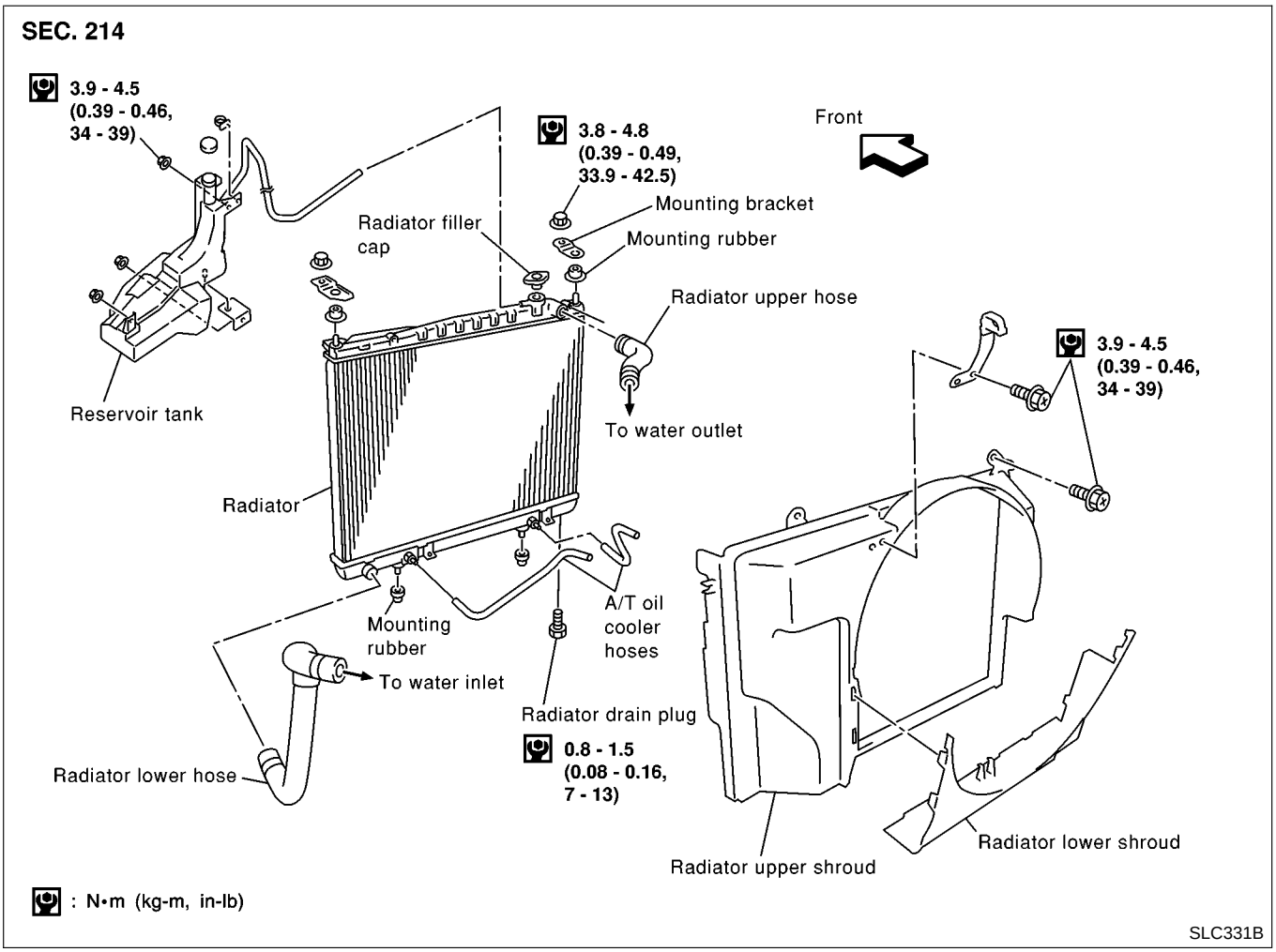
Radiator

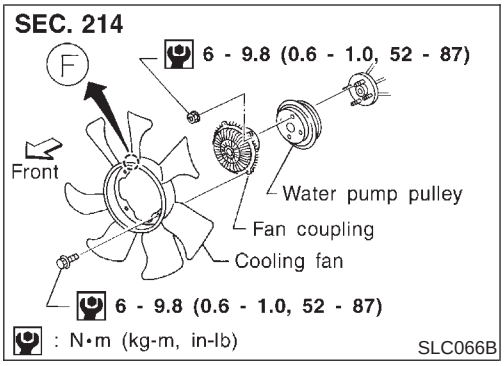
REMOVAL AND INSTALLATION

=NALC0023

1. Remove undercover.
2. Remove suspension member stay.
3. Drain coolant from radiator.
4. Disconnect radiator upper and lower hoses.
5. Remove upper and lower radiator shroud.
6. Remove A/T oil cooler hoses. (A/T)
7. Disconnect reservoir tank hose.
8. Remove radiator mounting bracket.
9. Remove radiator.
10. After repairing or replacing radiator, install any part removed in reverse order of removal.

When filling radiator with coolant, refer to MA-15, “Changing Engine Coolant”.



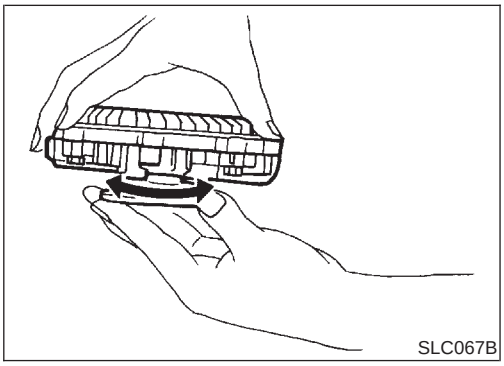


Cooling Fan (Crankshaft driven)

REMOVAL AND INSTALLATION

=NALC0038

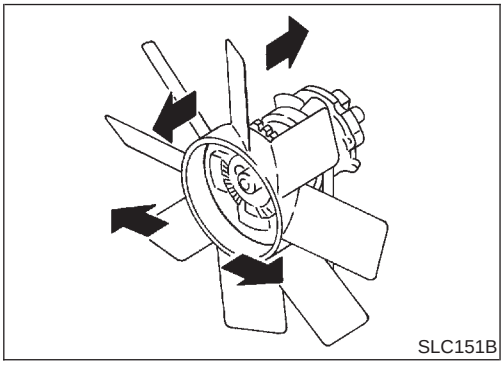
- Do not release the drive belt tension by removing the fan/water pump pulley.
- Fan coupling cannot be disassembled and should be replaced as a unit. If front mark **F** is present, install fan so that side marked **F** faces the front.
- Install the drive belt only after the fan and fan coupling to water pump flange bolts/nuts have been properly torqued.
- Proper alignment of these components is essential. Improper alignment will cause them to wobble and may eventually cause the fan to separate from the water pump causing extensive damage.



INSPECTION

NALC0039

Check fan coupling for rough operation, wobbling, oil leakage or bent bimetal.



After assembly, verify the fan does not wobble or flap while the engine is running.

WARNING:

- **When the engine is running, keep hands and clothing away from moving parts such as drive belts and fan.**

Refilling Engine Coolant

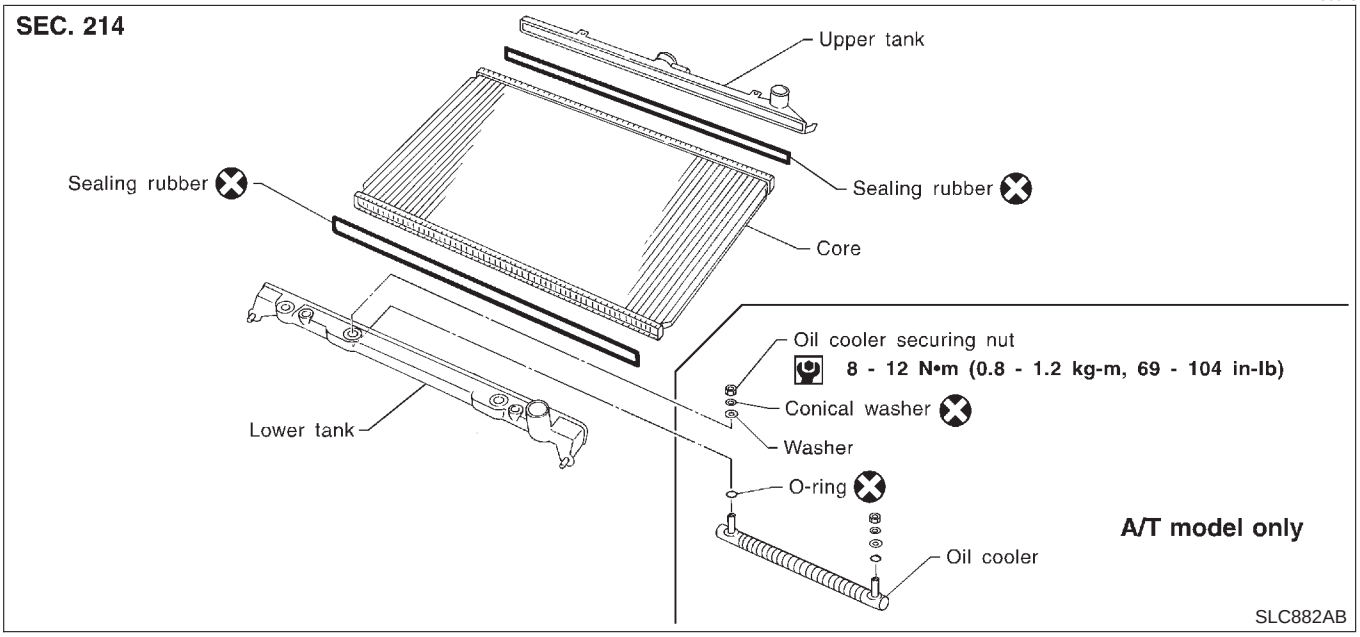
NALC0034

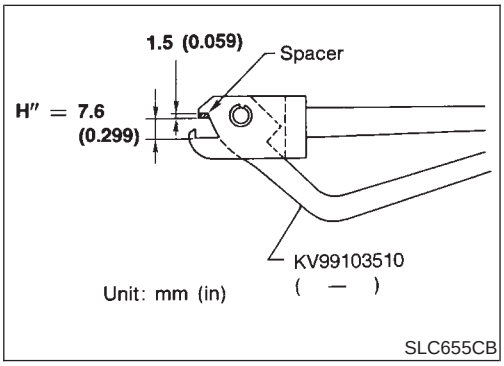
For details on refilling engine coolant, refer to MA-16, “REFILLING ENGINE COOLANT”.

Radiator (Aluminum type)

PREPARATION

NALC0025



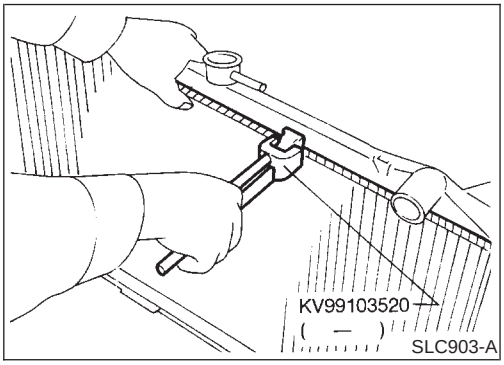


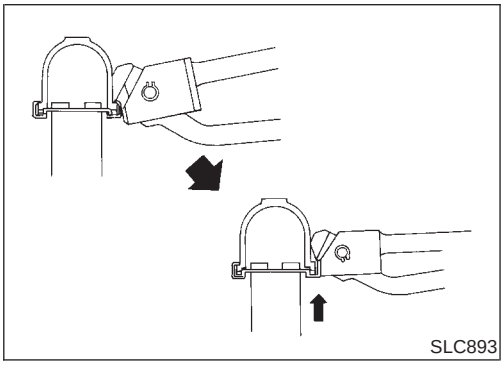
1. Attach the spacer to the tip of the radiator plate pliers A. Spacer specification: 1.5 mm (0.059 in) thick x 18 mm (0.71 in) wide x 8.5 mm (0.335 in) long.
2. Make sure that when radiator plate pliers A are closed dimension H″ is approx. 7.6 mm (0.299 in).
3. Adjust dimension H″ with the spacer, if necessary.

DISASSEMBLY

NALC0026

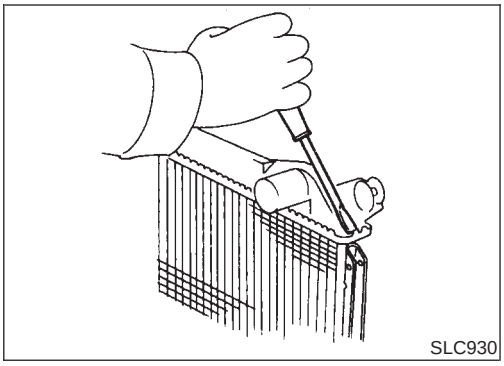
1. Remove tank with Tool.





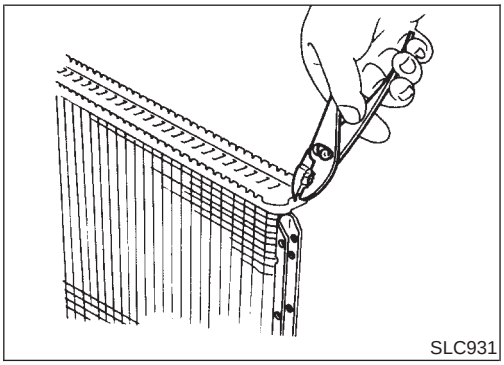
- Grip the crimped edge and bend it upwards so that Tool slips off.

Do not bend excessively.


SLC930

- In areas where Tool cannot be used, use a screwdriver to bend the edge up.

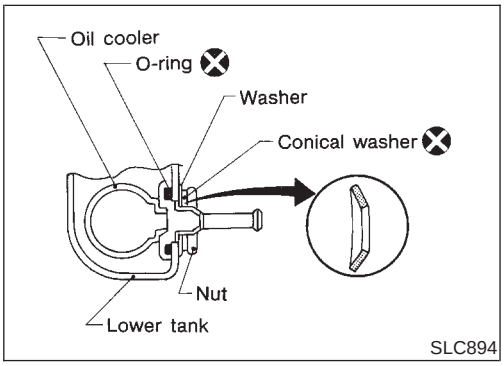
Be careful not to damage tank.


SLC931

2. Make sure the edge stands straight up.
3. Remove oil cooler from tank.

ASSEMBLY

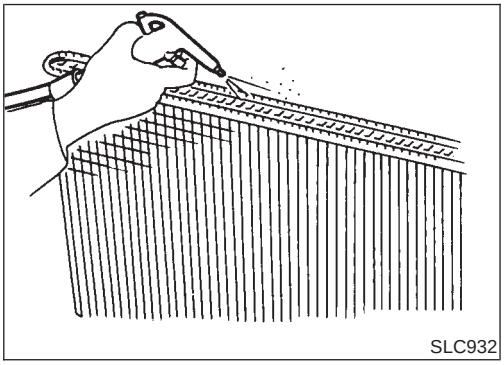
NALC0027



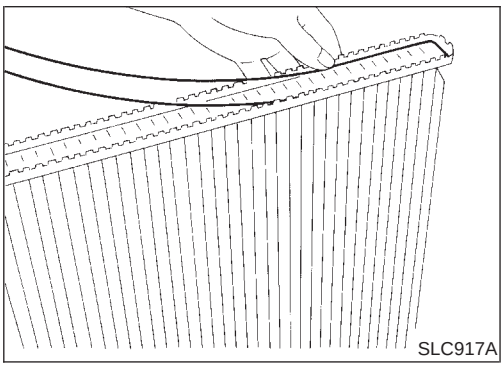
SLC894

1. Install oil cooler.

Pay attention to direction of conical washer.

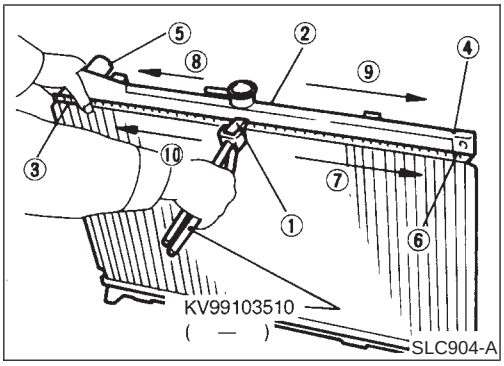

SLC932

2. Clean contact portion of tank.

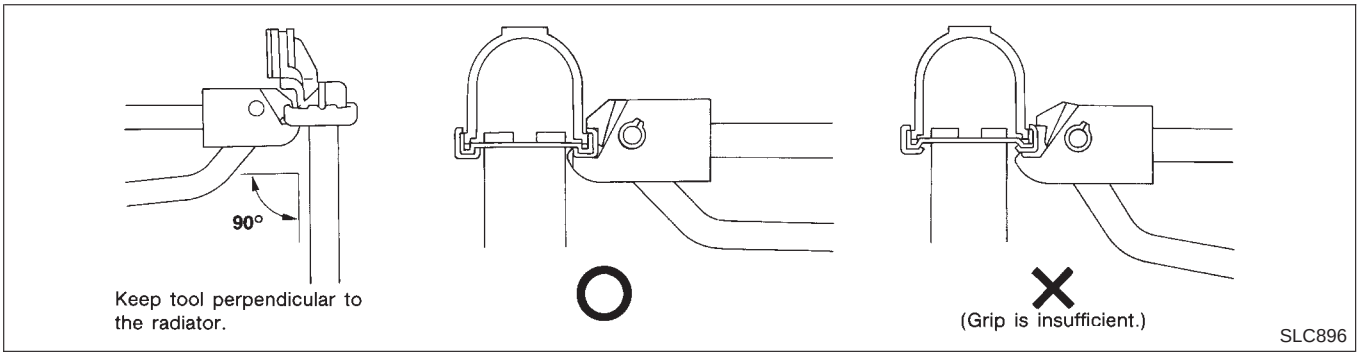

SLC917A

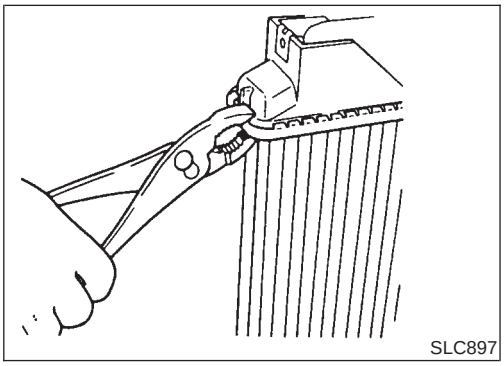
3. Install sealing rubber.

Push it in with fingers.
Be careful not to twist sealing rubber.

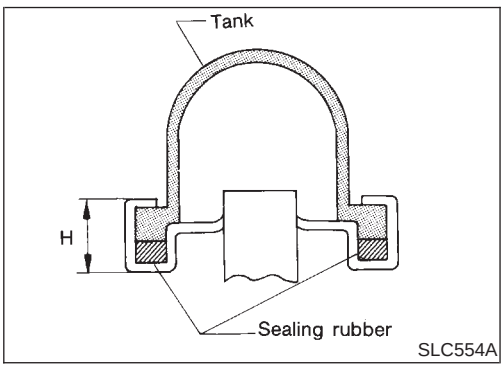


4. Caulk tank in specified sequence with Tool.



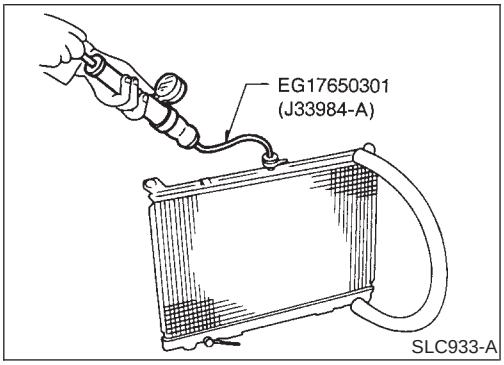


- Use pliers in the locations where Tool cannot be used.



5. Make sure that the rim is completely crimped down.
   Standard height "H":
   8.0 - 8.4 mm (0.315 - 0.331 in)
6. Confirm that there is no leakage.

Refer to Inspection.



INSPECTION

NALC0028

Apply pressure with Tool.

Specified pressure value:
157 kPa (1.6 kg/cm^2, 23 psi)

WARNING:
To prevent the risk of the hose coming undone while under pressure, securely fasten it down with a hose clamp. Attach a hose to the oil cooler as well.

Overheating Cause Analysis

NALC0029

	Symptom		Check items	
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—
		Thermostat stuck closed	—	
		Damaged fins	Dust contamination or paper clogging	
			Mechanical damage	
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)	
	Reduced air flow	Cooling fan does not operate	—	—
		High resistance to fan rotation		
		Damaged fan blades		
	Damaged radiator shroud	—	—	—
	Improper coolant mixture ratio	—	—	—
	Poor coolant quality	—	—	—
	Insufficient coolant	Coolant leaks	Cooling hose	Loose clamp
				Cracked hose
			Water pump	Poor sealing
			Radiator cap	Loose
				Poor sealing
			Radiator	O-ring for damage, deterioration or improper fitting
				Cracked radiator tank
				Cracked radiator core
			Reservoir tank	Cracked reservoir tank
		Overflowing reservoir tank	Exhaust gas leaks into cooling system	Cylinder head deterioration
				Cylinder head gasket deterioration

Overheating Cause Analysis (Cont'd)

	Symptom		Check items	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load
				Driving in low gear for extended time
				Driving at extremely high speed
			Powertrain system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes	
			Improper ignition timing	
	Blocked or restricted air flow	Blocked bumper	—	—
		Blocked radiator grille	Installed car brassiere	
			Mud contamination or paper clogging	
		Blocked radiator	—	
		Blocked condenser	—	
		Installed large fog lamp		

Service Data and Specifications (SDS)

THERMOSTAT

NALC0030

Valve opening temperature	76.5°C (170°F)
Valve lift	More than 8.6 mm/90°C (0.339 in/194°F)

WATER CONTROL VALVE

NALC0035

Valve opening temperature	95°C (203°F)
Valve lift	More than 8.0 mm/108°C (0.315 in/226°F)

RADIATOR

NALC0031

Unit: kPa (kg/cm^2, psi)

Cap relief pressure	Standard	78 - 98 (0.8 - 1.0, 11 - 14)
	Limit	59 - 98 (0.6 - 1.0, 9 - 14)
Leakage test pressure		157 (1.6, 23)

ENGINE CONTROL SYSTEM

SECTION EC

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NAEC0001

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*1: 1st trip DTC No. is the same as DTC No.

*2: This DTC is displayed with CONSULT-II only.

*3: When the fail-safe operation occurs, the MIL illuminates.

*4: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

NOTE:

- Regarding R50 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.
- Bank 1 (-B1 or BK1) includes No. 1 cylinder.

P NO. INDEX FOR DTC

=NAEC0001S02

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P1320	IGN SIGNAL-PRIMARY	EC-494
P1335	CPS/CIRCUIT (REF)	EC-505
P1336	CPS/CIRC (POS) COG	EC-512
P1441	EVAP VERY SMALL LEAK	EC-521
P1444	PURG VOLUME CONT/V	EC-536
P1446	VENT CONTROL VALVE	EC-548
P1447	EVAP PURG FLOW/MON	EC-556
P1448	VENT CONTROL VALVE	EC-568
P1464	FUEL LEVEL SEN/CIRC	EC-577
P1490	VC/V BYPASS/V	EC-580
P1491	VC CUT/V BYPASS/V	EC-586
P1605	A/T DIAG COMM LINE	EC-598
P1610 - P1615*2	NATS MALFUNCTION	EL-352
P1705	TP SEN/CIRC A/T*3	AT-176
P1706	P-N POS SW/CIRCUIT	EC-599
P1760	O/R CLTCH SOL/CIRC	AT-185

*1: 1st trip DTC No. is the same as DTC No.

*2: This DTC is displayed with CONSULT-II only.

*3: When the fail-safe operation occurs, the MIL illuminates.

*4: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

NOTE:

- Regarding R50 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.
- Bank 1 (-B1 or BK1) includes No. 1 cylinder.

Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

NAEC0002

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL R50 is as follows:

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, refer to RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.**

Precautions for On Board Diagnostic (OBD) System of Engine and A/T

NAEC0003

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to EL-6, “HARNESS CONNECTOR (SLIDE-LOCKING TYPE)”.**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

Engine Fuel & Emission Control System

NAEC0004

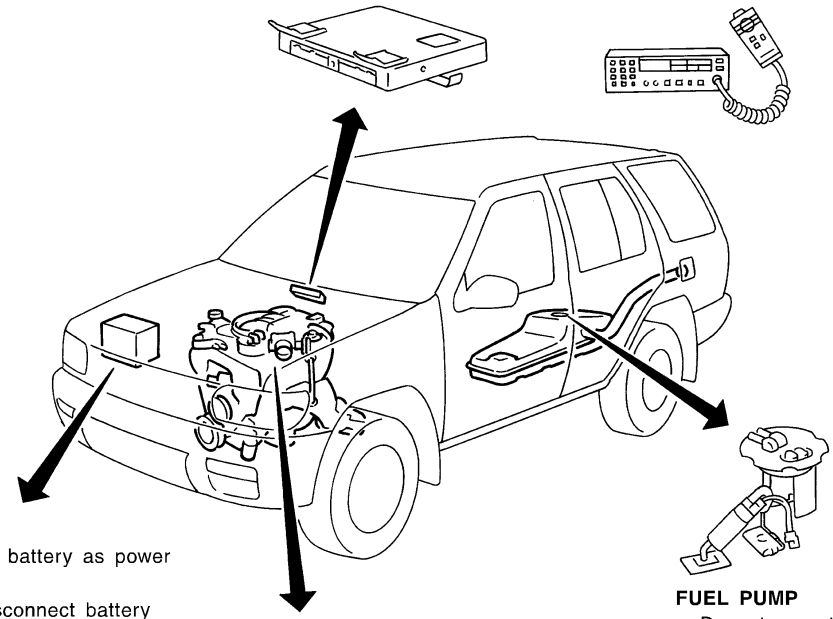
ECM

- Do not disassemble ECM.
- Do not turn diagnosis test mode selector forcibly.
- If a battery terminal is disconnected, the memory will return to the ECM value.
  The ECM will not start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a problem. Do not replace parts because of a slight variation.

WIRELESS EQUIPMENT

- When installing CB ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.

1) Keep the antenna as far away as possible from the electronic control units.
2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls.
   Do not let them run parallel for a long distance.
3) Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
4) Be sure to ground the radio to vehicle body.



BATTERY

- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.

WHEN STARTING

- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.

ECM PARTS HANDLING

- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble IACV-AAC valve.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the camshaft position sensor or crankshaft position sensor (OBD).



FUEL PUMP

- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque. (Refer to MA section.)

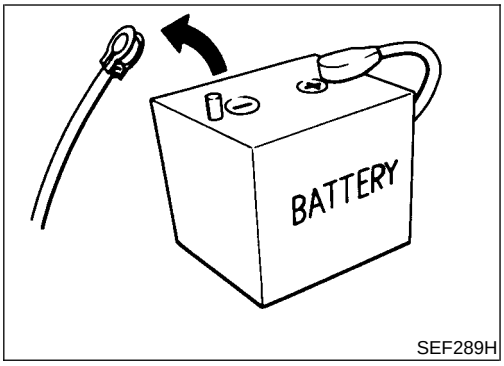
ECM HARNESS HANDLING

- Securely connect ECM harness connectors.
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in.) away from adjacent harnesses to prevent an ECM system malfunction due to receiving external noise, degraded operation of ICs, etc.
- Keep ECM parts and harnesses dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.

SEF952RE

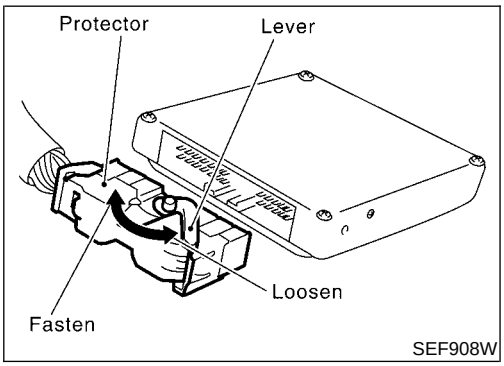
Precautions

NAEC0005



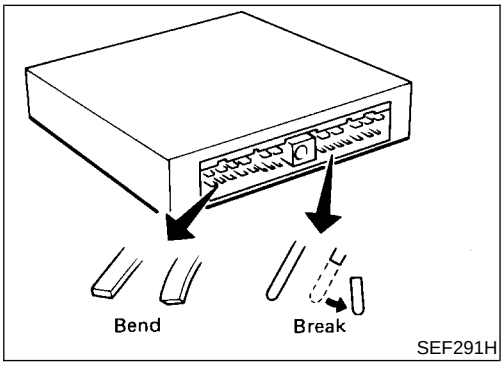
SEF289H

- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off.**



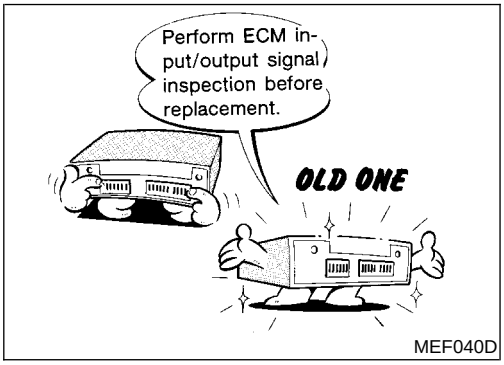
SEF908W

- **When connecting ECM harness connector, fasten it securely with a lever as far as it will go as shown at left.**



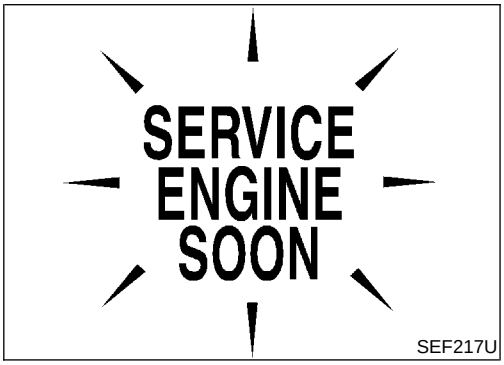
SEF291H

- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.



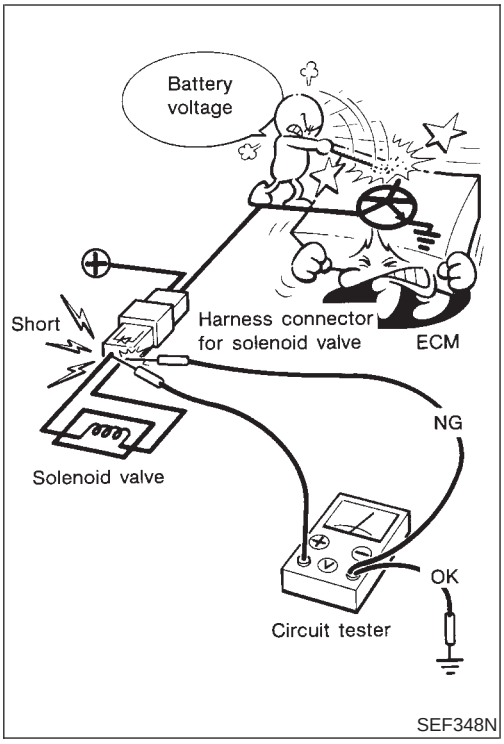
MEF040D

- **Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to EC-126.**

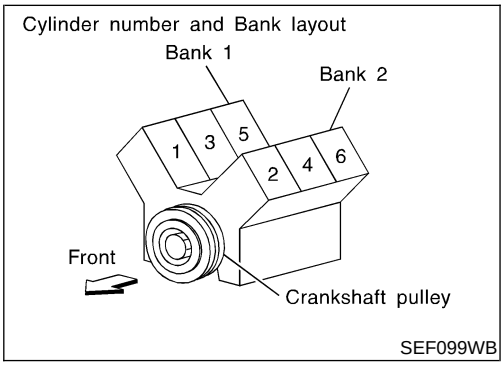


SEF217U

- **After performing each TROUBLE DIAGNOSIS, perform “DTC Confirmation Procedure” or “Overall Function Check”.**
  The DTC should not be displayed in the “DTC Confirmation Procedure” if the repair is completed. The “Overall Function Check” should be a good result if the repair is completed.



- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**



- **Regarding model R50, "-B1" indicates the right bank and "-B2" indicates the left bank as shown in the figure.**
- **Bank 1 includes No. 1 cylinder.**

Wiring Diagrams and Trouble Diagnosis

NAEC0006

When you read Wiring diagrams, refer to the following:

- GI-11, "HOW TO READ WIRING DIAGRAMS"
- EL-9, "POWER SUPPLY ROUTING" for power distribution circuit

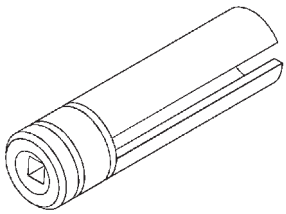
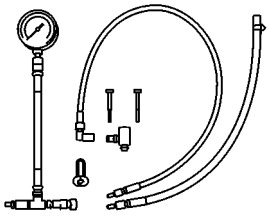
When you perform trouble diagnosis, refer to the following:

- GI-35, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSIS"
- GI-24, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

Special Service Tools

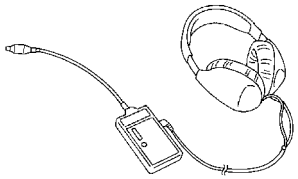
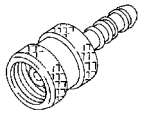
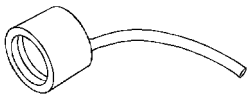
NAEC0007

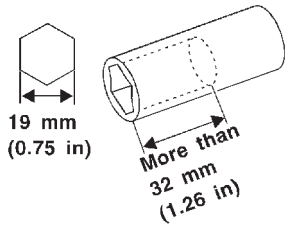
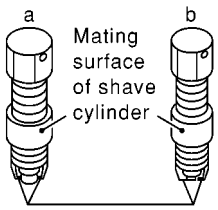
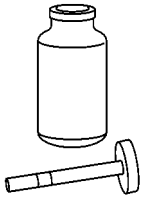
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
KV10117100 (J36471-A) Front heated oxygen sensor wrench Rear heated oxygen sensor wrench	 NT379 — Loosening or tightening front and rear heated oxygen sensors with 22 mm (0.87 in) hexagon nut
(J44321) Fuel pressure adapter and gauge kit	 SEF326Z — Checking fuel pressure with pressure gauge

Commercial Service Tools

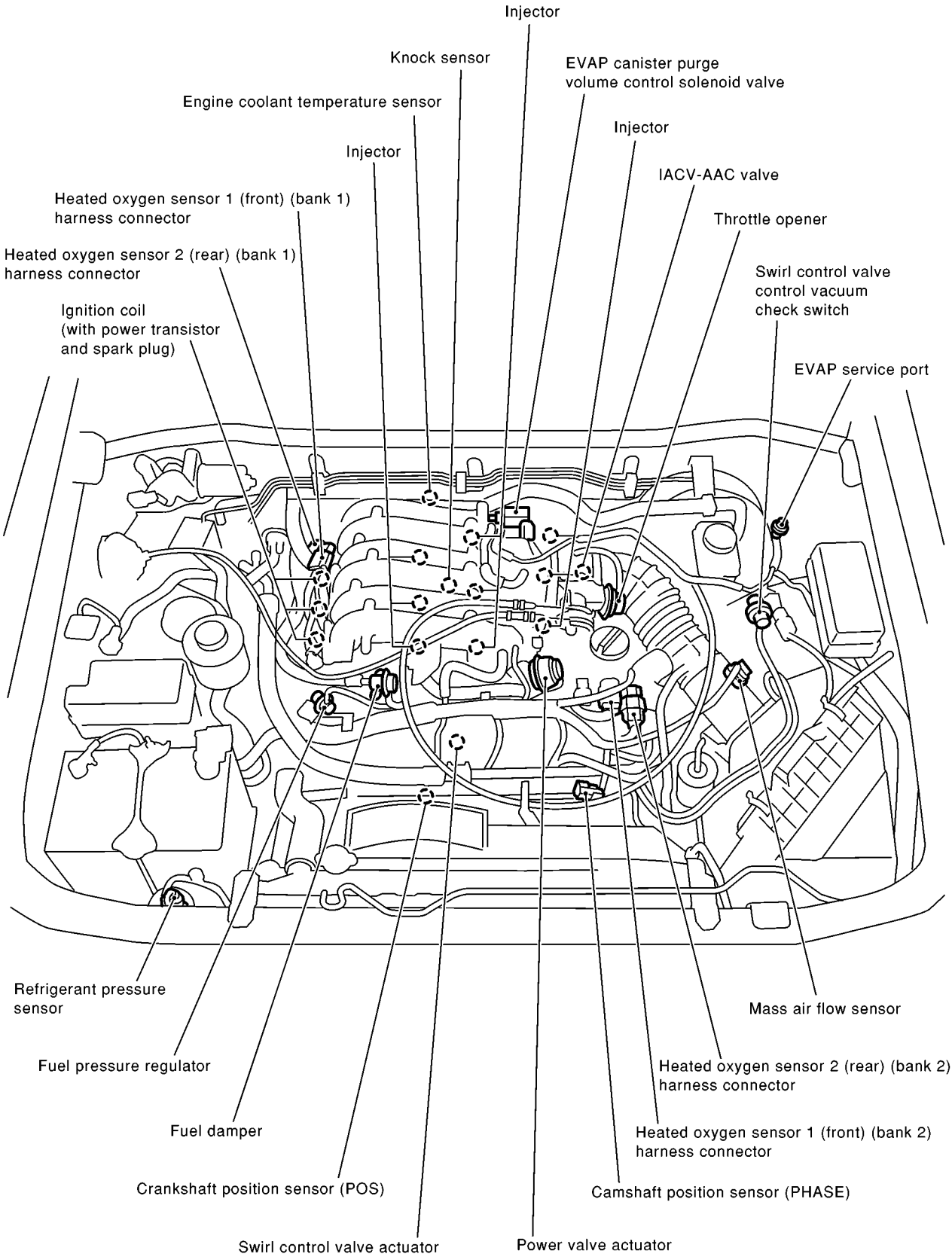
NAEC0008

Tool name (Kent-Moore No.)	Description
Leak detector (J41416)	 NT703 — Locating the EVAP leak
EVAP service port adapter (J41413-OBD)	 NT704 — Applying positive pressure through EVAP service port
Fuel filler cap adapter	 NT653 — Checking fuel tank vacuum relief valve opening pressure

Tool name (Kent-Moore No.)	Description	
Socket wrench	 NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	 NT828	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: J-43897-18 18 mm diameter with pitch 1.5 mm, for Zirconia Oxygen Sensor** **b: J-43897-12 12 mm diameter with pitch 1.25 mm, for Titania Oxygen Sensor**
Anti-seize lubricant (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	 NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

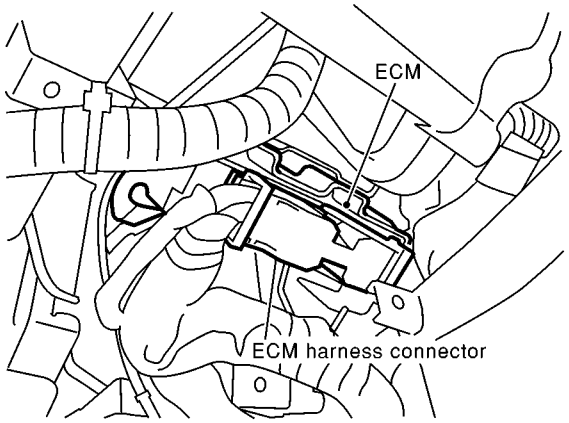
Engine Control Component Parts Location

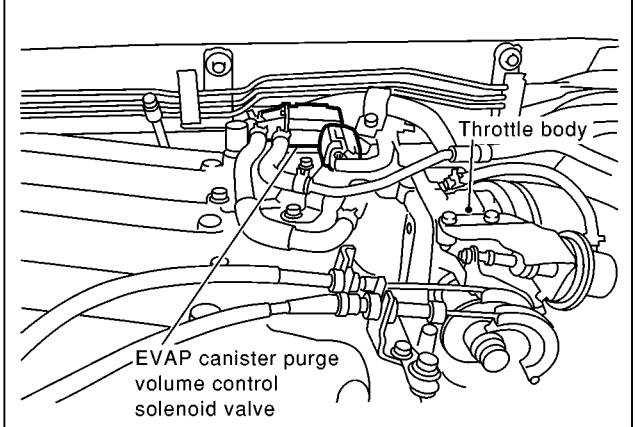
NAEC0009



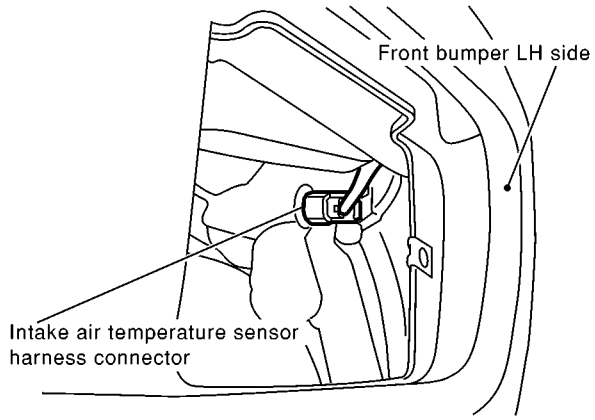
SEF929Y

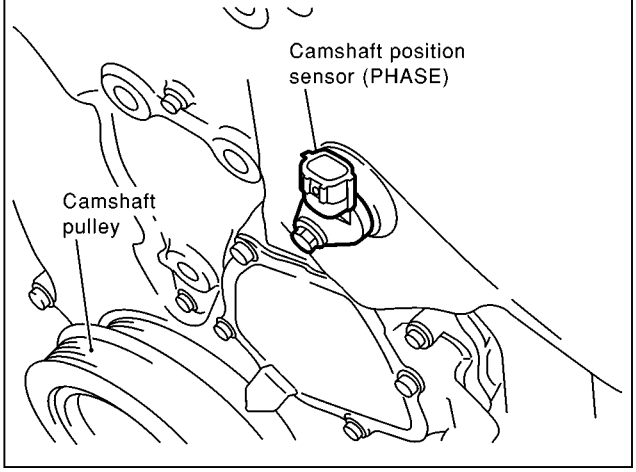
View with instrument lower cover removed

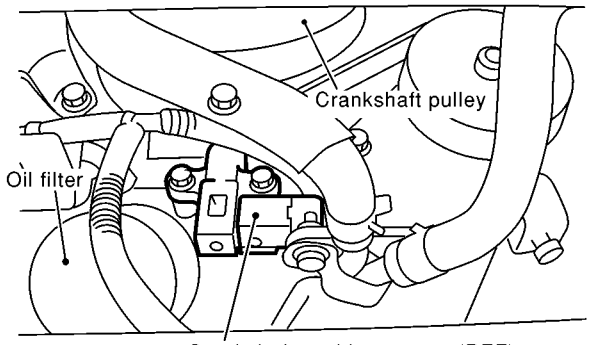




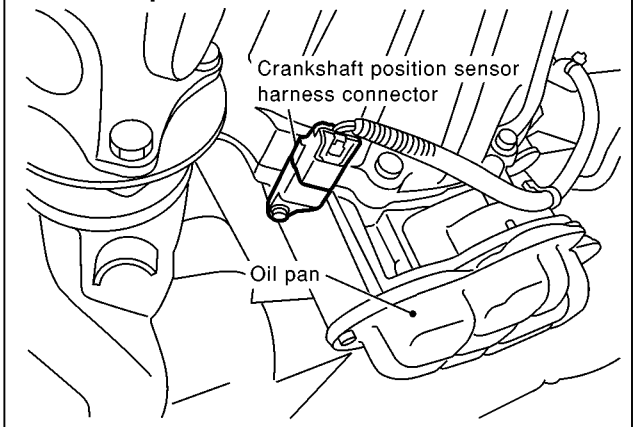
View with fog lamp removed



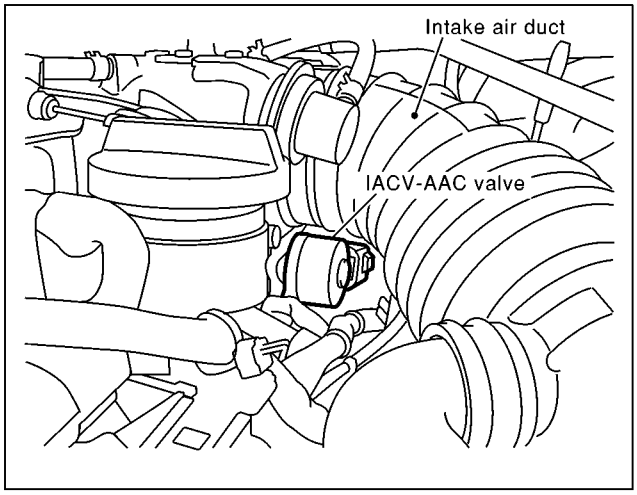


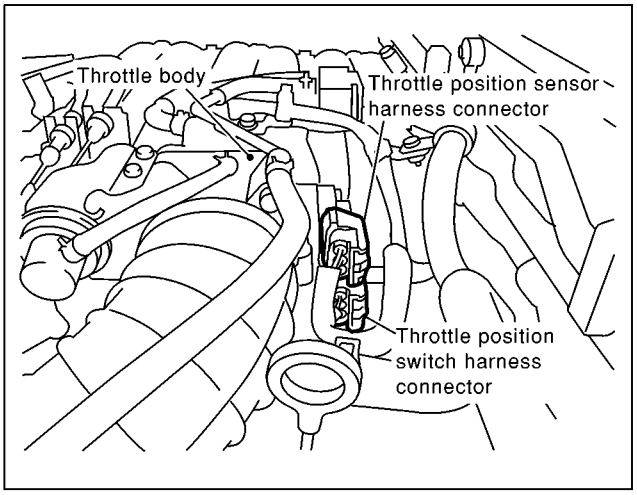


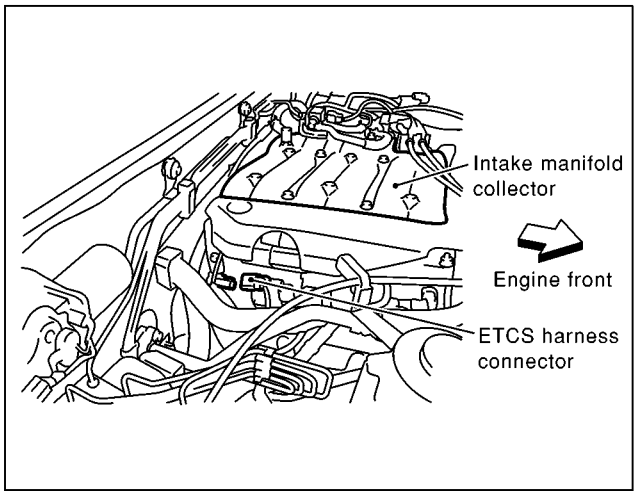
View with protector cover removed

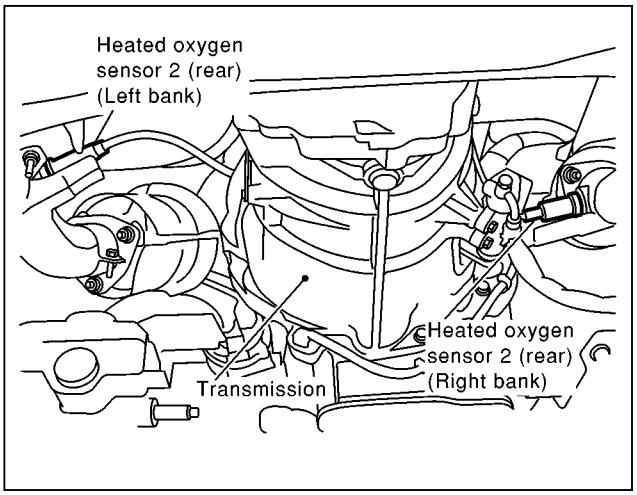


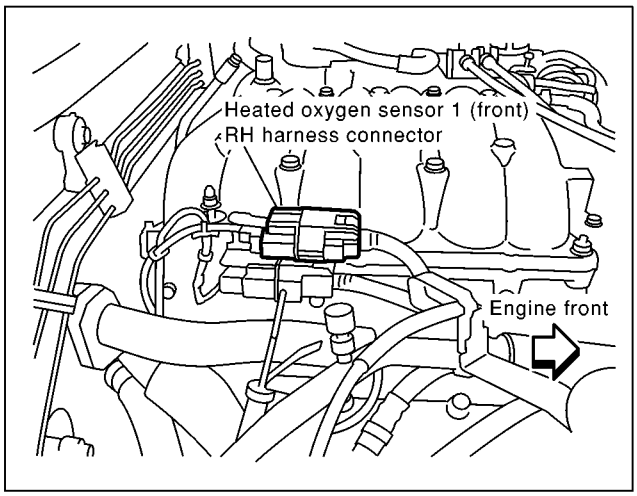
SEF034Z


Intake air duct
IACV-AAC valve

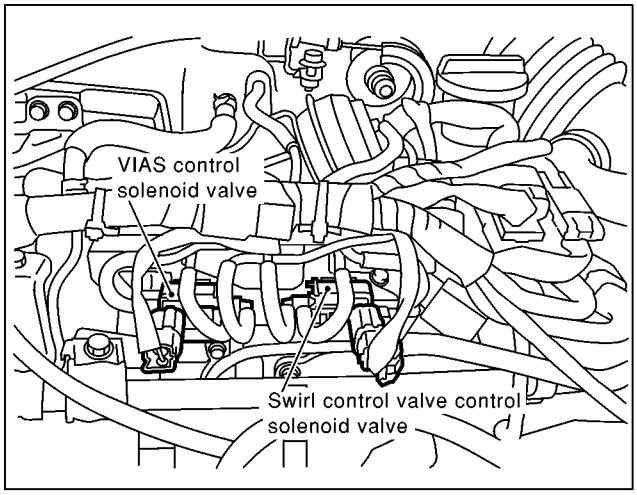

Throttle body
Throttle position sensor harness connector
Throttle position switch harness connector

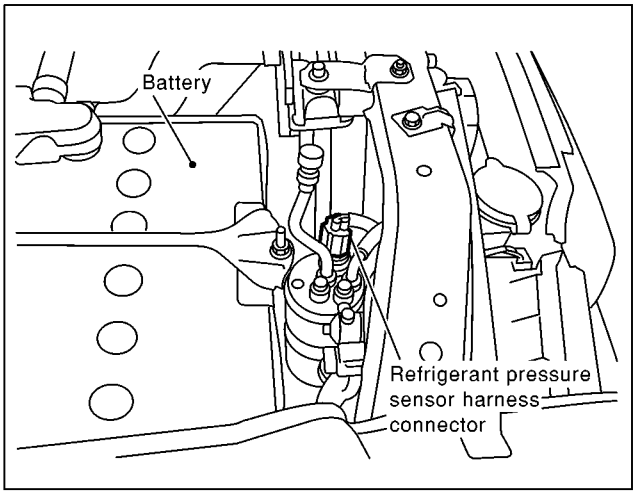

Intake manifold collector
Engine front
ETCS harness connector

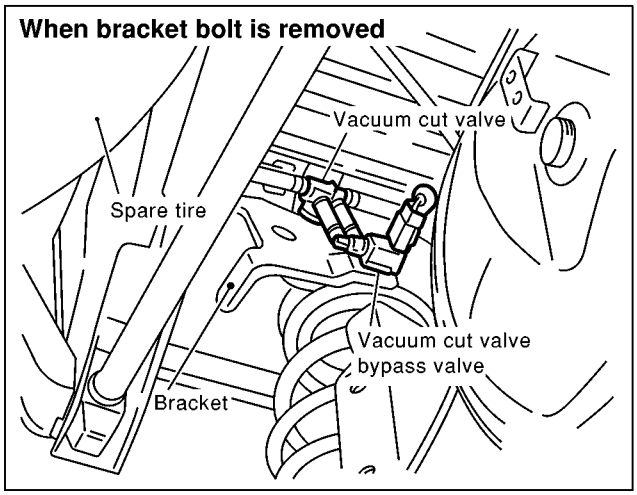

Heated oxygen sensor 2 (rear) (Left bank)
Heated oxygen sensor 2 (rear) (Right bank)
Transmission

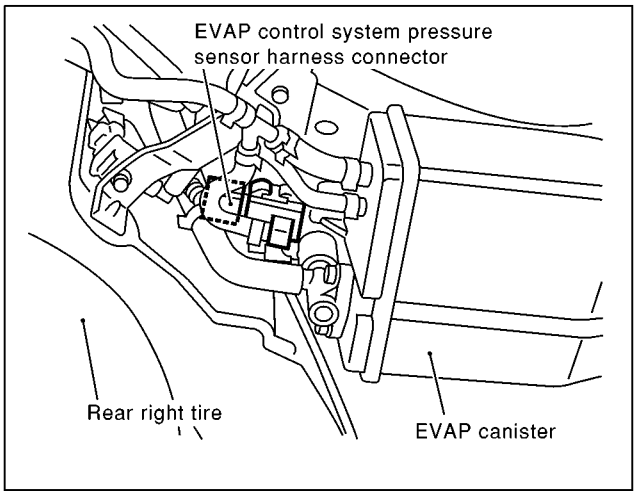

Heated oxygen sensor 1 (front) RH harness connector
Engine front

SEF584Z


VIAS control solenoid valve
Swirl control valve control solenoid valve


Battery
Refrigerant pressure sensor harness connector

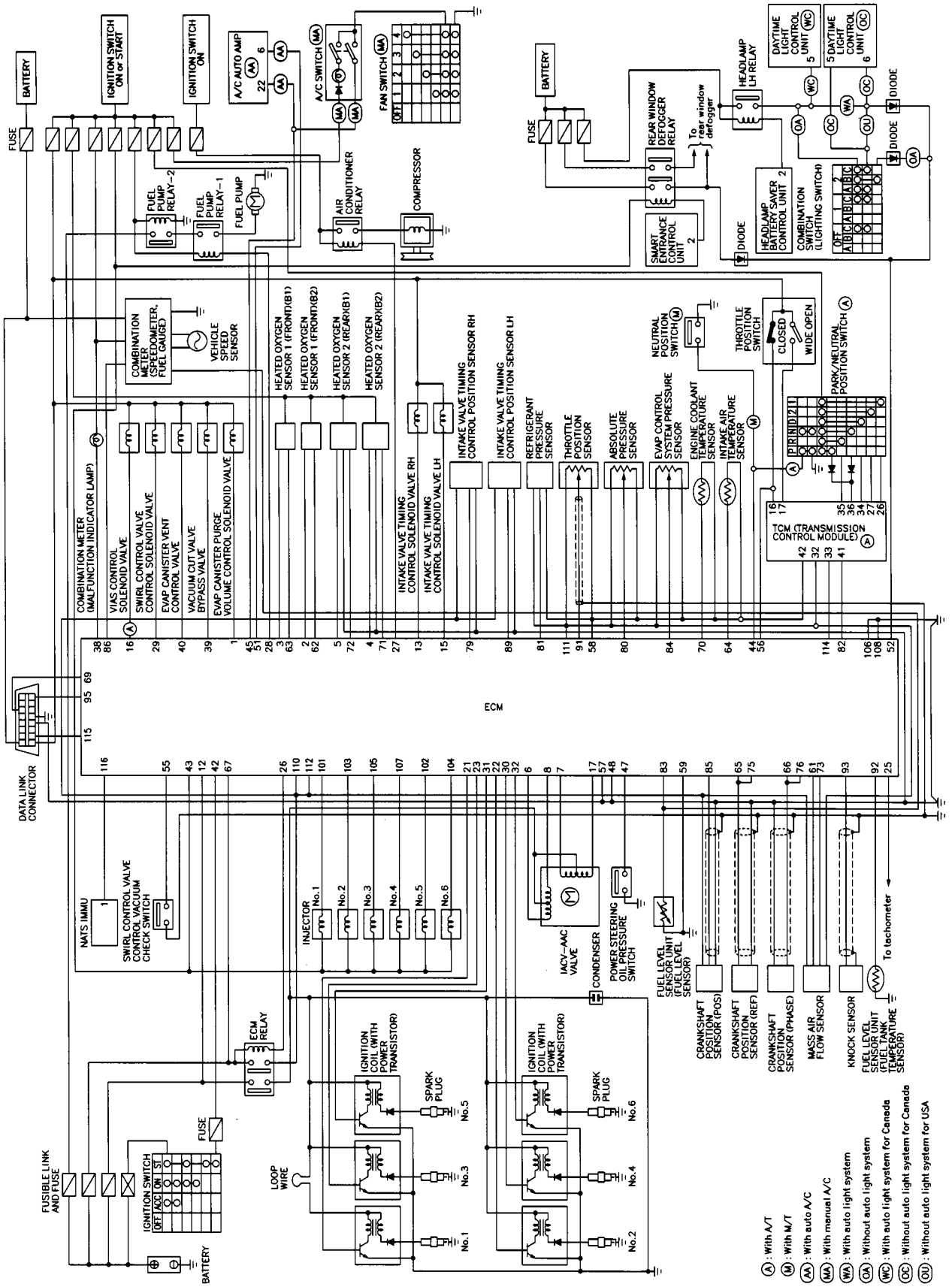

When bracket bolt is removed
Vacuum cut valve
Spare tire
Vacuum cut valve bypass valve
Bracket


EVAP control system pressure sensor harness connector
Rear right tire
EVAP canister

SEF036Z

Circuit Diagram

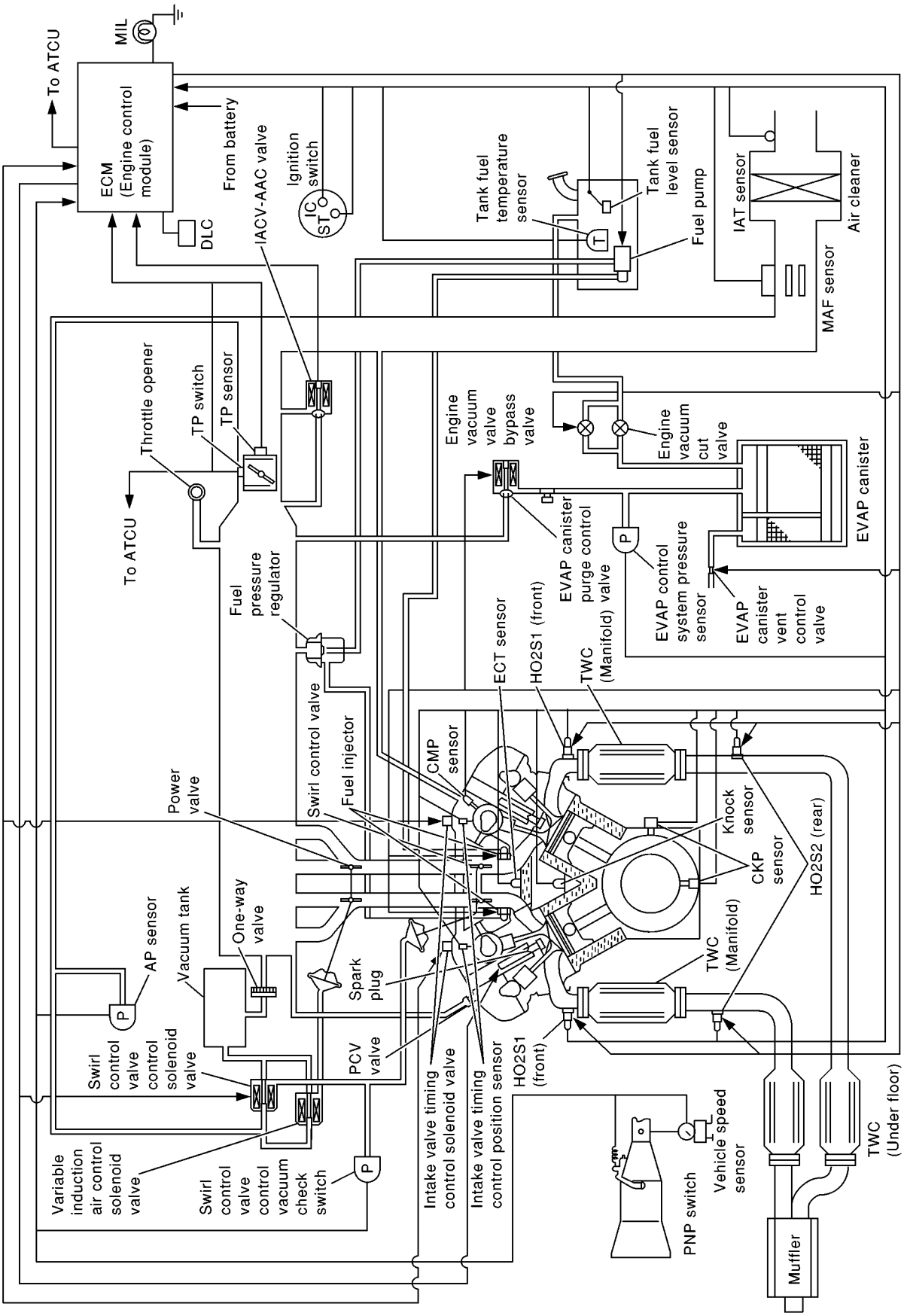
NAEC0010



MEC012D

System Diagram

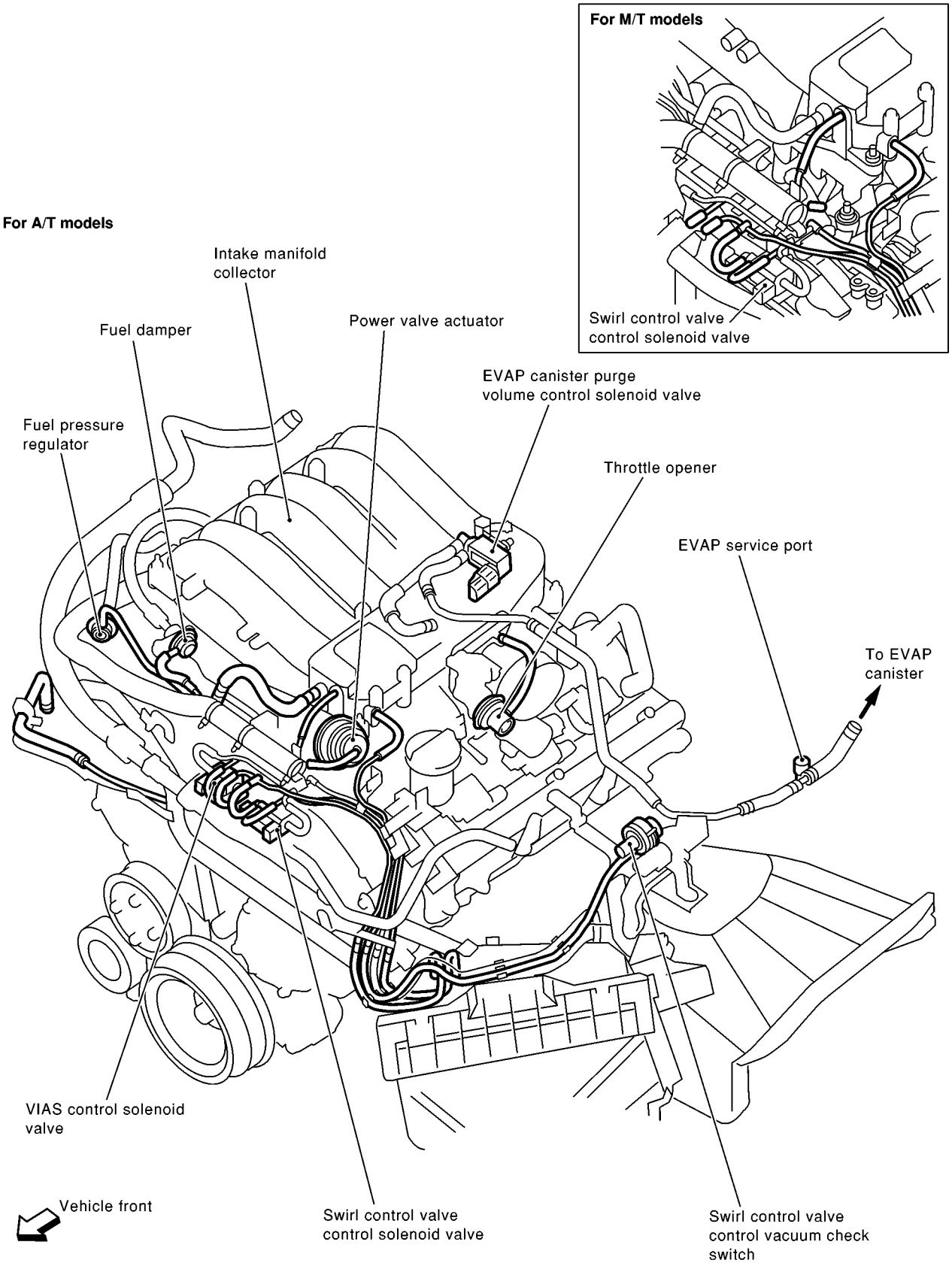
NAEC0011



Vacuum Hose Drawing

NAEC0012

Refer to “System Diagram”, EC-25 for Vacuum Control System.



NOTE:
Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

SEF037Z

System Chart

NAEC0013

Input (Sensor)	ECM Function	Output (Actuator)
• Camshaft position sensor (PHASE) • Crankshaft position sensor (REF) • Mass air flow sensor • Engine coolant temperature sensor • Heated oxygen sensor 1 (front) • Ignition switch • Throttle position sensor • Closed throttle position switch *3 • Park/neutral position (PNP) switch • Air conditioner switch • Knock sensor • Intake air temperature sensor • Absolute pressure sensor • EVAP control system pressure sensor *1 • Battery voltage • Power steering oil pressure switch • Vehicle speed sensor • Fuel tank temperature sensor *1 • Crankshaft position sensor (POS) • Heated oxygen sensor 2 (rear)*2 • TCM (Transmission control module) • Refrigerant pressure sensor • Electrical load • Fuel level sensor*1	Fuel injection & mixture ratio control	Injectors
	Electronic ignition system	Power transistor
	Idle air control system	IACV-AAC valve
	Fuel pump control	Fuel pump relay
	On board diagnostic system	MIL (On the instrument panel)
	Swirl control valve control	Swirl control valve control solenoid valve
	Power valve control	VIAS control solenoid valve
	Heated oxygen sensor 1 heater (front) control	Heated oxygen sensor 1 heater (front)
	Heated oxygen sensor 2 heater (rear) control	Heated oxygen sensor 2 heater (rear)
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay
	ON BOARD DIAGNOSIS for EVAP system	• EVAP canister vent control valve • Vacuum cut valve bypass valve

*1: These sensors are not used to control the engine system. They are used only for the on board diagnosis.

*2: This sensor is not used to control the engine system under normal conditions.

*3: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

Multiport Fuel Injection (MFI) System

DESCRIPTION

Input/Output Signal Chart

NAEC0014

NAEC0014S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	Fuel injection & mixture ratio control	Injectors
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position Throttle valve idle position		
Park/neutral position (PNP) switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Battery	Battery voltage		
Absolute pressure sensor	Ambient air barometric pressure		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2 (rear)*	Density of oxygen in exhaust gas		

*: Under normal conditions, this sensor is not for engine control operation.

Basic Multiport Fuel Injection System

NAEC0014S02

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from both the crankshaft position sensor and the mass air flow sensor.

Various Fuel Injection Increase/Decrease Compensation

NAEC0014S03

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

<Fuel increase>

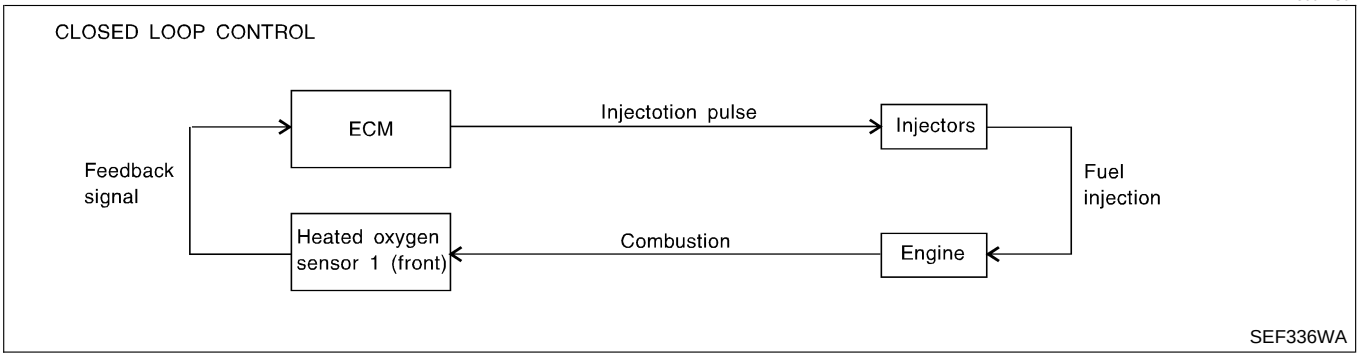
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from “N” to “D”
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

Mixture Ratio Feedback Control (Closed loop control)

NAEC0014S04



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The warm-up three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a heated oxygen sensor 1 (front) in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the heated oxygen sensor 1 (front) , refer to EC-187. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Heated oxygen sensor 2 (rear) is located downstream of the warm-up three way catalyst. Even if the switching characteristics of the heated oxygen sensor 1 (front) shift, the air-fuel ratio is controlled to stoichiometric by the signal from the heated oxygen sensor 2 (rear).

Open Loop Control

NAEC0014S05

The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 (front) or its circuit
- Insufficient activation of heated oxygen sensor 1 (front) at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from "N" to "D"
- When starting the engine

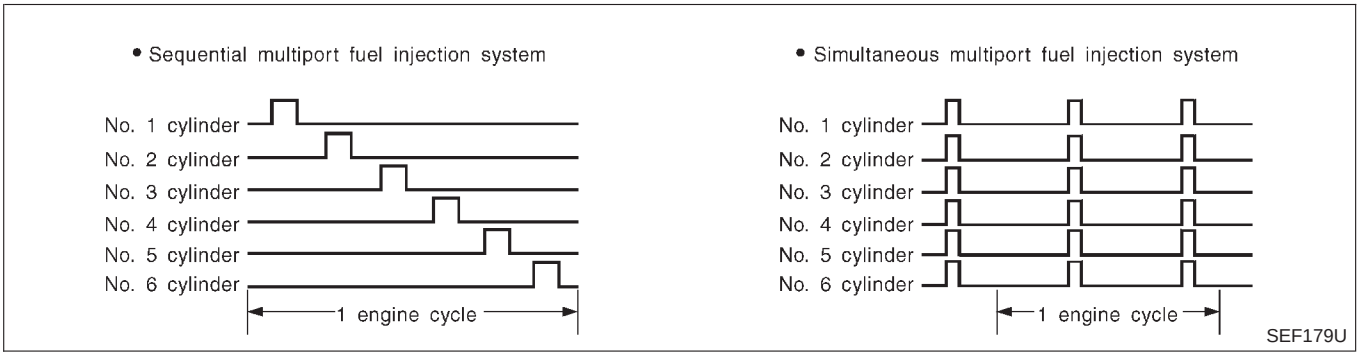
Mixture Ratio Self-learning Control

NAEC0014S06

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the heated oxygen sensor 1 (front). This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.
"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from the heated oxygen sensor 1 (front) indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.
"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

Fuel Injection Timing

NAEC0014S07



Two types of systems are used.

Sequential Multiport Fuel Injection System

NAEC0014S0701

Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

Simultaneous Multiport Fuel Injection System

NAEC0014S0702

Fuel is injected simultaneously into all six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The six injectors will then receive the signals two times for each engine cycle.
This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

Fuel Shut-off

NAEC0014S08

Fuel to each cylinder is cut off during deceleration or operation of the engine at excessively high speeds.

Electronic Ignition (EI) System

DESCRIPTION

NAEC0015

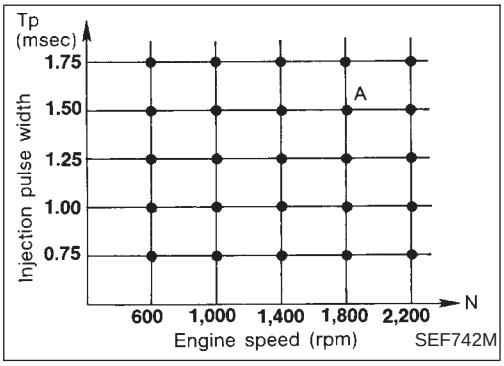
Input/Output Signal Chart

NAEC0015S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	Ignition timing control	Power transistor
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position Throttle valve idle position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage		

System Description

NAEC0015S02



The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM. This data forms the map shown.
The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.
e.g., N: 1,800 rpm, Tp: 1.50 msec
A °BTDC
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Air Conditioning Cut Control

DESCRIPTION

NAEC0016

Input/Output Signal Chart

NAEC0016S01

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner "ON" signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
Crankshaft position sensor (POS)	Engine speed (POS signal)		
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Vehicle speed sensor	Vehicle speed		
Refrigerant pressure sensor	Refrigerant pressure		
Power steering oil pressure switch	Power steering operation		

System Description

NAEC0016S02

This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.

- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

Fuel Cut Control (at no load & high engine speed)

DESCRIPTION

NAEC0017

Input/Output Signal Chart

NAEC0017S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Injectors
Park/neutral position (PNP) switch	Neutral position		
Throttle position sensor	Throttle position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS)	Engine speed (POS signal)		
Crankshaft position sensor (REF)	Engine speed (REF signal)		

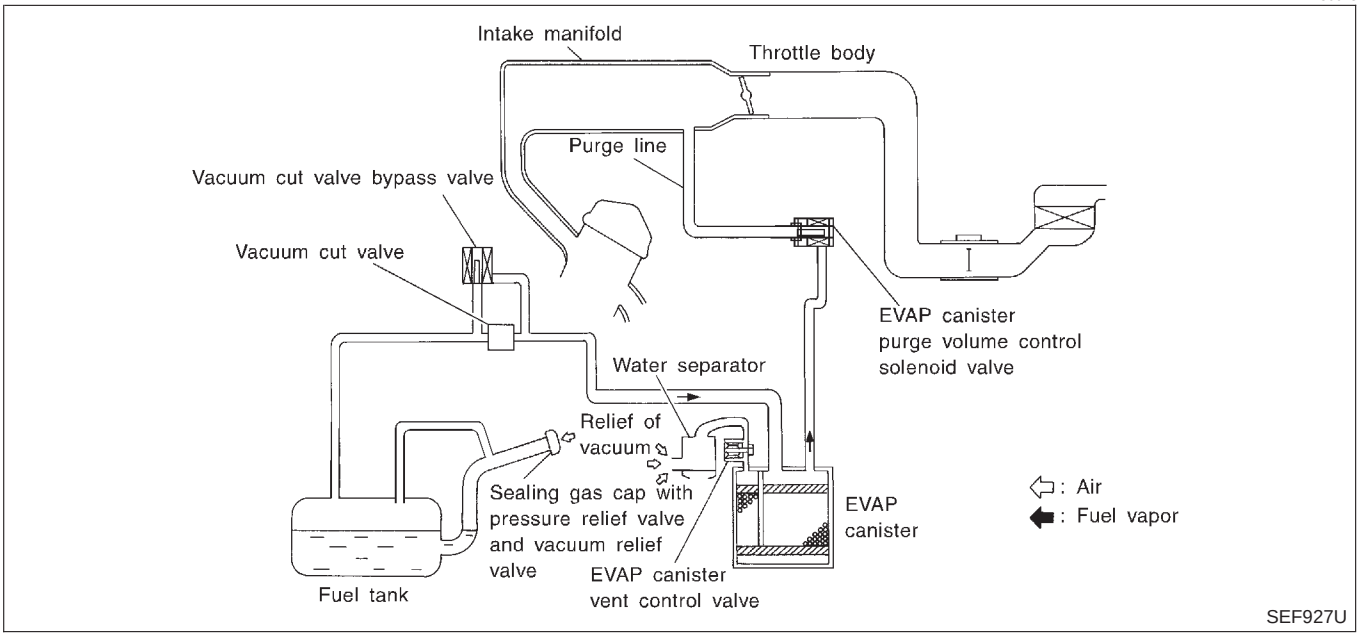
If the engine speed is above 1,800 rpm with no load (for example, in neutral and engine speed over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

NOTE:
This function is different from deceleration control listed under "Multiport Fuel Injection (MFI) System", EC-28.

Evaporative Emission System

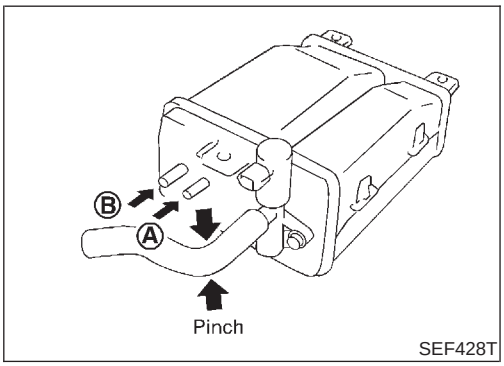
DESCRIPTION

NAEC0018



The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine

operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.



SEF428T

INSPECTION

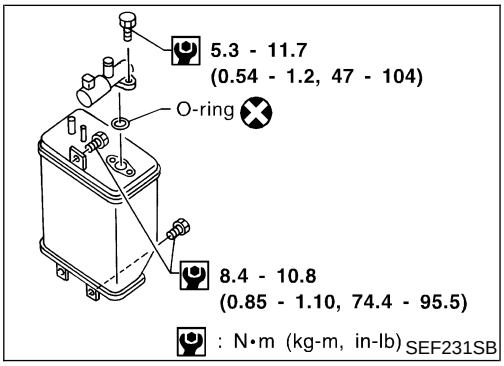
EVAP Canister

NAEC0019

NAEC0019S01

Check EVAP canister as follows:

1. Pinch the fresh air hose.
2. Blow air into port **A** and check that it flows freely out of port **B**.

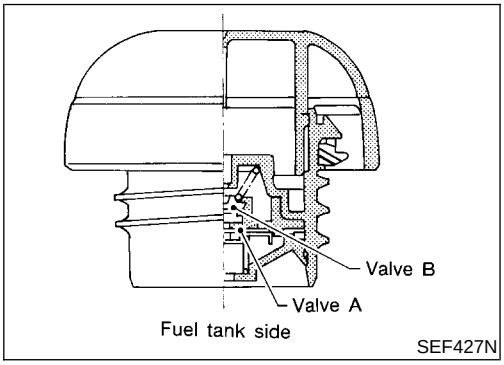


SEF231SB

Tightening Torque

NAEC0019S02

Tighten EVAP canister as shown in the figure.
Make sure new O-ring is installed properly between EVAP canister and EVAP canister vent control valve.



SEF427N

Fuel Tank Vacuum Relief Valve (Built into fuel filler cap)

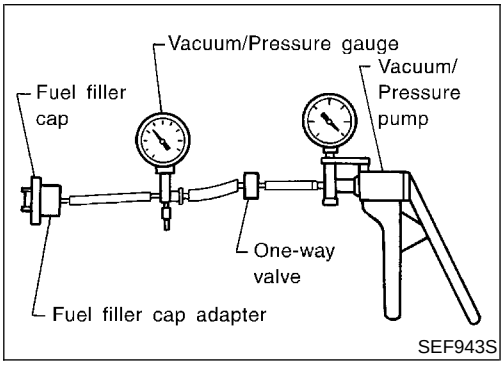
NAEC0019S03

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.

Pressure:
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

3. If out of specification, replace fuel filler cap as an assembly.

CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.



SEF943S

Vacuum Cut Valve and Vacuum Cut Valve Bypass Valve
NAEC0019S04

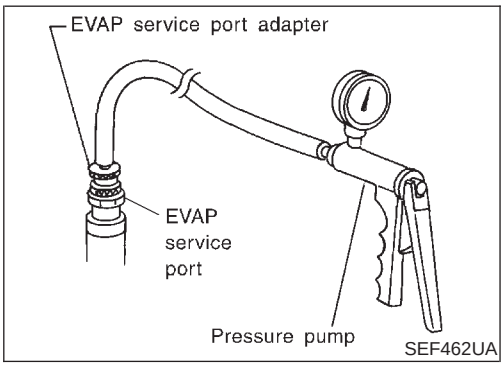
Refer to EC-586.

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve
NAEC0019S05

Refer to EC-362.

Fuel Tank Temperature Sensor
NAEC0019S06

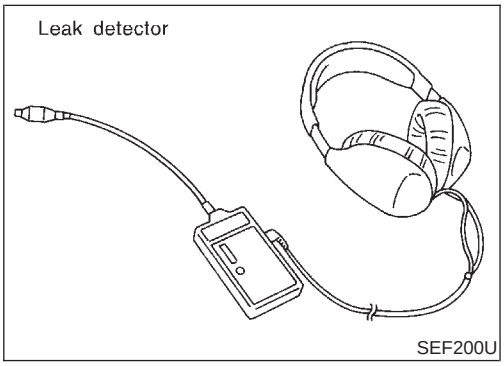
Refer to EC-304.



SEF462UA

Evap Service Port
NAEC0019S07

Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.



SEF200U

How to Detect Fuel Vapor Leakage
NAEC0019S08

CAUTION:

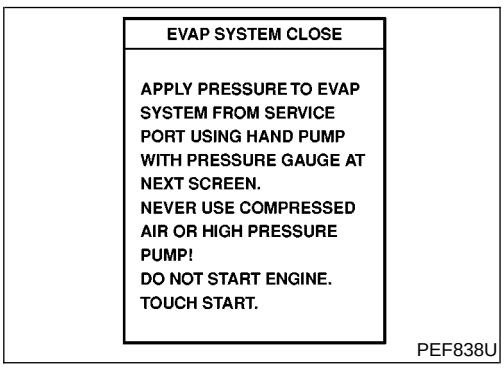
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in EVAP system.**

NOTE:

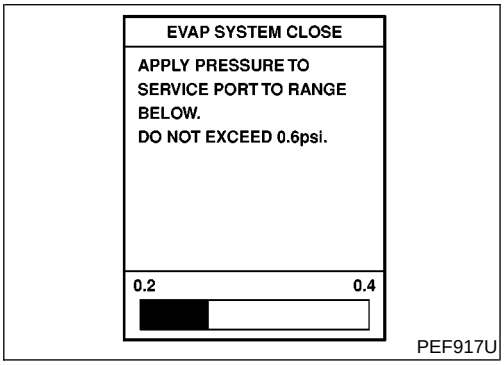
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

With CONSULT-II
NAEC0019S0801

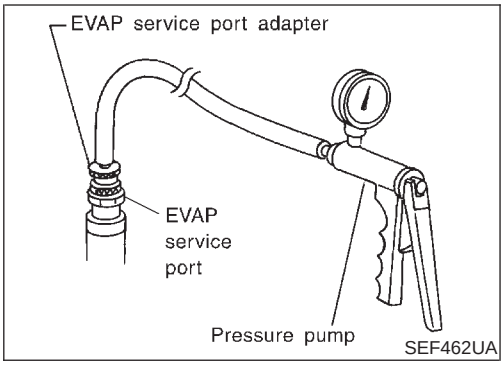
1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Also attach the pressure pump and hose to the EVAP service port adapter.
3) Turn ignition switch "ON".
4) Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-II.
5) Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
6) Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7) Remove EVAP service port adapter and hose with pressure pump.
8) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.

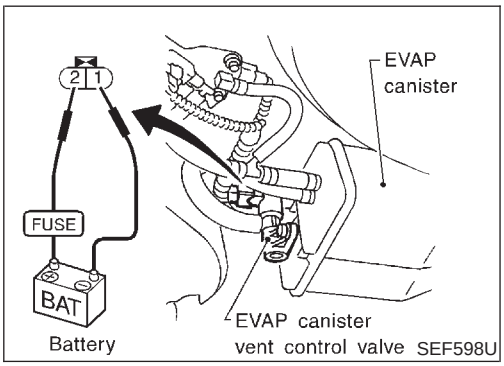


PEF838U



PEF917U





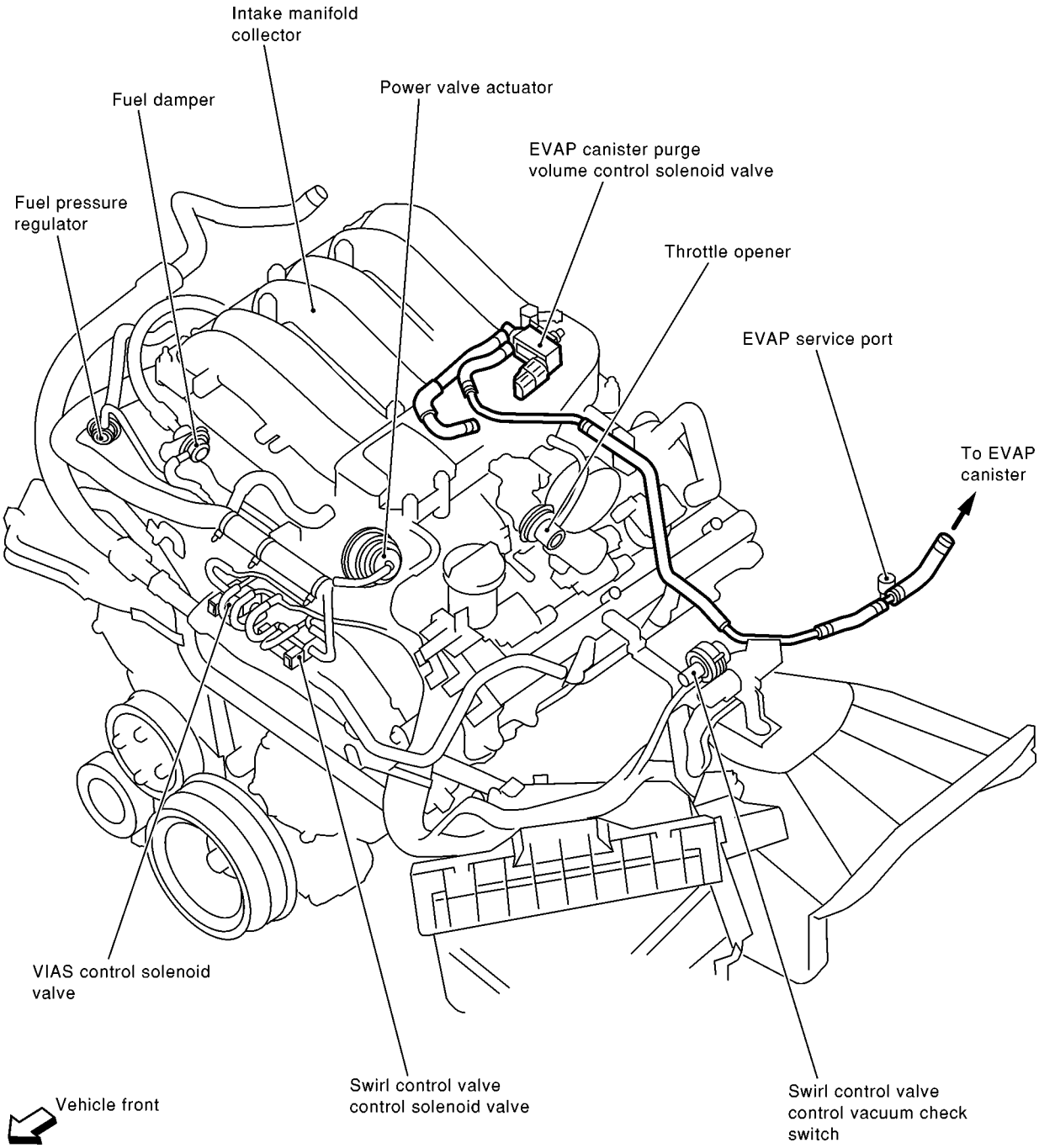
Without CONSULT-II

NAEC0019S0802

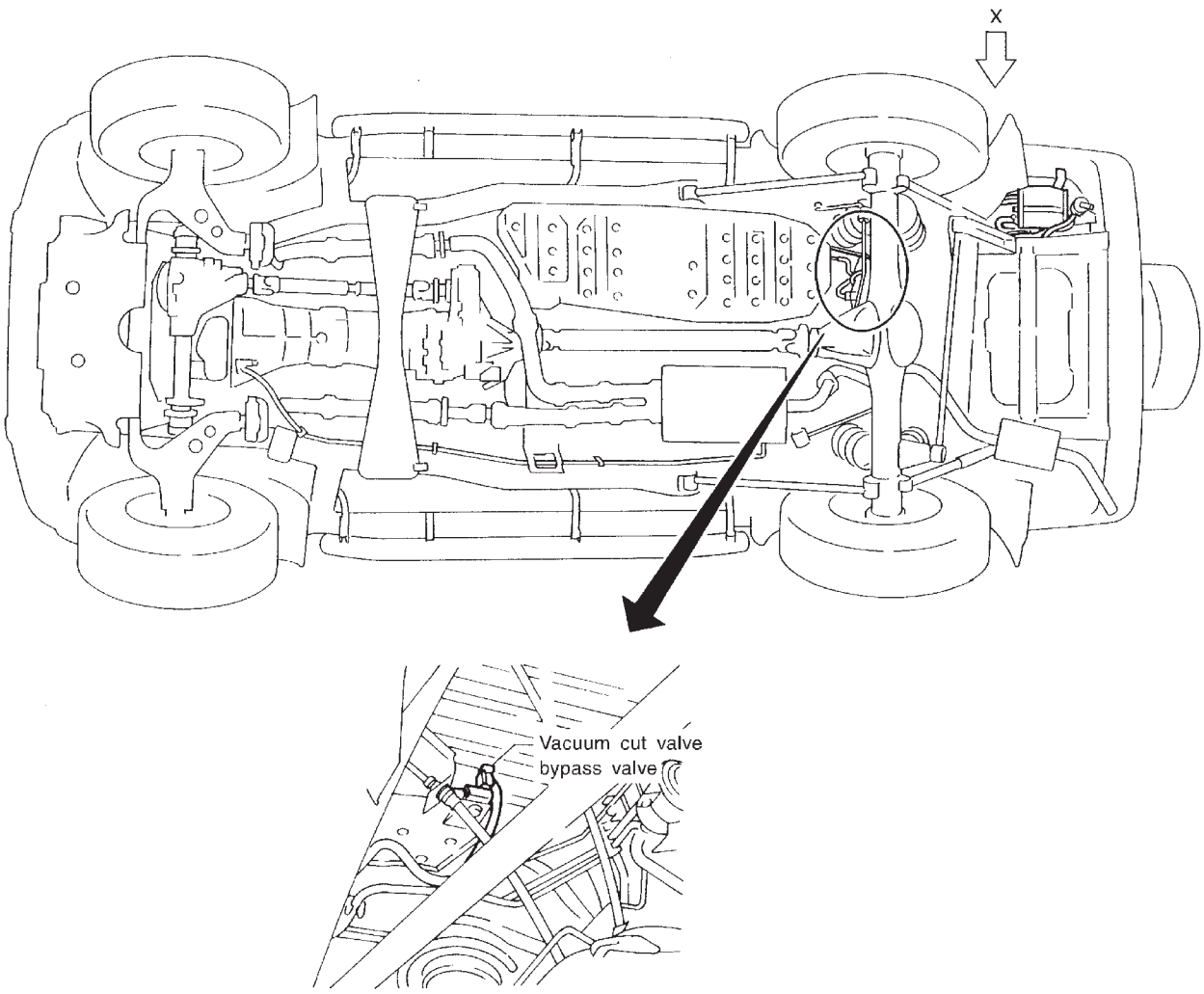
1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Also attach the pressure pump with pressure gauge to the EVAP service port adapter.
3) Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
4) To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2, 0.2 to 0.4 psi).
5) Remove EVAP service port adapter and hose with pressure pump.
6) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.

EVAPORATIVE EMISSION LINE DRAWING

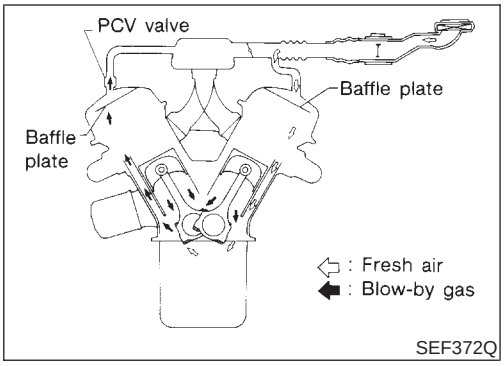
NAEC0020



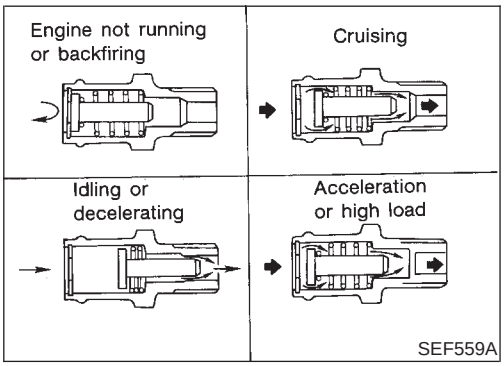
SEF932Y


X
Vacuum cut valve
bypass valve
LH rear side member
EVAP canister
EVAP control
system pressure sensor
EVAP canister
vent control valve
Water separator
Vacuum cut valve
View X

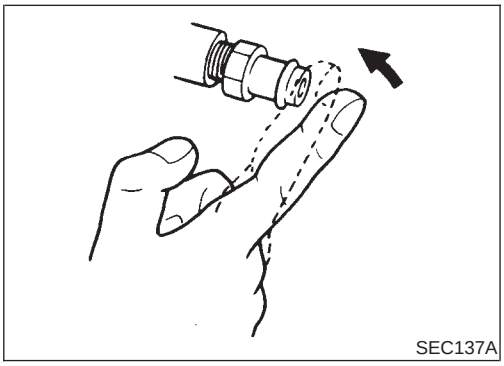
SEF870T

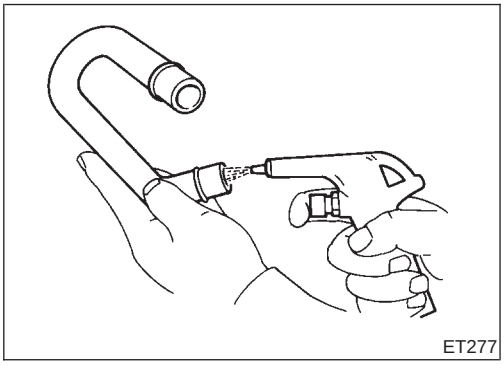


SEF372Q



SEF559A


SEC137A


ET277

Positive Crankcase Ventilation

DESCRIPTION

NAEC0021

This system returns blow-by gas to the intake manifold.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.

INSPECTION

NAEC0022

PCV (Positive Crankcase Ventilation) Valve

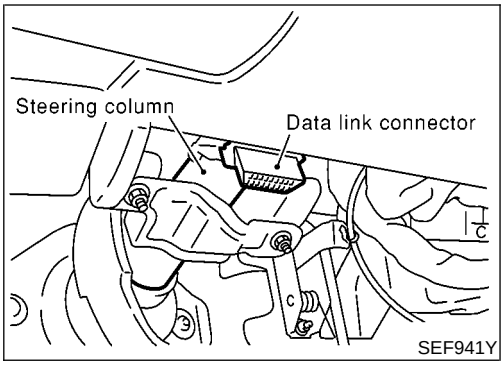
NAEC0022S01

With engine running at idle, remove PCV valve ventilation hose from PCV valve; if the valve is working properly, a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.

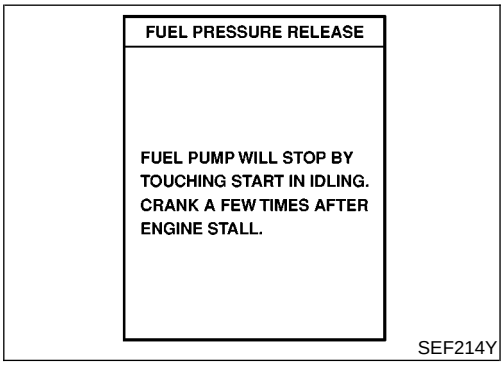
PCV Valve Ventilation Hose

NAEC0022S02

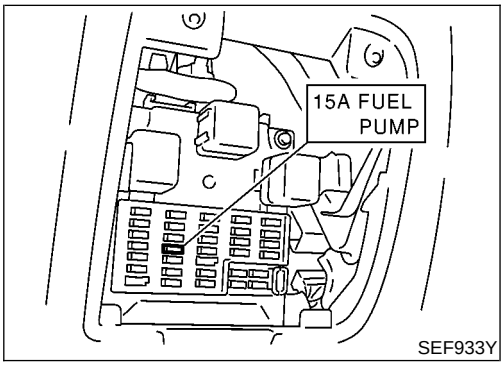
1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



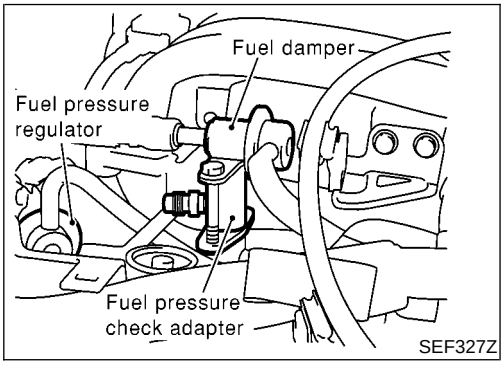
SEF941Y



SEF214Y



SEF933Y



SEF327Z

Fuel Pressure Release

NAEC0023

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

WITH CONSULT-II

NAEC0023S01

1. Turn ignition switch “ON”.
2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode with CONSULT-II.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch “OFF”.

WITHOUT CONSULT-II

NAEC0023S02

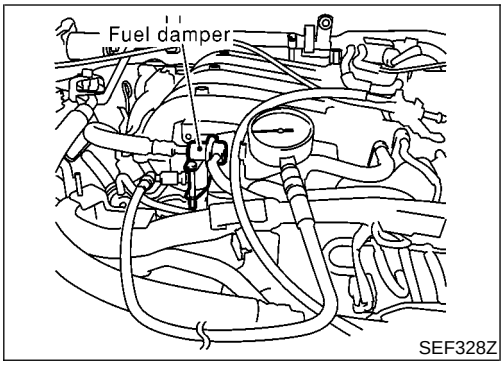
1. Remove fuel pump fuse located in fuse box.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch “OFF”.
5. Reinstall fuel pump fuse after servicing fuel system.

Fuel Pressure Check

NAEC0024

- **When reconnecting fuel line, always use new clamps.**
- **Make sure that clamp screw does not contact adjacent parts.**
- **Use a torque driver to tighten clamps.**
- **Use Pressure Gauge to check fuel pressure.**
- **Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.**

1. Release fuel pressure to zero.
2. Disconnect fuel tube joint between fuel damper and injector tube and set fuel pressure check adapter (J44321).



3. Install pressure gauge to the fuel pressure check adapter as shown in the figure.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

At idling:

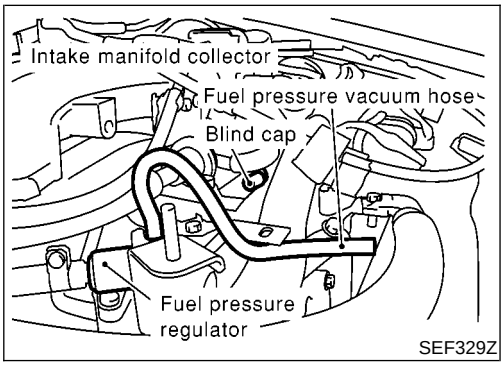
With vacuum hose connected

Approximately 235 kPa (2.4 kg/cm^2, 34 psi)

With vacuum hose disconnected

Approximately 294 kPa (3.0 kg/cm^2, 43 psi)

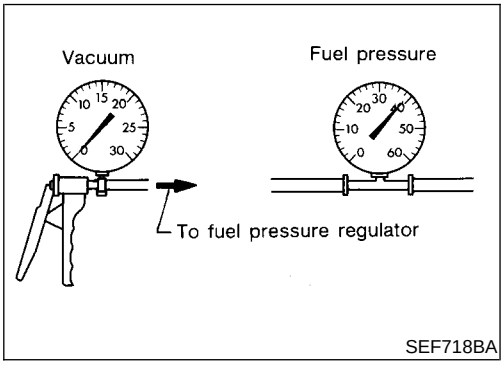
If results are unsatisfactory, perform Fuel Pressure Regulator Check.



Fuel Pressure Regulator Check

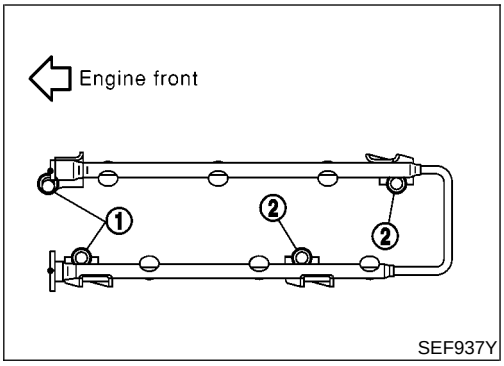
NAEC0025

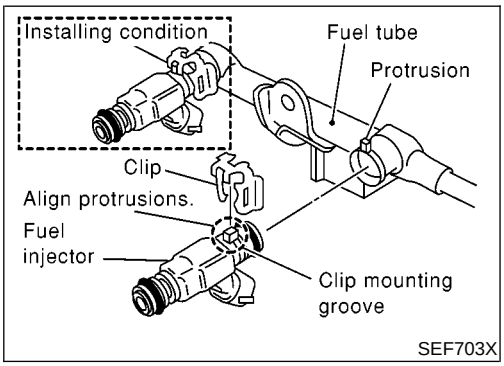
1. Stop engine and disconnect fuel pressure regulator vacuum hose from vacuum gallery.
2. Plug vacuum gallery with a blind cap.
3. Connect variable vacuum source to fuel pressure regulator.



4. Start engine and read indication of fuel pressure gauge as vacuum is changed.

Fuel pressure should decrease as vacuum increases. If results are unsatisfactory, replace fuel pressure regulator.





Injector

REMOVAL AND INSTALLATION

NAEC0026

1. Release fuel pressure to zero.
2. Remove intake manifold collector. Refer to EM-20, “TIMING CHAIN”.
3. Remove fuel tube assemblies in numerical sequence as shown in the figure at left.
4. Expand and remove clips securing fuel injectors.
5. Extract fuel injectors straight from fuel tubes.

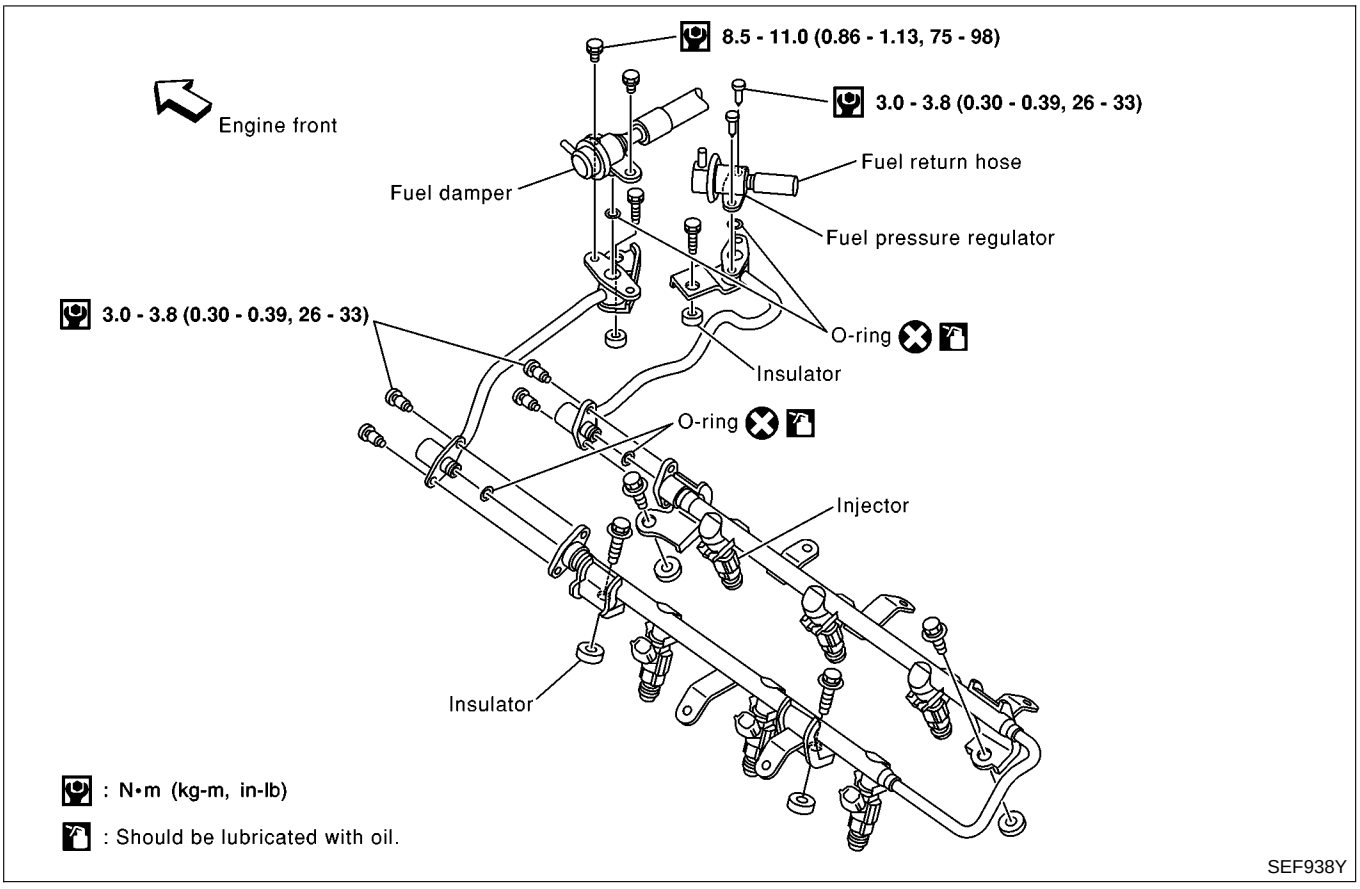
- **Be careful not to damage injector nozzles during removal.**
- **Do not bump or drop fuel injectors.**

6. Carefully install O-rings, including the one used with the pressure regulator.

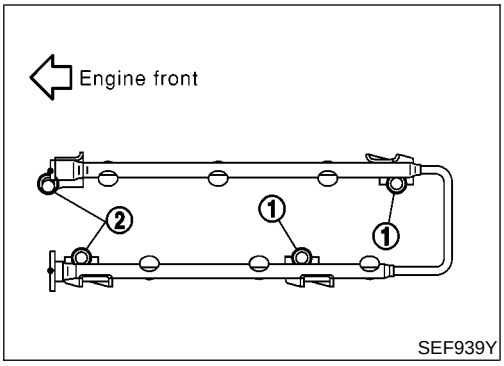
- **Lubricate O-rings with a smear of engine oil.**
- **Be careful not to damage O-rings with service tools, finger nails or clips. Do not expand or twist O-rings.**
- **Discard old clips; replace with new ones.**

7. Position clips in grooves on fuel injectors.

- **Make sure that protrusions of fuel injectors are aligned with cutouts of clips after installation.**



8. Align protrusions of fuel tubes with those of fuel injectors. Insert fuel injectors straight into fuel tubes.
9. After properly inserting fuel injectors, check to make sure that fuel tube protrusions are engaged with those of fuel injectors, and that flanges of fuel tubes are engaged with clips.



SEF939Y

10. Tighten fuel tube assembly mounting nuts in numerical sequence (indicated in the figure at left) and in two stages.
    : Tightening torque N·m (kg-m, ft-lb)
    1st stage:
    9.3 - 10.8 (1.0 - 1.1, 6.9 - 7.9)
    2nd stage:
    20.6 - 26.5 (2.1 - 2.7, 16 - 19)
11. Install all parts removed in reverse order of removal.

CAUTION:
After properly connecting fuel tube assembly to injector and fuel hose, check connection for fuel leakage.

How to Check Idle Speed and Ignition Timing

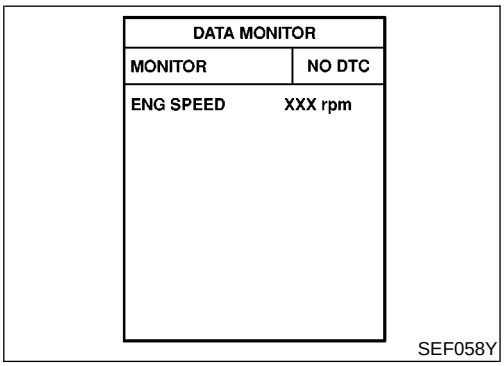
NAEC0607

IDLE SPEED

NAEC0607S01

- **Using CONSULT-II**

Check idle speed in "DATA MONITOR" mode with CONSULT-II.



SEF058Y

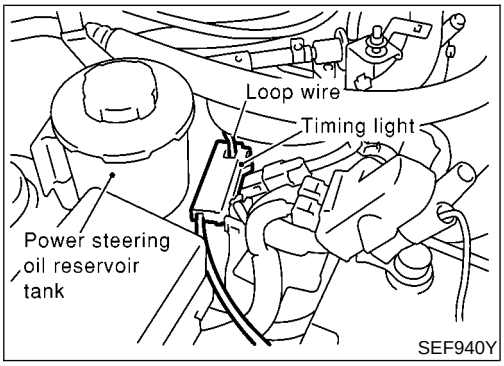
IGNITION TIMING

NAEC0607S02

Any of following two methods may be used.

- **Method A**

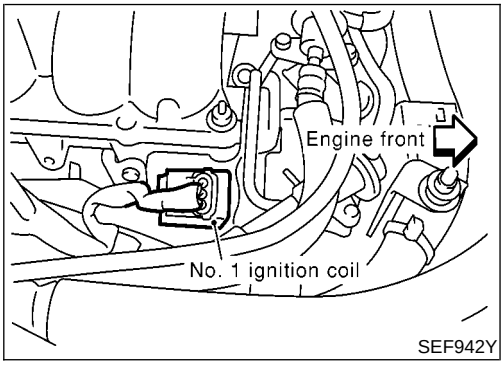
a) Attach timing light to loop wire as shown.
b) Check ignition timing.



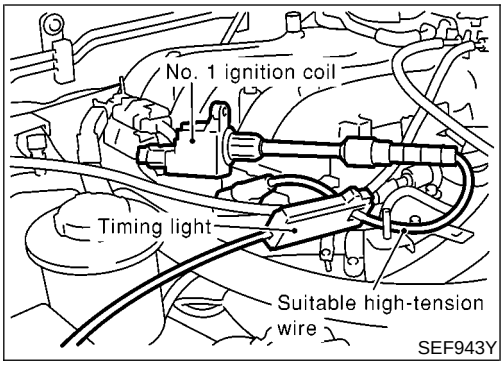
SEF940Y

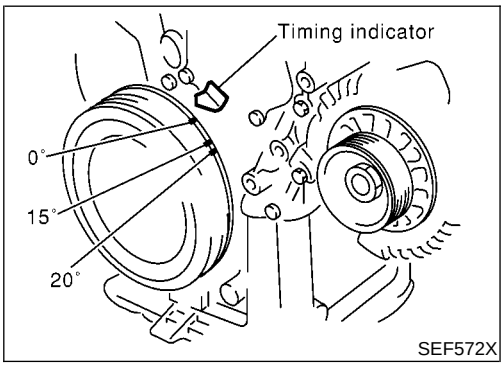
- **Method B**

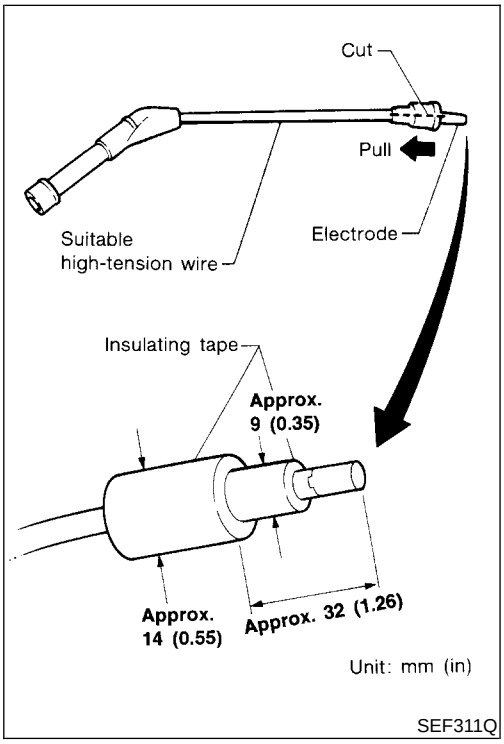
a) Remove No. 1 ignition coil.



SEF942Y







b) Connect No. 1 ignition coil and No. 1 spark plug with suitable high-tension wire as shown, and attach timing light clamp to this wire.

c) Check ignition timing.

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

NAEC0028

NAEC0028S01

PREPARATION

1) Make sure that the following parts are in good order.

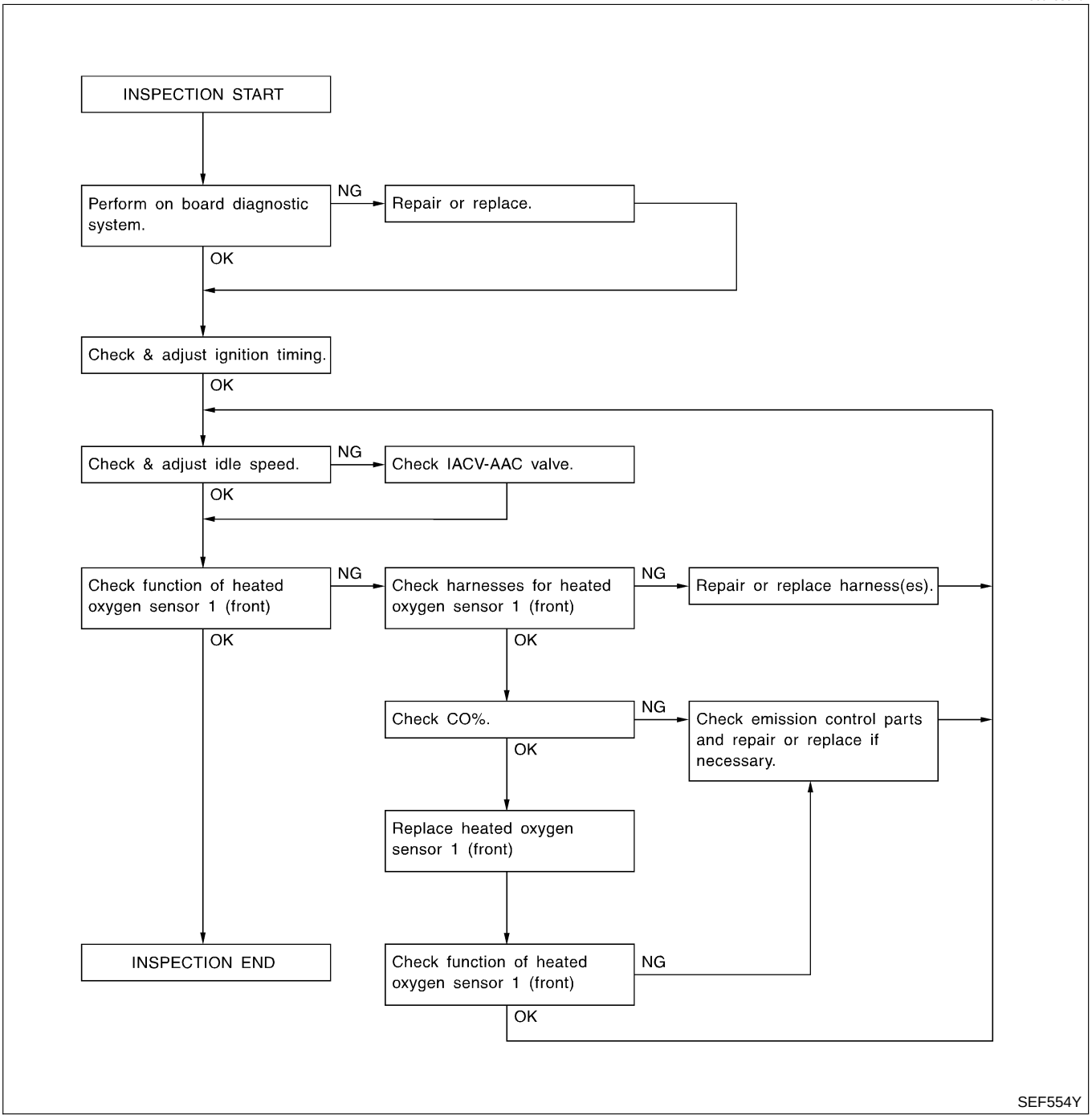
- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- ECM harness connector
- Vacuum hoses

- Air intake system
  (Oil filler cap, oil level gauge, etc.)
- Fuel pressure
- Engine compression
- Throttle valve
- Evaporative emission system

2) On air conditioner equipped models, checks should be carried out while the air conditioner is "OFF".
3) On automatic transmission equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in "N" position.
4) When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
5) Turn off headlamps, heater blower, rear defogger.
6) Keep front wheels pointed straight ahead.
7) Make the check after the cooling fan has stopped.

Overall Inspection Sequence

NAEC0028S0101



NOTE:
If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be expected to detect the resulting malfunction.

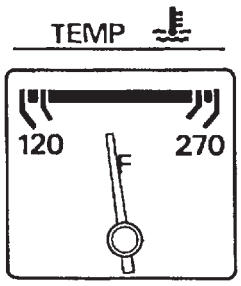
INSPECTION PROCEDURE

=NAEC0028S02

1	INSPECTION START

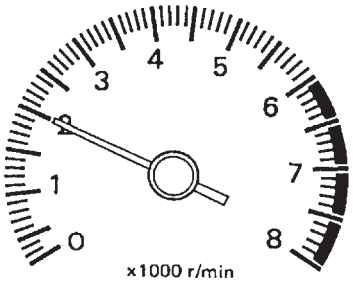
1. Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- Electrical connectors
- Gasket
- Throttle valve and throttle position sensor operation

2. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge. Ensure engine stays below 1,000 rpm.



SEF976U

3. Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.



SEF977U

4. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

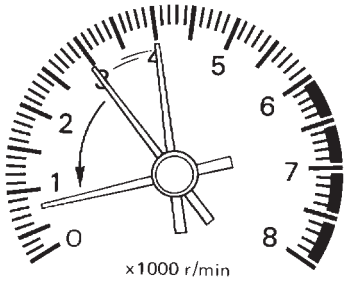
2	REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding "Diagnostic Procedure".

▶ GO TO 3.

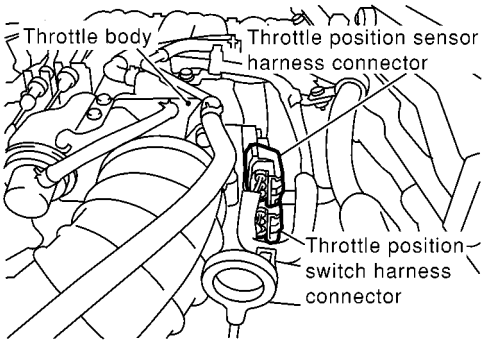
3	CHECK IGNITION TIMING

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.



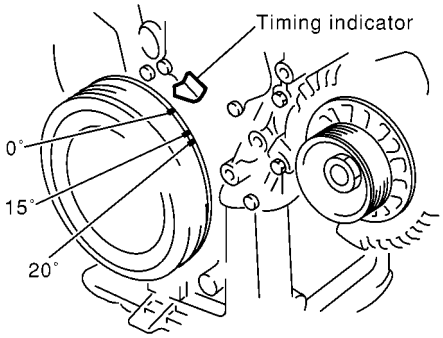
SEF978U

3. Turn off engine and disconnect throttle position sensor harness connector.



SEF944Y

4. Start and rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run at idle speed.
5. Check ignition timing with a timing light.



SEF572X

MT: 15°±2° BTDC
AT: 15°±2° BTDC (in "P" or "N" position)

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

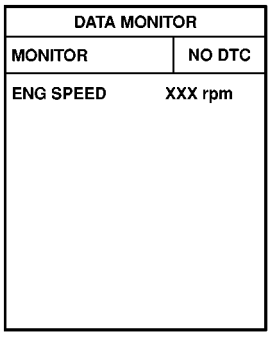
Check the following.
- Check camshaft position sensor (REF) and circuit, repair or replace if necessary. Refer to EC-505.
- Check camshaft position sensor (PHASE) and circuit, repair or replace if necessary. Refer to EC-337.
- Check crankshaft position sensor (POS) and circuit, repair or replace if necessary. Refer to EC-329, EC-512.
- Check ECM function by substituting another known-good ECM.
  (ECM may be the cause of a problem, but this is rarely the case.)

	▶	GO TO 3.

5	CHECK TARGET IDLE SPEED

With CONSULT-II

1. Turn off engine and connect throttle position sensor harness connector.
2. Start engine and make sure that electrical load switches are "OFF".
3. Rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run at idle speed.
4. Read idle speed in "DATA MONITOR" mode with CONSULT-II.



SEF058Y

MT: 750±50 rpm
AT: 750±50 rpm (in "P" or "N" position)

Without CONSULT-II

1. Turn off engine and connect throttle position sensor harness connector.
2. Start engine and make sure that electrical load switches are "OFF".
3. Rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run at idle speed.
4. Check idle speed.

MT: 750±50 rpm
AT: 750±50 rpm (in "P" or "N" position)

OK or NG

OK (With CONSULT-II) ▶	GO TO 8.
OK (Without CONSULT-II) ▶	GO TO 9.
NG ▶	GO TO 6.

6	CHECK TARGET IDLE SPEED AGAIN

Perform test No. 5 again.

OK or NG

OK (With CONSULT-II) ▶	GO TO 8.
OK (Without CONSULT-II) ▶	GO TO 9.
NG ▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

Check the following.

- Check IACV-AAC valve and replace if necessary. Refer to EC-417.
- Check IACV-AAC valve harness and repair if necessary. Refer to EC-417.
- Check ECM function by substituting another known-good ECM.
  (ECM may be the cause of a problem, but this is rarely the case.)

With CONSULT-II ▶	GO TO 8.
Without CONSULT-II ▶	GO TO 9.

8	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) SIGNAL

With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. See "HO2S1 MNTR (B2)" in "DATA MONITOR" mode.
3. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

1 time: RICH → LEAN → RICH
2 times: RICH → LEAN → RICH → LEAN → RICH

SEF945Y

OK or NG

OK	▶	GO TO 12.
NG (Monitor does not fluctuate.)	▶	GO TO 17.
NG (Monitor fluctuates less than 5 times.)	▶	GO TO 10.

9	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) SIGNAL

Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Set voltmeter probe between ECM terminal 62 and ground.
3. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

OK or NG

OK	▶	GO TO 12.
NG (Voltage does not fluctuate.)	▶	GO TO 17.
NG (Voltage fluctuates less than 5 times.)	▶	GO TO 10.

10	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) SIGNAL

With CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (front) (bank 2).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. See "HO2S1 MNTR (B2)" in "DATA MONITOR" mode.
6. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.
   1 time: RICH → LEAN → RICH
   2 times: RICH → LEAN → RICH → LEAN → RICH

Without CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (front) (bank 2).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. Set voltmeter probe between ECM terminal 62 and ground.
6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

OK or NG

OK (With CONSULT-II) ▶	GO TO 12.
OK (Without CONSULT-II) ▶	GO TO 13.
NG ▶	GO TO 11.

11	DETECT MALFUNCTIONING PART

Check the following.

1. Check fuel pressure regulator. Refer to EC-40.
2. Check mass air flow sensor and its circuit. Refer to EC-145.
3. Check injector and its circuit. Refer to EC-612.
   Clean or replace if necessary.
4. Check engine coolant temperature sensor and its circuit. Refer to EC-182.
5. Check ECM function by substituting another known-good ECM.
   (ECM may be the cause of a problem, but this is rarely the case.)

▶ GO TO 3.

12	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) SIGNAL

With CONSULT-II

1. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode.
2. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

1 time: RICH → LEAN → RICH
2 times: RICH → LEAN → RICH → LEAN → RICH

SEF945Y

OK or NG

OK	▶	**INSPECTION END**
NG (Monitor does not fluctuate.)	▶	GO TO 16.
NG (Monitor fluctuates less than 5 times.)	▶	GO TO 14.

13	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) SIGNAL

Without CONSULT-II

1. Set voltmeter probe between ECM terminal 63 and ground.
2. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

OK or NG

OK	▶	**INSPECTION END**
NG (Voltage does not fluctuate.)	▶	GO TO 16.
NG (Voltage fluctuates less than 5 times.)	▶	GO TO 14.

14	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) SIGNAL

With CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (front) (bank 1).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode.
6. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.
   1 time: RICH → LEAN → RICH
   2 times: RICH → LEAN → RICH → LEAN → RICH

Without CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (front) (bank 1).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. Set voltmeter probe between ECM terminal 63 and ground.
6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 15.

15	DETECT MALFUNCTIONING PART

Check the following.

- Check fuel pressure regulator. Refer to EC-40.
- Check mass air flow sensor and its circuit. Refer to EC-145.
- Check injector and its circuit. Refer to EC-612.
  Clean or replace if necessary.
- Check engine coolant temperature sensor and its circuit. Refer to EC-182.
- Check ECM function by substituting another known-good ECM.
  (ECM may be the cause of a problem, but this is rarely the case.)

	▶	GO TO 5.

16	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1) HARNESS

1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect heated oxygen sensor 1 (front) (bank 1) harness connector.
4. Check harness continuity between ECM terminal 63 and heated oxygen sensor 1 (front) (bank 1) harness connector terminal 1.
   Refer to Wiring Diagram, EC-191.
   Continuity should exist.

OK or NG

OK	▶	GO TO 19.
NG	▶	GO TO 18.

17	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) HARNESS

1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect heated oxygen sensor 1 (front) (bank 2) harness connector.
4. Check harness continuity between ECM terminal 62 and front heated oxygen sensor LH harness connector terminal 1. Refer to Wiring Diagram, EC-192.
   Continuity should exist.

OK or NG

OK	▶	GO TO 19.
NG	▶	GO TO 18.

18	REPAIR OR REPLACE

Repair or replace harness between ECM and heated oxygen sensor 1 (front).

▶ GO TO 5.

19	PREPARATION FOR "CO" % CHECK

With CONSULT-II

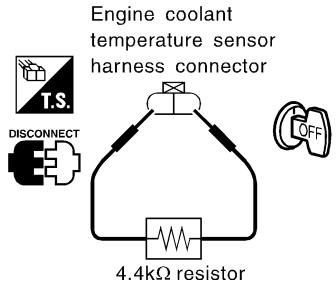
1. Reconnect ECM harness connector.
2. Turn ignition switch "ON".
3. Select "ENG COOLANT TEMP" in "ACTIVE TEST" mode.
4. Set "ENG COOLANT TEMP" to 5°C (41°F) by touching "DOWN" and "Qd".

ACTIVE TEST	
ENG COOLANT TEMP	XXX °C
MONITOR	
ENG SPEED	XXX rpm
INJ PULSE-B1	XXX msec
IGN TIMING	XXX BTDC

SEF172Y

Without CONSULT-II

1. Disconnect ECM harness connector.
2. Disconnect engine coolant temperature sensor harness connector.
3. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.



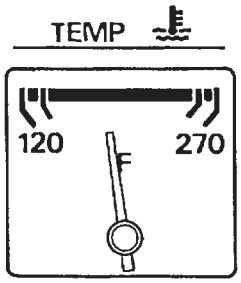
SEF982UA

▶ GO TO 20.

20	CHECK "CO" %

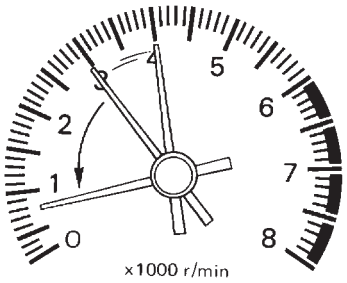
With CONSULT-II

1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.



SEF976U

2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.



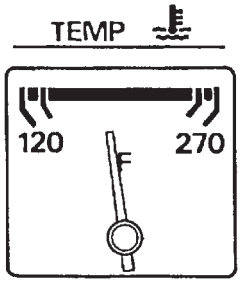
SEF978U

3. Check "CO" %.

Idle CO: 1.0 - 9.5%

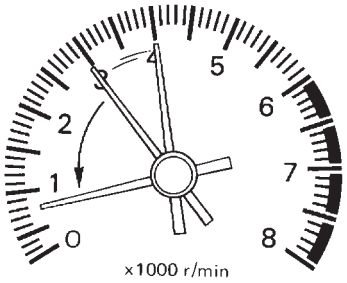
Without CONSULT-II

1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.



SEF976U

2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.



SEF978U

3. Check "CO" %.
4. After checking CO%,

a. Disconnect the resistor from terminals of engine coolant temperature sensor.
b. Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.

OK or NG

OK	▶	GO TO 21.
NG	▶	GO TO 22.

21	CHECK HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) SIGNAL

With CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (front) (bank 1)/(bank 2).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. See "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode.
6. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.
   1 time: RICH → LEAN → RICH
   2 times: RICH → LEAN → RICH → LEAN → RICH

Without CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (front) (bank 1)/(bank 2).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. Set voltmeter probe between ECM terminal 63 or 62 and ground.
6. Make sure that voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

OK or NG

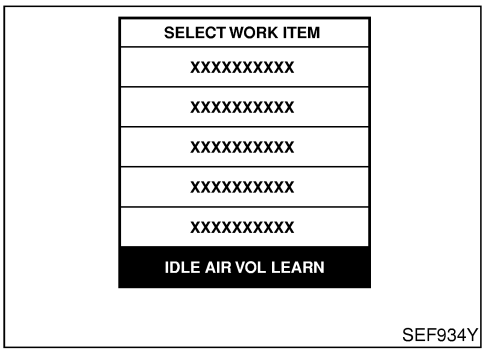
OK	▶	GO TO 5.
NG	▶	GO TO 22.

22	DETECT MALFUNCTIONING PART

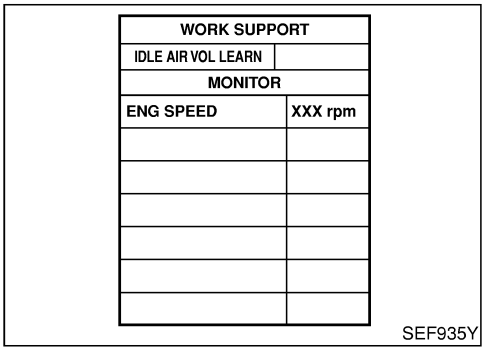
Check the following.

- Connect heated oxygen sensor 1 (front) harness connectors to heated oxygen sensors 1 (front).
- Check fuel pressure regulator. Refer to EC-40.
- Check mass air flow sensor and its circuit. Refer to EC-145.
- Check injector and its circuit. Refer to EC-612.
  Clean or replace if necessary.
- Check engine coolant temperature sensor and its circuit. Refer to EC-182.
- Check ECM function by substituting another known-good ECM.
  (ECM may be the cause of a problem, but this is rarely the case.)

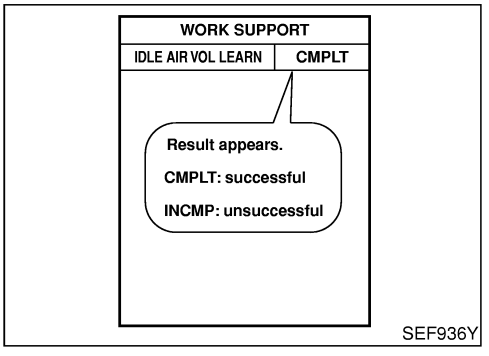
	▶	GO TO 5.



SEF934Y



SEF935Y



SEF936Y

Idle Air Volume Learning

NAEC0642

DESCRIPTION

NAEC0642S01

"Idle Air Volume Learning" is an operation to learn the idle air volume that keeps each engine within the specific range. It must be performed under any of the following conditions:

- Each time IACV-AAC valve, throttle body or ECM is replaced.
- Idle speed or ignition timing is out of specification.

PRE-CONDITIONING

NAEC0642S02

Before performing "Idle Air Volume Learning", make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 99°C (158 - 210°F)
- PNP switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)

On vehicles equipped with daytime running light systems, if the parking brake is applied before the engine is started the headlamp will not illuminate.

- Cooling fan motor: Not operating
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
  For A/T models with CONSULT-II, drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9V.
  For A/T models without CONSULT-II and M/T models, drive vehicle for 10 minutes.

OPERATION PROCEDURE

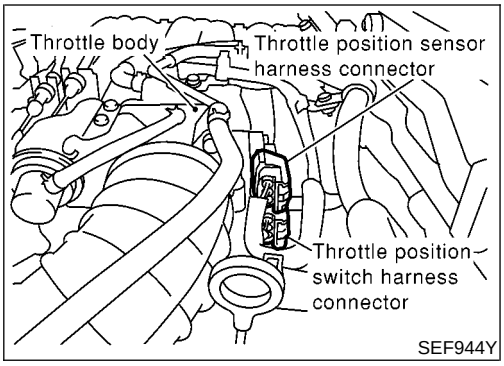
NAEC0642S03

With CONSULT-II

NAEC0642S0301

1. Turn ignition switch "ON" and wait at least 1 second.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic "PRE-CONDITIONING" (previously mentioned) are in good order.
5. Turn ignition switch "OFF" and wait at least 10 seconds.
6. Start the engine and let it idle for at least 30 seconds.
7. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
8. Touch "START" and wait 20 seconds.
9. Make sure that "CMPLT" is displayed on CONSULT-II screen. If "INCMP" is displayed, "Idle Air Volume Learning" will not be carried out successfully. In this case, find the cause of the problem by referring to the NOTE below.
10. Rev up the engine two or three times. Make sure that idle speed and ignition timing are within specifications.

ITEM	SPECIFICATION
Idle speed	M/T: 750±50 rpm A/T: 750±50 rpm (in "P" or "N" position)
Ignition timing	M/T: 15°±2° BTDC A/T: 15°±2° BTDC (in "P" or "N" position)



Without CONSULT-II

NAEC0642S0302

1. Turn ignition switch "ON" and wait at least 1 second.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic "PRE-CONDITIONING" (previously mentioned) are in good order.
5. Turn ignition switch "OFF" and wait at least 10 seconds.
6. Start the engine and let it idle for at least 30 seconds.
7. Disconnect throttle position sensor harness connector (brown), then reconnect it within 5 seconds.
8. Wait 20 seconds.
9. Make sure that idle speed is within specifications. If not, the result will be incomplete. In this case, find the cause of the problem by referring to the NOTE below.
10. Rev up the engine two or three times. Make sure that idle speed and ignition timing are within specifications.

ITEM	SPECIFICATION
Idle speed	M/T: 750±50 rpm A/T: 750±50 rpm (in "P" or "N" position)
Ignition timing	M/T: 15°±2° BTDC A/T: 15°±2° BTDC (in "P" or "N" position)

NOTE:
If idle air volume learning cannot be performed successfully, proceed as follows:

1) **Check that throttle valve is fully closed.**
2) **Check that downstream of throttle valve is free from air leakage.**
3) **Adjust closed throttle position switch and reset memory. (Refer to Basic Inspection, EC-99.)**
4) **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the problem.**
5) **If any of the following conditions occur after the engine has started, eliminate the cause of the problem and perform "Idle air volume learning" all over again:**

- **Engine stalls.**
- **Erroneous idle.**
- **Blown fuses related to the IACV-AAC valve system.**

Introduction

NAEC0029

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	SAE Mode
Diagnostic Trouble Code (DTC)	Mode 3 of SAE J1979
Freeze Frame data	Mode 2 of SAE J1979
System Readiness Test (SRT) code	Mode 1 of SAE J1979
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Mode 7 of SAE J1979
1st Trip Freeze Frame data	
Test values and Test limits	Mode 6 of SAE J1979

The above information can be checked using procedures listed in the table below.

X: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	Test value
CONSULT-II	X	X	X	X	X	—
GST	X	X*1	X	—	X	X

*1: 1st trip DTCs for self-diagnoses concerning SRT items cannot be shown on the GST display.

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-116.)

Two Trip Detection Logic

NAEC0030

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not light up at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

X: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Coolant overtemperature enrichment protection — DTC: P0217	—	X	—	—	X	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	X	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	—	—	X	—	—	X	—	—
Closed loop control — DTC: P1148, P1168	—	X	—	—	X	—	X	—
Fail-safe items (Refer to EC-116.)	—	X	—	—	X*1	—	X*1	—
Except above	—	—	—	X	—	X	X	—

*1: Except “ECM”

Emission-related Diagnostic Information

NAEC0031

DTC AND 1ST TRIP DTC

NAEC0031S01

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-71.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-68. These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.

1st trip DTC is specified in Mode 7 of SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a problem. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in "Work Flow" procedure Step II, refer to EC-97. Then perform "DTC Confirmation Procedure" or "Overall Function Check" to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

NAEC0031S0101

DTC and 1st trip DTC can be read by the following methods.

With CONSULT-II

With GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P1320, P0705, P0750, etc.

These DTCs are prescribed by SAE J2012.

(CONSULT-II also displays the malfunctioning component or system.)

- **1st trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However, GST does not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.**

A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.

If the DTC is being detected currently, the time data will be "0".

If a 1st trip DTC is stored in the ECM, the time data will be "[1t]".

DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
MAF SEN/CIRCUIT [P0100]	0

1st trip DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
MAF SEN/CIRCUIT [P0100]	1t

SEF992X

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

NAEC0031S02

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed and absolute pressure at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data.

The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For details, see EC-84.
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0306 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-71.

SYSTEM READINESS TEST (SRT) CODE

NAEC0031S03

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979.
As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.
If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating "INCMP", use the information in this Service Manual to set the SRT to "CMPLT".
In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate "CMPLT" for each application system. Once set as "CMPLT", the SRT status remains "CMPLT" until the self-diagnosis memory is erased.
Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate "INCMP" for these items.

NOTE:
The SRT will also indicate "INCMP" if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.

If, during the state emissions inspection, the SRT indicates "CMPLT" for all test items, the inspector will continue with the emissions test. However, if the SRT indicates "INCMP" for one or more of the SRT items the vehicle is returned to the customer untested.

NOTE:
If MIL is "ON" during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates "CMPLT" for all test items. Therefore, it is important to check SRT ("CMPLT") and DTC (No DTCs) before the inspection.

SRT Item

=NAEC0031S0310

The table below shows required self-diagnostic items to set the SRT to "CMPLT".

SRT item (CONSULT-II indication)	Performance Priority*	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	3	Three way catalyst function	P0420, P0430
EVAP SYSTEM	2	EVAP control system (small leak) (negative pressure)	P0440
	3	EVAP control system (very small leak) (negative pressure)/ (positive pressure)	P1441
	3	EVAP control system purge flow monitoring	P1447
O2 SENSOR	3	Heated oxygen sensor 1 (front) (circuit)	P0130, P0150
		Heated oxygen sensor 1 (front) (lean shift monitoring)	P0131, P0151
		Heated oxygen sensor 1 (front) (rich shift monitoring)	P0132, P0152
		Heated oxygen sensor 1 (front) (response monitoring)	P0133, P0153
		Heated oxygen sensor 1 (front) (high voltage)	P0134, P0154
		Heated oxygen sensor 2 (rear) (min. voltage monitoring)	P0137, P0157
		Heated oxygen sensor 2 (rear) (max. voltage monitoring)	P0138, P0158
		Heated oxygen sensor 2 (rear) (response monitoring)	P0139, P0159
		Heated oxygen sensor 2 (rear) (high voltage)	P0140, P0160
O2 SEN HEATER	3	Heated oxygen sensor 1 heater (front)	P0135, P0155
		Heated oxygen sensor 2 heater (rear)	P0141, P0161

*: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT-II.

SRT Set Timing

=NAEC0031S0311

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

Self-diagnosis result		Example				
		Diagnosis	Ignition cycle ← ON →	OFF	← ON →	OFF ← ON → OFF ← ON →
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	"CMPLT"	"CMPLT"	"CMPLT"	"CMPLT"
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"
NG exists	Case 3	P0400	OK	OK	—	—
		P0402	—	—	—	—
		P1402	NG	—	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MIL "ON")
		SRT of EGR	"INCMP"	"INCMP"	"INCMP"	"CMPLT"

OK: Self-diagnosis is carried out and the result is OK.
NG: Self-diagnosis is carried out and the result is NG.
—: Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate "CMPLT". → Case 1 above
When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate "CMPLT" at the time the respective self-diagnoses have at least one OK result. → Case 2 above
If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate "CMPLT". → Case 3 above
The table above shows that the minimum number of cycles for setting SRT as "INCMP" is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary of each self-diagnosis to be executed twice (Case 3) for the following reasons:

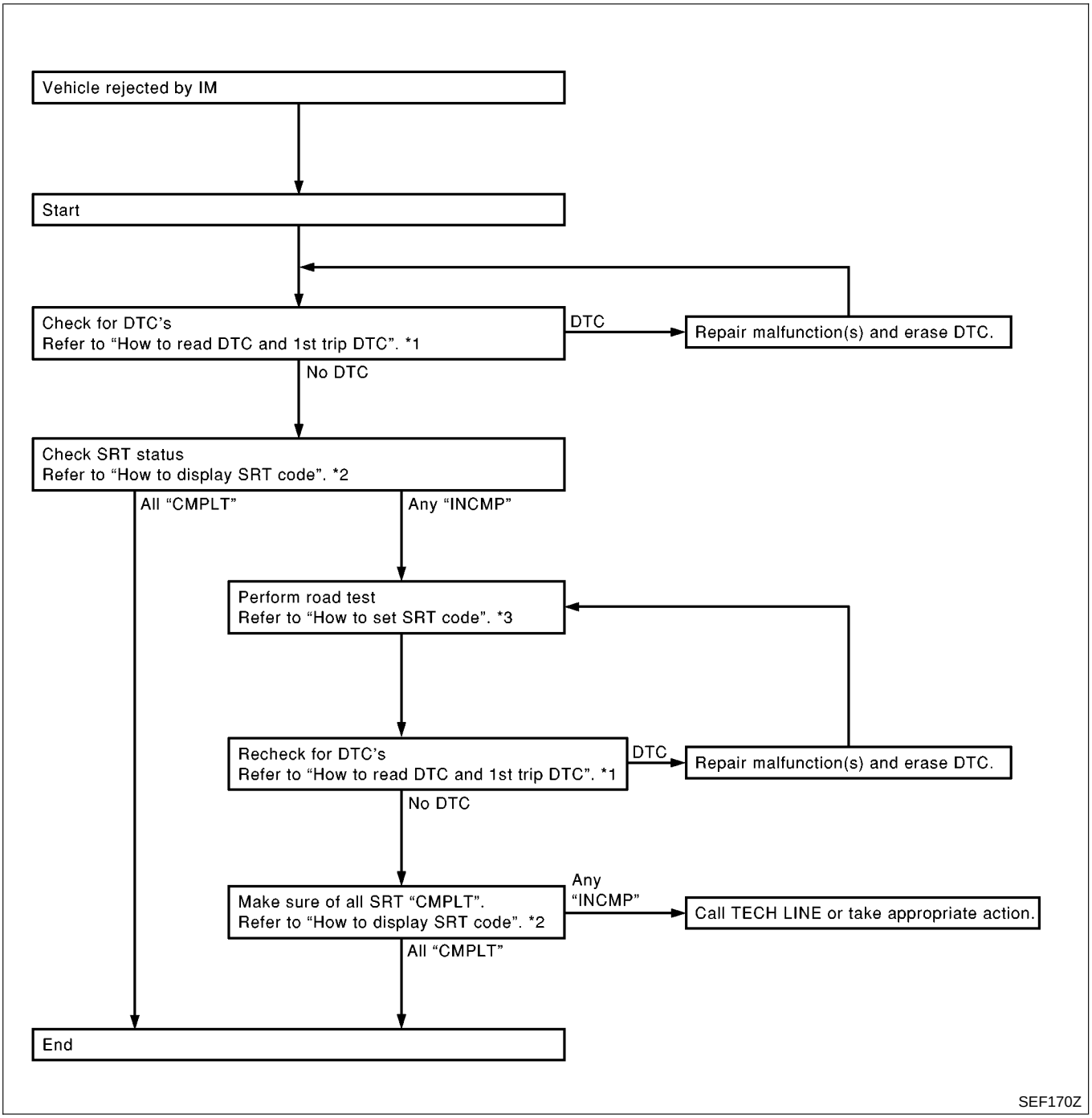
- The SRT will indicate "CMPLT" at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires "CMPLT" of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to "CMPLT" of SRT, the self-diagnosis memory must be erased from ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate "INCMP".

NOTE:
SRT can be set as "CMPLT" together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates "CMPLT".

SRT Service Procedure

NAEC0031S0312

If a vehicle has failed the state emissions inspection due to one or more SRT items indicating "INCMP", review the flowchart diagnostic sequence on the next page.



*1 EC-59 *2 EC-63 *3 EC-64

How to Display SRT Code

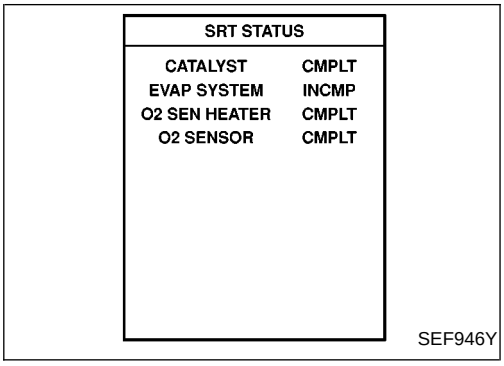
NAEC0031S0301

With CONSULT-II

Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-II.
For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT-II screen; for items whose SRT codes are not set, "INCMP" is displayed.

With GST

Selecting Mode 1 with GST (Generic Scan Tool)
A sample of CONSULT-II display for SRT code is shown below.
"INCMP" means the self-diagnosis is incomplete and SRT is not set. "CMPLT" means the self-diagnosis is complete and SRT is set.



How to Set SRT Code

NAEC0031S0302

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

With CONSULT-II

Perform corresponding DTC Confirmation Procedure one by one based on "Performance Priority" in the table on EC-61.

Without CONSULT-II

The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.

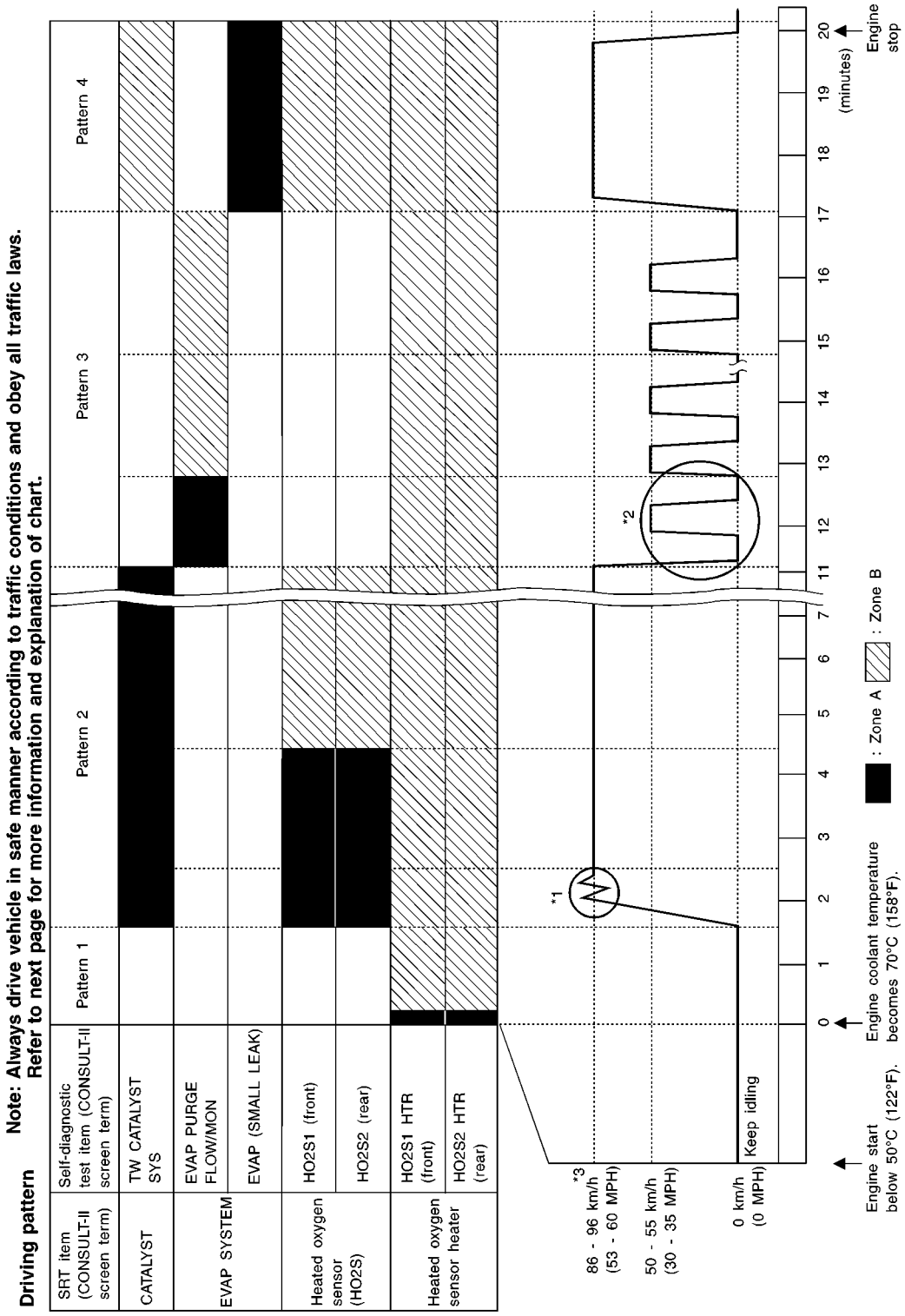
Driving Pattern

NAEC0031S0303

Driving pattern

Note: Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.
Refer to next page for more information and explanation of chart.

SRT item (CONSULT-II screen term)	Self-diagnostic test item (CONSULT-II screen term)	Pattern 1	Pattern 2	Pattern 3	Pattern 4
CATALYST	TW CATALYST SYS				
EVAP SYSTEM	EVAP PURGE FLOW/MON				
	EVAP (SMALL LEAK)				
Heated oxygen sensor (HO2S)	HO2S1 (front)				
	HO2S2 (rear)				
Heated oxygen sensor heater	HO2S1 HTR (front)				
	HO2S2 HTR (rear)				



SEF947Y

- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
  Zone A refers to the range where the time required, for the diagnosis under normal conditions*, is the shortest.
  Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

− Sea level
− Flat road
− Ambient air temperature: 20 - 30°C (68 - 86°F)
− Diagnosis is performed as quickly as possible under normal conditions.
  Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

- **The engine is started at the engine coolant temperature of −10 to 35°C (14 to 95°F) (where the voltage between the ECM terminals 70 and 58 is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminals 70 and 58 is lower than 1.4V).**
- **The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 92 and ground is less than 4.1V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

- The driving pattern outlined in *2 must be repeated at least 3 times.

Pattern 4:

- Tests are performed after the engine has been operated for at least 17 minutes.
- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

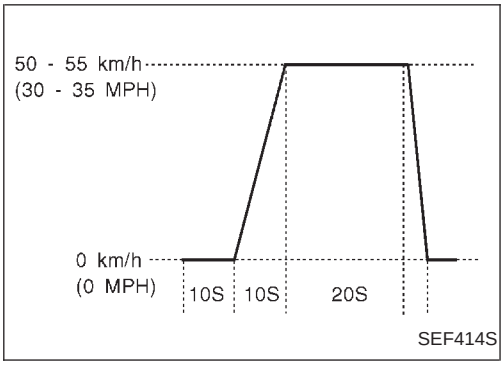
*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

*2: Operate the vehicle in the following driving pattern.

1) Decelerate vehicle to 0 km/h (0 MPH) and let engine idle.
2) Repeat driving pattern shown below at least 10 times.

- **During acceleration, hold the accelerator pedal as steady as possible.**

3) Repeat steps 1 and 2 until the EGR system SRT is set.



*3: Checking the vehicle speed with GST is advised.

Suggested Transmission Gear Position for A/T Models

Set the selector lever in the "D" position with the overdrive switch turned ON.

Suggested upshift speeds for M/T models

Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:		For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
Gear change	ACCEL shift point km/h (MPH)	CRUISE shift point km/h (MPH)	km/h (MPH)
1st to 2nd	21 (13)	21 (13)	24 (15)
2nd to 3rd	37 (23)	26 (16)	40 (25)
3rd to 4th	53 (33)	44 (27)	64 (40)
4th to 5th	63 (39)	58 (36)	72 (45)

Suggested Maximum Speed in Each Gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.
Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed. Always observe posted speed limits and drive according to the road conditions to ensure safe operation. Do not over-rev the engine when shifting to a lower gear as it may cause engine damage or loss of vehicle control.

Gear	km/h (MPH)
1st	50 (30)
2nd	89 (55)
3rd	128 (80)
4th	—
5th	—

TEST VALUE AND TEST LIMIT (GST ONLY — NOT APPLICABLE TO CONSULT-II)

NAEC0031S04

The following is the information specified in Mode 6 of SAE J1979.
The test value is a parameter used to determine whether a system/circuit diagnostic test is "OK" or "NG" while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
Items for which these data (test value and test limit) are displayed are the same as SRT code items (30 test items).
These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

X: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function (Right bank)	01H	01H	Max.	X
	Three way catalyst function (Left bank)	03H	02H	Max.	X
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	X
	EVAP control system purge flow monitoring	06H	83H	Min.	X

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
O2 SENSOR	Heated oxygen sensor 1 (front) (bank 1)	09H	04H	Max.	X
		0AH	84H	Min.	X
		0BH	04H	Max.	X
		0CH	04H	Max.	X
		0DH	04H	Max.	X
	Heated oxygen sensor 1 (front) (bank 2)	11H	05H	Max.	X
		12H	85H	Min.	X
		13H	05H	Max.	X
		14H	05H	Max.	X
		15H	05H	Max.	X
	Heated oxygen sensor 2 (rear) (bank 1)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
	Heated oxygen sensor 2 (rear) (bank 2)	21H	87H	Min.	X
		22H	87H	Min.	X
		23H	07H	Max.	X
		24H	07H	Max.	X
O2 SENSOR HEATER	Heated oxygen sensor 1 (front) heater (bank 1)	29H	08H	Max.	X
		2AH	88H	Min.	X
	Heated oxygen sensor 1 (front) heater (bank 2)	2BH	09H	Max.	X
		2CH	89H	Min.	X
	Heated oxygen sensor 2 (rear) heater (bank 1)	2DH	0AH	Max.	X
		2EH	8AH	Min.	X
	Heated oxygen sensor 2 (rear) heater (bank 2)	2FH	0BH	Max.	X
		30H	8BH	Min.	X

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

NAEC0031S05

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	—	—	—	—
MAF SEN/CIRCUIT	P0100	—	—	X	EC-145
ABSL PRES SEN/CIRC	P0105	—	—	X	EC-153
AIR TEMP SEN/CIRC	P0110	—	—	X	EC-159
COOLANT T SEN/CIRC	P0115	—	—	X	EC-164

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
THRTL POS SEN/CIRC	P0120	—	—	X	EC-169
*COOLAN T SEN/CIRC	P0125	—	—	X	EC-182
HO2S1 (B1)	P0130	X	X	X*2	EC-187
HO2S1 (B1)	P0131	X	X	X*2	EC-197
HO2S1 (B1)	P0132	X	X	X*2	EC-205
HO2S1 (B1)	P0133	X	X	X*2	EC-213
HO2S1 (B1)	P0134	X	X	X*2	EC-226
HO2S1 HTR (B1)	P0135	X	X	X*2	EC-235
HO2S2 (B1)	P0137	X	X	X*2	EC-242
HO2S2 (B1)	P0138	X	X	X*2	EC-252
HO2S2 (B1)	P0139	X	X	X*2	EC-262
HO2S2 (B1)	P0140	X	X	X*2	EC-272
HO2S2 HTR (B1)	P0141	X	X	X*2	EC-281
HO2S1 (B2)	P0150	X	X	X*2	EC-187
HO2S1 (B2)	P0151	X	X	X*2	EC-197
HO2S1 (B2)	P0152	X	X	X*2	EC-205
HO2S1 (B2)	P0153	X	X	X*2	EC-213
HO2S1 (B2)	P0154	X	X	X*2	EC-226
HO2S1 HTR (B2)	P0155	X	X	X*2	EC-235
HO2S2 (B2)	P0157	X	X	X*2	EC-242
HO2S2 (B2)	P0158	X	X	X*2	EC-252
HO2S2 (B2)	P0159	X	X	X*2	EC-262
HO2S2 (B2)	P0160	X	X	X*2	EC-272
HO2S2 HTR (B2)	P0161	X	X	X*2	EC-281
FUEL SYS-LEAN/BK1	P0171	—	—	X	EC-289
FUEL SYS-RICH/BK1	P0172	—	—	X	EC-297
FUEL SYS-LEAN/BK2	P0174	—	—	X	EC-289
FUEL SYS-RICH/BK2	P0175	—	—	X	EC-297
FUEL TEMP SEN/CIRC	P0180	—	—	X	EC-304
ENG OVER TEMP	P0217	—	—	X	EC-309
MULTI CYL MISFIRE	P0300	—	—	X	EC-315
CYL 1 MISFIRE	P0301	—	—	X	EC-315
CYL 2 MISFIRE	P0302	—	—	X	EC-315
CYL 3 MISFIRE	P0303	—	—	X	EC-315
CYL 4 MISFIRE	P0304	—	—	X	EC-315
CYL 5 MISFIRE	P0305	—	—	X	EC-315
CYL 6 MISFIRE	P0306	—	—	X	EC-315

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
KNOCK SEN/CIRC-B1	P0325	—	—	—	EC-323
CPS/CIRCUIT (POS)	P0335	—	—	X	EC-329
CAM PS/CIRC (PHS)	P0340	—	—	X	EC-337
TW CATALYST SYS-B1	P0420	X	X	X*2	EC-342
TW CATALYST SYS-B2	P0430	X	X	X*2	EC-342
EVAP SMALL LEAK	P0440	X	X	X*2	EC-347
PURG VOLUME CONT/V	P0443	—	—	X	EC-362
VENT CONTROL VALVE	P0446	—	—	X	EC-369
EVAP SYS PRES SEN	P0450	—	—	X	EC-376
EVAP GROSS LEAK	P0455	X	X	X*2	EC-389
FUEL LV SE (SLOSH)	P0460	—	—	X	EC-402
FUEL LEVEL SENSOR	P0461	—	—	X	EC-406
FUEL LEVEL SEN/CIRC	P0464	—	—	X	EC-408
VEH SPEED SEN/CIRC	P0500	—	—	X	EC-412
IACV/AAC VLV/CIRC	P0505	—	—	X	EC-417
CLOSED TP SW/CIRC	P0510	—	—	X	EC-426
A/T COMM LINE	P0600	—	—	—	EC-435
ECM	P0605	—	—	X	EC-439
PNP SW/CIRC	P0705	—	—	X	AT-99
ATF TEMP SEN/CIRC	P0710	—	—	X	AT-105
VEH SPD SEN/CIR AT	P0720	—	—	X	AT-111
ENGINE SPEED SIG	P0725	—	—	X	AT-116
A/T 1ST GR FNCTN	P0731	—	—	X	AT-120
A/T 2ND GR FNCTN	P0732	—	—	X	AT-126
A/T 3RD GR FNCTN	P0733	—	—	X	AT-132
A/T 4TH GR FNCTN	P0734	—	—	X	AT-138
TCC SOLENOID/CIRC	P0740	—	—	X	AT-148
A/T TCC S/V FNCTN	P0744	—	—	X	AT-153
L/PRESS SOL/CIRC	P0745	—	—	X	AT-162
SFT SOL A/CIRC	P0750	—	—	X	AT-168
SFT SOL B/CIRC	P0755	—	—	X	AT-172
INT/V TIM CONT-B1	P1110	—	—	X	EC-441
INT/V TIM V/CIR-B1	P1111	—	—	X	EC-446
SWIRL CONT SOL/V	P1130	—	—	X	EC-453
INT/V TIM CONT-B2	P1135	—	—	X	EC-441
INT/V TIM V/CIR-B2	P1136	—	—	X	EC-446
INTK TIM S/CIRC-B1	P1140	—	—	X	EC-477

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
INTK TIM S/CIRC-B2	P1145	—	—	X	EC-477
CLOSED LOOP-B1	P1148	—	—	X	EC-486
SWL CON VC SW/CIRC	P1165	—	—	X	EC-488
CLOSED LOOP-B2	P1168	—	—	X	EC-486
ENG OVER TEMP	P1217	—	—	X	LC-25
IGN SIGNAL-PRIMARY	P1320	—	—	X	EC-494
CPS/CIRCUIT (REF)	P1335	—	—	X	EC-505
CPS/CIRC (POS) COG	P1336	—	—	X	EC-512
EVAP VERY SMALL LEAK	P1441	X	X	X*2	EC-521
PURG VOLUME CONT/V	P1444	—	—	X	EC-536
VENT CONTROL VALVE	P1446	—	—	X	EC-548
EVAP PURG FLOW/MON	P1447	X	X	X*2	EC-556
VENT CONTROL VALVE	P1448	—	—	X	EC-568
FUEL LEVEL SEN/CIRC	P1464	—	—	X	EC-577
VC/V BYPASS/V	P1490	—	—	X	EC-580
VC CUT/V BYPASS/V	P1491	—	—	X	EC-586
A/T DIAG COMM LINE	P1605	—	—	X	EC-598
TP SEN/CIRC A/T	P1705	—	—	X	AT-176
P-N POS SW/CIRCUIT	P1706	—	—	X	EC-599
O/R CLTCH SOL/CIRC	P1760	—	—	X	AT-185

*1: 1st trip DTC No. is the same as DTC No.
*2: These are not displayed with GST.

NOTE:
Regarding A33 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

NAEC0031S06

How to Erase DTC (With CONSULT-II)

NAEC0031S0601

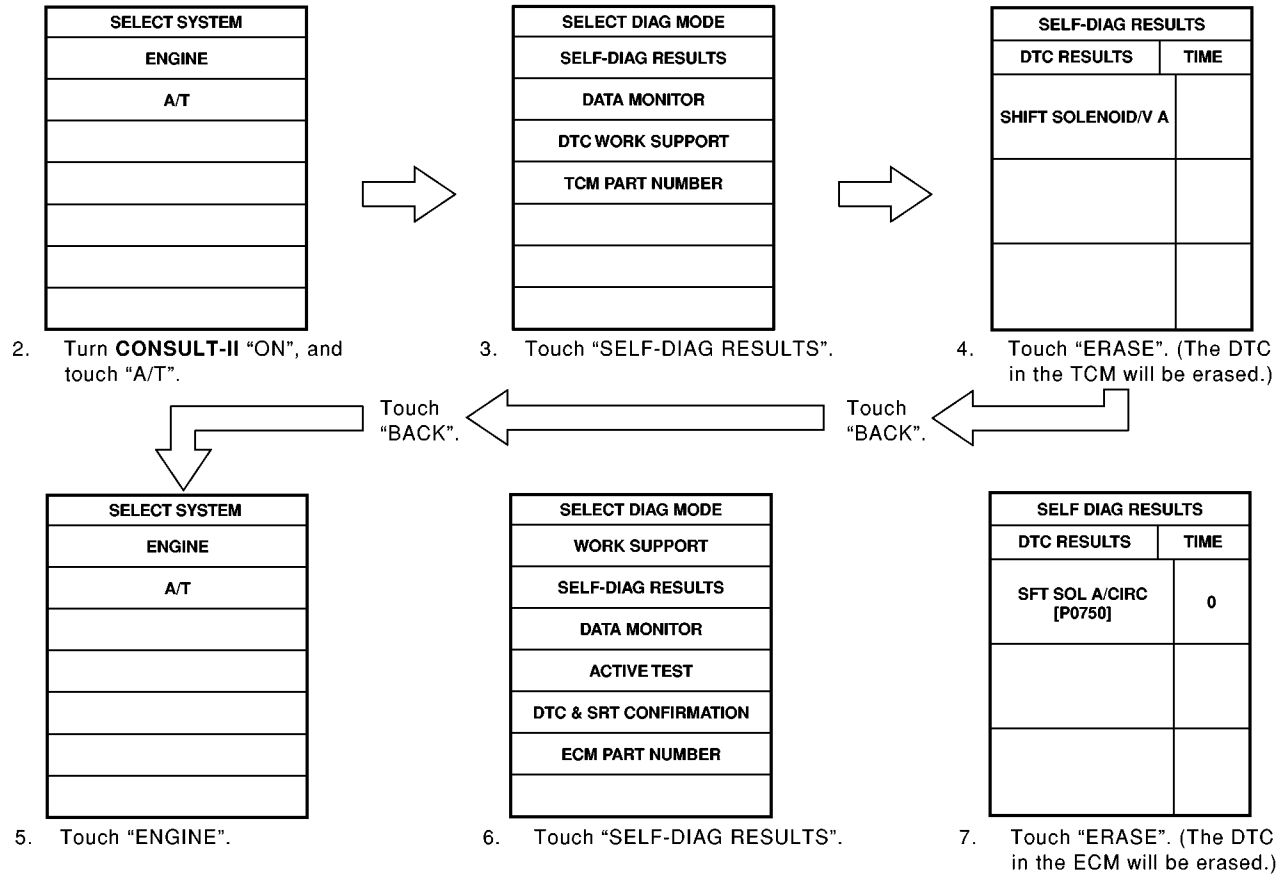
NOTE:
If the DTC is not for A/T related items (see EC-8), skip steps 2 through 4.

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 seconds and then turn it "ON" (engine stopped) again.
2. Turn CONSULT-II "ON" and touch "A/T".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". [The DTC in the TCM (Transmission control module) will be erased.] Then touch "BACK" twice.
5. Touch "ENGINE".
6. Touch "SELF-DIAG RESULTS".
7. Touch "ERASE". (The DTC in the ECM will be erased.)

- If DTCs are displayed for both ECM and TCM (Transmission control module), they need to be erased individually from the ECM and TCM (Transmission control module).

How to erase DTC (With CONSULT-II)

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 seconds and then turn it "ON" (engine stopped) again.



SEF966X

The emission related diagnostic information in the ECM can be erased by selecting "ERASE" in the "SELF-DIAG RESULTS" mode with CONSULT-II.

How to Erase DTC (GST) With GST)

NAEC0031S0602

NOTE:

If the DTC is not for A/T related items (see EC-8), skip step 2.

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 seconds and then turn it "ON" (engine stopped) again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)" in AT section titled "TROUBLE DIAGNOSIS", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with GST (Generic Scan Tool).

The emission related diagnostic information in the ECM can be erased by selecting Mode 4 with GST.

- **If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

1) Diagnostic trouble codes
2) 1st trip diagnostic trouble codes
3) Freeze frame data
4) 1st trip freeze frame data
5) System readiness test (SRT) codes
6) Test values
7) Others

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)

NAEC0031S08

SELF DIAG RESULTS	
DTC RESULTS	TIME
NATS MALFUNCTION [P1610]	0

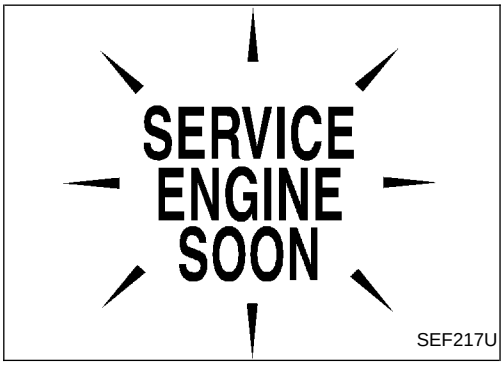
SEF515Y

- **If the security indicator lights up with the ignition switch in the "ON" position or "NATS MALFUNCTION" is displayed on "SELF-DIAG RESULTS" screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to "NVIS (Nissan Vehicle Immobilizer System — NATS)" in EL section.**
- **Confirm no self-diagnostic results of NVIS (NATS) is displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT-II.**
- **When replacing ECM, initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs must be carried out with CONSULT-II using NATS program card.**
  Therefore, be sure to receive all keys from vehicle owner. Regarding the procedures of NVIS (NATS) initialization and NVIS (NATS) ignition key ID registration, refer to CONSULT-II operation manual, IVIS/NVIS.

Malfunction Indicator Lamp (MIL)

DESCRIPTION

NAEC0032



SEF217U

The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
- If the MIL does not light up, refer to EL-134, "WARNING LAMPS" or see EC-646.
2. When the engine is started, the MIL should go off.
   If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.

On Board Diagnostic System Function

NAEC0032S01

The on board diagnostic system has the following two functions.

Malfunction Indicator Lamp (MIL) (Cont'd)

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in "ON" position  Engine stopped 	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. • Coolant overtemperature enrichment protection • "Misfire (Possible three way catalyst damage)" • "Closed loop control" • Fail-safe mode

Diagnostic Test Mode I — Bulb Check

NAEC0032S03

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to EL-134, "WARNING LAMPS" or see EC-646.

Diagnostic Test Mode I — Malfunction Warning

NAEC0032S04

MIL	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

OBD System Operation Chart

NAEC0033

RELATIONSHIP BETWEEN MIL, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

NAEC0033S01

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to "Two Trip Detection Logic" on EC-58.
- The MIL will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The "TIME" in "SELF-DIAGNOSTIC RESULTS" mode of CONSULT-II will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in "OK" for the 2nd trip.

SUMMARY CHART

NAEC0033S02

Items	Fuel Injection System	Misfire	Other
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)

OBD System Operation Chart (Cont'd)

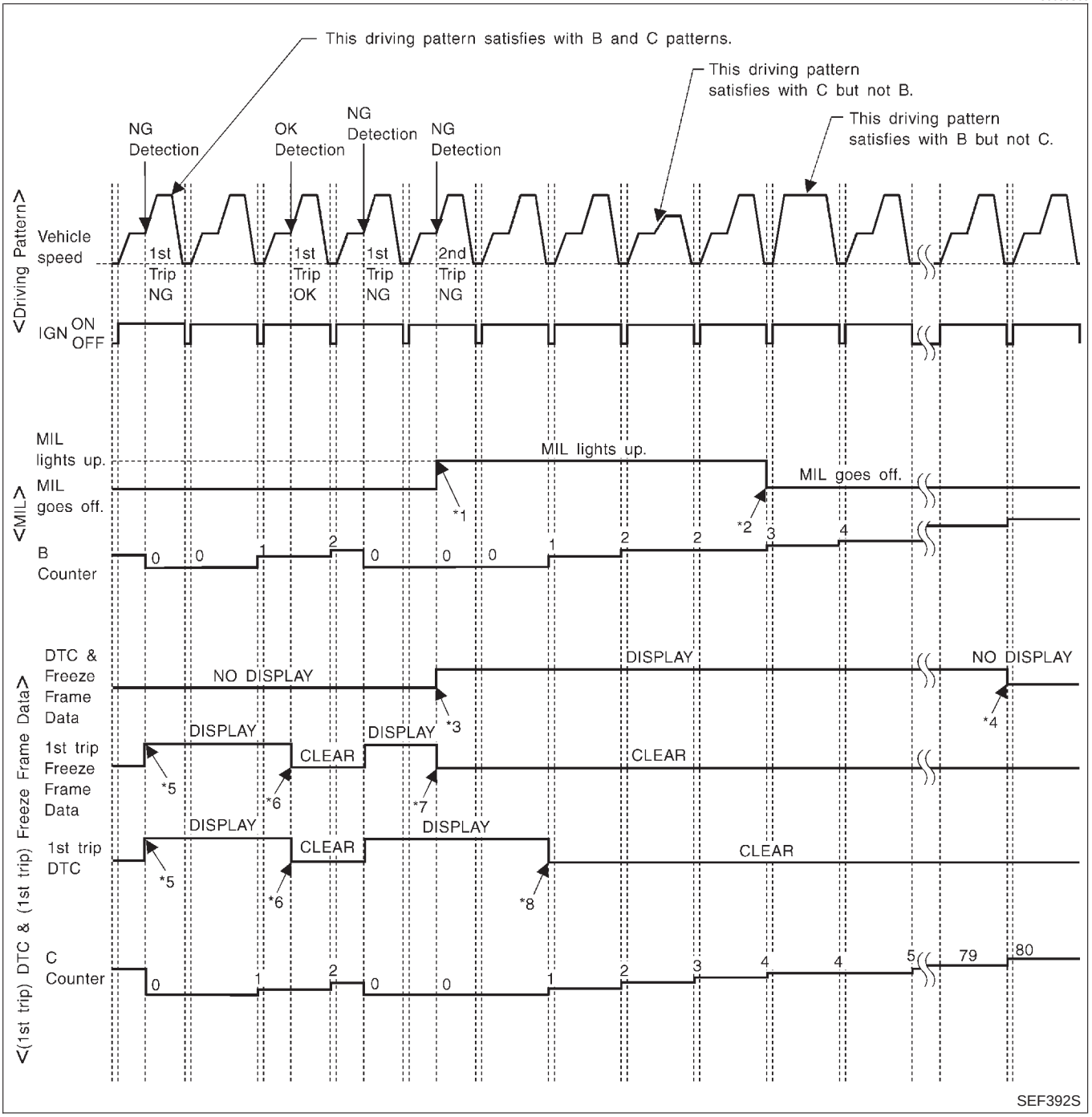
Items	Fuel Injection System	Misfire	Other
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns "B" and "C" under "Fuel Injection System" and "Misfire", see EC-77.
For details about patterns "A" and "B" under "Other", see EC-79.
*1: Clear timing is at the moment OK is detected.
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

OBD System Operation Chart (Cont'd)

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS FOR "MISFIRE" <EXHAUST QUALITY DETERIORATION>, "FUEL INJECTION SYSTEM"

=NAEC0033S03



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

*8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

NAEC0033S04

<Driving Pattern B>

NAEC0033S0401

Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunction.
- The MIL will go off when the B counter reaches 3. (*2 in "OBD SYSTEM OPERATION CHART")

<Driving Pattern C>

NAEC0033S0402

Driving pattern C means the vehicle operation as follows:

1) The following conditions should be satisfied at the same time:
   Engine speed: (Engine speed in the freeze frame data) ±375 rpm
   Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
   Engine coolant temperature (T) condition:

- When the freeze frame data shows lower than 70°C (158°F), "T" should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), "T" should be higher than or equal to 70°C (158°F).

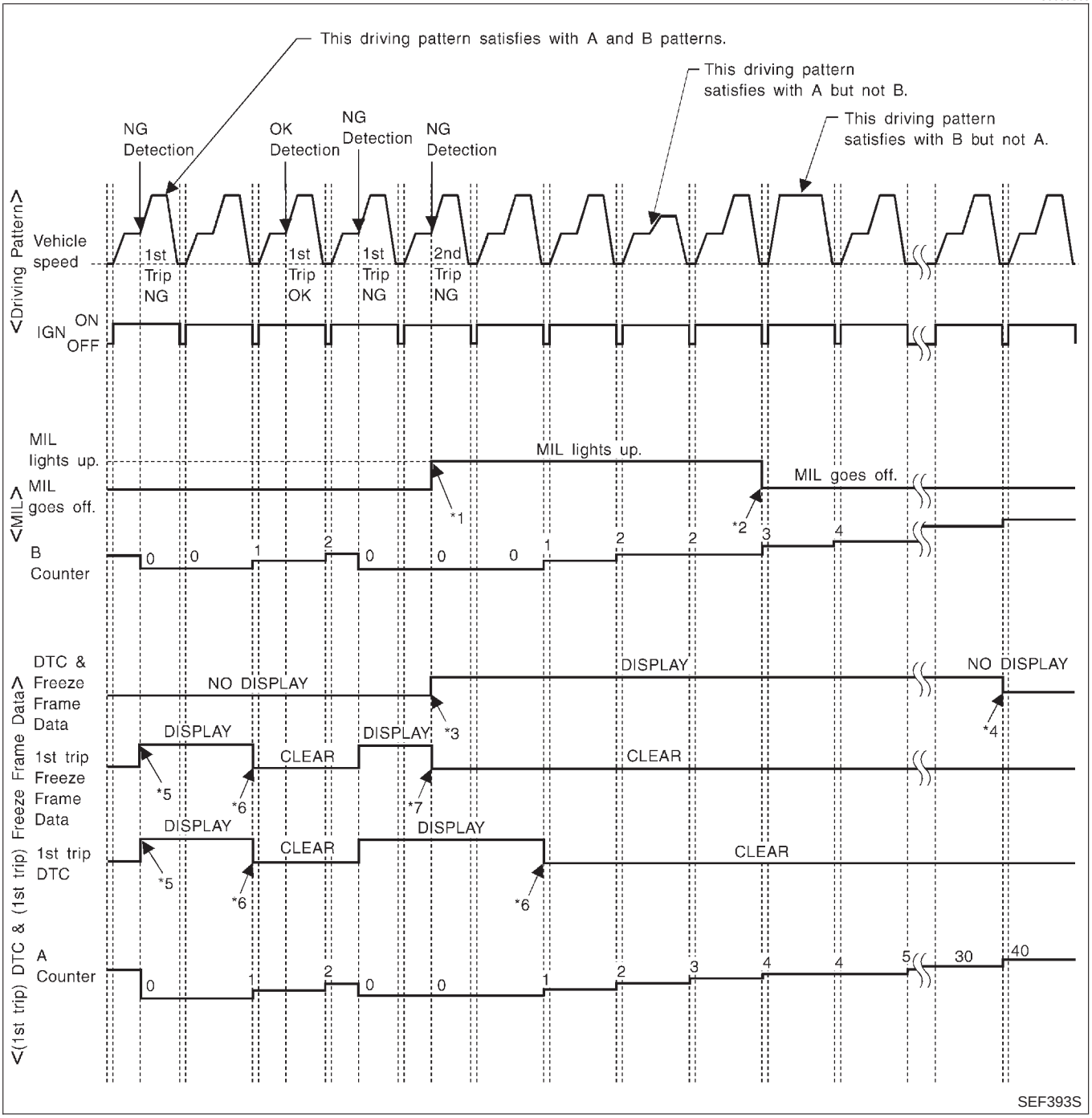
Example:
If the stored freeze frame data is as follows:
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)
To be satisfied with driving pattern C, the vehicle should run under the following conditions:
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

- The C counter will be cleared when the malfunction is detected regardless of (1).
- The C counter will be counted up when (1) is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

OBD System Operation Chart (Cont'd)

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

NAEC0033S05



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction.
(The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

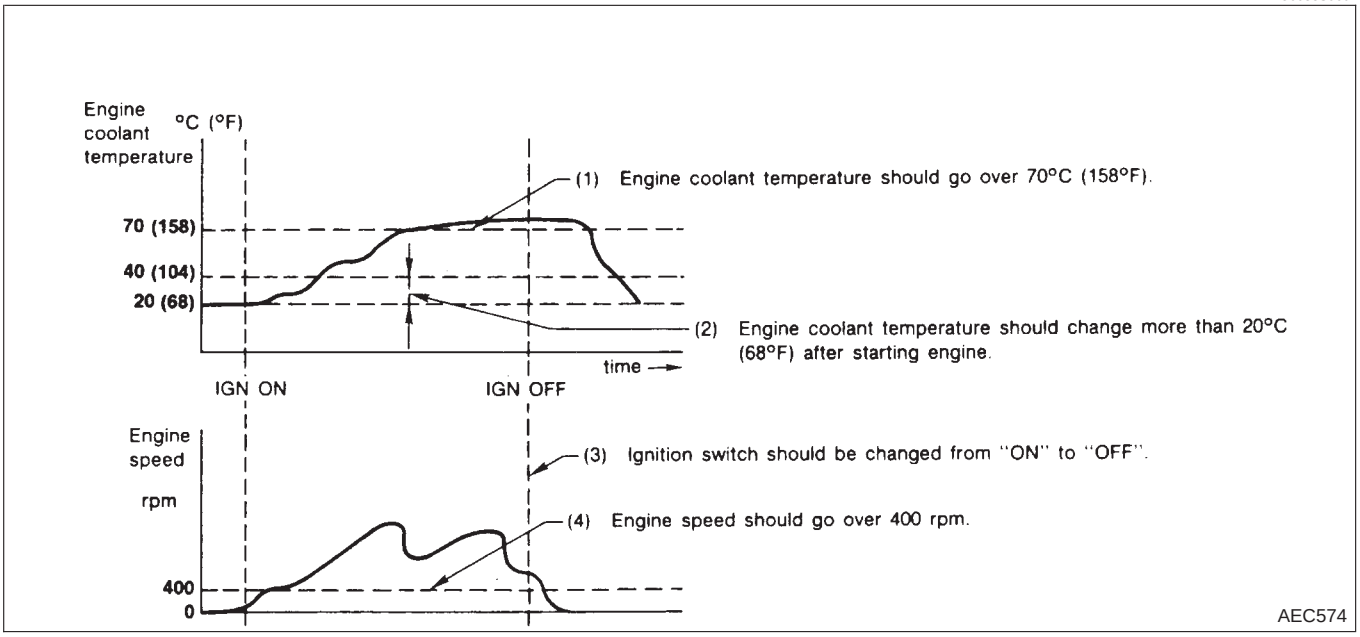
*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

EXPLANATION FOR DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

NAEC0033S06

<Driving Pattern A>

NAEC0033S0601



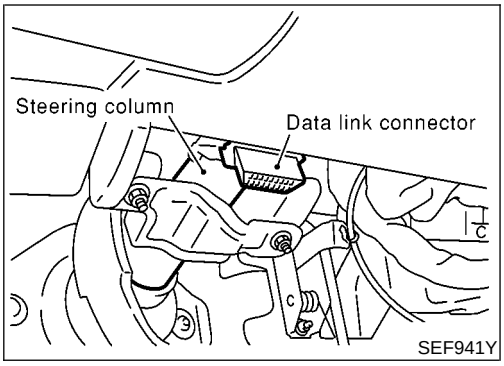
- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>

NAEC0033S0602

Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will go off when the B counter reaches 3 (*2 in "OBD SYSTEM OPERATION CHART").



SEF941Y

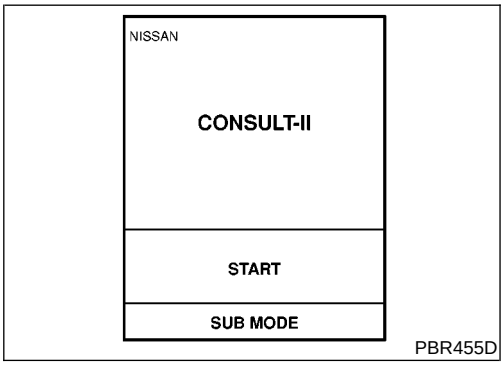
CONSULT-II

=NAEC0034

CONSULT-II INSPECTION PROCEDURE

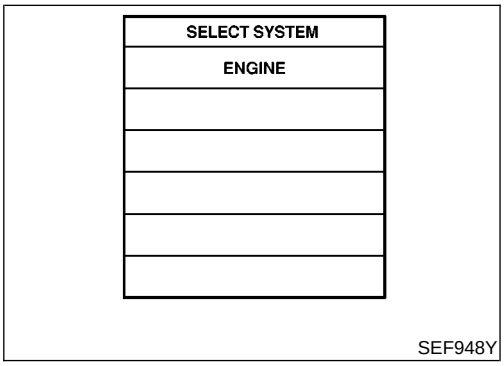
NAEC0034S01

1. Turn ignition switch OFF.
2. Connect CONSULT-II to data link connector, which is located under LH dash panel near the fuse box cover.



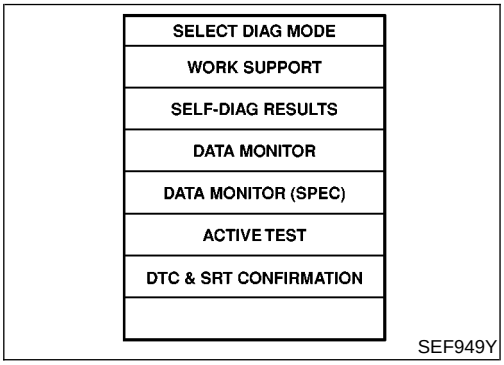
PBR455D

3. Turn ignition switch ON.
4. Touch “START”.



SEF948Y

5. Touch “ENGINE”.



SEF949Y

6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NAEC0034S02

		Item	DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		X	X	X	X			
		Crankshaft position sensor (REF)		X		X	X			
		Mass air flow sensor		X		X	X			
		Engine coolant temperature sensor		X	X	X	X	X		
		Heated oxygen sensor 1 (front)		X		X	X		X	X
		Heated oxygen sensor 2 (rear)		X		X	X		X	X
		Vehicle speed sensor		X	X	X	X			
		Throttle position sensor		X		X	X			
		Fuel tank temperature sensor		X		X	X	X		
		EVAP control system pressure sensor		X		X	X			
		Absolute pressure sensor		X		X	X			
		Intake air temperature sensor		X		X	X			
		Knock sensor		X						
		Ignition switch (start signal)				X	X			
		Closed throttle position switch		X		X	X			
		Closed throttle position switch (throttle position sensor signal)				X	X			
		Air conditioner switch				X	X			
		Park/neutral position (PNP) switch		X		X	X			
		Power steering oil pressure switch				X	X			
		Battery voltage				X	X			
		Ambient air temperature switch				X	X			
		Load signal				X	X			
		Swirl control valve control vacuum check switch		X		X	X			
		Fuel level sensor		X		X	X			

CONSULT-II (Cont'd)

Item			DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Injectors				X	X	X		
		Power transistor (Ignition timing)		X (Ignition signal)		X	X	X		
		IACV-AAC valve		X		X	X	X		
		EVAP canister purge volume control solenoid valve		X		X	X	X		X
		Air conditioner relay				X	X			
		Fuel pump relay	X			X	X	X		
		Heated oxygen sensor 1 (front) heater		X		X	X		X	
		Heated oxygen sensor 2 (rear) heater		X		X	X		X	
		EVAP canister vent control valve		X		X	X	X		
		Vacuum cut valve bypass valve		X		X	X	X		X
		Swirl control valve control sole-noid valve		X		X	X	X		
		VIAS control solenoid valve				X	X	X		
		Electronic controlled engine mount				X	X	X		
		Calculated load value			X	X	X			

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-59.

FUNCTION

=NAEC0034S03

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*1
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output specification of the basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
ECM part number	ECM part number can be read.

*1 The following emission-related diagnostic information is cleared when the ECM memory is erased.

1) Diagnostic trouble codes
2) 1st trip diagnostic trouble codes
3) Freeze frame data
4) 1st trip freeze frame data
5) System readiness test (SRT) codes
6) Test values
7) Others

CONSULT-II (Cont'd)

WORK SUPPORT MODE

=NAEC0034S04

WORK ITEM	CONDITION	USAGE
TP SW/TP SEN IDLE POSI ADJ	• FOLLOW THE BASIC INSPECTION INSTRUCTION IN THE SERVICE MANUAL.	When adjusting the idle throttle position
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	• THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clean the coefficient of self-learning control valve
EVAP SYSTEM CLOSE	OPEN THE VACUUM CUT VALVE BYPASS VALVE AND CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. • IGN SW "ON" • ENGINE NOT RUNNING • AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). • NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM • TANK FUEL TEMP. IS MORE THAN 0°C (32°F). • WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE" • WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. **NOTE:** **WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN IN USING CHARGED BATTERY.**	When detecting EVAP vapor leak point of EVAP system
TARGET IGNITION TIMING ADJ*	• IDLE CONDITION	• When adjusting target ignition timing After adjustment, confirm target ignition timing with a timing light. • If once the "TARGET IDLE RPM ADJ" has been done, the Idle Air Volume Learning procedure will not be completed.
TARGET IDLE RPM ADJ*	• IDLE CONDITION	When setting target idle speed

*: This function is not necessary in the usual service procedure.

SELF-DIAGNOSTIC MODE

NAEC0034S05

DTC and 1st Trip DTC

NAEC0034S0501

Regarding items of "DTC and 1st trip DTC", refer to "TROUBLE DIAGNOSIS — INDEX" (See EC-8.)

Freeze Frame Data and 1st Trip Freeze Frame Data

NAEC0034S0502

Freeze frame data item*1	Description
DIAG TROUBLE CODE [PXXXX]	• The engine control component part/control system has a trouble code, it is displayed as "PXXXX". (Refer to "TROUBLE DIAGNOSIS — INDEX", EC-8.)

Freeze frame data item*1	Description
FUEL SYS-B1*2	• "Fuel injection system status" at the moment a malfunction is detected is displayed. • One mode in the following is displayed. "MODE 2": Open loop due to detected system malfunction "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment) "MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control "MODE 5": Open loop - has not yet satisfied condition to go to closed loop
FUEL SYS-B2*2	
CAL/LD VALUE [%]	• The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	• The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B1 [%]	• "Short-term fuel trim" at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
S-FUEL TRIM-B2 [%]	
L-FUEL TRIM-B1 [%]	• "Long-term fuel trim" at the moment a malfunction is detected is displayed. • The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
L-FUEL TRIM-B2 [%]	
ENGINE SPEED [rpm]	• The engine speed at the moment a malfunction is detected is displayed.
VHCL SPEED [km/h] or [mph]	• The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH·P/S [% or degree]	• The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	• The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	• The intake air temperature at the moment a malfunction is detected is displayed.

*1: The items are the same as those of 1st trip freeze frame data.
*2: Regarding A33 model, "-B1" indicates right bank and "-B2" indicates left bank.

CONSULT-II (Cont'd)

DATA MONITOR MODE

=NAEC0034S06

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○	○	• Indicates the engine speed computed from the REF signal (120° signal) of the crankshaft position sensor (REF).	
CKPS·RPM (POS) [rpm]	○		• Indicates the engine speed computed from the POS signal (1° signal) of the crankshaft position sensor (POS).	• Accuracy becomes poor if engine speed drops below the idle rpm. • If the signal is interrupted while the engine is running, an abnormal value may be indicated.
POS COUNT	○		• Indicates the number of signal plate (Flywheel/Drive Plate) cogs (tooth) during one revolution of the engine.	
MAS A/F SE-B1 [V]	○	○	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated.
COOLAN TEMP/S [°C] or [°F]	○	○	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
HO2S1 (B1) [V]	○	○	• The signal voltage of the front heated oxygen sensor is displayed.	
HO2S1 (B2) [V]	○	○		
HO2S2 (B1) [V]	○	○	• The signal voltage of the rear heated oxygen sensor is displayed.	
HO2S2 (B2) [V]	○	○		
HO2S1 MNTR (B1) [RICH/LEAN]	○		• Display of front heated oxygen sensor signal during air-fuel ratio feedback control: RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture.	• After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. • When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S1 MNTR (B2) [RICH/LEAN]	○			
HO2S2 MNTR (B1) [RICH/LEAN]	○		• Display of rear heated oxygen sensor signal: RICH ... means the amount of oxygen after three way catalyst is relatively small. LEAN ... means the amount of oxygen after three way catalyst is relatively large.	• When the engine is stopped, a certain value is indicated.
HO2S2 MNTR (B2) [RICH/LEAN]	○			
VHCL SPEED SE [km/h] or [mph]	○	○	• The vehicle speed computed from the vehicle speed sensor signal is displayed.	
BATTERY VOLT [V]	○	○	• The power supply voltage of ECM is displayed.	
THRTL POS SEN [V]	○	○	• The throttle position sensor signal voltage is displayed.	
FUEL T/TMP SE [°C] or [°F]			• The fuel temperature judged from the tank fuel temperature sensor signal voltage is displayed.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
INT/A TEMP SE [°C] or [°F]	○	○	• The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.	
EVAP SYS PRES [V]	○		• The signal voltage of EVAP control system pressure sensor is displayed.	
ABSOL PRES/SE [V]	○		• The signal voltage of the absolute pressure sensor is displayed.	
FUEL LEVEL SE [V]	○		• The signal voltage of the fuel level sensor is displayed.	
START SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the starter signal.	• After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS* [ON/OFF]	○	○	• Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal.	
CLSD THL/P SW* [ON/OFF]	○		• Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch.	
AIR COND SIG [ON/OFF]	○	○	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	○	○	• [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated.	
LOAD SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the electrical load signal and/or lighting switch. ON ... rear defogger is operating and/or lighting switch is on. OFF ... rear defogger is not operating and lighting switch is not on.	
IGNITION SW [ON/OFF]	○		• Indicates [ON/OFF] condition from ignition switch.	
SWRL CONT S/V [ON/OFF]	○		• The control condition of the swirl control valve control solenoid valve (determined by ECM according to the input signals) is indicated. • ON ... Swirl control valve is closed. OFF ... Swirl control valve is opened.	
INJ PULSE-B1 [msec]		○	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B2 [msec]				
B/FUEL SCHDL [msec]		○	• "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
IGN TIMING [BTDC]		○	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.
IACV-AAC/V [step]		○	• Indicates the IACV-AAC valve control value computed by ECM according to the input signals.	
PURG VOL C/V [%]			• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
A/F ALPHA-B1 [%]		○	• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]		○		
AIR COND RLY [ON/OFF]		○	• The air conditioner relay control condition (determined by ECM according to the input signal) is indicated.	
FUEL PUMP RLY [ON/OFF]		○	• Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
VENT CONT/V [ON/OFF]			• The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated. • ON ... Closed OFF ... Open	
HO2S1 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals.	
HO2S1 HTR (B2) [ON/OFF]				
HO2S2 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals.	
HO2S2 HTR (B2) [ON/OFF]				
VC/V BYPASS/V [ON/OFF]			• The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. • ON ... Open OFF ... Closed	
CAL/LD VALUE [%]			• "Calculated load value" indicates the value of the current airflow divided by peak airflow.	
ABSOL TH·P/S [% or degree]			• "Absolute throttle position sensor" indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor.	
MASS AIRFLOW [g·m/s]			• Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
TRVL AFTER MIL [km] or [Mile]			• Distance traveled while MIL is activated	
VIAS S/V [ON/OFF]			• The control condition of the VIAS control solenoid valve (determined by ECM according to the input signal) is indicated. • OFF ... VIAS control solenoid valve is not operating. ON ... VIAS control solenoid valve is operating.	
SWL CON VC SW			• Indicates [ON/OFF] condition from the swirl control valve control vacuum check switch. ON ... Swirl control valve is not operational. OFF ... Swirl control valve is operational.	
IDL A/V LEAN			• Display the condition of idle air volume learning YET ... Idle air volume learning has not been performed yet. CMPLT ... Idle air volume learning has already been performed successfully. INCMP ... Idle air volume learning has not been performed successfully.	
Voltage [V]			• Voltage measured by the voltage probe.	
Frequenty [msec] or [Hz] or [%]			• Pulse width, frequency or duty cycle measured by the pulse probe.	• Only "#" is displayed if item is unable to be measured. • Figures with "#"s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.

*: This item is not available.

NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding R50 model, "-B1" indicates right bank and "-B2" indicates left bank.
- Bank 1 (-B1 or BK1) includes No. 1 cylinder.

ACTIVE TEST MODE

NAEC0034S07

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Fuel injectors • Front heated oxygen sensor
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	• Adjust initial ignition timing

CONSULT-II (Cont'd)

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
IACV-AAC/V OPENING	• Engine: After warming up, idle the engine. • Change the IACV-AAC valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	• Harness and connector • IACV-AAC valve
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch "OFF" • Shift lever "N" • Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	• Harness and connector • Compression • Injectors • Power transistor • Spark plugs • Ignition coils
ENG COOLANT TEMP	• Engine: Return to the original trouble condition • Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Engine coolant temperature sensor • Fuel injectors
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay "ON" and "OFF" using CONSULT-II and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connector • Fuel pump relay
VIAS SOL VALVE	• Ignition switch: ON • Turn solenoid valve "ON" and "OFF" with CONSULT-II and listen for operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
SWIRL CONT SOL VALVE	• Ignition switch: ON • Turn solenoid valve "ON" and "OFF" with CONSULT-II and listen for operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
PURG VOL CONT/V	• Engine: After warming up, run engine at 1,500 rpm. • Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	• Harness and connector • Solenoid valve
FUEL/T TEMP SEN	• Change the fuel tank temperature using CONSULT-II.		
VENT CONTROL/V	• Ignition switch: ON (Engine stopped) • Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
VC/V BYPASS/V	• Ignition switch: ON (Engine stopped) • Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve

DTC & SRT CONFIRMATION MODE

NAEC0034S08

SRT STATUS Mode

NAEC0034S0801

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-60.

SRT Work Support Mode

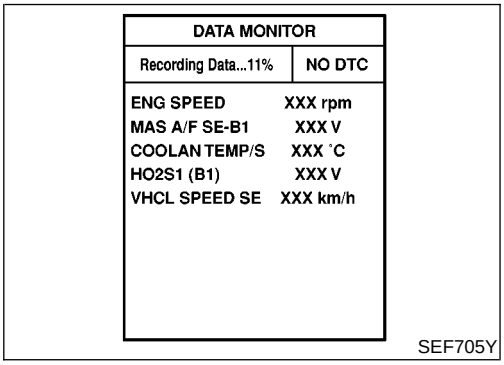
NAEC0034S0803

This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

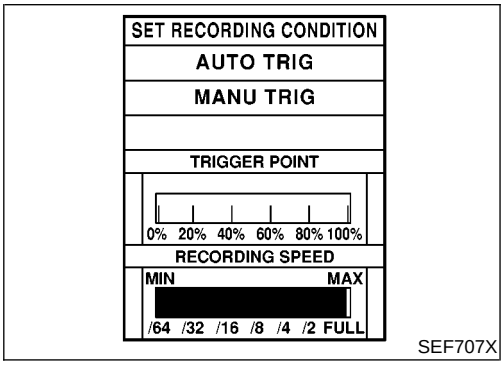
DTC Work Support Mode

NAEC0034S0802

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	EVAP SML LEAK P0440	Refer to corresponding trouble diagnosis for DTC.	EC-347
	EVAP VERY SML LEAK P1441		EC-521
	PURG VOL CN/V P1444		EC-536
	PURGE FLOW P1447		EC-556
	VC CUT/V BP/V P1491		EC-586
HEATED OXYGEN SENSOR 1 (FRONT)	HO2S1 (B1) P0130		EC-187
	HO2S1 (B1) P0131		EC-197
	HO2S1 (B1) P0132		EC-205
	HO2S1 (B1) P0133		EC-213
	HO2S1 (B2) P0150		EC-187
	HO2S1 (B2) P0151		EC-197
	HO2S1 (B2) P0152		EC-205
	HO2S1 (B2) P0153		EC-213
HEATED OXYGEN SENSOR 2 (REAR)	HO2S2 (B1) P0137		EC-242
	HO2S2 (B1) P0138		EC-252
	HO2S2 (B1) P0139		EC-262
	HO2S2 (B2) P0157		EC-242
	HO2S2 (B2) P0158		EC-252
	HO2S2 (B2) P0159		EC-262



SEF705Y



SEF707X

REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

NAEC0034S10

CONSULT-II has two kinds of triggers and they can be selected by touching "SETTING" in "DATA MONITOR" mode.

1) "AUTO TRIG" (Automatic trigger):

- The malfunction will be identified on the CONSULT-II screen in real time.
  In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.
  At the moment a malfunction is detected by ECM, "MONITOR" in "DATA MONITOR" screen is changed to "Recording Data ... xx%" as shown at left, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, "REAL-TIME DIAG" screen is displayed. If "STOP" is touched on the screen during " Recording Data ... xx%", "REAL-TIME DIAG" screen is also displayed.
  The recording time after the malfunction detection and the recording speed can be changed by "TRIGGER POINT" and "Recording Speed". Refer to CONSULT-II OPERATION MANUAL.

2) "MANU TRIG" (Manual trigger):

- DTC/1st trip DTC and malfunction item will not be displayed

automatically on CONSULT-II screen even though a malfunction is detected by ECM.
DATA MONITOR can be performed continuously even though a malfunction is detected.

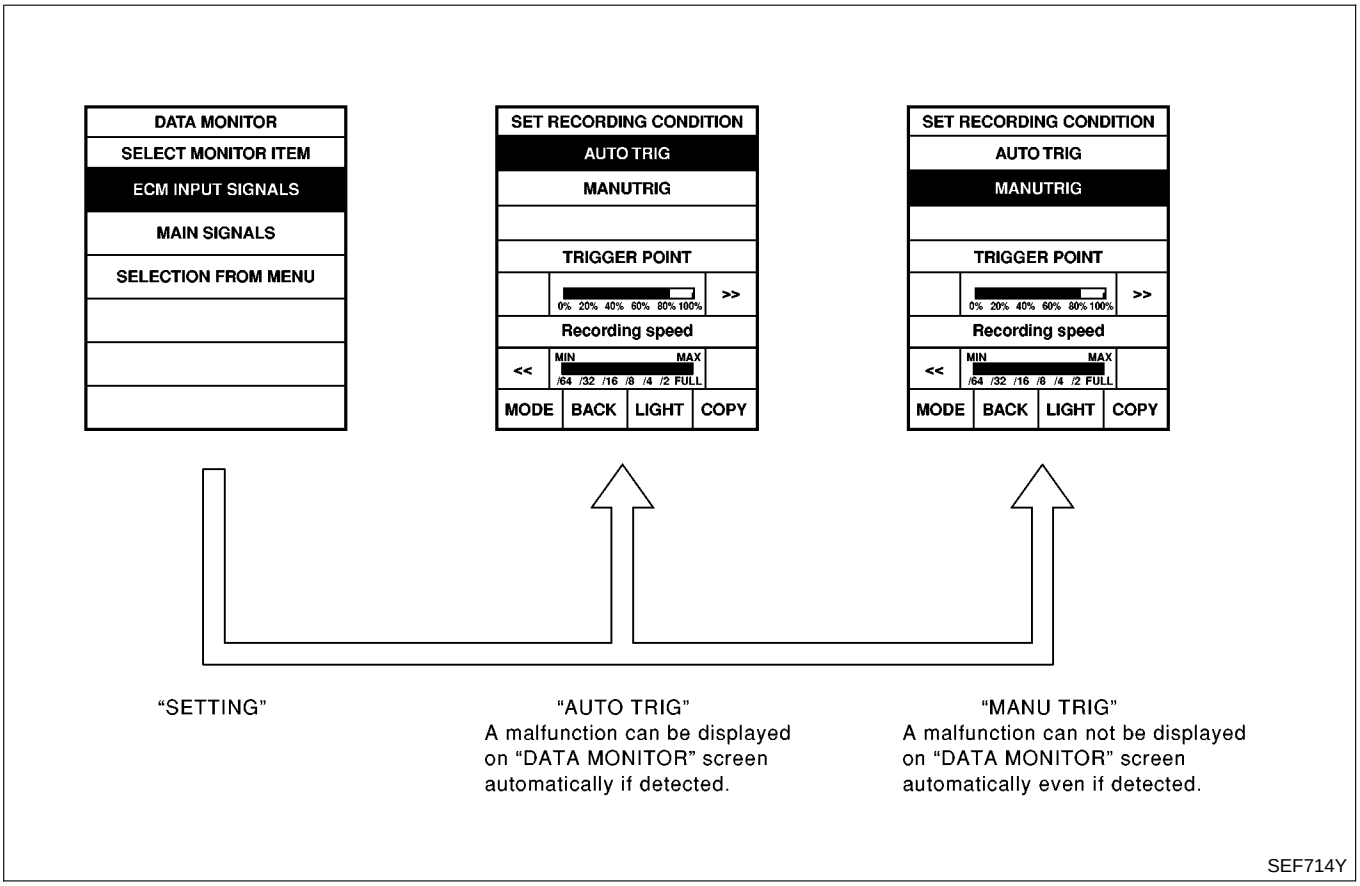
Use these triggers as follows:

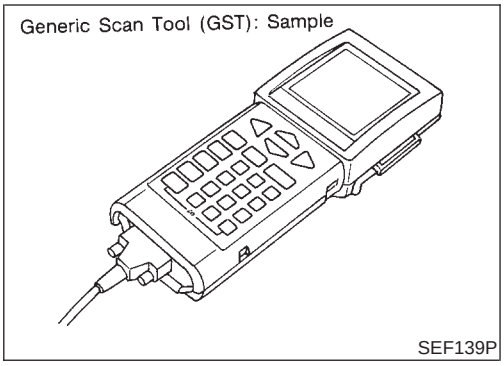
1) "AUTO TRIG"

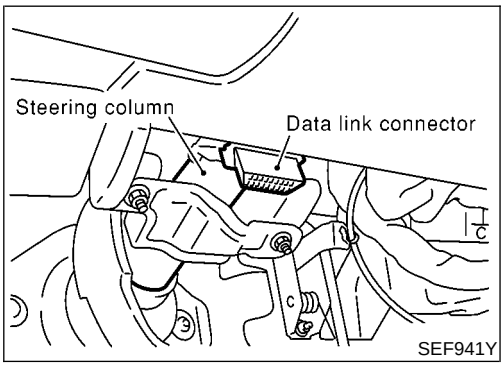
- While trying to detect the DTC/1st trip DTC by performing the "DTC Confirmation Procedure", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
- While narrowing down the possible causes, CONSULT-II should be set in "DATA MONITOR (AUTO TRIG)" mode, especially in case the incident is intermittent.
  When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the "DTC Confirmation Procedure", the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to GI-25, "Incident Simulation Tests".)

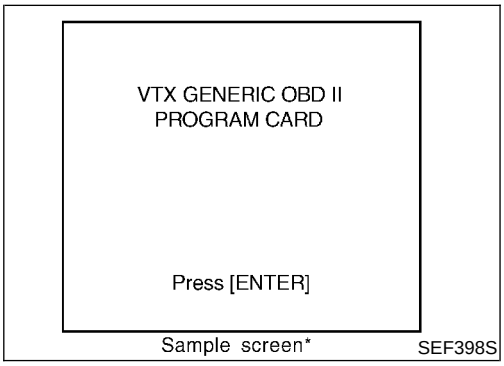
2) "MANU TRIG"

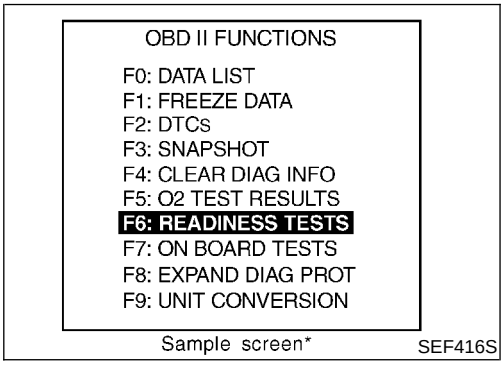
- If the malfunction is displayed as soon as "DATA MONITOR" is selected, reset CONSULT-II to "MANU TRIG". By selecting "MANU TRIG" you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.











Generic Scan Tool (GST)

=NAEC0035

DESCRIPTION

NAEC0035S01

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained on the next page.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.

GST INSPECTION PROCEDURE

NAEC0035S02

1. Turn ignition switch OFF.
2. Connect GST to data link connector, which is located under LH dash panel near the fuse box cover.
3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.

(*: Regarding GST screens in this section, sample screens are shown.)

5. Perform each diagnostic mode according to each service procedure.

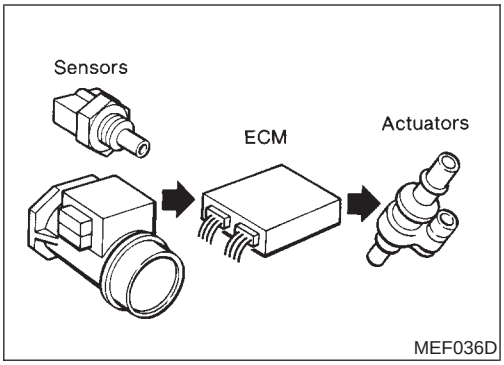
For further information, see the GST Operation Manual of the tool maker.

Generic Scan Tool (GST) (Cont'd)

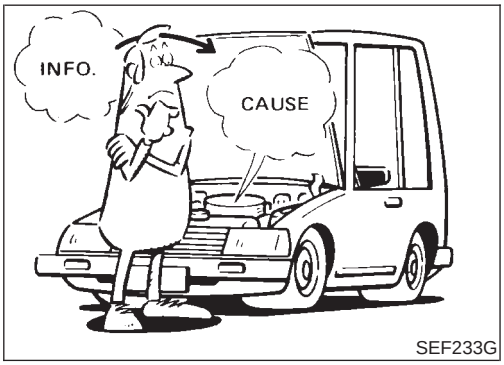
FUNCTION

NAEC0035S03

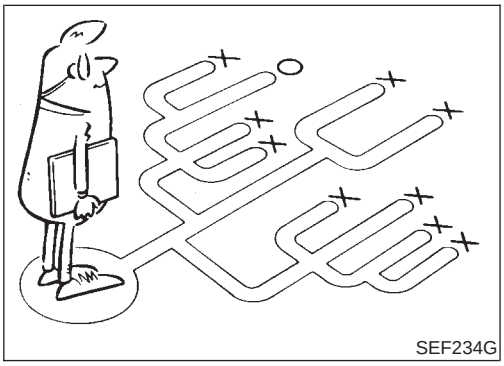
Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-84).]
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	This mode can close EVAP system in ignition switch "ON" position (Engine stopped). When this mode is performed, the following parts can be opened or closed. ● EVAP canister vent control valve open ● Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. ● Low ambient temperature ● Low battery voltage ● Engine running ● Ignition switch "OFF" ● Low fuel temperature ● Too much pressure is applied to EVAP system
MODE 9	(CALIBRATION ID)	This mode enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.



MEF036D



SEF233G


SEF234G

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

SEF907L

Introduction

NAEC0036

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no problems such as vacuum leaks, fouled spark plugs, or other problems with the engine.

It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.

A visual check only may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the “Work Flow” on EC-97.

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A “Diagnostic Worksheet” like the example on next page should be used.

Start your diagnosis by looking for “conventional” problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle.

DIAGNOSTIC WORKSHEET

NAEC0036S01

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make trouble-shooting faster and more accurate.

In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

Worksheet Sample

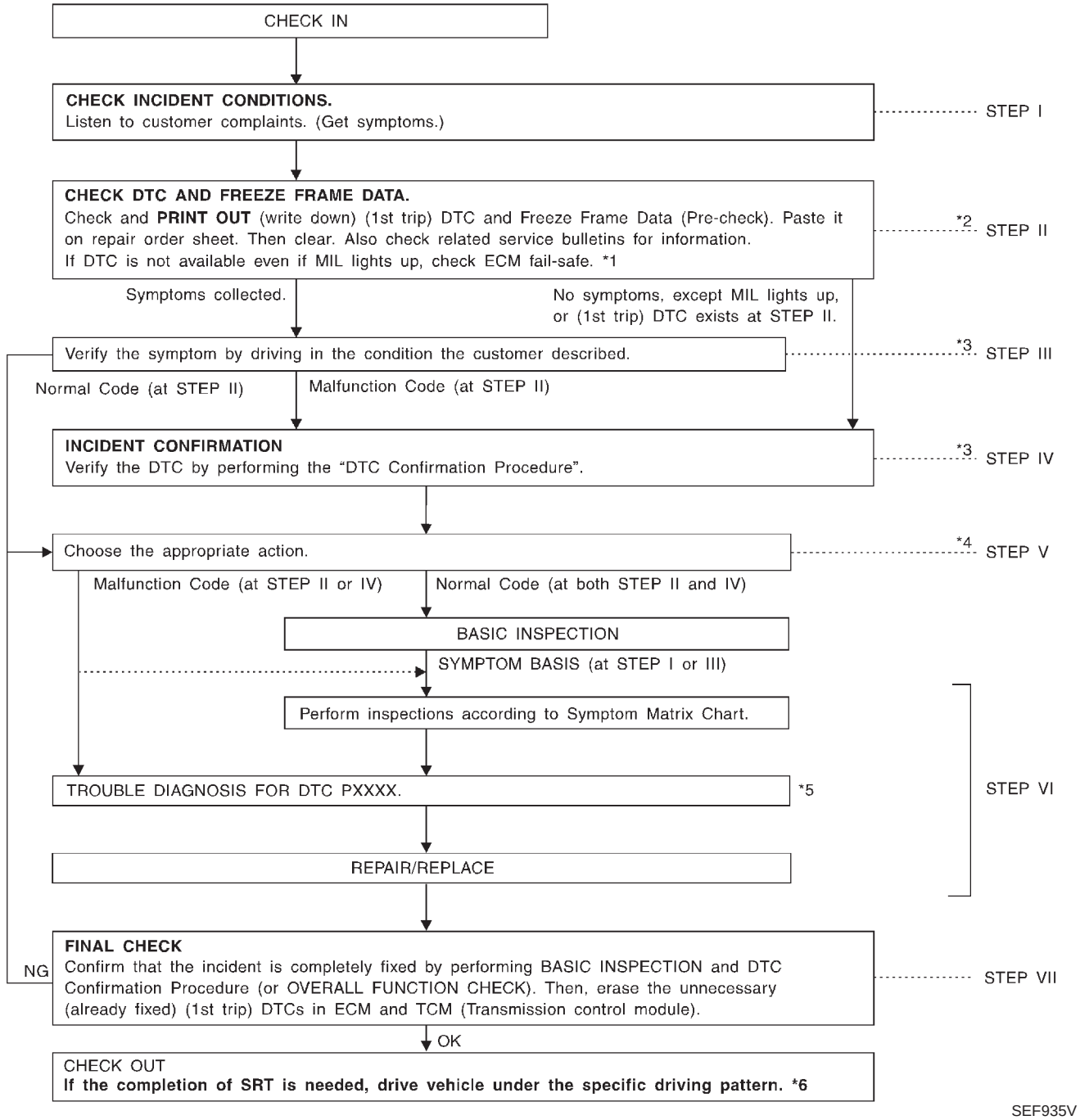
NAEC0036S0101

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Fuel and fuel filler cap		☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms	☐ Startability	☐ Inpossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions		☐ Not affected	
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid ˚F	
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp		☐ Turned on ☐ Not turned on	

MTBL0017

Work Flow

NAEC0037



SEF935V

*1 EC-116

*2 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.

*3 If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.

*4 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to "TROUBLE DIAGNOSIS FOR POWER SUPPLY", EC-137.

*5 If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.

*6 EC-65

Work Flow (Cont'd)

DESCRIPTION FOR WORK FLOW

NAEC0037S01

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-96.
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to EC-71.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135. Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-117.) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The "DIAGNOSTIC WORK SHEET" and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135. If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) DTC by driving in (or performing) the "DTC Confirmation Procedure". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or GST. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135. In case the "DTC Confirmation Procedure" is not available, perform the "Overall Function Check" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "Overall Function Check" is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-99.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-117.)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) "Harness Layouts". Gently shake the related connectors, components or wiring harness with CONSULT-II set in "DATA MONITOR (AUTO TRIG)" mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-121, 126. The "Diagnostic Procedure" in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to GI-27, "Circuit Inspection". Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the "DTC Confirmation Procedure" and confirm the normal code [DTC No. P0000] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer to EC-71.)

Basic Inspection

NAEC0038

Precaution:

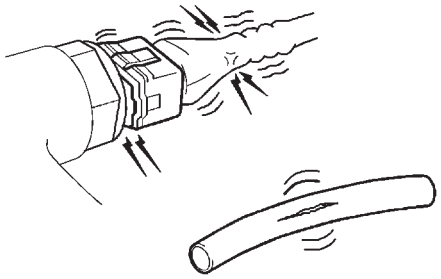
Perform Basic Inspection without electrical or mechanical loads applied;

- Headlamp switch is OFF,
- Air conditioner switch is OFF,
- Rear window defogger switch is OFF,
- Steering wheel is in the straight-ahead position, etc.

1	INSPECTION START

1. Check service records for any recent repairs that may indicate a related problem, or a current need for scheduled maintenance.
2. Open engine hood and check the following:

- Harness connectors for improper connections
- Vacuum hoses for splits, kinks and improper connections
- Wiring for improper connections, pinches and cuts
- Air cleaner clogging
- Hoses and ducts for leaks

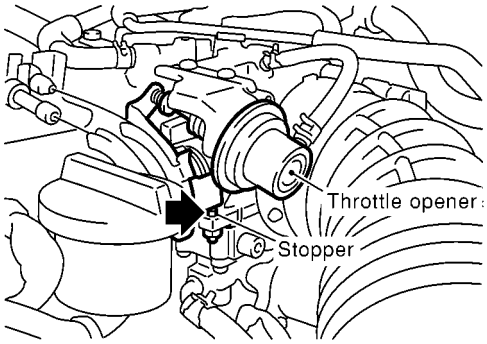


SEF983U

▶ GO TO 2.

2	CHECK THROTTLE OPENER OPERATION-I

Confirm that there is a clearance between throttle drum and stopper.



SEF950Y

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	CHECK THROTTLE OPENER FIXING BOLTS

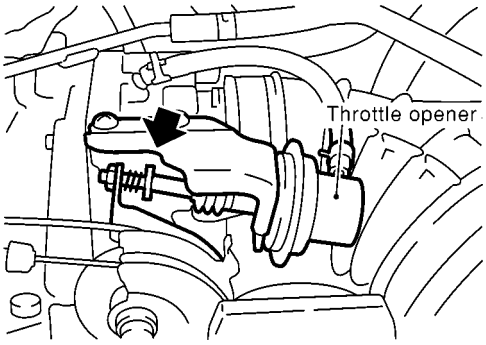
Check throttle opener fixing bolts for loosening.

OK or NG

OK	▶	Repair or replace throttle body assembly.
NG	▶	Retighten the fixing bolts.

4	CHECK THROTTLE OPENER OPERATION-II

1. Start engine and let it idle.
2. Confirm that throttle opener rod moves backward and there is a clearance between throttle drum and throttle opener rod.



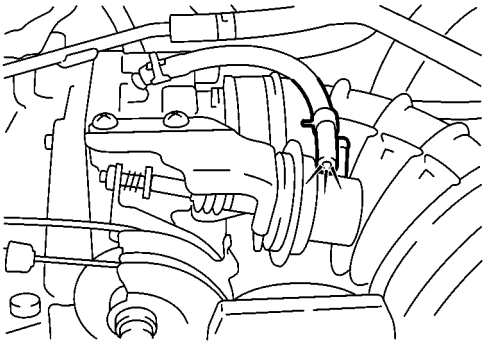
SEF951Y

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 5.

5	CHECK VACUUM SOURCE FOR THROTTLE OPENER

1. Disconnect vacuum hose connected to throttle opener.
2. Check vacuum existance with engine running.



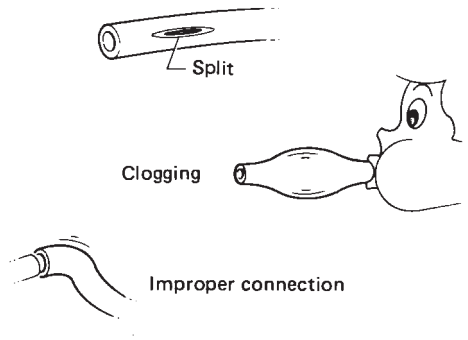
SEF952Y

OK or NG

OK	▶	Repair or replace throttle body assembly.
NG	▶	GO TO 6.

6	CHECK VACUUM HOSE

1. Stop engine.
2. Remove the vacuum hose.
3. Check the vacuum hose for splits, kinks and clogging.



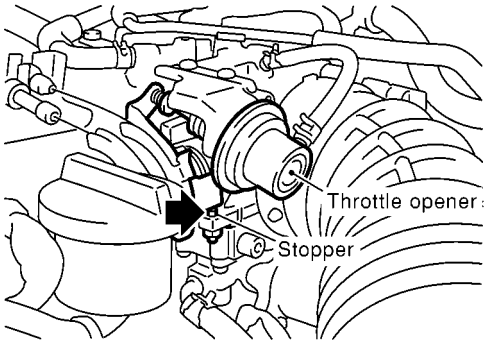
SEF109L

OK or NG

OK	▶	Clean vacuum port by blowing air.
NG	▶	Replace vacuum hose.

7	CHECK THROTTLE DRUM OPERATION

Confirm that throttle drum moves to contact the stopper.



SEF950Y

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 8.

8	CHECK ACCELERATOR WIRE INSTALLATION

1. Stop engine.
2. Check accelerator wire for slack.

OK or NG

OK	▶	GO TO 9.
NG	▶	Adjust accelerator wire. Refer to FE-3, "Adjusting Accelerator Wire".

9	CHECK THROTTLE VALVE OPERATION

1. Remove intake air ducts.
2. Check throttle valve operation when moving throttle drum by hand.

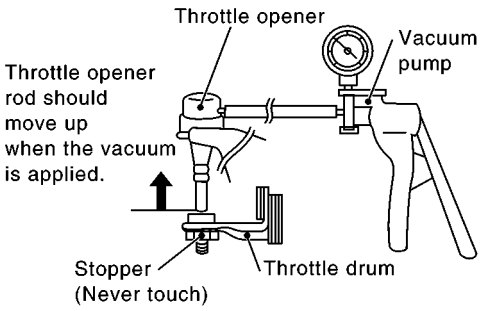
OK or NG

OK	▶	Retighten the throttle drum fixing nuts.
NG	▶	Clean the throttle body and throttle valve.

10	CHECK THROTTLE POSITION SWITCH CLOSED POSITION-I

NOTE:
Always check ignition timing before performing the following.

1. Warm up engine to normal operating temperature.
2. Stop engine.
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to vacuum pump as shown below.



SEF793WA

5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum is free from the throttle opener rod.

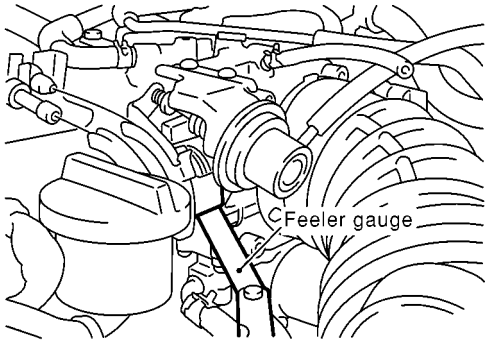
▶	GO TO 15.

11	CHECK THROTTLE POSITION SWITCH CLOSED POSITION-II

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" mode with CONSULT-II.
3. Read "CLSD THL/P SW" signal under the following conditions.

- Insert a 0.05 mm (0.0020 in) and 0.15 mm (0.0059 in) feeler gauge alternately between stopper and throttle drum as shown in the figure and check the signal.



SEF953Y

TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	XXX °C
CLSD THL POS	ON
CLSD THL/P SW	ON

SEF987Y

"CLSD THL/P SW" signal should remain "ON" while inserting 0.05 mm (0.0020 in) feeler gauge.
"CLSD THL/P SW" signal should remain "OFF" while inserting 0.15 mm (0.0059 in) feeler gauge.

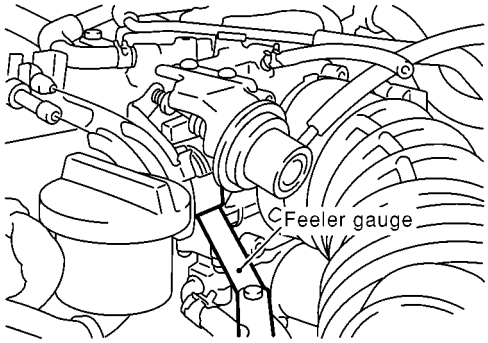
OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 12.

12	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-I

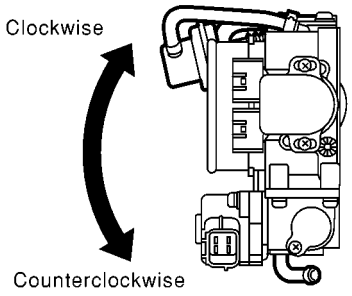
With CONSULT-II

1. Loosen throttle position sensor fixing bolts.
2. Confirm that proper vacuum is applied. Refer to test No. 10. During adjustment, vacuum should be applied.
3. Insert 0.05 mm (0.0020 in) feeler gauge between stopper and throttle drum as shown in the figure.



SEF953Y

4. Turn throttle position sensor body counterclockwise until "CLSD THL/P SW" signal switches to "OFF".



SEF954Y

TP SW/TP SEN IDLE POJI ADJ	
MONITOR	
COOLAN TEMP/S	XXX °C
CLSD THL POS	ON
CLSD THL/P SW	OFF

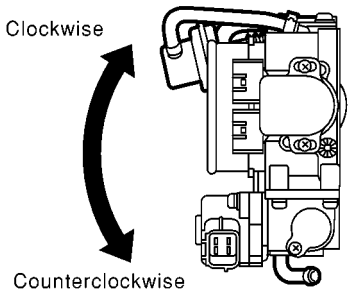
SEF007Z

▶	GO TO 13.

13	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-II

With CONSULT-II

1. Temporarily tighten sensor body fixing bolts as follows.
- **Gradually move the sensor body clockwise and stop it when "CLSD THL/P SW" signal switches from "OFF" to "ON", then temporarily tighten sensor body fixing bolts.**



SEF954Y

2. Make sure two or three times that the signal is "ON" when the throttle valve is closed and "OFF" when it is opened.
3. Remove 0.05 mm (0.0020 in) feeler gauge then insert 0.15 mm (0.0059 in) feeler gauge.
4. Make sure two or three times that the signal remains "OFF" when the throttle valve is closed.
5. Tighten throttle position sensor.
6. Check the "CLSD THL/P SW" signal again.
   The signal remains "OFF" while closing throttle valve.

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 12.

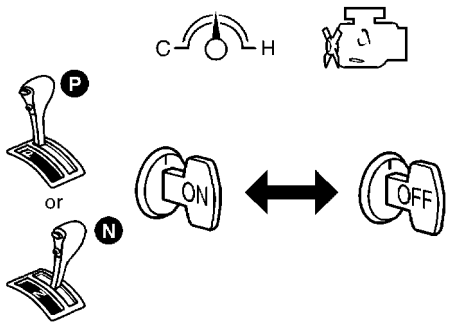
14	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

With CONSULT-II

NOTE:

Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.

1. Confirm that proper vacuum is applied. Refer to Test No. 10.
2. Attach blind cap to vacuum port from which vacuum hose to throttle opener was disconnected.
3. Start engine.
4. Warm up engine to normal operating temperature.
5. Select "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" mode.
6. Stop engine. (Turn ignition switch "OFF".)
7. Turn ignition switch "ON" and wait at least 5 seconds.



SEF864V

8. Turn ignition switch "OFF" and wait at least 10 seconds.
9. Repeat steps 7 and 8 until "CLSD THL POS" signal changes to "ON".

TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	XXX °C
CLSD THL POS	ON
CLSD THL/P SW	ON

SEF987Y

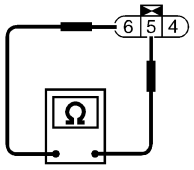
▶	GO TO 19.

15	CHECK THROTTLE POSITION SWITCH CLOSED POSITION-II

1. Disconnect closed throttle position switch harness connector.
2. Check continuity between closed throttle position switch terminals **6** and **5** under the following conditions.

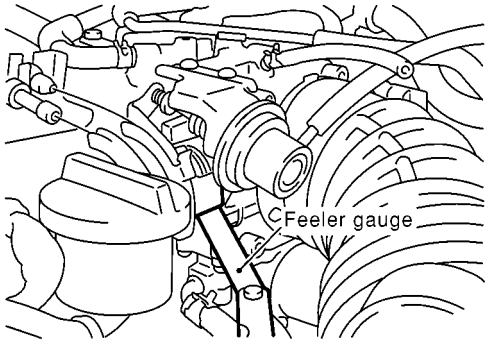


Throttle position switch connector



SEF330Z

- Insert the 0.05 mm (0.0020 in) and 0.15 mm (0.0059 in) feeler gauge alternately between the stopper and throttle drum as shown in the figure.



SEF953Y

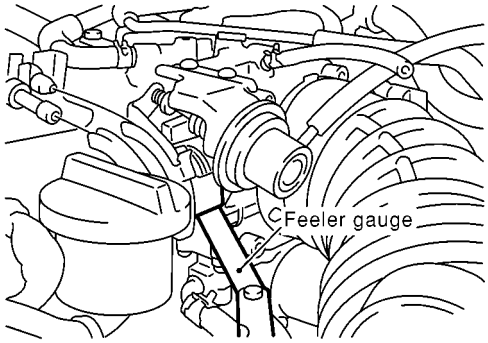
"Continuity should exist" while inserting 0.05 mm (0.0020 in) feeler gauge.
"Continuity should not exist" while inserting 0.15 mm (0.0059 in) feeler gauge.

OK or NG

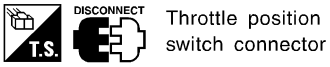
OK	▶	GO TO 18.
NG	▶	GO TO 16.

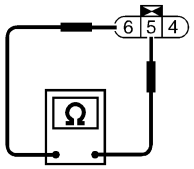
16	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-I

1. Loosen throttle position sensor fixing bolts.
2. Confirm that proper vacuum is applied. Refer to Test No. 10. During adjustment, vacuum should be applied.
3. Insert 0.05 mm (0.0020 in) feeler gauge between stopper and throttle drum as shown in the figure.



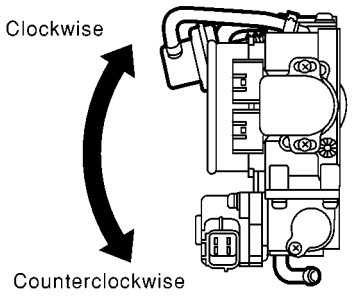
SEF953Y





SEF330Z

4. Turn throttle position sensor body counterclockwise until continuity does not exist.

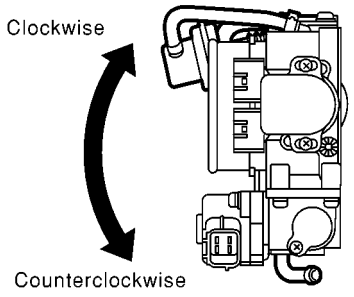


SEF954Y

▶	GO TO 17.

17	ADJUSTMENT THROTTLE POSITION SWITCH CLOSED POSITION-II

1. Temporarily tighten sensor body fixing bolts as follows.
- **Gradually move the sensor body clockwise and stop it when the continuity comes to exist, then temporarily tighten sensor body fixing bolts.**



SEF954Y

2. Make sure two or three times that the continuity exists when the throttle valve is closed and continuity does not exist when it is opened.
3. Remove 0.05 mm (0.0020 in) feeler gauge then insert 0.15 mm (0.0059 in) feeler gauge.
4. Make sure two or three times that the continuity does not exist when the throttle valve is closed.
5. Tighten throttle position sensor.
6. Check the continuity again.

Continuity does not exist while closing the throttle valve.

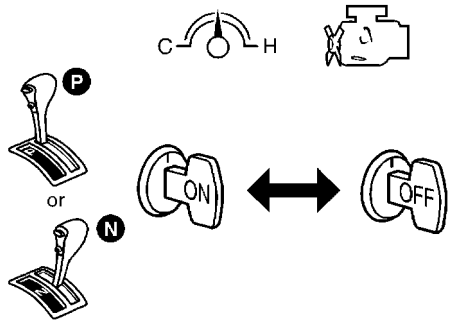
OK or NG

OK	▶	GO TO 18.
NG	▶	GO TO 16.

18	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

NOTE:
Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.

1. Confirm that proper vacuum is applied. Refer to Test No. 10.
2. Attach blind cap to vacuum port from which vacuum hose to throttle opener was disconnected.
3. Start engine.
4. Warm up engine to normal operating temperature.
5. Stop engine. (Turn ignition switch "OFF".)
6. Turn ignition switch "ON" and wait at least 5 seconds.



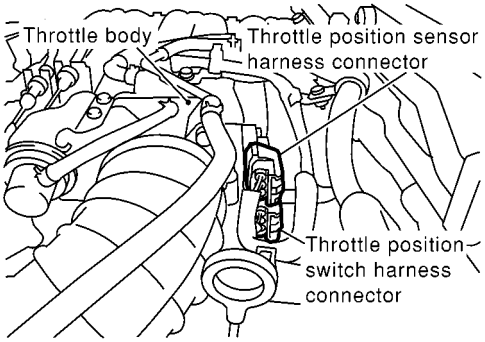
SEF864V

7. Turn ignition switch "OFF" and wait at least 10 seconds.
8. Repeat steps 6 and 7, 20 times.

	▶	GO TO 19.

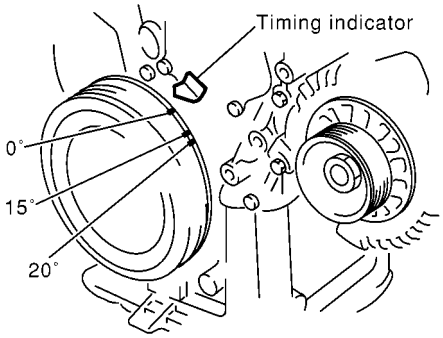
19	CHECK IGNITION TIMING-I

1. Turn ignition switch "OFF".
2. Release vacuum from throttle opener.
3. Remove vacuum pump and vacuum hose from throttle opener.
4. Reinstall original vacuum hose to throttle opener securely.
5. Start engine and warm it up to normal operating temperature.
6. Stop engine and disconnect throttle position sensor harness connector.



SEF944Y

7. Start engine.
8. Check ignition timing at idle using a timing light.



SEF572X

Ignition timing:
M/T: 15°±2° BTDC
A/T: 15°±2° BTDC (in "P" or "N" position)

OK or NG

OK	▶	GO TO 24.
NG	▶	GO TO 20.

20	DETECT MALFUNCTIONING PART

Check the following.
- Crankshaft position sensor (POS) circuit and function. Refer to EC-329, 512
- Crankshaft position sensor (REF) circuit and function. Refer to EC-505.
- Camshaft position sensor (PHASE) circuit and function. Refer to EC-337.

OK or NG

OK	▶	GO TO 22.
NG	▶	GO TO 21.

21	REPAIR MALFUNCTION

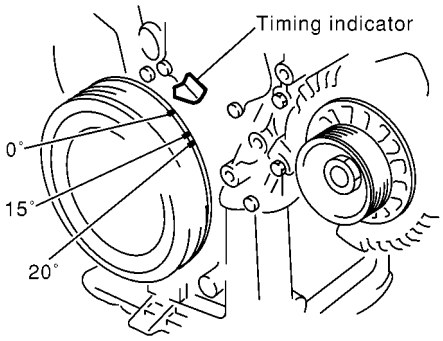
Repair or replace malfunctioning part following the "Diagnostic Procedure" corresponding the detected malfunction.

	▶	GO TO 23.

22	CHECK ECM FUNCTION
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.) 2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM-NATS)", EC-73	
▶	GO TO 23.

23	PERFORM IDLE AIR VOLUME LEARNING
Refer to "Idle Air Volume Learning", EC-56 **Is the result CMPLT or INCMP?**	
CMPLT or INCMP	
CMPLT ▶	GO TO 19.
INCMP ▶	Follow the construction of "Idle Air Volume Leaning".

24	CHECK IGNITION TIMING-II
1. Stop engine. 2. Reconnect throttle position sensor harness connector. 3. Start engine and let it idle. 4. Check ignition timing at idle using a timing light.	



SEF572X

Ignition timing:
M/T: 15°±2° BTDC
A/T: 15°±2° BTDC (in "P" or "N" position)

OK or NG	
OK (With CONSULT-II) ▶	GO TO 32.
OK (Without CONSULT-II) ▶	GO TO 35.
NG ▶	GO TO 25.

25	PERFORM IDLE AIR VOLUME LEARNING
Refer to "Idle Air Volume Learning", EC-56. **Is the result CMPLT or INCMP?**	
CMPLT or INCMP	
CMPLT ▶	GO TO 26.
INCMP ▶	Follow the construction of "Idle Air Volume Learning".

26	CHECK IGNITION TIMING AGAIN	
Check ignition timing again. Refer to Test No. 24.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 32.
OK (Without CONSULT-II)	▶	GO TO 35.
NG	▶	GO TO 27.

27	CHECK FOR INTAKE AIR LEAK	
1. Start engine and let it idle. 2. Listen for an air leak from PCV hose and after IACV-AAC valve.		
OK or NG		
OK	▶	GO TO 29.
NG	▶	GO TO 28.

28	REPAIR MALFUNCTION	
1. Stop engine. 2. Repair or replace malfunctioning part.		
	▶	GO TO 25.

29	DETECT MALFUNCTIONING PART	
Check the IACV-AAC valve circuit and function. Refer to EC-417.		
OK or NG		
OK	▶	GO TO 31.
NG	▶	GO TO 30.

30	REPAIR MALFUNCTION	
Repair or replace malfunction part following the "Diagnostic Procedure" corresponding the detected malfunction.		
	▶	GO TO 25.

31	CHECK ECM FUNCTION	
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a problem, but this is rarely the case.) 2. Perform initialization of NVIS (NATS) system and registration of NVIS (NATS) ignition key IDs. Refer to "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-73.		
	▶	GO TO 25.

32	CHECK TARGET IDLE SPEED	
With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode. 3. Check idle speed. **M/T: 750±50 rpm** **A/T: 750±50 rpm (in "P" or "N" position)**		
OK or NG		
OK	▶	GO TO 38.
NG	▶	GO TO 33.

33	PERFORM IDLE AIR VOLUME LEARNING	
Refer to "Idle Air Volume Learning", EC-56. **Is the result CMPLT or INCMP?**		
	CMPLT or INCMP	
CMPLT	▶	GO TO 34.
INCMP	▶	Follow the construction of "Idle Air Volume Learning".

34	CHECK TARGET IDLE SPEED AGAIN	
1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode with CONSULT-II. 3. Check idle speed. **M/T: 750±50 rpm** **A/T: 750±50 rpm (in "P" or "N" position)**		
	OK or NG	
OK	▶	GO TO 38.
NG	▶	GO TO 27.

35	CHECK TARGET IDLE SPEED	
Without CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. **M/T: 750±50 rpm** **A/T: 750±50 rpm (in "P" or "N" position)**		
	OK or NG	
OK	▶	GO TO 38.
NG	▶	GO TO 36.

36	PERFORM IDLE AIR VOLUME LEARNING	
Refer to "Idle Air Volume Learning", EC-56. **Is the result CMPLT or INCMP?**		
	CMPLT or INCMP	
CMPLT	▶	GO TO 37.
INCMP	▶	Follow the construction of "Idle Air Volume Learning".

37	CHECK TARGET IDLE SPEED AGAIN	
1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. **M/T: 750±50 rpm** **A/T: 750±50 rpm (in "P" or "N" position)**		
	OK or NG	
OK	▶	GO TO 38.
NG	▶	GO TO 27.

Basic Inspection (Cont'd)

38	ERASE UNNECESSARY DTC
After this inspection, unnecessary DTC No. might be displayed. Erase the stored memory in ECM and TCM (Transmission control module). Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-71 and AT-35, "HOW TO ERASE DTC".	
▶	**INSPECTION END**

DTC Inspection Priority Chart

NAEC0039

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	• P0100 Mass air flow sensor • P0110 Intake air temperature sensor • P0115 P0125 Engine coolant temperature sensor • P0120 Throttle position sensor • P0180 Fuel tank temperature sensor • P0325 Knock sensor • P0335 P1336 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0460 P0461 P0464 P1464 Fuel level sensor • P0500 Vehicle speed sensor • P0605 ECM • P1320 Ignition signal • P1335 Crankshaft position sensor (REF) • P1605 A/T diagnosis communication line • P1706 Park/Neutral position (PNP) switch
2	• P0105 Absolute pressure sensor • P0130-P0134, P0150-P0154 Heated oxygen sensor 1 (front) • P0135 P0155 Heated oxygen sensor 1 heater (front) • P0137-P0140, P0157-P0160 Heated oxygen sensor 2 (rear) • P0141 P0161 Heated oxygen sensor 2 (rear) heater • P0217 Coolant overtemperature enrichment protection • P0443 P1444 EVAP canister purge volume control solenoid valve • P0446 P1446 P1448 EVAP canister vent control valve • P0450 EVAP control system pressure sensor • P0510 Closed throttle position switch • P0705-P0755 P1705 P1760 A/T related sensors, solenoid valves and switches • P1111 Intake valve timing control solenoid valve • P1140 Intake valve timing control position sensor • P1165 Swirl control valve control vacuum check switch • P1441 EVAP control system (VERY SMALL LEAK) • P1447 EVAP control system purge flow monitoring • P1490 P1491 Vacuum cut valve bypass valve
3	• P0171 P0172 P0174 P0175 Fuel injection system function • P0306 - P0300 Misfire • P0420 P0430 Three way catalyst function • P0440 P1440 EVAP control system (SMALL LEAK) • P0455 EVAP control system (GROSS LEAK) • P0505 IACV-AAC valve • P0600 A/T communication line • P0731-P0734 P0744 A/T function • P1110 Intake valve timing control • P1130 Swirl control valve control solenoid valve • P1148 P1168 Closed loop control

Fail-safe Chart

=NAEC0040

The ECM enters fail-safe mode, if any of the following malfunctions is detected due to the open or short circuit. When the ECM enters the fail-safe mode, the MIL illuminates.

<table>
<tr><th>DTC No.</th><th>Detected items</th><th colspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><td>P0100</td><td>Mass air flow sensor circuit</td><td colspan="2">Engine speed will not rise more than 2,400 rpm due to the fuel cut.</td></tr>
<tr><td>P0115</td><td>Engine coolant temperature sensor circuit</td><td colspan="2">Engine coolant temperature will be determined by ECM based on the time after turning ignition switch “ON” or “START”.
CONSULT-II displays the engine coolant temperature decided by ECM.</td></tr>
<tr><td></td><td></td><td>Condition</td><td>Engine coolant temperature decided (CONSULT-II display)</td></tr>
<tr><td></td><td></td><td>Just as ignition switch is turned ON or Start</td><td>40°C (104°F)</td></tr>
<tr><td></td><td></td><td>More than approx. 4 minutes after ignition ON or Start</td><td>80°C (176°F)</td></tr>
<tr><td></td><td></td><td>Except as shown above</td><td>40 - 80°C (104 - 176°F)
(Depends on the time)</td></tr>
<tr><td>P0120</td><td>Throttle position sensor circuit</td><td colspan="2">Throttle position will be determined based on the injected fuel amount and the engine speed.
Therefore, acceleration will be poor.</td></tr>
<tr><td></td><td></td><td>Condition</td><td>Driving condition</td></tr>
<tr><td></td><td></td><td>When engine is idling</td><td>Normal</td></tr>
<tr><td></td><td></td><td>When accelerating</td><td>Poor acceleration</td></tr>
<tr><td>P1335</td><td>Crankshaft position sensor (REF) circuit</td><td colspan="2">Compression TDC signal (120° signal) is controlled by camshaft position sensor (PHASE) signal and crankshaft position sensor (POS) signal. Ignition timing will be delayed 0° to 2°.</td></tr>
<tr><td>Unable to access ECM</td><td>ECM</td><td colspan="2">ECM fail-safe activating condition
The computing function of the ECM was judged to be malfunctioning.
When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the MIL on the instrument panel lights to warn the driver.
However it is not possible to access ECM and DTC cannot be confirmed.
Engine control with fail-safe
When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation, IACV-AAC valve operation and cooling fan operation are controlled under certain limitations.</td></tr>
<tr><td></td><td></td><td></td><td>ECM fail-safe operation</td></tr>
<tr><td></td><td></td><td>Engine speed</td><td>Engine speed will not rise more than 3,000 rpm</td></tr>
<tr><td></td><td></td><td>Fuel injection</td><td>Simultaneous multiport fuel injection system</td></tr>
<tr><td></td><td></td><td>Ignition timing</td><td>Ignition timing is fixed at the preset valve</td></tr>
<tr><td></td><td></td><td>Fuel pump</td><td>Fuel pump relay is “ON” when engine is running and “OFF” when engine stalls</td></tr>
<tr><td></td><td></td><td>IACV-AAC valve</td><td>Full open</td></tr>
<tr><td></td><td></td><td colspan="2">Replace ECM, if ECM fail-safe condition is confirmed.</td></tr>
</table>

Symptom Matrix Chart

NAEC0041

SYSTEM — BASIC ENGINE CONTROL SYSTEM

NAEC0041S01

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-621
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-40
	Injector circuit	1	1	2	3	2		2	2			2			EC-612
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-32
Air	Positive crankcase ventilation system												1		EC-38
	Incorrect idle speed adjustment						1	1	1	1		1			EC-99
	IACV-AAC valve circuit	1	1	2	3	3	2	2	2	2		2		2	EC-417
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-99
	Ignition circuit	1	1	2	2	2		2	2			2			EC-494
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-137
Air conditioner circuit							3			3				2	HA section

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

Symptom Matrix Chart (Cont'd)

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine control	Crankshaft position sensor (REF) circuit	2	2												EC-505
	Crankshaft position sensor (POS) circuit														EC-329, 512
	Camshaft position sensor (PHASE) circuit	3													EC-337
	Mass air flow sensor circuit	1	1	2	2	2		2	2			2			EC-145
	Heated oxygen sensor 1 (front) circuit				3										EC-187
	Engine coolant temperature sensor circuit	1					3			3					EC-164, 182
	Throttle position sensor circuit						2			2					EC-169
	Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-99
	Vehicle speed sensor circuit		2	3		3						3			EC-412
	Knock sensor circuit			2											EC-323
	ECM	2	2	3	3	3	3	3	3	3	3				EC-439, 116
	Start signal circuit	2													EC-617
	Park/Neutral position switch circuit			3		3		3	3			3			EC-599
	Power steering oil pressure switch circuit		2												EC-630
	Electrical load signal circuit														EC-640

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

NAEC0041S02

		SYMPTOM													Reference section
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FE section
	Fuel piping			5	5	5		5	5			5			—
	Vapor lock														
	Valve deposit	5		5	5	5		5	5			5			
	Poor fuel (Heavy weight gasoline, Low octane)														
Air	Air duct	5	5	5	5	5	5	5	5	5		5			
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)														
	Throttle body, Throttle wire														FE section
	Air leakage from intake manifold/ Collector/Gasket														—
Cranking	Battery	1	1	1		1		1	1			1		1	EL section
	Alternator circuit														
	Starter circuit	3													
	Flywheel/Drive plate	6													EM section
	PNP switch	4													AT section

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

Symptom Matrix Chart (Cont'd)

		SYMPTOM													Reference section
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM section
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			
	Camshaft														
	Intake valve												3		
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5	5	5		5					FE section
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			MA, EM, LC section
	Oil level (Low)/Filthy oil														LC section
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			
	Thermostat									5					
	Water pump														
	Water gallery														
	Coolant level (low)/Contaminated coolant														MA section

1 - 6: The numbers refer to the order of inspection.

	SYMPTOM													Reference section
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
NVIS (NISSAN Vehicle Immobilizer System — NATS)	1	1												EC-73 or EL section

1 - 6: The numbers refer to the order of inspection.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0042

Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

  * Specification data may not be directly related to their components signals/values/operations.

  i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.
- If the real-time diagnosis results are NG and the on board diagnostic system results are OK when diagnosing the mass air flow sensor, first check to see if the fuel pump control circuit is normal.

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED CKPS·RPM (POS)	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT-II value.		Almost the same speed as the CONSULT-II value.
POS COUNT	• Engine: Running		179 - 181
MAS A/F SE-B1	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	1.2 - 1.8V
		2,500 rpm	1.6 - 2.2V
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1) HO2S1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.
HO2S2 (B1) HO2S2 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH

CONSULT-II Reference Value in Data Monitor Mode (Cont'd)

MONITOR ITEM	CONDITION		SPECIFICATION
VHCL SPEED SE	• Turn drive wheels and compare speedometer indication with the CONSULT-II value		Almost the same speed as the CONSULT-II value
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
THRTL POS SEN	• Engine: After warming up, idle the engine	Throttle valve: fully closed	0.15 - 0.85V
	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	3.5 - 4.7V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS CLSD THL/P SW	• Engine: After warming up, idle the engine	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: "OFF"	OFF
		Air conditioner switch: "ON" (Compressor operates.)	ON
P/N POSI SW	• Ignition switch: ON	Shift lever: "P" or "N"	ON
		Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
INJ PULSE-B2 INJ PULSE-B1	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 2.8 msec
B/FUEL SCHDL	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	2.0 - 3.2 msec
		2,000 rpm	1.4 - 2.6 msec
IGN TIMING	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	15° BTDC
		2,000 rpm	More than 25° BTDC
IACV-AAC/V	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	2 - 10 step
		2,000 rpm	—
PURG VOL C/V	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	0 %
		2,000 rpm	—
A/F ALPHA-B2 A/F ALPHA-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	54 - 155%
EVAP SYS PRES	• Ignition switch: ON		Approx. 3.4V
AIR COND RLY	• Air conditioner switch: OFF → ON		OFF → ON
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking		ON
	Except as shown above		OFF

MONITOR ITEM	CONDITION		SPECIFICATION
VENT CONT/V	• Ignition switch: ON		OFF
HO2S1 HTR (B1) HO2S1 HTR (B2)	• Engine speed: Below 3,600 rpm		ON
	• Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1) HO2S2 HTR (B2)	• Ignition switch: ON (Engine stopped) • Engine speed: Above 3,200 rpm		OFF
	• Engine speed: Below 3,200 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]		ON
VC/V BYPASS/V	Ignition switch: ON		OFF
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	14.0 - 33.0%
		2,500 rpm	12.0 - 25.0%
ABSOL TH·P/S	• Engine: After warming up	Throttle valve: fully closed	0.0%
	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 80%
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s
ABSOL PRES/SE	• Ignition switch: ON		Approx. 4.4V
SWRL CONT S/V	• Engine speed: Idle	Engine coolant temperature is between 15°C (59°F) to 50°C (122°F).	ON
		Engine coolant temperature is above 55°C (131°F).	OFF
SWL CON VC SW	• Engine speed: Idle • Engine coolant temperature is between 15°C (59°F) to 50°C (122°F).		OFF
	• Engine speed: Idle • Engine coolant temperature is above 55°C (131°F).		ON
INT/V TIM (B1) INT/V TIM (B2)	• Engine: After warming up • Shift lever "N" • Quickly depressed accelerator pedal • No-load	Idle	0° CA
		2,000 rpm	Approximately 12 - 18° CA
INT/V SOL (B1) INT/V SOL (B2)	• Engine: After warming up • Shift lever "N" • Quickly depressed accelerator pedal • No-load	Idle	0%
		2,000 rpm	Approximately 40%

Major Sensor Reference Graph in Data Monitor Mode

NAEC0043

The following are the major sensor reference graphs in "DATA MONITOR" mode.

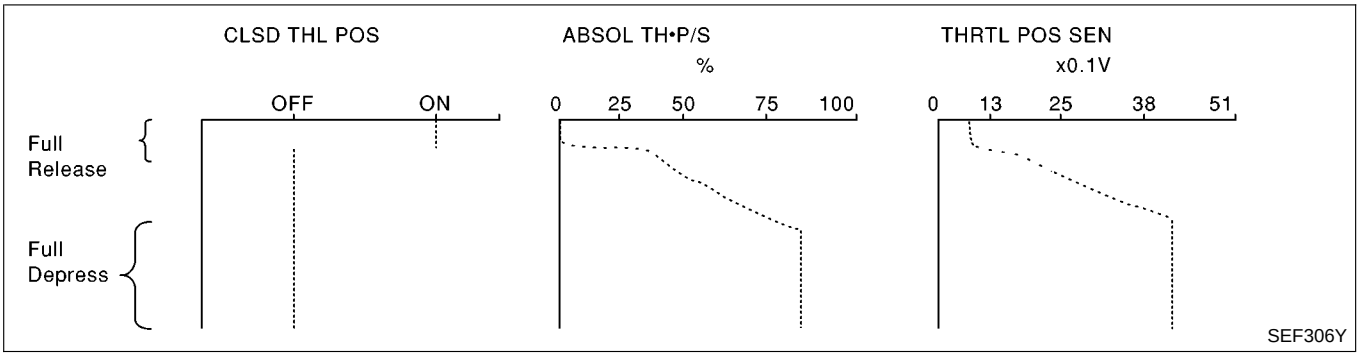
THRTL POS SEN, ABSOL TH·P/S, CLSD THL POS

NAEC0043S01

Below is the data for "THRTL POS SEN", "ABSOL TH·P/S" and "CLSD THL POS" when depressing the accelerator pedal with the ignition switch "ON".

The signal of "THRTL POS SEN" and "ABSOL TH·P/S" should rise gradually without any intermittent drop or rise after "CLSD THL POS" is changed from "ON" to "OFF".

Major Sensor Reference Graph in Data Monitor Mode (Cont'd)

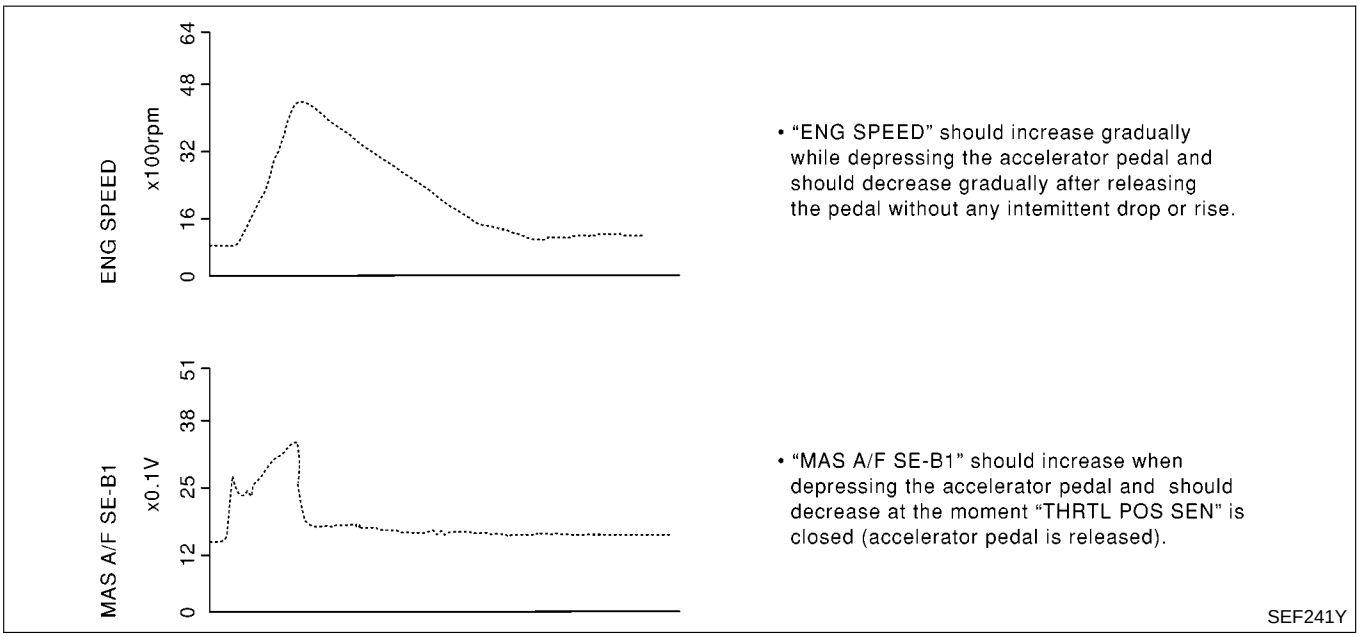


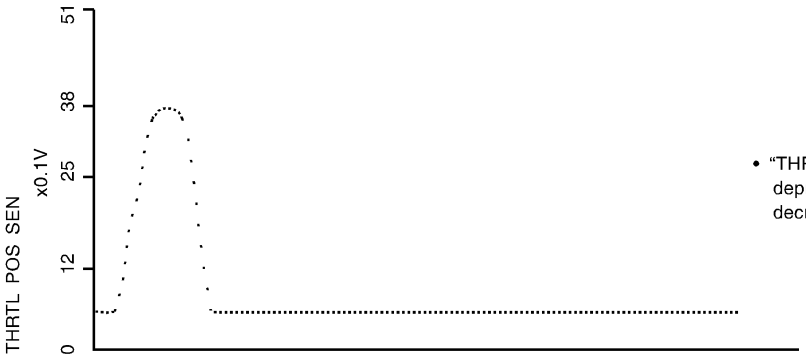
ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

NAEC0043S02

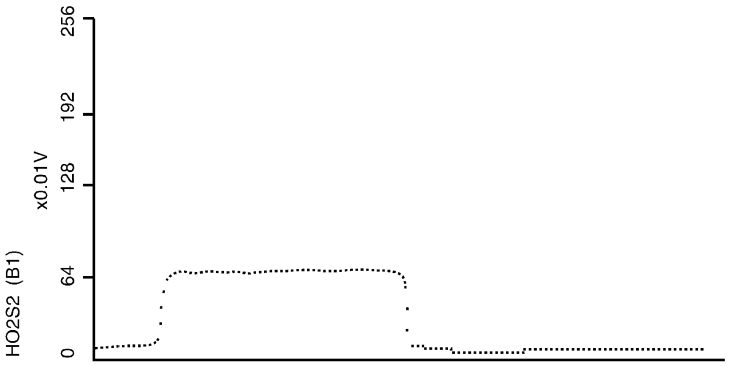
Below is the data for "ENG SPEED", "MAS A/F SE-B1", "THRTL POS SEN", "HO2S2 (B1)", "HO2S1 (B1)" and "INJ PULSE-B1" when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.

Each value is for reference, the exact value may vary.

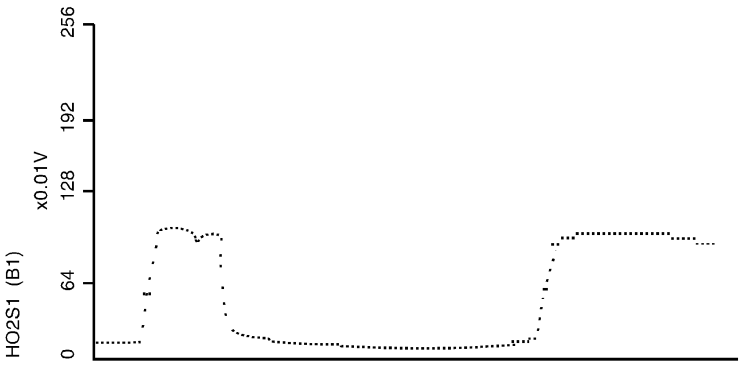




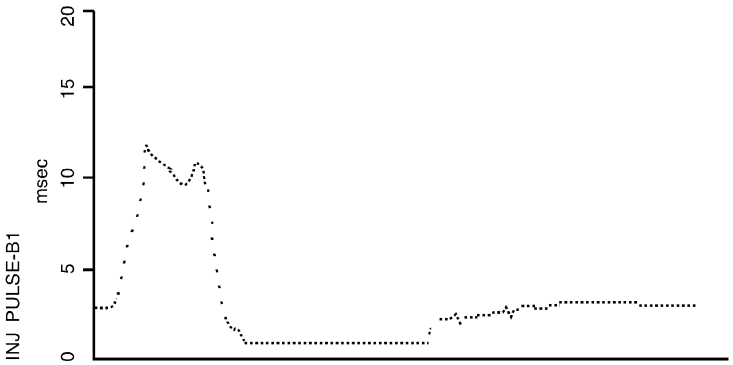
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.

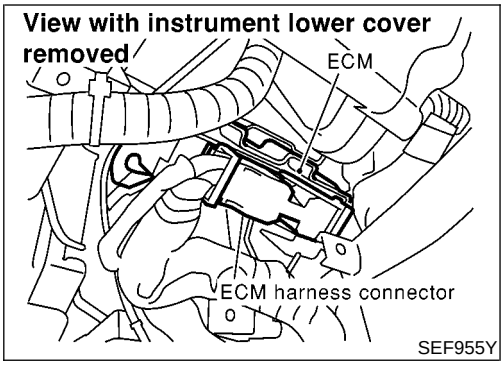


- "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

SEF242YA



ECM Terminals and Reference Value

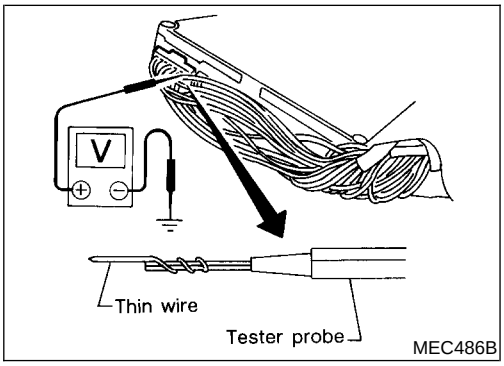
NAEC0044

PREPARATION

NAEC0044S01

1. ECM is located behind the instrument lower cover. For this inspection, remove instrument lower cover.

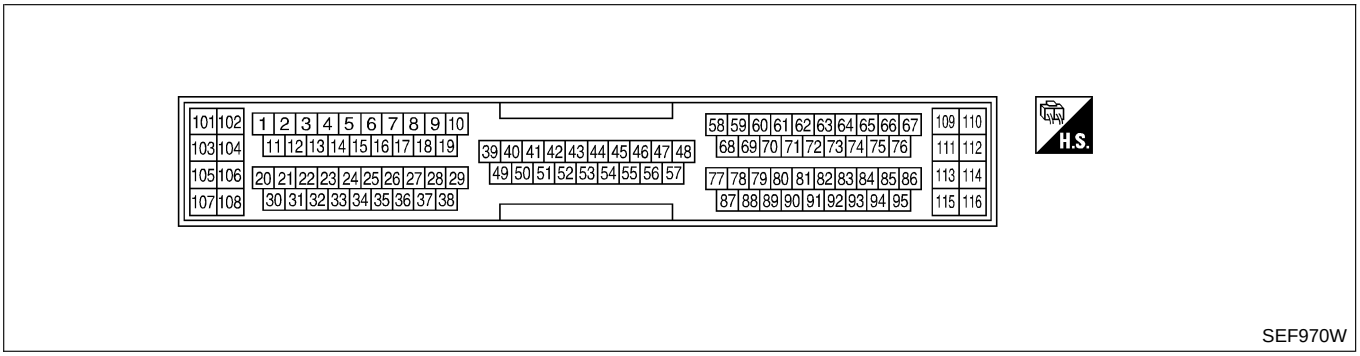
2. Remove ECM harness protector.



3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily.
- Open harness securing clip to make testing easier.
- Use extreme care not to touch 2 pins at one time.
- Data is for comparison and may not be exact.

ECM HARNESS CONNECTOR TERMINAL LAYOUT

NAEC0044S02



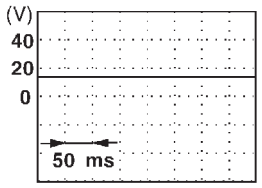
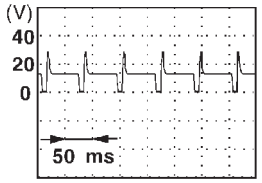
ECM INSPECTION TABLE

NAEC0044S03

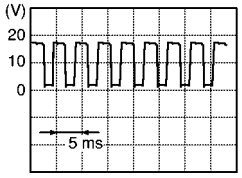
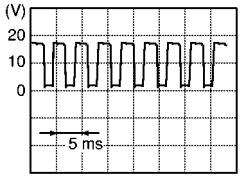
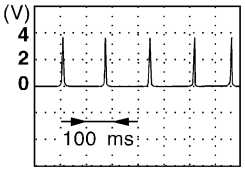
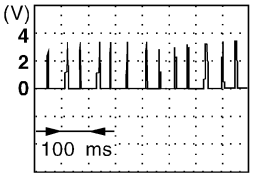
Specification data are reference values and are measured between each terminal and ground.

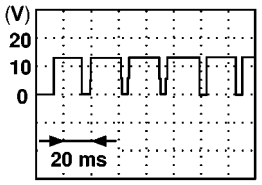
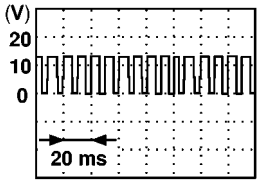
CAUTION:

Do not use ECM ground terminals when measuring the input/ output voltage. Doing so may result in damage to the ECM's transistor. Use ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine).	BATTERY VOLTAGE (11 - 14V)  SEF995U
2	R/G	Heated oxygen sensor 1 (front) (bank 2) heater	**[Engine is running]** ● Engine speed is below 3,600 rpm.	0 - 1.0V
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
3	L/OR	Heated oxygen sensor 1 (front) (bank 1) heater	**[Engine is running]** ● Engine speed is below 3,600 rpm.	0 - 1.0V
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
4	R/W	Heated oxygen sensor 2 (rear) (bank 2) heater	**[Engine is running]** ● Engine speed is below 3,200 rpm. ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,200 rpm.	BATTERY VOLTAGE (11 - 14V)
5	P/B	Heated oxygen sensor 2 (rear) (bank 1) heater	**[Engine is running]** ● Engine speed is below 3,200 rpm. ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	0 - 1.0V
			[Ignition switch "ON"] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,200 rpm.	BATTERY VOLTAGE (11 - 14V)
6 7 8 17	PU/G GY Y GY/L	IACV-AAC valve	**[Engine is running]** ● Idle speed	0.1 - 14V

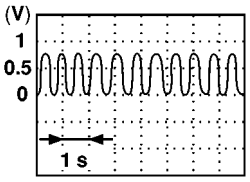
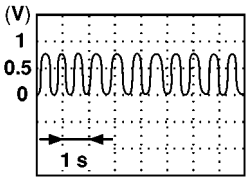
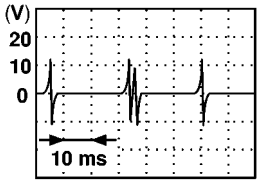
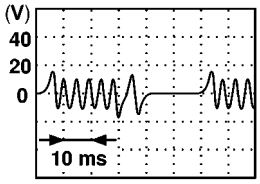
ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	OR/B	Intake valve timing control solenoid valves (RH)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Battery voltage
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	7 - 8V  SEF350Z
15	P/L	Intake valve timing control solenoid valves (LH)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Battery voltage
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	7 - 8V  SEF350Z
16	Y/G	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm.	0 - 1.0V
21 22 23 30 31 32	Y/R G/R L/R GY PU/W GY/R	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 3 Ignition signal No. 4 Ignition signal No. 5 Ignition signal No. 6	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.2V★  SEF399T
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	0.1 - 0.3V★  SEF645T

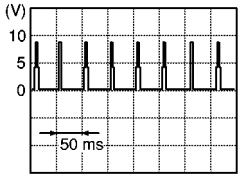
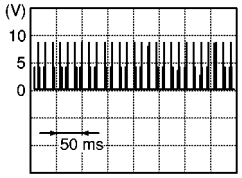
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	W/G	Tachometer	**[Engine is running]** ● **Warm-up condition** ● Idle speed	7 - 8V★  SEF579X
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	7 - 8V★  SEF580X
26	L/B	ECM relay (Self shutt-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For a few seconds after turning ignition switch "OFF"	0 - 1.5V
			[Ignition switch "OFF"] ● A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
27	L/G	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are "ON" (Compressor is operating).	0 - 1.0V
			[Engine is running] ● A/C switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
28	R/L	Fuel pump relay	**[Ignition switch "ON"]** ● For 1 second after turning ignition switch "ON" **[Engine is running]**	0 - 1.5V
			[Ignition switch "ON"] ● 1 second passed after turning ignition switch "ON".	BATTERY VOLTAGE (11 - 14V)
29	G	Swirl control valve control solenoid valve	**[Engine is running]** ● Idle speed ● Engine coolant temperature is between 15 - 50°C (59 - 122°F).	0 - 1.0V
			[Engine is running] ● Idle speed ● Engine coolant temperature is above 55°C (131°F).	BATTERY VOLTAGE (11 - 14V)
38	OR	MIL	**[Ignition switch "ON"]**	0 - 1.0V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
39	G/W	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
40	G/Y	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

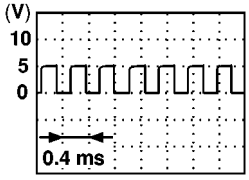
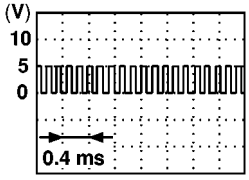
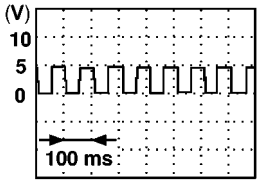
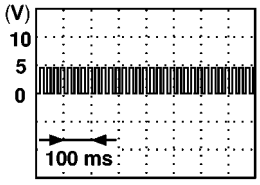
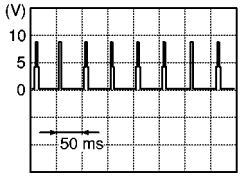
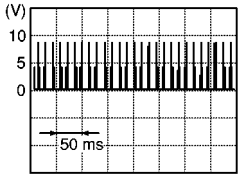
ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	B/Y	Start signal	**[Ignition switch "ON"]**	Approximately 0V
			[Ignition switch "START"]	9 - 12V
43	R	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
44	L	PNP switch	**[Ignition switch "ON"]** ● Gear position is "Neutral position" (M/T models). Gear position is "P" or "N" (A/T models).	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	BATTERY VOLTAGE (11 - 14V)
45	B/R	Air conditioner switch signal	**[Engine is running]** ● Both A/C switch and blower switch are "ON".	Approximately 0V
			[Engine is running] ● A/C switch is "OFF".	Approximately 5V
47	R/B	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being turned.	0 - 1.0V
			[Engine is running] ● Steering wheel is not being turned.	Approximately 5V
48	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground [Probe this terminal with (–) tester probe when measuring]
51	B/R	A/C cut signal	**[Engine is running]** ● Air conditioner is operating.	0 - 0.5V
52	PU	Electrical load signal	**[Engine is running]** ● Rear window defogger: ON ● Hi-beam headlamp: ON	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Electrical load: OFF	0V
55	W/B	Swirl control valve control vacuum check switch	**[Engine is running]** ● Idle speed ● Engine coolant temperature is between 15 - 50°C (59 - 122°F).	Approximately 5V
			[Engine is running] ● Idle speed ● Engine coolant temperature is above 55°C (131°F).	0 - 1.0V
56	OR/W	Throttle position switch (Closed position)	**[Engine is running]** ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Accelerator pedal depressed	Approximately 0V
57	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
58	B/P	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
59	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
61	OR	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.2 - 1.8V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.6 - 2.2V
62	G/B	Heated oxygen sensor 1 (front) (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)  SEF059V
63	G	Heated oxygen sensor 1 (front) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)  SEF059V
64	Y/PU	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
65 75	LG LG	Crankshaft position sensor (REF)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.3V★ (AC voltage)  SEF581X
66 76	L L	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 4.2V★ (AC voltage)  SEF582X
12 67	W/R	Power supply for ECM (Buck-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
70	LG/R	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
71	OR/L	Heated oxygen sensor 2 (rear) (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V
72	OR	Heated oxygen sensor 2 (rear) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V
73	B/P	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
79	Y/G	Intake valve timing control position sensors (RH)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.5V  SEF351Z
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	Approximately 0.5V  SEF352Z
80	L/R	Absolute pressure sensor	**[Ignition switch "ON"]**	Approximately 4.4V
81	W/PU	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are "ON". (Compressor operates.)	0.36 - 3.88V
82	W	Throttle position sensor signal output	**[Engine is running]** ● **Warm-up condition** ● Accelerator pedal fully released	Approximately 0.4V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	Approximately 4V
83	Y/PU	Fuel level sensor	**[Ignition switch "ON"]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
84	L/G	EVAP control system pressure sensor	**[Ignition switch "ON"]**	Approximately 3.4V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
85	Y	Crankshaft position sensor (POS)	**[Engine is running]** ● Idle speed	Approximately 2.4V  SEF057V
			[Engine is running] ● Engine speed is 2,000 rpm.	Approximately 2.3V  SEF058V
86	W/L	Vehicle speed sensor	**[Engine is running]** ● Jack up front wheels. ● In 1st gear position ● 10 km/h (6 MPH)	Approximately 2.5V  SEF583X
			[Engine is running] ● Jack up front wheels. ● In 2nd gear position ● 30 km/h (19 MPH)	Approximately 2.0V  SEF584X
89	OR	Intake valve timing control position sensors (LH)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	approximately 0.5V  SEF351Z
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	approximately 0.5V  SEF352Z

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	R	Throttle position sensor	**[Engine is running]** ● **Warm-up condition** ● Accelerator pedal fully released	0.15 - 0.85V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	3.5 - 4.7V
92	G/B	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel tank temperature.
93	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
101 102 103 104 105 107	R/B L/W R/W PU/R R/Y R/L	Injector No. 1 Injector No. 5 Injector No. 2 Injector No. 6 Injector No. 3 Injector No. 4	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
106 108	B B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
110 112	B/W B/W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
111	P/B	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
114	G/R	Communication line (LAN)	**[Engine is running]** ● Idle speed	Approximately 2V
115	LG/R	Data link connector	**[Ignition switch "ON"]** ● CONSULT-II or GST is disconnected.	Approximately 2V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Description

NAEC0045

Intermittent incidents (I/I) may occur. In many cases, the problem resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of I/I occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific problem area.

COMMON I/I REPORT SITUATIONS

NAEC0045S01

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than "0" or "[1t]".
III	The symptom described by the customer does not recur.
IV	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
VI	The Diagnostic Procedure for PXXXX does not indicate the problem area.

Diagnostic Procedure

NAEC0046

1	INSPECTION START
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION — RELATED INFORMATION", EC-71.	
▶	GO TO 2.

2	CHECK GROUND TERMINALS
Check ground terminals for corroding or loose connection. Refer to GI-30, "GROUND INSPECTION".	
OK or NG	
OK ▶	GO TO 3.
NG ▶	Repair or replace.

3	SEARCH FOR ELECTRICAL INCIDENT
Perform GI-25, "Incident Simulation Tests".	
OK or NG	
OK ▶	GO TO 4.
NG ▶	Repair or replace.

4	CHECK CONNECTOR TERMINALS
Refer to GI-22, "How to Check Enlarged Contact Spring of Terminal".	
OK or NG	
OK ▶	**INSPECTION END**
NG ▶	Repair or replace connector.

ECM Terminals and Reference Value

NAEC0648

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

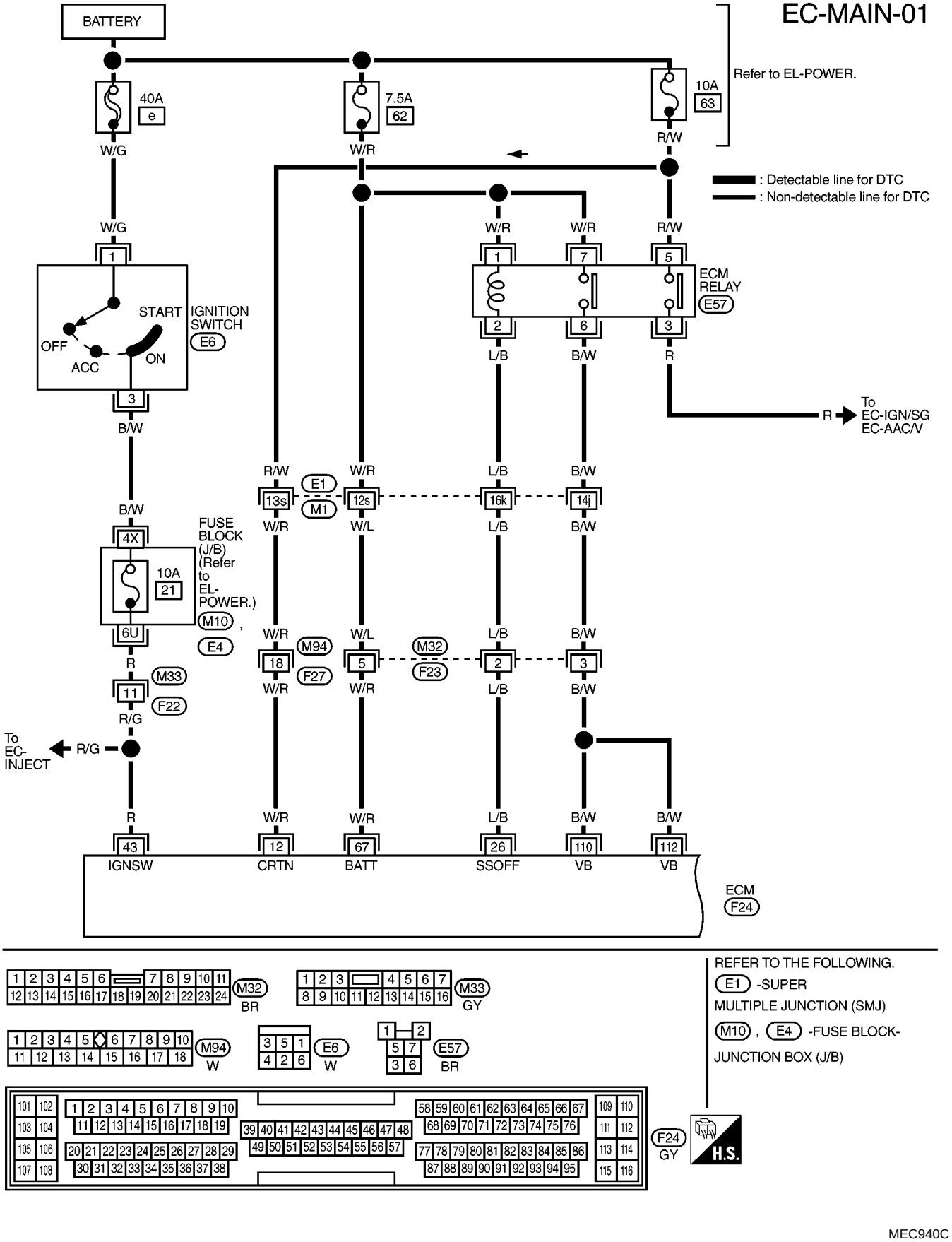
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
26	L/B	ECM relay (Self shutt-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For a few seconds after turning ignition switch "OFF"	0 - 1.5V
			[Ignition switch "OFF"] ● A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
43	R	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
48	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground [Probe this terminal with (–) tester probe when measuring]
57	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
12 67	W/R	Power supply for ECM (Buck-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
108	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
110 112	B/W B/W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

Main Power Supply and Ground Circuit

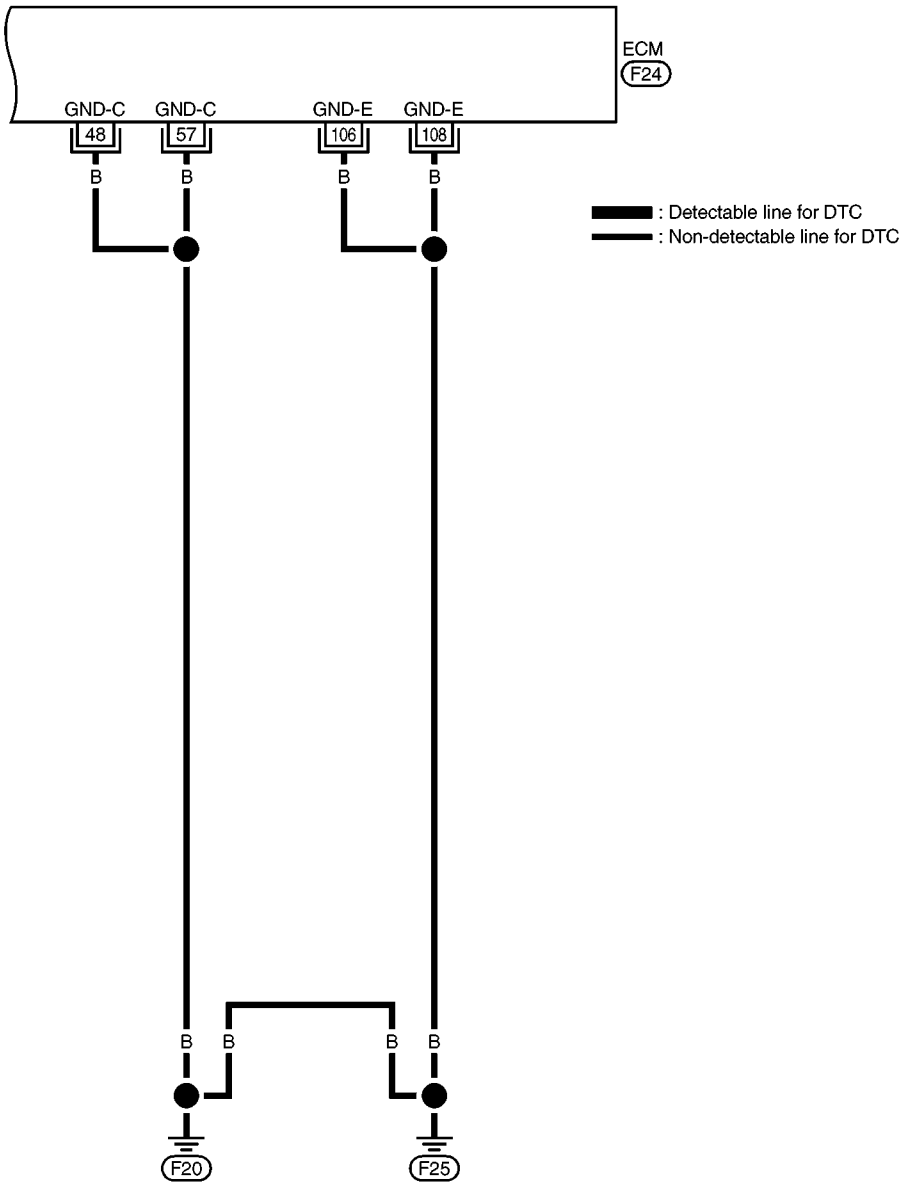
WIRING DIAGRAM

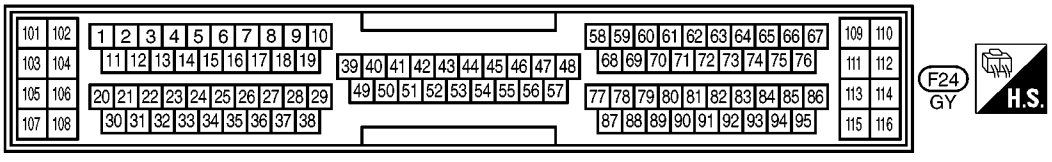
NAEC0047



MEC940C

EC-MAIN-02



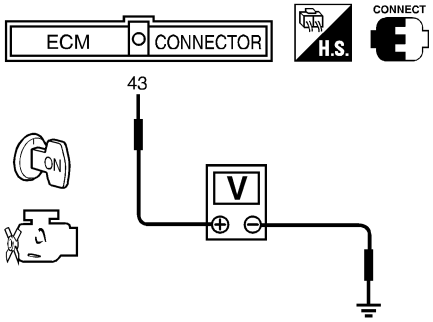


MEC941C

DIAGNOSTIC PROCEDURE

NAEC0049

1	INSPECTION START
Start engine. **Is engine running?**	
Yes or No	
Yes ▶	GO TO 9.
No ▶	GO TO 2.

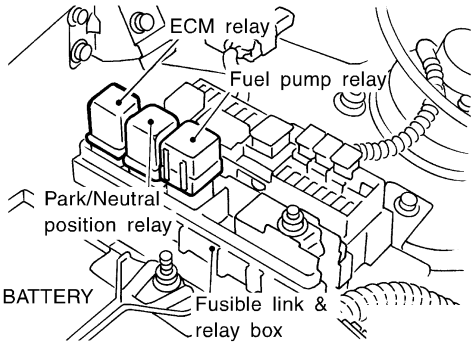
2	CHECK ECM POWER SUPPLY CIRCUIT-I
1. Turn ignition switch "OFF" and then "ON". 2. Check voltage between ECM terminal 43 and ground with CONSULT-II or tester.	
	**Voltage: Battery voltage** SEF291X
OK or NG	
OK ▶	GO TO 4.
NG ▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. • 10A fuse • Harness connectors M33, F22 • Harness for open or short between ECM and ignition switch	
▶	Repair harness or connectors.

4	CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I
1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 48, 57, 106, 108 and engine ground. Refer to WIRING DIAGRAM. **Continuity should exist.** 4. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 5.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

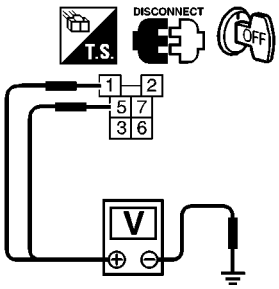
5	CHECK POWER SUPPLY-II

1. Disconnect ECM relay.



SEF681UB

2. Check voltage between ECM relay terminals 1, 5 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF956Y

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- 7.5A and 10A fuses
- Harness for open or short between ECM relay and battery

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 26 and ECM relay terminal 2.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

OK	▶	Go to "DTC P1320 IGNITION SIGNAL", EC-494.
NG	▶	GO TO 8.

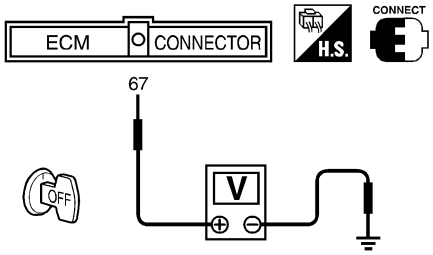
8	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1 and M32, F23
- Harness for open or short between ECM relay and ECM

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK ECM POWER SUPPLY CIRCUIT-II

1. Stop engine.
2. Check voltage between ECM terminal 67 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF293X

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

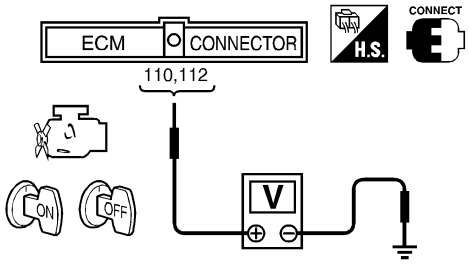
10	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1 and M32, F23
- Harness for open or short between ECM and fuse

	▶	Repair harness or connectors.

11	CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch "ON" and then "OFF".
2. Check voltage between ECM terminals 110, 112 and ground with CONSULT-II or tester.



Voltage:
After turning ignition switch "OFF", battery voltage will exist for a few seconds, then drop approximately 0V.

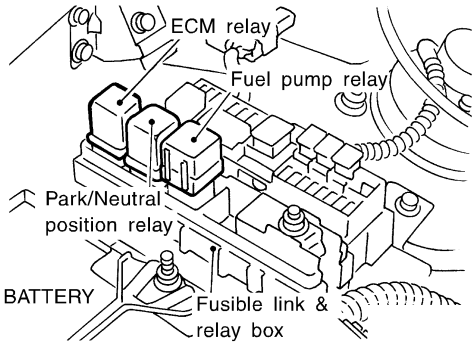
SEF294X

OK or NG

OK	▶	GO TO 17.
NG (Battery voltage does not exist.)	▶	GO TO 12.
NG (Battery voltage exists for more than a few seconds.)	▶	GO TO 14.

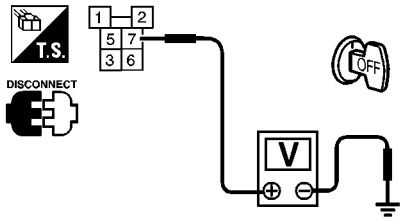
12	CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Disconnect ECM relay.



SEF681UB

2. Check voltage between ECM relay terminal 7 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF957Y

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

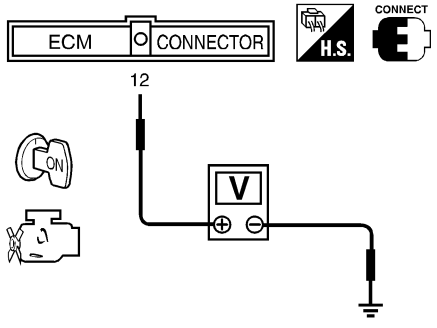
13	DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECM relay and 7.5A fuse

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

14	CHECK ECM POWER SUPPLY-V

1. Turn ignition switch "OFF" and then "ON".
2. Check voltage between ECM terminal 12 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF331Z

OK or NG

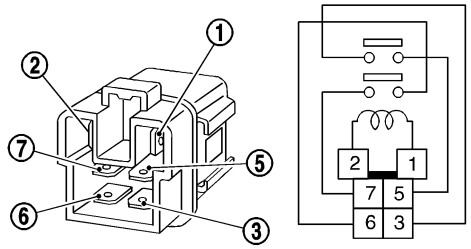
OK	▶	GO TO 16.
NG	▶	GO TO 15.

15	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 ● Harness connectors M94, F27 ● 10A fuse.	
▶	Repair harness or connectors.

16	CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM FOR OPEN AND SHORT
1. Check harness continuity between ECM terminals 110, 112 and ECM relay terminal 6. Refer to WIRING DIAGRAM. **Continuity should exist.** 2. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 18.
NG ▶	GO TO 17.

17	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 and M32, F23 ● Harness for open or short between ECM and ECM relay	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

18	CHECK ECM RELAY
1. Apply 12V direct current between ECM relay terminals 1 and 2. 2. Check continuity between relay terminals 3 and 5, 6 and 7.	



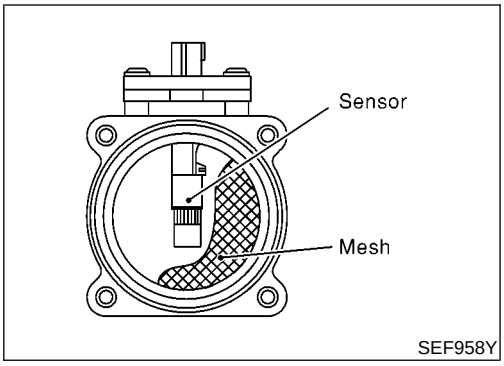
Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

SEF296X

OK or NG	
OK ▶	GO TO 19.
NG ▶	Replace ECM relay.

19	CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II
1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 48, 57, 106, 108 and engine ground. Refer to WIRING DIAGRAM. **Continuity should exist.** 4. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 20.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

20	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**



Component Description

NAEC0050

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot film that is supplied with electric current from the ECM. The temperature of the hot film is controlled by the ECM a certain amount. The heat generated by the hot film is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the ECM must supply more electric current to maintain the temperature of the hot film as air flow increases. The ECM detects the air flow by means of this current change.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0051

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	1.2 - 1.8V
		2,500 rpm	1.6 - 2.2V
CAL/LD VALUE	ditto	Idle	14.0 - 33.0%
		2,500 rpm	12.0 - 25.0%
MASS AIRFLOW	ditto	Idle	2.0 - 6.0 g·m/s
		2,500 rpm	7.0 - 20.0 g·m/s

ECM Terminals and Reference Value

NAEC0649

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
61	OR	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.2 - 1.8V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.6 - 2.2V
73	B/P	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
111	P/B	Sensors’ power supply	**[Ignition switch “ON”]**	Approximately 5V

On Board Diagnosis Logic

NAEC0053

Malfunction is detected when
(Malfunction A) an excessively high voltage from the sensor is sent to ECM when engine is not running,
(Malfunction B) an excessively low voltage from the sensor is sent to ECM when engine is running,
(Malfunction C) a high voltage from the sensor is sent to ECM under light load driving condition,
(Malfunction D) a low voltage from the sensor is sent to ECM under heavy load driving condition,
(Malfunction E) a voltage from the sensor is constantly approx. 1.0V when engine is running.

FAIL-SAFE MODE

NAEC0053S02

When the malfunction B is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

Possible Cause

NAEC0426

MALFUNCTION A OR C

NAEC0426S01

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Mass air flow sensor

MALFUNCTION B, D OR E

NAEC0426S02

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Intake air leaks
- Mass air flow sensor

DTC Confirmation Procedure

NAEC0054

Perform “PROCEDURE FOR MALFUNCTION A” first.
If the 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B AND E”.
If there is no problem on “PROCEDURE FOR MALFUNCTION B AND E”, perform “PROCEDURE FOR MALFUNCTION C”.
If there is no problem on ”PROCEDURE FOR MALFUNCTION C”, perform “PROCEDURE FOR MALFUNCTION D”.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NAEC0054S01

With CONSULT-II

NAEC0054S0101

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 6 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-150.

With GST

NAEC0054S0102

Follow the procedure "With CONSULT-II" above.

PROCEDURE FOR MALFUNCTION B AND E

NAEC0054S02

With CONSULT-II

NAEC0054S0201

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and wait 5 seconds at most.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-150.

With GST

NAEC0054S0202

Follow the procedure "With CONSULT-II" above.

NOTE:
If 1st trip DTC is confirmed after more than 5 seconds, there may be malfunction C.

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION C

NAEC0054S03

NOTE:
If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch "ON") instead of running engine at idle speed.

With CONSULT-II

NAEC0054S0301

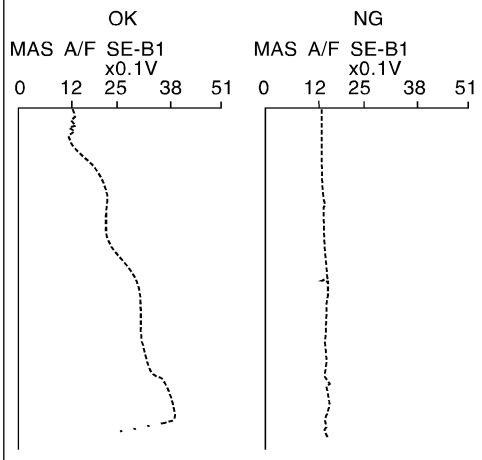
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and warm it up to normal operating temperature.
4) Run engine for at least 10 seconds at idle speed.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-150.

With GST

NAEC0054S0302

Follow the procedure "With CONSULT-II" above.

6



SEF243Y

7

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V

SEF175Y

CALC LOAD	20%
COOLANT TEMP	95°C
SHORT FT #1	2%
LONG FT #1	0%
SHORT FT #2	4%
LONG FT #2	0%
ENGINE SPD	2637RPM
VEHICLE SPD	0MPH
IGN ADVANCE	41.0°
INTAKE AIR	41°C
MAF	**14.1gm/sec**
THROTTLE POS	3%

SEF534P

PROCEDURE FOR MALFUNCTION D

NAEC0054S04

CAUTION:

Always drive vehicle at a safe speed.

With CONSULT-II

NAEC0054S0402

1) Turn ignition switch "ON".
2) Start engine and warm it up to normal operating temperature. **If engine cannot be started, go to "Diagnostic Procedure", EC-150.**
3) Select "DATA MONITOR" mode with CONSULT-II.
4) Check the voltage of MAS AIR/FL SE with "DATA MONITOR".
5) Increases engine speed to about 4,000 rpm.
6) Monitor the linear voltage rise in response to engine speed increases.
   If NG, go to "Diagnostic Procedure", EC-150.
   If OK, go to following step.
7) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
THRTL POS SEN	More than 3V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-150.

Overall Function Check

NAEC0055

PROCEDURE FOR MALFUNCTION D

NAEC0055S01

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a 1st trip DTC might not be confirmed.

With GST

NAEC0055S0101

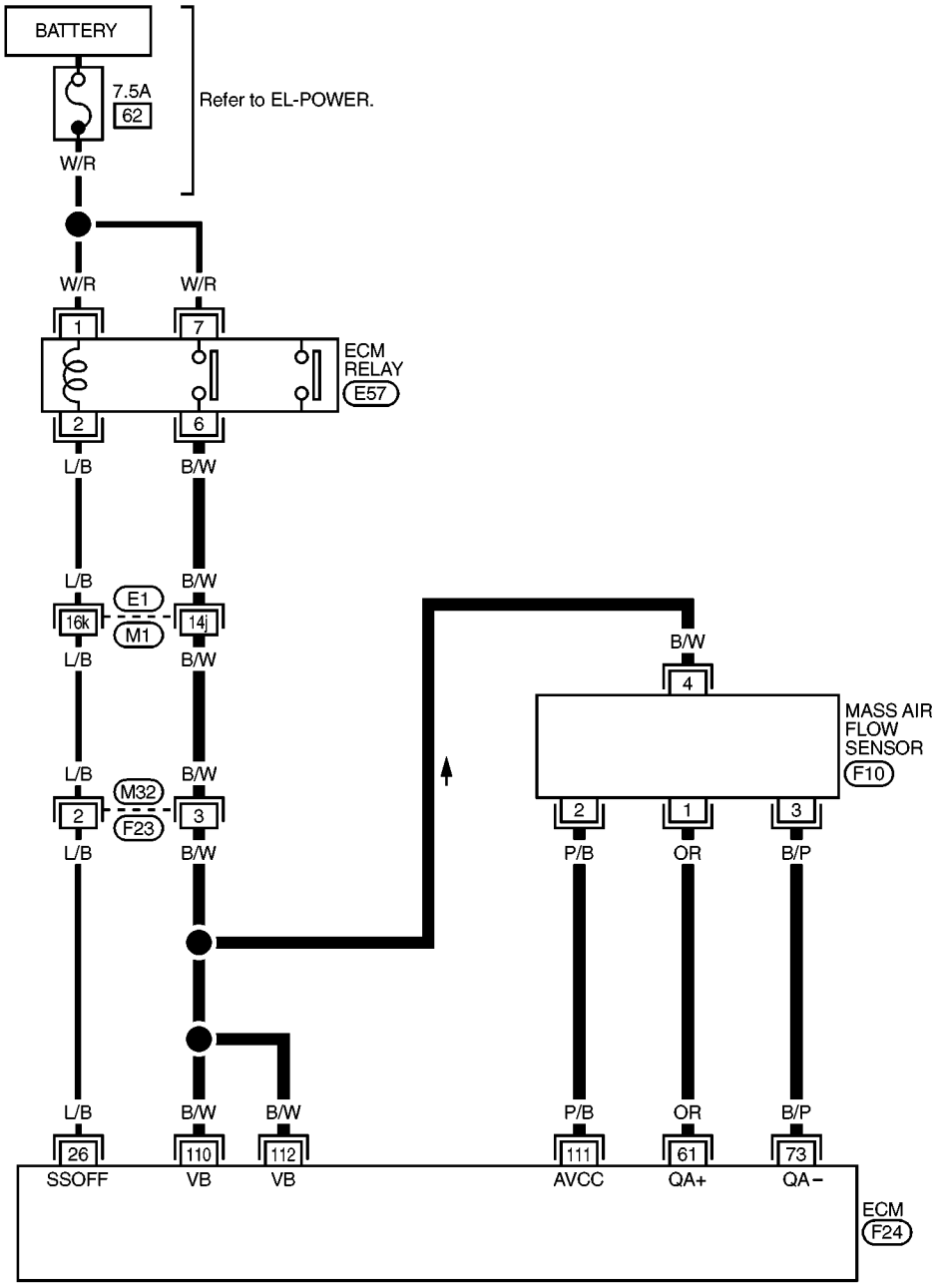
1) Start engine and warm it up to normal operating temperature.
2) Select "MODE 1" with GST.
3) Check the mass air flow sensor signal with "MODE 1".
4) Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
5) If NG, go to "Diagnostic Procedure", EC-150.

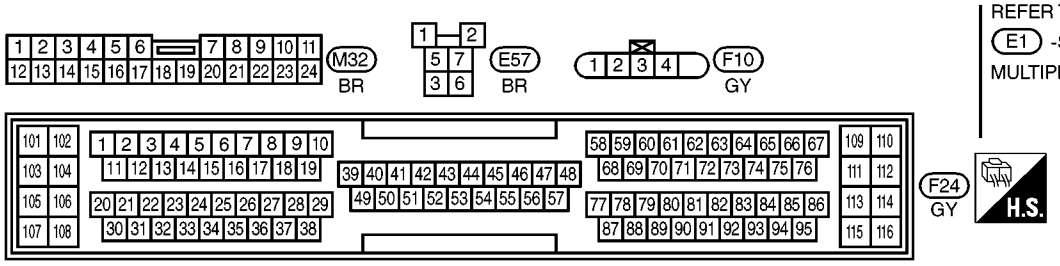
Wiring Diagram

NAEC0056

EC-MAFS-01

: Detectable line for DTC
: Non-detectable line for DTC





REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

MEC942C

Diagnostic Procedure

NAEC0057

1	INSPECTION START

Which malfunction (A, B, C, D or E) is duplicated?

MALFUNCTION	Type
A and/or C	I
B, D and/or E	II

MTBL0373

Type I or Type II

Type I	▶	GO TO 3.
Type II	▶	GO TO 2.

2	CHECK INTAKE SYSTEM

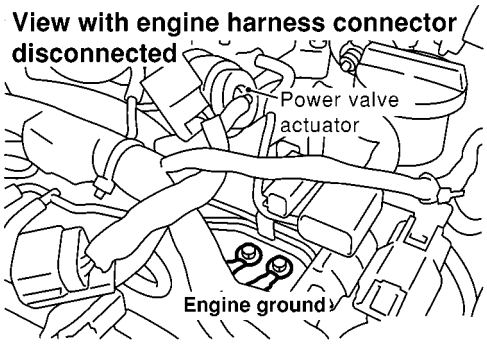
Check the following for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

OK or NG

OK	▶	GO TO 3.
NG	▶	Reconnect the parts.

3	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

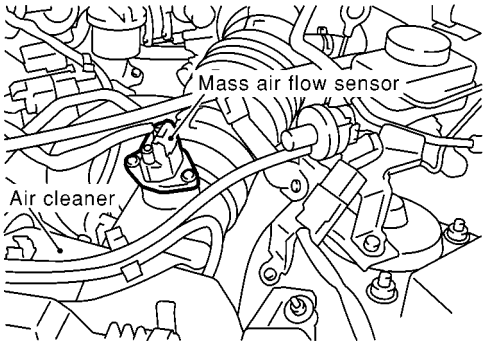


SEF959Y

	▶	GO TO 4.

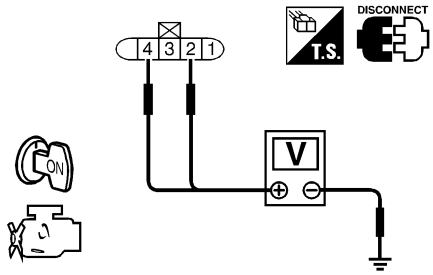
4	CHECK MAFS POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (MAFS) harness connector.



SEF960Y

2. Turn ignition switch "ON".
3. Check voltage between MAFS terminals 2, 4 and ground with CONSULT-II or tester.



Terminal	Voltage
2	Approximately 5
4	Battery voltage

SEF297X

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

	▶	Repair harness or connectors.

6	CHECK MAFS GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between MAFS terminal 3 and ECM terminal 73.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

7	CHECK MAFS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

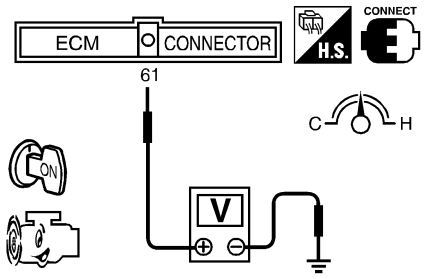
1. Check harness continuity between MAFS terminal 1 and ECM terminal 61.
   Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 61 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.2 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.2
Idle to about 4,000 rpm*	1.2 - 1.8 to Approx. 4.0

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

SEF298X

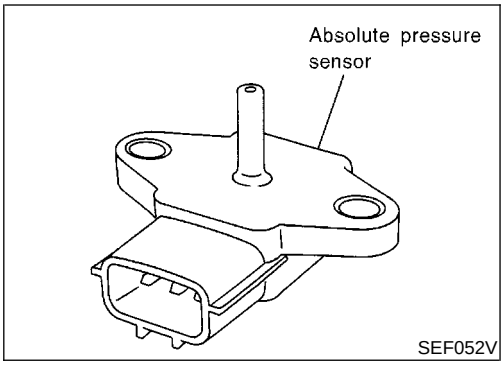
4. If the voltage is out of specification, disconnect MAFS harness connector and connect it again.
   Then repeat above check.

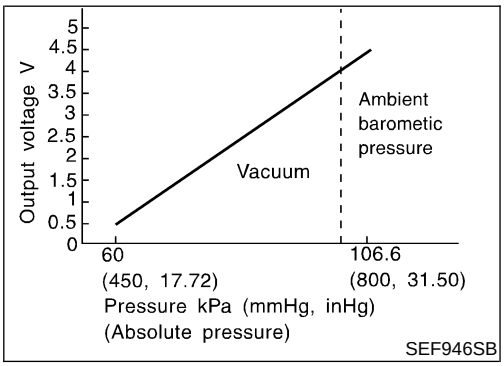
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace mass air flow sensor.

9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.		
	▶	**INSPECTION END**





Component Description

NAEC0058

The absolute pressure sensor detects ambient barometric pressure and sends the voltage signal to the ECM. As the pressure increases, the voltage rises.

ECM Terminals and Reference Value

NAEC0650

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
80	L/R	Absolute pressure sensor	**[Ignition switch "ON"]**	Approximately 4.4V
111	P/B	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
58	B/P	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

On Board Diagnosis Logic

NAEC0059

Malfunction is detected when an excessively low or high voltage from the sensor is sent to ECM.

Possible Cause

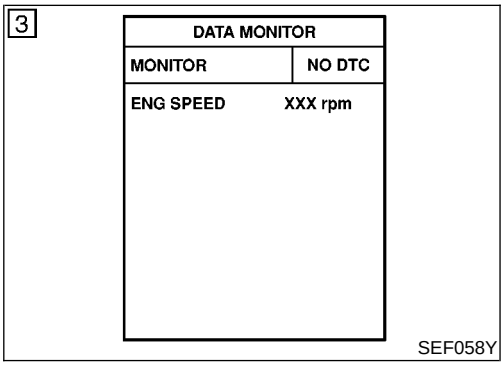
NAEC0427

- Harness or connectors
  (Absolute pressure sensor circuit is open or shorted.)
- Absolute pressure sensor

DTC Confirmation Procedure

NAEC0060

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.



WITH CONSULT-II

NAEC0060S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 10 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-156.

WITH GST

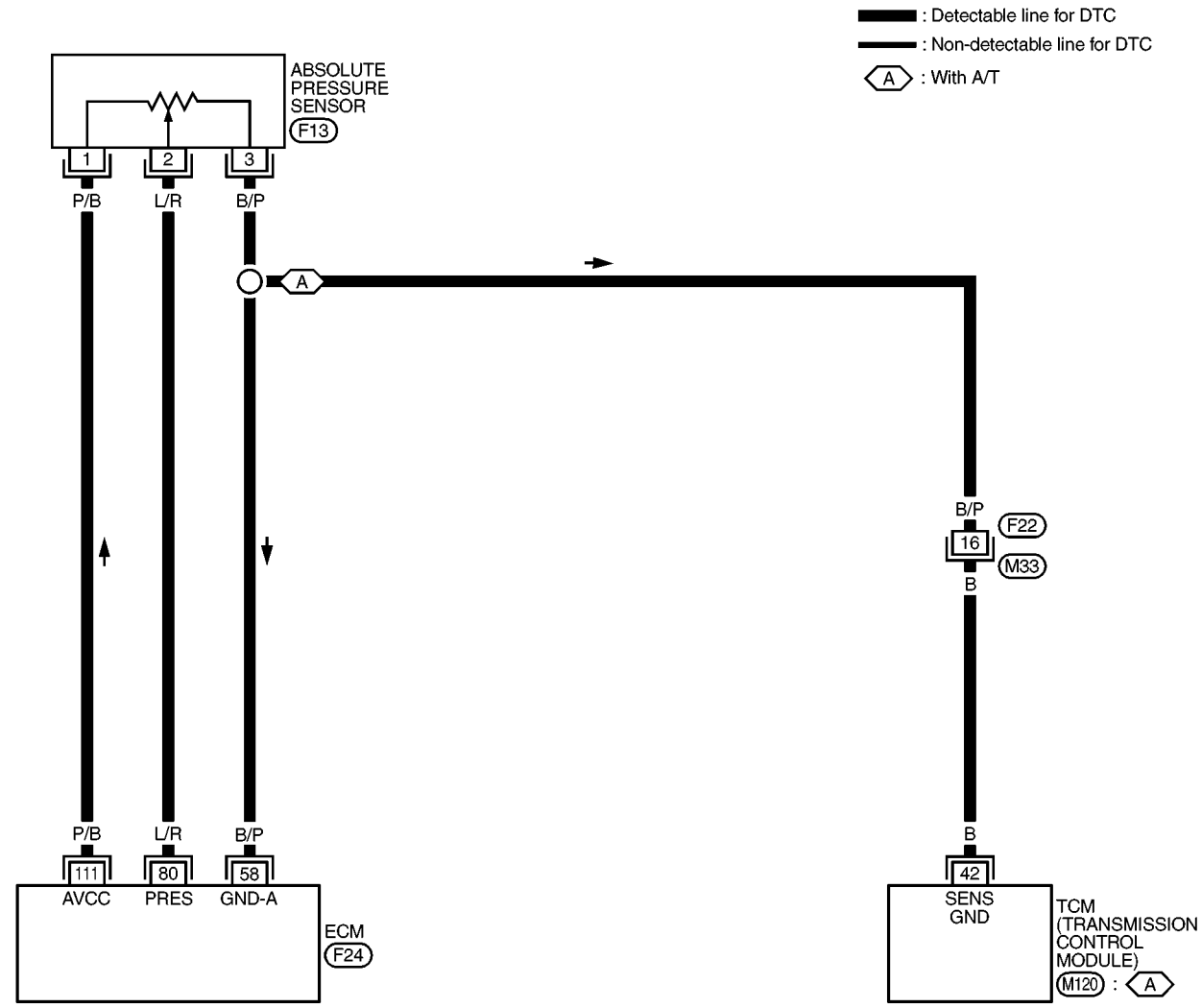
NAEC0060S02

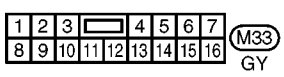
Follow the procedure “WITH CONSULT-II” above.

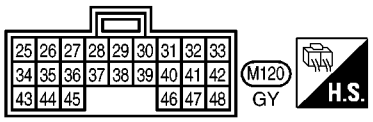
Wiring Diagram

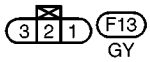
=NAEC0062

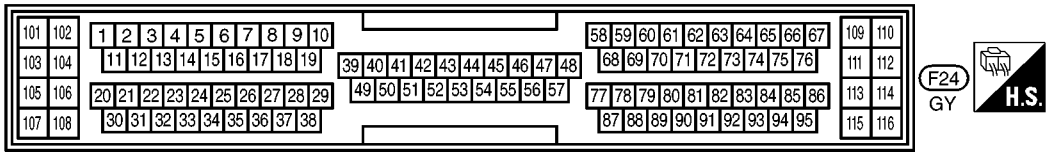
EC-AP/SEN-01











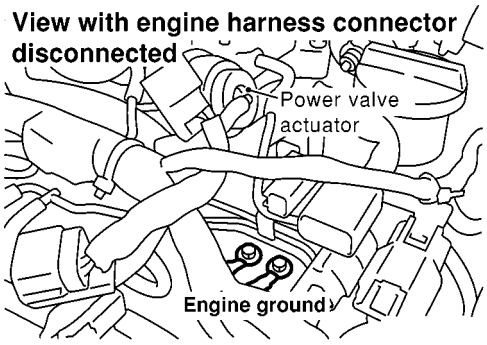
MEC013D

Diagnostic Procedure

NAEC0063

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

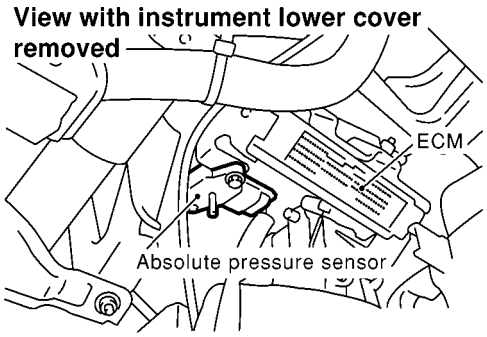


SEF959Y

▶	GO TO 2.

2	CHECK ABSOLUTE PRESSURE SENSOR CONNECTOR FOR WATER

1. Disconnect absolute pressure sensor harness connector.



SEF961Y

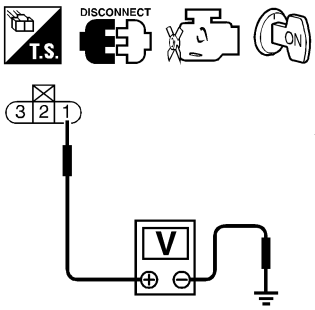
2. Check sensor harness connector for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace harness connector.

3	CHECK ABSOLUTE PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "ON".
2. Check voltage between absolute pressure sensor terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF299X

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair harness or connectors.

4	CHECK ABSOLUTE PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between absolute pressure sensor terminal 3 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECM and absolute pressure sensor
- Harness for open or short between TCM (Transmission Control Module) and absolute pressure sensor

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK ABSOLUTE PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 80 and absolute pressure sensor terminal 2.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

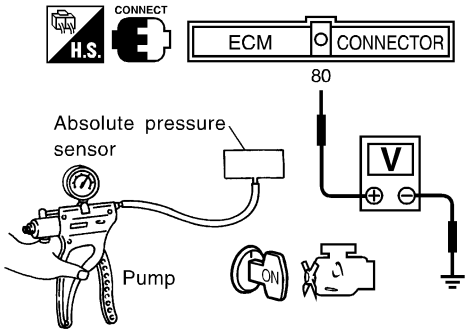
OK or NG

OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

7	CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.
2. Remove hose from absolute pressure sensor.
3. Install a vacuum pump to absolute pressure sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 80 and engine ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	1.0 to 1.4 lower than above value

SEF300XA

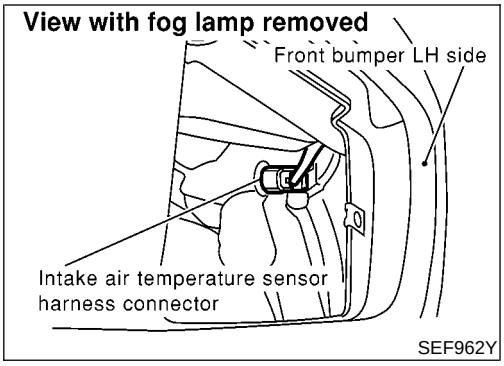
CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (–700 mmHg, –27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

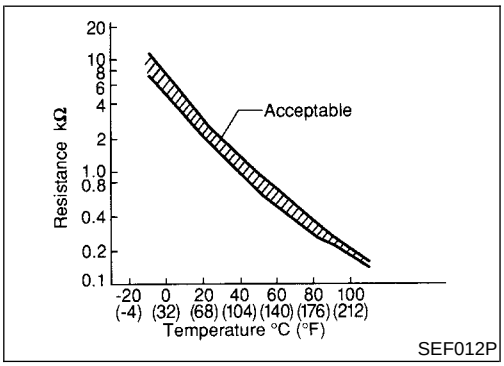
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace absolute pressure sensor.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**



SEF962Y



SEF012P

Component Description

NAEC0064

The intake air temperature sensor is mounted to the air duct housing. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
80 (176)	1.23	0.27 - 0.38

*: These data are reference values and are measured between ECM terminal 64 (Intake air temperature sensor) and body ground.

CAUTION:

Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

NAEC0065

Malfunction is detected when
(Malfunction A) an excessively low or high voltage from the sensor is sent to ECM,
(Malfunction B) rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.

Possible Cause

NAEC0428

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Intake air temperature sensor

DTC Confirmation Procedure

NAEC0066

Perform "PROCEDURE FOR MALFUNCTION A" first. If 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

DTC Confirmation Procedure (Cont'd)

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

5

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF176Y

PROCEDURE FOR MALFUNCTION A

NAEC0066S01

With CONSULT-II

NAEC0066S0101

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-162.

With GST

NAEC0066S0102

Follow the procedure "With CONSULT-II" above.

PROCEDURE FOR MALFUNCTION B

NAEC0066S02

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

With CONSULT-II

NAEC0066S0201

1) Wait until engine coolant temperature is less than 90°C (194°F).

a) Turn ignition switch "ON".
b) Select "DATA MONITOR" mode with CONSULT-II.
c) Check the engine coolant temperature.
d) If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch "OFF" and cool down engine.

- Perform the following steps before engine coolant temperature is above 90°C (194°F).

2) Turn ignition switch "ON".
3) Select "DATA MONITOR" mode with CONSULT-II.
4) Start engine.
5) Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-162.

With GST

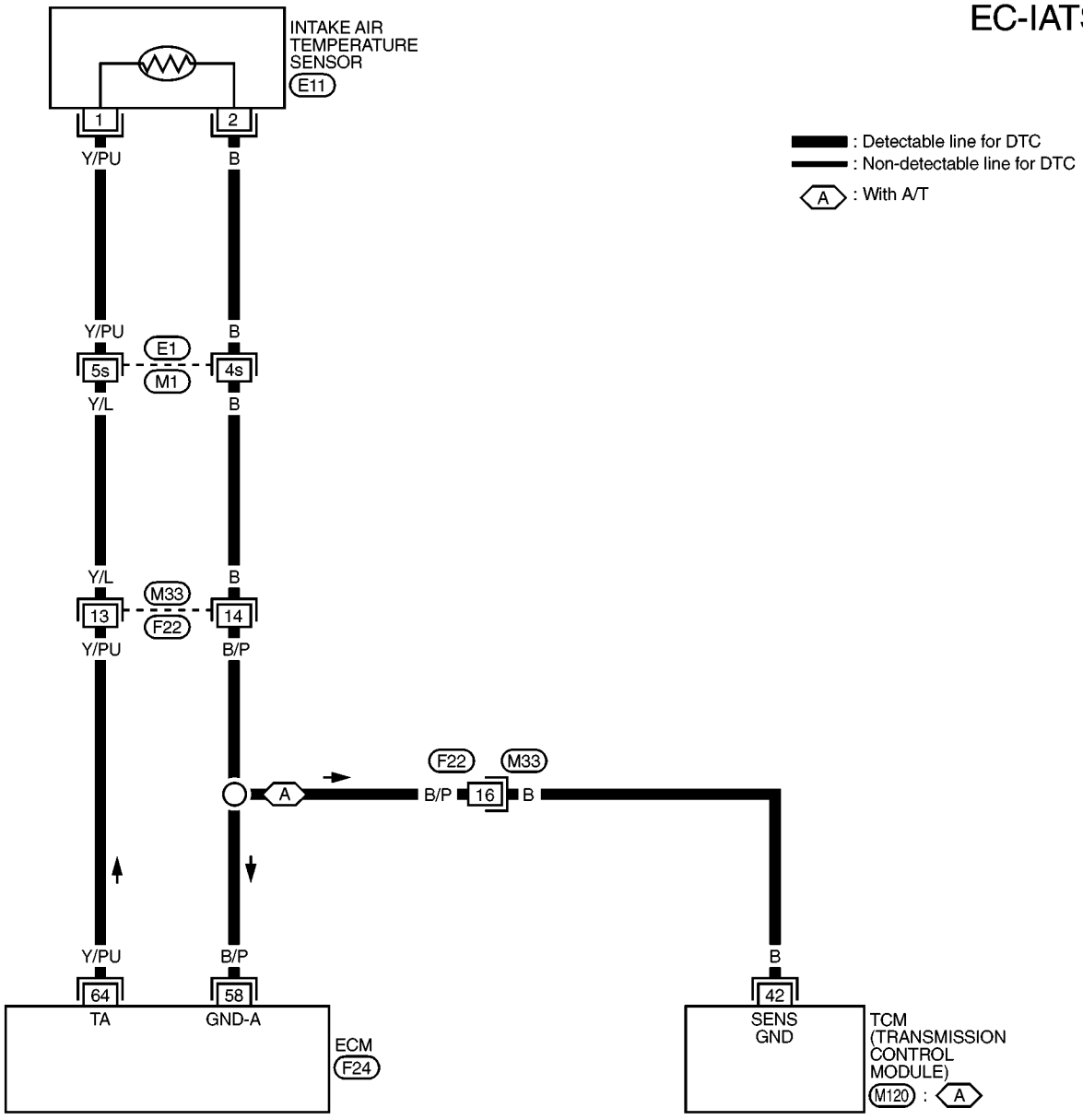
NAEC0066S0202

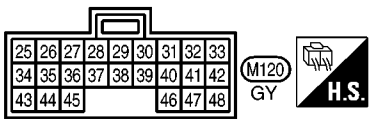
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

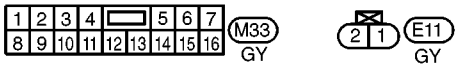
NAEC0067

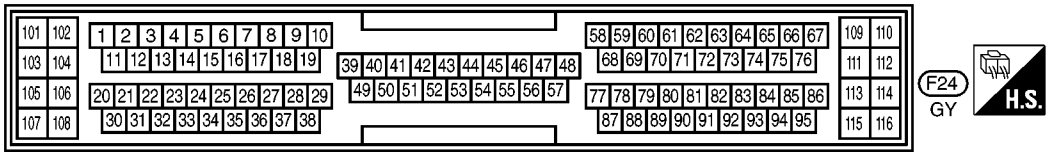
EC-IATS-01





REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)





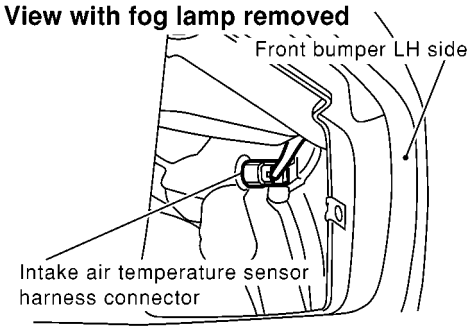
MEC014D

Diagnostic Procedure

NAEC0068

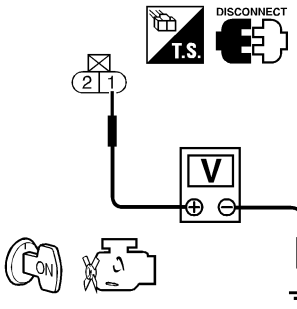
1	CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect intake air temperature sensor harness connector.



SEF962Y

3. Turn ignition switch “ON”.
4. Check voltage between terminal 1 and ground.



Voltage: Approximately 5V

SEF301X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M33, F22
- Harness for open or short between ECM and intake air temperature sensor

	▶	Repair harness or connectors.

3	CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between sensor terminal 2 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

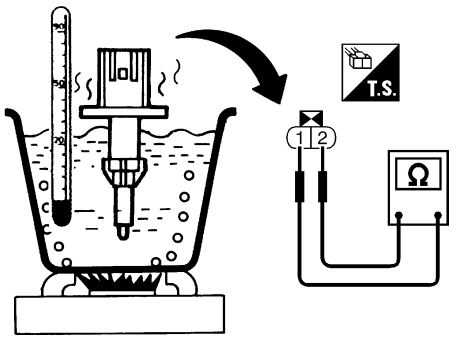
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 ● Harness connectors M33, F22 ● Harness for open or short between ECM and intake air temperature sensor ● Harness for open or short between TCM (Transmission Control Module) and intake air temperature sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

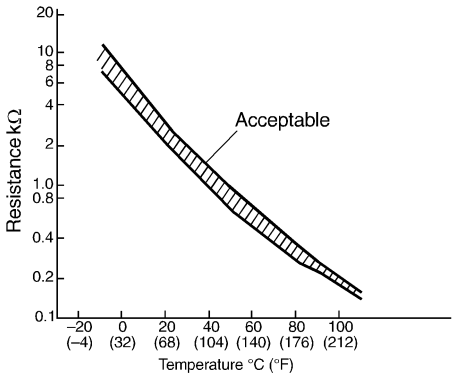
5	CHECK INTAKE AIR TEMPERATURE SENSOR

Check resistance between intake air temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

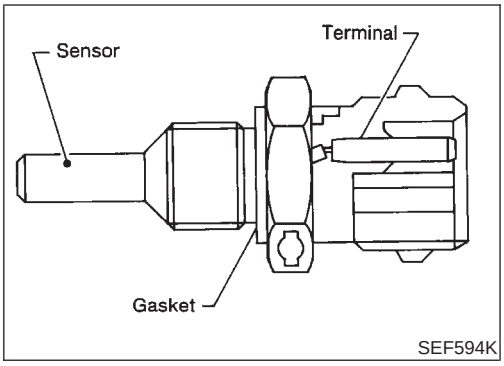


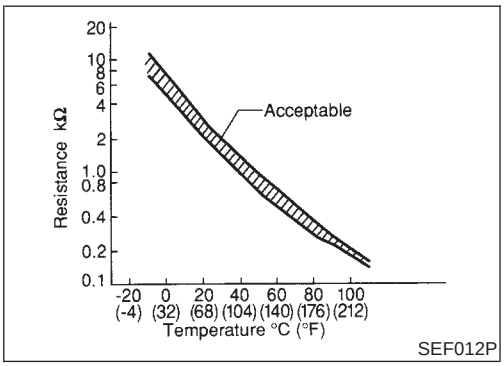
SEF302X

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace intake air temperature sensor.

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**





Component Description

NAEC0069

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
−10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 70 (Engine coolant temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

NAEC0070

Malfunction is detected when an excessively high or low voltage from the sensor is sent to ECM.

FAIL-SAFE MODE

NAEC0070S02

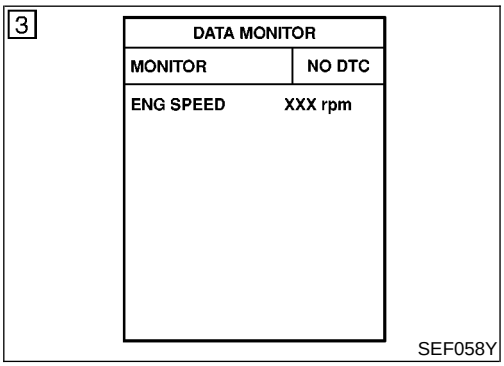
When this malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode	
Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch "ON" or "START". CONSULT-II displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT-II display)
	Just as ignition switch is turned ON or Start	40°C (104°F)
	More than approx. 4 minutes after ignition ON or Start	80°C (176°F)
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)

Possible Cause

NAEC0429

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Engine coolant temperature sensor



DTC Confirmation Procedure

NAEC0071

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NAEC0071S01

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-167.

WITH GST

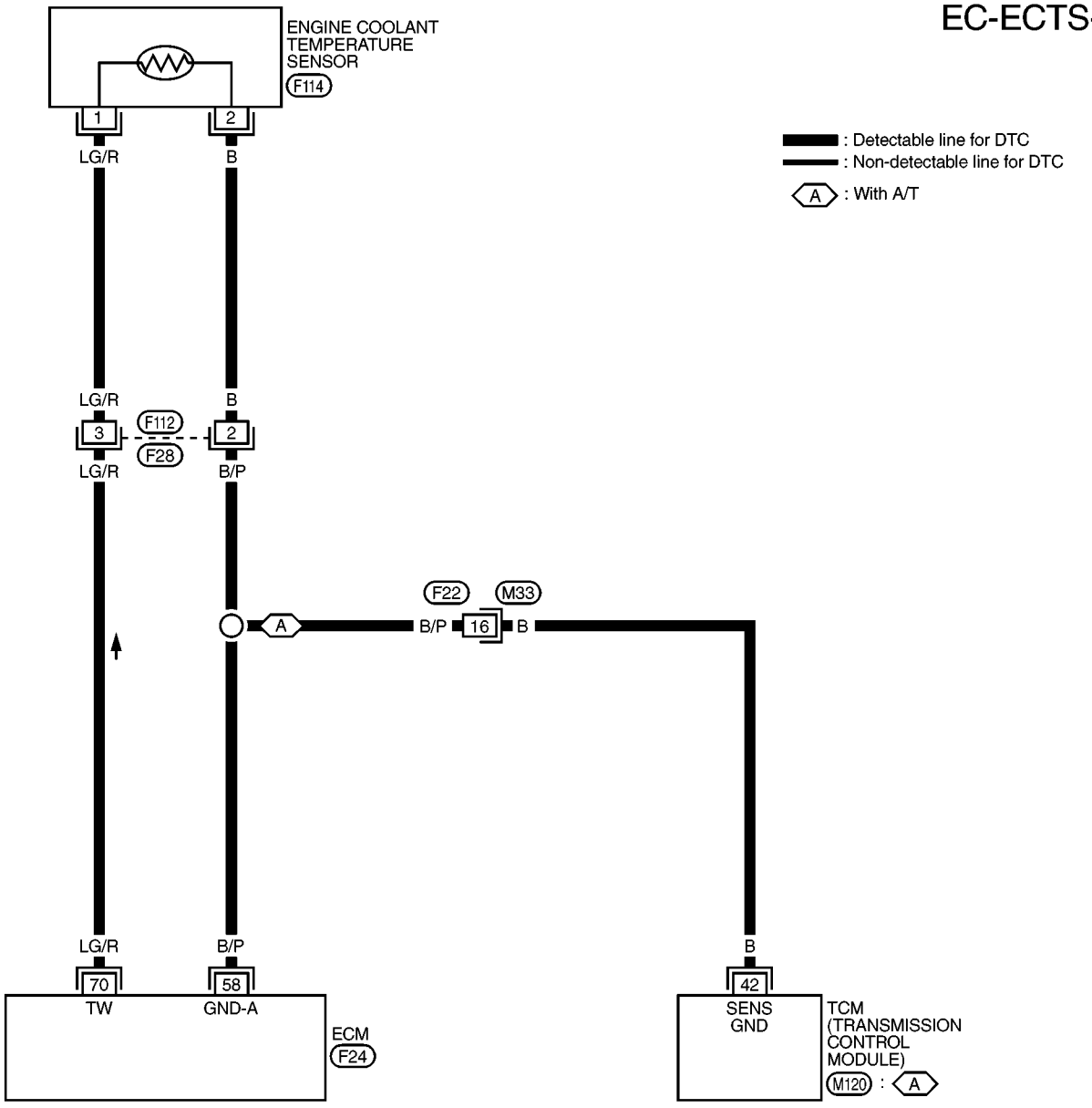
NAEC0071S02

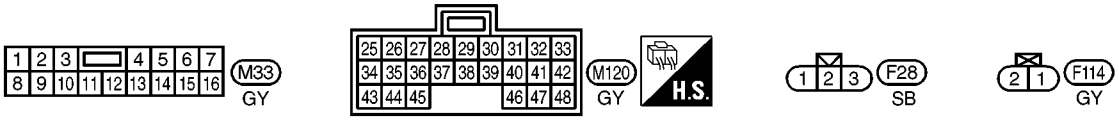
Follow the procedure "WITH CONSULT-II" above.

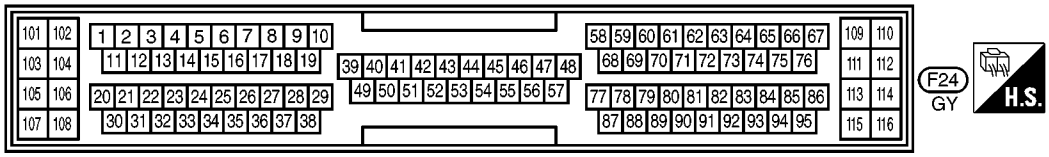
Wiring Diagram

NAEC0072

EC-ECTS-01







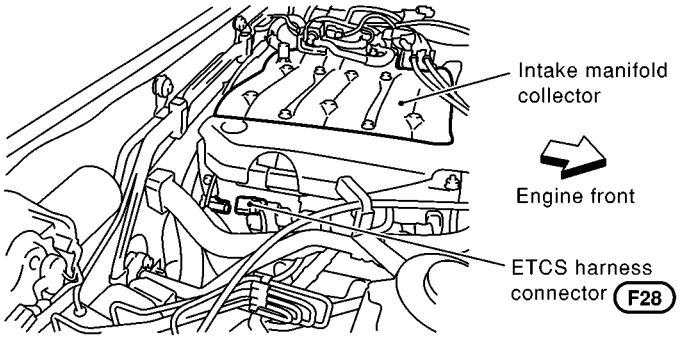
MEC015D

Diagnostic Procedure

NAEC0073

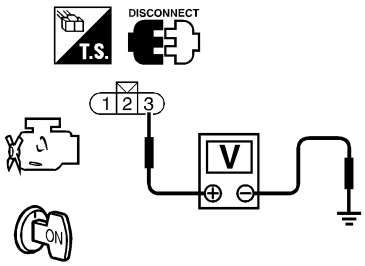
1	CHECK ECTS POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect engine coolant temperature sensor (ECTS) harness connectors F112, F28.



SEF370Z

3. Turn ignition switch “ON”.
4. Check voltage between ECTS harness connector F28 terminal 3 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF371Z

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F112, F28
- Harness for open or short between ECM and engine coolant temperature sensor

	▶	Repair harness or connectors.

3	CHECK ECTS GROUND CIRCUIT FOR OPEN AND CIRCUIT

1. Turn ignition switch “OFF”.
2. Check harness continuity between ECTS terminal 2 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

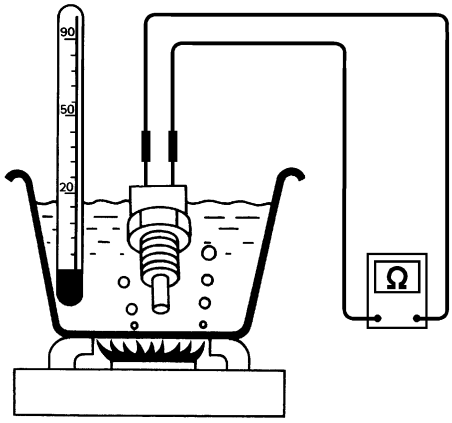
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F112, F28 ● Harness for open or short between ECM and engine coolant temperature sensor ● Harness for open or short between TCM (Transmission Control Module) and engine coolant temperature sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

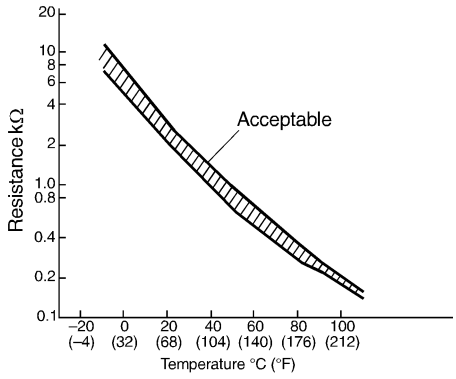
5	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



SEF304X

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace engine coolant temperature sensor.

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**

Description

NAEC0074

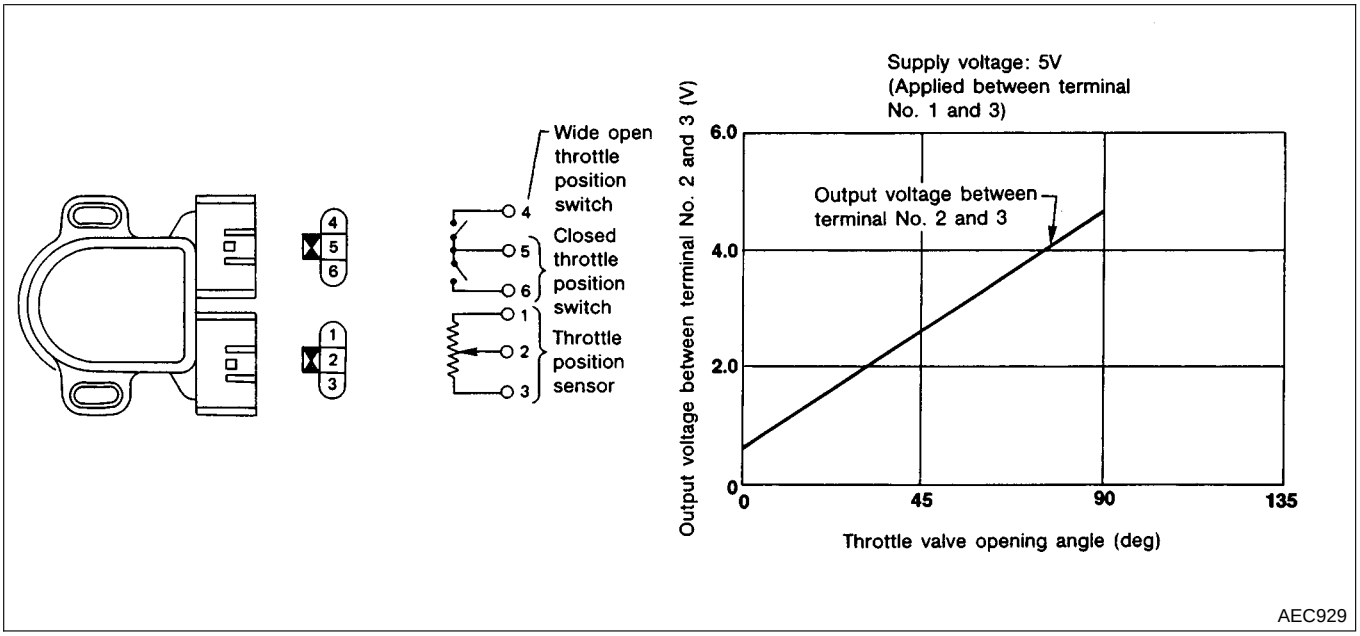
NOTE:
If DTC P0120 is displayed with DTC P0510, first perform the trouble diagnosis for DTC P0510. Refer to EC-426.

COMPONENT DESCRIPTION

NAEC0074S01

The throttle position sensor responds to the accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle position into output voltage, and emits the voltage signal to the ECM. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the ECM.

Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This sensor controls engine operation such as fuel cut. On the other hand, the “Wide open and closed throttle position switch”, which is built into the throttle position sensor unit, is not used for engine control.



AEC929

CONSULT-II Reference Value in Data Monitor Mode

NAEC0075

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.15 - 0.85V
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	3.5 - 4.7V
ABSOL TH·P/S	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.0%
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 80%

ECM Terminals and Reference Value

=NAEC0651

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	R	Throttle position sensor	**[Engine is running]** ● **Warm-up condition** ● Accelerator pedal fully released	0.15 - 0.85V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	3.5 - 4.7V
111	P/B	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
58	B/P	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

On Board Diagnosis Logic

NAEC0077

Malfunction is detected when
(Malfunction A) an excessively low or high voltage from the sensor is sent to ECM,
(Malfunction B) a high voltage from the sensor is sent to ECM under light load driving conditions,
(Malfunction C) a low voltage from the sensor is sent to ECM under heavy load driving conditions.

FAIL-SAFE MODE

NAEC0077S02

When the malfunction A is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode	
Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
	Condition	Driving condition
	When engine is idling	Normal
	When accelerating	Poor acceleration

Possible Cause

NAEC0430

MALFUNCTION A

NAEC0430S01

- Harness or connectors
  (The throttle position sensor circuit is open or shorted.)
- Throttle position sensor

MALFUNCTION B

NAEC0430S02

- Harness or connectors
  (The throttle position sensor circuit is open or shorted.)
- Throttle position sensor
- Fuel injector

- Crankshaft position sensor (REF)
- Crankshaft position sensor (POS)
- Mass air flow sensor

MALFUNCTION C

NAEC0430S03

- Harness or connectors
  (The throttle position sensor circuit is open or shorted.)
- Intake air leaks
- Throttle position sensor

DTC Confirmation Procedure

NAEC0078

NOTE:

- **Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".**
  If there is no problem on "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE FOR MALFUNCTION C".
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

NAEC0078S01

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

- **Before performing the following procedure, confirm that battery voltage is more than 10V at idle.**
- **This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.**

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
P/N POSI SW	OFF

SEF065Y

With CONSULT-II

NAEC0078S0101

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2) Start engine and maintain the following conditions for at least 5 consecutive seconds.

Vehicle speed	More than 4 km/h (2 MPH)
Selector lever	Suitable position except "P" or "N" position

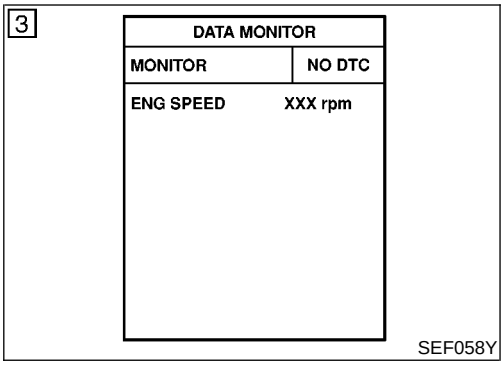
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-176.

With GST

NAEC0078S0102

Follow the procedure "With CONSULT-II" above.

DTC Confirmation Procedure (Cont'd)



PROCEDURE FOR MALFUNCTION B

NAEC0078S02

With CONSULT-II

NAEC0078S0201

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and let it idle for at least 10 seconds.
   If idle speed is over 1,000 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,000 rpm.

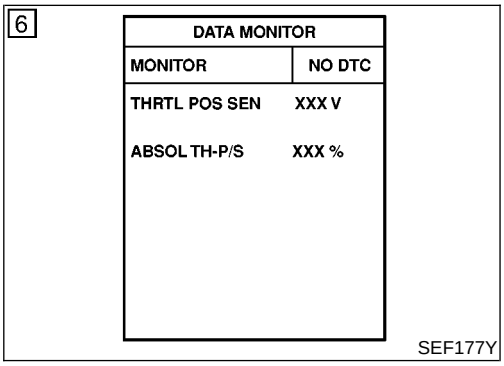
Selector lever	Suitable position except "P" or "N"
Brake pedal	Depressed
Vehicle speed	0 km/h (0 MPH)

4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-176.

With GST

NAEC0078S0202

Follow the procedure "With CONSULT-II" above.



PROCEDURE FOR MALFUNCTION C

NAEC0078S03

CAUTION:

Always drive vehicle at a safe speed.

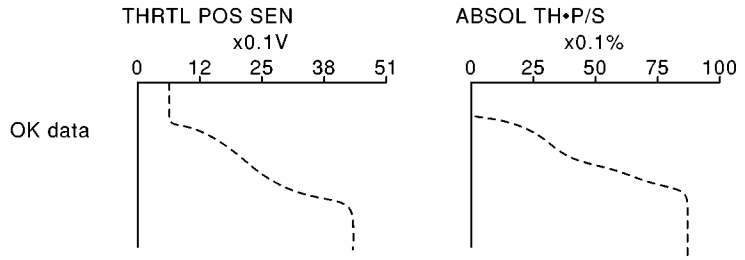
With CONSULT-II

NAEC0078S0301

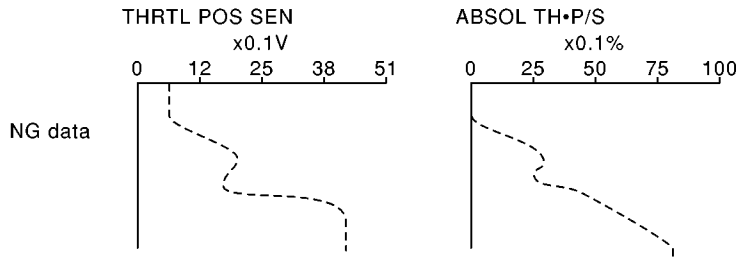
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Turn ignition switch "ON".
4) Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II.
5) Select "THRTL POS SEN" and "ABSOL TH·P/S" in "DATA MONITOR" mode with CONSULT-II.
6) Press RECORD on CONSULT-II SCREEN at the same time accelerator pedal is depressed.
7) Print out the recorded graph and check the following:

- The voltage rise is linear in response to accelerator pedal depression.
- The voltage when accelerator pedal is fully depressed is approximately 4V.
  If NG, go to "Diagnostic Procedure", EC-176.
  If OK, go to following step.

7



Trigger	THRTL POS SEN	ABSOL TH/PO SEN
	V	%
00"43	2.52	48.8
00"44	2.64	52.0
00"45	2.76	54.9
00"46	2.88	57.4
00"47	3.00	60.5
00"48	3.12	63.3
00"49	3.24	66.1
00"50	3.34	68.9
00"51	3.46	71.4
00"52	3.56	74.2
00"53	3.68	77.0
00"54	3.80	79.8

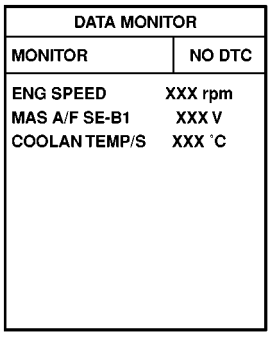


Trigger	THRTL POS SEN	ABSOL TH/PO SEN
	V	%
00"33	1.96	38.7
00"34	2.02	39.1
00"35	2.08	39.5
00"36	2.14	39.9
00"37	2.20	41.3
00"38	2.26	42.7
00"39	2.32	44.4
00"41	2.26	42.7
00"42	2.20	41.3
00"43	2.58	50.4
00"44	2.66	52.5
00"45	2.76	54.9

SEF174Z

8) Select "AUTO TRIG" in "DATA MONITOR" mode with CONSULT-II.

9

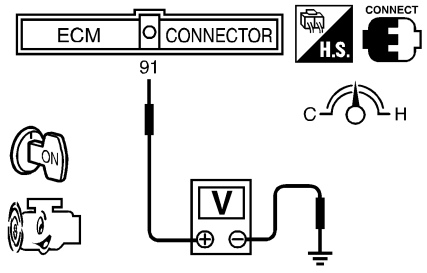


SEF178Y

9) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
MAS A/F SE-B1	More than 3.2V
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

10) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-176.



SEF305X

With GST

NAEC0078S0302

1) Start engine and warm it up to normal operating temperature.
2) Maintain the following conditions for at least 10 consecutive seconds.

Gear position	Suitable position
Engine speed	More than 2,000 rpm
Engine coolant temperature	More than 70°C (158°F)

DTC Confirmation Procedure (Cont'd)

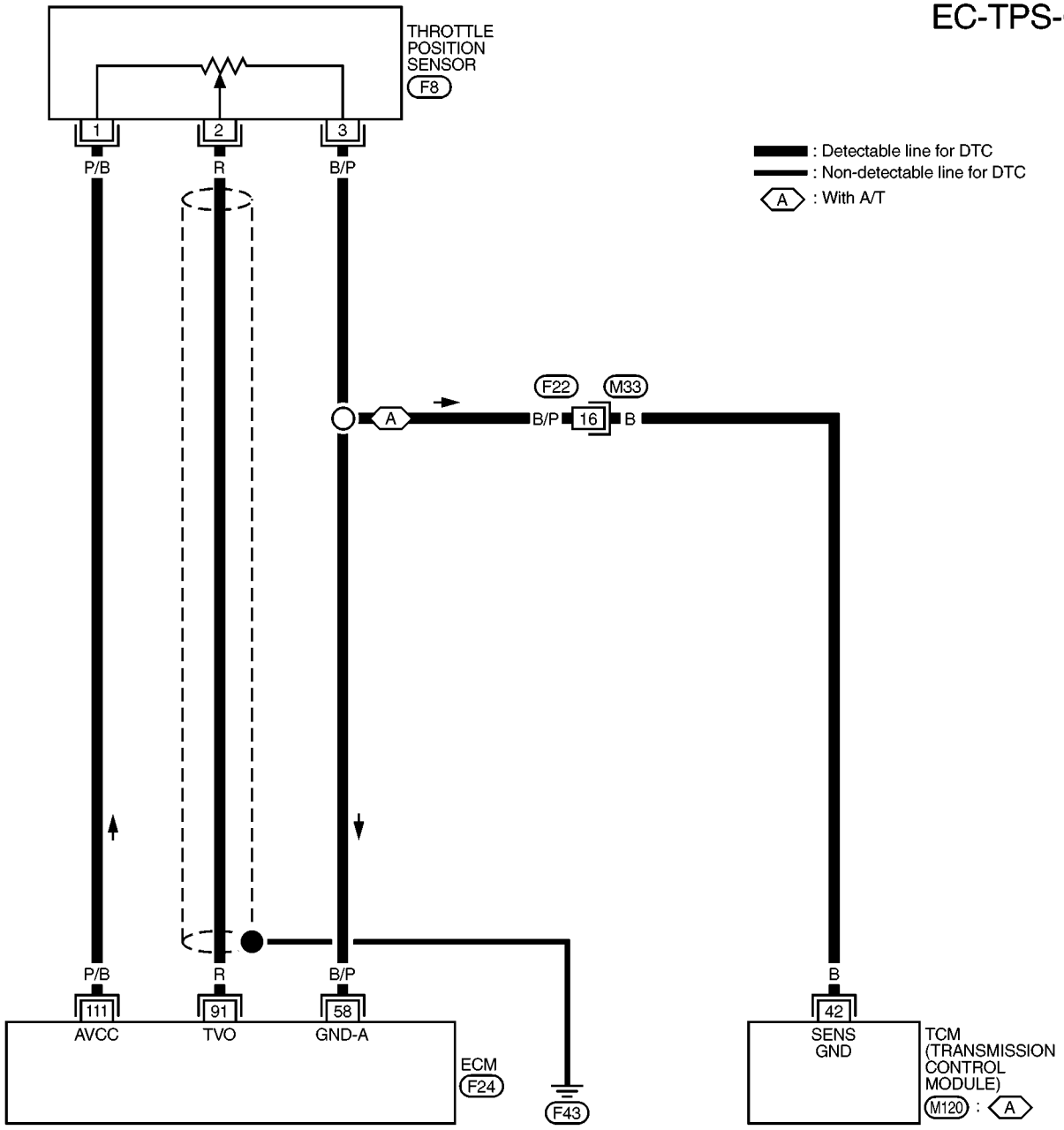
Voltage between ECM terminal 91 (Mass air flow sensor signal) and ground	More than 3.2V

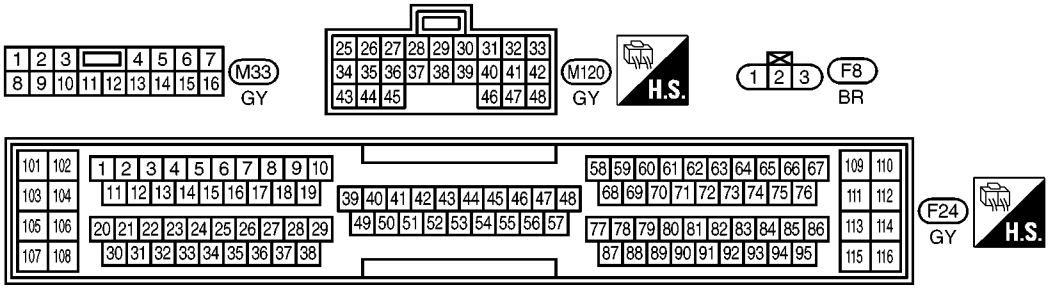
3) Select "MODE 7" with GST.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-176.

Wiring Diagram

NAEC0079

EC-TPS-01





MEC016D

Diagnostic Procedure

NAEC0080

1 INSPECTION START

Which malfunction A, B or C is duplicated?

MALFUNCTION	Type
A	A
B	B
C	C

MTBL0066

Type A, B or C

Type A or B	▶	GO TO 4.
Type C	▶	GO TO 2.

2 ADJUST THROTTLE POSITION SENSOR

Check the following items. Refer to “Basic Inspection”, EC-99.

Items	Specifications
Ignition timing	15° ± 2° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	M/T: 750 ± 50 rpm A/T: 750 ± 50 rpm (in “P” or “N” position)

MTBL0537

	▶	GO TO 3.

3 CHECK INTAKE SYSTEM.

1. Turn ignition switch “OFF”.
2. Check the following for connection.

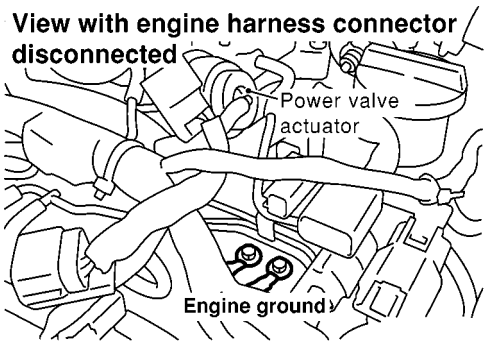
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

OK or NG

OK	▶	GO TO 4.
NG	▶	Reconnect the parts.

4 RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

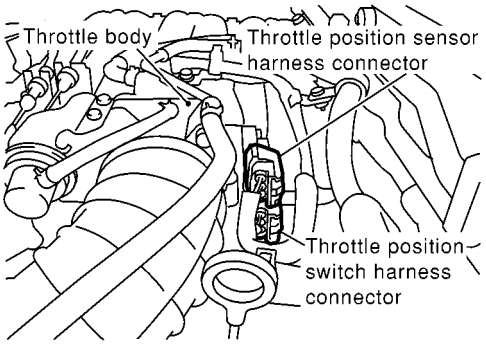


SEF959Y

	▶	GO TO 5.

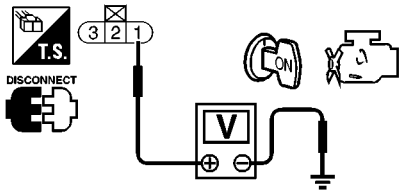
5	CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect throttle position sensor harness connector.



SEF944Y

2. Turn ignition switch "ON".
3. Check voltage between throttle position sensor terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF964Y

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between sensor terminal 3 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECM and throttle position sensor
- Harness for open or short between TCM (Transmission Control Module) and throttle position sensor

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

8	CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 91 and throttle position sensor terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

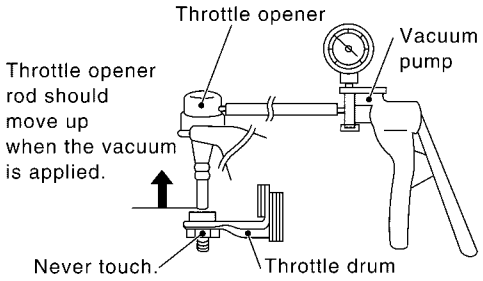
OK or NG

OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK THROTTLE POSITION SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than –40.0kPa (–300mmHg, –11.81inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Turn ignition switch ON.
7. Select "DATA MONITOR" mode with CONSULT-II.
8. Check voltage of "THRTL POS SEN" under the following conditions.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
THRTL POS SEN	XXX V

Throttle valve conditions	THRTL POS SEN
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

SEF062Y

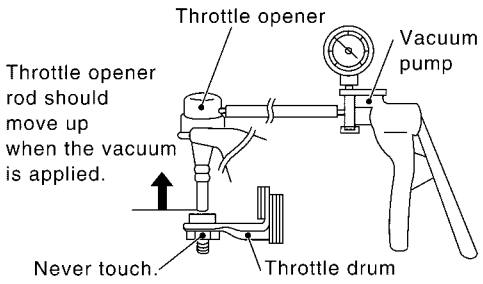
OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 11.

10	CHECK THROTTLE POSITION SENSOR

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Turn ignition switch ON.
7. Check voltage between ECM terminal 91 (Throttle position sensor signal) and ground.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

Throttle valve conditions	Voltage
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

MTBL0231

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 11.

11	ADJUST CLOSED THROTTLE POSITION SWITCH

Adjust closed throttle position switch. Refer to "Basic Inspection", EC-99.

Items	Specifications
Ignition timing	15° ± 2° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	M/T: 750 ± 50 rpm A/T: 750 ± 50 rpm (in "P" or "N" position)

MTBL0537

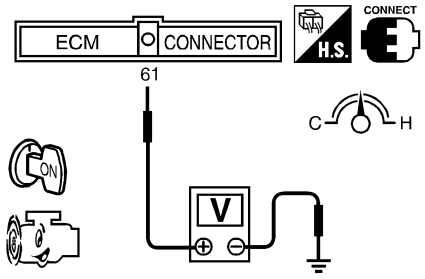
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-99.

Diagnostic Procedure (Cont'd)

12	CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconneted.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 61 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.2 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.2
Idle to about 4,000 rpm*	1.2 - 1.8 to Approx. 4.0

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

SEF298X

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace mass air flow sensor.

13	CHECK CRANKSHAFT POSITION SENSOR (POS)

1. Install all removed parts.
2. Perform "DTC Confirmation Procedure" for DTC P0335 and P1336. Refer to EC-331, 514.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace crankshaft position sensor (POS).

14	CHECK CRANKSHAFT POSITION SENSOR (REF)

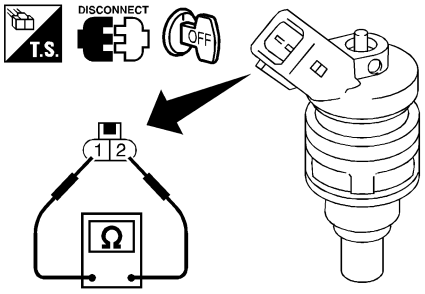
Perform "DTC Confirmation Procedure" for DTC P1335. Refer to EC-506.

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace crankshaft position sensor (REF).

15	CHECK FUEL INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.



Resistance: 13.5 - 17.5Ω [at 20°C (68°F)]

SEF964XB

OK or NG

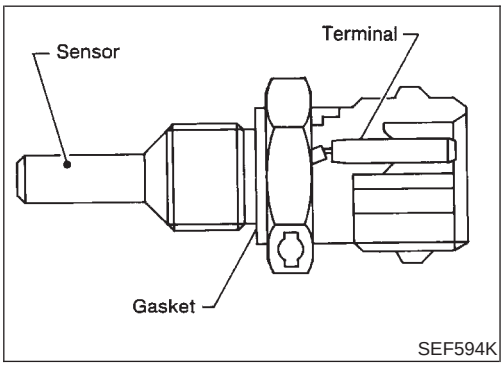
OK	▶	GO TO 16.
NG	▶	Replace fuel injector.

16	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**

Description

NAEC0081

NOTE:
If DTC P0125 is displayed with P0115, first perform the trouble diagnosis for DTC P0115. Refer to EC-164.

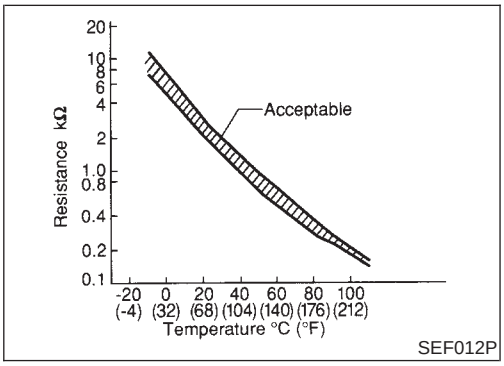


SEF594K

COMPONENT DESCRIPTION

NAEC0081S01

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



SEF012P

<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
−10 (14)	4.4	9.2
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 70 (Engine coolant temperature sensor) and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

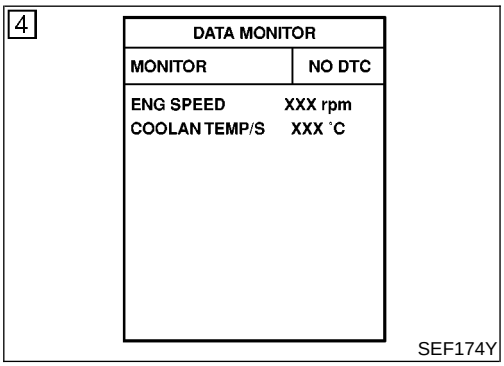
NAEC0082

Malfunction is detected when voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine, or engine coolant temperature is insufficient for closed loop fuel control.

Possible Cause

NAEC0431

- Harness or connectors
  (High resistance in the circuit)
- Engine coolant temperature sensor
- Thermostat



DTC Confirmation Procedure

NAEC0083

CAUTION:

Be careful not to overheat engine.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NAEC0083S01

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Check that "COOLAN TEMP/S" is above 10°C (50°F).
   If it is above 10°C (50°F), the test result will be OK.
   If it is below 10°C (50°F), go to following step.
4) Start engine and run it for 65 minutes at idle speed.
   If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-185.

WITH GST

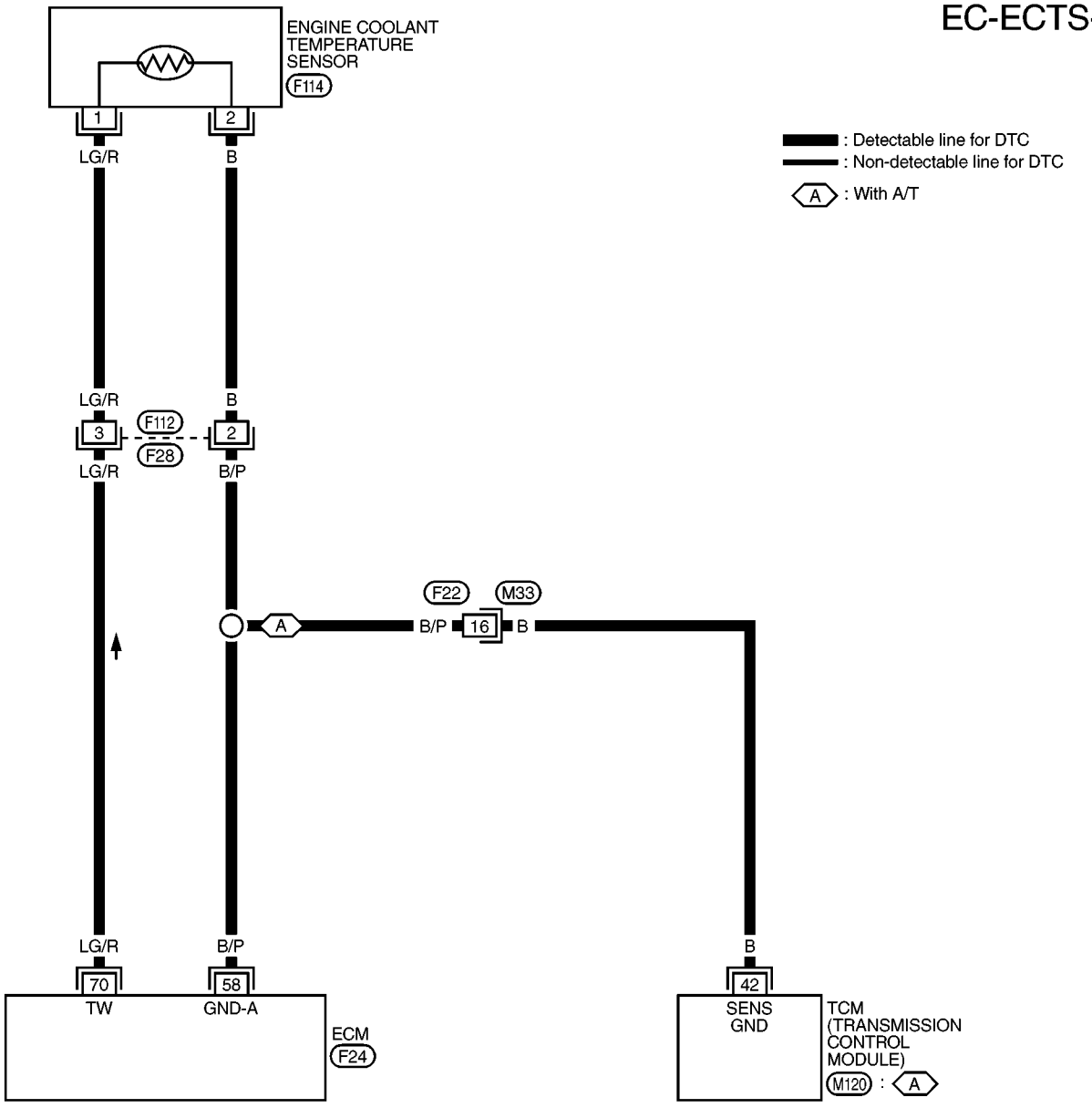
NAEC0083S02

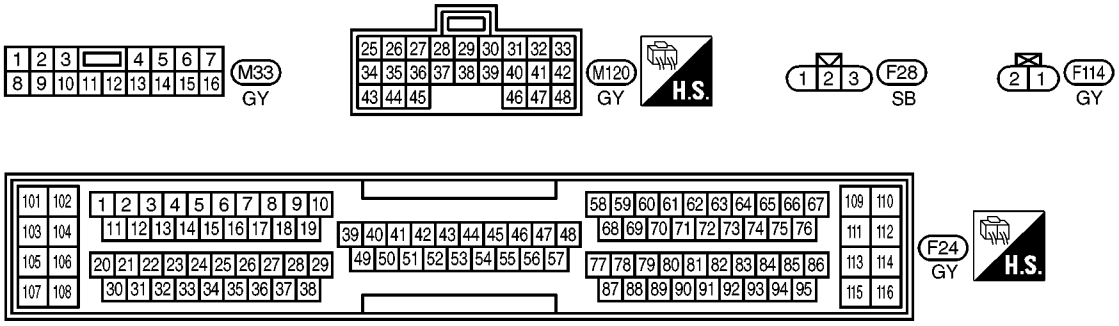
Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

NAEC0084

EC-ECTS-01





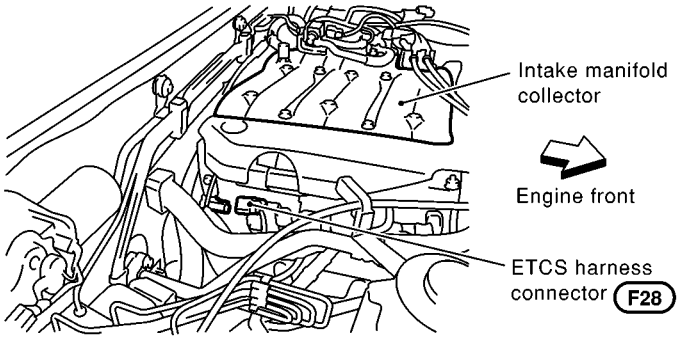
MEC015D

Diagnostic Procedure

NAEC0085

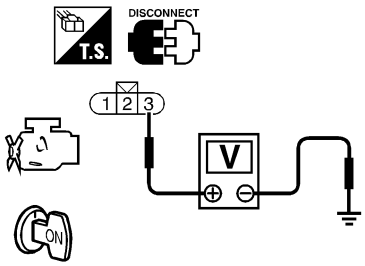
1	CHECK ECTS POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect engine coolant temperature sensor harness connectors F112, F28.



SEF370Z

3. Turn ignition switch “ON”.
4. Check voltage between ECTS harness connector F28 terminal 3 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF371Z

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F112, F28
- Harness for open or short between ECM and engine coolant temperature sensor

	▶	Repair harness or connectors.

3	CHECK ECTS GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between ECTS terminal 2 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

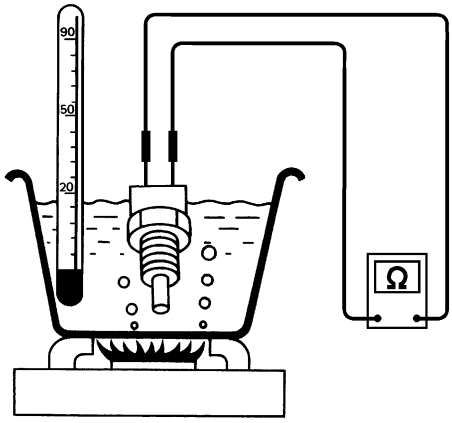
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F112, F28 ● Harness for open or short between ECM and engine coolant temperature sensor ● Harness for open or short between TCM (Transmission Control Module) and engine coolant temperature sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

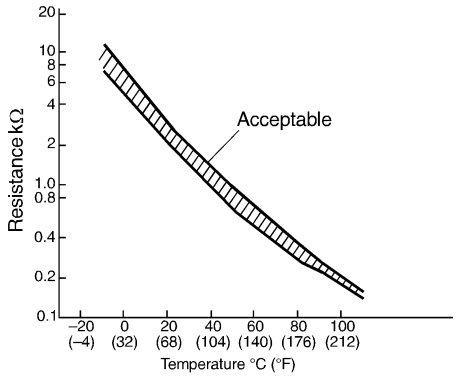
5	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



SEF304X

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace engine coolant temperature sensor.

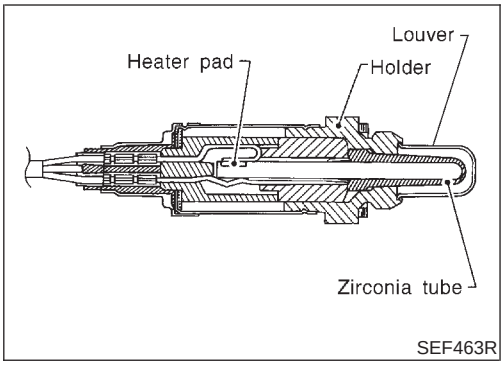
6	CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

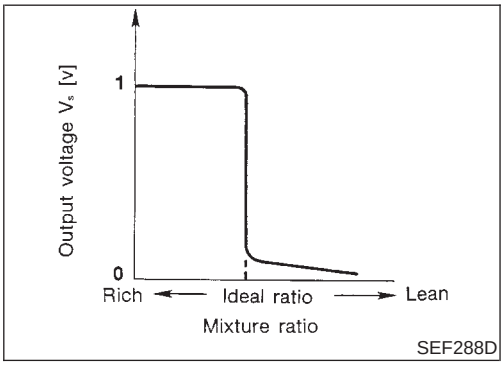
OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace thermostat. Refer to LC-17, "Thermostat".

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**



SEF463R



SEF288D

Component Description

NAEC0086

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0087

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

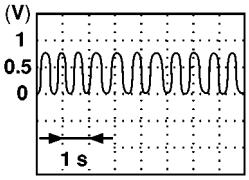
ECM Terminals and Reference Value

NAEC0652

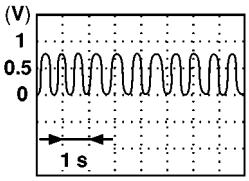
Specification data are reference values and are measured between each terminal and ground.

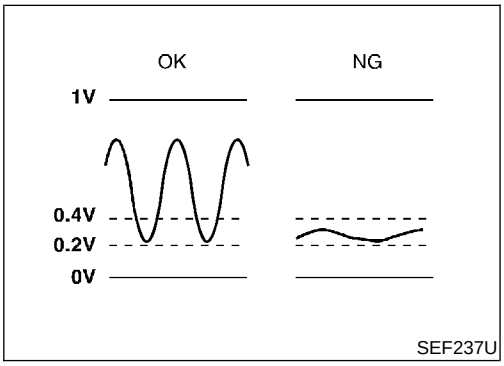
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	G	Heated oxygen sensor 1 (front) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)  SEF059V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	G/B	Heated oxygen sensor 1 (front) (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)  SEF059V



SEF237U

On Board Diagnosis Logic

NAEC0089

Under the condition in which the heated oxygen sensor 1 (front) signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.
Malfunction is detected when the voltage from the sensor is constantly approx. 0.3V.

Possible Cause

NAEC0432

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 1 (front)

5

HO2S1 (B1) P0130	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF332Z

5

HO2S1 (B1) P0130	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF333Z

5

HO2S1 (B1) P0130
COMPLETED

SEF645Y

DTC Confirmation Procedure

NAEC0090

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

NAEC0090S01

1) Start engine and warm it up to normal operating temperature.
2) Select "HO2S1 (B1)/(B2) P0130/P0150" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
3) Touch "START".
4) Let it idle for at least 3 minutes.

NOTE:

Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 4.

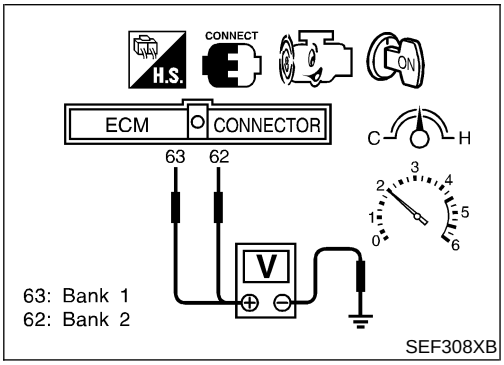
5) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,500 - 2,800 rpm
Vehicle speed	70 - 100 km/h (43 - 62 MPH)
B/FUEL SCHDL	3.0 - 10 msec
Selector lever	Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2.

6) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-193.

During this test, P1148 and P1168 may be stored in ECM.



SEF308XB

Overall Function Check

NAEC0091

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NAEC0091S01

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground.

Overall Function Check (Cont'd)

3) Check the following with engine speed held at 2,000 rpm constant under no load.
- The voltage does not remain in the range of 0.2 - 0.4V.

4) If NG, go to "Diagnostic Procedure", EC-193.

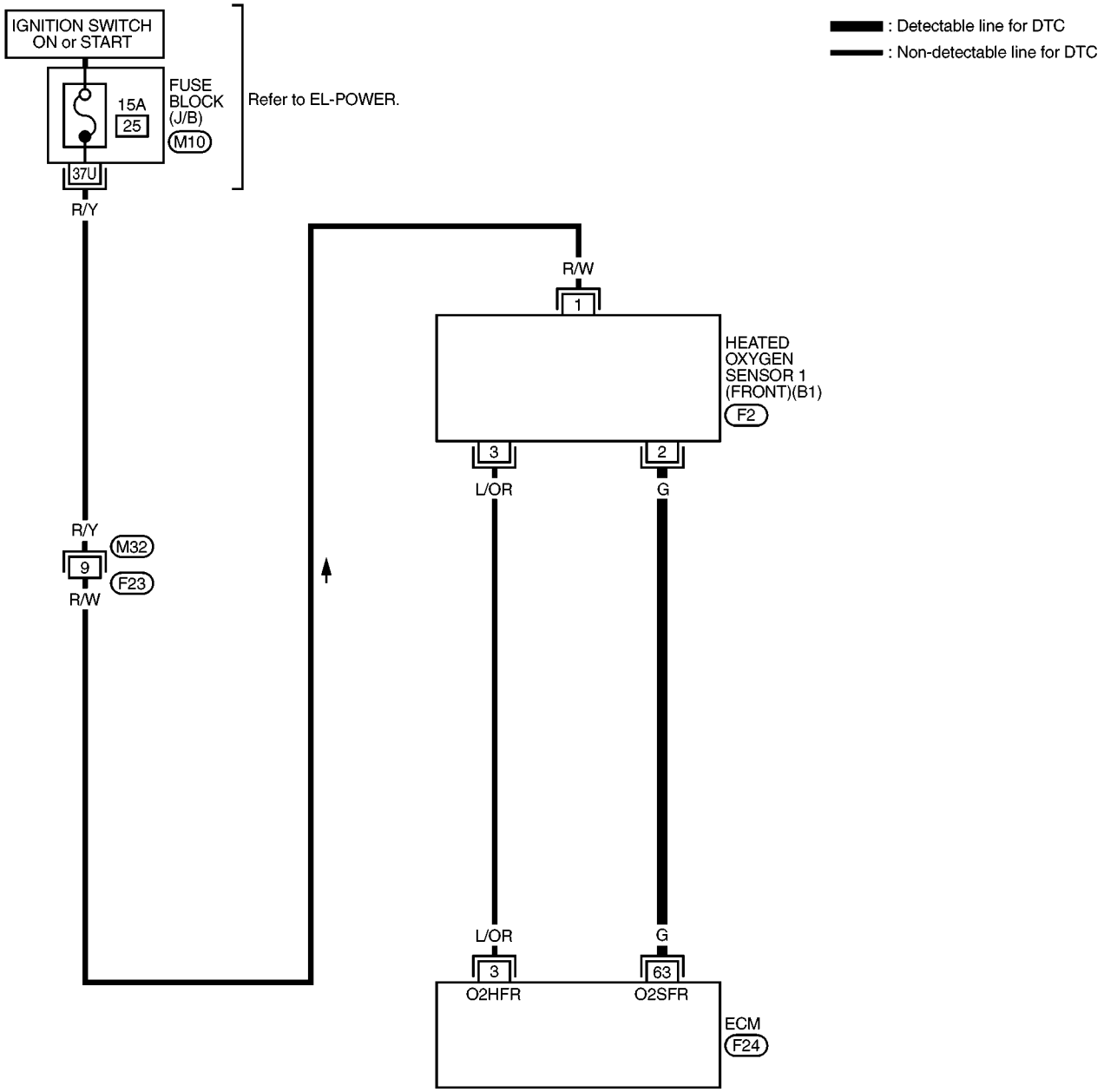
Wiring Diagram

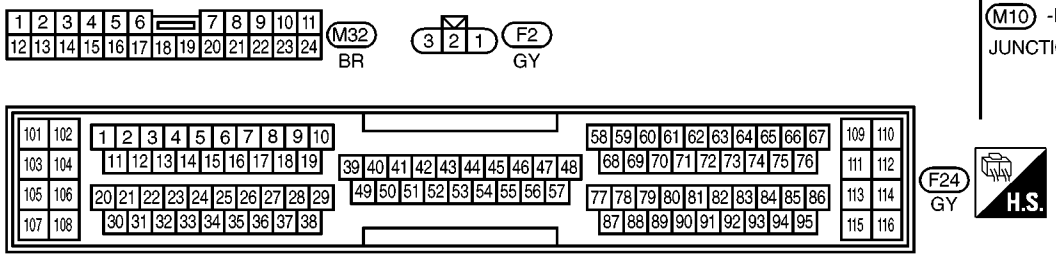
=NAEC0092

NAEC0092S01

RIGHT BANK

EC-O2S1B1-01





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

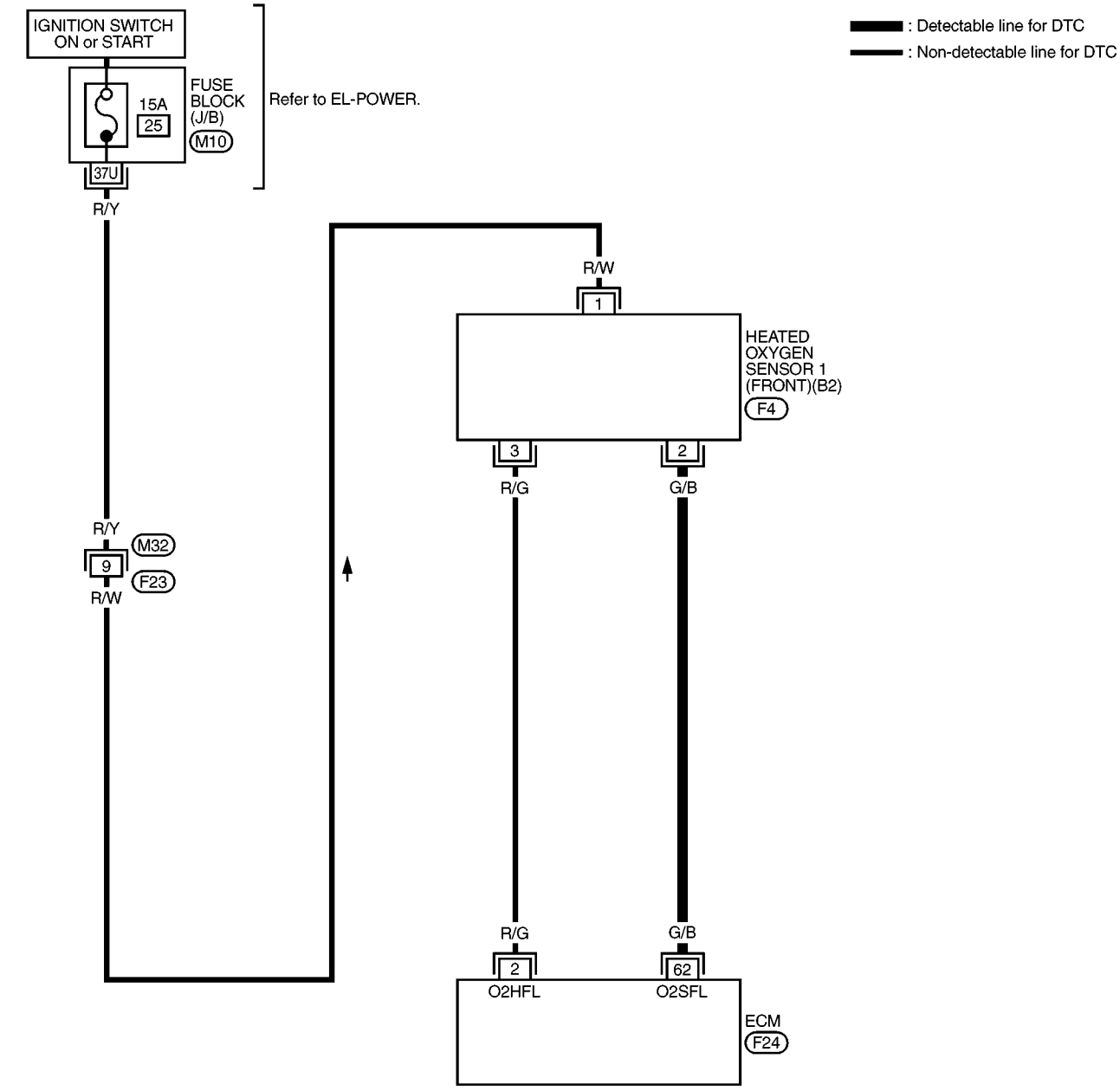
MEC947C

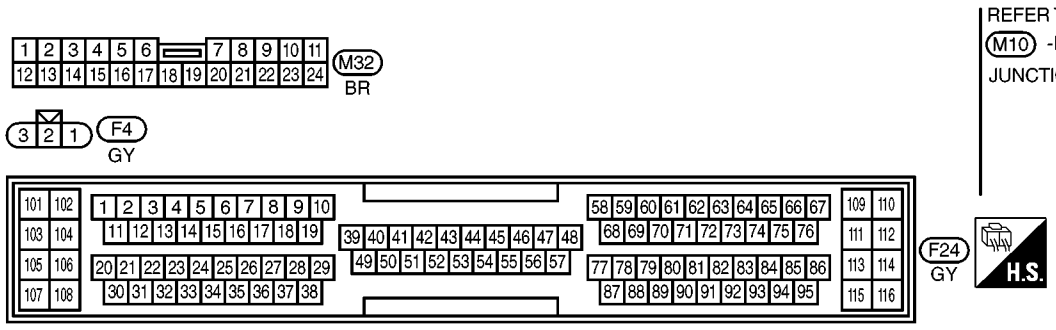
Wiring Diagram (Cont'd)

LEFT BANK

NAEC0092S02

EC-O2S1B2-01





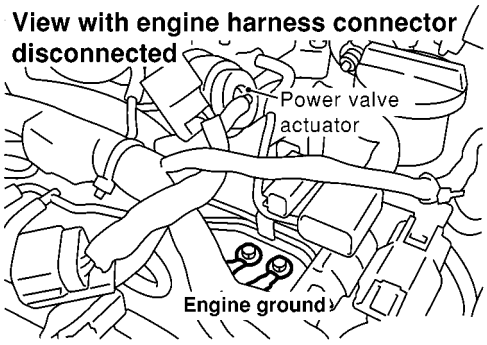
MEC948C

Diagnostic Procedure

NAEC0093

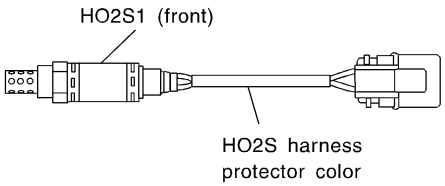
1	INSPECTION START

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



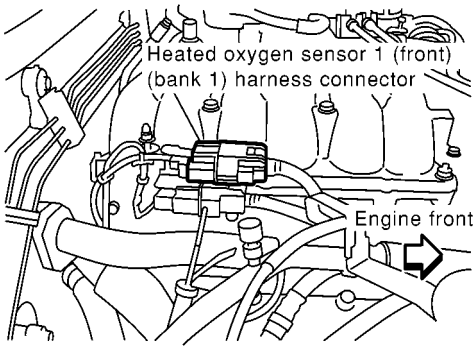
SEF959Y

3. Make sure HO2S1 (front) harness protector color, and disconnect corresponding heated oxygen sensor 1 (front) harness connector.

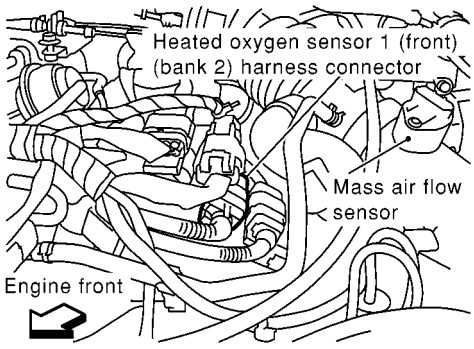


HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y



SEF965Y



SEF966Y

▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	CHECK HO2S1 (FRONT) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0130	63	2	Bank 1 (Right)
P0150	62	2	Bank 2 (Left)

MTBL0471

Continuity should exist.

3. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0130	63 or 2	Ground	Bank 1 (Right)
P0150	62 or 2	Ground	Bank 2 (Left)

MTBL0472

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

OK (With CONSULT-II) ▶	GO TO 3.
OK (Without CONSULT-II) ▶	GO TO 4.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

6. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Bank 1

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L	R-L	R-L	R-L	R-L

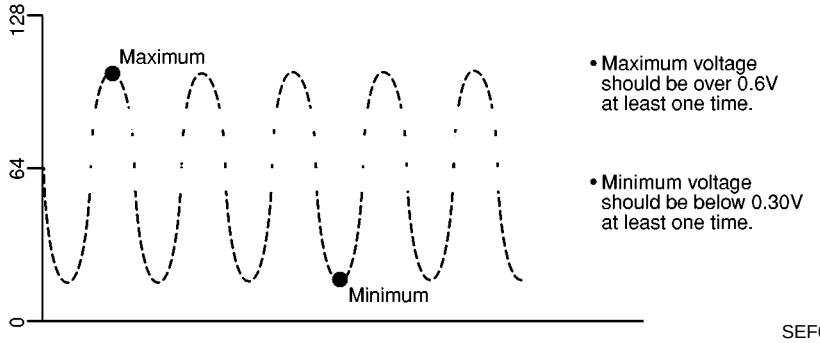
R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

CAUTION:

Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

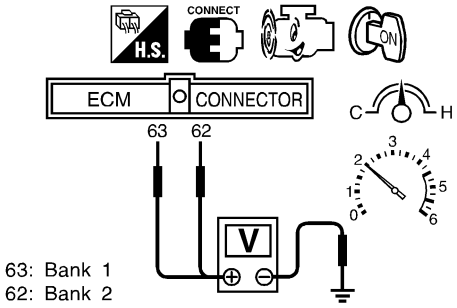
OK	▶	GO TO 6.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

4	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

SEF967XA

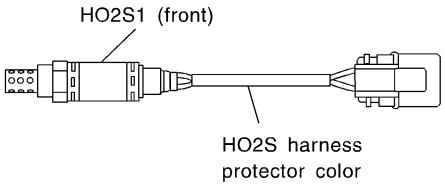
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 (front) harness protector color.



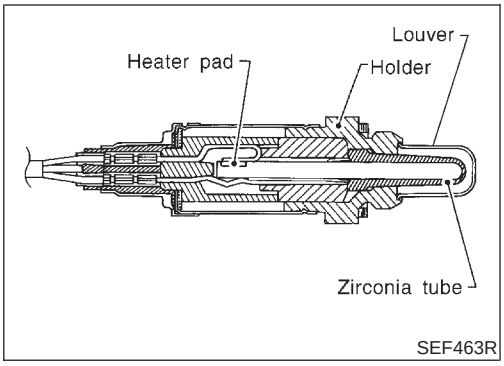
HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

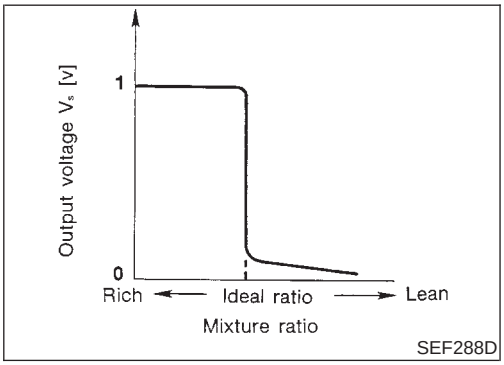
CAUTION:
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning heated oxygen sensor 1 (front).

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
	▶ **INSPECTION END**



SEF463R



SEF288D

Component Description

NAEC0094

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0095

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

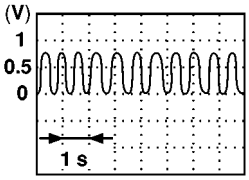
ECM Terminals and Reference Value

NAEC0653

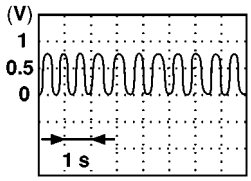
Specification data are reference values and are measured between each terminal and ground.

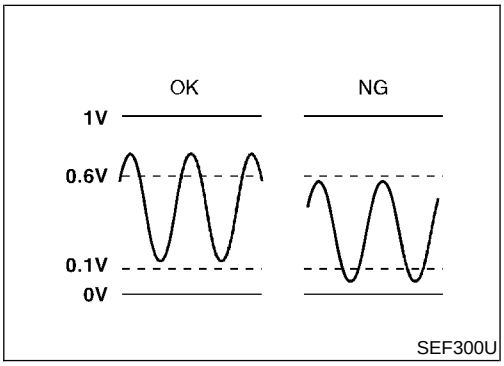
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	G	Heated oxygen sensor 1 (front) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)  SEF059V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	G/B	Heated oxygen sensor 1 (front) (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)  SEF059V



SEF300U

On Board Diagnosis Logic

NAEC0097

To judge the malfunction, the output from the heated oxygen sensor 1 (front) is monitored to determine whether the "rich" output is sufficiently high and whether the "lean" output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.
Malfunction is detected when the maximum and minimum voltage from the sensor are not reached to the specified voltages.

Possible Cause

NAEC0433

- Heated oxygen sensor 1 (front)
- Heated oxygen sensor 1 heater (front)
- Fuel pressure
- Injectors
- Intake air leaks

DTC Confirmation Procedure

NAEC0098

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Always perform at a temperature above −10°C (14°F).**
- **Before performing following procedure, confirm that battery voltage is more than 11V at idle.**

6

HO2S1 (B1) P0130	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF334Z

6

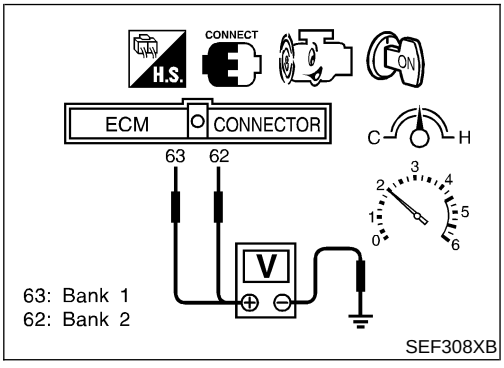
HO2S1 (B1) P0131	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF335Z

6

HO2S1 (B1) P0131
COMPLETED

SEF651Y



SEF308XB

WITH CONSULT-II

NAEC0098S01

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 10 seconds.
3) Turn ignition switch "ON" and select "HO2S1 (B1)/(B2) P0131/P0150" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle for at least 3 minutes.

NOTE:
Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 50 seconds or more.)

ENG SPEED	1,600 - 2,800 rpm
Vehicle speed	80 - 100 km/h (50 - 62 MPH)
B/FUEL SCHDL	3 - 10 msec
Selector lever	Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2.

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-200.

Overall Function Check

NAEC0099

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NAEC0099S01

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 63 (Right bank HO2S1 signal) or 62 (Left bank HO2S1 signal) and engine ground.
3) Check one of the following with engine speed held at 2,000 rpm constant under no load.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is over 0.1V at least one time.

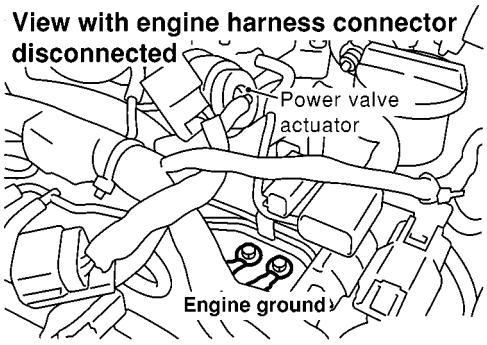
4) If NG, go to "Diagnostic Procedure", EC-200.

Diagnostic Procedure

NAEC0100

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



SEF959Y

▶	GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)

Loosen and retighten corresponding heated oxygen sensor 1 (front).

Tightening torque:

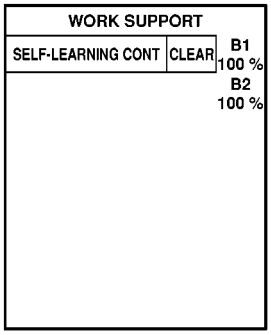
40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

▶	GO TO 3.

3	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARN CONTROL" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".



SEF968Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-71.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

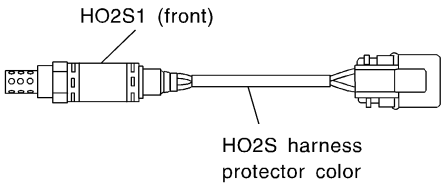
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-289.
No	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4	CHECK HEATED OXYGEN SENSOR HEATER 1 (FRONT)

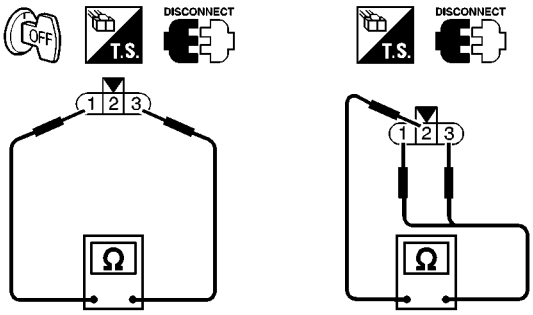
1. Stop engine.
2. Check heated oxygen sensor 1 (front) harness protector color.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

3. Disconnect HO2S1 harness connector.
4. Check resistance between HO2S1 terminals as follows.



Terminals	Resistance
1 and 3	2.3 - 4.3Ω at 25°C (77°F)
1 and 2 2 and 3	∞Ω (Continuity should not exist.)

SEF969Y

CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	GO TO 7.

5	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

6. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Bank 1

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L	R-L	R-L	R-L	R-L

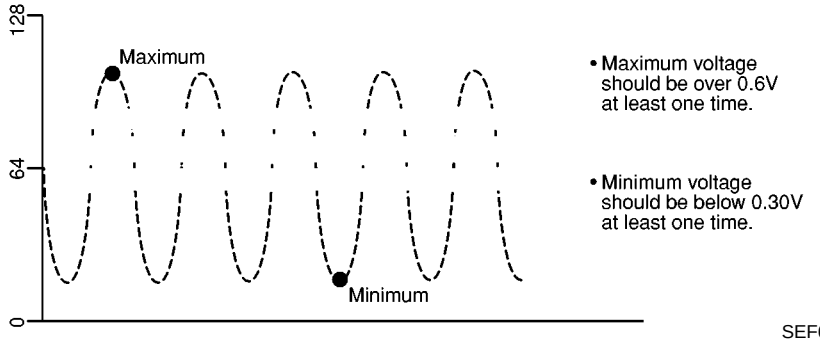
R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

CAUTION:

Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

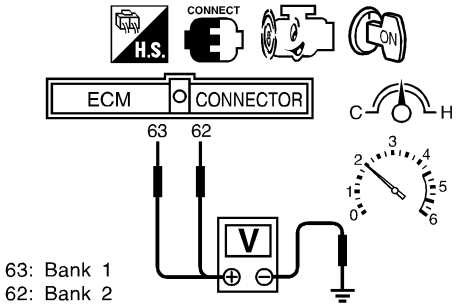
OK	▶	GO TO 8.
NG	▶	GO TO 7.

Diagnostic Procedure (Cont'd)

6	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

SEF967XA

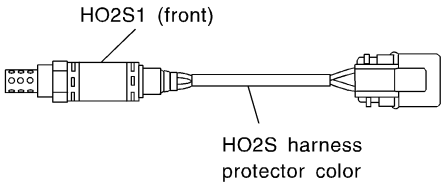
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	REPLACE FRONT HEATED OXYGEN SENSOR

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 (front) harness protector color.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

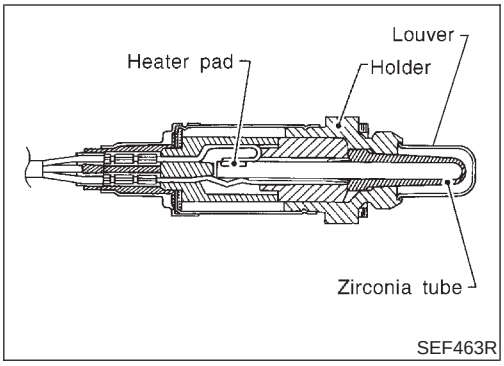
CAUTION:
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning heated oxygen sensor 1 (front).

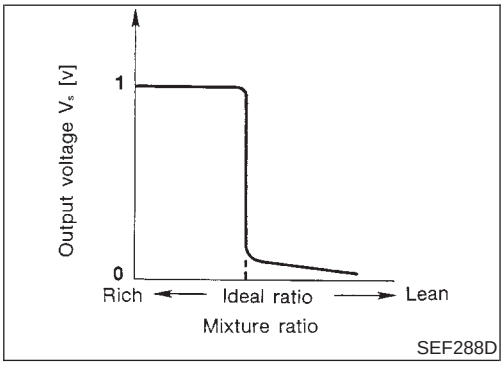
8	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.
For circuit, refer to "DTC P0130 (RIGHT BANK 1), P0150 (LEFT BANK 2) HEATED OXYGEN SENSOR 1 (FRONT) [HO2S1 (FRONT) (BANK 1)/(BANK 2)] (CIRCUIT)", EC-187.

	▶	**INSPECTION END**



SEF463R



SEF288D

Component Description

NAEC0101

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0102

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

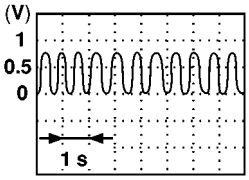
ECM Terminals and Reference Value

NAEC0654

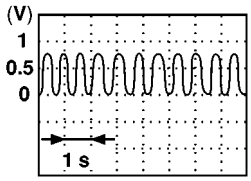
Specification data are reference values and are measured between each terminal and ground.

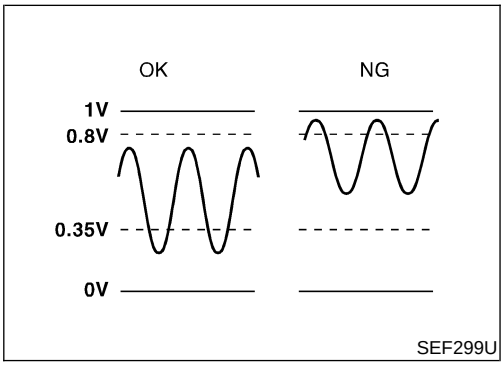
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	G	Heated oxygen sensor 1 (front) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)  SEF059V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	G/B	Heated oxygen sensor 1 (front) (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)  SEF059V



SEF299U

On Board Diagnosis Logic

NAEC0104

To judge the malfunction, the output from the heated oxygen sensor 1 (front) is monitored to determine whether the "rich" output is sufficiently high. The "lean" output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.
Malfunction is detected when the maximum and minimum voltages from the sensor are beyond the specified voltages.

Possible Cause

NAEC0434

- Heated oxygen sensor 1 (front)
- Fuel pressure
- Injectors
- Heated oxygen sensor 1 heater (front)

DTC Confirmation Procedure

NAEC0105

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Always perform at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

6

HO2S1 (B1) P0132	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF336Z

6

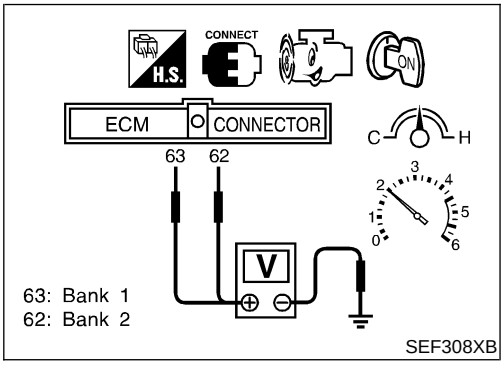
HO2S1 (B1) P0132	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF337Z

6

HO2S1 (B1) P0132
COMPLETED

SEF655Y



SEF308XB

WITH CONSULT-II

NAEC0105S01

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "HO2S1 (B1)/(B2) P0132/P0152" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle for at least 3 minutes.

NOTE:
Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 50 seconds or more.)

ENG SPEED	1,600 - 2,800 rpm
Vehicle speed	80 - 100 km/h (50 - 62 MPH)
B/FUEL SCHDL	3 - 10 msec
Selector lever	Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2.

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-208.

Overall Function Check

NAEC0106

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NAEC0106S01

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground.
3) Check one of the following with engine speed held at 2,000 rpm constant under no load.
- The maximum voltage is below 0.8V at least one time.
- The minimum voltage is below 0.35V at least one time.

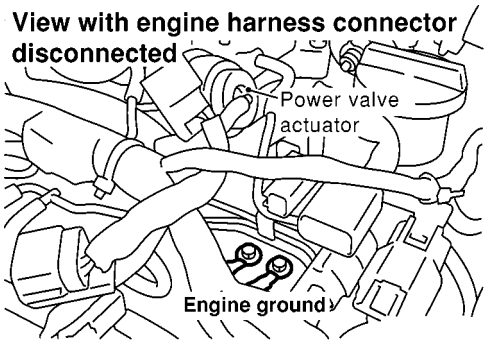
4) If NG, go to "Diagnostic Procedure", EC-208.

Diagnostic Procedure

NAEC0107

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



SEF959Y

▶	GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)

Loosen and retighten corresponding heated oxygen sensor 1 (front).

Tightening torque:

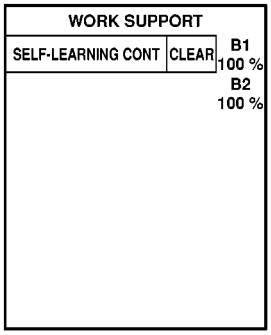
40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

▶	GO TO 3.

3	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARN CONTROL" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".



SEF968Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT-II

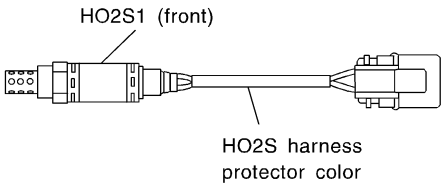
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-71.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-297.
No	▶	GO TO 4.

4	CHECK HO2S 1 (FRONT) CONNECTOR FOR WATER

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 (front) harness protector color.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

3. Disconnect heated oxygen sensor 1 (front) harness connector.
4. Check connectors for water.
   Water should not exist.

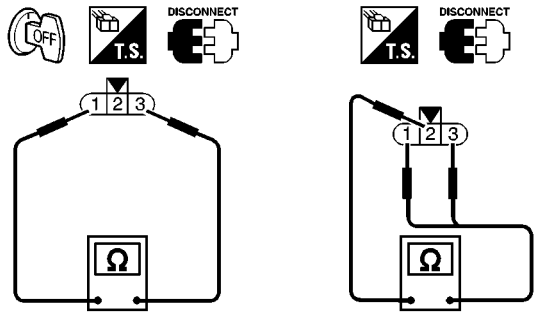
OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace harness or connectors.

Diagnostic Procedure (Cont'd)

5	CHECK HEATED OXYGEN SENSOR 1 (FRONT) HEATER

Check resistance between HO2S1 terminals as follows.



Terminals	Resistance
1 and 3	2.3 - 4.3Ω at 25°C (77°F)
1 and 2 2 and 3	∞Ω (Continuity should not exist.)

SEF969Y

CAUTION:

Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 8.

6	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

6. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Bank 1

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R				

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R				

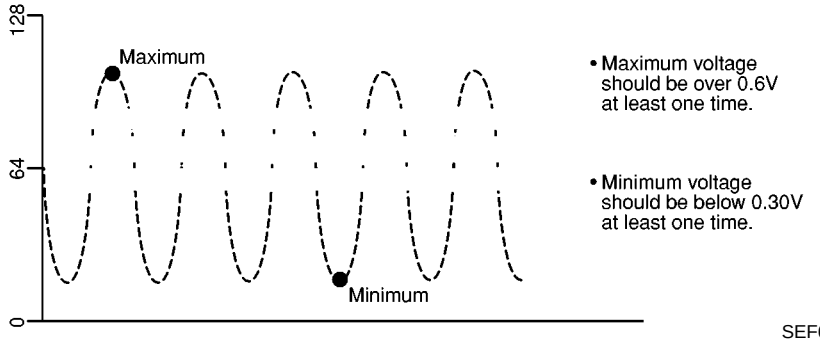
R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

CAUTION:

Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

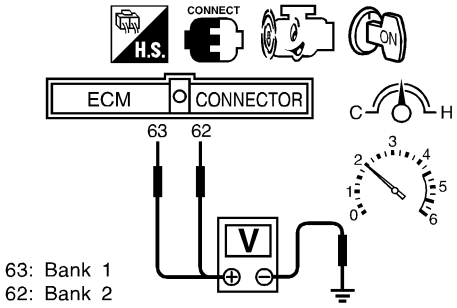
OK	▶	GO TO 9.
NG	▶	GO TO 8.

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

SEF967XA

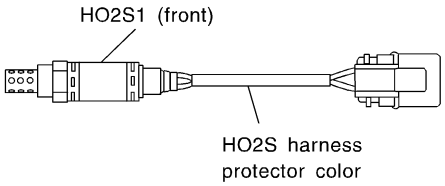
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 (front) harness protector color.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

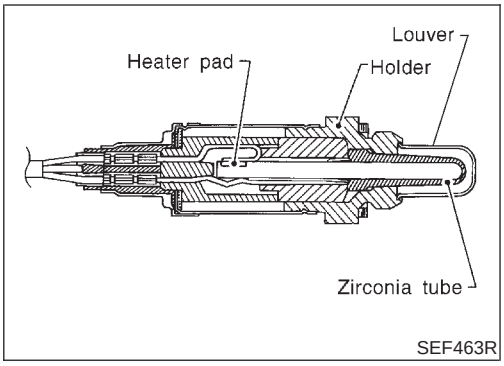
CAUTION:
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning heated oxygen sensor 1 (front).

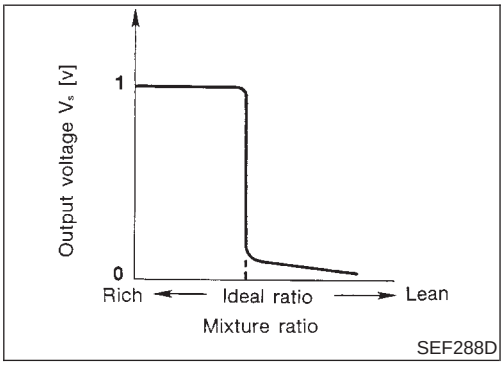
9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.
For circuit, refer to "DTC P0130 (RIGHT BANK, -B1), P0150 (LEFT BANK, -B2) HEATED OXYGEN SENSOR 1 [HO2S1 (FRONT) (BANK 1)/(BANK 2)] (CIRCUIT)", EC-187.

	▶	**INSPECTION END**



SEF463R



SEF288D

Component Description

NAEC0108

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0109

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

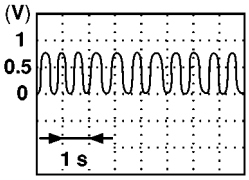
ECM Terminals and Reference Value

NAEC0655

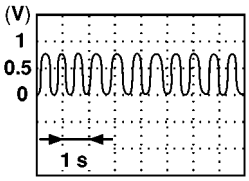
Specification data are reference values and are measured between each terminal and ground.

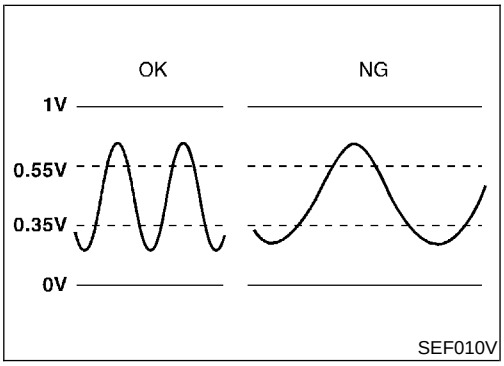
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	G	Heated oxygen sensor 1 (front) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)  SEF059V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	G/B	Heated oxygen sensor 1 (front) (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)  SEF059V



SEF010V

On Board Diagnosis Logic

NAEC0111

To judge the malfunction of heated oxygen sensor 1 (front), this diagnosis measures response time of heated oxygen sensor 1 (front) signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 (front) temperature index. Judgment is based on whether the compensated time [heated oxygen sensor 1 (front) cycling time index] is inordinately long or not.

Malfunction is detected when the response of the voltage signal from the sensor takes more than the specified time.

Possible Cause

NAEC0435

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 1 (front)
- Heated oxygen sensor 1 heater (front)
- Fuel pressure
- Injectors
- Intake air leaks
- Exhaust gas leaks
- PCV valve
- Mass air flow sensor

DTC Confirmation Procedure

NAEC0112

CAUTION:

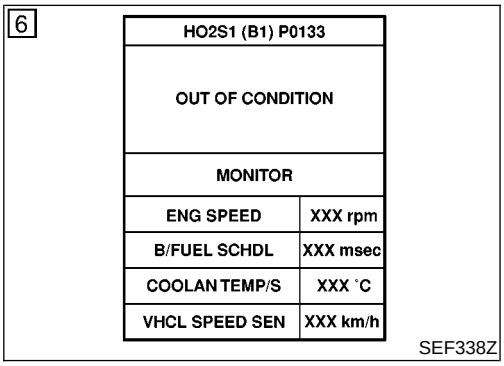
Always drive vehicle at a safe speed.

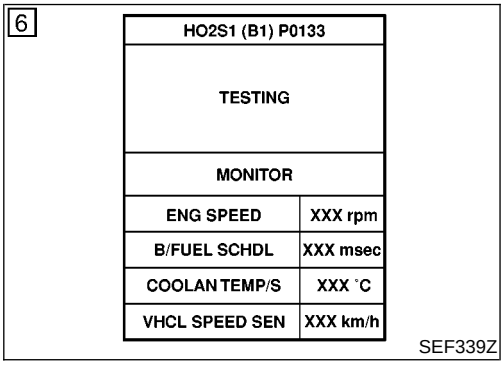
NOTE:

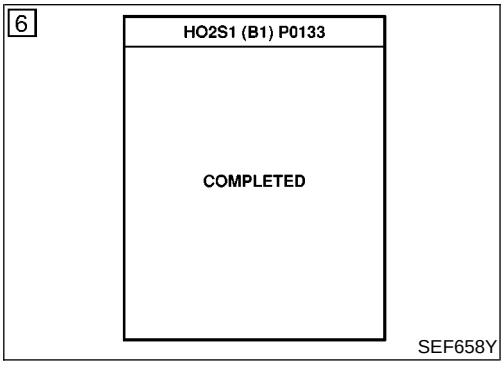
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Always perform at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**







WITH CONSULT-II

NAEC0112S01

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "HO2S1 (B1)/(B2) P0133/P0153" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle for at least 3 minutes.

NOTE:

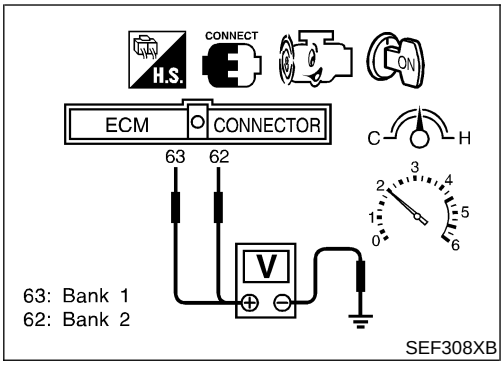
Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.

6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 40 to 50 seconds.)

ENG SPEED	1,600 - 3,100 rpm (A/T) 1,800 - 3,100 rpm (M/T)
Vehicle speed	80 - 120 km/h (50 - 75 MPH)
B/FUEL SCHDL	5 - 12 msec (A/T) 5 - 15 msec (M/T)
Selector lever	Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2.

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-219.



Overall Function Check

NAEC0113

Use this procedure to check the overall function of the heated oxygen sensor 1 (front) circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NAEC0113S01

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
  1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
  2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

4) If NG, go to “Diagnostic Procedure”, EC-219.

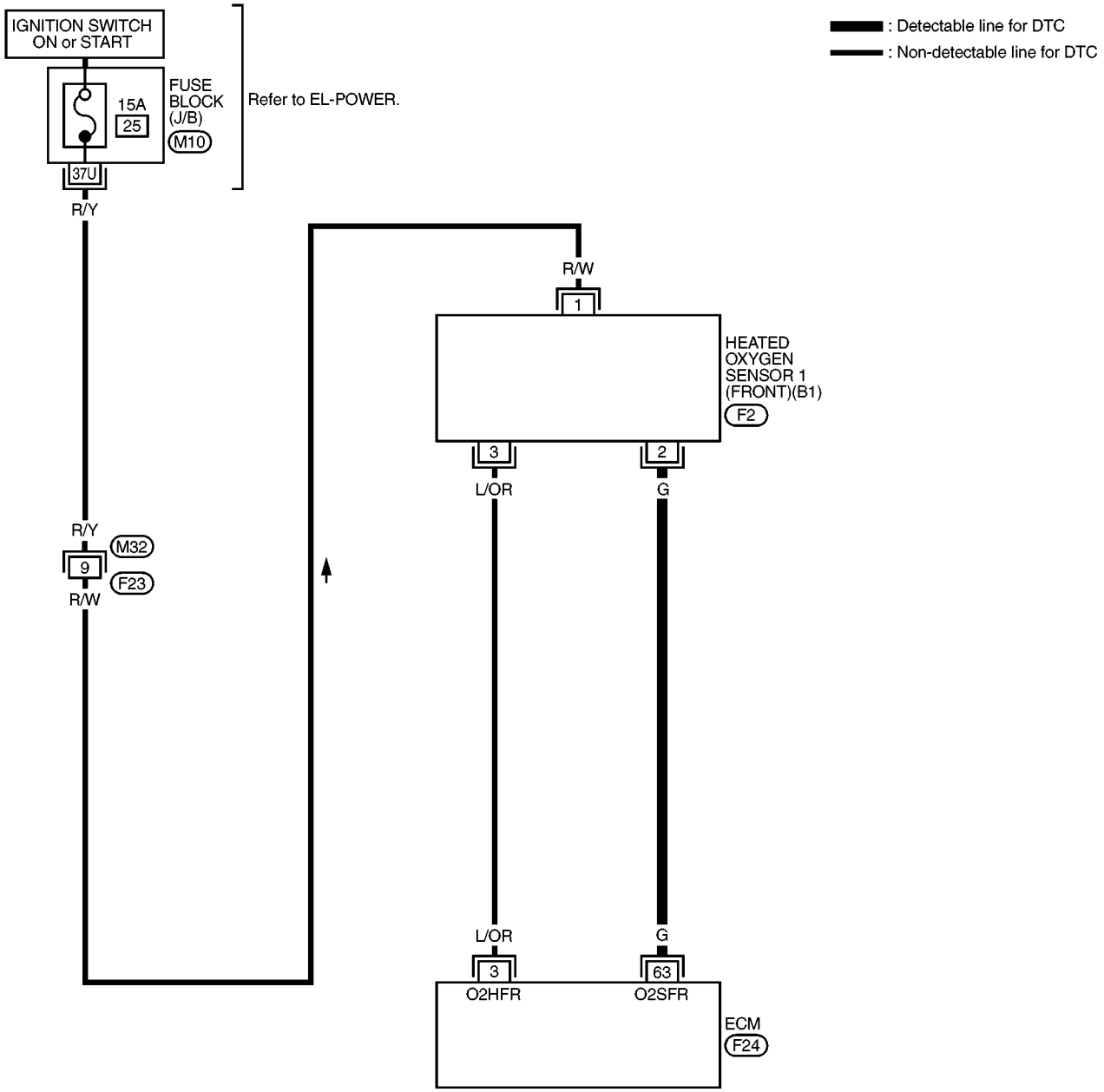
Wiring Diagram

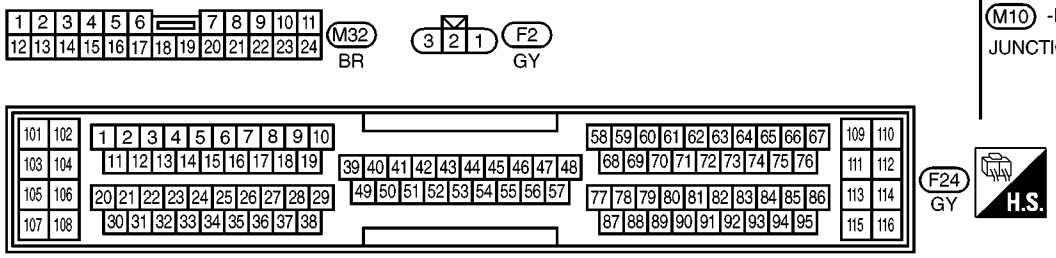
NAEC0114

RIGHT BANK

NAEC0114S01

EC-O2S1B1-01





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

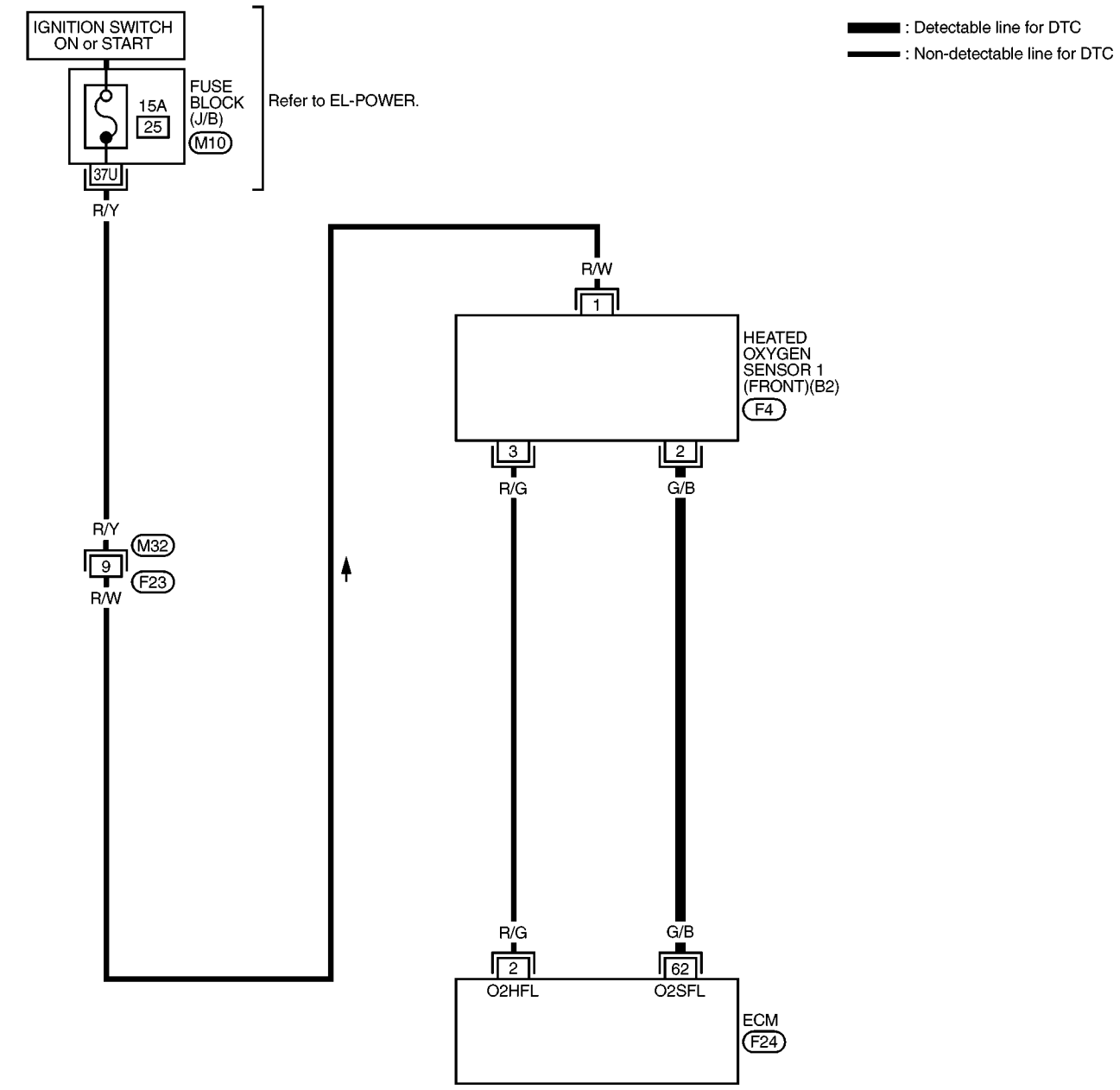
MEC947C

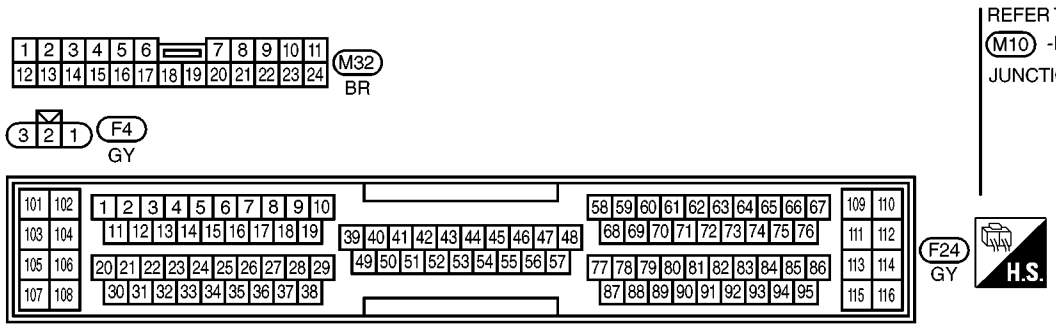
Wiring Diagram (Cont'd)

LEFT BANK

NAEC0114S02

EC-O2S1B2-01





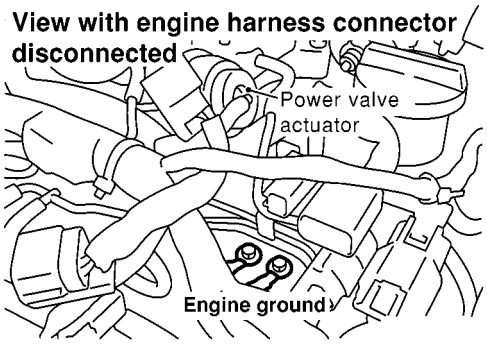
MEC948C

Diagnostic Procedure

NAEC0115

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



SEF959Y

▶	GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)

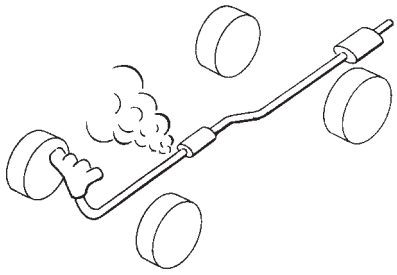
Loosen and retighten corresponding heated oxygen sensor 1 (front).

Tightening torque:
40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

▶	GO TO 3.

3	CHECK FOR EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst.



SEF099P

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

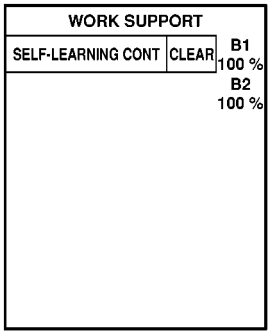
OK	▶	GO TO 5.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

5	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARN CONTROL" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".



SEF968Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT-II

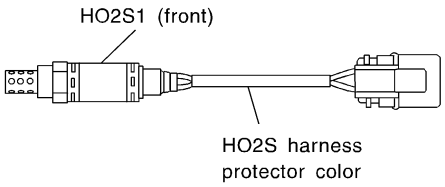
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-71.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-289, 297.
No	▶	GO TO 6.

6	CHECK HO2S1 (FRONT) HARNESS PROTECTOR COLOR

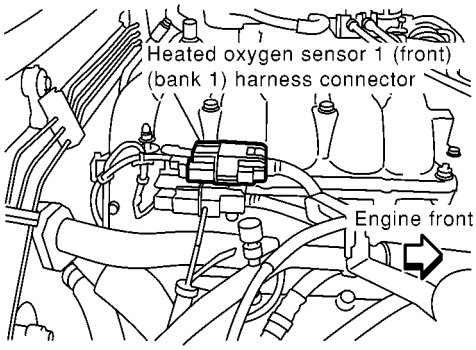
1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 (front) harness protector.



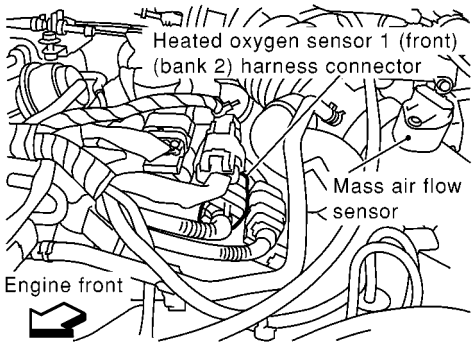
HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

3. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.



SEF965Y



SEF966Y

▶	GO TO 7.

Diagnostic Procedure (Cont'd)

7	CHECK HO2S1 (FRONT) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and front HO2S terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0133	63	2	Bank 1 (Right)
P0153	62	2	Bank 2 (Left)

MTBL0473

Continuity should exist.

3. Check harness continuity between ECM terminal or FRONT HO2S terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0133	63 or 2	Ground	Bank 1 (Right)
P0153	62 or 2	Ground	Bank 2 (Left)

MTBL0474

Continuity should not exist.

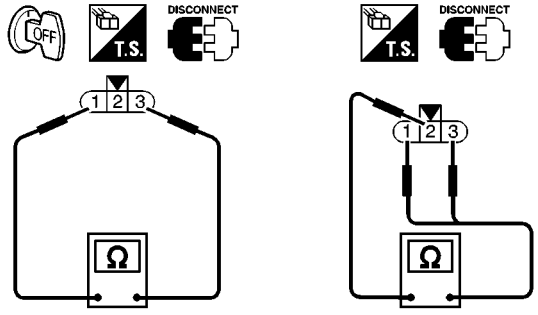
4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)

Check resistance between HO2S1 (front) terminals as follows.



Terminals	Resistance
1 and 3	2.3 - 4.3Ω at 25°C (77°F)
1 and 2 2 and 3	∞Ω (Continuity should not exist.)

SEF969Y

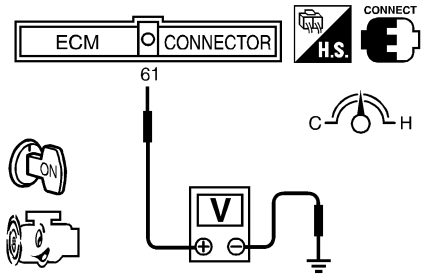
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 13.

9	CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 61 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.2 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.2
Idle to about 4,000 rpm*	1.2 - 1.8 to Approx. 4.0

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

SEF298X

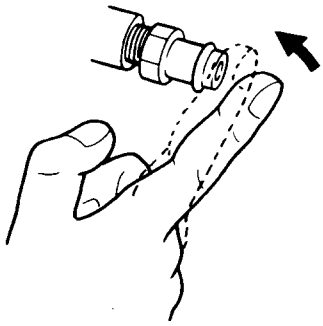
4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace mass air flow sensor.

10	CHECK PCV VALVE

1. Install all removed parts.
2. Start engine and let it idle.
3. Remove PCV valve ventilation hose from PCV valve.
4. Make sure that a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.



SEC137A

OK or NG

OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Replace PCV valve.

Diagnostic Procedure (Cont'd)

11	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

6. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
  5 times (cycles) are counted as shown below.

Bank 1

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L-R

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L	R-L	R-L	R-L	R-L-R

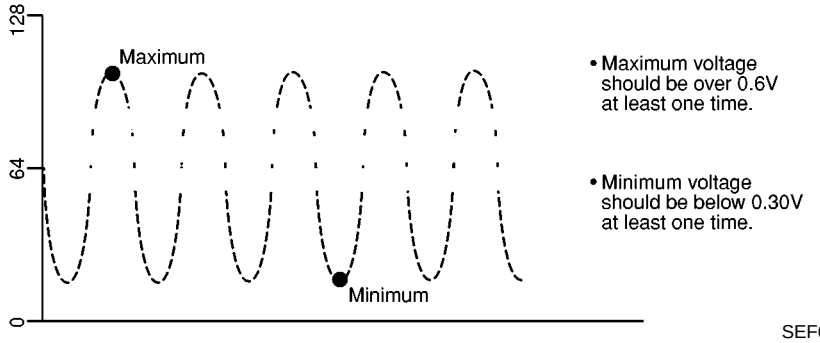
R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

CAUTION:

Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

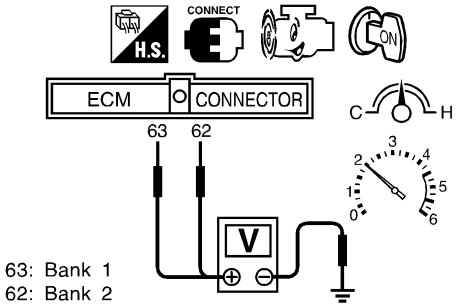
OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

12	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

SEF967XA

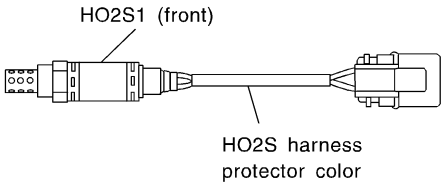
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 (front) harness protector color.

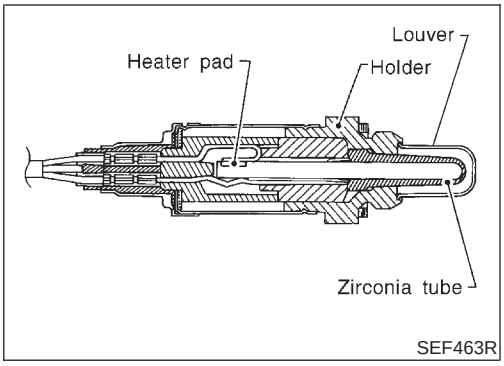


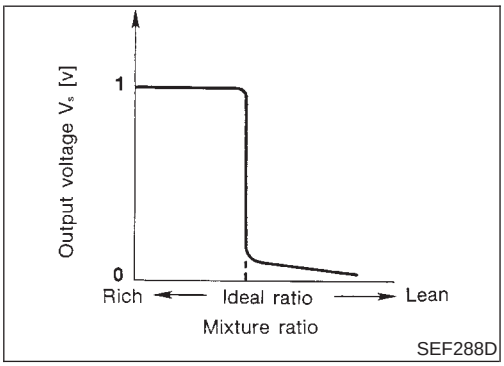
HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

	▶	Replace malfunctioning heated oxygen sensor 1 (front).

14	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**





Component Description

NAEC0116

The heated oxygen sensor 1 (front) is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 (front) has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 (front) signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0117

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

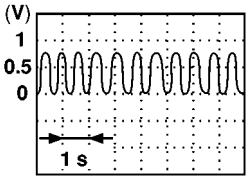
ECM Terminals and Reference Value

NAEC0656

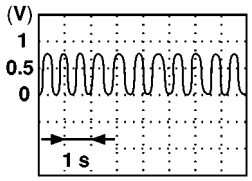
Specification data are reference values and are measured between each terminal and ground.

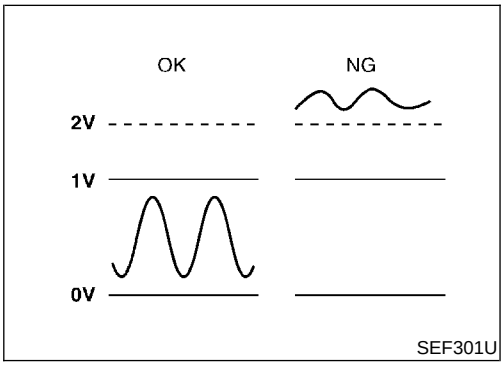
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	G	Heated oxygen sensor 1 (front) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)  SEF059V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	G/B	Heated oxygen sensor 1 (front) (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)  SEF059V



SEF301U

On Board Diagnosis Logic

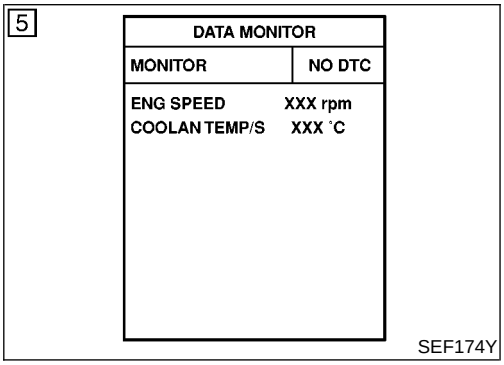
NAEC0119

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 (front) output is not inordinately high.
Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.

Possible Cause

NAEC0436

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 1 (front)



SEF174Y

DTC Confirmation Procedure

NAEC0120

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NAEC0120S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Turn ignition switch "ON".
4) Select "DATA MONITOR" mode with CONSULT-II.

DTC Confirmation Procedure (Cont'd)

5) Restart engine and let it idle for 25 seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-231.

WITH GST

NAEC0120S02

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Restart engine and let it idle for 25 seconds.
4) Turn ignition switch "OFF" and wait at least 10 seconds.
5) Restart engine and let it idle for 25 seconds.
6) Select "MODE 3" with GST.
7) If DTC is detected, go to "Diagnostic Procedure", EC-231.

- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

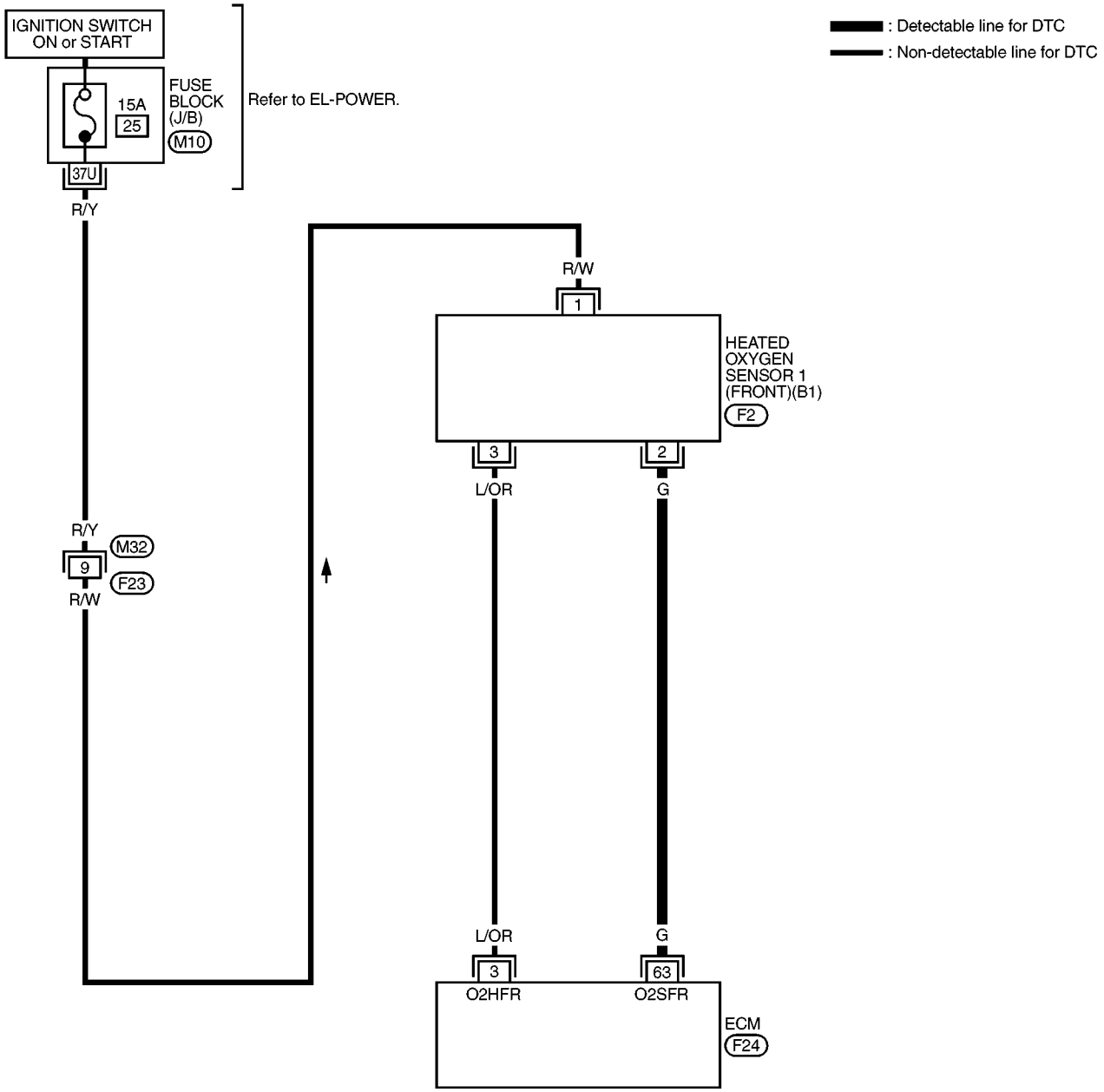
Wiring Diagram

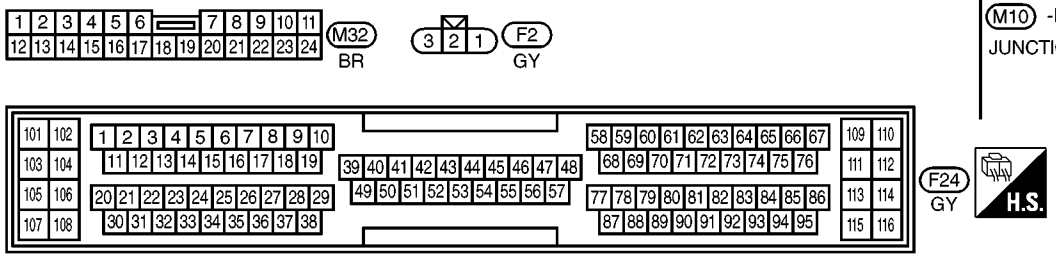
NAEC0121

RIGHT BANK

NAEC0121S01

EC-O2S1B1-01





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

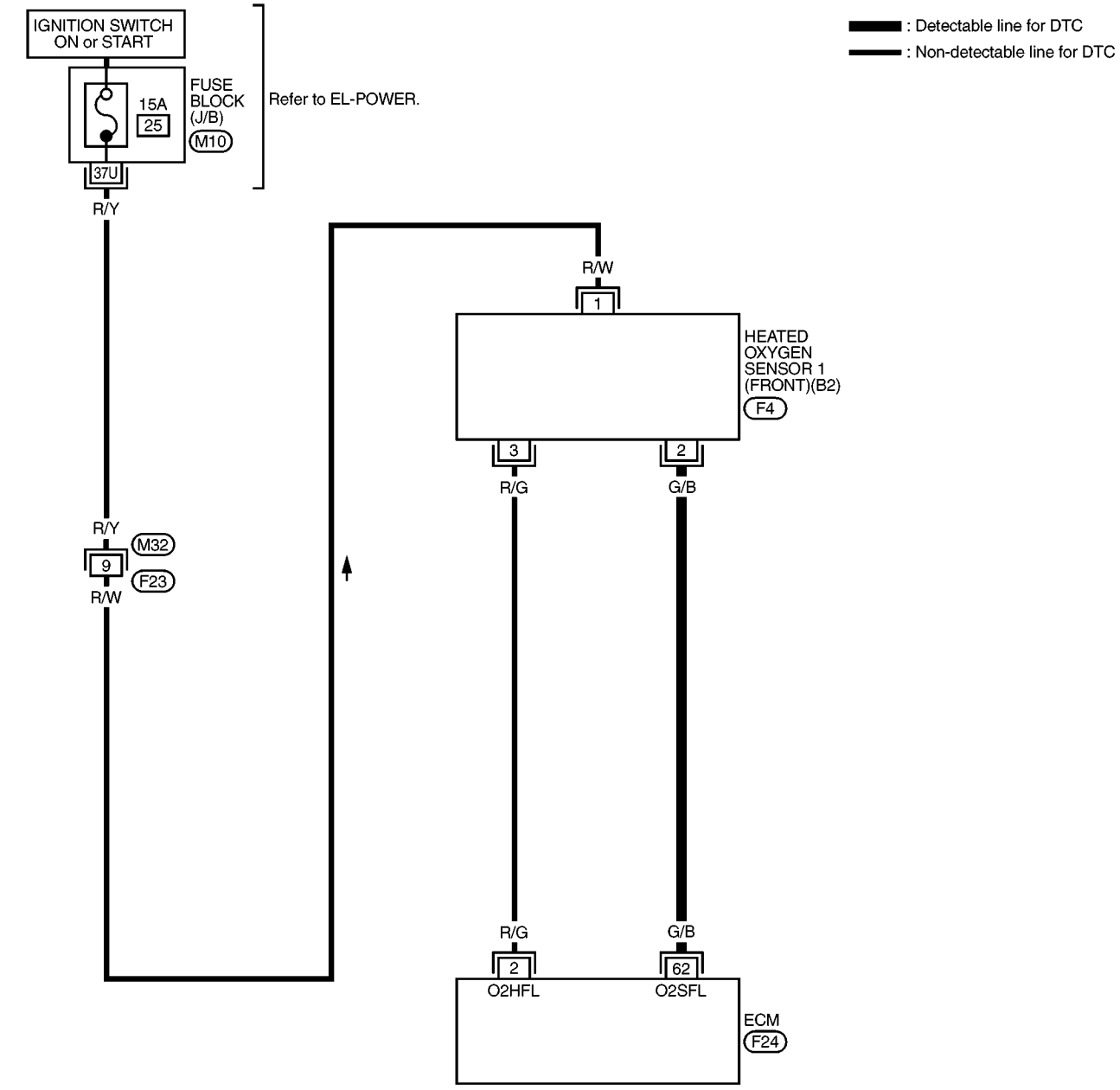
MEC947C

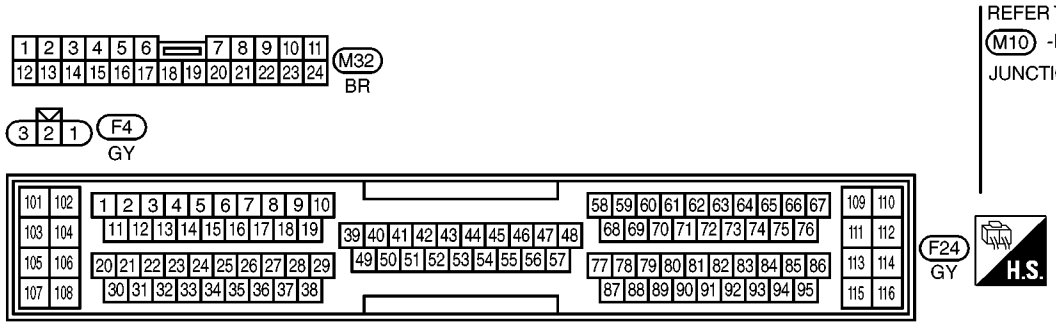
Wiring Diagram (Cont'd)

LEFT BANK

NAEC0121S02

EC-O2S1B2-01





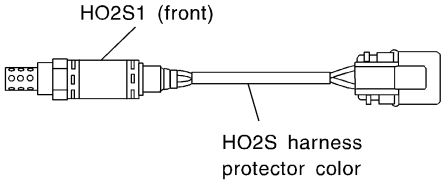
MEC948C

Diagnostic Procedure

NAEC0122

1	INSPECTION START

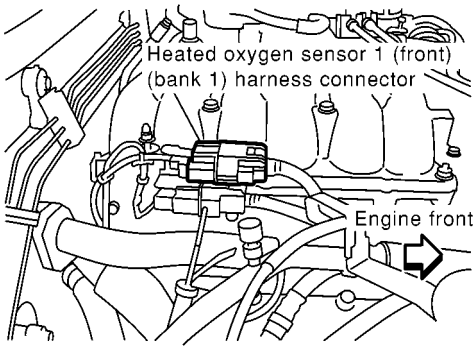
1. Turn ignition switch “OFF”.
2. Check heated oxygen sensor 1 (front) harness protector color.



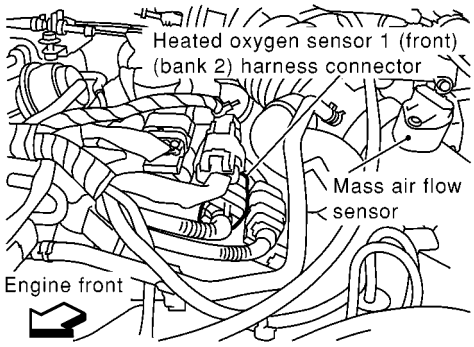
HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

3. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.



SEF965Y



SEF966Y

▶	GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)

Loosen and retighten corresponding heated oxygen sensor 1 (front).

Tightening torque:
40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK HO2S1 (FRONT) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0134	63	2	Bank 1 (Right)
P0154	62	2	Bank 2 (Left)

MTBL0475

Continuity should exist.

3. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0134	63 or 2	Ground	Bank 1 (Right)
P0154	62 or 2	Ground	Bank 2 (Left)

MTBL0476

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK HO2S1 (FRONT) CONNECTOR FOR WATER

1. Disconnect heated oxygen sensor 1 (front) harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair or replace harness or connectors.

5	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and adjust "TRIGGER POINT" to 100% in "DATA MONITOR" mode with CONSULT-II.
3. Select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

6. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown left:

Bank 1

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R				

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R				

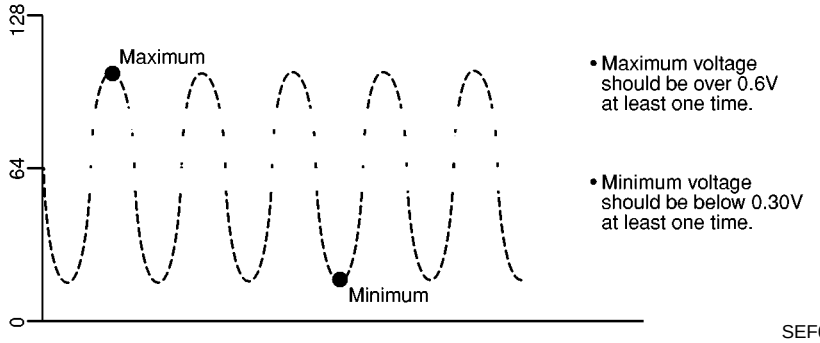
R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

CAUTION:

Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

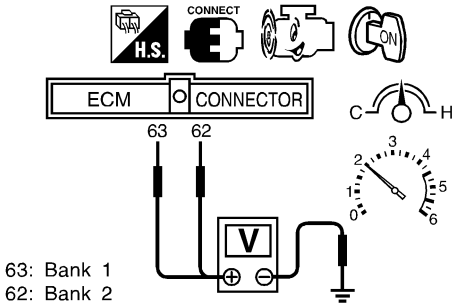
OK	▶	GO TO 8.
NG	▶	GO TO 7.

Diagnostic Procedure (Cont'd)

6	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

SEF967XA

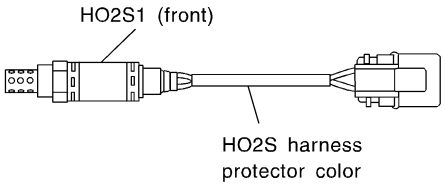
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 (front) harness protector color.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

CAUTION:
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning heated oxygen sensor 1 (front).

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
	▶ **INSPECTION END**

Description

NAEC0123

SYSTEM DESCRIPTION

NAEC0123S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 1 heater (front) control	Heated oxygen sensor 1 heaters (front)
Crankshaft position sensor (REF)			

The ECM performs ON/OFF control of the heated oxygen sensor 1 heaters (front) corresponding to the engine speed.

OPERATION

NAEC0123S02

Engine speed rpm	Heated oxygen sensor 1 heaters (front)
Above 3,600	OFF
Below 3,600	ON

CONSULT-II Reference Value in Data Monitor Mode

NAEC0124

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1) HO2S1 HTR (B2)	• Engine speed: Below 3,600 rpm	ON
	• Engine speed: Above 3,600 rpm	OFF

ECM Terminals and Reference Value

NAEC0657

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	L/OR	Heated oxygen sensor 1 heater (front) (bank 1)	**[Engine is running]** • Engine speed is below 3,600 rpm.	0 - 1.0V
			[Engine is running] • Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
2	R/G	Heated oxygen sensor 1 heater (front) (bank 2)	**[Engine is running]** • Engine speed is below 3,600 rpm.	0 - 1.0V
			[Engine is running] • Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

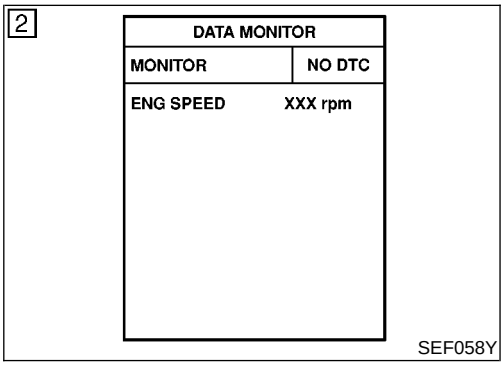
NAEC0126

Malfunction is detected when the current amperage in the heated oxygen sensor 1 heater (front) circuit is out of the normal range. [An improper voltage drop signal is sent to ECM through the heated oxygen sensor 1 heater (front).]

Possible Cause

NAEC0437

- Harness or connectors
  (The heated oxygen sensor 1 heater (front) circuit is open or shorted.)
- Heated oxygen sensor 1 heater (front)



DTC Confirmation Procedure

NAEC0127

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

WITH CONSULT-II

NAEC0127S01

1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT.
2) Start engine and run it for at least 6 seconds at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-239.

WITH GST

NAEC0127S02

1) Start engine and run it for at least 6 seconds at idle speed.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Start engine and run it for at least 6 seconds at idle speed.
4) Select “MODE 3” with GST.
5) If DTC is detected, go to “Diagnostic Procedure”, EC-239.

- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

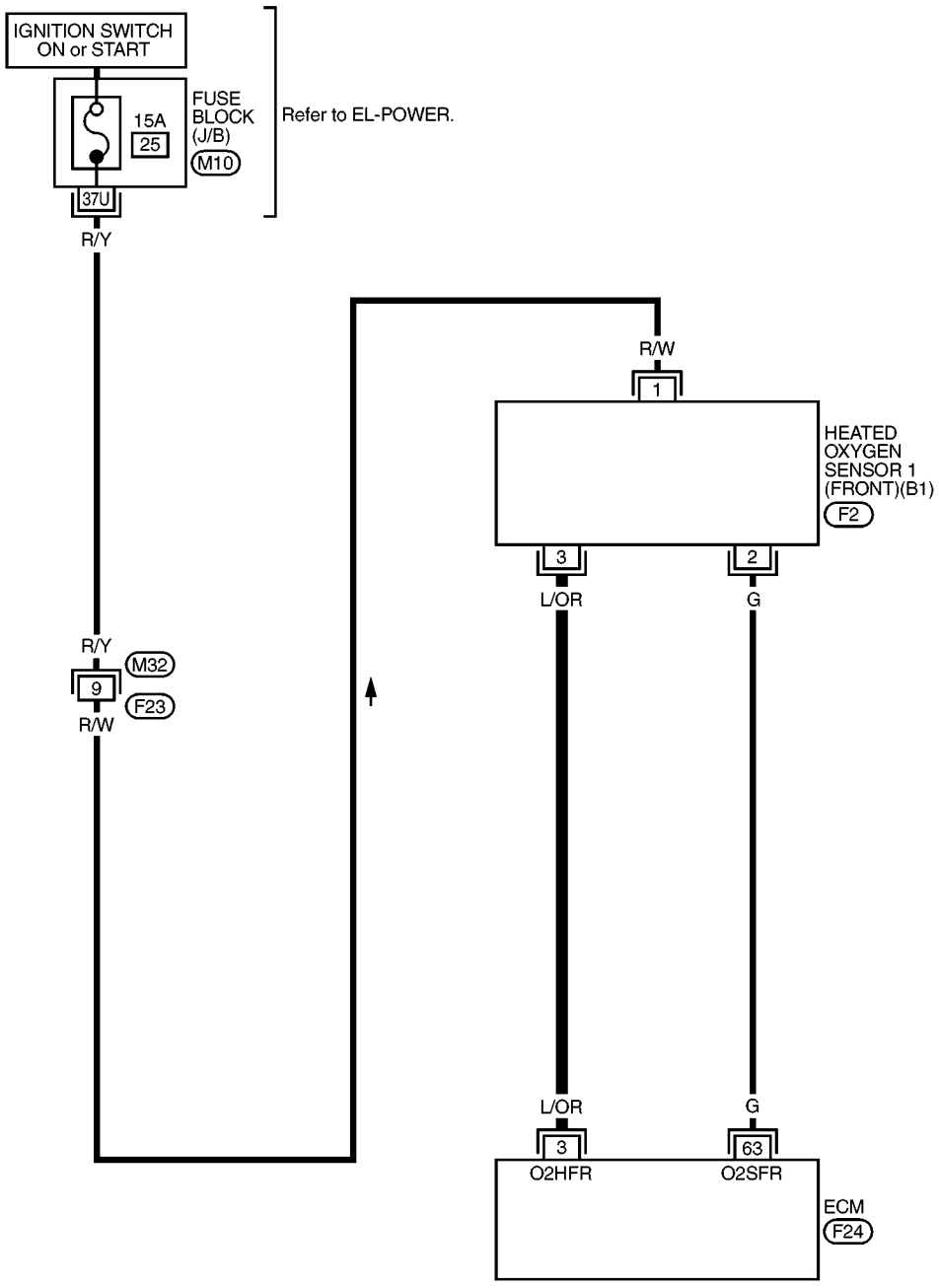
Wiring Diagram

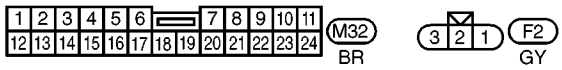
NAEC0128

RIGHT BANK

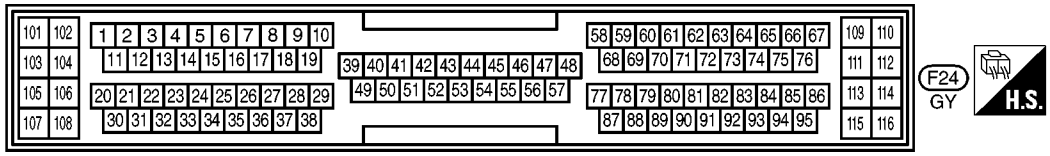
NAEC0128S01

EC-O2H1B1-01





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

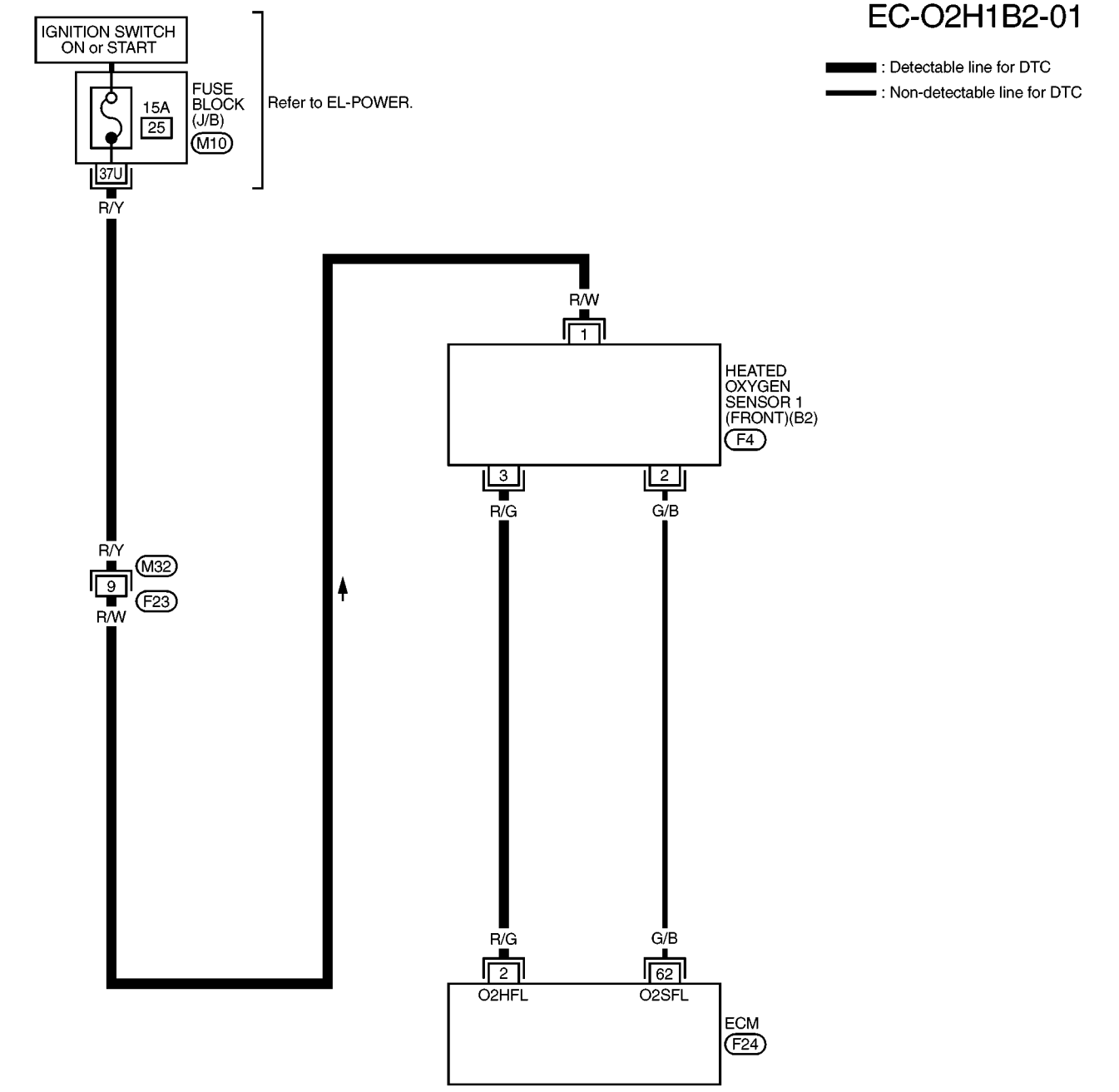


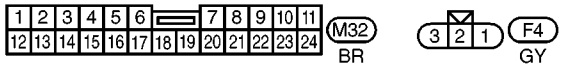
MEC949C

Wiring Diagram (Cont'd)

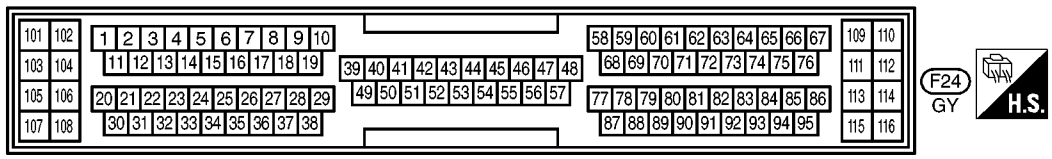
LEFT BANK

NAEC0128S02





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)



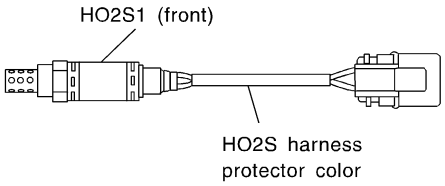
MEC950C

Diagnostic Procedure

NAEC0129

1	CHECK HO2S1 (FRONT) POWER SUPPLY CIRCUIT

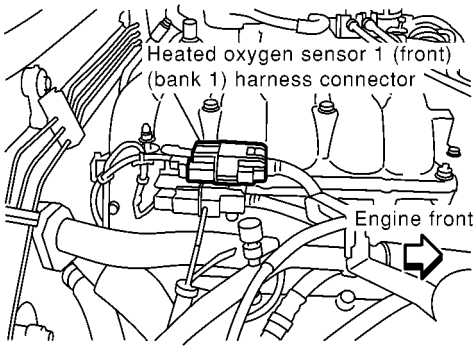
1. Turn ignition switch “OFF”.
2. Check heated oxygen sensor 1 (front) harness protector color.



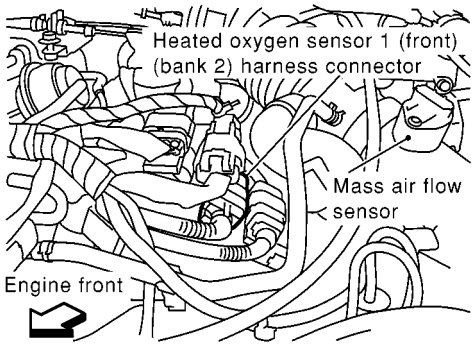
HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

3. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.

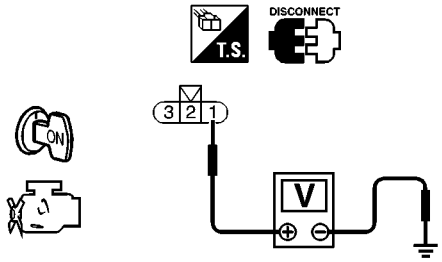


SEF965Y



SEF966Y

4. Turn ignition switch “ON”.
5. Check voltage between HO2S1 (front) terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF970Y

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M32, F23 ● Fuse block (J/B) connector M10 ● 15A fuse ● Harness for open or short between heated oxygen sensor 1 (front) and fuse	
▶	Repair harness or connectors.

3	CHECK HO2S1 (FRONT) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0135	3	3	Bank 1 (Right)
P0155	2	3	Bank 2 (Left)

MTBL0520

Continuity should exist.

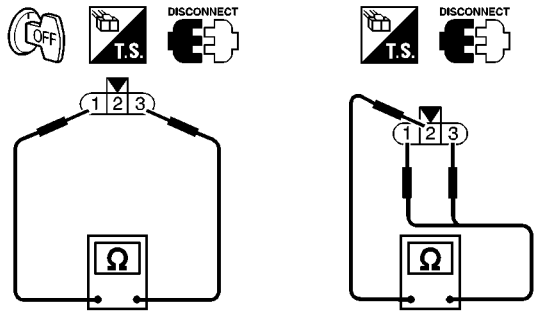
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)

Check resistance between HO2S1 (front) terminals as follows.



Terminals	Resistance
1 and 3	2.3 - 4.3Ω at 25°C (77°F)
1 and 2 2 and 3	∞Ω (Continuity should not exist.)

SEF969Y

CAUTION:

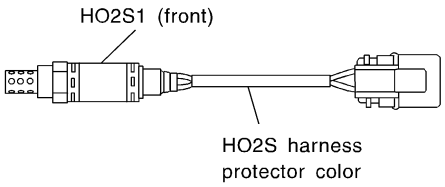
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 (front) harness protector color.



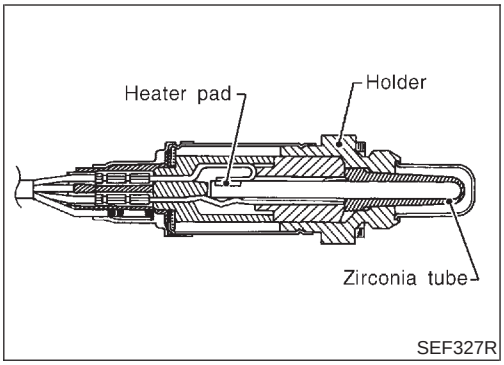
HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

CAUTION:
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

▶	Replace malfunctioning heated oxygen sensor 1 (front).

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**



Component Description

NAEC0130

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0131

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH

ECM Terminals and Reference Value

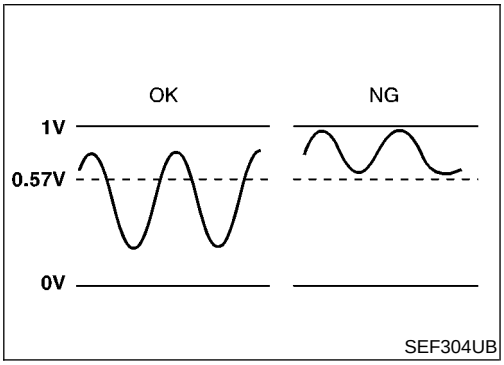
NAEC0658

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
72	OR	Heated oxygen sensor 2 (rear) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V
71	OR/L	Heated oxygen sensor 2 (rear) (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V



On Board Diagnosis Logic

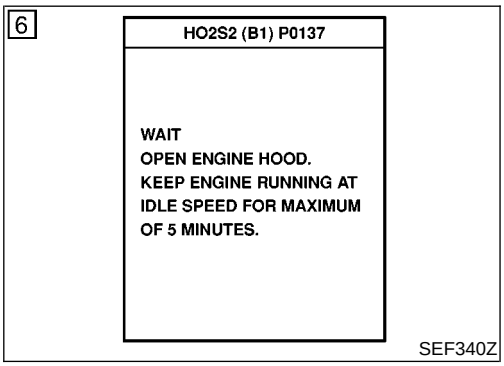
NAEC0133

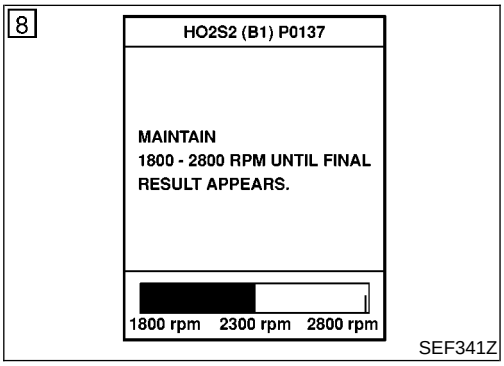
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.
Malfunction is detected when the minimum voltage from the sensor is not reached to the specified voltage.

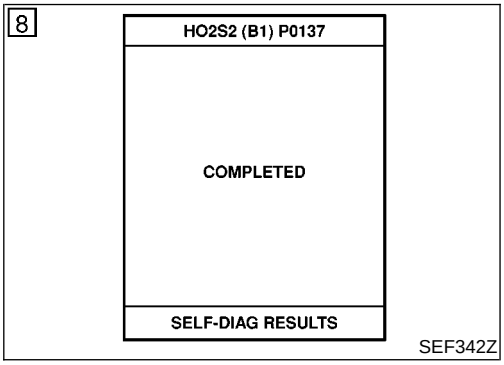
Possible Cause

NAEC0438

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)
- Fuel pressure
- Injectors







DTC Confirmation Procedure

NAEC0134

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Open engine hood before conducting following procedure.

WITH CONSULT-II

NAEC0134S01

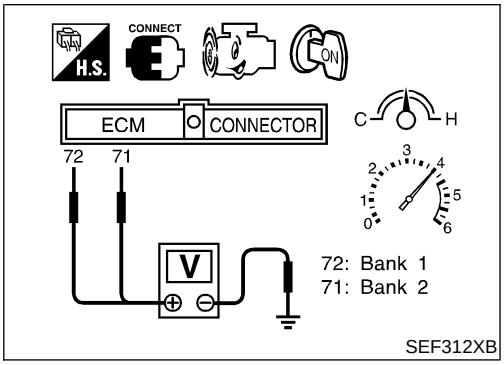
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Turn ignition switch “ON”.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
6) Select “HO2S2 (B1)/(B2) P0137/P0157” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
7) Start engine and follow the instruction of CONSULT-II.
8) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, refer to “Diagnostic Procedure”, EC-247.
   If “CANNOT BE DIAGNOSED” is displayed, perform the following.

a) Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
b) Turn ignition switch “ON”.
c) Select “DATA MONITOR” mode with CONSULT-II.
d) Start engine.
e) Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).

Overall Function Check

NAEC0135

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.



WITH GST

NAEC0135S01

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 72 (HO2S2 bank

1 right signal) or 71 (HO2S2 bank 2 left signal) and engine ground.

4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be below 0.57V at least once during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.

5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "OD" OFF (A/T).
The voltage should be below 0.57V at least once during this procedure.

6) If NG, go to "Diagnostic Procedure", EC-247.

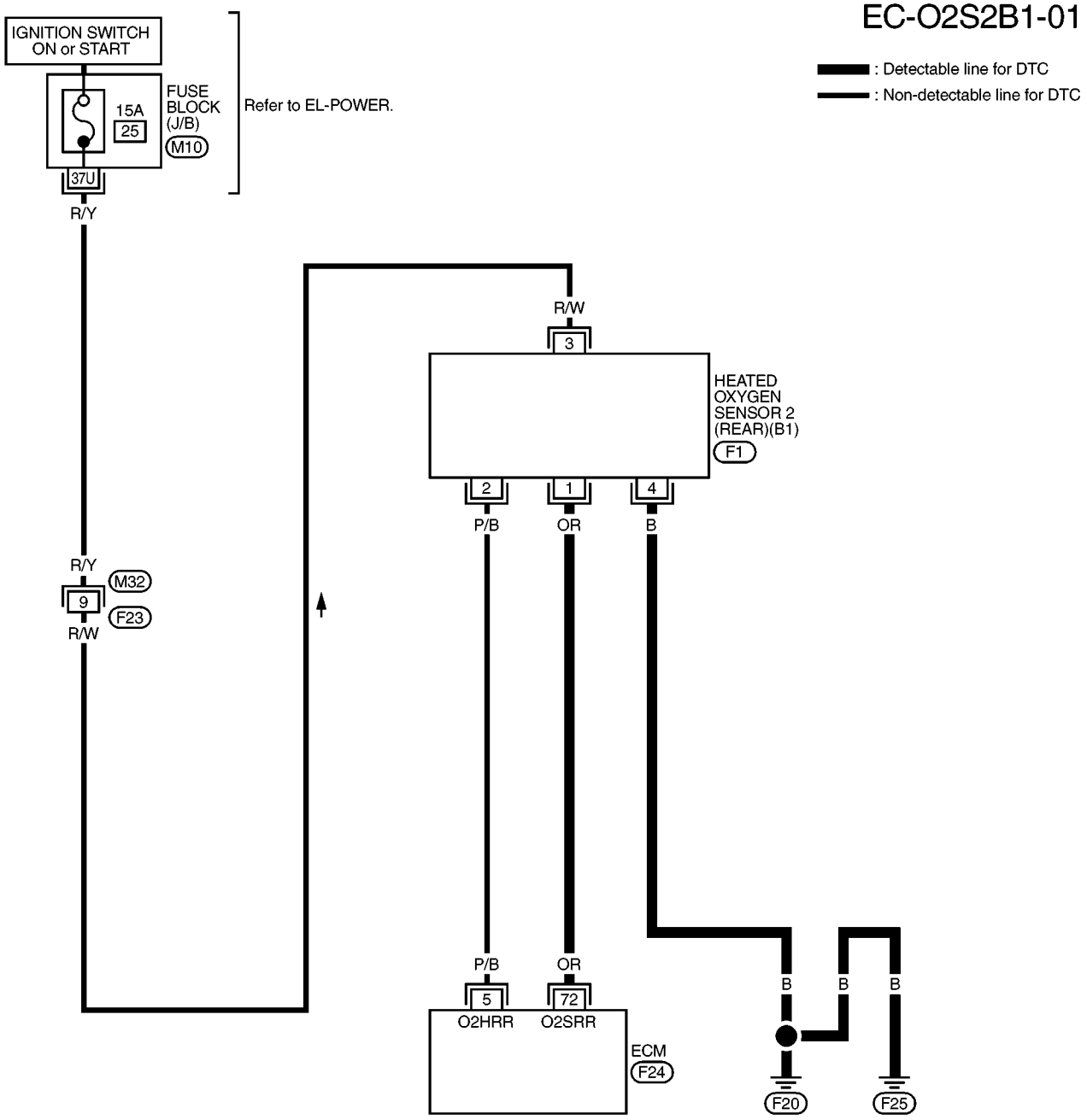
Wiring Diagram

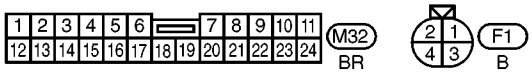
=NAEC0136

NAEC0136S01

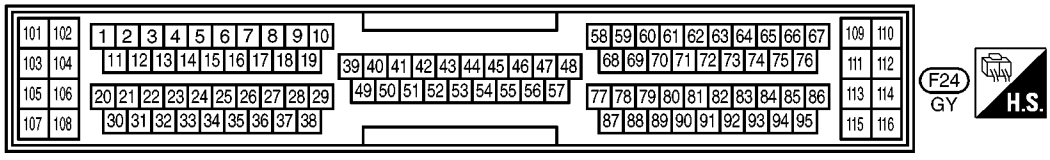
RIGHT BANK

EC-O2S2B1-01





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

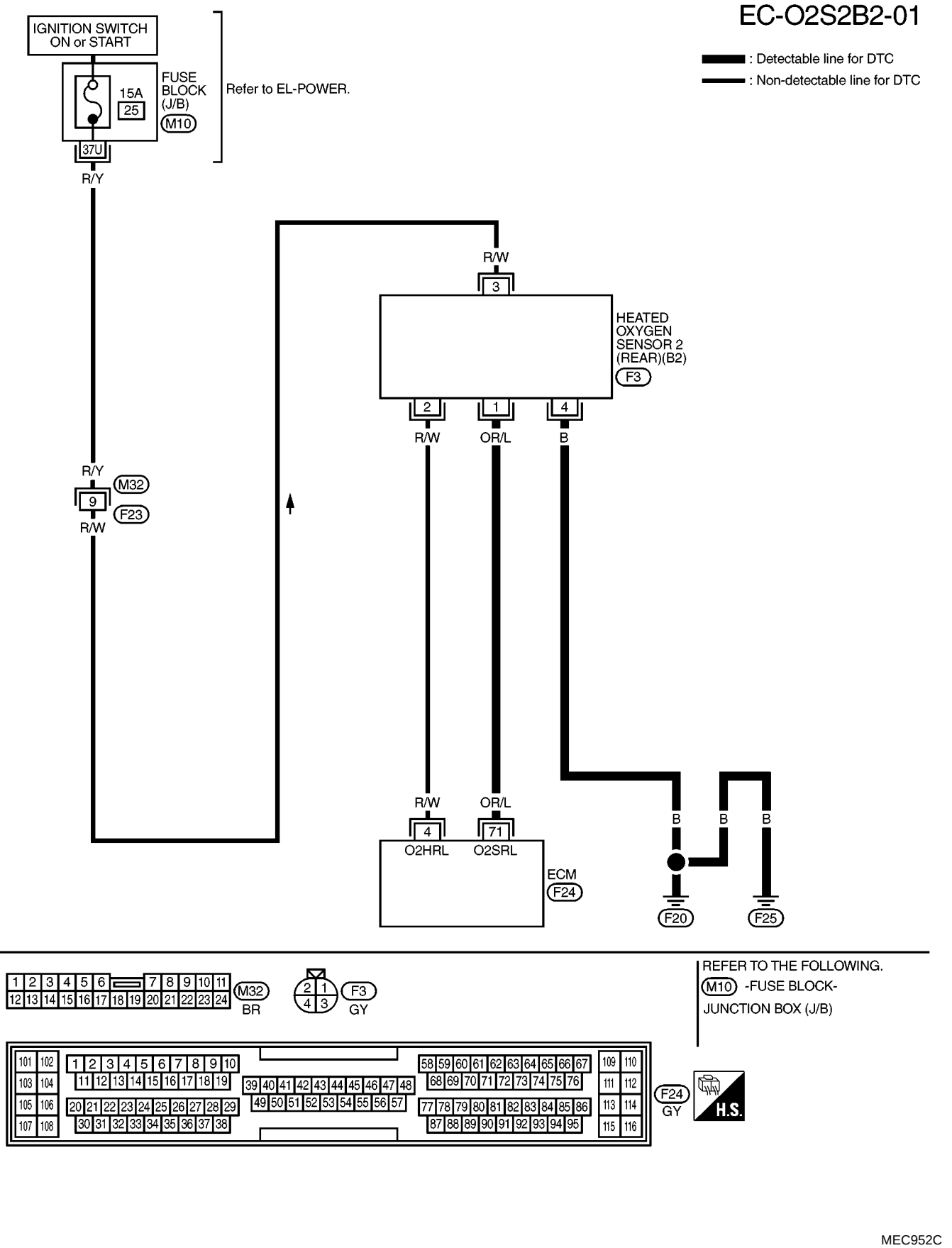


MEC951C

Wiring Diagram (Cont'd)

LEFT BANK

NAEC0136S02



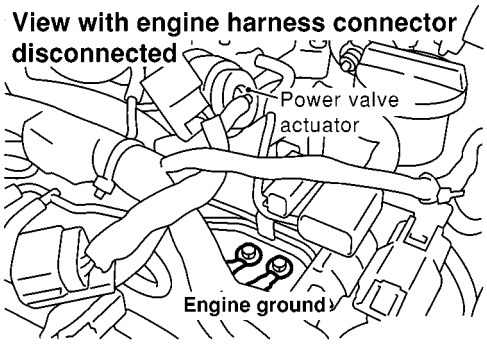
MEC952C

Diagnostic Procedure

NAEC0137

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



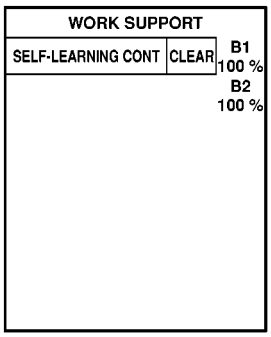
SEF959Y

▶	GO TO 2.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARN CONTROL” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.



SEF968Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-71.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

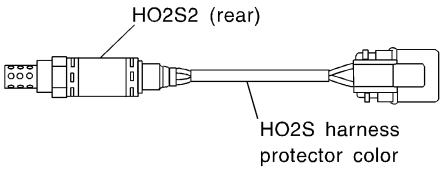
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-297.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3 **CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

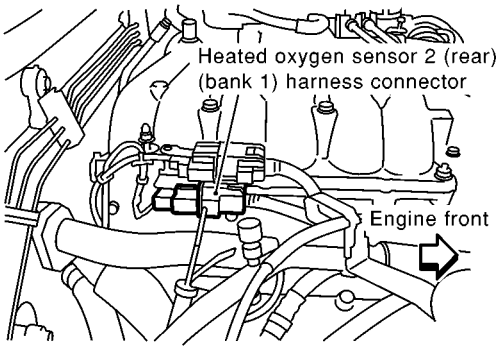
1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 (rear) harness protector color.

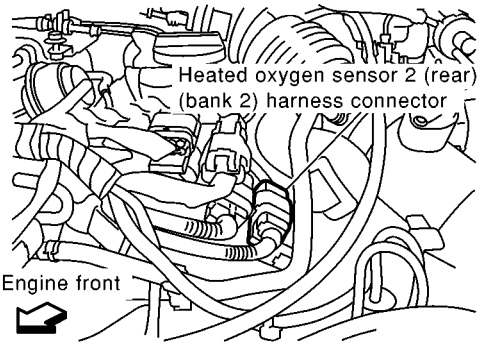


HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.





SEF971Y

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and rear HO2S terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0137	72	1	Bank 1 (Right)
P0157	71	1	Bank 2 (Left)

MTBL0521

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0137	72 or 1	Ground	Bank 1 (Right)
P0157	71 or 1	Ground	Bank 2 (Left)

MTBL0522

Continuity should not exist.

7. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK HO2S2 (REAR) GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 4 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

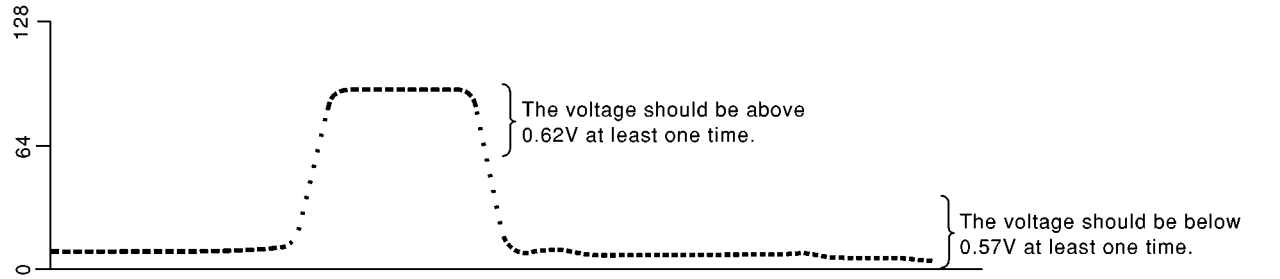
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK HEATED OXYGEN SENSOR 2 (REAR)

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.
4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.

(Reference data)



SEF972Y

"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%.
"HO2S2 (B1)/(B2)" should be below 0.57V at least once when the "FUEL INJECTION" is −25%.

CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

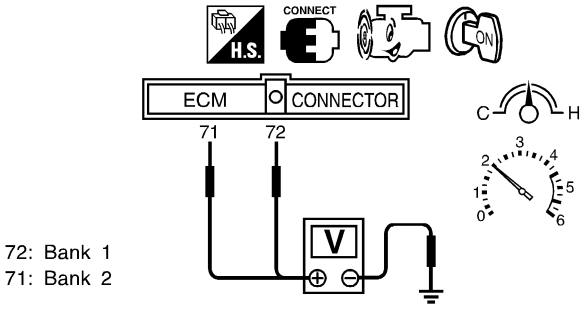
OK	▶	GO TO 9.
NG	▶	GO TO 8.

Diagnostic Procedure (Cont'd)

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)-I

Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 72 (HO2S2 bank 1 right signal) or 71 (HO2S2 bank 2 left signal) and engine ground.
4. Check the voltage when rewing up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)



72: Bank 1
71: Bank 2

The voltage should be above 0.62V at least once during this procedure.

SEF313XA

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 7.

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)-II

Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 6; or check voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "OD" OFF (A/T).

The voltage should go below 0.57V at least once during this procedure.

CAUTION:

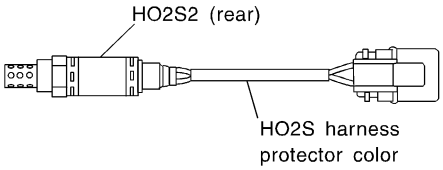
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	REPLACE HEATED OXYGEN SENSOR 2 (REAR)

1. Stop vehicle and turn ignitioin switch OFF.
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

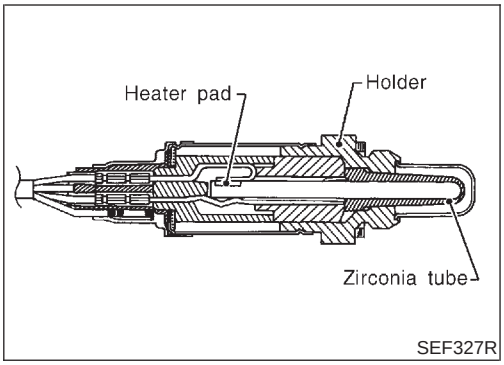
CAUTION:

Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning heated oxygen sensor 2 (rear).

Diagnostic Procedure (Cont'd)

9	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**



Component Description

NAEC0138

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0139

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH

ECM Terminals and Reference Value

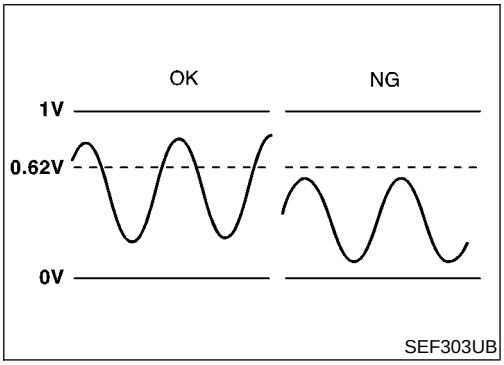
NAEC0659

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
72	OR	Heated oxygen sensor 2 (rear) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V
71	OR/L	Heated oxygen sensor 2 (rear) (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V



On Board Diagnosis Logic

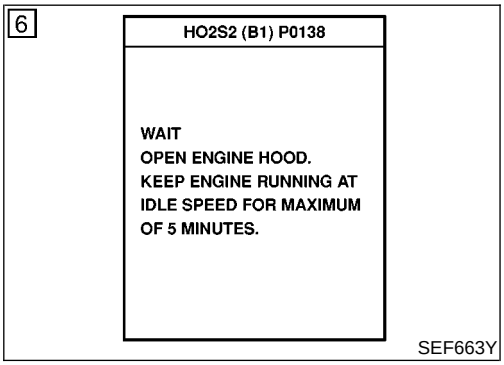
NAEC0141

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.
Malfunction is detected when the maximum voltage from the sensor is not reached to the specified voltage.

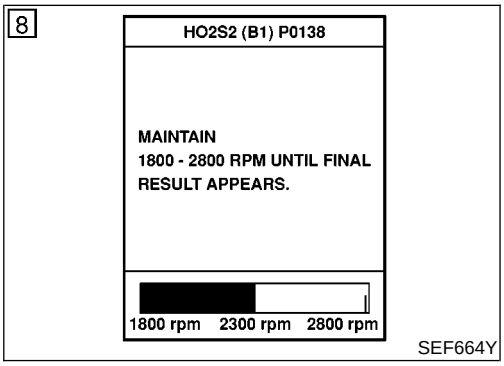
Possible Cause

NAEC0439

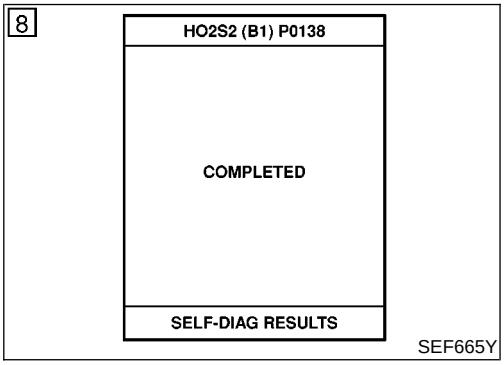
- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)
- Fuel pressure
- Injectors
- Intake air leaks



SEF663Y



SEF664Y



SEF665Y

DTC Confirmation Procedure

NAEC0142

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

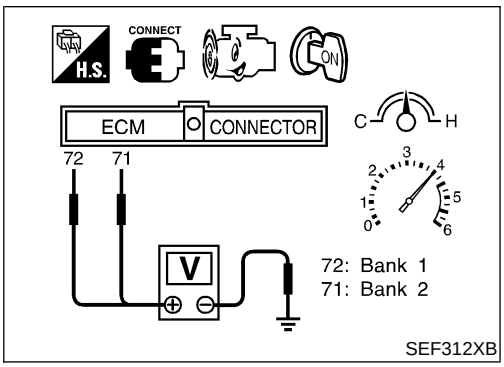
TESTING CONDITION:
Open engine hood before conducting following procedure.

WITH CONSULT-II

NAEC0142S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Turn ignition switch “ON”.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
6) Select “HO2S2 (B1)/(B2) P0138/P0158” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
7) Start engine and follow the instruction of CONSULT-II.
8) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, refer to “Diagnostic Procedure”, EC-257.
   If “CANNOT BE DIAGNOSED” is displayed, perform the following.

a) Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
b) Turn ignition switch “ON”.
c) Select “DATA MONITOR” mode with CONSULT-II.
d) Start engine.
e) Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).



SEF312XB

Overall Function Check

NAEC0143

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NAEC0143S01

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 72 (HO2S2 bank

1 right signal) or 71 (HO2S2 bank 2 left signal) and engine ground.

4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be above 0.62V at least once during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.

5) Keep vehicle at idling for 10 minutes, then check the voltage.
Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "OD" OFF (A/T).
The voltage should be above 0.62V at least once during this procedure.

6) If NG, go to "Diagnostic Procedure", EC-257.

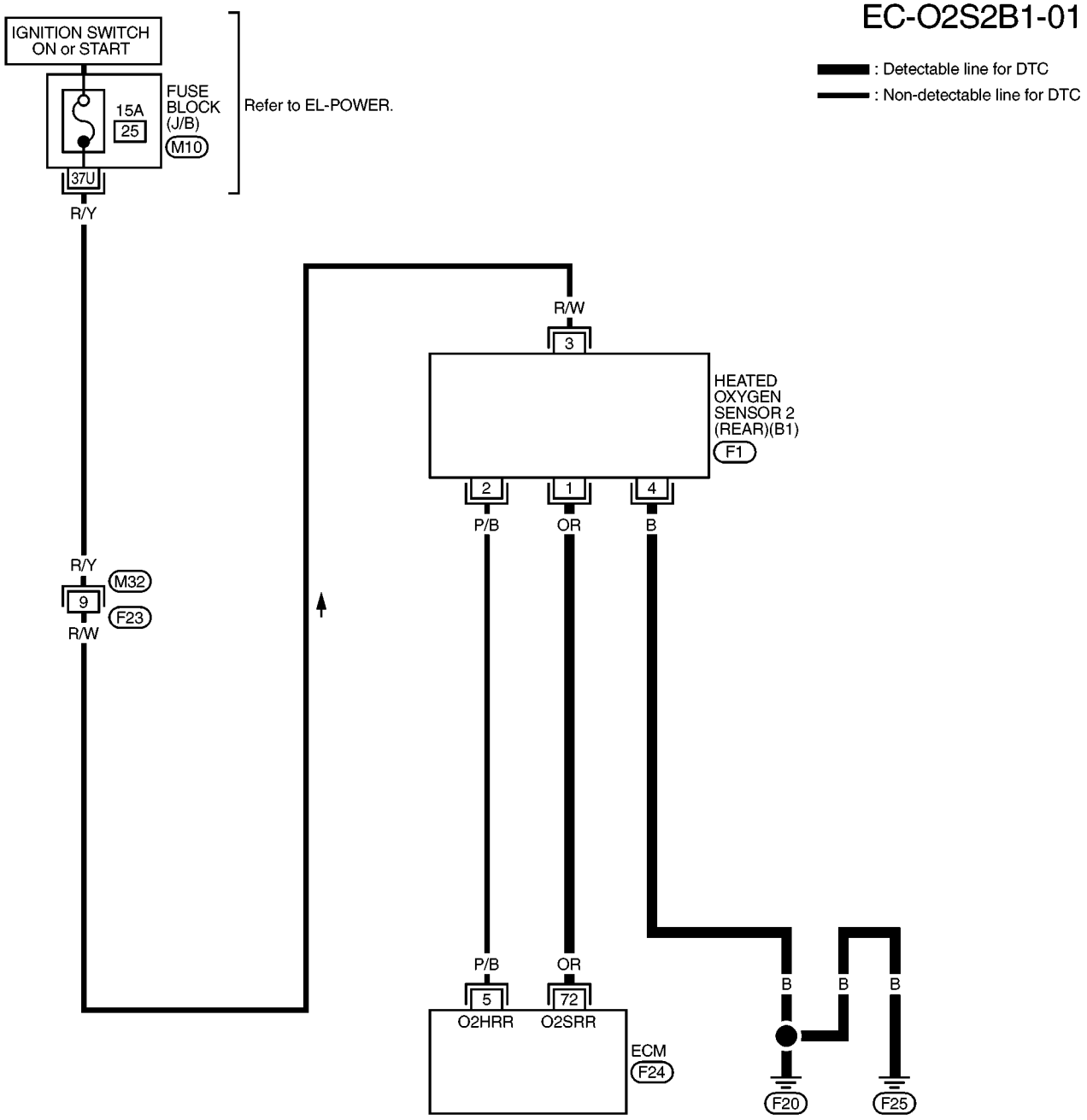
Wiring Diagram

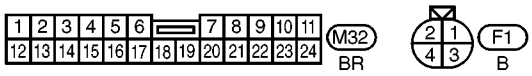
=NAEC0144

NAEC0144S01

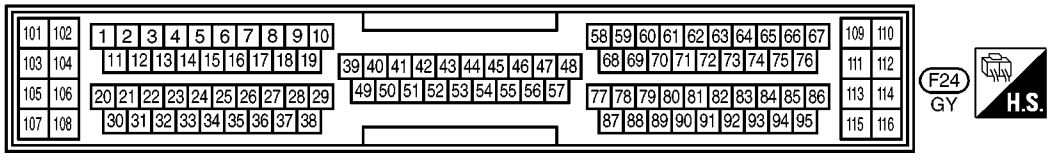
RIGHT BANK

EC-O2S2B1-01





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

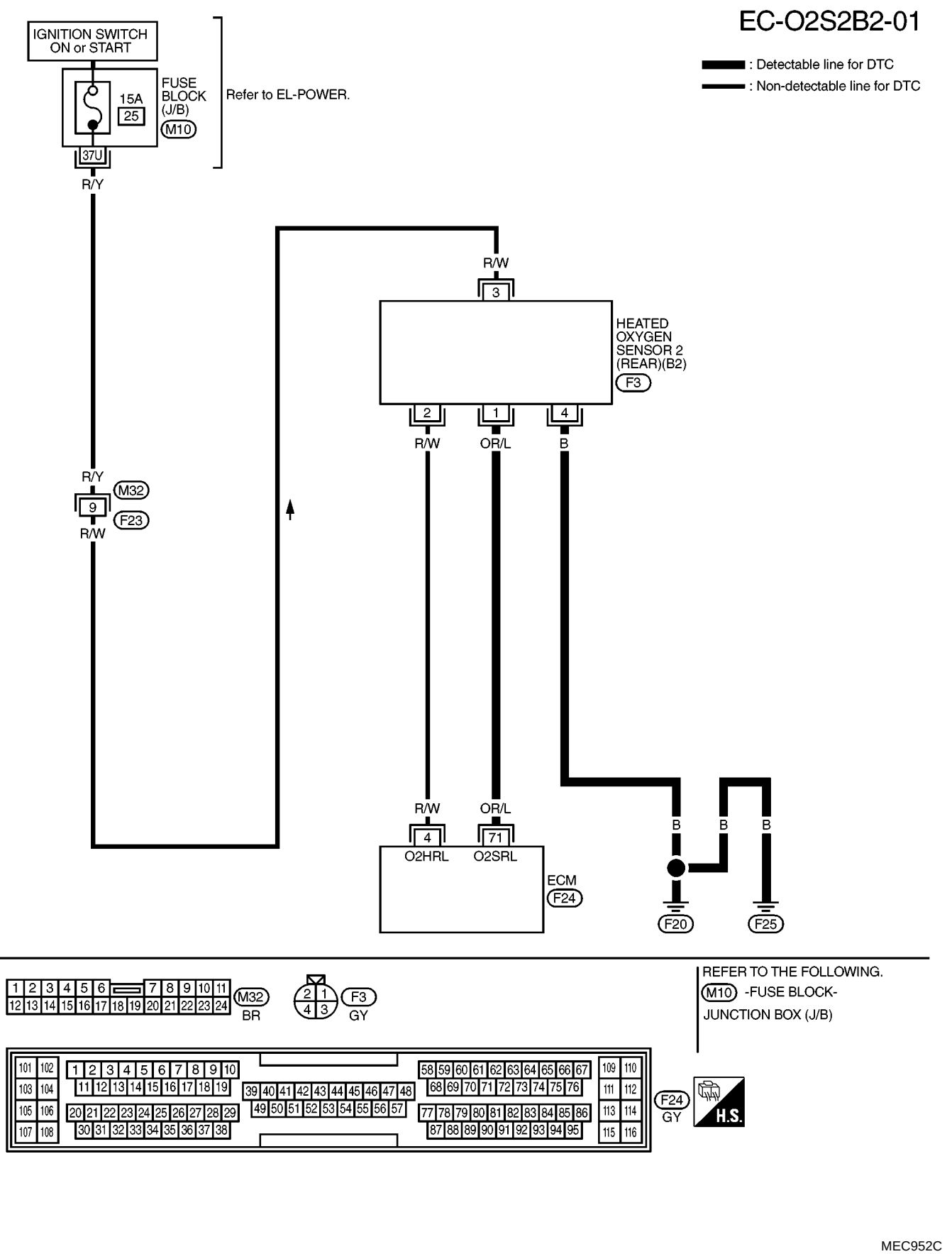


MEC951C

Wiring Diagram (Cont'd)

LEFT BANK

NAEC0144S02



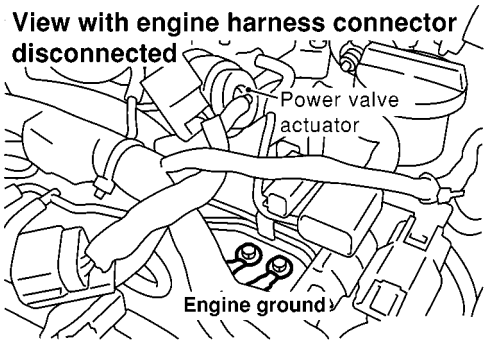
MEC952C

Diagnostic Procedure

NAEC0145

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



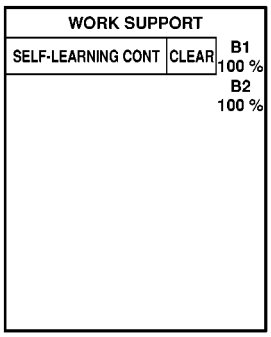
SEF959Y

▶	GO TO 2.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARN CONTROL” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.



SEF968Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-71.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

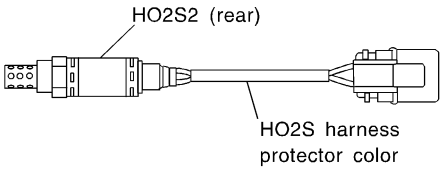
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-289.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3 **CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

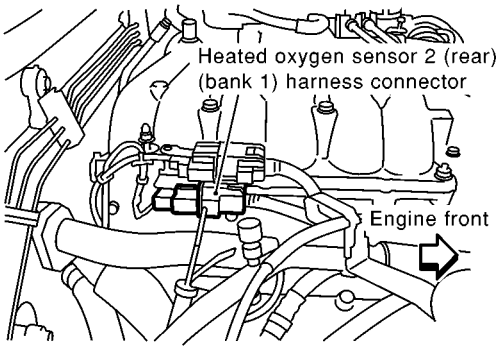
1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 (rear) harness protector color.

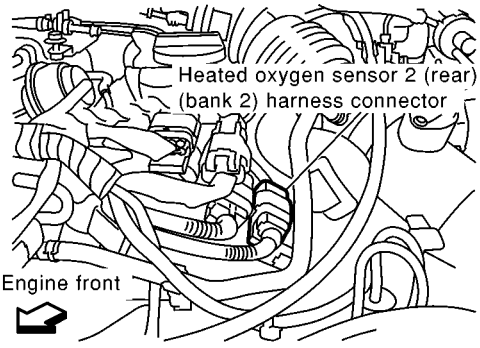


HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.





SEF971Y

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	72	1	Bank 1 (Right)
P0158	71	1	Bank 2 (Left)

MTBL0523

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0138	72 or 1	Ground	Bank 1 (Right)
P0158	71 or 1	Ground	Bank 2 (Left)

MTBL0524

Continuity should not exist.

7. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK HO2S2 (REAR) GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 4 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

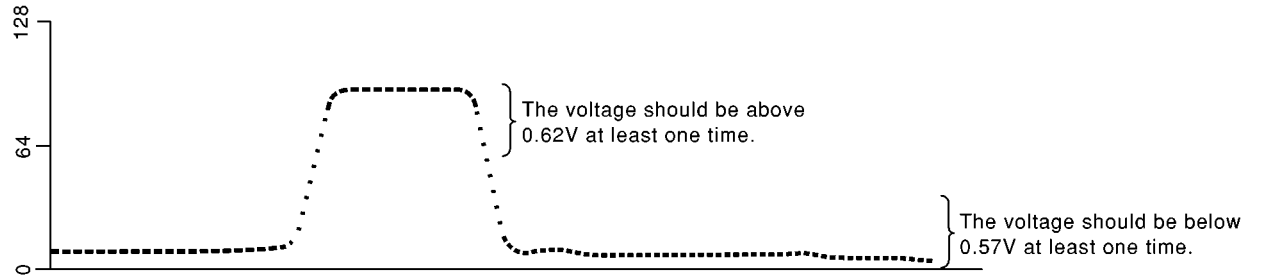
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK HEATED OXYGEN SENSOR 2 (REAR)

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.
4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.

(Reference data)



SEF972Y

"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%.
"HO2S2 (B1)/(B2)" should be below 0.57V at least once when the −25%.

CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

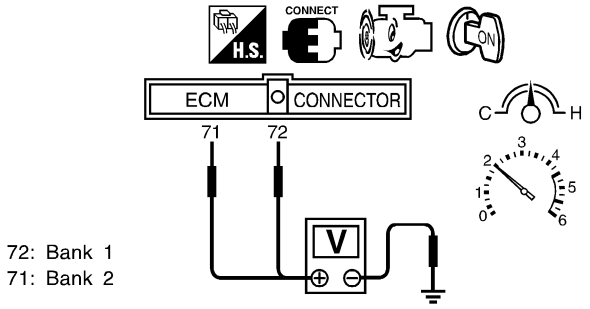
OK	▶	GO TO 9.
NG	▶	GO TO 8.

Diagnostic Procedure (Cont'd)

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)-I

Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 72 (HO2S2 bank 1 right signal) or 71 (HO2S bank 2 left signal) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)



72: Bank 1
71: Bank 2

The voltage should be above 0.62V at least once during this procedure.

SEF313XA

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 7.

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)-II

Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 6; or check voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "OD" OFF (A/T).

The voltage should go below 0.57V at least once during this procedure.

CAUTION:

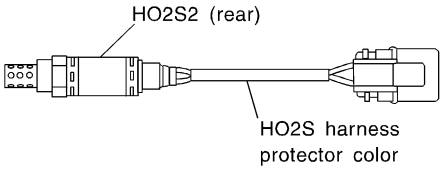
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	REPLACE HEATED OXYGEN SENSOR 2 (REAR)

1. Stop vehicle and turn ignition switch "OFF".
2. Check rear heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

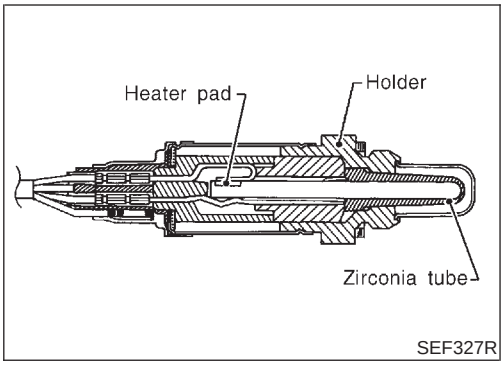
CAUTION:

Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning heated oxygen sensor 2 (rear).

Diagnostic Procedure (Cont'd)

9	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**



Component Description

NAEC0146

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0147

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH

ECM Terminals and Reference Value

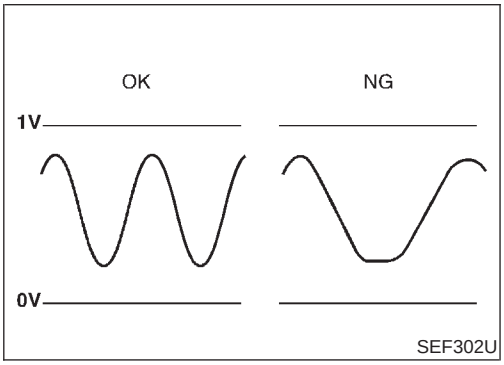
NAEC0660

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
72	OR	Heated oxygen sensor 2 (rear) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V
71	OR/L	Heated oxygen sensor 2 (rear) (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V



On Board Diagnosis Logic

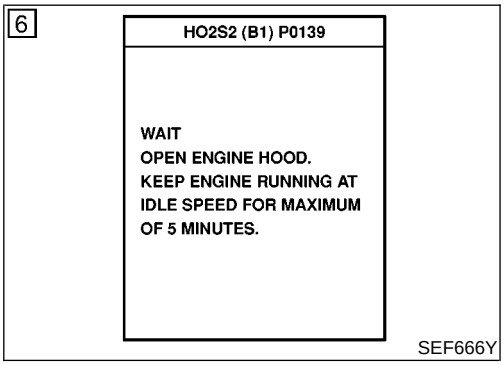
NAEC0149

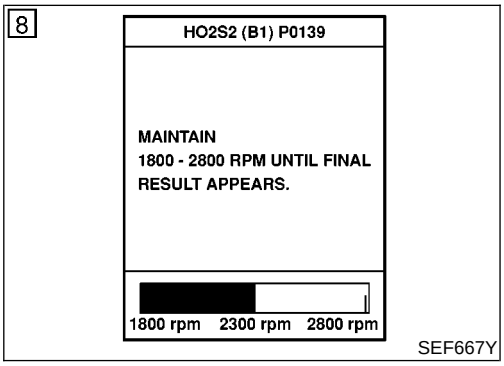
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.
Malfunction is detected when it takes more time for the sensor to respond between rich and lean than the specified time.

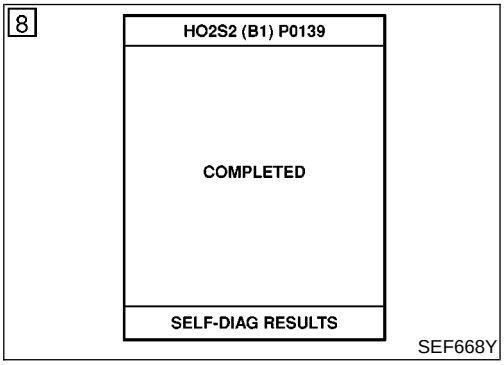
Possible Cause

NAEC0440

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)
- Fuel pressure
- Injectors
- Intake air leaks







DTC Confirmation Procedure

NAEC0150

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

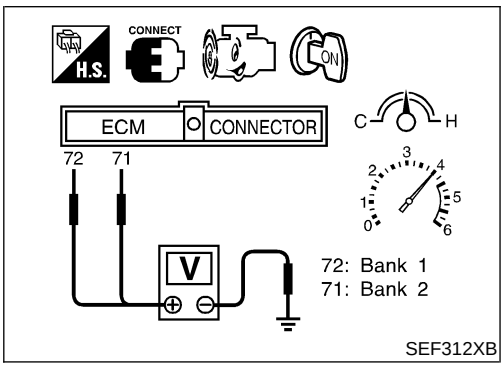
TESTING CONDITION:
Open engine hood before conducting following procedure.

WITH CONSULT-II

NAEC0150S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Turn ignition switch “ON”.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
6) Select “HO2S2 (B1)/(B2) P0139/P0159” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
7) Start engine and follow the instruction of CONSULT-II.
8) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, refer to “Diagnostic Procedure”, EC-267.
   If “CANNOT BE DIAGNOSED” is displayed, perform the following.

a) Stop engine and cool down until “COOLAN TEMP/S” indicates less than 70°C (158°F).
b) Turn ignition switch “ON”.
c) Select “DATA MONITOR” mode with CONSULT-II.
d) Start engine.
e) Return to step 6 again when the “COOLAN TEMP/S” reaches to 70°C (158°F).



Overall Function Check

NAEC0151

Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NAEC0151S01

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 72 (HO2S2 bank

1 right signal) or 71 (HO2S2 bank 2 left signal) and engine ground.

4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should change at more than 0.06V for 1 second during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.

5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "OD" OFF (A/T).
The voltage should change at more than 0.06V for 1 second during this procedure.

6) If NG, go to "Diagnostic Procedure", EC-267.

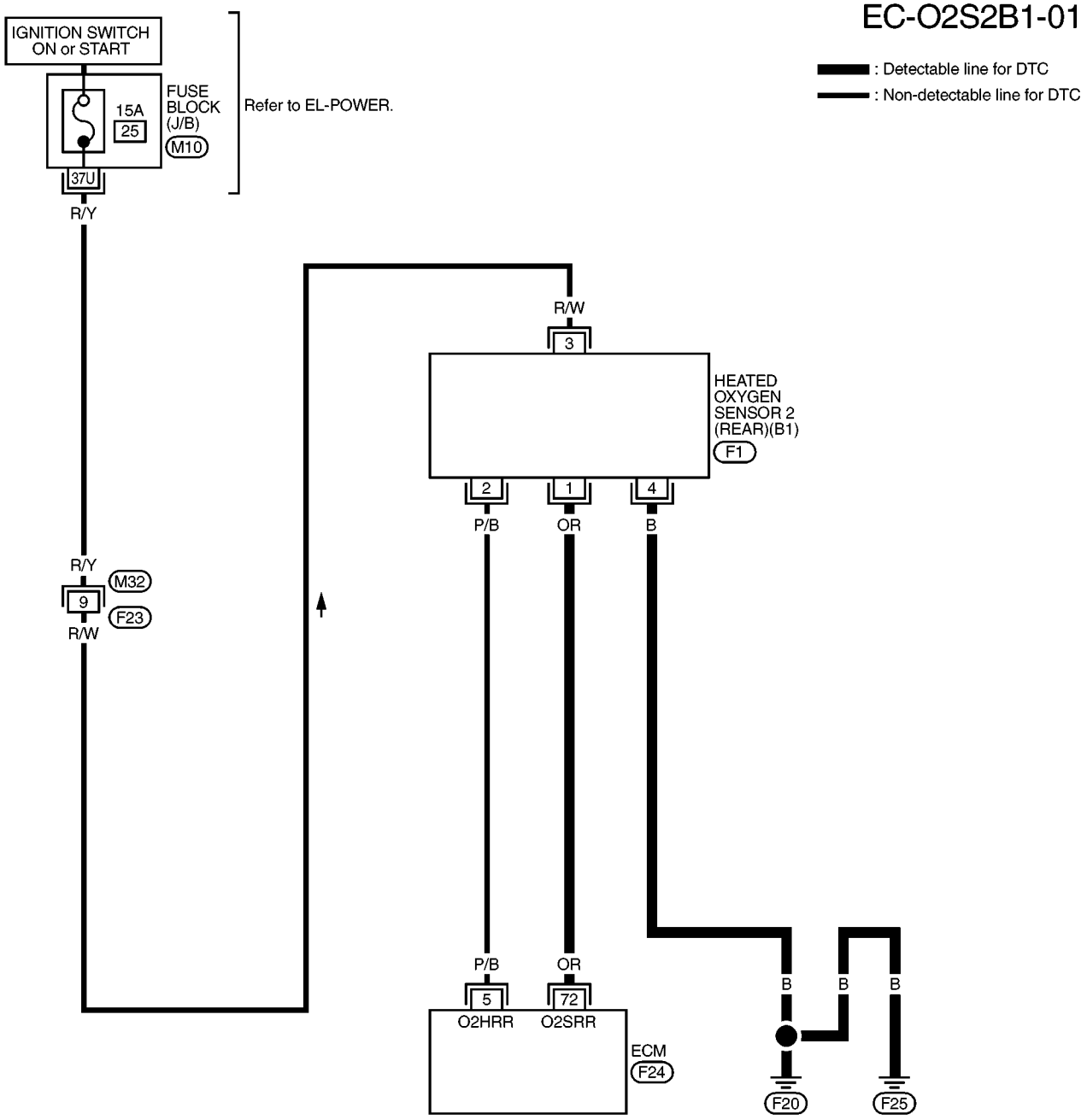
Wiring Diagram

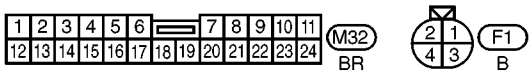
=NAEC0152

NAEC0152S01

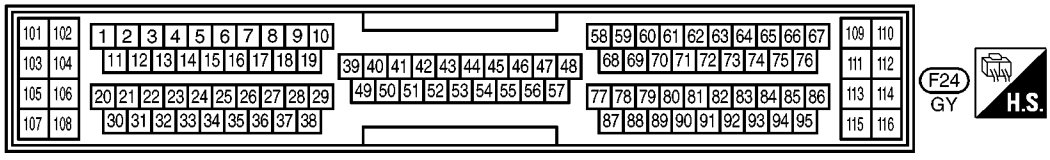
RIGHT BANK

EC-O2S2B1-01





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

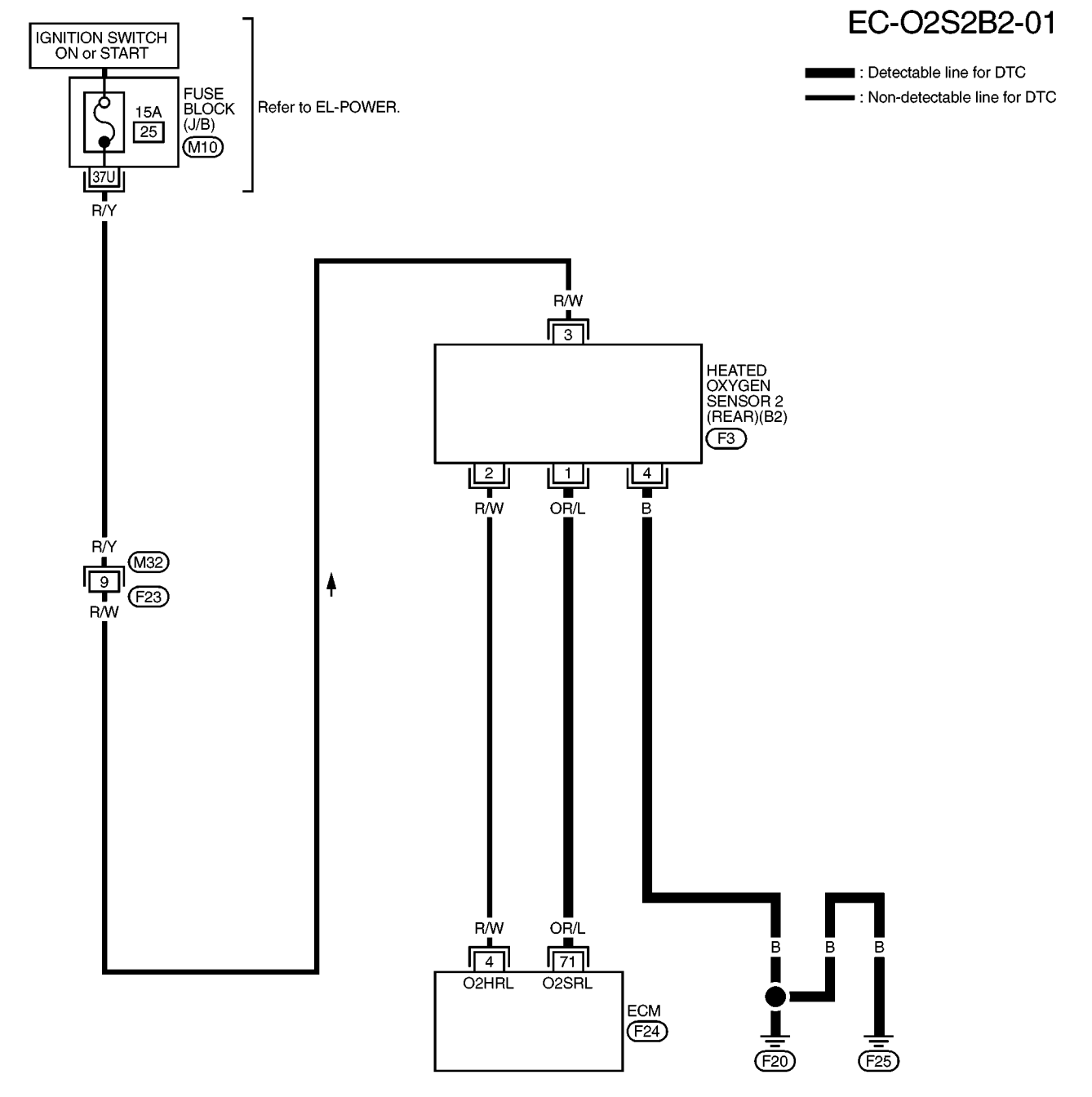


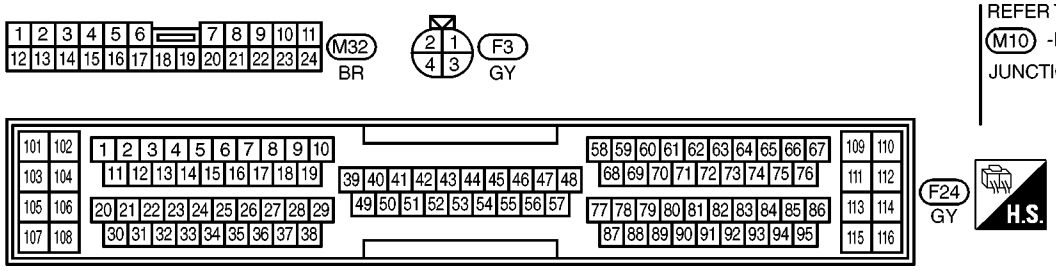
MEC951C

Wiring Diagram (Cont'd)

LEFT BANK

NAEC0152S02





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

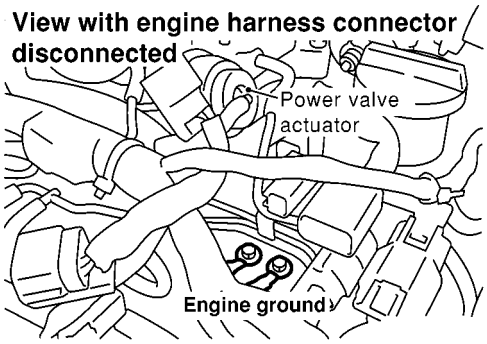
MEC952C

Diagnostic Procedure

NAEC0153

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



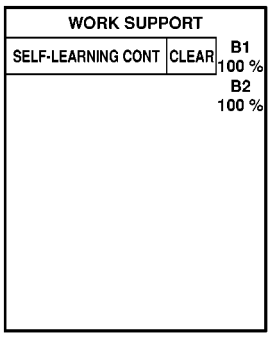
SEF959Y

▶	GO TO 2.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARN CONTROL” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.



SEF968Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC No. 0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-71.
7. Make sure DTC No. 0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

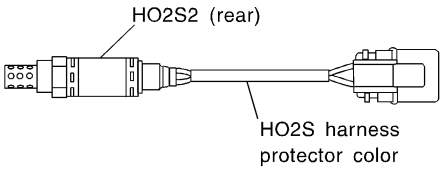
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-289, 297.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

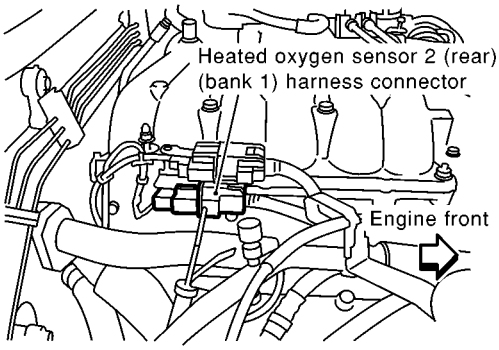
1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 (rear) harness protector color.

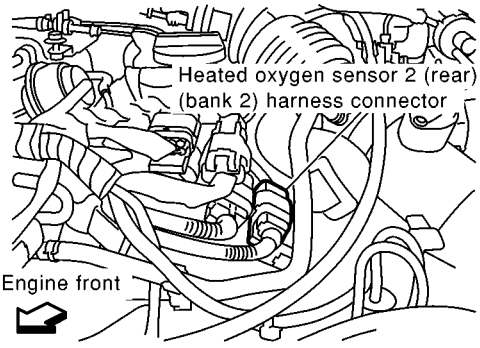


HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.





SEF971Y

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	72	1	Bank 1 (Right)
P0159	71	1	Bank 2 (Left)

MTBL0525

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0139	72 or 1	Ground	Bank 1(Right)
P0159	71 or 1	Ground	Bank 2 (Left)

MTBL0526

Continuity should not exist.

7. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK HO2S2 (REAR) GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 4 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

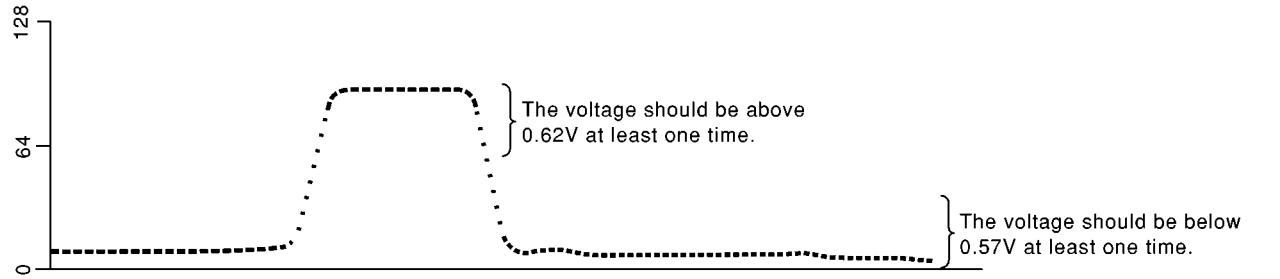
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors

5	CHECK REAR HEATED OXYGEN SENSOR

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.
4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.

(Reference data)



SEF972Y

"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%.
"HO2S2 (B1)/(B2)" should be below 0.57V at least once when the "FUEL INJECTION" is −25%.

CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

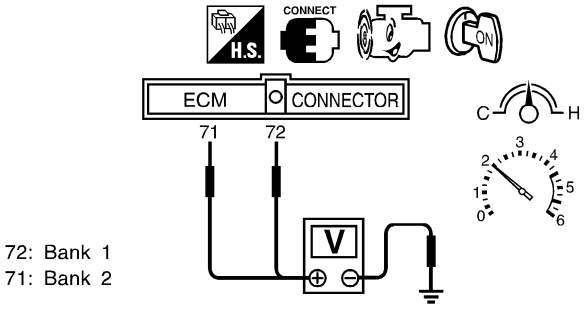
OK	▶	GO TO 9.
NG	▶	GO TO 8.

Diagnostic Procedure (Cont'd)

6	CHECK REAR HEATED OXYGEN SENSOR 2 (REAR)-I

Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 72 (HO2S2 bank 1 right signal) or 71 (HO2S2 bank 2 left signal) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)



72: Bank 1
71: Bank 2

The voltage should be above 0.62V at least once during this procedure.

SEF313XA

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 7.

7	CHECK REAR HEATED OXYGEN SENSOR 2 (REAR)-II

Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 6; or check voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "OD" OFF (A/T).

The voltage should go below 0.57V at least once during this procedure.

CAUTION:

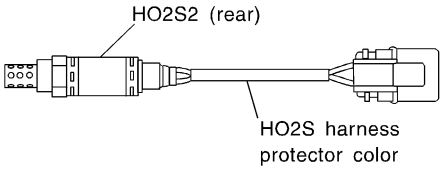
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	REPLACE REAR HEATED OXYGEN SENSOR

1. Stop vehicle and turn ignition switch "OFF".
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

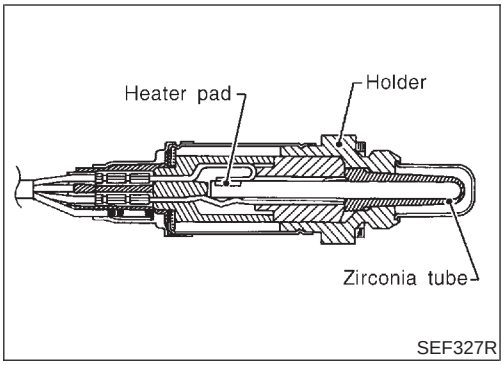
CAUTION:

Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning heated oxygen sensor 2 (rear).

Diagnostic Procedure (Cont'd)

9	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**



Component Description

NAEC0154

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 (front) are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2 (rear).
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 (rear) is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0155

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH

ECM Terminals and Reference Value

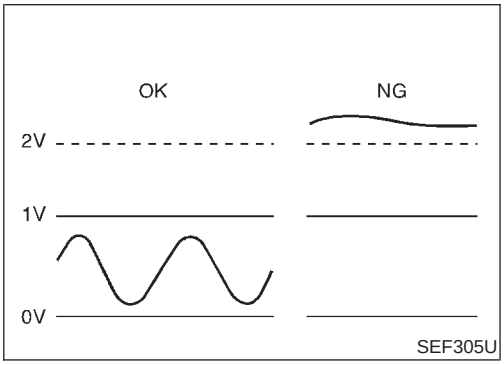
NAEC0661

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
72	OR	Heated oxygen sensor 2 (rear) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V
71	OR/L	Heated oxygen sensor 2 (rear) (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V



On Board Diagnosis Logic

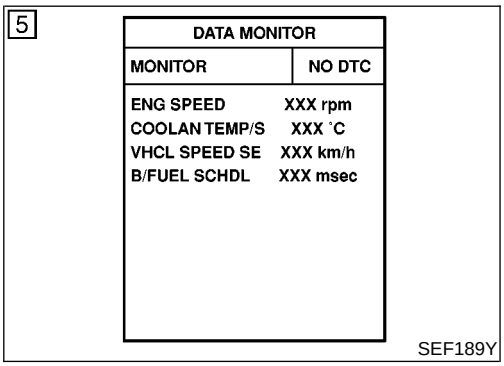
NAEC0157

The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.
Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.

Possible Cause

NAEC0441

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)



DTC Confirmation Procedure

NAEC0158

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

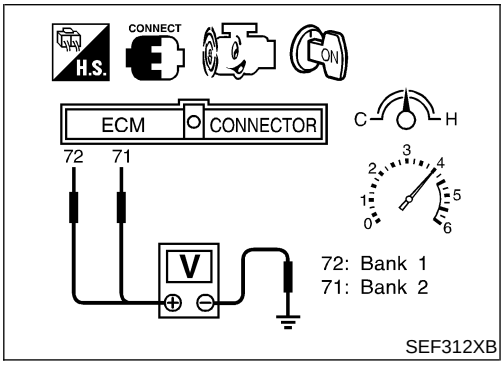
WITH CONSULT-II

NAEC0158S01

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3) Stop vehicle with engine running.
4) Let engine idle for 1 minute.
5) Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	1,300 - 3,100 rpm
VHCL SPEED SE	64 - 130 km/h (40 - 80 MPH)
B/FUEL SCHDL	0.5 - 6.4 msec
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-277.



Overall Function Check

NAEC0159

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NAEC0159S01

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 72 (HO2S2 bank

1 right signal) or 71 (HO2S2 bank 2 left signal) and engine ground.

4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be below 2V during this procedure.

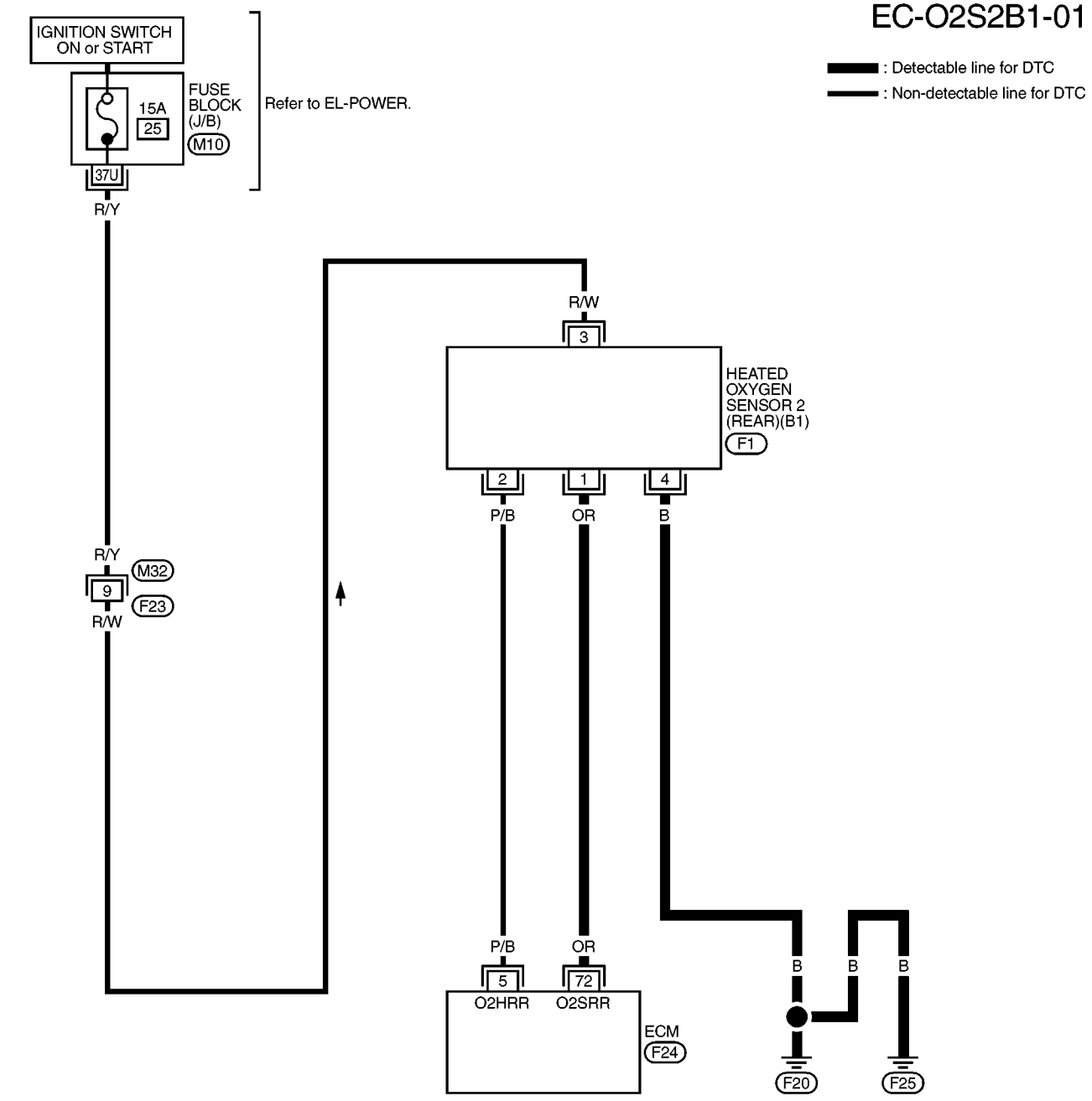
5) If NG, go to "Diagnostic Procedure", EC-277.

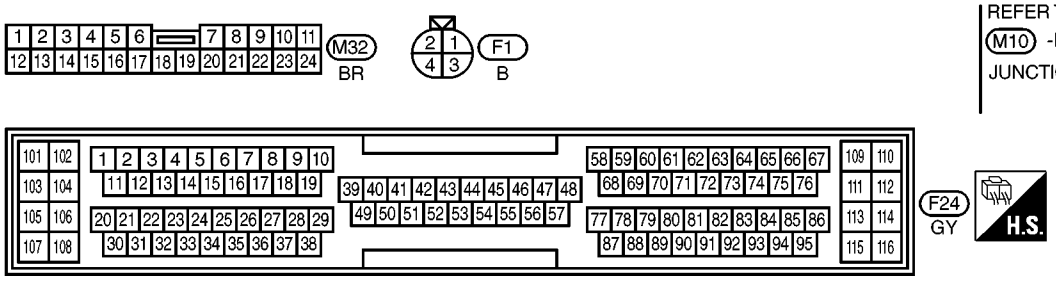
Wiring Diagram

NAEC0160

RIGHT BANK

NAEC0160S01





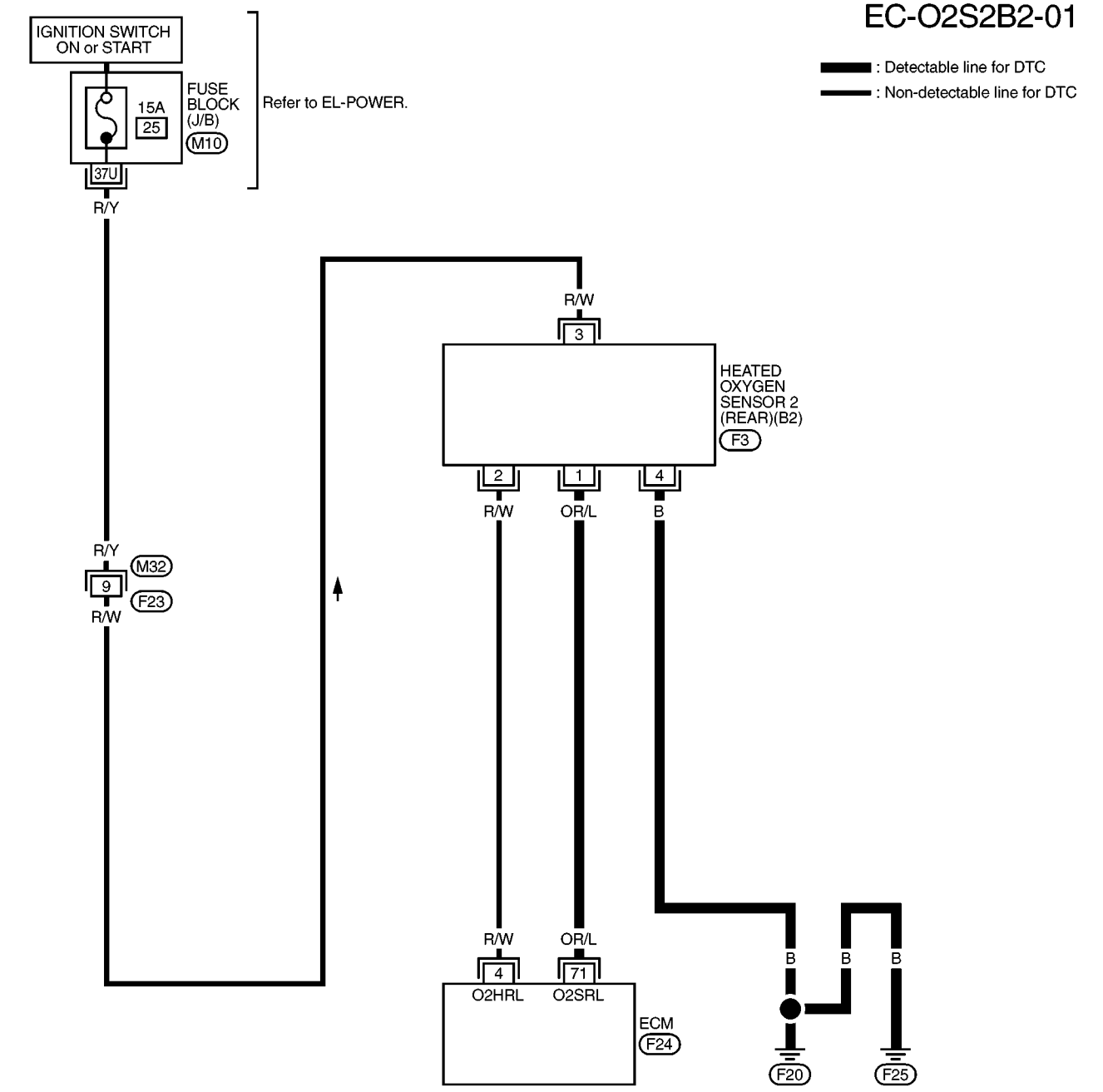
REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

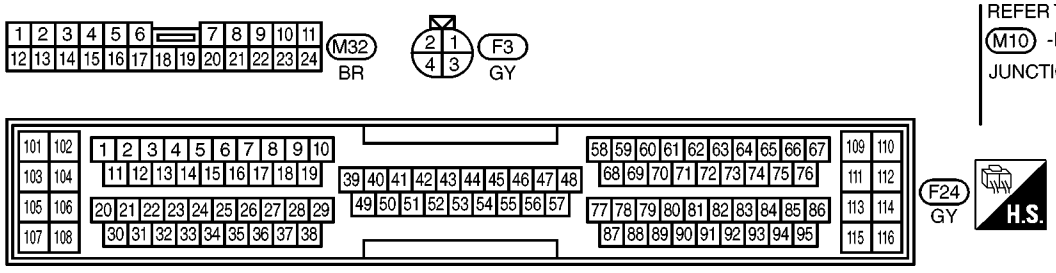
MEC951C

Wiring Diagram (Cont'd)

LEFT BANK

NAEC0160S02





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

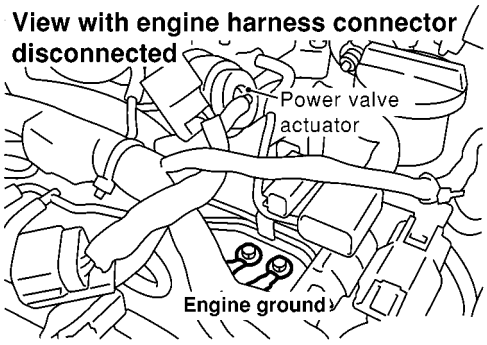
MEC952C

Diagnostic Procedure

NAEC0161

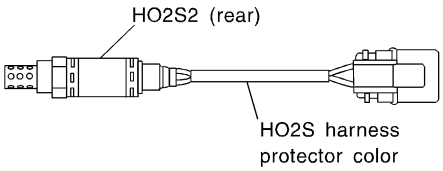
1	INSPECTION START

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.



SEF959Y

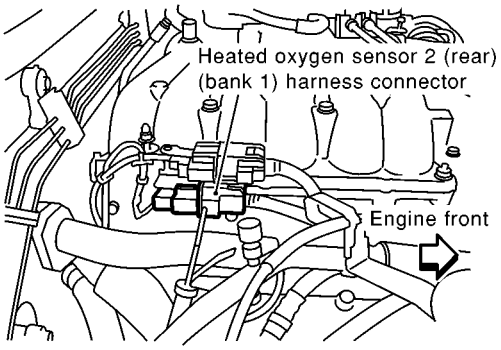
3. Check heated oxygen sensor 2 (rear) harness protector color.

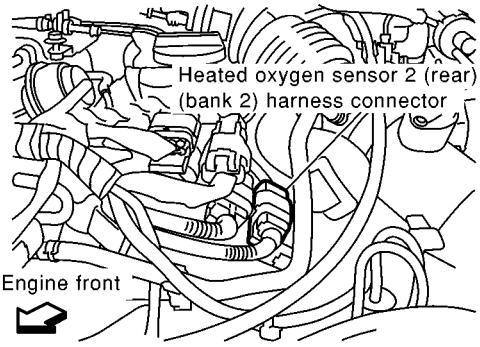


HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

4. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.





SEF971Y

5. Disconnect ECM harness connector.

▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0140	72	1	Bank 1 (Right)
P0160	71	1	Bank 2 (Left)

MTBL0527

Continuity should exist.

2. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0140	72 or 1	Ground	Bank 1 (Right)
P0160	71 or 1	Ground	Bank 2 (Left)

MTBL0528

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK HO2S2 (REAR) GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK HO2S2 (REAR) CONNECTORS FOR WATER

Check heated oxygen sensor connector 2 (rear) and harness connector for water.
Water should not exist.

OK or NG

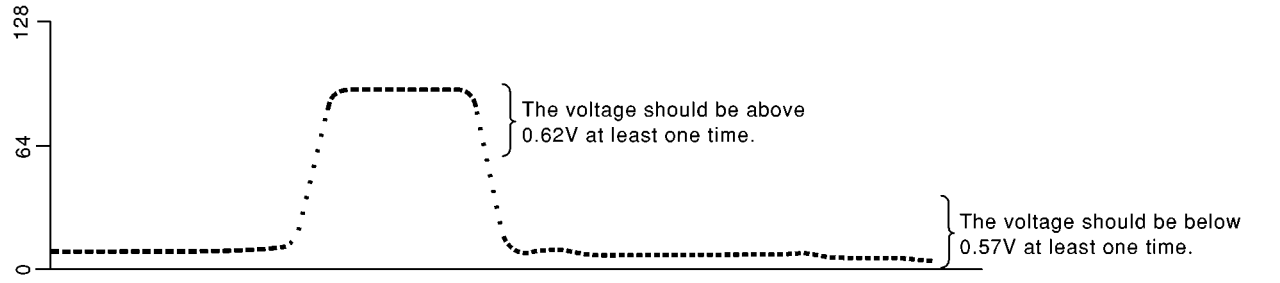
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair or replace harness or connectors.

5	CHECK HEATED OXYGEN SENSOR 2 (REAR)

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.
4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.

(Reference data)



SEF972Y

"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%.
"HO2S2 (B1)/(B2)" should be below 0.57V at least once when the "FUEL INJECTION" is −25%.

CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

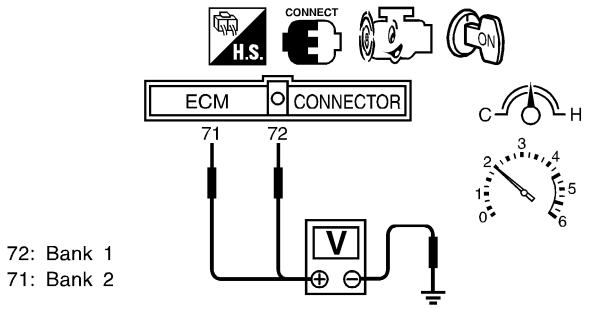
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)-I

Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 72 (HO2S2 bank 1 right signal) or 71 (HO2S2 bank 2 left signal) and engine ground.
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)



The voltage should be above 0.62V at least once during this procedure.

SEF313XA

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 7.

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)-II

Idle vehicle for 10 minutes, then check voltage between the same terminals as in Test No. 6; or check voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "OD" OFF (A/T).

The voltage should go below 0.57V at least once during this procedure.

CAUTION:

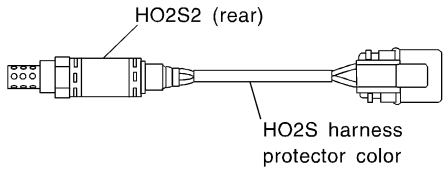
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	REPLACE HEATED OXYGEN SENSOR 2 (REAR)

1. Stop vehicle and turn ignition switch "OFF".
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

CAUTION:

Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning heated oxygen sensor 2 (rear).

9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.

	▶	**INSPECTION END**

Description

NAEC0162

SYSTEM DESCRIPTION

NAEC0162S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor heater 2 (rear) control	Heated oxygen sensor 2 heaters (rear)
Crankshaft position sensor (REF)			

The ECM performs ON/OFF control of the heated oxygen sensor 2 heaters (rear) corresponding to the engine speed.

OPERATION

NAEC0162S02

Engine speed rpm	Heated oxygen sensor 2 heaters (rear)
Above 3,200	OFF
Below 3,200	ON

CONSULT-II Reference Value in Data Monitor Mode

NAEC0163

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	• Ignition switch: ON (Engine stopped) • Engine is running above 3,200 rpm.	OFF
	• Engine is running below 3,200 rpm after driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	ON

ECM Terminals and Reference Value

NAEC0662

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	P/B	Heated oxygen sensor 2 heater (rear) (bank 1)	**[Engine is running]** • Engine speed is below 3,200 rpm. • After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	0 - 1.0V
			[Ignition switch "ON"] • Engine stopped **[Engine is running]** • Engine speed is above 3,200 rpm.	BATTERY VOLTAGE (11 - 14V)
4	R/W	Heated oxygen sensor 2 heater (rear) (bank 2)	**[Engine is running]** • Engine speed is below 3,200 rpm. • After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	0 - 1.0V
			[Ignition switch "ON"] • Engine stopped **[Engine is running]** • Engine speed is above 3,200 rpm.	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

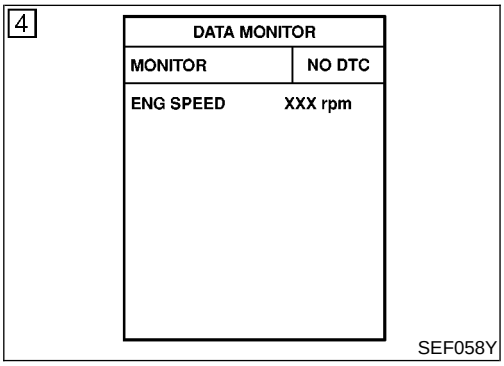
NAEC0165

Malfunction is detected when the current amperage in the heated oxygen sensor 2 heater (rear) circuit is out of the normal range. [An improper voltage drop signal is sent to ECM through the heated oxygen sensor 2 heater (rear).]

Possible Cause

NAEC0442

- Harness or connectors
  [The heated oxygen sensor 2 heater (rear) circuit is open or shorted.]
- Heated oxygen sensor 2 heater (rear)



DTC Confirmation Procedure

NAEC0166

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

WITH CONSULT-II

NAEC0166S01

1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine.
3) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
4) Stop vehicle and let engine idle for at least 6 seconds.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-286.

WITH GST

NAEC0166S02

1) Start engine.
2) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3) Stop vehicle and let engine idle for at least 6 seconds.
4) Turn ignition switch “OFF” and wait at least 10 seconds.
5) Start engine.
6) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
7) Stop vehicle and let engine idle for at least 6 seconds.
8) Select “MODE 3” with GST.
9) If DTC is detected, go to “Diagnostic Procedure”, EC-286.

- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II**

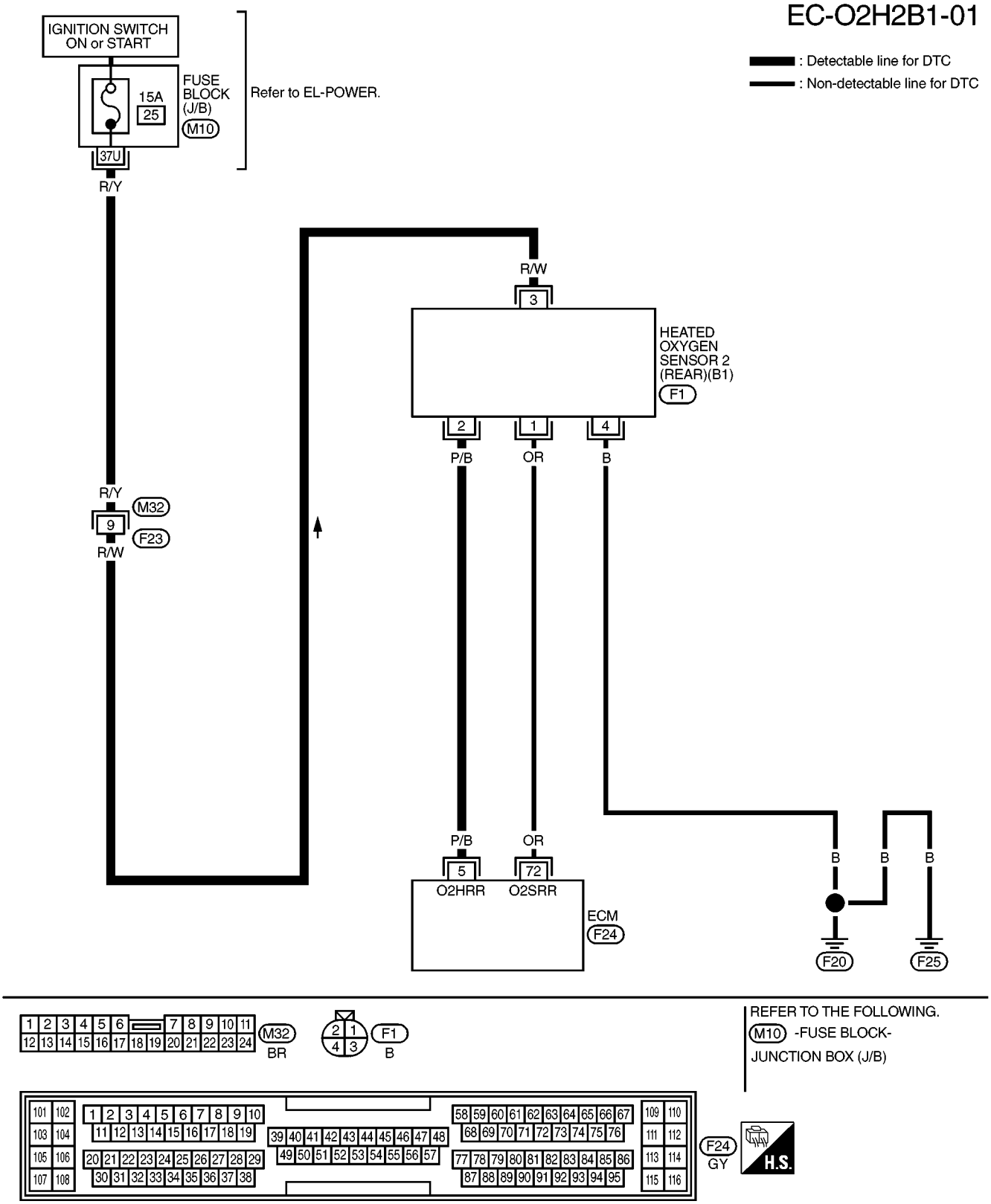
because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.

Wiring Diagram

NAEC0167

NAEC0167S01

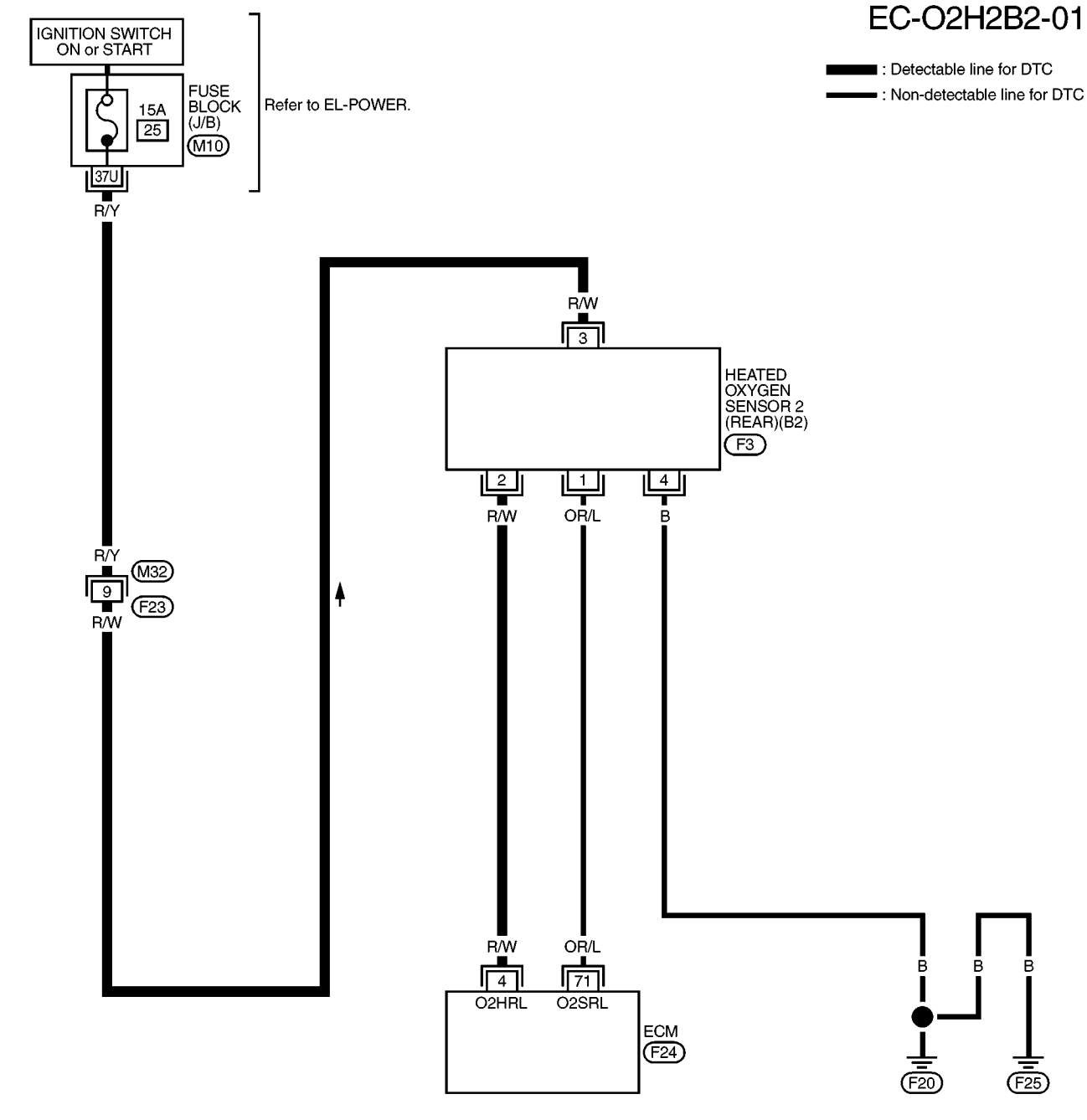
RIGHT BANK

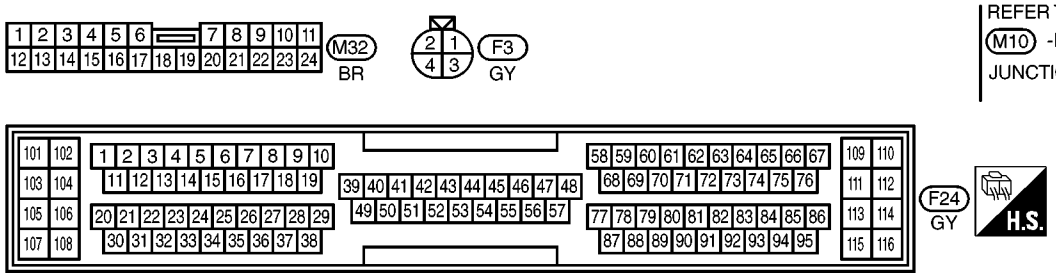


MEC953C

LEFT BANK

NAEC0167S02





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

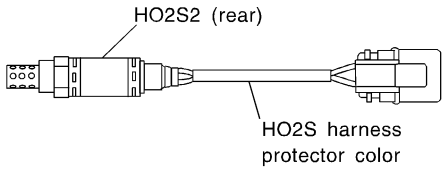
MEC954C

Diagnostic Procedure

NAEC0168

1	CHECK HO2S2 (REAR) POWER SUPPLY CIRCUIT

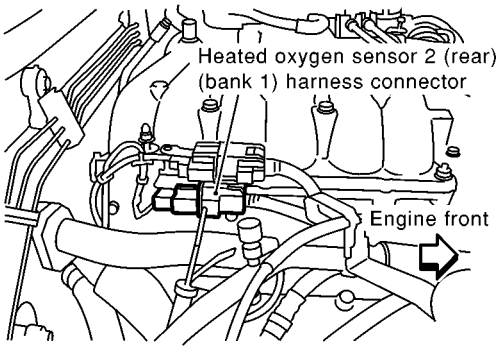
1. Turn ignition switch “OFF”.
2. Check heated oxygen sensor harness 2 (rear) protector color.

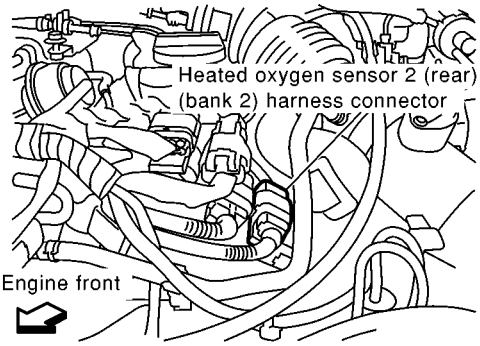


HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

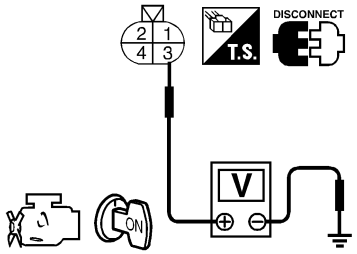
3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.





SEF971Y

4. Turn ignition switch “ON”.
5. Check voltage between HO2S2 terminal 3 and ground.



Voltage: Battery voltage

SEF314X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M32, F23
- Fuse block (J/B) connector M10
- 15A fuse
- Harness for open or short between heated oxygen sensor 2 (rear) and fuse

	▶	Repair harness or connectors.

3	CHECK HO2S2 (REAR) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0141	5	2	Bank 1 (Right)
P0161	4	2	Bank 2 (Left)

MTBL0529

Continuity should exist.

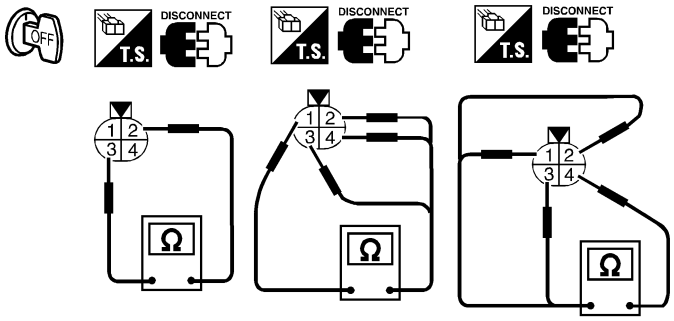
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK HEATED OXYGEN SENSOR 2 HEATER (REAR)

Check the resistance between HO2S2 terminals as follows.



Terminal No.	Resistance
2 and 3	2.3 - 4.3Ω at 25°C (77°F)
1 and 2, 3, 4	∞ Ω (Continuity should not exist.)
4 and 1, 2, 3	

SEF315X

CAUTION:

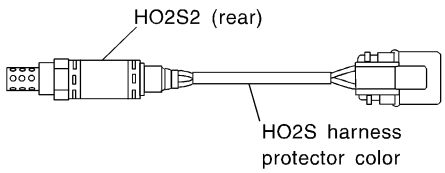
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	REPLACE HEATED OXYGEN SENSOR 2 (REAR)

Check rear heated oxygen sensor harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

CAUTION:

Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning heated oxygen sensor 2 (rear).

Diagnostic Procedure (Cont'd)

6	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NAEC0169

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1 (front). The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

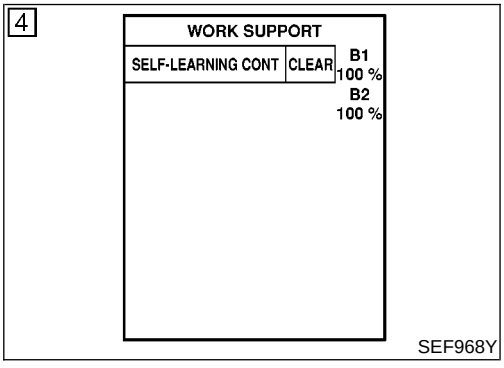
Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)

Possible Cause

NAEC0487

- Intake air leaks
- Heated oxygen sensor 1 (front)
- Injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Mass air flow sensor



DTC Confirmation Procedure

NAEC0170

NOTE:

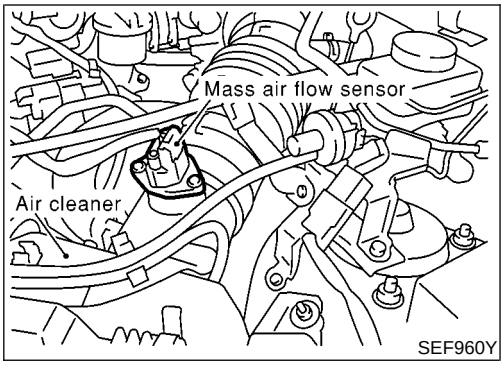
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NAEC0170S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Turn ignition switch “ON” and select “SELF-LEARN CONTROL” in “WORK SUPPORT” mode with CONSULT-II.
4) Clear the self-learning control coefficient by touching “CLEAR”.
5) Select “DATA MONITOR” mode with CONSULT-II.
6) Start engine again and let it idle for at least 10 minutes. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to “Diagnostic Procedure”, EC-293.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8) Crank engine while depressing accelerator pedal. If engine starts, go to “Diagnostic Procedure”, EC-293. If engine does not start, check exhaust and intake air leak visually.

DTC Confirmation Procedure (Cont'd)



WITH GST

NAEC0170S02

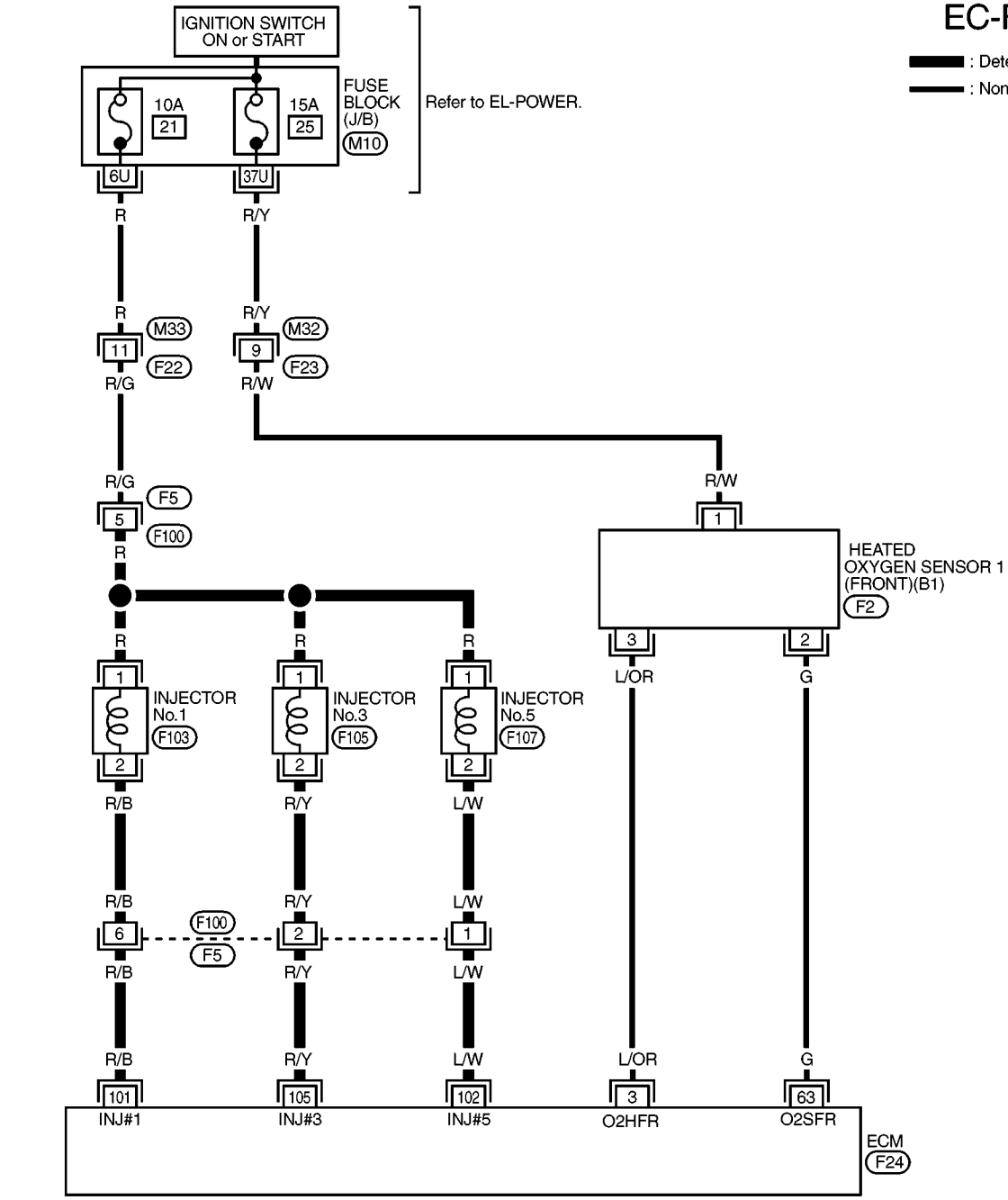
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select "MODE 7" with GST. Make sure 1st trip DTC P0100 is detected.
6) Select "MODE 4" with GST and erase the 1st trip DTC P0100.
7) Start engine again and let it idle for at least 10 minutes.
8) Select "MODE 7" with GST. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-293.
9) If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-293. If engine does not start, check exhaust and intake air leak visually.

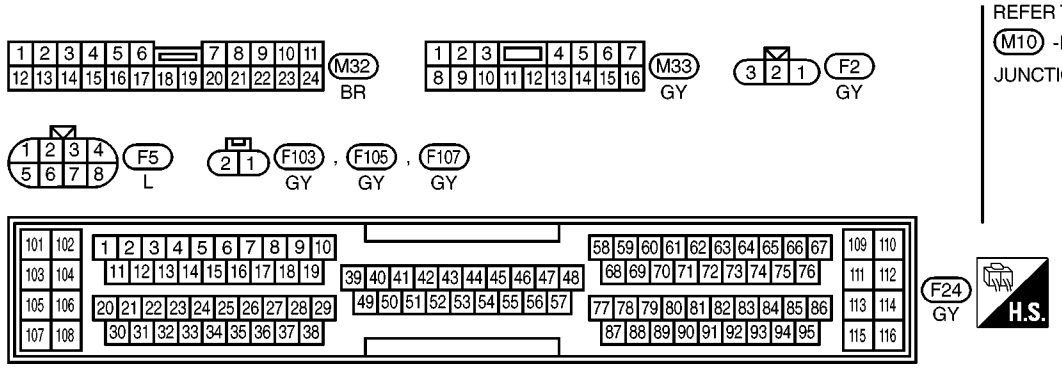
Wiring Diagram

NAEC0171

RIGHT BANK

NAEC0171S01





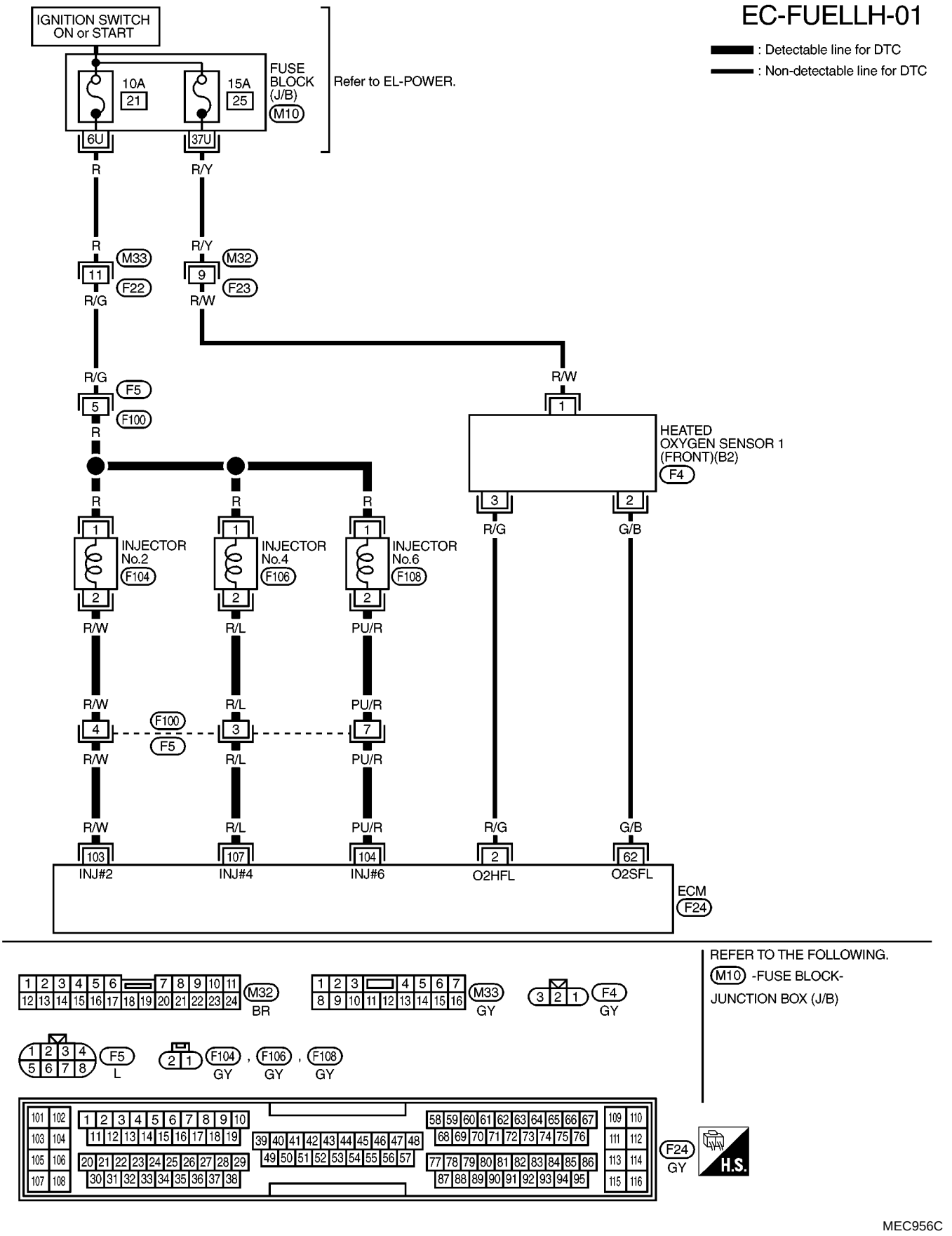
REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC955C

Wiring Diagram (Cont'd)

LEFT BANK

NAEC0171S02



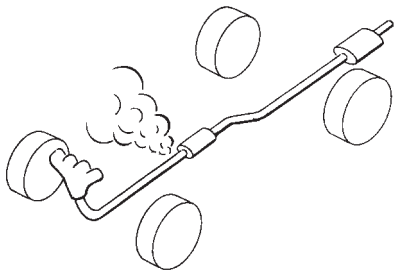
MEC956C

Diagnostic Procedure

NAEC0172

1	CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst.



SEF099P

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK HEATED OXYGEN SENSOR 1 (FRONT) CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0171	63	2	Bank 1 (Right)
P0174	62	2	Bank 2 (Left)

MTBL0477

Continuity should exist.

5. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0172	63 or 2	Ground	Bank 1 (Right)
P0175	62 or 2	Ground	Bank 2 (Left)

MTBL0478

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK FUEL PRESSURE	
1. Release fuel pressure to zero. Refer to EC-39. 2. Install fuel pressure gauge and check fuel pressure. Refer to EC-39. **At idling:** **When fuel pressure regulator valve vacuum hose is connected.** **235 kPa (2.4 kg/cm^2, 34 psi)** **When fuel pressure regulator valve vacuum hose is disconnected.** **294 kPa (3.0 kg/cm^2, 43 psi)**		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
Check the following. ● Fuel pump and circuit (Refer to EC-621.) ● Fuel pressure regulator (Refer to EC-40.) ● Fuel lines (Refer to MA-17, "Checking Fuel Lines".) ● Fuel filter for clogging		
	▶	Repair or replace.

6	CHECK MASS AIR FLOW SENSOR	
With CONSULT-II 1. Install all removed parts. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. **2.0 - 6.0 g·m/sec: at idling** **7.0 - 20.0 g·m/sec: at 2,500 rpm**		
With GST 1. Install all removed parts. 2. Check mass air flow sensor signal in MODE 1 with GST. **2.0 - 6.0 g·m/sec: at idling** **7.0 - 20.0 g·m/sec: at 2,500 rpm**		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-145.

7	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

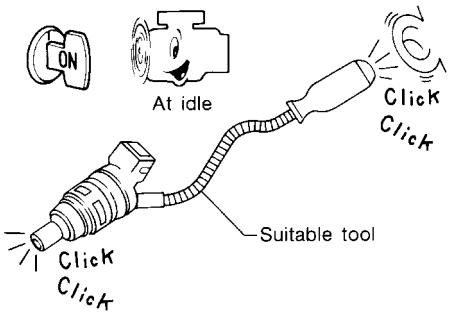
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIF SE-B1	XXX V
IACV-AAC/V	XXX step

SEF070Y

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.



MEC703B

Clicking noise should be heard.

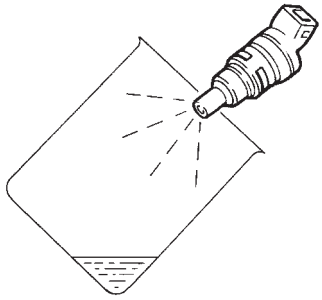
OK or NG

OK	▶	GO TO 8.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-612.

Diagnostic Procedure (Cont'd)

8	CHECK INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch "OFF".
3. Disconnect injector harness connectors on left bank (for DTC P0171), right bank (for DTC P0174).
4. Remove injector gallery assembly. Refer to EC-41.
   Keep fuel hose and all injectors connected to injector gallery.
   The injector harness connectors on right bank (for DTC P0171), left bank (for DTC P0174) should remain connected.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each injector.
7. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.



SEF595Q

Fuel should be sprayed evenly for each injector.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NAEC0173

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1 (front). The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

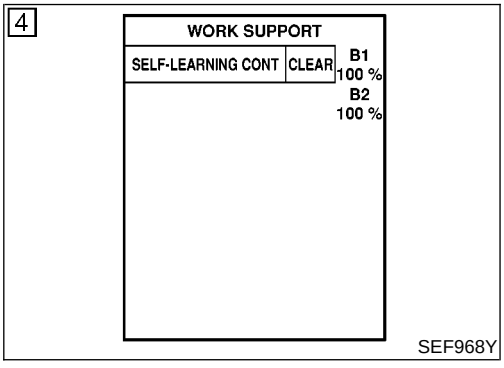
Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)

Possible Cause

NAEC0488

- Heated oxygen sensor 1 (front)
- Injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Mass air flow sensor



DTC Confirmation Procedure

NAEC0174

NOTE:

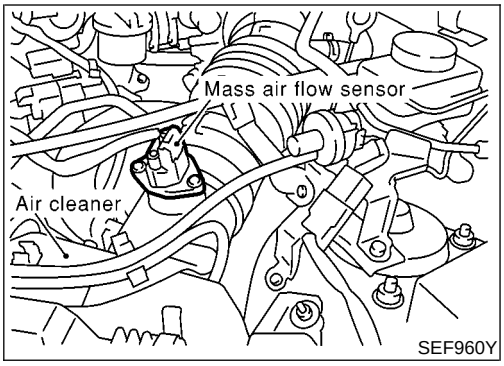
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NAEC0174S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "WORK SUPPORT" mode with CONSULT-II.
4) Clear the self-learning control coefficient by touching "CLEAR".
5) Select "DATA MONITOR" mode with CONSULT-II.
6) Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0172, P0175 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-301.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8) Crank engine while depressing accelerator pedal.
   If engine starts, go to "Diagnostic Procedure", EC-301. If engine does not start, remove ignition plugs and check for fouling, etc.

DTC Confirmation Procedure (Cont'd)



WITH GST

NAEC0174S02

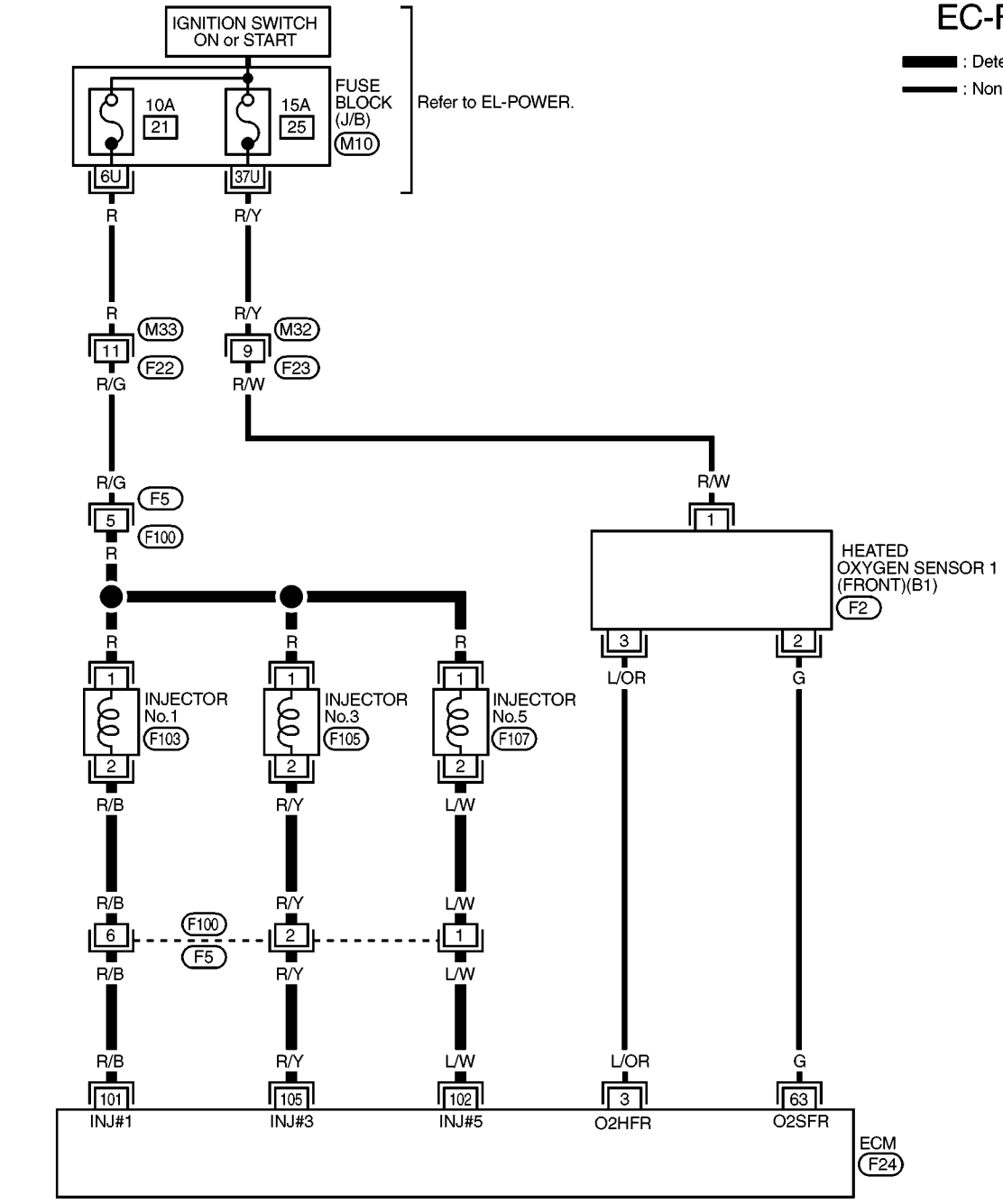
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select "MODE 7" with GST. Make sure 1st trip DTC P0100 is detected.
6) Select "MODE 4" with GST and erase the 1st trip DTC P0100.
7) Start engine again and let it idle for at least 10 minutes.
8) Select "MODE 7" with GST. The 1st trip DTC P0172 or P0175 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-301.
9) If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal.
    If engine starts, go to "Diagnostic Procedure", EC-301. If engine does not start, check exhaust and intake air leak visually.

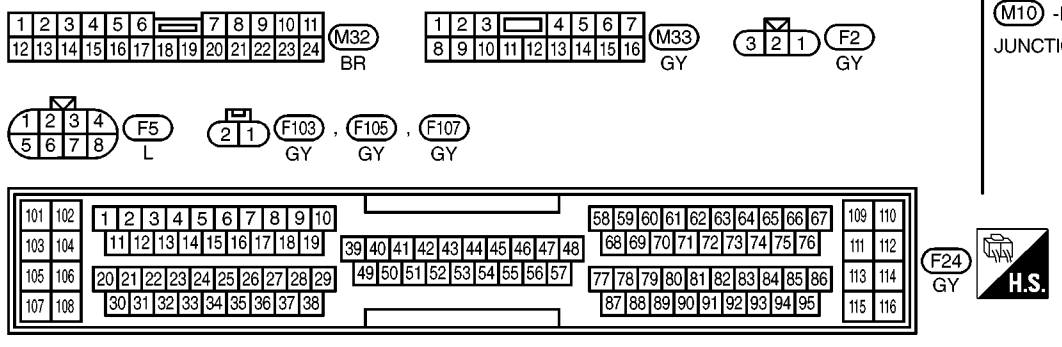
Wiring Diagram

NAEC0175

RIGHT BANK

NAEC0175S01





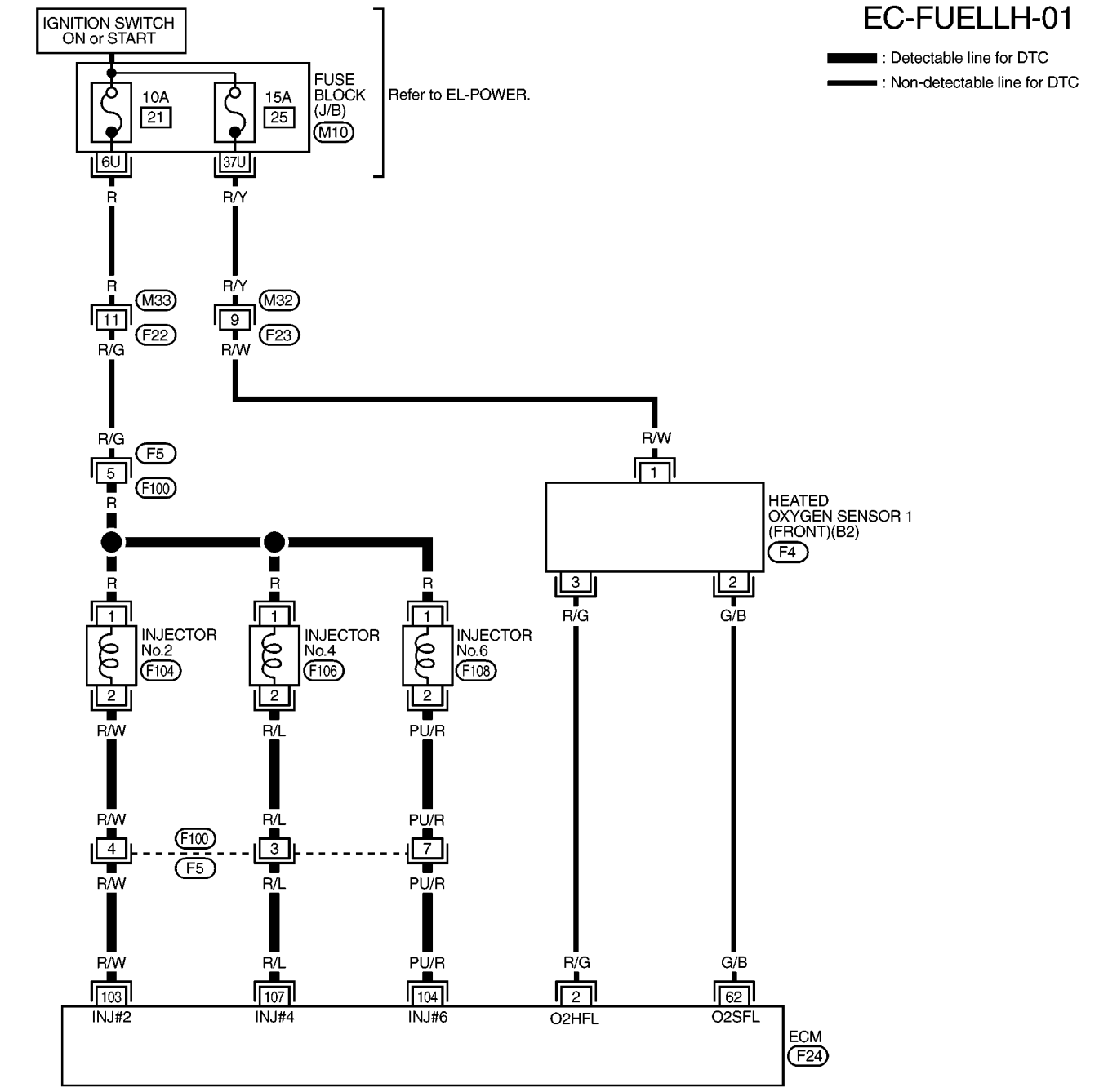
REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

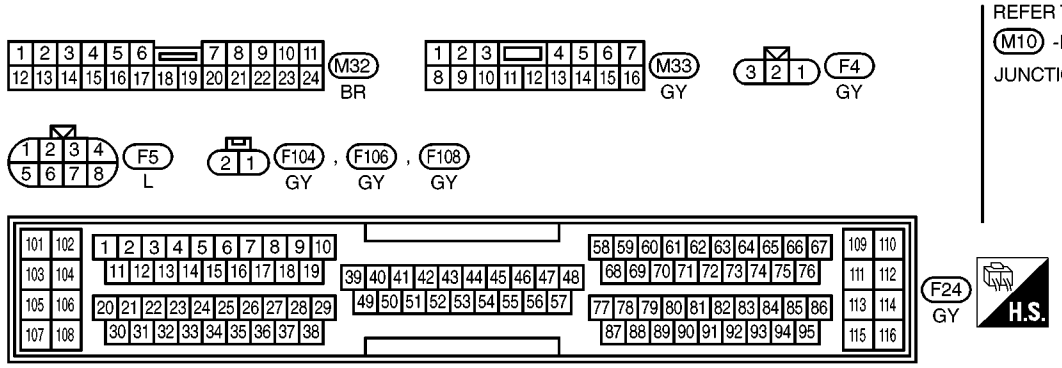
MEC955C

Wiring Diagram (Cont'd)

LEFT BANK

NAEC0175S02





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

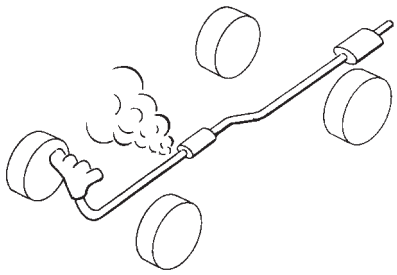
MEC956C

Diagnostic Procedure

NAEC0176

1	CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst.



SEF099P

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK HEATED OXYGEN SENSOR 1 (FRONT) CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0172	63	2	Bank 1 (Right)
P0175	62	2	Bank 2 (Left)

MTBL0479

Continuity should exist.

5. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P0172	63 or 2	Ground	Bank 1 (Right)
P0175	62 or 2	Ground	Bank 2 (Left)

MTBL0480

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK FUEL PRESSURE	
1. Release fuel pressure to zero. Refer to EC-39. 2. Install fuel pressure gauge and check fuel pressure. Refer to EC-39. **At idling:** **When fuel pressure regulator valve vacuum hose is connected.** **235 kPa (2.4 kg/cm^2, 34 psi)** **When fuel pressure regulator valve vacuum hose is disconnected.** **294 kPa (3.0 kg/cm^2, 43 psi)** **OK or NG**		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
Check the following. ● Fuel pump and circuit (Refer to EC-621.) ● Fuel pressure regulator (Refer to EC-40.)		
	▶	Repair or replace.

6	CHECK MASS AIR FLOW SENSOR	
With CONSULT-II 1. Install all removed parts. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. **2.0 - 6.0 g·m/sec: at idling** **7.0 - 20.0 g·m/sec: at 2,500 rpm**		
With GST 1. Install all removed parts. 2. Check mass air flow sensor signal in MODE 1 with GST. **2.0 - 6.0 g·m/sec: at idling** **7.0 - 20.0 g·m/sec: at 2,500 rpm** **OK or NG**		
OK	▶	GO TO 7.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-145.

7	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

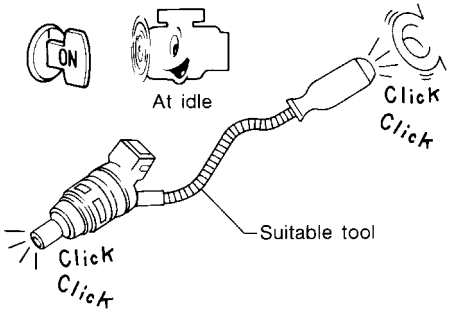
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIF SE-B1	XXX V
IACV-AAC/V	XXX step

SEF070Y

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.



MEC703B

Clicking noise should be heard.

OK or NG

OK	▶	GO TO 8.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-613.

8	CHECK INJECTOR

1. Remove injector assembly. Refer to EC-41.
   Keep fuel hose and all injectors connected to injector gallery.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect injector harness connectors left bank (for DTC P0172), right bank (for P0175).
   The injector harness connectors on right bank (for P0172), left bank (for P0175) should remain connected.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each injectors.
6. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

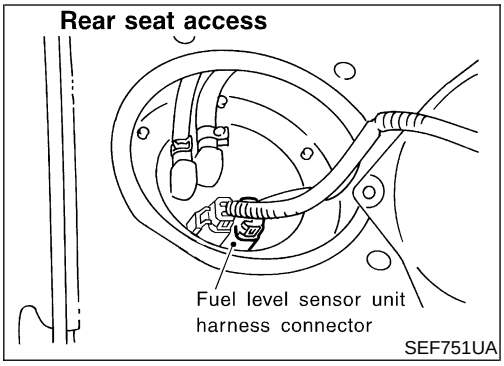
OK or NG

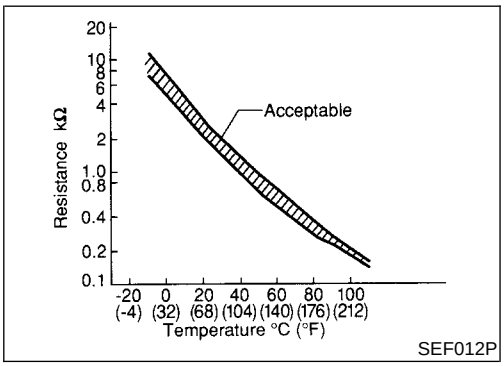
OK (Does not drip.)	▶	GO TO 9.
NG (Drips.)	▶	Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.

▶ **INSPECTION END**





Component Description

NAEC0177

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Fuel temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 92 (Fuel tank temperature sensor) and body ground.

CAUTION:

Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

NAEC0178

Malfunction is detected when an excessively high or low voltage is sent to ECM, rationally incorrect voltage is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.

Possible Cause

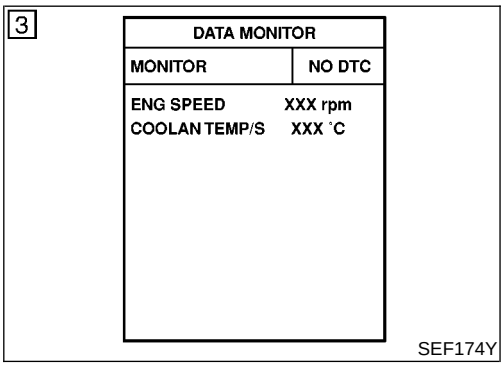
NAEC0489

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Fuel tank temperature sensor

DTC Confirmation Procedure

NAEC0179

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.



WITH CONSULT-II

NAEC0179S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 10 seconds.
   If the result is NG, go to “Diagnostic Procedure”, EC-307.
   If the result is OK, go to following step.
4) Check “COOLAN TEMP/S” value.
   If “COOLAN TEMP/S” is less than 60°C (140°F), the result will be OK.
   If “COOLAN TEMP/S” is above 60°C (140°F), go to the following step.
5) Cool engine down until “COOLAN TEMP/S” is less than 60°C (140°F).
6) Wait at least 10 seconds.
7) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-307.

WITH GST

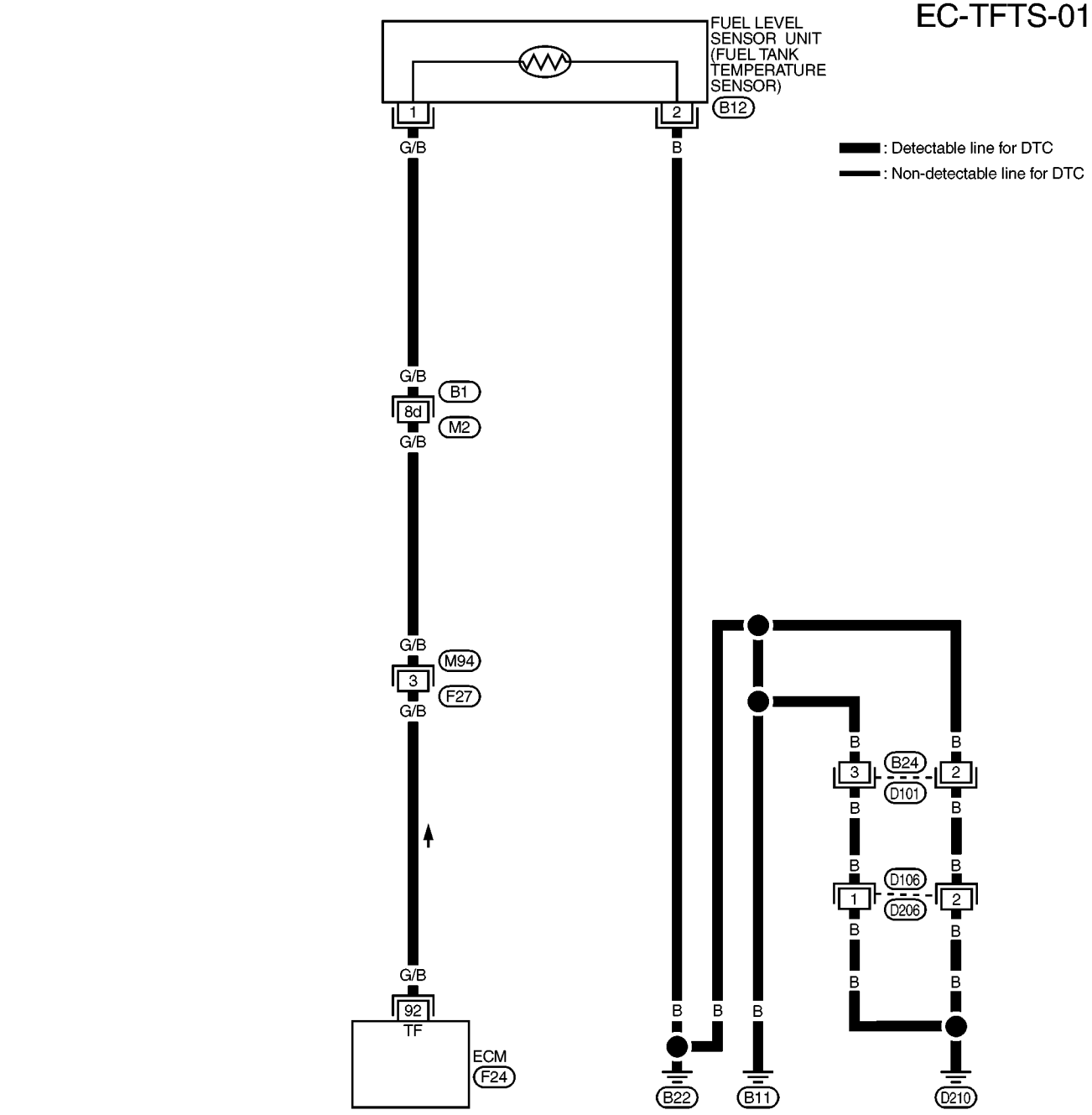
NAEC0179S02

Follow the procedure “With CONSULT-II” above.

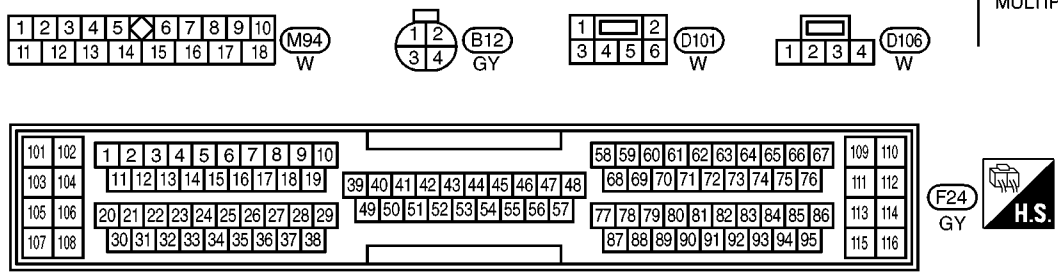
Wiring Diagram

NAEC0180

EC-TFTS-01



REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)



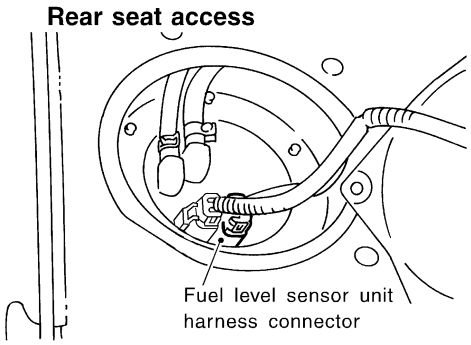
MEC957C

Diagnostic Procedure

NAEC0181

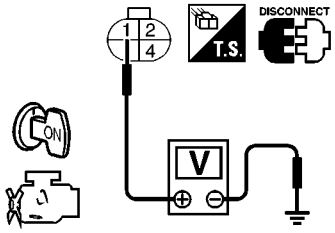
1	CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit and fuel pump harness connector.



SEF751UA

3. Turn ignition switch “ON”.
4. Check voltage between fuel level sensor unit terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF973Y

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B1, M2
- Harness connectors M92, F27
- Harness for open or short between ECM and fuel level sensor unit and fuel pump

	▶	Repair harness or connector.

3	CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit and fuel pump terminal 2 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

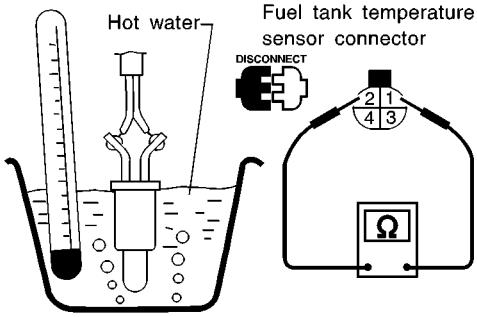
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 2 by heating with hot water or heat gun as shown in the figure.



Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

SEF974Y

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace fuel level sensor unit.

5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NAEC0610

This diagnosis checks whether the engine coolant temperature is extraordinary high, even when the load is not heavy.
When malfunction is detected, the malfunction indicator lamp (MIL) will light up even in the first trip.
Malfunction is detected when engine coolant temperature is excessively high under normal engine speed.

Possible Cause

NAEC0611

- Thermostat
- Improper ignition timing
- Engine coolant temperature sensor
- Blocked radiator
- Blocked front end (Improper fitting of nose mask)
- Crushed vehicle frontal area (Vehicle frontal is collided but not repaired)
- Blocked air passage by improper installation of front fog lamp or fog lamps.
- Improper mixture ratio of coolant
- Damaged bumper

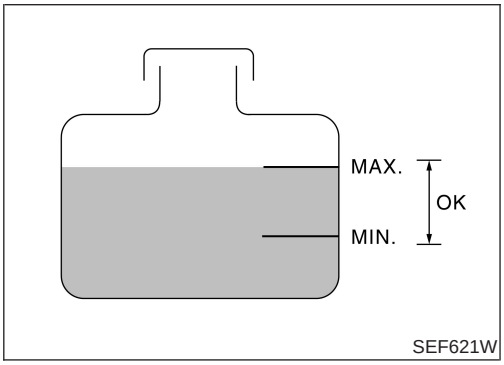
For more information, refer to “MAIN 12 CAUSES OF OVERHEATING”, EC-314.

Overall Function Check

NAEC0612

Use this procedure to check the overall function of the coolant overtemperature enrichment protection check, a DTC might not be confirmed.

WARNING:
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high-pressure fluid escaping from the radiator.
Wrap a thick cloth around the cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.



WITH CONSULT-II

NAEC0612S01

1) Check the coolant level and mixture ratio (using coolant tester) in the reservoir tank and radiator.
Allow engine to cool before checking coolant level and mixture ratio.

- If the coolant level in the reservoir and/or radiator is below the proper range, go to “Diagnostic Procedure”, EC-311.
- If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure MA-15, “Changing Engine Coolant”.

a) Fill radiator with coolant up to specified level with a filling speed

of 2 liters per minute like pouring coolant from a kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-13, "Anti-freeze Coolant Mixture Ratio".

b) After refilling coolant, run engine to ensure that no water-flow noise is emitted.

c) After checking or replacing coolant, go to step 3 below.

2) Ask the customer if engine coolant has been added. If it has been added, go to "Diagnostic Procedure", EC-311. After repair, go to the next step.

3) Start engine and let it idle.

4) Make sure that A/C switch is "OFF" and air conditioner is not operating. If NG, check air conditioner circuit. Refer to HA-28 or HA-148, "TROUBLE DIAGNOSES". After repair, go to the next step.

5) Check for blocked coolant passage.

a) Warm up engine to normal operating temperature, then grasp radiator upper hose and lower hose and make sure that coolant flows.
If NG, go to "Diagnostic Procedure", EC-311. After repair, go to the next step.
Be extremely careful not to touch any moving or adjacent parts.

6) Check for blocked radiator air passage.

a) When market fog lamps have been installed, check for damaged fans and clogging in the condenser and radiator.

b) Check the front end for clogging caused by insects or debris.

c) Check for improper fitting of front-end cover, damaged radiator grille or bumper, damaged vehicle front.
If NG, take appropriate action and then go to the next step.

7) Check function of ECT sensor.
Refer to step 7 of "Diagnostic Procedure", EC-311.
If NG, replace ECT sensor and go to the next step.

8) Check ignition timing. Refer to basic inspection, EC-99.
Make sure that ignition timing is 15°±2° at idle.
If NG, adjust ignition timing and then recheck.

WITH GST

NAEC0612S02

1) Check the coolant level and mixture ratio (using coolant tester) in the reservoir tank and radiator.
Allow engine to cool before checking coolant level and mixture ratio.

- If the coolant level in the reservoir and/or radiator is below the proper range, and go to "Diagnostic Procedure", EC-311.
- If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure MA-15, "Changing Engine Coolant".

a) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant from a kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-13, "Anti-freeze Coolant Mixture Ratio".

b) After refilling coolant, run engine to ensure that no water-flow noise is emitted.

c) After checking or replacing coolant, go to step 3 below.

2) Ask the customer if engine coolant has been added. If it has been added, go to "Diagnostic Procedure", EC-311. After repair, go to the next step.

3) Start engine and let it idle.

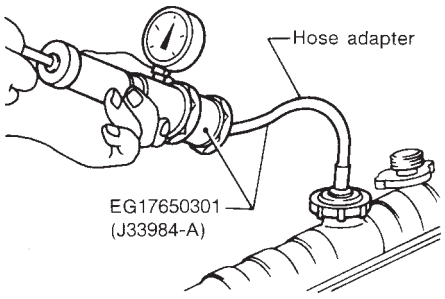
4) Make sure that A/C switch is "OFF" and air conditioner is not operating. If NG, check air conditioner circuit. Refer to HA-28 or HA-148, "TROUBLE DIAGNOSES". After repair, go to the next step.
5) Check for blocked coolant passage.
a) Warm up engine to normal operating temperature, then grasp radiator upper hose and lower hose and make sure that coolant flows.
If NG, go to "Diagnostic Procedure", EC-311. After repair, go to the next step.
Be extremely careful not to touch any moving or adjacent parts.
6) Check for blocked radiator air passage.
a) When market fog lamps have been installed, check for damaged fans and clogging in the condenser and radiator.
b) Check the front end for clogging caused by insects or debris.
c) Check for improper fitting of front-end cover, damaged radiator grille or bumper, damaged vehicle front.
If NG, take appropriate action and then go to the next step.
7) Check function of ECT sensor.
Refer to step 6 of "Diagnostic Procedure", EC-311.
If NG, replace ECT sensor and go to the next step.
8) Check ignition timing. Refer to basic inspection, EC-99.
Make sure that ignition timing is 15°±2° at idle.
If NG, adjust ignition timing and then recheck.

Diagnostic Procedure

NAEC0614

1	CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.
Testing pressure: 157 kPa (1.6 kg/cm^2, 23 psi)
CAUTION:
Higher than the specified pressure may cause radiator damage.



SLC754A

Pressure should not drop.

OK or NG

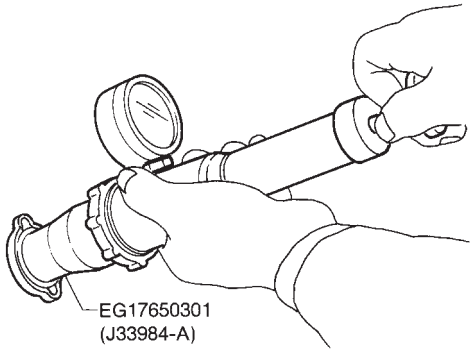
OK	▶	GO TO 3.
NG	▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	DETECT MALFUNCTIONING PART
Check the following for leak. ● Hose ● Radiator ● Water pump (Refer to LC-13, "Water Pump".)	
▶	Repair or replace.

3	CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.



SLC755A

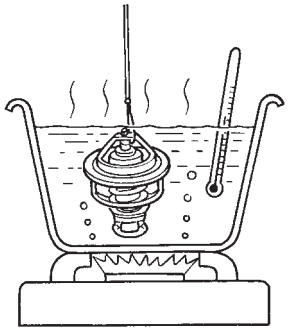
Radiator cap relief pressure:
59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi)

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace radiator cap.

4	CHECK THERMOSTAT

1. Remove thermostat.
2. Check valve seating condition at normal room temperatures.
   It should seat tightly.
3. Check valve opening temperature and valve lift.



SLC343

Valve opening temperature:
76.5°C (170°F) [standard]
Valve lift:
More than 8.6 mm/90°C (0.339 in/194°F)

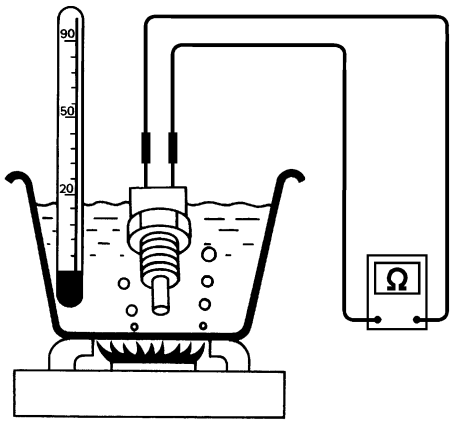
4. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC-17, "Thermostat".

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace thermostat

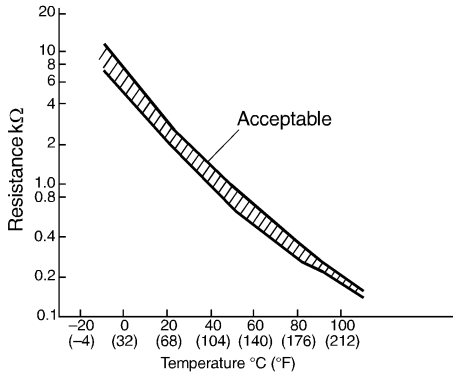
5	CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Remove engine coolant temperature sensor.
2. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



SEF304X

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace engine coolant temperature sensor.

6	CHECK MAIN 12 CAUSES
If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-314.	
▶	**INSPECTION END**

Main 12 Causes of Overheating

NAEC0615

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	See MA-12, “RECOMMENDED FLUIDS AND LUBRICANTS”.
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-15, “Changing Engine Coolant”.
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See LC-12, “System Check”.
ON*2	5	• Coolant leaks	• Visual	No leaks	See LC-12, “System Check”.
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See LC-17, “Thermostat” and LC-20, “Radiator”.
ON*1	7*5	• Cooling fan	• CONSULT-II	Operating	See trouble diagnosis for DTC P0217 (EC-309).
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	See MA-15, “Changing Engine Coolant”.
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See MA-14, “ENGINE MAINTENANCE”.
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-43, “Inspection”.
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See EM-64, “Inspection”.

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
*5: Cooling fan is not applied to this vehicle.
For more information, refer to LC-25, “OVERHEATING CAUSE ANALYSIS”.

On Board Diagnosis Logic

NAEC0182

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the CKP sensor signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off. If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink. When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on. If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

Malfunction is detected when multiple cylinders misfire, No. 1 cylinder misfires, No. 2 cylinder misfires, No. 3 cylinder misfires, No. 4 cylinder misfires, No. 5 cylinder misfires and No. 6 cylinder misfires.

Possible Cause

NAEC0490

- Improper spark plug
- Insufficient compression
- Incorrect fuel pressure
- The injector circuit is open or shorted
- Injectors
- Intake air leak
- The ignition secondary circuit is open or shorted
- Lack of fuel
- Drive plate or flywheel
- Heated oxygen sensor 1 (front)

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
P/N POSI SW	OFF
B/FUEL SCHDL	XXX msec

SEF213Y

DTC Confirmation Procedure

NAEC0183

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NAEC0183S01

1) Turn ignition switch “ON”, and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch “OFF” and wait at least 10 seconds.
4) Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.
   Hold the accelerator pedal as steady as possible.

NOTE:

Refer to the freeze frame data for the test driving conditions.

5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-316.

WITH GST

NAEC0183S02

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

NAEC0184

1	CHECK FOR INTAKE AIR LEAK	
1. Start engine and run it at idle speed. 2. Listen for the sound of the intake air leak.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Discover air leak location and repair.

2	CHECK FOR EXHAUST SYSTEM CLOGGING	
1. Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace it.

3	PERFORM POWER BALANCE TEST

With CONSULT-II

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.

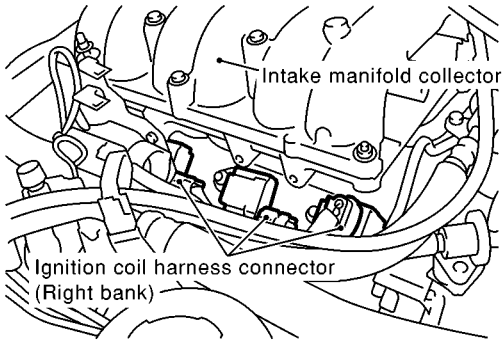
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

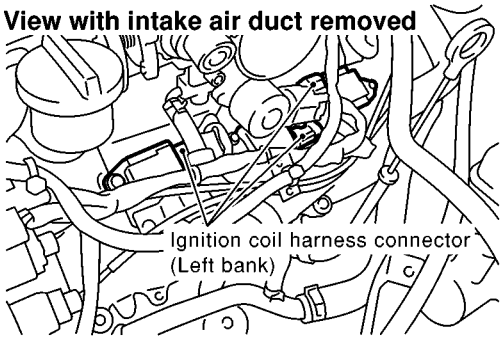
SEF190Y

2. Is there any cylinder which does not produce a momentary engine speed drop?

Without CONSULT-II

When disconnecting each ignition coil harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?





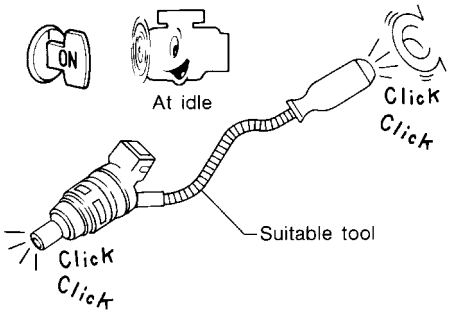
SEF975Y

Yes or No

Yes	▶	GO TO 5.
No	▶	GO TO 4.

4	CHECK INJECTOR

Does each injector make an operating sound at idle?



MEC703B

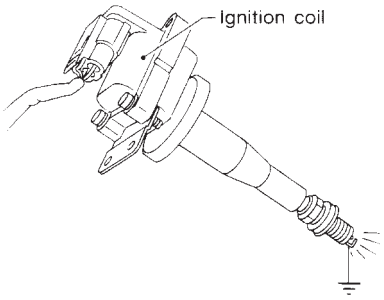
Yes or No

Yes	▶	GO TO 5.
No	▶	Check injector(s) and circuit(s). Refer to EC-612.

Diagnostic Procedure (Cont'd)

5	CHECK IGNITION SPARK

1. Disconnect ignition wire from spark plug.
2. Connect a known good spark plug to the ignition wire.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.



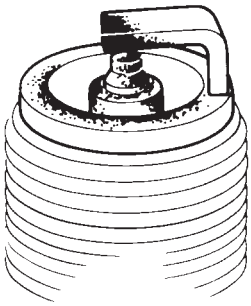
SEF575Q

OK or NG

OK	▶	GO TO 6.
NG	▶	Check ignition coil, power transistor and their circuits. Refer to "DTC P1320 IGNITION SIGNAL", EC-494

6	CHECK SPARK PLUGS

Remove the spark plugs and check for fouling, etc.



SEF156I

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-14, "ENGINE MAINTENANCE".

7	CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-14, "Measurement of Compression Pressure".

Standard:

1,275 kPa (13.0 kg/cm^2, 185 psi)/300 rpm

Minimum:

981 kPa (10.0 kg/cm^2, 142 psi)/300 rpm

Difference between each cylinder:

98 kPa (1.0 kg/cm^2, 14 psi)/300 rpm

OK or NG

OK	▶	GO TO 8.
NG	▶	Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

8	CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to EC-39.
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-39.

At idle:

Approx. 235 kPa (2.4 kg/cm^2, 34 psi)

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART

Check the following.
- Fuel pump and circuit (Refer to EC-621.)
- Fuel pressure regulator (Refer to EC-40.)
- Fuel lines (Refer to MA-17, "Checking Fuel Lines".)
- Fuel filter for clogging

	▶	Repair or replace.

10	CHECK IGNITION TIMING

Check the following items. Refer to "Basic Inspection", EC-99.

Items	Specifications
Ignition timing	15° ± 2° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	M/T: 750 ± 50 rpm A/T: 750 ± 50 rpm (in "P" or "N" position)

MTBL0537

OK or NG

OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Follow the "Basic Inspection".

Diagnostic Procedure (Cont'd)

11	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown left:

Bank 1

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R				

Bank 2

cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R				

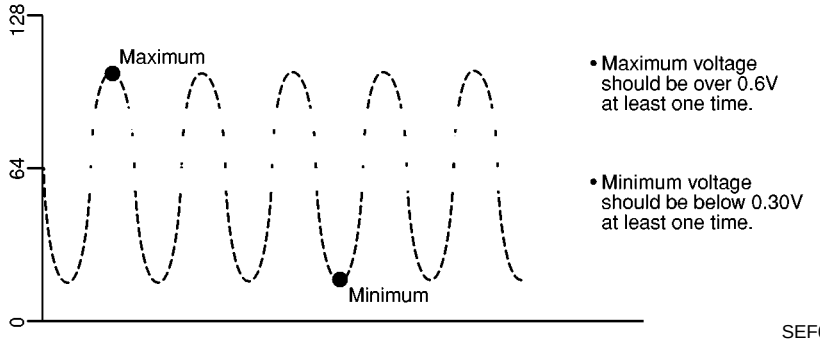
R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

CAUTION:

Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

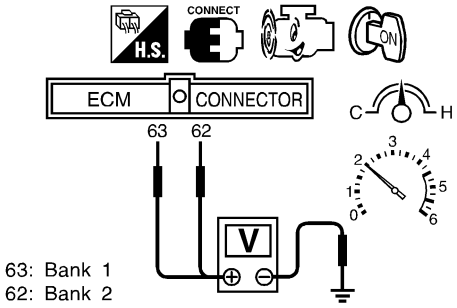
OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

12	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 63 (HO2S1 bank 1 right signal) or 62 (HO2S1 bank 2 left signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

SEF967XA

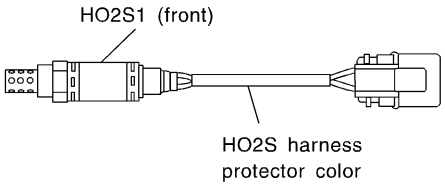
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 (front) harness protector color.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

	▶	Replace malfunctioning heated oxygen sensor 1 (front).

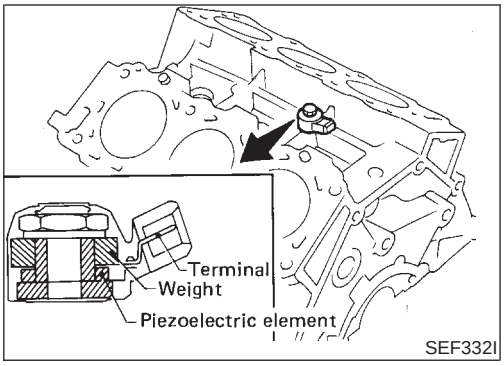
Diagnostic Procedure (Cont'd)

14	CHECK MASS AIR FLOW SENSOR
With CONSULT-II Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT-II. **2.0 - 6.0 g·m/sec: at idling** **7.0 - 20.0 g·m/sec: at 2,500 rpm**	
With GST Check mass air flow sensor signal in MODE 1 with GST. **2.0 - 6.0 g·m/sec: at idling** **7.0 - 20.0 g·m/sec: at 2,500 rpm**	
OK or NG	
OK ▶	GO TO 15.
NG ▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-145.

15	CHECK SYMPTOM MATRIX CHART
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-117.	
OK or NG	
OK ▶	GO TO 16.
NG ▶	Repair or replace.

16	ERASE THE 1ST TRIP DTC
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-71. Some tests may cause a 1st trip DTC to be set.	
▶	GO TO 17.

17	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**



Component Description

NAEC0185

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.
Freeze frame data will not be stored in the ECM for the knock sensor. The MIL will not light for knock sensor malfunction. The knock sensor has one trip detection logic.

ECM Terminals and Reference Value

NAEC0663

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
93	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V

On Board Diagnosis Logic

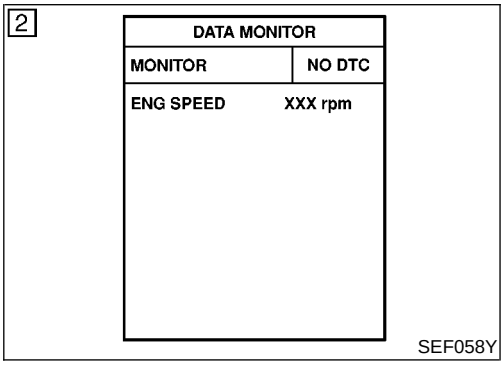
NAEC0187

Malfunction is detected when an excessively low or high voltage from the knock sensor is sent to ECM.

Possible Cause

NAEC0491

- Harness or connectors
  (The knock sensor circuit is open or shorted.)
- Knock sensor



DTC Confirmation Procedure

NAEC0188

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

DTC Confirmation Procedure (Cont'd)

WITH CONSULT-II

NAEC0188S01

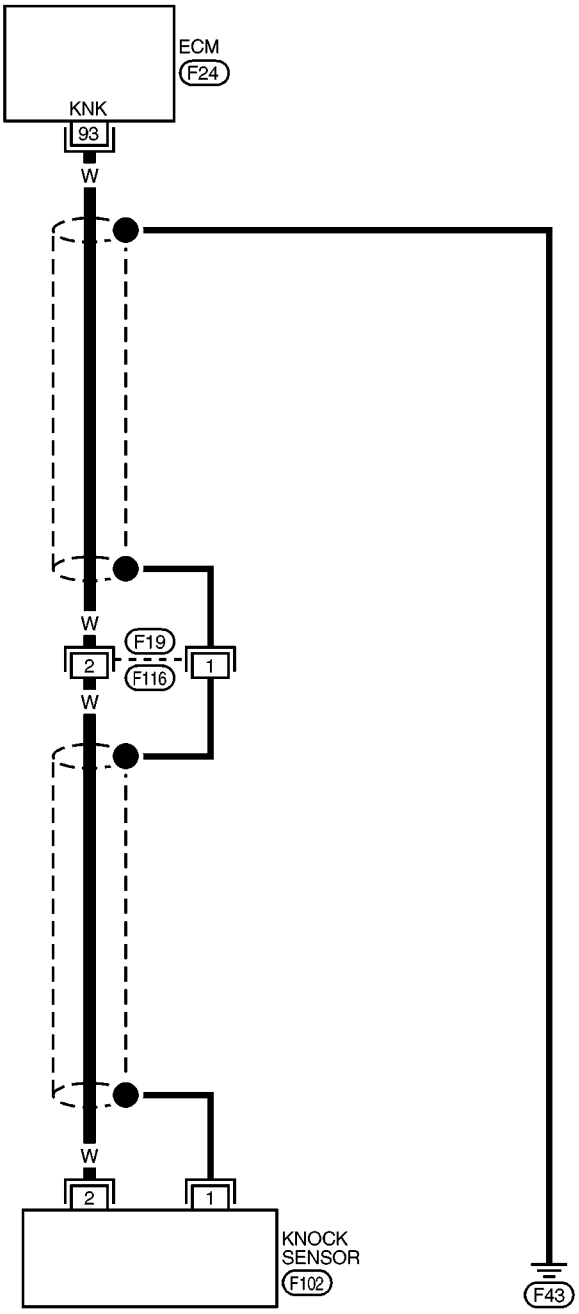
1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II
2) Start engine and run it for at least 5 seconds at idle speed.
3) If DTC is detected, go to "Diagnostic Procedure", EC-326.

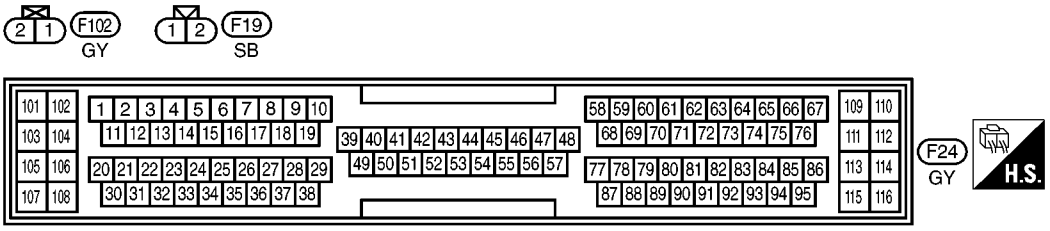
Wiring Diagram

NAEC0189

EC-KS-01

: Detectable line for DTC
: Non-detectable line for DTC





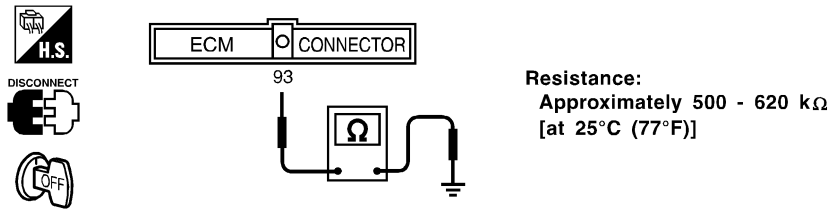
MEC958C

Diagnostic Procedure

NAEC0190

1	CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminal 93 and engine ground.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.



Resistance:
Approximately 500 - 620 kΩ
[at 25°C (77°F)]

SEF321X

4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 2.

2	CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 93 and knock sensor terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F19, F116
- Harness for open or short between ECM and knock sensor

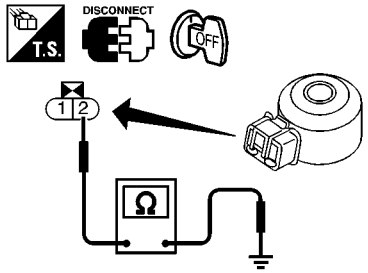
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK KNOCK SENSOR

Check resistance between knock sensor terminal 2 and ground.

NOTE:

It is necessary to use an ohmmeter which can measure more than 10 MΩ.



Resistance: 500 - 620 kΩ [at 25°C (77°F)]

SEF976Y

CAUTION:

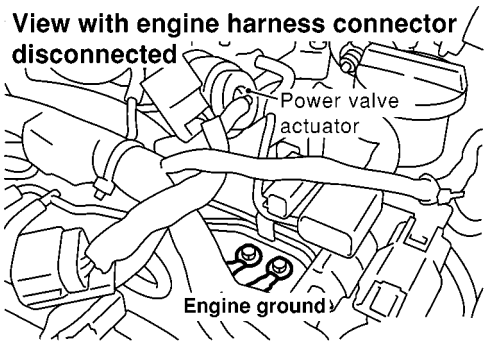
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace knock sensor.

5	RETIGHTEN GROUND SCREWS

Loose and retighten engine ground screws.



SEF959Y

	▶	GO TO 6.

6	CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors F19, F116.
2. Check harness continuity between harness connector F19 terminal 1 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

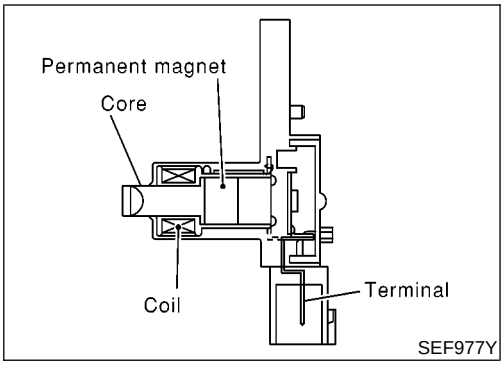
Check the following.

- Harness connectors F19, F116
- Harness for open or short between harness connector F19 and engine ground

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

8	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**



Component Description

NAEC0191

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate (flywheel). It detects the crankshaft position signal (1° signal).
The sensor consists of a permanent magnet, core and coil.
When engine is running, the gap between the sensor and the gear teeth (cogs) will periodically change. Permeability near the sensor also changes.
Due to the permeability change, the magnetic flux near the core is changed. Therefore, the voltage signal generated in the coil is changed.
The ECM receives the voltage signal and detects the crankshaft position signal (1° signal).

CONSULT-II Reference Value in Data Monitor Mode

NAEC0492

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CKPS·RPM (POS)	● Tachometer: Connect ● Run engine and compare tachometer indication with the CONSULT-II value.	Almost the same speed as the CONSULT-II value.

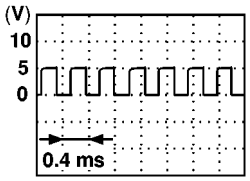
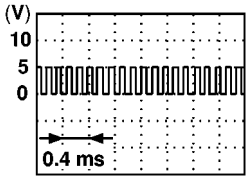
ECM Terminals and Reference Value

=NAEC0664

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
85	Y	Crankshaft position sensor (POS)	**[Engine is running]** ● Idle speed	Approximately 2.4V  SEF057V
			[Engine is running] ● Engine speed is 2,000 rpm.	Approximately 2.3V  SEF058V

On Board Diagnosis Logic

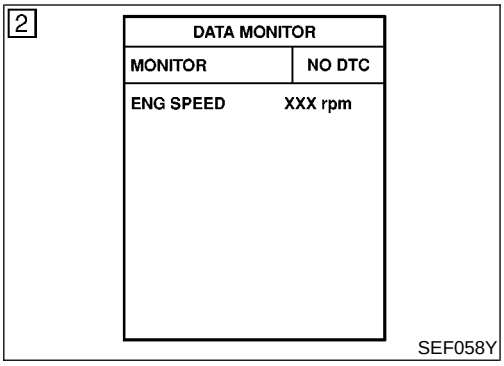
NAEC0193

Malfunction is detected when 1° signal is not entered to ECM for the first few seconds during engine cranking, or 1° signal is not entered to ECM during engine running.

Possible Cause

NAEC0493

- Harness or connectors
  [The crankshaft position sensor (POS) circuit is open or shorted.]
- Crankshaft position sensor (POS)
- Starter motor (Refer to EL section.)
- Starting system circuit (Refer to EL section.)
- Dead (Weak) battery



DTC Confirmation Procedure

NAEC0194

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V.

WITH CONSULT-II

NAEC0194S01

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2) Crank engine for at least two seconds.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-333.

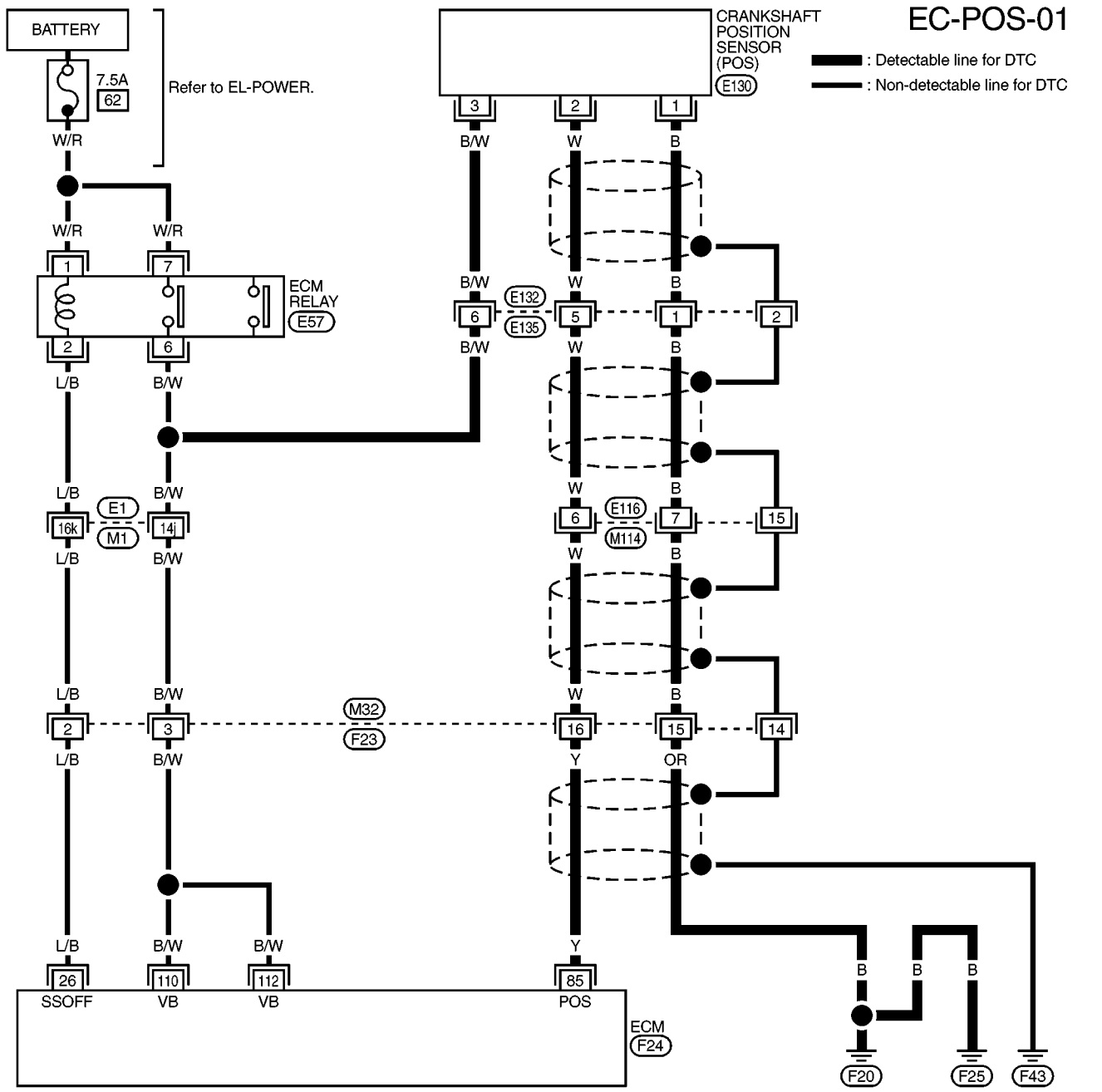
WITH GST

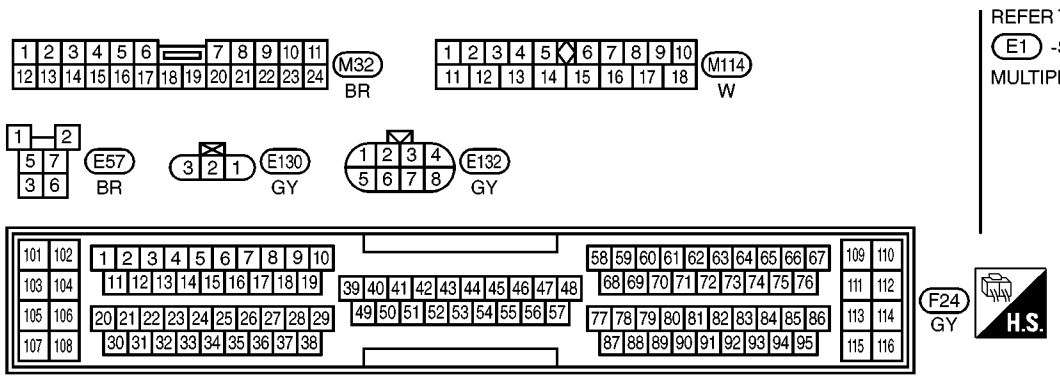
NAEC0194S02

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NAEC0195





REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

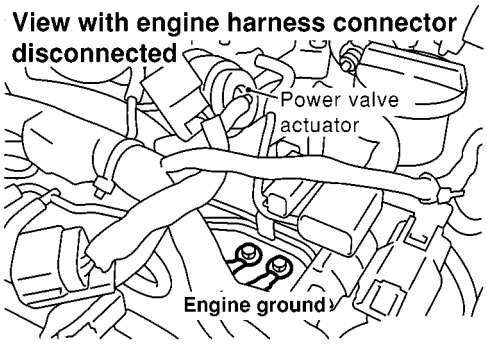
MEC959C

Diagnostic Procedure

NAEC0196

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

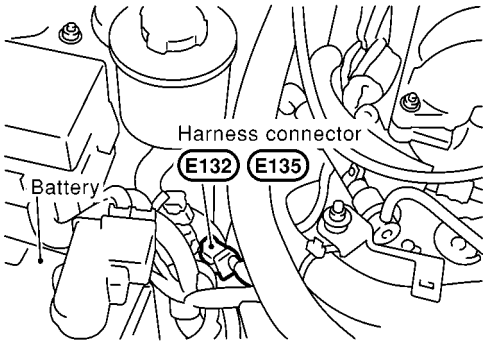


SEF959Y

▶	GO TO 2.

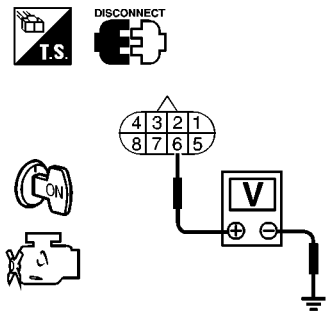
2	CHECK CKPS (POS) POWER SUPPLY CIRCUIT

1. Disconnect harness connectors E132, E135.



SEF978Y

2. Check voltage between harness connector E135 terminal 6 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF979Y

3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E132, E135 ● Harness for open or short between ECM and crankshaft position sensor (POS) ● Harness for open or short between ECM relay and crankshaft position sensor (POS)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK CKPS (POS) GROUND CIRCUIT FOR OPEN AND SHORT
1. Check harness continuity between harness connector E135 terminal 1 and engine ground. Refer to Wiring Diagram. **Continuity should exist.** 2. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E132, E135 ● Harness connectors E116, M114 ● Harness connectors M32, F23 ● Harness for open or short between ECM and crankshaft position sensor (POS)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

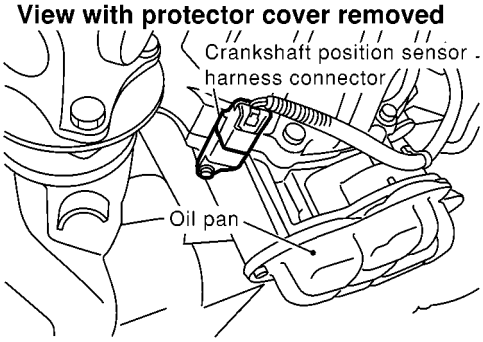
6	CHECK CKPS (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 85 and harness connector E135 terminal 5. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E132, E135 ● Harness connectors E116, M114 ● Harness connectors M32, F23 ● Harness for open or short between ECM and crankshaft position sensor (POS)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK CKPS (POS) SUB-HARNESS CIRCUIT FOR OPEN AND SHORT

1. Disconnect CKPS (POS) harness connector.

View with protector cover removed



SEF980Y

2. Check harness continuity between CKPS (POS) terminals and harness connector E132 terminals as follows.

CKPS (POS) terminal	Harness conector F171 terminal
1	1
2	5
3	6

MTBL0481

Continuity should exist.

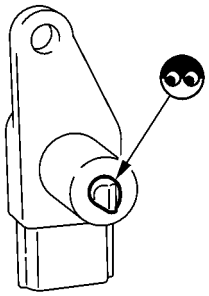
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK CRANKSHAFT POSITION SENSOR (POS)-I

1. Disconnect crankshaft position sensor (POS) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



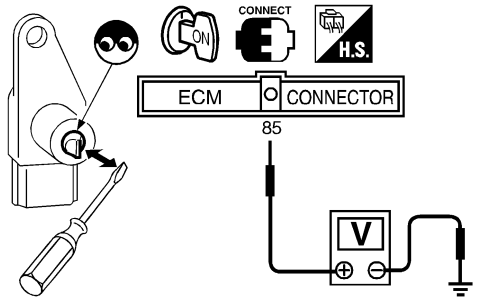
SEF981Y

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace crankshaft position sensor (POS).

10	CHECK CRANKSHAFT POSITION SENSOR (POS)-II

1. Reconnect disconnected harness connectors.
2. Turn ignition switch "ON".
3. Check voltage between ECM terminal 85 and ground by briefly touching the sensor core with a flat-bladed screwdrivers.



ECM terminal	Condition	Voltage
85	Contacted	Approximately 5V
	Pulled away	Approximately 0V

There should be a steady 5V as the flat-bladed screwdriver is drawn away slowly.

SEF343Z

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace crankshaft position sensor (POS).

11	CHECK CKPS (POS) SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors E132, E135.
2. Check harness continuity between harness connector E135 terminal 2 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 13.
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART

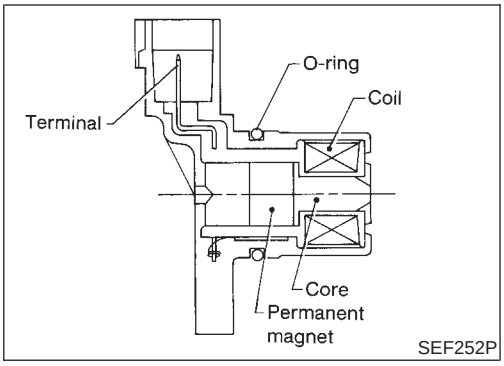
Check the following.
- Harness connectors E132, E135
- Harness connectors E116, M114
- Harness connectors M32, F23
- Harness for open or short between harness connector E135 and engine ground

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

13	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.

	▶	**INSPECTION END**



Component Description

NAEC0197

The camshaft position sensor (PHASE) is located on the engine front cover facing the camshaft sprocket. It detects the cylinder No. signal.
The sensor consists of a permanent magnet, core and coil.
When engine is running, the gap between the sensor and the camshaft sprocket will periodically change. Permeability near the sensor also changes.
Due to the permeability change, the magnetic flux near the core is changed. Therefore, the voltage signal generated in the coil is changed.
The ECM receives the voltage signal and detects the cylinder No. signal.

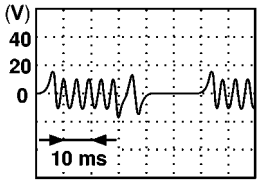
ECM Terminals and Reference Value

NAEC0665

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
66 76	L L	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 4.2V★ (AC voltage)  SEF582X

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

NAEC0199

Malfunction is detected when
(Malfunction A) the cylinder No. signal is not sent to ECM for the first few seconds during engine cranking,
(Malfunction B) the cylinder No. signal is not sent to ECM during engine running,
(Malfunction C) the cylinder No. signal is not in the normal pattern during engine running.

Possible Cause

NAEC0494

- Harness or connectors
  [The camshaft position sensor (PHASE) circuit is open or shorted.]
- Camshaft position sensor (PHASE)
- Starter motor (Refer to SC section.)
- Starting system circuit (Refer to SC section.)
- Dead (Weak) battery

DTC Confirmation Procedure

NAEC0200

NOTE:

- **Perform "PROCEDURE FOR MALFUNCTION A" first. If 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B AND C".**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

2

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C

SEF013Y

PROCEDURE FOR MALFUNCTION A

NAEC0200S01

With CONSULT-II

NAEC0200S0101

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Crank engine for at least 2 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-340.

With GST

NAEC0200S0102

Follow the procedure "With CONSULT-II" above.

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B AND C

NAEC0200S02

With CONSULT-II

NAEC0200S0201

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and run it for at least 2 seconds at idle speed.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-340.

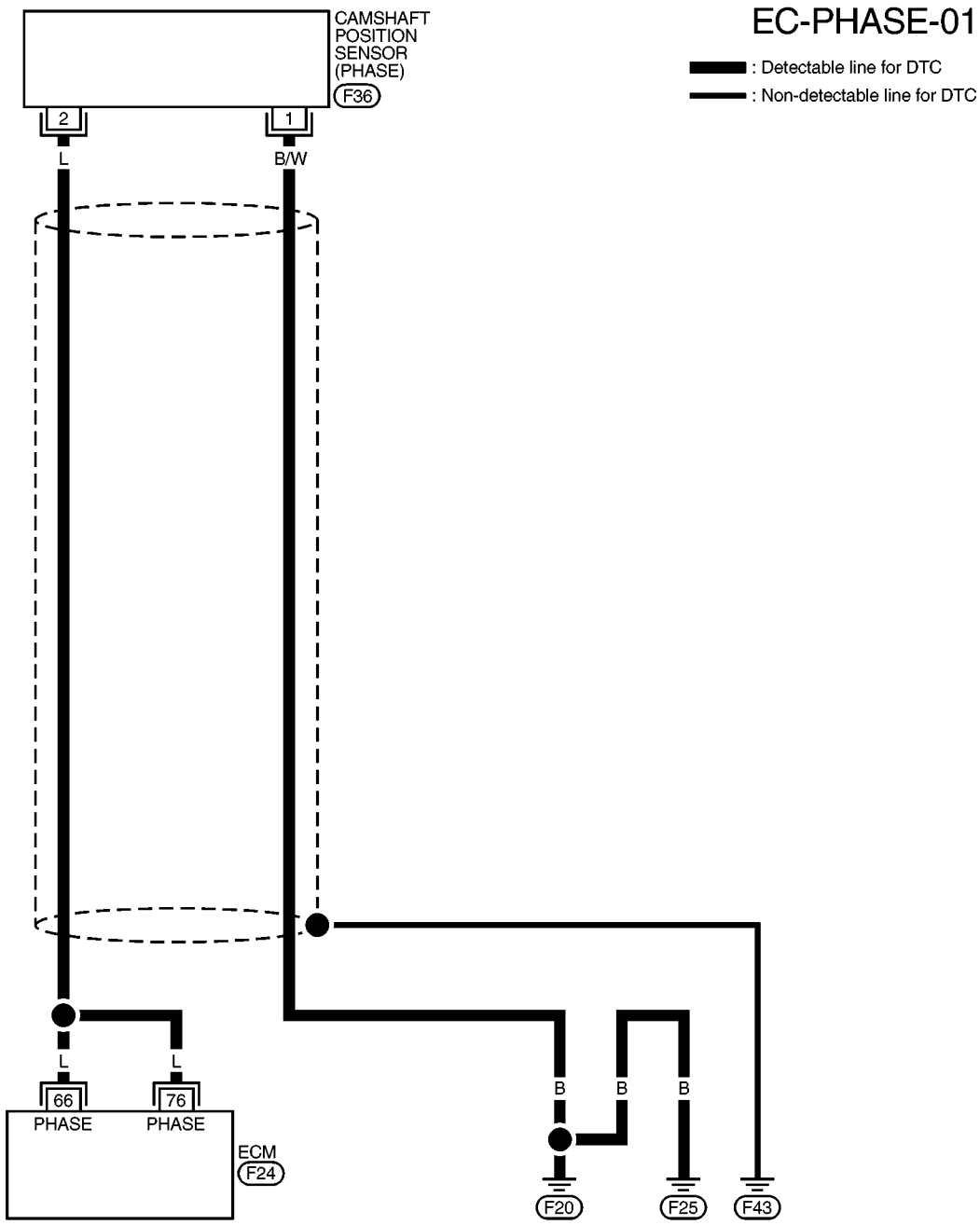
With GST

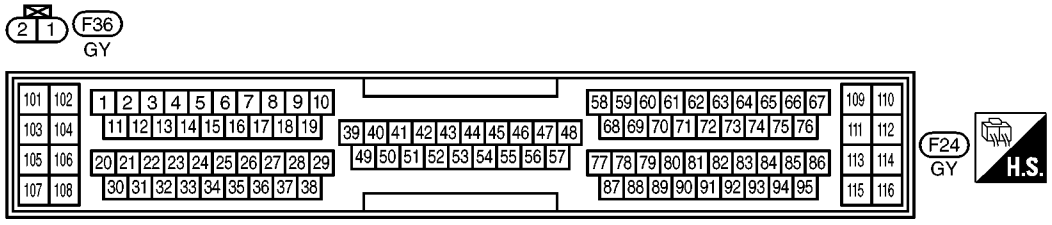
NAEC0200S0202

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NAEC0201



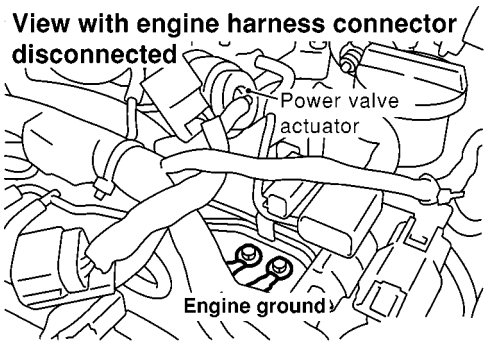


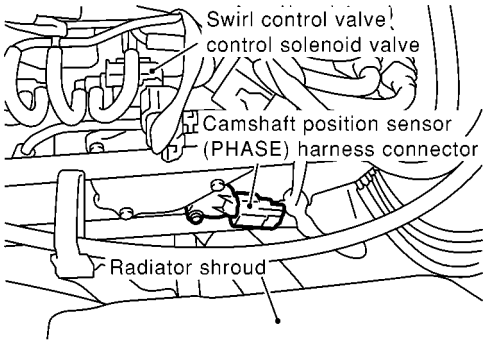
MEC961C

Diagnostic Procedure

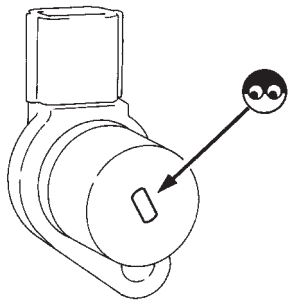
NAEC0202

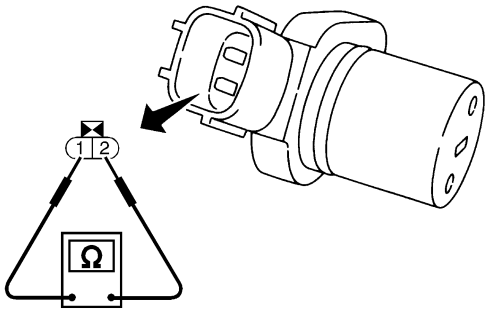
1	CHECK STARTING SYSTEM	
Turn ignition switch to “START” position. **Does the engine turn over?** **Does the starter motor operate?**		
Yes or No		
Yes	▶	GO TO 2.
No	▶	Check starting system. (Refer to SC-10, “STARTING SYSTEM”.)

2	RETIGHTEN GROUND SCREWS	
1. Turn ignition switch “OFF”. 2. Loosen and retighten engine ground screws.		
 SEF959Y		
	▶	GO TO 3.

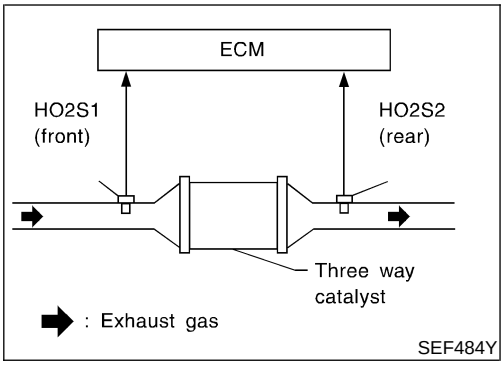
3	CHECK CMPS (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector and CMPS (PHASE) harness connector.		
 SEF982Y		
3. Check harness continuity between CMPS (PHASE) terminal 2 and ECM terminals 66, 76. Refer to Wiring Diagram. **Continuity should exist.** 4. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK CMPS (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT	
1. Check harness continuity between CMPS (PHASE) terminal 1 and engine ground. **Continuity should exist.** 2. Also check harness for short to ground and short to power. **OK or NG**		
OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connector.

5	CHECK CAMSHAFT POSITION SENSOR (PHASE)-I	
1. Loosen the fixing bolt of the camshaft position sensor (PHASE). 2. Remove the CMPS (PHASE). 3. Visually check the CMPS (PHASE) for chipping.  SEF583P **OK or NG**		
OK	▶	GO TO 6.
NG	▶	Replace camshaft position sensor (PHASE).

6	CHECK CAMSHAFT POSITION SENSOR (PHASE)-II	
Check resistance between CMPS (PHASE) terminals 1 and 2 as shown below.  **Resistance:** **Approximately 1,440 - 1,760 Ω at 20°C (68°F) (HITACHI make)** **Approximately 2,090 - 2,550 Ω at 20°C (68°F) (MITSUBISHI make)** SEF325X **OK or NG**		
OK	▶	GO TO 7.
NG	▶	Replace camshaft position sensor (PHASE).

7	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.		
	▶	**INSPECTION END**



On Board Diagnosis Logic

NAEC0214

The ECM monitors the switching frequency ratio of heated oxygen sensors 1 (front) and 2 (rear).

A warm-up three way catalyst with high oxygen storage capacity will indicate a low switching frequency of rear heated oxygen sensor. As oxygen storage capacity decreases, the rear heated oxygen sensor switching frequency will increase.

When the frequency ratio of front and rear heated oxygen sensors approaches a specified limit value, the warm-up three way catalyst malfunction is diagnosed.

Malfunction is detected when warm-up three way catalyst does not operate properly, warm-up three way catalyst does not have enough oxygen storage capacity.

Possible Cause

NAEC0504

- Warm-up three way catalyst
- Exhaust tube
- Intake air leaks
- Injectors
- Injector leaks
- Spark plug
- Improper ignition timing

SRT WORK SUPPORT	
CATALYST	INCMP
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

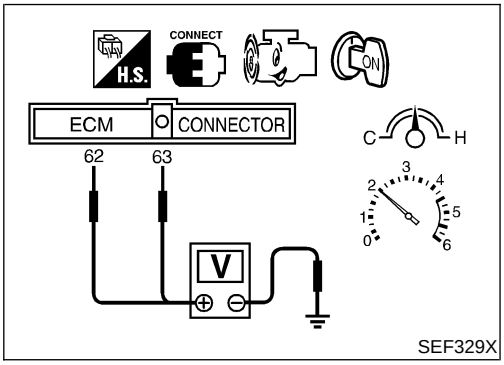
SEF344Z

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

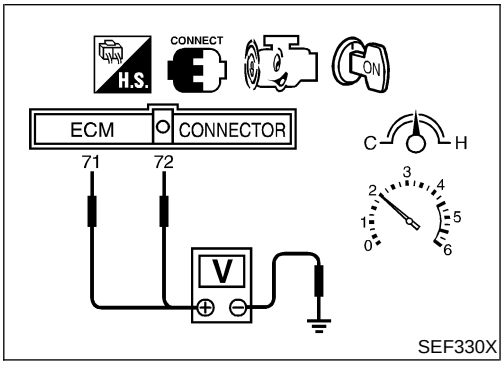
SEF345Z

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF560X



SEF329X



SEF330X

DTC Confirmation Procedure

NAEC0215

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NAEC0215S01

TESTING CONDITION:

- **Open engine hood before conducting the following procedure.**
- **Do not hold engine speed for more than the specified minutes below.**

1) Turn ignition switch "ON".
2) Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-II.
3) Start engine.
4) Rev engine up to 3,000±500 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
5) Wait 5 seconds at idle.
6) Rev engine up to 2,500±500 rpm and maintain it until "INCMP" of CATALYST changes to "CMPLT" (It will take approximately 5 minutes).
   If not "CMPLT", stop engine and cool it down to less than 70°C (158°F) and then retest from step 1.
7) Select "SELF-DIAG RESULTS" mode with CONSULT-II.
8) Confirm that the 1st trip DTC is not detected.
   If the 1st trip DTC is detected, go to "Diagnostic Procedure", EC-344.

Overall Function Check

NAEC0216

Use this procedure to check the overall function of the warm-up three way catalyst. During this check, a 1st trip DTC might not be confirmed.

CAUTION:
Always drive vehicle at a safe speed.

WITH GST

NAEC0216S01

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeters probes between ECM terminals 63 [heated oxygen sensor 1 (front) right bank signal], 62 [heated oxygen sensor 1 (front) left bank signal] and engine ground, and ECM terminals 72 [heated oxygen sensor 2 (rear) right bank signal], 71 [heated oxygen sensor 2 (rear) left bank signal] and engine ground.
4) Keep engine speed at 2,000 rpm constant under no load.
5) Make sure that the voltage switching frequency (high & low) between ECM terminals 72 and engine ground, or 71 and engine ground is very less than that of ECM terminals 63 and engine ground, or 62 and engine ground.
   Switching frequency ratio = A/B

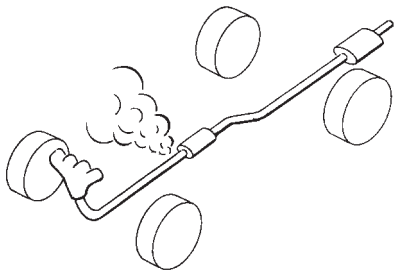
A: Rear heated oxygen sensor voltage switching frequency
B: Front heated oxygen sensor voltage switching frequency
This ratio should be less than 0.75.
If the ratio is greater than above, it means warm-up three way catalyst does not operate properly. Go to "Diagnostic Procedure", EC-344.

NOTE:
If the voltage at terminal 62 or 63 does not switch periodically more than 5 times within 10 seconds at step 5, perform trouble diagnosis for "DTC P0133, P0153" first. (See EC-213.)

Diagnostic Procedure

NAEC0217

1	CHECK EXHAUST SYSTEM	
Visually check exhaust tubes and muffler for dent.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK EXHAUST AIR LEAK	
1. Start engine and run it at idle. 2. Listen for an exhaust air leak before the warm-up three way catalyst.		
 SEF099P		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK IGNITION TIMING

Check the following items. Refer to "Basic Inspection", EC-99.

Items	Specifications
Ignition timing	15° ± 2° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	M/T: 750 ± 50 rpm A/T: 750 ± 50 rpm (in "P" or "N" position)

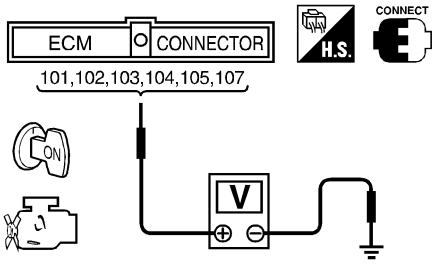
MTBL0537

OK or NG

OK	▶	GO TO 5.
NG	▶	Follow the "Basic Inspection".

5	CHECK INJECTORS

1. Refer to WIRING DIAGRAM for Injectors, EC-613.
2. Stop engine and then turn ignition switch "ON".
3. Check voltage between ECM terminals 101, 102, 103, 104, 105, 107 and ground with CONSULT-II or tester.



Battery voltage should exist.

SEF331X

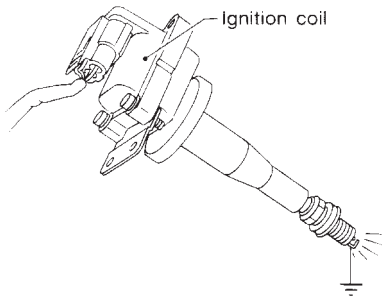
OK or NG

OK	▶	GO TO 6.
NG	▶	Perform "Diagnostic Procedure", "INJECTOR", EC-614.

Diagnostic Procedure (Cont'd)

6	CHECK IGNITION SPARK

1. Turn ignition switch "OFF".
2. Disconnect ignition coil assembly from rocker cover.
3. Connect a known good spark plug to the ignition coil assembly.
4. Place end of spark plug against a suitable ground and crank engine.
5. Check for spark.



SEF575Q

OK or NG

OK	▶	GO TO 7.
NG	▶	Check ignition coil with power transistor and their circuit. Refer to EC-494.

7	CHECK INJECTOR

1. Turn ignition switch "OFF".
2. Remove injector assembly.
   Refer to EC-41.
   Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect all ignition coil harness connectors.
4. Turn ignition switch "ON".
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)	▶	GO TO 8.
NG (Drips.)	▶	Replace the injector(s) from which fuel is dripping.

8	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.

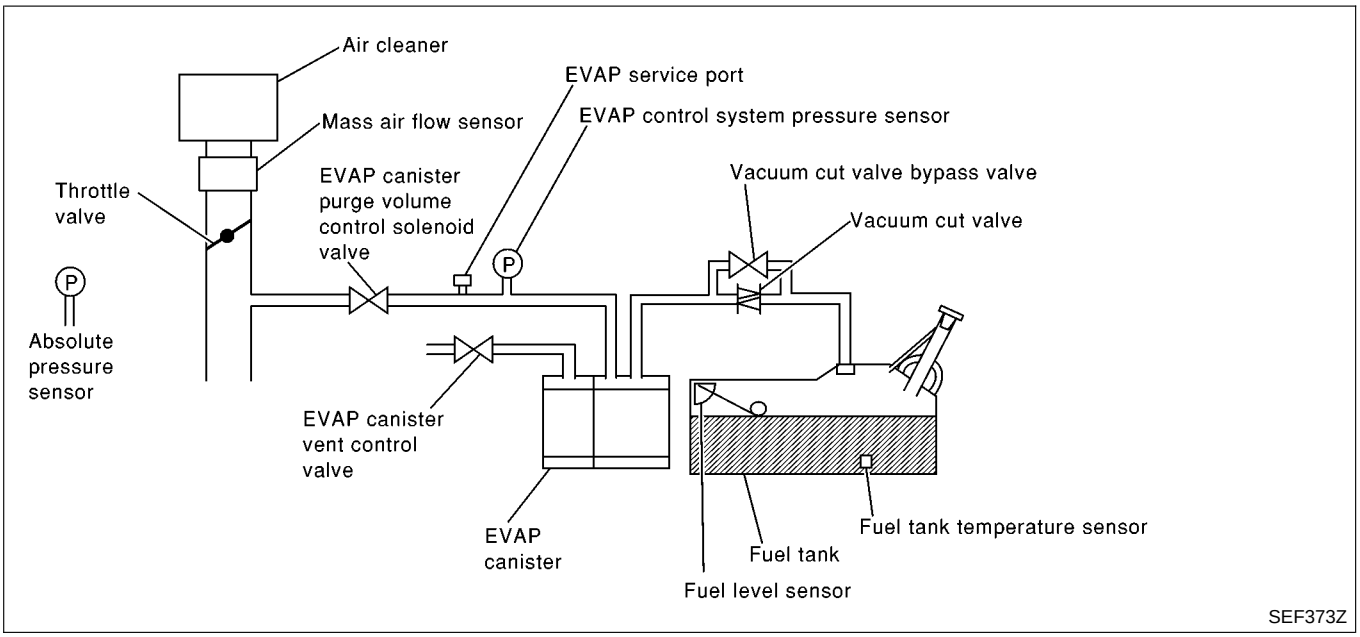
Trouble is fixed.	▶	**INSPECTION END**
Trouble is not fixed.	▶	Replace warm-up three way catalyst.

On Board Diagnosis Logic

NAEC0218

NOTE:
If DTC P0440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-568.)

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.
If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following "Vacuum test" conditions.
The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve is opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

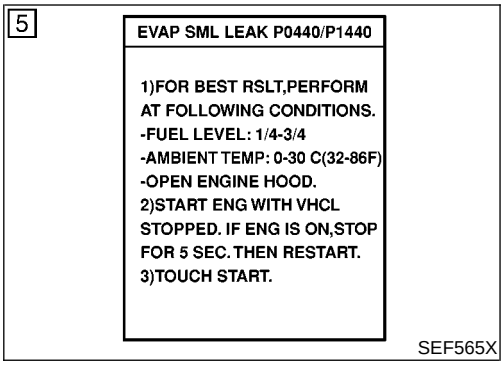
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

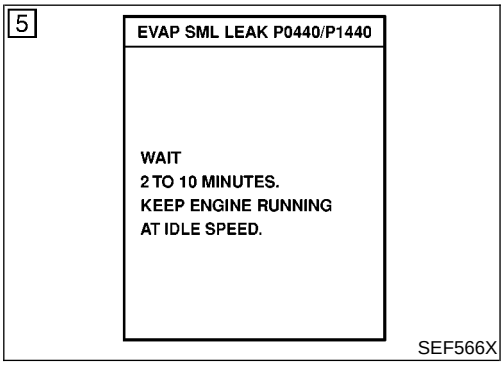
Possible Cause

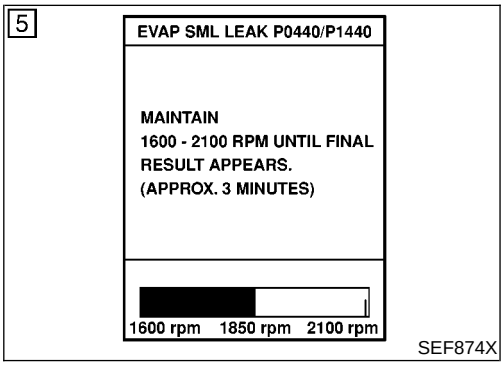
NAEC0510

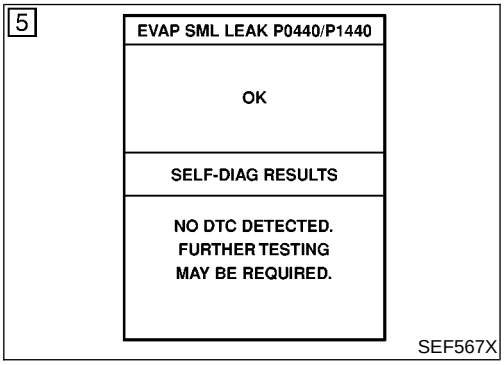
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks

- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- EVAP control system pressure sensor
- Fuel level sensor and the circuit









DTC Confirmation Procedure

NAEC0219

NOTE:

- **If DTC P0440 or P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-568.)**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedure.**

WITH CONSULT-II

NAEC0219S01

1) Turn ignition switch "ON".
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
4) Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 30°C (32 - 86°F)
5) Select "EVAP SML LEAK P0440/P1440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-99.

6) Make sure that "OK" is displayed.
   If "NG" is displayed, refer to "Diagnostic Procedure", EC-350.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

WITH GST

NAEC0219S02

NOTE:

Be sure to read the explanation of "Driving Pattern" on EC-65 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-65.
3) Stop vehicle.
4) Select "MODE 1" with GST.
   - If SRT of EVAP system is not set yet, go to the following step.
   - If SRT of EVAP system is set, the result will be OK.
5) Turn ignition switch "OFF" and wait at least 10 seconds.
6) Start engine.
   It is not necessary to cool engine down before driving.
7) Drive vehicle again according to the "Driving Pattern", EC-65.
8) Stop vehicle.
9) Select "MODE 3" with GST.
   - If P0440 or P1440 is displayed on the screen, go to "Diagnostic Procedure", EC-350.
   - If P1447 is displayed on the screen, go to "Diagnostic Procedure" for DTC P1447, EC-559.

- If P0440, P1440 and P1447 are not displayed on the screen, go to the following step.

10) Select "MODE 1" with GST.

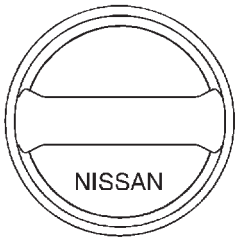
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

NAEC0220

1	CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch "OFF".
2. Check for genuine NISSAN fuel filler cap design.



SEF915U

OK or NG

OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

2	CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK	▶	GO TO 3.
NG	▶	• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. • Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION

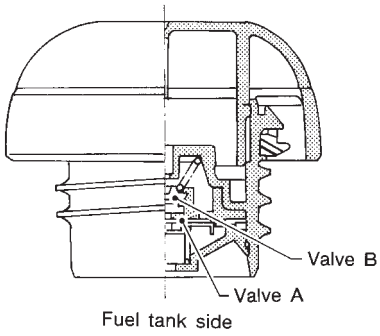
Check for air releasing sound while opening the fuel filler cap.

OK or NG

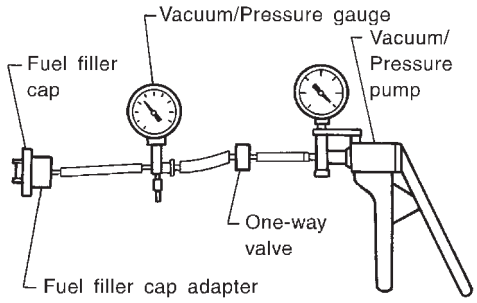
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.



SEF427N



SEF943S

Pressure:
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

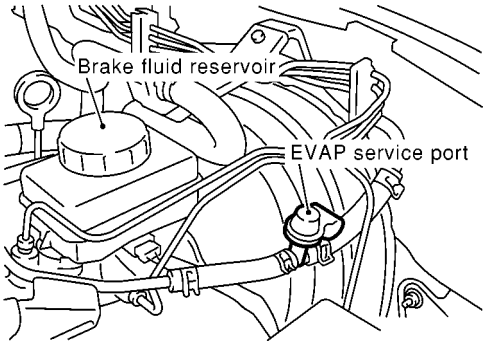
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

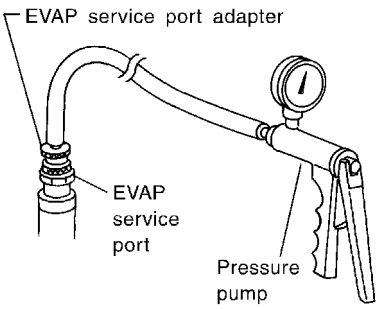
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEF983Y



SEF916U

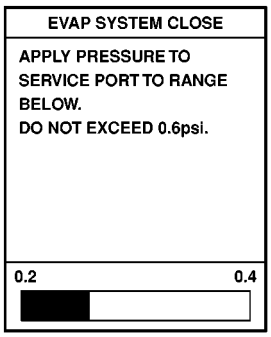
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶	GO TO 6.
Models without CONSULT-II ▶	GO TO 7.

6	CHECK FOR EVAP LEAK

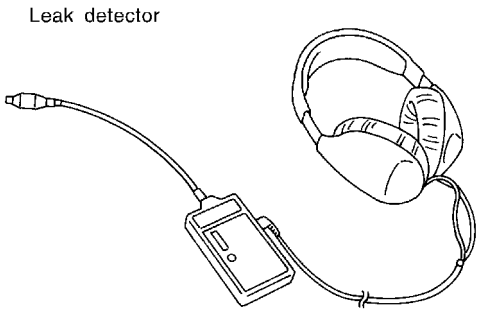
With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.



SEF200U

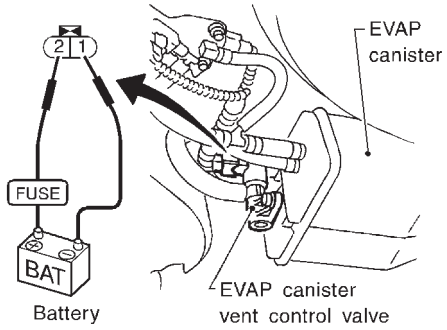
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

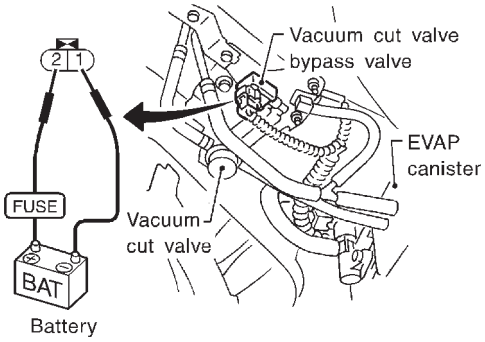
Without CONSULT-II

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



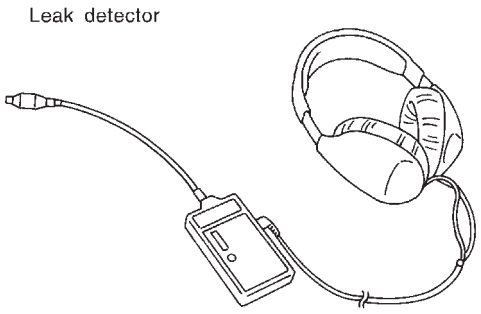
SEF598U

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



SEF599U

4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**
5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.



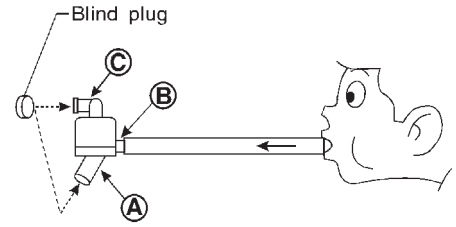
SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

8	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



* Ⓐ: Bottom hole (To atmosphere)
Ⓑ: Emergency tube (From EVAP canister)
Ⓒ: Inlet port (To member)

SEF829T

5. In case of NG in items 2 - 4, replace the parts.

NOTE:
- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

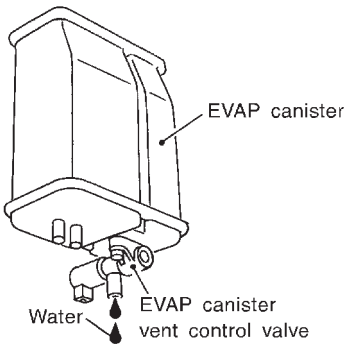
Refer to "DTC Confirmation Procedure", EC-370.

OK or NG

OK	▶	GO TO 10.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?



SEF596U

Yes or No

Yes	▶	GO TO 11.
No (With CONSULT-II)	▶	GO TO 13.
No (Without CONSULT-II)	▶	GO TO 14.

11	CHECK EVAP CANISTER
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).** **OK or NG**	
OK (With CONSULT-II) ▶	GO TO 13.
OK (Without CONSULT-II) ▶	GO TO 14.
NG ▶	GO TO 12.

12	DETECT MALFUNCTIONING PART
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

Vacuum should exist.

SEF984Y

OK or NG

OK ▶	GO TO 16.
NG ▶	GO TO 15.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK ▶	GO TO 17.
NG ▶	GO TO 15.

15	CHECK VACUUM HOSE
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-26.	
OK or NG	
OK (With CONSULT-II) ▶	GO TO 16.
OK (Without CONSULT-II) ▶	GO TO 17.
NG ▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

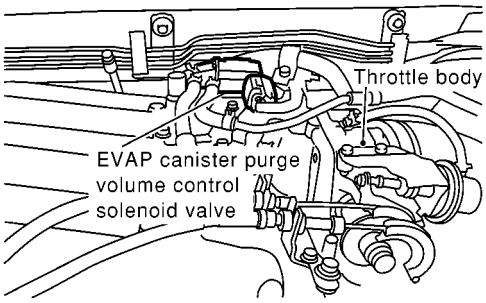
OK or NG

OK ▶	GO TO 18.
NG ▶	GO TO 17.

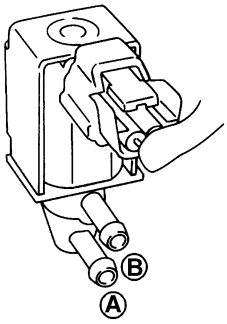
17	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF986Y

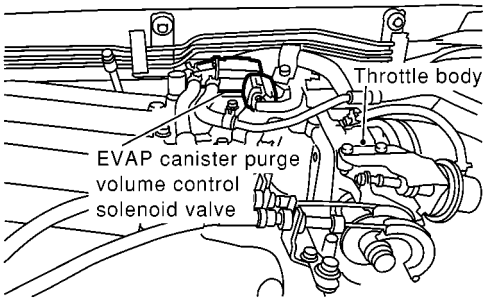


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

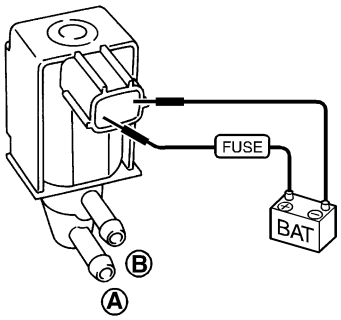
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF986Y



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

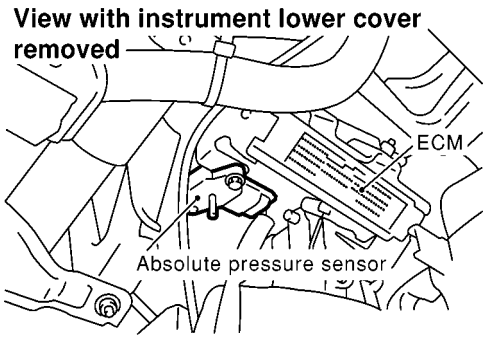
SEF335X

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

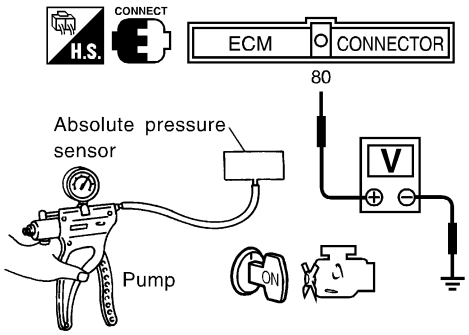
18	CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.



SEF961Y

2. Remove hose from absolute pressure sensor.
3. Install a vacuum pump to absolute pressure sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 80 and engine ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	1.0 to 1.4 lower than above value

SEF300XA

CAUTION:

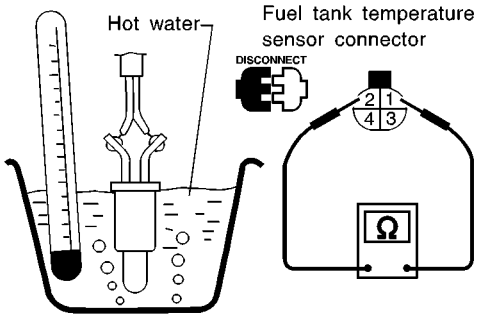
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (–700 mmHg, –27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace absolute pressure sensor.

19	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 2 by heating with hot water or heat gun as shown in the figure.



Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

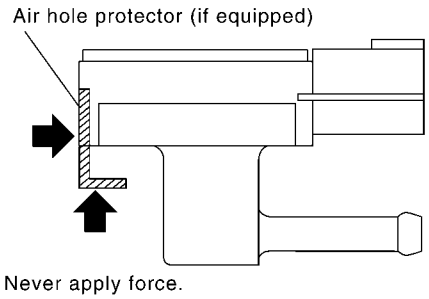
SEF974Y

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace fuel level sensor unit.

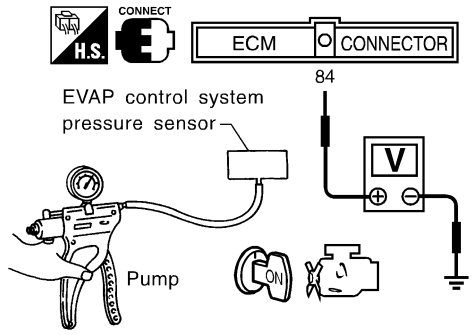
20	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   CAUTION:
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
   CAUTION:
   - **Always calibrate the vacuum pump gauge when using it.**
   - **Do not apply below −20 kPa (−150 mmHg, −5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**
5. Check input voltage between ECM terminal 84 and ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
−9.3 kPa (−70 mmHg, −2.76 inHg)	0.4 - 0.6

SEF342X

CAUTION:
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5m (19.7in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 21.
NG	▶	Replace EVAP control system pressure sensor.

21	CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to "Evaporative Emission System", EC-32.

OK or NG

OK	▶	GO TO 22.
NG	▶	Repair or reconnect the hose.

22	CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

▶ GO TO 23.

23	CHECK FUEL LEVEL SENSOR	
Refer to EL-128, "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 24.
NG	▶	Replace fuel level sensor unit.

24	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.		
	▶	**INSPECTION END**

Description

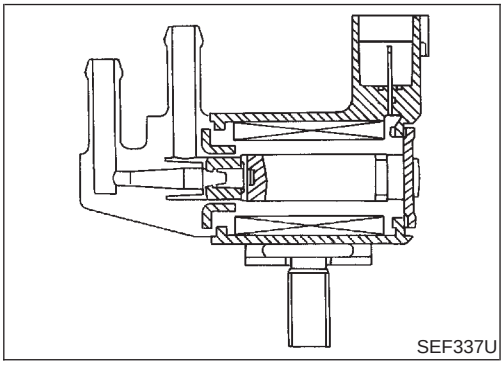
NAEC0221

SYSTEM DESCRIPTION

NAEC0221S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.


SEF337U

COMPONENT DESCRIPTION

NAEC0221S02

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0222

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	• Engine: After warming up • Air conditioner switch “OFF” • Shift lever: “N” • No-load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

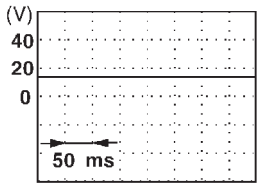
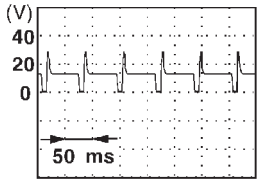
ECM Terminals and Reference Value

NAEC0666

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine).	BATTERY VOLTAGE (11 - 14V)  SEF995U

On Board Diagnosis Logic

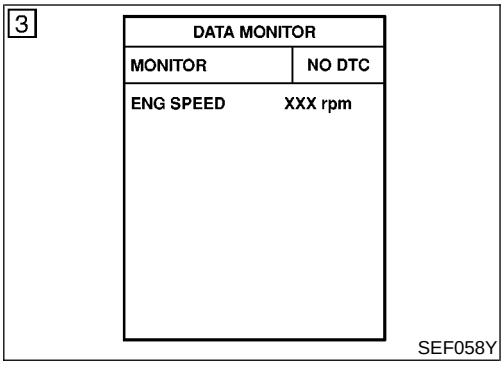
NAEC0224

Malfunction is detected when an improper voltage signal is sent to ECM through the valve.

Possible Cause

NAEC0511

- Harness or connectors
  (The valve circuit is open or shorted.)
- EVAP canister purge volume control solenoid valve



DTC Confirmation Procedure

NAEC0225

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.

WITH CONSULT-II

NAEC0225S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and let it idle for at least 13 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-366.

WITH GST

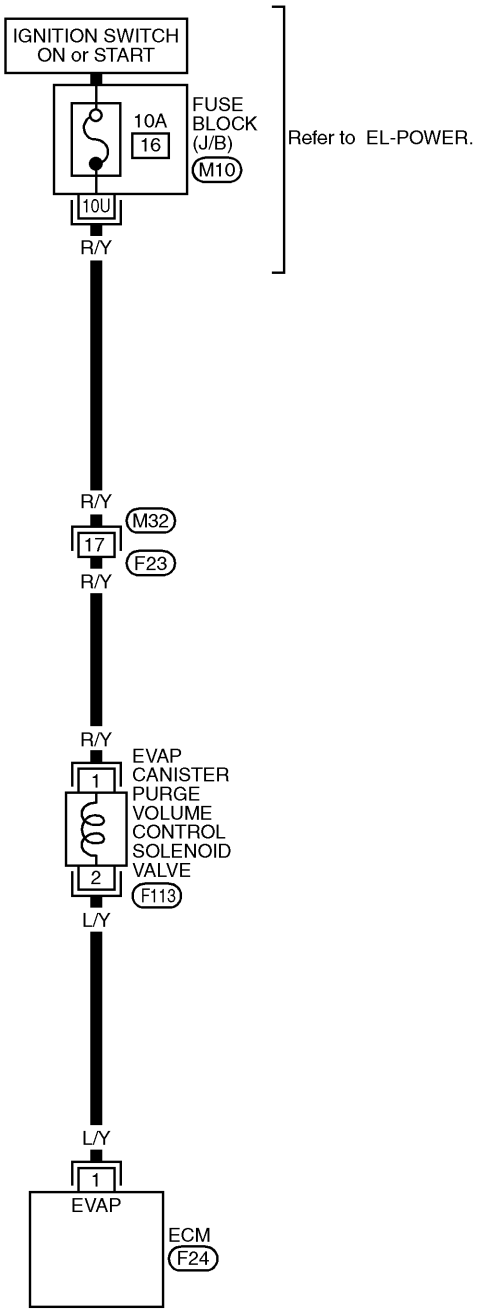
NAEC0225S02

Follow the proocedure “WITH CONSULT-II” above.

Wiring Diagram

NAEC0226

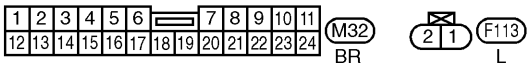
EC-PGC/V-01

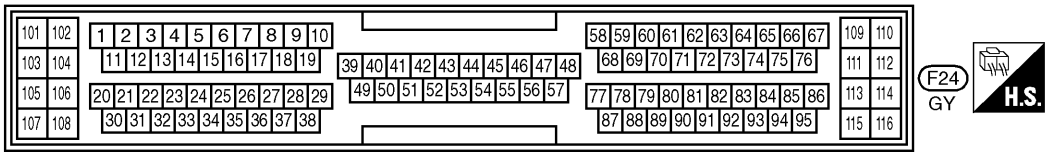


: Detectable line for DTC

: Non-detectable line for DTC

REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)





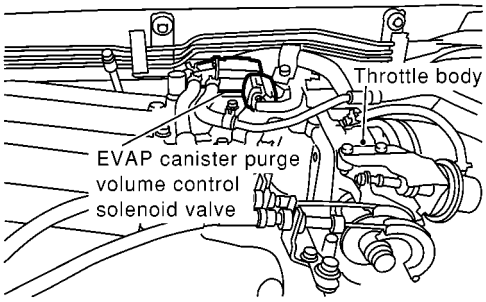
MEC962C

Diagnostic Procedure

NAEC0227

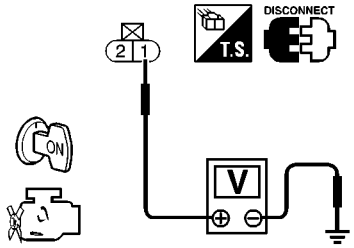
1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



SEF986Y

3. Turn ignition switch “ON”.
4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF988Y

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M32, F23
- Fuse block (J/B) connector M10
- 10A fuse
- Harness for open or short between EVAP canister purge volume control solenoid valve and fuse

	▶	Repair harness or connectors.

3	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 1 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK (With CONSULT-II)	▶	GO TO 4.
OK (Without CONSULT-II)	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground and short to power in harness or connetors.

4	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

OK or NG

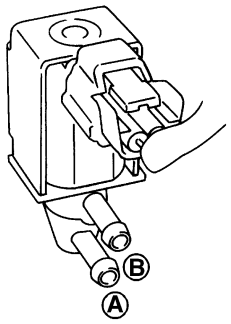
OK	▶	GO TO 6.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

5	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

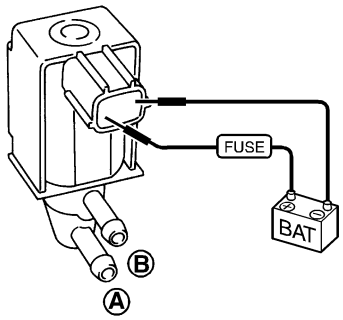


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



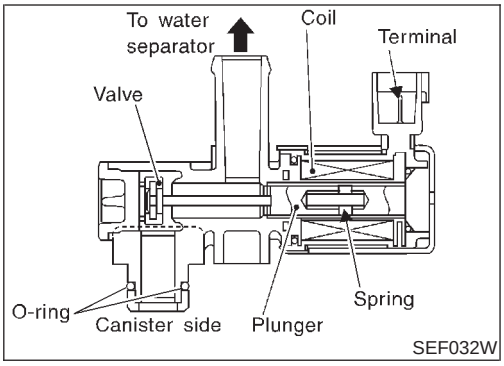
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

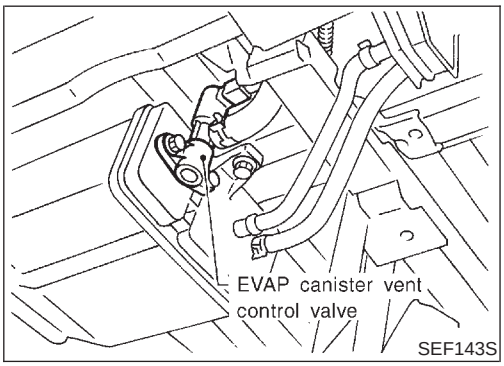
SEF335X

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**





Component Description

NAEC0228

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0229

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NAEC0667

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
40	G/Y	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC0231

Malfunction is detected when an improper voltage signal is sent to ECM through EVAP canister vent control valve.

Possible Cause

NAEC0512

- Harness or connectors
  (The valve circuit is open or shorted.)
- EVAP canister vent control valve

DTC Confirmation Procedure

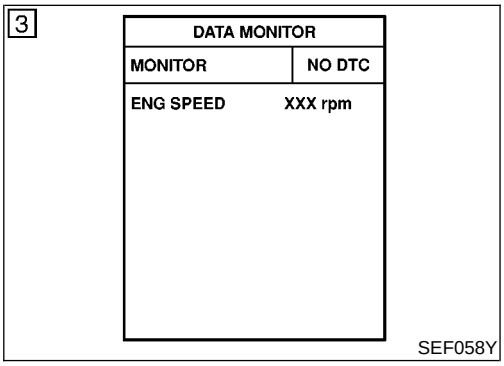
NAEC0232

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.



WITH CONSULT-II

NAEC0232S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and wait at least 8 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-372.

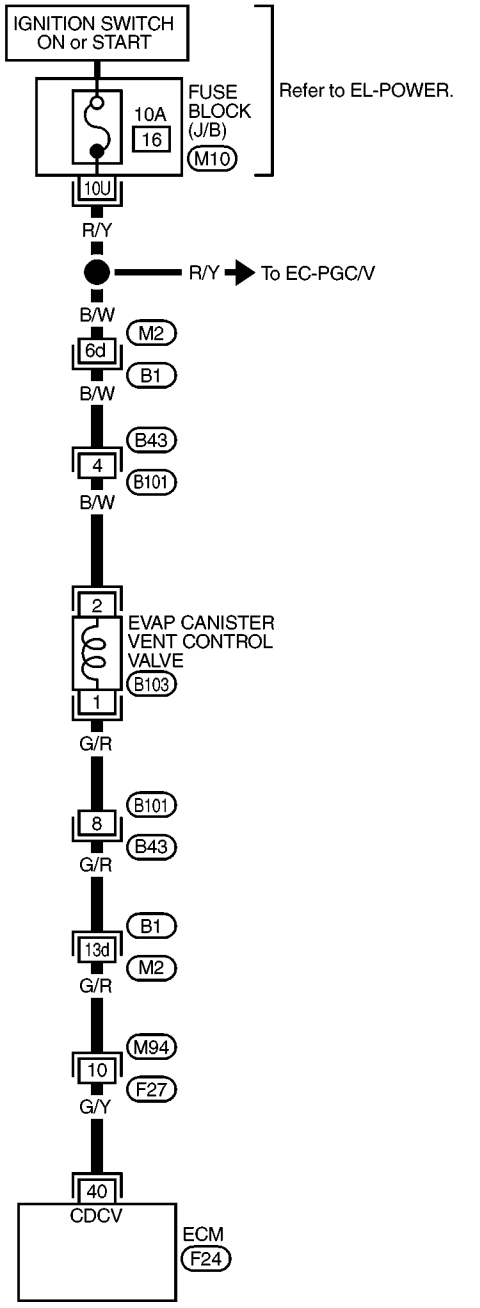
WITH GST

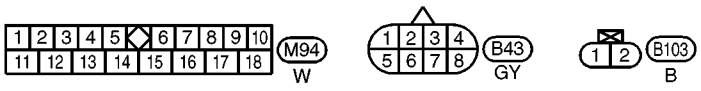
NAEC0232S02

Follow the procedure “WITH CONSULT-II” above.

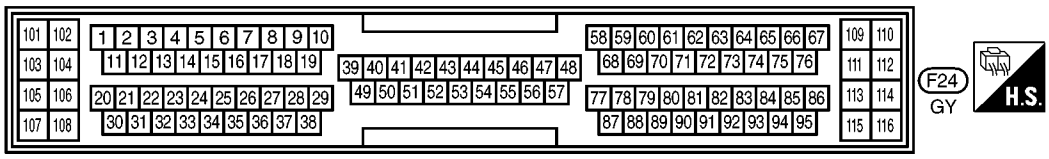
Wiring Diagram

NAEC0233





REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK-JUNCTION BOX (J/B)



MEC963C

Diagnostic Procedure

NAEC0234

1	INSPECTION START
1. Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch “OFF” and then turn “ON”.
2. Select “VENT CONTROL/V” in “ACTIVE TEST” mode with CONSULT-II.
3. Touch “ON/OFF” on CONSULT-II screen.

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

SEF989Y

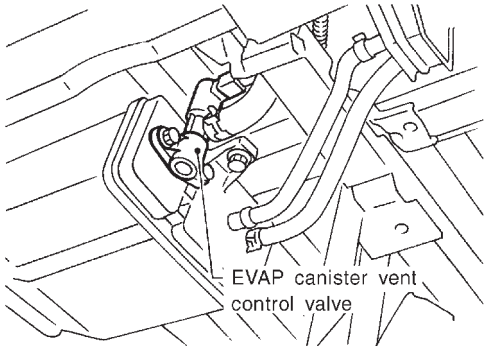
4. Check for operating sound of the valve.
   Clicking noise should be heard.

OK or NG

OK ▶	GO TO 7.
NG ▶	GO TO 3.

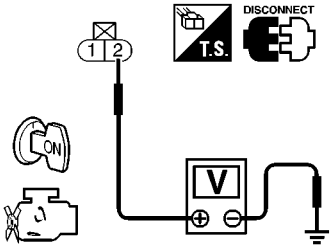
3	CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect EVAP canister vent control valve harness connector.



SEF143S

3. Turn ignition switch "ON".
4. Check voltage between EVAP canister vent control valve terminal 2 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF990Y

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M2, B1 and B43, B101
- Fuse block (J/B) connector M10
- 10A fuse
- Harness for open or short between EVAP canister vent control valve and fuse

	▶	Repair harness or connectors.

5	CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 40 and EVAP canister vent control valve terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

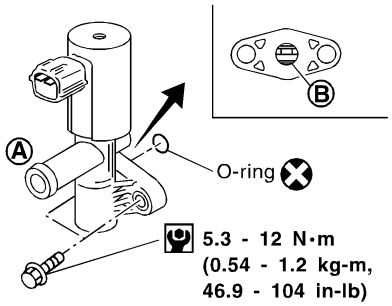
OK	▶	GO TO 7.
NG	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B101, B43 ● Harness connectors B1, M2 and M94, F27 ● Harness for open or short between EVAP canister vent control valve and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK RUBBER TUBE FOR CLOGGING
1. Disconnect rubber tube connected to EVAP canister vent control valve. 2. Check the rubber tube for clogging.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Clean the rubber tube using an air blower.

8	CHECK EVAP CANISTER VENT CONTROL VALVE-I
1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion **B** of EVAP canister vent control valve for being rusted.	



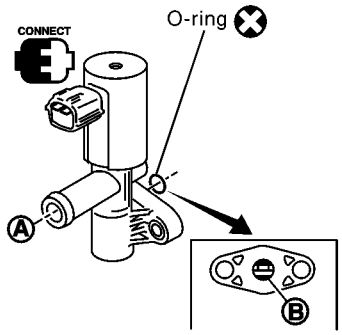
SEF337X

OK or NG	
OK ▶	GO TO 9.
NG ▶	Replace EVAP canister vent control valve.

9	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch "ON".
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

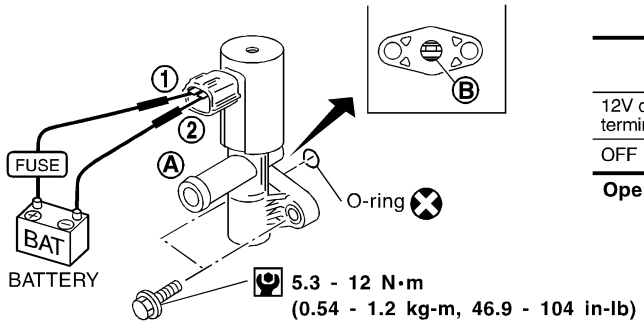
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF991Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

SEF339X

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

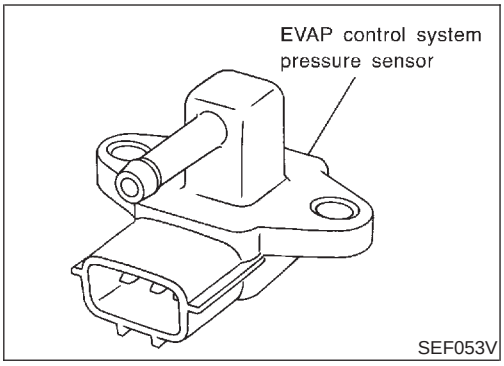
10	CHECK EVAP CANISTER VENT CONTROL VALVE-III

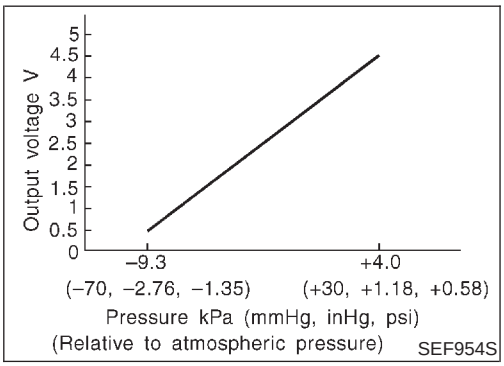
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 9 again.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**





Component Description

NAEC0235

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases. The EVAP control system pressure sensor is not used to control the engine system. It is used only for on board diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0236

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 3.4V

ECM Terminals and Reference Value

NAEC0668

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
58	B/P	Sensors' ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
84	L/G	EVAP control system pressure sensor	**[Ignition switch "ON"]**	Approximately 3.4V
111	P/B	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V

On Board Diagnosis Logic

NAEC0238

Malfunction is detected when an improper voltage signal from EVAP control system pressure sensor is sent to ECM.

Possible Cause

NAEC0513

- Harness or connectors
  (The EVAP control system pressure sensor circuit is open or shorted.)
- Rubber hose to EVAP control system pressure sensor is clogged, vent, kinked, disconnected or improper connection.
- EVAP control system pressure sensor
- EVAP canister vent control valve
- EVAP canister purge volume control solenoid valve
- EVAP canister
- Rubber hose from EVAP canister vent control valve to water separator

DTC Confirmation Procedure

NAEC0239

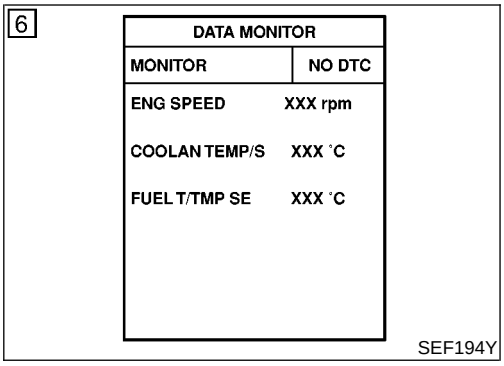
NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

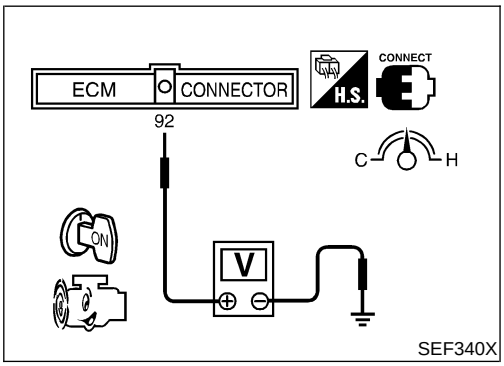
TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

DTC Confirmation Procedure (Cont'd)



SEF194Y



SEF340X

WITH CONSULT-II

NAEC0239S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Turn ignition switch "ON".
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Make sure that "FUEL T/TEMP SE" is more than 0°C (32°F).
6) Start engine and wait at least 20 seconds.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-380.

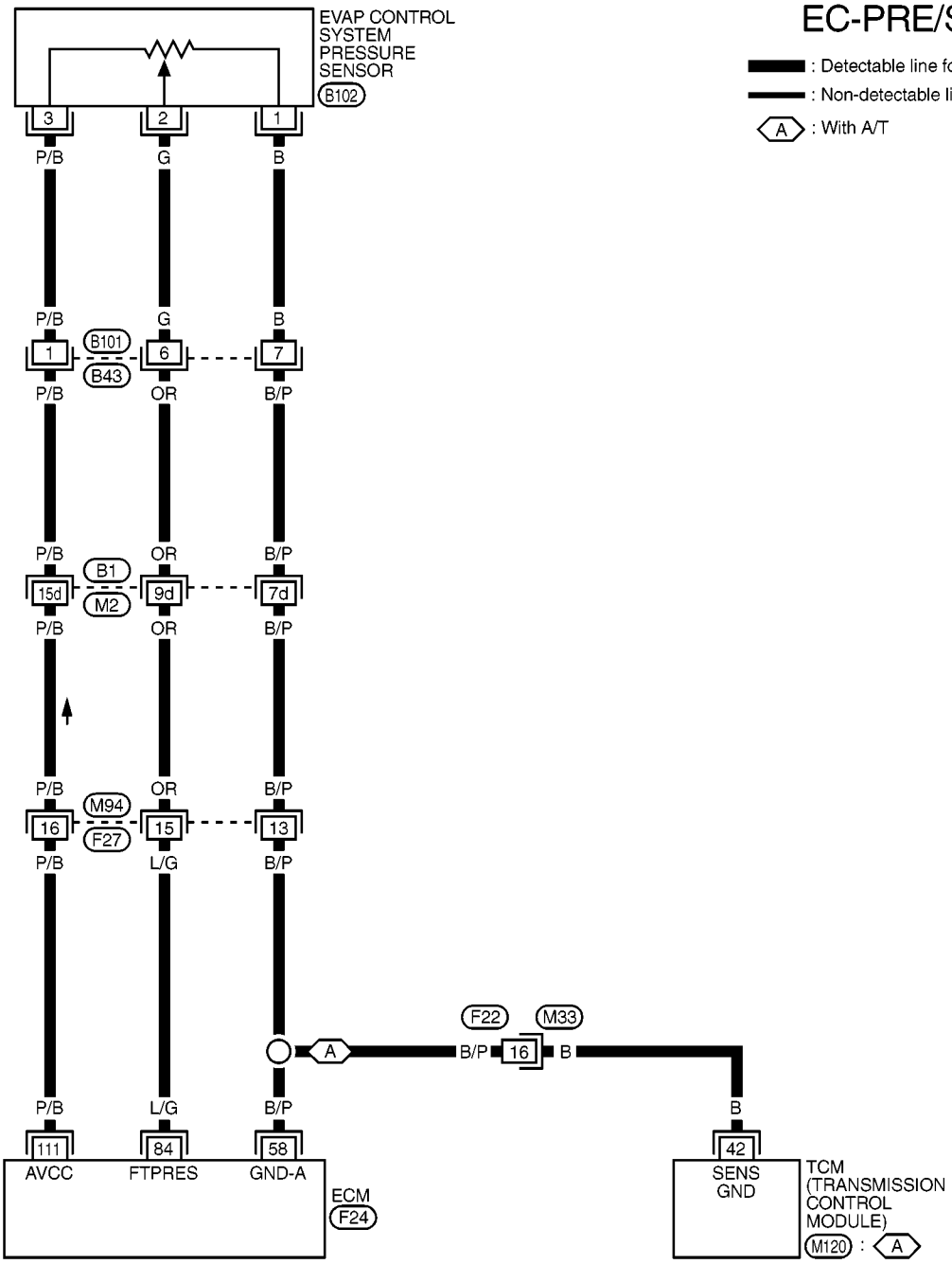
WITH GST

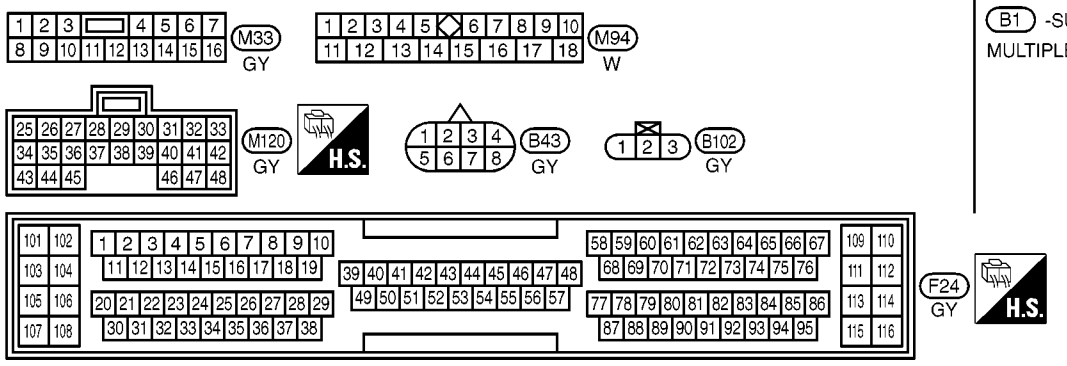
NAEC0239S02

1) Start engine and warm it up to normal operating temperature.
2) Check that voltage between ECM terminal 92 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3) Turn ignition switch "OFF" and wait at least 10 seconds.
4) Start engine and wait at least 20 seconds.
5) Select "MODE 7" with GST.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-380.

Wiring Diagram

NAEC0240





REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)

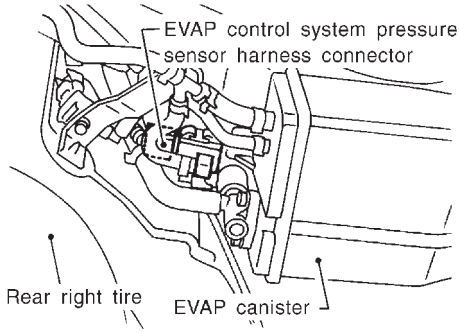
MEC017D

Diagnostic Procedure

NAEC0241

1	CHECK RUBBER TUBE

1. Turn ignition switch “OFF”.
2. Check rubber tube connected to the EVAP control system pressure sensor for clogging, vent, kink, disconnection or improper connection.



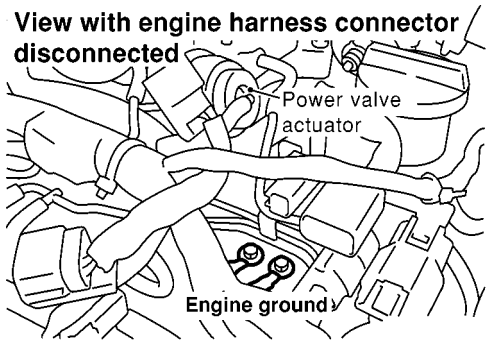
SEF495R

OK or NG

OK	▶	GO TO 2.
NG	▶	Reconnect, repair or replace.

2	RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.



SEF959Y

	▶	GO TO 3.

3	CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

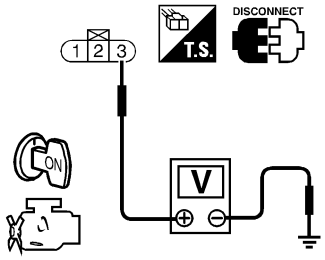
Water should not exist.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace harness connector.

4	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "ON".
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF992Y

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B101, B43
- Harness connectors B1, M2 and M94, F27
- Harness for open or short between EVAP control system pressure sensor and ECM

	▶	Repair harness or connectors.

6	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between EVAP control system pressure sensor terminal 1 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B101, B43
- Harness connectors B1, M2 and M94, F27
- Harness for open or short between EVAP control system pressure sensor and ECM
- Harness for open or short between EVAP control system pressure sensor and TCM (Transmission Control Module)

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 84 and EVAP control system pressure sensor terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK (With CONSULT-II)	▶	GO TO 10.
OK (Without CONSULT-II)	▶	GO TO 11.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B101, B43
- Harness connectors B1, M2 and M94, F27
- Harness for open or short between ECM and EVAP control system pressure sensor

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II
1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

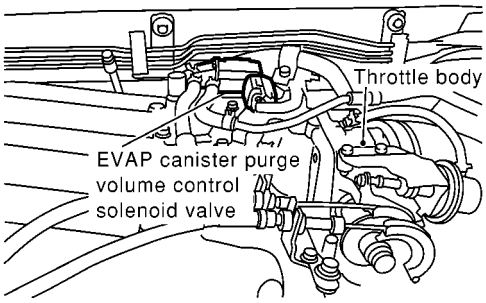
OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 11.

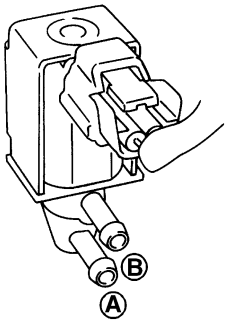
11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF986Y

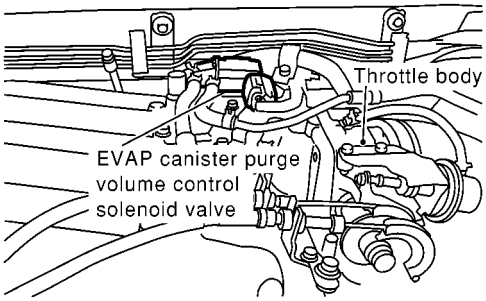


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

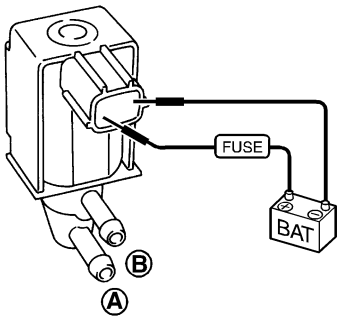
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF986Y



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

Diagnostic Procedure (Cont'd)

12	CHECK RUBBER TUBE FOR CLOGGING

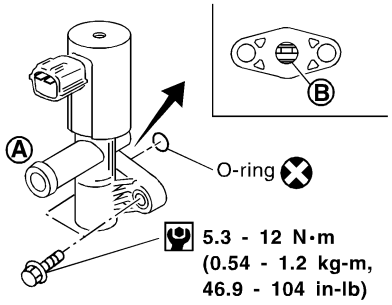
1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK	▶	GO TO 13.
NG	▶	Clean the rubber tube using an air blower.

13	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF337X

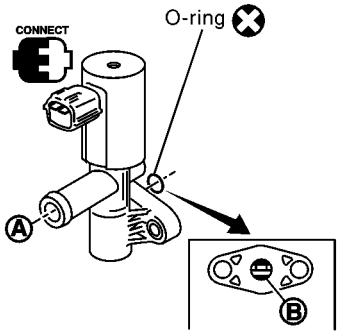
OK or NG

OK	▶	GO TO 14.
NG	▶	Replace EVAP canister vent control valve.

14	CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

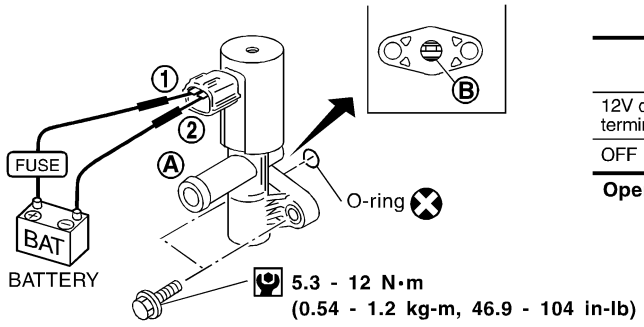
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF991Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

SEF339X

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

15	CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 14 again.

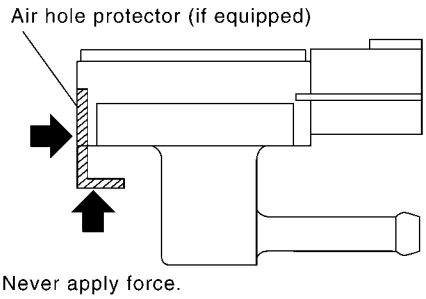
OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister vent control valve.

Diagnostic Procedure (Cont'd)

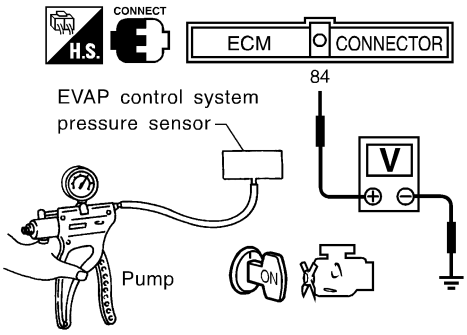
16	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   CAUTION:
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
   CAUTION:
   - **Always calibrate the vacuum pump gauge when using it.**
   - **Do not apply below −20 kPa (−150 mmHg, −5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**
5. Check input voltage between ECM terminal 84 and ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
–9.3 kPa (–70 mmHg, –2.76 inHg)	0.4 - 0.6

SEF342X

CAUTION:
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace EVAP control system pressure sensor.

17	CHECK RUBBER TUBE

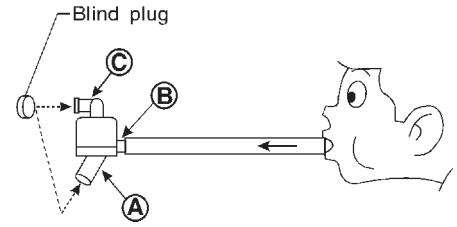
Check obstructed rubber tube connected to EVAP canister vent control valve.

OK or NG

OK	▶	GO TO 18.
NG	▶	Clean rubber tube using an air blower, repair or replace rubber tube.

18	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



* Ⓐ: Bottom hole (To atmosphere)
Ⓑ: Emergency tube (From EVAP canister)
Ⓒ: Inlet port (To member)

SEF829T

5. In case of NG in items 2 - 4, replace the parts.

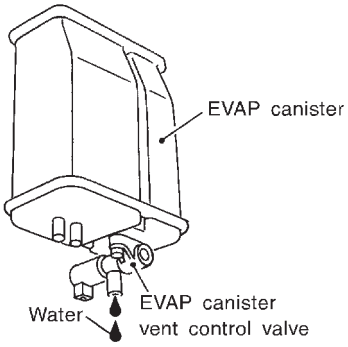
NOTE:
- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace water separator.

19	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes	▶	GO TO 20.
No	▶	GO TO 22.

20	CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK	▶	GO TO 22.
NG	▶	GO TO 21.

Diagnostic Procedure (Cont'd)

21	DETECT MALFUNCTIONING PART
Check the following. • EVAP canister for damage • EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

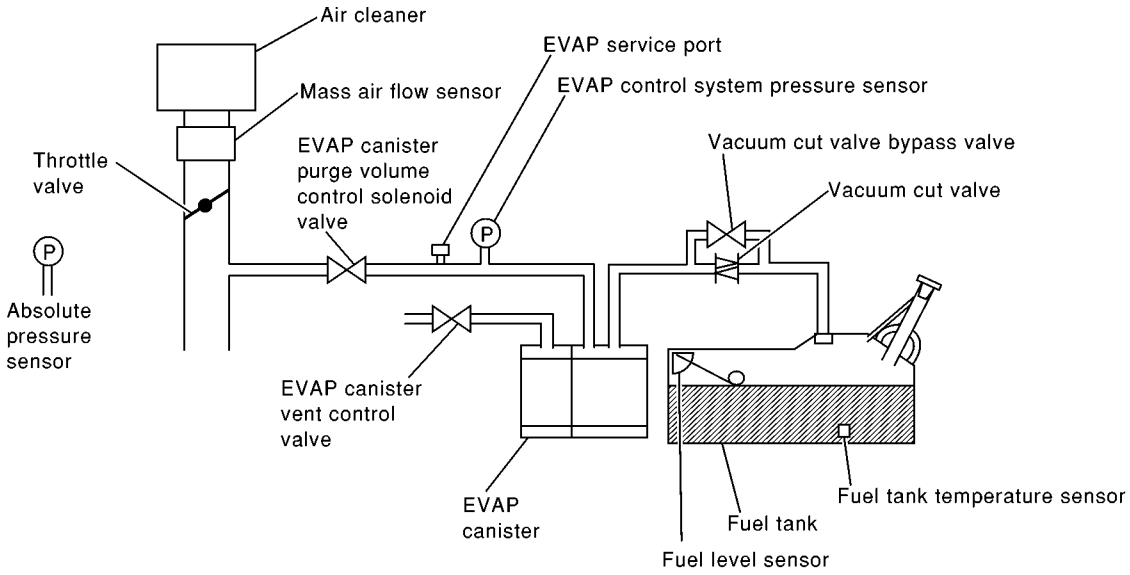
22	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NAEC0644

NOTE:
If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-568.)

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.



SEF373Z

Malfunction is detected when EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly.

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

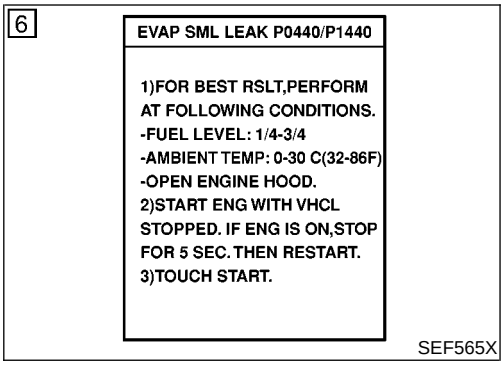
Possible Cause

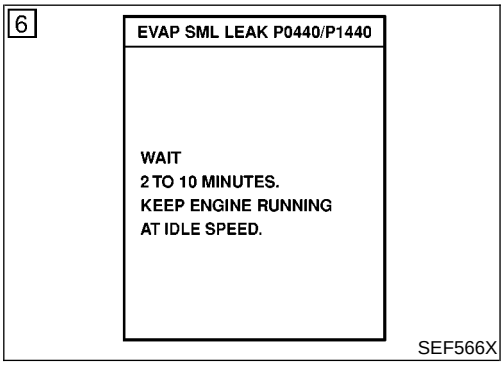
NAEC0645

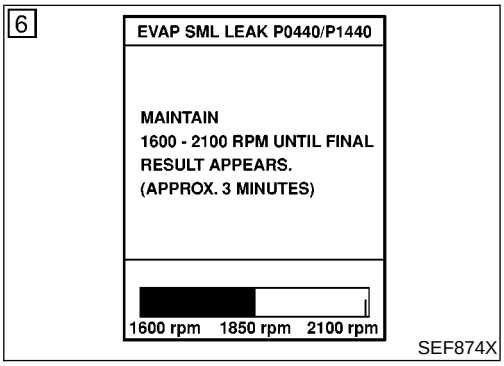
- Fuel filler cap remains open or fails to close.
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks

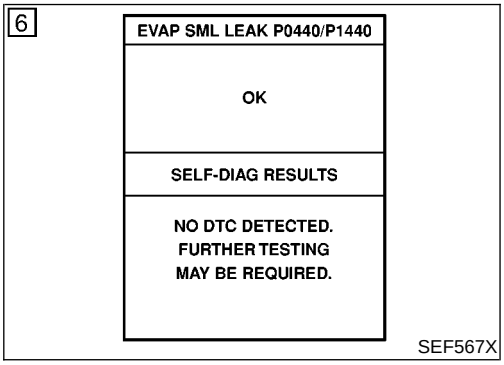
Possible Cause (Cont'd)

- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- EVAP control system pressure sensor









DTC Confirmation Procedure

NAEC0646

CAUTION:

Never remove fuel filler cap during the DTC Confirmation Procedure.

NOTE:

- **If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-568.)**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedures.**

WITH CONSULT-II

NAEC0646S01

1) Tighten fuel filler cap securely until ratcheting sound is heard.
2) Turn ignition switch "ON".
3) Turn ignition switch "OFF" and wait at least 10 seconds.
4) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
5) Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 60°C (32 - 140°F)
6) Select "EVAP SML LEAK P0440/P1440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-99.

7) Make sure that "OK" is displayed.
   If "NG" is displayed, select "SELF-DIAG RESULTS" mode and make sure that "EVAP GROSS LEAK [P0455]" is displayed. If it is displayed, refer to "Diagnostic Procedure", EC-392.
   If P0440 is displayed, perform "Diagnostic Procedure" for DTC P0440.

WITH GST

NAEC0646S02

NOTE:

Be sure to read the explanation of "Driving Pattern" on EC-65 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-65.
3) Stop vehicle.
4) Select "MODE 1" with GST.
   - If SRT of EVAP system is not set yet, go to the following step.
   - If SRT of EVAP system is set, the result will be OK.
5) Turn ignition switch "OFF" and wait at least 10 seconds.
6) Start engine.
   It is not necessary to cool engine down before driving.
7) Drive vehicle again according to the "Driving Pattern", EC-65.
8) Stop vehicle.

9) Select "MODE 3" with GST.
- If P0455 is displayed on the screen, go to "Diagnostic Procedure", EC-392.
- If P0440 or P1440 is displayed on the screen, go to "Diagnostic Procedure", for DTC P0440, EC-350.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure" for DTC P1447, EC-559.
- If P0455, P0440, P1440 and P1447 are not displayed on the screen, go to the following step.

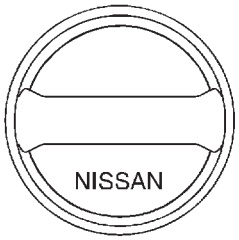
10) Select "MODE 1" with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

NAEC0647

1	CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch "OFF".
2. Check for genuine NISSAN fuel filler cap design.



SEF915U

OK or NG

OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

2	CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

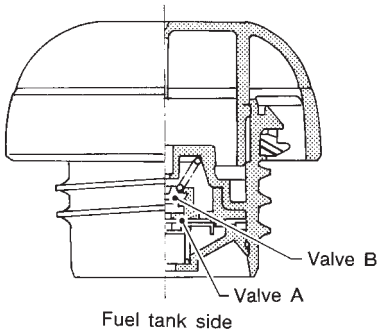
OK or NG

OK	▶	GO TO 3.
NG	▶	• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. • Retighten until ratcheting sound is heard.

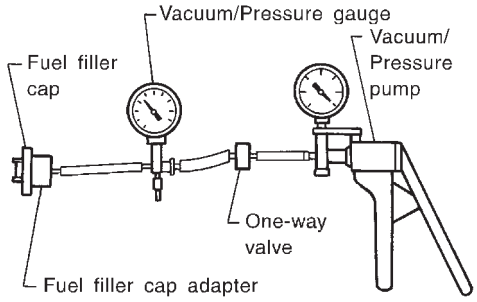
3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE	

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.



SEF427N



SEF943S

Pressure:
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

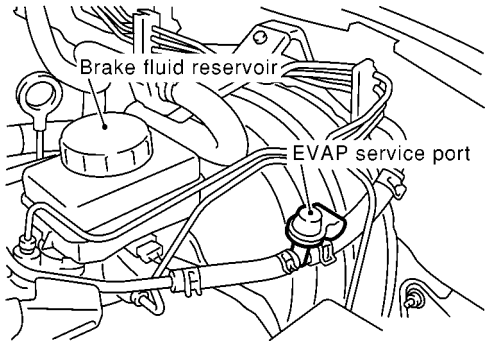
5	CHECK EVAP PURGE LINE	
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. Refer to "Evaporative Emission System", EC-32.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Repair or reconnect the hose.

6	CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.	
▶	GO TO 7.

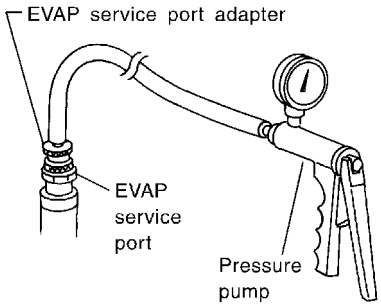
7	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT
Refer to "DTC Confirmation Procedure", EC-370.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

8	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEF983Y



SEF916U

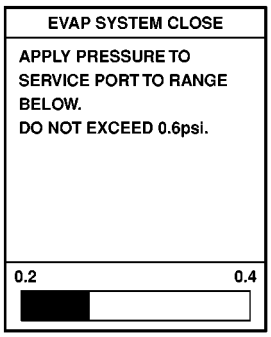
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶	GO TO 9.
Models without CONSULT-II ▶	GO TO 10.

9	CHECK FOR EVAP LEAK

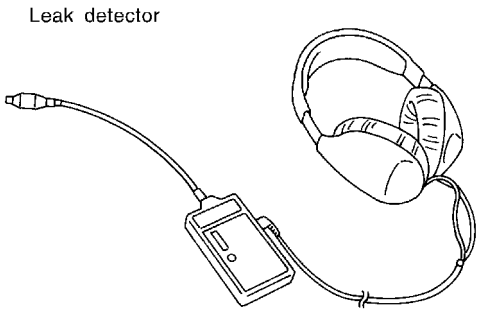
With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.



SEF200U

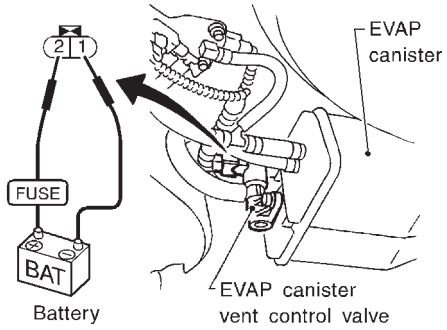
OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace.

10	CHECK FOR EVAP LEAK

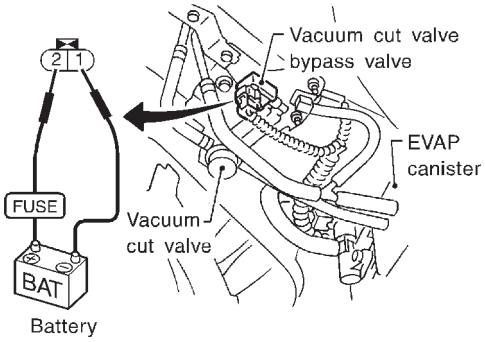
Without CONSULT-II

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



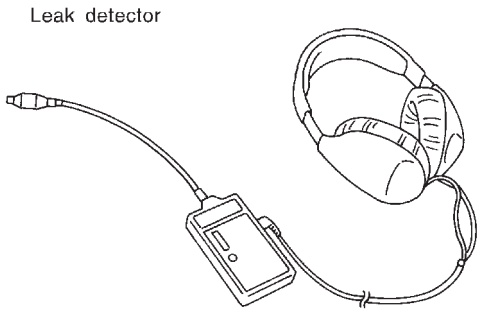
SEF598U

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



SEF599U

4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**
5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.



SEF200U

OK or NG

OK	▶	GO TO 12.
NG	▶	Repair or replace.

11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

Vacuum should exist.

SEF984Y

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

12	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 13.

13	CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-26.

OK or NG

OK (With CONSULT-II)	▶	GO TO 14.
OK (Without CONSULT-II)	▶	GO TO 15.
NG	▶	Repair or reconnect the hose.

Diagnostic Procedure (Cont'd)

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

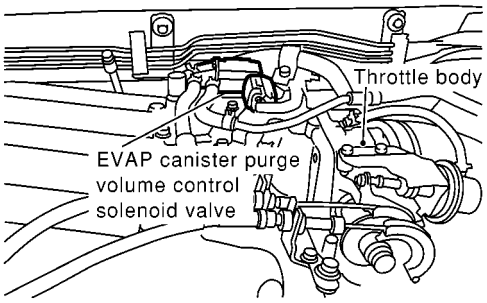
OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

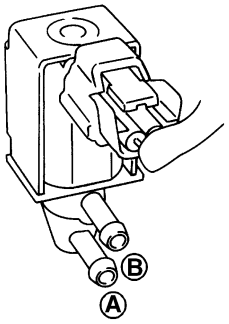
15	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF986Y

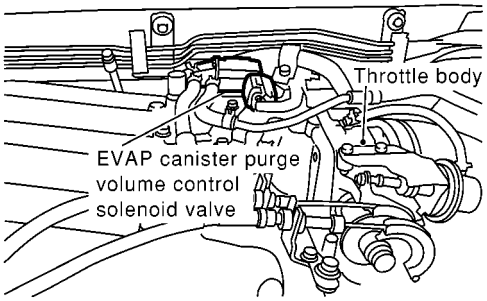


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

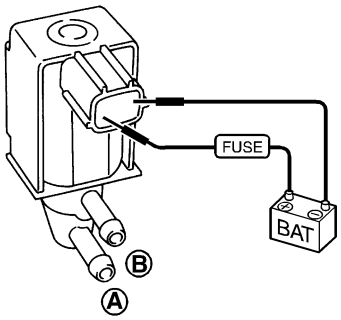
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF986Y



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

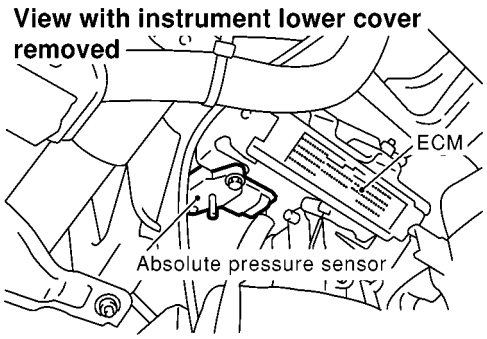
SEF335X

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

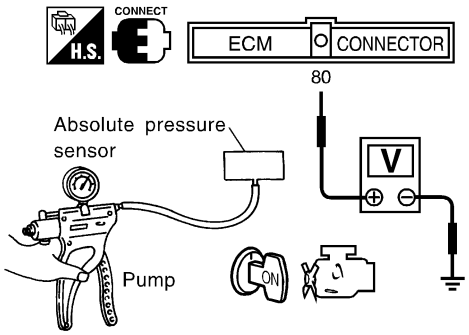
16	CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.



SEF961Y

2. Remove hose from absolute pressure sensor.
3. Install a vacuum pump to absolute pressure sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 80 and engine ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	1.0 to 1.4 lower than above value

SEF300XA

CAUTION:

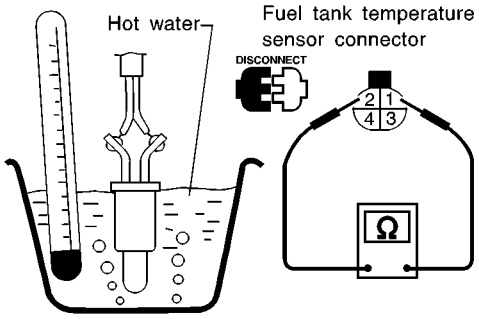
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (–700 mmHg, –27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace absolute pressure sensor.

17	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 4 and 5 by heating with hot water or heat gun as shown in the figure.



Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

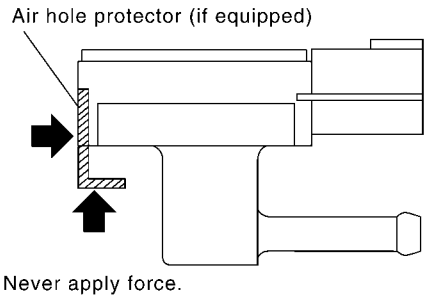
SEF974Y

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace fuel level sensor unit.

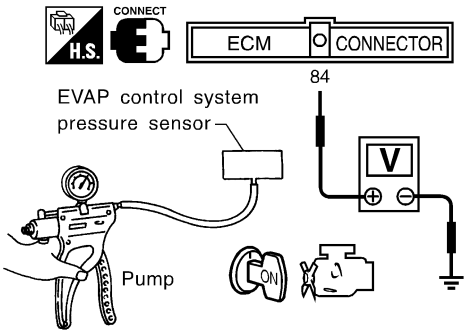
18	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   CAUTION:
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
   CAUTION:
   - **Always calibrate the vacuum pump gauge when using it.**
   - **Do not apply below −20 kPa (−150 mmHg, −5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**
5. Check input voltage between ECM terminal 84 and ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
−9.3 kPa (−70 mmHg, −2.76 inHg)	0.4 - 0.6

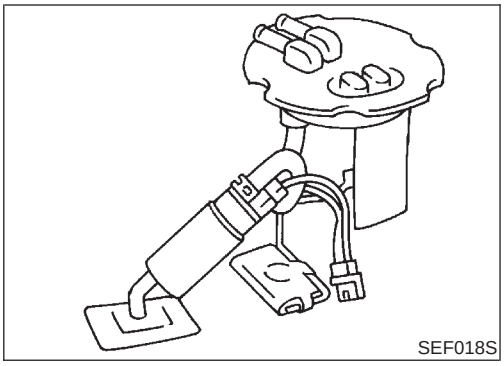
SEF342X

CAUTION:
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5m (19.7in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace EVAP control system pressure sensor.

19	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**


SEF018S

Component Description

NAEC0616

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

NAEC0617

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.
Malfunction is detected when even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.

Possible Cause

NAEC0618

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

DTC Confirmation Procedure

NAEC0619

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NAEC0619S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and wait maximum of 2 consecutive minutes.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-404.

WITH GST

NAEC0619S02

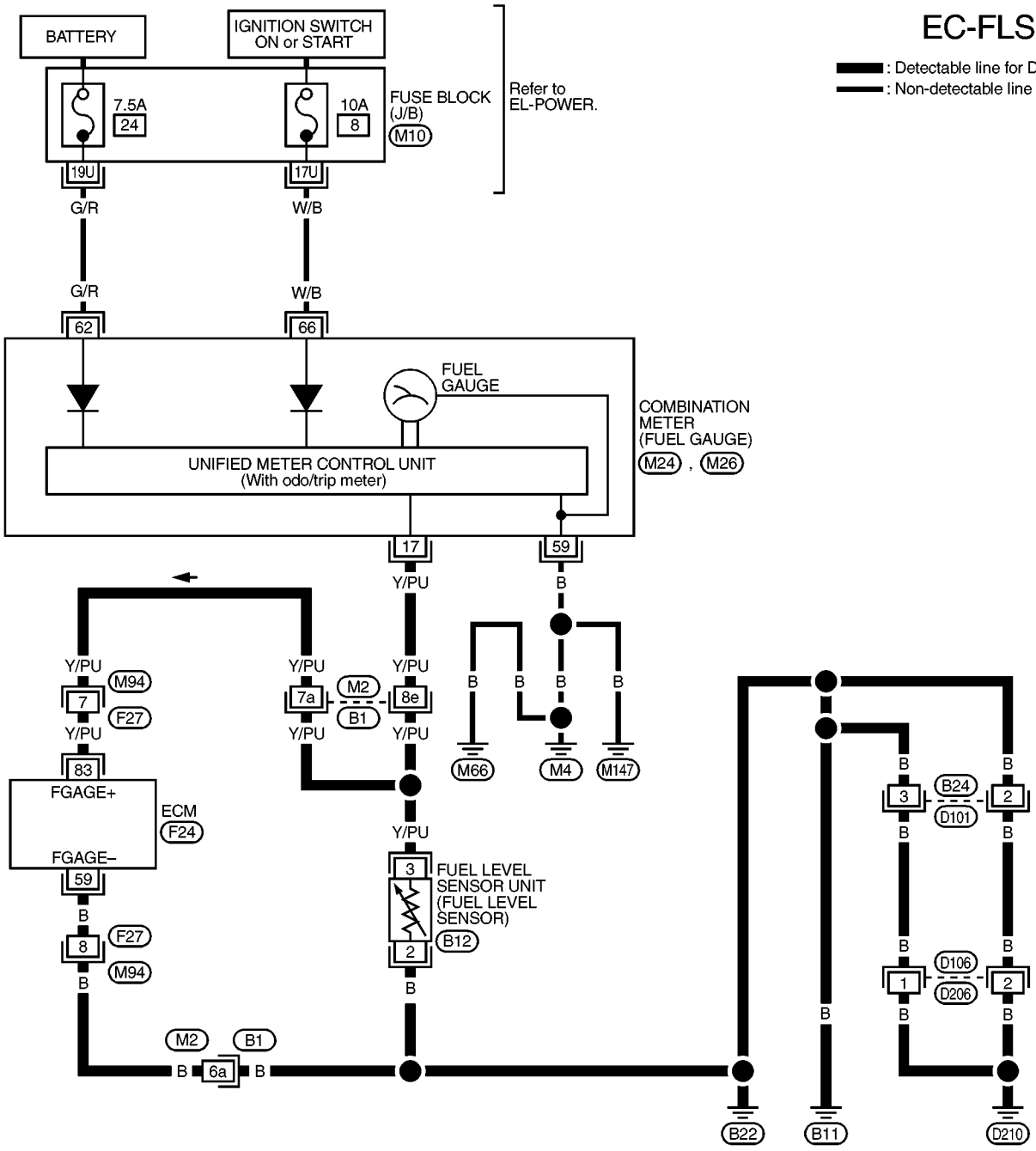
Follow the procedure “WITH CONSULT-II” above.

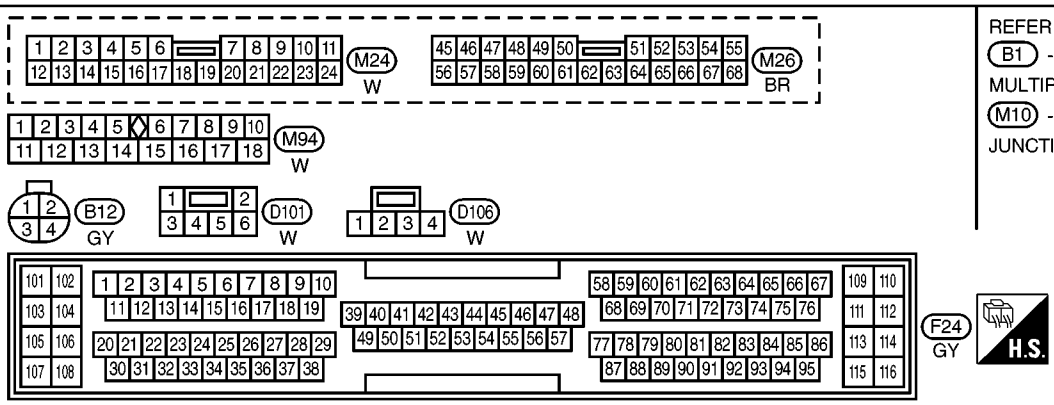
Wiring Diagram

NAEC0620

EC-FLS1-01

: Detectable line for DTC
: Non-detectable line for DTC





REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK- JUNCTION BOX (J/B)

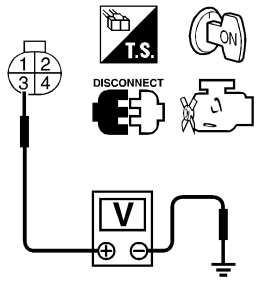
MEC021D

Diagnostic Procedure

=NAEC0621

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor until and fuel pump harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between fuel level sensor unit and fuel pump terminal 3 and ground with CONSULT-II or a tester.



Voltage: Approximately 12V

SEF993Y

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M2, B1
- Harness for open or short between combination meter and fuel level sensor until and fuel pump

	▶	Repair or replace harness or connectors.

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit and fuel pump terminal 2 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 83 and fuel level sensor unit and fuel pump terminal 3, ECM terminal 59 and fuel level sensor unit and fuel pump terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

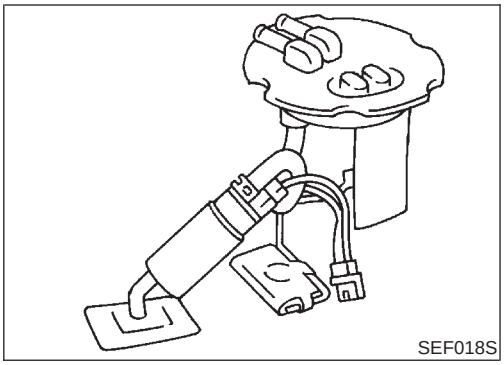
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M2, B1 ● Harness connectors M94, F27 ● Harness for open or short between ECM and fuel level sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK FUEL LEVEL SENSOR
Refer to EL-128, "Fuel Level Sensor Unit Check".	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Replace fuel level sensor unit.

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**


SEF018S

Component Description

=NAEC0622

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

NAEC0623

Driving long distances naturally affect fuel gauge level.
This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.
Malfunction is detected when the output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.

Possible Cause

NAEC0624

- Harness or connectors
  (The level sensor circuit is open or shorted.)
- Fuel level sensor

Overall Function Check

NAEC0625

Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

WARNING:
When performing following procedure, be sure to observe the handling of the fuel. Refer to FE-5, “Fuel Tank”.

TESTING CONDITION:
Before starting overall function check, preparation of draining fuel and refilling fuel is required.

7

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

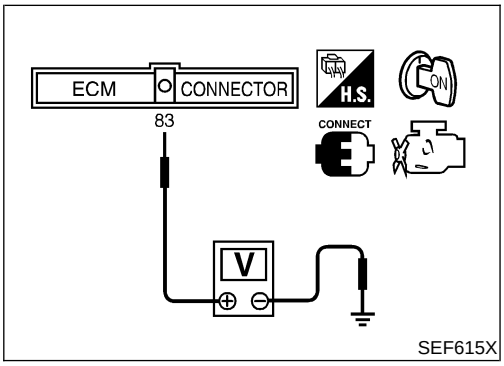
WITH CONSULT-II

NAEC0625S01

NOTE:
Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1) Prepare a fuel container and a spare hose.
2) Release fuel pressure from fuel line, refer to “Fuel Pressure Release”, EC-39.
3) Remove the fuel feed hose on the fuel level sensor unit.
4) Connect a spare fuel hose where the fuel feed hose was removed.

5) Turn ignition switch "OFF" and wait at least 10 seconds then turn "ON".
6) Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-II.
7) Check "FUEL LEVEL SE" output voltage and note it.
8) Select "FUEL PUMP" in "ACTIVE TEST" mode with CONSULT-II.
9) Touch "ON" and drain fuel approximately 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10) Fill fuel into the fuel tank for 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
11) Check "FUEL LEVEL SE" output voltage and note it.
12) Check "FUEL LEVEL SE" output voltage and confirm whether the voltage changes more than 0.03V during step 7 to 11.
If NG, check the fuel level sensor, refer to EL-128, "FUEL LEVEL SENSOR UNIT CHECK".

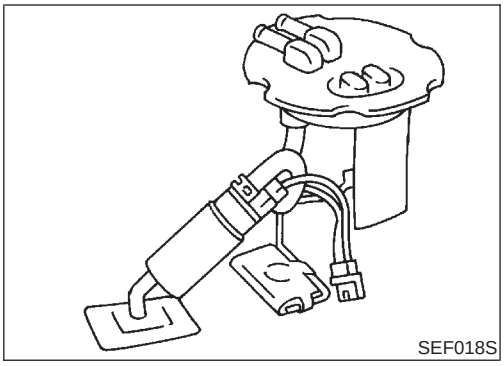


WITH GST

NAEC0625S02

NOTE:
Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1) Prepare a fuel container and a spare hose.
2) Release fuel pressure from fuel line, refer to "Fuel Pressure Release", EC-39.
3) Remove the fuel feed hose on the fuel level sensor unit.
4) Connect a spare fuel hose where the fuel feed hose was removed.
5) Turn ignition switch "OFF".
6) Set voltmeters probe between ECM terminal 83 (fuel level sensor signal) and ground.
7) Turn ignition switch "ON".
8) Check voltage between ECM terminal 83 and ground and note it.
9) Drain fuel by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
10) Fill fuel into the fuel tank for 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
11) Confirm that the voltage between ECM terminal 83 and ground changes more than 0.03V during step 8 - 10.
If NG, check component of fuel level sensor, refer to EL-128, "FUEL LEVEL SENSOR UNIT CHECK".


SEF018S

Component Description

NAEC0626

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

NAEC0627

ECM receives two signals from the fuel level sensor circuit.
One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.
This diagnosis indicates the former, to detect open or short circuit malfunction.
Malfunction is detected when an excessively low or high voltage is sent from the sensor is sent to ECM.

Possible Cause

NAEC0628

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

DTC Confirmation Procedure

NAEC0629

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch “ON”.

2

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

NAEC0629S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-410.

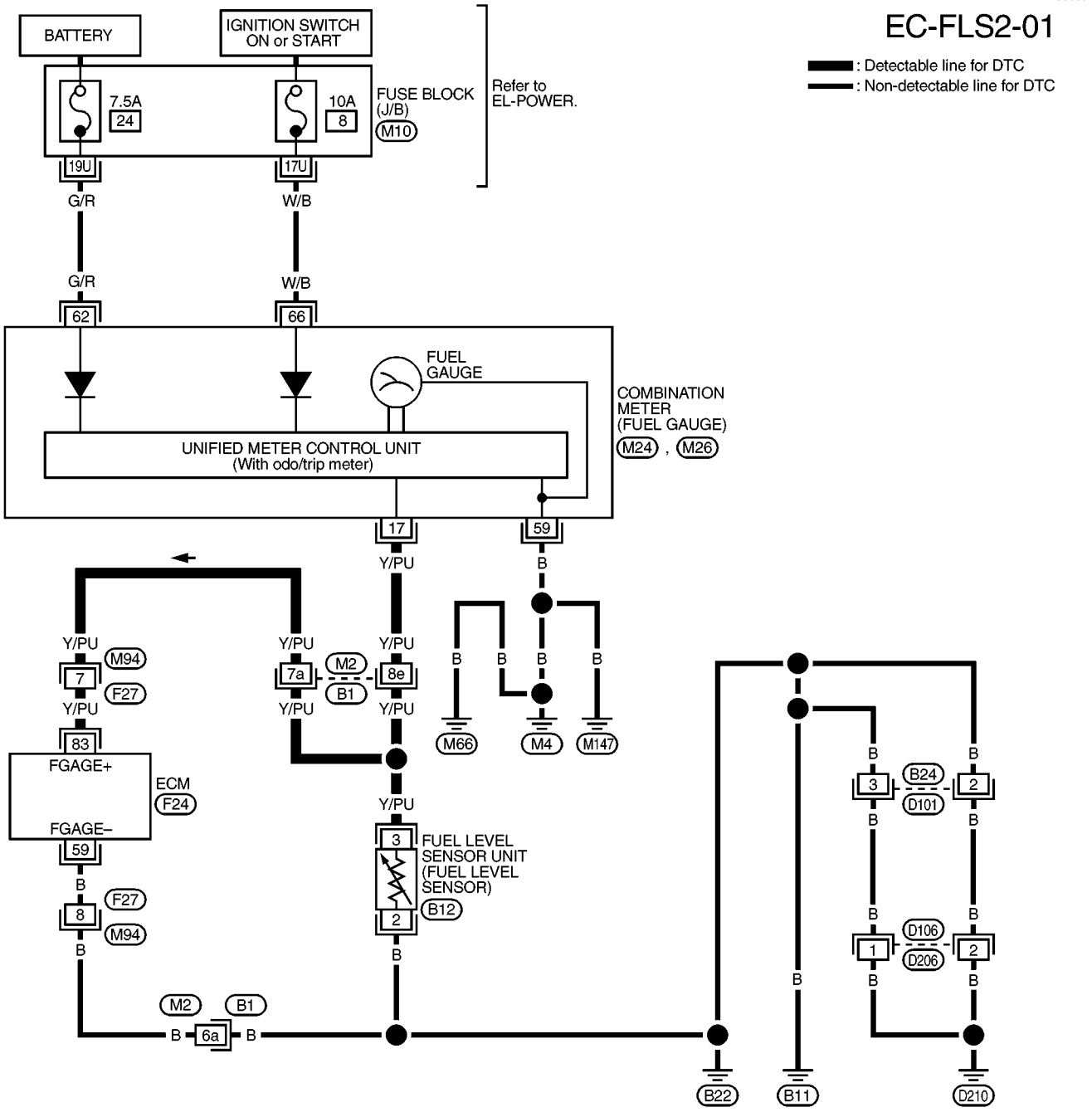
WITH GST

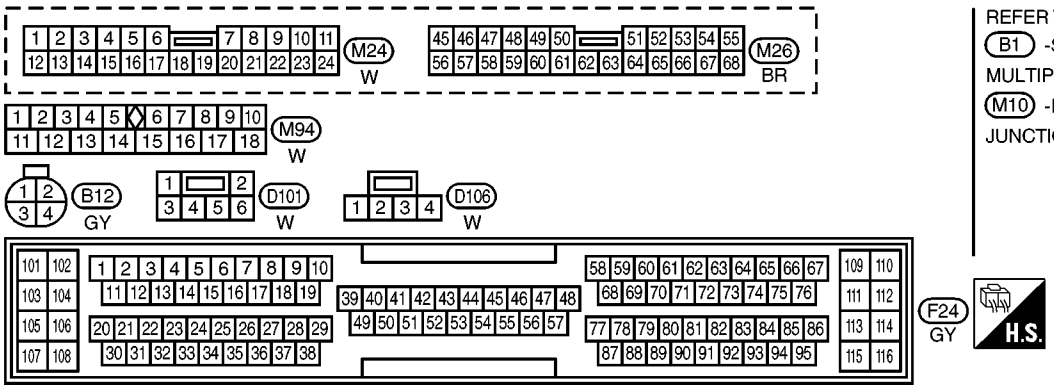
NAEC0629S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NAEC0630





REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK- JUNCTION BOX (J/B)

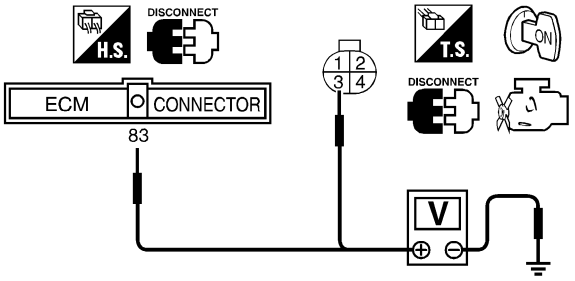
MEC022D

Diagnostic Procedure

=NAEC0631

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor until and fuel pump harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between fuel level sensor unit and fuel pump terminal 3 and ground, ECM terminal 83 and ground with CONSULT-II or tester.



Voltage: Approximately 12V

SEF374Z

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M2, B1 and M94, F27
- Harness for open or short between combination meter and fuel level sensor until and fuel pump

	▶	Repair or replace harness or connectors.

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit and fuel pump terminal 2 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 83 and fuel level sensor unit and fuel pump terminal 3. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

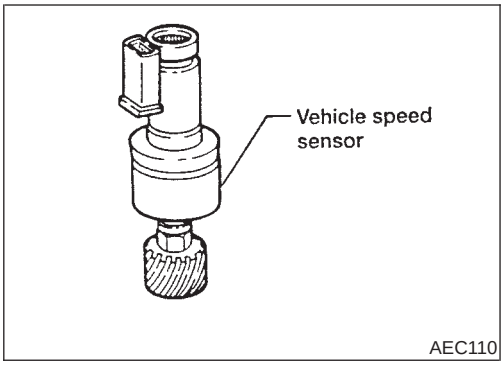
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M2, B1 ● Harness connectors M94, F27 ● Harness for open or short between ECM and fuel level sensor	
▶	Repair open circuit or short to ground or short to power in harness on connectors.

6	CHECK FUEL LEVEL SENSOR
Refer to EL-128, "Fuel Level Sensor Unit Check".	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Replace fuel level sensor unit.

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**



Component Description

=NAEC0242

The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.

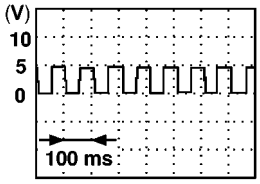
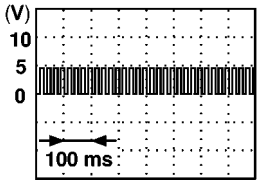
ECM Terminals and Reference Value

NAEC0669

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
86	W/L	Vehicle speed sensor	**[Engine is running]** ● Jack up front wheels. ● In 1st gear position ● 10 km/h (6 MPH)	Approximately 2.5V  SEF583X
			[Engine is running] ● Jack up front wheels. ● In 2nd gear position ● 30 km/h (19 MPH)	Approximately 2.0V  SEF584X

On Board Diagnosis Logic

NAEC0244

Malfunction is detected when the almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.

Possible Cause

NAEC0514

- Harness or connector
  (The vehicle speed sensor circuit is open or shorted.)
- Vehicle speed sensor

DTC Confirmation Procedure

NAEC0245

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
B/FUEL SCHDL	XXX msec
PW/ST SIGNAL	OFF
VHCL SPEED SE	XXX km/h

SEF196Y

WITH CONSULT-II

NAEC0245S01

1) Start engine (TCS switch “OFF”).
2) Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
   If NG, go to “Diagnostic Procedure”, EC-416.
   If OK, go to following step.
3) Select “DATA MONITOR” mode with CONSULT-II.
4) Warm engine up to normal operating temperature.
5) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	1,400 - 2,400 rpm (A/T) 1,900 - 3,000 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	4 - 8 msec (A/T) 4.8 - 9 msec (M/T)
Selector lever	Suitable position
PW/ST SIGNAL	OFF

6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-416.

Overall Function Check

NAEC0246

Use this procedure to check the overall function of the vehicle speed sensor circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

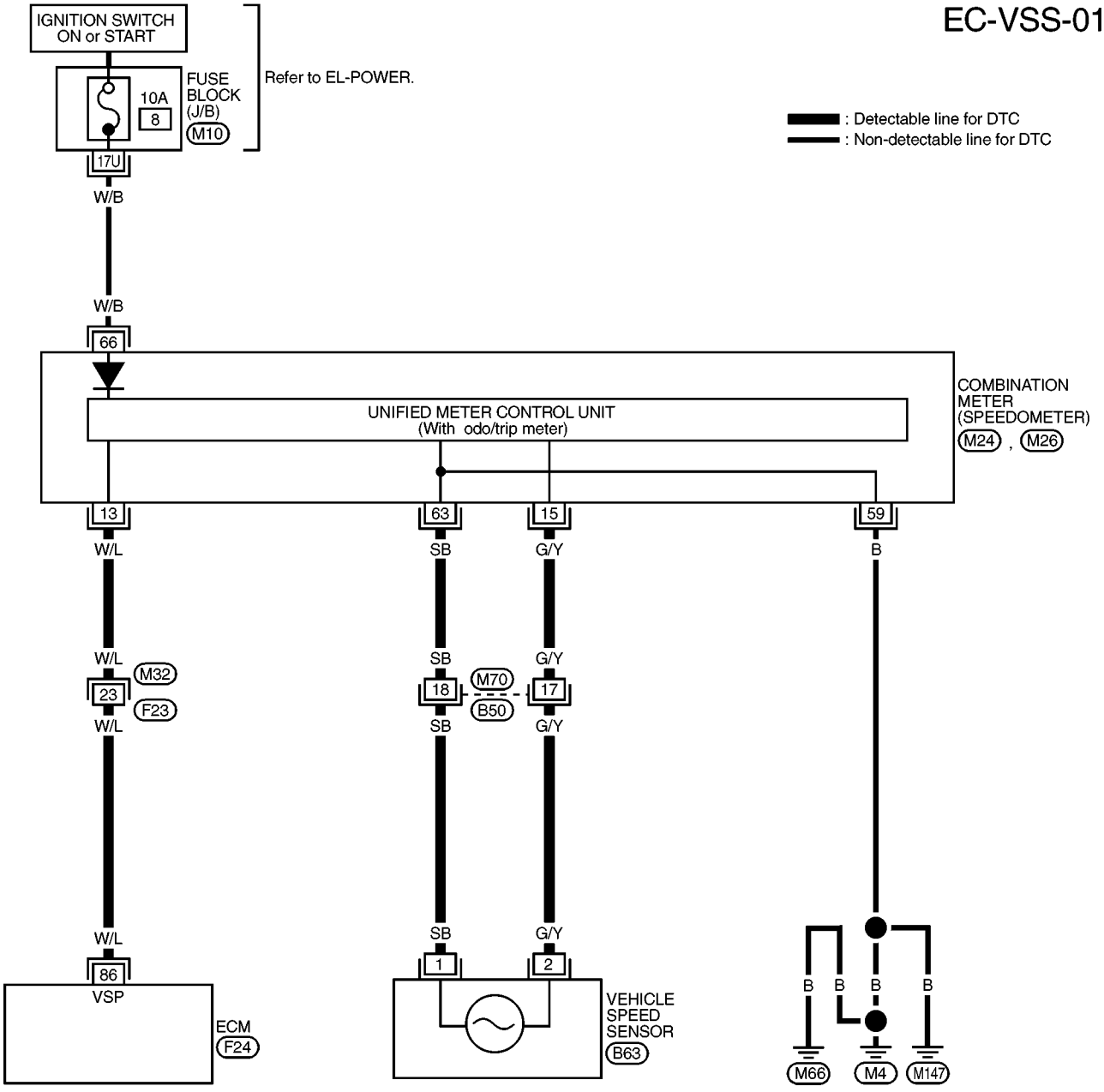
NAEC0246S01

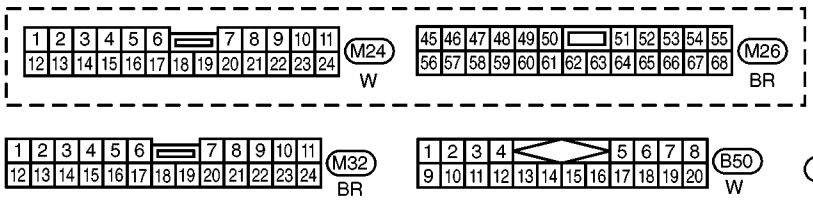
1) Lift up drive wheels.
2) Start engine.
3) Read vehicle speed sensor signal in “MODE 1” with GST.
   The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4) If NG, go to “Diagnostic Procedure”, EC-416.

Wiring Diagram

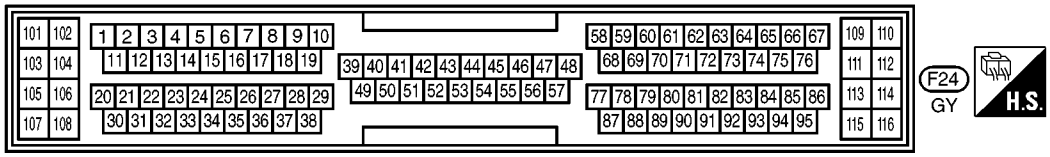
NAEC0247

EC-VSS-01





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)



MEC018D

Diagnostic Procedure

NAEC0248

1	CHECK VEHICLE SPEED SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and combination meter harness connector.
3. Check harness continuity between ECM terminal 86 and combination meter terminal 13.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M32, F23
- Harness for open or short between ECM and combination meter

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK SPEEDOMETER FUNCTION

Make sure that speedometer functions properly.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK SPEEDOMETER CIRCUIT FOR OPEN AND SHORT

Check the following.
- Harness connectors M70, B50
- Harness connectors F19, F111
- Harness for open or short between combination meter and vehicle speed sensor
- Harness for open or short between vehicle speed sensor and ECM

OK or NG

OK	▶	Check combination meter and vehicle speed sensor. Refer to EL section.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-135.

	▶	**INSPECTION END**

Description

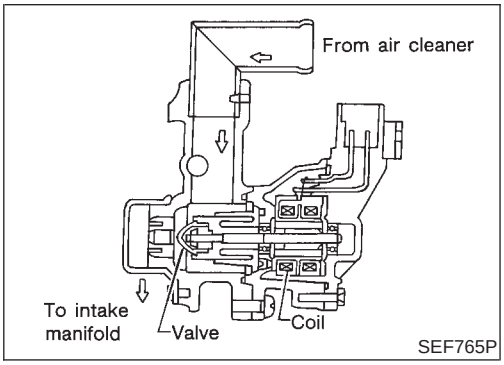
NAEC0249

SYSTEM DESCRIPTION

NAEC0249S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	Idle air control	IACV-AAC valve
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Park/neutral position (PNP) switch	Park/neutral position		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		
Ambient air temperature switch	Ambient air temperature		
Intake air temperature sensor	Intake air temperature		
Absolute pressure sensor	Ambient barometic pressure		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which by-passes the throttle valve via IACV-AAC valve. The IACV-AAC valve changes the opening of the air by-pass passage to control the amount of auxiliary air. This valve is actuated by a step motor built into the valve, which moves the valve in the axial direction in steps corresponding to the ECM output signals. One step of IACV-AAC valve movement causes the respective opening of the air by-pass passage. (i.e. when the step advances, the opening is enlarged.) The opening of the valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM. The ECM then controls the step position of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by takig into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner, power steering and cooling fan operation).



COMPONENT DESCRIPTION

NAEC0249S02

IACV-AAC Valve

NAEC0249S0201

The IACV-AAC valve is operated by a step motor for centralized control of auxiliary air supply. This motor has four winding phases and is actuated by the output signals of ECM which turns ON and OFF two windings each in seqeunce. Each time the IACV-AAC valve opens or closes to change tha auxiliary air quantity, the ECM sends a pulse signal to the step motor. When no change in the auxiliary air quantity is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0250

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	• Engine: After warming up • Air conditioner switch: “OFF” • Shift lever: “N” • No-load	Idle	14 - 20 step
		2,000 rpm	—

ECM Terminals and Reference Value

NAEC0670

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6 7 8 17	PU/G GY Y GY/L	IACV-AAC valve	**[Engine is running]** • Idle speed	0.1 - 14V

On Board Diagnosis Logic

NAEC0252

Malfunction is detected when

(Malfunction A) the IACV-AAC valve does not operate properly,

(Malfunction B) the IACV-AAC valve does not operate properly.

Possible Cause

NAEC0515

MALFUNCTION A

NAEC0515S01

- Harness or connectors
  (The IACV-AAC valve circuit is open.)
- IACV-AAC valve

MALFUNCTION B

NAEC0515S02

- Harness or connectors
  (The IACV-AAC valve circuit is shorted.)
- Air control valve (Power steering)
- IACV-AAC valve

DTC Confirmation Procedure

NAEC0253

NOTE:

- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
- **Perform “PROCEDURE FOR MALFUNCTION A” first. If 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”.**

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NAEC0253S01

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch "ON".

With CONSULT-II

NAEC0253S0101

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Perform "Idle Air Volume Learning" (see EC-56).
4) Turn ignition switch "OFF" and wait at least 10 seconds.
5) Turn ignition switch "ON".
6) Select "DATA MONITOR" mode with CONSULT-II.
7) Start engine and let it idle.
8) Keep engine speed at 2,500 rpm for three seconds, then let it idle for three seconds.
   Do not rev engine to more than 3,000 rpm.
9) Perform step 4 once more.
10) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-421.

With GST

NAEC0253S0102

Follow the procedure "With CONSULT-II" above.

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION B

NAEC0253S02

TESTING CONDITION:

- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**
- **Always perform the test at a temperature above −10°C (14°F).**

With CONSULT-II

NAEC0253S0201

1) Open engine hood.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch "OFF" and wait at least 10 seconds.
4) Perform "Idle Air Volume Learning (see EC-56).
5) Turn ignition switch "OFF" and wait at least 10 seconds.
6) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT-II
7) Start engine and run it for at least 1 minute at idle speed.
8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-421.

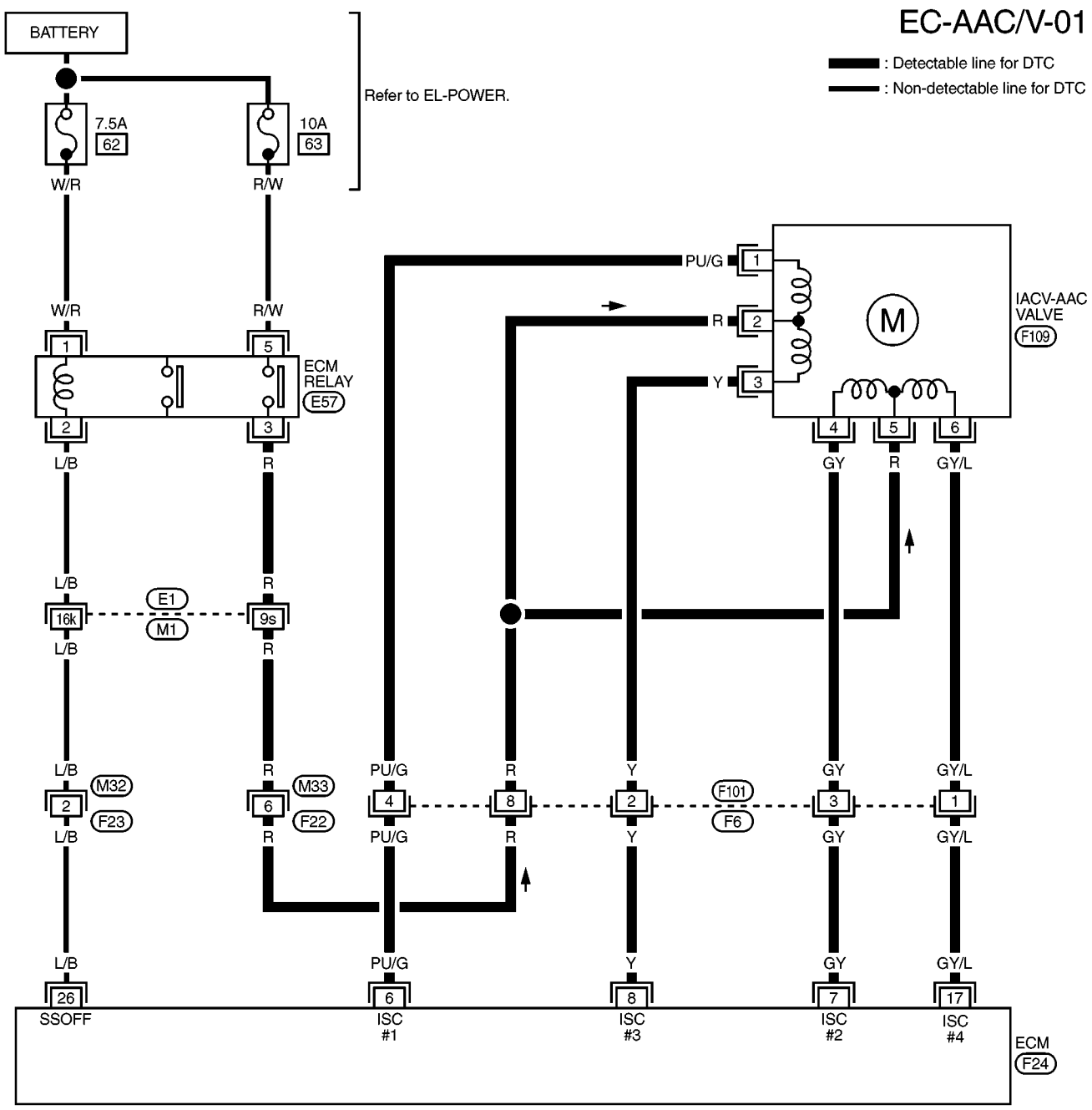
With GST

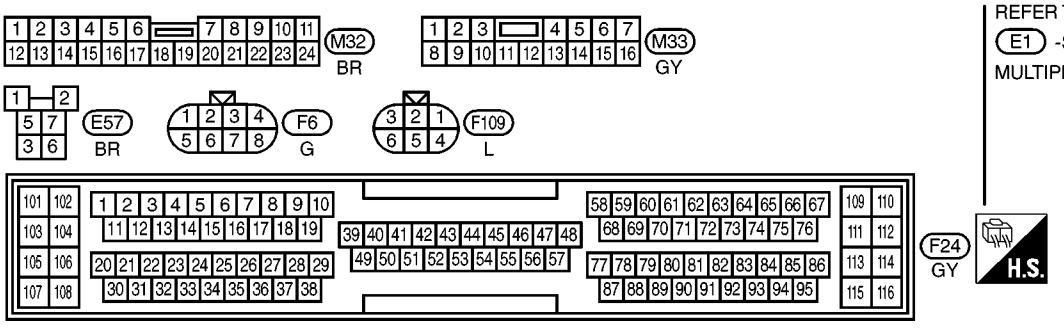
NAEC0253S0202

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NAEC0254





REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

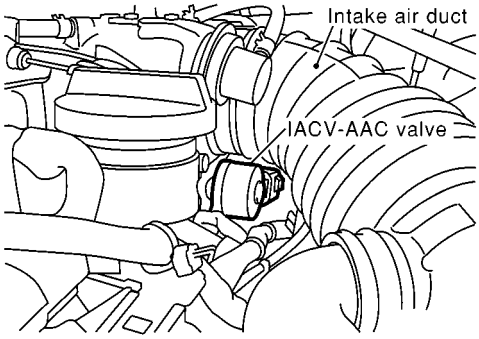
MEC966C

Diagnostic Procedure

NAEC0255

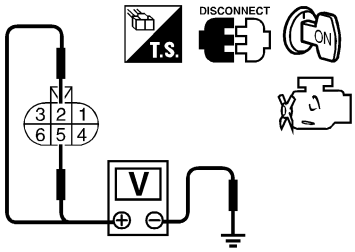
1	CHECK IACV-AAC VALVE POWER SUPPLY CIRCUIT

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.



SEF994Y

3. Turn ignition switch “ON”.
4. Check voltage between IACV-AAC valve terminals 2, 5 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF343X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M33, F22
- Harness for open or short between IACV-AAC valve and ECM relay

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

3	CHECK IACV-AAC VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals and IACV-AAC valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	IACV-AAC valve terminal
6	1
7	4
8	3
17	6

MTBL0354

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

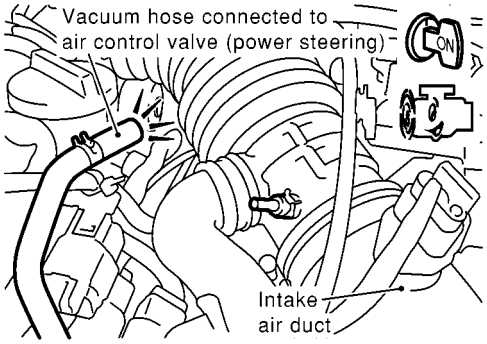
4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F101, F6
- Harness for open or short between IACV-AAC valve and ECM

	▶	Repair harness connectors.

5	CHECK AIR CONTROL VALVE (POWER STEERING) OPERATION-I

1. Reconnect ECM harness connector and IACV-AAC valve harness connector.
2. Disconnect vacuum hose connected to air control valve (Power steering) at intake air duct.
3. Start engine and let it idle.
4. Check vacuum hose for vacuum existence.



SEF995Y

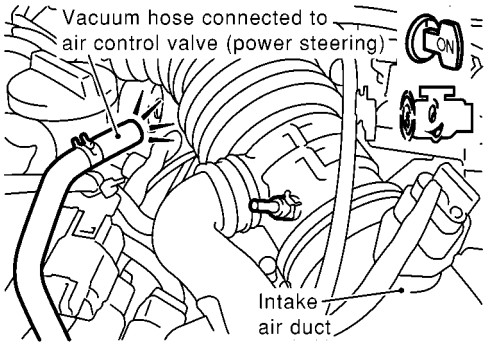
Vacuum slightly exists or does not exist.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace air control valve (Power steering).

6	CHECK AIR CONTROL VALVE (POWER STEERING) OPERATION-II

Check vacuum hose for vacuum existence when steering wheel is turned.



SEF995Y

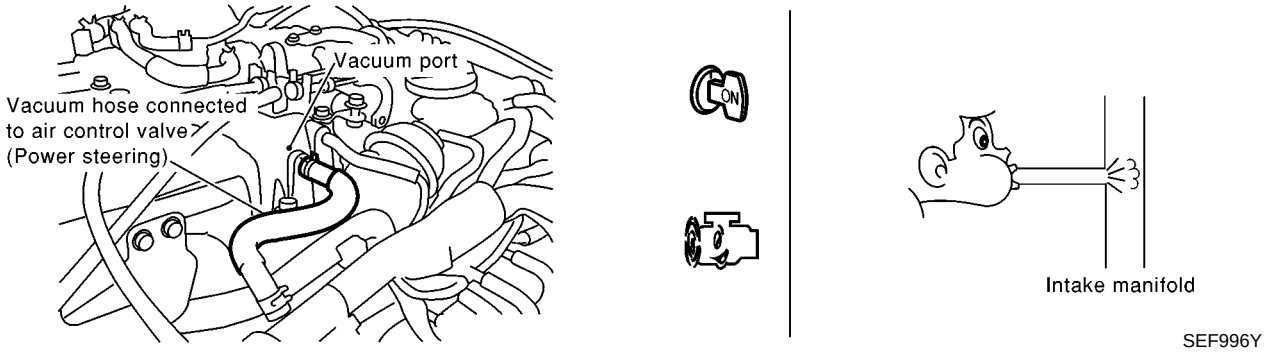
Vacuum should exist.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 7.

7	CHECK VACUUM PORT

1. Stop engine.
2. Disconnect vacuum hose connected to air control valve (Power steering) at vacuum port.
3. Blow air into vacuum port.
4. Check that air flows freely.



SEF996Y

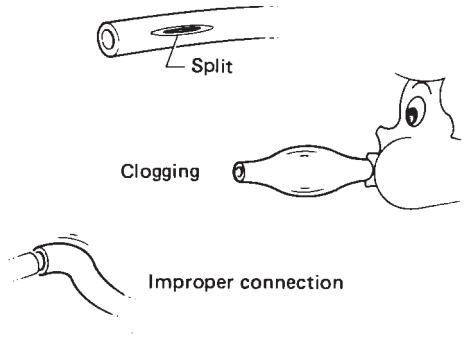
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or clean vacuum port.

Diagnostic Procedure (Cont'd)

8	CHECK VACUUM HOSES AND TUBES

1. Disconnect vacuum hoses between air control valve (Power steering) and vacuum port, air control valve (Power steering) and intake air duct.
2. Check the hoses and tubes for crack, clogging, improper connection or disconnection.



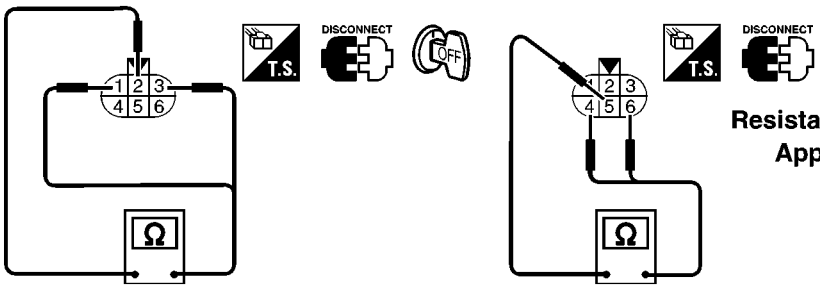
SEF109L

OK or NG

OK	▶	GO TO 9.
NG	▶	Repair hoses or tubes.

9	CHECK IACV-AAC VALVE-I

1. Disconnect IACV-AAC valve harness connector.
2. Check resistance between IACV-AAC valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.



Resistance:
Approximately 20 - 24Ω [at 20°C (68°F)]

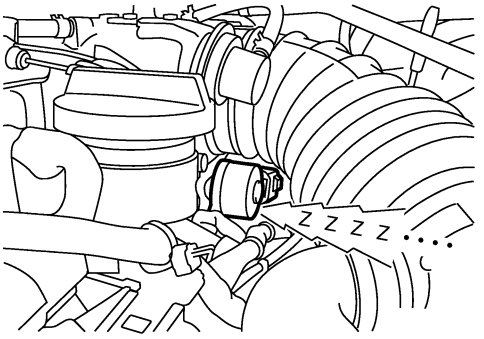
SEF344XA

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace IACV-AAC valve assembly.

10	CHECK IACV-AAC VALVE-II

1. Reconnect IACV-AAC valve harness connector and ECM harness connector.
2. Turn ignition switch "ON" and "OFF", and ensure the IACV-AAC valve makes operating sound according to the ignition switch position.



SEF997Y

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 11.

11	REPLACE IACV-AAC VALVE

1. Replace IACV-AAC valve assembly.
2. Perform "Idle Air Volume Learning", EC-56.
   Is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT	▶	**INSPECTION END**
INCMP	▶	Follow the construction of "Idle Air Volume Learning".

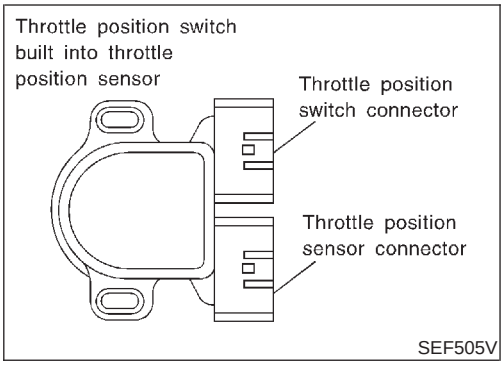
12	CHECK TARGET IDLE SPEED

1. Turn ignition switch "OFF".
2. Reconnect all harness connectors and vacuum hoses.
3. Start engine and warm it up to normal operating temperature.
4. Also warm up transmission to normal operating temperature.
- For A/T models with CONSULT-II, drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9V.
- For A/T models without CONSULT-II and M/T models, drive vehicle for 10 minutes.
5. Stop vehicle with engine running.
6. Check target idle speed.
   M/T: 750±50 rpm
   A/T: 750±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 13.
NG	▶	Perform "Idle Air Volume Learning", EC-56

13	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**



Component Description

NAEC0256

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.
When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge volume control solenoid valve when the throttle position sensor is malfunctioning.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0257

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
CLSD THL/P SW	● Engine: After warming up, idle the engine	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF

ECM Terminals and Reference Value

NAEC0671

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR/L	Throttle position switch (Closed position)	**[Engine is running]** ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Accelerator pedal depressed	Approximately 0V

On Board Diagnosis Logic

NAEC0259

Malfunction is detected when battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened.

Possible Cause

NAEC0516

- Harness or connectors
  (The closed throttle position switch circuit is shorted.)
- Closed throttle position switch
- Throttle position sensor

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

SEF197Y

6

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V

SEF198Y

DTC Confirmation Procedure

NAEC0260

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NAEC0260S01

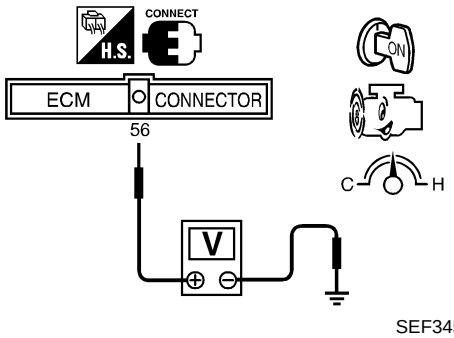
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF", wait at least 10 seconds and then start engine.
3) Select "CLSD THL/P SW" in "DATA MONITOR" mode.
   If "CLSD THL/P SW" is not available, go to step 5.
4) Check the signal under the following conditions.

Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF

   If the result is NG, go to "Diagnostic Procedure", EC-430.
   If OK, go to following step.
5) Select "DATA MONITOR" mode with CONSULT-II.
6) Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.5V
VHCL SPEED SE	More than 4 km/h (2 MPH)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-430.



SEF345X

Overall Function Check

NAEC0261

Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NAEC0261S01

1) Start engine and warm it up to normal operating temperature.
2) Check the voltage between ECM terminal 56 (Closed throttle position switch signal) and ground under the following conditions.

At idle: Battery voltage

At 2,000 rpm: Approximately 0V

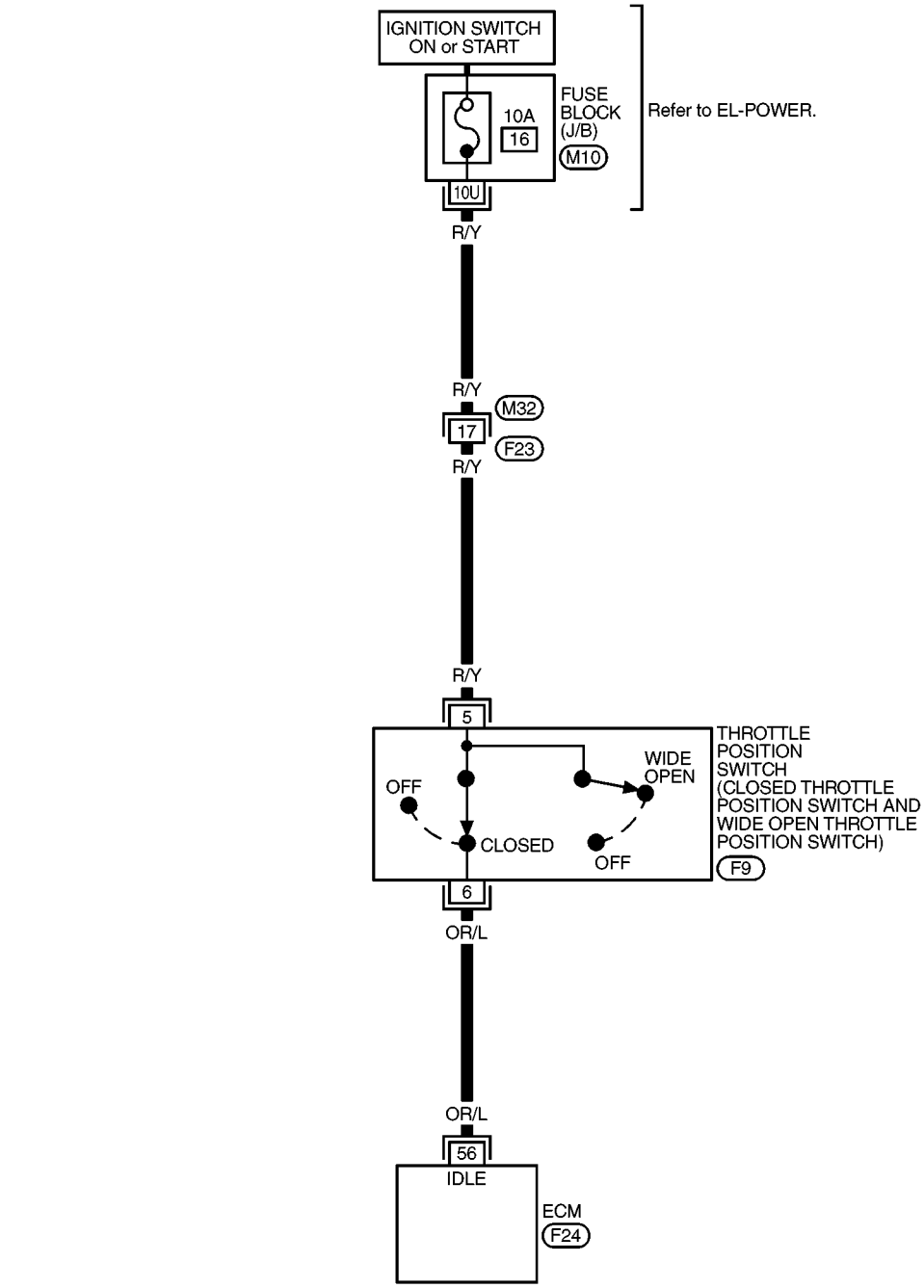
3) If NG, go to "Diagnostic Procedure", EC-430.

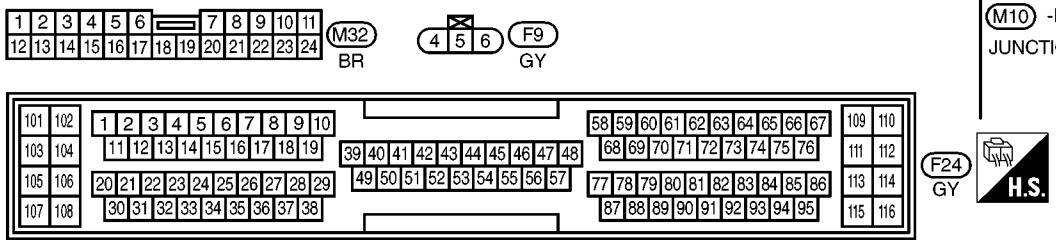
Wiring Diagram

=NAEC0262

EC-TP/SW-01

: Detectable line for DTC
: Non-detectable line for DTC





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

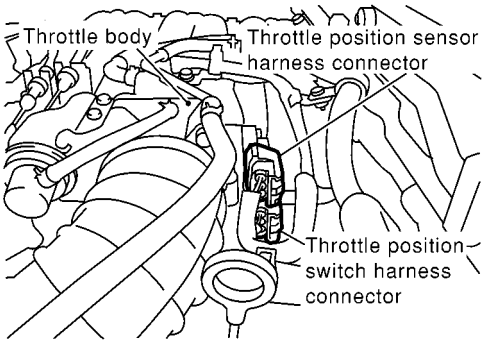
MEC967C

Diagnostic Procedure

NAEC0263

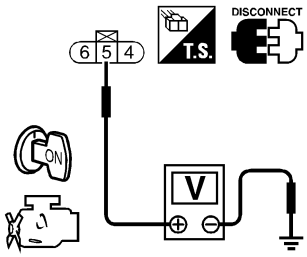
1	CHECK CLOSED THROTTLE POSITION SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect throttle position switch harness connector.



SEF944Y

3. Turn ignition switch “ON”.
4. Check voltage between throttle position switch terminal 5 and engine ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF346X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M32, F23
- Harness for open or short between throttle position switch and ECM

	▶	Repair harness or connectors.

3	CHECK CLOSED THROTTLE POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 56 and throttle position switch terminal 6.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK IGNITION TIMING AND ENGINE IDLE SPEED

Check the following items. Refer to "Basic Inspection", EC-99.

Items	Specifications
Ignition timing	M/T: 15° ± 2° BTDC A/T: 15° ± 2° BTDC
Idle speed	M/T: 750 ± 50 rpm A/T: 750 ± 50 rpm (in "P" or "N" position)

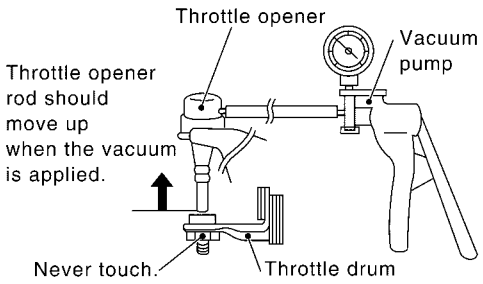
MTBL0530

Models with CONSULT-II ▶	GO TO 6.
Models without CONSULT-II ▶	GO TO 6.

5	CHECK THROTTLE POSITION SWITCH

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Remove vacuum hose connected to throttle opener.
4. Connect suitable vacuum hose to vacuum pump and the throttle opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Turn ignition switch "ON".
7. Select "DATA MONITOR" mode with CONSULT-II.
8. Check indication of "CLSD THL/P SW" under the following conditions.
   Measurement must be made with throttle position switch installed in vehicle.

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

MTBL0355

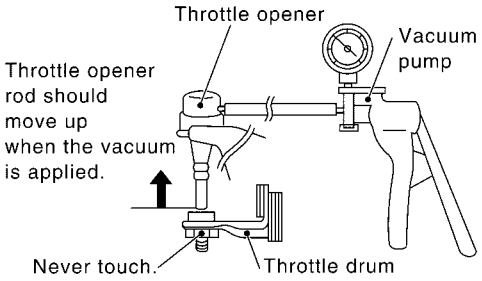
OK or NG

OK (With CONSULT-II) ▶	GO TO 8.
OK (Without CONSULT-II) ▶	GO TO 9.
NG ▶	GO TO 7.

Diagnostic Procedure (Cont'd)

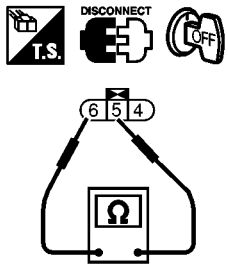
6	CHECK THROTTLE POSITION SWITCH

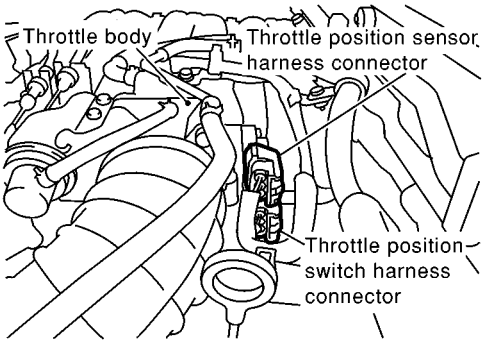
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Remove vacuum hose connected to throttle opener.
4. Connect suitable vacuum hose to vacuum pump and the throttle opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Disconnect closed throttle position switch harness connector.
7. Check continuity between closed throttle position switch terminals 6 and 5 under the following conditions. Resistance measurement must be made with throttle position switch installed in vehicle.





Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

SEF998Y

OK or NG

OK (With CONSULT-II)	▶	GO TO 8.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	GO TO 7.

7	ADJUST THROTTLE POSITION SWITCH

Check the following items. Refer to "Basic Inspection", EC-99.

Items	Specifications
Ignition timing	15° ± 2° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	M/T: 750 ± 50 rpm A/T: 750 ± 50 rpm (in "P" or "N" position)

MTBL0537

Is it possible to adjust closed throttle position switch?

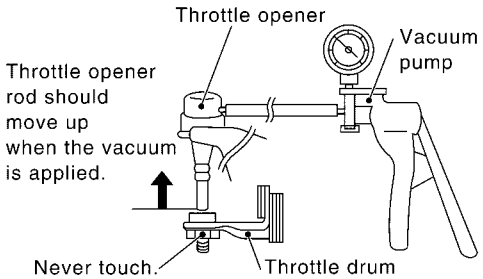
Yes or No

Yes (With CONSULT-II)	▶	GO TO 9.
Yes (Without CONSULT-II)	▶	GO TO 9.
No	▶	Replace throttle position switch.

8	CHECK THROTTLE POSITION SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Turn ignition switch ON.
7. Select "DATA MONITOR" mode with CONSULT-II.
8. Check voltage of "THRTL POS SEN" under the following conditins.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

Throttle valve conditions	THRTL POS SEN
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

MTBL0230

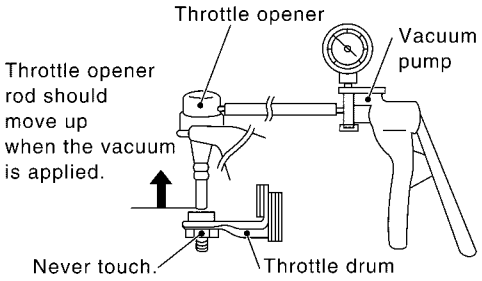
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace throttle position sensor.

Diagnostic Procedure (Cont'd)

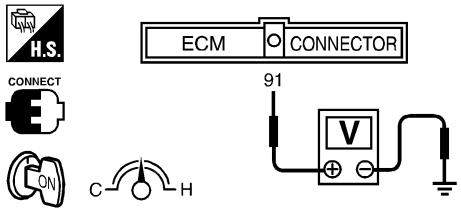
9	CHECK THROTTLE POSITION SENSOR

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Turn ignition switch ON.
7. Check voltage between ECM terminal 91 (Throttle position sensor signal) and ground.
   Voltage measurement must be made with throttle position sensor installed in vehicle.



Throttle valve conditions	Voltage
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

SEF348X

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace throttle position sensor.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**

System Description

NAEC0264

This circuit line (LAN) is used to control the smooth shifting up and down of A/T during the hard acceleration/deceleration.
Pulse signals are exchanged between ECM and TCM (Transmission Control Module).
Be sure to erase the malfunction information such as DTC not only in TCM but also ECM after the A/T related repair.

ECM Terminals and Reference Value

NAEC0672

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
114	G/R	Communication line (LAN)	**[Engine is running]** ● Idle speed	Approximately 2V

On Board Diagnosis Logic

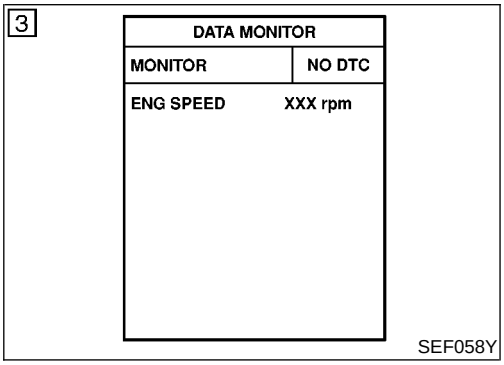
NAEC0266

Malfunction is detected when ECM receives incorrect voltage from TCM (Transmission Control Module) continuously.

Possible Cause

NAEC0517

- Harness or connectors
  [The communication line circuit between ECM and TCM (Transmission Control Module) is open or shorted.]
- TCM
- Dead (Weak) battery



DTC Confirmation Procedure

NAEC0267

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

WITH CONSULT-II

NAEC0267S01

1) Turn ignition switch "ON".

DTC Confirmation Procedure (Cont'd)

2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and let it idle for at least 2 seconds.
4) If DTC is detected, go to "Diagnostic Procedure", EC-438.

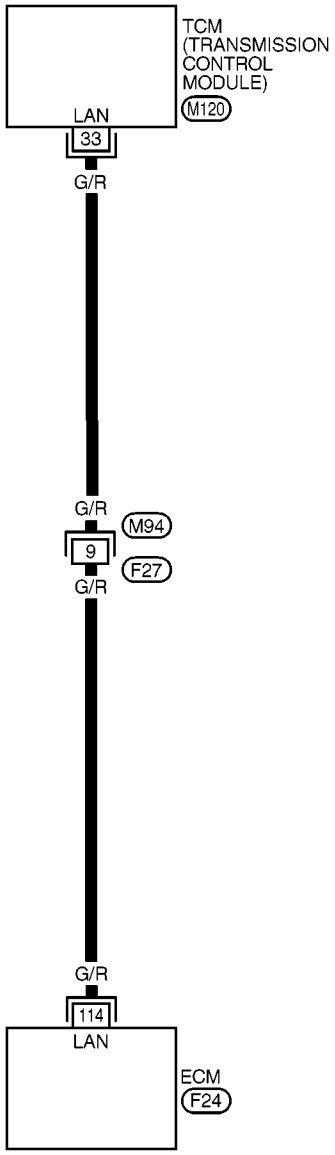
Wiring Diagram

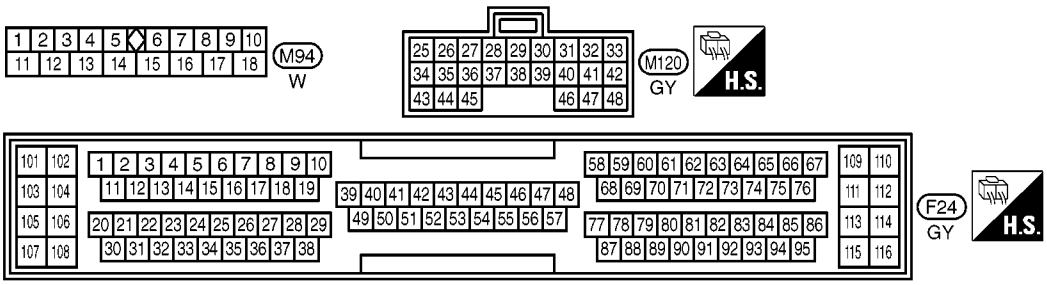
NAEC0269

EC-AT/C-01

: Detectable line for DTC

: Non-detectable line for DTC





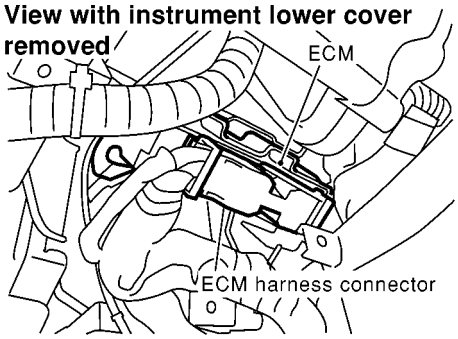
MEC968C

Diagnostic Procedure

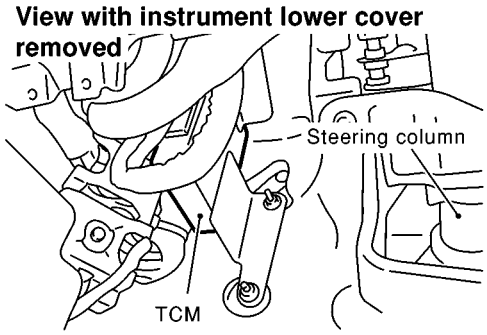
NAEC0270

1	CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR OPEN

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and TCM (Transmission Control Module) harness connector.



SEF955Y



SEF001Z

3. Check harness continuity between ECM terminal 114 and TCM terminal 33.
   Refer to Wiring Diagram.
   Continuity should exist.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTION PART

Check the following.
- Harness connectors M94, F27
- Harness for open or short between ECM and TCM (Transmission control module)

	▶	Repair harness or connectors.

3	CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR SHORT

1. Check harness continuity between ECM terminal 114 and ground.
   Refer to Wiring Diagram.
   Continuity should not exist.
2. Also check harness for short to power.

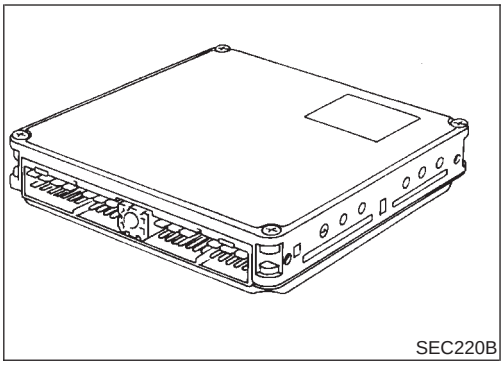
OK or NG

OK	▶	GO TO 4.
NG	▶	Repair short to ground or short to power in harness or connectos.

4	CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-135.

	▶	**INSPECTION END**



SEC220B

Component Description

NAEC0271

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine.

On Board Diagnosis Logic

NAEC0272

Malfunction is detected when ECM calculation function is malfunctioning.

Possible Cause

NAEC0518

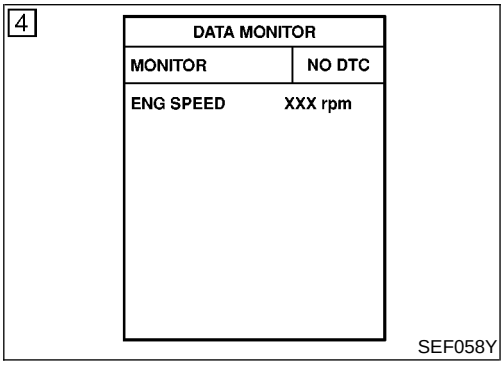
- ECM

DTC Confirmation Procedure

NAEC0273

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.



SEF058Y

WITH CONSULT-II

NAEC0273S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine.
4) Run engine for at least 30 seconds at idle speed.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-440.

WITH GST

NAEC0273S02

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

NAEC0274

1	INSPECTION START

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform “DTC Confirmation Procedure”.**
   See EC-439.
5. Is the 1st trip DTC P0605 displayed again?

With GST

1. Turn ignition switch “ON”.
2. Select MODE 4 with GST.
3. Touch “ERASE”.
4. **Perform “DTC Confirmation Procedure”.**
   See EC-439.
5. Is the 1st trip DTC P0605 displayed again?

Yes or No

Yes	▶	GO TO 2.
No	▶	**INSPECTION END**

2	REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to “NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)”, EC-73.
3. Perform “Idle Air Volume Learning”, EC-56,

Is the result CMPLT or INCMP?

CMPLT or INCMP

CMPLT	▶	**INSPECTION END**
INCMP	▶	Follow the construction of “Idle Air Volume Learning”.

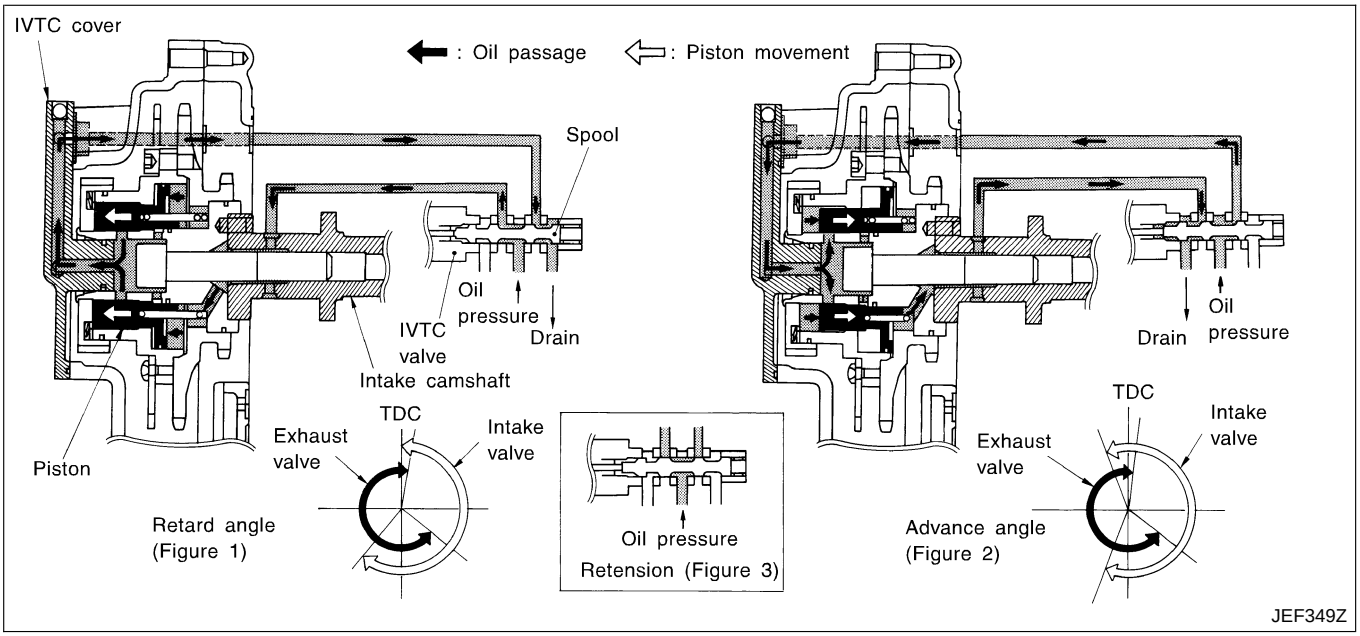
Description

NAEC0691

SYSTEM DESCRIPTION

NAEC0691S01

Sensor	Input signal to ECM function	ECM	Actuator
Crankshaft position sensor (POS)	Engine speed (POS)	Intake valve timing control	Intake valve timing control solenoid valve
Crankshaft position sensor (REF)	Engine speed (REF)		
Camshaft position sensor	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Vehicle speed sensor	Vehicle speed		



This mechanism hydraulically controls cam phases sequentially with the fixed operating angle of the intake valve.
The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the camshaft timing control valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0692

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1) INT/V TIM (B2)	• Engine: After warming up • Shift lever “N” • Quickly depressed accelerator pedal • No-load	Idle	0° CA
		2,000 rpm	Approximately 12 - 18° CA
INT/V SOL (B1) INT/V SOL (B2)	• Engine: After warming up • Shift lever “N” • Quickly depressed accelerator pedal • No-load	Idle	0%
		2,000 rpm	Approximately 40%

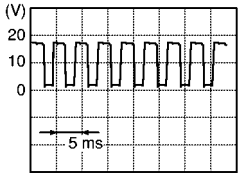
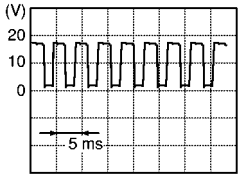
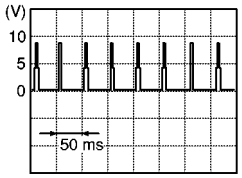
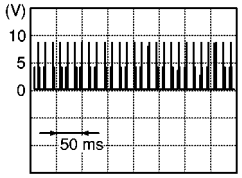
ECM Terminals and Reference Value

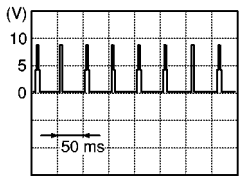
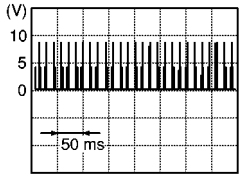
=NAEC0693

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	OR/B	Intake valve timing control solenoid valves (RH)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Battery voltage
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	7 - 8V  SEF350Z
15	P/L	Intake valve timing control solenoid valves (LH)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Battery voltage
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	7 - 8V  SEF350Z
79	Y/G	Intake valve timing control position sensors (RH)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.5V  SEF351Z
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	Approximately 0.5V  SEF352Z

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
89	OR	Intake valve timing control position sensors (LH)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.5V  SEF351Z
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	Approximately 0.5V  SEF352Z

On Board Diagnosis Logic

NAEC0694

Malfunction is detected when
(Malfunction A)
The alignment of the intake valve timing control has been misregistered.
(Malfunction B)
There is a gap between angle of target and phase-control angle degree.

FAIL-SAFE MODE

NAEC0694S01

When malfunction A or B is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Intake valve timing control	The signal is not energized to the solenoid valve and the valve control does not function.

Possible Cause

NAEC0695

MALFUNCTION A OR B

NAEC0695S01

- Harness or connectors
  (Intake valve timing control position sensor circuit is open or shorted.) Refer to EC-477.
- Crankshaft position sensor (REF)
- Crankshaft position sensor (POS)
- Camshaft position sensor (PHASE)

DTC Confirmation Procedure

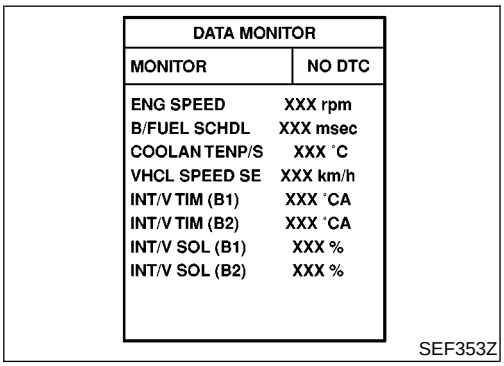
NAEC0696

CAUTION:

Always drive at a safe speed.

NOTE:

- **If both DTC P1111 (B1), P1136 (B2) or P1140 (B1), P1145 (B2) and P1110 (B1), P1135 (B2) are displayed, perform trouble diagnosis for "DTC P1111 (B1), P1136 (B2) or P1140 (B1), P1145 (B2)" first. (See EC-446, EC-477.)**
- **If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.**



PROCEDURE FOR MALFUNCTION A

NAEC0696S01

With CONSULT-II

NAEC0696S0101

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
COOLANT TEMPS	More than 70°C (158°F)
Selector lever	1st positon (A/T or M/T)
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

4) Maintain the following conditions for at least 20 consecutive seconds.

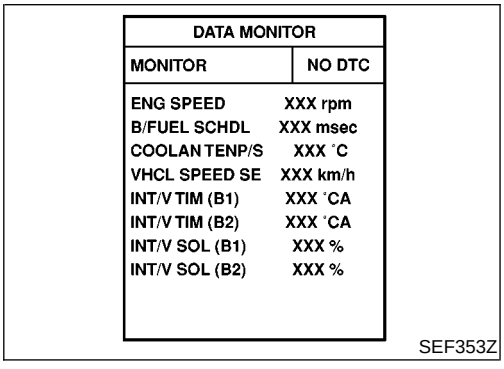
ENG SPEED	Idle
COOLANT TEMPS	More than 70°C (158°F)
Selector lever	"P" or "N" position

5) If 1st trip DTC is detected, go to "P1140, P1145 INTAKE VALVE TIMING CONTROL POSITION SENSOR". Refer to EC-477.

With GST

NAEC0696S0102

Follow the procedure "With CONSULT-II" above.



PROCEDURE FOR MALFUNCTION B

NAEC0696S02

With CONSULT-II

NAEC0696S0201

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Maintain the following conditions for at least 20 conecutive seconds.

ENG SPEED	2,000 - 3,000 rpm (A constant rotation is maintained.)
COOLANT TEMPS	70 - 90°C (158 - 194°F)

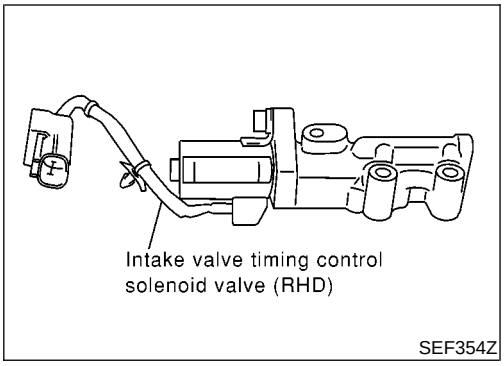
Selector lever	1st position (A/T or M/T)
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

4) If 1st trip DTC is detected, go to "P1140, P1145 INTAKE VALVE TIMING CONTROL POSITION SENSOR". Refer to EC-477.

With GST

NAEC0696S0202

Follow the procedure "With CONSULT-II" above.



Component Description

NAEC0697

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.
The longer pulse width advances valve angle.
The shorter pulse width retards valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0698

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1) INT/V SOL (B2)	● Engine: After warming up ● Shift lever “N” ● Quickly depressed accelerator pedal ● No-load	Idle	0%
		2,000 rpm	Approximately 40%

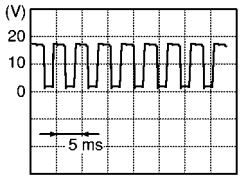
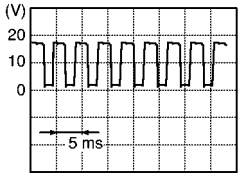
ECM Terminals and Reference Value

NAEC0699

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	OR/B	Intake valve timing control solenoid valves (RH)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Battery voltage
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	7 - 8V  SEF350Z
15	P/L	Intake valve timing control solenoid valves (LH)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Battery voltage
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	7 - 8V  SEF350Z

On Board Diagnosis Logic

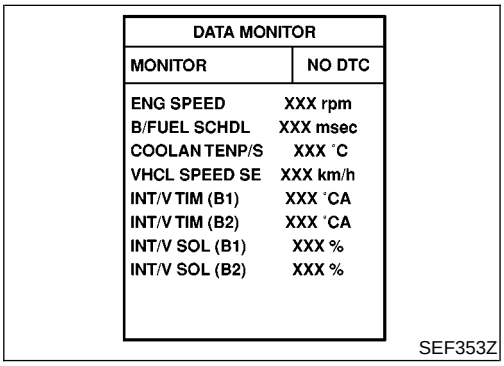
NAEC0700

Malfunction is detected when an improper voltage is sent to the ECM through intake valve timing control solenoid valve.

Possible Cause

NAEC0701

- Harness or connectors
  (Intake valve timing control solenoid valve circuit is open or shorted)
- Intake valve timing control solenoid valve.



DTC Confirmation Procedure

NAEC0702

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NAEC0702S01

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Maintain the following conditions for at least 5 seconds.

Engine speed	More than Idle speed
Selector lever	"P" or "N" position

4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-450.

WITH GST

NAEC0702S02

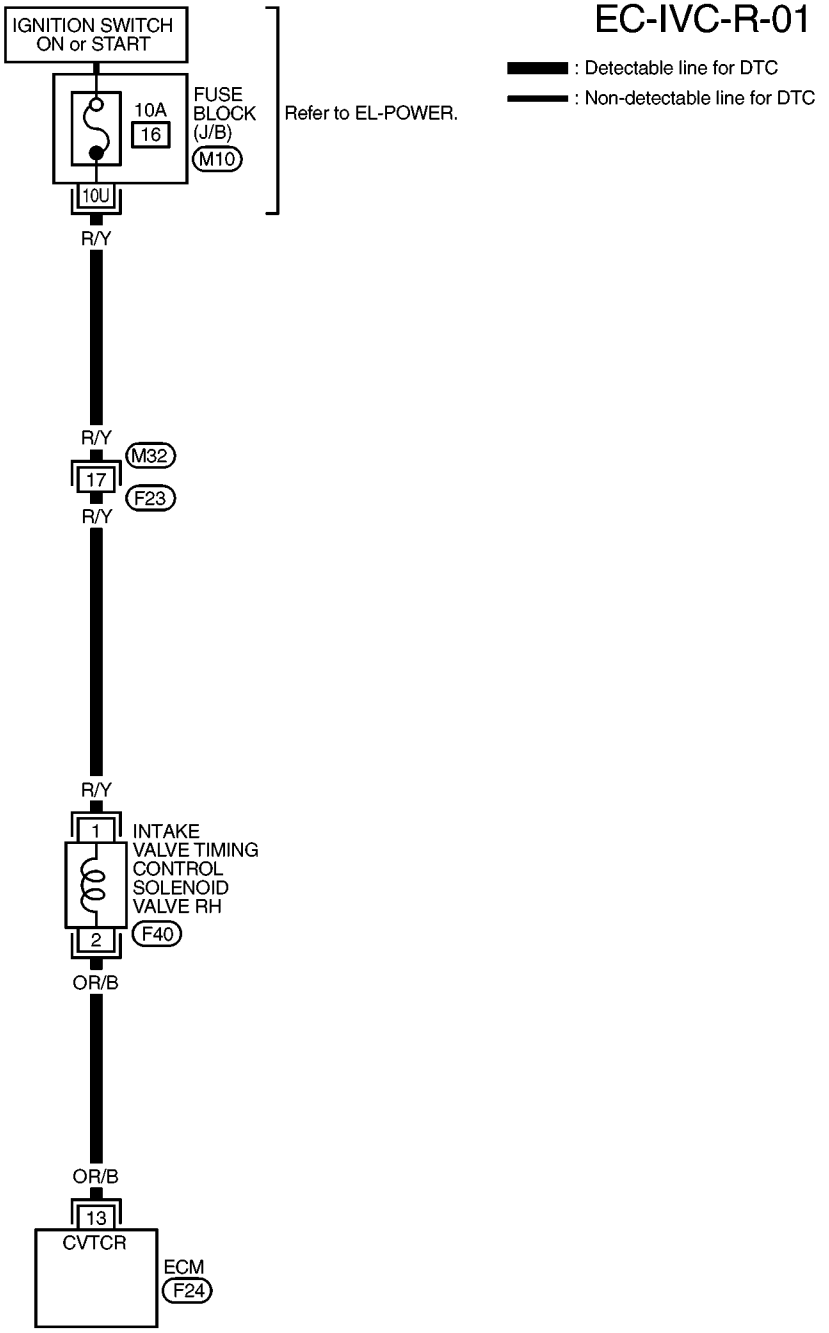
Follow the procedure "With CONSULT-II" above.

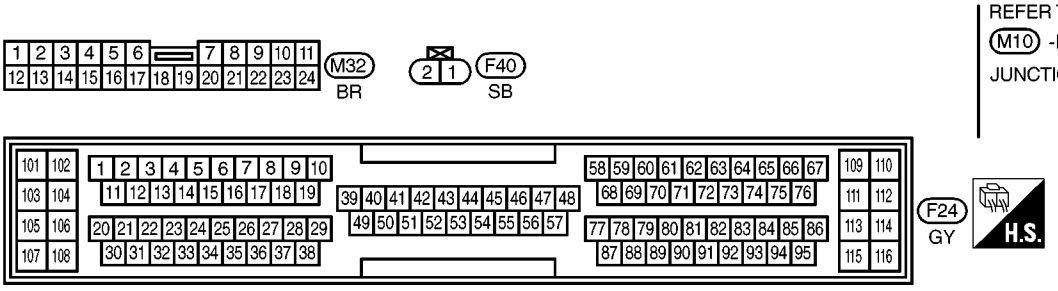
Wiring Diagram

NAEC0703

RIGHT BANK

NAEC0703S01



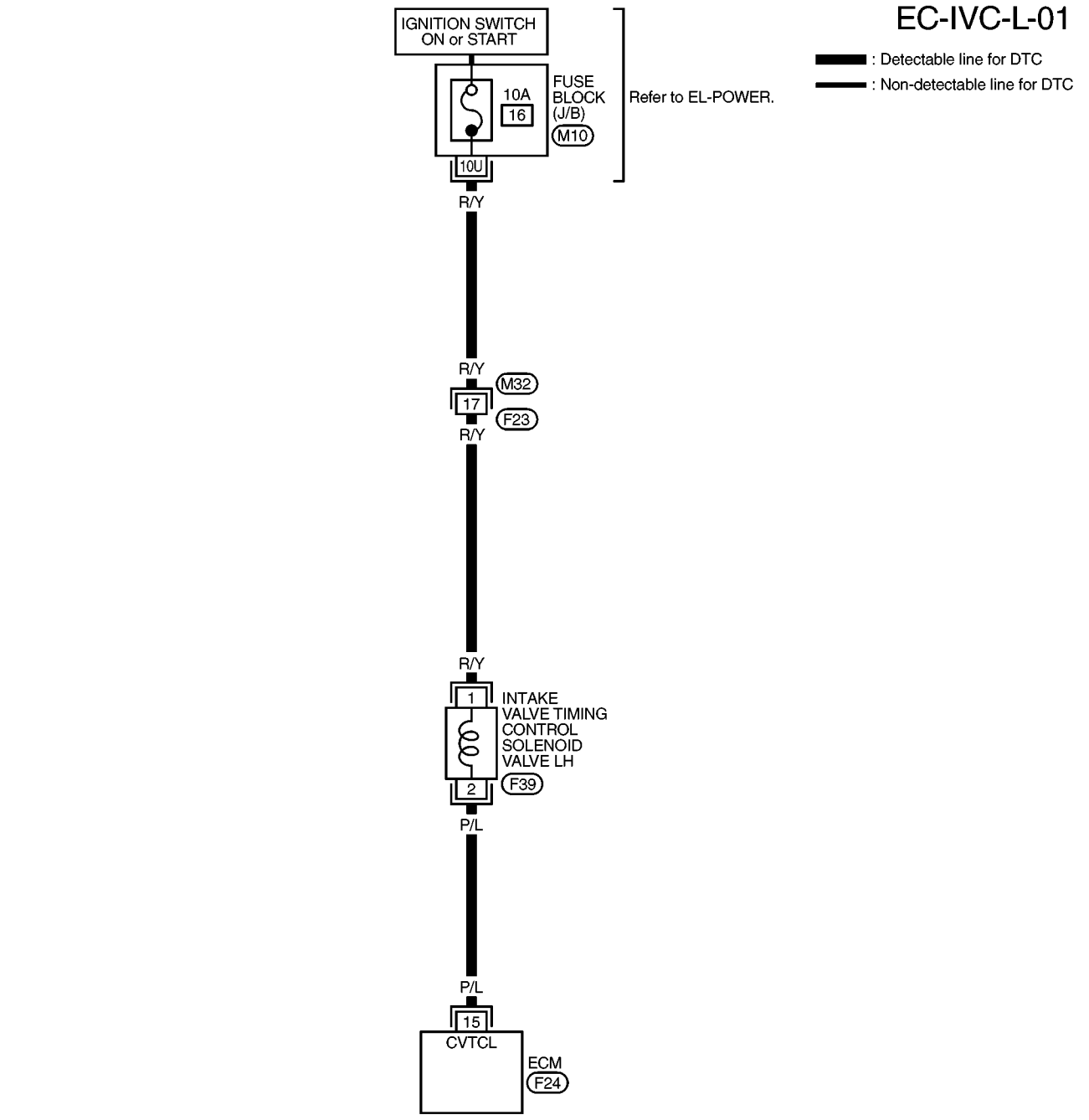


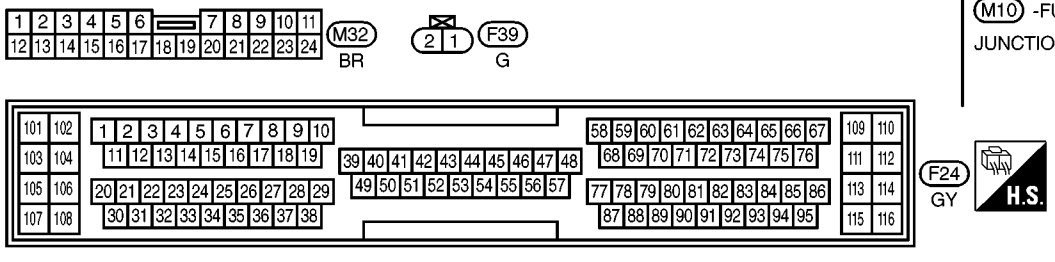
REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC989C

LEFT BANK

NAEC0703S02





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEC988C

Diagnostic Procedure

NAEC0704

1 **CHECK OVERALL FUNCTION**

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Perform “TARGET INT/V TIM” in “ACTIVE TEST” mode with CONSULT-II.
3. Hold engine speed at 1,500 to 2,500 rpm under the following step.
4. Touch “UP” or “DOWN” on CONSULT-II screen.

ACTIVE TEST	
TARGET INT/V TIM	0°
MONITOR	
ENG SPEED	XXX rpm
INT/V TIM (B1)	XXX °CA
INT/V TIM (B2)	XXX °CA
INT/V SOL (B1)	XXX %
INT/V SOL (B2)	XXX %

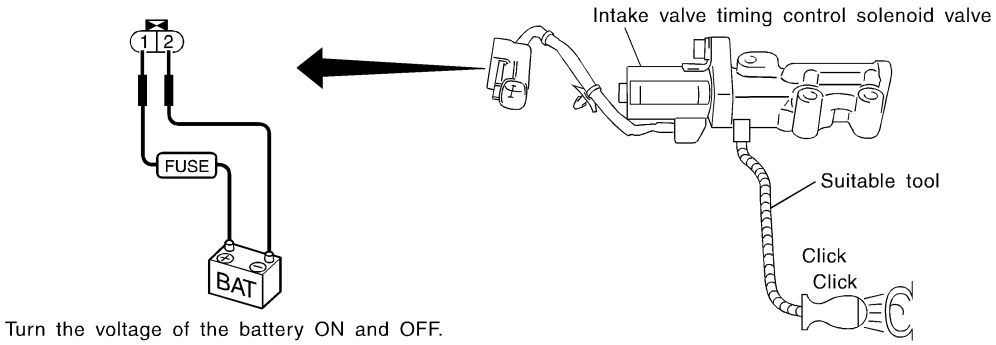
SEF355Z

5. Check the following.

- The angle of a corresponding INT/V TIM (B1)/(B2) to setting TARGET INT/V TIM confirms the variation.

Without CONSULT-II

1. Remove intake valve timing control solenoid valve.
2. Reconnect intake valve timing control solenoid valve harness connector.
3. Supply intake valve timing control solenoid valve terminals with battery voltage as shown below.



Turn the voltage of the battery ON and OFF.

SEF356Z

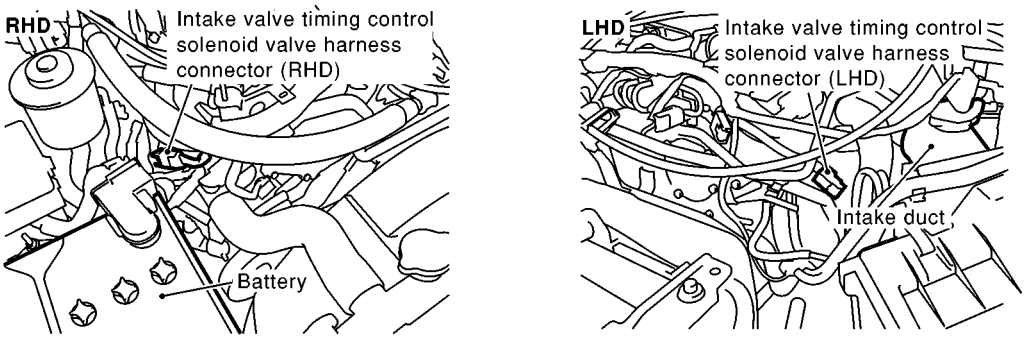
Clicking noise should be heard.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

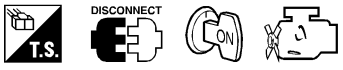
2	INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

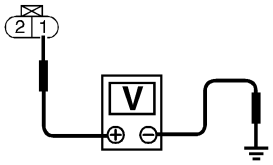
1. Stop engine.
2. Disconnect intake valve timing control solenoid valve harness connector.



SEF357Z

3. Turn ignition switch "ON".
4. Check voltage between terminal 1 and ground with CONSULT-II or tester.





Voltage: Battery voltage

SEF603X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTION PART

Check the following.
- Harness connectors M32, F23
- 10A fuse
- Harness continuity between fuse and intake valve timing control solenoid valve

	▶	Repair harness or connectors.

4	CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness connectors continuity between ECM terminal 13 (Right) or 15 (Left) and terminal 2. Refer to Wiring Diagram.

   Continuity should exist.
4. Also check harness for short to ground and short to power.

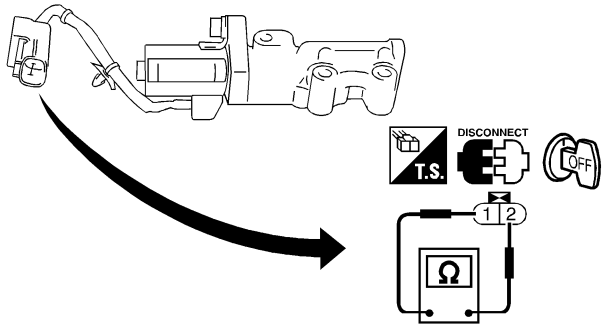
OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

5	CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Check resistance between intake valve timing control solenoid valve terminals as follows.



Terminals	Resistance
1 and 2	5.5 - 9.2Ω at 20°C (68°F)
1 or 2 and ground	∞ Ω (Continuity should not exist.)

SEF358Z

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair intake valve timing control solenoid valve.

6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.

▶ **INSPECTION END**

Description

NAEC0523

If DTC P1130 is displayed with P1165, first perform trouble diagnosis for DTC P1165, EC-488.

SYSTEM DESCRIPTION

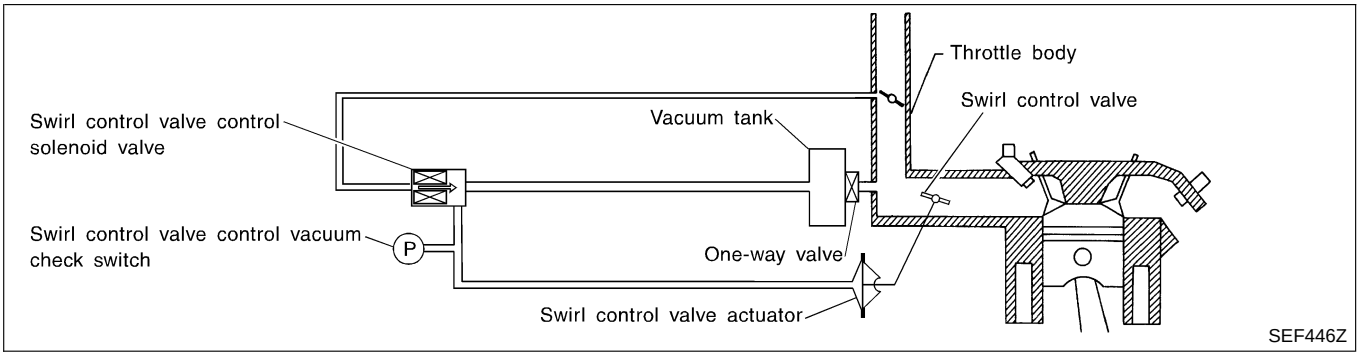
NAEC0523S01

Sensor	Input Signal to ECM	ECM function	Actuator
Throttle position sensor	Throttle position	Swirl control valve control	Swirl control valve control solenoid valve ↓ Vacuum signal Swirl control valve actuator ↓ Swirl control valve
Ignition switch	Start signal		
Crankshaft position sensor (POS)	Engine speed (POS signal)		
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		

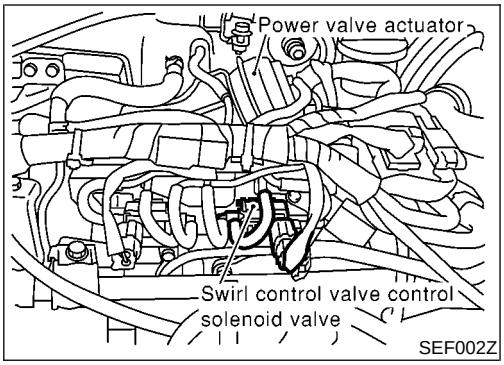
This system has a swirl control valve in the intake passage of each cylinder.
While idling and during low engine speed operation, the swirl control valve closes. Thus the velocity of the air in the intake passage increases, promoting the vaporization of the fuel and producing a swirl in the combustion chamber.
Because of this operation, this system tends to increase the burning speed of the gas mixture, improve fuel consumption, and increase the stability in running conditions.
Also, except when idling and during low engine speed operation, this system opens the swirl control valve. In this condition, this system tends to increase power by improving intake efficiency via reduction of intake flow resistance, intake flow.
The solenoid valve controls swirl control valve's shut/open condition. This solenoid valve is operated by the ECM.

Throttle position sensor (Idle position)	Engine speed (A/T)	Engine speed (M/T)	Swirl control valve control solenoid valve	Swirl control valve
ON	Below 3,200 rpm	Below 2,400 rpm	ON	Closed
OFF	Less than 3,200 rpm	Less than 2,400 rpm	ON	Closed
	More than 3,600 rpm	More than 2,800 rpm	OFF	Open

When engine coolant temperature is below 10°C (50°F) and above 55°C (131°F), swirl control valve is kept open regardless of above condition.



Description (Cont'd)



COMPONENT DESCRIPTION

NAEC0523S02

Swirl Control Valve Control Solenoid Valve

NAEC0523S0201

The swirl control valve control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the solenoid valve is bypassed to apply intake manifold vacuum to the swirl control valve actuator. This operation closes the swirl control valve. When the ECM sends an OFF signal, the vacuum signal is cut and the swirl control valve opens.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0524

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
SWRL CONT S/V	• Engine speed: Idle	Engine coolant temperature is between 15°C (59°F) to 50°C (122°F).	ON
		Engine coolant temperature is above 55°C (131°F).	OFF

ECM Terminals and Reference Value

NAEC0673

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	G	Swirl control valve control solenoid valve	**[Engine is running]** • Idle speed • Engine coolant temperature is between 15 to 50°C (59 to 122°F).	0 - 1.0V
			[Engine is running] • Idle speed • Engine coolant temperature is above 55°C (131°F).	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC0526

Malfunction is detected when

(Malfunction A) An improper voltage signal is sent to ECM through swirl control valve control solenoid valve,

(Malfunction B) The vacuum signal is not sent to swirl control valve under specified driving conditions, even though swirl control valve control solenoid valve is ON,

(Malfunction C) The vacuum signal is sent to swirl control valve even though swirl control valve control solenoid valve is OFF.

Possible Cause

NAEC0527

MALFUNCTION A

NAEC0527S01

- Harness or connectors
  (The swirl control valve control solenoid valve circuit is open or shorted.)
- Swirl control valve control solenoid valve

MALFUNCTION B

NAEC0527S02

- Harness or connector
  (The swirl control valve control solenoid valve circuit is open.)
- Swirl control valve control solenoid valve
- Intake system
  (Intake air leaks)
- Hoses and tubes between intake manifold, vacuum tank and swirl control valve actuator
- Swirl control valve actuator
- Swirl control valve control vacuum check switch
- Mass air flow sensor
- Crankshaft position sensor (REF)
- Throttle position sensor

MALFUNCTION C

NAEC0527S03

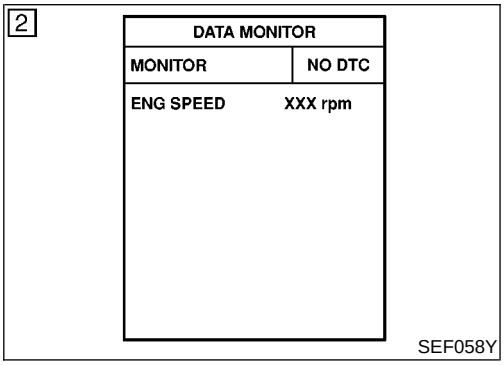
- Harness or connector
  (The swirl control valve control solenoid valve circuit is shorted.)
- Swirl control valve control vacuum check switch
- Crankshaft position sensor (REF)
- Throttle position sensor
- Hoses and tubes between air cleaner and swirl control valve vacuum check switch
- Swirl control valve control solenoid valve

DTC Confirmation Procedure

NAEC0528

Perform “Procedure for malfunction A” first. If the 1st trip DTC cannot be confirmed, perform “Procedure for malfunction B”. If the 1st trip DTC is not confirmed on “Procedure for malfunction B”, perform “Procedure for malfunction C”.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.



PROCEDURE FOR MALFUNCTION A

NAEC0528S01

With CONSULT-II

NAEC0528S0101

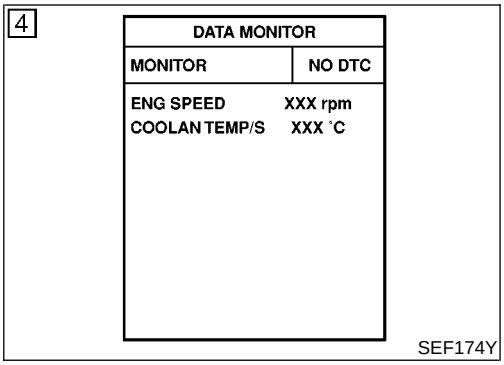
1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 5 seconds.
   If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-458.

With GST

NAEC0528S0102

Follow the procedure “With CONSULT-II” above.

DTC Confirmation Procedure (Cont'd)



PROCEDURE FOR MALFUNCTION B

NAEC0528S02

TESTING CONDITION:

- **For best results, perform the test at a temperature above 5°C (41°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 10V at idle, then stop engine immediately.**

With CONSULT-II

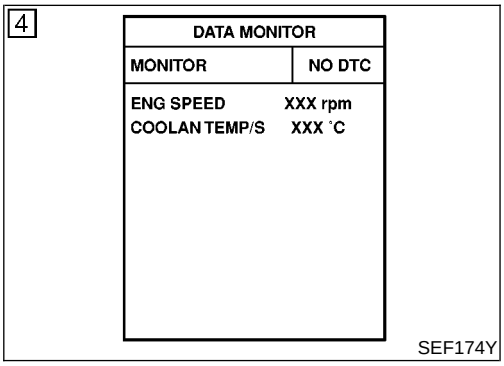
NAEC0528S0201

1) Turn ignition switch "OFF" and wait at least 10 seconds.
2) Turn ignition switch "ON".
3) Check "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
4) Confirm COOLAN TEMP/S value is 40°C (104°F) or less.
   If the value is more than 40°C (104°F), park the vehicle in a cool place and retry from step 1.
5) Start engine and wait until COOLAN TEMP/S value increases to more than 55°C (131°F).
   If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-458.

With GST

NAEC0528S0202

Follow the procedure "With CONSULT-II" above.



PROCEDURE FOR MALFUNCTION C

NAEC0528S03

TESTING CONDITION:

- **For best results, perform the test at a temperature above 5°C (41°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 10V at idle.**

With CONSULT-II

NAEC0528S0301

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT-II.
4) Start engine and let it idle for at least 20 seconds. If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-458.

With GST

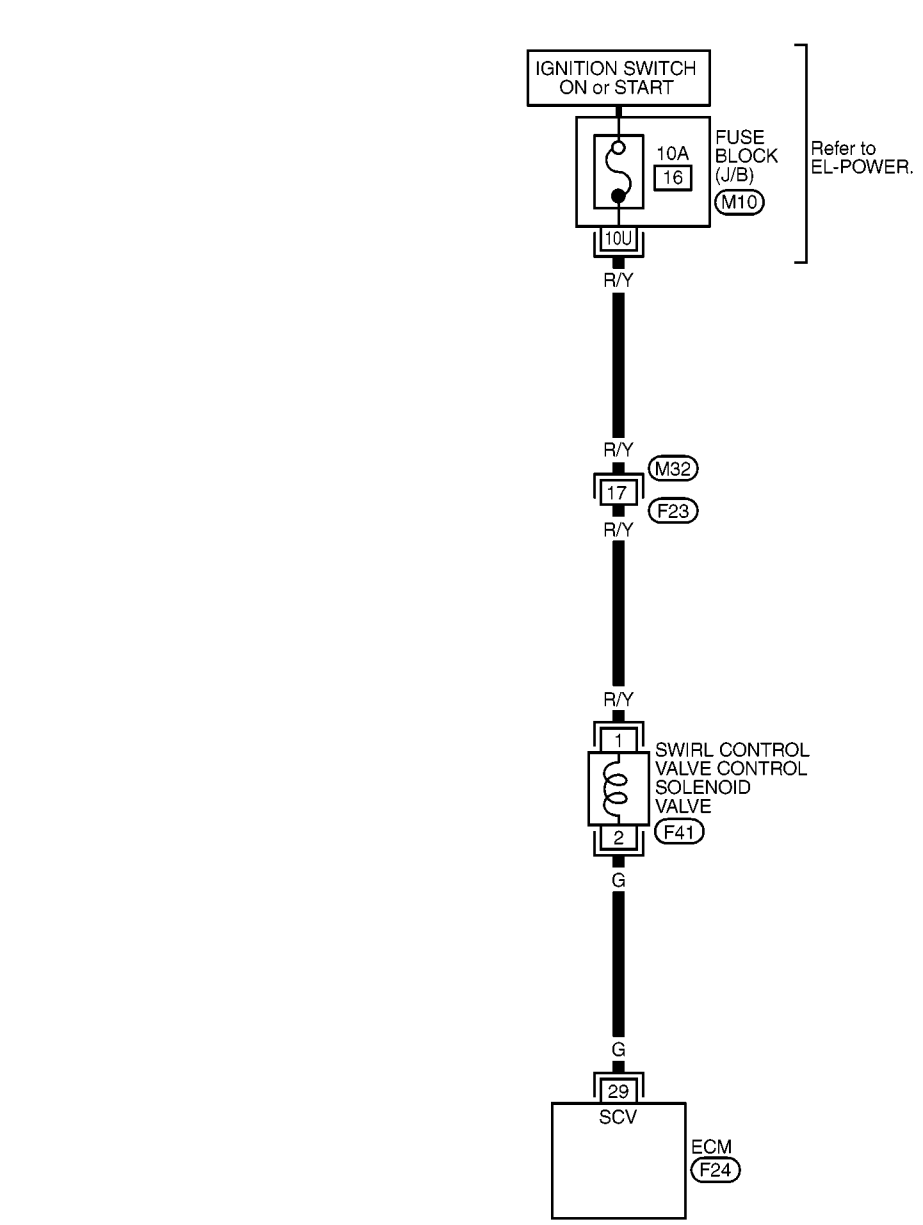
NAEC0528S0302

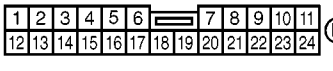
Follow the procedure "With CONSULT-II" above.

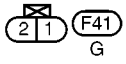
Wiring Diagram

NAEC0529

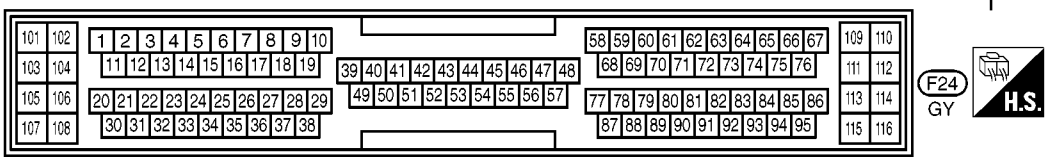
EC-SWL/V-01







REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)



MEC980C

Diagnostic Procedure

NAEC0530

PROCEDURE A

NAEC0530S01

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “SWIRL CONT SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.
3. Touch “ON” and “OFF” on CONSULT-II screen.

ACTIVE TEST	
SWIRL CONT SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm
IACV-AAC/V	XXX step

SEF003Z

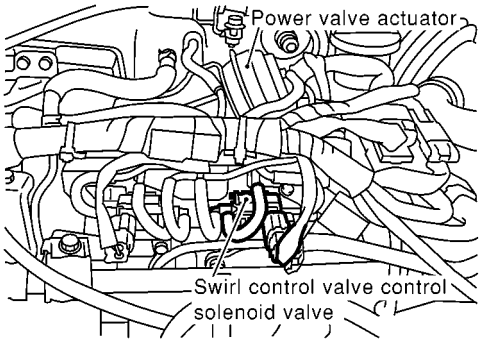
4. Make sure that clicking sound is heard from the swirl control valve control solenoid valve.

OK or NG

OK ▶	GO TO 6.
NG ▶	GO TO 3.

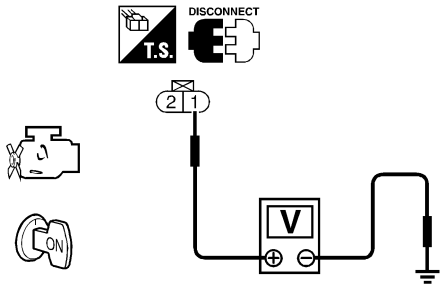
3	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect swirl control valve control solenoid valve harness connector.



SEF002Z

3. Turn ignition switch "ON".
4. Check voltage between swirl control valve control solenoid valve terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF619X

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M32, F23
- 15A fuse
- Harness for open or short between swirl control valve control solenoid valve and fuse

	▶	Repair harness or connectors.

5	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 29 and swirl control valve control solenoid valve terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

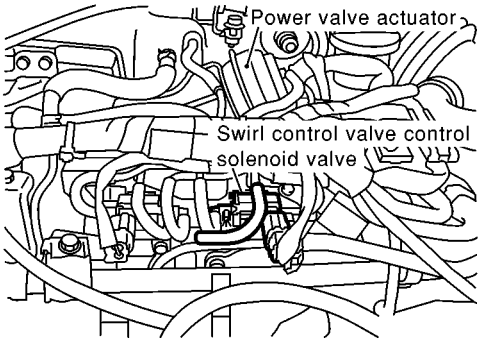
OK	▶	GO TO 6.
NG	▶	Repair open circuit, short to ground or short to power in harness connectors.

Diagnostic Procedure (Cont'd)

6	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL VALVE" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.





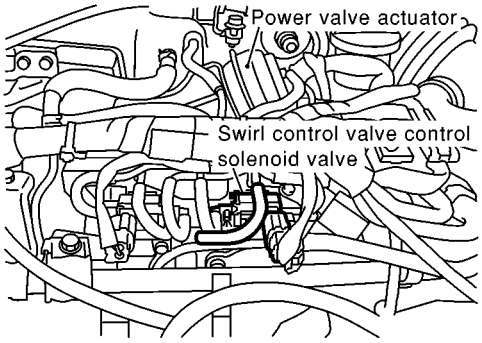
SWIRL CONT SOL/V	Vacuum
ON	Should exist.
OFF	Should not exist.

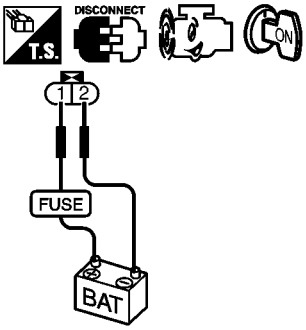
Operation takes less than 1 second.

SEF004Z

Without CONSULT-II

1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals 1 and 2.
5. Check vacuum existence and operation delay time under the following conditions.





Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

Operation takes less than 1 second.

SEF005Z

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace intake manifold collector assembly.

7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**

PROCEDURE B

NAEC0530S02

1	CHECK INTAKE SYSTEM
1. Start engine and let it idle. 2. Check intake air system for air leaks. **OK or NG**	
OK (With CONSULT-II) ▶	GO TO 2.
OK (Without CONSULT-II) ▶	GO TO 3.
NG ▶	Repair intake system.

2	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE CIRCUIT

With CONSULT-II

1. Select "SWIRL CONT SOL VALVE" in "ACTIVE TEST" mode with CONSULT-II.
2. Touch "ON" and "OFF" on CONSULT-II screen.

ACTIVE TEST	
SWIRL CONT SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm
IACV-AAC/V	XXX step

SEF003Z

3. Make sure that clicking sound is heard from the swirl control valve control solenoid valve.

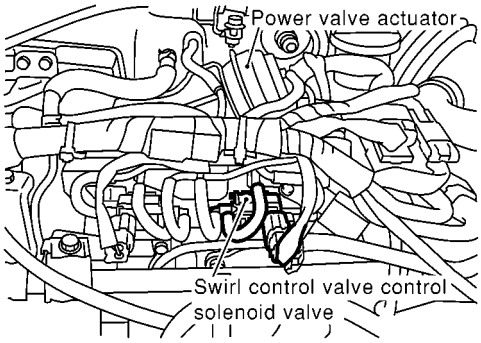
OK or NG

OK ▶	GO TO 6.
NG ▶	GO TO 3.

Diagnostic Procedure (Cont'd)

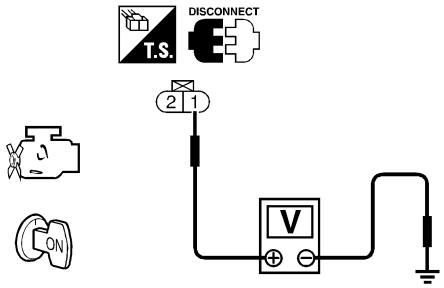
3	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect swirl control valve control solenoid valve harness connector.



SEF002Z

3. Turn ignition switch "ON".
4. Check voltage between swirl control valve control solenoid valve terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF619X

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M32, F23
- 15A fuse
- Harness for open or short between swirl control valve control solenoid valve and fuse

	▶	Repair harness or connectors.

5	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

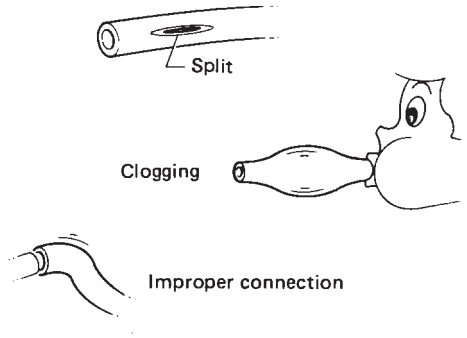
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 29 and swirl control valve control solenoid valve terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit, short to ground or short to power in harness connectors.

6	CHECK HOSES

Check hoses and tubes between intake manifold, and swirl control valve actuator for crack, clogging, improper connection or disconnection.



SEF109L

OK or NG

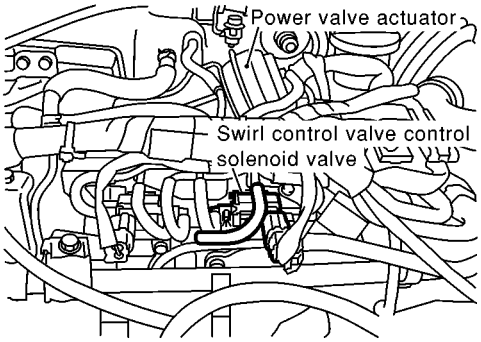
OK	▶	GO TO 7.
NG	▶	Repair hoses or tubes.

Diagnostic Procedure (Cont'd)

7	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



SWIRL CONT SOL/V	Vacuum
ON	Should exist.
OFF	Should not exist.

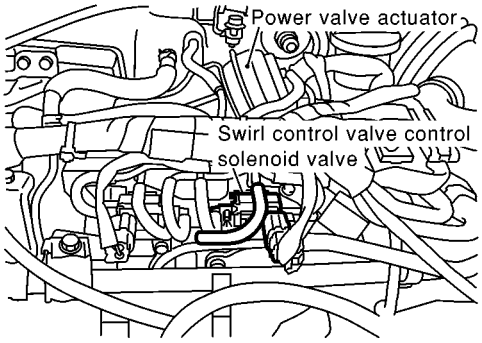
Operation takes less than 1 second.

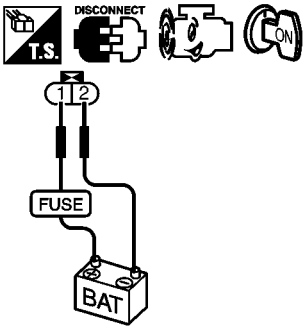


SEF004Z

Without CONSULT-II

1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals 1 and 2.
5. Check vacuum existence and operation delay time under the following conditions.





Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

Operation takes less than 1 second.

SEF005Z

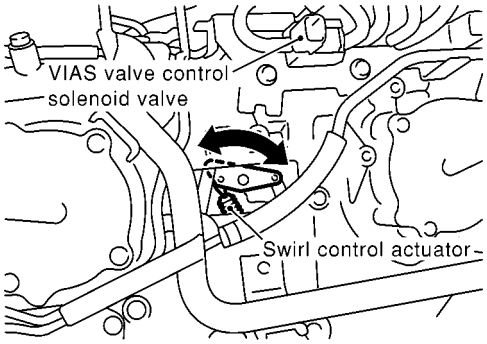
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace intake manifold collector assembly.

8	CHECK SWIRL CONTROL VALVE ACTUATOR

With CONSULT-II

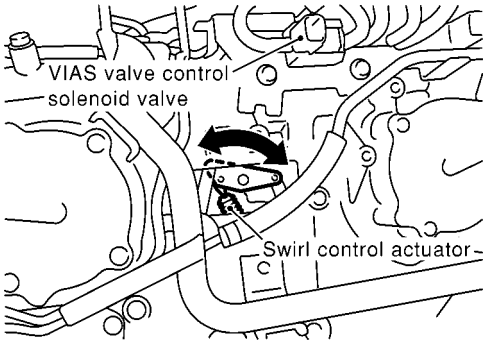
1. Reconnect vacuum hose between swirl control valve actuator and swirl control valve control solenoid valve.
2. Start engine and let it idle.
3. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode.
4. Touch "ON" and "OFF" on CONSULT-II screen.
5. Make sure that swirl control valve actuator rod moves according to "SWIRL CONT SOL/V indication.



SEF006Z

Without CONSULT-II

1. Reconnect vacuum hose between swirl control valve actuator and swirl control valve control solenoid valve.
2. Start engine and let it idle.
3. Apply 12V direct current between swirl control valve control solenoid valve terminals 1 and 2.
4. Make sure that swirl control valve actuator rod moves according to 12V direct current being applied.



SEF006Z

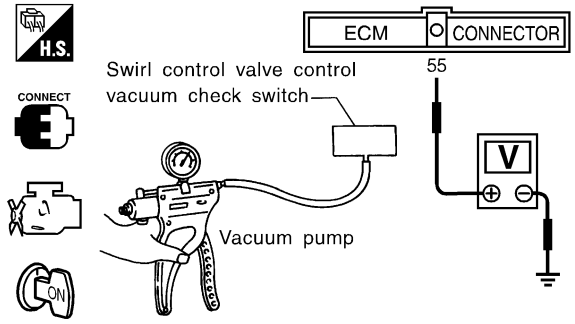
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace swirl control valve and actuator.

Diagnostic Procedure (Cont'd)

9	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH

1. Turn ignition switch "OFF".
2. Disconnect vacuum hose connected to swirl control valve control vacuum check switch.
3. Attach vacuum pump to swirl control valve control vacuum check switch.
4. Turn ignition switch "ON".
5. Check voltage between ECM terminal 55 and ground under the following conditions.



Applied pressure	Voltage V
More than –20.0 kPa (–150 mmHg, –5.91 inHg)	Engine ground
–20.0 to –23.0 kPa (–150 to –172 mmHg, –5.91 to –6.77 inHg)	Engine ground or Approx. 4.8
Less than –23.0 kPa (–172 mmHg, –6.77 inHg)	Approx. 4.8

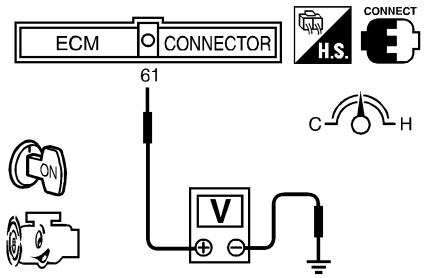
SEF709X

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace swirl control valve control vacuum check switch.

10	CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 61 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.2 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.2
Idle to about 4,000 rpm*	1.2 - 1.8 to Approx. 4.0

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

SEF298X

4. If the voltage is out of specification, disconnect MAFS harness connector and connect it again. Then repeat above check.

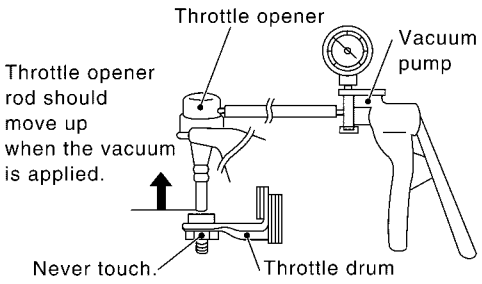
OK or NG

OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Replace mass air flow sensor.

11	CHECK THROTTLE POSITION SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Turn ignition switch ON.
7. Select "DATA MONITOR" mode with CONSULT-II.
8. Check voltage of "THRTL POS SEN" under the following conditions.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
THRTL POS SEN	XXX V

Throttle valve conditions	THRTL POS SEN
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

SEF062Y

OK or NG

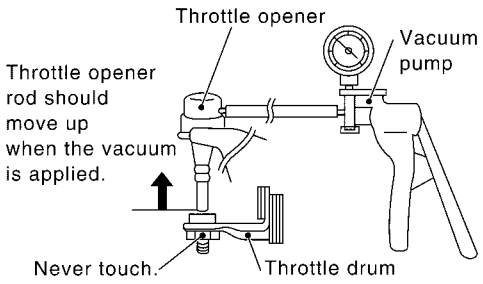
OK	▶	GO TO 14.
NG	▶	GO TO 13.

Diagnostic Procedure (Cont'd)

12	CHECK THROTTLE POSITION SENSOR

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Turn ignition switch ON.
7. Check voltage between ECM terminal 91 (Throttle position sensor signal) and ground.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

Throttle valve conditions	Voltage
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

MTBL0231

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	ADJUST CLOSED THROTTLE POSITION SWITCH

Adjust closed throttle position switch. Refer to "Basic Inspection", EC-99.

Items	Specifications
Ignition timing	15° ± 2° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	M/T: 750 ± 50 rpm A/T: 750 ± 50 rpm (in "P" or "N" position)

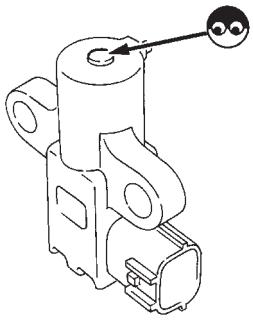
MTBL0537

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-99.

14	CHECK CRANKSHAFT POSITION SENSOR (REF)-I

1. Turn ignition switch "OFF".
2. Loosen the fixing bolts and remove the CKPS (REF).
3. Visually check the CKPS (REF) for chipping.



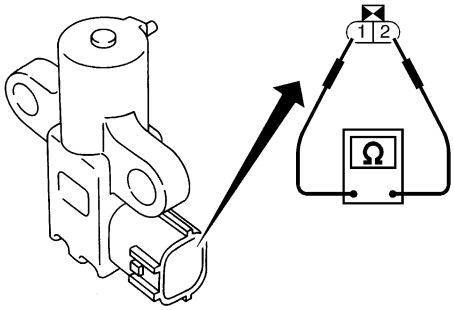
SEF585P

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace crankshaft position sensor (REF).

15	CHECK CRANKSHAFT POSITION SENSOR (REF)-II

Check resistance between CKPS (REF) terminals 1 and 2.



Resistance: Approximately
470 - 570 Ω
[AT 20°C (68°F)]

SEF350X

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace crankshaft position sensor (REF).

16	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.

▶ **INSPECTION END**

PROCEDURE C

NAEC0530S03

1	INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

2	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch "OFF".
2. Select "SWIRL CONT SOL VALVE" in "ACTIVE TEST" mode with CONSULT-II.
3. Touch "ON" and "OFF" on CONSULT-II screen.

ACTIVE TEST	
SWIRL CONT SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm
IACV-AAC/V	XXX step

SEF003Z

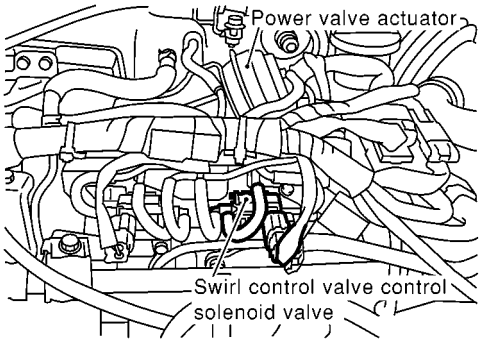
4. Make sure that clicking sound is heard from the swirl control valve control solenoid valve.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 3.

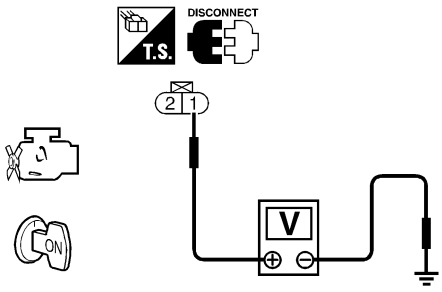
3	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect swirl control valve control solenoid valve harness connector.



SEF002Z

3. Turn ignition switch "ON".
4. Check voltage between swirl control valve control solenoid valve terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF619X

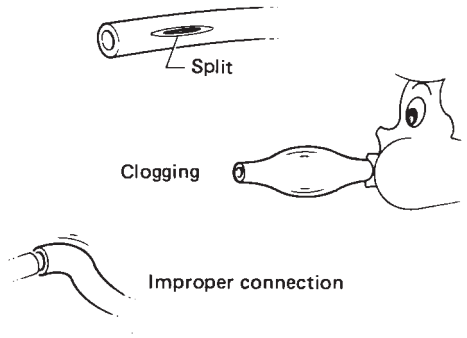
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M32, F23 ● 15A fuse ● Harness for open or short between swirl control valve control solenoid valve and fuse	
▶	Repair harness or connectors.

5	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 29 and terminal 2. Refer to Wiring Diagram. **Continuity should exist.** 4. Also, check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Repair open circuit, short to ground or short to power in harness connectors.

6	CHECK HOSES
Check hoses and tubes between air cleaner and swirl control valve vacuum check switch for clogging or improper connection.	



SEF109L

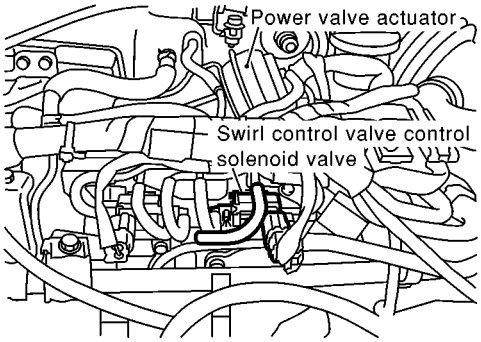
OK or NG	
OK ▶	GO TO 7.
NG ▶	Repair hoses or tubes.

Diagnostic Procedure (Cont'd)

7	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



SWIRL CONT SOL/V	Vacuum
ON	Should exist.
OFF	Should not exist.

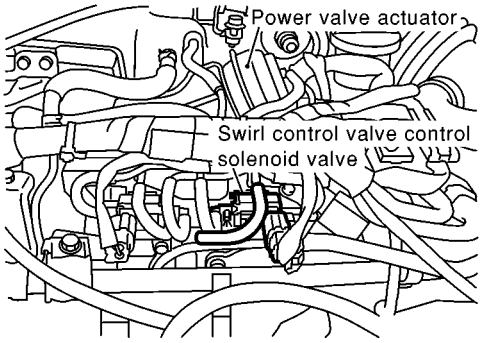
Operation takes less than 1 second.

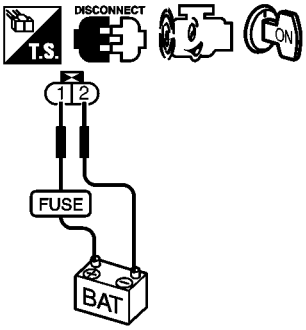


SEF004Z

Without CONSULT-II

1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals 1 and 2.
5. Check vacuum existence and operation delay time under the following conditions.





Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

Operation takes less than 1 second.

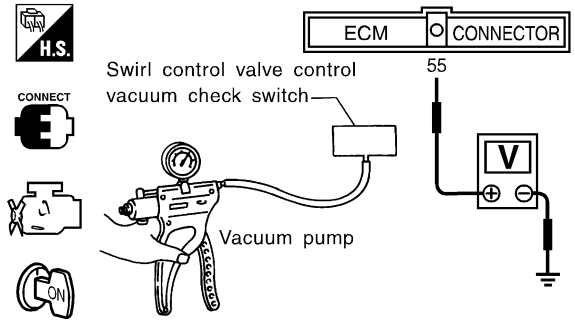
SEF005Z

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace intake manifold collector assembly.

8	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH

1. Turn ignition switch "OFF".
2. Disconnect vacuum hose connected to swirl control valve control vacuum check switch.
3. Attach vacuum pump to swirl control valve control vacuum check switch.
4. Turn ignition switch "ON".
5. Check voltage between ECM terminal 55 and ground under the following conditions.



Applied pressure	Voltage V
More than –20.0 kPa (–150 mmHg, –5.91 inHg)	Engine ground
–20.0 to –23.0 kPa (–150 to –172 mmHg, –5.91 to –6.77 inHg)	Engine ground or Approx. 4.8
Less than –23.0 kPa (–172 mmHg, –6.77 inHg)	Approx. 4.8

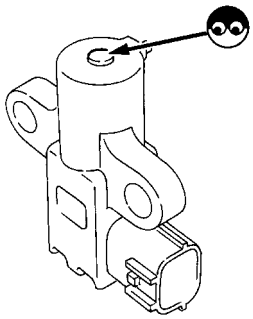
SEF709X

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace swirl control valve control vacuum check switch.

9	CHECK CRANKSHAFT POSITION SENSOR (REF)-I

1. Turn ignition switch "OFF".
2. Loosen the fixing bolts and remove the CKPS (REF).
3. Visually check the CKPS (REF) for chipping.



SEF585P

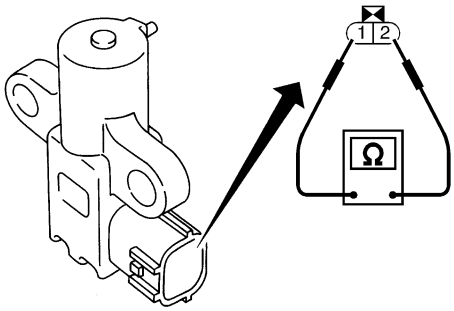
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace crankshaft position sensor (REF).

Diagnostic Procedure (Cont'd)

10	CHECK CRANKSHAFT POSITION SENSOR (REF)-II

Check resistance between CKPS (REF) terminals 1 and 2.



Resistance: Approximately
470 - 570 Ω
[AT 20°C (68°F)]

SEF350X

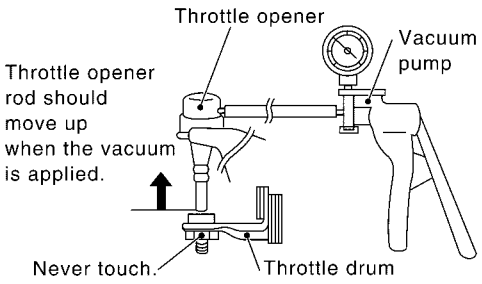
OK or NG

OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Replace crankshaft position sensor (REF).

11	CHECK THROTTLE POSITION SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Turn ignition switch ON.
7. Select "DATA MONITOR" mode with CONSULT-II.
8. Check voltage of "THRTL POS SEN" under the following conditions.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
THRTL POS SEN	XXX V

Throttle valve conditions	THRTL POS SEN
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

SEF062Y

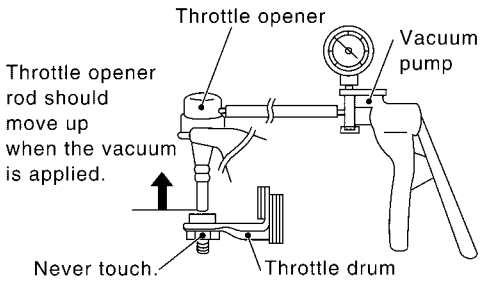
OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

12	CHECK THROTTLE POSITION SENSOR

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Remove the vacuum hose connected to the throttle opener.
4. Connect suitable vacuum hose to the vacuum pump and the opener.
5. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

6. Turn ignition switch ON.
7. Check voltage between ECM terminal 91 (Throttle position sensor signal) and ground.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

Throttle valve conditions	Voltage
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

MTBL0231

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	ADJUST CLOSED THROTTLE POSITION SWITCH

Adjust closed throttle position switch. Refer to "Basic Inspection", EC-99.

Items	Specifications
Ignition timing	15° ± 2° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	M/T: 750 ± 50 rpm A/T: 750 ± 50 rpm (in "P" or "N" position)

MTBL0537

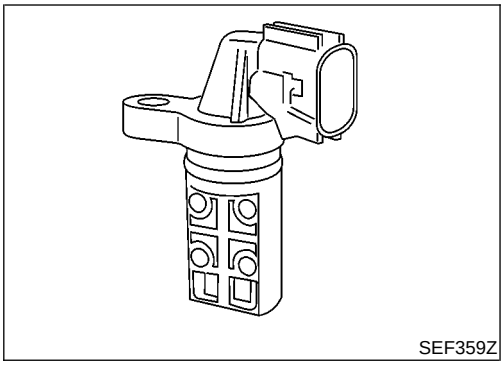
OK or NG

OK	▶	GO TO 14.
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-99.

14	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.

▶ **INSPECTION END**



Component Description

NAEC0705

Intake valve advance unit position sensors are located in the front cylinder heads in both right/left banks.
This sensor uses a Hall IC (element).
The cam position is determined by the intake primary cam sprocket concave (in three places). The ECM provides feedback to the intake valve timing control for appropriate target valve open-close timing according to drive conditions based on detected cam position.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0706

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1) INT/V TIM (B2)	● Engine: After warming up ● Shift lever “N” ● Quickly depressed accelerator pedal ● No-load	Idle	0° CA
		2,000 rpm	Approximately 12 - 18° CA

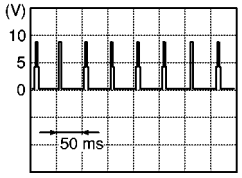
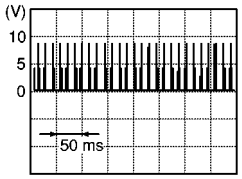
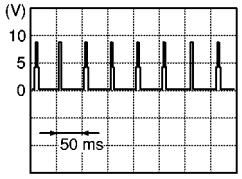
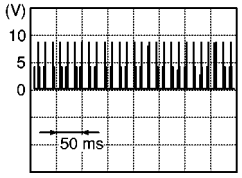
ECM Terminals and Reference Value

=NAEC0707

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
79	Y/G	Intake valve timing control position sensors (RH)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.5V  SEF351Z
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	Approximately 0.5V  SEF352Z
89	OR	Intake valve timing control position sensors (LH)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.5V  SEF351Z
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	Approximately 0.5V  SEF352Z

On Board Diagnosis Logic

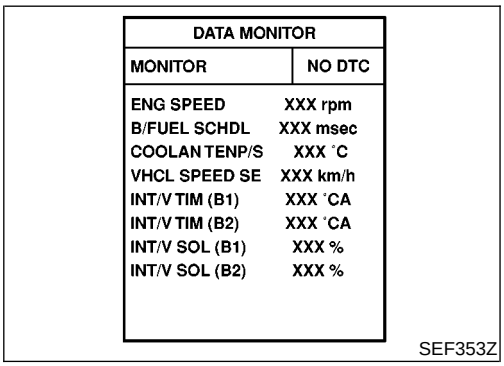
NAEC0708

Malfunction is detected when an excessively high or low voltage from the sensor is sent to ECM.

Possible Cause

NAEC0709

- Harness or connectors
  (Intake valve timing control position sensor circuit is open or shorted)
- Intake valve timing control position sensor.
- Crankshaft position sensor (REF)
- Crankshaft position sensor (POS)
- Camshaft position sensor (PHASE)



DTC Confirmation Procedure

NAEC0710

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NAEC0710S01

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Maintain the following conditions for at least 10 seconds.

Engine speed	More than Idle speed
Selector lever	"P" or "N" position

4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-482.

WITH GST

NAEC0710S02

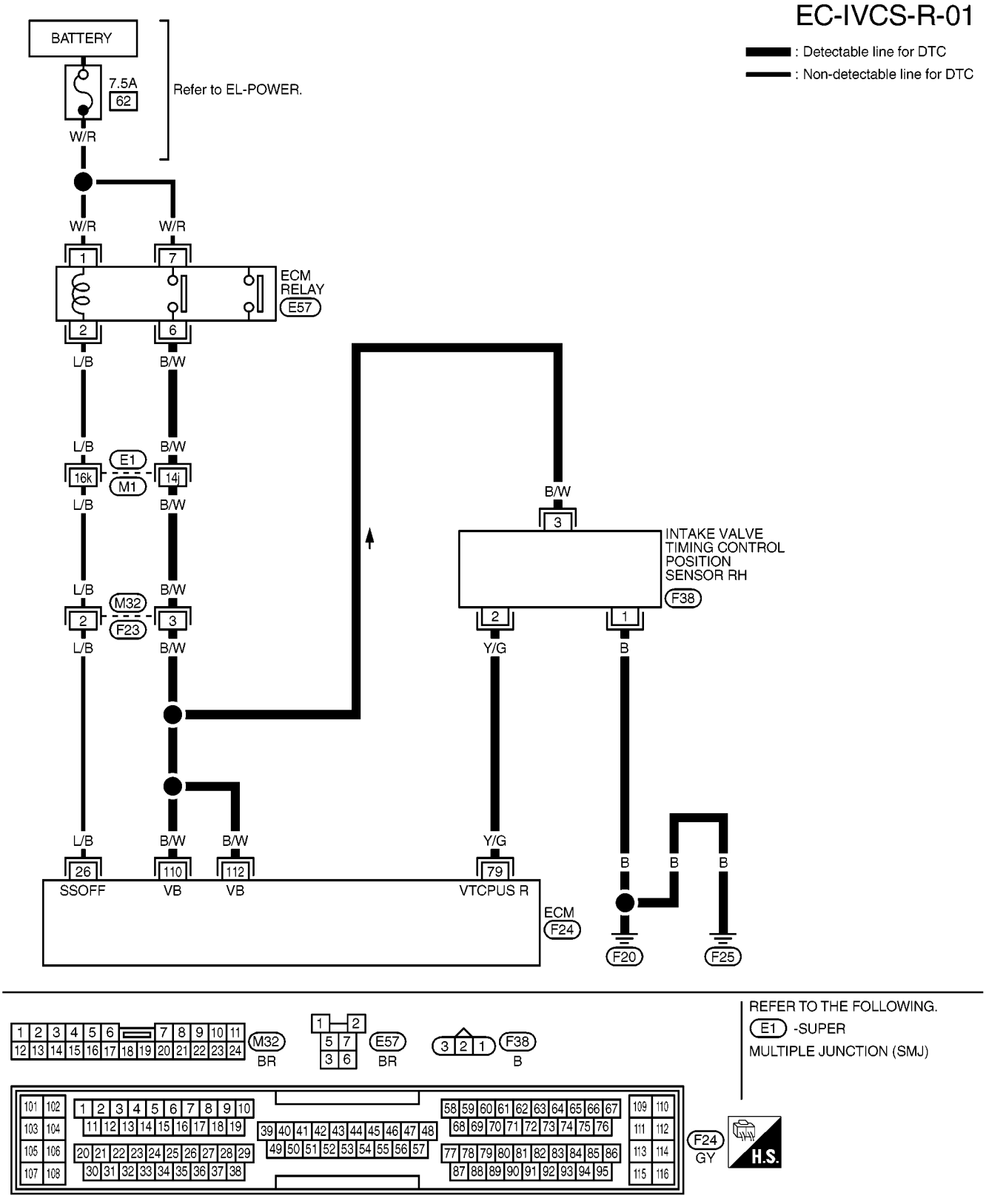
Follow the procedure "With CONSULT-II" above.

Wiring Diagram

RIGHT BANK

NAEC0711

NAEC0711S01



MEC987C

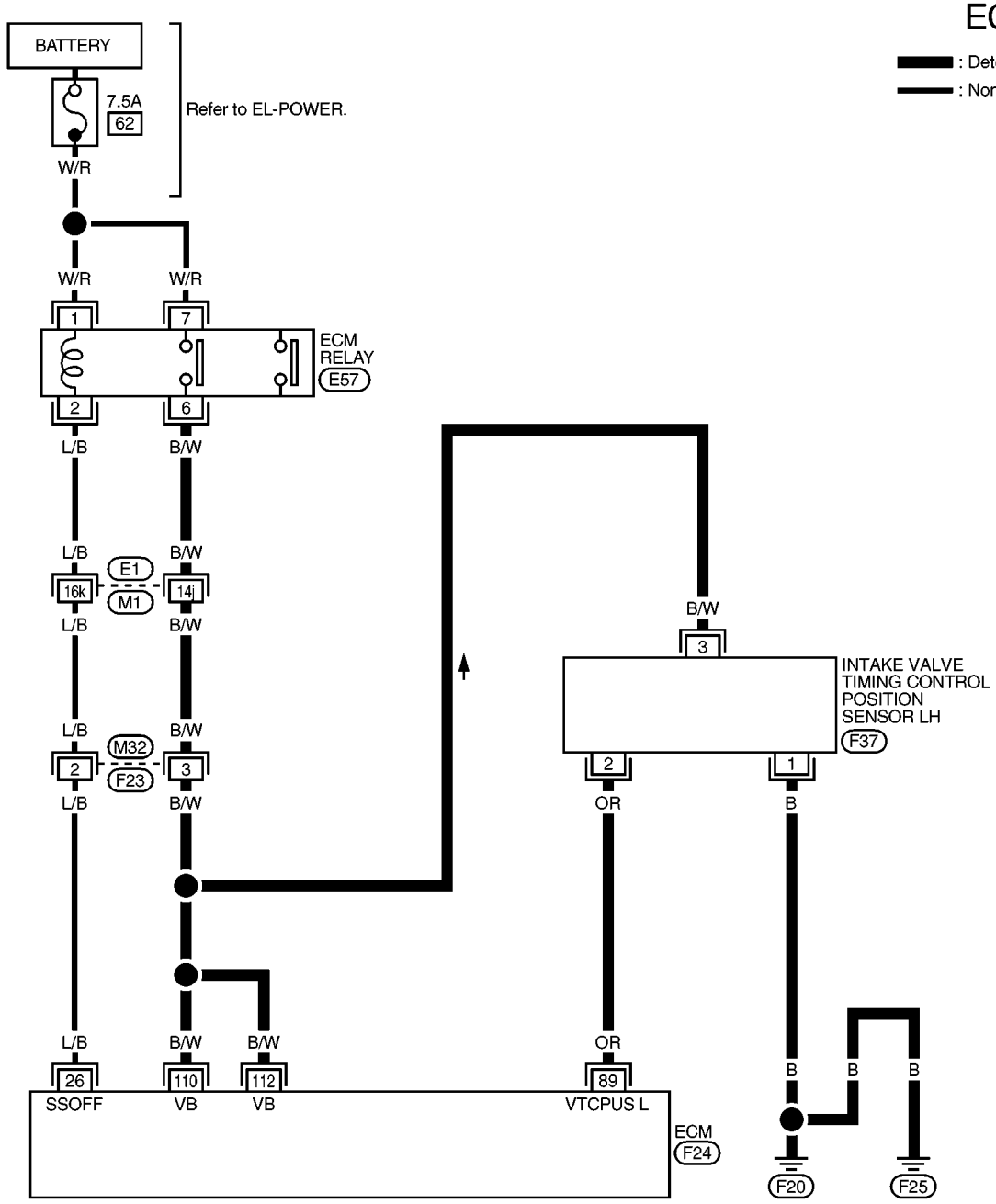
Wiring Diagram (Cont'd)

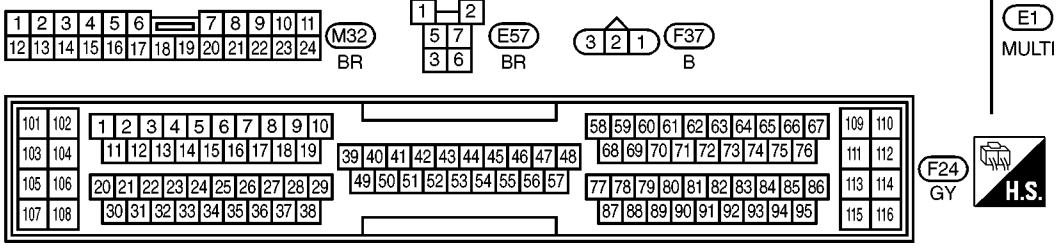
LEFT BANK

NAEC0711S02

EC-IVCS-L-01

: Detectable line for DTC
: Non-detectable line for DTC





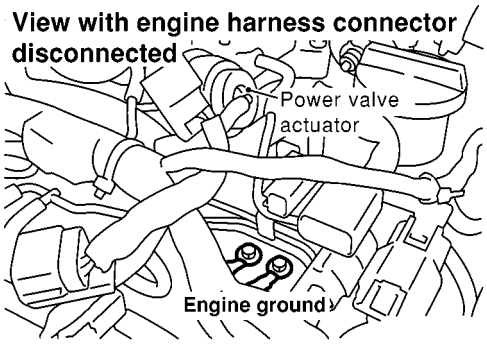
MEC986C

Diagnostic Procedure

NAEC0712

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

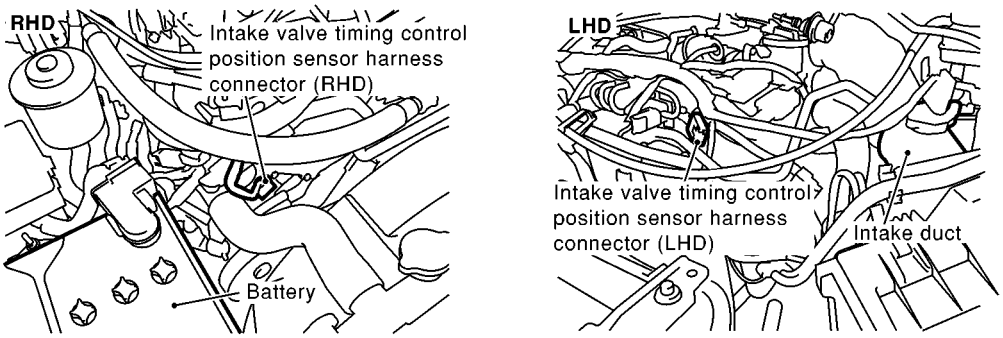


SEF959Y

▶	GO TO 2.

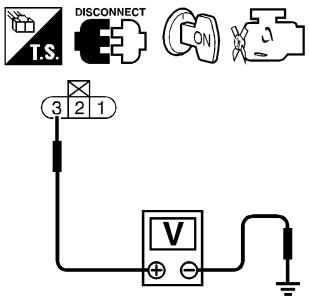
2	CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect intake valve timing control position sensor harness connector.



SEF360Z

2. Turn ignition switch “ON”.
3. Check voltage between intake valve timing control position sensor harness connector terminal 3 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF370X

4. Also check harness for short to ground and short to power.

OK or NG

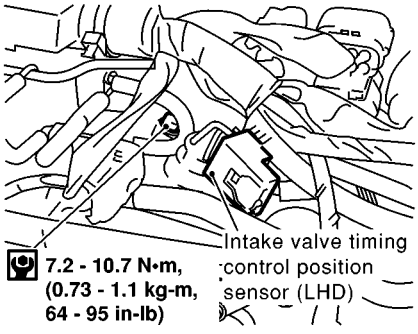
OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M32, F23 ● Harness connectors E1, M1 ● Harness for open or short between ECM and intake valve timing control position sensor ● Harness for open or short between ECM relay and intake valve timing control position sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch "OFF". 2. Check harness connector continuity between intake valve timing control position sensor harness connector terminal 1 and engine ground. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 5.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT
1. Disconnect ECM harness connector. 2. Check harness connectors continuity between ECM terminal 79 (Right) or 89 (Left) and terminal 2. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR INSTALLATION
Check that intake valve timing control position sensor is installed correctly as shown below.	

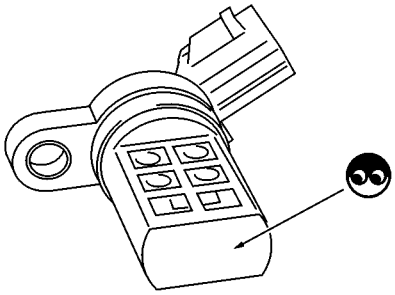


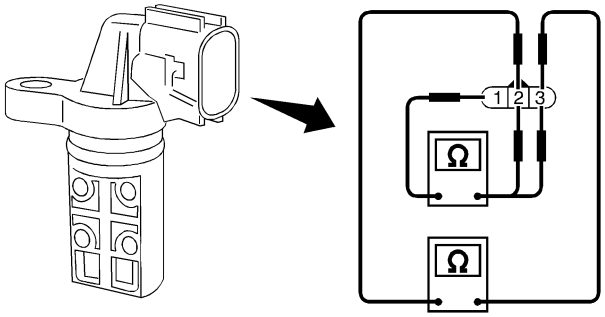
SEF361Z

OK or NG	
OK ▶	GO TO 7.
NG ▶	Install intake valve timing control position sensor correclty.

Diagnostic Procedure (Cont'd)

7	CHECK IMPROPER INSTALLATION	
1. Loosen and retighten the fixing bolt of the intake valve timing control position sensor. 2. Reconnect harness connector disconnected. 3. Perform "DTC Confirmation Procedure", EC-479 again. **Is a 1st trip DTC P1140 (RIGHT, -B1) P1145 (LEFT, -B2) detected?**		
Yes	▶	GO TO 8.
No	▶	**INSPECTION END**

8	CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR	
1. Disconnect intake valve timing control position sensor connector. 2. Loosen the fixing bolt of the sensor. 3. Remove the sensor. 4. Visually check the sensor for chipping.  SEF362Z **OK or NG**		
OK	▶	GO TO 9.
NG	▶	Replace intake valve timing control position sensor.

9	CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR-II	
• Check resistance as shown below.  SEF363Z **OK or NG**		
OK	▶	GO TO 10.
NG	▶	Replace intake valve timing control position sensor.

Resistance Ω [at 25°C (77°F)]	Terminal No. (Polarity)
Except 0 or ∞	3 (+) - 1 (–)
	2 (+) - 1 (–)
	3 (+) - 2 (–)

10	CHECK CAMSHAFT	
Check accumulation of debris to the signal pick-up portion of the camshaft. Refer to step 35 of "Timing chain removal", EM-23.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Remove debris and clean the signal pick-up cut out of camshaft.

11	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.		
	▶	**INSPECTION END**

On Board Diagnosis Logic

NAEC0282

★ The closed loop control has the one trip detection logic.

Malfunction is detected when the closed loop control function for right bank does not operate even when vehicle is driving in the specified condition, the closed loop control function for left bank does not operate even when vehicle is driving in the specified condition.

Possible Cause

NAEC0531

- The front heated oxygen sensor circuit is open or shorted.
- Front heated oxygen sensor
- Front heated oxygen sensor heater

DTC Confirmation Procedure

NAEC0283

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Never raise engine speed above 3,600 rpm during the “DTC Confirmation Procedure”. If the engine speed limit is exceeded, retry the procedure from step 2.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
RR O2 SEN-B2	XXX V

SEF063Y

WITH CONSULT-II

NAEC0283S01

1) Start engine and warm it up to normal operating temperature.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Hold engine speed at 2,000 rpm and check one of the following.

- “HO2S1 (B1)/(B2)” voltage should go above 0.70V at least once.
- “HO2S1 (B1)/(B2)” voltage should go below 0.21V at least once.

If the check result is NG, perform “Diagnosis Procedure”, EC-487.

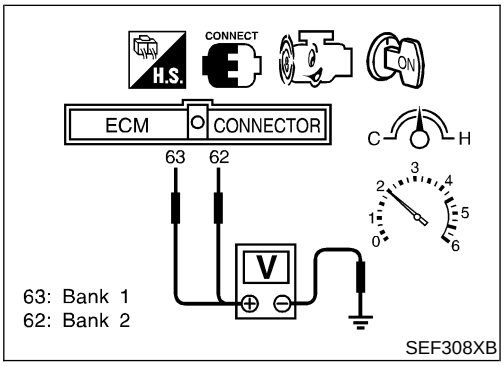
If the check result is OK, perform the following step.

4) Let engine idle at least 5 minutes.
5) Maintain the following condition at least 50 consecutive seconds.

B/FUEL SCHDL	3.65 msec or more
ENG SPEED	1,500 rpm or more
Selector lever	Suitable position
VHCL SPEED SE	More than 70 km/h (43 MPH)

During this test, P0130 and/or P0150 may be displayed on CONSULT-II screen.

6) If DTC is detected, go to "Diagnostic Procedure", EC-487.



Overall Function Check

NAEC0284

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

WITH GST

NAEC0284S01

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 63 [Heated oxygen sensor 1 (front) right bank signal] or 62 [Heated oxygen sensor 1 (front) left bank signal] and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no-load.

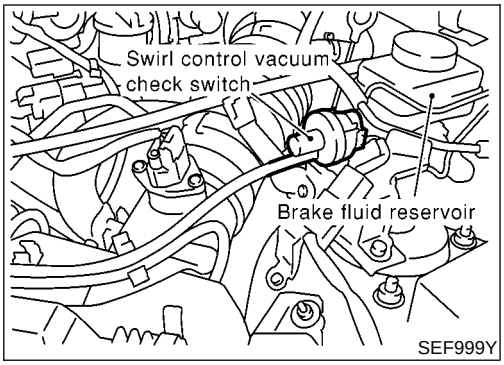
- The voltage should go above 0.70V at least once.
- The voltage should go below 0.21V at least once.

4) If NG, go to "Diagnostic Procedure", EC-487.

Diagnostic Procedure

NAEC0285

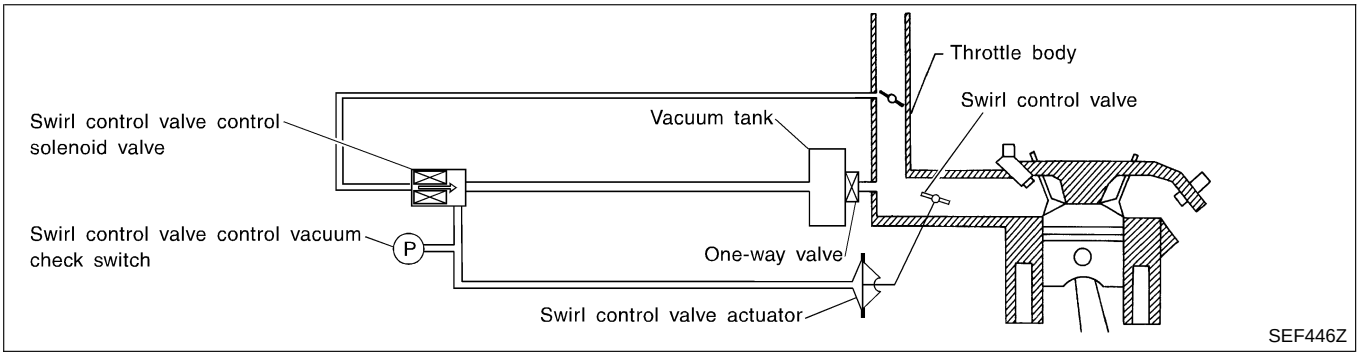
Perform trouble diagnosis for "DTC P0133, P0153", EC-213.



Component Description

NAEC0532

The swirl control valve control vacuum check switch detects vacuum signal to the swirl control valve, and sends “ON” or “OFF” signal to the ECM.
When vacuum is supplied to the valve, the swirl control valve control vacuum check switch sends “OFF” signal to the ECM.
The swirl control valve control vacuum check switch is not used to control the engine system, it is used for on board diagnosis.



CONSULT-II Reference Value in Data Monitor Mode

NAEC0533

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
SWL CON VC SW	• Engine speed: Idle • Engine coolant temperature is between 15°C (59°F) to 50°C (122°F).	OFF
	• Engine speed: Idle • Engine coolant temperature is above 55°C (131°F).	ON

ECM Terminals and Reference Value

NAEC0674

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
55	W/B	Swirl control valve control vacuum check switch	**[Engine is running]** • Idle speed • Engine coolant temperature is between 15 to 50°C (59 to 122°F).	Approximately 5V
			[Engine is running] • Idle speed • Engine coolant temperature is above 55°C (131°F).	0 - 1.0V

On Board Diagnosis Logic

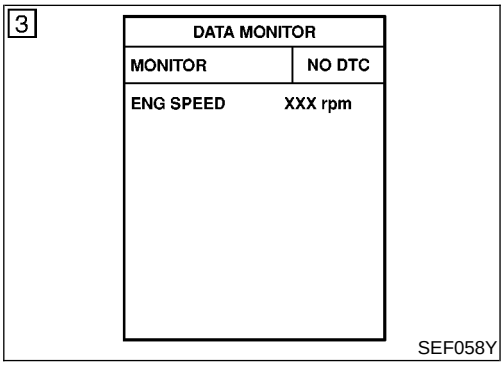
NAEC0535

Malfunction is detected when the swirl control valve control vacuum check switch remains “OFF” under specified engine conditions.

Possible Cause

NAEC0536

- Harness or connectors
  (Swirl control valve control vacuum check switch circuit is open.)
- Hoses
  (Hoses are clogged or connected incorrectly.)
- Swirl control valve control solenoid valve
- Swirl control valve control vacuum check switch



DTC Confirmation Procedure

NAEC0537

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
For best results, perform the test at a temperature above 5°C (41°F).

WITH CONSULT-II

NAEC0537S01

1) Turn ignition switch “OFF” and wait at least 10 seconds.
2) Turn ignition switch “ON”.
3) Select “DATA MONITOR” mode with CONSULT-II and wait at least 5 seconds.
   If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-491.

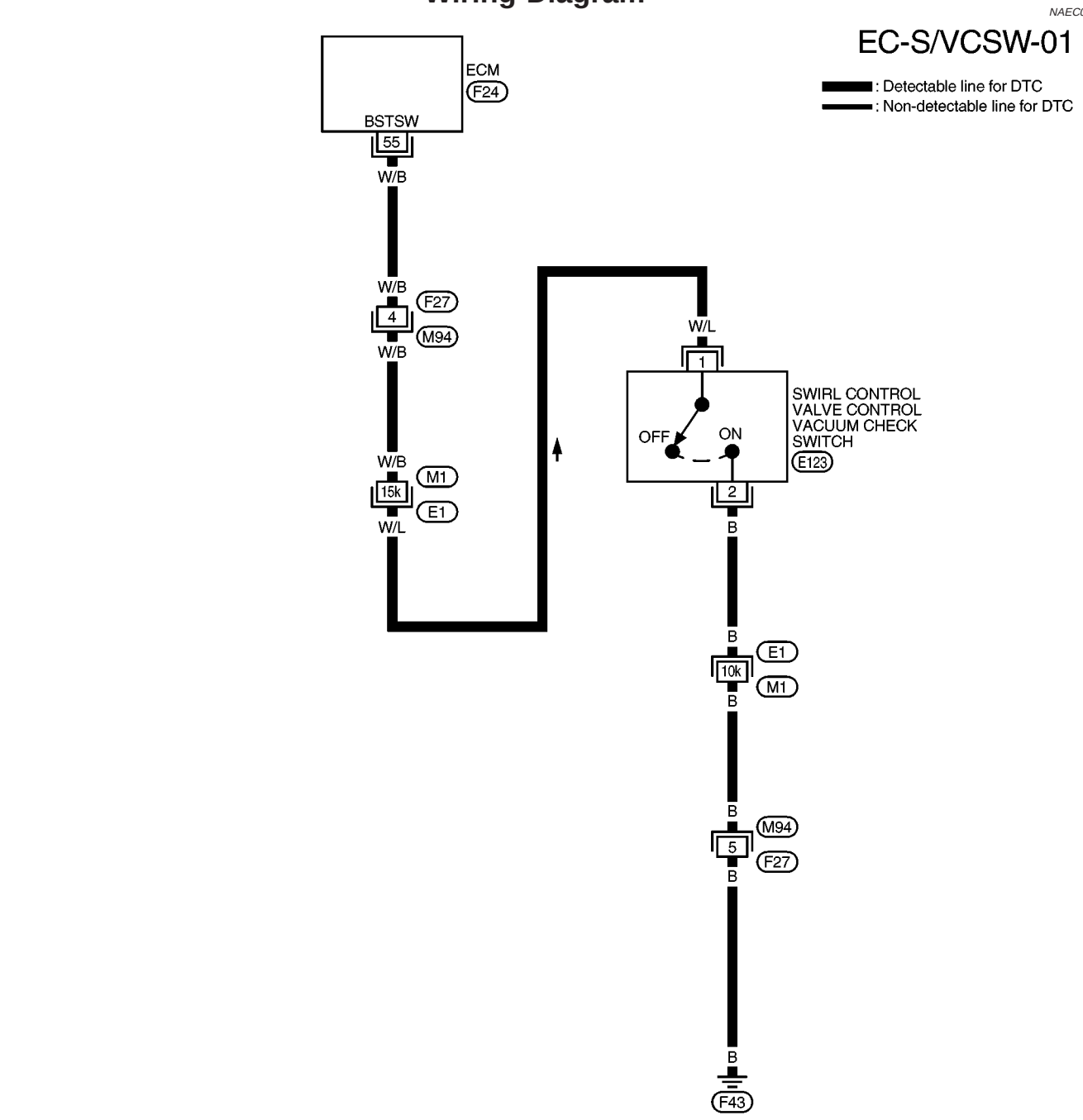
WITH GST

NAEC0537S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NAEC0538



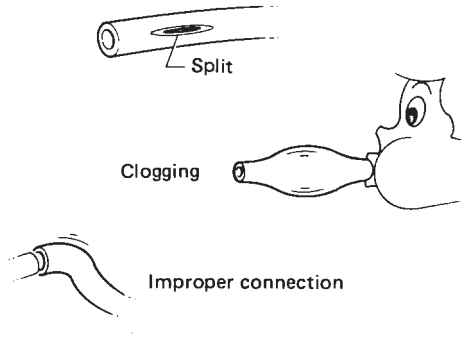
MEC981C

Diagnostic Procedure

NAEC0539

1	CHECK HOSES

1. Turn ignition switch “OFF”.
2. Check hose for clogging or improper connection.



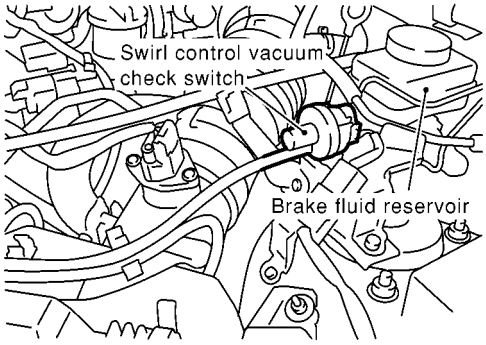
SEF109L

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or reconnect the hose.

2	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect swirl control valve control vacuum check switch harness connector.



SEF999Y

2. Check harness continuity between terminal 2 and ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1 and M92, F27
- Harness for open or short between swirl control valve control vacuum check switch and engine ground

	▶	Repair open circuit, short to ground or short to power in harness connectors.

Diagnostic Procedure (Cont'd)

4	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

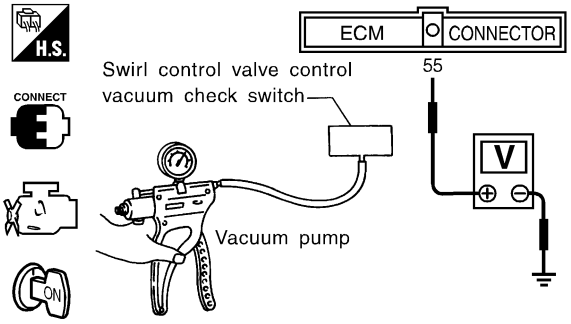
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 55 and swirl control valve control vacuum check switch terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit, short to ground or short to power in harness connectors.

5	CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH

1. Turn ignition switch "OFF".
2. Disconnect vacuum hose connected to swirl control valve control vacuum check switch.
3. Attach vacuum pump to swirl control valve control vacuum check switch.
4. Turn ignition switch "ON".
5. Check voltage between ECM terminal 55 and ground under the following conditions.



Applied pressure	Voltage V
More than –20.0 kPa (–150 mmHg, –5.91 inHg)	Engine ground
–20.0 to –23.0 kPa (–150 to –172 mmHg, –5.91 to –6.77 inHg)	Engine ground or Approx. 4.8
Less than –23.0 kPa (–172 mmHg, –6.77 inHg)	Approx. 4.8

SEF709X

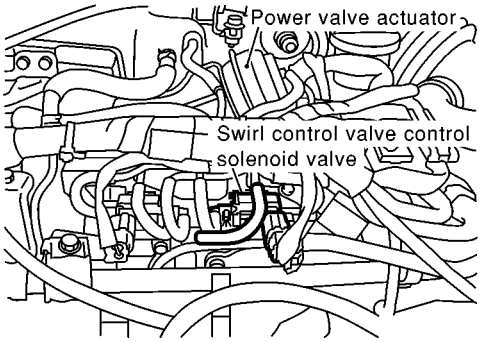
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace swirl control valve control vacuum check switch.

6	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL/V" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



SWIRL CONT SOL/V	Vacuum
ON	Should exist.
OFF	Should not exist.

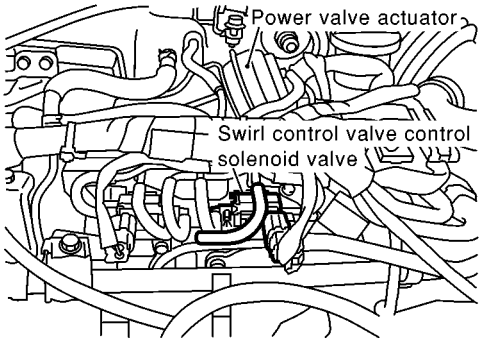
Operation takes less than 1 second.

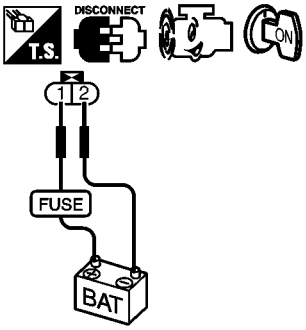


SEF004Z

Without CONSULT-II

1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals and 2.
5. Check vacuum existence and operation delay time under the following conditions.





Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

Operation takes less than 1 second.

SEF005Z

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace intake manifold collector assembly.

7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**

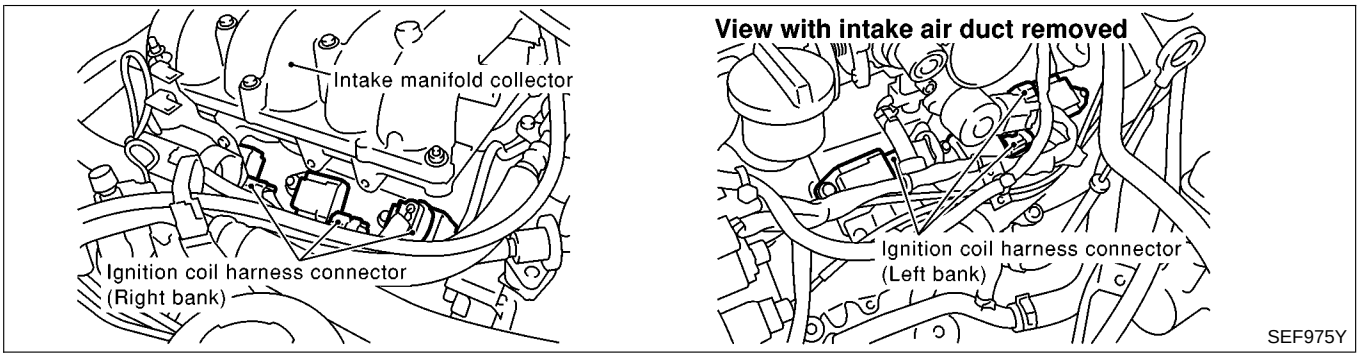
Component Description

NAEC0286

IGNITION COIL & POWER TRANSISTOR

NAEC0286S01

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns on and off the ignition coil primary circuit. This on-off operation induces the proper high voltage in the coil secondary circuit.



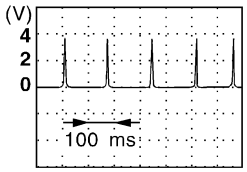
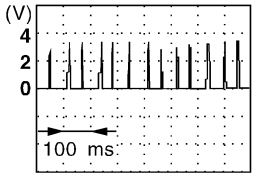
ECM Terminals and Reference Value

NAEC0675

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
21	Y/R	Ignition signal No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.2V★  SEF399T
22	G/R	Ignition signal No. 2		
23	L/R	Ignition signal No. 3		
30	GY	Ignition signal No. 4	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,500 rpm.	0.1 - 0.3V★  SEF645T
31	PU/W	Ignition signal No. 5		
32	GY/R	Ignition signal No. 6		

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

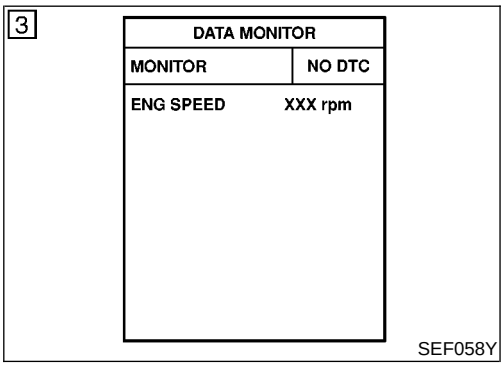
NAEC0288

Malfunction is detected when the ignition signal in the primary circuit is not sent to ECM during engine cranking or running.

Possible Cause

NAEC0572

- Harness or connectors (The ignition primary circuit is open or shorted.)
- Power transistor unit built into ignition coil
- Condenser
- Crankshaft position sensor (REF)
- Crankshaft position sensor (REF) circuit



DTC Confirmation Procedure

NAEC0289

NOTE:

- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.
- **If DTC P1320 is displayed with DTC P0335, P0340, P1335 or P1336, perform trouble diagnosis for DTC P0335, P0340, P1335 or P1336 first. Refer to EC-329, EC-337, EC-505 or EC-512.**

WITH CONSULT-II

NAEC0289S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine. (If engine does not run, turn ignition switch to “START” for at least 5 seconds.)
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-499.

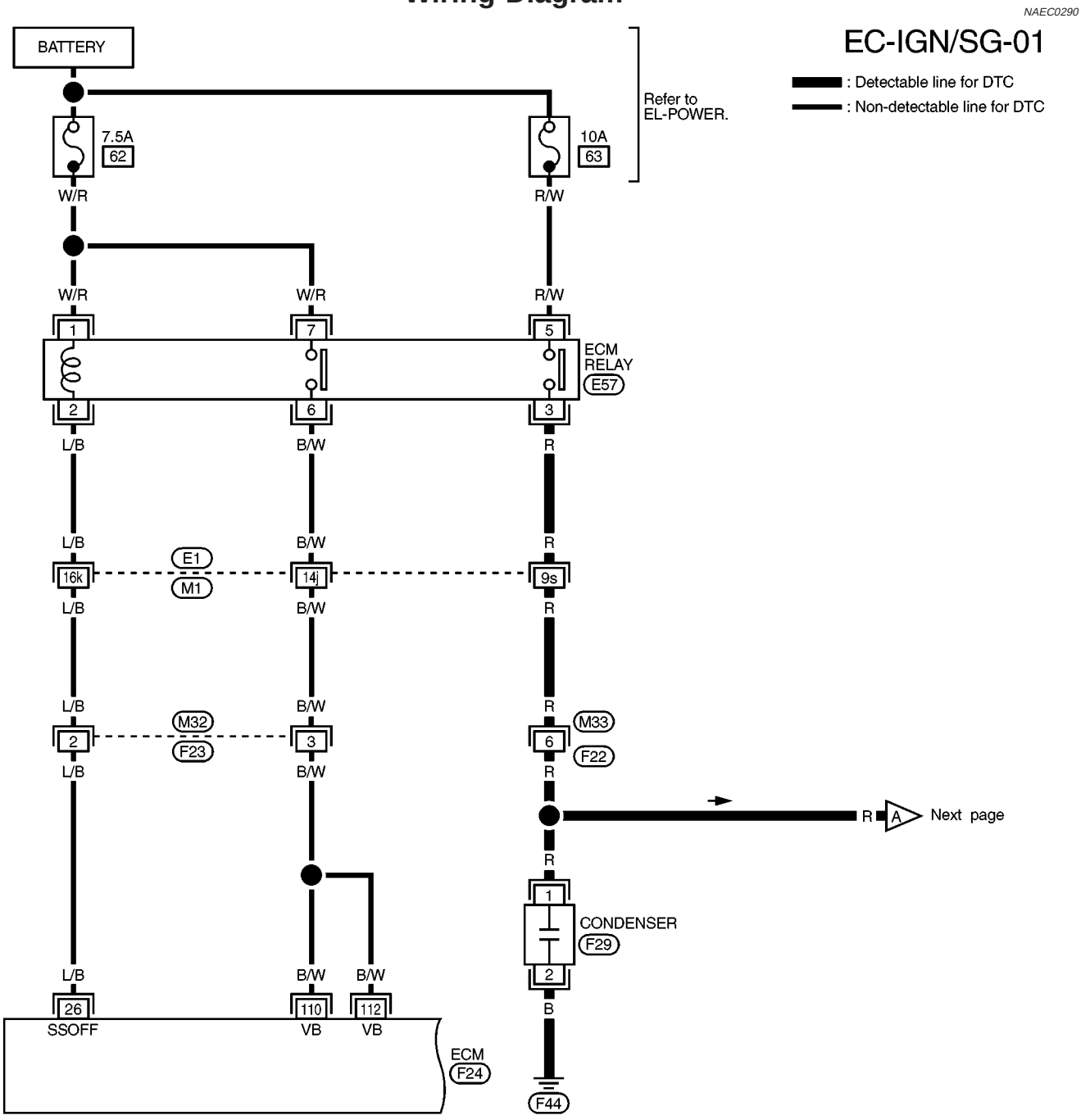
WITH GST

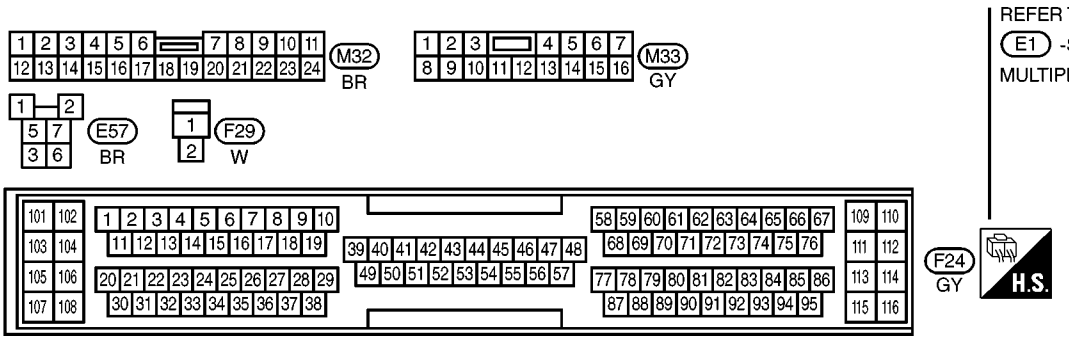
NAEC0289S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

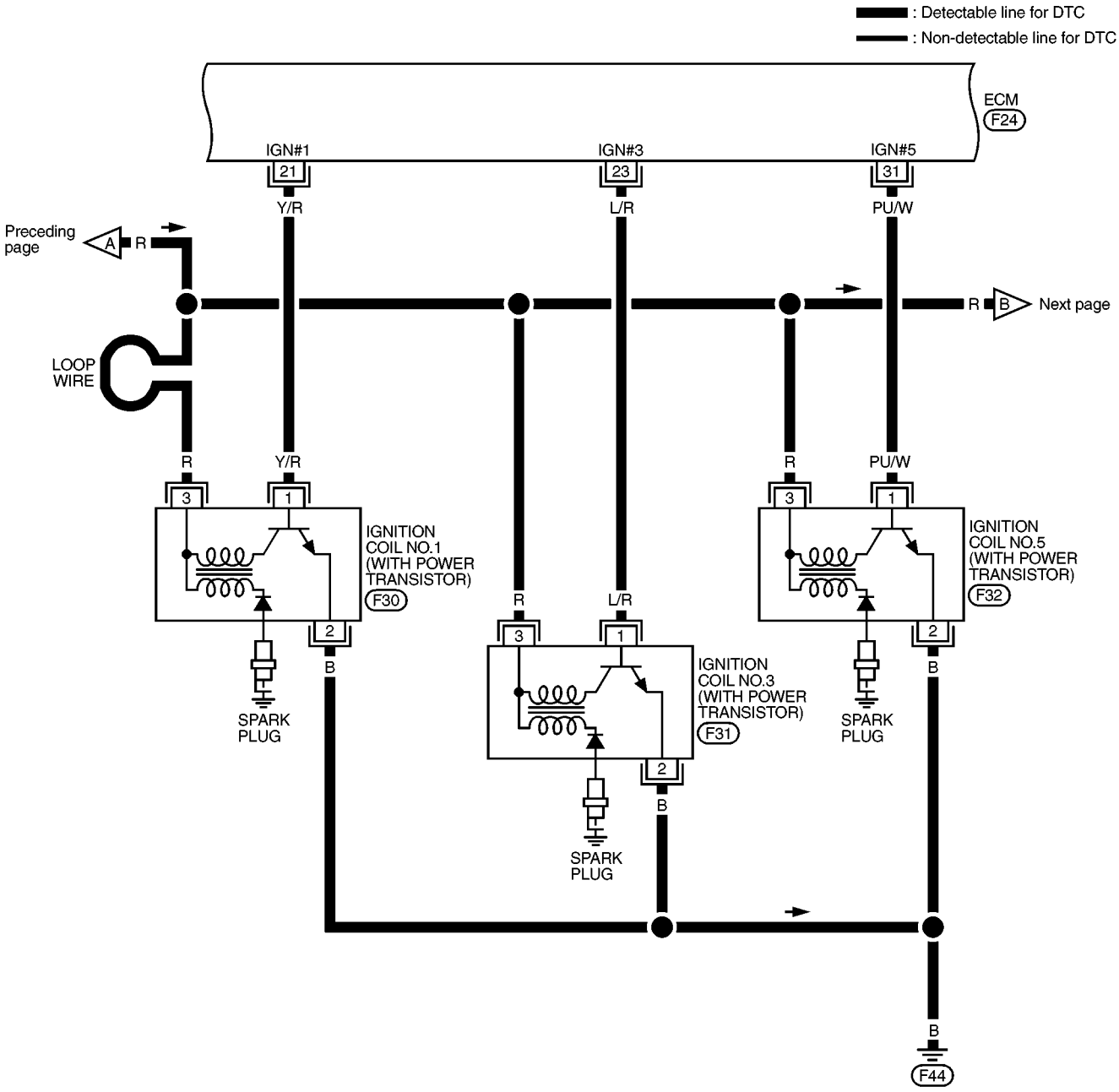
NAEC0290

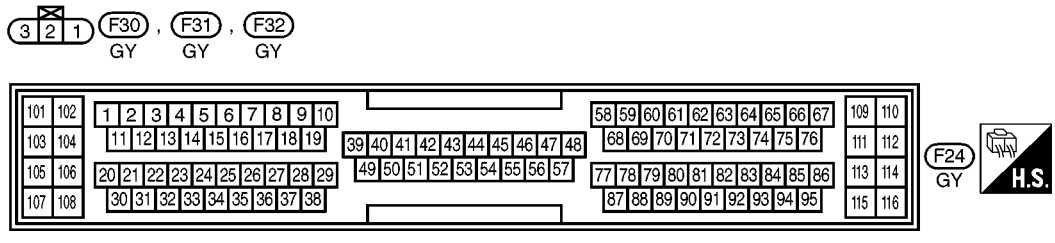




MEC969C

EC-IGN/SG-02

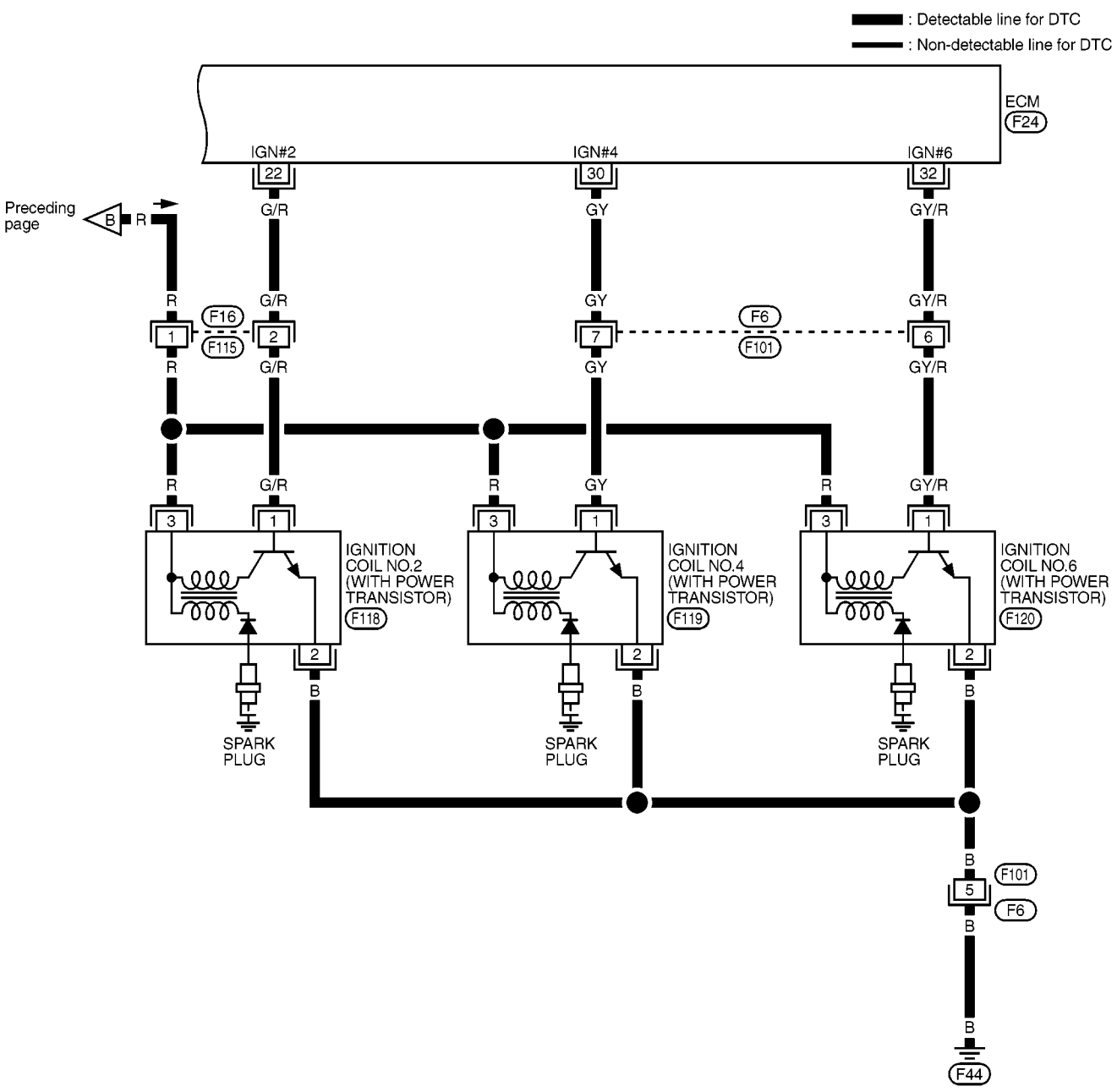


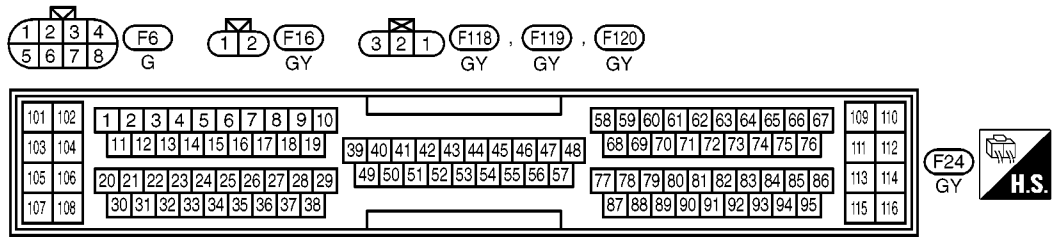


MEC970C

Wiring Diagram (Cont'd)

EC-IGN/SG-03





MEC971C

Diagnostic Procedure

NAEC0291

1	CHECK ENGINE START

Turn ignition switch “OFF”, and restart engine.
Is engine running?

Yes or No

Yes (With CONSULT-II)	▶	GO TO 2.
Yes (Without CONSULT-II)	▶	GO TO 12.
No	▶	GO TO 3.

2	SEARCH FOR MALFUNCTIONING CIRCUIT

With CONSULT-II
1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
2. Search for circuit which does not produce a momentary engine speed drop.

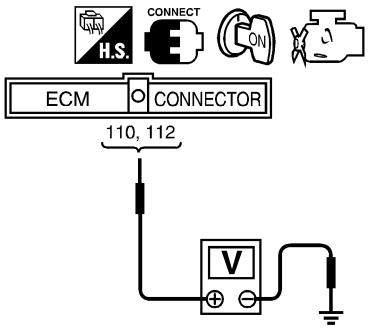
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

	▶	GO TO 12.

3	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between ECM terminals 110, 112 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF366X

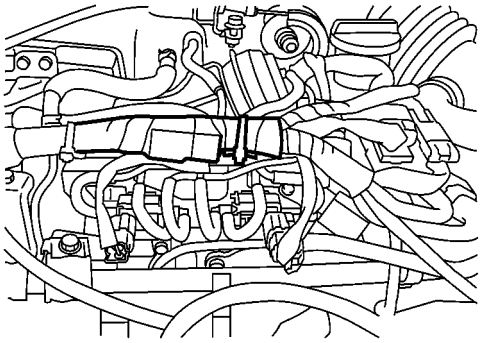
OK or NG

OK	▶	GO TO 4.
NG	▶	Go to TROUBLE DIAGNOSIS FOR POWER SUPPLY, EC-137.

Diagnostic Procedure (Cont'd)

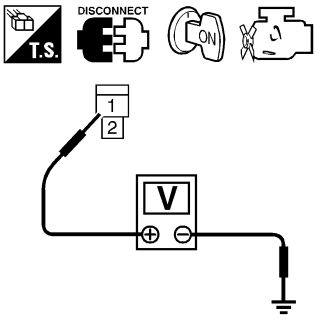
4	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.



SEF008Z

3. Turn ignition switch ON.
4. Check voltage between condenser terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

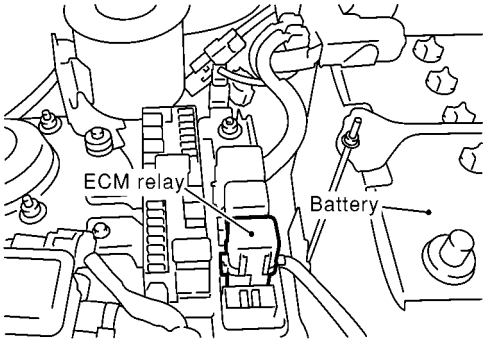
SEF367X

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 5.

5	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect ECM relay.



SEF009Z

3. Check harness continuity between ECM relay terminal 3 and condenser terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

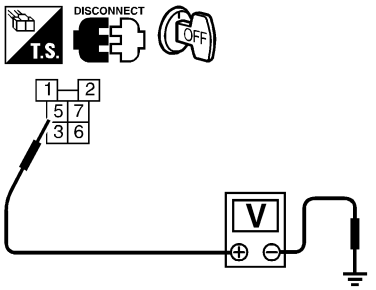
OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 and M33, F22 ● Harness for open or short between ECM relay and condenser	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

Check voltage between ECM relay terminal 5 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF010Z

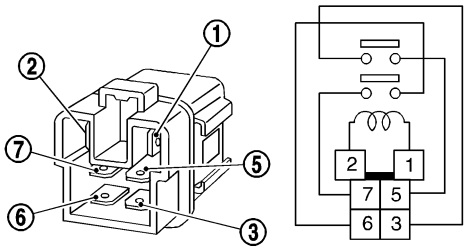
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. ● 10A fuse ● Harness for open and short between ECM relay and fuse	
▶	Repair or replace harness or connectors.

9	CHECK ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between ECM relay terminals 3 and 5, 6 and 7.



Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

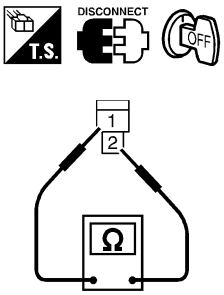
SEF296X

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace ECM relay.

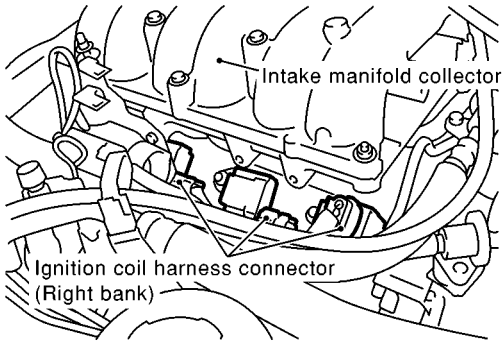
Diagnostic Procedure (Cont'd)

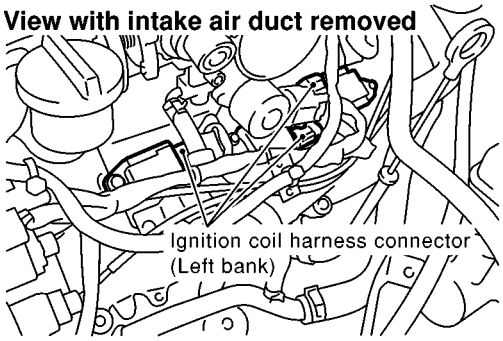
10	CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Check harness continuity between condenser terminal 2 and engine ground. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power. **OK or NG**		
OK	▶	GO TO 11.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

11	CHECK CONDENSER	
Check resistance between condenser terminals 1 and 2.  **Resistance: Above 1MΩ at 25°C (77°F)** SEF369X **OK or NG**		
OK	▶	GO TO 12.
NG	▶	Replace condenser.

12	CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

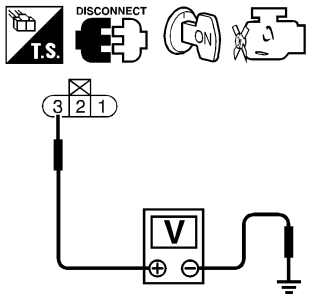
1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect ignition coil harness connector.





SEF975Y

4. Turn ignition switch ON.
5. Check voltage between ignition coil terminal 3 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF370X

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	DETECT MALFUNCTIONING PART

Check the harness for open or short between ignition coil and harness connector F22.

	▶	Repair or replace harness or connectors.

14	CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ignition coil terminal 2 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 15.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

15	CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

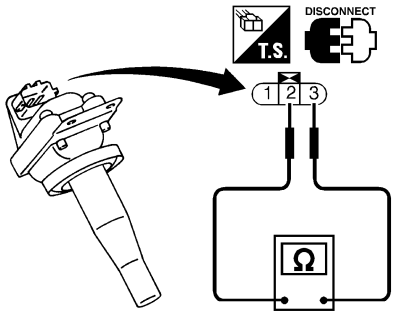
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 21, 22, 23, 30, 31, 32 and ignition coil terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 16.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

16	CHECK IGNITION COIL WITH POWER TRANSISTOR

Check resistance between ignition coil terminals 2 and 3.



Terminals	Resistance	Result
2 and 3	Not 0Ω	OK
	0Ω	NG

SEF371X

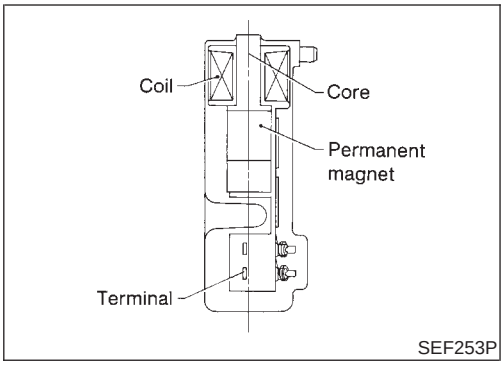
OK or NG

OK	▶	GO TO 17.
NG	▶	Replace ignition coil with power transistor.

17	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.

▶ **INSPECTION END**



Component Description

NAEC0573

The crankshaft position sensor (REF) is located on the oil pan (upper) facing the crankshaft pulley. It detects the TDC (Top Dead Center) signal (120° signal).
The sensor consists of a permanent magnet, core and coil.
When engine is running, the gap between the sensor and the crankshaft pulley will periodically change. Permeability near the sensor also changes.
Due to the permeability change, the magnetic flux near the core is changed. Therefore, the voltage signal generated in the coil is changed.
The ECM receives the voltage signal and detects the TDC signal (120° signal).

CONSULT-II Reference Value in Data Monitor Mode

NAEC0574

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CKPS·RPM (POS)	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT-II value.	Almost the same speed as the CONSULT-II value.
ENG SPEED		

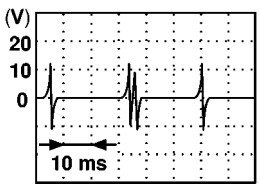
ECM Terminals and Reference Value

NAEC0676

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
65 75	LG LG	Crankshaft position sensor (REF)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 2.3V★ (AC voltage)  SEF581X

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

On Board Diagnosis Logic

NAEC0576

Malfunction is detected when
(Malfunction A) 120° signal is not entered to ECM for the first few seconds during engine cranking,
(Malfunction B) 120° signal is not entered to ECM during engine running,
(Malfunction C) 120° signal cycle excessively changes during engine running.

FAIL-SAFE MODE

NAEC0576S01

When the ECM enters the fail-safe mode, the MIL illuminates.

Detected items	Engine operating condition in fail-safe mode
Crankshaft position sensor (REF) circuit	Compression TDC signal (120° signal) is controlled by camshaft position sensor (PHASE) signal and crankshaft position sensor (POS) signal. Ignition timing will be delayed 0° to 2°.

Possible Cause

NAEC0577

- Harness or connectors
  (The crankshaft position sensor (REF) circuit is open or shorted.)
- Crankshaft position sensor (REF)
- Starter motor (Refer to SC section.)
- Starting system circuit (Refer to SC section.)
- Dead (Weak) battery

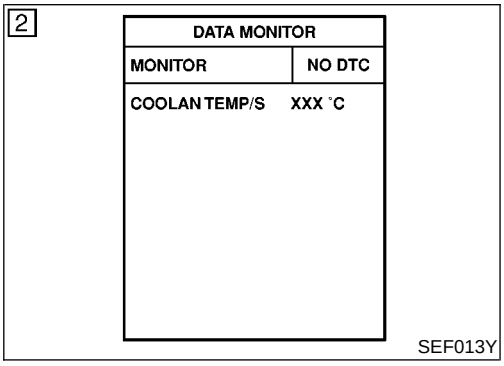
DTC Confirmation Procedure

NAEC0578

NOTE:

- **Perform “PROCEDURE FOR MALFUNCTION A” first. If 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B AND C”.**
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.



PROCEDURE FOR MALFUNCTION A

NAEC0578S01

With CONSULT-II

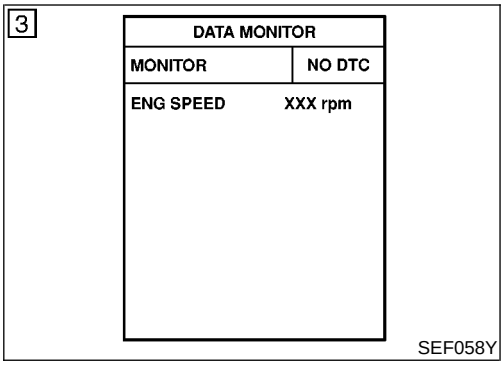
NAEC0578S0101

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Crank engine for at least 2 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-509.

With GST

NAEC0578S0102

Follow the procedure “With CONSULT-II” above.



PROCEDURE FOR MALFUNCTION B AND C

NAEC0578S02

With CONSULT-II

NAEC0578S0201

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and run it for at least 2 seconds at idle speed.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-509.

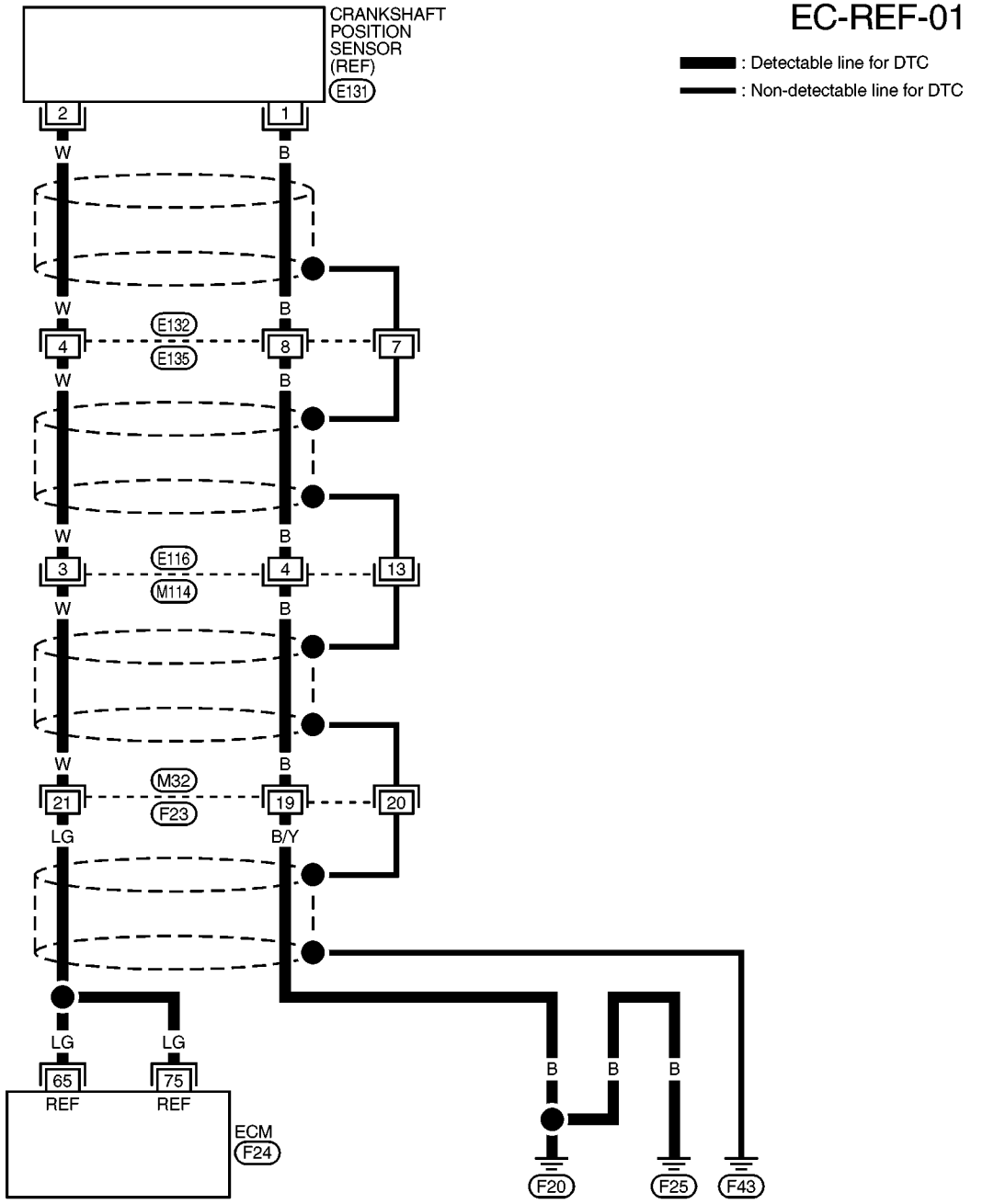
With GST

NAEC0578S0202

Follow the procedure "With CONSULT-II" above.

Wiring Diagram

NAEC0579



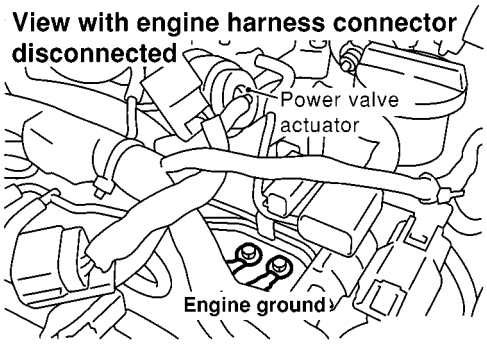
MEC960C

Diagnostic Procedure

NAEC0580

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

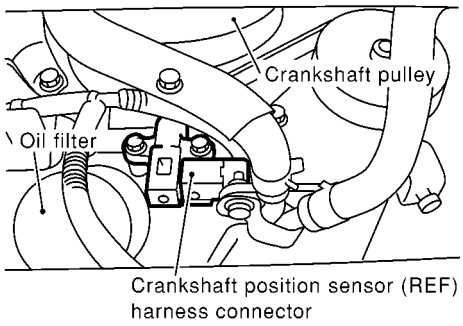


SEF959Y

▶	GO TO 2.

2	CHECK CKPS (REF) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect CKPS (REF) harness connector.



SEF011Z

2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 65, 75 and CKPS (REF) terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E132, E135
- Harness connectors E116, M114 and M32, F23
- Harness for open or short between crankshaft position sensor (REF) and ECM

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK CKPS (REF) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between CKPS (REF) terminal 1 and engine ground.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

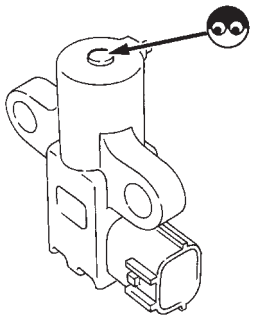
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E132, E135
- Harness connectors E116, M114 and M32, F23
- Harness for open or short between crankshaft position sensor (REF) and engine ground

	▶	Repair open circuit or short to ground or short to power in harness or connector.

6	CHECK CKPS (REF)-I

1. Loosen the fixing bolts and remove the CKPS (REF).
2. Visually check the CKPS (REF) for chipping.



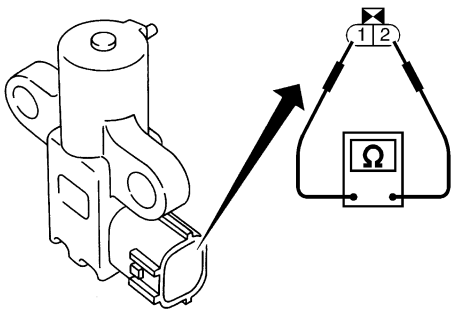
SEF585P

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace crankshaft position sensor (REF).

7	CHECK CKPS (REF)-II

Check resistance between CKPS (REF) terminals 1 and 2.



Resistance: Approximately
470 - 570 Ω
[AT 20°C (68°F)]

SEF350X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace crankshaft position sensor (REF).

8	CHECK CKPS (REF) SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect harness connectors E132, E135.
3. Check harness continuity between harness connector E135 terminal 7 and engine ground.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART

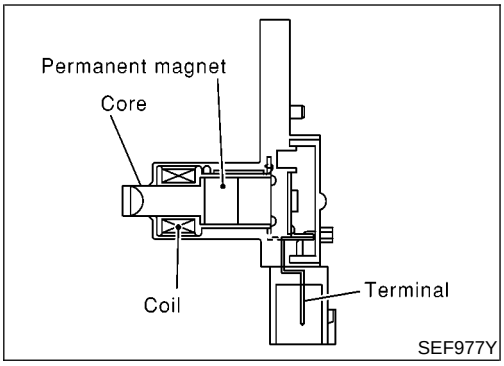
Check the following.
- Harness connectors E132, E135
- Harness connectors E116, M114 and M32, F23
- Harness for open or short between harness connector F23 and engine ground

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.

	▶	**INSPECTION END**



Component Description

NAEC0292

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate (flywheel). It detects the crankshaft position signal (1° signal).
The sensor consists of a permanent magnet, core and coil.
When engine is running, the gap between the sensor and the gear teeth (cogs) will periodically change. Permeability near the sensor also changes.
Due to the permeability change, the magnetic flux near the core is changed. Therefore, the voltage signal generated in the coil is changed.
The ECM receives the voltage signal and detects the crankshaft position signal (1° signal).

CONSULT-II Reference Value in Data Monitor Mode

NAEC0581

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CKPS·RPM (POS)	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT-II value.	Almost the same speed as the CONSULT-II value.
ENG SPEED		

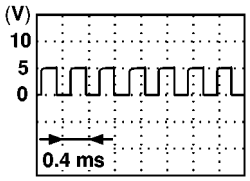
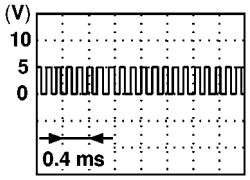
ECM Terminals and Reference Value

=NAEC0677

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
85	Y	Crankshaft position sensor (POS)	**[Engine is running]** ● Idle speed	Approximately 2.4V  SEF057V
			[Engine is running] ● Engine speed is 2,000 rpm.	Approximately 2.3V  SEF058V

On Board Diagnosis Logic

NAEC0294

Malfunction is detected when chipping of the signal plate (flywheel or drive plate) gear tooth (cog) is detected by the ECM.

Possible Cause

NAEC0582

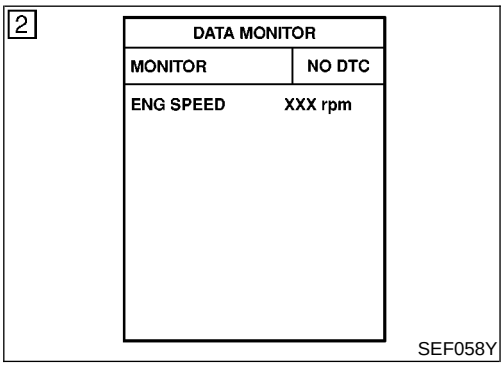
- Harness or connectors
- Crankshaft position sensor (POS)
- Signal plate (Drive plate/Flywheel)

DTC Confirmation Procedure

NAEC0295

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V.



WITH CONSULT-II

NAEC0295S01

1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and run it for at least 70 seconds at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-516.

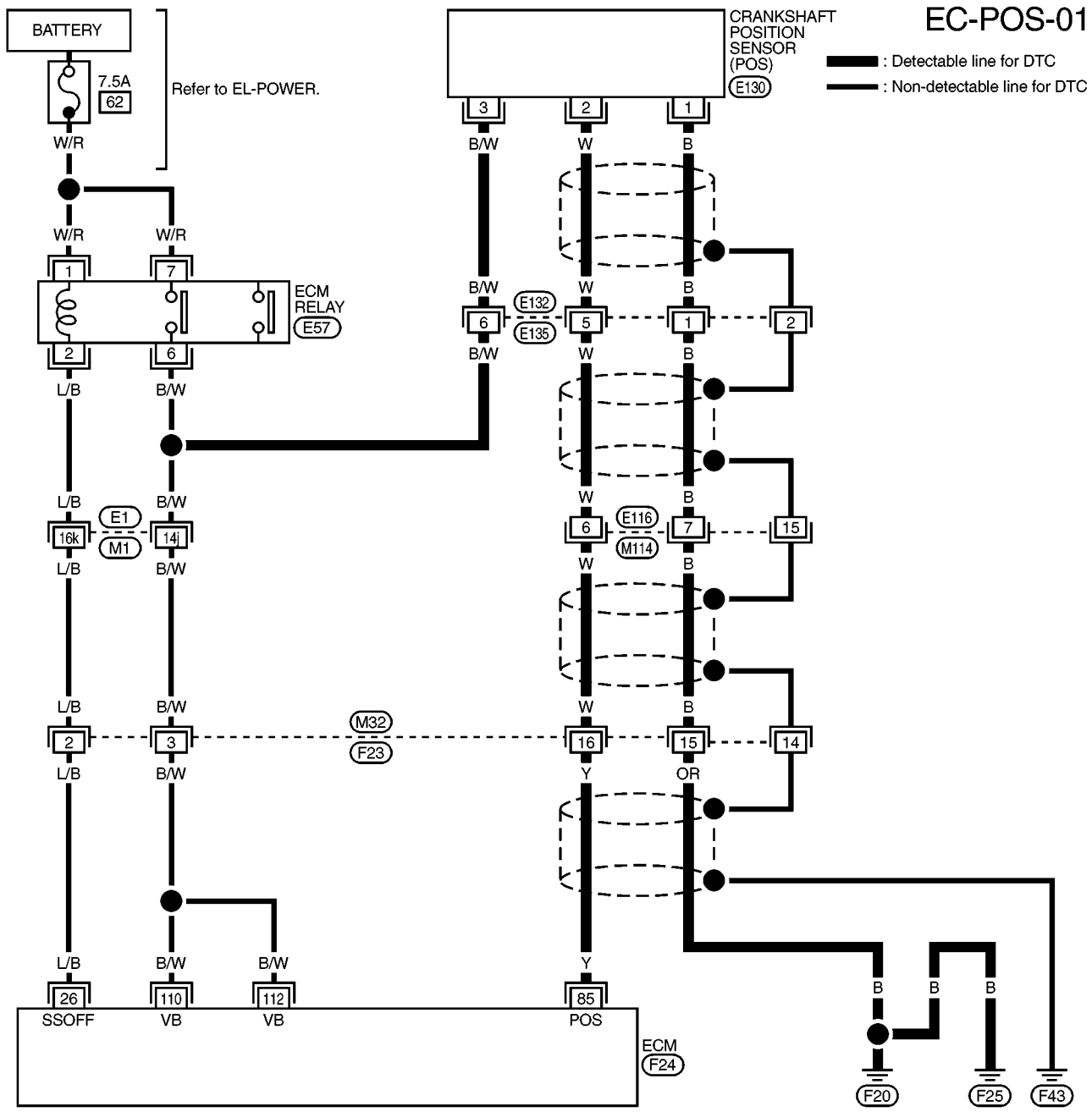
WITH GST

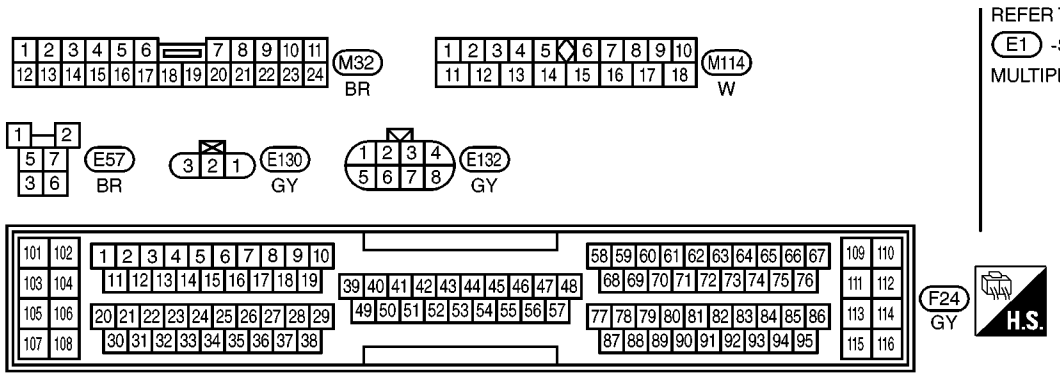
NAEC0295S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NAEC0296





REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

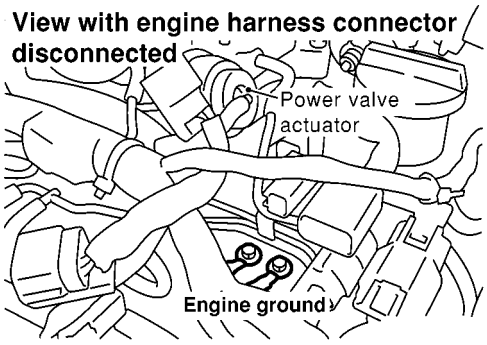
MEC959C

Diagnostic Procedure

NAEC0297

1	RETIGHTEN GROUND SCERWS

1. Turn ignition switch “OFF”.
2. Loosen and retighten engine ground screws.

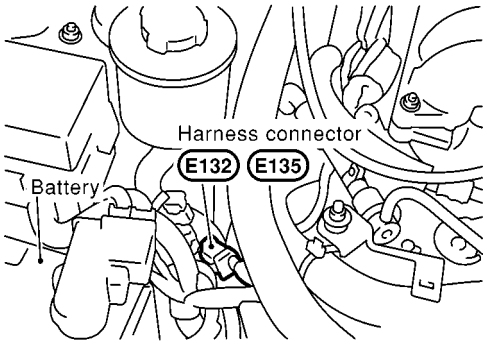


SEF959Y

▶	GO TO 2.

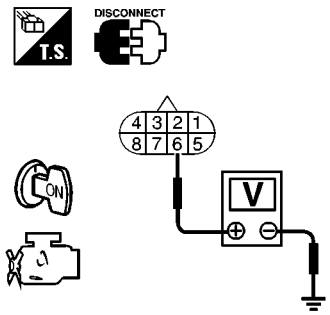
2	CHECK CKPS (POS) POWER SUPPLY CIRCUIT

1. Disconnect harness connectors E132, E135.



SEF978Y

2. Check voltage between harness connector E135 terminal 6 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF979Y

3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E132, E135 ● Harness for open or short between ECM and crankshaft position sensor (POS) ● Harness for open or short between ECM relay and crankshaft position sensor (POS)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK CKPS (POS) GROUND CIRCUIT FOR OPEN AND SHORT
1. Check harness continuity between harness connector E135 terminal 1 and engine ground. Refer to Wiring Diagram. **Continuity should exist.** 2. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E132, E135 ● Harness connectors E116, M114 ● Harness connectors M32, F23 ● Harness for open or short between ECM and crankshaft position sensor (POS)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

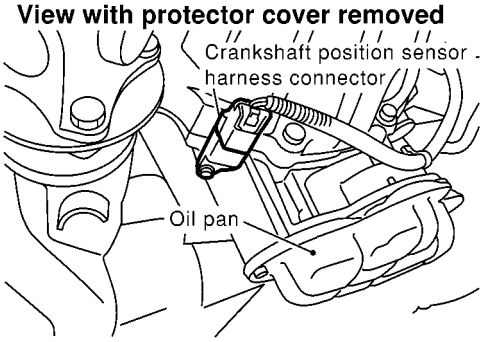
6	CHECK CKPS (POS) INPUT SIGNAL CIRCUIT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 85 and harness connector F23 terminal 16. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E132, E135 ● Harness connectors E116, M114 ● Harness connectors M32, F23 ● Harness for open or short between ECM and crankshaft position sensor (POS)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK CKPS (POS) SUB-HARNESS CIRCUIT FOR OPEN AND SHORT

1. Disconnect CKPS (POS) harness connector.

View with protector cover removed



SEF980Y

2. Check harness continuity between CKPS (POS) terminals and harness connector E132 terminals as follows.

CKPS (POS) terminal	Harness conector E132 terminal
1	1
2	5
3	6

MTBL0531

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK IMPROPER INSTALLATION

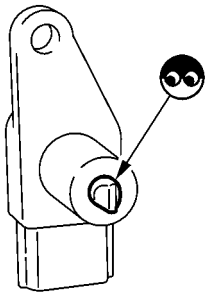
1. Loosen and retighten the fixing bolt of the crankshaft position sensor (POS).
2. Reconnect harness connectors disconnected.
3. Perform "DTC Confirmation Procedure", EC-514 again.

Is a 1st trip DTC P1336 detected?

Yes	▶	GO TO 10.
No	▶	**INSPECTION END**

10	CHECK CRANKSHAFT POSITION SENSOR (POS)

1. Disconnect crankshaft position sensor (POS) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



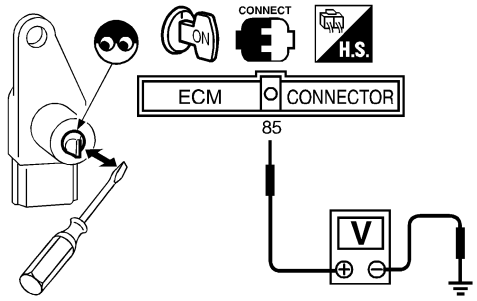
SEF981Y

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace crankshaft position sensor (POS).

11	CHECK CRANKSHAFT POSITION SENSOR (POS)-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminal 85 and ground by briefly touching the sensor core with a flat-bladed screwdriver.



ECM terminal	Condition	Voltage
85	Contacted	Approximately 5V
	Pulled away	Approximately 0V

There should be a steady 5V as the flat-bladed screwdriver is drawn away slowly.

SEF343Z

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace crankshaft position sensor (POS).

12	CHECK CKPS (POS) SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors E132, E135.
2. Check harness continuity between harness connector E135 terminal 2 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E132, E135 ● Harness connectors E116, M114 ● Harness connectors M32, F23 ● Harness for open or short between harness connector E135 and engine ground	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

14	CHECK GEAR TOOTH
Visually check for chipping signal plate (flywheel or drive plate) gear tooth (cog).	
OK or NG	
OK ▶	GO TO 15.
NG ▶	Replace the signal plate (flywheel or drive plate).

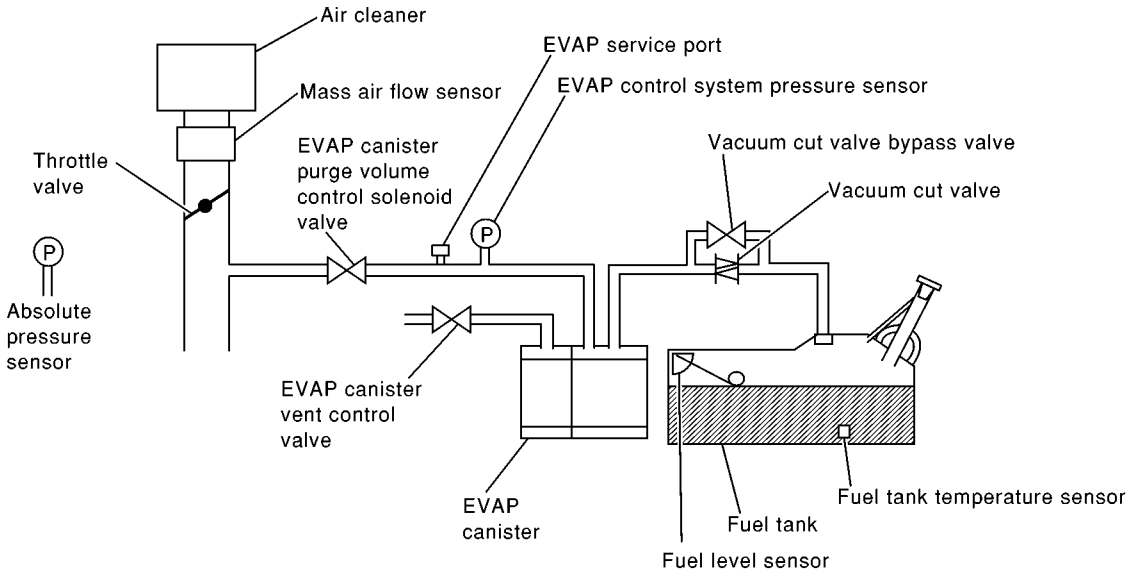
15	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NAEC0316

This diagnosis detects very small leaks in the EVAP line between the fuel tank and the EVAP canister purge volume control solenoid valve using intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.

If the ECM judges a leak equivalent to a very small leak, the very small leak DTC P1441 will be detected. If the ECM judges a leak equivalent to a small leak, the EVAP small leak DTC P0440 will be detected. Correspondingly, if the ECM judges there is no leak, the diagnosis result is OK.



Malfunction is detected when EVAP control system has a very small leak, EVAP control system does not operate properly.

CAUTION:

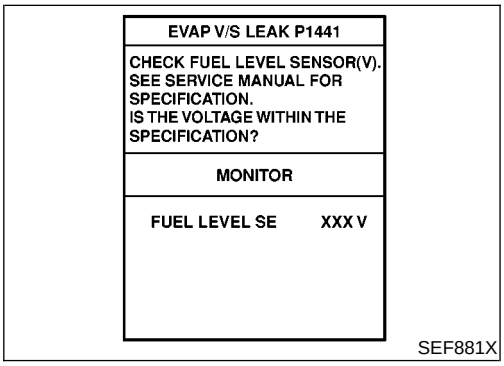
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

Possible Cause

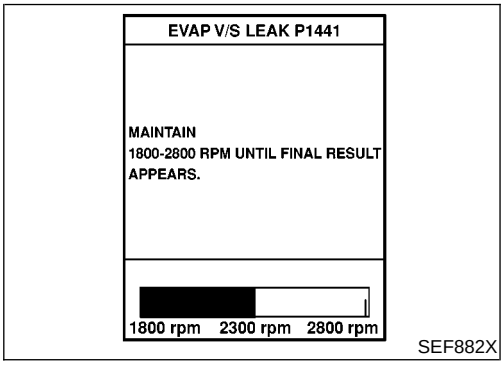
NAEC0587

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks

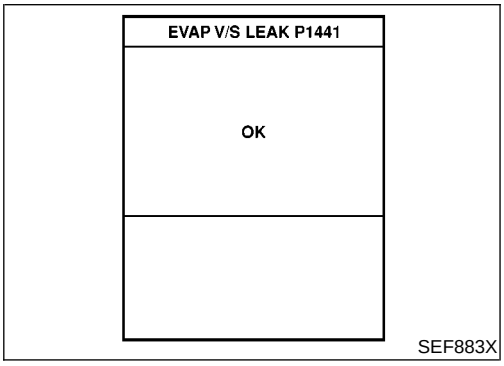
- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- Fuel level sensor and the circuit
- EVAP control system pressure sensor



SEF881X



SEF882X



SEF883X

DTC Confirmation Procedure

NAEC0317

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- **If DTC P1441 is displayed with P0440, perform TROUBLE DIAGNOSIS FOR DTC P1441 first.**
- **If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.**
- **After repair, make sure that the hoses and clips are installed properly.**

TESTING CONDITION:

- **Open engine hood before conducting following procedure.**
- **If any of following condition is met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.**

a) **Fuel filler cap is removed.**
b) **Refilled or drained the fuel.**
c) **EVAP component parts is/are removed.**

- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

With CONSULT-II

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2) Make sure the following conditions are met.
   FUEL LEVEL SE: 1.08 - 0.2V
   COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
   FUEL T/TMP SE: 0 - 32°C (32 - 90°F)
   INT A/TEMP SE: More than 0°C (32°F)
   If NG, turn ignition switch "OFF" and leave the vehicle in a cool

place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the "FUEL LEVEL SE" meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).

3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Turn ignition switch "ON".
5) Select "EVAP VERY/SML LEAK P1441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.
6) Make sure that "OK" is displayed.
   If "NG" is displayed, refer to "Diagnostic Procedure", EC-524.

NOTE:

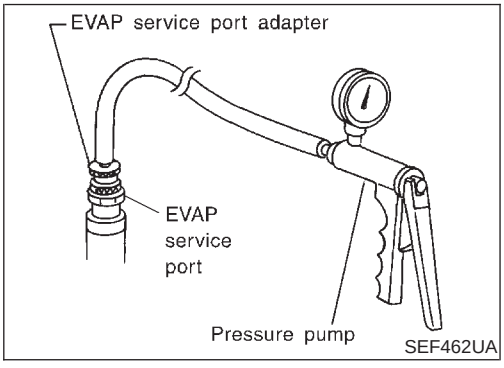
- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to "Basic inspection", EC-99.**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

OVERALL FUNCTION CHECK

NAEC0317S05

With GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.



CAUTION:

- **Never use compressed air, doing so may damage the EVAP system.**
- **Do not start engine.**
- **Do not exceeded 4.12 kPa (0.042 kg/cm^2, 0.6 psi).**

1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Set the pressure pump and a hose.
3) Also set a vacuum gauge via 3-way connector and a hose.
4) Turn ignition switch "ON".
5) Connect GST and select mode 8.
6) Using mode 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
7) Apply pressure and make sure the following conditions are satisfied.
   Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)
   Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg)
   If NG, go to diagnostic procedure, EC-524.

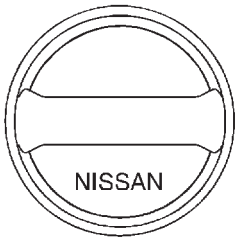
NOTE:
For more information, refer to GST instruction manual.

Diagnostic Procedure

NAEC0643

1	CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch "OFF".
2. Check for genuine NISSAN fuel filler cap design.



SEF915U

OK or NG

OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

2	CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK	▶	GO TO 3.
NG	▶	• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. • Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION

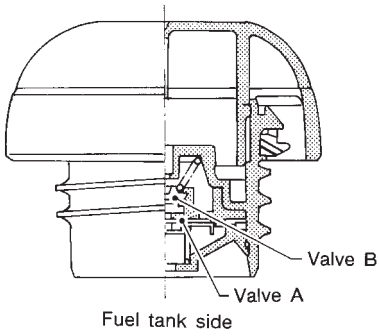
Check for air releasing sound while opening the fuel filler cap.

OK or NG

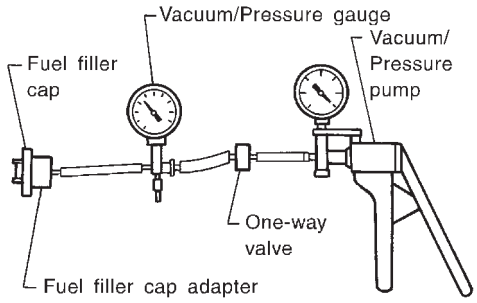
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.



SEF427N



SEF943S

Pressure:
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

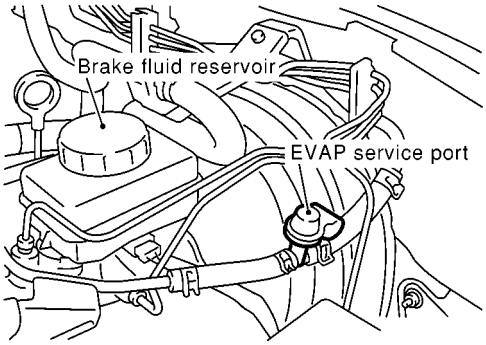
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

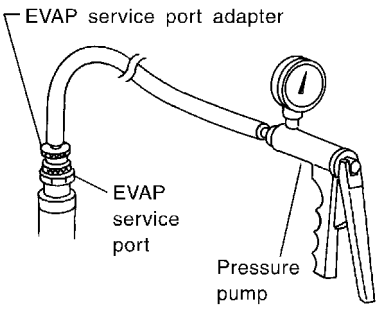
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEF983Y



SEF916U

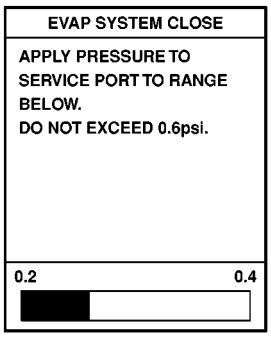
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶	GO TO 6.
Models without CONSULT-II ▶	GO TO 7.

6	CHECK FOR EVAP LEAK

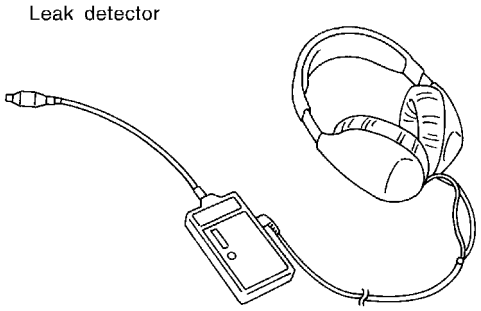
With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.



SEF200U

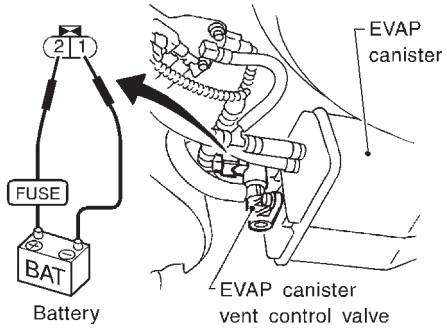
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

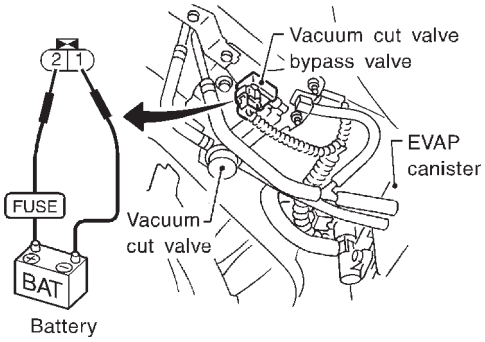
Without CONSULT-II

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



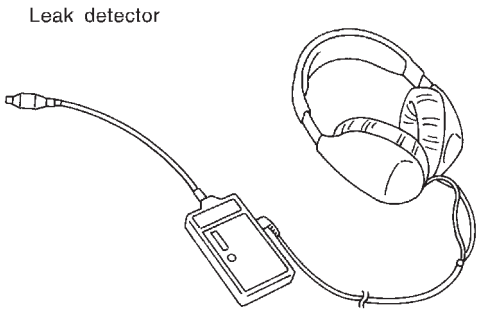
SEF598U

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



SEF599U

4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**
5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.



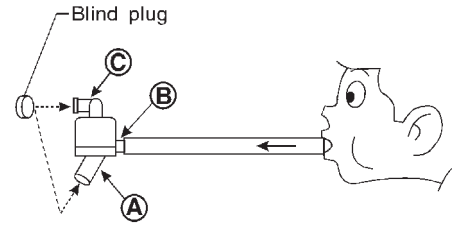
SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

8	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



* Ⓐ: Bottom hole (To atmosphere)
Ⓑ: Emergency tube (From EVAP canister)
Ⓒ: Inlet port (To member)

SEF829T

5. In case of NG in items 2 - 4, replace the parts.

NOTE:
- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

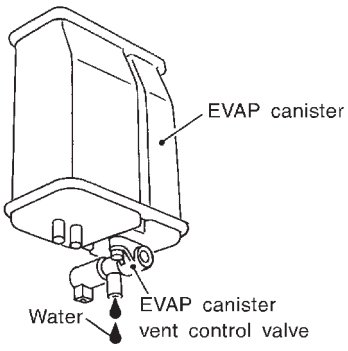
Refer to "DTC Confirmation Procedure", EC-370.

OK or NG

OK	▶	GO TO 10.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?



SEF596U

Yes or No

Yes	▶	GO TO 11.
No (With CONSULT-II)	▶	GO TO 13.
No (Without CONSULT-II)	▶	GO TO 14.

11	CHECK EVAP CANISTER
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).** **OK or NG**	
OK (With CONSULT-II) ▶	GO TO 13.
OK (Without CONSULT-II) ▶	GO TO 14.
NG ▶	GO TO 12.

12	DETECT MALFUNCTIONING PART
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

Vacuum should exist.

SEF984Y

OK or NG

OK ▶	GO TO 16.
NG ▶	GO TO 15.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK ▶	GO TO 17.
NG ▶	GO TO 15.

15	CHECK VACUUM HOSE
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-26.	
OK or NG	
OK (With CONSULT-II) ▶	GO TO 16.
OK (Without CONSULT-II) ▶	GO TO 17.
NG ▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

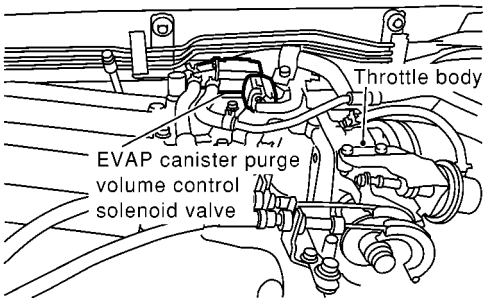
OK or NG

OK ▶	GO TO 18.
NG ▶	GO TO 17.

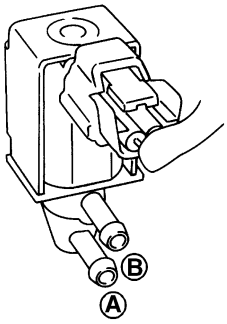
17	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF986Y

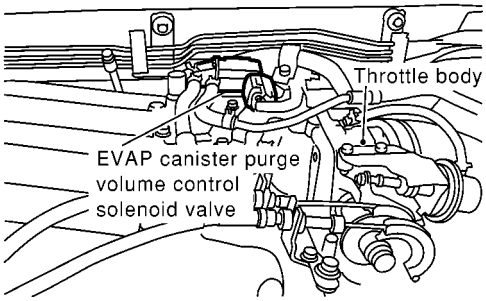


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

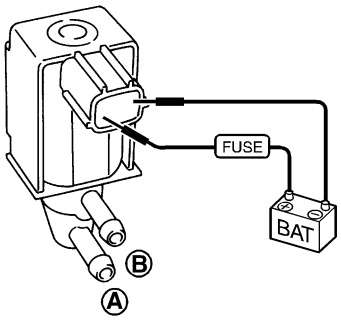
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF986Y



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

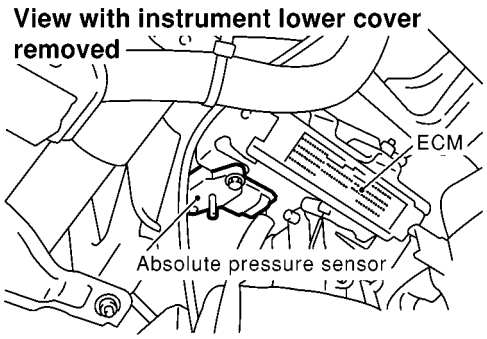
SEF335X

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

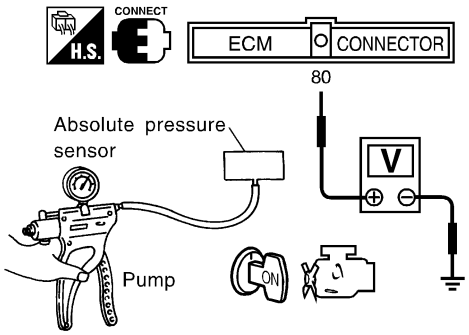
18	CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.



SEF961Y

2. Remove hose from absolute pressure sensor.
3. Install a vacuum pump to absolute pressure sensor.
4. Turn ignition switch "ON" and check output voltage between ECM terminal 80 and engine ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	1.0 to 1.4 lower than above value

SEF300XA

CAUTION:

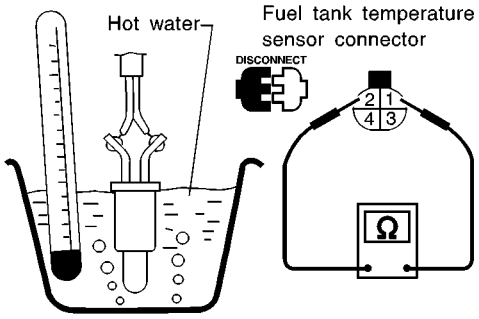
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (–700 mmHg, –27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace absolute pressure sensor.

19	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 2 by heating with hot water or heat gun as shown in the figure.



Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

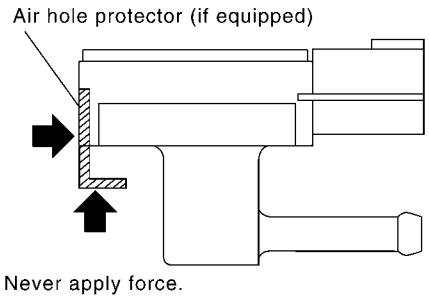
SEF974Y

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace fuel level sensor unit.

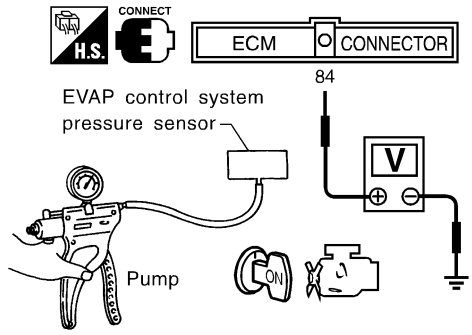
20	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   CAUTION:
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
   CAUTION:
   - **Always calibrate the vacuum pump gauge when using it.**
   - **Do not apply below −20 kPa (−150 mmHg, −5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**
5. Check input voltage between ECM terminal 84 and ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
−9.3 kPa (−70 mmHg, −2.76 inHg)	0.4 - 0.6

SEF342X

CAUTION:
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5m (19.7in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 21.
NG	▶	Replace EVAP control system pressure sensor.

21	CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to "Evaporative Emission System", EC-32.

OK or NG

OK	▶	GO TO 22.
NG	▶	Repair or reconnect the hose.

22	CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

	▶	GO TO 23.

23	CHECK FUEL LEVEL SENSOR	
Refer to EL-128, "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 24.
NG	▶	Replace fuel level sensor unit.

24	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.		
	▶	**INSPECTION END**

Description

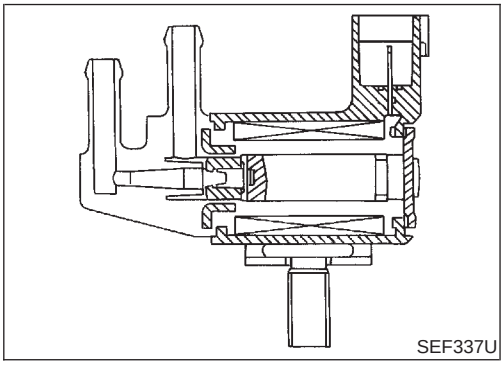
NAEC0319

SYSTEM DESCRIPTION

NAEC0319S01

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.


SEF337U

COMPONENT DESCRIPTION

NAEC0319S02

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0320

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	• Engine: After warming up • Air conditioner switch “OFF” • Shift lever: “N” • No-load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

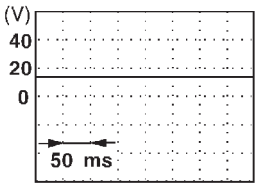
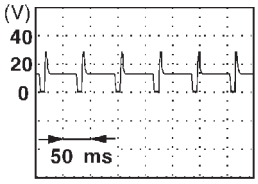
ECM Terminals and Reference Value

NAEC0678

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine).	BATTERY VOLTAGE (11 - 14V)  SEF995U

On Board Diagnosis Logic

NAEC0322

Malfunction is detected when the canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.

Possible Cause

NAEC0588

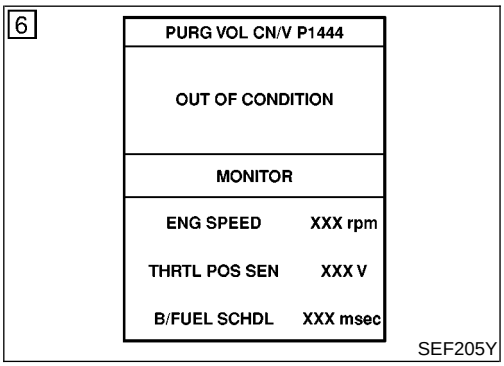
- EVAP control system pressure sensor
- EVAP canister purge volume control solenoid valve (The valve is stuck open.)
- EVAP canister vent control valve
- EVAP canister
- Hoses
  (Hoses are connected incorrectly or clogged.)

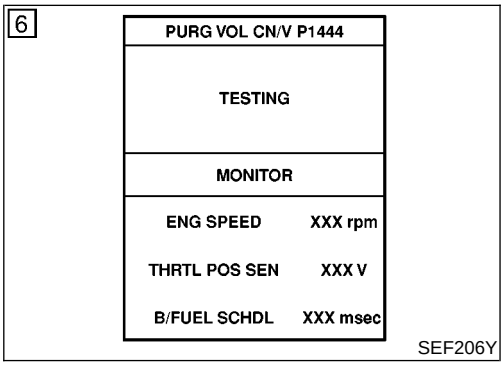
DTC Confirmation Procedure

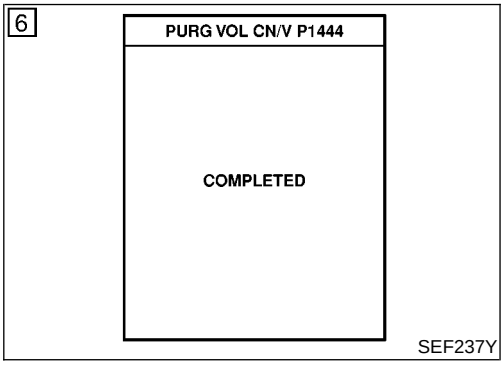
NAEC0323

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Always perform test at a temperature of 0°C (32°F) or more.







WITH CONSULT-II

NAEC0323S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Turn ignition switch “ON”.
4) Select “PURG VOL CN/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
5) Touch “START”.
6) Start engine and let it idle until “TESTING” on CONSULT-II changes to “COMPLETED”. (It will take for approximately 10 seconds.)
   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-540.

WITH GST

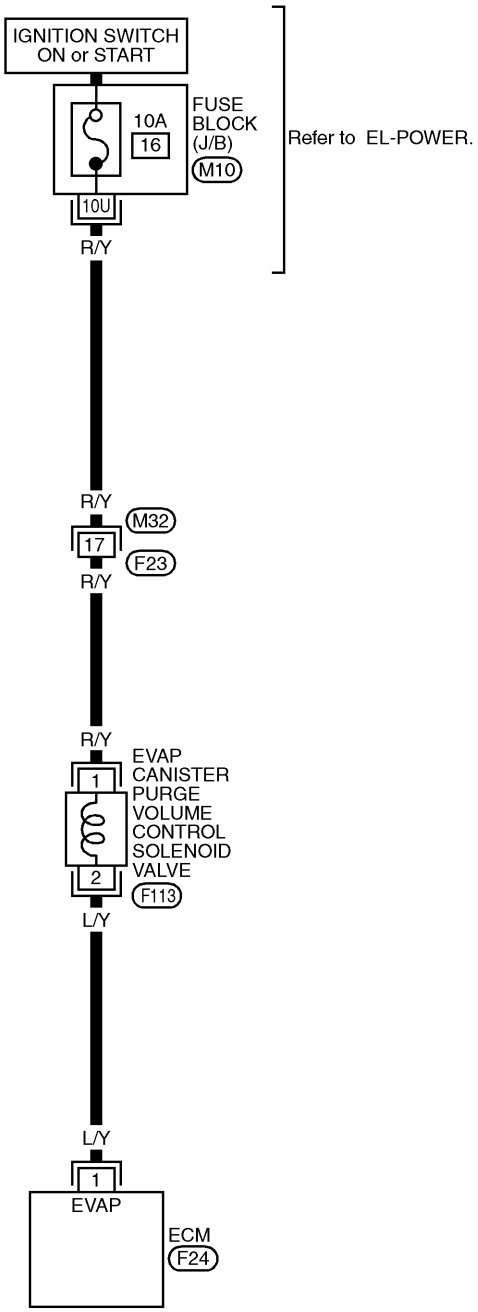
NAEC0323S02

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 10 seconds.
3) Start engine and let it idle for at least 20 seconds.
4) Select “MODE 7” with GST.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-540.

Wiring Diagram

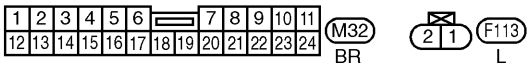
NAEC0324

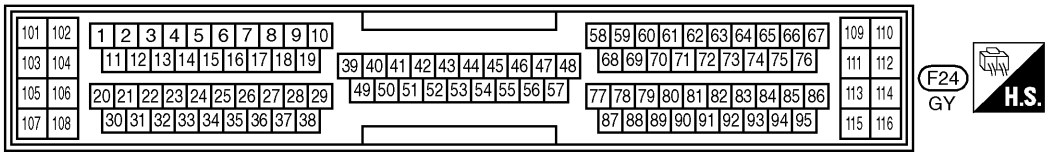
EC-PGC/V-01



: Detectable line for DTC
: Non-detectable line for DTC

REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)





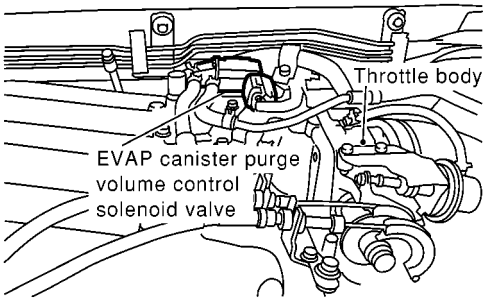
MEC962C

Diagnostic Procedure

NAEC0325

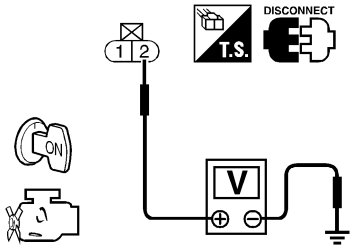
1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



SEF986Y

3. Turn ignition switch “ON”.
4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and engine ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF333X

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M32, F23
- Fuse block (J/B) connector M10
- 10A fuse
- Harness for open or short between EVAP canister purge volume control solenoid valve and fuse

	▶	Repair harness or connectors.

3	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

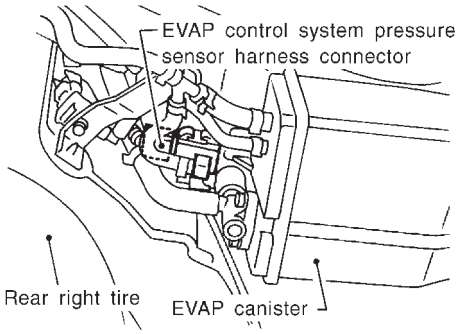
1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 1 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.



SEF495R

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair it.

5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

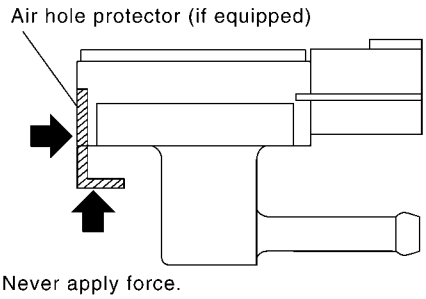
1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace EVAP control system pressure sensor.

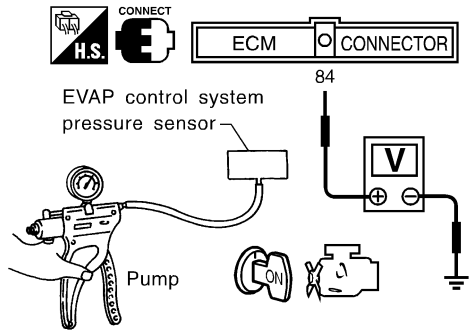
6	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   CAUTION:
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
   CAUTION:
   - **Always calibrate the vacuum pump gauge when using it.**
   - **Do not apply below −20 kPa (−150 mmHg, −5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**
5. Check input voltage between ECM terminal 84 and ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
–9.3 kPa (–70 mmHg, –2.76 inHg)	0.4 - 0.6

SEF342X

CAUTION:
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5m (19.7in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK (With CONSULT-II)	▶	GO TO 7.
OK (Without CONSULT-II)	▶	GO TO 8.
NG	▶	Replace EVAP control system pressure sensor.

7	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Turn ignition switch "OFF".
2. Reconnect harness connectors disconnected.
3. Start engine.
4. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

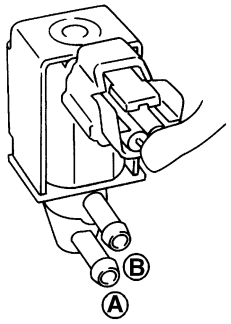
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

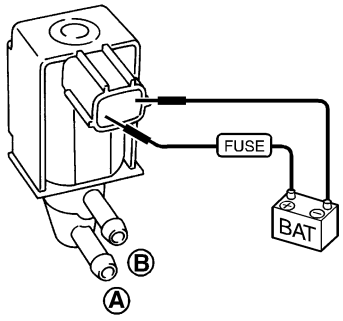


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

Diagnostic Procedure (Cont'd)

9	CHECK RUBBER TUBE FOR CLOGGING

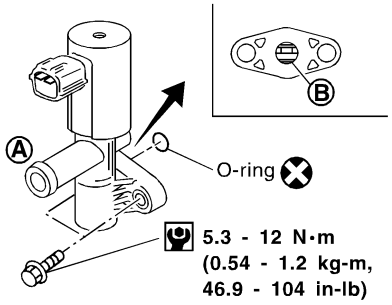
1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK	▶	GO TO 10.
NG	▶	Clean the rubber tube using an air blower.

10	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF337X

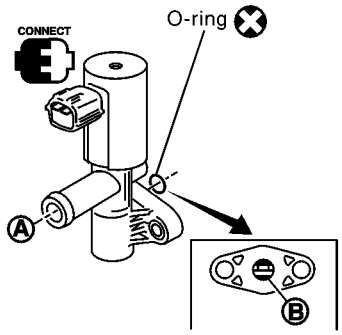
OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

11	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch "ON".
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

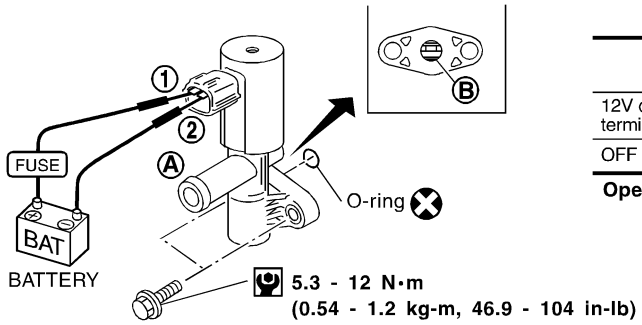
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF991Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

SEF339X

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 13.
NG	▶	GO TO 12.

12	CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform procedure 9 again.

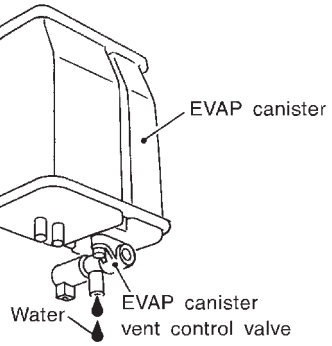
OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

Diagnostic Procedure (Cont'd)

13	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes	▶	GO TO 14.
No	▶	GO TO 17.

14	CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

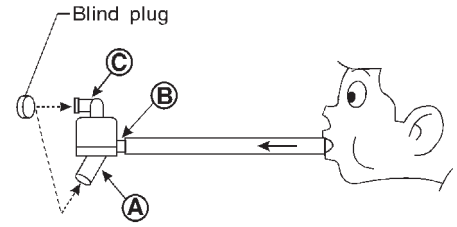
15	DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and water separater for clogging or poor connection

	▶	Repair hose or replace EVAP canister.

16	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



* Ⓐ: Bottom hole (To atmosphere)
Ⓑ: Emergency tube (From EVAP canister)
Ⓒ: Inlet port (To member)

SEF829T

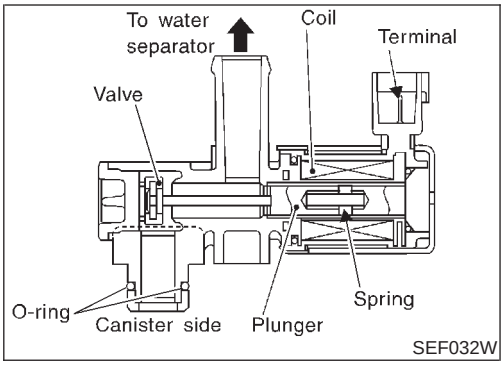
5. In case of NG in items 2 - 4, replace the parts.

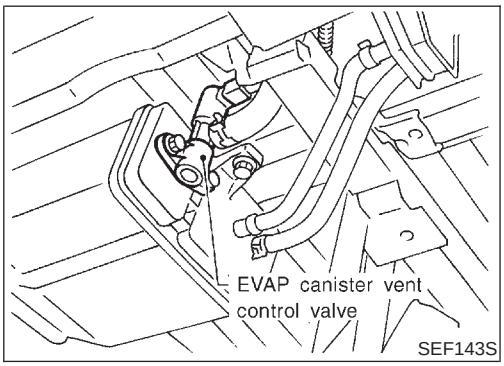
NOTE:
- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 17.
NG	▶	Clean or replace water separator.

17	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**





Component Description

NAEC0326

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0327

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NAEC0679

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
40	G/Y	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

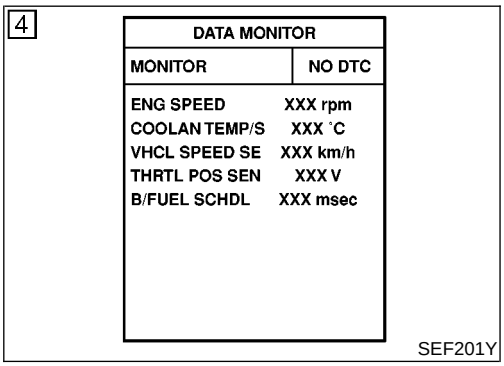
NAEC0329

Malfunction is detected when EVAP canister vent control valve remains closed under specified driving conditions.

Possible Cause

NAEC0589

- EVAP canister vent control valve
- EVAP control system pressure sensor and the circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water.



DTC Confirmation Procedure

NAEC0330

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

NAEC0330S01

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine.
4) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.

NOTE:

If a malfunction exists, NG result may be displayed quicker.

5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-551.

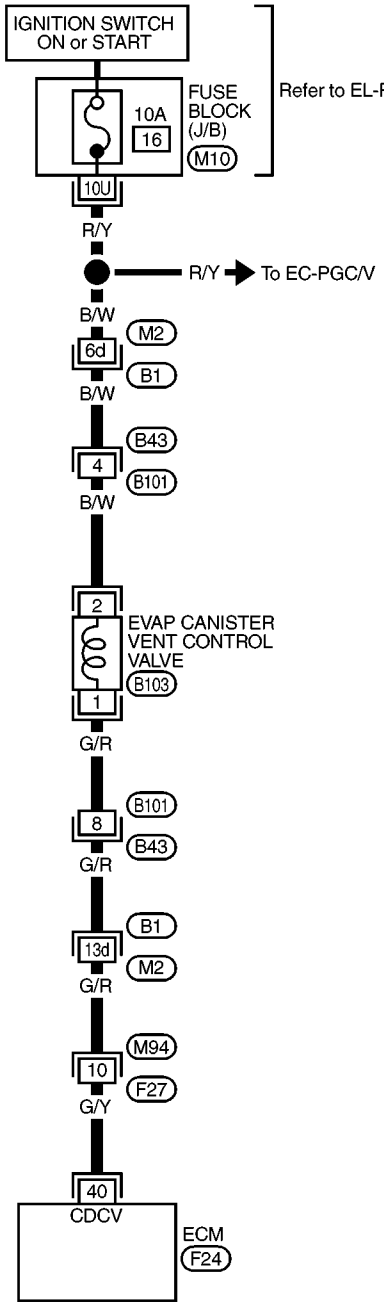
WITH GST

NAEC0330S02

Follow the procedure "WITH CONSULT-II" above.

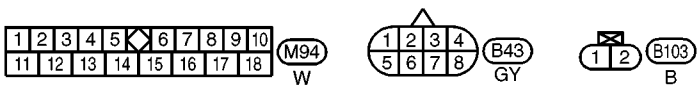
Wiring Diagram

NAEC0331

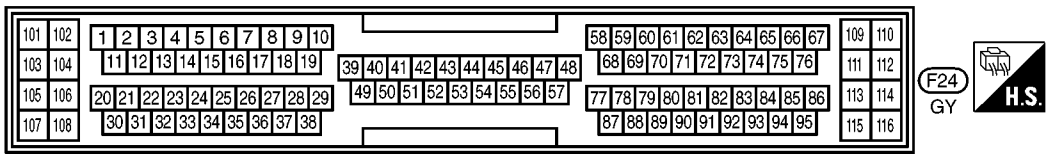


EC-VENT/V-01

: Detectable line for DTC
: Non-detectable line for DTC



REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK-JUNCTION BOX (J/B)



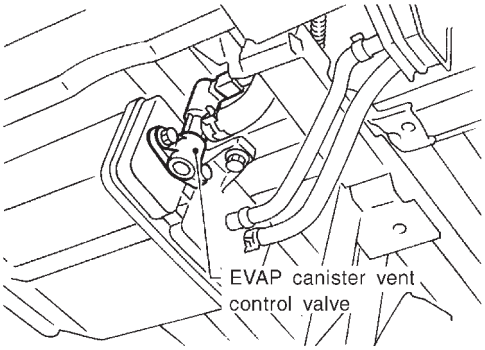
MEC963C

Diagnostic Procedure

NAEC0332

1	CHECK RUBBER TUBE

1. Turn ignition switch “OFF”.
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.



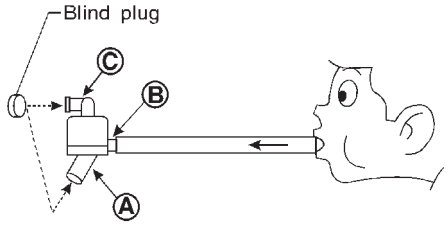
SEF143S

OK or NG

OK	▶	GO TO 2.
NG	▶	Clean rubber tube using an air blower.

2	CHECK WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.



* Ⓐ: Bottom hole (To atmosphere)
Ⓑ: Emergency tube (From EVAP canister)
Ⓒ: Inlet port (To member)

SEF829T

5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.

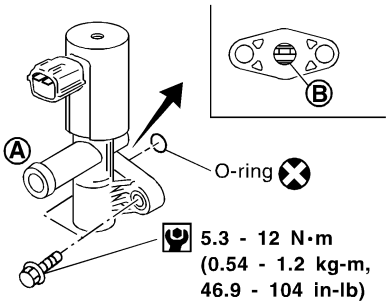
OK or NG

OK	▶	GO TO 3.
NG	▶	Clean or replace water separator.

Diagnostic Procedure (Cont'd)

3	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF337X

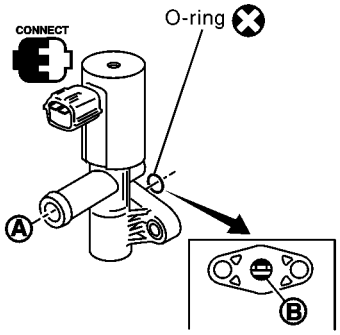
OK or NG

OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve.

4	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Turn ignition switch ON.
2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
3. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

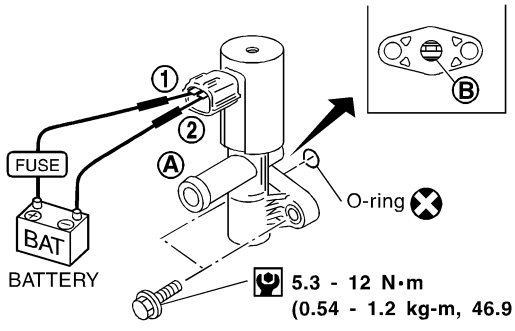
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF991Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

SEF339X

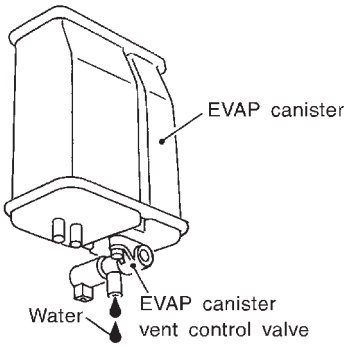
Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	CHECK EVAP CANISTER VENT CONTROL VALVE-III
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower. 2. Perform the procedure 4 again.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Replace EVAP canister vent control valve.

6	CHECK IF EVAP CANISTER SATURATED WITH WATER
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.	



SEF596U

Yes or No	
Yes ▶	GO TO 7.
No ▶	GO TO 9.

7	CHECK EVAP CANISTER
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).**	
OK or NG	
OK ▶	GO TO 9.
NG ▶	GO TO 8.

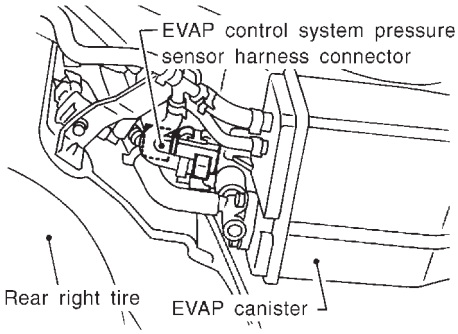
8	DETECT MALFUNCTIONING PART
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.	
OK or NG	
OK ▶	GO TO 10.
NG ▶	Repair it.

Diagnostic Procedure (Cont'd)

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



SEF495R

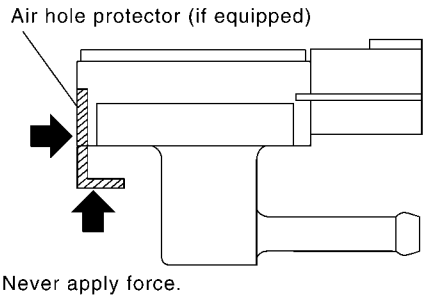
2. Check connectors for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

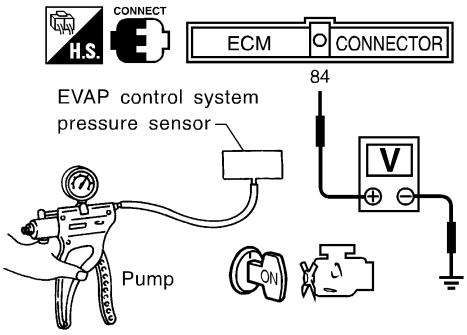
11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   CAUTION:
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
   CAUTION:
   - **Always calibrate the vacuum pump gauge when using it.**
   - **Do not apply below −20 kPa (−150 mmHg, −5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**
5. Check input voltage between ECM terminal 84 and ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
−9.3 kPa (−70 mmHg, −2.76 inHg)	0.4 - 0.6

SEF342X

CAUTION:
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

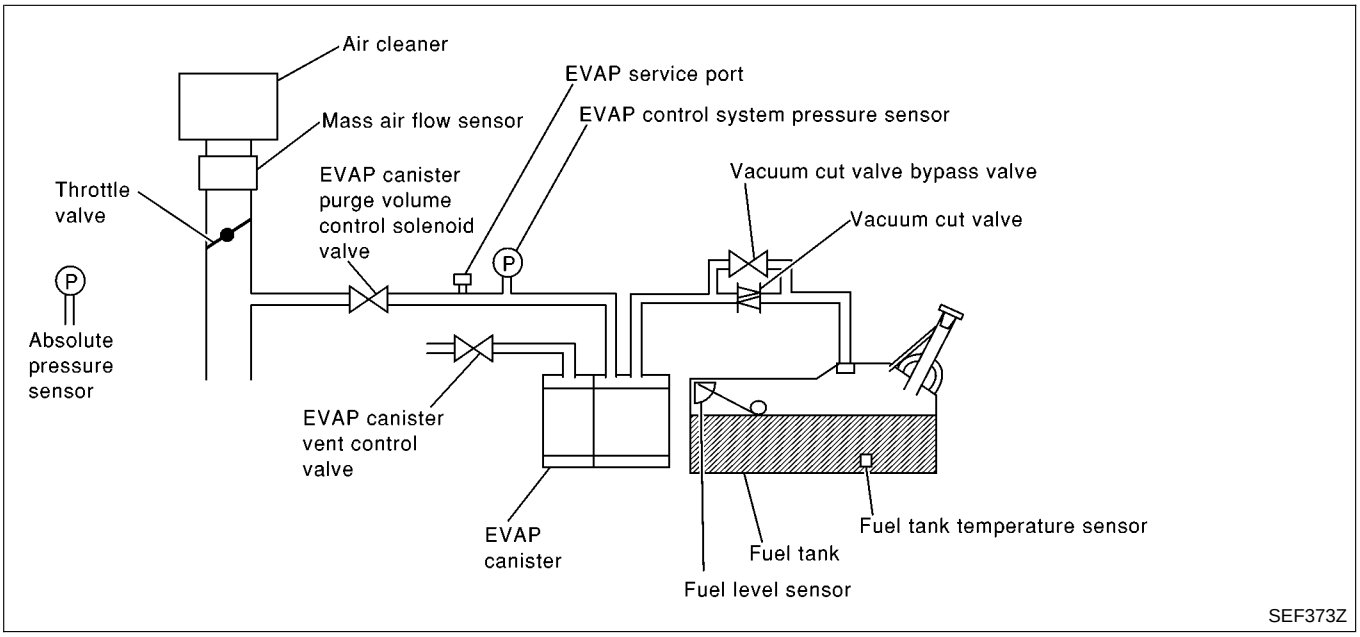
OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

12	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**

System Description

NAEC0333

NOTE:
If DTC P1447 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See EC-426.)



In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

NAEC0334

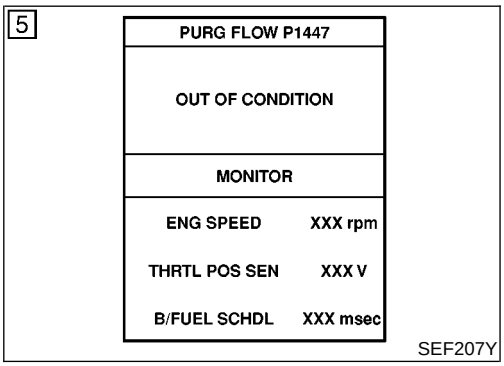
Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.
Malfunction is detected when EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.

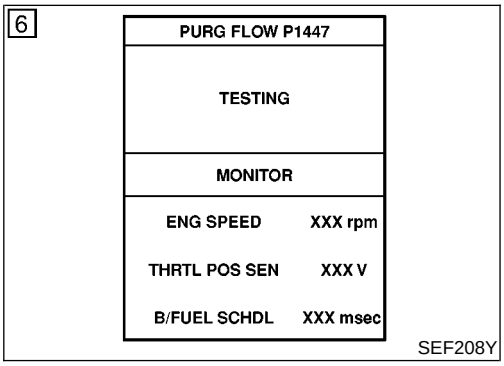
Possible Cause

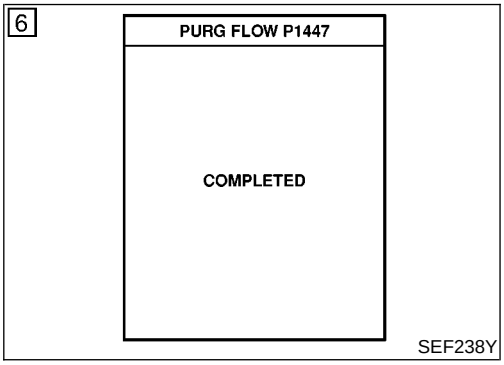
NAEC0590

- EVAP canister purge volume control solenoid valve stuck closed
- EVAP control system pressure sensor and the circuit
- Loose, disconnected or improper connection of rubber tube
- Blocked rubber tube
- Cracked EVAP canister
- EVAP canister purge volume control solenoid valve circuit
- Closed throttle position switch
- Blocked purge port

- EVAP canister vent control valve







DTC Confirmation Procedure

NAEC0335

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-II

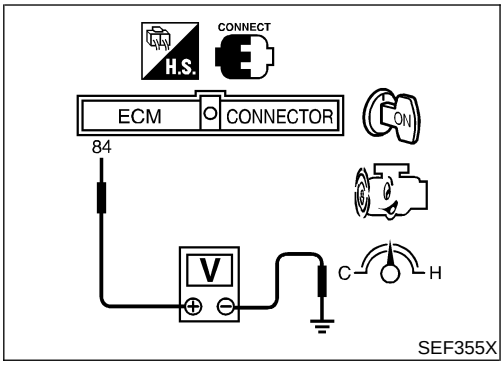
NAEC0335S01

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Start engine and let it idle for at least 70 seconds.
4) Select "PURG FLOW P1447" of "EVAPORATIVE SYSTEM" in "DTC CONFIRMATION" mode with CONSULT-II.
5) Touch "START".
   If "COMPLETED" is displayed, go to step 7.
6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,000 rpm
B/FUEL SCHDL	1.0 - 10 msec
Engine coolant temperature	More than 70°C (158°F)

If "TESTING" is not changed for a long time, retry from step 2.

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-559.



Overall Function Check

NAEC0336

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NAEC0336S01

1) Lift up drive wheels.
2) Start engine (TCS switch “OFF”) and warm it up to normal operating temperature.
3) Turn ignition switch “OFF”, wait at least 10 seconds.
4) Start engine and wait at least 70 seconds.
5) Set voltmeter probes to ECM terminals 84 (EVAP control system pressure sensor signal) and ground.
6) Check EVAP control system pressure sensor value at idle speed and note it.
7) Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch	ON
Steering wheel	Fully turned
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Gear position	Any position other than “P”, “N” or “R”

8) Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
9) If NG, go to “Diagnostic Procedure”, EC-559.

Diagnostic Procedure

=NAEC0337

1	CHECK EVAP CANISTER

1. Turn ignition switch “OFF”.
2. Check EVAP canister for cracks.

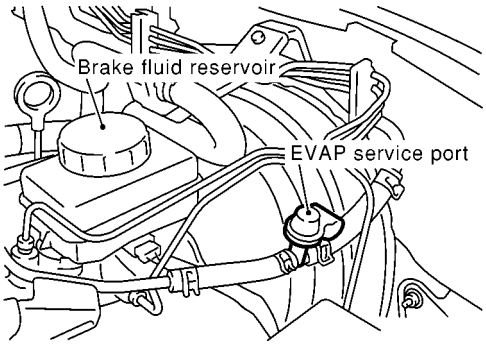
OK or NG

OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Replace EVAP canister.

2	CHECK PURGE FLOW

With CONSULT-II

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.



SEF983Y

2. Start engine and let it idle.
3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
4. Rev engine up to 2,000 rpm.
5. Touch “Qd” and “Qu” on CONSULT-II screen to adjust “PURG VOL CONT/V” opening and check vacuum existence.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

PURG VOL CONT/V	VACUUM
100.0%	Should exist
0.0%	Should not exist

SEF012Z

OK or NG

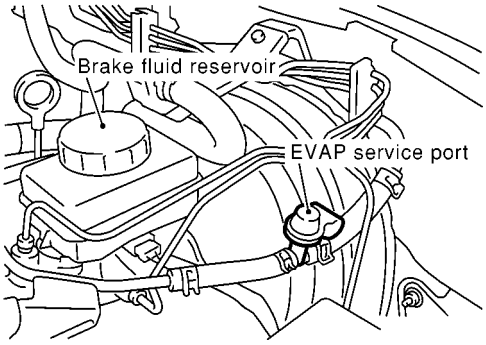
OK	▶	GO TO 7.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

3	CHECK PURGE FLOW

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.



SEF983Y

4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum gauge indication when revving engine up to 2,000 rpm.
   Vacuum should exist.
6. Release the accelerator pedal fully and let idle.
   Vacuum should not exist.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 4.

4	CHECK EVAP PURGE LINE

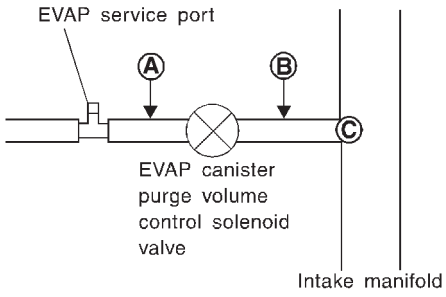
1. Turn ignition switch "OFF".
2. Check EVAP purge line for improper connection or disconnection.
   Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.

OK or NG

OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair it.

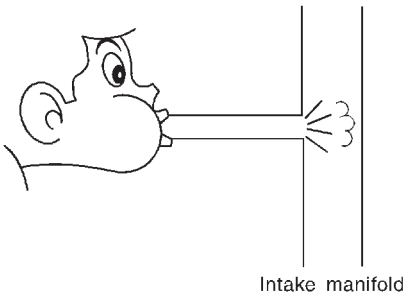
5	CHECK EVAP PURGE HOSE AND PURGE PORT

1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.



SEF367U

2. Blow air into each hose and EVAP purge port **C**.
3. Check that air flows freely.



SEF368U

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or clean hoses and/or purge port.

6	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

OK or NG

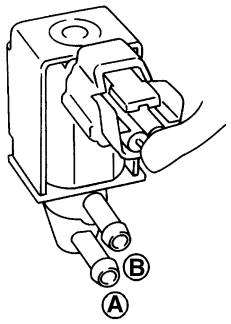
OK	▶	GO TO 8.
NG	▶	GO TO 7.

Diagnostic Procedure (Cont'd)

7	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

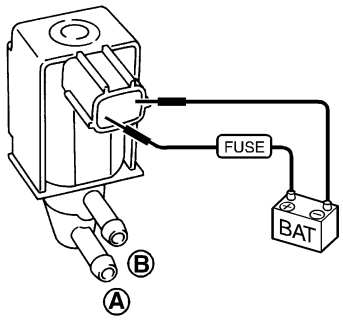


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

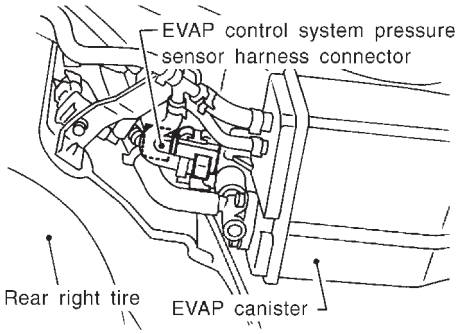
1. Turn ignition switch "OFF".
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK	▶	GO TO 9.
NG	▶	Repair it.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



SEF495R

2. Check connectors for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to "DTC Confirmation Procedure" for DTC P0450, EC-377.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK RUBBER TUBE FOR CLOGGING

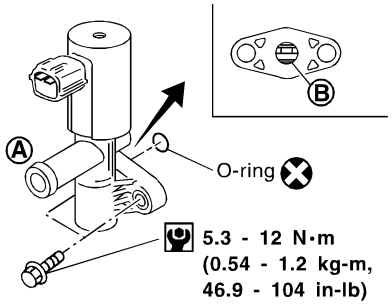
1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK	▶	GO TO 12.
NG	▶	Clean the rubber tube using an air blower.

12	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF337X

OK or NG

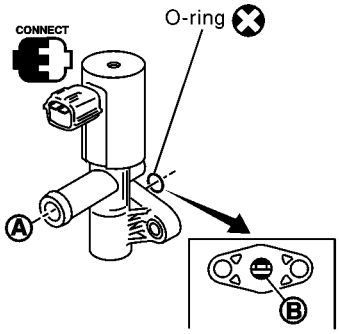
OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

Diagnostic Procedure (Cont'd)

13	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch "ON".
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

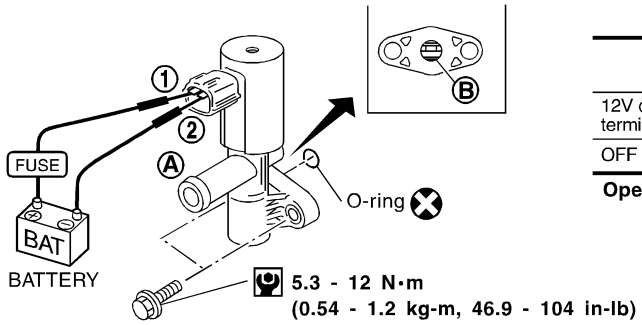
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF991Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

SEF339X

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 14.

14	CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 13 again.

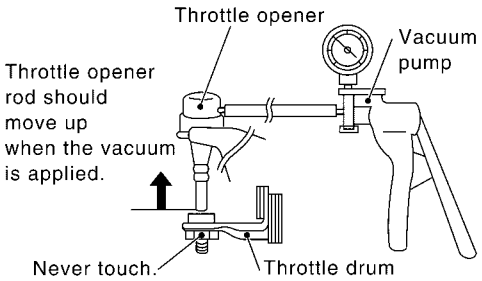
OK or NG

OK (With CONSULT-II)	▶	GO TO 16.
OK (Without CONSULT-II)	▶	GO TO 16.
NG	▶	Replace EVAP canister vent control valve.

15	CHECK THROTTLE POSITION SWITCH

With CONSULT-II

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch "OFF".
4. Remove vacuum hose connected to throttle opener.
5. Connect suitable vacuum hose to vacuum pump and the throttle opener.
6. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

7. Turn ignition switch "ON".
8. Select "DATA MONITOR" mode with CONSULT-II.
9. Check indication of "CLSD THL/P SW" under the following conditions.
   Measurement must be made with throttle position switch installed in vehicle.

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

MTBL0355

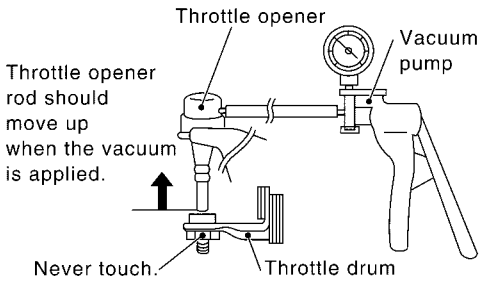
OK or NG

OK	▶	GO TO 18.
NG	▶	GO TO 17.

Diagnostic Procedure (Cont'd)

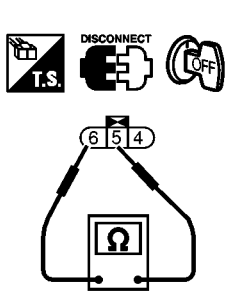
16	CHECK THROTTLE POSITION SWITCH

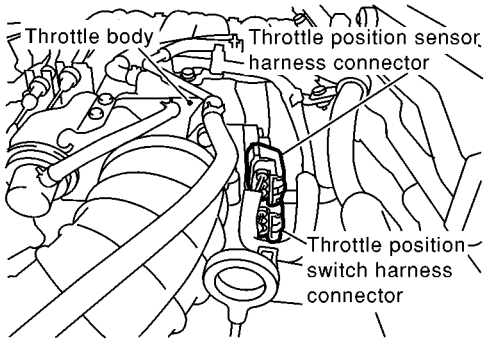
1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch "OFF".
4. Remove vacuum hose connected to throttle opener.
5. Connect suitable vacuum hose to vacuum pump and the throttle opener.
6. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.



SEF793W

7. Disconnect closed throttle position switch harness connector.
8. Check continuity between closed throttle position switch terminals 6 and 5 under the following conditions. Resistance measurement must be made with throttle position switch installed in vehicle.





Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

SEF998Y

OK or NG

OK	▶	GO TO 18.
NG	▶	GO TO 17.

17	ADJUST THROTTLE POSITION SWITCH

Check the following items. Refer to "Basic Inspection", EC-99.

Items	Specifications
Ignition timing	15° ± 2° BTDC
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.05 mm (0.0020 in): ON 0.15 mm (0.0059 in): OFF
Target idle speed	M/T: 750 ± 50 rpm A/T: 750 ± 50 rpm (in "P" or "N" position)

MTBL0537

Is it possible to adjust closed throttle position switch?

Yes or No

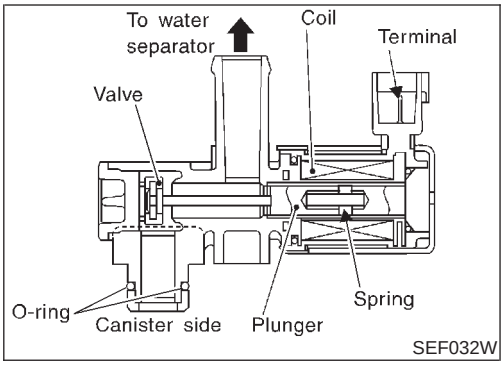
Yes	▶	GO TO 18.
No	▶	Replace throttle position switch.

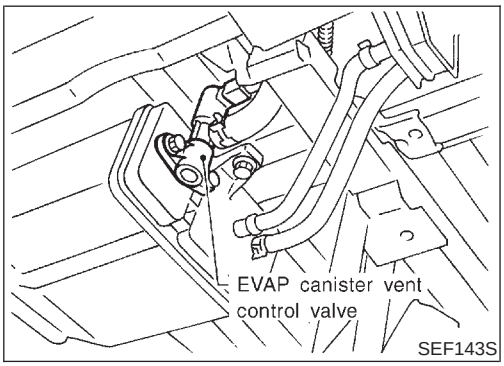
Diagnostic Procedure (Cont'd)

18	CHECK EVAP PURGE LINE	
Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.		
OK or NG		
OK	▶	GO TO 19.
NG	▶	Replace it.

19	CLEAN EVAP PURGE LINE	
Clean EVAP purge line (pipe and rubber tube) using air blower.		
	▶	GO TO 20.

20	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.		
	▶	**INSPECTION END**





Component Description

NAEC0338

NOTE:
If DTC P1448 is displayed with P0440, perform trouble diagnosis for DTC P1448 first.

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0339

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NAEC0680

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
40	Y	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC0341

Malfunction is detected when EVAP canister vent control valve remains opened under specified driving conditions.

Possible Cause

NAEC0591

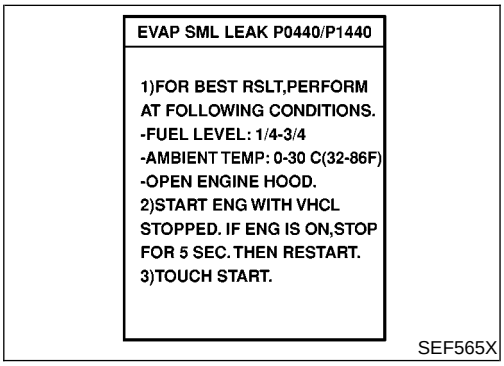
- EVAP canister vent control valve
- EVAP control system pressure sensor and circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water.
- Vacuum cut valve

DTC Confirmation Procedure

NAEC0342

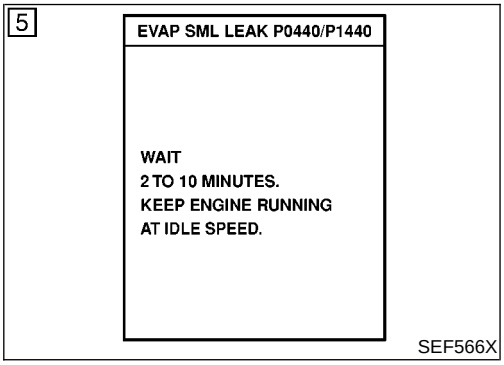
NOTE:

- **If DTC P1448 is displayed with P0440 or P1440, perform trouble diagnosis for DTC P1448 first.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.



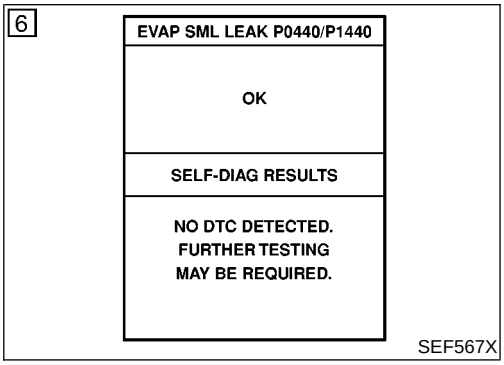
SEF565X

5



SEF566X

6



SEF567X

WITH CONSULT-II

NAEC0342S01

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedure.**

1) Turn ignition switch "ON".
2) Turn ignition switch "OFF" and wait at least 10 seconds.
3) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
4) Make sure that the following conditions are met.

COOLAN TEMP/S	0 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 30°C (32 - 86°F)

5) Select "EVAP SML LEAK P0440/P1440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-99.

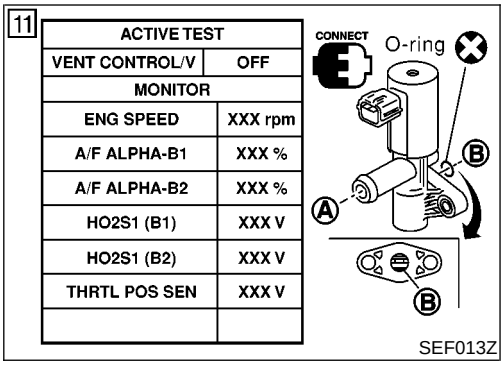
6) Make sure that "OK" is displayed.
   If "NG" is displayed, go to the following step.

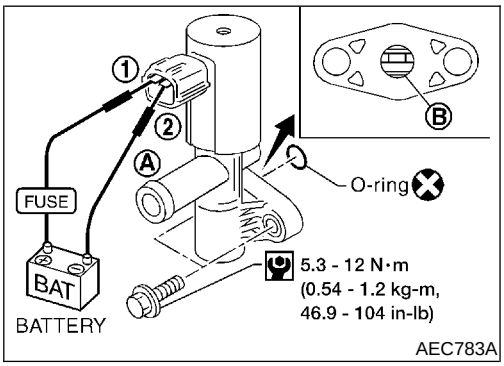
NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

7) Stop engine and wait at least 10 seconds, then turn "ON".
8) Disconnect hose from water separator.
9) Select "VENT CONTROL/V" of "ACTIVE TEST" mode with CONSULT-II.
10) Touch "ON" and "OFF" alternately.

DTC Confirmation Procedure (Cont'd)





11) Make sure the following.

Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

If the result is NG, go to "Diagnostic Procedure", EC-572.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-350.

Overall Function Check

NAEC0343

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a DTC might not be confirmed.

WITH GST

NAEC0343S01

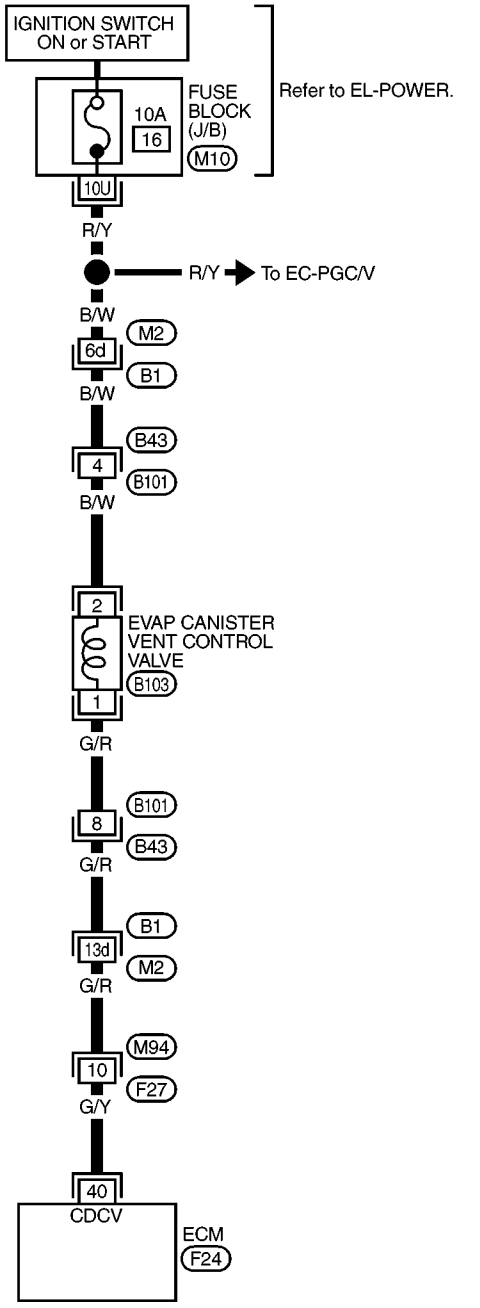
1) Disconnect hose from water separator.
2) Disconnect EVAP canister vent control valve harness connector.
3) Verify the following.

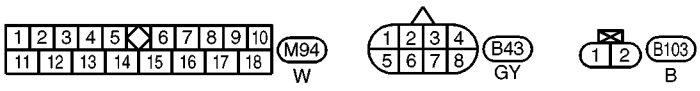
Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

If the result is NG, go to "Diagnostic Procedure", EC-572.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-350.

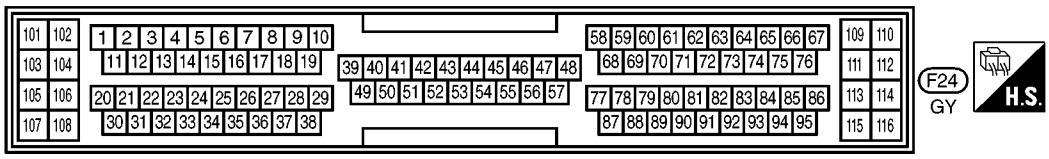
Wiring Diagram

NAEC0344





REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK-JUNCTION BOX (J/B)



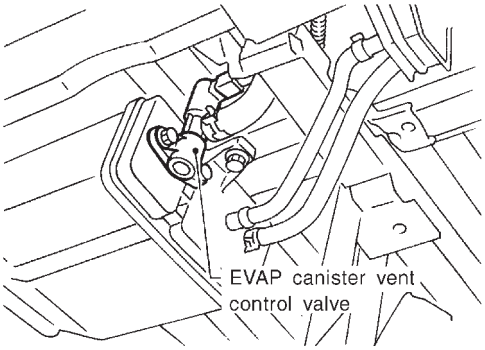
MEC963C

Diagnostic Procedure

NAEC0345

1	CHECK RUBBER TUBE

1. Turn ignition switch “OFF”.
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.



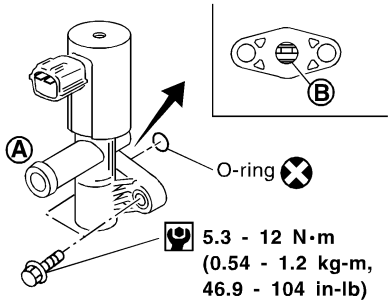
SEF143S

OK or NG

OK	▶	GO TO 2.
NG	▶	Clean rubber tube using an air blower.

2	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF337X

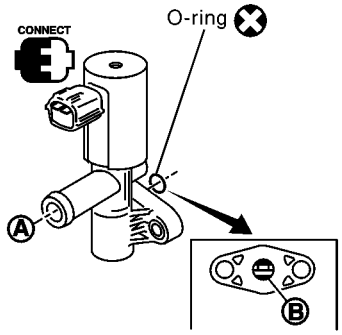
OK or NG

OK	▶	GO TO 3.
NG	▶	Replace EVAP canister vent control valve.

3	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Turn ignition switch ON.
2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
3. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

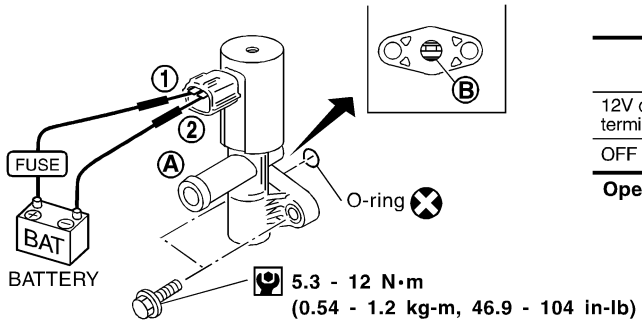
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF991Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

SEF339X

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 3 again.

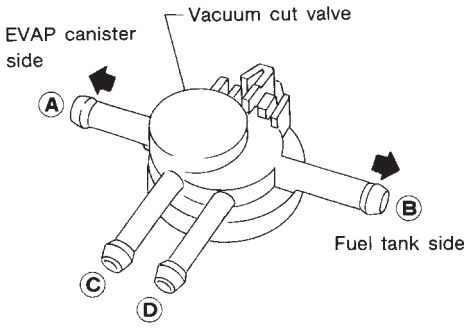
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EVAP canister vent control valve.

Diagnostic Procedure (Cont'd)

5	CHECK VACUUM CUT VALVE

1. Turn ignition switch OFF.
2. Remove vacuum cut valve.
3. Check vacuum cut valve as follows:



SEF379Q

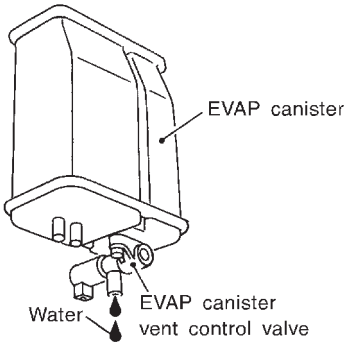
a. Plug port **C** and **D** with fingers.
b. Apply vacuum to port **A** and check that there is no suction from port **B**.
c. Apply vacuum to port **B** and check that there is suction from port **A**.
d. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
e. Open port **C** and **D**.
f. Blow air in port **A** check that air flows freely out of port **C**.
g. Blow air in port **B** check that air flows freely out of port **D**.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace vacuum cut valve.

6	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes	▶	GO TO 7.
No	▶	GO TO 9.

7	CHECK EVAP CANISTER

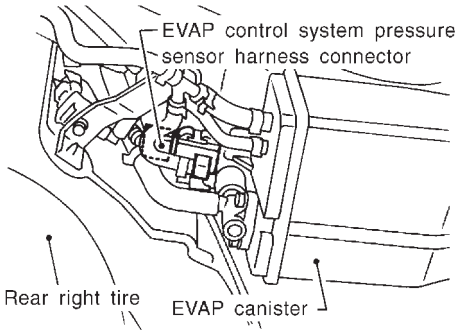
Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

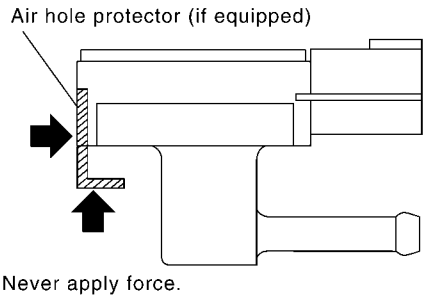
9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor. **OK or NG**	
OK ▶	GO TO 10.
NG ▶	Repair it.

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR
1. Disconnect EVAP control system pressure sensor harness connector.  SEF495R 2. Check connectors for water. **Water should not exist.** **OK or NG**	
OK ▶	GO TO 11.
NG ▶	Replace EVAP control system pressure sensor.

Diagnostic Procedure (Cont'd)

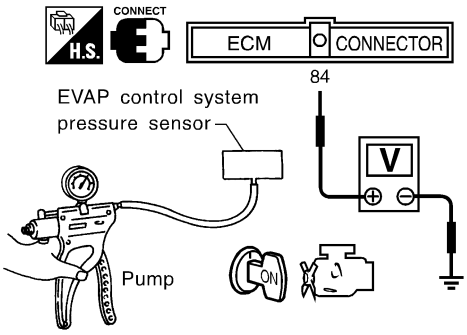
11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   CAUTION:
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
   CAUTION:
   - **Always calibrate the vacuum pump gauge when using it.**
   - **Do not apply below −20 kPa (−150 mmHg, −5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**
5. Check input voltage between ECM terminal 84 and ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
–9.3 kPa (–70 mmHg, –2.76 inHg)	0.4 - 0.6

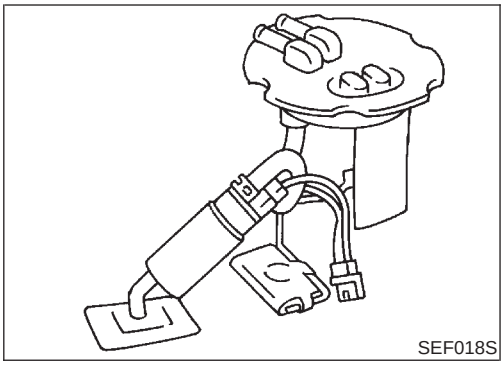
SEF342X

CAUTION:
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

12	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**


SEF018S

Component Description

NAEC0632

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.
It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

NAEC0633

ECM receives two signals from the fuel level sensor.
One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.
This diagnosis indicates the latter to detect open circuit malfunction. Malfunction is detected when a high voltage from the sensor is sent to ECM.

Possible Cause

NAEC0634

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)

DTC Confirmation Procedure

NAEC0635

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

NAEC0635S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-579.

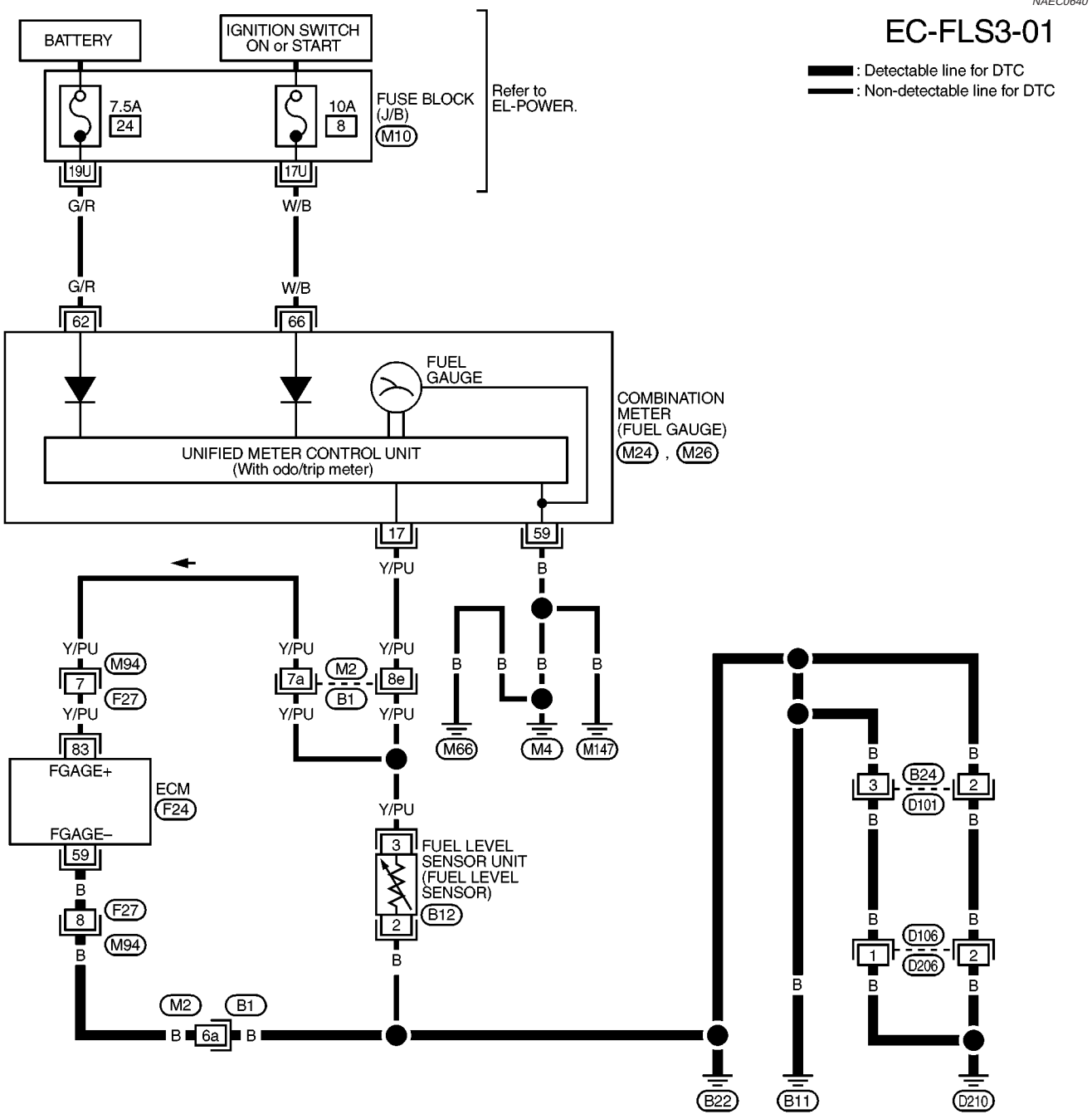
WITH GST

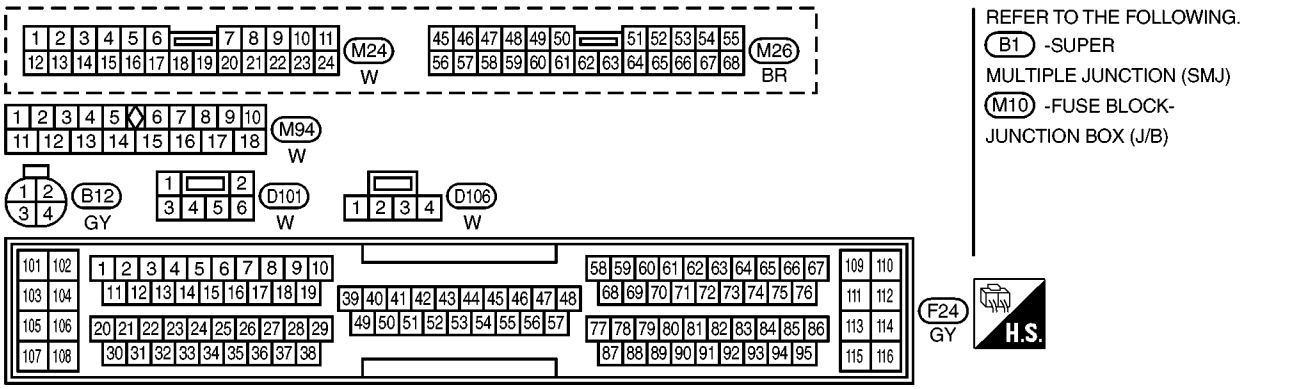
NAEC0635S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NAEC0640





REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK- JUNCTION BOX (J/B)

MEC023D

Diagnostic Procedure

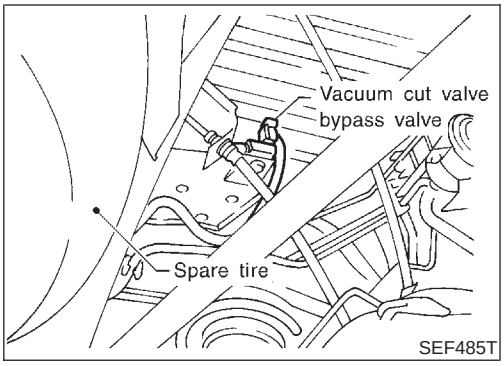
=NAEC0641

1	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 59 and body ground. Refer to Wiring Diagram. **Continuity should exist.** 4. Also check harness for short to ground and short to power. **OK or NG**	
OK ▶	GO TO 3.
NG ▶	GO TO 2.

2	DETECT MALFUNCTIONING PART
1. Check the following. ● Harness connectors F27, M94 ● Harness connectors M2, B1 ● Harness for open and short between ECM and body ground	
▶	Replace open circuit or short to ground or short to power in harness or connectors.

3	CHECK FUEL LEVEL SENSOR
Refer to EL-128, “Fuel Level Sensor Unit Check”. **OK or NG**	
OK ▶	GO TO 4.
NG ▶	Replace fuel level sensor unit.

4	CHECK INTERMITTENT INCIDENT
Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-135 **OK or NG**	
▶	**INSPECTION END**



Description

=NAEC0346

COMPONENT DESCRIPTION

NAEC0346S01

The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

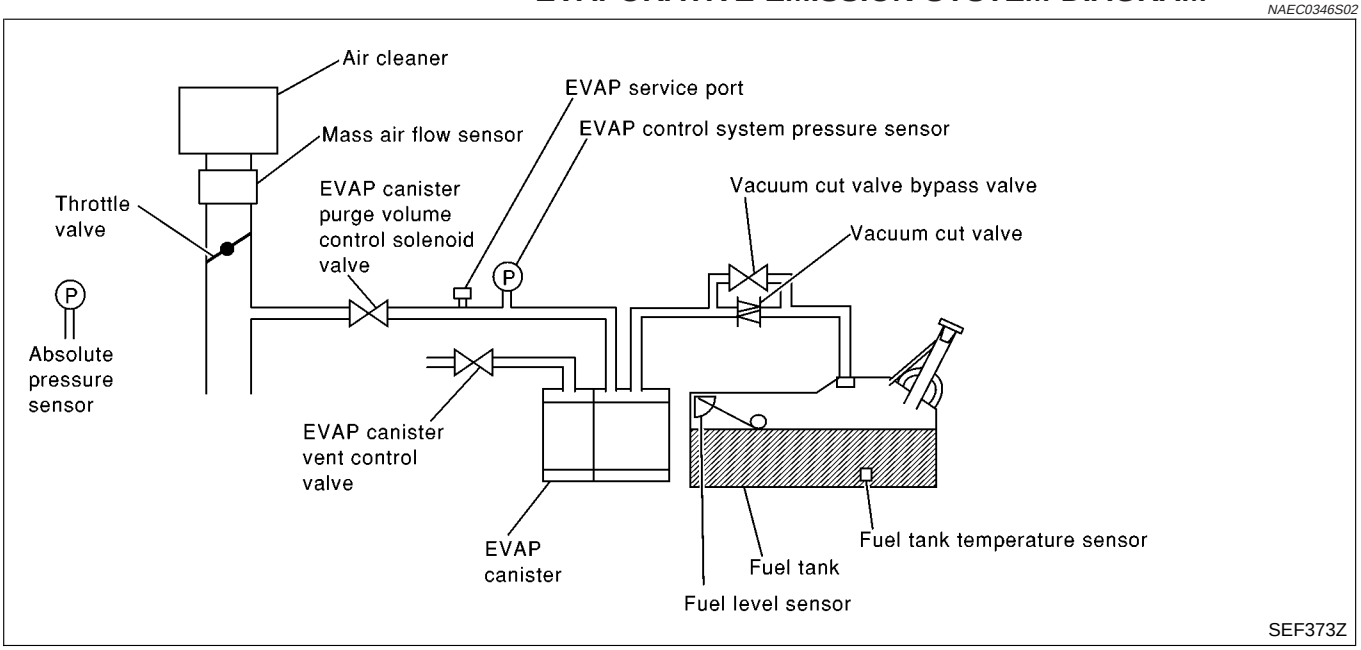
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM

NAEC0346S02



CONSULT-II Reference Value in Data Monitor Mode

NAEC0347

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NAEC0681

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
39	G/W	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC0349

Malfunction is detected when an improper voltage signal is sent to ECM through vacuum cut valve bypass valve.

Possible Cause

NAEC0592

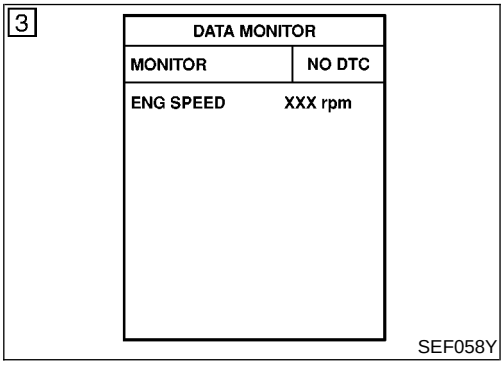
- Harness or connectors
  (The vacuum cut valve bypass valve circuit is open or shorted.)
- Vacuum cut valve bypass valve

DTC Confirmation Procedure

NAEC0350

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle speed.



WITH CONSULT-II

NAEC0350S01

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-583.

WITH GST

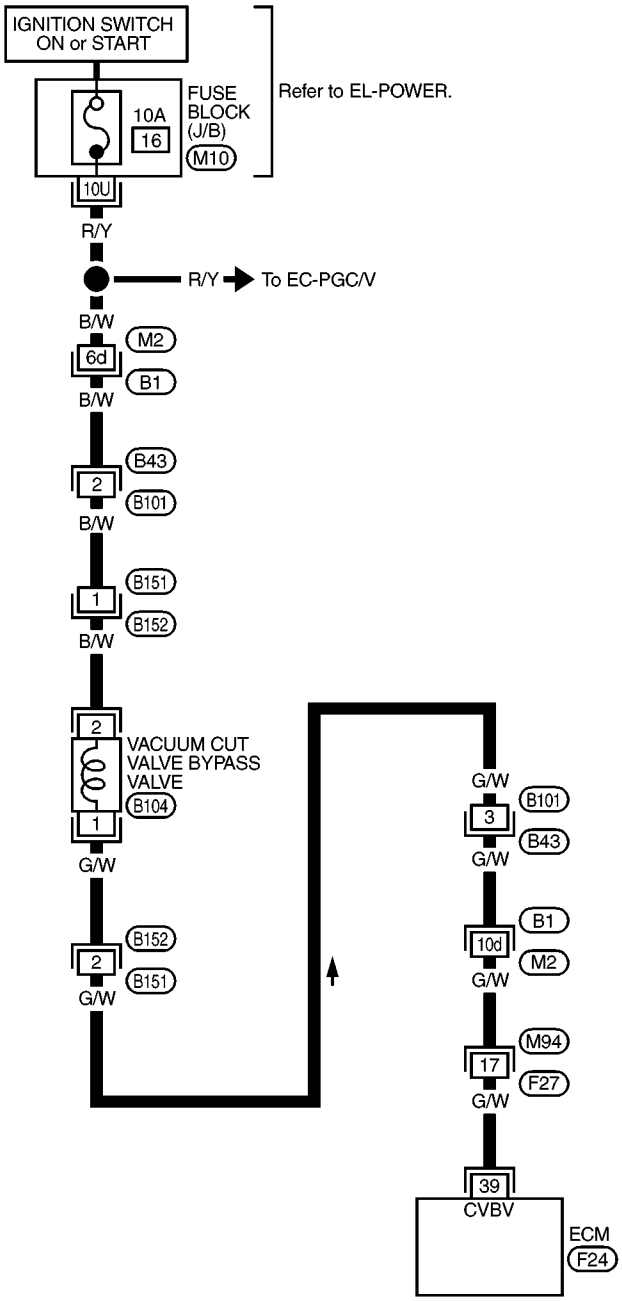
NAEC0350S02

Follow the procedure "WITH CONSULT-II" above.

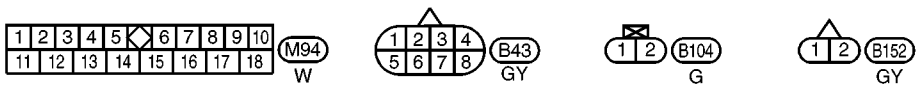
Wiring Diagram

NAEC0351

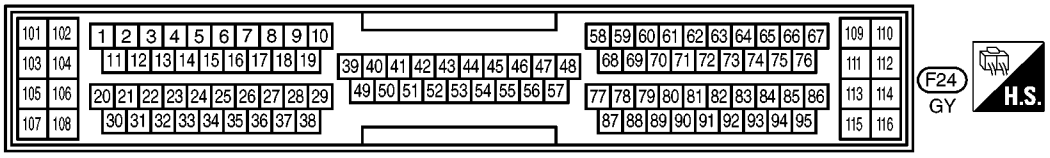
EC-BYPS/V-01



: Detectable line for DTC
: Non-detectable line for DTC



REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK-JUNCTION BOX (J/B)



MEC972C

Diagnostic Procedure

NAEC0352

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE CIRCUIT	

With CONSULT-II

1. Turn ignition switch “OFF” and then “ON”.
2. Select “VC/V BYPASS/V” in “ACTIVE TEST” mode with CONSULT-II.
3. Touch “ON/OFF” on CONSULT-II screen.

ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

SEF014Z

4. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.

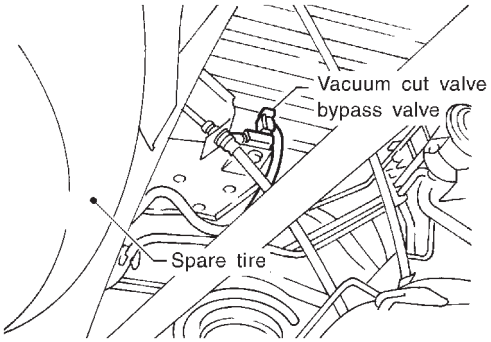
OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

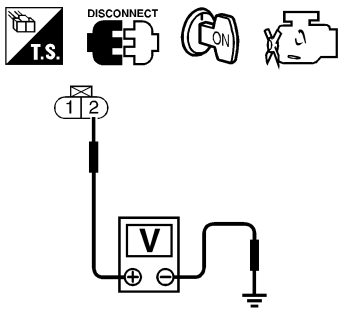
3	CHECK VACUUM CUT VALVE BYPASS VALUE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect vacuum cut valve bypass valve harness connector.



SEF485T

3. Turn ignition switch "ON".
4. Check voltage between vacuum cut valve bypass valve terminal 2 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF015Z

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M2, B1
- Fuse block (J/B) connector M10
- Harness connectors B43, B101 and B151, B152
- 10A fuse
- Harness for open or short between vacuum cut valve bypass valve and fuse

	▶	Repair harness or connectors.

5	CHECK VACUUM CUT VALVE BYPASS VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 39 and vacuum cut valve bypass valve terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

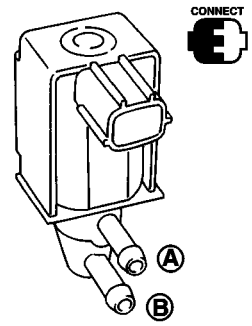
OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B152, B151 and B101, B43 ● Harness connectors B1, M2 and M94, F27 ● Harness for open or short between vacuum cut valve bypass valve and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

1. Reconnect harness disconnected connectors.
2. Turn ignition switch ON.
3. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

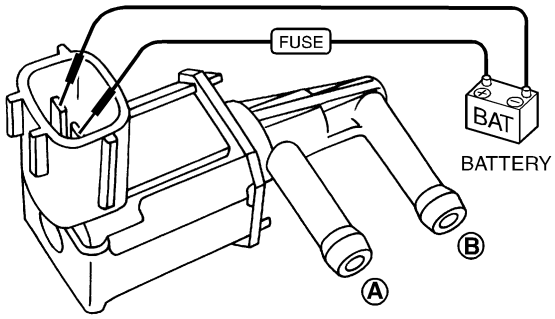
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF016Z

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

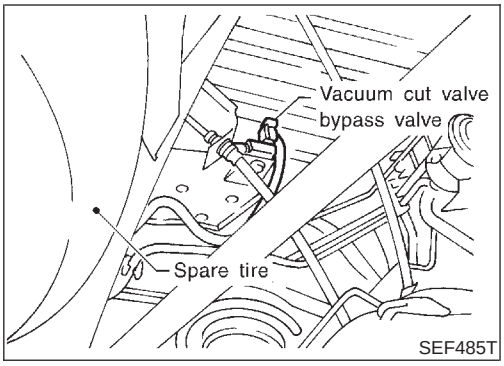
Operation takes less than 1 second.

SEF358X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace vacuum cut valve bypass valve.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**



Description

NAEC0353

COMPONENT DESCRIPTION

NAEC0353S01

The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

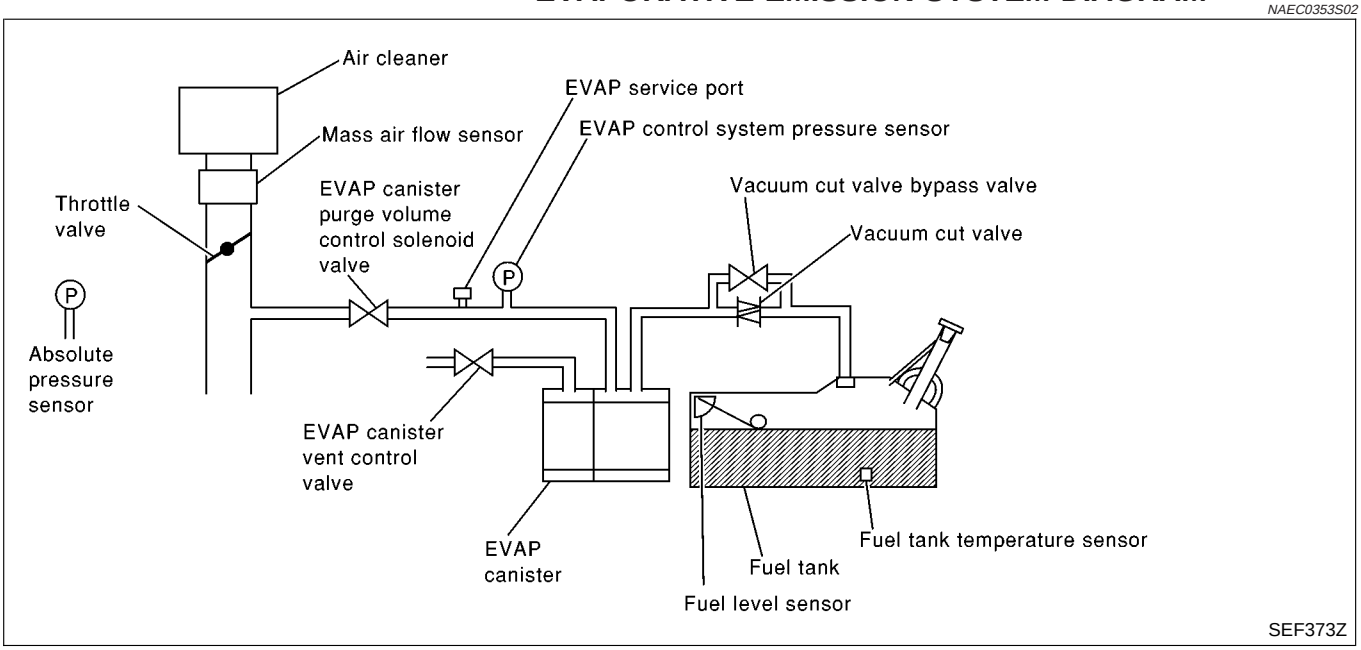
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM

NAEC0353S02



CONSULT-II Reference Value in Data Monitor Mode

NAEC0354

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NAEC0682

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
39	G/W	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC0356

Malfunction is detected when vacuum cut valve bypass valve does not operate properly.

Possible Cause

NAEC0593

- Vacuum cut valve bypass valve
- Vacuum cut valve
- Bypass hoses for clogging
- EVAP control system pressure sensor and circuit
- EVAP canister vent control valve
- Hose between fuel tank and vacuum cut valve clogged
- Hose between vacuum cut valve and EVAP canister clogged
- EVAP canister
- EVAP purge port of fuel tank for clogging

DTC Confirmation Procedure

NAEC0357

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

For best results, perform test at a temperature of 5 to 30°C (41 to 86°F).

WITH CONSULT-II

NAEC0357S01

1) Turn ignition switch "ON".
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch "OFF" and wait at least 10 seconds.
4) Start engine and let it idle for at least 70 seconds.
5) Select "VC CUT/V BP/V P1491" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
6) Touch "START".
7) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 30 seconds.)

ENG SPEED	1,000 - 3,000 rpm
Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	1.3 - 10 msec

If "TESTING" is not displayed after 5 minutes, retry from step 3.

8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic

7

VC CUT/V BP/V P1491	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF210Y

7

VC CUT/V BP/V P1491	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

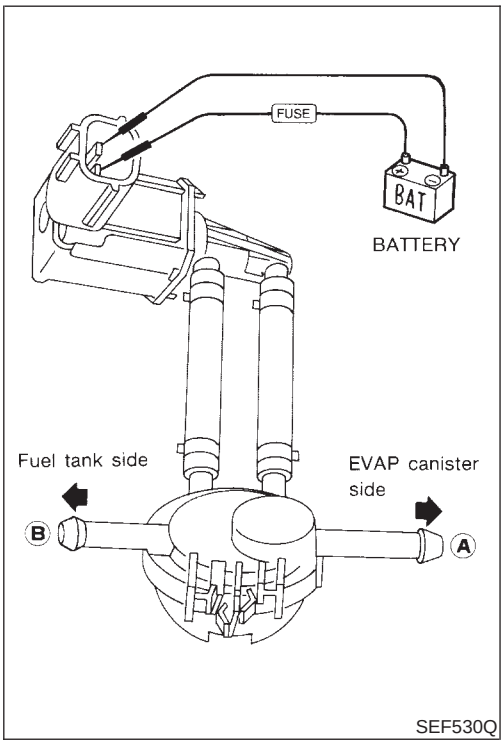
SEF211Y

7

VC CUT/V BP/V P1491
COMPLETED

SEF239Y

Procedure", EC-590.



Overall Function Check

NAEC0358

Use this procedure to check the overall function of vacuum cut valve bypass valve. During this check, the 1st trip DTC might not be confirmed.

WITH GST

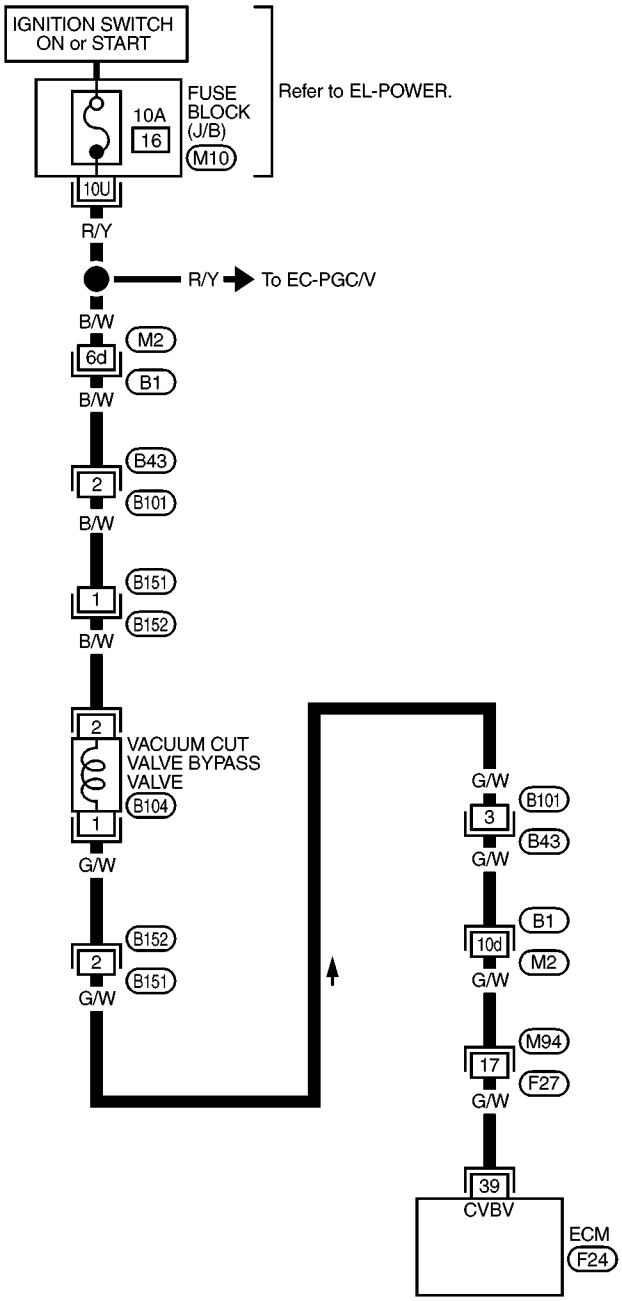
NAEC0358S01

1) Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
2) Apply vacuum to port **A** and check that there is no suction from port **B**.
3) Apply vacuum to port **B** and check that there is suction from port **A**.
4) Blow air in port **B** and check that there is a resistance to flow out of port **A**.
5) Supply battery voltage to the terminal.
6) Blow air in port **A** and check that air flows freely out of port **B**.
7) Blow air in port **B** and check that air flows freely out of port **A**.
8) If NG, go to "Diagnostic Procedure", EC-590.

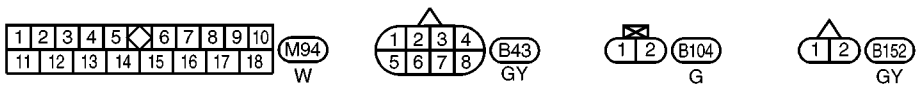
Wiring Diagram

NAEC0359

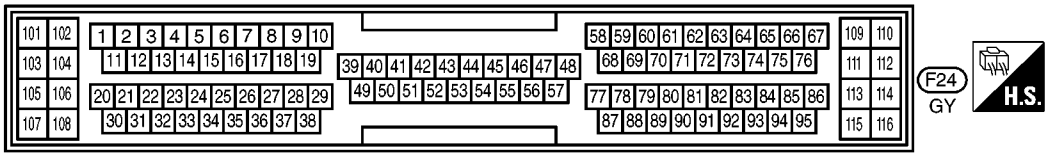
EC-BYPS/V-01



: Detectable line for DTC
: Non-detectable line for DTC



REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK-JUNCTION BOX (J/B)



MEC972C

Diagnostic Procedure

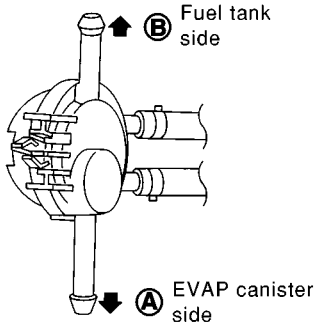
NAEC0360

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

With CONSULT-II

1. Turn ignition switch “OFF”.
2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
3. Apply vacuum to port A and check that there is no suction from port B.
4. Apply vacuum to port B and check that there is suction from port A.
5. Blow air in port B and check that there is a resistance to flow out of port A.
6. Turn ignition switch “ON”.
7. Select “VC/V BYPASS/V” in “ACTIVE TEST” mode with CONSULT-II and touch “ON”.
8. Blow air in port A and check that air flows freely out of port B.
9. Blow air in port B and check that air flows freely out of port A.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

SEF017Z

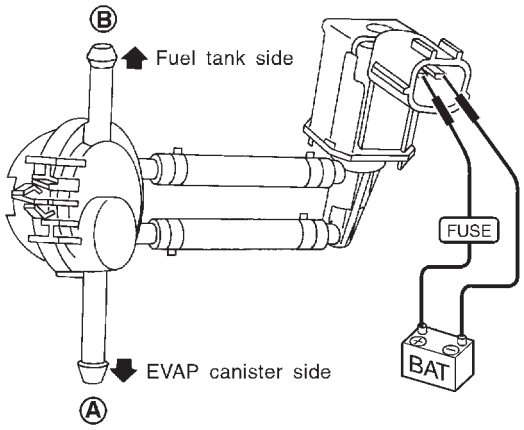
OK or NG

OK ▶	GO TO 4.
NG ▶	GO TO 5.

3	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

Without CONSULT-II

1. Turn ignition switch "OFF".
2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
3. Apply vacuum to port A and check that there is no suction from port B.
4. Apply vacuum to port B and check that there is suction from port A.
5. Blow air in port B and check that there is a resistance to flow out of port A.
6. Disconnect vacuum cut valve bypass valve harness connector.
7. Supply battery voltage to the terminal.
8. Blow air in port A and check that air flows freely out of port B.
9. Blow air in port B and check that air flows freely out of port A.



SEF914U

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 7.

4	CHECK EVAP PURGE LINE

Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair it.

5	CHECK EVAP PURGE PORT

Check EVAP purge port of fuel tank for clogging.

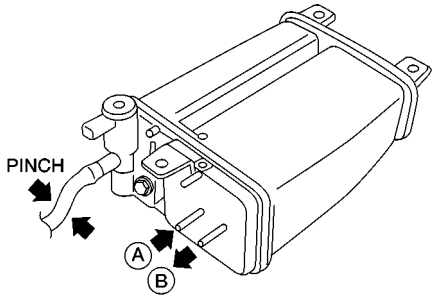
OK or NG

OK	▶	GO TO 6.
NG	▶	Clean EVAP purge port.

Diagnostic Procedure (Cont'd)

6	CHECK EVAP CANISTER

1. Pinch the fresh air hose.
2. Blow air into port **A** and check that it flows freely out of port **B**.



AEC630A

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister.

7	CHECK BYPASS HOSE

Check bypass hoses for clogging.

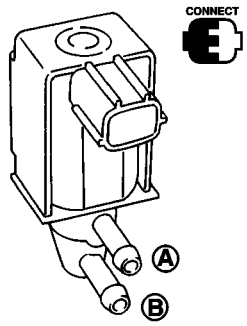
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace hoses.

8	CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

1. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

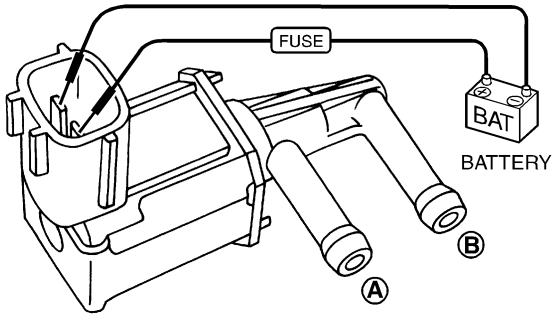
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF016Z

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

Operation takes less than 1 second.

SEF358X

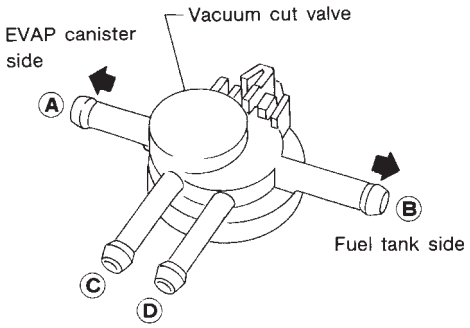
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace vacuum cut valve bypass valve.

Diagnostic Procedure (Cont'd)

9	CHECK VACUUM CUT VALVE

Check vacuum cut valve as follows:



SEF379Q

a. Plug port **C** and **D** with fingers.
b. Apply vacuum to port **A** and check that there is no suction from port **B**.
c. Apply vacuum to port **B** and check that there is suction from port **A**.
d. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
e. Open port **C** and **D**.
f. Blow air in port **A** check that air flows freely out of port **C**.
g. Blow air in port **B** check that air flows freely out of port **D**.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace vacuum cut valve.

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

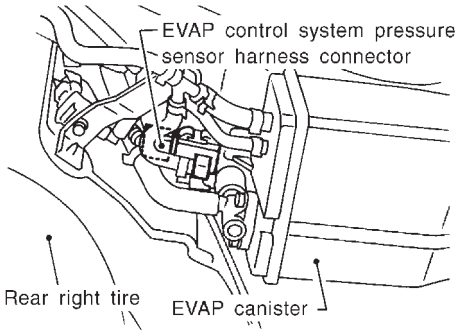
1. Turn ignition switch "OFF".
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace.

11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



SEF495R

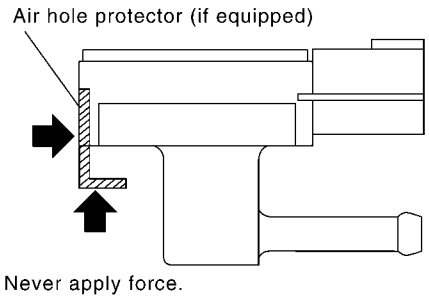
2. Check connectors for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

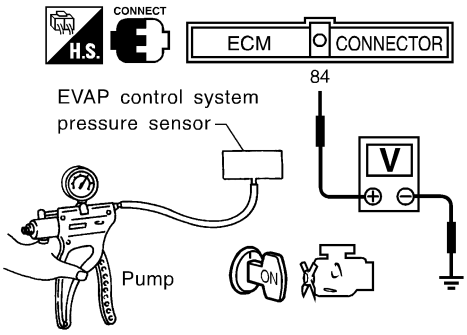
12	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   CAUTION:
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
   CAUTION:
   - **Always calibrate the vacuum pump gauge when using it.**
   - **Do not apply below −20 kPa (−150 mmHg, −5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**
5. Check input voltage between ECM terminal 84 and ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
−9.3 kPa (−70 mmHg, −2.76 inHg)	0.4 - 0.6

SEF342X

CAUTION:
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP control system pressure sensor.

13	CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

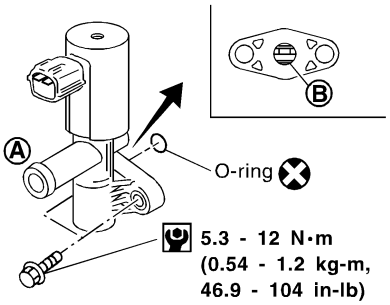
OK or NG

OK	▶	GO TO 14.
NG	▶	Clean the rubber tube using an air blower.

Diagnostic Procedure (Cont'd)

14	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF337X

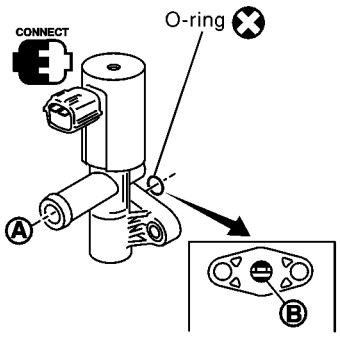
OK or NG

OK	▶	GO TO 15.
NG	▶	Replace EVAP canister vent control valve.

15	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness disconnected connectors.
2. Turn ignition switch ON.
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

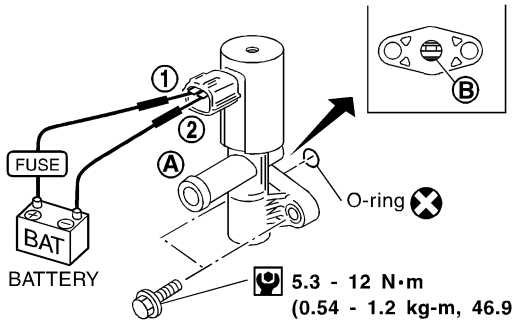
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF991Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

SEF339X

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 17.
NG	▶	GO TO 16.

16	CHECK EVAP CANISTER VENT CONTROL VALVE-III	
1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower. 2. Perform the Test No. 15 again.		
OK or NG		
OK	▶	GO TO 17.
NG	▶	Replace EVAP canister vent control valve.

17	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**

Component Description

NAEC0361

The malfunction information related to A/T (Automatic Transmission) is transferred through the line (circuit) from TCM (Transmission control module) to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM (Transmission control module) but also ECM after the A/T related repair.

On Board Diagnosis Logic

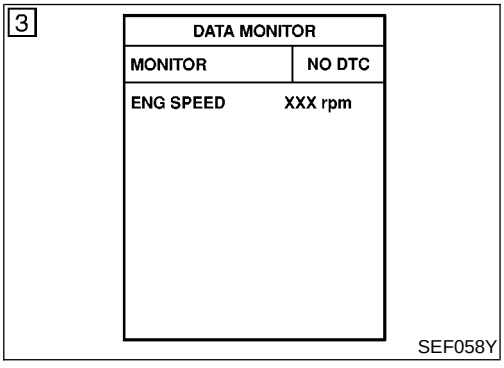
NAEC0363

Malfunction is detected when an incorrect signal from TCM (Transmission control module) is sent to ECM.

Possible Cause

NAEC0594

- Harness or connectors
  [The communication line circuit between ECM and TCM (Transmission control module) is open or shorted.]
- Dead (Weak) battery
- TCM (Transmission control module)



DTC Confirmation Procedure

NAEC0364

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

WITH CONSULT-II

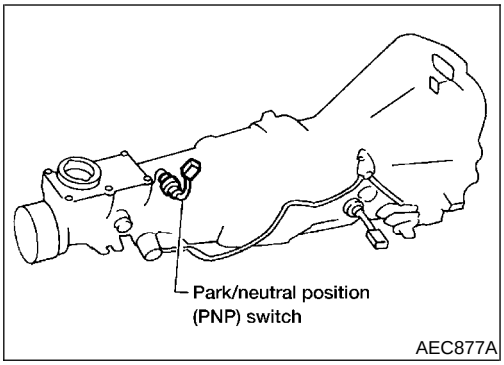
NAEC0364S01

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and wait at least 40 seconds.
4) If 1st trip DTC is detected, go to “DTC P0600 A/T COMMUNICATION LINE Diagnostic Procedure”, EC-438.

WITH GST

NAEC0364S02

Follow the procedure “WITH CONSULT-II” above.



Component Description

NAEC0367

When the gear position is “P” (A/T models only) or “N”, park/neutral position (PNP) switch is “ON”.
ECM detects the position because the continuity of the line (the “ON” signal) exists.
For A/T models, the park/neutral position (PNP) switch assembly also includes a transmission range switch to detect selector lever position.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0368

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	• Ignition switch: ON	Shift lever: “P” or “N”	ON
		Except above	OFF

ECM Terminals and Reference Value

NAEC0683

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
44	L (A/T)	PNP switch	**[Ignition switch “ON”]** • Gear position is “P” or “N” (A/T models).	Approximately 0V
			[Ignition switch “ON”] • Except the above gear position	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NAEC0370

Malfunction is detected when the signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.

Possible Cause

NAEC0595

- Harness or connectors
  [The park/neutral position (PNP) switch circuit is open or shorted.]
- Park/neutral position (PNP) switch

DTC Confirmation Procedure

NAEC0371

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 10 seconds before conducting the next test.

2

DATA MONITOR	
MONITOR	NO DTC
P/N POSI SW	ON

SEF212Y

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
P/N POSI SW	OFF
B/FUEL SCHDL	XXX msec

SEF213Y

WITH CONSULT-II

NAEC0371S01

1) Turn ignition switch “ON”.
2) Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II. Then check the “P/N POSI SW” signal under the following conditions.

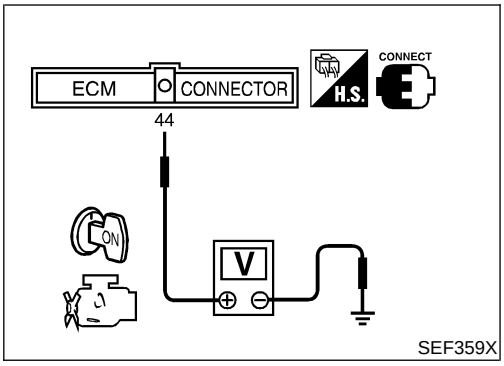
Position (Selector lever)	Known-good signal
“N” and “P” position	ON
Except the above position	OFF

If NG, go to “Diagnostic Procedure”, EC-603.
If OK, go to following step.

3) Select “DATA MONITOR” mode with CONSULT-II.
4) Start engine and warm it up to normal operating temperature.
5) Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,500 - 2,500 rpm (A/T) 1,800 - 2,800 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.7 - 12 msec
VHCL SPEED SE	70 - 100 km/h (43 - 62 MPH)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-603.



Overall Function Check

=NAEC0372

Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

NAEC0372S01

1) Turn ignition switch “ON”.
2) Check voltage between ECM terminal 44 and body ground under the following conditions.

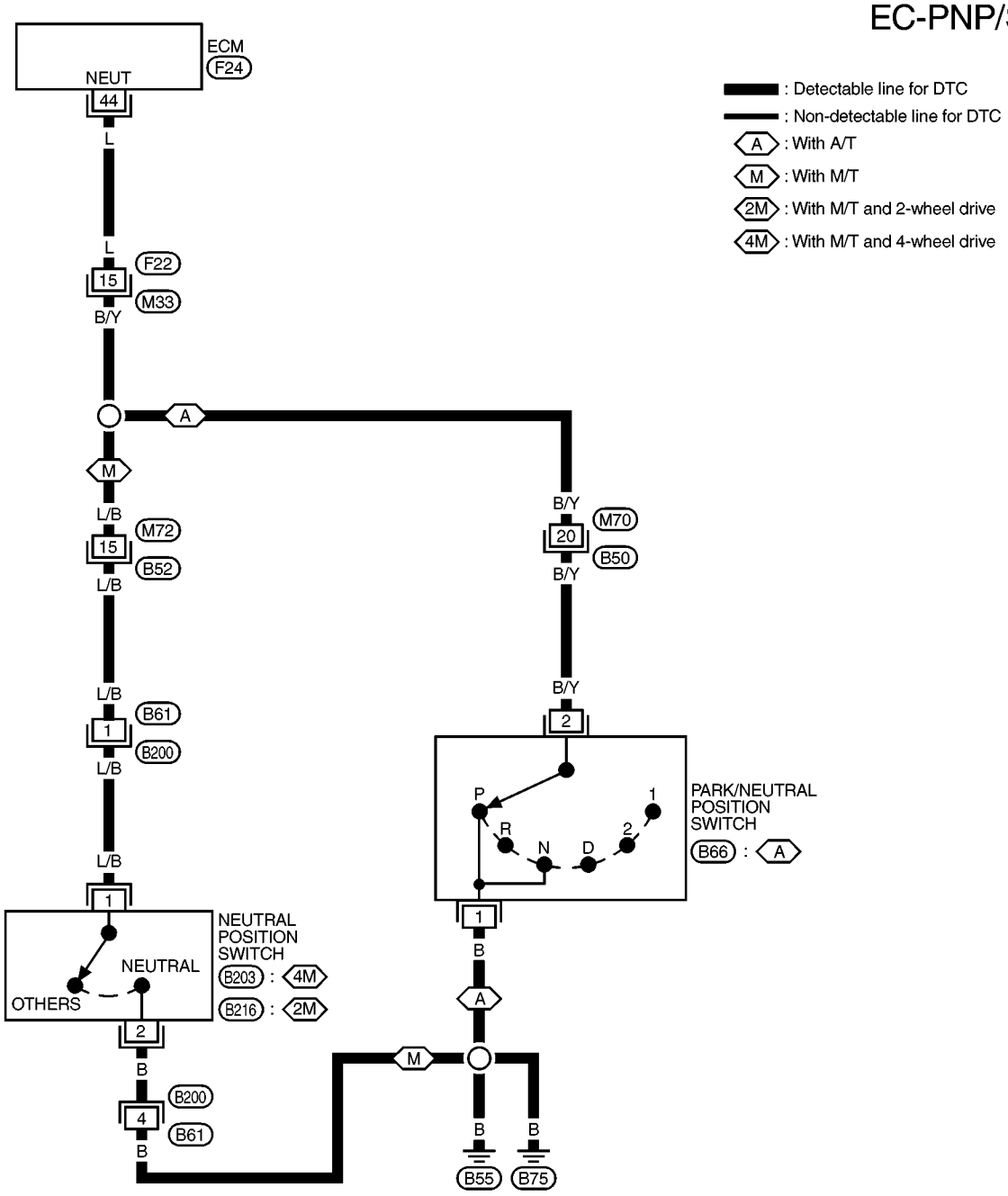
Condition (Gear position)	Voltage V (Known-good data)
“P” and “N” position	Approx. 0
Except the above position	Battery voltage

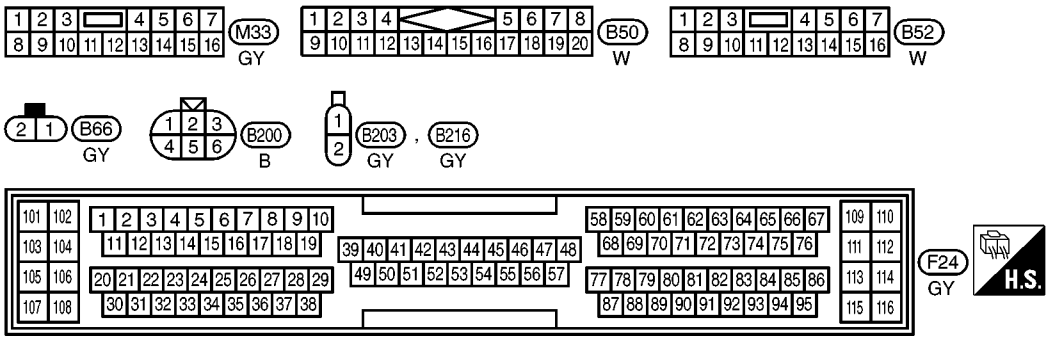
3) If NG, go to “Diagnostic Procedure”, EC-603.

Wiring Diagram

NAEC0373

EC-PNP/SW-01





MEC019D

Diagnostic Procedure

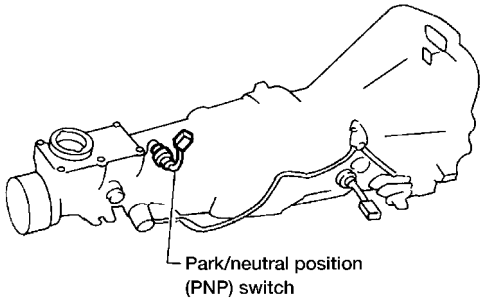
NAEC0374

FOR M/T MODELS

NAEC0374S03

1	CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Disconnect park/neutral position (PNP) switch harness connector.



AEC877A

3. Check harness continuity between PNP switch terminal 2 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

2	CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 44 and PNP switch terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH

Refer to MT-6, MT-7, “Position Switch Check”.

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace park/neutral position (PNP) switch.

4	CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-135.

▶ **INSPECTION END**

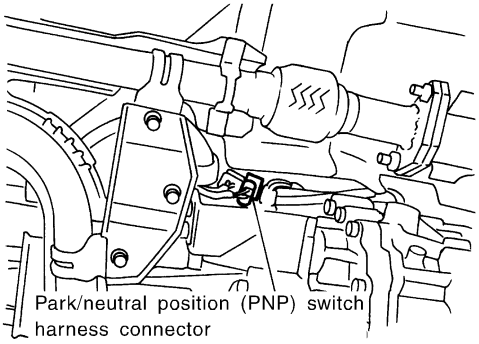
Diagnostic Procedure (Cont'd)

FOR A/T MODELS

=NAEC0374S02

1	CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect park/neutral position (PNP) switch harness connector.



SEF011SA

3. Check harness continuity between PNP switch terminal 1 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check harness for open or short between park/neutral position (PNP) switch and engine ground.

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 44 and PNP switch terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F22, M33 and M70, B50
- Harness for open or short between ECM and park/neutral position (PNP) switch

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH

Refer to AT-102, "Diagnostic Procedure".

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace park/neutral position (PNP) switch.

6	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**

Description

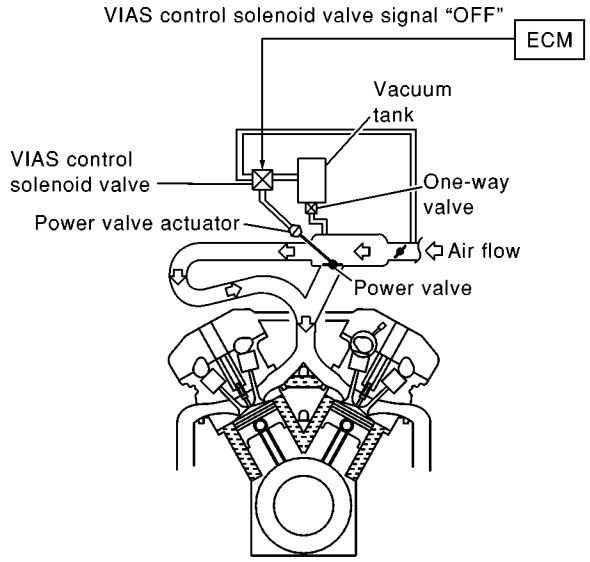
NAEC0596

SYSTEM DESCRIPTION

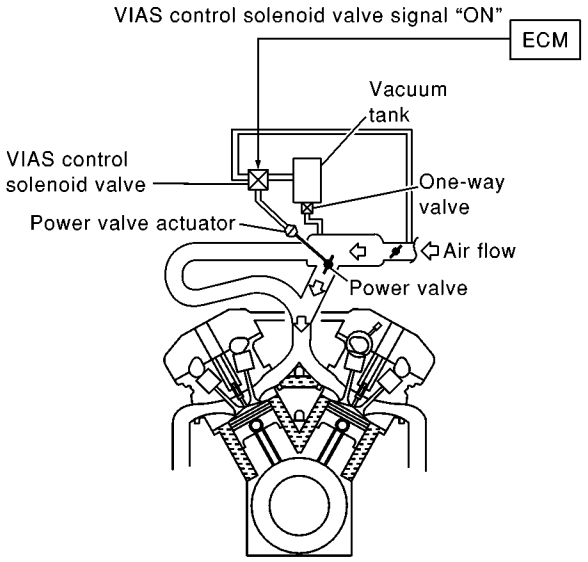
NAEC0596S01

Sensor	Input Signal to ECM	ECM function	Actuator
Mass air flow sensor	Amount of intake air	VIAS control	VIAS control solenoid valve
Throttle position sensor	Throttle position		
Closed throttle position	Throttle valve idle position		
Ignition switch	Start signal		
Crankshaft position sensor (POS)	Engine speed (POS signal)		
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Engine coolant temperature sensor	Engine coolant temperature		

When VIAS control signal is “OFF”.



When VIAS control signal is “ON”.

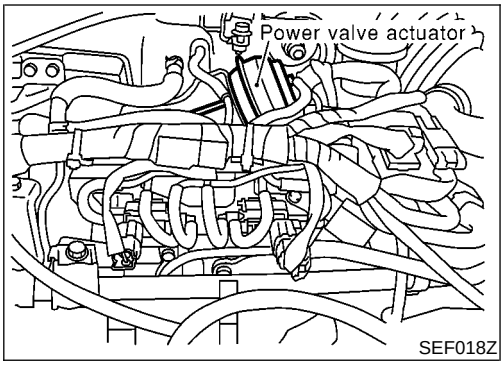


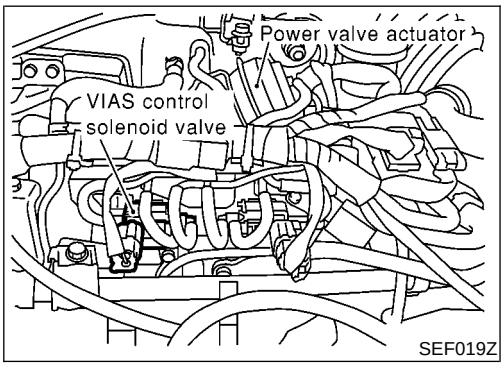
SEF447Z

When the engine is running at low or medium speed, the power valve is fully closed. Under this condition, the effective suction port length is equivalent to the total length of the intake manifold collector’s suction port including the intake valve. This long suction port provides increased air intake which results in improved suction efficiency and higher torque generation.

The surge tank and one-way valve are provided. When engine is running at high speed, the ECM sends the signal to the VIAS control solenoid valve. This signal introduces the intake manifold vacuum into the power valve actuator and therefore opens the power valve to two suction passages together in the collector.

Under this condition, the effective port length is equivalent to the length of the suction port provided independently for each cylinder. This shortened port length results in enhanced engine output with reduced suction resistance under high speeds.





COMPONENT DESCRIPTION

NAEC0596S02

Power Valve

NAEC0596S0201

The power valve is installed in intake manifold collector and used to control the suction passage of the variable induction air control system. It is set in the fully closed or fully opened position by the power valve actuator operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the VIAS control solenoid valve.

VIAS Control Solenoid Valve

NAEC0596S0202

The VIAS control solenoid valve cuts the intake manifold vacuum signal for power valve control. It responds to ON/OFF signals from the ECM. When the solenoid is off, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.

ECM Terminals and Reference Value

NAEC0684

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

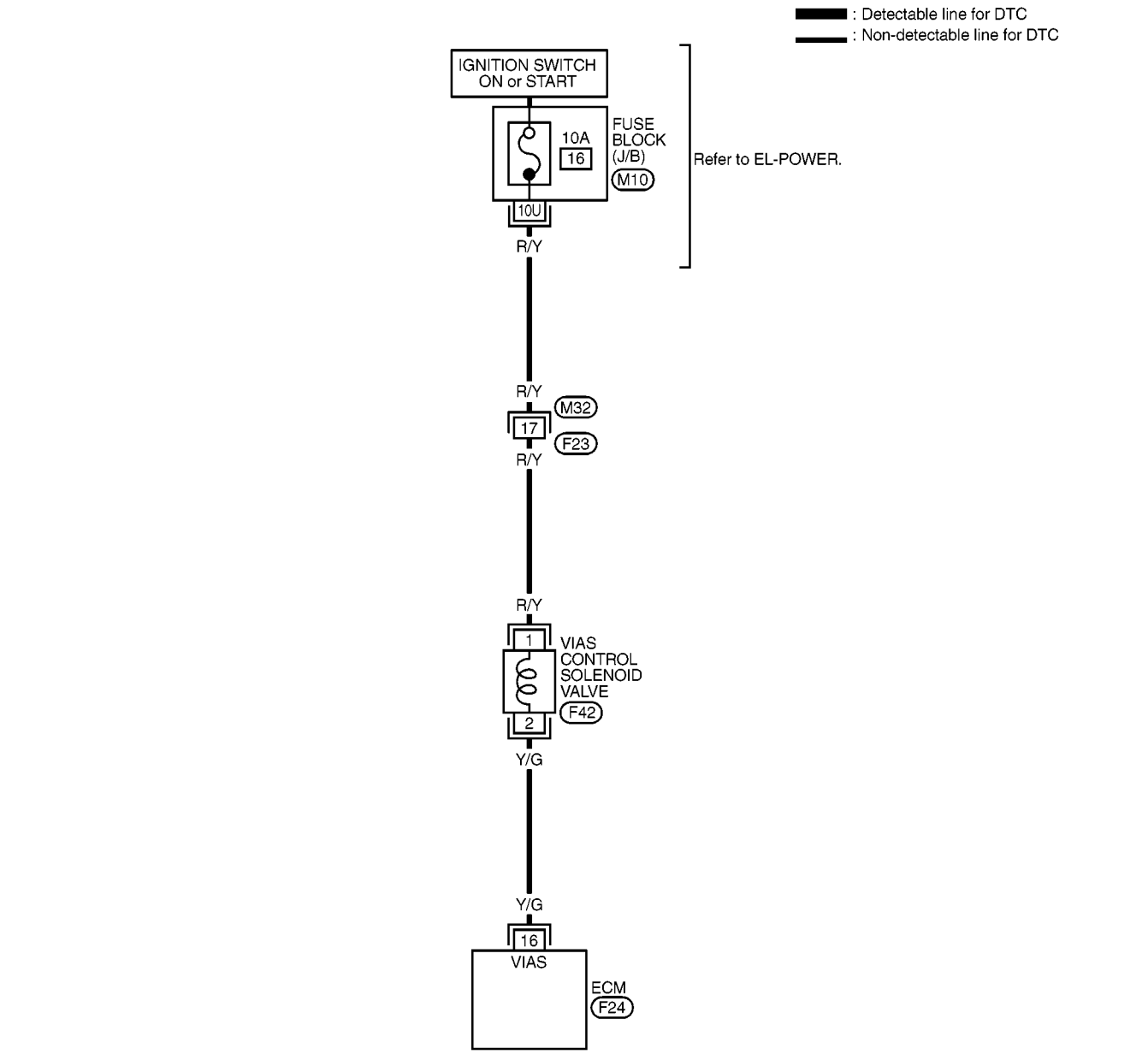
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

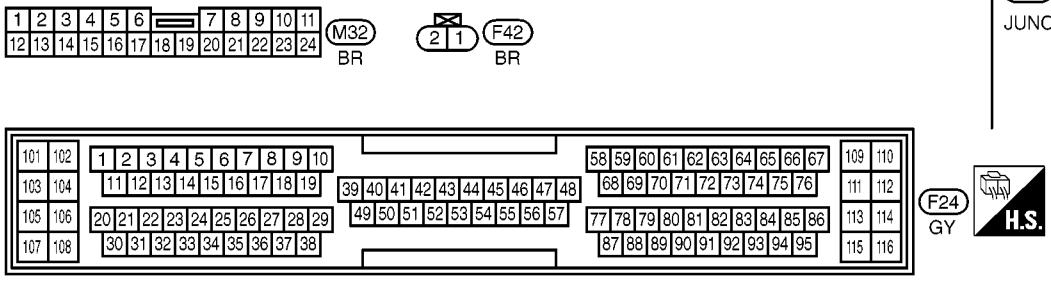
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	Y/G	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm.	0 - 1.0V

Wiring Diagram

NAEC0597

EC-VIAS/V-01





REFER TO THE FOLLOWING.
M10 - FUSE BLOCK - JUNCTION BOX (J/B)

MEC990C

Diagnostic Procedure

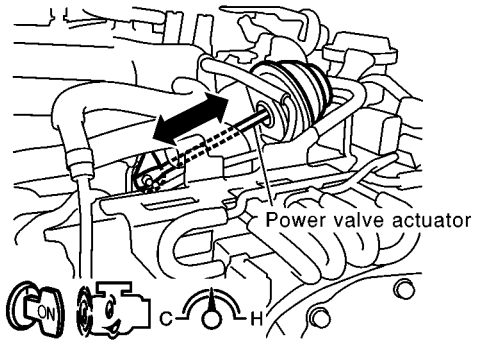
NAEC0598

1 CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.
3. Turn VIAS control solenoid valve “ON” and “OFF”, and make sure that power valve actuator rod moves.

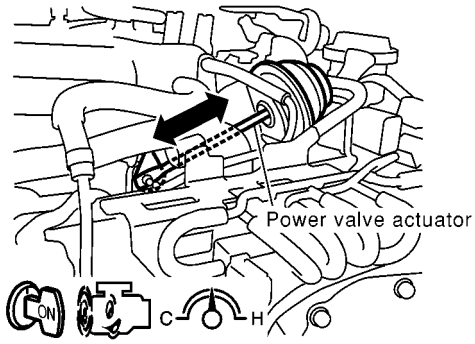
ACTIVE TEST	
VIAS SOLENOID/V	OFF
MONITOR	
ENG SPEED	XXX rpm
IACV-AAC/V	XXX step



SEF020Z

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Rev engine quickly up to above 5,000 rpm and make sure that power valve actuator rod moves.



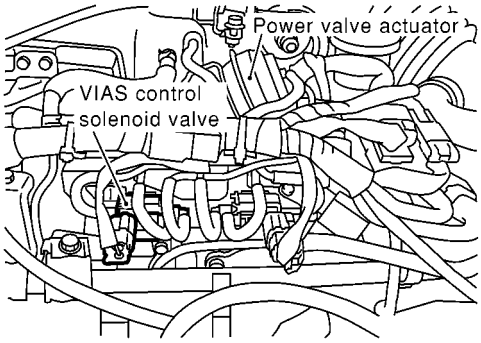
SEF021Z

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

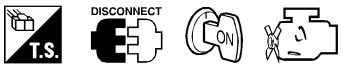
2	CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

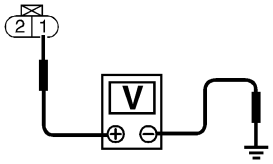
1. Stop engine.
2. Disconnect VIAS control solenoid valve harness connector.



SEF019Z

3. Turn ignition switch "ON".
4. Check voltage between terminal 1 and ground with CONSULT-II or tester.





Voltage: Battery voltage

SEF603X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M32, F23
- 10A fuse
- Harness continuity between fuse and VIAS control solenoid valve

	▶	Repair harness or connectors.

4	CHECK VIAS CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

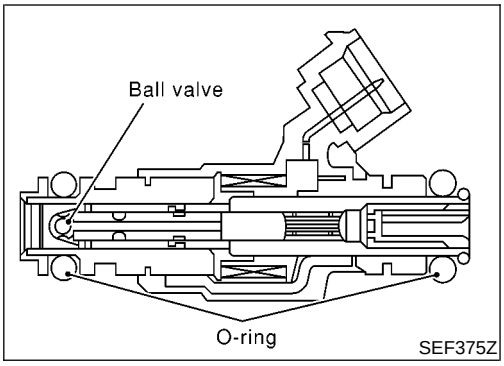
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 16 and terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	RETEST OVERALL FUNCTION	
1. Reconnect harness connectors disconnected. 2. Perform Test No. 1 again. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	GO TO 6.

6	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135. **OK or NG**		
OK	▶	Replace VIAS control solenoid valve as intake manifold collector assembly.
NG	▶	Repair or replace harness or connectors.



Component Description

NAEC0383

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0384

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INJ PULSE-B2 INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 2.8 msec
B/FUEL SCHDL	ditto	Idle	2.0 - 3.2 msec
		2,000 rpm	1.4 - 2.6 msec

ECM Terminals and Reference Value

NAEC0685

Specification data are reference values and are measured between each terminal and ground.

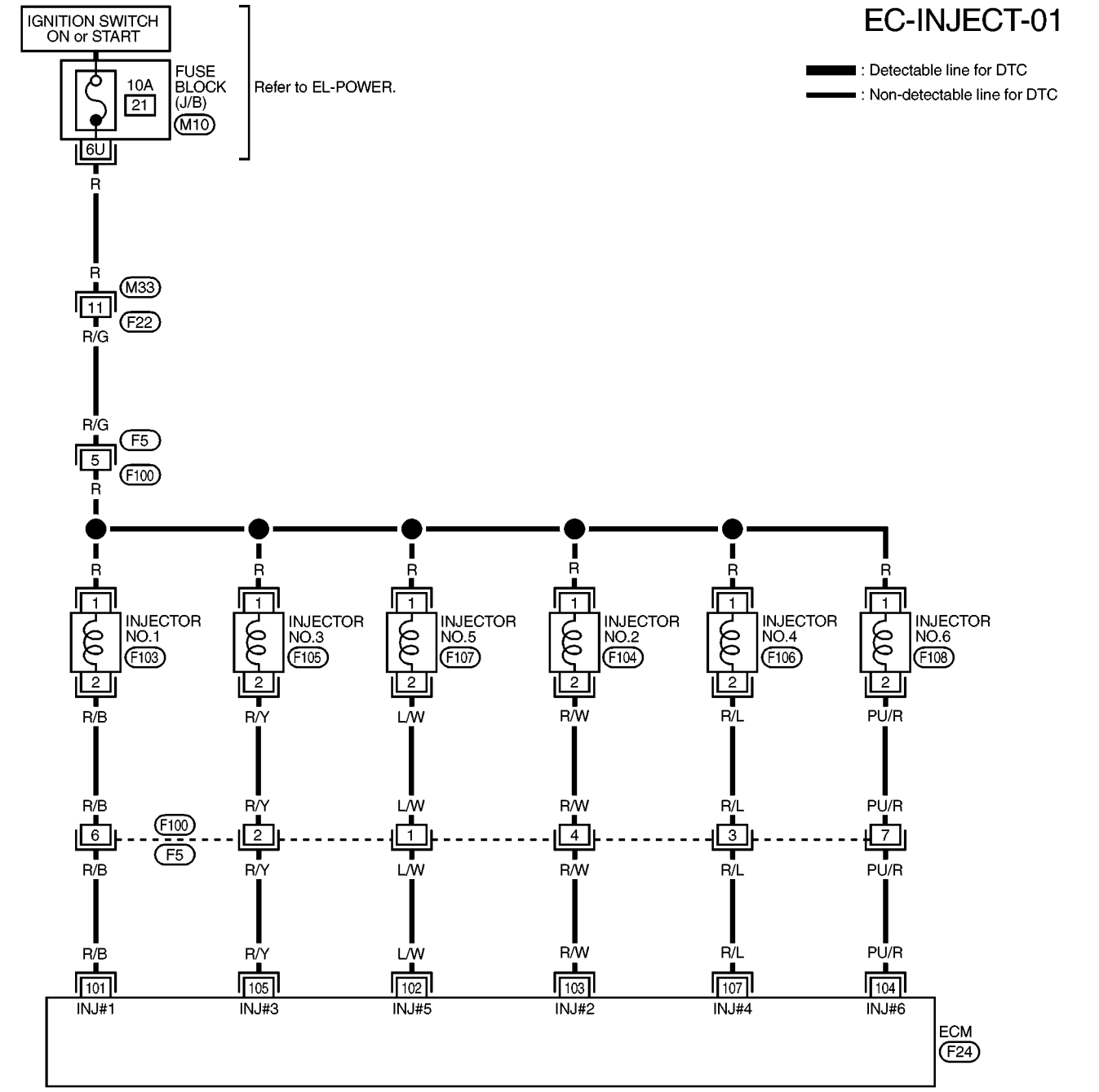
CAUTION:

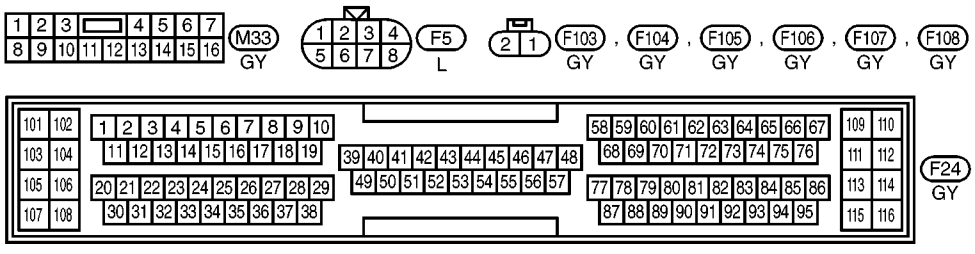
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	R/B	Injector No. 1	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
102	L/W	Injector No. 5		
103	R/W	Injector No. 2		
104	PU/R	Injector No. 6		
105	R/Y	Injector No. 3		
107	R/L	Injector No. 4		

Wiring Diagram

NAEC0386





MEC974C

Diagnostic Procedure

NAEC0387

1	INSPECTION START

Turn ignition switch to “START”.
Is any cylinder ignited?

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION

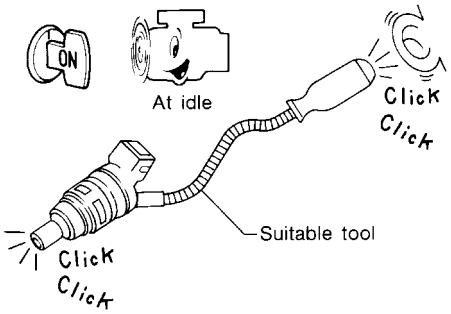
With CONSULT-II
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II
1. Start engine.
2. Listen to each injector operating sound.



MEC703B

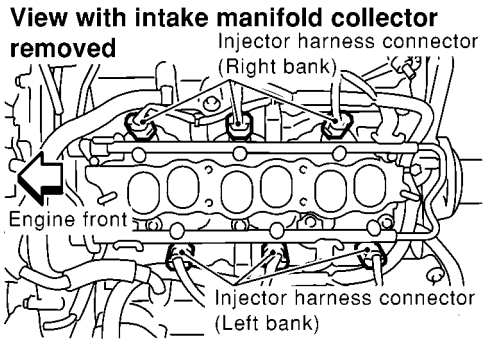
Clicking noise should be heard.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 3.

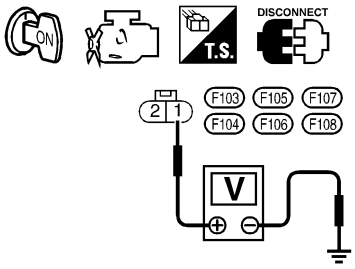
3	CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".



SEF023Z

2. Turn ignition switch "ON".
3. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF364Z

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M33, F22
- Harness connectors F5, F100
- Fuse block (J/B) connector M10
- 10A fuse
- Harness for open or short between injector and fuse

	▶	Repair harness or connectors.

5	CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between injector terminal 2 and ECM terminals 103, 104, 107, 101, 105, 102. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F100, F5 ● Harness for open or short between harness connector F5 and ECM ● Harness for open or short between harness connector F100 and injector	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK SUB-HARNESS CIRCUIT FOR OPEN AND SHORT

1. Remove intake manifold collector.
2. Disconnect injector harness connectors.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

Harness connector F100	Injector F103, F105, F107, F104, F106, F108
5	1
6, 2, 1, 4, 3, 7	2

MTBL0483

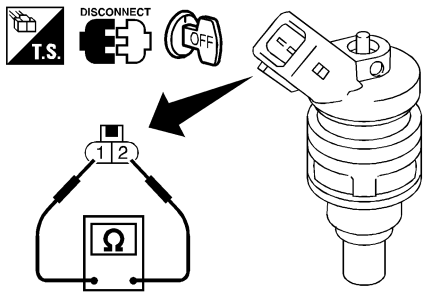
Continuity should exist.

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.



Resistance: 13.5 - 17.5 Ω [at 20°C (68°F)]

SEF964XB

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace injector.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**

CONSULT-II Reference Value in Data Monitor Mode

NAEC0388

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

ECM Terminals and Reference Value

NAEC0688

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

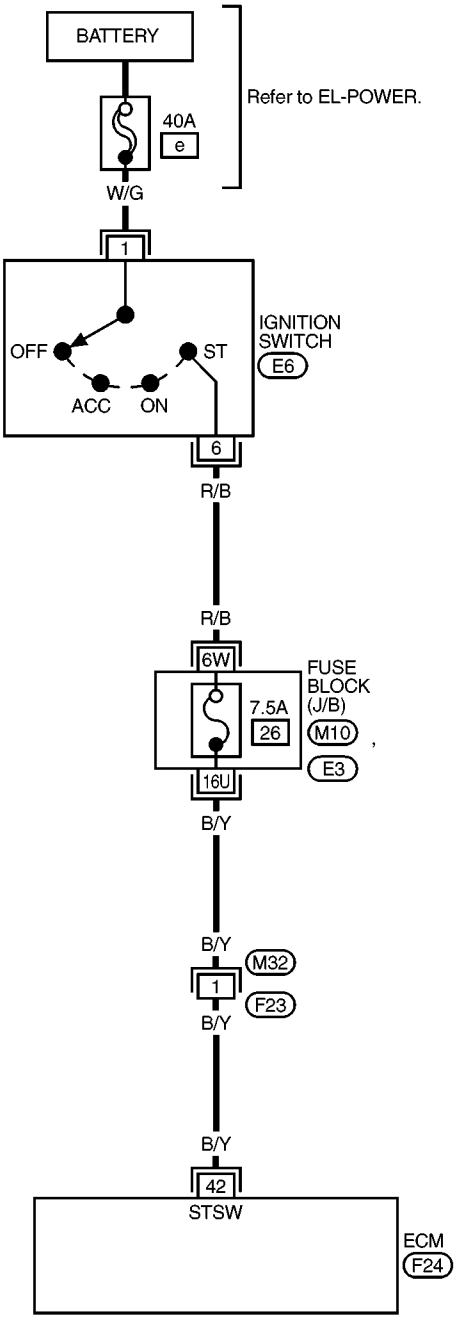
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	B/Y	Start signal	**[Ignition switch "ON"]**	Approximately 0V
			[Ignition switch "START"]	9 - 12V

Wiring Diagram

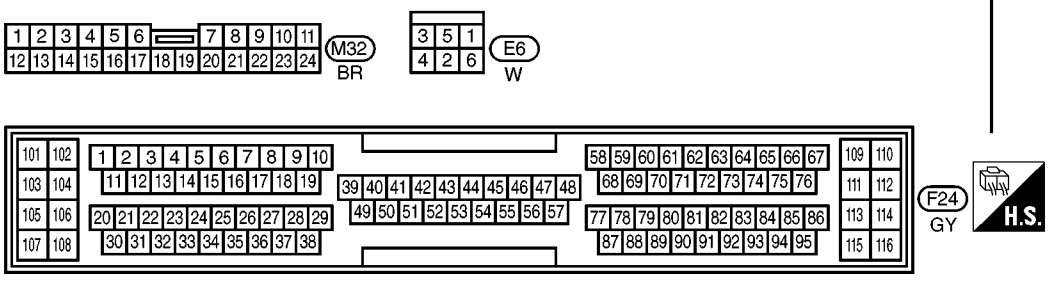
=NAEC0390

EC-S/SIG-01



: Detectable line for DTC
: Non-detectable line for DTC

REFER TO THE FOLLOWING.
M10 , E3 -FUSE BLOCK-JUNCTION BOX (J/B)



MEC975C

Diagnostic Procedure

NAEC0391

1	INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch “ON”.
2. Check “START SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
START SIGNAL	OFF
CLSD THL POS	ON
AIR COND SIG	OFF
P/N POSI SW	ON

Condition	“START SIGNAL”
Ignition switch “ON”	OFF
Ignition switch “START”	ON

SEF072Y

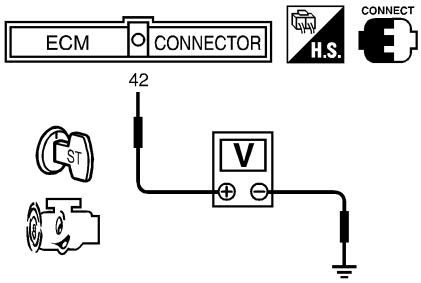
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

3	CHECK OVERALL FUNCTION

Without CONSULT-II

Check voltage between ECM terminal 42 and ground under the following conditions.



Condition	Voltage
Ignition switch “START”	Battery voltage
Other positions	Approximately 0V

SEF362X

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

4	CHECK STARTING SYSTEM

Turn ignition switch “OFF”, then turn it to “START”.

Does starter motor operate?

Yes or No

Yes	▶	GO TO 5.
No	▶	Refer to SC-10, “STARTING SYSTEM”.

Diagnostic Procedure (Cont'd)

5	CHECK FUSE
1. Turn ignition switch "OFF". 2. Disconnect 7.5A fuse. 3. Check if 7.5A fuse is OK.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Replace 7.5A fuse.

6	CHECK START SIGNAL INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Disconnect ignition switch harness connector. 3. Check harness continuity between ECM terminal 42 and fuse block, ignition switch and fuse block. Refer to Wiring Diagram. **Continuity should exist.** 4. Also check harness for short to ground and short to power.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M32, F23 ● Fuse block (J/B) connectors M10, E3 ● Harness for open or short between ignition switch and fuse ● Harness for open or short between ECM and fuse	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**

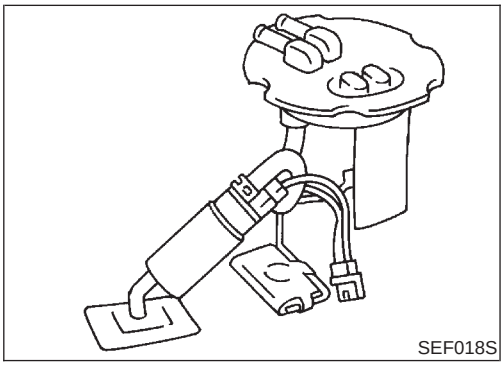
System Description

NAEC0392

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed (POS signal)	Fuel pump control	Fuel pump relay
Crankshaft position sensor (REF)	Engine speed (REF signal)		
Ignition switch	Start signal		

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a 120° signal from the crankshaft position sensor (REF), it knows that the engine is rotating, and causes the pump to operate. If the 120° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.



SEF018S

Component Description

NAEC0393

The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).

CONSULT-II Reference Value in Data Monitor Mode

NAEC0394

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	• Ignition switch is turned to ON. (Operates for 1 second.) • Engine running and cranking	ON
	Except as shown above	OFF

ECM Terminals and Reference Value

=NAEC0686

Specification data are reference values and are measured between each terminal and ground.

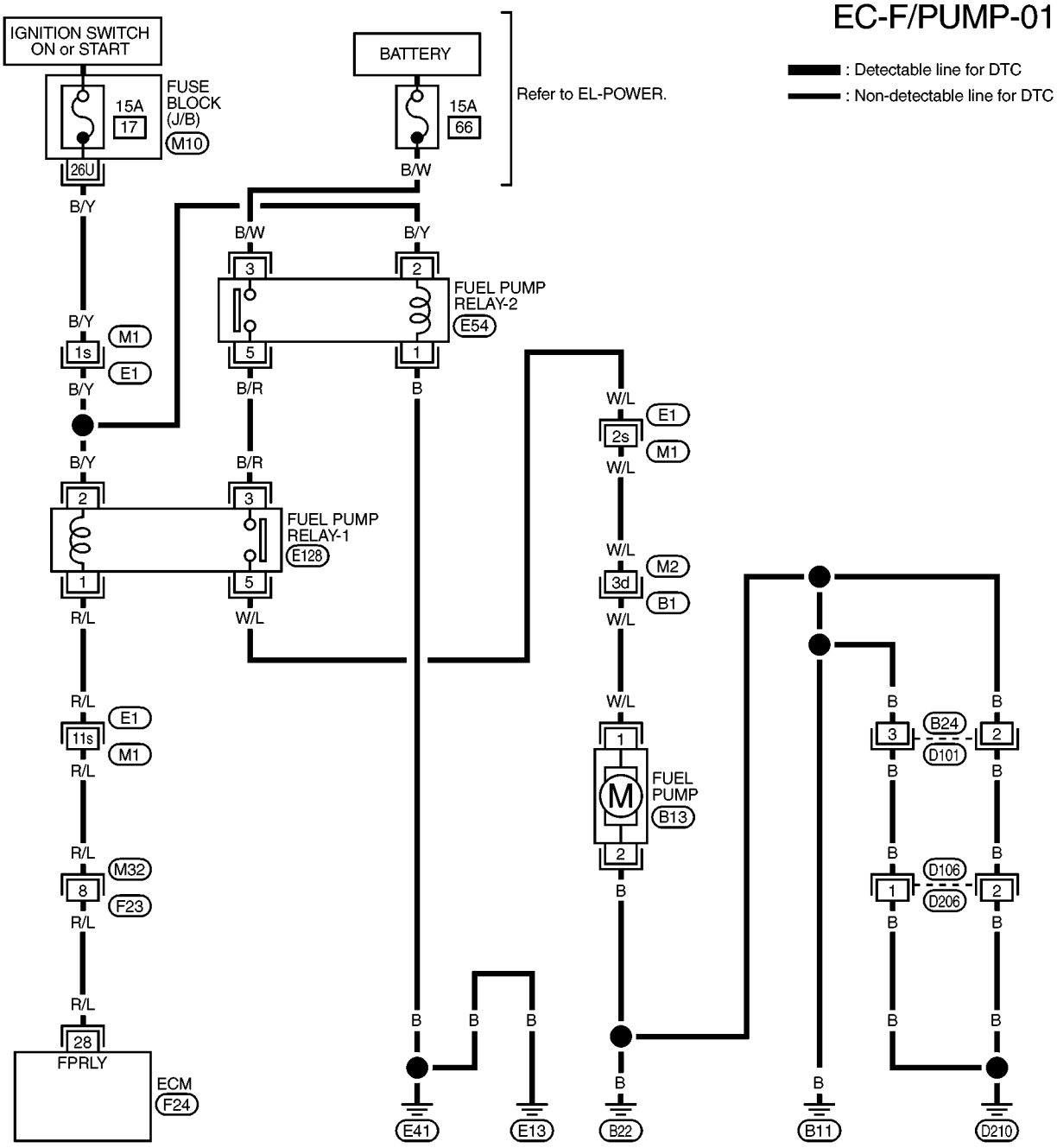
CAUTION:

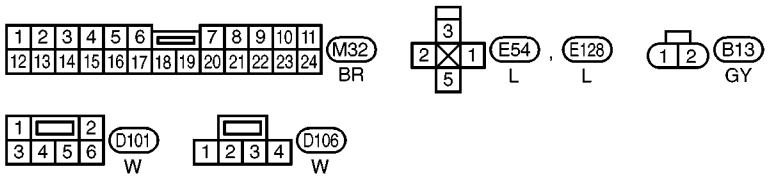
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	R/L	Fuel pump relay	**[Ignition switch "ON"]** ● For 1 second after turning ignition switch "ON" **[Engine is running]**	0 - 1.5V
			[Ignition switch "ON"] ● 1 second passed after turning ignition switch "ON".	BATTERY VOLTAGE (11 - 14V)

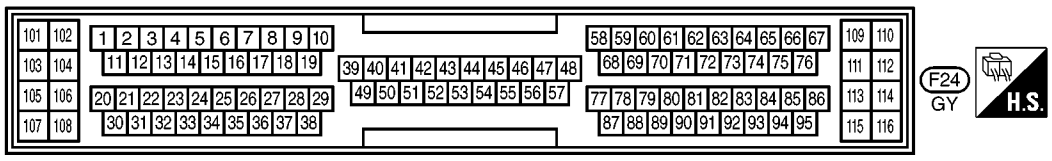
Wiring Diagram

NAEC0396





REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK-JUNCTION BOX (J/B)



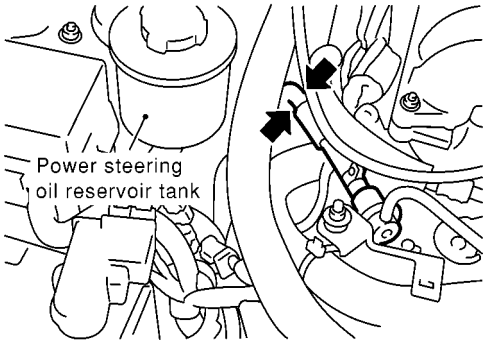
MEC976C

Diagnostic Procedure

NAEC0397

1	CHECK OVERALL FUNCTION

1. Turn ignition switch “ON”.
2. Pinch fuel feed hose with two fingers.



SEF025Z

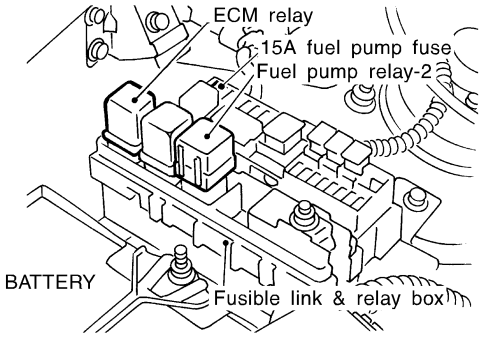
Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned “ON”.

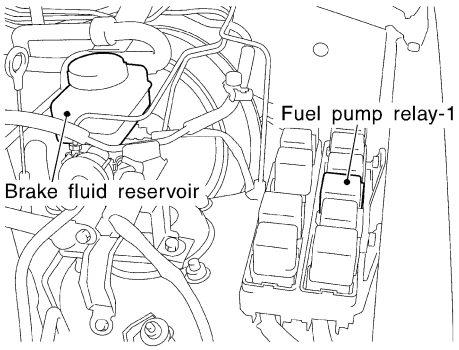
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

2	CHECK FUEL PUMP RELAY-1 and -2 POWER SUPPLY CIRCUIT-I

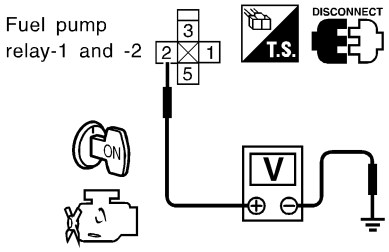
1. Turn ignition switch “OFF”.
2. Disconnect fuel pump relay-1 and -2.





SEF346Z

3. Turn ignition switch “ON”.
4. Check voltage between terminals 2 and ground with CONSULT-II or tester.



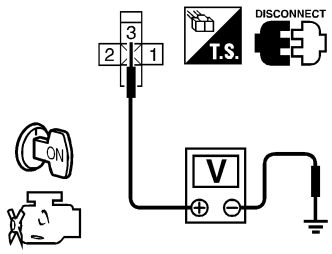
Voltage: Battery voltage

SEF347Z

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. • Fuse block (J/B) connector M10 • 15A fuse in fuse block (J/B) • Harness connectors M1, E1 • Harness for open or short between fuse and fuel pump relay-1 and fuel pump relay-2	
▶	Repair harness or connectors.

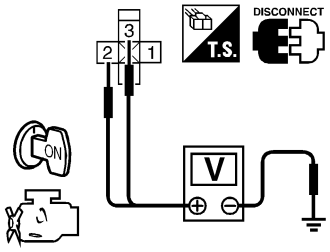
4	CHECK FUEL PUMP RELAY-1 POWER SUPPLY CIRCUIT-II
Check voltage between terminal 3 and ground with CONSULT-II or tester.  **Voltage: Battery voltage** SEF348Z **OK or NG**	
OK ▶	GO TO 8.
NG ▶	GO TO 5.

5	CHECK FUEL PUMP RELAY-2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect fuel pump relay-2. 2. Check harness continuity between fuel pump relay-2 terminal 5 and fuel pump relay-1 terminal 3. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power. **OK or NG**	
OK ▶	GO TO 6.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

6	CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT-III

1. Turn ignition switch "OFF".
2. Disconnect fuel pump relay-2.
3. Turn ignition switch "ON".
4. Check voltage between terminals 2, 3 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF026Z

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

Check the following.
- 15A fuse in fusible link and relay box
- Harness for open or short between fuse and fuel pump relay-2

	▶	Repair harness or connectors.

8	CHECK FUEL PUMP RELAY-2 GROUND CIRCUIT FOR OPEN AND SHORT

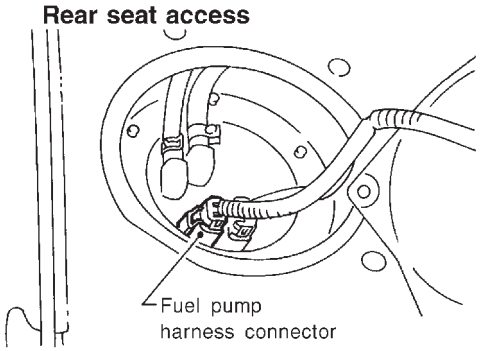
1. Check harness continuity between fuel pump relay-2 terminal 1 and ground.
   Continuity should exist.
2. Also check harness for short to power.

OK or NG

	▶	Repair open circuit or short to power in harness or connector.

9	CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect fuel level sensor unit and fuel pump harness connector.



SEF021S

3. Check harness continuity between fuel pump terminal 2 and body ground, fuel pump terminal 1 and fuel pump relay terminal 5. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

10	DETECT MALFUNCTIONING PART

Check harness for open or short between fuel pump relay and fuel pump.

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

11	CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 28 and fuel pump relay-1 terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 13.
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M32, F23
- Harness for open or short between ECM and fuel pump relay-1

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

13	CHECK FUEL PUMP RELAY-1 AND -2

With CONSULT-II

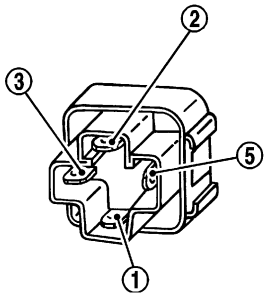
1. Reconnect fuel pump relay-1 and -2, fuel level sensor unit and fuel pump harness connector and ECM harness connector.
2. Turn ignition switch "ON".
3. Turn fuel pump relay-1, -2 "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.

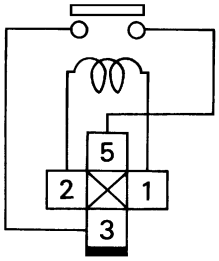
ACTIVE TEST	
FUEL PUMP RELAY	ON
MONITOR	
ENG SPEED	XXX rpm

SEF073Y

Without CONSULT-II

Check continuity between terminals 3 and 5 under the following conditions.





Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

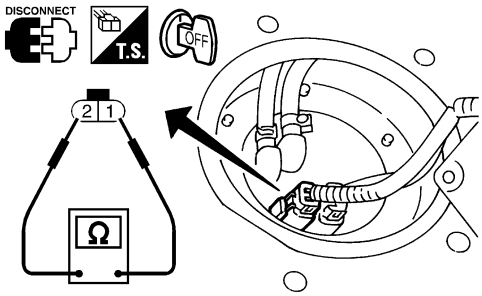
SEF608X

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace fuel pump relay.

14	CHECK FUEL PUMP

1. Disconnect fuel level sensor unit and fuel pump harness connector.
2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 2.



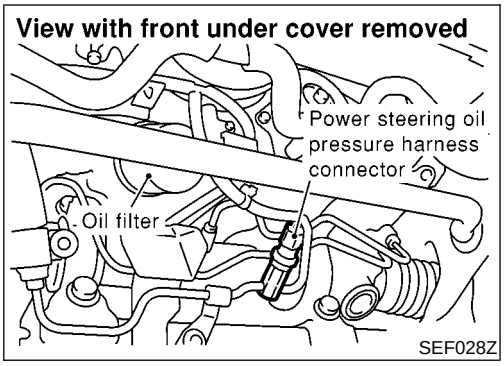
Resistance: 0.2 - 5.0 Ω [at 25°C (77°F)]

SEF027Z

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace fuel pump.

15	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**



Component Description

NAEC0398

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.

CONSULT-II Reference Value in Data Monitor Mode

NAEC0399

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is fully turned.	ON

ECM Terminals and Reference Value

NAEC0687

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

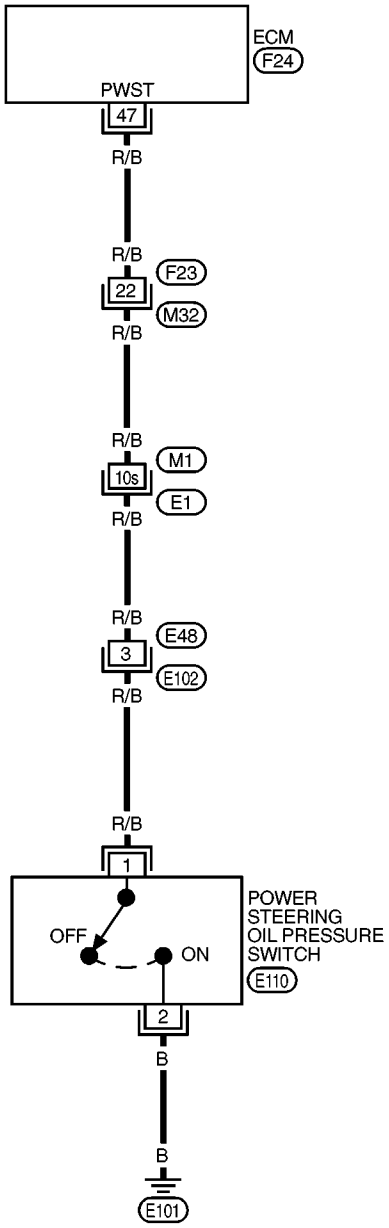
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	R/B	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being turned.	0 - 1.0V
			[Engine is running] ● Steering wheel is not being turned.	Approximately 5V

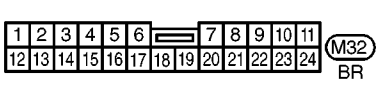
Wiring Diagram

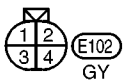
NAEC0401

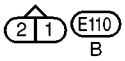
EC-PST/SW-01



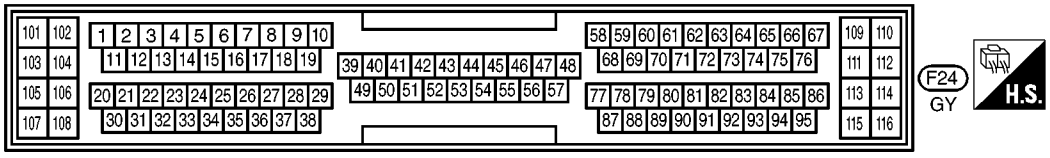
: Detectable line for DTC
: Non-detectable line for DTC







REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)



MEC977C

Diagnostic Procedure

NAEC0402

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Check “PW/ST SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
PW/ST SIGNAL	OFF

Steering is in neutral position	OFF
Steering is turned	ON

SEF228Y

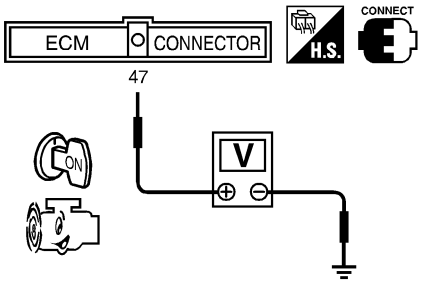
OK or NG

OK ▶	**INSPECTION END**
NG ▶	GO TO 4.

3	CHECK OVERALL FUNCTION

Without CONSULT-II

1. Start engine.
2. Check voltage between ECM terminal 47 and ground under the following conditions.



Conditions	Voltage
Steering is neutral position.	Approximately 5V
Steering is turned to full position.	Approximately 0V

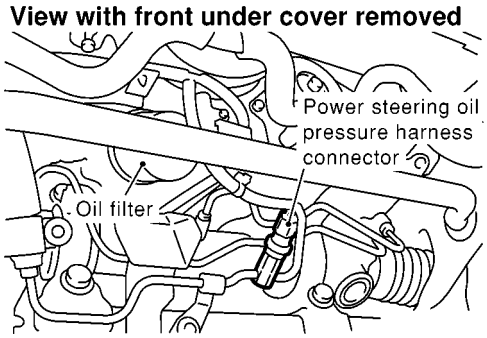
SEF363X

OK or NG

OK ▶	**INSPECTION END**
NG ▶	GO TO 4.

4	CHECK POWER STEERING OIL PRESSURE SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect power steering oil pressure switch harness connector.



SEF028Z

3. Check harness continuity between power steering oil pressure switch terminal 2 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK POWER STEERING OIL PRESSURE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

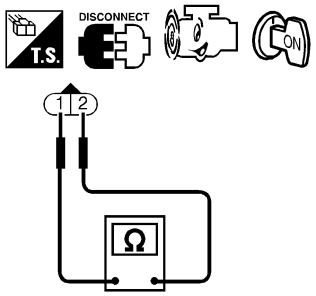
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 47 and power steering oil pressure switch terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK POWER STEERING OIL PRESSURE SWITCH

1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between power steering oil pressure switch terminals 1 and 2 under the following conditions.



Conditions	Continuity
Steering wheel is being fully turned.	Yes
Steering wheel is not being turned.	No

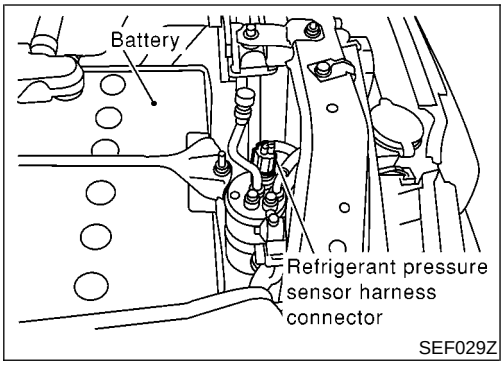
SEF364X

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace power steering oil pressure switch.

Diagnostic Procedure (Cont'd)

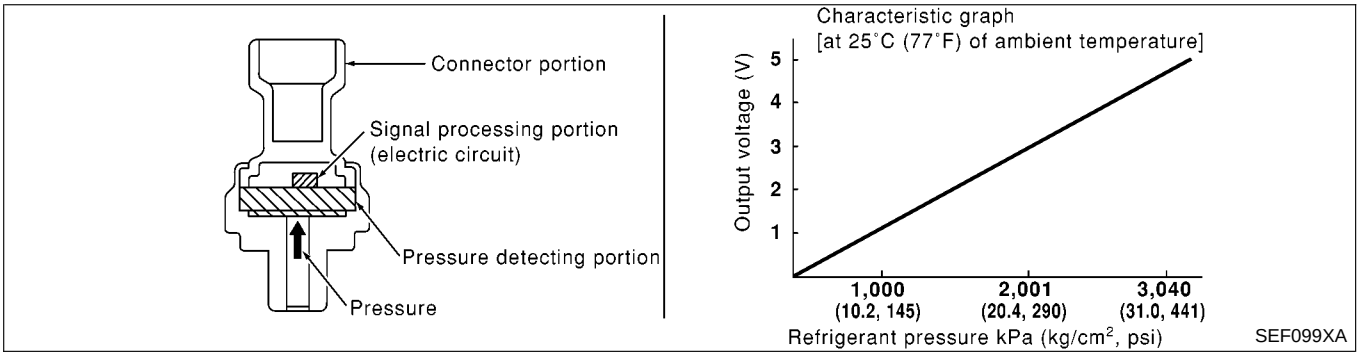
7	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**



Description

NAEC0636

The refrigerant pressure sensor is installed at the liquid tank of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



ECM Terminals and Reference Value

NAEC0689

Specification data are reference values and are measured between each terminal and ground.

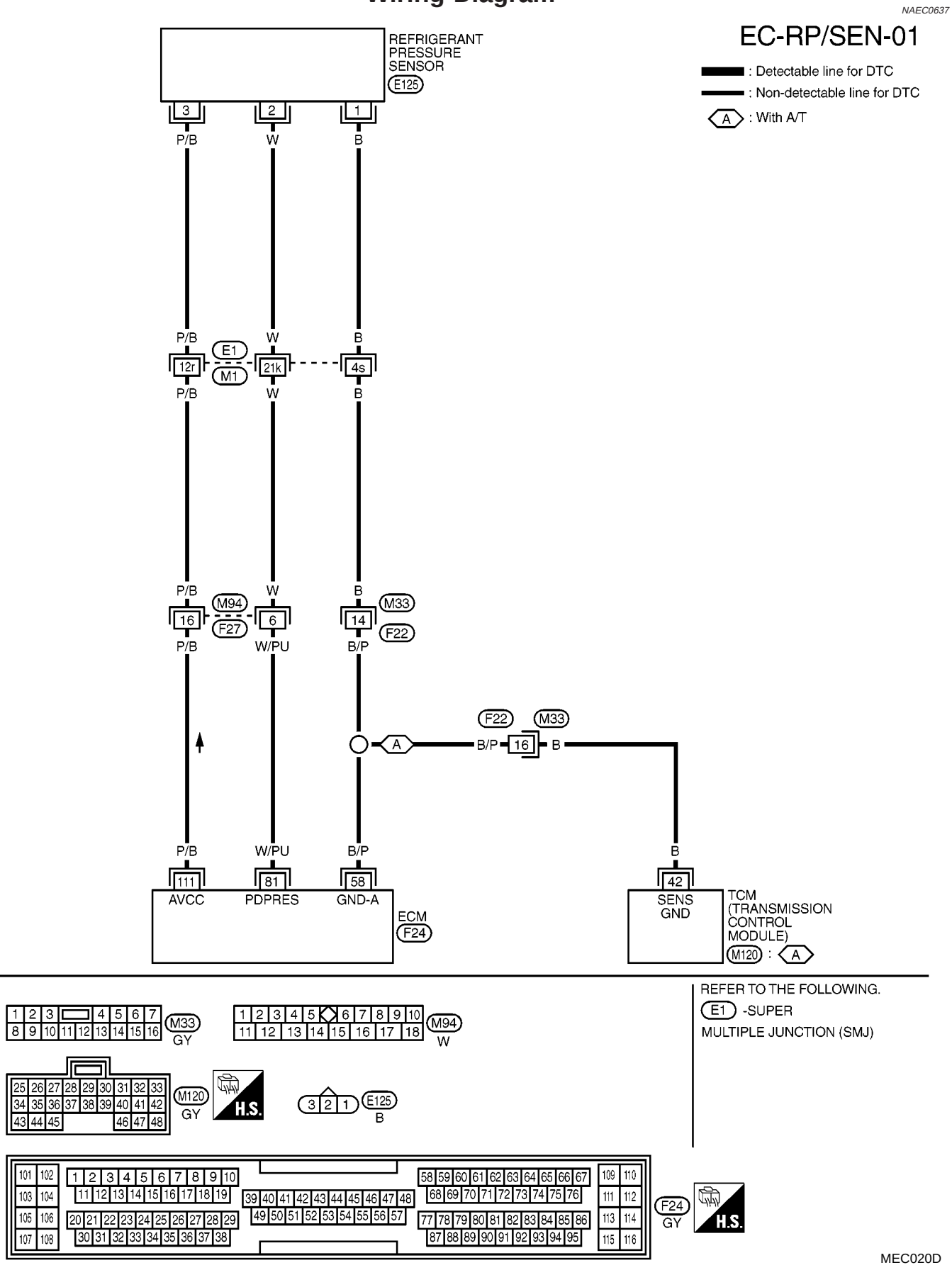
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
58	B/P	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
81	W/PU	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are "ON". (Compressor operates.)	1.0 - 3.88V
111	P/B	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V

Wiring Diagram

NAEC0637

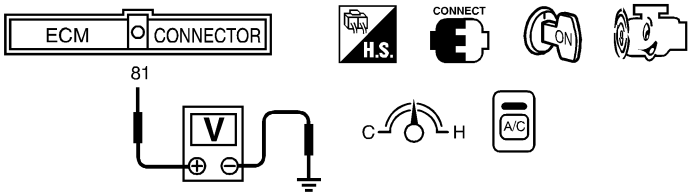


Diagnostic Procedure

NAEC0638

1	CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower switch “ON”.
3. Check voltage between ECM terminal 81 and ground with CONSULT-II or tester.



Voltage: 1 - 4V

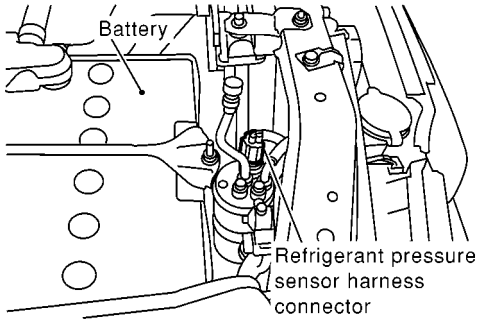
SEF617XA

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

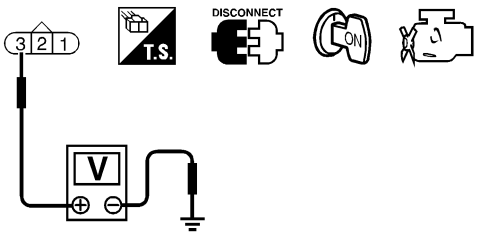
2	CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn A/C switch and blower switch “OFF”.
2. Stop engine.
3. Disconnect refrigerant pressure sensor harness connector.



SEF029Z

4. Turn ignition switch “ON”.
5. Check voltage between refrigerant pressure sensor terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 5V

SEF030Z

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 ● Harness for open or short between ECM and refrigerant pressure sensor	
▶	Repair harness or connectors.

4	CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch "OFF". 2. Check harness continuity between refrigerant pressure sensor terminal 1 and engine ground. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 and M33, F22 ● Harness connectors F23, M32 ● Harness for open or short between ECM and refrigerant pressure sensor ● Harness for open or short between TCM (Transmission control module) and refrigerant pressure sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 81 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E1, M1 and M94, F27 ● Harness for open or short between ECM and refrigerant pressure sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK REFRIGERANT PRESSURE SENSOR	
Refer to HA-15, "Refrigerant pressure sensor".		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace refrigerant pressure sensor.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.	
▶	**INSPECTION END**

ECM Terminals and Reference Value

NAEC0690

Specification data are reference values and are measured between each terminal and ground.

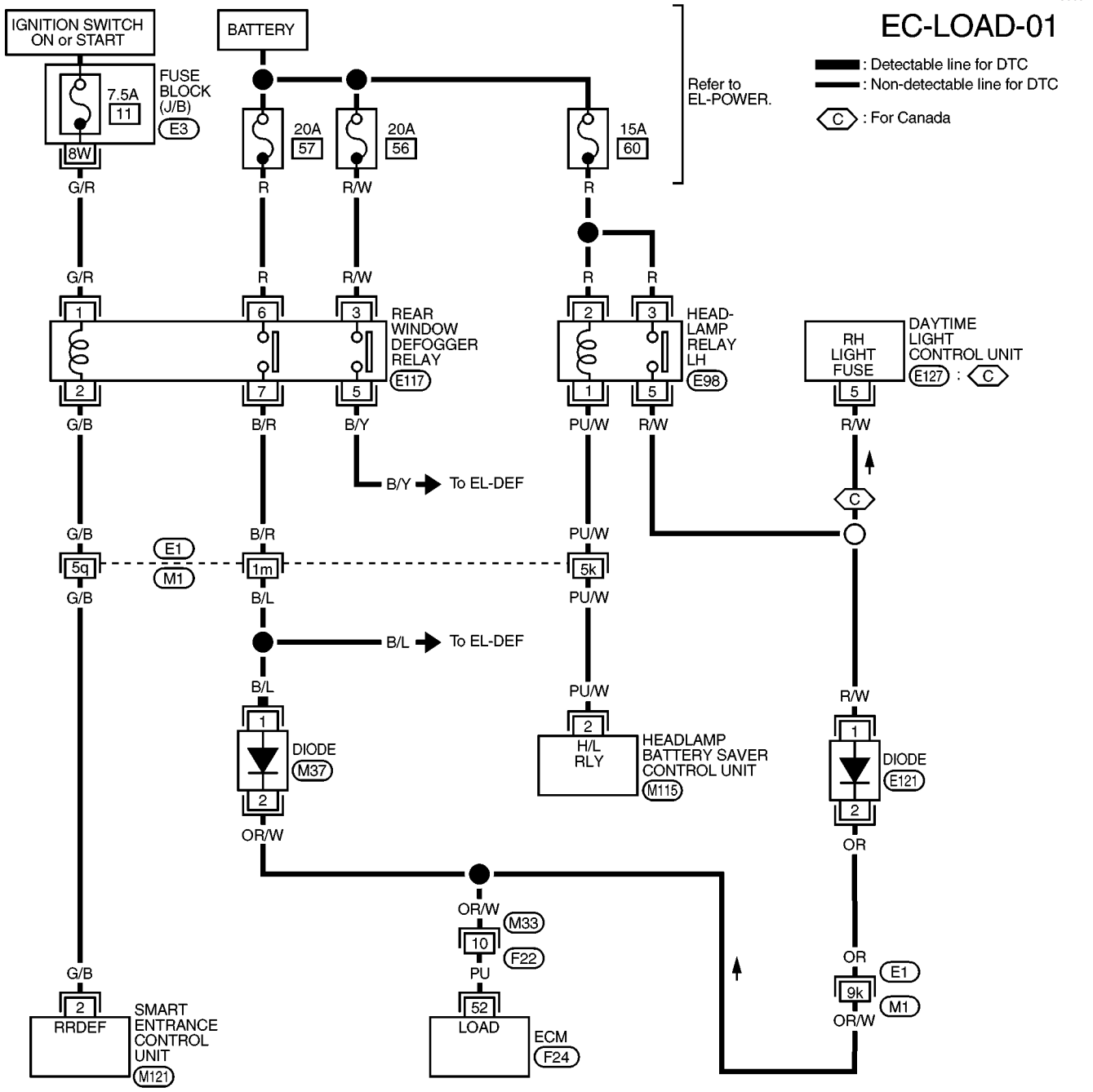
CAUTION:

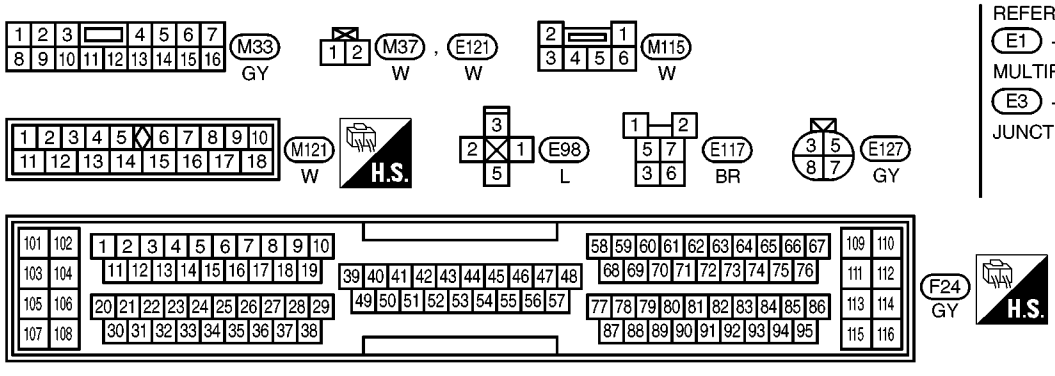
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
52	PU	Electrical load signal	**[Engine is running]** ● Rear window defogger: ON ● Hi-beam headlamp: ON	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Electrical load: OFF	0V

Wiring Diagram

NAEC0604

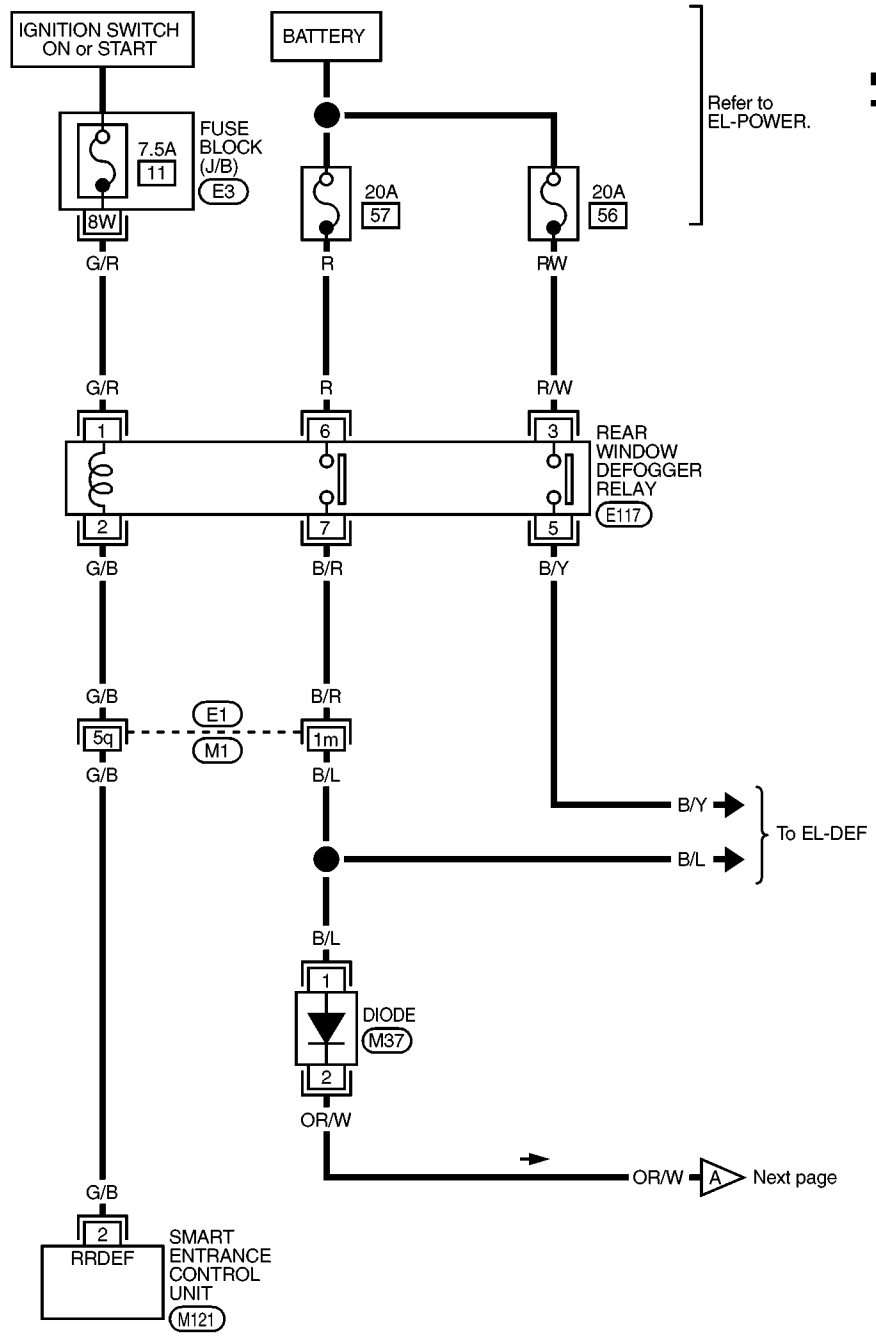




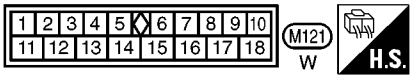
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
E3 -FUSE BLOCK-JUNCTION BOX (J/B)

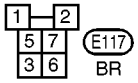
MEC024D

Wiring Diagram (Cont'd)





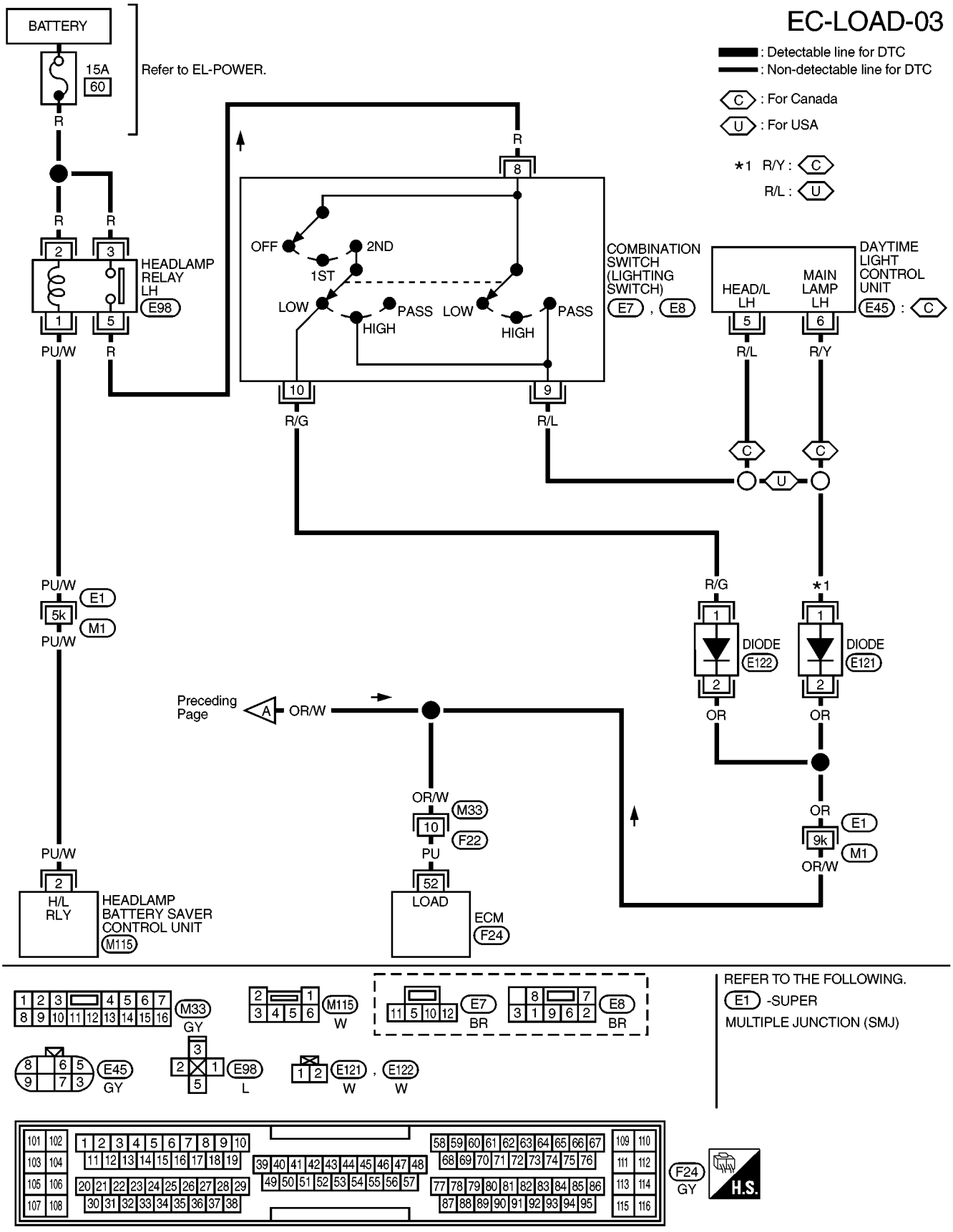




REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
E3 -FUSE BLOCK-JUNCTION BOX (J/B)

MEC025D

Wiring Diagram (Cont'd)



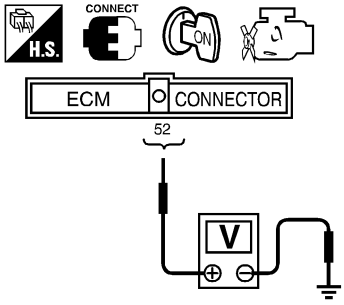
MEC026D

Diagnostic Procedure

NAEC0605

1	CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

1. Turn ignition switch “ON”.
2. Check voltage between ECM terminal 52 and ground under the following conditions.



Condition	Voltage
Rear window defogger switch “ON”	BATTERY VOLTAGE
Rear window defogger switch “OFF”	0V

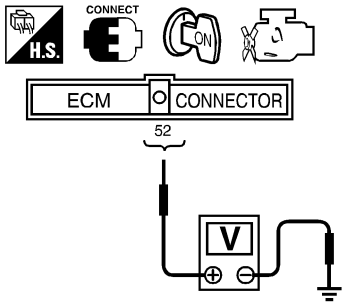
SEF610X

OK or NG

OK	▶	GO TO 2.
NG	▶	GO TO 3.

2	CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Check voltage between ECM terminal 52 and ground under the following conditions.



Condition	Voltage
Lighting switch “ON” at 1st position	BATTERY VOLTAGE
Lighting switch “OFF”	0V

SEF611X

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 7.

3	CHECK REAR WINDOW DEFOGGER FUNCTION

1. Start engine.
2. Turn “ON” the rear window defogger switch.
3. Check the rear windshield. Is the rear windshield heated up?

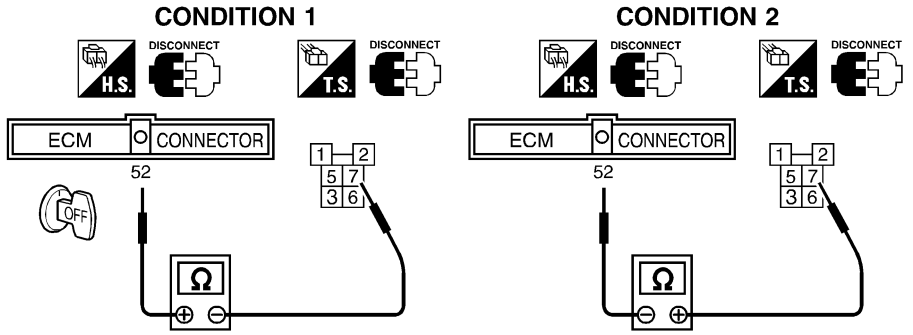
Yes or No

Yes	▶	GO TO 4.
No	▶	Refer to EL-170, “Rear Window Defogger”.

Diagnostic Procedure (Cont'd)

4	CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect rear window defogger relay.
4. Check harness continuity between ECM terminal 52 and rear window defogger relay terminal 7.



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

SEF031Z

5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M33, F22
- Diode M37
- Harness for open and short between ECM and rear window defigger relay

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.

	▶	**INSPECTION END**

7	CHECK HEADLAMP FUNCTION

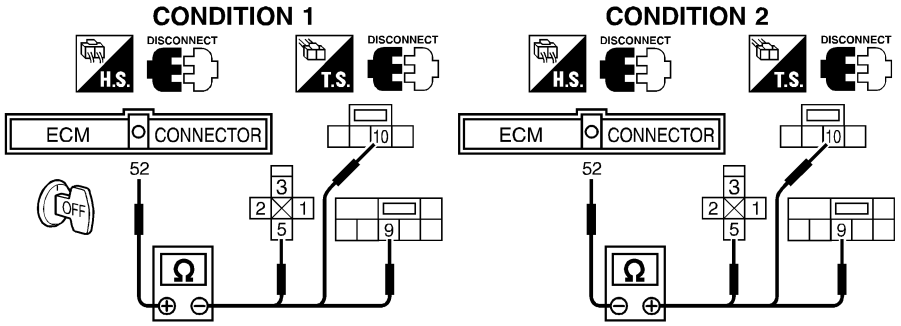
1. Start engine.
2. Turn the lighting switch "ON" at 1st position with high beam.
3. Check that headlamps are illuminated.

OK or NG

OK	▶	GO TO 8.
NG	▶	Refer to EL-32, "HEADLAMP (FOR USA)" or "EL-53, "HEADLAMP (FOR CANADA) — DAYTIME LIGHT SYSTEM".

8	CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

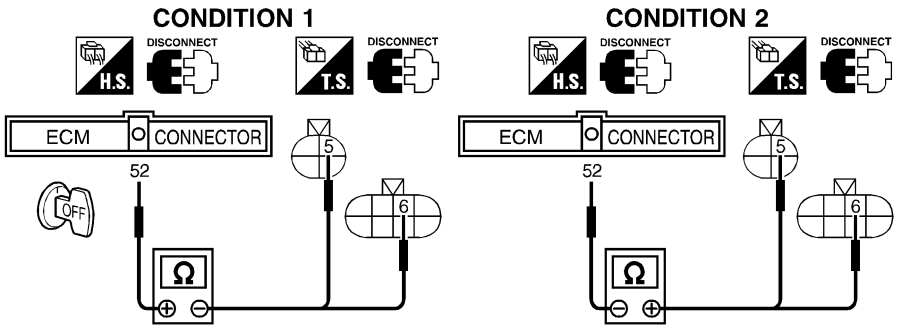
1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect headlamp LH relay. (Models for USA), daytime light control unit harness connector (Models for Canada).
4. Check harness continuity between ECM terminal 52 and headlamp LH relay terminal 5 or combination switch 9, 10 (without autolight system) under the following conditions.



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

SEF038Z

5. Check harness continuity between ECM terminal 52 and daytime tight control unit terminal 5 (with autolight system for Canada) or 6 (without autolight system for Canada) under the following conditions.



CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

SEF039Z

6. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M33, F22
- Diode E121, E122
- Harness for open and short between ECM and headlamp LH relay or daytime light control unit

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

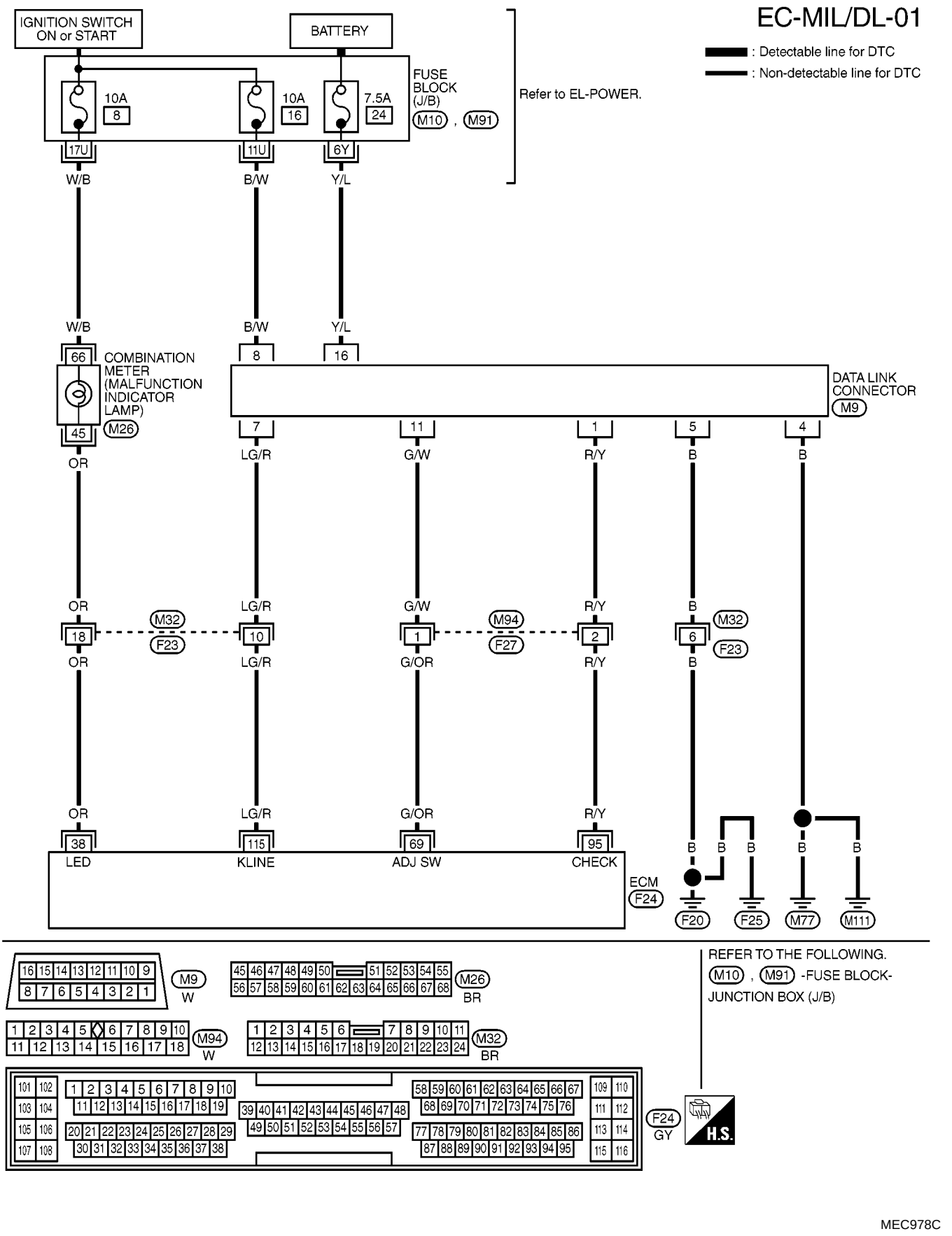
10	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-135.

	▶	**INSPECTION END**

Wiring Diagram

NAEC0407



MEC978C

Fuel Pressure Regulator

NAEC0408

Fuel pressure at idling kPa (kg/cm^2, psi)	
Vacuum hose is connected.	Approximately 235 (2.4, 34)
Vacuum hose is disconnected.	Approximately 294 (3.0, 43)

Idle Speed and Ignition Timing

NAEC0409

Target idle speed*1	No-load*3 (in “P” or N” position)	M/T: 750±50 rpm A/T: 750±50 rpm
Air conditioner: ON	In “P” or N” position	825 rpm or more
Ignition timing*2	In “P” or N” position	15°±2° BTDC
Throttle position sensor idle position		0.15 - 0.85V

*1: Throttle position sensor harness connector connected
*2: Throttle position sensor harness connector disconnected
*3: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

NAEC0411

Supply voltage	Battery voltage (11 - 14)V
Output voltage at idle	1.2 - 1.8*V
Mass air flow (Using CONSULT-II or GST)	2.0 - 6.0 g·m/sec at idle* 7.0 - 20.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no-load.

Engine Coolant Temperature Sensor

NAEC0412

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Heated Oxygen Sensor 1 Heater (front)

NAEC0414

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Fuel Pump

NAEC0415

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω

IACV-AAC Valve

NAEC0416

Resistance [at 20°C (68°F)]	Approximately 20 - 24Ω

Injector

NAEC0417

Resistance [at 20°C (68°F)]	13.5 - 17.5Ω

Resistor

NAEC0418

Resistance [at 25°C (77°F)]	Approximately 2.2 kΩ

Throttle Position Sensor

NAEC0419

Throttle valve conditions	Voltage (at normal operating temperature, engine off, ignition switch ON, throttle opener disengaged)
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

Calculated Load Value

NAEC0420

	Calculated load value % (Using CONSULT-II or GST)
At idle	14.0 - 33.0
At 2,500 rpm	12.0 - 25.0

Intake Air Temperature Sensor

NAEC0421

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

Heated Oxygen Sensor 2 Heater (rear)

NAEC0422

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Crankshaft Position Sensor (REF)

NAEC0423

Resistance [at 20°C (68°F)]	470 - 570Ω

Fuel Tank Temperature Sensor

NAEC0424

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

Camshaft Position Sensor (PHASE)

NAEC0639

Resistance [at 20°C (68°F)]	HITACHI make	1,440 - 1,760Ω
	MITSUBISHI make	2,090 - 2,550Ω

ACCELERATOR CONTROL, FUEL & EXHAUST SYSTEMS

SECTION FE

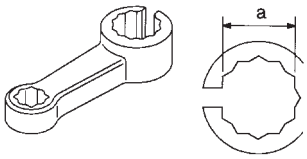
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Removal and Installation 8

Special Service Tool

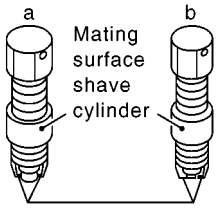
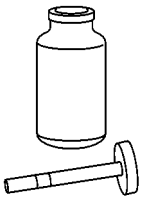
NAFE0001

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
KV10114400 (J38365) Heated oxygen sensor wrench	 NT636	Loosening or tightening rear heated oxygen sensor (For right bank) **a: 22 mm (0.87 in)**

Commercial Service Tools

NAFE0007

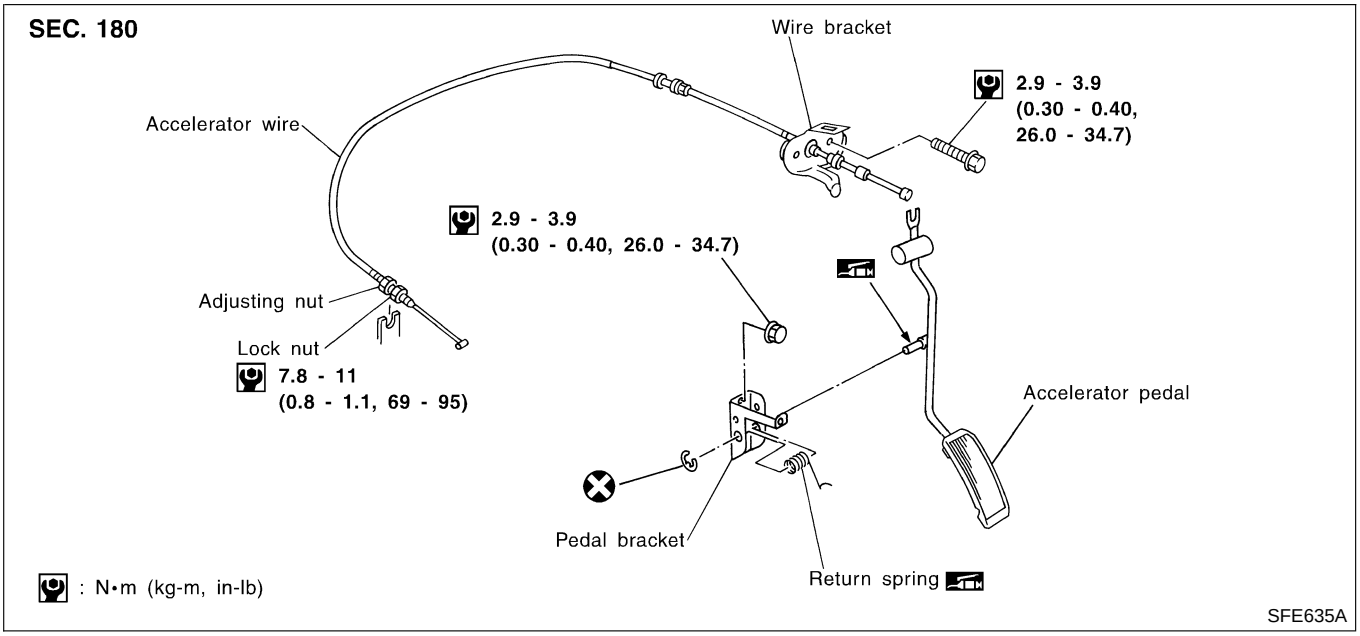
Tool number (Kent-Moore No.) Tool name	Description	
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	 NT778	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: J-43897-18 (18 mm dia.) for Zirconia Oxygen Sensor** **b: J-43897-12 (12 mm dia.) for Titania Oxygen Sensor**
Anti-seize lubricant (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	 NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

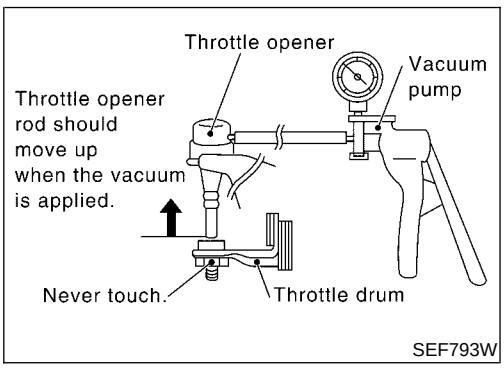
Removal and Installation

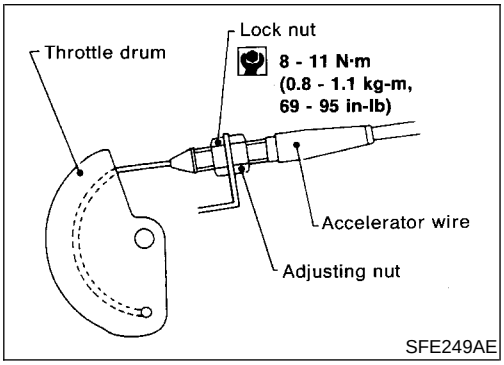
NAFE0002

CAUTION:

- **When removing accelerator wire, make a mark to indicate lock nut's initial position.**
- **Check that throttle valve opens fully when accelerator pedal is fully depressed. Also check that it returns to idle position when pedal is released.**
- **Check accelerator control parts for improper contact with any adjacent parts.**
- **When connecting accelerator wire, be careful not to twist or scratch its inner wire.**
- **Refer to EL-258, "AUTOMATIC SPEED CONTROL DEVICE" for ASCD wire adjustment.**







Adjusting Accelerator Wire

NAFE0003

1. Remove the vacuum hose connected to the throttle opener.
2. Connect suitable vacuum hose to vacuum pump as shown left.
3. Apply vacuum [more than −40.0 kPa (−300 mmHg, −11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
   Make sure that there is clearance between the throttle drum and rod.
   If NG, refer to EC-97, "Basic Inspection".
   If OK, go to following step.
4. Loosen lock nut.
5. Tighten accelerator adjusting nut until throttle drum starts to move.
6. From that position, turn back adjusting nut 1.5 to 2 turns, and secure lock nut.
7. Release vacuum from the throttle opener.
8. Remove vacuum pump and vacuum hose from the throttle opener.
9. Reinstall the original vacuum hose to the throttle opener securely.

Removal and Installation

NAFE0004

WARNING:

When replacing fuel line parts, be sure to observe the following:

- **Put a “CAUTION: INFLAMMABLE” sign in workshop.**
- **Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.**
- **Be sure to furnish the workshop with a CO_2 fire extinguisher.**

CAUTION:

- **Before removing fuel line parts, carry out the following procedures:**

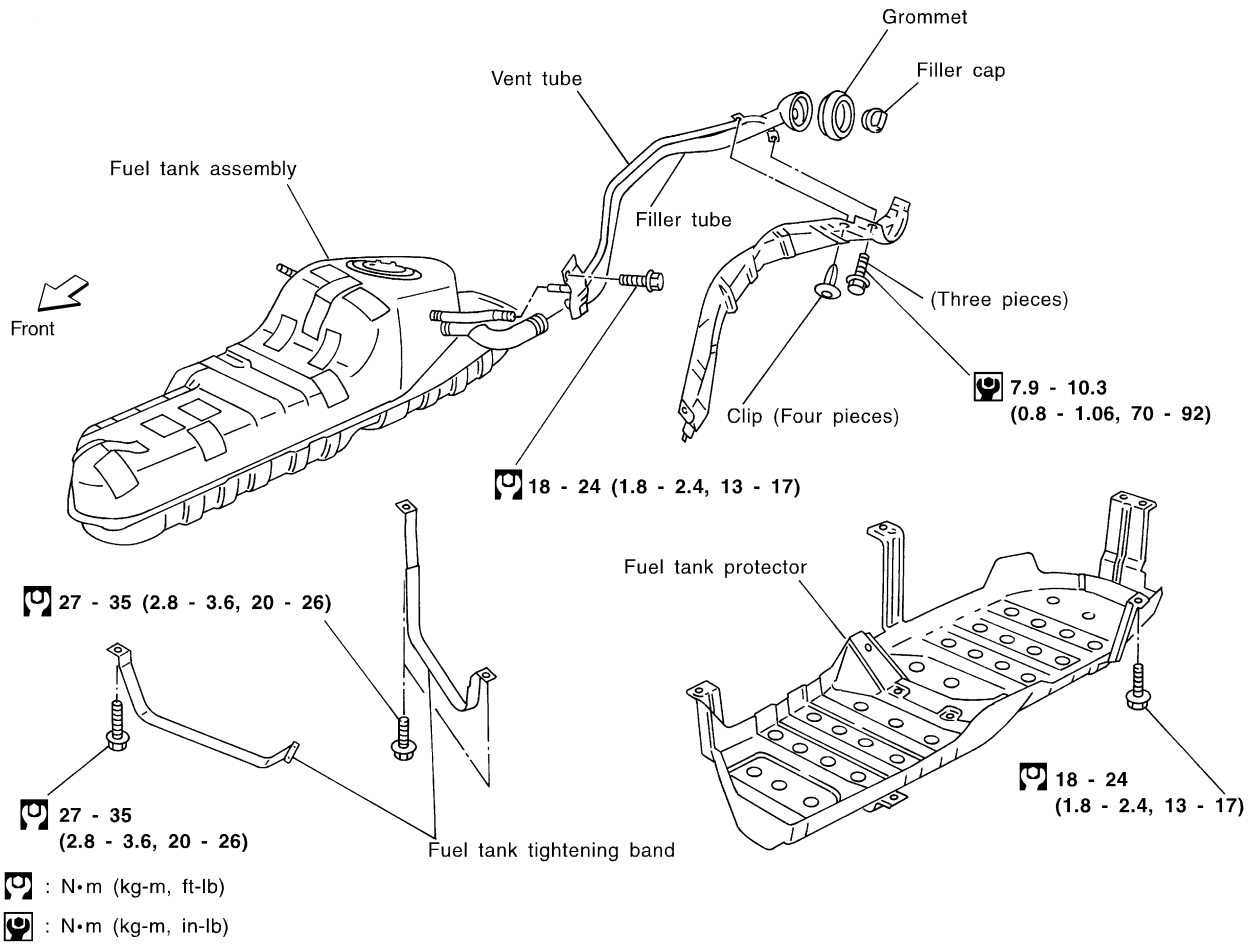
a) Put drained fuel in an explosion-proof container and put lid on securely.

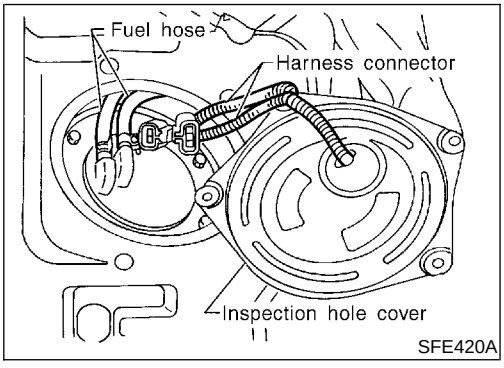
b) Release fuel pressure from fuel line. Refer to MA-17, “Changing Fuel Filter”.

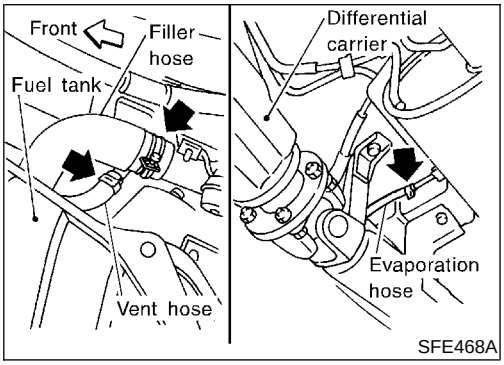
c) Disconnect battery ground cable.

- **Always replace O-ring with new ones.**
- **Do not kink or twist hose and tube when they are installed.**
- **Do not tighten hose clamps excessively to avoid damaging hoses.**
- **When installing fuel check valve, be careful of its designated direction. Refer to EC-32, “EVAPORATIVE EMISSION SYSTEM”.**
- **After installation, run engine and check for fuel leaks at connections.**

SEC. 172



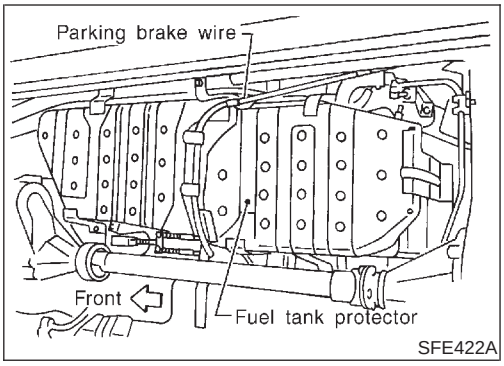




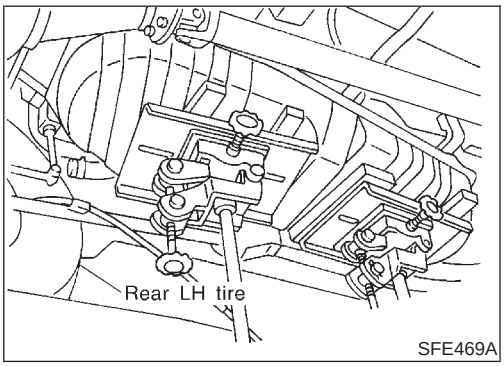
FUEL TANK

NAFE0004S01

1. Release fuel pressure from fuel line.
   Refer to MA-17, "Changing Fuel Filter".
2. Remove inspection hole cover located behind the rear seat.
3. Disconnect harness connectors under inspection hole cover.
4. Disconnect fuel hoses.
   - Put mating marks on hoses for correct installation.
5. Disconnect filler hose, vent hose and evaporation hose at fuel tank side.



6. Remove parking brake wire from fuel tank protector.
7. Remove fuel tank protector.

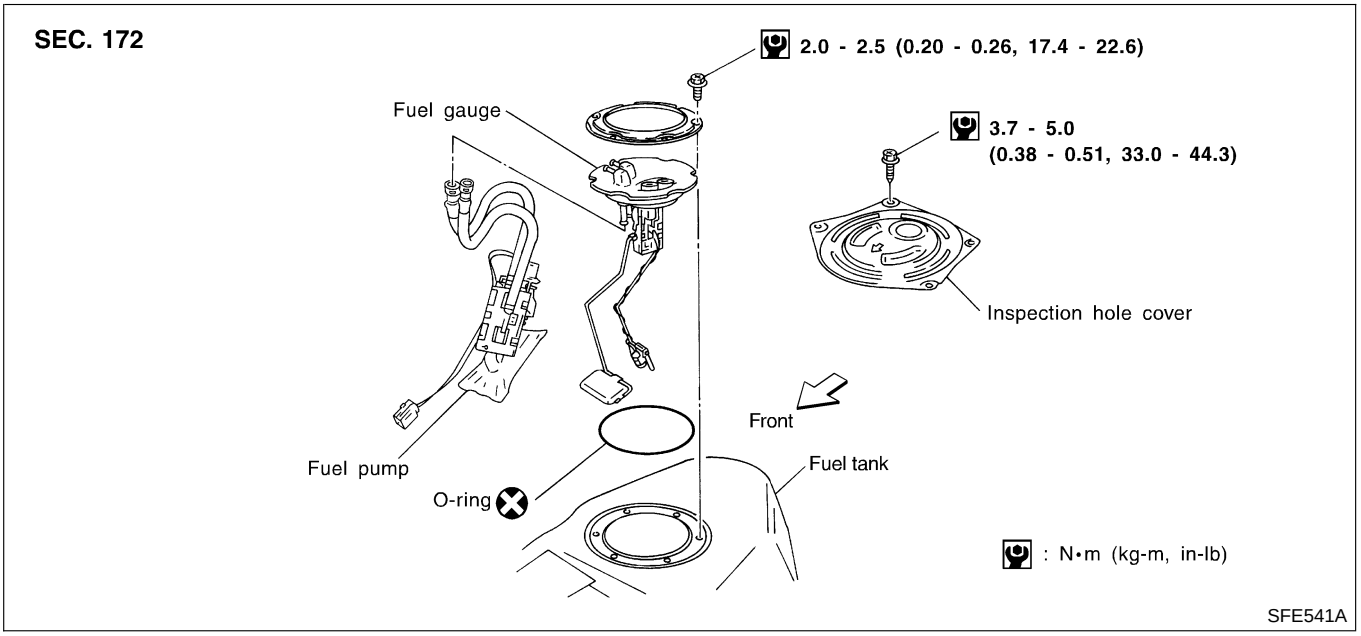


8. Remove fuel tank band mounting bolts while supporting fuel tank.
9. Remove fuel tank.

Installation procedure is the reverse order of removal.

FUEL PUMP AND GAUGE

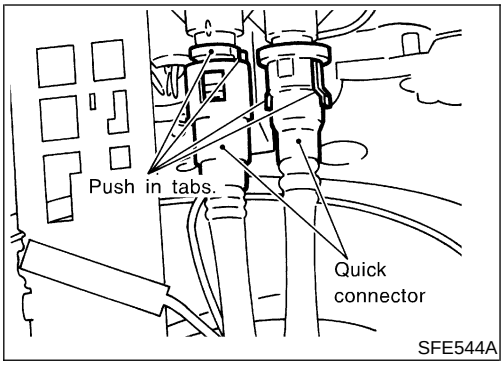
NAFE0004S02



1. Release fuel pressure from fuel line.
   Refer to MA-17, "Changing Fuel Filter".
2. Remove inspection hole cover located behind the rear seat.
3. Disconnect harness connectors and fuel tubes from upper plate of fuel gauge.

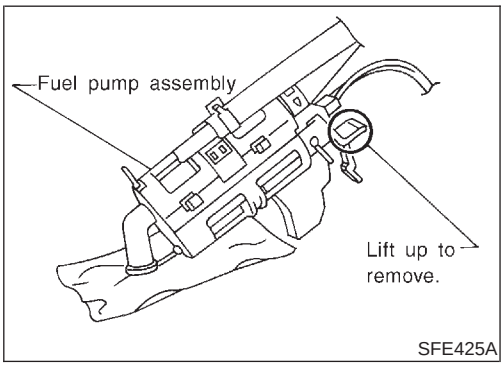
- Put mating marks on tubes for correct installation.

4. Remove fuel gauge retainer and fuel gauge.

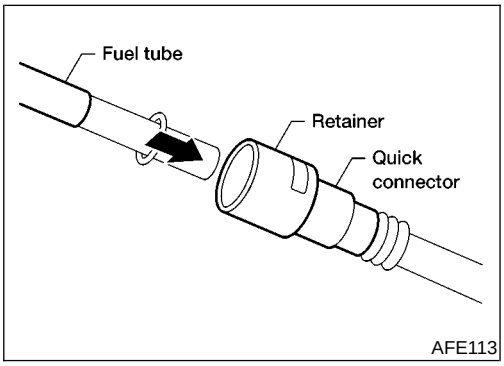


5. Disconnect the quick connectors as follows.
1) Put mating marks on tubes and connectors for correct installation.
2) Hold the sides of the connector, push in tabs, and pull out the tube inserted in the retainer.

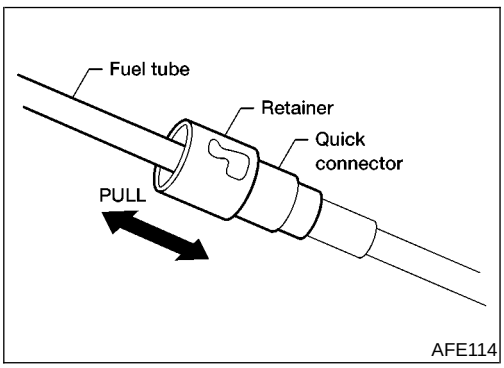
CAUTION:
- **The tube can be removed when the push in tabs are completely depressed. Do not twist it more than necessary.**
- **Do not use any tools to remove the quick connector.**
- **Keep the connecting portion of the tubes and quick connectors clean.**



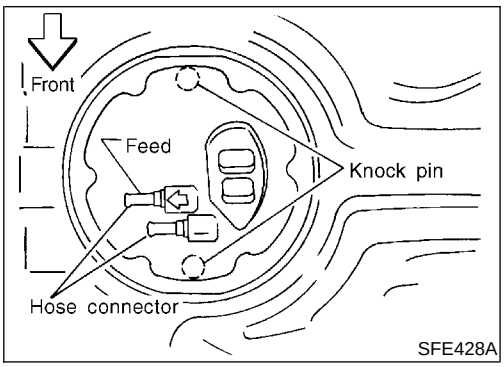
6. Remove fuel pump with bracket while lifting the pawl of the fuel pump bracket upward.



7. To install, reverse the removal procedure. Connect the quick connectors as follows.
- Be sure that the connecting portion is clean and smooth.
- Align mating marks.
- Insert tube into the center of the connector until you hear a click.



After connecting quick connectors, make sure the connection is firmly made using the following method.
- Pull on the fuel tube and connector to make sure they are firmly connected.
- Start the engine, increase engine speed and verify that there are no leaks.



- Install fuel gauge as shown.

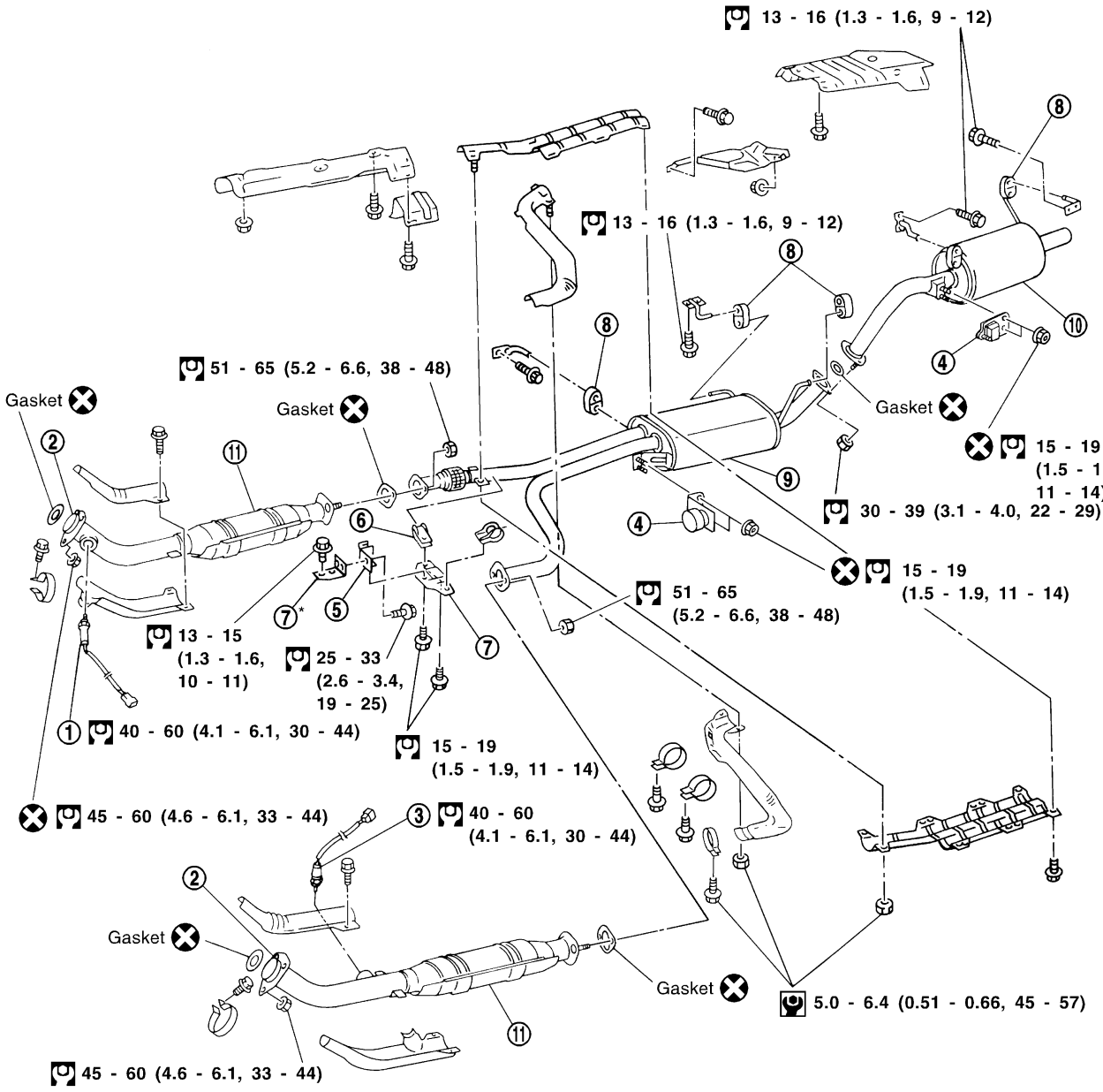
Removal and Installation

NAFE0005

CAUTION:

- **Always replace exhaust gaskets with new ones when reassembling.**
- **With engine running, check all tube connections for exhaust gas leaks, and entire system for unusual noises.**
- **Check to ensure that mounting brackets and mounting insulators are installed properly and free from undue stress. Improper installation could result in excessive noise or vibration.**
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 of J-43897-12 and approved anti-seize lubricant.**
- **Do not overtorque the oxygen sensor. Doing so may cause damage to the oxygen sensor, resulting in the MIL coming on.**

SEC. 200•208
4WD model



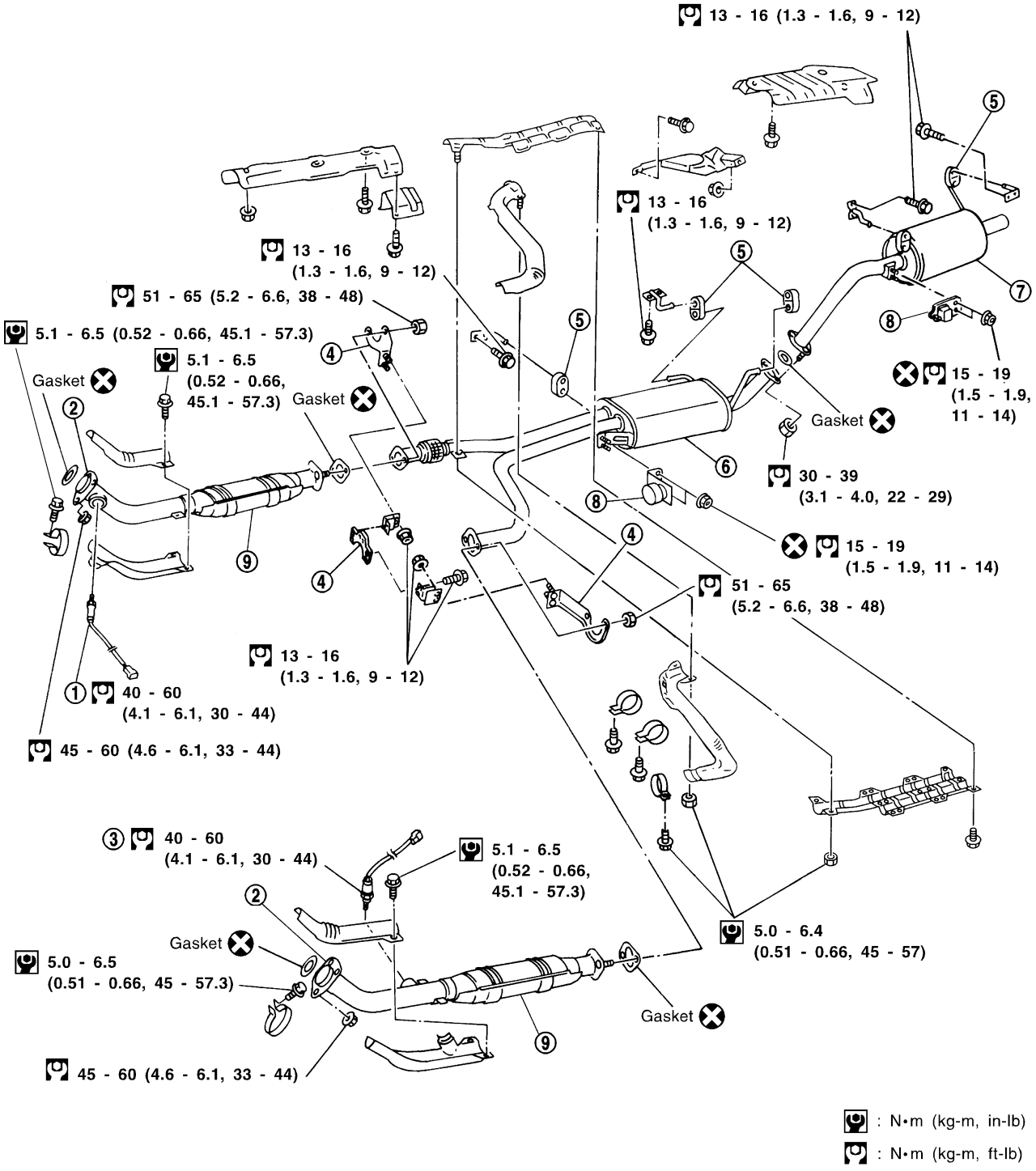
* : Part-time 4WD models only

: N•m (kg-m, in-lb)
: N•m (kg-m, ft-lb)

SFE655A

1. Heated oxygen sensor 2 (rear) (bank 1)
2. Front tube
3. Heated oxygen sensor 2 (rear) (bank 2)
4. Dynamic damper
5. Mounting rubber
6. Clamp
7. Mounting bracket
8. Mounting rubber
9. Main muffler
10. Post muffler
11. TWC (under floor)

SEC. 200•208
2WD model



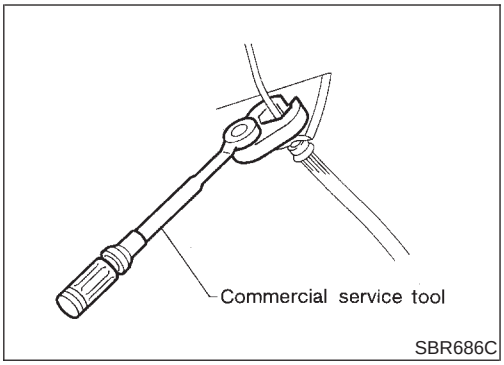
SFE652A

1. Heated oxygen sensor 2 (rear) (bank 1)
2. Front tube
3. Heated oxygen sensor 2 (rear) (bank 2)
4. Mounting bracket
5. Mounting rubber
6. Main muffler
7. Post muffler
8. Dynamic damper
9. TWC (under floor)

SECTION CL

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Precautions

NACL0001

- **Recommended fluid is brake fluid “DOT 3”.**
- **Never reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas.**
- **When removing and installing clutch piping, use Tool.**
- **Use new brake fluid to clean or wash all parts of master cylinder, operating cylinder and clutch damper.**
- **Never use mineral oils such as gasoline or kerosene. It will ruin the rubber parts of the hydraulic system.**

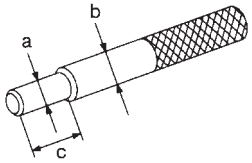
WARNING:

After cleaning the clutch disc, wipe it with a dust collector. Do not use compressed air.

Special Service Tools

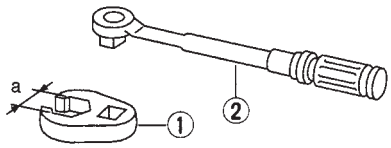
NACL0002

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
ST20670000 (—) Clutch aligning bar	 NT405 Installing clutch cover and clutch disc **a: 15 mm (0.59 in) dia.** **b: 23 mm (0.91 in) dia.** **c: 30 mm (1.18 in)**

Commercial Service Tools

NACL0003

Tool name	Description
1 Flare nut crowfoot 2 Torque wrench	 NT360 Removing and installing clutch piping **a: 10 mm (0.39 in)**

NVH Troubleshooting Chart

NACL0027S01

Use the chart below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, repair or replace these parts.

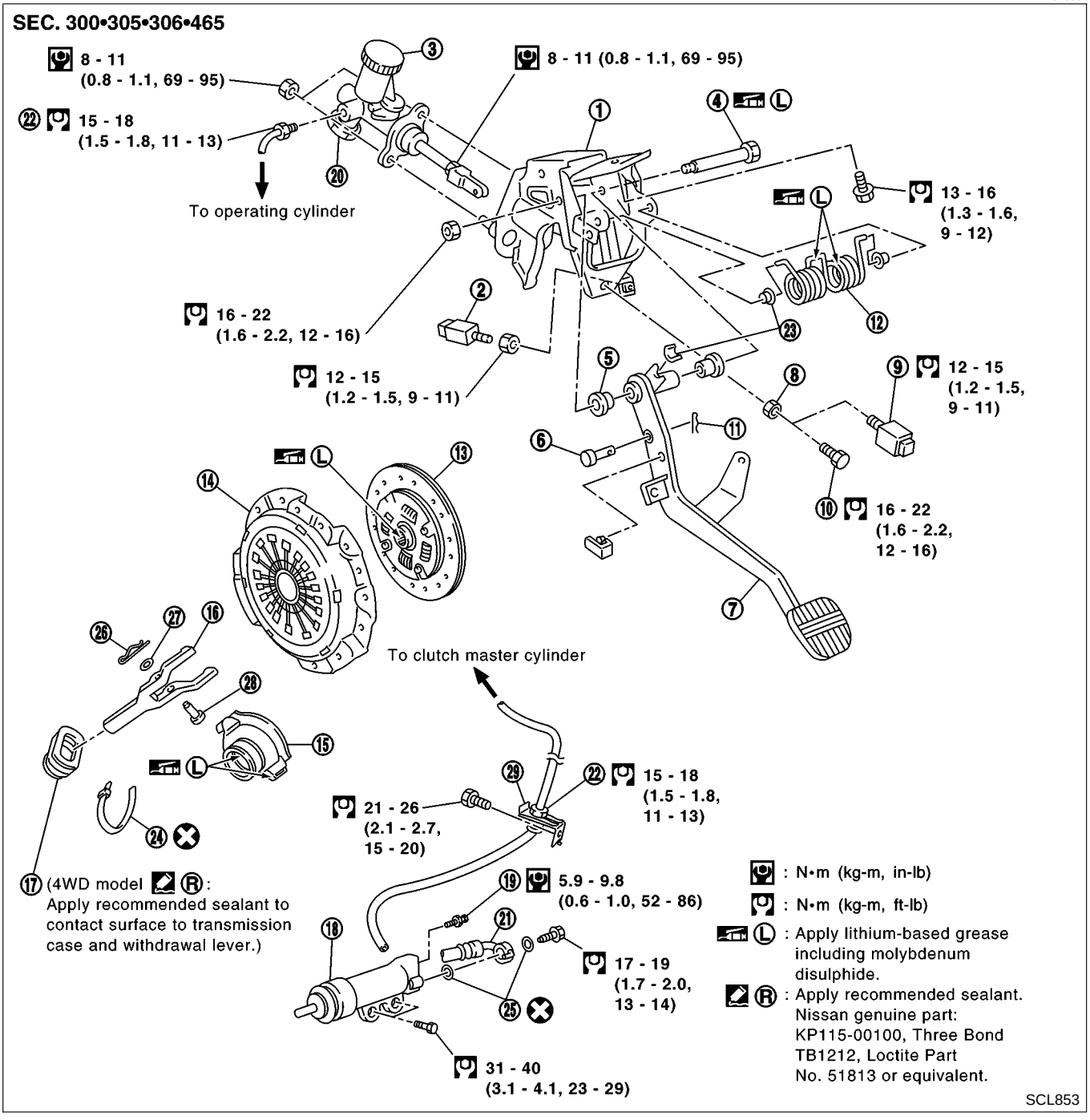
CLUTCH

NACL0027S0101

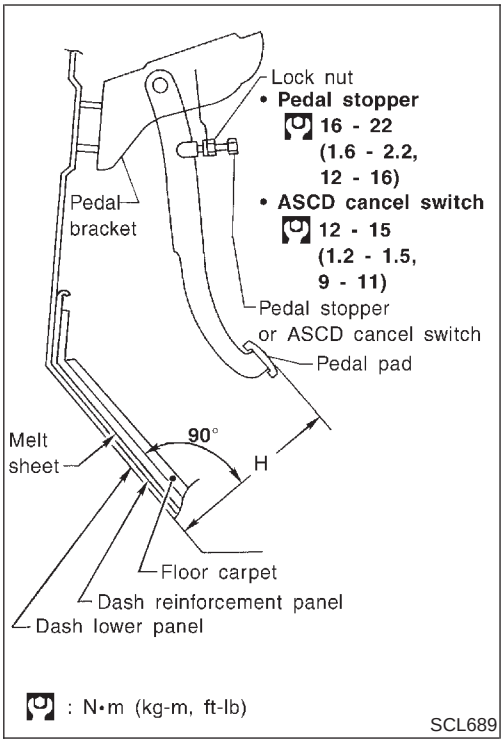
Reference page		CL-6	CL-7	CL-8	CL-9	Refer to EM-59, "REMOVAL".	CL-10	CL-14	CL-14	CL-14	CL-14	CL-14	CL-14	CL-14	CL-14	CL-14	CL-14	CL-14
SUSPECTED PARTS (Possible cause)		CLUTCH PEDAL (Free play out of adjustment)	CLUTCH LINE (Air in line)	MASTER CYLINDER PISTON CUP (Damaged)	OPERATING CYLINDER PISTON CUP (Damaged)	ENGINE MOUNTING (Loose)	RELEASE BEARING (Worn, dirty or damaged)	CLUTCH DISC (Out of true)	CLUTCH DISC (Runout is excessive)	CLUTCH DISC (Lining broken)	CLUTCH DISC (Dirty or burned)	CLUTCH DISC (Oily)	CLUTCH DISC (Worn out)	CLUTCH DISC (Hardened)	CLUTCH DISC (Lack of spline grease)	DIAPHRAGM SPRING (Damaged)	PRESSURE PLATE (Distortion)	FLYWHEEL (Distortion)
Symptom	Clutch grabs/chatters					1			2			2	2	2				
	Clutch pedal spongy		1	2	2													
	Clutch noisy						1											
	Clutch slips	1										2	2			3	4	5
	Clutch does not disengage	1	2	3	4			5	5	5	5	5			5	6	7	

Components

NACL0004



1. Clutch pedal bracket
2. Clutch interlock switch
3. Clutch master cylinder
4. Fulcrum pin
5. Bushing
6. Clevis pin
7. Clutch pedal
8. Lock nut
9. ASCD cancel switch
10. Pedal stopper
11. Snap pin
12. Assist spring
13. Clutch disc
14. Clutch cover
15. Release bearing
16. Withdrawal lever
17. Dust boot
18. Operating cylinder
19. Air bleeder
20. Clutch damper (not serviceable)
21. Clutch hose
22. Flare nut
23. Bushing
24. Dust cover clip (4WD model)
25. Copper washer
26. Snap pin
27. Washer
28. Withdrawal shaft
29. Lock spring



Inspection and Adjustment

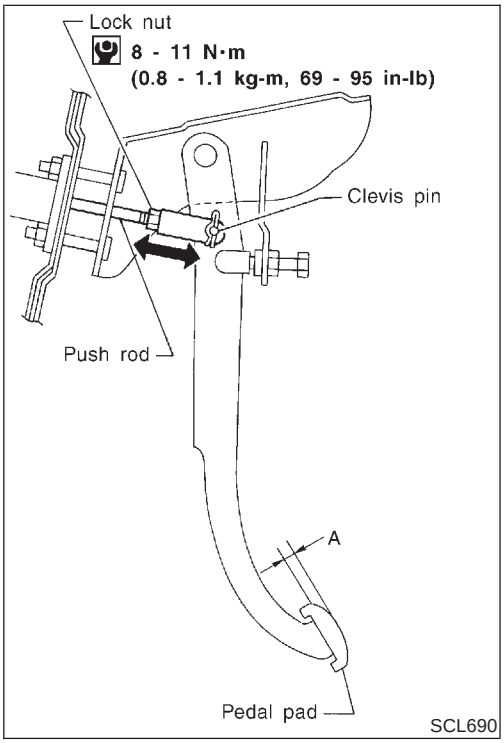
NACL0005

ADJUSTING CLUTCH PEDAL

NACL0005S01

1. Adjust pedal height with pedal stopper or ASCD cancel switch.

Pedal height “H”:
186 - 196 mm (7.32 - 7.72 in)



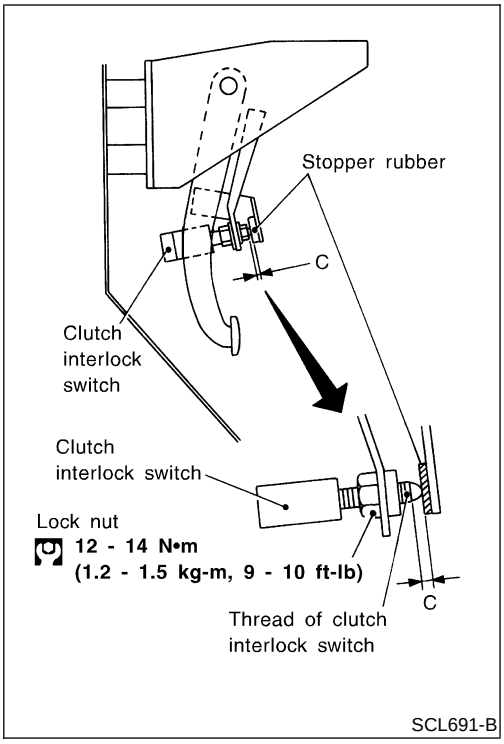
2. Adjust pedal free play with master cylinder push rod. Then tighten lock nut.

Pedal free play (measured at pedal pad) “A”:
9 - 16 mm (0.35 - 0.63 in)

Pedal free play means the following total measured at position of pedal pad:

- **Play due to clevis pin and clevis pin hole in clutch pedal.**

3. Make sure that clevis pin can rotate smoothly. If not, readjust pedal free play with master cylinder push rod.



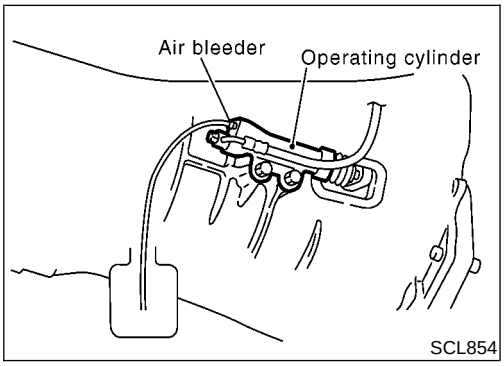
— Models with Clutch Interlock System —

NACL0005S0101

- Adjust clearance "C" shown in the figure while fully depressing clutch pedal.

Clearance C:

0.1 - 1.5 mm (0.004 - 0.059 in)



AIR BLEEDING PROCEDURE

NACL0005S02

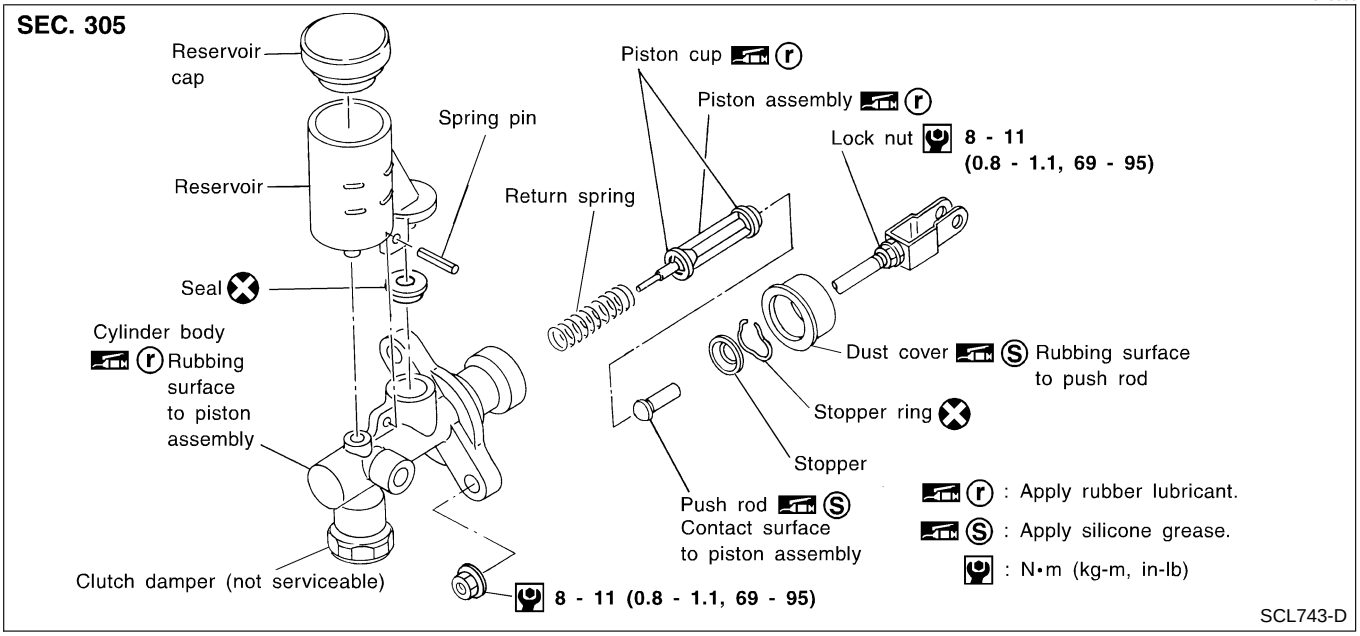
CAUTION:

- **Check the clutch fluid level of the reservoir for shortage.**
- **Keep clutch fluid away from the coating surface of the body or other parts. If it adheres, remove it quickly and flush the area with water.**

1. Fill up master cylinder reservoir tank with new clutch fluid.
2. Connect a clear vinyl hose to air bleeder.
3. Carefully depress clutch pedal fully and release it. Repeat the cycle several times at an interval of 2 or 3 seconds.
4. While depressing clutch pedal, open air bleeder.
5. Close air bleeder.
6. Release clutch pedal, and wait for approx. 5 seconds.
7. Repeat steps 3 to 6 until no air is found in brake fluid.

Components

NACL0006



Disassembly and Assembly

NACL0007

- When removing and installing stopper ring, pry it off with screwdriver while pushing push rod into cylinder.

Inspection

NACL0008

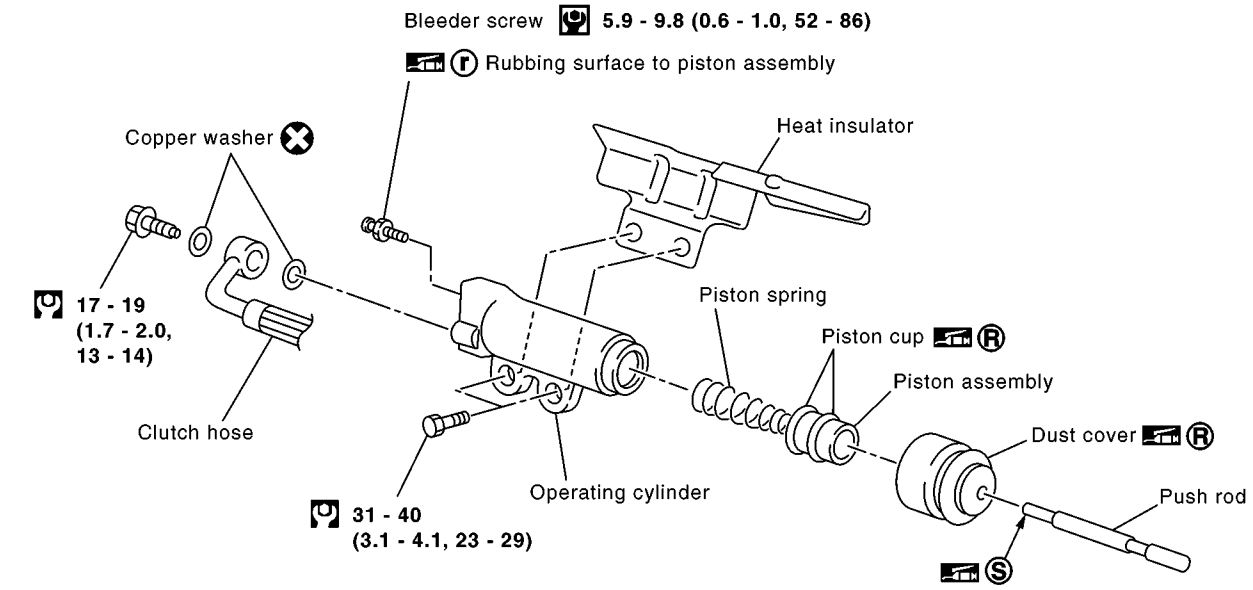
Check the following items, and replace if necessary.

- Rubbing surface of cylinder and piston, for uneven wear, rust or damage
- Piston with piston cup, for wear or damage
- Return spring, for wear or damage
- Dust cover, for cracks, deformation or damage
- Reservoir, for deformation or damage

Components

NACL0009

SEC. 306



SCL855

Inspection

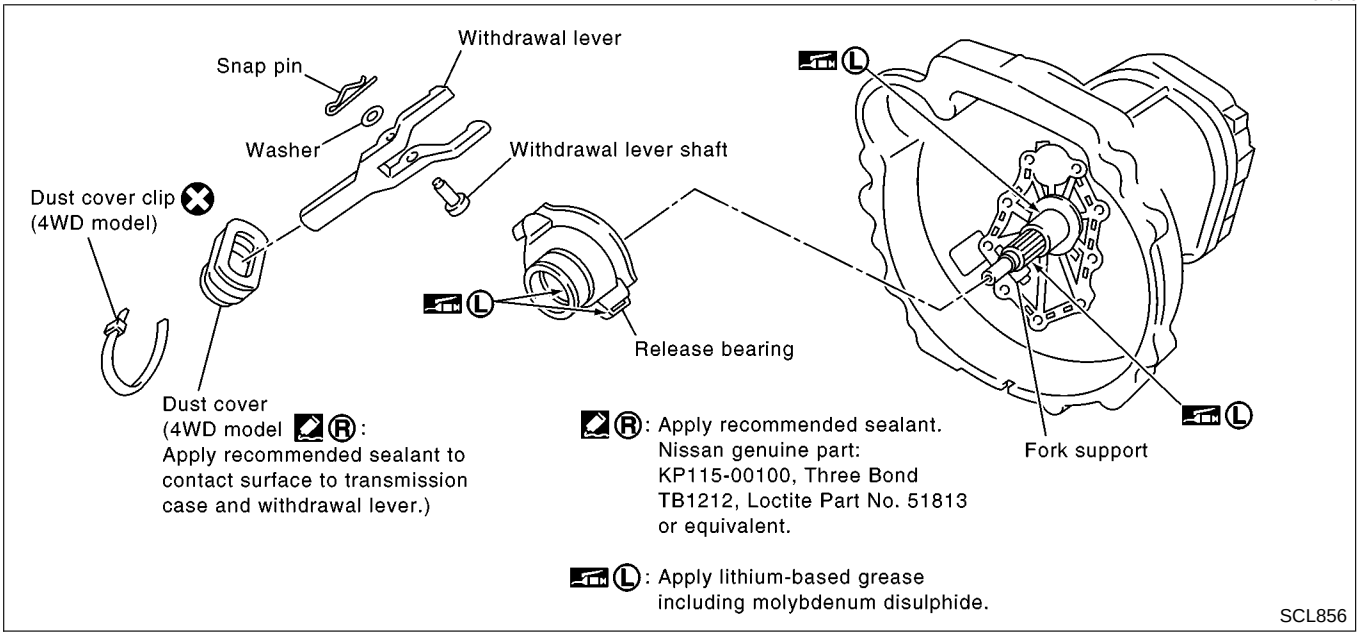
NACL0010

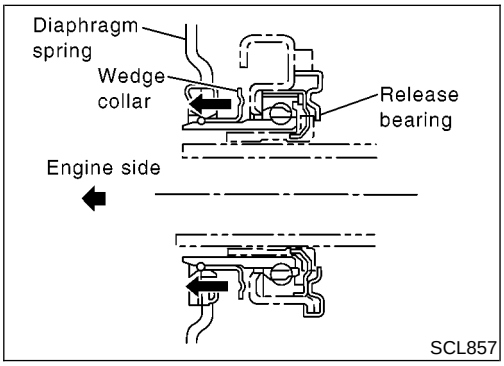
Check the following items, and replace if necessary.

- Rubbing surface of cylinder and piston, for uneven wear, rust or damage
- Piston with piston cup, for wear or damage
- Piston spring, for wear or damage
- Dust cover, for cracks, deformation or damage

Components

NACL0013

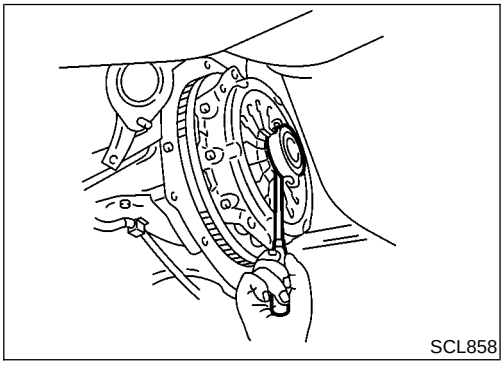




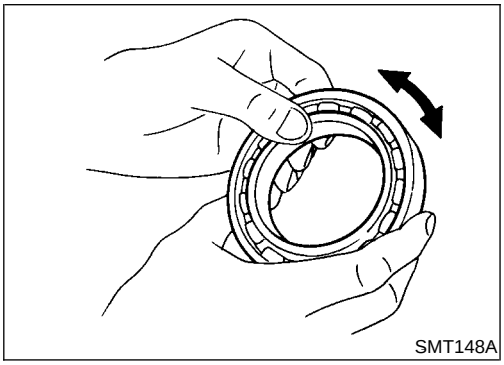
Removal

NACL0029

1. Remove manual transmission from the vehicle.
   Refer to MT-10, “Removal and Installation”.
2. Remove withdrawal lever from inside clutch housing.
3. Press wedge collar on clutch cover toward the engine.



4. Using a flat-head screwdriver or the like, remove release bearing from clutch cover.

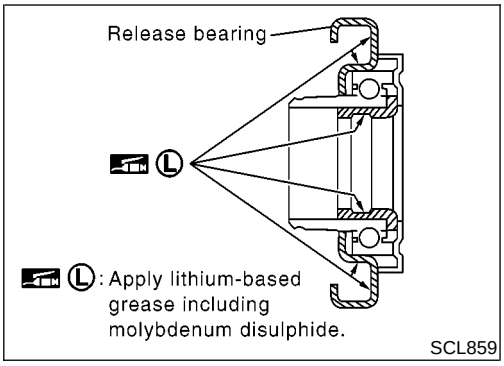


Inspection

NACL0030

Check the following items, and replace the part, if necessary.

- Release bearing seizure, damages, and rough rotation.
- Abnormal wear on contact surfaces of release bearing or withdrawal lever.
- Dust cover cracks.



Installation

NACL0031

1. Apply clutch sleeve grease to the areas shown by the arrows in the figure.
2. Install the release bearing to main drive shaft.
3. Install withdrawal lever to fork support, and secure it with withdrawal lever shaft, washer, and snap pin.
4. Operate withdrawal lever to check sliding parts for smooth movement.

CAUTION:

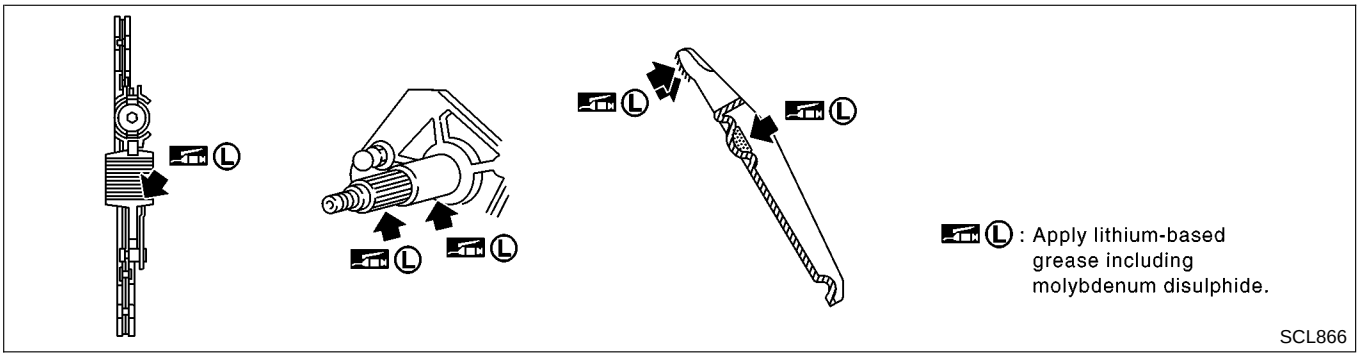
Remove excessive grease coming-out.

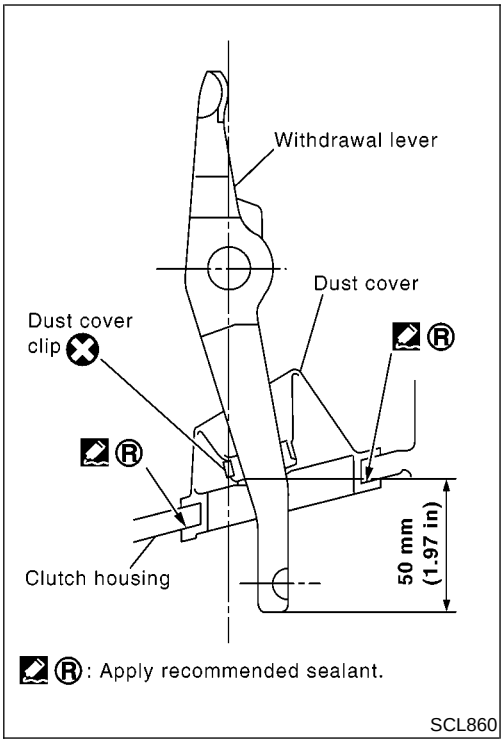
5. Install manual transmission.
   Refer to MT-10, “Removal and Installation”.

Lubrication

NACL0016

- Apply recommended grease to contact surface and rubbing surface.
- **Too much lubricant might damage clutch disc facing.**





Waterproof — for 4WD Model

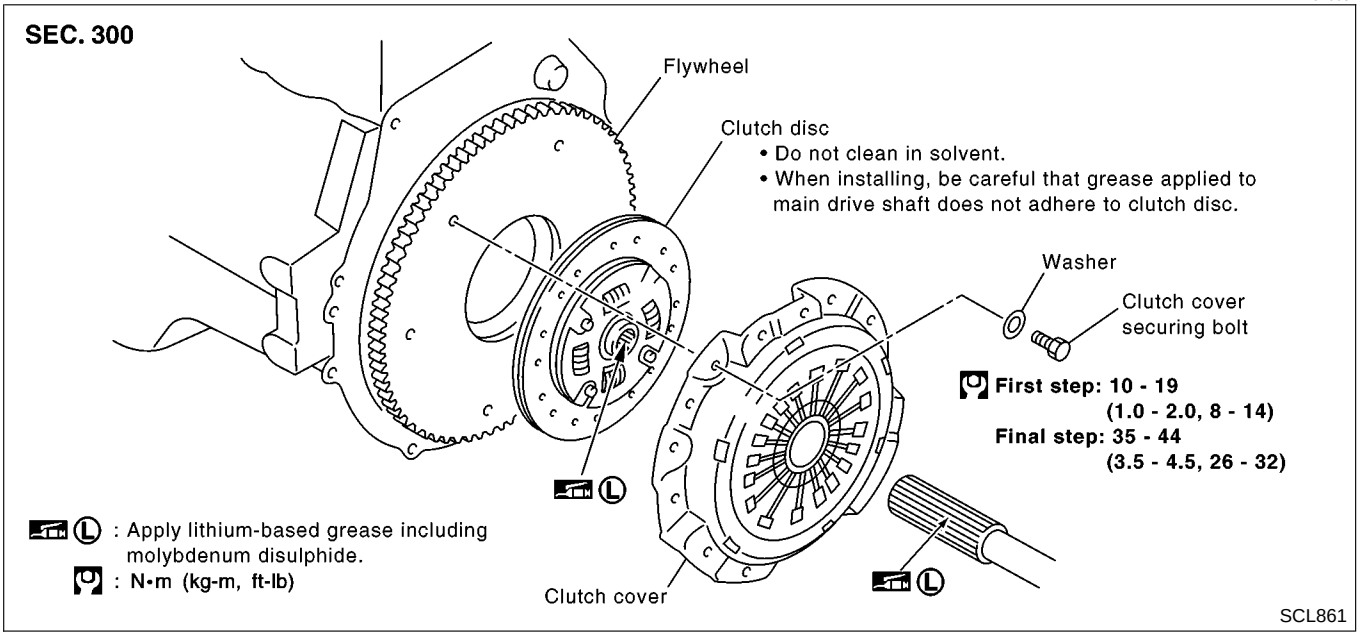
NACL0017

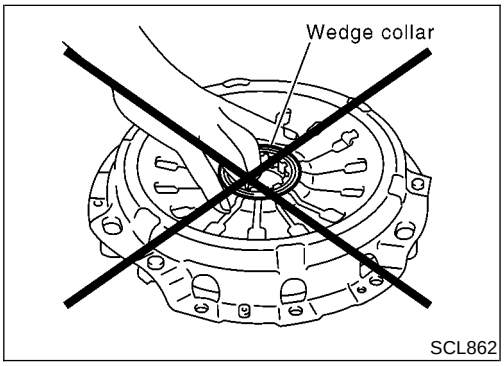
- Apply recommended sealant to contact surface of dust cover to transmission case and withdrawal lever and then install dust cover clip.

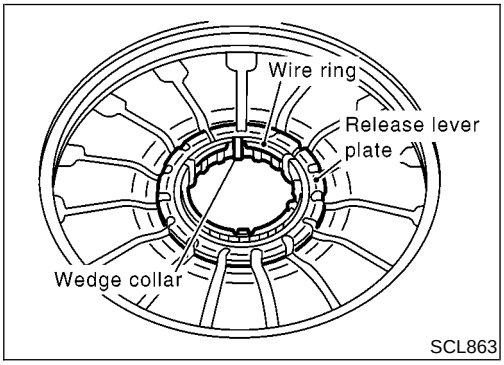
  Recommended sealant: Nissan genuine part KP115-00100, Three Bond TB1212, Loctite Part No. 51813 or equivalent.

Components

NACL0032







Removal

NACL0033

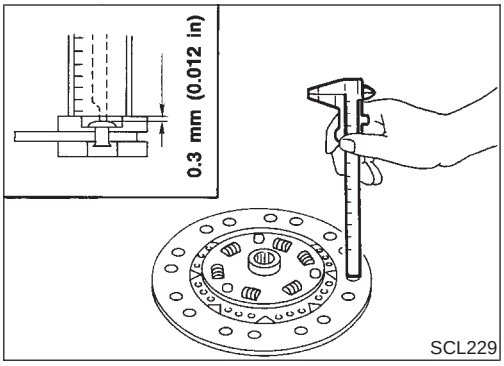
1. Remove manual transmission from the vehicle. Refer to MT-10, “Removal and Installation”.
2. Remove release bearing from clutch cover.
3. Loosen mounting bolts on the clutch cover evenly, and remove clutch cover and clutch disc.

CAUTION:
Do not hold the wedge collar when handling the clutch cover.

Inspection

NACL0034

- Check parts (wedge collar and wiring) contacting the release bearing. If any worn or damaged parts are found, replace the clutch cover as an assembly.
- Check release lever plate for looseness. If necessary, replace clutch cover as an assembly.
- Check thrust ring of the clutch cover for wear or bending. If necessary, replace clutch cover as an assembly.
- If thrust ring is worn, chattering noise is heard when the riveted area is lightly hit with a hammer.
- If thrust ring is bent, jangling noise is heard when cover is swung up and down.
- If seizure mark or discoloration is found with the mating surfaces between pressure plate and clutch disc of clutch cover, repair them with sand-paper. If surfaces are distorted or damaged, replace clutch cover as an assembly.



Inspection and Adjustment

NACL0019

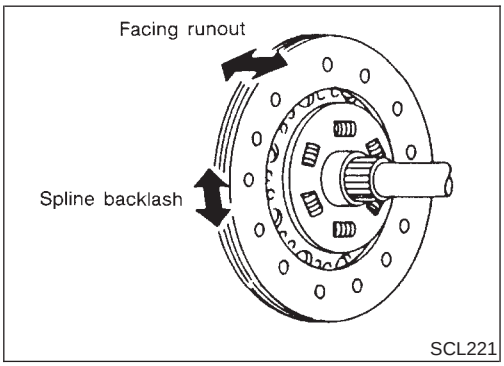
CLUTCH DISC

NACL0019S01

Check the following items, and replace if necessary.

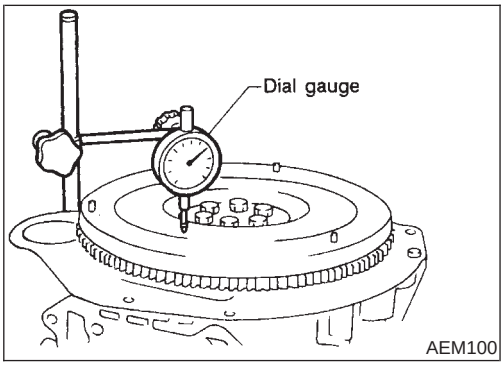
- Clutch disc, for burns, discoloration, oil or grease leakage
- Clutch disc, for wear of facing

Wear limit of facing surface to rivet head:
0.3 mm (0.012 in)



- Clutch disc, for backlash of spline and runout of facing

Maximum backlash of spline (at outer edge of disc):
1.0 mm (0.039 in)
Runout limit:
Less than 0.7 mm (0.028 in)
Distance of runout check point (from hub center):
120 mm (4.72 in)



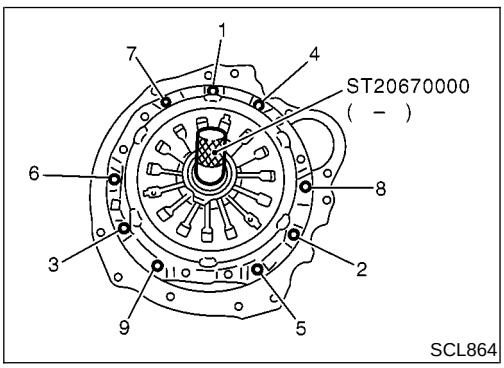
FLYWHEEL INSPECTION

NACL0019S03

CAUTION:
Do not allow any magnetic materials to contact the ring gear teeth.

- Inspect contact surface of flywheel for slight burns or discoloration. Clean flywheel with emery paper.
- Check flywheel runout.

Maximum allowable runout:
Refer to EM-71, “Flywheel/Drive plate Runout”.



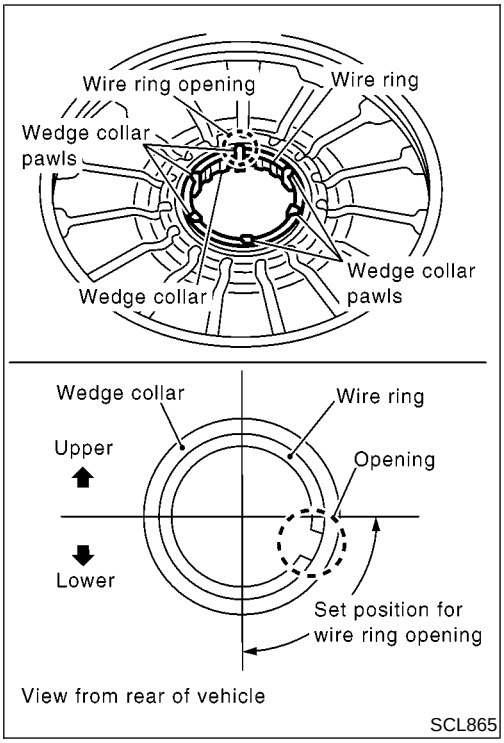
Installation

NACL0035

1. Apply specified Nissan clutch grease to clutch disc and spline of main drive shaft.

CAUTION:
Always apply grease. If no grease is applied, it may cause abnormal noise, insufficient disengagement, or damage to the clutch. Also, always remove excessive grease. If grease is applied excessively, it may cause sliding or juddering.

2. Install clutch disc and clutch cover. Tighten mounting bolts temporarily, and install clutch aligning bar (SST).



3. Tighten clutch cover mounting bolts evenly in the order shown in the figure by two steps.
   1st step:
   : 10 - 19 N·m (1.0 - 2.0 kg-m, 8 - 14 ft-lb)
   Final step:
   : 35 - 44 N·m (3.5 - 4.5 kg-m, 26 - 32 ft-lb)
4. Check that the wire ring of clutch cover is installed securely to wedge collar pawls.
5. Turn flywheel so that the wire ring opening is positioned as shown in the figure.

CAUTION:
Always perform alignment of the wire ring opening. If transmission is installed without alignment, it may cause clutch disengagement failure or clutch pedal operation failure.

6. Install manual transmission.
   Refer to MT-10, "Removal and Installation".

Clutch Control System

NACL0028

Type of clutch control	Hydraulic

Clutch Master Cylinder (With damper)

NACL0021

Inner diameter	15.87 mm (5/8 in)

Clutch Operating Cylinder

NACL0022

Inner diameter	19.05 mm (3/4 in)

Clutch Disc

NACL0023

Unit: mm (in)

Model	250
Facing size (Outer dia. x inner dia. x thickness)	250 × 160 × 3.5 (9.84 × 6.30 × 0.138)
Thickness of disc assembly With load	7.9 - 8.3 (0.311 - 0.327) with 7,355 N (750 kg, 1,654 lb)
Wear limit of facing surface to rivet head	0.3 (0.012)
Runout limit of facing	0.7 (0.028)
Distance of runout check point (from hub center)	120 (4.72)
Maximum backlash of spline (at outer edge of disc)	1.0 (0.039)

Clutch Cover

NACL0024

Unit: mm (in)

Model	250
Set-load	7,355 N (750 kg, 1,654 lb)
Diaphragm spring height	48.2 - 50.2 (1.898 - 1.976)
Uneven limit of diaphragm spring toe height	0.6 (0.024)

Clutch Pedal

NACL0025

Unit: mm (in)

Pedal height “H”*	186 - 196 (7.32 - 7.72)
Pedal free play “A” (at pedal pad)	9 - 16 (0.35 - 0.63)
Clearance between pedal stopper bracket and threaded end of clutch interlock switch (when depressing clutch pedal fully.)	0.1 - 1.5 (0.004 - 0.059)

*: Measured from surface of dash lower panel to pedal pad.

MANUAL TRANSMISSION

SECTION MT

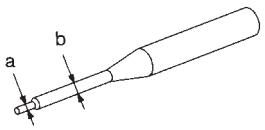
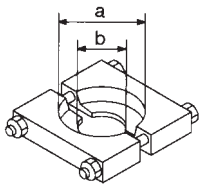
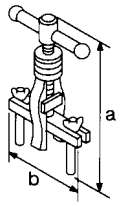
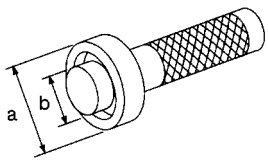
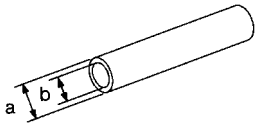
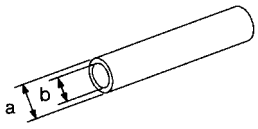
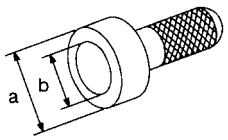
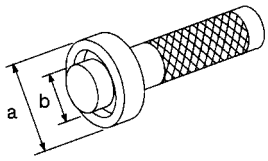
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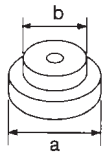
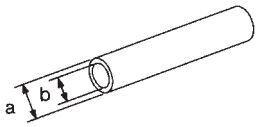
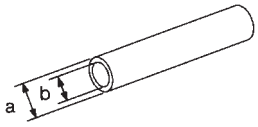
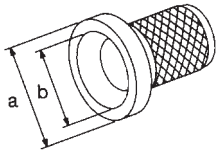
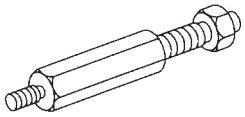
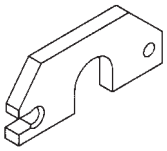
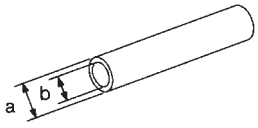
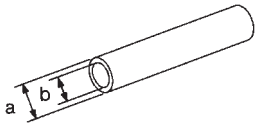
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Special Service Tools

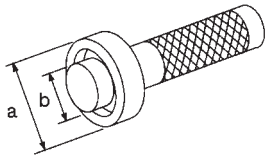
NAMT0001

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
ST23540000 (J25689-A) Pin punch	 NT442	Removing and installing retaining pin **a: 2.3 mm (0.091 in) dia.** **b: 4 mm (0.16 in) dia.**
ST30031000 (J22912-01) Puller	 NT411	Removing 1st & 2nd synchronizer assembly Removing counter gear rear thrust bearing Removing main drive bearing **a: 90 mm (3.54 in) dia.** **b: 50 mm (1.97 in) dia.**
ST33290001 (J25810-A) Puller	 NT414	Removing rear oil seal **a: 250 mm (9.84 in)** **b: 160 mm (6.30 in)**
ST33230000 (—) Drift	 NT084	Removing mainshaft and counter gear **a: 51 mm (2.01 in) dia.** **b: 28.5 mm (1.122 in) dia.**
ST22350000 (J25678-01) Drift	 NT065	Removing counter gear front bearing (Use with KV38100300) **a: 34 mm (1.34 in) dia.** **b: 28 mm (1.10 in) dia.**
KV38100300 (J25523) Drift	 NT065	Removing counter gear front bearing (Use with ST22350000) Installing counter gear rear bearing **a: 54 mm (2.13 in) dia.** **b: 32 mm (1.26 in) dia.**
ST30720000 1 (J34286) 2 (J34331) Drift	 NT115	1 Removing mainshaft front bearing 2 Installing mainshaft front bearing **a: 77 mm (3.03 in) dia.** **b: 55.5 mm (2.185 in) dia.**
ST33210000 1 (J25523) 2 (J25803-01) Drift	 NT084	1 Installing counter gear front bearing 2 Installing front cover oil seal **a: 44 mm (1.73 in) dia.** **b: 24.5 mm (0.965 in) dia.**

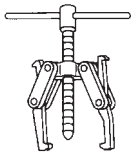
Tool number (Kent-Moore No.) Tool name	Description	
ST30613000 (J25742-3) Drift	 NT073	Installing main drive gear bearing **a: 72 mm (2.83 in) dia.** **b: 48 mm (1.89 in) dia.**
ST37750000 1 (J34286) 2 (J34332) 3 (J34334) 4 (J25679-01) Drift	 NT065	1 Removing counter gear rear bearing 2 Installing OD gear bushing 2 Removing and installing mainshaft rear bearing (4WD model) 2 Installing reverse cone 3 Installing reverse counter gear 4 Installing counter gear rear end bearing **a: 40 mm (1.57 in) dia.** **b: 31 mm (1.22 in) dia.**
ST22452000 (J34337) Drift	 NT065	Installing reverse hub Installing mainshaft rear bearing (2WD model) **a: 45 mm (1.77 in) dia.** **b: 36 mm (1.42 in) dia.**
ST33400001 (J26082) Drift	 NT086	Installing rear oil seal **a: 60 mm (2.36 in) dia.** **b: 47 mm (1.85 in) dia.**
(J26349-3) Puller leg	 NT078	Installing mainshaft and counter gear (Use with J34328)
(J34328) Puller	 NT079	Installing mainshaft and counter gear (Use with J26349-3)
(J26092) Drift	 NT065	Installing sub-gear snap ring **a: 44.5 mm (1.752 in) dia.** **b: 38.5 mm (1.516 in) dia.**
(J34342) Drift	 NT065	Installing OD main gear Installing reverse gear bushing **a: 44.5 mm (1.752 in) dia.** **b: 40.5 mm (1.594 in) dia.**

Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
ST33220000 (J25804-01) Drift	 NT084	Installing mainshaft rear bearing **a: 37 mm (1.46 in) dia.** **b: 22 mm (0.87 in) dia.**

Commercial Service Tool

NAMT0002

Tool name	Description	
Puller	 NT077	Removing counter gear rear end bearing Removing mainshaft rear bearing (2WD model) Removing reverse synchronizer hub Removing reverse counter gear

NVH Troubleshooting Chart

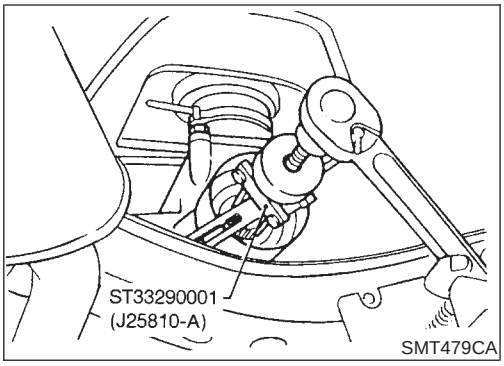
NAMT0023S01

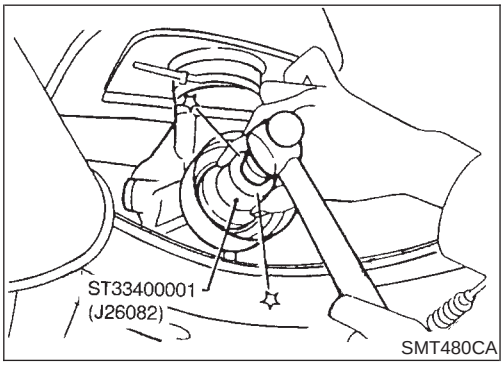
Use the chart below to help you find the cause of the problem. The numbers indicate the order of the inspection. If necessary, repair or replace these parts.

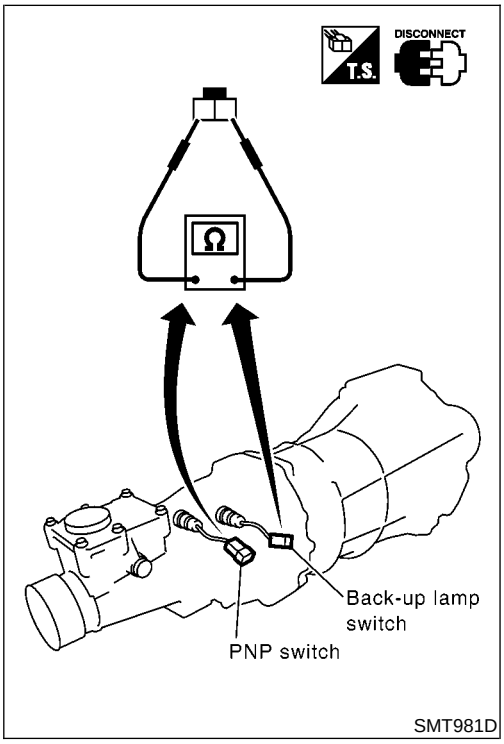
MANUAL TRANSMISSION

NAMT0023S0101

Reference page			Refer to MA-22, "Checking M/T Oil".		MT-13	MT-13	MT-16	MT-16	MT-16	MT-14	MT-14	MT-14	MT-14
SUSPECTED PARTS (Possible cause)		OIL (Level low)	OIL (Wrong)	OIL (Level too high)	GASKET (Damaged)	OIL SEAL (Worn or damaged)	O-RING (Worn or damaged)	CHECK PLUG RETURN SPRING AND CHECK BALL (Worn or damaged)	SHIFT FORK (Worn)	GEAR (Worn or damaged)	BEARING (Worn or damaged)	BAULK RING (Worn or damaged)	INSERT SPRING (Damaged)
Symptom	Noise	1	2							3	3		
	Oil leakage		3	1	2	2	2						
	Hard to shift or will not shift		1	1								2	2
	Jumps out of gear							1	2	2			







Replacing Rear Oil Seal — 2WD Model

NAMT0003

REMOVAL

NAMT0003S01

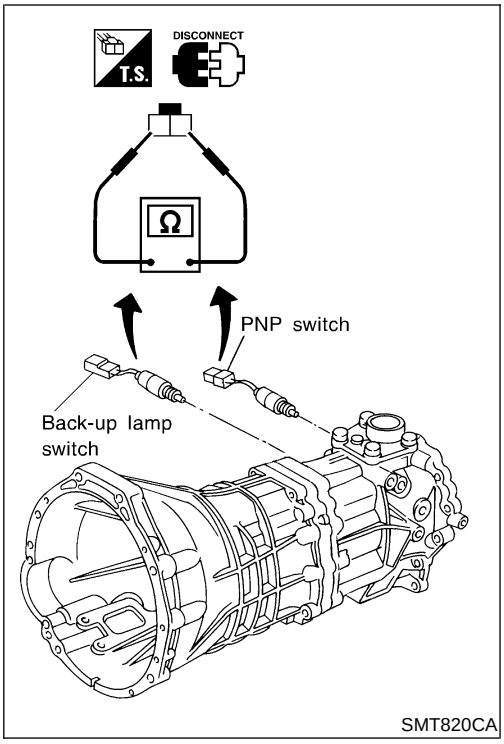
INSTALLATION

NAMT0003S02

Position Switch Check — 2WD Model

NAMT0004

Switch	Gear position	Continuity
Back-up lamp switch	Reverse	Yes
	Except reverse	No
PNP switch	Neutral	Yes
	Except neutral	No



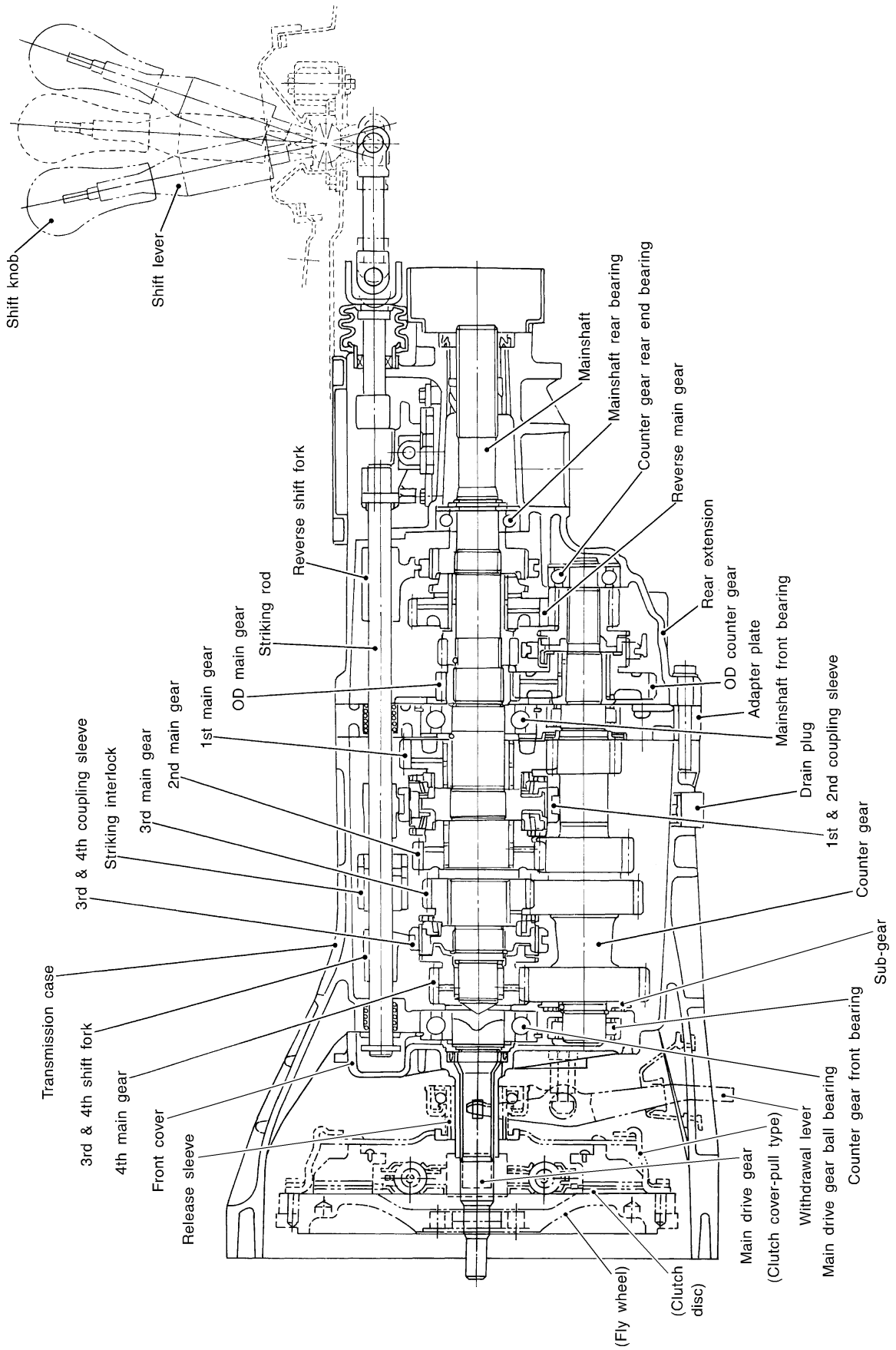
Position Switch Check — 4WD Model

NAMT0024

Switch	Gear position	Continuity
Back-up lamp switch	Reverse	Yes
	Except reverse	No
PNP switch	Neutral	Yes
	Except neutral	No

Cross-sectional View — 2WD Model

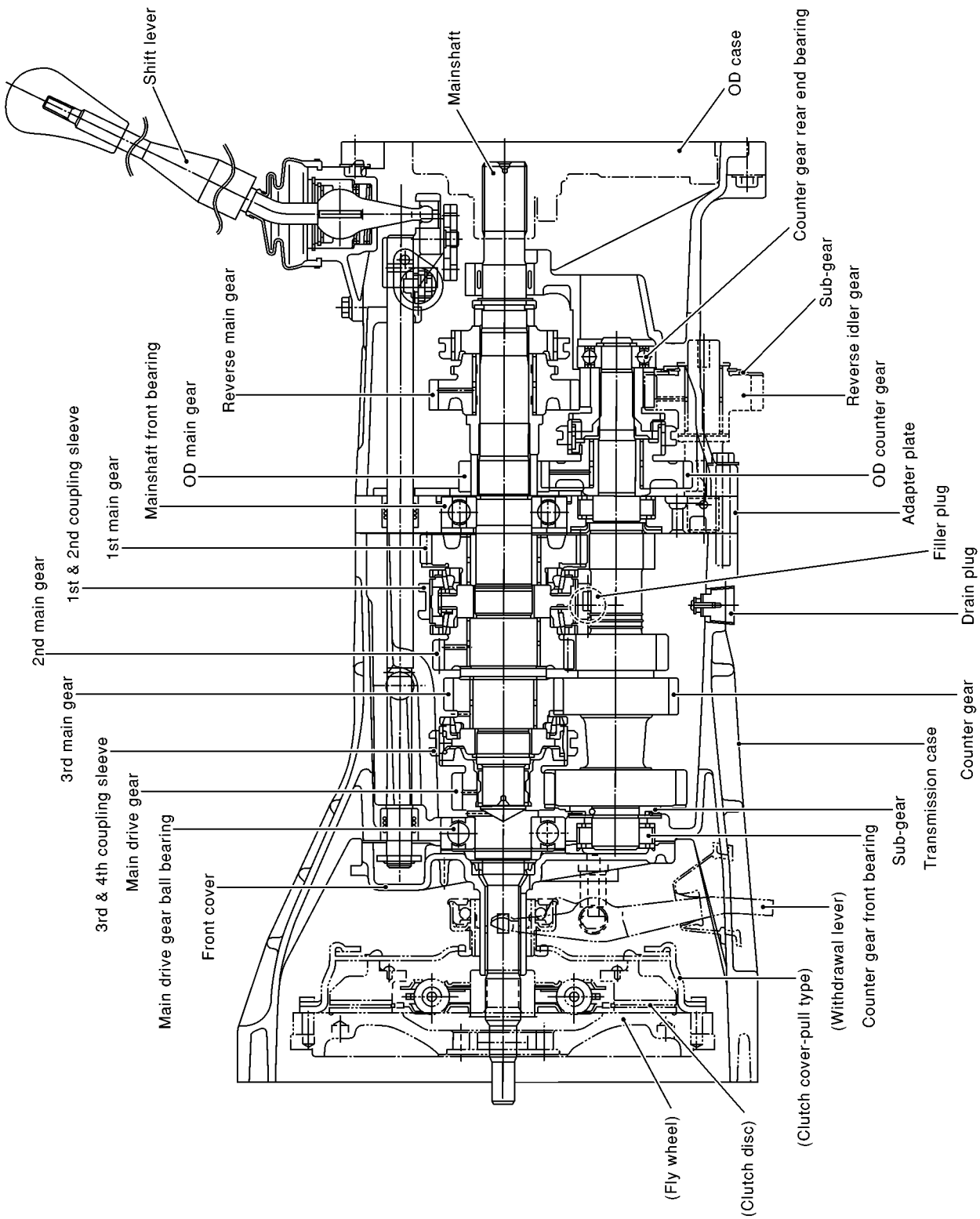
NAMT0005S01



SMT989D

Cross-sectional View — 4WD Model

NAMT0005S02

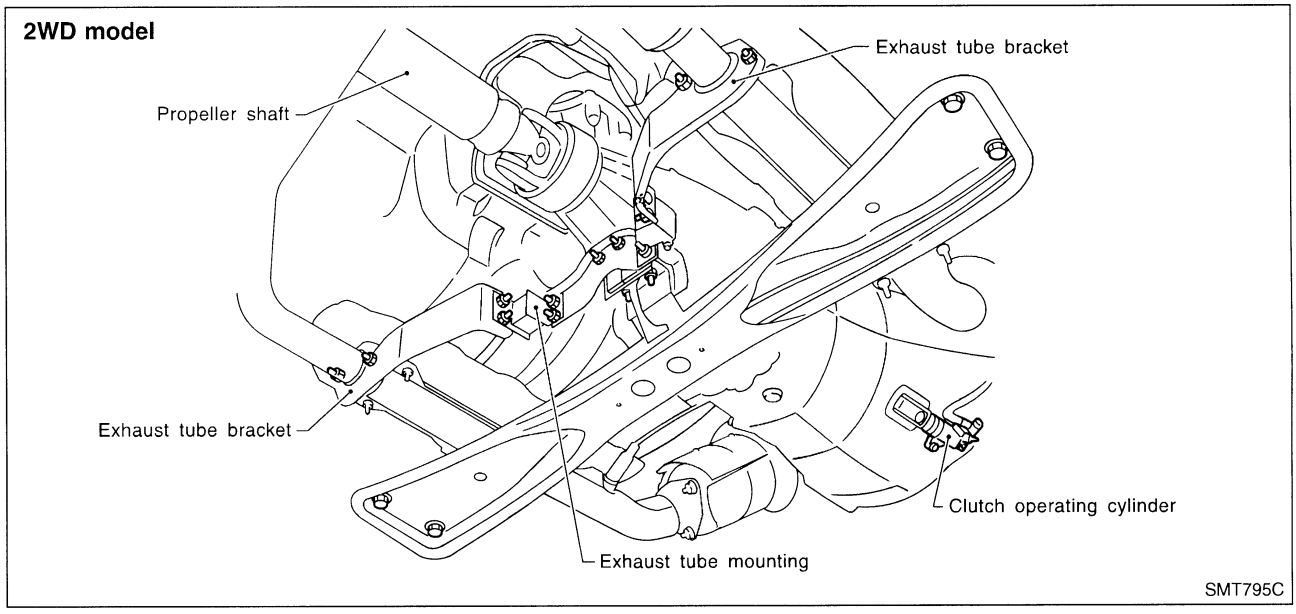


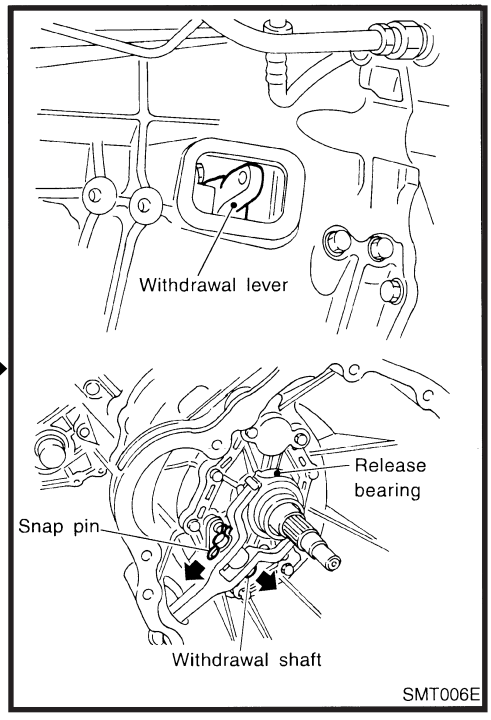
SMT990D

Removal

NAMT0006S01

CAUTION:
When removing the M/T assembly from engine, first remove the crankshaft position sensor (OBD) from the M/T assembly. Be careful not to damage sensor edge.





2WD MODEL

NAMT0006S0101

1. Remove battery negative terminal.
2. Remove shift lever from transmission.
3. Remove crankshaft position sensor (OBD) from lower side of transmission case.
4. Remove clutch operating cylinder from transmission. Tighten clutch operating cylinder to the specified torque. Refer to CL-5, “CLUTCH SYSTEM”.
5. Lower the transmission out of the body with the speed sensor and other harnesses still connected. The harnesses are attached to the body in four places. ←
6. Remove starter motor from transmission.
   : 41 - 52 N·m (4.2 - 5.3 kg-m, 30 - 38 ft-lb)
7. Remove propeller shaft. Refer to PD-8, “Removal and Installation”.

- **Insert plug into rear oil seal after removing propeller shaft.**
- **Be careful not to damage spline, sleeve yoke and rear oil seal when removing propeller shaft.**

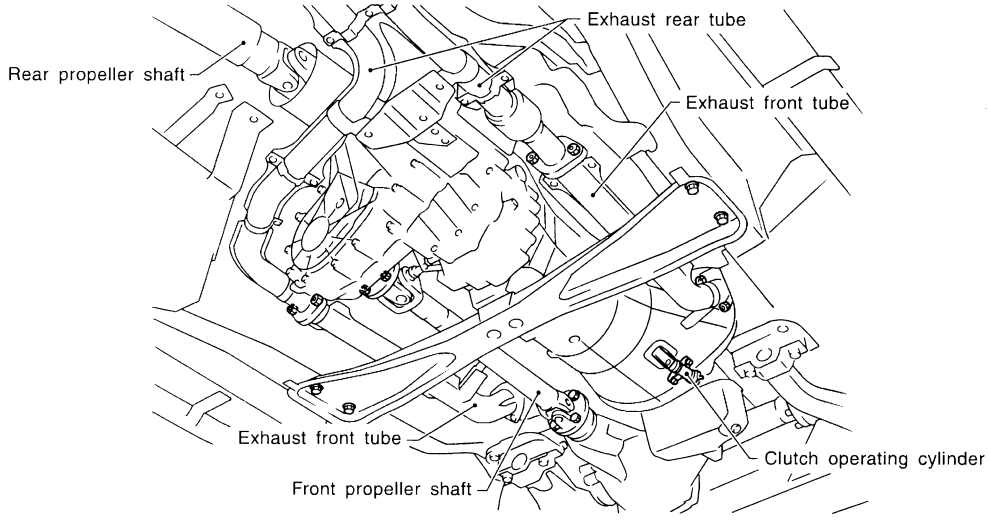
8. Remove clutch withdrawal lever and release bearing following the procedures below. ←
   a. Remove the dust cover on the withdrawal lever hole from the transmission case.

b. Pull out snap pin on the withdrawal shaft, and then pull out withdrawal shaft to remove withdrawal lever and release bearing.

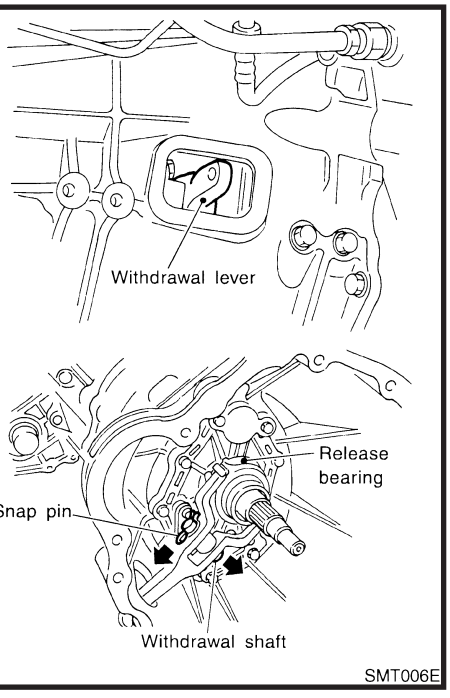
9. Remove exhaust tube mounting bracket from transmission. Refer to FE-8, "EXHAUST SYSTEM".
10. Support manual transmission with a jack.
11. Remove rear mounting member. Tighten rear mounting member to the specified torque. Refer to EM-58, "Removal and Installation".
12. Remove bolt securing engine to manual transmission to separate engine from the transmission.
13. Lower manual transmission as much as possible.

WARNING:
Support manual transmission while removing it.

4WD model



SMT815C



SMT006E

4WD MODEL

NAMT0006S0102

1. Remove battery negative terminal.
2. Remove shift lever from transmission and control lever from transfer.
3. Remove crankshaft position sensor (OBD) from lower side of transmission case.
4. Remove clutch operating cylinder from transmission. Tighten clutch operating cylinder to the specified torque. Refer to CL-5, "CLUTCH SYSTEM".
5. Lower the transmission out of the body with the speed sensor and other harnesses still connected. The harnesses are attached to the body in four places.
6. Remove starter motor from transmission.
   : 41 - 52 N·m (4.2 - 5.3 kg-m, 30 - 38 ft-lb)
7. Remove front and rear propeller shafts. Refer to PD-8, "Removal and Installation".

- **Insert plug into rear oil seal after removing propeller shaft.**
- **Be careful not to damage spline, sleeve yoke and rear oil seal when removing propeller shaft.**

8. Remove clutch withdrawal lever and release bearing following the procedures below.

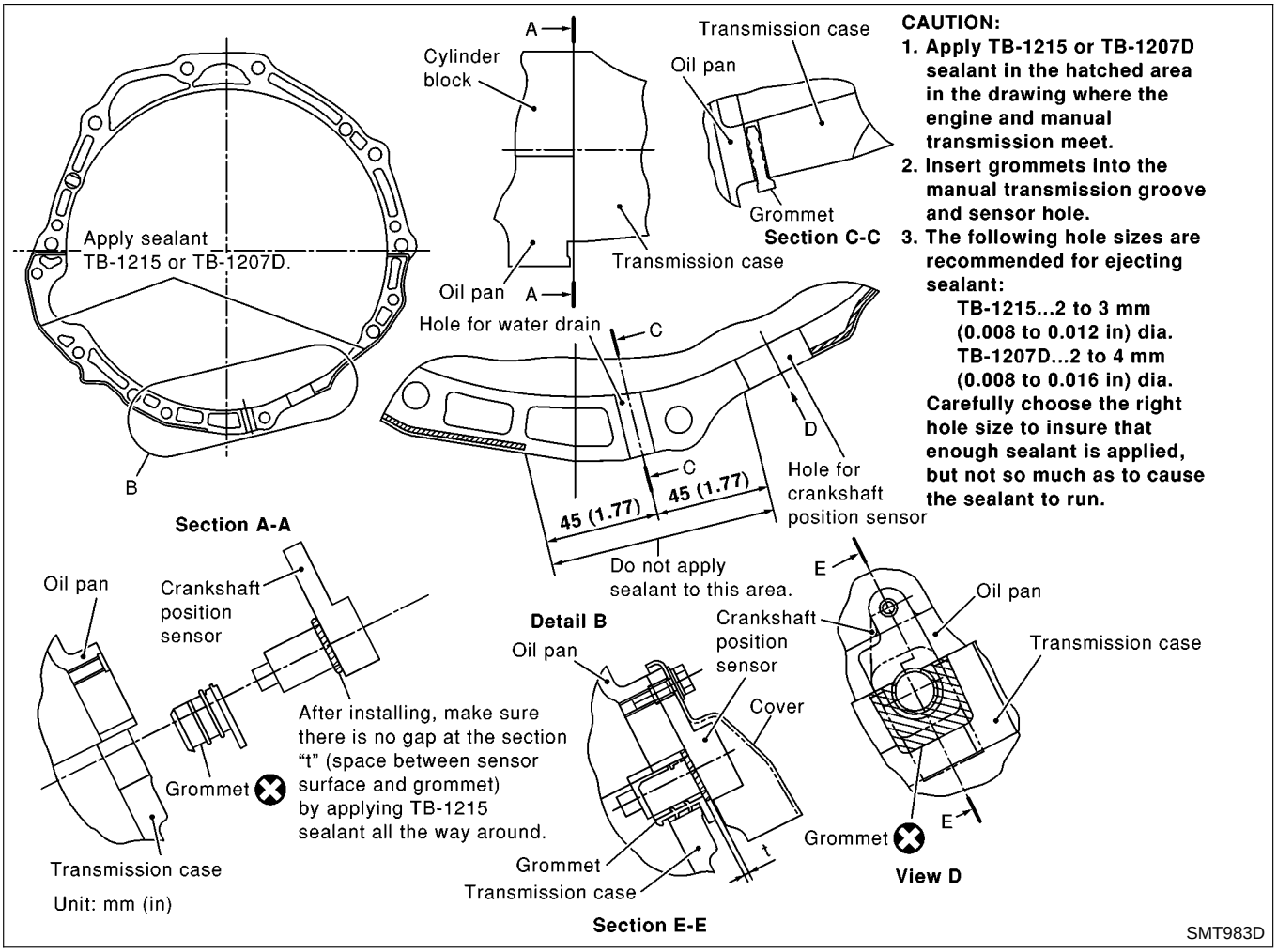
10. Remove rear mounting member. Tighten rear mounting member to the specified torque. Refer to EM-58, "Removal and Installation".
11. Lower manual transmission as much as possible.

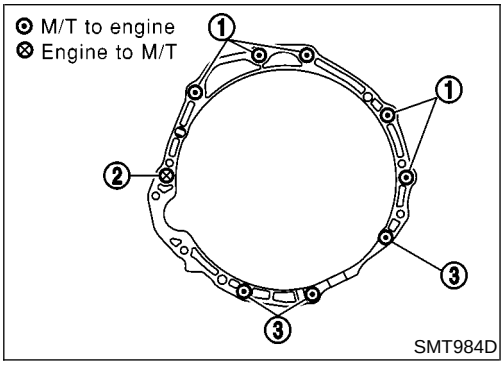
WARNING:
Support Manual Transmission together with transfer, while removing it.

Installation

NAMT0006S02

- Apply sealant as below: — 4WD model



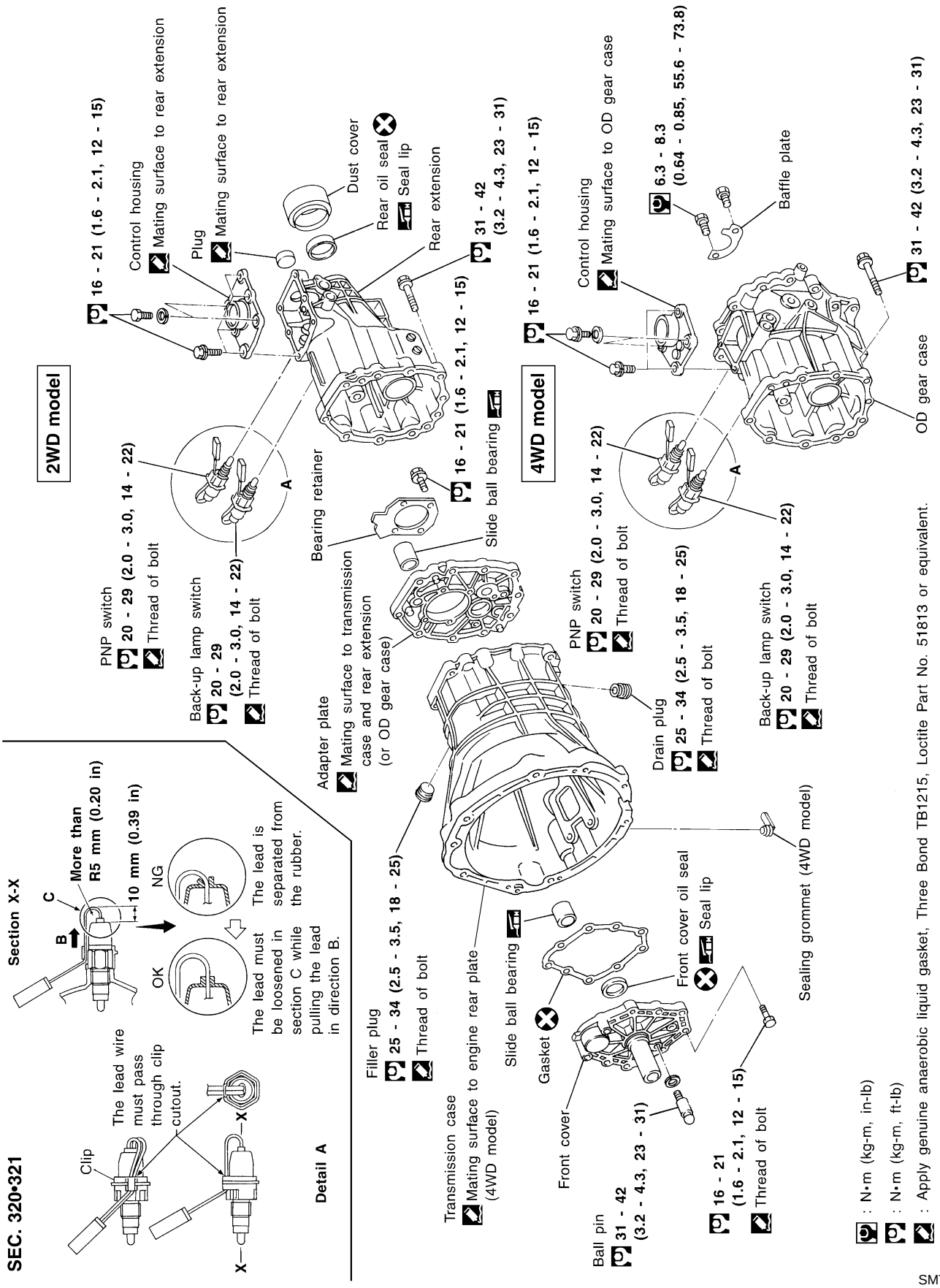


- Tighten bolt securing transmission.

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	ℓ mm (in)
1	70 - 79 (7.1 - 8.1, 52 - 58)	65 (2.56)
2	70 - 79 (7.1 - 8.1, 52 - 58)	55 (2.17)
3	29 - 39 (3.0 - 4.0, 22 - 28)	40 (1.57)

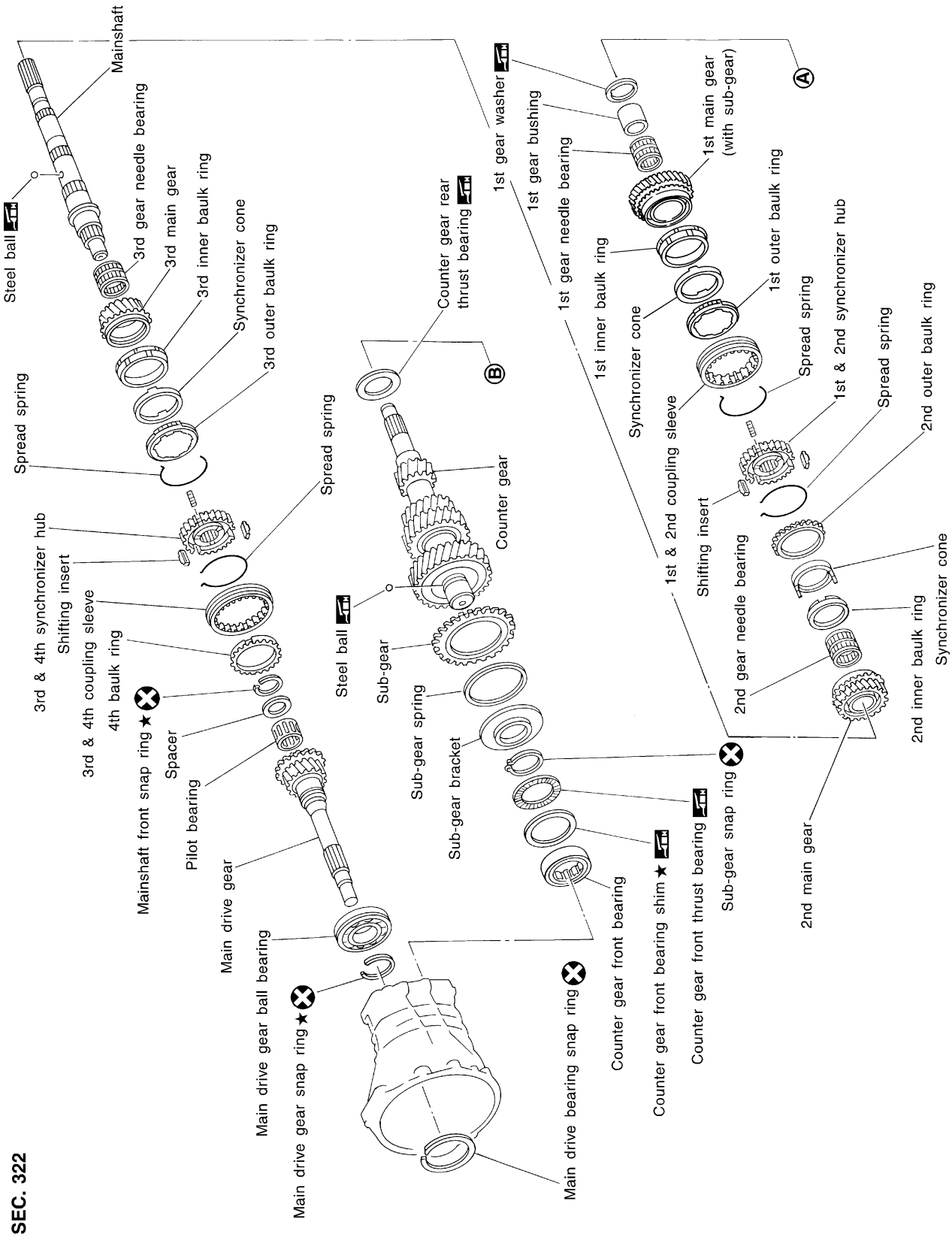
Case Components

NAMT0007S01

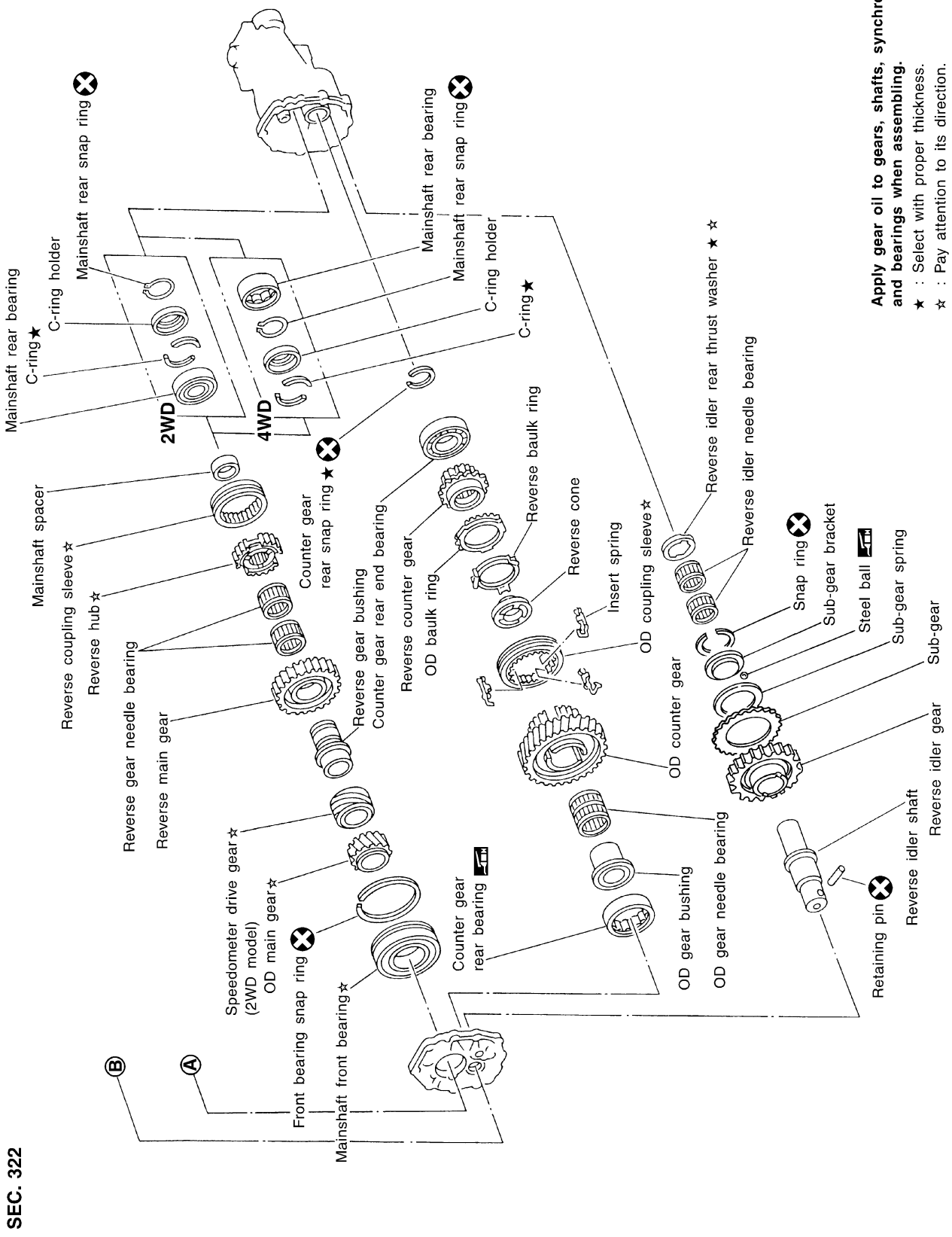


Gear Components

NAMT0007S02



SMT986D

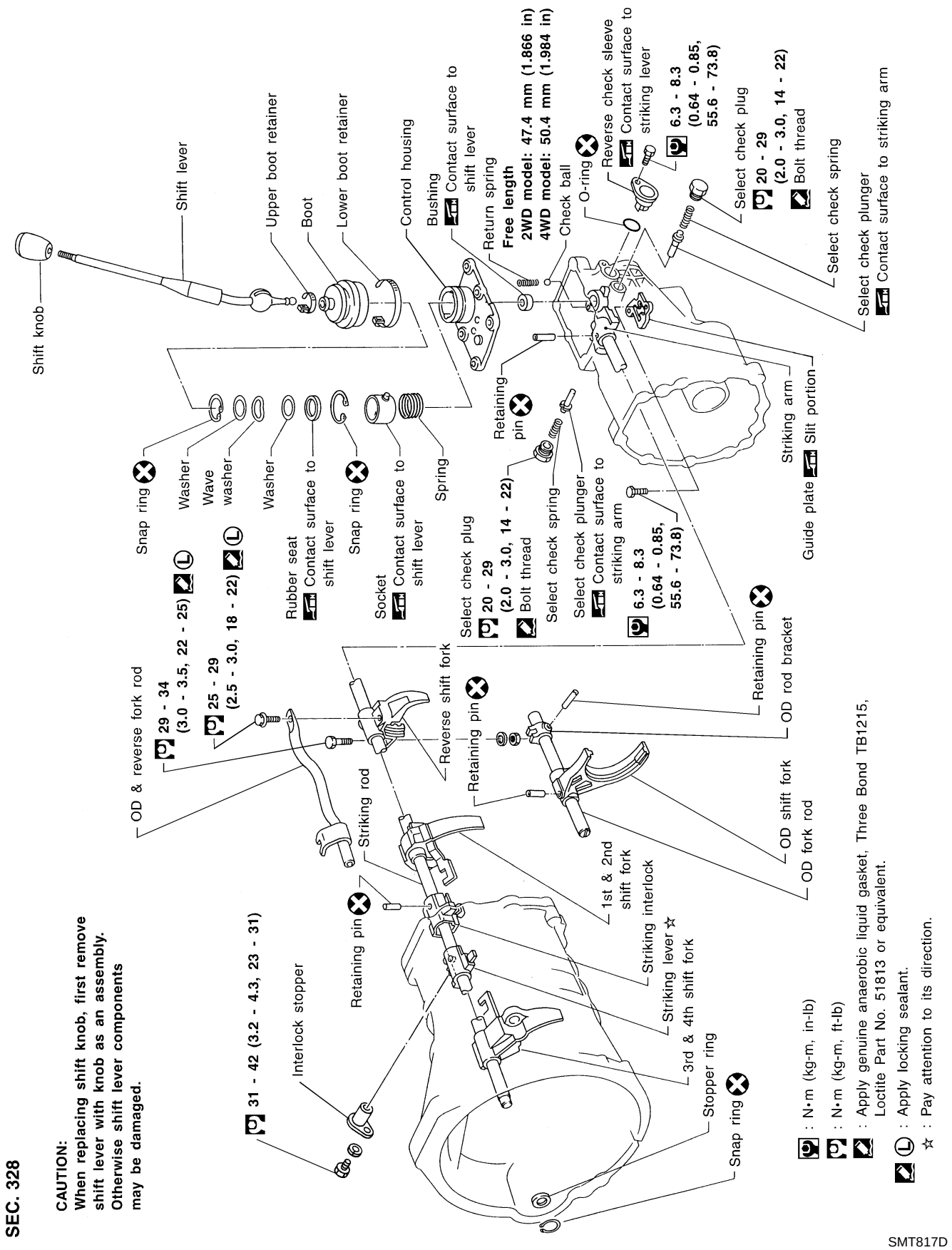


SEC. 322

SMT987D

Shift Control Components

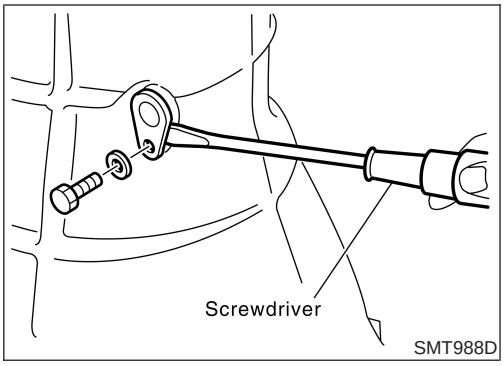
NAMT0007S03



SEC. 328

CAUTION:
When replacing shift knob, first remove shift lever with knob as an assembly. Otherwise shift lever components may be damaged.

SMT817D



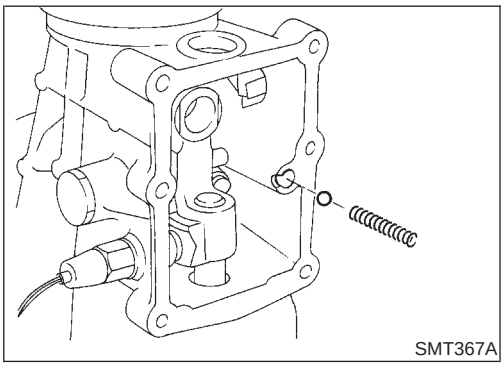
Case Components

DISASSEMBLY

NAMT0008

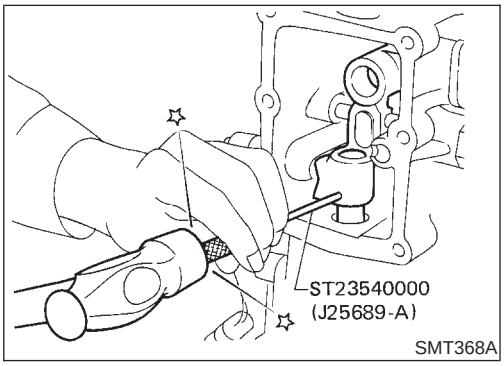
1. Remove check ball plug, check spring and check ball. Then remove interlock stopper.

- **If interlock assembly is removed as a unit, the check ball can fall into transmission case.**
- **Be careful not to lose check ball.**

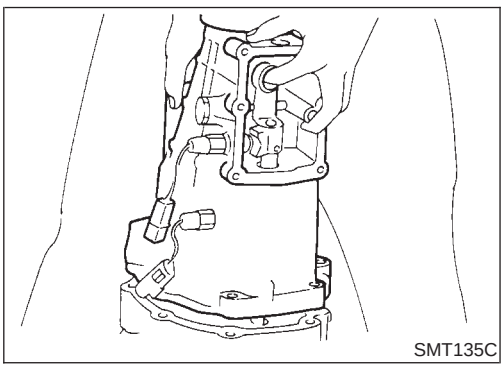


2. Remove control housing, return spring and check ball.

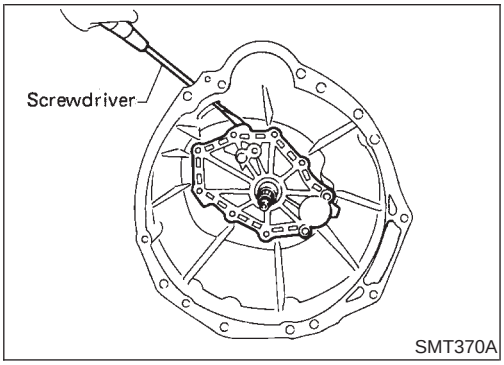
- **Be careful not to lose check ball.**



3. Drive out retaining pin from striking arm.

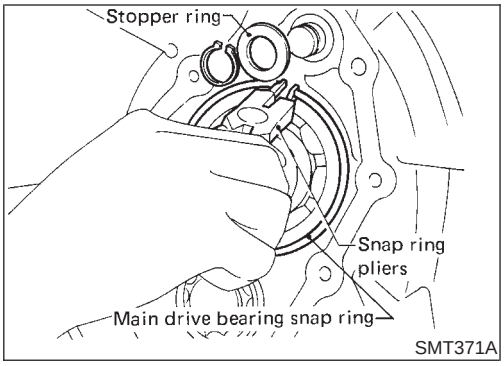


4. Remove rear extension (or OD gear case) together with striking arm by tapping lightly.

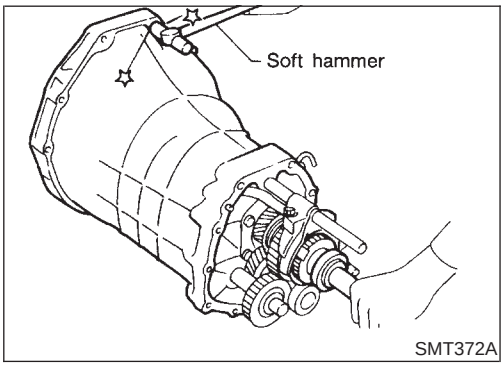


5. Remove front cover and gasket.

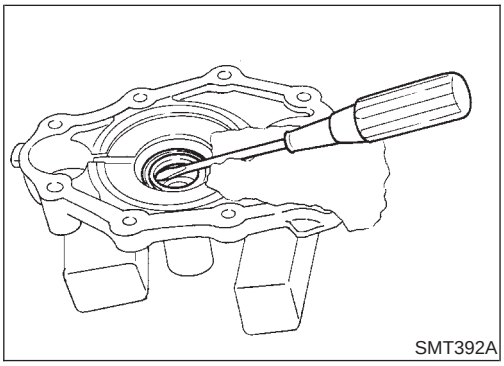
Case Components (Cont'd)



6. Remove stopper ring and main drive bearing snap ring.



7. Remove transmission case by tapping lightly.



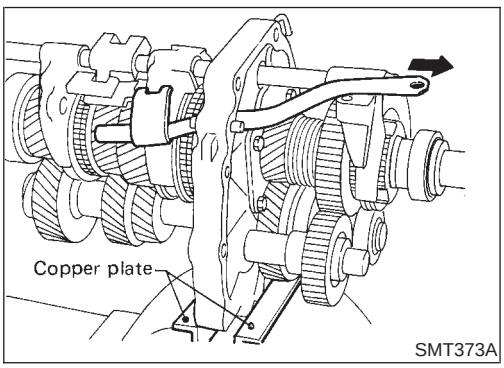
8. Remove front cover oil seal.

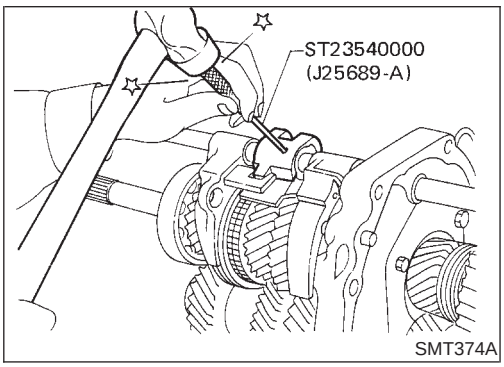
Shift Control Components

DISASSEMBLY

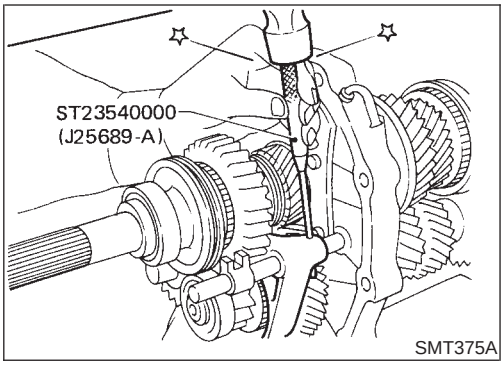
NAMT0009

1. Mount adapter plate on vise.
2. Remove OD & reverse fork rod.



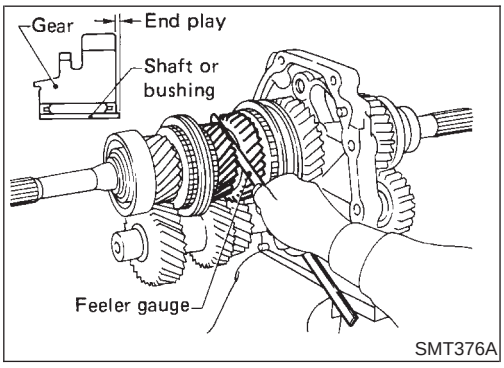


3. Drive out retaining pin from striking lever.
4. While pulling out striking rod, remove striking lever and striking interlock. Then remove 1st & 2nd, 3rd & 4th and reverse shift fork.



SMT375A

5. Drive out retaining pin from OD shift fork.
6. Pull out OD fork rod and then remove OD shift fork.



SMT376A

Gear Components

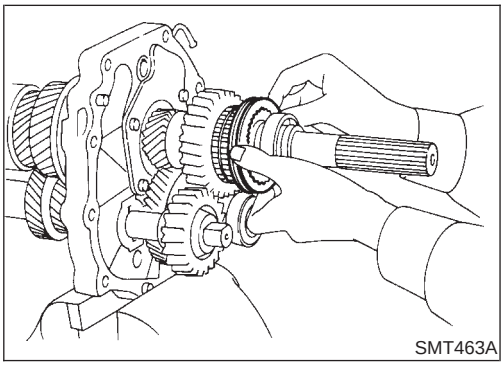
DISASSEMBLY

NAMT0010

1. Before removing gears and shafts, measure each gear end play.

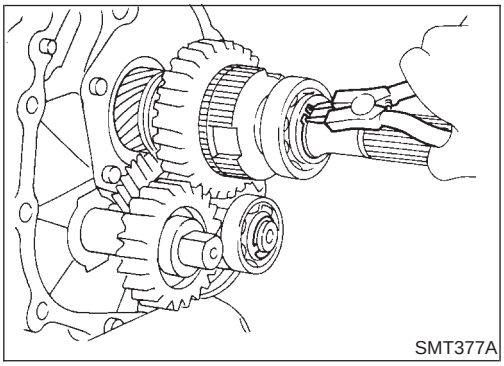
Gear end play:
Refer to SDS, MT-36.

- If not within specification, disassemble and check contact surface of gear to hub, washer, bushing, needle bearing and shaft.

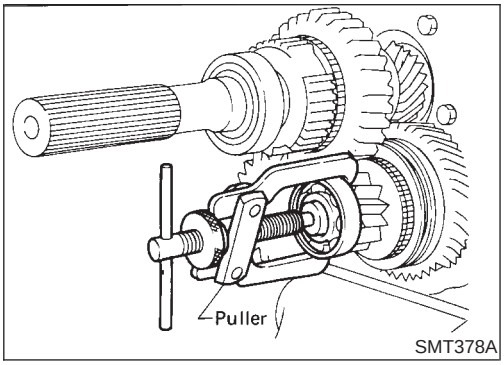

SMT463A

2. Remove rear side components on mainshaft and counter gear.

a. Remove reverse coupling sleeve.

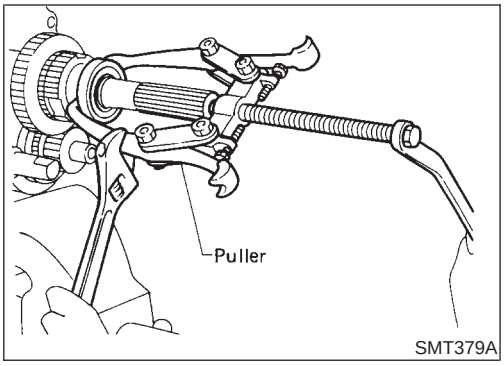

SMT377A

b. Remove mainshaft rear snap ring and counter gear rear snap ring.
c. Remove C-ring holder and mainshaft C-rings from mainshaft. Use punch and hammer to remove C-rings.

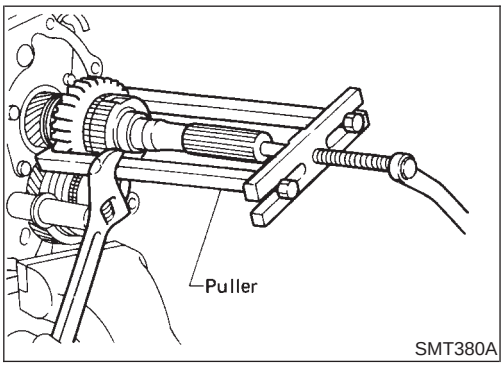


SMT378A

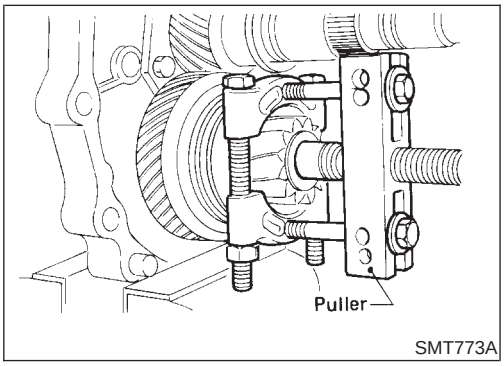
d. Pull out counter gear rear end bearing.
e. Remove reverse idler gear and reverse idler thrust washers.



f. Pull out mainshaft rear bearing (2WD model).

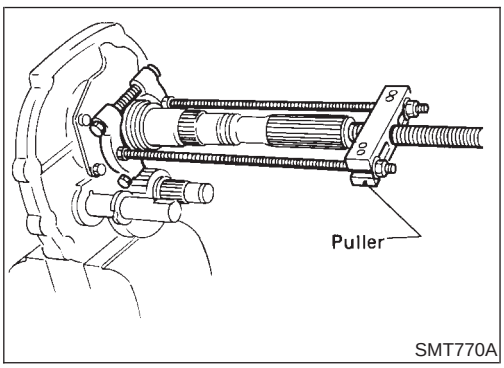


g. Pull out reverse main gear together with mainshaft spacer and reverse synchronizer hub. Then remove reverse gear needle bearings.

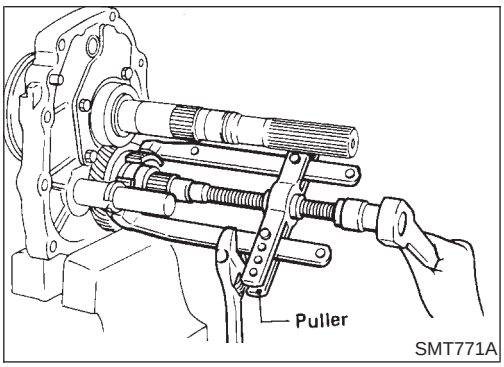


h. Pull out reverse counter gear.

i. Remove OD coupling sleeve together with OD baulk ring, reverse baulk ring and spring inserts.

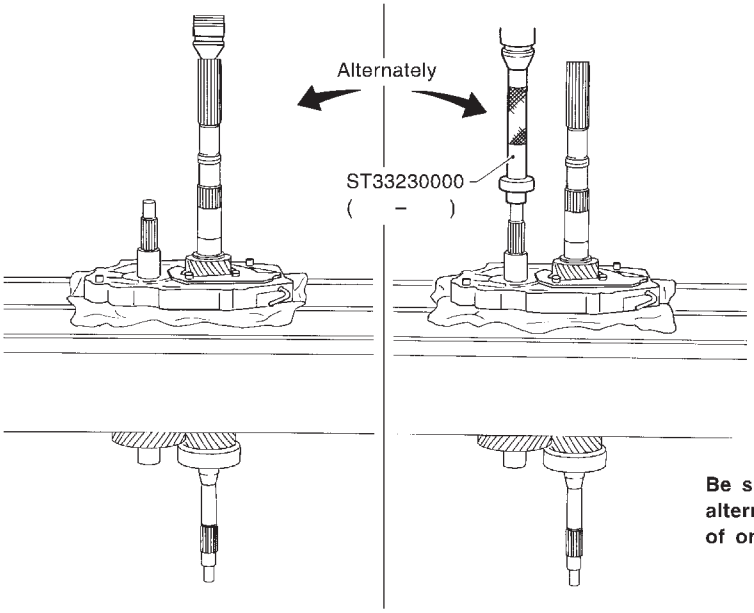


j. Pull out reverse gear bushing.



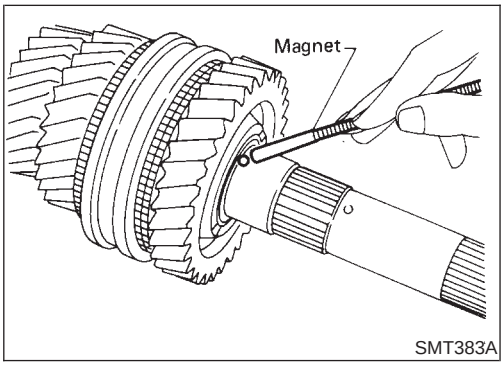
k. Pull out OD counter gear together with reverse cone.

3. Press out mainshaft and counter gear alternately.



Be sure to press mainshaft and counter gear alternately so as not to allow the front surface of one to contact the rear surface of the other.

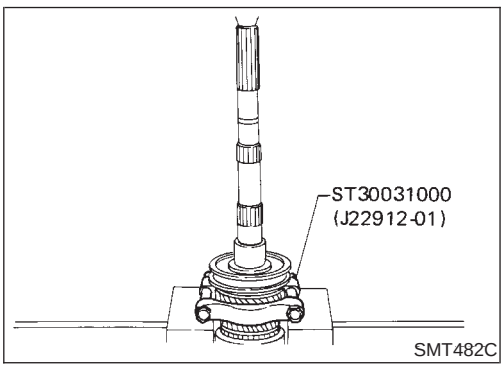
SMT772A



SMT383A

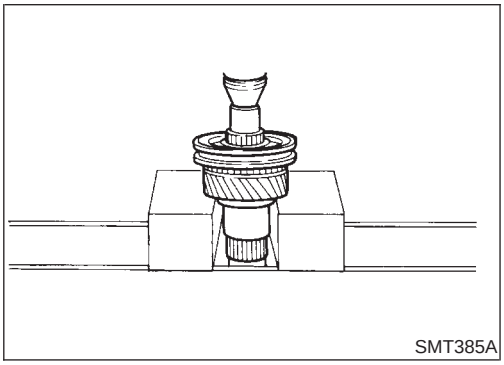
4. Remove front side components on mainshaft.
a. Remove 1st gear washer and steel ball.
b. Remove 1st main gear and 1st gear needle bearing.

- **Be careful not to lose steel ball.**



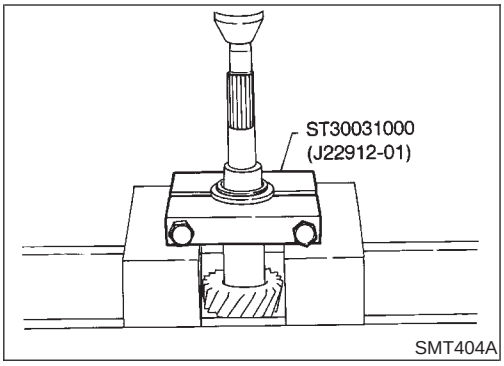
SMT482C

c. Press out 2nd main gear together with 1st gear bushing and 1st & 2nd synchronizer assembly.
d. Remove mainshaft front snap ring.

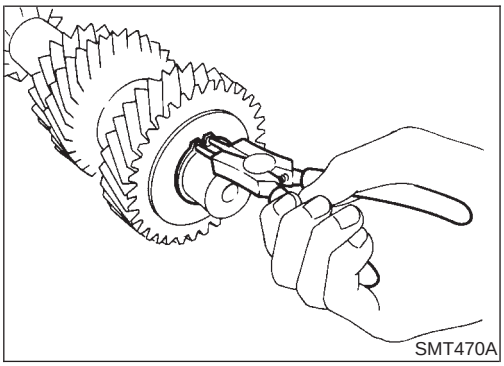


SMT385A

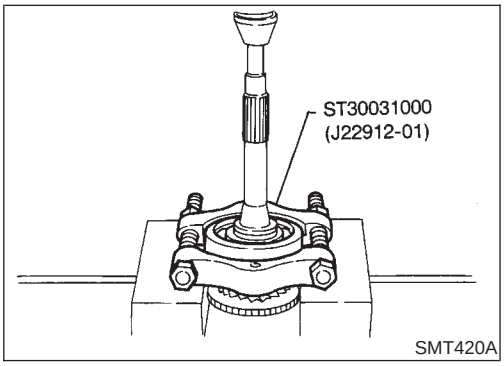
e. Press out 3rd main gear together with 3rd & 4th synchronizer assembly and 3rd gear needle bearing.



5. Remove front side components on counter gear.
a. Remove counter gear rear thrust bearing.



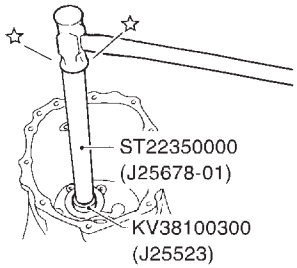
b. Remove sub-gear components.



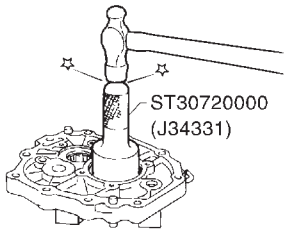
6. Remove main drive gear bearing.
a. Remove main drive gear snap ring.
b. Press out main drive gear bearing.

7. Remove bearings from case components.

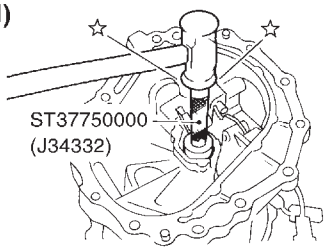
Counter gear front bearing in transmission case



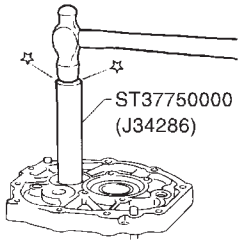
Mainshaft front bearing in adapter plate



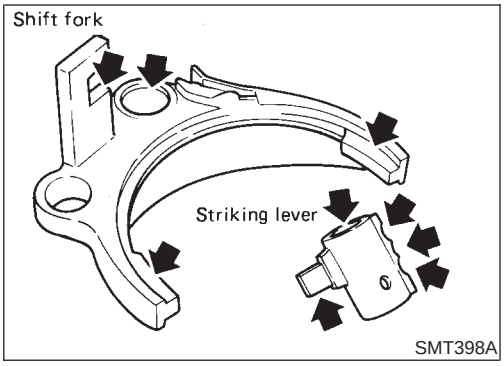
Mainshaft rear bearing in OD gear case (4WD model)



Counter gear rear bearing in adapter plate



SMT206D

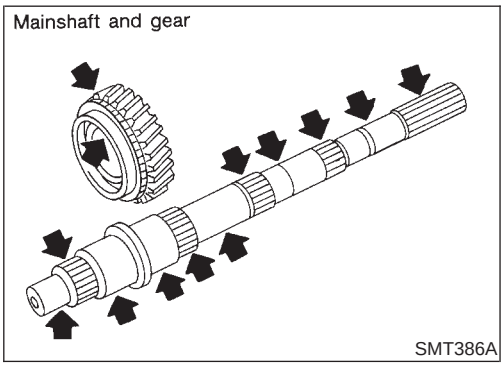


Shift Control Components

INSPECTION

NAMT0011

- Check contact surface and sliding surface for wear, scratches, projections or other damage.



Gear Components

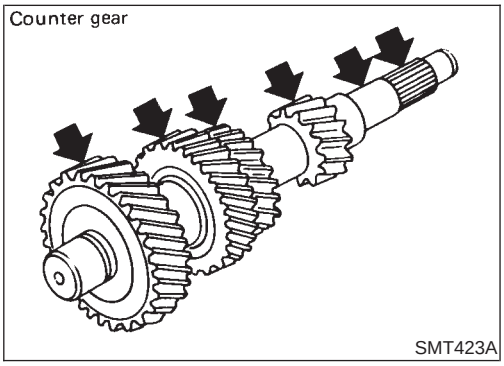
INSPECTION

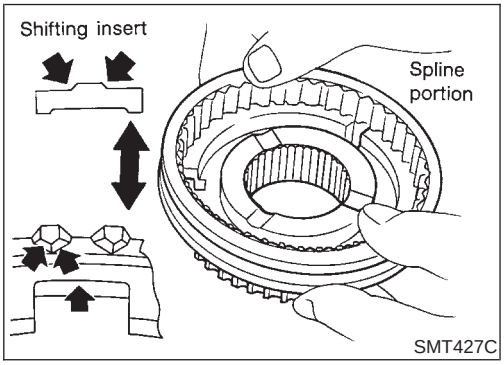
NAMT0012

Gears and Shafts

NAMT0012S01

- Check shafts for cracks, wear or bending.
- Check gears for excessive wear, chips or cracks.

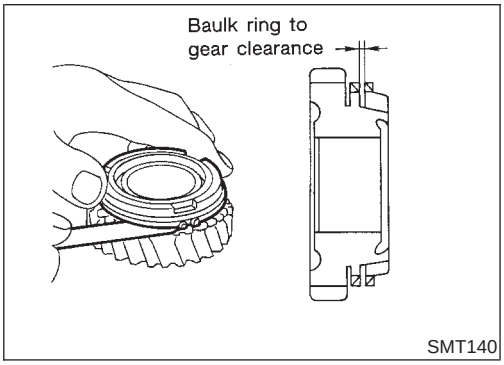




Synchronizers

NAMT0012S02

- Check spline portion of coupling sleeves, hubs, and gears for wear or cracks.
- Check baulk rings for cracks or deformation.
- Check shifting inserts for wear or deformation.
- Check insert springs for deformation.



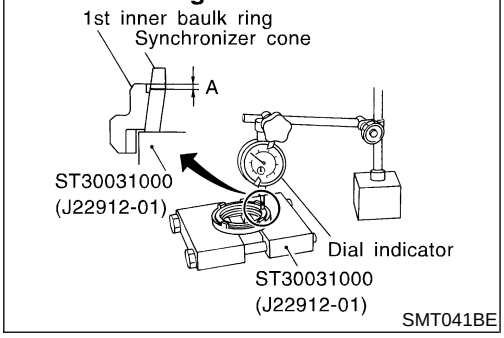
- Measure wear of main drive and OD baulk rings.

  Clearance between baulk ring and gear:

  Refer to SDS, MT-36.

- If the clearance is smaller than the wear limit, replace baulk ring.

Inner baulk ring



- Measure wear of 1st, 2nd and 3rd baulk rings.

a) Place baulk rings in position on synchronizer cone.

b) While holding baulk rings against synchronizer cone as far as it will go, measure dimensions "A" and "B".

Standard:

A 0.7 - 0.9 mm (0.028 - 0.035 in)

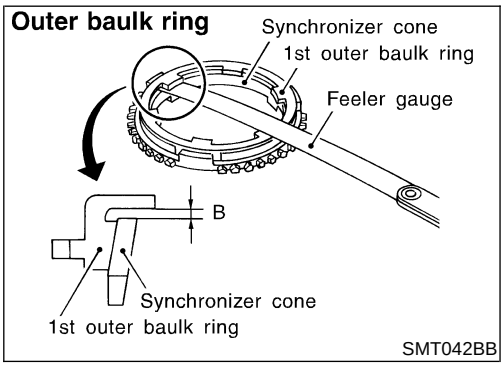
B 0.6 - 1.1 mm (0.024 - 0.043 in)

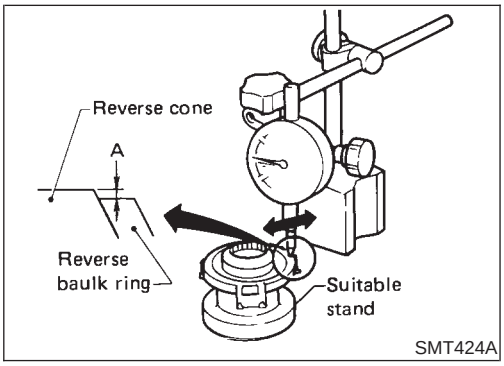
Wear limit:

0.2 mm (0.008 in)

- If dimension "A" or "B" is smaller than the wear limit, replace outer baulk ring, inner baulk ring and synchronizer cone as a set.

Outer baulk ring





- Measure wear of reverse baulk ring.

a) Place baulk ring in position on reverse cone.

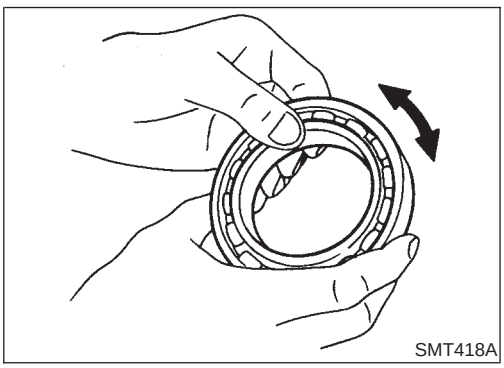
b) While holding baulk ring against reverse cone as far as it will go, measure dimension "A" with dial indicator.

Dimension "A":

Standard −0.1 to 0.35 mm (−0.0039 to 0.0138 in)

Wear limit 0.7 mm (0.028 in)

c) If dimension "A" is larger than the wear limit, replace baulk ring.



Bearings

NAMT0012S03

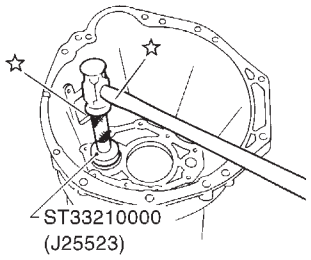
- Make sure bearings roll freely and are free from noise, crack, pitting or wear.

Gear Components

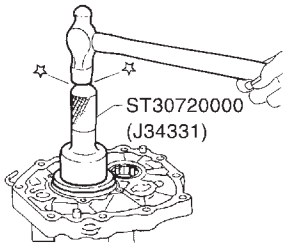
ASSEMBLY

NAMT0013

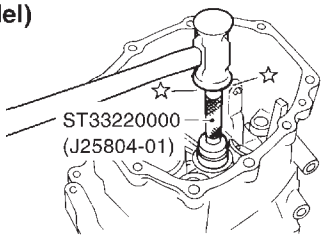
Counter gear front bearing in transmission case



Mainshaft front bearing in adapter plate

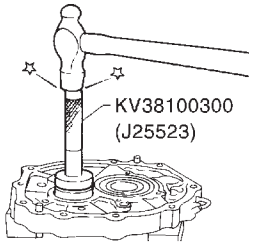


Mainshaft rear bearing in OD gear case (4WD model)

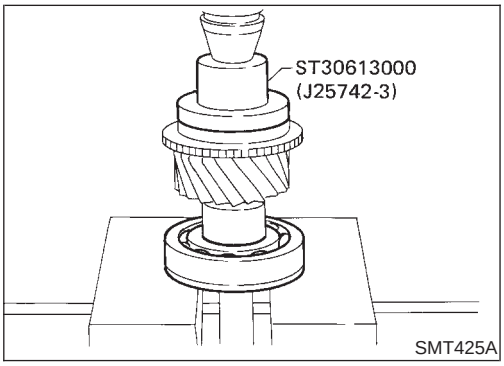


Be flush with front surface of OD gear case.

Counter gear rear bearing in adapter plate



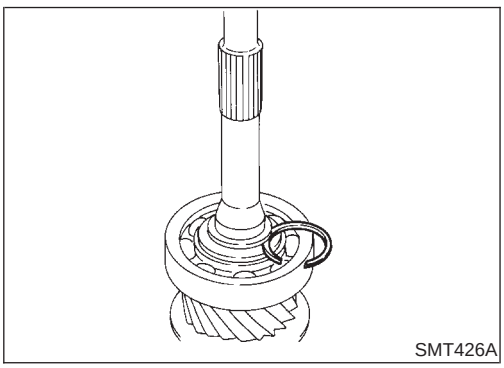
SMT207D



SMT425A

1. Install bearings into case components.
2. Install main drive gear bearing.

a. Press main drive gear bearing.

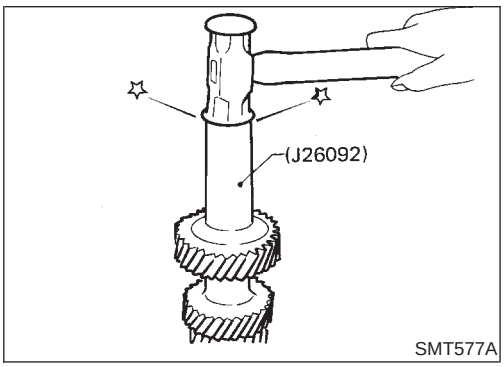


SMT426A

b. Select proper main drive gear snap ring to minimize clearance of groove.

Allowable clearance of groove:
0 - 0.1 mm (0 - 0.004 in)
Main drive gear snap ring:
Refer to SDS, MT-37.

c. Install selected snap ring on main drive gear.

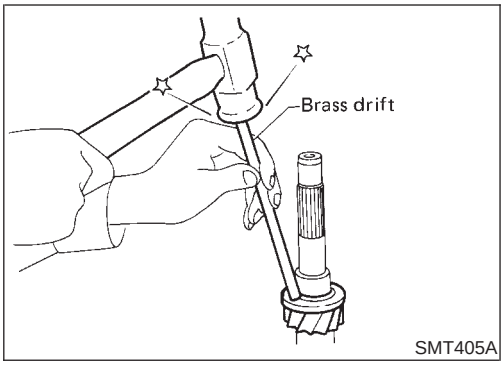


SMT577A

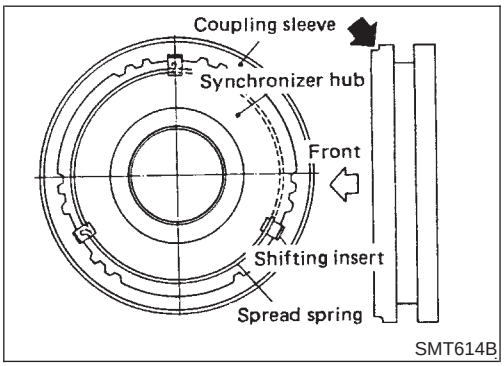
3. Install components on counter gear.

a. Install sub-gear components.

- **When installing sub-gear snap ring, tap sub-gear snap ring into position on counter gear.**

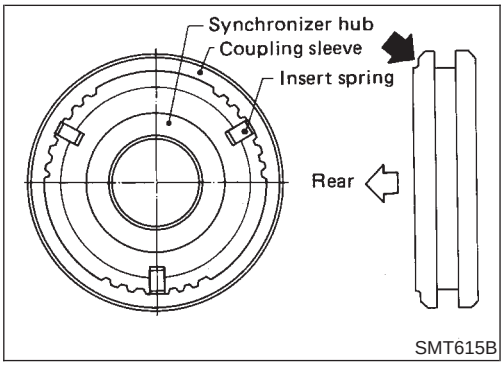


b. Install counter gear rear thrust bearing.

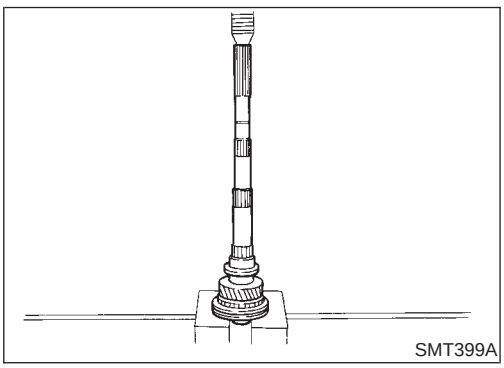


4. Install front side components on mainshaft.

a. Assemble 1st & 2nd synchronizer.

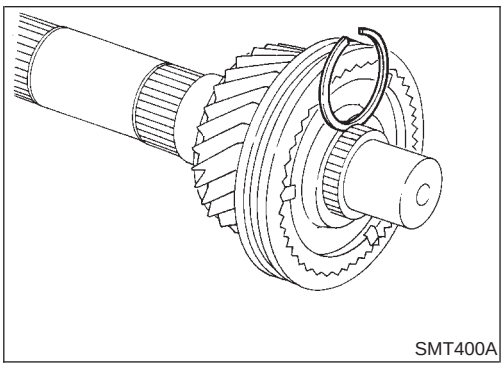


b. Assemble 3rd & 4th synchronizer.



c. Press on 3rd & 4th synchronizer assembly together with 3rd main gear and 3rd gear needle bearing.

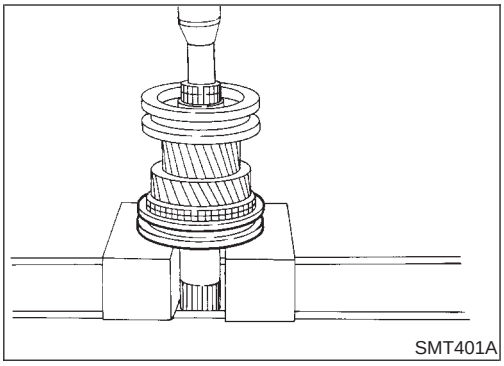
- **Pay attention to direction of synchronizer assembly.**



d. Select proper snap ring to minimize clearance of groove.

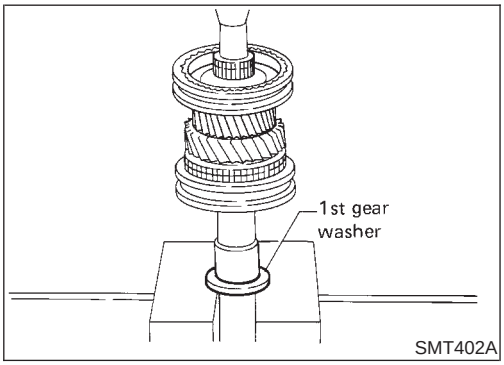
Allowable clearance of groove:
0 - 0.1 mm (0 - 0.004 in)
Mainshaft front snap ring:
Refer to SDS, MT-37.

e. Install selected snap ring on mainshaft.



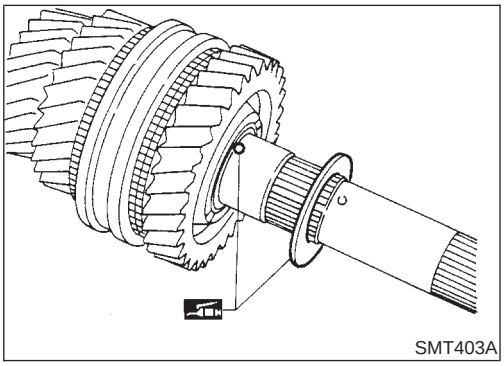
SMT401A

f. Press on 1st & 2nd synchronizer assembly together with 2nd main gear and 2nd gear needle bearing.



SMT402A

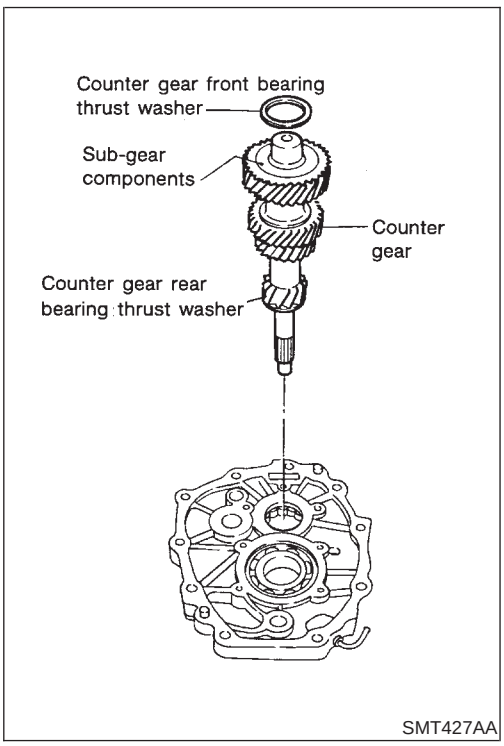
g. Press on 1st gear bushing using 1st gear washer.
h. Install 1st main gear and needle bearing.



SMT403A

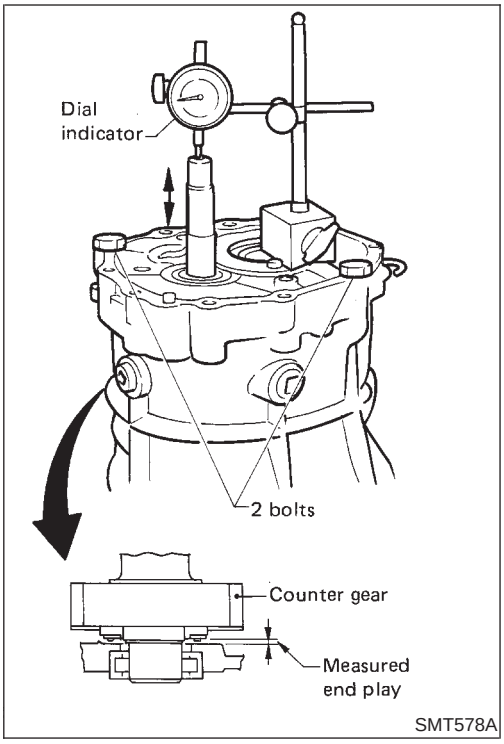
i. Install steel ball and 1st gear washer.

- **Apply multi-purpose grease to steel ball and 1st gear washer before installing.**



SMT427AA

5. Select proper counter gear front bearing thrust washer when replacing transmission case, counter gear, counter gear rear thrust bearing or sub-gear components.
a. Install counter gear with sub-gear components, counter gear front and rear bearing thrust washer on adapter plate.
b. Remove counter gear front bearing thrust washer from transmission case.
c. Place adapter plate and counter gear assembly in transmission case (case inverted).



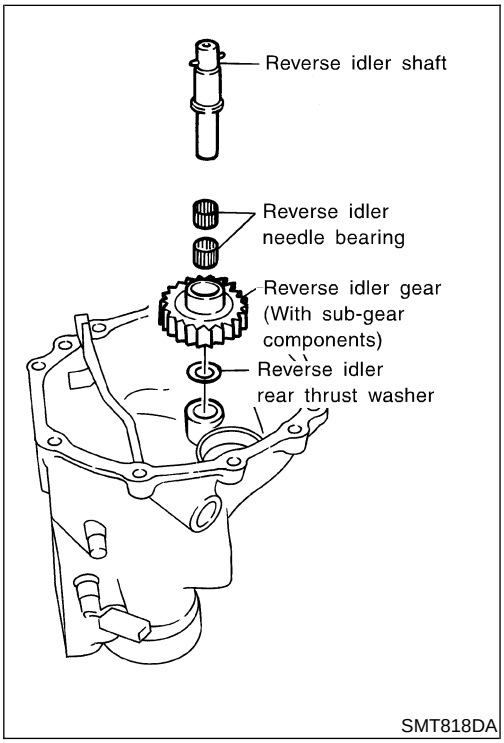
d. Tighten adapter plate to transmission case using 2 bolts.
e. Place dial indicator on rear end of counter gear.
f. Move counter gear up and down and measure dial indicator deflection.
g. Select proper thrust washer using table below as a guide.

Counter gear end play:

0.10 - 0.25 mm (0.0039 - 0.0098 in)

Table for selecting proper counter gear front bearing thrust washer:

Refer to SDS, MT-39.



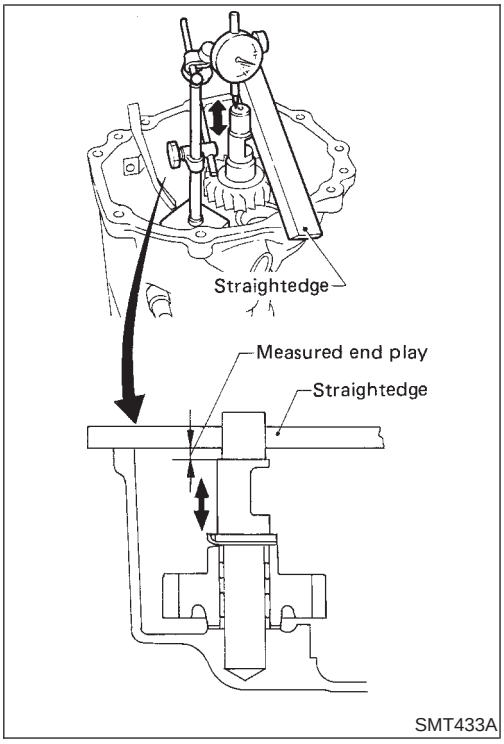
6. Select proper reverse idler rear thrust washer when replacing rear extension (or OD gear case), reverse idler gear (with sub-gear components), reverse idler shaft.

a. Install reverse idler gear (with sub-gear components), reverse idler needle bearings and reverse idler shaft into rear extension (or OD gear case).

- **When replacing reverse idler rear thrust washer, install either A or B.**

Reverse idler rear thrust washer:

Refer to SDS, MT-39.

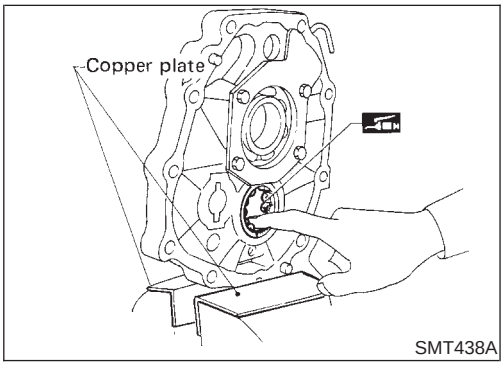


SMT433A

b. Place dial indicator on front end of reverse idler shaft.
c. Put straightedge on front surface of rear extension (or OD gear case) as a stopper of reverse idler shaft.
d. Move reverse idler shaft up and down and measure reverse idler gear end play.

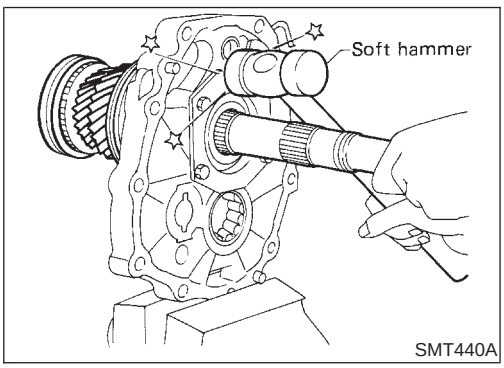
Reverse idler gear end play:
0.30 - 0.53 mm (0.0118 - 0.0209 in)

e. If not within specification, replace reverse idler rear thrust washer with the other (A or B) and check again.



SMT438A

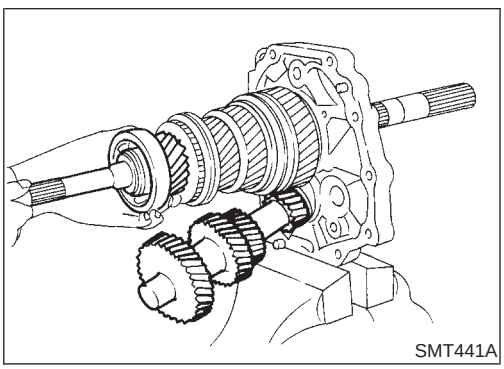
7. Install mainshaft and counter gear on adapter plate and main drive gear on mainshaft.
a. Mount adapter plate on vise and apply multi-purpose grease to counter gear rear bearing.



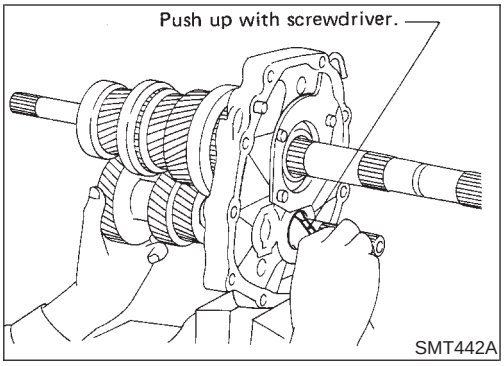
SMT440A

b. Install mainshaft a little on mainshaft front bearing.

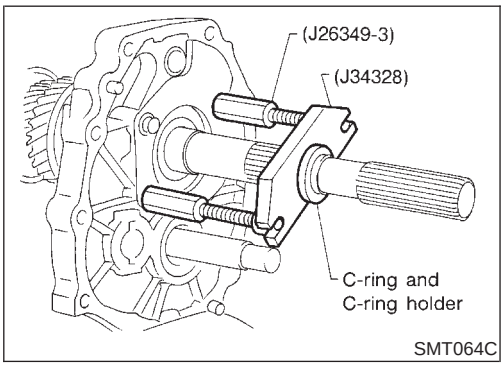
- **To allow for installation of counter gear, do not install mainshaft completely.**


SMT441A

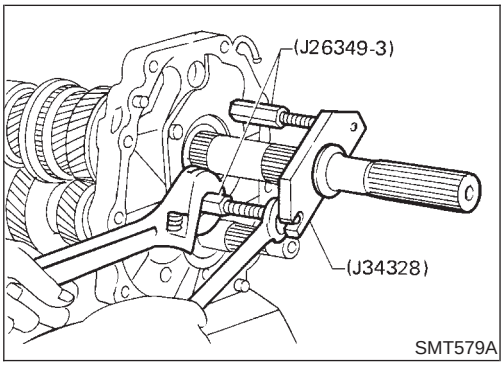
c. Install counter gear on counter gear rear bearing and install main drive gear, pilot bearing and spacer on mainshaft.



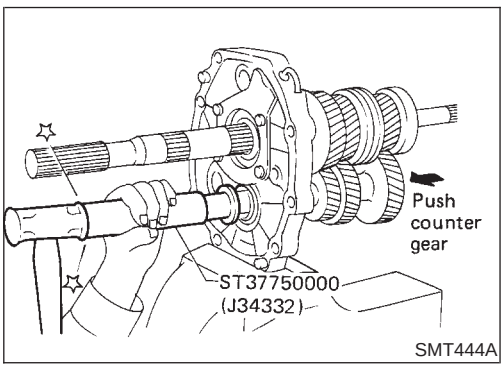
- **When installing counter gear into counter gear rear bearing, push up on upper roller of counter gear rear bearing with screwdriver.**



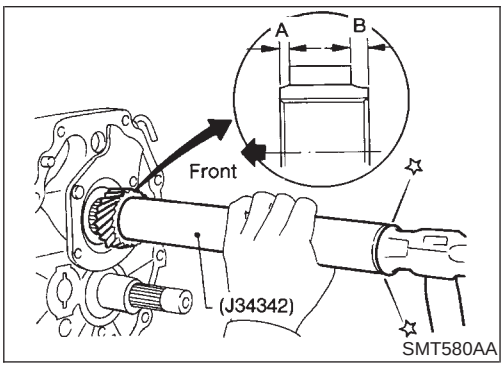
d. Install Tools (J26349-3) onto adapter plate and C-ring and C-ring holder on mainshaft.
e. Install Tool (J34328) on mainshaft.



f. Install mainshaft and counter gear completely by extending length of (J26349-3).

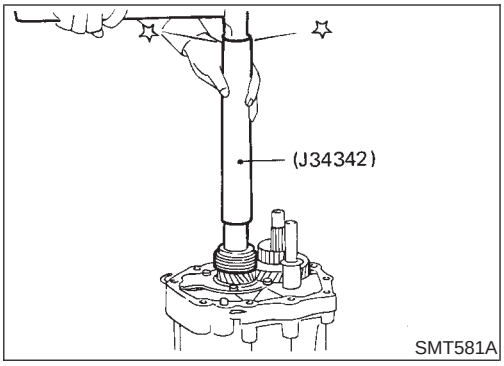


8. Install rear side components on mainshaft and counter gear.
a. Install OD gear bushing while pushing on the front of counter gear.

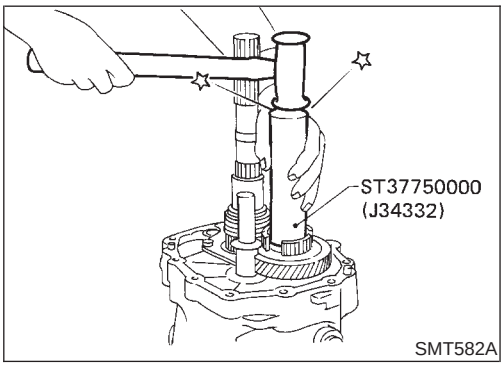


b. Install OD main gear.
- **Pay attention to direction of OD main gear. (B is wider than A as shown at left.)**

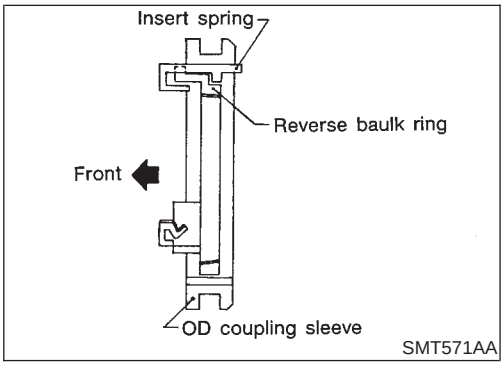
c. Install adapter plate with gear assembly onto transmission case.
d. Install OD gear needle bearing and then install OD counter gear and reverse idler shaft.



e. Install reverse gear bushing with speedometer drive gear (2WD model).

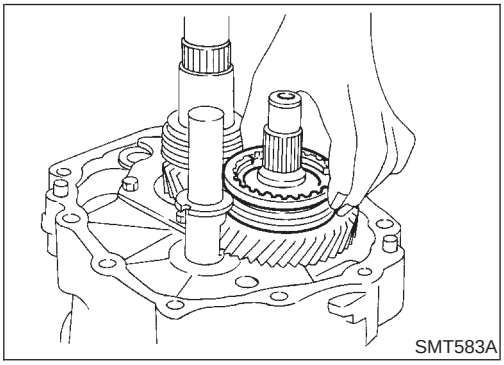


f. Install reverse cone.



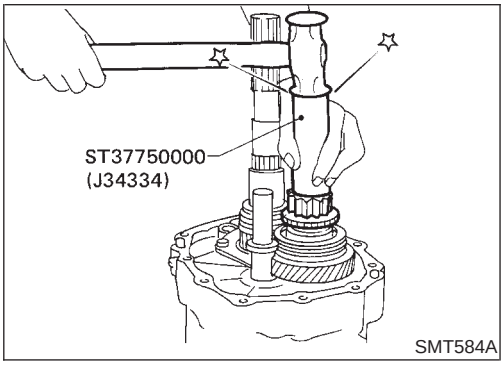
g. Install insert springs and reverse baulk ring on OD coupling sleeve. Then install them and OD baulk ring on OD counter gear.

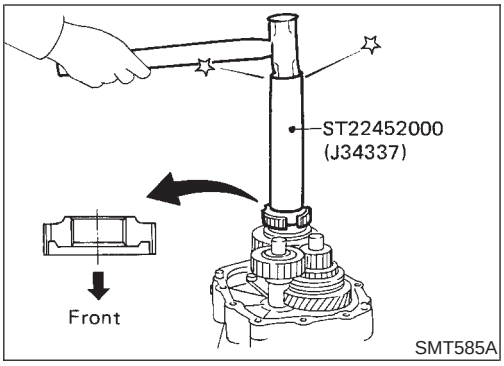
- **Pay attention to direction of OD coupling sleeve.**



h. Install reverse counter gear.

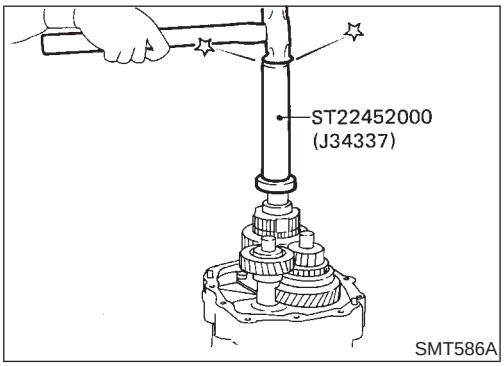
i. Install reverse gear needle bearing and then install reverse main gear, reverse idler gear and reverse idler thrust washers.



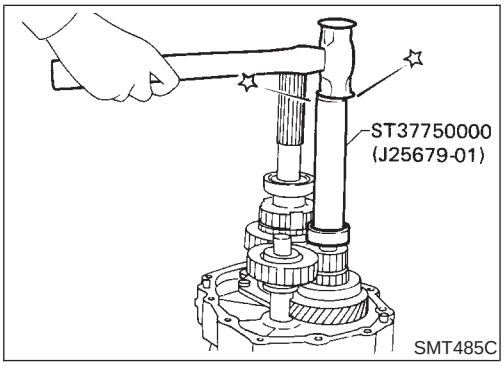


j. Install reverse hub.

- **Pay attention to its direction.**

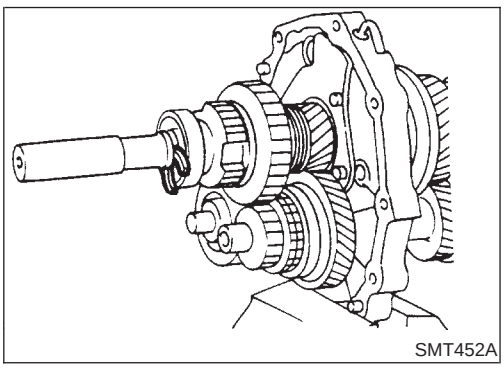


k. Install mainshaft spacer and mainshaft rear bearing (2WD model).



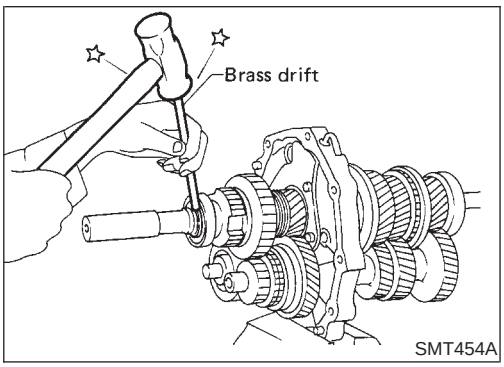
l. Install counter gear rear end bearing.

m. Separate adapter plate from transmission case and mount adapter plate on vice again.

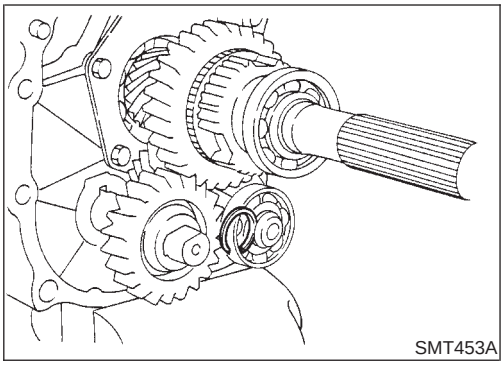


n. Select proper mainshaft C-ring to minimize clearance of groove.

Allowable clearance of groove:
0 - 0.1 mm (0 - 0.004 in)
Mainshaft C-ring:
Refer to SDS, MT-38.



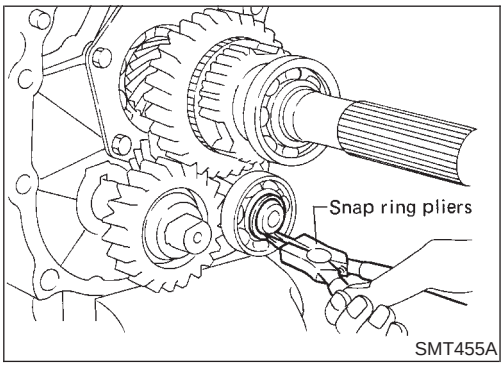
o. Install selected C-ring, C-ring holder and mainshaft rear snap ring.


SMT453A

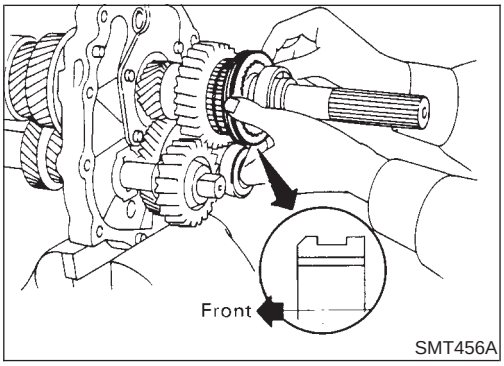
p. Select proper counter gear rear snap ring to minimize clearance of groove.

Allowable clearance of groove:
0 - 0.1 mm (0 - 0.004 in)
Counter gear rear snap ring:
Refer to SDS, MT-38.

q. Install selected counter gear rear snap ring.



SMT455A



SMT456A

r. Install reverse coupling sleeve.
- **Pay attention to its direction.**

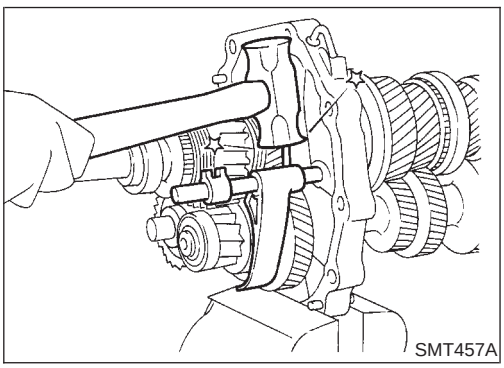
s. Measure each gear end play as a final check. Refer to "DISASSEMBLY", MT-19.

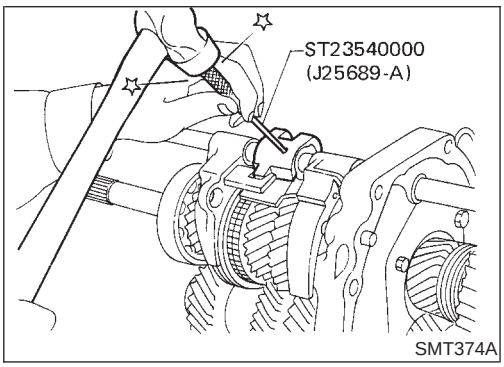
Shift Control Components

ASSEMBLY

NAMT0014

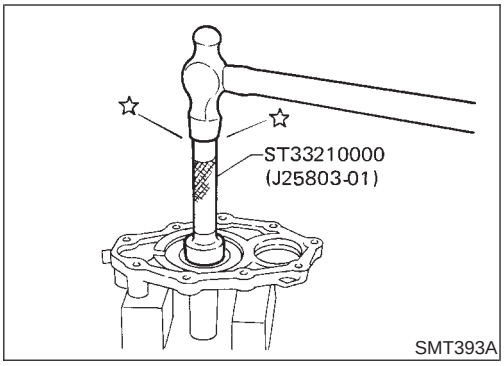
1. Install OD fork rod and OD shift fork. Then install retaining pin into OD shift fork.
2. Install 1st & 2nd, 3rd & 4th and reverse shift fork onto coupling sleeve.


SMT457A



SMT374A

3. Install striking rod into hole of shift forks, striking lever and interlock and then install retaining pin into striking lever.
- **Make sure that striking rod moves smoothly.**

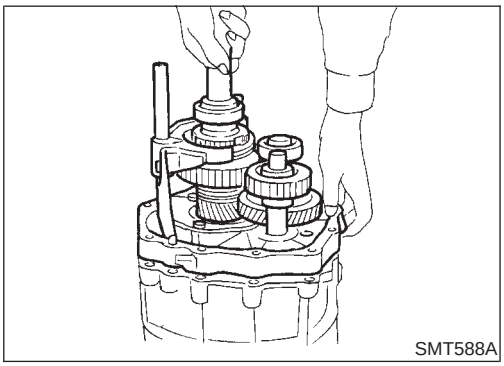


Case Components

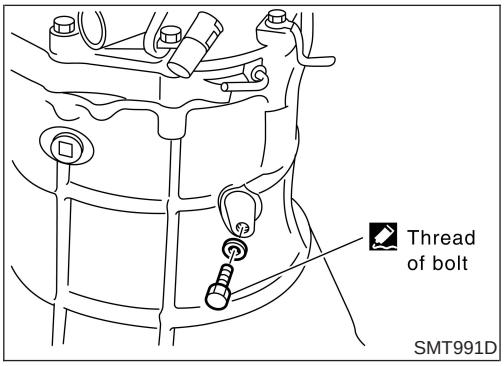
ASSEMBLY

NAMT0015

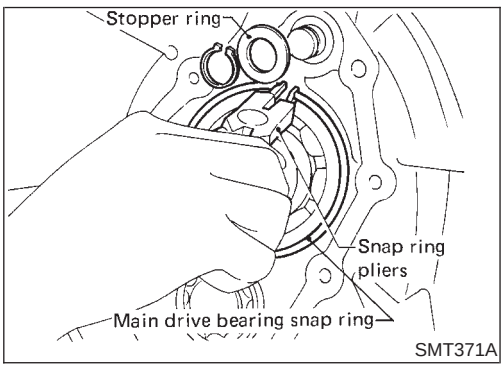
1. Install front cover oil seal.
- **Apply multi-purpose grease to seal lip.**
2. Install selected counter gear front bearing shim onto transmission case.
- **Apply multi-purpose grease.**
3. Apply sealant to mating surface of transmission case.



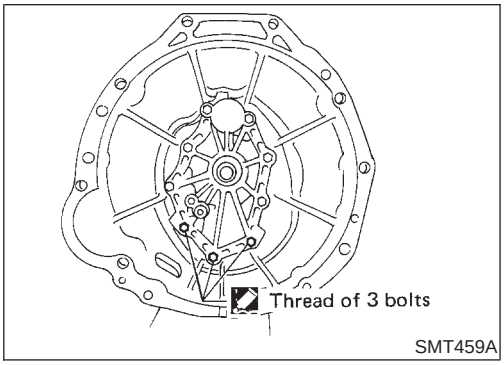
4. Install gear assembly onto transmission case.
5. Install check spring and check ball into interlock stopper.
- **Apply multi-purpose grease to check ball.**



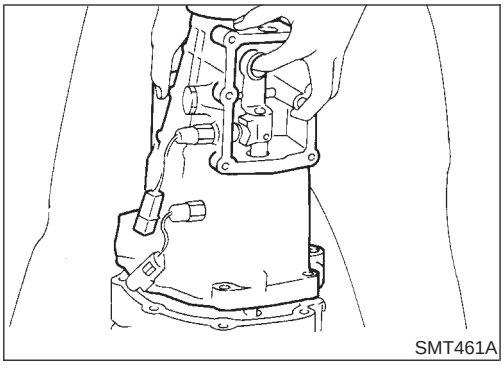
6. Install interlock stopper assembly and then tighten check ball plug.
- **Apply sealant to thread of check ball plug.**
  Refer to Shift Control Components, MT-16.



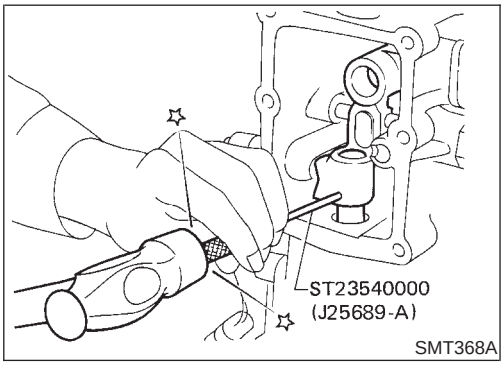
7. Install stopper ring and main drive bearing snap ring.



8. Install front cover and gasket.
- **Apply sealant to thread of 3 bolts shown left.**
  Refer to Case Components, MT-13.
9. Apply sealant to mating surface of adapter plate.

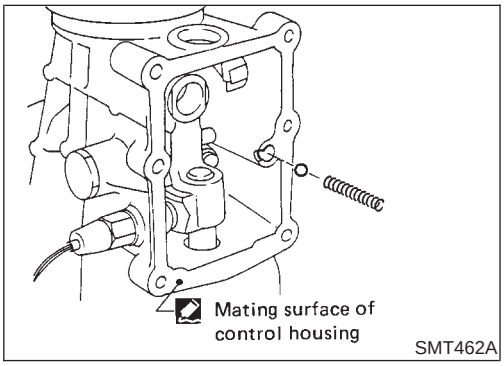

SMT461A

10. Install rear extension (or OD gear case) together with striking arm.



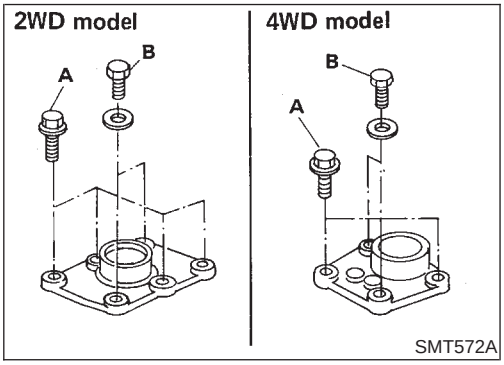
SMT368A

11. Install retaining pin into striking arm.



SMT462A

12. Install return spring and check ball and then install control housing.
- **Apply sealant to mating surface of rear extension (or OD gear case).**
  Refer to Case Components, MT-13.



SMT572A

13. Tighten control housing bolts.
    Bolt head size:
    A bolts 12 mm (0.47 in)
    B bolts 13 mm (0.51 in)

General Specifications

NAMT0016

Applied model	VQ35DE	
	2WD	4WD
Transmission	FS5R30A	
Number of speed	5	
Shift pattern	 MT-SDS-2	
Synchromesh type	Warner	

	Gear ratio	Number of teeth	
		Mainshaft	Countershaft
Drive	—	22	32
1st	3.580	32	13
2nd	2.077	30	21
3rd	1.360	29	31
4th	1.000	—	—
OD	0.811	24	43
Reverse	3.636	30	12
Reverse idler gear	22		
Oil capacity ℓ (US pt, Imp pt)*	2.8 (5-7/8, 4-7/8)	5.1 (10-3/4, 9)	
Remarks	1st, 2nd & 3rd double baulk ring type synchronizer		

*: Refer to MA-12, “Fluids and Lubricants”.

Gear End Play

NAMT0017

Unit: mm (in)

Gear	End play
1st main gear	0.23 - 0.33 (0.0091 - 0.0130)
2nd main gear	0.23 - 0.33 (0.0091 - 0.0130)
3rd main gear	0.06 - 0.16 (0.0024 - 0.0063)
OD counter gear	0.23 - 0.33 (0.0091 - 0.0130)
Reverse main gear	0.33 - 0.43 (0.0130 - 0.0169)
Counter gear	0.10 - 0.25 (0.0039 - 0.0098)
Reverse idler gear	0.30 - 0.53 (0.0118 - 0.0209)

Clearance Between Baulk Ring and Gear

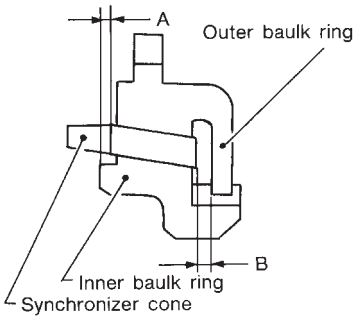
NAMT0018

Unit: mm (in)

	Standard	Wear limit
Main drive	1.05 - 1.3 (0.0413 - 0.0512)	0.7 (0.028)
OD	1.05 - 1.3 (0.0413 - 0.0512)	

1ST, 2ND AND 3RD BAULK RING

NAMT0018S01
Unit: mm (in)

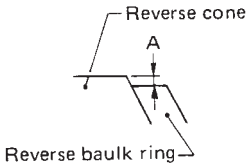


SMT742C

Dimension	Standard	Wear limit
A	0.7 - 0.9 (0.028 - 0.035)	0.2 (0.008)
B	0.6 - 1.1 (0.024 - 0.043)	

Distance Between Rear Surface of Reverse Cone and Reverse Baulk Ring

NAMT0019
Unit: mm (in)



SMT428C

	Standard	Wear limit
Dimension "A"	−0.1 to 0.35 (−0.0039 to 0.0138)	0.7 (0.028)

Available Snap Ring

MAIN DRIVE GEAR SNAP RING

NAMT0020

NAMT0020S01
Unit: mm (in)

Allowable clearance 0 - 0.1 (0 - 0.004)

Thickness	Part number*	Thickness	Part number*
1.89 (0.0744)	32204-01G60	2.03 (0.0799)	32204-01G63
1.95 (0.0768)	32204-01G61	2.07 (0.0815)	32204-01G64
1.99 (0.0783)	32204-01G62	2.11 (0.0831)	32204-01G65

*: Always check with the Parts Department for the latest parts information.

MAINSHAFT FRONT SNAP RING

NAMT0020S02
Unit: mm (in)

Allowable clearance 0 - 0.1 (0 - 0.004)

Thickness	Part number*	Thickness	Part number*
1.99 (0.0783)	32204-01G62	2.11 (0.0831)	32204-01G65
2.03 (0.0799)	32204-01G63	2.15 (0.0846)	32204-01G66
2.07 (0.0815)	32204-01G64	2.19 (0.0862)	32204-01G67

*: Always check with the Parts Department for the latest parts information.

Available Snap Ring (Cont'd)

COUNTER GEAR REAR SNAP RING

NAMT0020S03

Unit: mm (in)

Allowable clearance	0 - 0.11 (0 - 0.0043)		
Thickness	Part number*	Thickness	Part number*
1.32 (0.0520)	32236-01G00	1.56 (0.0614)	32236-01G04
1.38 (0.0543)	32236-01G01	1.62 (0.0638)	32236-01G05
1.44 (0.0567)	32236-01G02	1.68 (0.0661)	32236-01G06
1.50 (0.0591)	32236-01G03	1.74 (0.0685)	32236-01G07

*: Always check with the Parts Department for the latest parts information.

Available C-ring

NAMT0021

MAINSHAFT C-RING

NAMT0021S01

Unit: mm (in)

Allowable clearance	0 - 0.1 (0 - 0.004)		
Thickness	Part number*	Thickness	Part number*
2.63 (0.1035)	32348-01G15	3.19 (0.1256)	32348-01G07
2.70 (0.1063)	32348-01G00	3.26 (0.1283)	32348-01G08
2.77 (0.1091)	32348-01G01	3.33 (0.1311)	32348-01G09
2.84 (0.1118)	32348-01G02	3.40 (0.1339)	32348-01G10
2.91 (0.1146)	32348-01G03	3.47 (0.1366)	32348-01G11
2.98 (0.1173)	32348-01G04	3.54 (0.1394)	32348-01G12
3.05 (0.1201)	32348-01G05	3.61 (0.1421)	32348-01G13
3.12 (0.1228)	32348-01G06	3.68 (0.1449)	32348-01G14

*: Always check with the Parts Department for the latest parts information.

Available Shim and Washer

=NAMT0022

TABLE FOR SELECTING PROPER COUNTER GEAR FRONT BEARING THRUST WASHER

NAMT0022S01

Unit: mm (in)

Dial indicator deflection	Thickness of proper washer	Part number*
0.93 - 1.02 (0.0366 - 0.0402)	0.80 (0.0315)	32218-01G00
1.01 - 1.10 (0.0398 - 0.0433)	0.88 (0.0346)	32218-01G11
1.09 - 1.18 (0.0429 - 0.0465)	0.96 (0.0378)	32218-01G12
1.17 - 1.26 (0.0461 - 0.0496)	1.04 (0.0409)	32218-01G13
1.25 - 1.34 (0.0492 - 0.0528)	1.12 (0.0441)	32218-01G14
1.33 - 1.42 (0.0524 - 0.0559)	1.20 (0.0472)	32218-01G04
1.41 - 1.50 (0.0555 - 0.0591)	1.28 (0.0504)	32218-01G15
1.49 - 1.58 (0.0587 - 0.0622)	1.36 (0.0535)	32218-01G16
1.57 - 1.66 (0.0618 - 0.0654)	1.44 (0.0567)	32218-01G17

*: Always check with the Parts Department for the latest parts information.

REVERSE IDLER REAR THRUST WASHER

NAMT0022S02

Unit: mm (in)

Thickness		Part number*
A	1.97 (0.0776)	32284-01G10
B	2.07 (0.0815)	32284-01G11

*: Always check with the Parts Department for the latest parts information.

NOTES

AUTOMATIC TRANSMISSION

SECTION AT

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Alphabetical & P No. Index for DTC

NAAT0179

ALPHABETICAL INDEX FOR DTC

NAAT0179S01

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VEH SPD SEN/CIR AT*3	P0720	AT-111

*1: These numbers are prescribed by SAE J2012.

*2: When the fail-safe operation occurs, the MIL illuminates.

*3: The MIL illuminates when both the “Revolution sensor signal” and the “Vehicle speed sensor signal” meet the fail-safe condition at the same time.

P NO. INDEX FOR DTC

=NAAT0179S02

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*1: These numbers are prescribed by SAE J2012.

*2: When the fail-safe operation occurs, the MIL illuminates.

*3: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

NAAT0001

The supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL R50 is as follows:

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.**

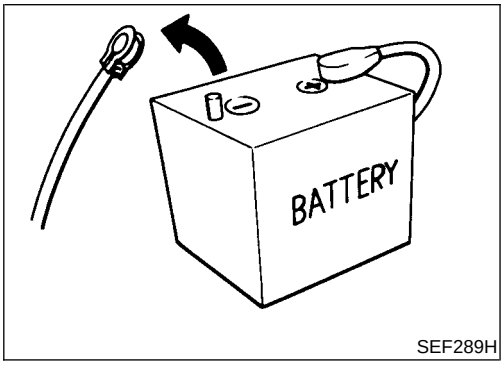
Precautions for On Board Diagnostic (OBD) System of A/T and Engine

NAAT0002

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

- **Be sure to turn the ignition switch “OFF” and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to an open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Be sure to route and secure the harnesses properly after work. Interference of the harness with a bracket, etc. may cause the MIL to light up due to a short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to a malfunction of the EGR system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the TCM and ECM before returning the vehicle to the customer.**

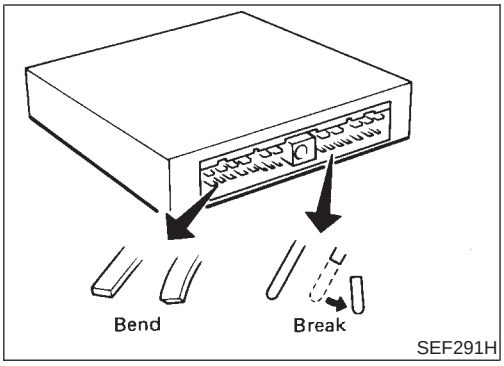


SEF289H

Precautions

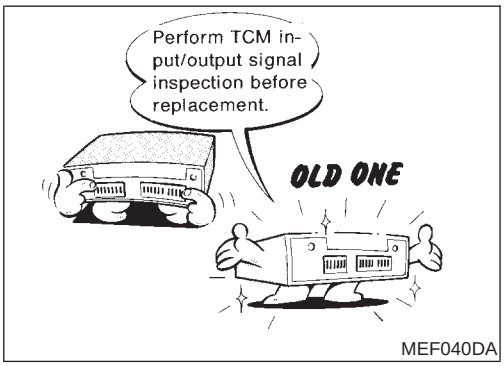
NAAT0003

- **Before connecting or disconnecting the TCM harness connector, turn ignition switch “OFF” and disconnect negative battery terminal. Failure to do so may damage the TCM. Because battery voltage is applied to TCM even if ignition switch is turned “OFF”.**



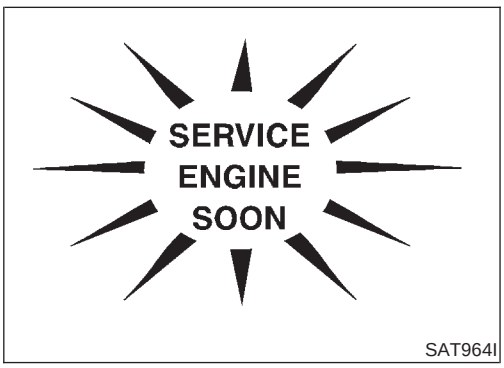
SEF291H

- **When connecting or disconnecting pin connectors into or from TCM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on TCM pin terminal, when connecting pin connectors.



MEF040DA

- **Before replacing TCM, perform TCM input/output signal inspection and make sure whether TCM functions properly or not. (Refer to AT-92.)**



SAT964I

- **After performing each TROUBLE DIAGNOSIS, perform "DTC (Diagnostic Trouble Code) CONFIRMATION PROCEDURE".**
  The DTC should not be displayed in the "DTC CONFIRMATION PROCEDURE" if the repair is completed.

- Before proceeding with disassembly, thoroughly clean the outside of the transmission. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transmission.
- Place disassembled parts in order for easier and proper assembly.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals and O-rings should be replaced any time the transmission is disassembled.
- It is very important to perform functional tests whenever they are indicated.
- The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place disassembled valve body parts in order for easier and proper assembly. Care will also prevent springs and small parts from becoming scattered or lost.
- Properly installed valves, sleeves, plugs, etc. will slide along bores in valve body under their own weight.

- Before assembly, apply a coat of recommended ATF to all parts. Apply petroleum jelly to protect O-rings and seals, or hold bearings and washers in place during assembly. Do not use grease.
- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer. Refer to "ATF COOLER SERVICE", AT-9.
- After overhaul, refill the transmission with new ATF.
- When the A/T drain plug is removed, only some of the fluid is drained. Old A/T fluid will remain in torque converter and ATF cooling system.
  Always follow the procedures when changing A/T fluid. Refer to MA-22, "Changing A/T Fluid".

Service Notice or Precautions

NAAT0004

FAIL-SAFE

NAAT0004S01

The TCM has an electronic Fail-Safe (limp home mode). This allows the vehicle to be driven even if a major electrical input/output device circuit is damaged.
Under Fail-Safe, the vehicle always runs in third gear, even with a shift lever position of "1", "2" or "D". The customer may complain of sluggish or poor acceleration.
When the ignition key is turned "ON" following Fail-Safe operation, O/D OFF indicator lamp blinks for about 8 seconds. (For "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", refer to AT-46.)
The blinking of the O/D OFF indicator lamp for about 8 seconds will appear only once and be cleared. The customer may resume normal driving conditions.
Always follow the "WORK FLOW" (Refer to AT-57).
The SELF-DIAGNOSIS results will be as follows:
The first SELF-DIAGNOSIS will indicate damage to the vehicle speed sensor or the revolution sensor.
During the next SELF-DIAGNOSIS, performed after checking the sensor, no damages will be indicated.

TORQUE CONVERTER SERVICE

NAAT0004S04

The torque converter should be replaced under any of the following conditions:

- External leaks in the hub weld area.
- Converter hub is scored or damaged.
- Converter pilot is broken, damaged or fits poorly into crankshaft.
- Steel particles are found after flushing the cooler and cooler lines.
- Pump is damaged or steel particles are found in the converter.
- Vehicle has TCC shudder and/or no TCC apply. Replace only after all hydraulic and electrical diagnoses have been made. (Converter clutch material may be glazed.)
- Converter is contaminated with engine coolant containing antifreeze.
- Internal failure of stator roller clutch.
- Heavy clutch debris due to overheating (blue converter).
- Steel particles or clutch lining material found in fluid filter or on magnet when no internal parts in unit are worn or damaged — indicates that lining material came from converter.

The torque converter should not be replaced if:

- The fluid has an odor, is discolored, and there is no evidence of metal or clutch facing particles.
- The threads in one or more of the converter bolt holes are damaged.

- Transmission failure did not display evidence of damaged or worn internal parts, steel particles or clutch plate lining material in unit and inside the fluid filter.
- Vehicle has been exposed to high mileage (only). The exception may be where the torque converter clutch dampener plate lining has seen excess wear by vehicles operated in heavy and/or constant traffic, such as taxi, delivery or police use.

ATF COOLER SERVICE

NAAT0004S02

Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer.
Replace radiator lower tank (which includes ATF cooler) with a new one and flush cooler line using cleaning solvent and compressed air. Refer to LC-20, "REMOVAL AND INSTALLATION".

OBD-II SELF-DIAGNOSIS

NAAT0004S03

- A/T self-diagnosis is performed by the TCM in combination with the ECM. The results can be read through the blinking pattern of the O/D OFF indicator or the malfunction indicator lamp (MIL). Refer to the table on AT-38 for the indicator used to display each self-diagnostic result.
- The self-diagnostic results indicated by the MIL are automatically stored in both the ECM and TCM memories.
  Always perform the procedure "HOW TO ERASE DTC" on AT-35 to complete the repair and avoid unnecessary blinking of the MIL.
- The following self-diagnostic items can be detected using ECM self-diagnostic results mode* only when the O/D OFF indicator lamp does not indicate any malfunctions.

− PNP switch
− A/T 1st, 2nd, 3rd, or 4th gear function
− A/T TCC S/V function (lock-up)

*: For details of OBD-II, refer to EC-58, "Introduction".

- **Certain systems and components, especially those related to OBD, may use the new style slide-locking type harness connector. For description and how to disconnect, refer to EL-5, "Description".**

Wiring Diagrams and Trouble Diagnosis

NAAT0005

When you read wiring diagrams, refer to the following:

- GI-11, "HOW TO READ WIRING DIAGRAMS".
- EL-9, "POWER SUPPLY ROUTING" for power distribution circuit.

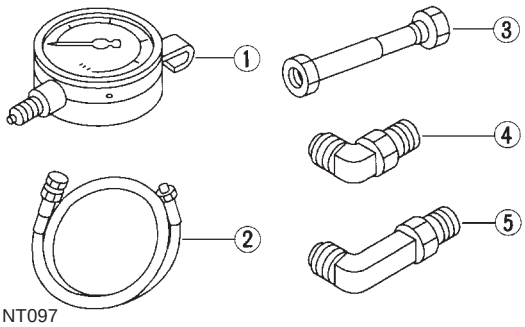
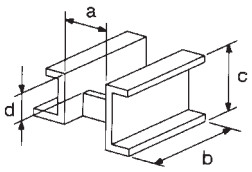
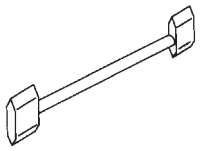
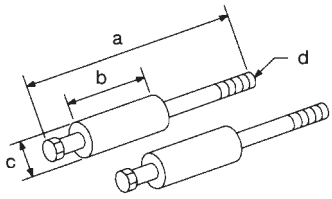
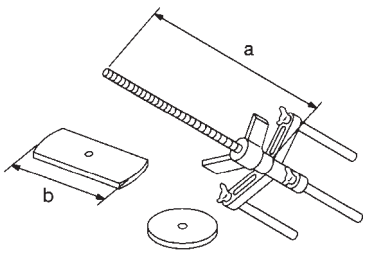
When you perform trouble diagnosis, refer to the following:

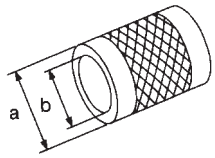
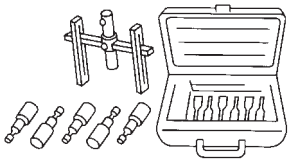
- GI-35, "HOW TO FOLLOW TEST GROUP IN TROUBLE DIAGNOSIS".
- GI-24, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".

Special Service Tools

NAAT0006

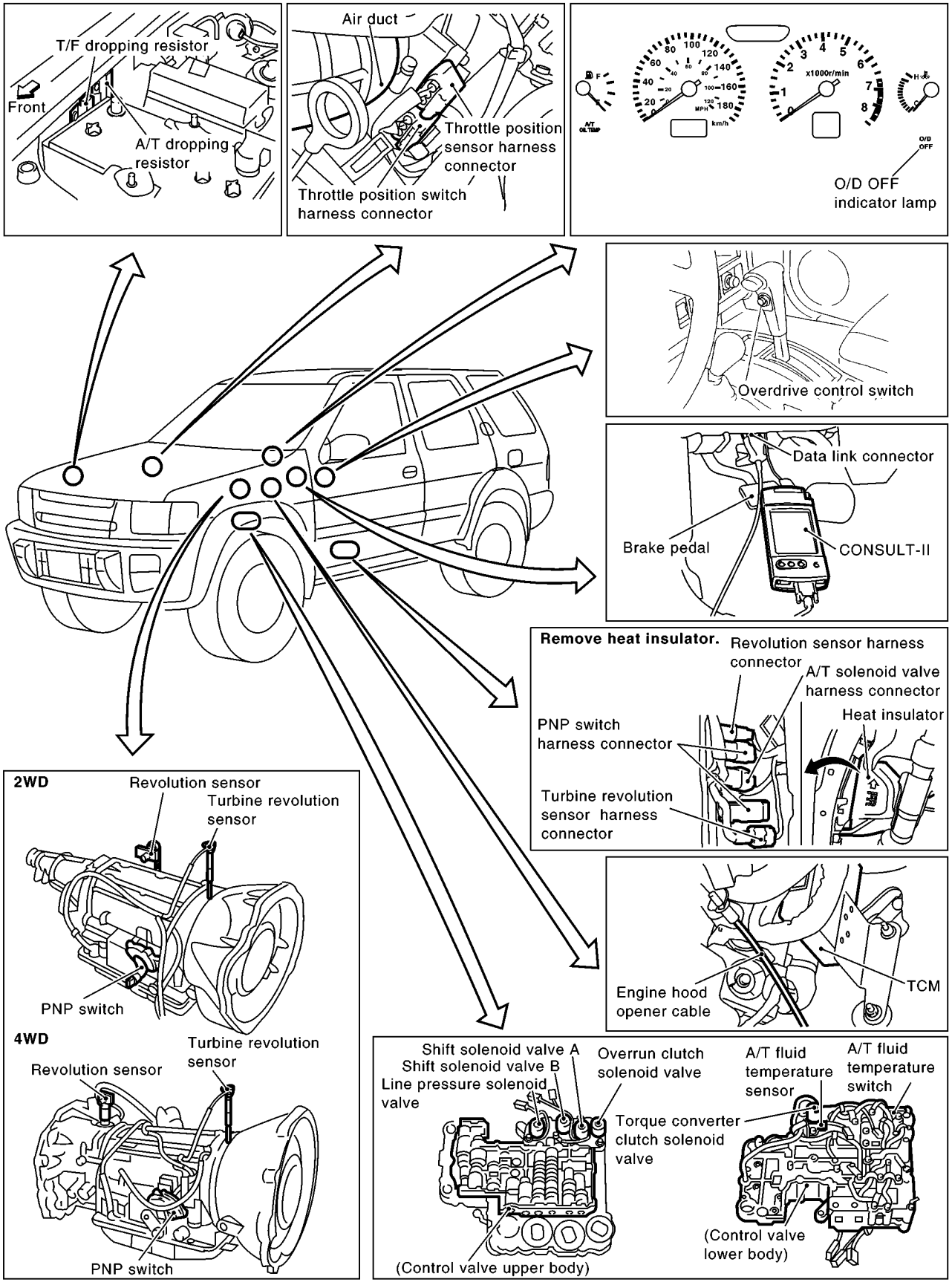
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
ST2505S001 (J34301-C) Oil pressure gauge set 1 ST25051001 (—) Oil pressure gauge 2 ST25052000 (—) Hose 3 ST25053000 (—) Joint pipe 4 ST25054000 (—) Adapter 5 ST25055000 (—) Adapter	 NT097 Measuring line pressure
ST07870000 (J37068) Transmission case stand	 NT421 Disassembling and assembling A/T **a: 182 mm (7.17 in)** **b: 282 mm (11.10 in)** **c: 230 mm (9.06 in)** **d: 100 mm (3.94 in)**
KV31102100 (J37065) Torque converter one-way clutch check tool	 NT098 Checking one-way clutch in torque converter
ST25850000 (J25721-A) Sliding hammer	 NT422 Removing oil pump assembly **a: 179 mm (7.05 in)** **b: 70 mm (2.76 in)** **c: 40 mm (1.57 in) dia.** **d: M12 x 1.75P**
KV31102400 (J34285 and J34285-87) Clutch spring compressor	 NT423 Removing and installing clutch return springs **a: 320 mm (12.60 in)** **b: 174 mm (6.85 in)**

Tool number (Kent-Moore No.) Tool name	Description	
ST33200000 (J26082) Drift	 NT091	Installing oil pump housing oil seal Installing rear oil seal **a: 60 mm (2.36 in) dia.** **b: 44.5 mm (1.752 in) dia.**
(J34291) Shim setting gauge set	 NT101	Selecting oil pump cover bearing race and oil pump thrust washer

A/T Electrical Parts Location

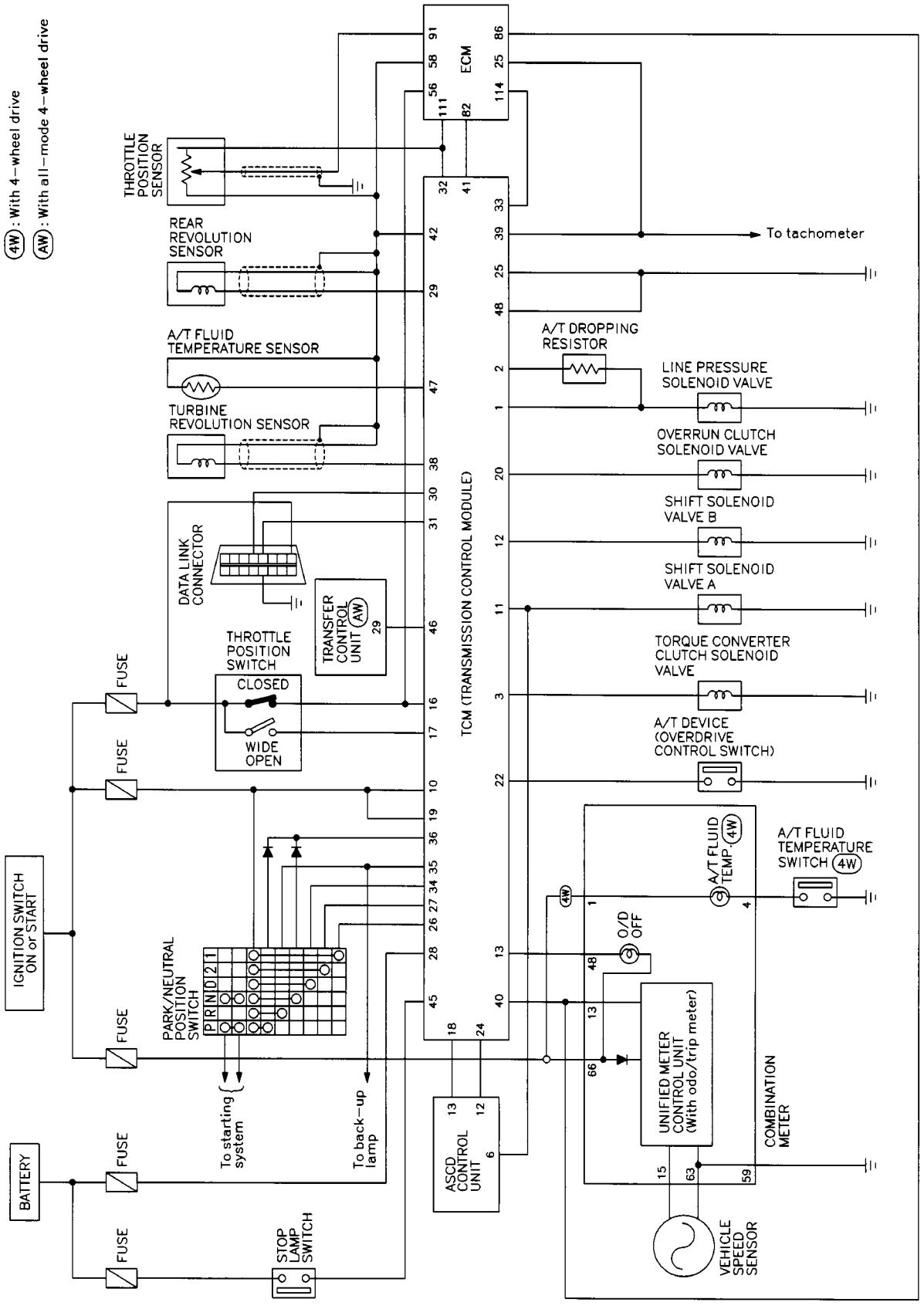
NAAT0007



SAT203K

Circuit Diagram

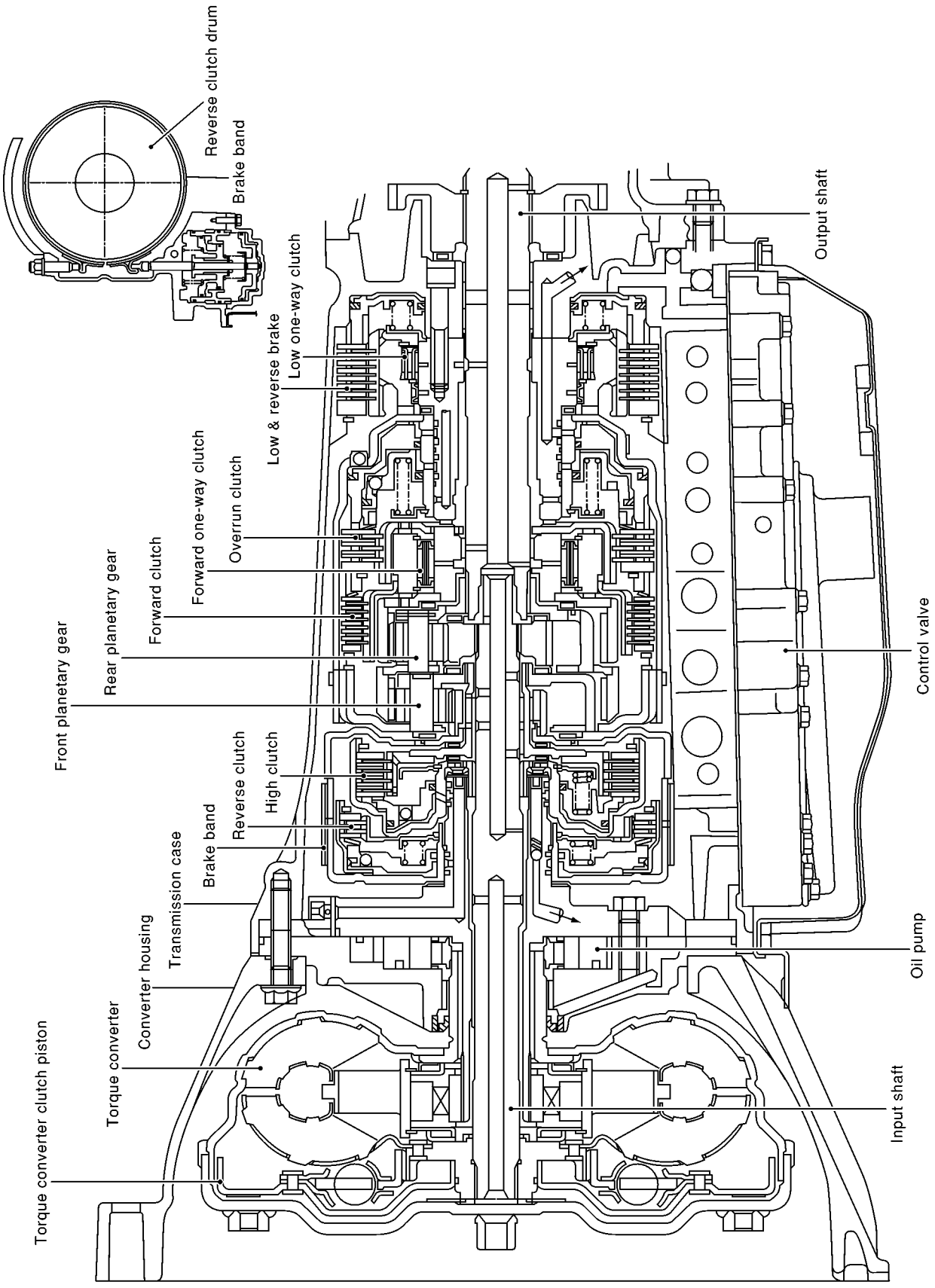
NAAT0008



MAT949A

Cross-sectional View

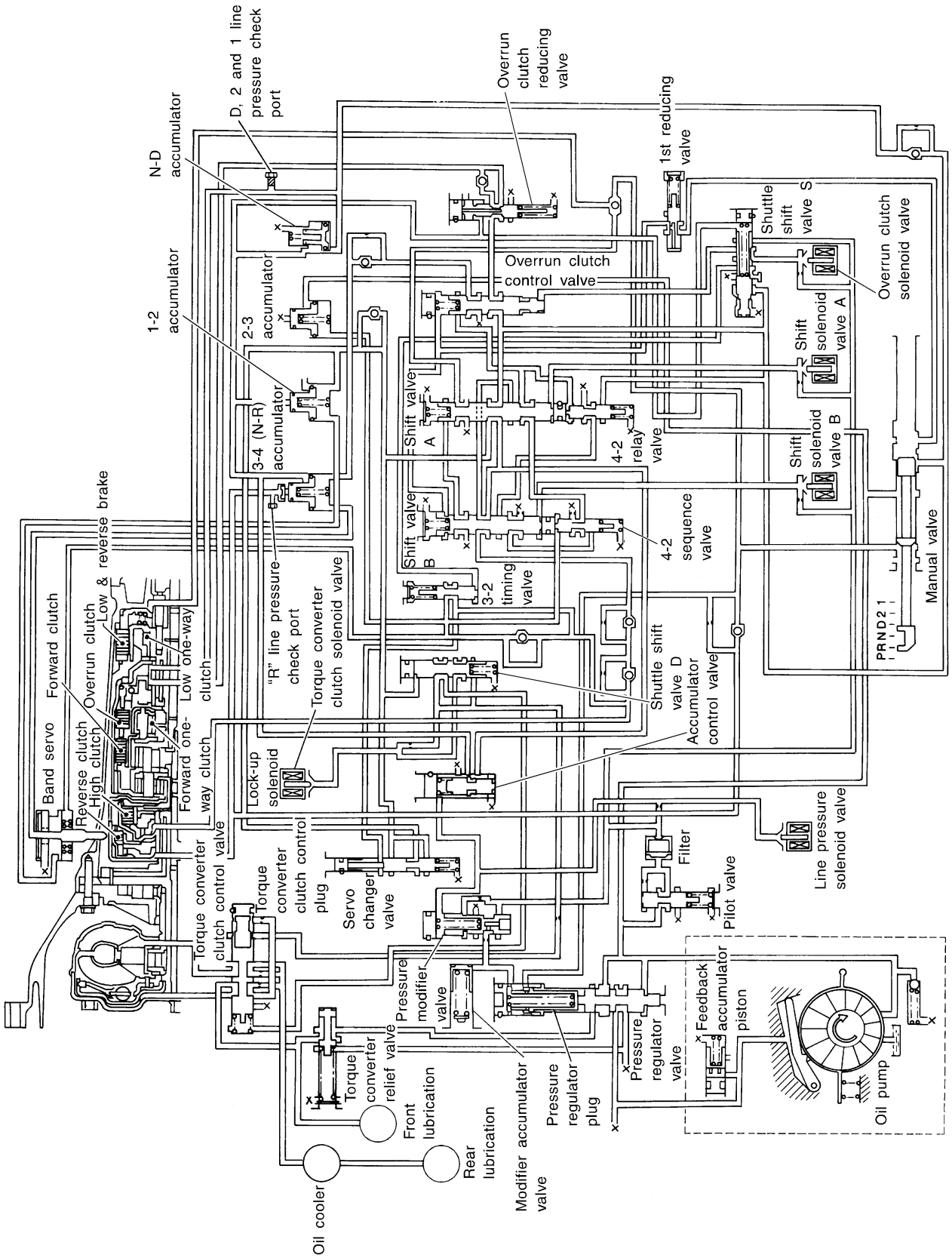
NAAT0010



SAT150K

Hydraulic Control Circuit

NAAT0011



SAT151K

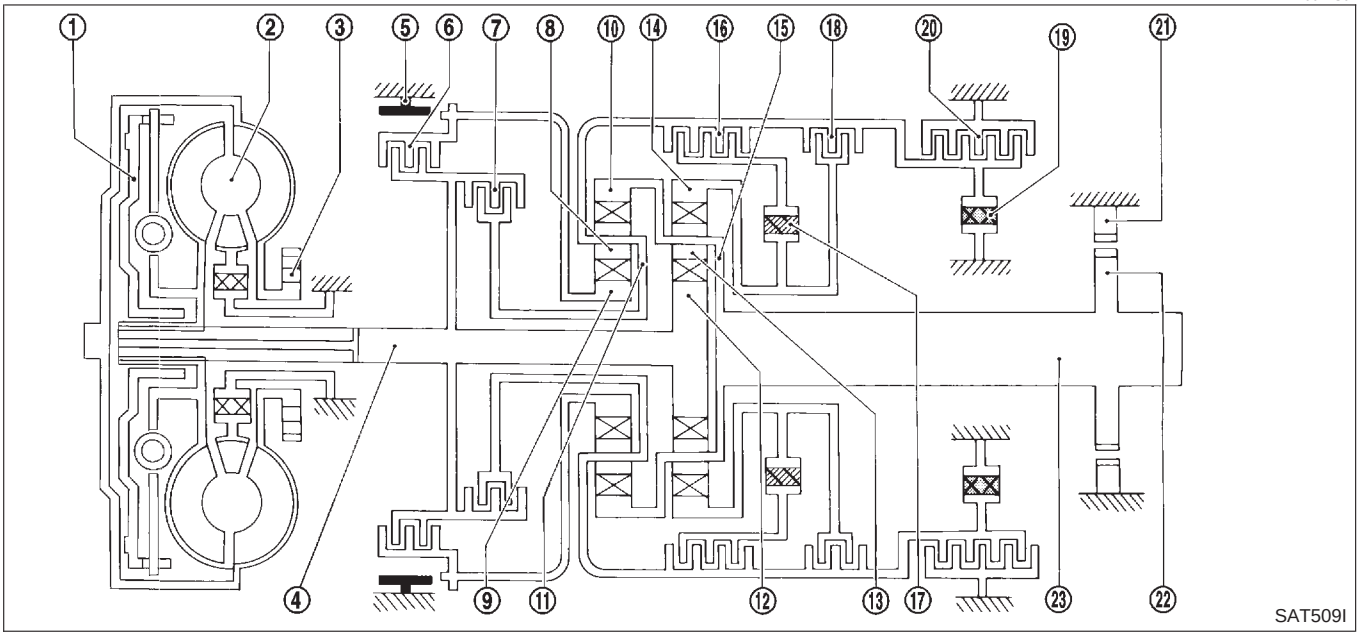
Shift Mechanism

NAAT0012

The automatic transmission uses compact, dual planetary gear systems to improve power-transmission efficiency, simplify construction and reduce weight.
It also employs an optimum shift control and superwide gear ratios. They improve starting performance and acceleration during medium and high-speed operation.
Two one-way clutches are also employed: one is used for the forward clutch and the other for the low clutch. These one-way clutches, combined with four accumulators, reduce shifting shock to a minimum.

CONSTRUCTION

NAAT0012S01



1. Torque converter clutch piston
2. Torque converter
3. Oil pump
4. Input shaft
5. Brake band
6. Reverse clutch
7. High clutch
8. Front pinion gear
9. Front sun gear
10. Front internal gear
11. Front planetary carrier
12. Rear sun gear
13. Rear pinion gear
14. Rear internal gear
15. Rear planetary carrier
16. Forward clutch
17. Forward one-way clutch
18. Overrun clutch
19. Low one-way clutch
20. Low & reverse brake
21. Parking pawl
22. Parking gear
23. Output shaft

FUNCTION OF CLUTCH AND BRAKE

NAAT0012S02

Clutch and brake components	Abbr.	Function
Reverse clutch **6**	R/C	To transmit input power to front sun gear **9**.
High clutch **7**	H/C	To transmit input power to front planetary carrier **11**.
Forward clutch **16**	F/C	To connect front planetary carrier **11** with forward one-way clutch **17**.
Overrun clutch **18**	O/C	To connect front planetary carrier **11** with rear internal gear **14**.
Brake band **5**	B/B	To lock front sun gear **9**.
Forward one-way clutch **17**	F/O.C	When forward clutch **16** is engaged, to stop rear internal gear **14** from rotating in opposite direction against engine revolution.
Low one-way clutch **19**	L/O.C	To stop front planetary carrier **11** from rotating in opposite direction against engine revolution.
Low & reverse brake **20**	L & R/B	To lock front planetary carrier **11**.

CLUTCH AND BAND CHART

NAAT0012S03

Shift position		Reverse clutch	High clutch	For-ward clutch	Over-run clutch	Band servo			For-ward one -way clutch	Low one-way clutch	Low & reverse brake	Lock-up	Remarks
						2nd apply	3rd release	4th apply					
P													PARK POSITION
R		○									○		REVERSE POSITION
N													NEUTRAL POSITION
D*4	1st			○	*1D				B	B			Automatic shift 1 ⇔ 2 ⇔ 3 ⇔ 4
	2nd			○	*1A	○			B				
	3rd		○	○	*1A	*2C	C		B			*5○	
	4th		○	C		*3C	C	○				○	
2	1st			○	D				B	B			Automatic shift 1 ⇔ 2
	2nd			○	*1A	○			B				
1	1st			○	○				B		○		Locks (held stationary) in 1st speed 1 ⇐ 2
	2nd			○	○	○			B				

*1: Operates when overdrive control switch is being set in "OFF" position.

*2: Oil pressure is applied to both 2nd "apply" side and 3rd "release" side of band servo piston. However, brake band does not contract because oil pressure area on the "release" side is greater than that on the "apply" side.

*3: Oil pressure is applied to 4th "apply" side in condition *2 above, and brake band contracts.

*4: A/T will not shift to 4th when overdrive control switch is set in "OFF" position.

*5: Operates when overdrive control switch is "OFF".

○ : Operates.

A: Operates when throttle opening is less than 3/16, activating engine brake.

B: Operates during "progressive" acceleration.

C: Operates but does not affect power transmission.

D: Operates when throttle opening is less than 3/16, but does not affect engine brake.

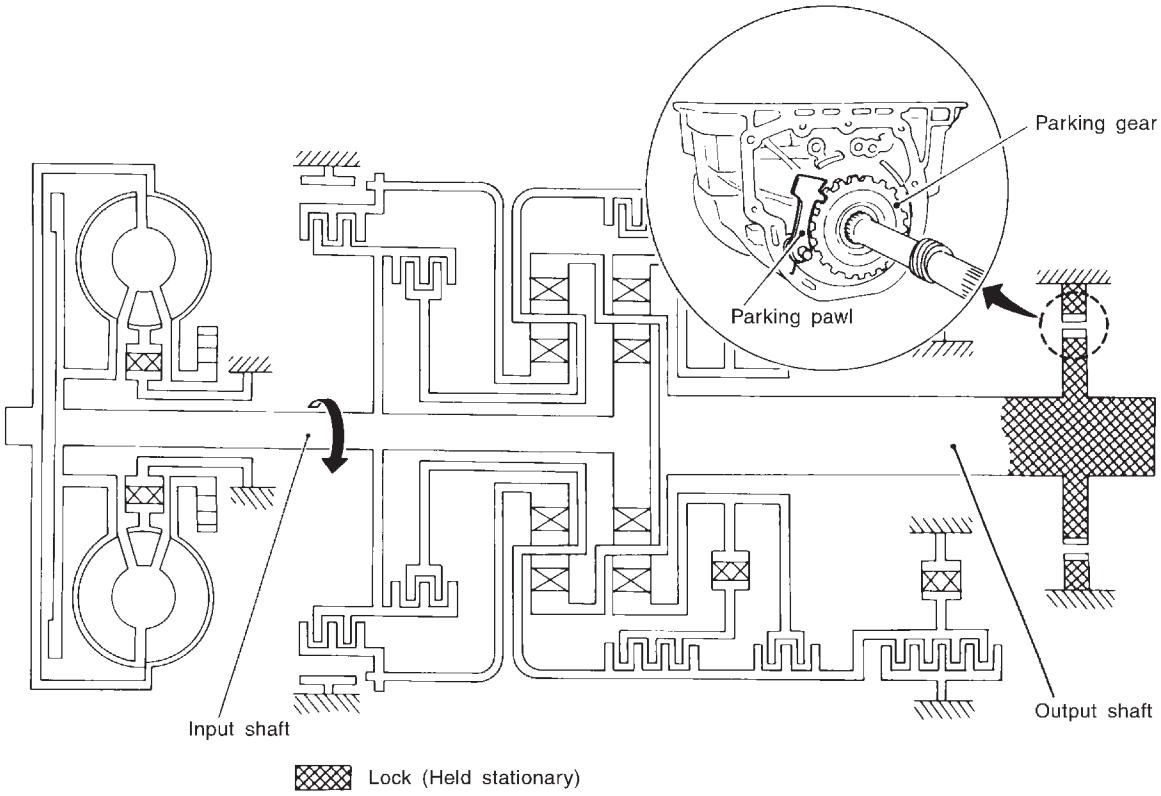
POWER TRANSMISSION

=NAAT0012S04

"N" and "P" Positions

NAAT0012S0401

- "N" position
  No control members operate. Power from the input shaft is not transmitted to the output shaft since the clutch does not operate.
- "P" position
  Similar to the "N" position, no control members operate. The parking pawl interconnected with the select lever engages with the parking gear to mechanically hold the output shaft so that the power train is locked.

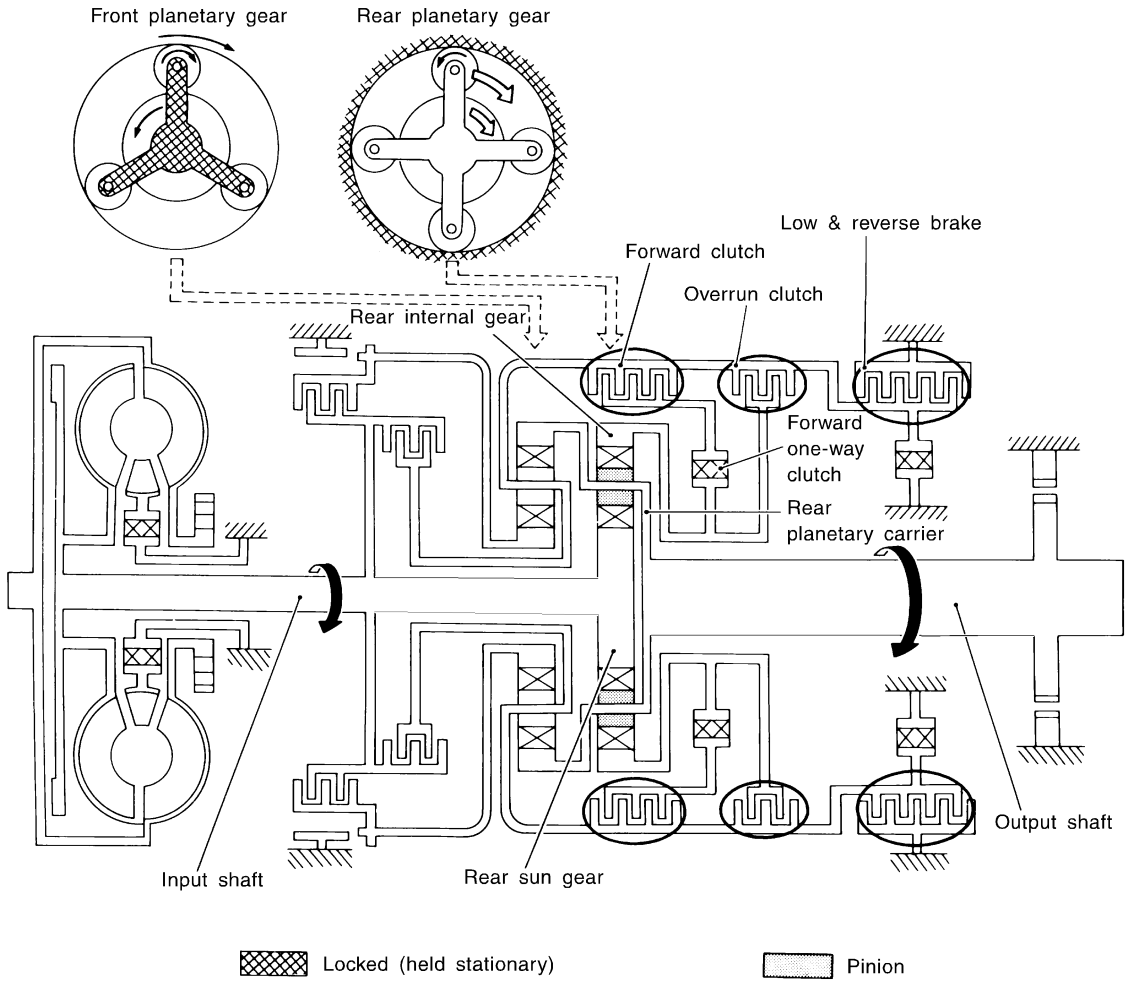


SAT039J

"1_1" Position

=NAAT0012S0406

Forward clutch **Forward one-way clutch** **Overrun clutch** **Low and reverse brake**	As overrun clutch engages, rear internal gear is locked by the operation of low and reverse brake. This is different from that of D_1 and 2_1.
Engine brake	Overrun clutch always engages, therefore engine brake can be obtained when decelerating.



Power flow

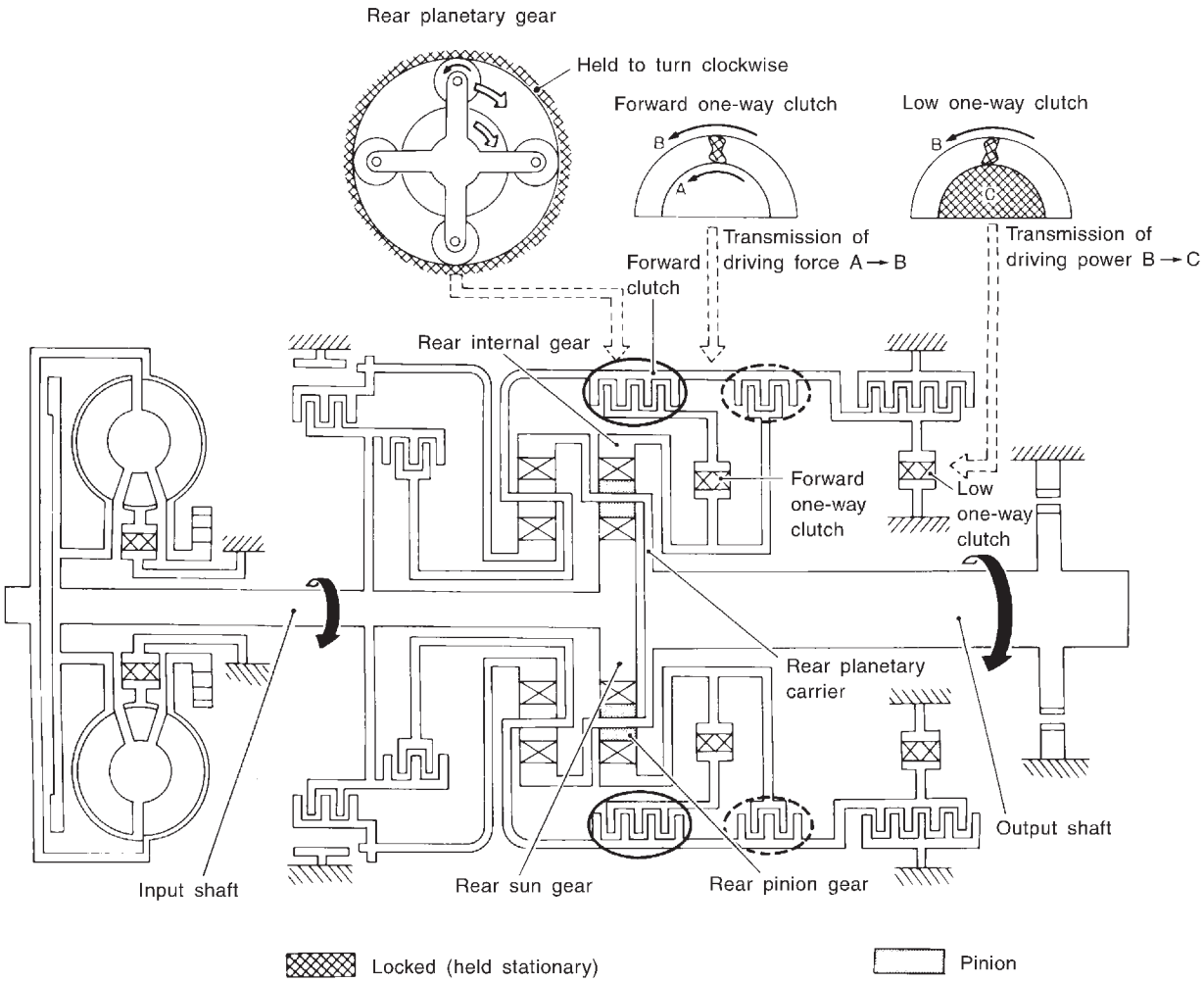
Input shaft
⇩
Rear sun gear
⇩
Rear planetary gear ⇨ Output shaft

SAT100J

"D_1" and "2_1" Positions

=NAAT0012S0402

Forward one-way clutch **Forward clutch** **Low one-way clutch**	Rear internal gear is locked to rotate counterclockwise because of the functioning of these three clutches. (Start-up at D_1)
Overrun clutch engagement conditions (Engine brake)	D_1: Overdrive control switch in "OFF" Throttle opening less than 3/16 2_1: Throttle opening less than 3/16 At D_1 and 2_1 positions, engine brake is not activated due to free turning of low one-way clutch.



Power flow

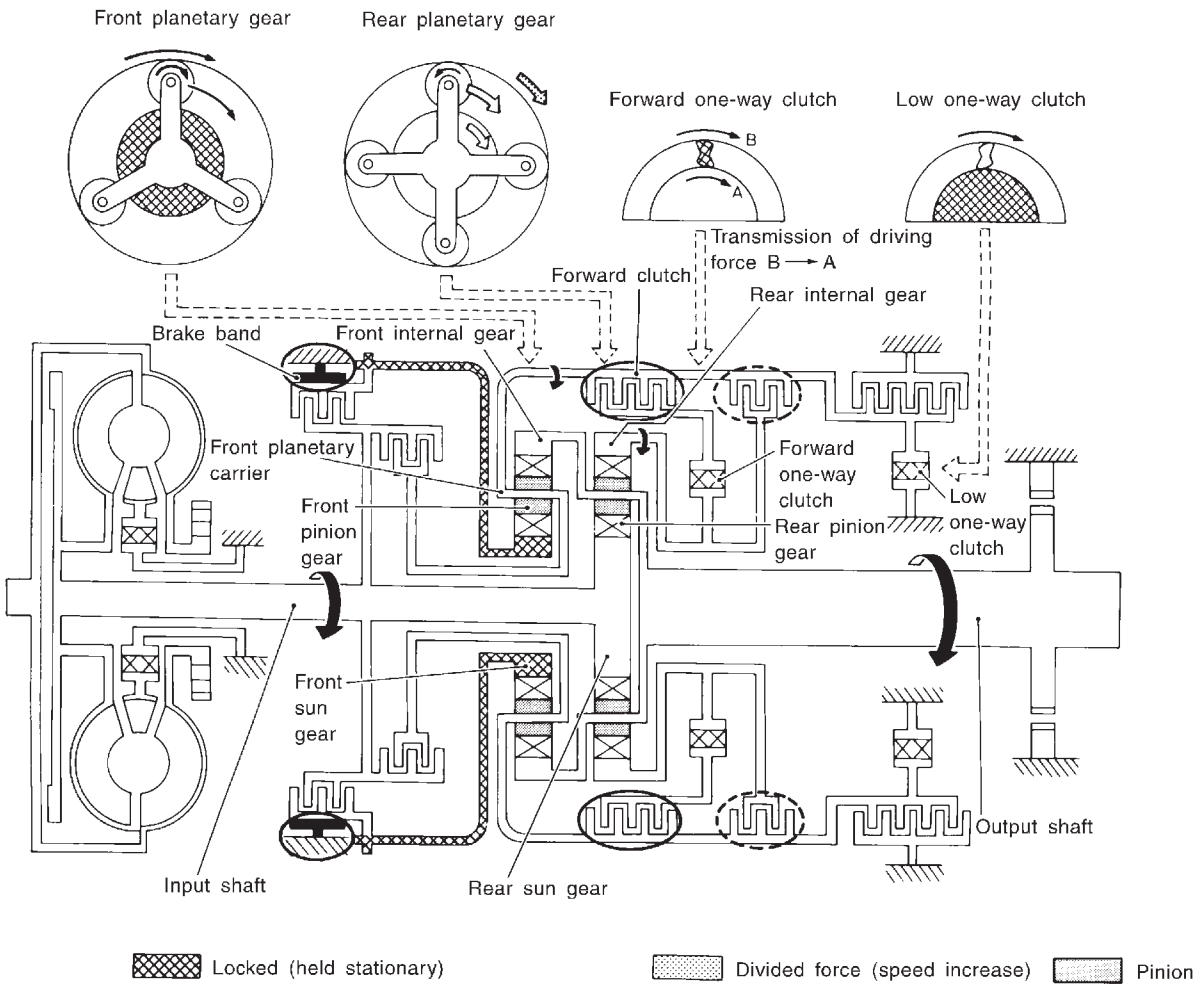
Input shaft
⇩
Rear sun gear
⇩
Rear pinion gear
⇩
Rear planetary carrier → Output shaft

SAT096J

"D_2", "2_2" and "1_2" Positions

=NAAT0012S0403

Forward clutch **Forward one-way clutch** **Brake band**	Rear sun gear drives rear planetary carrier and combined front internal gear. Front internal gear now rotates around front sun gear accompanying front planetary carrier. As front planetary carrier transfers the power to rear internal gear through forward clutch and forward one-way clutch, this rotation of rear internal gear increases the speed of rear planetary carrier compared with that of the 1st speed.
Overrun clutch engagement conditions	D_2: Overdrive control switch in "OFF" Throttle opening less than 3/16 2_2: Throttle opening less than 3/16 1_2: Always engaged



Power flow

Input shaft → Rear sun gear

Front internal gear → Rear planetary carrier / Front internal gear → Output shaft

Front planetary carrier

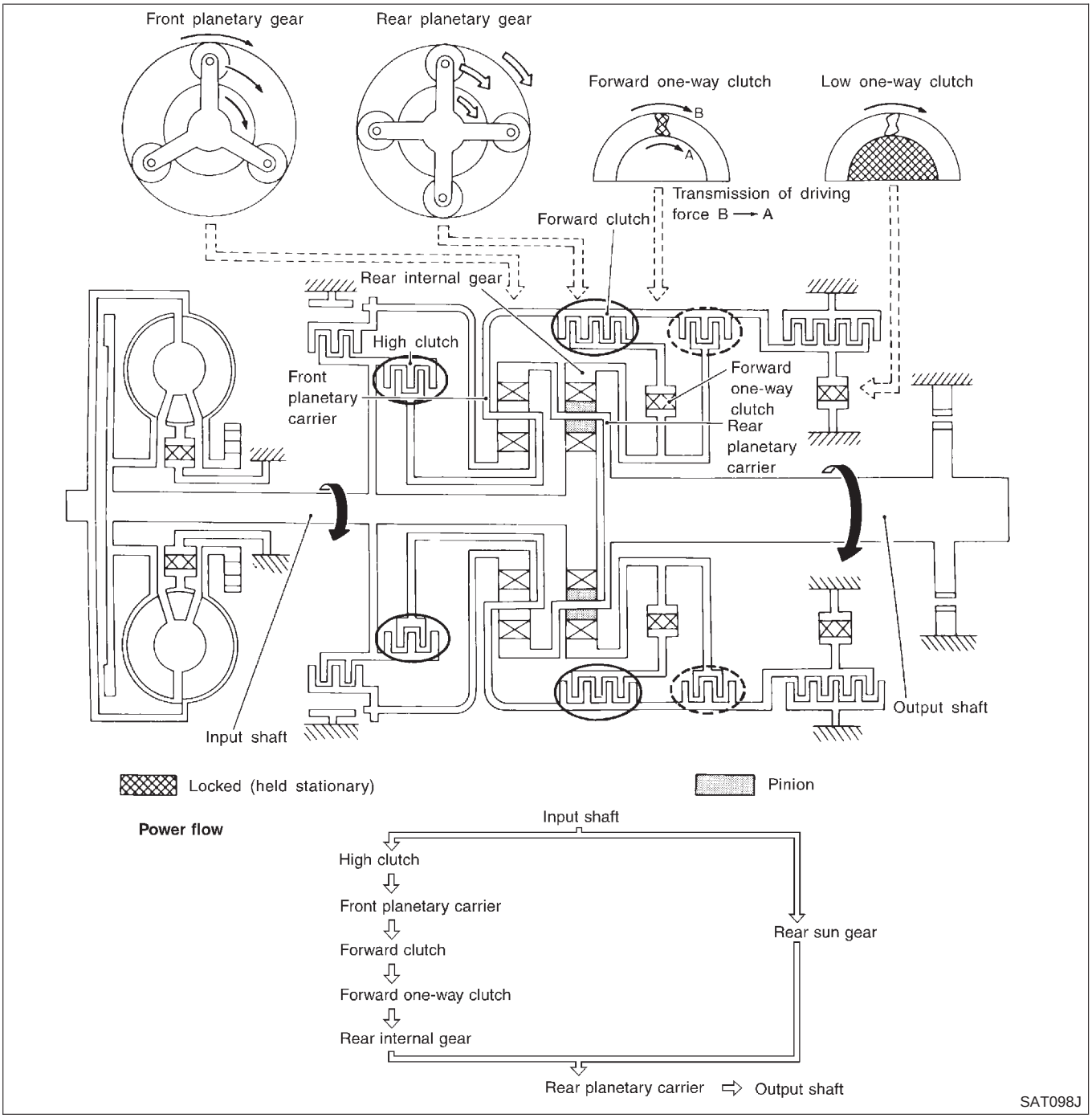
Rear internal gear

SAT097J

"D_3" Position

=NAAT0012S0404

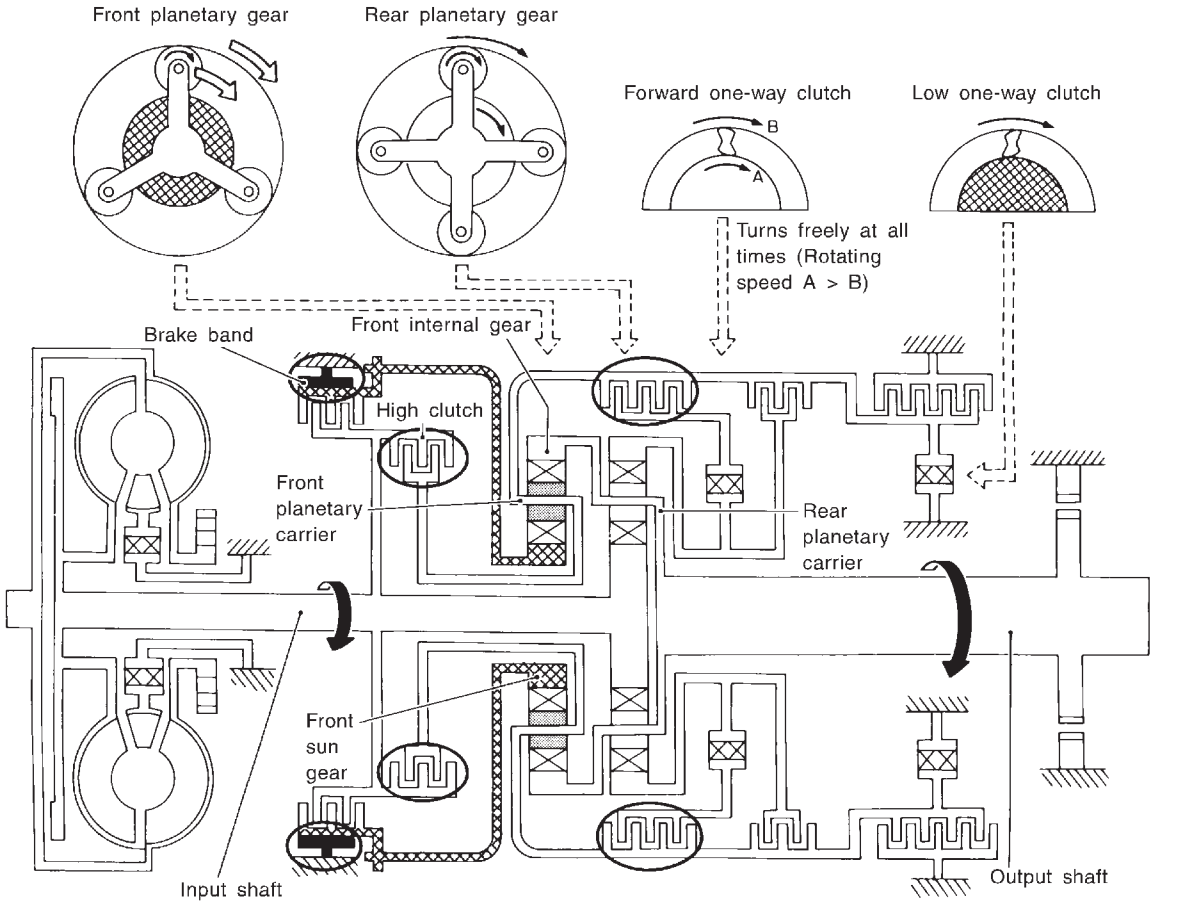
High clutch **Forward clutch** **Forward one-way clutch**	Input power is transmitted to front planetary carrier through high clutch. And front planetary carrier is connected to rear internal gear by operation of forward clutch and forward one-way clutch. This rear internal gear rotation and another input (the rear sun gear) accompany rear planetary carrier to turn at the same speed.
Overrun clutch engagement conditions	D_3: Overdrive control switch in "OFF" Throttle opening less than 3/16



"D_4" (OD) Position

=NAAT0012S0405

High clutch **Brake band** **Forward clutch** (Does not affect power transmission)	Input power is transmitted to front carrier through high clutch. This front planetary carrier turns around the sun gear which is fixed by brake band and makes front internal gear (output) turn faster.
Engine brake	At D_4 position, there is no one-way clutch in the power transmission line and engine brake can be obtained when decelerating.



Power flow

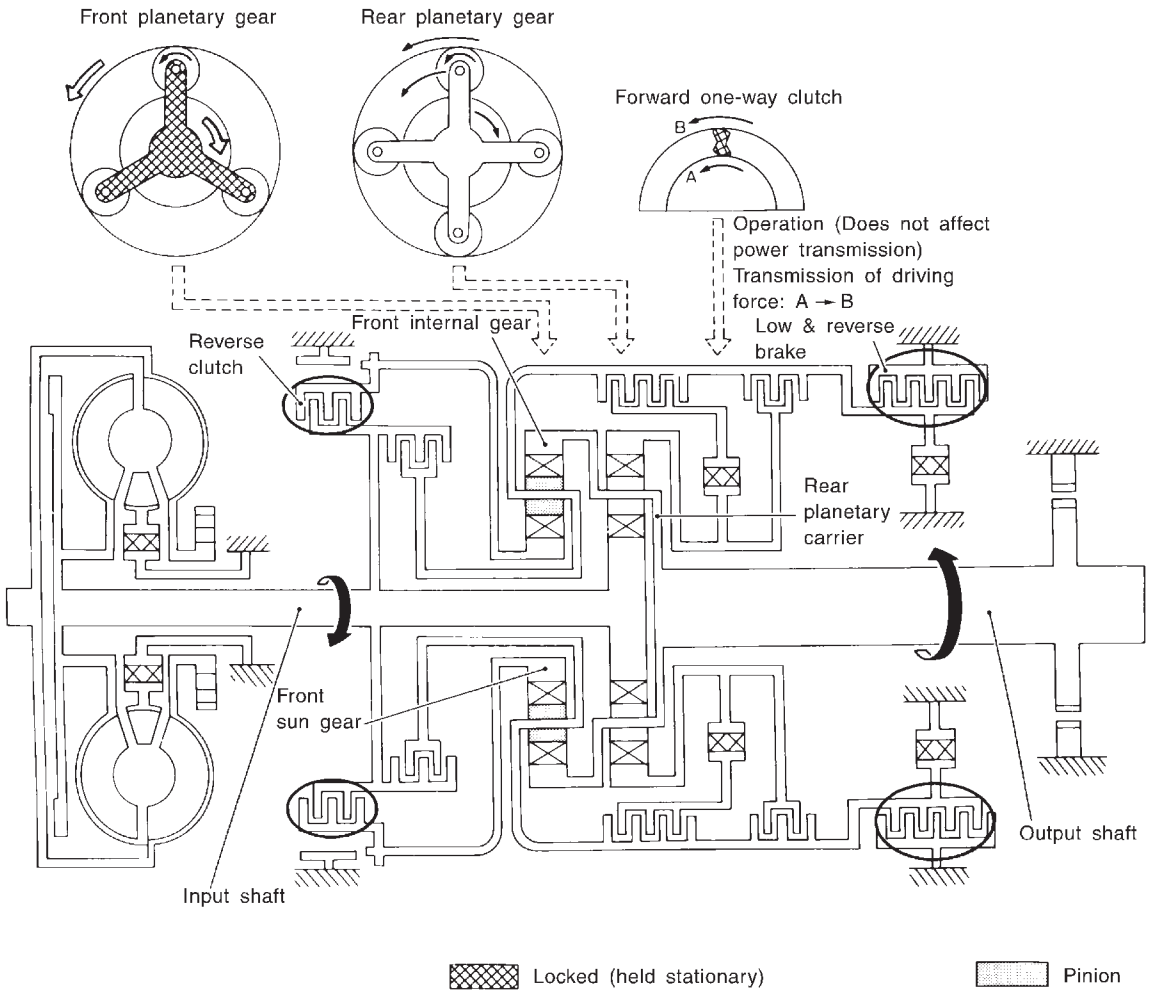
Input shaft
⇩
High clutch
⇩
Front planetary carrier
⇩
Front pinion gear
⇨ Front internal gear
⇩
Rear planetary carrier
⇩
Output shaft

SAT099J

"R" Position

=NAAT0012S0407

Reverse clutch **Low and reverse brake**	Front planetary carrier is stationary because of the operation of low and reverse brake. Input power is transmitted to front sun gear through reverse clutch, which drives front internal gear in the opposite direction.
Engine brake	As there is no one-way clutch in the power transmission line, engine brake can be obtained when decelerating.



Power flow

Input shaft
⇩
Reverse clutch
⇩
Front pinion gear ⇦ Front sun gear
⇩
Front internal gear ⇨ Output shaft

SAT101J

Control System

=NAAT0013

OUTLINE

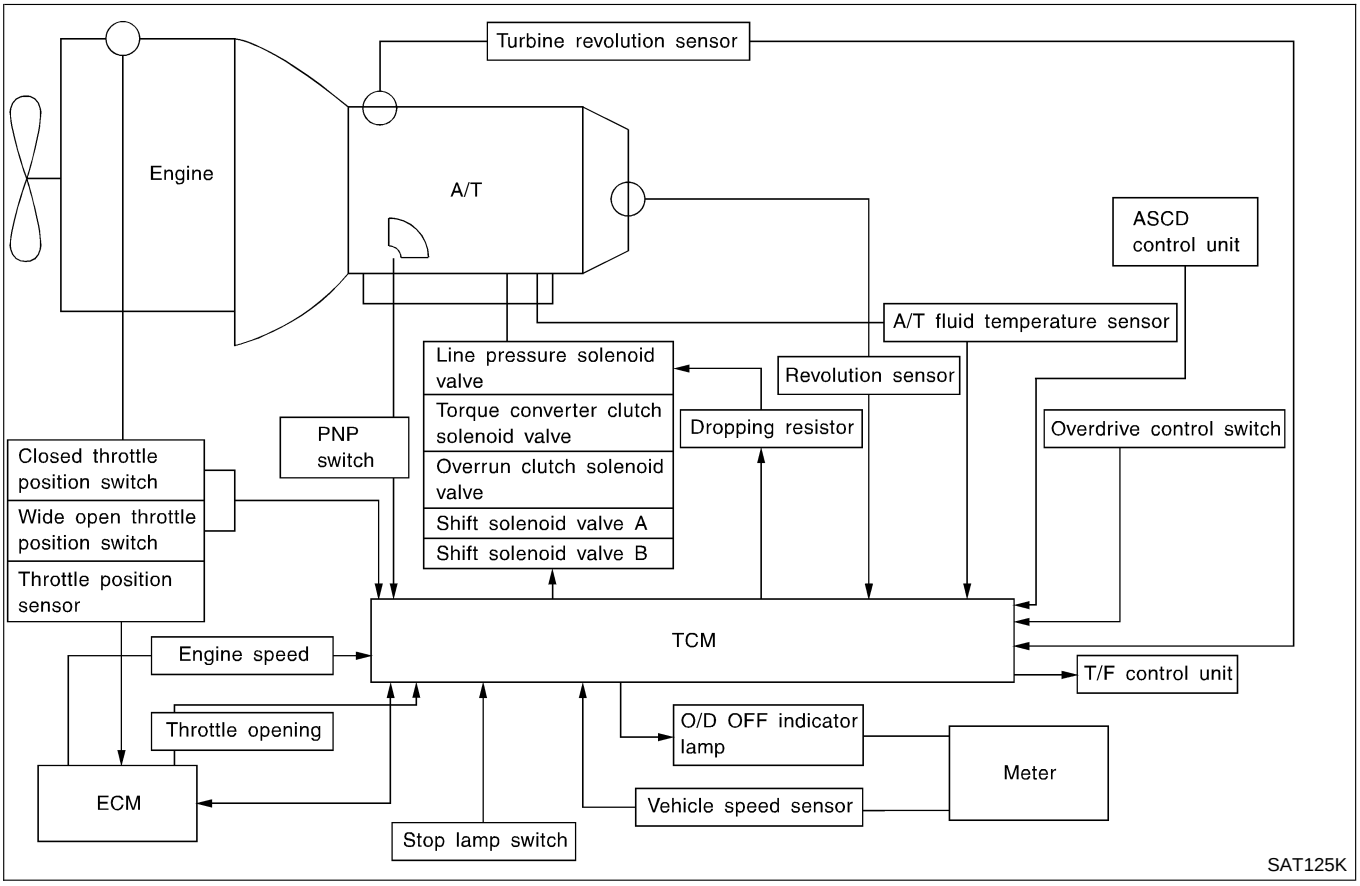
NAAT0013S01

The automatic transmission senses vehicle operating conditions through various sensors. It always controls the optimum shift position and reduces shifting and lock-up shocks.

SENSORS		TCM		ACTUATORS
PNP switch Throttle position sensor Closed throttle position switch Wide open throttle position switch Engine speed signal A/T fluid temperature sensor Revolution sensor Vehicle speed sensor Overdrive control switch ASCD control unit Stop lamp switch Turbine revolution sensor	▶	Shift control Line pressure control Lock-up control Overrun clutch control Timing control Fail-safe control Self-diagnosis CONSULT-II communication line Duet-EU control	▶	Shift solenoid valve A Shift solenoid valve B Overrun clutch solenoid valve Torque converter clutch solenoid valve Line pressure solenoid valve O/D OFF indicator lamp T/F control unit

CONTROL SYSTEM

NAAT0013S02



TCM FUNCTION

=NAAT0013S03

The function of the TCM is to:

- Receive input signals sent from various switches and sensors.
- Determine required line pressure, shifting point, lock-up operation, and engine brake operation.
- Send required output signals to the respective solenoids.

INPUT/OUTPUT SIGNAL OF TCM

NAAT0013S04

	Sensors and solenoid valves	Function
Input	PNP switch	Detects select lever position and sends a signal to TCM.
	Throttle position sensor	Detects throttle valve position and sends a signal to TCM.
	Closed throttle position switch	Detects throttle valve's fully-closed position and sends a signal to TCM.
	Wide open throttle position switch	Detects a throttle valve position of greater than 1/2 of full throttle and sends a signal to TCM.
	Engine speed signal	From ECM.
	A/T fluid temperature sensor	Detects transmission fluid temperature and sends a signal to TCM.
	Revolution sensor	Detects output shaft rpm and sends a signal to TCM.
	Vehicle speed sensor	Used as an auxiliary vehicle speed sensor. Sends a signal when revolution sensor (installed on transmission) malfunctions.
	Overdrive control switch	Sends a signal, which prohibits a shift to "D_4" (overdrive) position, to the TCM.
	ASCD control unit	Sends the cruise signal and "D_4" (overdrive) cancellation signal from ASCD control unit to TCM.
	Turbine revolution sensor	Sends an input shaft revolution signal.
	Stop lamp switch	Sends the lock-up release signal to the TCM at time of D_4 (lock-up).
Output	Shift solenoid valve A/B	Selects shifting point suited to driving conditions in relation to a signal sent from TCM.
	Line pressure solenoid valve	Regulates (or decreases) line pressure suited to driving conditions in relation to a signal sent from TCM.
	Torque converter clutch solenoid valve	Regulates (or decreases) lock-up pressure suited to driving conditions in relation to a signal sent from TCM.
	Overrun clutch solenoid valve	Controls an "engine brake" effect suited to driving conditions in relation to a signal sent from TCM.
	O/D OFF indicator lamp	Shows TCM faults, when A/T control components malfunction.

Control Mechanism

NAAT0180

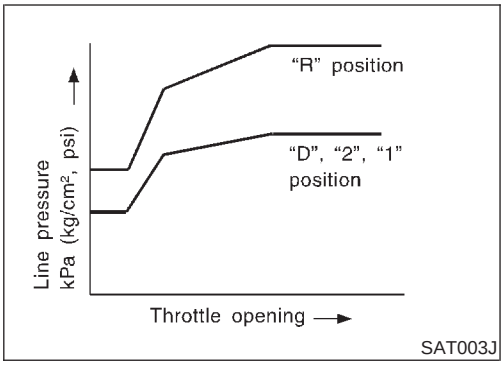
LINE PRESSURE CONTROL

NAAT0180S01

TCM has the various line pressure control characteristics to meet the driving conditions.

An ON-OFF duty signal is sent to the line pressure solenoid valve based on TCM characteristics.

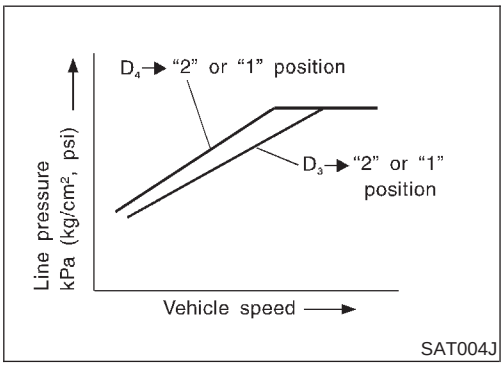
Hydraulic pressure on the clutch and brake is electronically controlled through the line pressure solenoid valve to accommodate engine torque. This results in smooth shift operation.



Normal Control

NAAT0180S0101

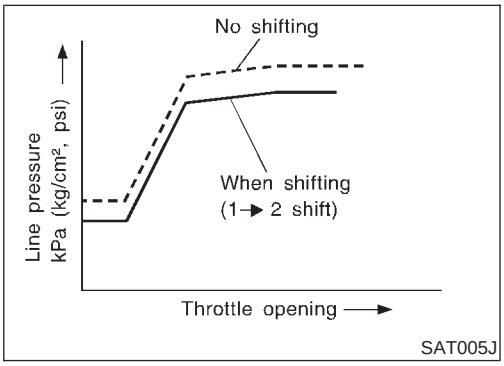
The line pressure to throttle opening characteristics is set for suitable clutch operation.



Back-up Control (Engine brake)

NAAT0180S0102

If the selector lever is shifted to "2" position while driving in D_4 (OD) or D_3, great driving force is applied to the clutch inside the transmission. Clutch operating pressure (line pressure) must be increased to deal with this driving force.



During Shift Change

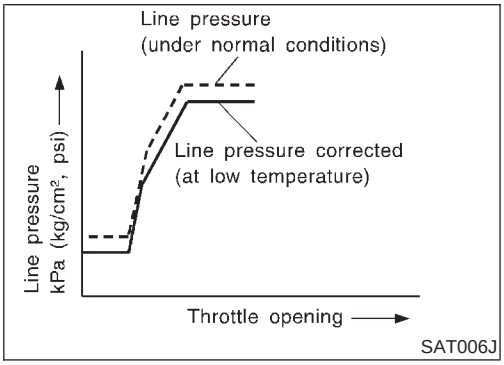
NAAT0180S0103

The line pressure is temporarily reduced corresponding to a change in engine torque when shifting gears (that is, when the shift solenoid valve is switched for clutch operation) to reduce shifting shock.

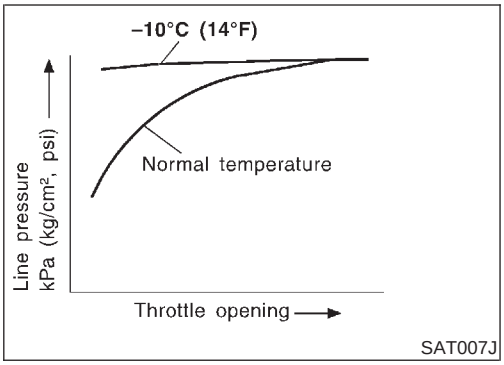
At Low Fluid Temperature

NAAT0180S0104

- Fluid viscosity and frictional characteristics of the clutch facing change with fluid temperature. Clutch engaging or band-contacting pressure is compensated for, according to fluid temperature, to stabilize shifting quality.



- The line pressure is reduced below 60°C (140°F) to prevent shifting shock due to low viscosity of automatic transmission fluid when temperature is low.

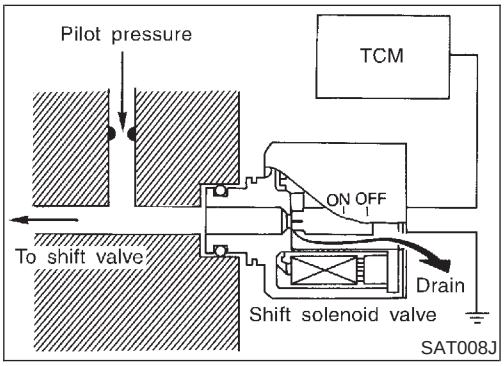


- Line pressure is increased to a maximum irrespective of the throttle opening when fluid temperature drops to −10°C (14°F). This pressure rise is adopted to prevent a delay in clutch and brake operation due to extreme drop of fluid viscosity at low temperature.

SHIFT CONTROL

NAAT0180S02

The shift is regulated entirely by electronic control to accommodate vehicle speed and varying engine operations. This is accomplished by electrical signals transmitted by the revolution sensor and throttle position sensor. This results in improved acceleration performance and fuel economy.



Control of Shift Solenoid Valves A and B

NAAT0180S0201

The TCM activates shift solenoid valves A and B according to signals from the throttle position sensor and revolution sensor to select the optimum gear position on the basis of the shift schedule memorized in the TCM.

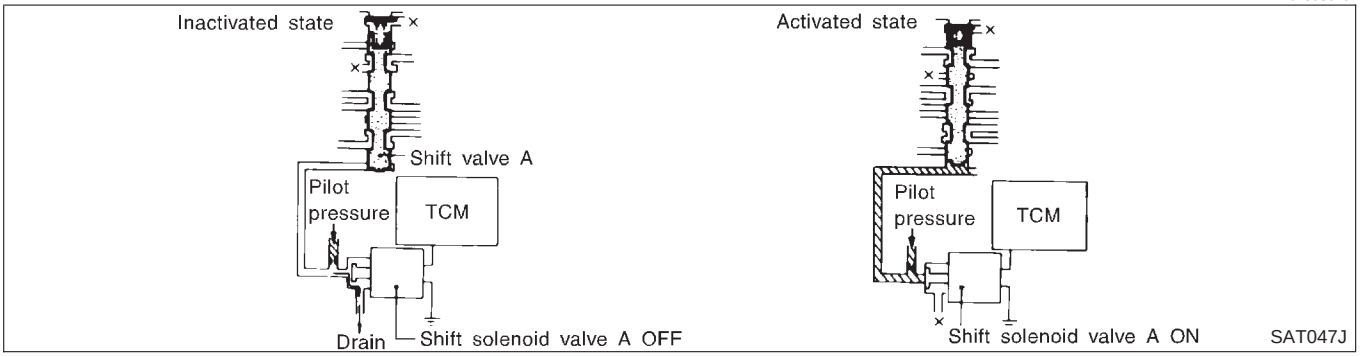
The shift solenoid valve performs simple ON-OFF operation. When set to "ON", the drain circuit closes and pilot pressure is applied to the shift valve.

[Relation between shift solenoid valves A and B and gear positions]

Shift solenoid valve	Gear position				
	D_1, 2_1, 1_1	D_2, 2_2, 1_2	D_3	D_4 (OD)	N-P
A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)	ON (Closed)
B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)

Control of Shift Valves A and B

NAAT0180S0202



Pilot pressure generated by the operation of shift solenoid valves A and B is applied to the end face of shift valves A and B.
The drawing above shows the operation of shift valve B. When the shift solenoid valve is "ON", pilot pressure applied to the end face of the shift valve overcomes spring force, moving the valve upward.

LOCK-UP CONTROL

NAAT0180S03

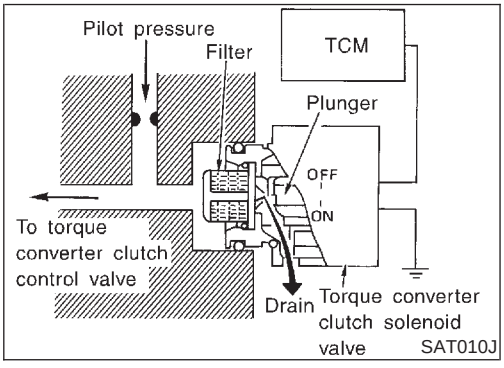
The torque converter clutch piston in the torque converter is locked to eliminate torque converter slip to increase power transmission efficiency. The solenoid valve is controlled by an ON-OFF duty signal sent from the TCM. The signal is converted to oil pressure signal which controls the torque converter clutch piston.

Conditions for Lock-up Operation

NAAT0180S0301

When vehicle is driven in 4th gear position, vehicle speed and throttle opening are detected. If the detected values fall within the lock-up zone memorized in the TCM, lock-up is performed.

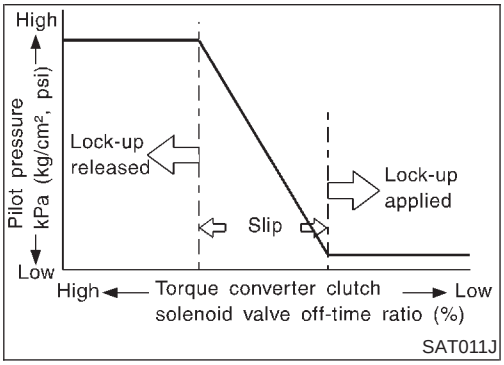
Overdrive control switch	ON	OFF
Selector lever	"D" position	
Gear position	D_4	D_3
Vehicle speed sensor	More than set value	
Throttle position sensor	Less than set opening	
Closed throttle position switch	OFF	
A/T fluid temperature sensor	More than 40°C (104°F)	



Torque Converter Clutch Solenoid Valve Control

NAAT0180S0302

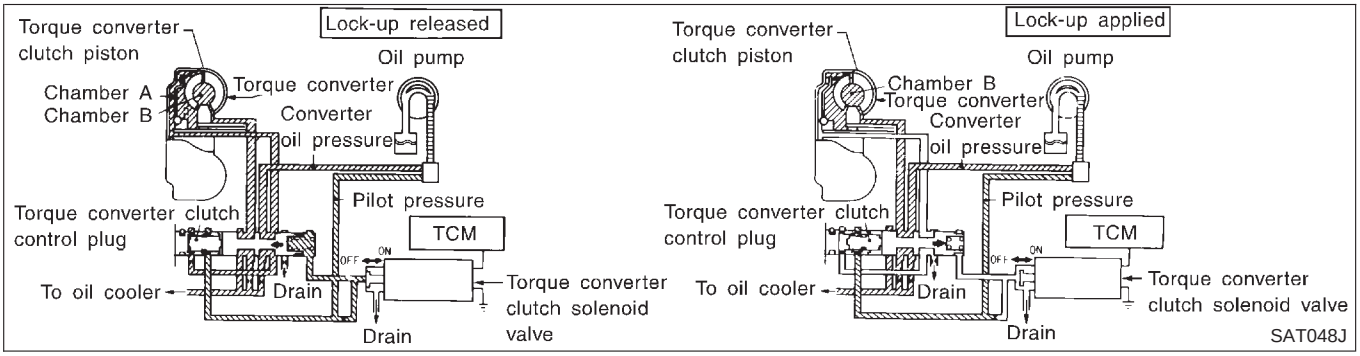
The torque converter clutch solenoid valve is controlled by the TCM. The plunger closes the drain circuit during the "OFF" period, and opens the circuit during the "ON" period. If the percentage of OFF-time increases in one cycle, the pilot pressure drain time is reduced and pilot pressure remains high.
The torque converter clutch piston is designed to slip to adjust the ratio of ON-OFF, thereby reducing lock-up shock.



OFF-time INCREASING
↓
Amount of drain DECREASING
↓
Pilot pressure HIGH
↓
Lock-up RELEASING

Torque Converter Clutch Control Valve Operation

NAAT0180S0303



Lock-up Released

The OFF-duration of the torque converter clutch solenoid valve is long, and pilot pressure is high. The pilot pressure pushes the end face of the torque converter clutch control valve in combination with spring force to move the valve to the left. As a result, converter pressure is applied to chamber A (torque converter clutch piston release side). Accordingly, the torque converter clutch piston remains unlocked.

Lock-up Applied

When the OFF-duration of the torque converter clutch solenoid valve is short, pilot pressure drains and becomes low. Accordingly, the control valve moves to the right by the pilot pressure of the other circuit and converter pressure. As a result, converter pressure is applied to chamber B, keeping the torque converter clutch piston applied.

Also smooth lock-up is provided by transient application and release of the lock-up.

OVERRUN CLUTCH CONTROL (ENGINE BRAKE CONTROL)

NAAT0180S04

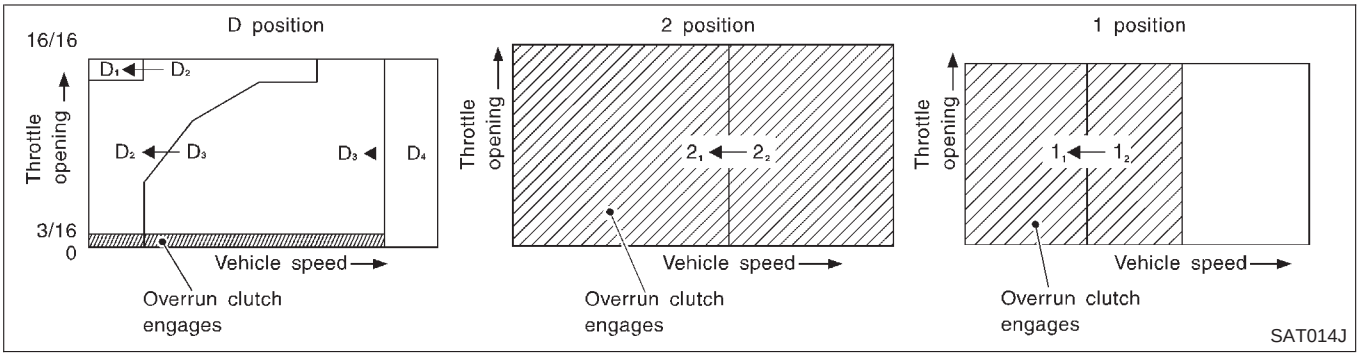
Forward one-way clutch is used to reduce shifting shocks in down-shifting operations. This clutch transmits engine torque to the wheels. However, drive force from the wheels is not transmitted to the engine because the one-way clutch rotates idle. This means the engine brake is not effective.

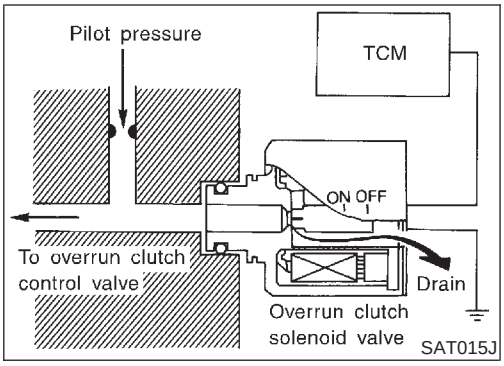
The overrun clutch operates when the engine brake is needed.

Overrun Clutch Operating Conditions

NAAT0180S0401

	Gear position	Throttle opening
"D" position	D_1, D_2, D_3 gear position	Less than 3/16
"2" position	2_1, 2_2 gear position	
"1" position	1_1, 1_2 gear position	At any position

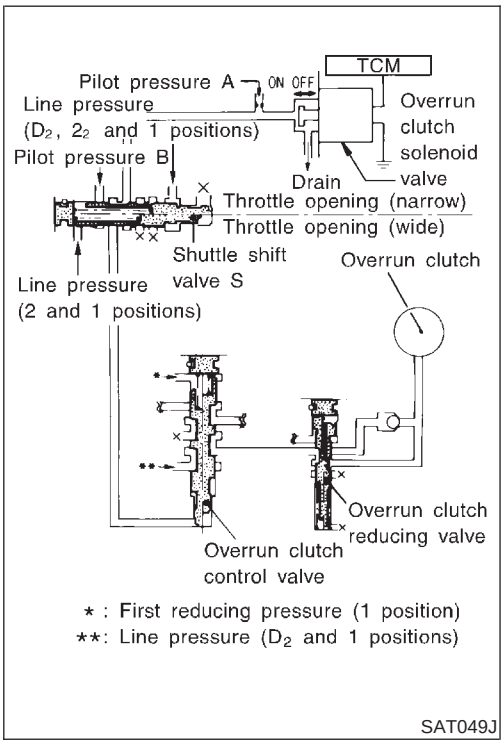




Overrun Clutch Solenoid Valve Control

NAAT0180S0402

The overrun clutch solenoid valve is operated by an ON-OFF signal transmitted by the TCM to provide overrun clutch control (engine brake control).
When this solenoid valve is "ON", the pilot pressure drain port closes. When it is "OFF", the drain port opens.
During the solenoid valve "ON" pilot pressure is applied to the end face of the overrun clutch control valve.



Overrun Clutch Control Valve Operation

NAAT0180S0403

When the solenoid valve is "ON", pilot pressure A is applied to the overrun clutch control valve. This pushes up the overrun clutch control valve. The line pressure is then shut off so that the clutch does not engage.
When the solenoid valve is "OFF", pilot pressure A is not generated. At this point, the overrun clutch control valve moves downward by spring force. As a result, overrun clutch operation pressure is provided by the overrun clutch reducing valve. This causes the overrun clutch to engage.
In the "1" position, the overrun clutch control valve remains pushed down so that the overrun clutch is engaged at all times.

Control Valve

NAAT0181

FUNCTION OF CONTROL VALVE

NAAT0181S01

Valve name	Function
• Pressure regulator valve • Pressure regulator plug • Pressure regulator sleeve plug	Regulate oil discharged from the oil pump to provide optimum line pressure for all driving conditions.
Pressure modifier valve	Used as a signal supplementary valve to the pressure regulator valve. Regulates pressure-modifier pressure (signal pressure) which controls optimum line pressure for all driving conditions.
Modifier accumulator piston	Smooths hydraulic pressure regulated by the pressure modifier valve to prevent pulsations.
Pilot valve	Regulates line pressure to maintain a constant pilot pressure level which controls lock-up mechanism, overrun clutch, 3-2 timing required for shifting.
Accumulator control valve Accumulator control sleeve	Regulate accumulator back-pressure to pressure suited to driving conditions.
Manual valve	Directs line pressure to oil circuits corresponding to select positions. Hydraulic pressure drains when the shift lever is in Neutral.

Control Valve (Cont'd)

Valve name	Function
Shift valve A	Simultaneously switches three oil circuits using output pressure of shift solenoid valve A to meet driving conditions (vehicle speed, throttle opening, etc.). Provides automatic downshifting and up-shifting (1st → 2nd → 3rd → 4th gears/4th → 3rd → 2nd → 1st gears) in combination with shift valve B.
Shift valve B	Simultaneously switches three oil circuits using output pressure of shift solenoid valve B in relation to driving conditions (vehicle speed, throttle opening, etc.). Provides automatic downshifting and up-shifting (1st → 2nd → 3rd → 4th gears/4th → 3rd → 2nd → 1st gears) in combination with shift valve A.
Shuttle shift valve S	Switches hydraulic circuits to provide 3-2 timing control and overrun clutch control in relation to the throttle opening. Inactivates the overrun clutch to prevent interlocking in 4th gear when the throttle is wide open.
Overrun clutch control valve	Switches hydraulic circuits to prevent engagement of the overrun clutch simultaneously with application of the brake band in 4th gear. (Interlocking occurs if the overrun clutch engages during D_4 gear operation.)
4-2 relay valve	Memorizes that the transmission is in 4th gear. Prevents the transmission from downshifting from 4th gear to 3rd and then to 2nd in combination with 4-2 sequence valve and shift valves A and B when downshifting from 4th to 2nd gear.
4-2 sequence valve	Prevents band servo pressure from draining before high clutch operating pressure and band servo releasing pressure drain (from the same circuit) during downshifting from 4th to 2nd gear.
Servo charger valve	An accumulator and a one-way orifice are used in the 2nd gear band servo oil circuit to dampen shifting shock when shifting from 1st to 2nd gear. To maintain adequate flow rate when downshifting from 4th or 3rd gear to 2nd gear, the servo charger valve directs 2nd gear band servo hydraulic pressure to the circuit without going through the one-way orifice when downshifting from 3rd or a higher gear.
3-2 timing valve	Prevents a late operation of the brake band when shifting selector lever from "D" to "1" or "2" position while driving in D_3.
"1" reducing valve	Reduces low & reverse brake pressure to dampen engine-brake shock when downshifting from the "1" position 2nd gear to 1st gear.
Overrun clutch reducing valve	Reduces oil pressure directed to the overrun clutch and prevents engine-brake shock. In "1" and "2" positions, line pressure acts on the overrun clutch reducing valve to increase the pressure-regulating point, with resultant engine brake capability.
Torque converter relief valve	Prevents an excessive rise in torque converter pressure.
Torque converter clutch control valve, torque converter clutch control plug and torque converter clutch control sleeve	Activate or inactivate the lock-up function. Also provide smooth lock-up through transient application and release of the lock-up system.
Shuttle shift valve D	Switches hydraulic circuits so that output pressure of the torque converter clutch solenoid valve acts on the lock-up valve in the "D" position of 2nd, 3rd and 4th gears. (In the "D" position 1st gear, lock-up is inhibited.) ● Lock-up control is not affected in "D" position 2nd, 3rd or 4th gears, unless output pressure of the torque converter clutch solenoid valve is generated by a signal from the control unit.

Introduction

NAAT0014

The A/T system has two self-diagnostic systems.
The first is the emission-related on board diagnostic system (OBD-II) performed by the TCM in combination with the ECM. The malfunction is indicated by the MIL (malfunction indicator lamp) and is stored as a DTC in the ECM memory but not the TCM memory.
The second is the TCM original self-diagnosis indicated by the O/D OFF indicator lamp. The malfunction is stored in the TCM memory. The detected items are overlapped with OBD-II self-diagnostic items. For detail, refer to AT-38.

OBD-II Function for A/T System

NAAT0182

The ECM provides emission-related on board diagnostic (OBD-II) functions for the A/T system. One function is to receive a signal from the TCM used with OBD-related parts of the A/T system. The signal is sent to the ECM when a malfunction occurs in the corresponding OBD-related part. The other function is to indicate a diagnostic result by means of the MIL (malfunction indicator lamp) on the instrument panel. Sensors, switches and solenoid valves are used as sensing elements.
The MIL automatically illuminates in One or Two Trip Detection Logic when a malfunction is sensed in relation to A/T system parts.

One or Two Trip Detection Logic of OBD-II

NAAT0015

ONE TRIP DETECTION LOGIC

NAAT0015S01

If a malfunction is sensed during the first test drive, the MIL will illuminate and the malfunction will be stored in the ECM memory as a DTC. The TCM is not provided with such a memory function.

TWO TRIP DETECTION LOGIC

NAAT0015S02

When a malfunction is sensed during the first test drive, it is stored in the ECM memory as a 1st trip DTC (diagnostic trouble code) or 1st trip freeze frame data. At this point, the MIL will not illuminate. — First Trip
If the same malfunction as that experienced during the first test drive is sensed during the second test drive, the MIL will illuminate. — Second Trip
A/T-related parts for which the MIL illuminates during the first or second test drive are listed below.

Items	MIL	
	One trip detection	Two trip detection
Shift solenoid valve A — DTC: P0750	X	
Shift solenoid valve B — DTC: P0755	X	
Throttle position sensor or switch — DTC: P1705	X	
Except above		X

The “trip” in the “One or Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation.

OBD-II Diagnostic Trouble Code (DTC)

NAAT0016

HOW TO READ DTC AND 1ST TRIP DTC

NAAT0016S01

DTC and 1st trip DTC can be read by the following methods.
(with CONSULT-II or GST) CONSULT-II or GST (Generic Scan Tool) Examples: P0705, P0710, P0720, P0725, etc.
These DTCs are prescribed by SAE J2012.
(CONSULT-II also displays the malfunctioning component or system.)

- **1st trip DTC No. is the same as DTC No.**
- **Output of the diagnostic trouble code indicates that the indicated circuit has a malfunction. However, in case of the Mode II and GST they do not indicate whether the malfunction is still occurring or occurred in the past and returned to normal.**
  CONSULT-II can identify them as shown below. Therefore, using CONSULT-II (if available) is recommended.

A sample of CONSULT-II display for DTC and 1st trip DTC is shown on the next page. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode for “ENGINE” with CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.

SELECT SYSTEM
A/T
ENGINE

SAT014K

If the DTC is being detected currently, the time data will be "0".

SELF-DIAG RESULTS	
DTC RESULTS	TIME
PNP SW/CIRC [P0705]	0

SAT015K

If a 1st trip DTC is stored in the ECM, the time data will be "1t".

SELF-DIAG RESULTS	
DTC RESULTS	TIME
PNP SW/CIRC [P0705]	1 t

SAT016K

Freeze Frame Data and 1st Trip Freeze Frame Data

NAAT0016S0101

The ECM has a memory function, which stores the driving condition such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed and vehicle speed at the moment the ECM detects a malfunction.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data, and the data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For detail, refer to EC-80, "CONSULT-II".

Only one set of freeze frame data (either 1st trip freeze frame data of freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0306 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased.

HOW TO ERASE DTC

NAAT0016S02

The diagnostic trouble code can be erased by CONSULT-II, GST or ECM DIAGNOSTIC TEST MODE as described following.

- **If the battery terminal is disconnected, the diagnostic trouble code will be lost within 24 hours.**
- **When you erase the DTC, using CONSULT-II or GST is easier and quicker than switching the mode selector on the ECM.**

The following emission-related diagnostic information is cleared from the ECM memory when erasing DTC related to OBD-II. For details, refer to EC-59, "Emission-related Diagnostic Information".

- **Diagnostic trouble codes (DTC)**
- **1st trip diagnostic trouble codes (1st trip DTC)**
- **Freeze frame data**
- **1st trip freeze frame data**
- **System readiness test (SRT) codes**
- **Test values**

HOW TO ERASE DTC (WITH CONSULT-II)

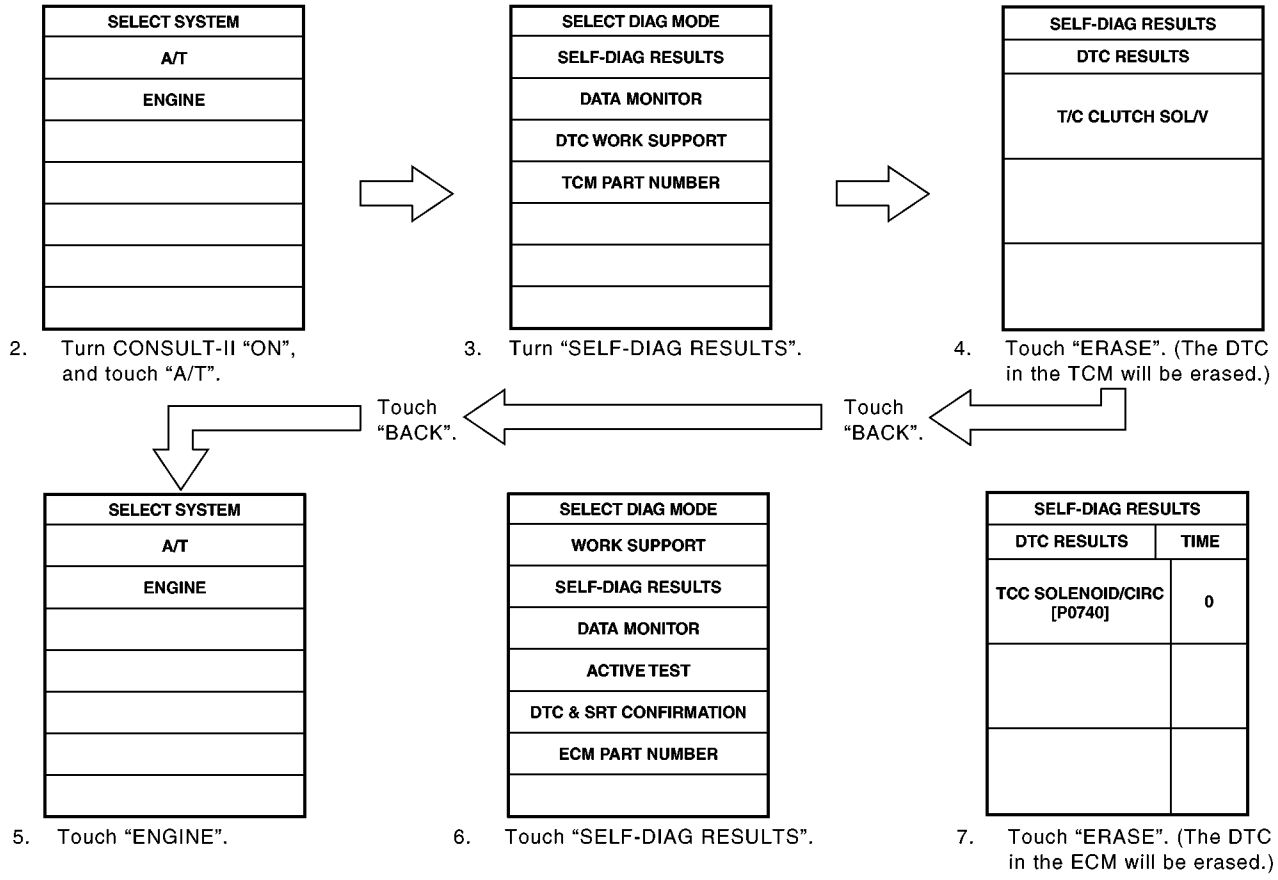
NAAT0016S03

- **If a DTC is displayed for both ECM and TCM, it needs to be erased for both ECM and TCM.**

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Turn CONSULT-II "ON" and touch "A/T".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". (The DTC in the TCM will be erased.) Then touch "BACK" twice.
5. Touch "ENGINE".
6. Touch "SELF-DIAG RESULTS".
7. Touch "ERASE". (The DTC in the ECM will be erased.)

How to erase DTC (With CONSULT-II)

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.



SAT017K

HOW TO ERASE DTC (WITH GST)

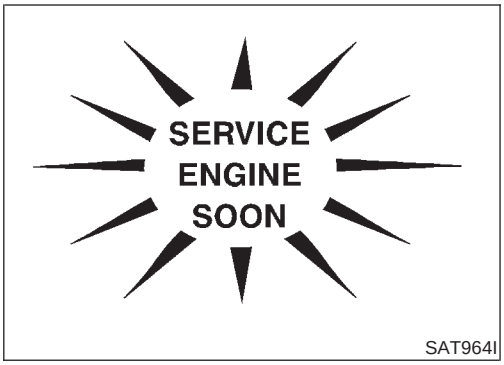
NAAT0016S04

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Perform "OBD-II SELF-DIAGNOSTIC PROCEDURE (No Tools)". Refer to AT-46. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with Generic Scan Tool (GST). For details, refer to EC-93, "DESCRIPTION".

HOW TO ERASE DTC (NO TOOLS)

NAAT0016S05

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Perform "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)". Refer to AT-46. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)



SAT964I

Malfunction Indicator Lamp (MIL)

=NAAT0183

The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
- If the MIL does not light up, refer to EL-134, “Schematic”. (Or refer to EC-646, “Wiring Diagram”.)
2. When the engine is started, the MIL should go off.
   If the MIL remains on, the on board diagnostic system has detected an engine system malfunction. For detail, refer to EC-58, “Introduction”.

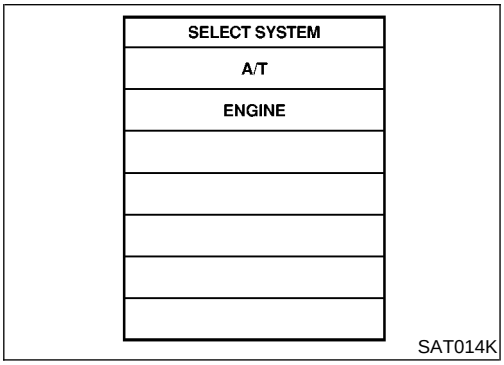
CONSULT-II

NAAT0184

After performing “SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)” (AT-37), place check marks for results on the “DIAGNOSTIC WORKSHEET”, AT-55. Reference pages are provided following the items.

NOTICE:

1) The CONSULT-II electrically displays shift timing and lock-up timing (that is, operation timing of each solenoid).
   Check for time difference between actual shift timing and the CONSULT-II display. If the difference is noticeable, mechanical parts (except solenoids, sensors, etc.) may be malfunctioning. Check mechanical parts using applicable diagnostic procedures.
2) Shift schedule (which implies gear position) displayed on CONSULT-II and that indicated in Service Manual may differ slightly. This occurs because of the following reasons:
- Actual shift schedule has more or less tolerance or allowance,
- Shift schedule indicated in Service Manual refers to the point where shifts start, and
- Gear position displayed on CONSULT-II indicates the point where shifts are completed.
3) Shift solenoid valve “A” or “B” is displayed on CONSULT-II at the start of shifting. Gear position is displayed upon completion of shifting (which is computed by TCM).
4) Additional CONSULT-II information can be found in the Operation Manual supplied with the CONSULT-II unit.



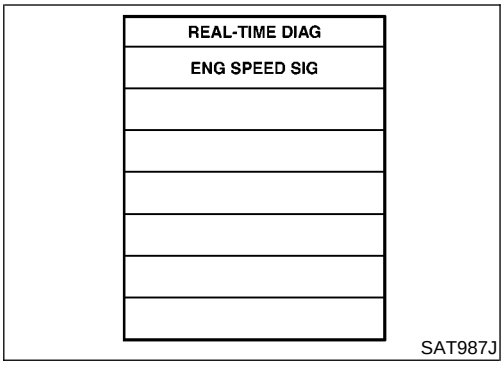
SAT014K

Ⓑ SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)

NAAT0184S01

1. Turn on CONSULT-II and touch “ENGINE” for OBD-II detected items or touch “A/T” for TCM self-diagnosis.
   If A/T is not displayed, check TCM power supply and ground circuit. Refer to AT-92. If result is NG, refer to EL-9, “Schematic”.

CONSULT-II (Cont'd)



2. Touch "SELF-DIAG RESULTS".
Display shows malfunction experienced since the last erasing operation.
CONSULT-II performs REAL-TIME SELF-DIAGNOSIS.
Also, any malfunction detected while in this mode will be displayed at real time.

SELF-DIAGNOSTIC RESULT TEST MODE

NAAT0184S02

Detected items (Screen terms for CONSULT-II, "SELF-DIAG RESULTS" test mode)		Malfunction is detected when ...	TCM self-diagnosis	OBD-II (DTC)
"A/T"	"ENGINE"		Available by O/D OFF indicator lamp or "A/T" on CONSULT-II	Available by malfunction indicator lamp*2, "ENGINE" on CONSULT-II or GST
PNP switch circuit		• TCM does not receive the correct voltage signal (based on the gear position) from the switch.	—	P0705
—	PNP SW/CIRC			
Revolution sensor		• TCM does not receive the proper voltage signal from the sensor.	X	P0720
VHCL SPEED SEN·A/T	VEH SPD SEN/CIR AT			
Vehicle speed sensor (Meter)		• TCM does not receive the proper voltage signal from the sensor.	X	—
VHCL SPEED SEN·MTR	—			
A/T 1st gear function		• A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	—	P0731*1
—	A/T 1ST GR FNCTN			
A/T 2nd gear function		• A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.	—	P0732*1
—	A/T 2ND GR FNCTN			
A/T 3rd gear function		• A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	—	P0733*1
—	A/T 3RD GR FNCTN			
A/T 4th gear function		• A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	—	P0734*1
—	A/T 4TH GR FNCTN			
A/T TCC S/V function (lock-up)		• A/T cannot perform lock-up even if electrical circuit is good.	—	P0744*1
—	A/T TCC S/V FNCTN			
Shift solenoid valve A		• TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0750
SHIFT SOLENOID/V A	SFT SOL A/CIRC			
Shift solenoid valve B		• TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0755
SHIFT SOLENOID/V B	SFT SOL B/CIRC			

Detected items (Screen terms for CONSULT-II, "SELF-DIAG RESULTS" test mode)		Malfunction is detected when ...	TCM self-diagnosis	OBD-II (DTC)
"A/T"	"ENGINE"		O/D OFF Available by O/D OFF indicator lamp or "A/T" on CONSULT-II	SERVICE ENGINE SOON Available by malfunction indicator lamp*2, "ENGINE" on CONSULT-II or GST
Overrun clutch solenoid valve		• TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P1760
OVERRUN CLUTCH S/V	O/R CLUCH SOL/CIRC			
T/C clutch solenoid valve		• TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0740
T/C CLUTCH SOL/V	TCC SOLENOID/CIRC			
Line pressure solenoid valve		• TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0745
LINE PRESSURE S/V	L/PRESS SOL/CIRC			
Throttle position sensor Throttle position switch		• TCM receives an excessively low or high voltage from the sensor.	X	P1705
THROTTLE POSI SEN	TP SEN/CIRC A/T			
Engine speed signal		• TCM does not receive the proper voltage signal from the ECM.	X	P0725
ENGINE SPEED SIG				
A/T fluid temperature sensor		• TCM receives an excessively low or high voltage from the sensor.	X	P0710
BATT/FLUID TEMP SEN	ATF TEMP SEN/CIRC			
Engine control		• The ECM-AT communication line is open or shorted.	X	EC-435, EC-598
A/T COMM LINE	—			
Turbine revolution sensor		• TCM does not receive the proper voltage signal from the sensor.	X	—
TURBINE REV	—			
TCM (RAM)		• TCM memory (RAM) is malfunctioning.	—	—
CONTROL UNIT (RAM)	—			
TCM (ROM)		• TCM memory (ROM) is malfunctioning.	—	—
CONTROL UNIT (ROM)	—			
TCM (EEP ROM)		• TCM memory (EEP ROM) is malfunctioning.	—	—
CONTROL UNIT (EEP ROM)	—			
Initial start		• This is not a malfunction message (Whenever shutting off a power supply to the TCM, this message appears on the screen.)	X	—
INITIAL START	—			
No failure (NO DTC IS DETECTED FURTHER TESTING MAY BE REQUIRED)		• No failure has been detected.	X	X

CONSULT-II (Cont'd)

X: Applicable
—: Not applicable
*1: These malfunctions cannot be displayed by MIL SERVICE ENGINE SOON if another malfunction is assigned to MIL.
*2: Refer to EC-73, "DESCRIPTION".

DATA MONITOR MODE (A/T)

NAAT0184S03

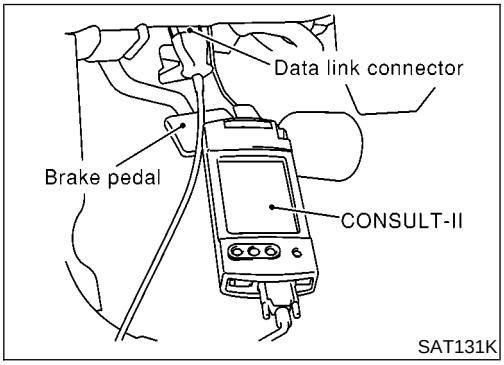
Item	Display	Monitor item		Description	Remarks
		TCM input signals	Main signals		
Vehicle speed sensor 1 (A/T) (Revolution sensor)	VHCL/S SE·A/T [km/h] or [mph]	X	—	• Vehicle speed computed from signal of revolution sensor is displayed.	When racing engine in "N" or "P" position with vehicle stationary, CONSULT-II data may not indicate 0 km/h (0 mph).
Vehicle speed sensor 2 (Meter)	VHCL/S SE·MTR [km/h] or [mph]	X	—	• Vehicle speed computed from signal of vehicle speed sensor is displayed.	Vehicle speed display may not be accurate under approx. 10 km/h (6 mph). It may not indicate 0 km/h (0 mph) when vehicle is stationary.
Throttle position sensor	THRTL POS SEN [V]	X	—	• Throttle position sensor signal voltage is displayed.	
A/T fluid temperature sensor	FLUID TEMP SE [V]	X	—	• A/T fluid temperature sensor signal voltage is displayed. • Signal voltage lowers as fluid temperature rises.	
Battery voltage	BATTERY VOLT [V]	X	—	• Source voltage of TCM is displayed.	
Engine speed	ENGINE SPEED [rpm]	X	X	• Engine speed, computed from engine speed signal, is displayed.	Engine speed display may not be accurate under approx. 800 rpm. It may not indicate 0 rpm even when engine is not running.
Turbine revolution sensor	TURBINE REV [rpm]	X	—	• Turbine revolution computed from signal of turbine revolution sensor is displayed.	Error may occur under approx. 800 rpm and will not indicate 0 rpm even if engine is not running.
Overdrive control switch	OVERDRIVE SW [ON/OFF]	X	—	• ON/OFF state computed from signal of overdrive control SW is displayed.	
PN position switch	PN POSI SW [ON/OFF]	X	—	• ON/OFF state computed from signal of PN position SW is displayed.	
R position switch	R POSITION SW [ON/OFF]	X	—	• ON/OFF state computed from signal of R position SW is displayed.	
D position switch	D POSITION SW [ON/OFF]	X	—	• ON/OFF state computed from signal of D position SW is displayed.	
2 position switch	2 POSITION SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of 2 position SW, is displayed.	

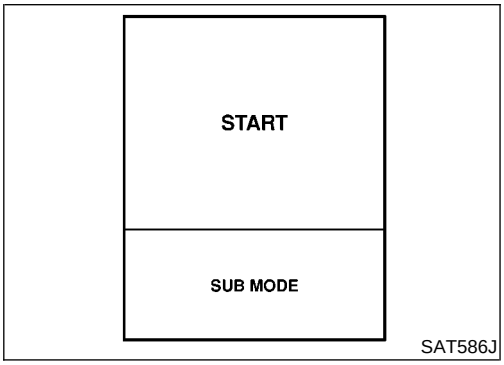
Item	Display	Monitor item		Description	Remarks
		TCM input signals	Main signals		
1 position switch	1 POSITION SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of 1 position SW, is displayed.	
ASCD cruise signal	ASCD-CRUISE [ON/OFF]	X	—	• Status of ASCD cruise signal is displayed. ON ... Cruising state OFF ... Normal running state	• This is displayed even when no ASCD is mounted.
ASCD OD cut signal	ASCD-OD CUT [ON/OFF]	X	—	• Status of ASCD OD release signal is displayed. ON ... OD released OFF ... OD not released	• This is displayed even when no ASCD is mounted.
Kickdown switch	KICKDOWN SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of kickdown SW, is displayed.	• This is displayed even when no kickdown switch is equipped.
Closed throttle position switch	CLOSED THL/SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of closed throttle position SW, is displayed.	
Wide open throttle position switch	W/O THRL/P-SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of wide open throttle position SW, is displayed.	
Stop lamp switch	BRAKE SW [ON/OFF]	X	—	• ON/OFF status is displayed. ON ... Brake pedal is depressed. OFF ... Brake pedal is released.	
Gear position	GEAR	—	X	• Gear position data used for computation by TCM, is displayed.	
Selector lever position	SLCT LVR POSI	—	X	• Selector lever position data, used for computation by TCM, is displayed.	• A specific value used for control is displayed if fail-safe is activated due to error.
Vehicle speed	VEHICLE SPEED [km/h] or [mph]	—	X	• Vehicle speed data, used for computation by TCM, is displayed.	
Throttle position	THROTTLE POSI [/8]	—	X	• Throttle position data, used for computation by TCM, is displayed.	• A specific value used for control is displayed if fail-safe is activated due to error.
Line pressure duty	LINE PRES DTY [%]	—	X	• Control value of line pressure solenoid valve, computed by TCM from each input signal, is displayed.	

CONSULT-II (Cont'd)

Item	Display	Monitor item		Description	Remarks
		TCM input signals	Main signals		
Torque converter clutch solenoid valve duty	TCC S/V DUTY [%]	—	X	• Control value of torque converter clutch solenoid valve, computed by TCM from each input signal, is displayed.	
Shift solenoid valve A	SHIFT S/V A [ON/OFF]	—	X	• Control value of shift solenoid valve A, computed by TCM from each input signal, is displayed.	Control value of solenoid is displayed even if solenoid circuit is disconnected. The "OFF" signal is displayed if solenoid circuit is shorted.
Shift solenoid valve B	SHIFT S/V B [ON/OFF]	—	X	• Control value of shift solenoid valve B, computed by TCM from each input signal, is displayed.	
Overrun clutch solenoid valve	OVERRUN/C S/V [ON/OFF]	—	X	• Control value of overrun clutch solenoid valve computed by TCM from each input signal is displayed.	
Self-diagnosis display lamp (O/D OFF indicator lamp)	SELF-D DP LMP [ON/OFF]	—	X	• Control status of O/D OFF indicator lamp is displayed.	

X: Applicable
—: Not applicable





DTC WORK SUPPORT MODE WITH CONSULT-II

NAAT0184S04

CONSULT-II Setting Procedure

NAAT0184S0401

1. Turn ignition switch "OFF".
2. Connect CONSULT-II to data link connector, which is located in instrument lower panel on driver side.
3. Turn ignition switch "ON".
4. Touch "START".

SELECT SYSTEM
A/T
ENGINE

SAT014K

5. Touch "A/T".

SELECT DIAG MODE
SELF-DIAG RESULTS
DATA MONITOR
DTC WORK SUPPORT
TCM PART NUMBER

SAT971J

6. Touch "DTC WORK SUPPORT".

SELECT WORK ITEM
1ST GR FNCTN P0731
2ND GR FNCTN P0732
3RD GR FNCTN P0733
4TH GRFNCTN P0734
TCC S/V FNCTN P0744

SAT018K

7. Touch select item menu (1ST, 2ND, etc.).

1ST GR FNCTN P0731
THIS SUPPORT FUNCTION IS FOR DTC P0731. SEE THE SERVICE MANUAL ABOUT THE OPERATING CONDITION FOR THIS DIAGNOSIS.

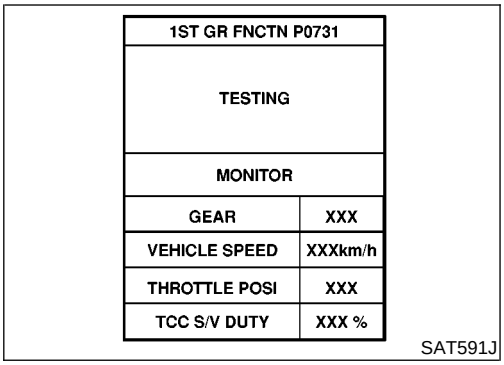
SAT589J

8. Touch "START".

1ST GR FNCTN P0731	
OUT OF CONDTION	
MONITOR	
GEAR	XXX
VEHICLE SPEED	XXXkm/h
THROTTLE POSI	XXX
TCC S/V DUTY	XXX %

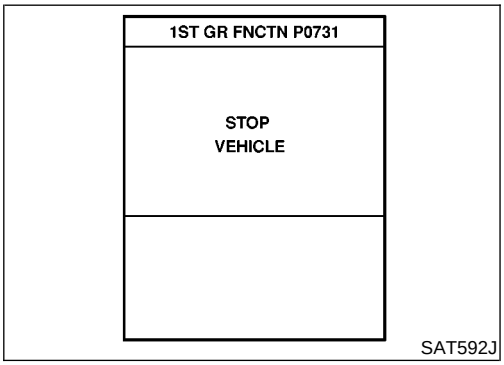
SAT019K

9. Perform driving test according to "DTC CONFIRMATION PROCEDURE" in "TROUBLE DIAGNOSIS FOR DTC".



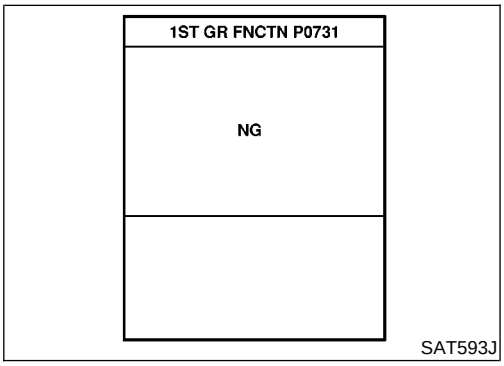
SAT591J

- **When testing conditions are satisfied, CONSULT-II screen changes from "OUT OF CONDITION" to "TESTING".**

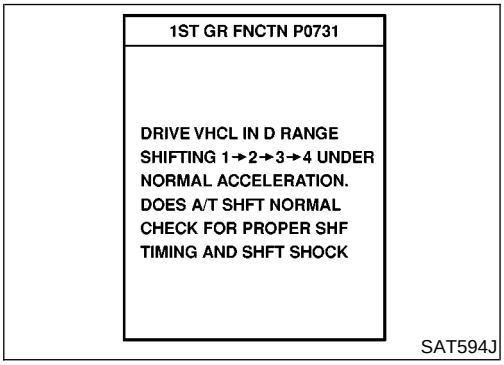


SAT592J

10. Stop vehicle. If "NG" appears on the screen, malfunction may exist. Go to "DIAGNOSTIC PROCEDURE".

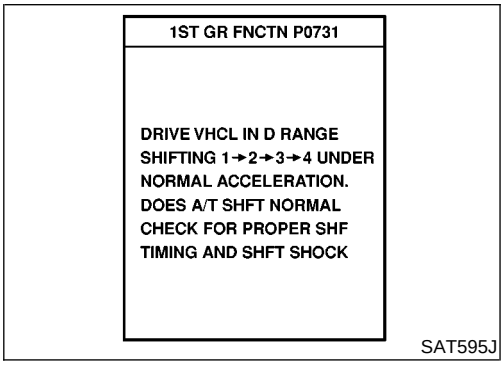


SAT593J



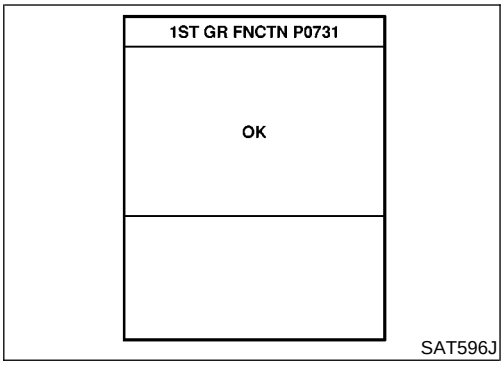
SAT594J

11. Perform test drive to check gear shift feeling in accordance with instructions displayed.

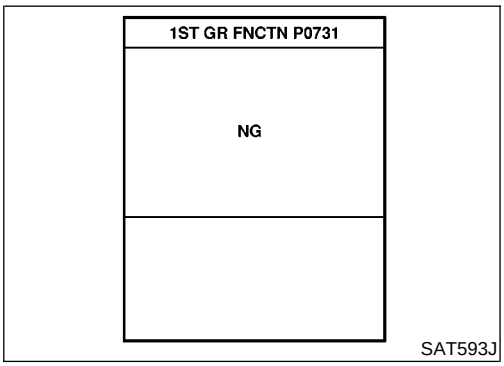


SAT595J

12. Touch "YES" or "NO".



SAT596J



SAT593J

13. CONSULT-II procedure ended.
If "NG" appears on the screen, a malfunction may exist. Go to "DIAGNOSTIC PROCEDURE".

DTC WORK SUPPORT MODE

NAAT0184S05

DTC work support item	Description	Check item
1ST GR FNCTN P0731	Following items for "A/T 1st gear function (P0731)" can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve A ● Shift solenoid valve B ● Each clutch ● Hydraulic control circuit
2ND GR FNCTN P0732	Following items for "A/T 2nd gear function (P0732)" can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve B ● Each clutch ● Hydraulic control circuit
3RD GR FNCTN P0733	Following items for "A/T 3rd gear function (P0733)" can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve A ● Each clutch ● Hydraulic control circuit
4TH GR FNCTN P0734	Following items for "A/T 4th gear function (P0734)" can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve A ● Shift solenoid valve B ● Overrun clutch solenoid valve ● Line pressure solenoid valve ● Each clutch ● Hydraulic control circuit
TCC S/V FNCTN P0744	Following items for "A/T TCC S/V function (lock-up) (P0744)" can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Torque converter clutch solenoid valve ● Each clutch ● Hydraulic control circuit

Diagnostic Procedure Without CONSULT-II

NAAT0206

OBD-II SELF-DIAGNOSTIC PROCEDURE (WITH GST)

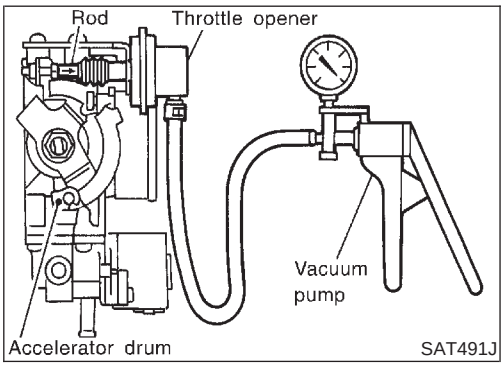
NAAT0206S01

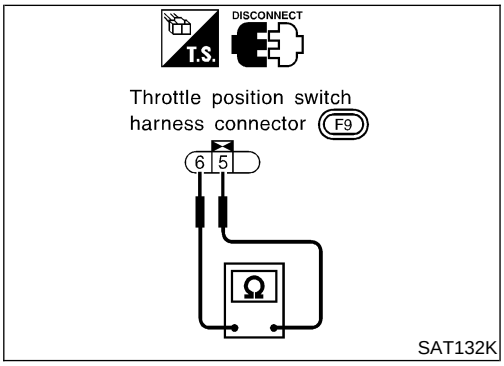
Refer to EC-93, “DESCRIPTION”.

OBD-II SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)

NAAT0206S02

Refer to EC-73, “DESCRIPTION”.





TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)

NAAT0206S03

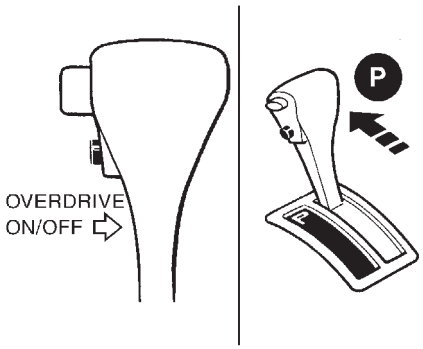
Preparation

NAAT0206S0301

1. Turn ignition switch to “OFF” position.
2. Connect the handy type vacuum pump to the throttle opener and apply vacuum −25.3 kPa (−190 mmHg, −7.48 inHg).
3. Disconnect the throttle position switch harness connector.
4. Turn ignition switch to “ON” position.
5. Check continuity of the closed throttle position switch.
   Continuity should exist.
   (If continuity does not exist, check throttle opener and closed throttle position switch. Then increase vacuum until closed throttle position switch shows continuity.)
6. Go to “DIAGOSIS START” on next page.

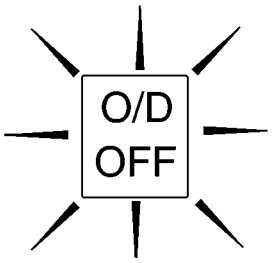
1	CHECK O/D OFF INDICATOR LAMP

1. Start the engine with selector lever in "P" position. Warm engine to normal operating temperature.
2. Turn ignition switch to "OFF" position.
3. Wait 5 seconds.



SAT967I

4. Turn ignition switch to "ON" position.
   (Do not start engine.)
5. Does O/D OFF indicator lamp come on for about 2 seconds?



O/D OFF indicator lamp

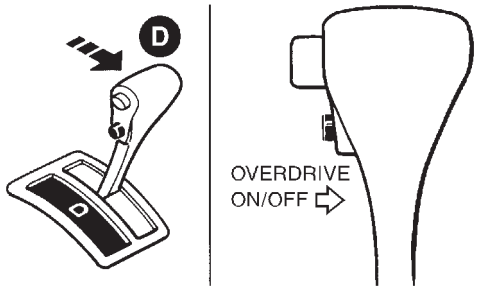
SAT204K

Yes or No

Yes	▶	GO TO 2.
No	▶	Go to "1. O/D OFF Indicator Lamp Does Not Come On", AT-218.

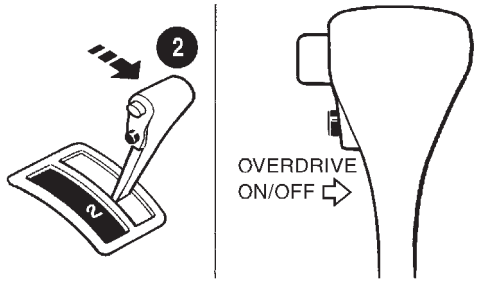
2	JUDGEMENT PROCEDURE STEP 1

1. Turn ignition switch to "OFF" position.
2. Push shift lock release button.
3. Move selector lever from "P" to "D" position.
4. Turn ignition switch to "ON" position. (Do not start engine.)
5. Depress and hold overdrive control switch in "OFF" position (the O/D OFF indicator lamp will be "ON") until directed to release the switch. (If O/D OFF indicator lamp does not come on, go to step 5 on AT-257.)
6. Turn ignition switch to "OFF" position.



SAT968I

7. Turn ignition switch to "ON" position (Do not start engine.).
8. Release the overdrive control switch (the O/D OFF indicator lamp will be "OFF").
9. Wait 2 seconds.
10. Move selector lever to "2" position.
11. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be "ON").
12. Depress and hold the overdrive control switch (the O/D OFF indicator lamp will be "OFF") until directed to release the switch.

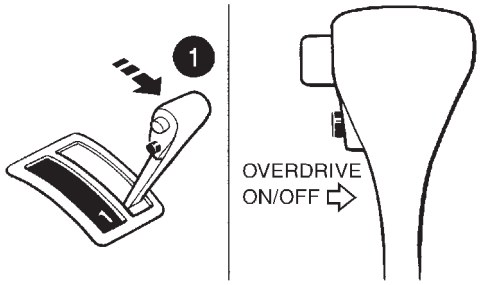


SAT969I

▶	GO TO 3.

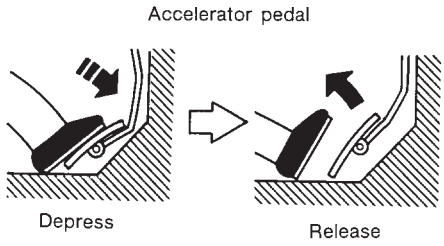
3	JUDGEMENT PROCEDURE STEP 2

1. Move selector lever to "1" position.
2. Release the overdrive control switch.
3. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be "ON").
4. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be "OFF").
5. Depress and hold the overdrive control switch (the O/D OFF indicator lamp will be "ON") until directed to release the switch.



SAT970I

6. Depress accelerator pedal fully and release it.
7. Release the overdrive control switch (the O/D OFF indicator lamp will begin to flash "ON" and "OFF").

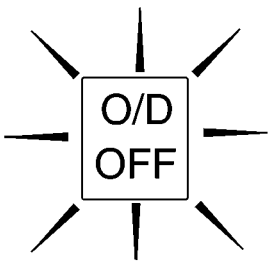


SAT981F

▶ GO TO 4.

4	CHECK SELF-DIAGNOSIS CODE

Check O/D OFF indicator lamp.
Refer to JUDGEMENT OF SELF-DIAGNOSIS CODE, AT-50.



O/D OFF indicator lamp

SAT204K

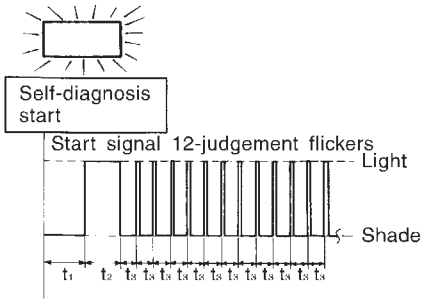
▶ **DIAGNOSIS END**

JUDGEMENT OF SELF-DIAGNOSIS CODE

NAAT0206S04

O/D OFF indicator lamp:

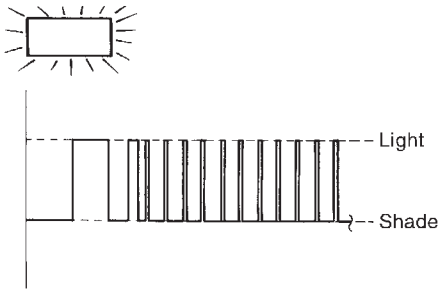
All judgement flickers are same.



SAT666I

All circuits that can be confirmed by self-diagnosis are OK.

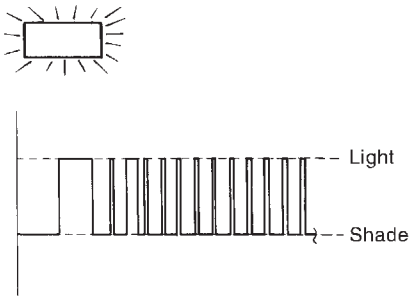
1st judgement flicker is longer than others.



SAT667I

Revolution sensor circuit is short-circuited or disconnected.
⇒ **Go to DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR), AT-111.**

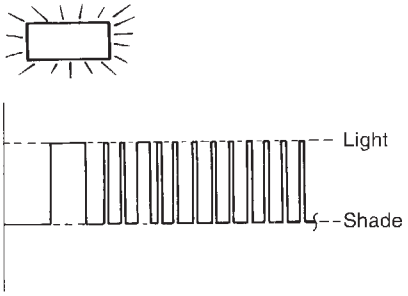
2nd judgement flicker is longer than others.



SAT668I

Vehicle speed sensor circuit is short-circuited or disconnected.
⇒ **Go to DTC VEHICLE SPEED SENSOR·MTR, AT-197.**

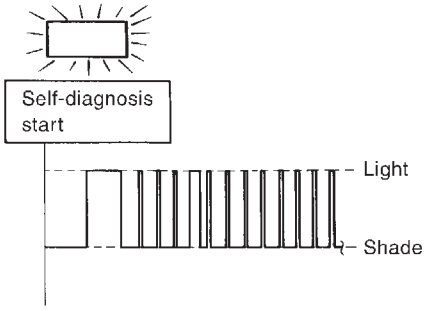
3rd judgement flicker is longer than others.



SAT669I

Throttle position sensor circuit is short-circuited or disconnected.
⇒ **Go to DTC P1705 THROTTLE POSITION SENSOR, AT-176.**

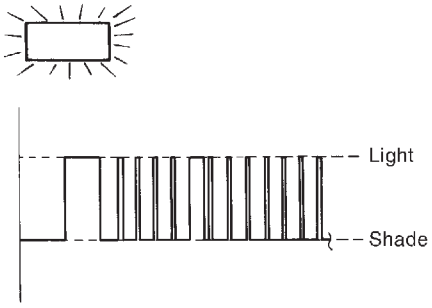
4th judgement flicker is longer than others.



SAT670I

Shift solenoid valve A circuit is short-circuited or disconnected.
⇒ **Go to DTC P0750 SHIFT SOLENOID VALVE A, AT-168.**

5th judgement flicker is longer than others.

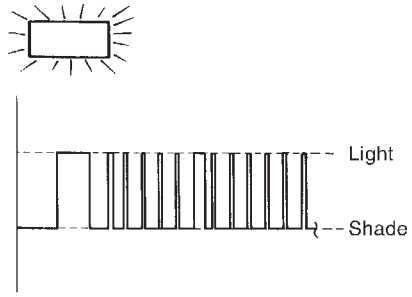


SAT671I

Shift solenoid valve B circuit is short-circuited or disconnected.
⇒ **Go to DTC P0755 SHIFT SOLENOID VALVE B, AT-172.**

O/D OFF indicator lamp:

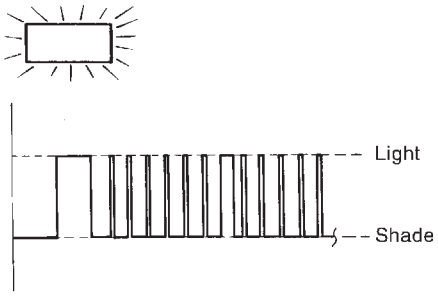
6th judgement flicker is longer than others.



SAT672I

Overrun clutch solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to DTC P1760 OVERRUN CLUTCH SOLENOID VALVE, AT-185.**

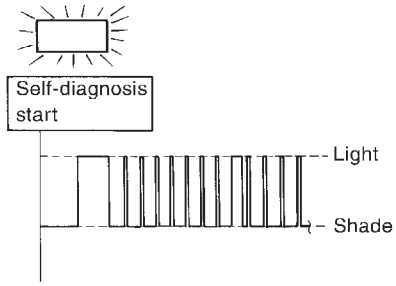
7th judgement flicker is longer than others.



SAT673I

Torque converter clutch solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE, AT-148.**

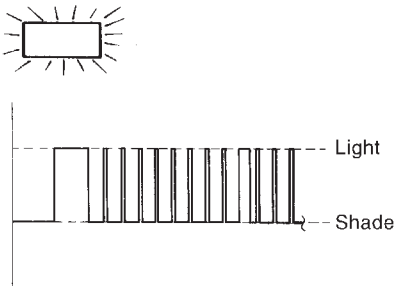
8th judgement flicker is longer than others.



SAT674I

A/T fluid temperature sensor is disconnected or TCM power source circuit is damaged.
⇒ **Go to DTC BATT/FLUID TEMP SEN (A/T FLUID TEMPERATURE SENSOR AND TCM POWER SOURCE), AT-190.**

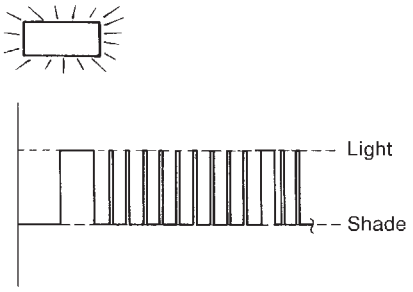
9th judgement flicker is longer than others.



SAT675I

Engine speed signal circuit is short-circuited or disconnected.
⇒ **Go to DTC P0725 ENGINE SPEED SIGNAL, AT-116.**

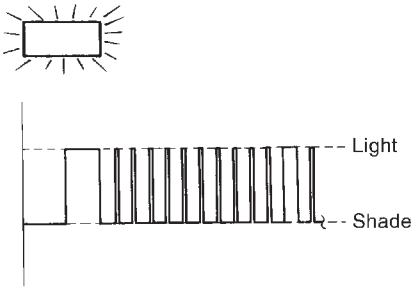
10th judgement flicker is longer than others.



SAT676I

Turbine revolution sensor circuit is short-circuited or disconnected.
⇒ **Go to DTC Turbine Revolution Sensor, AT-202.**

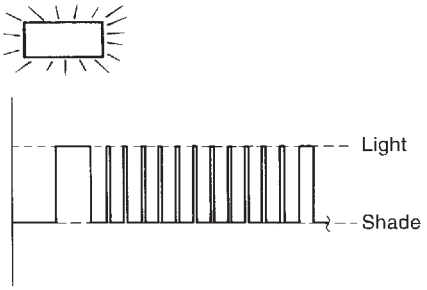
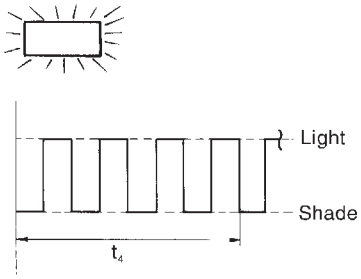
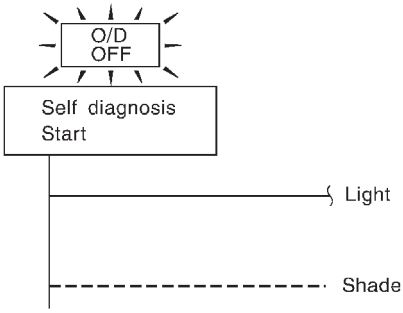
11th judgement flicker is longer than others.



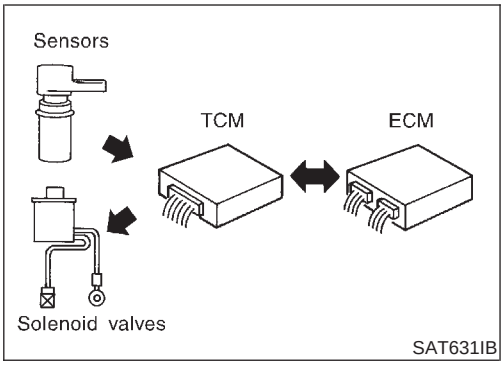
SAT677I

Line pressure solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to DTC P0745 LINE PRESSURE SOLENOID VALVE, AT-162.**

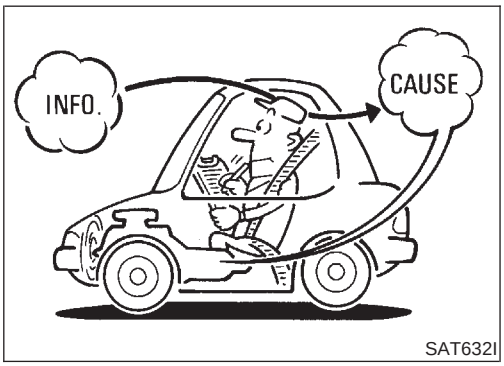
O/D OFF indicator lamp:

12th judgement flicker is longer than others.  SAT678I	Flickers as shown below.  SAT679I
The ECM-A/T communication line is open or shorted. ⇒ **Go to DTC A/T Communication Line, AT-207.**	Battery power is low. Battery has been disconnected for a long time. Battery is connected conversely. (When reconnecting TCM connectors. — This is not a problem.)
Lamp comes on.  SAT367J	
PNP switch, overdrive control switch or throttle position switch circuit is disconnected or TCM is damaged. ⇒ **Go to 21. TCM Self-diagnosis Does Not Activate (PNP, OVERDRIVE CONTROL AND THROTTLE POSITION SWITCHES), AT-257.**	

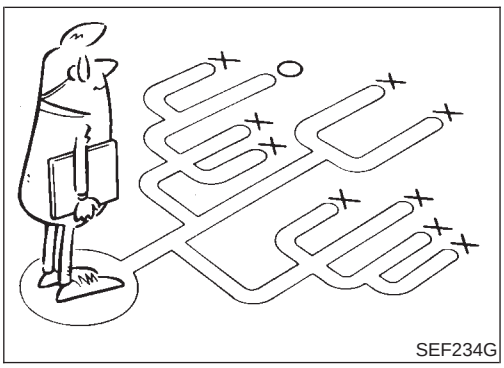
t_1 = 2.5 seconds t_2 = 2.0 seconds t_3 = 1.0 second t_4 = 1.0 second



SAT631IB



SAT632I


SEF234G

Introduction

NAAT0019

The TCM receives a signal from the vehicle speed sensor, throttle position sensor or PNP switch and provides shift control or lock-up control via A/T solenoid valves.

The TCM also communicates with the ECM by means of a signal sent from sensing elements used with the OBD-related parts of the A/T system for malfunction-diagnostic purposes. The TCM is capable of diagnosing malfunctioning parts while the ECM can store malfunctions in its memory.

Input and output signals must always be correct and stable in the operation of the A/T system. The A/T system must be in good operating condition and be free of valve seizure, solenoid valve malfunction, etc.

It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.

A visual check only may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the “Work Flow”. Refer to AT-57.

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A “Diagnostic Worksheet” like the example (AT-55) should be used.

Start your diagnosis by looking for “conventional” problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle.

Also check related Service bulletins.

Introduction (Cont'd)

DIAGNOSTIC WORKSHEET

=NAAT0019S01

Information From Customer

NAAT0019S0101

KEY POINTS

WHAT ..... Vehicle & A/T model
WHEN..... Date, Frequencies
WHERE..... Road conditions
HOW..... Operating conditions, Symptoms

Customer name MR/MS	Model & Year	VIN
Trans. model	Engine	Mileage
Incident Date	Manuf. Date	In Service Date
Frequency	☐ Continuous ☐ Intermittent (times a day)	
Symptoms	☐ Vehicle does not move. (☐ Any position ☐ Particular position)	
	☐ No up-shift (☐ 1st → 2nd ☐ 2nd → 3rd ☐ 3rd → O/D)	
	☐ No down-shift (☐ O/D → 3rd ☐ 3rd → 2nd ☐ 2nd → 1st)	
	☐ Lockup malfunction	
	☐ Shift point too high or too low.	
	☐ Shift shock or slip (☐ N → D ☐ Lockup ☐ Any drive position)	
	☐ Noise or vibration	
	☐ No kickdown	
	☐ No pattern select	
	☐ Others ( )	
O/D OFF indicator lamp	Blinks for about 8 seconds.	
	☐ Continuously lit	☐ Not lit
Malfunction indicator lamp (MIL)	☐ Continuously lit	☐ Not lit

Diagnostic Worksheet

=NAAT0019S0102

1.	☐ Read the Fail-safe Remarks and listen to customer complaints.			AT-8
2.	☐ CHECK A/T FLUID			AT-59
		☐ Leakage (Follow specified procedure) ☐ Fluid condition ☐ Fluid level		
3.	Perform STALL TEST and LINE PRESSURE TEST.			AT-59, AT-62
	☐ Stall test — Mark possible damaged components/others.			
		☐ Torque converter one-way clutch ☐ Reverse clutch ☐ Forward clutch ☐ Overrun clutch ☐ Forward one-way clutch	☐ Low & reverse brake ☐ Low one-way clutch ☐ Engine ☐ Line pressure is low ☐ Clutches and brakes except high clutch and brake band are OK	
	☐ Pressure test — Suspected parts:			
4.	☐ Perform all ROAD TEST and mark required procedures.			AT-63
	4-1.	Check before engine is started.		AT-64
		☐ SELF-DIAGNOSTIC PROCEDURE - Mark detected items.		
		☐ DTC P0705 PNP switch, AT-99. ☐ DTC P0710 A/T fluid temperature sensor, AT-105. ☐ DTC P0720 Vehicle speed sensor·A/T (Revolution sensor), AT-111. ☐ DTC P0725 Engine speed signal, AT-116. ☐ DTC P0740 Torque converter clutch solenoid valve, AT-148. ☐ DTC P0745 Line pressure solenoid valve, AT-162. ☐ DTC P0750 Shift solenoid valve A, AT-168. ☐ DTC P0755 Shift solenoid valve B, AT-172. ☐ DTC P1705 Throttle position sensor, AT-176. ☐ DTC P1760 Overrun clutch solenoid valve, AT-185. ☐ DTC BATT/FLUID TEMP SEN (A/T fluid temperature sensor and TCM power source), AT-190. ☐ DTC Vehicle speed sensor·MTR, AT-197. ☐ DTC Turbine revolution sensor, AT-202. ☐ DTC A/T communication line, AT-207. ☐ DTC Control unit (RAM), control unit (ROM), AT-211. ☐ DTC Control unit (EEP ROM), AT-213. ☐ PNP, overdrive control and throttle position switches, AT-257. ☐ Battery ☐ Others		
	4-2.	Check at idle		AT-66
		☐ 1. O/D OFF Indicator Lamp Does Not Come On, AT-218. ☐ 2. Engine Cannot Be Started In "P" And "N" Position, AT-221. ☐ 3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed, AT-222. ☐ 4. In "N" Position, Vehicle Moves, AT-223. ☐ 5. Large Shock. "N" → "R" Position, AT-225. ☐ 6. Vehicle Does Not Creep Backward In "R" Position, AT-227. ☐ 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position, AT-230.		

4.	4-3.	Cruise test	AT-67 AT-71
		Part-1	
		☐ 8. Vehicle Cannot Be Started From D_1, AT-233. ☐ 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-236. ☐ 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-239. ☐ 11. A/T Does Not Shift: $D_3 \rightarrow D_4$, AT-242. ☐ 12. A/T Does Not Perform Lock-up, AT-245. ☐ 13. A/T Does Not Hold Lock-up Condition, AT-247. ☐ 14. Lock-up Is Not Released, AT-249. ☐ 15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$), AT-250.	
		Part-2	AT-75
		☐ 16. Vehicle Does Not Start From D_1, AT-252. ☐ 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-236. ☐ 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-239. ☐ 11. A/T Does Not Shift: $D_3 \rightarrow D_4$, AT-242.	
		Part-3	AT-77
		☐ 17. A/T Does Not Shift: $D_4 \rightarrow D_3$ When Overdrive Control Switch "ON" → "OFF", AT-253 ☐ 15. Engine Speed Does Not Return To Idle (Engine Brake In D_3), AT-250. ☐ 18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever "D" → "2" Position, AT-254. ☐ 15. Engine Speed Does Not Return To Idle (Engine Brake In 2_2), AT-250. ☐ 19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever "2" → "1" Position, AT-255. ☐ 20. Vehicle Does Not Decelerate By Engine Brake, AT-256. ☐ SELF-DIAGNOSTIC PROCEDURE — Mark detected items.	
		☐ DTC P0705 PNP switch, AT-99. ☐ DTC P0710 A/T fluid temperature sensor, AT-105. ☐ DTC P0720 Vehicle speed sensor·A/T (Revolution sensor), AT-111. ☐ DTC P0725 Engine speed signal, AT-116. ☐ DTC P0740 Torque converter clutch solenoid valve, AT-148. ☐ DTC P0745 Line pressure solenoid valve, AT-162. ☐ DTC P0750 Shift solenoid valve A, AT-168. ☐ DTC P0755 Shift solenoid valve B, AT-172. ☐ DTC P1705 Throttle position sensor, AT-176. ☐ DTC P1760 Overrun clutch solenoid valve, AT-185. ☐ DTC BATT/FLUID TEMP SEN (A/T fluid temperature sensor and TCM power source), AT-190. ☐ DTC Vehicle speed sensor·MTR, AT-197. ☐ DTC Turbine revolution sensor, AT-202. ☐ DTC A/T communication line, AT-207. ☐ DTC Control unit (RAM), control unit (ROM), AT-211. ☐ DTC Control unit (EEP ROM), AT-213. ☐ PNP, overdrive control and throttle position switches, AT-257. ☐ Battery ☐ Others	
5.	☐ For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts.		AT-38
6.	☐ Perform all ROAD TEST and re-mark required procedures.		AT-63
7.	☐ Perform DTC CONFIRMATION PROCEDURE for following MIL indicating items and check out NG items. Refer to EC-59, "Emission-related Diagnostic Information".		EC-59
	☐ DTC (P0731, 1103) A/T 1st gear function, AT-120. ☐ DTC (P0732, 1104) A/T 2nd gear function, AT-126. ☐ DTC (P0733, 1105) A/T 3rd gear function, AT-132. ☐ DTC (P0734, 1106) A/T 4th gear function, AT-138. ☐ DTC (P0744, 1107) A/T TCC S/V function (lock-up), AT-153.		
8.	☐ Perform the Diagnostic Procedures for all remaining items marked NG. Repair or replace the damaged parts. Refer to the Symptom Chart when you perform the procedures. (The chart also shows some other possible symptoms and the component inspection orders.)		AT-92 AT-97
9.	☐ Erase DTC from TCM and ECM memories.		AT-35

Work Flow

NAAT0020

HOW TO PERFORM TROUBLE DIAGNOSES FOR QUICK AND ACCURATE REPAIR

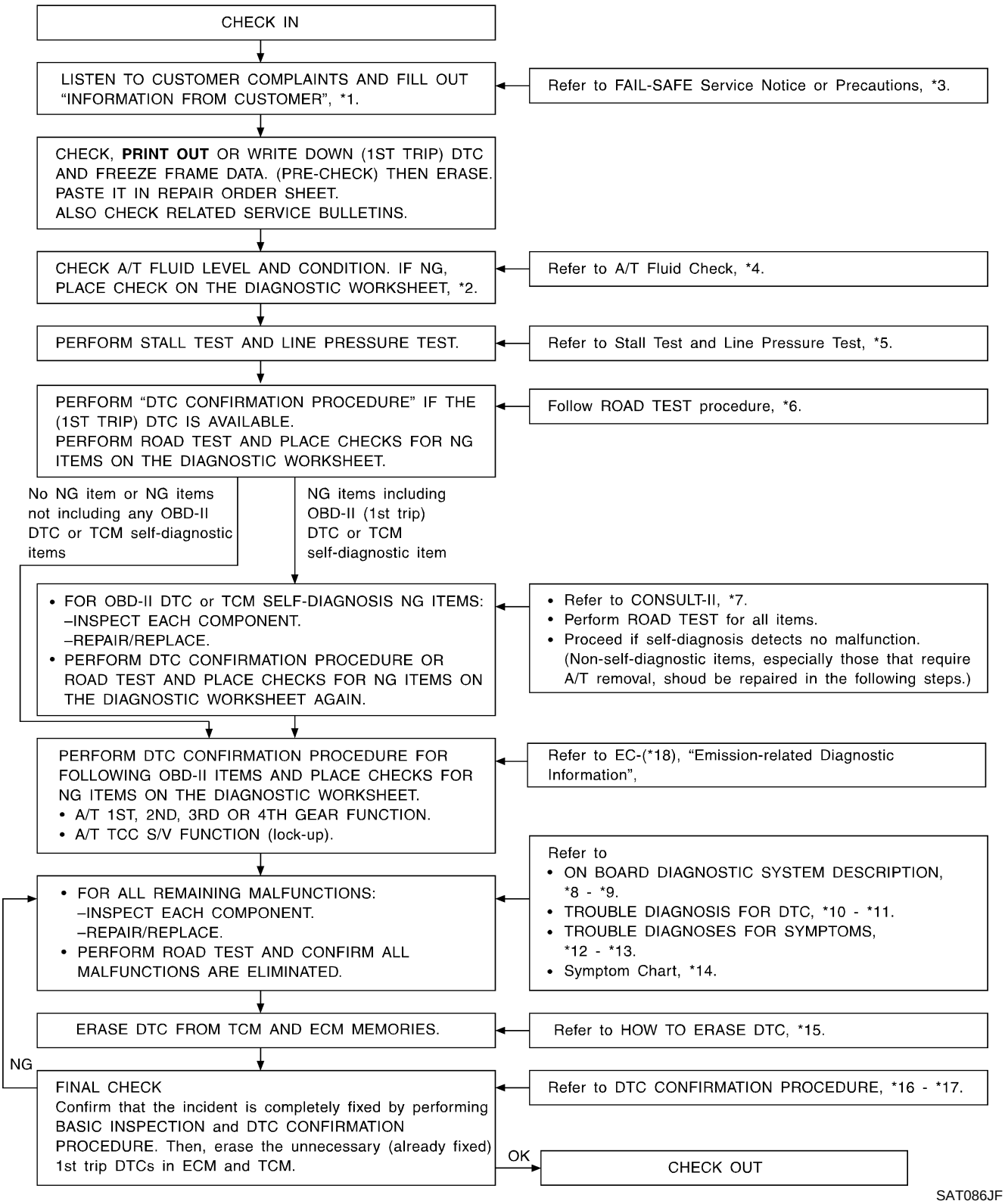
NAAT0020S01

A good understanding of the malfunction conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.
Make good use of the two sheets provided, “INFORMATION FROM CUSTOMER” (AT-54) and “DIAGNOSTIC WORKSHEET” (AT-55), to perform the best troubleshooting possible.

Work Flow (Cont'd)

WORK FLOW CHART

NAAT0020S02



SAT086JF

*1: AT-54
*2: AT-55
*3: AT-8
*4: AT-59
*5: AT-59, 62
*6: AT-63
*7: AT-37
*8: AT-33
*9: AT-50
*10: AT-99
*11: AT-213
*12: AT-215
*13: AT-257
*14: AT-81
*15: AT-35
*16: AT-100
*17: AT-213
*18: EC-59

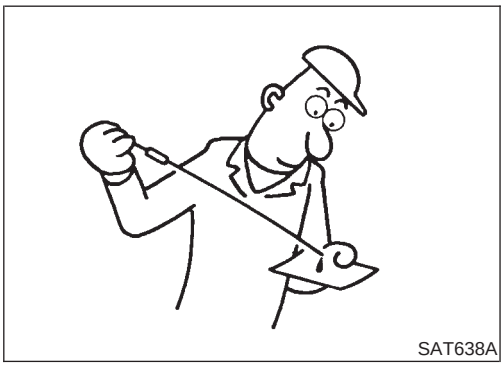
A/T Fluid Check

NAAT0021

FLUID LEAKAGE CHECK

NAAT0021S01

1. Clean area suspected of leaking. — for example, mating surface of converter housing and transmission case.
2. Start engine, apply foot brake, place selector lever in “D” position and wait a few minutes.
3. Stop engine.
4. Check for fresh leakage.



SAT638A

FLUID CONDITION CHECK

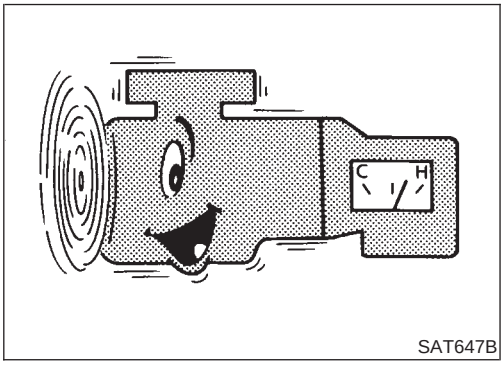
NAAT0021S02

Fluid color	Suspected problem
Dark or black with burned odor	Wear of frictional material
Milky pink	Water contamination — Road water entering through filler tube or breather
Varnished fluid, light to dark brown and tacky	Oxidation — Over or under filling, — Overheating

FLUID LEVEL CHECK

NAAT0021S03

Refer to MA-22, “Checking A/T Fluid”.



SAT647B

Stall Test

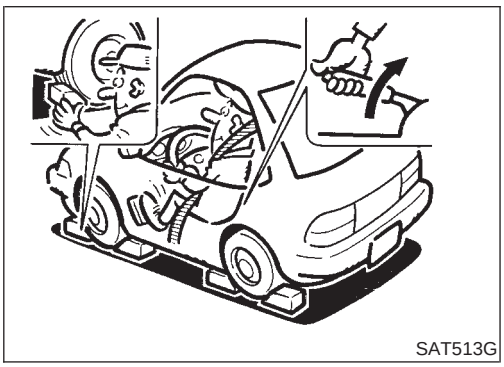
NAAT0022

STALL TEST PROCEDURE

NAAT0022S01

1. Check A/T fluid and engine oil levels. If necessary, add fluid and oil.
2. Drive vehicle for approx. 10 minutes or until fluid and oil reach operating temperature.

ATF operating temperature:
50 - 80°C (122 - 176°F)

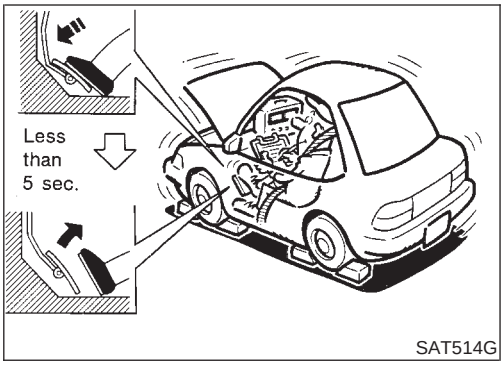


SAT513G

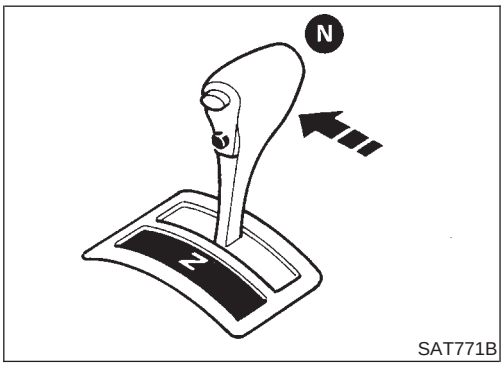
3. Set parking brake and block wheels.
4. Install a tachometer where it can be seen by driver during test.

- **It is good practice to put a mark on point of specified engine rpm on indicator.**

Stall Test (Cont'd)



SAT514G



SAT771B

5. Start engine, apply foot brake, and place selector lever in "D" position.
6. Accelerate to wide open throttle gradually while applying foot brake.
7. Quickly note the engine stall revolution and immediately release throttle.

- **During test, never hold throttle wide open for less than 5 seconds.**

Stall revolution:
Refer to SDS, AT-357.

8. Move selector lever to "N" position.
9. Cool off ATF.

- **Run engine at idle for at least one minute.**

10. Repeat steps 5 through 9 with selector lever in "2", "1" and "R" positions.

JUDGEMENT OF STALL TEST

NAAT0022S02

The test result and possible damaged components relating to each result are shown in the illustration. In order to pinpoint the possible damaged components, refer to "Work Flow", AT-57.

NOTE:

Stall revolution is too high in "D" or "2" position:

- Slippage occurs in 1st gear but not in 2nd and 3rd gears. ..... Low one-way clutch slippage
- Slippage occurs at the following gears:
  1st through 3rd gears in "D" position and engine brake functions.
  1st and 2nd gears in "2" position and engine brake functions with accelerator pedal released (fully closed throttle). ..... Forward clutch or forward one-way clutch slippage

Stall revolution is too high in "R" position:

- Engine brake does not function in "1" position. ..... Low & reverse brake slippage
- Engine brake functions in "1" position. ..... Reverse clutch slippage

Stall revolution within specifications:

- Vehicle does not achieve speed of more than 80 km/h (50 MPH). ..... One-way clutch seizure in torque converter housing

CAUTION:

Be careful since automatic fluid temperature increases abnormally.

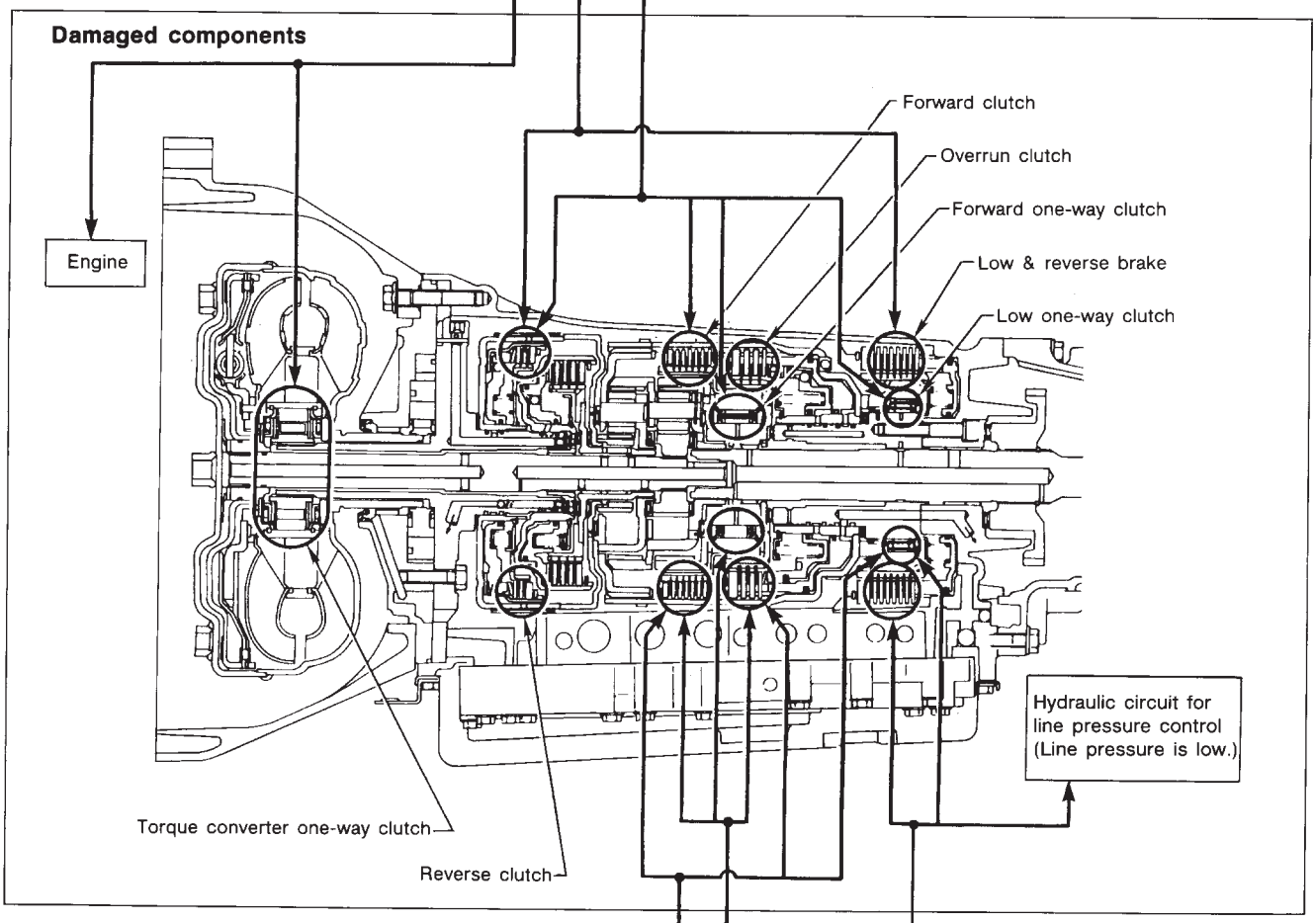
- Slippage occurs in 3rd and 4th gears in "D" position. ..... High clutch slippage
- Slippage occurs in 2nd and 4th gear in "D" position. ..... Brake band slippage

Stall revolution less than specifications:

- Poor acceleration during starts. ..... One-way clutch seizure in torque converter

Selector lever position	Judgement		
D	L	O	H
2	L	O	H
1	L	O	O
R	L	H	H

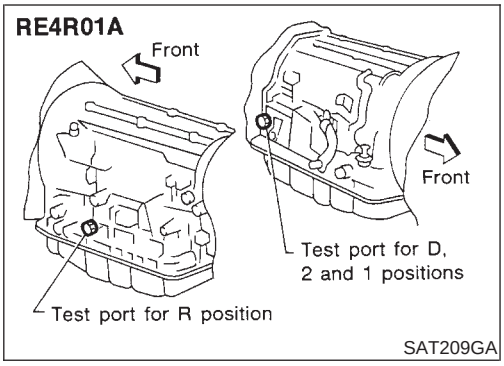
O : Stall revolution is normal.
H : Stall revolution is higher than specified.
L : Stall revolution is lower than specified.



Clutches and brakes except high clutch and brake band are OK. (Condition of high clutch and brake band cannot be confirmed by stall test.)

Selector lever position	Judgement			
D	H	H	H	O
2	H	H	H	O
1	O	H	H	O
R	O	O	H	O

SAT392H

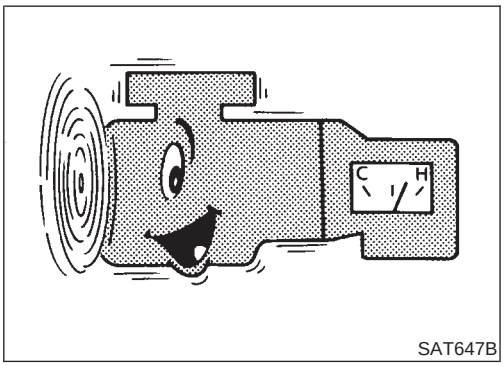


SAT209GA

Line Pressure Test

NAAT0023

- Location of line pressure test ports.
- **Always replace line pressure plugs as they are self-sealing bolts.**



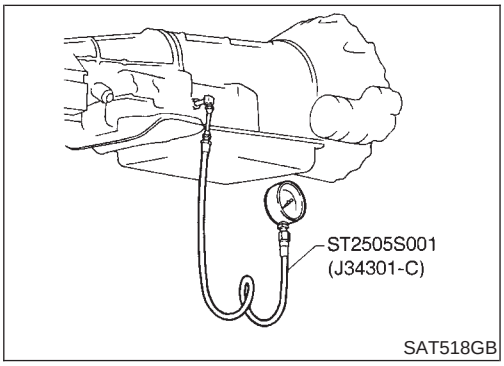
SAT647B

LINE PRESSURE TEST PROCEDURE

NAAT0023S01

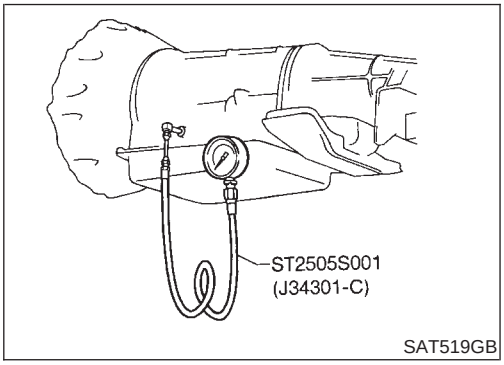
1. Check A/T fluid and engine oil levels. If necessary, add fluid and oil.
2. Drive vehicle for approx. 10 minutes or until fluid and oil reach operating temperature.

   ATF operating temperature:
   50 - 80°C (122 - 176°F)

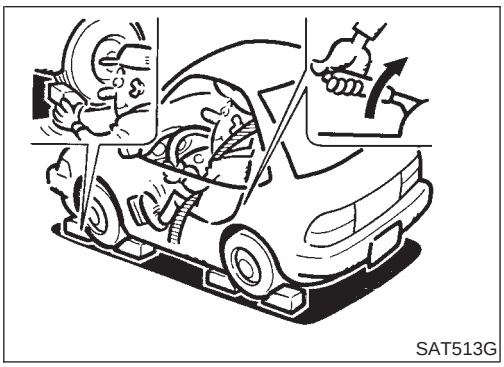


SAT518GB

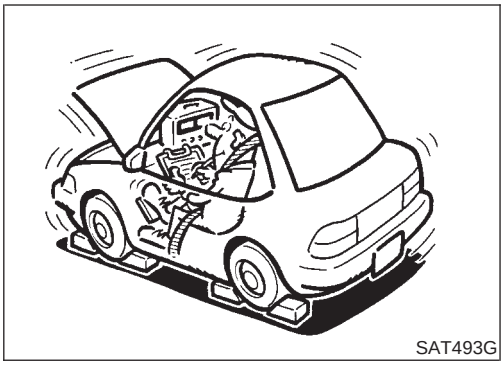
3. Install pressure gauge to corresponding line pressure port.



SAT519GB


SAT513G

4. Set parking brake and block wheels.
- **Continue to depress brake pedal fully while line pressure test is being performed at stall speed.**


SAT493G

5. Start engine and measure line pressure at idle and stall speed.
- **When measuring line pressure at stall speed, follow the stall test procedure.**

Line pressure:
Refer to SDS, AT-357.

JUDGEMENT OF LINE PRESSURE TEST

NAAT0023S02

Judgement		Suspected parts
At idle	Line pressure is low in all positions.	• Oil pump wear • Control piston damage • Pressure regulator valve or plug sticking • Spring for pressure regulator valve damaged • Fluid pressure leakage between oil strainer and pressure regulator valve • Clogged strainer
	Line pressure is low in particular position.	• Fluid pressure leakage between manual valve and particular clutch • For example, line pressure is: — Low in "R" and "1" positions, but — Normal in "D" and "2" positions. Then, fluid leakage exists at or around low and reverse brake circuit. Refer to "CLUTCH AND BAND CHART", AT-17.
	Line pressure is high.	• Mal-adjustment of throttle position sensor • Fluid temperature sensor damaged • Line pressure solenoid valve sticking • Short circuit of line pressure solenoid valve circuit • Pressure modifier valve sticking • Pressure regulator valve or plug sticking • Open in dropping resistor circuit
At stall speed	Line pressure is low.	• Mal-adjustment of throttle position sensor • Line pressure solenoid valve sticking • Short circuit of line pressure solenoid valve circuit • Pressure regulator valve or plug sticking • Pressure modifier valve sticking • Pilot valve sticking

ROAD TEST PROCEDURE

1. Check before engine is started.
⇩
2. Check at idle.
⇩
3. Cruise test.

SAT786A

Road Test

DESCRIPTION

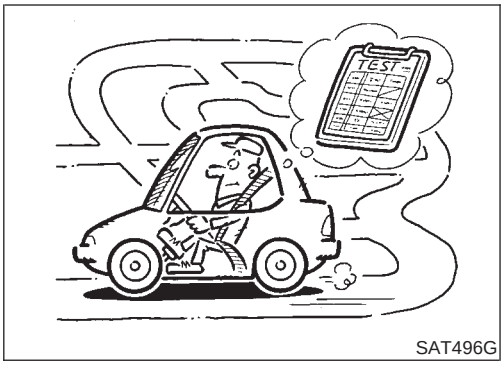
NAAT0024

NAAT0024S01

- The purpose of the test is to determine overall performance of A/T and analyze causes of problems.
- The road test consists of the following three parts:

1. Check before engine is started
2. Check at idle
3. Cruise test

Road Test (Cont'd)



SAT496G

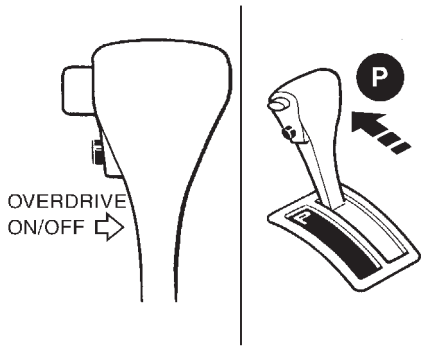
- Before road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items until specified symptom is found. Troubleshoot items which check out No Good after road test. Refer to "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" and "TROUBLE DIAGNOSES FOR SYMPTOMS", AT-33 - AT-50 and AT-215 - AT-257.

1. CHECK BEFORE ENGINE IS STARTED

NAAT0024S02

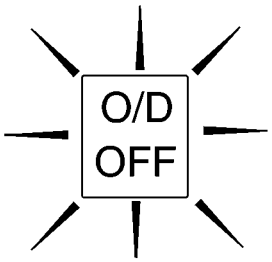
1	CHECK O/D OFF INDICATOR LAMP

1. Park vehicle on flat surface.
2. Move selector lever to "P" position.
3. Turn ignition switch to "OFF" position.
   Wait at least 5 seconds.



SAT967I

4. Turn ignition switch to "ON" position. (Do not start engine.)
5. Does O/D OFF indicator lamp come on for about 2 seconds?



O/D OFF indicator lamp

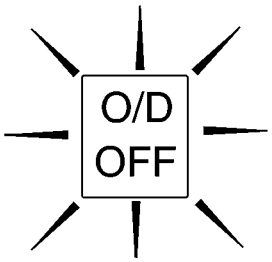
SAT204K

Yes or No

Yes	▶	GO TO 2.
No	▶	Go to "1. O/D OFF Indicator Lamp Does Not Come On", AT-218.

2	CHECK O/D OFF INDICATOR LAMP

Does O/D OFF indicator lamp flicker for about 8 seconds?



O/D OFF indicator lamp

SAT204K

Yes or No

Yes	▶	Perform self-diagnosis. Refer to TCM SELF-DIAGNOSIS PROCEDURE (No Tools), AT-46.
No	▶	GO TO 3.

3	CHECK NG ITEM

1. Turn ignition switch to "OFF" position.
2. Perform self-diagnosis and note NG items.
   Refer to TCM SELF-DIAGNOSIS PROCEDURE (No Tools), AT-46.

	▶	Go to "2. Check at idle", AT-66.

Road Test (Cont'd)

2. CHECK AT IDLE

=NAAT0024S03

1	CHECK ENGINE START

1. Park vehicle on flat surface.
2. Turn ignition switch to "OFF" position.
3. Move selector lever to "P" or "N" position.
4. Turn ignition switch to start position.
5. Is engine started?

Yes or No

Yes	▶	GO TO 2.
No	▶	Go to "2. Engine Cannot Be Started In "P" and "N" Position", AT-221.

2	CHECK ENGINE START

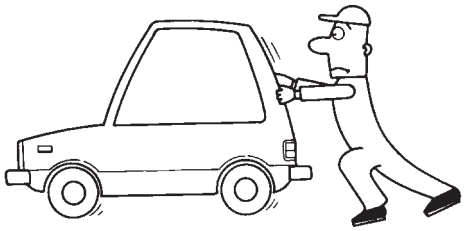
1. Turn ignition switch to "OFF" position.
2. Move selector lever to "D", "1", "2" or "R" position.
3. Turn ignition switch to start position.
4. Is engine started?

Yes or No

Yes	▶	Go to "2. Engine Cannot Be Started In "P" and "N" Position", AT-221.
No	▶	GO TO 3.

3	CHECK VEHICLE MOVE

1. Turn ignition switch to "OFF" position.
2. Move selector lever to "P" position.
3. Release parking brake.
4. Push vehicle forward or backward.
5. Does vehicle move when it is pushed forward or backward?



SAT796A

Yes or No

Yes	▶	Go to "3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed", AT-222.
No	▶	GO TO 4.

4	CHECK VEHICLE MOVE

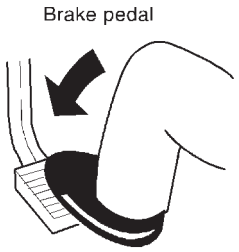
1. Apply parking brake.
2. Move selector lever to "N" position.
3. Turn ignition switch to "START" position and start engine.
4. Release parking brake.
5. Does vehicle move forward or backward?

Yes or No

Yes	▶	Go to "4. In "N" Position, Vehicle Moves", AT-223.
No	▶	GO TO 5.

5	CHECK SHIFT SHOCK

1. Apply foot brake.
2. Move selector lever to "R" position.
3. Is there large shock when changing from "N" to "R" position?



SAT082J

Yes or No

Yes	▶	Go to "5. Large Shock. "N" → "R" Position", AT-225.
No	▶	GO TO 6.

6	CHECK VEHICLE MOVE

1. Release foot brake for several seconds.
2. Does vehicle creep backward when foot brake is released?

Yes or No

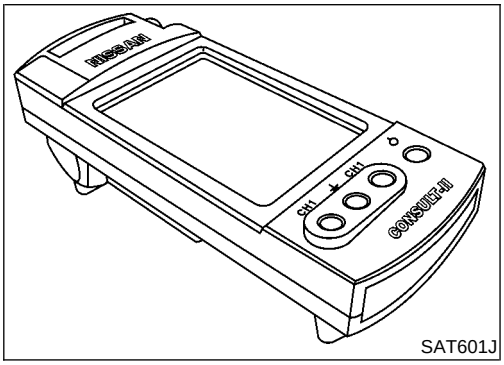
Yes	▶	GO TO 7.
No	▶	Go to "6. Vehicle Does Not Creep Backward In "R" Position", AT-227.

7	CHECK VEHICLE MOVE

1. Move selector lever to "D", "2" and "1" position and check if vehicle creeps forward.
2. Does vehicle creep forward in all three positions?

Yes or No

Yes	▶	Go to "3. Cruise test", AT-67.
No	▶	Go to "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position", AT-230.



SAT601J

3. CRUISE TEST

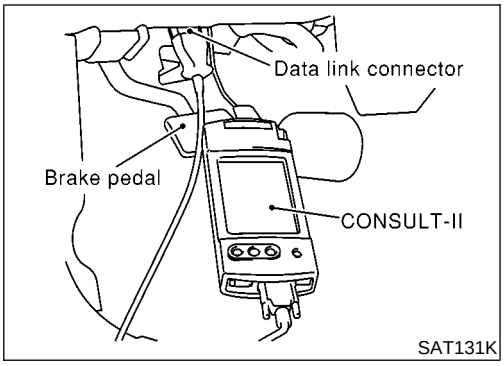
NAAT0024S04

- Check all items listed in Parts 1 through 3.

With CONSULT-II

NAAT0024S0401

- Using CONSULT-II, conduct a cruise test and record the result.
- Print the result and ensure that shifts and lock-ups take place as per "Shift Schedule".

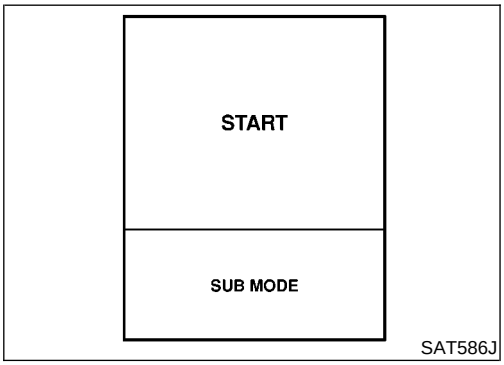


SAT131K

CONSULT-II Setting Procedure

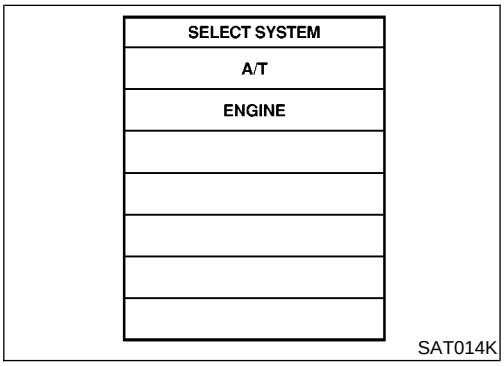
NAAT0024S0402

1. Turn ignition switch "OFF".
2. Connect CONSULT-II to data link connector, which is located in instrument lower panel on driver side.



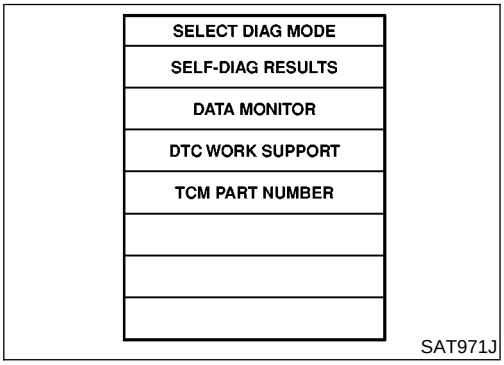
SAT586J

3. Turn ignition switch "ON".
4. Touch "START".



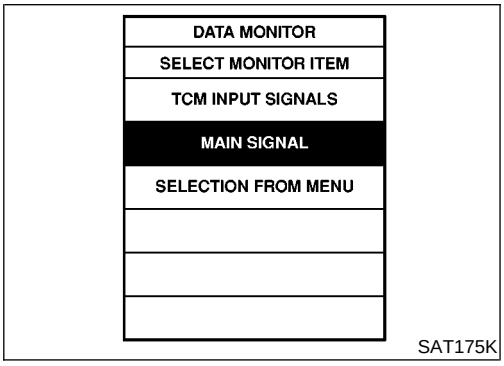
SAT014K

5. Touch "A/T".



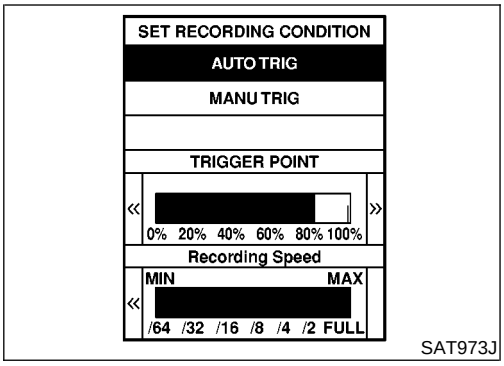
SAT971J

6. Touch "DATA MONITOR".



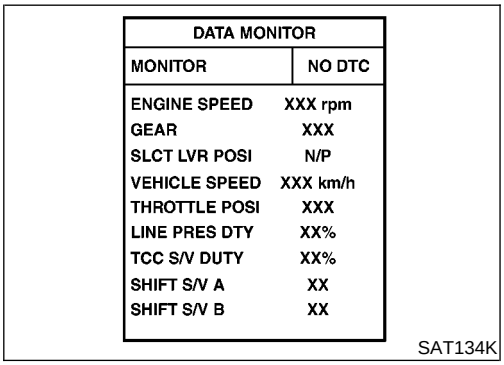
SAT175K

7. Touch "MAIN SIGNALS" or "TCM INPUT SIGNALS".
8. See "Numerical Display", "Barchart Display" or "Line Graph Display".



SAT973J

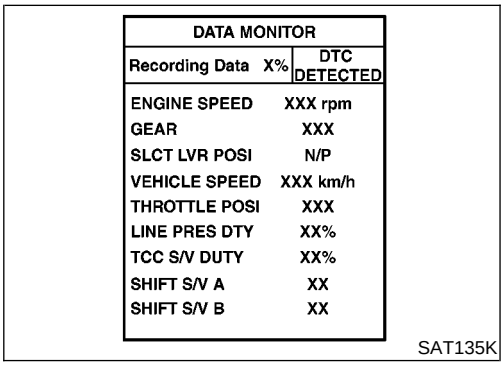
9. Touch "SETTING" to set recording condition ("AUTO TRIG" or "MANU TRIG") and touch "BACK".
10. Touch "Start".



DATA MONITOR	
MONITOR	NO DTC
ENGINE SPEED	XXX rpm
GEAR	XXX
SLCT LVR POSI	N/P
VEHICLE SPEED	XXX km/h
THROTTLE POSI	XXX
LINE PRES DTY	XX%
TCC S/V DUTY	XX%
SHIFT S/V A	XX
SHIFT S/V B	XX

SAT134K

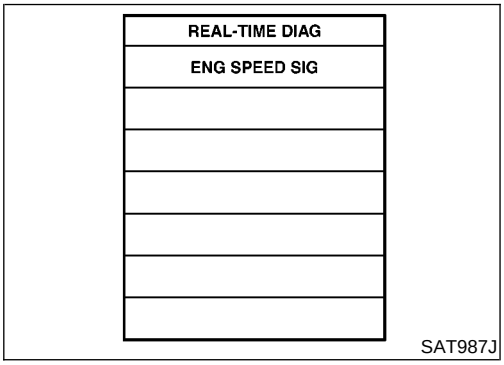
11. When performing cruise test, touch "RECORD".



DATA MONITOR		
Recording Data X%		DTC DETECTED
ENGINE SPEED	XXX rpm	
GEAR	XXX	
SLCT LVR POSI	N/P	
VEHICLE SPEED	XXX km/h	
THROTTLE POSI	XXX	
LINE PRES DTY	XX%	
TCC S/V DUTY	XX%	
SHIFT S/V A	XX	
SHIFT S/V B	XX	

SAT135K

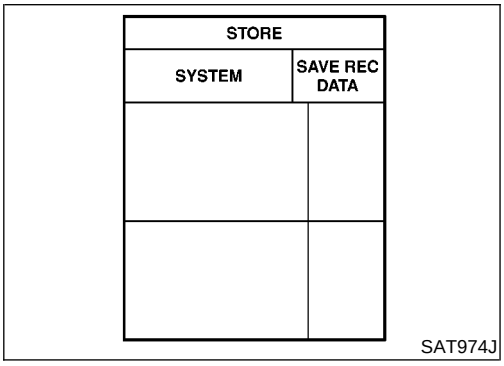
12. After finishing cruise test part 1, touch "STOP".



REAL-TIME DIAG
ENG SPEED SIG

SAT987J

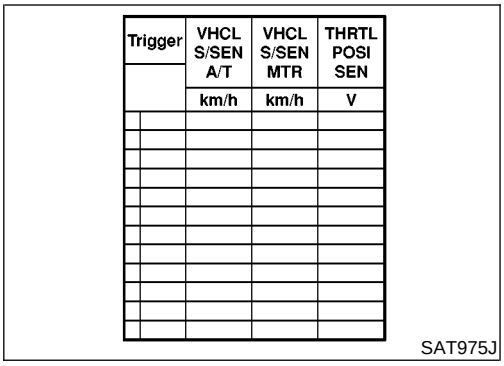
13. Touch "STORE" and touch "BACK".



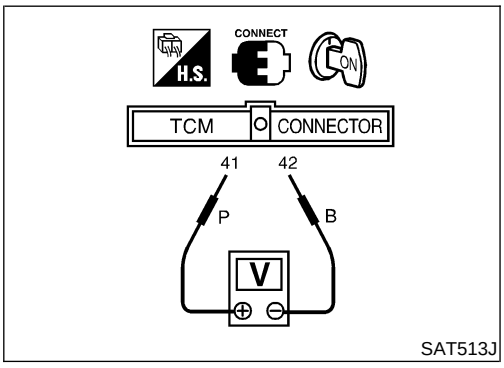
STORE	
SYSTEM	SAVE REC DATA

SAT974J

Road Test (Cont'd)



14. Touch "DISPLAY".
15. Touch "PRINT".
16. Check the monitor data printed out.
17. Continue cruise test part 2 and 3.



Without CONSULT-II

NAAT0024S0403

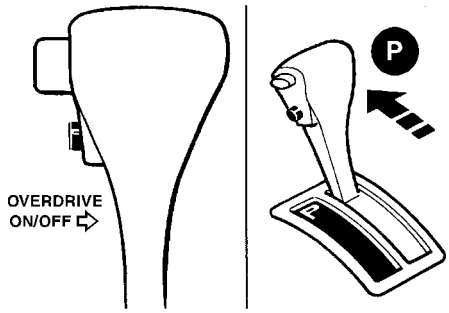
- Throttle position sensor can be checked by voltage across terminals 41 and 42 of TCM.

Cruise Test — Part 1

=NAAT0024S0404

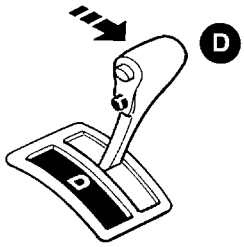
1	CHECK STARTING GEAR (D_1) POSITION

1. Drive vehicle for approx. 10 minutes to warm engine oil and ATF up to operating temperature.
   ATF operating temperature:
   50 - 80°C (122 - 176°F)
2. Park vehicle on flat surface.
3. Set overdrive control switch to "ON" position.
4. Move selector lever to "P" position.



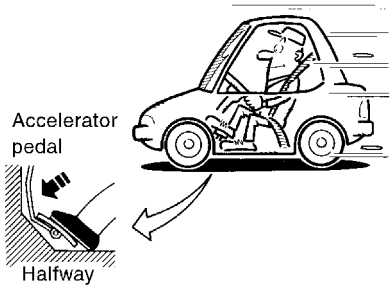
SAT001J

5. Start engine.
6. Move selector lever to "D" position.



SAT952I

7. Accelerate vehicle by constantly depressing accelerator pedal halfway.



SAT953I

8. Does vehicle start from D_1?
   Read gear position.

Yes or No

Yes	▶	GO TO 2.
No	▶	Go to "8. Vehicle Cannot Be Started From D_1", AT-233.

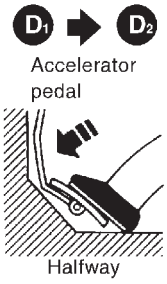
2	CHECK SHIFT UP (D_1 TO D_2)

Does A/T shift from D_1 to D_2 at the specified speed?

Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D_1 to D_2:

Refer to Shift schedule, AT-357.



SAT954I

Yes or No

Yes	▶	GO TO 3.
No	▶	Go to "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ or Does Not Kickdown: $D_4 \rightarrow D_2$", AT-236.

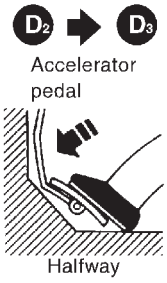
3	CHECK SHIFT UP (D_2 TO D_3)

Does A/T shift from D_2 to D_3 at the specified speed?

Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D_2 to D_3:

Refer to Shift schedule, AT-357.



SAT955I

Yes or No

Yes	▶	GO TO 4.
No	▶	Go to "10. A/T Does Not Shift: $D_2 \rightarrow D_3$", AT-239.

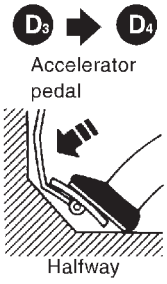
4	CHECK SHIFT UP (D_3 TO D_4)

Does A/T shift from D_3 to D_4 at the specified speed?

Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D_3 to D_4:

Refer to Shift schedule, AT-357.



SAT956I

Yes or No

Yes	▶	GO TO 5.
No	▶	Go to "11. A/T Does Not Shift: $D_3 \rightarrow D_4$", AT-242.

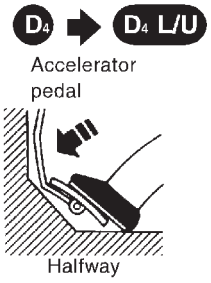
5	CHECK LOCK-UP (D_4 TO D_4 L/U)

Does A/T perform lock-up at the specified speed?

Read vehicle speed, throttle position when lock-up duty becomes 94%.

Specified speed when lock-up occurs:

Refer to Shift schedule, AT-357.



SAT957I

Yes or No

Yes	▶	GO TO 6.
No	▶	Go to "12. A/T Does Not Perform Lock-up", AT-245.

6	CHECK HOLD LOCK-UP

Does A/T hold lock-up condition for more than 30 seconds?

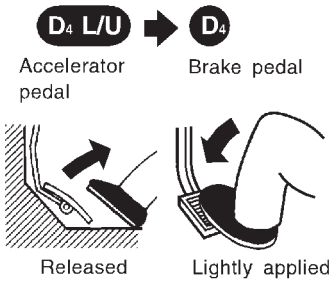
Yes or No

Yes	▶	GO TO 7.
No	▶	Go to "13. A/T Does Not Hold Lock-up Condition", AT-247.

Road Test (Cont'd)

7	CHECK LOCK-UP OFF (D_4 L/U TO D_4)

1. Release accelerator pedal.
2. Is lock-up released when accelerator pedal is released?



SAT958I

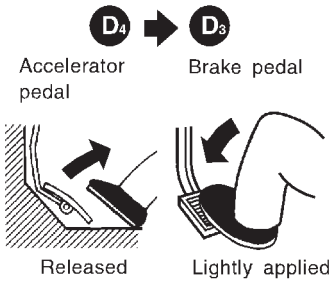
Yes or No

Yes	▶	GO TO 8.
No	▶	Go to "14. Lock-up Is Not Released", AT-249.

8	CHECK SHIFT DOWN (D_4 TO D_3)

1. Decelerate vehicle by applying foot brake lightly.
2. Does engine speed return to idle smoothly when A/T is shifted from D_4 to D_3?

Read gear position and engine speed.



SAT959I

Yes or No

Yes	▶	1. Stop vehicle. 2. Go to "Cruise test — Part 2", AT-75.
No	▶	Go to "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)", AT-250.

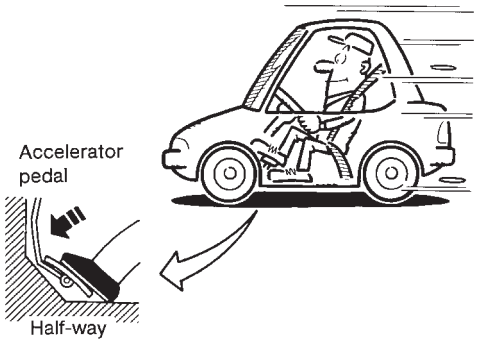
Cruise Test — Part 2

=NAAT0024S0405

1	CHECK STARTING GEAR (D_1) POSITION

1. Confirm overdrive control switch is in "ON" position.
2. Confirm selector lever is in "D" position.
3. Accelerate vehicle by half throttle again.
4. Does vehicle start from D_1?

Read gear position.



SAT495G

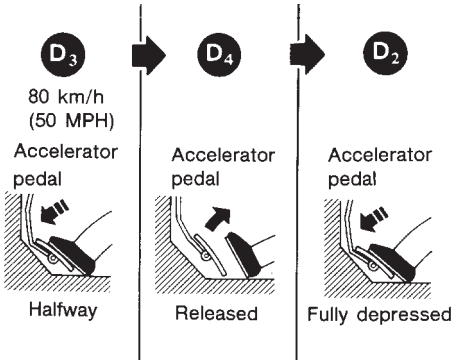
Yes or No

Yes	▶	GO TO 2.
No	▶	Go to "16. Vehicle Does Not Start From D_1", AT-252.

2	CHECK SHIFT UP AND SHIFT DOWN (D_3 TO D_4 TO D_2)

1. Accelerate vehicle to 80 km/h (50 MPH) as shown in illustration.
2. Release accelerator pedal and then quickly depress it fully.
3. Does A/T shift from D_4 to D_2 as soon as accelerator pedal is depressed fully?

Read gear position and throttle position.



SAT404H

Yes or No

Yes	▶	GO TO 3.
No	▶	Go to "9. A/T Does Not Shift: $D_3 \rightarrow D_4$ Or Does Not Kickdown: $D_4 \rightarrow D_2$", AT-236.

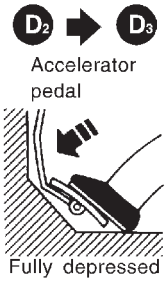
3	CHECK SHIFT UP (D_2 TO D_3)

Does A/T shift from D_2 to D_3 at the specified speed?

Read gear position, throttle position and vehicle speed.

Specified speed when shifting from D_2 to D_3:

Refer to Shift schedule, AT-357.



SAT960I

Yes or No

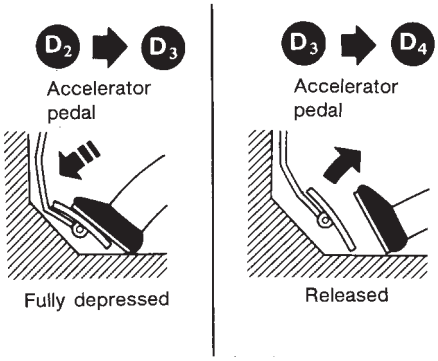
Yes	▶	GO TO 4.
No	▶	Go to "10. A/T Does Not Shift: $D_2 \rightarrow D_3$", AT-239.

4	CHECK SHIFT UP (D_3 TO D_4) AND ENGINE BRAKE

Release accelerator pedal after shifting from D_2 to D_3.

Does A/T shift from D_3 to D_4 and does vehicle decelerate by engine brake?

Read gear position, throttle position and vehicle speed.



SAT405H

Yes or No

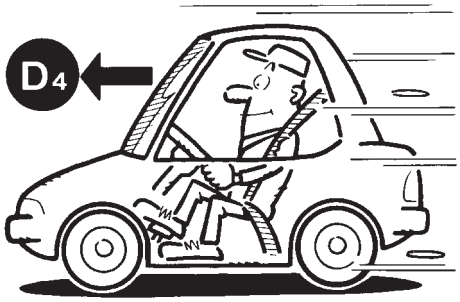
Yes	▶	1. Stop vehicle. 2. Go to "Cruise test — Part 3", AT-77.
No	▶	Go to "11. A/T Does Not Shift: $D_3 \rightarrow D_4$", AT-242.

Cruise Test — Part 3

=NAAT0024S0406

1	VEHICLE SPEED D_4 POSITION

1. Confirm overdrive control switch is in "ON" position.
2. Confirm selector lever is in "D" position.
3. Accelerate vehicle using half-throttle to D_4.



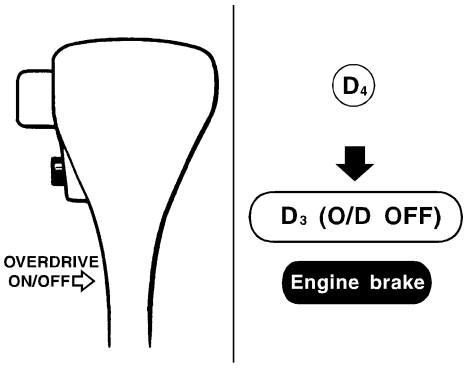
SAT812A

▶ GO TO 2.

2	CHECK SHIFT DOWN (D_4 TO D_3)

1. Release accelerator pedal.
2. Set overdrive control switch to "OFF" position while driving in D_4.
3. Does A/T shift from D_4 to D_3 (O/D OFF)?

Ⓜ **Read gear position and vehicle speed.**



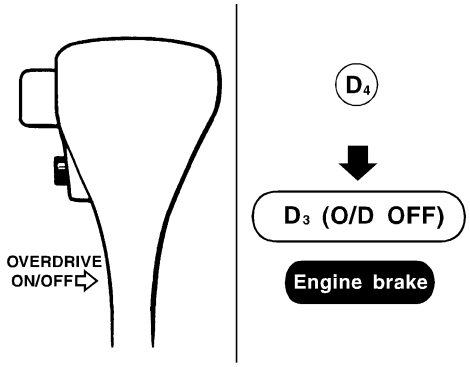
SAT999IA

Yes or No

Yes	▶	GO TO 3.
No	▶	Go to "17. A/T Does Not Shift: $D_4 \rightarrow D_3$, When Overdrive Control Switch "ON" → "OFF", AT-253.

3	CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?



SAT999IA

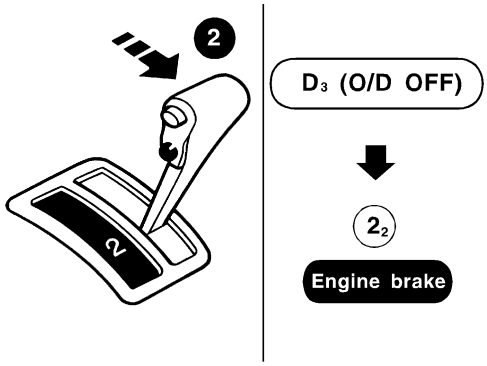
Yes or No

Yes	▶	GO TO 4.
No	▶	Go to "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)", AT-250.

4	CHECK SHIFT DOWN (D_3 TO D_2)

1. Move selector lever from "D" to "2" position while driving in D_3 (O/D OFF).
2. Does A/T shift from D_3 (O/D OFF) to 2_2?

Read gear position.



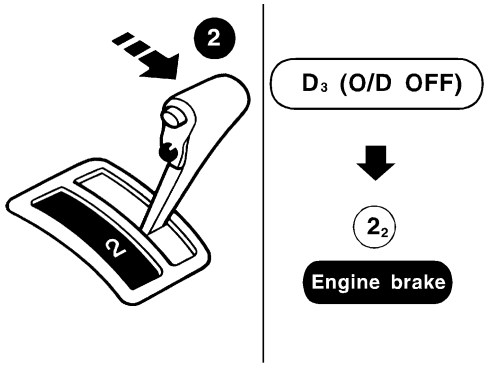
SAT791GB

Yes or No

Yes	▶	GO TO 5.
No	▶	Go to "18. A/T Does Not Shift: $D_3 \rightarrow D_2$, When Selector Lever "D" → "2" Position", AT-254.

5	CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?



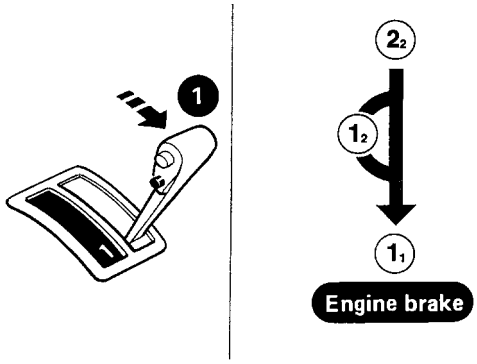
SAT791GB

Yes or No

Yes	▶	GO TO 6.
No	▶	Go to "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)", AT-250.

6	CHECK SHIFT DOWN (2_2 TO 1_1)

1. Move selector lever from "2" to "1" position while driving in 2_2.
2. Does A/T shift from 2_2 to 1_1 position?



SAT778B

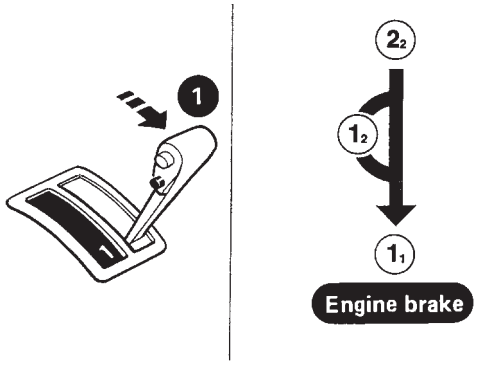
Yes or No

Yes	▶	GO TO 7.
No	▶	Go to "19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector lever "2" → "1" Position", AT-255.

Road Test (Cont'd)

7	CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?



SAT778B

Yes or No

Yes ▶	1. Stop vehicle. 2. Perform self-diagnosis. Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-46.
No ▶	Go to "20. Vehicle Does Not Decelerate By Engine Brake", AT-256.

Symptom Chart

NAAT0233

Numbers are arranged in order of inspection.
Perform inspections starting with number one and work up.

Items	Symptom	Condition	Diagnostic Item	Reference Page
No Lock-up Engagement/TCC Inoperative	Torque converter is not locked up.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-169
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-111, 197
			3. Park/neutral position (PNP) switch adjustment	AT-276
			4. Engine speed signal	AT-116
			5. A/T fluid temperature sensor	AT-105
			6. Line pressure test	AT-62
			7. Torque converter clutch solenoid valve	AT-148
			8. Control valve assembly	AT-273
		OFF vehicle	9. Torque converter	AT-287
	Torque converter clutch piston slip.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor (Adjustment)	EC-169
			3. Line pressure test	AT-62
			4. Torque converter clutch solenoid valve	AT-148
			5. Line pressure solenoid valve	AT-162
			6. Control valve assembly	AT-273
		OFF vehicle	7. Torque converter	AT-287
	Lock-up point is extremely high or low. AT-245	ON vehicle	1. Throttle position sensor (Adjustment)	EC-169
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-111, 197
			3. Torque converter clutch solenoid valve	AT-148
			4. Control valve assembly	AT-273
Shift Shock	Sharp shock in shifting from N to D position.	ON vehicle	1. Engine idling rpm	EC-426
			2. Throttle position sensor (Adjustment)	EC-169
			3. Line pressure test	AT-62
			4. A/T fluid temperature sensor	AT-105
			5. Engine speed signal	AT-116
			6. Line pressure solenoid valve	AT-162
			7. Control valve assembly	AT-273
			8. Accumulator N-D	AT-273
		OFF vehicle	9. Turbine revolution sensor	EC-363
			10. Forward clutch	AT-321

Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
Shift Shock	Too sharp a shock in change from D_1 to D_2.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-169
			2. Line pressure test	AT-62
			3. Accumulator servo release	AT-273
			4. Control valve assembly	AT-273
			5. A/T fluid temperature sensor	AT-105
		OFF vehicle	6. Brake band	AT-334
	Too sharp a shock in change from D_2 to D_3.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-169
			2. Line pressure test	AT-62
			3. Control valve assembly	AT-273
		OFF vehicle	4. High clutch	AT-318
			5. Brake band	AT-334
	Too sharp a shock in change from D_3 to D_4.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-169
			2. Line pressure test	AT-62
			3. Control valve assembly	AT-273
		OFF vehicle	4. Brake band	AT-334
			5. Overrun clutch	AT-321
	Gear change shock felt during deceleration by releasing accelerator pedal.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-169
			2. Line pressure test	AT-62
			3. Overrun clutch solenoid valve	AT-185
			4. Control valve assembly	AT-273
	Large shock changing from 1_2 to 1_1 in 1 position.	ON vehicle	1. Control valve assembly	AT-273
		ON vehicle	2. Low & reverse brake	AT-325
Improper Shift Timing	Too high a gear change point from D_1 to D_2, from D_2 to D_3, from D_3 to D_4. AT-236, 239, 242	ON vehicle	1. Throttle position sensor (Adjustment)	EC-169
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-111, 197
			3. Shift solenoid valve A	AT-168
			4. Shift solenoid valve B	AT-172
	Gear change directly from D_1 to D_3 occurs.	ON vehicle	1. Fluid level	AT-59
			2. Accumulator servo release	AT-273
		OFF vehicle	3. Brake band	AT-334
	Too high a change point from D_4 to D_3, from D_3 to D_2, from D_2 to D_1.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-169
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-111, 197
	Kickdown does not operate when depressing pedal in D_4 within kickdown vehicle speed.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-169
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-111, 197
			3. Shift solenoid valve A	AT-168
			4. Shift solenoid valve B	AT-172

Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
Improper Shift Timing	Kickdown operates or engine overruns when depressing pedal in D_4 beyond kickdown vehicle speed limit.	ON vehicle	1. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-111, 197
			2. Throttle position sensor (Adjustment)	EC-169
			3. Shift solenoid valve A	AT-168
			4. Shift solenoid valve B	AT-172
	Gear change from 2_2 to 2_3 in 2 position.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-276
	Gear change from 1_1 to 1_2 in 1 position.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-276
			2. Manual control linkage adjustment	AT-276
No Down Shift	Failure to change gear from D_4 to D_3.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor (Adjustment)	EC-169
			3. Overrun clutch solenoid valve	AT-185
			4. Shift solenoid valve A	AT-168
			5. Line pressure solenoid valve	AT-162
			6. Control valve assembly	AT-273
		OFF vehicle	7. Low & reverse brake	AT-325
			8. Overrun clutch	AT-321
	Failure to change gear from D_3 to D_2 or from D_4 to D_2.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor (Adjustment)	EC-169
			3. Shift solenoid valve A	AT-168
			4. Shift solenoid valve B	AT-172
			5. Control valve assembly	AT-273
		OFF vehicle	6. High clutch	AT-318
			7. Brake band	AT-334
	Failure to change gear from D_2 to D_1 or from D_3 to D_1.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor (Adjustment)	EC-169
			3. Shift solenoid valve A	AT-168
			4. Shift solenoid valve B	AT-172
			5. Control valve assembly	AT-273
		OFF vehicle	6. Low one-way clutch	AT-329
			7. High clutch	AT-318
			8. Brake band	AT-334

Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
No Down Shift	Failure to change from D_3 to 2_2 when changing lever into 2 position. AT-250	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-276
			2. Throttle position sensor (Adjustment)	EC-169
			3. Overrun clutch solenoid valve	AT-185
			4. Shift solenoid valve B	AT-172
			5. Shift solenoid valve A	AT-168
			6. Control valve assembly	AT-273
			7. Manual control linkage adjustment	AT-276
		OFF vehicle	8. Brake band	AT-334
			9. Overrun clutch	AT-321
	Does not change from 1_2 to 1_1 in 1 position.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-276
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-111, 197
			3. Shift solenoid valve A	AT-168
			4. Control valve assembly	AT-273
			5. Overrun clutch solenoid valve	AT-185
		OFF vehicle	6. Overrun clutch	AT-321
			7. Low & reverse brake	AT-325
No Up Shift	Failure to change gear from D_1 to D_2.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-276
			2. Manual control linkage adjustment	AT-276
			3. Shift solenoid valve A	AT-168
			4. Control valve assembly	AT-273
			5. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-111, 197
		OFF vehicle	6. Brake band	AT-334
	Failure to change gear from D_2 to D_3.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-276
			2. Manual control linkage adjustment	AT-276
			3. Shift solenoid valve B	AT-172
			4. Control valve assembly	AT-273
			5. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-111, 197
		OFF vehicle	6. High clutch	AT-318
			7. Brake band	AT-334

Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
No Up Shift	Failure to change gear from D_3 to D_4.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-276
			2. Manual control linkage adjustment	AT-276
			3. Shift solenoid valve A	AT-168
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-111, 197
			5. A/T fluid temperature sensor	AT-105
		OFF vehicle	6. Brake band	AT-334
	A/T does not shift to D_4 when driving with overdrive control switch ON.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-169
			2. Park/neutral position (PNP) switch adjustment	AT-276
			3. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-111, 197
			4. Shift solenoid valve A	AT-168
			5. Overrun clutch solenoid valve	AT-185
			6. Control valve assembly	AT-273
			7. A/T fluid temperature sensor	AT-105
			8. Line pressure solenoid valve	AT-162
		OFF vehicle	9. Brake band	AT-334
			10. Overrun clutch	AT-321
Slips/Will Not Engage	Vehicle will not run in R position (but runs in D, 2 and 1 positions). Clutch slips. Very poor acceleration. AT-227	ON vehicle	1. Manual control linkage adjustment	AT-276
			2. Line pressure test	AT-62
			3. Line pressure solenoid valve	AT-162
			4. Control valve assembly	AT-273
		OFF vehicle	5. Reverse clutch	AT-315
			6. High clutch	AT-318
			7. Forward clutch	AT-321
			8. Overrun clutch	AT-321
			9. Low & reverse brake	AT-325
	Vehicle will not run in D and 2 positions (but runs in 1 and R positions).	ON vehicle	1. Manual control linkage adjustment	AT-276
		OFF vehicle	2. Low one-way clutch	AT-329

Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
Slips/Will Not Engage	Vehicle will not run in D, 1, 2 positions (but runs in R position). Clutch slips. Very poor acceleration. AT-230	ON vehicle	1. Fluid level	AT-59
			2. Line pressure test	AT-62
			3. Line pressure solenoid valve	AT-162
			4. Control valve assembly	AT-273
			5. Accumulator N-D	AT-273
		OFF vehicle	6. Reverse clutch	AT-315
			7. High clutch	AT-318
			8. Forward clutch	AT-321
			9. Forward one-way clutch	AT-331
			10. Low one-way clutch	AT-329
	Clutches or brakes slip somewhat in starting.	ON vehicle	1. Fluid level	AT-59
			2. Manual control linkage adjustment	AT-276
			3. Throttle position sensor (Adjustment)	EC-169
			4. Line pressure test	AT-62
			5. Line pressure solenoid valve	AT-162
			6. Control valve assembly	AT-273
			7. Accumulator N-D	AT-273
		OFF vehicle	8. Forward clutch	AT-321
			9. Reverse clutch	AT-315
			10. Low & reverse brake	AT-325
			11. Oil pump	AT-298
			12. Torque converter	AT-287
	No creep at all. AT-227, 230	ON vehicle	1. Fluid level	AT-59
			2. Line pressure test	AT-62
			3. Control valve assembly	AT-273
		OFF vehicle	4. Forward clutch	AT-321
			5. Oil pump	AT-298
			6. Torque converter	AT-287
	Almost no shock or clutches slipping in change from D_1 to D_2.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor (Adjustment)	EC-169
			3. Line pressure test	AT-62
			4. Accumulator servo release	AT-273
			5. Control valve assembly	AT-273
		OFF vehicle	6. Brake band	AT-334

Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
Slips/Will Not Engage	Almost no shock or slipping in change from D_2 to D_3.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor (Adjustment)	EC-169
			3. Line pressure test	AT-62
			4. Control valve assembly	AT-273
		OFF vehicle	5. High clutch	AT-318
			6. Forward clutch	AT-321
	Almost no shock or slipping in change from D_3 to D_4.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor (Adjustment)	EC-169
			3. Line pressure test	AT-62
			4. Control valve assembly	AT-273
		OFF vehicle	5. High clutch	AT-318
			6. Brake band	AT-334
	Races extremely fast or slips in changing from D_4 to D_3 when depressing pedal.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor (Adjustment)	EC-169
			3. Line pressure test	AT-62
			4. Line pressure solenoid valve	AT-162
			5. Control valve assembly	AT-273
		OFF vehicle	6. High clutch	AT-318
			7. Forward clutch	AT-321
	Races extremely fast or slips in changing from D_4 to D_2 when depressing pedal.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor (Adjustment)	EC-169
			3. Line pressure test	AT-62
			4. Line pressure solenoid valve	AT-162
			5. Shift solenoid valve A	AT-168
			6. Control valve assembly	AT-273
		OFF vehicle	7. Brake band	AT-334
			8. Forward clutch	AT-321
	Races extremely fast or slips in changing from D_3 to D_2 when depressing pedal.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor (Adjustment)	EC-169
			3. Line pressure test	AT-62
			4. Line pressure solenoid valve	AT-162
			5. Control valve assembly	AT-273
			6. A/T fluid temperature sensor	AT-105
		OFF vehicle	7. Brake band	AT-334
			8. Forward clutch	AT-321
			9. High clutch	AT-318

Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
Slips/Will Not Engage	Races extremely fast or slips in changing from D_4 or D_3 to D_1 when depressing pedal.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor (Adjustment)	EC-169
			3. Line pressure test	AT-62
			4. Line pressure solenoid valve	AT-162
			5. Control valve assembly	AT-273
		OFF vehicle	6. Forward clutch	AT-321
			7. Forward one-way clutch	AT-331
			8. Low one-way clutch	AT-329
	Vehicle will not run in any position.	ON vehicle	1. Fluid level	AT-59
			2. Manual control linkage adjustment	AT-276
			3. Line pressure test	AT-62
			4. Line pressure solenoid valve	AT-162
		OFF vehicle	5. Oil pump	AT-298
			6. High clutch	AT-318
			7. Brake band	AT-334
			8. Low & reverse brake	AT-325
			9. Torque converter	AT-287
			10. Parking pawl components	AT-338
NOT USED	Engine cannot be started in P and N positions. AT-221	ON vehicle	1. Ignition switch and starter	EL-9, and SC-10
			2. Manual control linkage adjustment	AT-276
			3. Park/neutral position (PNP) switch adjustment	AT-276
	Engine starts in positions other than P and N. AT-221	ON vehicle	1. Manual control linkage adjustment	AT-276
			2. Park/neutral position (PNP) switch adjustment	AT-276
	Transmission noise in P and N positions.	ON vehicle	1. Fluid level	AT-59
			2. Line pressure test	AT-62
			3. Throttle position sensor (Adjustment)	EC-169
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-111, 197
			5. Engine speed signal	AT-116
		OFF vehicle	6. Oil pump	AT-298
			7. Torque converter	AT-287
	Vehicle moves when changing into P position or parking gear does not disengage when shifted out of P position. AT-222	ON vehicle	1. Manual control linkage adjustment	AT-276
		OFF vehicle	2. Parking pawl components	AT-338

Symptom Chart (Cont'd)

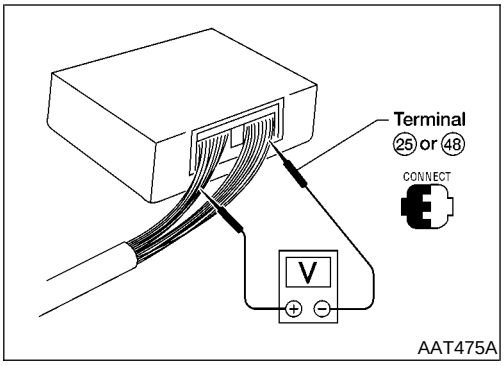
Items	Symptom	Condition	Diagnostic Item	Reference Page
NOT USED	Vehicle runs in N position. AT-223	ON vehicle	1. Manual control linkage adjustment	AT-276
		OFF vehicle	2. Forward clutch	AT-321
			3. Reverse clutch	AT-315
			4. Overrun clutch	AT-321
	Vehicle braked when shifting into R position.	ON vehicle	1. Fluid level	AT-59
			2. Manual control linkage adjustment	AT-276
			3. Line pressure test	AT-62
			4. Line pressure solenoid valve	AT-162
			5. Control valve assembly	AT-273
		OFF vehicle	6. High clutch	AT-318
			7. Brake band	AT-334
			8. Forward clutch	AT-321
			9. Overrun clutch	AT-321
	Excessive creep.	ON vehicle	1. Engine idling rpm	EC-426
	Engine stops when shifting lever into R, D, 2 and 1.	ON vehicle	1. Engine idling rpm	EC-426
			2. Torque converter clutch solenoid valve	AT-148
			3. Control valve assembly	AT-273
		OFF vehicle	4. Torque converter	AT-287
	Vehicle braked by gear change from D_1 to D_2.	ON vehicle	1. Fluid level	AT-59
		OFF vehicle	2. Reverse clutch	AT-315
			3. Low & reverse brake	AT-325
			4. High clutch	AT-318
			5. Low one-way clutch	AT-329
	Vehicle braked by gear change from D_2 to D_3.	ON vehicle	1. Fluid level	AT-59
		OFF vehicle	2. Brake band	AT-334
	Vehicle braked by gear change from D_3 to D_4.	ON vehicle	1. Fluid level	AT-59
		OFF vehicle	2. Overrun clutch	AT-321
			3. Forward one-way clutch	AT-331
			4. Reverse clutch	AT-315

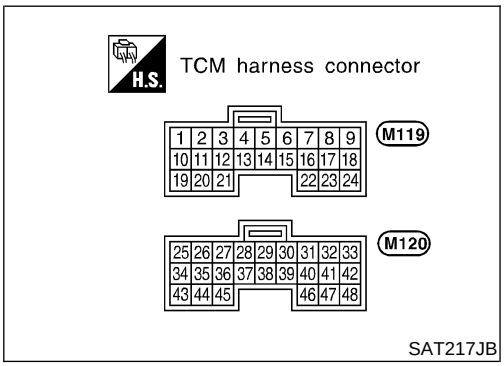
Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
NOT USED	Maximum speed not attained. Acceleration poor.	ON vehicle	1. Fluid level	AT-59
			2. Park/neutral position (PNP) switch adjustment	AT-276
			3. Shift solenoid valve A	AT-168
			4. Shift solenoid valve B	AT-172
			5. Control valve assembly	AT-273
		OFF vehicle	6. Reverse clutch	AT-315
			7. High clutch	AT-318
			8. Brake band	AT-334
			9. Low & reverse brake	AT-325
			10. Oil pump	AT-298
			11. Torque converter	AT-287
	Transmission noise in D, 2, 1 and R positions.	ON vehicle	1. Fluid level	AT-59
		ON vehicle	2. Torque converter	AT-287
	Engine brake does not operate in "1" position. AT-252	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-276
			2. Manual control linkage adjustment	AT-276
			3. Throttle position sensor (Adjustment)	EC-169
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-111, 197
			5. Shift solenoid valve A	AT-168
			6. Control valve assembly	AT-273
			7. Overrun clutch solenoid valve	AT-185
		OFF vehicle	8. Overrun clutch	AT-321
			9. Low & reverse brake	AT-325
	Transmission overheats.	ON vehicle	1. Fluid level	AT-59
			2. Engine idling rpm	EC-426
			3. Throttle position sensor (Adjustment)	EC-169
			4. Line pressure test	AT-62
			5. Line pressure solenoid valve	AT-162
			6. Control valve assembly	AT-273
		OFF vehicle	7. Oil pump	AT-298
			8. Reverse clutch	AT-315
			9. High clutch	AT-318
			10. Brake band	AT-334
			11. Forward clutch	AT-321
			12. Overrun clutch	AT-321
			13. Low & reverse brake	AT-325
			14. Torque converter	AT-287

Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
NOT USED	ATF shoots out during operation. White smoke emitted from exhaust pipe during operation.	ON vehicle	1. Fluid level	AT-59
		OFF vehicle	2. Reverse clutch	AT-315
			3. High clutch	AT-318
			4. Brake band	AT-334
			5. Forward clutch	AT-321
			6. Overrun clutch	AT-321
			7. Low & reverse brake	AT-325
	Offensive smell at fluid charging pipe.	ON vehicle	1. Fluid level	AT-59
		OFF vehicle	2. Torque converter	AT-287
			3. Oil pump	AT-298
			4. Reverse clutch	AT-315
			5. High clutch	AT-318
			6. Brake band	AT-334
			7. Forward clutch	AT-321
			8. Overrun clutch	AT-321
			9. Low & reverse brake	AT-325
	Engine is stopped at R, D, 2 and 1 positions.	ON vehicle	1. Fluid level	AT-59
			2. Torque converter clutch solenoid valve	AT-148
			3. Shift solenoid valve B	AT-172
			4. Shift solenoid valve A	AT-168
			5. Control valve assembly	AT-273





TCM Terminals and Reference Value

=NAAT0027

PREPARATION

NAAT0027S01

- Measure voltage between each terminal and terminal 25 or 48 by following “TCM INSPECTION TABLE”.

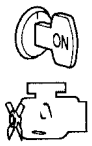
TCM HARNESS CONNECTOR TERMINAL LAYOUT

NAAT0027S02

TCM INSPECTION TABLE

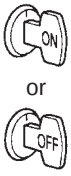
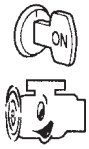
NAAT0027S03

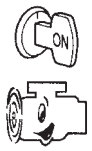
(Data are reference values.)

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
1	GY	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 3.0V
				When depressing accelerator pedal fully after warming up engine.	0V
2	BR/Y	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
				When depressing accelerator pedal fully after warming up engine.	0V
3	G/OR	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock- up.	0V
4	—	—		—	—
5	—	—		—	—
6	—	—		—	—
7	—	—		—	—
8	—	—		—	—
9	—	—		—	—
10	W/R	Power source		When turning ignition switch to “ON”.	Battery voltage
				When turning ignition switch to “OFF”.	0V

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
11	L/W	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in "D_1" or "D_4".)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in "D_2" or "D_3".)	0V
12	L/R	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in "D_1" or "D_2".)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in "D_3" or "D_4".)	0V
13	GY	O/D OFF indicator lamp		When setting overdrive control switch in "ON" position.	Battery voltage
				When setting overdrive control switch in "OFF" position.	0V
14	—	—		—	—
15	—	—		—	—
16	OR/W	Closed throttle position switch (in throttle position switch)		When releasing accelerator pedal after warming up engine. Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.	Battery voltage
				When depressing accelerator pedal after warming up engine. Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.	0V
17	OR/B	Wide open throttle position switch (in throttle position switch)		When depressing accelerator pedal more than half-way after warming up engine.	Battery voltage
				When releasing accelerator pedal after warming up engine.	0V
18	B/Y	ASCD cruise signal		When ASCD cruise is being performed. ("CRUISE" light comes on.)	Battery voltage
				When ASCD cruise is not being performed. ("CRUISE" light does not comes on.)	0V
19	W/R	Power source		Same as No. 10	
20	L/B	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery voltage
				When overrun clutch solenoid valve does not operate.	0V
21	—	—		—	—
22	GY	Overdrive control switch		When setting overdrive control switch in "ON" position	Battery voltage
				When setting overdrive control switch in "OFF" position	0V
23	—	—		—	—

TCM Terminals and Reference Value (Cont'd)

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
24	W/G	ASCD OD cut signal		When "ACCEL" set switch on ASCD cruise is released.	5 - 10V
				When "ACCEL" set switch on ASCD cruise is applied.	Less than 2V
25	B	Ground		—	0V
26	G	PNP switch "1" position		When setting selector lever to "1" position.	Battery voltage
				When setting selector lever to other positions.	0V
27	G/W	PNP switch "2" position		When setting selector lever to "2" position.	Battery voltage
				When setting selector lever to other positions.	0V
28	R/Y	Power source (Memory back-up)		When turning ignition switch to "OFF".	Battery voltage
				When turning ignition switch to "ON".	Battery voltage
29	W	Revolution sensor (Measure in AC range)		When vehicle cruises at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
				When vehicle parks.	0V
30*2	W	(RX)		—	—
31*2	L	(TX)		—	—
32	P/B	Throttle position sensor (Power source)		Ignition switch "ON".	4.5 - 5.5V
				Ignition switch "OFF".	0V
33*1	G/R	LAN		—	—
34	L	PNP switch "D" position		When setting selector lever to "D" position.	Battery voltage
				When setting selector lever to other positions.	0V
35	Y	PNP switch "R" position		When setting selector lever to "R" position.	Battery voltage
				When setting selector lever to other positions.	0V
36	P	PNP switch "N" or "P" position		When setting selector lever to "N" or "P" position.	Battery voltage
				When setting selector lever to other positions.	0V
37	—	—		—	—
38	W	Turbine revolution sensor (Measure in AC range)		When engine is running at 1,000 rpm	1.2V Voltage rises gradually in response to engine speed.

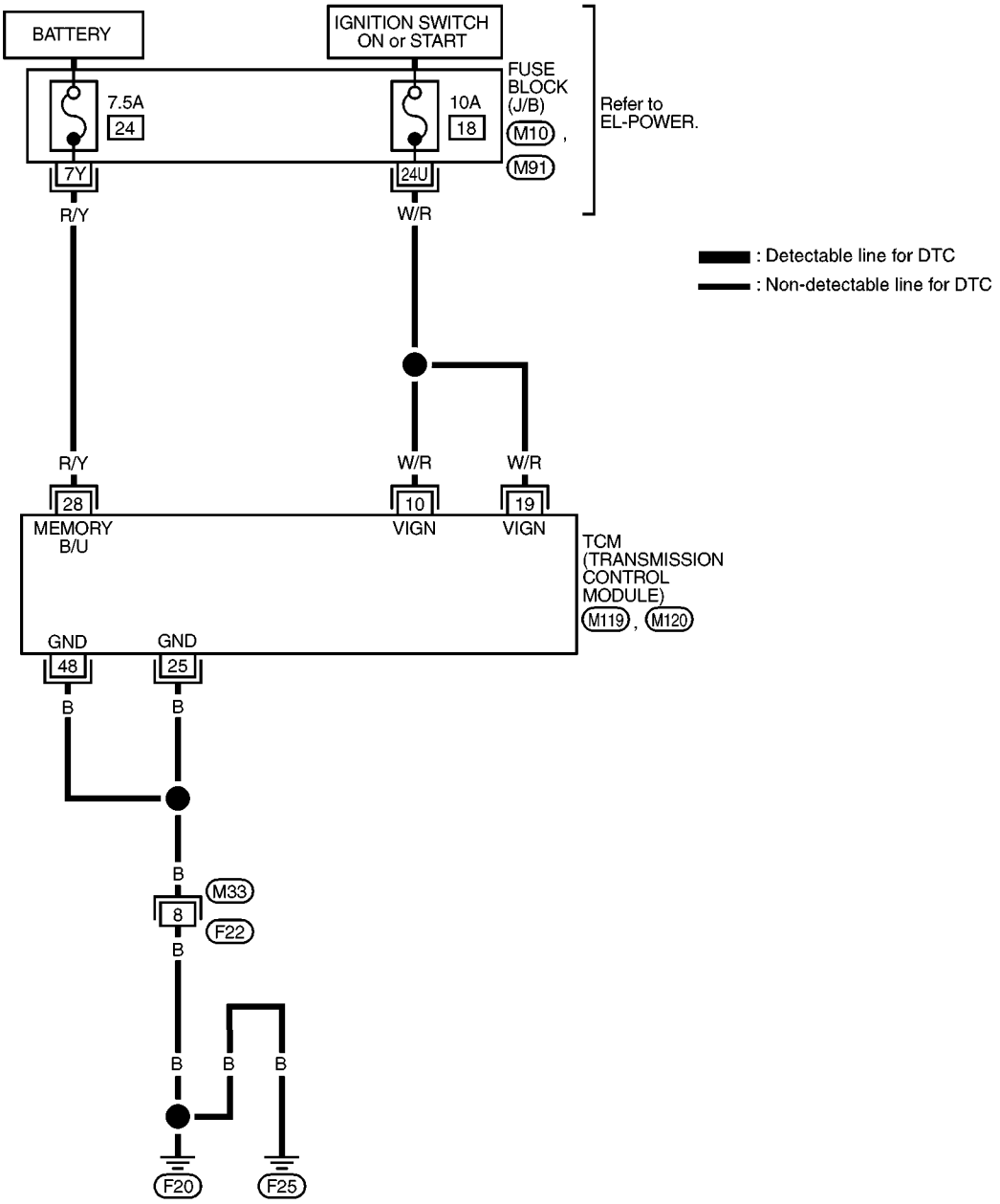
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
39	W/B	Engine speed signal		Refer to EC-126, "ECM INSPECTION TABLE".	—
40	W/L	Vehicle speed sensor		When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Voltage varies between less than 1.0V and more than 4.5V.
41	P	Throttle position sensor		When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: 0.5V - 0.7V Fully-open throttle: 4V
42	B	Throttle position sensor (Ground)		—	0V
45	G/Y	Stop lamp switch		When depressing brake pedal	Battery voltage
				When releasing brake pedal	0V
46	W	Transfer control unit		—	—
47	R	A/T fluid temperature sensor		When ATF temperature is 20°C (68°F).	1.5V
				When ATF temperature is 80°C (176°F).	0.5V
48	B	Ground		—	0V

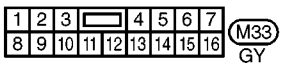
*1: These terminals are connected to the ECM.
*2: These terminals are connected to the Data link connector for CONSULT-II.

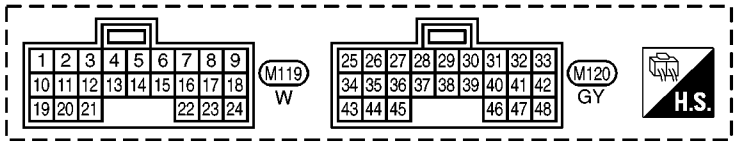
Wiring Diagram — AT — MAIN

NAAT0185

AT-MAIN-01







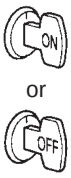
REFER TO THE FOLLOWING.
M10 , M91 -FUSE BLOCK-JUNCTION BOX (J/B)

MAT907A

TCM TERMINALS AND REFERENCE VALUE

NAAT0185S01

Remarks: Specification data are reference values.

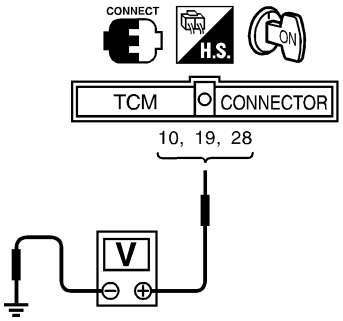
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
10	W/R	Power source		When turning ignition switch to "ON".	Battery voltage
				When turning ignition switch to "OFF".	0V
19	W/R	Power source		Same as No. 10	
25	B	Ground		—	0V
28	R/Y	Power source (Memory back-up)		When turning ignition switch to "OFF".	Battery voltage
				When turning ignition switch to "ON".	Battery voltage
48	B	Ground		—	0V

Diagnostic Procedure

NAAT0223

1 CHECK TCM POWER SOURCE STEP 1

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM terminals 10, 19, 28 and ground.



Voltage:
Battery voltage

SAT611J

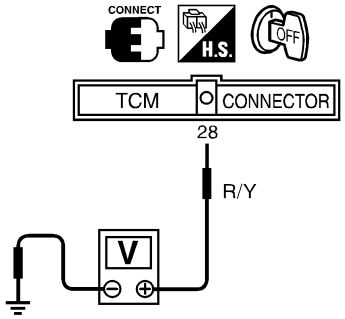
OK or NG

OK	▶	GO TO 2.
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

2	CHECK TCM POWER SOURCE STEP 2

1. Turn ignition switch to OFF position.
2. Check voltage between TCM terminal 28 and ground.



Voltage:
Battery voltage

SAT612JC

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING ITEM

Check the following items:
- Harness for short or open between ignition switch and TCM terminals 10, 19 and 28 (Main harness)
- Ignition switch and 10A or 7.5A fuse [No. 18 or 24, located in the fuse block (J/B)]
  Refer to EL-9, "Schematic".

OK or NG

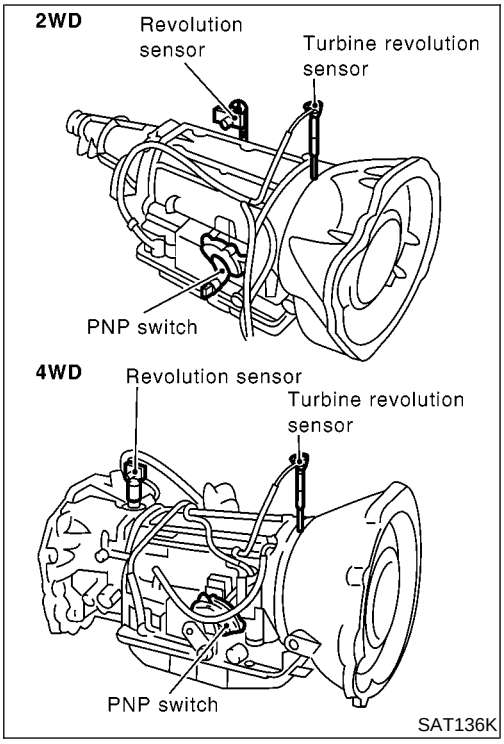
OK	▶	GO TO 4.
NG	▶	Repair or replace damaged parts.

4	CHECK TCM GROUND CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between TCM terminals 25, 48 and ground. Refer to wiring diagram — AT — MAIN.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.



Description

NAAT0028

- The PNP switch assemble includes a transmission range switch.
- The transmission range switch detects the selector position and sends a signal to the TCM.

TCM TERMINALS AND REFERENCE VALUE

NAAT0028S02

Remarks: Specification data are reference values.

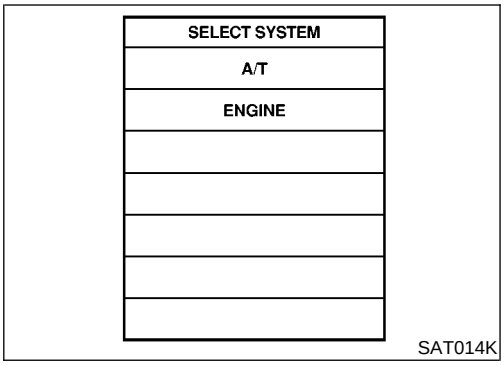
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
26	G	PNP switch “1” position		When setting selector lever to “1” position.	Battery voltage
				When setting selector lever to other positions.	0V
27	G/W	PNP switch “2” position		When setting selector lever to “2” position.	Battery voltage
				When setting selector lever to other positions.	0V
34	L	PNP switch “D” position		When setting selector lever to “D” position.	Battery voltage
				When setting selector lever to other positions.	0V
35	Y	PNP switch “R” position		When setting selector lever to “R” position.	Battery voltage
				When setting selector lever to other positions.	0V
36	P	PNP switch “N” or “P” position		When setting selector lever to “N” or “P” position.	Battery voltage
				When setting selector lever to other positions.	0V

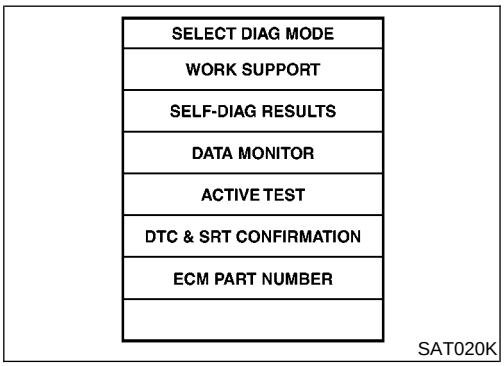
ON BOARD DIAGNOSIS LOGIC

NAAT0028S03

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: PNP SW/CIRC	TCM does not receive the correct voltage signal from the switch based on the gear position.	• Harness or connectors (The PNP switch circuit is open or shorted.) • PNP switch
: P0705		

Description (Cont'd)





DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0028S01

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

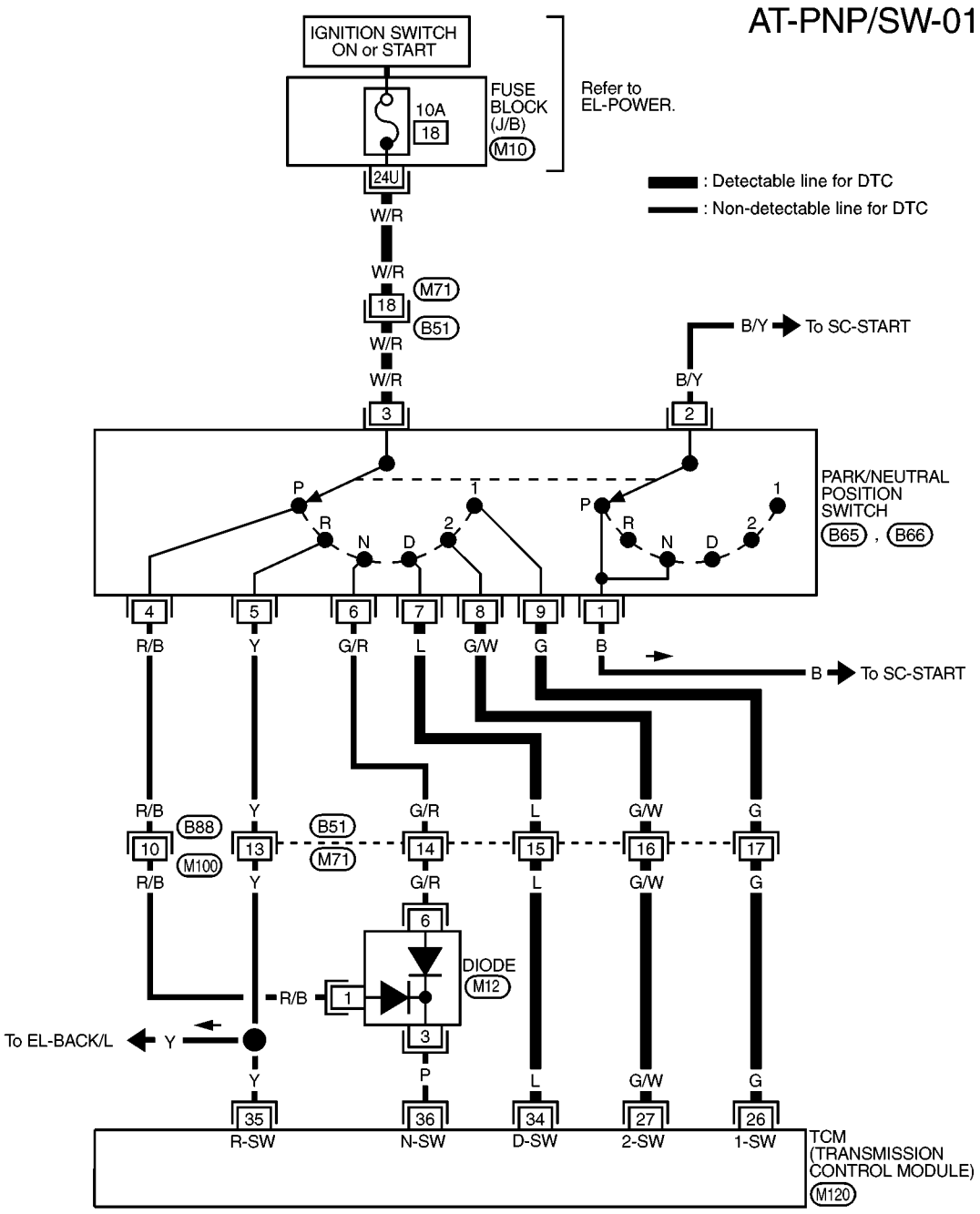
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
3) Start engine and maintain the following conditions for at least 5 consecutive seconds.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.3V
   Selector lever: D position (OD "ON" or "OFF")

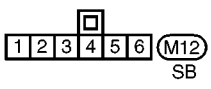
With GST

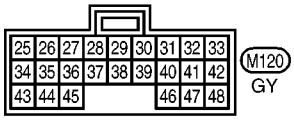
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — PNP/SW

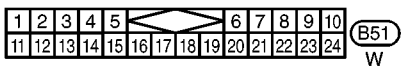
NAAT0186



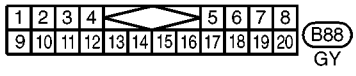












REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

MAT908A

Diagnostic Procedure

NAAT0029

1	CHECK PNP SWITCH CIRCUIT (WITH CONSULT-II)

With CONSULT-II

1. Turn ignition switch to “ON” position.
   (Do not start engine.)
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out “P”, “R”, “N”, “D”, “2” and “1” position switches moving selector lever to each position. Check the signal of the selector lever position is indicated properly.

DATA MONITOR	
MONITORING	
PN POSI SW	OFF
R POSITION SW	OFF
D POSITION SW	OFF
2 POSITION SW	ON
1 POSITION SW	OFF

SAT643J

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

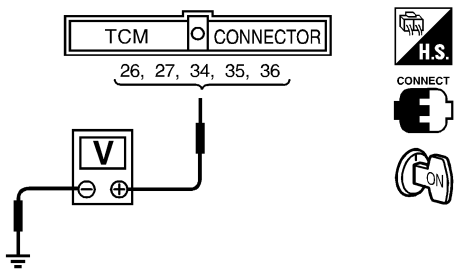
2	CHECK PNP SWITCH CIRCUIT (WITHOUT CONSULT-II)

Without CONSULT-II

1. Turn ignition switch to “ON” position.
   (Do not start engine.)
2. Check voltage between TCM terminals 26, 27, 34, 35, 36 and ground while moving selector lever through each position.

Lever position	Terminals				
	36	35	34	27	26
P, N	**B**	0	0	0	0
R	0	**B**	0	0	0
D	0	0	**B**	0	0
2	0	0	0	**B**	0
1	0	0	0	0	**B**

MTBL0205



SAT517J

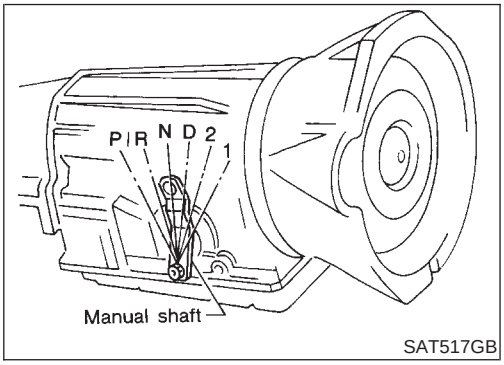
Does battery voltage exist (B) or non-existent (0)?

Yes	▶	GO TO 4.
No	▶	GO TO 3.

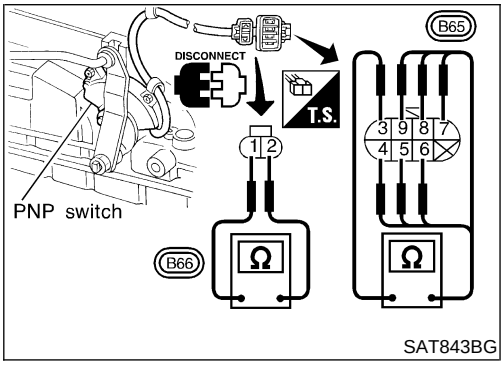
3	DETECT MALFUNCTIONING ITEM	
Check the following items: • PNP switch Refer to "Component Inspection", AT-103. • Harness for short or open between ignition switch and PNP switch (Main harness) • Harness for short or open between PNP switch and TCM (Main harness) • Diode (P, N position) • Ignition switch and 10A fuse [No. 18, located in the fuse block (J/B)] Refer to EL-9, "Schematic".		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace damaged parts.

4	CHECK DTC	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-100.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	GO TO 5.

5	CHECK TCM INSPECTION	
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.



SAT517GB



SAT843BG

Component Inspection

PARK/NEUTRAL POSITION SWITCH

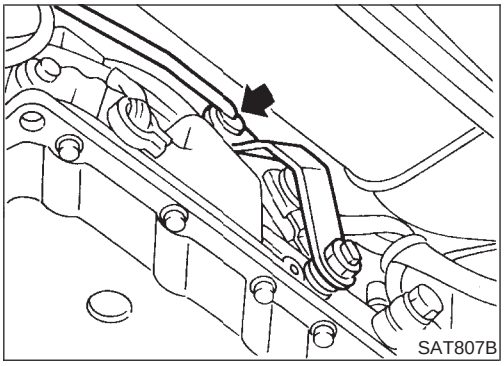
NAAT0030

NAAT0030S02

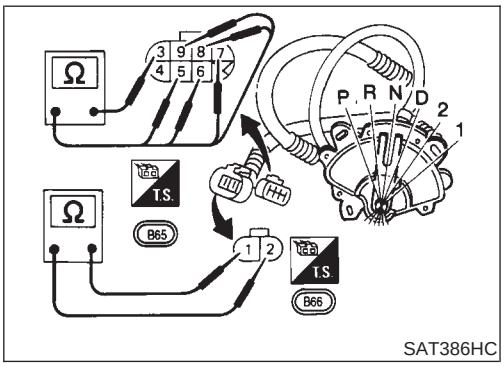
1. Check continuity between terminals 1 and 2 and between terminals 3 and 4, 5, 6, 7, 8, 9 while moving manual shaft through each position.

Lever position	Terminal No.	
P	1 - 2	3 - 4
R	3 - 5	
N	1 - 2	3 - 6
D	3 - 7	
2	3 - 8	
1	3 - 9	

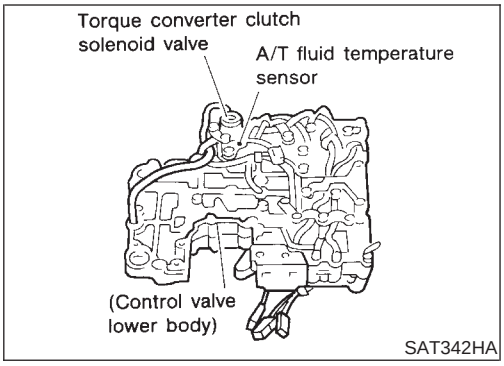
Component Inspection (Cont'd)

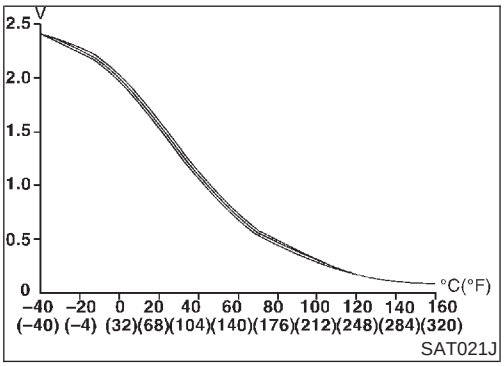


2. If NG, check again with manual control linkage disconnected from manual shaft of A/T assembly. Refer to step 1.
3. If OK on step 2, adjust manual control linkage. Refer to AT-276.



4. If NG on step 2, remove PNP switch from A/T and check continuity of PNP switch terminals. Refer to step 1.
5. If OK on step 4, adjust PNP switch. Refer to AT-276.
6. If NG on step 4, replace PNP switch.





Description

NAAT0031

The A/T fluid temperature sensor detects the A/T fluid temperature and sends a signal to the TCM.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NAAT0031S04

Remarks: Specification data are reference values.

Monitor item	Condition	Specification	
A/T fluid temperature sensor	Cold [20°C (68°F)] ↓ Hot [80°C (176°F)]	Approximately 1.5V ↓ Approximately 0.5V	Approximately 2.5 kΩ ↓ Approximately 0.3 kΩ

TCM TERMINALS AND REFERENCE VALUE

NAAT0031S02

Remarks: Specification data are reference values.

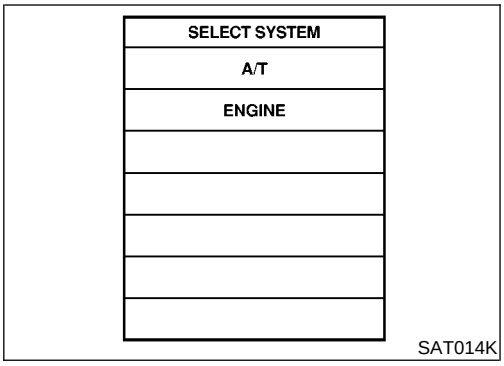
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
42	B	Throttle position sensor (Ground)		—	0V
47	R	A/T fluid temperature sensor		When ATF temperature is 20°C (68°F).	1.5V
				When ATF temperature is 80°C (176°F).	0.5V

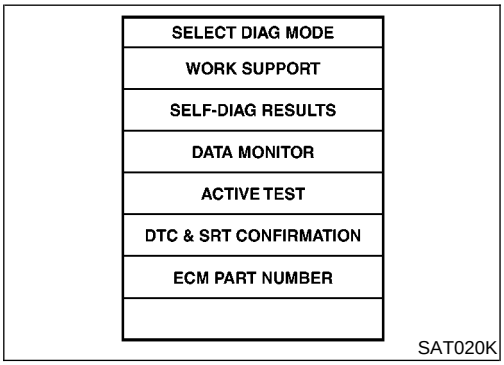
ON BOARD DIAGNOSIS LOGIC

NAAT0031S03

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: ATF TEMP SEN/CIRC	TCM receives an excessively low or high voltage from the sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • A/T fluid temperature sensor
: P0710		

Description (Cont'd)





DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0031S01

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Turn ignition switch "ON" and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
2) Start engine and maintain the following conditions for at least 10 minutes (Total). (It is not necessary to maintain continuously.)
   CMPS·RPM (REF): 450 rpm or more
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (OD "ON")

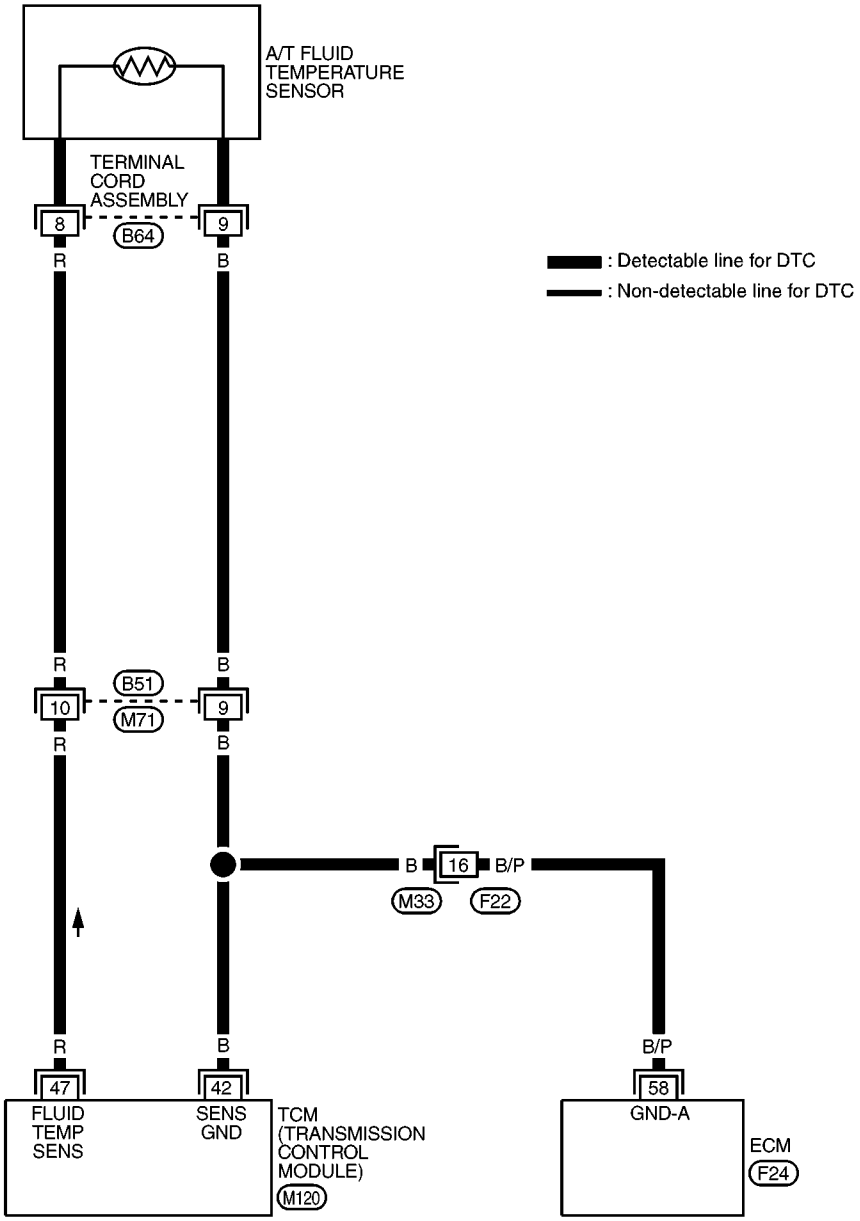
With GST

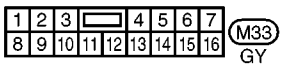
Follow the procedure "With CONSULT-II".

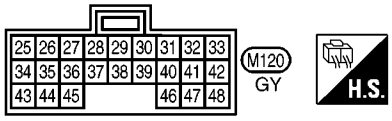
Wiring Diagram — AT — FTS

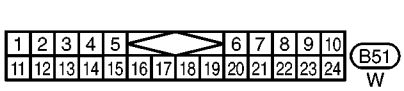
NAAT0187

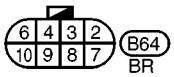
AT-FTS-01











REFER TO THE FOLLOWING.
F24 -ELECTRICAL UNITS

MAT909A

Diagnostic Procedure

NAAT0032

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 6.

2	CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITH CONSULT-II)

With CONSULT-II

1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “FLUID TEMP SE”.

Voltage:
Cold [20°C (68°F)] → Hot [80°C (176°F)]:
Approximately 1.5V → 0.5V

DATA MONITOR	
MONITORING	
VHCL/S SE-A/T	XXX km/h
VHCL/S SE-MTR	XXX km/h
THRTL POS SEN	XXX V
FLUID TEMP SE	XXX V
BATTERY VOLT	XXX V

SAT614J

OK or NG

OK ▶	GO TO 4.
NG ▶	GO TO 3.

3	DETECT MALFUNCTIONING ITEM

Check the following item:

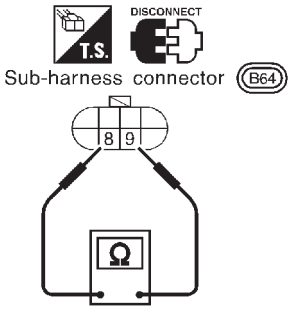
- Harness for short to ground or short to power or open between TCM, ECM and terminal cord assembly (Main harness)
- Ground circuit for ECM.
  Refer to EC-137, “Wiring Diagram”.

OK or NG

OK ▶	GO TO 4.
NG ▶	Repair or replace damaged parts.

4	CHECK A/T FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY

1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector on the right side of transfer assmebly.
3. Check resistance between terminals 8 and 9 when A/T is cold [20°C (68°F)].



SAT697I

Is resistance approx. 2.5 kΩ?

Yes	▶	GO TO 7.
No	▶	GO TO 5.

5	DETECT MALFUNCTIONING ITEM

1. Remove oil pan.
2. Check the following items:
- A/T fluid temperature sensor
  Refer to "Component Inspection", AT-110.
- Harness of terminal cord assembly for short or open

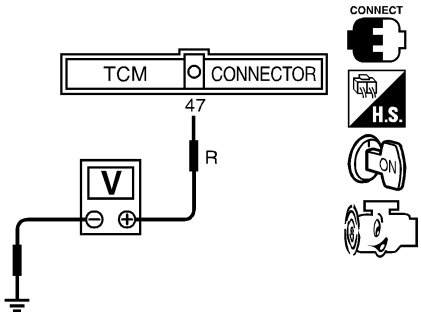
OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

6	CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITHOUT CONSULT-II)

Without CONSULT-II
1. Start engine.
2. Check voltage between TCM terminal 47 and ground while warming up A/T.

Voltage:
Cold [20°C (68°F)] → Hot [80°C (176°F)]:
Approximately 1.5V → 0.5V



SAT518J

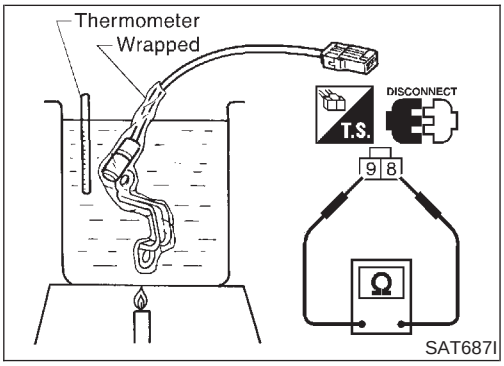
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

7	CHECK DTC	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-106.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	GO TO 8.

8	CHECK TCM INSPECTION	
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.



Component Inspection

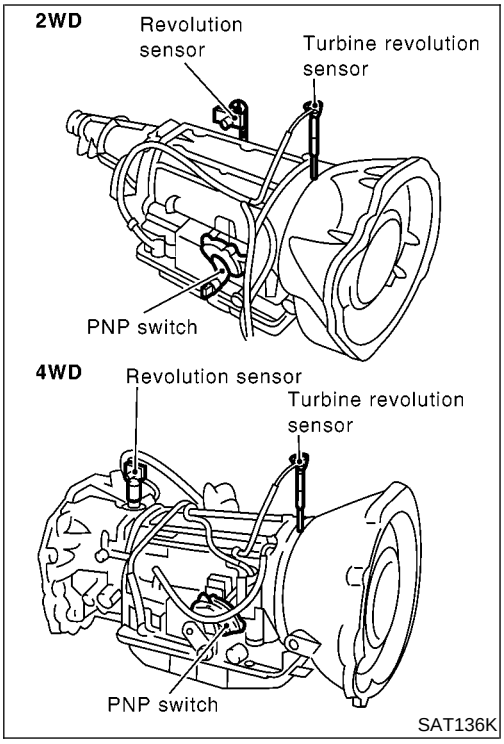
NAAT0033

A/T FLUID TEMPERATURE SENSOR

NAAT0033S01

- For removal, refer to AT-273.
- Check resistance between terminals 8 and 9 while changing temperature as shown at left.

Temperature °C (°F)	Resistance
20 (68)	Approximately 2.5 kΩ
80 (176)	Approximately 0.3 kΩ



Description

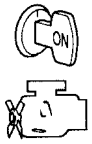
NAAT0034

The revolution sensor detects the revolution of the out put shaft parking pawl lock gear and emits a pulse signal. The pulse signal is sent to the TCM which converts it into vehicle speed.

TCM TERMINALS AND REFERENCE VALUE

NAAT0034S02

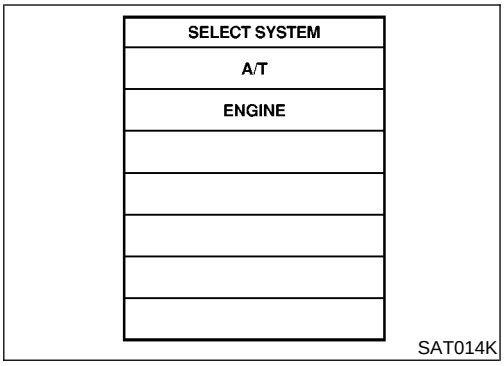
Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
29	W	Revolution sensor (Measure in AC range)		When vehicle cruises at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
				When vehicle parks.	0V
42	B	Throttle position sensor (Ground)		—	0V

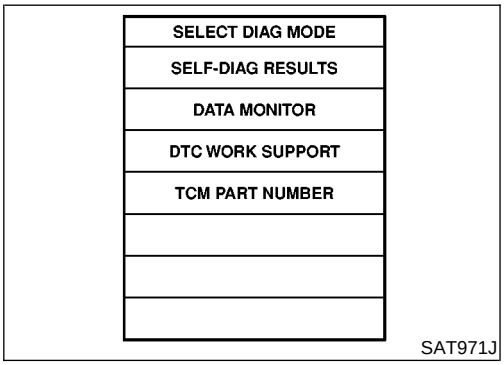
ON BOARD DIAGNOSIS LOGIC

NAAT0034S03

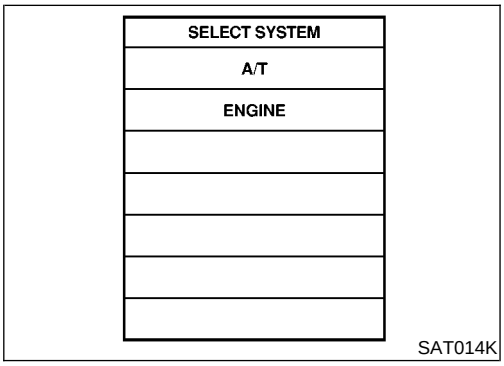
Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: VEH SPD SEN/CIR AT	TCM does not receive the proper voltage signal from the sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • Revolution sensor
: P0720		



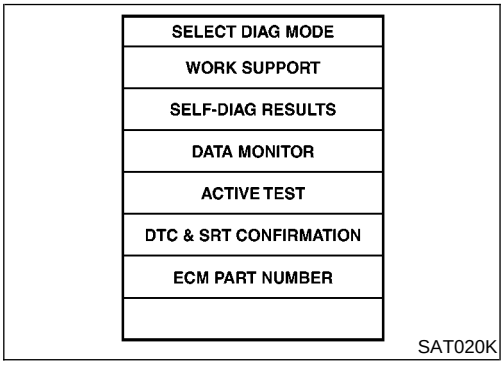
SAT014K



SAT971J



SAT014K



SAT020K

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0034S01

CAUTION:

- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Turn ignition switch "ON" and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Drive vehicle and check for an increase of "VHCL/S SE·MTR" value.
   If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-200.
   If the check result is OK, go to following step.
3) Select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
4) Start engine and maintain the following conditions for at least 5 consecutive seconds.
   VHCL SPEED SE: 30 km/h (19 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (OD "ON")
   Driving pattern: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.
   If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-114.
   If the check result is OK, go to following step.
5) Maintain the following conditions for at least 5 consecutive seconds.
   CMPS·RPM (REF): 3,500 rpm or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (OD "ON")
   Driving pattern: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.

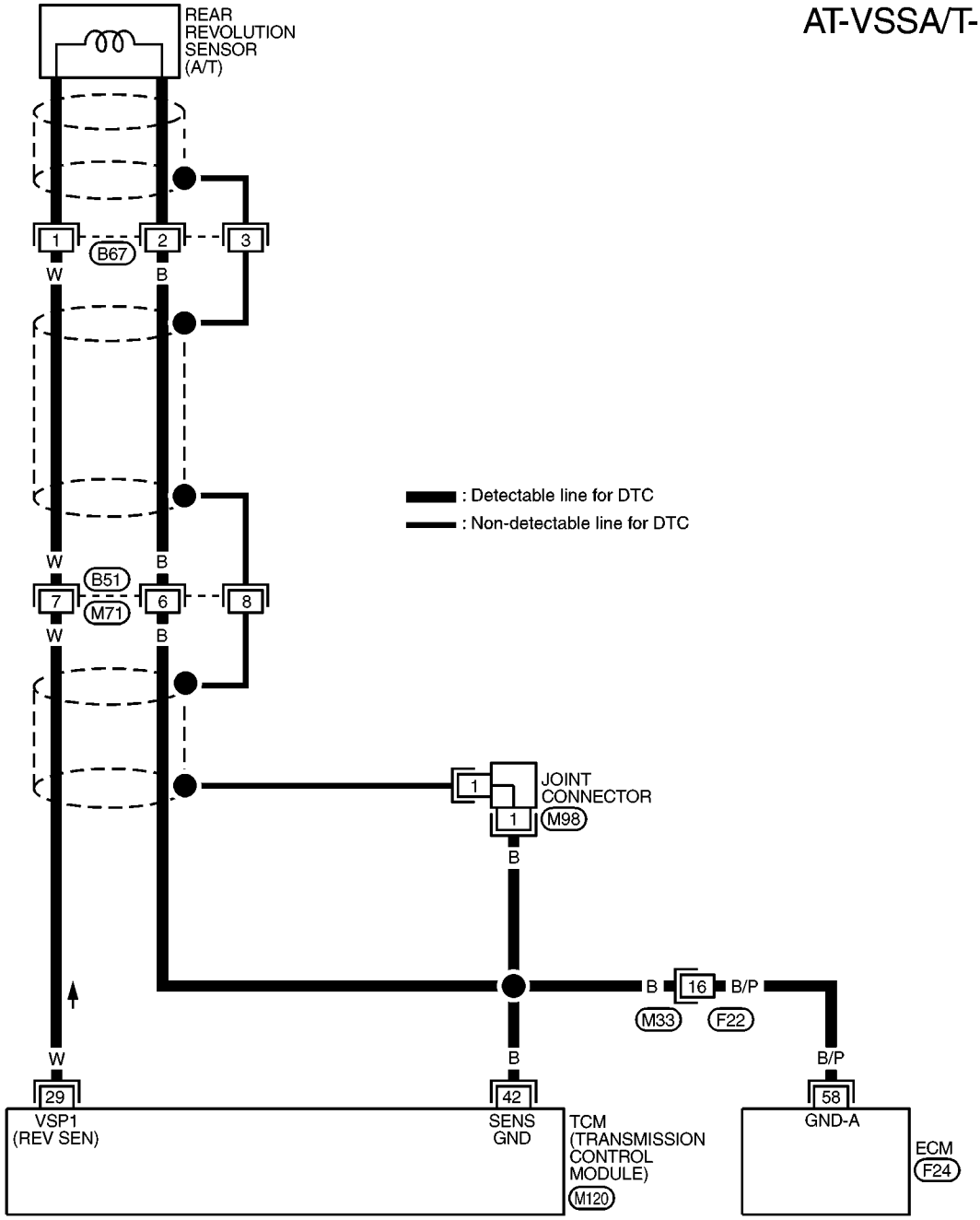
With GST

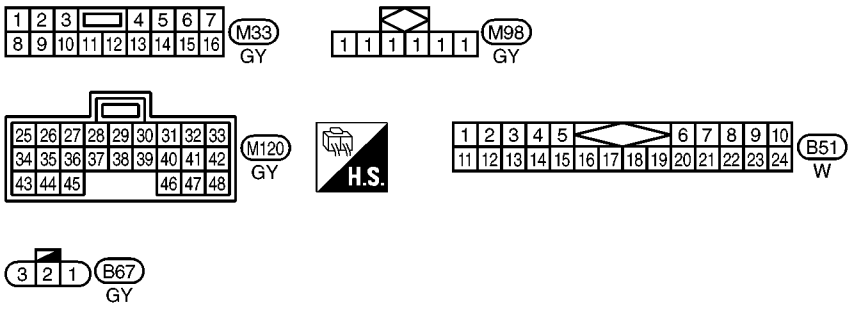
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — VSSA/T

NAAT0188

AT-VSSA/T-01





REFER TO THE FOLLOWING.
F24 -ELECTRICAL UNITS

MAT910A

Diagnostic Procedure

NAAT0035

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes (With CONSULT-II) ▶	GO TO 2.
No (Without CONSULT-II) ▶	GO TO 5.

2	CHECK INPUT SIGNAL (WITH CONSULT-II)

With CONSULT-II
1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “VHCL/S SE·A/T” while driving.
   Check the value changes according to driving speed.

DATA MONITOR	
MONITORING	
VHCL/S SE-A/T	XXX km/h
VHCL/S SE-MTR	XXX km/h
THRTL POS SEN	XXX V
FLUID TEMP SE	XXX V
BATTERY VOLT	XXX V

SAT614J

OK or NG	
OK ▶	GO TO 3.
NG ▶	GO TO 4.

3	CHECK REVOLUTION SENSOR
Refer to “Component Inspection”, AT-115.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Repair or replace revolution sensor.

4	DETECT MALFUNCTIONING ITEM

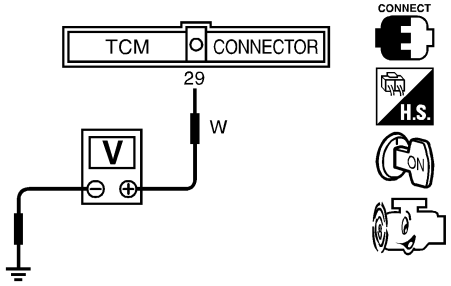
Check the following items:
- Harness for short or open between TCM and revolution sensor (Main harness)
- Harness for short or open between revolution sensor and ECM (Main harness)
- Ground circuit for ECM
  Refer to EC-137, “WIRING DIAGRAM”.

OK or NG	
OK ▶	GO TO 6.
NG ▶	GO TO 3.

5	CHECK INPUT SIGNAL (WITHOUT CONSULT-II)

Without CONSULT-II
1. Start engine.
2. Check voltage between TCM terminal 29 and ground while driving. (Measure with AC range.)

Voltage:
At 0 km/h (0 MPH):
0V
At 30 km/h (19 MPH):
1V or more
(Voltage rises gradually in response to vehicle speed.)



SAT519J

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 4.

6	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-112.

OK or NG

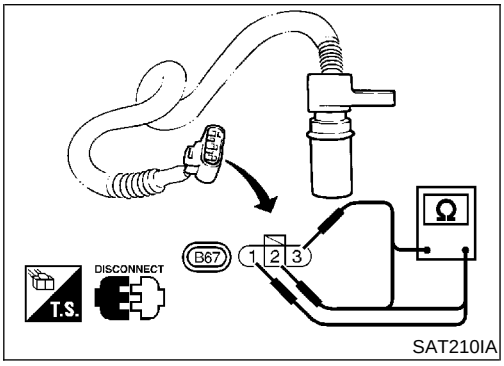
OK	▶	**INSPECTION END**
NG	▶	GO TO 7.

7	CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.



SAT210IA

Component Inspection

NAAT0036

REVOLUTION SENSOR

NAAT0036S01

- For removal, refer to AT-273.
- Check resistance between terminals 1, 2 and 3.

Terminal No.		Resistance
1	2	500 - 650Ω
2	3	No continuity
1	3	No continuity

Description

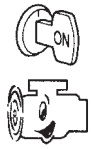
NAAT0037

The engine speed signal is sent from the ECM to the TCM.

TCM TERMINALS AND REFERENCE VALUE

NAAT0037S02

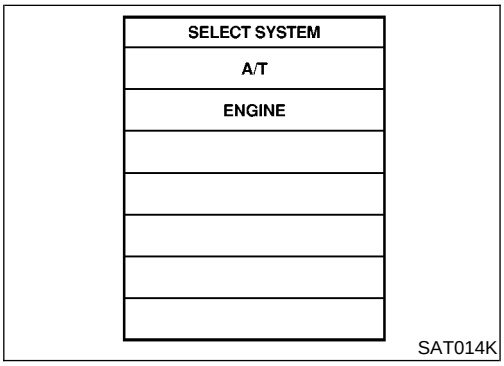
Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
39	W/B	Engine speed signal		Refer to EC-126, “ECM INSPECTION TABLE”.	—

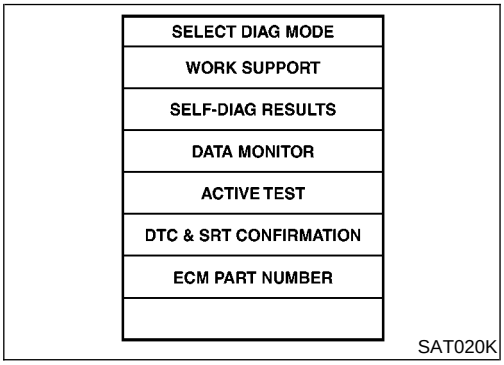
ON BOARD DIAGNOSIS LOGIC

NAAT0037S03

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: ENGINE SPEED SIG	TCM does not receive the proper voltage signal from ECM.	• Harness or connectors (The sensor circuit is open or shorted.)
: P0725		



SAT014K



SAT020K

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0037S01

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Turn ignition switch “ON” and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.
2) Start engine and maintain the following conditions for at least 10 consecutive seconds.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (OD “ON”)

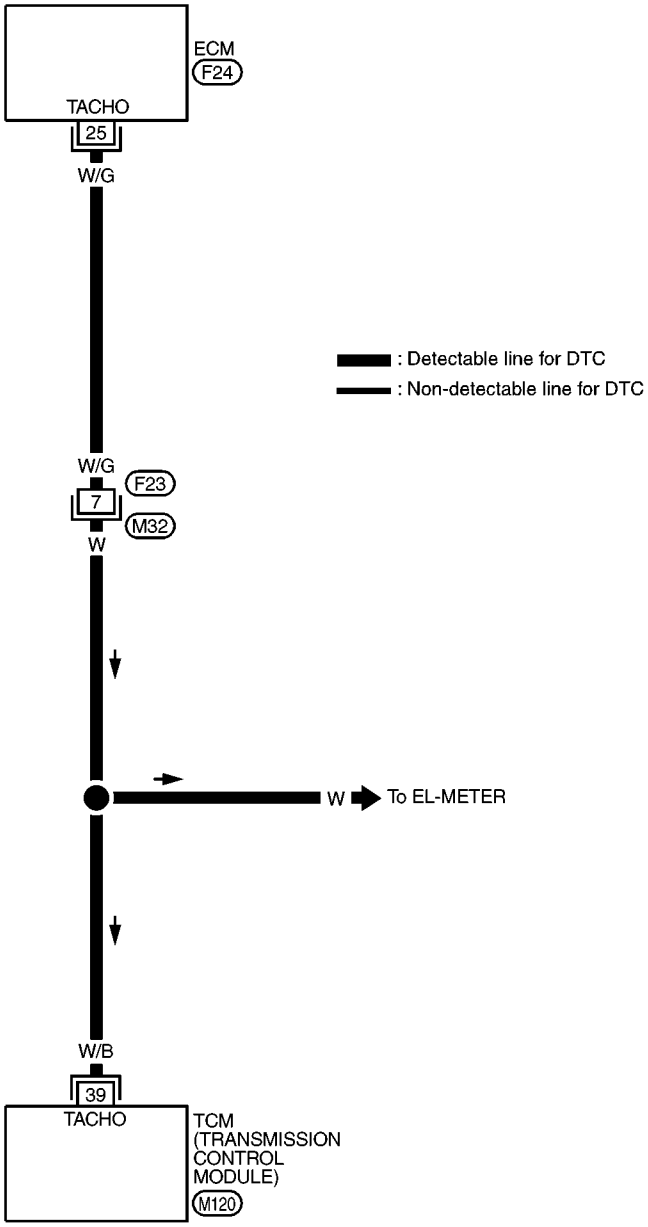
With GST

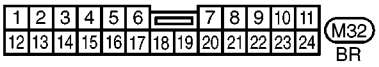
Follow the procedure “With CONSULT-II”.

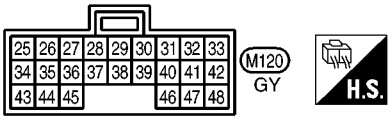
Wiring Diagram — AT — ENGSS

NAAT0189

AT-ENGSS-01







REFER TO THE FOLLOWING.
F24 - ELECTRICAL UNITS

MAT911A

Diagnostic Procedure

NAAT0038

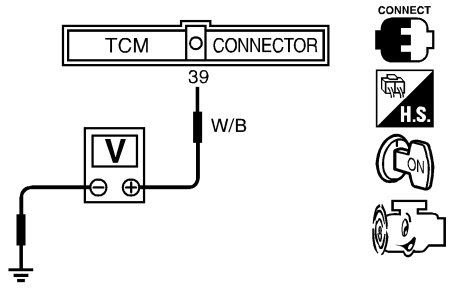
1	CHECK DTC WITH ECM	
● Check P code with CONSULT-II. Turn ignition switch “ON” and select “SELF-DIAG RESULTS” mode for “ENGINE” with CONSULT-II. Refer to EC-73, “DESCRIPTION”.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 4.
NG	▶	Check ignition signal circuit for engine control. Refer to EC-494, “Component Description”.

2	CHECK INPUT SIGNAL (WITH CONSULT-II)	
With CONSULT-II 1. Start engine. 2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II. 3. Read out the value of “ENGINE SPEED”. Check engine speed changes according to throttle position.		
Refer to EC-126**, “ECM INSPECTION TABLE”.**		
Yes	▶	GO TO 5.
No	▶	GO TO 3.

DATA MONITOR	
MONITORING	
ENGINE SPEED	XXX rpm
TURBINE REV	XXX rpm
OVERDRIVE SW	ON
PN POSI SW	OFF
R POSITION SW	OFF

SAT645J

3	DETECT MALFUNCTIONING ITEM	
Check the following items: ● Harness for short or open between TCM and ECM ● Resistor ● Ignition coil Refer to EC-494, “Component Description”.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair or replace damaged parts.

4	CHECK INPUT SIGNAL (WITHOUT CONSULT-II)	
Without CONSULT-II 1. Start engine. 2. Check voltage between TCM terminal 39 and ground.  SAT520J **Refer to** EC-126**, "ECM INSPECTION TABLE".**		
Yes	▶	GO TO 4.
No	▶	GO TO 3.

5	CHECK DTC	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-116. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	GO TO 6.

6	CHECK TCM INSPECTION	
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.

Description

NAAT0039

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis.
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into first gear position as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, etc.

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

TCM TERMINALS AND REFERENCE VALUE

NAAT0039S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
11	L/W	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in "D_1" or "D_4".)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in "D_2" or "D_3".)	0V
12	L/R	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in "D_1" or "D_2".)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in "D_3" or "D_4".)	0V

ON BOARD DIAGNOSIS LOGIC

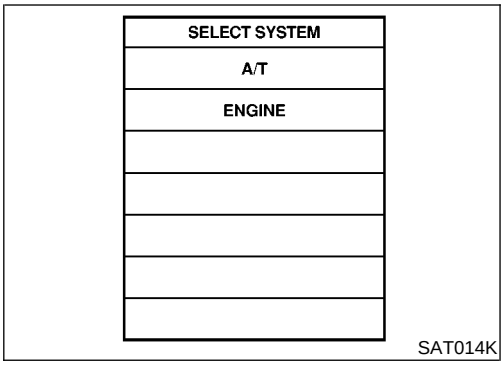
NAAT0039S03

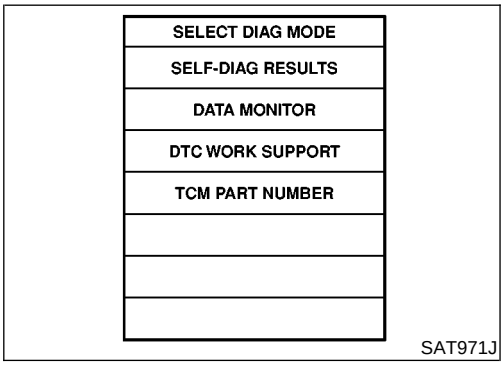
This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is higher than the position (1st) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when either shift solenoid valve A is stuck open or shift solenoid valve B is stuck open.

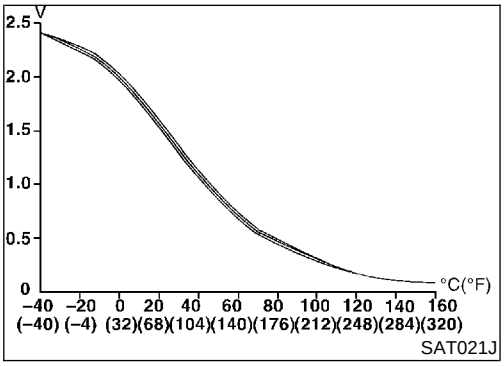
Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve A stuck open	2*	2	3	3
In case of gear position with shift solenoid valve B stuck open	4*	3	3	4

*: P0731 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: A/T 1ST GR FNCTN	A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	• Shift solenoid valve A • Shift solenoid valve B • Each clutch • Hydraulic control circuit
: P0731		







DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0039S01

CAUTION:

- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITIONS:
Always drive vehicle on a level road to improve the accuracy of test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Start engine and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3) Select "1ST GR FNCTN P0731" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
4) Accelerate vehicle to 10 to 20 km/h (6 to 12 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8 (at all times during step 4)
   Selector lever: D position (OD "ON")
   - **Check that "GEAR" shows "2" after releasing pedal.**
5) Depress accelerator pedal to WOT (more than 7.0/8 of "THROTTLE POSI") quickly from a speed of 10 to 20 km/h (6 to 12 MPH) until "TESTING" changes to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-124.
   If "STOP VEHICLE" appears on CONSULT-II screen, go to the following step.
   - **Check that "GEAR" shows "1" when depressing accelerator pedal to WOT.**
   - **If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAG RESULTS" for "ENGINE". In case a 1st trip DTC other than P0731 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".**
6) Stop vehicle.
7) Follow the instruction displayed. (Check for normal shifting referring to the table below.)

Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists	1 → 2 → 3 → 4

Malfunction for P0731 exists.	2 → 2 → 3 → 3
	4 → 3 → 3 → 4

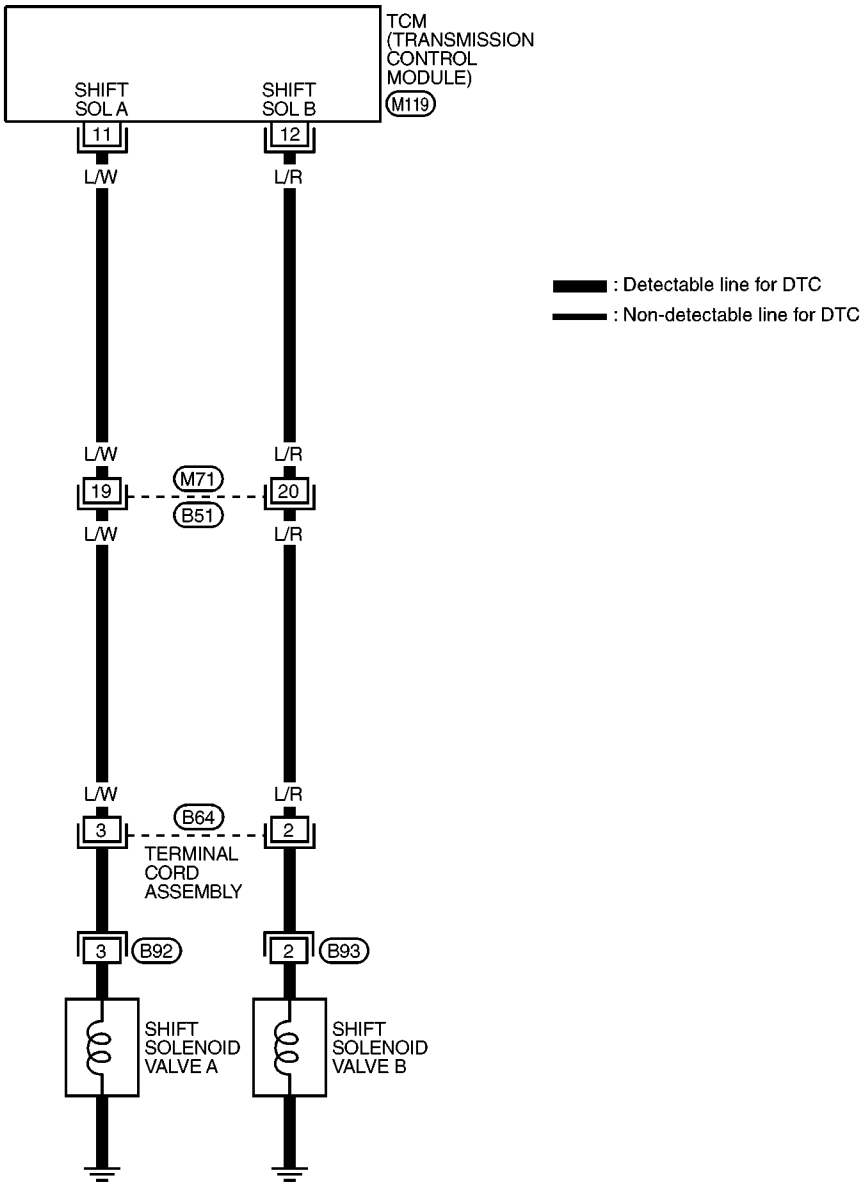
8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)
Refer to "DIAGNOSTIC PROCEDURE", AT-124.
Refer to shift schedule, AT-357.

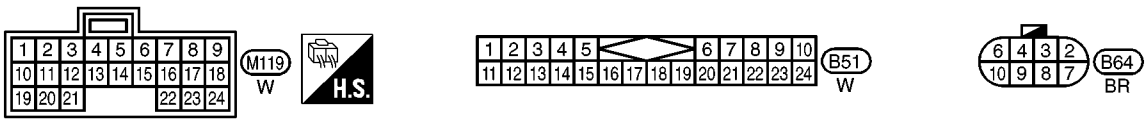
With GST
Follow the procedure "With CONSULT-II".

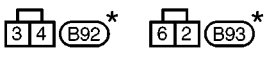
Wiring Diagram — AT — 1ST

NAAT0190

AT-1STSIG-01







★ : This connector is not shown in "HARNESS LAYOUT" in EL section.

MAT731A

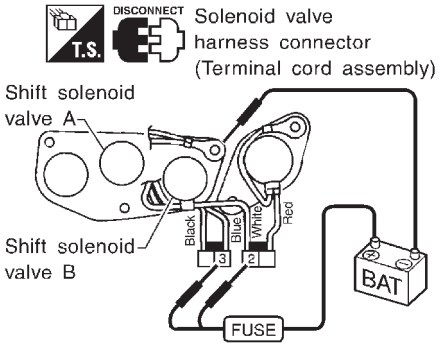
Diagnostic Procedure

NAAT0040

1	CHECK SHIFT SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-273.
2. Check shift solenoid valve operation.
- Shift solenoid valve A
- Shift solenoid valve B

Refer to “Component Inspection”, AT-125.



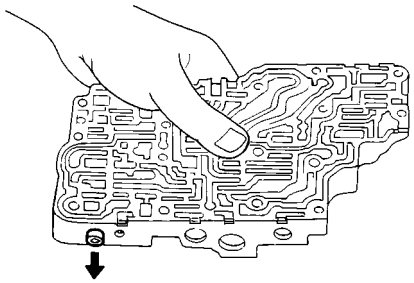
SAT648I

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace shift solenoid valve assembly.

2	CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to “Control Valve Assembly”, AT-302.
2. Check to ensure that:
- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.



SAT367H

OK or NG

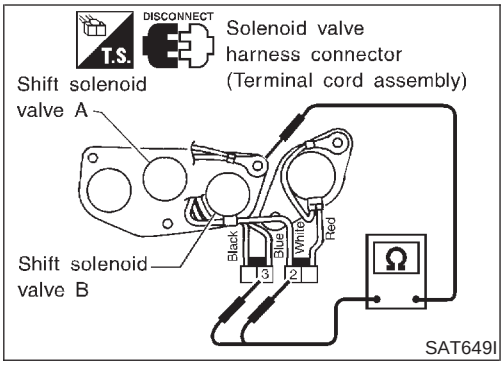
OK	▶	GO TO 3.
NG	▶	Repair control valve assembly.

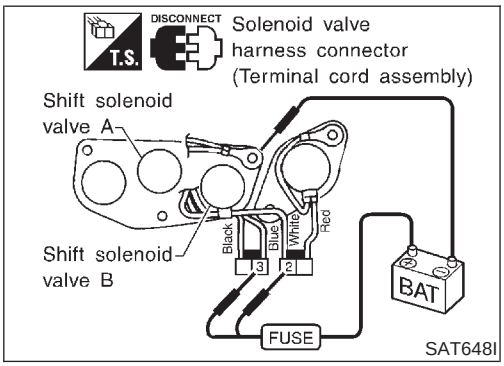
3	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-121.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Check control valve again. Repair or replace control valve assembly.





Component Inspection

=NAAT0041

SHIFT SOLENOID VALVE A AND B

NAAT0041S01

- For removal, refer to AT-273.

Resistance Check

NAAT0041S0101

- Check resistance between terminals (3 or 2) and ground.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	3	Ground	20 - 40Ω
Shift solenoid valve B	2		

Operation Check

NAAT0041S0102

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminals (3 or 2) and ground.

Description

NAAT0042

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis.
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into second gear position as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, etc.

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

TCM TERMINALS AND REFERENCE VALUE

NAAT0042S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
12	L/R	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in "D_1" or "D_2".)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in "D_3" or "D_4".)	0V

ON BOARD DIAGNOSIS LOGIC

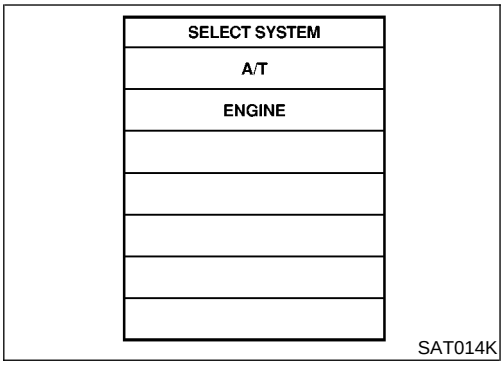
NAAT0042S03

This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is higher than the position (2nd) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when shift solenoid valve B is stuck open.

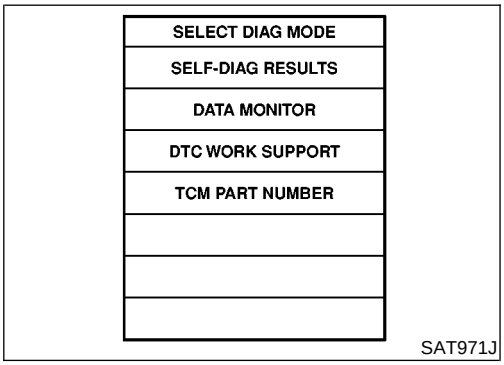
Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve B stuck open	4	3*	3	4

*: P0732 is detected.

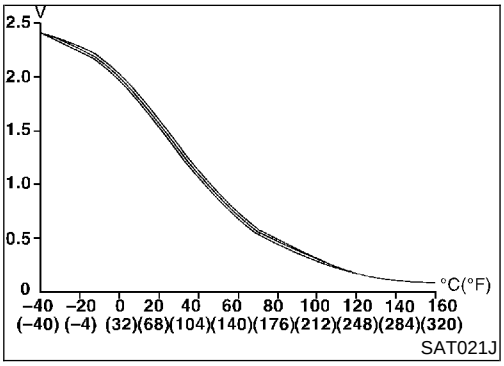
Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: A/T 2ND GR FNCTN	A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.	• Shift solenoid valve B • Each clutch • Hydraulic control circuit
: P0732		



SAT014K



SAT971J



SAT021J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0042S01

CAUTION:

- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITIONS:

Always drive vehicle on a level road to improve the accuracy of test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Start engine and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3) Select "2ND GR FNCTN P0732" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
4) Accelerate vehicle to 25 to 30 km/h (16 to 19 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8 (at all times during step 4)
   Selector lever: D position (OD "ON")
   - **Check that "GEAR" shows "3" or "4" after releasing pedal.**
5) Depress accelerator pedal to WOT (more than 7.0/8 of "THROTTLE POSI") quickly from a speed of 25 to 30 km/h (16 to 19 MPH) until "TESTING" changes to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-130.
   If "STOP VEHICLE" appears on CONSULT-II screen, go to following step.
   - **Check that "GEAR" shows "2" when depressing accelerator pedal to WOT.**
   - **If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAG RESULTS" for "ENGINE". In case a 1st trip DTC other than P0732 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".**
6) Stop vehicle.
7) Follow the instruction displayed. (Check for normal shifting referring to the table below.)

Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists	1 → 2 → 3 → 4
Malfunction for P0732 exists.	4 → 3 → 3 → 4

Description (Cont'd)

8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".) Refer to "DIAGNOSTIC PROCEDURE", AT-130. Refer to shift schedule, AT-357.

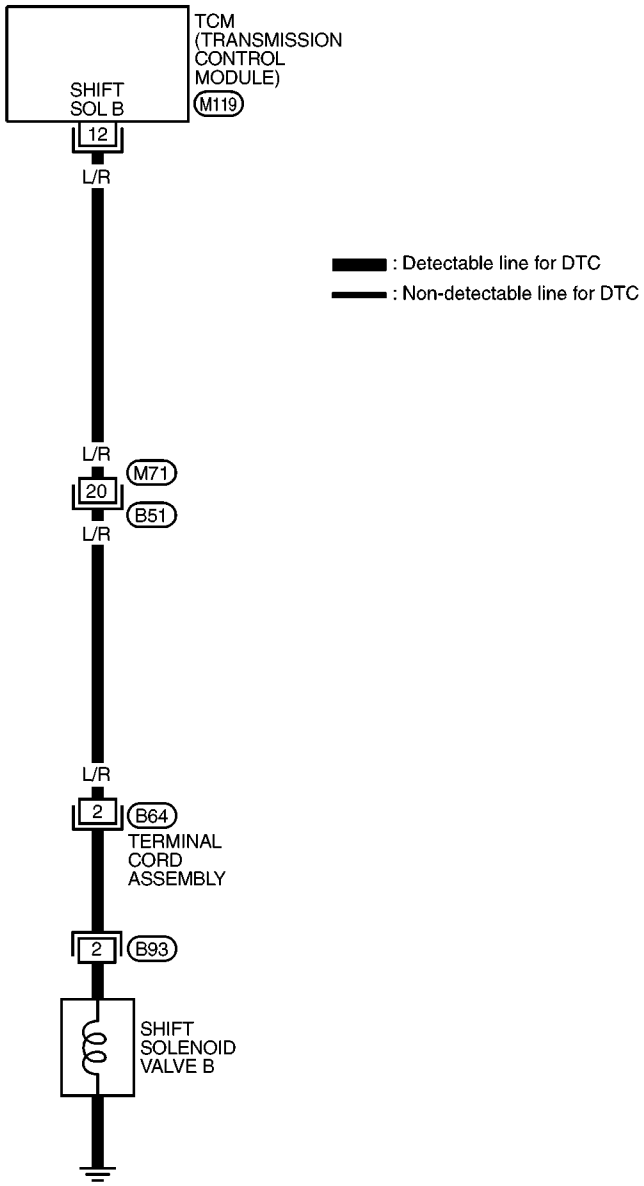
With GST

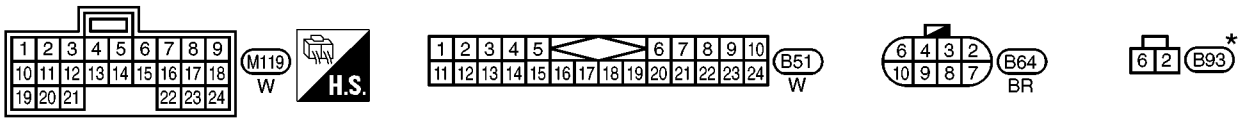
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — 2ND

NAAT0191

AT-2NDSIG-01





★ : This connector is not shown in "HARNESS LAYOUT" in EL section.

MAT732A

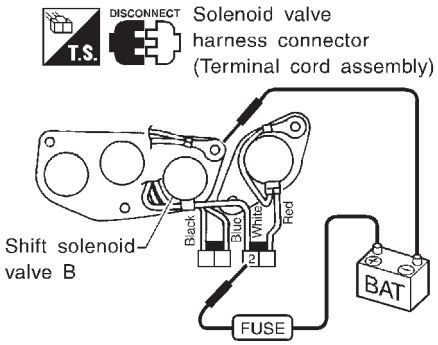
Diagnostic Procedure

NAAT0043

1	CHECK SHIFT SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-273.
2. Check shift solenoid valve operation.
- Shift solenoid valve B

Refer to “Component Inspection”, AT-131.



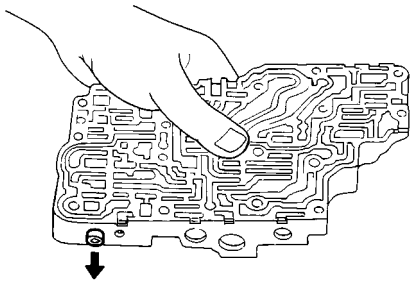
SAT650I

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace shift solenoid valve assembly.

2	CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to “Control Valve Assembly”, AT-302.
2. Check to ensure that:
- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.



SAT367H

OK or NG

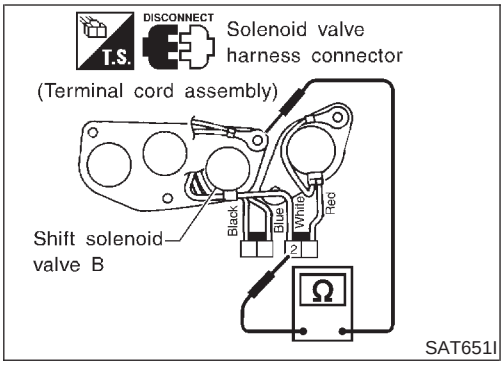
OK	▶	GO TO 3.
NG	▶	Repair control valve assembly.

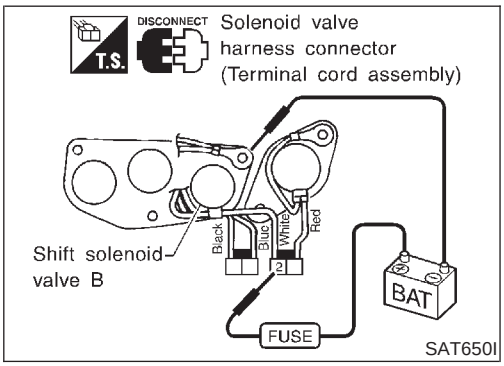
3	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-127.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Check control valve again. Repair or replace control valve assembly.





Component Inspection

NAAT0044

SHIFT SOLENOID VALVE B

NAAT0044S01

- For removal, refer to AT-273.

Resistance Check

NAAT0044S0101

- Check resistance between terminal 2 and ground.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve B	2	Ground	20 - 40Ω

Operation Check

NAAT0044S0102

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal 2 and ground.

Description

NAAT0045

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis.
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into third gear position as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning servo piston or brake band, etc.

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

TCM TERMINALS AND REFERENCE VALUE

NAAT0045S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
11	L/W	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in "D_1" or "D_4".)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in "D_2" or "D_3".)	0V

ON BOARD DIAGNOSIS LOGIC

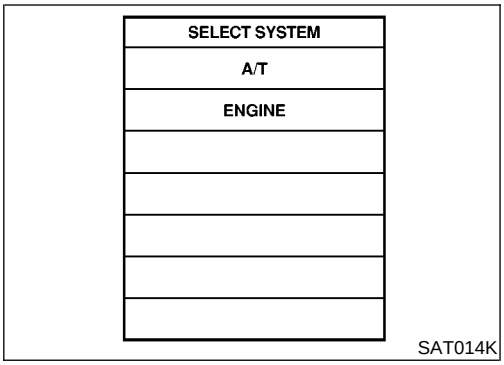
NAAT0045S03

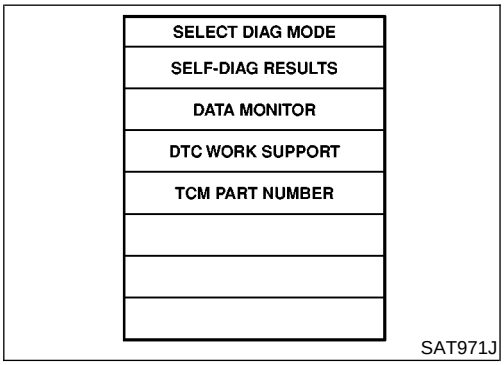
This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is higher than the position (3rd) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when shift solenoid valve A is stuck closed.

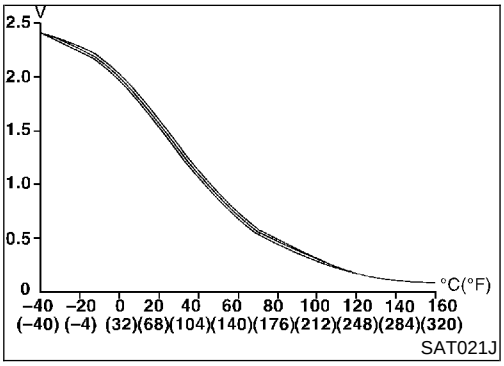
Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve A stuck closed	1	1	4*	4

*: P0733 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: A/T 3RD GR FNCTN	A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	• Shift solenoid valve A • Each clutch • Hydraulic control circuit
: P0733		







DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0045S01

CAUTION:

- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITIONS:

Always drive vehicle on a level road to improve the accuracy of test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Start engine and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3) Select "3RD GR FNCTN P0733" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
4) Accelerate vehicle to 35 to 45 km/h (22 to 28 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8 (at all times during step 4)
   Selector lever: D position (OD "ON")
   - **Check that "GEAR" shows "4" after releasing pedal.**
5) Depress accelerator pedal steadily with 3.5/8 - 4.5/8 of "THROTTLE POSI" from a speed of 35 to 45 km/h (22 to 28 MPH) until "TESTING" changes to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-136.
   If "STOP VEHICLE" appears on CONSULT-II screen, go to following step.
   - **Check that "GEAR" shows "3" when depressing accelerator pedal with 3.5/8 - 4.5/8 of "THROTTLE POSI".**
   - **If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAG RESULTS" for "ENGINE". In case a 1st trip DTC other than P0733 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".**
6) Stop vehicle.
7) Follow the instruction displayed. (Check for normal shifting referring to the table below.)

Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists.	1 → 2 → 3 → 4
Malfunction for P0733 exists.	1 → 1 → 4 → 4

Description (Cont'd)

8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".) Refer to "DIAGNOSTIC PROCEDURE", AT-136.
Refer to shift schedule, AT-357.

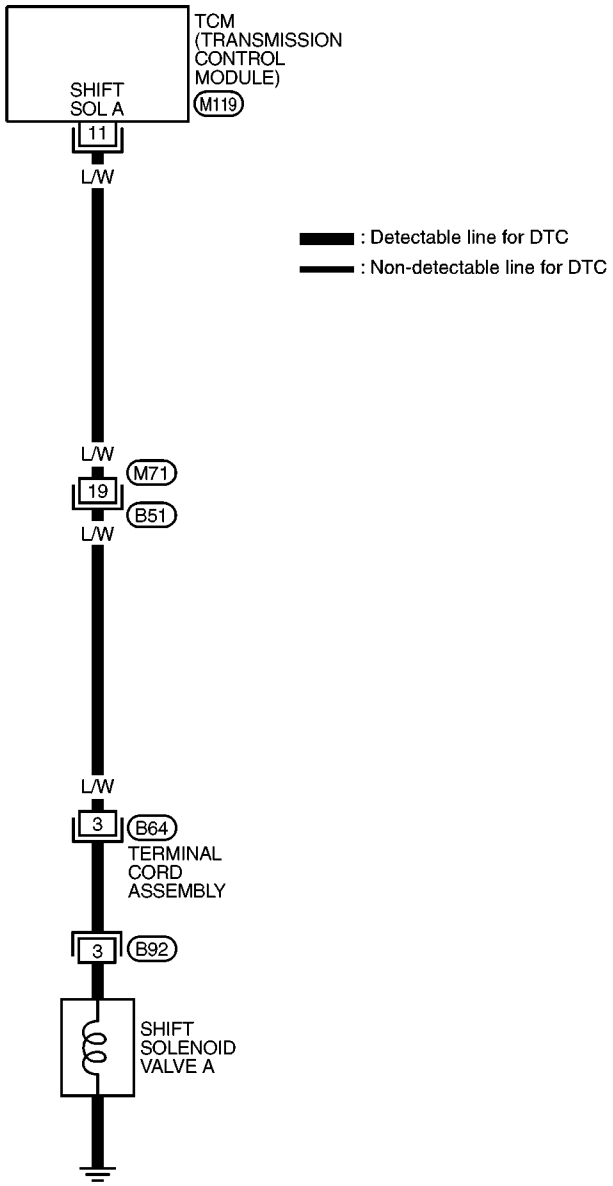
With GST

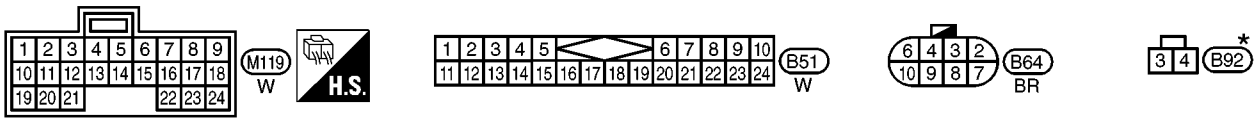
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — 3RD

NAAT0192

AT-3RDSIG-01





★ : This connector is not shown in "HARNESS LAYOUT" in EL section.

MAT733A

Diagnostic Procedure

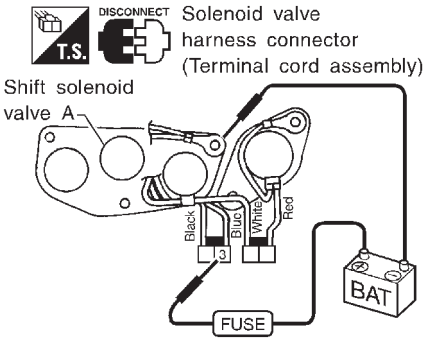
NAAT0046

1	CHECK SHIFT SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-273.
2. Check shift solenoid valve operation.

- Shift solenoid valve A

Refer to “Component Inspection”, AT-137.



SAT653I

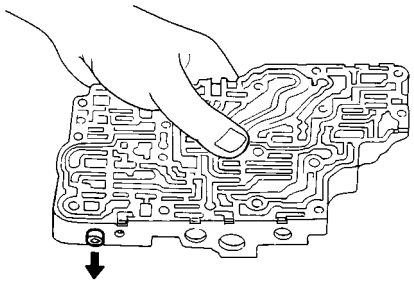
OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace shift solenoid valve assembly.

2	CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to “Control Valve Assembly”, AT-302.
2. Check to ensure that:

- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.



SAT367H

OK or NG

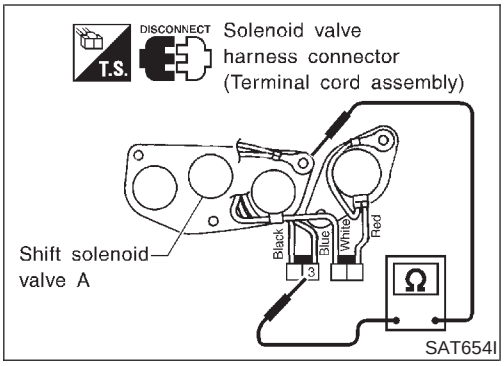
OK	▶	GO TO 3.
NG	▶	Repair control valve assembly.

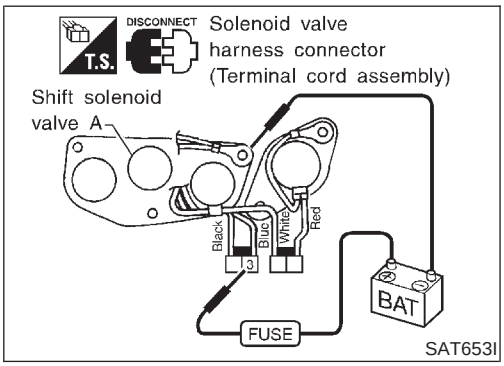
3	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-133.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Check control valve again. Repair or replace control valve assembly.





Component Inspection

NAAT0047

SHIFT SOLENOID VALVE A

NAAT0047S01

- For removal, refer to AT-273.

Resistance Check

NAAT0047S0101

- Check resistance between terminal 3 and ground.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	3	Ground	20 - 40Ω

Operation Check

NAAT0047S0102

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal 3 and ground.

Description

NAAT0048

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis.
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into fourth gear position or the torque converter clutch does not lock up as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning oil pump or torque converter clutch, etc.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NAAT0048S04

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Line pressure solenoid valve duty	Small throttle opening (Low line pressure) ↓ Large throttle opening (High line pressure)	Approximately 24% ↓ Approximately 95%

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

TCM TERMINALS AND REFERENCE VALUE

NAAT0048S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
1	GY	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 3.0V
				When depressing accelerator pedal fully after warming up engine.	0V
2	BR/Y	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
				When depressing accelerator pedal fully after warming up engine.	0V
11	L/W	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in “D_1” or “D_4”.)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in “D_2” or “D_3”.)	0V
12	L/R	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in “D_1” or “D_2”.)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in “D_3” or “D_4”.)	0V

Description (Cont'd)

ON BOARD DIAGNOSIS LOGIC

=NAAT0048S03

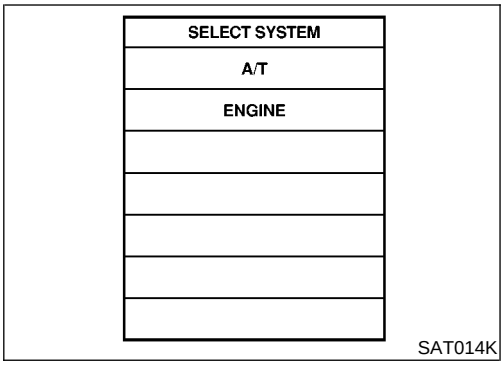
This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is much lower than the position (4th) supposed by TCM, the slip ratio will be much less than normal. In case the ratio does not reach the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when shift solenoid valve B is stuck closed.

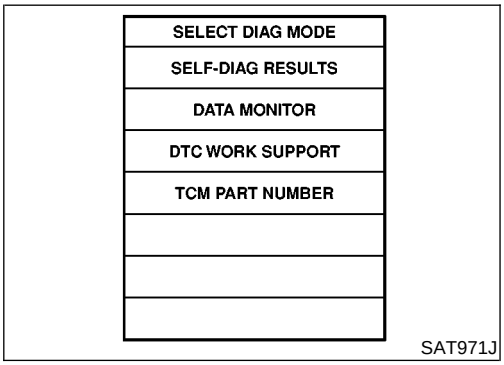
Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve B stuck closed	1	2	2	1*

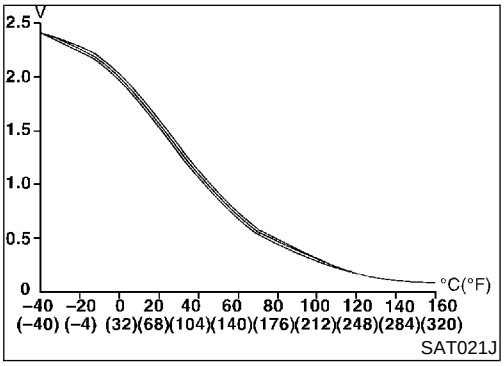
*: P0734 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: A/T 4TH GR FNCTN	A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	• Shift solenoid valve A • Shift solenoid valve B • Line pressure solenoid valve • Each clutch • Hydraulic control circuit
: P0734		

Description (Cont'd)







DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0048S01

CAUTION:

- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITIONS:

Always drive vehicle on a level road to improve the accuracy of test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Start engine and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3) Select "4TH GR FNCTN P0734" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
4) Accelerate vehicle to 55 to 65 km/h (34 to 40 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 5.5/8 (at all times during step 4)
   Selector lever: D position (OD "ON")
   - **Check that "GEAR" shows "3" after releasing pedal.**
5) Depress accelerator pedal steadily with 1.0/8 - 2.0/8 of "THROTTLE POSI" from a speed of 55 to 65 km/h (34 to 40 MPH) until "TESTING" has turned to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-143.
   If "STOP VEHICLE" appears on CONSULT-II screen, go to following step.
   - **Check that "GEAR" shows "4" when depressing accelerator pedal with 1.0/8 - 2.0/8 of "THROTTLE POSI".**
   - **If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAG RESULTS" for "ENGINE". In case a 1st trip DTC other than P0734 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".**
6) Stop vehicle.
7) Follow the instruction displayed. (Check for normal shifting referring to the table below.)

Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists	1 → 2 → 3 → 4
Malfunction for P0734 exists.	1 → 2 → 2 → 1

8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".) Refer to "DIAGNOSTIC PROCEDURE", AT-143.
Refer to shift schedule, AT-357.

With GST

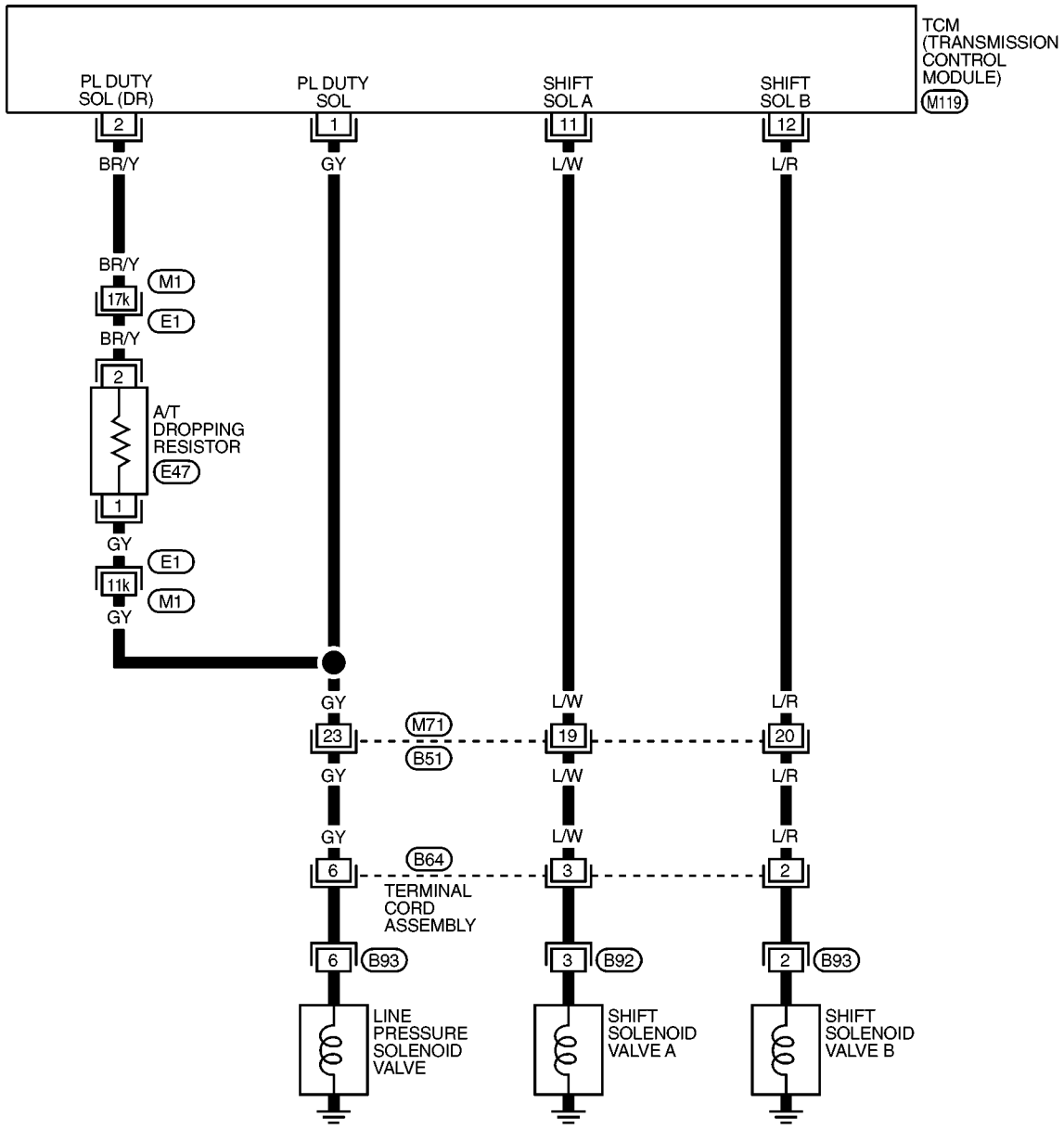
Follow the procedure "With CONSULT-II".

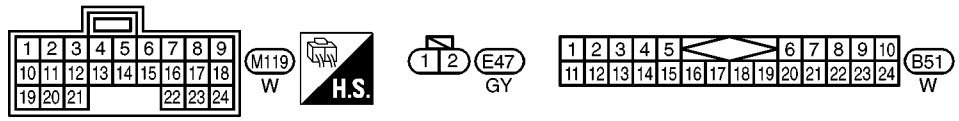
Wiring Diagram — AT — 4TH

NAAT0193

AT-4THSIG-01

: Detectable line for DTC
: Non-detectable line for DTC







∗ : This connector is not shown in "HARNESS LAYOUT" in EL section.

REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

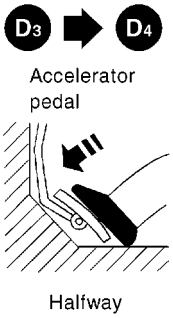
MAT912A

Diagnostic Procedure

NAAT0049

1	CHECK SHIFT UP (D_3 TO D_4)

During “Cruise test − Part 1”, AT-71.
Does A/T shift from D_3 to D_4 at the specified speed?



SAT988H

Yes or No

Yes	▶	GO TO 9.
No	▶	GO TO 2.

2	CHECK LINE PRESSURE

Perform line pressure test. Refer to AT-62.

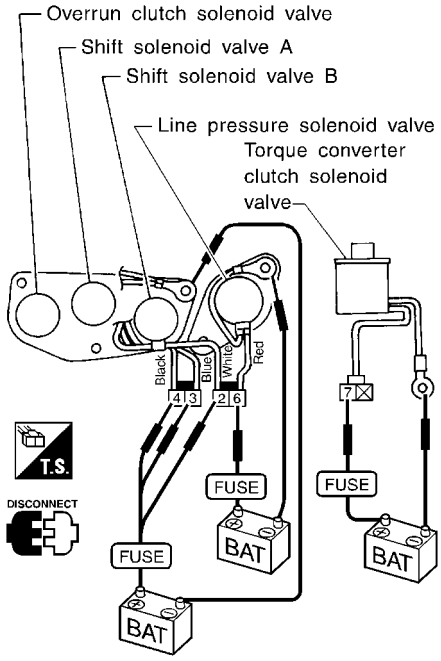
OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

3	CHECK SOLENOID VALVES

1. Remove control valve assembly. Refer to AT-273.
2. Refer to "Component Inspection", AT-147.



SAT158J

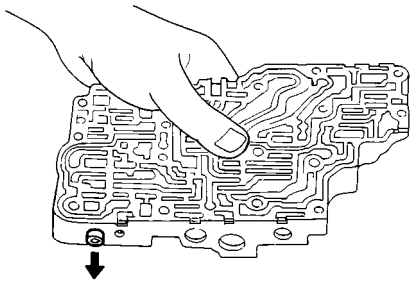
OK or NG

OK	▶	GO TO 4.
NG	▶	Replace solenoid valve assembly.

4	CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-302.
2. Check to ensure that:

- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.



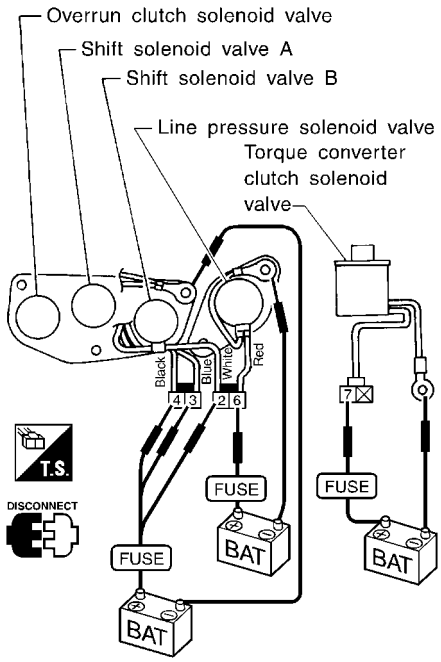
SAT367H

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair control valve.

5	CHECK SHIFT UP (D_3 TO D_4)	
Does A/T shift from D_3 to D_4 at the specified speed? **Yes or No**		
Yes	▶	GO TO 9.
No	▶	Check control valve again. Repair or replace control valve assembly.

6	CHECK LINE PRESSURE SOLENOID VALVE	
1. Remove control valve assembly. Refer to AT-273. 2. Refer to "Component Inspection", AT-147.		



SAT158J

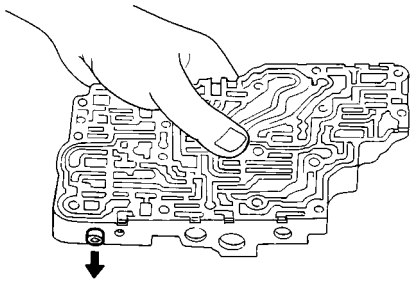
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace solenoid valve assembly.

Diagnostic Procedure (Cont'd)

7	CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-302.
2. Check line pressure circuit valves for sticking.
- Pressure regulator valve
- Pilot valve
- Pressure modifier valve



SAT367H

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair control valve.

8	CHECK SHIFT UP (D_3 TO D_4)

Does A/T shift from D_3 to D_4 at the specified speed?

OK or NG

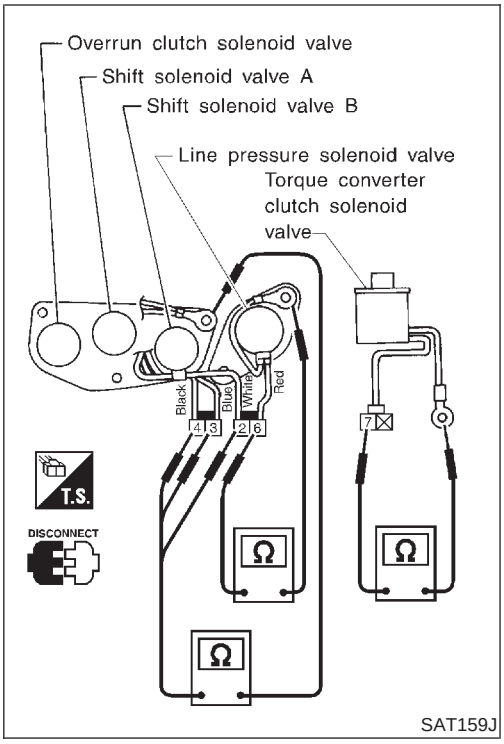
OK	▶	GO TO 9.
NG	▶	Check control valve again. Repair or replace control valve assembly.

9	CHECK DTC

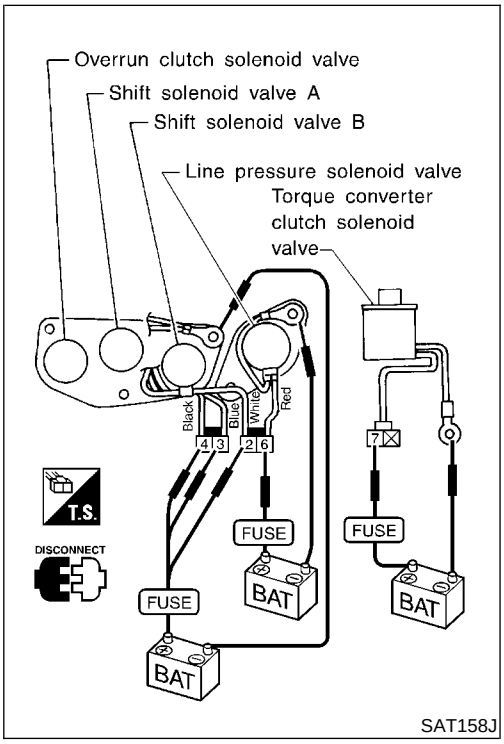
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-140.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Perform "Cruise test — Part 1" again and return to the start point of this flow chart.



SAT159J



SAT158J

Component Inspection

NAAT0050

SOLENOID VALVES

NAAT0050S01

- For removal, refer to AT-273.

Resistance Check

NAAT0050S0101

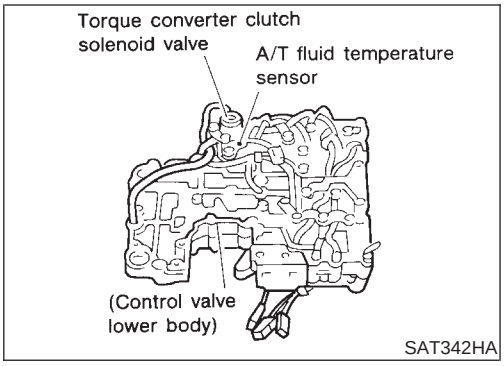
- Check resistance between terminals (3, 2 or 6) and ground.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	3	Ground	20 - 40Ω
Shift solenoid valve B	2		
Line pressure solenoid valve	6		2.5 - 5Ω

Operation Check

NAAT0050S0102

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminals (3, 2 or 6) and ground.



Description

NAAT0051

The torque converter clutch solenoid valve is activated, with the gear in "D_4", by the TCM in response to signals sent from the vehicle speed and throttle position sensors. Lock-up piston operation will then be controlled.
Lock-up operation, however, is prohibited when A/T fluid temperature is too low.
When the accelerator pedal is depressed (less than 2/8) in lock-up condition, the engine speed should not change abruptly. If there is a big jump in engine speed, there is no lock-up.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NAAT0051S02

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Torque converter clutch solenoid valve duty	Lock-up "OFF" ↓ Lock-up "ON"	Approximately 4% ↓ Approximately 94%

TCM TERMINALS AND REFERENCE VALUE

NAAT0051S03

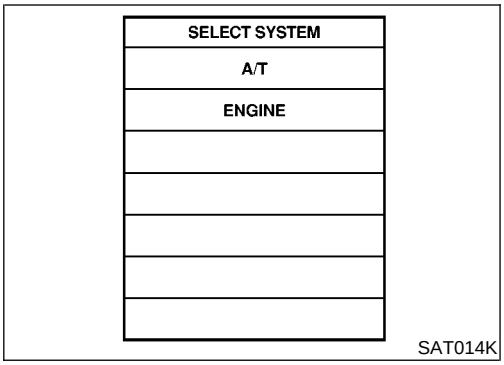
Remarks: Specification data are reference values.

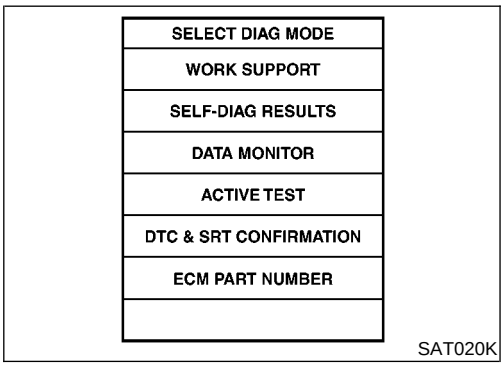
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
3	G/OR	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock-up.	0V

ON BOARD DIAGNOSIS LOGIC

NAAT0051S04

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: TCC SOLENOID/CIRC	TCM detects an improper voltage drop when it tires to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or shorted.) • Torque converter clutch solenoid valve
GST : P0740		





DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0051S01

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode for "ENGINE" with CONSULT-II and wait at least 1 second.

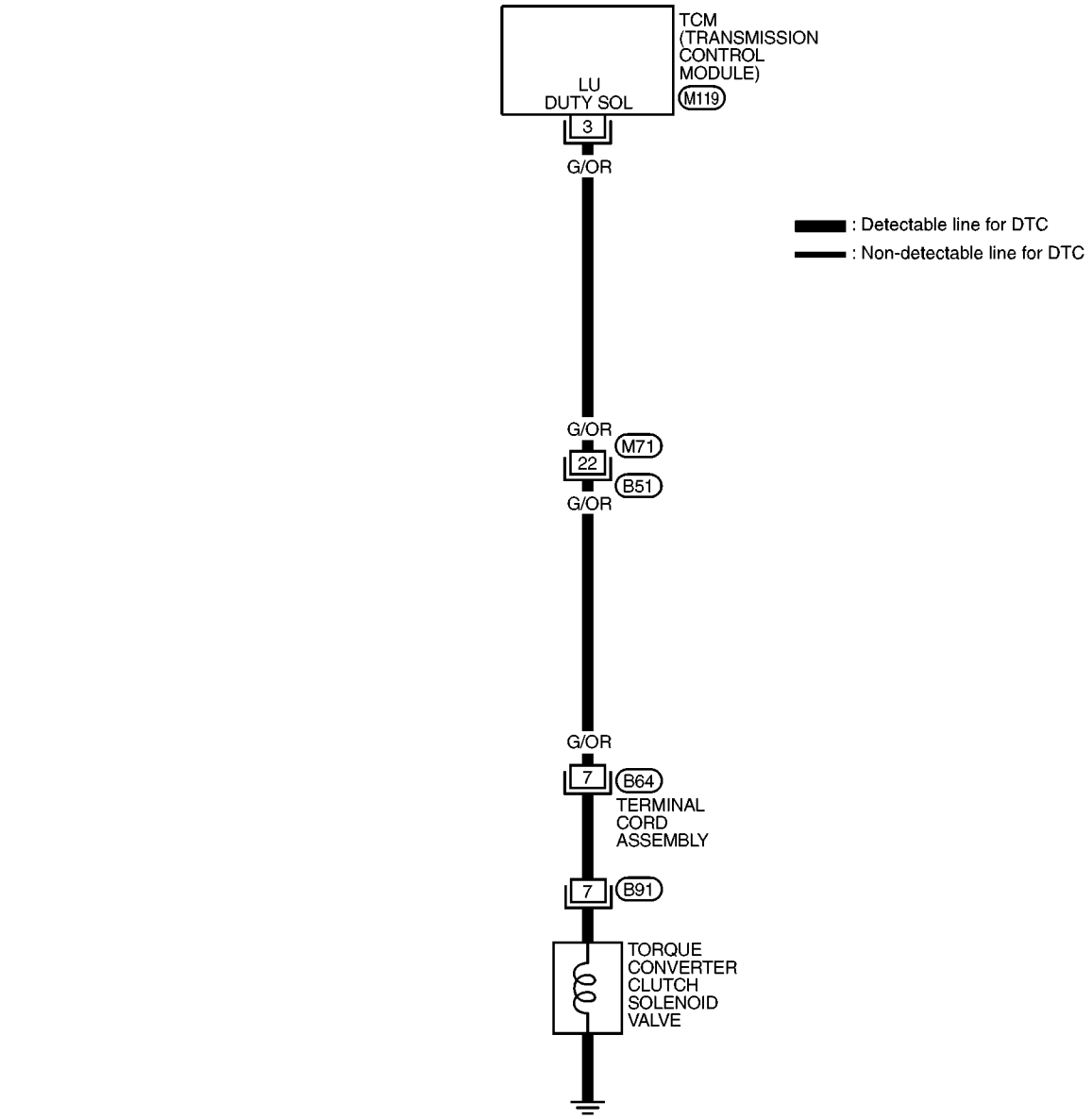
With GST

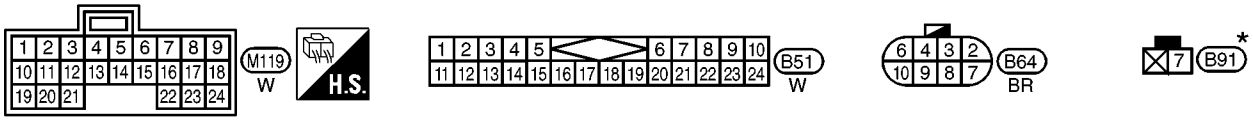
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — TCV

NAAT0194

AT-TCV-01





★ : This connector is not shown in "HARNESS LAYOUT" in EL section.

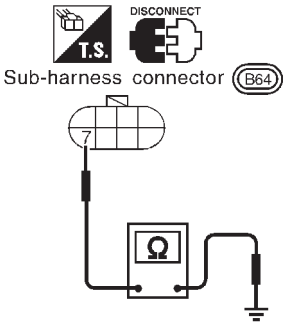
MAT735A

Diagnostic Procedure

NAAT0052

1	CHECK VALVE RESISTANCE

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector on the right side of transfer assembly.
3. Check resistance between terminal 7 and ground.



SAT156J

Is resistance approx. 10 - 20Ω?

Yes	▶	GO TO 3.
No	▶	GO TO 2.

2	CHECK VALVE OPERATION

1. Remove oil pan. Refer to AT-273.
2. Check the following items:

- Torque converter clutch solenoid valve
  Refer to “Component Inspection”, AT-152.
- Harness of terminal cord assembly for short or open

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK RESISTANCE

1. Turn ignition switch to “OFF” position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal 7 and TCM harness connector terminal 3. Refer to wiring diagram — AT — TCV.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.
4. Reinstall any part removed.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK DTC

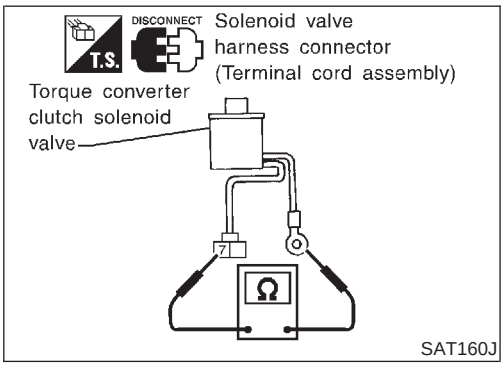
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-149.

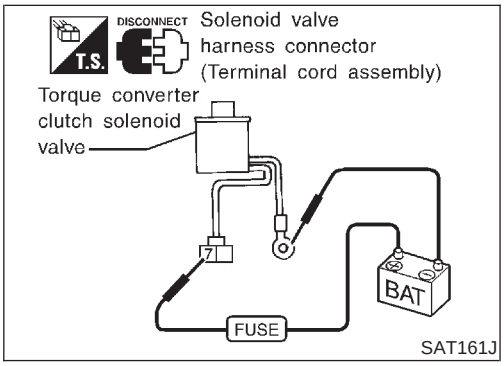
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

5	CHECK TCM INSPECTION	
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.





Component Inspection

NAAT0053

TORQUE CONVERTER CLUTCH SOLENOID VALVE

NAAT0053S01

- For removal, refer to AT-273.

Resistance Check

NAAT0053S0101

- Check resistance between terminal 7 and ground.

Solenoid valve	Terminal No.		Resistance (Approx.)
Torque converter clutch solenoid valve	7	Ground	10 - 20Ω

Operation Check

NAAT0053S0102

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal 7 and ground.

Description

NAAT0054

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis.
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into fourth gear position or the torque converter clutch does not lock up as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning oil pump or torque converter clutch, etc.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NAAT0054S02

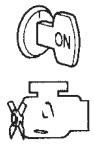
Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Torque converter clutch solenoid valve duty	Lock-up “OFF” ↓ Lock-up “ON”	Approximately 4% ↓ Approximately 94%
Line pressure solenoid valve duty	Small throttle opening (Low line pressure) ↓ Large throttle opening (High line pressure)	Approximately 24% ↓ Approximately 95%

TCM TERMINALS AND REFERENCE VALUE

NAAT0054S03

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
1	GY	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 3.0V
				When depressing accelerator pedal fully after warming up engine.	0V
2	BR/Y	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
				When depressing accelerator pedal fully after warming up engine.	0V
3	G/OR	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock- up.	0V

ON BOARD DIAGNOSIS LOGIC

NAAT0054S04

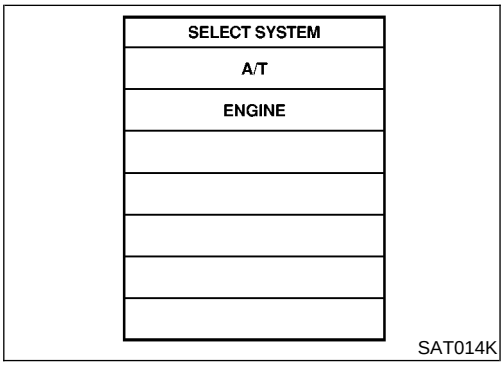
This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is much lower than the position (4th) supposed by TCM, the slip ratio will be much less than normal. In case the ratio does not reach the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when shift solenoid valve B is stuck closed.

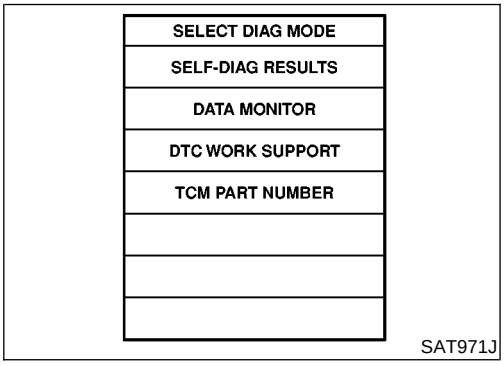
Description (Cont'd)

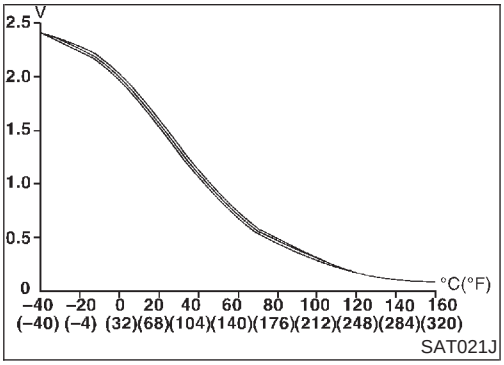
Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve B stuck closed	1	2	2	1*

*: P0744 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: A/T TCC S/V FNCTN	A/T cannot perform lock-up even if electrical circuit is good.	• Line pressure solenoid valve • Torque converter clutch solenoid valve • Each clutch • Hydraulic control circuit
: P0744		







DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0054S01

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Start engine and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3) Select "TCC S/V FNCTN P0744" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
4) Accelerate vehicle to more than 67 to 100 km/h (42 to 62 MPH) and maintain the following condition continuously until "TESTING" has turned to "COMPLETED". (It will take approximately 30 seconds after "TESTING" shows.)
   THROTTLE POSI: 1.0/8 - 2.0/8 (at all times during step 4)
   Selector lever: D position (OD "ON")
   TCC S/V DUTY: More than 94%
   VHCL/S SE·A/T: Constant speed of more than 67 to 100 km/h (42 to 62 MPH)

- **Check that "GEAR" shows "4".**
- **For shift schedule, refer to SDS, AT-357.**

- **If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAG RESULTS". In case a 1st trip DTC other than P0744 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".**

5) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)
   Refer to "DIAGNOSTIC PROCEDURE", AT-157.
   Refer to shift schedule, AT-357.

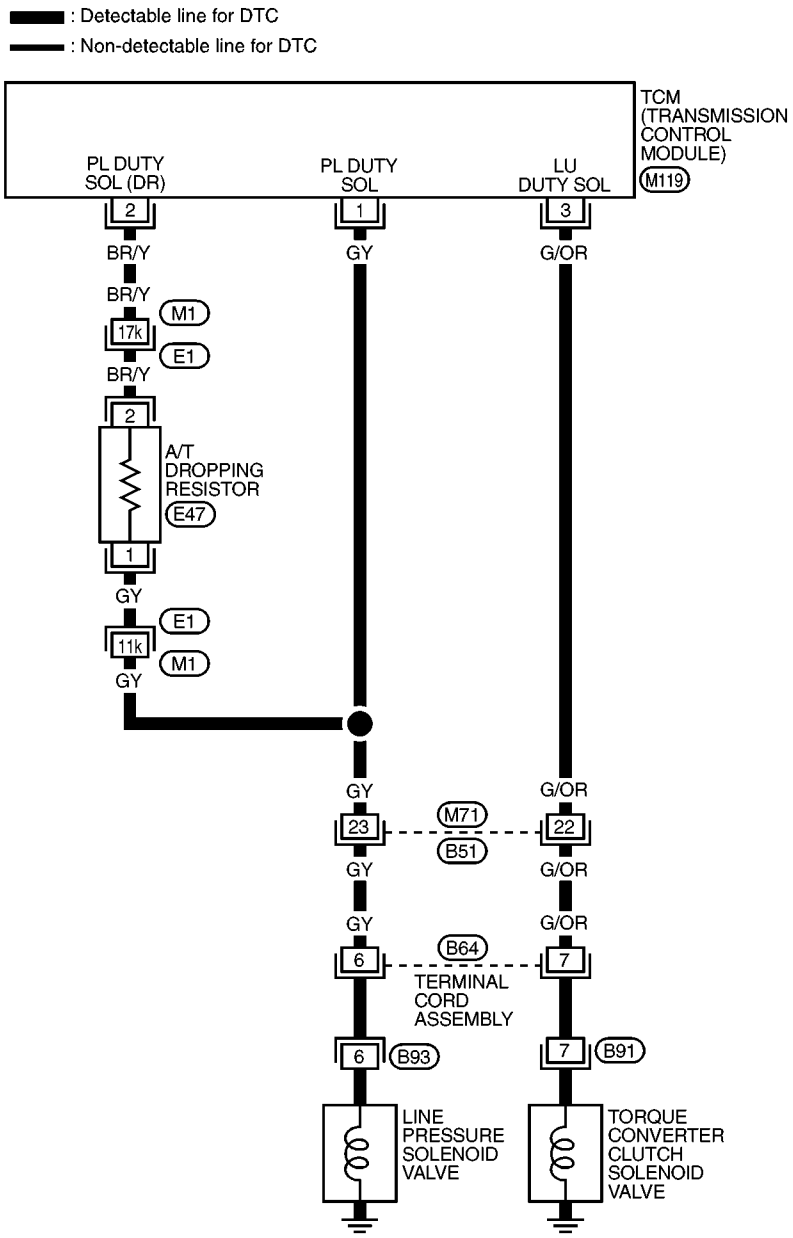
With GST

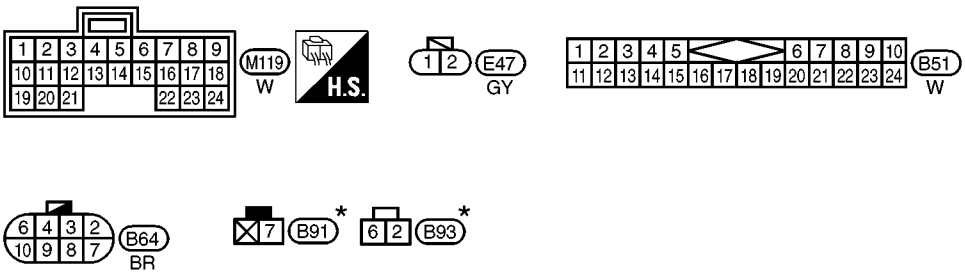
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — TCCSIG

NAAT0195

AT-TCCSIG-01





* : This connector is not shown in "HARNESS LAYOUT" in EL section.

REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

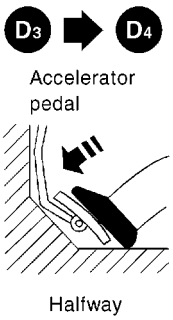
MAT913A

Diagnostic Procedure

=NAAT0055

1	CHECK SHIFT UP (D_3 TO D_4)

During “Cruise test − Part 1”, AT-71.
Does A/T shift from D_3 to D_4 at the specified speed?



SAT988H

Yes or No

Yes	▶	• GO TO 10. • And check for proper lock-up.
No	▶	GO TO 2.

2	CHECK LINE PRESSURE

Perform line pressure test. Refer to AT-62.

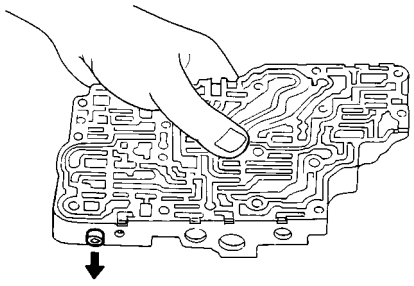
OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 6.

3	CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-302.
2. Check to ensure that:

- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.



SAT367H

OK or NG

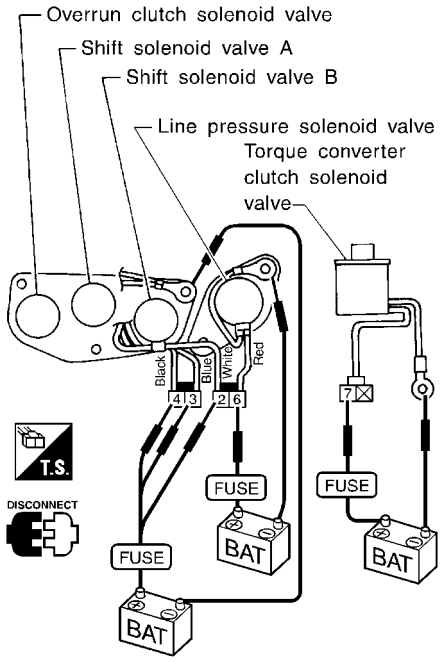
OK	▶	GO TO 4.
NG	▶	Repair control valve.

Diagnostic Procedure (Cont'd)

4	CHECK SHIFT UP (D_3 TO D_4)	
Does A/T shift from D_3 to D_4 at the specified speed?		
Yes or No		
Yes	▶	GO TO 5.
No	▶	Check control valve again. Repair or replace control valve assembly.

5	CHECK DTC	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-154.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	• GO TO 10. • And check for proper lock-up.

6	CHECK LINE PRESSURE SOLENOID VALVE	
1. Remove control valve assembly. Refer to AT-273. 2. Check line pressure solenoid valve operation. Refer to AT-161.		

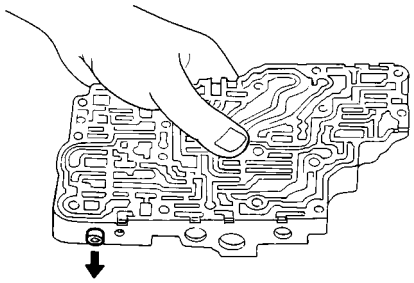


SAT158J

OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace solenoid valve assembly.

7	CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-302.
2. Check line pressure circuit valves for sticking.
- Pressure regulator valve
- Pilot valve
- Pressure modifier valve



SAT367H

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair control valve.

8	CHECK SHIFT UP (D_3 TO D_4)

Does A/T shift from D_3 to D_4 at the specified speed?

Yes or No

Yes	▶	GO TO 9.
No	▶	Check control valve again. Repair or replace control valve assembly.

9	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-154.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	• GO TO 10. • And check for proper lock-up.

10	CHECK LOCK-UP CONDITION

During "Cruise test − Part 1", AT-71.
Does A/T perform lock-up at the specified speed?

Yes or No

Yes	▶	Perform "Cruise test − Part 1" again and return to the start point of this flow chart.
No	▶	GO TO 11.

11	CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-273.
2. Check torque converter clutch solenoid valve operation.
   Refer to AT-161.

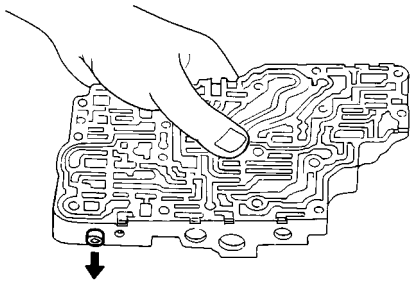
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace solenoid valve assembly.

Diagnostic Procedure (Cont'd)

12	CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-302.
2. Check control valves for sticking.
- Torque converter clutch control valve
- Torque converter clutch relief valve



SAT367H

OK or NG

OK	▶	GO TO 13.
NG	▶	Repair control valve

13	CHECK LOCK-UP CONDITION

Does A/T perform lock-up at the specified speed?

Yes or No

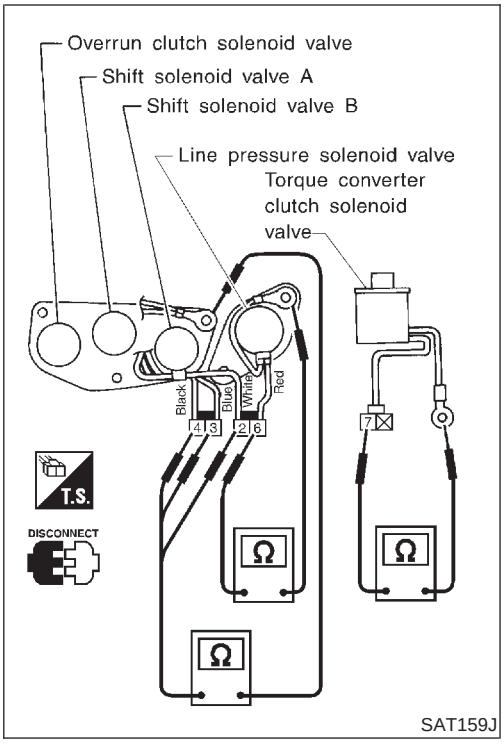
Yes	▶	GO TO 14.
No	▶	Check control valve again. Repair or replace control valve assembly.

14	CHECK DTC

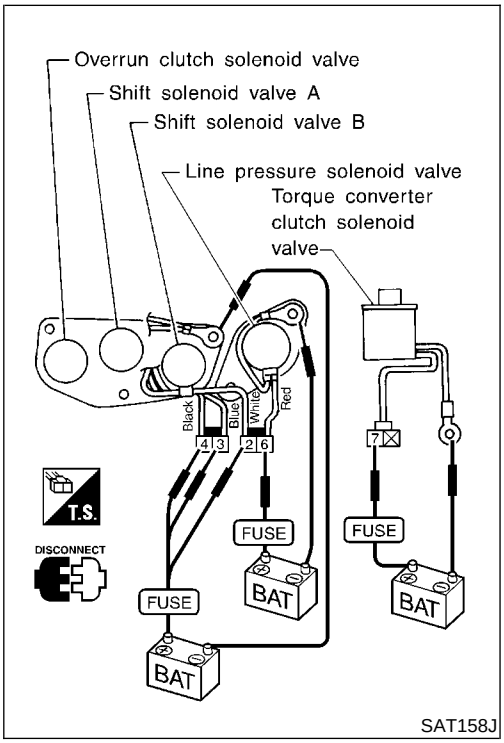
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-154.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Perform "Cruise test — Part 1" again and return to the start point of this flow chart.



SAT159J



SAT158J

Component Inspection

NAAT0056

SOLENOID VALVES

NAAT0056S01

- For removal, refer to AT-273.

Resistance Check

NAAT0056S0101

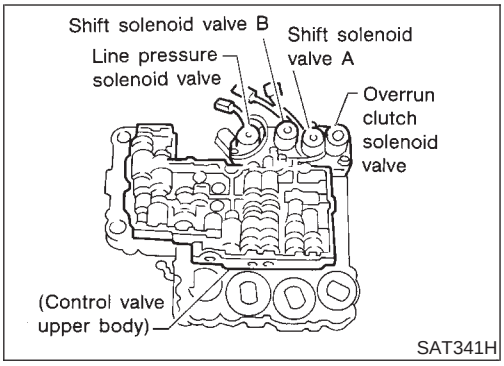
- Check resistance between terminals (6 or 7) and ground.

Solenoid valve	Terminal No.		Resistance (Approx.)
Line pressure solenoid valve	6	Ground	2.5 - 5Ω
Torque converter clutch solenoid valve	7		10 - 20Ω

Operation Check

NAAT0056S0102

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminals (6 or 7) and ground.



Description

NAAT0057

The line pressure solenoid valve regulates the oil pump discharge pressure to suit the driving condition in response to a signal sent from the TCM.

The line pressure duty cycle value is not consistent when the closed throttle position switch is “ON”. To confirm the line pressure duty cycle at low pressure, the accelerator (throttle) should be open until the closed throttle position switch is “OFF”.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NAAT0057S02

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Line pressure solenoid valve duty	Small throttle opening (Low line pressure) ↓ Large throttle opening (High line pressure)	Approximately 24% ↓ Approximately 95%

NOTE:

The line pressure duty cycle value is not consistent when the closed throttle position switch is “ON”. To confirm the line pressure duty cycle at low pressure, the accelerator (throttle) should be open until the closed throttle position switch is “OFF”.

TCM TERMINALS AND REFERENCE VALUE

NAAT0057S03

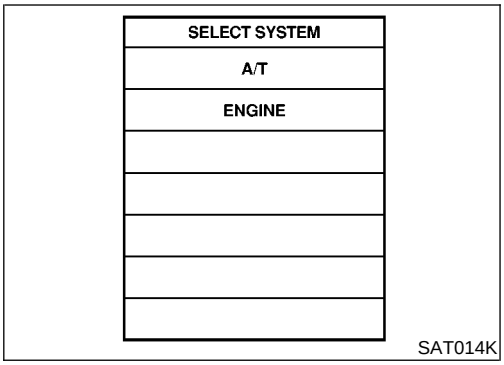
Remarks: Specification data are reference values.

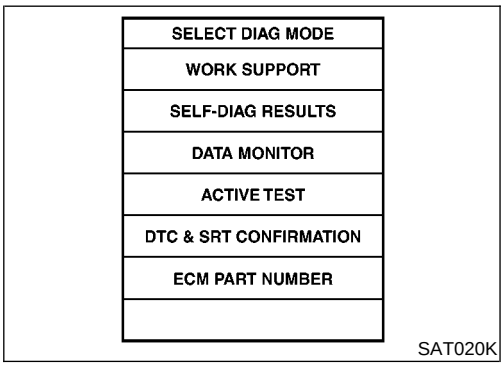
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
1	GY	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 3.0V
				When depressing accelerator pedal fully after warming up engine.	0V
2	BR/Y	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
				When depressing accelerator pedal fully after warming up engine.	0V

ON BOARD DIAGNOSIS LOGIC

NAAT0057S04

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: L/PRESS SOL/CIRC	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or shorted.) • Line pressure solenoid valve
: P0745		





DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0057S01

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Turn ignition switch "ON" and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
2) Depress accelerator pedal completely and wait at least 1 second.

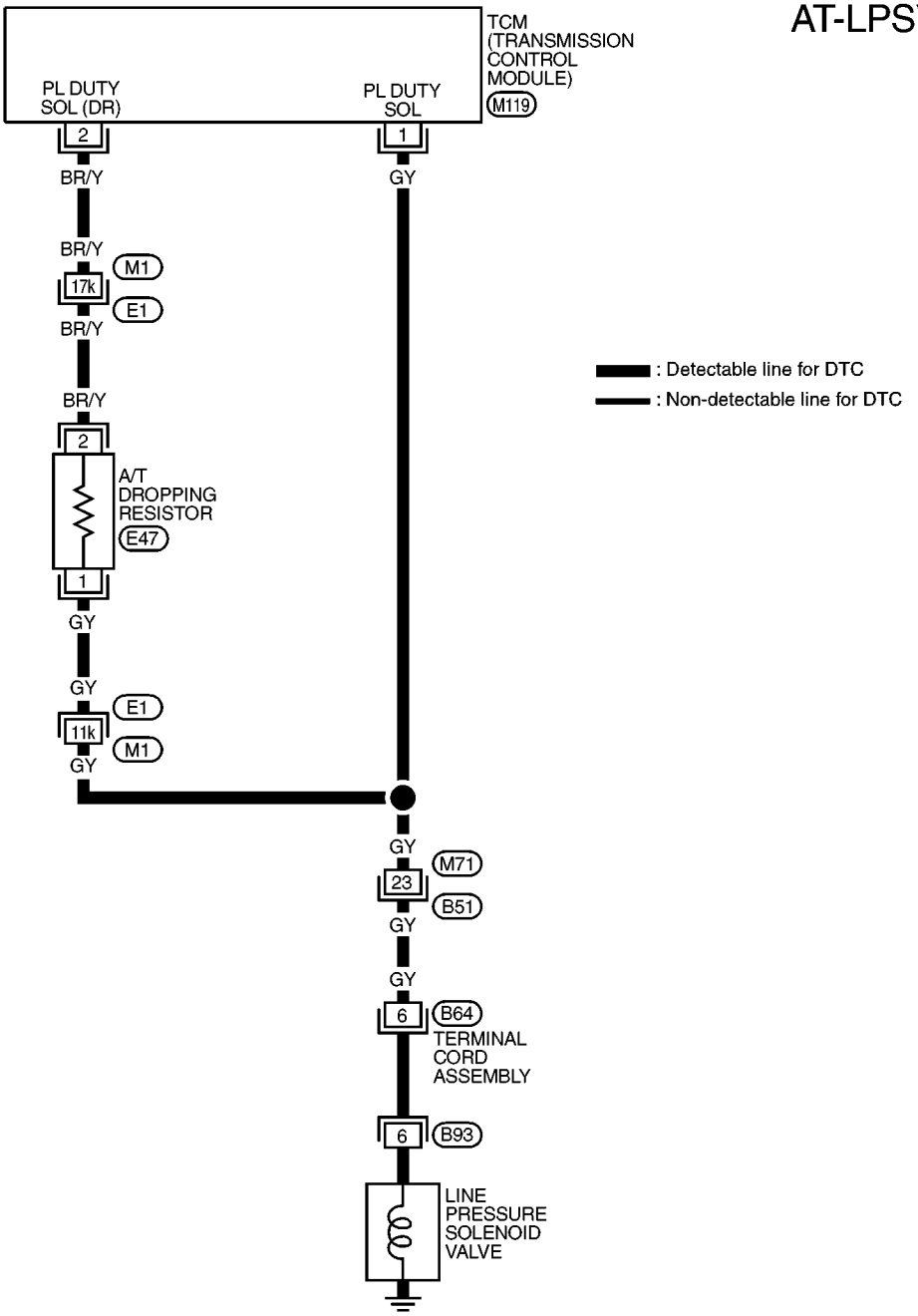
With GST

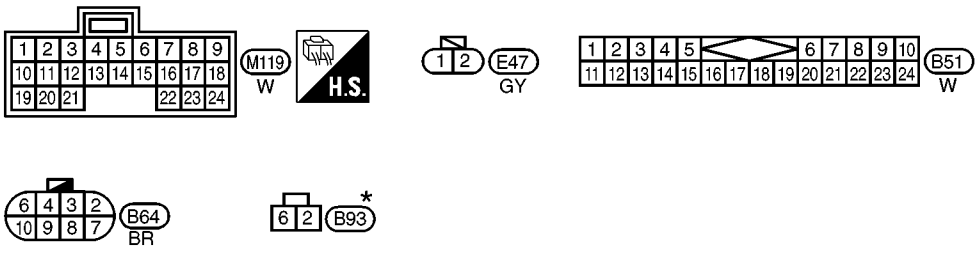
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — LPSV

NAAT0196

AT-LPSV-01





REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

*: This connector is not shown in "HARNESS LAYOUT" in EL section.

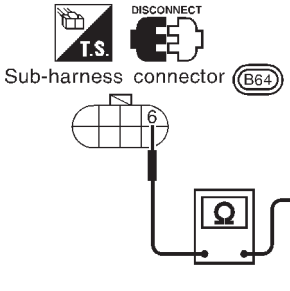
MAT914A

Diagnostic Procedure

NAAT0058

1	CHECK VALVE RESISTANCE

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector on the right side of transfer assembly.
3. Check resistance between terminal 6 and ground.



SAT162J

Is resistance approx. 2.5 - 5Ω?

Yes	▶	GO TO 3.
No	▶	GO TO 2.

2	CHECK VALVE OPERATION

1. Remove control valve assembly.
   Refer to AT-273.
2. Check the following items:

- Line pressure solenoid valve
  Refer to “Component Inspection”, AT-167.
- Harness of terminal cord assembly for short or open

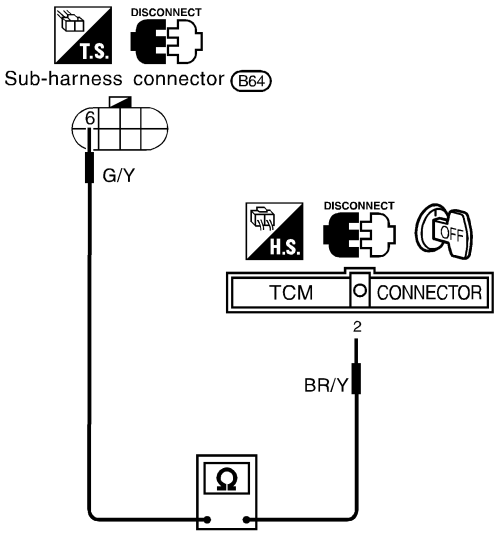
OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace damaged parts.

Diagnostic Procedure (Cont'd)

3	CHECK POWER SOURCE AND DROPPING RESISTOR CIRCUIT

1. Turn ignition switch to "OFF" position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal 6 and TCM harness connector terminal 2.



SAT522J

Is resistance approx. 11.2 - 12.8Ω?

Yes	▶	GO TO 5.
No	▶	GO TO 4.

4	DETECT MALFUNCTIONING ITEM

Check the following items:
- Dropping resistor
  Refer to "Component Inspection", AT-167.
- Harness for short or open between TCM terminal 2 and terminal cord assembly (Main harness)

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace damaged parts.

5	CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to "OFF" position.
2. Check continuity between terminal 6 and TCM harness connector terminal 1. Refer to wiring diagram — AT — LPSV.
   Continuity should exist.
   If OK, check harness for short to ground or to power.
3. Reinstall any part removed.

Yes	▶	GO TO 6.
No	▶	Repair or replace harness between TCM terminal 1 and terminal cord assembly.

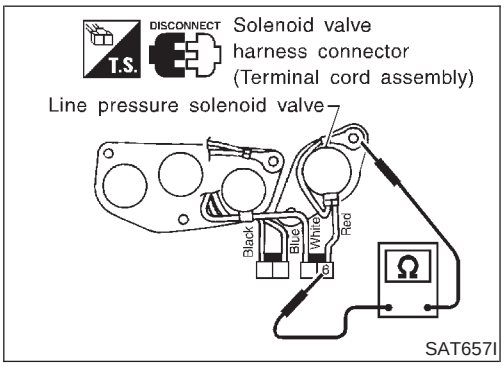
6	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-163.

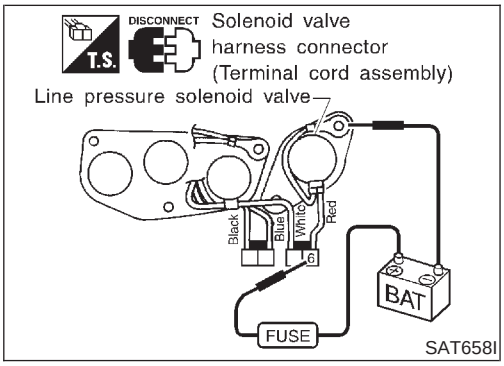
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 7.

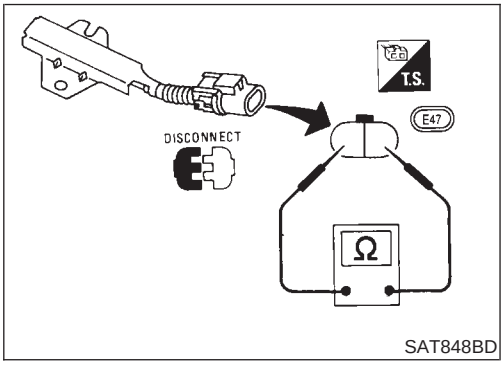
7	CHECK TCM INSPECTION	
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.



SAT657I



SAT658I



SAT848BD

Component Inspection

NAAT0059

LINE PRESSURE SOLENOID VALVE

NAAT0059S01

- For removal, refer to AT-273.

Resistance Check

NAAT0059S0101

- Check resistance between terminal 6 and ground.

Solenoid valve	Terminal No.		Resistance (Approx.)
Line pressure solenoid valve	6	Ground	2.5 - 5Ω

Operation Check

NAAT0059S0102

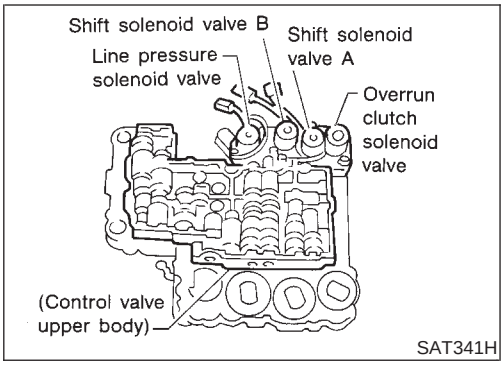
- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal 6 and ground.

DROPPING RESISTOR

NAAT0059S02

- Check resistance between two terminals.

  Resistance: 11.2 - 12.8Ω



SAT341H

Description

NAAT0060

Shift solenoid valves A and B are turned “ON” or “OFF” by the TCM in response to signals sent from the PNP switch, vehicle speed and throttle position sensors. Gears will then be shifted to the optimum position.

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

TCM TERMINALS AND REFERENCE VALUE

NAAT0060S02

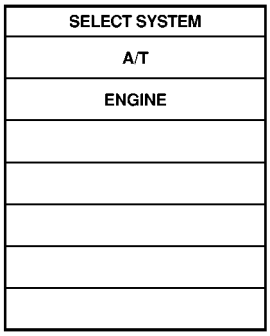
Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
11	L/W	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in “D_1” or “D_4”.)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in “D_2” or “D_3”.)	0V

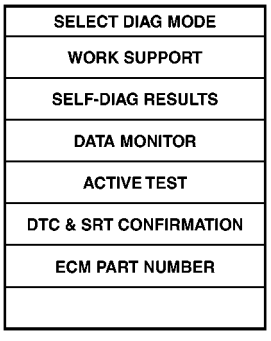
ON BOARD DIAGNOSIS LOGIC

NAAT0060S03

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: SFT SOL A/CIRC : P0750	TCM detects an improper voltage drop when it tires to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or shorted.) • Shift solenoid valve A



SAT014K



SAT020K

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0060S01

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Turn ignition switch “ON” and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.
2) Start engine.
3) Drive vehicle in “D” position and allow the transmission to shift “1” → “2” (“GEAR”).

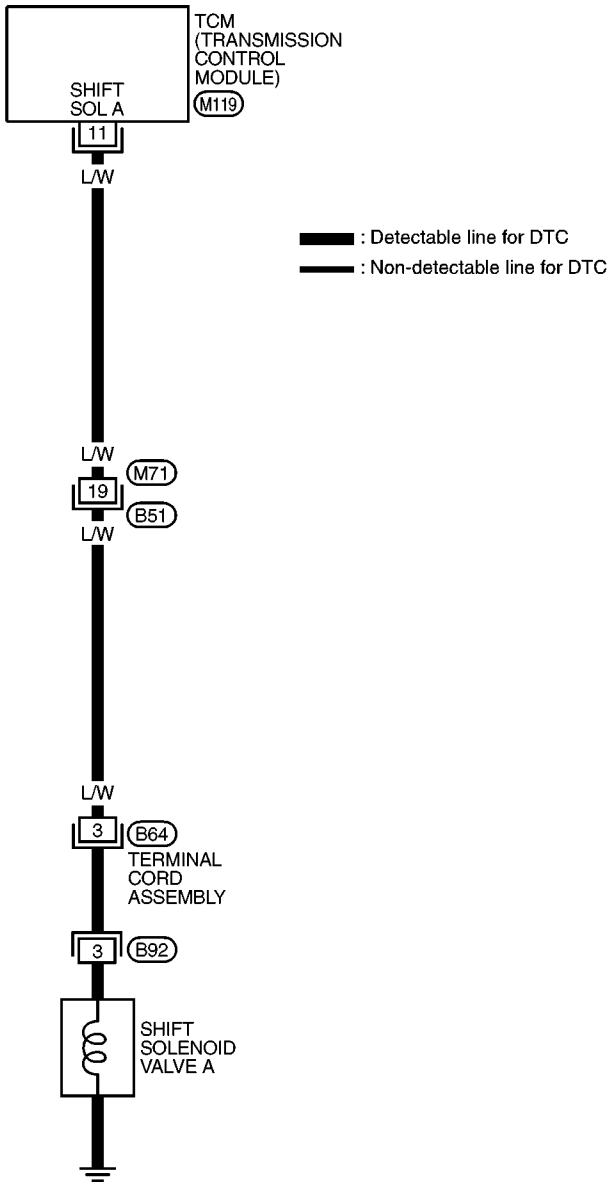
With GST

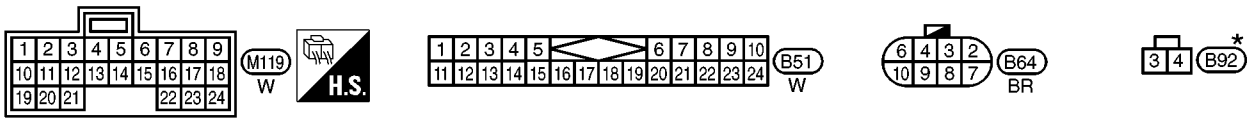
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — SSV/A

NAAT0197

AT-SSV/A-01





★ : This connector is not shown in "HARNESS LAYOUT" in EL section.

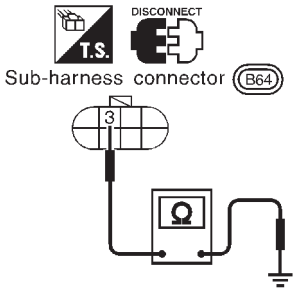
MAT738A

Diagnostic Procedure

NAAT0061

1	CHECK VALVE RESISTANCE

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector on the right side of transfer assembly.
3. Check resistance between terminal 3 and ground.



SAT164J

Is resistance approx. 20 - 40Ω?

Yes	▶	GO TO 3.
No	▶	GO TO 2.

2	CHECK VALVE OPERATION

1. Remove control valve assembly.
   Refer to AT-273.
2. Check the following items:

- Shift solenoid valve A
  Refer to “Component Inspection”, AT-171.
- Harness of terminal cord assembly for short or open

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace damaged parts.

3	CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to “OFF” position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal 3 and TCM harness connector terminal 11. Refer to wiring diagram — AT — SSV/A.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.
4. Reinstall any part removed.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

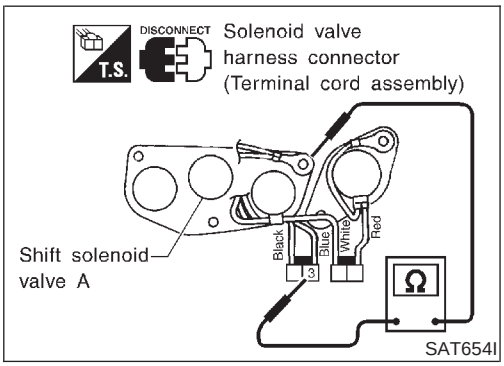
4	CHECK DTC

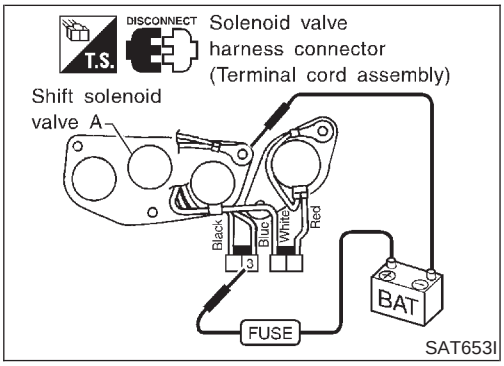
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-168.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 5.

5	CHECK TCM INSPECTION	
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.





Component Inspection

NAAT0062

SHIFT SOLENOID VALVE A

NAAT0062S01

- For removal, refer to AT-273.

Resistance Check

NAAT0062S0101

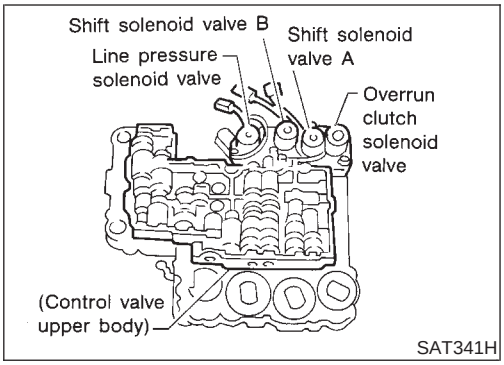
- Check resistance between terminal 3 and ground.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	3	Ground	20 - 40Ω

Operation Check

NAAT0062S0102

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal 3 and ground.



SAT341H

Description

NAAT0063

Shift solenoid valves A and B are turned “ON” or “OFF” by the TCM in response to signals sent from the PNP switch, vehicle speed and throttle position sensors. Gears will then be shifted to the optimum position.

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

TCM TERMINALS AND REFERENCE VALUE

NAAT0063S02

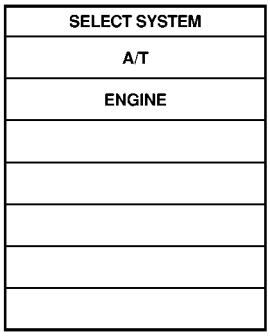
Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
12	L/R	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in “D_1” or “D_2”.)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in “D_3” or “D_4”.)	0V

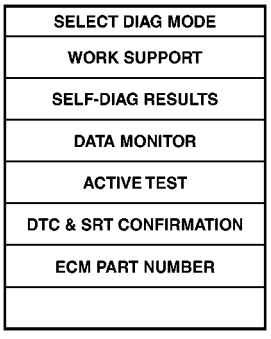
ON BOARD DIAGNOSIS LOGIC

NAAT0063S03

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: SFT SOL B/CIRC : P0755	TCM detects an improper voltage drop when it tires to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or shorted.) • Shift solenoid valve B



SAT014K



SAT020K

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0063S01

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Turn ignition switch “ON” and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.
2) Drive vehicle in “D” position and allow the transmission to shift 1 → 2 → 3 (“GEAR”).

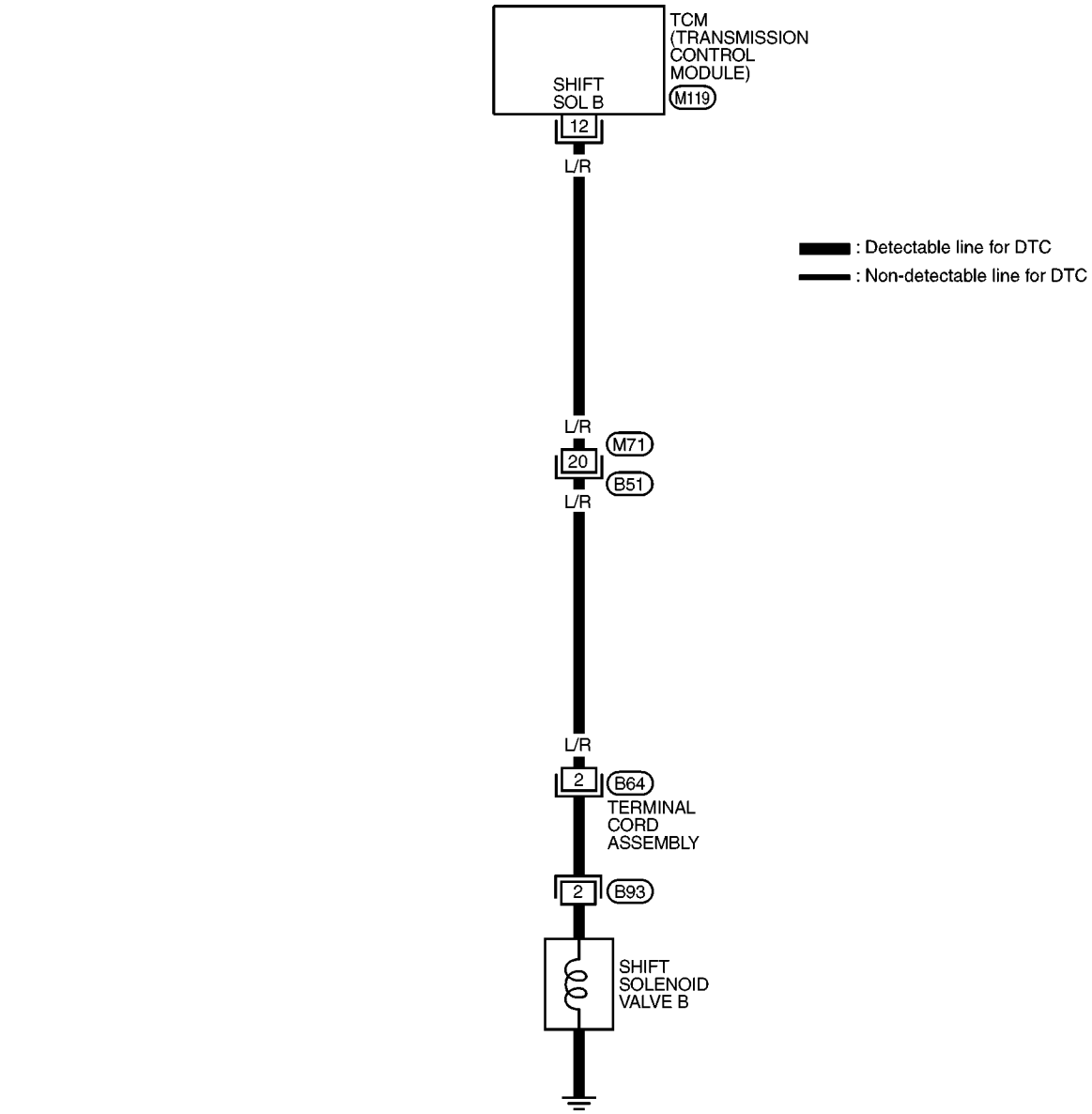
With GST

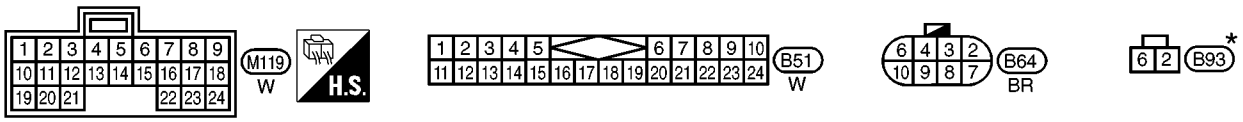
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — SSV/B

NAAT0198

AT-SSV/B-01





★ : This connector is not shown in "HARNESS LAYOUT" in EL section.

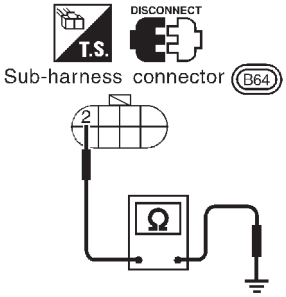
MAT739A

Diagnostic Procedure

NAAT0064

1	CHECK VALVE RESISTANCE

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector on the right side of transfer assembly.
3. Check resistance between terminal 2 and ground.



SAT166J

Is resistance approx. 20 - 40Ω?

Yes	▶	GO TO 3.
No	▶	GO TO 2.

2	CHECK VALVE OPERATION

1. Remove control valve assembly.
   Refer to AT-273.
2. Check the following items:

- Shift solenoid valve B
  Refer to “Component Inspection”, AT-175.
- Harness of terminal cord assembly for short or open

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace damaged parts.

3	CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to “OFF” position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal 2 and TCM harness connector terminal 12. Refer to wiring diagram — AT — SSV/B.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.
4. Reinstall any part removed.

Is resistance approx. 0Ω?

Yes	▶	GO TO 4.
No	▶	Repair open circuit or short to ground or short to power in harness or connectors.

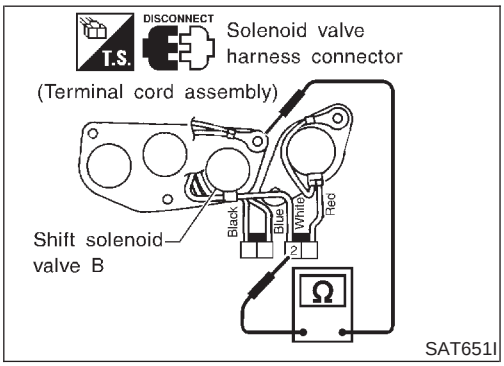
4	CHECK DTC

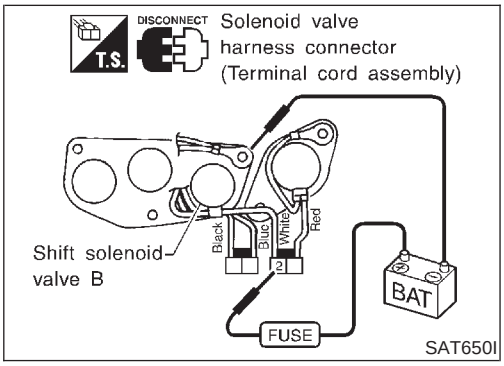
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-172.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 5.

5	CHECK TCM INSPECTION
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. **OK or NG**	
OK ▶	**INSPECTION END**
NG ▶	Repair or replace damaged parts.





Component Inspection

NAAT0065

SHIFT SOLENOID VALVE B

NAAT0065S01

- For removal, refer to AT-273.

Resistance Check

NAAT0065S0101

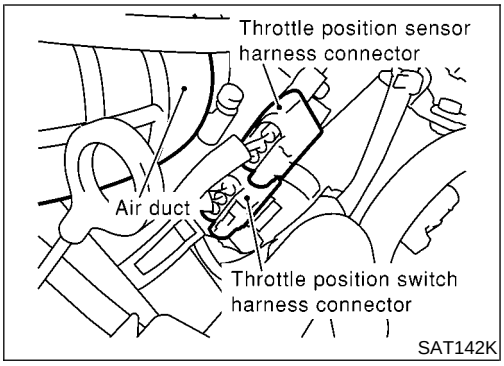
- Check resistance between terminal 2 and ground.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve B	2	Ground	20 - 40Ω

Operation Check

NAAT0065S0102

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal 2 and ground.



Description

NAAT0066

- Throttle position sensor
  The throttle position sensor detects the throttle valve position and sends a signal to the TCM.
- Throttle position switch
  Consists of a wide open throttle position switch and a closed throttle position switch. The wide open position switch sends a signal to the TCM when the throttle valve is open at least 1/2 of the full throttle position. The closed throttle position switch sends a signal to the TCM when the throttle valve is fully closed.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NAAT0066S02

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Throttle position sensor	Fully-closed throttle	Approximately 0.5V
	Fully-open throttle	Approximately 4V

TCM TERMINALS AND REFERENCE VALUE

NAAT0066S03

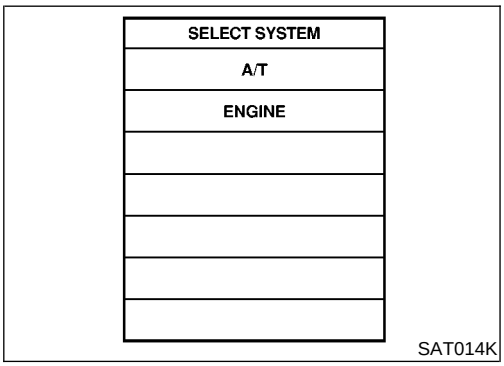
Remarks: Specification data are reference values.

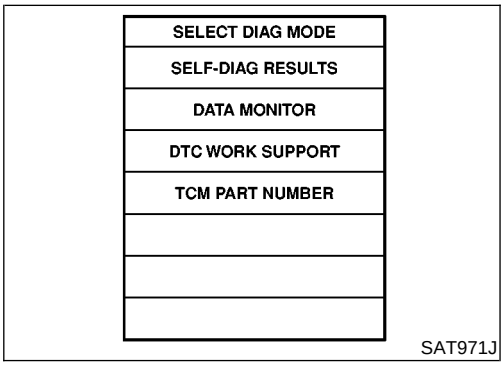
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
16	OR/W	Closed throttle position switch (in throttle position switch)		When releasing accelerator pedal after warming up engine. [Refer to “Preparation”, “TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)”, AT-46.]	Battery voltage
				When depressing accelerator pedal after warming up engine. [Refer to “Preparation”, “TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)”, AT-46.]	0V
17	OR/B	Wide open throttle position switch (in throttle position switch)		When depressing accelerator pedal more than half-way after warming up engine.	Battery voltage
				When releasing accelerator pedal after warming up engine.	0V
32	P/B	Throttle position sensor (Power source)		Ignition switch “ON”.	4.5 - 5.5V
				Ignition switch “OFF”.	0V
41	P	Throttle position sensor		When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: 0.5 - 0.7V Fully-open throttle: 4V
42	B	Throttle position sensor (Ground)		—	—

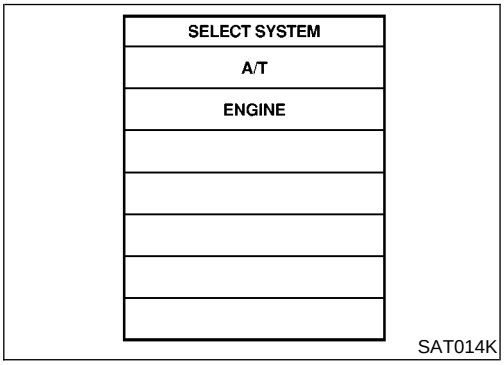
ON BOARD DIAGNOSIS LOGIC

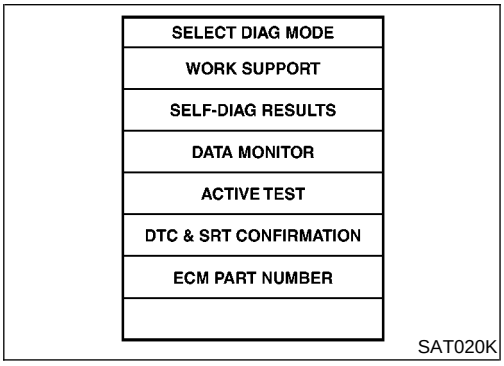
NAAT0066S04

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: TP SEN/CIRC A/T	TCM receives an excessively low or high voltage from the sensor.	• Harness or connectors (The solenoid circuit is open or shorted.) • Throttle position sensor • Throttle position switch
: P1705		









DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0066S01

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Turn ignition switch "ON" and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Apply vacuum to the throttle opener, then check the following. Refer to steps 1 and 2 of "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.

Accelerator pedal condition	THRTL POS SEN	CLOSED THL/SW	W/O THRL/P·SW
Fully released	Less than 4.7V	ON	OFF
Partially depressed	0.1 - 4.6V	OFF	OFF
Fully depressed	More than 1.9 - 4.6V	OFF	ON

If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-180.
If the check result is OK, go to following step.

3) Turn ignition switch "ON" and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
4) Start engine and maintain the following conditions for at least 3 consecutive seconds. Then release accelerator pedal completely.
VHCL SPEED SE: 10 km/h (6 MPH) or more
THRTL POS SEN: Approximately 3V or less
Selector lever: D position (OD "ON")
If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-180.
If the check result is OK, go to following step.
5) Maintain the following conditions for at least 3 consecutive seconds. Then release accelerator pedal completely.
VHCL SPEED SE: 10 km/h (6 MPH) or more
Accelerator pedal: Wide open throttle
Selector lever: D position (OD "ON")

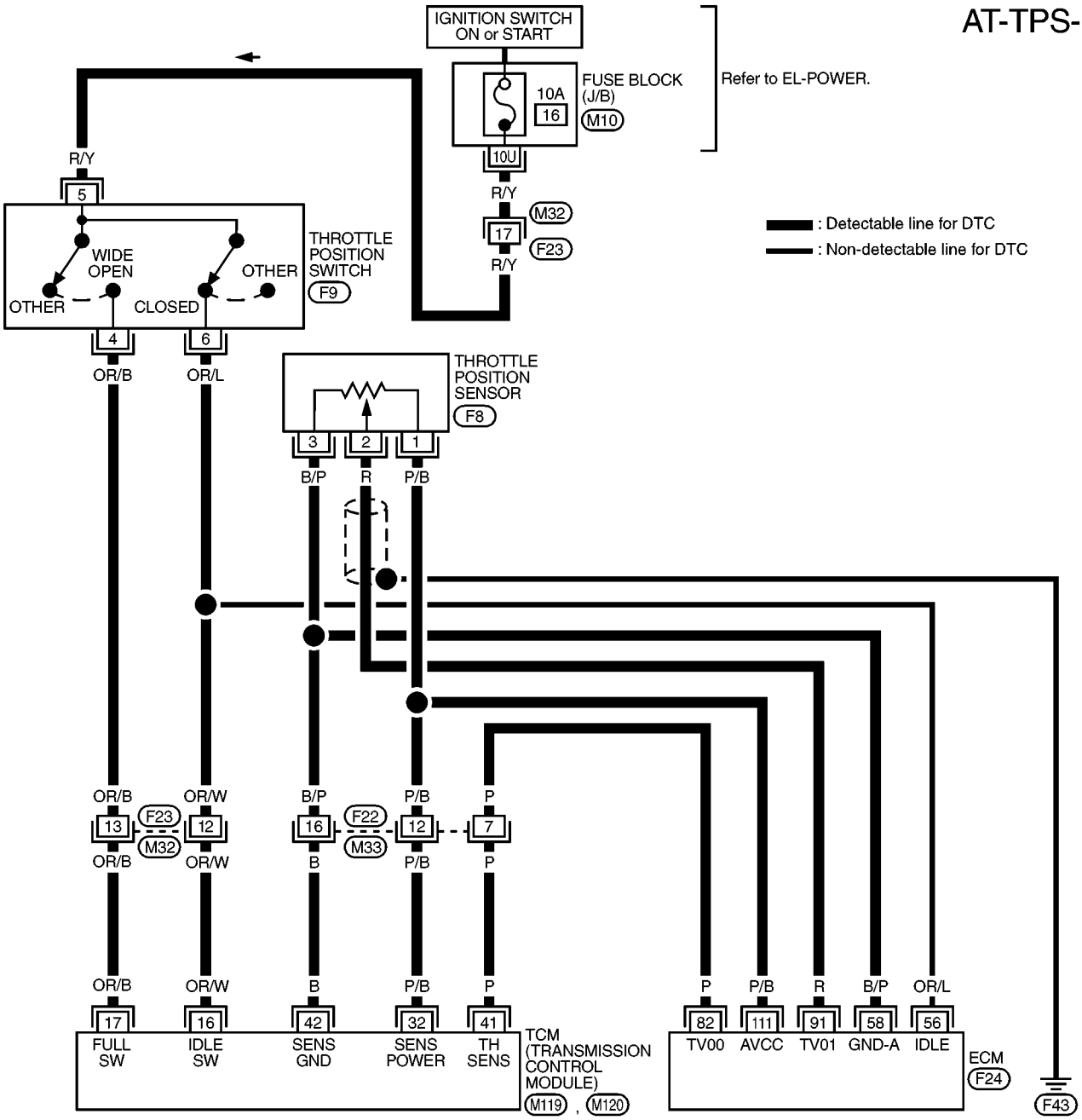
Description (Cont'd)

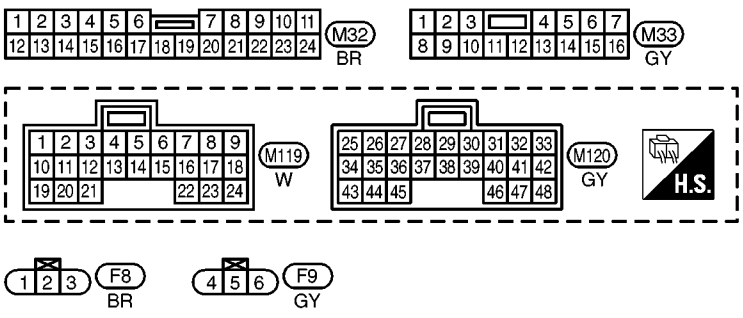
With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — TPS

NAAT0199





REFER TO THE FOLLOWING.
M10 - FUSE BLOCK - JUNCTION BOX (J/B)
F24 - ELECTRICAL UNITS

MAT915A

Diagnostic Procedure

NAAT0067

1	CHECK DTC WITH ECM	
● Check P code CONSULT-II “ENGINE”. Turn ignition switch “ON” and select “SELF-DIAG RESULTS” mode for “ENGINE” with CONSULT-II. Refer to EC-73, “DESCRIPTION”.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Check throttle position sensor circuit for engine control. Refer to EC-169, “Description”.

2	CHECK INPUT SIGNAL

With CONSULT-II

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out the value of "THRTL POS SEN".

Voltage:

Fully-closed throttle:

Approximately 0.5 - 0.7V

Fully-open throttle:

Approximately 4V

DATA MONITOR	
MONITORING	
VHCL/S SE-A/T	XXX km/h
VHCL/S SE-MTR	XXX km/h
THRTL POS SEN	XXX V
FLUID TEMP SE	XXX V
BATTERY VOLT	XXX V

SAT614J

Without CONSULT-II

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Check voltage between TCM terminals 41 and 42 while accelerator pedal is depressed slowly.

Voltage:

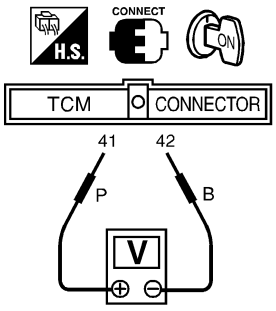
Fully-closed throttle valve:

Approximately 0.5 - 0.7V

Fully-open throttle valve:

Approximately 4V

(Voltage rises gradually in response to throttle position.)



SAT513J

OK or NG

OK (With CONSULT-II)	▶	GO TO 3.
OK (Without CONSULT-II)	▶	GO TO 4.
NG	▶	Check harness for short or open between ECM and TCM regarding throttle position sensor circuit. (Main harness)

Diagnostic Procedure (Cont'd)

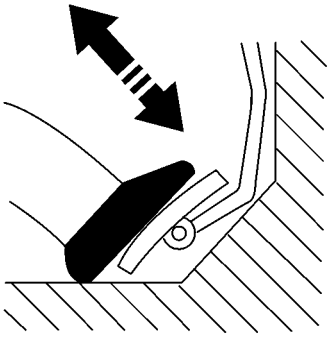
3	CHECK THROTTLE POSITION SWITCH CIRCUIT (With CONSULT-II)

With CONSULT-II

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Apply vacuum to the throttle opener, then check the following. Refer to steps 1 and 2 of "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.
4. Read out "CLOSED THL/SW" and "W/O THRL/P-SW" depressing and releasing accelerator pedal.
   Check the signal of throttle position switch is indicated properly.

Accelerator pedal condition	Data monitor	
	CLOSED THL/SW	W/O THRL/P-SW
Released	ON	OFF
Fully depressed	OFF	ON

MTBL0011



DATA MONITOR	
MONITORING	
POWERSHIFT SW	OFF
CLOSED THL/SW	OFF
W/O THRL/P-SW	OFF
HOLD SW	OFF
BRAKE SW	ON

SAT646J

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING ITEM

Check the following items:

- Throttle position switch
  Refer to "Component Inspection", AT-184.
- Harness for short or open between ignition switch and throttle position switch (Main harness)
- Harness for short or open between throttle position switch and TCM (Main harness)

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

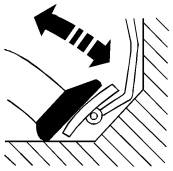
5	CHECK THROTTLE POSITION SWITCH CIRCUIT (Without CONSULT-II)

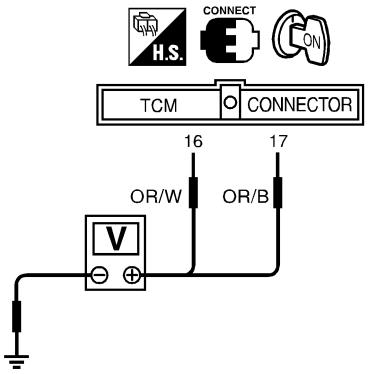
Without CONSULT-II

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Check voltage between TCM terminals 16, 17 and ground while depressing, and releasing accelerator pedal slowly.
   (after warming up engine)
   [Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.]

Accelerator pedal condition	Voltage	
	Terminal No. 16	Terminal No. 17
Released	Battery voltage	0V
Fully depressed	0V	Battery voltage

MTBL0519





SAT526J

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 4.

6	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-177.

OK or NG

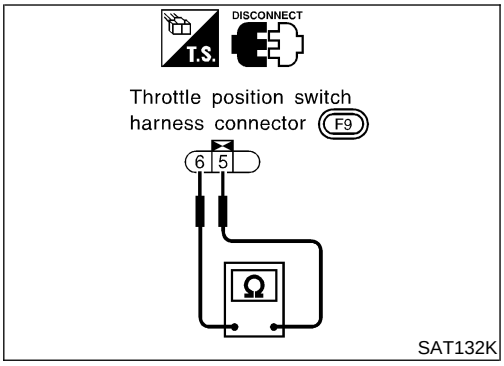
OK	▶	**INSPECTION END**
NG	▶	GO TO 7.

7	CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.



Component Inspection

NAAT0205

THROTTLE POSITION SWITCH

NAAT0205S01

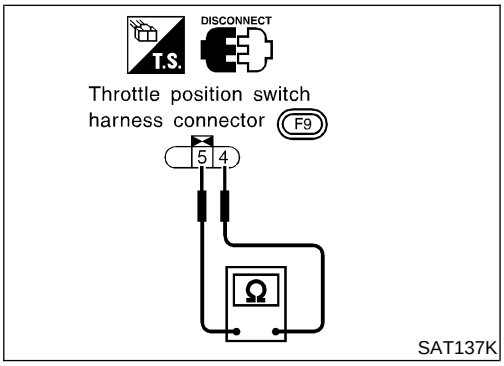
Closed Throttle Position Switch (Idle position)

NAAT0205S0101

- Check continuity between terminals 5 and 6.
  [Refer to “Preparation”, “TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)”, AT-46.]

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

- To adjust closed throttle position switch, refer to EC-149, “System Description”.

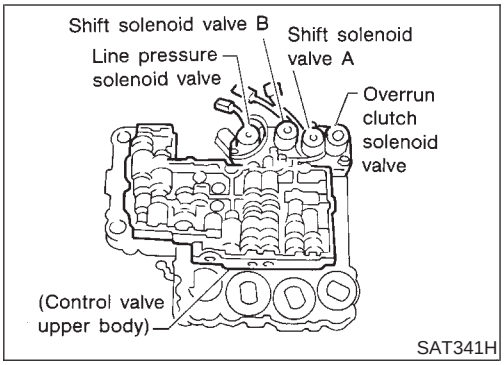


Wide Open Throttle Position Switch

NAAT0205S0102

- Check continuity between terminals 4 and 5.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes



SAT341H

Description

NAAT0068

The overrun clutch solenoid valve is activated by the TCM in response to signals sent from the inhibitor switch, overdrive control switch, vehicle speed and throttle position sensors. The overrun clutch operation will then be controlled.

TCM TERMINALS AND REFERENCE VALUE

NAAT0068S02

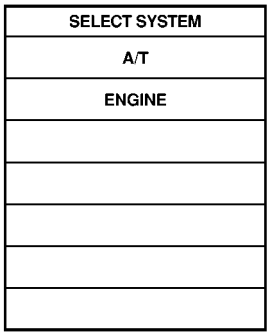
Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
20	L/B	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery voltage
				When overrun clutch solenoid valve does not operate.	0V

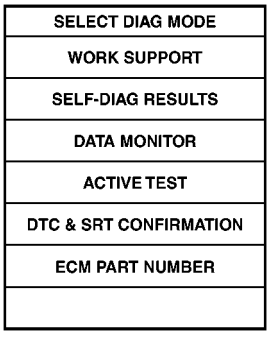
ON BOARD DIAGNOSIS LOGIC

NAAT0068S03

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
(CONSULT-II) : O/R CLTCH SOL/CIRC	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or shorted.) • Overrun clutch solenoid valve
(GST) : P1760		



SAT014K



SAT020K

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0068S01

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always drive vehicle on a level road to improve accuracy of test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Turn ignition switch "ON" and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
2) Start engine.
3) Accelerate vehicle to a speed of more than 10 km/h (6MPH) in "D" position (OD "ON").
4) Release accelerator pedal completely in "D" position (OD "OFF").

Description (Cont'd)

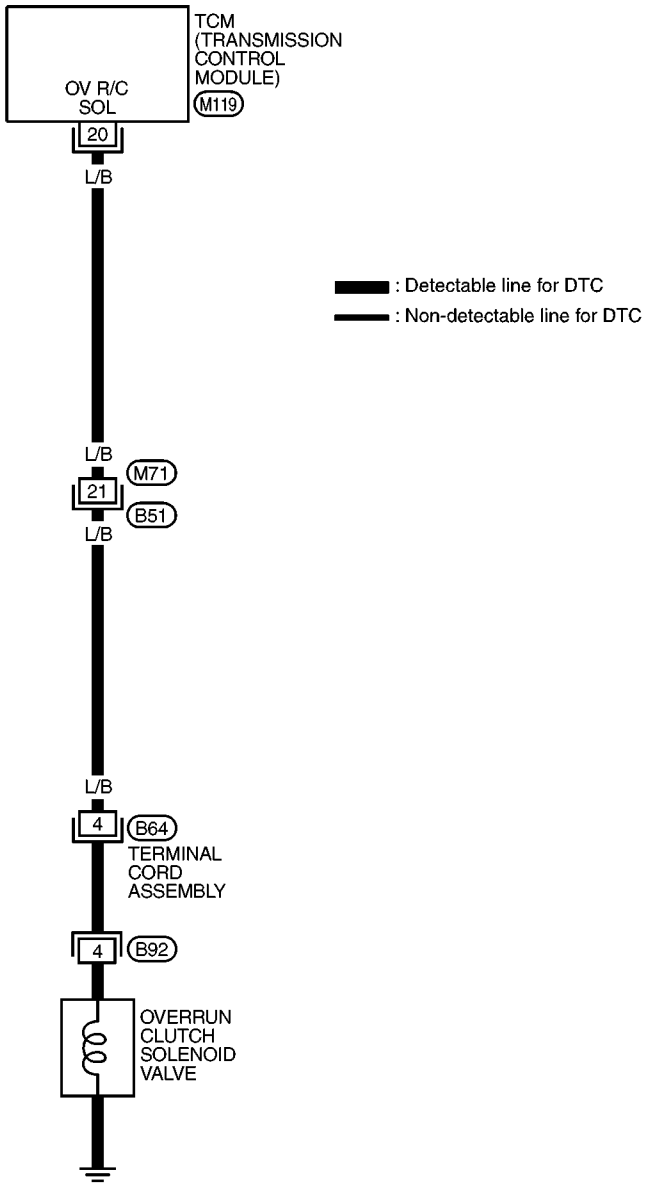
With GST

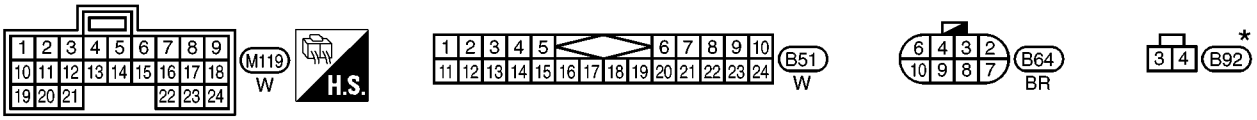
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — OVRCSV

NAAT0200

AT-OVRCSV-01





★ : This connector is not shown in "HARNESS LAYOUT" in EL section.

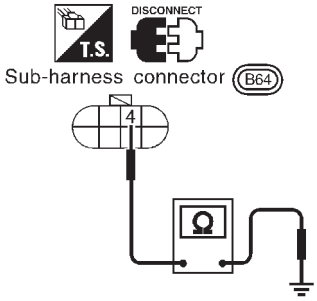
MAT741A

Diagnostic Procedure

NAAT0069

1	CHECK VALVE RESISTANCE

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector on the right side of transfer assembly.
3. Check resistance between terminal 4 and ground.



SAT170J

Is resistance approx. 20 - 40Ω?

Yes	▶	GO TO 3.
No	▶	GO TO 2.

2	CHECK VALVE OPERATION

1. Remove control valve assembly.
   Refer to AT-273.
2. Check the following items:

- Overrun clutch solenoid valve
  Refer to “Component Inspection”, AT-189.
- Harness of terminal cord assembly for short or open

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace damaged parts.

3	CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to “OFF” position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal 4 and TCM harness connector terminal 20. Refer to wiring diagram — AT — OVRCSV.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.
4. Reinstall any part removed.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

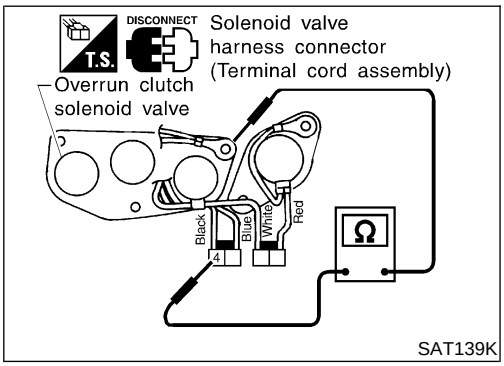
4	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-185.

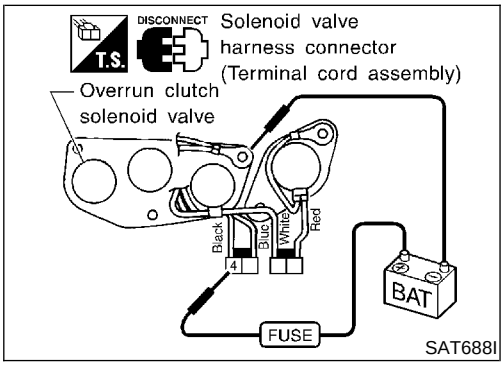
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 5.

5	CHECK TCM INSPECTION	
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.



SAT139K



SAT688I

Component Inspection

NAAT0070

OVERRUN CLUTCH SOLENOID VALVE

NAAT0070S01

- For removal, refer to AT-273.

Resistance Check

NAAT0070S0101

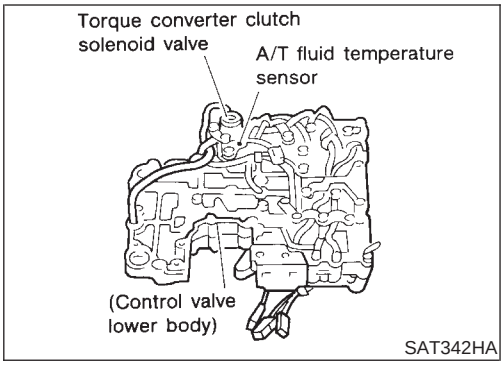
- Check resistance between terminal 4 and ground.

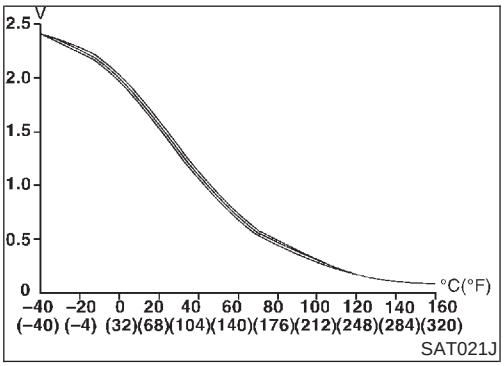
Solenoid valve	Terminal No.		Resistance (Approx.)
Overrun clutch solenoid valve	4	Ground	20 - 40Ω

Operation Check

NAAT0070S0102

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal 4 and ground.





Description

NAAT0172

The A/T fluid temperature sensor detects the A/T fluid temperature and sends a signal to the TCM.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NAAT0172S02

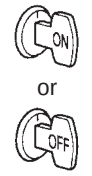
Remarks: Specification data are reference values.

Monitor item	Condition	Specification	
A/T fluid temperature sensor	Cold [20°C (68°F)] ↓ Hot [80°C (176°F)]	Approximately 1.5V ↓ Approximately 0.5V	Approximately 2.5 kΩ ↓ Approximately 0.3 kΩ

TCM TERMINALS AND REFERENCE VALUE

NAAT0172S03

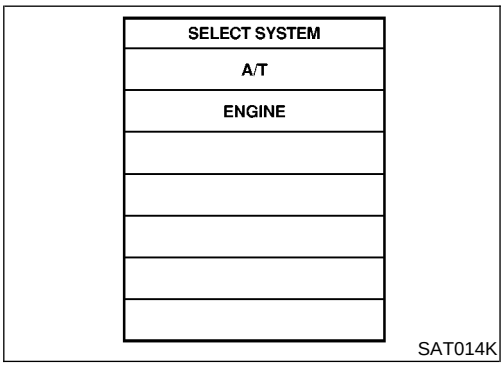
Remarks: Specification data are reference values.

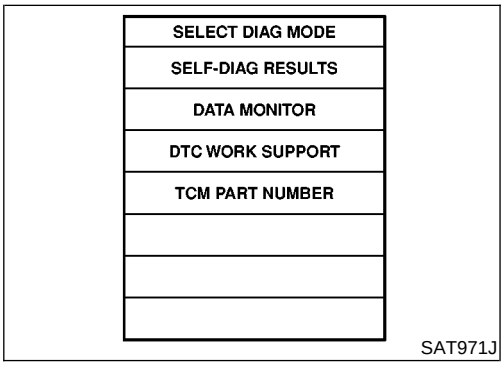
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
10	W/R	Power source		When turning ignition switch to “ON”.	Battery voltage
				When turning ignition switch to “OFF”.	0V
19	W/R	Power source		Same as No. 10	
28	R/Y	Power source (Memory back-up)		When turning ignition switch to “OFF”.	Battery voltage
				When turning ignition switch to “ON”.	Battery voltage
42	B	Throttle position sensor (Ground)		—	0V
47	R	A/T fluid temperature sensor		When ATF temperature is 20°C (68°F).	1.5V
				When ATF temperature is 80°C (176°F).	0.5V

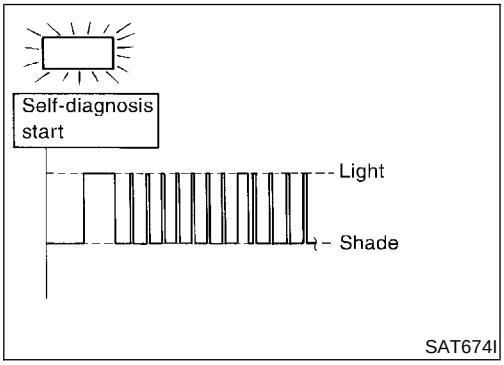
ON BOARD DIAGNOSIS LOGIC

NAAT0172S04

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: BATT/FLUID TEMP SEN	TCM receives an excessively low or high voltage from the sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • A/T fluid temperature sensor
NO TOOLS : 8th judgement flicker		







DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0172S01

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Start engine.
2) Select "DATA MONITOR" mode for "A/T" with CONSULT-II.
3) Drive vehicle under the following conditions:
   Selector lever in "D" position, vehicle speed higher than 20 km/h (12 MPH).

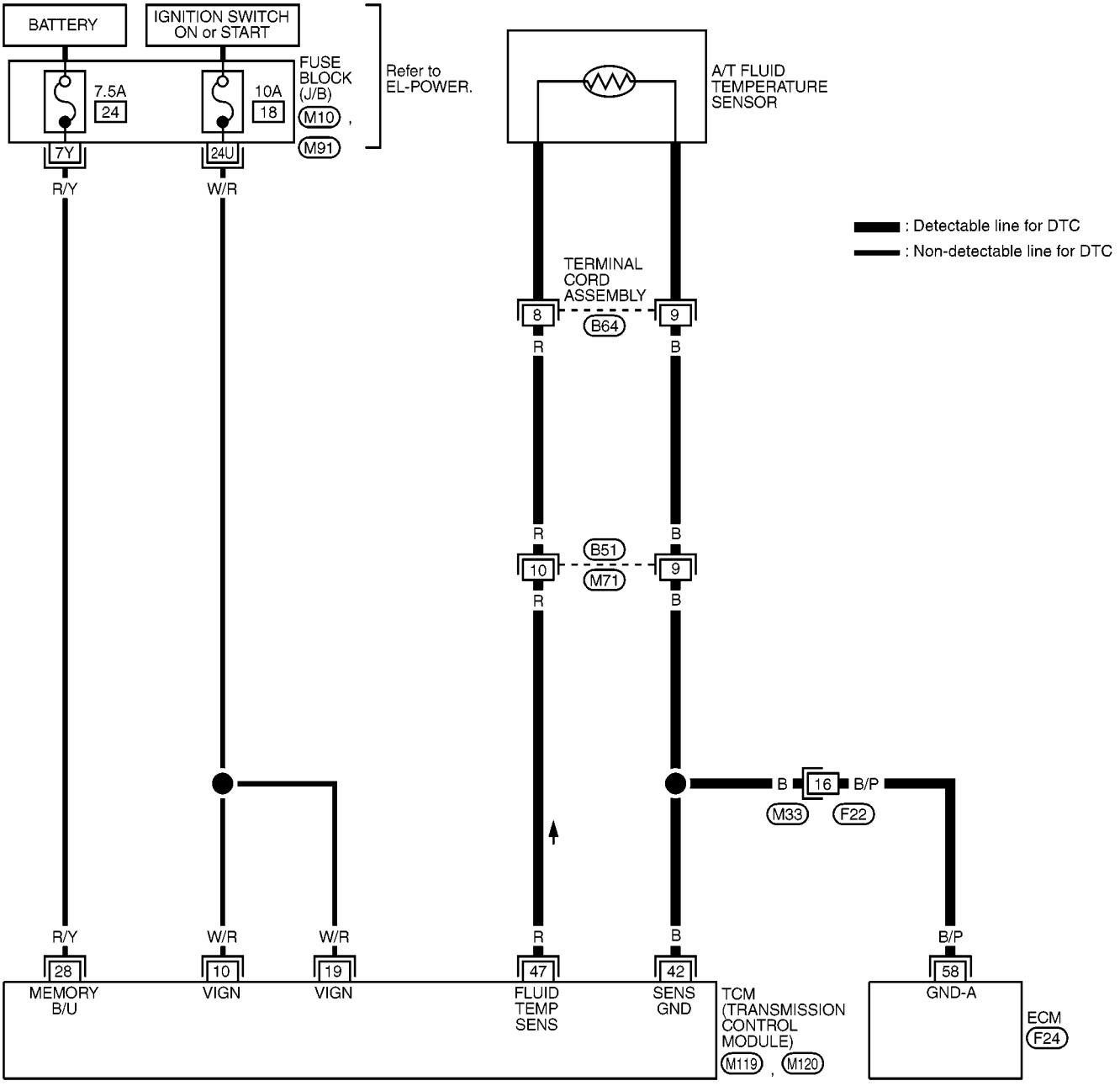
No Tools

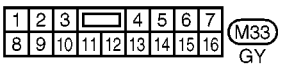
1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D" position, vehicle speed higher than 20 km/h (12 MPH).
3) Perform self-diagnosis.
   Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-46.

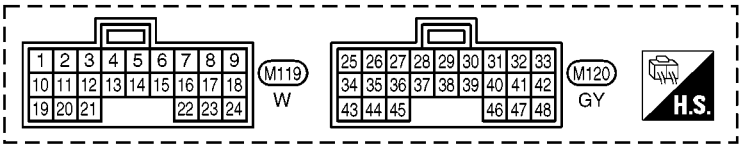
Wiring Diagram — AT — BA/FTS

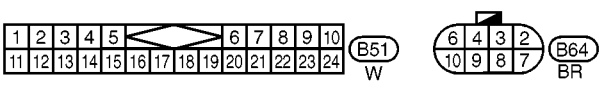
NAAT0201

AT-BA/FTS-01









REFER TO THE FOLLOWING.

M10 , M91 - FUSE BLOCK - JUNCTION BOX (J/B)

F24 - ELECTRICAL UNITS

MAT916A

Diagnostic Procedure

NAAT0173

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 6.

2	CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITH CONSULT-II)

With CONSULT-II

1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “FLUID TEMP SE”.

Voltage:

Cold [20°C (68°F)] → Hot [80°C (176°F)]:

Approximately 1.5V → 0.5V

DATA MONITOR	
MONITORING	
VHCL/S SE-A/T	XXX km/h
VHCL/S SE-MTR	XXX km/h
THRTL POS SEN	XXX V
FLUID TEMP SE	XXX V
BATTERY VOLT	XXX V

SAT614J

OK or NG

OK ▶	GO TO 4.
NG ▶	GO TO 3.

3	DETECT MALFUNCTIONING ITEM

Check the following items:

- Harness for short to ground or short to power or open between TCM, ECM and terminal cord assembly (Main harness)
- Ground circuit for ECM.
  Refer to EC-169, “Wiring Diagram”.

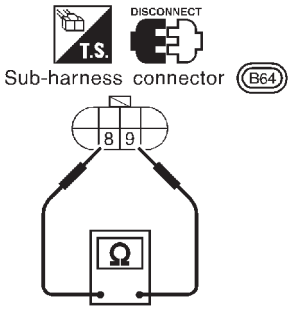
OK or NG

OK ▶	GO TO 4.
NG ▶	Repair or replace damaged parts.

Diagnostic Procedure (Cont'd)

4	CHECK A/T FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY

1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector on the right side of transfer assmebly.
3. Check resistance between terminals 8 and 9 when A/T is cold [20°C (68°F)].



SAT697I

Is resistance approx. 2.5 kΩ?

Yes	▶	GO TO 7.
No	▶	GO TO 5.

5	DETECT MALFUNCTIONING ITEM

1. Remove oil pan.
2. Check the following items:
- A/T fluid temperature sensor
  Refer to "Component Inspection", AT-110.
- Harness of terminal cord assembly for short or open

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

6	CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITHOUT CONSULT-II)

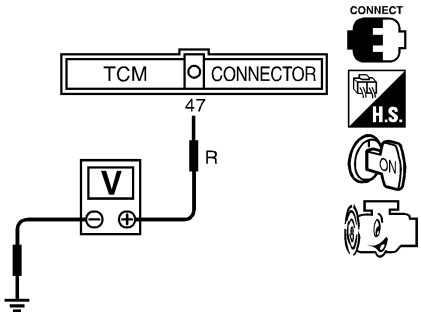
Without CONSULT-II

1. Start engine.
2. Check voltage between TCM terminal 47 and ground while warming up A/T.

Voltage:

Cold [20°C (68°F)] → Hot [80°C (176°F)]:

Approximately 1.5V → 0.5V



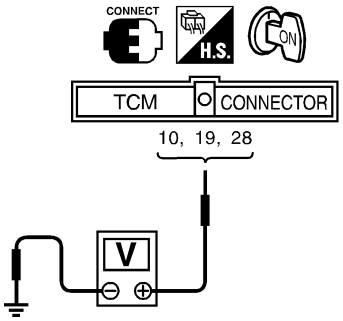
SAT518J

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

7	CHECK TCM POWER SOURCE STEP 1

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM terminals 10, 19, 28 and ground.



Voltage:
Battery voltage

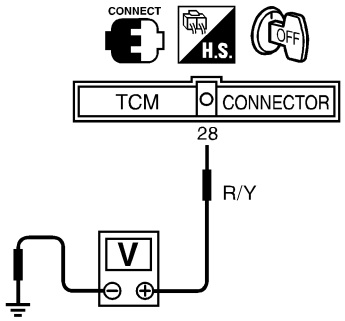
SAT611J

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 9.

8	CHECK TCM POWER SOURCE STEP 2

1. Turn ignition switch to OFF position.
2. Check voltage between TCM terminal 28 and ground.



Voltage:
Battery voltage

SAT612JC

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING ITEM

Check the following items:
- Harness for short or open between ignition switch and TCM terminals 10, 19 and 28 (Main harness)
- Ignition switch and 10A or 7.5A fuse [No. 18 or 24, located in the fuse block (J/B)]
  Refer to EL-9, "Schematic".

OK or NG

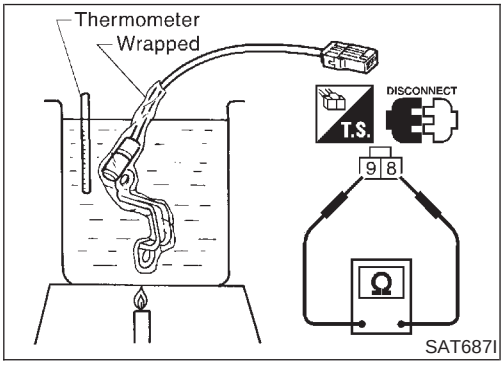
OK	▶	GO TO 10.
NG	▶	Repair or replace damaged parts.

Diagnostic Procedure (Cont'd)

10	CHECK TCM GROUND CIRCUIT	
1. Turn ignition switch to OFF position. 2. Disconnect TCM harness connector. 3. Check continuity between TCM terminals 25, 48 and ground. Refer to wiring diagram — AT — MAIN. **Continuity should exist.** If OK, check harness for short to ground and short to power. **OK or NG**		
OK	▶	GO TO 11.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

11	CHECK DTC	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-106. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	GO TO 12.

12	CHECK TCM INSPECTION	
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.



Component Inspection

NAAT0174

A/T FLUID TEMPERATURE SENSOR

NAAT0174S01

- For removal, refer to AT-273.
- Check resistance between terminals 8 and 9 while changing temperature as shown at left.

Temperature °C (°F)	Resistance
20 (68)	Approximately 2.5 kΩ
80 (176)	Approximately 0.3 kΩ

Description

NAAT0071

The vehicle speed sensor·MTR is built into the speedometer assembly. The sensor functions as an auxiliary device to the revolution sensor when it is malfunctioning. The TCM will then use a signal sent from the vehicle speed sensor·MTR.

TCM TERMINALS AND REFERENCE VALUE

NAAT0071S02

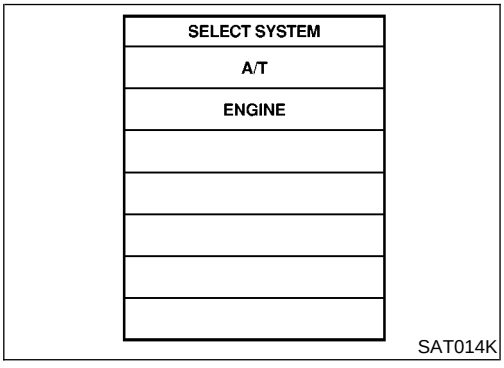
Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
40	W/L	Vehicle speed sensor		When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Voltage varies between less than 1V and more than 4.5V

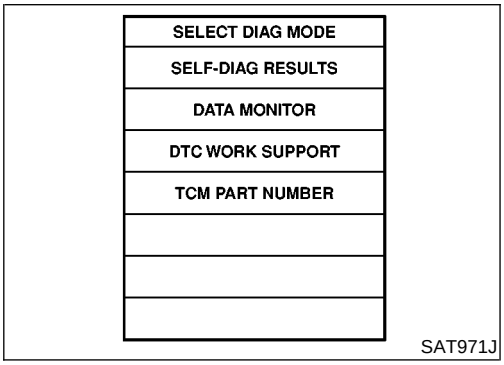
ON BOARD DIAGNOSIS LOGIC

NAAT0071S03

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: VHCL SPEED SEN·MTR	TCM does not receive the proper voltage signal from the sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • Vehicle speed sensor
NO TOOLS : 2nd judgement flicker		



SAT014K



SAT971J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0071S01

CAUTION:

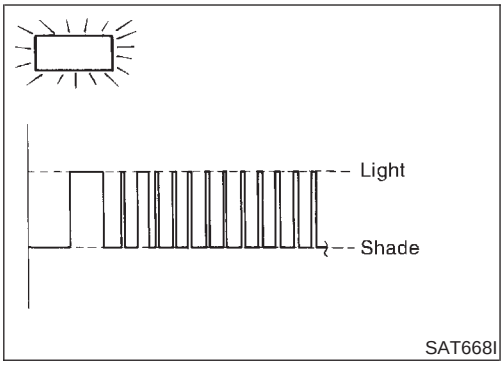
- **Always drive vehicle at a safe speed.**
- **If conducting this "DTC CONFIRMATION PROCEDURE" again, always turn ignition switch "OFF" and wait at least 5 seconds before continuing.**

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Turn ignition switch "ON" and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Start engine and accelerate vehicle from 0 to 25 km/h (0 to 6 MPH).

Description (Cont'd)

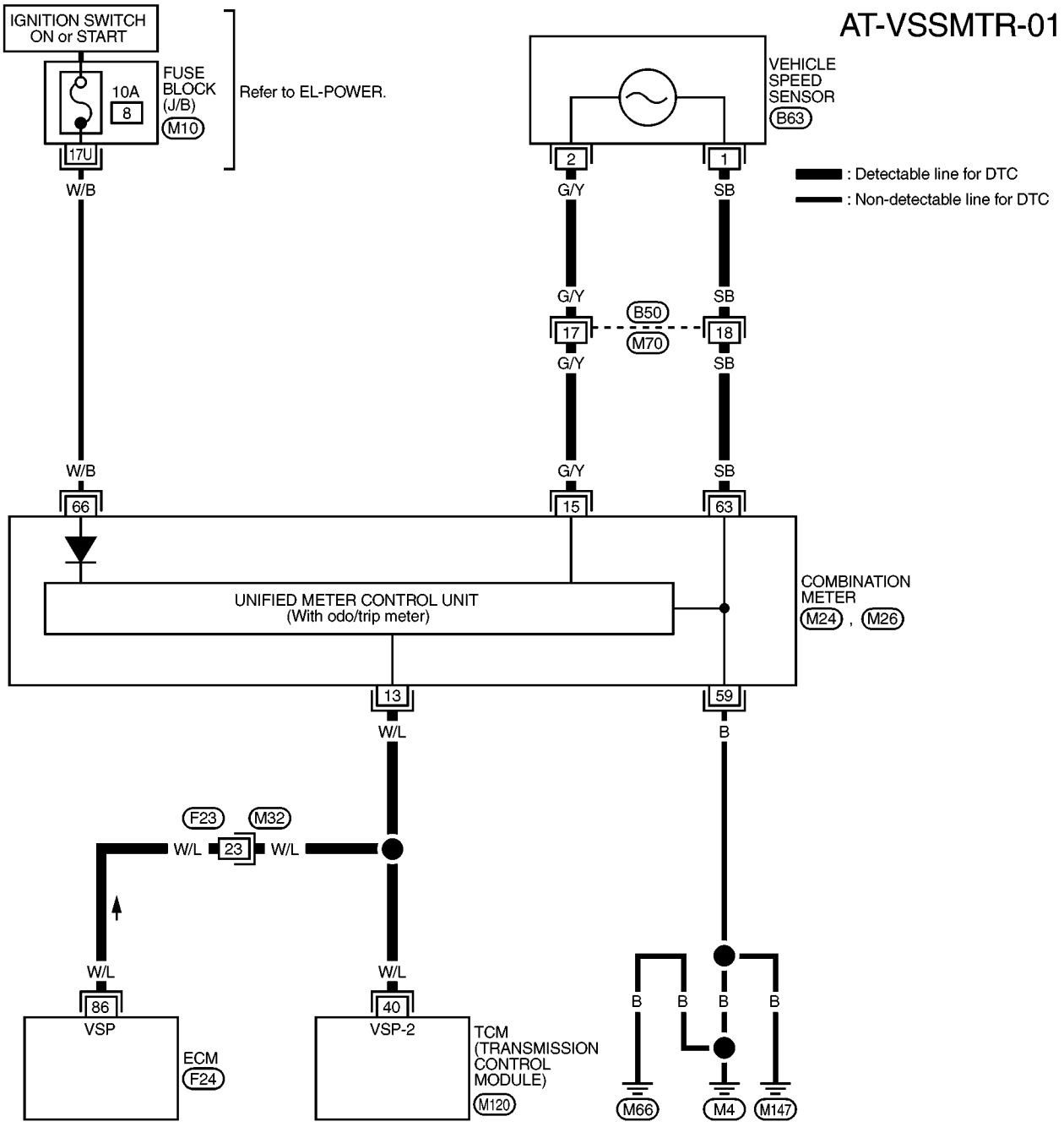


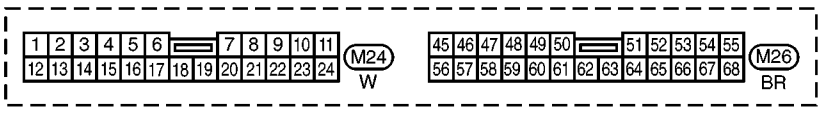
No Tools

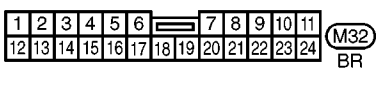
1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D" position and vehicle speed higher than 25 km/h (16 MPH).
3) Perform self-diagnosis.
   Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-46.

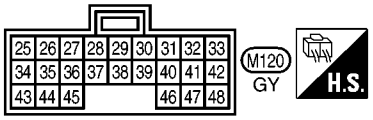
Wiring Diagram — AT — VSSMTR

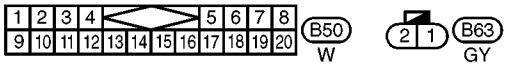
NAAT0202











REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-JUNCTION BOX (J/B)
F24 -ELECTRICAL UNITS

MAT950A

Diagnostic Procedure

NAAT0072

1	CHECK INPUT SIGNAL.

With CONSULT-II

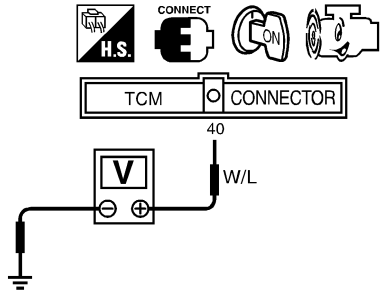
1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “VHCL/S SE·MTR” while driving.
   Check the value changes according to driving speed.

DATA MONITOR	
MONITORING	
VHCL/S SE-A/T	XXX km/h
VHCL/S SE-MTR	XXX km/h
THRTL POS SEN	XXX V
FLUID TEMP SE	XXX V
BATTERY VOLT	XXX V

SAT614J

Without CONSULT-II

1. Start engine.
2. Check voltage between TCM terminal 40 and ground while driving at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.



SAT528J

Does battery voltage vary between less than 1V and more than 4.5V?

Yes	▶	GO TO 3.
No	▶	GO TO 2.

2	DETECT MALFUNCTIONING ITEM

Check the following items:

- Vehicle speed sensor and ground circuit for vehicle speed sensor
  Refer to EL-114, “Component Parts and Harness Connector Location”.
- Harness for short or open between TCM and vehicle speed sensor (Main harness)

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace damaged parts.

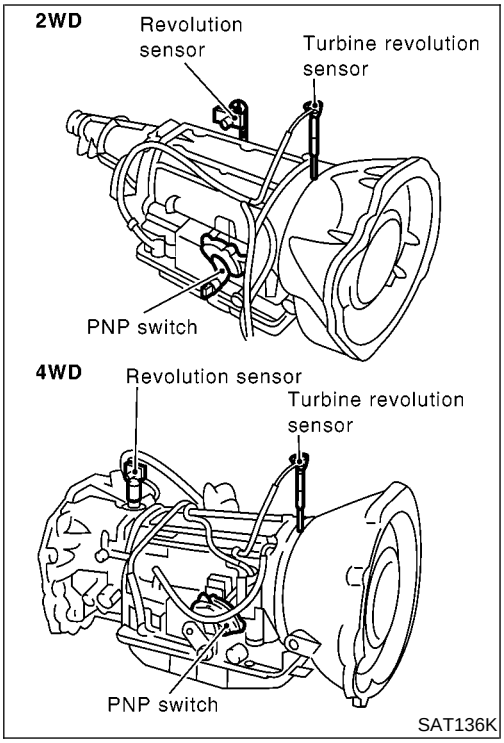
3	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-197.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

4	CHECK TCM INSPECTION	
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.



Description

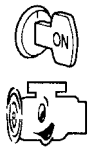
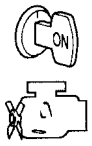
NAAT0224

The turbine revolution sensor detects input shaft rpm (revolutions per minute). It is located on the input side of the automatic transmission. The vehicle speed sensor A/T (Revolution sensor) is located on the output side of the automatic transmission. With the two sensors, input and output shaft rpms are accurately detected. The result is optimal shift timing during deceleration and improved shifting.

TCM TERMINALS AND REFERENCE VALUE

NAAT0224S01

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
38	W	Turbine revolution sensor (Measure in AC range)		When engine is running at 1,000 rpm	1.2V Voltage rises gradually in response to engine speed.
42	B	Throttle position sensor (Ground)		—	0V

ON BOARD DIAGNOSIS LOGIC

NAAT0224S02

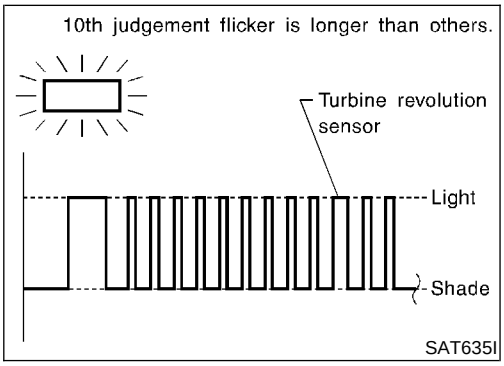
Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: TURBINE REV	TCM does not receive the proper voltage signal from the sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • Turbine revolution sensor
: 10th judgement flicker		

SELECT SYSTEM
A/T
ENGINE

SAT014K

SELECT DIAG MODE
SELF-DIAG RESULTS
DATA MONITOR
DTC WORK SUPPORT
TCM PART NUMBER

SAT971J



SAT635I

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0224S03

CAUTION:

- **Always drive vehicle at a safe speed.**
- **If conducting this "DTC CONFIRMATION PROCEDURE" again, always turn ignition switch "OFF" and wait at least 5 seconds before continuing.**

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Start engine.
2) Select "DATA MONITOR" mode for "A/T" with CONSULT-II.
3) Drive vehicle under the following conditions:
   Selector lever in "D", vehicle speed higher than 40 km/h (25 MPH), engine speed higher than 1,500 rpm, throttle opening greater than 1.0/8 of the full throttle position and driving for more than 5 seconds.

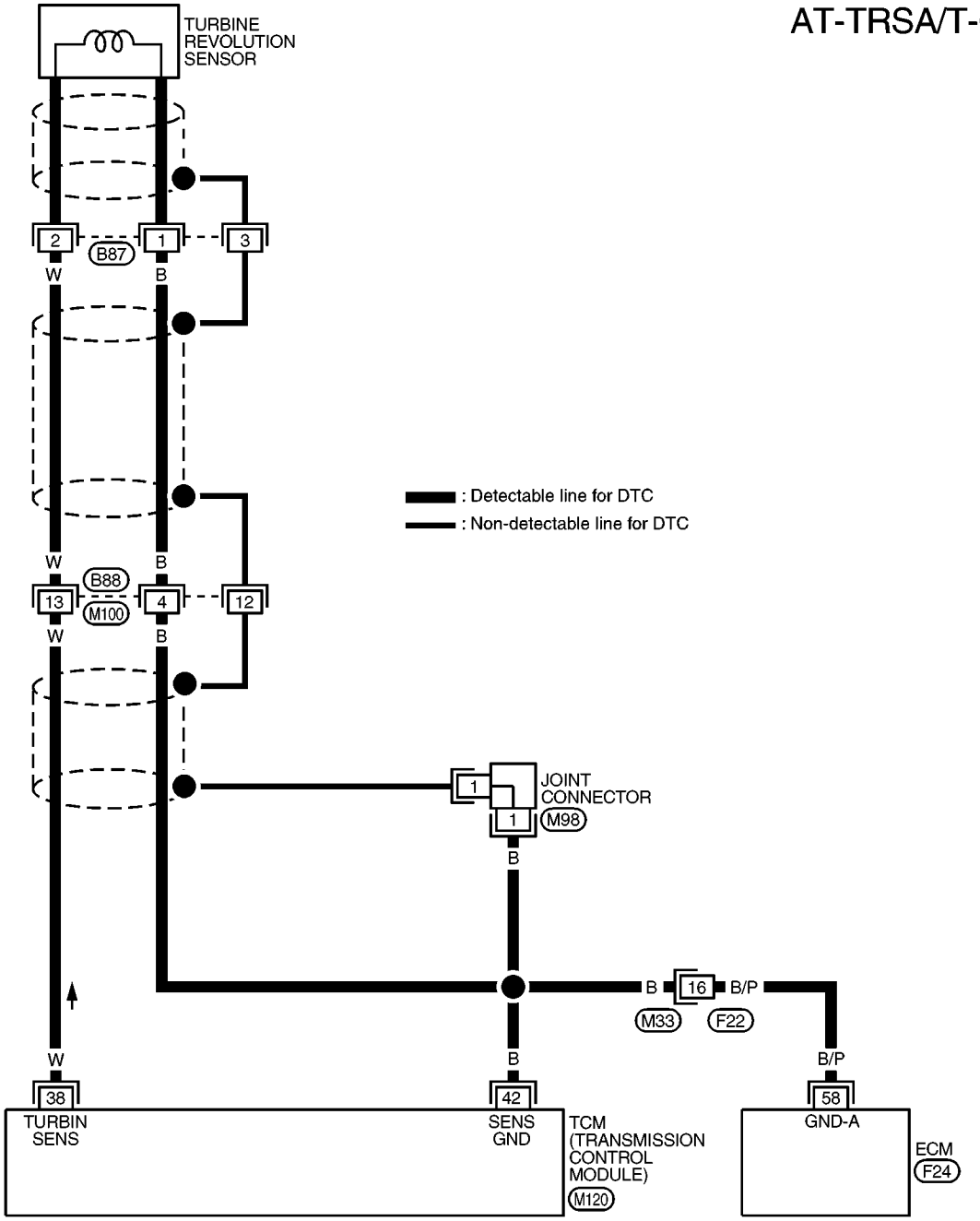
No Tools

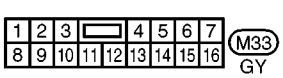
1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D", vehicle speed higher than 40 km/h (25 MPH), engine speed higher than 1,500 rpm, throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds.
3) Perform self-diagnosis.
   Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-46.

Wiring Diagram — AT — TRSA/T

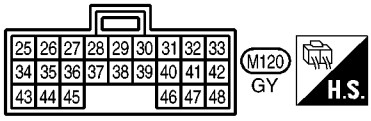
NAAT0225

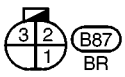
AT-TRSA/T-01

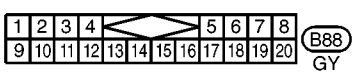












REFER TO THE FOLLOWING.
F24 - ELECTRICAL UNITS

MAT923A

Diagnostic Procedure

NAAT0226

1	CHECK INPUT SIGNAL

With CONSULT-II

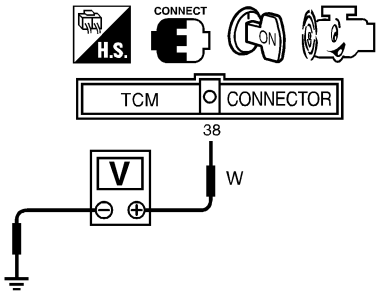
1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “TURBINE REV”. Check the value changes according to engine speed.

DATA MONITOR	
MONITORING	
ENGINE SPEED	XXX rpm
TURBINE REV	XXX rpm
OVERDRIVE SW	ON
PN POSI SW	OFF
R POSITION SW	OFF

SAT740J

Without CONSULT-II

1. Start engine.
2. Check voltage between TCM terminal 38 and ground. (Measure in AC range.)



Approximately 1.2V
(Voltage rises gradually in response to engine speed.)

SAT140K

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING ITEM

Check harness for short or open between TCM and turbine revolution sensor.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace damaged parts.

3	CHECK DTC

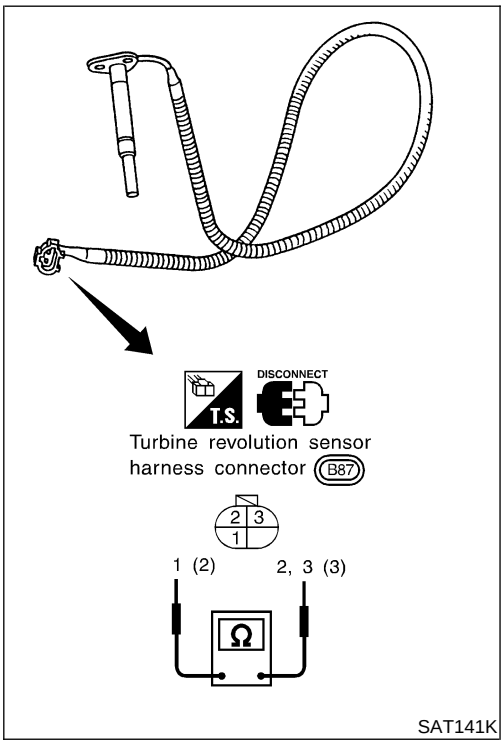
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-203.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4	CHECK TCM INSPECTION	
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminal for damage or loose connection with harness connector. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.



Component Inspection

NAAT0227

TURBINE REVOLUTION SENSOR

NAAT0227S01

- Check resistance between terminals 1, 2 and 3.

Terminal No.		Resistance (Approx.)
1	2	2.4 - 2.8 kΩ
1	3	No continuity
2	3	No continuity

Description

NAAT0228

The ECM and TCM provide mutual communication in relation to engine output control signal (ignition timing retard signal) during rapid standing starts/acceleration. With this consistent real-time control, the shifting feel is substantially improved.

TCM TERMINALS AND REFERENCE VALUE

NAAT0228S01

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
33	G/R	LAN		—	—

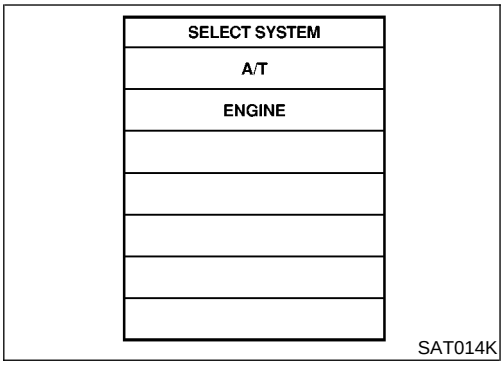
*: This terminal is connected to the ECM.

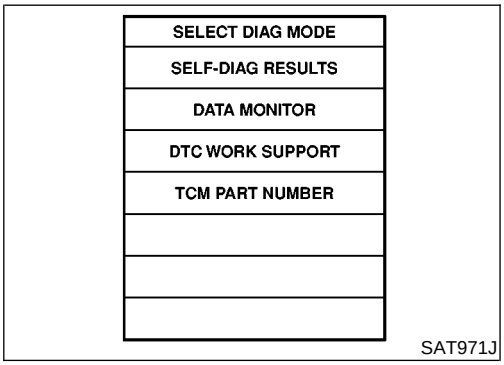
ON BOARD DIAGNOSIS LOGIC

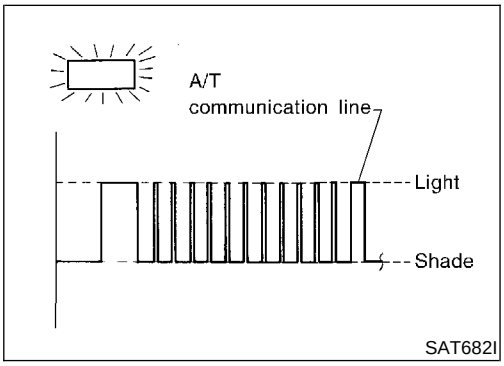
NAAT0228S02

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: A/T COMM LINE	The ECM-A/T communication line is open or shorted.	• Harness or connector
: 12th judgement flicker		

Description (Cont'd)







DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0228S03

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

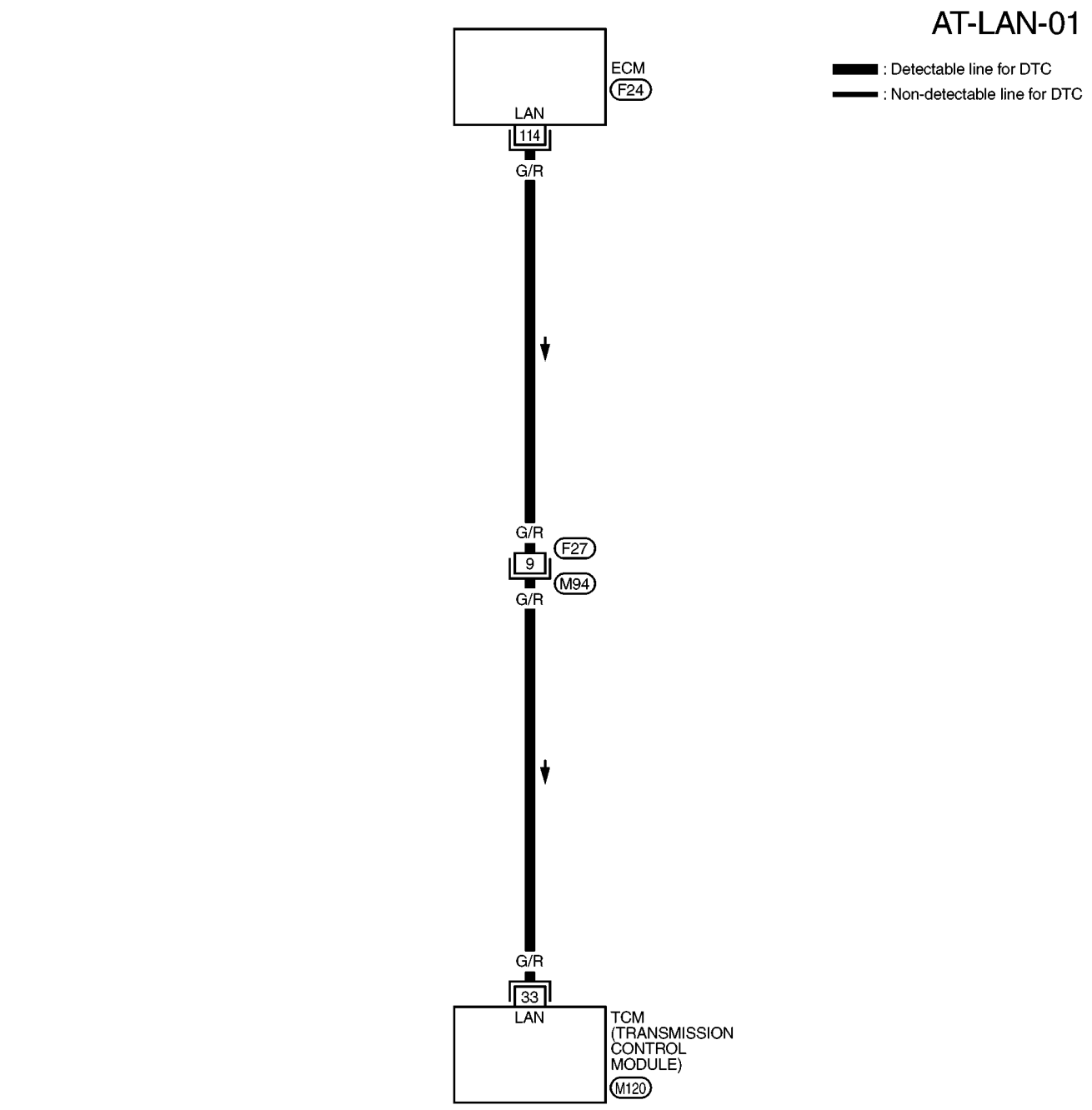
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode for "A/T" with CONSULT-II.
3) Wait at least 6 seconds or start engine and wait for at least 6 seconds.

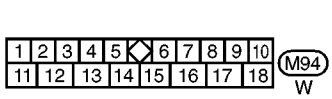
No Tools

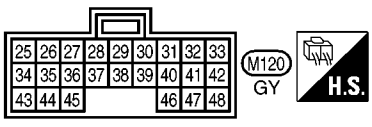
1) Turn ignition switch "ON".
2) Wait at least 6 seconds or start engine and wait for at least 6 seconds.
3) Perform self-diagnosis.
   Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-46.

Wiring Diagram — AT — LAN

NAAT0229







REFER TO THE FOLLOWING.
F24 -ELECTRICAL UNITS

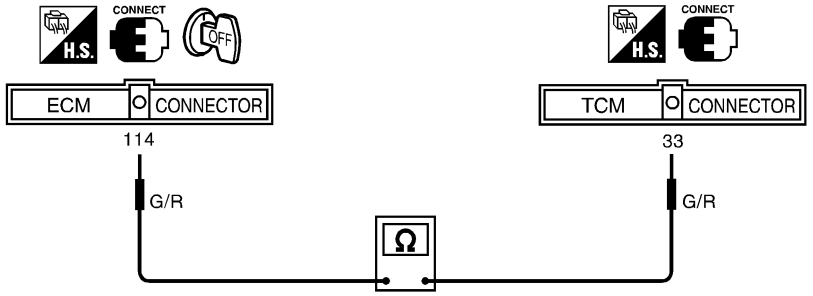
MAT922A

Diagnostic Procedure

NAAT0230

1	CHECK CIRCUIT BETWEEN TCM AND ECM

1. Turn ignition switch to OFF position.
2. Check continuity between TCM terminal 33 and ECM terminal 114.



Continuity should exist.

SAT640JA

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace harness and connector between TCM and ECM.

2	CHECK DTC WITH ECM STEP 1

Perform self-diagnosis for engine control. Refer to EC-73, “DESCRIPTION”.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	CHECK DTC WITH ECM STEP 2

Check ECM. Refer to EC-435 and EC-598, “System Description” and “Component Description”.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace damaged parts.

4	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-208.

OK or NG

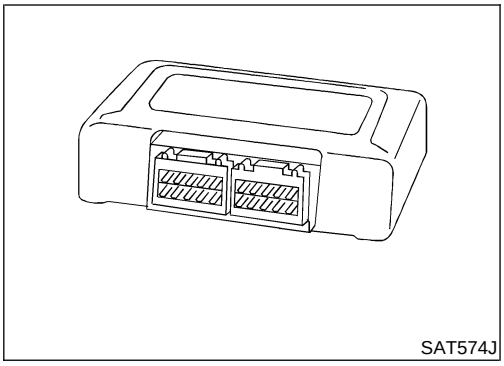
OK	▶	**INSPECTION END**
NG	▶	GO TO 5.

5	CHECK TCM INSPECTION

If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.



SAT574J

Description

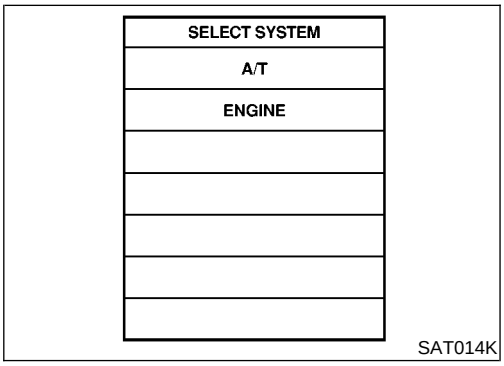
NAAT0207

The TCM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the A/T.

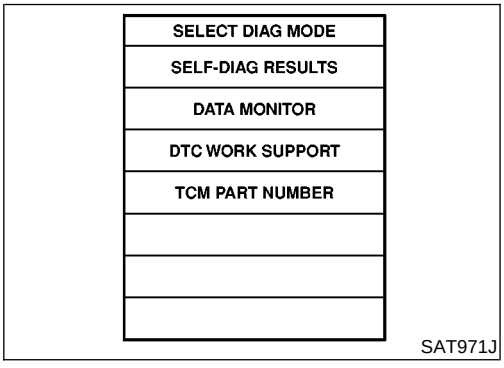
ON BOARD DIAGNOSIS LOGIC

NAAT0207S01

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
Ⓑ : CONTROL UNIT (RAM) Ⓑ : CONTROL UNIT (ROM)	TCM memory (RAM) or (ROM) is malfunctioning.	TCM



SAT014K



SAT971J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0207S02

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

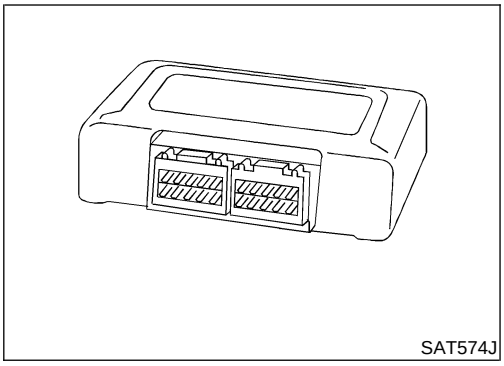
Ⓑ With CONSULT-II

1) Turn ignition switch "ON" and select "DATA MONITOR" mode for A/T with CONSULT-II.
2) Start engine.
3) Run engine for at least 2 seconds at idle speed.

Diagnostic Procedure

=NAAT0208

1	CHECK DTC	
With CONSULT-II 1. Turn ignition switch “ON” and select “SELF DIAG RESULTS” mode for A/T with CONSULT-II. 2. Touch “ERASE”. PERFORM DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE. See previous page. **Is the “CONTROL UNIT (RAM) or CONTROL UNIT (ROM)” displayed again?**		
Yes	▶	Replace TCM.
No	▶	**INSPECTION END**


SAT574J

Description

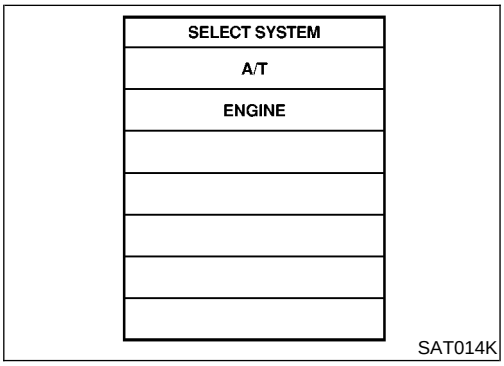
NAAT0215

The TCM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the A/T.

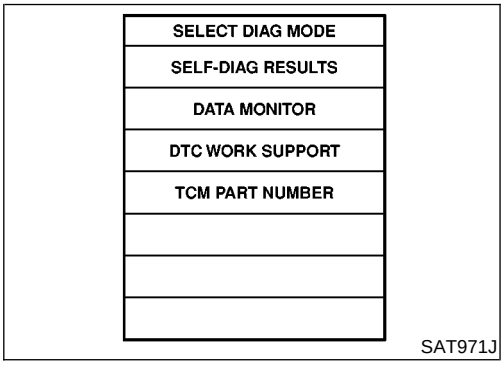
ON BOARD DIAGNOSIS LOGIC

NAAT0215S01

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: CONT UNIT (EEP ROM)	TCM memory (EEP ROM) is malfunctioning.	TCM



SAT014K



SAT971J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0215S02

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

With CONSULT-II

1) Turn ignition switch "ON" and select "DATA MONITOR" mode for A/T with CONSULT-II.
2) Start engine.
3) Run engine for at least 2 seconds at idle speed.

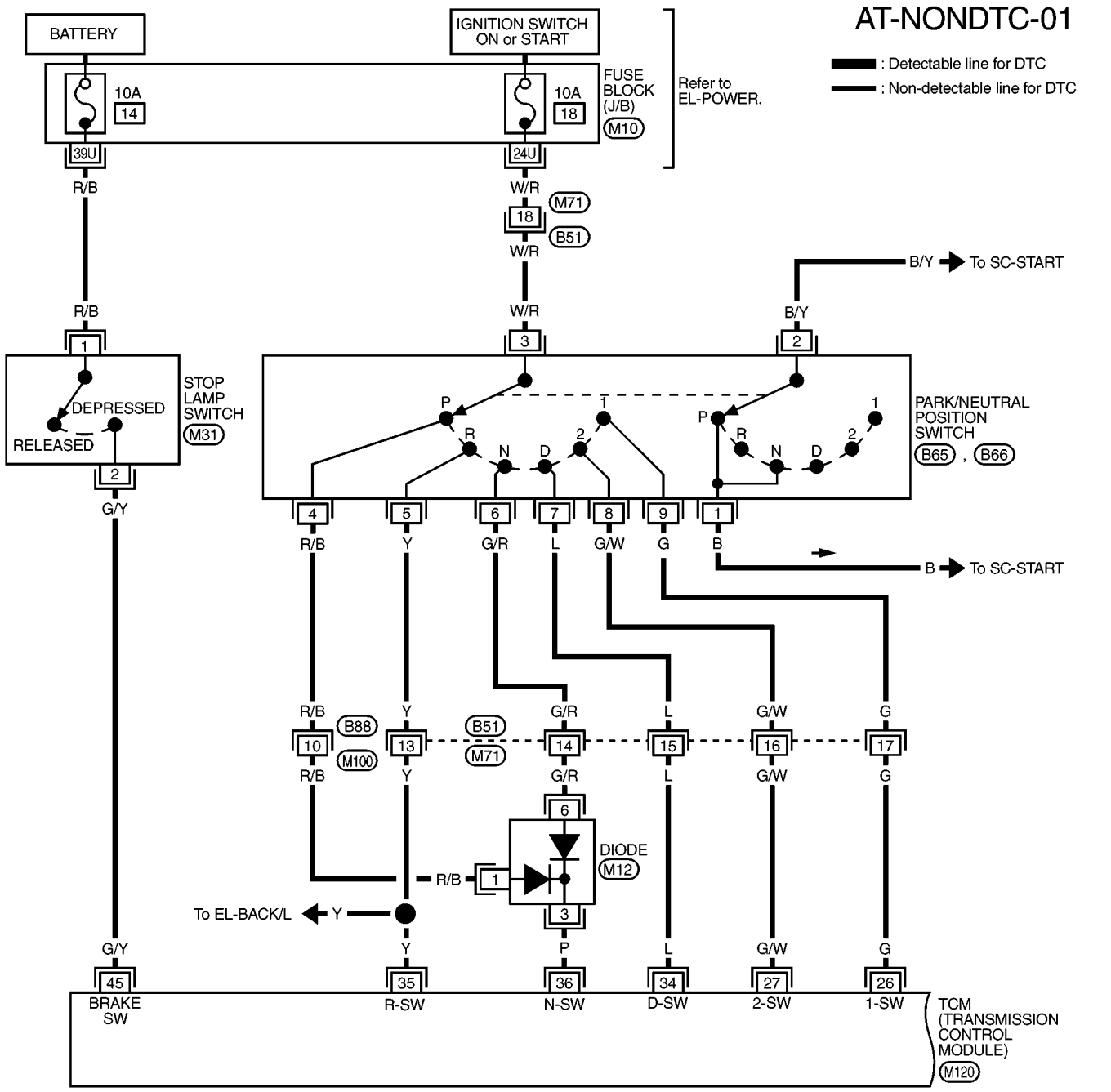
Diagnostic Procedure

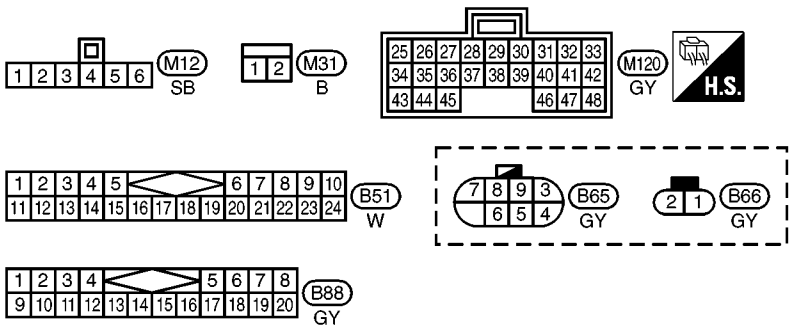
=NAAT0216

1	CHECK DTC	
With CONSULT-II 1. Turn ignition switch “ON” and select “SELF DIAG RESULTS” mode for A/T with CONSULT-II. 2. Move selector lever to “R” position. 3. Depress accelerator pedal (Full throttle position). 4. Touch “ERASE”. 5. Turn ignition switch “OFF” position for 10 seconds. PERFORM DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE. See previous page. **Is the “CONTROL UNIT (EEP ROM)” displayed again?**		
Yes	▶	Replace TCM.
No	▶	**INSPECTION END**

Wiring Diagram — AT — NONDTC

NAAT0203

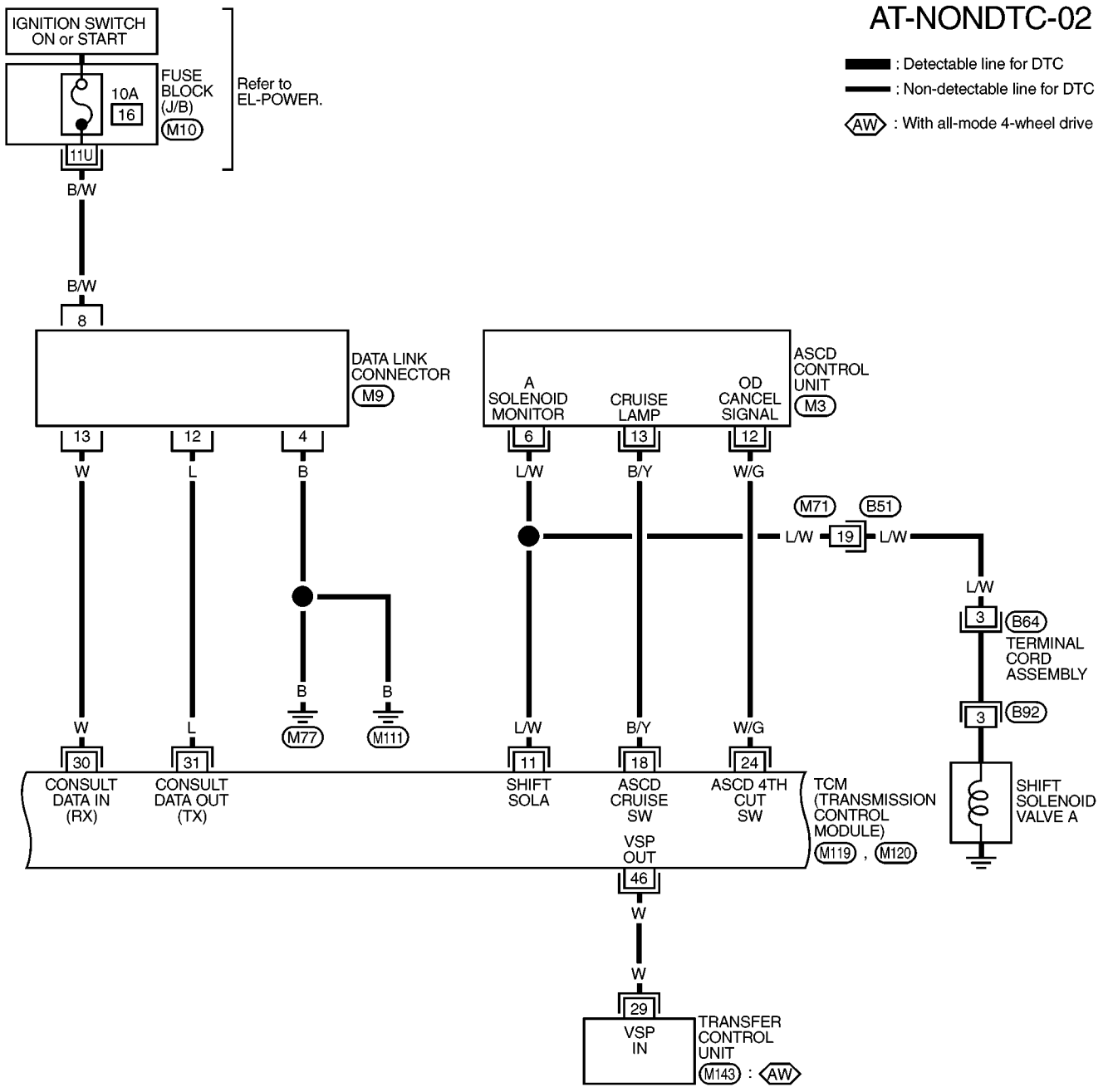


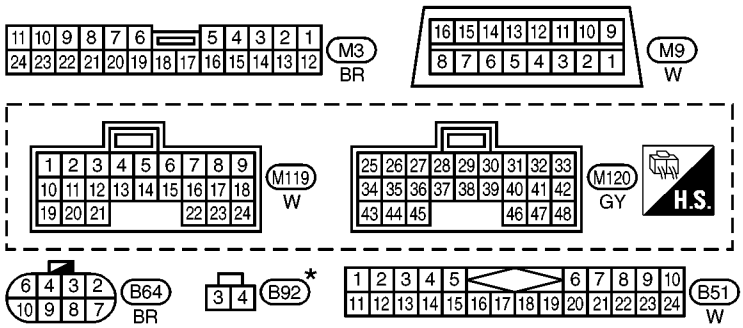


REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

MAT918A

Wiring Diagram — AT — NONDTC (Cont'd)

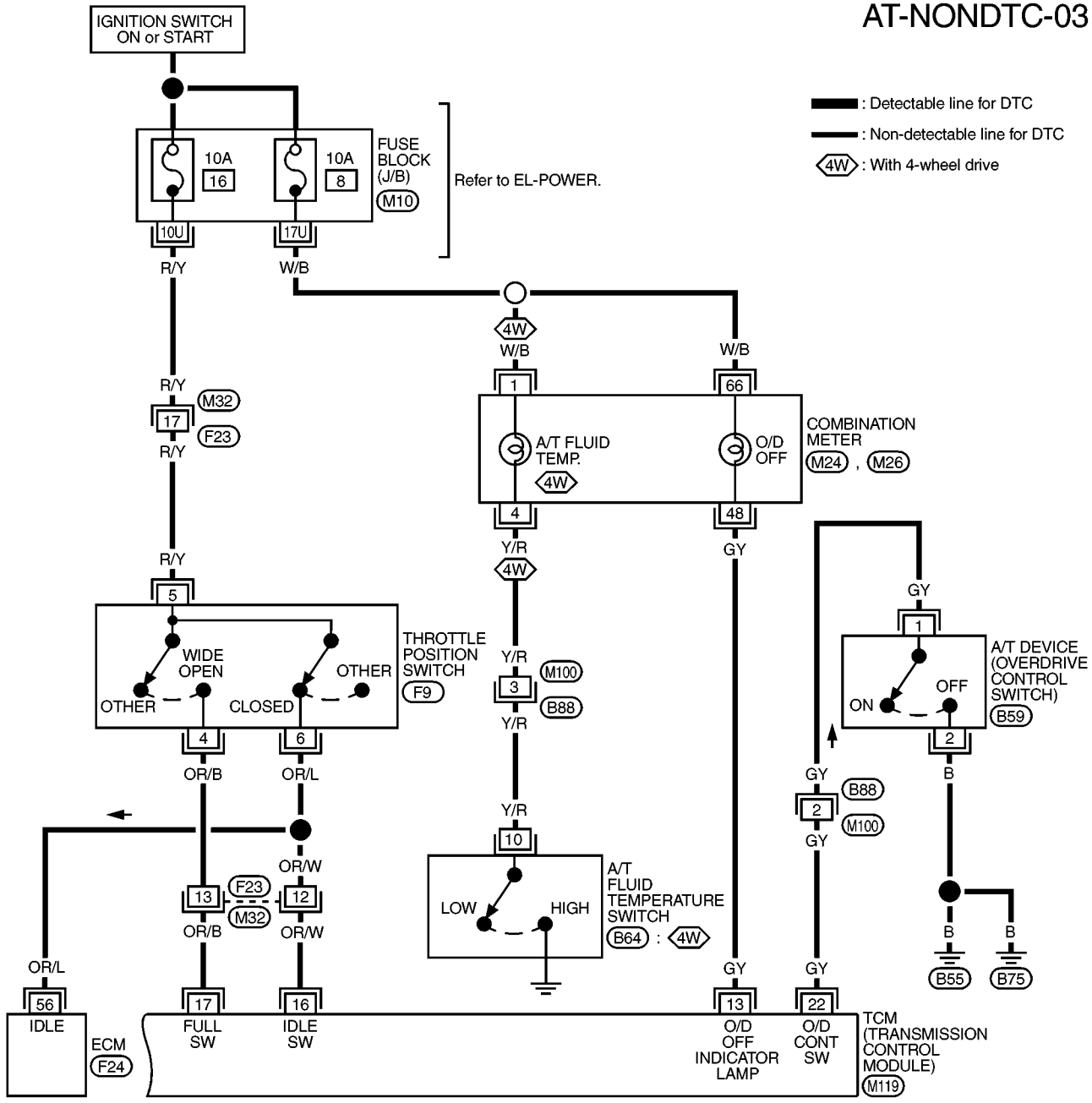


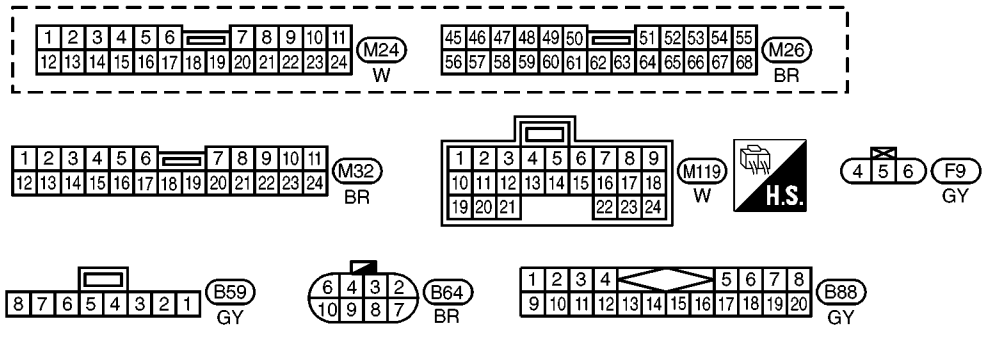


REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

★ : This connector is not shown in "HARNESS LAYOUT" , EL section.

MAT951A





REFER TO THE FOLLOWING.
M10 - FUSE BLOCK - JUNCTION BOX (J/B)
F24 - ELECTRICAL UNITS

MAT952A

1. O/D OFF Indicator Lamp Does Not Come On

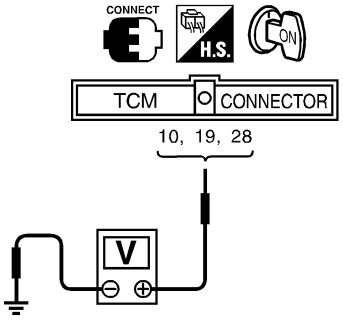
NAAT0073

SYMPTOM:

O/D OFF indicator lamp does not come on for about 2 seconds when turning ignition switch to “ON”.

1	CHECK TCM POWER SOURCE STEP 1

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM terminals 10, 19, 28 and ground.



Voltage:
Battery voltage

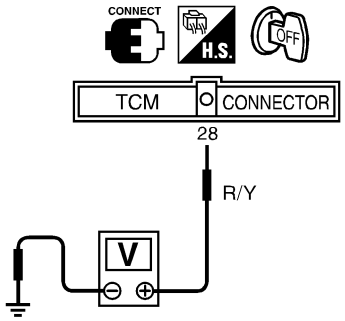
SAT611J

OK or NG

OK	▶	GO TO 2.
NG	▶	GO TO 3.

2	CHECK TCM POWER SOURCE STEP 2

1. Turn ignition switch to OFF position.
2. Check voltage between TCM terminal 28 and ground.



Voltage:
Battery voltage

SAT612JC

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING ITEM

Check the following items:

- Harness for short or open between ignition switch and TCM terminals 10, 19 and 28 (Main harness)
- Ignition switch and 10A or 7.5A fuse [No. 18 or 24, located in the fuse block (J/B)]
  Refer to EL-9, “Schematic”.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace damaged parts.

4	CHECK TCM GROUND CIRCUIT

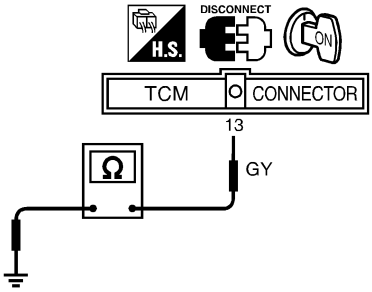
1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between TCM terminals 25, 48 and ground. Refer to wiring diagram — AT — MAIN.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK LAMP CIRCUIT

1. Turn ignition switch to "ON" position.
2. Set overdrive control switch to "ON" position.
3. Check voltage between TCM terminals 13 and ground.



SAT529J

Does battery voltage exist?

Yes	▶	GO TO 7.
No	▶	GO TO 6.

6	CHECK MALFUNCTIONING ITEM

Check the following items:
- Fuse
- O/D OFF indicator lamp
- Harness for short or open between ignition switch and O/D OFF indicator lamp (Main harness)
- Refer to EL-9, "Schematic".
- Harness for short or open between O/D OFF indicator lamp and TCM

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

7	CHECK SYMPTOM

Check again.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 8.

1. O/D OFF Indicator Lamp Does Not Come On (Cont'd)

8	CHECK TCM INSPECTION	
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.

2. Engine Cannot Be Started In “P” and “N” Position

=NAAT0074

SYMPTOM:

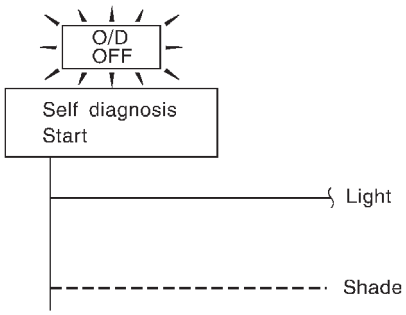
Engine cannot be started with selector lever in “P” or “N” position.

Engine cannot be started with selector lever in “P”Engine can be started with selector lever in “D”, “2”, “1” or “R” position.

1	CHECK PNP SWITCH CIRCUIT

With CONSULT-II
Does “TCM INPUT SIGNALS” in Data Monitor show damage to PNP switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to PNP switch circuit?



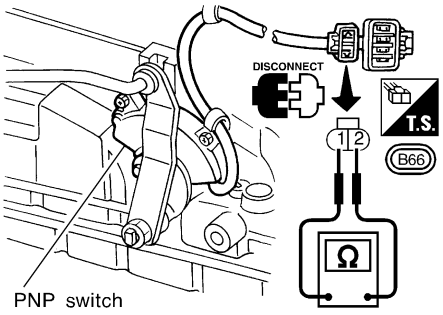
SAT367J

Yes or No

Yes	▶	Check PNP switch circuit. Refer to “DTC P0705”, AT-99.
No	▶	GO TO 2.

2	CHECK PNP SWITCH INSPECTION

Check for short or open of PNP switch 2-pin connector. Refer to “Components Inspection”, AT-103.



SAT838BB

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace PNP switch.

3	CHECK STARTING SYSTEM

Check starting system. Refer to SC-10, “System Description”.

OK or NG

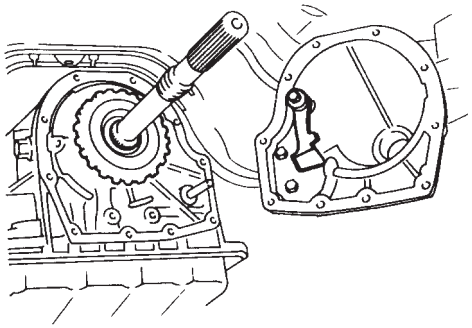
OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.

3. In “P” Position, Vehicle Moves Forward Or Backward When Pushed

=NAAT0075

SYMPTOM:

Vehicle moves when it is pushed forward or backward with selector lever in “P” position.

1	CHECK PARKING COMPONENTS	
Check parking components. Refer to “Parking Pawl Components”, AT-338.		
 SAT133B		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.

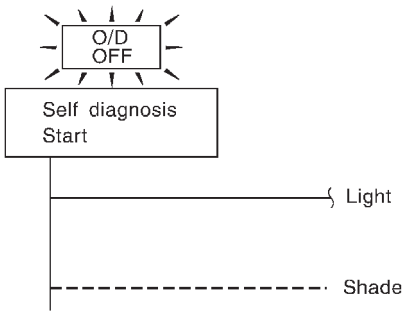
4. In “N” Position, Vehicle Moves

=NAAT0076

SYMPTOM:

Vehicle moves forward or backward when selecting “N” position.

1	CHECK PNP SWITCH CIRCUIT
With CONSULT-II Does “TCM INPUT SIGNALS” in Data Monitor show damage to PNP switch circuit?	
Without CONSULT-II Does self-diagnosis show damage to PNP switch circuit?	

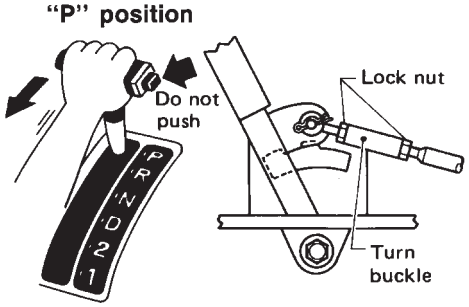


SAT367J

Yes or No

Yes	▶	Check PNP switch circuit. Refer to “DTC P0705”, AT-99.
No	▶	GO TO 2.

2	CHECK CONTROL LINKAGE
Check control linkage. Refer to AT-276.	



SAT032G

OK or NG

OK	▶	GO TO 3.
NG	▶	Adjust control linkage. Refer to AT-276.

4. In "N" Position, Vehicle Moves (Cont'd)

3	CHECK A/T FLUID LEVEL

Check A/T fluid level again.



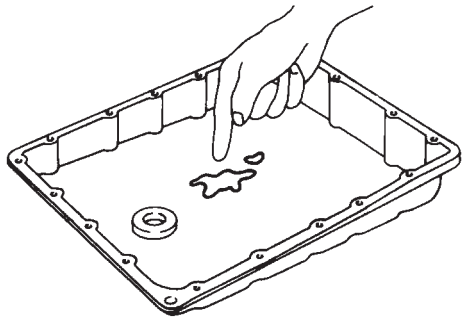
SAT638A

OK or NG

OK	▶	GO TO 4.
NG	▶	Refill ATF.

4	CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.



SAT171B

OK or NG

OK	▶	GO TO 5.
NG	▶	1. Disassemble A/T. 2. Check the following items: ● Forward clutch assembly ● Overrun clutch assembly ● Reverse clutch assembly

5	CHECK SYMPTOM

Check again.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

5. Large Shock. “N” → “R” Position

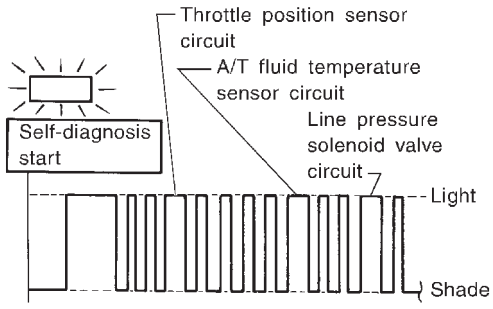
=NAAT0077

SYMPTOM:

There is large shock when changing from “N” to “R” position.

1	CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to A/T fluid temperature sensor, line pressure solenoid valve or throttle position sensor circuit?



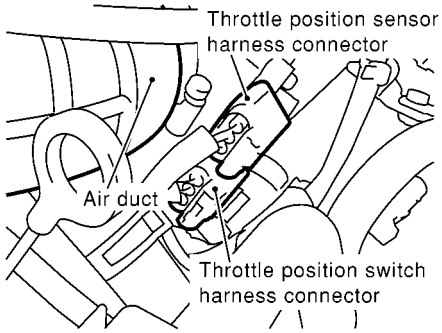
SAT579I

Yes or No

Yes	▶	Check damaged circuit. Refer to “DTC P0710, DTC P0745 or DTC P1705”, AT-105, 162 or 176.
No	▶	GO TO 2.

2	CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to EC-169, “Description”.



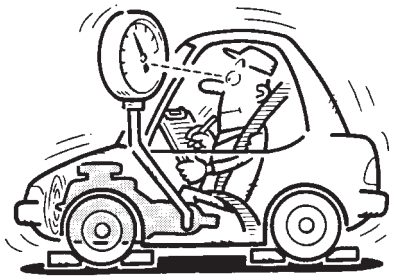
SAT142K

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace throttle position sensor.

3	CHECK LINE PRESSURE

Check line pressure at idle with selector lever in "D" position. Refer to "LINE PRESSURE TEST", AT-62.



SAT494G

OK or NG

OK	▶	GO TO 4.
NG	▶	1. Remove control valve assembly. Refer to AT-273. 2. Check the following items: ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve

4	CHECK SYMPTOM

Check again.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

6. Vehicle Does Not Creep Backward In "R" Position

=NAAT0078

SYMPTOM:

Vehicle does not creep backward when selecting "R" position.

1	CHECK A/T FLUID LEVEL

Check A/T fluid level again.



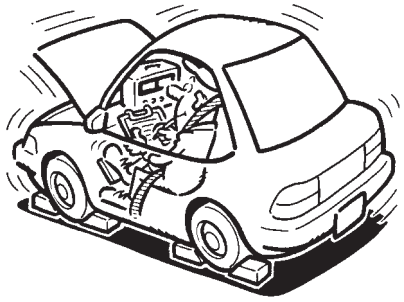
SAT638A

OK or NG

OK	▶	GO TO 2.
NG	▶	Refill ATF.

2	CHECK STALL TEST

Check stall revolution with selector lever in "1" and "R" positions.
Refer to AT-357.



SAT493G

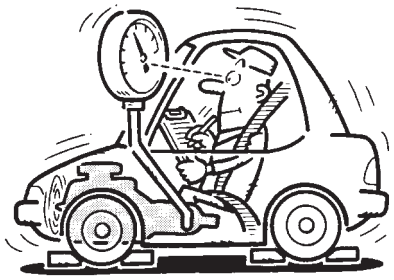
OK or NG

OK	▶	GO TO 3.
OK in "1" position, NG in "R" position	▶	1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-273. 2. Check the following items: ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: ● Oil pump assembly ● Torque converter ● Reverse clutch assembly ● High clutch assembly
NG in both "1" and "R" positions	▶	GO TO 6.

6. Vehicle Does Not Creep Backward In "R" Position (Cont'd)

3	CHECK LINE PRESSURE

Check line pressure at idle with selector lever in "R" position. Refer to "LINE PRESSURE TEST", AT-62.



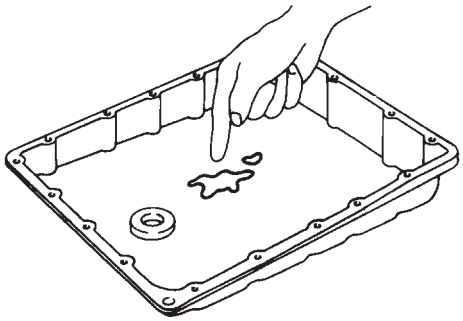
SAT494G

OK or NG

OK	▶	GO TO 4.
NG	▶	1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-273. 2. Check the following items: ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: ● Oil pump assembly

4	CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.



SAT171B

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 6.

5	CHECK SYMPTOM

Check again.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

6	DETECT MALFUNCTIONING ITEM
1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-273. 2. Check the following items: ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: ● Oil pump assembly ● Torque converter ● Reverse clutch assembly ● High clutch assembly ● Low & reverse brake assembly ● Low one-way clutch	
▶	Repair or replace damaged parts.

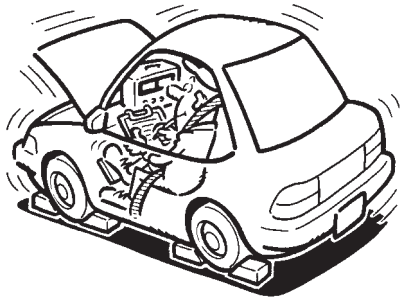
7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position

=NAAT0079

SYMPTOM:

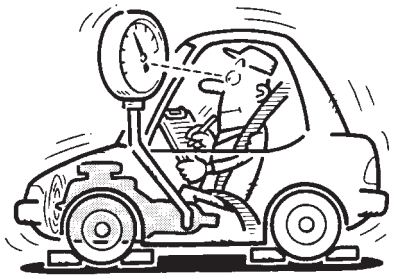
Vehicle does not creep forward when selecting “D”, “2” or “1” position.

1	CHECK A/T FLUID LEVEL	
Check A/T fluid level again.  SAT638A **OK or NG**		
OK	▶	GO TO 2.
NG	▶	Refill ATF.

2	CHECK STALL TEST	
Check stall revolution with selector lever in “D” position. Refer to “STALL TEST”, AT-59.  SAT493G **OK or NG**		
OK	▶	GO TO 3.
NG	▶	GO TO 6.

3	CHECK LINE PRESSURE

Check line pressure at idle with selector lever in "R" position.
Refer to "LINE PRESSURE TEST", AT-62.



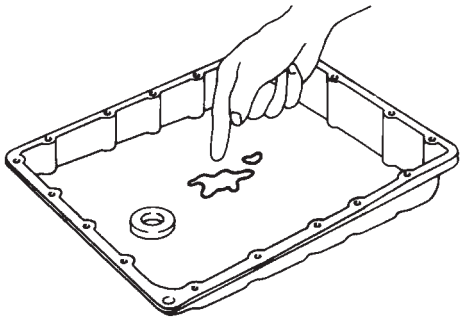
SAT494G

OK or NG

OK	▶	GO TO 4.
NG	▶	1. Remove control valve assembly. Refer to AT-273. 2. Check the following items: ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: ● Oil pump assembly

4	CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.



SAT171B

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 6.

5	CHECK SYMPTOM

Check again.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position (Cont’d)

6	DETECT MALFUNCTIONING ITEM
1. Remove control valve assembly. Refer to “ON-VEHICLE SERVICE”, AT-273. 2. Check the following items: ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: ● Oil pump assembly ● Forward clutch assembly ● Forward one-way clutch ● Low one-way clutch ● Low & reverse brake assembly ● Torque converter	
▶	Repair or replace damaged parts.

8. Vehicle Cannot Be Started From D_1

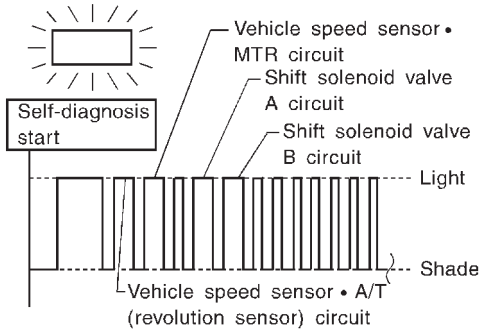
=NAAT0080

SYMPTOM:

Vehicle cannot be started from D_1 on Cruise test — Part 1.

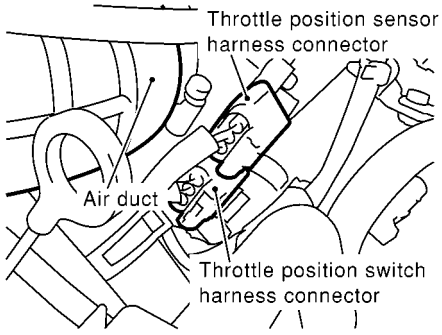
1	CHECK SYMPTOM	
Is “6. Vehicle Does Not Creep Backward In “R” Position” OK?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	Go to “6. Vehicle Does Not Creep Backward In “R” Position”, AT-227.

2	CHECK SELF-DIAGNOSTIC RESULTS	
Does self-diagnosis show damage to vehicle speed sensor·A/T (revolution sensor), shift solenoid valve A, B or vehicle speed sensor·MTR after cruise test?		
Yes or No		
Yes	▶	Check damaged circuit. Refer to “DTC P0720, DTC P0750, DTC P0755 or VEHICLE SPEED SENSOR. MTR”, AT-111, 168, 172 or 197.
No	▶	GO TO 3.



SAT686I

3	CHECK THROTTLE POSITION SENSOR	
Check throttle position sensor. Refer to EC-169, “Description”.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace throttle position sensor.

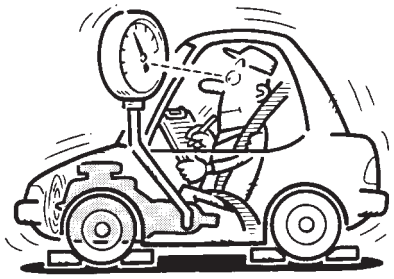


SAT142K

8. Vehicle Cannot Be Started From D_1 (Cont'd)

4	CHECK LINE PRESSURE

Check line pressure at stall point with selector lever in "D" position.
Refer to "LINE PRESSURE TEST", AT-62.



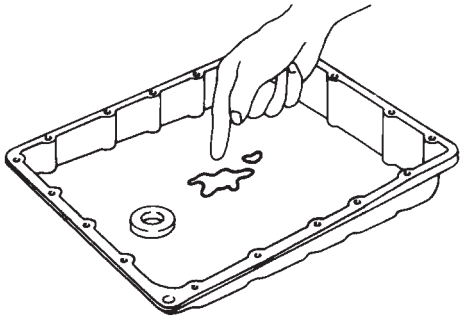
SAT494G

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 8.

5	CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.



SAT171B

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 8.

6	DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly.
   Refer to AT-273.
2. Check the following items:

- Shift valve A
- Shift valve B
- Shift solenoid valve A
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

7	CHECK SYMPTOM
Check again. **OK or NG**	
OK ▶	**INSPECTION END**
NG ▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

8	DETECT MALFUNCTIONING ITEM
1. Remove control valve assembly. Refer to AT-273. 2. Check the following items: ● Shift valve A ● Shift valve B ● Shift solenoid valve A ● Shift solenoid valve B ● Pilot valve ● Pilot filter 3. Disassemble A/T. 4. Check the following items: ● Forward clutch assembly ● Forward one-way clutch ● Low one-way clutch ● High clutch assembly ● Torque converter ● Oil pump assembly **OK or NG**	
OK ▶	GO TO 7.
NG ▶	Repair or replace damaged parts.

9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$

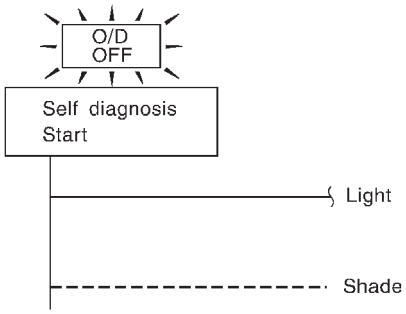
=NAAT0081

SYMPTOM:

A/T does not shift from D_1 to D_2 at the specified speed.
A/T does not shift from D_4 to D_2 when depressing accelerator pedal fully at the specified speed.

1	CHECK SYMPTOM	
Are "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position" and "8. Vehicle Cannot Be Started From D_1" OK?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	Go to "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position" and "8. Vehicle Cannot Be Started From D_1", AT-230, 233.

2	CHECK PNP SWITCH CIRCUIT	
With CONSULT-II Does "TCM INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit?		
Without CONSULT-II Does self-diagnosis show damage to PNP switch circuit?		



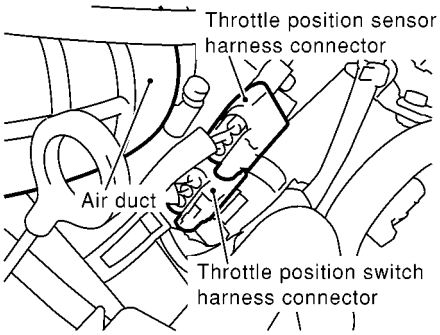
SAT367J

Yes or No		
Yes	▶	Check PNP switch circuit. Refer to "DTC P0705", AT-99.
No	▶	GO TO 3.

3	CHECK VEHICLE SPEED SENSOR·A/T AND VEHICLE SPEED SENSOR·MTR CIRCUIT	
Check vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuit. Refer to "DTC P0720 and VEHICLE SPEED SENSOR·MTR", AT-111, 197.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuits.

4	CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to EC-169, "Description".



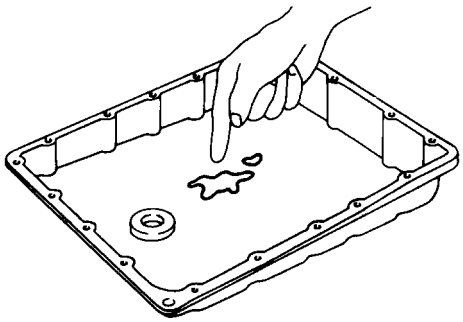
SAT142K

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace throttle position sensor.

5	CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.



SAT171B

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 8.

6	DETECT MALFUNCTIONING ITEM

1. Remove control valve. Refer to AT-273.
2. Check the following items:
- Shift valve A
- Shift solenoid valve A
- Pilot valve
- Pilot filter

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

7	CHECK SYMPTOM	
Check again. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

8	DETECT MALFUNCTIONING ITEM	
1. Remove control valve. Refer to AT-273. 2. Check the following items: ● Shift valve A ● Shift solenoid valve A ● Pilot valve ● Pilot filter 3. Disassemble A/T. 4. Check the following items: ● Servo piston assembly ● Brake band ● Oil pump assembly **OK or NG**		
OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

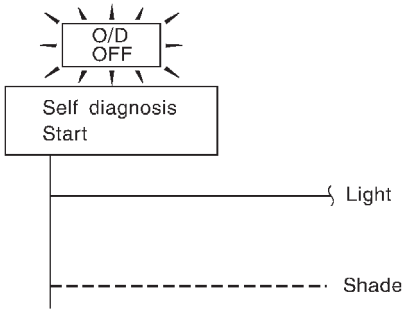
10. A/T Does Not Shift: $D_2 \rightarrow D_3$

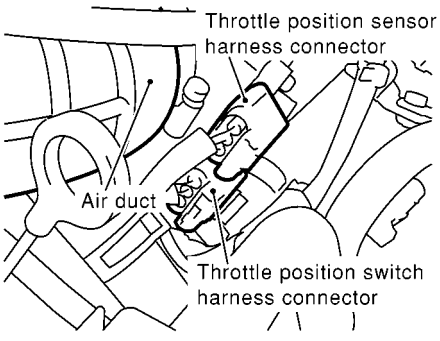
=NAAT0082

SYMPTOM:

A/T does not shift from D_2 to D_3 at the specified speed.

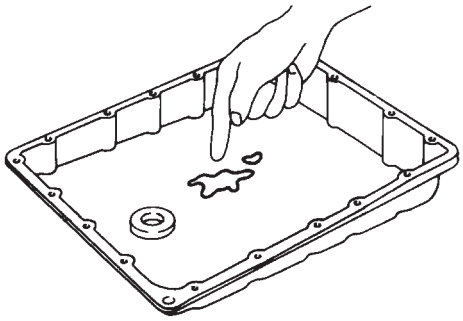
1	CHECK SYMPTOM	
Are “7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position” and “8. Vehicle Cannot Be Started From D_1” OK?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	Go to “7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position” and “8. Vehicle Cannot Be Started From D_1”, AT-230, 233.

2	CHECK PNP SWITCH CIRCUIT	
With CONSULT-II Does “TCM INPUT SIGNALS” in Data Monitor show damage to PNP switch circuit?		
Without CONSULT-II Does self-diagnosis show damage to PNP switch circuit?		
 SAT367J		
Yes or No		
Yes	▶	Check PNP switch circuit. Refer to “DTC P0705”, AT-99.
No	▶	GO TO 3.

3	CHECK THROTTLE POSITION SENSOR	
Check throttle position sensor. Refer to EC-169, “Description”.		
 SAT142K		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace throttle position sensor.

4	CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.



SAT171B

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 7.

5	DETECT MALFUNCTIONING ITEM

1. Remove control valve Assembly. Refer to AT-273.
2. Check the following items:

- Shift valve B
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

6	CHECK SYMPTOM

Check again.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

7	DETECT MALFUNCTIONING ITEM	
1. Remove control valve Assembly. Refer to AT-273. 2. Check the following items: ● Shift valve B ● Shift solenoid valve B ● Pilot valve ● Pilot filter 3. Disassemble A/T. 4. Check the following items: ● Servo piston assembly ● High clutch assembly ● Oil pump assembly		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

11. A/T Does Not Shift: $D_3 \rightarrow D_4$

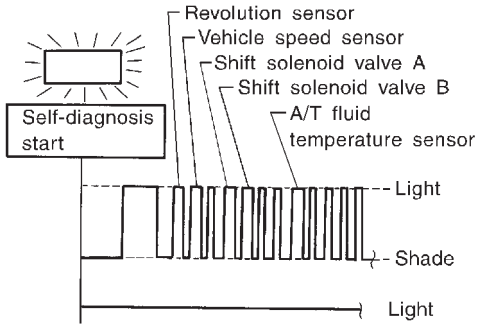
=NAAT0083

SYMPTOM:

- **A/T does not shift from D_3 to D_4 at the specified speed.**
- **A/T must be warm before D_3 to D_4 shift will occur.**

1	CHECK SYMPTOM	
Are “7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position” and “8. Vehicle Cannot Be Started From D_1” OK?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	Go to “7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position” and “8. Vehicle Cannot Be Started From D_1”, AT-230, 233.

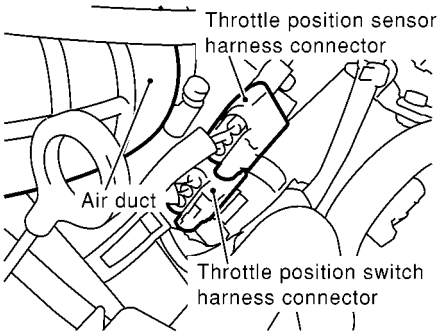
2	CHECK SELF-DIAGNOSTIC RESULTS	
With CONSULT-II Does self-diagnosis, after cruise test, show damage to any of the following circuits? ● Inhibitor switch ● Overdrive control switch ● A/T fluid temperature sensor ● Revolution sensor ● Shift solenoid valve A or B ● Vehicle speed sensor		
Yes or No		
Yes	▶	Check damaged circuit. Refer to “DTC P0705, P0710, P0720, P0750, P0755 or VHCL SPEED SEN·MTR”, AT-99, 105, 111, 168, 172 or 197.
No	▶	GO TO 3.



SAT580I

3	CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to EC-169, "Description".



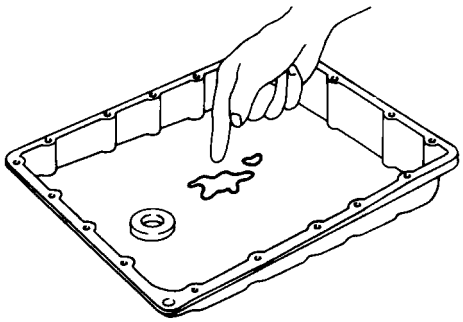
SAT142K

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace throttle position sensor.

4	CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.



SAT171B

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 7.

5	DETECT MALFUNCTIONING ITEM

1. Remove control valve Assembly. Refer to AT-273.
2. Check the following items:
- Shift valve B
- Overrun clutch control valve
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

6	CHECK SYMPTOM	
Check again. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

7	DETECT MALFUNCTIONING ITEM	
1. Remove control valve Assembly. Refer to AT-273. 2. Check the following items: ● Shift valve B ● Overrun clutch control valve ● Shift solenoid valve B ● Pilot valve ● Pilot filter 3. Disassemble A/T. 4. Check the following items: ● Servo piston assembly ● Brake band ● Torque converter ● Oil pump assembly **OK or NG**		
OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

12. A/T Does Not Perform Lock-up

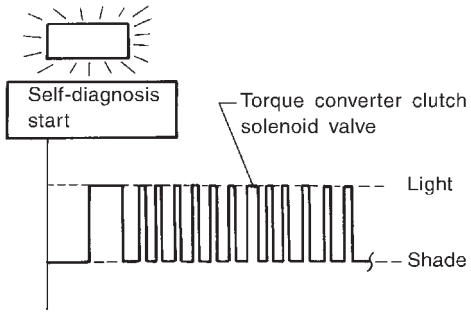
=NAAT0084

SYMPTOM:

A/T does not perform lock-up at the specified speed.

1	CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to torque converter clutch solenoid valve circuit after cruise test?



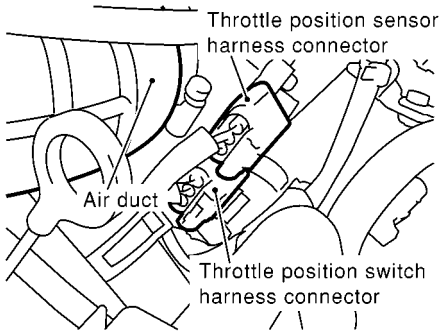
SAT581I

Yes or No

Yes	▶	Check torque converter clutch solenoid valve circuit. Refer to “DTC P0740”, AT-148.
No	▶	GO TO 2.

2	CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to EC-169, “Description”.



SAT142K

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace throttle position sensor.

3	DETECT MALFUNCTIONING ITEM

1. Remove control valve. Refer to AT-273.
2. Check following items:

- Torque converter clutch control valve
- Torque converter relief valve
- Torque converter clutch solenoid valve
- Pilot valve
- Pilot filter

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace damaged parts.

12. A/T Does Not Perform Lock-up (Cont'd)

4	CHECK SYMPTOM	
Check again. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

13. A/T Does Not Hold Lock-up Condition

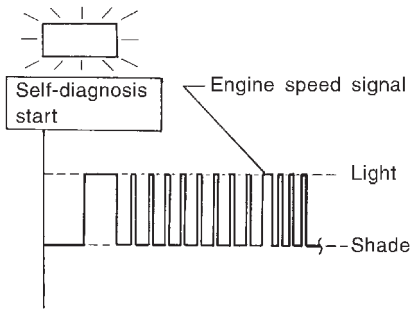
=NAAT0085

SYMPTOM:

A/T does not hold lock-up condition for more than 30 seconds.

1	CHECK DIAGNOSTIC RESULTS

Does self-diagnosis show damage to engine speed signal circuit after cruise test?



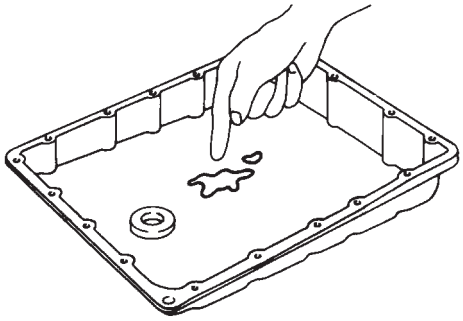
SAT582I

Yes or No

Yes	▶	Check engine speed signal circuit. Refer to “DTC P0725”, AT-116.
No	▶	GO TO 2.

2	CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.



SAT171B

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 5.

3	DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-273.
2. Check the following items:
- Torque converter clutch control valve
- Pilot valve
- Pilot filter

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace damaged parts.

4	CHECK SYMPTOM	
Check again. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

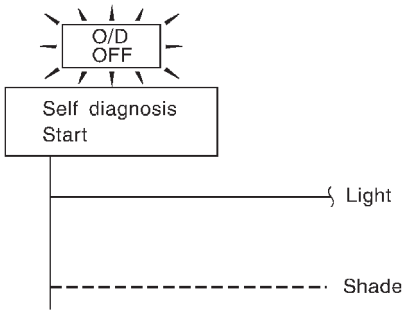
5	DETECT MALFUNCTIONING ITEM	
1. Remove control valve assembly. Refer to AT-273. 2. Check the following items: ● Torque converter clutch control valve ● Pilot valve ● Pilot filter 3. Disassemble A/T. 4. Check torque converter and oil pump assembly. **OK or NG**		
OK	▶	GO TO 4.
NG	▶	Repair or replace damaged parts.

14. Lock-up Is Not Released

=NAAT0086

SYMPTOM:

Lock-up is not released when accelerator pedal is released.

1	CHECK THROTTLE POSITION SWITCH CIRCUIT	
With CONSULT-II Does “TCM INPUT SIGNALS” in Data Monitor show damage to closed throttle position switch circuit?		
Without CONSULT-II Does self-diagnosis show damage to closed throttle position switch circuit?  SAT367J		
Yes or No		
Yes	▶	Check closed throttle position switch circuit. Refer to “DTC P1705”, AT-176.
No	▶	GO TO 2.

2	CHECK SYMPTOM	
Check again.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

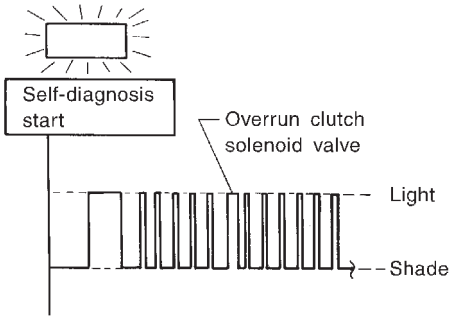
15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)

=NAAT0087

SYMPTOM:

- **Engine speed does not smoothly return to idle when A/T shifts from D_4 to D_3.**
- **Vehicle does not decelerate by engine brake when turning overdrive control switch OFF.**
- **Vehicle does not decelerate by engine brake when shifting A/T from “D” to “2” position.**

1	CHECK SELF-DIAGNOSTIC RESULTS	
Does self-diagnosis show damage to overrun clutch solenoid valve circuit after cruise test?		

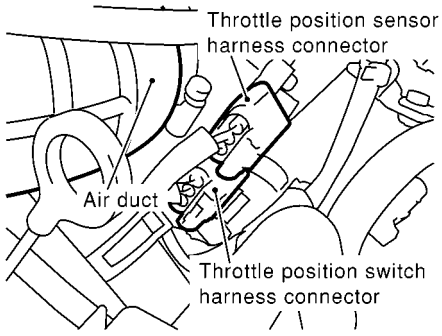


SAT583I

Yes or No

Yes	▶	Check overrun clutch solenoid valve circuit. Refer to “DTC P1760”, AT-185.
No	▶	GO TO 2.

2	CHECK THROTTLE POSITION SENSOR	
Check throttle position sensor. Refer to EC-169, “Description”.		



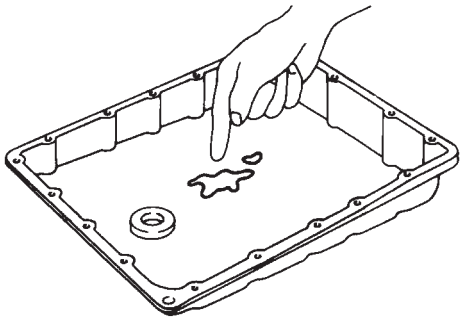
SAT142K

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace throttle position sensor.

3	CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.



SAT171B

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 6.

4	DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-273.
2. Check the following items:
- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace damaged parts.

5	CHECK SYMPTOM

Check again.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

6	DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-273.
2. Check the following items:
- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve
3. Disassemble A/T.
4. Check the following items:
- Overrun clutch assembly
- Oil pump assembly

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace damaged parts.

16. Vehicle Does Not Start From D_1

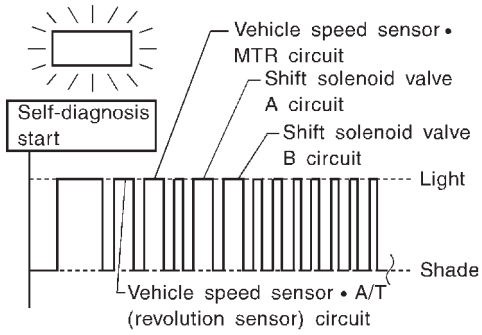
NAAT0088

SYMPTOM:

Vehicle does not start from D_1 on Cruise test — Part 2.

1	CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to vehicle speed sensor·A/T (revolution sensor), shift solenoid valve A, B or vehicle speed sensor·MTR after cruise test?



SAT686I

Yes or No

Yes	▶	Check damaged circuit. Refer to “DTC P0720, P0750, P0755 or VHCL SPEED SEN·MTR”, AT-111, 176, 172 or 197.
No	▶	GO TO 2.

2	CHECK SYMPTOM

Check again.

OK or NG

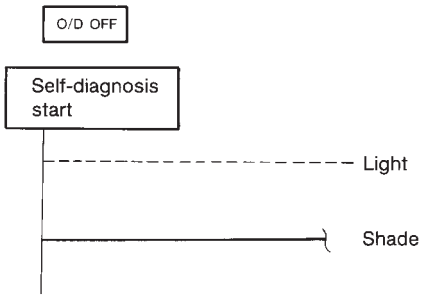
OK	▶	Go to “8. Vehicle Cannot Be Started From D_1”, AT-233.
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

17. A/T Does Not Shift: $D_4 \rightarrow D_3$, When Overdrive Control Switch "ON" → "OFF"

=NAAT0089

SYMPTOM:

A/T does not shift from D_4 to D_3 when changing overdrive control switch to "OFF" position.

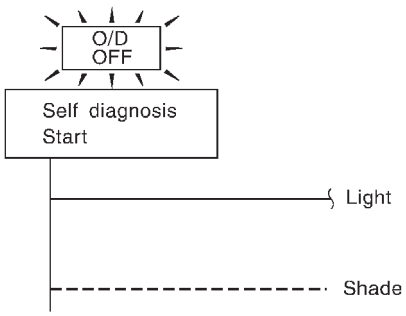
1	CHECK OVERDRIVE CONTROL SWITCH CIRCUIT	
With CONSULT-II Does "TCM INPUT SIGNALS" in Data Monitor show damage to overdrive control switch circuit? **Without CONSULT-II** Does self-diagnosis show damage to overdrive control switch circuit?  SAT344H		
Yes or No		
Yes	▶	Check overdrive control switch circuit. Refer to AT-257.
No	▶	Go to "10. A/T Does Not Shift: $D_2 \rightarrow D_3$", AT-239.

18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever "D" $\rightarrow$ "2" Position

=NAAT0090

SYMPTOM:

A/T does not shift from D_3 to 2_2 when changing selector lever from "D" to "2" position.

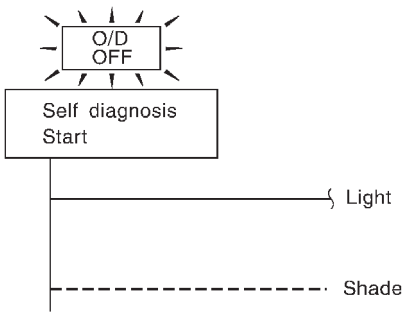
1	CHECK PNP SWITCH CIRCUIT	
With CONSULT-II Does "TCM INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit? **Without CONSULT-II** Does self-diagnosis show damage to PNP switch circuit?  SAT367J		
Yes or No		
Yes	▶	Check PNP switch circuit. Refer to "DTC P0705", AT-99.
No	▶	Go to "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$", AT-236.

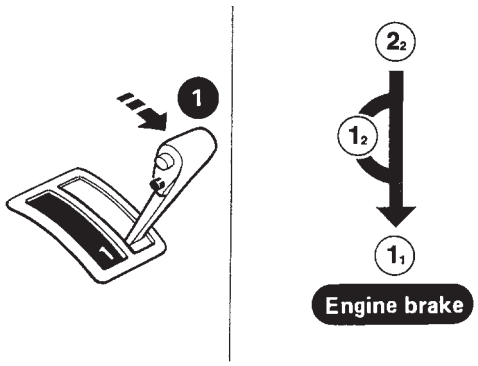
19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever "2" → "1" Position

=NAAT0091

SYMPTOM:

A/T does not shift from 2_2 to 1_1 when changing selector lever from "2" to "1" position.

1	CHECK PNP SWITCH CIRCUIT	
With CONSULT-II Does "TCM INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit? **Without CONSULT-II** Does self-diagnosis show damage to PNP switch circuit?  SAT367J **Yes or No**		
Yes	▶	Check PNP switch circuit. Refer to "DTC P0705", AT-99.
No	▶	GO TO 2.

2	CHECK SYMPTOM	
Check again.  SAT778B **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

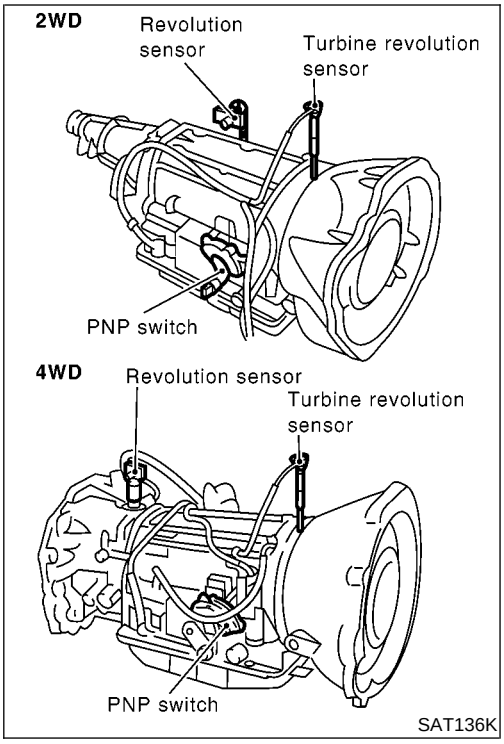
20. Vehicle Does Not Decelerate By Engine Brake

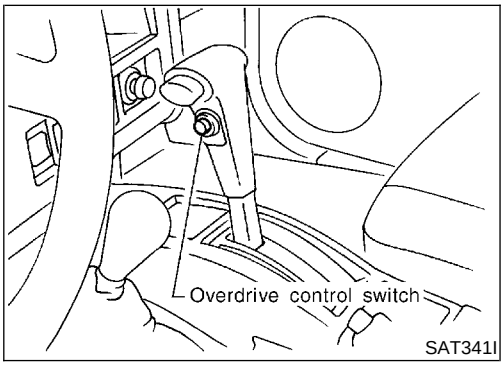
NAAT0092

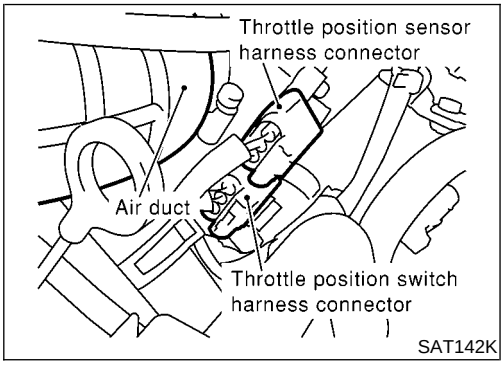
SYMPTOM:

Vehicle does not decelerate by engine brake when shifting from 2_2 (1_2) to 1_1.

1	CHECK SYMPTOM	
Is “6. Vehicle Does Not Creep Backward In “R” Position” OK?		
Yes or No		
Yes	▶	Go to “15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)”, AT-250.
No	▶	Go to “6. Vehicle Does Not Creep Backward In “R” Position”, AT-227.







21. TCM Self-diagnosis Does Not Activate (PNP, Overdrive Control and Throttle Position Switches Circuit Checks)

NAAT0204

SYMPTOM:

O/D OFF indicator lamp does not come on in TCM self-diagnostic procedure even the lamp circuit is good.

DESCRIPTION

NAAT0204S01

- PNP switch
  The PNP switch assemble includes a transmission range switch. The transmission range switch detects the selector position and sends a signal to the TCM.
- Overdrive control switch
  Detects the overdrive control switch position (ON or OFF) and sends a signal to the TCM.
- Throttle position switch
  Consists of a wide open throttle position switch and a closed throttle position switch.
  The wide open throttle position switch sends a signal to the TCM when the throttle valve is open at least 1/2 of the full throttle position. The closed throttle position switch sends a signal to the TCM when the throttle valve is fully closed.

DIAGNOSTIC PROCEDURE

=NAAT0204S03

NOTE:
The diagnostic procedure includes inspections for the overdrive control and throttle position switch circuits.

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes (With CONSULT-II) ▶	GO TO 2.
No (Without CONSULT-II) ▶	GO TO 3.

2	CHECK PNP SWITCH CIRCUIT (With CONSULT-II)

With CONSULT-II

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out "P", "R", "N", "D", "2" and "1" position switches moving selector lever to each position. Check the signal of the selector lever position is indicated properly.

DATA MONITOR	
MONITORING	
PN POSI SW	OFF
R POSITION SW	OFF
D POSITION SW	OFF
2 POSITION SW	ON
1 POSITION SW	OFF

SAT643J

OK or NG

OK ▶	GO TO 5.
NG ▶	GO TO 4.

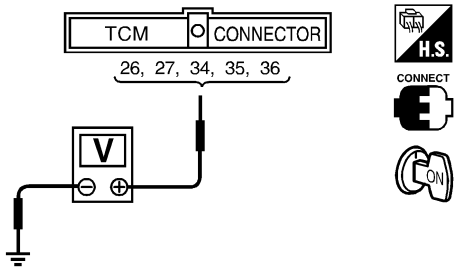
3	CHECK PNP SWITCH CIRCUIT (Without CONSULT-II)

Without CONSULT-II

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Check voltage between TCM terminals 26, 27, 34, 35, 36 and ground while moving selector lever through each position.

Lever position	Terminals				
	36	35	34	27	26
P, N	**B**	0	0	0	0
R	0	**B**	0	0	0
D	0	0	**B**	0	0
2	0	0	0	**B**	0
1	0	0	0	0	**B**

MTBL0205



SAT517J

Does battery voltage exist (B) or non-existent (0)?

Yes	▶	GO TO 5.
No	▶	GO TO 4.

4	DETECT MALFUNCTIONING ITEM

Check the following items:

- PNP switch
  Refer to "Component Inspection", AT-263.
- Harness for short or open between ignition switch and PNP switch (Main harness)
- Harness for short or open between PNP switch and TCM (Main harness)

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace damaged parts.

5	CHECK OVERDRIVE CONTROL SWITCH CIRCUIT

With CONSULT-II

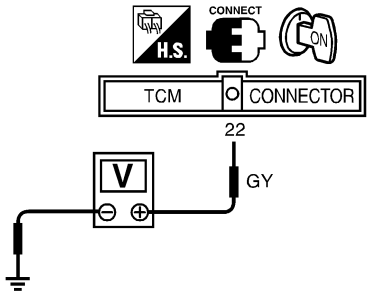
1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out "OVERDRIVE SWITCH". Check the signal of the overdrive control switch is indicated properly.
   (Overdrive control switch "ON" displayed on CONSULT-II means overdrive "OFF".)

DATA MONITOR	
MONITORING	
ENGINE SPEED	XXX rpm
TURBINE REV	XXX rpm
OVERDRIVE SW	ON
PN POSI SW	OFF
R POSITION SW	OFF

SAT645J

Without CONSULT-II

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Check voltage between TCM terminal 22 and ground when overdrive control switch is "ON" and "OFF".
   Voltage:
   Switch position "ON":
   Battery voltage
   Switch position "OFF":
   1V or less



SAT531J

OK or NG

OK (With CONSULT-II)	▶	GO TO 7.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING ITEM

Check the following items:

- Overdrive control switch
  Refer to "Component Inspection", AT-263.
- Harness for short or open between TCM and overdrive control switch (Main harness)
- Harness for short or open of ground circuit for overdrive control switch (Main harness)

OK or NG

OK (With CONSULT-II)	▶	GO TO 7.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	Repair or replace damaged parts.

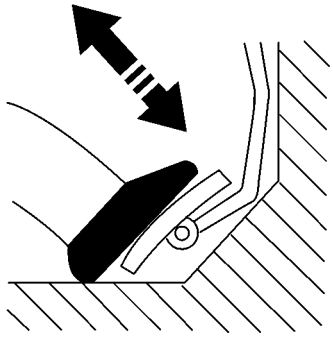
7	CHECK THROTTLE POSITION SWITCH CIRCUIT (With CONSULT-II)

With CONSULT-II

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Apply vacuum to the throttle opener, then check the following. Refer to steps 1 and 2 of "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.
4. Read out "CLOSED THL/SW" and "W/O THRL/P-SW" depressing and releasing accelerator pedal.
   Check the signal of throttle position switch is indicated properly.

Accelerator pedal condition	Data monitor	
	CLOSED THL/SW	W/O THRL/P-SW
Released	ON	OFF
Fully depressed	OFF	ON

MTBL0011



DATA MONITOR	
MONITORING	
POWERSHIFT SW	OFF
CLOSED THL/SW	OFF
W/O THRL/P-SW	OFF
HOLD SW	OFF
BRAKE SW	ON

SAT646J

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING ITEM

Check the following items:

- Throttle position switch
  Refer to "Component Inspection", AT-264.
- Harness for short or open between ignition switch and throttle position switch (Main harness)
- Harness for short or open between throttle position switch and TCM (Main harness)

OK or NG

OK	▶	GO TO 10.
NG	▶	Repair or replace damaged parts.

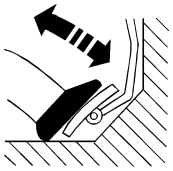
9	CHECK THROTTLE POSITION SWITCH CIRCUIT (Without CONSULT-II)

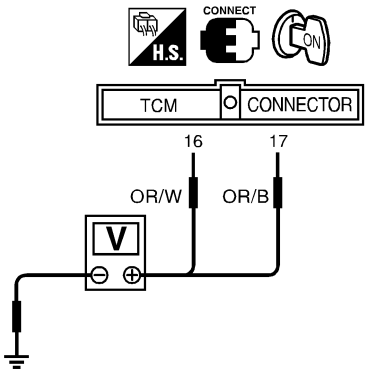
Without CONSULT-II

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Check voltage between TCM terminals 16, 17 and ground while depressing, and releasing accelerator pedal slowly.
   (after warming up engine)
   [Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.]

Accelerator pedal condition	Voltage	
	Terminal No. 16	Terminal No. 17
Released	Battery voltage	0V
Fully depressed	0V	Battery voltage

MTBL0519





SAT526J

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 8.

10	CHECK DTC

Perform Diagnostic procedure, AT-258.

OK or NG

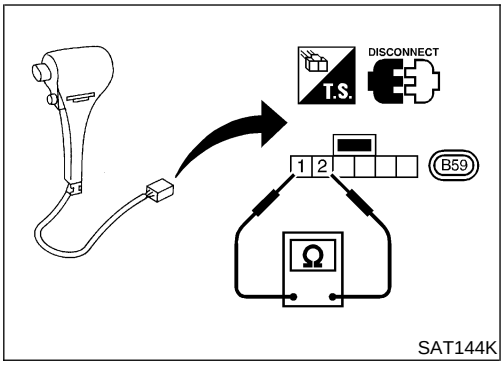
OK	▶	**INSPECTION END**
NG	▶	GO TO 11.

11	CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.



SAT144K

COMPONENT INSPECTION

Overdrive Control Switch

NAAT0204S04

NAAT0204S0401

- Check continuity between two terminals.

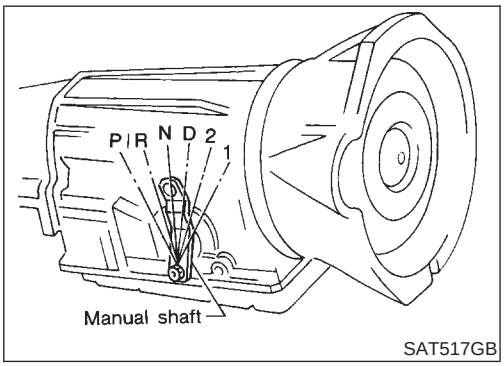
Continuity:

Switch position "ON":

No

Switch position "OFF":

Yes



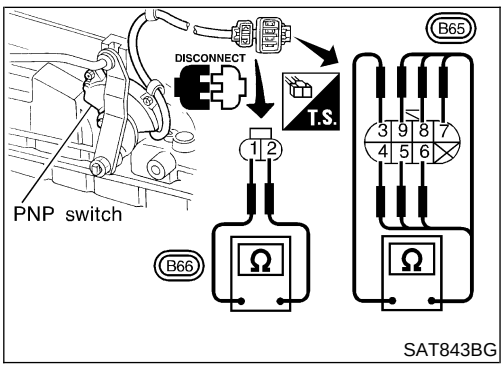
SAT517GB

Park/Neutral Position Switch

NAAT0204S0402

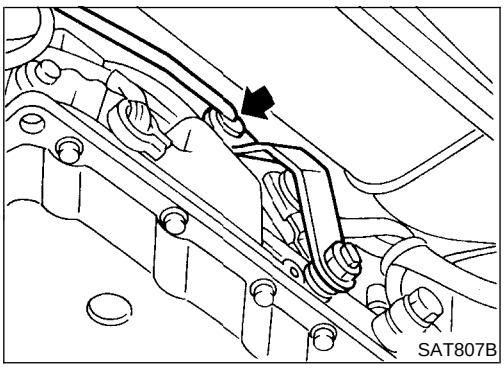
1. Check continuity between terminals 1 and 2 and between terminals 3 and 4, 5, 6, 7, 8, 9 while moving manual shaft through each position.

Lever position	Terminal No.	
P	1 - 2	3 - 4
R	3 - 5	
N	1 - 2	3 - 6
D	3 - 7	
2	3 - 8	
1	3 - 9	

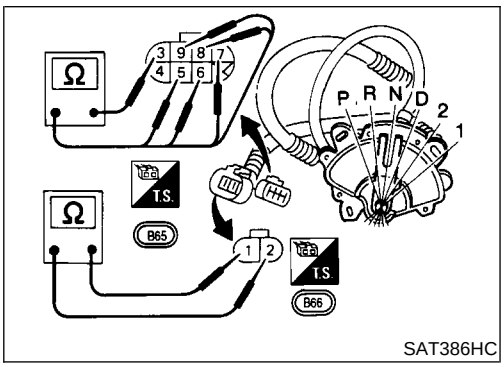


SAT843BG

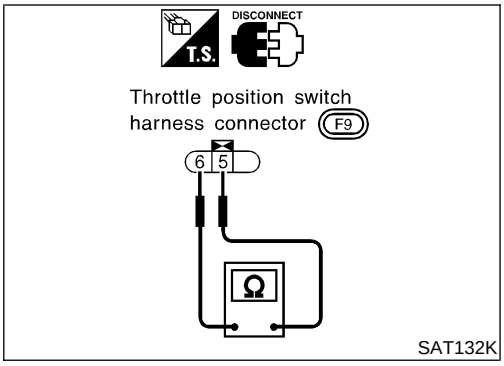
2. If NG, check again with manual control linkage disconnected from manual shaft of A/T assembly. Refer to step 1.
3. If OK on step 2, adjust manual control linkage. Refer to AT-276.


SAT807B

4. If NG on step 2, remove PNP switch from A/T and check continuity of PNP switch terminals. Refer to step 1.
5. If OK on step 4, adjust PNP switch. Refer to AT-276.
6. If NG on step 4, replace PNP switch.



SAT386HC



Throttle Position Switch

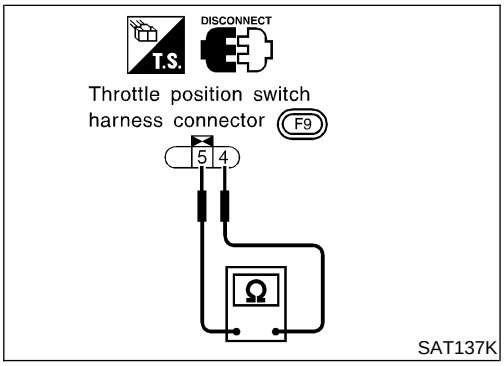
NAAT0204S0403

Closed Throttle Position Switch (Idle Position)

- Check continuity between terminals 5 and 6.
  [Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.]

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

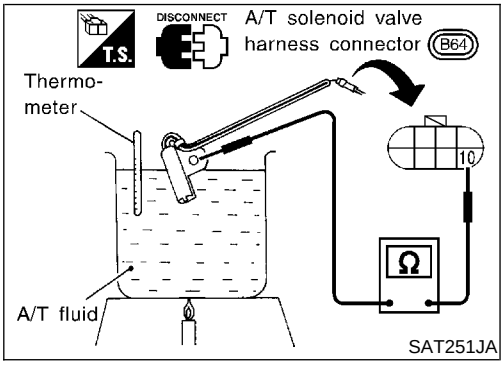
- To adjust closed throttle position switch, refer to EC-426, "System Description".



Wide Open Throttle Position Switch

- Check continuity between terminals 4 and 5.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes



A/T Fluid Temperature Switch

NAAT0204S0404

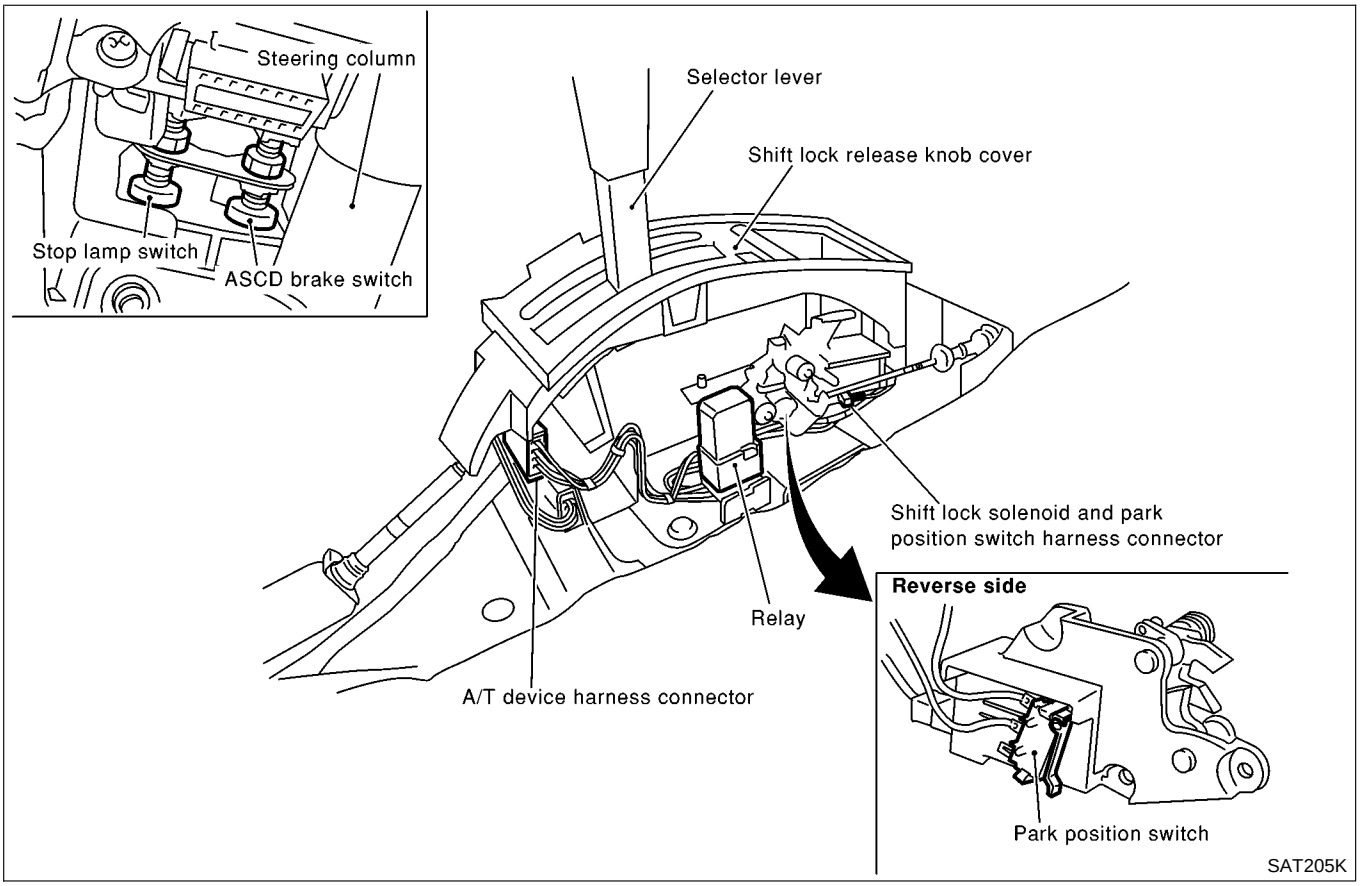
1. Make sure the A/T fluid warning lamp lights when the key is inserted and turned to "ON".
2. Make sure the A/T fluid warning lamp goes off when turning the ignition switch to "ON".
3. Check resistance between terminal 10 and ground while changing temperature as shown at left.

Temperature °C (°F)	Resistance
140 (284) or more	Yes
140 (284) or less	No

Description

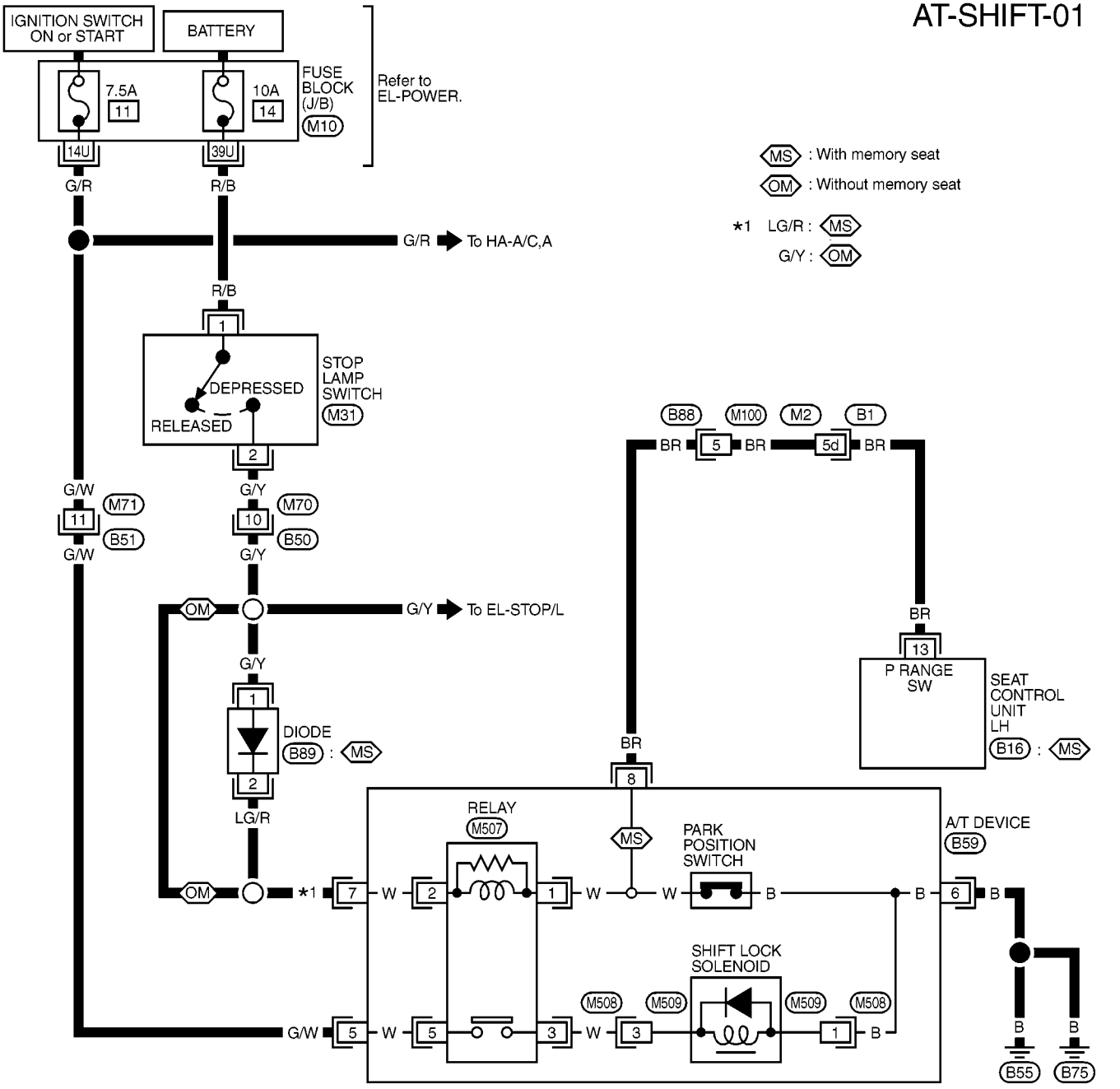
NAAT0093

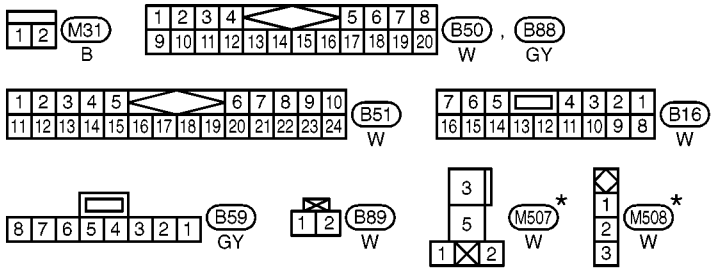
- The mechanical key interlock mechanism also operates as a shift lock:
  With the key switch turned to “ON”, the selector lever cannot be shifted from “P” (parking) to any other position unless the brake pedal is depressed.
  With the key removed, the selector lever cannot be shifted from “P” to any other position.
  The key cannot be removed unless the selector lever is placed in “P”.
- The shift lock and key interlock mechanisms are controlled by the ON-OFF operation of the shift lock solenoid and by the operation of the rotator and slider located inside the key cylinder, respectively.



Wiring Diagram — SHIFT —

NAAT0094





REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK-JUNCTION BOX (J/B)

*: This connector is not shown in "HARNESS LAYOUT", EL section.

MAT953A

Diagnostic Procedure

NAAT0095

SYMPTOM 1:

- **Selector lever cannot be moved from “P” position with key in “ON” position and brake pedal applied.**
- **Selector lever can be moved from “P” position with key in “ON” position and brake pedal released.**
- **Selector lever can be moved from “P” position when key is removed from key cylinder.**

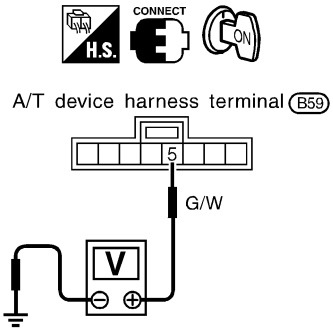
SYMPTOM 2:

Ignition key cannot be removed when selector lever is set to “P” position. It can be removed when selector lever is set to any position except “P”.

1	CHECK KEY INTERLOCK CABLE	
Check key interlock cable for damage.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair key interlock cable. Refer to “Key Interlock Cable”, AT-271.

2	CHECK SELECTOR LEVER POSITION	
Check selector lever position for damage.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Check selector lever. Refer to “ON-VEHICLE SERVICE — PNP Switch and Manual Control Linkage Adjustment”, AT-276 and AT-276.

3	CHECK POWER SOURCE	
1. Turn ignition switch to ON position. (Do not start engine.) 2. Check voltage between A/T device harness terminal 5 and ground.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.



Voltage:
Battery voltage

SAT758JA

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING ITEM

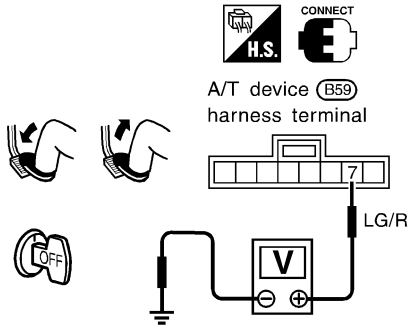
Check the following items:
1. Harness for short or open between ignition switch and A/T device harness terminal 5
2. 7.5A fuse [No. 11, located in the fuse block (J/B)]
3. Ignition switch (Refer to EL-9, "Schematic".)

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace damaged parts.

5	CHECK INPUT SIGNAL A/T DEVICE

Turn ignition switch to OFF position.
- Check voltage between A/T device harness terminal 7 and ground.



Brake pedal	Voltage
Depressed	Battery voltage
Released	0V

SAT179K

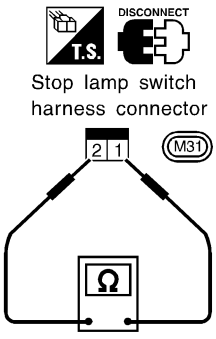
OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING ITEM

Check the following items:
1. Harness for short or open between battery and stop lamp switch harness connector 1
2. Harness for short or open between stop lamp switch harness connector 2 and A/T device harness connector 7
3. Diode
4. 10A fuse [No. 14, located in the fuse block (J/B)]
5. Stop lamp switch

a. Check continuity between terminals 1 and 2.



Condition	Continuity
When brake pedal is depressed	Yes
When brake pedal is released	No

SAT146K

Check stop lamp switch after adjusting brake pedal — refer to BR-14, "Adjustment".

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

7	CHECK GROUND CIRCUIT

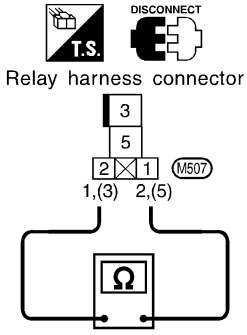
1. Turn ignition switch to OFF position.
2. Disconnect A/T device harness connector.
3. Check continuity between A/T device harness terminal 6 and ground. Refer to wiring diagram — SHIFT —.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK RELAY CIRCUIT

1. Turn ignition switch to ON and OFF position.
- Check continuity between terminals 1, 2, 3 and 5.



Condition	Terminal No.	Ignition SW	Continuity
When selector lever is set in "P" position and breake pedal depressed	1 – 2	ON or OFF	Approx. 100±25Ω
	3 – 5	ON	Yes
		OFF	No

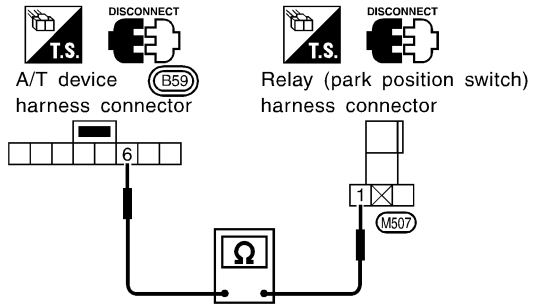
SAT775J

Yes or No

Yes	▶	GO TO 9.
No	▶	Replace relay.

9	CHECK PARK POSITION SWITCH

- Check continuity between A/T device harness terminal 6 and relay (park position switch) harness terminal 1.



Condition	Continuity
When selector lever is set in "P" position and selector lever button is released	Yes
Except above	No

SAT180K

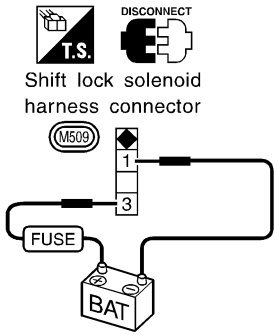
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace park position switch.

Diagnostic Procedure (Cont'd)

10	CHECK SHIFT LOCK SOLENOID

- Check operation by applying battery voltage shift lock solenoid harness terminals 1 and 3.



SAT762J

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace shift lock solenoid.

11	CHECK SHIFT LOCK OPERATION

1. Reconnect shift lock harness connector.
2. Turn ignition switch from OFF to ON position. (Do not start engine.)
3. Recheck shift lock operation.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 12.

12	CHECK A/T DEVICE INSPECTION

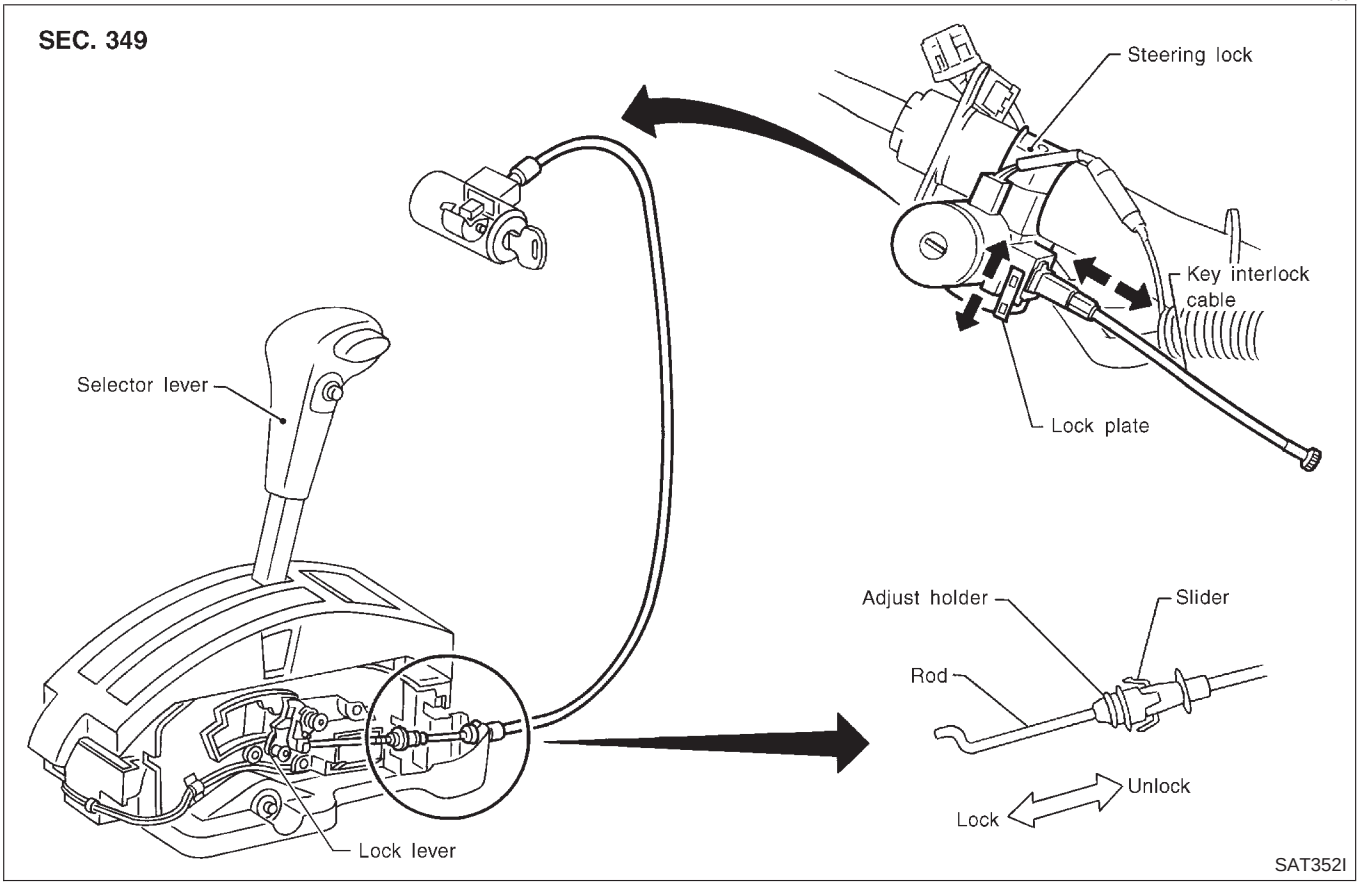
1. Perform A/T device input/output signal inspection test.
2. If NG, recheck harness connector connection.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.

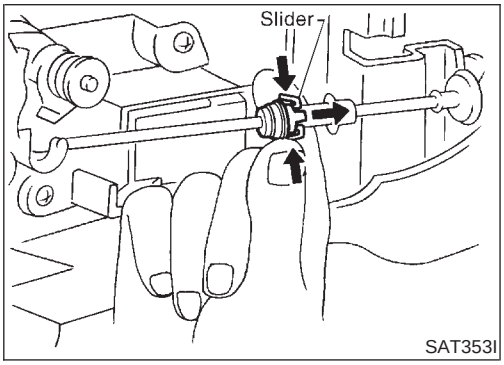
Components

NAAT0097



CAUTION:

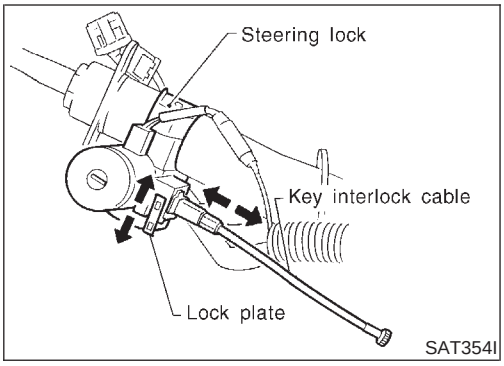
- **Install key interlock cable in such a way that it will not be damaged by sharp bends, twists or interference with adjacent parts.**
- **After installing key interlock cable to control device, make sure that casing cap and bracket are firmly secured in their positions. If casing cap can be removed with an external load of less than 39.2 N (4.0 kg, 8.8 lb), replace key interlock cable with new one.**



Removal

NAAT0098

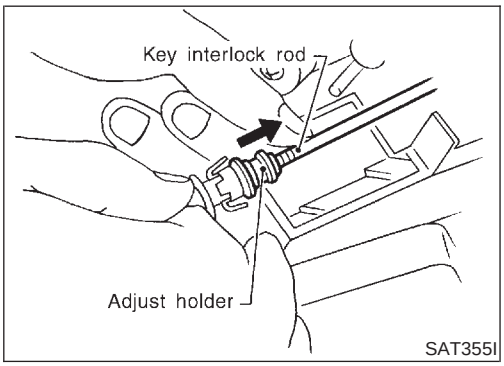
Unlock slider from adjuster holder and remove rod from cable.



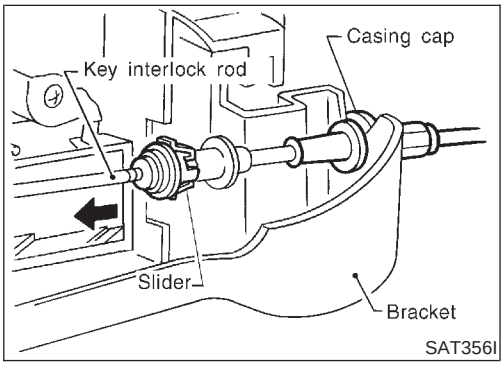
Installation

NAAT0099

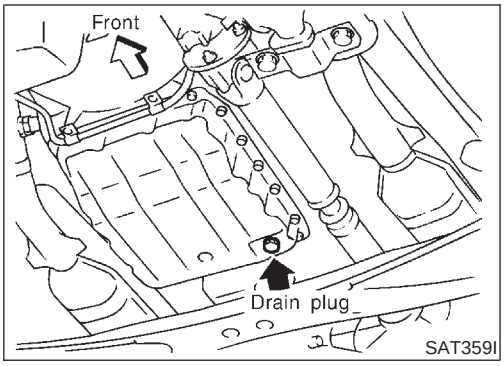
1. Set key interlock cable to steering lock assembly and install lock plate.
2. Clamp cable to steering column and fix to control cable with band.
3. Set selector lever to P position.

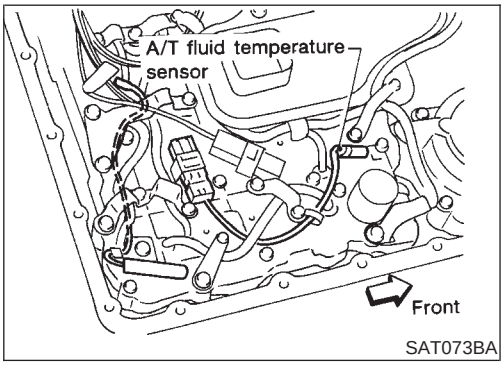


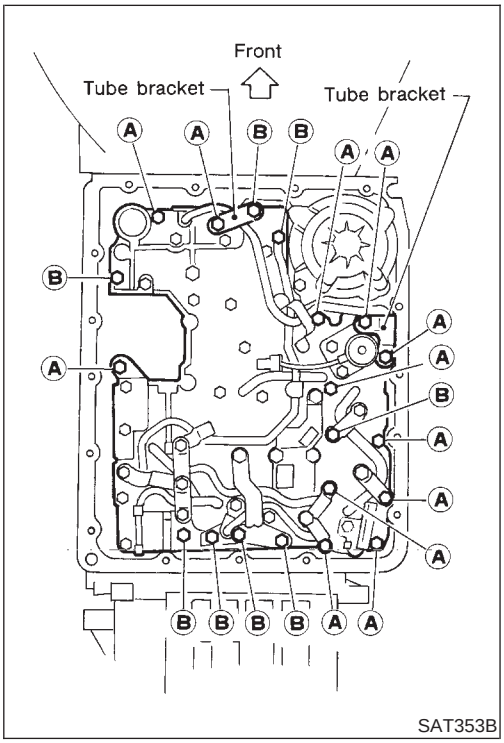
4. Insert interlock rod into adjuster holder.

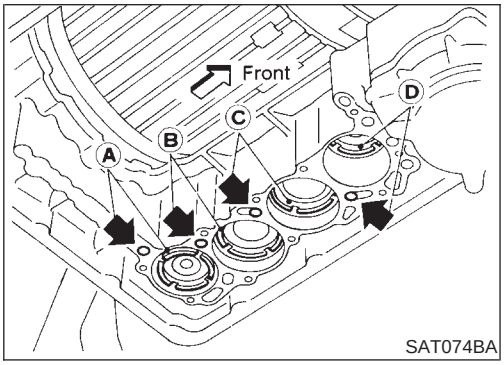


5. Install casing cap to bracket.
6. Move slider in order to fix adjuster holder to interlock rod.









Control Valve Assembly and Accumulators

NAAT0100

REMOVAL

NAAT0100S01

1. Remove exhaust front tube.
2. Remove oil pan and gasket and drain ATF.
3. Remove A/T fluid temperature sensor if necessary.
4. Remove oil strainer.
5. Remove control valve assembly by removing fixing bolts and disconnecting harness connector.

Bolt length and location

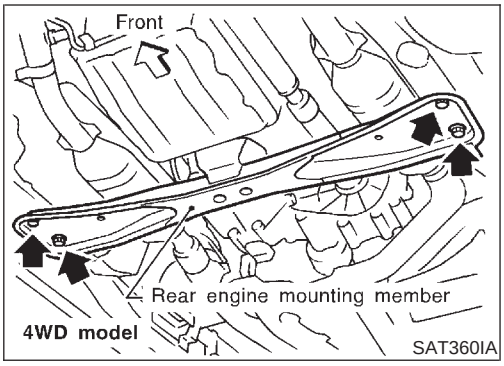
Bolt symbol	ℓ mm (in)
A	33 (1.30)
B	45 (1.77)

6. Remove solenoids and valves from valve body if necessary.
7. Remove terminal cord assembly if necessary.
8. Remove accumulator **A, B, C** and **D** by applying compressed air if necessary.

- **Hold each piston with rag.**

9. Reinstall any part removed.

- **Always use new sealing parts.**



Revolution Sensor Replacement

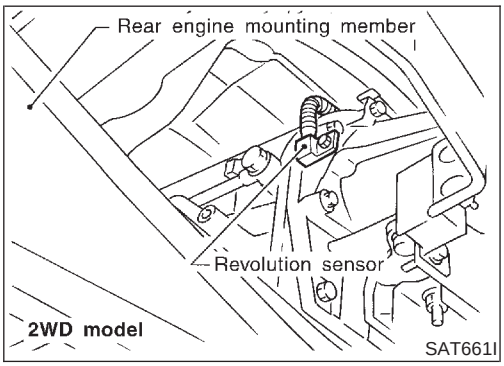
NAAT0210

— 4WD MODEL —

NAAT0210S01

1. Remove rear engine mounting member from side member while supporting A/T with transfer case with jack. Tighten rear engine mounting member to the specified torque. Refer to EM-60, “Rear Engine Mounting”.
2. Lower A/T with transfer case as much as possible.
3. Remove revolution sensor from A/T.
4. Reinstall any part removed.

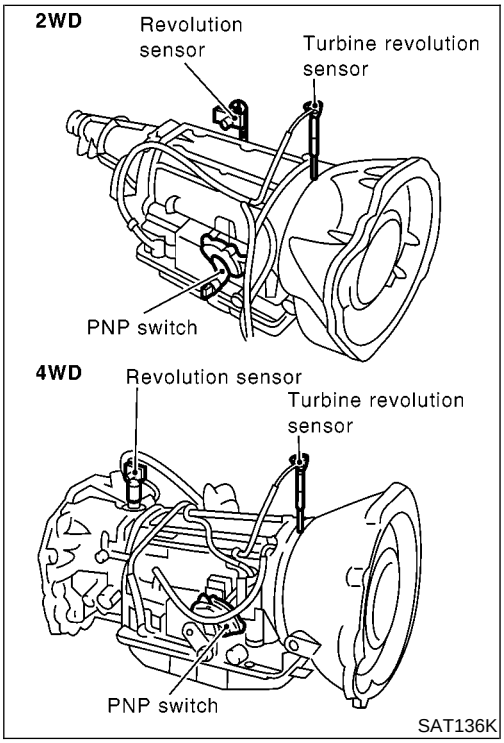
- **Always use new sealing parts.**



— 2WD MODEL —

NAAT0210S02

- Remove revolution sensor from A/T.
- **Always use new sealing parts.**

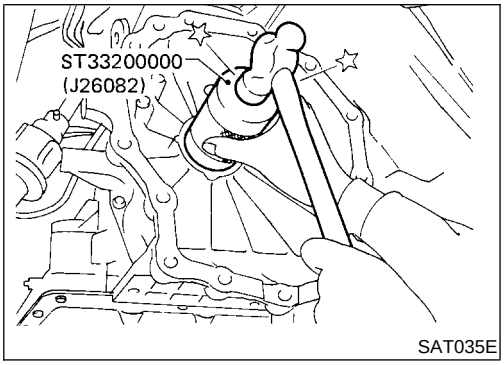


Turbine Revolution Sensor Replacement

NAAT0231

1. Remove A/T assembly, Refer to “Removal”, AT-277.
2. Remove turbine revolution sensor from A/T assembly upper side.
3. Reinstall any part removed.

- **Always use new sealing parts.**



Rear Oil Seal Replacement

NAAT0211

— 4WD MODEL —

NAAT0211S01

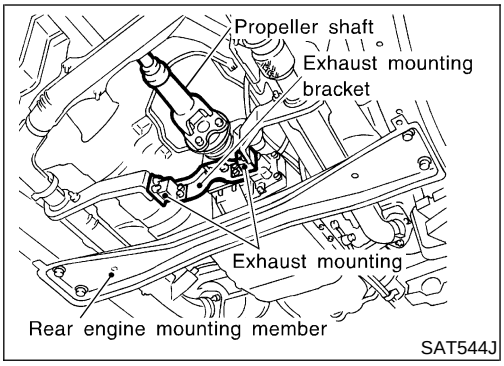
1. Remove transfer case from vehicle. Refer to TF-150, “Removal”.
2. Remove rear oil seal.

- **Do not remove oil seal unless it is to be replaced.**

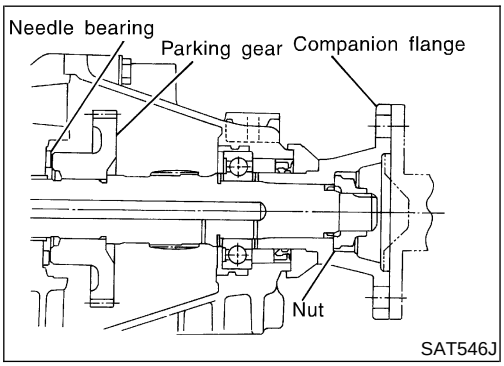
3. Install rear oil seal.

- **Apply ATF before installing.**

4. Reinstall any part removed.



SAT544J



SAT546J

Rear Oil Seal and Companion Flange Oil Seal Replacement

NAAT0212

— 2WD MODEL —

NAAT0212S01

NOTE:
Replace rear extension assembly as a single unit because it cannot be disassembled.

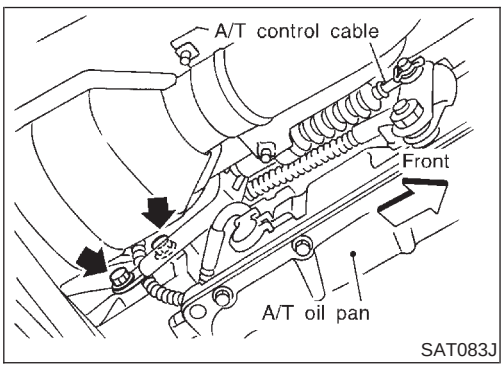
1. Remove propeller shaft. Refer to PD-5, “Components”.
2. Remove exhaust mounting and mounting bracket.
3. Disconnect revolution and speedometer sensor harness connector.
4. Support A/T assembly with a jack.
5. Remove rear engine mounting member. Tighten rear engine mounting member to the specified torque. Refer to EM-60, “Rear Engine Mounting”.
6. Remove rear extension assembly.

a. Remove parking gear and needle bearing.

CAUTION:
Insert your hand between rear extension and transmission case. Detach rear extension assembly while holding parking gear and needle bearing by hand.

7. Reinstall any part removed.

- Always use new sealing parts.



SAT083J

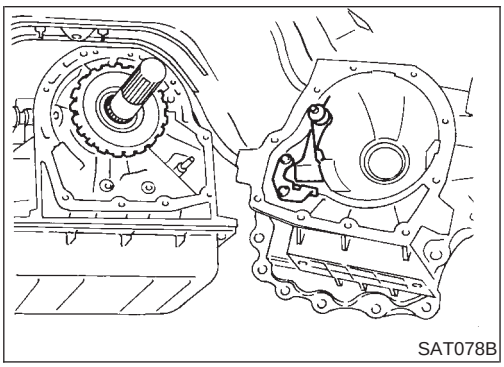
Parking Components Inspection

NAAT0213

— 4WD MODEL —

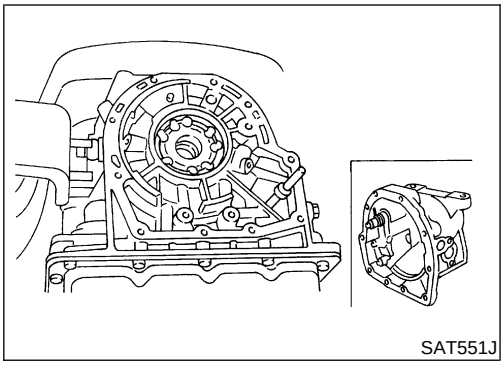
NAAT0213S01

1. Remove propeller shaft. Refer to PD-5, “Components”.
2. Remove transfer case from vehicle. Refer to TF-150, “Removal”.
3. Remove A/T control cable bracket from transmission case.


SAT078B

4. Support A/T assembly with a jack.
5. Remove adapter case from transmission case.
6. Replace parking components if necessary.
7. Reinstall any part removed.

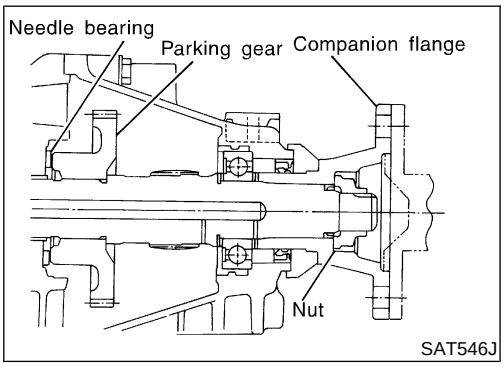
- **Always use new sealing parts.**


SAT551J

— 2WD MODEL —

NAAT0213S02

1. Remove propeller shaft from vehicle. Refer to PD-5, "Components".
2. Support A/T assembly with a jack.
3. Remove rear engine mounting member. Tighten rear engine mounting member to the specified torque. Refer to EM-60, "Rear Engine Mounting".



SAT546J

4. Remove rear extension assembly.

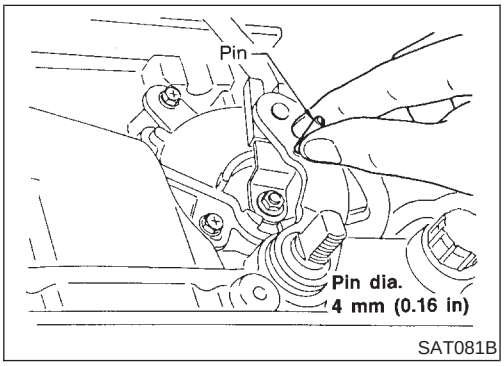
a. Remove parking gear and needle bearing.

CAUTION:

Insert your hand between rear extension and transmission case. Detach rear extension assembly while holding parking gear and needle bearing by hand.

5. Replace parking components if necessary.
6. Reinstall any part removed.

- **Always use new sealing parts.**



SAT081B

Park/Neutral Position Switch Adjustment

NAAT0104

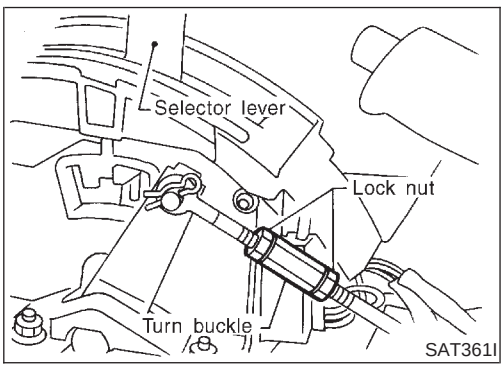
1. Remove manual control linkage from manual shaft of A/T assembly.
2. Set manual shaft of A/T assembly in "N" position.
3. Loosen PNP switch fixing bolts.
4. Insert pin into adjustment holes in both PNP switch and manual shaft of A/T assembly as near vertical as possible.
5. Reinstall any part removed.
6. Check continuity of PNP switch. Refer to "Components Inspection", AT-103.

Manual Control Linkage Adjustment

NAAT0105

Move selector lever from "P" position to "1" position. You should be able to feel the detents in each position.
If the detents cannot be felt or the pointer indicating the position is improperly aligned, the linkage needs adjustment.

1. Place selector lever in "P" position.
2. Loosen lock nuts.



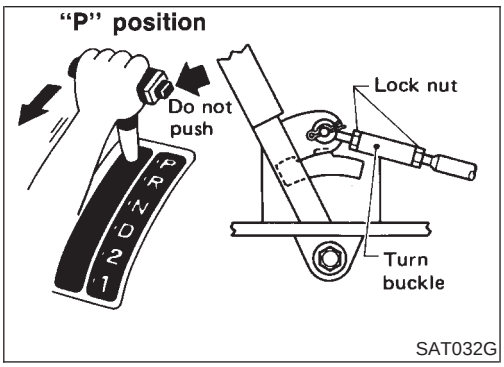
SAT361I

3. Tighten turn buckle until aligns with inner cable, pulling selector lever toward "R" position side without pushing button.
4. Back off turn buckle 1 turn and tighten lock nuts to the specified torque.

Lock nut:

: 4.4 - 5.9 N·m (0.45 - 0.60 kg-m, 39.1 - 52.1 in-lb)

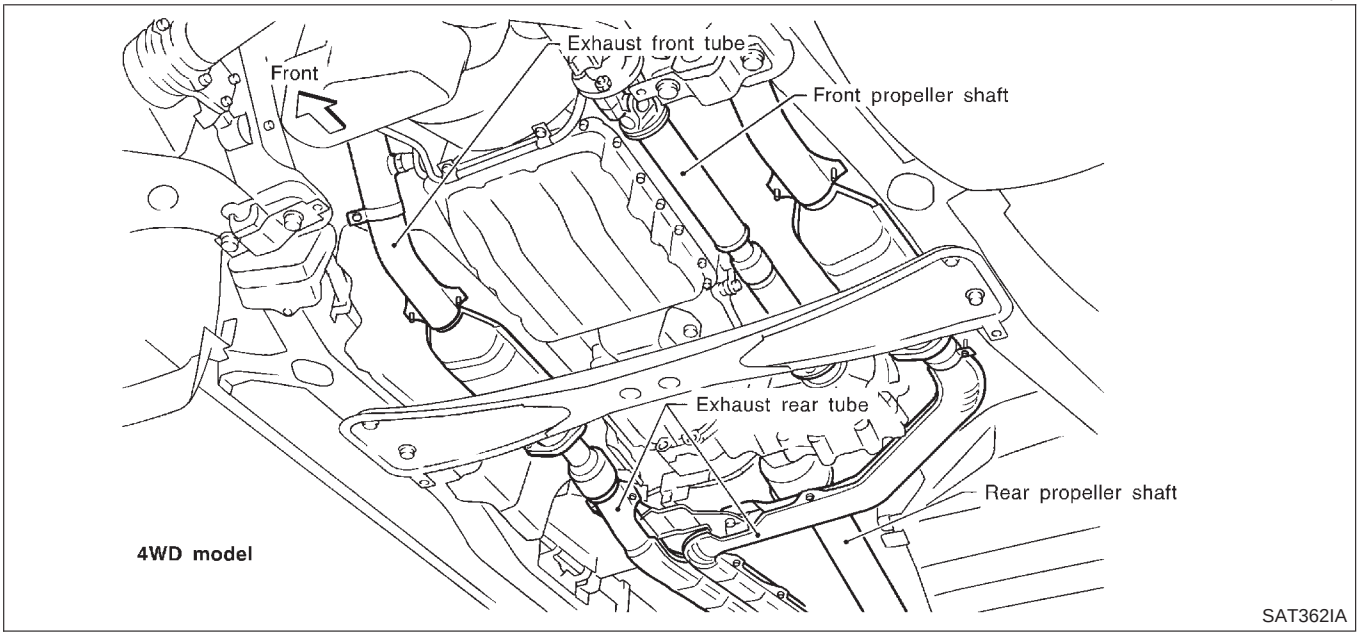
5. Move selector lever from "P" position to "1" position. Make sure that selector lever can move smoothly.

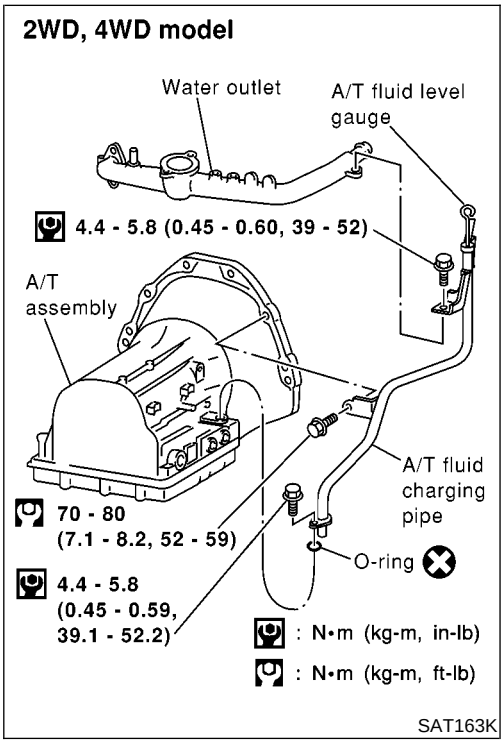


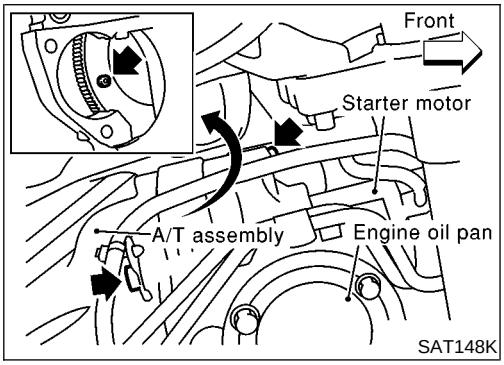
SAT032G

Removal

NAAT0214







CAUTION:

When removing the A/T assembly from engine, first remove the crankshaft position sensor (OBD) from the A/T assembly lower side.

Be careful not to damage sensor edge.

— 4WD MODEL —

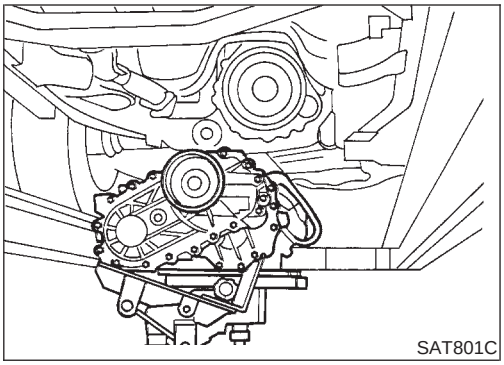
NAAT0214S01

1. Remove battery negative terminal.
2. Remove exhaust front and rear tubes.
3. Remove fluid charging pipe from A/T assembly.
4. Remove oil cooler pipe from A/T assembly.
5. Plug up openings such as the fluid charging pipe hole, etc.
6. Remove propeller shaft. Refer to PD-5, “Components”.
7. Remove transfer control linkage from transfer. Refer to TF-150, “Removal”.

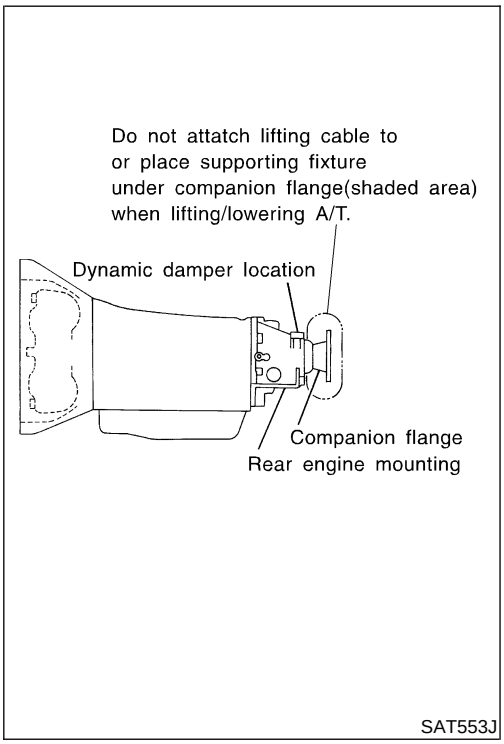
- **Insert plug into rear oil seal after removing rear propeller shaft.**
- **Be careful not to damage spline, sleeve yoke and rear oil seal.**

8. Remove A/T control cable from A/T assembly.
9. Disconnect A/T solenoid, PNP switch, turbine revolution, revolution and speedometer sensor harness connectors.
10. Remove starter motor. Refer to SC-19, “Removal and Installation”.
11. Remove bolts securing torque converter to drive plate.

- **Remove the bolts by turning crankshaft.**


SAT801C

12. Support A/T and transfer assembly with a jack.
13. Remove rear engine mounting member from body and A/T assembly. Tighten rear engine mounting member to the specified torque. Refer to EM-60, "Rear Engine Mounting".
14. Remove bolts securing A/T assembly to engine.
- **Secure torque converter to prevent it from dropping.**
- **Secure A/T assembly to a jack.**
15. Lower A/T assembly with transfer.



SAT553J

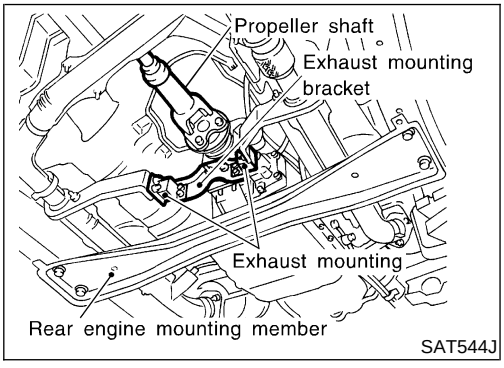
— 2WD MODEL —

NAAT0214S02

CAUTION:

- **Do not attach lifting cable to or place supporting fixture under companion flange at rear of A/T (shown in the figure at left) when lifting/lowering A/T.**
- **Be sure to attach lifting cable to rear engine mounting or dynamic damper location when lifting/lowering A/T.**

1. Remove battery negative terminal.
2. Remove exhaust front and rear tubes.
3. Remove fluid charging pipe from A/T assembly.
4. Remove oil cooler pipe from A/T assembly.
5. Plug up openings such as the fluid charging pipe hole, etc.
6. Remove propeller shaft. Refer to PD-5, "Components".
7. Remove A/T control cable from A/T assembly.
8. Disconnect A/T and speedometer sensor harness connectors.
9. Remove starter motor. Refer to SC-19, "Removal and Installation".
10. Remove gusset and rear plate cover securing engine to A/T assembly.
11. Remove bolts securing torque converter to drive plate.
- **Remove the bolts by turning crankshaft.**
12. Support A/T assembly with a jack.
13. Remove rear engine mounting member from body and A/T assembly. Tighten rear engine mounting member to the specified torque. Refer to EM-60, "Rear Engine Mounting".
14. Remove bolts securing A/T assembly to engine.
15. Pull A/T assembly backwards.
- **Secure torque converter to prevent it from dropping.**
- **Secure A/T assembly to a jack.**
16. Lower A/T assembly.



SAT544J

Installation

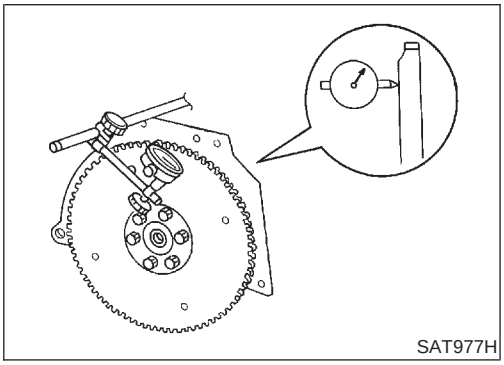
NAAT0107

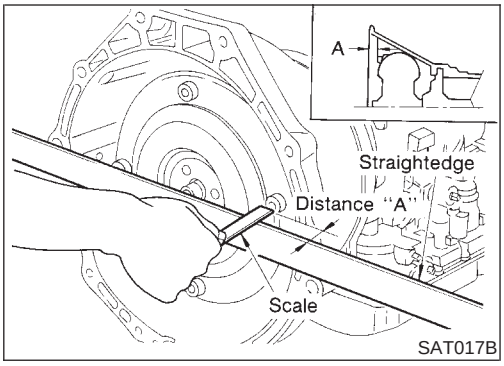
- Drive plate runout

Maximum allowable runout:

Refer to EM-71, "FLYWHEEL/DRIVE PLATE RUNOUT".

If this runout is out of specification, replace drive plate with ring gear.

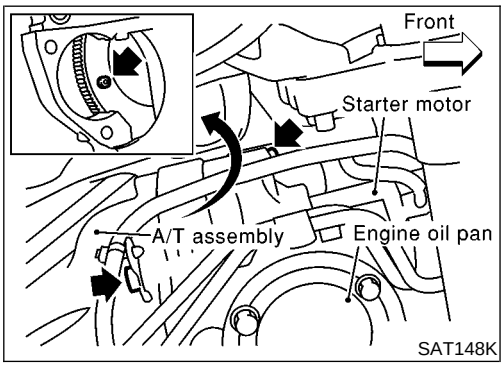

SAT977H



SAT017B

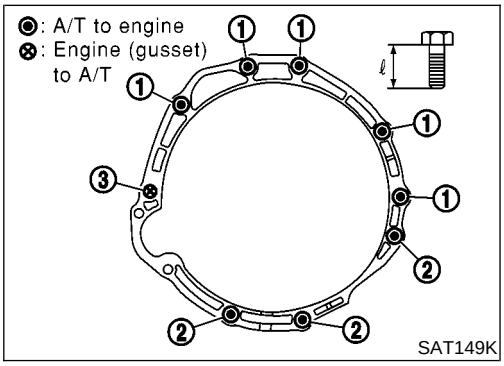
- When connecting torque converter to transmission, measure distance "A" to be certain that they are correctly assembled.

Distance "A":
25.0 mm (0.984 in) or more



SAT148K

- Install converter to drive plate.
- **After converter is installed to drive plate, rotate crankshaft several turns and check to be sure that transmission rotates freely without binding.**

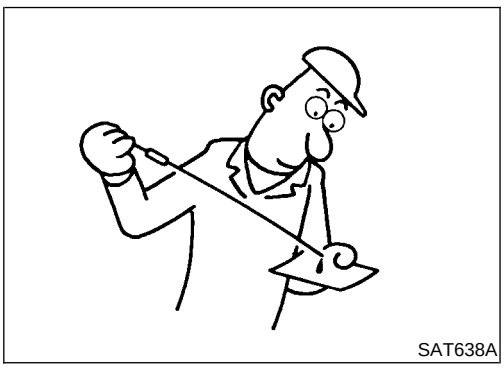


SAT149K

- Tighten bolts securing transmission.

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	Bolt length "ℓ" mm (in)
1	70 - 80 (7.1 - 8.2, 52 - 59)	65 (2.56)
2	70 - 80 (7.1 - 8.2, 52 - 59)	55 (2.17)
3	29 - 39 (3.0 - 4.0, 22 - 29)	40 (1.57)

- Reinstall any part removed.

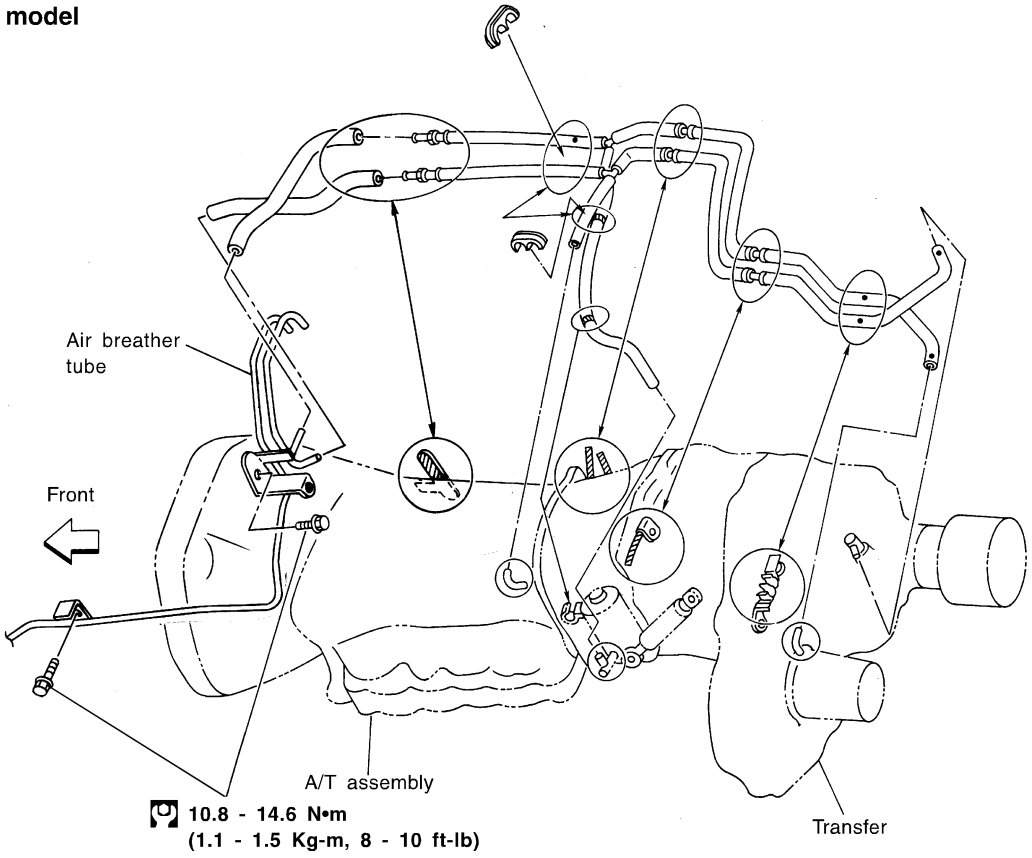

SAT638A

- Check fluid level in transmission.
- Move selector lever through all positions to be sure that transmission operates correctly.
  With parking brake applied, rotate engine at idling. Move selector lever through "N" to "D", to "2", to "1" and to "R" positions. A slight shock should be felt by hand gripping selector each time transmission is shifted.
- Perform road test. Refer to "ROAD TEST", AT-63.

AIR BREATHER HOSE

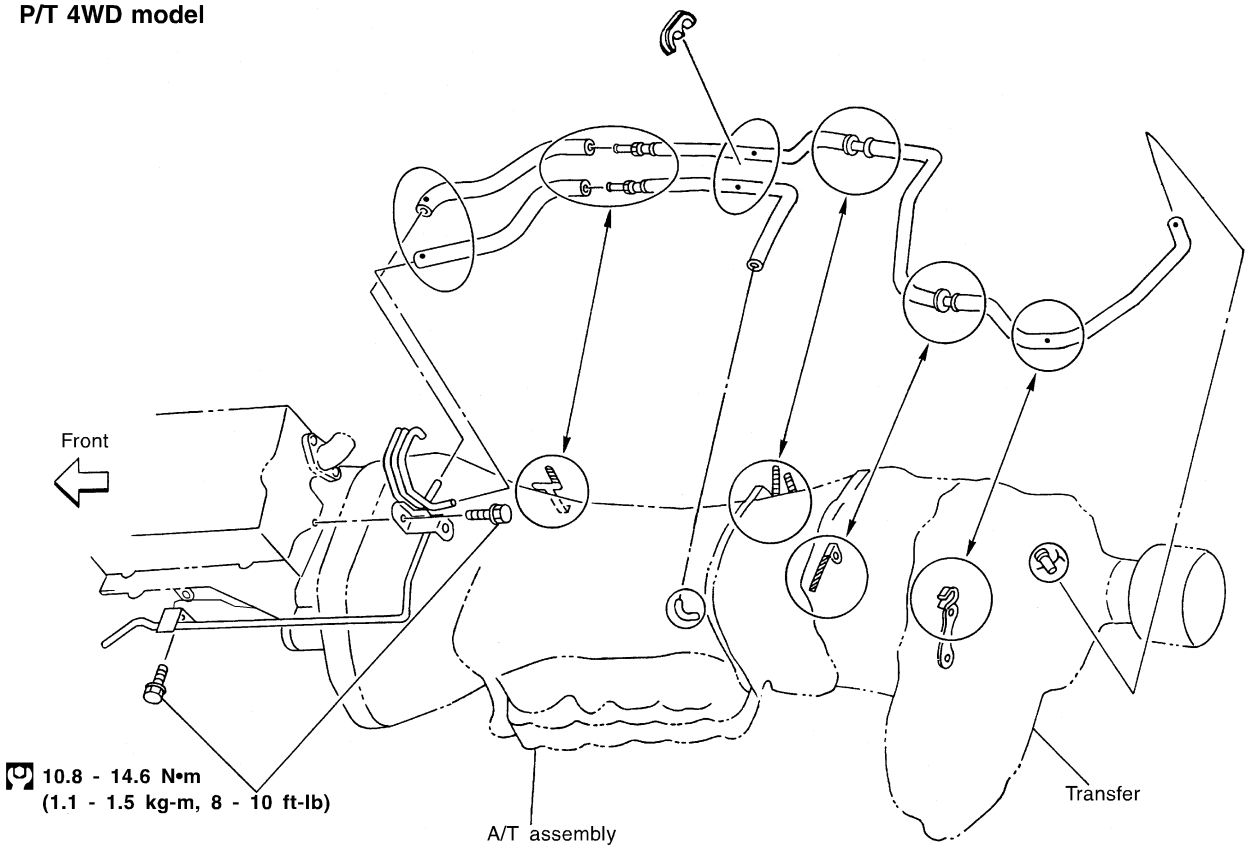
NAAT0107S01

F/T 4WD model

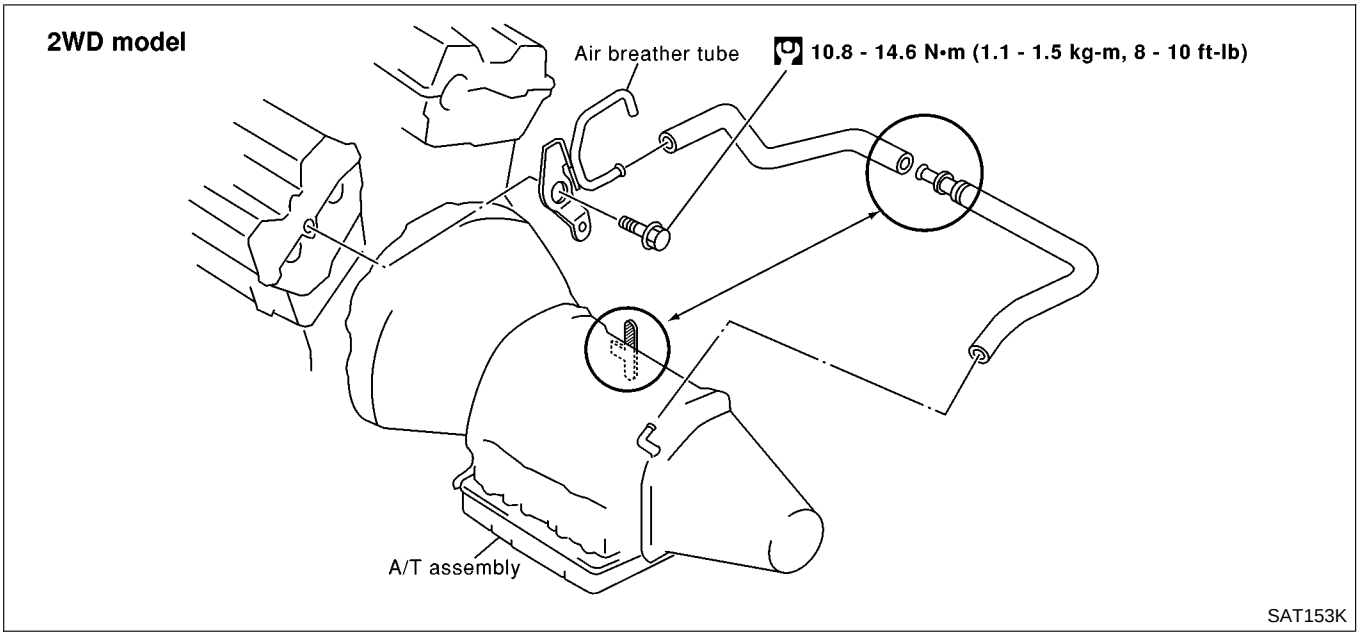


SAT152K

P/T 4WD model



SAT206K


2WD model
Air breather tube
10.8 - 14.6 N•m (1.1 - 1.5 kg-m, 8 - 10 ft-lb)
A/T assembly
SAT153K

Components

NAAT0108

SEC. 311•313•315

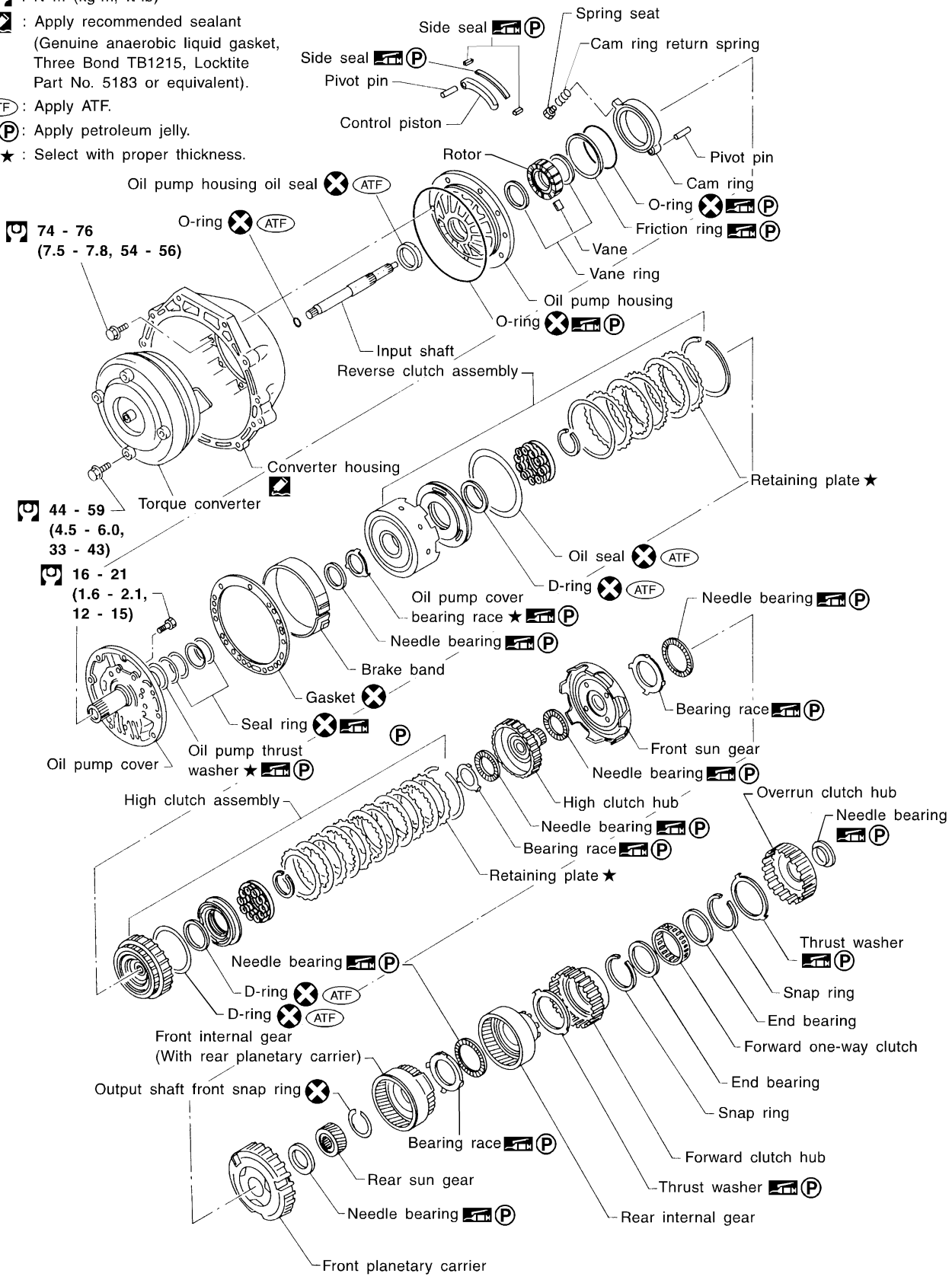
: N•m (kg-m, ft-lb)

: Apply recommended sealant (Genuine anaerobic liquid gasket, Three Bond TB1215, Locktite Part No. 5183 or equivalent).

(ATF) : Apply ATF.

(P) : Apply petroleum jelly.

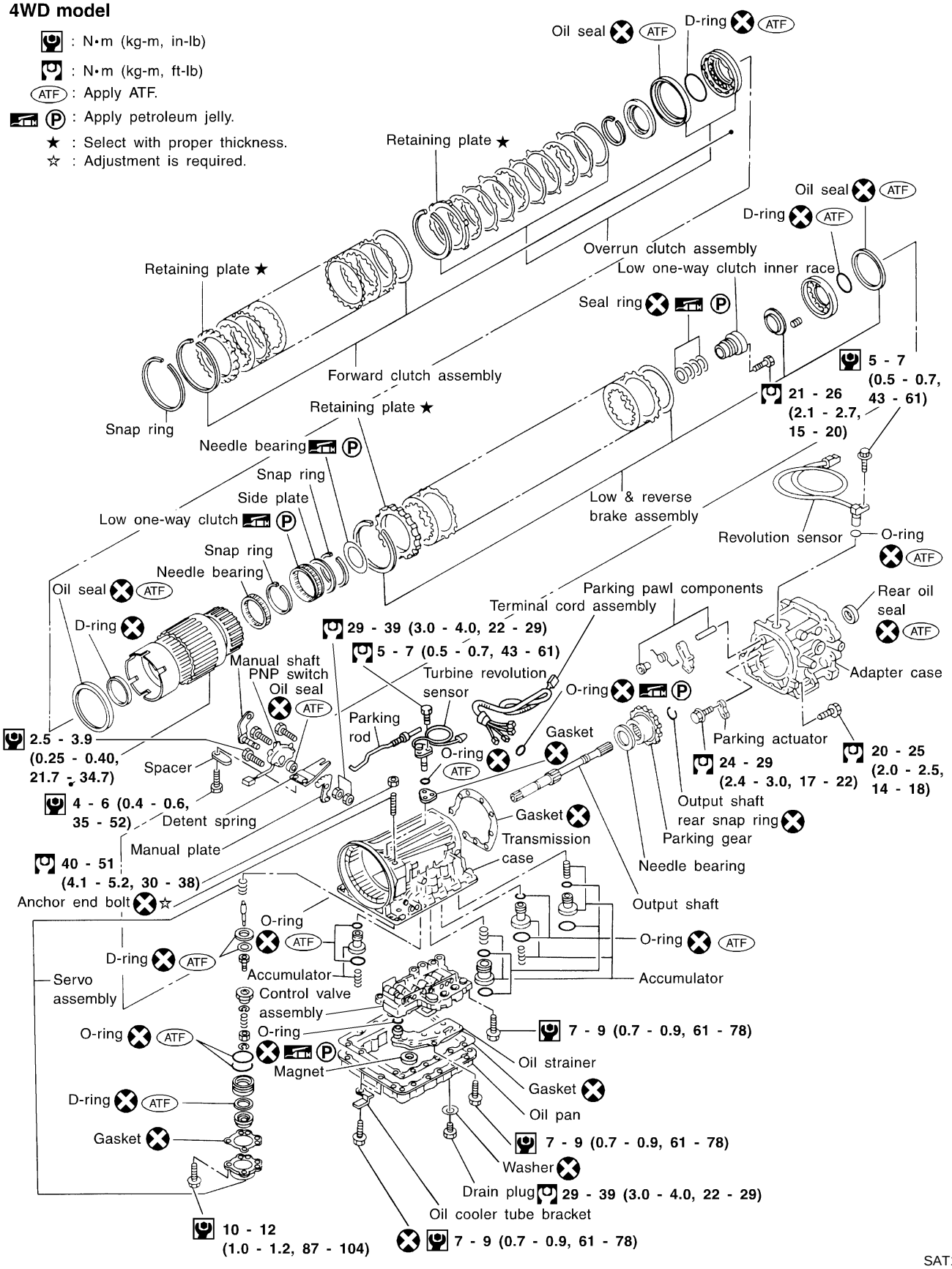
★ : Select with proper thickness.



SAT147JA

SEC. 311•315•317
4WD model

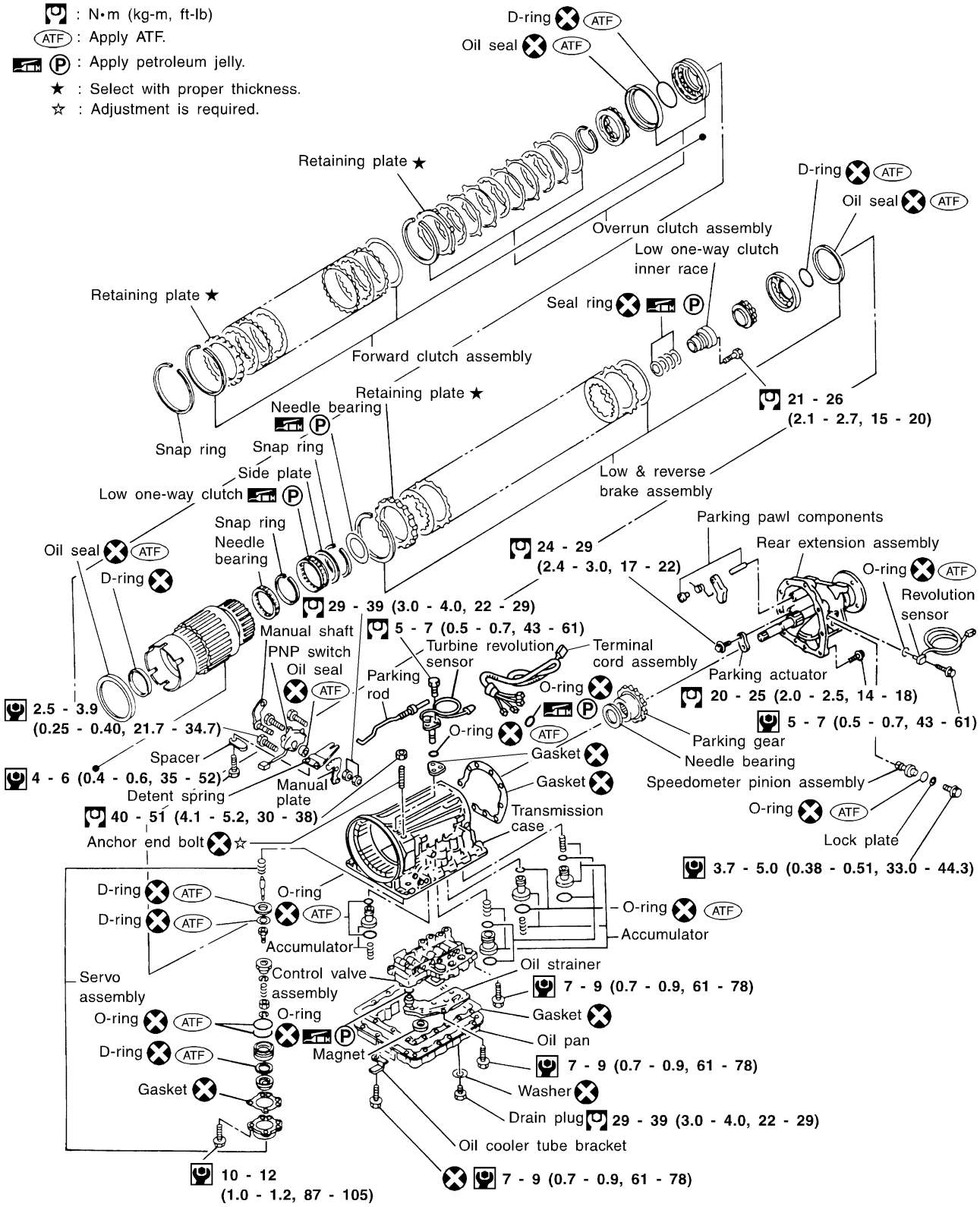
: N•m (kg-m, in-lb)
: N•m (kg-m, ft-lb)
ATF : Apply ATF.
Ⓟ : Apply petroleum jelly.
★ : Select with proper thickness.
☆ : Adjustment is required.



SAT154K

SEC. 311•315•317
2WD model

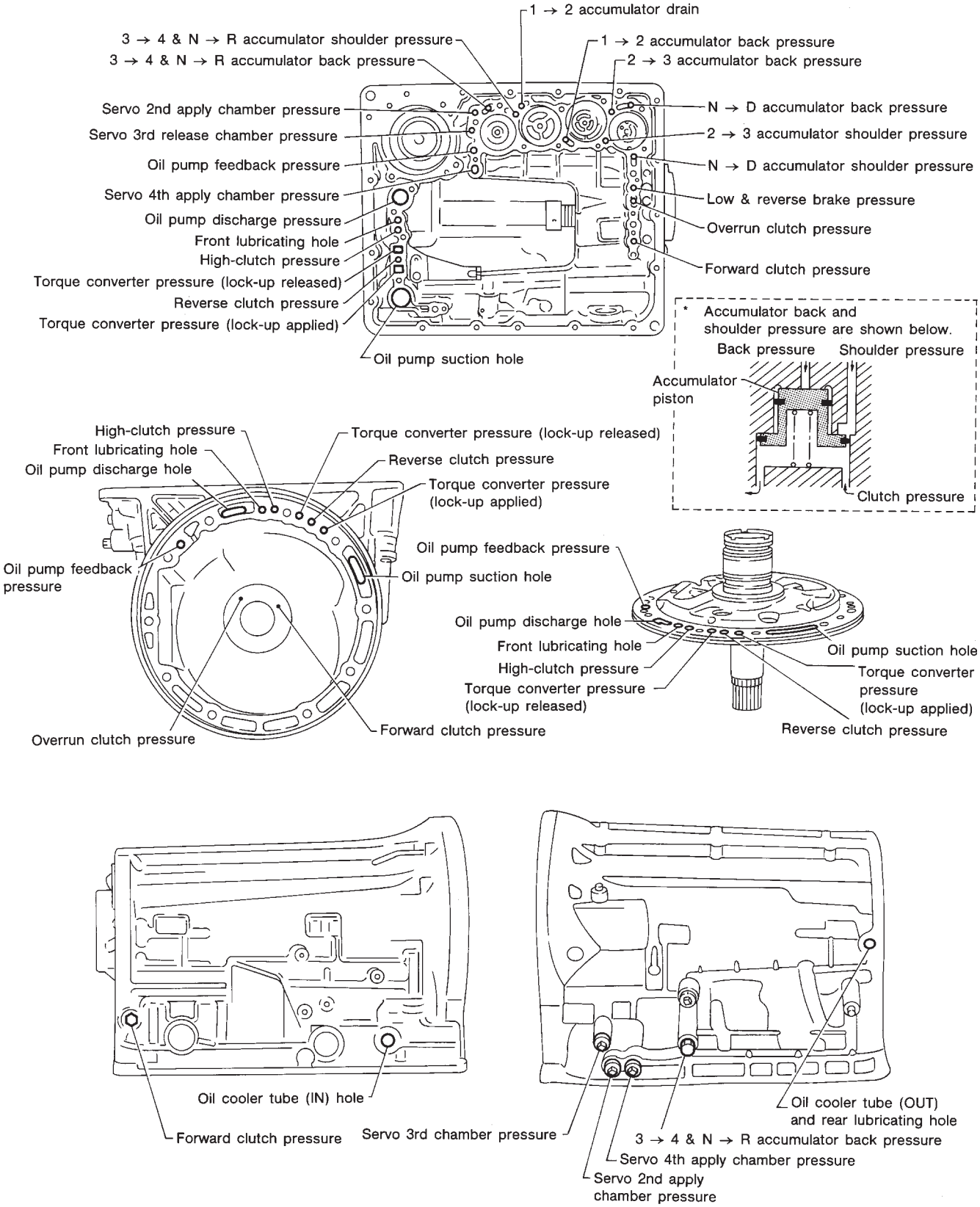
: N•m (kg-m, in-lb)
: N•m (kg-m, ft-lb)
ATF : Apply ATF.
Ⓟ : Apply petroleum jelly.
★ : Select with proper thickness.
☆ : Adjustment is required.



SAT155K

Oil Channel

NAAT0109



SAT185B

Locations of Needle Bearings, Thrust Washers and Snap Rings

NAAT0110

Outer diameter of snap rings

Item number	Outer diameter mm (in)
②	161.0 (6.34)
③	140.1 (5.52)
④	156.4 (6.16)
⑥	142.0 (5.59)
⑦	159.2 (6.27)

Thrust washers

Item number	Color
①	Black
⑤	White

Outer diameter of needle bearings

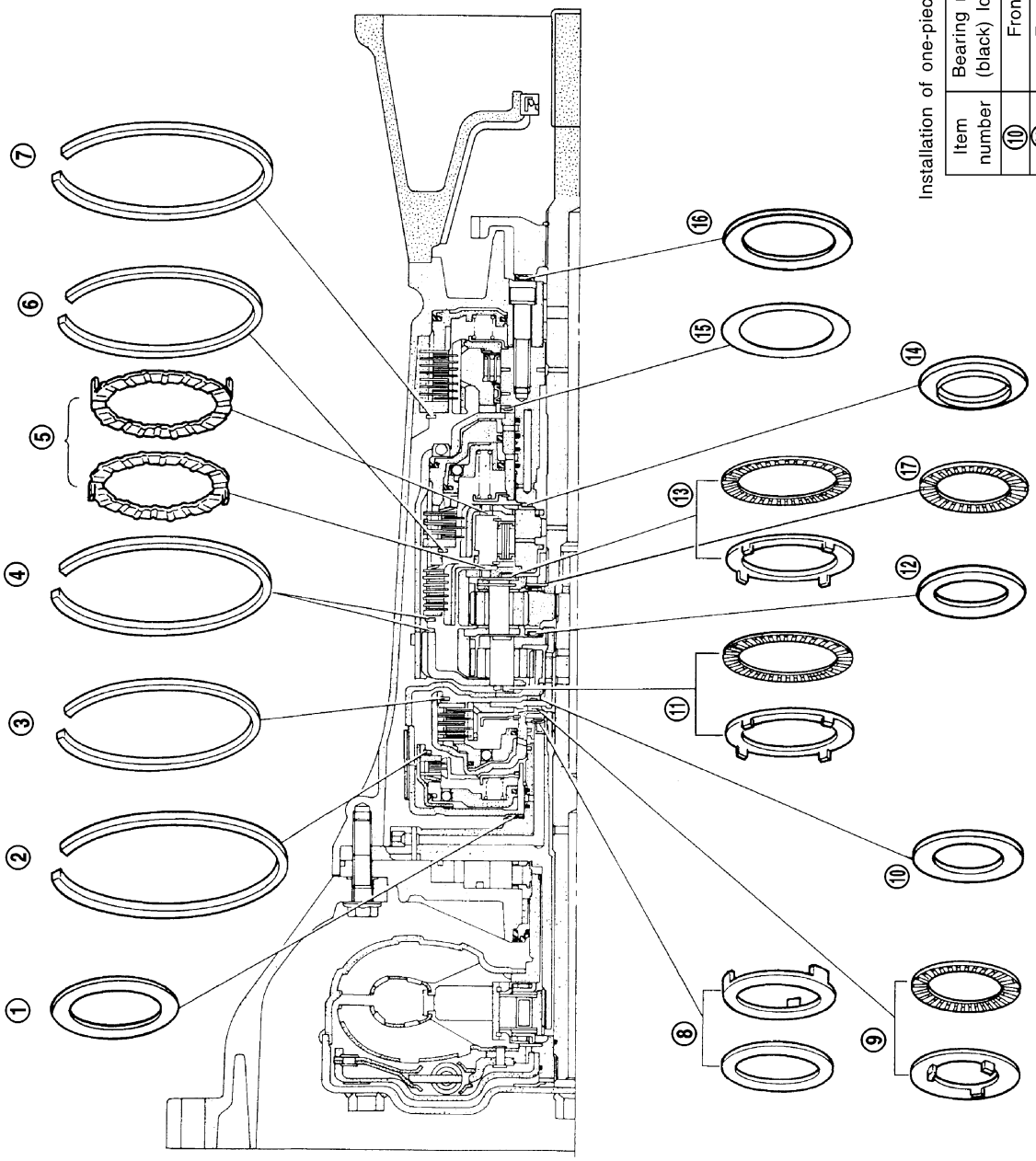
Item number	Outer diameter mm (in)
⑧	47 (1.85)
⑨	53 (2.09)
⑪	75 (2.95)
⑫	53 (2.09)
⑬	75 (2.95)
⑭	57 (2.24)
⑮	78.1 (3.075)
⑯	64 (2.52)
⑰	53 (2.09)

Inner diameter of bearing races

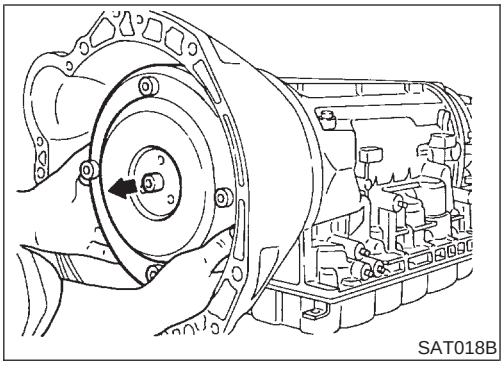
Item number	Outer diameter mm (in)
⑪	58.8 (2.315)
⑬	58.8 (2.315)

Installation of one-piece bearings

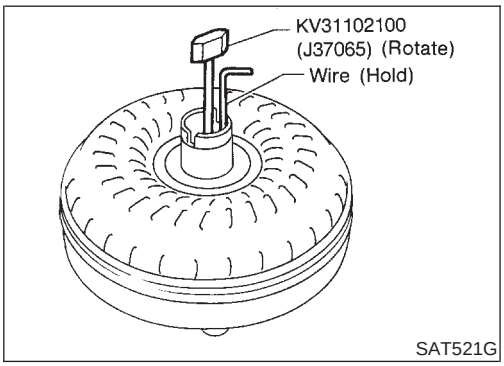
Item number	Bearing race (black) location
⑩	Front
⑫	Front
⑮	Rear side
⑯	Rear side



SAT140JB

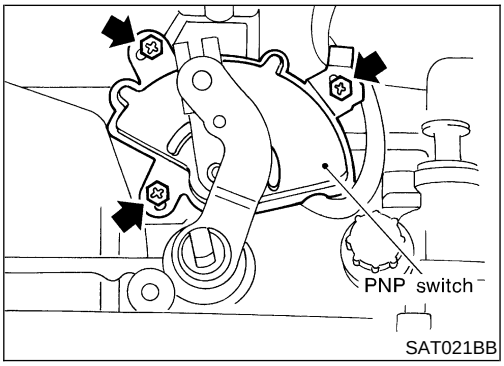

SAT018B

1. Drain ATF through drain plug.
2. Remove turbine revolution sensor.
3. Remove torque converter by holding it firmly and turning while pulling straight out.



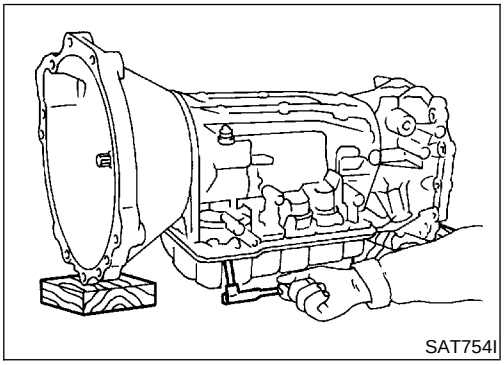
SAT521G

4. Check torque converter one-way clutch.
a. Insert Tool into spline of one-way clutch inner race.
b. Hook bearing support unitized with one-way clutch outer race with suitable wire.
c. Check that one-way clutch inner race rotates only clockwise with Tool while holding bearing support with wire.

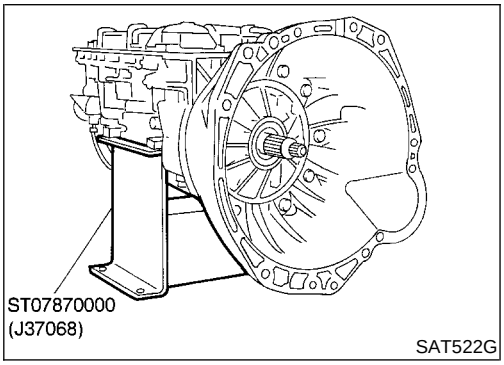


SAT021BB

5. Remove PNP switch from transmission case.

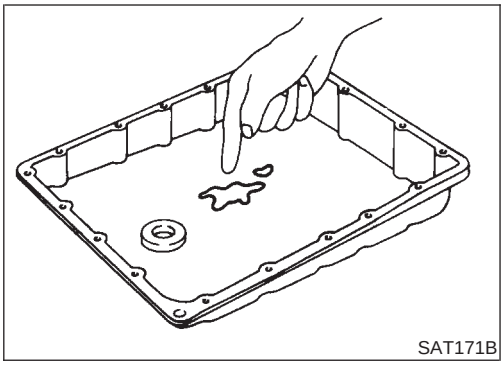

SAT754I

6. Remove oil pan.
- Always place oil pan straight down so that foreign particles inside will not move.



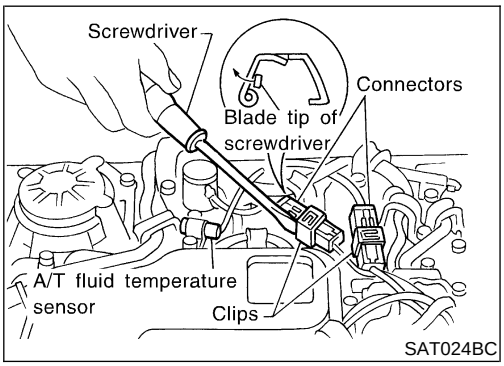
SAT522G

7. Place transmission into Tool with the control valve facing up.


SAT171B

8. Check foreign materials in oil pan to help determine cause of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up. Varnish can cause valves, servo, and clutches to stick and may inhibit pump pressure.

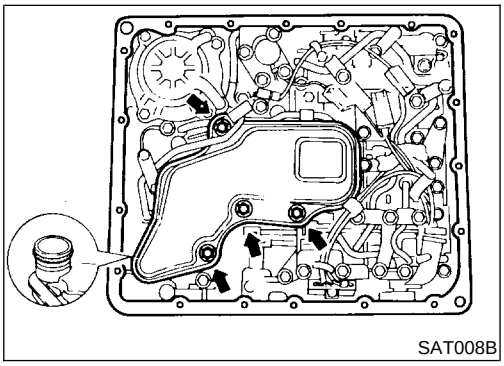
- **If frictional material is detected, replace radiator after repair of A/T. Refer to LC-20, "REMOVAL AND INSTALLATION".**



SAT024BC

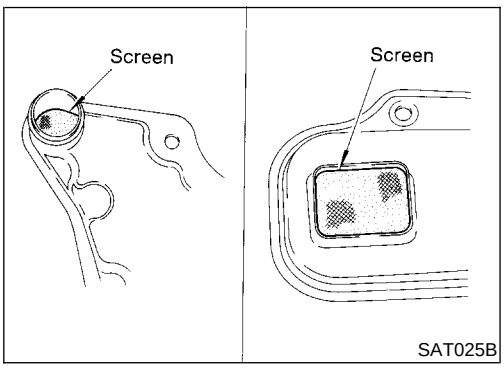
9. Remove torque converter clutch solenoid valve and A/T fluid temperature sensor connectors.

- **Be careful not to damage connector.**


SAT008B

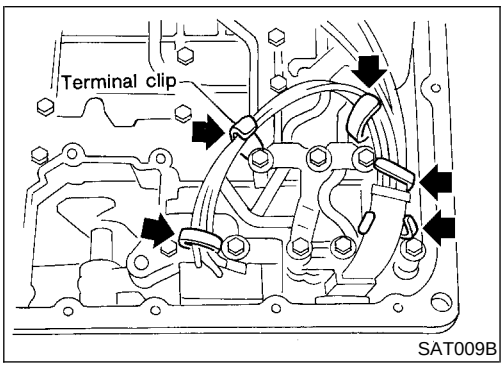
10. Remove oil strainer.

a. Remove oil strainer from control valve assembly. Then remove O-ring from oil strainer.



SAT025B

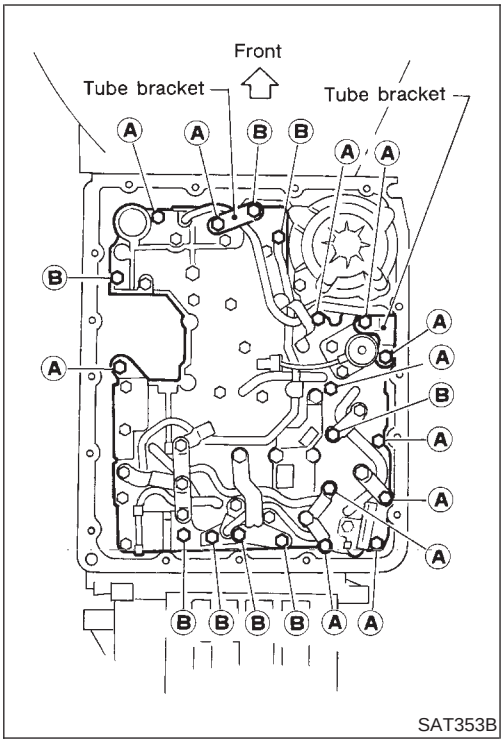
b. Check oil strainer screen for damage.



SAT009B

11. Remove control valve assembly.

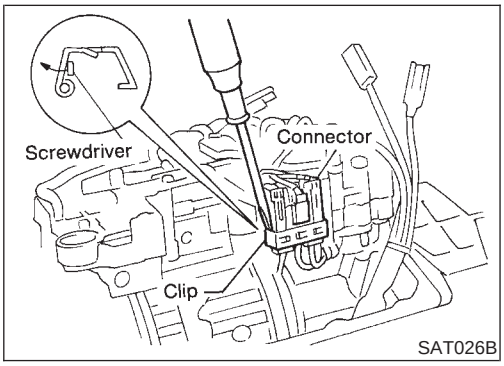
a. Straighten terminal clips to free terminal cords then remove terminal clips.



SAT353B

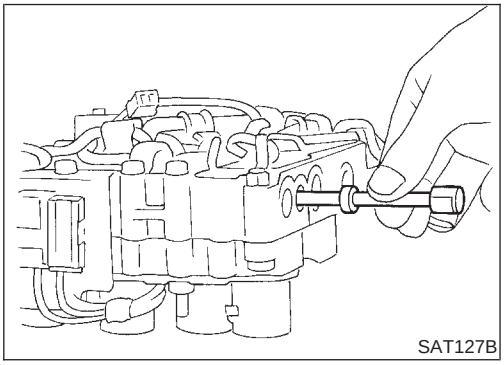
b. Remove bolts A and B, and remove control valve assembly from transmission.

Bolt symbol	Length mm (in)
A	33 (1.30)
B	45 (1.77)

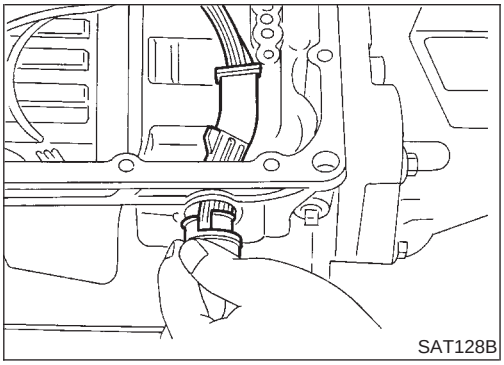


SAT026B

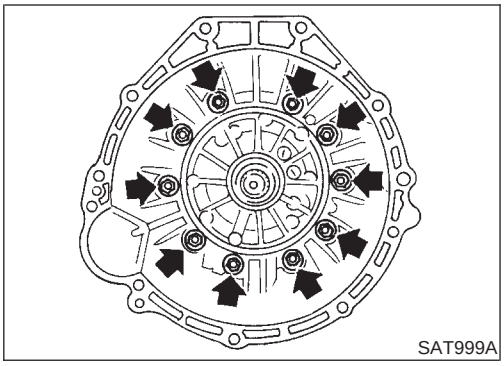
c. Remove solenoid connector.
- **Be careful not to damage connector.**


SAT127B

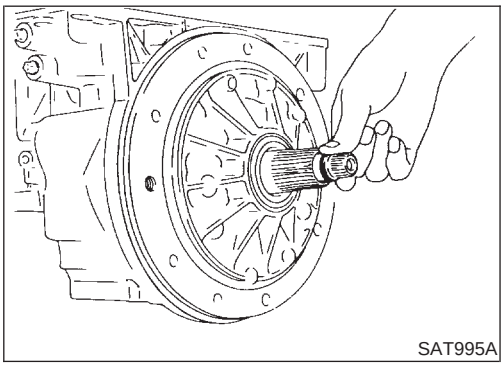
d. Remove manual valve from control valve assembly.


SAT128B

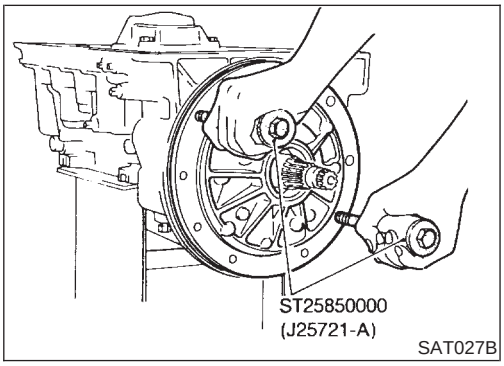
12. Remove terminal cord assembly from transmission case while pushing on stopper.
- **Be careful not to damage cord.**
- **Do not remove terminal cord assembly unless it is damaged.**


SAT999A

13. Remove converter housing from transmission case.
- **Be careful not to scratch converter housing.**


SAT995A

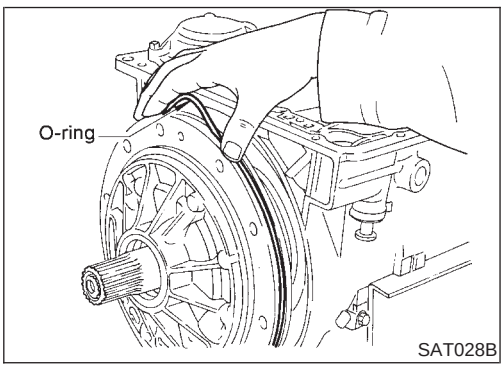
14. Remove O-ring from input shaft.



SAT027B

15. Remove oil pump assembly.

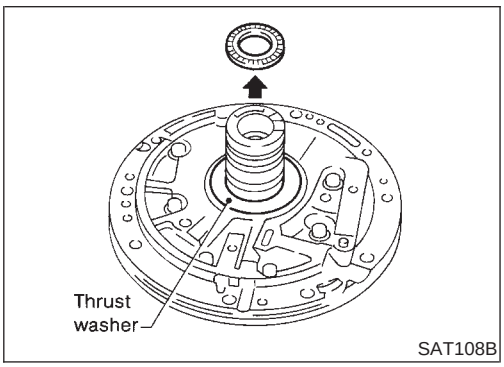
a. Attach Tool to oil pump assembly and extract it evenly from transmission case.



SAT028B

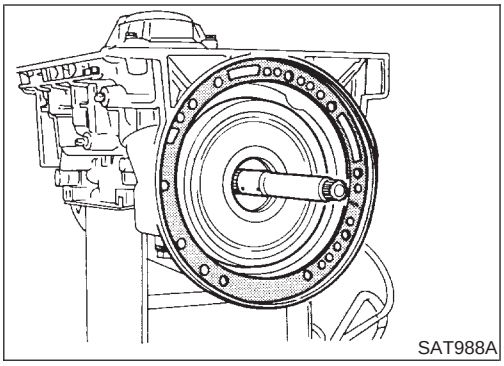
b. Remove O-ring from oil pump assembly.

c. Remove traces of sealant from oil pump housing.
- **Be careful not to scratch pump housing.**

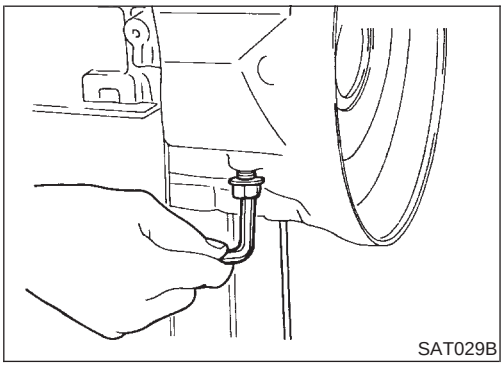


SAT108B

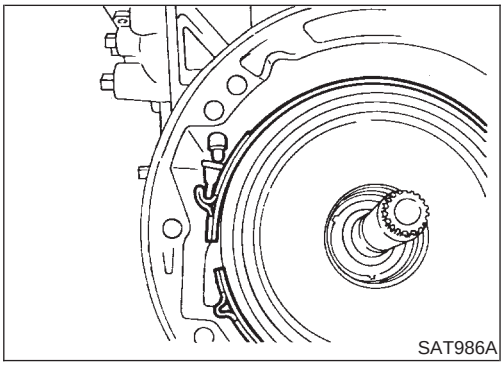
d. Remove needle bearing and thrust washer from oil pump assembly.


SAT988A

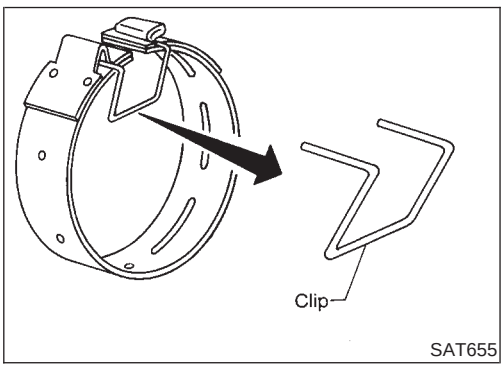
16. Remove input shaft and oil pump gasket.


SAT029B

17. Remove brake band and band strut.
a. Loosen lock nut and remove band servo anchor end pin from transmission case.

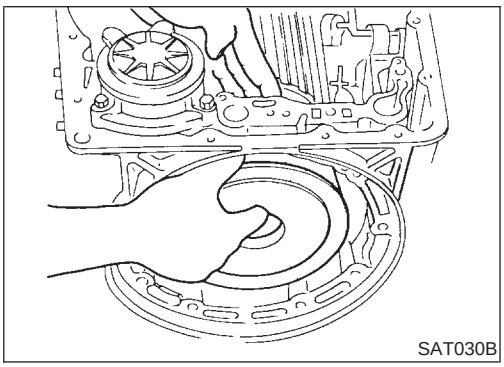

SAT986A

b. Remove brake band and band strut from transmission case.

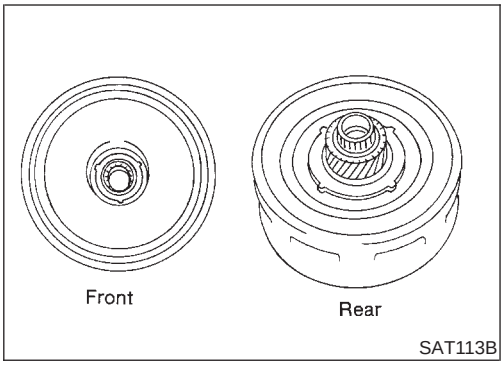


SAT655

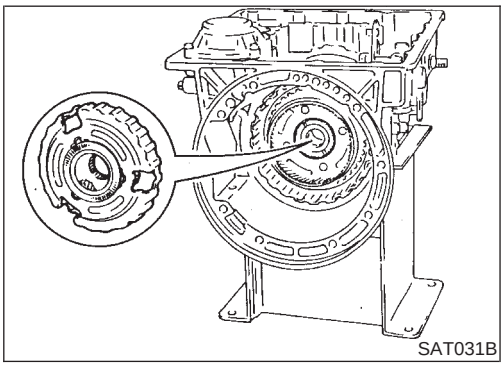
c. Hold brake band in a circular shape with clip.


SAT030B

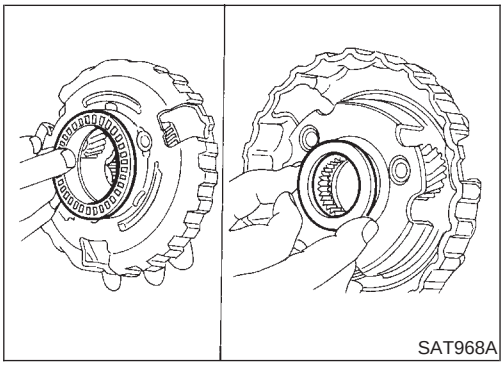
18. Remove front side clutch and gear components.
a. Remove clutch pack (reverse clutch, high clutch and front sun gear) from transmission case.



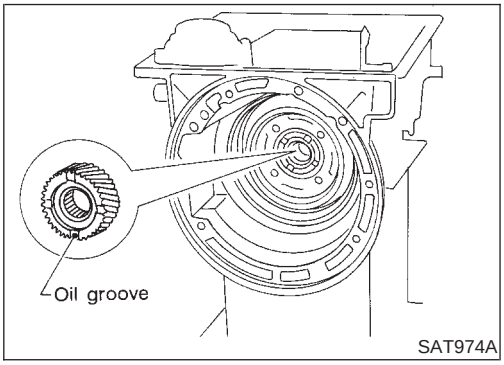
b. Remove front bearing race from clutch pack.
c. Remove rear bearing race from clutch pack.



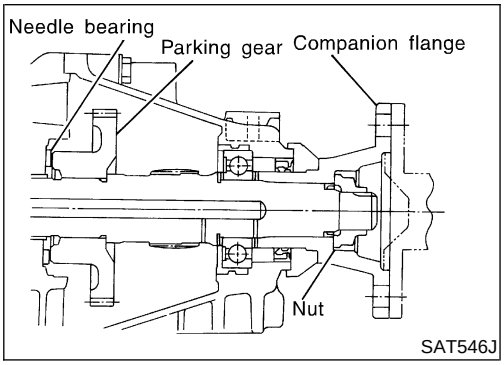
d. Remove front planetary carrier from transmission case.



e. Remove front needle bearing from front planetary carrier.
f. Remove rear bearing from front planetary carrier.



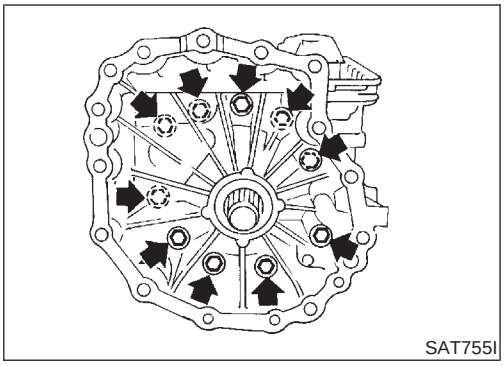
g. Remove rear sun gear from transmission case.



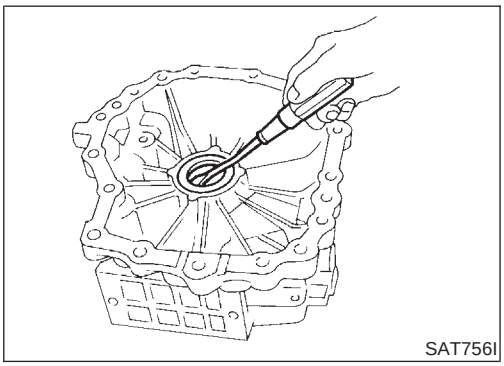
19. Remove rear extension assembly (2WD model only).
a. Remove rear extension assembly.
b. Remove parking gear and needle bearing.

CAUTION:
Insert your hand between rear extension and transmission case. Detach rear extension assembly while holding parking gear and needle bearing by hand.

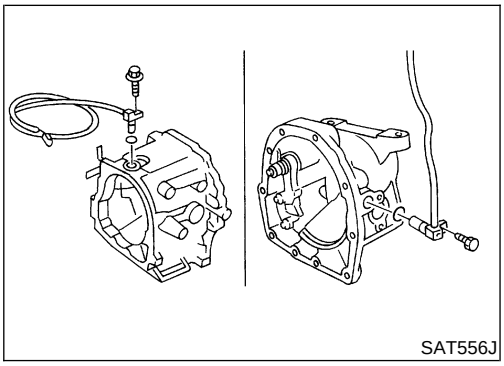
c. Remove rear extension gasket.


SAT755I

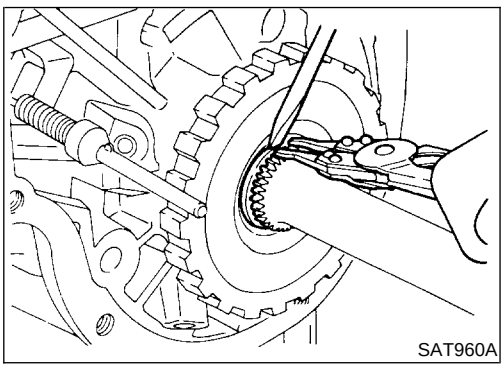
20. Remove adapter case (4WD model only).
a. Remove adapter case from transmission case.
b. Remove adapter case gasket from transmission case.


SAT756I

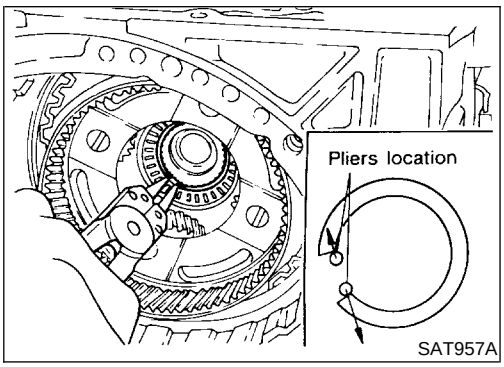
c. Remove oil seal from adapter case.
- **Be careful not to scratch adapter case.**
- **Do not remove oil seal unless it is to be replaced.**


SAT556J

21. Remove revolution sensor from rear extension or adapter case.
a. Remove O-ring from revolution sensor.


SAT960A

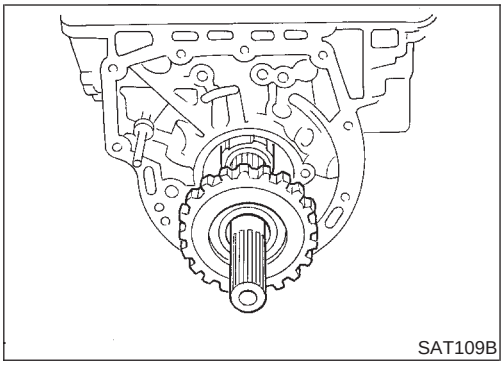
22. Remove output shaft and parking gear (4WD model only).
a. Remove rear snap ring from output shaft.



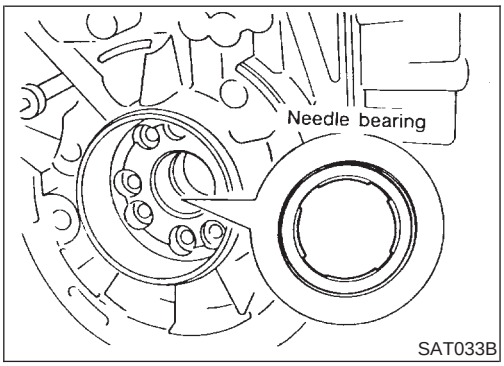
SAT957A

b. Slowly push output shaft all the way forward.
- **Do not use excessive force.**

c. Remove snap ring from output shaft.

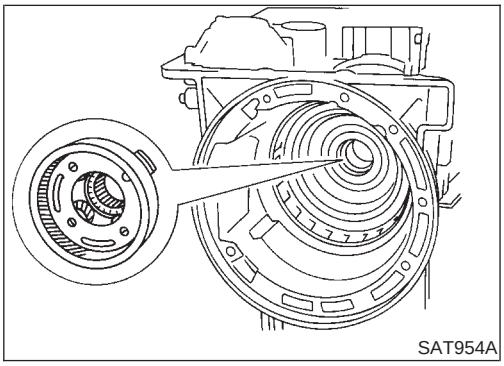

SAT109B

d. Remove output shaft and parking gear as a unit from transmission case.
e. Remove parking gear from output shaft.

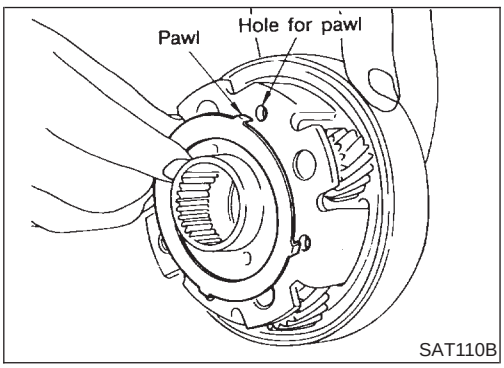


SAT033B

f. Remove needle bearing from transmission case.

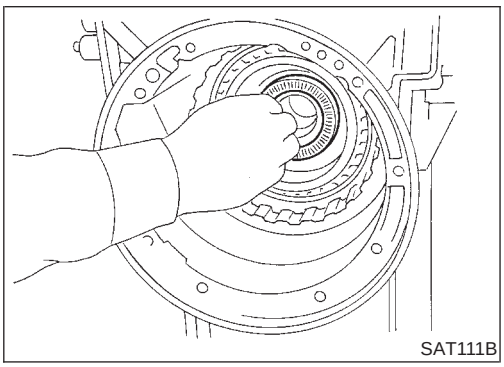

SAT954A

23. Remove rear side clutch and gear components.
a. Remove front internal gear.

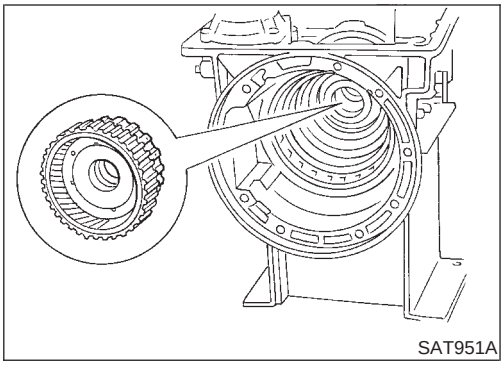


SAT110B

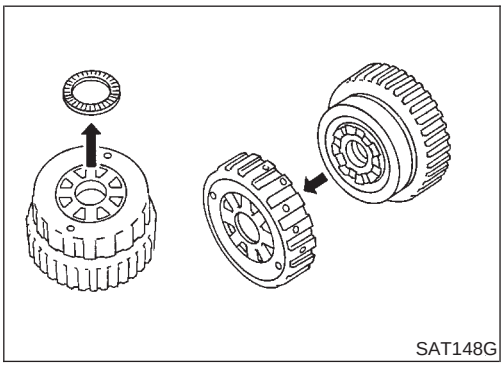
b. Remove bearing race from front internal gear.


SAT111B

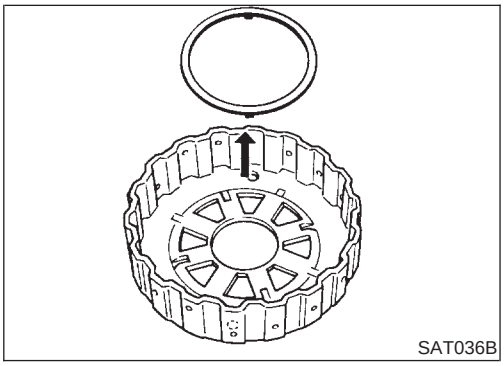
c. Remove needle bearing from rear internal gear.


SAT951A

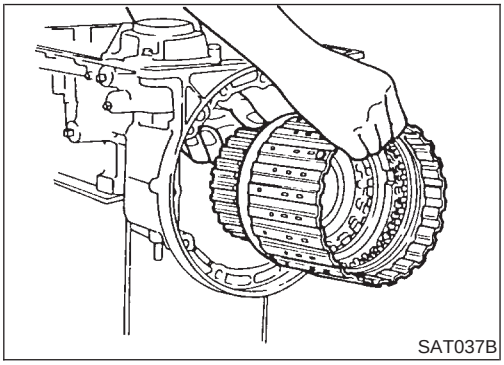
d. Remove rear internal gear, forward clutch hub and overrun clutch hub as a set from transmission case.


SAT148G

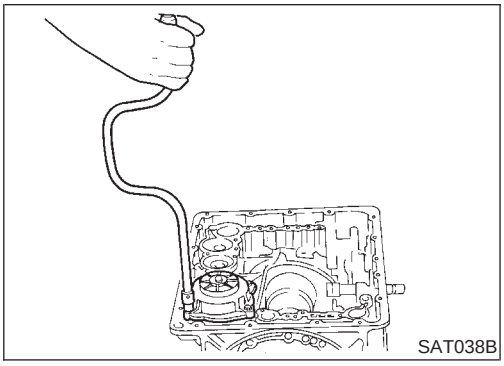
e. Remove needle bearing from overrun clutch hub.
f. Remove overrun clutch hub from rear internal gear and forward clutch hub.


SAT036B

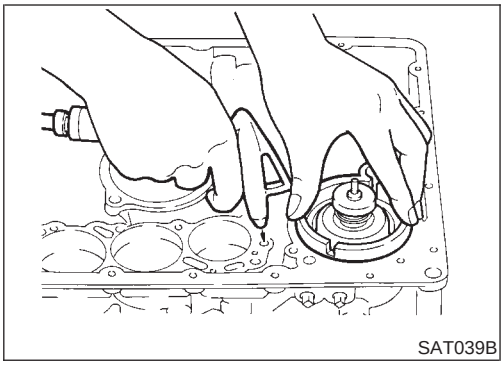
g. Remove thrust washer from overrun clutch hub.


SAT037B

h. Remove forward clutch assembly from transmission case.

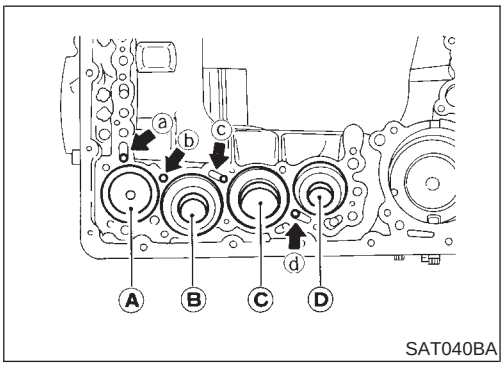

SAT038B

24. Remove band servo and accumulator components.
a. Remove band servo retainer from transmission case.


SAT039B

b. Apply compressed air to oil hole until band servo piston comes out of transmission case.
- **Hold piston with a rag and gradually direct air to oil hole.**

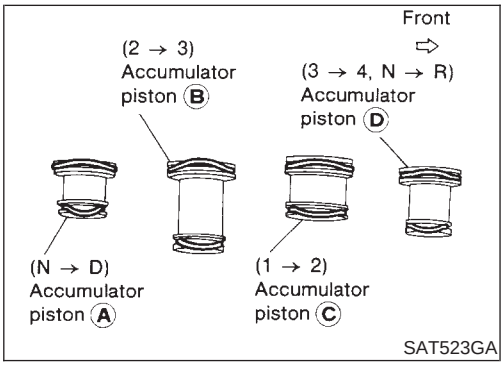
c. Remove return springs.



SAT040BA

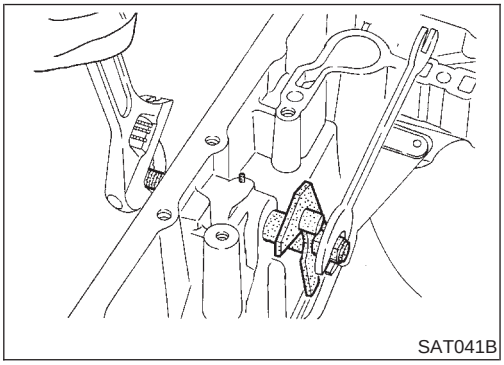
d. Remove springs from accumulator pistons B, C and D.
e. Apply compressed air to each oil hole until piston comes out.
- **Hold piston with a rag and gradually direct air to oil hole.**

Identification of accumulator pistons	A	B	C	D
Identification of oil holes	a	b	c	d

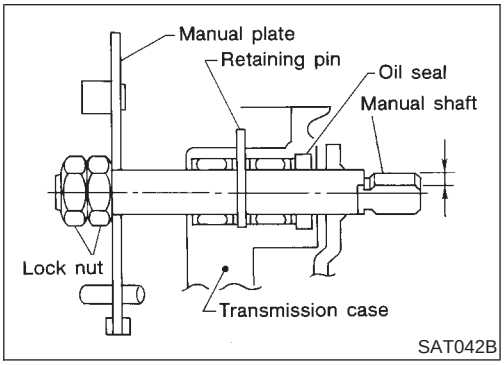


SAT523GA

f. Remove O-ring from each piston.

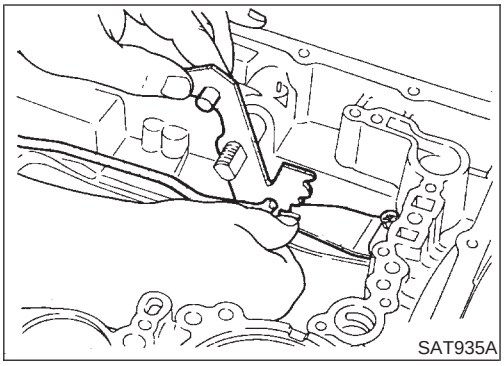

SAT041B

25. Remove manual shaft components, if necessary.
a. Hold width across flats of manual shaft (outside the transmission case) and remove lock nut from shaft.

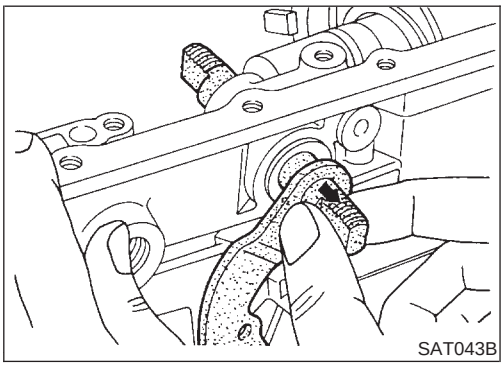


SAT042B

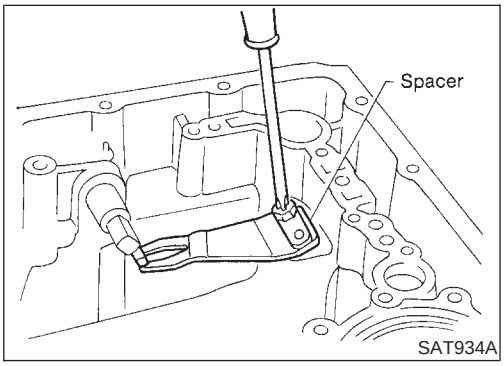
b. Remove retaining pin from transmission case.


SAT935A

c. While pushing detent spring down, remove manual plate and parking rod from transmission case.

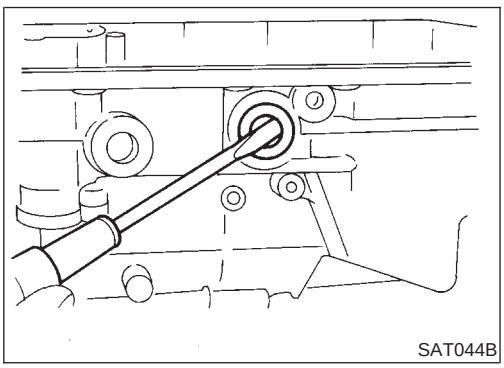

SAT043B

d. Remove manual shaft from transmission case.



SAT934A

e. Remove spacer and detent spring from transmission case.

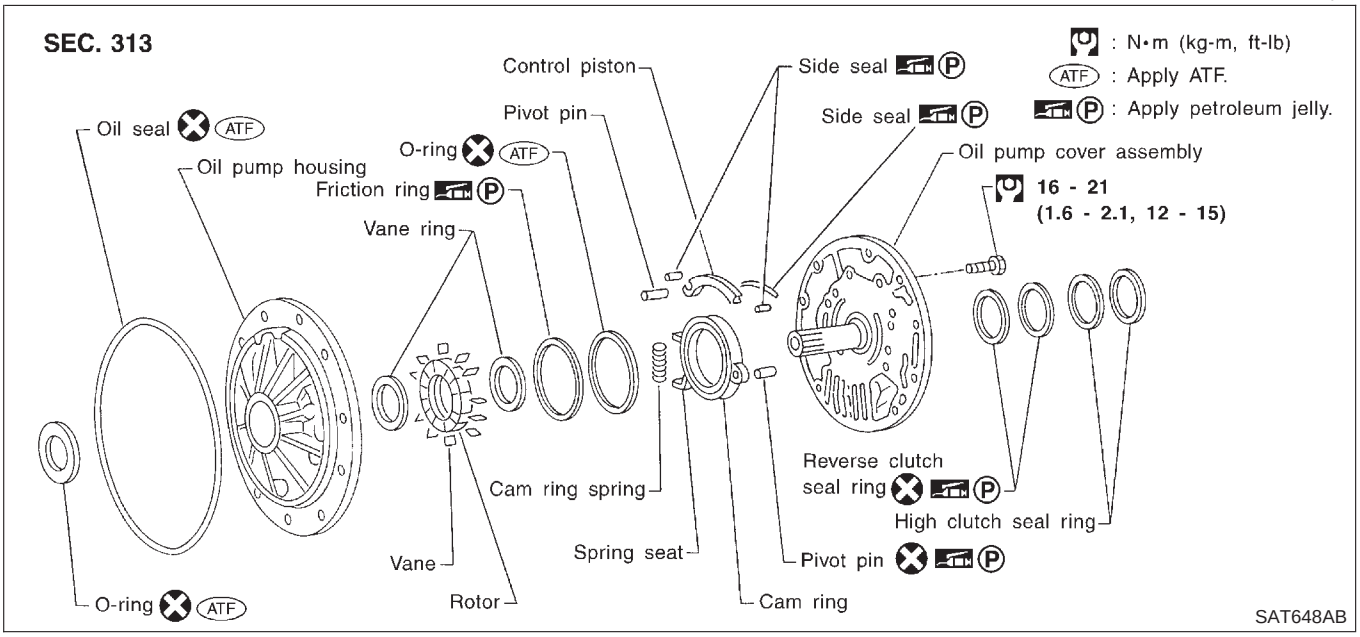

SAT044B

f. Remove oil seal from transmission case.

Oil Pump

COMPONENTS

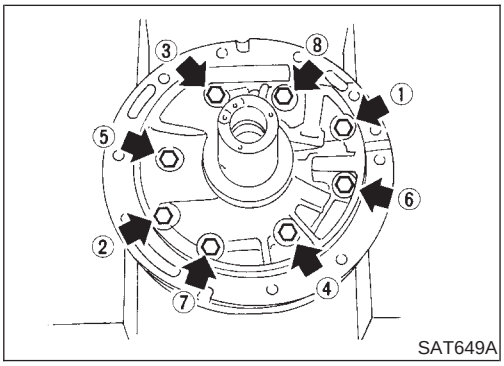
NAAT0112



DISASSEMBLY

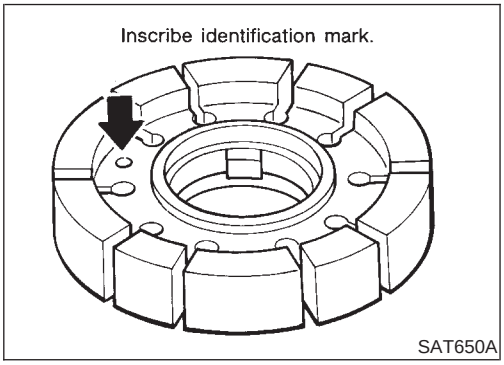
NAAT0113

1. Loosen bolts in numerical order and remove oil pump cover.



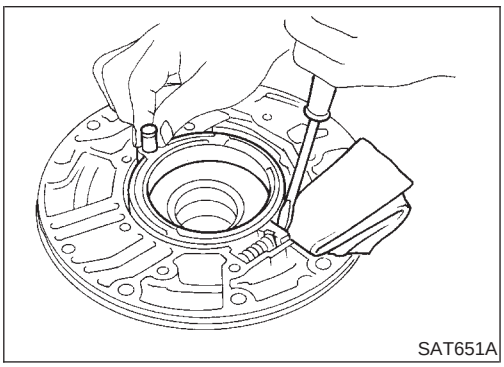
2. Remove rotor, vane rings and vanes.

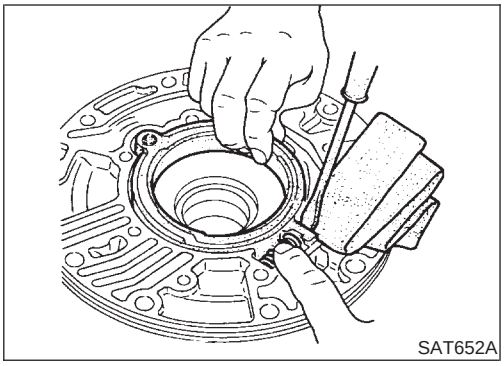
- **Inscribe a mark on back of rotor for identification of fore-aft direction when reassembling rotor. Then remove rotor.**



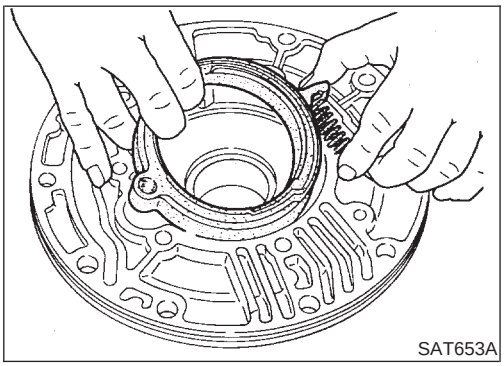
3. While pushing on cam ring remove pivot pin.

- **Be careful not to scratch oil pump housing.**

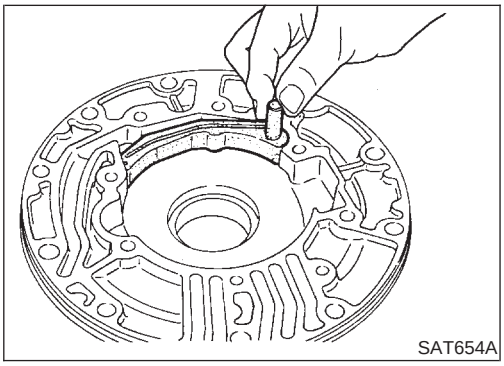



SAT652A

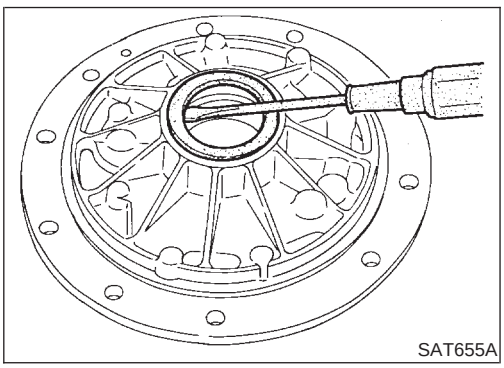
4. While holding cam ring and spring lift out cam ring spring.
- **Be careful not to damage oil pump housing.**
- **Hold cam ring spring to prevent it from jumping.**


SAT653A

5. Remove cam ring and cam ring spring from oil pump housing.


SAT654A

6. Remove pivot pin from control piston and remove control piston assembly.


SAT655A

7. Remove oil seal from oil pump housing.
- **Be careful not to scratch oil pump housing.**

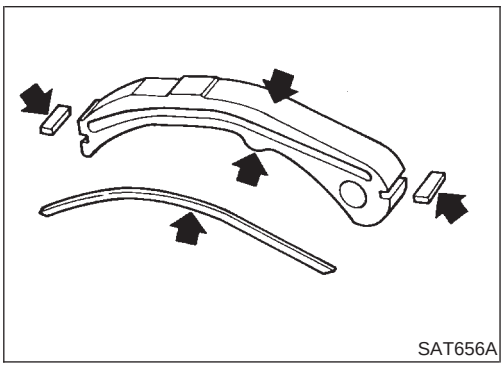
INSPECTION

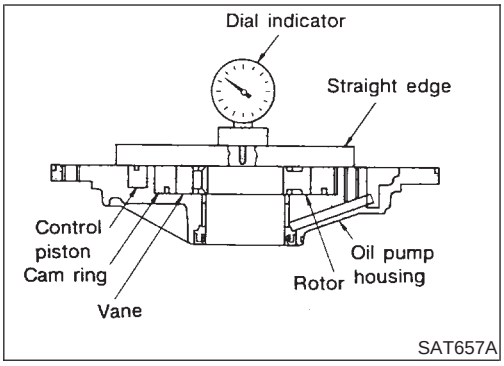
NAAT0114

Oil Pump Cover, Rotor, Vanes, Control Piston, Side Seals, Cam Ring and Friction Ring

NAAT0114S01

- Check for wear or damage.


SAT656A



SAT657A

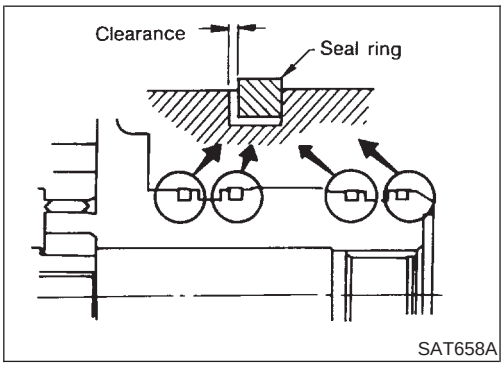
Side Clearances

NAAT0114S02

- Measure side clearances between end of oil pump housing and cam ring, rotor, vanes and control piston. Measure in at least four places along their circumferences. Maximum measured values should be within specified positions.
- **Before measurement, check that friction rings, O-ring, control piston side seals and cam ring spring are removed.**

  Standard clearance (Cam ring, rotor, vanes and control piston):

  Refer to SDS, AT-361.
- If not within standard clearance, replace oil pump assembly except oil pump cover assembly.



SAT658A

Seal Ring Clearance

NAAT0114S03

- Measure clearance between seal ring and ring groove.

  Standard clearance:

  0.10 - 0.25 mm (0.0039 - 0.0098 in)

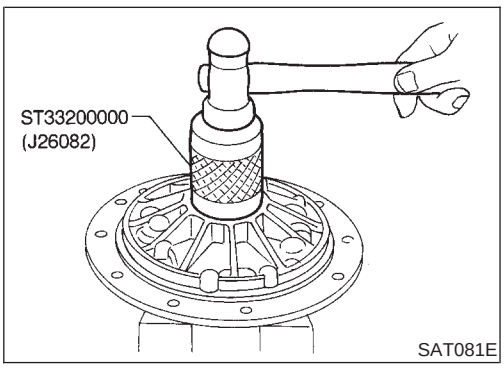
  Wear limit:

  0.25 mm (0.0098 in)
- If not within wear limit, replace oil pump cover assembly.

ASSEMBLY

NAAT0115

1. Drive oil seal into oil pump housing.
- **Apply ATF to outer periphery and lip surface.**

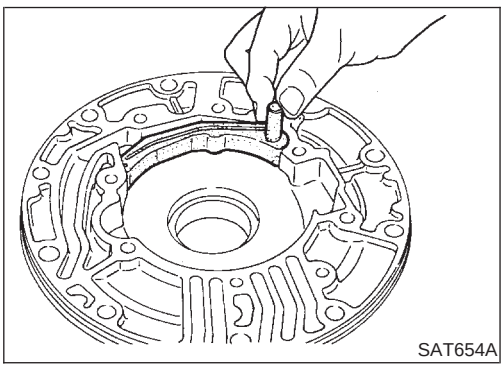


SAT081E

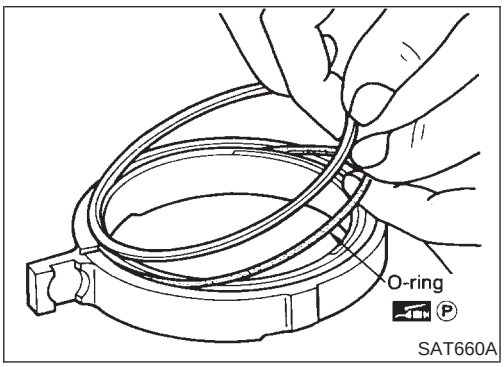
2. Install cam ring in oil pump housing by the following

a. Install side seal on control piston.
- **Pay attention to its direction — Black surface goes toward control piston.**
- **Apply petroleum jelly to side seal.**

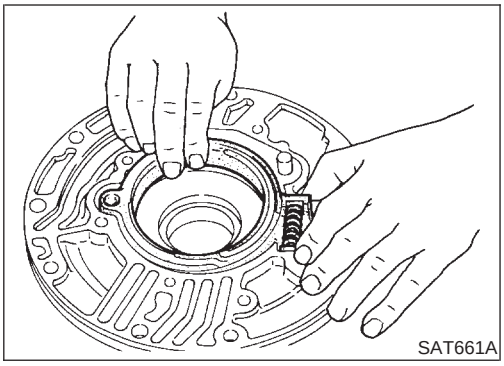
b. Install control piston on oil pump.


SAT654A

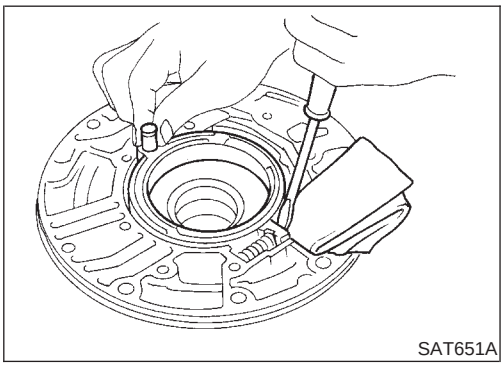
c. Install O-ring and friction ring on cam ring.
- **Apply petroleum jelly to O-ring.**



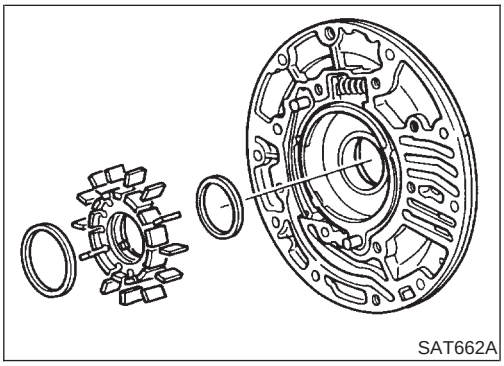
SAT660A


SAT661A

d. Assemble cam ring, cam ring spring and spring seat. Install spring by pushing it against pump housing.

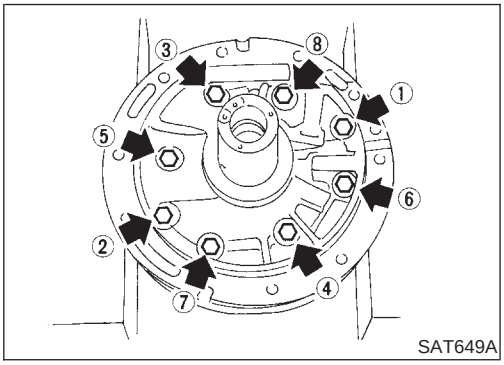

SAT651A

e. While pushing on cam ring install pivot pin.


SAT662A

3. Install rotor, vanes and vane rings.

- **Pay attention to direction of rotor.**

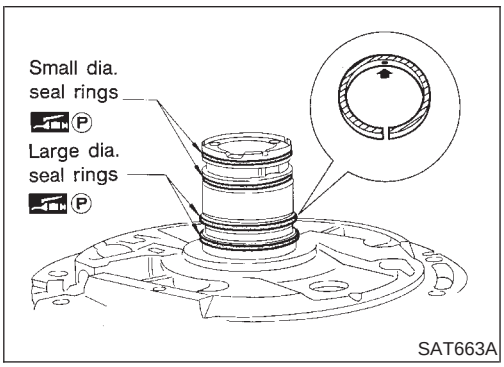


SAT649A

4. Install oil pump housing and oil pump cover.

a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly in oil pump housing assembly, then remove masking tape.

b. Tighten bolts in a criss-cross pattern.



SAT663A

5. Install new seal rings carefully after packing ring grooves with petroleum jelly. Press rings down into jelly to a close fit.

- **Seal rings come in two different diameters. Check fit carefully in each groove.**

  Small dia. seal ring:

  No mark

  Large dia. seal ring:

  Yellow mark in area shown by arrow

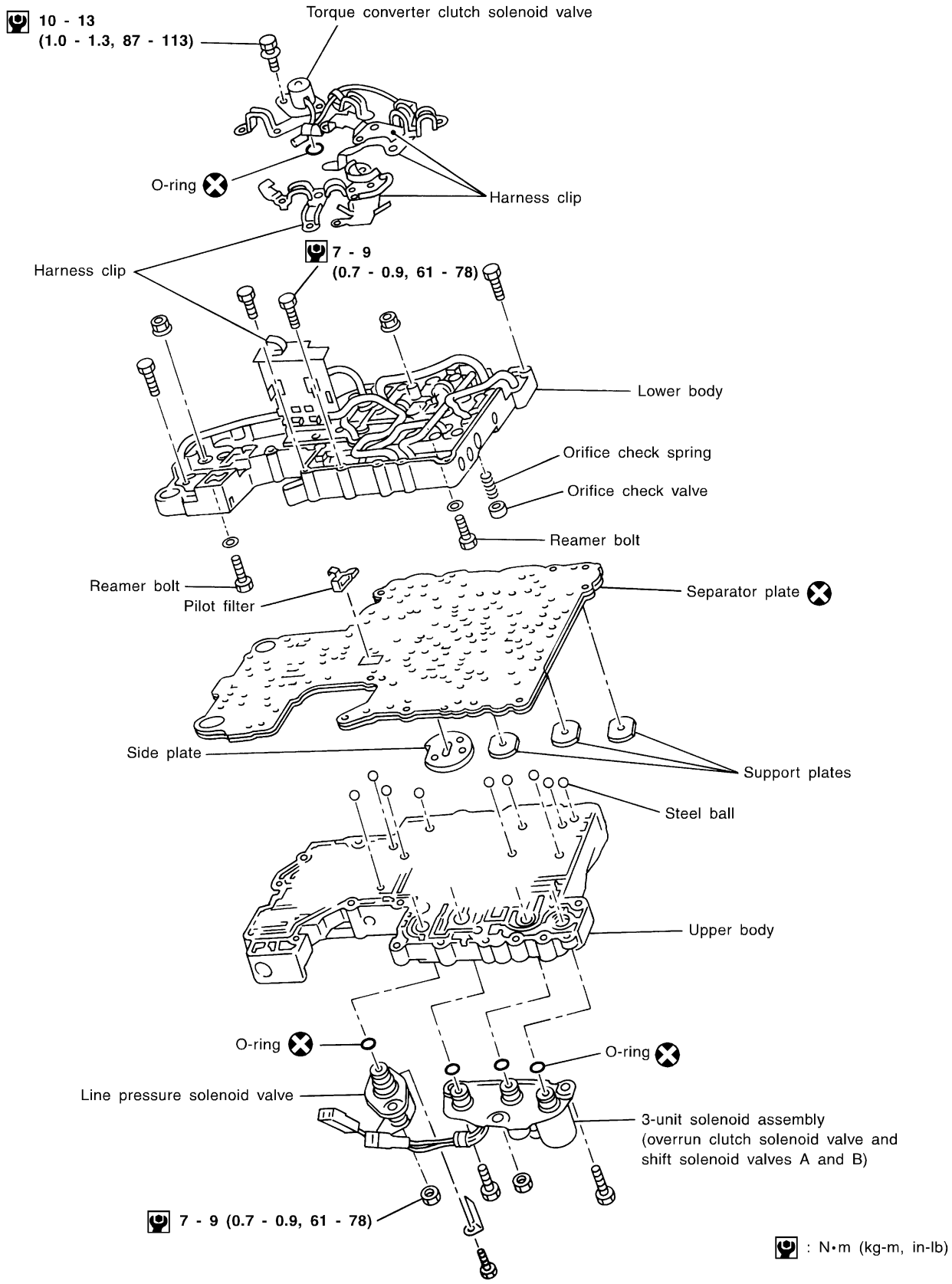
- **Do not spread gap of seal ring excessively while installing. It may deform ring.**

Control Valve Assembly

COMPONENTS

NAAT0116

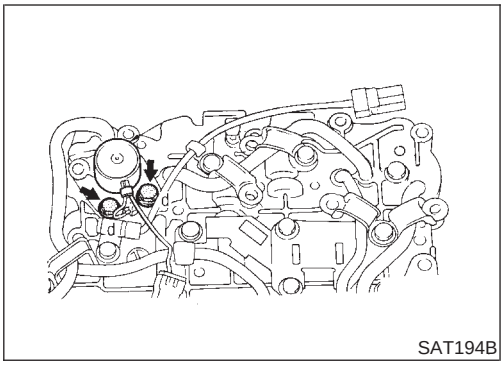
SEC. 317



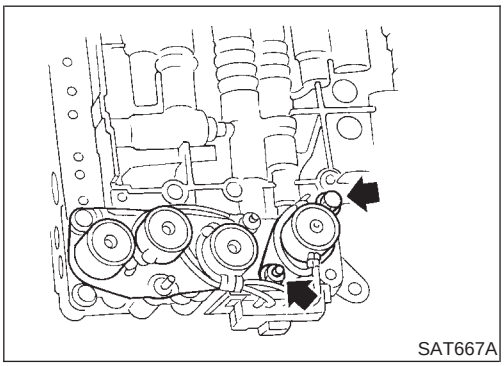
SAT156K

DISASSEMBLY

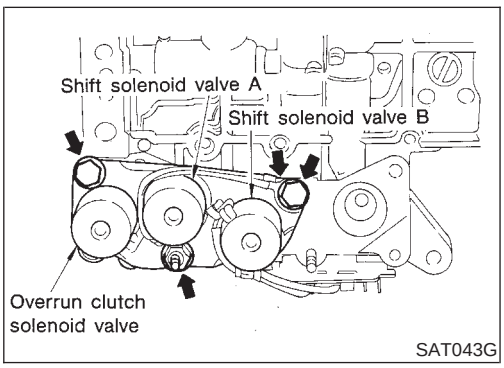
NAAT0117


SAT194B

1. Remove solenoids.
a. Remove torque converter clutch solenoid valve and side plate from lower body.
b. Remove O-ring from solenoid.

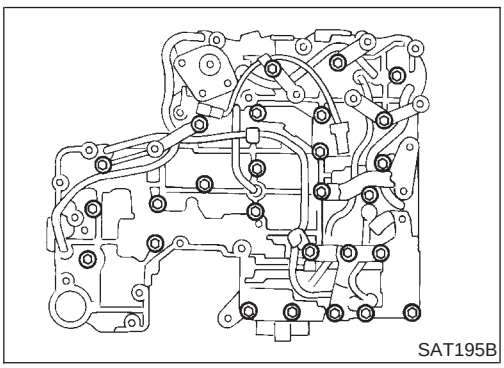

SAT667A

c. Remove line pressure solenoid valve from upper body.
d. Remove O-ring from solenoid.



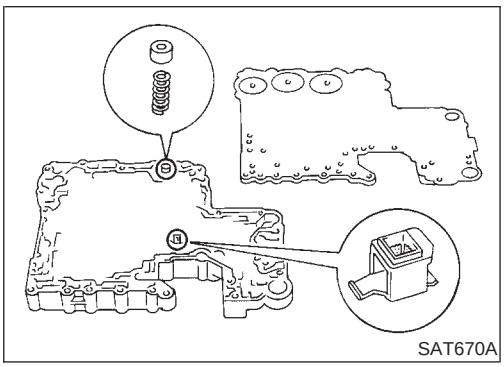
SAT043G

e. Remove 3-unit solenoid assembly from upper body.
f. Remove O-rings from solenoids.

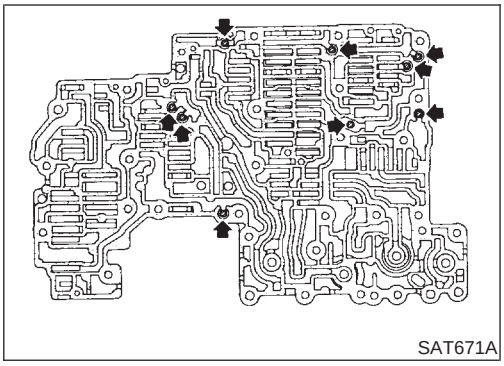

SAT195B

2. Disassemble upper and lower bodies.
a. Place upper body facedown, and remove bolts, reamer bolts and support plates.
b. Remove lower body, separator plate as a unit from upper body.

- **Be careful not to drop pilot filter, orifice check valve, spring and steel balls.**


SAT670A

c. Place lower body facedown, and remove separator plate.
d. Remove pilot filter, orifice check valve and orifice check spring.



SAT671A

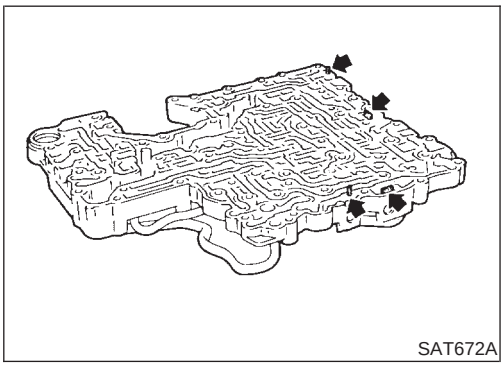
e. Check to see that steel balls are properly positioned in upper body. Then remove them from upper body.

INSPECTION

NAAT0118

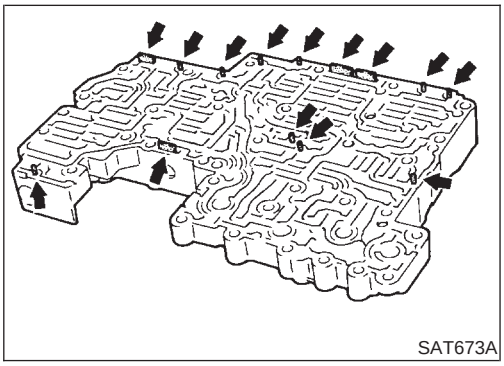
Lower and Upper Bodies

NAAT0118S01



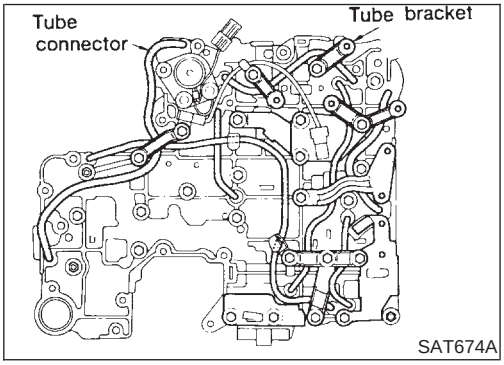
SAT672A

- Check to see that there are pins and retainer plates in lower body.



SAT673A

- Check to see that there are pins and retainer plates in upper body.
- **Be careful not to lose these parts.**

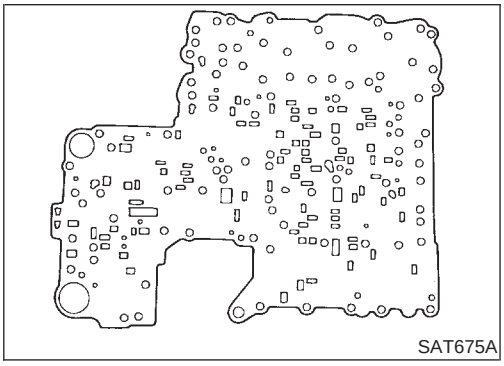


SAT674A

- Check to make sure that oil circuits are clean and free from damage.
- Check tube brackets and tube connectors for damage.

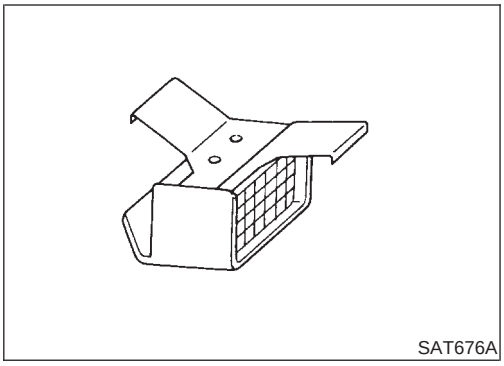
Separator Plate

NAAT0118S02



SAT675A

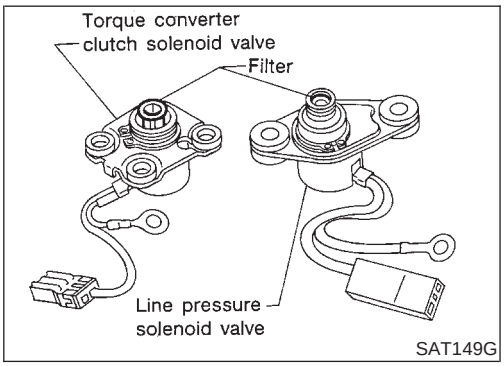
- Make sure that separator plate is free of damage and not deformed and oil holes are clean.


SAT676A

Pilot Filter

NAAT0118S03

- Check to make sure that filter is not clogged or damaged.



SAT149G

Torque Converter Clutch Solenoid Valve

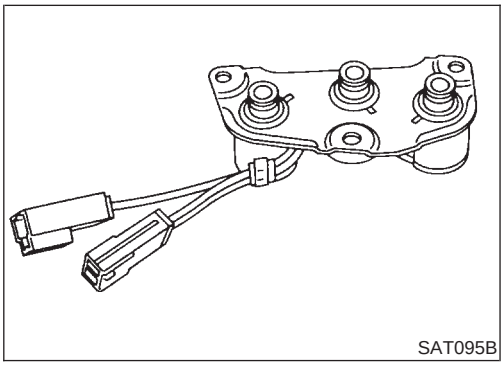
NAAT0118S04

- Check that filter is not clogged or damaged.
- Measure resistance. Refer to "Component Inspection", AT-152.

Line Pressure Solenoid Valve

NAAT0118S05

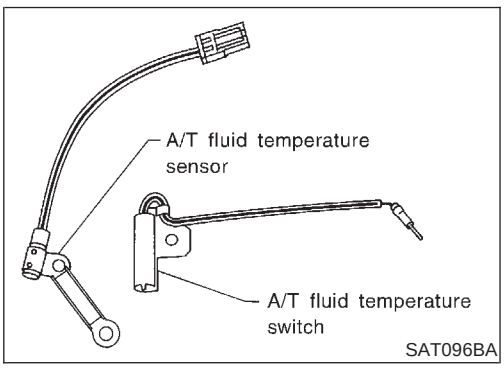
- Check that filter is not clogged or damaged.
- Measure resistance. Refer to "Component Inspection", AT-167.


SAT095B

3-Unit Solenoid Assembly (Overrun Clutch Solenoid Valve and Shift Solenoid Valves A and B)

NAAT0118S06

- Measure resistance of each solenoid. Refer to "Component Inspection", AT-171, AT-175 and AT-189.

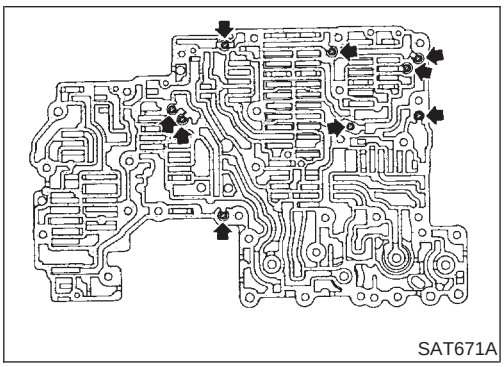


SAT096BA

A/T Fluid Temperature Sensor and Switch

NAAT0118S07

- Measure resistance. Refer to "Component Inspection", AT-110 and AT-264.

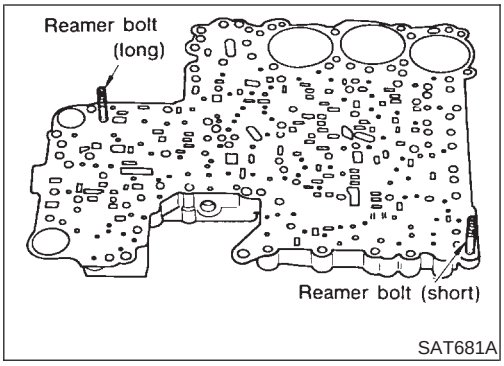

SAT671A

ASSEMBLY

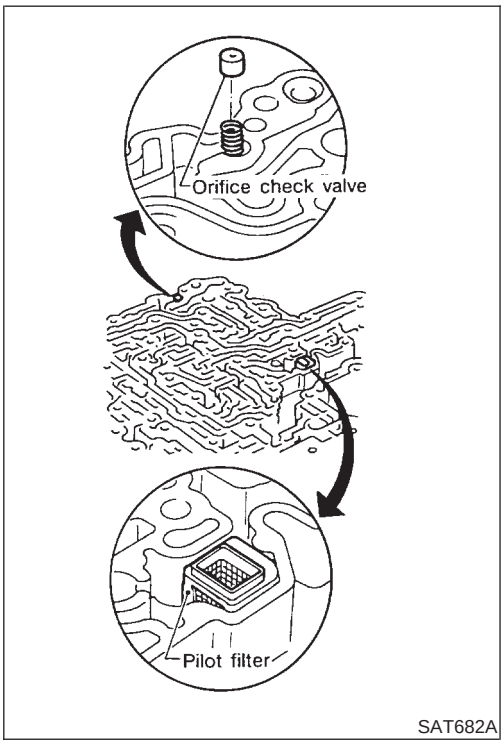
NAAT0119

1. Install upper and lower bodies.

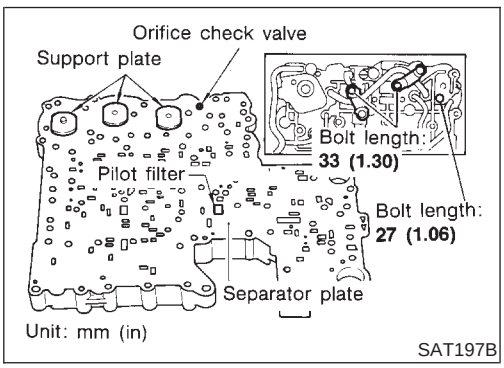
a. Place oil circuit of upper body face up. Install steel balls in their proper positions.



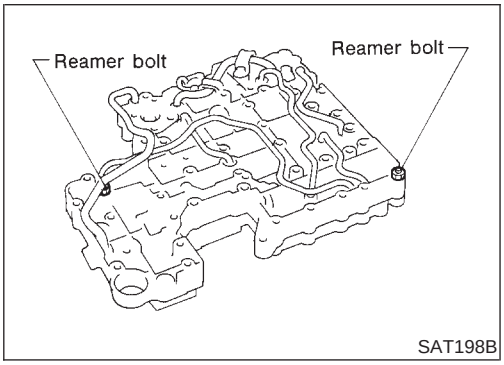
b. Install reamer bolts from bottom of upper body.



c. Place oil circuit of lower body face up. Install orifice check spring, orifice check valve and pilot filter.

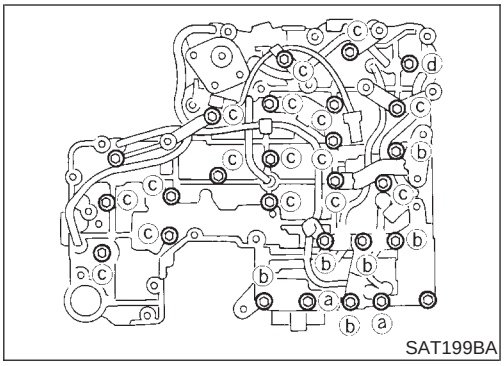


d. Install lower separator plate on lower body.
e. Install and temporarily tighten support plates, A/T fluid temperature sensor and tube brackets.



f. Temporarily assemble lower and upper bodies, using reamer bolt as a guide.

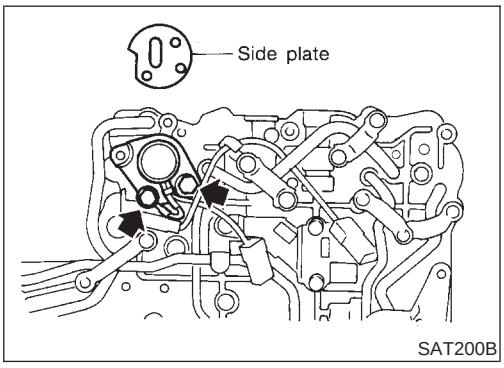
- **Be careful not to dislocate or drop steel balls, orifice check spring, orifice check valve and pilot filter.**



g. Install and temporarily tighten bolts and tube brackets in their proper locations.

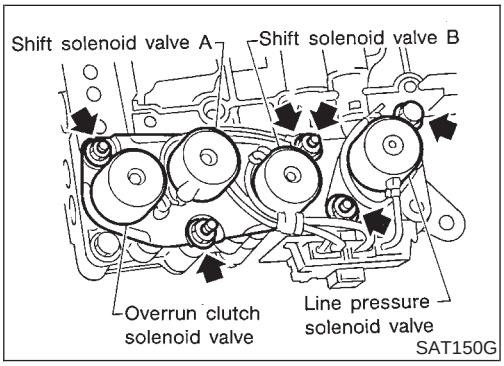
Bolt length and location:

Bolt symbol	a	b	c	d
Bolt length mm (in)	70 (2.76)	50 (1.97)	33 (1.30)	27 (1.06)



2. Install solenoids.

a. Attach O-ring and install torque converter clutch solenoid valve and side plates onto lower body.



b. Attach O-rings and install 3-unit solenoids assembly onto upper body.

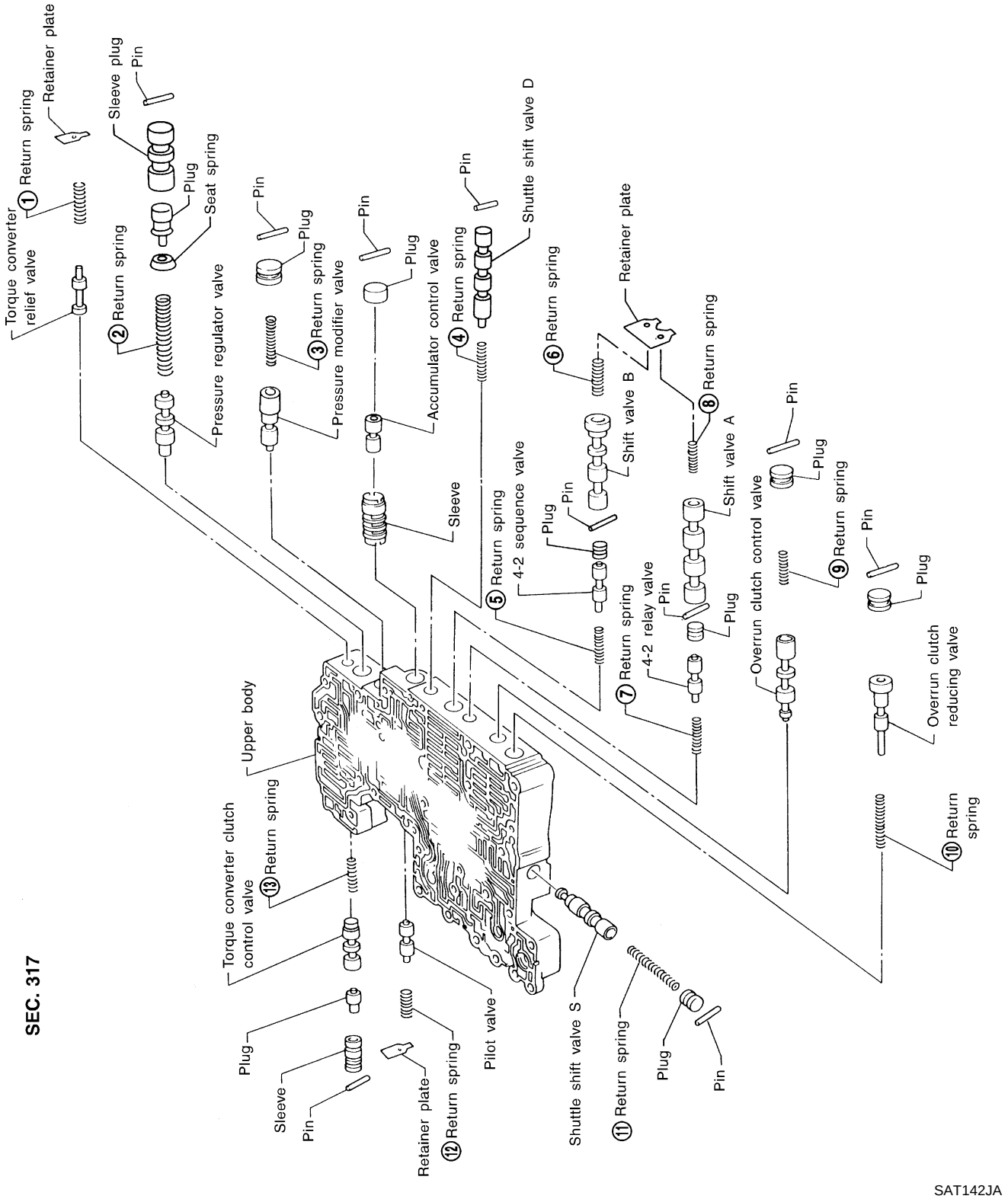
c. Attach O-ring and install line pressure solenoid valve onto upper body.

3. Tighten all bolts.

Control Valve Upper Body

COMPONENTS

NAAT0120

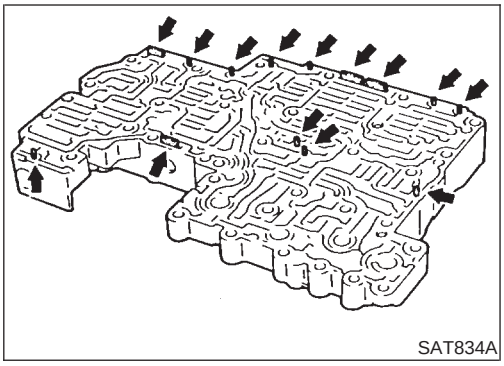


SAT142JA

Apply ATF to all components before their installation.
Numbers preceding valve springs correspond with those shown in SDS on page AT-358.

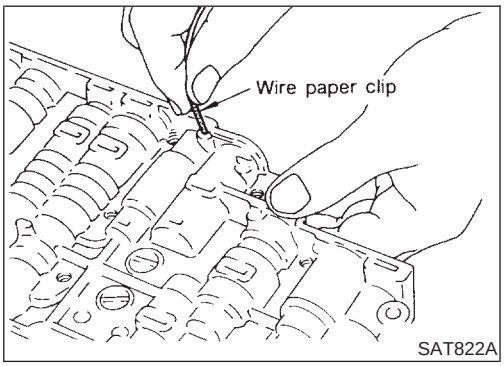
DISASSEMBLY

NAAT0121


SAT834A

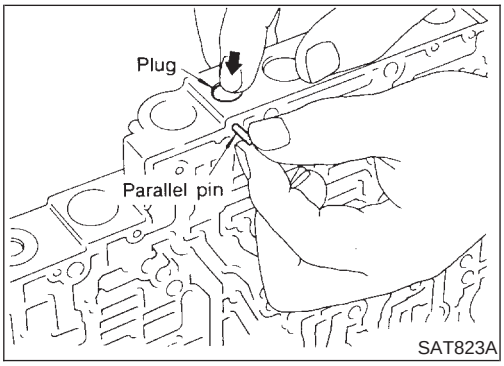
1. Remove valves at parallel pins.

- **Do not use a magnetic hand.**



SAT822A

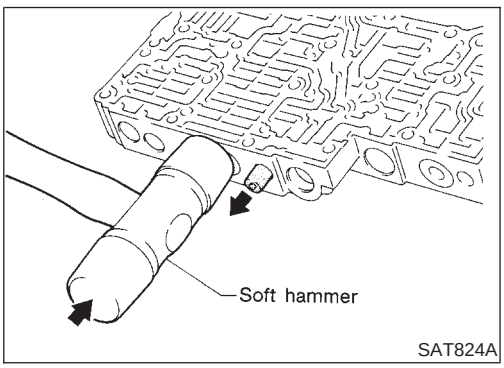
a. Use a wire paper clip to push out parallel pins.



SAT823A

b. Remove parallel pins while pressing their corresponding plugs and sleeves.

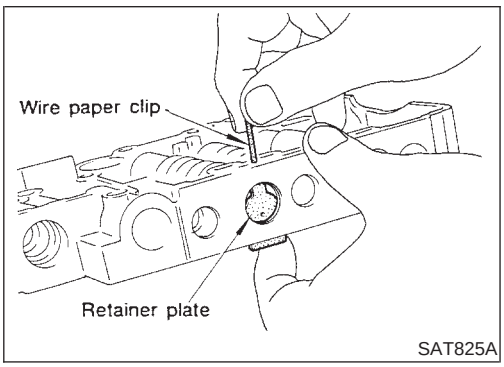
- **Remove plug slowly to prevent internal parts from jumping out.**



SAT824A

c. Place mating surface of valve facedown, and remove internal parts.

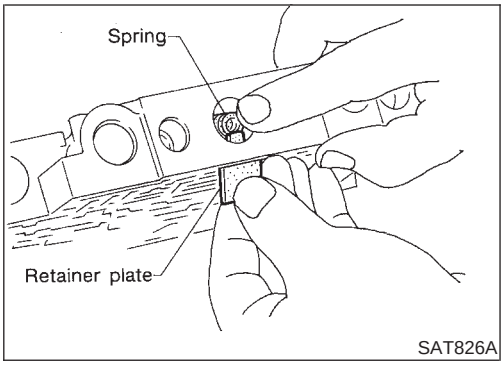
- **If a valve is hard to remove, place valve body facedown and lightly tap it with a soft hammer.**
- **Be careful not to drop or damage valves and sleeves.**



SAT825A

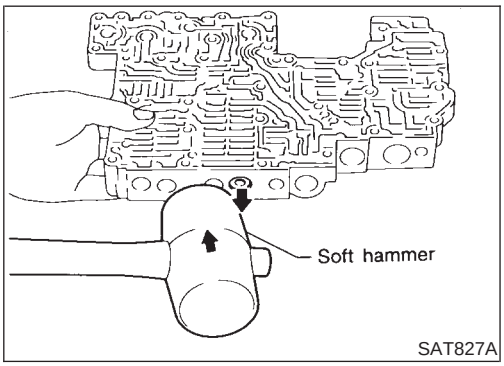
2. Remove valves at retainer plates.

a. Pry out retainer plate with wire paper clip.



SAT826A

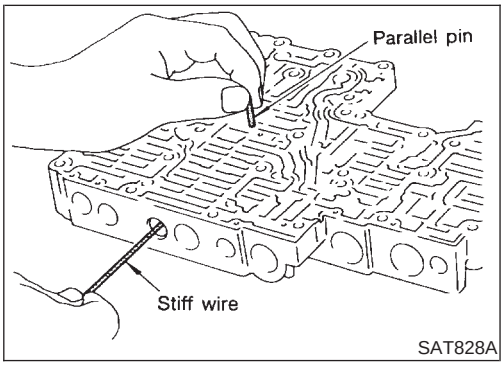
b. Remove retainer plates while holding spring.



SAT827A

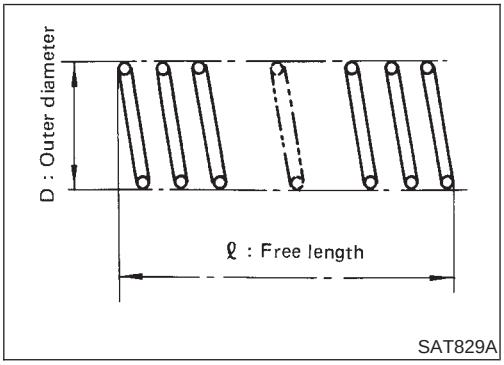
c. Place mating surface of valve facedown, and remove internal parts.

- **If a valve is hard to remove, lightly tap valve body with a soft hammer.**
- **Be careful not to drop or damage valves, sleeves, etc.**



SAT828A

- 4-2 sequence valve and relay valve are located far back in upper body. If they are hard to remove, carefully push them out using stiff wire.
- **Be careful not to scratch sliding surface of valve with wire.**



SAT829A

INSPECTION

NAAT0122

Valve Springs

NAAT0122S01

- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.

  Inspection standard:

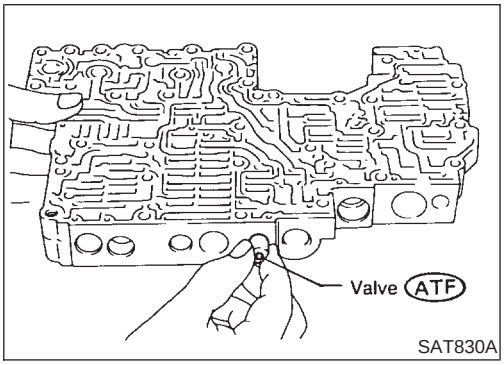
  Refer to SDS, AT-358.

- Replace valve springs if deformed or fatigued.

Control Valves

NAAT0122S02

- Check sliding surfaces of valves, sleeves and plugs.



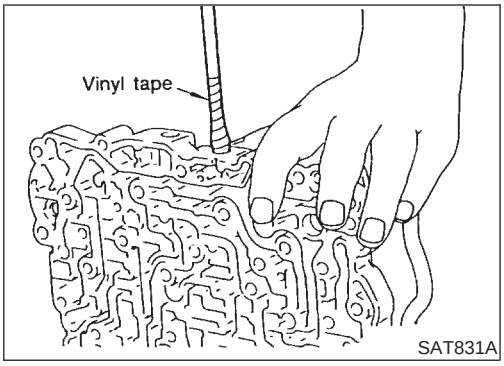
SAT830A

ASSEMBLY

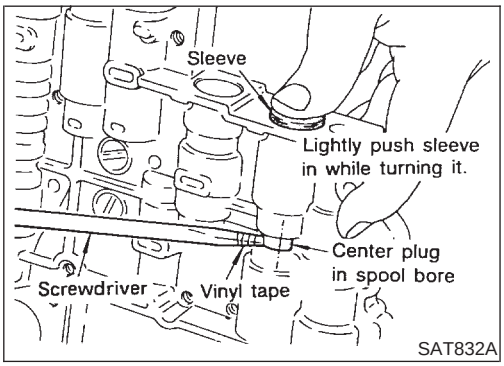
NAAT0123

1. Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores.

- **Be careful not to scratch or damage valve body.**

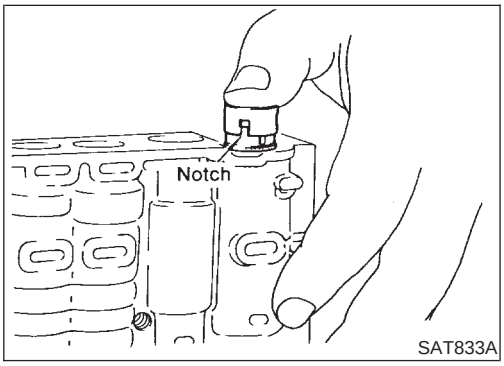


- Wrap a small screwdriver with vinyl tape and use it to insert the valves into proper position.



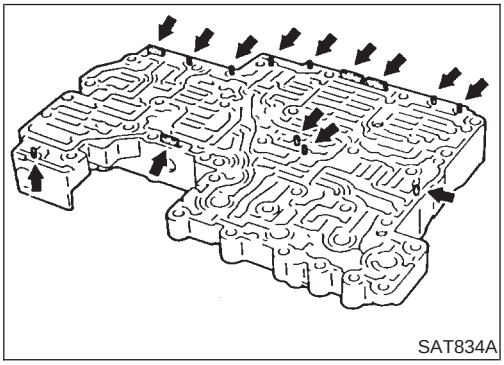
Pressure regulator valve

- If pressure regulator plug is not centered properly, sleeve cannot be inserted into bore in upper body. If this happens, use vinyl tape wrapped screwdriver to center sleeve until it can be inserted.
- Turn sleeve slightly while installing.

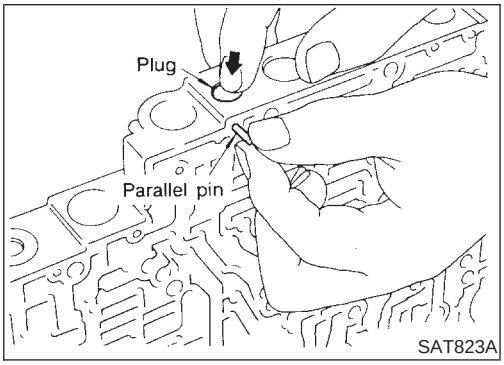


Accumulator control plug

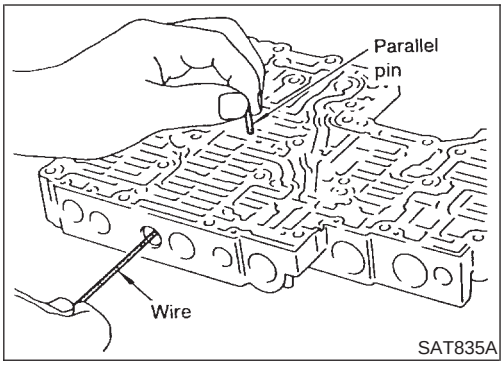
- Align protrusion of accumulator control sleeve with notch in plug.
- Align parallel pin groove in plug with parallel pin, and install accumulator control valve.



2. Install parallel pins and retainer plates.

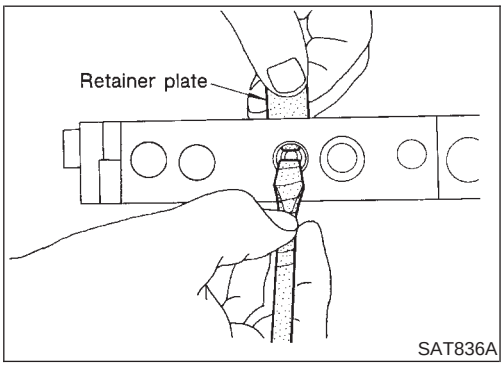


- **While pushing plug, install parallel pin.**



4-2 sequence valve and relay valve

- Push 4-2 sequence valve and relay valve with wire wrapped in vinyl tape to prevent scratching valve body. Install parallel pins.

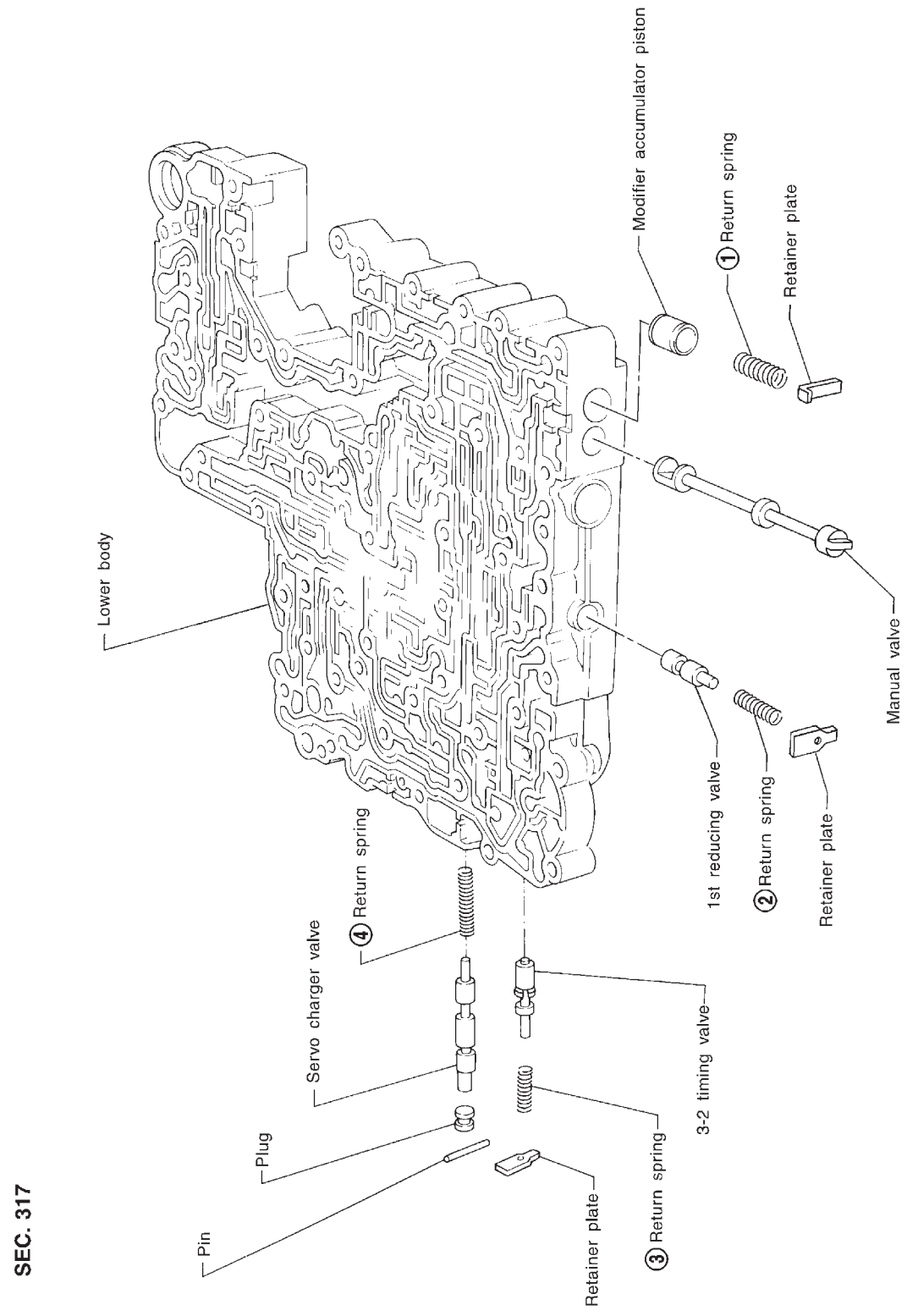


- Insert retainer plate while pushing spring.

Control Valve Lower Body

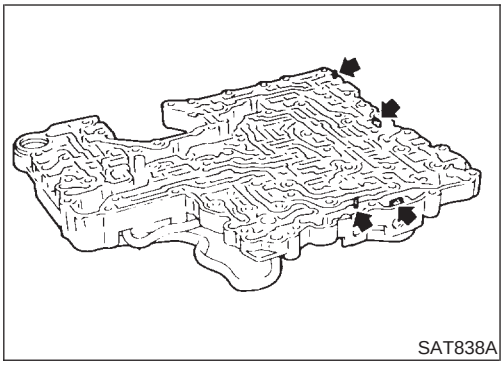
COMPONENTS

NAAT0124



SAT966I

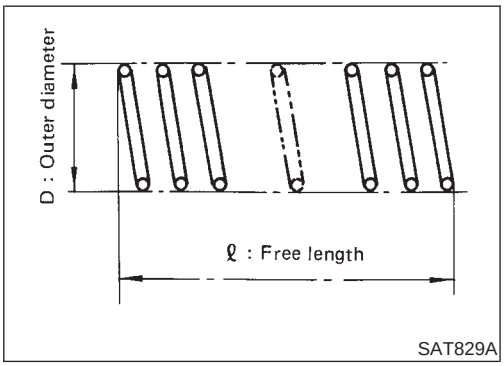
Apply ATF to all components before their installation.
Numbers preceding valve springs correspond with those shown in SDS on page AT-358.


SAT838A

DISASSEMBLY

NAAT0125

1. Remove valves at parallel pins.
2. Remove valves at retainer plates.
   For removal procedures, refer to "DISASSEMBLY" of Control Valve Upper Body.



SAT829A

INSPECTION

NAAT0126

Valve Springs

NAAT0126S01

- Check each valve spring for damage or deformation. Also measure free length and outer diameter.

  Inspection standard:

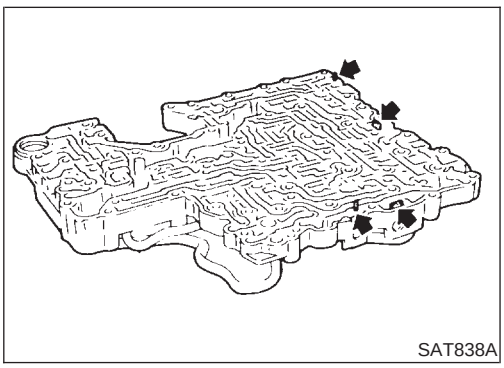
  Refer to SDS, AT-358.

- Replace valve springs if deformed or fatigued.

Control Valves

NAAT0126S02

- Check sliding surfaces of control valves, sleeves and plugs for damage.


SAT838A

ASSEMBLY

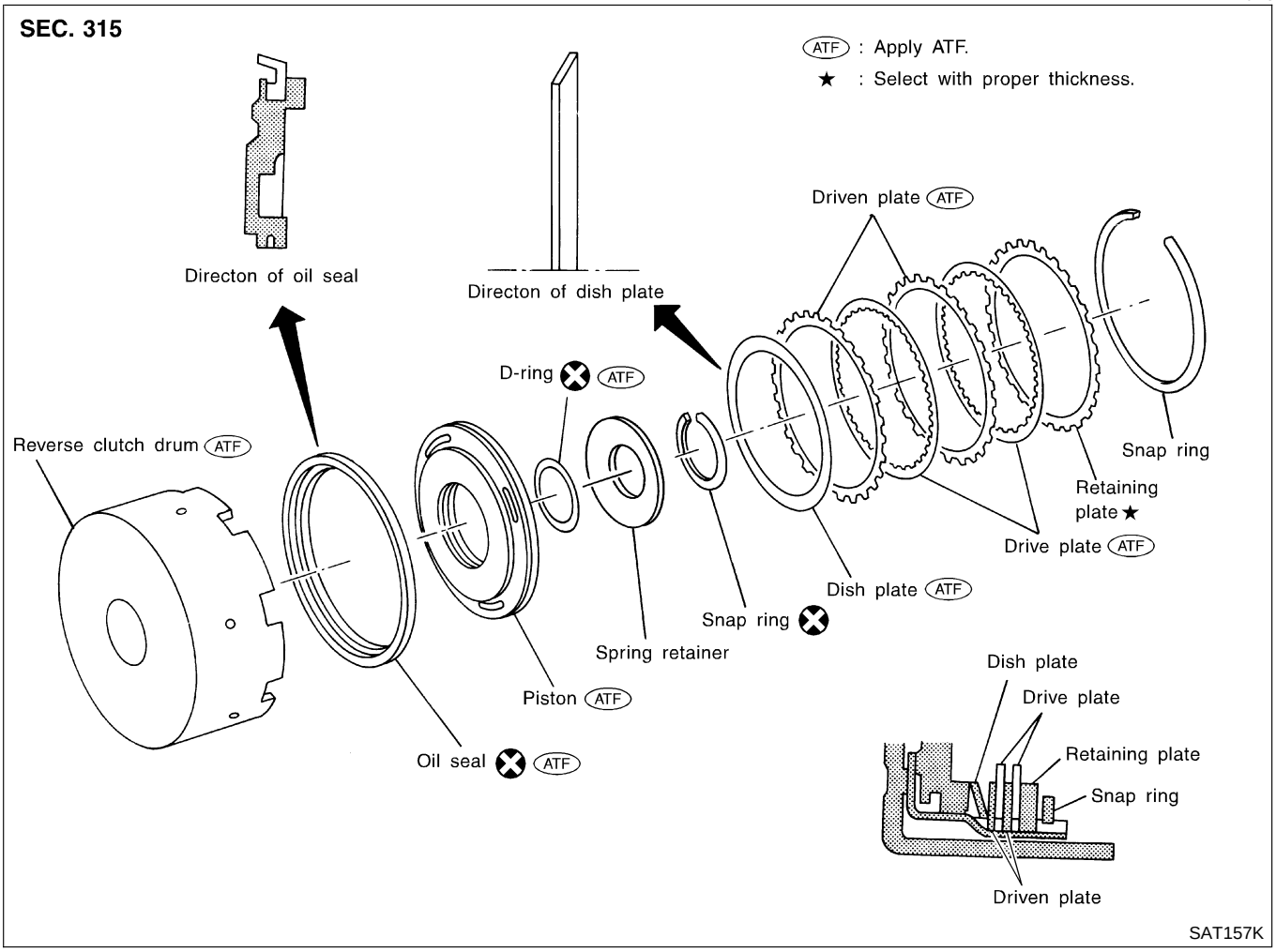
NAAT0127

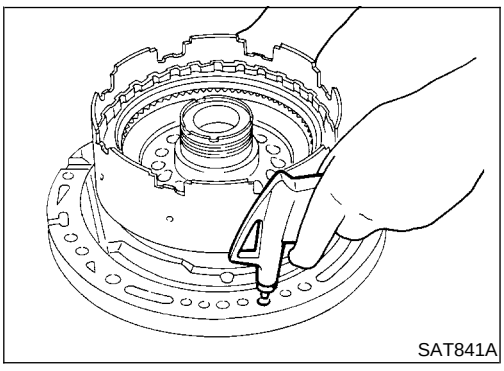
- Install control valves.
  For installation procedures, refer to "ASSEMBLY" of Control Valve Upper Body, AT-310.

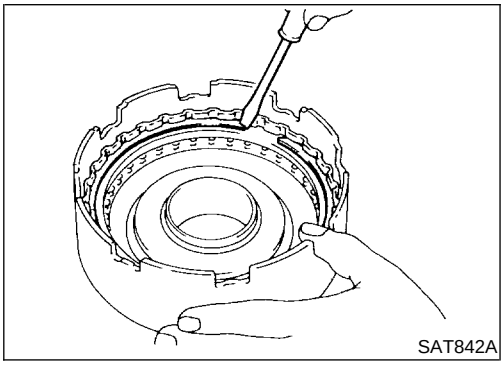
Reverse Clutch

COMPONENTS

NAAT0128




SAT841A


SAT842A

DISASSEMBLY

NAAT0129

1. Check operation of reverse clutch.

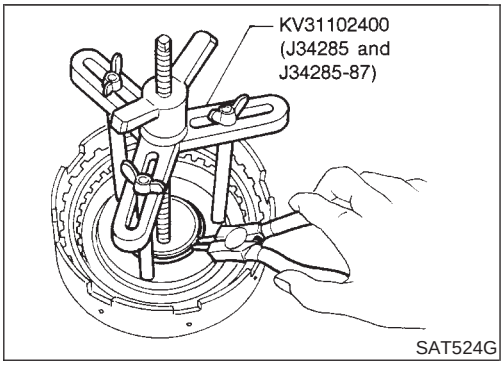
a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.

b. Check to see that retaining plate moves to snap ring.

c. If retaining plate does not contact snap ring,

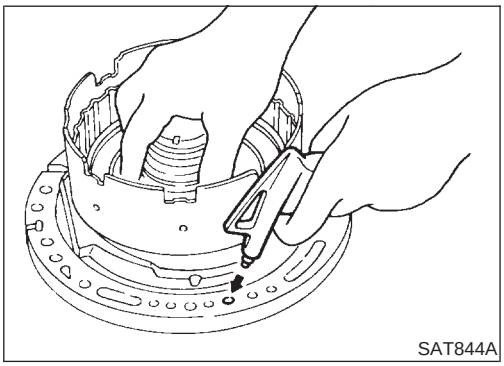
- D-ring might be damaged.
- Oil seal might be damaged.
- Fluid might be leaking past piston check ball.

2. Remove drive plates, driven plates, retaining plate, dish plate and snap ring.



SAT524G

3. Remove snap ring from clutch drum while compressing clutch springs.
- **Do not expand snap ring excessively.**
4. Remove spring retainer.


SAT844A

5. Install seal ring onto oil pump cover and install reverse clutch drum. While holding piston, gradually apply compressed air to oil hole until piston is removed.
- **Do not apply compressed air abruptly.**
6. Remove D-ring and oil seal from piston.

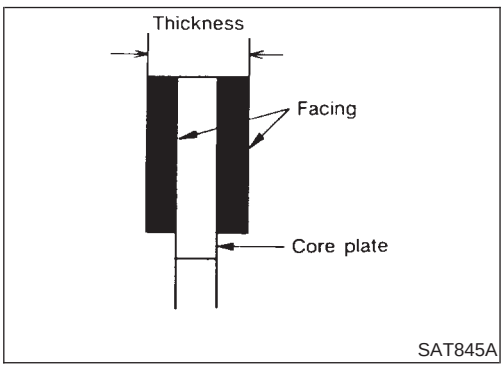
INSPECTION

NAAT0130

Reverse Clutch Snap Ring and Spring Retainer

NAAT0130S01

- Check for deformation, fatigue or damage.



SAT845A

Reverse Clutch Drive Plates

NAAT0130S03

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate:

Standard value: 1.90 - 2.05 mm (0.0748 - 0.0807 in)

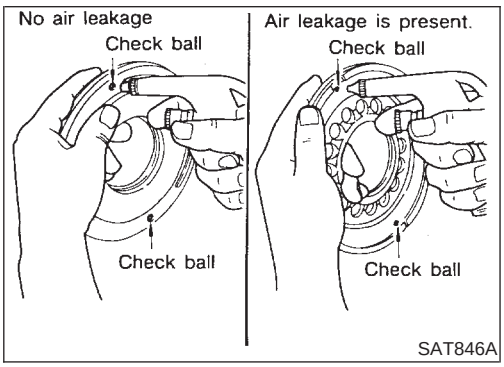
Wear limit: 1.80 mm (0.0709 in)

- If not within wear limit, replace.

Reverse Clutch Dish Plate

NAAT0130S04

- Check for deformation or damage.



SAT846A

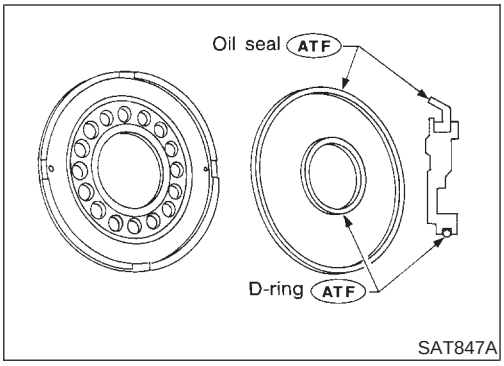
Reverse Clutch Piston

NAAT0130S05

- Shake piston to assure that balls are not seized.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Also apply compressed air to oil hole on return spring side to assure that air leaks past ball.

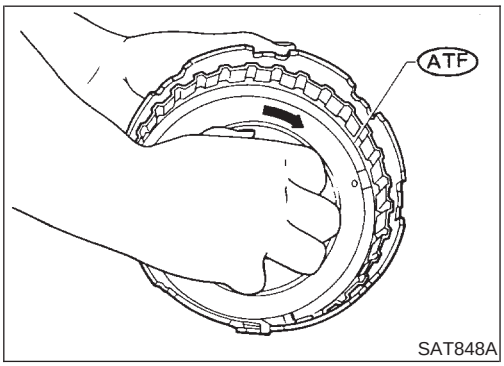
ASSEMBLY

NAAT0131



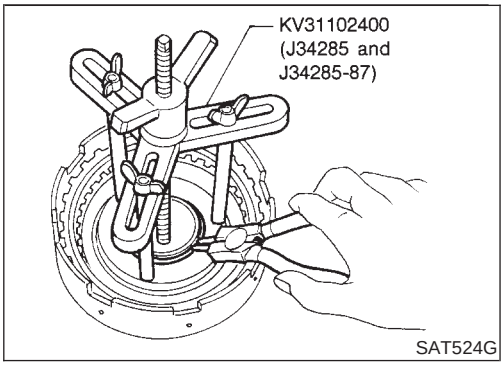
SAT847A

1. Install D-ring and oil seal on piston.
- **Apply ATF to both parts.**



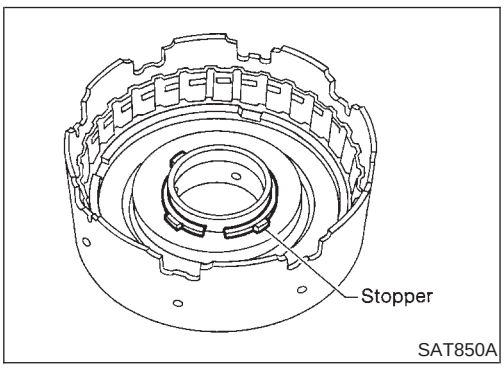
SAT848A

2. Install piston assembly by turning it slowly and evenly.
- **Apply ATF to inner surface of drum.**
3. Install spring retainer.



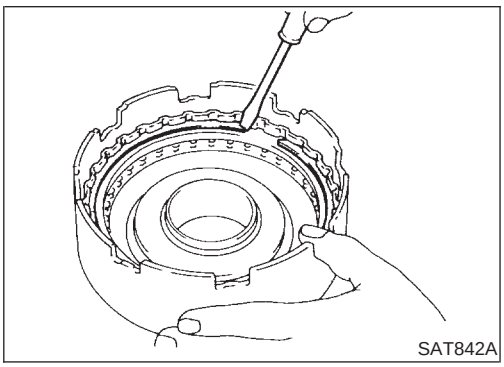
SAT524G

4. Install snap ring while compressing clutch springs.

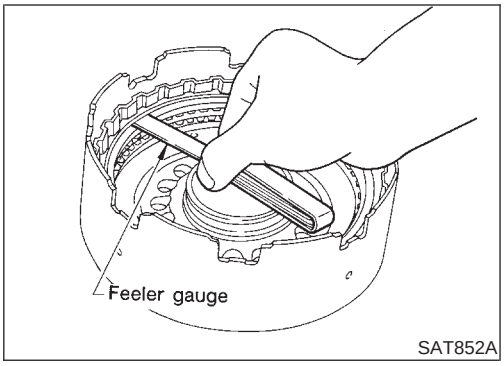


SAT850A

- **Do not align snap ring gap with spring retainer stopper.**


SAT842A

5. Install drive plates, driven plates, retaining plate and dish plate.
6. Install snap ring.



7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

Specified clearance:

Standard

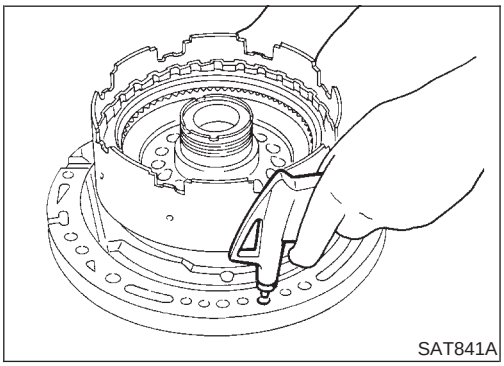
0.5 - 0.8 mm (0.020 - 0.031 in)

Allowable limit

1.2 mm (0.047 in)

Retaining plate:

Refer to SDS, AT-359.



8. Check operation of reverse clutch.
Refer to "DISASSEMBLY" of Reverse Clutch, AT-315.

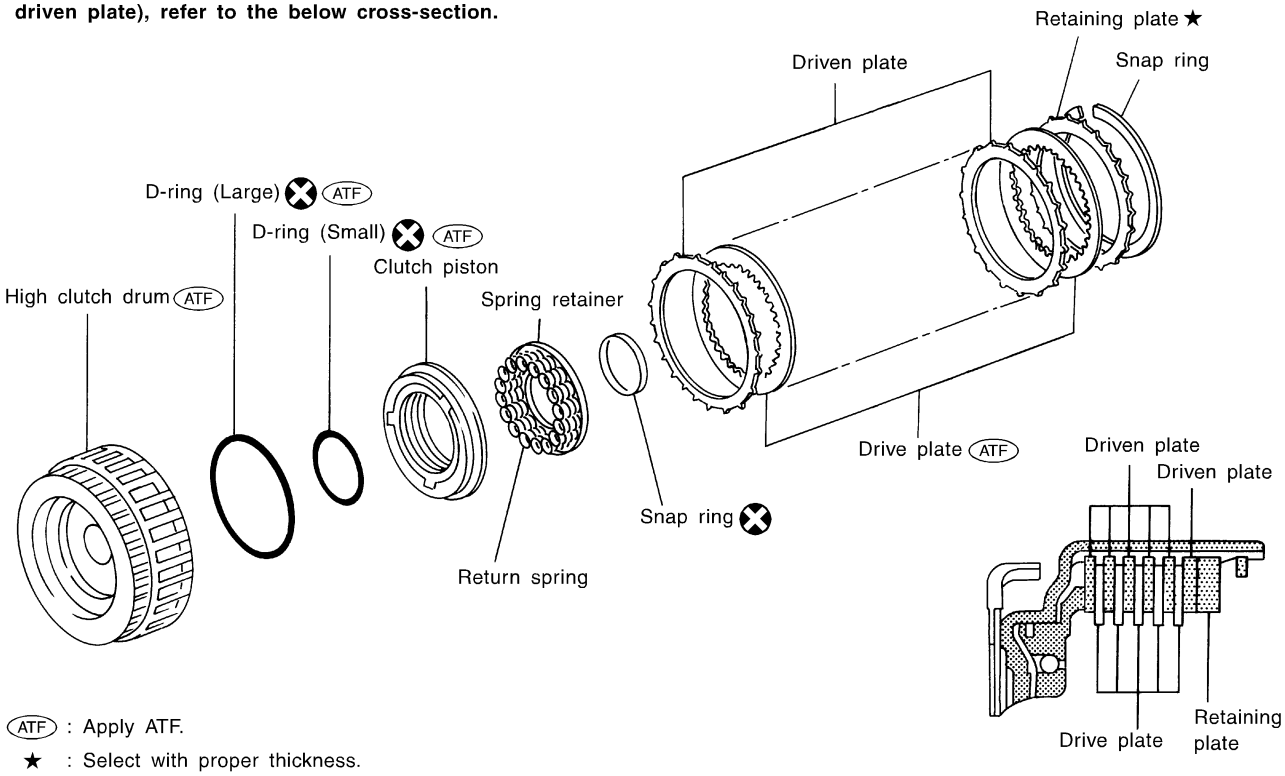
High Clutch

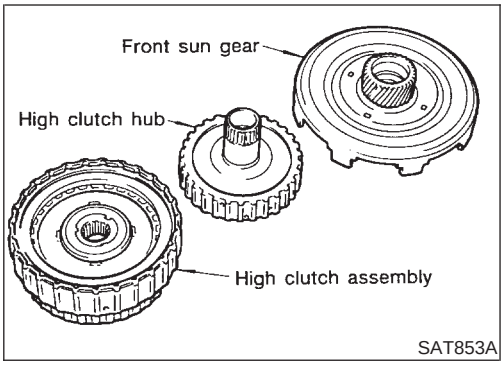
COMPONENTS

NAAT0132

SEC. 315

For the number of clutch sheets (drive plate and driven plate), refer to the below cross-section.



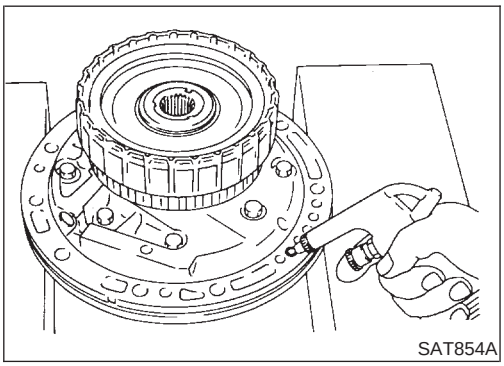


SAT853A

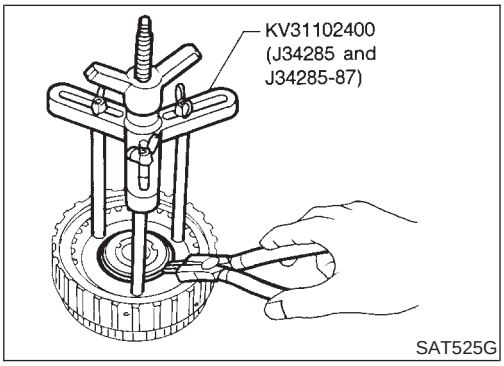
DISASSEMBLY AND ASSEMBLY

NAAT0133

Service procedures for high clutch are essentially the same as those for reverse clutch, with the following exception:

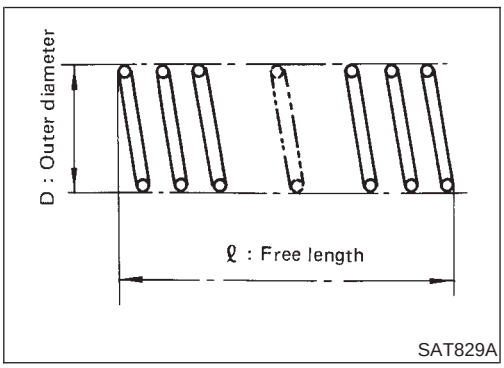

SAT854A

- Check of high clutch operation



SAT525G

- Removal and installation of return spring

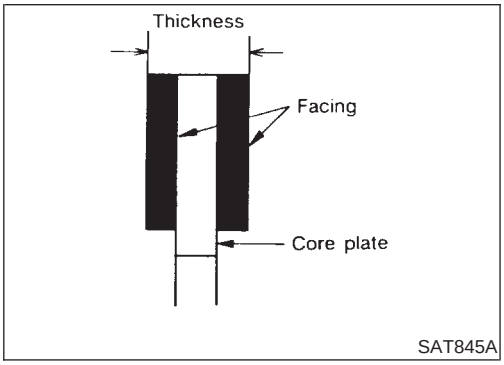


SAT829A

- Inspection of high clutch return springs

  Inspection standard:

  Refer to SDS, AT-358.



SAT845A

- Inspection of high clutch drive plate

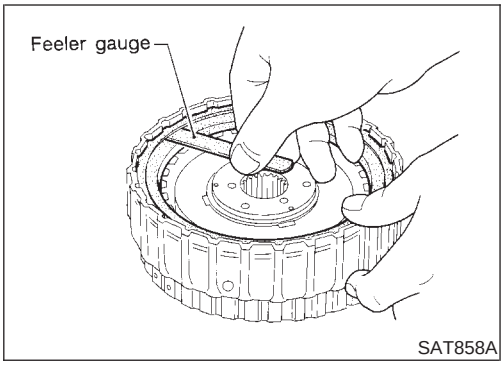
  Thickness of drive plate:

  Standard

  1.52 - 1.67 mm (0.0598 - 0.0657 in)

  Wear limit

  1.40 mm (0.0551 in)



- Measurement of clearance between retaining plate and snap ring

Specified clearance:

Standard

1.8 - 2.2 mm (0.071 - 0.087 in)

Allowable limit

3.2 mm (0.126 in)

Retaining plate:

Refer to SDS, AT-359.

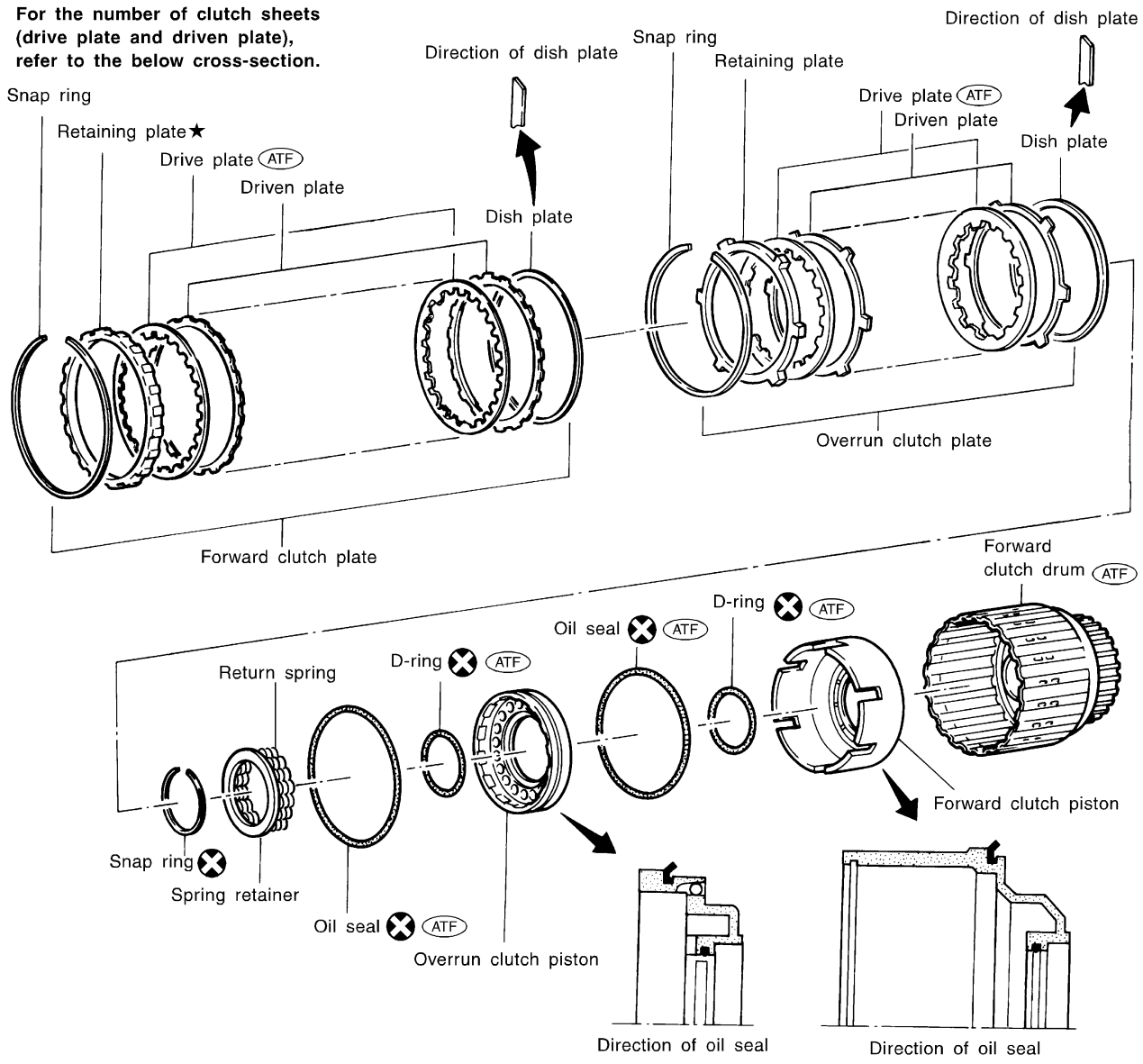
Forward and Overrun Clutches

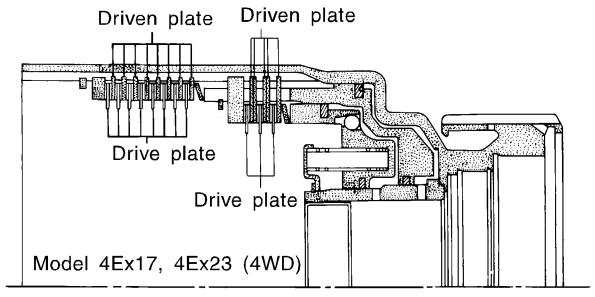
COMPONENTS

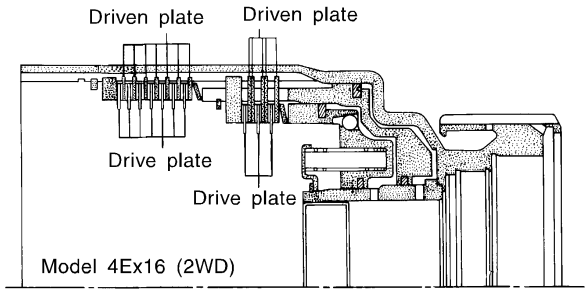
NAAT0134

SEC. 315

For the number of clutch sheets (drive plate and driven plate), refer to the below cross-section.







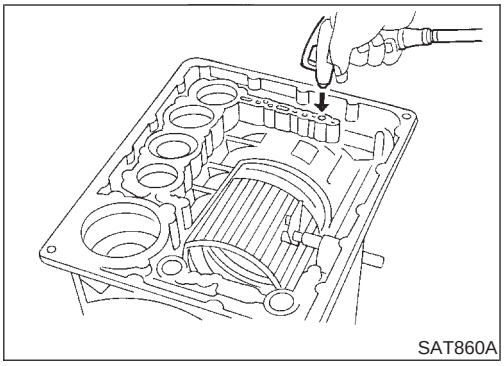
(ATF) : Apply ATF.
★ : Select with proper thickness.

SAT159K

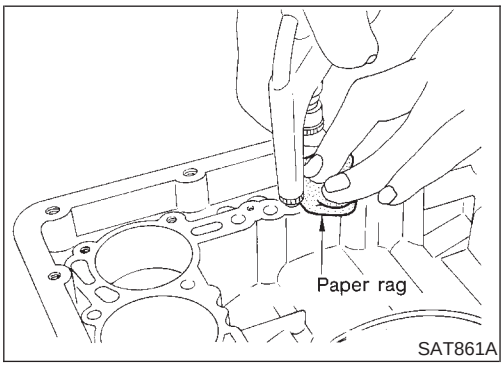
DISASSEMBLY AND ASSEMBLY

NAAT0135

Forward and overrun clutches are serviced essentially the same way as reverse clutch is serviced. However, note the following exceptions.

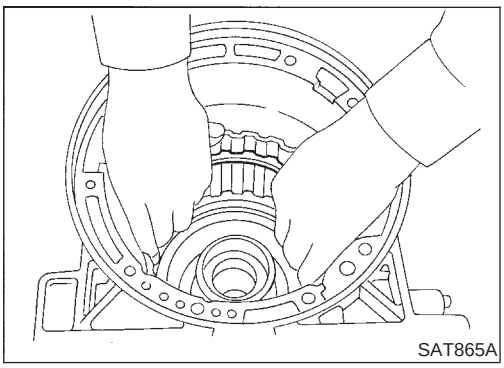

SAT860A

- Check of forward clutch operation



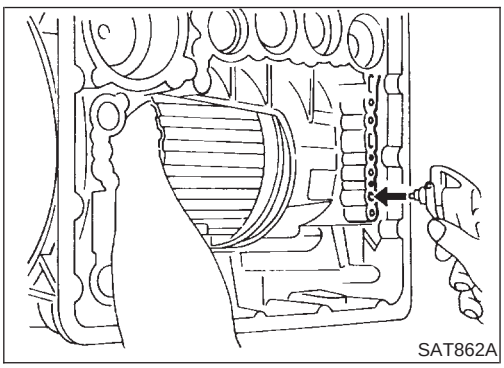
SAT861A

- Check of overrun clutch operation


SAT865A

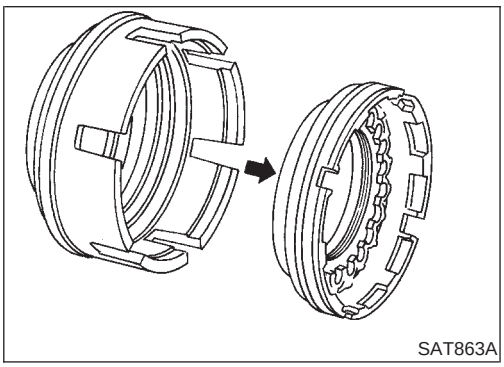
- Removal of forward clutch drum

  Remove forward clutch drum from transmission case by holding snap ring.

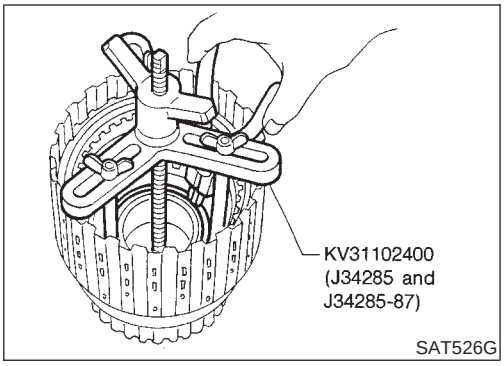

SAT862A

- Removal of forward clutch and overrun clutch pistons

a) While holding overrun clutch piston, gradually apply compressed air to oil hole.

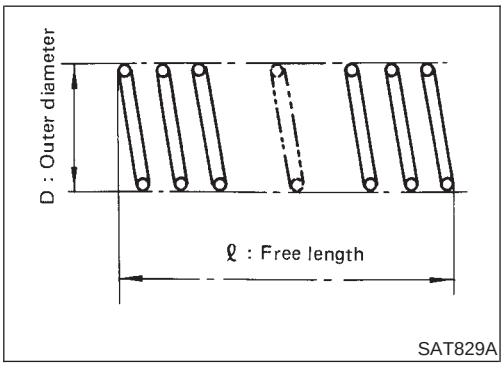

SAT863A

b) Remove overrun clutch from forward clutch.



SAT526G

- Removal and installation of return springs

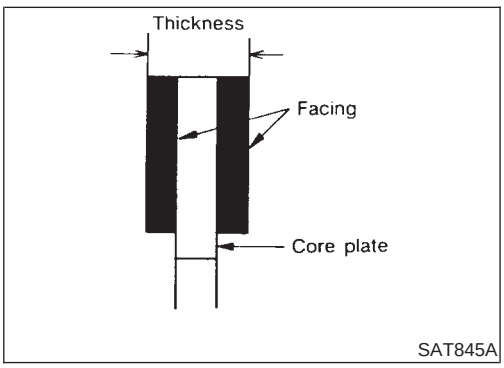


SAT829A

- Inspection of forward clutch and overrun clutch return springs

  Inspection standard:

  Refer to SDS, AT-358.



SAT845A

- Inspection of forward clutch drive plates

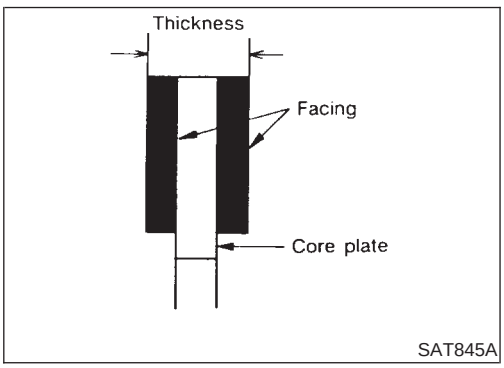
  Thickness of drive plate:

  Standard

  1.52 - 1.67 mm (0.0598 - 0.0657 in)

  Wear limit

  1.40 mm (0.0551 in)



SAT845A

- Inspection of overrun clutch drive plates

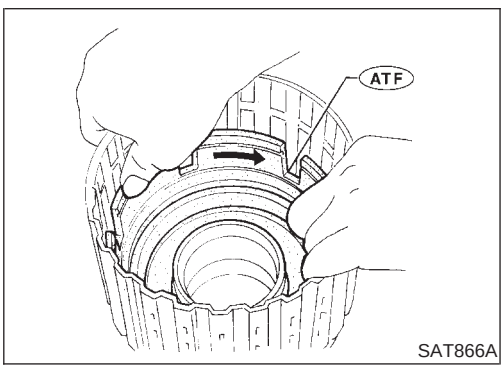
  Thickness of drive plate:

  Standard

  1.90 - 2.05 mm (0.0748 - 0.0807 in)

  Wear limit

  1.80 mm (0.0709 in)

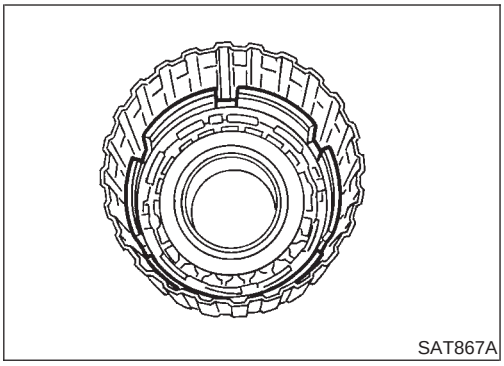


SAT866A

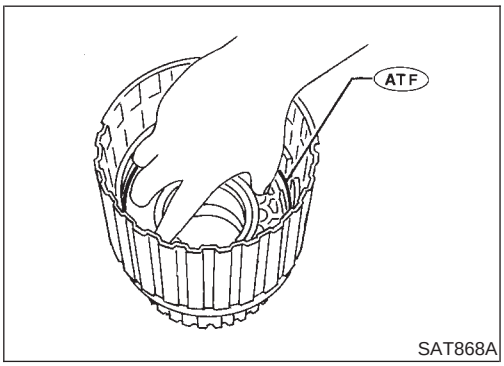
- Installation of forward clutch piston and overrun clutch piston

a) Install forward clutch piston by turning it slowly and evenly.

- **Apply ATF to inner surface of clutch drum.**


SAT867A

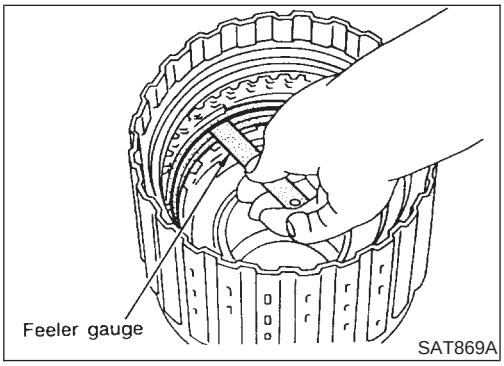
- **Align notch in forward clutch piston with groove in forward clutch drum.**



SAT868A

b) Install overrun clutch by turning it slowly and evenly.

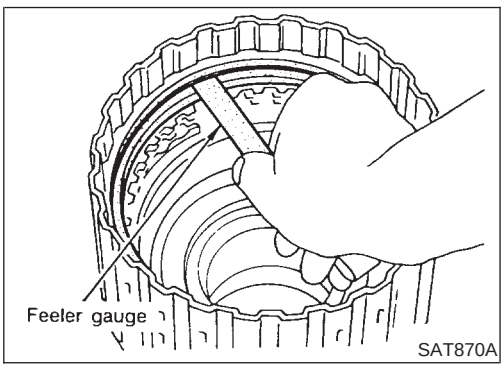
- **Apply ATF to inner surface of forward clutch piston.**



SAT869A

- Measurement of clearance between retaining plate and snap ring of overrun clutch

Specified clearance:
Standard
1.0 - 1.4 mm (0.039 - 0.055 in)
Allowable limit
2.0 mm (0.079 in)
Retaining plate:
Refer to SDS, AT-360.



SAT870A

- Measurement of clearance between retaining plate and snap ring of forward clutch

Specified clearance:
Standard
0.35 - 0.75 mm (0.0138 - 0.0295 in)
Allowable limit
Model 4EX16 (2WD)
2.15 mm (0.0846 in)
Model 4EX17, 4EX23 (4WD)
2.35 mm (0.0925 in)
Retaining plate:
Refer to SDS, AT-360.

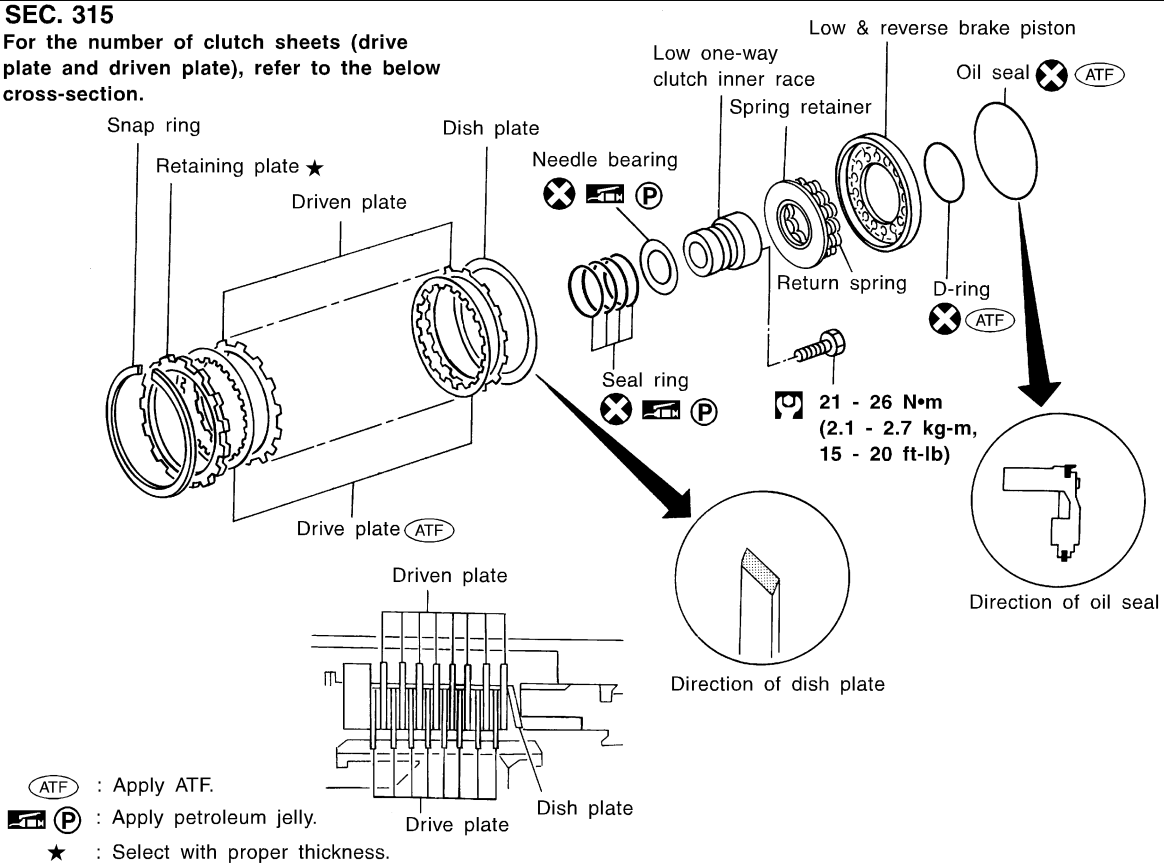
Low & Reverse Brake

COMPONENTS

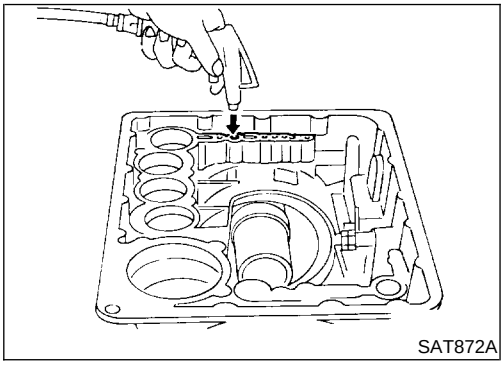
NAAT0136

SEC. 315

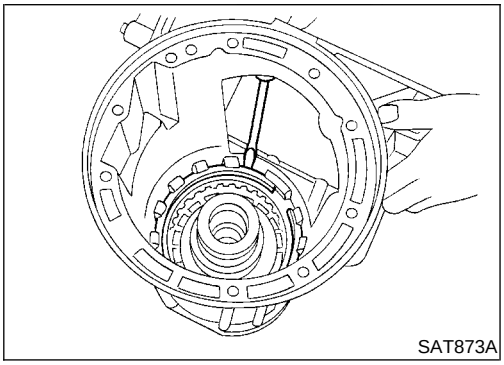
For the number of clutch sheets (drive plate and driven plate), refer to the below cross-section.



SAT160K



SAT872A



SAT873A

DISASSEMBLY

NAAT0137

1. Check operation of low and reverse brake.

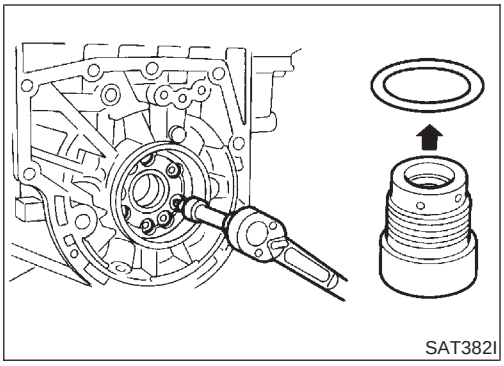
a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.

b. Check to see that retaining plate moves to snap ring.

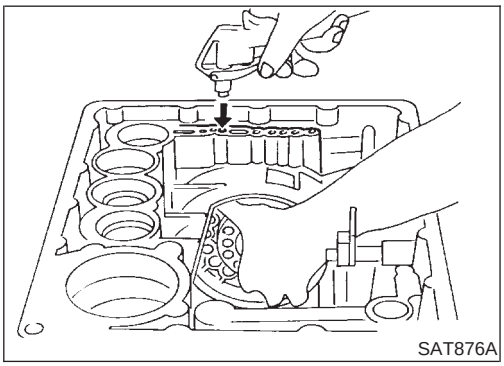
c. If retaining plate does not contact snap ring,

- D-ring might be damaged.
- Oil seal might be damaged.
- Fluid might be leaking past piston check ball.

2. Remove snap ring, low and reverse brake drive plates, driven plates and dish plate.


SAT382I

3. Remove low one-way clutch inner race, spring retainer and return spring from transmission case.
4. Remove seal rings from low one-way clutch inner race.
5. Remove needle bearing from low one-way clutch inner race.


SAT876A

6. Remove low and reverse brake piston using compressed air.
7. Remove oil seal and D-ring from piston.

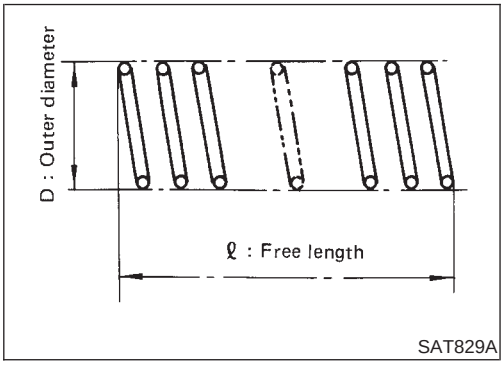
INSPECTION

NAAT0138

Low and Reverse Brake Snap Ring and Spring Retainer

NAAT0138S01

- Check for deformation, or damage.



SAT829A

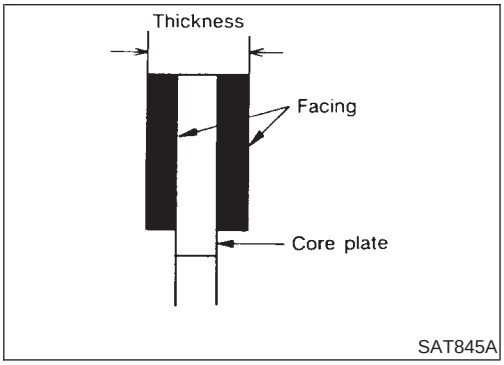
Low and Reverse Brake Return Springs

NAAT0138S02

- Check for deformation or damage. Also measure free length and outside diameter.

Inspection standard:

Refer to SDS, AT-358.



SAT845A

Low and Reverse Brake Drive Plates

NAAT0138S03

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate:

Standard value

Model 4EX16 (2WD)

1.90 - 2.05 mm (0.075 - 0.081 in)

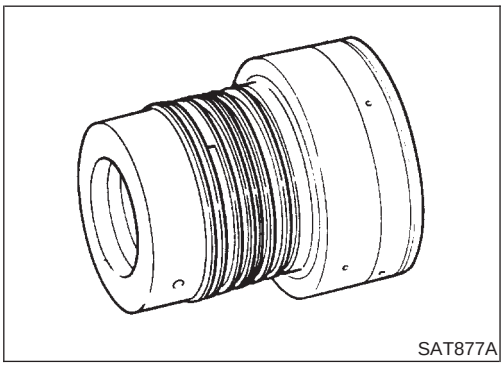
Model 4EX17, 4EX23 (4WD)

1.52 - 1.67 mm (0.0598 - 0.0657 in)

Wear limit

1.40 mm (0.0551 in)

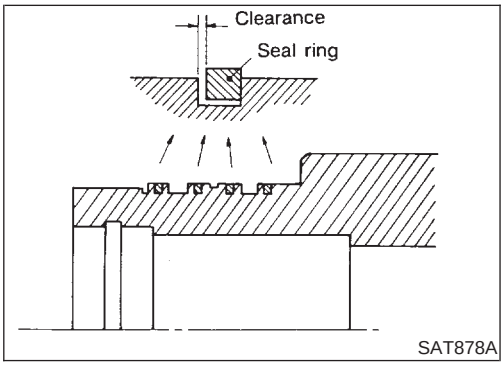
- If not within wear limit, replace.


SAT877A

Low One-way Clutch Inner Race

NAAT0138S04

- Check frictional surface of inner race for wear or damage.



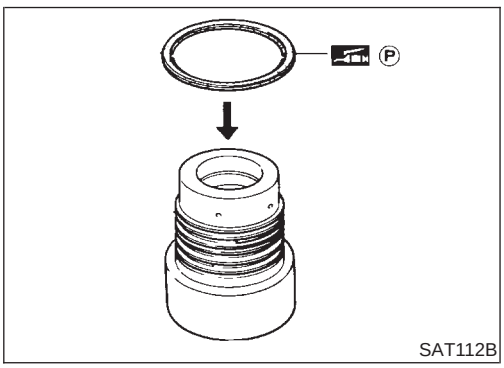
SAT878A

- Install a new seal rings onto low one-way clutch inner race.
- **Be careful not to expand seal ring gap excessively.**
- Measure seal ring-to-groove clearance.

  Inspection standard:

  Standard value: 0.10 - 0.25 mm (0.0039 - 0.0098 in)

  Allowable limit: 0.25 mm (0.0098 in)
- If not within allowable limit, replace low one-way clutch inner race.

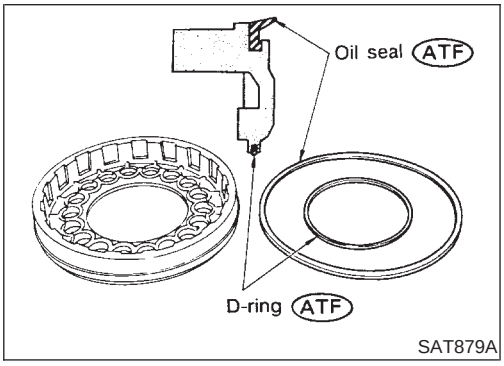


SAT112B

ASSEMBLY

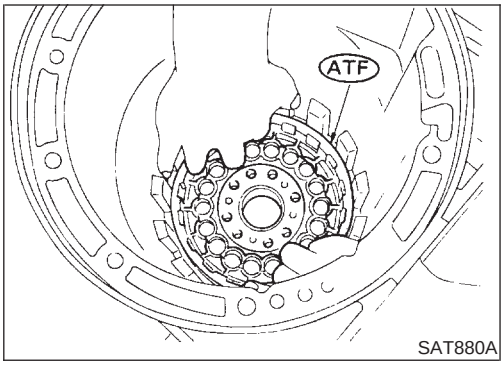
NAAT0139

1. Install needle bearing onto one-way clutch inner race.
- **Pay attention to its direction — Black surface goes to rear side.**
- **Apply petroleum jelly to needle bearing.**



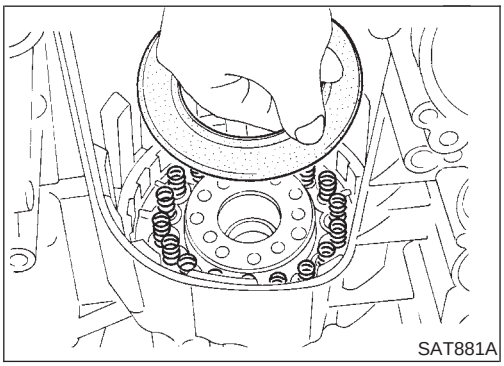
SAT879A

2. Install oil seal and D-ring onto piston.
- **Apply ATF to oil seal and D-ring.**

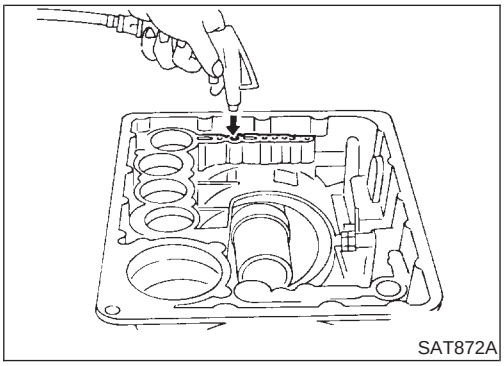


SAT880A

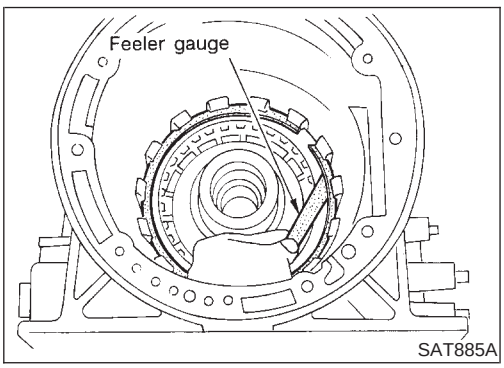
3. Install piston by rotating it slowly and evenly.
- **Apply ATF to inner surface of transmission case.**


SAT881A

4. Install return springs, spring retainer and low one-way clutch inner race onto transmission case.
5. Install dish plate, low and reverse brake drive plates, driven plates and retaining plate.
6. Install snap ring on transmission case.


SAT872A

7. Check operation of low and reverse brake clutch piston. Refer to "DISASSEMBLY", AT-325.



SAT885A

8. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

Specified clearance:

Standard

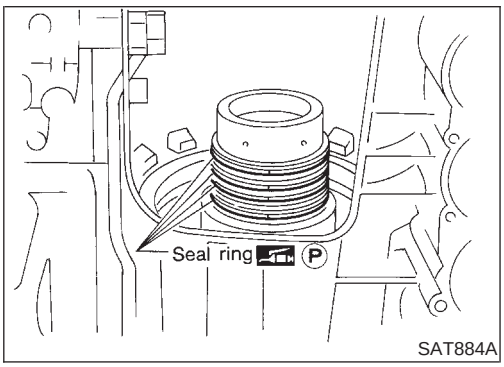
0.8 - 1.1 mm (0.031 - 0.043 in)

Allowable limit

2.7 mm (0.106 in)

Retaining plate:

Refer to SDS, AT-361.



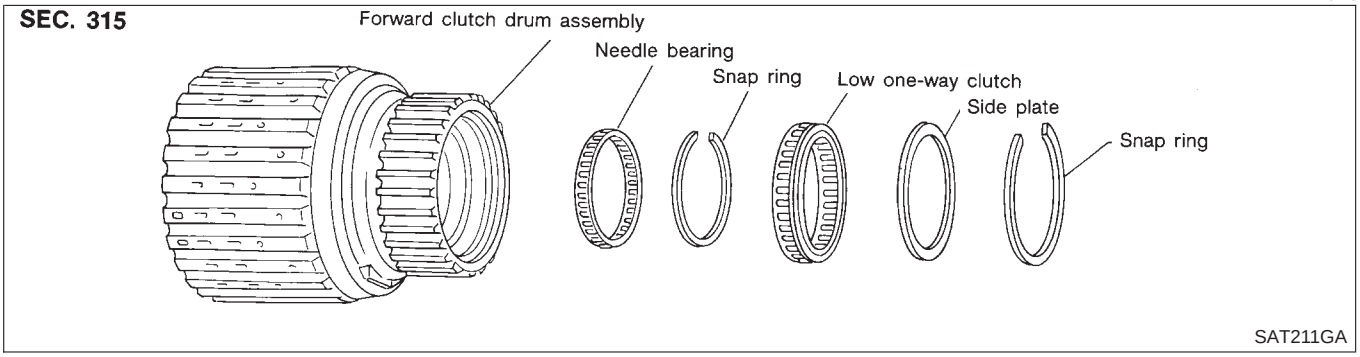
SAT884A

9. Install low one-way clutch inner race seal ring.
- **Apply petroleum jelly to seal ring.**
- **Make sure seal rings are pressed firmly into place and held by petroleum jelly.**

Forward Clutch Drum Assembly

COMPONENTS

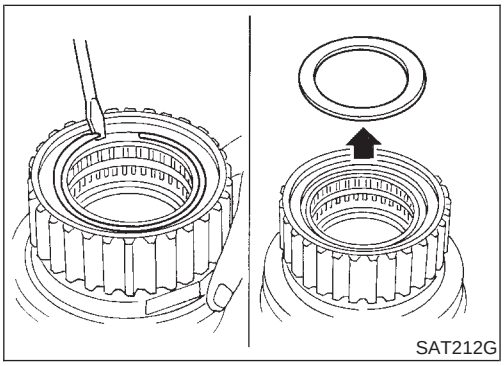
NAAT0140



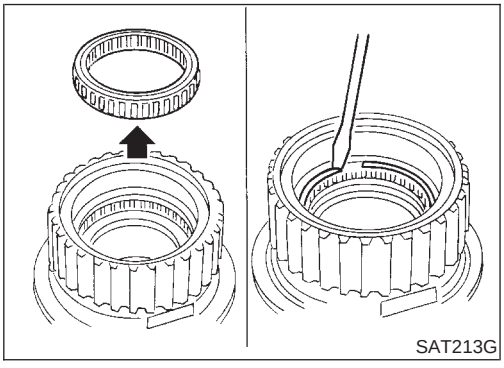
DISASSEMBLY

NAAT0141

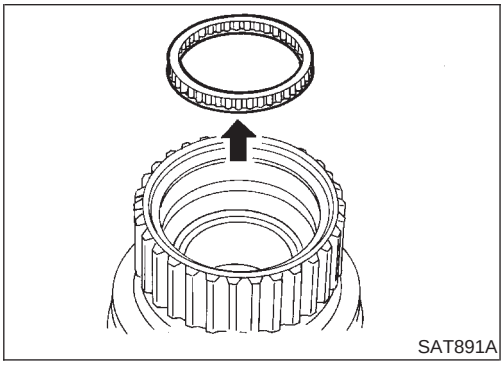
1. Remove snap ring from forward clutch drum.
2. Remove side plate from forward clutch drum.

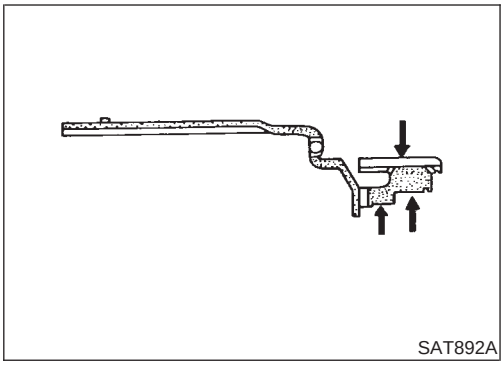


3. Remove low one-way clutch from forward clutch drum.
4. Remove snap ring from forward clutch drum.



5. Remove needle bearing from forward clutch drum.




SAT892A

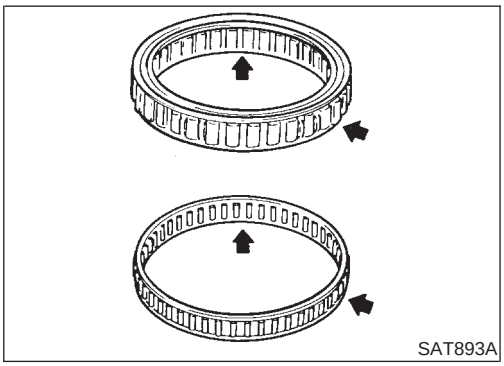
INSPECTION

NAAT0142

Forward Clutch Drum

NAAT0142S01

- Check spline portion for wear or damage.
- Check frictional surfaces of low one-way clutch and needle bearing for wear or damage.


SAT893A

Needle Bearing and Low One-way Clutch

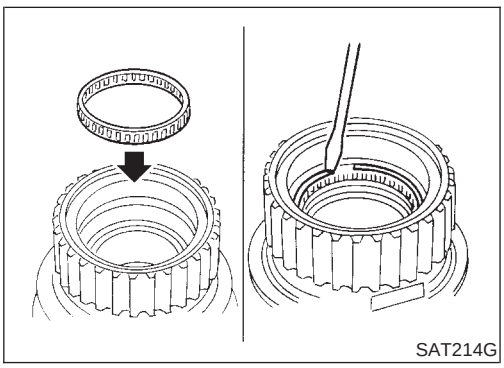
NAAT0142S02

- Check frictional surface for wear or damage.

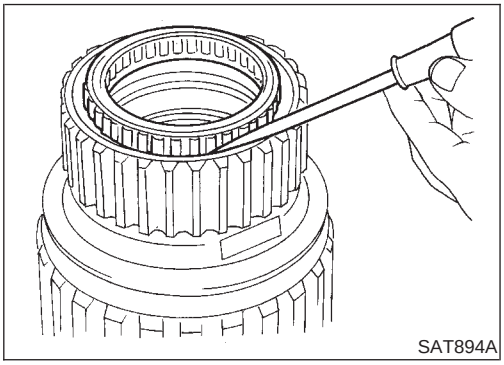
ASSEMBLY

NAAT0143

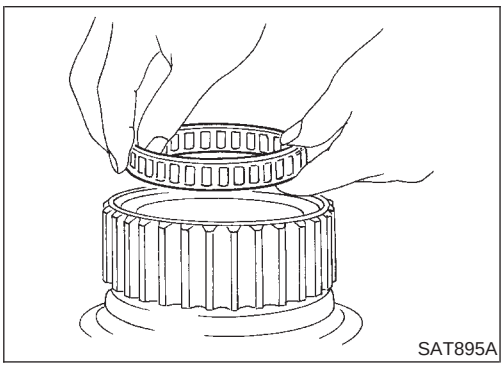
1. Install needle bearing in forward clutch drum.
2. Install snap ring onto forward clutch drum.

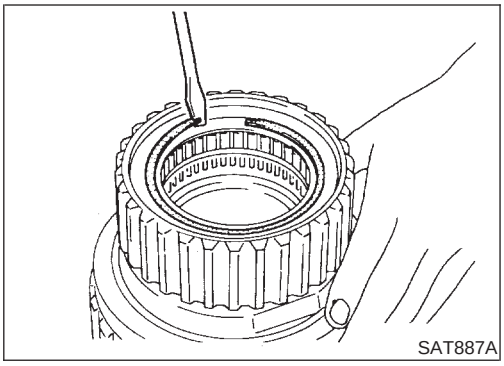

SAT214G

3. Install low one-way clutch onto forward clutch drum by pushing the roller in evenly.


SAT894A

- **Install low one-way clutch with flange facing rearward.**


SAT895A

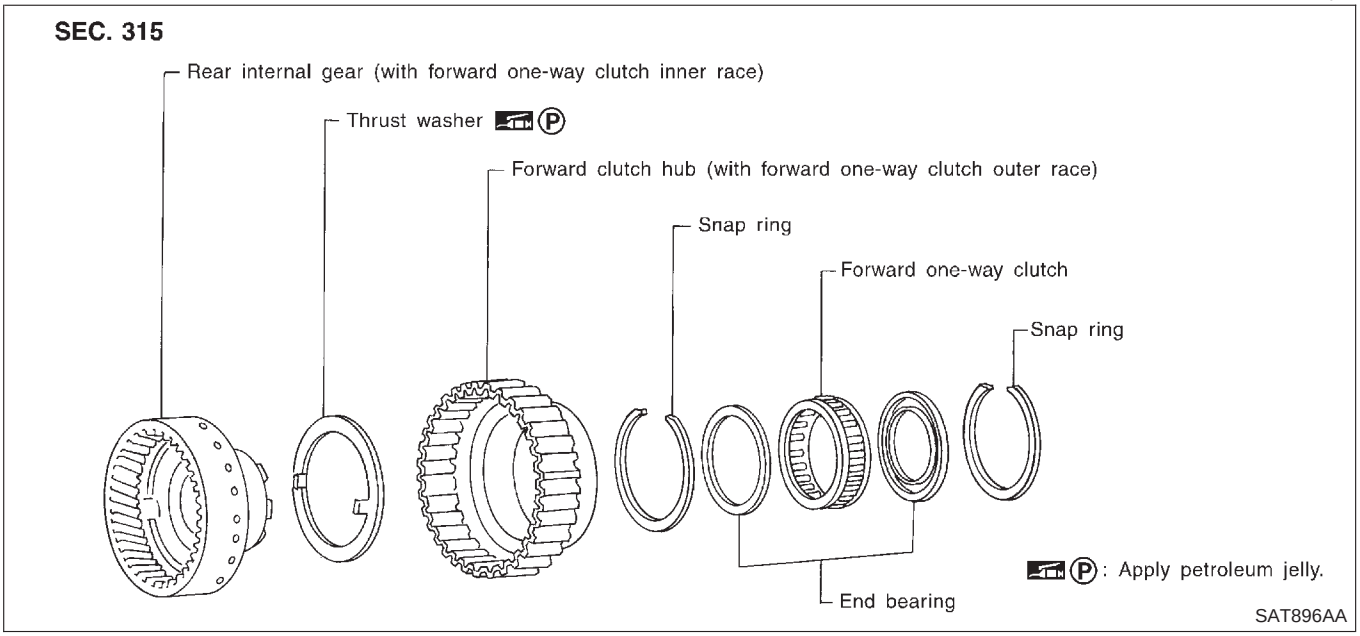

SAT887A

4. Install side plate onto forward clutch drum.
5. Install snap ring onto forward clutch drum.

Rear Internal Gear and Forward Clutch Hub

COMPONENTS

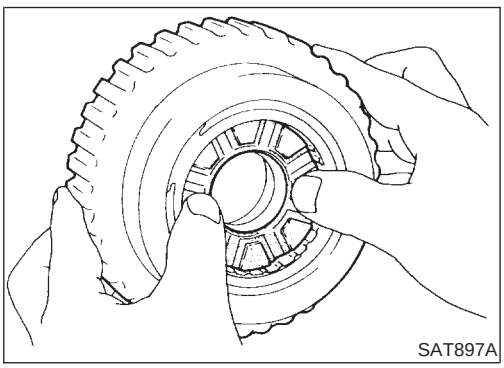
NAAT0144



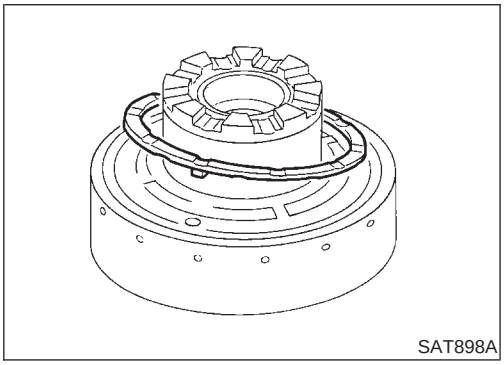
DISASSEMBLY

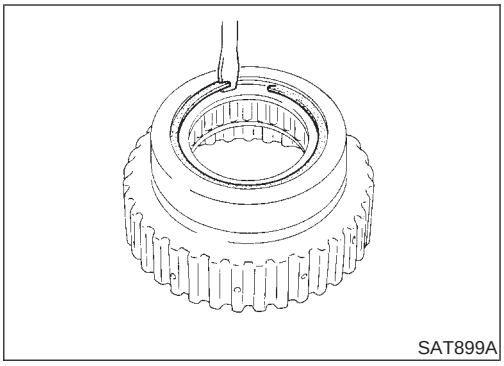
NAAT0145

1. Remove rear internal gear by pushing forward clutch hub forward.

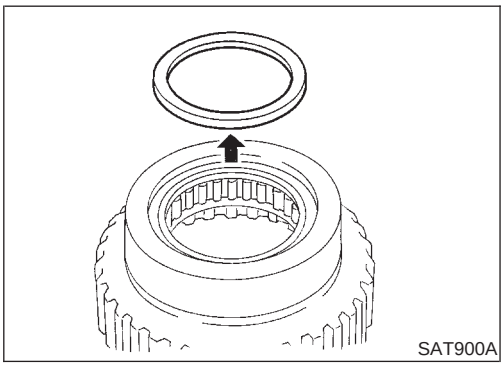

SAT897A

2. Remove thrust washer from rear internal gear.

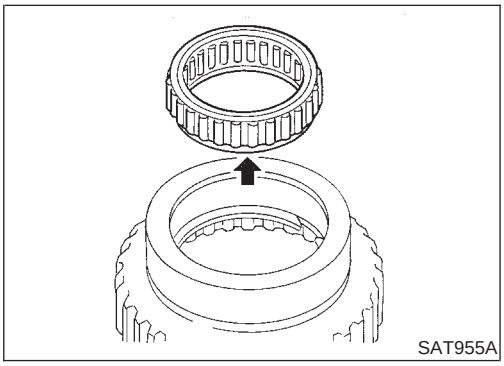

SAT898A


SAT899A

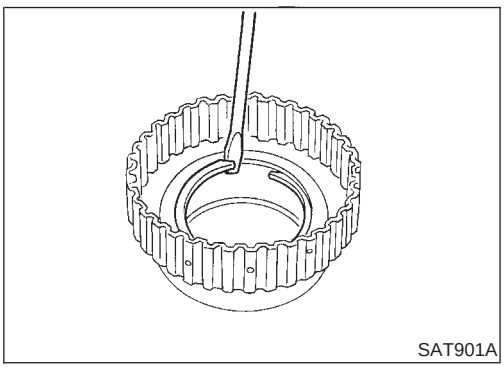
3. Remove snap ring from forward clutch hub.


SAT900A

4. Remove end bearing.


SAT955A

5. Remove forward one-way clutch and end bearing as a unit from forward clutch hub.


SAT901A

6. Remove snap ring from forward clutch hub.

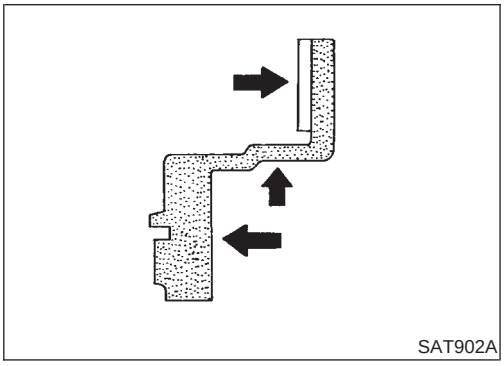
INSPECTION

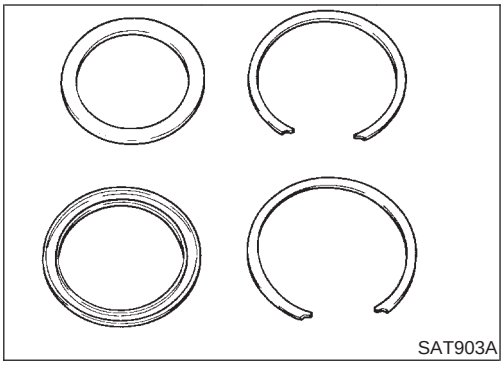
NAAT0146

Rear Internal Gear and Forward Clutch Hub

NAAT0146S01

- Check gear for excessive wear, chips or cracks.
- Check frictional surfaces of forward one-way clutch and thrust washer for wear or damage.
- Check spline for wear or damage.

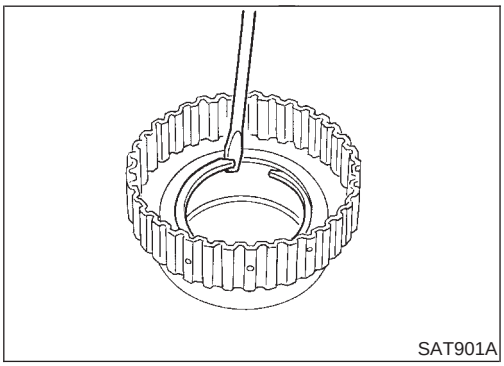

SAT902A


SAT903A

Snap Ring and End Bearing

NAAT0146S02

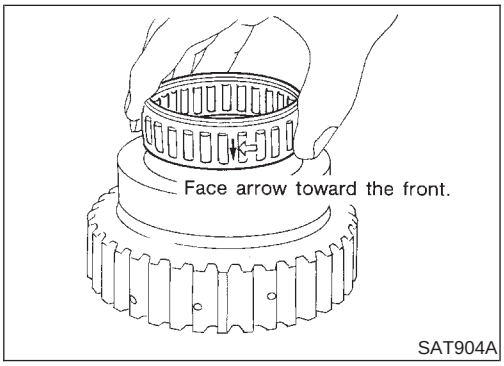
- Check for deformation or damage.


SAT901A

ASSEMBLY

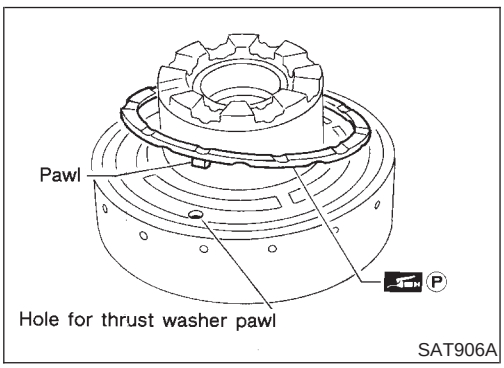
NAAT0147

1. Install snap ring onto forward clutch hub.
2. Install end bearing.



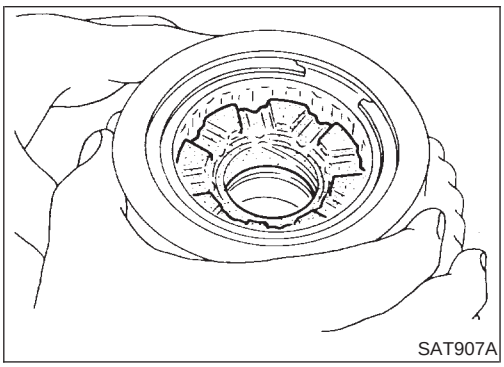
SAT904A

3. Install forward one-way clutch onto clutch hub.
- **Install forward one-way clutch with flange facing rearward.**
4. Install end bearing.
5. Install snap ring onto forward clutch hub.

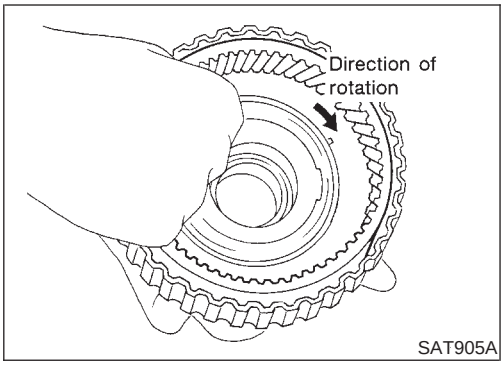


SAT906A

6. Install thrust washer onto rear internal gear.
- **Apply petroleum jelly to thrust washer.**
- **Securely insert pawls of thrust washer into holes in rear internal gear.**


SAT907A

7. Position forward clutch hub in rear internal gear.

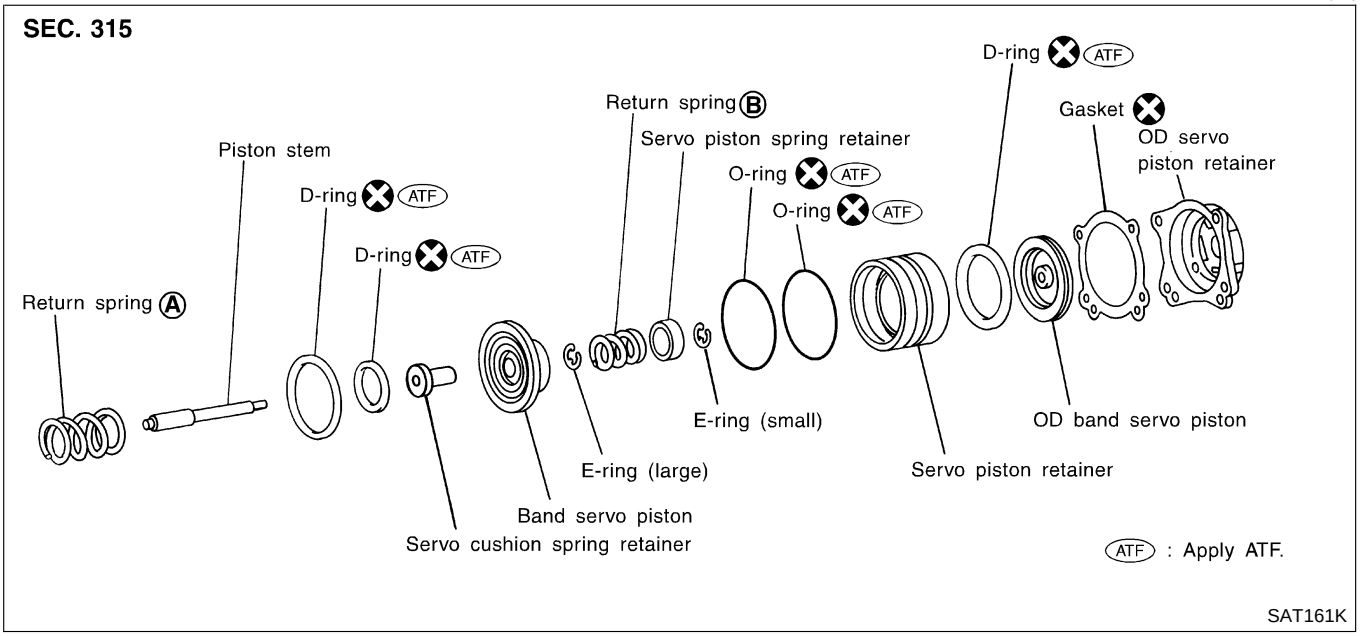


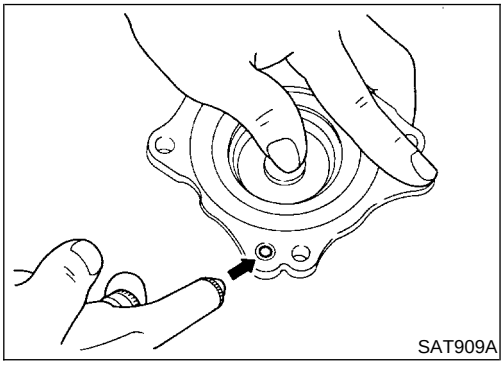
8. After installing, check to assure that forward clutch hub rotates clockwise.

Band Servo Piston Assembly

COMPONENTS

NAAT0148

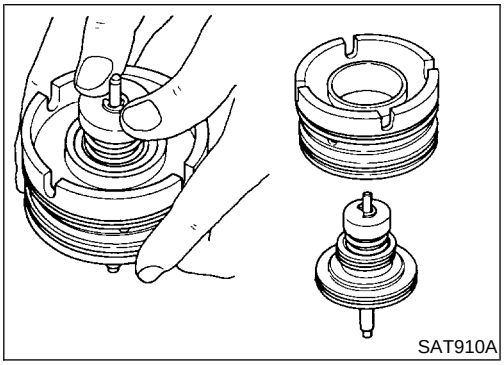




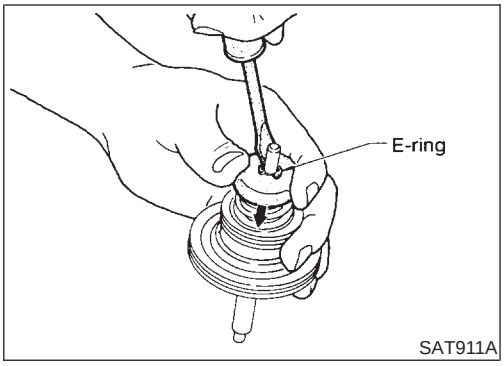
DISASSEMBLY

NAAT0149

1. Block one oil hole in OD servo piston retainer and the center hole in OD band servo piston.
2. Apply compressed air to the other oil hole in piston retainer to remove OD band servo piston from retainer.
3. Remove D-ring from OD band servo piston.

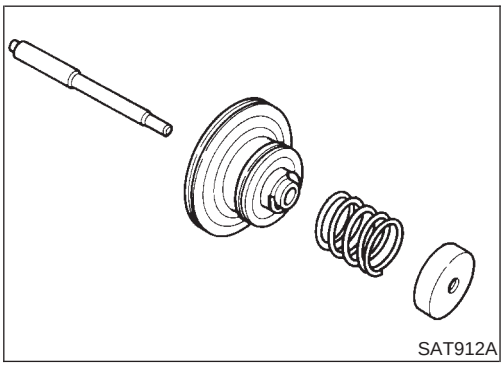


4. Remove band servo piston assembly from servo piston retainer by pushing it forward.

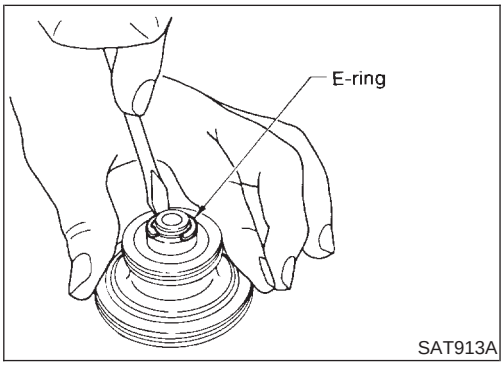


SAT911A

5. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.

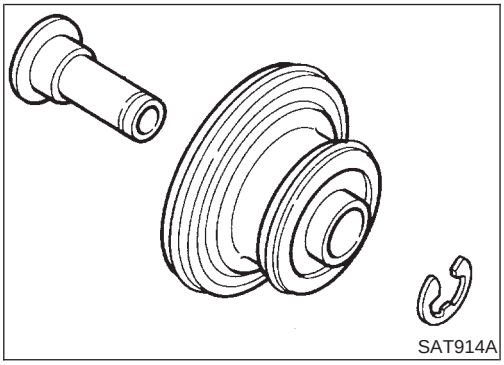

SAT912A

6. Remove servo piston spring retainer, return spring C and piston stem from band servo piston.

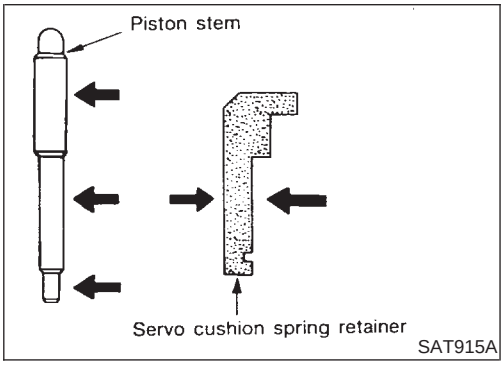


SAT913A

7. Remove E-ring from band servo piston.


SAT914A

8. Remove servo cushion spring retainer from band servo piston.
9. Remove D-rings from band servo piston.
10. Remove O-rings from servo piston retainer.



SAT915A

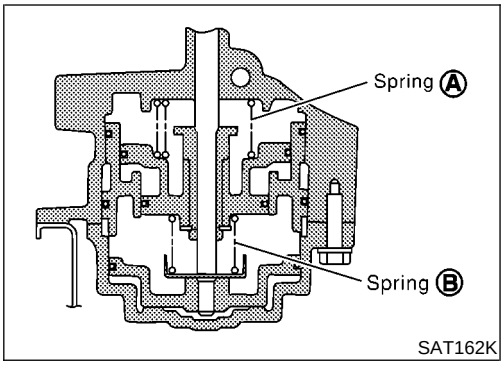
INSPECTION

Pistons, Retainers and Piston Stem

NAAT0150

NAAT0150S01

- Check frictional surfaces for abnormal wear or damage.



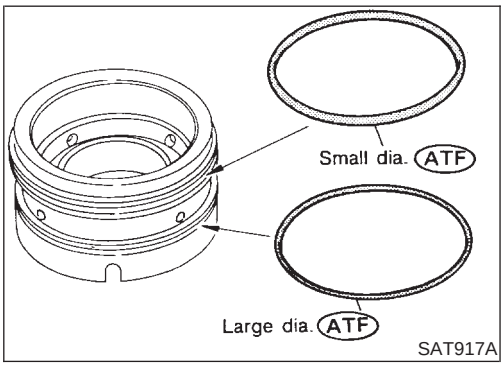
SAT162K

Return Springs

NAAT0150S02

- Check for deformation or damage. Measure free length and outer diameter.

Inspection standard:
Refer to SDS, AT-358.

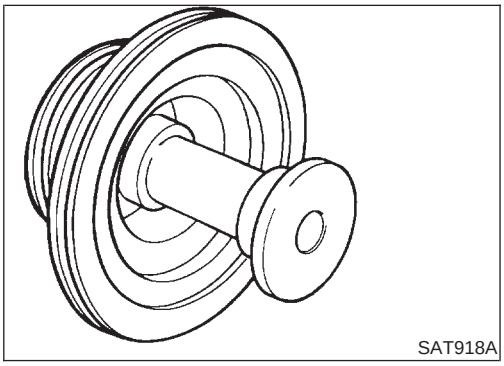


SAT917A

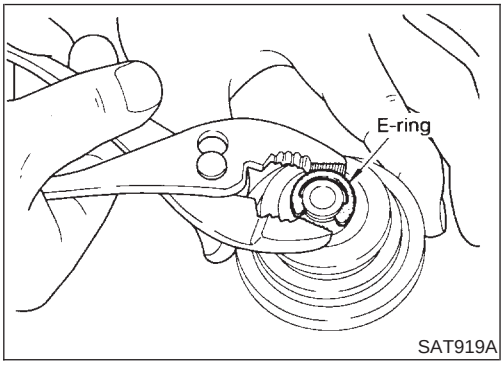
ASSEMBLY

NAAT0151

1. Install O-rings onto servo piston retainer.
- **Apply ATF to O-rings.**
- **Pay attention to position of each O-ring.**

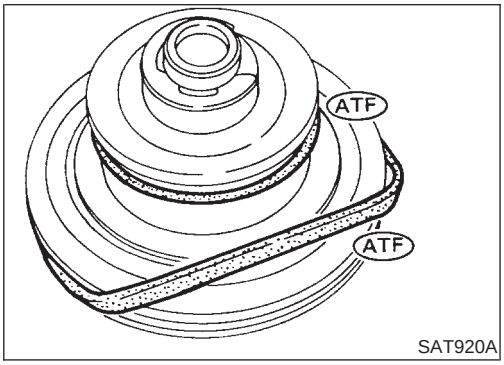

SAT918A

2. Install servo cushion spring retainer onto band servo piston.



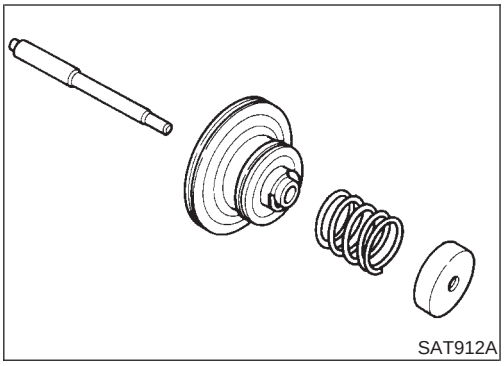
SAT919A

3. Install E-ring onto servo cushion spring retainer.

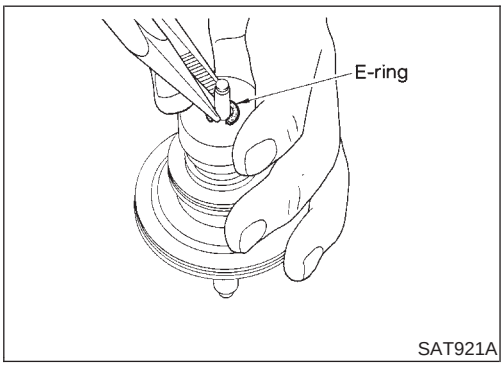


SAT920A

4. Install D-rings onto band servo piston.
- **Apply ATF to D-rings.**

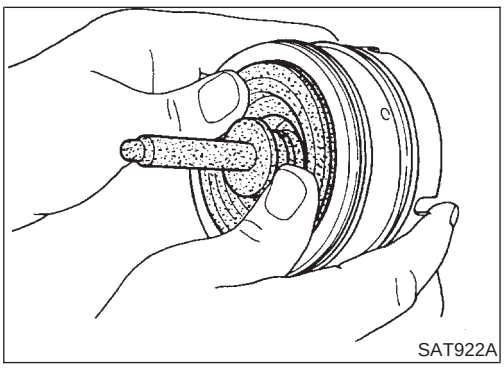

SAT912A

5. Install servo piston spring retainer, return spring C and piston stem onto band servo piston.

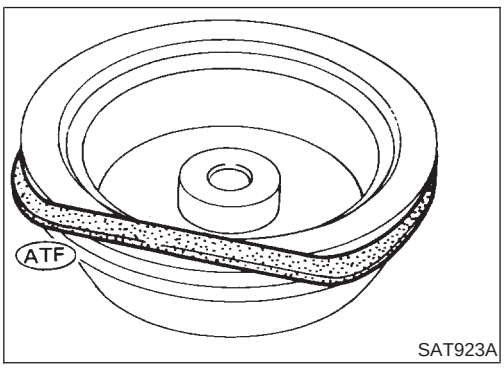


SAT921A

6. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.

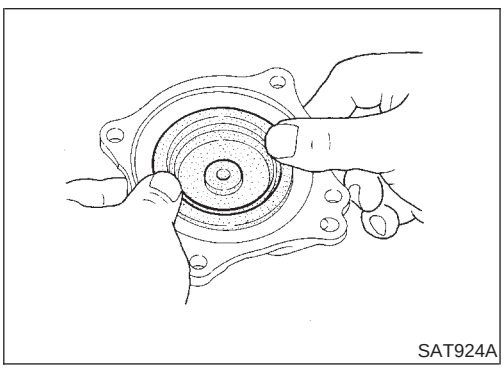

SAT922A

7. Install band servo piston assembly onto servo piston retainer by pushing it inward.



SAT923A

8. Install D-ring on OD band servo piston.
- **Apply ATF to D-ring.**

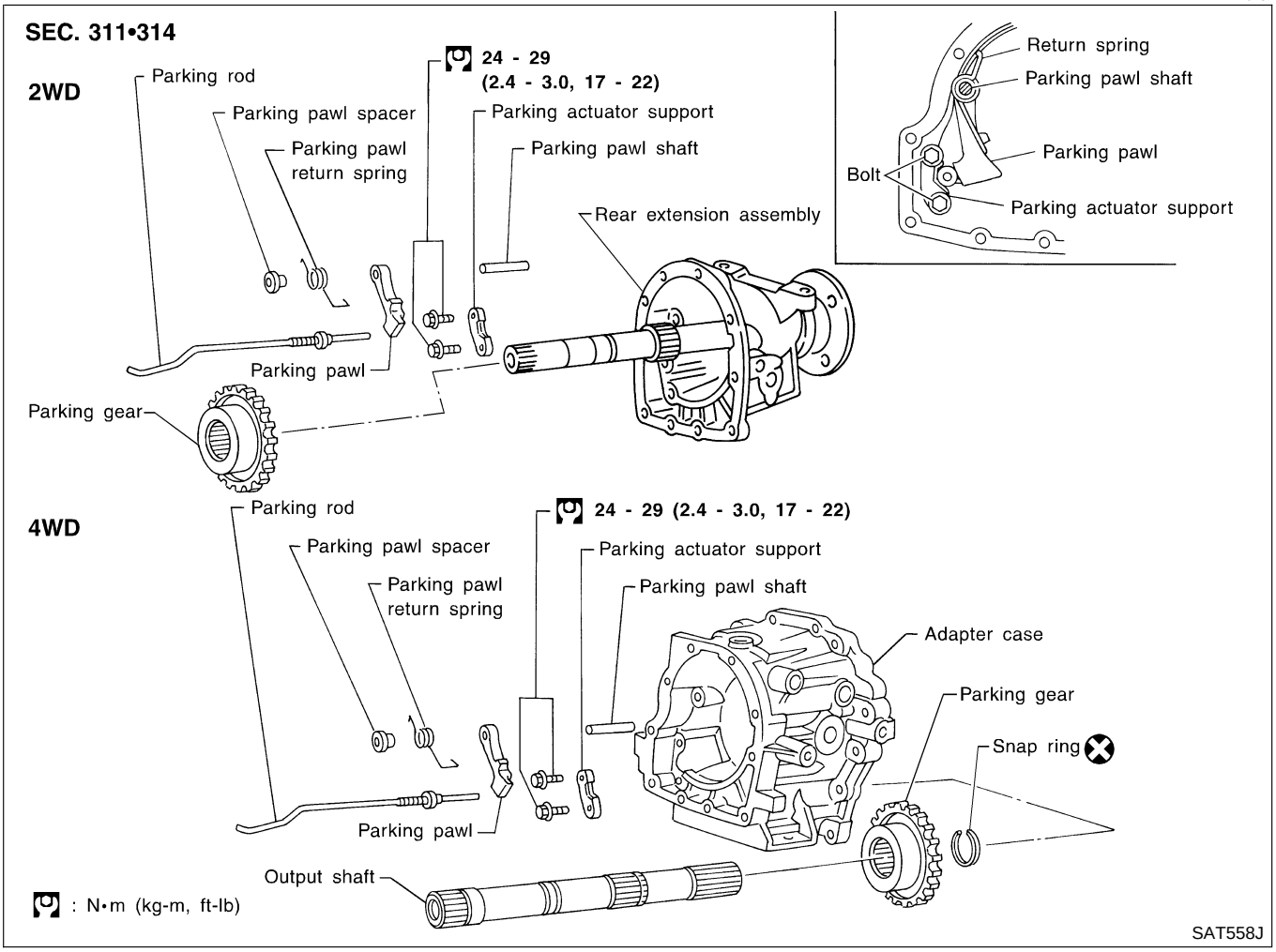

SAT924A

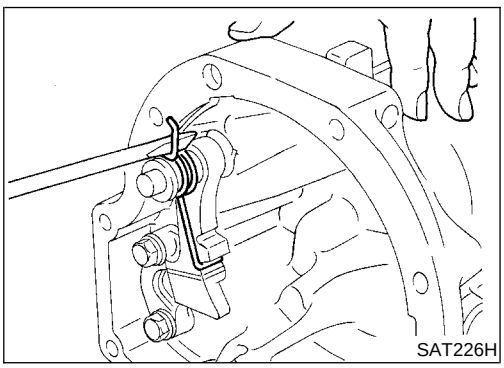
9. Install OD band servo piston onto servo piston retainer by pushing it inward.

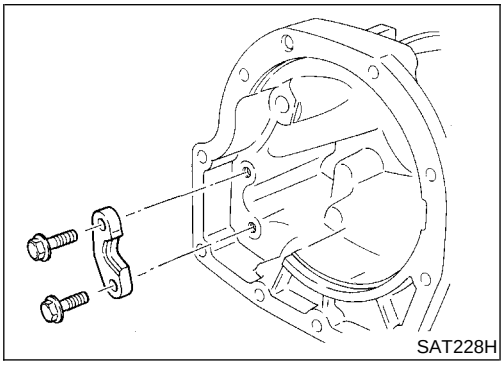
Parking Pawl Components

COMPONENTS

NAAT0152



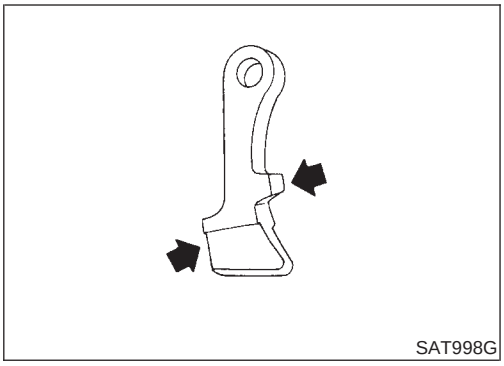




DISASSEMBLY

NAAT0153

1. Slide return spring to the front of adapter case flange.
2. Remove return spring, parking pawl spacer and parking pawl from adapter case.
3. Remove parking pawl shaft from adapter case.
4. Remove parking actuator support from adapter case.


SAT998G

INSPECTION

NAAT0209

Parking Pawl and Parking Actuator Support

NAAT0209S01

- Check contact surface of parking rod for wear.

Rear Extension Assembly (2WD model only)

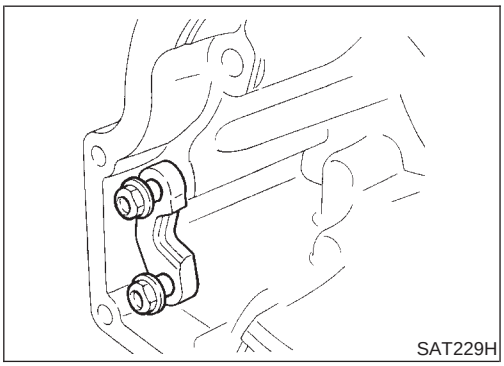
NAAT0209S02

- Check for free play between companion flange and output shaft.
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- Check contact surface of output shaft for wear.

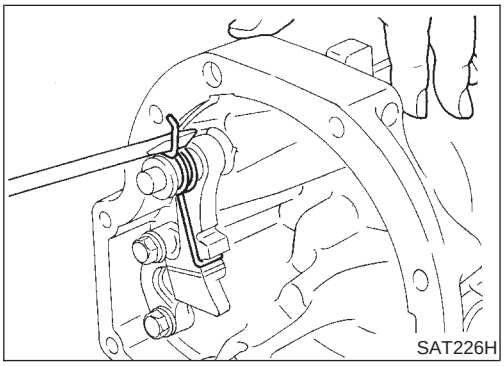
ASSEMBLY

NAAT0154

1. Install parking actuator support onto adapter case.
2. Insert parking pawl shaft into adapter case.
3. Install return spring, pawl spacer and parking pawl onto parking pawl shaft.

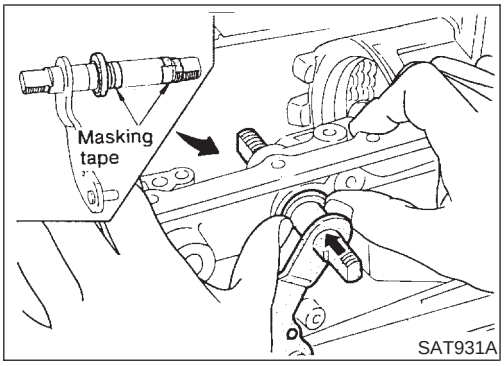

SAT229H

4. Bend return spring upward and install it onto adapter case.


SAT226H

Assembly (1)

NAAT0155



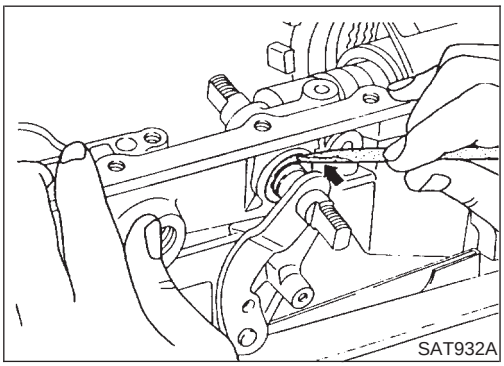
1. Install manual shaft components.

a. Install oil seal onto manual shaft.

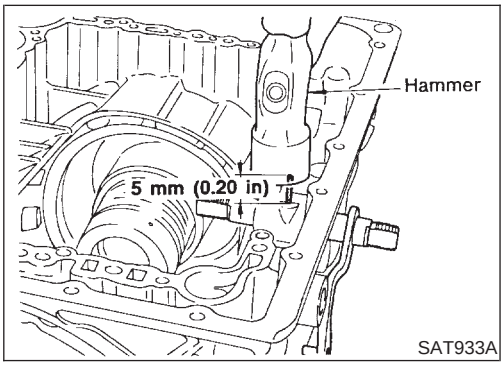
- **Apply ATF to oil seal.**
- **Wrap threads of manual shaft with masking tape.**

b. Insert manual shaft and oil seal as a unit into transmission case.

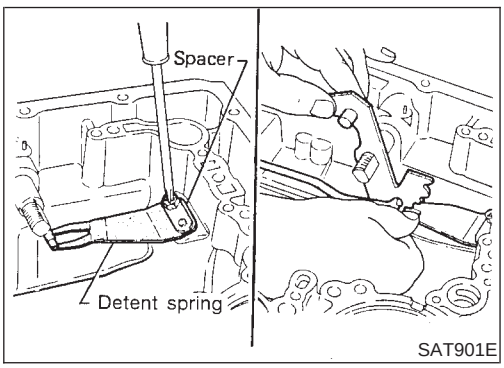
c. Remove masking tape.



d. Push oil seal evenly and install it onto transmission case.

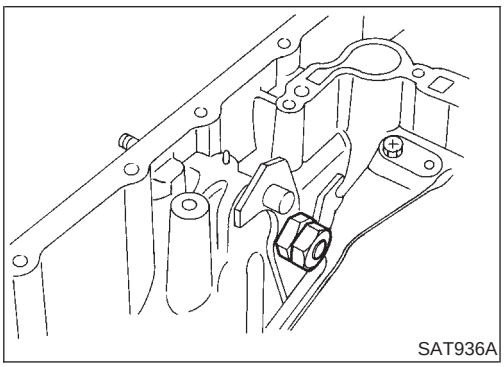


e. Align groove in shaft with retaining pin hole, then retaining pin into position as shown in figure at left.

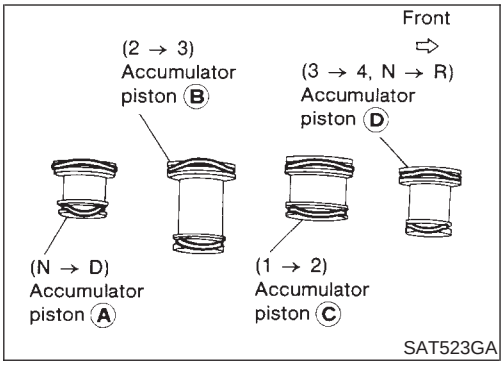


f. Install detent spring and spacer.

g. While pushing detent spring down, install manual plate onto manual shaft.



h. Install lock nuts onto manual shaft.



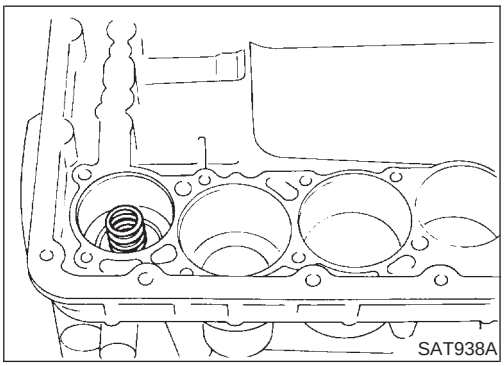
SAT523GA

2. Install accumulator piston.
a. Install O-rings onto accumulator piston.
- **Apply ATF to O-rings.**

Accumulator piston O-rings

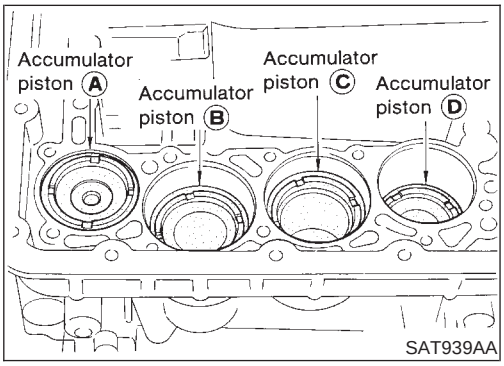
Unit: mm (in)

Accumulator	A	B	C	D
Small diameter end	29 (1.14)	32 (1.26)	45 (1.77)	29 (1.14)
Large diameter end	45 (1.77)	50 (1.97)	50 (1.97)	45 (1.77)


SAT938A

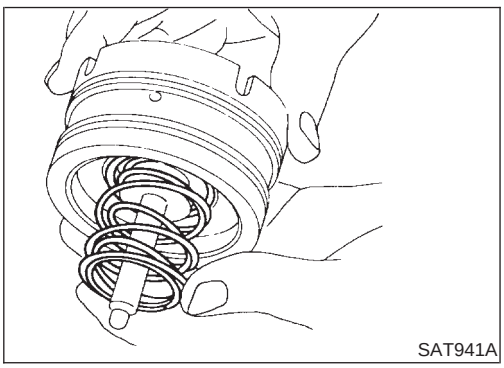
b. Install return spring for accumulator A onto transmission case.

Free length of return spring:
Refer to SDS, AT-358.

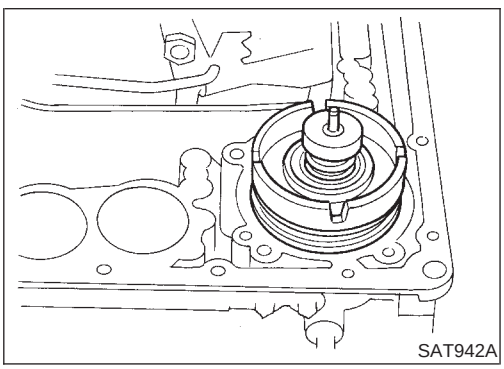


SAT939AA

c. Install accumulator pistons A, B, C and D.
- **Apply ATF to transmission case.**

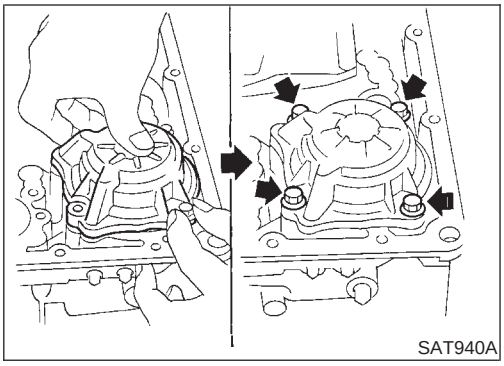

SAT941A

3. Install band servo piston.
a. Install return springs onto servo piston.

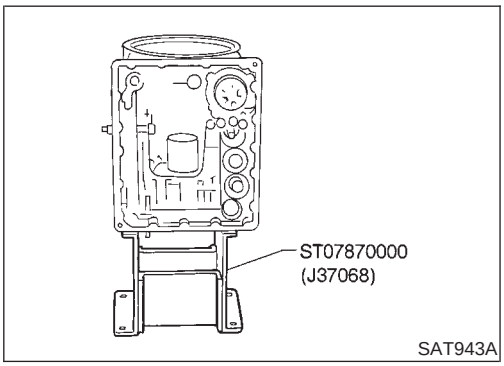

SAT942A

b. Install band servo piston onto transmission case.
- **Apply ATF to O-ring of band servo piston and transmission case.**

c. Install gasket for band servo onto transmission case.


SAT940A

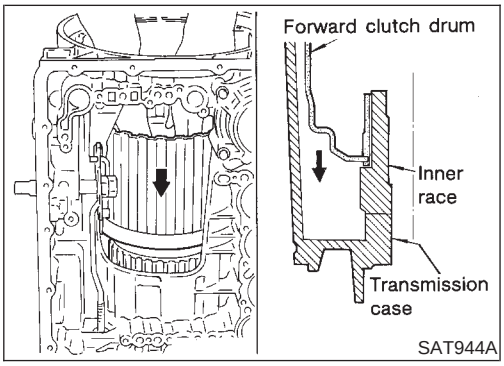
d. Install band servo retainer onto transmission case.



SAT943A

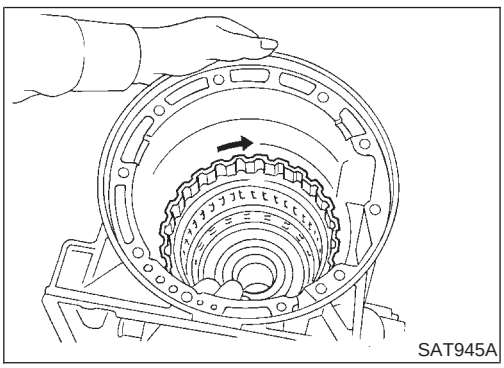
4. Install rear side clutch and gear components.

a. Place transmission case in vertical position.

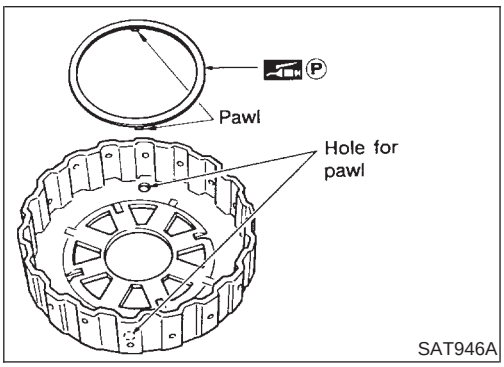


SAT944A

b. Slightly lift forward clutch drum assembly. Then slowly rotate it clockwise until its hub passes fully over clutch inner race inside transmission case.


SAT945A

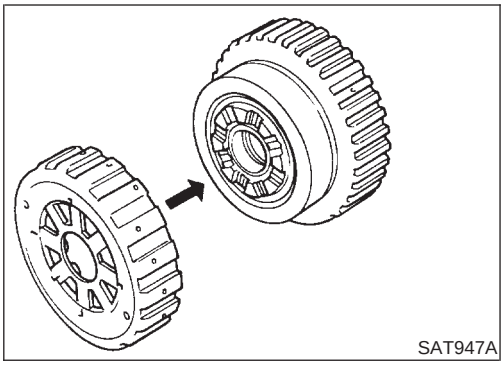
c. Check to be sure that rotation direction of forward clutch assembly is correct.



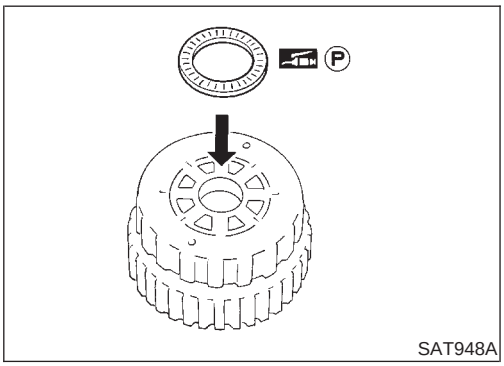
SAT946A

d. Install thrust washer onto front of overrun clutch hub.

- **Apply petroleum jelly to the thrust washer.**
- **Insert pawls of thrust washer securely into holes in overrun clutch hub.**

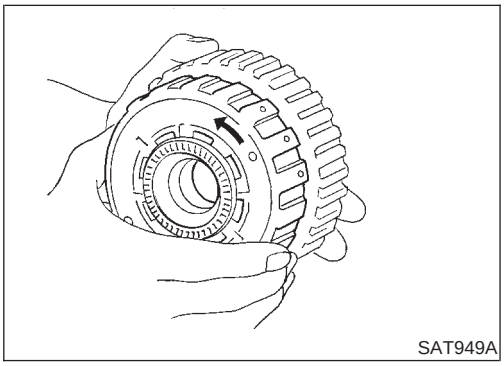

SAT947A

e. Install overrun clutch hub onto rear internal gear assembly.

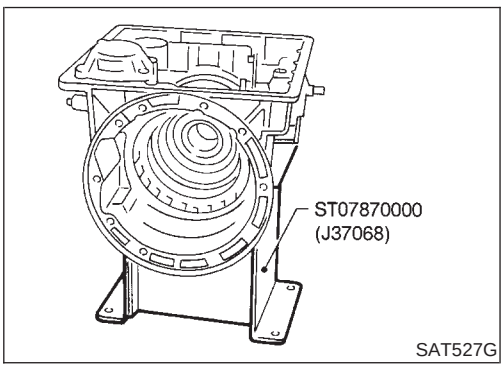

SAT948A

f. Install needle bearing onto rear of overrun clutch hub.

- **Apply petroleum jelly to needle bearing.**

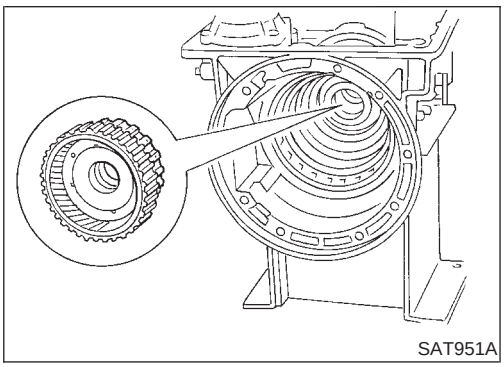

SAT949A

g. Check that overrun clutch hub rotates as shown while holding forward clutch hub.

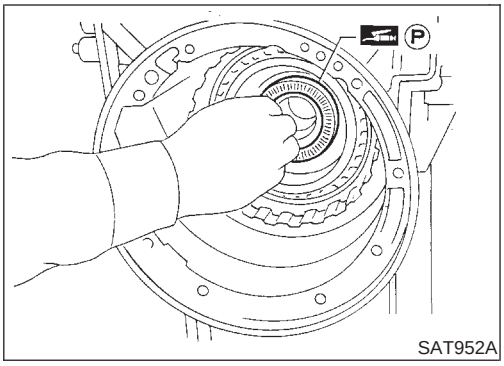


SAT527G

h. Place transmission case into horizontal position.


SAT951A

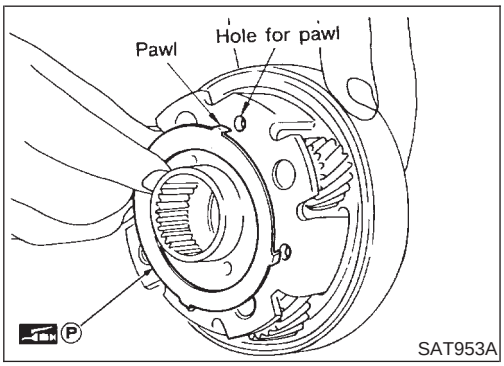
i. Install rear internal gear, forward clutch hub and overrun clutch hub as a unit onto transmission case.



SAT952A

j. Install needle bearing onto rear internal gear.

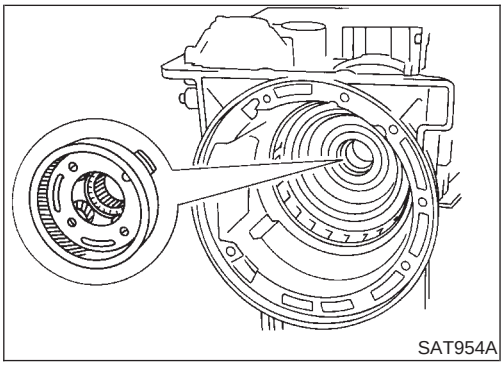
- **Apply petroleum jelly to needle bearing.**



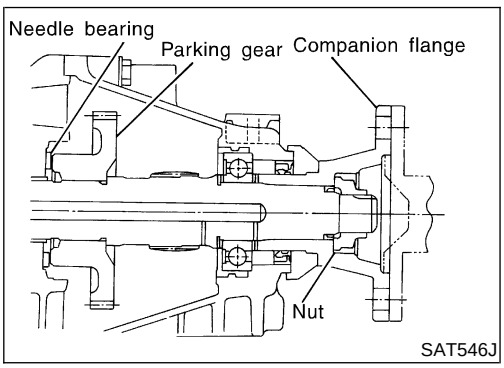
SAT953A

k. Install bearing race onto rear of front internal gear.

- **Apply petroleum jelly to bearing race.**
- **Securely engage pawls of bearing race with holes in front internal gear.**


SAT954A

l. Install front internal gear on transmission case.

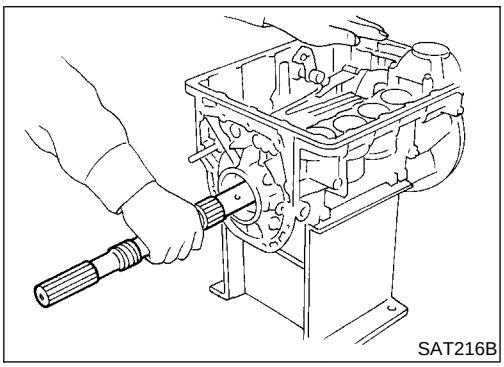


SAT546J

5. Install rear extension assembly on transmission case (2WD model only).

a. Install revolution sensor on rear extension.
b. Install rear extension gasket on transmission case.
c. Install parking rod on transmission case.
d. Install parking gear and needle bearing.

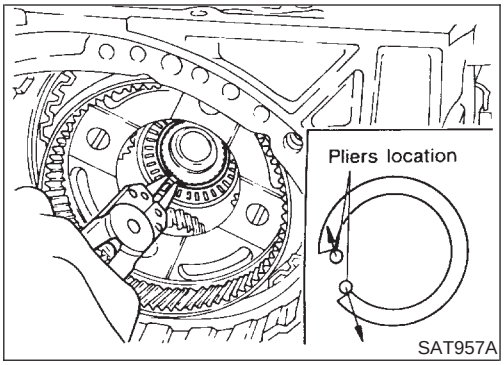
- **Insert rear extension assembly into place while holding parking gear and needle bearing by hand.**


SAT216B

6. Install output shaft and parking gear (4WD model only).

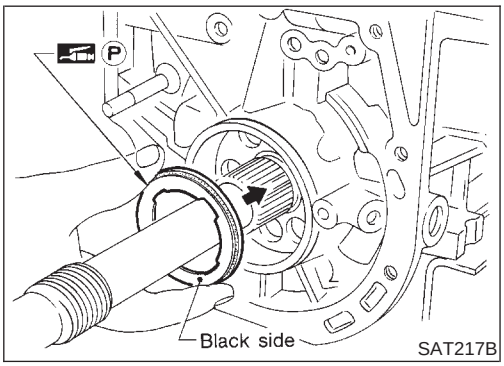
a. Insert output shaft from rear of transmission case while slightly lifting front internal gear.

- **Do not force output shaft against front of transmission case.**



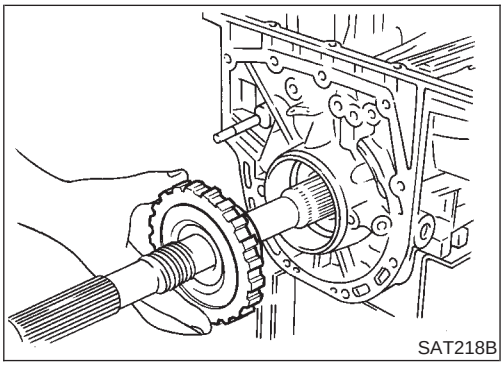
b. Carefully push output shaft against front of transmission case. Install snap ring on front of output shaft.

- **Check to be sure output shaft cannot be removed in rear direction.**

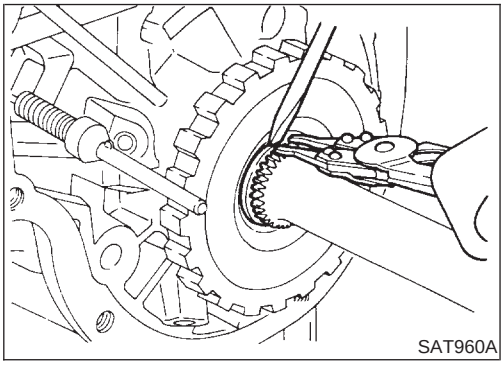


c. Install needle bearing on transmission case.

- **Pay attention to its direction — Black side goes to rear.**
- **Apply petroleum jelly to needle bearing.**

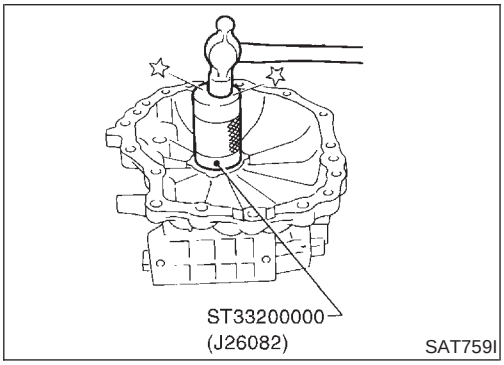


d. Install parking gear on transmission case.



e. Install snap ring on rear of output shaft.

- **Check to be sure output shaft cannot be removed in forward direction.**

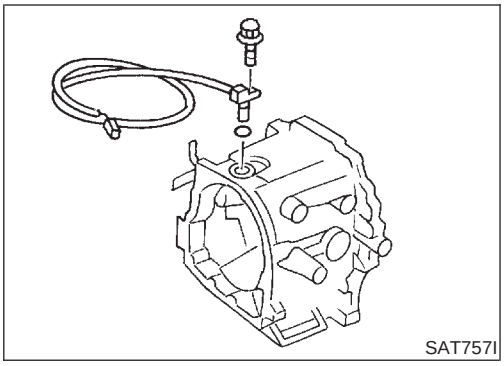


7. Install adapter case (4WD model only).

a. Install oil seal on adapter case.

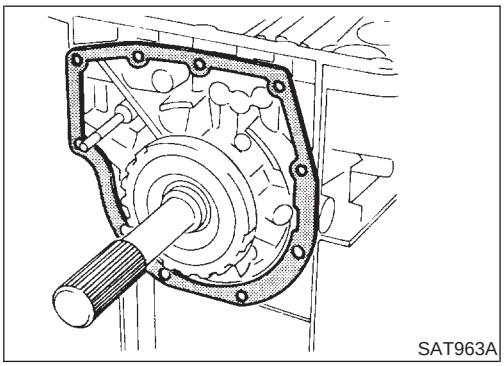
- **Apply ATF to oil seal.**

Assembly (1) (Cont'd)

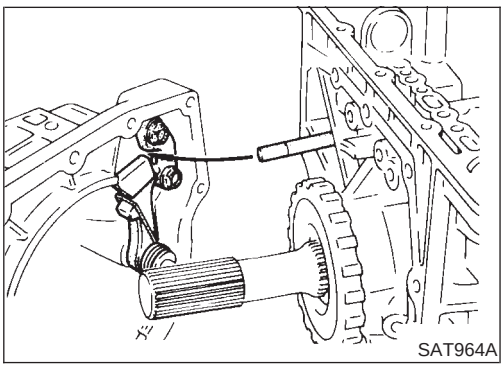

SAT757I

b. Install O-ring on revolution sensor.
- **Apply ATF to O-ring.**

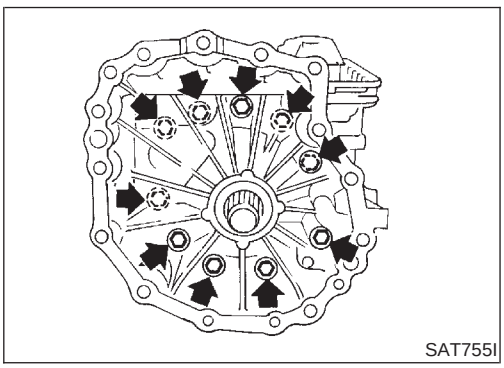
c. Install revolution sensor on adapter case.


SAT963A

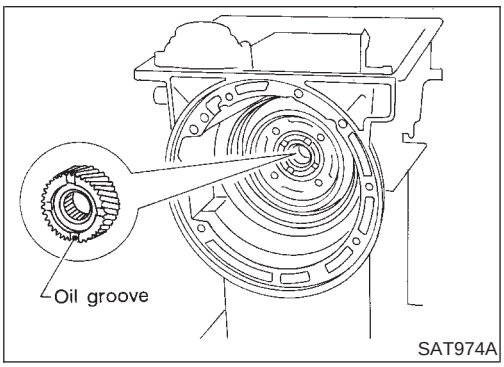
d. Install adapter case gasket on transmission case.


SAT964A

e. Install parking rod on transmission case.


SAT755I

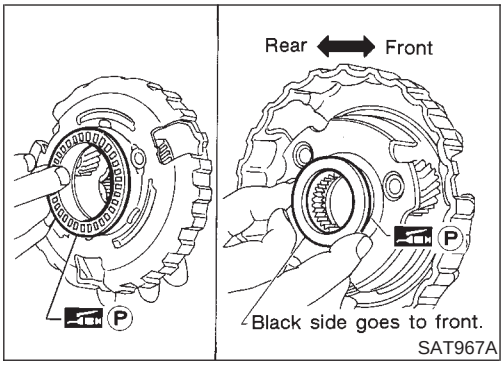
f. Install adapter case on transmission case.



SAT974A

8. Install front side clutch and gear components.

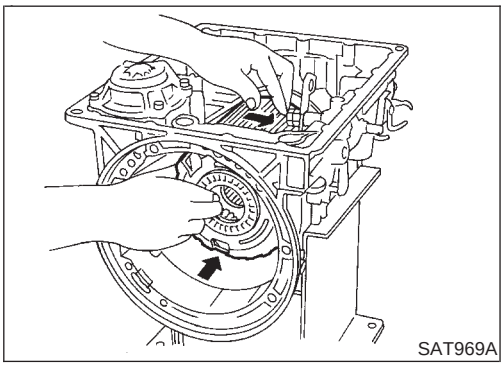
a. Install rear sun gear on transmission case.
- **Pay attention to its direction.**



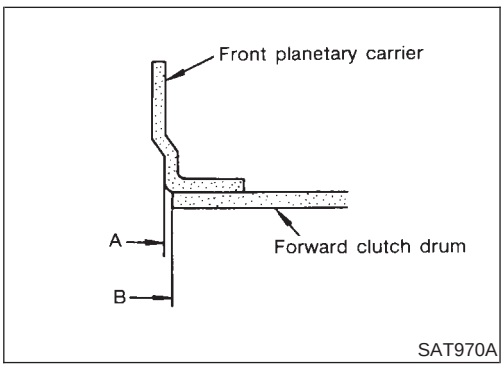
SAT967A

b. Make sure needle bearing is on front of front planetary carrier.
- **Apply petroleum jelly to needle bearing.**

c. Make sure needle bearing is on rear of front planetary carrier.
- **Apply petroleum jelly to bearing.**
- **Pay attention to its direction — Black side goes to front.**

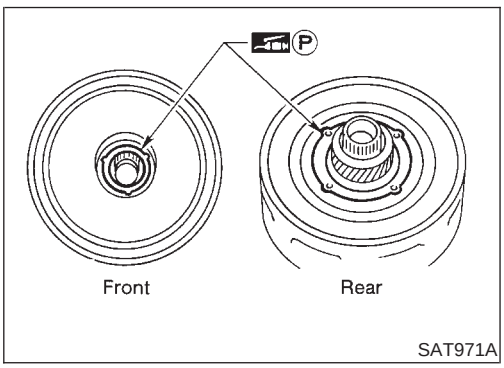

SAT969A

d. While rotating forward clutch drum clockwise, install front planetary carrier on forward clutch drum.



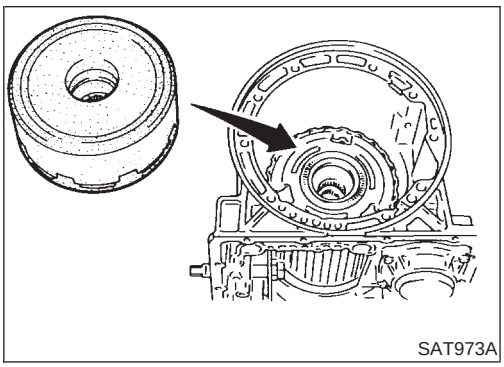
SAT970A

- **Check that portion A of front planetary carrier protrudes approximately 2 mm (0.08 in) beyond portion B of forward clutch assembly.**



SAT971A

e. Make sure bearing races are on front and rear of clutch pack.
- **Apply petroleum jelly to bearing races.**
- **Securely engage pawls of bearing races with holes in clutch pack.**


SAT973A

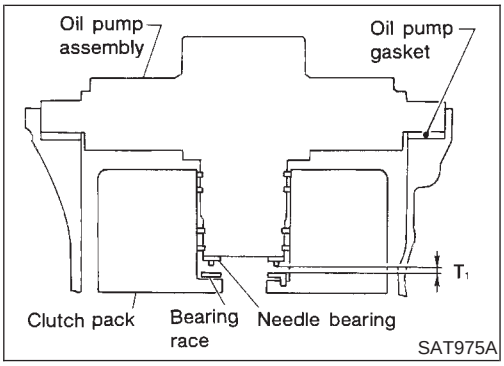
f. Install clutch pack into transmission case.

Adjustment

=NAAT0156

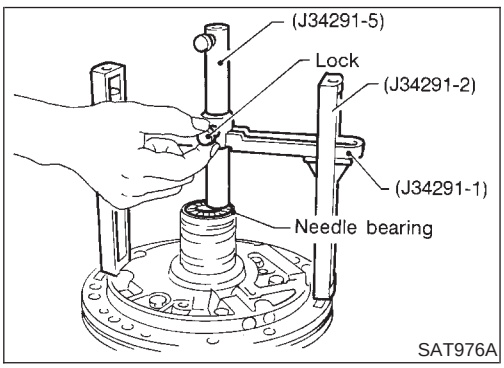
When any parts listed in the following table are replaced, total end play or reverse clutch end play must be adjusted.

Part name	Total end play	Reverse clutch end play
Transmission case	●	●
Low one-way clutch inner race	●	●
Overrun clutch hub	●	●
Rear internal gear	●	●
Rear planetary carrier	●	●
Rear sun gear	●	●
Front planetary carrier	●	●
Front sun gear	●	●
High clutch hub	●	●
High clutch drum	●	●
Oil pump cover	●	●
Reverse clutch drum	—	●

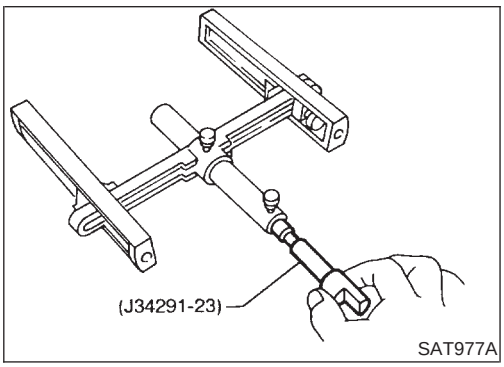


1. Adjust total end play.

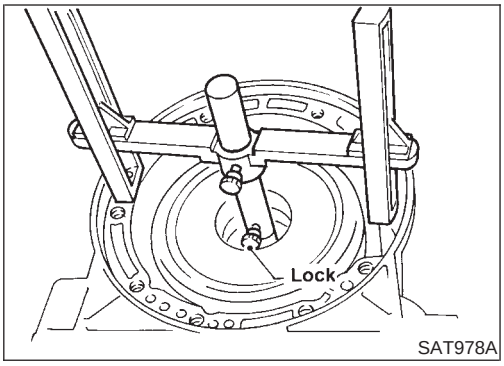
Total end play "T_1":
0.25 - 0.55 mm (0.0098 - 0.0217 in)



a. With needle bearing installed, place J34291-1 (bridge), J34291-2 (legs) and the J34291-5 (gauging cylinder) onto oil pump. The long ends of legs should be placed firmly on machined surface of oil pump assembly. The gauging cylinder should rest on top of the needle bearing. Lock gauging cylinder in place with set screw.

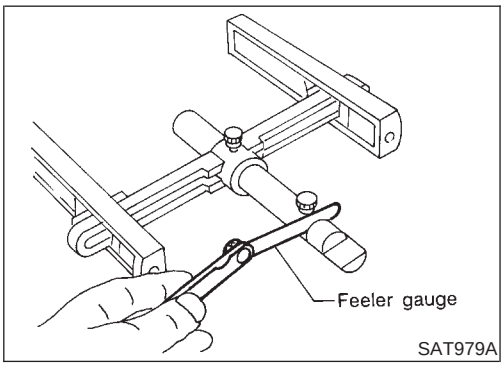


b. Install J34291-23 (gauging plunger) into gauging cylinder.



SAT978A

c. Install original bearing race inside reverse clutch drum. Place shim selecting gauge with its legs on machined surface of transmission case (no gasket). Allow gauging plunger to rest on bearing race. Lock gauging plunger in place with set screw.



SAT979A

d. Remove Tool and use feeler gauge to measure gap between gauging cylinder and gauging plunger. This measurement should give exact total end play.

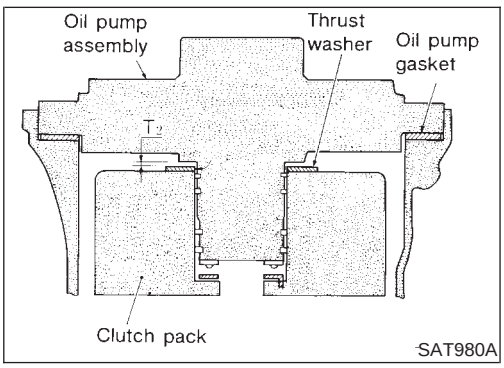
Total end play "T_1":

0.25 - 0.55 mm (0.0098 - 0.0217 in)

- If end play is out of specification, decrease or increase thickness of oil pump cover bearing race as necessary.

Available oil pump cover bearing race:

Refer to SDS, AT-361.

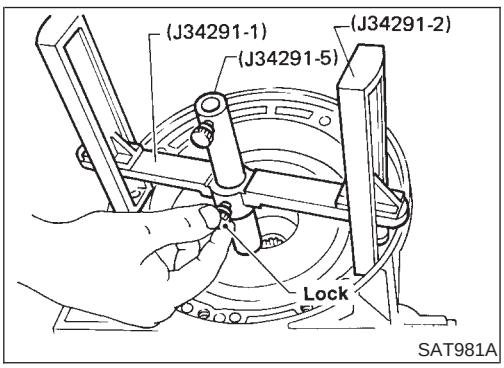


SAT980A

2. Adjust reverse clutch drum end play.

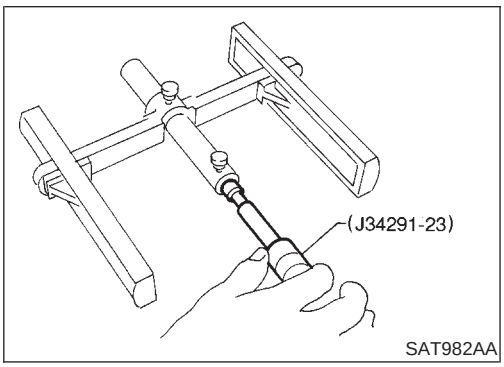
Reverse clutch drum end play "T_2":

0.55 - 0.90 mm (0.0217 - 0.0354 in)



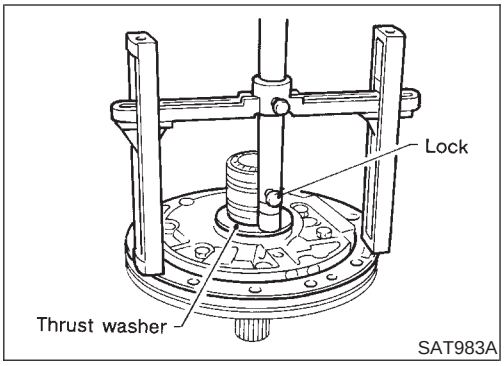
SAT981A

a. Place J34291-1 (bridge), J34291-2 (legs) and J34291-5 (gauging cylinder) on machined surface of transmission case (no gasket). Allow gauging cylinder to rest on front thrust surface of reverse clutch drum. Lock cylinder in place with set screw.

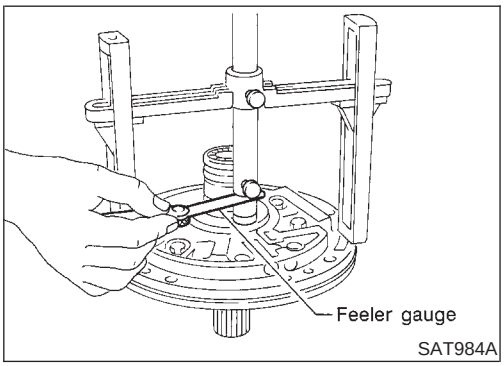


SAT982AA

b. Install J34291-23 (gauging plunger) into gauging cylinder.



c. Install original thrust washer on oil pump. Place shim setting gauge legs onto machined surface of oil pump assembly. Allow gauging plunger to rest on thrust washer. Lock plunger in place with set screw.



d. Use feeler gauge to measure gap between gauging plunger and gauging cylinder. This measurement should give you exact reverse clutch drum end play.

Reverse clutch drum end play "T_2":
0.55 - 0.90 mm (0.0217 - 0.0354 in)

- If end play is out of specification, decrease or increase thickness of oil pump thrust washer as necessary.

Available oil pump thrust washer:
Refer to SDS, AT-362.

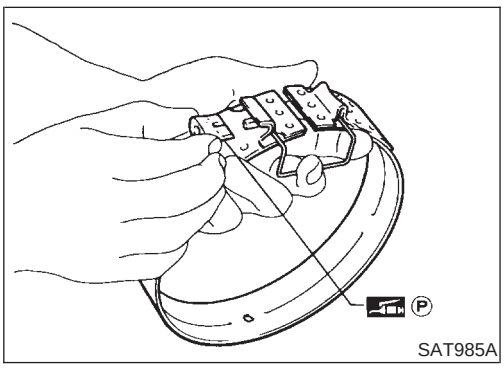
Assembly (2)

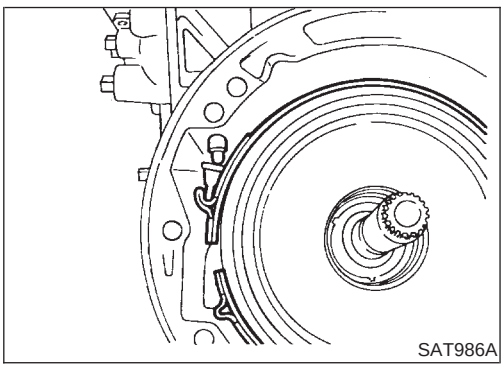
NAAT0157

1. Install brake band and band strut.

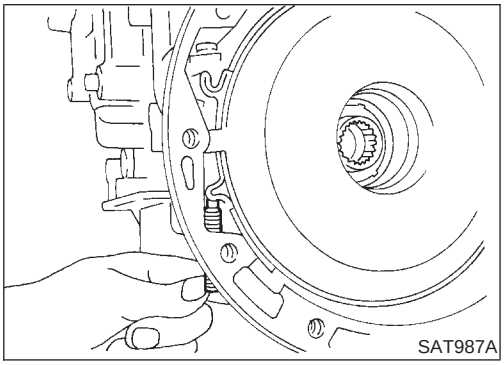
a. Install band strut on brake band.

- **Apply petroleum jelly to band strut.**

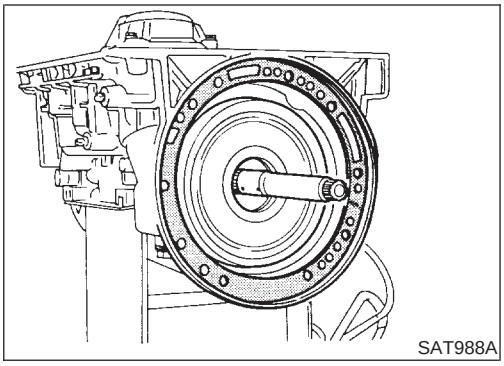




b. Place brake band on periphery of reverse clutch drum, and insert band strut into end of band servo piston stem.

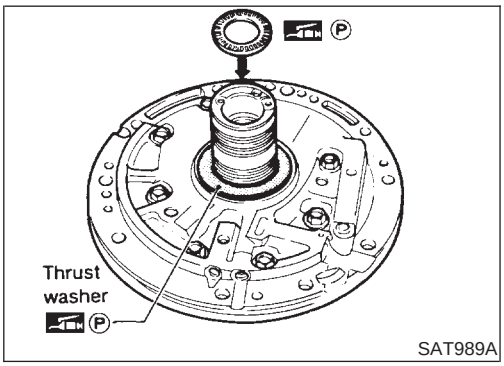


c. Install anchor end bolt on transmission case. Then, tighten anchor end bolt just enough so that reverse clutch drum (clutch pack) will not tilt forward.


SAT988A

2. Install input shaft on transmission case.
- **Pay attention to its direction — O-ring groove side is front.**

3. Install gasket on transmission case.

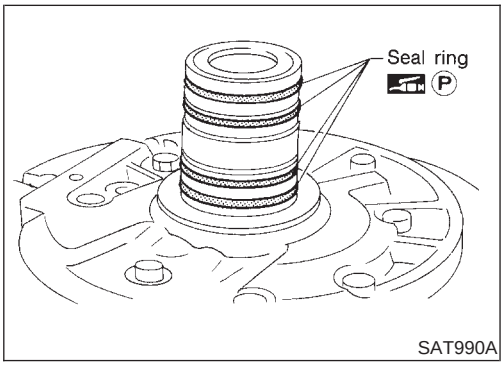


SAT989A

4. Install oil pump assembly.

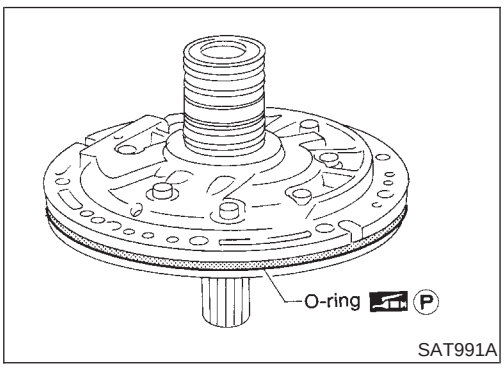
a. Install needle bearing on oil pump assembly.
- **Apply petroleum jelly to the needle bearing.**

b. Install selected thrust washer on oil pump assembly.
- **Apply petroleum jelly to thrust washer.**



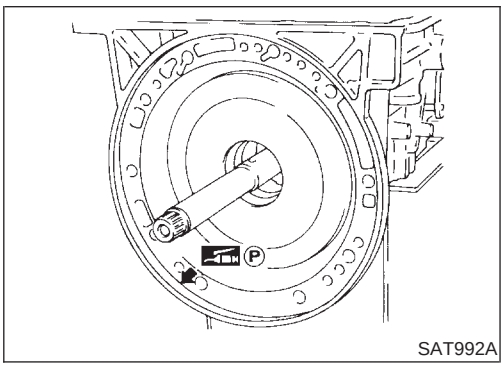
SAT990A

c. Carefully install seal rings into grooves and press them into the petroleum jelly so that they are a tight fit.



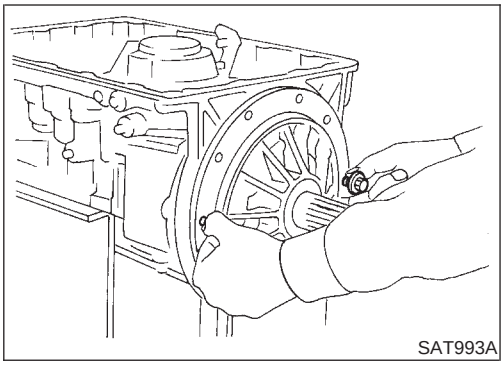
SAT991A

d. Install O-ring on oil pump assembly.
- **Apply petroleum jelly to O-ring.**



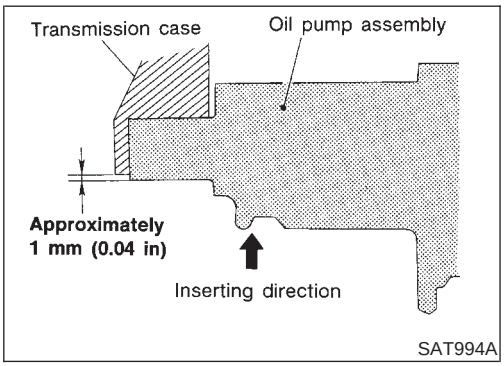
SAT992A

e. Apply petroleum jelly to mating surface of transmission case and oil pump assembly.


SAT993A

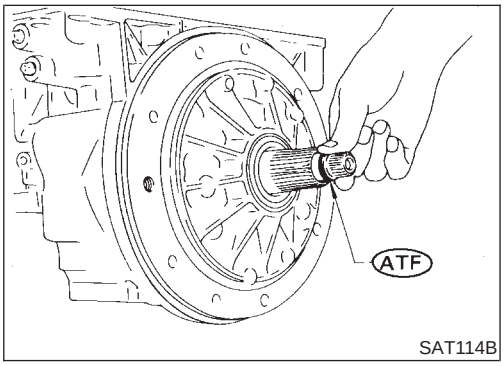
f. Install oil pump assembly.

- **Install two converter housing securing bolts in bolt holes in oil pump assembly as guides.**



SAT994A

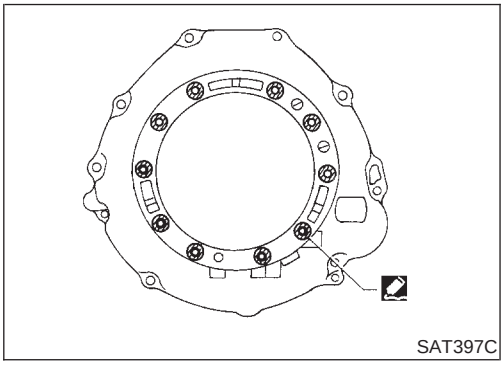
- **Insert oil pump assembly to the specified position in transmission, as shown at left.**



SAT114B

5. Install O-ring on input shaft.

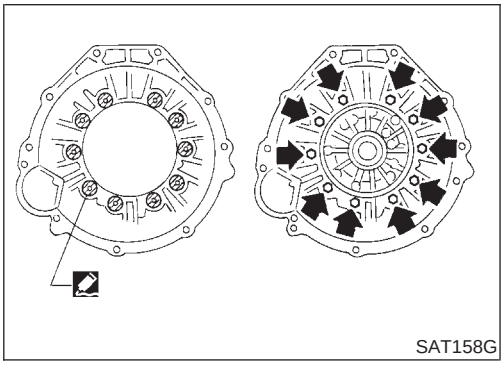
- **Apply ATF to O-rings.**


SAT397C

6. Install converter housing.

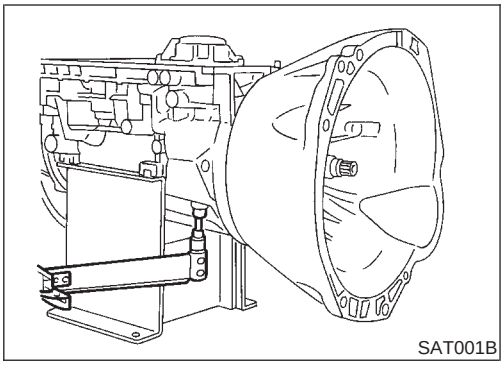
a. Apply recommended sealant (Genuine anaerobic liquid gasket, Three Bond TB1215, Locktite Part No. 51813 or equivalent) to outer periphery of bolt holes in converter housing.

- **Do not apply too much sealant.**


SAT158G

b. Apply recommended sealant (Genuine anaerobic liquid gasket, Three Bond TB1215, Locktite Part No. 51813 or equivalent) to seating surfaces of bolts that secure front of converter housing.

c. Install converter housing on transmission case.


SAT001B

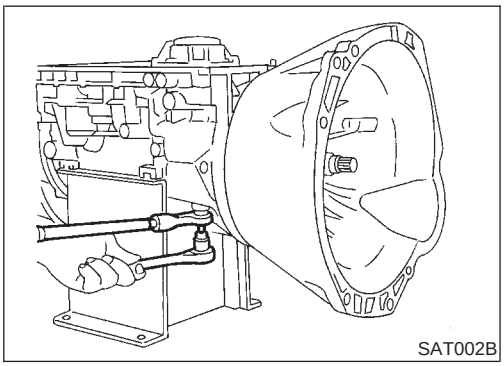
7. Install turbine revolution sensor.
8. Adjust brake band.

a. Tighten anchor end bolt to specified torque.

Anchor end bolt:

: 4 - 6 N·m (0.4 - 0.6 kg-m, 35 - 52 in-lb)

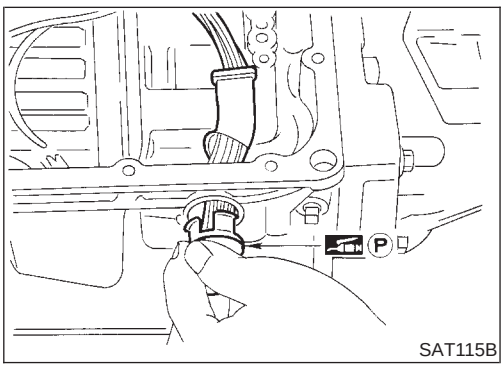
b. Back off anchor end bolt two and a half turns.


SAT002B

c. While holding anchor end bolt, tighten lock nut.

Ancher end bolt nut:

: 41 - 50 N·m (4.1 - 5.2 kg-m, 30 - 37 ft-lb)



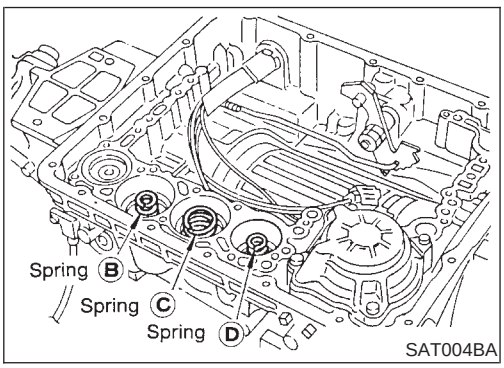
SAT115B

9. Install terminal cord assembly.

a. Install O-ring on terminal cord assembly.

- **Apply petroleum jelly to O-ring.**

b. Compress terminal cord assembly stopper and install terminal cord assembly on transmission case.



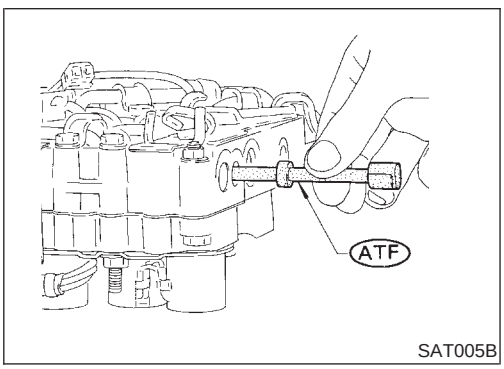
SAT004BA

10. Install control valve assembly.

a. Install accumulator piston return springs B, C and D.

Free length of return springs:

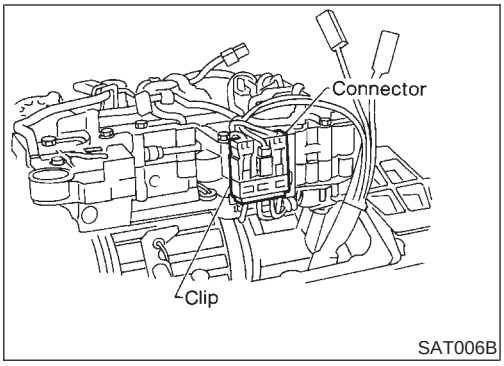
Refer to SDS, AT-358.



SAT005B

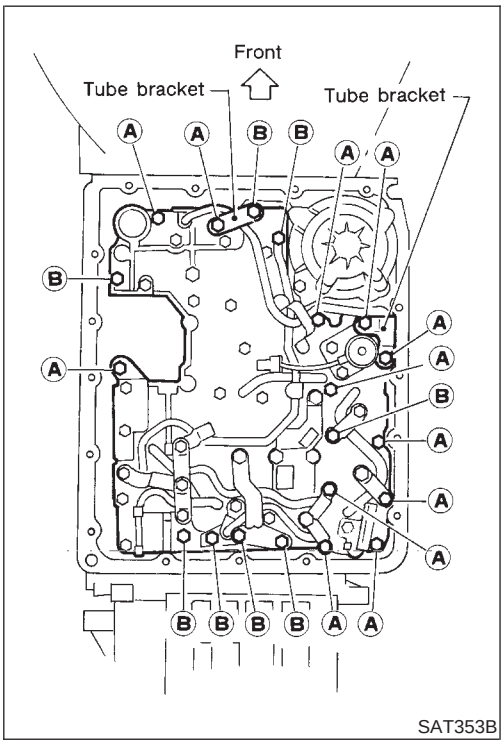
b. Install manual valve on control valve.

- **Apply ATF to manual valve.**



SAT006B

c. Place control valve assembly on transmission case. Connect solenoid connector for upper body.
d. Install connector clip.

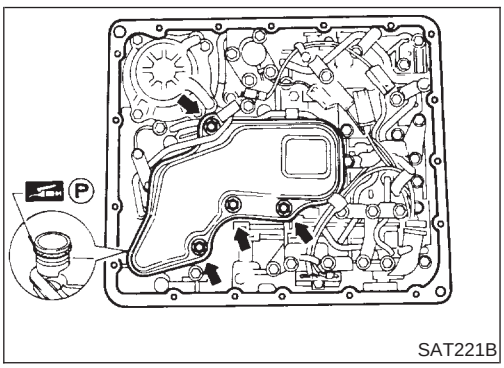


SAT353B

e. Install control valve assembly on transmission case.
f. Install connector tube brackets and tighten bolts A and B.

- **Check that terminal assembly does not catch.**

Bolt symbol	ℓ mm (in)
A	33 (1.30)
B	45 (1.77)

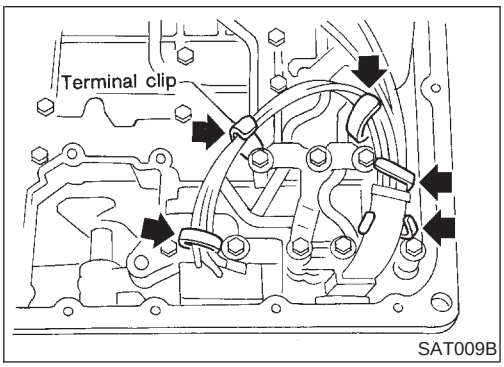


SAT221B

g. Install O-ring on oil strainer.

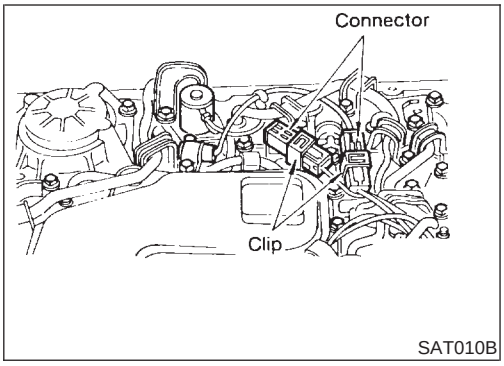
- **Apply petroleum jelly to O-ring.**

h. Install oil strainer on control valve.



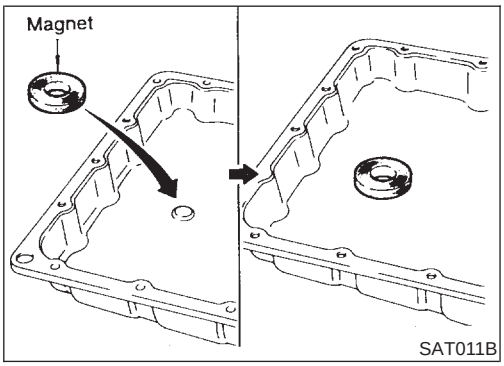
SAT009B

i. Securely fasten terminal harness with clips.



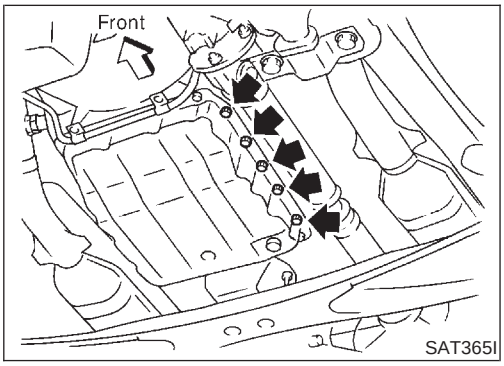
SAT010B

j. Install torque converter clutch solenoid valve and A/T fluid temperature sensor connectors.



SAT011B

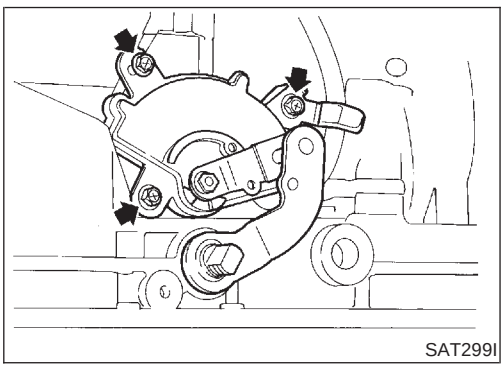
11. Install oil pan.
a. Attach a magnet to oil pan.



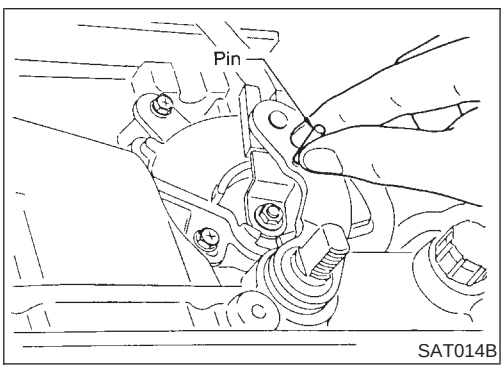
SAT365I

b. Install new oil pan gasket on transmission case.
c. Install oil pan and bracket on transmission case.
- **Always replace oil pan bolts as they are self-sealing bolts.**
- **Before installing bolts, remove traces of sealant and oil from mating surface and thread holes.**
- **Tighten four bolts in a criss-cross pattern to prevent dislocation of gasket.**

d. Tighten drain plug.

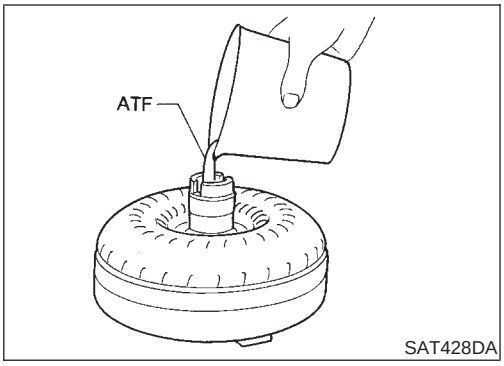

SAT299I

12. Install PNP switch.
a. Check that manual shaft is in "1" position.
b. Temporarily install PNP switch on manual shaft.
c. Move manual shaft to "N".



SAT014B

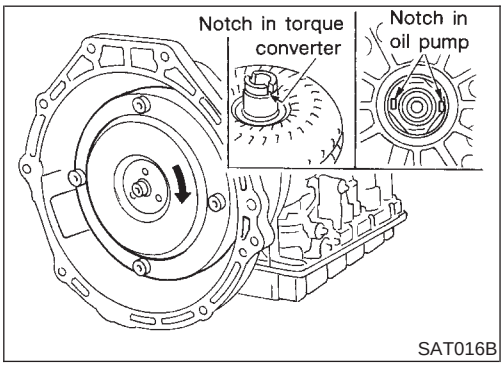
d. Tighten bolts while inserting 4.0 mm (0.157 in) dia. pin vertically into locating holes in PNP switch and manual shaft.



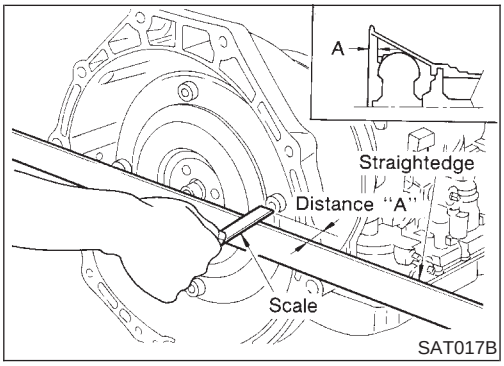
13. Install torque converter.

a. Pour ATF into torque converter.

- **Approximately 2 liters (2-1/8 US qt, 1-3/4 Imp qt) of fluid are required for a new torque converter.**
- **When reusing old torque converter, add the same amount of fluid as was drained.**



b. Install torque converter while aligning notches and oil pump.



c. Measure distance A to check that torque converter is in proper position.

Distance "A":

25.0 mm (0.984 in) or more

General Specifications

NAAT0160

Applied model		VQ35DE engine	
		2WD	4WD
Automatic transmission model		RE4R01A	
Transmission model code number		4EX16	4EX17, 4EX23
Stall torque ratio		2.0 : 1	
Transmission gear ratio	1st	2.785	
	2nd	1.545	
	Top	1.000	
	OD	0.694	
	Reverse	2.272	
Recommended fluid		Nissan Matic “D” (Continental U.S. and Alaska) or Genuine Nissan Automatic Transmission Fluid (Canada)*1	
Fluid capacity		8.5ℓ (9 US qt, 7-1/2 Imp qt)	

*1: Refer to MA-12, “Fluids and Lubricants”.

Shift Schedule

NAAT0178

VEHICLE SPEED WHEN SHIFTING GEARS THROTTLE POSITION

NAAT0178S01

Throttle position	Vehicle speed km/h (MPH)						
	$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$	$1_2 \rightarrow 1_1$
Full throttle	55 - 59 (34 - 37)	105 - 113 (65 - 70)	174 - 184 (108 - 114)	170 - 180 (106 - 112)	102 - 110 (63 - 68)	43 - 47 (27 - 29)	43 - 47 (27 - 29)
Half throttle	37 - 41 (23 - 25)	71 - 79 (44 - 49)	129 - 139 (80 - 86)	81 - 91 (50 - 57)	33 - 41 (21 - 25)	12 - 16 (7 - 10)	43 - 47 (27 - 29)

VEHICLE SPEED WHEN PERFORMING AND RELEASING LOCK-UP

NAAT0178S02

Throttle position	Overdrive control switch [Shift position]	Vehicle speed km/h (MPH)	
		Lock-up “ON”	Lock-up “OFF”
Full throttle	ON [D_4]	174 - 184 (108 - 114)	170 - 180 (106 - 112)
	OFF [D_3]	104 - 114 (65 - 71)	101 - 111 (63 - 69)
Half throttle	ON [D_4]	151 - 161 (94 - 100)	106 - 116 (66 - 72)
	OFF [D_3]	85 - 95 (53 - 59)	82 - 92 (51 - 57)

Stall Revolution

NAAT0163

Stall revolution rpm	2,440 - 2,640

Line Pressure

NAAT0164

Engine speed rpm	Line pressure kPa (kg/cm^2, psi)	
	D, 2 and 1 positions	R position
Idle	422 - 461 (4.3 - 4.7, 61 - 67)	667 - 706 (6.8 - 7.2, 97 - 102)
Stall	1,020 - 1,098 (10.4 - 11.2, 148 - 159)	1,422 - 1,500 (14.5 - 15.3, 206 - 218)

Return Springs

NAAT0165

Unit: mm (in)

Parts				Item		
				Part No.*	Free length	Outer diameter
Control valve	Upper body	1	Torque converter relief valve spring	31742-41X23	38.0 (1.496)	9.0 (0.354)
		2	Pressure regulator valve spring	31742-41X24	44.02 (1.7331)	14.0 (0.551)
		3	Pressure modifier valve spring	31742-41X19	31.95 (1.2579)	6.8 (0.268)
		—	Accumulator control valve spring	—	—	—
		4	Shuttle shift valve D spring	31762-41X01	25.0 (0.984)	7.0 (0.276)
		5	4-2 sequence valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
		6	Shift valve B spring	31762-41X01	25.0 (0.984)	7.0 (0.276)
		7	4-2 relay valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
		8	Shift valve A spring	31762-41X01	25.0 (0.984)	7.0 (0.276)
		9	Overrun clutch control valve spring	31762-41X03	23.6 (0.929)	7.0 (0.276)
		10	Overrun clutch reducing valve spring	31742-41X14	38.9 (1.531)	7.0 (0.276)
		11	Shuttle shift valve S spring	31762-41X04	51.0 (2.008)	5.65 (0.2224)
		12	Pilot valve spring	31742-41X13	25.7 (1.012)	9.0 (0.354)
		13	Torque converter clutch control valve spring	31742-41X22	18.5 (0.728)	13.0 (0.512)
	Lower body	1	Modifier accumulator piston spring	31742-27X70	31.4 (1.236)	9.8 (0.386)
		2	1st reducing valve spring	31756-60X00	20.5 (0.807)	7.0 (0.276)
		3	3-2 timing valve spring	31742-41X06	23.0 (0.906)	6.7 (0.264)
		4	Servo charger valve spring	31742-41X06	23.0 (0.906)	6.7 (0.264)
Reverse clutch			—	31505-41X07	—	—
High clutch			10 pcs	31521-41X03 (Assembly)	24.2 (0.9528)	11.6 (0.457)
Forward clutch (Overrun clutch)			20 pcs	31521-41X04 (Assembly)	35.77 (1.4083)	9.7 (0.382)
Low & reverse brake			18 pcs	31655-41X00 (Assembly)	22.3 (0.878)	11.2 (0.441)
Band servo			Spring A	31605-4AX03	45.6 (1.795)	34.3 (1.350)
			Spring B	31605-41X01	29.7 (1.169)	27.6 (1.087)
Accumulator			Accumulator A	31605-41X02	43.0 (1.693)	18.0 (0.709)
			Accumulator B	31605-41X14	47.6 (1.874)	26.5 (1.043)
			Accumulator C	31605-41X09	45.0 (1.772)	29.3 (1.154)
			Accumulator D	31605-41X06	58.4 (2.299)	17.3 (0.681)

Accumulator O-ring

NAAT0166

Accumulator	Diameter mm (in)			
	A	B	C	D
Small diameter end	29 (1.14)	32 (1.26)	45 (1.77)	29 (1.14)
Large diameter end	45 (1.77)	50 (1.97)	50 (1.97)	45 (1.77)

Clutches and Brakes

NAAT0167

REVERSE CLUTCH

NAAT0167S01

Code number		4EX16	4EX17, 4EX23
Number of drive plates		2	
Number of driven plates		2	
Thickness of drive plate mm (in)	Standard	1.90 - 2.05 (0.0748 - 0.0807)	
	Wear limit	1.80 (0.0709)	
Clearance mm (in)	Standard	0.5 - 0.8 (0.020 - 0.031)	
	Allowable limit	1.2 (0.047)	
Thickness of retaining plate		Thickness mm (in)	Part number*
		4.6 (0.181) 4.8 (0.189) 5.0 (0.197) 5.2 (0.205) 5.4 (0.213)	31537-42X20 31537-42X21 31537-42X22 31537-42X23 31537-42X24

HIGH CLUTCH

NAAT0167S02

Code number		4EX16	4EX17, 4EX23
Number of drive plates		5	
Number of driven plates		6	
Thickness of drive plate mm (in)	Standard	1.52 - 1.67 (0.0598 - 0.0657)	
	Wear limit	1.40 (0.0551)	
Clearance mm (in)	Standard	1.8 - 2.2 (0.071 - 0.087)	
	Allowable limit	3.2 (0.126)	
Thickness of retaining plate		Thickness mm (in)	Part number*
		4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197)	31537-41X63 31537-41X64 31537-41X65 31537-41X66 31537-41X67 31537-41X68

FORWARD CLUTCH

NAAT0167S03

Code number		4EX16		4EX17, 4EX23	
Number of drive plates		7		8	
Number of driven plates		7		8	
Thickness of drive plate mm (in)	Standard	1.52 - 1.67 (0.0598 - 0.0657)			
	Wear limit	1.40 (0.0551)			
Clearance mm (in)	Standard	0.35 - 0.75 (0.0138 - 0.0295)			
	Allowable limit	2.15 (0.0846)		2.35 (0.0925)	
Thickness of retaining plate		Thickness mm (in)	Part number*	Thickness mm (in)	Part number*
		4.6 (0.181) 4.8 (0.189) 5.0 (0.197) 5.2 (0.205) 5.4 (0.213) 5.6 (0.220)	31537-42X13 31537-42X14 31537-42X15 31537-4AX00 31537-4AX01 31537-4AX02	4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197) 5.2 (0.205) 5.4 (0.213)	31537-42X11 31537-42X12 31537-42X13 31537-42X14 31537-42X15 31537-4AX00 31537-4AX01

OVERRUN CLUTCH

NAAT0167S04

Code number		4EX16	4EX17, 4EX23	
Number of drive plates		3		
Number of driven plates		5		
Thickness of drive plate mm (in)	Standard	1.90 - 2.05 (0.0748 - 0.0807)		
	Wear limit	1.80 (0.0709)		
Clearance mm (in)	Standard	1.0 - 1.4 (0.039 - 0.055)		
	Allowable limit	2.0 (0.079)		
Thickness of retaining plate		Thickness mm (in)	Part number*	
		4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197)	31537-41X80 31537-41X81 31537-41X82 31537-41X83 31537-41X84	

LOW & REVERSE BRAKE

NAAT0167S05

Code number		4EX16	4EX17, 4EX23
Number of drive plates		8	
Number of driven plates		8	
Thickness of drive plate mm (in)	Standard	1.90 - 2.05 (0.0748 - 0.0807)	1.52 - 1.67 (0.0598 - 0.0657)
	Wear limit	1.40 (0.0551)	
Clearance mm (in)	Standard	0.8 - 1.1 (0.031 - 0.043)	
	Allowable limit	2.7 (0.106)	
Thickness of retaining plate		Thickness mm (in)	Part number*
		7.6 (0.299)	31667-41X07
		7.8 (0.307)	31667-41X08
		8.0 (0.315)	31667-41X00
		8.2 (0.323)	31667-41X01
		8.4 (0.331)	31667-41X02
		8.6 (0.339)	31667-41X03
		8.8 (0.346)	31667-41X04
		9.0 (0.354)	31667-41X05
		9.2 (0.362)	31667-41X06
		9.4 (0.370)	31667-41X09
		9.6 (0.378)	31667-41X10

BRAKE BAND

NAAT0167S06

Anchor end bolt nut tightening torque	40 - 51 N·m (4.1 - 5.2 kg-m, 30 - 38 ft-lb)
Anchor end bolt tightening torque	4 - 6 N·m (0.4 - 0.6 kg-m, 35 - 52 in-lb)
Number of returning revolution for anchor end bolt	2.5

Oil Pump and Low One-way Clutch

NAAT0168

Unit: mm (in)

Oil pump clearance	Cam ring — oil pump housing	Standard	0.01 - 0.024 (0.0004 - 0.0009)
	Rotor, vanes and control piston — oil pump housing	Standard	0.03 - 0.044 (0.0012 - 0.0017)
Seal ring clearance		Standard	0.10 - 0.25 (0.0039 - 0.0098)
		Allowable limit	0.25 (0.0098)

Total End Play

NAAT0169

Total end play "T_1"	0.25 - 0.55 mm (0.0098 - 0.0217 in)	
Thickness of oil pump cover bearing race	Thickness mm (in)	Part number*
	0.8 (0.031)	31435-41X01
	1.0 (0.039)	31435-41X02
	1.2 (0.047)	31435-41X03
	1.4 (0.055)	31435-41X04
	1.6 (0.063)	31435-41X05
	1.8 (0.071)	31435-41X06
	2.0 (0.079)	31435-41X07

Reverse Clutch Drum End Play

NAAT0170

Reverse clutch drum end play "T_2"	0.55 - 0.90 mm (0.0217 - 0.0354 in)	
Thickness of oil pump thrust washer	Thickness mm (in)	Part number*
	0.9 (0.035) 1.1 (0.043) 1.3 (0.051) 1.5 (0.059) 1.7 (0.067) 1.9 (0.075)	31528-21X01 31528-21X02 31528-21X03 31528-21X04 31528-21X05 31528-21X06

Removal and Installation

NAAT0171

Manual control linkage	Number of returning revolutions for lock nut	2
	Lock nut tightening torque	4.4 - 5.9 N·m (0.45 - 0.60 kg-m, 39.1 - 52.1 in-lb)
Distance between end of converter housing and torque converter		25.0 mm (0.984 in) or more

*: Always check with the Parts Department for the latest parts information.

Shift Solenoid Valves

NAAT0217

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

Solenoid Valves

NAAT0218

Solenoid valves	Resistance (Approx.) Ω	Terminal No.
Shift solenoid valve A	20 - 40	3
Shift solenoid valve B	20 - 40	2
Overrun clutch solenoid valve	20 - 40	4
Line pressure solenoid valve	2.5 - 5	6
Torque converter clutch solenoid valve	10 - 20	7

A/T Fluid Temperature Sensor

NAAT0219

Remarks: Specification data are reference values.

Monitor item	Condition	Specification	
A/T fluid temperature sensor	Cold [20°C (68°F)] ↓ Hot [80°C (176°F)]	Approximately 1.5V ↓ Approximately 0.5V	Approximately 2.5 kΩ ↓ Approximately 0.3 kΩ

Turbine Revolution Sensor

NAAT0232

Terminal No.		Resistance
1	2	2.4 - 2.8 kΩ
2	3	No continuity
1	3	No continuity

Revolution Sensor

NAAT0220

Terminal No.		Resistance
1	2	500 - 650Ω
2	3	No continuity
1	3	No continuity

Dropping Resistor

NAAT0221

Resistance	11.2 - 12.8Ω

NOTES

TRANSFER

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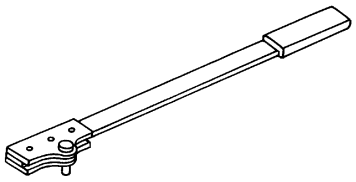
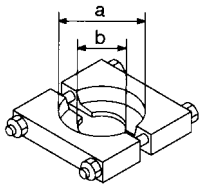
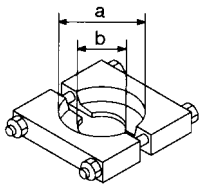
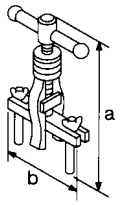
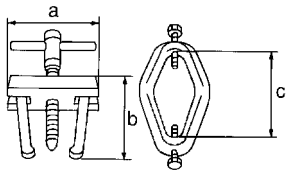
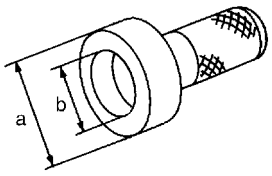
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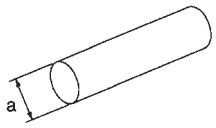
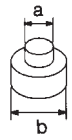
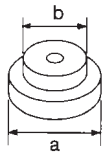
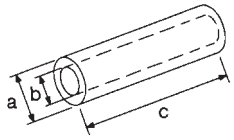
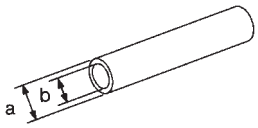
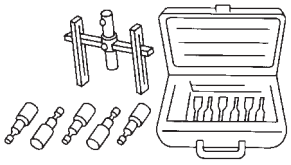
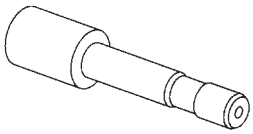
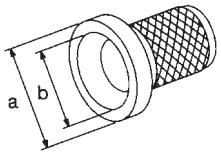
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Special Service Tools

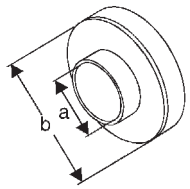
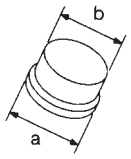
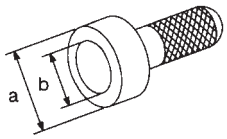
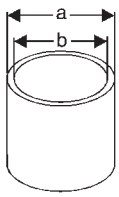
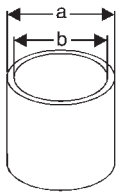
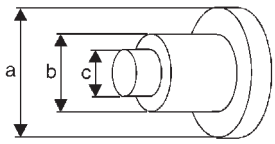
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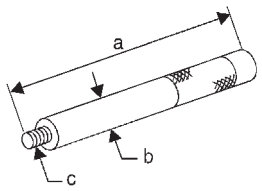
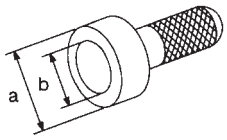
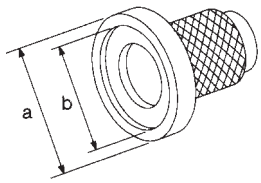
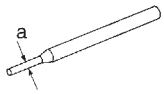
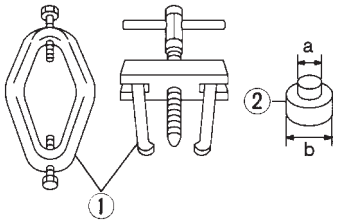
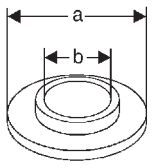
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
KV38108300 (J44195) Companion flange wrench	 NT771	Removing companion flange nut Installing companion flange nut
ST30021000 (J22912-01) Puller	 NT411	Removing counter gear front bearing (Use with ST36710010) Removing L & H hub **a: 110 mm (4.33 in) dia.** **b: 68 mm (2.68 in) dia.**
ST30031000 (J22912-01) Puller	 NT411	Removing counter gear rear bearing (Use with ST36710010) **a: 90 mm (3.54 in) dia.** **b: 50 mm (1.97 in) dia.**
ST33290001 (J25810-A) Puller	 NT414	Removing center case oil seal Removing rear oil seal **a: 250 mm (9.84 in)** **b: 160 mm (6.30 in)**
ST33051001 (J22888) Puller	 NT657	Removing companion flange **a: 135 mm (5.31 in)** **b: 100 mm (3.94 in)** **c: 130 mm (5.12 in)**
ST30720000 1 (J25273) 2 (J25405) Drift	 NT658	1 Installing center case oil seal 2 Installing rear oil seal **a: 77 mm (3.03 in) dia.** **b: 55.5 mm (2.185 in) dia.**

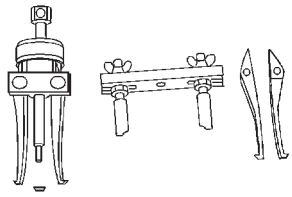
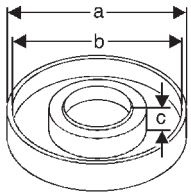
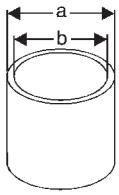
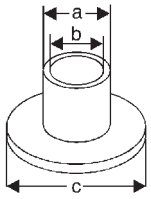
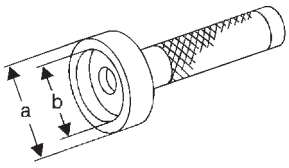
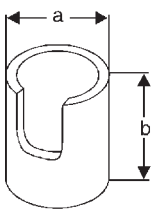
Tool number (Kent-Moore No.) Tool name	Description	
ST36710010 (—) Drift	 NT063	Removing counter gear front bearing (Use with ST30021000) Removing counter gear rear bearing (Use with ST30031000) **a: 34.5 mm (1.358 in) dia.**
ST33061000 (J8107-2) Drift	 NT116	Removing main gear bearing **a: 28.5 mm (1.122 in) dia.** **b: 38 mm (1.50 in) dia.**
ST30613000 1 (J25742-3) 2 (J34339) Drift	 NT073	1 Installing main gear bearing 2 Installing front case cover oil seal **a: 72 mm (2.83 in) dia.** **b: 48 mm (1.89 in) dia.**
(J35864) Drift	 NT117	Installing shift shaft oil seal **a: 26 mm (1.02 in) dia.** **b: 20 mm (0.79 in) dia.** **c: 150 mm (5.91 in)**
(J26092) Drift	 NT065	Seating counter gear assembly **a: 44.5 mm (1.752 in) dia.** **b: 38.5 mm (1.516 in) dia.**
(J34291) Shim setting gauge set	 NT101	Selecting counter gear rear bearing shim
(J34291-20) Plunger-shim setting gauge	 NT118	Selecting counter gear rear bearing shim
KV40100621 (J26091) Drift	 NT086	Installing front drive shaft bearing **a: 76 mm (2.99 in) dia.** **b: 69 mm (2.72 in) dia.**

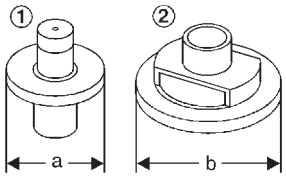
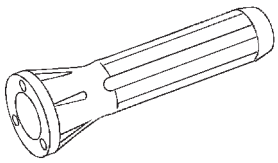
Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
ST30032000 (—) Base	 NT660	Installing front drive shaft bearing **a: 38 mm (1.50 in) dia.** **b: 80 mm (3.15 in) dia.**
ST33052000 (—) Adapter	 NT431	Removing front drive shaft bearing **a: 28 mm (1.10 in) dia.** **b: 22 mm (0.87 in) dia.**
ST35271000 (J26091) Drift	 NT115	Installing rear oil seal Removing and installing press flange snap ring **a: 72 mm (2.83 in) dia.** **b: 63 mm (2.48 in) dia.**
ST27863000 (—) Support ring	 NT661	Removing and installing press flange snap ring **a: 74.5 mm (2.933 in) dia.** **b: 62.5 mm (2.461 in) dia.**
KV40104710 (—) Support ring	 NT661	Removing and installing press flange snap ring **a: 76.3 mm (3.004 in) dia.** **b: 67.9 mm (2.673 in) dia.**
ST35291000 (—) Remover	 NT662	Removing mainshaft rear bearing **a: 40 mm (1.57 in) dia.** **b: 29.5 mm (1.161 in) dia.** **c: 22.5 mm (0.886 in) dia.**

Tool number (Kent-Moore No.) Tool name	Description	
ST30090010 (—) Remover	 NT663	Removing mainshaft rear bearing **a: 165 mm (6.50 in)** **b: 25 mm (0.98 in) dia.** **c: M16 x P2.0**
KV38100500 (—) Drift	 NT115	Installing front drive shaft oil seal **a: 80 mm (3.15 in) dia.** **b: 60 mm (2.36 in) dia.**
KV40100621 (J25273) Drift	 NT104	Installing mainshaft rear bearing **a: 76 mm (2.99 in) dia.** **b: 69 mm (2.72 in) dia.**
KV32101100 (—) Pin punch	 NT410	Removing and installing L-H fork, 2-4 fork **a: 6 mm (0.24 in) dia.**
ST3306S001 (J22888-D) Differential side bearing puller set 1: ST33051001 (—) Puller 2: ST33061000 (J8107-2) Adapter	 NT072	Installing mainshaft rear bearing Removing sun gear assembly **a: 28.5 mm (1.122 in) dia.** **b: 38 mm (1.50 in) dia.**
ST30911000 (—) Puller	 NT664	Installing mainshaft and planetary carrier assembly **a: 98 mm (3.86 in) dia.** **b: 40.5 mm (1.594 in) dia.**

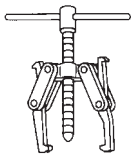
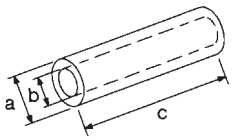
Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
KV381054S0 (—) Outer race puller	 NT665	Removing rear oil seal
KV40105230 (—) Adapter	 NT666	Installing planetary carrier assembly **a: 92 mm (3.62 in) dia.** **b: 86 mm (3.39 in) dia.** **c: 12 mm (0.47 in)**
KV40105310 (—) Support ring	 NT661	Installing planetary carrier assembly **a: 89.1 mm (3.508 in) dia.** **b: 80.7 mm (3.177 in) dia.**
KV40105500 (—) Support	 NT667	Installing planetary carrier assembly **a: 69 mm (2.72 in) dia.** **b: 52 mm (2.05 in) dia.** **c: 120 mm (4.72 in) dia.**
KV38100200 (—) Drift	 NT673	Installing transfer cover oil seal **a: 65 mm (2.56 in) dia.** **b: 49 mm (1.93 in) dia.**
KV31103300 (—) Drift	 NT668	Removing and installing press flange snap ring **a: 76.3 mm (3.004 in) dia.** **b: 130 mm (5.12 in)**

Tool number (Kent-Moore No.) Tool name	Description	
KV31103400 (—) Clutch piston attachment 1 Shaft-drift 2 Guide-cylinder	 NT669	Installing clutch piston **a: 88.5 mm (3.484 in) dia.** **b: 158 mm (6.22 in) dia.**
(J35864) Drift	 NT671	Installing oil seal

Commercial Service Tools

NATF0094

Tool name	Description	
Puller	 NT077	Removing front drive shaft front bearing Removing front drive shaft rear bearing Removing main gear bearing
Drift	 NT117	1 Installing mainshaft rear bearing 2 Installing L & H hub 1 **a: 50 mm (1.97 in) dia.** **b: 42 mm (1.65 in) dia.** **c: 180 mm (7.09 in)** 2 **a: 60 mm (2.36 in) dia.** **b: 50 mm (1.97 in) dia.** **c: 60 mm (2.36 in)**

NVH Troubleshooting Chart

NATF0095S01

Use the chart below to help you find the cause of the symptom. The numbers indicate the order of inspection. If necessary, repair or replace these parts.

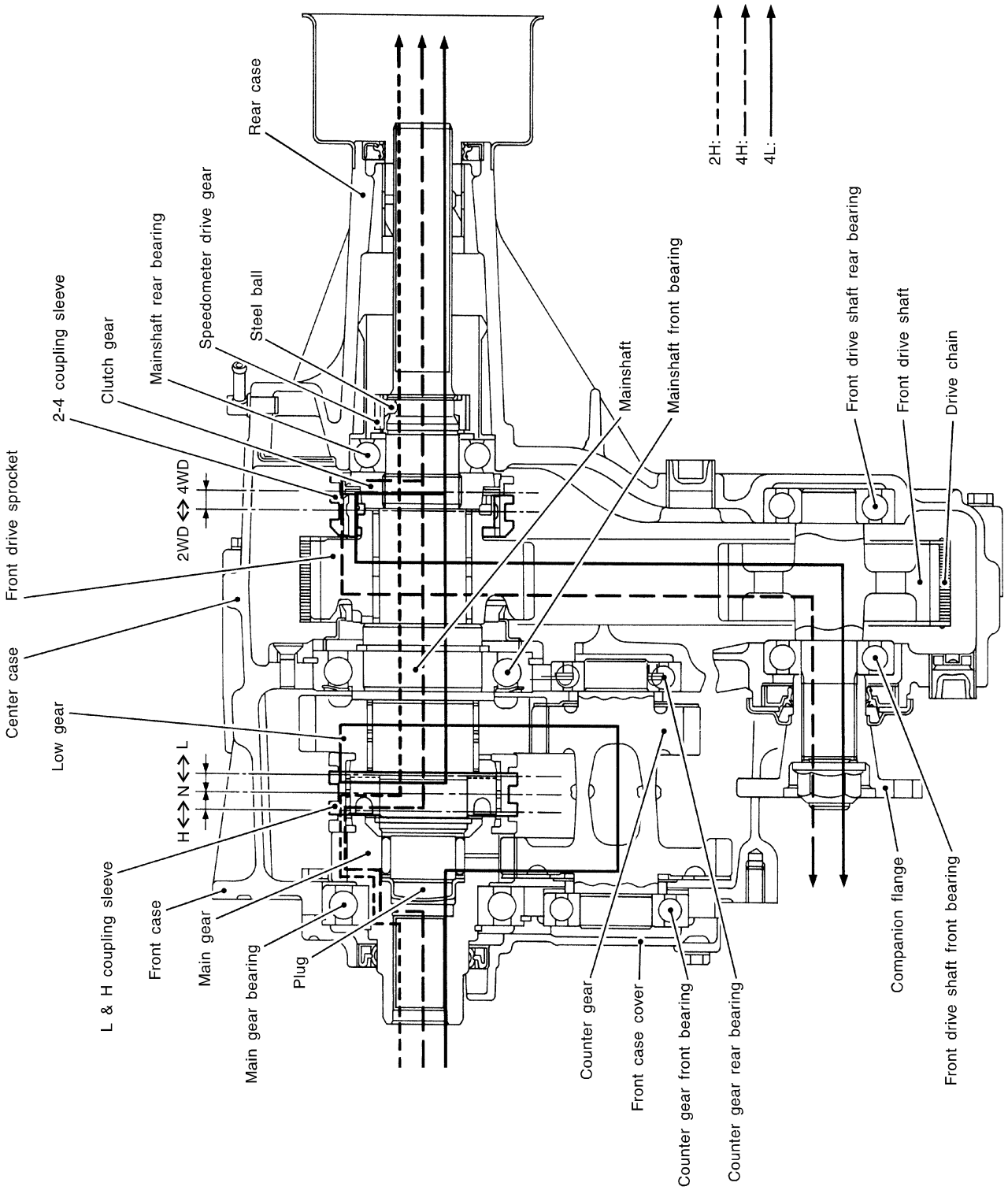
TRANSFER

NATF0095S0101

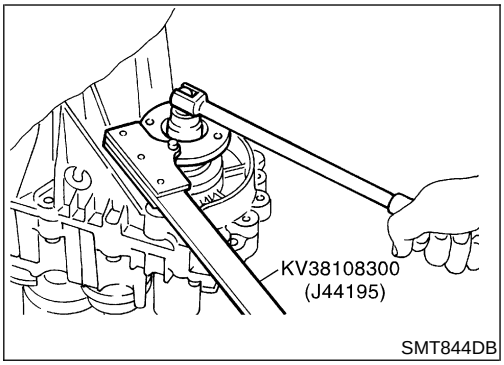
Reference page		Refer to MA-22, "Checking Transfer Fluid".			TF-16	TF-16	TF-16, 18	TF-18	TF-17	TF-17
SUSPECTED PARTS (Possible cause)		FLUID (Level low)	FLUID (Wrong)	FLUID (Level too high)	LIQUID GASKET (Damaged)	OIL SEAL (Worn or damaged)	CHECK SPRING AND CHECK BALL (Worn or damaged)	SHIFT FORK (Worn)	GEAR (Worn or damaged)	BEARING (Worn or damaged)
Symptom	Noise	1	2						3	3
	Fluid leakage		3	1	2	2				
	Hard to shift or will not shift		1	1						
	Jumps out of gear						1	2	2	

Cross-sectional View

NATF0096



SMT820D



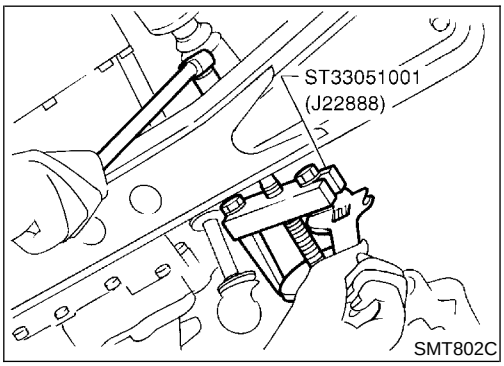
Replacing Oil Seal

NATF0097

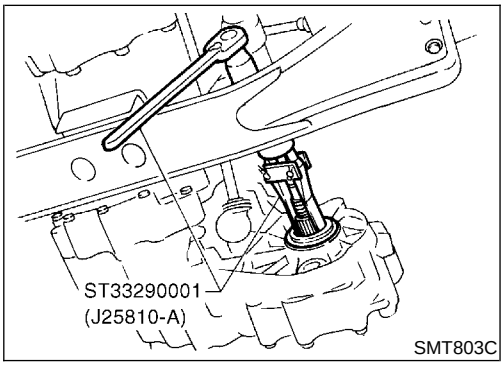
CENTER CASE OIL SEAL

NATF0097S01

1. Remove exhaust front tube and heat insulator. Refer to “Removal”, TF-14.
2. Remove front propeller shaft. Refer to PD-8, “Removal and Installation”.
3. Remove companion flange nut.



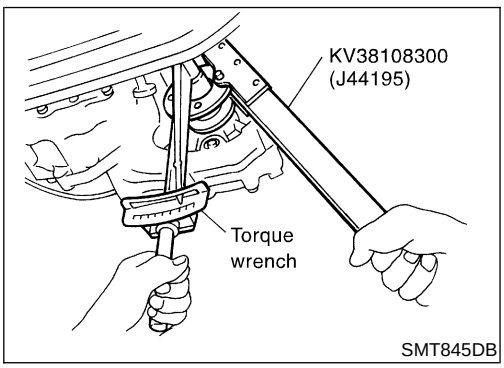
4. Remove companion flange.



5. Remove center case oil seal.
6. Install center case oil seal.

- **Before installing, apply multi-purpose grease to seal lip.**

7. Install companion flange.

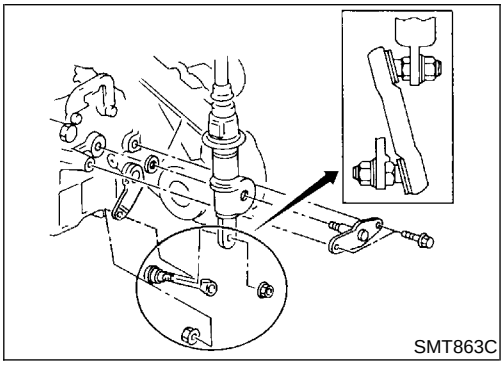


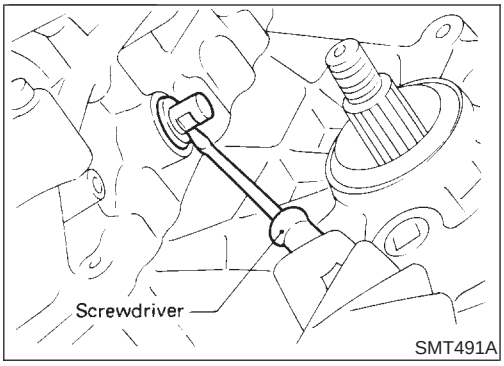
8. Tighten nut to the specified torque.
9. Install front propeller shaft.

SHIFT SHAFT OIL SEAL

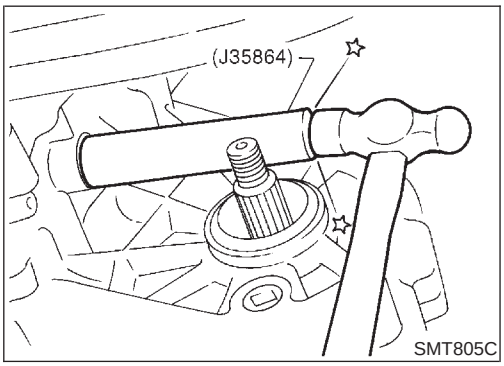
NATF0097S02

1. Remove front propeller shaft. Refer to PD-8, “Removal and Installation”.
2. Remove companion flange. Refer to center case oil seal, TF-12.
3. Remove transfer control lever from transfer outer shift lever. Then remove outer shift lever.





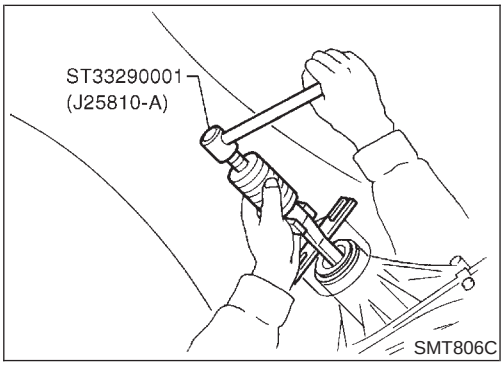
4. Remove shift shaft oil seal.
- **Be careful not to damage cross shaft.**



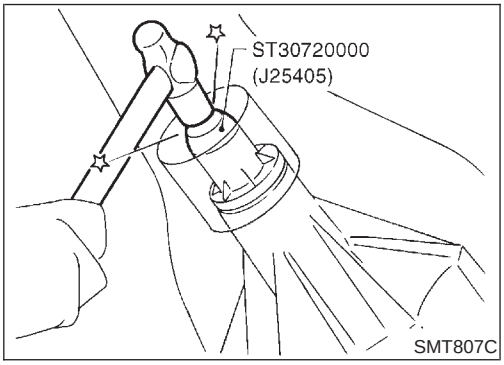
5. Install shift shaft oil seal.
- **Before installing, apply multi-purpose grease to seal lip.**
6. Install transfer control linkage.
7. Install companion flange. Refer to center case oil seal, TF-12.
8. Install front propeller shaft.

REAR OIL SEAL

NATF0097S03



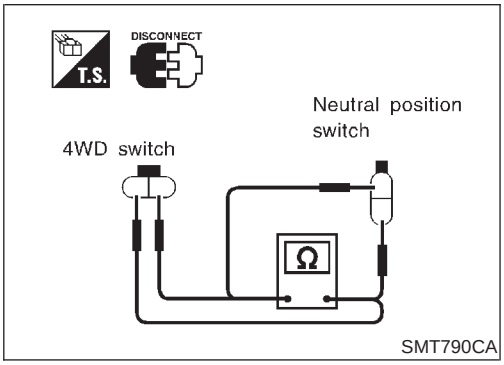
1. Remove rear propeller shaft. Refer to PD-8, "Removal and Installation".
2. Remove rear oil seal.



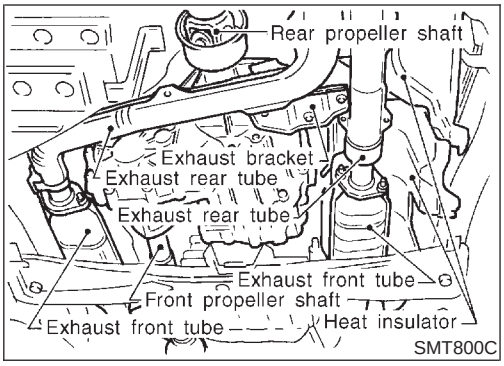
3. Install rear oil seal.
- **Before installing apply multi-purpose grease to seal lip.**
4. Install rear propeller shaft.

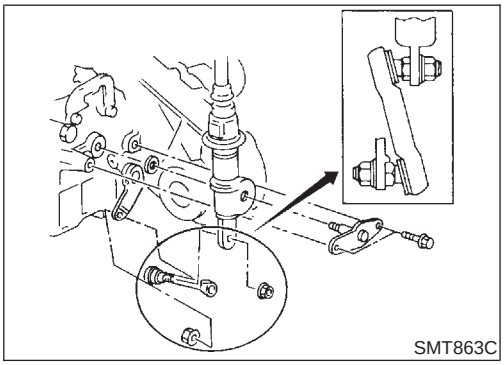
Position Switch Check

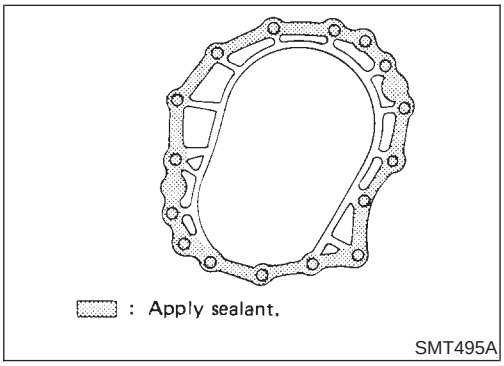
NATF0098

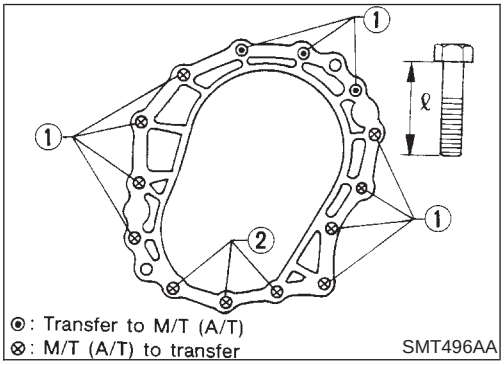


Switch	Gear position	Continuity
4WD switch	4WD	Yes
	Except 4WD	No
Neutral position switch	Neutral	No
	Except neutral	Yes









Removal

NATF0099

1. Drain fluid from transfer and oil from transmission.
2. Remove exhaust front and rear tubes. Refer to FE-8, “Removal and Installation”.
3. Remove front and rear propeller shaft. Refer to PD-8, “Removal and Installation”.
4. Insert plug into rear oil seal after removing propeller shaft.

- **Be careful not to damage spline, sleeve yoke and rear oil seal, when removing propeller shaft.**

5. Disconnect neutral position and 4WD switch harness connectors.
6. Remove transfer control lever from transfer outer shift lever.
7. Remove transfer from transmission.

WARNING:

Support transfer while removing it.

Installation

NATF0100

- Apply recommended sealant to mating surface to transmission. (M/T model only)

Recommended sealant:

Genuine anaerobic liquid gasket, Three Bond TB1215, Loctite Part No. 51813 or equivalent

- Tighten bolts securing transfer.

M/T MODEL

NATF0100S01

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	ℓ mm (in)
1	31 - 41 (3.2 - 4.2, 23 - 30)	45 (1.77)
2	31 - 41 (3.2 - 4.2, 23 - 30)	60 (2.36)

A/T MODEL

NATF0100S02

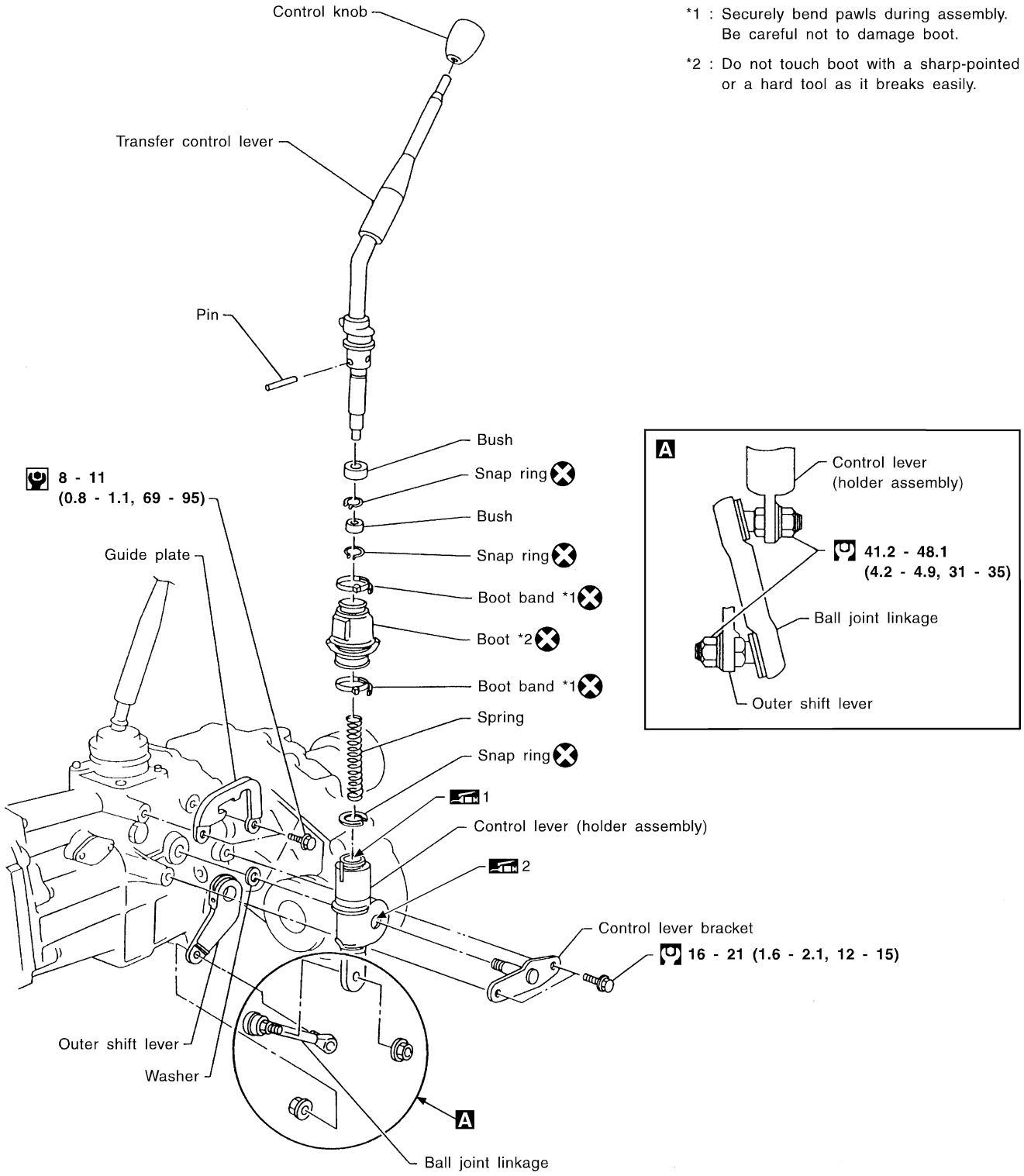
Bolt No.	Tightening torque N·m (kg-m, ft-lb)	ℓ mm (in)
1	31 - 41 (3.2 - 4.2, 23 - 30)	60 (2.36)
2	31 - 41 (3.2 - 4.2, 23 - 30)	60 (2.36)

Transfer Gear Control

NATF0101

SEC. 333

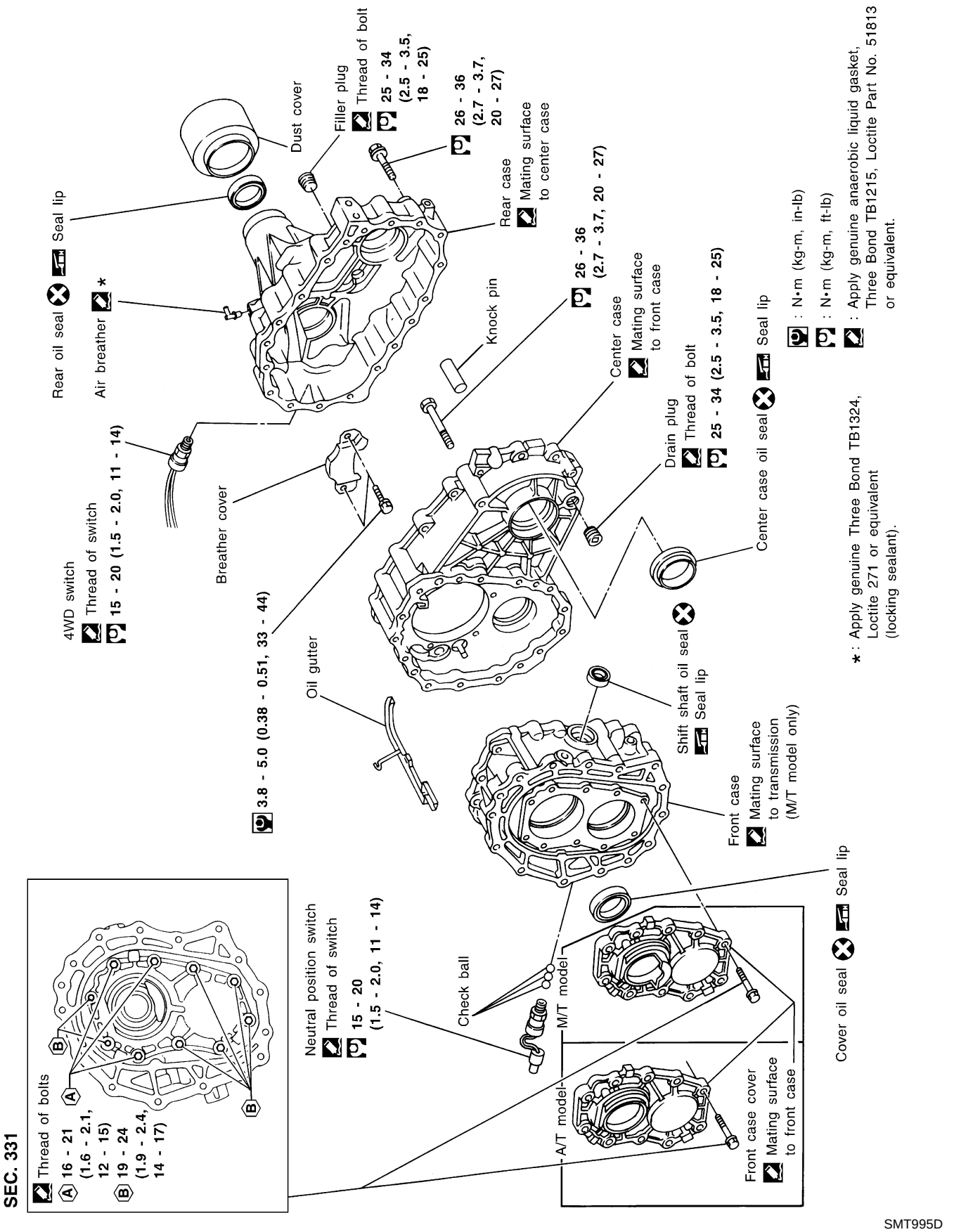
: N•m (kg-m, in-lb)
: N•m (kg-m, ft-lb)
1 : Fill multi-purpose grease up.
2 : Apply multi-purpose grease.
*1 : Securely bend pawls during assembly. Be careful not to damage boot.
*2 : Do not touch boot with a sharp-pointed or a hard tool as it breaks easily.



SMT864CC

Case Components

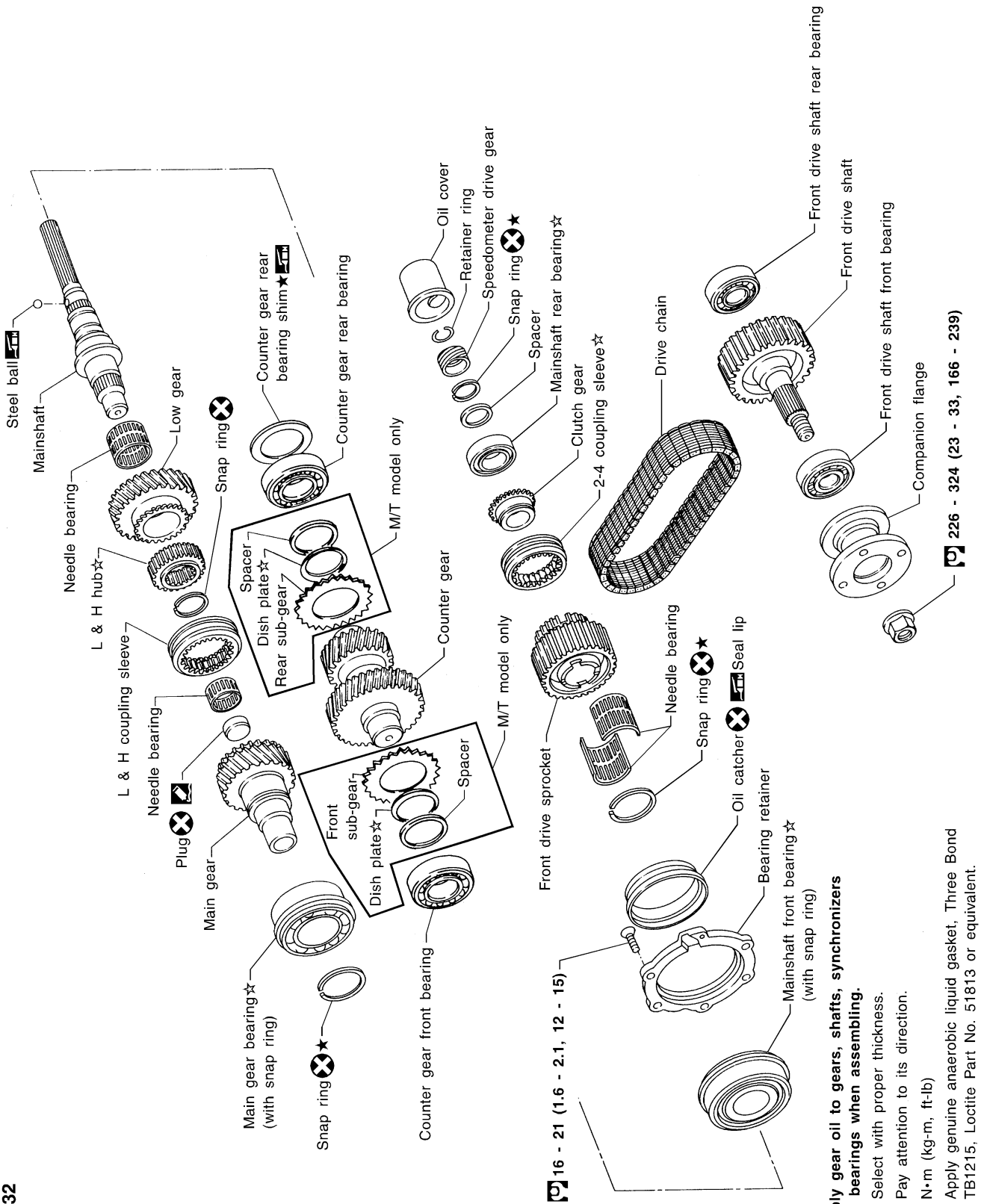
NATF0102



SMT995D

Gear Components

NATF0103

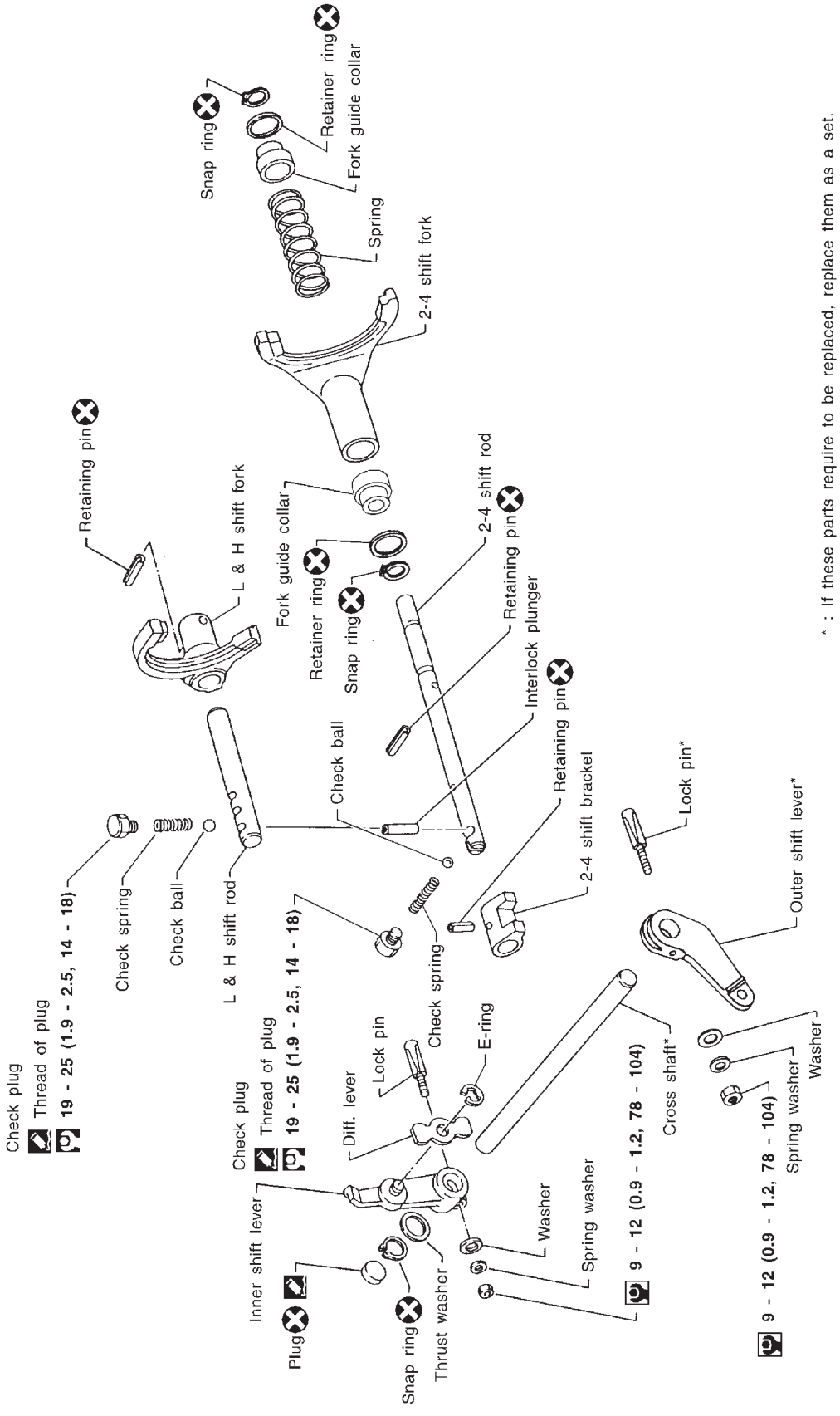


SMT865CB

SEC. 332

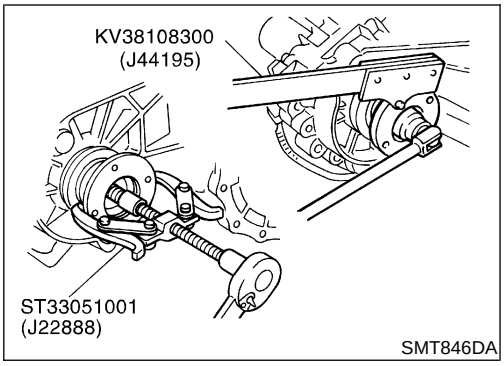
Shift Control Components

NATF0104



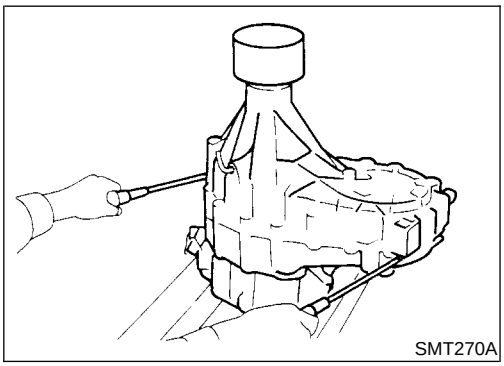
SEC. 333

SMT866CA



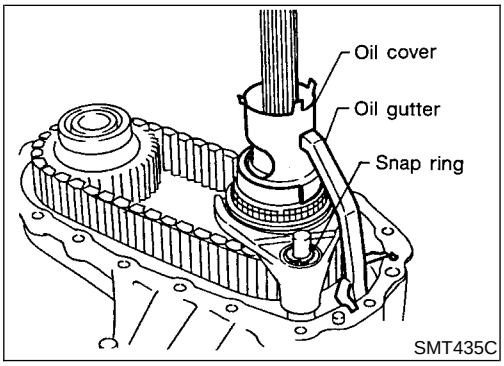
SMT846DA

1. Remove nut of companion flange.
2. Remove companion flange.


SMT270A

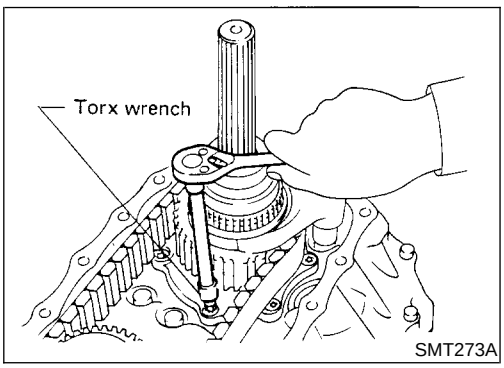
3. Remove 4WD switch.
4. Remove rear case.

- **Be careful not to damage the mating surface.**



SMT435C

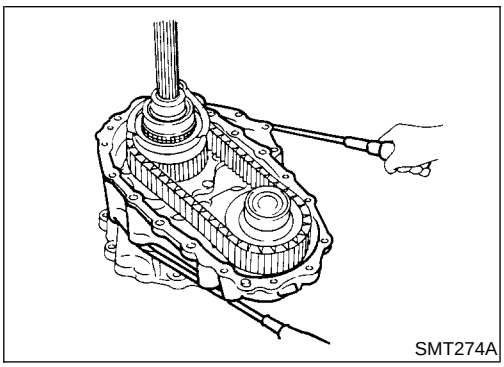
5. Remove oil cover and oil gutter.
6. Remove snap ring and retainer ring from 2-4 shift rod.



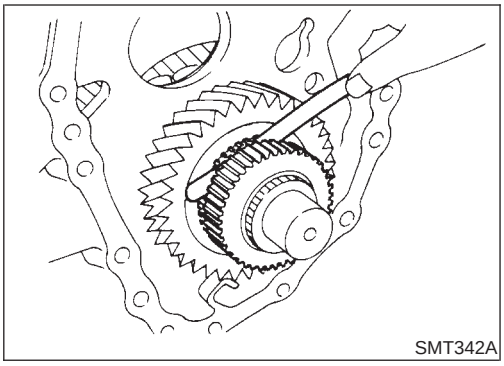
SMT273A

7. Remove bolts securing bearing retainer.

- **This step is necessary to remove mainshaft from center case.**


SMT274A

8. Remove bolts securing center case to front case and then separate center case and front case.

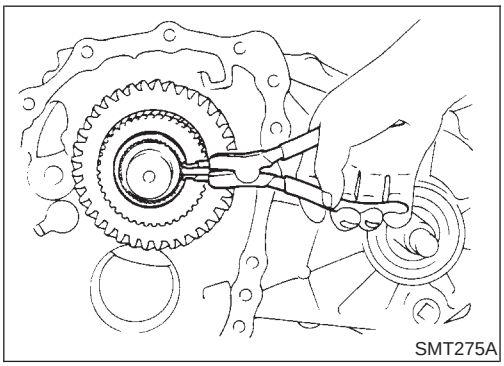

SMT342A

9. Measure end play of low gear.

Standard:

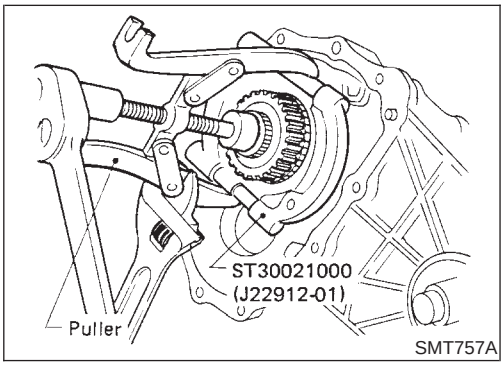
0.2 - 0.35 mm (0.0079 - 0.0138 in)

- **If end play is beyond the maximum value, check low gear and L & H hub for wear.**


SMT275A

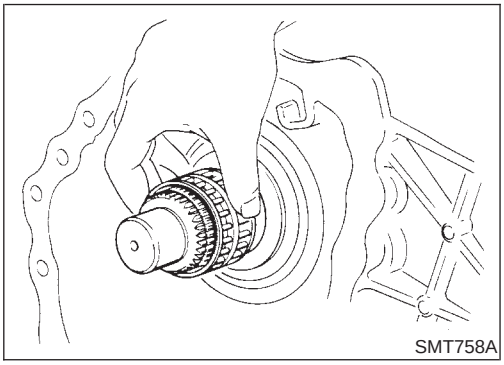
10. Disassemble center case assembly.

a. Remove snap ring from mainshaft.

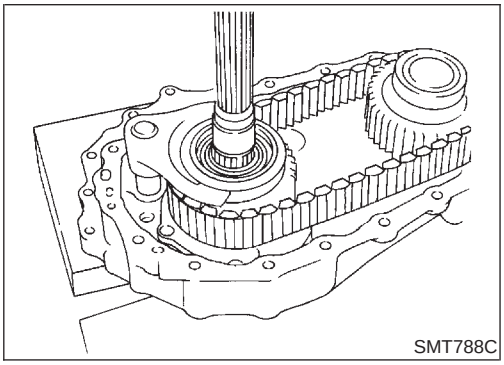


SMT757A

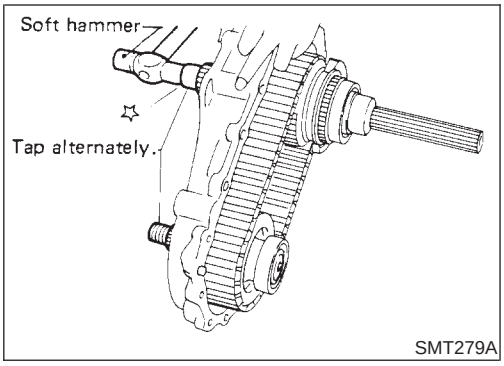
b. Pull out low gear with L & H hub.


SMT758A

c. Remove needle bearing of low gear.


SMT788C

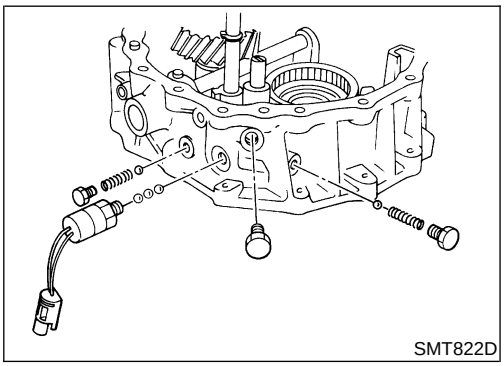
d. Make sure of the direction of the drive chain before removing it. (It must be reinstalled in the same direction.)



SMT279A

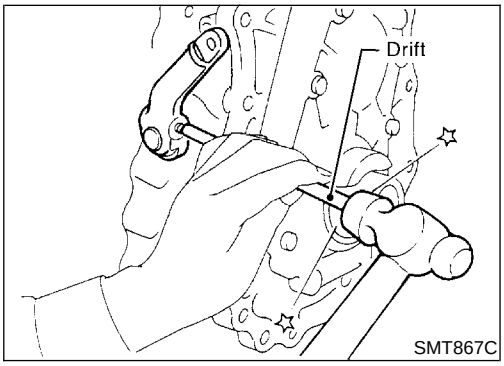
e. Remove mainshaft, front drive and drive chain as a set by tapping front end of mainshaft and front drive shaft alternately.

- **Be careful not to bend drive chain.**


SMT822D

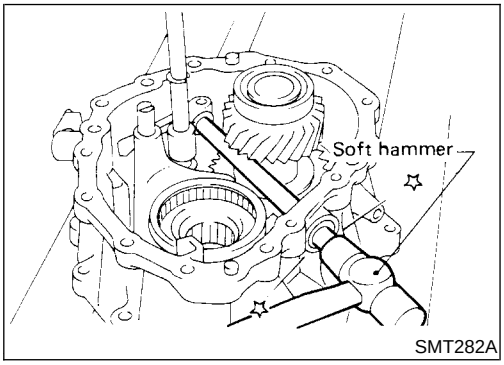
11. Disassemble front case assembly.

a. Remove neutral position switch, plugs, check springs and check balls.



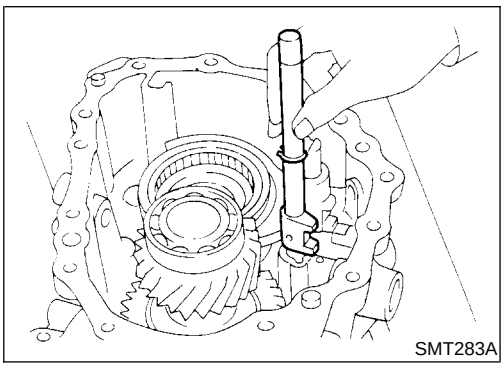
SMT867C

b. Remove outer shift lever.

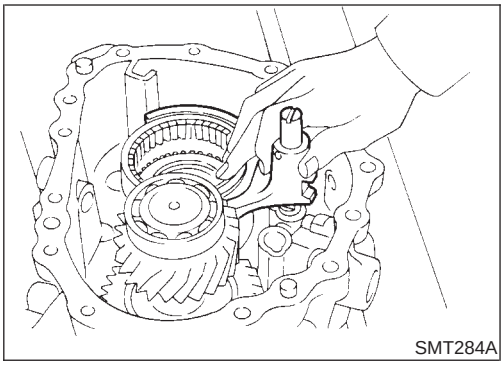


SMT282A

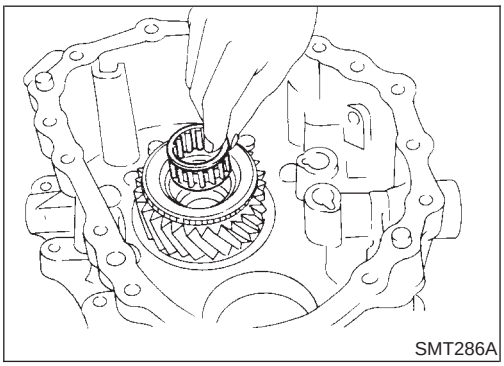
c. Remove lock pin of inner shift lever and drive out cross shaft with plug.


SMT283A

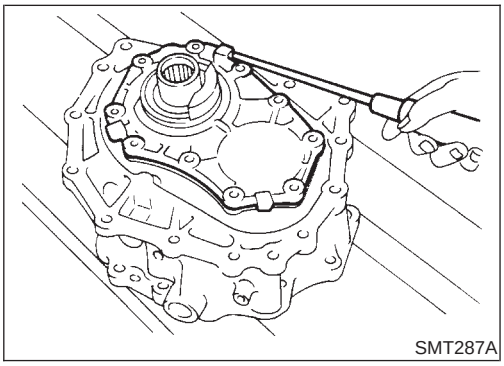
d. Remove 2-4 shift rod.


SMT284A

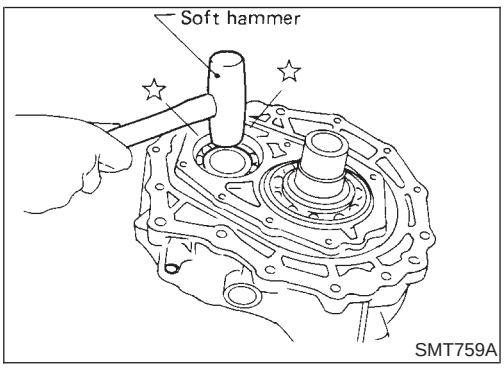
e. Remove L & H shift rod and fork assembly with coupling sleeve.


SMT286A

f. Remove needle bearing from main gear.

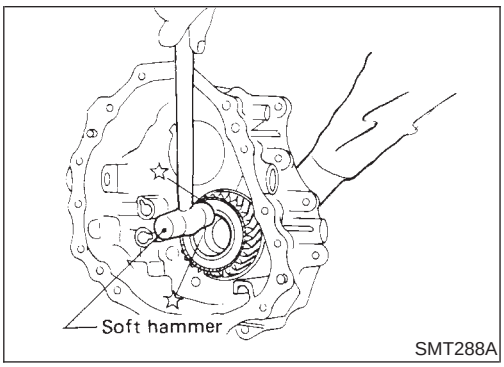

SMT287A

g. Remove bolts securing front case cover and then remove case.



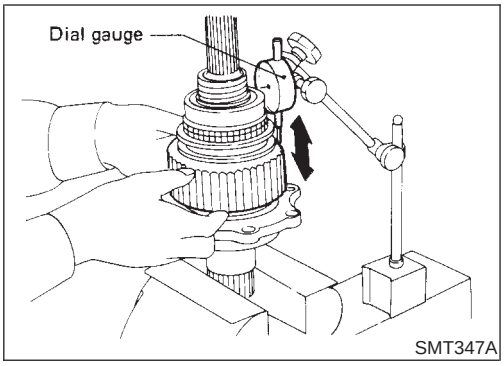
SMT759A

h. Remove counter gear by tapping lightly.



SMT288A

i. Remove main gear by tapping lightly.



SMT347A

Mainshaft

DISASSEMBLY

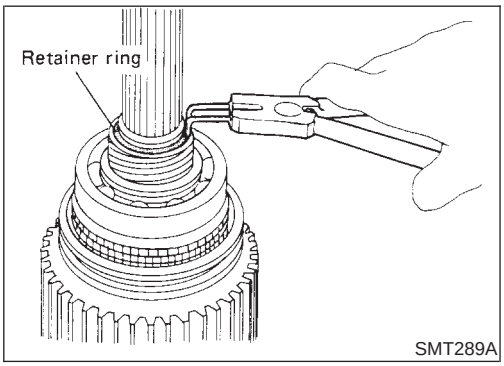
NATF0106

1. Check end play of front drive sprocket.

Standard:

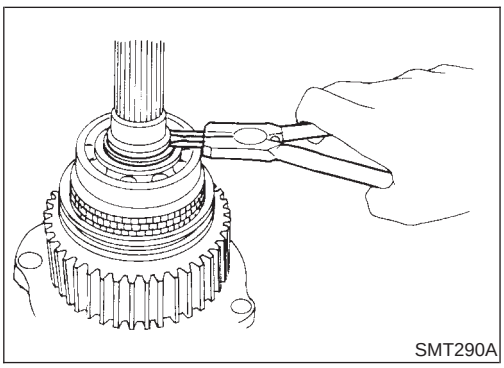
0.2 - 0.35 mm (0.0079 - 0.0138 in)

- **If end play is beyond the maximum value, check front drive sprocket and clutch gear for wear.**

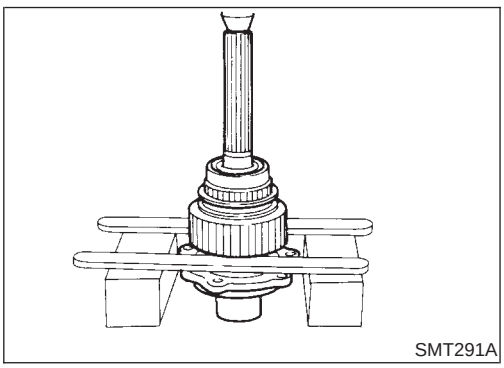


SMT289A

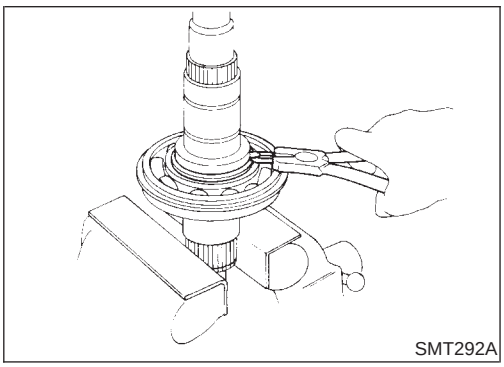
2. Remove retainer ring, speedometer drive gear and steel ball.
- **Be careful not to lose the steel ball.**


SMT290A

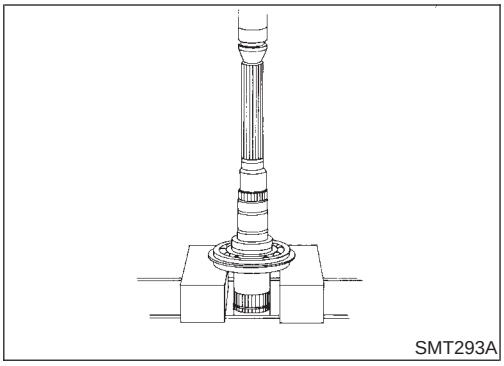
3. Remove snap ring and spacer.


SMT291A

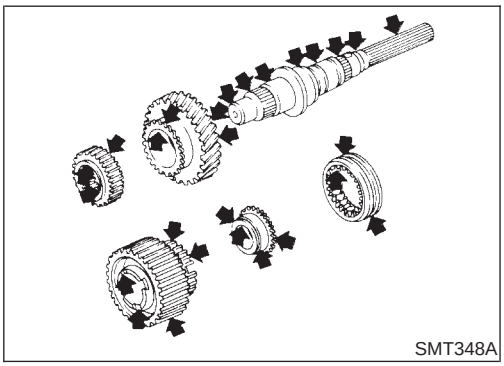
4. Press out front drive sprocket with mainshaft rear bearing and clutch gear together.
5. Remove needle bearing.


SMT292A

6. Remove bearing retainer and then remove snap ring.


SMT293A

7. Press out mainshaft front bearing from mainshaft.


SMT348A

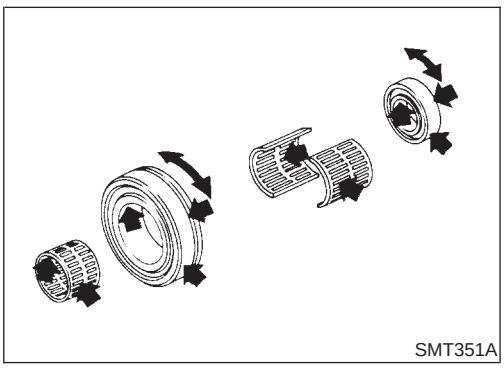
INSPECTION

NATF0107

Gear and Shaft

NATF0107S01

- Check gears for excessive wear, chips or cracks.
- Check shaft for cracks, wear or bending.
- Check coupling sleeve for wear or damage.


SMT351A

Bearing

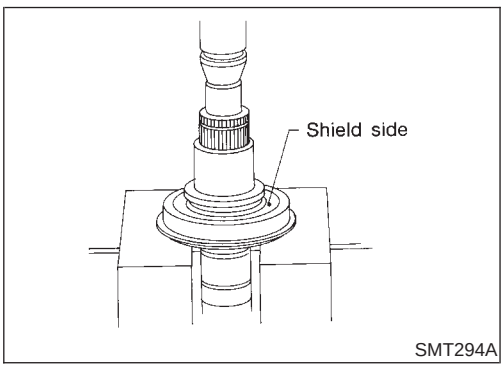
NATF0107S02

- Make sure bearings roll freely and are free from noise, crack, pitting or wear.

ASSEMBLY

NATF0108

1. Press mainshaft front bearing onto mainshaft.
- **Pay special attention to its direction.**

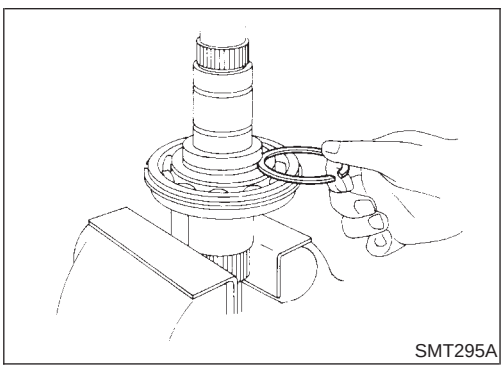


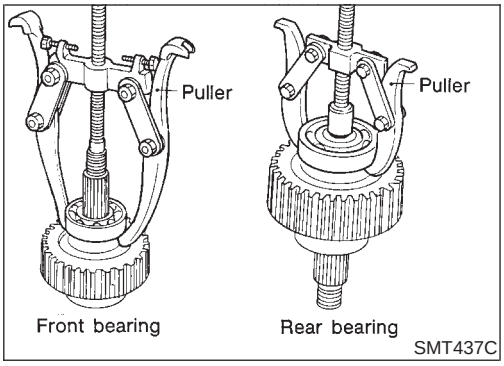
SMT294A

2. Select snap ring with proper thickness and install it.

Allowable clearance between snap ring and groove:
0 - 0.15 mm (0 - 0.0059 in)
Available snap ring for mainshaft front bearing:
Refer to SDS, TF-38.

3. Regarding to further procedures, refer to "ASSEMBLY", TF-31.


SMT295A

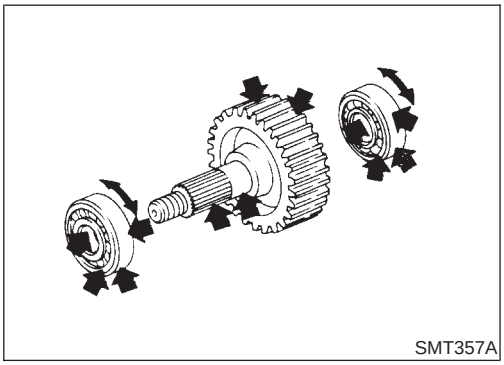


Front Drive Shaft

DISASSEMBLY

NATF0109

- Front drive shaft front bearing and rear bearing



INSPECTION

NATF0110

Sprocket and Shaft

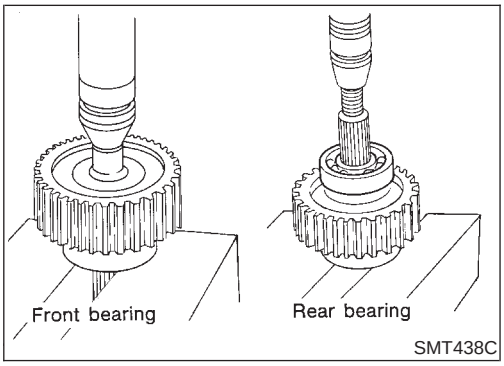
NATF0110S01

- Check sprocket for excessive wear, chips or cracks.
- Check shaft for cracks or wear.

Bearing

NATF0110S02

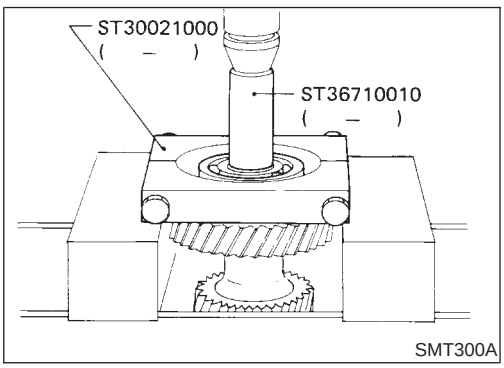
- Make sure bearings roll freely and are free from noise, crack, pitting or wear.



ASSEMBLY

NATF0111

- Press front drive shaft front bearing and rear bearing.

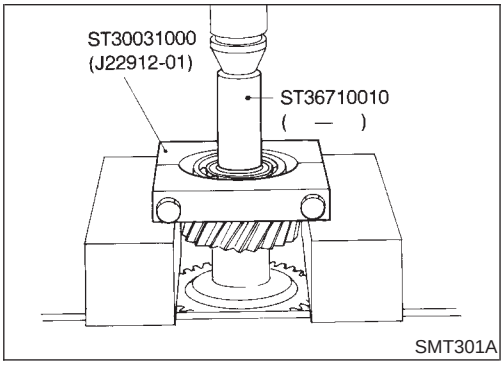


Counter Gear

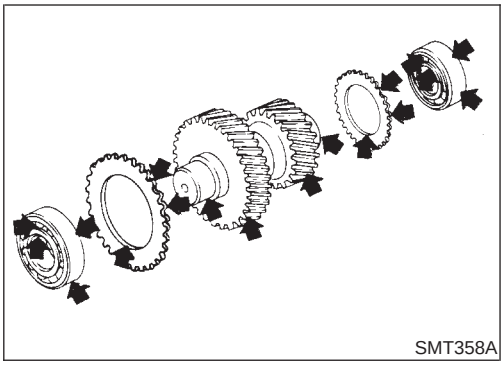
DISASSEMBLY

NATF0112

1. Press out counter gear front bearing.
- Remove front sub-gear, spacer and dish plate (M/T model only).



2. Press out counter gear rear bearing.
- Remove rear sub-gear, spacer and dish plate (M/T model only).


SMT358A

INSPECTION

NATF0113

Gear and Shaft

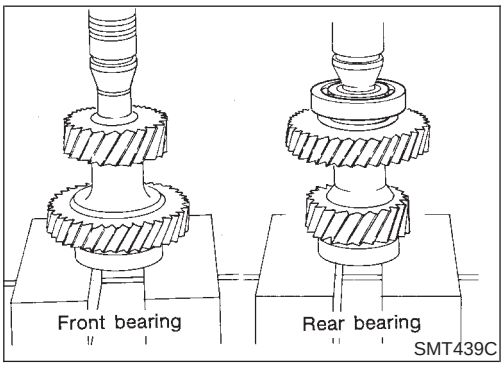
NATF0113S01

- Check gears for excessive wear, chips or cracks.
- Check shaft for cracks or wear.

Bearing

NATF0113S02

- Make sure bearings roll freely and are free from noise, crack, pitting or wear.

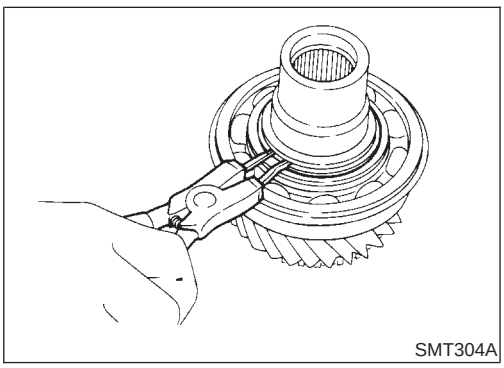


SMT439C

ASSEMBLY

NATF0114

1. Install front sub-gear, dish plate and spacer (M/T model only).
- Press on counter gear front bearing.
2. Install rear sub-gear, dish plate and spacer.
- Press on counter gear rear bearing (M/T model only).


SMT304A

Main Gear

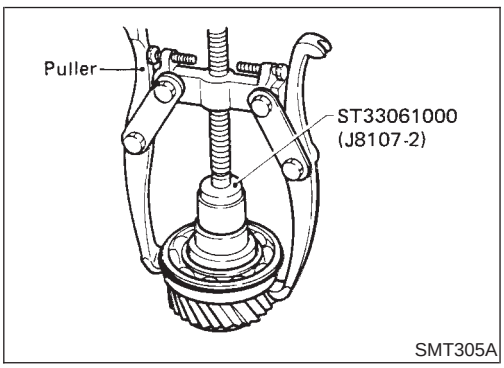
DISASSEMBLY

NATF0115

Main Gear Bearing

NATF0115S01

1. Remove snap ring.



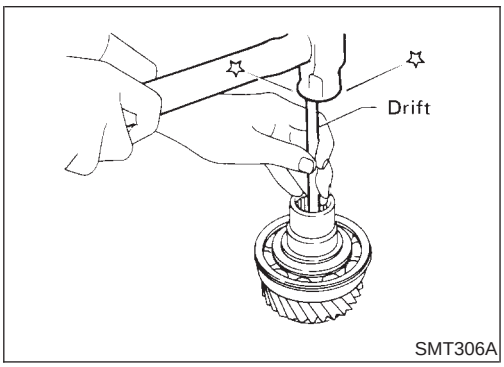
SMT305A

2. Pull out main gear bearing.

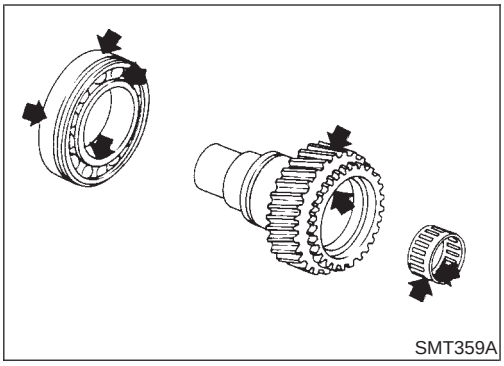
Plug

NATF0115S02

- **Always replace it with new one whenever it is removed.**



SMT306A


SMT359A

INSPECTION

NATF0116

Gear and Shaft

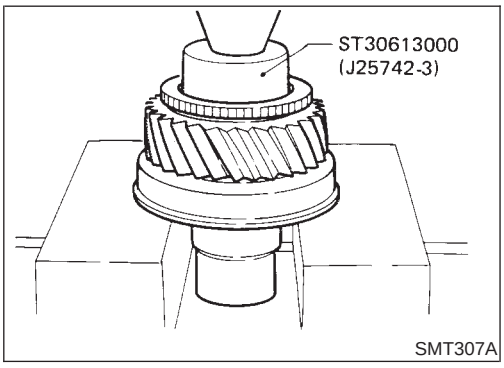
NATF0116S01

- Check gears for excessive wear, chips or cracks.
- Check shaft for cracks or wear.

Bearing

NATF0116S02

- Make sure bearings roll freely and are free from noise, crack, pitting or wear.



SMT307A

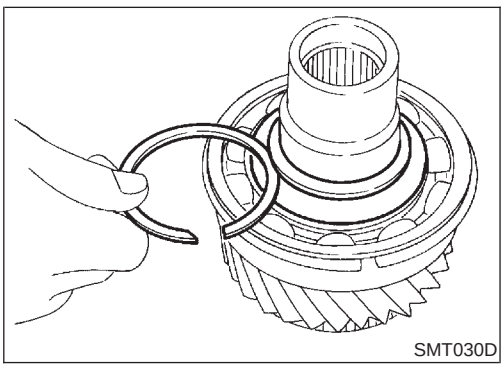
ASSEMBLY

NATF0117

Main Gear Bearing

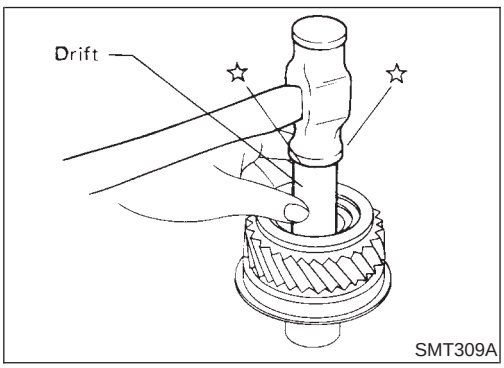
NATF0117S01

1. Press on main gear bearing.


SMT030D

2. Select snap ring with proper thickness and install it.

Allowable clearance between snap ring and groove:
0 - 0.15 mm (0 - 0.0059 in)
Available snap ring for main gear bearing:
Refer to SDS, TF-38.



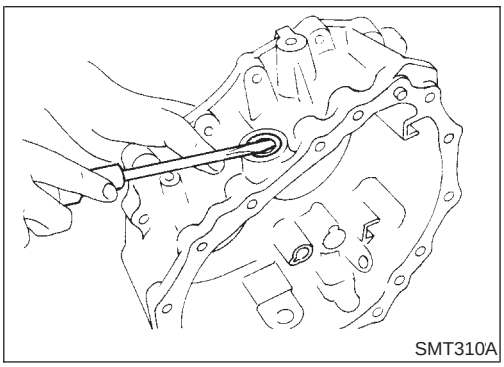
SMT309A

Plug

NATF0117S02

- Apply sealant to plug and install it.

Sealant:
Refer to Gear Components, TF-17.


SMT310A

Front Case

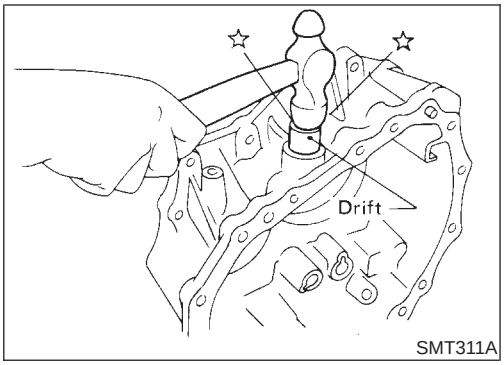
REMOVAL

NATF0118

Shift Shaft Oil Seal

NATF0118S01

- Use a screwdriver to pry out old seal.
- Be careful not to damage case.
- Always replace with a new one whenever it has been removed.



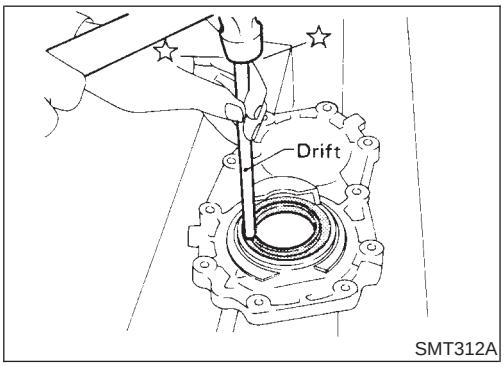
INSTALLATION

NATF0119

Shift Shaft Oil Seal

NATF0119S01

- Install new shift shaft oil seal until flush with case.
- Before installing, apply multi-purpose grease to seal lip.



Front Case Cover

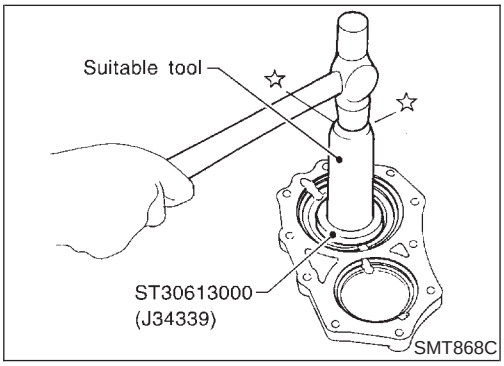
REMOVAL

NATF0120

Cover Oil Seal

NATF0120S01

- Drive out old seal from inside of front case cover.
- Be careful not to damage front case cover.



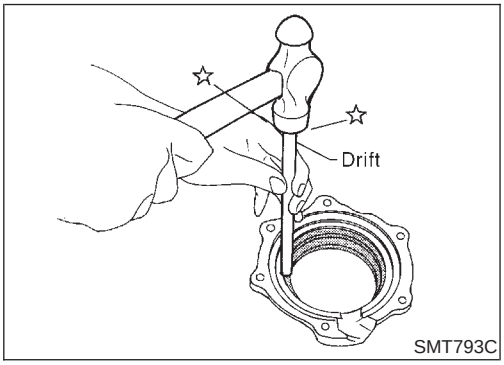
INSTALLATION

NATF0121

Cover Oil Seal

NATF0121S01

- Install new front case cover oil seal until it stops.
- Before installing, apply multi-purpose grease to seal lip.



Bearing Retainer

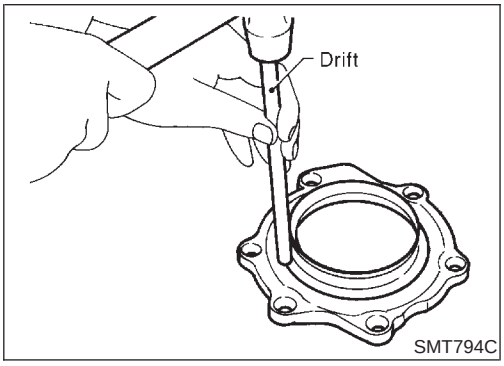
REMOVAL

NATF0122

Oil Catcher

NATF0122S01

- Drive out oil catcher from inside of bearing retainer.
- Be careful not to damage bearing retainer.



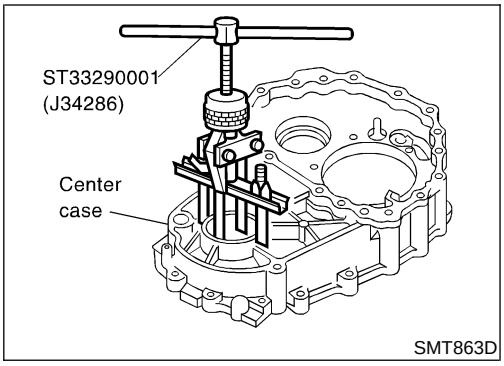
INSTALLATION

NATF0123

Oil Catcher

NATF0123S01

- Install oil catcher until it stops.
- Be careful not to damage or distort oil catcher or bearing retainer.
- Before installing, apply multi-purpose grease to seal lip.



Center Case

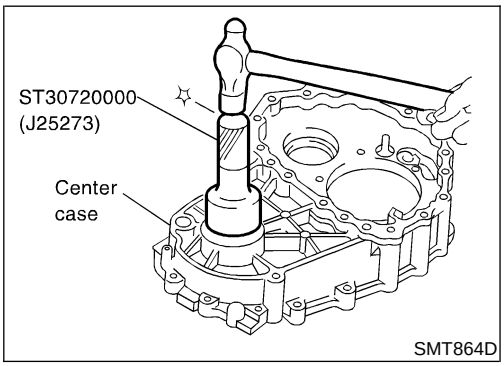
REMOVAL

NATF0124

Center Case Oil Seal

NATF0124S01

- Remove center case oil seal.



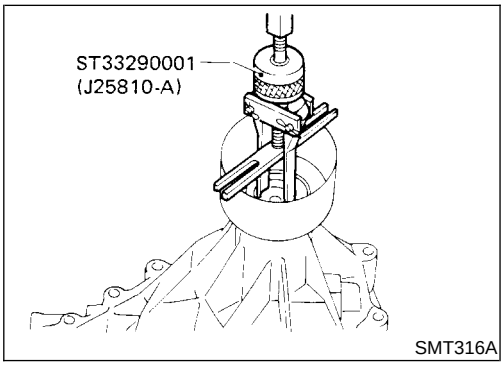
INSTALLATION

NATF0125

Center Case Oil Seal

NATF0125S01

- Install center case oil seal.



Rear Case

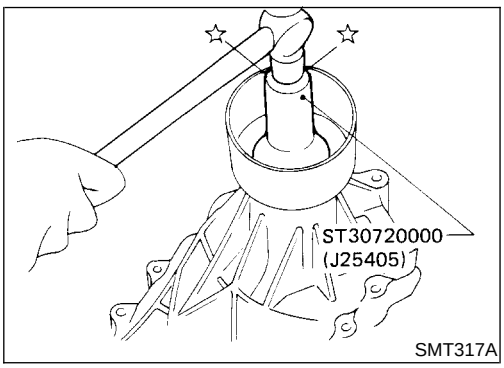
REMOVAL

NATF0126

Rear Oil Seal

NATF0126S01

- Pull out rear oil seal.



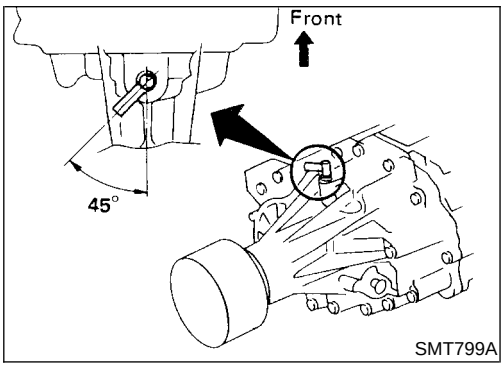
INSTALLATION

NATF0127

Rear Oil Seal

NATF0127S01

- Install new rear oil seal until it stops.
- Before installing, apply multi-purpose grease to seal lip.



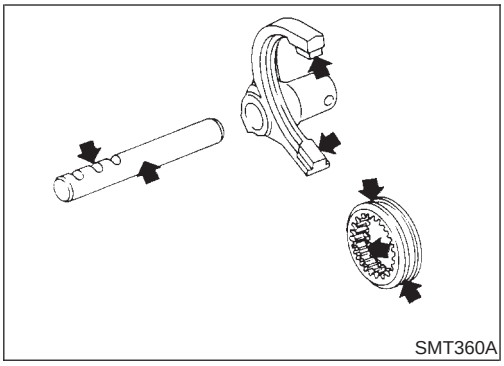
Air Breather

NATF0127S02

- Install as shown in illustration.

Locking sealant:

Refer to Case Components, TF-16.

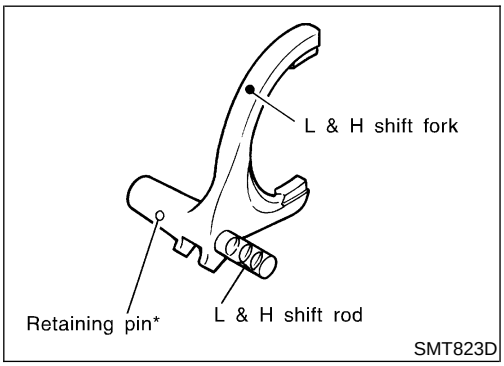

SMT360A

Shift Control Components

INSPECTION

NATF0128

- Check contact surface and sliding surface for wear, scratches, projections or other faulty conditions.

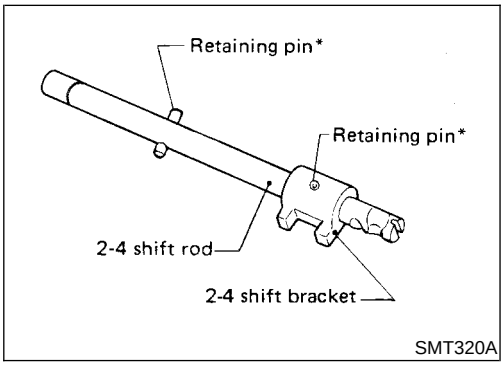


SMT823D

L & H Shift Rod & Fork

NATF0128S01

- Assemble as shown in illustration.
  * Retaining pin is the same size as the one for 2-4 shift rod.

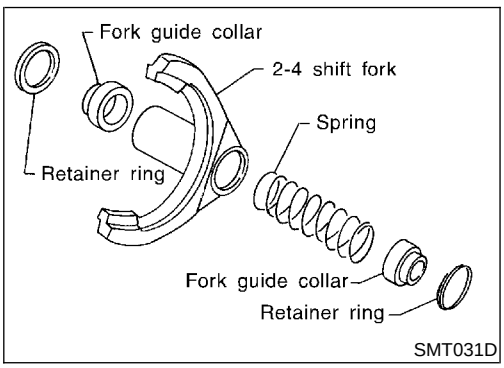


SMT320A

2-4 Shift Rod & Fork

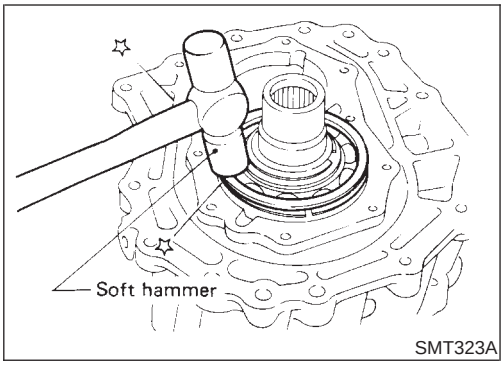
NATF0128S02

- Assemble as shown in illustration.
  * Retaining pins are the same size.



SMT031D

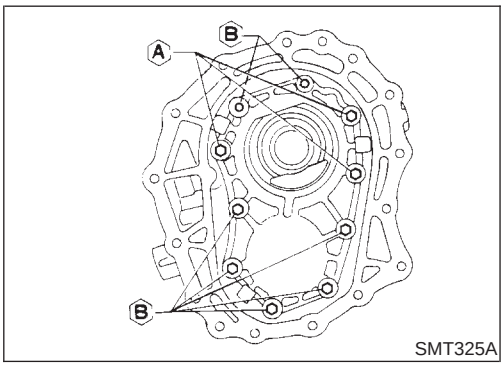
- **Pay special attention to the direction of fork guide collar.**



SMT323A

1. Assemble front case.

a. Install main gear assembly by tapping lightly.



SMT325A

b. Apply sealant to the mating surface and bolts of front case cover and install it on front case.

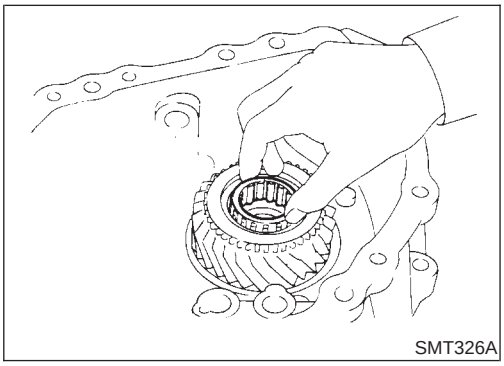
- **These ten bolts should be coated with sealant.**
- **Tightening torque**

  A: 16 - 21 N·m (1.6 - 2.1 kg-m, 12 - 15 ft-lb)

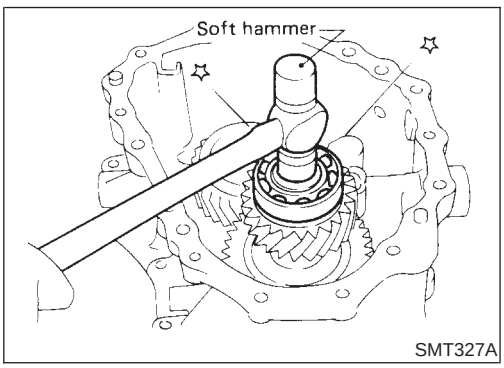
  B: 19 - 24 N·m (1.9 - 2.4 kg-m, 14 - 17 ft-lb)

  Sealant:

  Refer to Case Components, TF-16.

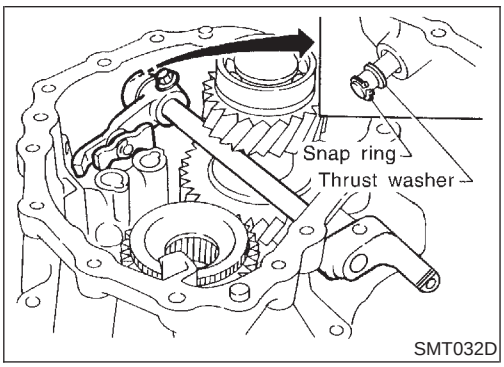

SMT326A

c. Apply gear oil to needle bearing and install it into main gear.



SMT327A

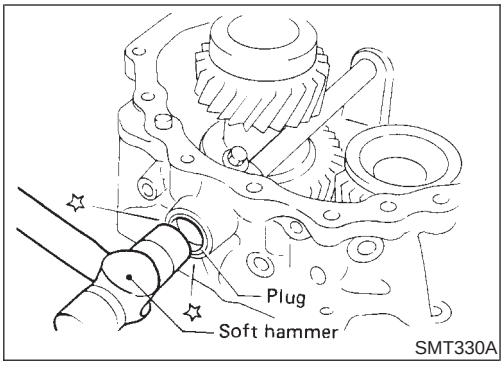
d. Install counter gear assembly by tapping lightly.



SMT032D

e. Install cross shaft and inner shift lever.

- **When replacing cross shaft, outer shift lever or lock pin of outer shift lever, replace them as a set.**

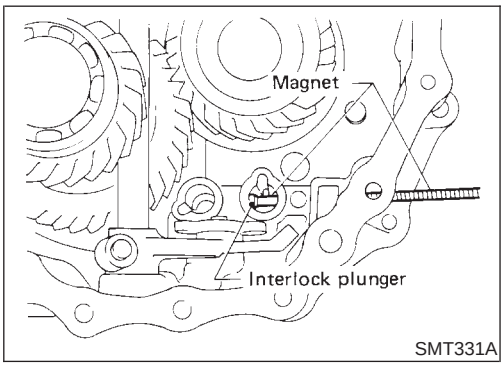


SMT330A

f. Apply sealant to plug and install it into front case.

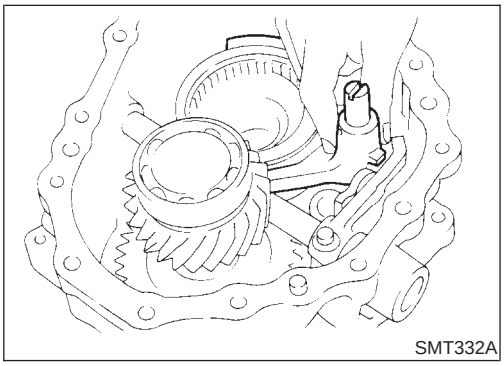
Sealant:

Refer to Case Components, TF-16.

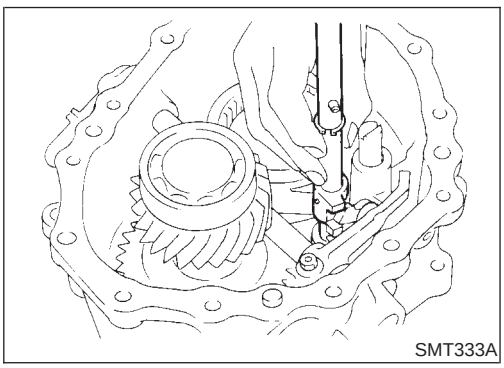


SMT331A

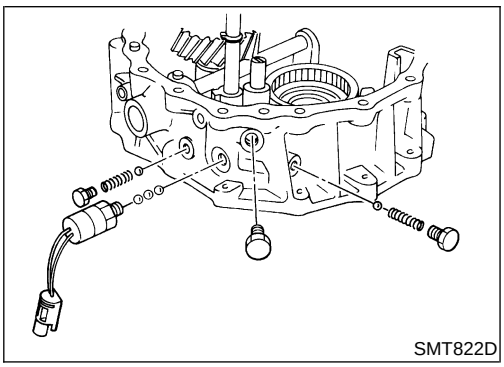
g. Insert interlock plunger into front case.


SMT332A

h. Install L & H shift rod and fork assembly with coupling sleeve.


SMT333A

i. Install 2-4 shift rod.

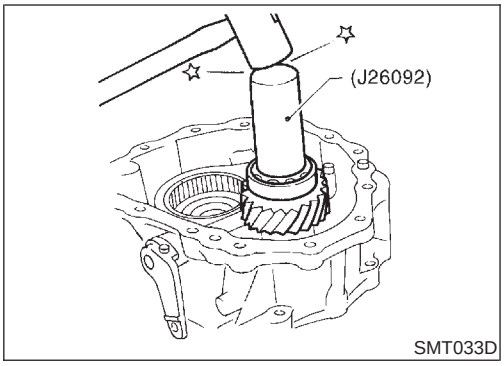

SMT822D

j. Install neutral position switch, check balls, check springs and plugs.

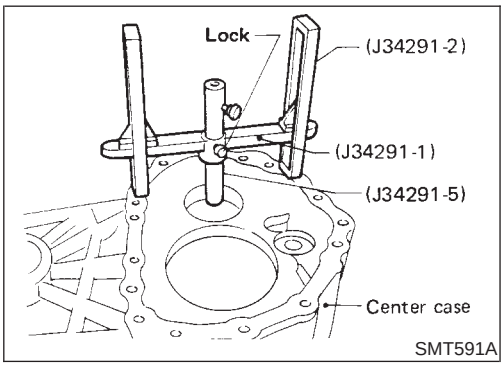
- **Apply sealant to switches and plugs.**

Sealant:

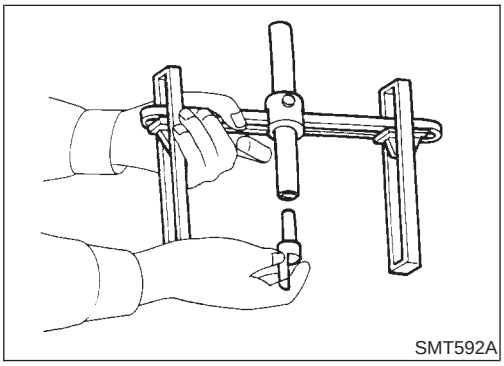
Refer to Case Components, TF-16.



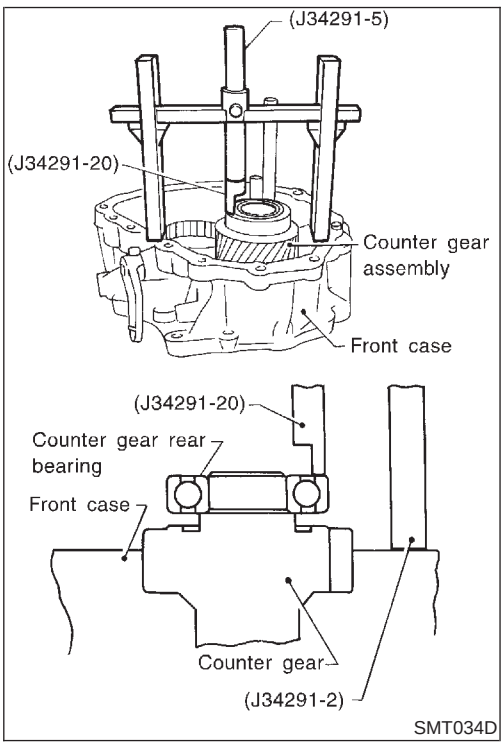
2. Select counter gear rear bearing shim.
a. Seat counter gear assembly.



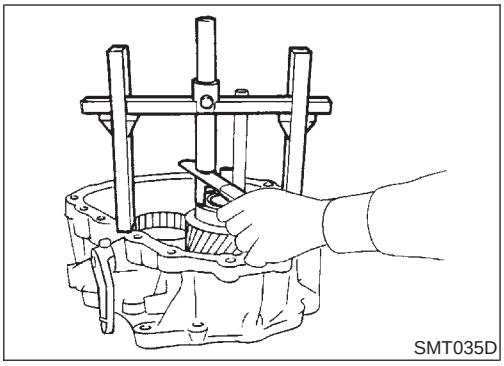
b. Place J34291-1 (bridge), J34291-2 (legs) and J34291-5 (gauging cylinder) on machined surface of center case and allow gauging cylinder to rest on top outer portion of counter gear rear bearing. Lock gauging cylinder in place.



c. Insert J34291-20 (gauging plunger) into J34291-5 (gauging cylinder).



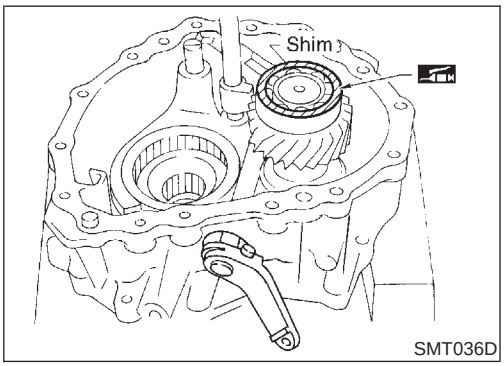
d. Place bridge, legs, gauging cylinder and gauging plunger onto machined surface of front case assembly, and allow gauging plunger to drop until it contacts counter gear rear bearing mating surface.


SMT035D

e. Lock gauging plunger in place and use feeler gauge to measure gap between gauging cylinder and gauging plunger.
f. Use measured distance and following chart to select correct shim.

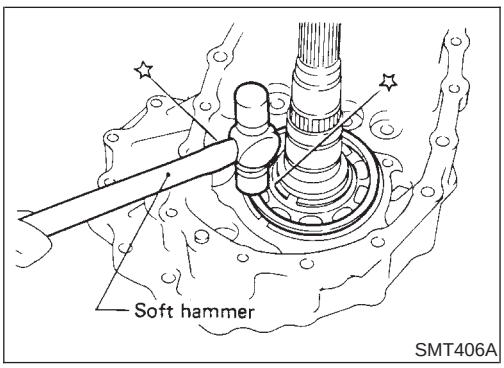
Counter gear end play:
0 - 0.2 mm (0 - 0.008 in)
Counter gear rear bearing shim:
Refer to SDS, TF-39.

g. Select counter gear rear bearing shim.



SMT036D

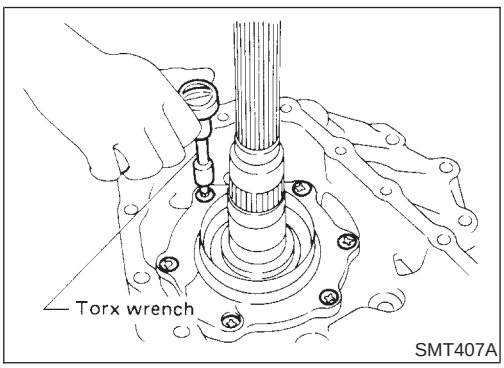
3. Place suitable shim on counter gear rear bearing with grease.
4. Apply ATF to each part in front case.



SMT406A

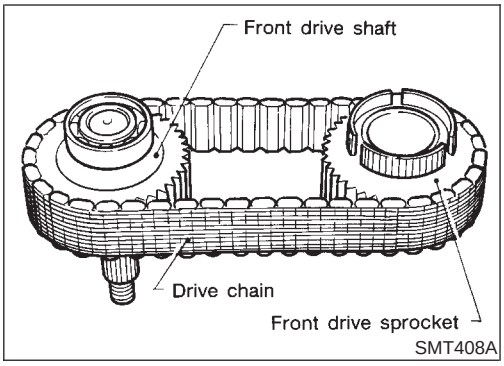
5. Assemble center case assembly.
a. Install mainshaft on center case by tapping lightly.

- **Apply ATF to mainshaft front bearing.**



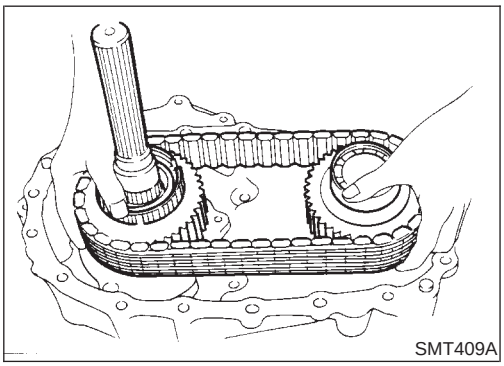
SMT407A

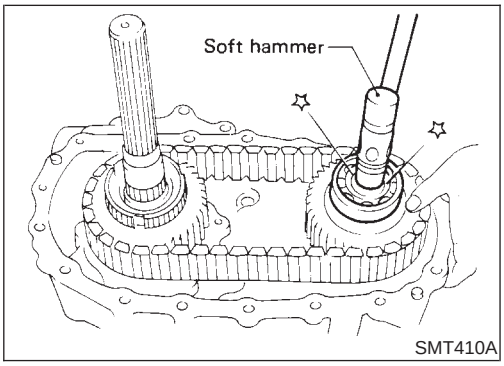
b. Install bearing retainer.



SMT408A

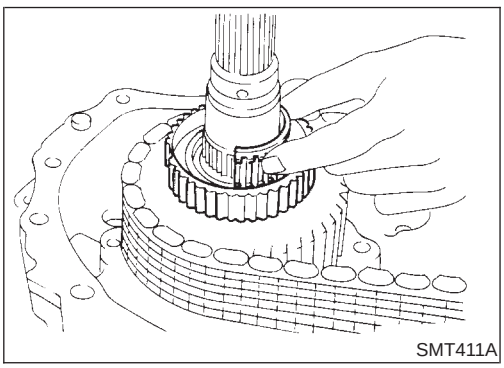
c. Put drive chain onto the front drive sprocket and front drive shaft, and then put them in center case.


SMT409A

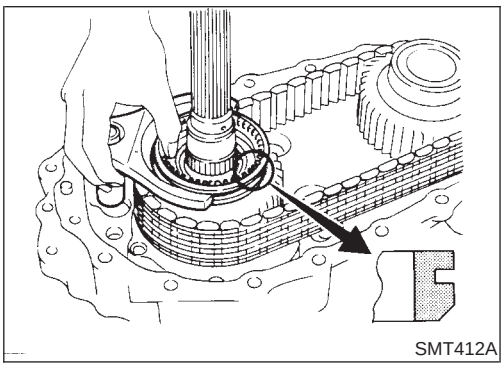


SMT410A

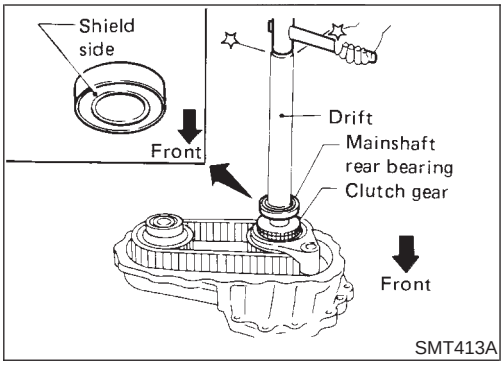
d. Install front drive shaft by tapping lightly.
- **Make sure shafts are lined up in the case.**


SMT411A

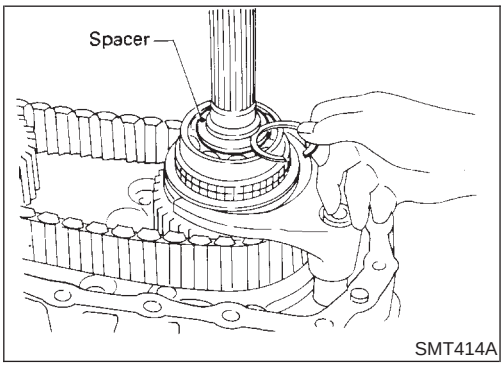
e. Apply ATF to needle bearings and install them into front drive sprocket.
- **These needle bearings can be installed more easily if front drive sprocket is rotated while installing them.**


SMT412A

f. Install 2-4 coupling sleeve with 2-4 shift fork.
- **Pay special attention to direction of coupling sleeve.**

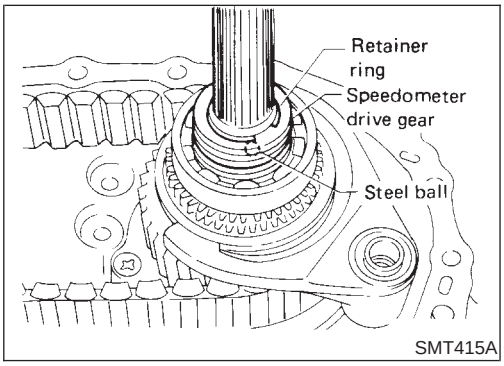


g. Install clutch gear and mainshaft rear bearing.
- **Place wooden block under mainshaft in order to protect mainshaft front bearing.**

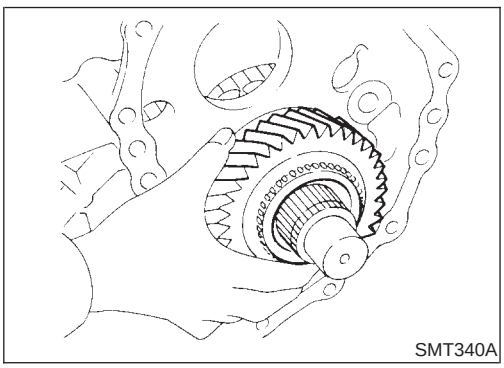


h. Install spacer.
i. Select snap ring with proper thickness and install it.

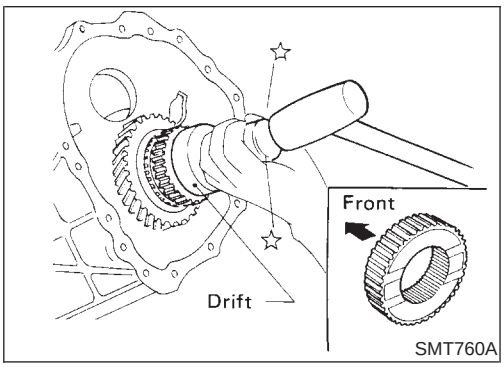
Allowable clearance between snap ring and groove:
0 - 0.15 mm (0 - 0.0059 in)
Available snap ring for mainshaft rear bearing:
Refer to SDS, TF-38.



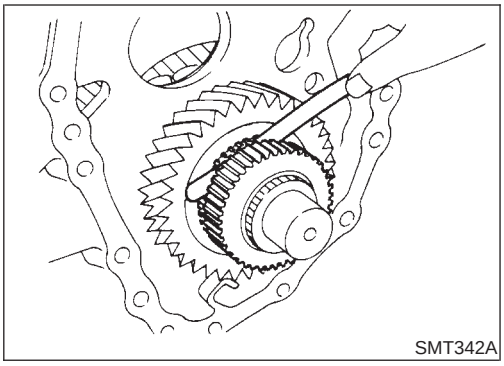
j. Install steel ball, speedometer drive gear and retainer ring.
- **Steel ball is the smallest of check balls for this unit.**



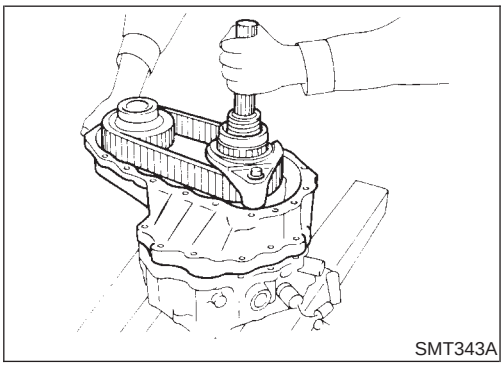
k. Install low gear and its bearing to mainshaft.
- **Apply ATF to needle bearing.**



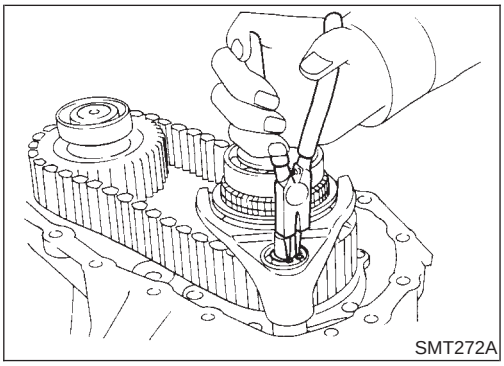
l. Install L & H hub and snap ring to mainshaft.
- **Pay special attention to direction of L & H hub.**


SMT342A

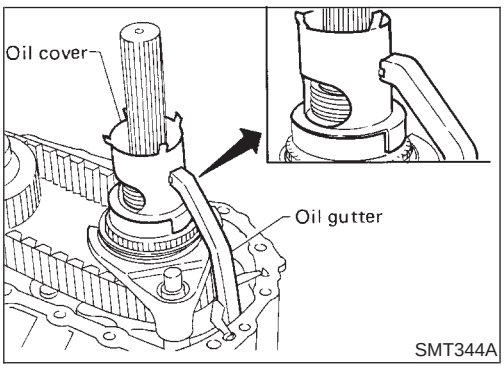
m. Measure end play of low gear.
Standard:
0.2 - 0.35 mm (0.0079 - 0.0138 in)


SMT343A

6. Apply sealant to mating surface and put center case assembly onto front case and tighten bolts.
Sealant:
Refer to Case Components, TF-16.

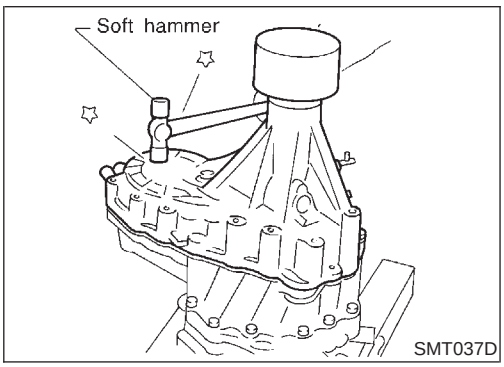

SMT272A

7. Install snap ring to 2-4 shift rod.



SMT344A

8. Install oil gutter and oil cover.
9. Apply ATF to each part in center case.



SMT037D

10. Apply sealant to mating surface and install rear case on center case.
11. Install 4WD switch.

- **Apply sealant to thread of switch.**
Sealant:
Refer to Case Components, TF-16.

General Specifications

NATF0130

Transfer model			TX10A
Gear ratio	High		1.000
	Low		2.020
Number of teeth	Main gear		29
	Low gear		37
	Counter gear	High	38
		Low	24
	Front drive sprocket		41
	Front drive shaft		41
Fluid capacity ℓ (US qt, Imp qt)*			2.2 (2-3/8, 2)

*: Refer to MA-12, “Fluids and Lubricants”.

Gear End Play

NATF0131

Unit: mm (in)

Front drive sprocket	0.2 - 0.35 (0.0079 - 0.0138)
Low gear	0.2 - 0.35 (0.0079 - 0.0138)
Counter gear	0 - 0.2 (0 - 0.008)

Available Snap Ring

NATF0132

MAINSHAFT FRONT BEARING

NATF0132S01

Allowable clearance	0 - 0.15 mm (0 - 0.0059 in)
Thickness mm (in)	Part number*
3.10 (0.1220) 3.19 (0.1256) 3.28 (0.1291)	33138-73P10 33138-73P11 33138-73P12

*: Always check with the Parts Department for the latest parts information.

MAINSHAFT REAR BEARING

NATF0132S02

Allowable clearance	0 - 0.15 mm (0 - 0.0059 in)
Thickness mm (in)	Part number*
1.80 (0.0709) 1.89 (0.0744) 1.98 (0.0780) 2.07 (0.0815) 2.16 (0.0850)	33138-73P20 33138-73P21 33138-73P22 33138-73P23 33138-73P24

*: Always check with the Parts Department for the latest parts information.

MAIN GEAR BEARING

NATF0132S03

Allowable clearance	0 - 0.15 mm (0 - 0.0059 in)
Thickness mm (in)	Part number*
2.60 (0.1024) 2.69 (0.1059) 2.78 (0.1094)	33114-73P00 33114-73P01 33114-73P02

*: Always check with the Parts Department for the latest parts information.

Available Shim

NATF0133

COUNTER GEAR REAR BEARING

NATF0133S01

Allowable clearance	0 - 0.2 mm (0 - 0.008 in)
Thickness mm (in)	Part number*
0.1 (0.004)	33112-C6900
0.2 (0.008)	33112-C6901
0.3 (0.012)	33112-C6902
0.4 (0.016)	33112-C6903
0.5 (0.020)	33112-33G00
0.6 (0.024)	33112-33G01

*: Always check with the Parts Department for the latest parts information.

Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

NATF0001

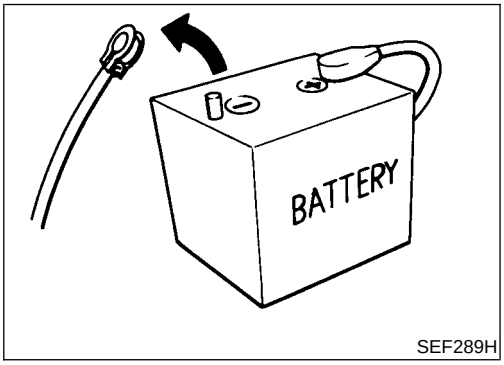
The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL PATHFINDER is as follows:

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

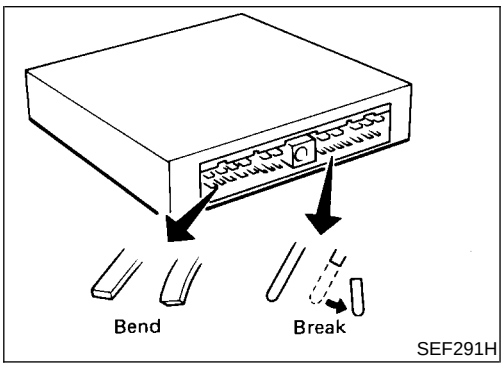
Information necessary to service the system safely is included in the **RS** section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.**



SEF289H



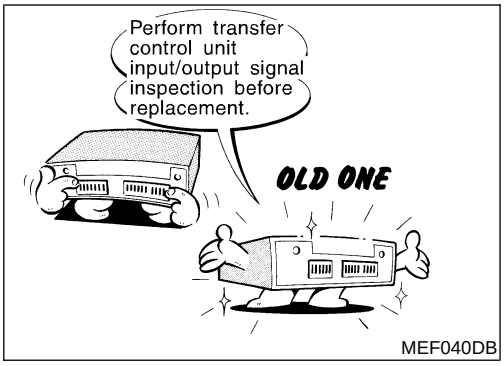
SEF291H

Precautions

NATF0092

- **Before connecting or disconnecting the Transfer control unit harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the Transfer control unit. Because battery voltage is applied to Transfer control unit even if ignition switch is turned off.**

- **When connecting or disconnecting pin connectors into or from Transfer control unit, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on Transfer control unit pin terminal, when connecting pin connectors.



- **Before replacing Transfer control unit, perform Transfer control unit input/output signal inspection and make sure whether Transfer control unit functions properly or not. (See page TF-86.)**

Service Notice

NATF0002

1) Before proceeding with disassembly, thoroughly clean the outside of the all-mode 4WD transfer. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
2) Disassembly should be done in a clean work area.
3) Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the all-mode 4WD transfer.
4) Place disassembled parts in order for easier and proper assembly.
5) All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
6) Gaskets, seals and O-rings should be replaced any time the all-mode 4WD transfer is disassembled.
7) It is very important to perform functional tests whenever they are indicated.
8) The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place removed parts in a parts rack in order to replace them in correct positions and sequences. Care will also prevent springs and small parts from becoming scattered or lost.
9) Properly installed valves, sleeves, plugs, etc. will slide along bores in valve body under their own weight.
10) Before assembly, apply a coat of recommended ATF to all parts. Apply petroleum jelly to protect O-rings and seals, and to hold bearings and washers in place during assembly. Do not use grease.
11) Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
12) After overhaul, refill the transfer with new ATF.
13) When the all-mode 4WD transfer drain plug is removed, only some of the fluid is drained. Old all-mode 4WD transfer fluid will remain in torque converter and ATF cooling system. Always follow the procedures, MA-25, "Changing All-mode 4WD Transfer Fluid".

Wiring Diagrams and Trouble Diagnosis

NATF0003

When you read wiring diagrams, refer to the following:

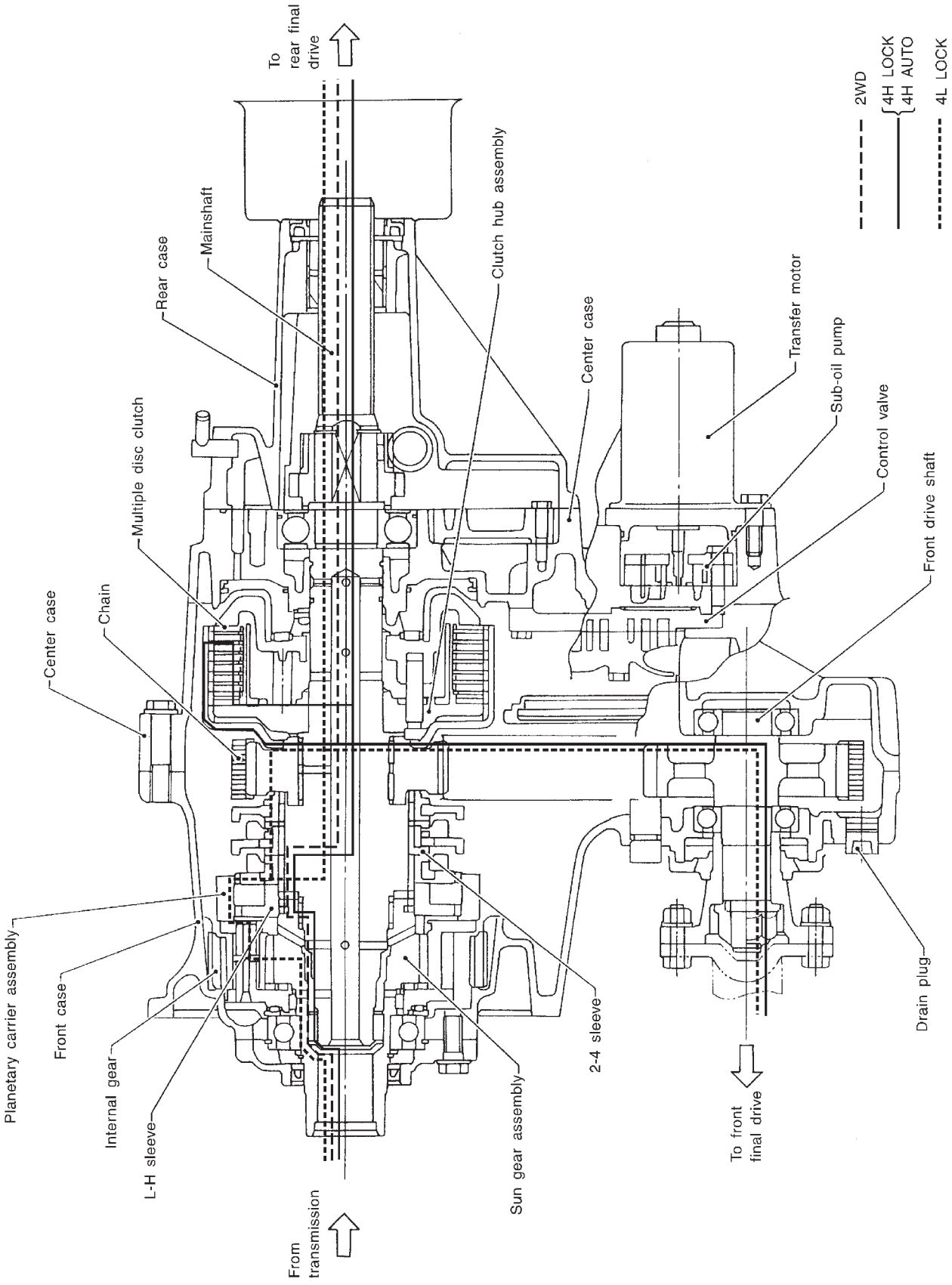
- GI-11, "HOW TO READ WIRING DIAGRAMS"
- EL-9, "POWER SUPPLY ROUTING"

When you perform trouble diagnosis, refer to the following:

- GI-35, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSIS"
- GI-24, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

Cross-sectional View

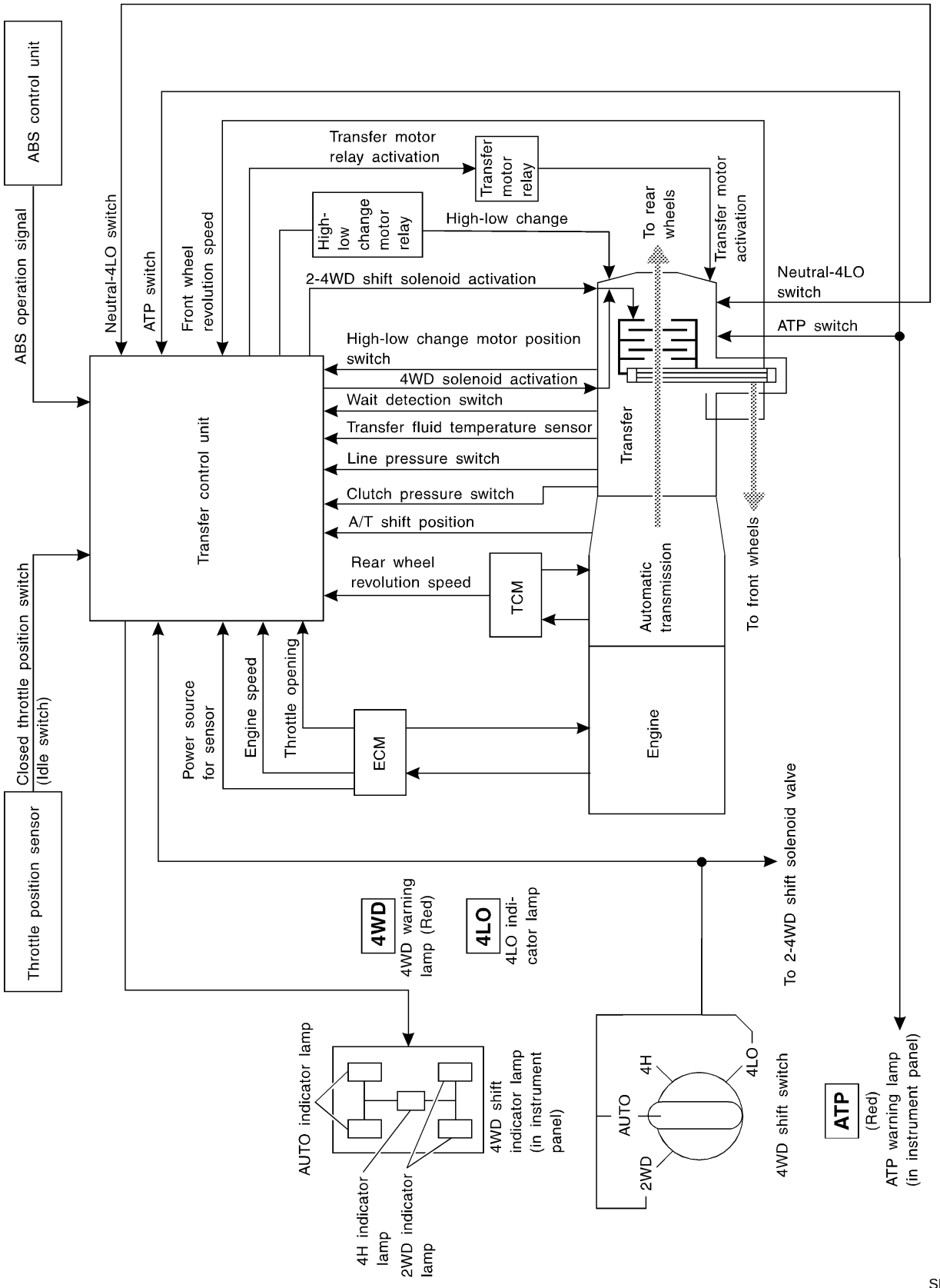
NATF0006



SMT953CA

Control System

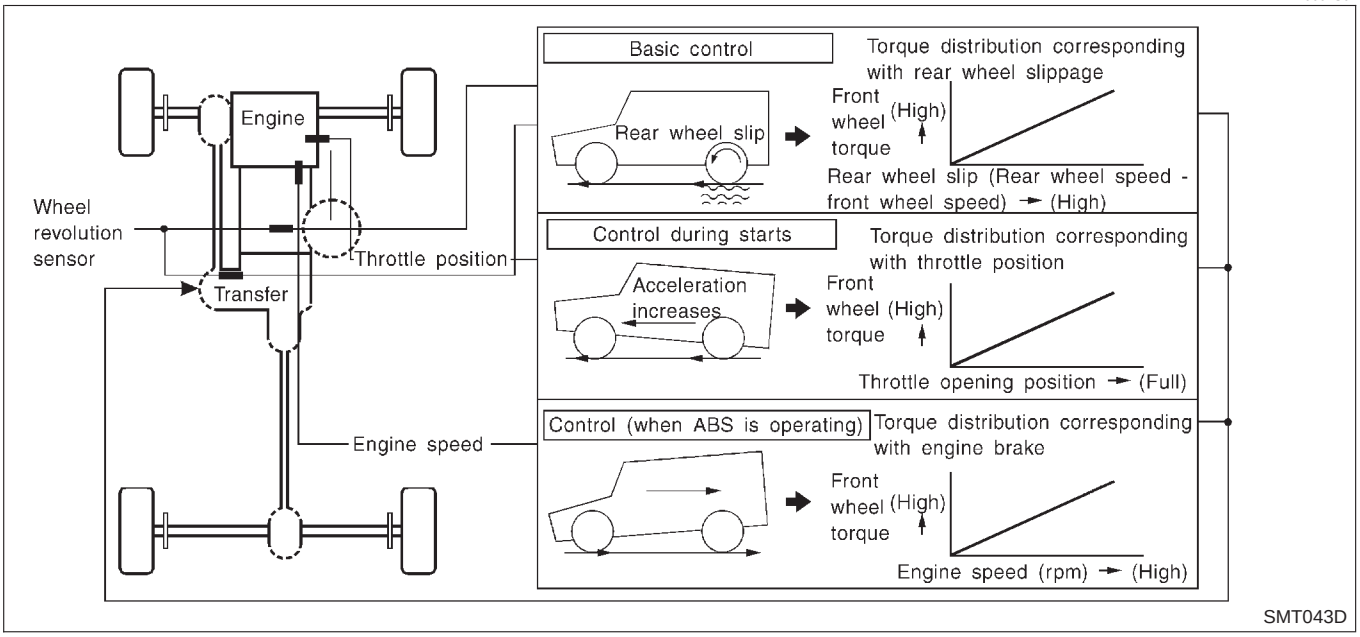
NATF0007



SMT961D

ALL-MODE 4WD TRANSFER BASIC CONTROL

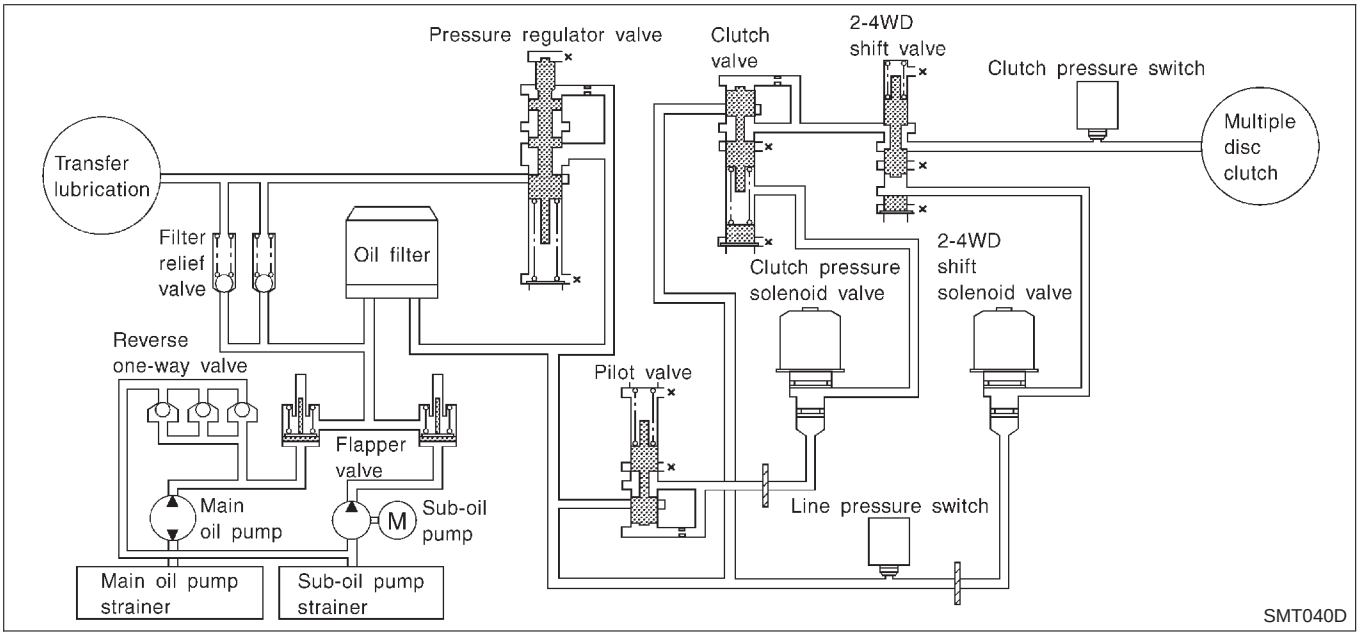
NATF0007S01



SMT043D

HYDRAULIC CONTROL CIRCUITS

NATF0007S02



SMT040D

OUTLINE

NATF0007S03

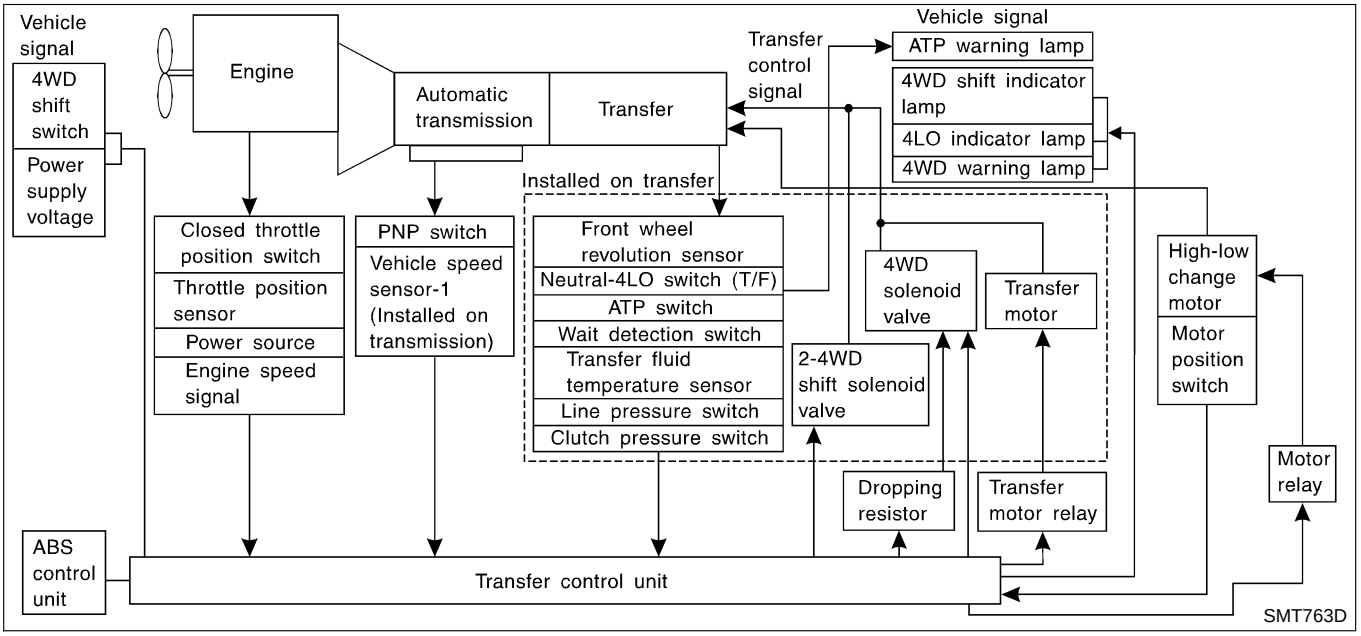
All-mode 4WD transfer is controlled by the transfer control unit and sensors.

If a malfunction occurs in the all-mode 4WD system, the 4WD warning lamp lights up to indicate the system malfunction. There are two ways to identify the cause of the malfunction.

1) Performing the self-diagnosis. (The 4WD warning lamp will indicate what kind of malfunction has occurred by flickering.)
2) Performing diagnosis using CONSULT-II.

CONTROL SYSTEM DIAGRAM

NATF0007S04



INDICATIONS OF 4WD WARNING LAMP

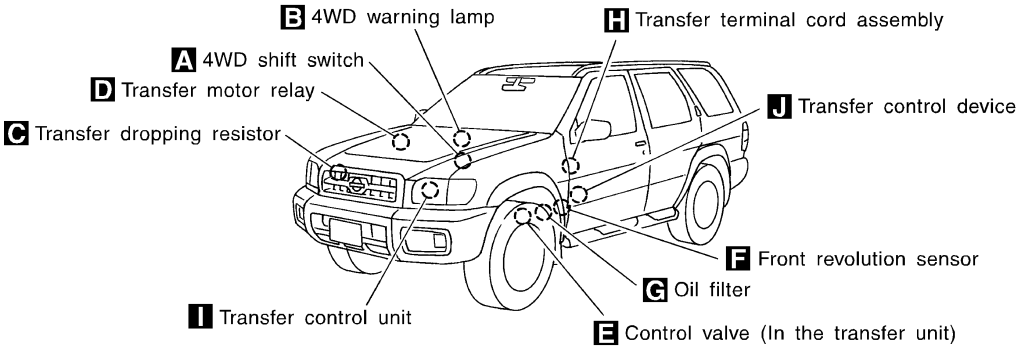
NATF0007S05

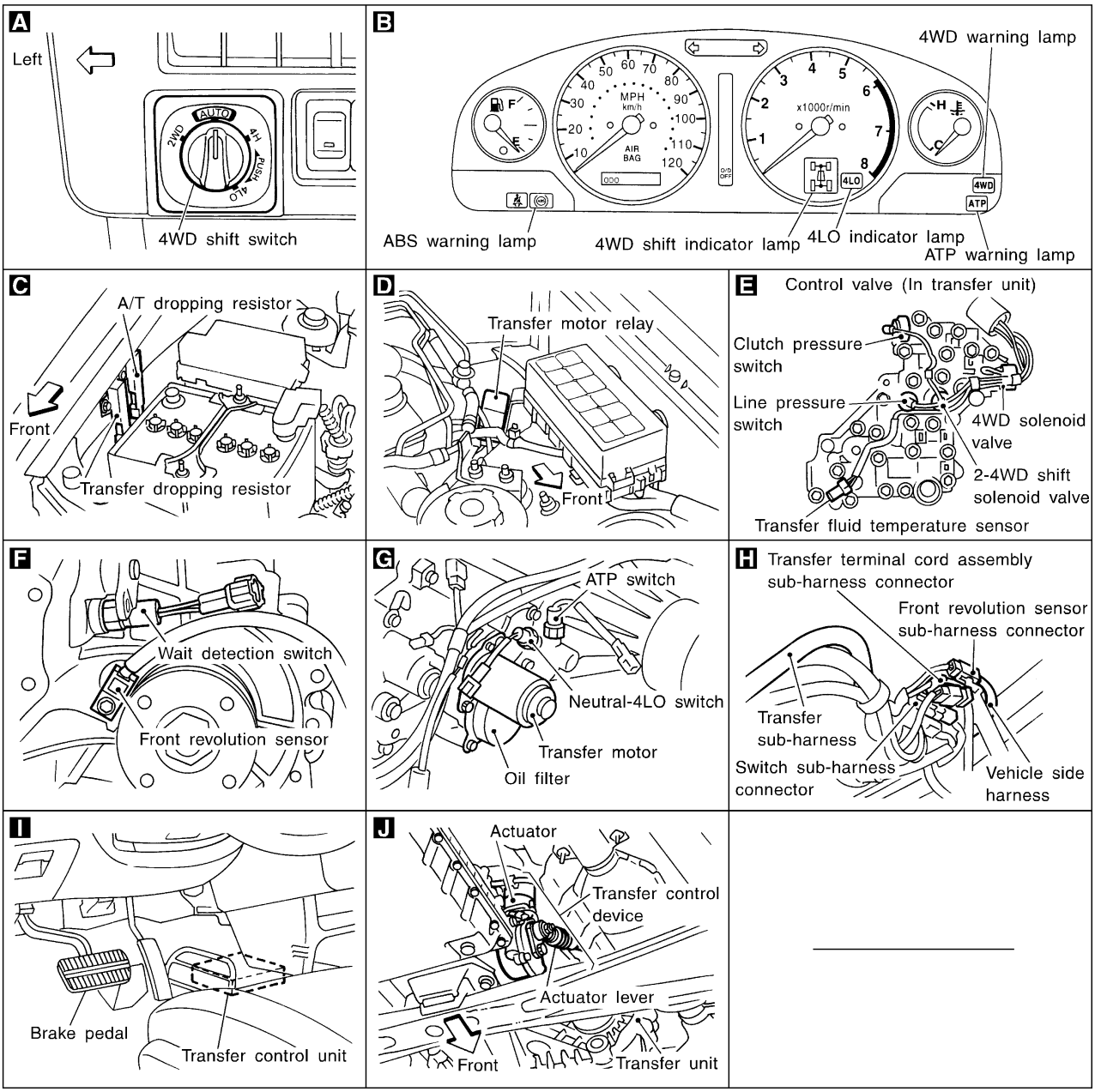
Condition	Content	4WD warning lamp
During self-diagnosis	Indicates the malfunction position by number of flickers.	Flickers at malfunction mode.
Lamp check*	Checks the lamp by turning ON during engine starting. After engine starts, it turns OFF if there are no malfunctions.	ON
Malfunction in 4WD system*	Turns ON to indicate malfunction. When ignition switch is turned to "OFF" or the malfunction is corrected, it turns OFF.	ON
When vehicle is driven with different diameters of front and rear tires	Flickers once every 2 seconds. Turns OFF when ignition switch is "OFF".	Flickers once every 2 seconds.
High fluid temperature in transfer unit	When fluid temperature is high or fluid temperature sensor circuit is shorted, it flickers twice every second. It turns OFF when fluid temperature becomes normal.	Flickers twice a second.
Other than above (System is normal.)	Lamp is OFF.	OFF

*: When 4WD warning lamp is ON, all the 4WD shift indicator lamps turn OFF.

Location of Electrical Parts

NATF0008





SMT992D

Description of Electrical Parts

NATF0067

TRANSFER MOTOR

NATF0067S01

1. The transfer motor drives the sub-oil pump to provide proper lubrication and oil pressure control when the vehicle is at standstill, during low-speed operations or is being driven in reverse.
2. The main oil pump is operated by the driving force of the mainshaft. In other words, sufficient oil pressure buildup does not occur when the vehicle is at standstill or during low-speed operations. While the vehicle is being driven in reverse, the main oil pump rotates in the reverse direction. Therefore the main oil pump does not discharge oil pressure. During any of the above vehicle operations, the transfer motor drives the sub-oil pump to compensate for insufficient oil pressure.
3. The transfer motor operates as follows:

1) The motor relay turns OFF in the 2WD mode.
2) The motor relay operates as described in the table below in modes other than the 2WD mode.

Table 1

PNP switch “R” position	VFF (Vehicle speed)	A/T position	Motor relay drive command
ON	—	R	ON
OFF	0 km/h	Positions other than the “P” or “N” positions	ON
	—	“P” or “N” position (See Table 2.)	—
	0 < VFF ≦ 30 km/h	—	ON
	30 < VFF < 35 km/h	—	HOLD
	35 km/h ≦ VFF	—	OFF

Table 2

A/T position	N-4L SW	4WD mode	Throttle position		
			0 - 0.07/8	0.07/8 - 1/8	1/8 - MAX
N	OFF	LOCK (4H)	ON	ON	ON
		Positions other than the LOCK position (2WD or AUTO)	See NOTE.	HOLD	ON
	ON	—	See NOTE.	HOLD	ON
P	—	—	See NOTE.	HOLD	ON

NOTE:
OFF (after 2.5 seconds have elapsed.)

4. 4WD shift switch, PNP switch, Neutral-4LO switch, vehicle speed sensor and throttle position sensor are used in conjunction with the transfer motor.

WAIT DETECTION SWITCH

NATF0067S02

1. The wait detection switch releases the “booming” torque produced in the propeller shaft. After the release of the “booming” torque, the wait detection switch helps provide the 4WD lock gear (clutch drum) shifts. A difference may occur between the operation (“4LO” to “4H” shift only) of the 4WD shift switch and actual drive mode. At this point, the wait detection switch senses an actual drive mode.
2. The wait detection switch operates as follows:
   4WD lock gear (clutch drum) locked: ON
   4WD lock gear (clutch drum) released: OFF
3. The wait detection switch senses an actual drive mode and the 4WD shift indicator lamp indicates the vehicle drive mode.

Description of Electrical Parts (Cont'd)

2-4WD SHIFT SOLENOID VALVE

NATF0067S03

The 2-4WD shift solenoid valve operates to apply oil pressure to the wet, multiplate clutch, depending on the drive mode. The driving force is transmitted to the front wheels through the clutch so the vehicle is set in the 4WD mode. Setting the vehicle in the 2WD mode requires no pressure buildup. In other words, pressure force applied to the wet, multiplate clutch becomes zero.

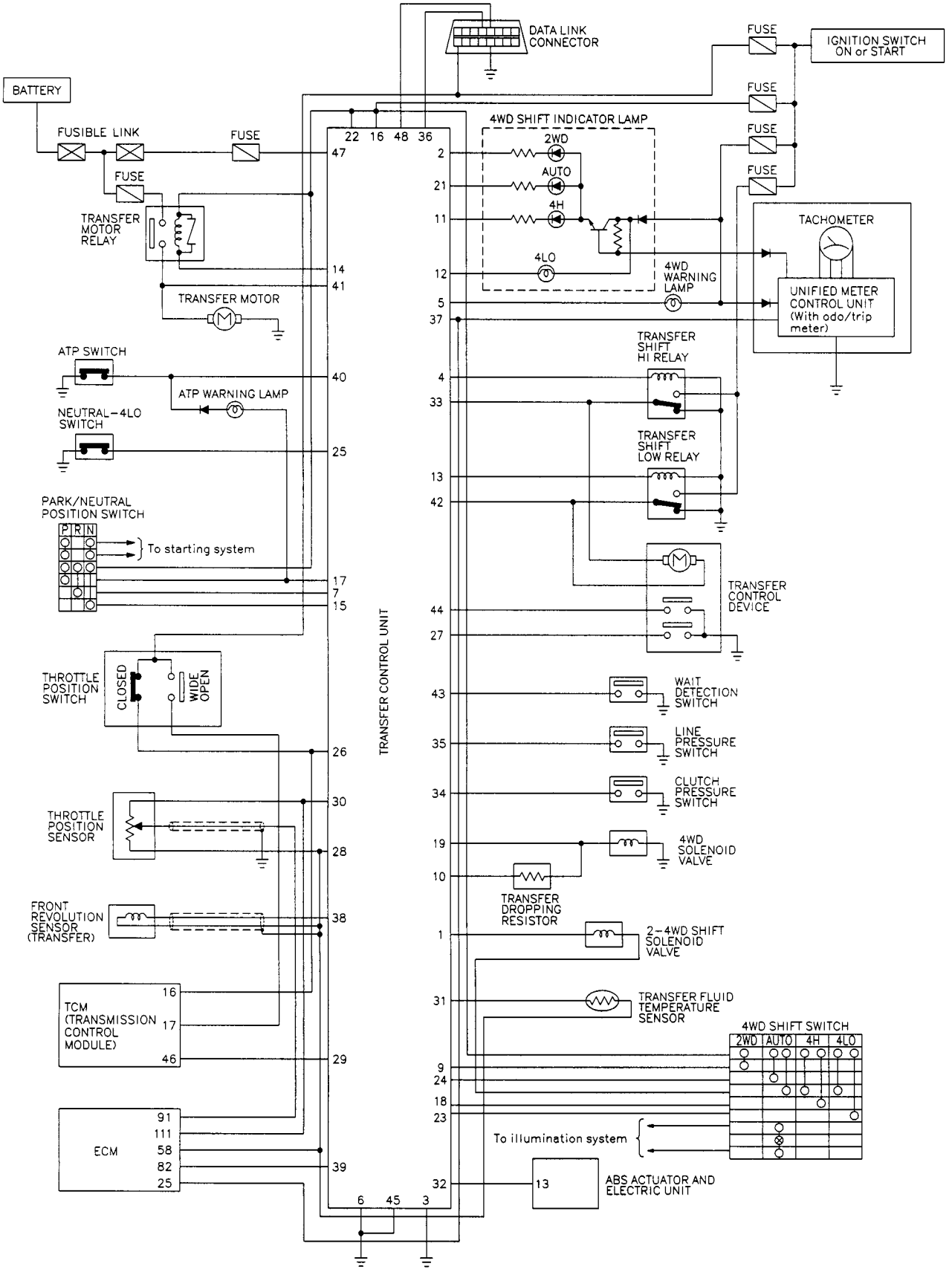
LINE PRESSURE SWITCH

NATF0067S04

1. With the transfer system design, control of the oil pressure provides the transmission of drive torque to the front wheels. The main pressure to control the oil pressure is referred to as the line pressure.
   The line pressure switch determines whether or not adequate line pressure has built up under different operating conditions.
2. The line pressure switch turns ON when line pressure is produced.
3. The line pressure switch senses line pressure abnormalities and turns the 4WD warning lamp ON.

Circuit Diagram for Quick Pinpoint Check

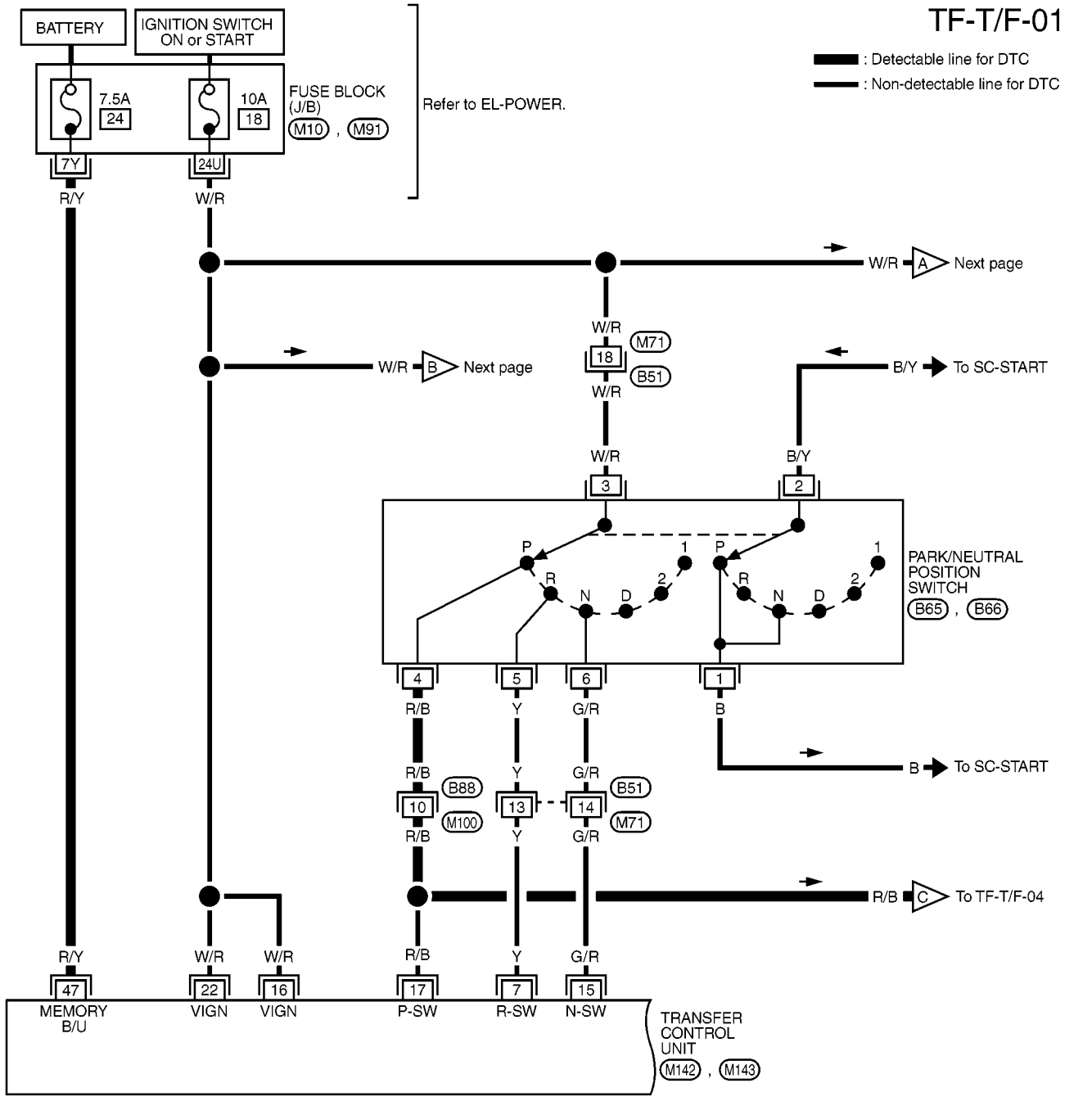
NATF0009

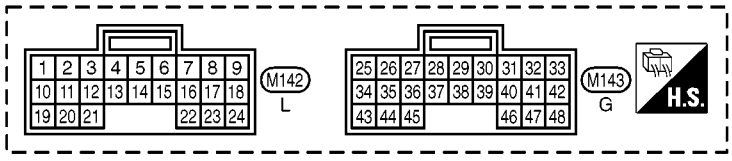


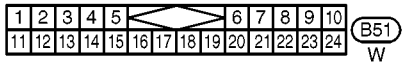
MTF069A

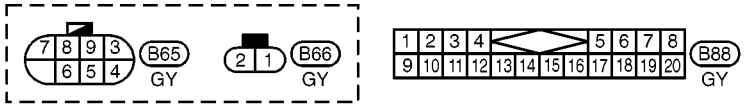
Wiring Diagram — TF —

NATF0010



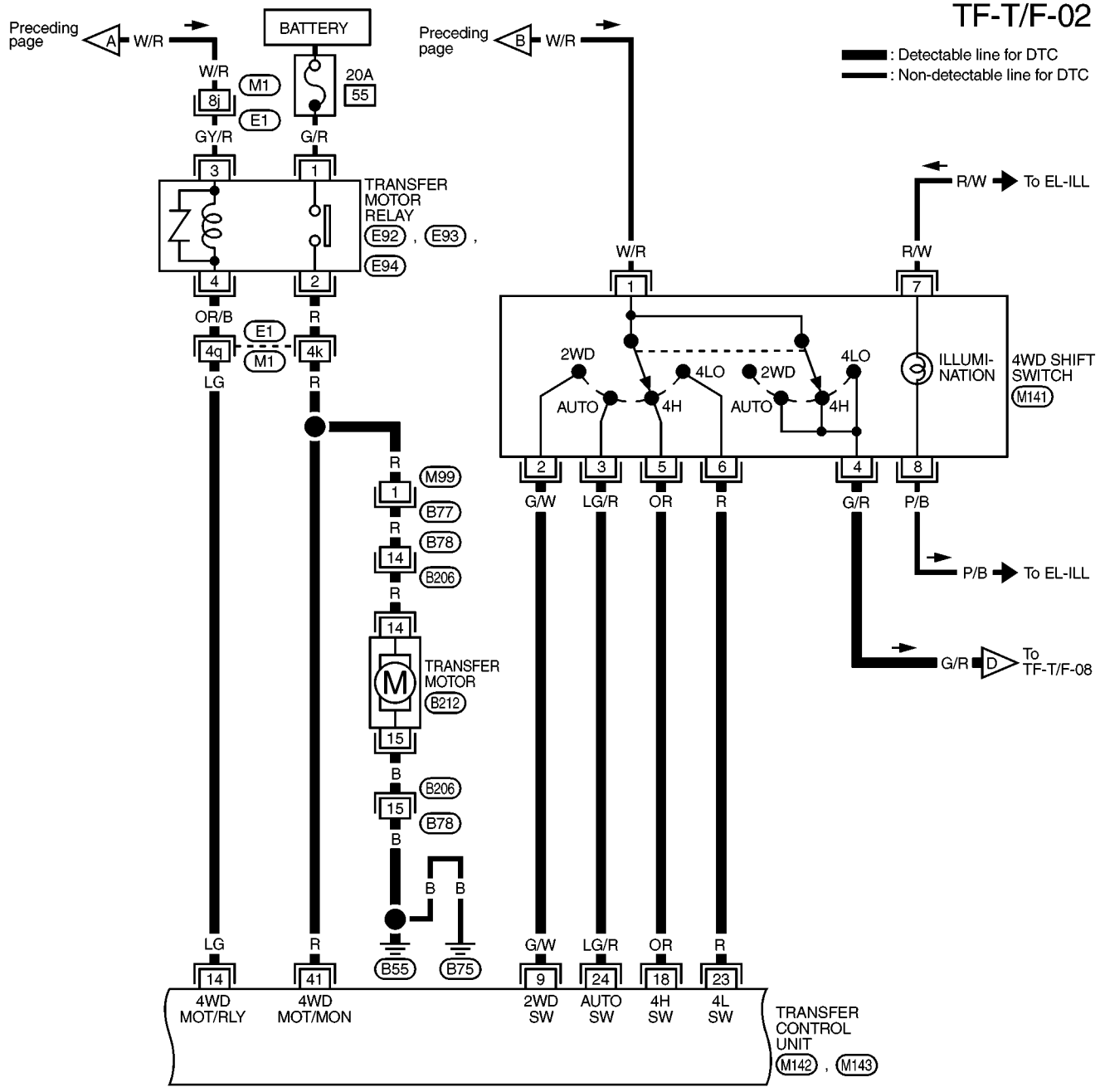






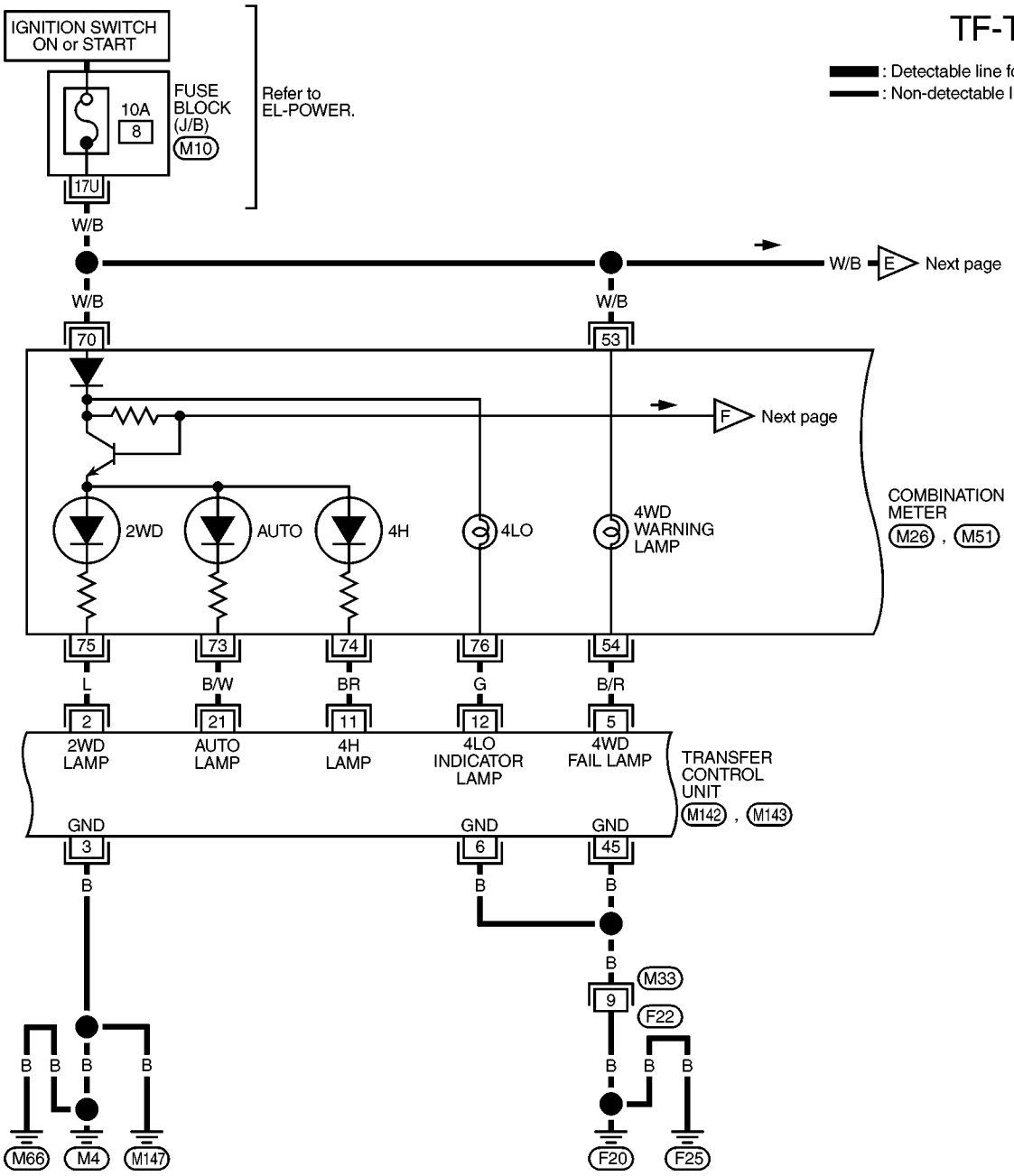
REFER TO THE FOLLOWING.
M10 , M91 -FUSE BLOCK-JUNCTION BOX (J/B)

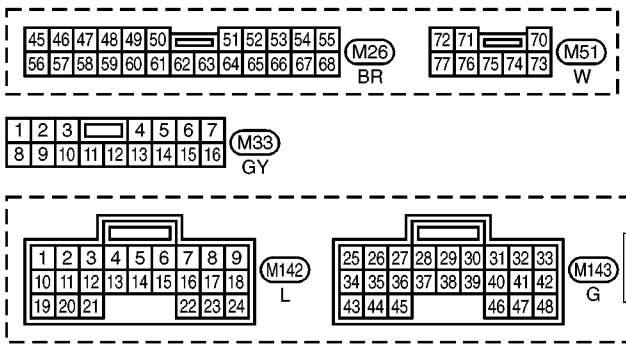
MTF061A


TF-T/F-02
: Detectable line for DTC
: Non-detectable line for DTC
Preceding page
A
W/R
BATTERY
20A
55
M1
E1
8j
GY/R
G/R
3
1
TRANSFER MOTOR RELAY
E92
E93
E94
4
2
OR/B
R
4q
4k
LG
R
M99
B77
B78
14
B206
TRANSFER MOTOR
B212
15
B55
B75
B
Preceding page
B
W/R
R/W
To EL-ILL
7
2WD
AUTO
4H
4LO
ILLUMI-NATION
4WD SHIFT SWITCH
M141
2
3
5
6
4
8
G/W
LG/R
OR
R
G/R
P/B
P/B
To EL-ILL
G/R
D
To TF-T/F-08
LG
R
G/W
LG/R
OR
R
14
41
9
24
18
23
4WD MOT/RLY
4WD MOT/MON
2WD SW
AUTO SW
4H SW
4L SW
TRANSFER CONTROL UNIT
M142
M143
M141
W
M142
L
M143
G
H.S.
E92
E93
E94
W
W
G
B77
W
B206
GY
B212
B
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

MTF077A

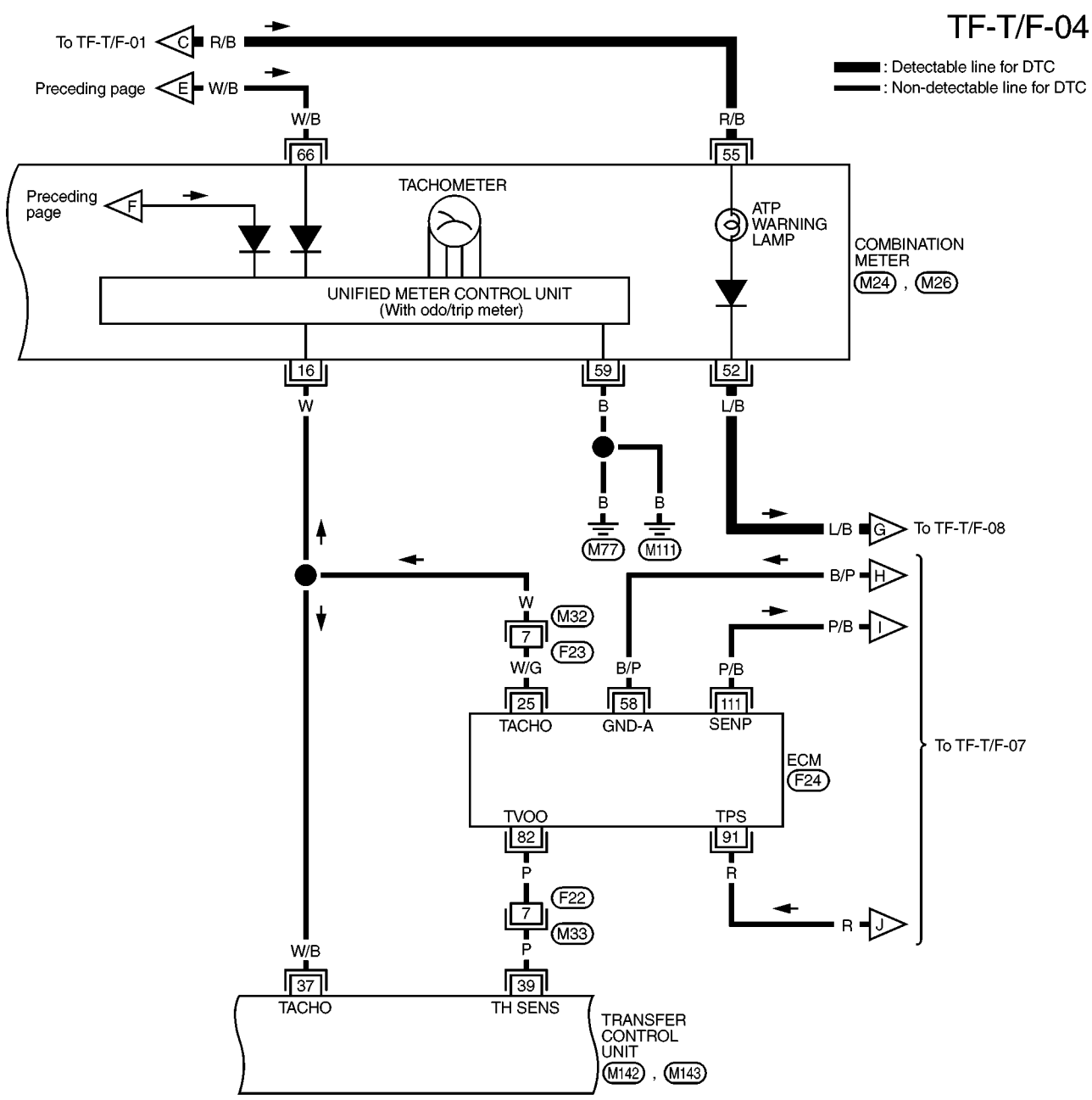
Wiring Diagram — TF — (Cont'd)

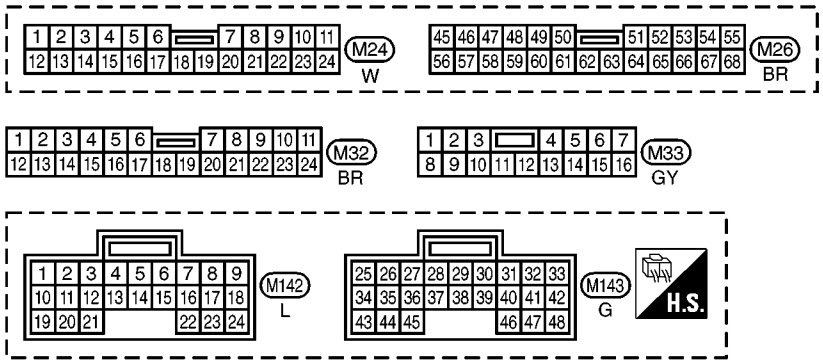




REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

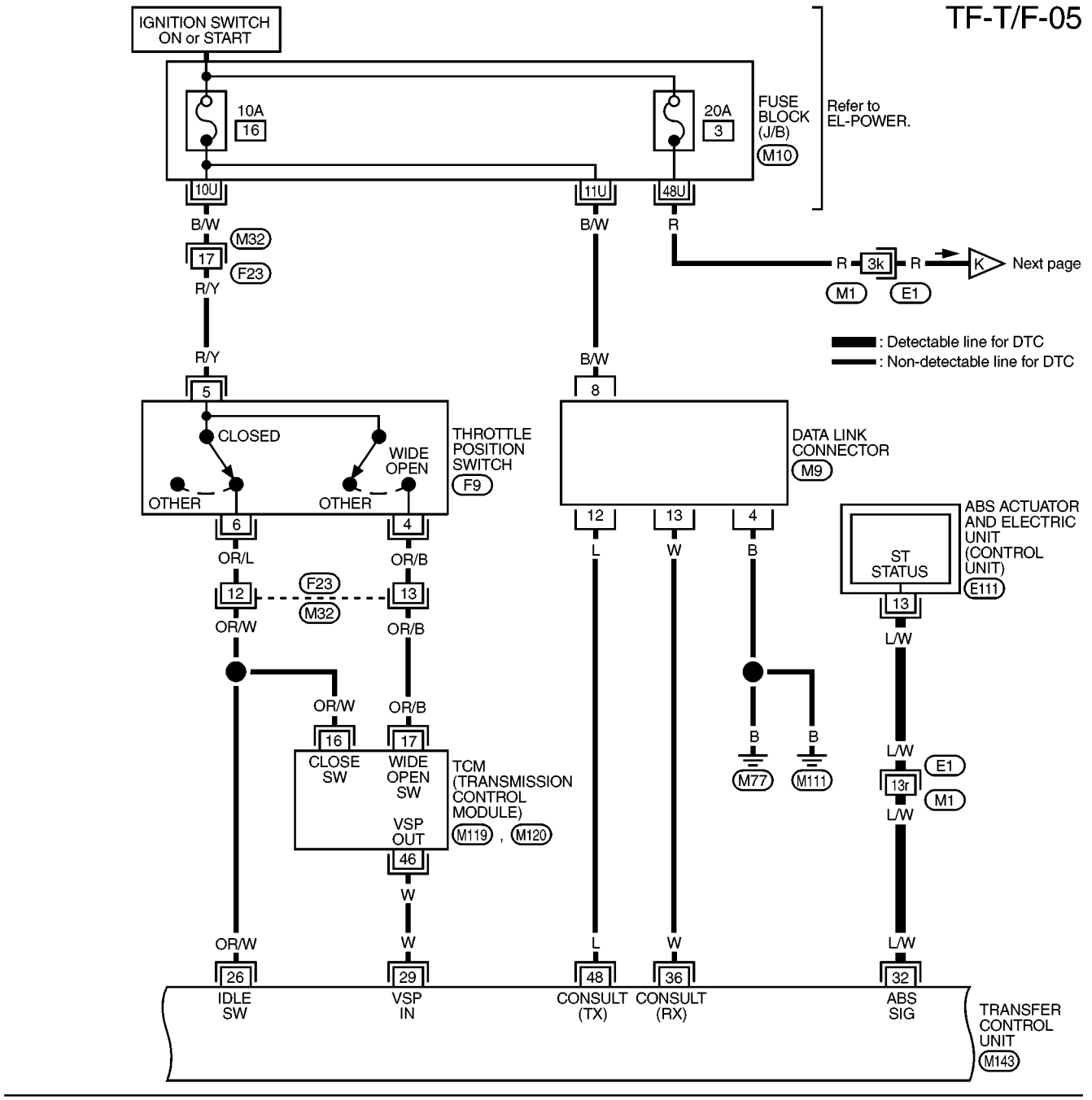
MTF070A

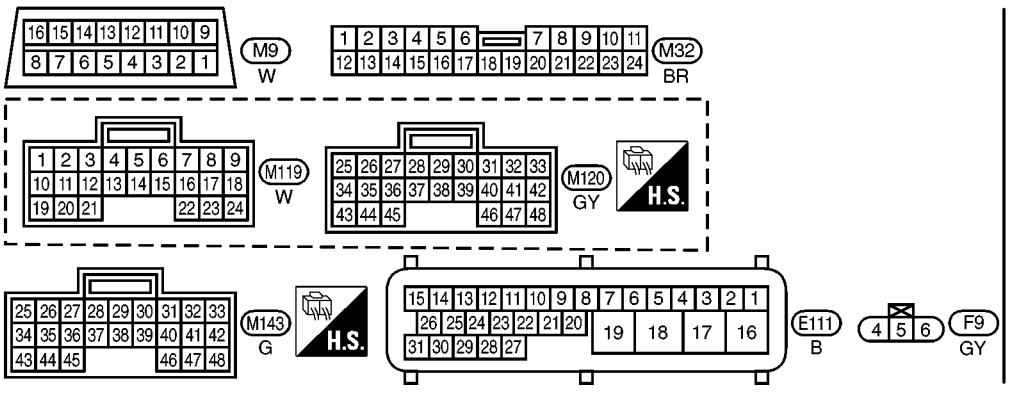




REFER TO THE FOLLOWING.
F24 -ELECTRICAL UNITS

MTF071A



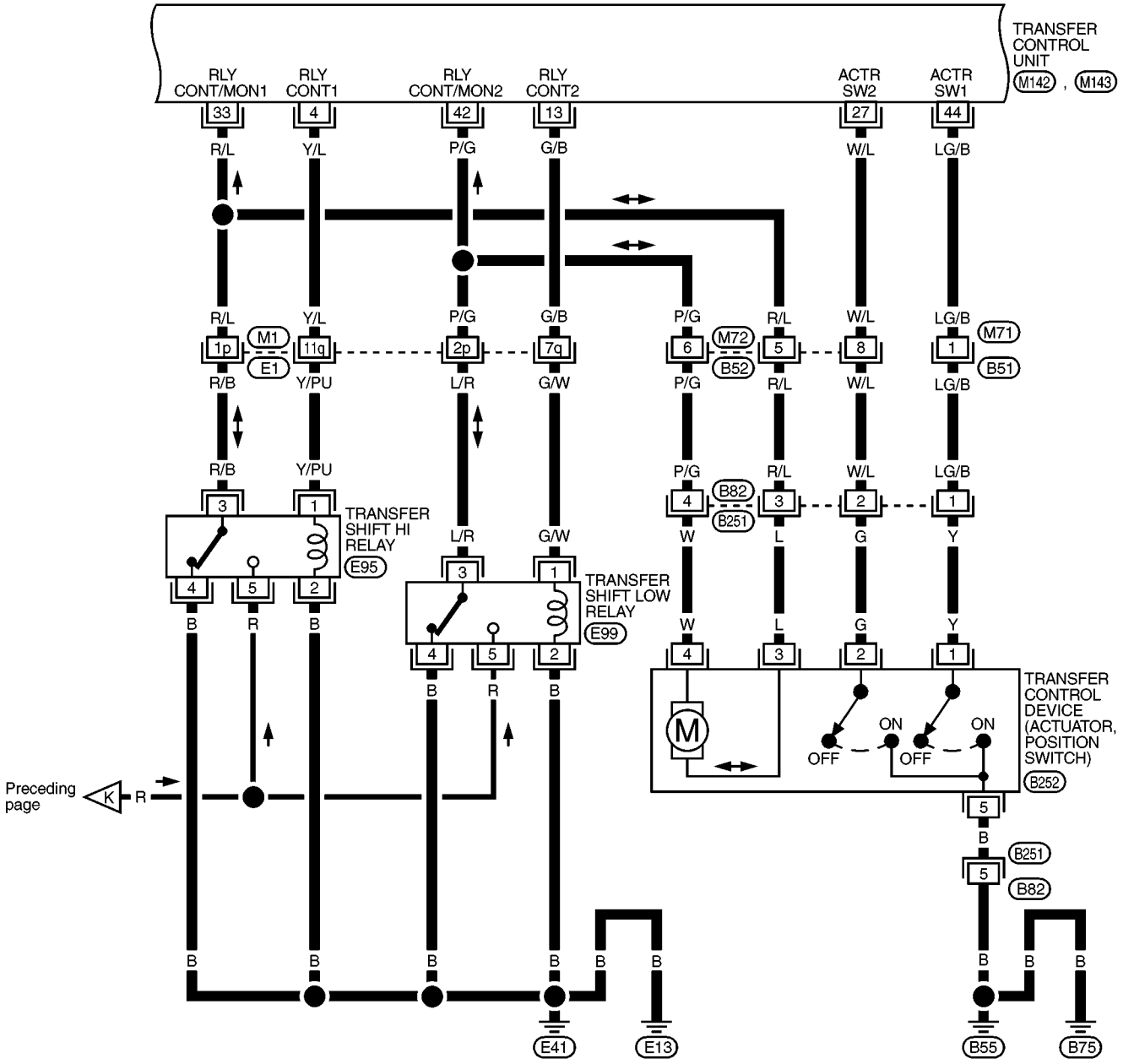


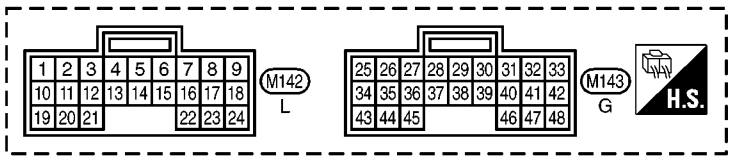
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK- JUNCTION BOX (J/B)

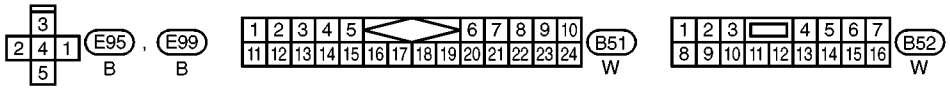
MTF072A

TF-T/F-06

: Detectable line for DTC
: Non-detectable line for DTC







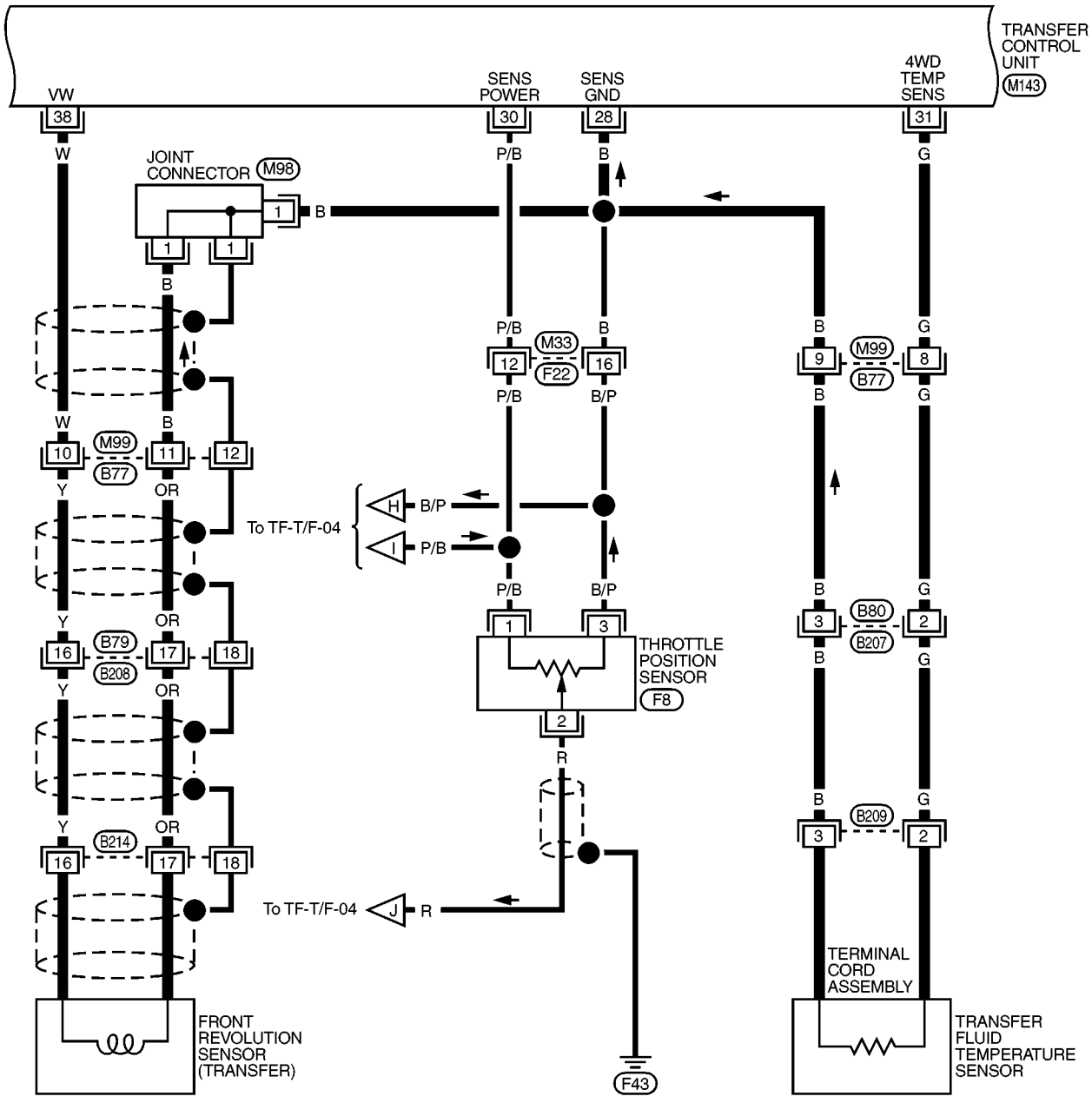


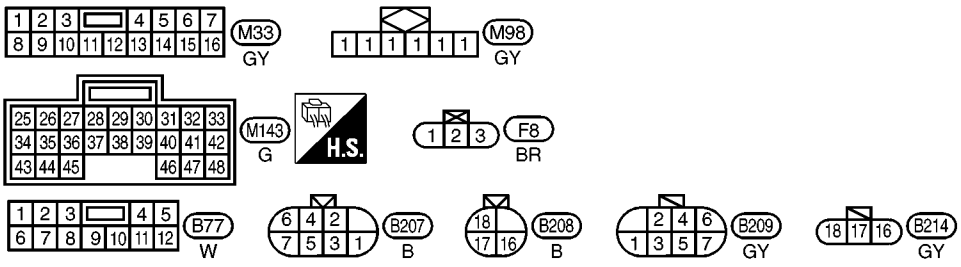
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

MTF073A

: Detectable line for DTC
: Non-detectable line for DTC

TF-T/F-07

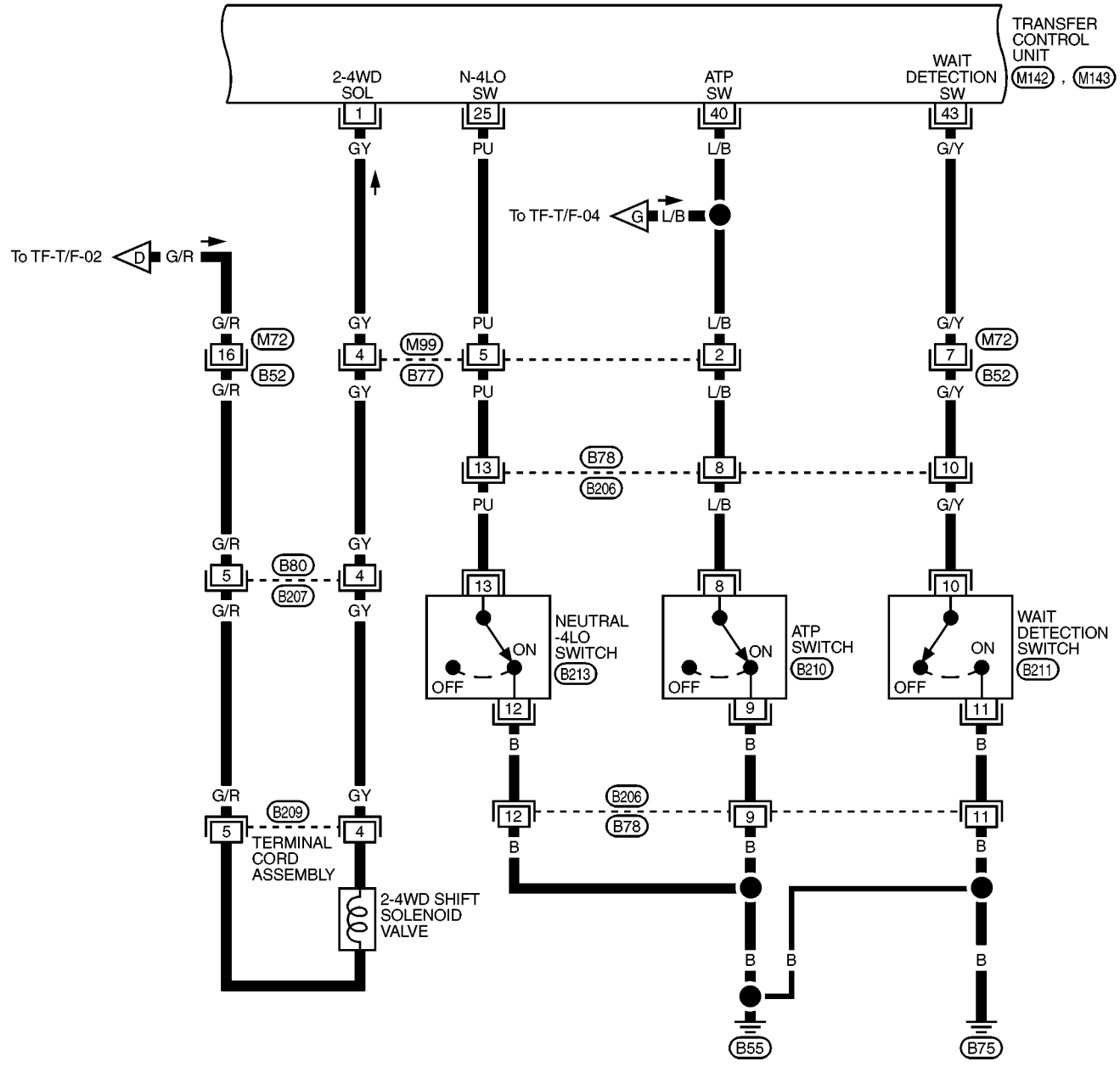


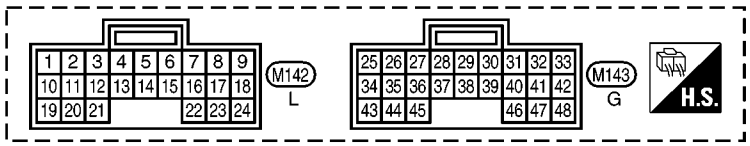


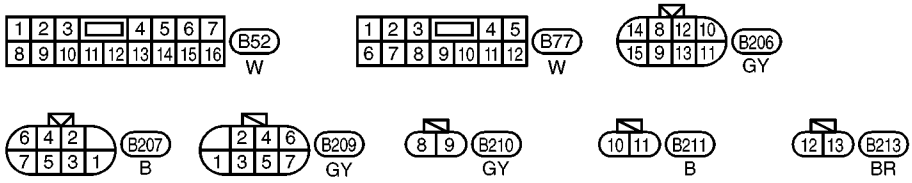
MTF074A

TF-T/F-08

: Detectable line for DTC
: Non-detectable line for DTC

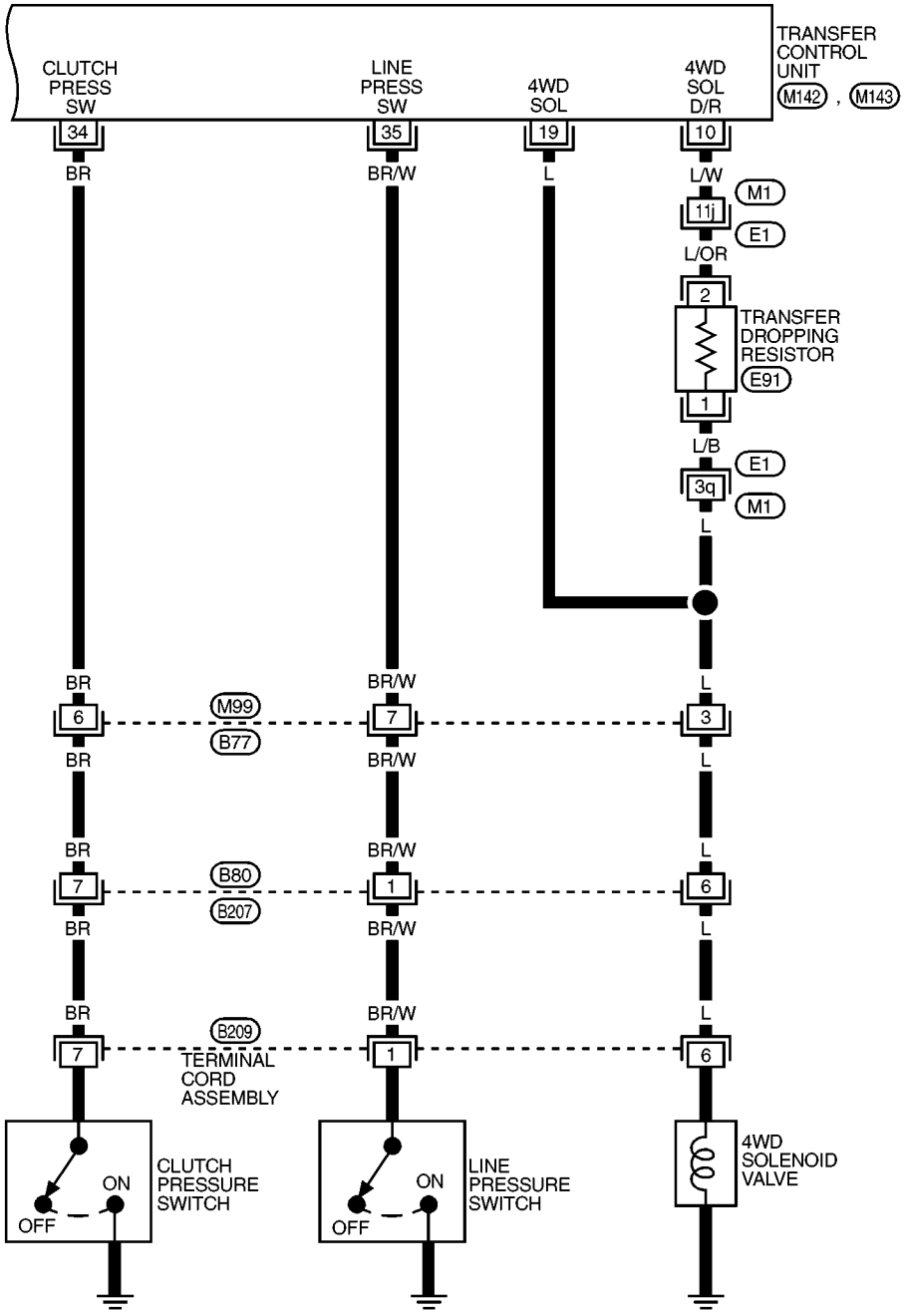


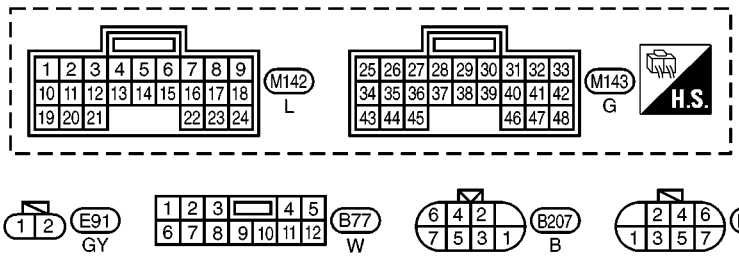




MTF075A

TF-T/F-09





REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

MTF068A

Trouble Diagnosis without CONSULT-II

NATF0011

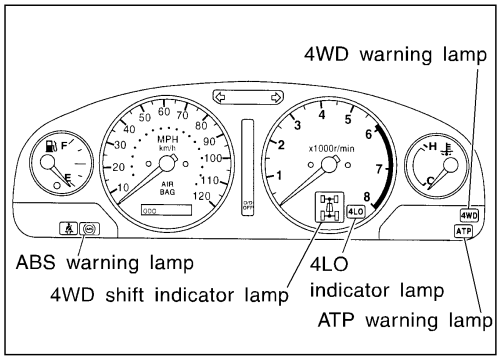
DESCRIPTION

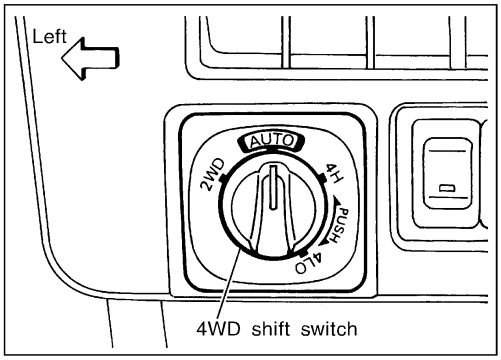
NATF0011S01

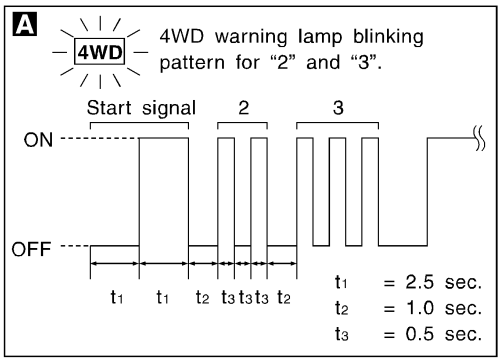
If the engine starts when there is something wrong with the all-mode 4WD system, the 4WD warning lamp turns ON or flickers in the combination meter. When the system functions properly, the warning lamp turns ON when the ignition switch is turned to “ON”, and it turns OFF after engine starts.
To locate the cause of a problem, start the self-diagnosis function. The 4WD warning lamp in the combination meter will indicate the problem area by flickering according to the self-diagnostic results. As for the details of the 4WD warning lamp flickering patterns, refer to TF-61.

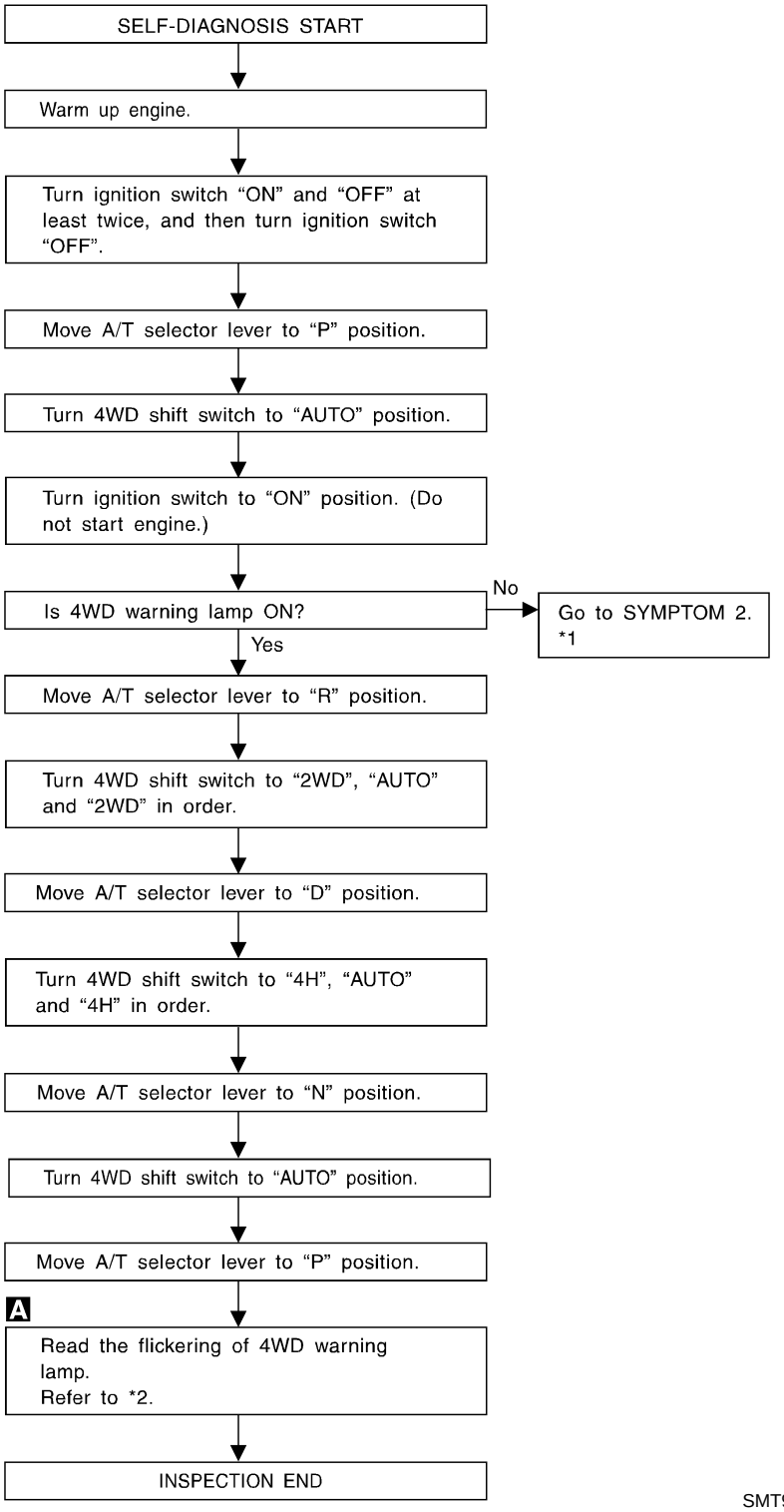
SELF-DIAGNOSTIC PROCEDURE

NATF0011S02









SMT993D

*1: TF-131

*2: TF-61

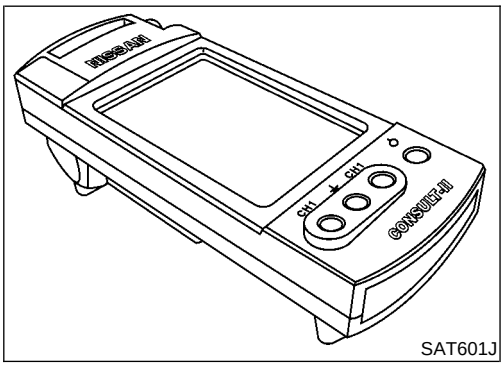
INDICATIONS OF 4WD WARNING LAMP

NATF0011S03

Flickering pattern or flickering condition	Malfunction	Check items
1	Front revolution sensor circuit is shorted or open.	Revolution sensor (front) circuit, TF-92.
2	Rear revolution sensor circuit is shorted or open.	Revolution sensor (rear) [Refer to AT-111, "DTC P0720 Vehicle Speed Sensor·A/T (Revolution sensor)".]
3	4WD solenoid valve circuit is shorted or open.	4WD solenoid valve circuit, TF-95.
4	2-4WD shift solenoid valve circuit is shorted or 2WD switch of 4WD shift switch is shorted.	2-4WD shift solenoid valve circuit or 4WD shift switch circuit, TF-97.
5	Transfer motor relay circuit is shorted or open.	Transfer motor relay circuit, TF-101.
8	Power supply voltage of throttle position sensor is improper. Or A/D converter of transfer control unit functions improperly.	Throttle position sensor (Refer to AT-176, "DTC P1705 Throttle Position Sensor".)
9	Transfer fluid temperature sensor circuit is open.	Transfer fluid temperature sensor circuit, TF-104.
10	Neutral-4LO switch circuit is shorted or open.	Neutral-4LO switch circuit, TF-107.
11	2-4WD shift solenoid valve circuit, 2WD switch of 4WD shift switch circuit or clutch pressure switch circuit is shorted or open.	2-4WD shift solenoid valve circuit, 4WD shift switch circuit or clutch pressure switch circuit, TF-97, 111.
12	Line pressure switch circuit is shorted or open.	Line pressure switch circuit, TF-114.
13	Engine speed signal circuit is shorted or open.	Engine speed signal (Refer to AT-116, "DTC P0725 Engine Speed Signal".)
14	Throttle position sensor circuit is shorted or open.	Throttle position sensor (Refer to AT-176, "DTC P1705 Throttle Position Sensor".)
15	Failure in power supply circuit of transfer control unit.	Power supply of transfer control unit
16	4WD shift switch circuit is shorted.	4WD shift switch circuit, TF-97.
17	ABS operation signal circuit is shorted.	ABS operation signal circuit, TF-117.
18	ATP switch, wait detection switch or neutral-4LO switch circuit is shorted or open.	ATP switch, wait detection switch or neutral-4LO switch circuit*, TF-107.
19	Transfer control device actuator motor is faulty. (Abnormalities are detected when actuator motor fails to operate while shifting from "4H" to "4LO" or vice versa.)	Actuator motor and motor circuit, TF-146, 120.
20	Transfer control device actuator motor arm position sensing switch is faulty.	Actuator motor arm position sensing switch and sensing switch circuit, TF-146, 123.
21	Transfer control device actuator circuit is faulty (Abnormalities are detected when motor relay circuit is open/shorted or relay monitor circuit is open/shorted.)	Actuator motor, actuator motor arm position sensing switch and their associated circuits, TF-145, 146 and 125.
Repeats flickering every 2 to 5 sec.	Circuits that the self-diagnosis covers have no malfunction.	—
Repeats flickering every 0.25 sec.	• Power supply failure of memory back-up. • Battery is disconnected for a long time. • Battery performance is poor.	Data erase/display circuit, TF-119.

Flickering pattern or flickering condition	Malfunction	Check items
No flickering	PNP switch or 4WD shift switch circuit is shorted or open.	PNP switch (Refer to AT-99, "DTC P0705 Park/Neutral Position Switch".) or 4WD shift switch circuit, TF-97.

*: If revolution sensor malfunction is simultaneously detected, check revolution sensor first.



SAT601J

Trouble Diagnosis with CONSULT-II

NATF0012

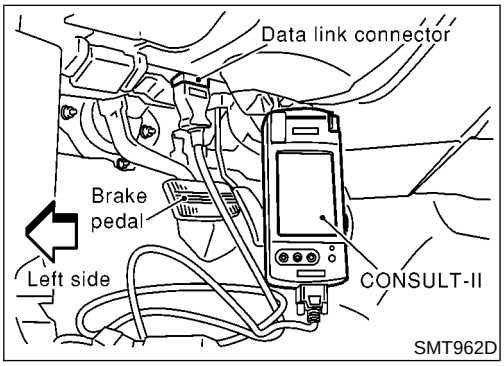
SELF-DIAGNOSIS

NATF0012S01

CONSULT-II Setting Procedure

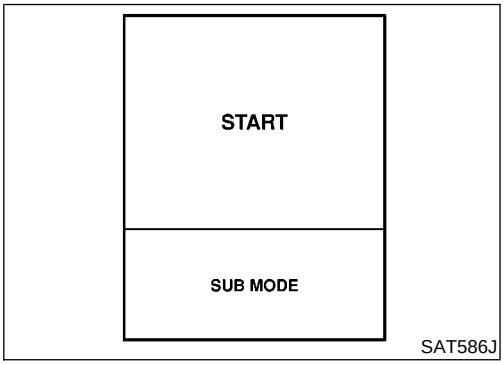
NATF0012S0101

1. Turn ignition switch to "OFF" position.



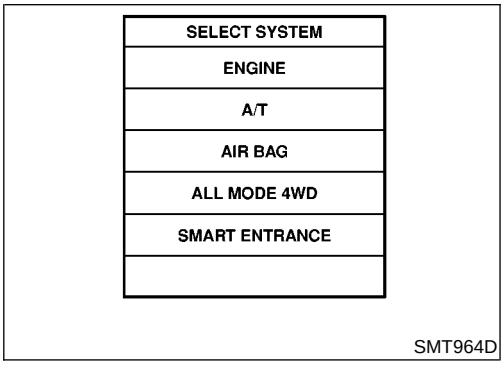
SMT962D

2. Connect CONSULT-II to data link connector which is located in instrument lower panel on driver side.



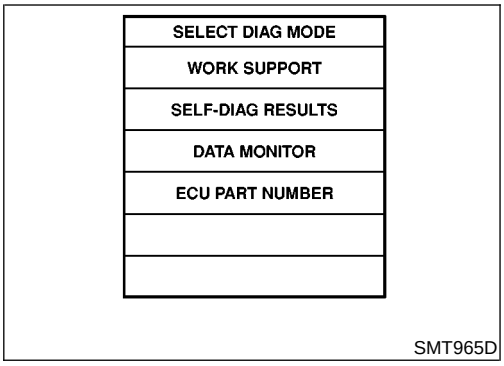
SAT586J

3. Start engine.
4. On CONSULT-II screen, touch "START".

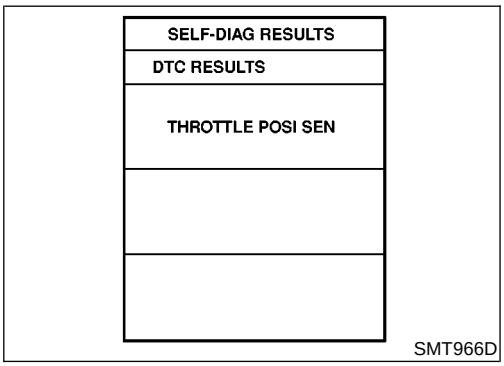


SMT964D

5. Touch "ALL MODE 4WD" on SELECT SYSTEM screen.



6. Touch "SELF-DIAG RESULTS" on SELECT DIAG MODE screen.



7. Self-diagnostic results are displayed.

SELF-DIAGNOSTIC ITEMS

NATF0012S02

Detected items (Screen terms for CONSULT-II, "SELF-DIAG RESULT" mode)	Malfunction is detected when...	Check items
Revolution sensor (front) (Note 3) (VHCL SPEED SEN·FR)	• Front revolution sensor (installed on T/F) signal is not input due to open circuit. • Improper signal is input while driving.	Revolution sensor (front) circuit, TF-92.
Revolution sensor (rear) (VHCL SPEED SEN·RR)	• Signal from vehicle speed sensor 1 (installed on A/T) is not input due to open circuit. • Improper signal is input while driving.	Revolution sensor (rear) [Refer to AT-111, "DTC P0720 Vehicle Speed Sensor·A/T (Revolution sensor)".]
4WD solenoid valve (DUTY SOLENOID)	• Proper voltage is not applied to solenoid valve due to open or short circuit.	4WD solenoid valve, TF-95.
2-4WD shift solenoid valve (2-4WD SOLENOID)		2-4WD shift solenoid valve or 4WD shift switch circuit, TF-97.
Transfer motor relay (MOTOR RELAY)	• Motor does not operate properly due to open or short circuit in transfer motor or motor relay.	Transfer motor relay circuit, TF-101.
Transfer fluid temperature sensor (FLUID TEMP SENSOR)	• Signal voltage from fluid temperature sensor is abnormally high (T/F fluid temperature is abnormally low) while driving.	Transfer fluid temperature sensor circuit, TF-104.
Neutral-4LO switch (N POSI SW TF)	• Improper signal is input while driving.	Neutral-4LO switch, TF-107.
Clutch pressure (CLUTCH PRESSURE)	• Improper signal is input due to open or short circuit. • Malfunction occurs in clutch pressure hydraulic circuit.	Clutch pressure switch circuit (*1), TF-111.
Line pressure (LINE PRESSURE)	• Improper signal is input due to open or short circuit. • Malfunction occurs in line pressure hydraulic circuit.	Line pressure switch circuit (*1), TF-114.
Engine speed signal (Note 1) (ENGINE SPEED SIG)	• Engine speed is abnormally low while driving.	Engine speed signal (Refer to AT-116, "DTC P0725 Engine Speed Signal".)

Detected items (Screen terms for CONSULT-II, "SELF-DIAG RESULT" mode)	Malfunction is detected when...	Check items
Throttle position sensor (THRTL POSI SEN)	• Signal voltage from throttle position sensor is abnormally high. • Signal voltage from throttle position sensor is abnormally low when closed throttle position switch is OFF.	Throttle position sensor (Refer to AT-176, "DTC P1705 Throttle Position Sensor".)
Transfer control unit (ADC) C/U (ADC)/THRTL SEN	• Power supply voltage for throttle position sensor is improper or A/D converter system of transfer control unit is faulty.	Throttle position sensor (Refer to AT-176, "DTC P1705 Throttle Position Sensor".)
Battery voltage (Note 1) (BATTERY VOLTAGE)	• Power supply voltage for transfer control unit is abnormally low while driving.	Power supply circuit (Refer to AT-96, "Wiring Diagram — AT — MAIN".)
4WD shift switch (4WD MODE SW)	• More than two switch inputs are simultaneously detected due to short circuit of 4WD shift switch.	4WD shift switch circuit, TF-97.
ABS operation signal (Note 4) (ABS OPER SIGNAL)	• When a malfunction signal due to disconnection or shorting is detected. • When a defect signal is entered from the ABS control unit.	ABS operation signal circuit, TF-117.
Wait detection switch (Note 2) (WAIT DETECT SWITCH)	• Improper signal is input due to open or short circuit.	ATP switch, wait detection switch and neutral-4LO switch circuits (*2), TF-107.
Shift actuator abnormal (SHIFT ACT)	Transfer control device actuator motor is faulty. (Abnormalities are detected when actuator motor fails to operate while shifting from "4H" to "4LO" or vice versa.)	Actuator motor and motor circuit, TF-146, 120.
Shift actuator position switch abnormal (SHIFT ACT P/S)	Transfer control device actuator motor arm position sensing switch is faulty.	Actuator motor arm position sensing switch and sensing switch circuit, TF-146, 123.
Shift actuator circuit abnormal (SHIFT ACT CIR)	Transfer control device actuator circuit is faulty (Abnormalities are detected when motor relay circuit is open/shorted or relay monitor circuit is open/shorted.)	Actuator motor, actuator motor arm position sensing switch and their associated circuits, TF-145, 146 and 125.
Memory power supply stop	• Due to removal of battery which cuts off power supply to transfer control unit, self-diagnosis memory function is suspended.	Data erase/display circuit, TF-119.
Transfer control unit (RAM) [CONTROL UNIT (RAM)]	• Failure is detected in the memory (RAM) system of transfer control unit.	
Transfer control unit (ROM) [CONTROL UNIT (ROM)]	• Failure is detected in the memory (ROM) system of transfer control unit.	
Transfer control unit (EEPROM) [CONTROL UNIT (EEPROM)]	• Failure is detected in the memory (EEPROM) system of transfer control unit.	

Note 1: When a malfunction occurs, it is only displayed and not stored in the memory.

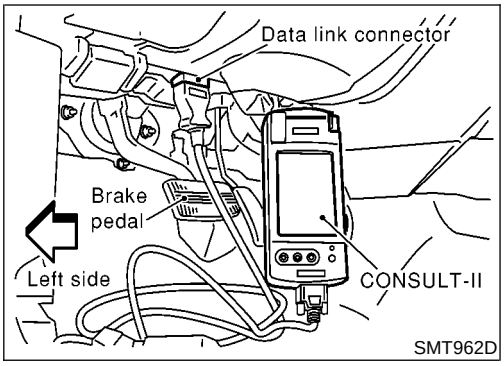
Note 2: When the wait detection switch has been properly fixed, malfunction information is erased from the memory.

Note 3: If 4WD shift switch is left between 4H and 4LO for a while, this indication may be displayed.

(*1): If the malfunction is detected only while driving in reverse, check the continuity of "R" position on A/T PNP switch. When there is nothing wrong with the electrical system, check the hydraulic system.

(*2): If a revolution sensor malfunction is detected at the same time, check the revolution sensor circuit first.

Note 4: When this malfunction is detected with the ABS warning lamp off, first check for disconnection or shorting in the harness between the transfer control unit and the ABS control unit.



SMT962D

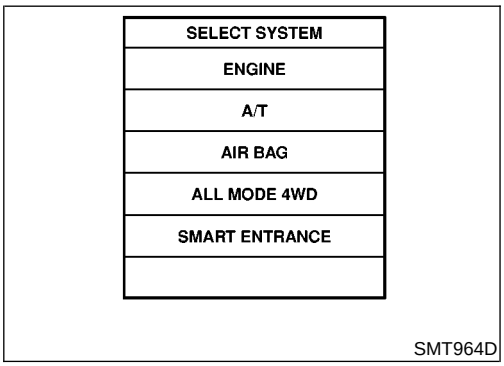
DATA MONITOR

NATF0012S03

CONSULT-II Setting Procedure

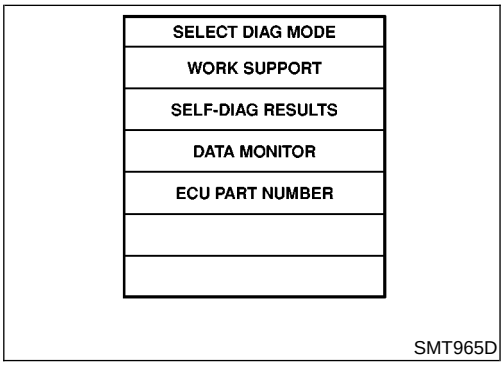
NATF0012S0301

1. Turn ignition switch to "OFF" position.
2. Connect CONSULT-II to data link connector, which is located in instrument lower panel on driver side.
3. Turn ignition switch to "ON" position.
4. Touch "START".



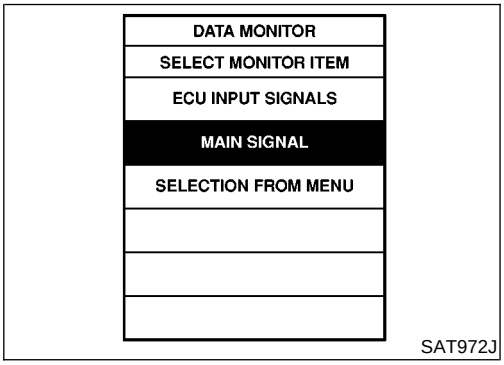
SMT964D

5. Touch "ALL MODE 4WD".



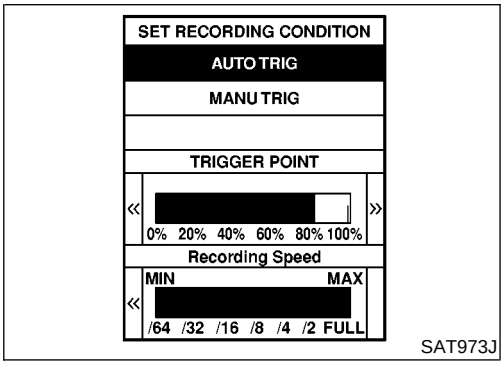
SMT965D

6. Touch "DATA MONITOR".



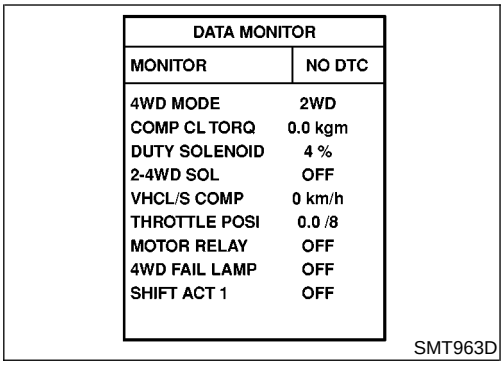
SAT972J

7. Touch "ECU INPUT SIGNALS" or "MAIN SIGNALS".
8. Select "Numerical Display", "Bar Chart Display" or "Line Graph Display".
9. Touch "SETTING" to set record conditions.



SAT973J

10. Touch "AUTO TRIG" or "MANU TRIG".
11. Return to "SELECT MONITOR ITEM" on "DATA MONITOR" screen and touch "START".



12. Monitored data are displayed.

DATA MONITOR ITEMS

NATF0012S04

◯: Standard ▼: Option

Item [Unit]	Monitor item			Remarks
	ECU input signals	Main signals	Item menu selection	
Revolution sensor-front [km/h (MPH)]	◯		▼	Revolution sensor installed on T/F
Revolution sensor-rear [km/h (MPH)]	◯		▼	Vehicle speed sensor·A/T
Engine speed [rpm]	◯		▼	
Throttle position sensor [V]	◯		▼	
Transfer fluid temperature sensor [V]	◯		▼	
Battery voltage [V]	◯		▼	
2WD switch [ON-OFF]	◯		▼	2WD switch of 4WD shift switch
AUTO switch [ON-OFF]	◯		▼	AUTO switch of 4WD shift switch
Lock switch [ON-OFF]	◯		▼	4H switch of 4WD shift switch
4L switch [ON-OFF]	◯		▼	4LO switch of 4WD shift switch
N position switch TF [ON-OFF]	◯		▼	N position switch of transfer
Line pressure switch [ON-OFF]	◯		▼	Line pressure switch
Clutch pressure switch [ON-OFF]	◯		▼	Clutch pressure switch
ATP switch [ON-OFF]	◯		▼	
N position switch [ON-OFF]	◯		▼	"N" position on A/T PNP switch
R position switch [ON-OFF]	◯		▼	"R" position on A/T PNP switch
P position switch [ON-OFF]	◯		▼	"P" position on A/T PNP switch
Closed throttle position switch [ON/OFF]	◯		▼	Idle contact of throttle position switch
ABS operation switch [ON-OFF]	◯		▼	ABS operation switch
Wait detection switch [ON-OFF]	◯		▼	
Throttle opening		◯	▼	Throttle opening recognized by transfer control unit
4WD-mode		◯	▼	4WD-mode recognized by transfer control unit (2WD, AUTO, 4H & 4LO)
Vehicle speed comp [km/h (MPH)]		◯	▼	Vehicle speed recognized by transfer control unit
*Control torque [N·m (kg-m, ft-lb)]		◯	▼	Calculated torque recognized by transfer control unit

Item [Unit]	Monitor item			Remarks
	ECU input signals	Main signals	Item menu selection	
Duty solenoid valve [%] (Transfer 4WD solenoid valve)		○	▼	
2-4WD shift solenoid valve [ON-OFF]		○	▼	Control signal outputs of transfer control unit
Transfer motor relay [ON-OFF]		○	▼	
Shift activating 1 [ON-OFF]		○	▼	
Shift activating 2 [ON-OFF]		○	▼	
2-4WD shift solenoid valve monitor [ON-OFF]			▼	Check signal (re-input signal) of transfer control unit control signal output is displayed. If circuit is shorted or open, ON/OFF state does not change.
Transfer motor relay monitor [ON-OFF]			▼	
Shift activating monitor 1 [ON-OFF]			▼	
Shift activating monitor 2 [ON-OFF]			▼	
4WD fail lamp [ON-OFF]		○	▼	Transfer control unit control signal output for 4WD warning lamp (left)
Shift position switch 1 [ON-OFF]	○		▼	
Shift position switch 2 [ON-OFF]	○		▼	
2WD indicator lamp [ON-OFF]			▼	Transfer control unit control signal output for 4WD shift indicator lamp (rear)
AUTO indicator lamp [ON-OFF]			▼	Transfer control unit control signal output for 4WD shift indicator lamp (front & rear)
LOCK indicator lamp [ON-OFF]			▼	Transfer control unit control signal output for 4WD shift indicator lamp (center)
4LO indicator lamp [ON-OFF]			▼	Transfer control unit control signal output for 4WD shift indicator lamp (right)
Offset at starting			▼	Appears on monitor but does not function.
Clutch limit [N·m (kg-m, ft-lb)]			▼	Clutch force release limit value set in WORK SUPPORT
Voltage [V]			▼	Value measured by voltage probe is displayed.
Frequency [Hz]			▼	Value measured by pulse probe is displayed. If measurement is impossible, "#" sign is displayed. "#" sign is also displayed at the final data value until the measurement result is obtained.
DUTY-HI			▼	Duty cycle value for measurement probe is displayed.
DUTY-LOW			▼	
PLS WIDTH-HI			▼	Measured pulse width of measurement probe is displayed.
PLS WIDTH-LOW			▼	

*: This item is indicated as "COMP CL TORQ".

REFERENCE VALUE IN DATA MONITOR MODE

NATF0012S09

Indicated items (Screen terms for CONSULT, "DATA MONITOR" mode)	Display	Conditions
Throttle position sensor (THRTL POS SEN)	Approx. 0.5 - 4.0V	Throttle valve fully closed to fully open
Transfer fluid temperature sensor (FLUID TEMP SE)	Approx. 1.5 - 0.5V	Transfer fluid temperature approx. 20 - 80°C (68 - 176°F)
Closed throttle position switch (CLOSED THL/SW)	ON	After engine warm-up, accelerator pedal is released.
	OFF	After engine warm-up, accelerator pedal is depressed.
ABS operation switch (ABS OPER SW)	OFF	ABS is not operating.
	ON	ABS is operating.
ABS control operation (ABS CONT OPER)	ON	ABS OPER SW is "ON". Control operation is accomplished in combination with ABS.
	OFF	ABS is not operating. When a message such as "improper ABS operation signal" appears on the display and ABS OPER SW is "ON", control operation is not accomplished in combination with ABS.
2WD position (2WD SW)	ON	4WD shift switch is in "2WD".
	OFF	Except the above condition
Lock position (LOCK SWITCH)	ON	4WD shift switch is in "4H".
	OFF	Except the above condition

Neutral-4LO switch (N POSI SW TF) ATP switch (ATP SWITCH) Wait detection switch (WAIT DETCT SW)	4WD shift switch position	2WD, AUTO, 4H	(N)	4LO
	ATP switch	OFF	ON	OFF
	Neutral-4LO switch	OFF	ON	
	Wait detection switch	OFF	ON	
		See Note.		
	Note: When shifting from "4LO" to "2WD", "AUTO", "4H", it turns ON when "Wait" function is operating (and it turns OFF when "Wait" function is canceled).			

Transfer motor relay (MOTOR RELAY)	Throttle valve	4WD shift switch	A/T selector lever	Motor relay	Remarks
	Fully closed	2WD	—	OFF	
		AUTO, 4LO	P, N	OFF	ON for approx. 2 sec. after shifting to "P" and "N"
			Others	ON	
		4H	P	OFF	ON for approx. 2 sec. after shifting to "P"
			Others	ON	

Line pressure switch (LINE PRES SW)	OFF	The vehicle has been left at room temperature for 5 minutes and more with ignition switch in "OFF" position.
	ON	Ignition switch in "ON", and 4WD shift switch in "AUTO" or "4H" and A/T selector lever in "D".

Indicated items (Screen terms for CONSULT, "DATA MONITOR" mode)	Display	Conditions	
Clutch pressure switch (CL PRES SW)	OFF	Ignition switch in "ON", and 4WD shift switch in "2WD". ("Wait" function is not operating.)	
	ON	Ignition switch in "ON", and 4WD shift switch in "AUTO" or "4H" and A/T selector lever in "D". ("Wait" function is not operating.)	
Control torque (COMP CL TORQ)	0 kg-m	4WD shift switch ("Wait" function is not operating.)	In "2WD" position
	39 - 1,079 N·m (4 - 110 kg-m, 29 - 796 ft-lb)		In "AUTO" position
	1,079 N·m (110 kg-m, 796 ft-lb)		In "4H" or "4LO" position
4WD solenoid (DUTY SOLENOID)	4%		In "2WD" position
	94 - 4%		In "AUTO" position
	4%		In "4H" or "4LO" position
2-4WD shift solenoid valve (2-4WD SOL)	OFF	4WD shift switch	In "2WD" position
	ON ("Wait" function is not operating.)		In "AUTO" position
	OFF ("Wait" function is operating.)		
	ON ("Wait" function is not operating.)		In "4H" position
	OFF ("Wait" function is operating.)		
	ON		In "4LO" position

Indicated items	Display	Conditions
Battery voltage	Approx. 12V	Key switch "ON" and engine at rest
	Approx. 13 - 14V	During idling
AUTO switch	OFF	4WD shift switch in other than "AUTO" position
	ON	4WD shift switch in "AUTO" position
4L switch	OFF	4WD shift switch in other than "4LO" position
	ON	4WD shift switch in "4LO" position
N position switch	OFF	A/T selector lever in other than "N" position
	ON	A/T selector lever in "N" position
R position swtich	OFF	A/T selector lever in other than "R" position
	ON	A/T selector lever in "R" position
P position switch	OFF	A/T selector lever in other than "P" position
	ON	A/T selector lever in "P" position
Throttle opening	0.0/8 - 8.0/8	Throttle fully closed (0.0/8) or throttle fully open (8.0/8)

Indicated items	Display	Conditions	
4WD-mode	2WD	4WD shift switch	In "2WD" position
	AUTO		In "AUTO" position
	LOCK		In "4H" position
	4L		In "4LO" position
Front wheel speed	0 - 255 km/h (0 - 158 MPH)	0 km/h (vehicle at standstill)	
Rear wheel speed	0 - 255 km/h (0 - 158 MPH)	0 km/h (vehicle at standstill)	
Shift ACTR operating 1, Shift activating monitor 1	OFF	During normal operation	
	ON	During shifts from "4H" to "4LO" position	
Shift ACTR operating 2, Shift activating monitor 2	OFF	During normal operation	
	ON	During shifts from "4LO" to "4H" position	
4WD fail lamp	OFF	During normal operation	
	ON	During 2-second period (after key switch turned to "ON") or when system is out of order	
Shift ACTR position sensing switch 1	OFF	4WD shift switch is in a position other than "4LO".	
	ON	4WD shift switch in "4LO" position	
Shift ACTR position sensing switch 2	OFF	4WD shift switch in "4LO" position	
	ON	4WD shift switch is in a position other than "4LO".	
2WD indicator lamp	OFF	Engine at rest or system out of order	
	ON	Except the above condition	
AUTO indicator lamp	OFF	Engine at rest during 2WD-mode operation or system out of order	
	ON	4WD shift switch in "4LO" or "4H" position and A/T selector lever in "AUTO" position	
LOCK indicator lamp	OFF	Engine at rest and A/T selector lever in "AUTO" position during 2WD-mode operation or system out of order	
	ON	4WD shift switch in "4H" or "4LO" position	
4LO indicator lamp	OFF	Engine at rest and A/T selector lever in "AUTO" position during 2WD-mode operation or system out of order	
	ON	4WD shift switch in "4LO" position	

WORK SUPPORT

NATF0012S06

Purpose

NATF0012S0601

When there is no problem with transfer and 4WD system, following symptoms in "AUTO" mode may be claimed by a customer.

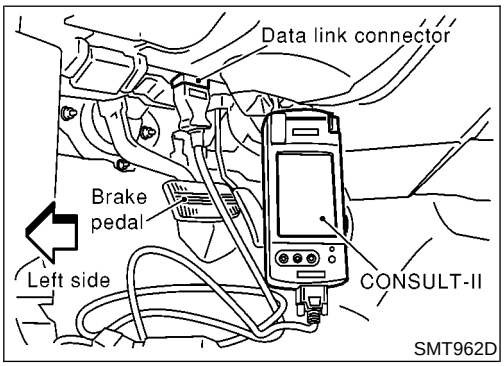
- Tight corner braking symptom after accelerator (throttle) opening (Note 1)
- Vibration when accelerating on a low μ road (snow-covered or icy road) (Note 2)
  It is possible to deal with these symptoms by changing "CLUTCH FORCE RELEASE LIMIT VALUE". However, be careful when changing the values because it may adversely affect driving performance.

NOTE:

1) When the accelerator is slightly open (approx. 1/8) or fully closed after being opened. The tight corner braking symptom during idle creep driving with accelerator fully closed cannot be

solved by this method. Refer to SYMPTOM 8, TF-139.

2) A slight shock is felt at a few hertz as if it were being pushed lightly from behind.

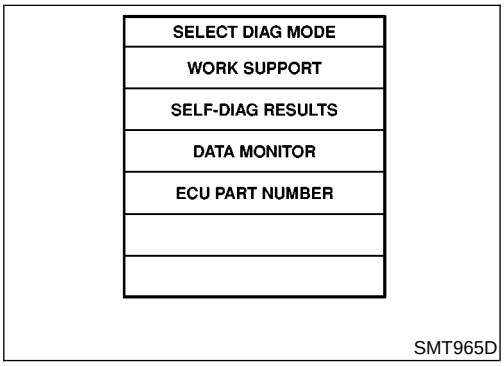


SMT962D

CONSULT-II Setting Procedure

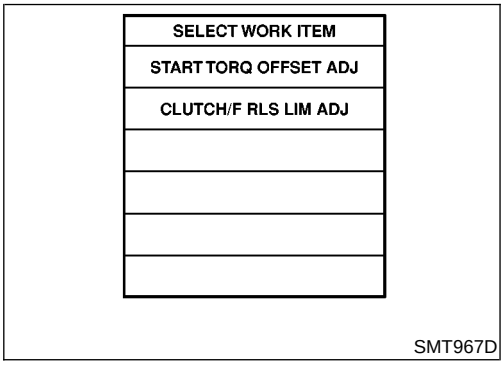
NATF0012S0602

1. Turn ignition switch to "OFF" position.
2. Connect CONSULT-II to data link connector, which is located in instrument lower panel on driver side.
3. Turn ignition switch to "ON" position.
4. Touch "START".
5. Touch "ALL MODE 4WD".



SMT965D

6. Touch "WORK SUPPORT".



SMT967D

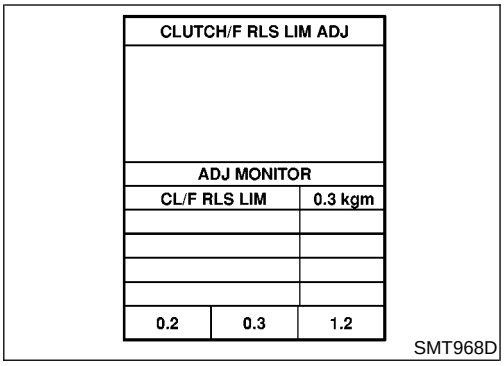
7. Select WORK ITEM by touching "CLUTCH/F RLS LIM ADJ".

NOTE:
"START TORQ OFFSET ADJ" is displayed, but the transfer does not have this function.

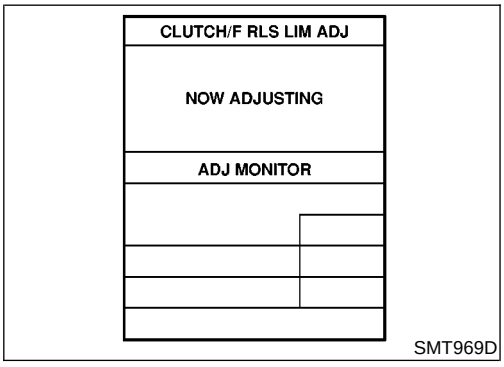
CLUTCH FORCE RELEASE LIMIT ADJUSTMENT

NATF0012S07

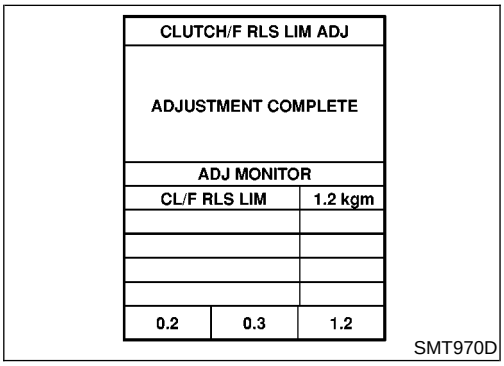
1.2 kg-m: Tight corner braking symptom is alleviated. However, vibration may occur when accelerating on a low μ road (icy road, etc.).
0.3 kg-m: Initial set value
0.2 kg-m: Do not set to this value because the tight corner braking symptom will get worse.



1. Current CLUTCH FORCE RELEASE LIMIT value "0.3 kg-m" appears under "CONDITION SETTING" on CONSULT-II display.
2. Touch "1.2" on the display.



3. Display changes to "NOW ADJUSTING" in a short time.



4. When clutch force release limit value is set to "1.2 kg-m", current value "0.3 kg-m" shown on display will be replaced by "1.2 kg-m" and "ADJUSTING COMPLETE" will appear at the same time. Clutch force release limit value setting is now complete.

Introduction

NATF0013

DESCRIPTION

NATF0013S01

When a malfunction (indicated by the 4WD warning lamp illumination) occurs, collect information first from the customer about how the malfunction occurs. Then, proceed with the diagnosis presuming it is the cause. Also inspect the electrical system, paying close attention to other possibilities such as fluid level and leaks.
All-mode 4WD transfer is controlled by transfer control unit and sensors.
If a malfunction occurs in the all-mode 4WD system, the 4WD warning lamp lights up to inform of the system malfunction. There are two ways to identify the cause of the malfunction.

1) Performing the self-diagnosis. (The 4WD warning lamp will indicate what kind of malfunction has occurred by flickering.)
2) Performing diagnosis using CONSULT-II.

DIAGNOSTIC WORKSHEET

NATF0013S02

Information from Customer

NATF0013S0201

KEY POINTS

WHAT ..... Vehicle model

WHEN..... Date, Frequencies

WHERE..... Road conditions

HOW..... Operating conditions, Symptoms

Information sheet from customer		
Customer name MR/MS	Model & Year	VIN
Transfer model ATX14A	Engine	Mileage
Incident Date	Manuf. Date	In Service Date
Frequency	☐ Continuous ☐ Intermittent (times a day)	
Symptoms	☐ 4WD shift indicator lamp does not turn on.	
	☐ 4WD warning lamp does not turn on.	
	☐ 4WD shift indicator lamp does not turn off.	
	☐ ATP warning lamp does not turn on.	
	☐ 4LO indicator lamp does not turn on.	
	☐ 4WD shift indicator lamp does not indicate “4H”.	
	☐ 4WD shift indicator lamp repeats flicking.	
	☐ Tight corner braking symptom occurs.	
	☐ 4WD system does not operate.	
	☐ Others.	
4WD warning lamp	☐ Continuously lit	☐ Not lit

Introduction (Cont'd)

Diagnostic Worksheet

NATF0013S0202

1.	☐ Listen to customer complaints.	TF-76
2.	☐ Check transfer fluid.	TF-76
	☐ Leakage ☐ Fluid condition ☐ Fluid level	
3.	☐ Road testing	TF-76
	☐ 1. Check before engine is started. ☐ 2. Check at idle. ☐ 3. Cruise test	
4.	☐ Perform self-diagnosis NG items (with CONSULT-II and without CONSULT-II).	TF-62, TF-59
5.	☐ Check component. Repair or replace the damaged parts.	TF-142
6.	☐ Perform final check. Perform road test (1 through 3).	TF-76

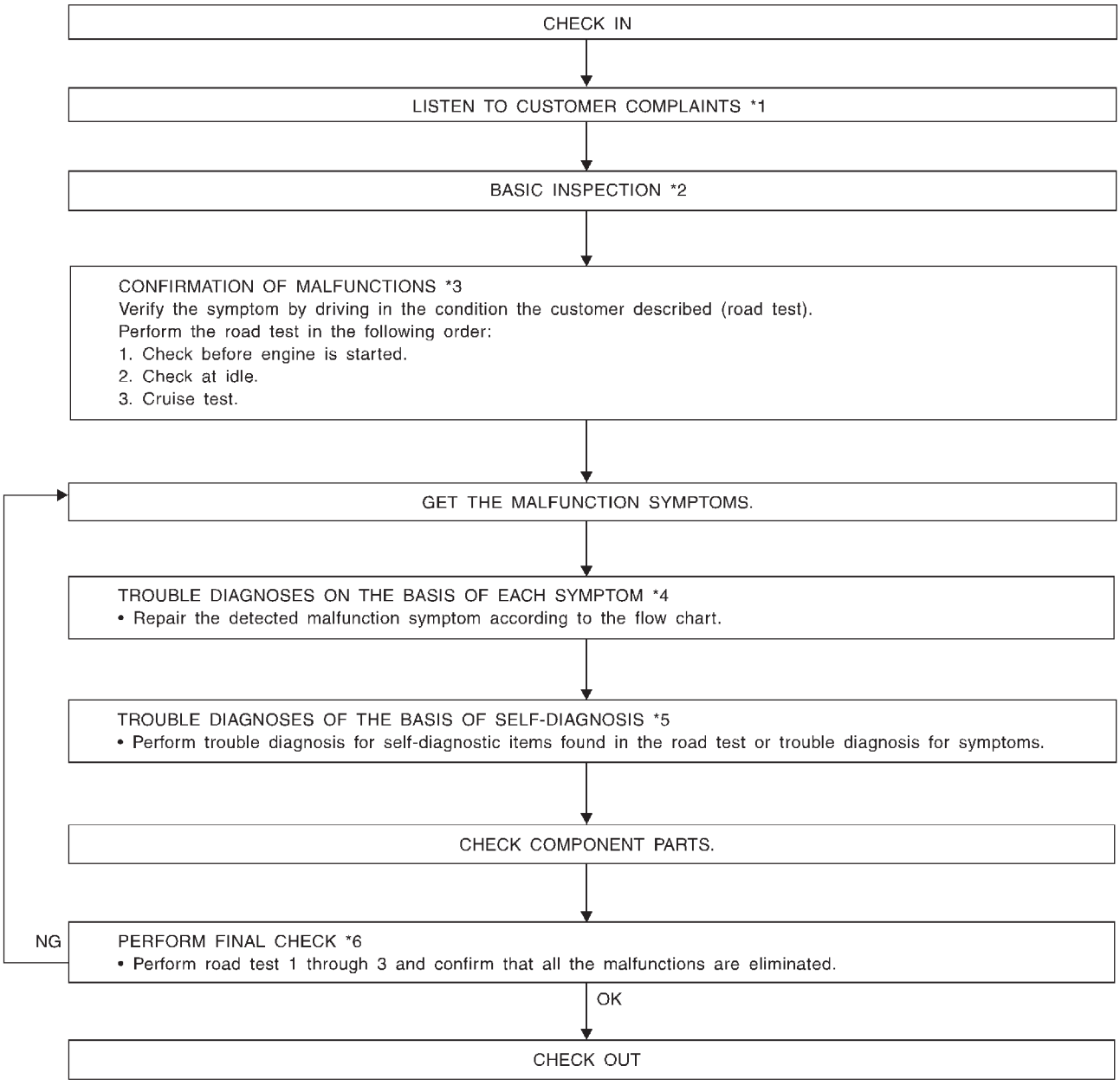
Work Flow

=NATF0014

HOW TO PERFORM TROUBLE DIAGNOSES FOR QUICK AND ACCURATE REPAIR

NATF0014S01

A good understanding of the malfunction conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.
Make good use of the two sheets provided, “Information from Customer” (Refer to TF-73.) and “Diagnostic Worksheet” (Refer to TF-74.), to perform the best troubleshooting possible.



MTF013A

*1: TF-76
*2: TF-76
*3: TF-76
*4: TF-129 - TF-140
*5: TF-92 - TF-125
*6: TF-76

Listen to Customer Complaints

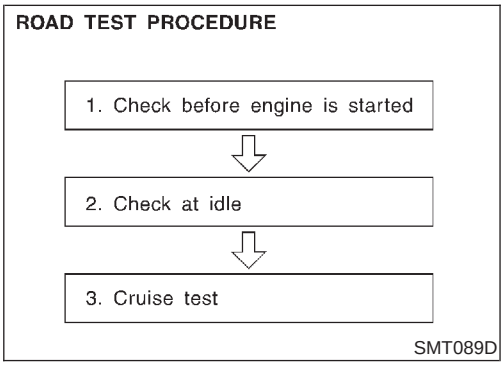
NATF0015

- Each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.
- Listen to the customer about how and when the malfunction occurs, and make good use of it when performing the road test.

Transfer Fluid Check

NATF0016

- Check fluid for leaks and fluid level. Refer to MA-24, “Checking All-mode 4WD Transfer Fluid”.



Road Test

NATF0017

PREPARATION FOR ROAD TEST

NATF0017S01

- The purpose of the test is to determine overall performance of transfer and analyze causes of problems.
- The road test consists of the following three parts:
- When a malfunction is found in any part of transfer, perform the road test to locate the malfunction area and repair the malfunction parts.

1. Check before engine is started
2. Check at idle
3. Cruise test

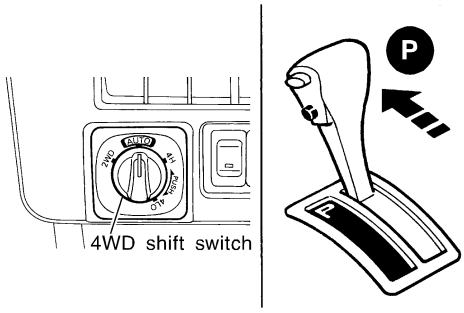
- Perform road test and place checks for NG items on the diagnostic worksheet. Refer to TF-74.

1. CHECK BEFORE ENGINE IS STARTED

=NATF0017S02

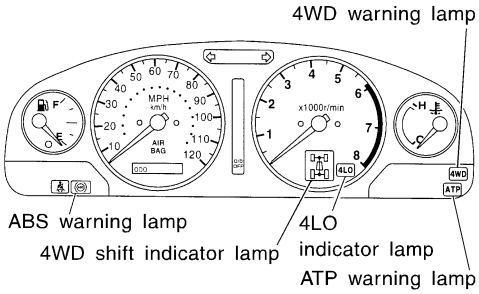
1	CHECK 4WD SHIFT INDICATOR LAMP

1. Park vehicle on flat surface.
2. Turn ignition switch to "OFF" position.
3. Move A/T selector lever to "P" position.
4. Set 4WD shift switch to "4H" position.



SMT849D

5. Set 4WD shift switch to "2WD" position.
6. Turn ignition switch to "ON" position. (Do not start engine.)
7. Does 4WD shift indicator lamp turn ON for approx. 1 second?



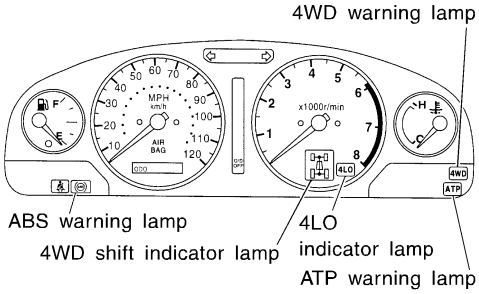
SMT994D

Yes or No

Yes	▶	GO TO 2.
No	▶	Go to Symptom 1. Refer to TF-129.

2	CHECK 4WD WARNING LAMP

Is 4WD warning lamp turned ON?



SMT994D

Yes or No

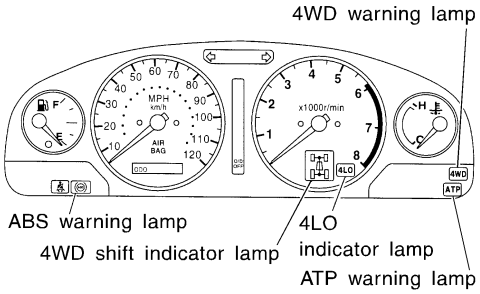
Yes	▶	1. Turn ignition switch to "OFF" position. 2. Perform self-diagnosis. Refer to "Trouble Diagnosis without CONSULT-II", TF-59. 3. Go to "2. CHECK AT IDLE". Refer to TF-78.
No	▶	Go to Symptom 2. Refer to TF-131.

2. CHECK AT IDLE

=NATF0017S03

1	CHECK 4WD SHIFT INDICATOR LAMP

1. Park vehicle on flat surface.
2. Turn ignition switch to "OFF" position.
3. Move A/T selector lever to "P" or "N" position.
4. Set 4WD shift switch to "4H" position.
5. Set 4WD shift switch to "2WD" position.
6. Start engine.
7. Is 4WD shift indicator lamp turned OFF?



SMT994D

Yes or No

Yes	▶	Go to "ATP SWITCH, WAIT DETECTION SWITCH AND NEUTRAL-4LO SWITCH". Refer to TF-107.
No	▶	GO TO 2.

2	CHECK 4WD WARNING LAMP

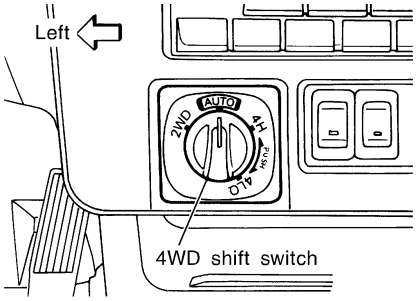
Is 4WD warning lamp turned OFF?

Yes or No

Yes	▶	GO TO 3.
No	▶	Perform self-diagnosis. Refer to "Trouble Diagnosis without CONSULT-II", TF-59.

3	CHECK 4WD SHIFT INDICATOR LAMP

1. Set 4WD shift switch to "2WD", "AUTO", "4H", "4LO", "4H" and "2WD" in order.
   (Stay at each switch position for at least 1 second.)
2. Does 4WD shift indicator lamp change properly and does buzzer sound?



SMT851D

4WD shift switch operation	4WD shift indicator lamp	4WD warning lamp	Buzzer sound
2WD		4WD OFF	
			"Pip"
AUTO		4WD OFF	
			"Pip"
4H		4WD OFF	
4LO		4WD OFF	
4H		4WD OFF	
			"Pip"
AUTO		4WD OFF	
			"Pip"
2WD		4WD OFF	

SMT971D

Yes or No

Yes	▶	GO TO 4.
No	▶	Go to "2-4WD SHIFT SOLENOID VALVE AND 4WD SHIFT SWITCH". Refer to TF-97.

4	CHECK 4WD WARNING LAMP

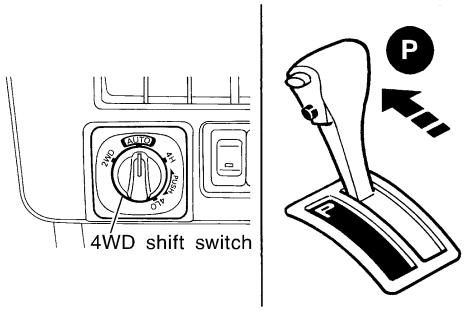
Is 4WD warning lamp turned ON?

Yes or No

Yes	▶	Perform self-diagnosis. (Refer to "Trouble Diagnosis without CONSULT-II", TF-59.)
No	▶	GO TO 5.

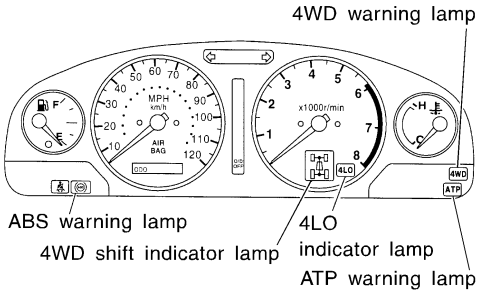
5	CHECK 4WD SHIFT INDICATOR LAMP

1. Move A/T selector lever to "P" position.
2. Set 4WD shift switch from "4H" to "4LO".



SMT849D

3. While shifting from "4H" to "4LO", does 4WD shift indicator lamp turn OFF and ATP warning lamp turn ON?



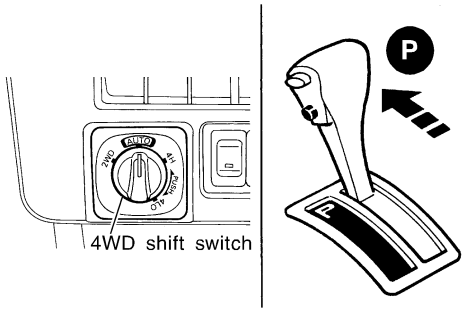
SMT994D

Yes or No

Yes	▶	GO TO 6.
No	▶	Go to Symptoms 3 and 4. Refer to TF-133.

6	CHECK 4WD SHIFT INDICATOR LAMP

Does 4WD shift indicator lamp indicate 4LO indicator lamp turn ON when 4WD shift switch is set in "4LO"?



SMT849D

4WD shift switch operation	4WD shift indicator lamp	4WD warning lamp
4LO		4WD OFF

4LO indicator lamp

SMT770D

Yes or No

Yes	▶	GO TO 7.
No	▶	Go to Symptom 5. Refer to TF-135.

7	CHECK 4WD SHIFT INDICATOR LAMP (*1)

1. Set 4WD shift switch from "4LO" to "4H".
2. Does 4LO indicator lamp flicker? (*1)

*1: While "Wait" function is operating, 4LO indicator lamp flashes.

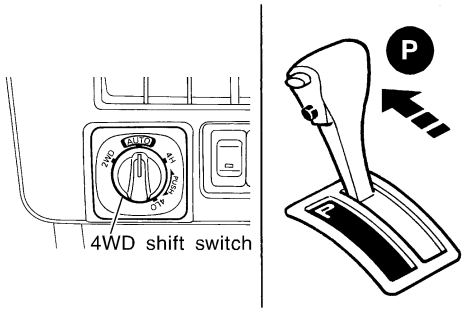
Yes or No

Yes	▶	Go to Symptoms 6 and 7. Refer to TF-137 and TF-138.
No	▶	Go to "3. CRUISE TEST". Refer to TF-82.

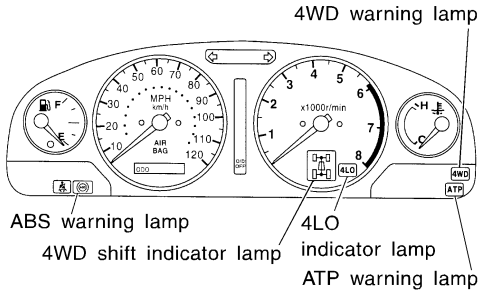
3. CRUISE TEST

=NATF0017S04

1	INSPECTION START



SMT849D



SMT994D

WITH CONSULT-II	▶	GO TO 2.
WITHOUT CONSULT-II	▶	GO TO 3.

2	CHECK INPUT SIGNAL

With CONSULT-II

1. Warm up engine to normal operating temperature.
2. Park vehicle on flat surface.
3. Move A/T selector lever to "P" position.
4. Set 4WD shift switch to "4H" position.
5. Set 4WD shift switch to "AUTO" position.
6. Start engine.
7. Drive for at least 30 seconds at a speed higher than 20 km/h (12 MPH).
   (Drive vehicle until "FLUID TEMP SE" exceeds 0.9V.)
8. Park vehicle on flat surface.
9. Move A/T selector lever to "P" position.
10. Set 4WD shift switch to "2WD" position.
11. Leave vehicle for at least 80 seconds with "FLUID TEMP SE" at 0.9V or less.

DATA MONITOR	
MONITOR	NO DTC
VHCL/S SEN-FR	0 km/h
VHCL/S SEN-RR	0 km/h
ENGINE SPEED	775 rpm
THRTL POS SEN	0.5 V
FLUID TEMP SE	0.86 V
BATTERY VOLT	14.1 V
2WD SWITCH	ON
AUTO SWITCH	OFF
LOCK SWITCH	OFF

SMT972D

12. Is 4WD warning lamp turned ON?

Yes or No

Yes	▶	Perform self-diagnosis. Refer to "Trouble Diagnosis with CONSULT-II", TF-62.
No	▶	GO TO 4.

3	CHECK INPUT SIGNAL

Without CONSULT-II

1. Warm up engine to normal operating temperature.
2. Park vehicle on flat surface.
3. Move A/T selector lever to "P" position.
4. Set 4WD shift switch to "4H" position.
5. Set 4WD shift switch to "AUTO" position.
6. Start engine.
7. Drive vehicle for at least 30 seconds at a speed higher than 20 km/h (12 MPH).
8. Park vehicle on flat surface.
9. Move A/T selector lever to "P" position.
10. Set 4WD shift switch to "2WD" position.
11. Is 4WD warning lamp turned ON?

Yes or No

Yes	▶	Perform self-diagnosis. Refer to "Trouble Diagnosis without CONSULT-II", TF-59.
No	▶	GO TO 4.

4	(1) CHECK TIGHT CORNER BRAKING SYMPTOM

1. Set 4WD shift switch to "AUTO" position.
2. Drive vehicle at speed lower than 20 km/h (12 MPH) with steering wheel fully turned.
3. Does tight corner braking symptom occur?

Yes or No

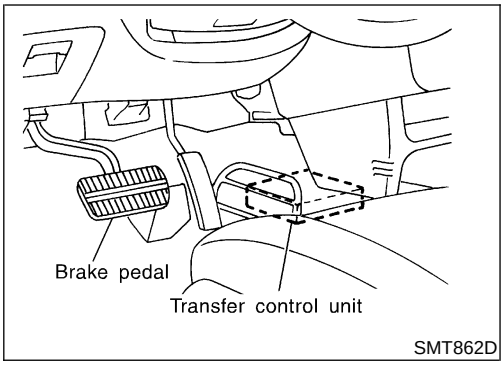
Yes	▶	GO TO 5.
No	▶	GO TO 6.

Road Test (Cont'd)

5	CONFIRM SYMPTOM AGAIN
Confirm symptom and self-diagnosis again. Refer to "Trouble Diagnosis without CONSULT-II", TF-59 and "Trouble Diagnosis with CONSULT-II", TF-62.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Go to Symptoms 8 and 9. Refer to TF-139, 140.

6	(2) CHECK TIGHT CORNER BRAKING SYMPTOM
1. Set 4WD shift switch to "4H" position. 2. Drive vehicle at speed lower than 20 km/h (12 MPH) with steering wheel fully turned. 3. Does tight corner braking symptom occur?	
Yes or No	
Yes ▶	**INSPECTION END**
No ▶	GO TO 7.

7	CONFIRM SYMPTOM AGAIN
Confirm symptom and self-diagnosis again. Refer to "Trouble Diagnosis without CONSULT-II", TF-59 and "Trouble Diagnosis with CONSULT-II", TF-62.	
OK or NG	
OK ▶	**INSPECTION END**
NG ▶	Go to Symptoms 8 and 9. Refer to TF-139, 140.



Transfer Control Unit Terminals and Reference Value

NATF0018

REMOVAL AND INSTALLATION OF TRANSFER CONTROL UNIT

NATF0018S03

Removal

NATF0018S0301

1. Turn ignition switch OFF and disconnect negative battery terminal.
2. Remove console box.
3. Remove cluster lid C.
4. Remove audio assembly and A/C control unit.
5. Remove instrument lower panel on driver side.
6. Remove glove box.
7. Remove instrument lower panel on passenger side.
8. Remove instrument lower center panel.
9. Remove transfer control unit.

- For steps 2 through 8 above, refer to BT-22, “Instrument Panel Assembly”.

Installation

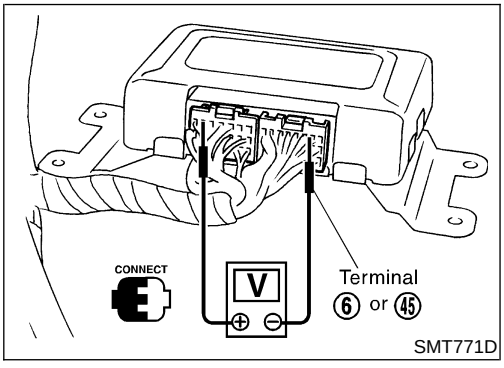
NATF0018S0302

- Installation is in the reverse order of removal.

When installing transfer control unit, tighten transfer control unit lock nut.

Tightening torque:

: 4.3 - 5.8 N·m (0.44 - 0.59 kg-m, 38 - 51 in-lb)

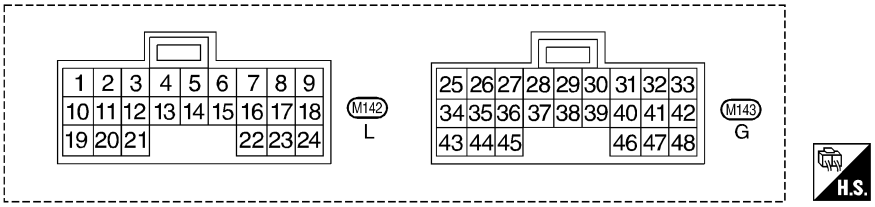


INSPECTION OF TRANSFER CONTROL UNIT

NATF0018S01

- Measure voltage between each terminal and terminal 6 or 45 by following “TRANSFER CONTROL UNIT INSPECTION TABLE”, TF-86.

- Pin connector terminal layout



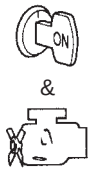
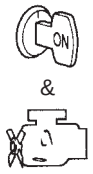
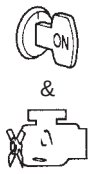
SMT772D

TRANSFER CONTROL UNIT INSPECTION TABLE

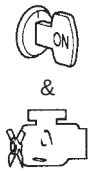
NATF0018S02

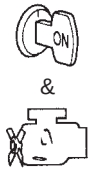
(Data are reference values.)

Terminal No.	Item	Condition		Judgement standard
1	2-4WD shift solenoid valve	ON &	4WD shift switch is set to "2WD" position.	Less than 1V
			4WD shift switch is set to any position other than "2WD".	Battery voltage
2	4WD shift indicator lamp (2WD)		Lamp lights while system is operating properly.	Less than 1V
		ON &	2WD indicator lamp does not come on.	Battery voltage
3	Ground		—	—
4	Transfer shift relay (High)		While actuator is operating (4H → 4LO)	Battery voltage
			Actuator does not operate.	Less than 1V
5	4WD warning lamp		Lamp comes ON. (when engine is stopped.) (Fail-safe condition appears on display, engine is stopped, actuator position detection switch is inoperative, oil temperature is too high and/or tires of different size are installed.)	Less than 1V
			Except above	Battery voltage
6	Ground	—	—	—
7	PNP switch (R position)	ON &	A/T selector lever is set to "reverse" position.	Battery voltage
			A/T selector lever is set to any position other than "reverse".	Less than 1V
8	—	—	—	—

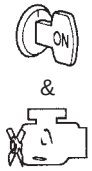
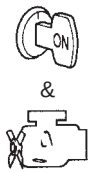
Terminal No.	Item	Condition		Judgement standard
9	4WD shift switch (2WD)		4WD shift switch is set to "2WD" position.	Battery voltage
			4WD shift switch is set to any position other than "2WD".	Less than 1V
10	Transfer dropping resistor		4WD shift switch is set to "AUTO" position.	Approx. 4 - 14V
			4WD shift switch is set to any position other than "2WD".	Less than 1V
11	4WD shift indicator lamp (4H)		"4H" indicator lamp comes ON.	Less than 1V
			4WD shift switch is set to any position other than "4H".	Battery voltage
12	4WD shift indicator lamp (4LO)		"4LO" indicator lamp comes ON.	Approx. 0V
			4WD shift switch is set to any position other than "4LO".	Battery voltage
13	Transfer shift relay (Low)		While actuator is operating (4LO → 4H)	Battery voltage
			Actuator does not operate.	Approx. 0V
14	Transfer motor relay		Transfer motor relay is ON.	Battery voltage
			Transfer motor relay is OFF.	Less than 1V
15	PNP switch (N position)		A/T selector lever is set to "N" position.	Battery voltage
			A/T selector lever is set to any position other than "N" position.	Less than 1V
16	Power supply	—	Ignition key is set to "ON" position.	Battery voltage
			Ignition key is set to "OFF" position.	Approx. 0V
17	PNP switch (P position)		A/T selector lever is set to "P" position.	Battery voltage
			A/T selector lever is set to any position other than "P".	Less than 1V
18	4WD shift switch (4H)		4WD shift switch is set to "4H" position.	Battery voltage
			4WD shift switch is set to any position other than "4H".	Less than 1V
19	4WD solenoid valve		4WD shift switch is set to "AUTO" position.	Approx. 1.5 - 3V
			4WD shift switch is set to any position other than "2WD".	Less than 1V
20	—	—	—	—
21	4WD shift indicator lamp (AUTO)		"AUTO" indicator lamp comes ON.	Approx. 0V
			4WD shift switch is set to any position other than "AUTO".	Battery voltage
22	Power supply	—	Ignition key is set to "ON" position.	Battery voltage
			Ignition key is set to "OFF" position.	Approx. 0V

Transfer Control Unit Terminals and Reference Value (Cont'd)

Terminal No.	Item	Condition		Judgement standard
23	4WD shift switch (4LO)		4WD shift switch is set to "4LO" position.	Battery voltage
			4WD shift switch is set to any position other than "4LO".	Less than 1V
24	4WD shift switch (AUTO)		4WD shift switch is set to "AUTO" position.	Battery voltage
			4WD shift switch is set to any position other than "AUTO".	Less than 1V
25	Neutral-4LO switch		Transfer is set to "4LO" position.	Approx. 0V
			Transfer is set to any position other than "4LO".	Power supply
26	Throttle position switch (closed)		Throttle valve is closed.	Power supply
			Throttle valve is in any position other than "closed".	Approx. 0V
27	Transfer 4H actuator switch		4WD shift switch is set to "4H" position.	Less than 1V
			4WD shift switch is set to any position other than "4H".	Battery voltage
28	Throttle position sensor (Ground)		Throttle valve is closed.	Less than 1V
			Throttle valve is fully open.	
29	TCM signal (Vehicle speed signal)		When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function.*1 **CAUTION:** **Connect the diagnosis data link cable to the vehicle diagnosis connector.** *1: A circuit tester cannot be used to test this item.	Approximately 225 Hz
30	Throttle position sensor (Power supply for throttle position sensor)		Ignition key is set to "ON" position.	Approx. 4.5 - 5.5V
			Ignition key is set to "OFF" position.	Approx. 0V

Terminal No.	Item	Condition		Judgement standard
31	Transfer fluid temperature sensor		At 20°C (68°F)	Approx. 1.5V
			At 80°C (176°F)	Approx. 0.5V
32	ABS signal		When moving, use the CONSULT-II pulse frequency measuirng function.*2 **CAUTION:** **Connect the diagnosis data link cable to the vehicle diagnosis connector.** *2: A circuit tester cannot be used to test this item.	Refer to the illustration (SMT973D) at the end of this section.
33	Transfer shift relay (High)		While actuator is operating from "4H" to "4LO"	Battery voltage
			Actuator does not operate.	Approx. 0V
34	Clutch pressure switch		4WD shift switch is set to "AUTO" or "4H", then A/T selector lever is set to "D" position. (wait detection system: OFF)	Battery voltage
			4WD shift switch is set to "2WD", "AUTO" or "4H", then A/T selector lever is set to "D" position. (wait detection system: ON)	Approx. 0V
35	Line pressure switch		4WD shift switch is set to "2WD", "AUTO" or "4H", then A/T selector lever is set to "D" position.	Battery voltage
			—	Approx. 0V
36	CONSULT-II (RX)	—	—	—
37	Tachometer		—	Refer to EC-126, "ECM Inspection Table".
38	Front revolution sensor		4WD shift switch is set to "4H" position. A/T selector lever is set to "D" position.	Approx. 1V [30 km/h (19 MPH)] Voltage rises in response to vehicle speed.

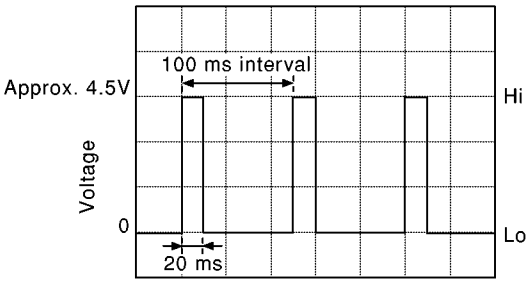
Transfer Control Unit Terminals and Reference Value (Cont'd)

Terminal No.	Item	Condition		Judgement standard
39	ECM (Throttle position sensor)		Throttle valve is fully open.	Approx. 0.5V
			Throttle valve is closed.	Approx. 4.2V
40	ATP switch		A/T selector lever is set to "P" position.	Battery voltage
			A/T selector lever is set to any position other than "P".	Less than 1V
41	Transfer motor relay monitor		Transfer motor relay is ON.	Battery voltage
			Transfer motor relay is OFF.	Less than 1V
42	Transfer shift relay (LOW)		While actuator is operating from "4LO" to "4H" position	Battery voltage
			Actuator does not operate.	Approx. 0V
43	Wait detection switch		4WD shift switch is set to any position other than "4LO".	Battery voltage
			4WD shift switch is set to "4LO" position.*3	Less than 1V
44	Transfer 4LO actuator switch		4WD shift switch is set to any position other than "4LO". (Actuator: High position)	Battery voltage
			4WD shift switch is set to "4LO" position. (Actuator: Low position)	Less than 1V
45	Ground	—	—	—
46	—	—	—	—
47	Power supply (memory back up)		—	Battery voltage
48	CONSULT-II (TX)	—	—	—

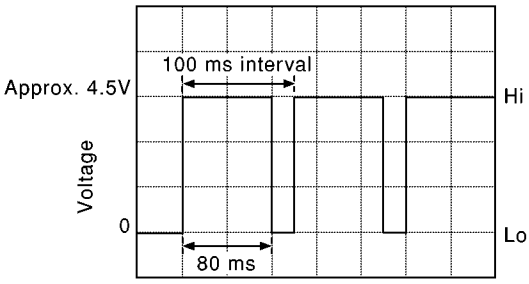
*3: While wait detection system is operating, terminal 43 exists battery voltage.

ABS signal judgement standard

① Forward waveform when engine is running or stopped.



② ABS waveform during operation



Caution:
In motion, (forward to turning) changes the Hi (ON) time from 20 to 40 to 60 ms.

③ If the ABS control unit malfunctions, the terminal voltage is fixed at Hi (approximately 4.5V).

SMT973D

Diagnostic Procedure

NATF0019

1	FRONT REVOLUTION SENSOR	
Refer to “Front Revolution Sensor”, “COMPONENT INSPECTION”, TF-143.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

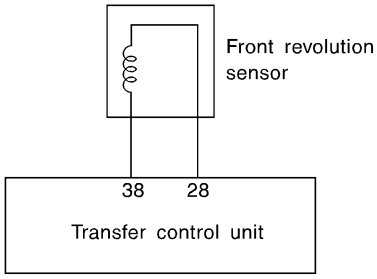
2	CHECK CONTINUITY	
Check the following. ● Continuity of transfer sub-harness Refer to “Transfer Sub-harness”, “COMPONENT INSPECTION”, TF-144.		
OK or NG		
OK	▶	Repair or replace front revolution sensor.
NG	▶	Repair or replace front revolution sensor and transfer sub-harness.

3	CHECK INPUT SIGNAL	
WITH CONSULT-II	▶	GO TO 4.
WITHOUT CONSULT-II	▶	GO TO 5.

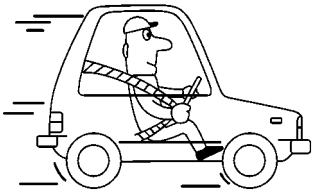
4	CHECK INPUT SIGNAL

With CONSULT-II

1. Start engine.
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out the value of "VEHICLE SPEED SENSOR (FRONT)" while driving.



SMT773D



DATA MONITOR	
MONITOR	NO DTC
VHCL/S SEN-FR	0 km/h
VHCL/S SEN-RR	0 km/h
ENGINE SPEED	775 rpm
THRTL POS SEN	0.5 V
FLUID TEMP SE	0.86 V
BATTERY VOLT	14.1 V
2WD SWITCH	ON
AUTO SWITCH	OFF
LOCK SWITCH	OFF

SMT974D

4. Check if the value changes according to accelerating and decelerating the vehicle.

OK or NG

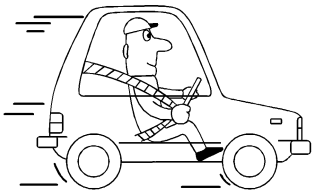
OK	▶	GO TO 6.
NG	▶	GO TO 7.

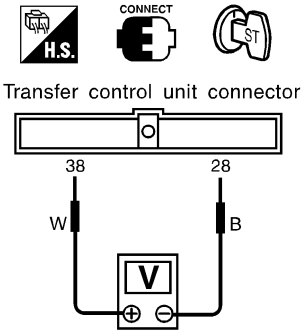
5	CHECK INPUT SIGNAL

Without CONSULT-II

1. Start engine.
2. Check voltage between transfer control unit harness connector terminals 38 and 28. (Measure it in AC range.)

Voltage:
0 km/h (0 MPH): 0V
30 km/h (19 MPH): More than 1V
(Voltage rises gradually in response to vehicle speed.)





SMT774D

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 7.

6	PERFORM SELF-DIAGNOSIS AGAIN

After driving for a while, perform self-diagnosis again.
Refer to "Trouble Diagnosis without CONSULT-II", TF-59.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform transfer control unit input/output signal inspection. Refer to "TRANSFER CONTROL UNIT INSPECTION TABLE", "TROUBLE DIAGNOSIS — GENERAL DESCRIPTION", TF-86. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

7	CHECK HARNESS CONTINUITY BETWEEN TRANSFER CONTROL UNIT AND FRONT REVOLUTION SENSOR SUB-HARNESS CONNECTOR

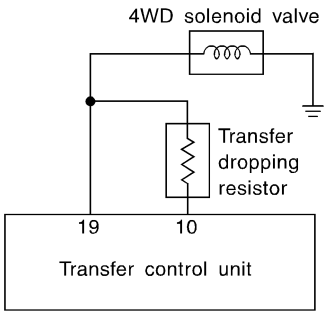
OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or replace sub-harness connector between transfer control unit and front revolution sensor.

Diagnostic Procedure

NATF0020

1	CHECK 4WD SOLENOID VALVE



SMT775D

Refer to “4WD Solenoid Valve, Clutch Pressure Switch and Line Pressure Switch”, “COMPONENT INSPECTION”, TF-142.

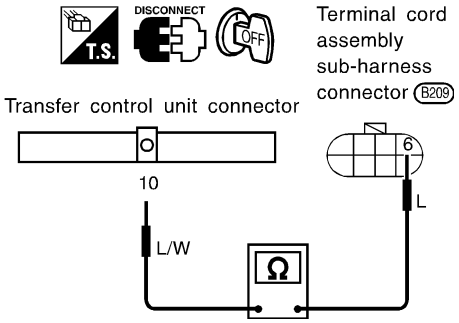
OK or NG

OK	▶	GO TO 2.
NG	▶	**Check the following. If OK, repair or replace 4WD solenoid valve.** ● Continuity of transfer sub-harness Refer to “TRANSFER TERMINAL CORD ASSEMBLY SUB-HARNESS CONNECTOR”, “COMPONENT INSPECTION”, TF-145.

2	CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to “OFF” position.
2. Disconnect transfer control unit harness connector.
3. Check resistance between transfer terminal cord assembly sub-harness connector terminal 6 and transfer control unit harness connector terminal 10.

Resistance: 11.2 - 12.8Ω



SMT776D

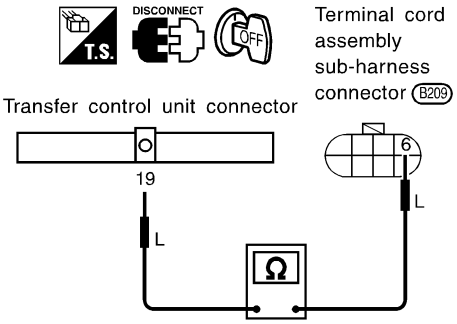
OK or NG

OK	▶	GO TO 3.
NG	▶	**Check the following.** ● Transfer dropping resistor Refer to “Transfer Dropping Resistor”, “COMPONENT INSPECTION”, TF-143. ● Continuity between transfer terminal cord assembly sub-harness connector terminal 6 and transfer control unit harness connector terminal 10.

Diagnostic Procedure (Cont'd)

3	CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to "OFF" position.
2. Check continuity between transfer terminal cord assembly sub-harness connector terminal 6 and transfer control unit harness connector terminal 19.
   Continuity should exist.



SMT777D

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace harness between transfer terminal cord assembly sub-harness connector terminal 6 and transfer control unit harness connector terminal 19.

4	PERFORM SELF-DIAGNOSIS

After driving for a while, perform self-diagnosis.
Refer to "Trouble Diagnosis without CONSULT-II", TF-59 and "Trouble Diagnosis with CONSULT-II", TF-62.

OK or NG

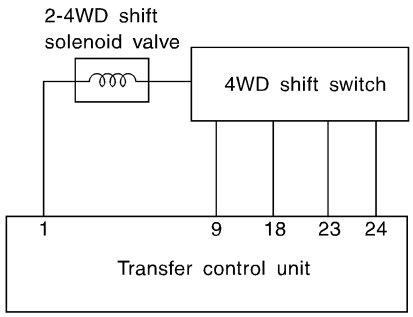
OK	▶	**INSPECTION END**
NG	▶	1. Perform transfer control unit input/output signal inspection. Refer to "TRANSFER CONTROL UNIT INSPECTION TABLE", TF-86. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

Diagnostic Procedure

NATF0021

1	CHECK 2-4WD SHIFT SOLENOID VALVE AND 4WD SHIFT SWITCH

Refer to “2-4WD Shift Solenoid Valve and Transfer Fluid Temperature Sensor”, “COMPONENT INSPECTION”, TF-142.



SMT778D

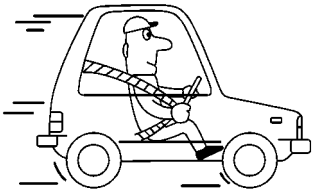
OK or NG

OK	▶	GO TO 2.
NG	▶	**Check the following. If OK, repair or replace 2-4WD shift solenoid valve and 4WD shift switch.** ● Continuity of transfer sub-harness Refer to “TRANSFER TERMINAL CORD ASSEMBLY SUB-HARNESS CONNECTOR”, “COMPONENT INSPECTION”, TF-145.

2	CHECK INPUT SIGNAL

With CONSULT-II

1. Select "ECU INPUT SIGNALS" in Data Monitor.
2. Read out ON/OFF status of "2WD SW" and "LOCK SWITCH".



DATA MONITOR	
MONITOR	NO DTC
VHCL/S SEN-FR	0 km/h
VHCL/S SEN-RR	0 km/h
ENGINE SPEED	775 rpm
THRTL POS SEN	0.5 V
FLUID TEMP SE	0.86 V
BATTERY VOLT	14.1 V
2WD SWITCH	ON
AUTO SWITCH	OFF
LOCK SWITCH	OFF

SMT974D

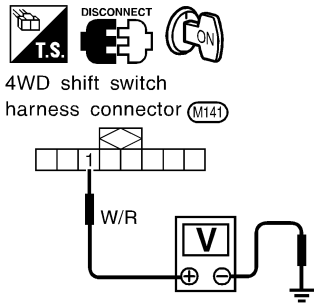
OK or NG

OK ▶	1. Perform transfer control unit input/output signal inspection. Refer to "TRANSFER CONTROL UNIT INSPECTION TABLE", "TROUBLE DIAGNOSIS — GENERAL DESCRIPTION", TF-86. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.
NG ▶	GO TO 3.

3	CHECK 4WD SHIFT SWITCH POWER SOURCE

1. Disconnect 4WD shift switch harness connector.
2. Turn ignition switch to "ON" position.
3. Check voltage between 4WD shift switch harness connector terminal 1 and body ground.

Voltage: Battery voltage



SMT852D

OK or NG

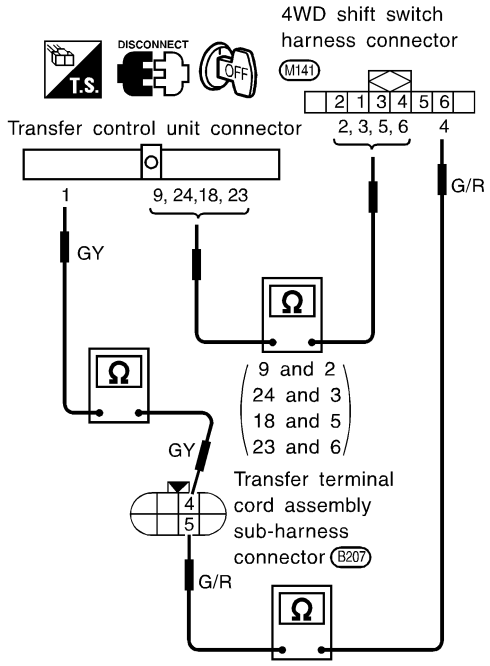
OK	▶	GO TO 4.
NG	▶	**Check the following.** ● No. 18 fuse (10A) ● Continuity between ignition switch and 4WD shift switch

4	CHECK HARNESS CONTINUITY

1. Turn ignition switch to "OFF" position.
2. Check continuity between the following terminals:

- **Transfer control unit 9 and 4WD shift switch 2 (2WD)**
- **Transfer control unit 18 and 4WD shift switch 5 (4H)**
- **Transfer control unit 24 and 4WD shift switch 3 (AUTO)**
- **Transfer control unit 23 and 4WD shift switch 6 (4LO)**
- **Transfer control unit 1 and Transfer terminal cord assembly sub-harness connector 4**
- **4WD shift switch 4 and Transfer terminal cord assembly sub-harness connector 5**

Continuity should exist.



SMT853D

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair harness or connector.

5	PERFORM SELF-DIAGNOSIS AGAIN

After driving for a while, perform self-diagnosis again.
Refer to "Trouble Diagnosis without CONSULT-II", TF-59.

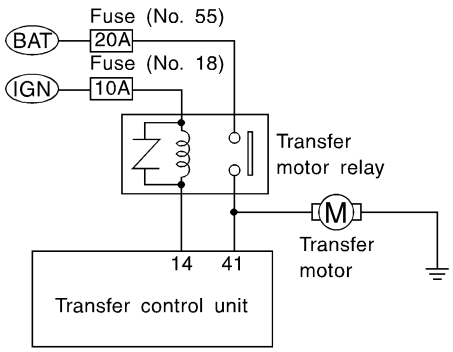
OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform transfer control unit input/output signal inspection. Refer to "TRANSFER CONTROL UNIT INSPECTION TABLE", "TROUBLE DIAGNOSIS — GENERAL DESCRIPTION", TF-86. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

Diagnostic Procedure

NATF0022

1 CHECK TRANSFER MOTOR AND TRANSFER MOTOR RELAY



SMT782D

Refer to “Transfer Motor” and “Transfer Motor Relay”, “COMPONENT INSPECTION”, TF-144.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2 CHECK CONTINUITY

Check the following.
- Continuity of transfer sub-harness
  Refer to “TRANSFER SWITCH ASSEMBLY SUB-HARNESS CONNECTOR”, “COMPONENT INSPECTION”, TF-145.

OK or NG

OK	▶	Repair or replace transfer motor and transfer motor relay.
NG	▶	Repair or replace transfer sub-harness.

3 CHECK INPUT SIGNAL

With CONSULT-II
1. Select “MAIN SIGNALS” in Data Monitor.
2. Read out ON/OFF status of “MOTOR RELAY”.

DATA MONITOR	
MONITOR	NO DTC
4WD MODE	2WD
COMP CL TORQ	0.0 kgm
DUTY SOLENOID	4 %
2-4WD SOL	OFF
VHCL/S COMP	0 km/h
THROTTLE POSI	0.0 /8
MOTOR RELAY	OFF
4WD FAIL LAMP	OFF
SHIFT ACT 1	OFF

SMT975D

3. When the value is different from standard value although ON/OFF switching occurs, check the following items.
- PNP switch, throttle position sensor and closed throttle position switch circuits
  Refer to AT-99, “DTC P0705 Park/Neutral Position Switch”, AT-176, “DTC P1705 Throttle Position Sensor” and AT-184, “Closed Throttle Position Switch (idle position)”.

OK or NG

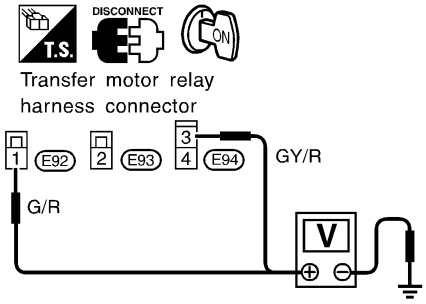
OK	▶	GO TO 4.
NG	▶	1. Perform transfer control unit input/output signal inspection. Refer to “TRANSFER CONTROL UNIT INSPECTION TABLE”, “TROUBLE DIAGNOSIS — GENERAL DESCRIPTION”, TF-86. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

Diagnostic Procedure (Cont'd)

4	CHECK TRANSFER MOTOR RELAY POWER SOURCE

1. Disconnect transfer motor relay harness connector.
2. Turn ignition switch to "ON" position.
3. Check voltage between transfer motor relay harness connector terminals 1, 3 and body ground.

Voltage: Battery voltage



SMT854DA

OK or NG

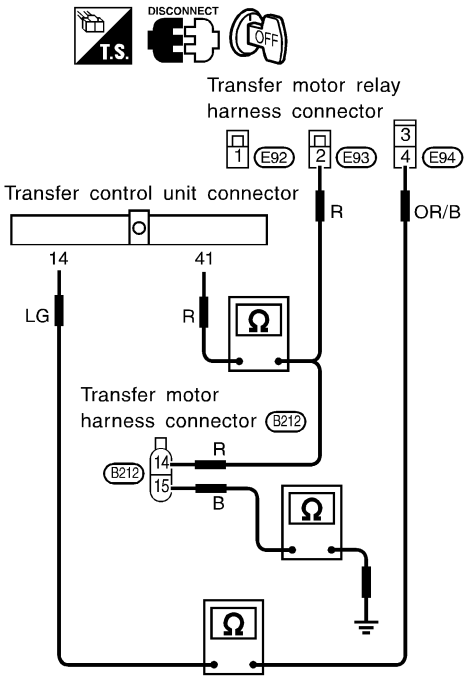
OK	▶	GO TO 5.
NG	▶	**Check the following.** ● No. 55 fuse (20A) ● No. 18 fuse (10A) ● Harness continuity between fuse and transfer motor relay

5	CHECK HARNESS CONTINUITY

1. Turn ignition switch to "OFF" position.
2. Check continuity between the following terminals.

- **Transfer control unit 41 and Transfer motor 14**
- **Transfer control unit 41 and Transfer motor relay 2**
- **Transfer control unit 14 and Transfer motor relay 4**
- **Transfer motor 15 and body ground**

Continuity should exist.



SMT855DA

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or replace harness or connector.

6	PERFORM SELF-DIAGNOSIS AGAIN

After driving for a while, perform self-diagnosis again.
Refer to "Trouble Diagnosis without CONSULT-II", TF-59 and "Trouble Diagnosis with CONSULT-II", TF-62.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform transfer control unit input/output signal inspection. Refer to "TRANSFER CONTROL UNIT INSPECTION TABLE", "TROUBLE DIAGNOSIS — GENERAL DESCRIPTION", TF-86. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

Diagnostic Procedure

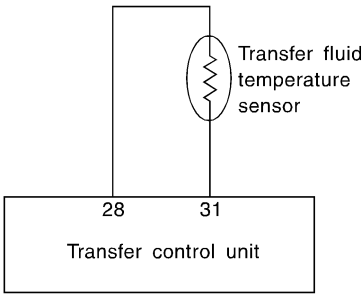
NATF0023

1	CHECK TRANSFER FLUID TEMPERATURE SENSOR	
Refer to “2-4WD Shift Solenoid Valve and Transfer Fluid Temperature Sensor”, “COMPONENT INSPECTION”, TF-142.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	CHECK CONTINUITY	
Check the following. ● Continuity of transfer sub-harness Refer to “TRANSFER TERMINAL CORD ASSEMBLY SUB-HARNESS CONNECTOR”, “COMPONENT INSPECTION”, TF-145.		
OK or NG		
OK	▶	Repair or replace fluid temperature sensor.
NG	▶	Repair or replace transfer sub-harness.

3	CHECK INPUT SIGNAL	
WITH CONSULT-II	▶	GO TO 4.
WITHOUT CONSULT-II	▶	GO TO 5.

4	CHECK INPUT SIGNAL



SMT784D

With CONSULT-II

1. Start engine.
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out the value of "FLUID TEMP SE".

Voltage:
20°C (68°F): Approx. 1.5V
80°C (176°F): Approx. 0.5V



DATA MONITOR	
MONITOR	NO DTC
VHCL/S SEN-FR	0 km/h
VHCL/S SEN-RR	0 km/h
ENGINE SPEED	775 rpm
THRTL POS SEN	0.5 V
FLUID TEMP SE	0.86 V
BATTERY VOLT	14.1 V
2WD SWITCH	ON
AUTO SWITCH	OFF
LOCK SWITCH	OFF

SMT974D

OK or NG

OK	▶	GO TO 6.
NG	▶	**Check the following.** ● Continuity between transfer control unit and transfer terminal cord assembly sub-harness connector

Diagnostic Procedure (Cont'd)

5	CHECK INPUT SIGNAL

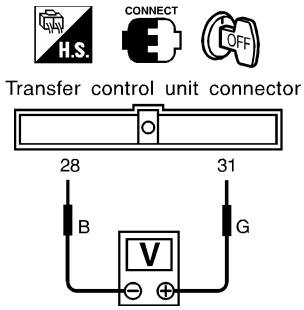
Without CONSULT-II

1. Turn ignition switch to "ON" position.
2. Check voltage between transfer control unit harness connector terminals 28 and 31.

Voltage:

20°C (68°F): Approx. 1.5V

80°C (176°F): Approx. 0.5V



SMT785D

OK or NG

OK	▶	GO TO 6.
NG	▶	**Check the following.** ● Continuity between transfer control unit and transfer terminal cord assembly sub-harness connector

6	PERFORM SELF-DIAGNOSIS AGAIN

After driving for a while, perform self-diagnosis again.
Refer to "Trouble Diagnosis without CONSULT-II", TF-59.

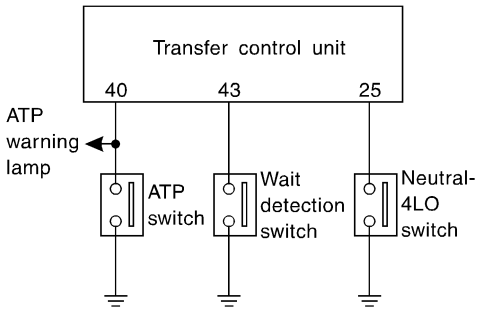
OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform transfer control unit input/output signal inspection. Refer to "TRANSFER CONTROL UNIT INSPECTION TABLE", "TROUBLE DIAGNOSIS — GENERAL DESCRIPTION", TF-86. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

Diagnostic Procedure

NATF0024

1	CHECK ATP SWITCH, WAIT DETECTION SWITCH AND NEUTRAL-4LO SWITCH



SMT786D

Refer to “ATP Switch, Neutral-4LO Switch and Wait Detection Switch”, “COMPONENT INSPECTION”, TF-143.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	CHECK CONTINUITY OF TRANSFER SUB-HARNESS

Check the following.
- Continuity of transfer sub-harness
  Refer to “TRANSFER SWITCH ASSEMBLY SUB-HARNESS CONNECTOR”, “COMPONENT INSPECTION”, TF-145.

OK or NG

OK	▶	Repair or replace ATP switch, wait detection switch or neutral-4LO switch.
NG	▶	Repair or replace transfer sub-harness.

3	CHECK INPUT SIGNAL

WITH CONSULT-II	▶	GO TO 4.
WITHOUT CONSULT-II	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

4	CHECK INPUT SIGNAL

With CONSULT-II

1. Select "ECU INPUT SIGNALS" in Data Monitor.
2. Read out the ON/OFF status of "ATP SW", "NEUTRAL SW" and "WAIT DETCT SW".

DATA MONITOR	
MONITOR	NO DTC
ATP SWITCH	OFF
N POSI SW AT	OFF
R POSI SW AT	OFF
P POSI SW AT	ON
CLOSED THL/SW	ON
ABS OPER SW	OFF
WAIT DETCT SW	OFF
SHIFT POS SW1	OFF
SHIFT POS SW2	ON

SMT976D

OK or NG

OK	▶	GO TO 6.
NG	▶	**Check the following.** ● Harness continuity between transfer switch assembly sub-harness connector and transfer control unit ● Continuity between transfer switch assembly sub-harness connector and body ground

5	CHECK INPUT SIGNAL

Without CONSULT-II

1. Turn ignition switch to "OFF" position.
2. Operate 4WD shift switch and check continuity between the following terminals.

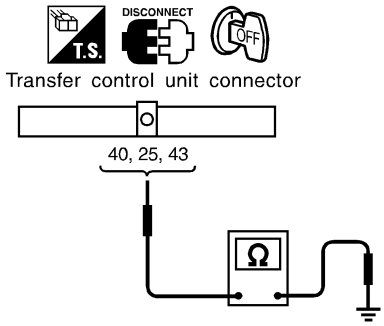
Continuity:

Terminal 40 (ATP switch) and body ground
"4H" position: No continuity should exist.
Between "4H" and "4LO": Continuity should exist.
"4LO" position: No continuity should exist.

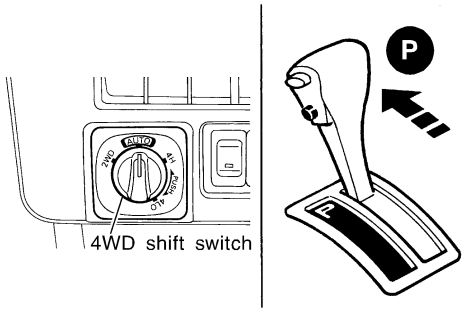
Terminal 25 (Neutral-4LO switch) and body ground
"4H" position: No continuity should exist.
"4LO" position: Continuity should exist.

Terminal 43 (Wait detection switch) and body ground
"4H" position: No continuity should exist. (*1)
"4LO" position: Continuity should exist.

*1: After setting from "4LO" to "4H", continuity exists while "Wait" function is operating in "4H" position. (No continuity exists when "Wait" function is canceled.)



SMT787D



SMT849D

OK or NG

OK	▶	GO TO 6.
NG	▶	**Check the following.** • Harness continuity between transfer switch assembly sub-harness connector and transfer control unit • Continuity between transfer switch assembly sub-harness connector and body ground

Diagnostic Procedure (Cont'd)

6	PERFORM SELF-DIAGNOSIS AGAIN	
After driving for a while, perform self-diagnosis again. Refer to "Trouble Diagnosis without CONSULT-II", TF-59.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	1. Perform transfer control unit input/output signal inspection. Refer to "TRANSFER CONTROL UNIT INSPECTION TABLE", "TROUBLE DIAGNOSIS — GENERAL DESCRIPTION", TF-86. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

Diagnostic Procedure

NATF0025

1	CHECK MALFUNCTION	
Is this malfunction detected only while driving in reverse? **Yes or No**		
Yes	▶	**CHECK A/T PNP SWITCH "R" POSITION.** Refer to AT-99, "DTC P0705 Park/Neutral Position Switch".
No	▶	GO TO 2.

2	CHECK OTHER MALFUNCTION	
Are other malfunctions also detected by self-diagnosis and CONSULT-II? Refer to "Trouble Diagnosis without CONSULT-II", TF-59 and "Trouble Diagnosis with CONSULT-II", TF-62. **Yes or No**		
Yes	▶	**CHECK FOR OTHER MALFUNCTIONS.** (When other malfunctions are eliminated, clutch pressure switch malfunction display may disappear.)
No	▶	GO TO 3.

3	CHECK 2-4WD SHIFT SOLENOID VALVE AND 4WD SHIFT SWITCH CIRCUITS	
Check 2-4WD shift solenoid valve and 4WD shift switch circuits. **OK or NG**		
OK	▶	GO TO 4.
NG	▶	Check, repair or replace faulty parts.

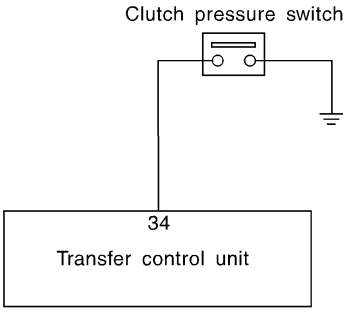
4	CHECK INPUT SIGNAL	
WITH CONSULT-II	▶	GO TO 5.
WITHOUT CONSULT-II	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

5	CHECK INPUT SIGNAL

With CONSULT-II

1. Turn ignition switch to "ON" position.
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out ON/OFF status of "CL PRES SW".



SMT788D

DATA MONITOR	
MONITOR	NO DTC
4L SWITCH	OFF
N POSI SW TF	OFF
LINE PRES SW	OFF
CL PRES SW	OFF
ATP SWITCH	OFF
N POSI SW AT	OFF
R POSI SW AT	OFF
P POSI SW AT	ON
CLOSED THL/SW	ON

SMT977D

OK or NG

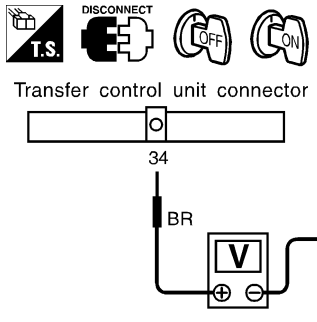
OK	▶	GO TO 7.
NG	▶	**Check the following.** ● Continuity between transfer control unit and transfer terminal cord assembly sub-harness connector ● Transfer sub-harness ● Clutch pressure switch Refer to "4WD Solenoid Valve, Clutch Pressure Switch and Line Pressure Switch", "COMPONENT INSPECTION", TF-142.

6	CHECK INPUT SIGNAL

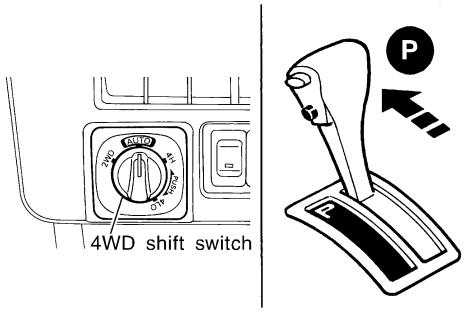
Without CONSULT-II

1. Turn ignition switch to "ON" position and set 4WD shift switch to "4H" position.
2. Check voltage between transfer control unit harness connector terminal 34 and body ground.

When 4WD shift switch is in "2WD":
Battery voltage should exist.
When 4WD shift switch is in "AUTO" or "4H" and A/T selector lever is in "D":
"Wait" operating: Battery voltage should exist.
"Wait" not operating: Approx. 0 volts should exist.



SMT789D



SMT849D

OK or NG

OK	▶	GO TO 7.
NG	▶	**Check the following.** ● Continuity between transfer control unit and transfer terminal cord assembly sub-harness connector ● Transfer sub-harness ● Clutch pressure switch Refer to "4WD Solenoid Valve, Clutch Pressure Switch and Line Pressure Switch", "COMPONENT INSPECTION", TF-142.

7	PERFORM SELF-DIAGNOSIS AGAIN

1. Check hydraulic parts.
2. After driving for a while, perform self-diagnosis again. Refer to "Trouble Diagnosis without CONSULT-II", TF-59.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform transfer control unit input/output signal inspection. Refer to "TRANSFER CONTROL UNIT INSPECTION TABLE", TF-86. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

Diagnostic Procedure

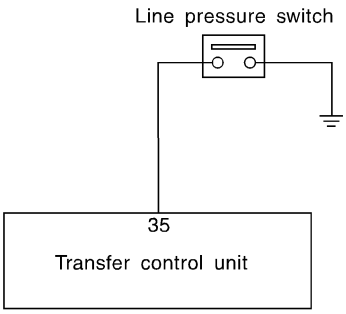
NATF0026

1	CHECK MALFUNCTION	
Is this malfunction detected only while driving in reverse? **Yes or No**		
Yes	▶	**CHECK A/T PNP SWITCH “R” POSITION.** Refer to AT-99, “DTC P0705 Park/Neutral Position Switch”.
No	▶	GO TO 2.

2	CHECK OTHER MALFUNCTIONS	
Are other malfunctions also detected by self-diagnosis and CONSULT-II? Refer to “Trouble Diagnosis without CONSULT-II”, TF-59 and “Trouble Diagnosis with CONSULT-II”, TF-62. **Yes or No**		
Yes	▶	**CHECK FOR OTHER MALFUNCTIONS.** (When other malfunctions are eliminated, line pressure switch malfunction display may disappear.)
No	▶	GO TO 3.

3	CHECK INPUT SIGNAL	
WITH CONSULT-II	▶	GO TO 4.
WITHOUT CONSULT-II	▶	GO TO 5.

4	CHECK INPUT SIGNAL



SMT790D

With CONSULT-II

1. Select "ECU INPUT SIGNALS" in Data Monitor.
2. Read out the ON/OFF status of "LINE PRES SW".

DATA MONITOR	
MONITOR	NO DTC
4L SWITCH	OFF
N POSI SW TF	OFF
LINE PRES SW	OFF
CL PRES SW	OFF
ATP SWITCH	OFF
N POSI SW AT	OFF
R POSI SW AT	OFF
P POSI SW AT	ON
CLOSED THL/SW	ON

SMT977D

OK or NG

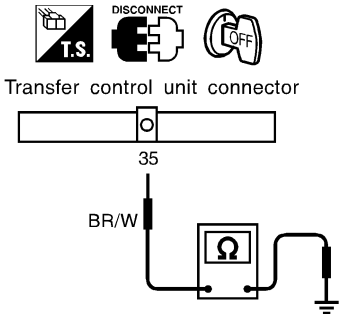
OK	▶	GO TO 6.
NG	▶	**Check the following.** ● Continuity between transfer control unit and transfer terminal cord assembly sub-harness connector ● Transfer sub-harness ● Line pressure switch Refer to "4WD Solenoid Valve, Clutch Pressure Switch and Line Pressure Switch", "COMPONENT INSPECTION", TF-142.

5	CHECK INPUT SIGNAL

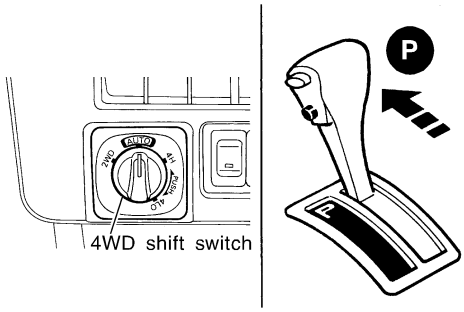
Without CONSULT-II

1. Turn ignition switch to "OFF" position.
2. Disconnect transfer control unit harness connector.
3. Check continuity between transfer control unit harness connector terminal 35 and body ground.

After the vehicle has been left for at least 5 minutes in a room temperature with ignition switch "OFF":
No continuity should exist.
With ignition switch in "ON", 4WD shift switch in "AUTO" or "4H" and A/T selector lever in "D":
Continuity should exist.



SMT791D



SMT849D

OK or NG

OK	▶	GO TO 6.
NG	▶	**Check the following.** ● Continuity between transfer control unit and transfer terminal cord assembly sub-harness connector ● Transfer sub-harness ● Line pressure switch Refer to "4WD Solenoid Valve, Clutch Pressure Switch and Line Pressure Switch", "COMPONENT INSPECTION", TF-142.

6	PERFORM SELF-DIAGNOSIS AGAIN

1. Check hydraulic parts.
2. After driving for a while, perform self-diagnosis again. Refer to "Trouble Diagnosis without CONSULT-II", TF-59.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform transfer control unit input/output signal inspection. Refer to TF-86. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

Diagnostic Procedure

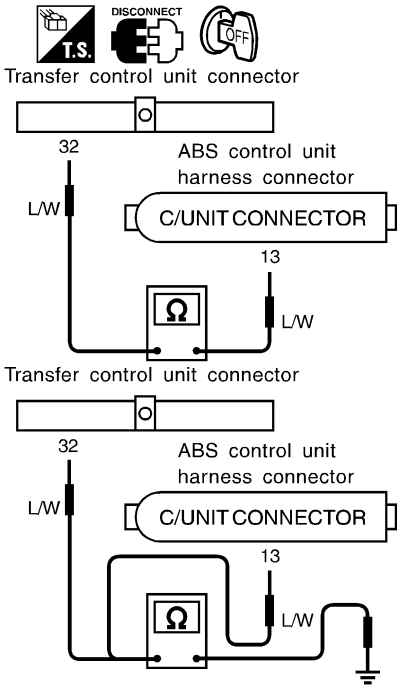
NATF0027

1	CHECK INPUT SIGNAL	
WITHOUT CONSULT-II	▶	GO TO 2.

2	CHECK INPUT SIGNAL	

Without CONSULT-II

1. Turn ignition switch to “OFF” position.
2. Disconnect ABS control unit harness connector.
3. Disconnect ABS control unit and transfer control unit harness connectors.
4. Check continuity between transfer control unit harness connector terminal 32 and ABS control unit harness connector terminal 13.
   Continuity should exist.
5. Check continuity between transfer control unit harness connector terminal 32, ABS control unit harness connector terminal 13 and body ground.
   No continuity should exist.



SMT793DA

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace harness or connector between ABS control unit and transfer control unit.

3	CHECK COMMUNICATION LINE	

Check communication line between ABS control unit and transfer control unit.
(Refer to BR-78, “8. Vehicle vibrates excessively when ABS is operating”.)

OK or NG

OK	▶	GO TO 4.
NG	▶	Check, repair or replace faulty parts.

Diagnostic Procedure (Cont'd)

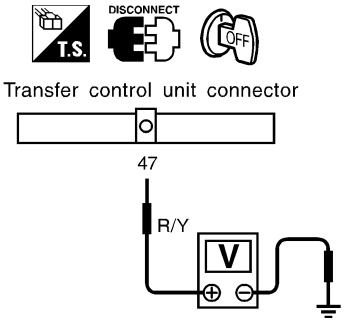
4	PERFORM SELF-DIAGNOSIS AGAIN	
After driving for a while, perform self-diagnosis again. Refer to "Trouble Diagnosis without CONSULT-II", TF-59.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	1. Perform transfer control unit input/output signal inspection. Refer to "TRANSFER CONTROL UNIT INSPECTION TABLE", "TROUBLE DIAGNOSIS — GENERAL DESCRIPTION", TF-86. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

Diagnostic Procedure

NATF0028

1	CHECK TRANSFER CONTROL UNIT POWER SOURCE

1. Turn ignition switch to “OFF” position and perform self-diagnosis again.
   Refer to “Trouble Diagnosis without CONSULT-II”, TF-59 and “Trouble Diagnosis with CONSULT-II”, TF-62.
2. Turn ignition switch to “OFF” position.
3. Disconnect transfer control unit harness connector.
4. Check voltage between transfer control unit harness connector terminal 47 and body ground.
   Voltage: Battery voltage



SMT794D

OK or NG

OK	▶	GO TO 2.
NG	▶	**Check the following.** ● No. 24 fuse (7.5A) ● Harness continuity between fuse and transfer control unit

2	PERFORM SELF-DIAGNOSIS AGAIN

After driving for a while, perform self-diagnosis again.
Refer to “Trouble Diagnosis without CONSULT-II”, TF-59 and “Trouble Diagnosis with CONSULT-II”, TF-62.

OK or NG

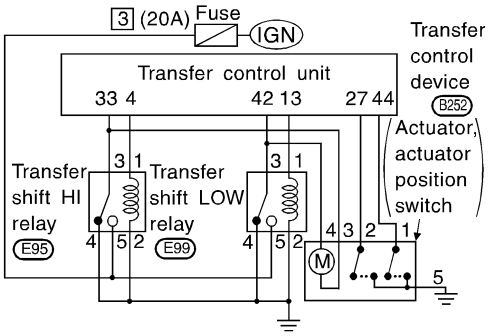
OK	▶	**INSPECTION END**
NG	▶	1. Perform transfer control unit input/output signal inspection. Refer to “TRANSFER CONTROL UNIT INSPECTION TABLE”, “TROUBLE DIAGNOSIS — GENERAL DESCRIPTION”, TF-86. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

Diagnostic Procedure

NATF0064

1	SHIFT ACTUATOR
Refer to “Actuator & Actuator Position Switch”, “COMPONENT INSPECTION”, TF-146.	
OK or NG	
OK ▶	GO TO 3.
NG ▶	GO TO 2.

2	CHECK POWER SOURCE



SMT825DA

1. Disconnect transfer control device terminal.
2. Turn ignition switch to “ON”. (Do not start engine.)
3. Check voltage between transfer control device harness connector 3 (or 4) and body ground while 4WD shift switch is set from 4H to 4LO (or from 4LO to 4H).
   Voltage: Battery voltage

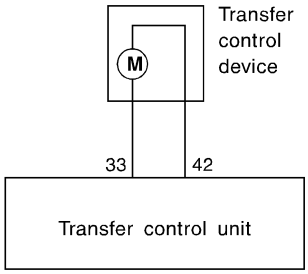
OK or NG	
OK ▶	Repair or replace actuator.
NG ▶	1. Recheck the following. ● Continuity between ignition switch and transfer HI & LOW relays ● Ignition switch and No. 3 fuse (20A) ● Continuity between transfer shift HI & LOW relays and transfer control device 2. If NG, repair or replace damaged part.

3	CHECK INPUT SIGNAL
WITH CONSULT-II ▶	GO TO 4.
WITHOUT CONSULT-II ▶	GO TO 5.

4	CHECK INPUT SIGNAL

With CONSULT-II

1. Start engine (idling).
2. Select "SELF-DIAG RESULTS" in Select Diag Mode.
3. Read out self-diagnostic result.



SMT826D

SELF-DIAG RESULTS
DTC RESULTS
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.

SMT978D

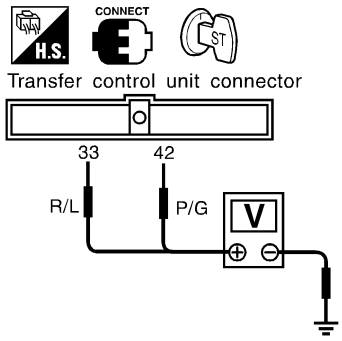
OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

5	CHECK INPUT SIGNAL

Without CONSULT-II

1. Start engine (idling).
2. Check voltage between transfer control unit harness connector terminal 33 (or 42) and body ground while 4WD shift switch is set from 4H to 4LO (or from 4LO to 4H).



SMT828D

3. Result

Terminal No.	Condition	Voltage
33	While actuator is operating from 4H to 4LO.	Battery voltage
	Actuator does not operate.	Approx. 0V
42	While actuator is operating from 4LO to 4H.	Battery voltage
	Actuator does not operate.	Approx. 0V

MTBL0202

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	CHECK HARNESS CONTINUITY BETWEEN TRANSFER CONTROL UNIT AND TRANSFER CONTROL DEVICE

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair and replace harness connector between transfer control unit and transfer control device.

7	PERFORM SELF-DIAGNOSIS AGAIN

After driving for a while, perform self-diagnosis again.
Refer to "Trouble Diagnosis without CONSULT-II", TF-59.

OK or NG

OK	▶	INSPECTION END
NG	▶	1. Perform transfer control unit/output signal inspection. Refer to "TRANSFER CONTROL UNIT INSPECTION TABLE", "TROUBLE DIAGNOSIS — GENERAL DESCRIPTION", TF-86. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

Diagnostic Procedure

NATF0065

1	SHIFT ACTUATOR POSITION SWITCH	
Refer to “Actuator & Actuator Position Switch”, “COMPONENT INSPECTION”, TF-146.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

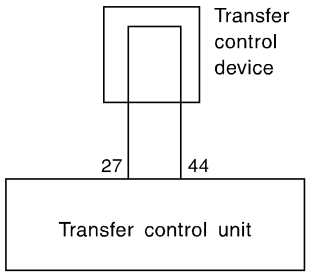
2	CHECK POSITION SWITCH	
1. Recheck continuity of shift actuator position switch. Refer to “Actuator & Actuator Position Switch”, “COMPONENT INSPECTION”, TF-146. **Continuity should exist.**		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace position switch.

3	CHECK INPUT SIGNAL	
WITH CONSULT-II	▶	GO TO 4.
WITHOUT CONSULT-II	▶	GO TO 5.

4	CHECK INPUT SIGNAL	

With CONSULT-II

1. Start engine (idling).
2. Select “SELF-DIAG RESULTS” in Select Diag Mode.
3. Read out self-diagnostic result.



SMT829DA

SELF-DIAG RESULTS
DTC RESULTS
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.

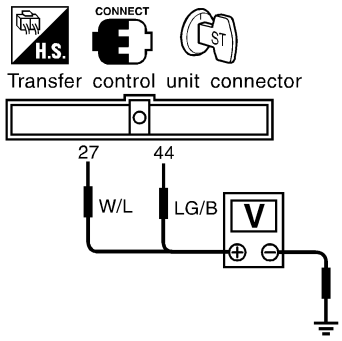
SMT978D

OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

5	CHECK INPUT SIGNAL

Without CONSULT-II

1. Start engine (idling).
2. Check voltage transfer control unit harness connector terminal 27 (or 44) and body ground while 4WD shift switch is set from 4H to 4LO (or from 4LO to 4H).



SMT830D

3. Result

Terminal No.	Condition	Voltage
27	4WD shift switch is set to 4H.	Less than 1V
	4WD shift switch is set except 4H.	Battery voltage
44	4WD shift switch is set to 4LO.	Less than 1V
	4WD shift switch is set except 4LO.	Battery voltage

MTBL0203

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	CHECK HARNESS CONTINUITY BETWEEN TRANSFER CONTROL UNIT AND TRANSFER CONTROL DEVICE

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair and replace harness connector between transfer control unit and transfer control device.

7	PERFORM SELF-DIAGNOSIS AGAIN

After driving for a while, perform self-diagnosis again.
Refer to "Trouble Diagnosis without CONSULT-II", TF-59.

OK or NG

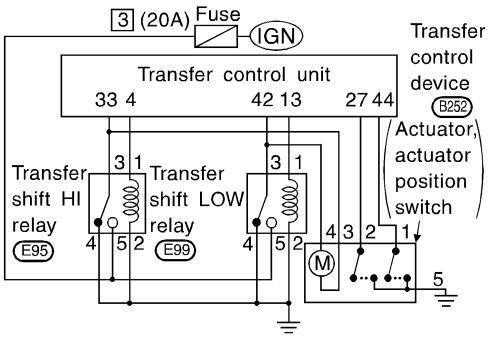
OK	▶	INSPECTION END
NG	▶	1. Perform transfer control unit/output signal inspection. Refer to "TRANSFER CONTROL UNIT INSPECTION TABLE", "TROUBLE DIAGNOSIS — GENERAL DESCRIPTION", TF-86. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

Diagnostic Procedure

NATF0066

1	SHIFT ACTUATOR CIRCUIT	
Refer to “Transfer Shift Relay (High & Low)”, “COMPONENT INSPECTION” and “Actuator & Actuator Position Switch”, “COMPONENT INSPECTION”, TF-145, 146.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace transfer shift relay and actuator and actuator position switch.

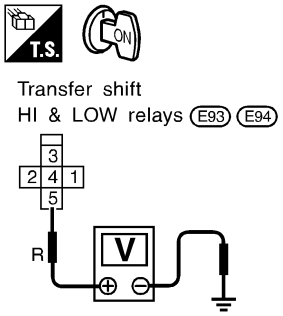
2	CHECK POWER SOURCE OF TRANSFER SHIFT (HI & LOW) RELAY	



SMT825DA

1. Disconnect transfer control device terminal.
2. Turn ignition switch to “ON” (Do not start engine).
3. Check voltage between transfer shift HI and LOW relay terminal 5 and body ground.

Voltage: Battery voltage



SMT831D

OK or NG

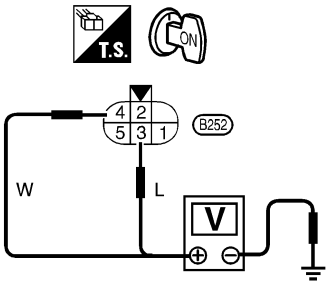
OK	▶	GO TO 3.
NG	▶	**Check the following.** • Continuity between ignition switch and transfer shift HI & LOW relays • Check ground circuit between transfer shift HI & LOW relays and body ground. • Ignition switch and No. 3 fuse (20A)

Diagnostic Procedure (Cont'd)

3	CHECK POWER SOURCE OF TRANSFER CONTROL DEVICE

1. Disconnect transfer control device terminal.
2. Turn ignition switch to "ON". (Do not start engine.)
3. Turn 4WD shift switch from "4H" to "4LO" (or from "4LO" to "4H").
4. Check voltage between transfer control device terminal 3 (or 4) and body ground.

Voltage: Battery voltage



SMT832D

OK or NG

OK	▶	GO TO 4.
NG	▶	**Check the following.** ● Harness and connector from transfer shift HI and LOW relays to transfer control device harness terminal ● Ground circuit between transfer control device and body ground.

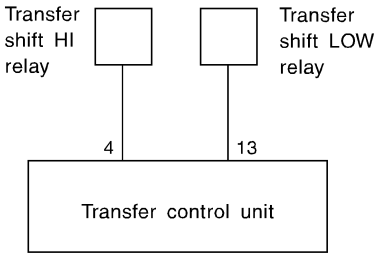
4	CHECK INPUT SIGNAL

WITH CONSULT-II	▶	GO TO 5.
WITHOUT CONSULT-II	▶	GO TO 6.

5	CHECK INPUT SIGNAL

With CONSULT-II

1. Start engine (idling).
2. Select "SELF-DIAG RESULTS" in Select Diag Mode.
3. Read out self-diagnostic result.



SMT835D

SELF-DIAG RESULTS
DTC RESULTS
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.

SMT978D

OK or NG

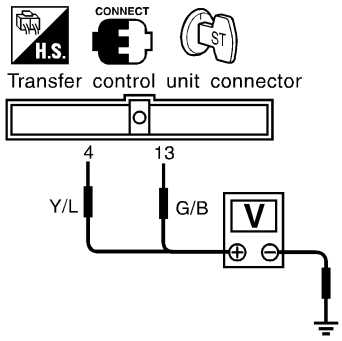
OK	▶	GO TO 8.
NG	▶	GO TO 7.

Diagnostic Procedure (Cont'd)

6	CHECK INPUT SIGNAL

Without CONSULT-II

1. Start engine (idling).
2. Check voltage between transfer control unit harness connector terminal 4 (or 13) and body ground while 4WD shift switch is set from 4H to 4LO (or from 4LO to 4H).



SMT836D

3. Result

Terminal No.	Condition	Voltage
4	While actuator is operating from 4H to 4LO.	Battery voltage
	Actuator does not operate.	Less than 1V
13	While actuator is operating from 4LO to 4H.	Battery voltage
	Actuator does not operate.	Approx. 0V

MTBL0516

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	CHECK HARNESS CONTINUITY BETWEEN TRANSFER CONTROL UNIT AND TRANSFER CONTROL DEVICE

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair and replace harness connector between transfer control unit and transfer control device.

8	PERFORM SELF-DIAGNOSIS AGAIN

After driving for a while, perform self-diagnosis again.
Refer to "Trouble Diagnosis without CONSULT-II", TF-59.

OK or NG

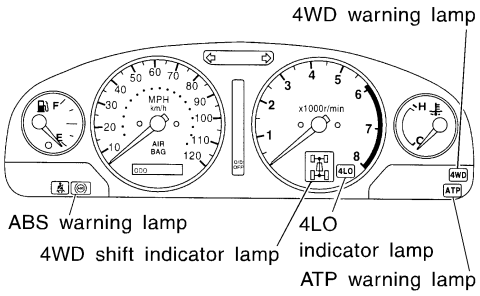
OK	▶	INSPECTION END
NG	▶	1. Perform transfer control unit/output signal inspection. Refer to "TRANSFER CONTROL UNIT INSPECTION TABLE", "TROUBLE DIAGNOSIS — GENERAL DESCRIPTION", TF-86. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

Symptom 1. 4WD Shift Indicator Lamp Does Not Turn ON

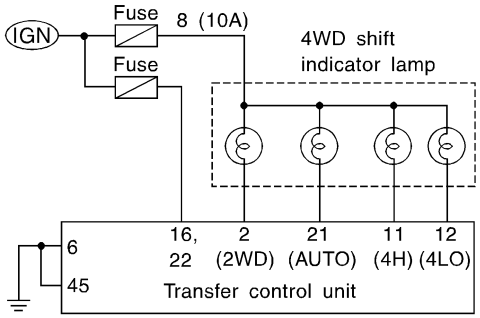
NATF0029

SYMPTOM: Although ignition switch is turned “ON”, all the 4WD shift indicator lamps do not turn ON for 1 second.

1	CHECK TRANSFER CONTROL UNIT POWER SOURCE



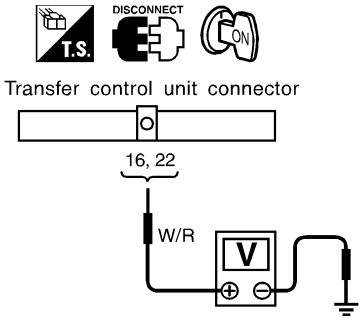
SMT994D



SMT860D

1. Turn ignition switch to “OFF” position and disconnect transfer control unit harness connector.
2. Turn ignition switch to “ON” position. (Do not start engine.)
3. Check voltage between transfer control unit harness connector terminals 16, 22 and body ground.

Voltage: Battery voltage



SMT796D

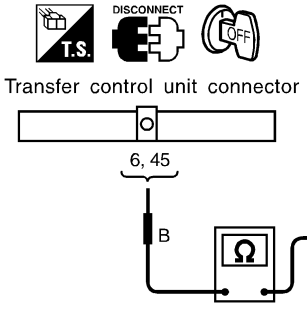
OK or NG

OK	▶	GO TO 2.
NG	▶	**Check the following.** ● Continuity between ignition switch and transfer control unit ● Ignition switch and No. 18 fuse (10A)

2	CHECK TRANSFER CONTROL UNIT GROUND CIRCUIT

1. Turn ignition switch to "OFF" position.
2. Disconnect transfer control unit harness connector.
3. Measure resistance between transfer control unit harness connector terminals 6, 45 and body ground.

Resistance: 0Ω



SMT797D

OK or NG

OK	▶	GO TO 3.
NG	▶	Check continuity between transfer control unit and body ground.

3	CHECK PROCEDURES FROM THE BEGINNING AGAIN

Check again.

OK or NG

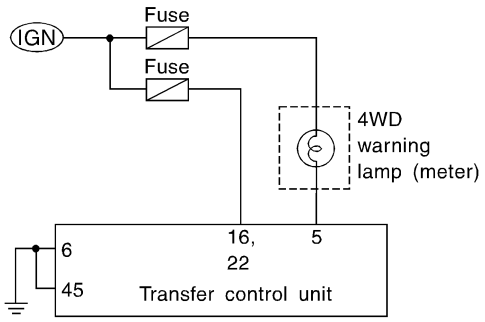
OK	▶	**INSPECTION END**
NG	▶	1. Perform transfer control unit input/output signal inspection. Refer to "TRANSFER CONTROL UNIT INSPECTION TABLE", "TROUBLE DIAGNOSIS — GENERAL DESCRIPTION", TF-86. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

Symptom 2. 4WD Warning Lamp Does Not Turn ON

=NATF0030

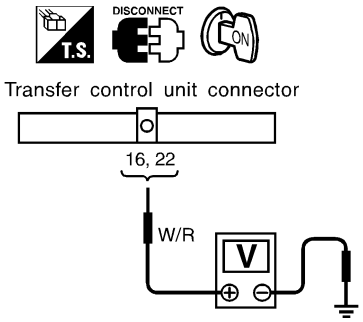
SYMPTOM: Although ignition switch is turned “ON”, 4WD warning lamp does not turn ON.

1	CHECK TRANSFER CONTROL UNIT POWER SOURCE



SMT799D

1. Turn ignition switch to “OFF” position and disconnect transfer control unit harness connector.
2. Turn ignition switch to “ON” position.
   (Do not start engine.)
3. Check voltage between transfer control unit harness connector terminals 16, 22 and body ground.
   Voltage: Battery voltage



SMT800D

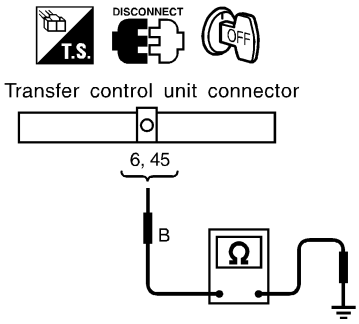
OK or NG

OK	▶	GO TO 2.
NG	▶	**Check the following.** ● Continuity between ignition switch and transfer control unit ● Ignition switch and No. 18 fuse (10A)

2	CHECK TRANSFER CONTROL UNIT GROUND CIRCUIT

1. Turn ignition switch to "OFF" position.
2. Disconnect transfer control unit harness connector.
3. Measure resistance between transfer control unit harness connector terminals 6, 45 and body ground.

Resistance: 0Ω



SMT803D

OK or NG

OK	▶	GO TO 3.
NG	▶	Check continuity between transfer control unit and body ground.

3	CHECK 4WD WARNING LAMP CIRCUIT

Check the following.
- 4WD warning lamp
- Continuity between ignition switch and 4WD warning lamp
- Continuity between 4WD warning lamp and transfer control unit

OK or NG

OK	▶	GO TO 4.
NG	▶	• Repair or replace harness or connector. • Replace 4WD warning lamp.

4	CHECK PROCEDURES FROM THE BEGINNING AGAIN

Check again.

OK or NG

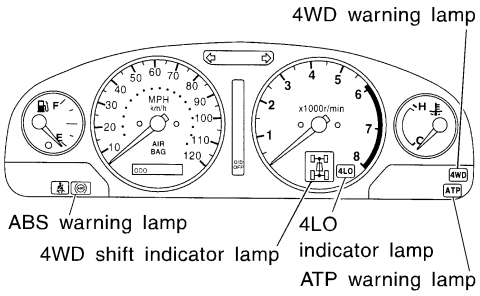
OK	▶	**INSPECTION END**
NG	▶	1. Perform transfer control unit input/output signal inspection. Refer to "TRANSFER CONTROL UNIT INSPECTION TABLE", "TROUBLE DIAGNOSIS — GENERAL DESCRIPTION", TF-86. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

Symptom 3. 4WD Shift Indicator Lamp Does Not Turn OFF

NATF0031

SYMPTOM: When 4WD shift switch is set from “4H” to “4LO”, all the 4WD shift indicator lamps do not turn OFF.

1	CHECK ATP SWITCH CIRCUIT



SMT994D

Check ATP switch circuit.
Refer to “Diagnostic Procedure”, “ATP SWITCH, WAIT DETECTION SWITCH AND NEUTRAL-4LO SWITCH”, TF-143.

OK or NG

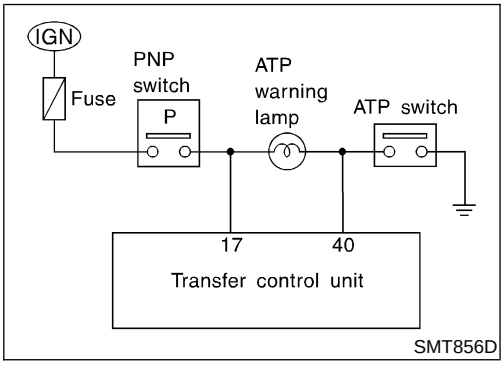
OK	▶	GO TO 2.
NG	▶	Check, repair or replace faulty parts.

2	CHECK PROCEDURE FROM THE BEGINNING AGAIN

Check again.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Recheck each connector’s pin terminals for damage or loose connection.



SMT856D

Symptom 4. ATP Warning Lamp Does Not Turn ON

NATF0032

SYMPTOM: When 4WD shift switch is set from “4H” to “4LO” with A/T selector lever in “P” position, ATP warning lamp does not turn ON.

1	CHECK ATP SWITCH CIRCUIT

Check ATP switch circuit.
Refer to “Diagnostic Procedure”, “ATP SWITCH, WAIT DETECTION SWITCH AND NEUTRAL-4LO SWITCH”, TF-143.

OK or NG

OK	▶	GO TO 2.
NG	▶	Check, repair or replace faulty parts.

2	CHECK FOLLOWING ITEMS	
Check the following. ● ATP warning lamp ● Continuity between PNP ("P" position) switch terminal 4 and ATP warning lamp ● Continuity between ATP warning lamp and ATP switch		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace ATP warning lamp, harness or connector.

3	CHECK PNP SWITCH CIRCUIT	
Check PNP switch circuit. Refer to AT-99, "DTC P0705 Park/Neutral Position Switch".		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Check, repair or replace faulty parts.

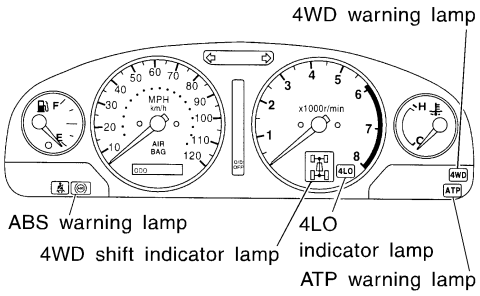
4	CHECK PROCEDURES FROM THE BEGINNING AGAIN	
Check again.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	Recheck each connector's pin terminals for damage or loose connection.

Symptom 5. 4LO Indicator Lamp Does Not Turn ON

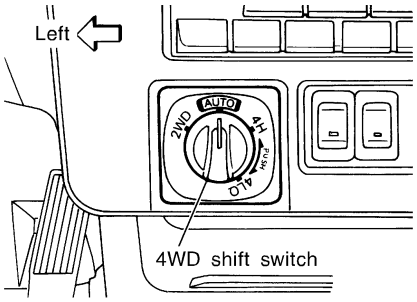
=NATF0033

SYMPTOM: When 4WD shift switch is set from “4H” to “4LO” position, 4LO indicator lamp does not turn ON.

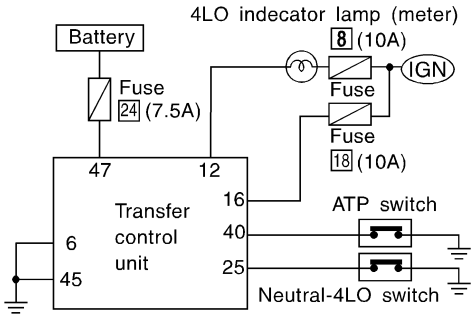
1 CHECK TRANSFER CONTROL UNIT POWER SUPPLY CIRCUIT



SMT994D



SMT851D



SMT979D

1. Disconnect battery negative terminal (−), then transfer control unit connector.
2. Connect battery negative terminal (−) and turn ignition switch “ON” (with engine stopped).
3. Check voltage across transfer control unit body-side connector terminals 47, 16 and body ground.

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 2.
NG	▶	**Check the following.** ● Continuity between battery and transfer control unit ● Ignition switch (Refer to EL-9, “Power Supply Routing”.) ● No. 24 fuse (7.5A), No. 8 fuse (10A) and No. 18 fuse (10A)

2	CHECK TRANSFER CONTROL UNIT GROUND CIRCUIT	
1. Turn ignition switch "OFF", and disconnect transfer control unit connector. 2. Check for continuity between transfer control unit body-side connector terminals 6, 45 and body ground. **Continuity should exist.** **OK or NG**		
OK	▶	GO TO 3.
NG	▶	**Check the following.** ● Continuity between transfer control unit and body ground

3	CHECK 4LO INDICATOR LAMP CIRCUIT	
Disconnect battery negative terminal (−) and check the following items: 1. Check condition of 4LO indicator lamp. 2. Check continuity between battery and 4LO indicator lamp. 3. Check continuity between 4LO indicator lamp and transfer control unit connector terminal 12. 4. Check condition of ATP switch. 5. Check condition of neutral-4LO switch. 6. Check continuity between neutral-4LO switch ground terminal 6 and body ground. **OK or NG**		
OK	▶	GO TO 4.
NG	▶	**Check the following.** ● 4LO indicator lamp ● Neutral-4LO switch Refer to "ATP Switch, Neutral-4LO Switch and Wait Detection Switch", "COMPONENT INSPECTION", TF-143.

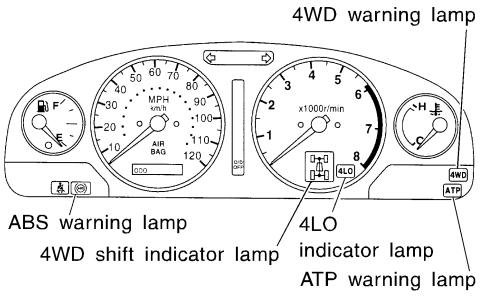
4	CHECK PROCEDURES FROM THE BEGINNING	
Check again. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	1. Perform transfer control unit input/output signal inspection. Refer to "TRANSFER CONTROL UNIT INSPECTION TABLE", "TROUBLE DIAGNOSIS — GENERAL DESCRIPTION", TF-86. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

Symptom 6. 4WD Shift Indicator Lamp Does Not Indicate “4H”

NATF0034

SYMPTOM: When 4WD shift switch is set to “4H”, 4WD shift indicator lamp does not indicate “4H”.

1	CHECk 4WD WARNING LAMP



SMT994D

Is 4WD warning lamp turned ON?

Yes or No

Yes	▶	Refer to “Trouble Diagnosis without CONSULT-II”, TF-59.
No	▶	GO TO 2.

2	CHECK FOLLOWING ITEMS

Check the following.
- Neutral-4LO switch circuit. Refer to TF-107.
- Wait detection switch circuit. Refer to TF-107.
- ATP switch circuit. Refer to TF-107.

OK or NG

OK	▶	GO TO 3.
NG	▶	Check, repair or replace faulty parts.

3	CHECK PROCEDURES FROM THE BEGINNING AGAIN

Check again.

OK or NG

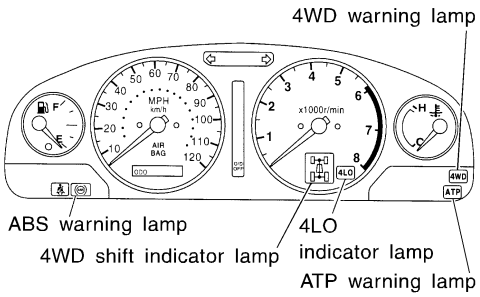
OK	▶	**INSPECTION END**
NG	▶	Recheck each connector’s pin terminals for damage or loose connection.

Symptom 7. 4WD Shift Indicator Lamp Repeats Flickering

=NATF0035

SYMPTOM: 4WD shift indicator lamp keeps flickering.

1	CHECK 4WD SHIFT INDICATOR LAMP



SMT994D

1. Set 4WD shift switch to “2WD” position.
2. Move vehicle forward and backward. Or drive straight increasing or decreasing speed under 20 km/h (12 MPH).
3. Does 4WD shift indicator lamp keep flickering?

Yes or No

Yes	▶	GO TO 2.
No	▶	**INSPECTION END**

2	CHECK TIGHT CORNER BRAKING SYMPTOM

Drive vehicle at speed under 20 km/h (12 MPH), turning steering wheel to the limit. Does tight corner braking symptom occur?

Yes or No

Yes	▶	GO TO 3.
No	▶	GO TO 4.

3	CHECK 4WD SHIFT INDICATOR LAMP

Does the 4WD shift indicator lamp keep flickering when the front wheels are jacked up?

Yes or No

Yes	▶	Check transfer unit operating system.
No	▶	Check tires.

4	CHECK 4WD WARNING LAMP

Does 4WD warning lamp flicker? (4WD shift indicator lamp is turned OFF.)

Yes or No

Yes	▶	Perform self-diagnoses. Refer to “Trouble Diagnosis without CONSULT-II”, TF-59.
No	▶	GO TO 5.

5	CHECK 4WD SHIFT INDICATOR LAMP

Does 4WD shift indicator lamp keep flickering?

Yes or No

Yes	▶	Check again.
No	▶	**INSPECTION END**

Symptom 8. Tight Corner Braking Symptom

NATF0036

SYMPTOM: Tight corner braking symptom occurs. (Hydraulic system failure)

1	CHECK INPUT SIGNAL

With CONSULT-II

1. Select “ECU INPUT SIGNALS” in Data Monitor.
2. Read out the ON/OFF status of “CLUTCH PRES SW”.

DATA MONITOR	
MONITOR	NO DTC
4L SWITCH	OFF
N POSI SW TF	OFF
LINE PRES SW	OFF
CL PRES SW	OFF
ATP SWITCH	OFF
N POSI SW AT	OFF
R POSI SW AT	OFF
P POSI SW AT	ON
CLOSED THL/SW	ON

SMT977D

Without CONSULT-II

Check voltage between transfer control unit harness connector terminal 34 and body ground.
Refer to “TRANSFER CONTROL UNIT INSPECTION TABLE”, “TROUBLE DIAGNOSIS — GENERAL DESCRIPTION”, TF-86.

OK or NG

OK	▶	**Disassemble transfer unit and check the following.** ● Control valve assembly ● 4WD solenoid valve ● 2-4WD shift solenoid valve ● Clutch piston ● Clutch assembly
NG	▶	GO TO 2.

2	CHECK CLUTCH PRESSURE SWITCH CIRCUIT

Check clutch pressure switch circuit.
Refer to “Diagnostic Procedure”, “CLUTCH PRESSURE SWITCH”, TF-111.

OK or NG

OK	▶	GO TO 3.
NG	▶	Check, repair or replace faulty parts.

3	CHECK PROCEDURES FROM THE BEGINNING AGAIN

Check again.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Recheck each connector’s pin terminals for damage or loose connection.

Symptom 9. 4WD System Does Not Operate

=NATF0037

SYMPTOM: The vehicle cannot be put into 4WD mode. (Hydraulic system failure)

1	CHECK INPUT SIGNAL

With CONSULT-II

1. Select “ECU INPUT SIGNALS” in Data Monitor.
2. Read out the ON/OFF status of “CLUTCH PRES SW”.

DATA MONITOR	
MONITOR	NO DTC
4L SWITCH	OFF
N POSI SW TF	OFF
LINE PRES SW	OFF
CL PRES SW	OFF
ATP SWITCH	OFF
N POSI SW AT	OFF
R POSI SW AT	OFF
P POSI SW AT	ON
CLOSED THL/SW	ON

SMT977D

Without CONSULT-II

Check voltage between transfer control unit harness connector terminal 34 and body ground.
Refer to “TRANSFER CONTROL UNIT INSPECTION TABLE”, “TROUBLE DIAGNOSIS — GENERAL DESCRIPTION”, TF-86.

OK or NG

OK	▶	1. Check transfer fluid level. 2. Disassemble transfer unit and check the following. ● Transfer motor ● Main oil pump assembly ● Sub-oil pump assembly ● Oil strainer ● Control valve assembly ● 2-4WD shift solenoid valve ● Oil filter element ● Lip seal ● Strainer O-ring ● Main oil pump drive gear ● Seal ring ● D-ring ● Clutch piston ● Clutch assembly
NG	▶	GO TO 2.

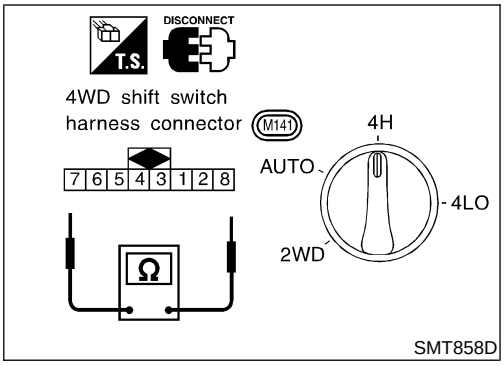
2	CHECK CLUTCH PRESSURE CIRCUIT

Check clutch pressure switch circuit.
Refer to “Diagnostic Procedure”, “CLUTCH PRESSURE SWITCH”, TF-111.

OK or NG

OK	▶	GO TO 3.
NG	▶	Check, repair or replace faulty parts.

3	CHECK PROCEDURES FROM THE BEGINNING	
Check again. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	Recheck each connector's pin terminals for damage or loose connection.

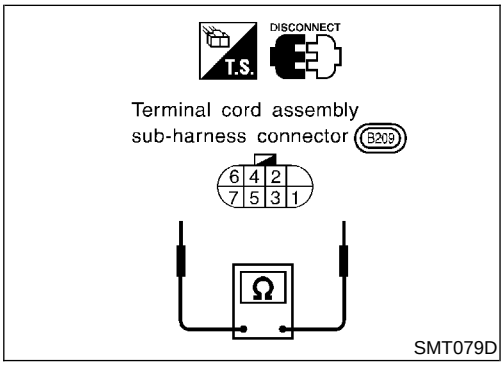


4WD Shift Switch

NATF0038S01

Check continuity between each terminal.

Terminals	Switch position	Continuity
1 - 2	2WD	Yes
	Except 2WD	No
1 - 3, 1 - 4	AUTO	Yes
	Except AUTO	No
1 - 4, 1 - 5	4H	Yes
	Except 4H	No
1 - 4, 1 - 6	4LO	Yes
	Except 4LO	No

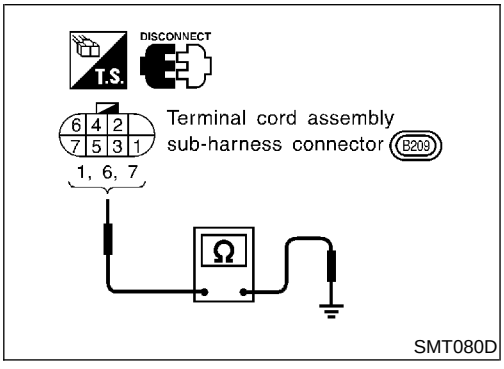


2-4WD Shift Solenoid Valve and Transfer Fluid Temperature Sensor

NATF0038S02

Measure resistance between terminals of transfer terminal cord assembly sub-harness connector located on rear-right of transfer unit.

Component parts	Terminals	Resistance
2-4WD shift solenoid valve	4 - 5	Approx. 20°C (68°F): Approx. 22.8 - 25.2Ω
Transfer fluid temperature sensor	2 - 3	Approx. 20°C (68°F): Approx. 2.5 kΩ Approx. 80°C (176°F): Approx. 0.3 kΩ

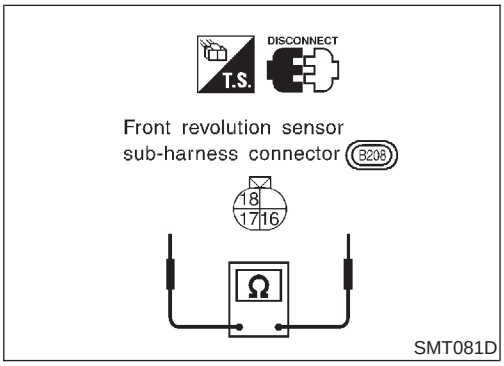


4WD Solenoid Valve, Clutch Pressure Switch and Line Pressure Switch

NATF0038S03

Measure resistance between terminals of transfer terminal cord assembly sub-harness connector located on rear-right of transfer unit.

Component parts	Terminals		Remarks
4WD solenoid valve	6	Ground terminal	Approx. 20°C (68°F): Approx. 3.0 - 3.4Ω
Clutch pressure switch	7		In room temperature ● 2-4WD shift solenoid valve "OFF": No continuity ● 2-4WD shift solenoid valve and transfer motor "ON": Continuity exists
Line pressure switch	1		In room temperature ● Turn ignition switch to "OFF" position and leave vehicle for more than 5 minutes. (OFF): No continuity ● Transfer motor "ON": Continuity exists



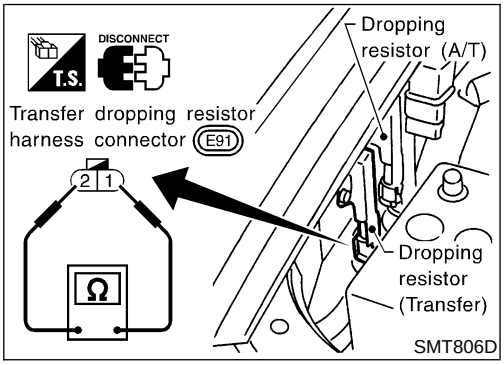
SMT081D

Front Revolution Sensor

NATF0038S04

Measure resistance between terminals of front revolution sensor sub-harness connector located on rear-right of transfer unit.

Terminals	Resistance
16 - 17	500 - 650Ω
18 - 17	No continuity
18 - 16	No continuity



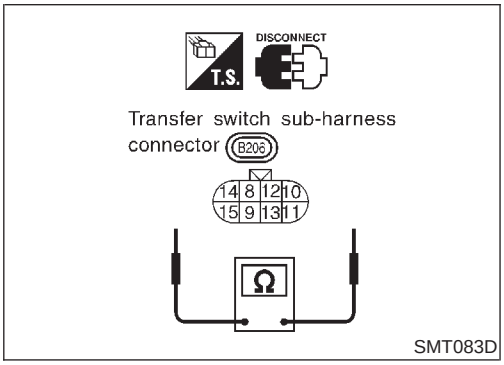
SMT806D

Transfer Dropping Resistor

NATF0038S07

Check resistance between terminals.

Resistance: 11.2 - 12.8 Ω



SMT083D

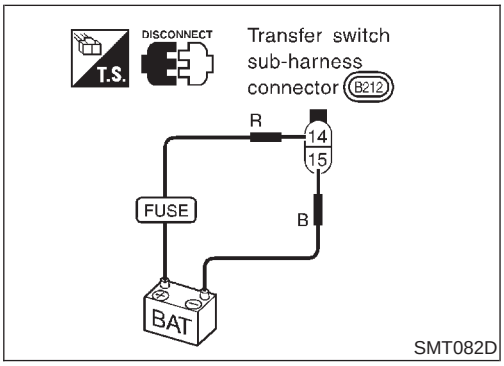
ATP Switch, Neutral-4LO Switch and Wait Detection Switch

NATF0038S06

Measure resistance between terminals of transfer switch assembly sub-harness connector located on rear-right of transfer unit.

Switch	Terminals	4WD shift switch position		
		4H	(N)	4LO
ATP switch	8 - 9	No continuity	Continuity	No continuity
Neutral-4LO switch	12 - 13	No continuity		Continuity
Wait detection switch	10 - 11	No continuity		Continuity
		(Note) ← -		

NOTE:
When shifting from "4LO" to "4H", continuity exists while "Wait" function is operating. (No continuity exists when "Wait" function is canceled.)

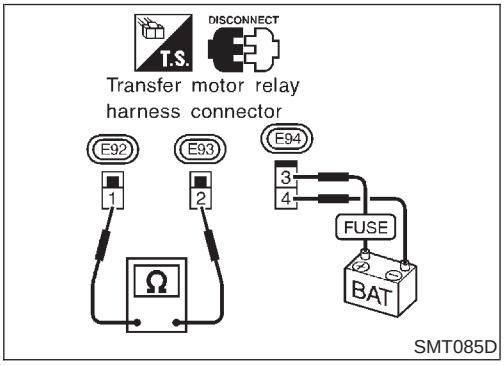


SMT082D

Transfer Motor

NATF0038S05

Apply battery voltage directly to transfer motor assembly sub-harness connector located on rear-right of transfer unit. (Positive: Terminal 14, Negative: Terminal 15)
Transfer motor should operate.



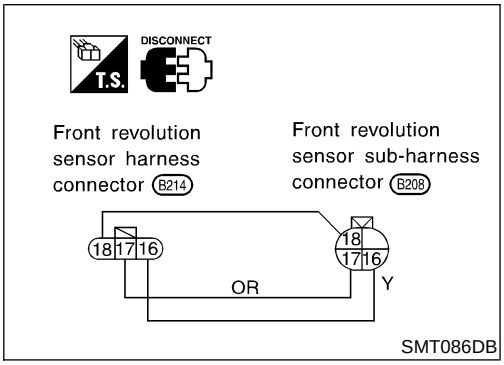
SMT085D

Transfer Motor Relay

NATF0038S08

1. Apply battery voltage directly to terminals 3 and 4.
2. Check continuity between terminals 1 and 2.

Condition	Continuity (1 - 2)
Battery voltage is applied	Yes
No voltage is applied	No



SMT086DB

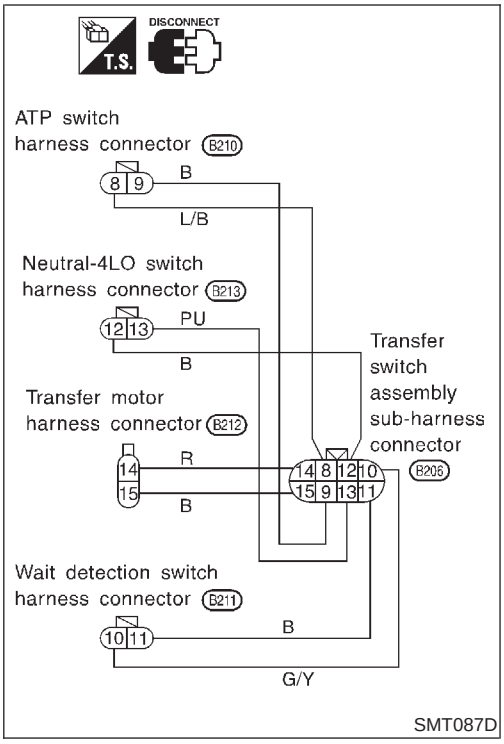
Transfer Sub-harness

NATF0038S09

FRONT REVOLUTION SENSOR SUB-HARNESS CONNECTOR

NATF0038S0901

Check continuity between terminals shown in the figure.

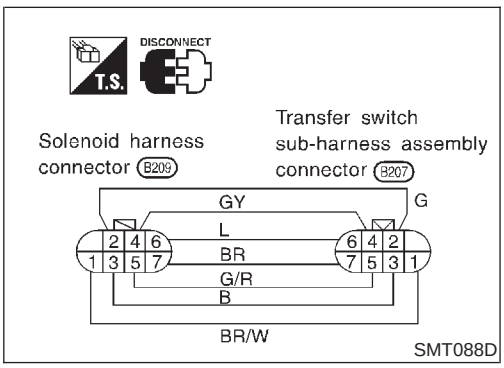


SMT087D

TRANSFER SWITCH ASSEMBLY SUB-HARNESS CONNECTOR

NATF0038S0902

Check continuity between terminals shown in the figure.



SMT088D

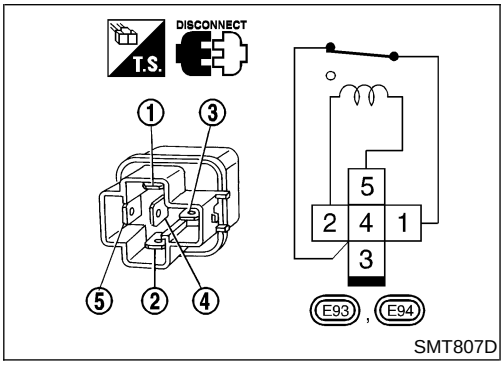
TRANSFER TERMINAL CORD ASSEMBLY SUB-HARNESS CONNECTOR

NATF0038S0903

Check continuity between terminals shown in the figure.

Terminals on solenoid valve

Terminals	Components
6	4WD solenoid valve
4, 5	2-4WD shift solenoid valve
2, 3	Transfer fluid temperature sensor
7	Clutch pressure switch
1	Line pressure switch



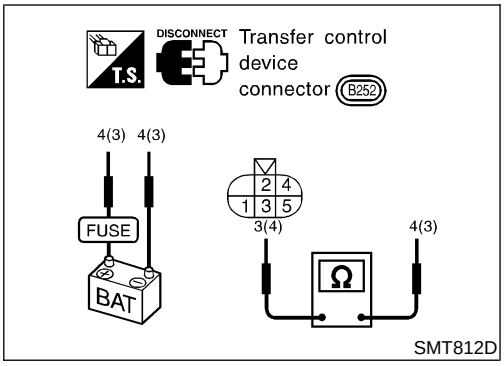
SMT807D

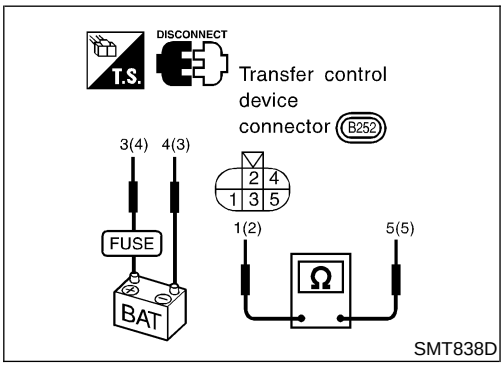
Transfer Shift Relay (High & low)

NATF0038S10

Check continuity between terminals 3 and 4.

Condition	Continuity
12V direct current supply between terminals 1 and 2	No
No current supply	Yes





Actuator & Actuator Position Switch

NATF0038S11

ACTUATOR

NATF0038S1101

Operation & resistance check

- Apply battery voltage directly to actuator assembly.

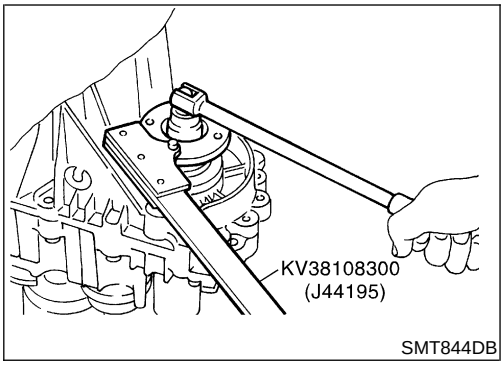
Operating check	Battery positive terminal	Battery negative terminal
1	4	3
2	3	4
Check	Approx. 0.2Ω (When the motor is not operated.)	

ACTUATOR POSITION SWITCH

NATF0038S1102

Continuity check

Continuity check	Battery positive terminal	Battery negative terminal	Continuity
1	4	3	1 - 5
2	3	4	2 - 5



SMT844DB

Replacing Oil Seal

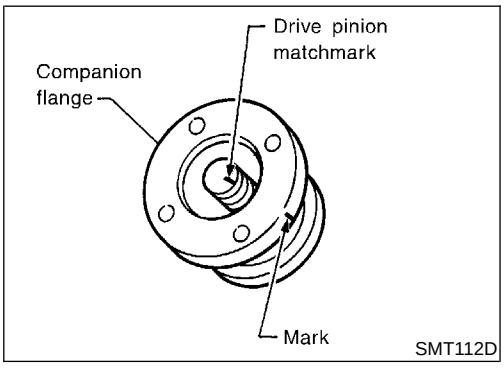
NATF0068

FRONT CASE OIL SEAL

NATF0068S01

1. Drain transfer fluid.
2. Remove exhaust front tube and heat insulator. Refer to “Removal”, TF-150.
3. Remove front propeller shaft. Refer to PD-8, “Removal and Installation”.
4. Remove companion flange lock nut.

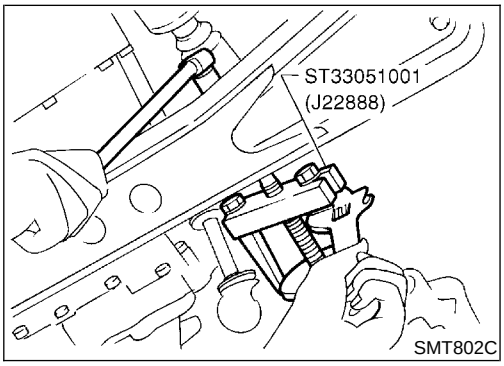
- **Do not reuse lock nut.**



SMT112D

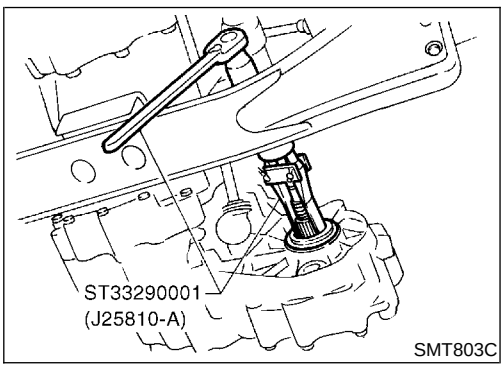
5. Put a matchmark on top of drive pinion thread. The mark should be in line with the mark on the companion flange.

- **Always mark top of drive pinion screw using paint.**



SMT802C

6. Remove companion flange.

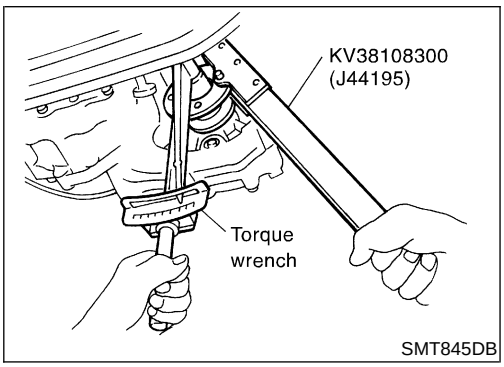


SMT803C

7. Remove front case oil seal.
8. Install front case oil seal.

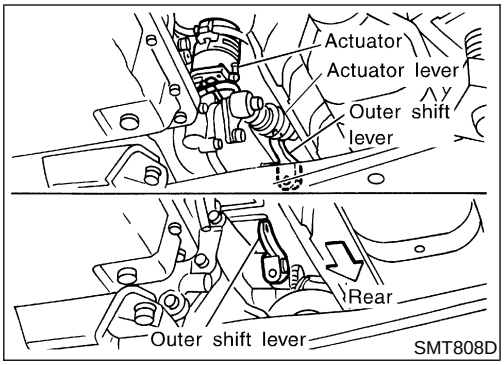
- **Before installing, apply multi-purpose grease to seal lip.**

9. Install companion flange.



SMT845DB

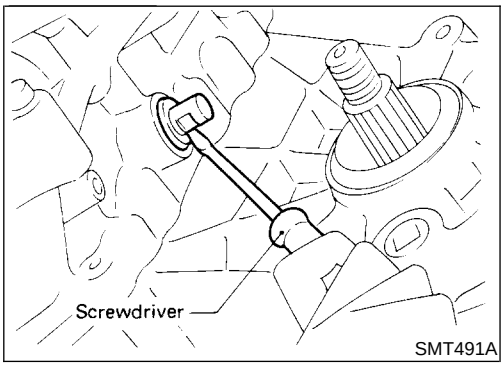
10. Tighten nut to the specified torque. Refer to TF-152.
11. Install front propeller shaft.



SHIFT SHAFT OIL SEAL

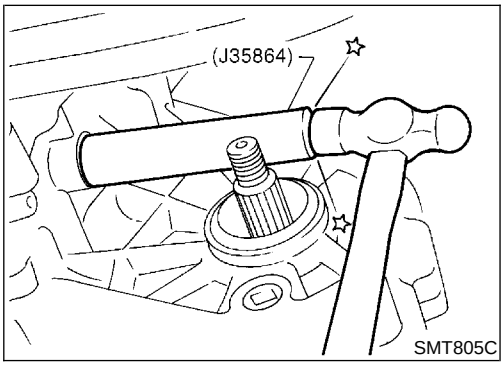
NATF0068S02

1. Remove front propeller shaft. Refer to PD-8, "Removal and Installation".
2. Remove companion flange. Refer to "FRONT CASE OIL SEAL", TF-147.
3. Remove actuator lever from transfer outer shift lever. Then remove outer shift lever.



4. Remove shift shaft oil seal.

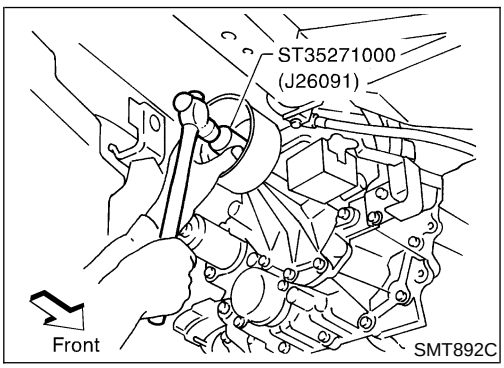
- **Be careful not to damage cross shaft.**



5. Install shift shaft oil seal.

- **Before installing, apply multi-purpose grease to seal lip.**

6. Install transfer control linkage.
7. Install companion flange. Refer to "FRONT CASE OIL SEAL", TF-147.
8. Install front propeller shaft.



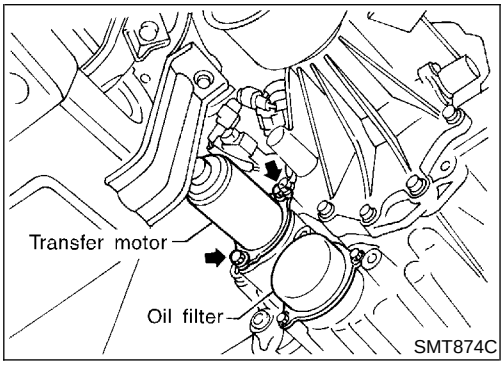
REAR OIL SEAL

NATF0068S03

1. Remove rear propeller shaft. Refer to PD-8, "Removal and Installation".
2. Remove rear oil seal.
3. Install rear oil seal.

- **Before installing, apply multi-purpose grease to seal lip.**

4. Install rear propeller shaft.



Transfer Motor

REMOVAL

NATF0069

1. Disconnect transfer motor harness connector.
2. Remove breather pipe from transfer motor.
3. Remove bolts to detach transfer motor.

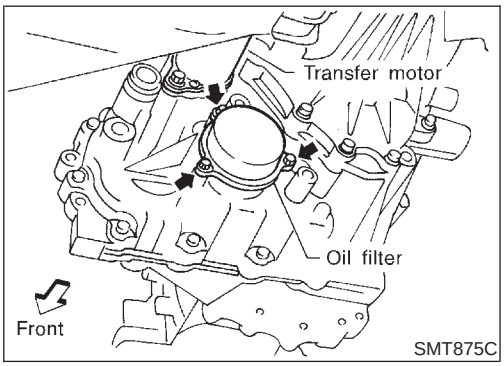
- **After removing transfer motor, be sure to replace O-ring with new one.**

INSTALLATION

NATF0070

1. Apply petroleum jelly or ATF to O-ring.

2. Align width across flat-notch with oil pump groove, and install transfer motor.
3. Tighten bolts.
   : 41 - 48 N·m (4.2 - 4.9 kg-m, 30 - 35 ft-lb)
4. Install breather pipe to transfer motor.
5. Connect transfer motor harness connector.



Transfer Oil Filter

REMOVAL

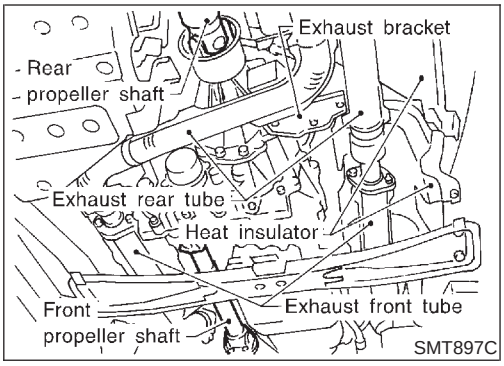
NATF0071

- Remove bolts to detach oil filter.
- **When removing oil filter from transfer, avoid damaging it. Be sure to loosen bolts evenly.**
- **When removing oil filter, be sure to replace O-ring with new one.**

INSTALLATION

NATF0072

1. Apply petroleum jelly or ATF to O-ring.
2. Tighten bolts evenly to install oil filter.
   : 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)
- **Be sure not to damage oil filter.**



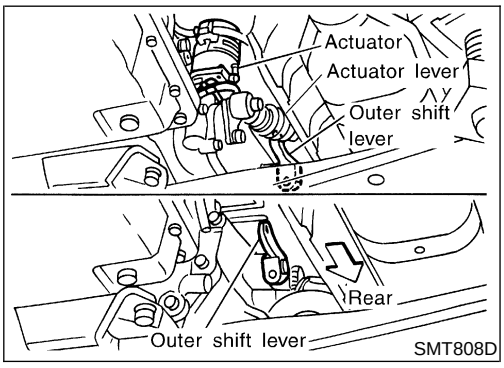
Removal

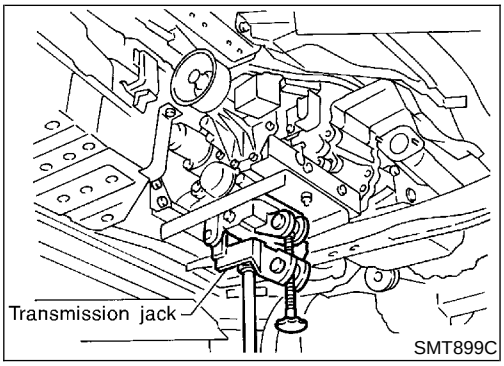
NATF0073

1. Remove exhaust front and rear tubes. Refer to FE-8, “EXHAUST SYSTEM”.
2. Remove front and rear propeller shaft. Refer to PD-8, “Removal and Installation”.
3. Insert plug into rear oil seal after removing propeller shaft.

- **Be careful not to damage spline, sleeve yoke and rear oil seal, when removing propeller shaft.**

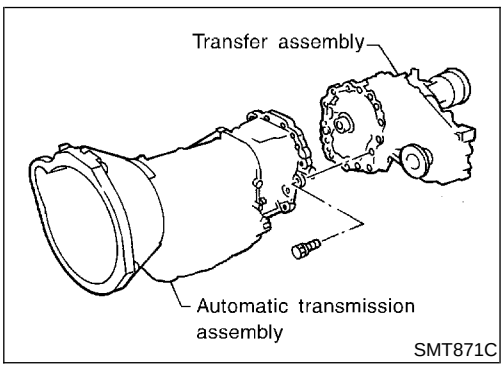
4. Disconnect neutral-4LO switch, front revolution sensor, ATP switch, transfer motor and 4WD shift switch harness connectors.
5. Remove center console and A/T control device.
6. Remove floor panel for transfer.
7. Remove upper side fixing bolt for A/T and TF.
8. Remove actuator lever from transfer outer shift lever and remove sub-oil pump from transfer.
9. Remove remaining fixing bolt for AT and TF.

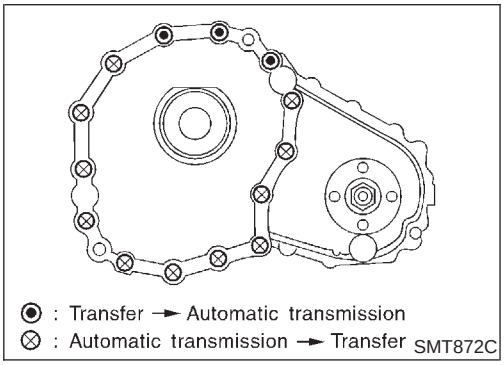




10. Remove transfer from transmission.

WARNING:
Support transfer while removing it.





Installation

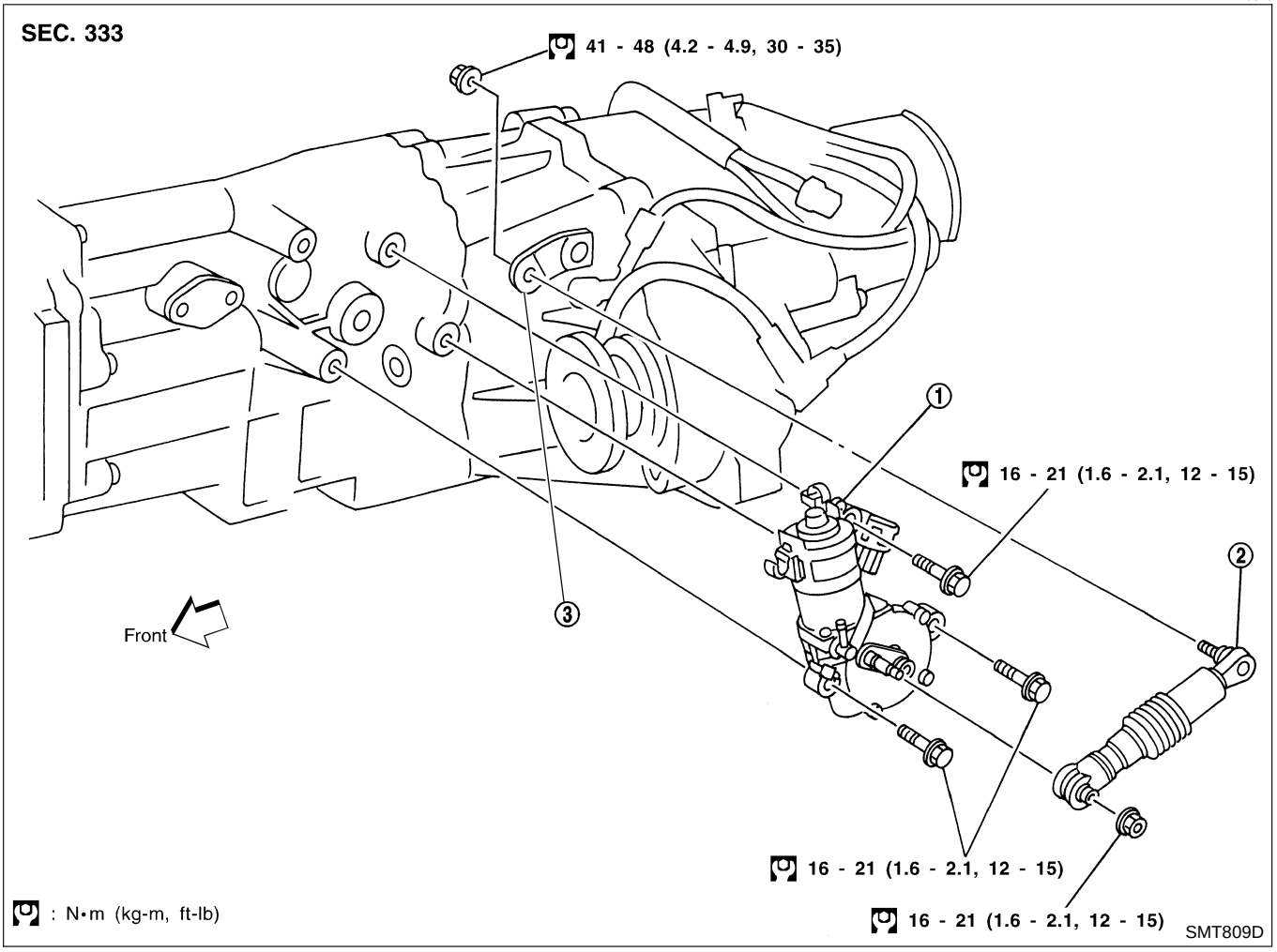
NATF0074

- Tighten bolts securing transfer.

Bolt length:
45 mm (1.77 in)
Tightening torque:
: 31 - 42 N·m (3.2 - 4.3 kg-m, 23 - 31 ft-lb)

Transfer Gear Control

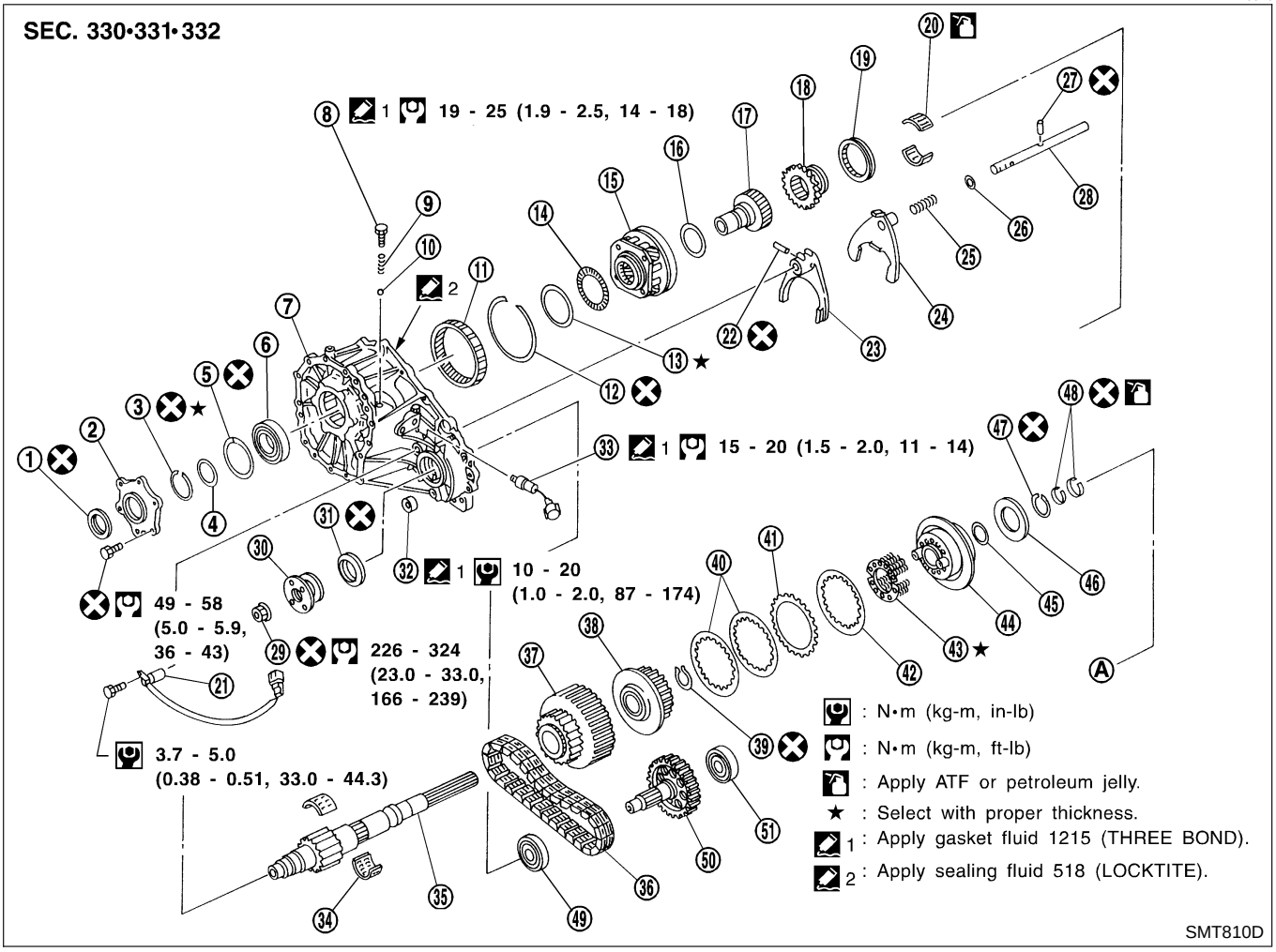
NATF0075



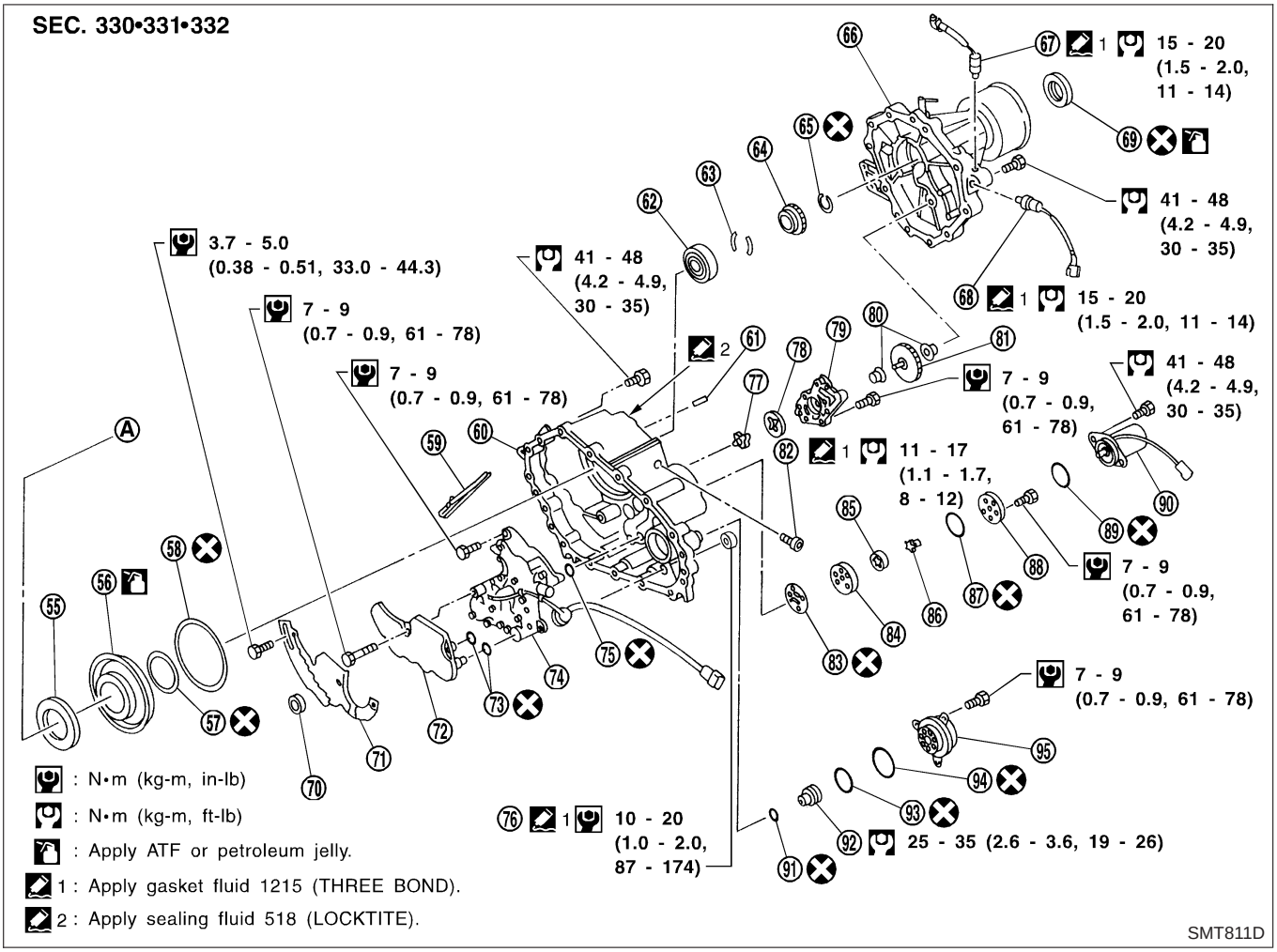
1. Actuator
2. Actuator lever
3. Outer shift lever

Transfer Components

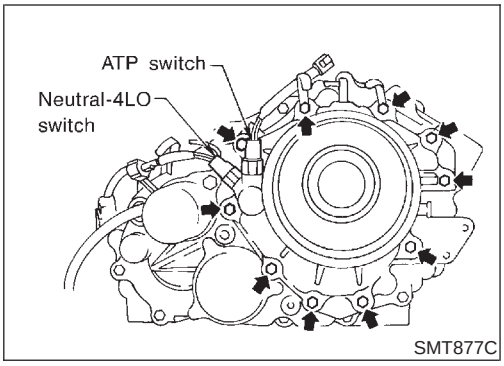
NATF0076



1. Oil seal
2. Transfer cover
3. Snap ring
4. Washer
5. Snap ring
6. Main gear bearing
7. Front case
8. Check plug
9. Check spring
10. Check ball
11. Internal gear
12. Snap ring
13. Bearing race
14. Thrust needle bearing
15. Planetary carrier
16. Thrust needle bearing
17. Sun gear
18. L-H sleeve
19. 2-4 sleeve
20. Radial needle bearing
21. Front revolution sensor
22. Roll pin
23. L-H fork
24. 2-4 fork
25. Shift fork spring
26. Fork guide
27. Roll pin
28. Shift rod
29. Self-lock nut
30. Companion flange
31. Oil seal
32. Drain plug
33. Wait detection switch
34. Needle bearing
35. Mainshaft
36. Drive chain
37. Clutch drum
38. Clutch hub
39. Snap ring
40. Driven plate
41. Drive plate
42. Retaining plate
43. Return spring assembly
44. Press flange
45. Washer
46. Thrust needle bearing
47. Snap ring
48. Seal ring
49. Front bearing
50. Front drive shaft
51. Rear bearing



55. Thrust needle bearing race
56. Clutch piston
57. D-ring
58. Lip seal
59. Oil gutter
60. Center case
61. Stem bleeder
62. Mainshaft rear bearing
63. Thrust washer
64. Speedometer drive gear
65. Snap ring
66. Rear case
67. ATP switch
68. Neutral-4LO switch
69. Oil seal
70. Magnet
71. Baffle plate
72. Oil strainer
73. O-ring
74. Control valve assembly
75. Lip seal (7 pieces)
76. Filler plug
77. Inner gear
78. Outer gear
79. Oil pump housing
80. Bushing
81. Oil pump shaft
82. Oil pressure check plug
83. Oil pump gasket
84. Sub-oil pump housing
85. Outer gear
86. Inner gear
87. O-ring
88. Sub-oil pump cover
89. O-ring
90. Transfer motor
91. O-ring
92. Oil filter stud
93. O-ring
94. O-ring
95. Oil filter

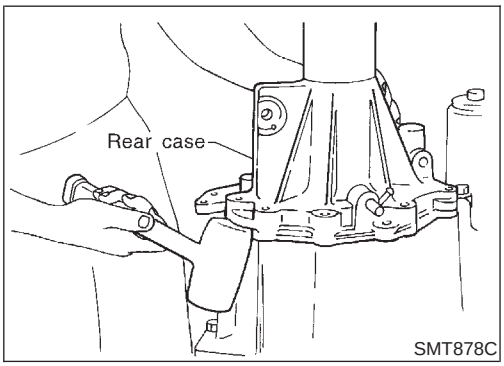


Rear Case

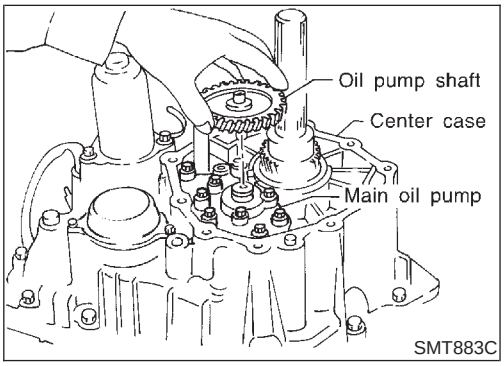
DISASSEMBLY

NATF0077

1. Remove neutral-4LO switch and ATP switch.
2. Remove bolts.



3. Remove rear case from center case by tapping it lightly with a plastic hammer.

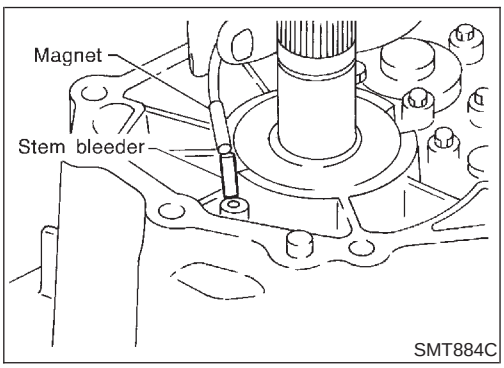


Center Case

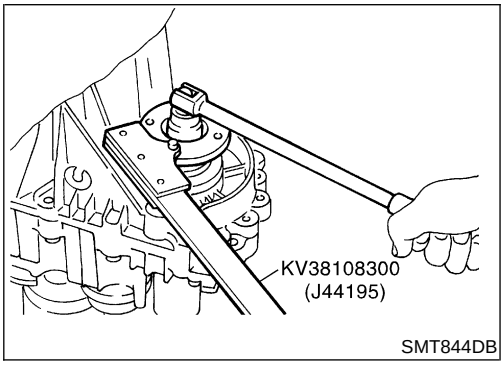
DISASSEMBLY

NATF0078

1. Remove oil pump shaft from main oil pump.

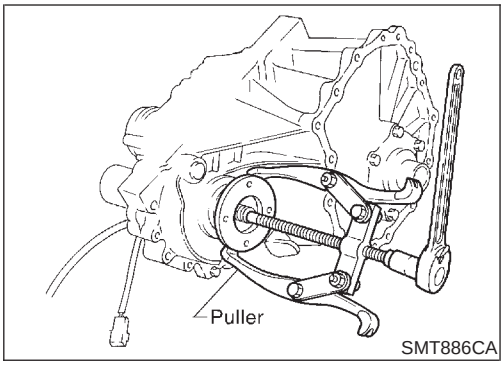


2. Remove stem bleeder from bleeder hole.

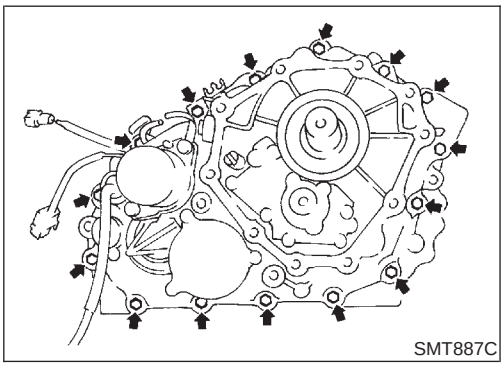


3. Remove lock nut from companion flange.

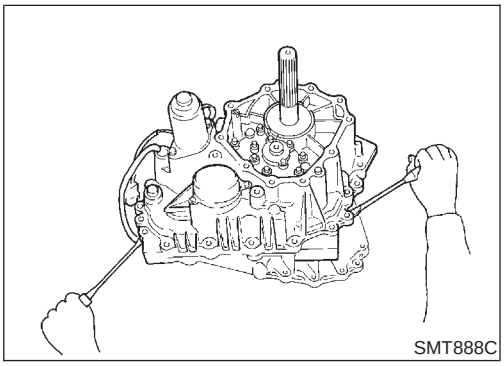
- **Do not reuse lock nut.**



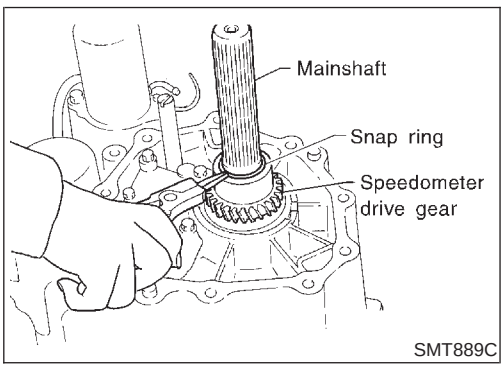
4. Remove companion flange.



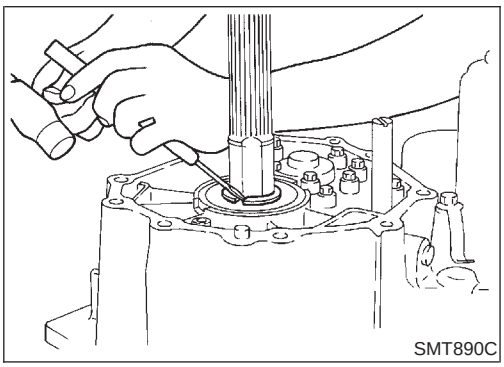
5. Remove bolts.



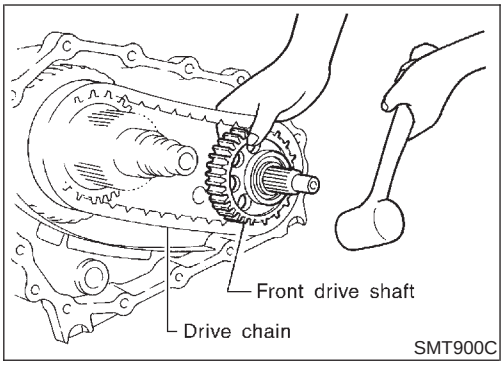
6. Insert screwdrivers as shown in the figure, and separate center case from front case. Then, remove center case by levering it up with a tire lever or the like.



7. Remove snap ring from mainshaft.
- **Do not reuse snap ring.**



8. Remove C-rings from mainshaft bearing.

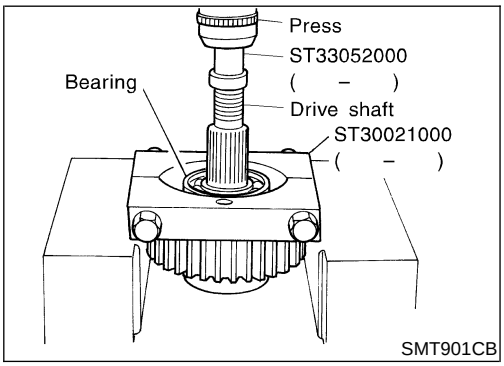


Front Drive Shaft and Drive Chain

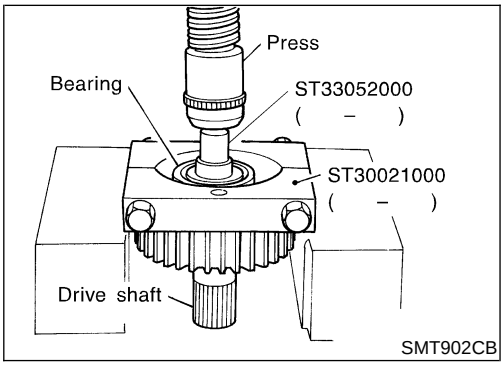
NATF0078S01

1. Remove oil gutter from center case.
2. With front drive shaft held by one hand as shown in the figure, tap center case with a plastic hammer to remove it with drive chain.

- **Do not tap drive chain with a plastic hammer.**



3. Set a puller (ST30021000) and an adapter (ST33052000). Remove front drive shaft front bearing.

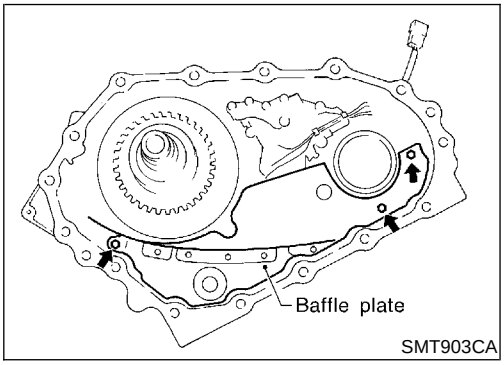


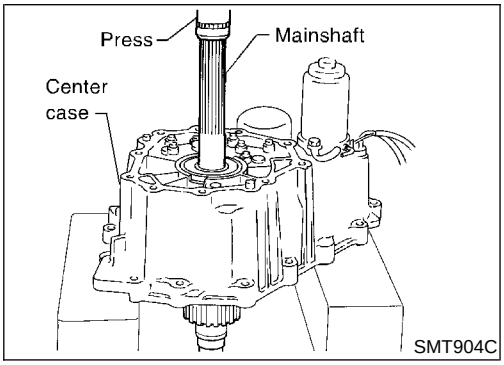
4. Set the puller (ST30021000) and the adapter (ST33052000). Remove front drive shaft rear bearing.

Mainshaft and Clutch Drum

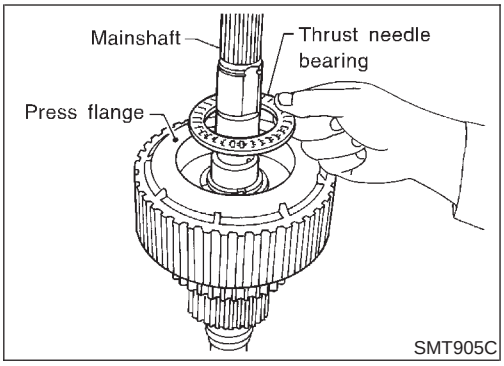
NATF0078S02

1. Remove mounting bolts to detach baffle plate.

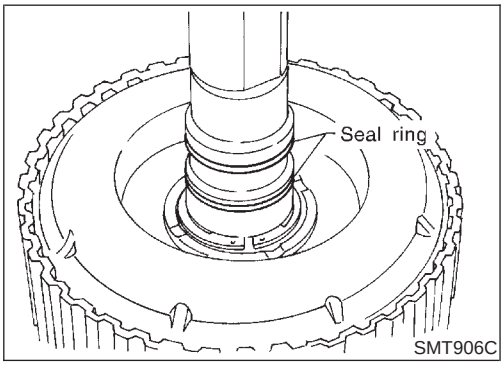




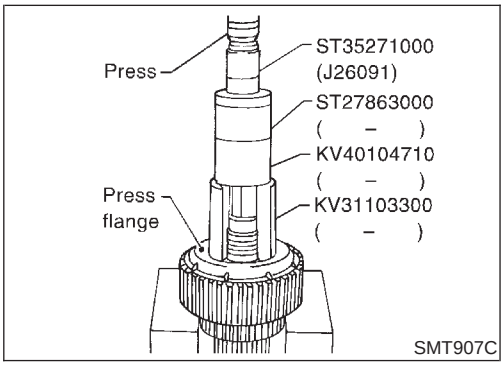
2. Set center case to press stand. Remove mainshaft from center case.



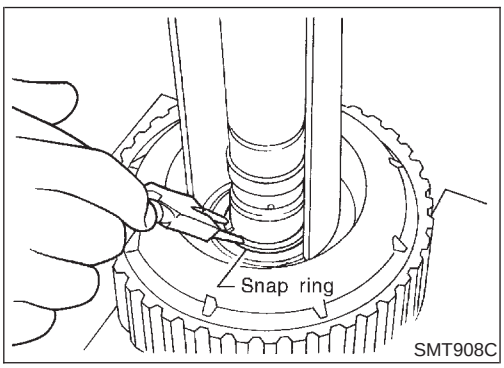
3. Remove thrust needle bearing from press flange.



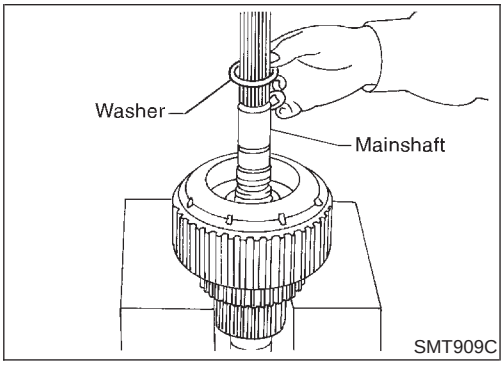
4. Remove seal ring from mainshaft.
- **Do not reuse seal ring.**



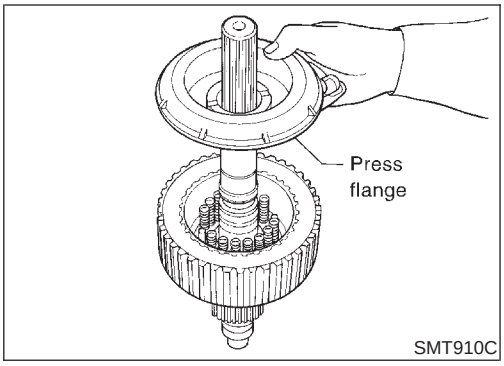
5. Set a drift (KV31103300), a support ring (KV40104710), a support ring (ST27863000) and a drift (ST35271000) to press flange as shown in the figure. Press drift until snap ring is out of place.



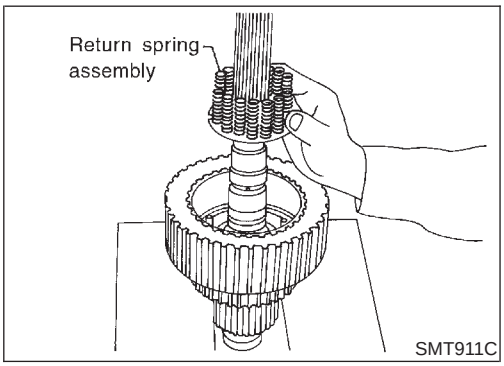
6. Remove snap ring from mainshaft.
- **Do not reuse snap ring.**



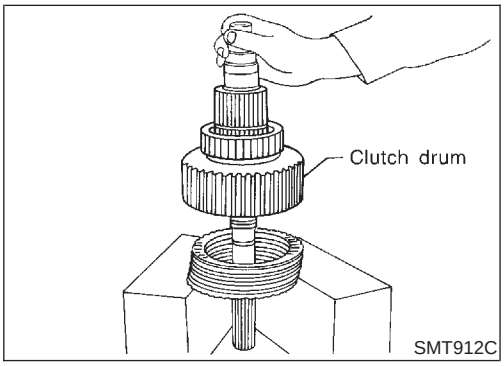
7. Remove washer.



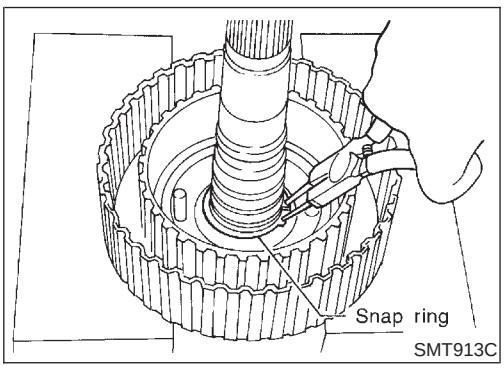
8. Remove press flange from mainshaft.



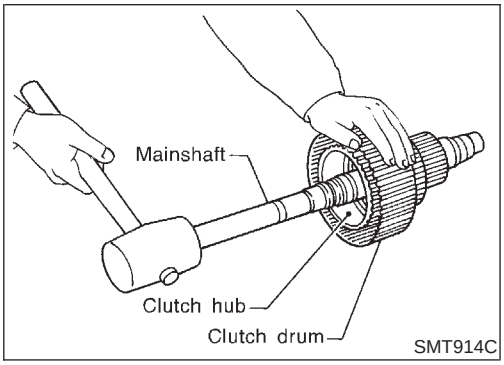
9. Remove return spring assembly from clutch hub.



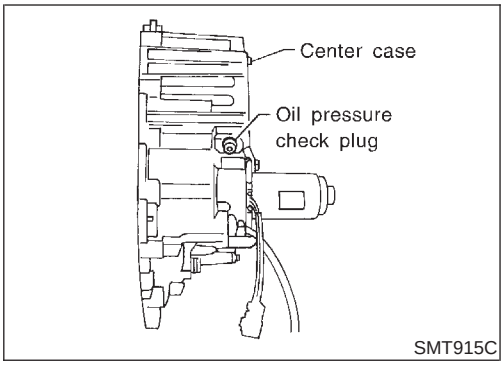
10. Remove each plate from clutch drum.



11. Remove snap ring from mainshaft.
- **Do not reuse snap ring.**



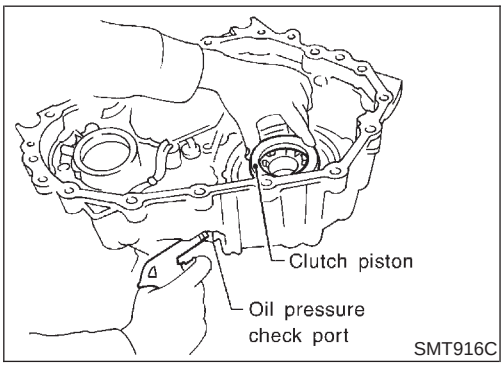
12. Tap mainshaft with a plastic hammer to remove it from clutch drum and clutch hub.
13. Remove needle bearing from mainshaft.



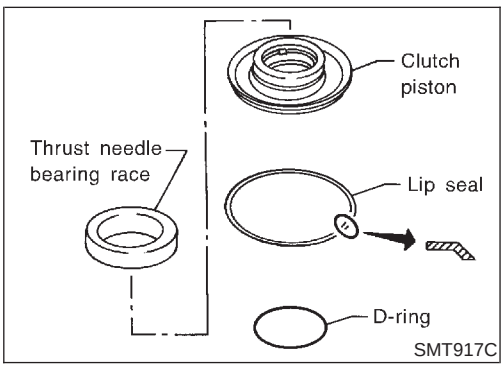
Clutch Piston

NATF0078S03

1. Remove oil pressure check plug from oil pressure check port.



2. Apply air gradually from oil pressure check port, and remove clutch piston from center case.



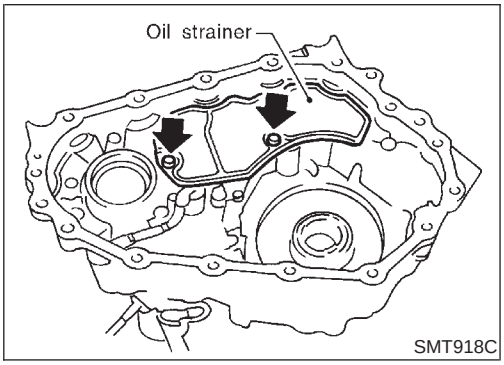
3. Remove lip seal and D-ring from clutch piston.
- **Do not reuse lip seal and D-ring.**

4. Remove thrust needle bearing race from clutch piston by hooking a screwdriver edge into 4 notches of thrust needle bearing race.

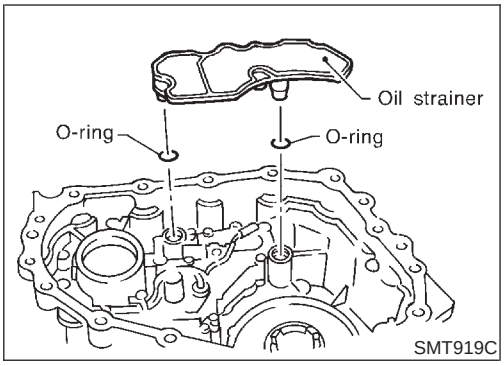
Control Valve

NATF0078S04

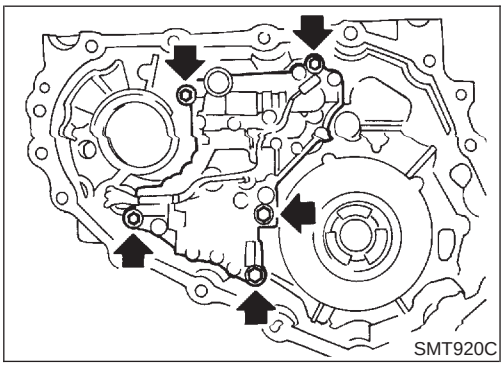
CAUTION:
- **Do not reuse any part that has been dropped or damaged.**
- **Make sure valve is assembled in the proper direction.**
- **Do not use a magnet because residual magnetism stays during disassembly.**



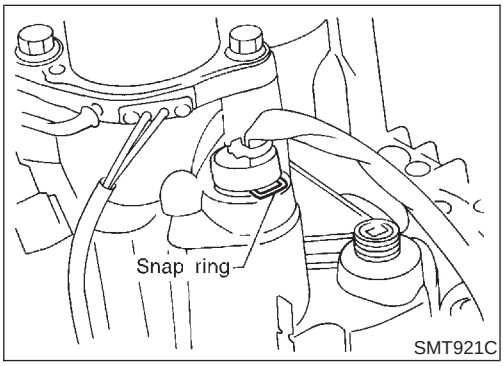
1. Remove bolts, and detach oil strainer.



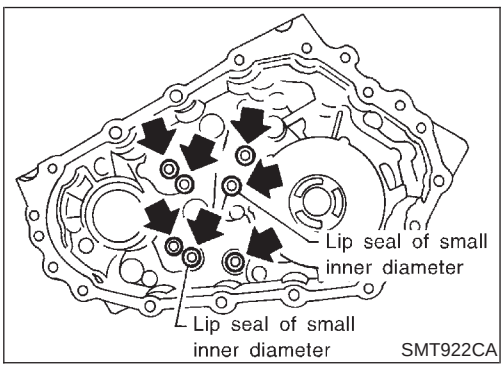
2. Remove O-rings from oil strainer.
- **Do not reuse O-rings.**



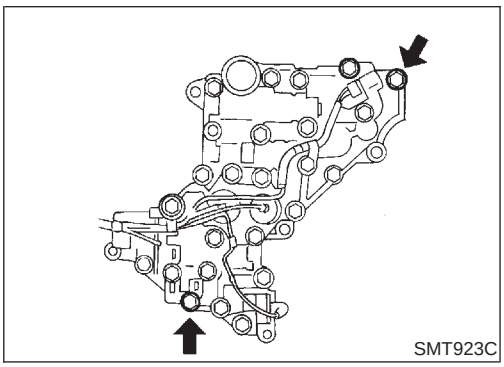
3. Remove bolts for control valve.



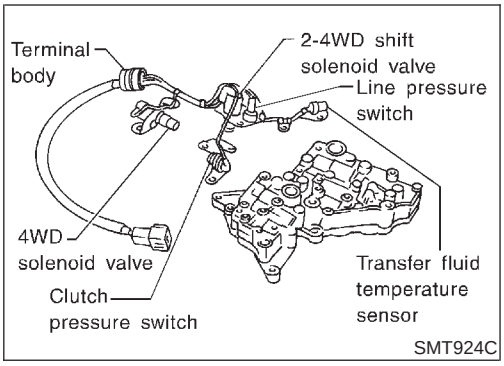
4. Remove snap ring. Then push terminal assembly into center case to remove control valve assembly.



5. Remove lip seals from center case.
- **Do not reuse lip seals.**
- **There are two kinds of lip seals (lip seal of large inner diameter: 5 pieces, lip seal of small inner diameter: 2 pieces). Confirm the position before disassembly.**

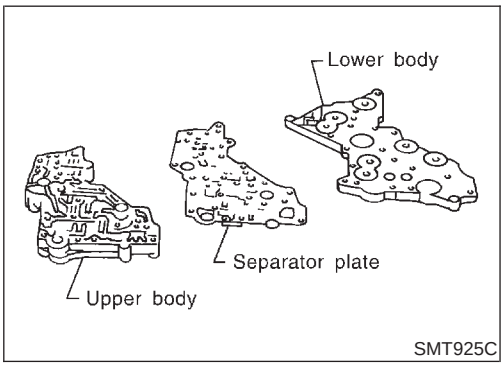


6. Remove all bolts except for two.



SMT924C

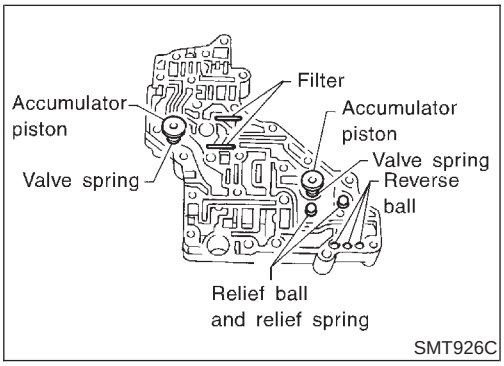
7. Remove 4WD solenoid valve, clutch pressure switch, 2-4WD shift solenoid valve, line pressure switch, and transfer fluid temperature sensor from control valve assembly.
8. Remove O-rings from each solenoid valve, switch and terminal body.
- **Do not reuse O-rings.**



SMT925C

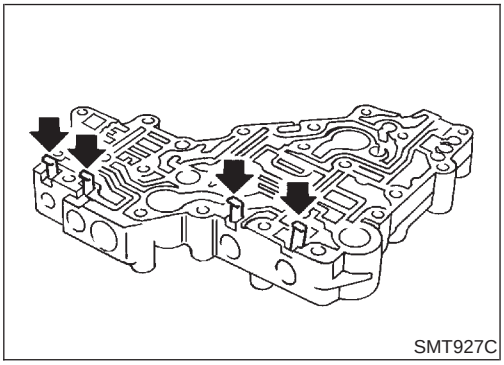
9. Place control valve with lower body facing up, remove two mounting bolts, and then remove lower body and separator plate from upper body.

CAUTION:
- **Be careful not to drop relief balls. Detach lower body carefully.**
- **Do not reuse separator plate.**

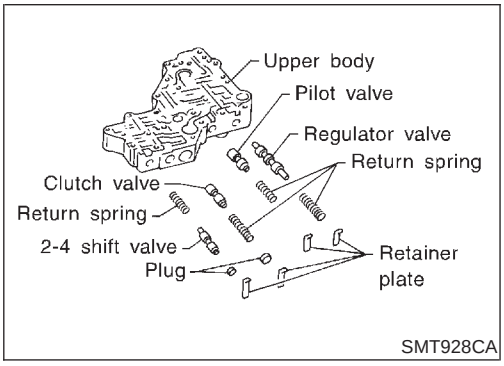


SMT926C

10. Make sure reverse balls, relief balls and relief springs, accumulator pistons, valve springs, and filters are securely installed as shown in the figure, and remove them.

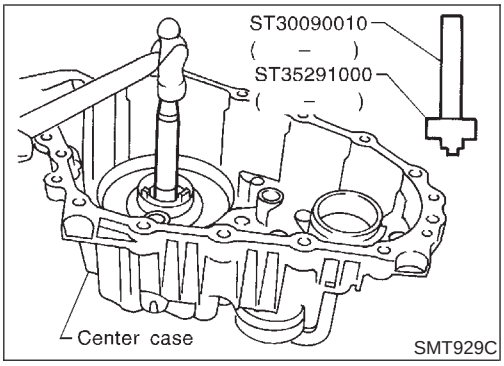

SMT927C

11. Remove retainer plates.



SMT928CA

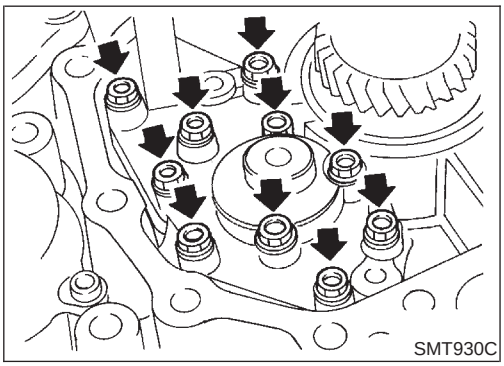
12. Remove each control valve, spring and plug.



Mainshaft Rear Bearing

NATF0078S05

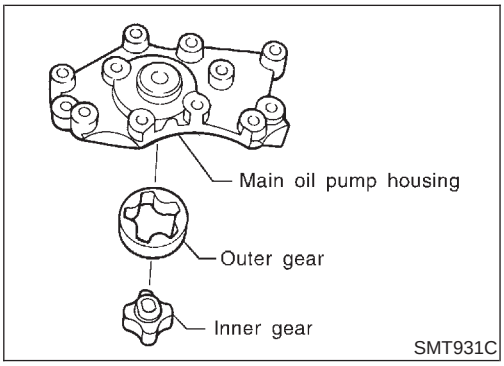
1. Remove mainshaft rear bearing from center case using a remover (ST35291000) and a remover (ST30090010).



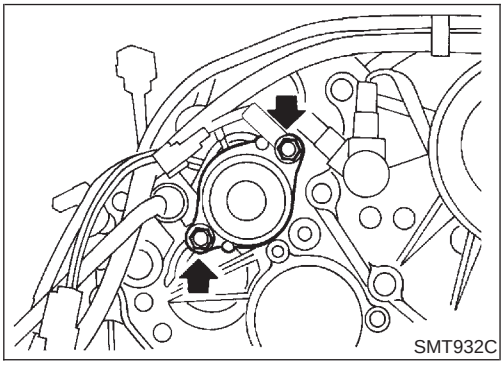
Main Oil Pump

NATF0078S06

1. Remove bolts as shown in figure to detach main oil pump.



2. Remove outer gear and inner gear.

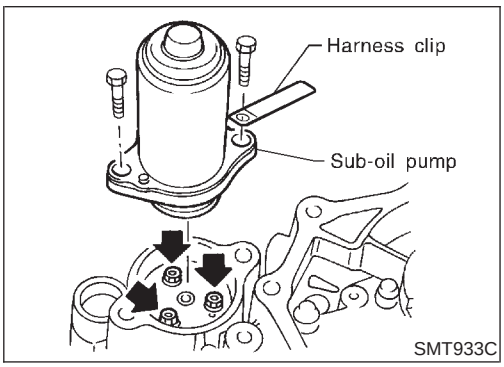


Sub-oil Pump

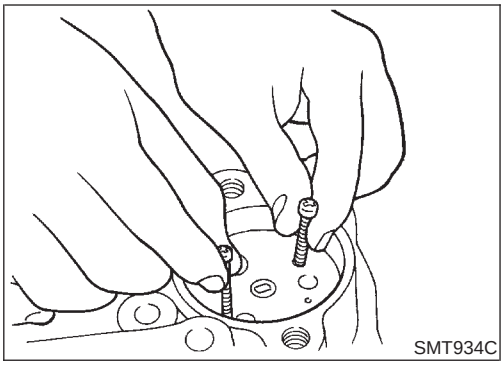
NATF0078S07

1. Remove bolts to detach transfer motor from center case. Then remove O-ring from the transfer motor.

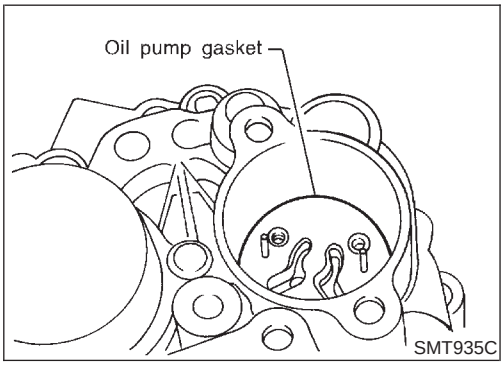
- **Do not reuse O-ring.**



2. Remove sub-oil pump mounting bolts.

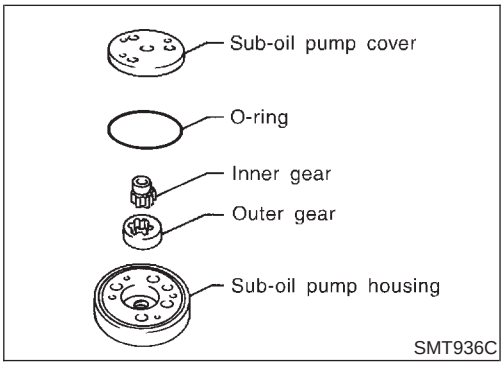

SMT934C

3. Thread two bolts (M4 x 0.8) into the holes of sub-oil pump as shown in the figure, and pull out to remove sub-oil pump.



SMT935C

4. Remove oil pump gasket.
- **Do not reuse gasket.**



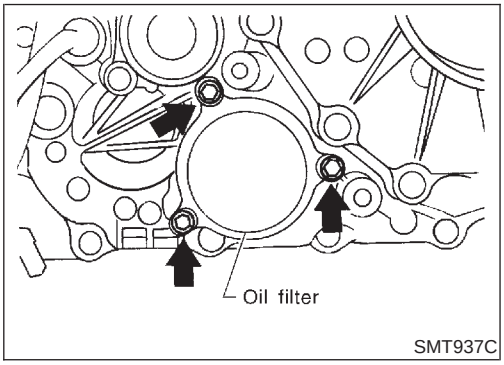
SMT936C

5. Remove sub-oil pump cover, outer gear, inner gear and O-ring from sub-oil pump housing.
- **Do not reuse O-ring.**

Oil Filter

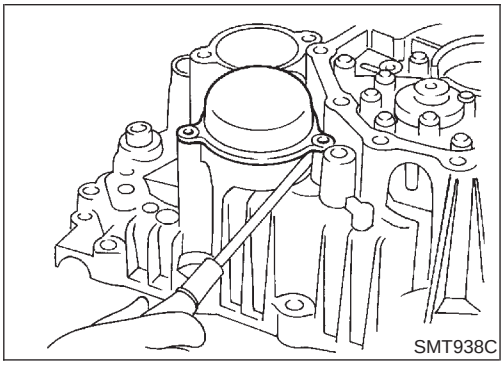
NATF0078S08

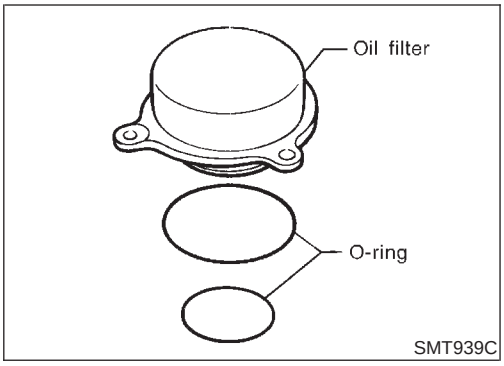
1. Remove bolts for oil filter.



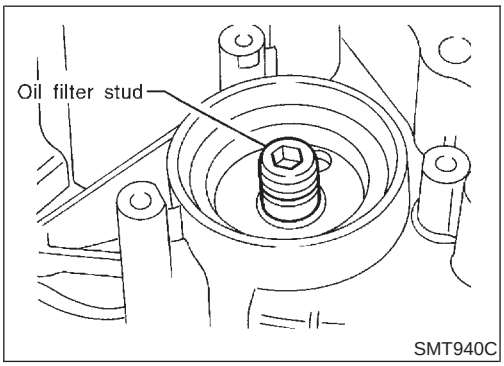
SMT937C

2. Insert a screwdriver as shown in the figure to remove oil filter.

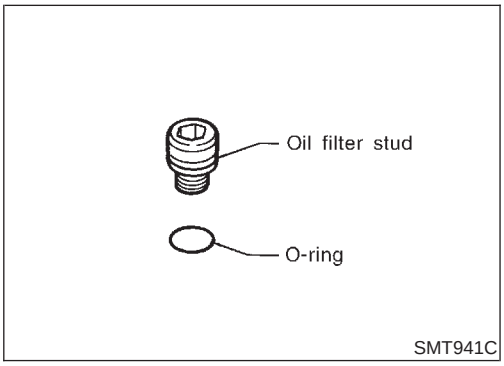

SMT938C



3. Remove O-rings from oil filter.
- **Do not reuse O-rings.**



4. Remove oil filter stud.



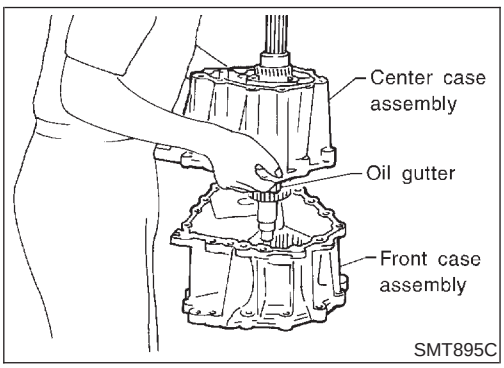
5. Remove O-ring from oil filter stud.
- **Do not reuse O-ring.**

Front Case

DISASSEMBLY

NATF0079

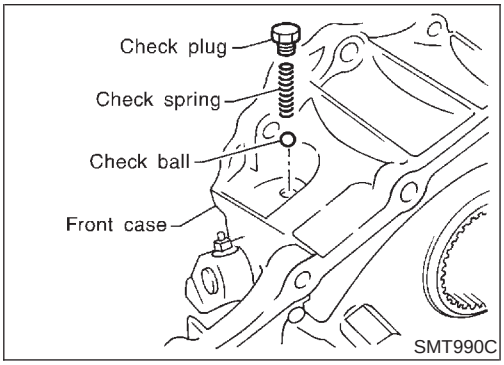
1. Remove rear case from center case. Refer to TF-154.
2. Remove front case from center case.

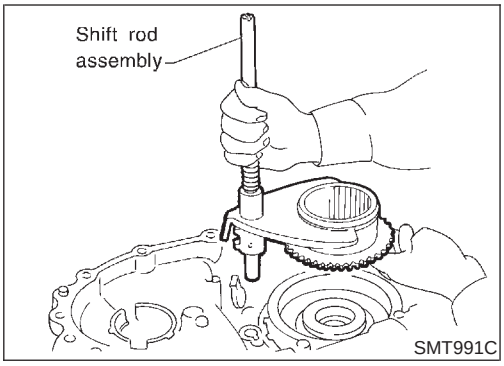


Shift Rod Components

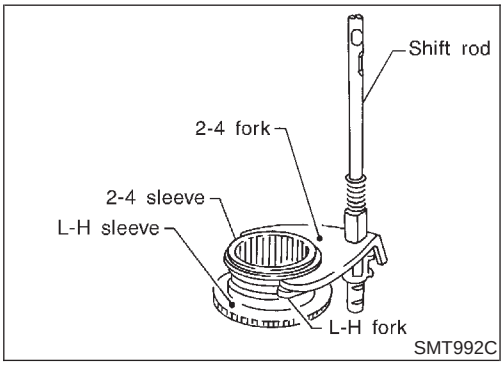
NATF0079S01

1. Remove check plug, then check spring and check ball.
2. Remove wait detection switch.

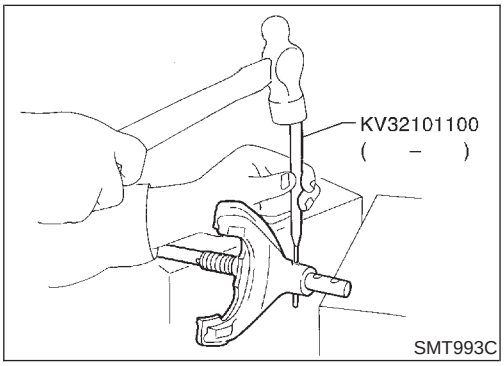




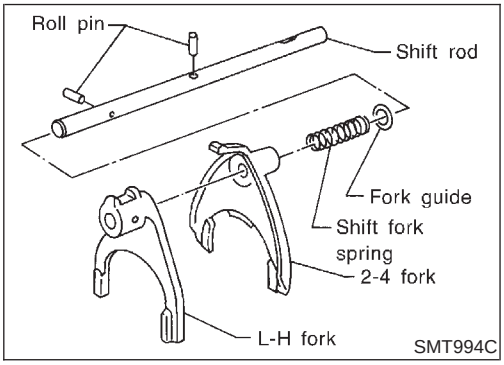
3. Remove shift rod components together with 2-4 sleeve and L-H sleeve.



4. Remove 2-4 sleeve and L-H sleeve from 2-4 fork and L-H fork respectively.



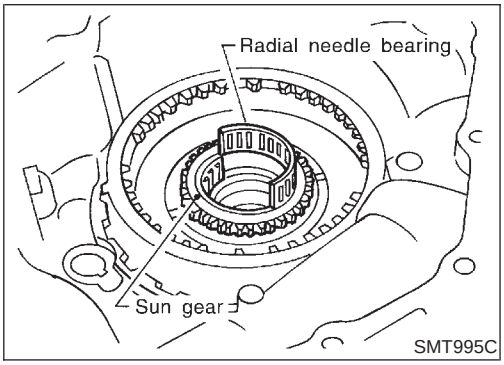
5. Drive out roll pin from shift rod.
- **Do not reuse roll pin.**



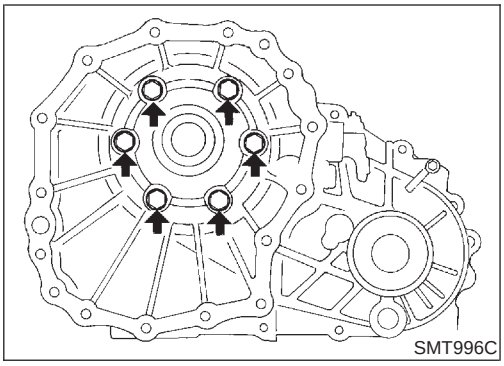
6. Remove L-H fork, 2-4 fork, shift fork spring and fork guide from shift rod.

Planetary Carrier, Sun Gear and Internal Gear

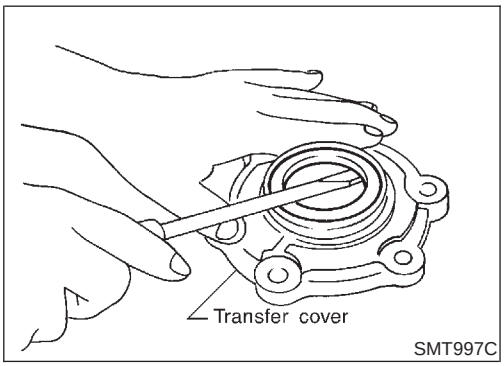
NATF0079S02



1. Remove radial needle bearing from sun gear.

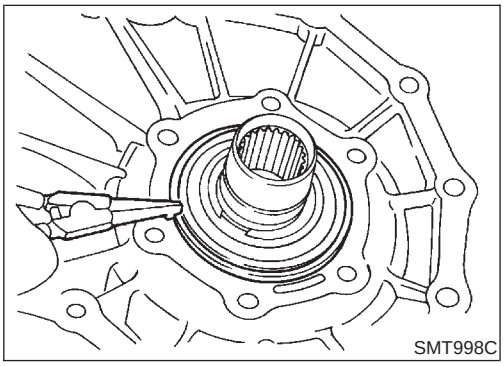

SMT996C

2. Remove bolts to detach transfer cover.
- **Do not reuse bolts.**

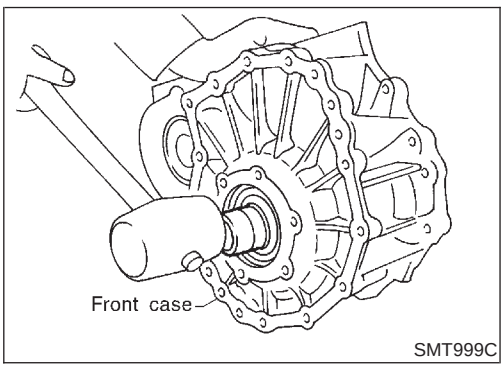


SMT997C

3. Remove oil seal from transfer cover.
- **Do not reuse oil seal.**

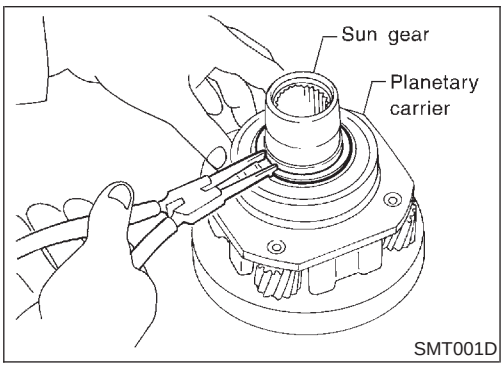

SMT998C

4. Remove snap ring from main gear bearing.
- **Do not reuse snap ring.**



SMT999C

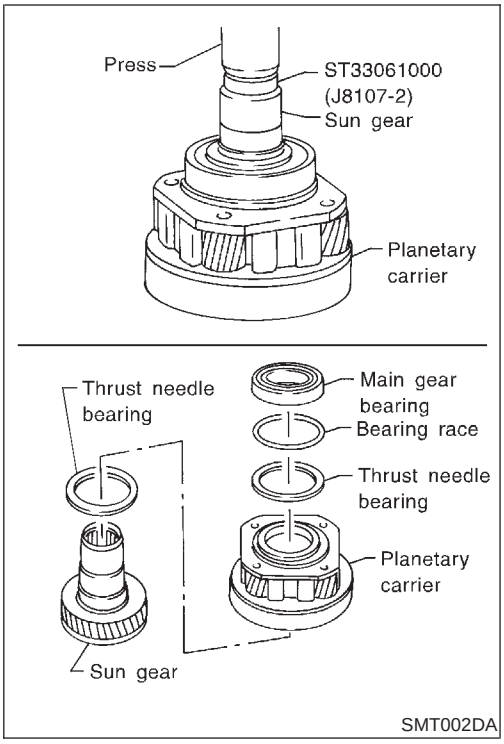
5. Remove sun gear by tapping it lightly.



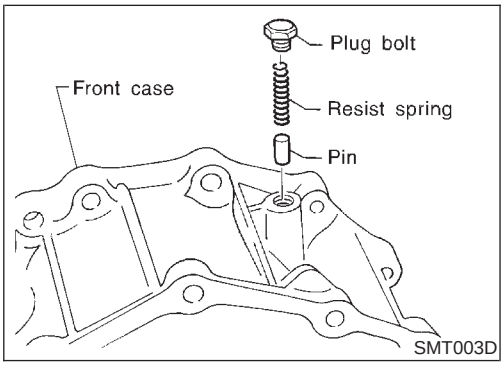
SMT001D

6. Remove snap ring from sun gear.
- **Do not reuse snap ring as it is a selective part.**

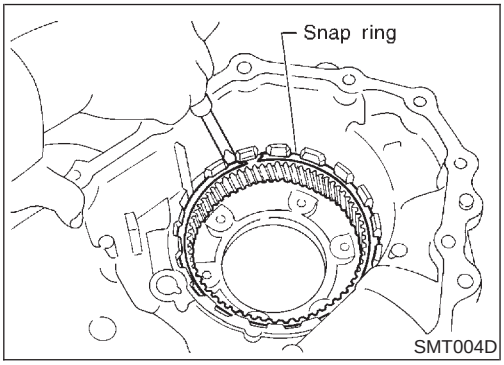
7. Remove washer from sun gear.



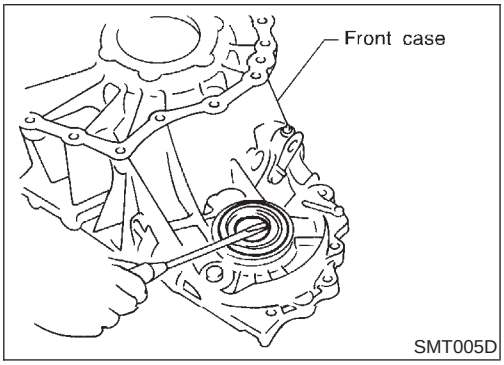
8. Set an adapter to sun gear as shown in the figure. Remove sun gear from planetary carrier. Remove main gear bearing, bearing race and thrust needle bearing (front and rear of planetary carrier) from sun gear.



9. Remove plug bolt, then remove resist spring and pin.

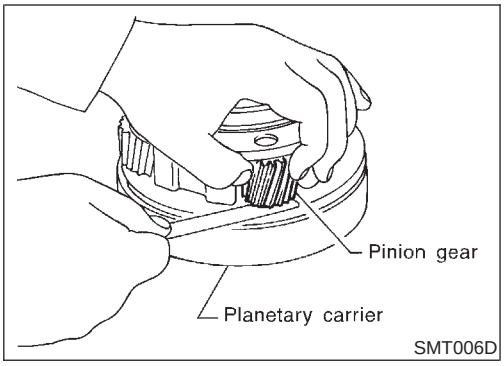


10. Remove snap ring, and remove internal gear.
- **Do not reuse snap ring.**



11. Remove front oil seal.
- **Do not reuse oil seal.**

12. Loosen nut of outer lever assembly to pull out cotter pin, and remove outer lever.
13. Remove inner lever assembly.



Front Case

INSPECTION

NATF0080

Planetary Carrier

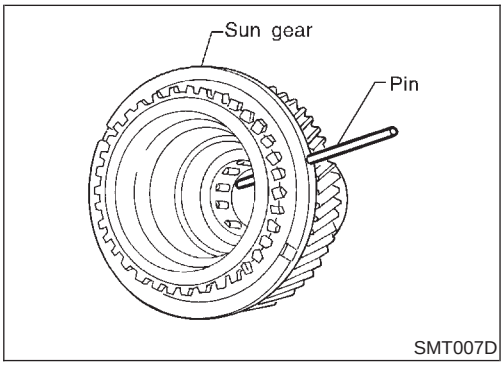
NATF0080S01

- Measure end play of each pinion gear, and make sure the measurement is within specification shown below. If out of specification, replace planetary carrier with new one.

  Pinion gear end play:

  0.1 - 0.7 mm (0.004 - 0.028 in)

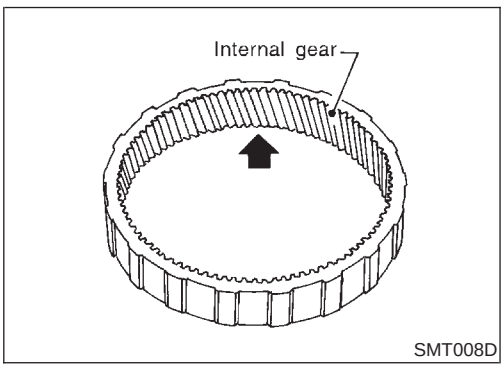
- Check working face of each gear, bearing and others for damage, burrs, partial wear, dents and other abnormality. If any is found, replace planetary carrier with new one.



Sun Gear

NATF0080S02

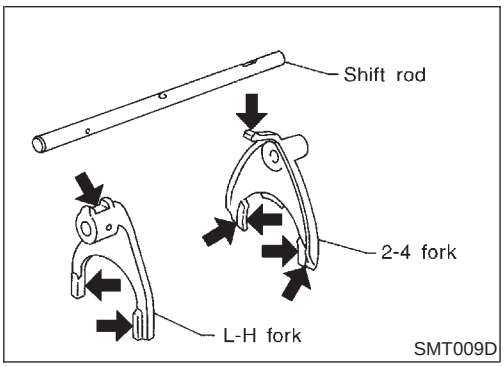
- Check if oil passage of sun gear is clogged. For this, try to pass a 3.6 mm (0.142 in) dia. wire through oil passage as shown in the figure.
- Check sliding/contact surface of each gear, bearing and others for damage, burrs, partial wear, dents, and other abnormality. If any is found, replace sun gear with new one.



Internal Gear

NATF0080S03

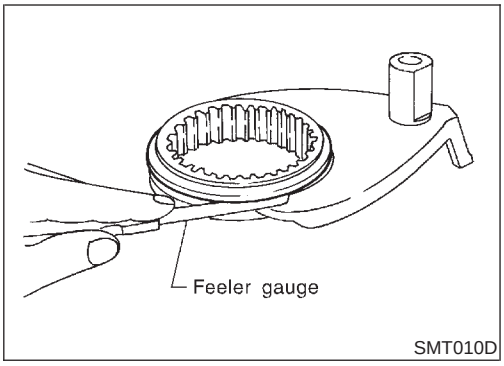
- Check internal gear teeth for damage, partial wear, dents and other abnormality. If any is found, replace internal gear with new one.



Shift Rod Components

NATF0080S04

- Check working face of shift rod and fork for wear, partial wear, bending and other abnormality. If any is found, replace with new one.

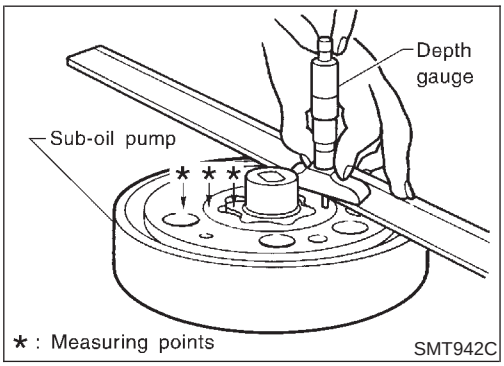


SMT010D

- Measure clearance between shift fork and sleeve. If it is out of specification, replace it with new one.

Standard value:

Less than 0.36 mm (0.0142 in)



SMT942C

Center Case

INSPECTION

NATF0081

Sub-oil Pump

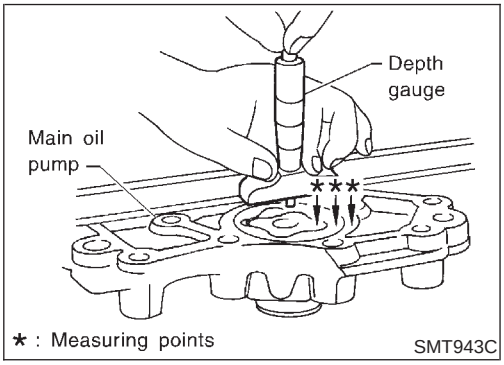
NATF0081S01

1. Check inner and outer circumference, tooth face, and side-face of inner and outer gears for damage or abnormal wear.
2. Measure side clearance between oil pump housing edge and inner gear/outer gear.
3. Make sure side clearance is within specification. If the measurement is out of specification, replace inner and outer gears together with new ones as a set.

Specification:

0.015 - 0.035 mm (0.0006 - 0.0014 in)

For inner gear and outer gear, refer to SDS, TF-188.



SMT943C

Main Oil Pump

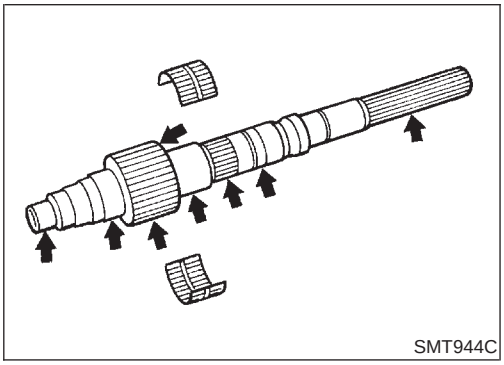
NATF0081S02

1. Check inner and outer circumference, tooth face, and side-face of inner and outer gears for damage or abnormal wear.
2. Measure side clearance between oil pump housing edge and inner gear/outer gear.
3. Make sure side clearance is within specification. If the measurement is out of specification, replace inner and outer gears with new ones as a set.

Specification:

0.015 - 0.035 mm (0.0006 - 0.0014 in)

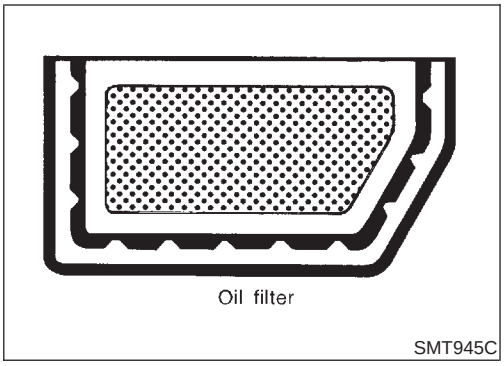
For inner gear and outer gear, refer to SDS, TF-188.


SMT944C

Mainshaft

NATF0081S03

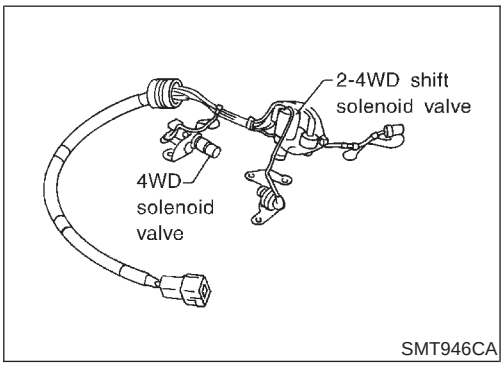
- Check surfaces which contact sun gear, clutch drum, clutch hub, press flange, clutch piston, each bearing, etc. for damage, peel, partial wear, dents, bending, or other abnormal damage. If any is found, replace with new one.



Control Valve

NATF0081S04

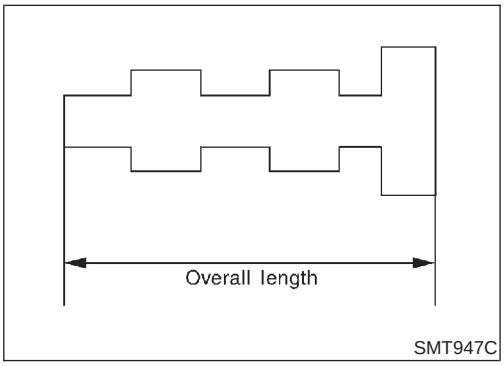
- Check oil filter screen for damage. If any is found, replace with new one.



- Check resistance between terminals of 4WD solenoid valve, 2-4WD shift solenoid valve and transfer fluid temperature sensor.

Resistance:

Refer to "COMPONENT INSPECTION", TF-142.



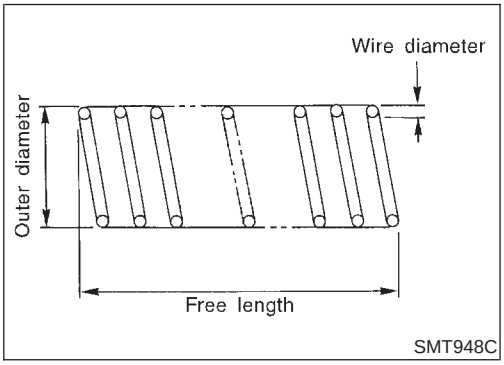
- Check sliding faces of control valves and plugs for abnormality. If any is found, replace the control valve assembly with new one.

CAUTION:

Replace control valve body together with clutch return spring as a set.

Control valve:

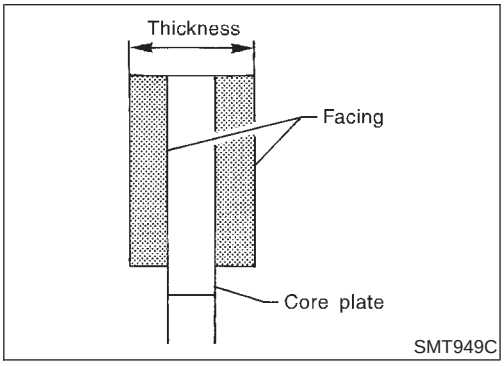
Refer to SDS, TF-188.



- Check each control valve spring for damage or distortion, and also check its free length, outer diameter and wire diameter. If any damage or fatigue is found, replace control valve body with new one.
- **Replace control valve body together with clutch return spring as a set.**

Inspection standard:

Refer to SDS, TF-188.



Clutch

NATF0081S05

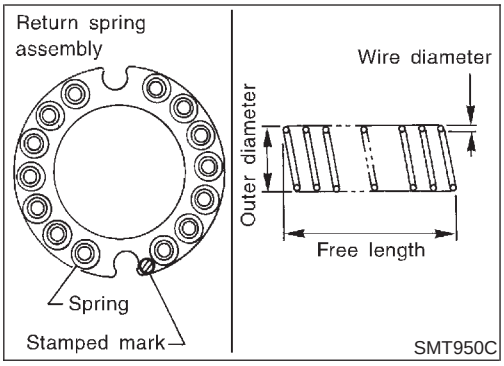
- Check drive plate and driven plate facings for damage, cracks or other abnormality. If any, replace with new one.
- Check the thickness of drive plate and driven plate facings.

Inspection standard:

Refer to SDS, TF-189.

CAUTION:

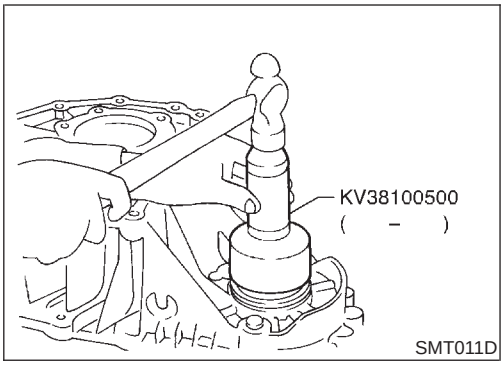
- **Measure facing thickness at 3 points to take an average.**
- **Check all the drive and driven plates.**
- **Check return spring for damage or deformation.**



- Check stamped mark shown in the figure. Then, check that free length, outer diameter and wire diameter are within specifications. If any abnormality is found, replace with new return spring assembly of the same stamped number.

  Inspection standard:

  Refer to SDS, TF-189.



Front Case

ASSEMBLY

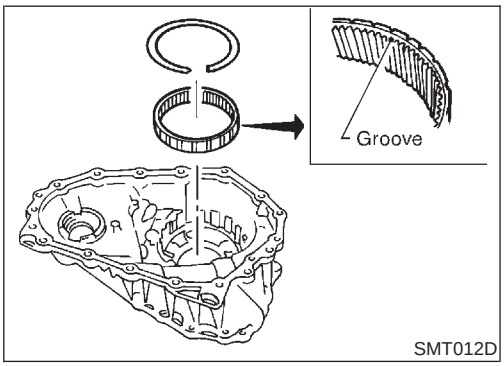
NATF0082

Planetary Carrier, Sun Gear and Internal Gear

NATF0082S01

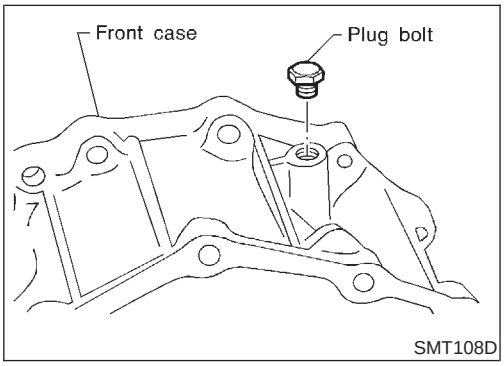
1. Apply ATF to oil seal periphery, and install oil seal so that it is flush with the end face of front case.

- **Do not reuse oil seal.**



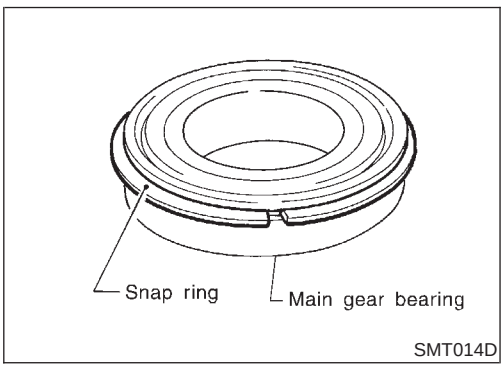
2. Install internal gear with its groove facing snap ring into front case. Then secure it with snap ring.

- **Do not reuse snap ring.**



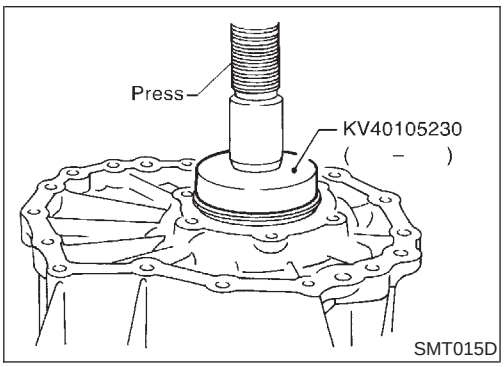
3. Remove all the liquid gasket on plug bolt and front case. Apply locking sealant to plug bolt, install it to front case and tighten it to specified torque.
- With one crest of plug bolt inserted in the hole, apply liquid gasket 1215 to the thread.

: 19 - 25 N·m (1.9 - 2.5 kg-m, 14 - 18 ft-lb)

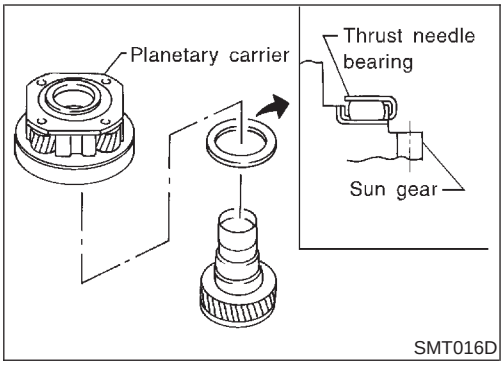


4. Install snap ring to main gear bearing.

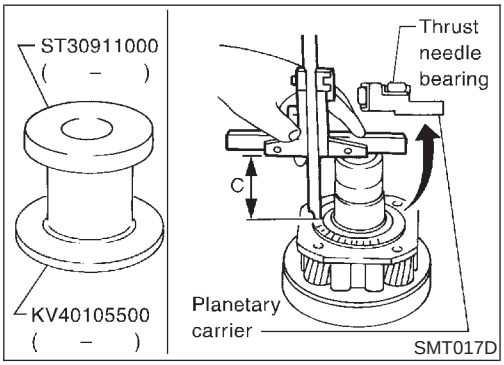
- **Do not reuse snap rings.**



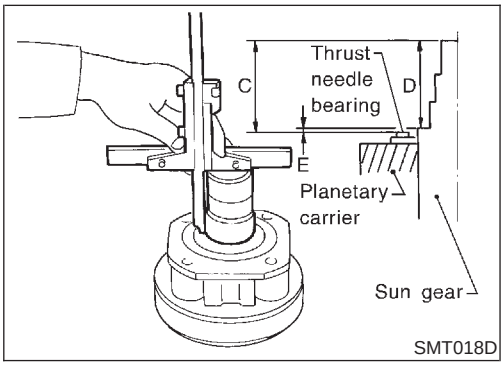
5. Set main gear bearing to front case, then press it.



6. Install thrust needle bearing to sun gear.
7. Install sun gear to planetary carrier.



8. Set a support (KV40105500) to bushing replacer puller (ST30911000) as shown in the figure, and place planetary carrier on it.
9. Install thrust needle bearing to planetary carrier with its roller facing front case.
10. Measure "C" from the end of sun gear to the roller surface of thrust needle bearing.



11. Measure "D" from the end of sun gear to the main gear bearing contact surface.
12. Calculate end play "E" using "C" and "D" obtained in steps 10 and 11. Select bearing race so that the end play becomes the standard value.

Calculation formula:

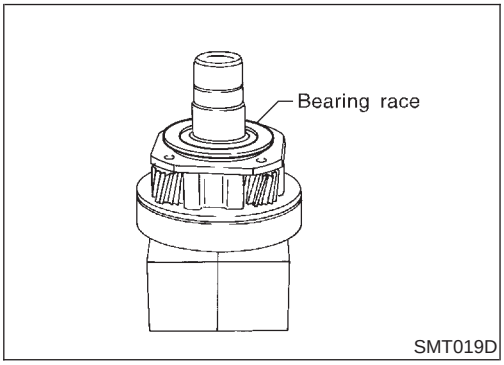
End play "E" = "C" – "D"

Standard end play:

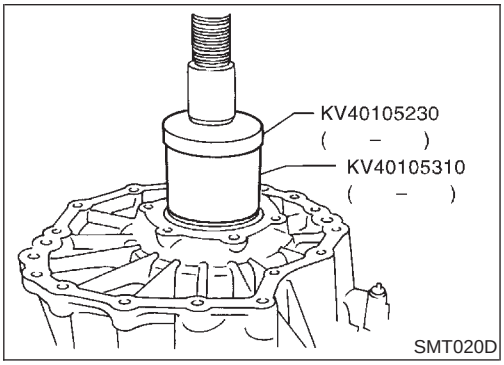
0.1 - 0.25 mm (0.0039 - 0.0098 in)

Bearing race:

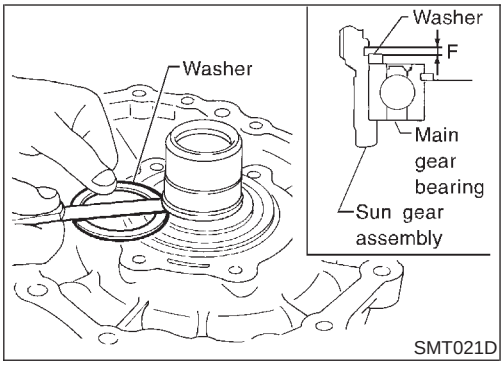
Refer to SDS, TF-190.



13. Set planetary carrier to press in the status described in step 8. Then install the selected bearing race to planetary carrier.

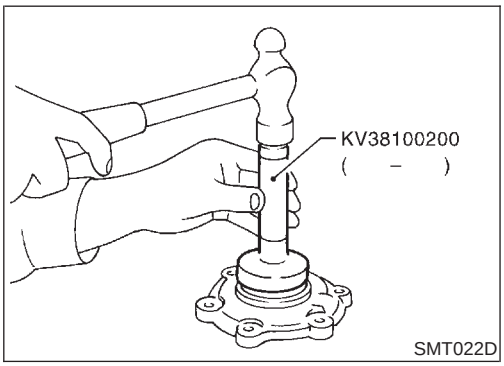


14. Install front case to planetary carrier. Set a support ring (KV40105310) and an adapter B (KV40105230) to main gear bearing inner race, then press it.



15. Install washer to sun gear assembly, and select proper snap ring so that end play "F" of sun gear is within specifications.

Standard end play "F":
0 - 0.15 mm (0 - 0.0059 in)
Snap ring: Refer to SDS, TF-190.

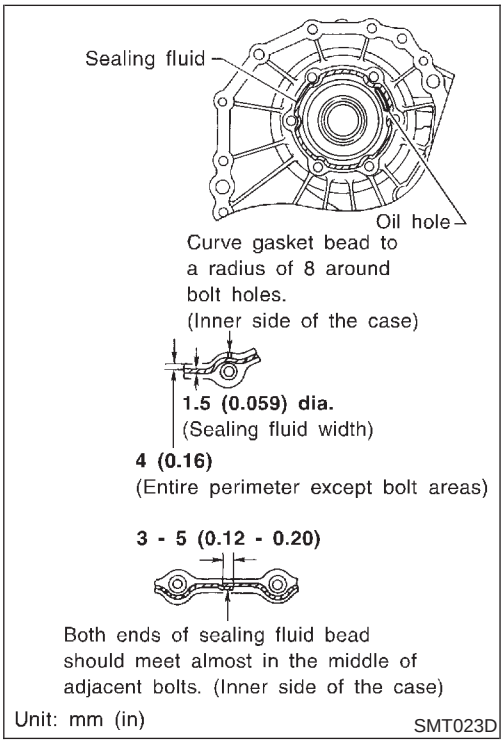


16. Install the selected snap ring.

- **Do not reuse snap rings.**

17. Apply ATF to the periphery of new transfer cover oil seal, and attach it at 1.5 mm (0.059 in) from the transfer cover and face.

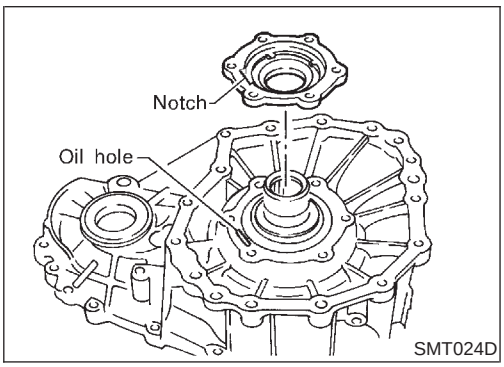
- **Do not reuse oil seal.**



18. Apply sealing fluid (Locktite 518·C1335 x 25) to transfer cover mounting surface of front case as shown in the figure.

CAUTION:

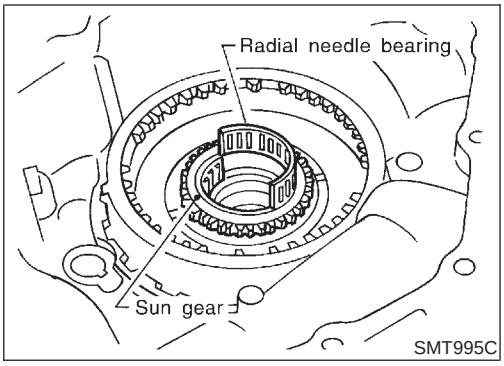
- **Remove all foreign materials such as water, oil, and grease from mating surfaces of front case and transfer cover.**
- **Prevent sealing fluid from entering into oil holes of front case.**



19. Align oil hole of front case with notch of transfer cover, and tighten bolts.

: 49 - 58 N·m (5.0 - 5.9 kg-m, 36 - 43 ft-lb)

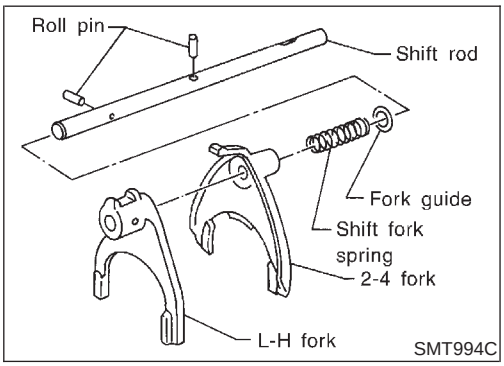
- **Do not reuse bolts.**



20. Apply petroleum jelly to radial needle bearing, and install it inside sun gear.
21. Install shift rod assembly to front case assembly. Refer to "Shift Rod Assembly", TF-175.
22. Install center case assembly to front case assembly. Refer to "Final Assembly", TF-184.
23. Install rear case assembly to center case. Refer to "Final Assembly", TF-184.

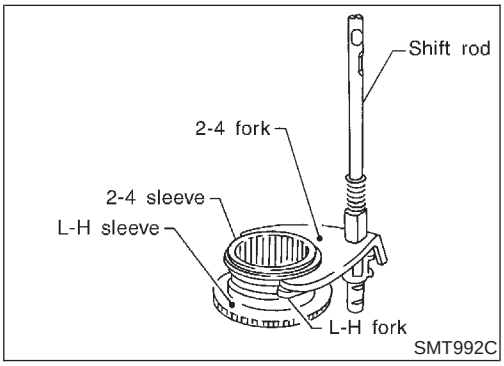
Shift Rod Assembly

NATF0082S02

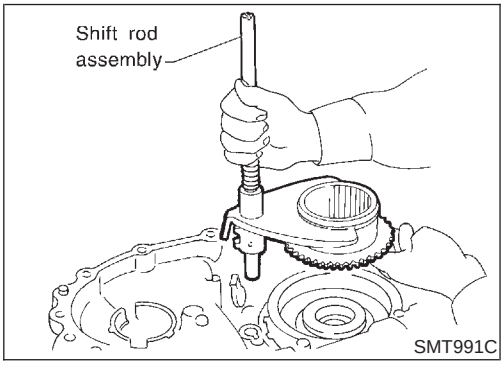


1. Install fork guide, shift fork spring, 2-4 fork, and L-H fork to shift rod, and secure them with roll pins.

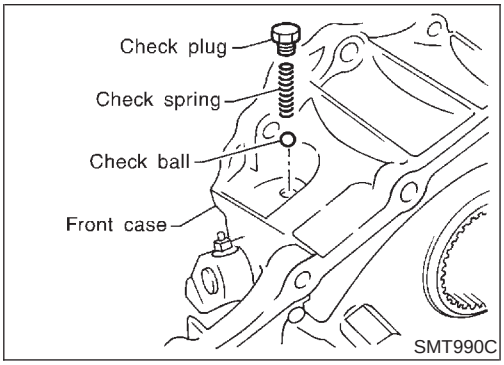
- **Do not reuse roll pins.**



2. Install 2-4 sleeve and L-H sleeve to each fork.



3. While aligning L-H sleeve with planetary carrier, install shift rod assembly to front case.



4. Remove all the liquid gasket on check plug and front case, and install check ball and check spring to front case. Apply gasket fluid 1215 (Three Bond) to check plug, install it to front case, and tighten it to specified torque.

- With plug bolt threaded one pitch into the hole, apply gasket fluid 1215 (Three Bond) to the thread.

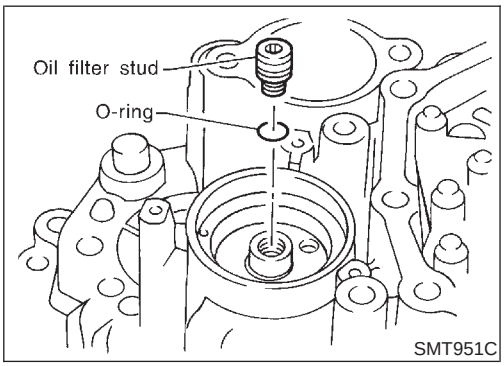
: 19 - 25 N·m (1.9 - 2.5 kg-m, 14 - 18 ft-lb)

5. Remove all the liquid gasket on the switch fitting and inner side of front case, and with wait detection switch threaded one pitch into the hole, apply gasket fluid 1215 (Three Bond) to the thread, install it, and tighten it to specified torque.

: 15 - 20 N·m (1.5 - 2.0 kg-m, 11 - 14 ft-lb)

- **Wait detection switch harness connector is black.**

6. Install center case assembly to front case assembly. Refer to "Final Assembly", TF-184.
7. Install rear case assembly to center case. Refer to "Final Assembly", TF-184.



Center Case

ASSEMBLY

NATF0083

Oil Filter

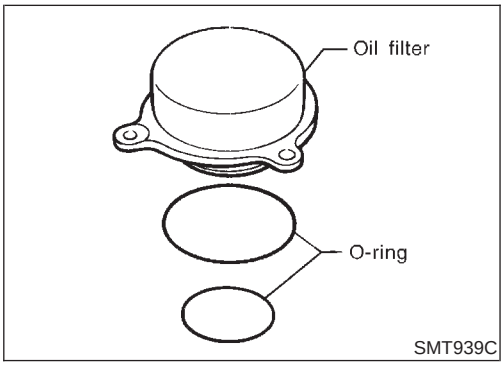
NATF0083S01

1. Apply ATF or petroleum jelly to new O-ring, and install it to oil filter stud.

- **Do not reuse O-rings.**

2. Install oil filter stud to center case, and tighten it.

: 25 - 35 N·m (2.6 - 3.6 kg-m, 19 - 26 ft-lb)



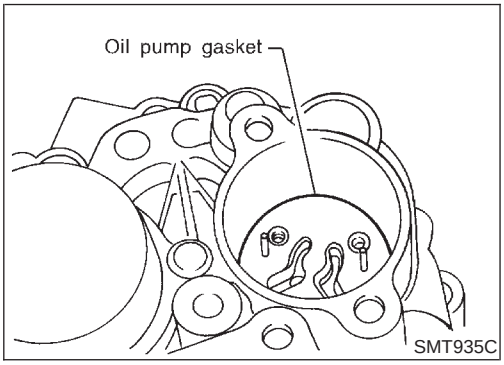
3. Apply ATF or petroleum jelly to two new O-rings, and install them to oil filter.

- **Do not reuse O-rings.**

4. Install oil filter to center case and tighten bolts.

: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)

- **Do not knock oil filter with a tool such as a hammer.**

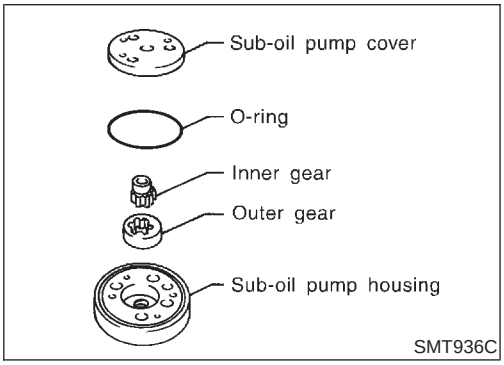


Sub-oil Pump

NATF0083S02

1. Install new oil pump gasket to center case by aligning it with dowel pin inside the center case.

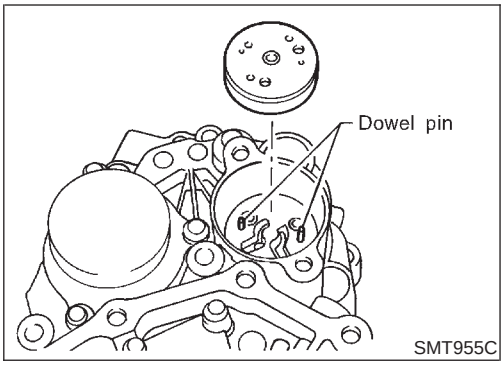
- **Do not reuse gaskets.**



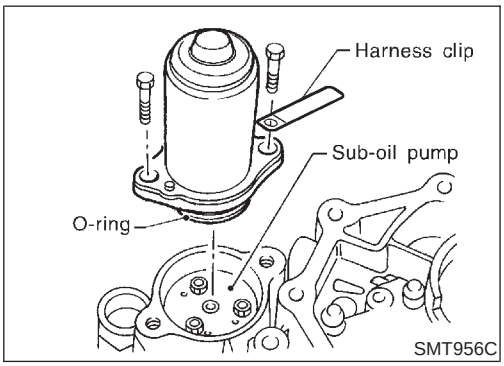
2. Install outer gear* and inner gear to sub-oil pump housing, and measure side clearance. Refer to "Sub-oil Pump", "INSPECTION", TF-169.
3. Set new O-ring to sub-oil pump housing, and install sub-oil pump cover.

- **Do not reuse O-rings.**

* Identification mark "▼" is placed on the side of sub-oil pump cover.



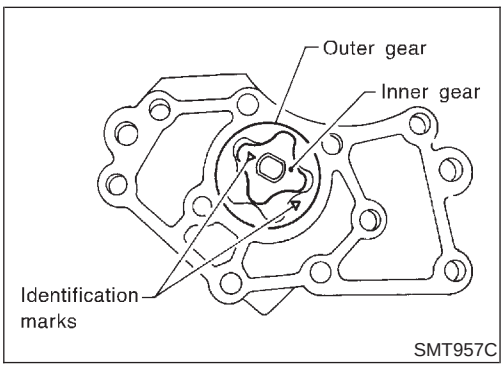
4. Align dowel pin hole and mounting bolt hole of sub-oil pump assembly with center case. Then tighten bolts.
   : 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)



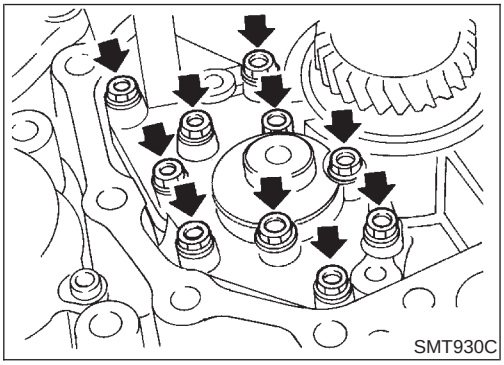
5. Apply ATF or petroleum jelly to new O-ring and install it to transfer motor.
6. Fit double-flat end of transfer motor shaft into slot of sub-oil pump assembly. Then tighten bolts.
   : 41 - 48 N·m (4.2 - 4.9 kg-m, 30 - 35 ft-lb)

Main Oil Pump

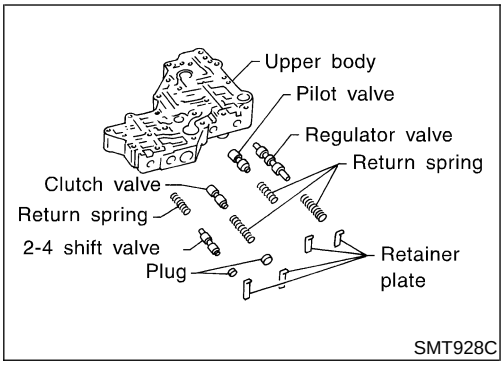
NATF0083S03



1. Install inner gear and outer gear in the main oil pump housing with their identification marks facing toward center case mounting surface side. Then, measure the side clearance. Refer to "Main Oil Pump", "Center Case", TF-169.



2. Install main oil pump assembly to center case assembly, and tighten bolts.
   : 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)
3. Install oil pump shaft to main oil pump, then install rear case assembly to center case.
   Refer to "Final Assembly", TF-184.



Control Valve

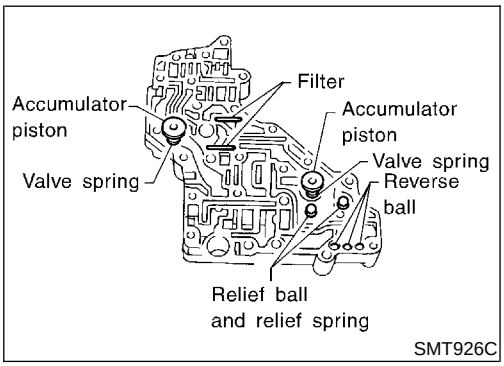
NATF0083S04

1. Clean upper body, control valves and springs with cleaning agent, and apply air blow.
2. Dip control valves in ATF, and apply ATF to the valve-mounting area of upper body.
3. Install each control valve, spring, and plug to upper body, and fix it with retainer plates.

CAUTION:

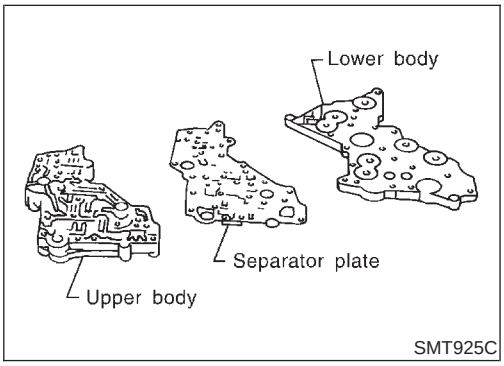
- **To insert control valves into upper body, place upper body on a level surface in order to prevent flaw or damage.**
- **Make sure each control valve is smoothly inserted.**

4. Install reverse balls, relief balls and relief springs, accumulator pistons, valve springs and two filters to upper body.



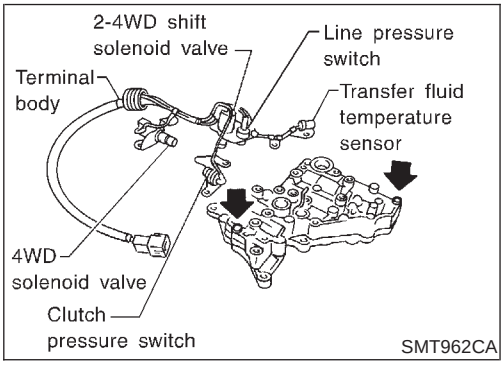
5. Install lower body and separator plate to upper body.

- **Do not reuse separator plates.**



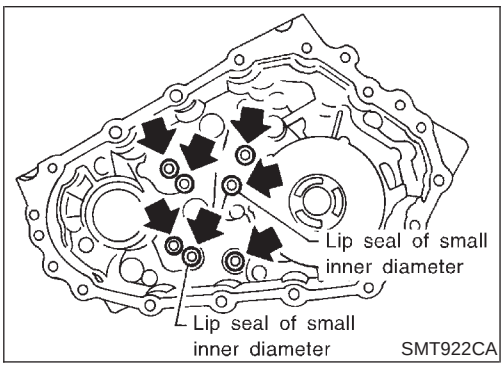
6. With lower body down, tighten two bolts in the position shown in the figure.
7. Apply ATF or petroleum jelly to new O-ring, and install it to 2-4WD shift solenoid valve, terminal body, line pressure switch and 4WD solenoid valve. Install them to control valve assembly.

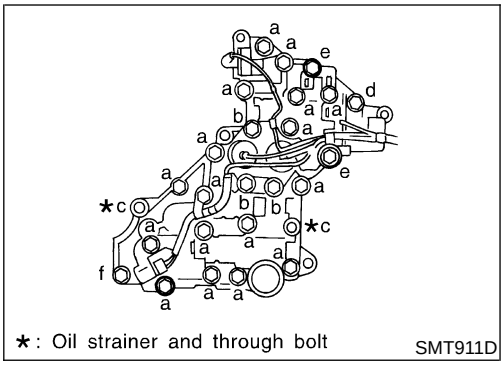
- **Do not reuse O-rings.**



8. Apply ATF or petroleum jelly to lip seals, and install them to center case.

- **Do not reuse lip seals.**
- **There are 2 kinds of lip seals (lip seal of large inner diameter: 5 pieces, lip seal of small inner diameter: 2 pieces). Confirm the position before installation.**



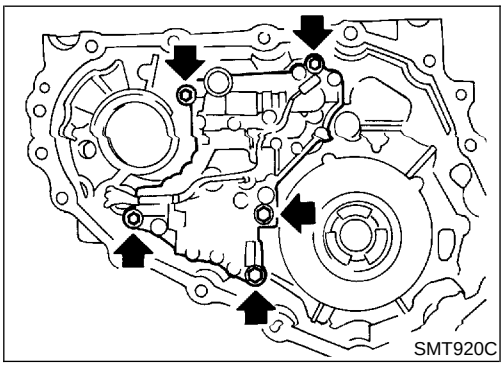


*: Oil strainer and through bolt
SMT911D

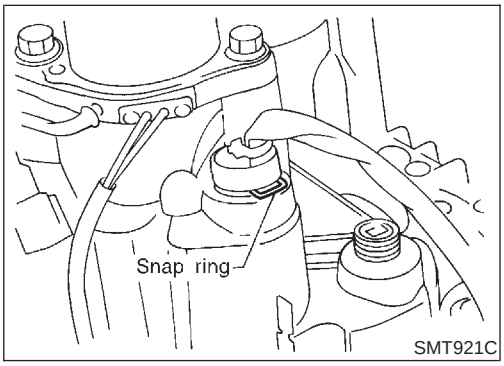
9. Install bolts as shown in the figure, and tighten them to specified torque.

Bolt symbol	a	b	*c	d	e	f
Length under head mm (in)	38 (1.50)	43.5 (1.713)	62 (2.44)	19 (0.75)	52 (2.05)	47 (1.85)
Q'ty	17	3	2	1	1	1
Tightening torque N·m (kg-m, in-lb)	6.9 - 8.8 (0.70 - 0.90, 61.1 - 77.9)					

*: Tighten with oil strainer.

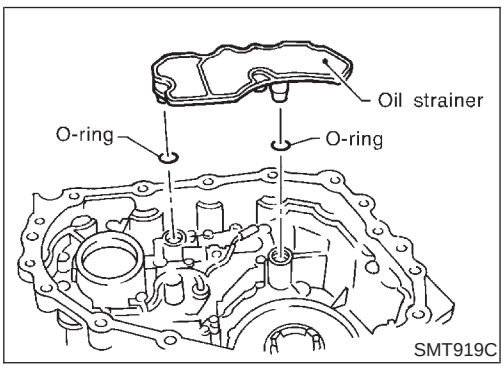

SMT920C

10. Install control valve assembly to center case, and tighten bolts.
: 6.9 - 8.8 N·m (0.70 - 0.90 kg-m, 61.1 - 77.9 in-lb)



SMT921C

11. Secure terminal body with snap ring.

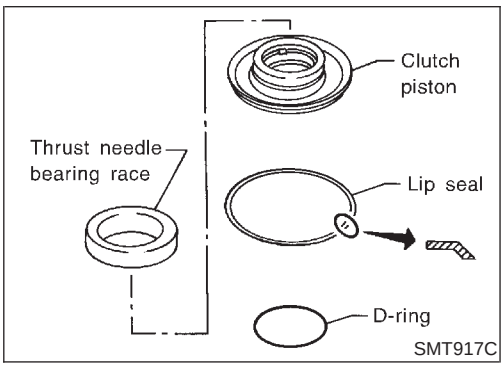


SMT919C

12. Apply ATF or petroleum jelly to O-rings, and install them to oil strainer.

CAUTION:
Do not reuse snap ring.

13. Install oil strainer to control valve assembly.
14. Install mainshaft and clutch drum to center case. Refer to "Mainshaft and Clutch Drum", TF-180.
15. Install front case assembly and rear case assembly. Refer to "Final Assembly", TF-184.

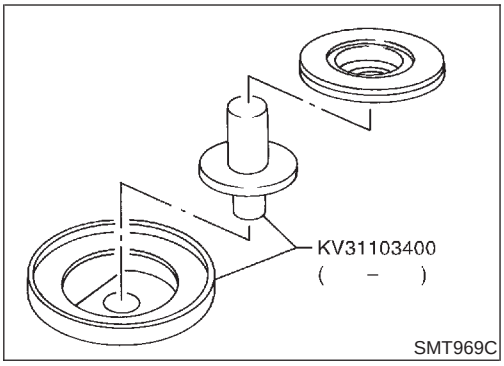


SMT917C

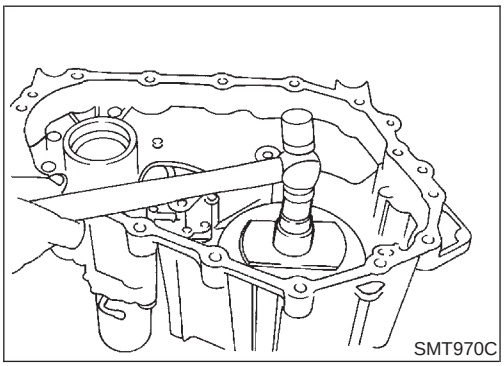
Clutch Piston

NATF0083S05

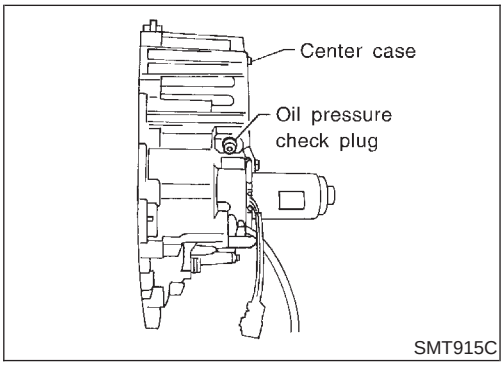
1. Apply ATF to D-ring and lip seal, and install them to clutch piston.



2. Set clutch piston to a clutch piston attachment (KV31103400).



3. Set the clutch piston attachment to center case, and install clutch piston, tap it lightly.
4. Install slide needle bearing race to clutch piston.



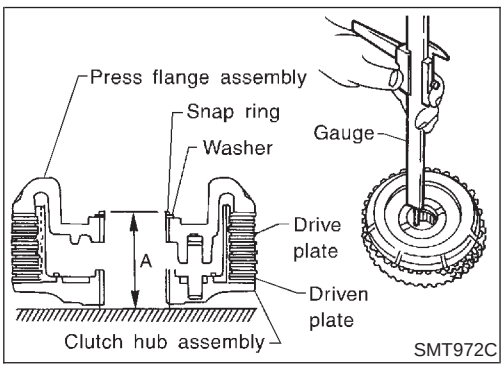
5. Remove all the liquid gasket from oil pressure check port and inside center case. With oil pressure check plug threaded in 1 or 2 pitches, apply gasket fluid 1215 (Three Bond) to the thread of plug, and tighten.
   : 10 - 17 N·m (1.0 - 1.7 kg-m, 87 - 148 in-lb)
6. Install mainshaft and clutch drum. Refer to "Mainshaft and Clutch Drum", TF-180.

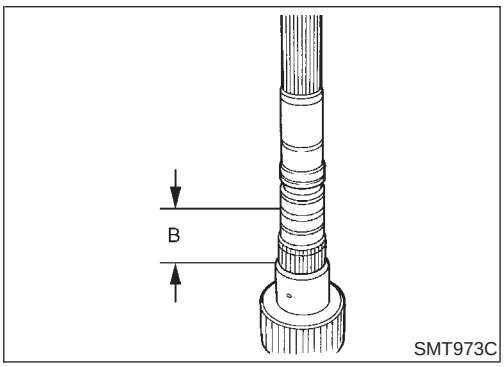
Mainshaft and Clutch Drum

NATF0083S06

1. Install drive plates, driven plates and press flange to clutch hub.
2. Place clutch hub on a surface plate and measure dimension "A" between snap ring mounting surface of press flange and clutch drum sliding face of clutch hub.

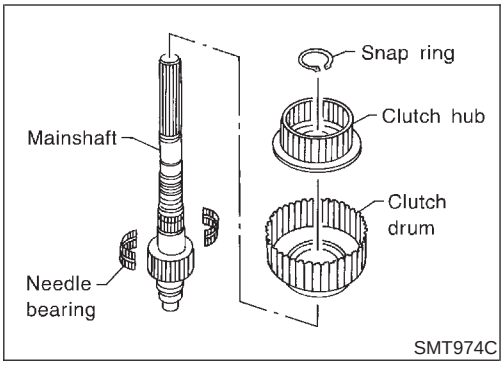
CAUTION:
Measure at least 2 points, and take an average.



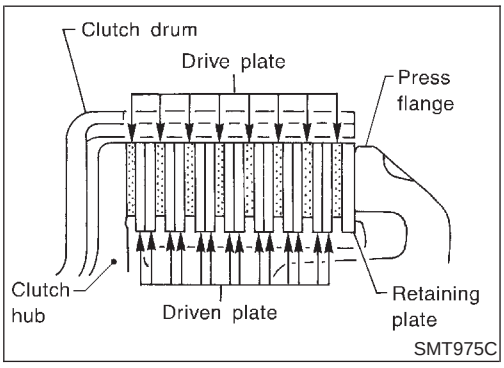


3. Measure dimension "B" between the gear end of mainshaft and the snap ring mounting portion.
4. Calculate end play using dimension "A" and dimension "B" (obtained in steps 2 and 3), and select proper retaining plate so that the end play is within specifications.

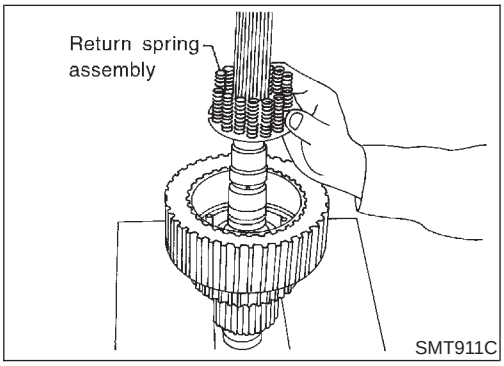
Calculation formula:
End play = B − A − Retaining plate thickness
Standard end play:
0.2 - 0.5 mm (0.008 - 0.020 in)
Retaining plate:
Refer to SDS, TF-189.



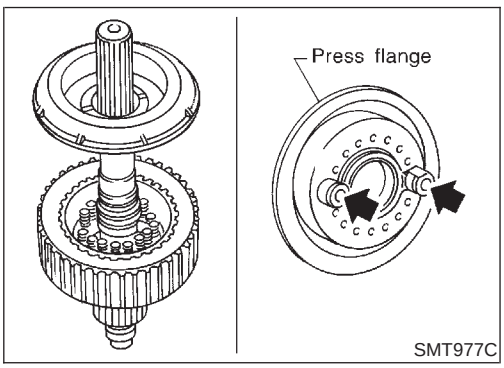
5. Install clutch drum, needle bearing and clutch hub to mainshaft, and secure them with snap ring.
- **Do not reuse snap ring.**



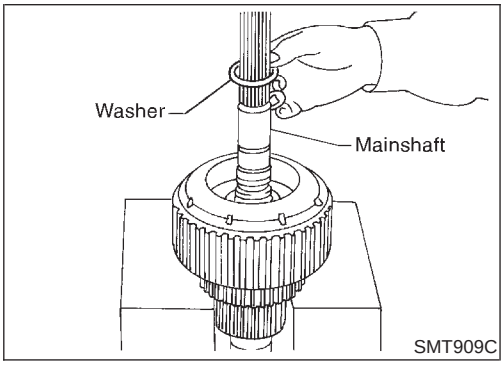
6. Install each clutch to clutch drum.



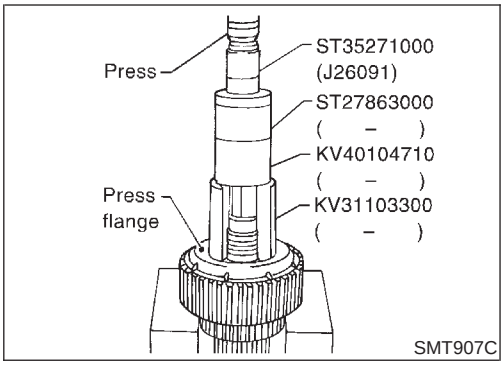
7. Align the notch of return spring assembly with the pin of clutch hub, and install it.



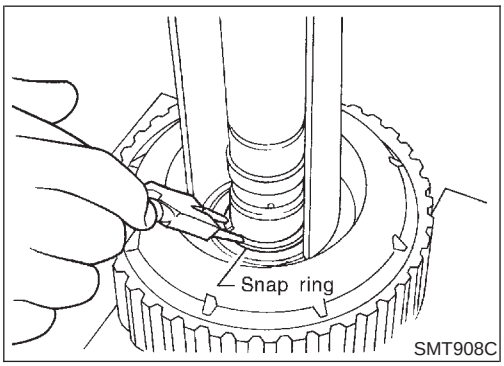
8. Install press flange (with the holes indicated by arrows aligned with pins of clutch hub).



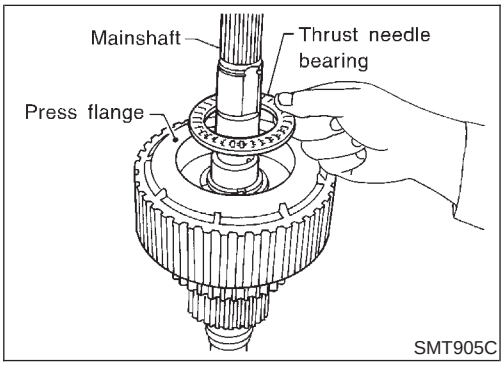
9. Install washer.



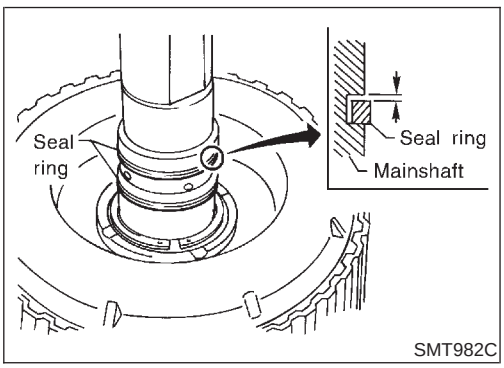
10. Pass mainshaft through snap ring. Set a drift (KV31103300), a support ring (KV40104710), a support ring (ST27863000) and a drift (ST35271000) to press flange at the position shown in the figure, and press snap ring until it fits into snap ring groove on mainshaft.
- **Do not reuse snap ring.**



11. Fix snap ring to mainshaft.



12. Install thrust needle bearing to press flange.



13. Apply petroleum jelly to new seal rings, and install them to mainshaft. Measure clearance between seal ring and groove using feeler gauge.

Standard clearance:

0.05 - 0.30 mm (0.0020 - 0.0118 in)

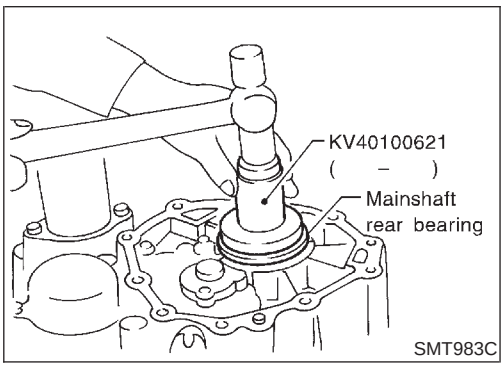
Limit clearance:

0.30 mm (0.0118 in)

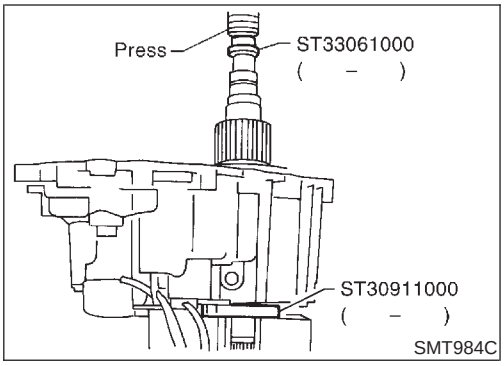
- Pass seal ring from mainshaft rear end to install it.

Seal ring dimension:

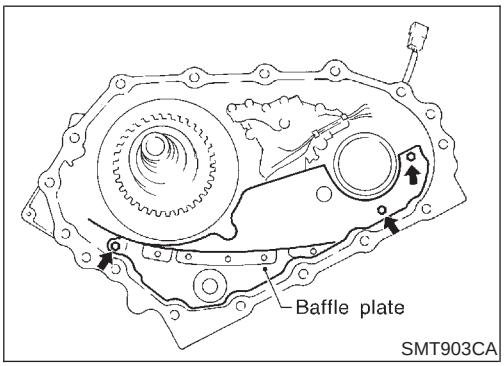
Refer to SDS, TF-190.



14. Install mainshaft rear bearing to center case.



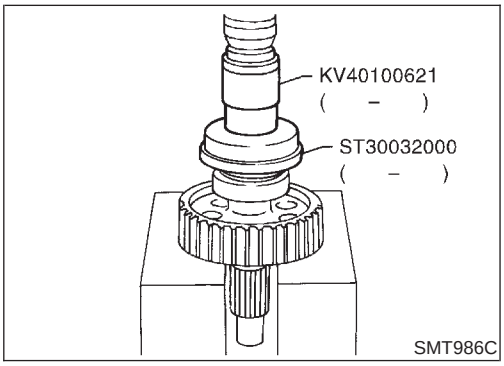
15. Place puller (ST30911000) to mainshaft rear bearing inner race, and set it to press stand.
16. Place adapter (ST33061000) to the tip of mainshaft, and press mainshaft into center case.



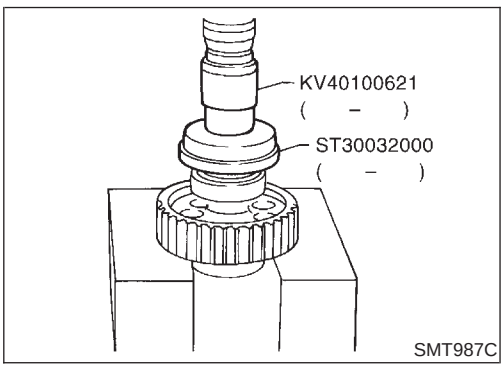
17. Install baffle plate to center case, and tighten bolts.
    : **3.7 - 5.0 N·m (0.38 - 0.51 kg-m, 33.0 - 44.3 in-lb)**
18. Install front drive shaft and drive chain. Refer to "Front Drive Shaft and Drive Chain" below.
19. Install front case assembly and rear case assembly. Refer to "Final Assembly", TF-184.

Front Drive Shaft and Drive Chain

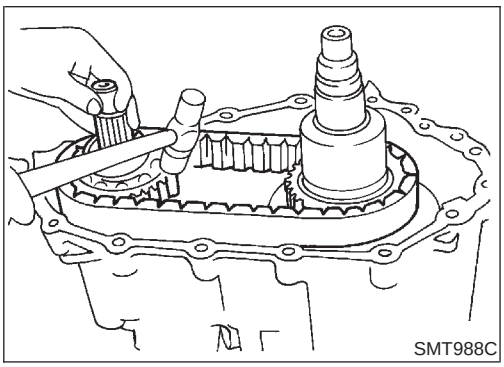
NATF0083S07



1. Place a base (ST30032000) to front drive shaft rear bearing inner race, and press it using a drift (KV40100621).

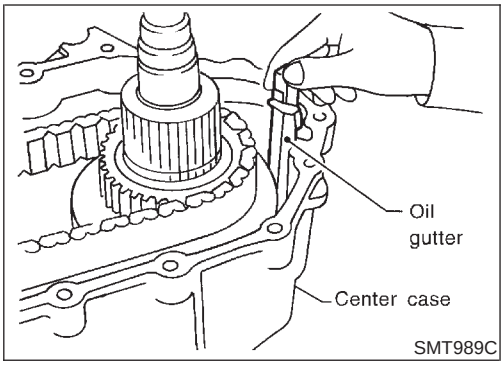


2. Place base (ST30032000) to front drive shaft front bearing inner race, and press it using the drift (KV40100621).



3. Install drive chain temporarily to front drive shaft and drive gear of clutch drum.
4. Tap front drive shaft with a plastic hammer while keeping it upright and press-fit front drive shaft rear bearing.

- **Be careful not to tap drive chain with a hammer.**

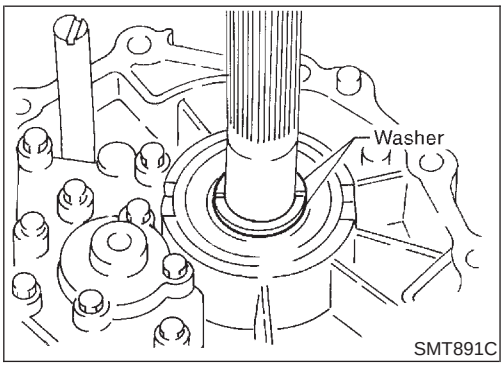


5. Align claw of oil gutter with center case, and install it.
6. Install front case assembly and rear case assembly. Refer to "Final Assembly", TF-184.

Final Assembly

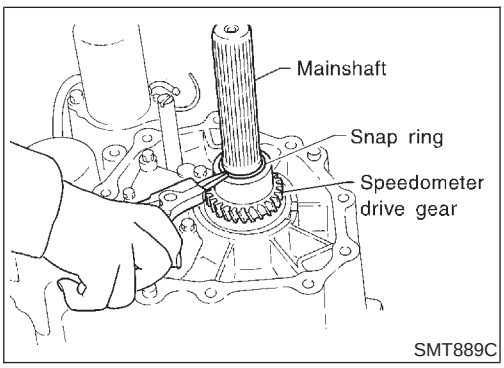
NATF0084

1. Install C-rings to mainshaft rear bearing.



2. Check speedometer drive gear teeth for abnormal wear. Set speedometer drive gear properly on mainshaft, and secure it with snap ring.

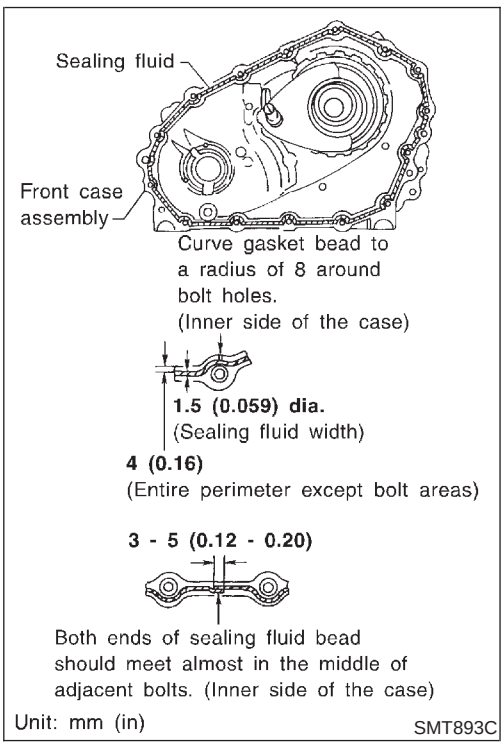
- **Do not reuse snap ring.**

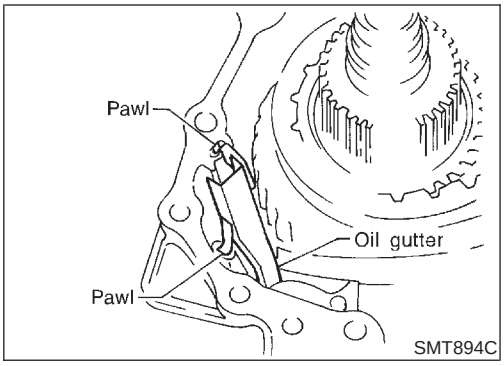


3. Apply sealing fluid 518 (Locktite) to the entire center case mounting surface of front case as shown in the figure.

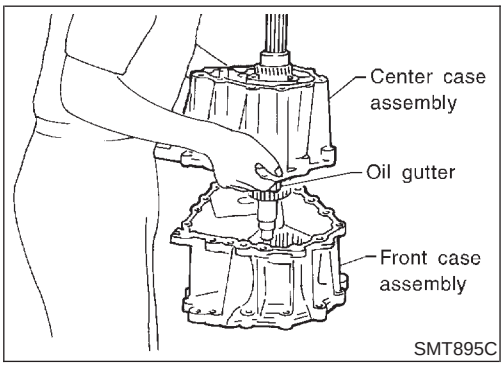
CAUTION:

Remove all foreign materials such as water, oil and grease from center case and front case mating surfaces.





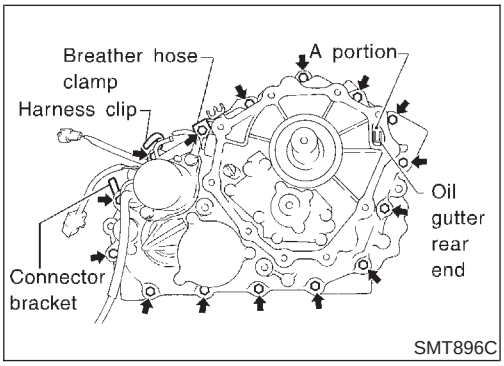
4. Make sure the two claws of oil gutter are securely attached to slots in center case.



5. With the claws of oil gutter held by a finger, install center case assembly to front case assembly.

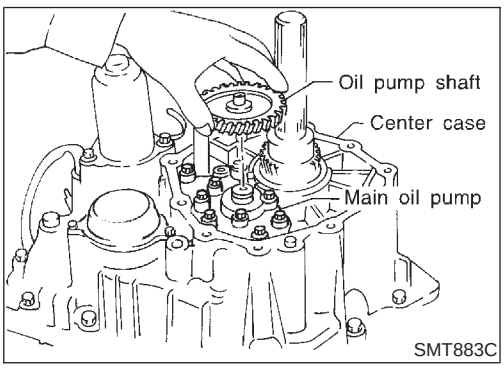
CAUTION:
Pay careful attention so that mainshaft end does not damage radial needle bearing in sun gear assembly.

6. Tap center case lightly with a rubber hammer or the like and press-fit front drive shaft bearing into front case.



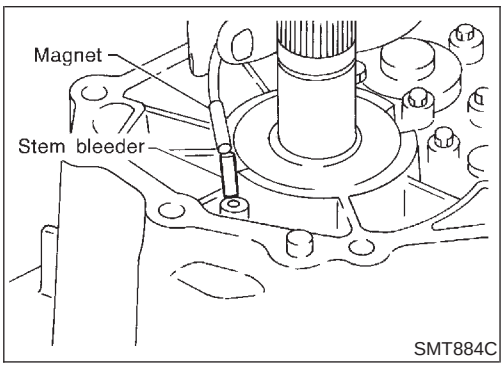
7. Make sure oil gutter rear end protrudes from point "A" in the figure.
8. Tightening bolts to specified torque.
   : **41 - 48 N·m (4.2 - 4.9 kg-m, 30 - 35 ft-lb)**

- **Be sure to install air breather hose clamp, connector bracket and harness clip.**

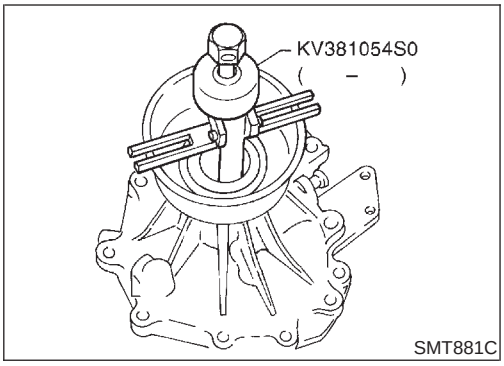


9. Fit double-flat end of oil pump shaft into slot of main oil pump and install it.

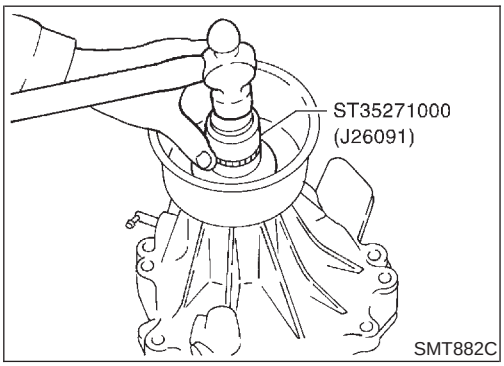
NOTE:
When oil pump shaft is rotated slightly, it drops into position where both parts fit.



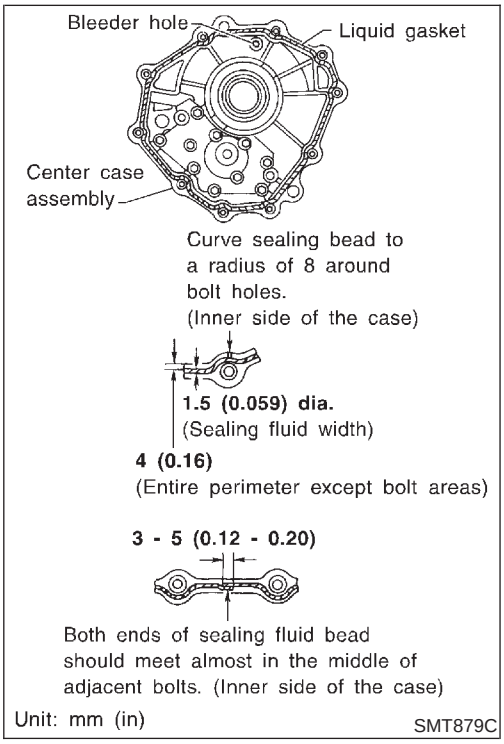
10. Install stem bleeder to center case.



11. Remove rear oil seal.
- **Do not reuse oil seal.**



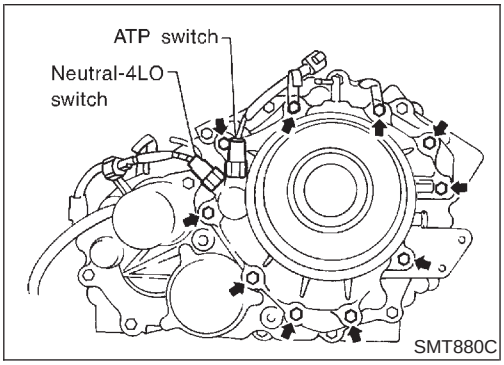
12. Apply ATF to the circumference of new rear oil seal, and tap it using a drift as shown in the figure so that it is aligned with case tip face.
- **Apply multi-purpose grease to oil seal lip.**



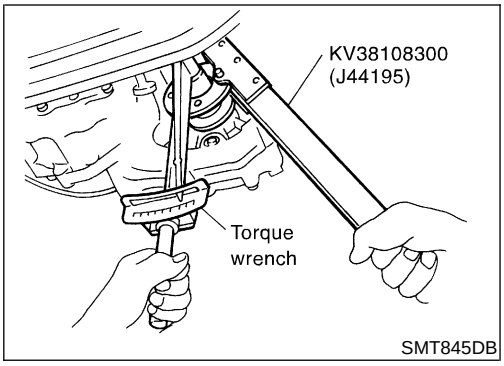
13. Apply sealing fluid 518 (Locktite) to entire rear case mounting surface of center case as shown in the figure.

CAUTION:
- **Remove all foreign materials such as water, oil, and grease from center case and rear case mating surfaces.**
- **Be careful not to allow sealing fluid to clog bleeder hole.**

14. Install rear case to center case, and tighten bolts to specified torque.
    : 41 - 48 N·m (4.2 - 4.9 kg-m, 30 - 35 ft-lb)
- **Be sure to attach harness clips.**



15. Remove all the gasket fluid 1215 (Three Bond) from switch mounting area and inside rear case, with ATP switch and neutral-4LO switch threaded in 1 to 2 pitches, apply gasket fluid 1215 (Three Bond) to the thread of the switches and tighten it to specified torque.
    : 15 - 20 N·m (1.5 - 2.0 kg-m, 11 - 14 ft-lb)
16. Install rear case assembly to center case assembly.



17. Install companion flange to front drive shaft, and tighten mounting nut.
    : 226 - 324 N·m (23.0 - 33.0 kg-m, 166 - 239 ft-lb)

General Specifications

NATF0085

Transfer model			ATX14A
Gear ratio	High		1.000
	Low		2.596
Number of teeth	Planetary gear	Sun gear	57
		Internal gear	91
	Front drive sprocket		35
	Front drive shaft		35
Fluid capacity ℓ (US qt, Imp qt)*			3.0 (3-1/8, 2-5/8)

*: Refer to MA-12, “Fluids and Lubricants”.

Inner Gear and Outer Gear

NATF0086

SUB-OIL PUMP

NATF0086S01

Allowable clearance	0.015 - 0.035 mm (0.0006 - 0.0014 in)	
Gear thickness mm (in)	Part No.*	
	Inner gear	Outer gear
9.27 - 9.28 (0.3650 - 0.3654)	31346 0W462	31347 0W462
9.28 - 9.29 (0.3654 - 0.3657)	31346 0W461	31347 0W461
9.29 - 9.30 (0.3657 - 0.3661)	31346 0W460	31347 0W460

*: Always check with the Parts Department for the latest parts information.

MAIN OIL PUMP

NATF0086S02

Allowable clearance	0.015 - 0.035 mm (0.0006 - 0.0014 in)	
Gear thickness mm (in)	Part No.*	
	Inner gear	Outer gear
14.67 - 14.68 (0.5776 - 0.5780)	31346 0W412	31347 0W412
14.68 - 14.69 (0.5780 - 0.5783)	31346 0W411	31347 0W411
14.69 - 14.70 (0.5783 - 0.5787)	31346 0W410	31347 0W410

*: Always check with the Parts Department for the latest parts information.

Control Valve

NATF0087

VALVE

NATF0087S01

Mounting position	Part name	Part No.*	Outer dia. mm (in)	Overall length mm (in)
L1	2-4 shift valve	31772 21X00	8.0 (0.315)	38.5 (1.516)
L2	Clutch valve	31772 80X11	10.0 (0.394)	40.0 (1.575)
L4	Pilot valve	31772 80X11	10.0 (0.394)	40.0 (1.575)
L5	Regulator valve	31741 0W410	12.0 (0.472)	68.0 (2.677)

*: Always check with the Parts Department for the latest parts information.

SPRING

NATF0087S02

Mounting position	Part name	Part No.*	Free length mm (in)	Outer dia. mm (in)	Wire dia. mm (in)	Winding direction
L1	2-4 shift valve spring	31742 0W400	31.85 (1.2539)	7.0 (0.276)	0.6 (0.024)	Clockwise

Mounting position	Part name	Part No.*	Free length mm (in)	Outer dia. mm (in)	Wire dia. mm (in)	Winding direction
L2	Clutch valve spring	31742 0W405	40.6 (1.598)	9.0 (0.354)	0.8 (0.031)	Clockwise
L4	Pilot valve spring	31742 0W410	28.1 (1.106)	9.0 (0.354)	1.2 (0.047)	Clockwise
L5	Regulator valve spring	31742 0W415	39.7 (1.563)	11.0 (0.433)	1.3 (0.051)	Clockwise

*: Always check with the Parts Department for the latest parts information.

Clutch

NATF0088

DRIVE PLATE

NATF0088S01

Part No.*	Quantity	Initial thickness mm (in)	Limit value mm (in)
31532 0W410	8	2.0 (0.079)	1.8 (0.071)

*: Always check with the Parts Department for the latest parts information.

DRIVEN PLATE

NATF0088S04

Part No.*	Quantity	Initial thickness mm (in)	Limit value mm (in)
31536 0W410	14	2.0 (0.079)	0 (0) (steel plate)

*: Always check with the Parts Department for the latest parts information.

RETURN SPRING

NATF0088S02

Stamped mark	Part No.*	Free length mm (in)	Outer dia. mm (in)	Wire dia. mm (in)	Winding direction
1	31521 0W401	37.3 (1.496)	12.0 (0.472)	1.8 (0.071)	Clockwise
2	31521 0W402	37.8 (1.488)			
3	31521 0W403	38.4 (1.512)			
4	31521 0W404	38.9 (1.531)			
5	31521 0W405	39.4 (1.551)			
6	31521 0W406	40.0 (1.575)			
7	31521 0W407	36.8 (1.449)			
8	31521 0W408	40.5 (1.594)			

*: Always check with the Parts Department for the latest parts information.

RETAINING PLATE

NATF0088S03

Standard end play	0.2 - 0.5 mm (0.008 - 0.020 in)	
Measured value mm (in)	Part No.*	Thickness mm (in)
2.30 - 2.50 (0.0906 - 0.0984)	31537 0W410	2.1 (0.083)
2.50 - 2.70 (0.0984 - 0.1063)	31537 0W411	2.3 (0.091)
2.70 - 2.90 (0.1063 - 0.1142)	31537 0W412	2.5 (0.098)
2.90 - 3.10 (0.1142 - 0.1220)	31537 0W413	2.7 (0.106)
3.10 - 3.30 (0.1220 - 0.1299)	31537 0W414	2.9 (0.114)
3.30 - 3.50 (0.1299 - 0.1378)	31537 0W415	3.1 (0.122)
3.50 - 3.70 (0.1378 - 0.1457)	31537 0W416	3.3 (0.130)
3.70 - 3.90 (0.1457 - 0.1535)	31537 0W417	3.5 (0.138)
3.90 - 4.10 (0.1535 - 0.1614)	31537 0W418	3.7 (0.146)
4.10 - 4.30 (0.1614 - 0.1693)	31537 0W419	3.9 (0.154)

Clutch (Cont'd)

Standard end play	0.2 - 0.5 mm (0.008 - 0.020 in)	
Measured value mm (in)	Part No.*	Thickness mm (in)
4.30 - 4.50 (0.1693 - 0.1772)	31537 0W420	4.1 (0.161)
4.50 - 4.70 (0.1772 - 0.1850)	31537 0W421	4.3 (0.169)
4.70 - 4.90 (0.1850 - 0.1929)	31537 0W422	4.5 (0.177)
4.90 - 5.10 (0.1929 - 0.2008)	31537 0W423	4.7 (0.185)

*: Always check with the Parts Department for the latest parts information.

Seal Ring (Mainshaft side)

NATF0089

Standard clearance Limit clearance	0.05 - 0.30 mm (0.0020 - 0.0118 in) 0.30 mm (0.0118 in)		
Part No.*	Outer dia. mm (in)	Inner dia. mm (in)	Thickness mm (in)
31525 0W410	40.8 (1.606)	36.9 (1.453)	1.97 (0.0776)

*: Always check with the Parts Department for the latest parts information.

Bearing Race (Thrust needle bearing side)

NATF0090

Standard end play	0.1 - 0.25 mm (0.0039 - 0.0098 in)	
End play (Dimension "E") mm (in)	Part No.*	Thickness mm (in)
1.785 - 1.800 (0.0703 - 0.0709)	31439 0W410	1.6 (0.063)
1.800 - 1.900 (0.0709 - 0.0748)	31439 0W411	1.7 (0.067)
1.900 - 2.000 (0.0748 - 0.0787)	31439 0W412	1.8 (0.071)
2.000 - 2.100 (0.0787 - 0.0827)	31439 0W413	1.9 (0.075)
2.100 - 2.200 (0.0827 - 0.0866)	31439 0W414	2.0 (0.079)
2.200 - 2.270 (0.0866 - 0.0894)	31439 0W415	2.1 (0.083)

*: Always check with the Parts Department for the latest parts information.

Snap Ring (Sun gear side)

NATF0091

Standard end play	0 - 0.15 mm (0 - 0.0059 in)	
End play (Dimension "F") mm (in)	Part No.*	Thickness mm (in)
2.40 - 2.50 (0.0945 - 0.0984)	33112 0W411	2.4 (0.094)
2.50 - 2.60 (0.0984 - 0.1024)	33112 0W412	2.5 (0.098)
2.60 - 2.70 (0.1024 - 0.1063)	33112 0W413	2.6 (0.102)

*: Always check with the Parts Department for the latest parts information.

PROPELLER SHAFT & DIFFERENTIAL CARRIER

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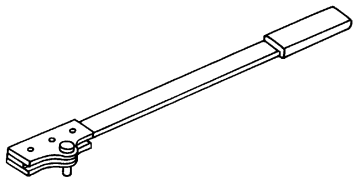
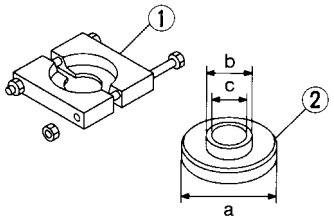
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Preparation

SPECIAL SERVICE TOOLS

NAPD0001

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
KV38108300 (J44195) Companion flange wrench	 NT771	Removing and installing propeller shaft lock nut, and drive pinion lock nut
ST3090S000 (—) Drive pinion rear inner race puller set 1 ST30031000 (J22912-01) Puller 2 ST30901000 (J26010-01) Base	 NT527	Removing and installing drive pinion rear inner cone **a: 79 mm (3.11 in) dia.** **b: 45 mm (1.77 in) dia.** **c: 35 mm (1.38 in) dia.**

Noise, Vibration and Harshness (NVH) Troubleshooting

=NAPD0049

NVH TROUBLESHOOTING CHART

NAPD0049S01

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

Reference page			—	PD-6	—	—	—	PD-8	PD-8	PD-24, 48	PD-30, 57	PD-24, 48	PD-19, 44	—	—	—	—	AX-3	AX-3	SU-3	SU-3	SU-3	BR-6	ST-6
Possible cause and SUSPECTED PARTS			Uneven rotation torque	Center bearing improper installation	Excessive center bearing axial end play	Center bearing mounting (insulator) cracks, damage or deterioration	Excessive joint angle	Rotation imbalance	Excessive runout	Rough gear tooth	Improper gear contact	Tooth surfaces worn	Incorrect backlash	Companion flange excessive runout	Improper gear oil	PROPELLER SHAFT	DIFFERENTIAL	DRIVE SHAFT	AXLE	SUSPENSION	TIRES	ROAD WHEEL	BRAKES	STEERING
Symptom	PROPELLER SHAFT	Noise	×	×	×	×	×	×	×								×	×	×	×	×	×	×	×
		Shake		×			×											×	×	×	×	×	×	×
		Vibration	×	×	×	×	×	×	×									×	×	×	×			×
	DIFFERENTIAL	Noise								×	×	×	×	×	×	×		×	×	×	×	×	×	×

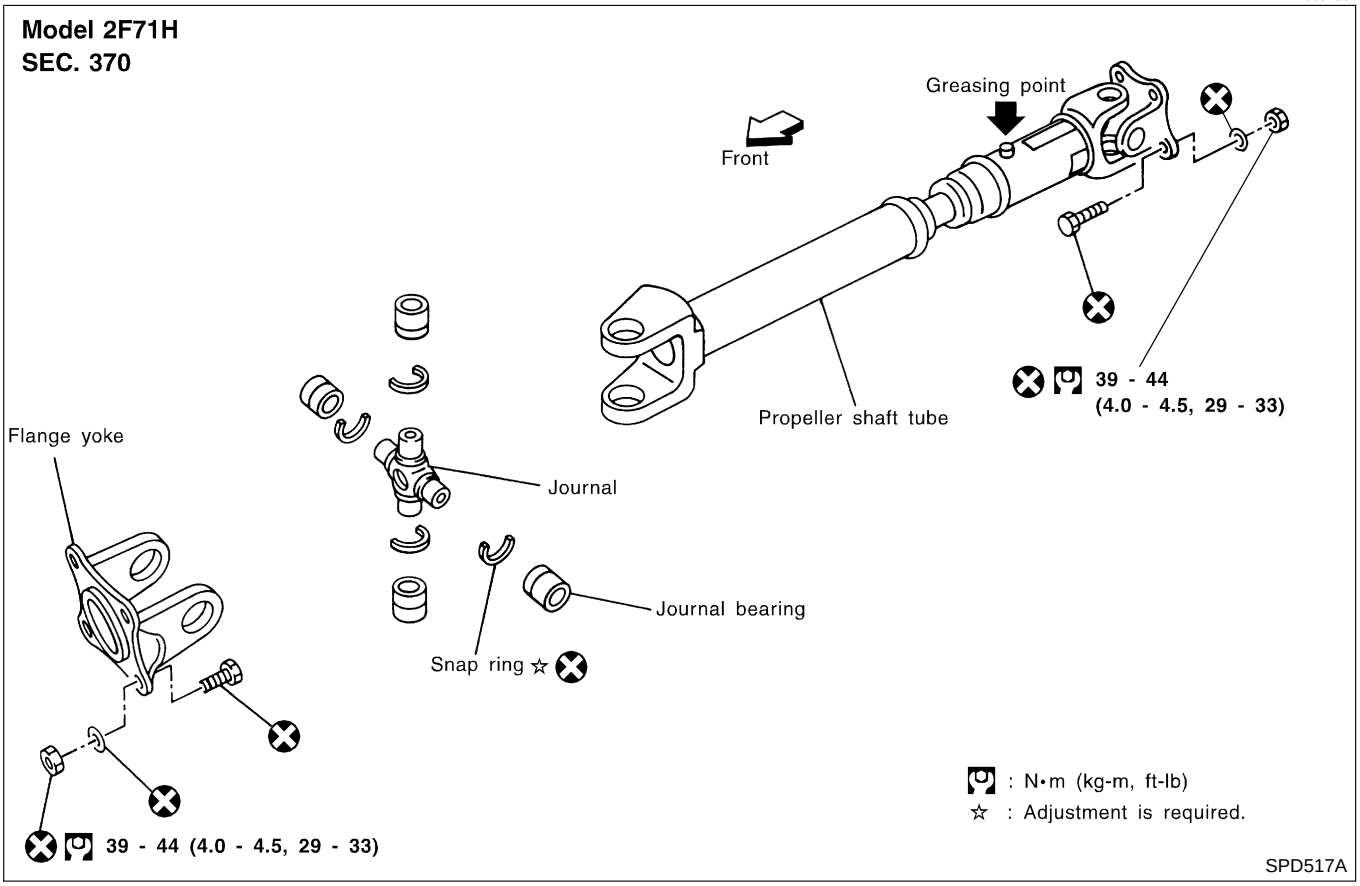
×: Applicable

Components

NAPD0002

FRONT PROPELLER SHAFT

NAPD0002S01

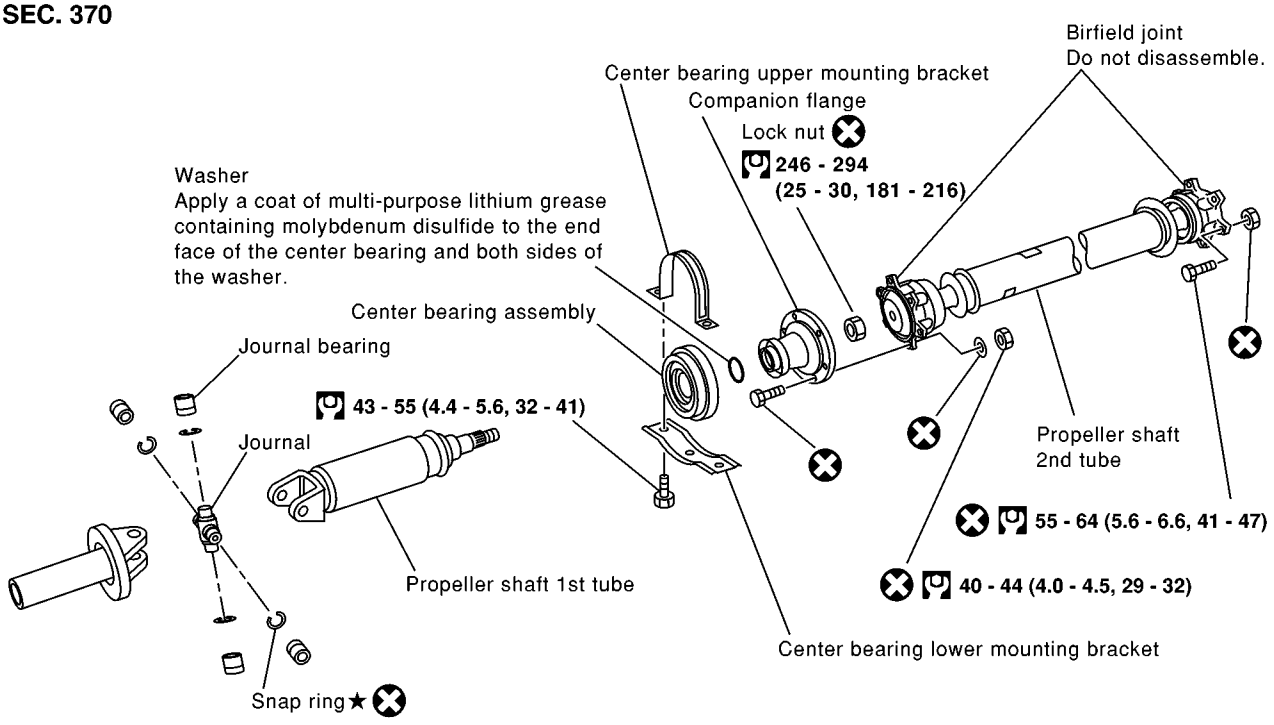


Components (Cont'd)

REAR PROPELLER SHAFT

NAPD0002S02

MODEL 3S80B-2BJ – 2WD M/T model – SEC. 370

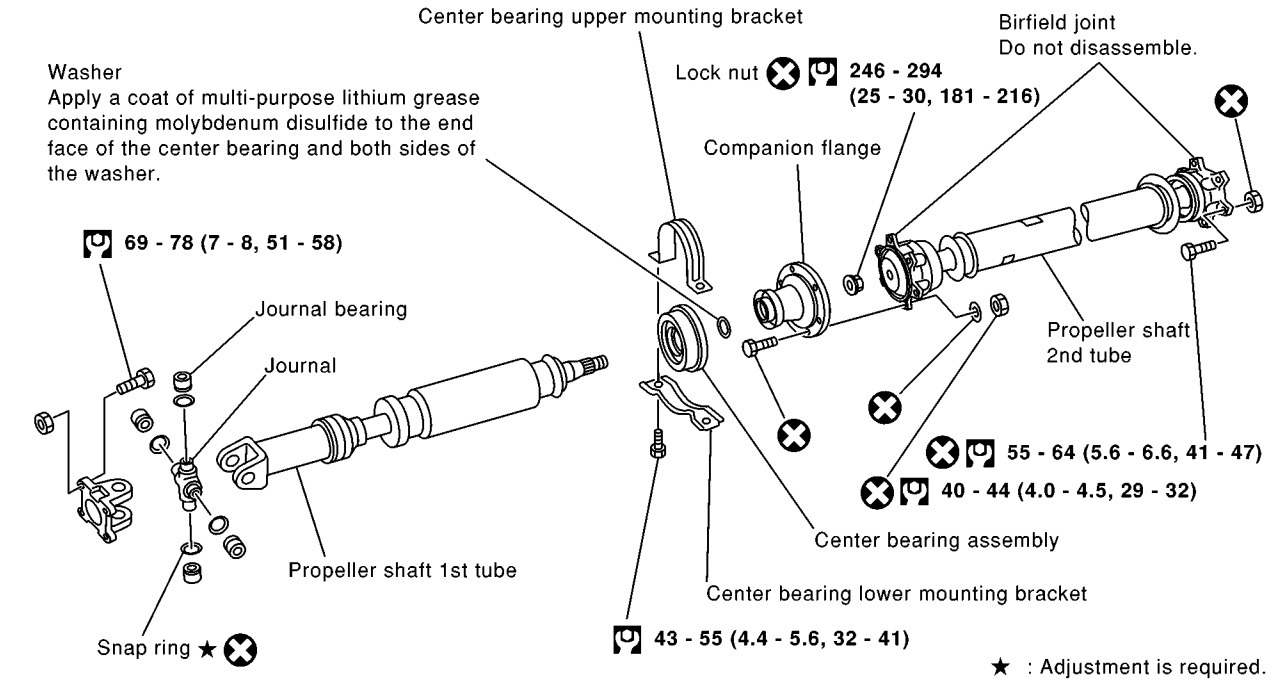


★ : Adjustment is required.

: N•m (kg-m, ft-lb)

SPD524A

MODEL 3F80B-2BJ – 2WD A/T model – SEC. 370

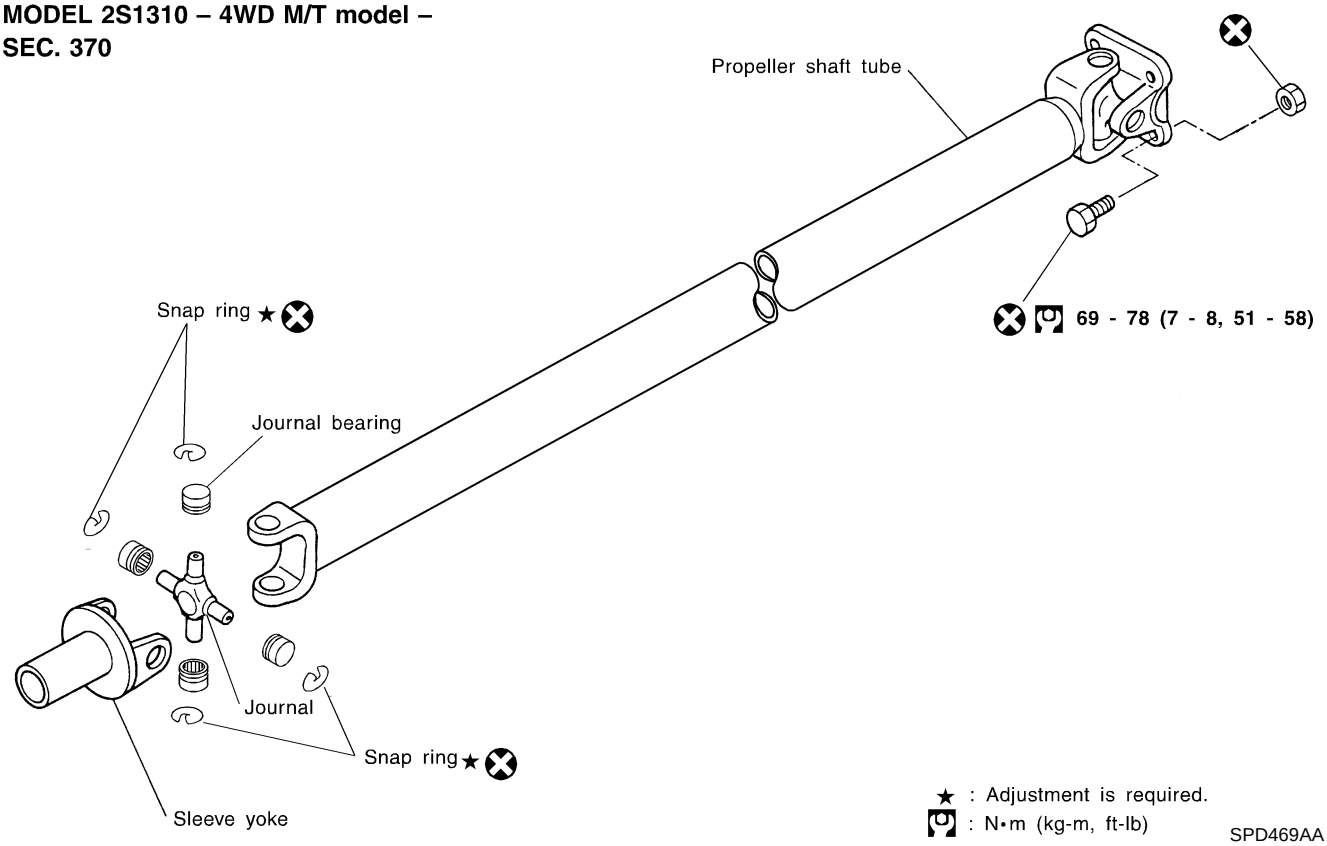


★ : Adjustment is required.

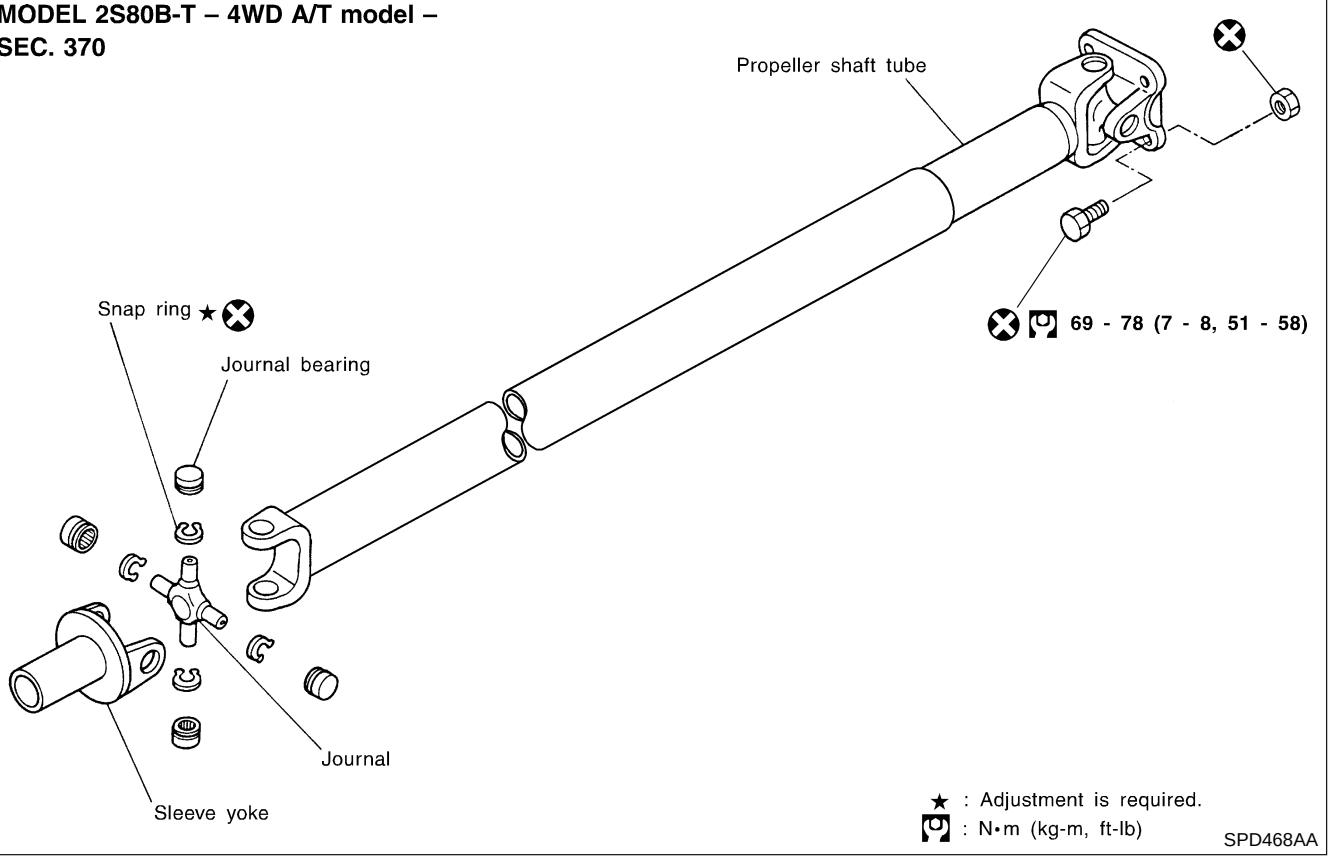
: N•m (kg-m, ft-lb)

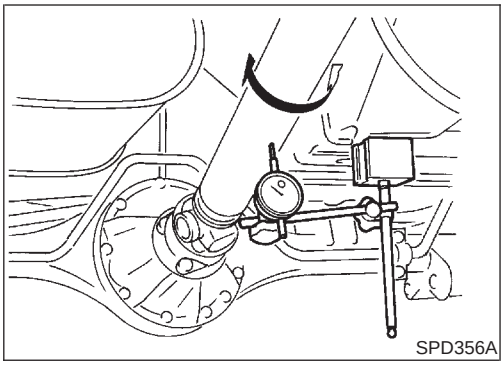
SPD522A

MODEL 2S1310 – 4WD M/T model –
SEC. 370

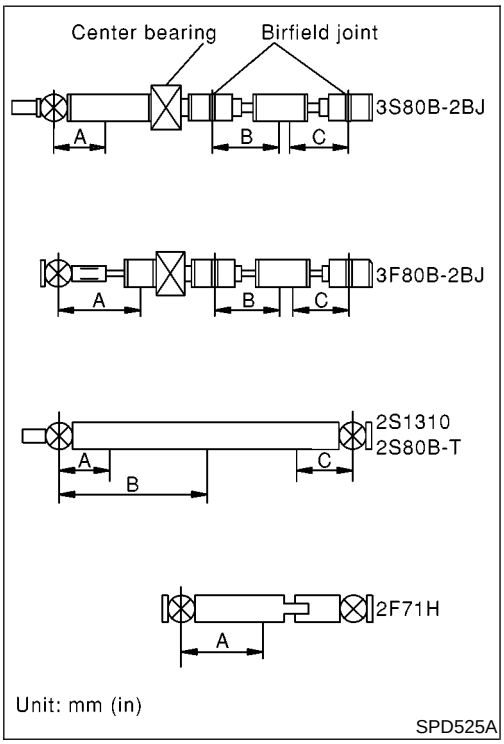


MODEL 2S80B-T – 4WD A/T model –
SEC. 370





SPD356A



Unit: mm (in)

SPD525A

On-vehicle Service

PROPELLER SHAFT VIBRATION

NAPD0003

If vibration is present at high speed, inspect propeller shaft runout first.

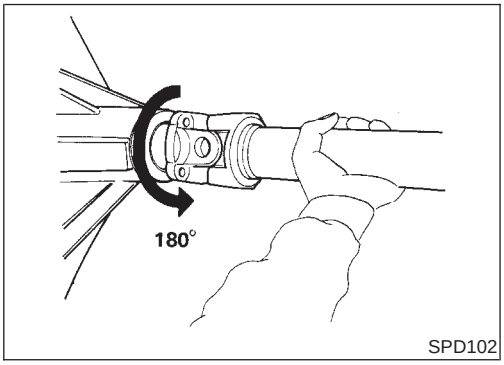
1. Raise rear wheels.
2. Measure propeller shaft runout at several points by rotating final drive companion flange with hands.

Runout limit: 0.6 mm (0.024 in)

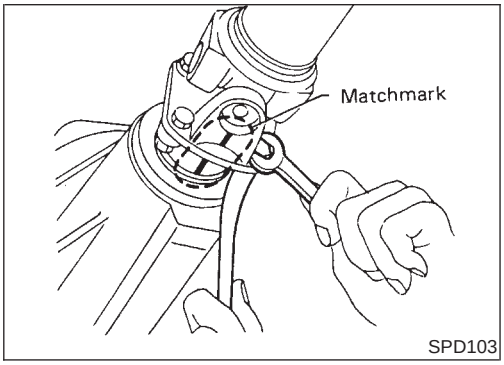
Propeller shaft runout measuring points:

Unit: mm (in)

Distance		A	B	C
3S80B-2BJ	2WD M/T	162 (6.38)	240 (9.45)	240 (9.45)
3F80B-2BJ	2WD A/T	372.5 (14.67)	240 (9.45)	240 (9.45)
2S1310		280 (11.02)	480.8 (18.93)	266.5 (10.49)
2S80B-T	Part-time 4WD	280 (11.02)	480 (18.90)	266.5 (10.49)
	Full-time 4WD	280 (11.02)	463.5 (18.25)	266.5 (10.49)
2F71H	Part-time 4WD	179.5 (7.07)	—	—
	Full-time 4WD	173.5 (6.83)	—	—



SPD102



SPD103

3. If runout exceeds specifications, disconnect propeller shaft at final drive companion flange; then rotate companion flange 180 degrees and reconnect propeller shaft.
4. Check runout again. If runout still exceeds specifications, replace propeller shaft assembly.
5. Perform road test.

APPEARANCE CHECKING

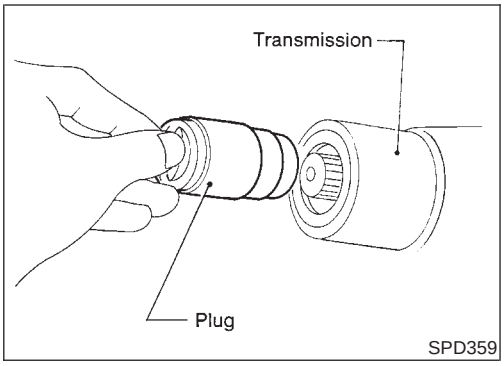
NAPD0004

- Inspect propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly.
- If center bearing is noisy or damaged, replace center bearing.

Removal and Installation

NAPD0005

- Put match marks on flanges and separate propeller shaft from final drive.

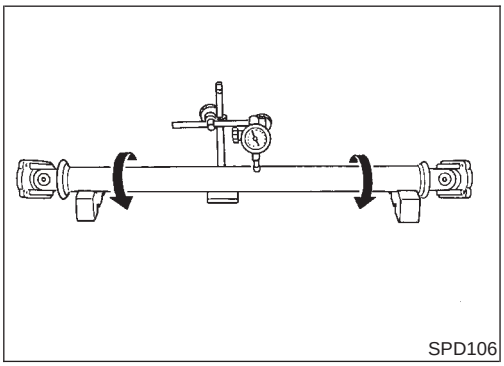


SPD359

- Draw out propeller shaft from transmission and plug up rear end of transmission rear extension housing.

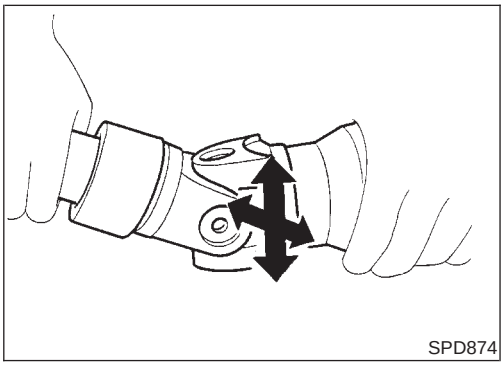
Inspection

NAPD0006


SPD106

- Inspect propeller shaft runout. If runout exceeds specifications, replace propeller shaft assembly.

  Runout limit: 0.6 mm (0.024 in)


SPD874

- If the play exceeds specifications, replace propeller shaft assembly.

  Journal axial play:
  0.02 mm (0.0008 in) or less

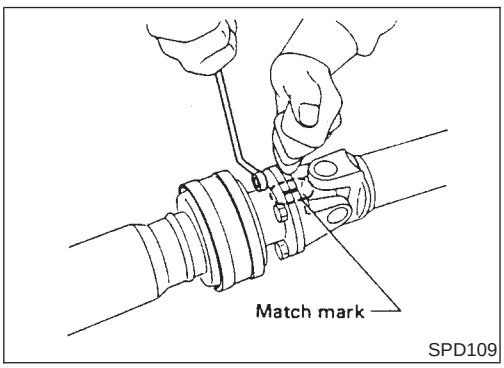
Disassembly

NAPD0007

CENTER BEARING — 2WD —

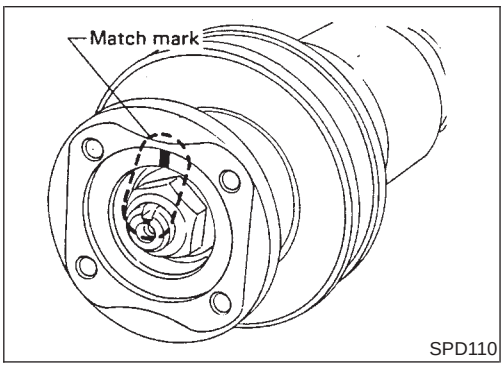
NAPD0007S01

1. Put match marks on flanges, and separate 2nd tube from 1st tube.

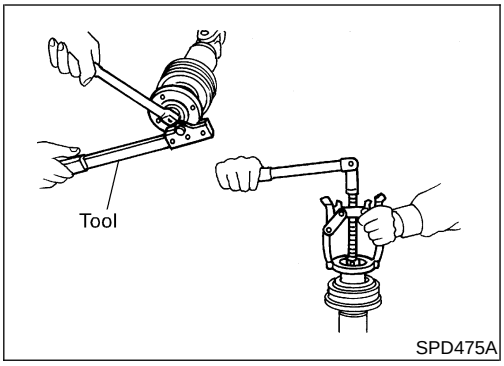


SPD109

2. Put match marks on the flange and shaft.

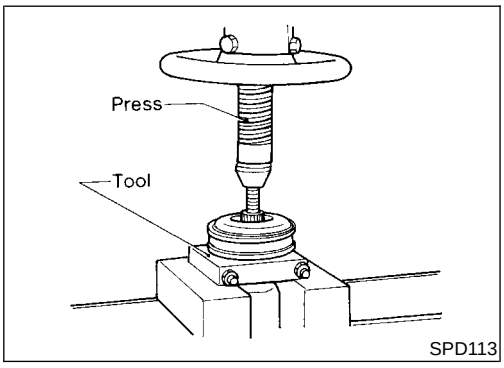


SPD110



SPD475A

3. Remove locking nut with Tool.
   Tool number:
   KV38108300 (J44195)
4. Remove companion flange with puller.

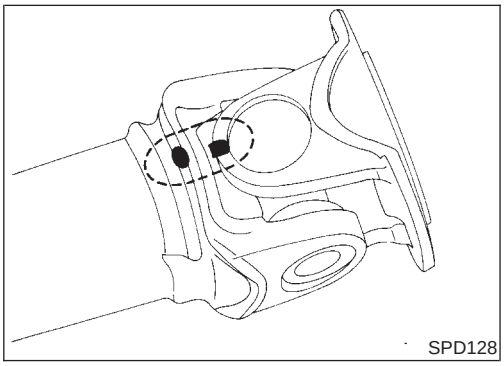


SPD113

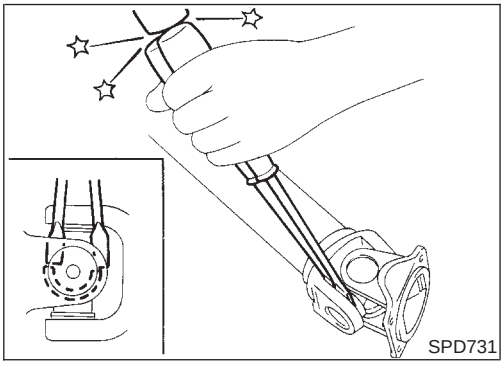
5. Remove center bearing with Tool and press.
   Tool number: ST30031000 (J22912-01)

JOURNAL (71H AND 80B)

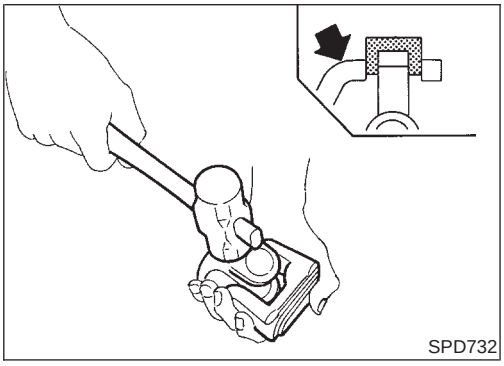
NAPD0007S02


SPD128

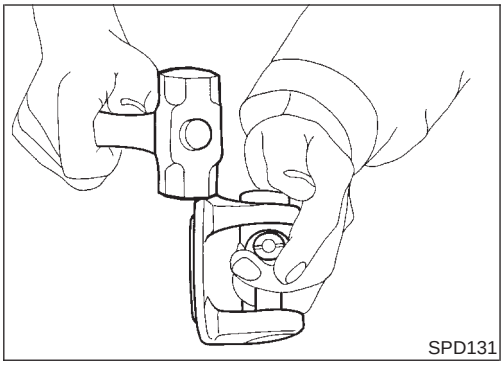
1. Put match marks on shaft and flange or yoke.


SPD731

2. Remove snap ring.


SPD732

3. Remove pushed out journal bearing by lightly tapping yoke with a hammer, taking care not to damage journal and yoke hole.


SPD131

4. Remove bearing at opposite side in above operation.

Put marks on disassembled parts so that they can be reinstalled in their original positions from which they were removed.

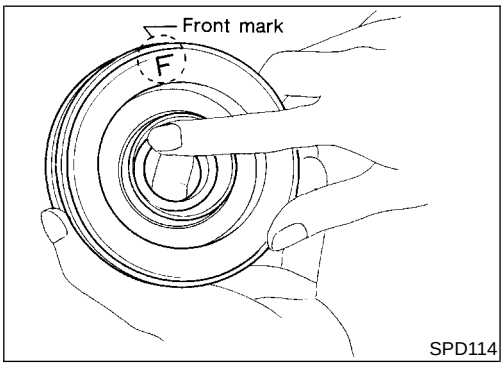
Assembly

NAPD0008

CENTER BEARING — 2WD —

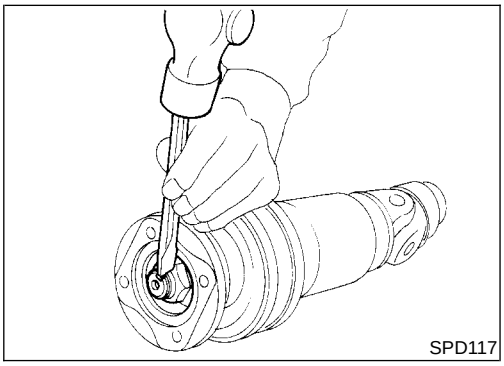
NAPD0008S01

- When installing center bearing, position the "F" mark on center bearing toward front of vehicle.
- **Apply a coat of multi-purpose lithium grease containing molybdenum disulfide to the end face of the center bearing and both sides of the washer.**



SPD114

- Stake the nut. Always use new one.
- Align match marks when assembling tubes.

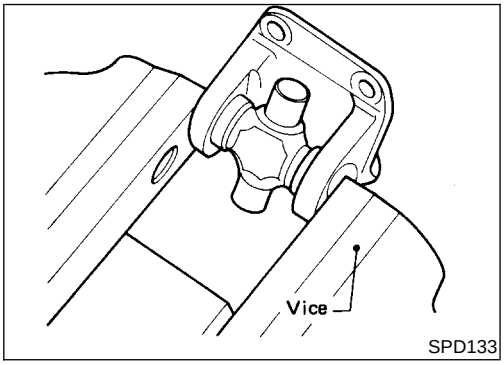

SPD117

JOURNAL (71H AND 80B)

NAPD0008S02

1. Assemble journal bearing. Apply recommended multi-purpose grease on bearing inner surface.

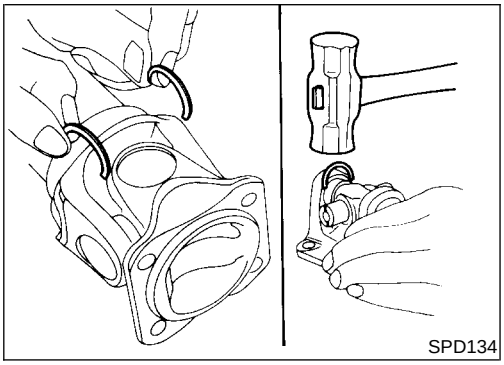
When assembling, be careful that needle bearing does not fall down.



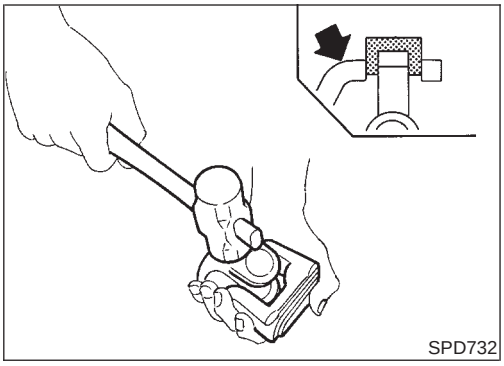
SPD133

2. Select snap ring that will provide specified play in axial direction of journal, and install them.
   Refer to SDS, PD-13.

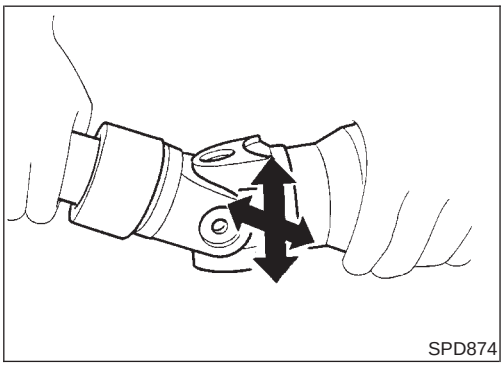
Select snap rings with a difference in thickness at both sides within 0.06 mm (0.0024 in).


SPD134

Assembly (Cont'd)


SPD732

3. Adjust thrust clearance between bearing and snap ring to zero by tapping yoke.


SPD874

4. Check to see that journal moves smoothly and check for axial play.

Axial play: 0.02 mm (0.0008 in) or less

Service Data and Specifications (SDS)

GENERAL SPECIFICATIONS
2WD Model

NAPD0009

NAPD0009S01

Transmission		M/T	A/T
Propeller shaft model		3S80B-2BJ	3F80B-2BJ
Number of joints		3	
Coupling method with transmission		Sleeve type	Flange type
Type of journal bearings		Solid type (disassembly type — without Birfield joint —)	
Distance between yokes mm (in)		80 (3.15)	
Shaft length (Spider to spider) mm (in)	1st	612 (24.19)	650 (25.59)
	2nd	749 (29.49)	
Shaft outer diameter mm (in)	1st	75 (2.95)	
	2nd	65 (2.56)	

4WD Model

NAPD0009S02

Location	Front		Rear		
			M/T	A/T	
	Full-time	Part-time		Full time	Part time
Propeller shaft model	2F71H		2S1310	2S80B-T	
Number of joints	2				
Coupling method with transmission	Flange type		Sleeve type		
Type of journal bearings	Solid type (disassembly type)				
Distance between yokes mm (in)	71 (2.80)		80 (3.15)		
Shaft length (Spider to spider) mm (in)	553 (21.77)	565 (22.24)	965.1 (38.00)	927 (36.50)	960 (37.80)
Shaft outer diameter mm (in)	50.8 (2.000)		76.2 (3.000)	75 and 63.5 (2.95 and 2.500)	

SERVICE DATA

NAPD0010
Unit: mm (in)

Propeller shaft runout limit	0.6 (0.024)
Journal axial play	0.02 (0.0008) or less

SNAP RING (80B)

NAPD0011
Unit: mm (in)

Thickness	Color	Part number*
1.99 (0.0783)	White	37146-C9400
2.02 (0.0795)	Yellow	37147-C9400
2.05 (0.0807)	Red	37148-C9400
2.08 (0.0819)	Green	37149-C9400
2.11 (0.0831)	Blue	37150-C9400
2.14 (0.0843)	Light brown	37151-C9400
2.17 (0.0854)	Black	37152-C9400
2.20 (0.0866)	No paint	37153-C9400

*: Always check with the Parts Department for the latest parts information.

SNAP RING (71H)

NAPD0012
Unit: mm (in)

Thickness	Color	Part number*
1.99 (0.0783)	White	37146-01G00
2.02 (0.0795)	Yellow	37147-01G00
2.05 (0.0807)	Red	37148-01G00
2.08 (0.0819)	Green	37149-01G00
2.11 (0.0831)	Blue	37150-01G00
2.14 (0.0843)	Light brown	37151-01G00
2.17 (0.0854)	Pink	37152-01G00
2.20 (0.0866)	No paint	37153-01G00

*: Always check with the Parts Department for the latest parts information.

SNAP RING (1310)

NAPD0052
Unit: mm (in)

Thickness	Color	Part number*
1.99 (0.0783)	White	37146-C9400
2.02 (0.0795)	Yellow	37147-C9400
2.05 (0.0807)	Red	37148-C9400
2.08 (0.0819)	Green	37149-C9400
2.11 (0.0831)	Blue	37150-C9400
2.14 (0.0843)	Light brown	37151-C9400
2.17 (0.0854)	Black	37152-C9400
2.20 (0.0866)	No paint	37153-C9400

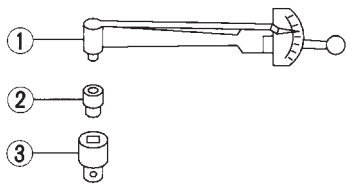
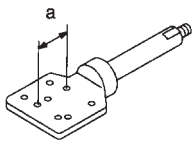
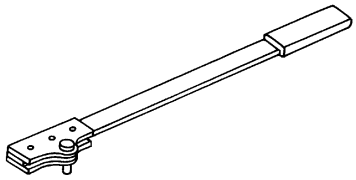
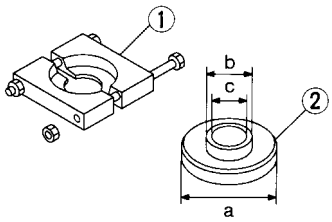
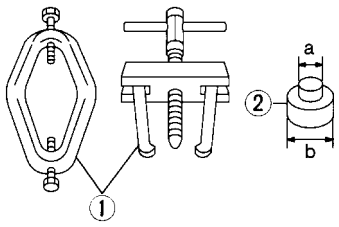
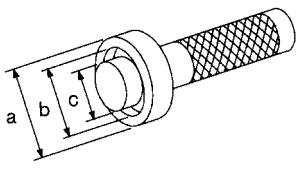
*: Always check with the Parts Department for the latest parts information.

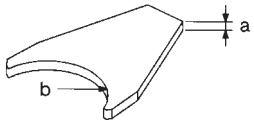
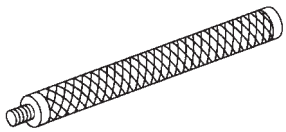
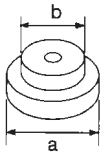
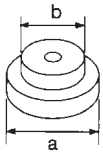
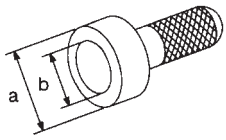
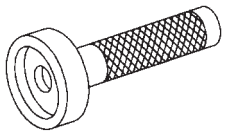
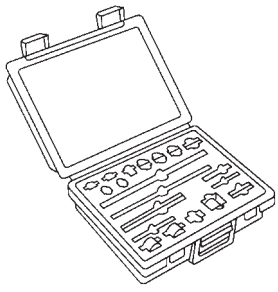
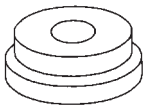
Preparation

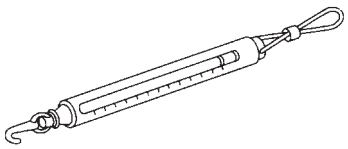
SPECIAL SERVICE TOOLS

NAPD0013

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
ST3127S000 (See J25765-A) Preload gauge 1 GG91030000 (J25765) Torque wrench 2 HT62940000 (—) Socket adapter 3 HT62900000 (—) Socket adapter	 NT124	Measuring pinion bearing preload and total preload
KV38100800 (J34310, J25604-01) Differential attachment	 NT119	Mounting final drive (To use, make a new hole.) **a: 152 mm (5.98 in)**
KV38108300 (J44195) Companion flange wrench	 NT771	Removing and installing propeller shaft lock nut, and drive pinion lock nut
ST3090S000 (—) Drive pinion rear inner race puller set 1 ST30031000 (J22912-01) Puller 2 ST30901000 (J26010-01) Base	 NT527	Removing and installing drive pinion rear inner cone **a: 79 mm (3.11 in) dia.** **b: 45 mm (1.77 in) dia.** **c: 35 mm (1.38 in) dia.**
ST3306S001 Differential side bearing puller set 1 ST33051001 (J22888-20) Body 2 ST33061000 (J8107-2) Adapter	 NT072	Removing and installing differential side bearing inner cone **a: 28.5 mm (1.122 in) dia.** **b: 38 mm (1.50 in) dia.**
KV38100300 (J25523) Differential side bearing drift	 NT085	Installing side bearing inner cone **a: 54 mm (2.13 in) dia.** **b: 46 mm (1.81 in) dia.** **c: 32 mm (1.26 in) dia.**

Tool number (Kent-Moore No.) Tool name	Description	
KV38100600 (J25267) Side bearing spacer drift	 NT528	Installing side bearing spacer **a: 8 mm (0.31 in)** **b: R42.5 mm (1.673 in)**
ST30611000 (J25742-1) Drift	 NT090	Installing pinion rear bearing outer race (Use with ST30621000 or ST30613000)
ST30621000 (J25742-5) Drift	 NT073	Installing pinion rear bearing outer race (Use with ST30611000) **a: 79 mm (3.11 in) dia.** **b: 59 mm (2.32 in) dia.**
ST30613000 (J25742-3) Drift	 NT073	Installing pinion front bearing outer race (Use with ST30611000) **a: 72 mm (2.83 in) dia.** **b: 48 mm (1.89 in) dia.**
KV38100500 (J25273) Gear carrier front oil seal drift	 NT115	Installing front oil seal **a: 85 mm (3.35 in) dia.** **b: 60 mm (2.36 in) dia.**
KV38100200 (J26233) Gear carrier side oil seal drift	 NT120	Installing side oil seal
(J34309) Differential shim selector	 NT134	Adjusting bearing pre-load and gear height
(J25269-4) Side bearing discs (2 Req'd)	 NT136	Selecting pinion height adjusting washer

Tool number (Kent-Moore No.) Tool name	Description
(J8129) Spring gauge	 NT127 Measuring carrier turning torque

Noise, Vibration and Harshness (NVH) Troubleshooting

NAPD0050

Refer to "NVH TROUBLESHOOTING CHART", PD-4.

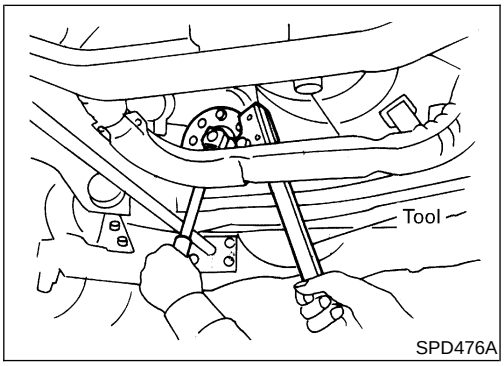
On-vehicle Service

FRONT OIL SEAL REPLACEMENT

NAPD0014

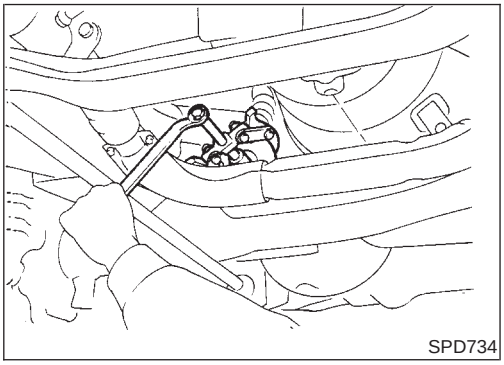
1. Remove front propeller shaft.
2. Loosen drive pinion nut.

Tool number: KV38108300 (J44195)

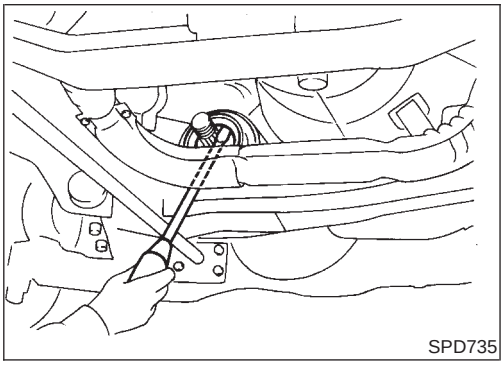


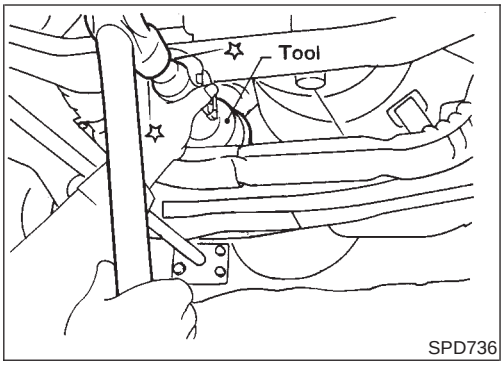
SPD476A

3. Remove companion flange.


SPD734

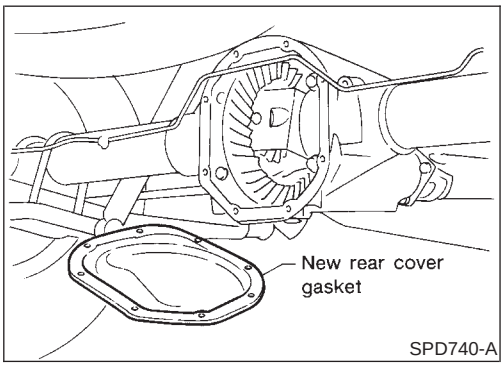
4. Remove front oil seal.


SPD735



5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Press front oil seal into carrier.
6. Install companion flange and drive pinion nut.
7. Install propeller shaft.

Tool number:
KV38100500 (J25273)



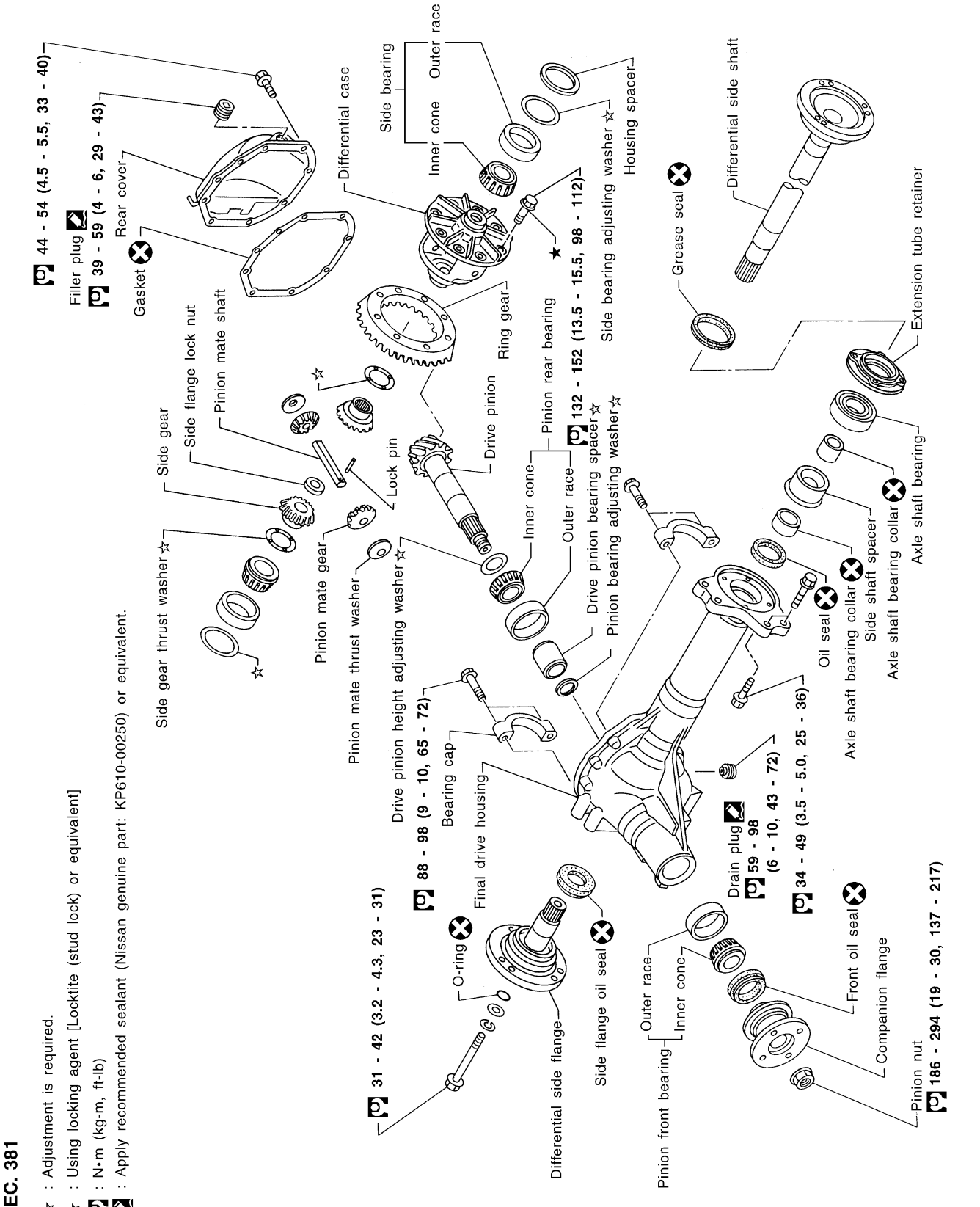
REAR COVER GASKET REPLACEMENT

NAPD0015

1. Drain gear oil.
2. Remove rear cover and rear cover gasket.
3. Install new rear cover gasket and rear cover.
4. Fill final drive with recommended gear oil.

Components

NAPD0016



SPD357AD

Removal and Installation

NAPD0017

REMOVAL

NAPD0017S01

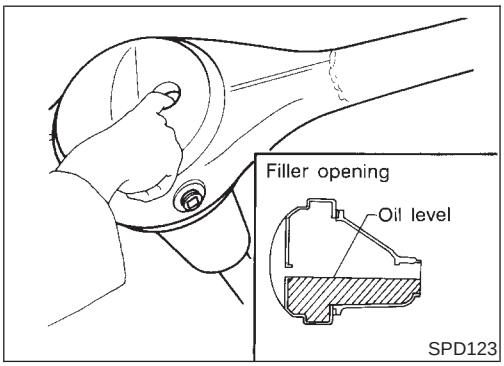
- Remove front of propeller shaft.
  Plug front end of transfer.
- Remove drive shaft. Refer to AX-12, “Removal”.
- Remove front final drive mounting bolts.

CAUTION:
Be careful not to damage spline, sleeve yoke and front oil seal when removing propeller shaft.

INSTALLATION

NAPD0017S02

- Fill final drive with recommended gear oil.



SPD123

Disassembly

NAPD0018

PRE-INSPECTION

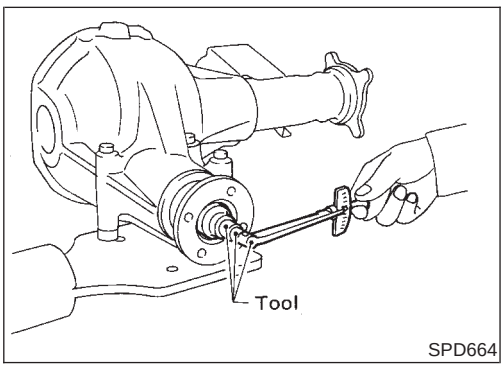
NAPD0018S01

Before disassembling final drive, perform the following inspection.

- Total preload

a) Turn drive pinion in both directions several times to set bearing rollers.
b) Check total preload with Tool.

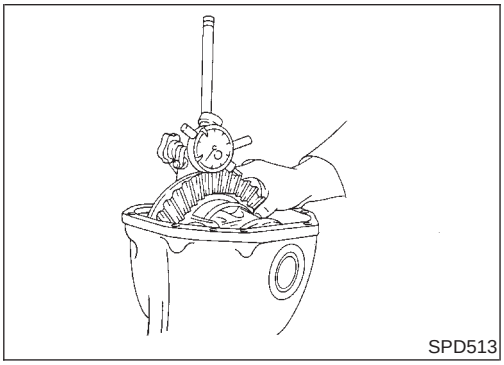
Tool number: ST3127S000 (J25765-A)
Total preload:
P_1 + [0.3 - 1.5 N·m (3 - 15 kg-cm, 2.6 - 13.0 in-lb)]
P_1 = Drive pinion preload

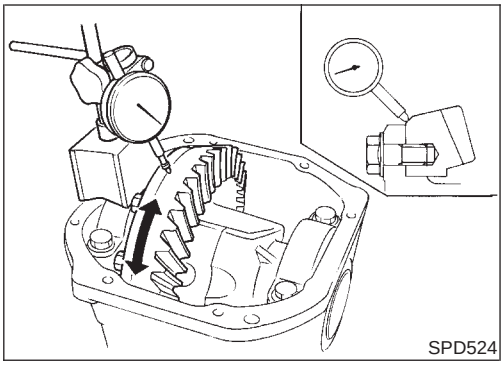


SPD664

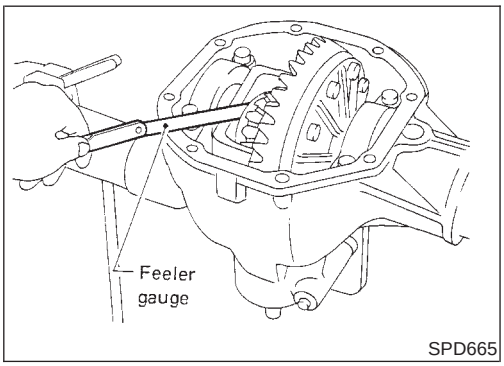
- Ring gear to drive pinion backlash
  Check backlash of ring gear with a dial indicator at several points.

Ring gear-to-drive pinion backlash:
0.10 - 0.15 mm (0.0039 - 0.0059 in)


SPD513


SPD524

- Ring gear runout
  Check runout of ring gear with a dial indicator.
  Runout limit:
  0.05 mm (0.0020 in)
- Tooth contact
  Check tooth contact. Refer to "TOOTH CONTACT", PD-30.



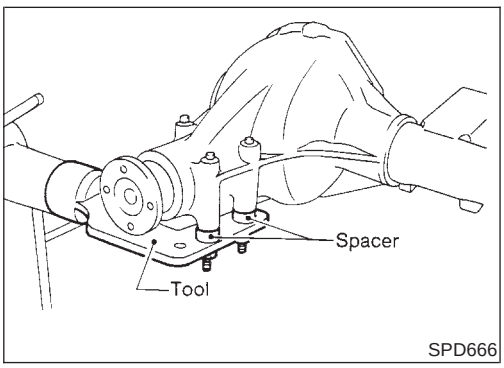
SPD665

- Side gear to pinion mate gear backlash
  Using a feeler gauge, measure clearance between side gear thrust washer and differential case.
  Clearance between side gear thrust washer and differential case:
  Less than 0.15 mm (0.0059 in)

FINAL DRIVE HOUSING

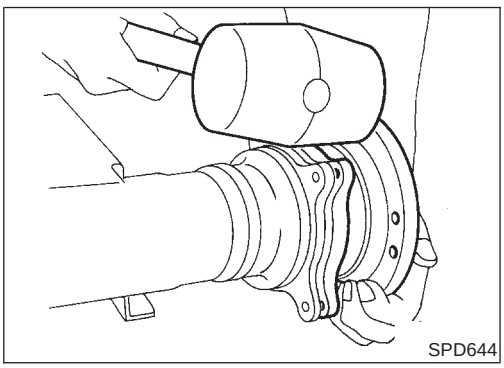
NAPD0018S02

1. Using three spacers [20 mm (0.79 in)], mount final drive assembly on Tool.
   Tool number:
   KV38100800 (J34310, J25604-01)

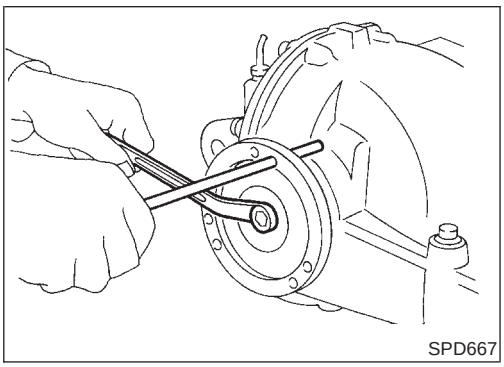


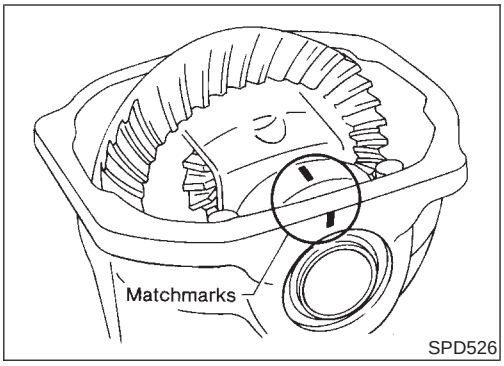
SPD666

2. Remove differential side shaft assembly.


SPD644

3. Remove differential side flange.

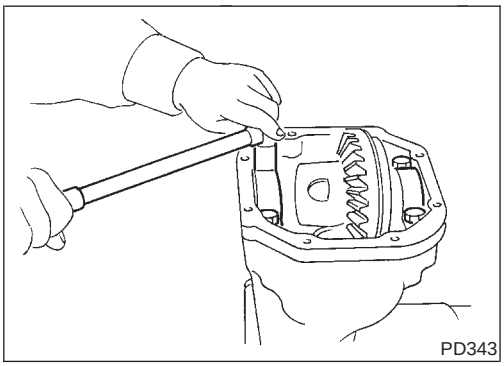

SPD667



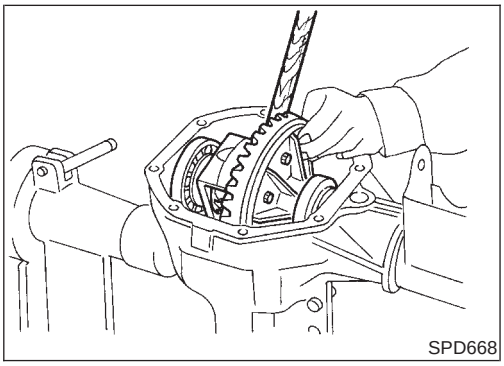
SPD526

4. Put match marks on one side of side bearing cap with paint or punch to ensure that it is replaced in proper position during reassembly.

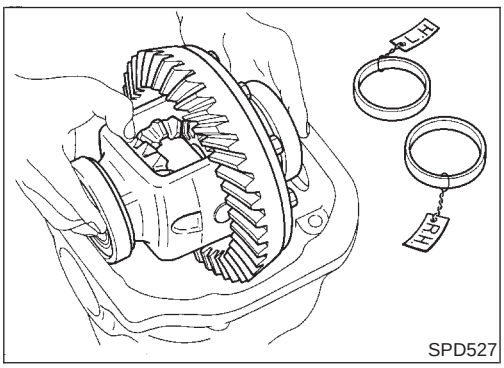
Bearing caps are line-bored during manufacture and should be put back in their original places.


PD343

5. Remove side bearing caps.


SPD668

6. Remove differential case assembly with a pry bar.

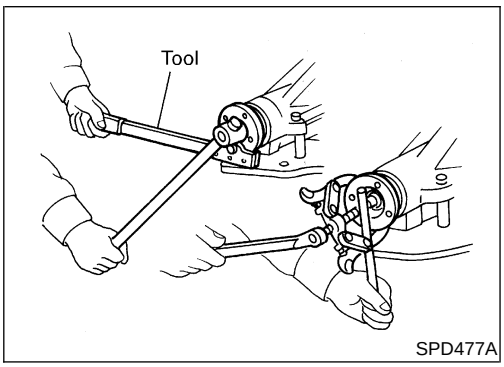


SPD527

Be careful to keep the side bearing outer races together with their respective inner cones — do not mix them up.

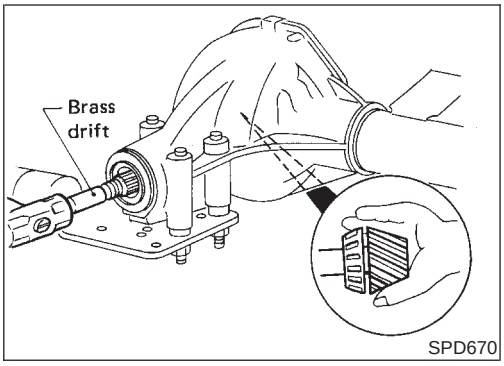
CAUTION:

Side bearing spacer is placed on either the left or right depending upon final drive gear ratio. It should be labeled so that it may be replaced correctly.



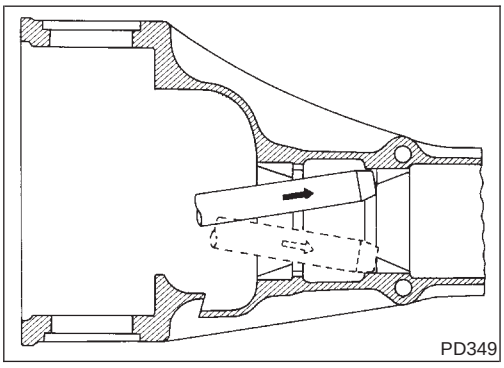
SPD477A

7. Loosen drive pinion nut.
   Tool number: KV38108300 (J44195)
8. Remove companion flange with puller.

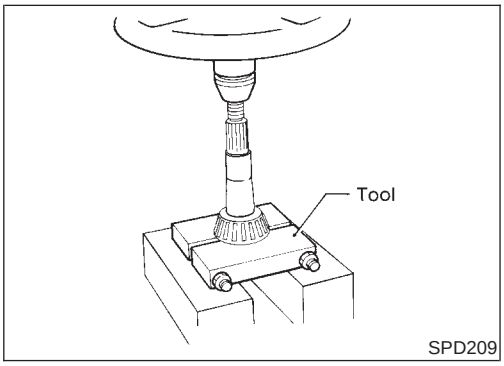


SPD670

9. Take out drive pinion together with rear bearing inner cone, drive pinion bearing spacer and pinion bearing adjusting washer.
10. Remove front oil seal and pinion front bearing inner cone.


PD349

11. Remove pinion bearing outer races with a brass drift.



SPD209

12. Remove pinion rear bearing inner cone and drive pinion height adjusting washer.

Tool number: ST30031000 (J22912-01)

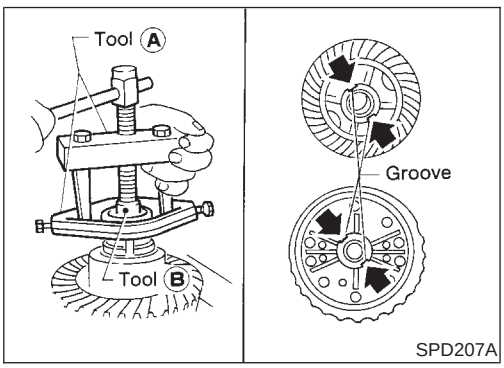
DIFFERENTIAL CASE

NAPD0018S03

1. Remove side bearing inner cones.

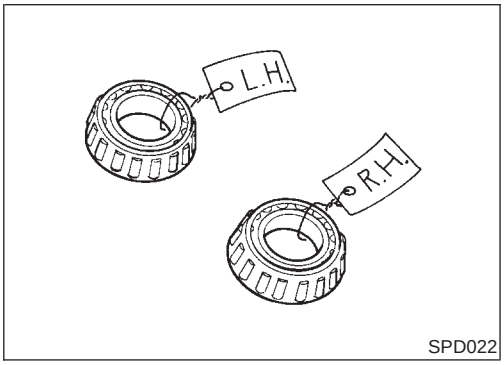
To prevent damage to bearing, engage puller jaws in grooves.

Tool number:
A ST33051001 (J22888-20)
B ST33061000 (J8107-2)

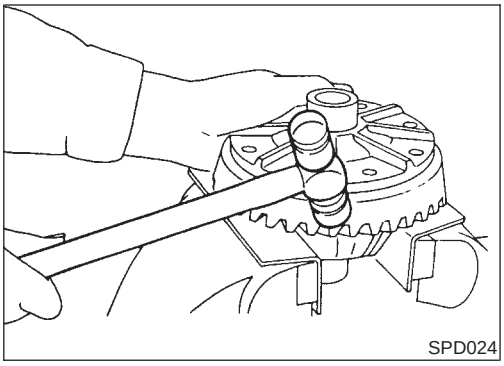


SPD207A

Be careful not to confuse the right and left hand parts.
Keep bearing and bearing race for each side together.

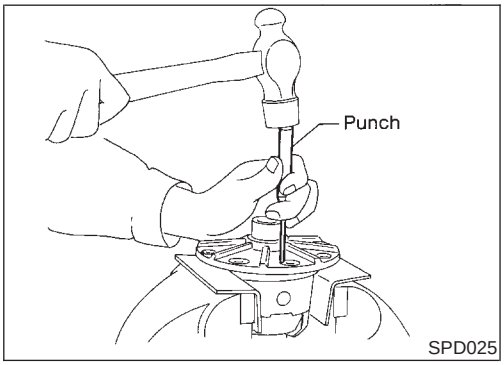


SPD022


SPD024

2. Loosen ring gear bolts in a criss-cross pattern.
3. Tap ring gear off the differential case with a soft hammer.

Tap evenly all around to keep ring gear from binding.



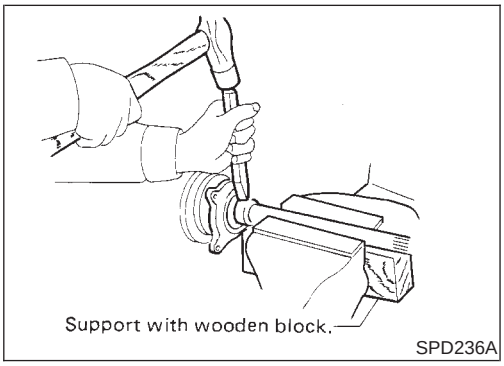
SPD025

4. Punch off pinion mate shaft lock pin from ring gear side.

DIFFERENTIAL SIDE SHAFT

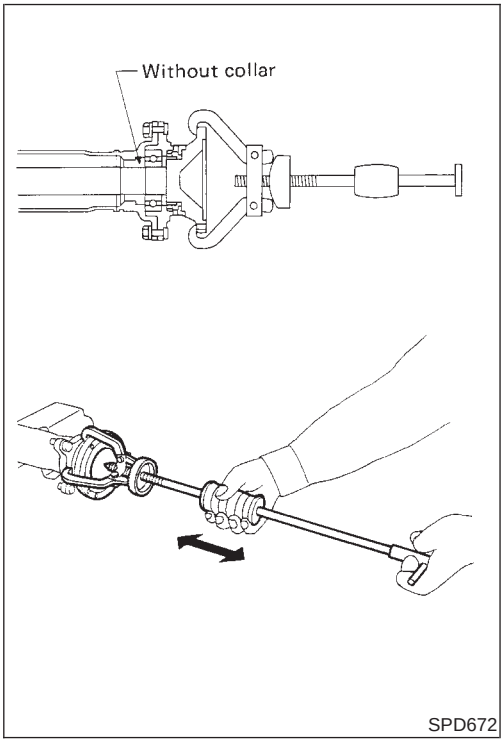
NAPD0018S04

1. Cut collar with cold chisel. Be careful not to damage differential side shaft.

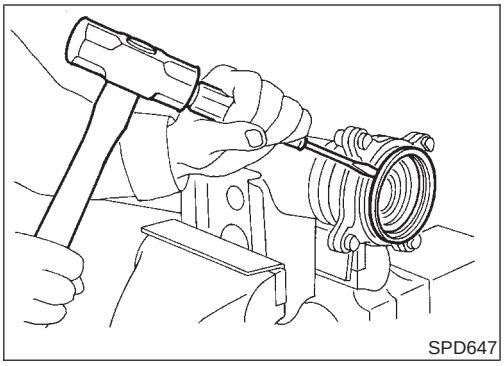


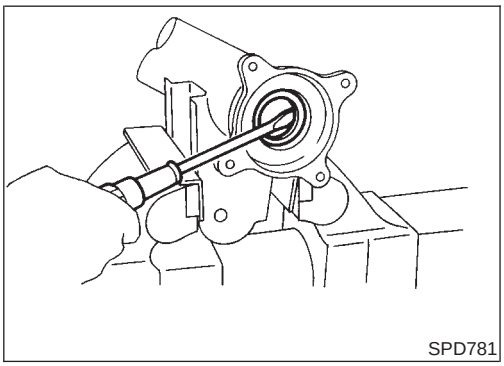
SPD236A

2. Reinstall differential side shaft into extension tube and secure with bolts. Remove rear axle bearing by drawing out differential side shaft from rear axle bearing with puller.



SPD672


SPD647


SPD781

3. Remove grease seal and oil seal.

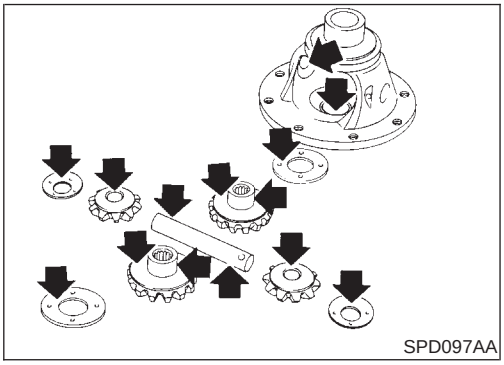
Inspection

NAPD0019

RING GEAR AND DRIVE PINION

NAPD0019S01

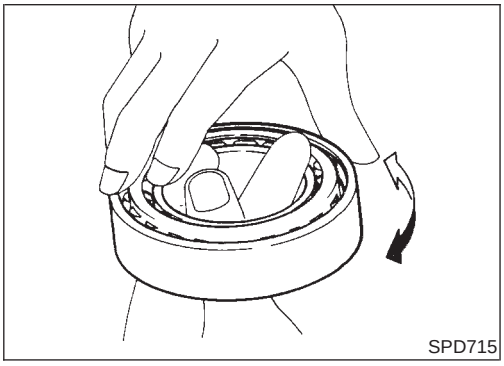
Check gear teeth for scoring, cracking or chipping.
If any damaged part is evident, replace ring gear and drive pinion as a set (hypoid gear set).


SPD097AA

DIFFERENTIAL CASE ASSEMBLY

NAPD0019S02

Check mating surfaces of differential case, side gears, pinion mate gears, pinion mate shaft and thrust washers.


SPD715

BEARING

NAPD0019S03

1. Thoroughly clean bearing.
2. Check bearing for wear, scratches, pitting or flaking.
   Check tapered roller bearing for smooth rotation. If damaged, replace outer race and inner cone as a set.

Adjustment

NAPD0020

For quiet and reliable final drive operation, the following five adjustments must be made correctly:

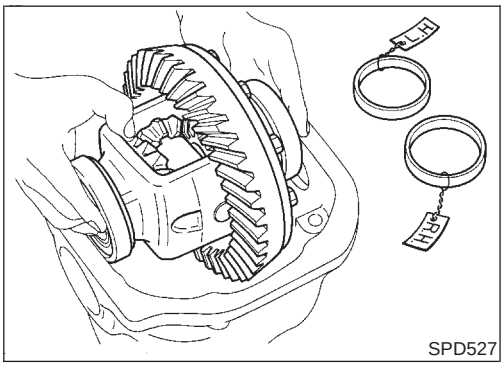
1. Side bearing preload
2. Pinion gear height
3. Pinion bearing preload
4. Ring gear-to-pinion backlash. Refer to SDS, PD-38.
5. Ring and pinion gear tooth contact pattern

SIDE BEARING PRELOAD

NAPD0020S01

A selection of carrier side bearing adjusting washer is required for successful completion of this procedure.

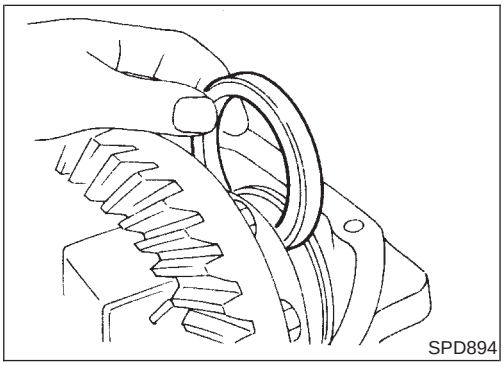
1. Make sure all parts are clean and that the bearings are well lubricated with light oil or "DEXRON™" type automatic transmission fluid.
2. Place the differential carrier, with side bearings and bearing races installed, into the final drive housing.



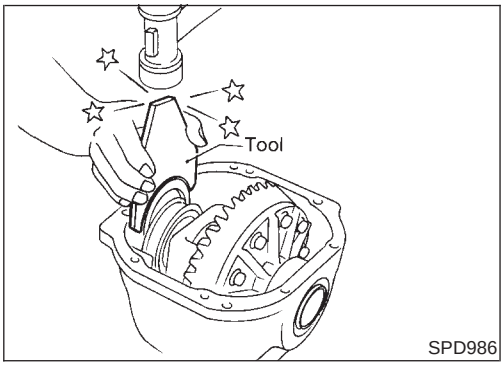
SPD527

3. Put the side bearing spacer in place.

CAUTION:
Side bearing spacer is placed on either the right or left depending upon final drive gear ratio. Be sure to replace it on the correct side.

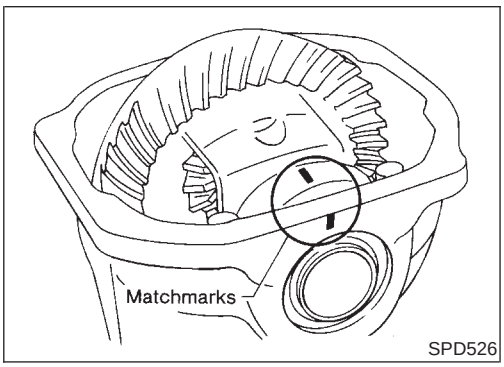

SPD894

4. Using Tool, install original carrier side bearing preload shims on the carrier end, opposite the ring gear.
   Tool number: KV38100600 (J25267)

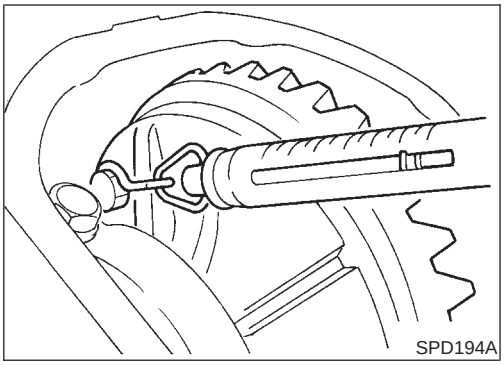


SPD986

5. Install the side bearing caps in their correct locations and torque the bearing cap retaining bolts.
   Specification:
   88 - 98 N·m (9 - 10 kg-m, 65 - 72 ft-lb)
6. Turn the carrier several times to seat the bearings.



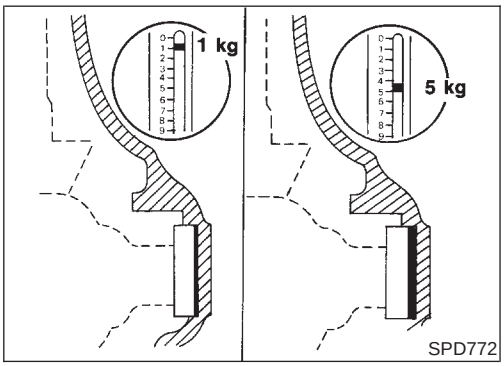
SPD526


SPD194A

7. Measure the turning torque of the carrier at the ring gear retaining bolts with a spring gauge, J8129.

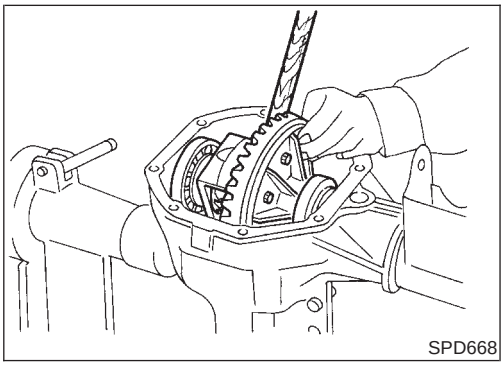
Specification:

34.3 - 39.2 N (3.5 - 4.0 kg, 7.7 - 8.8 lb) of pulling force at the ring gear bolt



SPD772

8. If the carrier turning torque is not within the specification range, increase or decrease the total thickness of the side bearing adjusting washers until the turning torque is correct. If the turning torque is less than the specified range, install washers of greater thickness; if the turning torque is greater than the specification, install thinner washers. See the SDS section for washer dimensions and part numbers.
9. Record the total amount of washer thickness required for the correct carrier side bearing preload.

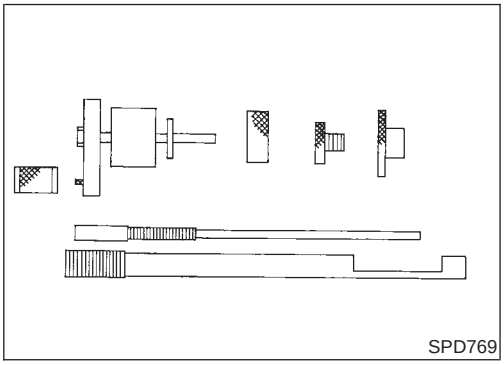

SPD668

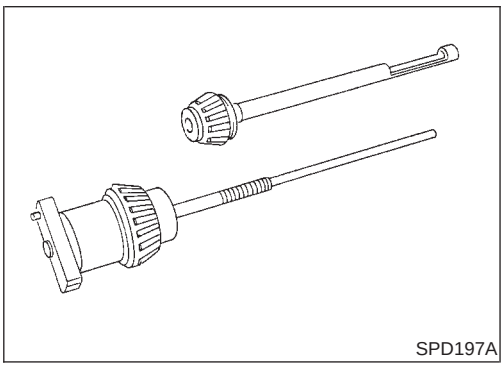
10. Remove the carrier from the final drive housing, saving the selected preload washers for later use during the assembly of the final drive unit.

PINION GEAR HEIGHT AND PINION BEARING PRELOAD

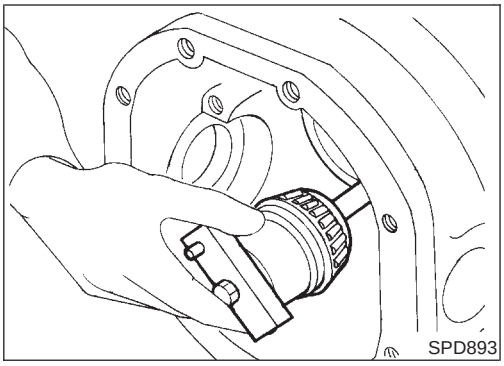
NAPD0020S02

1. Make sure all parts are clean and that the bearings are well lubricated.
2. Assemble the pinion gear bearings into the pinion pre-load shim selector Tool, J34309.

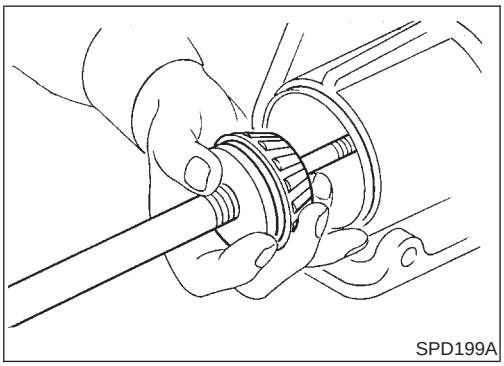

SPD769


SPD197A

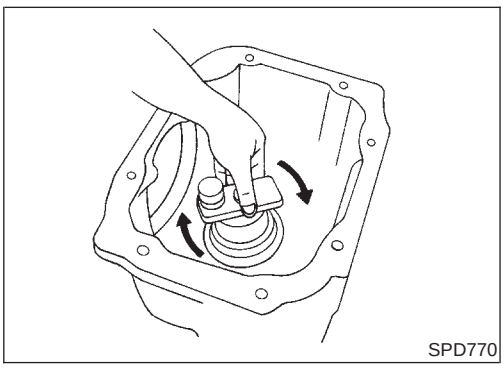
- **Front Pinion Bearing** — make sure the J34309-3 front pinion bearing seat is secured tightly against the J34309-2 gauge anvil. Then turn the front pinion bearing pilot, J34309-5, to secure the bearing in its proper position.
- **Rear Pinion Bearing** — the rear pinion bearing pilot, J34309-15, is used to center the rear pinion bearing only. The rear pinion bearing locking seat, J34309-4, is used to lock the bearing to the assembly.


SPD893

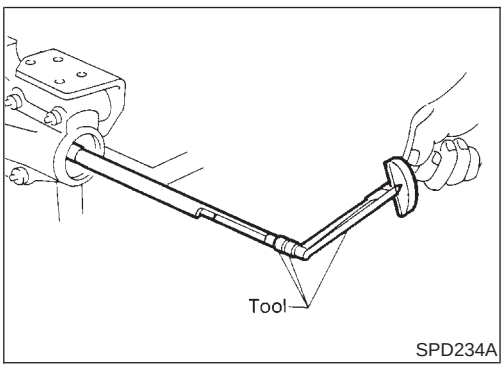
3. Place the pinion preload shim selector Tool, J34309-1, gauge screw assembly with the pinion rear bearing inner cone installed into the final drive housing.


SPD199A

4. Assemble the front pinion bearing inner cone and the J34309-2 gauge anvil together with the J34309-1 gauge screw in the final drive housing. Make sure that the pinion height gauge plate, J34309-16, will turn a full 360 degrees, and tighten the two sections together by hand.


SPD770

5. Turn the assembly several times to seat the bearings.

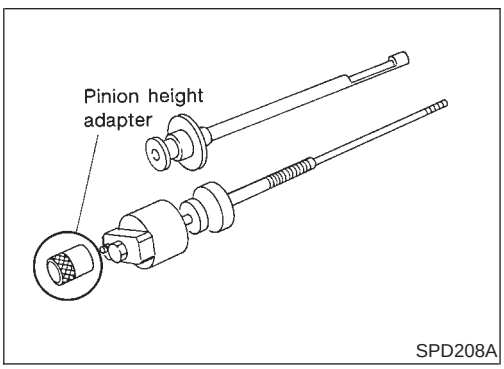


SPD234A

6. Measure the turning torque at the end of the J34309-2 gauge anvil using torque wrench J25765A.

Turning torque specification:

1.0 - 1.3 N·m (10 - 13 kg-cm, 8.7 - 11.3 in-lb)

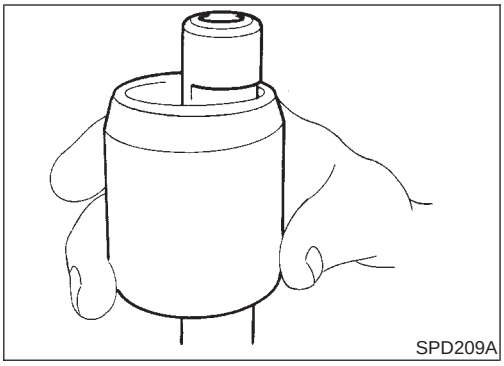


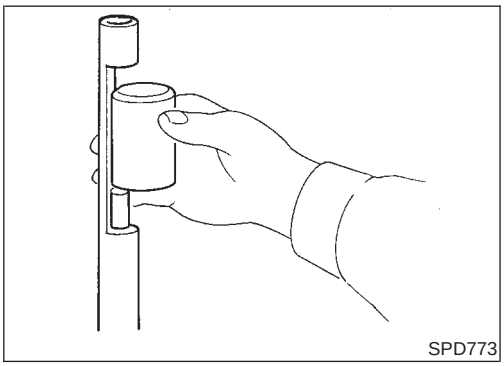
SPD208A

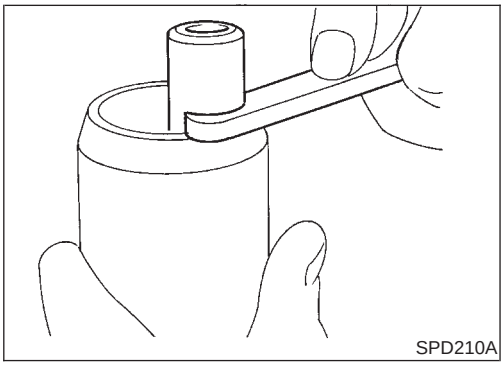
7. Place the J34309-1 "R200A" pinion height adapter onto the gauge plate and tighten it by hand.

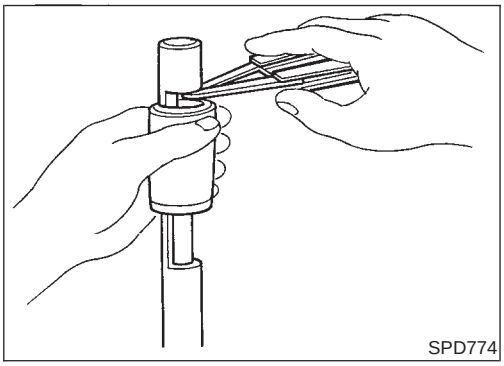
CAUTION:

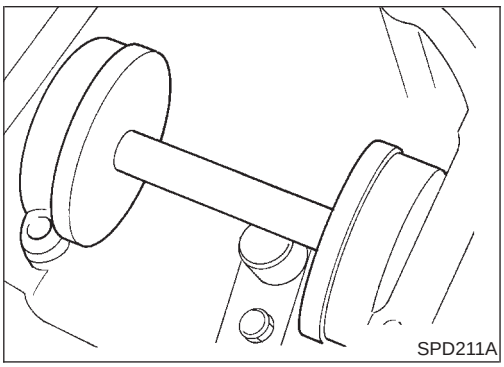
Make sure all machined surfaces are clean.


SPD209A


SPD773


SPD210A


SPD774


SPD211A

PINION BEARING PRELOAD WASHER SELECTION

8. Place the solid pinion bearing spacer, small end first, over the J34309-2 gauge anvil and seat the small end squarely against the tip of the J34309-1 gauge screw in the tool recessed portion.

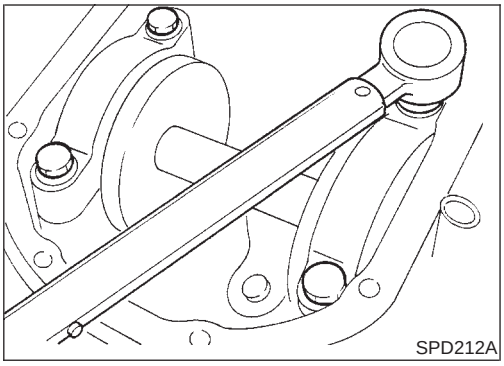
9. Select the correct thickness of pinion bearing preload adjusting washer using a standard gauge of 3.5 mm (0.138 in) and your J34309-101 feeler gauge. The exact measure you get with your gauges is the thickness of the adjusting washer required. Select the correct washer.

Drive pinion bearing preload adjusting washer:
Refer to SDS, PD-38.

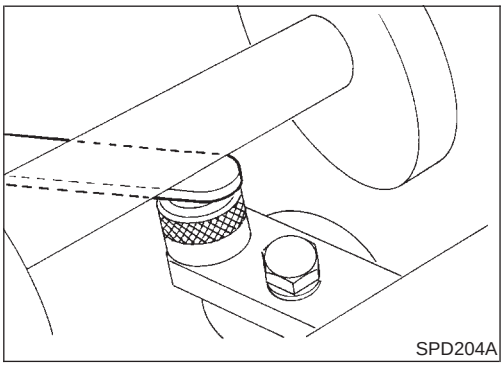
10. Set your selected, correct pinion bearing preload adjusting washer aside for use when assembling the pinion gear and bearings into the final drive.

PINION HEIGHT ADJUSTING WASHER SELECTION

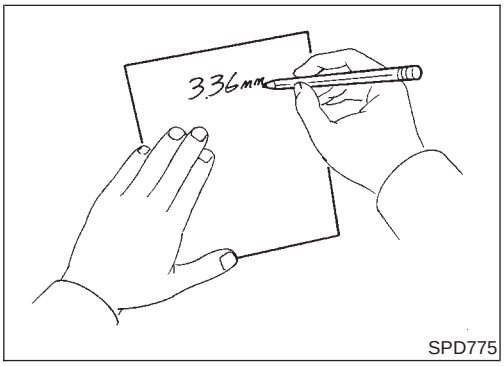
11. Now, position the side bearing discs, J25269-4, and arbor firmly into the side bearing bores.


SPD212A

12. Install the side bearing caps and tighten the cap bolts.
Specification:
88 - 98 N·m (9 - 10 kg-m, 65 - 72 ft-lb)

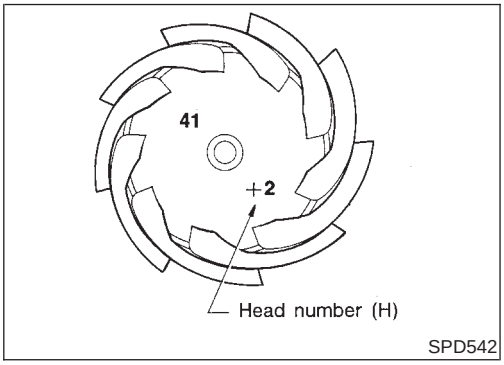

SPD204A

13. Select the correct standard pinion height adjusting washer thickness by using a standard gauge of 3.0 mm (0.118 in) and your J34309-101 feeler gauge. Measure the gap between the J34309-11 "R200A" pinion height adapter and the arbor.



SPD775

14. Write down your exact total measurement.

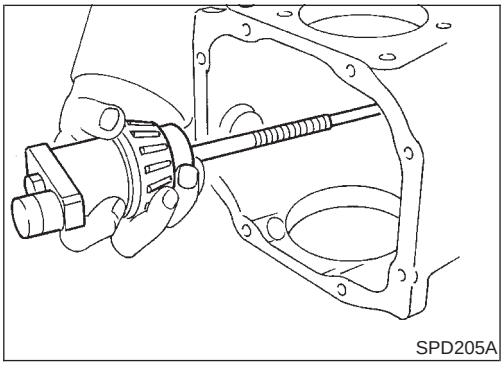


SPD542

15. Correct the pinion height washer size by referring to the "pinion head number".

There are two numbers painted on the pinion gear. The first one refers to the pinion and ring gear as a matched set and should be the same as the number on the ring gear. The second number is the "pinion head height number", and it refers to the ideal pinion height from standard for quietest operation. Use the following chart to determine the correct pinion height washer. Refer to SDS, PD-38.

Pinion Head Height Number	Add or Remove from the Standard Pinion Height Washer Thickness Measurement
−6	Add 0.06 mm (0.0024 in)
−5	Add 0.05 mm (0.0020 in)
−4	Add 0.04 mm (0.0016 in)
−3	Add 0.03 mm (0.0012 in)
−2	Add 0.02 mm (0.0008 in)
−1	Add 0.01 mm (0.0004 in)
0	Use the selected washer thickness
+1	Subtract 0.01 mm (0.0004 in)
+2	Subtract 0.02 mm (0.0008 in)
+3	Subtract 0.03 mm (0.0012 in)
+4	Subtract 0.04 mm (0.0016 in)
+5	Subtract 0.05 mm (0.0020 in)
+6	Subtract 0.06 mm (0.0024 in)

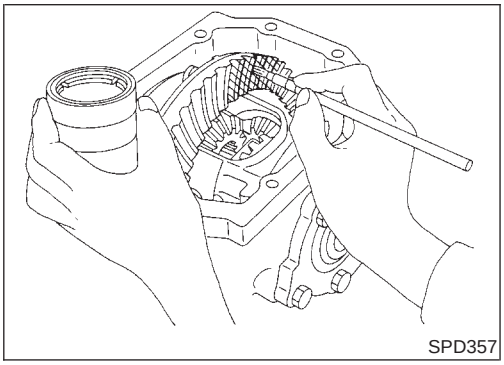

SPD205A

16. Remove the J34309 pinion preload shim selector tool from the final drive housing and disassemble to retrieve the pinion bearings.

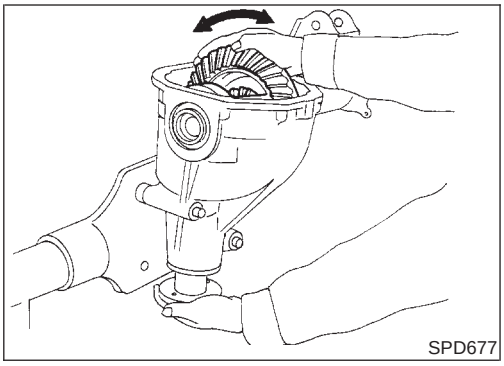
TOOTH CONTACT

NAPD0020S03

Gear tooth contact pattern check is necessary to verify correct relationship between ring gear and drive pinion.
Hypoid gear sets which are not positioned properly in relation to one another may be noisy, or have short life, or both. With a pattern check, the most desirable contact for low noise level and long life can be assured.

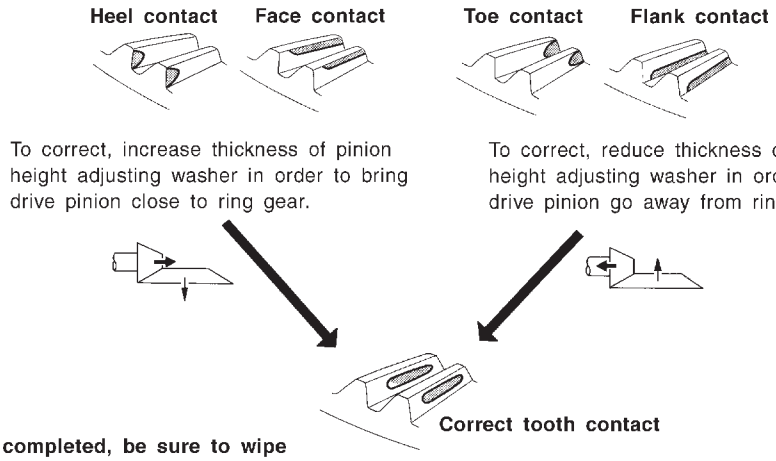

SPD357

1. Thoroughly clean ring gear and drive pinion teeth.
2. Sparingly apply a mixture of powdered ferric oxide and oil or equivalent to 3 or 4 teeth of ring gear drive side.


SPD677

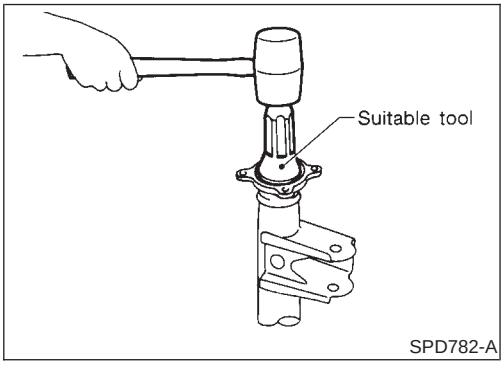
3. Hold companion flange steady by hand and rotate the ring gear in both directions.

Usually the pattern will be correct if shims are correctly calculated and the backlash is correct. However, in rare cases, trial and error processes may be employed to obtain a correct pattern. The tooth pattern is the best indication of how well a differential has been set up.

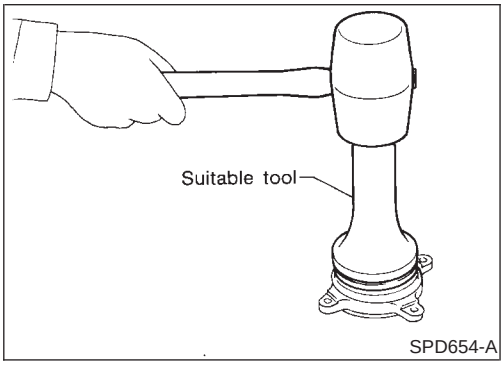


When adjustment is completed, be sure to wipe off completely the ferric oxide and oil or their equivalent.

SPD007-B



SPD782-A



SPD654-A

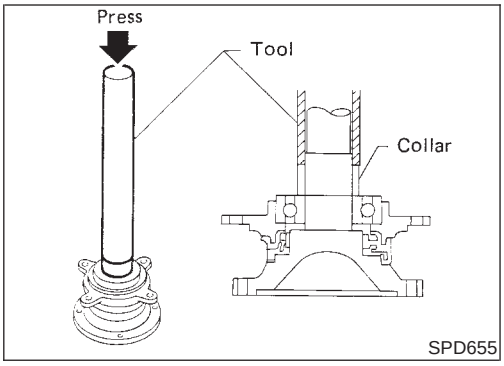
Assembly

NAPD0021

DIFFERENTIAL SIDE SHAFT

NAPD0021S01

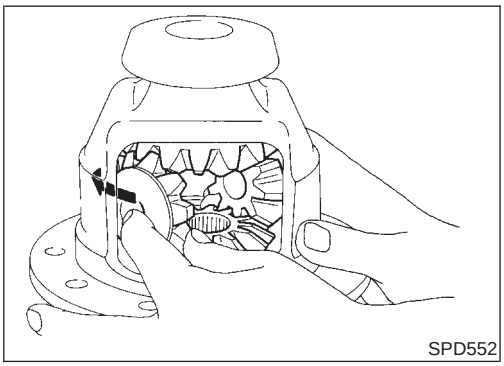
1. Install oil seal and grease seal.



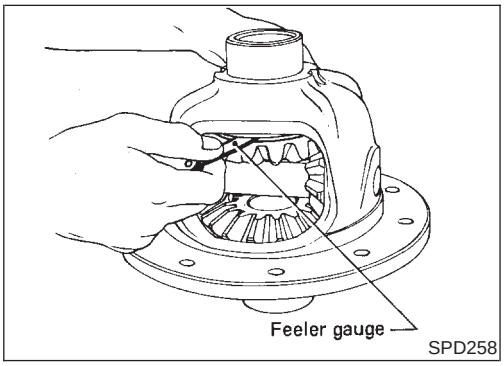
2. Install extension tube retainer, rear axle bearing and rear axle shaft bearing collar on differential side shaft.

DIFFERENTIAL CASE

NAPD0021S02



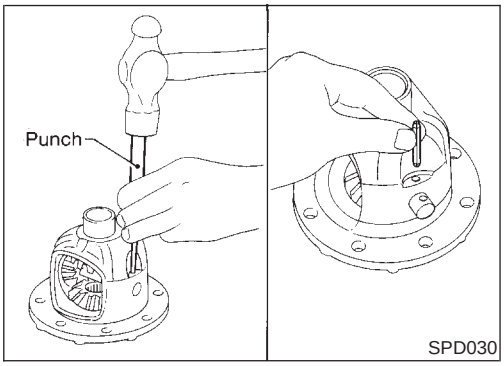
1. Install side gears, pinion mate gears and thrust washers into differential case.



2. Fit pinion mate shaft to differential case so that it meets lock pin holes.
3. Adjust backlash between side gear and pinion mate gear by selecting side gear thrust washer.
   Refer to SDS, PD-37.

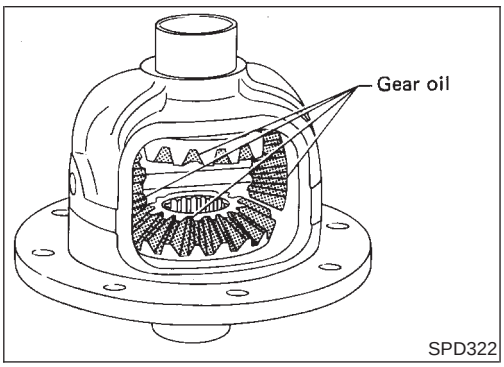
   Backlash between side gear and pinion mate gear (Clearance between side gear thrust washer and differential case):

   Less than 0.15 mm (0.0059 in)

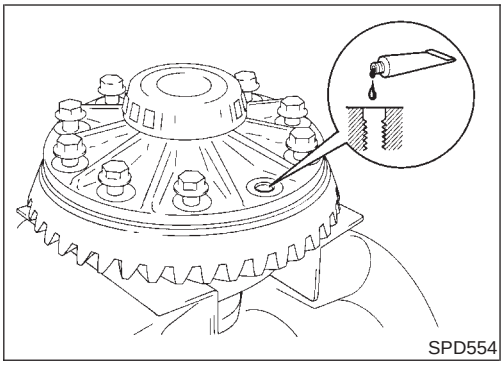


4. Install pinion mate shaft lock pin with a punch.

Make sure lock pin is flush with case.

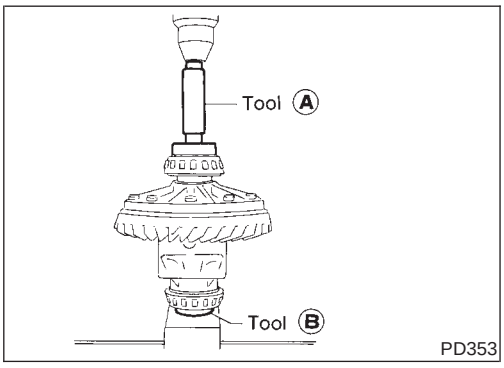


5. Apply gear oil to gear tooth surfaces and thrust surfaces and check to see they turn properly.


SPD554

6. Install differential case assembly on ring gear.
7. Apply locking agent [Locktite (stud lock) or equivalent] to ring gear bolts, and install them.

Tighten bolts in a criss-cross pattern, lightly tapping bolt head with a hammer.



PD353

8. Press-fit side bearing inner cones on differential case with Tool.

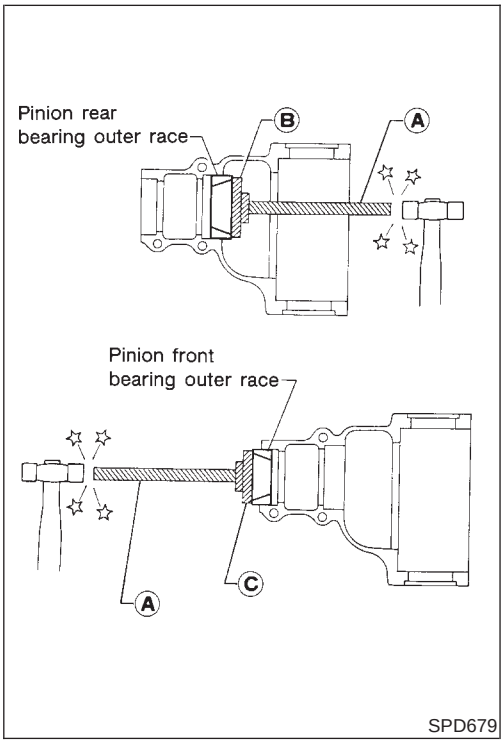
Tool number:
A KV38100300 (J25523)
B ST33061000 (J8107-2)

FINAL DRIVE HOUSING

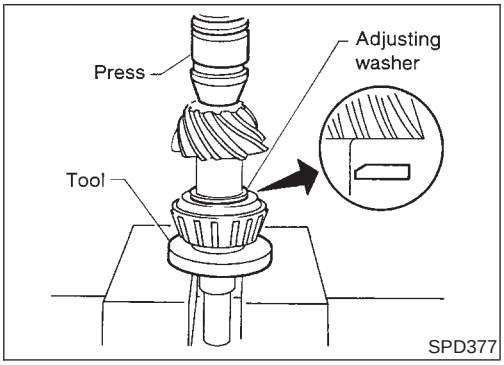
NAPD0021S03

1. Press-fit front and rear bearing outer races with Tools.

Tool number:
A ST30611000 (J25742-1)
B ST30621000 (J25742-5)
C ST30613000 (J25742-3)



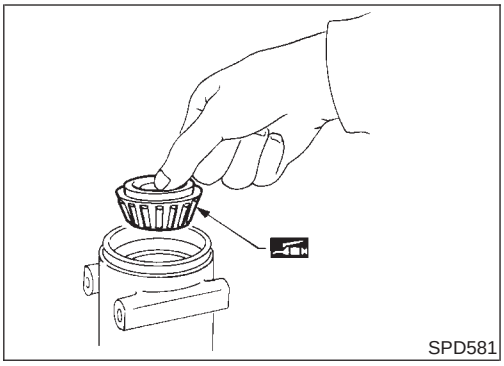
SPD679



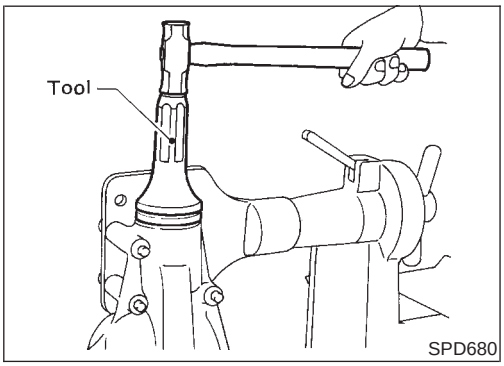
SPD377

2. Select drive pinion height adjusting washer and pinion bearing adjusting washer. Refer to "PINION GEAR HEIGHT AND PINION BEARING PRELOAD", PD-26.
3. Install drive pinion height adjusting washer in drive pinion, and press-fit pinion rear bearing inner cone in it, using press and Tool.

Tool number:
ST30901000 (J26010-01)


SPD581

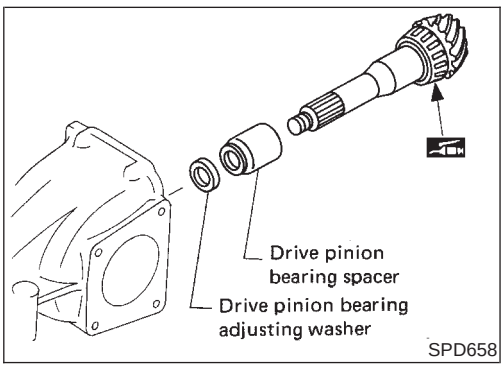
4. Place pinion front bearing inner cone in final drive housing.



SPD680

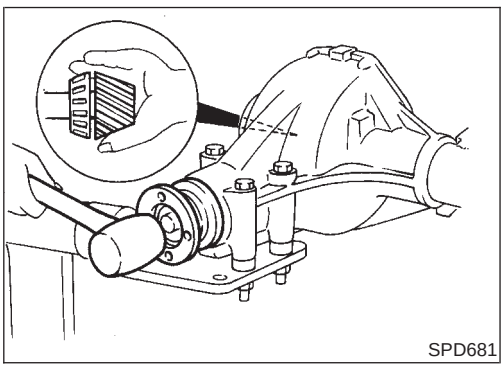
5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install front oil seal.

Tool number:
KV38100500 (J25273)

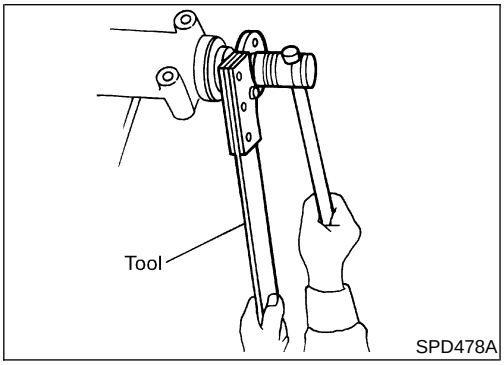


SPD658

6. Place drive pinion bearing spacer, drive pinion bearing adjusting washer and drive pinion in final drive housing.


SPD681

7. Insert companion flange into drive pinion by tapping the companion flange with a soft hammer.

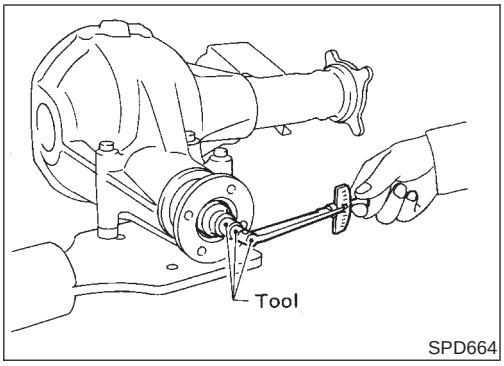


SPD478A

8. Tighten pinion nut to the specified torque.

The threaded portion of drive pinion and pinion nut should be free from oil or grease.

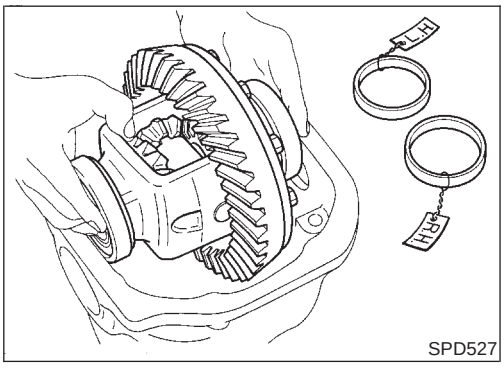
Tool number: KV38108300 (J44195)



SPD664

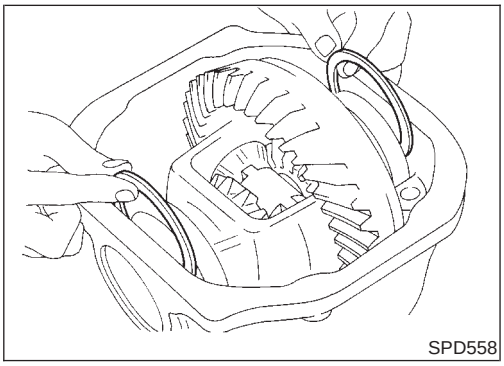
9. Turn drive pinion in both directions several revolutions, and measure pinion bearing preload.
   Tool number: ST3127S000 (J25765-A)
   Pinion bearing preload:
   1.1 - 1.4 N·m (11 - 14 kg-cm, 9.5 - 12.2 in-lb)

When pinion bearing preload is outside the specifications, replace pinion bearing adjusting washer and spacer with a different thickness.

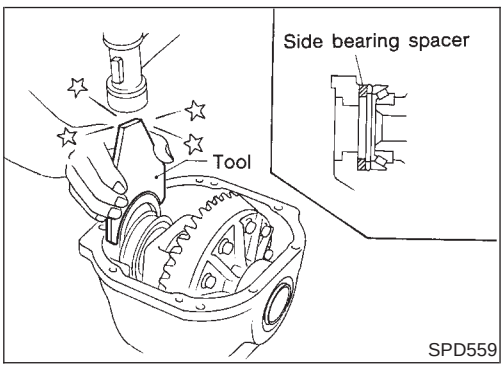


SPD527

10. Select side bearing adjusting washer.
    Refer to "SIDE BEARING PRELOAD", PD-25.
11. Install differential case assembly with side bearing outer races into final drive housing.

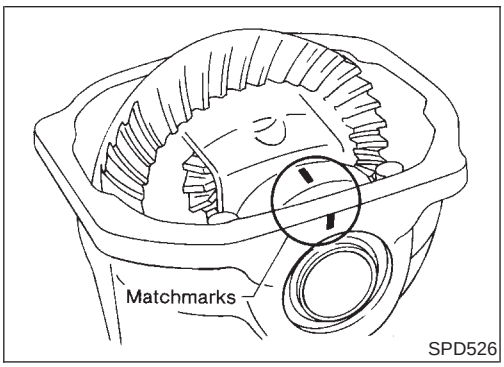

SPD558

12. Insert left and right side bearing adjusting washers in place between side bearings and final drive housing.



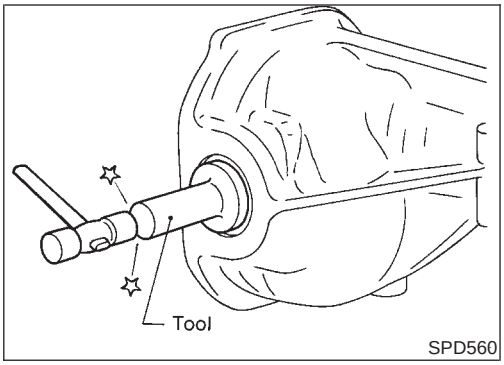
SPD559

13. Drive in side bearing spacer with Tool.
    Tool number: KV38100600 (J25267)

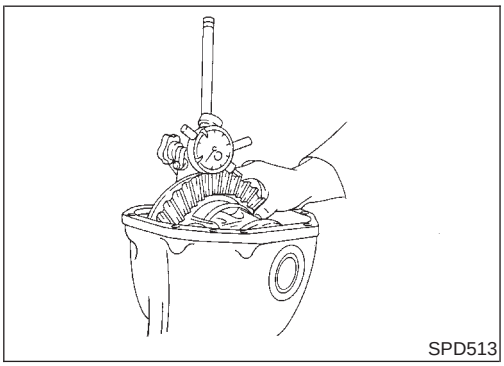


SPD526

14. Align mark on bearing cap with that on final drive housing and install bearing cap on final drive housing.



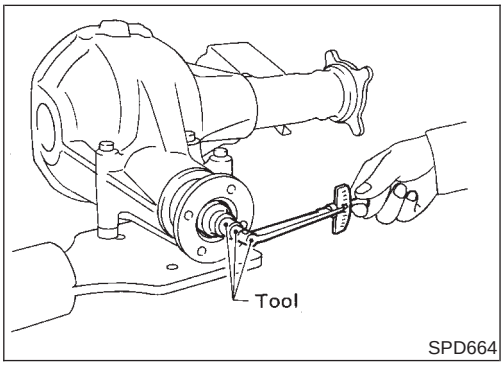
15. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install side oil seal.
    Tool number: KV38100200 (J26233)



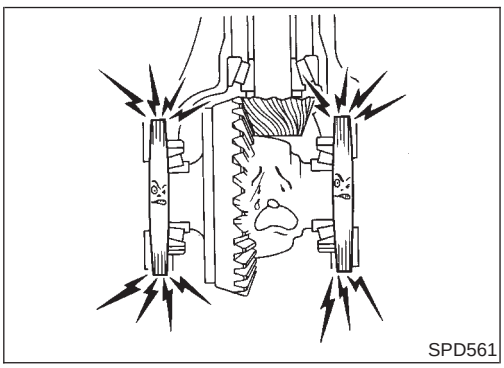
16. Measure ring gear to drive pinion backlash with a dial indicator.
    Ring gear-to-drive pinion backlash:
    0.10 - 0.15 mm (0.0039 - 0.0059 in)

- If backlash is too small, decrease thickness of right shim and increase thickness of left shim by the same amount.
  If backlash is too great, reverse the above procedure.

Never change the total amount of shims as it will change the bearing preload.



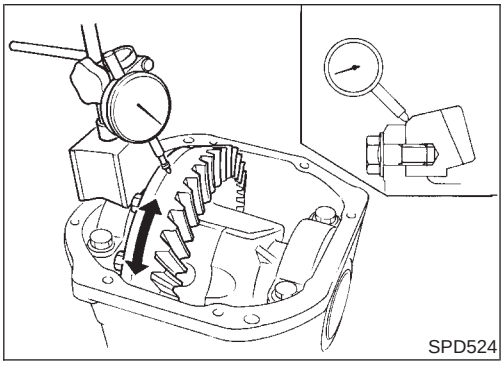
17. Check total preload with Tool.
    When checking preload, turn drive pinion in both directions several times to set bearing rollers.
    Tool number: ST3127S000 (J25765-A)
    Total preload:
    P_1 + [0.3 - 1.5 N·m (3 - 15 kg-cm, 2.6 - 13.0 in-lb)]
    P_1 = Drive pinion preload



- If preload is too great, remove the same amount of shim from each side.
- If preload is too small, add the same amount of shim to each side.

Never add or remove a different number of shims for each side as it will change ring gear to drive pinion backlash.

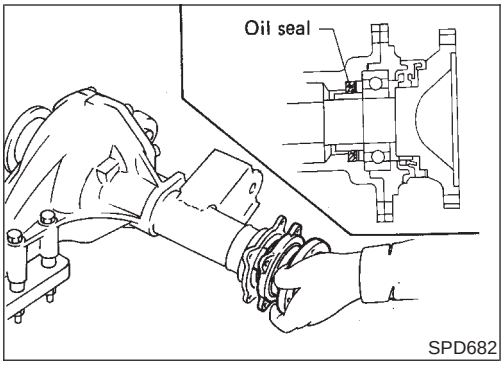
18. Recheck ring gear to drive pinion backlash because increase or decrease in thickness of shims will cause change of ring gear-to-pinion backlash.



19. Check runout of ring gear with a dial indicator.
    Runout limit:
    0.05 mm (0.0020 in)

- If backlash varies excessively in different places, the variance may have resulted from foreign matter caught between the ring gear and the differential case.
- If the backlash varies greatly when the runout of the ring gear is within a specified range, the hypoid gear set or differential case should be replaced.

20. Check tooth contact. Refer to "TOOTH CONTACT", PD-30.
21. Install rear cover and gasket.



22. Install differential side shaft assembly.

Service Data and Specifications (SDS)

R200A
General Specifications

NAPD0022

NAPD0022S01

Front final drive	Standard
	R200A
	2-pinion
Gear ratio	4.363
Number of teeth (Ring gear/drive pinion)	48/11
Oil capacity (Approx.) ℓ (US pt, Imp pt)	1.85 (3-7/8, 3-1/4)

Ring Gear Runout

NAPD0022S02

Ring gear runout limit mm (in)	0.05 (0.0020)

Side Gear Adjustment

NAPD0022S03

Side gear backlash (Clearance between side gear and differential case) mm (in)		Less than 0.15 (0.0059)
Available side gear thrust washers	Thickness mm (in)	Part number*
	0.75 (0.0295)	38424-N3110
	0.78 (0.0307)	38424-N3111
	0.81 (0.0319)	38424-N3112
	0.84 (0.0331)	38424-N3113
	0.87 (0.0343)	38424-N3114
	0.90 (0.0354)	38424-N3115
	0.93 (0.0366)	38424-N3116

*: Always check with the Parts Department for the latest parts information.

Side Bearing Adjustment

NAPD0022S04

Differential carrier assembly turning resistance N (kg, lb)		34.3 - 39.2 (3.5 - 4.0, 7.7 - 8.8)
Available side bearing adjusting washers	Thickness mm (in)	Part number*
	2.00 (0.0787)	38453-N3100
	2.05 (0.0807)	38453-N3101
	2.10 (0.0827)	38453-N3102
	2.15 (0.0846)	38453-N3103
	2.20 (0.0866)	38453-N3104
	2.25 (0.0886)	38453-N3105
	2.30 (0.0906)	38453-N3106
	2.35 (0.0925)	38453-N3107
	2.40 (0.0945)	38453-N3108
	2.45 (0.0965)	38453-N3109
	2.50 (0.0984)	38453-N3110
	2.55 (0.1004)	38453-N3111
	2.60 (0.1024)	38453-N3112

*: Always check with the Parts Department for the latest parts information.

Service Data and Specifications (SDS) (Cont'd)

Total Preload Adjustment

NAPD0022S05

Total preload N·m (kg-cm, in-lb)	P_1 + [0.3 - 1.5 (3 - 15, 2.6 - 13.0)]
Ring gear backlash mm (in)	0.10 - 0.15 (0.0039 - 0.0059)

P_1 = Drive pinion preload

Drive Pinion Height Adjustment

NAPD0022S06

	Thickness mm (in)	Part number*
Available pinion height adjusting washers	3.09 (0.1217)	38154-P6017
	3.12 (0.1228)	38154-P6018
	3.15 (0.1240)	38154-P6019
	3.18 (0.1252)	38154-P6020
	3.21 (0.1264)	38154-P6021
	3.24 (0.1276)	38154-P6022
	3.27 (0.1287)	38154-P6023
	3.30 (0.1299)	38154-P6024
	3.33 (0.1311)	38154-P6025
	3.36 (0.1323)	38154-P6026
	3.39 (0.1335)	38154-P6027
	3.42 (0.1346)	38154-P6028
	3.45 (0.1358)	38154-P6029
	3.48 (0.1370)	38154-P6030
	3.51 (0.1382)	38154-P6031
	3.54 (0.1394)	38154-P6032
	3.57 (0.1406)	38154-P6033
	3.60 (0.1417)	38154-P6034
	3.63 (0.1429)	38154-P6035
	3.66 (0.1441)	38154-P6036

*: Always check with the Parts Department for the latest parts information.

Drive Pinion Preload Adjustment

NAPD0022S07

Drive pinion bearing preload adjusting method		Adjusting washer and spacer
Drive pinion preload with front oil seal N·m (kg-cm, in-lb) [P_1]		1.1 - 1.4 (11 - 14, 9.5 - 12.2)
	Thickness mm (in)	Part number*
Available drive pinion bearing preload adjusting washers	3.81 (0.1500)	38125-61001
	3.83 (0.1508)	38126-61001
	3.85 (0.1516)	38127-61001
	3.87 (0.1524)	38128-61001
	3.89 (0.1531)	38129-61001
	3.91 (0.1539)	38130-61001
	3.93 (0.1547)	38131-61001
	3.95 (0.1555)	38132-61001
	3.97 (0.1563)	38133-61001
	3.99 (0.1571)	38134-61001
	4.01 (0.1579)	38135-61001
	4.03 (0.1587)	38136-61001
	4.05 (0.1594)	38137-61001
	4.07 (0.1602)	38138-61001
	4.09 (0.1610)	38139-61001
	Length mm (in)	Part number*
Available drive pinion bearing preload adjusting spacers	54.50 (2.1457)	38165-B4000
	54.80 (2.1575)	38165-B4001
	55.10 (2.1693)	38165-B4002
	55.40 (2.1811)	38165-B4003
	55.70 (2.1929)	38165-B4004
	56.00 (2.2047)	38165-61001

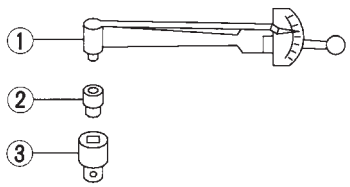
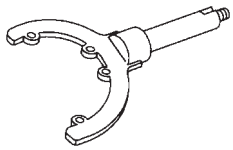
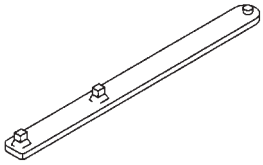
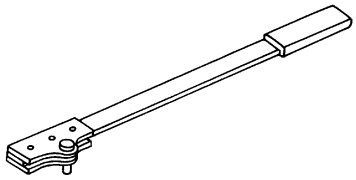
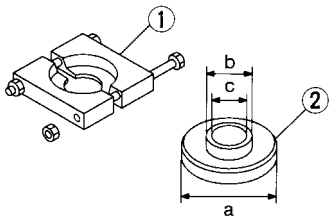
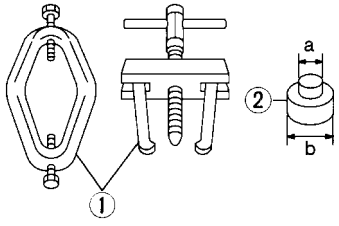
*: Always check with the Parts Department for the latest parts information.

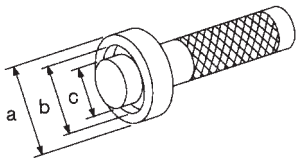
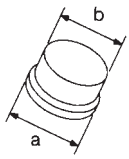
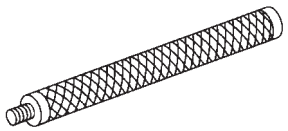
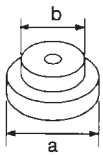
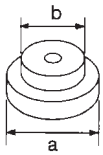
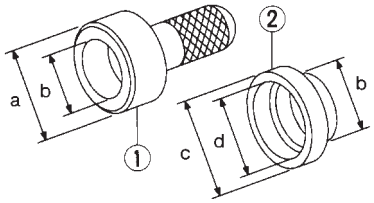
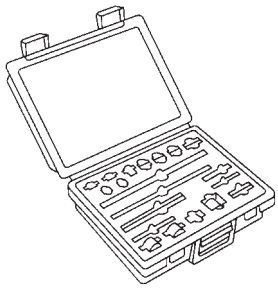
Preparation

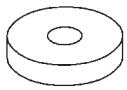
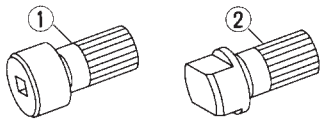
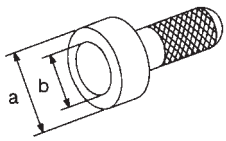
SPECIAL SERVICE TOOLS

NAPD0029

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
ST3127S000 (See J25765-A) Preload gauge 1 GG91030000 (J25765) Torque wrench 2 HT62940000 (—) Socket adapter 3 HT62900000 (—) Socket adapter	 NT124	Measuring pinion bearing preload and total preload
ST06340000 (J24310, J34310) Differential attachment	 NT140	Mounting final drive
ST32580000 (J34312) Differential side bearing adjusting nut wrench	 NT141	Adjusting side bearing preload and backlash (ring gear-drive pinion)
KV38108300 (J44195) Companion flange wrench	 NT771	Removing and installing propeller shaft lock nut, and drive pinion lock nut
ST3090S000 (—) Drive pinion rear inner race puller set 1 ST30031000 (J22912-01) Puller 2 ST30901000 (J26010-01) Base	 NT527	Removing and installing drive pinion rear inner cone **a: 79 mm (3.11 in) dia.** **b: 45 mm (1.77 in) dia.** **c: 35 mm (1.38 in) dia.**
ST3306S001 Differential side bearing puller set 1 ST33051001 (J22888-20) Body 2 ST33061000 (J8107-2) Adapter	 NT072	Removing and installing differential side bearing inner cone **a: 28.5 mm (1.122 in) dia.** **b: 38 mm (1.50 in) dia.**

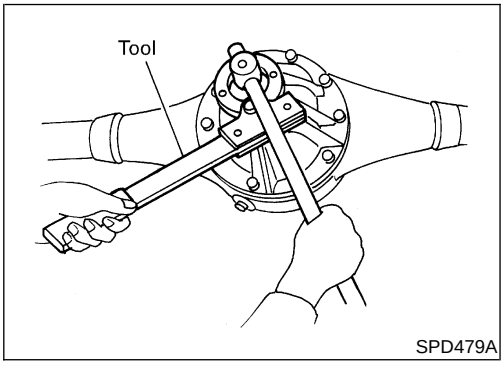
Tool number (Kent-Moore No.) Tool name	Description	
ST33190000 (J25523) Differential side bearing drift	 NT085	Installing side bearing inner cone **a: 52 mm (2.05 in) dia.** **b: 45.5 mm (1.791 in) dia.** **c: 34 mm (1.34 in) dia.**
ST33081000 (—) Side bearing puller adapter	 NT431	Installing side bearing inner cone **a: 43 mm (1.69 in) dia.** **b: 33.5 mm (1.319 in) dia.**
ST30611000 (J25742-1) Drift	 NT090	Installing pinion rear bearing outer race (Use with ST30621000 or ST30613000)
ST30621000 (J25742-5) Drift	 NT073	Installing pinion rear bearing outer race **a: 79 mm (3.11 in) dia.** **b: 59 mm (2.32 in) dia.**
ST30613000 (J25742-3) Drift	 NT073	Installing pinion front bearing outer race (Use with ST30611000) **a: 72 mm (2.83 in) dia.** **b: 48 mm (1.89 in) dia.**
KV381025S0 (—) Oil seal fitting tool 1 ST30720000 (J25405) Drift bar 2 KV38102510 (—) Drift	 NT525	Installing front oil seal **a: 77 mm (3.03 in) dia.** **b: 55 mm (2.17 in) dia.** **c: 71 mm (2.80 in) dia.** **d: 65 mm (2.56 in) dia.**
(J34309) Differential shim selector	 NT134	Adjusting bearing pre-load and gear height

Tool number (Kent-Moore No.) Tool name	Description	
(J25269-18) Side bearing discs (2 Req'd)	 NT135	Selecting pinion height adjusting washer
KV381052S0 (—) Rear axle shaft dummy 1 KV38105210 (—) Torque wrench side 2 KV38105220 (—) Vice side	 NT142	Checking differential torque on limited slip differential
KV38100500 (J25273) Gear carrier front oil seal drift	 NT115	Installing front oil seal **a: 85 mm (3.35 in) dia.** **b: 60 mm (2.36 in) dia.**

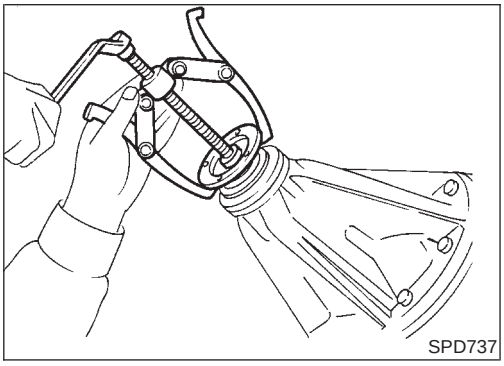
Noise, Vibration and Harshness (NVH) Troubleshooting

NAPD0051

Refer to "NVH TROUBLESHOOTING CHART", PD-4.



SPD479A

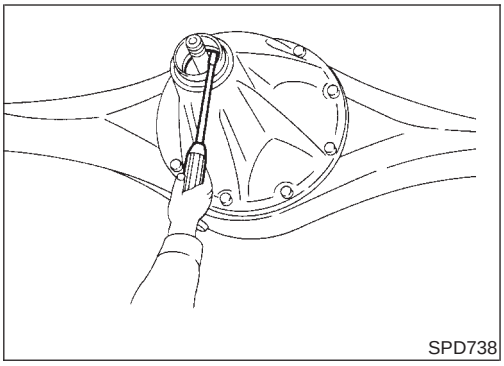

SPD737

On-vehicle Service

FRONT OIL SEAL REPLACEMENT

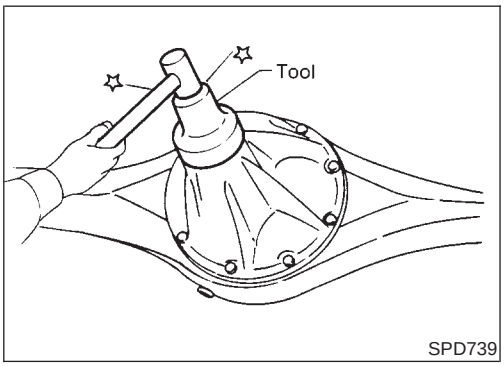
NAPD0030

1. Remove propeller shaft.
2. Loosen drive pinion nut.
   Tool number: KV38108300 (J44195)
3. Remove companion flange.



SPD738

4. Remove front oil seal.



SPD739

5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Press front oil seal into carrier.

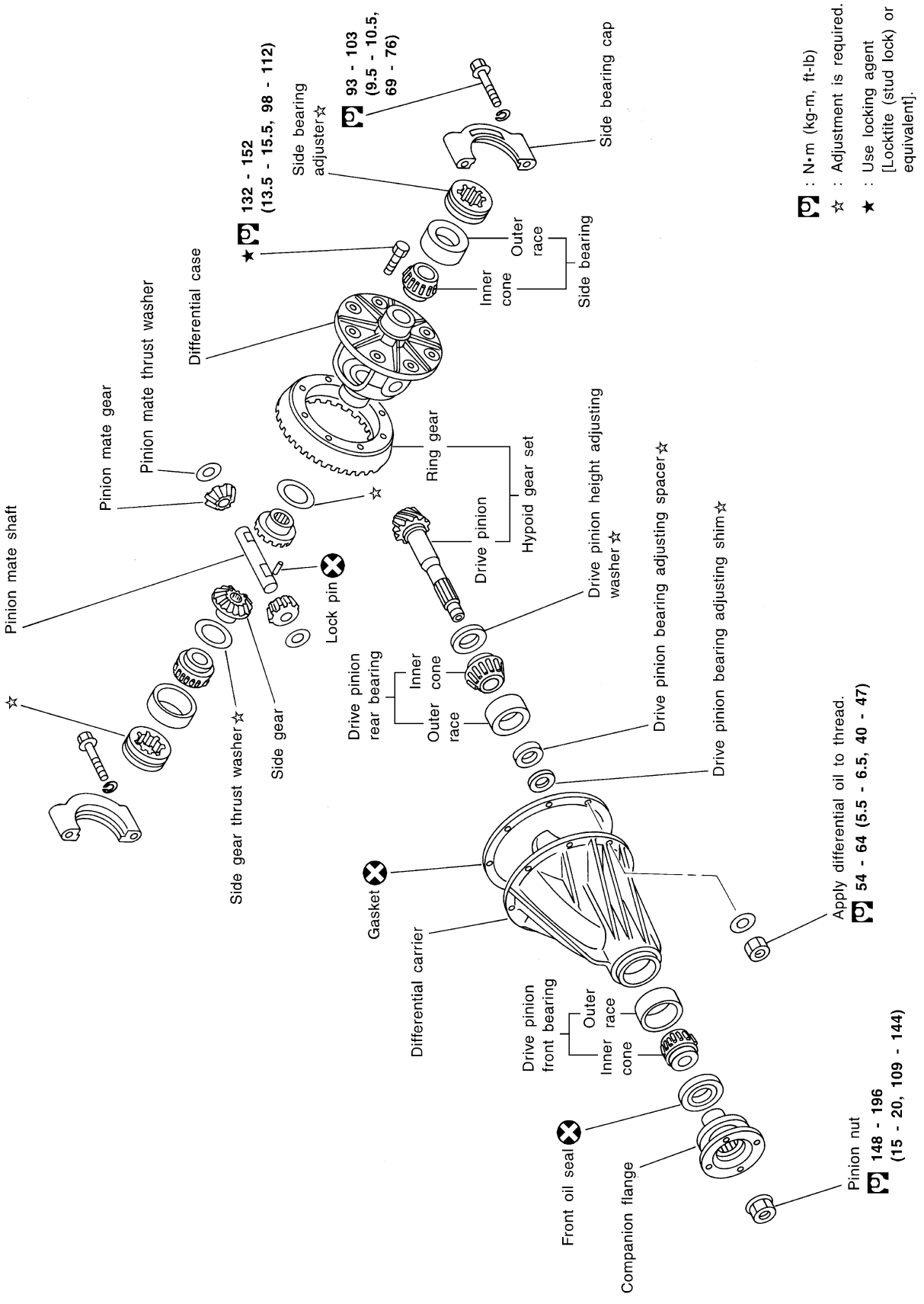
   Tool number:

   KV38100500 (J25273)

6. Install companion flange and drive pinion nut.
7. Install rear propeller shaft.

Components

NAPD0031



SPD362AA

SEC. 380

Removal and Installation

NAPD0032

REMOVAL

NAPD0032S01

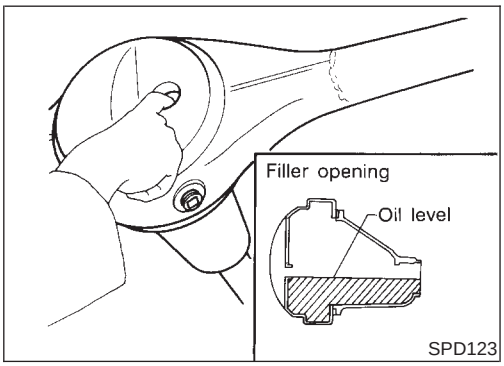
- Remove rear of propeller shaft.
  Plug front end of transfer.
- Remove axle shaft.
  Refer to AX-20, “Removal”.
- Remove rear final drive mounting bolts.

CAUTION:
Be careful not to damage spline, sleeve yoke and front oil seal when removing propeller shaft.

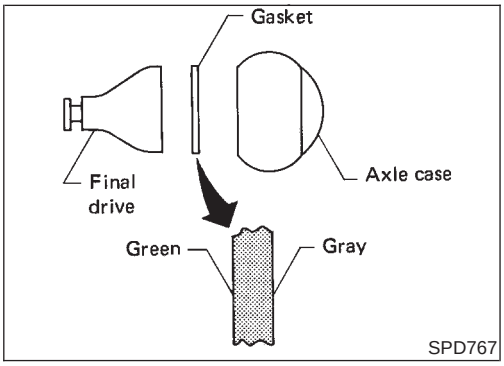
INSTALLATION

NAPD0032S02

- Fill final drive with recommended gear oil.



- Pay attention to the direction of gasket.



Disassembly

NAPD0033

PRE-INSPECTION

NAPD0033S01

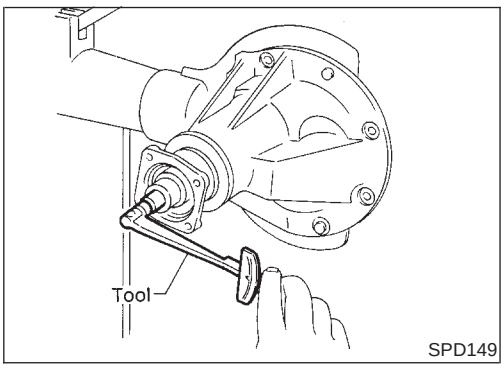
Before disassembling final drive, perform the following inspection.

- Total preload

a) Turn drive pinion in both directions several times to seat bearing rollers correctly.

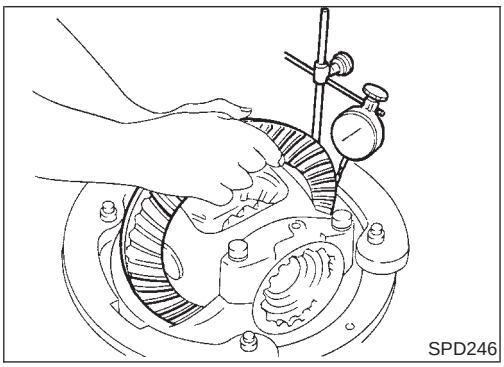
b) Check total preload with Tool.

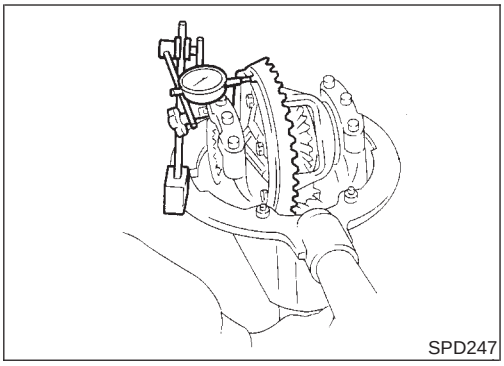
Tool number: ST3127S000 (J25765-A)
Total preload:
1.2 - 2.0 N·m (12 - 20 kg-cm, 10 - 17 in-lb)



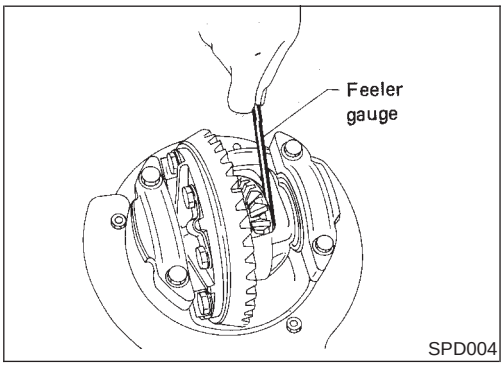
- Ring gear to drive pinion backlash
  Check backlash of ring gear with a dial indicator at several points.

Ring gear-to-drive pinion backlash:
0.13 - 0.18 mm (0.0051 - 0.0071 in)




SPD247

- Ring gear runout
  Check runout of ring gear with a dial indicator.
  Runout limit:
  0.08 mm (0.0031 in)



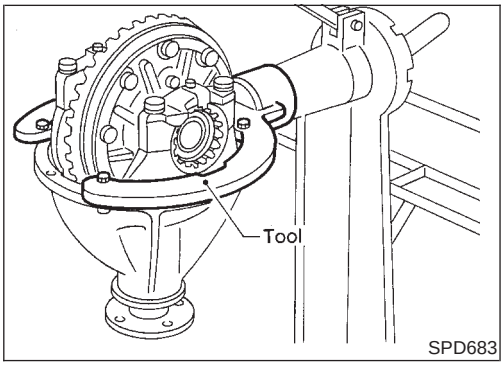
SPD004

- Tooth contact
  Check tooth contact. Refer to "TOOTH CONTACT", PD-57.
- Side gear to pinion mate gear backlash
  Measure clearance between side gear thrust washer and differential case with a feeler gauge.
  Clearance between side gear thrust washer and differential case:
  0.10 - 0.20 mm (0.0039 - 0.0079 in)

DIFFERENTIAL CARRIER

NAPD0033S02

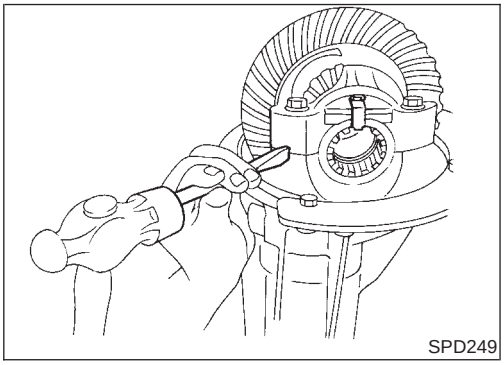
1. Mount final drive assembly on Tool.
   Tool number:
   ST06340000 (J24310, J34310)



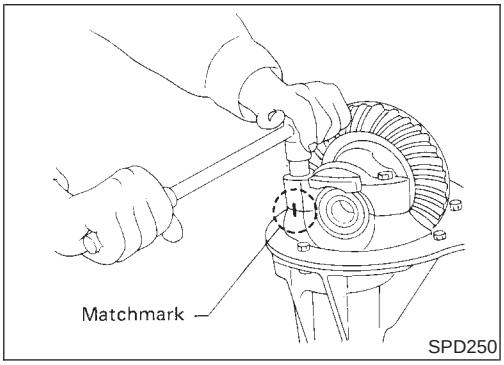
SPD683

2. Put match marks on one side of side bearing cap with paint or punch to ensure that it is replaced in proper position during reassembly.

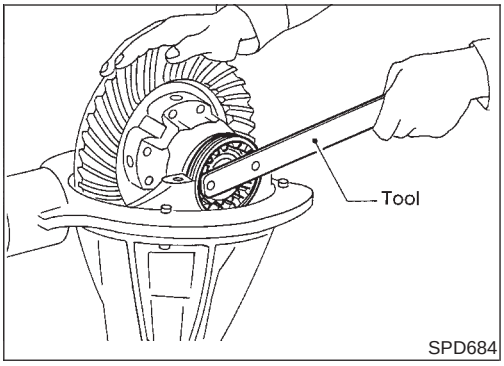
Bearing caps are line-bored during manufacture and should be put back in their original places.


SPD249

3. Remove side lock fingers and side bearing caps.

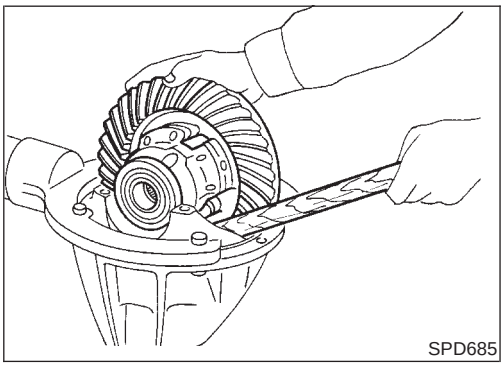


SPD250

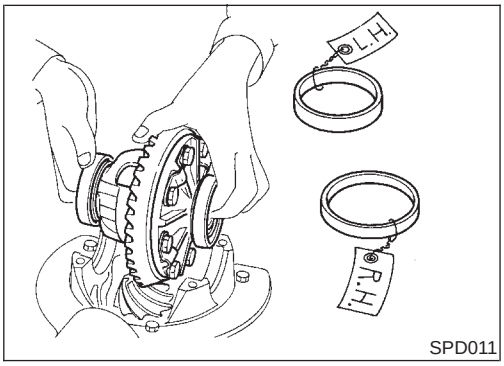


SPD684

4. Remove side bearing adjuster with Tool.
   Tool number: ST32580000 (J34312)

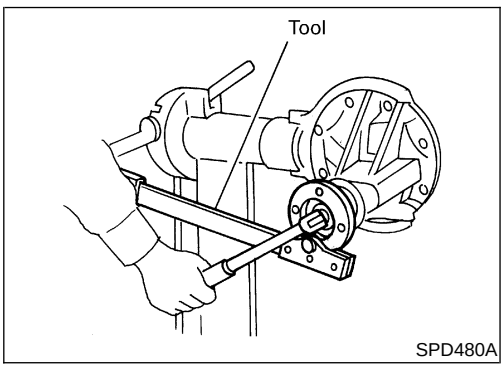

SPD685

5. Remove differential case assembly with a pry bar.



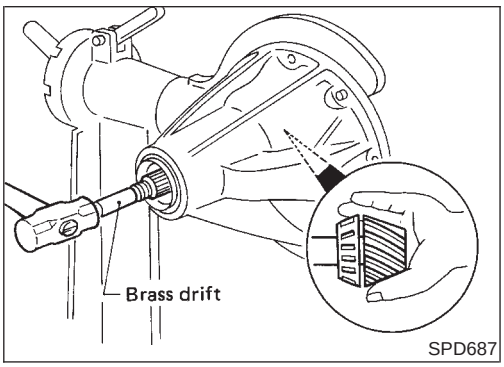
SPD011

Be careful to keep the side bearing outer races together with their respective inner cones — do not mix them up.



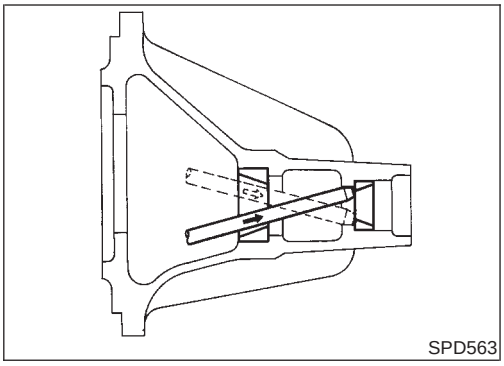
SPD480A

6. Remove drive pinion nut with Tool.
   Tool number: KV38108300 (J44195)
7. Remove companion flange with puller.

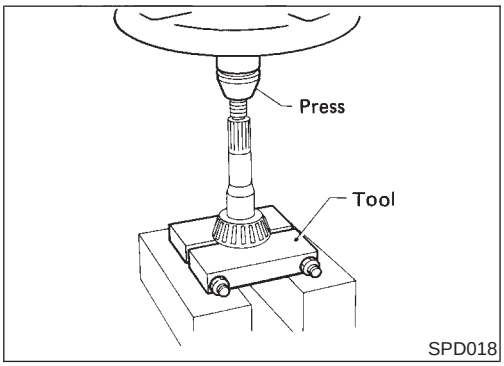


SPD687

8. Take out drive pinion together with pinion rear bearing inner cone, drive pinion bearing spacer and pinion bearing adjusting shim.


SPD563

9. Remove front oil seal and pinion front bearing inner cone.
10. Remove pinion bearing outer races with a brass drift.



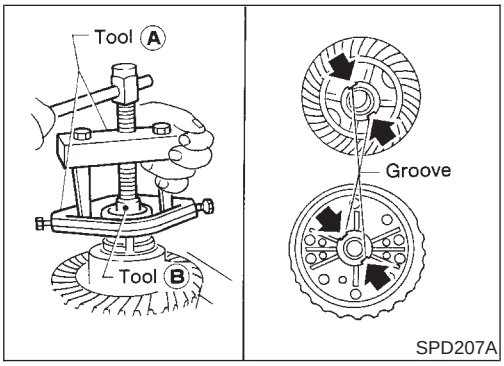
SPD018

11. Remove pinion rear bearing inner cone and drive pinion adjusting washer.
    Tool number: ST30031000 (J22912-01)

DIFFERENTIAL CASE

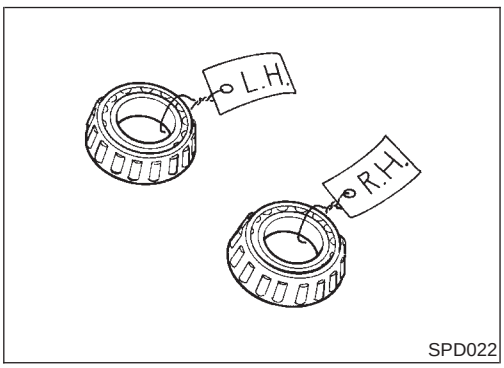
NAPD0033S03

1. Remove side bearing inner cones.
   To prevent damage to bearing, engage puller jaws in groove.
   Tool number:
   A ST33051001 (J22888-20)
   B ST33061000 (J8107-2)



SPD207A

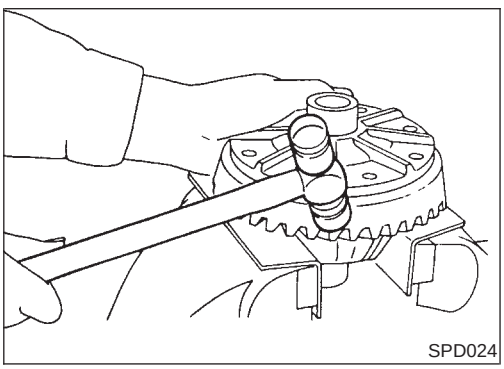
Be careful not to confuse the left and right hand parts.
Keep bearing and bearing race for each side together.

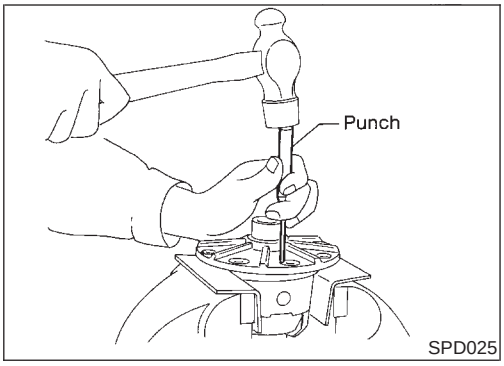


SPD022

2. Loosen ring gear bolts in a criss-cross pattern.
3. Tap ring gear off differential case with a soft hammer.

Tap evenly all around to keep ring gear from binding.


SPD024



4. Drive out pinion mate shaft lock pin, with punch from ring gear side.

Lock pin is calked at pin hole mouth on differential case.

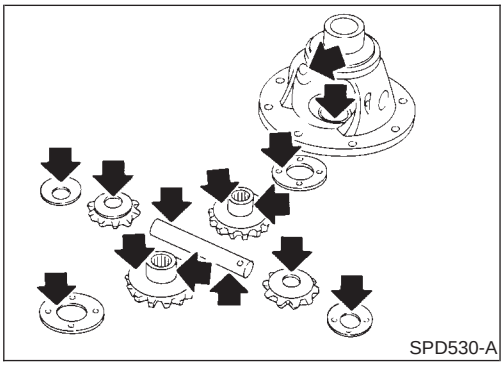
Inspection

NAPD0034

RING GEAR AND DRIVE PINION

NAPD0034S01

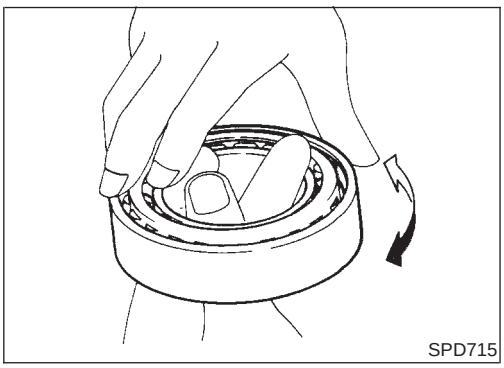
Check gear teeth for scoring, cracking or chipping.
If any damaged part is evident, replace ring gear and drive pinion as a set (hypoid gear set).



DIFFERENTIAL CASE ASSEMBLY

NAPD0034S02

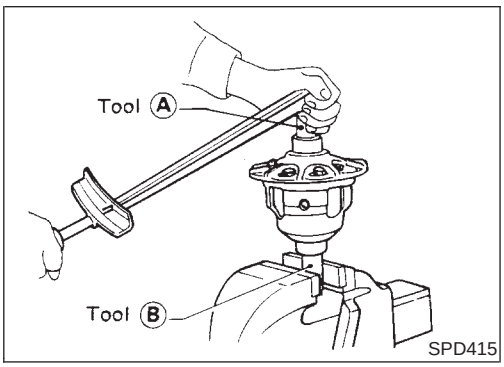
Check mating surfaces of differential case, side gears, pinion mate gears, pinion mate shaft, and thrust washers.



BEARING

NAPD0034S03

1. Thoroughly clean bearing.
2. Check bearings for wear, scratches, pitting or flaking.
   Check tapered roller bearing for smooth rotation. If damaged, replace outer race and inner cone as a set.



Limited Slip Differential

PREPARATION FOR DISASSEMBLY

NAPD0035

Checking Differential Torque

NAPD0035S01

Measure differential torque with Tool.
If it is not within the specifications, inspect components of limited slip differential.

Differential torque:
88 - 108 N·m (9 - 11 kg-m, 65 - 80 ft-lb)
Tool number: A KV38105210 (—)
Tool number: B KV38105220 (—)

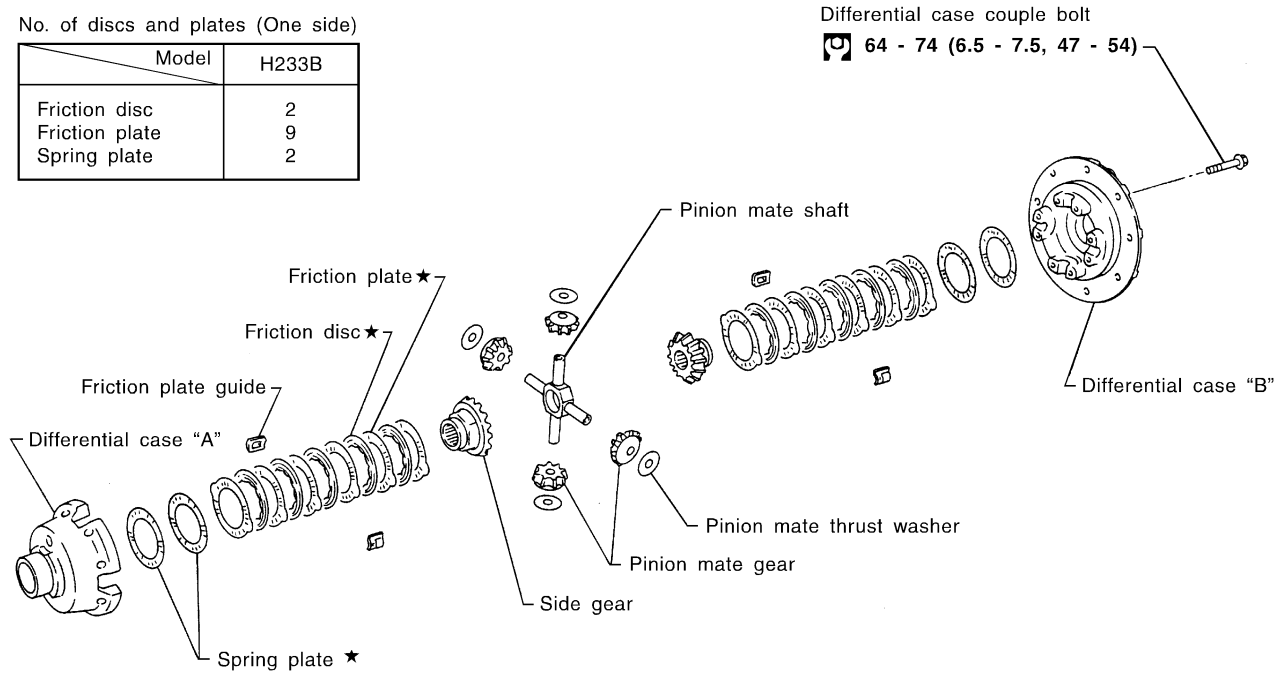
DISASSEMBLY

NAPD0036

SEC. 380

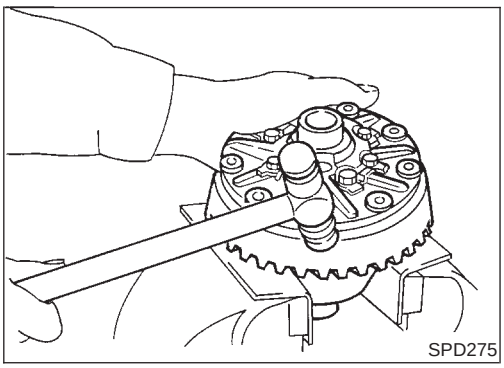
No. of discs and plates (One side)

Model	H233B
Friction disc	2
Friction plate	9
Spring plate	2



SPD380AA

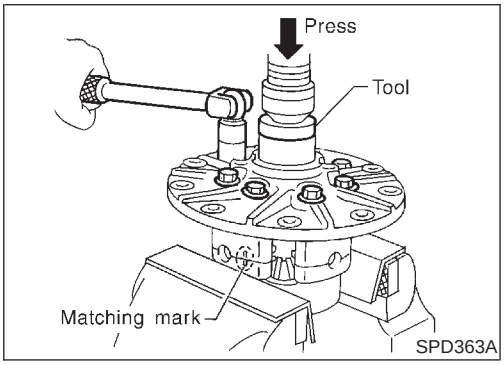
CAUTION:
Do not run engine when one wheel (rear) is off the ground.



SPD275

1. Remove side bearing inner cone with Tool.
2. Loosen ring gear bolts in a criss-cross pattern.
3. Tap ring gear off gear case with a soft hammer.

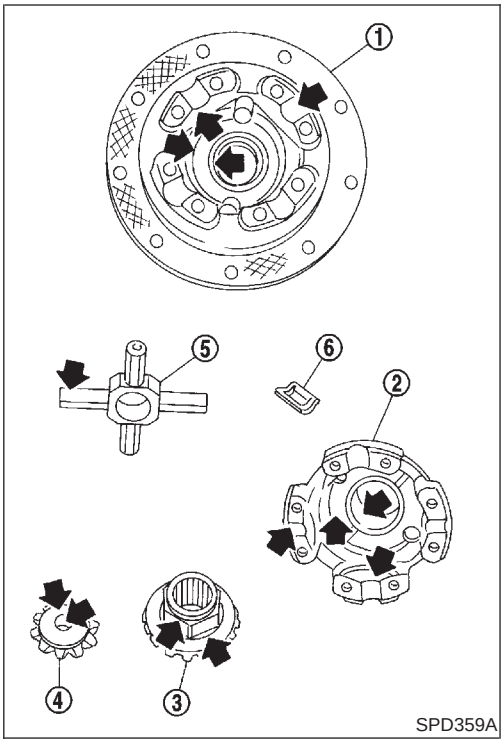
Tap evenly all around to keep ring gear from binding.



SPD363A

4. Remove couple bolts on differential cases A and B with a press.
   Tool number: ST33081000 (—)
5. Separate differential case A and B.
   Draw out component parts (discs and plates, etc.).

Put marks on gears and pressure rings so that they can be reinstalled in their original positions from which they were removed.



SPD359A

INSPECTION

NAPD0037

Contact Surfaces

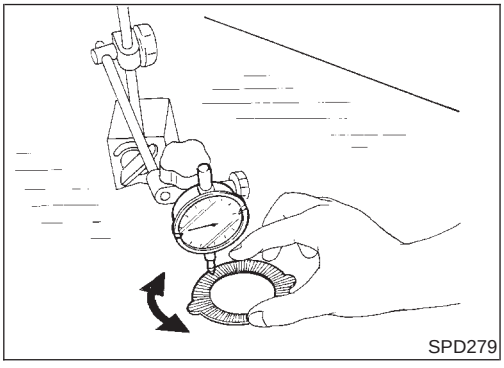
NAPD0037S01

1. Clean the disassembled parts in suitable solvent and blow dry with compressed air.
2. If following surfaces are found with burrs or scratches, smooth with oil stone.
   1 Differential case B
   2 Differential case A
   3 Side gear
   4 Pinion mate gear
   5 Pinion mate shaft
   6 Friction plate guide

Disc and Plate

NAPD0037S02

1. Clean the discs and plates in suitable solvent and blow dry with compressed air.
2. Inspect discs and plates for wear, nicks and burrs.

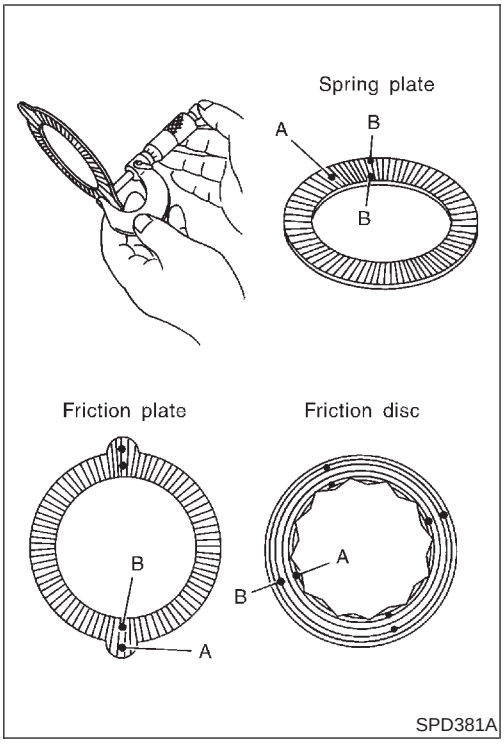

SPD279

3. To test if friction disc or plate is not distorted, place it on a surface plate and rotate it by hand with indicating finger of dial gauge resting against disc or plate surface.

   Allowable warpage:

   0.08 mm (0.0031 in)

   If it exceeds limits, replace with a new plate to eliminate possibility of clutch slippage or sticking.



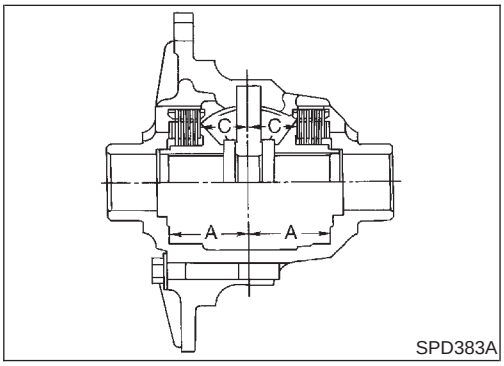
SPD381A

4. Measure frictional surfaces and projected portions of friction disc, friction plate, spring plate, and determine each part's differences to see if the specified wear limit has been exceeded.

If any part has worn beyond the wear limit, and deformed or fatigued, replace it with a new one that is the same thickness as the projected portion.

Wear limit:
0.1 mm (0.004 in) or less
A − B = Wear limit mm (in)

●: Measuring points
A: Projected portion
B: Frictional surface



SPD383A

ADJUSTMENT

NAPD0038

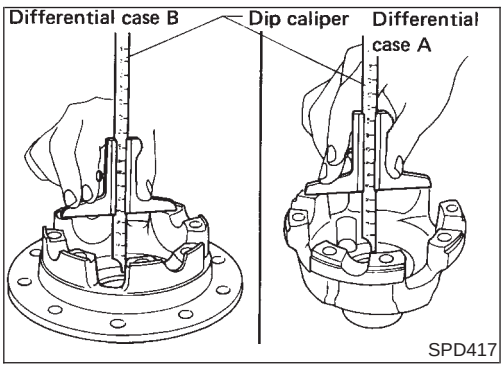
Friction Disc and Friction Plate End Play

NAPD0038S01

End play of friction disc and friction plate can be calculated by using following equation and should be adjusted within following range. Adjustment can be made by selecting friction disc having two different thicknesses.

End play E:
0.05 - 0.15 mm (0.0020 - 0.0059 in)
E = A − (B + C)

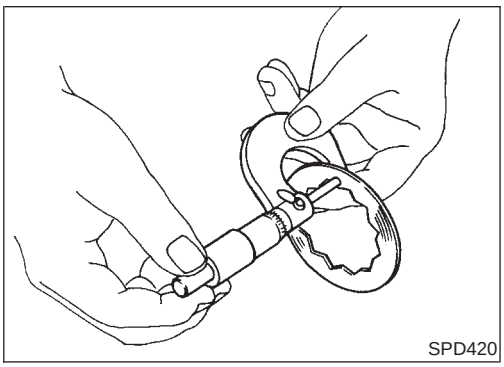
A: Length of differential case contact surface to differential case inner bottom.
B: Total thickness of friction discs, friction plates, spring disc and spring plate in differential case on one side.
C: Length of differential case contact surface to back side of side gear.



SPD417

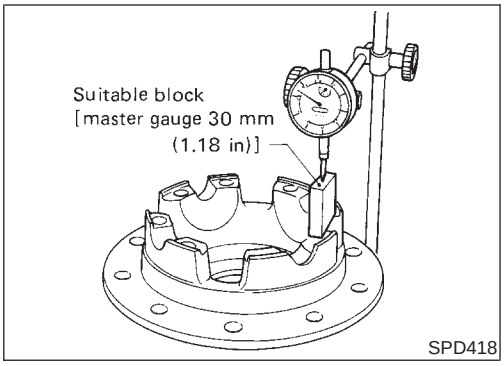
1. Measure values of "A".

Standard length A:
49.50 - 49.55 mm (1.9488 - 1.9508 in)

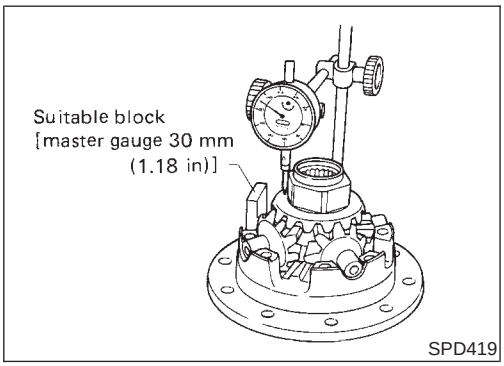

SPD420

2. Measure thickness of each disc and plate.

Total thickness "B":
19.24 - 20.26 mm (0.7575 - 0.7976 in)

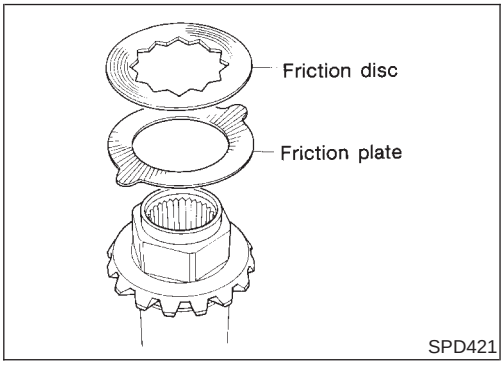


3. Measure values of "C".
a. Attach a dial indicator to the base plate.
b. Place differential case B on the base plate, and install a master gauge on case B.
Then adjust the dial indicator scale to zero with its tip on the master gauge.



c. Install pinion mate gears, side gears and pinion mate shaft in differential case B.
d. Set dial indicator's tip on the side gear, and read the indication.
Example:
E = A − D = A − (B + C) = 0.05 to 0.15 mm
A = 49.52 mm
B = 19.45 mm
C = 29.7 mm
D = B + C
49.15 (D) = 19.45 (B) + 29.7 (C)
E = A − D
0.37 (E) = 49.52 (A) − 49.15 (D)

From the above equation, end play of 0.37 mm exceeds the specified range of 0.05 to 0.15 mm.
Select suitable discs and plates to adjust correctly.



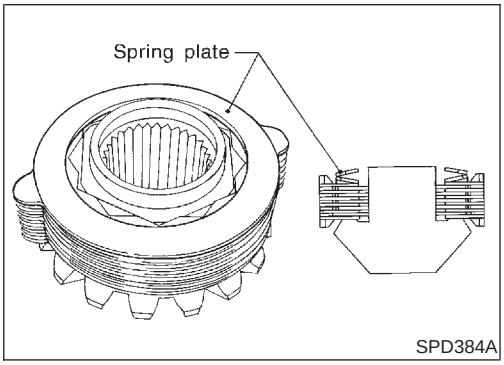
ASSEMBLY

NAPD0039

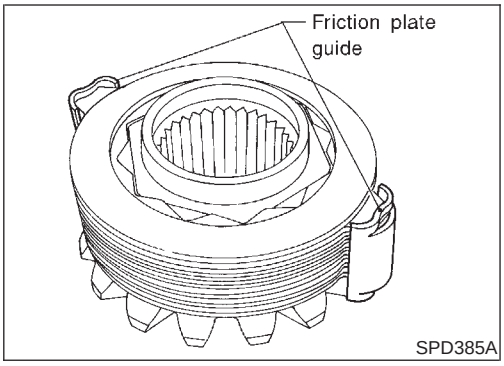
Prior to assembling discs and plates, properly lubricate them by dipping them in limited slip differential oil.

1. Alternately position specified number of friction plates and friction discs on rear of side gear.

Always position a friction plate first on rear of side gear.

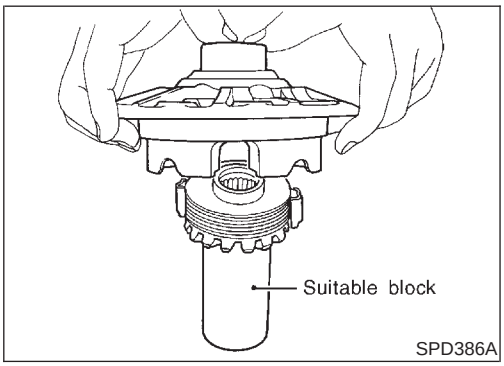


2. Install spring plate.



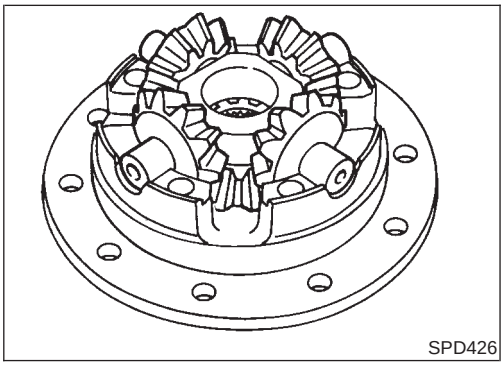
3. Install friction plate guides.

Correctly align the raised portions of friction plates, and apply grease to inner surfaces of friction plate guides to prevent them from falling.

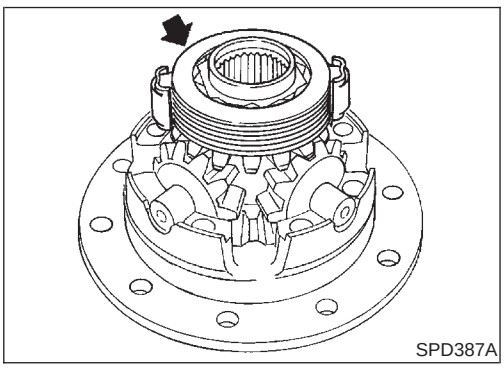


4. Install differential case B over side gear, discs, plates and friction plate guide assembly.

- **Install differential case B while supporting friction plate guides with your middle finger inserted through oil hole in differential case.**
- **Be careful not to detach spring disc from the hexagonal part of the side gear.**

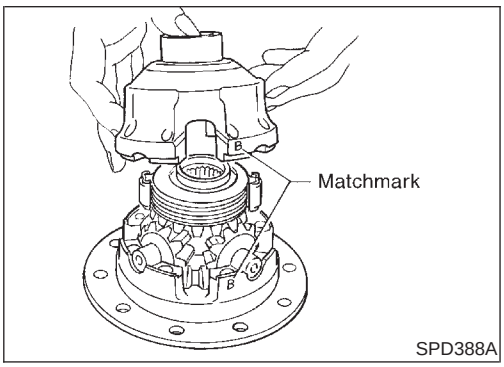


5. Install pinion mate gears and pinion mate thrust washers on pinion mate shaft, then install pinion mate shaft in differential case B.



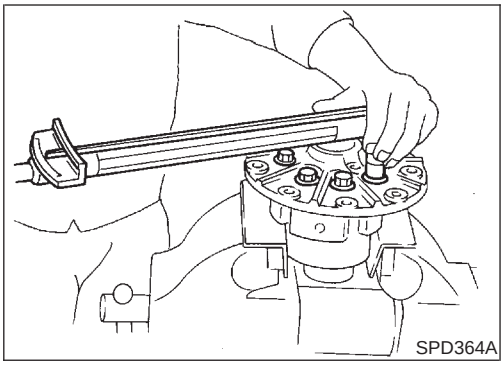
6. Install side gear to pinion mate gears.
7. Install each disc and plate.

Use same procedures as outlined in steps 1. through 4. above.



8. Install differential case A.

Position differential cases A and B by correctly aligning marks stamped on cases.


SPD364A

9. Tighten differential case couple bolts.
10. Place ring gear on differential case and tighten ring gear bolts.

Tighten bolts in a criss-cross pattern, lightly tapping bolt head with a hammer.
Then bend up lock straps to lock the bolts in place.

11. Install side bearing inner cone.
12. Check differential torque.

Adjustment

NAPD0040

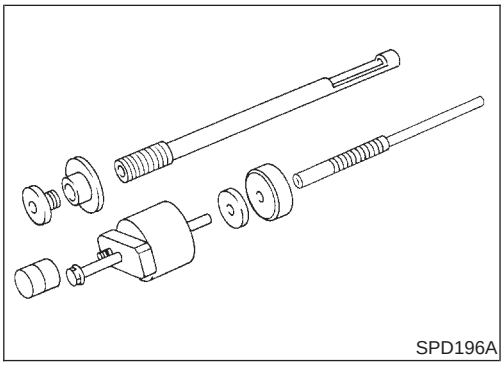
For quiet and reliable final drive operation, the following five adjustments must be made correctly:

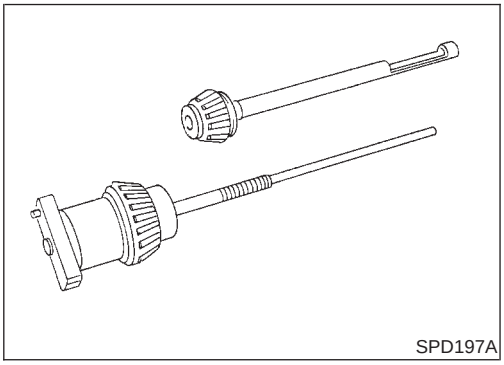
1. Side bearing preload
2. Pinion gear height
3. Side bearing preload
4. Ring gear-to-pinion backlash. Refer to SDS, PD-63.
5. Ring and pinion gear tooth contact pattern

PINION GEAR HEIGHT

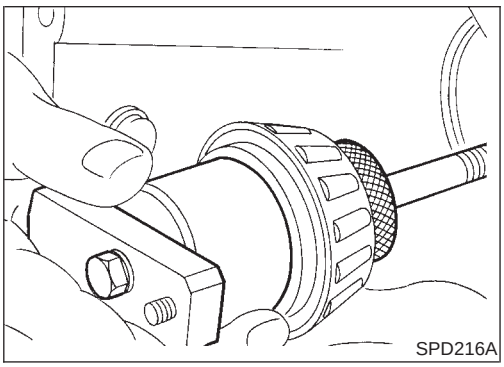
NAPD0040S01

1. Make sure all parts are clean and that the bearings are well lubricated.
2. Assemble the pinion gear bearings into the pinion pre-load shim selector tool, J34309.

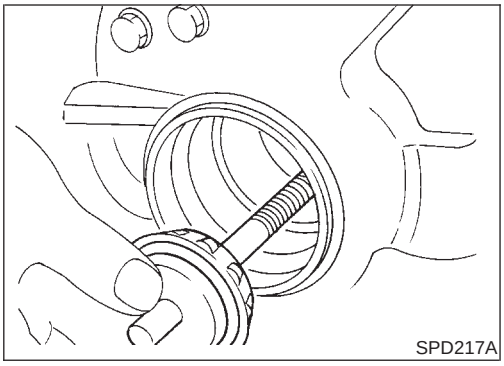

SPD196A


SPD197A

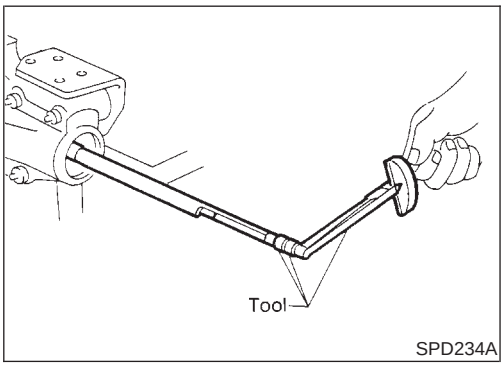
- **Rear Pinion Bearing** — the rear pinion bearing pilot, J34309-8, is used to center the rear pinion bearing only. The rear pinion bearing locking seat, J34309-4, is used to lock the bearing to the assembly.
- **Front Pinion Bearing** — make sure the J34309-3, front pinion bearing seat is secured tightly against the J34309-2 gauge anvil. Then turn the front pinion bearing pilot, J34309-5, to secure the bearing in its proper position.


SPD216A

3. Place the pinion preload shim selector tool gauge screw assembly, J34309-1, with the pinion rear bearing inner cone installed, into the final drive housing.


SPD217A

4. Install the J34309-2 gauge anvil with the front pinion bearing into the final drive housing and assemble it to the J34309-1 gauge screw. Make sure that the J34309-16 gauge plate will turn a full 360 degrees, and tighten the two sections by hand to set bearing pre-load.
5. Turn the assembly several times to seat the bearings.

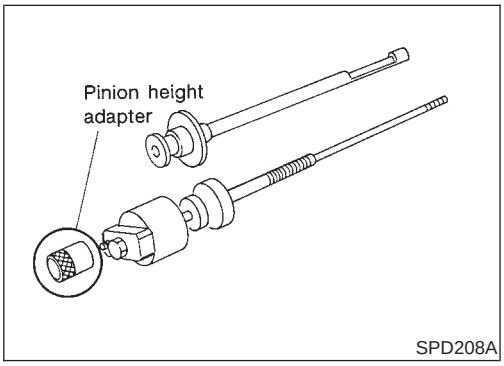


SPD234A

6. Measure the turning torque at the end of the J34309-2 gauge anvil using torque wrench J25765A.

Turning torque specification:

0.4 - 0.9 N·m (4 - 9 kg-cm, 3.5 - 7.8 in-lb)

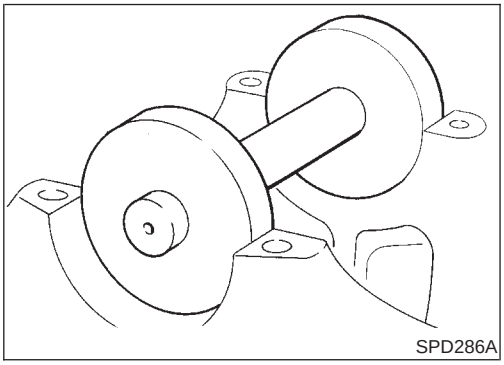


SPD208A

7. Place the J34309-12 "H233B" pinion height adapter onto the gauge plate and tighten it by hand.

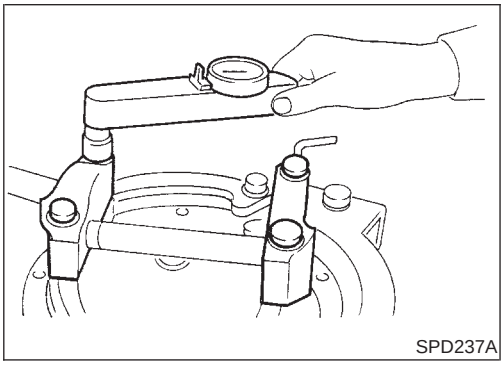
CAUTION:

Make sure all machined surfaces are clean.


SPD286A

PINION HEIGHT ADJUSTING WASHER SELECTION

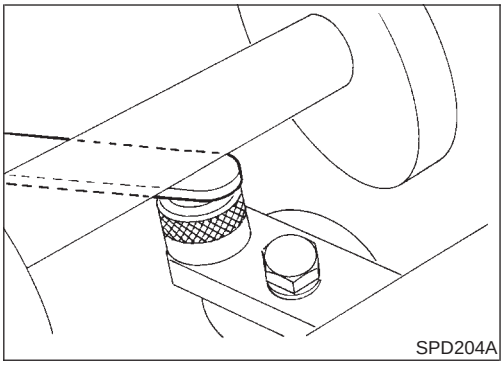
8. Position the J25269-18 side bearing discs and the arbor into the side bearing bores.


SPD237A

9. Install the bearing caps and torque the bolts.

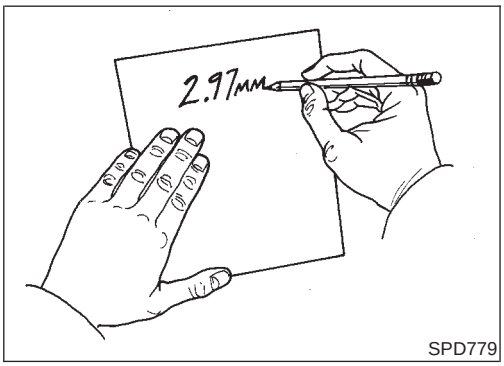
Specification:

93 - 103 N·m (9.5 - 10.5 kg-m, 69 - 76 ft-lb)



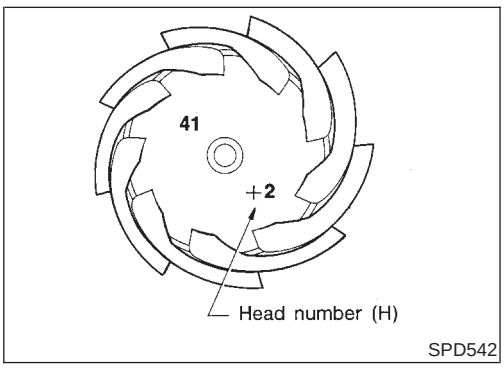
SPD204A

10. Select the correct standard pinion height adjusting washer thickness using a standard gauge of 2.5, 3.0, or 3.5 mm (0.098, 0.118, or 0.138 in) and your J34309-101 feeler gauge. Measure the distance between the J34309-12 "H233B" pinion height adapter and the arbor.



SPD779

11. Write down your exact total measurement.

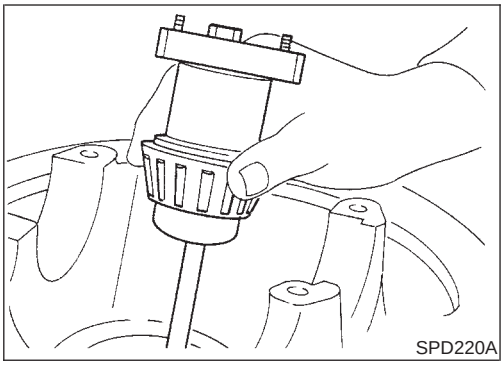


SPD542

12. Correct the pinion height washer size by referring to the "pinion head height number".

There are two numbers painted on the pinion gear. The first one refers to the pinion and ring gear as a matched set and should be the same as the number on the ring gear. The second number is the "pinion head height number", and it refers to the ideal pinion height from standard for the quietest operation. Use the following chart to determine the correct pinion height washer. Refer to SDS, PD-64.

Pinion Head Height Number	Add or Remove from the Selected Standard Pinion Height Washer Thickness Measurement
−6	Add 0.06 mm (0.0024 in)
−5	Add 0.05 mm (0.0020 in)
−4	Add 0.04 mm (0.0016 in)
−3	Add 0.03 mm (0.0012 in)
−2	Add 0.02 mm (0.0008 in)
−1	Add 0.01 mm (0.0004 in)
0	Use the selected washer thickness
+1	Subtract 0.01 mm (0.0004 in)
+2	Subtract 0.02 mm (0.0008 in)
+3	Subtract 0.03 mm (0.0012 in)
+4	Subtract 0.04 mm (0.0016 in)
+5	Subtract 0.05 mm (0.0020 in)
+6	Subtract 0.06 mm (0.0024 in)

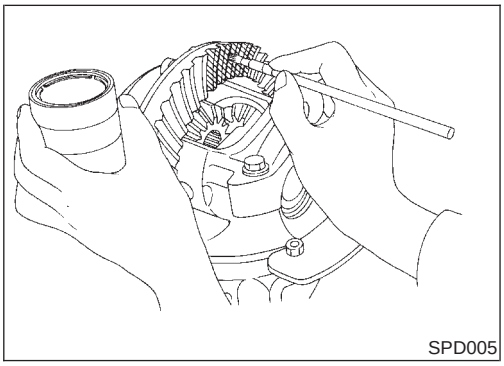

SPD220A

13. Remove the J34309 pinion preload shim selector tool from the final drive housing and disassemble to retrieve the pinion bearings.

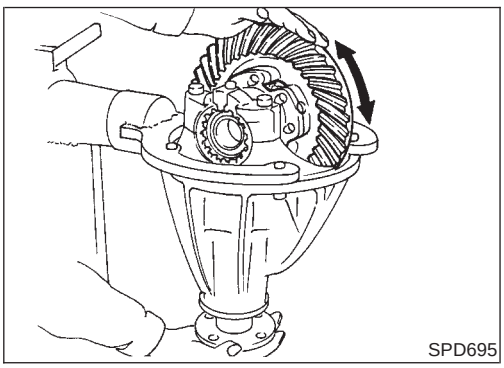
TOOTH CONTACT

NAPD0040S02

Gear tooth contact pattern check is necessary to verify correct relationship between ring gear and drive pinion.
Hypoid gear sets which are not positioned properly in relation to one another may be noisy, or have short life or both. With a pattern check, the most desirable contact for low noise level and long life can be assured.

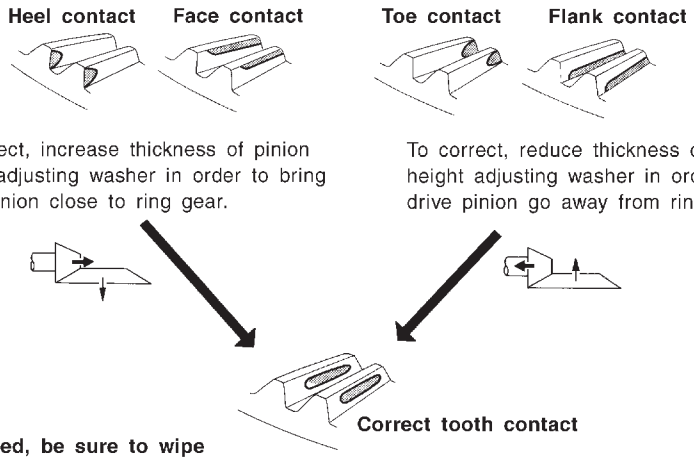

SPD005

1. Thoroughly clean ring gear and drive pinion teeth.
2. Sparingly apply a mixture of powdered ferric oxide and oil or equivalent to 3 or 4 teeth of ring gear drive side.


SPD695

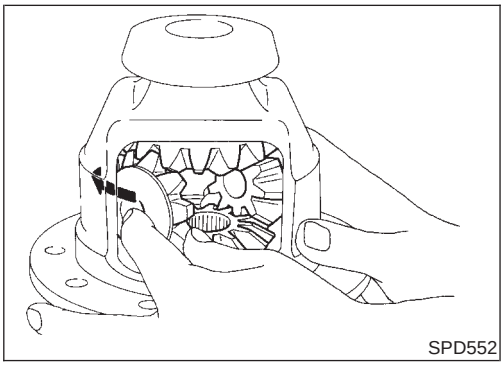
3. Hold companion flange steady by hand and rotate the ring gear in both directions.

Usually the pattern will be correct if shims are correctly calculated and the backlash is correct. However, in rare cases, trial and error processes may be employed to obtain a correct pattern. The tooth pattern is the best indication of how well a differential has been set up.

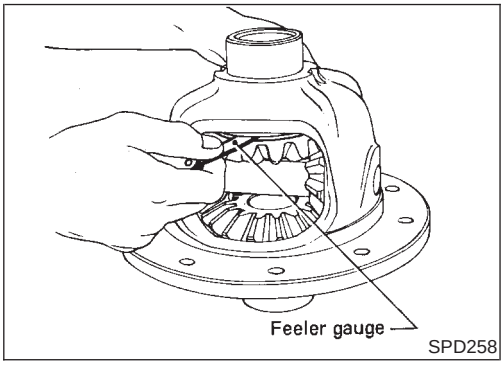


When adjustment is completed, be sure to wipe off completely the ferric oxide and oil or their equivalent.

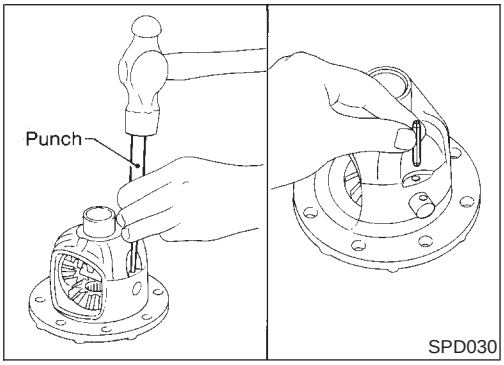
SPD007-B



SPD552



SPD258



SPD030

Assembly

NAPD0041

DIFFERENTIAL CASE

NAPD0041S01

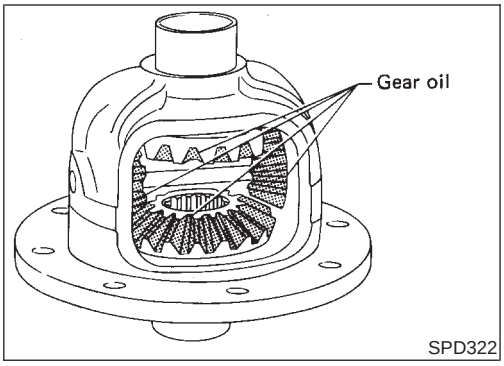
1. Install side gears, pinion mate gears and thrust washers into differential case.
2. Fit pinion mate shaft to differential case so that it meets lock pin holes.
3. Adjust backlash between side gear and pinion mate gear by selecting side gear thrust washer.
   Refer to SDS, PD-63.

   Backlash between side gear and pinion mate gear (Clearance between side gear thrust washer and differential case):

   0.10 - 0.20 mm (0.0039 - 0.0079 in)

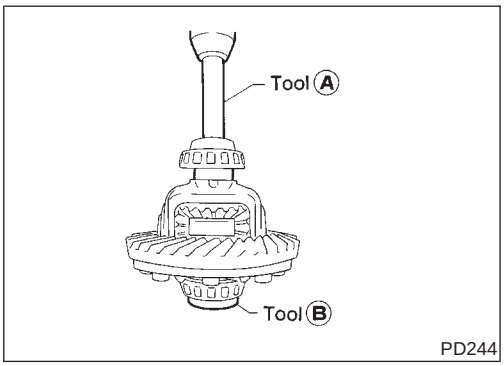
4. Install pinion mate shaft lock pin with a punch.

Make sure lock pin is flush with case.



5. Apply gear oil to gear tooth surfaces and thrust surfaces and check to see they turn properly.
6. Install differential case assembly on ring gear.

Tighten bolts in a criss-cross pattern, lightly tapping bolt head with a hammer.



7. Press-fit side bearing inner cones on differential case with Tool.

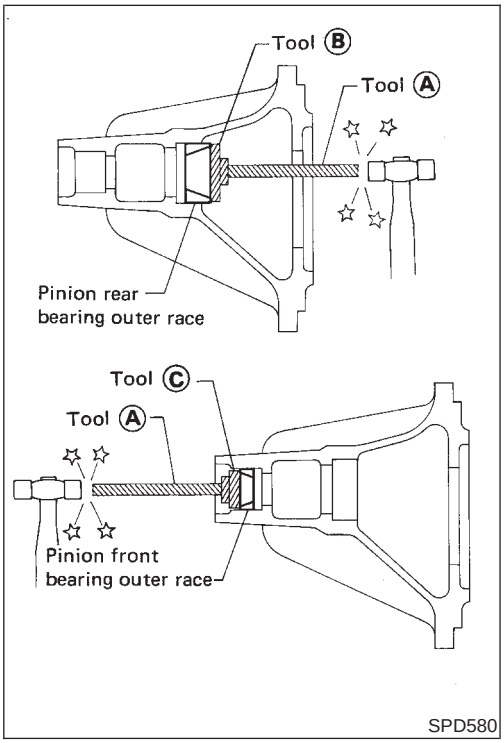
Tool number:
A ST33190000 (J25523)
B ST33081000 (—)

DIFFERENTIAL CARRIER

NAPD0041S02

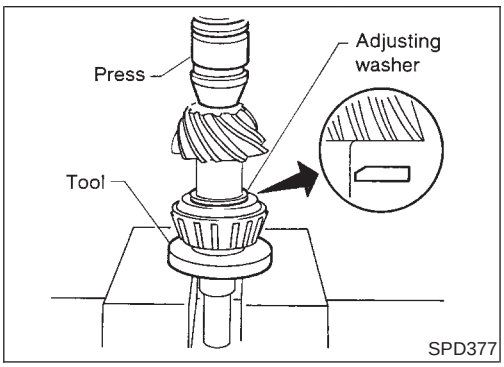
1. Press-fit front and rear bearing outer races with Tools.

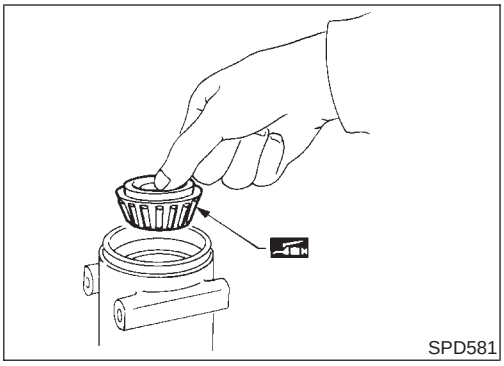
Tool number:
A ST30611000 (J25742-1)
B ST30621000 (J25742-5)
C ST30613000 (J25742-3)



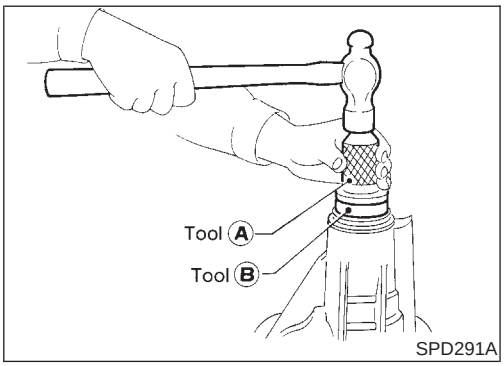
2. Select drive pinion height adjusting washer. Refer to "Adjustment", PD-54.
3. Install drive pinion adjusting washer in drive pinion, and press-fit pinion rear bearing inner cone in it, with press and Tool.

Tool number:
ST30901000 (J26010-01)




SPD581

4. Place pinion front bearing inner cone in gear carrier.



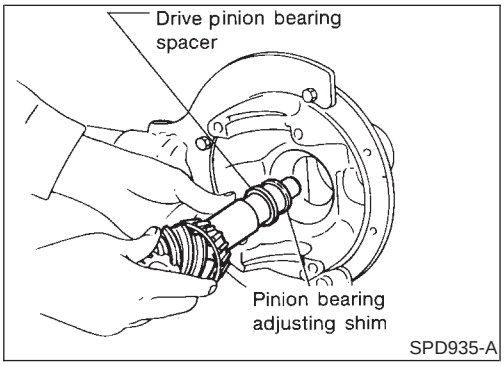
SPD291A

5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install front oil seal.

Tool number:

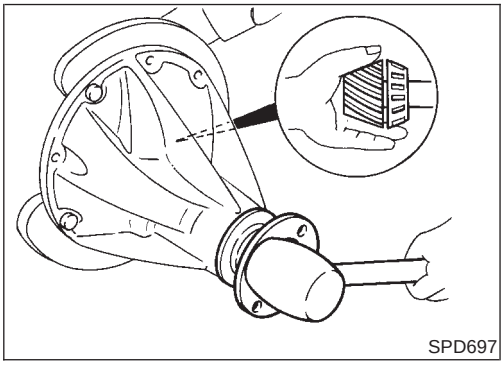
A ST30720000 (J25405)

B KV38102510 (—)

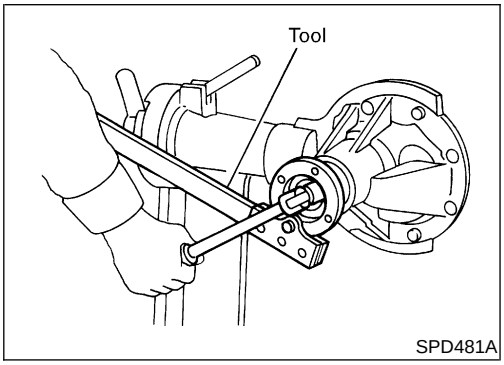


SPD935-A

6. Install drive pinion bearing spacer, pinion bearing adjusting shim and drive pinion in gear carrier.


SPD697

7. Insert companion flange into drive pinion by tapping the companion flange with a soft hammer.

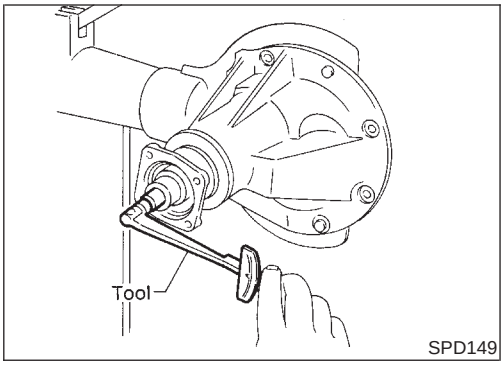


SPD481A

8. Tighten pinion nut to the specified torque.

The threaded portion of drive pinion and pinion nut should be free from oil or grease.

Tool number: KV38108300 (J44195)

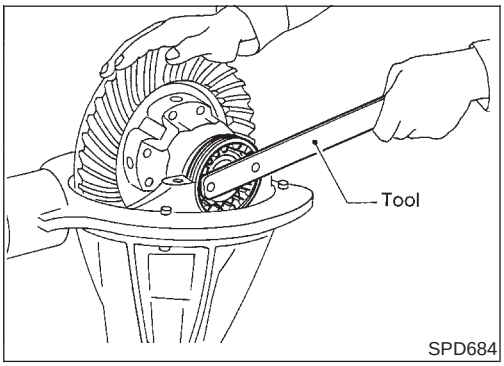


SPD149

9. Turn drive pinion in both directions several times, and measure pinion bearing preload.
   Tool number: ST3127S000 (J25765-A)
   Pinion bearing preload (Without front oil seal):
   0.12 - 0.20 N·m (1.2 - 2.0 kg-cm, 1.0 - 1.7 in-lb)

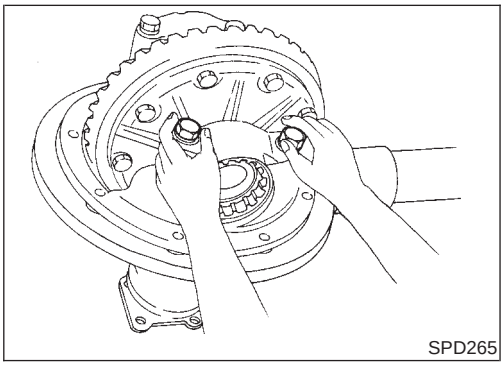
If preload is out of specification, adjust the thickness of spacer and shim combination by replacing shim and spacer with thinner one.

- Start from the combination of thickest spacer and shim.
- Combine each spacer and shim thickness one by one until the correct specification are achieved.
  Drive pinion bearing preload adjusting spacer and shim:
  Refer to SDS, PD-65.

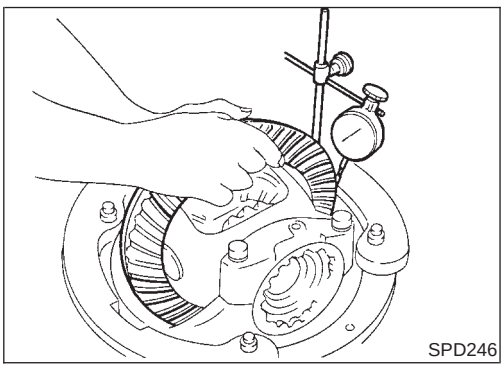


SPD684

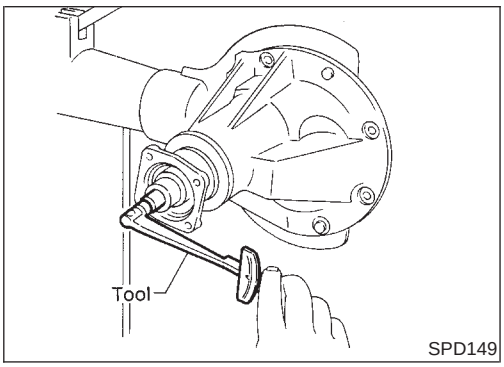
10. Install differential case assembly with side bearing outer races into gear carrier.
11. Position side bearing adjusters on gear carrier with threads properly engaged; screw in adjusters lightly at this stage of assembly.
    Tool number: ST32580000 (J34312)


SPD265

12. Align mark on bearing cap with that on gear carrier and install bearing cap on gear carrier.
- Do not tighten at this point to allow further tightening of side bearing adjusters.

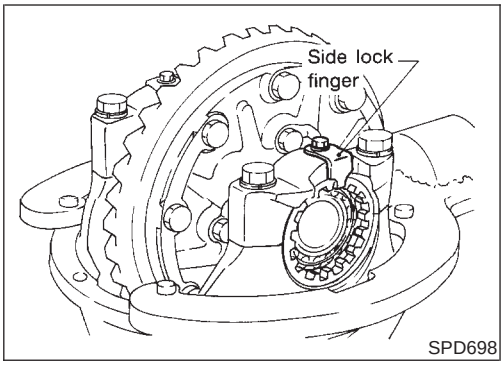

SPD246

13. Tighten both right and left side bearing adjusters alternately and measure ring gear backlash and total preload at the same time. Adjust right and left side bearing adjusters by tightening them alternately so that proper ring gear backlash and total preload can be obtained.
    Ring gear-to-drive pinion backlash:
    0.13 - 0.18 mm (0.0051 - 0.0071 in)

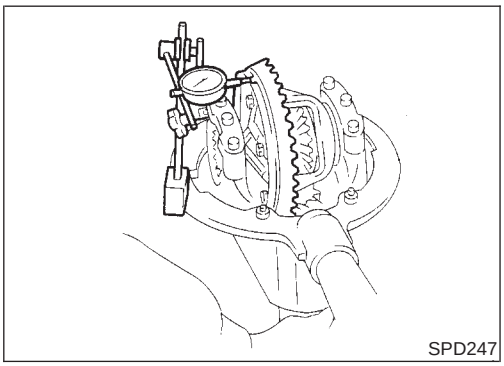


SPD149

- **When checking preload, turn drive pinion in both directions several times to set bearing rollers.**
  Tool number: ST3127S000 (J25765-A)
  Total preload:
  P_1 + [0.3 - 0.4 N·m (3 - 4 kg-cm, 2.6 - 3.5 in-lb)]
  P_1 = Drive pinion preload



SPD698


SPD247

14. Tighten side bearing cap bolts.
15. Install side lock finger in place to prevent rotation during operation.
16. Check runout of ring gear with a dial indicator.
    Runout limit: 0.08 mm (0.0031 in)
- If backlash varies excessively in different places, the variance may have resulted from foreign matter caught between the ring gear and the differential case.
- If the backlash varies greatly when the runout of the ring gear is within a specified range, the hypoid gear set or differential case should be replaced.

17. Check tooth contact. Refer to "TOOTH CONTACT", PD-57.

Service Data and Specifications (SDS)

H233B
General Specifications
2WD Model

NAPD0042
NAPD0042S01
NAPD0042S0101

Applied model	Standard	Optional (SE grade)
Rear final drive	H233B	
	2-pinion	LSD
Gear ratio	4.363	
Number of teeth (Ring gear/drive pinion)	48/11	
Oil capacity (Approx.) ℓ (US pt, Imp pt)	2.8 (5-7/8, 4-7/8)	

4WD Model

NAPD0042S0102

Applied model	All	
Rear final drive	Standard	Optional
	H233B	
	2-pinion	LSD
Gear ratio	4.363	
Number of teeth (Ring gear/drive pinion)	48/11	
Oil capacity (Approx.) ℓ (US pt, Imp pt)	2.8 (5-7/8, 4-7/8)	

Ring Gear Runout

NAPD0042S02

Ring gear runout limit mm (in)	0.08 (0.0031)

Side Gear Adjustment

NAPD0042S03

Side gear backlash (Clearance between side gear and differential case) mm (in)		0.10 - 0.20 (0.0039 - 0.0079)
Available side gear thrust washers	Thickness mm (in)	Part number*
	1.75 (0.0689) 1.80 (0.0709) 1.85 (0.0728)	38424-T5000 38424-T5001 38424-T5002

*: Always check with the Parts Department for the latest parts information.

Differential Torque Adjustment (LSD models)

NAPD0042S04

Differential torque N·m (kg-m, ft-lb)		88 - 108 (9 - 11, 65 - 80)
Number of discs and plates (One side)	Friction disc	2
	Friction plate	9
	Spring plate	2
Wear limit of plate and disc mm (in)		0.1 (0.004)
Allowable warpage of friction disc and plate mm (in)		0.08 (0.0031)

Available discs and plates	Plate name	Thickness mm (in)	Part number*
	Friction disc	1.48 - 1.52 (0.0583 - 0.0598) 1.38 - 1.42 (0.0543 - 0.0559) 1.58 - 1.62 (0.0622 - 0.0638)	38433-C6002 (Standard type) 38433-C6004 (Adjusting type) 38433-C6003 (Adjusting type)
	Friction plate	1.48 - 1.52 (0.0583 - 0.0598) 1.38 - 1.42 (0.0543 - 0.0559) 1.58 - 1.62 (0.0622 - 0.0638)	38432-C6001 38432-C6002 38432-C6003
	Spring plate	1.48 - 1.52 (0.0583 - 0.0598)	38435-S9200

*: Always check with the Parts Department for the latest parts information.

Total Preload Adjustment

NAPD0042S05

Total preload N·m (kg-cm, in-lb)	P_1 + [0.3 - 0.4 (3 - 4, 2.6 - 3.5)]
Ring gear backlash mm (in)	0.13 - 0.18 (0.0051 - 0.0071)
Side bearing adjusting method	Side adjuster

P_1 = Drive pinion preload

Drive Pinion Height Adjustment

NAPD0042S06

	Thickness mm (in)	Part number*
Available pinion height adjust washers	2.58 (0.1016)	38151-01J00
	2.61 (0.1028)	38151-01J01
	2.64 (0.1039)	38151-01J02
	2.67 (0.1051)	38151-01J03
	2.70 (0.1063)	38151-01J04
	2.73 (0.1075)	38151-01J05
	2.76 (0.1087)	38151-01J06
	2.79 (0.1098)	38151-01J07
	2.82 (0.1110)	38151-01J08
	2.85 (0.1122)	38151-01J09
	2.88 (0.1134)	38151-01J10
	2.91 (0.1146)	38151-01J11
	2.94 (0.1157)	38151-01J12
	2.97 (0.1169)	38151-01J13
	3.00 (0.1181)	38151-01J14
	3.03 (0.1193)	38151-01J15
	3.06 (0.1205)	38151-01J16
	3.09 (0.1217)	38151-01J17
	3.12 (0.1228)	38151-01J18
	3.15 (0.1240)	38151-01J19
	3.18 (0.1252)	38151-01J60
	3.21 (0.1264)	38151-01J61
	3.24 (0.1276)	38151-01J62
	3.27 (0.1287)	38151-01J63
	3.30 (0.1299)	38151-01J64
	3.33 (0.1311)	38151-01J65
	3.36 (0.1323)	38151-01J66
	3.39 (0.1335)	38151-01J67
	3.42 (0.1346)	38151-01J68
	3.45 (0.1358)	38151-01J69
	3.48 (0.1370)	38151-01J70
	3.51 (0.1382)	38151-01J71
	3.54 (0.1394)	38151-01J72
	3.57 (0.1406)	38151-01J73
	3.60 (0.1417)	38151-01J74
	3.63 (0.1429)	38151-01J75
	3.66 (0.1441)	38151-01J76

*: Always check with the Parts Department for the latest parts information.

Drive Pinion Preload Adjustment

NAPD0042S07

Drive pinion bearing preload adjusting method		Adjusting shim and spacer
Drive pinion preload without front oil seal N·m (kg-cm, in-lb) [P_1]		1.2 - 2.0 (12 - 20, 10 - 17)
Available front drive pinion bearing adjusting shims	Thickness mm (in)	Part number*
	2.31 (0.0909)	38125-82100
	2.33 (0.0917)	38126-82100
	2.35 (0.0925)	38127-82100
	2.37 (0.0933)	38128-82100
	2.39 (0.0941)	38129-82100
	2.41 (0.0949)	38130-82100
	2.43 (0.0957)	38131-82100
	2.45 (0.0965)	38132-82100
	2.47 (0.0972)	38133-82100
	2.49 (0.0980)	38134-82100
	2.51 (0.0988)	38135-82100
	2.53 (0.0996)	38136-82100
	2.55 (0.1004)	38137-82100
	2.57 (0.1012)	38138-82100
	2.59 (0.1020)	38139-82100
Available drive pinion bearing adjusting spacers	Thickness mm (in)	Part number*
	4.50 (0.1772)	38165-76000
	4.75 (0.1870)	38166-76000
	5.00 (0.1969)	38167-76000
	5.25 (0.2067)	38166-01J00
	5.50 (0.2165)	38166-01J10

*: Always check with the Parts Department for the latest parts information.

NOTES

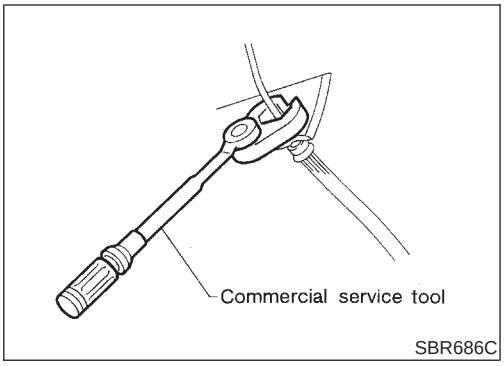
FRONT & REAR AXLE

SECTION AX

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SBR686C

Precautions

PRECAUTIONS

NAAX0001

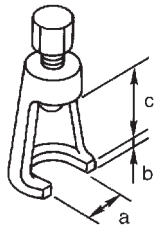
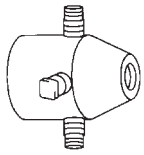
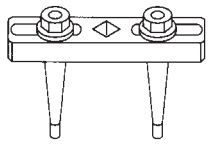
- **When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground. *Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**
- **Use flare nut wrench when removing and installing brake tubes.**
- **After installing removed suspension parts, check wheel alignment and adjust if necessary.**
- **Always torque brake lines when installing.**

Preparation

SPECIAL SERVICE TOOLS

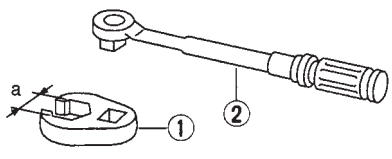
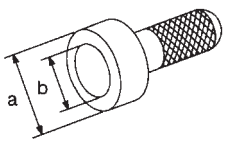
NAAX0002

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
ST29020001 (J24319-01) Ball joint remover	 NT694	Removing tie-rod outer end and lower ball joint **a: 34 mm (1.34 in)** **b: 6.5 mm (0.256 in)** **c: 61.5 mm (2.421 in)**
KV401021S0 (—) Bearing race drift	 NT153	Installing wheel bearing outer race
KV40105400 (J36001) Wheel bearing lock nut wrench	 NT154	Removing and installing wheel bearing lock nut

COMMERCIAL SERVICE TOOLS

NAAX0003

Tool name	Description	
1 Flare nut crowfoot 2 Torque wrench	 NT360	Removing and installing each brake piping **a: 10 mm (0.39 in)**
Hub cap drift	 NT115	Installing hub cap (2WD) **a: 85 mm (3.35 in) dia.** **b: 72 mm (2.83 in) dia.** Installing hub cap (4WD) **a: 57 mm (2.24 in) dia.** **b: 46 mm (1.81 in) dia.**

Noise, Vibration and Harshness (NVH) Troubleshooting

NAAX0034

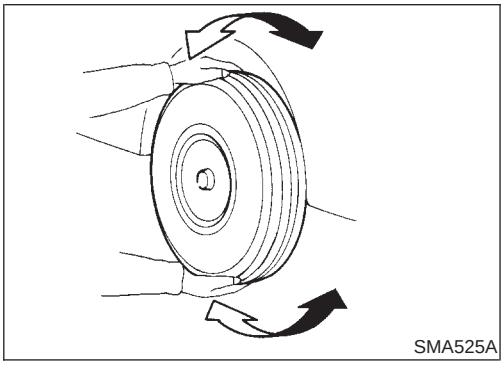
NVH TROUBLESHOOTING CHART

NAAX0034S01

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

		Reference page	—	AX-14	—	AX-6, 20	—	AX-4, 19	PD-4	PD-4	Refer to DRIVE SHAFT in this chart.	Refer to AXLE in this chart.	SU-3	SU-3	SU-3	BR-6	ST-6
		Possible cause and SUSPECTED PARTS	Excessive joint angle	Joint sliding resistance	Imbalance	Improper installation, looseness	Parts interference	Wheel bearing damage	PROPELLER SHAFT	DIFFERENTIAL	DRIVE SHAFT	AXLE	SUSPENSION	TIRES	ROAD WHEEL	BRAKES	STEERING
Symptom	DRIVE SHAFT	Noise, Vibration	×	×					×	×		×	×	×	×	×	×
		Shake	×		×				×			×	×	×	×	×	×
	AXLE	Noise				×	×		×	×	×		×	×	×	×	×
		Shake				×	×		×		×		×	×	×	×	×
		Vibration				×	×		×		×		×	×			×
		Shimmy				×	×						×	×	×	×	×
		Judder				×							×	×	×	×	×
		Poor quality ride or handling				×	×	×					×	×	×		

×: Applicable


SMA525A

On-vehicle Service

FRONT AXLE PARTS

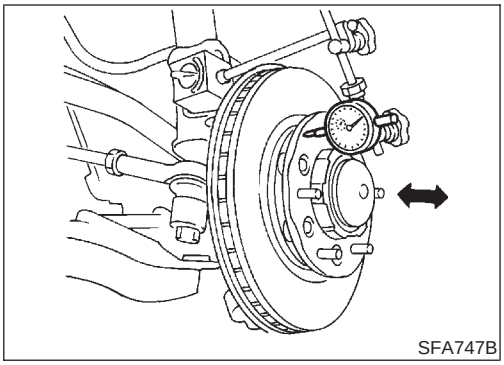
NAAX0004

Check front axle parts for excessive play, cracks, wear and other damage.

1. Shake each front wheel to check for excessive play.
2. Retighten all nuts and bolts to the specified torque.

Tightening torque:

Refer to “Wheel Hub and Rotor Disc”, AX-6.


SFA747B

FRONT WHEEL BEARING

NAAX0005

1. Check that wheel bearings operate smoothly.
2. Check axial end play.

   Axial end play: 0 mm (0 in)
3. Adjust wheel bearing preload if there is any axial end play or wheel bearing does not turn smoothly.

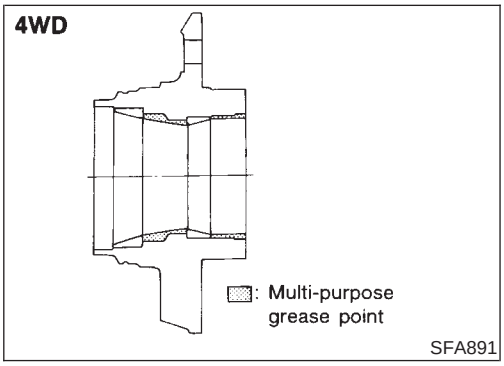
Preload Adjustment

NAAX0005S01

Adjust wheel bearing preload after wheel bearing has been replaced or front axle has been reassembled.

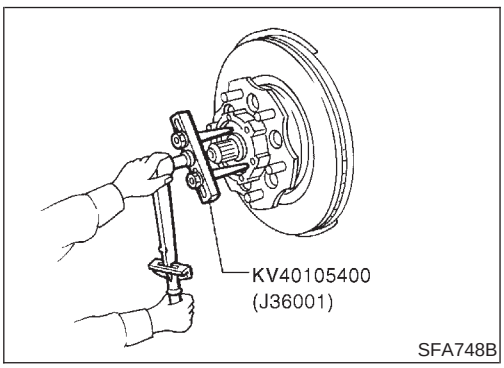
Adjust wheel bearing preload as follows:

1. Before adjustment, thoroughly clean all parts to prevent dirt entry.



SFA891

2. Apply multi-purpose grease sparingly to the following parts:
- Threaded portion of spindle
- Contact surface between wheel bearing lock washer (chamfered side) and outer wheel bearing
- Grease seal lip
- Wheel hub (as shown at left) — 4WD —

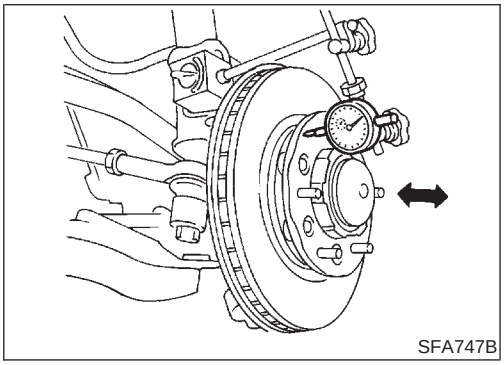


SFA748B

3. Tighten wheel bearing lock nut with Tool.

   : 78 - 98 N·m (8 - 10 kg-m, 58 - 72 ft-lb)
4. Turn wheel hub several times in both directions.
5. Loosen wheel bearing lock nut so that torque becomes 0 N·m (0 kg-m, 0 ft-lb).
6. Retighten wheel bearing lock nut with Tool.

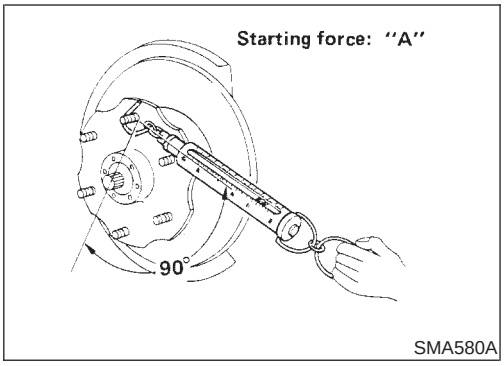
   : 0.5 - 1.5 N·m (0.05 - 0.15 kg-m, 4.3 - 13.0 in-lb)


SFA747B

7. Turn wheel hub several times in both directions.
8. Retighten wheel bearing lock nut with Tool.

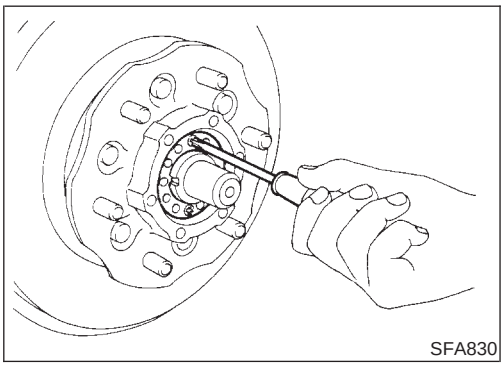
   : 0.5 - 1.5 N·m (0.05 - 0.15 kg-m, 4.3 - 13.0 in-lb)
9. Measure wheel bearing axial end play.

   Axial end play: 0 mm (0 in)



SMA580A

10. Measure starting force "A" at wheel hub bolt.

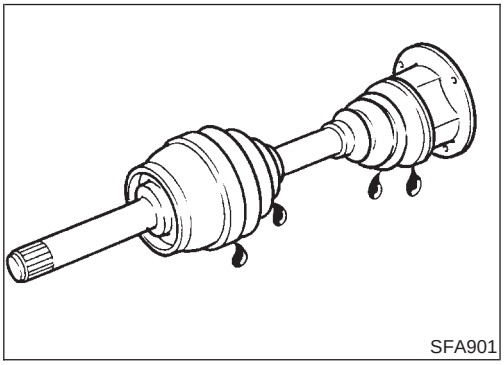

SFA830

11. Install lock washer by tightening the lock nut within 15 to 30 degrees.
12. Turn wheel hub several times in both directions to seat wheel bearing correctly.
13. Measure starting force "B" at wheel hub bolt. Refer to procedure 10.
14. Wheel bearing preload "C" can be calculated as shown below.

    C = B − A

    Wheel bearing preload "C":

    7.06 - 20.99 N (0.72 - 2.14 kg, 1.59 - 4.72 lb)
15. If wheel bearing preload "C" is outside specifications, remove lock washer. Tighten or loosen lock nut within ±15 degrees (Refer to step 11 above). Install lock washer, then repeat steps 12, 13 and 14.
16. Repeat above procedures until correct axial end play and wheel bearing preload are obtained.
17. Install drive flange (4WD models) and wheel hub cap.


SFA901

DRIVE SHAFT

NAAX0006

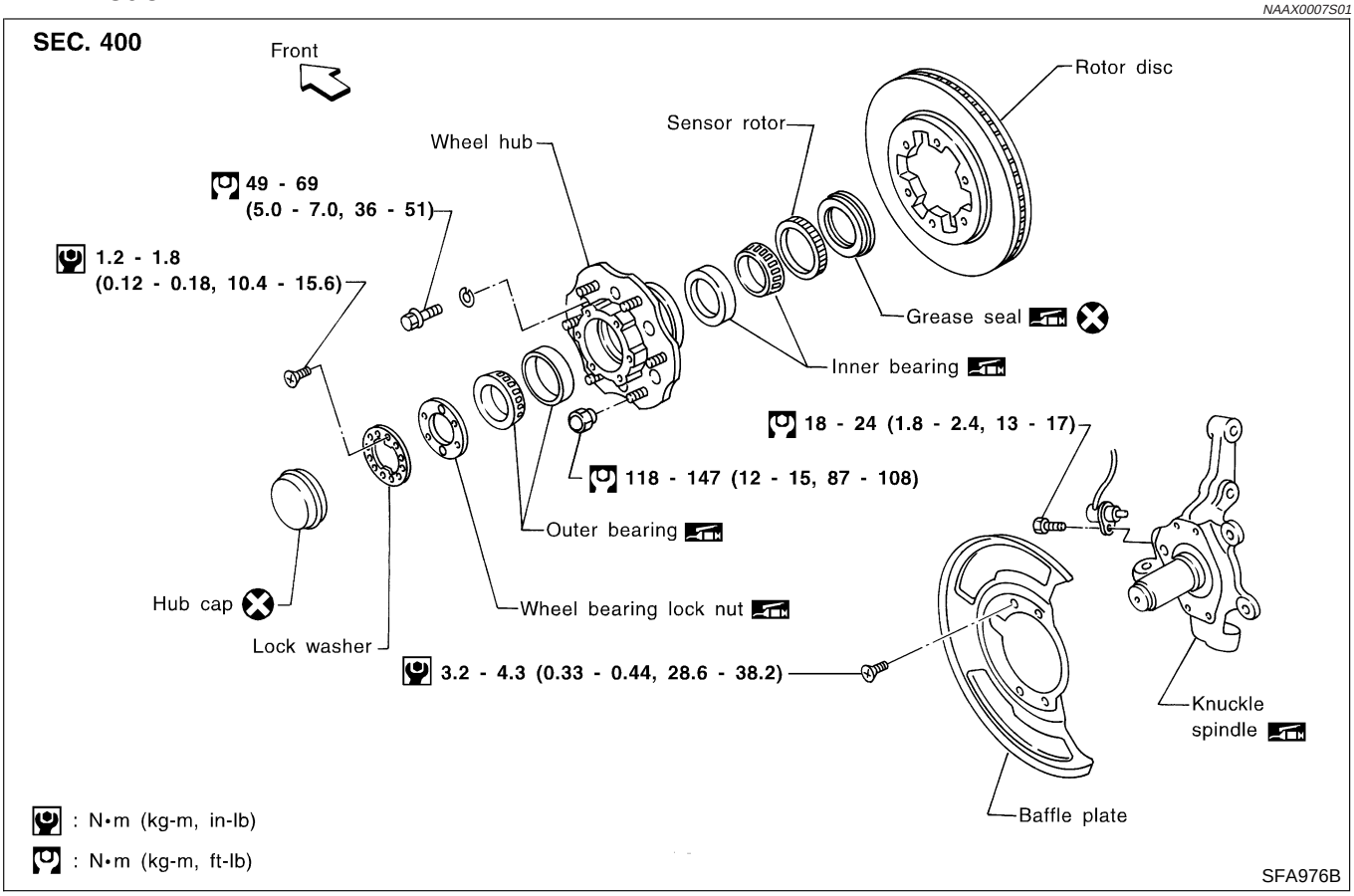
- Check boot and drive shaft for cracks, wear, damage and grease leakage.

Wheel Hub and Rotor Disc

COMPONENTS
2WD Model

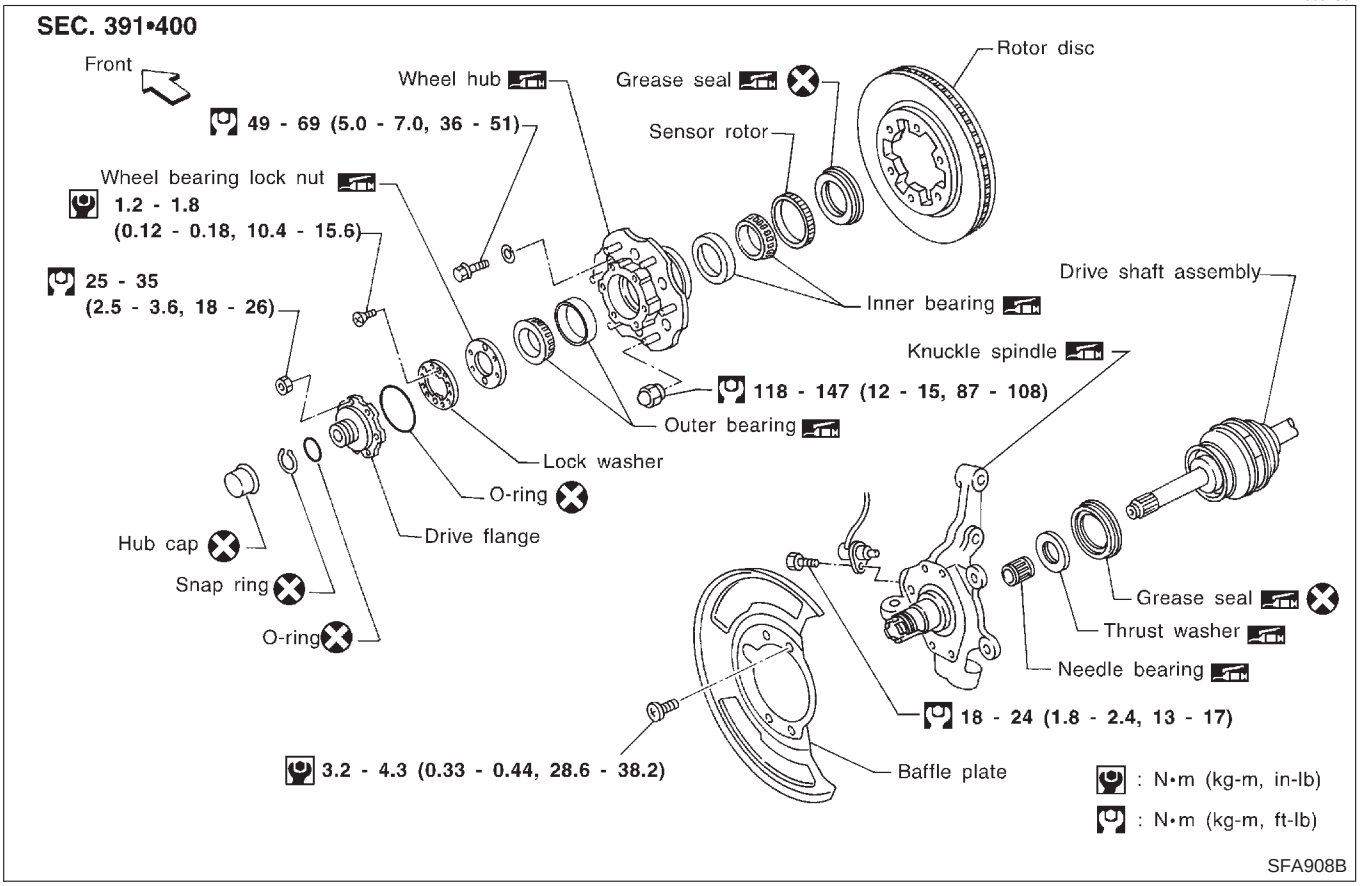
NAAX0007

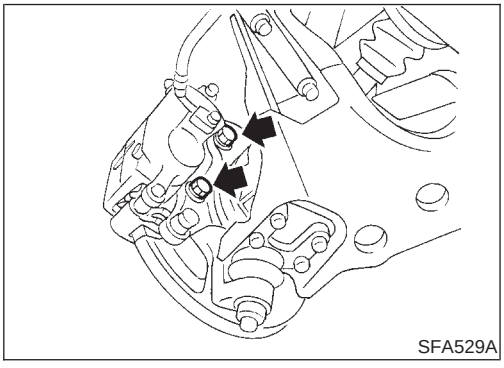
NAAX0007S01



4WD Model

NAAX0007S02





REMOVAL

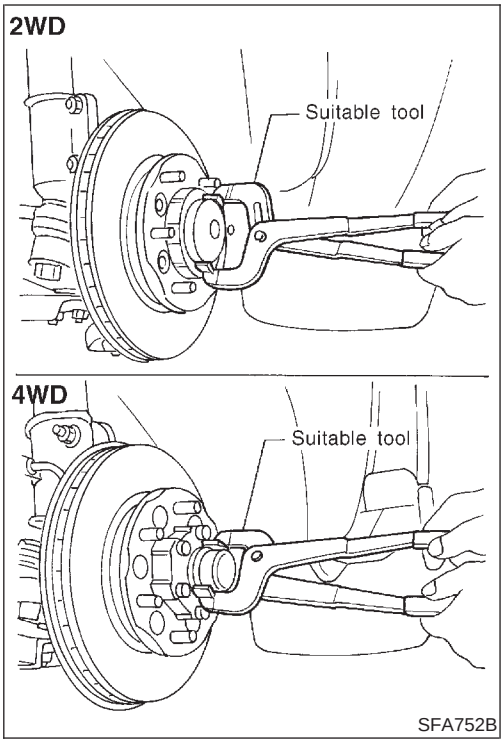
NAAX0008

CAUTION:

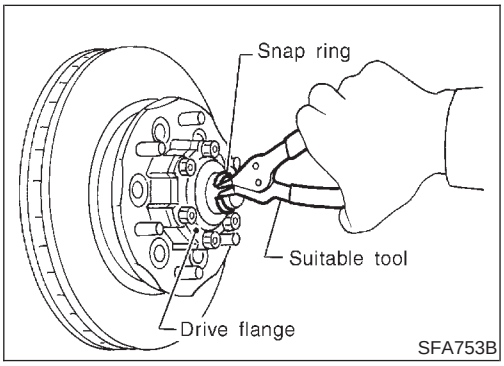
Before removing the front axle assembly, disconnect the ABS wheel sensor from the assembly. Then move it away from the front axle assembly area. Failure to do so may result in damage to the sensor wires and the sensor becoming inoperative.

1. Remove brake caliper assembly.

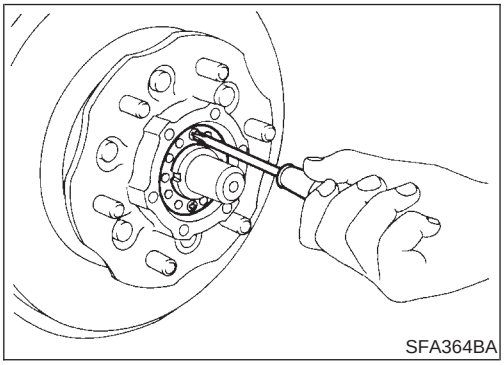
Brake hose need not be disconnected from brake caliper. In this case, suspend caliper assembly with wire so as not to stretch brake hose.
Be careful not to depress brake pedal, or piston will pop out. Make sure brake hose is not twisted.



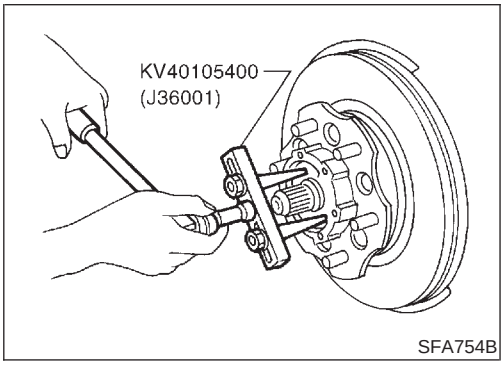
2. Remove hub cap with suitable tool.



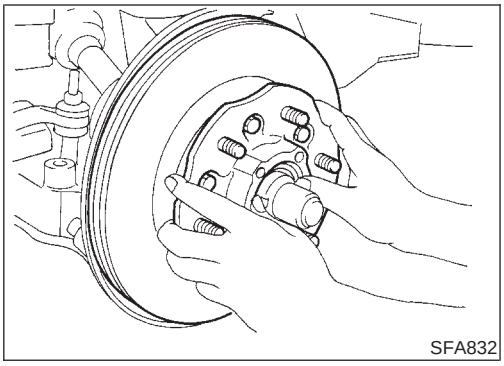
3. Remove snap ring with suitable tool. — 4WD —
4. Remove drive flange. — 4WD —



5. Remove lock washer.



6. Remove wheel bearing lock nut.

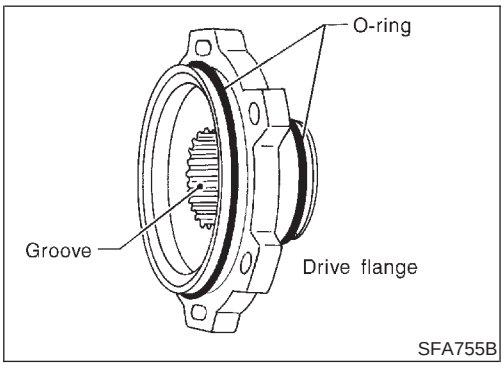

SFA832

7. Remove wheel hub and wheel bearing.
Be careful not to drop outer bearing.

INSTALLATION

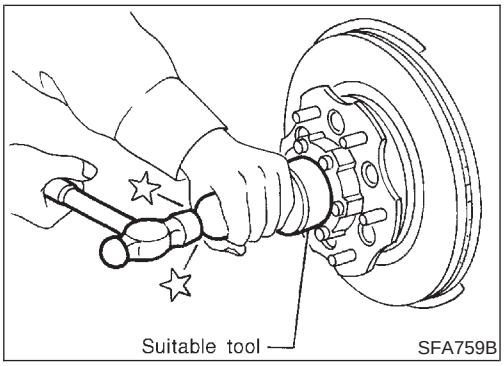
NAAX0009

1. After installing wheel hub and wheel bearing, adjust wheel bearing preload.
Refer to "Preload Adjustment", "FRONT WHEEL BEARING", "On-vehicle Service", AX-4.



SFA755B

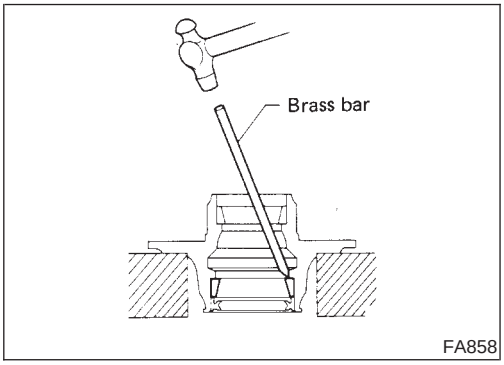
2. Pack drive flange groove with grease, apply grease to O-ring (two places) and mating surface of drive flange, and install flange. — 4WD —
3. Install snap ring. — 4WD —



SFA759B

4. Install hub cap using a suitable tool.

Do not reuse hub cap. When installing, replace it with a new one.



FA858

DISASSEMBLY

NAAX0010

- Remove grease seal and bearing outer races with suitable brass bar.

INSPECTION

NAAX0011

Thoroughly clean wheel bearings and wheel hub.

Wheel Bearing

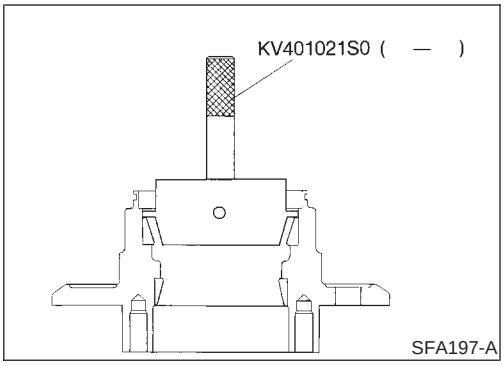
NAAX0011S01

- Make sure wheel bearing rolls freely and is free from noise, crack, pitting and wear.

Wheel Hub

NAAX0011S02

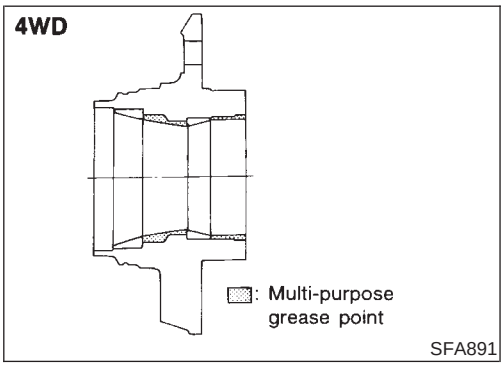
- Check wheel hub for crack by using a magnetic exploration or dyeing test.



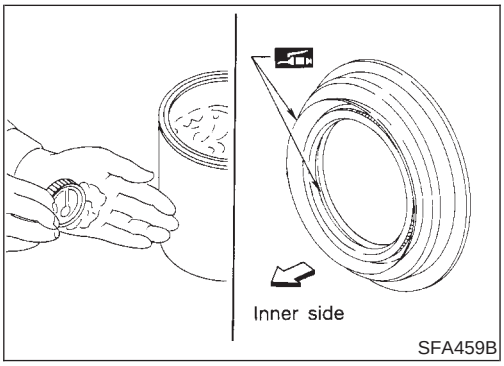
ASSEMBLY

NAAX0012

1. Install bearing outer race with Tool until it seats in hub.



2. Pack multi-purpose grease into wheel hub. — 4WD —



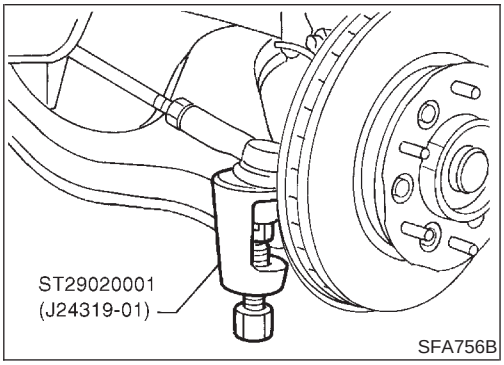
3. Apply multi-purpose grease to each bearing cone.
4. Pack grease seal lip with multi-purpose grease, then install it into wheel hub with suitable drift.

Knuckle Spindle

REMOVAL

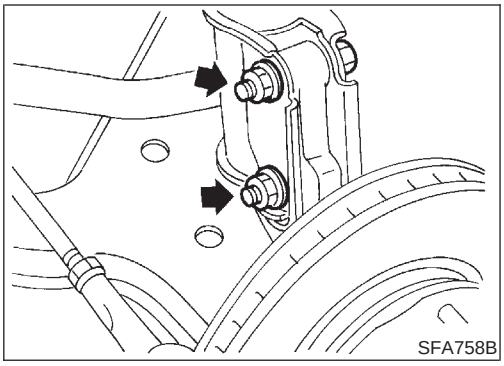
NAAX0013

1. Remove drive shaft. — 4WD —
   Refer to "Drive Shaft", AX-12.



2. Separate tie-rod end and lower ball joint from knuckle with Tool.

Install stud nut conversely on stud bolt so as not to damage stud bolt.


SFA758B

3. Separate knuckle from strut.

INSPECTION

NAAX0014

Knuckle Spindle

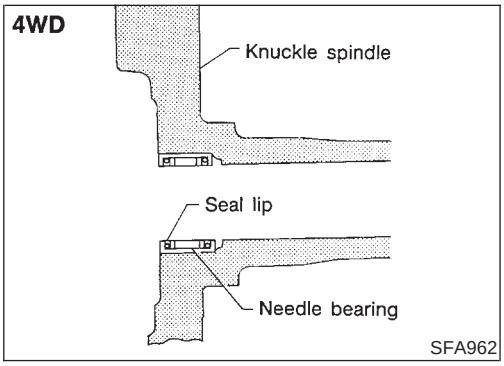
NAAX0014S01

- Check knuckle spindle for deformation, cracks and other damage by using a magnetic exploration or dyeing test.

Needle Bearing — 4WD —

NAAX0014S02

- Check needle bearing for wear, scratches, pitting, flaking and burn marks.



SFA962

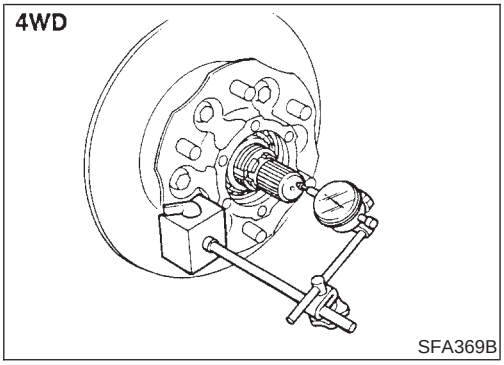
INSTALLATION

NAAX0015

1. Install needle bearing into knuckle spindle. — 4WD —

Make sure that needle bearing is facing in proper direction.
Apply multi-purpose grease.

2. Install knuckle with wheel hub.
3. Install tie-rod end and lower ball joint.



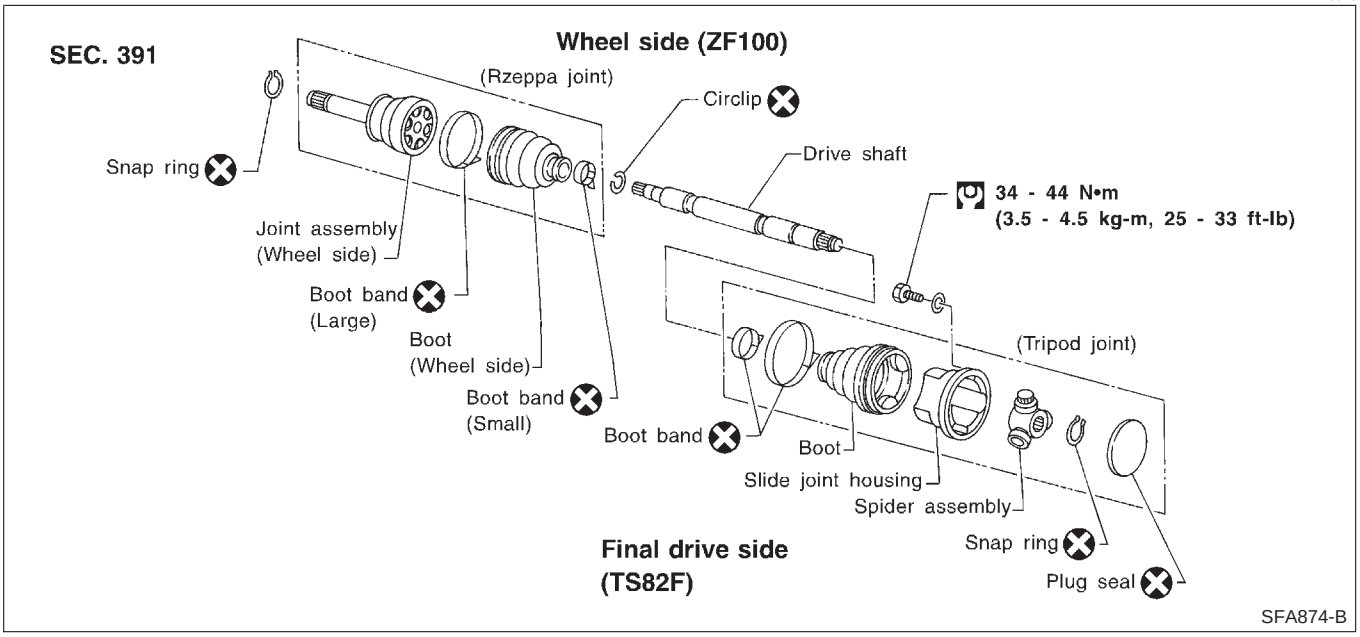
SFA369B

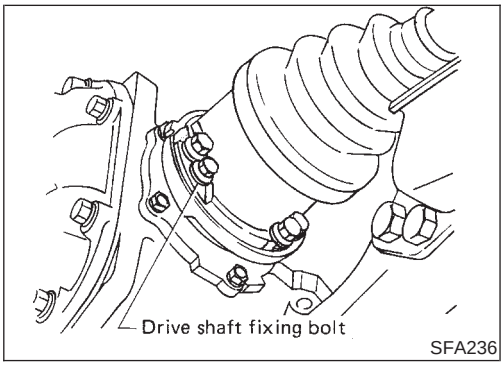
4. After installing knuckle spindle, adjust wheel bearing preload. Refer to "Preload Adjustment", "FRONT WHEEL BEARING", "On-vehicle Service", AX-4.
5. After installing drive shaft, check drive shaft axial end play. **Do not reuse snap ring once it has been removed.** Refer to "Drive Shaft", AX-12.

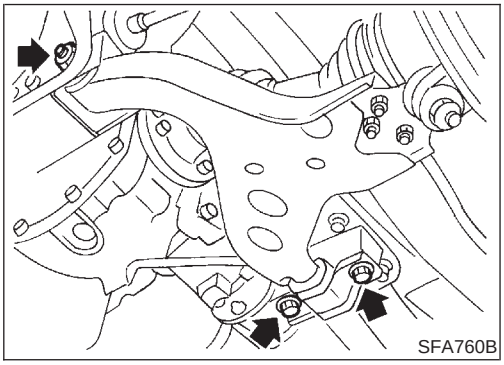
Drive Shaft

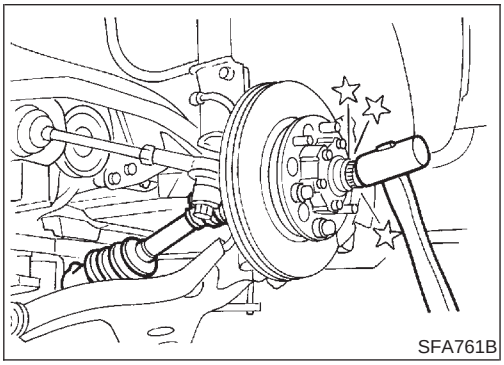
COMPONENTS

NAAX0016







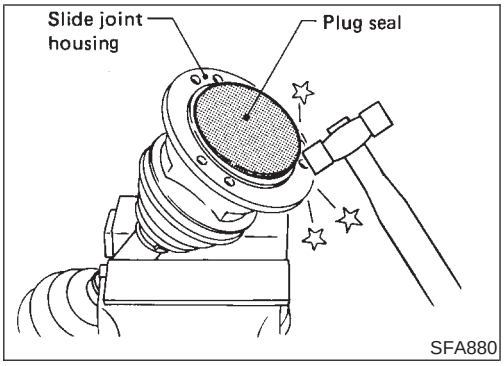


REMOVAL

NAAX0017

1. Remove hub cap and snap ring.
   Refer to “REMOVAL”, “Wheel Hub and Rotor Disc”, AX-7.
2. Remove bolts fixing drive shaft to final drive.
3. Remove transverse link fixing nut and bolts.
4. Separate drive shaft from knuckle by lightly tapping it with a copper hammer.

Cover boots with shop towel so as not to damage them when removing drive shaft.



SFA880

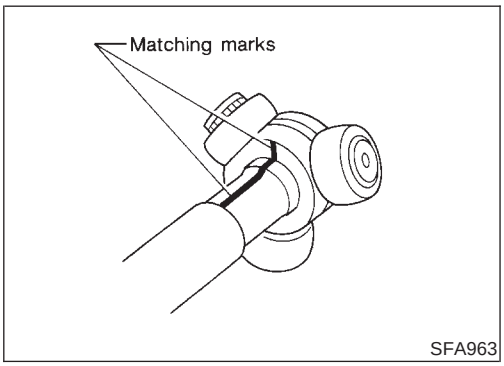
DISASSEMBLY

NAAX0018

Final Drive Side (TS82F)

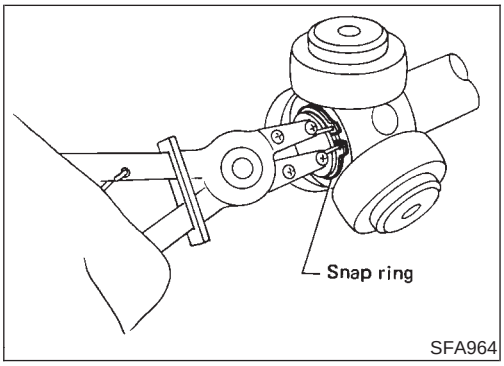
NAAX0018S01

1. Remove plug seal from slide joint housing by lightly tapping around slide joint housing.
2. Remove boot bands.



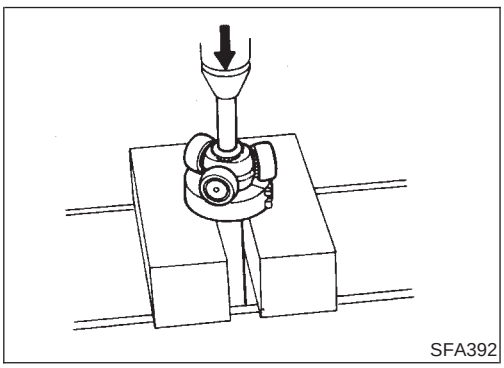
SFA963

3. Move boot and slide joint housing toward wheel side, and put matching marks.

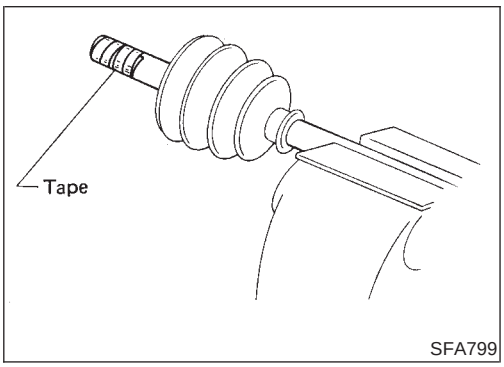


SFA964

4. Remove snap ring.


SFA392

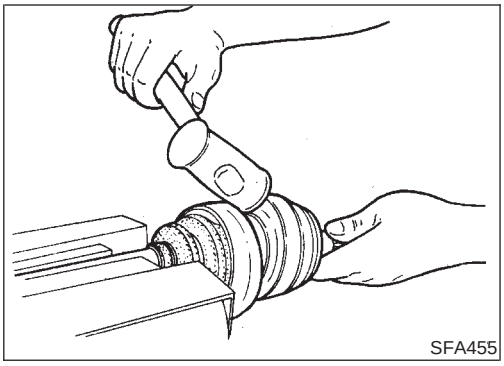
5. Detach spider assembly with press.



SFA799

6. Draw out boot.

Cover drive shaft serration with tape so as not to damage the boot.


SFA455

Wheel Side (ZF100)

NAAX0018S02

CAUTION:

The joint on the wheel side cannot be disassembled.

- Before separating joint assembly, put matching marks on drive shaft and joint assembly.
- Separate joint assembly with suitable tool.

Be careful not to damage threads on drive shaft.

- Remove boot bands.

INSPECTION

NAAX0019

Thoroughly clean all parts in cleaning solvent, and dry with compressed air. Check parts for evidence of deformation and other damage.

Drive Shaft

NAAX0019S01

Replace drive shaft if it is twisted or cracked.

Boot

NAAX0019S02

Check boot for fatigue, cracks, and wear. Replace boot with new boot bands.

Joint Assembly (Final drive side)

NAAX0019S03

- Replace any parts of double offset joint which show signs of scorching, rust, wear or excessive play.
- Check serration for deformation. Replace if necessary.
- Check slide joint housing for any damage. Replace if necessary.

Joint Assembly (Wheel side)

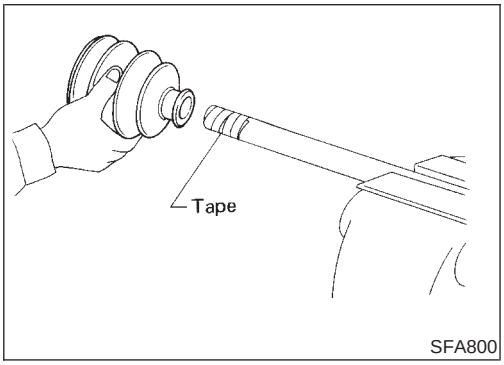
NAAX0019S04

Replace joint assembly if it is deformed or damaged.

ASSEMBLY

NAAX0020

- **After drive shaft has been assembled, ensure that it moves smoothly over its entire range without binding.**
- **Use NISSAN GENUINE GREASE or equivalent after every overhaul.**



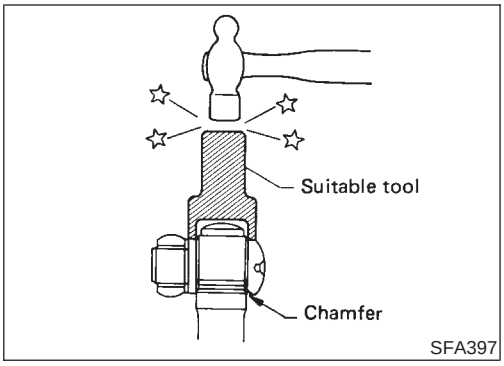
SFA800

Final Drive Side (TS82F)

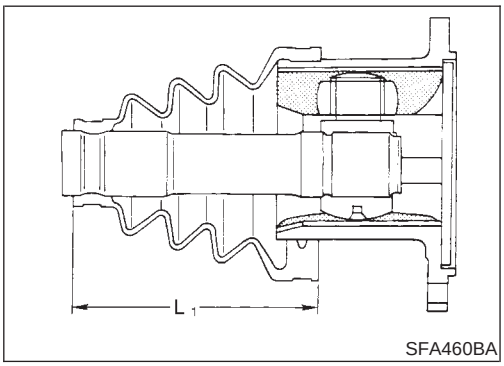
NAAX0020S01

1. Install new small boot band, boot and side joint housing to drive shaft.

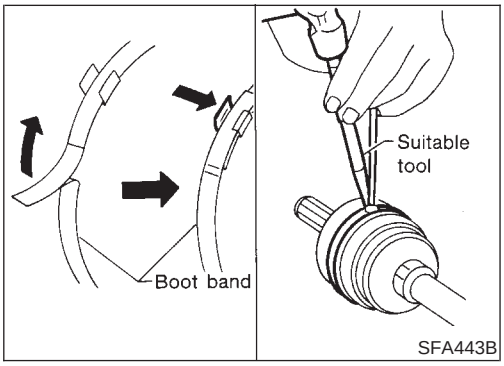
Cover drive shaft serration with tape so as not to damage boot during installation.



2. Install spider assembly securely, ensuring marks are properly aligned.
- **Press-fit with spider assembly serration chamfer facing shaft.**
3. Install new snap ring.



4. Pack with grease.
   Specified amount of grease:
   95 - 105 g (3.35 - 3.70 oz)
5. Make sure that boot is properly installed on the drive shaft groove. Set boot so that it does not swell and deform when its length is "L_1".
   Length "L_1": 95 - 97 mm (3.74 - 3.82 in)



6. Lock new larger boot band securely with a suitable tool, then lock new smaller boot band.
7. Install new plug seal to slide joint housing by lightly tapping it.

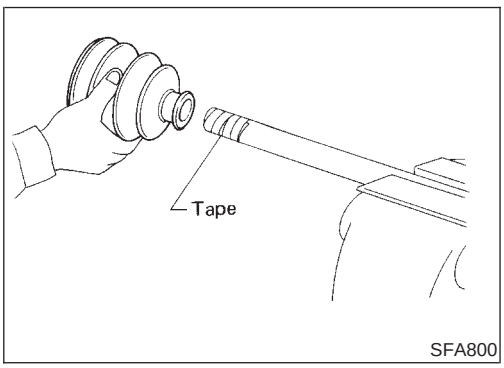
Apply sealant to mating surface of plug seal.

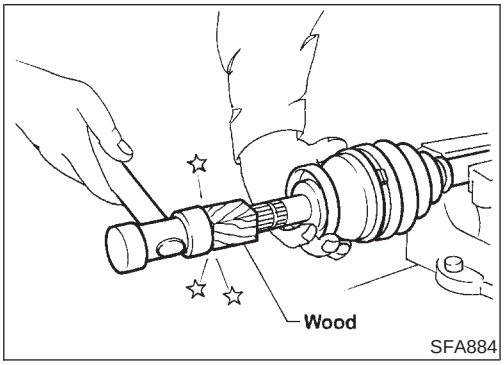
Wheel Side (ZF100)

NAAX0020S02

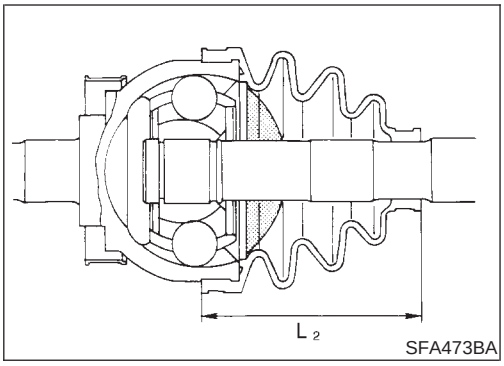
1. Install new small boot band and boot on drive shaft.

Cover drive shaft serration with tape so as not to damage boot during installation.





2. Set joint assembly onto drive shaft by lightly tapping it. Install joint assembly securely, ensuring marks which were made during disassembly are properly aligned.

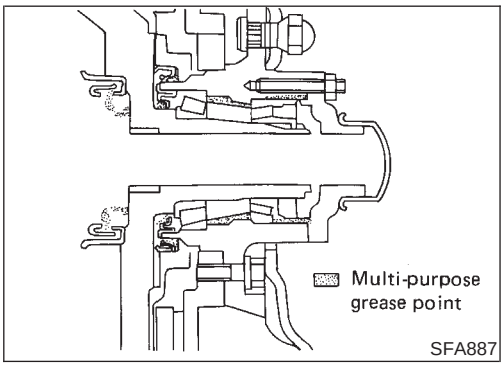


3. Pack drive shaft with specified amount of grease.
   Specified amount of grease:
   135 - 145 g (4.76 - 5.11 oz)
4. Make sure that boot is properly installed on the drive shaft groove. Set boot so that it does not swell and deform when its length is "L_2".
   Length "L_2": 96 - 98 mm (3.78 - 3.86 in)
5. Lock new larger boot band securely with a suitable tool.
6. Lock new smaller boot band.

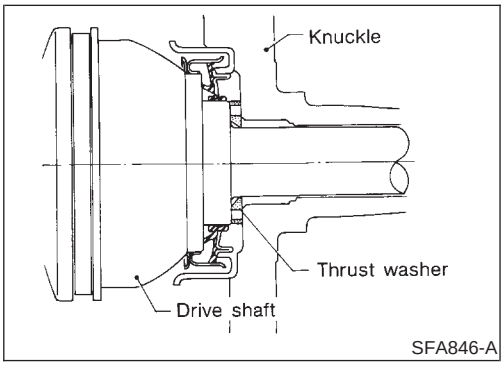
INSTALLATION

NAAX0021

1. Apply multi-purpose grease.

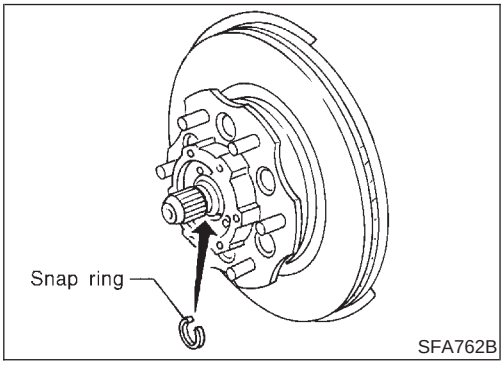


2. Install thrust washer onto drive shaft.
   Make sure that thrust washer is facing in proper direction, apply multi-purpose grease.

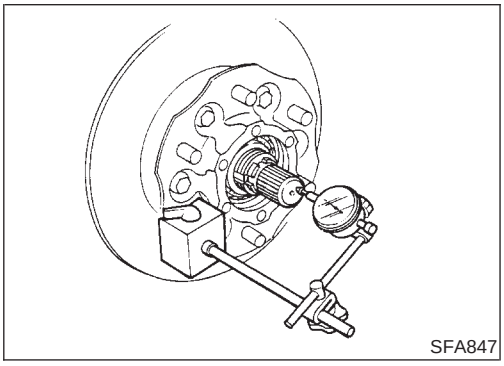


3. When installing drive shaft, adjust drive shaft axial end play by selecting a suitable snap ring.

a. Temporarily install new snap ring on drive shaft in the same thickness as it was installed before removal.



b. Set dial gauge on drive shaft end.
c. Measure axial end play of drive shaft.
   Axial end play: 0.45 mm (0.0177 in) or less
d. If axial end play is not within the specified limit, select another snap ring.



1.1 mm (0.043 in)	**1.9 mm (0.075 in)**
1.3 mm (0.051 in)	**2.1 mm (0.083 in)**
1.5 mm (0.059 in)	**2.3 mm (0.091 in)**
1.7 mm (0.067 in)	

Service Data and Specifications (SDS)

WHEEL BEARING (FRONT)

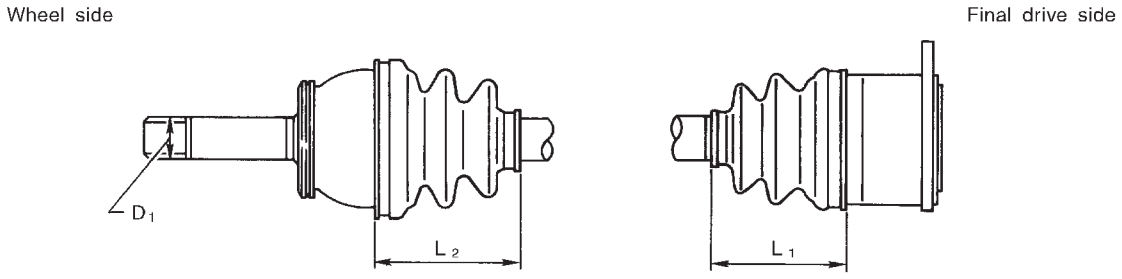
NAAX0022

Wheel bearing lock nut	Tightening torque	78 - 98 N·m (8 - 10 kg-m, 58 - 72 ft-lb)
	Retightening torque after loosening wheel bearing lock nut	0.5 - 1.5 N·m (0.05 - 0.15 kg-m, 4.3 - 13.0 in-lb)
	Axial end play	0 mm (0 in)
	Starting force at wheel hub bolt N (kg, lb)	A
	Turning angle	15° - 30°
	Starting force at wheel hub bolt N (kg, lb)	B
Wheel bearing preload at wheel hub bolt	B − A	7.06 - 20.99 N (0.72 - 2.14 kg, 1.59 - 4.72 lb)

DRIVE SHAFT (4WD)

NAAX0033

Drive shaft joint type	Final drive side		TS82F
	Wheel side		ZF100
	Fixed joint axial end play limit		1 mm (0.04 in)
Diameter	Wheel side (D_1)		29.0 mm (1.142 in)
Grease	Quality		Nissan genuine grease or equivalent
	Specified amount of grease	Final drive side	95 - 105 g (3.35 - 3.70 oz)
		Wheel side	135 - 145 g (4.76 - 5.11 oz)
Drive shaft axial end play			0.45 mm (0.0177 in) or less
Boot length	Final drive side (L_1)		95 - 97 mm (3.74 - 3.82 in)
	Wheel side (L_2)		96 - 98 mm (3.78 - 3.86 in)

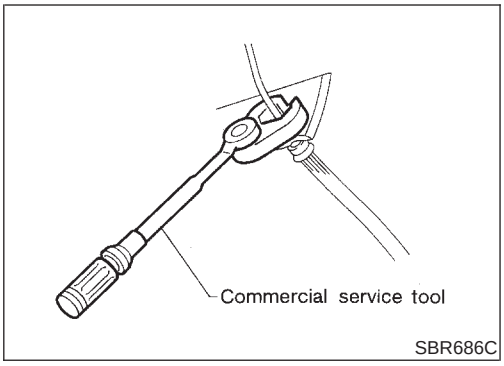


SAX001

Drive Shaft End Snap Ring

NAAX0033S01

Thickness mm (in)	Part No.	Thickness mm (in)	Part No.
1.1 (0.043)	39253-88G10	1.9 (0.075)	39253-88G14
1.3 (0.051)	39253-88G11	2.1 (0.083)	39253-88G15
1.5 (0.059)	39253-88G12	2.3 (0.091)	39253-88G16
1.7 (0.067)	39253-88G13		



SBR686C

Precautions

PRECAUTIONS

NAAX0023

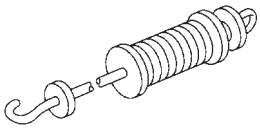
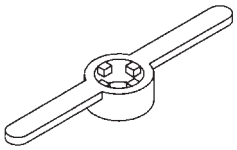
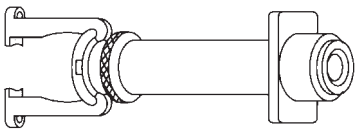
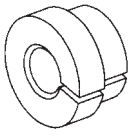
- **When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground. *Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**
- **Use flare nut wrench when removing and installing brake tubes.**
- **After installing removed suspension parts, check wheel alignment and adjust if necessary.**
- **Always torque brake lines when installing.**

Preparation

SPECIAL SERVICE TOOLS

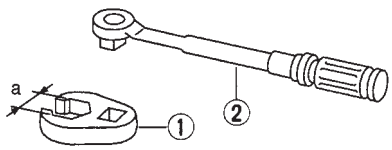
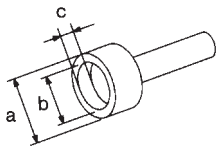
NAAX0024

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
KV40101000 (J25604-01) Axle stand	 NT159	Removing rear axle shaft
ST36230000 (J25840-A) Sliding hammer	 NT126	Removing rear axle shaft
ST38020000 (—) Bearing lock nut wrench	 NT160	Removing wheel bearing lock nut
HT72480000 or HT72210000 (J25852-B) Rear axle shaft bearing puller	 NT161	Removing wheel bearing
ST37840000 (—) Rear axle shaft guide	 NT162	Installing rear axle shaft

COMMERCIAL SERVICE TOOLS

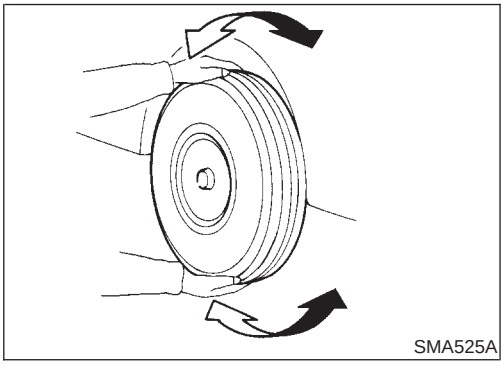
NAAX0025

Tool name	Description	
1 Flare nut crowfoot 2 Torque wrench	 NT360	Removing and installing each brake piping **a: 10 mm (0.39 in)**
Rear axle oil seal drift	 NT163	Installing oil seal **a: 74 mm (2.91 in) dia.** **b: 68 mm (2.68 in) dia.** **c: 10 mm (0.39 in)**

Noise, Vibration and Harshness (NVH) Troubleshooting

NAAX0035

Refer to "Noise, Vibration and Harshness (NVH) Troubleshooting", "FRONT AXLE", AX-3.


SMA525A

On-vehicle Service

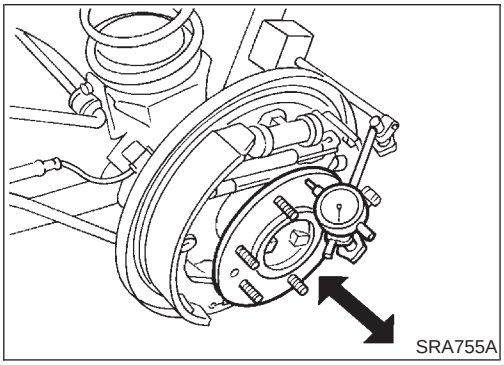
REAR AXLE PARTS

NAAX0026

Check rear axle parts for excessive play, wear and damage.

1. Shake each rear wheel to check for excessive play.
2. Retighten all nuts and bolts to the specified torque.

Tightening torque: Refer to "Components", AX-20.


SRA755A

REAR WHEEL BEARING

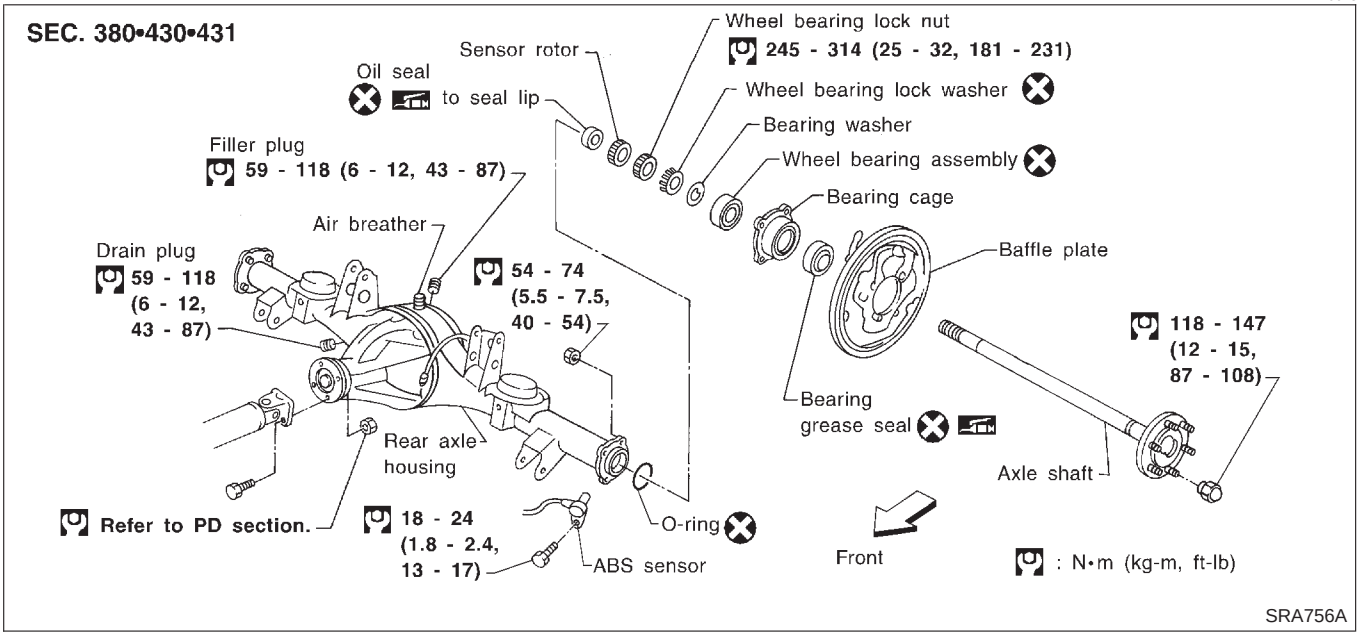
NAAX0027

1. Check that wheel bearings operate smoothly.
2. Check axial end play.

Axial end play:
0 mm (0 in)

Components

NAAX0028



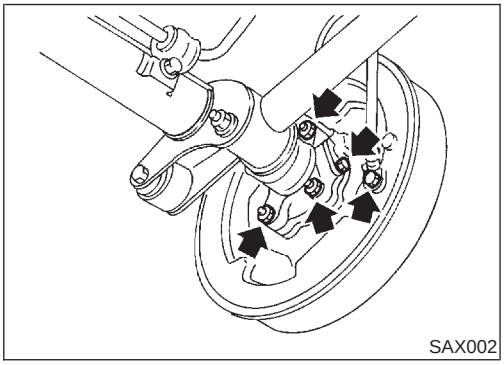
Removal

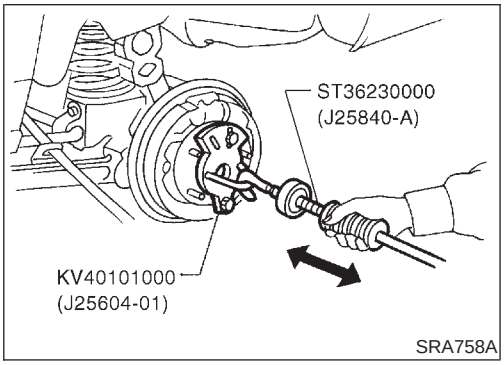
NAAX0029

CAUTION:

- **Before removing the rear axle, disconnect the ABS wheel sensor from the assembly. Then move it away from the axle. Failure to do so may result in damage to the sensor wires and the sensor becoming inoperative.**
- **Wheel bearing does not require maintenance.**
- If growling noise is emitted from wheel bearing during operation, replace wheel bearing assembly.
- If the wheel bearing assembly is removed, it must be renewed. The old assembly must not be re-used.

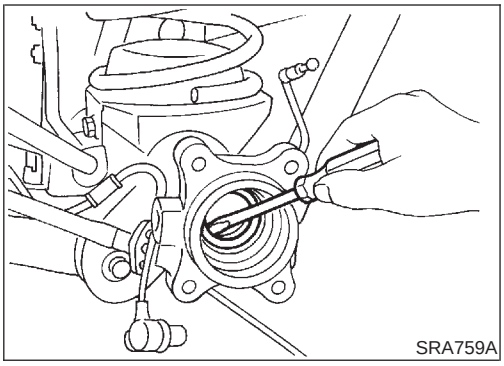
1. Disconnect parking brake cable and brake tube.
2. Remove nuts securing wheel bearing cage with baffle plate.





3. Draw out axle shaft with Tool.

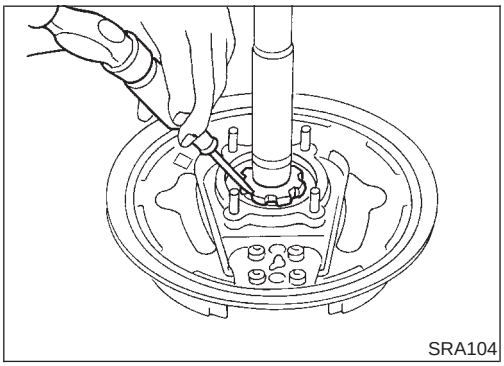
When drawing out axle shaft, be careful not to damage oil seal.


SRA759A

4. Remove oil seal with a screwdriver.

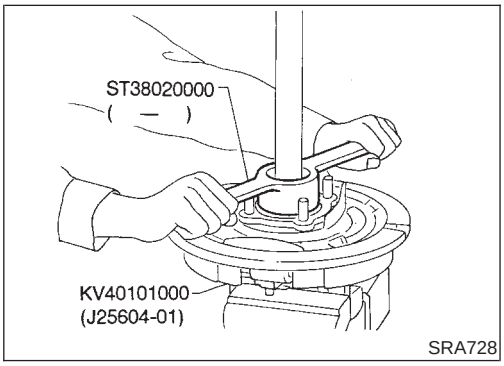
Do not reuse oil seal once it is removed. Always install new one.

5. Remove ABS sensor rotor.


SRA104

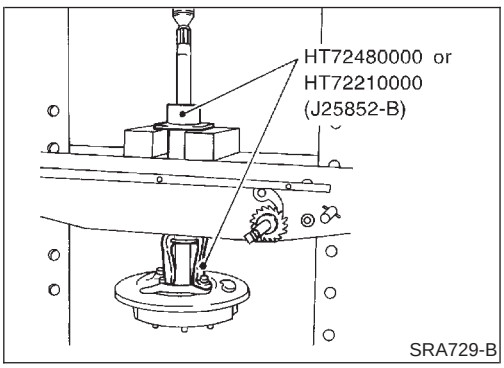
6. Unbend lock washer with a screwdriver.

Do not reuse lock washer once removed. Always install new one.



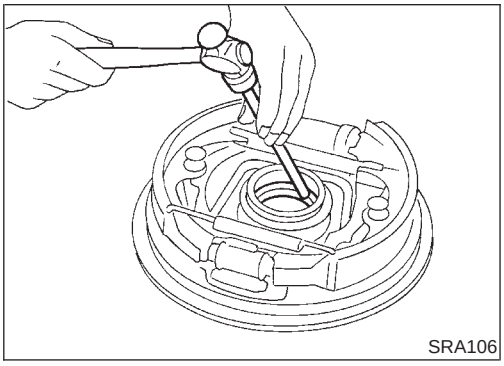
SRA728

7. Remove bearing lock nut with Tool.



SRA729-B

8. Remove wheel bearing together with bearing cage and baffle plate from axle shaft.


SRA106

9. Remove grease seal with a screwdriver.
10. Remove wheel bearing assembly with a brass drift.

Inspection

NAAX0030

AXLE SHAFT

NAAX0030S01

Check axle shaft for straightness, cracks, damage, wear and distortion. Replace if necessary.

BEARING CAGE

NAAX0030S02

Check bearing cage for deformation and cracks. Replace if necessary.

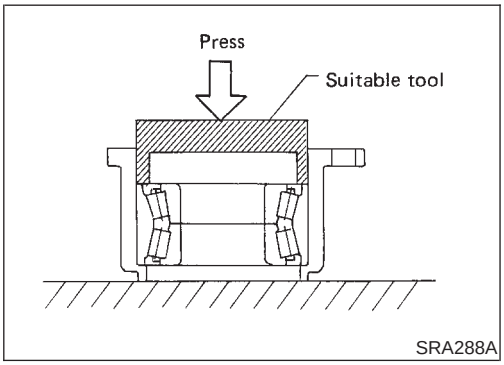
REAR AXLE HOUSING

NAAX0030S03

Check rear axle housing for yield, deformation and cracks. Replace if necessary.

Installation

NAAX0031

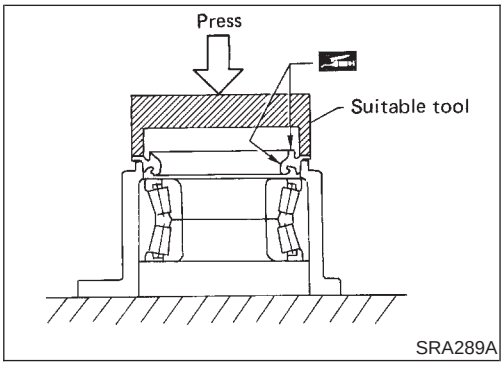


1. Press new wheel bearing until it bottoms end face of bearing cage.

Maximum load P:

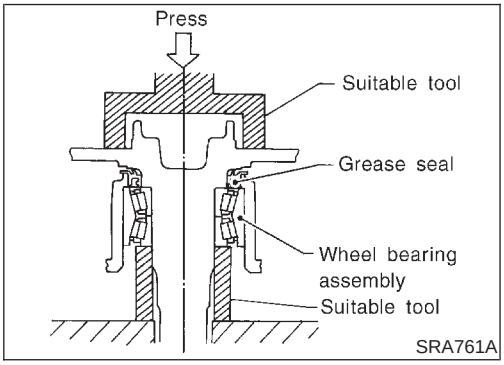
39 kN (4 ton, 4.4 US ton, 3.9 Imp ton)

Always press outer race of wheel bearing during installation.



2. Press new grease seal until it bottoms end face of bearing cage.

After installing new grease seal, coat sealing lip with multi-purpose grease.

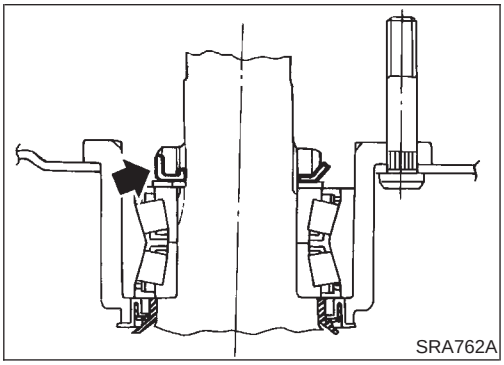


3. Press axle shaft into inner race of wheel bearing.

Maximum load P:

47.1 kN (4.8 ton, 5.3 US ton, 4.72 Imp ton)

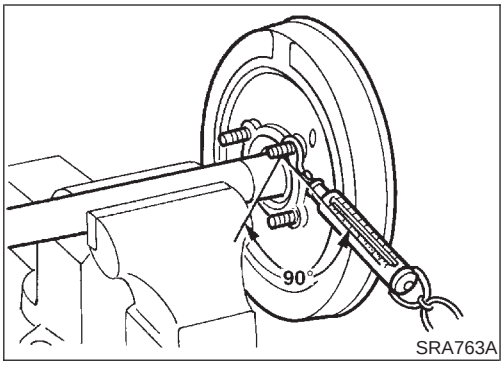
Be careful not to damage and deform grease seal.



4. Install plain washer and a new wheel bearing lock washer.
5. Tighten wheel bearing lock nut to specified torque.

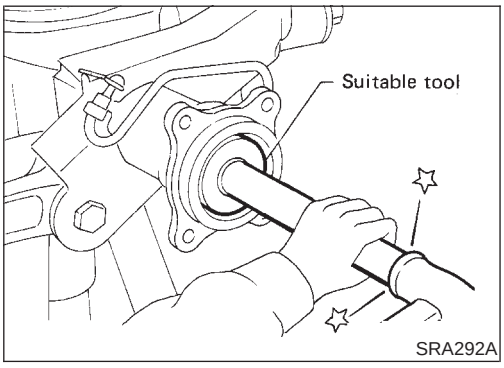
: 245 - 314 N·m (25 - 32 kg-m, 181 - 231 ft-lb)

Fit wheel bearing lock washer lip in wheel bearing lock nut groove correctly by tightening lock nut. Be sure to bend it up.



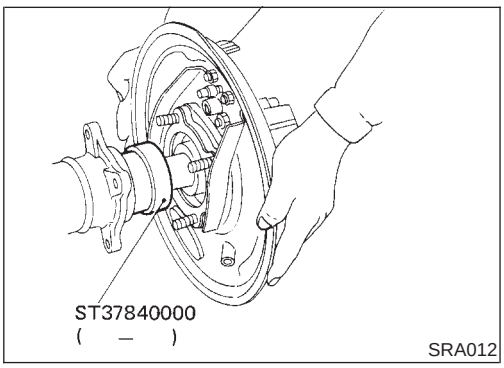
6. Check wheel bearing preload.
a. Turn bearing cage (with respect to axle shaft) two or three times. It must turn smoothly.
b. Attach spring gauge to bearing cage bolt (as shown at left) and pull it at a speed of 10 rpm to measure preload.

Spring gauge indication:
6.9 - 48.1 N (0.7 - 4.9 kg, 1.5 - 10.8 lb)



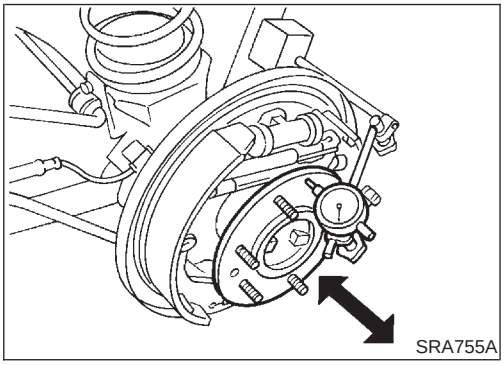
7. Install new oil seal to rear axle housing using a suitable tool.

After installing new oil seal, coat sealing lip with multi-purpose grease.



8. Press ABS sensor rotor onto axle shaft until it contacts wheel bearing lock nut.
9. Position axle shafts in rear axle housing with Tool as a guide.

Be careful not to damage oil seal.



10. Check axial end play.
a. Check that wheel bearings operate smoothly.
b. Check axial end play.

Axial end play:
0 mm (0 in)

Service Data and Specifications (SDS)

WHEEL BEARING (REAR)

NAAX0032

Wheel bearing axial end play	0 mm (0 in)
Wheel bearing lock nut tightening torque	245 - 314 N·m (25 - 32 kg-m, 181 - 231 ft-lb)
Wheel bearing preload measured at bearing cage bolt	6.9 - 48.1 N (0.7 - 4.9 kg, 1.5 - 10.8 lb)

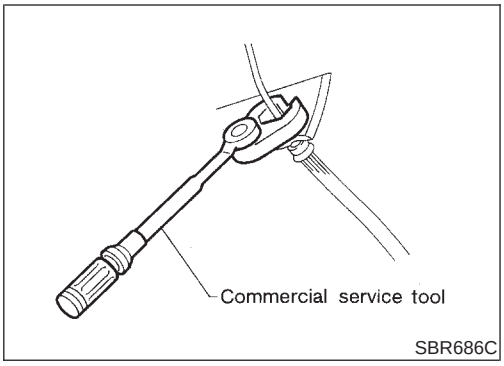
NOTES

FRONT & REAR SUSPENSION

SECTION SU

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SBR686C

Precautions

PRECAUTIONS

NASU0001

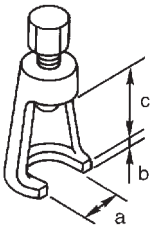
- **When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground. *Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**
- **Use flare nut wrench when removing and installing brake tubes.**
- **After installing removed suspension parts, check wheel alignment and adjust if necessary.**
- **Always torque brake lines when installing.**

Preparation

SPECIAL SERVICE TOOLS

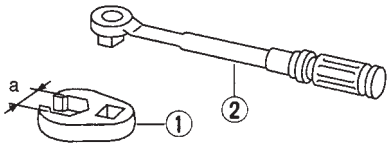
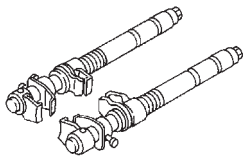
NASU0002

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
ST29020001 (J24319-01) Ball joint remover	 NT694	Removing tie-rod outer end and lower ball joint **a: 34 mm (1.34 in)** **b: 6.5 mm (0.256 in)** **c: 61.5 mm (2.421 in)**

COMMERCIAL SERVICE TOOLS

NASU0003

Tool name	Description	
1 Flare nut crowfoot 2 Torque wrench	 NT360	Removing and installing each brake piping **a: 10 mm (0.39 in)**
Spring compressor	 NT717	Removing and installing coil spring

Noise, Vibration and Harshness (NVH) Troubleshooting

=NASU0035

NVH TROUBLESHOOTING CHART

NASU0035S01

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

		Reference page	SU-4, 18	SU-9, 20	—	—	—	SU-9, 20	SU-7	SU-12, 22	SU-7	—	—	—	—	—	PD-4	PD-4	AX-3	AX-3	Refer to SUSPENSION in this chart.	Refer to TIRES in this chart.	Refer to ROAD WHEEL in this chart.	BR-6	ST-6
		Possible Cause and SUSPECTED PARTS	Improper installation, looseness	Shock absorber deformation, damage or deflection	Bushing or mounting deterioration	Parts interference	Spring fatigue	Suspension looseness	Incorrect wheel alignment	Stabilizer bar fatigue	Out-of-round	Imbalance	Incorrect air pressure	Uneven tire wear	Deformation or damage	Non-uniformity	Incorrect tire size	PROPELLER SHAFT	DIFFERENTIAL	DRIVE SHAFT	AXLE	SUSPENSION	TIRES	ROAD WHEEL	BRAKES	STEERING
Symptom	SUSPENSION	Noise	×	×	×	×	×	×										×	×	×	×		×	×	×	×
		Shake	×	×	×	×		×										×		×	×		×	×	×	×
		Vibration	×	×	×	×	×											×		×	×		×			×
		Shimmy	×	×	×	×			×												×		×	×	×	×
		Judder	×	×	×																×		×	×	×	×
		Poor quality ride or handling	×	×	×	×	×		×	×											×		×	×		
	TIRES	Noise	×								×	×	×	×	×	×		×	×	×	×	×		×	×	×
		Shake	×								×	×	×	×	×		×	×		×	×	×		×	×	×
		Vibration											×				×	×		×	×	×				×
		Shimmy	×								×	×	×	×	×	×	×				×	×		×	×	×
		Judder	×								×	×	×	×	×		×				×	×		×	×	×
		Poor quality ride or handling	×								×	×	×	×	×		×				×	×		×		
	ROAD WHEEL	Noise	×								×	×			×			×	×	×	×	×	×		×	×
		Shake	×								×	×			×			×		×	×	×	×		×	×
		Shimmy, Judder	×								×	×			×						×	×	×		×	×
		Poor quality ride or handling	×								×	×			×						×	×	×			

×: Applicable

Components

NASU0004

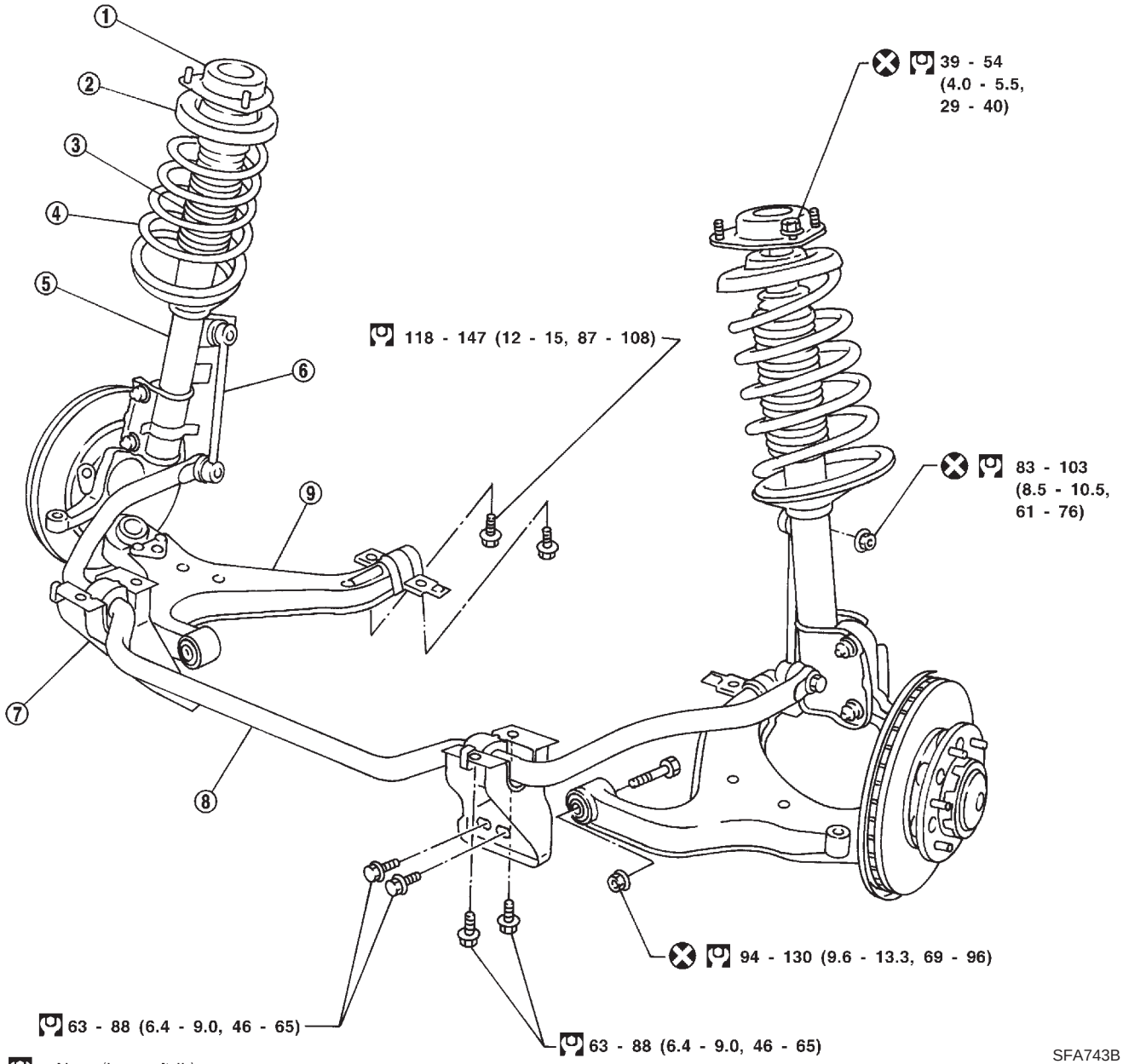
2WD

NASU0004S01

SEC. 400•401

When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.

*** Fuel, radiator coolant and engine oil full.**
Spare tire, jack, hand tools and mats in designated positions.



SFA743B

: N•m (kg-m, ft-lb)

1. Strut mounting insulator
2. Spring upper seat
3. Bound bumper
4. Coil spring
5. Strut assembly
6. Stabilizer connecting rod
7. Bracket
8. Stabilizer bar
9. Transverse link

4WD

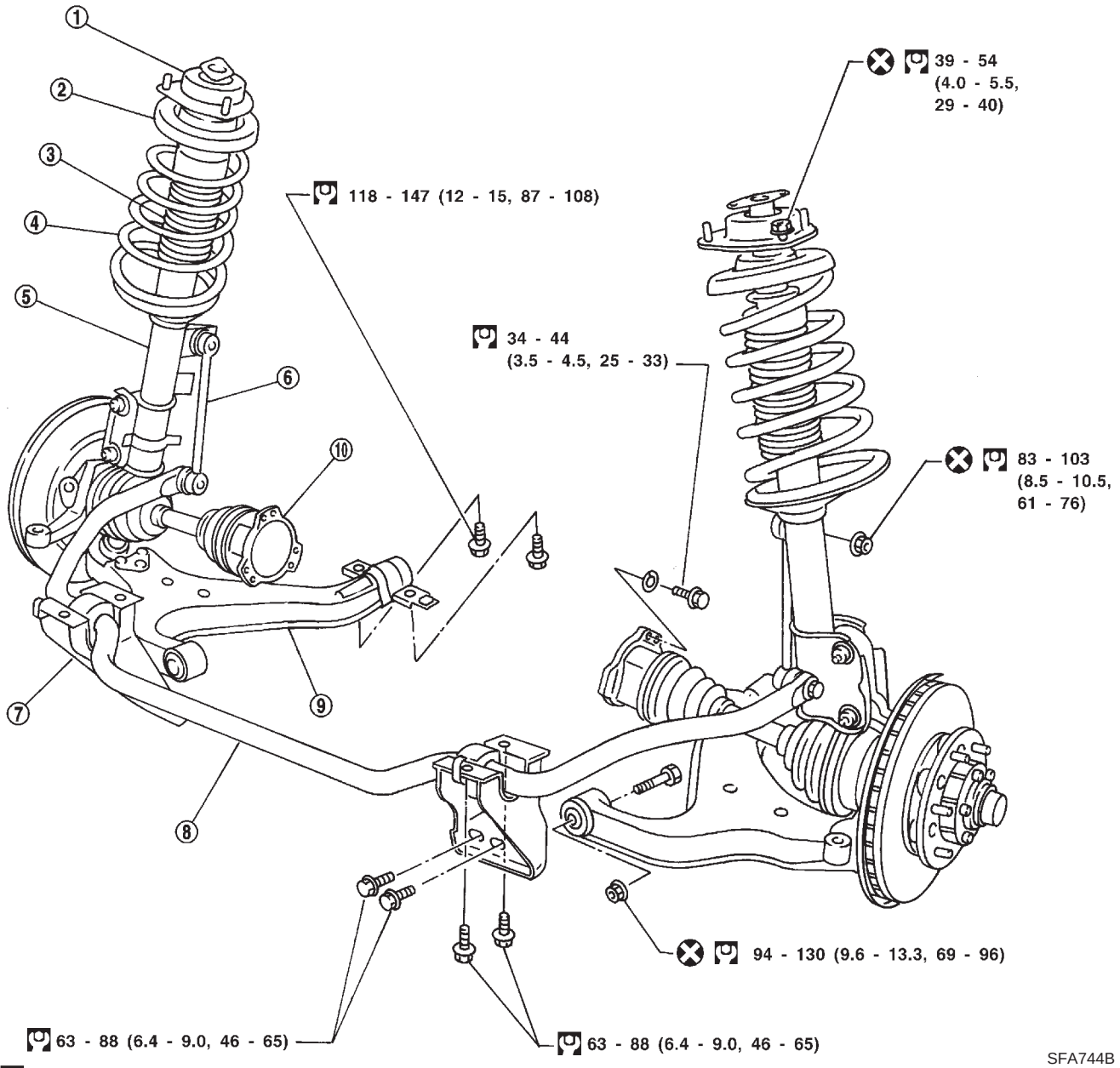
NASU0004S02

SEC. 391•400•401

When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.

*** Fuel, radiator coolant and engine oil full.**

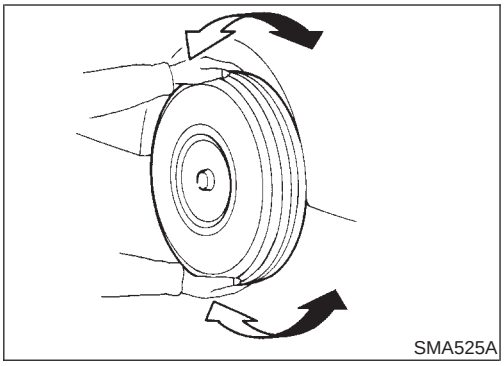
Spare tire, jack, hand tools and mats in designated positions.



SFA744B

: N•m (kg-m, ft-lb)

1. Strut mounting insulator
2. Spring upper seat
3. Bound bumper
4. Coil spring
5. Strut assembly
6. Stabilizer connecting rod
7. Bracket
8. Stabilizer bar
9. Transverse link
10. Drive shaft


SMA525A

On-vehicle Service

FRONT SUSPENSION PARTS

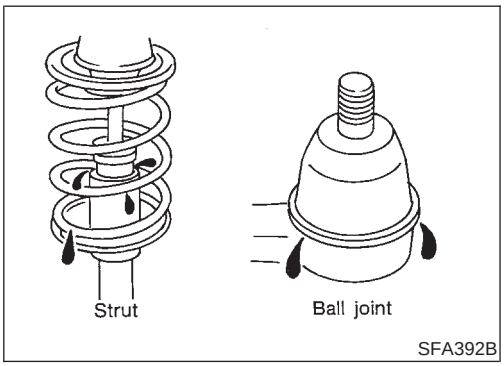
NASU0005

Check front axle and front suspension parts for excessive play, cracks, wear and other damage.

1. Shake each front wheel to check for excessive play.
2. Retighten all axle and suspensions nuts and bolts to the specified torque.

Tightening torque:

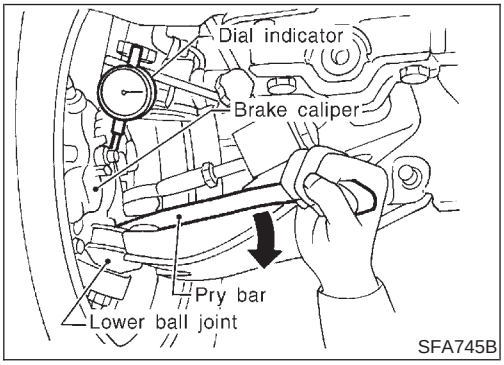
Refer to “Components”, SU-9.



SFA392B

3. Check strut (shock absorber) for oil leakage and other damage.
4. Check suspension ball joint for grease leakage and ball joint dust cover for cracks and other damage.
   If ball joint dust cover is cracked or damaged, replace ball joint assembly.
5. Check suspension ball joint end play.

a. Jack up front of vehicle and set the stands.
b. Clamp dial indicator onto transverse link and place indicator tip on lower edge of brake caliper.
c. Make sure front wheels are straight and brake pedal is depressed.



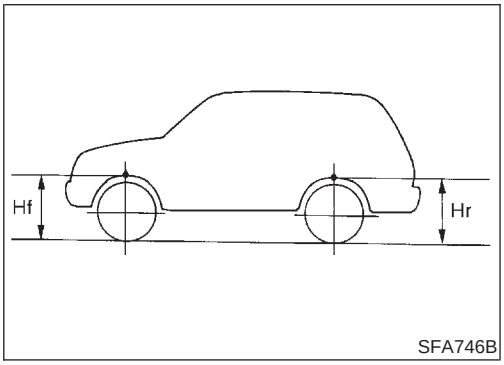
SFA745B

d. Place a pry bar between transverse link and knuckle.
e. While raising and releasing pry bar, observe maximum dial indicator value.

Vertical end play:

0 mm (0 in)

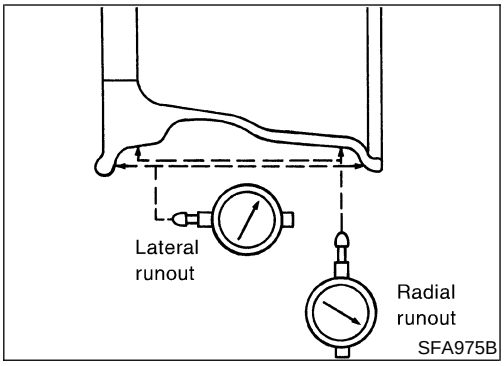
If ball joint vertical end play exists, remove lower ball joint assembly and recheck the ball joint. Refer to “Tranverse Link and Lower Ball Joint”, SU-13.



SFA746B

6. Check spring height from top of wheelarch to ground using the following procedure.

a. Park vehicle on a level surface with vehicle unladen*.
   *: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.
b. Check tires for proper inflation and wear (tread wear indicator must not be showing).
c. Bounce vehicle up and down several times and measure dimensions Hf and Hr. Refer to SDS, SU-16.
   Spring height is not adjustable. If out of specification, check for worn springs and suspension parts.



FRONT WHEEL ALIGNMENT

NASU0006

Before checking front wheel alignment, be sure to make a preliminary inspection (Unladen*).

*: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

Preliminary Inspection

NASU0006S01

1. Check tires for wear and improper inflation.
2. Check wheels for deformation, cracks and other damage. If deformed, remove wheel and check wheel runout.

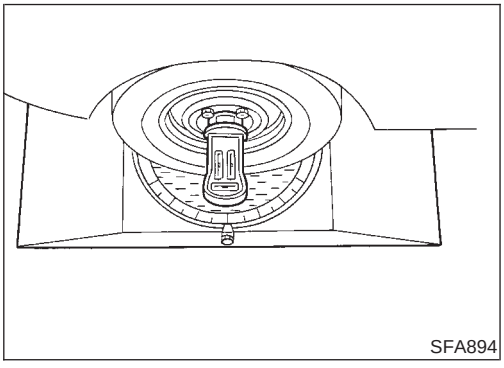
NOTE:

Measure both the inner and outer sides for the radial runout and lateral runout, and confirm the figures are within the standards.

Wheel runout (Dial indicator value):

Refer to SDS.

3. Check front wheel bearings for looseness.
4. Check front suspension for looseness.
5. Check steering linkage for looseness.
6. Check that front shock absorbers work properly.
7. Check vehicle posture (Unladen).



Camber, Caster and Kingpin Inclination

NASU0006S02

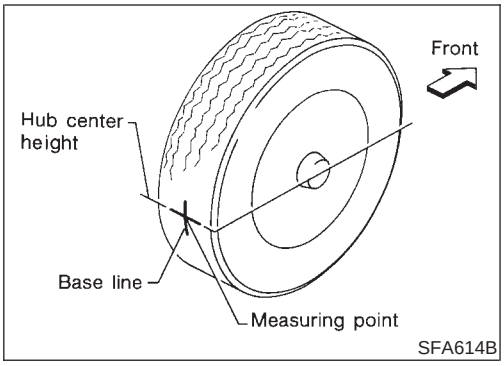
Camber, caster and kingpin inclination are preset at factory and cannot be adjusted.

1. Measure camber, caster and kingpin inclination of both right and left wheels with a suitable alignment gauge.

Camber, Caster and Kingpin inclination:

Refer to SDS, SU-14.

2. If camber, caster or kingpin inclination is not within specification, inspect front suspension parts. Replace damaged or worn out parts.



Toe-in

NASU0006S03

Measure toe-in using the following procedure.

WARNING:

- **Always perform the following procedure on a flat surface.**
- **Make sure that no person is in front of the vehicle before pushing it.**

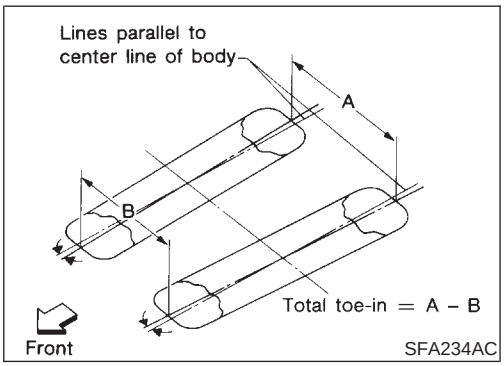
1. Bounce front of vehicle up and down to stabilize the posture.
2. Push the vehicle straight ahead about 5 m (16 ft).
3. Put a mark on base line of the tread (rear side) of both tires at the same height of hub center. This mark is a measuring point.
4. Measure distance "A" (rear side).
5. Push the vehicle slowly ahead to rotate the wheels 180 degrees (1/2 turn).

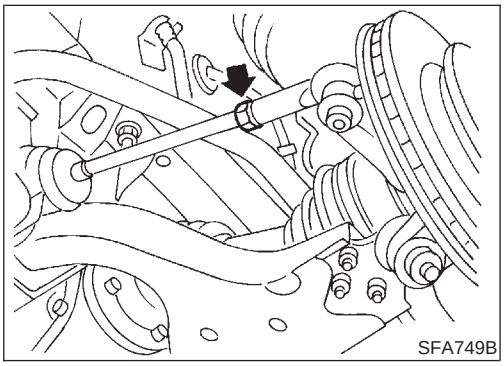
If the wheels have rotated more than 180 degrees (1/2 turn), try the above procedure again from the beginning. Never push vehicle backward.

6. Measure distance "B" (front side).

Total toe-in:

Refer to SDS, SU-14.





7. Adjust toe-in by varying the length of steering tie-rods.

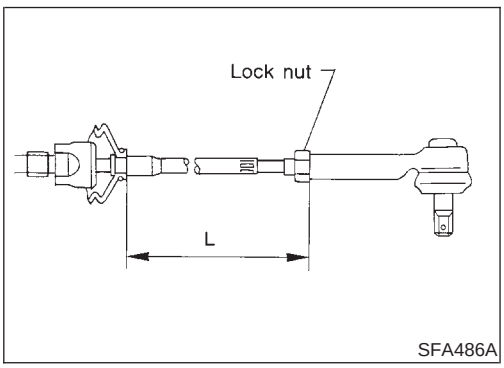
a. Loosen lock nuts.

b. Adjust toe-in by screwing tie-rods in and out.

Make sure both tie-rods are the same length.

Standard length "L":

Refer to ST-33, "Steering Gear and Linkage".



c. Tighten lock nuts to specified torque.

Lock nut tightening torque:

Refer to ST-18, "POWER STEERING GEAR AND LINKAGE".

Front Wheel Turning Angle

NASU0006S04

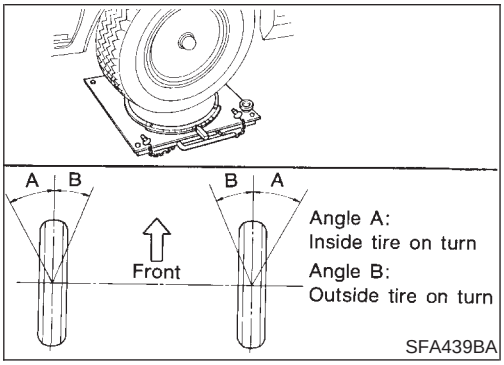
Turning angle is set by stroke length of steering gear rack and cannot be adjusted.

1. Set wheels in straight-ahead position. Then move vehicle forward until front wheels rest on turning radius gauge properly.
2. Rotate steering wheel all the way right and left; measure turning angle.

Do not hold the steering wheel on full lock for more than 15 seconds.

Wheel turning angle (Full turn):

Refer to SDS, SU-14.



Coil Spring and Strut Assembly

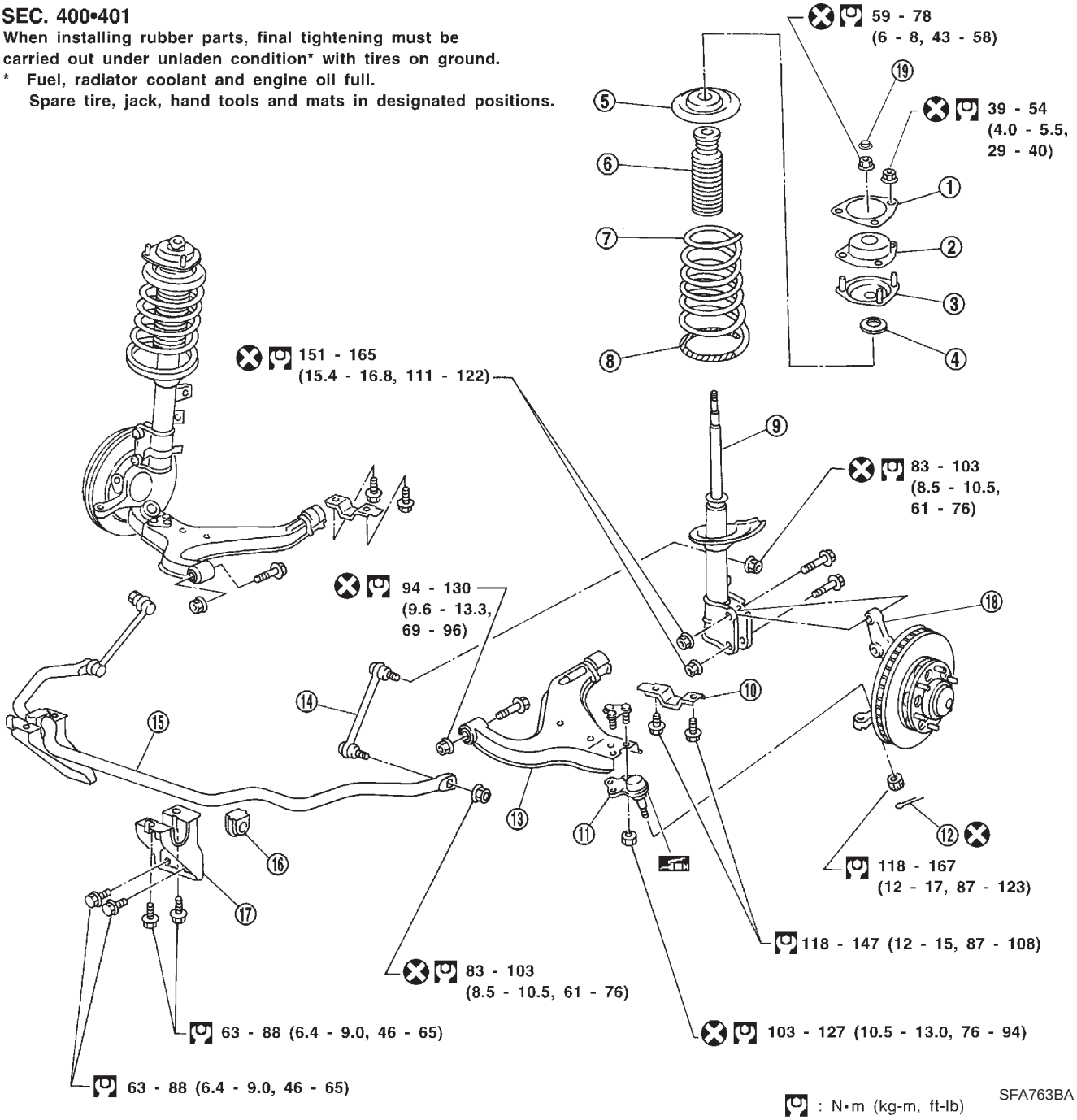
COMPONENTS
2WD

NASU0007

NASU0007S01

SEC. 400•401

When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.
*** Fuel, radiator coolant and engine oil full.**
Spare tire, jack, hand tools and mats in designated positions.



SFA763BA

1. Spacer
2. Strut mounting insulator
3. Bracket
4. Strut mounting bearing
5. Spring upper seat
6. Bound bumper
7. Coil spring
8. (Polyurethane tube)
9. Strut assembly
10. Bracket
11. Lower ball joint assembly
12. Cotter pin
13. Transverse link
14. Stabilizer connecting rod
15. Stabilizer bar
16. Bushing
17. Bracket
18. Knuckle spindle
19. Cap

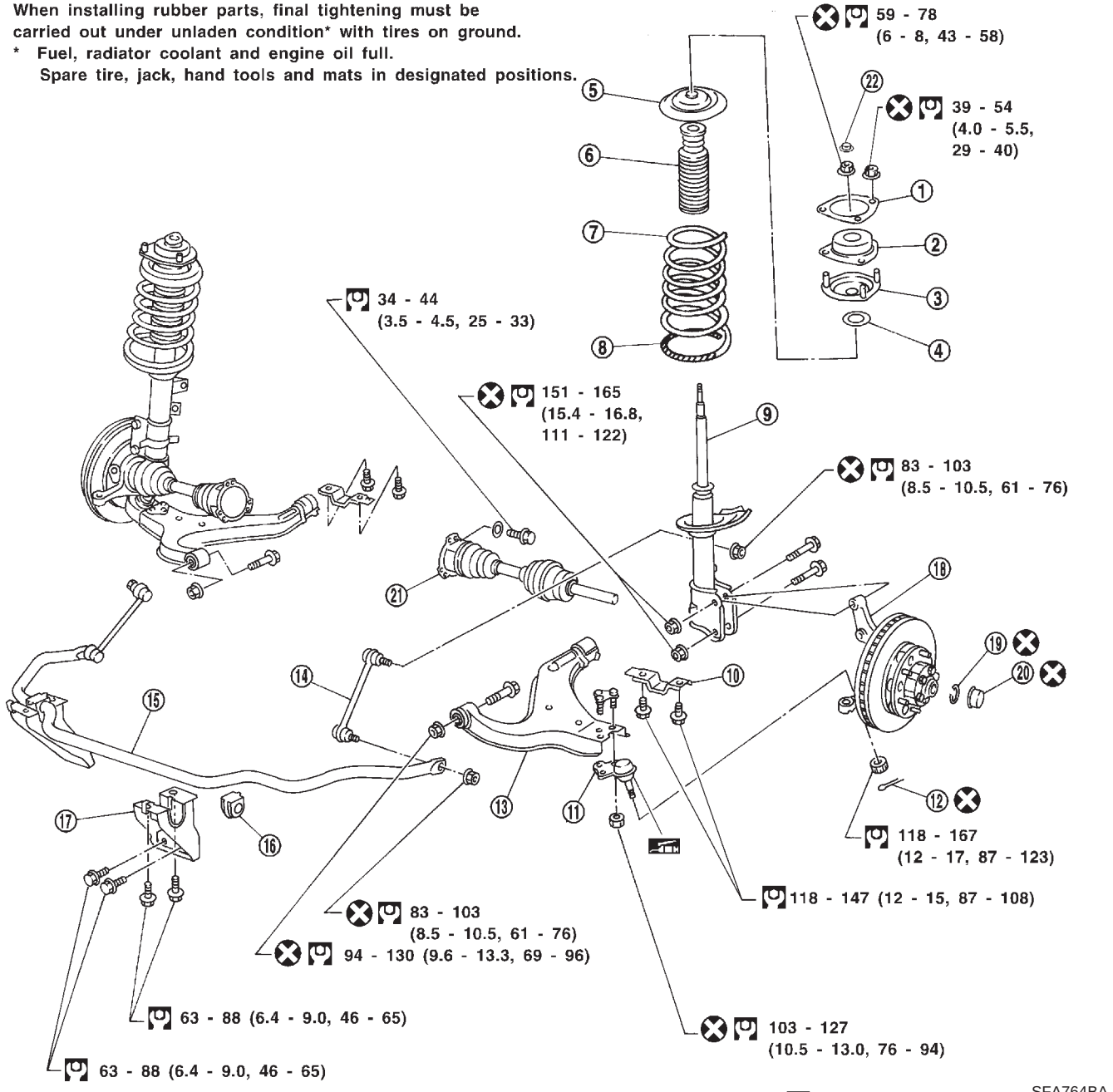
4WD

NASU0007S02

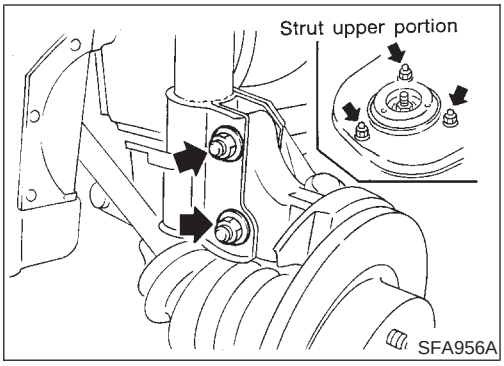
SEC. 391•400•401

When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.

*** Fuel, radiator coolant and engine oil full.**
Spare tire, jack, hand tools and mats in designated positions.



1. Spacer
2. Strut mounting insulator
3. Bracket
4. Strut mounting bearing
5. Spring upper seat
6. Bound bumper
7. Coil spring
8. (Polyurethane tube)
9. Strut assembly
10. Bracket
11. Lower ball joint assembly
12. Cotter pin
13. Transverse link
14. Stabilizer connecting rod
15. Stabilizer bar
16. Bushing
17. Bracket
18. Knuckle spindle
19. Snap ring
20. Hub cap
21. Drive shaft
22. Cap

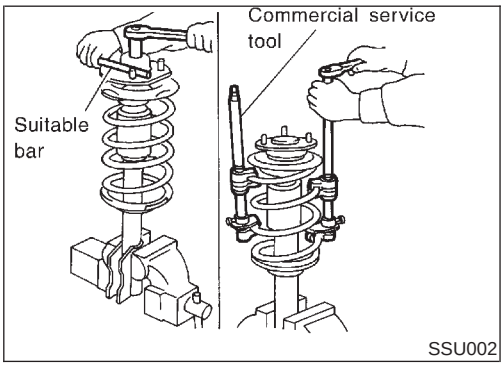


REMOVAL

NASU0008

1. Remove stabilizer connecting rod.
2. Remove strut assembly fixing bolts and nuts (to hood-ledge).

Do not remove piston rod lock nut on vehicle.



DISASSEMBLY

NASU0009

1. Set strut assembly on vise, then **loosen** piston rod lock nut.

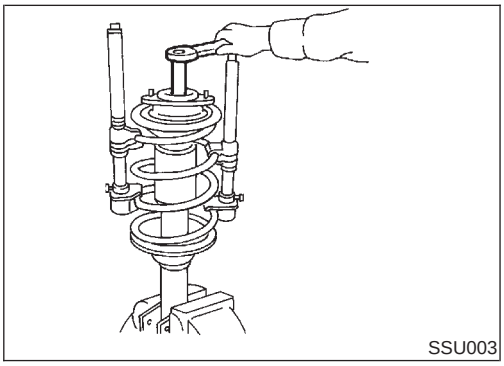
WARNING:

Do not remove piston rod lock nut at this time.

2. Compress spring with tool so that the strut mounting insulator can be turned by hand.

WARNING:

Make sure that the pawls of the two spring compressors are firmly hooked on the spring. The spring compressors must be tightened alternately so as not to tilt the spring.



3. Remove piston rod lock nut.

INSPECTION

NASU0010

Strut Assembly

NASU0010S01

- Check for smooth operation through a full stroke, both compression and extension.
- Check for oil leakage on welded and gland packing portion.
- Check piston rod for cracks, deformation and other damage.
- Replace if necessary.

Strut Mounting Insulator and Rubber Parts

NASU0010S02

- Check cemented rubber-to-metal portion for separation and cracks. Check rubber parts for deterioration.
- Replace if necessary.

Strut Mounting Bearing

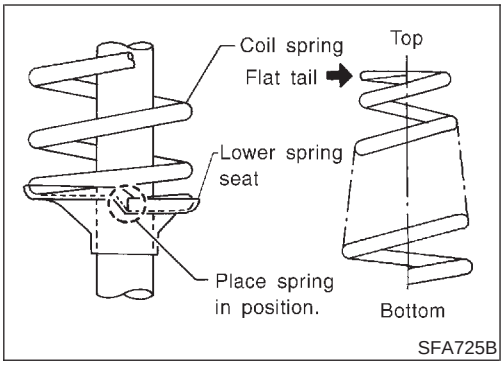
NASU0010S03

- Check thrust bearing parts for abnormal noise and excessive rattle in axial direction.
- Replace if necessary.

Coil Spring

NASU0010S04

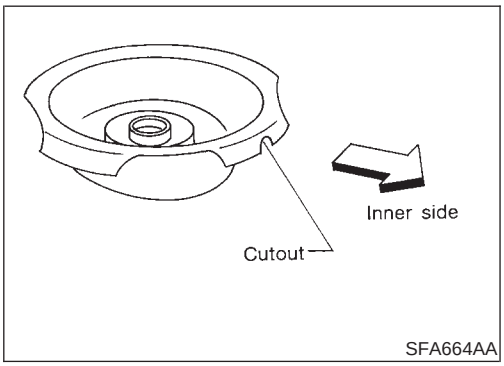
- Check for cracks, deformation and other damage. Replace if necessary.



ASSEMBLY

NASU0011

- When installing coil spring on strut, it must be positioned as shown in the figure at left.



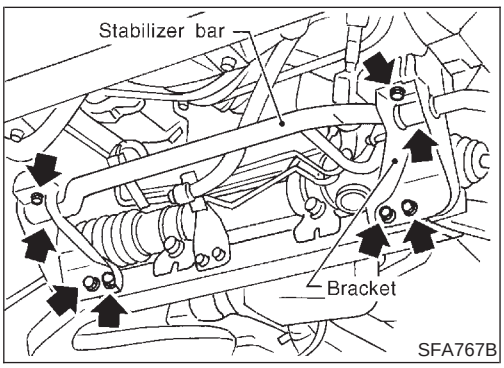
- Install upper spring seat with its cutout facing the inner side of vehicle.

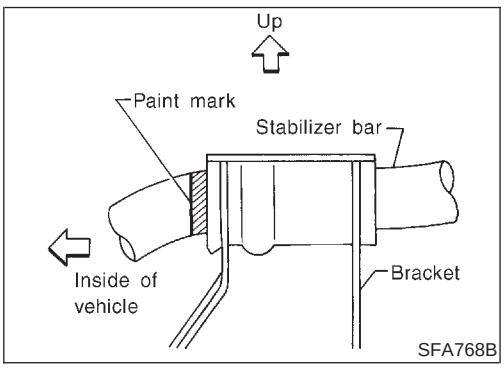
Stabilizer Bar

REMOVAL AND INSTALLATION

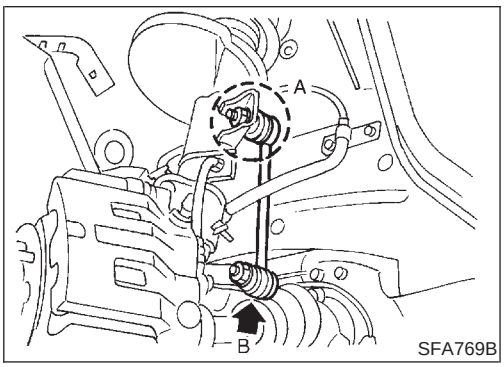
NASU0012

- Remove stabilizer bar and connecting rod.

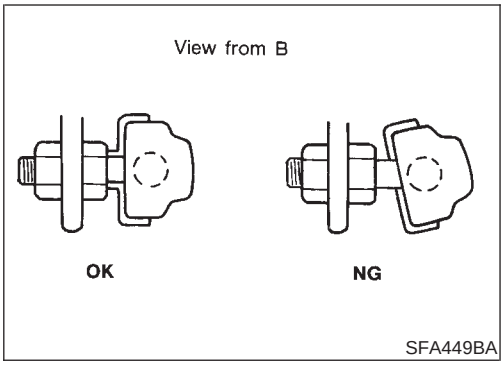




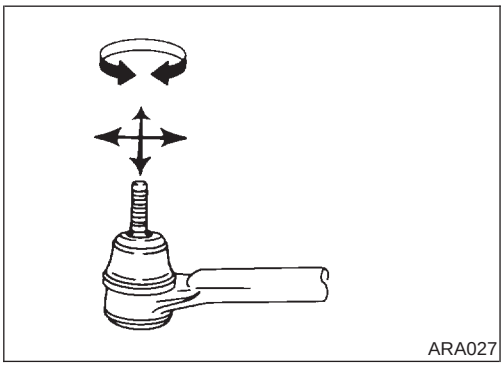
- When installing stabilizer, make sure that paint mark and bracket face in their correct directions.



- When removing and installing stabilizer bar fix portion A.



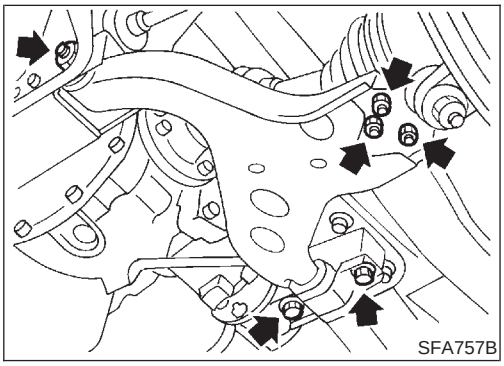
- Install stabilizer bar with ball joint socket properly placed.



INSPECTION

NASU0013

- Check stabilizer for deformation and cracks. Replace if necessary.
- Check rubber bushings for deterioration and cracks. Replace if necessary.
- Check ball joint can rotate in all directions. If movement is not smooth and free, replace stabilizer bar connecting rod.



Transverse Link and Lower Ball Joint

REMOVAL AND INSTALLATION

NASU0014

1. Separate drive shaft from knuckle. — 4WD — Refer to AX-12, "Drive Shaft".
2. Separate lower ball joint stud from knuckle.
3. Remove lower ball joint assembly from transverse link.
4. Remove transverse link.
5. During installation, final tightening must be carried out at curb weight with tires on ground.
6. After installation, check wheel alignment. Refer to "FRONT WHEEL ALIGNMENT", "On-vehicle Service", SU-7.

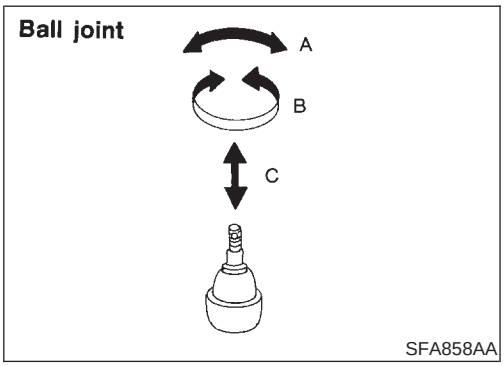
INSPECTION

=NASU0015

Transverse Link

NASU0015S01

- Check transverse link for damage, cracks and deformation. Replace it if necessary.
- Check rubber bushing for damage, cracks and deformation. Replace transverse link if necessary.



Lower Ball Joint

NASU0015S02

- Check ball joint for excessive play. Replace lower ball joint assembly if any of the following exists:

– Ball stud is worn.
– Joint is hard to swing.
– Play in axial direction is excessive.

Before checking, turn ball joint at least 10 revolutions so that ball joint is properly broken in.

Swinging force "A":
(measuring point: cotter pin hole of ball stud)
Refer to SDS, SU-15.
Turning torque "B":
Refer to SDS, SU-15.
Vertical end play "C":
Refer to SDS, SU-15.

Check dust cover for damage. Replace it and cover clamp if necessary.

Service Data and Specifications (SDS)

GENERAL SPECIFICATIONS (FRONT)

NASU0016

Suspension type	Independent macpherson strut with coil spring
Strut type	Double-acting hydraulic
Stabilizer bar	Standard equipment

WHEEL ALIGNMENT (UNLADEN*1)

NASU0017

Unit: Degree minute (Decimal degree)

Applied model		All
Camber	Minimum	−0°35′ (−0.58°)
	Nominal	0°10′ (0.17°)
	Maximum	0°55′ (0.92°)
	Left and right difference	45′ (0.75°) or less

Caster			Minimum	2°15′ (2.25°)
			Nominal	3°00′ (3.00°)
			Maximum	3°45′ (3.75°)
			Left and right difference	45′ (0.75°) or less
Kingpin inclination			Minimum	13°35′ (13.58°)
			Nominal	14°20′ (14.33°)
			Maximum	15°05′ (15.08°)
Total toe-in	Distance (A - B)		Minimum	1 mm (0.04 in)
			Nominal	2 mm (0.08 in)
			Maximum	3 mm (0.12 in)
	Angle (left plus right)		Minimum	5′ (0.08°)
			Nominal	10′ (0.17°)
			Maximum	15′ (0.25°)
Wheel turning angle	Full turn*2	Inside	Minimum	30°00′ (30.00°)
			Nominal	33°00′ (33.00°)
			Maximum	34°00′ (34.00°)
		Outside	Minimum	28°00′ (28.00°)
			Nominal	31°00′ (31.00°)
			Maximum	32°00′ (32.00°)

*1: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

*2: On power steering models, wheel turning force (at circumference of steering wheel) of 98 to 147 N (10 to 15 kg, 22 to 33 lb) with engine idle.

LOWER BALL JOINT

NASU0018

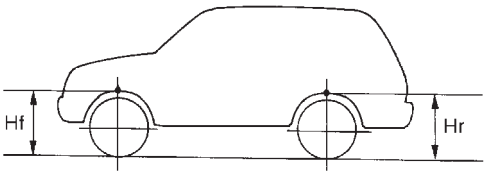
Swinging force "A" (Measuring point: cotter pin hole of ball stud)	7.8 - 76.5 N (0.8 - 7.8 kg, 1.8 - 17.2 lb)
Turning torque "B"	0.5 - 4.9 N·m (5 - 50 kg-cm, 4.3 - 43.4 in-lb)
Vertical end play "C"	0 mm (0 in)

Service Data and Specifications (SDS) (Cont'd)

WHEELARCH HEIGHT (UNLADEN*)

=NASU0019

Unit: mm (in)



SFA746B

Applied model	2WD		4WD	
	245/70 R16 tire	255/65 R16 tire (With over fender)	245/70 R16 tire	255/65 R16 tire (With over fender)
Front (Hf)	840 (33.07)	840 (33.07)	837 (32.95)	824 (32.44)
Rear (Hr)	867 (34.13)	817 (32.17)	867 (34.13)	817 (32.17)

*: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

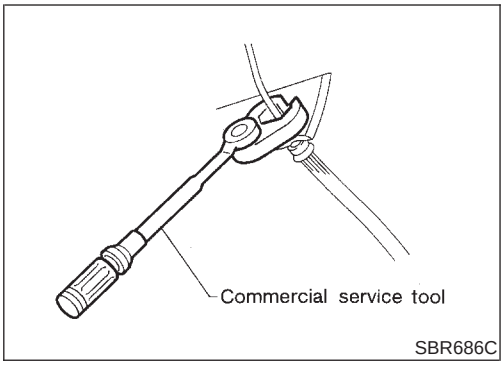
WHEEL RUNOUT AVERAGE*

NASU0020

Unit: mm (in)

Wheel type	Aluminum	Steel
Radial runout limit	0.3 (0.012)	0.8 (0.031)
Lateral runout limit	0.3 (0.012)	0.8 (0.031)

*: Wheel runout average = (Outside runout value + Inside runout value) x 0.5



SBR686C

Precautions

PRECAUTIONS

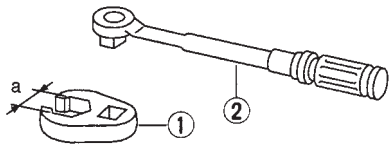
NASU0021

- **When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground. *Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**
- **Use flare nut wrench when removing and installing brake tubes.**
- **After installing removed suspension parts, check wheel alignment and adjust if necessary.**
- **Always torque brake lines when installing.**

Preparation

COMMERCIAL SERVICE TOOLS

NASU0023

Tool name	Description	
1 Flare nut crowfoot 2 Torque wrench	 NT360	Removing and installing each brake piping **a: 10 mm (0.39 in)**

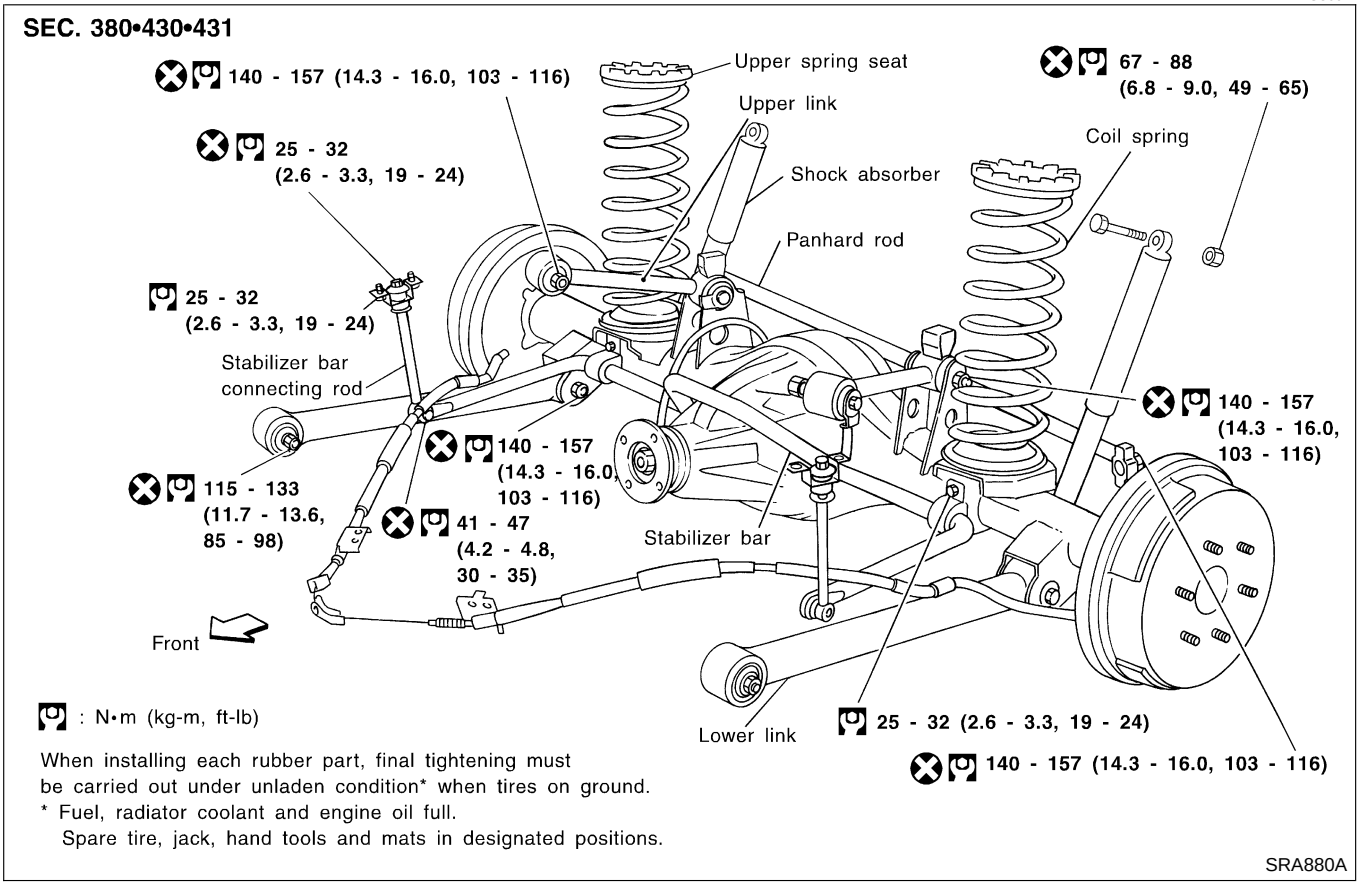
Noise, Vibration and Harshness (NVH) Troubleshooting

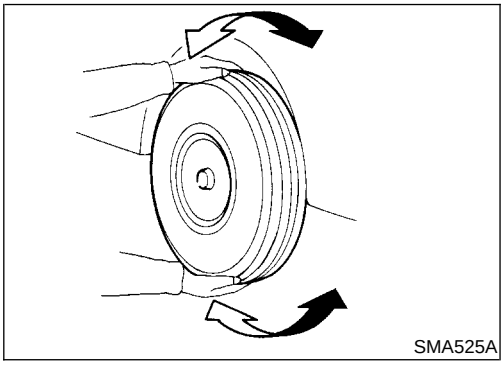
NASU0036

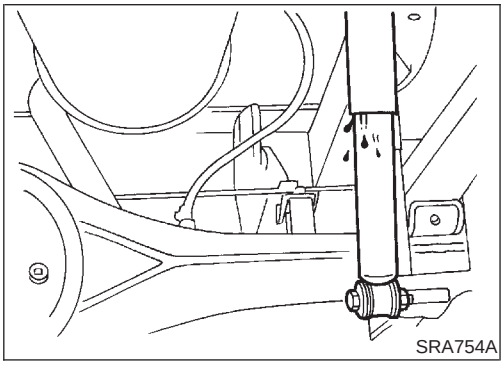
Refer to “Noise, Vibration and Harshness (NVH) Troubleshooting”, “FRONT SUSPENSION”, SU-3.

Components

NASU0024







On-vehicle Service

REAR SUSPENSION PARTS

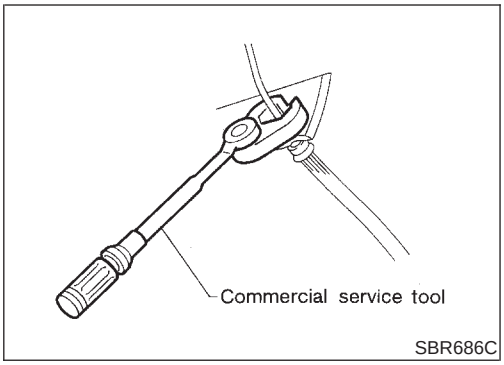
NASU0025

Check rear axle and rear suspension parts for excessive play, wear and damage.

1. Shake each rear wheel to check for excessive play.
2. Retighten all nuts and bolts to the specified torque.

   Tightening torque: Refer to “Coil Spring and Shock Absorber”, SU-20.

3. Check shock absorber for oil leakage and other damage.
4. Check shock absorber bushing for excessive wear and other damage.
5. Check wheelarch height. Refer to “On-vehicle Service”, “FRONT SUSPENSION”, SU-6.



SBR686C

Removal and Installation

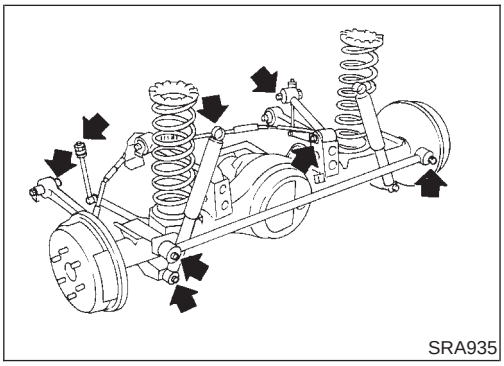
NASU0026

1. Support axle and suspension components with a suitable jack and block.
2. Disconnect brake hydraulic line and parking brake cables at back plates.

CAUTION:

- **Use flare nut wrench when removing and installing brake tubes.**
- **Before removing the rear suspension assembly, disconnect the ABS wheel sensor from the assembly. Then move it away from the rear suspension assembly. Failure to do so may result in damage to the sensor wires and the sensor becoming inoperative.**

3. Remove stabilizer bar from body.
4. Remove upper links and lower links from body.
5. Remove panhard rod from body.
6. Disconnect rear end of propeller shaft. Refer to PD-8, “Removal and Installation”.
7. Remove upper end nuts of shock absorber.


SRA935

Final tightening for rubber parts requires to be carried out under unladen condition with tires on ground.

Coil Spring and Shock Absorber

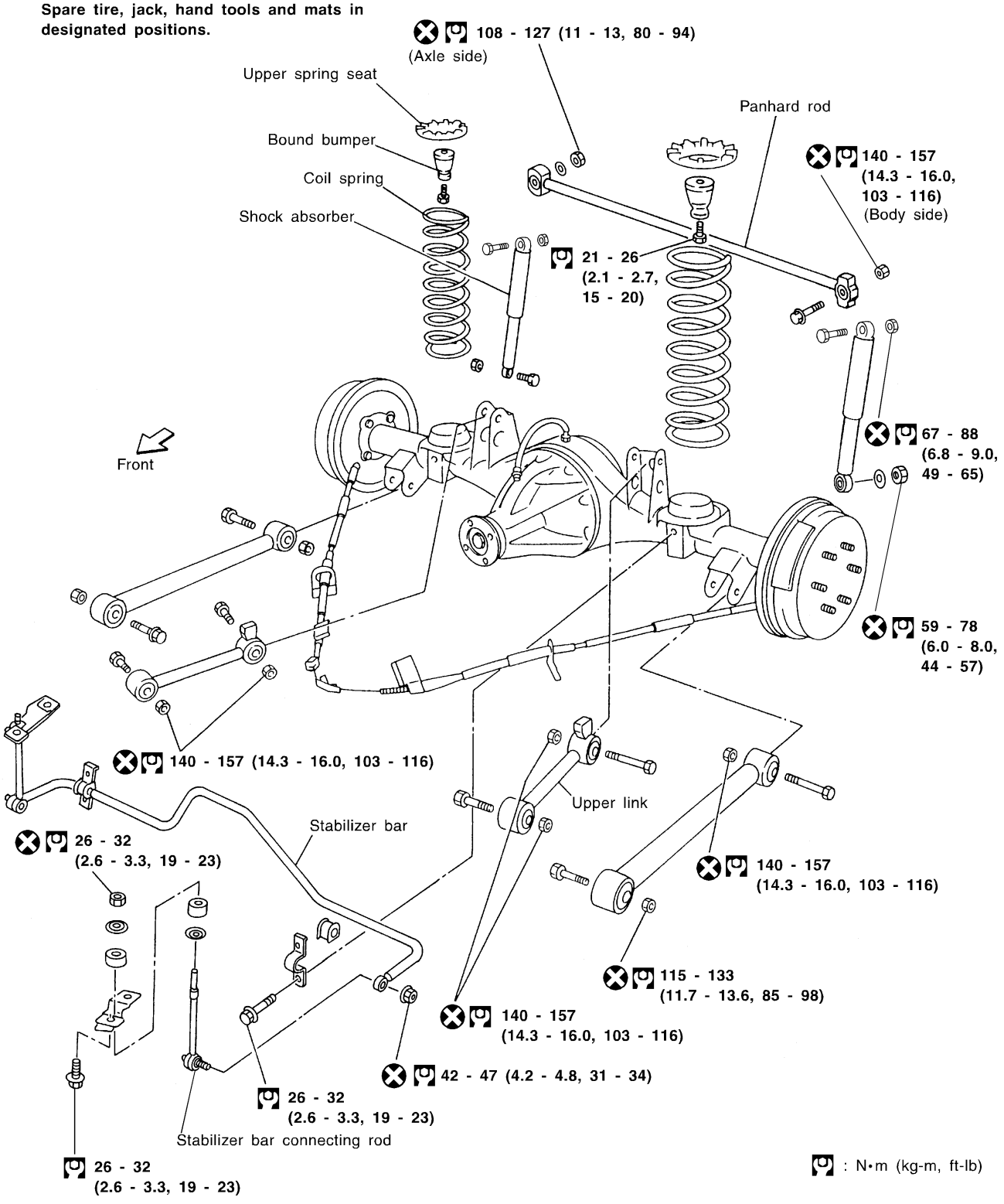
COMPONENTS

NASU0027

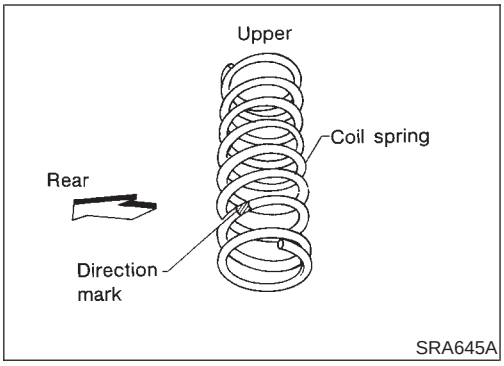
SEC. 380•430•431

When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.

*** Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**



SSU041



REMOVAL AND INSTALLATION

NASU0028

Refer to "Removal and Installation", "REAR SUSPENSION", SU-19.

When installing coil spring, pay attention to its direction.
Be sure spring rubber seat is not twisted and has not slipped off when installing coil spring.

INSPECTION

NASU0029

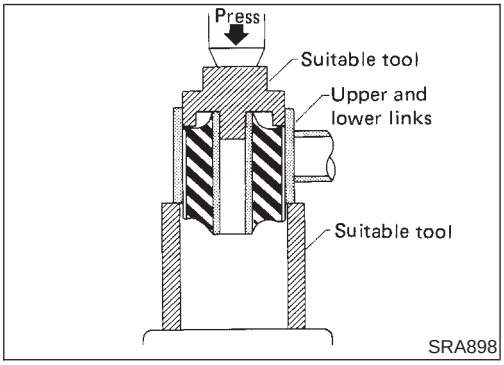
- Check coil spring for yield, deformation and cracks.
- Check shock absorber for oil leakage, cracks and deformation.
- Check all rubber parts for wear, cracks and deformation. Replace if necessary.

Upper Link, Lower Link and Panhard Rod

INSPECTION

NASU0030

Check for cracks, distortion and other damage. Replace if necessary.

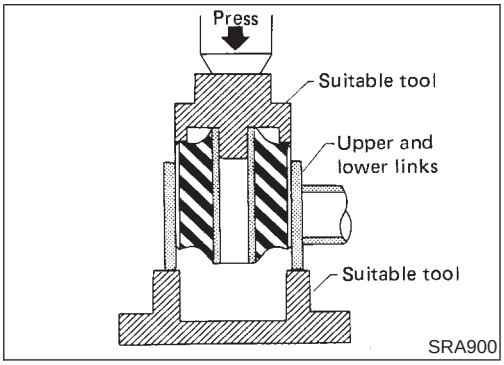


BUSHING REPLACEMENT

NASU0031

Check for cracks and other damage. Replace with suitable tool if necessary.

- Remove bushing with suitable tool.

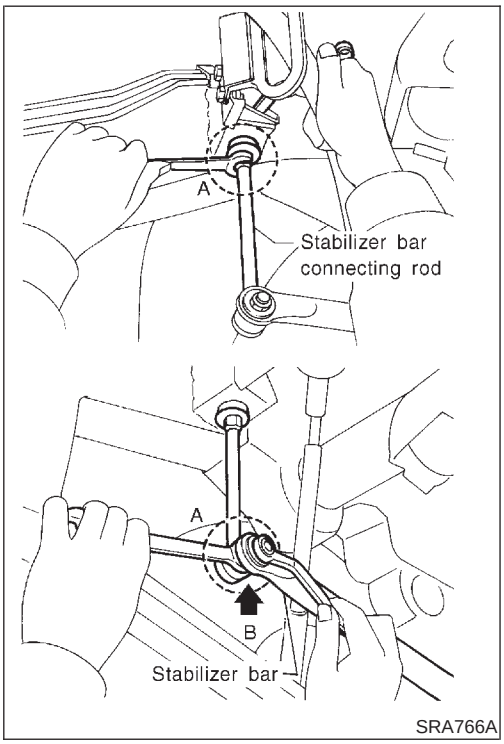


When installing bushing, apply a coat of 1% soapy water to outer wall of bushing.
Always install new bushing.
Do not tap end face of bushing directly with a hammer.

INSTALLATION

NASU0032

When installing each link, pay attention to direction of nuts and bolts.
When installing each rubber part, final tightening must be carried out under unladen condition with tires on ground.



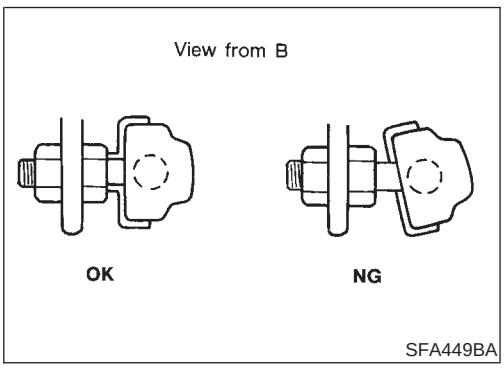
SRA766A

Stabilizer Bar

REMOVAL AND INSTALLATION

NASU0033

- When removing and installing stabilizer bar, fix portion A.



SFA449BA

- Install stabilizer bar with ball joint socket properly placed.

Service Data and Specifications (SDS)

GENERAL SPECIFICATIONS (REAR)

NASU0034

Suspension type	5-link type rigid with coil spring
Shock absorber type	Double-acting hydraulic
Stabilizer	Standard equipment

BRAKE SYSTEM

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Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

NABR0120

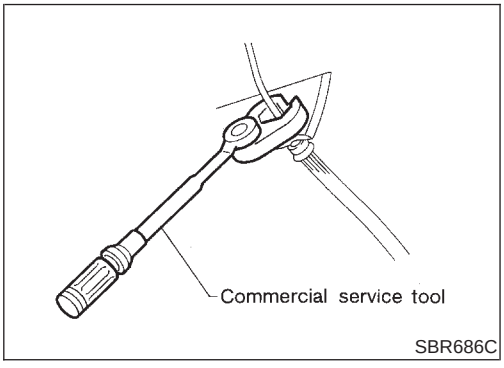
The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL R50 is as follows:

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.**



SBR686C

Precautions for Brake System

NABR0002

- **Use brake fluid “DOT 3”.**
- **Never reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**
- **To clean master cylinder parts, disc brake caliper parts or wheel cylinder parts, use clean brake fluid.**
- **Never use mineral oils such as gasoline or kerosene. They will ruin rubber parts of hydraulic system.**
- **Use flare nut wrench when removing and installing brake tubes.**
- **Always torque brake lines when installing.**

WARNING:

- **Clean brakes with a vacuum dust collector to minimize risk of health hazard from powder caused by friction.**

Wiring Diagrams and Trouble Diagnoses

NABR0003

When you read wiring diagrams, refer to the following:

- GI-11, “HOW TO READ WIRING DIAGRAMS”
- EL-9, “POWER SUPPLY ROUTING” for power distribution circuit

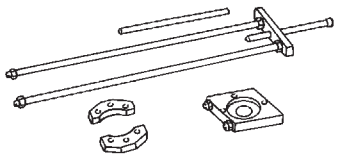
When you perform trouble diagnoses, refer to the following:

- GI-35, “HOW TO FOLLOW TEST GROUP IN TROUBLE DIAGNOSES”
- GI-24, “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”

Special Service Tools

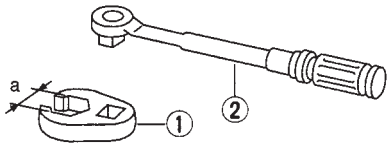
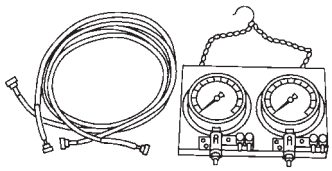
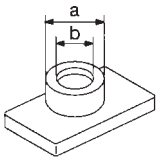
NABR0004

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
KV40106500 (J25852-B) Rear wheel bearing puller	 NT724	Removing rear wheel sensor rotor

Commercial Service Tools

NABR0005

Tool name	Description	
1 Flare nut crowfoot 2 Torque wrench	 NT360	Removing and installing each brake piping **a: 10 mm (0.39 in)**
Brake fluid pressure gauge	 NT151	Measuring brake fluid pressure
Rear wheel sensor rotor drift	 NT509	Installing rear wheel sensor rotor **a: 75 mm (2.95 in) dia.** **b: 63 mm (2.48 in) dia.**

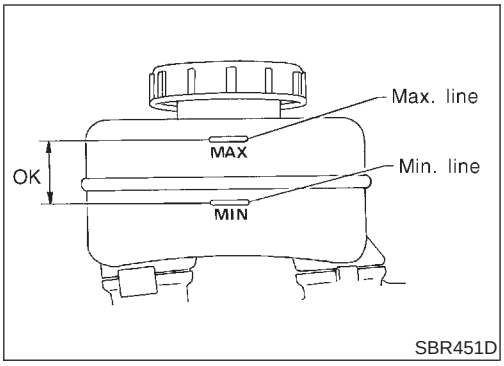
NVH Troubleshooting Chart

NABR0085S01

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

Reference page			BR-22, 28	BR-22, 28	BR-26	BR-22	—	—	BR-24, 28	—	—	—	BR-25	BR-28	PD-4	PD-4	AX-3	AX-3	SU-3	SU-3	SU-3	ST-6
Possible cause and SUSPECTED PARTS			Linings or pads - damaged	Linings or pads - uneven wear	Return spring damaged	Shims damaged	Rotor or drum imbalance	Rotor or drum damage	Rotor or drum runout	Rotor or drum deformation	Rotor or drum deflection	Rotor or drum rust	Rotor thickness variation	Drum out of round	PROPELLER SHAFT	DIFFERENTIAL	DRIVE SHAFT	AXLE	SUSPENSION	TIRES	ROAD WHEEL	STEERING
Symptom	BRAKE	Noise	×	×	×	×									×	×	×	×	×	×	×	×
		Shake					×								×		×	×	×	×	×	×
		Shimmy, Judder					×	×	×	×	×	×	×	×				×	×	×	×	×

×: Applicable

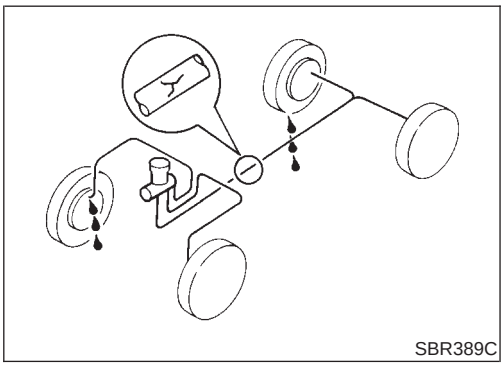


SBR451D

Checking Brake Fluid Level

NABR0006

- Check fluid level in reservoir tank. It should be between Max and Min lines on reservoir tank.
- If fluid level is extremely low, check brake system.
- If the brake warning lamp comes on, check brake fluid level switch and parking brake switch.


SBR389C

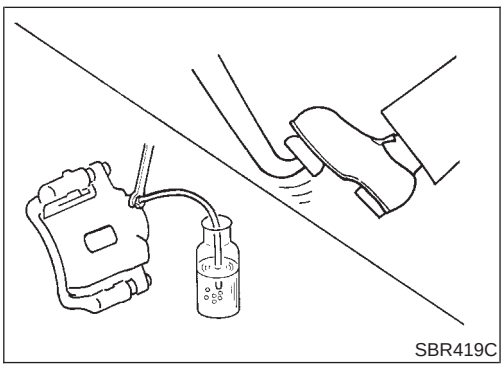
Checking Brake Line

NABR0007

CAUTION:

If leakage occurs around joints, retighten or, if necessary, replace damaged parts.

1. Check brake lines (tubes and hoses) for cracks, deterioration and other damage. Replace any damaged parts.
2. Check for oil leakage by fully depressing brake pedal while engine is running.


SBR419C

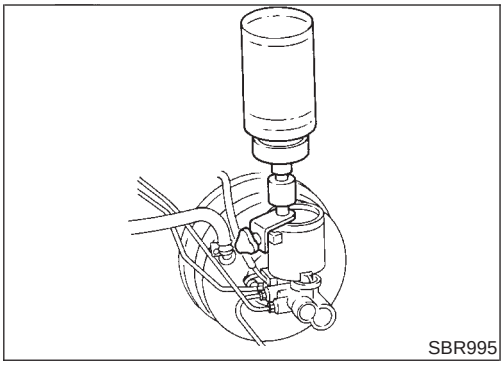
Changing Brake Fluid

NABR0008

CAUTION:

- **Refill with new brake fluid “DOT 3”.**
- **Always keep fluid level higher than minimum line on reservoir tank.**
- **Never reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**

1. Clean inside of reservoir tank, and refill with new brake fluid.
2. Connect a vinyl tube to each air bleeder valve.
3. Drain brake fluid from each air bleeder valve by depressing brake pedal.
4. Refill until brake fluid comes out of each air bleeder valve.
   Use same procedure as in bleeding hydraulic system to refill brake fluid.
   Refer to “Bleeding Brake System”, BR-8.


SBR995

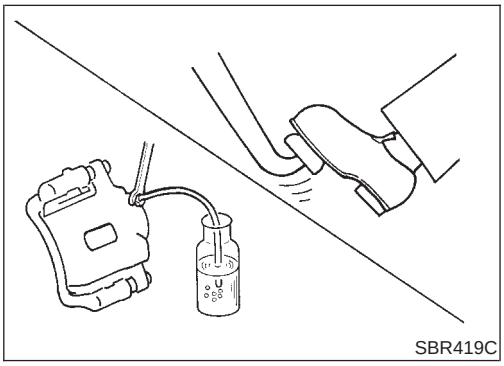
Bleeding Brake System

=NABR0009

CAUTION:

- **Carefully monitor brake fluid level at master cylinder during bleeding operation.**
- **If master cylinder is suspected to have air inside, bleed air from master cylinder first. Refer to “Installation”, “MASTER CYLINDER”, BR-18.**
- **Fill reservoir with new brake fluid “DOT 3”. Make sure it is full at all times while bleeding air out of system.**
- **Place a container under master cylinder to avoid spillage of brake fluid.**
- **Turn ignition switch OFF and disconnect ABS actuator and electric unit connectors or battery ground cable.**
- **Bleed air in the following order.**

1. LSV air bleeder (4WD models)
2. Left rear brake
3. Right rear brake
4. Left front brake
5. Right front brake


SBR419C

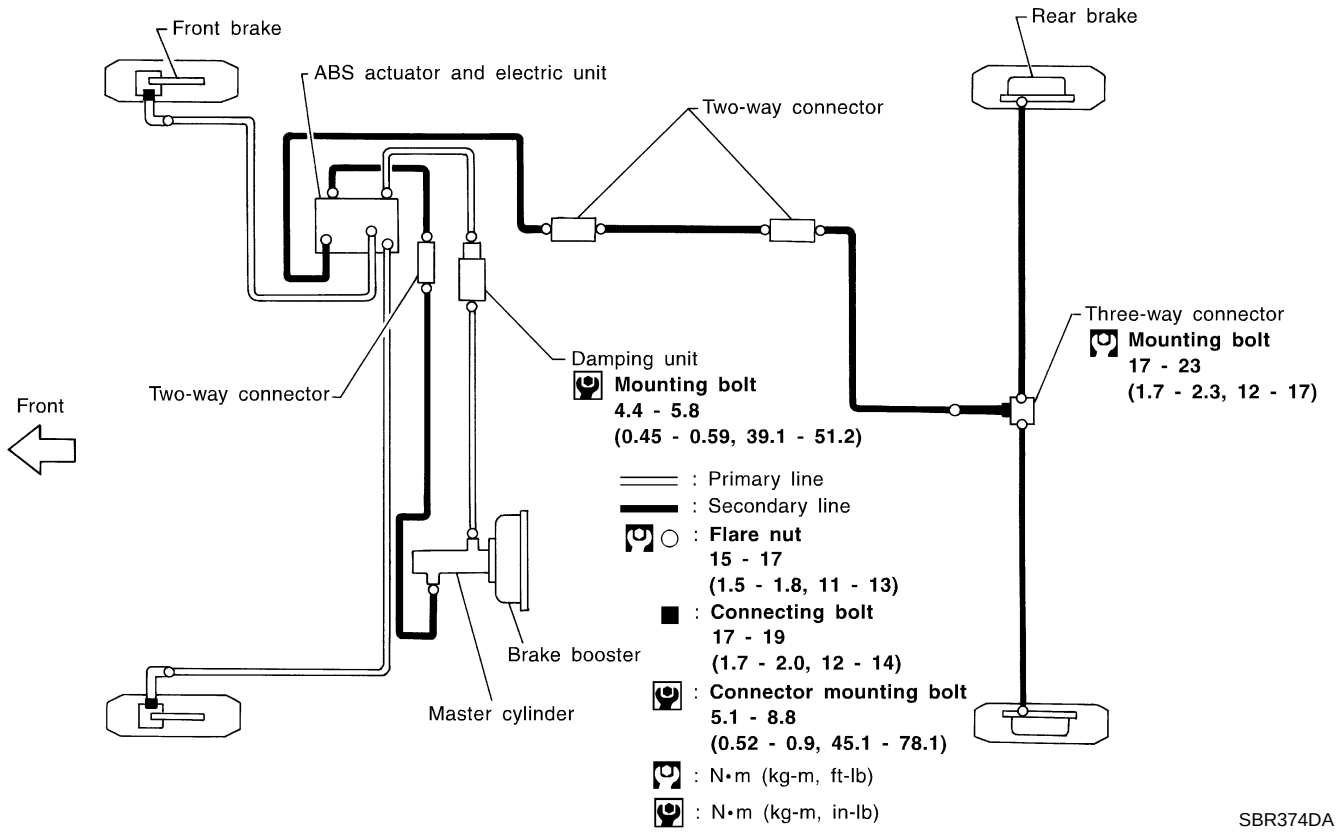
1. Connect a transparent vinyl tube to air bleeder valve.
2. Fully depress brake pedal several times.
3. With brake pedal depressed, open air bleeder valve to release air.
4. Close air bleeder valve.
5. Release brake pedal slowly.
6. Repeat steps 2. through 5. until clear brake fluid comes out of air bleeder valve.
7. Tighten air bleeder valve.

: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)

Hydraulic Circuit

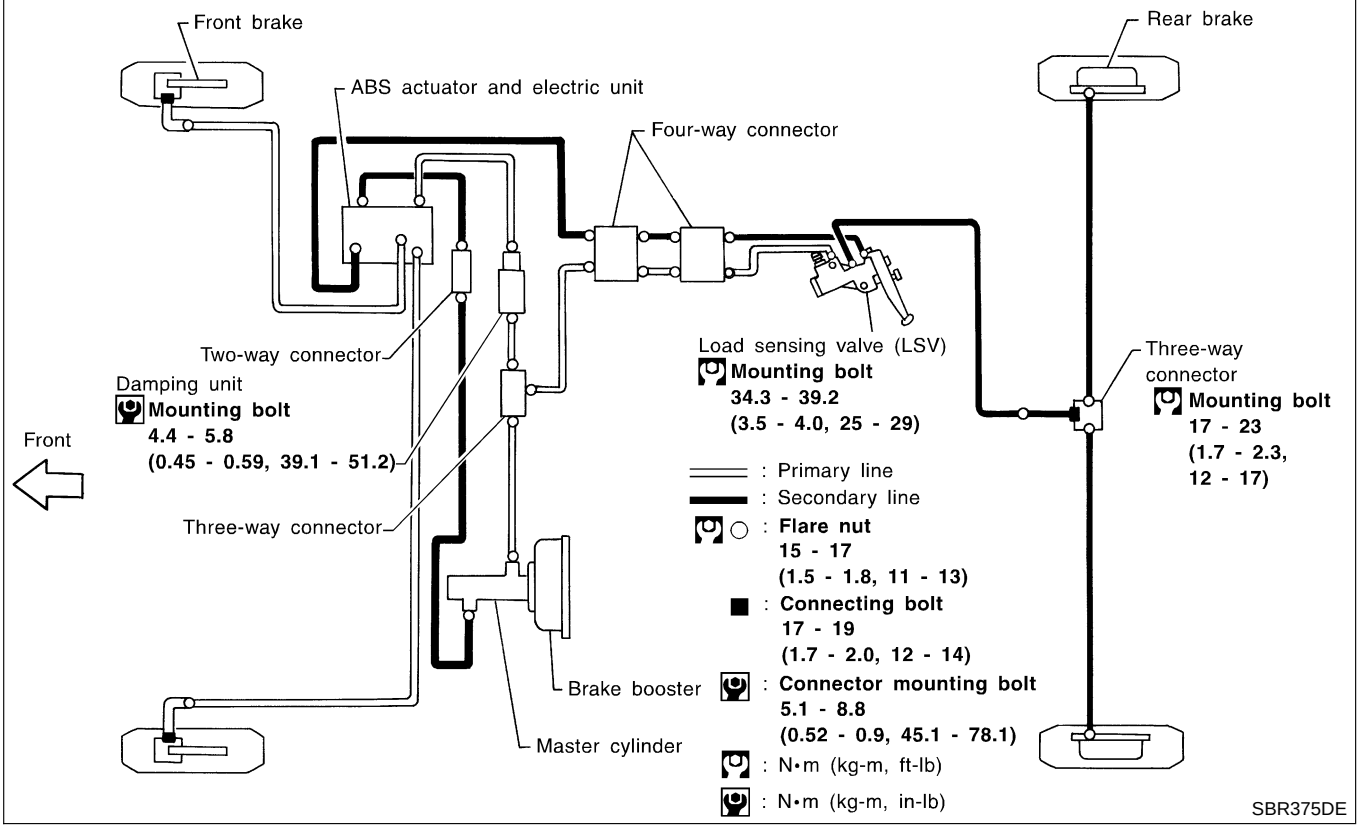
NABR0010

2WD models

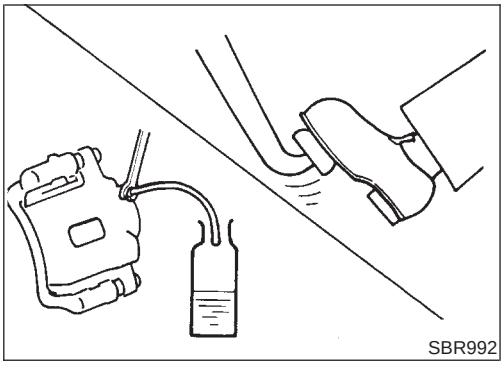


SBR374DA

4WD models



SBR375DE


SBR992

Removal

NABR0011

CAUTION:

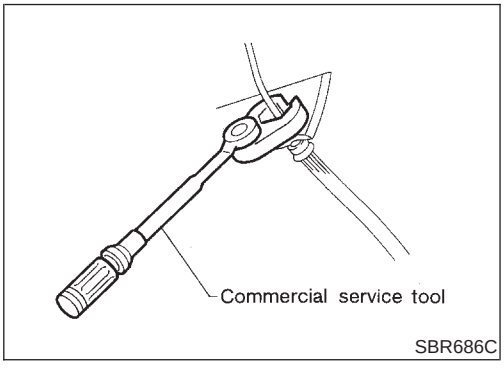
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**
- **All hoses must be free from excessive bending, twisting and pulling.**

1. Connect vinyl tube to air bleeder valve.
2. Drain brake fluid from each air bleeder valve by depressing brake pedal.
3. Remove flare nut connecting brake tube and hose, then withdraw lock spring.
4. Cover openings to prevent entrance of dirt whenever disconnecting brake line.

Inspection

NABR0012

Check brake lines (tubes and hoses) for cracks, deterioration and other damage. Replace any damaged parts.



SBR686C

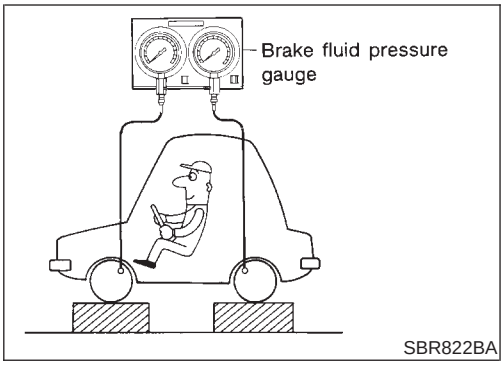
Installation

NABR0013

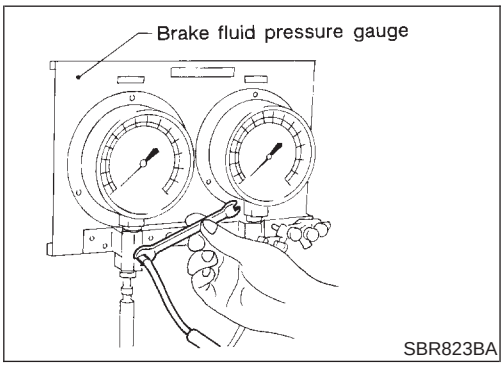
CAUTION:

- **Refill with new brake fluid “DOT 3”.**
- **Never reuse drained brake fluid.**

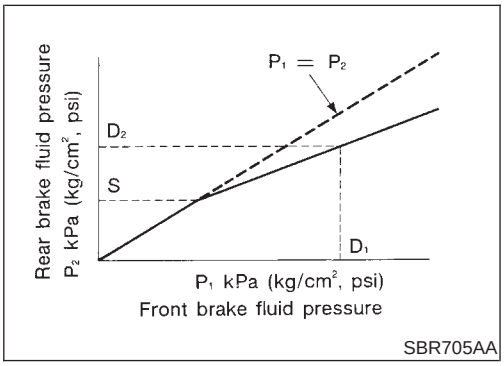
1. Tighten all flare nuts and connecting bolts.
   Flare nut:
   : 15 - 17 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)
   Connecting bolt:
   : 17 - 19 N·m (1.7 - 2.0 kg-m, 12 - 14 ft-lb)
2. Refill until new brake fluid comes out of each air bleeder valve.
3. Bleed air. Refer to “Bleeding Brake System”, BR-8.



SBR822BA



SBR823BA



SBR705AA

Inspection

NABR0086

CAUTION:

- **Carefully monitor brake fluid level at master cylinder.**
- **Use new brake fluid “DOT 3”.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on paint areas, wash it away with water immediately.**
- **Depress pedal slowly when raising front brake pressure.**
- **Check rear brake pressure 2 seconds after front brake pressure reaches specified value.**
- **Disconnect harness connectors from ABS actuator and electric unit before checking.**

1. Remove front LH tire.
2. Connect tool to air bleeders on front LH brake caliper and rear LH or RH brake wheel cylinder.
3. Install front LH tire.

Before installing front LH tire, confirm the tool is not touching the front LH wheel.

4. Bleed air from the tool.
5. Check fluid pressure by depressing brake pedal.

kPa (kg/cm^2, psi)

Applied pressure (Front brake) D_1	6,375 (65, 924)
Output pressure (Rear brake) D_2	3,432 - 3,825 (35 - 39, 498 - 555)

If output pressure is out of specifications, replace master cylinder assembly (built-in type).

6. Bleed air after disconnecting the tool. Refer to “Bleeding Brake System”, BR-8.
7. Install front LH tire.

Removal and Installation (Built-in type)

NABR0087

Always replace together with master cylinder as an assembly.

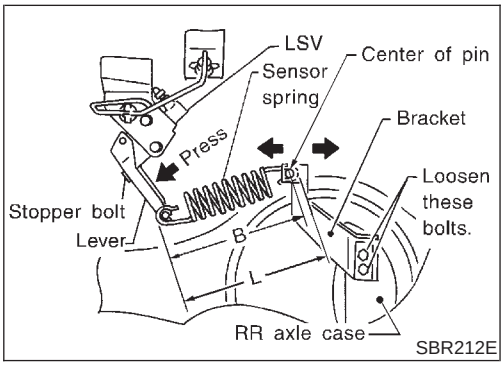
- Refer to “MASTER CYLINDER”, BR-16.

Inspection

NABR0014

CAUTION:

- **Carefully monitor brake fluid level at master cylinder.**
- **Use new brake fluid “DOT 3”.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on paint areas, wash it away with water immediately.**
- **Depress pedal slowly when raising front brake pressure.**
- **Check rear brake pressure 2 seconds after front brake pressure reaches specified value.**
- **Disconnect harness connectors from ABS actuator and electric unit before checking.**



1. Park vehicle on a level surface with vehicle unloaded*.
   * Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.
2. Press a lever to the stopper bolt, then adjust length “B” as follows:

Length “B”	Reference (Length “L”)
207.7 mm (8.18 in)	217.3 mm (8.56 in)

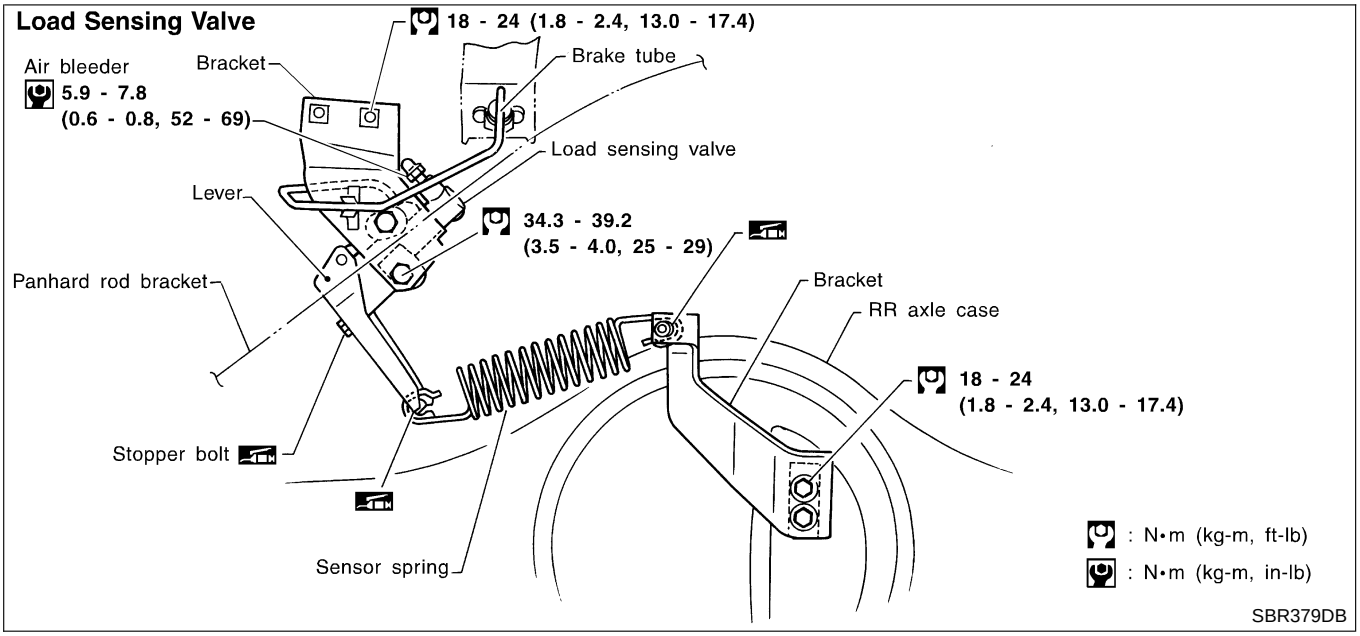
3. If length “B” is not within specification, adjust sensor spring length.

Removal and Installation

NABR0015

CAUTION:

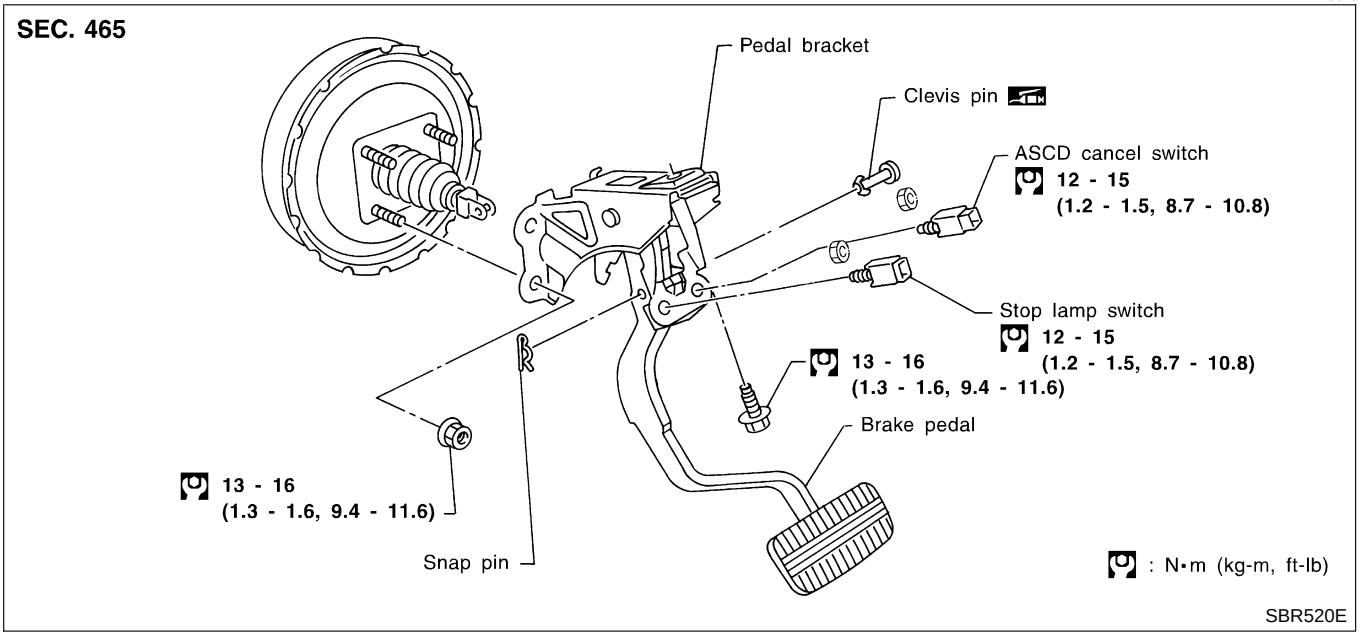
- **Refill with new brake fluid “DOT 3”.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**
- **Do not reuse Load Sensing Valve once it is disassembled.**
- **Replace damaged Load Sensing Valve as an assembly.**
- **When disassembling, apply multi-purpose grease to all rubbing areas.**



1. Tighten all flare nuts and mounting bolts.
   Flare nut:
   : 15 - 17 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)
2. Refill until new brake fluid comes out of each air bleeder valve.
3. Bleed air. Refer to "Bleeding Brake System", BR-8.

Removal and Installation

NABR0016

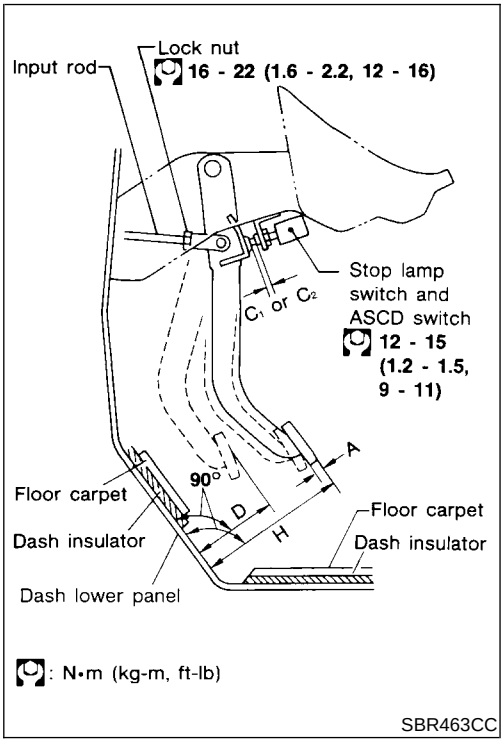


Inspection

NABR0017

Check brake pedal for following items.

- Brake pedal bend
- Clevis pin deformation
- Crack of any welded portion
- Crack or deformation of clevis pin stopper



Adjustment

NABR0018

Check brake pedal free height from metal panel.

H: Free height

Refer to SDS (BR-84).

D: Depressed height

Refer to SDS (BR-84).

Under force of 490 N (50 kg, 110 lb) with engine running

C_1, C_2: Clearance between pedal stopper and threaded end of stop lamp switch and ASCD switch

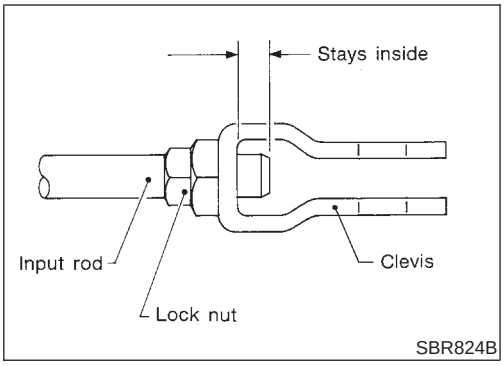
0.3 - 1.0 mm (0.012 - 0.039 in)

A: Pedal free play

1 - 3 mm (0.04 - 0.12 in)

If necessary, adjust brake pedal free height.

Adjustment (Cont'd)



1. Loosen lock nut and adjust pedal free height by turning brake booster input rod. Then tighten lock nut.

Make sure that tip of input rod stays inside.

2. Adjust clearance "C_1" and "C_2" with stop lamp switch and ASCD switch respectively. Then tighten lock nuts.
3. Check pedal free play.

Make sure that stop lamp is off when pedal is released.

4. Check brake pedal's depressed height while engine is running. If depressed height is below specified value, check brake system for leaks, accumulation of air or any damage to components (master cylinder, wheel cylinder, etc.). Then make necessary repairs.

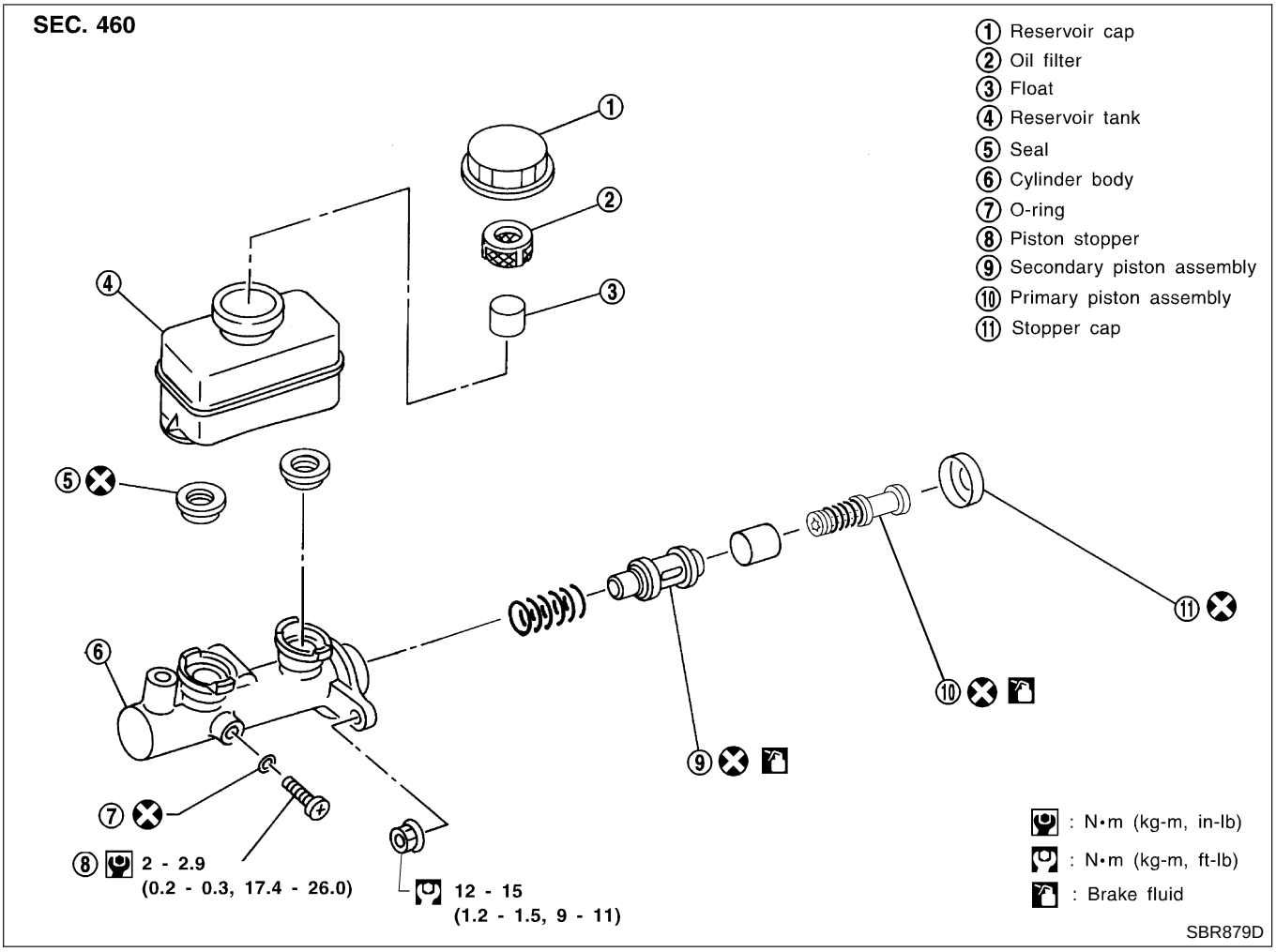
Removal

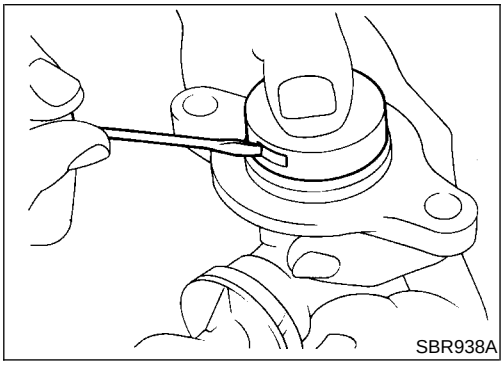
NABR0019

CAUTION:

- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**
- **In the case of brake fluid leakage from the master cylinder, disassemble the cylinder. Then check piston cups for deformation and scratches and replace necessary parts.**

1. Connect a vinyl tube to air bleeder valve.
2. Drain brake fluid from each air bleeder valve, depressing brake pedal to empty fluid from master cylinder.
3. Remove brake pipe flare nuts.
4. Remove master cylinder mounting nuts.

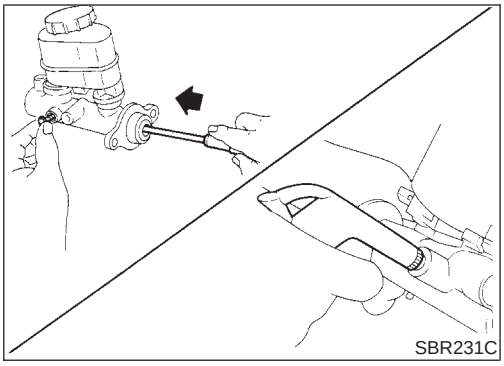




Disassembly

NABR0020

1. Bend claws of stopper cap outward.


SBR231C

2. Remove piston stopper while piston is pushed into cylinder.
3. Remove piston assemblies.

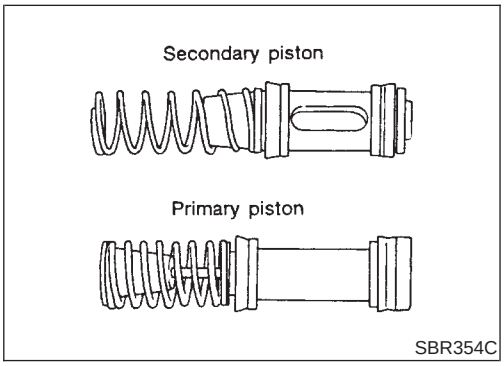
If it is difficult to remove secondary piston assembly, gradually apply compressed air through fluid outlet.

4. Draw out reservoir tank.

Inspection

NABR0021

Check master cylinder inner wall for pin holes and scratches. Replace if damaged.



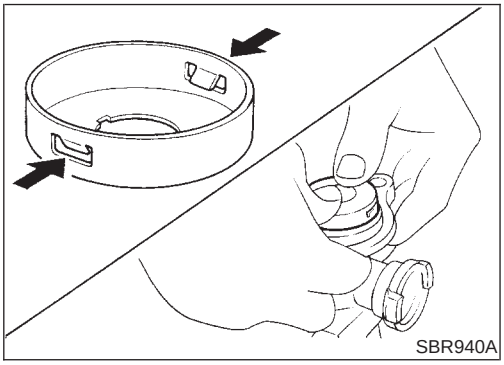
SBR354C

Assembly

NABR0022

1. Insert secondary piston assembly. Then insert primary piston assembly.

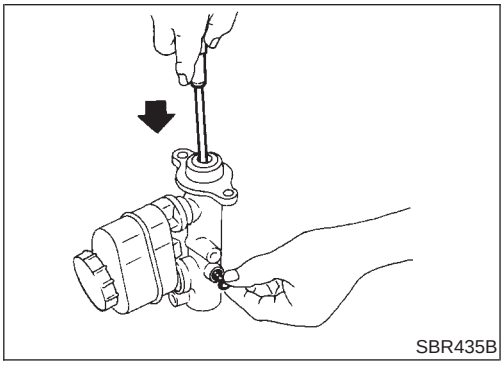
- **Pay attention to direction of piston cups in figure at left. Also, insert pistons squarely to avoid scratches on cylinder bore.**
- **Pay attention to alignment of secondary piston slit with valve stopper mounting hole of cylinder body.**


SBR940A

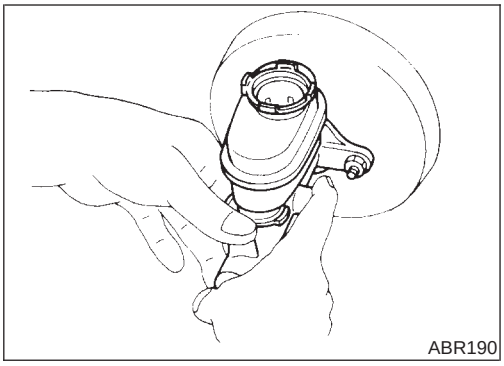
2. Install stopper cap.

Before installing stopper cap, ensure that claws are bent inward.

3. Push reservoir tank seals into cylinder body.
4. Push reservoir tank into cylinder body.


SBR435B

5. Install valve stopper while piston is pushed into cylinder.


ABR190

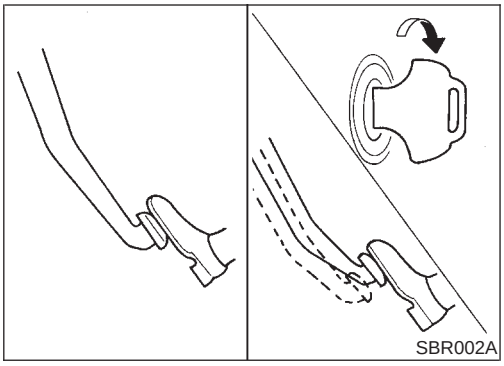
Installation

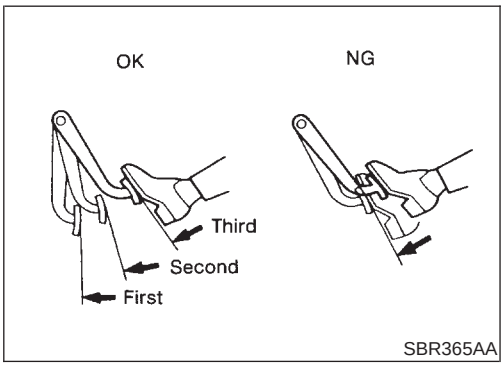
NABR0023

CAUTION:

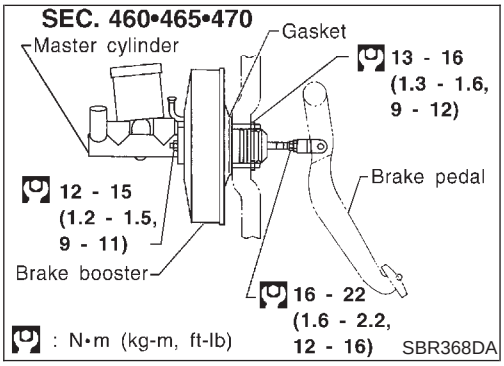
- **Refill with new brake fluid “DOT 3”.**
- **Never reuse drained brake fluid.**

1. Place master cylinder onto brake booster and secure mounting nuts lightly.
2. Torque mounting nuts.
   : 12 - 15 N·m (1.2 - 1.5 kg-m, 9 - 11 ft-lb)
3. Fill up reservoir tank with new brake fluid.
4. Plug all ports on master cylinder with fingers to prevent air suction while releasing brake pedal.
5. Have driver depress brake pedal slowly several times until no air comes out of master cylinder.
6. Fit brake lines to master cylinder.
7. Tighten flare nuts.
   : 15 - 17 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)
8. Bleed air. Refer to “Bleeding Brake System”, BR-8.

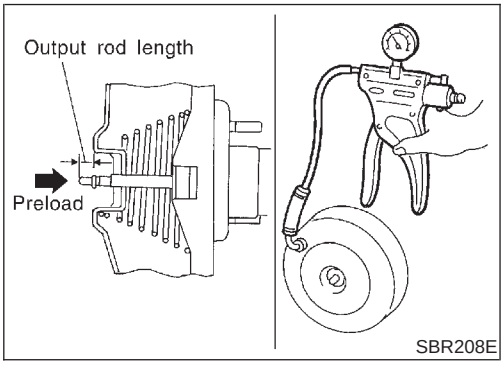

SBR002A



SBR365AA



SBR368DA



SBR208E

On-vehicle Service

NABR0024

OPERATING CHECK

NABR0024S01

1. Depress brake pedal several times with engine off. After exhausting vacuum, make sure there is no change in pedal stroke.
2. Depress brake pedal, then start engine. If pedal goes down slightly, operation is normal.

AIRTIGHT CHECK

NABR0024S02

1. Start engine, and stop it after one or two minutes. Depress brake pedal several times slowly. Booster is airtight if pedal stroke is less each time.
2. Depress brake pedal while engine is running, and stop engine with pedal depressed. The pedal stroke should not change after holding pedal down for **30 seconds**.

Removal

NABR0025

CAUTION:

- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**
- **Be careful not to deform or bend brake pipes, during removal of booster.**

Inspection

NABR0026

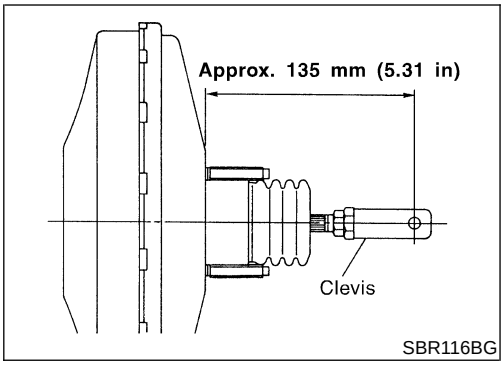
OUTPUT ROD LENGTH CHECK

NABR0026S01

1. Apply vacuum of −66.7 kPa (−500 mmHg, −19.69 inHg) to brake booster with a hand vacuum pump.
2. Add preload of 19.6 N (2.0 kg, 4.4 lb) to output rod.
3. Check output rod length.

Specified length:

10.275 - 10.525 mm (0.4045 - 0.4144 in)



Installation

=NABR0027

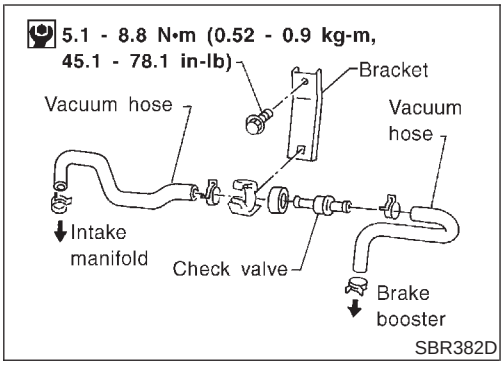
CAUTION:

- **Be careful not to deform or bend brake pipes during installation of booster.**
- **Replace clevis pin if damaged.**
- **Refill with new brake fluid “DOT 3”.**
- **Never reuse drained brake fluid.**
- **Take care not to damage brake booster mounting bolt thread when installing. Due to the narrow angle of installation, the threads can be damaged by the dash panel.**

1. Before fitting booster, temporarily adjust clevis to dimension shown.
2. Fit booster, then secure mounting nuts (brake pedal bracket to brake booster) lightly.
3. Connect brake pedal and booster input rod with clevis pin.
4. Secure mounting nuts.

   Specification: 13 - 16 N·m (1.3 - 1.6 kg-m, 9 - 12 ft-lb)
5. Install master cylinder. Refer to “Installation” in “MASTER CYLINDER”, BR-18.
6. Adjust brake pedal height and free play. Refer to “Adjustment” in “BRAKE PEDAL AND BRACKET”, BR-14.
7. Secure lock nut for clevis.

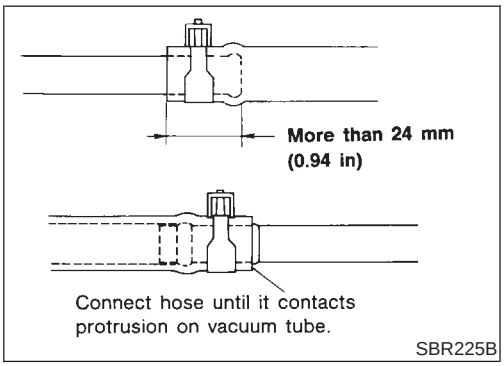
   : 16 - 22 N·m (1.6 - 2.2 kg-m, 12 - 16 ft-lb)
8. Bleed air. Refer to “Bleeding Brake System”, BR-8.



SBR382D

Vacuum Hose

NABR0028



SBR225B

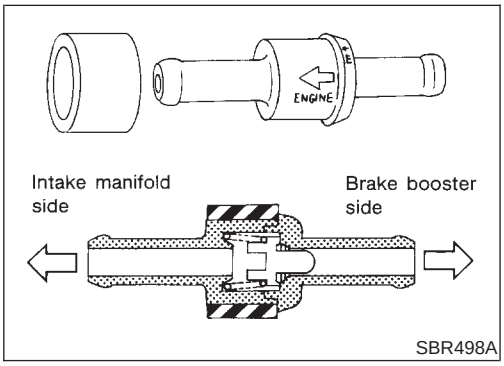
Removal and Installation

NABR0029

CAUTION:

When installing vacuum hoses, pay attention to the following points.

- **Do not apply any oil or lubricants to vacuum hose and check valve.**
- **Insert vacuum tube into vacuum hose as shown.**



SBR498A

- **Install check valve, paying attention to its direction.**

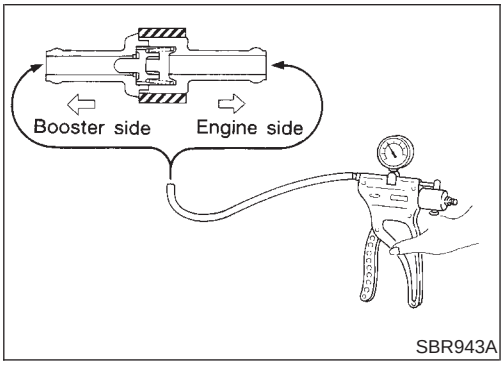
Inspection

NABR0030

HOSES AND CONNECTORS

NABR0030S01

Check vacuum lines, connections and check valve for airtightness, improper attachment chafing and deterioration.



SBR943A

CHECK VALVE

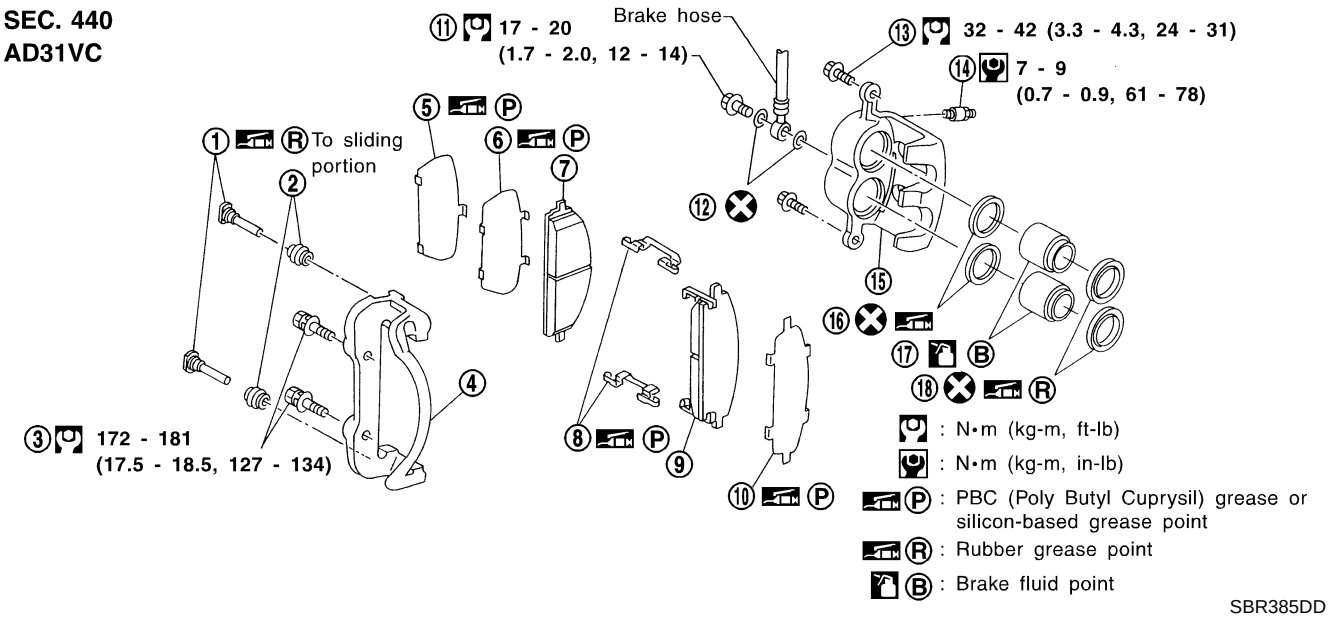
NABR0030S02

Check vacuum with a vacuum pump.

Connect to booster side	Vacuum should exist.
Connect to engine side	Vacuum should not exist.

Components

NABR0031



1. Main pin
2. Pin boot
3. Torque member fixing bolt
4. Torque member
5. Shim cover
6. Inner shim
7. Inner pad
8. Pad retainer
9. Outer pad
10. Outer shim
11. Connecting bolt
12. Copper washer
13. Main pin bolt
14. Bleed valve
15. Cylinder body
16. Piston seal
17. Piston
18. Piston boot

Pad Replacement

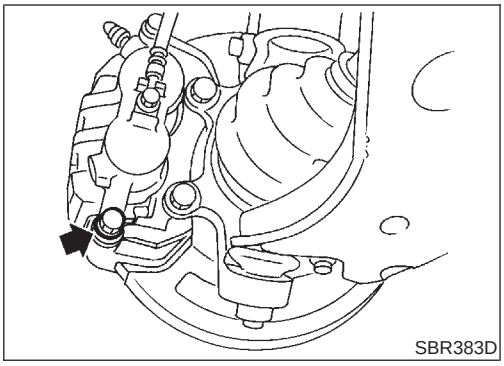
NABR0032

WARNING:

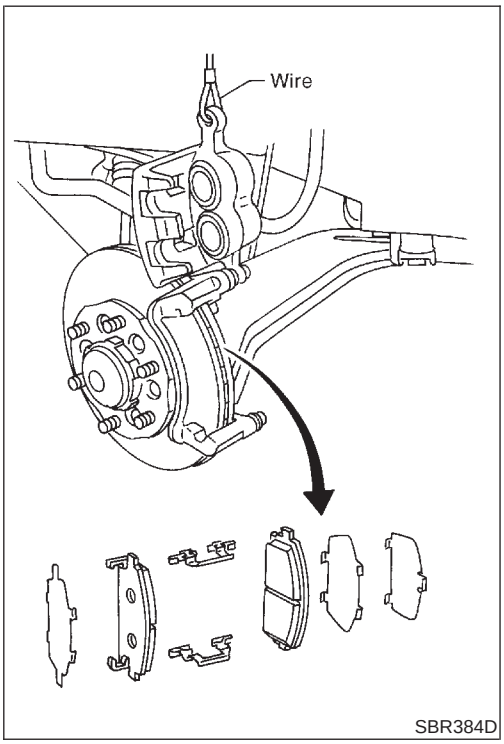
Clean brakes with a vacuum dust collector to minimize the hazard of airborne particles or other materials.

CAUTION:

- **When cylinder body is open, do not depress brake pedal, or piston will pop out.**
- **Be careful not to damage piston boot or get oil on rotor. Always replace shims when replacing pads.**
- **If shims are rusted or show peeling of the rubber coat, replace them with new shims.**
- **It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend cylinder body with wire so as not to stretch brake hose.**
- **Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston.**


SBR383D

1. Remove master cylinder reservoir cap.
2. Remove lower pin bolt.



SBR384D

3. Open cylinder body upward. Then remove pad retainers, and inner and outer shims.

Standard pad thickness:
11.0 mm (0.433 in)
Pad wear limit:
2.0 mm (0.079 in)

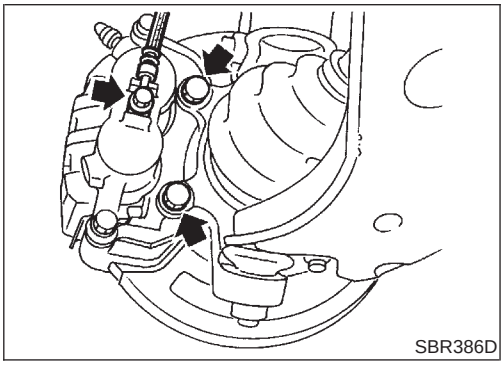
Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston.

Removal

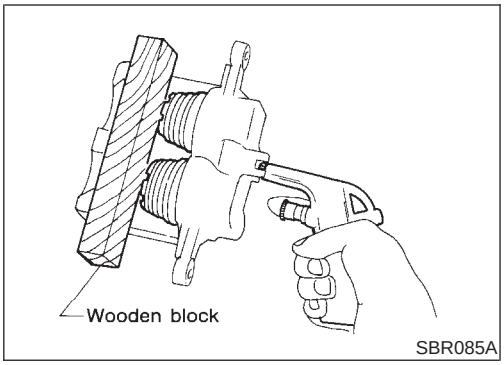
NABR0033

WARNING:
Clean brake pads with a vacuum dust collector to minimize the hazard of airborne particles or other materials.

CAUTION:
Suspend caliper assembly with wire so as not to stretch brake hose.


SBR386D

Remove torque member fixing bolts and connecting bolt.
It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend caliper assembly with wire so as not to stretch brake hose.



Disassembly

NABR0034

WARNING:

Do not place your fingers in front of piston.

CAUTION:

Do not scratch or score cylinder wall.

1. Push out piston with dust seal with compressed air.
2. Remove piston seal with a suitable tool.

Inspection

NABR0035

CALIPER

NABR0035S01

Cylinder Body

NABR0035S0101

- Check inside surface of cylinder for score, rust, wear, damage and presence of foreign objects. If any of the above conditions are observed, replace cylinder body.
- Minor damage from rust or foreign objects may be eliminated by polishing surface with a fine emery paper. Replace cylinder body if necessary.

CAUTION:

Use brake fluid to clean. Never use mineral oil.

Piston

NABR0035S0102

Check piston for score, rust, wear, damage and presence of foreign objects. Replace if any of the above conditions are observed.

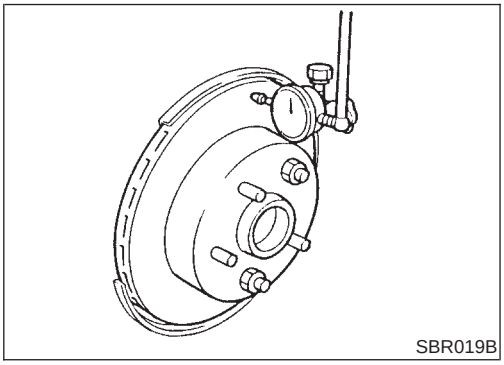
CAUTION:

Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign objects are stuck to sliding surface.

Slide Pin, Pin Bolt and Pin Boot

NABR0035S0103

Check for wear, cracks, rust and other damage. Replace if any of the above conditions are observed.



ROTOR

NABR0035S02

Runout

NABR0035S0201

1. Secure rotor to wheel hub with at least two nuts (M12 × 1.25).
2. Check runout using a dial indicator.

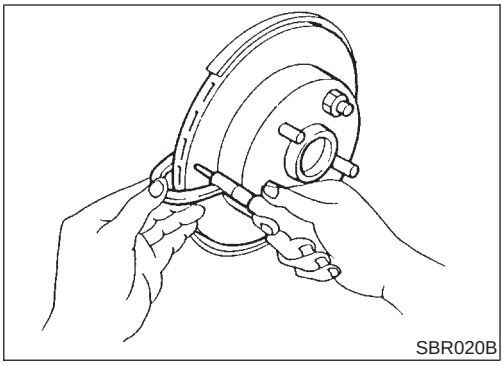
Make sure that wheel bearing axial end play is within the specifications before measuring. Refer to AX-4, "Front Wheel Bearing".

Maximum runout:
0.1 mm (0.004 in)

3. If the runout is out of specification, find minimum runout position as follows:

a. Remove nuts and rotor from wheel hub.
b. Shift the rotor one hole and secure rotor to wheel hub with nuts.
c. Measure runout.
d. Repeat steps a. to c. so that minimum runout position can be found.

4. If the runout is still out of specification, turn rotor with on-car brake lathe ("MAD, DL-8700", "AMMCO 700 and 705" or equivalent).


SBR020B

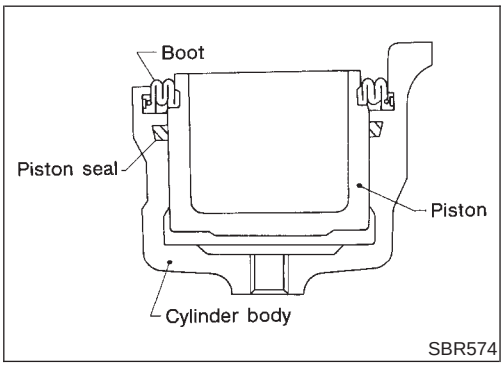
Thickness

NABR0035S0202

Thickness variation (At least 8 positions):
Maximum 0.015 mm (0.0006 in)

If thickness variation exceeds the specification, turn rotor with on-car brake lathe.

Rotor repair limit:
26.0 mm (1.024 in)

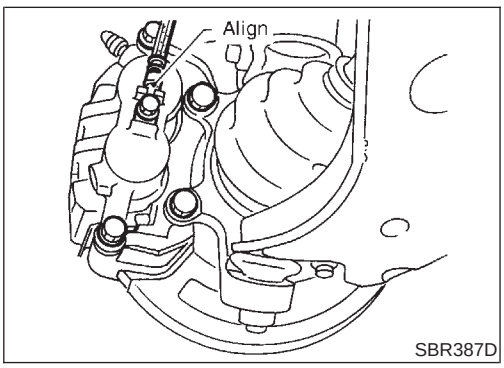


SBR574

Assembly

NABR0036

1. Insert piston seal into groove on cylinder body.
2. With piston boot fitted to piston, insert piston boot into groove on cylinder body and install piston.
3. Properly secure piston boot.



SBR387D

Installation

NABR0037

CAUTION:

- **Refill with new brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**

1. Install caliper assembly.
2. Install brake hose to caliper securely.
3. Install all parts and secure all bolts.
4. Bleed air. Refer to "Bleeding Brake System", BR-8.

Brake Burnishing Procedure

NABR0088

When experiencing soft brake pedal feel at very low mileage, or after replacing the rotor, burnish the brake pad contact surfaces according to the following procedures.

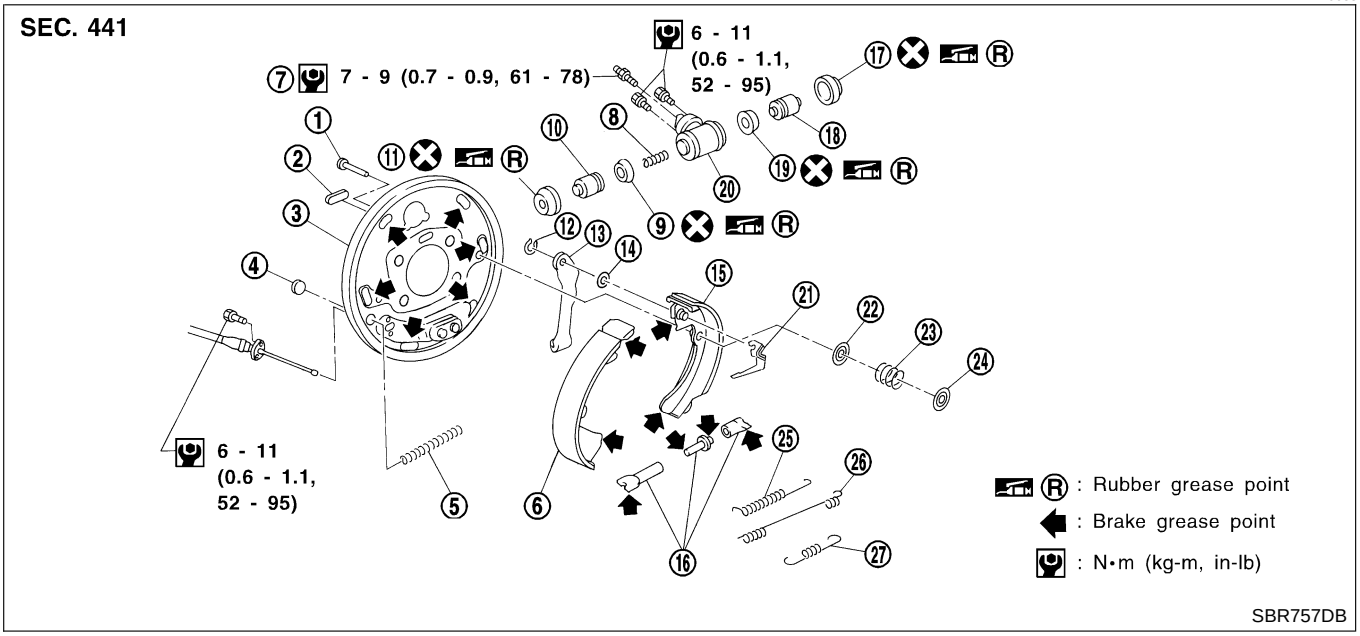
CAUTION:

Only perform this procedure under safe road and traffic conditions. Use extreme caution.

1. Drive the vehicle on a straight smooth road at 50 km/h (31 MPH).
2. Use medium brake pedal/foot effort to bring the vehicle to a complete stop from 50 km/h (31 MPH). Adjust brake pedal/foot pressure such that vehicle stopping time equals 3 to 5 seconds.
3. To cool the brake system, drive the vehicle at 50 km/h (31 MPH) for 1 minute without stopping.
4. Repeat steps 1 to 3 10 times or more to complete the burnishing procedure.

Components

NABR0038



1. Shoe hold pin
2. Plug
3. Back plate
4. Check plug
5. Spring
6. Shoe (leading side)
7. Air bleeder
8. Spring
9. Piston cup
10. Piston
11. Boot
12. Retainer ring
13. Toggle lever
14. Wave washer
15. Shoe (trailing side)
16. Adjuster
17. Boot
18. Piston
19. Piston cup
20. Wheel cylinder
21. Adjuster lever
22. Spring seat
23. Shoe hold spring
24. Retainer
25. Adjuster spring
26. Return spring (upper)
27. Return spring (lower)

Removal

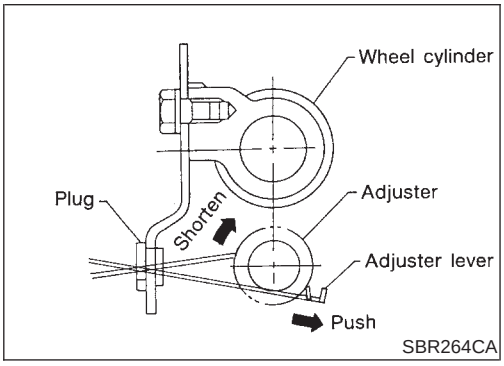
NABR0039

WARNING:

Clean brake lining with a vacuum dust collector to minimize the hazard of airborne asbestos or other materials.

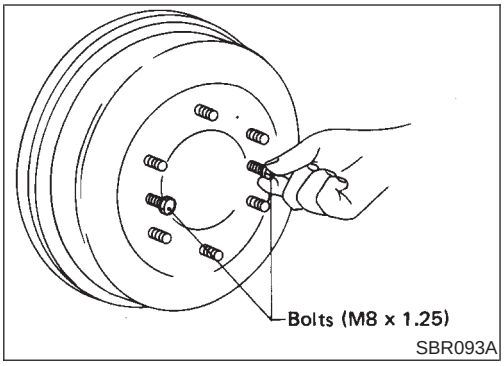
CAUTION:

Make sure parking brake lever is released completely.



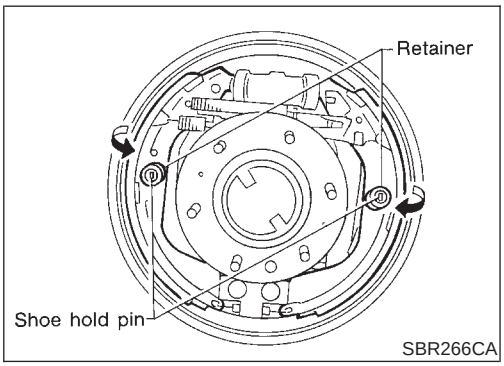
1. Release parking brake lever fully, then remove drum.
   If drum is hard to remove, the following procedures should be carried out.

a. Remove plug. Then shorten adjuster to make clearance between brake shoe and drum as shown.



SBR093A

b. Tighten the two bolts gradually.

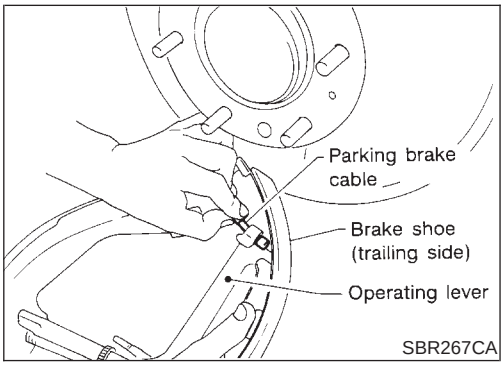


SBR266CA

2. After removing shoe hold pin by rotating push retainer, remove leading shoe then remove trailing shoe. Remove spring by rotating shoes in direction arrow.

Be careful not to damage wheel cylinder piston boots.

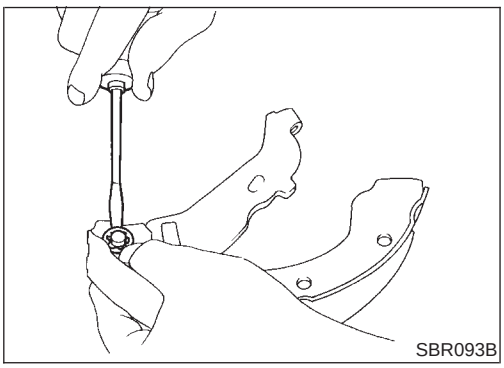
3. Remove adjuster.



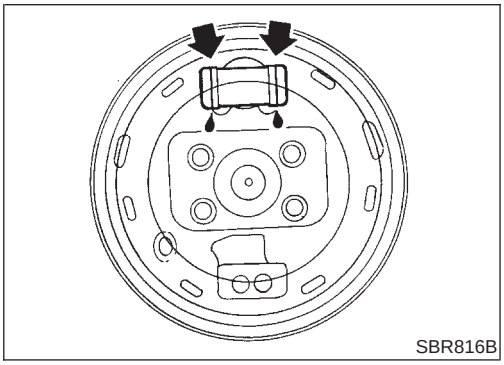
SBR267CA

4. Disconnect parking brake cable from toggle lever.

Be careful not to damage parking brake cable when separating it.


SBR093B

5. Remove retainer ring with a suitable tool. Then separate toggle lever and brake shoe.


SBR816B

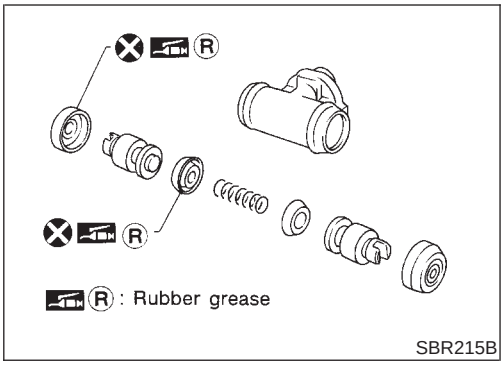
Inspection

NABR0040

WHEEL CYLINDER

NABR0040S01

- Check wheel cylinder for leakage.
- Check for wear, damage and loose conditions. Replace if any such condition exists.

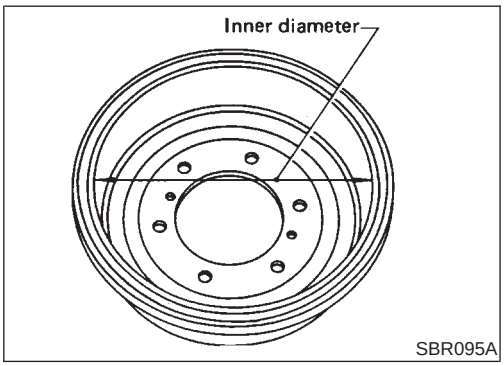


SBR215B

Wheel Cylinder Overhaul

NABR0041

- Check all internal parts for wear, rust and damage. Replace if necessary.
- Pay attention so as not to scratch cylinder when installing pistons.



SBR095A

Inspection

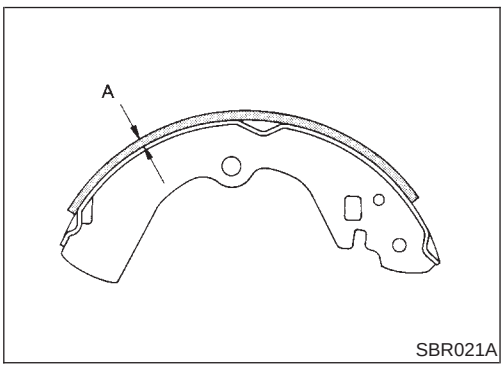
NABR0042

DRUM

NABR0042S01

Maximum inner diameter:
296.5 mm (11.67 in)
Out-of-roundness:
0.03 mm (0.0012 in) or less

- Contact surface should be fine finished with No. 120 to 150 emery paper.
- Using a drum lathe, lathe brake drum if it shows scoring, partial wear or stepped wear.
- After brake drum has been completely reconditioned or replaced, check drum and shoes for proper contact pattern.



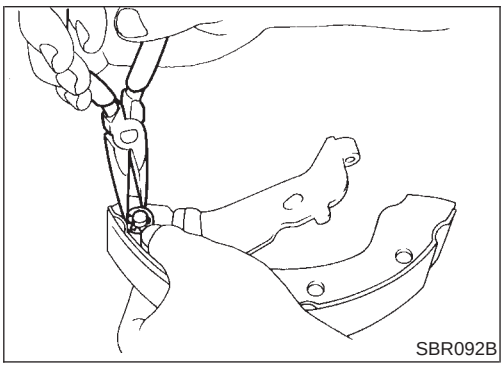
SBR021A

LINING

NABR0042S02

Check lining thickness.

Standard lining thickness:
6.1 mm (0.240 in)
Lining wear limit (A):
1.5 mm (0.059 in)

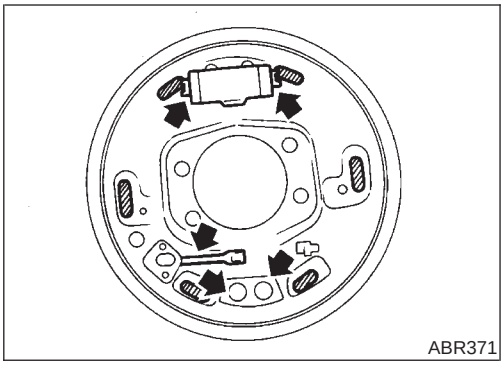

SBR092B

Installation

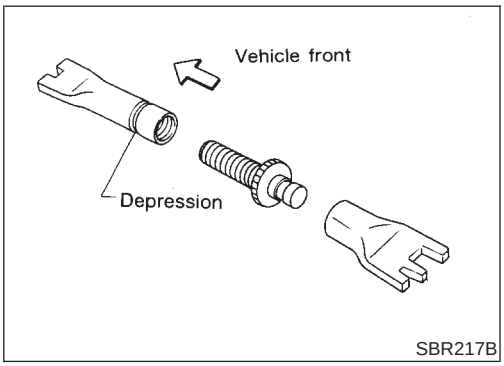
NABR0043

Always perform shoe clearance adjustment. Refer to BR-31.

1. Fit toggle lever to brake shoe (trailing side) with retainer ring.


ABR371

2. Apply brake grease to the contact areas (indicated by arrows and hatching) shown at left.

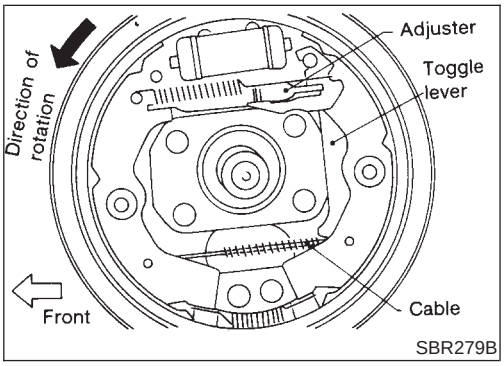


SBR217B

3. Shorten adjuster by rotating it.

- **Pay attention to direction of adjuster.**

Wheel	Screw	Depression
Left	Left-hand thread	Yes
Right	Right-hand thread	No



SBR279B

4. Connect parking brake cable to toggle lever.
5. Install all parts.

Be careful not to damage wheel cylinder piston boots.

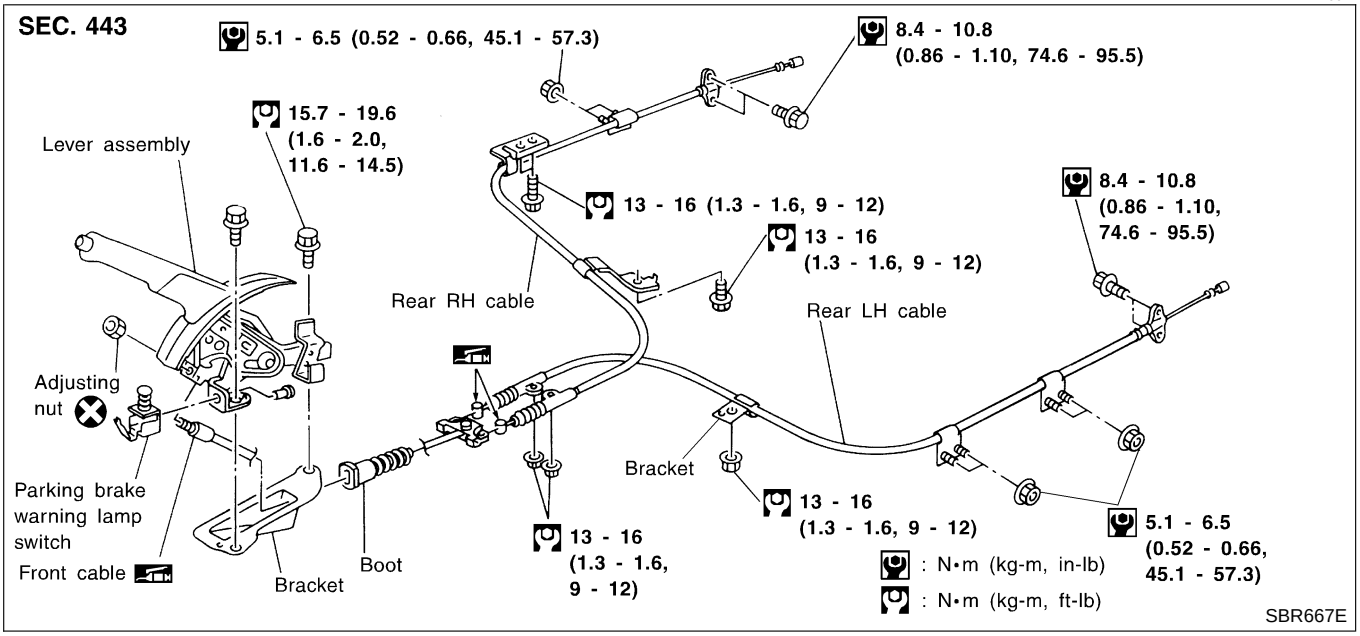
6. Check all parts are installed properly.

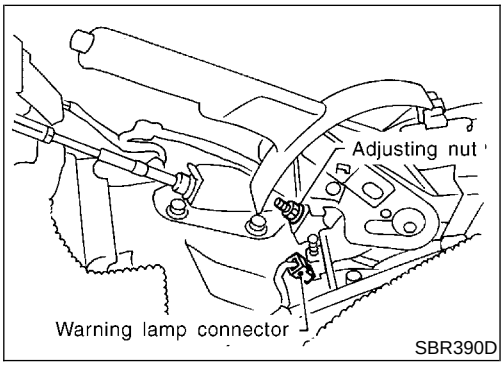
Pay attention to direction of adjuster assembly.

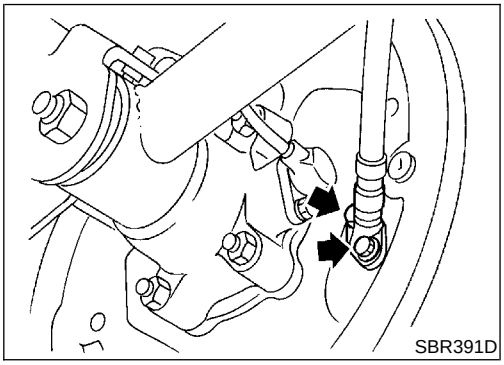
7. Install brake drum.
8. When installing new wheel cylinder or overhauling wheel cylinder, bleed air. Refer to "Bleeding Brake System", BR-8.
9. Adjust parking brake. Refer to "Adjustment", "PARKING BRAKE CONTROL", BR-31.

Components

NABR0044







Removal and Installation

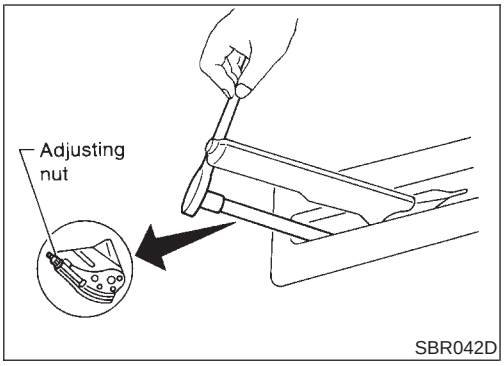
NABR0045

1. To remove parking brake cable, first remove center console.
2. Disconnect warning lamp connector.
3. Remove bolts, slacken off and remove adjusting nut.
4. Disconnect cable. Refer to “Removal”, “REAR DRUM BRAKE”, BR-26.

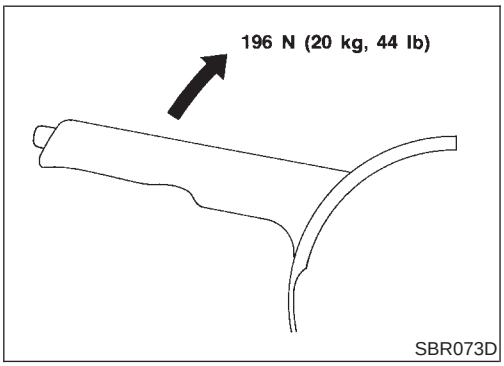
Inspection

NABR0046

1. Check control lever for wear and other damage. Replace if necessary.
2. Check wires for discontinuity and deterioration. Replace if necessary.
3. Check warning lamp and switch. Replace if necessary.
4. Check parts at each connecting portion and, if deformed or damaged, replace.



SBR042D



SBR073D

Adjustment

NABR0047

1. Adjust clearance between shoe and drum as follows:

a. Release parking brake lever and loosen adjusting nut.

b. Depress brake pedal fully at least 10 times with engine running.

2. Pull control lever 4 - 5 notches. Then adjust control lever by turning adjusting nut.

3. Pull control lever with specified amount of force. Check lever stroke and ensure smooth operation.

Number of notches: 6 - 8

4. Bend warning lamp switchplate to ensure:

- Warning lamp comes on when lever is lifted “A” notches.
- Warning lamp goes out when lever is fully released.

Number of “A” notches: 1 or less

Purpose

NABR0089

The Anti-Lock Brake System (ABS) consists of electronic and hydraulic components. It allows for control of braking force so locking of the wheels can be avoided.

1) Improves proper tracking performance through steering wheel operation.
2) Eases obstacle avoidance through steering wheel operation.
3) Improves vehicle stability.

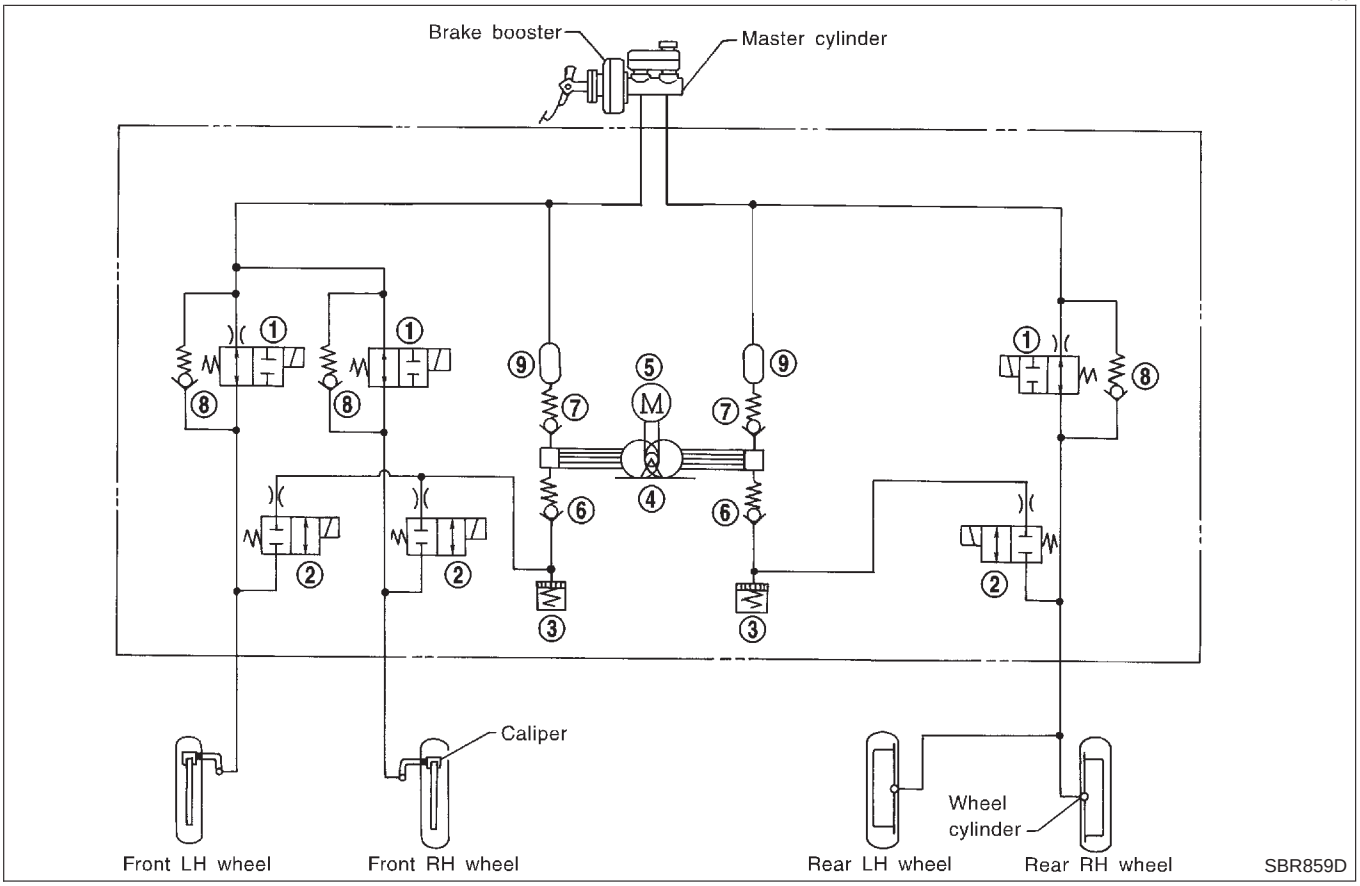
Operation

NABR0090

- When the vehicle speed is less than 10 km/h (6 MPH) this system does not work.
- The Anti-Lock Brake System (ABS) has a self-test function. The system turns on the ABS warning lamp for 1 second each time the ignition switch is turned “ON”. After the engine is started, the ABS warning lamp turns off. The system performs a test the first time the vehicle reaches 6 km/h (4 MPH). A mechanical noise may be heard as the ABS performs this self-test. This is a normal part of the self-test feature. If a malfunction is found during this check, the ABS warning lamp will stay on.
- While driving, a mechanical noise may be heard during ABS operation. This is a normal condition.

ABS Hydraulic Circuit

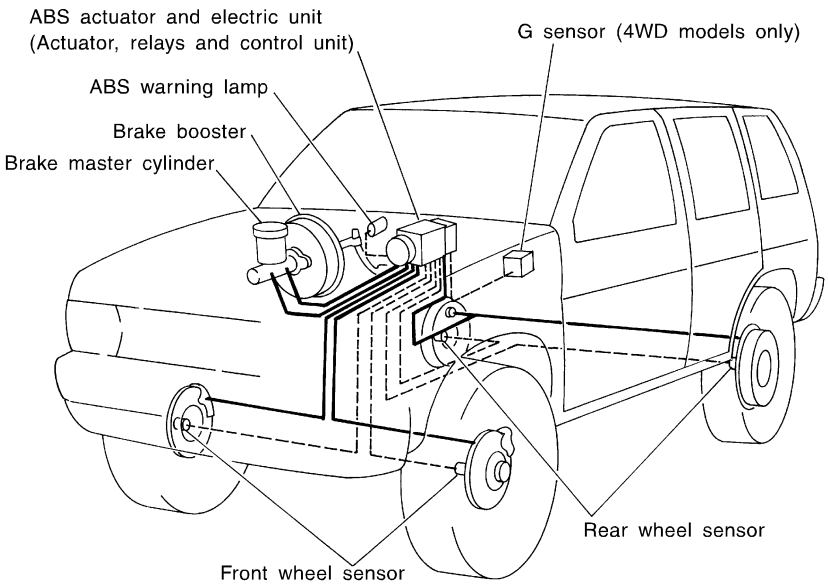
NABR0091



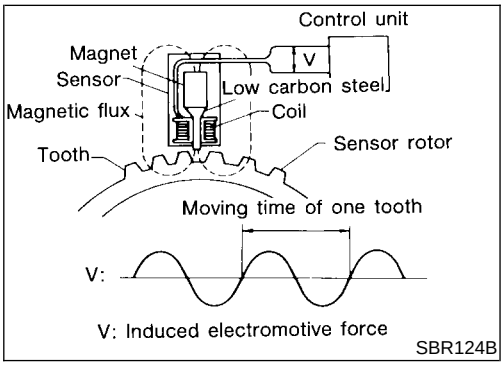
1. Inlet solenoid valve
2. Outlet solenoid valve
3. Reservoir
4. Pump
5. Motor
6. Inlet valve
7. Outlet valve
8. Bypass check valve
9. Damper

System Components

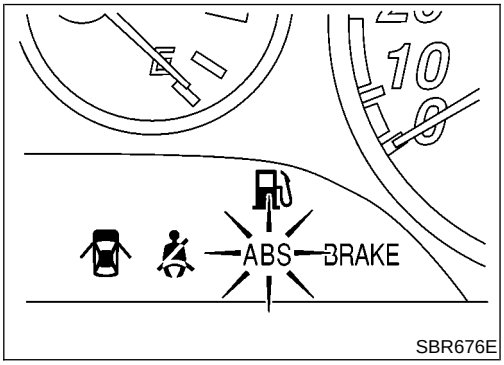
NABR0092



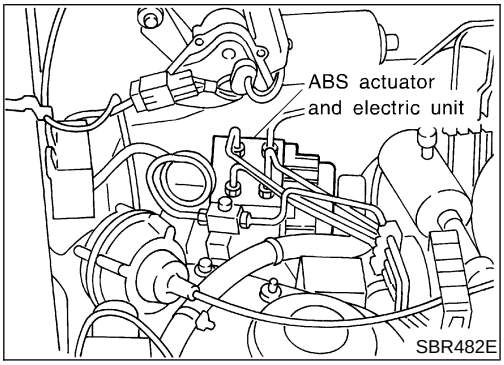
SBR447EA



SBR124B



SBR676E



SBR482E

System Description

NABR0093

SENSOR

NABR0093S01

The sensor unit consists of a gear-shaped sensor rotor and a sensor element. The element contains a bar magnet around which a coil is wound. The front sensors are installed on the front spindles and the rear sensors are installed on the rear spindles. As the wheel rotates, the sensor generates a sine-wave pattern. The frequency and voltage increase(s) as the rotating speed increases.

CONTROL UNIT (BUILT-IN ABS ACTUATOR AND ELECTRIC UNIT)

NABR0093S02

The control unit computes the wheel rotating speed by the signal current sent from the sensor. Then it supplies a DC current to the actuator solenoid valve. It also controls ON-OFF operation of the valve relay and motor relay. If any electrical malfunction should be detected in the system, the control unit causes the warning lamp to light up. In this condition, the ABS will be deactivated by the control unit, and the vehicle's brake system reverts to normal operation. (For control unit layout, refer to ABS ACTUATOR AND ELECTRIC UNIT, BR-33.)

ABS ACTUATOR AND ELECTRIC UNIT

NABR0093S03

The ABS actuator and electric unit contains:

- An electric motor and pump
- Two relays
- Six solenoid valves, each inlet and outlet for
  — LH front
  — RH front
  — Rear
- ABS control unit

This component controls the hydraulic circuit and increases, holds or decreases hydraulic pressure to all or individual wheels. The ABS actuator and electric unit is serviced as an assembly.

ABS Actuator Operation

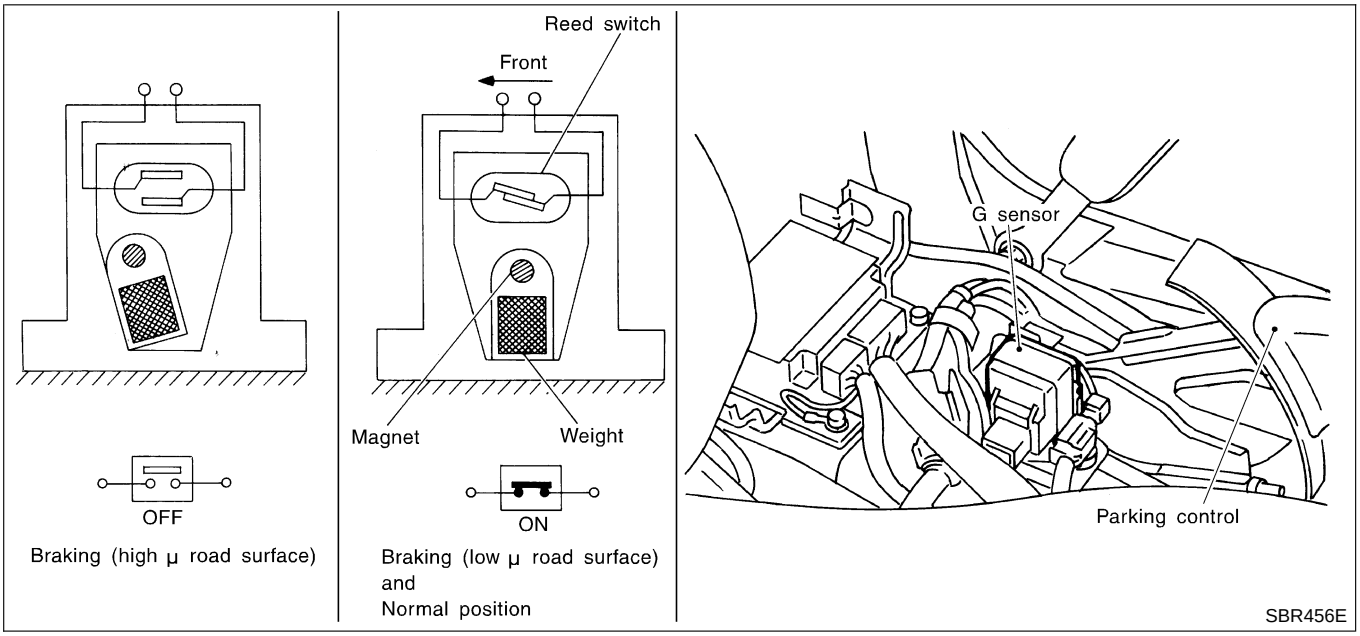
NABR0093S0301

		Inlet solenoid valve	Outlet solenoid valve	
Normal brake operation		OFF (Open)	OFF (Closed)	Master cylinder brake fluid pressure is directly transmitted to caliper via the inlet solenoid valve.
ABS operation	Pressure hold	ON (Closed)	OFF (Closed)	Hydraulic circuit is shut off to hold the caliper brake fluid pressure.
	Pressure decrease	ON (Closed)	ON (Open)	Caliper brake fluid is sent to reservoir via the outlet solenoid valve. Then it is pushed up to the master cylinder by pump.
	Pressure increase	OFF (Open)	OFF (Closed)	Master cylinder brake fluid pressure is transmitted to caliper.

G SENSOR (4WD MODELS ONLY)

NABR0093S05

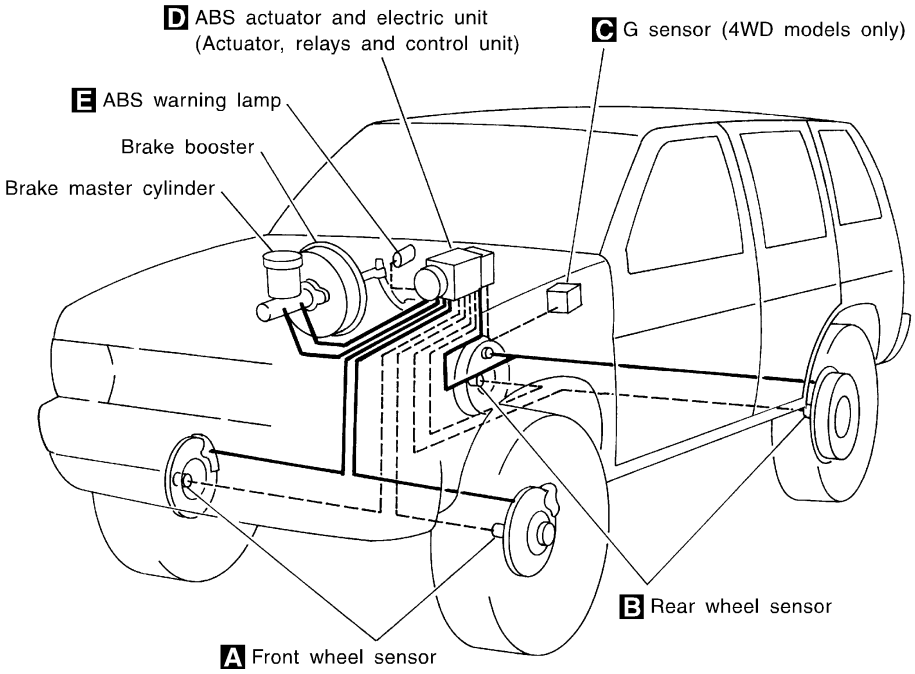
The G sensor senses deceleration during braking to determine whether the vehicle is being driven on a high µ road (asphalt road, etc.) or a low µ road (snow-covered road, etc.). It then sends a signal to the ABS control unit.

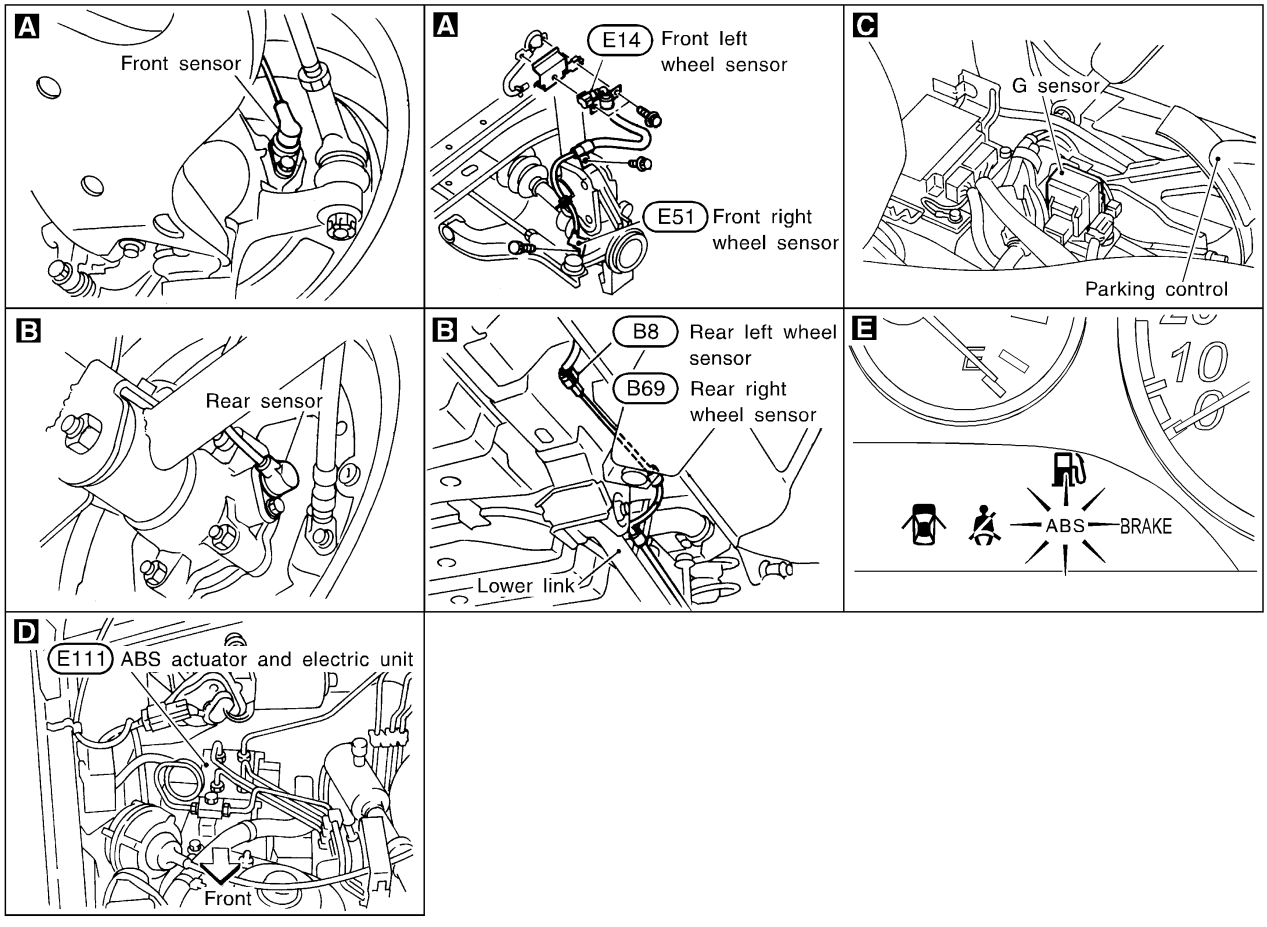


The reed switch turns on when it is affected by a magnetic field. During sudden deceleration (braking on a high µ road), the weight moves and the magnet in the weight moves away from the reed switch. The magnetic field then diminishes and the reed switch turns off.

Component Parts and Harness Connector Location

NABR0094

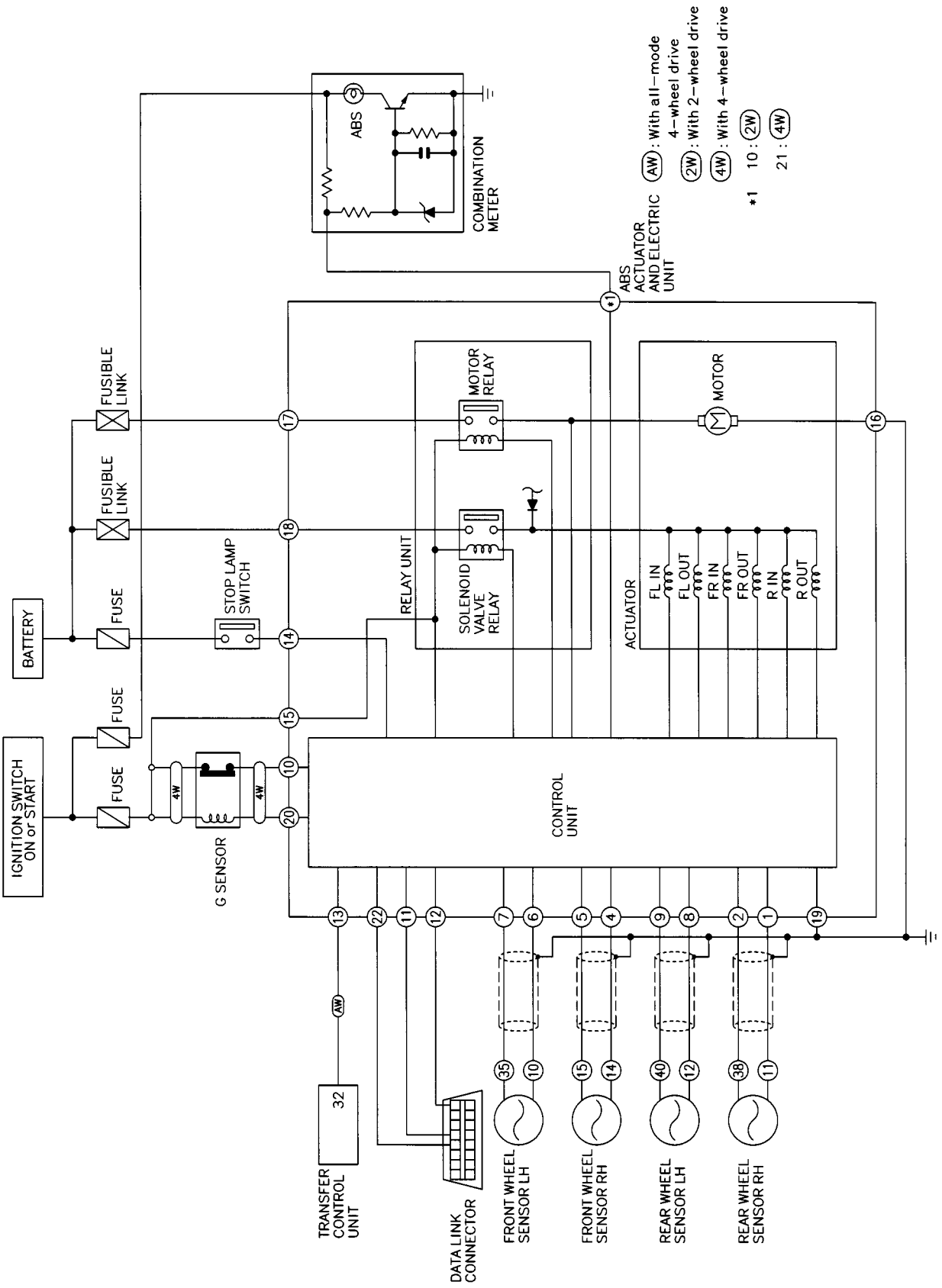




SBR678E

Schematic

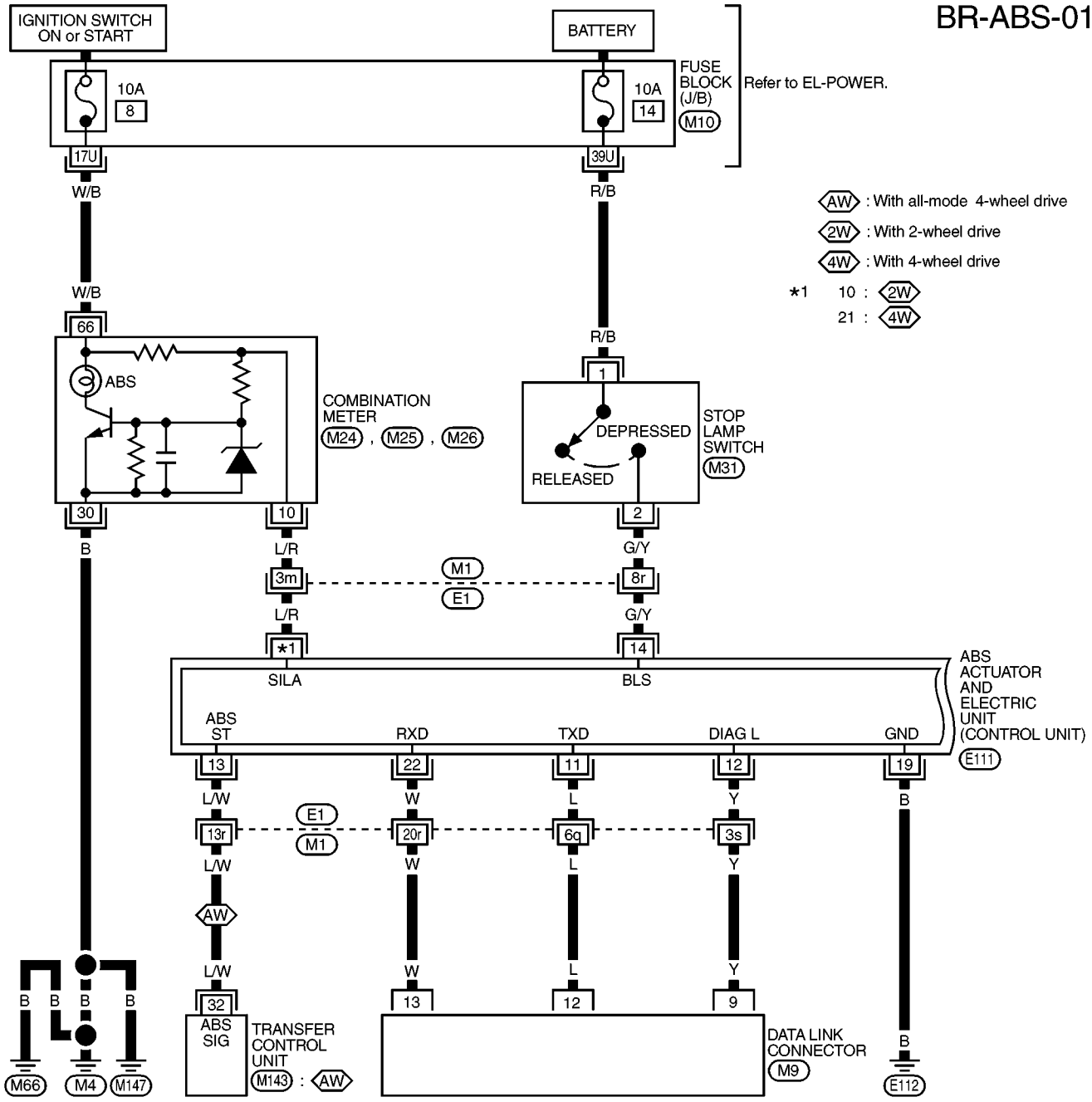
NABR0095

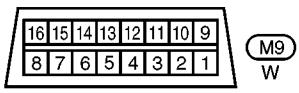


MBR442A

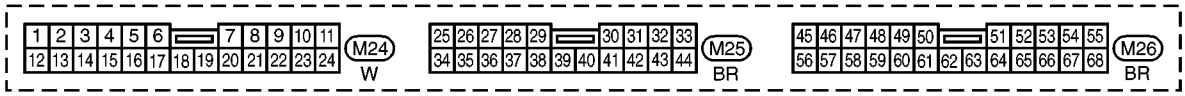
Wiring Diagram — ABS —

NABR0096





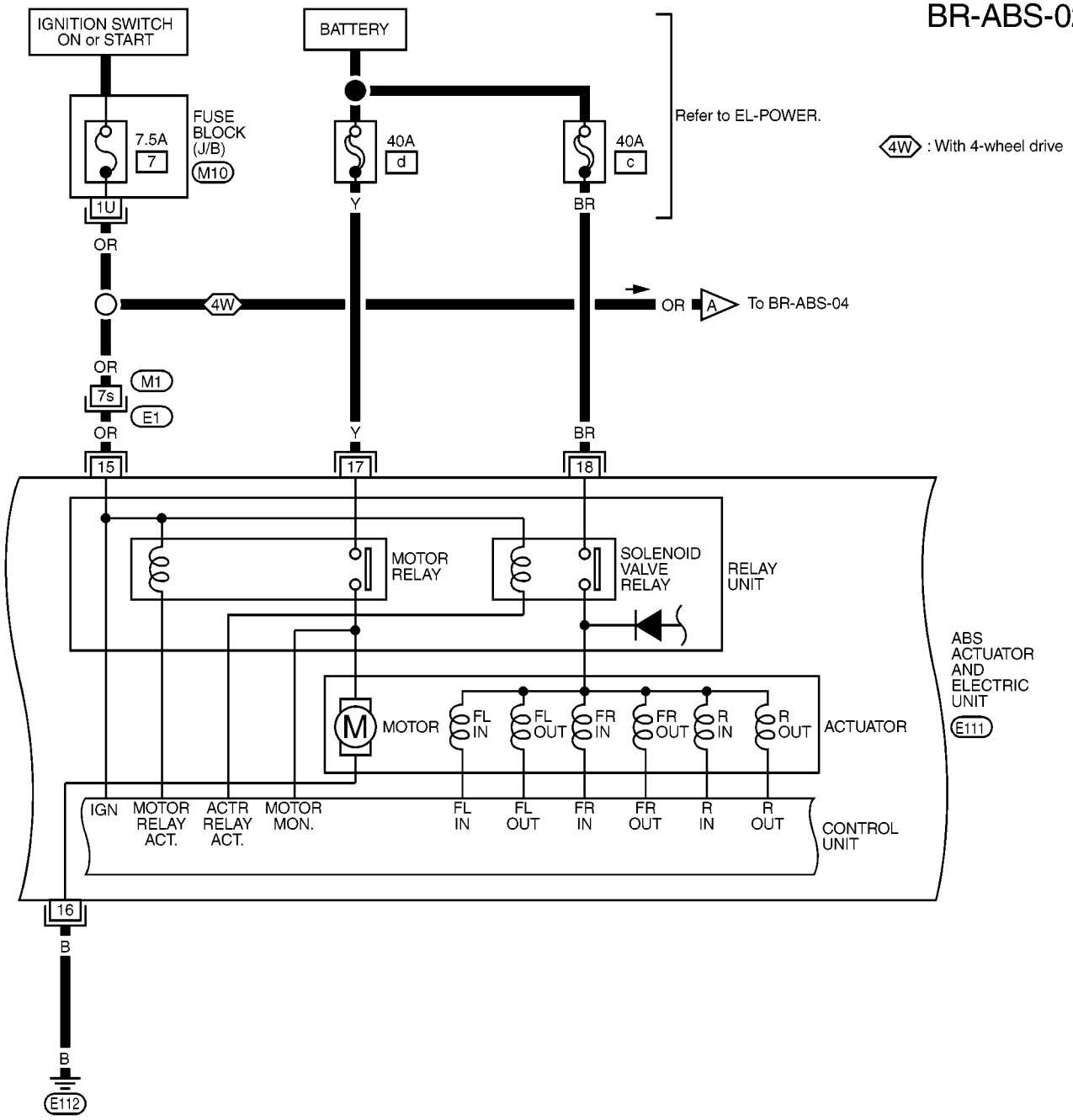
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK- JUNCTION BOX (J/B)

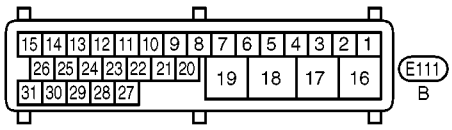




MBR443A

BR-ABS-02

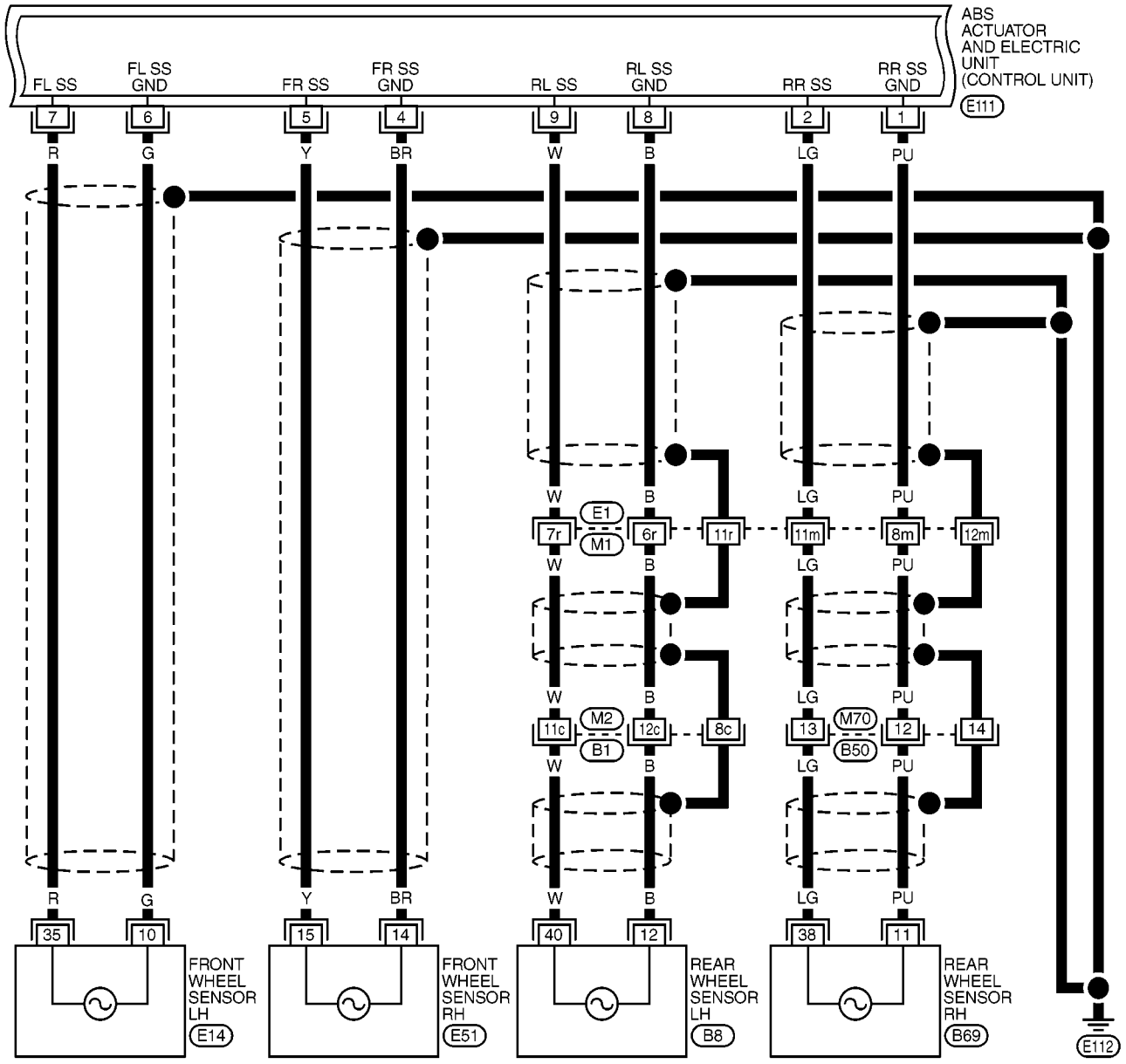


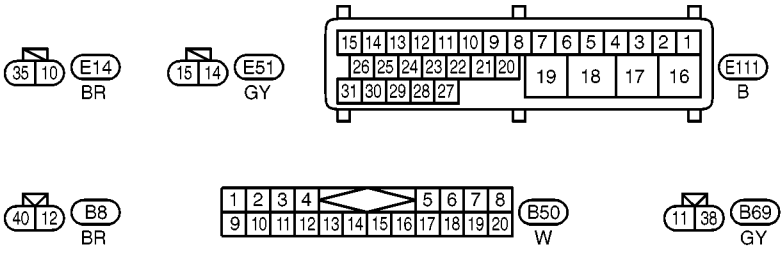


REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK- JUNCTION BOX (J/B)

MBR438A

BR-ABS-03

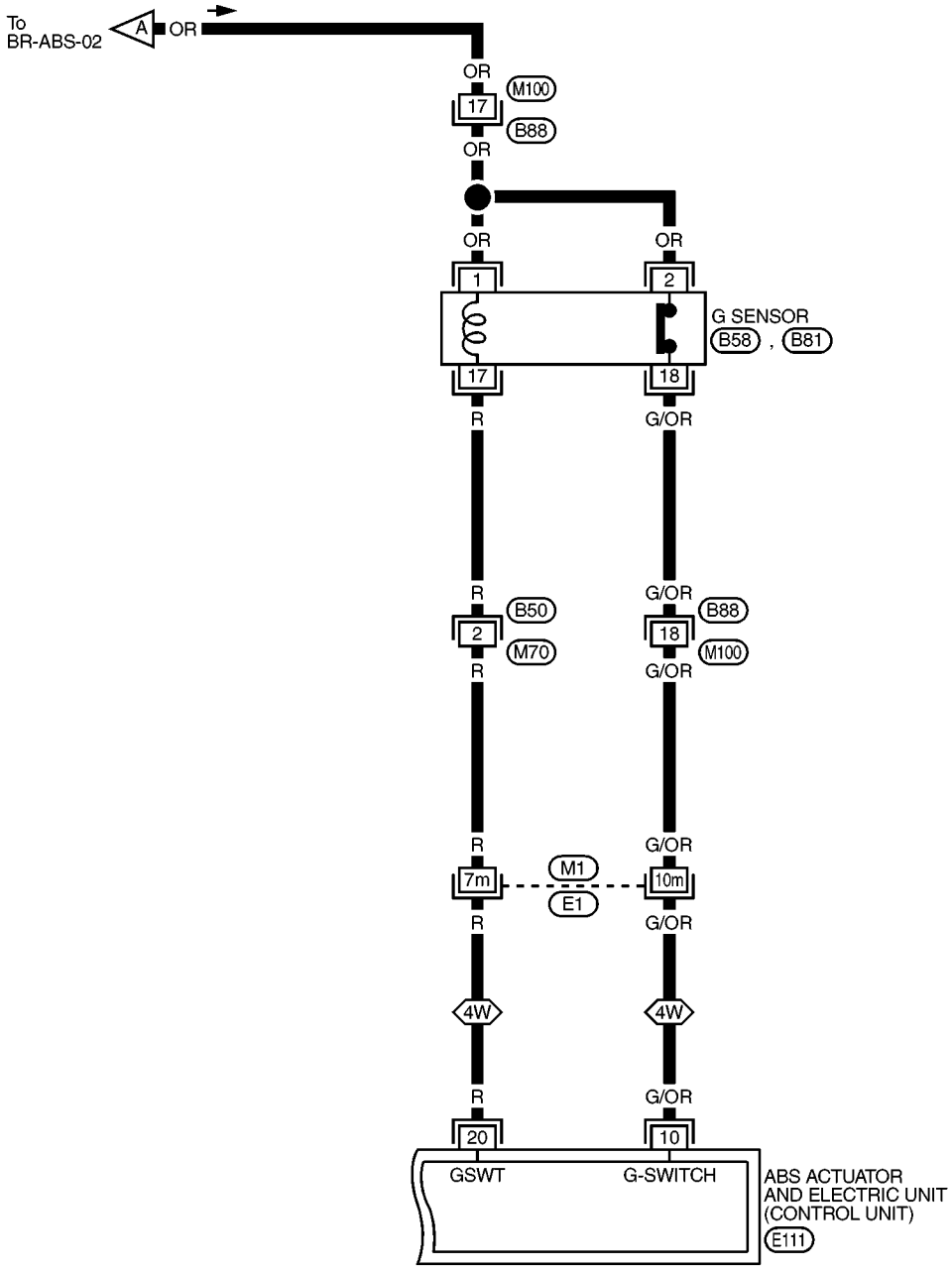


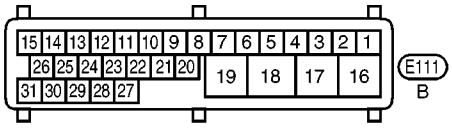


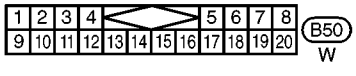
REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION(SMJ)

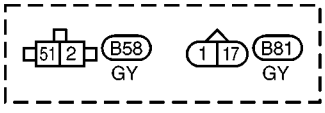
MBR439A

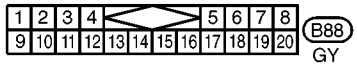
BR-ABS-04











REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

MBR440A

Self-diagnosis

NABR0097

FUNCTION

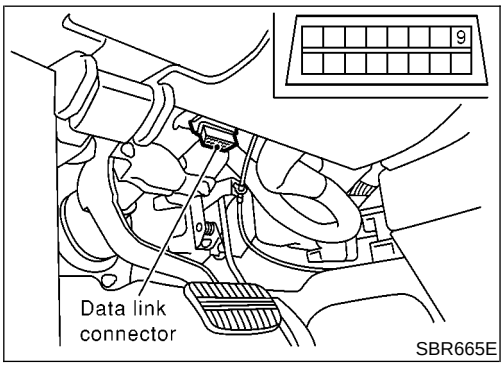
NABR0097S01

- When a problem occurs in the ABS, the warning lamp on the instrument panel comes on. To start the self-diagnostic results mode, ground the self-diagnostic (check) terminal located on data link connector. The location of the malfunction is indicated by the warning lamp flashing.

SELF-DIAGNOSIS PROCEDURE

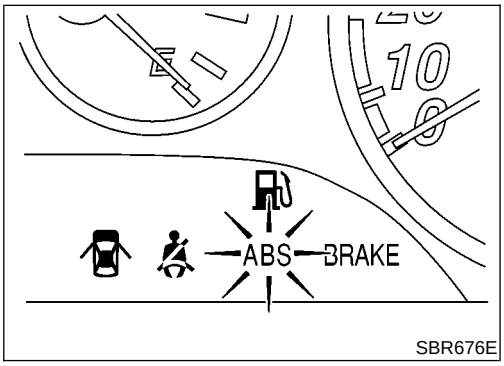
NABR0097S02

1. Drive vehicle over 30 km/h (19 MPH) for at least one minute.
2. Turn ignition switch OFF.



SBR665E

3. Ground terminal 9 of data link connector with a suitable harness.
4. Turn ignition switch ON while grounding terminal 9.
   Do not depress brake pedal.



SBR676E

5. After 3.0 seconds, the warning lamp starts flashing to indicate the malfunction code No. (See NOTE.)
6. Verify the location of the malfunction with the malfunction code chart. Refer to BR-54. Then make the necessary repairs following the diagnostic procedures.
7. After the malfunctions are repaired, erase the malfunction codes stored in the control unit. Refer to BR-42.
8. Rerun the self-diagnostic results mode to verify that the malfunction codes have been erased.
9. Disconnect the check terminal from the ground. The self-diagnostic results mode is now complete.
10. Check warning lamp for deactivation after driving vehicle over 30 km/h (19 MPH) for at least one minute.
11. After making certain that warning lamp does not come on, test the ABS in a safe area to verify that it functions properly.

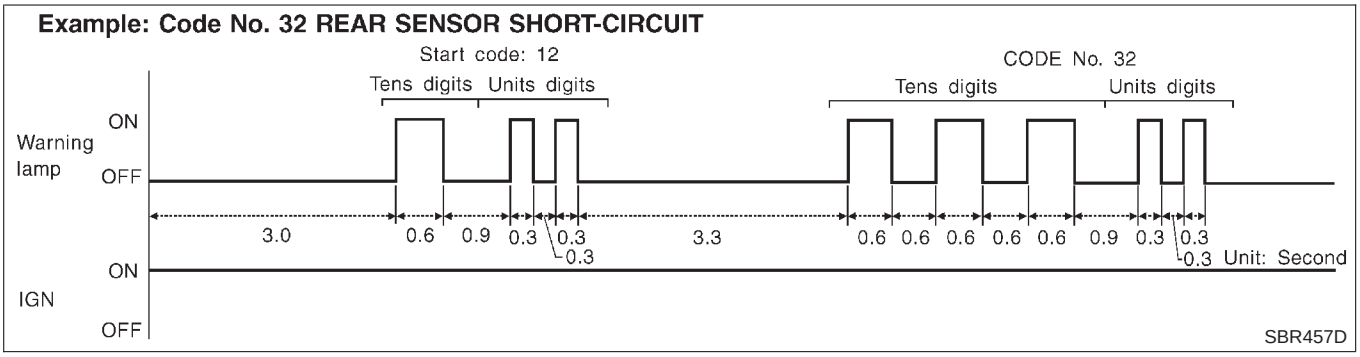
NOTE:
The indication terminates after 5 minutes.
However, when the ignition switch is turned from OFF to ON, the indication starts flashing again.

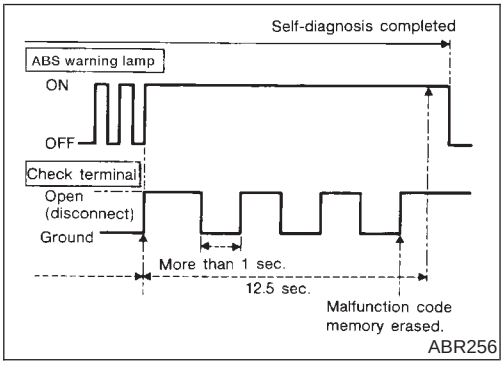
HOW TO READ SELF-DIAGNOSTIC RESULTS (MALFUNCTION CODES)

=NABR0097S03

1. Determine the code No. by counting the number of times the warning lamp flashes on and off.
2. When several malfunctions occur at one time, up to three code numbers can be stored; the latest malfunction will be indicated first.
3. The indication begins with the start code 12. After that a maximum of three code numbers appear in the order of the latest one first. The indication then returns to the start code 12 to repeat (the indication will stay on for five minutes at the most).
4. The malfunction code chart is given on page BR-54.

Example: Code No. 32 REAR SENSOR SHORT-CIRCUIT





HOW TO ERASE SELF-DIAGNOSTIC RESULTS (MALFUNCTION CODES)

NABR0097S04

1. Disconnect the check terminal from ground (ABS warning lamp will stay lit).
2. Within 12.5 seconds, ground the check terminal three times. Each terminal ground must last more than 1 second. The ABS warning lamp goes out after the erase operation has been completed.
3. Perform self-diagnosis again. Refer to BR-41. Only the start-code should appear, no malfunction codes.

CONSULT-II

CONSULT-II APPLICATION TO ABS

=NABR0098

NABR0098S01

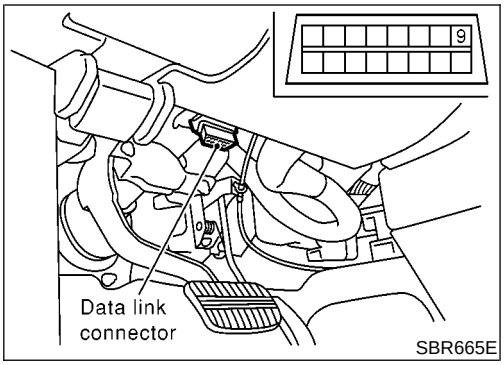
ITEM	SELF-DIAGNOSTIC RESULTS	DATA MONITOR	ACTIVE TEST
Front right wheel sensor	×	×	—
Front left wheel sensor	×	×	—
Rear right wheel sensor	×	×	—
Rear left wheel sensor	×	×	—
G switch (G sensor)★	×	×	×
ABS sensor	×	—	—
Stop lamp switch	—	×	—
Front right inlet solenoid valve	×	×	×
Front right outlet solenoid valve	×	×	×
Front left inlet solenoid valve	×	×	×
Front left outlet solenoid valve	×	×	×
Rear inlet solenoid valve	×	×	×
Rear outlet solenoid valve	×	×	×
Actuator solenoid valve relay	×	×	—
Actuator motor relay (ABS MOTOR is shown on the Data Monitor screen.)	×	×	×
ABS warning lamp	—	×	—
Battery voltage	×	×	—
Control unit	×	—	—
ABS operating signal	—	×	×

×: Applicable
—: Not applicable
★: 4WD models only

ECU (ABS CONTROL UNIT) PART NUMBER MODE

NABR0098S02

Ignore the ECU part number displayed in the ECU PART NUMBER MODE. Refer to parts catalog to order the ECU.



SBR665E

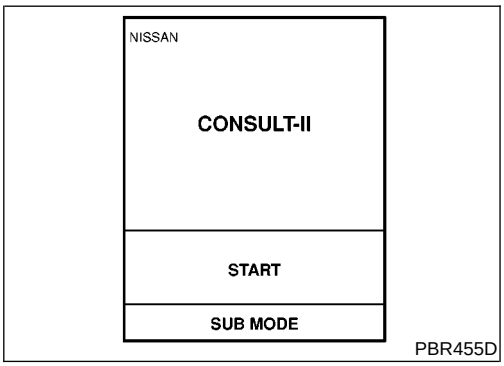
CONSULT-II Inspection Procedure

=NABR0099

SELF-DIAGNOSIS PROCEDURE

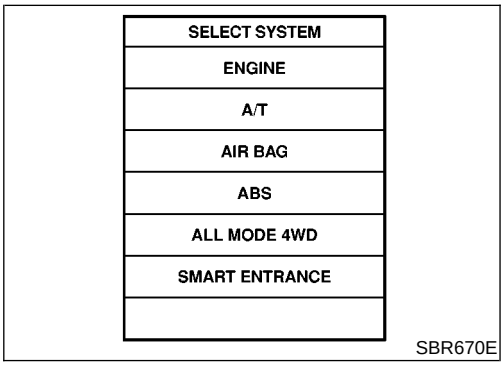
NABR0099S01

1. Turn ignition switch OFF.
2. Connect CONSULT-II to data link connector.
3. Start engine.
4. Drive vehicle over 30 km/h (19 MPH) for at least one minute.



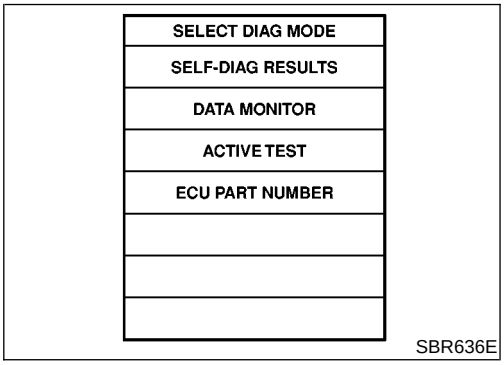
PBR455D

5. Stop vehicle with engine running and touch “START” on CONSULT-II screen.



SBR670E

6. Touch “ABS”.

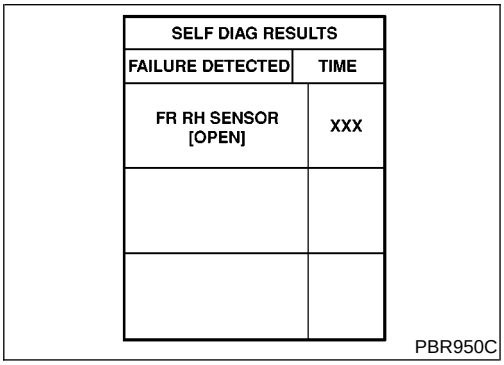


SBR636E

7. Touch “SELF-DIAG RESULTS”.

- The screen shows the detected malfunction and how many times the ignition switch has been turned ON since the malfunction.

8. Make the necessary repairs following the diagnostic procedures.



PBR950C

9. After the malfunctions are repaired, erase the self-diagnostic results stored in the control unit by touching “ERASE”.
10. Check warning lamp for deactivation after driving vehicle over 30 km/h (19 MPH) for at least one minute.
11. Test the ABS in a safe area to verify that it functions properly.

NOTE:
“SELF-DIAG RESULTS” screen shows the detected malfunction and how many times the ignition switch has been turned since the malfunction.

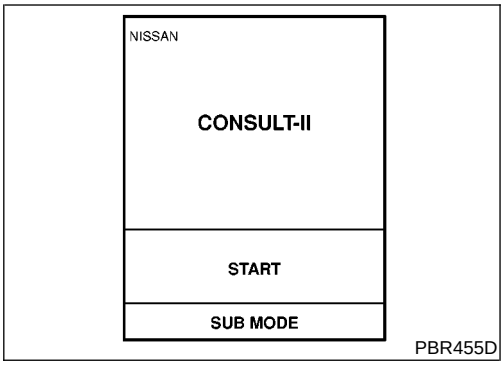
SELF-DIAGNOSTIC RESULTS MODE

=NABR0099S02

Diagnostic item	Diagnostic item is detected when ...	Reference Page
FR RH SENSOR★1 [OPEN]	• Circuit for front right wheel sensor is open. (An abnormally high input voltage is entered.)	BR-56
FR LH SENSOR★1 [OPEN]	• Circuit for front left wheel sensor is open. (An abnormally high input voltage is entered.)	BR-56
RR RH SENSOR★1 [OPEN]	• Circuit for rear right sensor is open. (An abnormally high input voltage is entered.)	BR-56
RR LH SENSOR★1 [OPEN]	• Circuit for rear left sensor is open. (An abnormally high input voltage is entered.)	BR-56
FR RH SENSOR★1 [SHORT]	• Circuit for front right wheel sensor is shorted. (An abnormally low input voltage is entered.)	BR-56
FR LH SENSOR★1 [SHORT]	• Circuit for front left wheel sensor is shorted. (An abnormally low input voltage is entered.)	BR-56
RR RH SENSOR★1 [SHORT]	• Circuit for rear right sensor is shorted. (An abnormally low input voltage is entered.)	BR-56
RR LH SENSOR★1 [SHORT]	• Circuit for rear left sensor is shorted. (An abnormally low input voltage is entered.)	BR-56
ABS SENSOR★1 [ABNORMAL SIGNAL]	• Teeth damage on sensor rotor or improper installation of wheel sensor. (Abnormal wheel sensor signal is entered.)	BR-56
FR RH IN ABS SOL [OPEN, SHORT]	• Circuit for front right inlet solenoid valve is open. (An abnormally low output voltage is entered.)	BR-59
FR LH IN ABS SOL [OPEN, SHORT]	• Circuit for front left inlet solenoid valve is open. (An abnormally low output voltage is entered.)	BR-59
FR RH OUT ABS SOL [OPEN, SHORT]	• Circuit for front right outlet solenoid valve is open. (An abnormally low output voltage is entered.)	BR-59
FR LH OUT ABS SOL [OPEN, SHORT]	• Circuit for front left outlet solenoid valve is open. (An abnormally low output voltage is entered.)	BR-59
RR IN ABS SOL [OPEN, SHORT]	• Circuit for rear inlet solenoid valve is shorted. (An abnormally high output voltage is entered.)	BR-59
RR OUT ABS SOL [OPEN, SHORT]	• Circuit for rear outlet solenoid valve is shorted. (An abnormally high output voltage is entered.)	BR-59
ABS ACTUATOR RELAY [ABNORMAL]	• Actuator solenoid valve relay is ON, even if control unit sends off signal. • Actuator solenoid valve relay is OFF, even if control unit sends on signal.	BR-59
ABS MOTOR RELAY [ABNORMAL]	• Circuit for ABS motor relay is open or shorted. • Circuit for actuator motor is open or shorted. • Actuator motor relay is stuck.	BR-61
BATTERY VOLT [VB-LOW]	• Power source voltage supplied to ABS control unit is abnormally low.	BR-63
CONTROL UNIT	• Function of calculation in ABS control unit has failed.	BR-68
G SENSOR [ABNORMAL]★2	• G sensor circuit is open or shorted.	BR-65

★1: If one or more wheels spin on a rough or slippery road for 40 seconds or more, the ABS warning lamp will illuminate. This does not indicate a malfunction. Only in the case of the short-circuit (Code Nos. 26, 22, 32 and 36), after repair the ABS warning lamp also illuminates when the ignition switch is turned ON. In this case, drive the vehicle at speeds greater than 30 km/h (19 MPH) for approximately 1 minute as specified in "SELF-DIAGNOSIS PROCEDURE", BR-41. Check to ensure that the ABS warning lamp goes out while the vehicle is being driven.

★2: 4WD models only

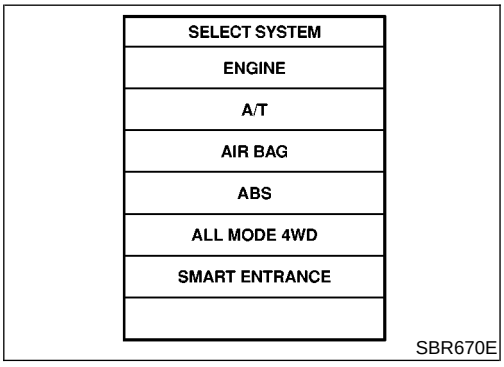


PBR455D

DATA MONITOR PROCEDURE

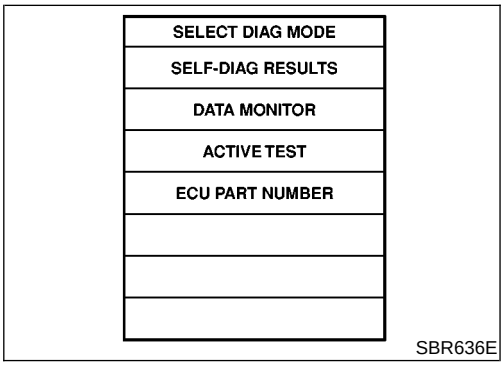
=NABR0099S03

1. Turn ignition switch OFF.
2. Connect CONSULT-II to data link connector for CONSULT-II.
3. Turn ignition switch ON.
4. Touch "START" on CONSULT-II screen.



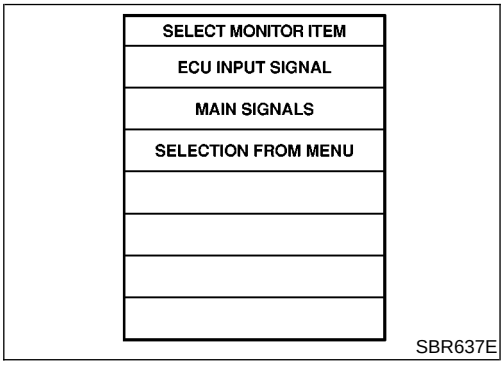
SBR670E

5. Touch "ABS".



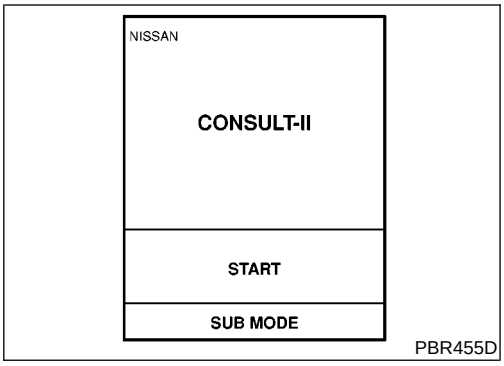
SBR636E

6. Touch "DATA MONITOR".



SBR637E

7. Touch "SETTING" on "SELECT MONITOR ITEM" screen.



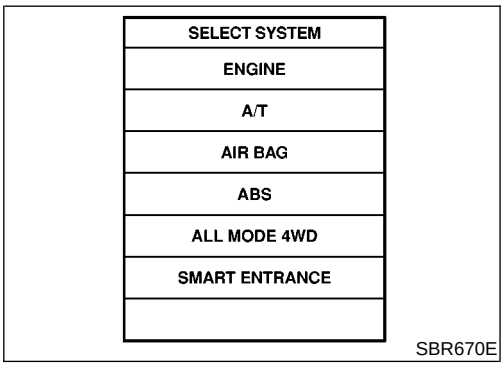
PBR455D

ACTIVE TEST PROCEDURE

=NABR0099S04

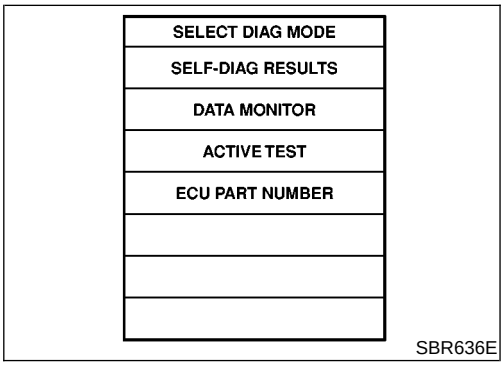
- When conducting Active test, vehicle must be stationary.
- When ABS warning lamp stays on, never conduct Active test.

1. Turn ignition switch OFF.
2. Connect CONSULT-II to data link connector.
3. Start engine.
4. Touch "START" on CONSULT-II screen.



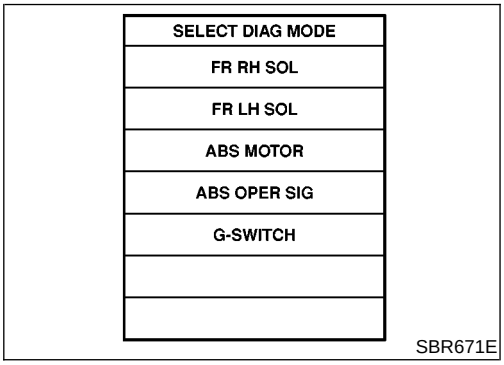
SBR670E

5. Touch "ABS".



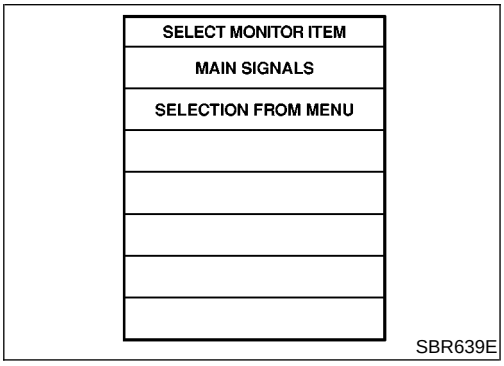
SBR636E

6. Touch "ACTIVE TEST".



SBR671E

7. Select active test item by touching screen.



SBR639E

8. Touch "START".
9. Carry out the active test by touching screen key.

DATA MONITOR MODE

=NABR0099S05

MONITOR ITEM	CONDITION	SPECIFICATION
FR RH SENSOR FR LH SENSOR RR RH SENSOR RR LH SENSOR	Drive vehicle. (Each wheel is rotating.)	Wheel speed signal (Almost the same speed as speedometer.)
STOP LAMP SW	Brake is depressed.	Depress the pedal: ON Release the pedal: OFF
G-SWITCH★	Vehicle is driven. Vehicle is stopped. Brake is applied.	During sudden braking while driving on high μ roads (asphalt roads, etc.): OFF While vehicle is stopped or during constant-speed driving: ON
FR RH IN SOL FR RH OUT SOL FR LH IN SOL FR LH OUT SOL RR IN SOL RR OUT SOL	1. Drive vehicle at speeds over 30 km/h (19 MPH) for at least 1 minute. 2. Engine is running.	Operating conditions for each solenoid valve are indicated. ABS is not operating: OFF
MOTOR RELAY		ABS is not operating: OFF ABS is operating: ON
ACTUATOR RELAY	Ignition switch is ON or engine is running.	Ignition switch ON (Engine stops): OFF Engine running: ON
WARNING LAMP		ABS warning lamp is turned on: ON ABS warning lamp is turned off: OFF
BATTERY VOLT		Power supply voltage for control unit
ABS OPER SIG		ABS is not operating: OFF ABS is operating: ON

★: 4WD models only

ACTIVE TEST MODE

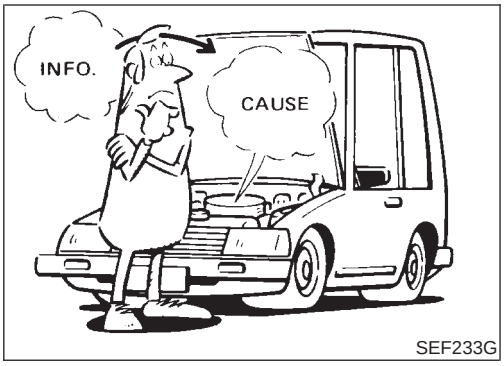
NABR0099S06

TEST ITEM	CONDITION	JUDGEMENT		
FR RH SOLENOID FR LH SOLENOID RR SOLENOID	Engine is running.	Brake fluid pressure control operation		
			IN SOL	OUT SOL
		UP (Increase):	OFF	OFF
		KEEP (Hold):	ON	OFF
		DOWN (Decrease):	ON	ON
ABS MOTOR		ABS actuator motor ON: Motor runs (ABS motor relay ON) OFF: Motor stops (ABS motor relay OFF)		
ABS OPER SIG	Ignition switch is ON or engine is running.	ON: Set ABS OPER SIG "ON" (ABS is operating.) OFF: Set ABS OPER SIG "OFF" (ABS is not operating.)		
G SWITCH★	Ignition switch is ON.	G SWITCH (G SENSOR), ON: Set G SWITCH MONITOR "ON" (G switch circuit is closed.) OFF: Set G SWITCH MONITOR "OFF" (G switch circuit is open.)		

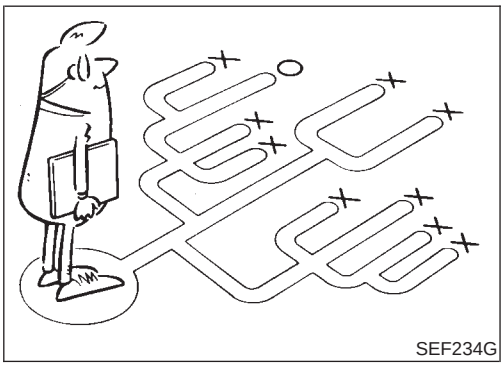
★: 4WD models only

NOTE:

Active test will automatically stop ten seconds after the test starts. (TEST IS STOPPED monitor shows ON.)



SEF233G


SEF234G

How to Perform Trouble Diagnoses for Quick and Accurate Repair

NABR0100

INTRODUCTION

NABR0100S01

The ABS system has an electronic control unit to control major functions. The control unit accepts input signals from sensors and instantly drives the actuators. It is essential that both kinds of signals are proper and stable. It is also important to check for conventional problems: such as air leaks in booster lines, lack of brake fluid, or other problems with the brake system.

It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or faulty wiring. In this case, careful checking of suspicious circuits may help prevent the replacement of good parts.

A visual check only may not find the cause of the problems, so a road test should be performed.

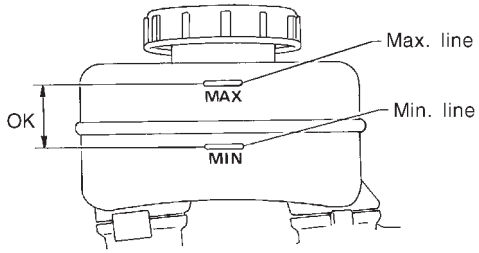
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with an ABS complaint. The customer is a very good source of information on such problems; especially intermittent ones. By talking to the customer, find out what symptoms are present and under what conditions they occur. Start your diagnosis by looking for “conventional” problems first. This is one of the best ways to troubleshoot brake problems on an ABS controlled vehicle.

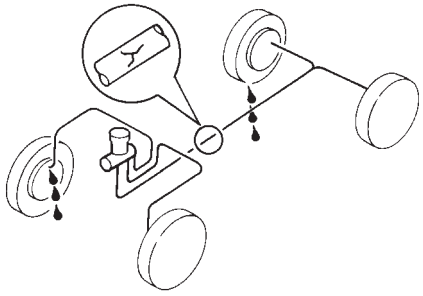
Also check related Service bulletins for information.

Preliminary Check

NABR0101

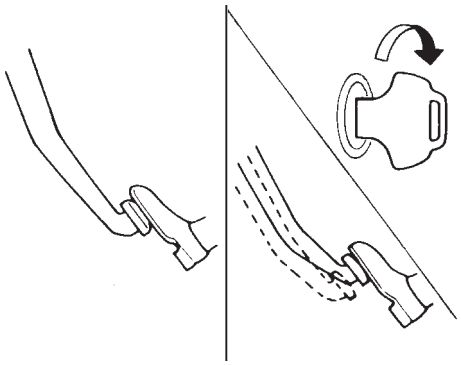
1	CHECK BRAKE FLUID	
Check brake fluid for contamination. **Has brake fluid been contaminated?**		
Yes	▶	Replace. GO TO 2.
No	▶	GO TO 2.

2	CHECK BRAKE FLUID LEVEL	
Check brake fluid level in reservoir tank. Low fluid level may indicate brake pad wear or leakage from brake line.  SBR451D **Is brake fluid filled between MAX and MIN lines on reservoir tank?**		
Yes	▶	GO TO 3.
No	▶	Fill up brake fluid. GO TO 3.

3	CHECK BRAKE LINE	
Check brake line for leakage.  SBR389C **Is leakage present at or around brake lines, tubes or hoses or are any of these parts cracked or damaged?**		
Yes	▶	Repair. GO TO 4.
No	▶	GO TO 4.

4	CHECK BRAKE BOOSTER OPERATION

Check brake booster for operation and air tightness.
Refer to "On-vehicle Service", "BRAKE BOOSTER", BR-19.



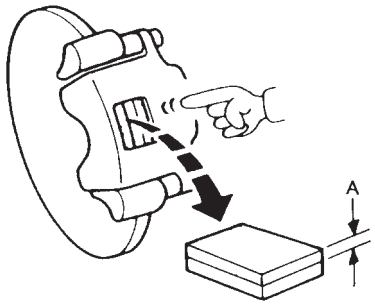
SBR058C

Is brake booster airtight and functioning properly?

Yes	▶	GO TO 5.
No	▶	Replace. GO TO 5.

5	CHECK BRAKE PAD AND ROTOR

Check brake pad and rotor.
Refer to (BR-22, 24).



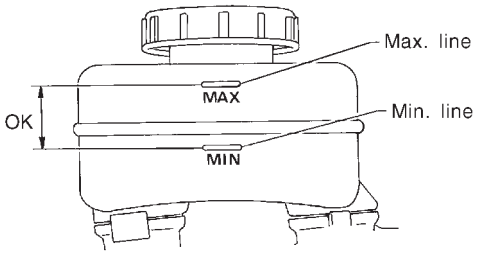
SBR059C

Are brake pads and rotors functioning properly?

Yes	▶	GO TO 6.
No	▶	Replace.

6	RECHECK BRAKE FLUID LEVEL

Check brake fluid level in reservoir tank again.



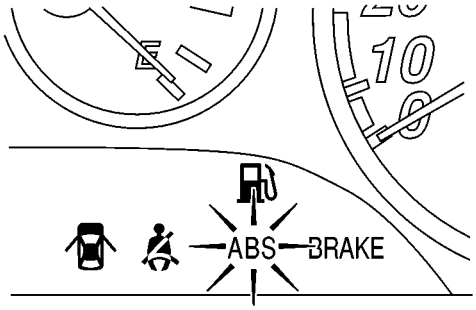
SBR451D

Is brake fluid filled between MAX and MIN lines on reservoir tank?

Yes	▶	GO TO 7.
No	▶	Fill up brake fluid.

7	CHECK WARNING LAMP ACTIVATION

Check warning lamp activation.



SBR677E

Does warning lamp turn on when ignition switch is turned ON?

Yes	▶	GO TO 8.
No	▶	Check fuse, warning lamp bulb and warning lamp circuit.

8	CHECK WARNING LAMP DEACTIVATION

Check warning lamp for deactivation after engine is started.

Does warning lamp turn off when engine is started?

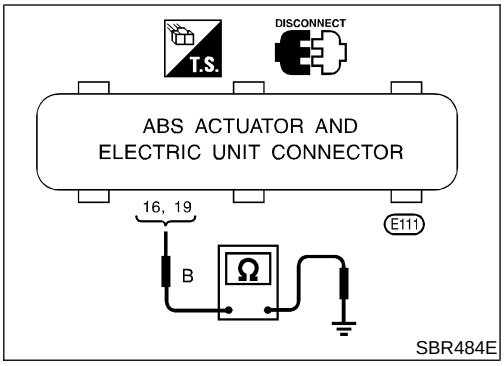
Yes	▶	GO TO 9.
No	▶	Go to Self-diagnosis (BR-41, 44).

9	DRIVE VEHICLE

Drive vehicle at speeds over 30 km/h (19 MPH) for at least one minute.

Does warning lamp remain off after vehicle has been driven at 30 km/h (19 MPH) for at least one minute?

Yes	▶	**INSPECTION END**
No	▶	Go to Self-diagnosis (BR-41, 44).



Ground Circuit Check

=NABR0102

ABS ACTUATOR AND ELECTRIC UNIT GROUND

NABR0102S01

- Check continuity between ABS actuator and electric unit connector terminals and ground.

Continuity should exist.

Malfunction Code/Symptom Chart

NABR0103

Code No. (No. of warning lamp flashes)	Malfunctioning part	Reference Page
12	Self-diagnosis could not detect any malfunctions.	—
17 ★4	G sensor and circuit	BR-65
18 ★1	Sensor rotor	BR-56
21 ★1	Front right sensor (open-circuit)	BR-56
22 ★1	Front right sensor (short-circuit)	BR-56
25 ★1	Front left sensor (open-circuit)	BR-56
26 ★1	Front left sensor (short-circuit)	BR-56
31 ★1	Rear right sensor (open-circuit)	BR-56
32 ★1	Rear right sensor (short-circuit)	BR-56
35 ★1	Rear left sensor (open-circuit)	BR-56
36 ★1	Rear left sensor (short-circuit)	BR-56
41	Actuator front right outlet solenoid valve	BR-59
42	Actuator front right inlet solenoid valve	BR-59
45	Actuator front left outlet solenoid valve	BR-59
46	Actuator front left inlet solenoid valve	BR-59
55	Actuator rear outlet solenoid valve	BR-59
56	Actuator rear inlet solenoid valve	BR-59
57 ★2	Power supply (Low voltage)	BR-63
61 ★3	Actuator motor or motor relay	BR-61
63	Solenoid valve relay	BR-59
71	Control unit	BR-68
ABS works frequently	—	BR-69
Unexpected pedal action	—	BR-69
Long stopping distance	—	BR-71
ABS does not work	—	BR-71
Pedal vibration and noise	—	BR-72
Warning lamp does not come on when ignition switch is turned ON.	Fuse, warning lamp bulb or warning lamp circuit Control unit	BR-73
Warning lamp stays on when ignition switch is turned ON.	Control unit power supply circuit Warning lamp bulb circuit Control unit or control unit connector Solenoid valve relay stuck Power supply for solenoid valve relay coil	BR-75
Vehicle vibrates excessively when ABS is operating.	ABS control unit to TCM circuit	BR-78

★1: If one or more wheels spin on a rough or slippery road for 40 seconds or more, the ABS warning lamp will illuminate. This does not indicate a malfunction. Only in the case of the short-circuit (Code Nos. 26, 22, 32 and 36), after repair the ABS warning lamp also illuminates when the ignition switch is turned ON. In this case, drive the vehicle at speeds greater than 30 km/h (19 MPH) for approximately 1 minute as specified in “SELF-DIAGNOSIS PROCEDURE”, BR-41. Check to ensure that the ABS warning lamp goes out while the vehicle is being driven.

★2: The trouble code “57”, which refers to a low power supply voltage, does not indicate that the ABS control unit is malfunctioning. Do not replace the ABS control unit with a new one.

★3: The trouble code "61" can sometimes appear when the ABS motor is not properly grounded. If it appears, be sure to check the condition of the ABS motor ground circuit connection.

★4: 4WD models only

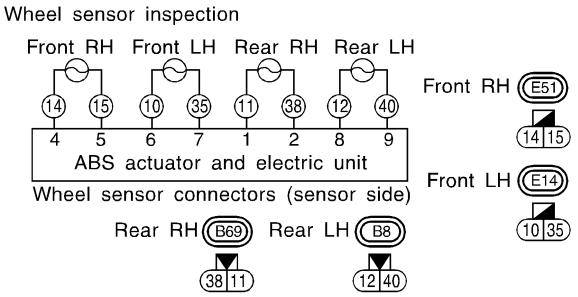
Wheel Sensor or Rotor

DIAGNOSTIC PROCEDURE

NABR0104

Malfunction code No. 21, 22, 25, 26, 31, 32, 35, 36 or 18

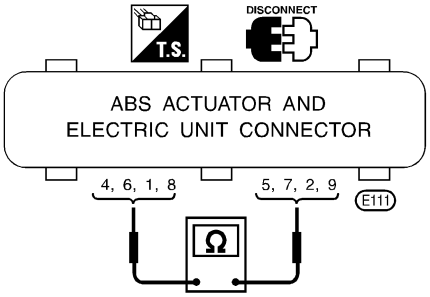
NOTE:
Wheel position should be distinguished by code No. except code No. 18 (sensor rotor).

1	**INSPECTION START**
Wheel sensor inspection  SBR485E	
	▶	GO TO 2.

2	**CHECK CONNECTOR**	
1. Disconnect connectors from ABS actuator and electric unit and wheel sensor of malfunction code No. Check terminals for damage or loose connection. Then reconnect connectors. 2. Carry out self-diagnosis again. **Does warning lamp activate again?**		
Yes	▶	GO TO 3.
No	▶	**INSPECTION END**

3	CHECK WHEEL SENSOR ELECTRICAL

1. Disconnect ABS actuator and electric unit connector.
2. Check resistance between ABS actuator and electric unit connector E111 (body side) terminals.
   Code No. 21 or 22 (Front RH wheel)
   Terminals 4 and 5
   Code No. 25 or 26 (Front LH wheel)
   Terminals 6 and 7
   Code No. 31 or 32 (Rear RH wheel)
   Terminals 1 and 2
   Code No. 35 or 36 (Rear LH wheel)
   Terminals 8 and 9



SBR486E

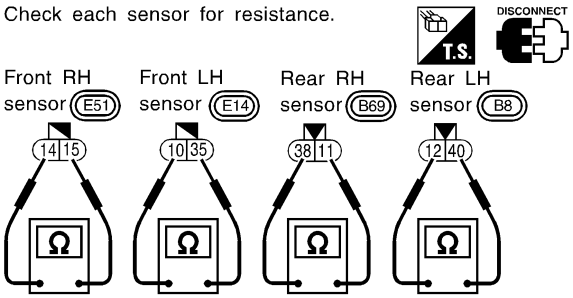
Resistance:
Front 0.9 - 1.1 kΩ
Rear 1.44 - 1.76 kΩ

Is front resistance 0.9 - 1.1 kΩ and rear resistance 1.44 - 1.76 kΩ?

Yes	▶	GO TO 5.
No	▶	GO TO 4.

4	CHECK WHEEL SENSOR

Check each sensor for resistance.



SBR487E

Resistance:
Front 0.9 - 1.1 kΩ
Rear 1.44 - 1.76 kΩ

Is front resistance 0.9 - 1.1 kΩ and rear resistance 1.44 - 1.76 kΩ?

Yes	▶	**Check the following.** If NG, repair harness or connectors. • Harness connectors E111, E14, E51, B8, B69 • Harness for open or short between wheel sensor connectors and ABS actuator and electric unit
No	▶	Replace wheel sensor.

5	CHECK TIRE	
Check for inflation pressure, wear and size of each tire. (See NOTE.) **Are tire pressure and size correct and is tire wear within specifications?**		
Yes	▶	GO TO 6.
No	▶	Adjust tire pressure or replace tire(s). (See NOTE.)

6	CHECK WHEEL BEARING	
Check wheel bearing axial end play. (See NOTE.) **Is wheel bearing axial end play within specifications? Refer to AX-4, "Front wheel bearing", AX-19, "Rear wheel bearing".**		
Yes	▶	GO TO 7.
No	▶	Check wheel bearing. Refer to AX-4, "Front wheel bearing", AX-19, "Rear wheel bearing".

7	CHECK SENSOR ROTOR	
Check sensor rotor for teeth damage. (See NOTE.) **Is sensor rotor free from damage?**		
Yes	▶	Check ABS actuator and electric unit pin terminals for damage or the connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector. Then retest.
No	▶	Replace sensor rotor. (See NOTE.)

ABS Actuator Solenoid Valve or Solenoid Valve Relay

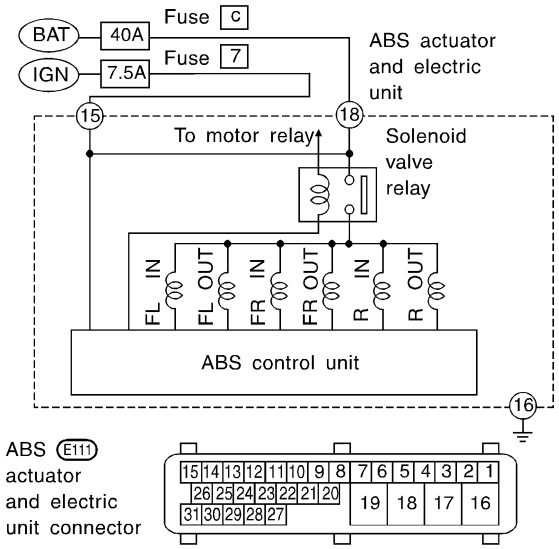
DIAGNOSTIC PROCEDURE

=NABR0105

Malfunction code No. 41, 45, 55, 42, 46, 56, 63

1	INSPECTION START

Solenoid valve relay inspection



SBR488E

▶ GO TO 2.

2	CHECK FUSIBLE LINK

Check 40A fusible link **c**. For fusible link layout, refer to EL-9, “POWER SUPPLY ROUTING”.

Is fusible link OK?

Yes	▶	GO TO 3.
No	▶	GO TO 6.

3	CHECK CONNECTOR

1. Disconnect connector from ABS actuator and electric unit. Check terminals for damage or loose connection. Then reconnect connector.
2. Carry out self-diagnosis again.

Does warning lamp activate again?

Yes	▶	GO TO 4.
No	▶	**INSPECTION END**

4	CHECK ABS ACTUATOR AND ELECTRIC UNIT GROUND CIRCUIT

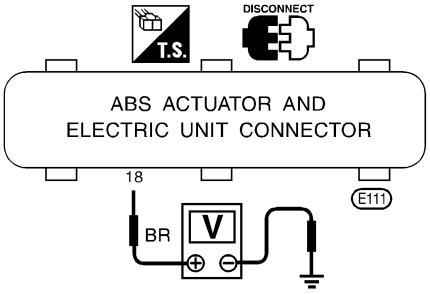
Refer to “ABS ACTUATOR AND ELECTRIC UNIT GROUND” in “Ground Circuit Check”, BR-53.

Is ground circuit OK?

Yes	▶	GO TO 5.
No	▶	Repair harness or connector.

5	CHECK SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Disconnect ABS actuator and electric unit connector.
2. Check voltage between ABS actuator and electric unit connector E111 (body side) terminal 18 and ground.



SBR489E

Does battery voltage exist?

Yes	▶	Replace ABS actuator and electric unit.
No	▶	**Check the following.** If NG, repair harness or connectors. ● Harness connector E111 ● Harness for open or short between ABS actuator and electric unit and fusible link

6	REPLACE FUSIBLE LINK

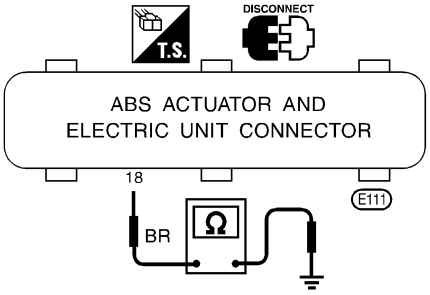
Replace fusible link.

Does the fuse blow out when ignition switch is turned ON?

Yes	▶	GO TO 7.
No	▶	**INSPECTION END**

7	CHECK SOLENOID VALVE RELAY POWER SUPPLY CIRCUIT FOR SHORT

1. Disconnect battery cable and ABS actuator and electric unit connector.
2. Check continuity between ABS actuator and electric unit connector E111 (body side) terminal 18 and ground.



SBR490E

Continuity should not exist.

Does continuity exist?

Yes	▶	**Check the following.** If NG, repair harness or connector. ● Harness connector E111 ● Harness for open or short between ABS actuator and electric unit and fusible link
No	▶	Replace ABS actuator and electric unit.

Motor Relay or Motor

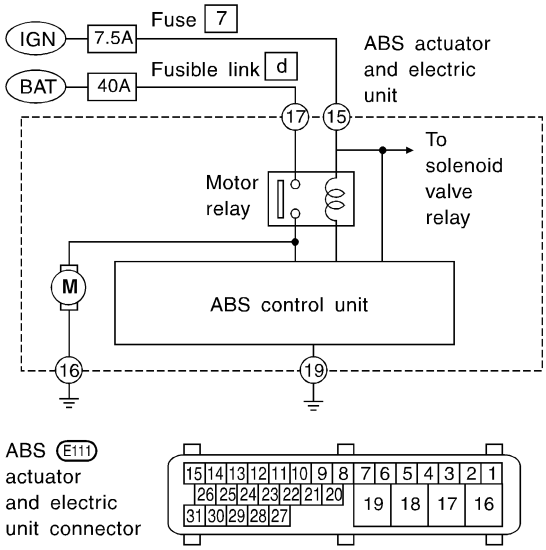
DIAGNOSTIC PROCEDURE

=NABR0106

Malfunction code No. 61

1	INSPECTION START

ABS motor relay inspection



SBR491E

▶ GO TO 2.

2	CHECK FUSIBLE LINK

Check 40A fusible link **d**. For fusible link layout, refer to EL-9, “POWER SUPPLY ROUTING”.

Is fusible link OK?

Yes	▶	GO TO 3.
No	▶	GO TO 6.

3	CHECK CONNECTOR

1. Disconnect ABS actuator and electric unit connector. Check terminals for damage or loose connection. Then reconnect connector.
2. Carry out self-diagnosis again.

Does warning lamp activate again?

Yes	▶	GO TO 4.
No	▶	**INSPECTION END**

4	CHECK ABS ACTUATOR AND ELECTRIC UNIT GROUND CIRCUIT

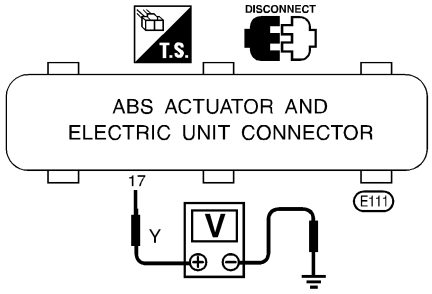
Refer to “ABS ACTUATOR AND ELECTRIC UNIT GROUND” in “Ground Circuit Check”, BR-53.

Is ground circuit OK?

Yes	▶	GO TO 5.
No	▶	Repair harness or connector.

5	CHECK MOTOR RELAY POWER SUPPLY CIRCUIT

1. Disconnect ABS actuator and electric unit connector.
2. Check voltage between ABS actuator and electric unit connector E111 (body side) terminal 17 and ground.



SBR492E

Does battery voltage exist?

Yes	▶	Replace ABS actuator and electric unit.
No	▶	**Check the following.** If NG, repair harness or connector. ● Harness connector E111 ● Harness for open or short between ABS actuator and electric unit and fusible link

6	REPLACE FUSIBLE LINK

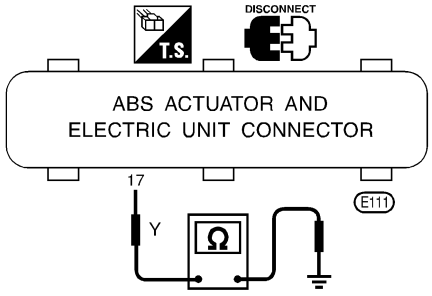
Replace fusible link.

Does the fusible link blow out when ignition switch is turned ON?

Yes	▶	GO TO 7.
No	▶	**INSPECTION END**

7	CHECK ABS ACTUATOR MOTOR POWER SUPPLY CIRCUIT FOR SHORT

1. Disconnect battery cable and ABS actuator and electric unit connector.
2. Check continuity between ABS actuator and electric unit connector E111 (body side) terminal 17 and ground.



SBR493E

Continuity should not exist.

Does continuity exist?

Yes	▶	**Check the following.** If NG, repair harness or connector. ● Harness connector E111 ● Harness for open or short between ABS actuator and electric unit and fusible link
No	▶	Replace ABS actuator and electric unit.

Low Voltage

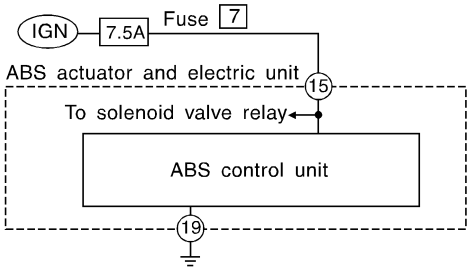
DIAGNOSTIC PROCEDURE

NABR0107

Malfunction code No. 57

1	INSPECTION START

ABS actuator and electric unit power supply and ground circuit inspection



SBR494E

	▶	GO TO 2.

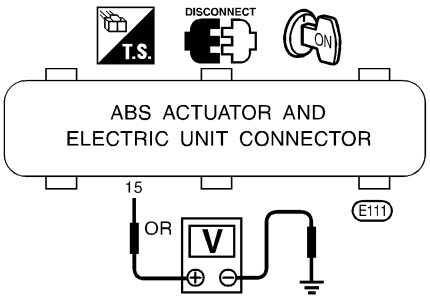
2	CHECK FUSE	
Check 7.5A fuse No. 7. For fuse layout, refer to EL-9, “POWER SUPPLY ROUTING”.		
Is fuse OK?		
Yes	▶	GO TO 3.
No	▶	GO TO 6.

3	CHECK CONNECTOR	
1. Disconnect ABS actuator and electric unit connector. Check terminals for damage or loose connections. Then reconnect connector. 2. Carry out self-diagnosis again.		
Does warning lamp activate again?		
Yes	▶	GO TO 4.
No	▶	**INSPECTION END**

4	CHECK ABS ACTUATOR AND ELECTRIC UNIT GROUND CIRCUIT	
Refer to “ABS ACTUATOR AND ELECTRIC UNIT GROUND” in “Ground Circuit Check”, BR-53.		
Is ground circuit OK?		
Yes	▶	GO TO 5.
No	▶	Repair harness or connector.

5	CHECK ABS ACTUATOR AND ELECTRIC UNIT POWER SUPPLY CIRCUIT

1. Disconnect ABS actuator and electric unit connector.
2. Check voltage between ABS actuator and electric unit connector E111 (body side) terminal 15 and ground.



SBR495E

Does battery voltage exist when ignition switch is turned ON?

Yes	▶	Replace ABS actuator and electric unit.
No	▶	**Check the following.** If NG, repair harness or connector. ● Harness connector E111 ● Harness for open or short between ABS actuator and electric unit and fuse

6	REPLACE FUSE

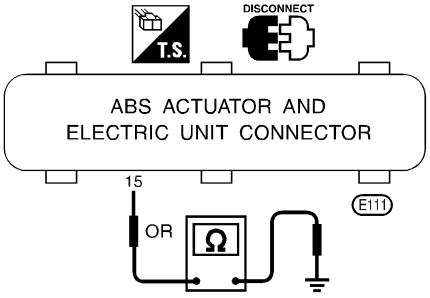
Replace fuse.

Does the fuse blow out when ignition switch is turned ON?

Yes	▶	GO TO 7.
No	▶	**INSPECTION END**

7	CHECK ABS ACTUATOR AND ELECTRIC UNIT POWER SUPPLY CIRCUIT FOR SHORT

1. Disconnect battery cable and ABS actuator and electric unit connector.
2. Check continuity between ABS actuator and electric unit connector E111 (body side) terminal 15 and ground.



SBR496E

Continuity should not exist.

Does continuity exist?

Yes	▶	**Check the following.** If NG, repair harness or connector. ● Harness connector E111 ● Harness for open or short between ABS actuator and electric unit and fuse
No	▶	Replace ABS actuator and electric unit.

G Sensor and Circuit

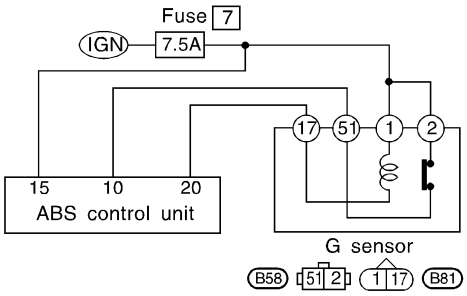
DIAGNOSTIC PROCEDURE

NABR0118

Malfunction code No. 17

1	INSPECTION START

G sensor inspection



SBR504E

	▶	GO TO 2.

2	CHECK FUSE

Check 7.5A fuse No. 7 for ABS actuator and electric unit. For fuse layout, refer to EL-9, “POWER SUPPLY ROUTING”.

Is fuse OK?

Yes	▶	GO TO 3.
No	▶	Replace fuse.

3	CHECK CONNECTOR

1. Disconnect connectors from ABS actuator and electric unit and G sensor. Check terminals for damage or loose connection. Then reconnect connectors.
2. Carry out self-diagnosis again.

Does warning lamp activate again?

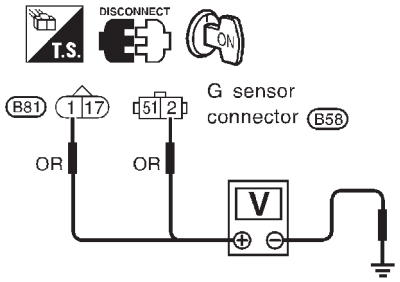
Yes	▶	GO TO 4.
No	▶	**INSPECTION END**

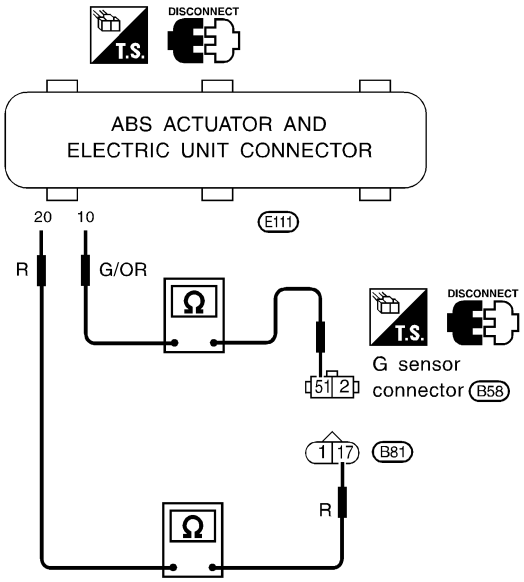
4	CHECK G SENSOR

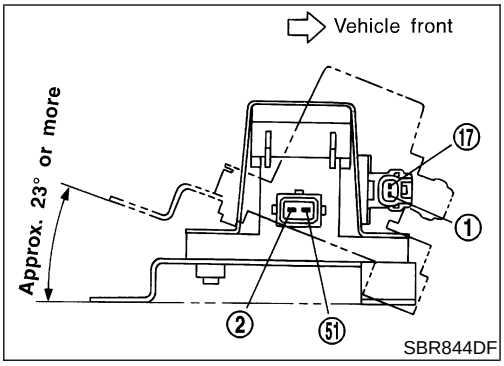
Refer to “G SENSOR” in “Electrical Components Inspection”, BR-67.

Is resistance within specifications?

Yes	▶	GO TO 5.
No	▶	Replace G sensor.

5	CHECK G SENSOR POWER SUPPLY CIRCUIT	
Check voltage between G sensor connector terminals 1, 2 and ground.  SBR861D **Does battery voltage exist?**		
Yes	▶	GO TO 6.
No	▶	**Check the following. If NG, repair harness or connectors.** ● Harness connectors B58, B81 ● Harness for open or short between G sensor and fuse

6	CHECK CIRCUIT	
1. Disconnect harness connector from ABS actuator and electric unit. 2. Check continuity between ABS actuator and electric unit connector terminals 20, 10 and G sensor connector terminals 17, 51.  SBR505E **Does continuity exist?**		
Yes	▶	Check ABS actuator and electric unit pin terminals for damage or the connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector. Then retest.
No	▶	**Check the following. If NG, repair harness or connectors.** ● Harness connectors E111, B58, B81 ● Harness for open or short between G sensor connector and ABS actuator and electric unit



ELECTRICAL COMPONENT INSPECTION

=NABR0119

G Sensor (4WD models only)

NABR0119S01

CAUTION:

The G sensor is easily damaged if it sustains an impact. Be careful not to drop or bump it.

1. Measure resistance between terminals 2 and 51 of G sensor unit connector.

G sensor condition	Resistance between terminals 2 and 51	G sensor switch condition
Installed in vehicle	1.4 - 1.6 kΩ	"ON"
Tilted as shown in figure	4.7 - 5.5 kΩ	"OFF"

2. Measure resistance between terminals 1 and 17 of the G sensor unit connector.

Resistance: 70 - 124Ω

Control Unit

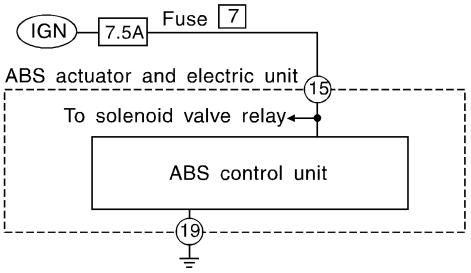
DIAGNOSTIC PROCEDURE

=NABR0108

Malfunction code No. 71

1	INSPECTION START

ABS actuator and electric unit power supply and ground circuit inspection



SBR497E

	▶	GO TO 2.

2	CHECK CONNECTOR	
1. Disconnect ABS actuator and electric unit connector. Check terminals for damage or loose connection. Then reconnect connector. 2. Carry out self-diagnosis again.		
Does warning lamp activate again?		
Yes	▶	GO TO 3.
No	▶	**INSPECTION END**

3	CHECK ABS ACTUATOR AND ELECTRIC UNIT POWER SUPPLY CIRCUIT	
Check voltage. Refer to “5. CHECK ABS ACTUATOR AND ELECTRIC UNIT POWER SUPPLY CIRCUIT” in “DIAGNOSTIC PROCEDURE”, “Low Voltage”, BR-63.		
Does battery voltage exist when ignition switch is turned ON?		
Yes	▶	GO TO 4.
No	▶	Repair.

4	CHECK WARNING LAMP INDICATION	
Does warning lamp indicate code No. 71 again?		
Yes or No		
Yes	▶	Replace ABS actuator and electric unit.
No	▶	Inspect the system according to the code No.

1. ABS Works Frequently

NABR0109

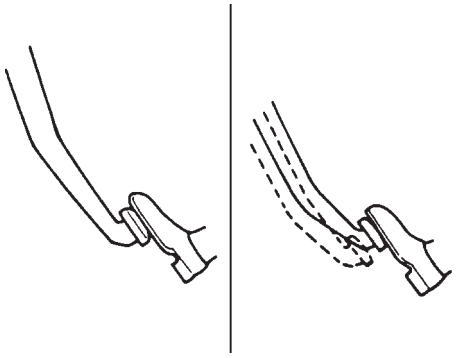
1	CHECK BRAKE FLUID PRESSURE	
Check brake fluid pressure distribution. Refer to “Inspection”, “LOAD SENSING VALVE”, BR-12. **Is brake fluid pressure distribution normal?**		
Yes	▶	GO TO 2.
No	▶	Repair. Then perform Preliminary Check. Refer to BR-50.

2	CHECK WHEEL SENSOR	
1. Check wheel sensor connector for terminal damage or loose connections. 2. Perform wheel sensor mechanical check. Refer to “7. CHECK SENSOR ROTOR” in “DIAGNOSTIC PROCEDURE”, “Wheel Sensor or Rotor”, BR-56. **Is wheel sensor mechanism OK?**		
Yes	▶	GO TO 3.
No	▶	Repair.

3	CHECK FRONT AXLE	
Check front axles for excessive looseness. Refer to AX-4, “Front Wheel Bearing”. **Is front axle installed properly?**		
Yes	▶	Go to “3. CHECK WARNING LAMP INDICATION” in “2. Unexpected Pedal Action”, BR-69.
No	▶	Repair.

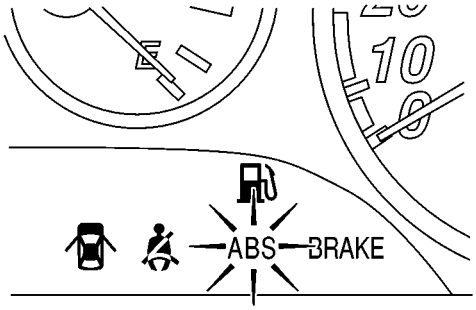
2. Unexpected Pedal Action

NABR0110

1	CHECK BRAKE PEDAL STROKE	
Check brake pedal stroke.  SBR540A **Is brake pedal stroke excessively large?**		
Yes	▶	Perform Preliminary Check. Refer to BR-50.
No	▶	GO TO 2.

2. Unexpected Pedal Action (Cont'd)

2	CHECK MECHANICAL BRAKE SYSTEM PERFORMANCE	
Disconnect ABS actuator and electric unit connector and check whether brake is effective. **Does brake system function properly when brake pedal is depressed?**		
Yes	▶	GO TO 3.
No	▶	Perform Preliminary Check. Refer to BR-50.

3	CHECK WARNING LAMP INDICATION	
Ensure warning lamp remains off while driving.  SBR677E **Is warning lamp turned off?**		
Yes	▶	GO TO 4.
No	▶	Carry out self-diagnosis. Refer to BR-41, 44.

4	CHECK WHEEL SENSOR	
1. Check wheel sensor connector for terminal damage or loose connection. 2. Perform wheel sensor mechanical check. Refer to "7. CHECK SENSOR ROTOR" in "DIAGNOSTIC PROCEDURE", "Wheel Sensor or Rotor", BR-56. **Is wheel sensor mechanism OK?**		
Yes	▶	Check ABS actuator and electric unit pin terminals for damage or the connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector. Then retest.
No	▶	Repair.

3. Long Stopping Distance

=NABR0111

1	CHECK MECHANICAL BRAKE SYSTEM PERFORMANCE	
Disconnect ABS actuator and electric unit connector and check whether stopping distance is still long. **Does brake system function properly when brake pedal is depressed?**		
Yes	▶	Perform Preliminary Check and air bleeding (if necessary).
No	▶	Go to “3. CHECK WARNING LAMP INDICATION” in “2. Unexpected Pedal Action”, BR-69.

NOTE:
Stopping distance may be longer for vehicles without ABS when road condition is slippery.

4. ABS Does Not Work

NABR0112

1	CHECK WARNING LAMP INDICATION	
Does the ABS warning lamp activate? **Yes or No**		
Yes	▶	Carry out self-diagnosis. Refer to BR-41, 44.
No	▶	Go to “3. CHECK WARNING LAMP INDICATION” in “2. Unexpected Pedal Action”, BR-69.

NOTE:
ABS does not work when vehicle speed is under 10 km/h (6 MPH).

5. Pedal Vibration and Noise

NABR0113

1	INSPECTION START
Pedal vibration and noise inspection Brake pedal  SAT797A	
▶	GO TO 2.

2	CHECK SYMPTOM
1. Apply brake. 2. Start engine. **Does the symptom appear only when engine is started?**	
Yes ▶	Carry out self-diagnosis. Refer to BR-41, 44.
No ▶	Go to “3. CHECK WARNING LAMP INDICATION” in “2. Unexpected Pedal Action”, BR-69.

NOTE:
ABS may operate and cause vibration under any of the following conditions.

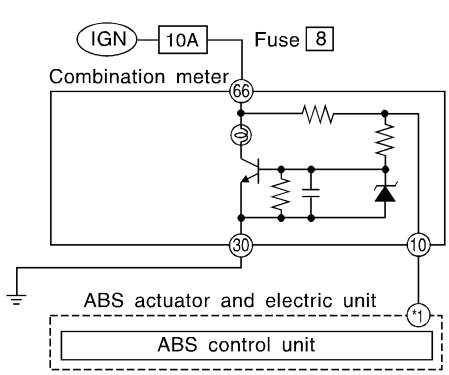
- Applying brake gradually when shifting or operating clutch.
- Low friction (slippery) road.
- High speed cornering.
- Driving over bumps and pot holes.
- Engine speed is over 5,000 rpm with vehicle stopped.

6. Warning Lamp Does Not Come On When Ignition Switch Is Turned On

NABR0114

1	INSPECTION START

Warning lamp circuit inspection



*1 10: 2WD
21: 4WD

SBR673E

▶ GO TO 2.

2	CHECK FUSE

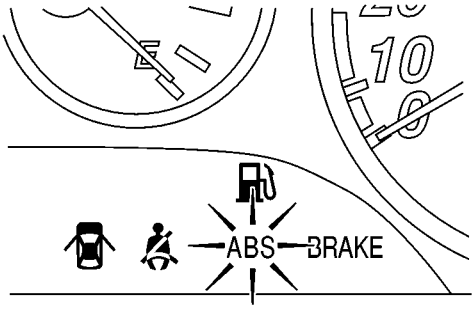
Check 10A fuse No. 8. For fuse layout, refer to EL-9, “POWER SUPPLY ROUTING”.

Is fuse OK?

Yes	▶	GO TO 3.
No	▶	Replace fuse.

3	CHECK WARNING LAMP ACTIVATE

Disconnect ABS actuator and electric unit connector.



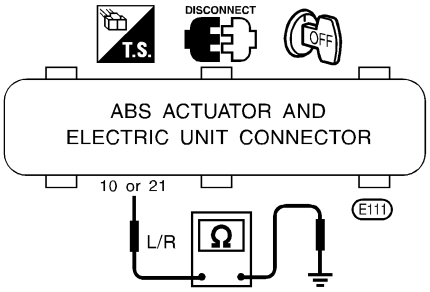
SBR677E

Does the warning lamp activate?

Yes	▶	Replace ABS actuator and electric unit.
No	▶	GO TO 4.

4	CHECK HARNESS FOR SHORT

1. Disconnect ABS actuator and electric unit connector and combination meter connector M24.
2. Check continuity between ABS actuator and electric unit connector E111 (body side) terminal 10 (2WD) or 21 (4WD) and ground.



SBR499E

Continuity should not exist.

Does continuity exist?

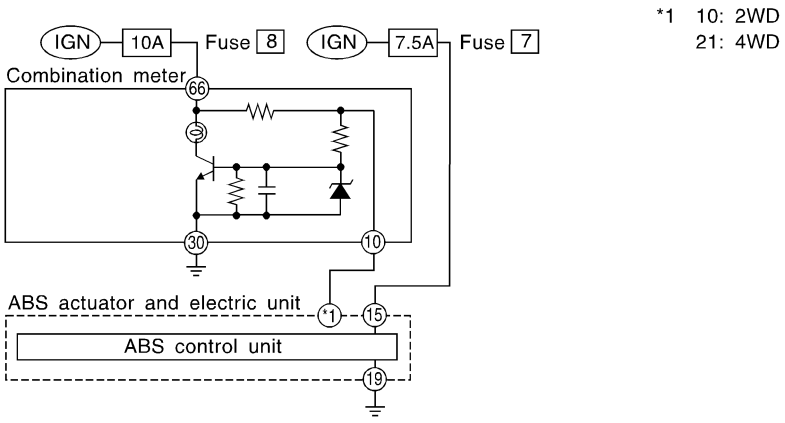
Yes	▶	Repair harness or connectors.
No	▶	**Check combination meter.** Refer to EL-9, "WARNING LAMPS".

7. Warning Lamp Stays On When Ignition Switch Is Turned On

=NABR0115

1	INSPECTION START

ABS control unit inspection



SBR674E

	▶	GO TO 2.

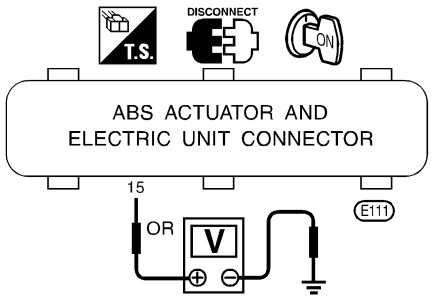
2	CHECK FUSE	
Check 7.5A fuse No. 7. For fuse layout, refer to EL-9, “POWER SUPPLY ROUTING”.		
Is fuse OK?		
Yes	▶	GO TO 3.
No	▶	GO TO 8.

3	CHECK HARNESS CONNECTOR	
Check ABS actuator and electric unit pin terminals for damage or bad connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector. Then retest.		
Does warning lamp stay on when ignition switch is turned ON?		
Yes	▶	GO TO 4.
No	▶	**INSPECTION END**

4	CHECK ABS ACTUATOR AND ELECTRIC UNIT GROUND CIRCUIT	
Refer to “ABS ACTUATOR AND ELECTRIC UNIT GROUND” in “Ground Circuit Check”, BR-53.		
Is ground circuit OK?		
Yes	▶	GO TO 5.
No	▶	Repair harness or connector.

5	CHECK ABS ACTUATOR AND ELECTRIC UNIT POWER SUPPLY CIRCUIT

1. Disconnect ABS actuator and electric unit connector.
2. Check voltage between ABS actuator and electric unit connector E111 (body side) terminal 15 and ground.



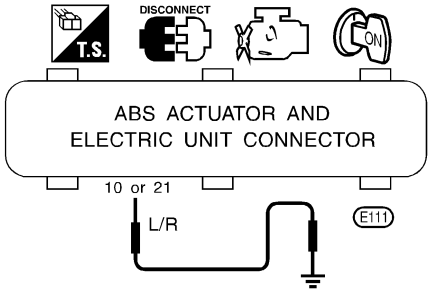
SBR495E

Does battery voltage exist when ignition switch is turned ON?

Yes	▶	GO TO 6.
No	▶	**Check the following.** If NG, repair harness or connector. ● Harness connector E111 ● Harness for open or short between ABS actuator and electric unit and fuse

6	CHECK WARNING LAMP

1. Disconnect ABS actuator and electric unit connector.
2. Connect suitable wire between ABS actuator and electric unit connector E111 (body side) terminal 10 (2WD) or 21 (4WD) and ground.



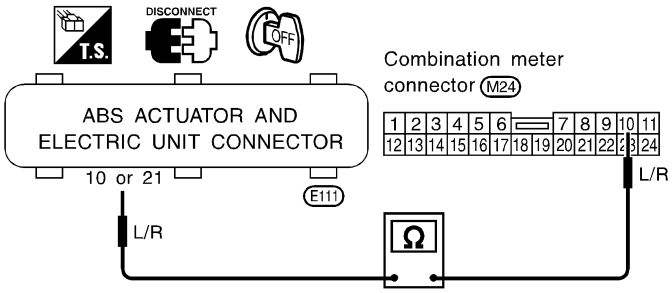
SBR502E

Does the warning lamp deactivate?

Yes	▶	Replace ABS actuator and electric unit.
No	▶	GO TO 7.

7	CHECK ABS WARNING LAMP CONTROL CIRCUIT FOR OPEN

1. Disconnect combination meter connector M24.
2. Check continuity between combination meter connector M24 (body side) terminal 10 and ABS actuator and electric unit connector E111 (body side) terminal 10 (2WD) or 21 (4WD).
   NOTE:
   Connect positive lead of multimeter to combination meter connector M24 (body side) terminal 10 and negative lead to ABS actuator and electric unit connector E111 (body side) terminal 10 (2WD) or 21 (4WD).



SBR675E

Continuity should exist.

Does continuity exist?

Yes	▶	**Check combination meter.** Refer to EL-9, "WARNING LAMPS".
No	▶	Repair harness or connectors.

8	REPLACE FUSE

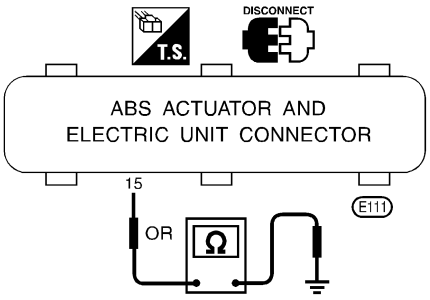
Replace fuse.

Does the fuse blow out when ignition switch is turned ON?

Yes	▶	GO TO 9.
No	▶	**INSPECTION END**

9	CHECK ABS ACTUATOR AND ELECTRIC UNIT POWER SUPPLY CIRCUIT FOR SHORT

1. Disconnect battery cable and ABS actuator and electric unit connector.
2. Check continuity between ABS actuator and electric unit connector E111 (body side) terminal 15 and ground.



SBR496E

Continuity should not exist.

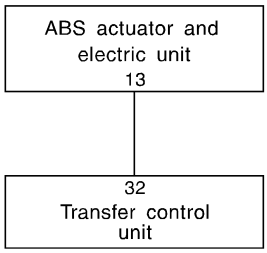
Does continuity exist?

Yes	▶	**Check the following.** If NG, repair harness or connector. ● Harness connector E111 ● Harness for open or short between ABS actuator and electric unit and fuse
No	▶	Replace ABS actuator and electric unit.

8. Vehicle Vibrates Excessively When ABS Is Operating

=NABR0121

- While ABS is operating, brake pedal vibrates slightly. This is not a problem.
- If vehicle vibration is greater in the AUTO mode than in the 2WD mode, there is the possibility of failure in the communication line between the ABS control unit and transfer control unit. Check and locate the cause of the problem.

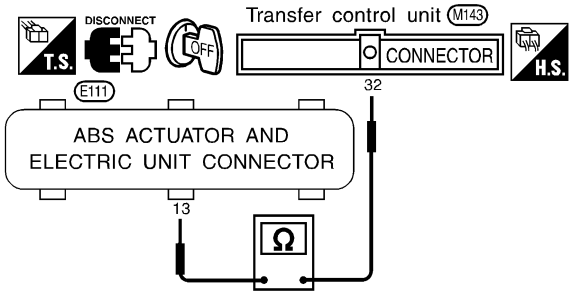
1	INSPECTION START
Inspection for excessive vibration of vehicle  SBR508E	
▶	GO TO 2.

2	CARRY OUT SELF-DIAGNOSIS
Perform self-diagnosis for the ABS actuator and electric unit and transfer control unit. **Are there any malfunctions?**	
Yes ▶	GO TO 3.
No ▶	GO TO 4.

3	INSPECTION OR REPAIR
Inspect or repair the system according to the self-diagnostic item.	
OK ▶	GO TO 4.

4	CHECK CIRCUIT

1. Disconnect connectors from ABS actuator and electric unit and transfer control unit. Check terminals for damage or loose connection.
2. Check continuity between ABS actuator and electric unit connector terminal 13 and transfer control unit connector terminal 32.



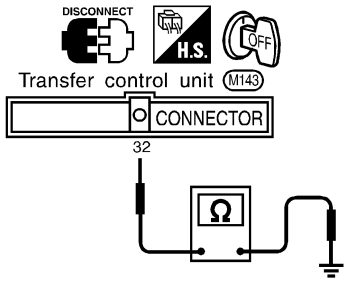
SBR509E

Does continuity exist?

Yes	▶	GO TO 5.
No	▶	**Check the following.** ● Harness connectors E111, M143 ● Harness for open or short between ABS actuator and electric unit and transfer control unit If NG, repair harness or connectors.

5	CHECK ABS OPERATING SIGNAL CIRCUIT

1. Reconnect only ABS actuator and electric unit connector.
2. Check continuity between transfer control unit connector terminal 32 and ground.
   Continuity should not exist.



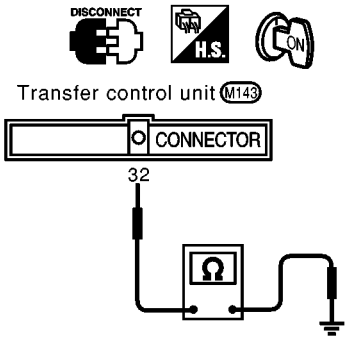
SBR510E

Does continuity exist?

Yes	▶	Replace ABS actuator and electric unit.
No	▶	GO TO 6.

6	CHECK ABS OPERATING SIGNAL

1. Connect CONSULT-II to Data Link Connector.
2. Turn ignition switch "ON". Set CONSULT-II in the active test mode to output an ABS operating signal.
   (Refer to "ACTIVE TEST PROCEDURE", "CONSULT-II Inspection Procedure", BR-42.)
3. An ABS operating signal lasts for 10 seconds. During the time the signal is being output, check resistance between transfer control unit connector terminal 32 and ground.
   Resistance: 0.5Ω, max.



ACTIVE TEST	
ABS OPER SIG	OFF
MONITOR	
ABS OPER SIG	OFF

SBR680E

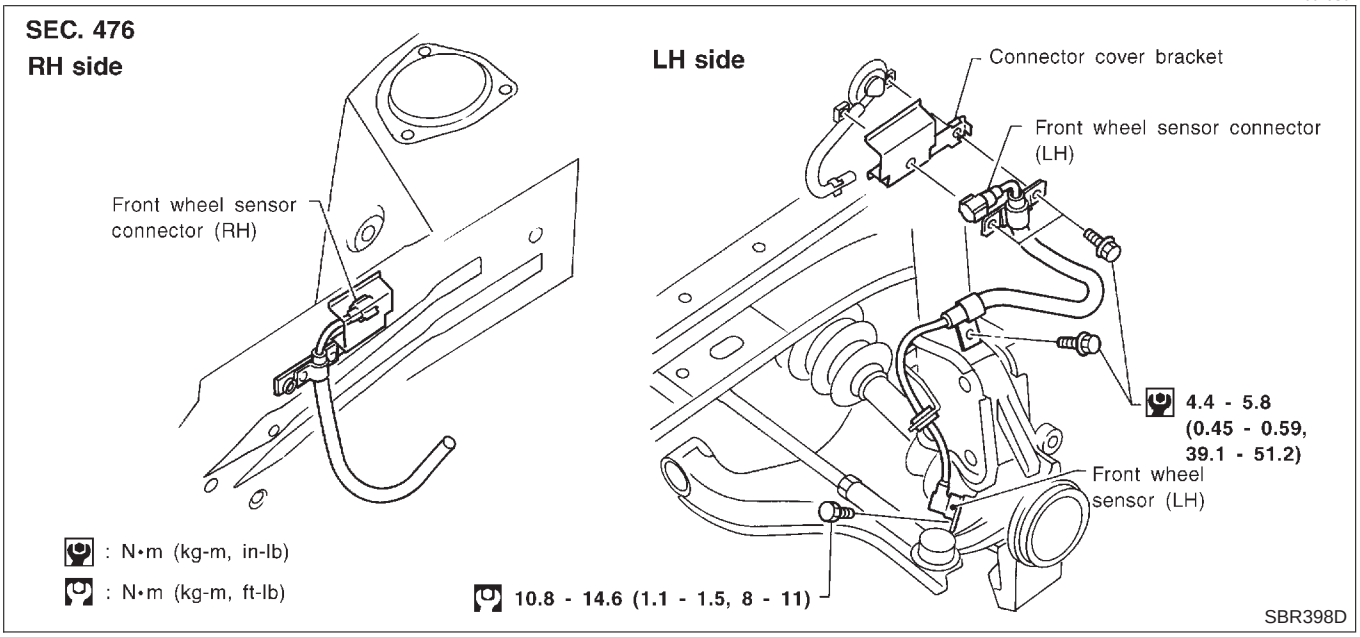
Is resistance within specifications?

Yes	▶	CHECK transfer control unit. Refer to TF-117, "TROUBLE DIAGNOSIS FOR ABS OPERATION SIGNAL".
No	▶	Replace ABS actuator and electric unit.

CAUTION:
Be careful not to damage sensor edge and sensor rotor teeth. When removing the front or rear wheel hub assembly, disconnect the ABS wheel sensor from the assembly and move it away.

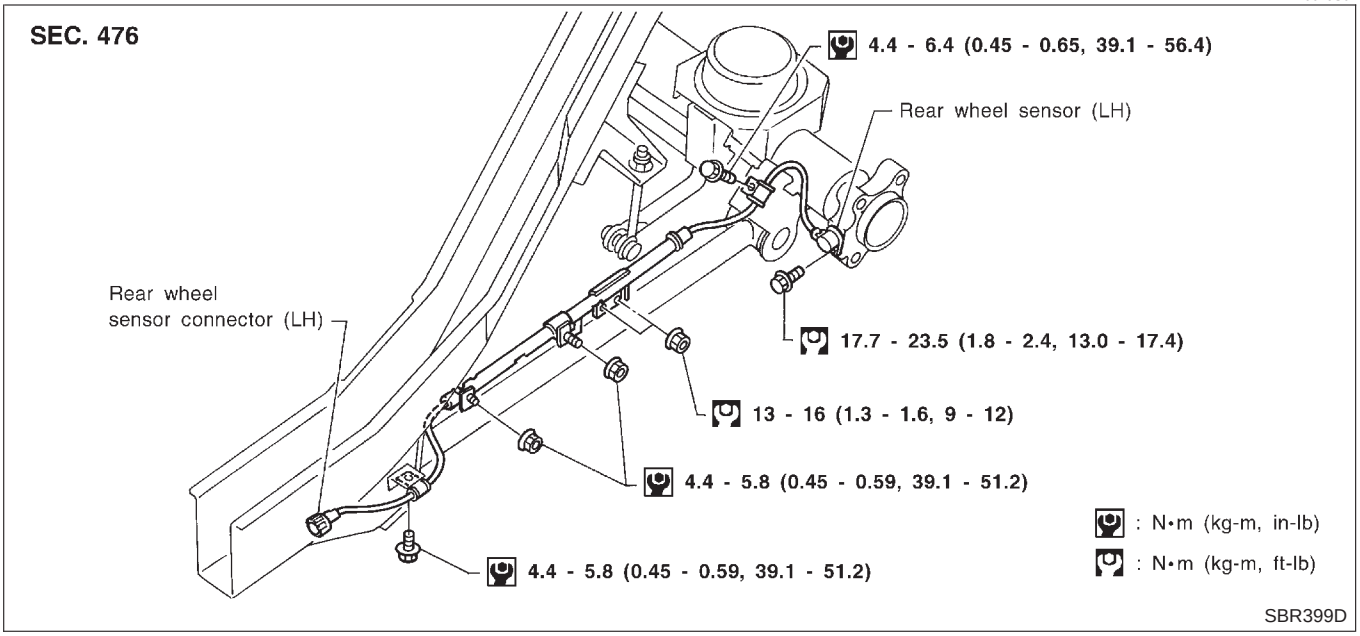
Front Wheel Sensor

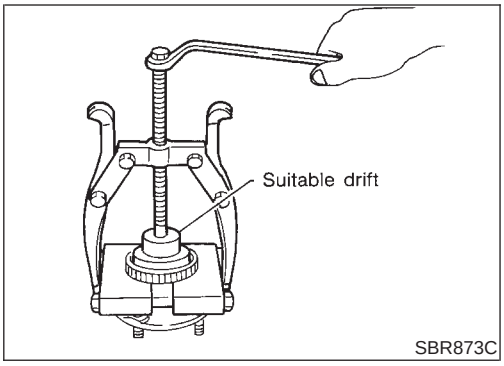
NABR0079S01



Rear Wheel Sensor

NABR0079S02





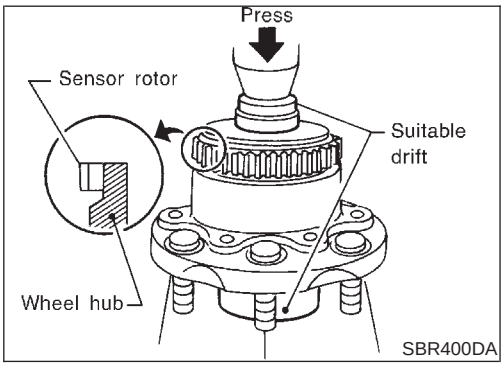
Front Sensor Rotor

NABR0079S03

REMOVAL

NABR0079S0301

1. Remove the front wheel hub. Refer to AX-7, “FRONT AXLE”.
2. Remove the sensor rotor using suitable puller, drift and bearing replacer.

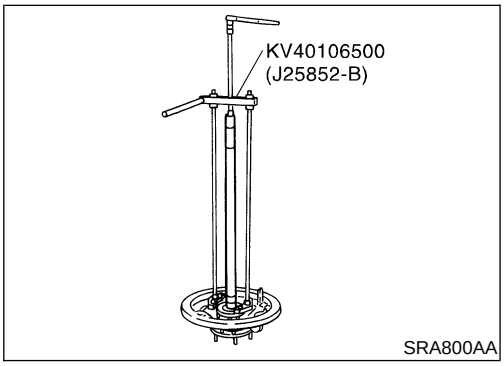


INSTALLATION

NABR0079S0302

Install the sensor rotor using suitable drift and press.

- Always replace sensor rotor with new one.
- Pay attention to the direction of front sensor rotor as shown in figure.



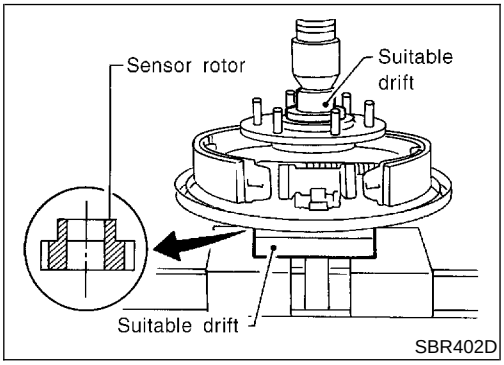
Rear Sensor Rotor

NABR0079S04

REMOVAL

NABR0079S0401

- Remove the sensor rotor using Tool.

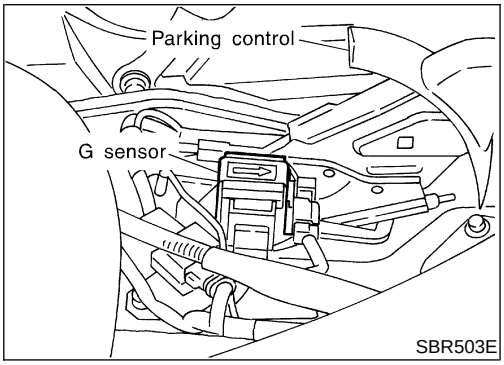


INSTALLATION

NABR0079S0402

Install the sensor rotor using suitable drift and press.

- Always replace sensor rotor with new one.
- Pay attention to the direction of front sensor rotor as shown in figure.



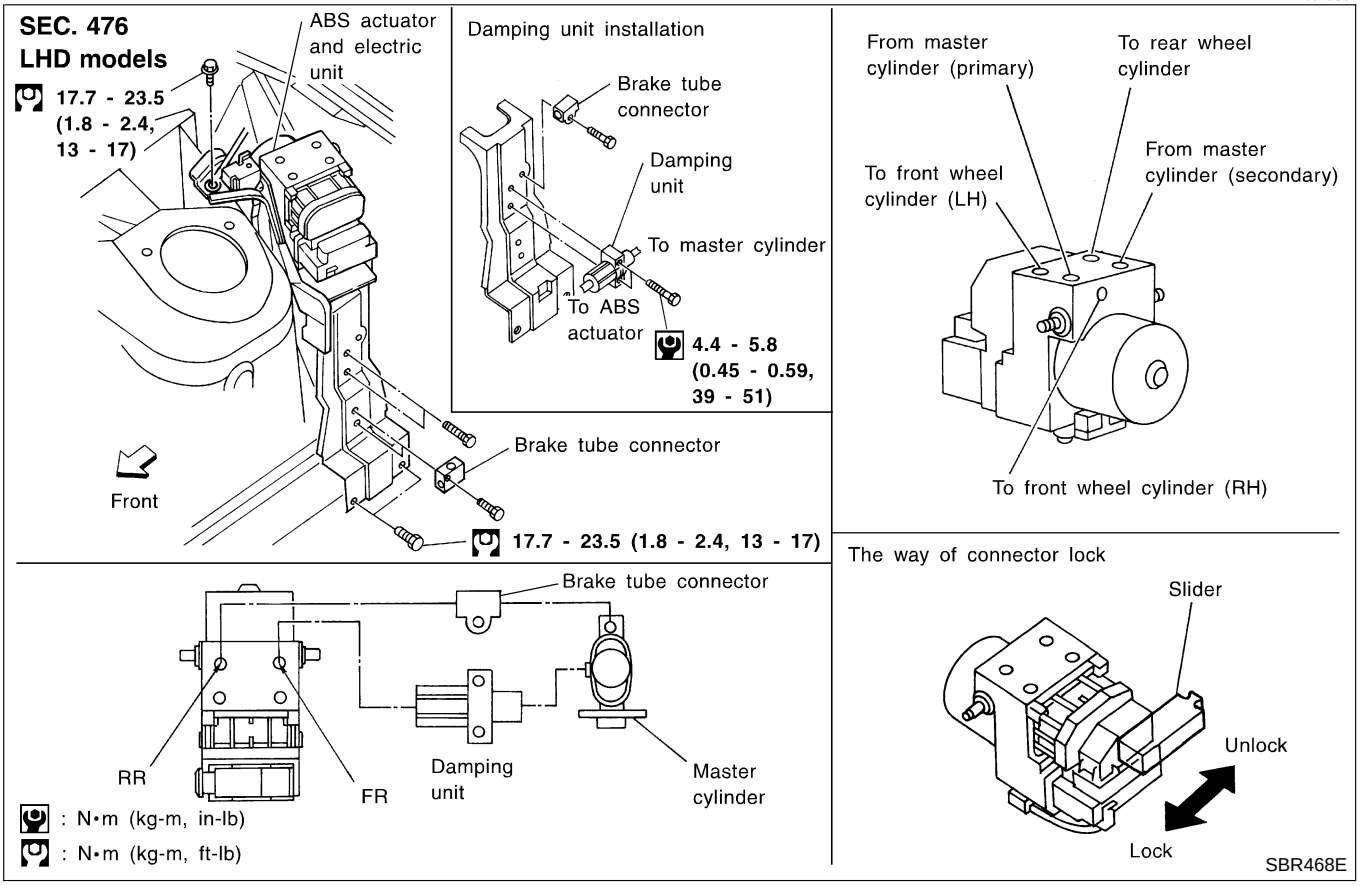
G Sensor

NABR0079S06

Always replace G sensor if bumped or dropped. Otherwise, performance characteristics of G sensor will be changed, which in turn changes ABS control performance characteristics.

ABS Actuator and Electric Unit

NABR0079S07



REMOVAL

NABR0079S0701

1. Disconnect battery cable.
2. Drain brake fluid. Refer to “Changing Brake Fluid”, BR-7.
3. Remove mounting bracket fixing bolts and nuts.
4. Disconnect connector, brake pipes and remove fixing nuts and actuator ground cable.

INSTALLATION

NABR0079S0702

CAUTION:

After installation, refill brake fluid. Then bleed air. Refer to “Bleeding Brake System”, BR-8.

1. Tighten actuator ground cable.

Place ground cable at a notch of mounting bracket.

2. Connect brake pipes temporarily.
3. Tighten fixing bolts and nuts.
4. Tighten brake pipes.
5. Connect connector and battery cable.

General Specifications

NABR0080
Unit: mm (in)

Applied model		2WD	4WD
Front brake	Brake model	AD31VC	
	Cylinder bore diameter × number of pistons	44.45 (1.7500) × 2	
	Pad Length × width × thickness	132.0 × 52.5 × 11 (5.20 × 2.067 × 0.43)	
	Rotor outer diameter × thickness	300 × 28 (11.81 × 1.10)	
Rear brake	Brake model	LT30C	
	Cylinder bore diameter	22.23 (7/8)	
	Lining length × width × thickness	296 × 50 × 6.1 (11.65 × 1.97 × 0.240)	
	Drum inner diameter	295.0 (11.61)	
Master cylinder	Bore diameter	25.40 (1)	
Control valve	Valve model	Proportioning valve within master cylinder	Linkage type load sensing valve
	Split point kPa (kg/cm^2, psi) × reducing ratio	2,942 (30, 427) × 0.2	(Variable) × 0.18
Brake booster	Booster model	M235T	
	Diaphragm diameter	Pri: 252 (9.92) Sec: 205 (8.07)	
Recommended brake fluid		DOT 3	

Disc Brake

NABR0081
Unit: mm (in)

Brake model		AD31VC
Pad wear limit	Minimum thickness	2.0 (0.079)
Rotor repair limit	Minimum thickness	26.0 (1.024)

Drum Brake

NABR0082
Unit: mm (in)

Brake model		LT30C
Lining wear limit	Minimum thickness	1.5 (0.059)
Drum repair limit	Maximum inner diameter	296.5 (11.67)
	Out-of-round limit	0.03 (0.0012)

Brake Pedal

NABR0083
Unit: mm (in)

Transmission		M/T	A/T
Free height “H”*		165 - 175 (6.50 - 6.89)	175 - 185 (6.89 - 7.28)
Depressed height “D”* [under force of 490 N (50 kg, 110 lb) with engine running]		65 (2.56)	70 (2.76)
Clearance “C” between pedal stopper and threaded end of stop lamp switch or ASCD switch		0.3 - 1.0 (0.012 - 0.039)	
Pedal free play	At clevis	1.0 - 3.0 (0.039 - 0.118)	
	At pedal pad	1 - 3 (0.04 - 0.12)	

*: Measured from surface of metal panel to pedal pad

Parking Brake Control

NABR0084

Unit: notch

Control Type	Center lever
Lever stroke [under force of 196 N (20 kg, 44 lb)]	6 - 8
Lever stroke when warning switch comes on	1 or less

NOTES

STEERING SYSTEM

SECTION ST

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Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

NAST0045

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL R50 is as follows:

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation type either just before the harness connectors or for the complete harness are related to the SRS.**

Precautions for Steering System

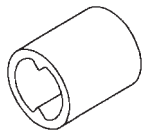
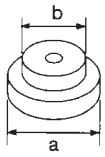
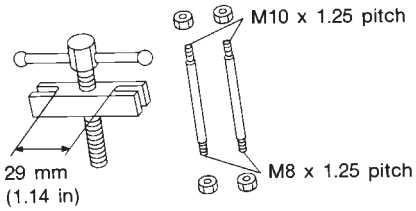
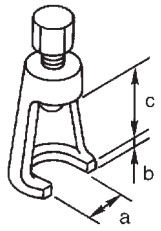
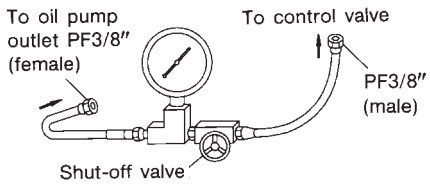
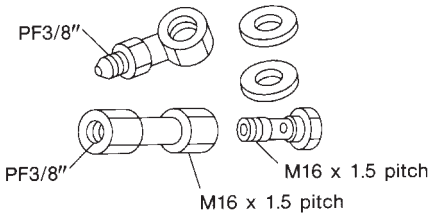
NAST0046

- **Before disassembly, thoroughly clean the outside of the unit.**
- **Disassembly should be done in a clean work area. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.**
- **Place disassembled parts in order, on a parts rack, for easier and proper assembly.**
- **Use nylon cloths or paper towels to clean the parts; common shop rags can leave lint that might interfere with their operation.**
- **Before inspection or reassembly, carefully clean all parts with a general purpose, non-flammable solvent.**
- **Before assembly, apply a coat of recommended power steering fluid* to hydraulic parts. Vaseline may be applied to O-rings and seals. Do not use any grease.**
- **Replace all gaskets, seals and O-rings. Avoid damaging O-rings, seals and gaskets during installation. Perform functional tests whenever designated.**
  ***: Genuine Nissan PSF II or equivalent. Refer to MA-12, “Fluids and Lubricants”.**

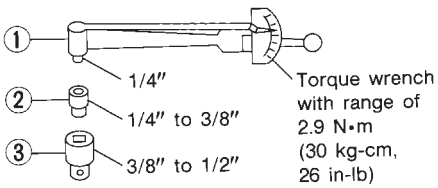
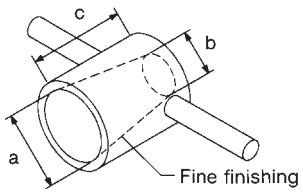
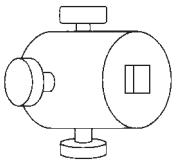
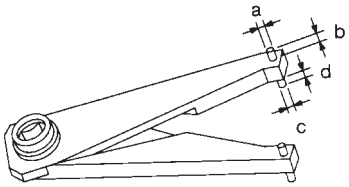
Special Service Tools

NAST0003

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

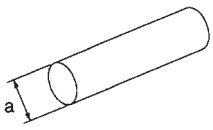
Tool number (Kent-Moore No.) Tool name	Description	
KV48100700 (J26364) Torque adapter	 NT169	Measuring pinion rotating torque
ST35300000 (—) Drift	 NT073	Installing power steering oil pump oil seal **a: 59 mm (2.32 in) dia.** **b: 45 mm (1.77 in) dia.**
ST27180001 (J25726-A) Steering wheel puller	 NT544	Removing steering wheel
ST29020001 (J24319-01) Ball joint remover	 NT694	Removing ball joint **a: 34 mm (1.34 in)** **b: 6.5 mm (0.256 in)** **c: 61.5 mm (2.421 in)**
KV48103500 (J26357 and J26357-10) Pressure gauge	 NT547	Measuring oil pressure
KV48102500 (—) Pressure gauge adapter	 NT542	Measuring oil pressure

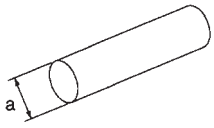
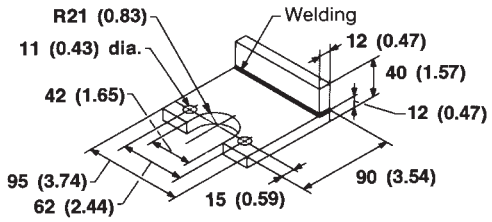
Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
ST3127S000 (See J25765-A) 1 GG91030000 (J25765-A) Torque wrench 2 HT62940000 (—) Socket adapter 3 HT62900000 (—) Socket adapter	 NT541	Measuring turning torque
KV48104400 (—) Rack seal ring reformer	 NT550	Reforming teflon ring **a: 50 mm (1.97 in) dia.** **b: 36 mm (1.42 in) dia.** **c: 100 mm (3.94 in)**
KV48103400 (—) Torque adapter	 NT236	Measuring steering transfer gear rotating torque
KV48104200 (—) Rear cover wrench	 NT540	Removing and installing gear housing end cover **a: 4 mm (0.16 in) dia.** **b: 5 mm (0.20 in)** **c: 3 mm (0.12 in) dia.** **d: 5 mm (0.20 in)**

Commercial Service Tools

NAST0004

Tool name	Description	
Rear oil seal drift	 NT063	Installing rear oil seal **a: 28 mm (1.10 in) dia.**

Tool name	Description	
Pinion oil seal drift	 NT063	Installing pinion oil seal **a: 40 mm (1.57 in) dia.**
Oil pump attachment	 NT179	Disassembling and assembling oil pump Unit: mm (in)

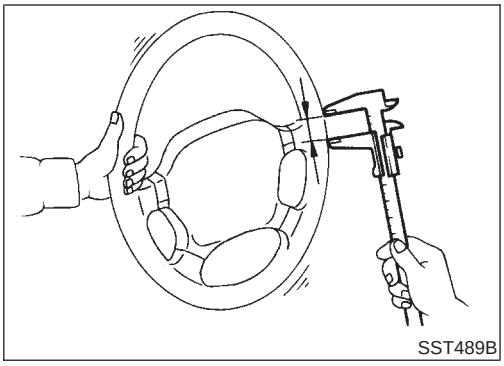
NVH Troubleshooting Chart

NAST0043S01

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

Reference page			ST-8	ST-9	ST-21	ST-21	ST-21	ST-8	ST-7	ST-9	MA-14	—	ST-13	ST-8	ST-13	ST-13	ST-17	PD-4	PD-4	AX-3	AX-3	SU-3	SU-3	SU-3	BR-6
Possible cause and SUSPECTED PARTS			Fluid level	Air in hydraulic system	Tie-rod ball joint swinging force	Tie-rod ball joint rotating torque	Tie-rod ball joint end play	Steering gear fluid leakage	Steering wheel play	Steering gear rack sliding force	Drive belt looseness	Improper steering wheel	Improper installation or looseness or tilt lock lever	Mounting rubber deterioration	Steering column deformation or damage	Improper installation or looseness of steering column	Steering linkage looseness	PROPELLER SHAFT	DIFFERENTIAL	DRIVE SHAFT	AXLE	SUSPENSION	TIRES	ROAD WHEEL	BRAKES
Symp-tom	STEERING	Noise	×	×	×	×	×	×	×	×	×							×	×	×	×	×	×	×	×
		Shake										×	×	×				×		×	×	×	×	×	×
		Vibration										×	×	×	×	×		×		×	×	×	×		
		Shimmy										×	×	×			×				×	×	×	×	×
		Judder												×			×				×	×	×	×	×

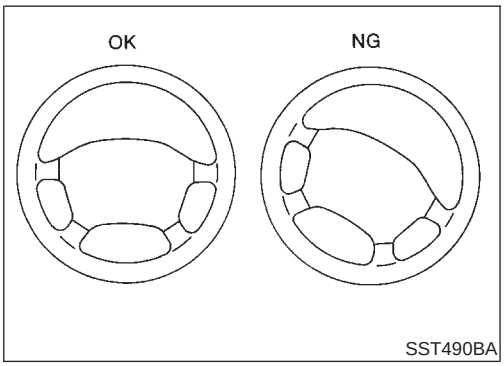
×: Applicable


SST489B

Checking Steering Wheel Play

NAST0005

1. With wheels in a straight-ahead position, check steering wheel play.
   Steering wheel play:
   35 mm (1.38 in) or less
2. If it is not within specification, check the following for loose or worn components.
   Steering gear assembly
   Steering column
   Front suspension and axle



SST490BA

Checking Neutral Position on Steering Wheel

NAST0006

PRE-CHECKING

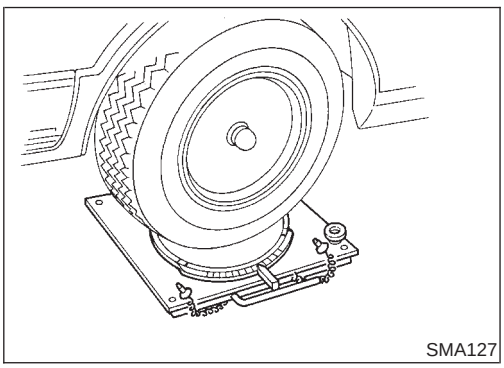
NAST0006S01

- Make sure that wheel alignment is correct.
  Wheel alignment:
  Refer to SU-14, “Wheel Alignment”.
- Verify that the steering gear is centered before removing the steering wheel.

CHECKING

NAST0006S02

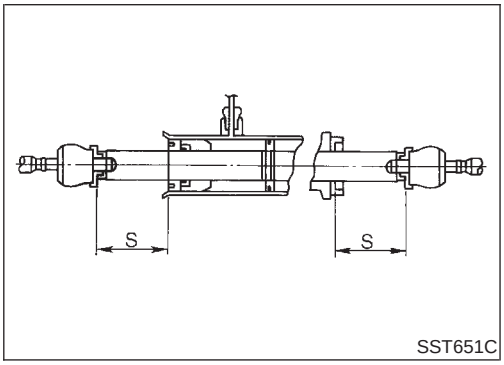
1. Check that the steering wheel is in the neutral position when driving straight ahead.
2. If it is not in the neutral position, remove the steering wheel and reinstall it correctly.
3. If the neutral position is between two teeth, loosen tie-rod lock nuts. Turn the tie-rods by the same amount in opposite directions on both left and right sides.


SMA127

Front Wheel Turning Angle

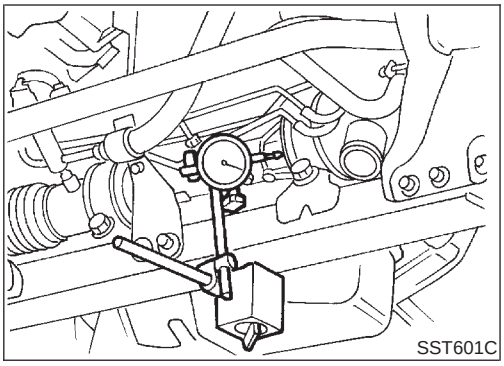
NAST0007

1. Rotate steering wheel all the way right and left; measure turning angle.
   Turning angle of full turns:
   Refer to SU-14, “Wheel Alignment”.



SST651C

2. If it is not within specification, check rack stroke.
   Rack stroke “S”:
   Refer to SDS (ST-33).


SST601C

Checking Gear Housing Movement

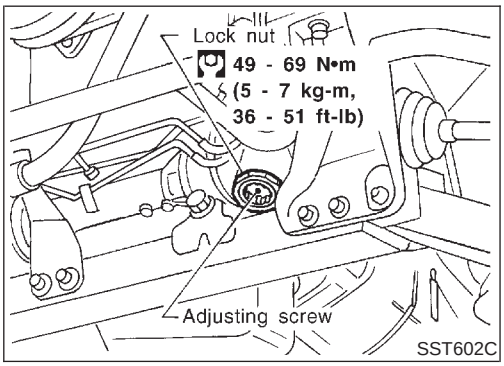
NAST0008

1. Check the movement of steering gear housing during stationary steering on a dry paved surface.

- Apply a force of 49 N (5 kg, 11 lb) to steering wheel to check the gear housing movement.
  Turn off ignition key while checking.

Movement of gear housing:
±2 mm (±0.08 in) or less

2. If movement exceeds the limit, replace mount insulator after confirming proper installation of gear housing clamps.



SST602C

Adjusting Rack Retainer

NAST0009

- Perform this driving test on a flat road.

a) Check whether vehicle moves in a straight line when steering wheel is released.

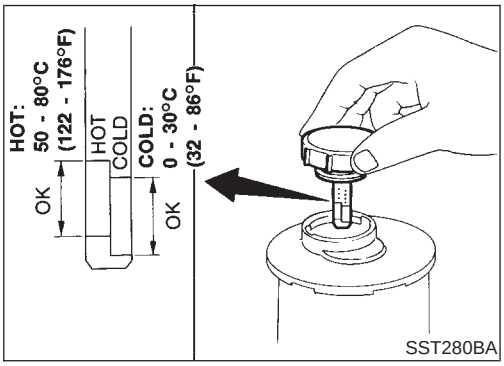
b) Check whether steering wheel returns to neutral position when steering wheel is released from a slightly turned (approx. 20°) position.

- If any abnormality is found, correct it by resetting adjusting screw.

Checking and Adjusting Drive Belts

NAST0010

Refer to MA-14, “Checking Drive Belts”.



SST280BA

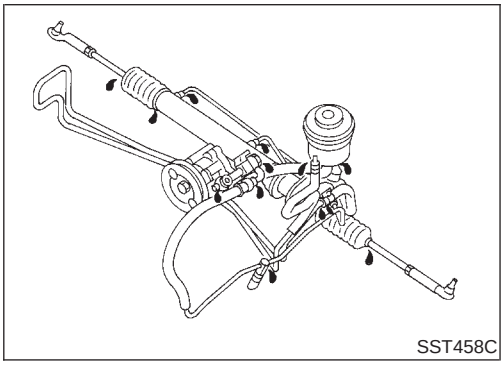
Checking Fluid Level

NAST0011

Check fluid level.
Use the correct range of the dipstick depending on the fluid temperature. Use the “HOT” range at 50 to 80°C (122 to 176°F), or the “COLD” range at 0 to 30°C (32 to 86°F).

CAUTION:

- **Do not overfill.**
- **Recommended fluid is Genuine Nissan PSF II or equivalent. Refer to MA-12, “Fluids and Lubricants”.**


SST458C

Checking Fluid Leakage

NAST0012

Check the lines for improper attachment and for leaks, cracks, damage, loose connections, chafing and deterioration.

1. Run engine between idle speed and 1,000 rpm.

Make sure temperature of fluid in oil tank rises to 60 to 80°C (140 to 176°F).

2. Turn steering wheel right-to-left several times.
3. Hold steering wheel at each “lock” position for five seconds and carefully check for fluid leakage.

CAUTION:
Do not hold the steering wheel in a locked position for more than 15 seconds.

4. If fluid leakage at connectors is noticed, loosen flare nut and then retighten.

Do not overtighten connector as this can damage O-ring, washer and connector.

5. Check rack boots for accumulation of power steering fluid.

Bleeding Hydraulic System

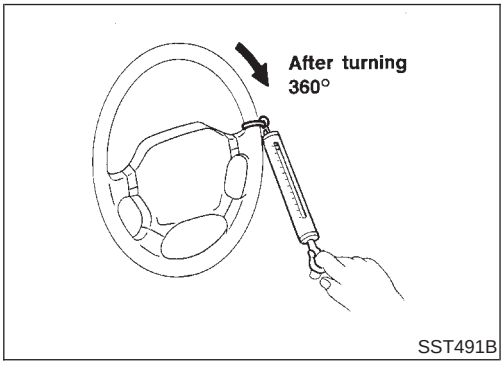
NAST0013

1. Raise front end of vehicle until wheels are clear of the ground.
2. Add fluid into oil tank to specified level. Then, quickly turn steering wheel fully to right and left and lightly touch steering stoppers.
   Repeat steering wheel operation until fluid level no longer decreases.
3. Start engine.
   Repeat step 2 above.

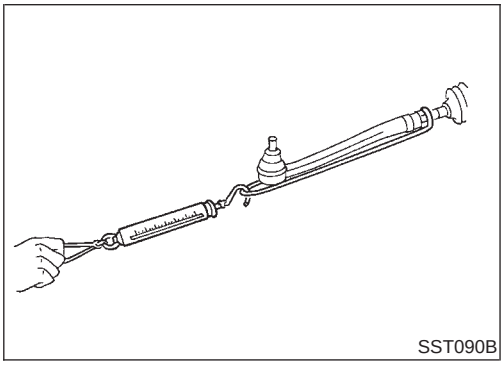
- Incomplete air bleeding will cause the following to occur. When this happens, bleed air again.

a) Air bubbles in reservoir tank
b) Clicking noise in oil pump
c) Excessive buzzing in oil pump

Fluid noise may occur in the valve or oil pump. This is common when the vehicle is stationary or while turning steering wheel slowly. This does not affect performance or durability of the system.



SST491B


SST090B

Checking Steering Wheel Turning Force

NAST0014

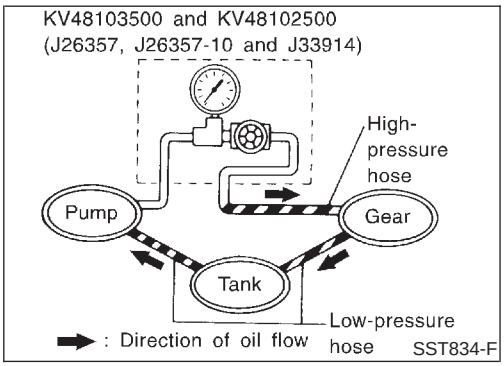
1. Park vehicle on a level, dry surface and set parking brake.
2. Start engine.
3. Bring power steering fluid up to adequate operating temperature. [Make sure temperature of fluid is approximately 60 to 80°C (140 to 176°F).]

Tires need to be inflated to normal pressure.

4. Check steering wheel turning force when steering wheel has been turned 360° from the neutral position.
   Steering wheel turning force:
   39 N (4 kg, 9 lb) or less
5. If steering wheel turning force is out of specification, check rack sliding force.

a. Disconnect steering column lower joint and knuckle arms from the gear.
b. Start and run engine at idle to make sure steering fluid has reached normal operating temperature.
c. Pull tie-rod slowly to move it from neutral position to ±11.5 mm (±0.453 in) at speed of 3.5 mm (0.138 in)/s. Check that rack sliding force is within specification.
   Rack sliding force:
   137 - 255 N (14 - 26 kg, 31 - 57 lb)

6. If rack sliding force is not within specification, overhaul steering gear assembly.
7. If rack sliding force is OK, inspect steering column. Refer to "Inspection", "STEERING WHEEL AND STEERING COLUMN", ST-14.



Checking Hydraulic System

NAST0015

Before starting, check belt tension, driving pulley and tire pressure.

1. Set Tool. Open shut-off valve. Then bleed air.
   Refer to "Bleeding Hydraulic System", ST-9.
2. Run engine, at idle speed or 1,000 rpm.

Make sure fluid temperature in reservoir tank rises to 60 to 80°C (140 to 176°F).

WARNING:

Warm up engine with shut-off valve fully opened. If engine is started with shut-off valve closed, fluid pressure in the power steering pump increase to maximum. This will raise fluid temperature abnormally.

3. Check pressure with steering wheel fully turned to left and right positions with engine idling at 1,000 rpm.

CAUTION:

Do not hold the steering wheel in a locked position for more than 15 seconds.

Power steering pump maximum operating pressure:
8,630 - 9,219 kPa
(88 - 94 kg/cm^2, 1,251 - 1,337 psi)

- If pressure reaches maximum operating pressure, system is OK.
- If pressure increases above maximum operating pressure, check power steering pump flow control valve. Refer to ST-28.

4. If power steering pressure is below the maximum operating pressure, slowly close shut-off valve and check pressure again.

CAUTION:

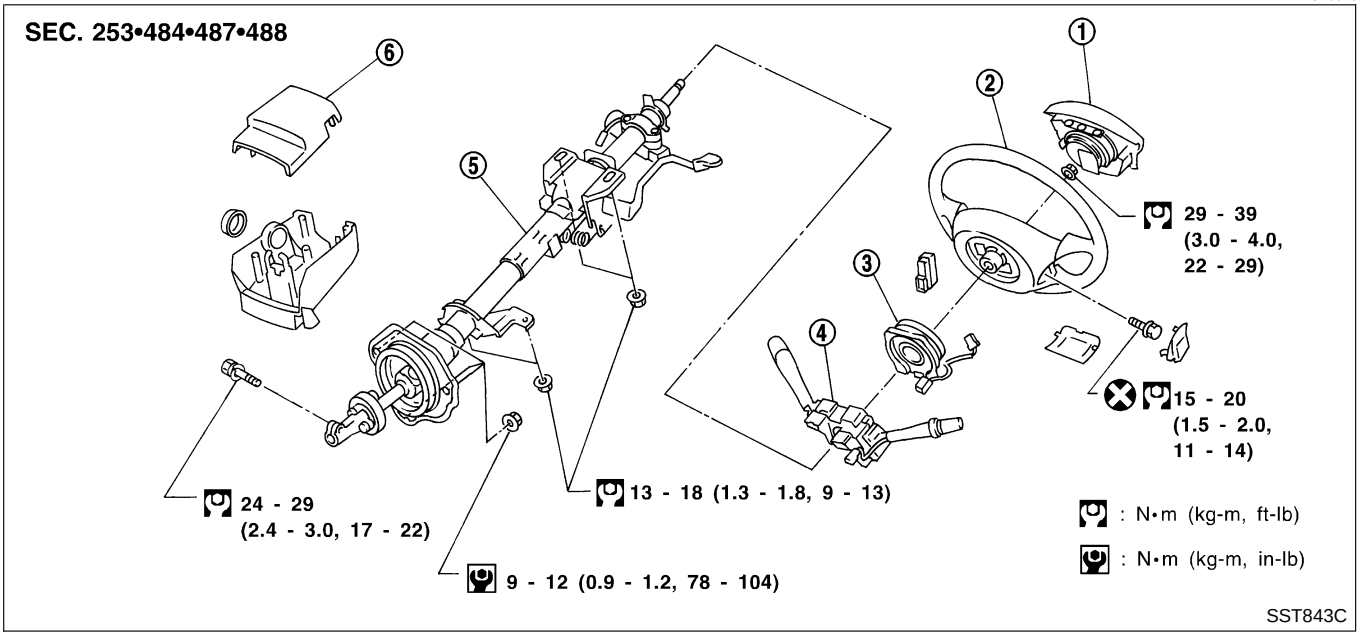
Do not close shut-off valve for more than 15 seconds.

- If pressure increases to maximum operating pressure, gear should be damaged. Refer to "Removal and Installation", ST-18.
- If pressure remains below maximum operating pressure, pump should be damaged. Refer to "Disassembly", ST-28.

5. After checking hydraulic system, remove Tool and add fluid as necessary. Then completely bleed air out of system. Refer to ST-9.

Components

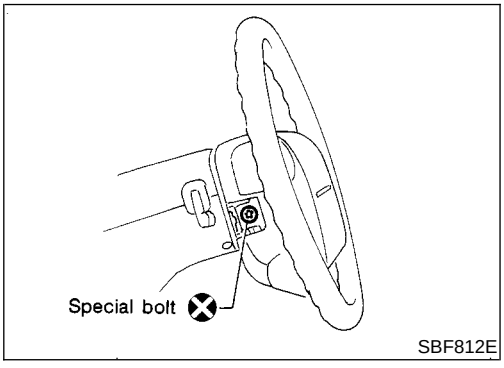
NAST0016



1. Air bag module
2. Steering wheel
3. Spiral cable
4. Combination switch
5. Steering column assembly
6. Column cover

CAUTION:

- **The rotation of the spiral cable (SRS "AIR BAG" component part) is limited. If the steering gear must be removed, set the front wheels in the straight-ahead direction. Do not rotate the steering column while the steering gear is removed.**
- **Remove the steering wheel before removing the steering lower joint to avoid damaging the SRS spiral cable.**



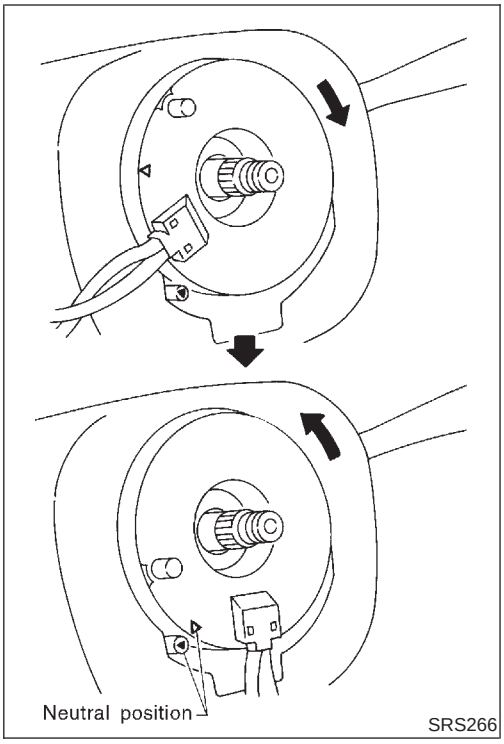
Removal and Installation

NAST0017

STEERING WHEEL

NAST0017S01

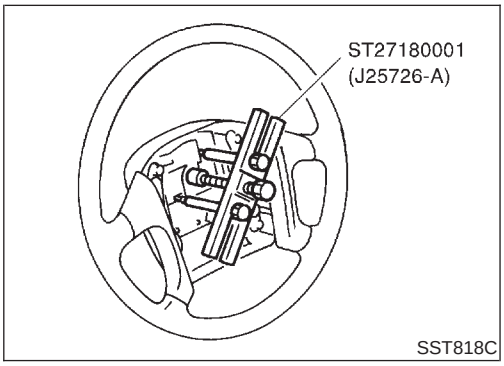
1. Remove air bag module and spiral cable. Refer to RS-17, "Removal — Air Bag Module and Spiral Cable".



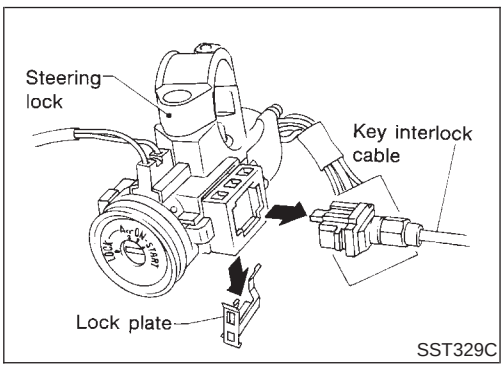
2. Align spiral cable correctly when installing steering wheel.
a. Set the front wheels in the straight-ahead position.
b. Make sure that the spiral cable is in the neutral position. The neutral position is detected by turning left about 2.5 revolutions from the right end position. Align the two marks (⧗).

CAUTION:

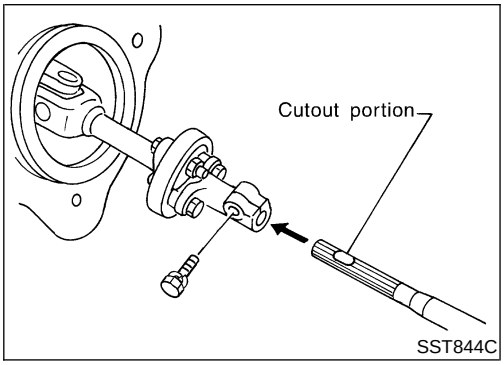
- **The spiral cable may snap due to steering operation if the cable is installed in an improper position.**
- **Also, with the steering linkage disconnected, the cable may snap by turning the steering wheel beyond the limited number of turns. The spiral cable can be turned to the left about 2.5 turns from the right end position.**



3. Remove steering wheel with Tool.



4. Remove key interlock cable.



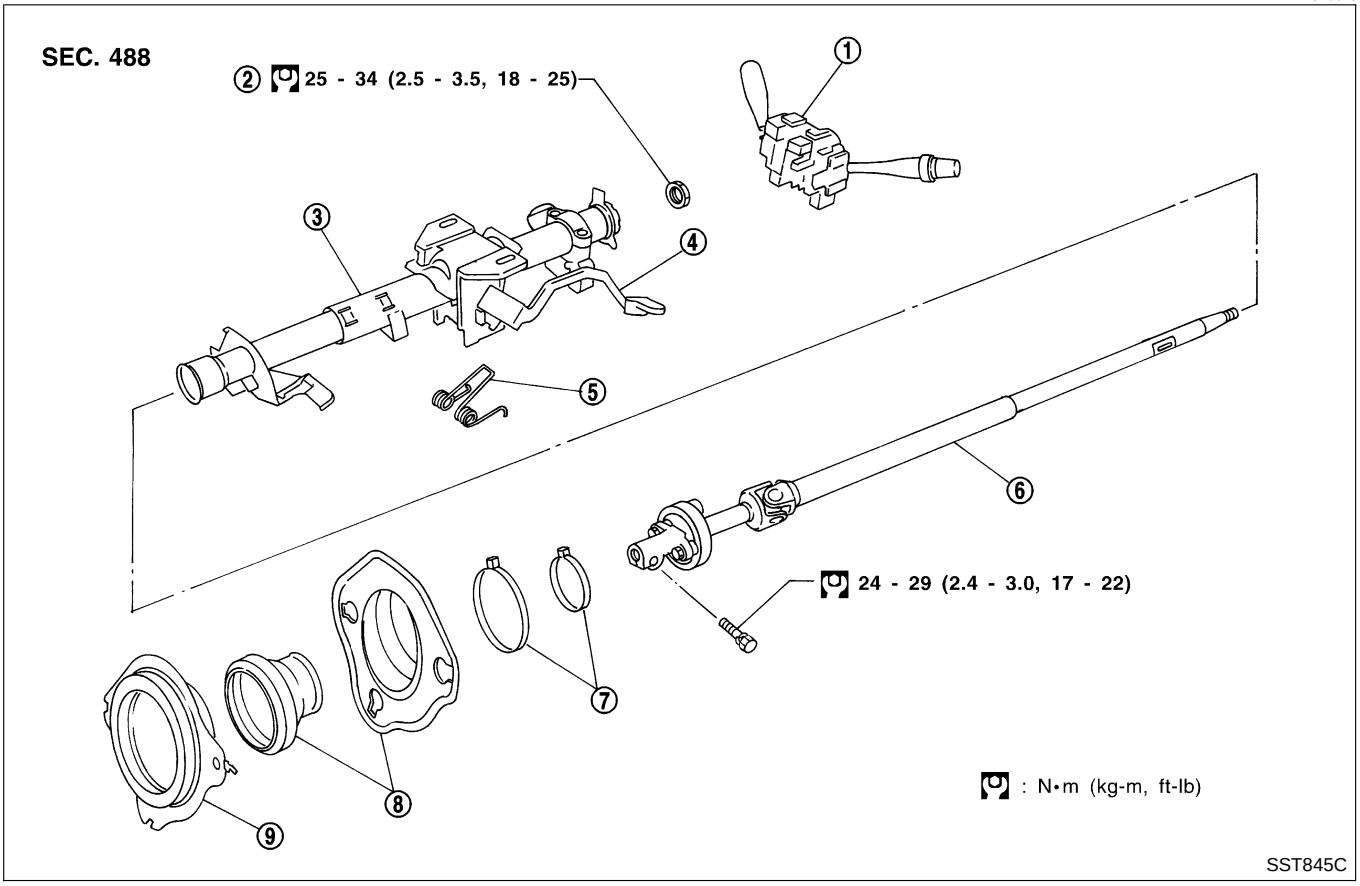
STEERING COLUMN

NAST0017S02

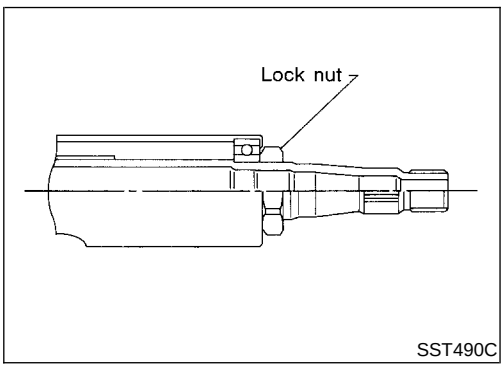
- When installing steering column, fingertighten all lower bracket and clamp retaining bolts; then tighten them securely. Do not apply undue stress to steering column.
- When attaching coupling joint, be sure tightening bolt faces cutout portion.

Disassembly and Assembly

NAST0018

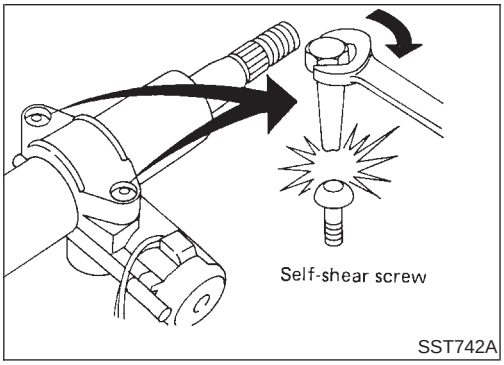


1. Combination switch
2. Lock nut
3. Jacket tube assembly
4. Tilt lever
5. Tilt spring
6. Steering column shaft assembly
7. Band
8. Jacket tube bracket insulator assembly
9. Hole cover



- When disassembling and assembling, unlock steering lock with key.
- Install lock nut on steering column shaft and tighten the nut to specification.

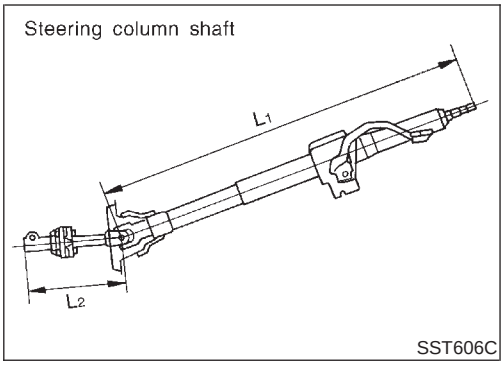
  : 25 - 34 N·m (2.5 - 3.5 kg-m, 18 - 25 ft-lb)



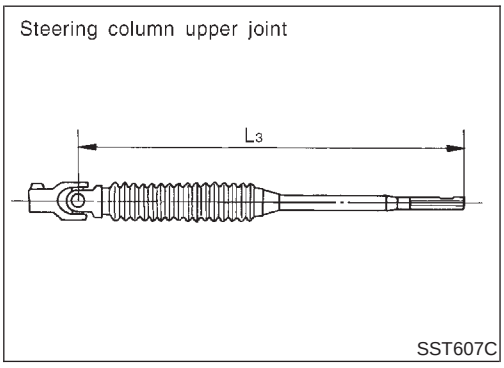
- Steering lock

a) Break self-shear type screws with a drill or other appropriate tool.

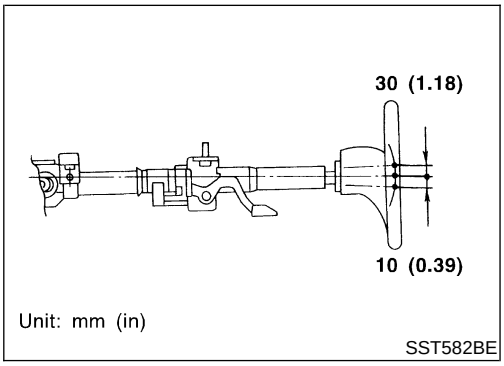
b) Install new self-shear type screws and then cut off self-shear type screw heads.



SST606C



SST607C



SST582BE

Inspection

NAST0019

- When steering wheel does not turn smoothly, check the steering column as follows and replace damaged parts.

a) Check column bearings for damage and unevenness. Lubricate with recommended multi-purpose grease or replace steering column as an assembly, if necessary.

b) Check steering column lower shaft for deformation and breakage. Replace if necessary.

- When the vehicle comes into a light collision, check length "L_1", "L_2" and "L_3".

Steering column length "L_1":
716.7 - 718.7 mm (28.22 - 28.30 in)
Steering column lower shaft length "L_2":
178 - 180 mm (7.01 - 7.09 in)
Steering column upper joint length "L_3":
430.7 - 432.7 mm (16.96 - 17.04 in)

If out of the specifications, replace steering column upper joint or steering column as an assembly.

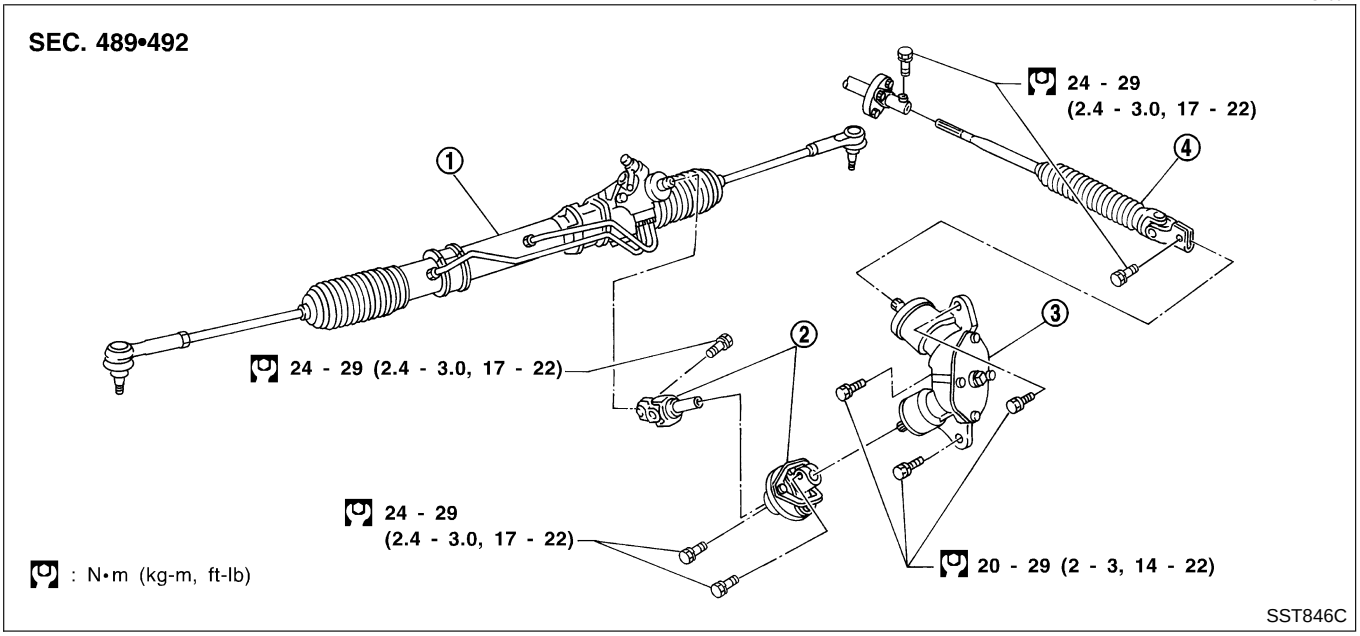
TILT MECHANISM

NAST0019S01

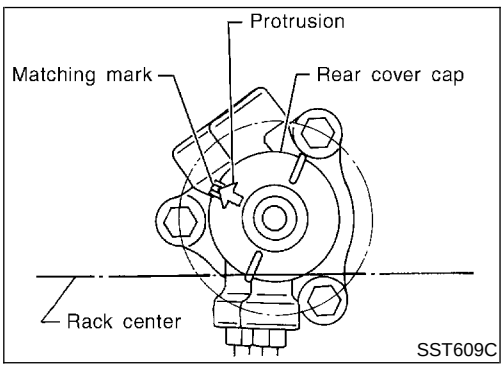
After installing steering column, check tilt mechanism operation.

Removal

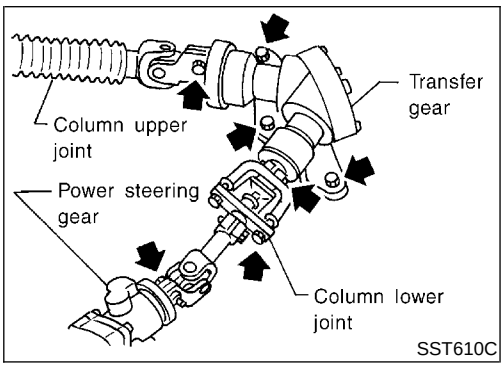
NAST0021



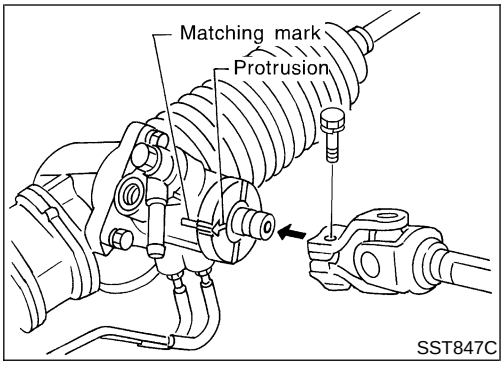
1. Power steering gear assembly
2. Steering column lower joint
3. Transfer gear assembly
4. Steering column upper joint



1. Set wheels in the straight-ahead position.
2. Straight-forward position is indicated by a protrusion on the power steering gear rear cover cap and matching mark on the rear housing.



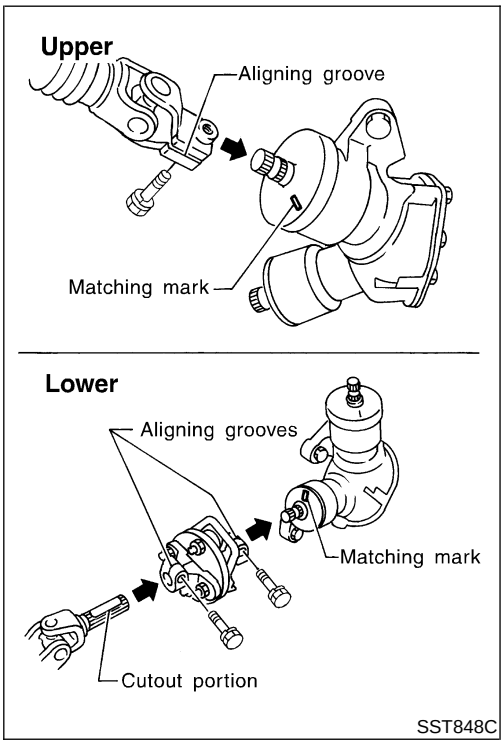
3. Remove steering column upper and lower joint from transfer gear.
4. Remove transfer gear assembly.



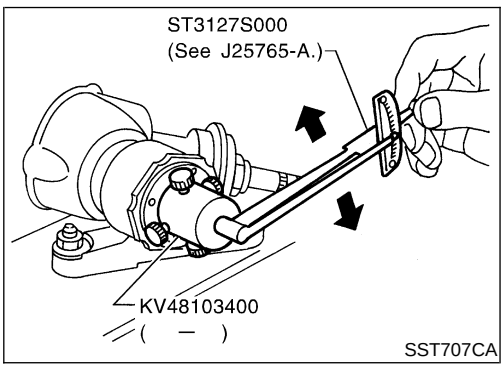
Installation

NAST0022

1. Set wheels in the straight-ahead position.
2. Install transfer gear assembly.
3. Install column lower joint while aligning groove with protrusions on the steering gear rear cover cap.
4. Tighten bolt while aligning groove on steering gear. Before tightening bolt, ensure it is inserted correctly.



5. When attaching steering column upper and lower joint to transfer gear, it must be positioned as shown in figure at left.



Inspection

NAST0024

Do not disassemble steering transfer gear assembly.

- Check that steering transfer gear assembly operates smoothly. Also check for grease leakage, deformation and damage. Replace steering transfer gear assembly if necessary.
- Check rotating torque at input shaft in 360° and in both directions.

  Rotating torque:

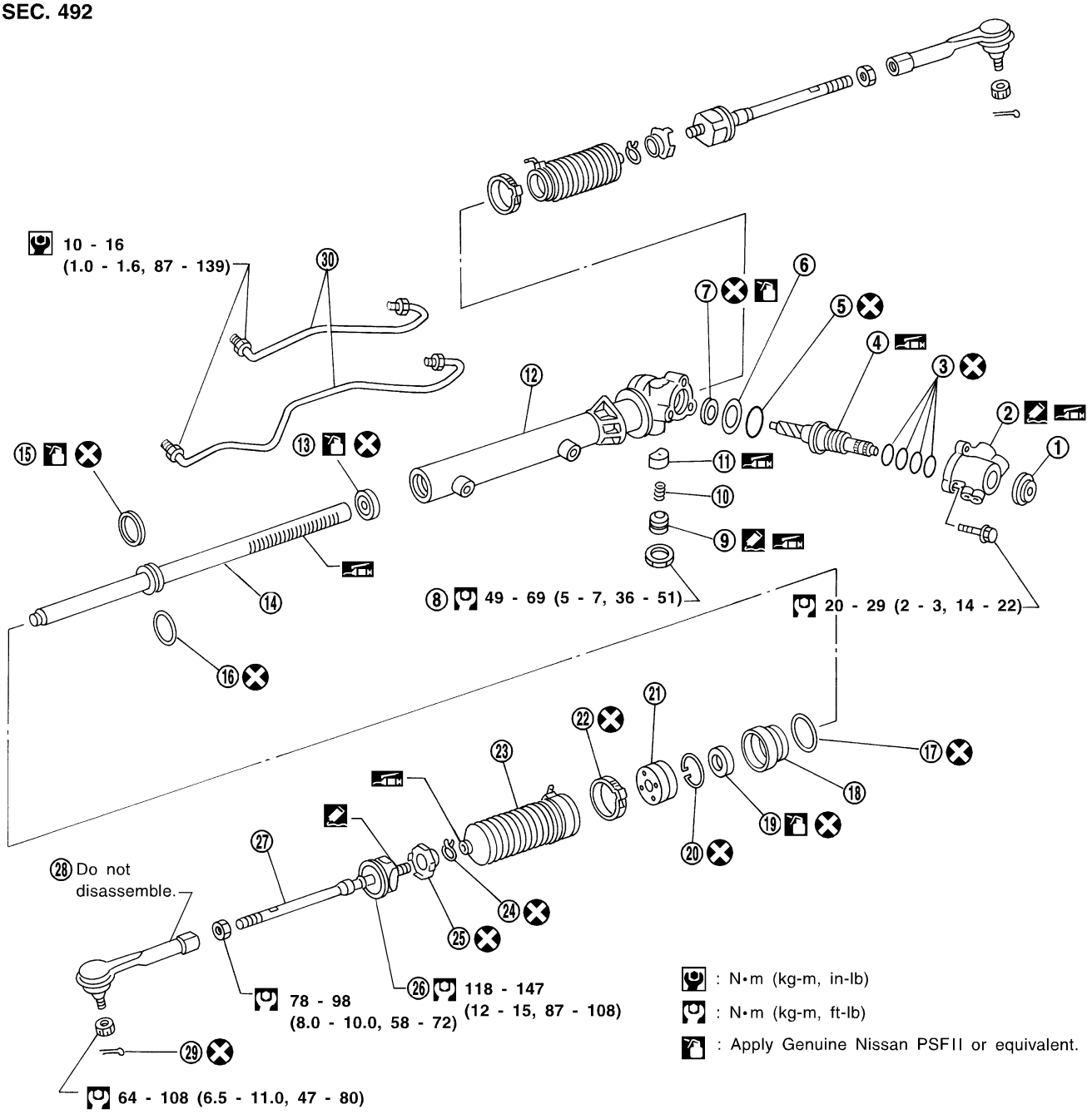
  0.25 - 0.69 N·m (2.5 - 7.0 kg-cm, 2.2 - 6.1 in-lb)

  If rotating torque is out of specification, replace steering transfer gear assembly.

Components

NAST0026

SEC. 492

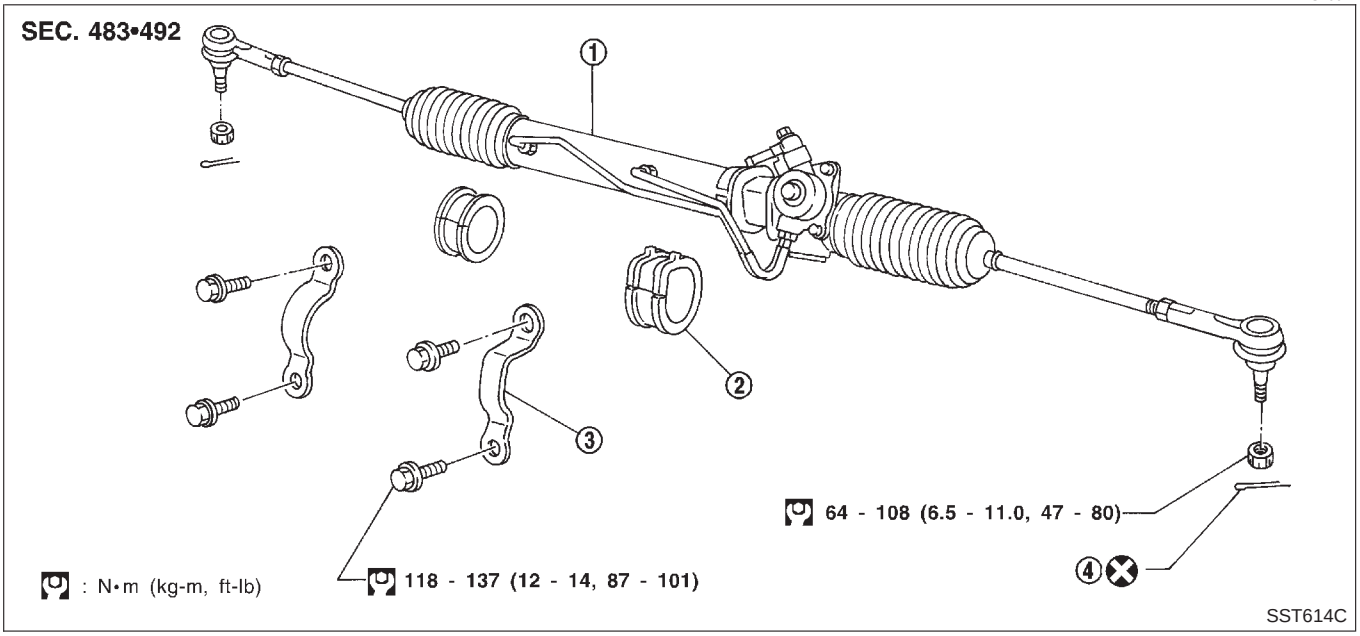


SST618CB

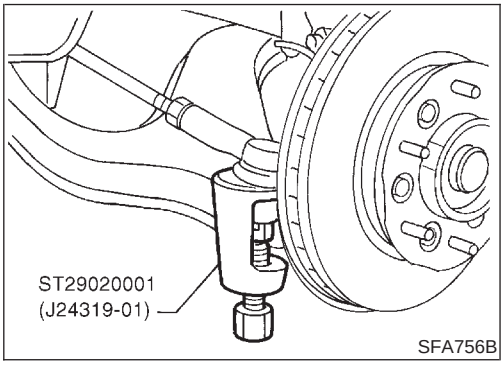
1. Rear cover cap
2. Rear housing assembly
3. Pinion seal ring
4. Pinion assembly
5. O-ring
6. Shim
7. Pinion oil seal
8. Lock nut
9. Adjusting screw
10. Spring
11. Retainer
12. Gear housing assembly
13. Rack oil seal
14. Rack assembly
15. Rack seal ring
16. O-ring
17. O-ring
18. Rack bushing
19. Rack oil seal
20. Snap ring
21. End cover assembly
22. Boot clamp
23. Dust boot
24. Boot clamp
25. Lock plate
26. Tie-rod inner socket
27. Tie-rod
28. Tie-rod outer socket
29. Cotter pin
30. Cylinder tube

Removal and Installation

NAST0027

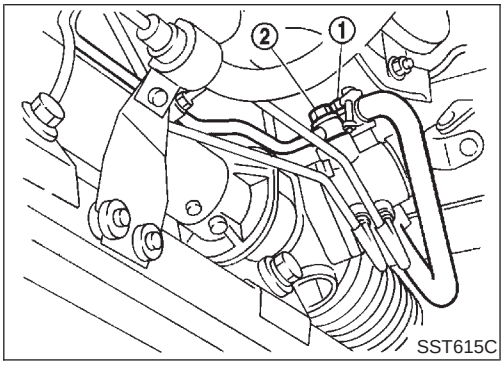


1. Gear and linkage assembly
2. Rack mounting insulator
3. Gear housing mounting bracket
4. Cotter pin



CAUTION:

- **The rotation of the spiral cable (SRS "AIR BAG" component part) is limited. If the steering gear must be removed, set the front wheels in the straight-ahead direction. Do not rotate the steering column while the steering gear is removed.**
- **Remove the steering wheel before removing the steering lower joint to avoid damaging the SRS spiral cable.**
- Detach tie-rod outer sockets from knuckle arms with Tool.



- Install pipe connector.
- Observe specified tightening torque when tightening high-pressure and low-pressure pipe connectors. Excessive tightening will damage threads of connector or O-ring.

  Connector tightening torque:

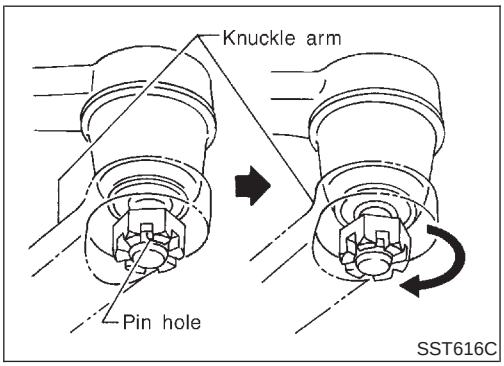
  Low-pressure side "1"

  30 - 35 N·m (3.1 - 3.6 kg-m, 22 - 26 ft-lb)

  High-pressure side "2"

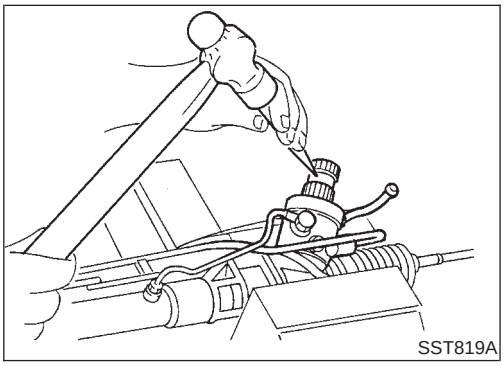
  30 - 35 N·m (3.1 - 3.6 kg-m, 22 - 26 ft-lb)
- The O-ring in low-pressure pipe connector is larger than that

in high-pressure connector. Take care to install the proper O-ring.

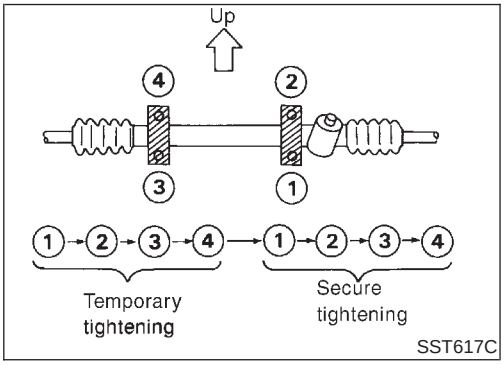


- Initially, tighten nut on tie-rod outer socket and knuckle arm to 64 to 69 N·m (6.5 to 7.0 kg-m, 47 to 51 ft-lb). Then tighten further to align nut groove with first pin hole so that cotter pin can be installed.

CAUTION:
Tightening torque must not exceed 108 N·m (11.0 kg-m, 80 ft-lb).

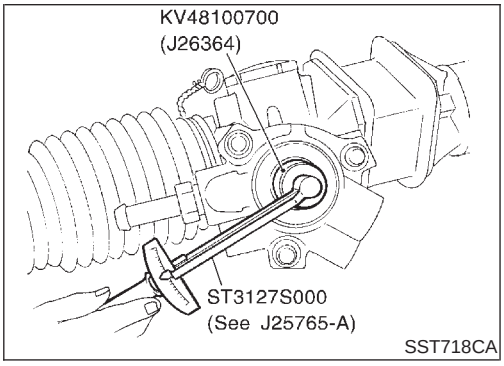


- Before removing steering column lower joint from gear, set gear in neutral (wheels in straight-ahead position). After removing steering column lower joint, put matching mark on pinion shaft and pinion housing to record neutral position.
- To install, set left and right dust boots to equal deflection. Attach steering column lower joint by aligning matching marks of pinion shaft and pinion housing.



- Tighten gear housing mounting bracket bolts in the order shown.

Secure tightening torque:
118 - 137 N·m (12 - 14 kg-m, 87 - 101 ft-lb)



Disassembly

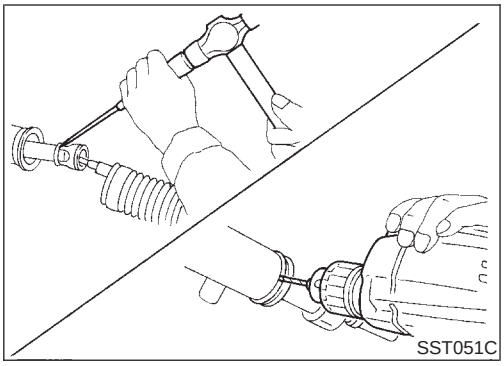
NAST0028

1. Prior to disassembling, measure pinion rotating torque. Record the pinion rotating torque as a reference.

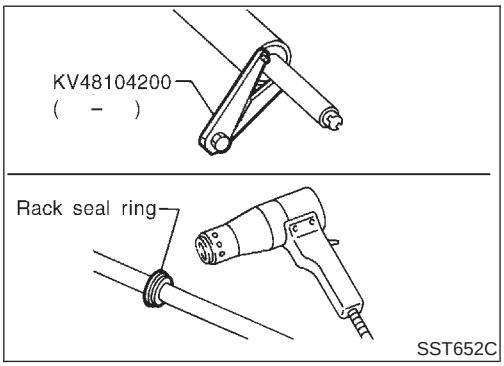
- **Before measuring, disconnect cylinder tube and drain fluid.**
- **Use soft jaws when holding steering gear housing. Handle gear housing carefully, as it is made of aluminum. Do not grip cylinder in a vise.**

2. Remove pinion gear.

Be careful not to damage pinion gear when removing pinion seal ring.



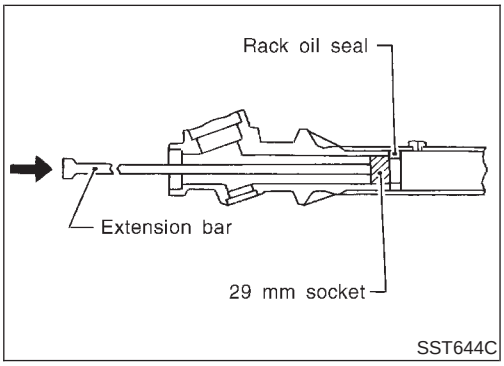
3. Remove tie-rod outer sockets and boots.
4. Loosen tie-rod inner socket by prying up staked portion, and remove socket.
5. Remove retainer.
6. Remove pinion assembly.
7. Use a 2 to 2.5 mm (0.079 to 0.098 in) diameter drill to completely remove staked portion of gear housing end.



8. Remove gear housing end cover assembly with a suitable tool.
9. Draw out rack assembly.
10. Remove rack seal ring.

- Using a heat gun, heat rack seal to approximately 40°C (104°F).
- Remove rack seal ring.

Be careful not to damage rack.



11. Remove rack bushing and rack oil seal using tape wrapped socket and extension bar.

Do not scratch inner surfaces of pinion housing.

Inspection

NAST0029

Thoroughly clean all parts in cleaning solvent or Genuine Nissan PSF II or equivalent. Blow dry with compressed air, if available.

BOOT

NAST0029S01

- Check condition of boot. If cracked excessively, replace it.
- Check boots for accumulation of power steering fluid.

RACK

NAST0029S02

Thoroughly examine rack gear. If damaged, cracked and worn, replace it.

PINION ASSEMBLY

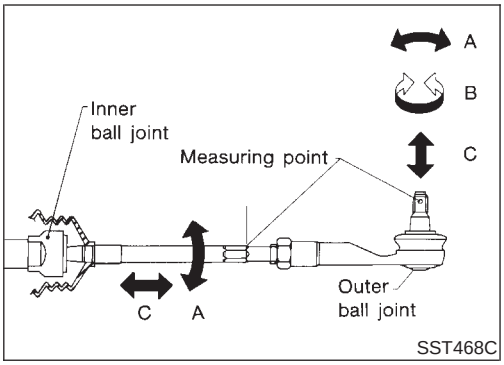
NAST0029S03

- Thoroughly examine pinion gear. If pinion gear is damaged, cracked and worn, replace it.
- Check that all bearings roll freely. Ensure that balls, rollers and races are not cracked, pitted and worn.

GEAR HOUSING CYLINDER

NAST0029S04

Check gear housing cylinder bore for scratches and other damage. Replace if necessary.

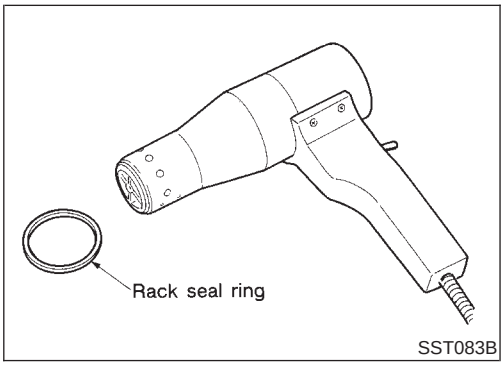


SST468C

TIE-ROD OUTER AND INNER SOCKETS

NAST0029S05

- Check ball joints for swinging force.
  Tie-rod outer and inner ball joints swinging force "A":
  Refer to SDS, ST-33.
- Check ball joint for rotating torque.
  Tie-rod outer ball joint rotating torque "B":
  Refer to SDS, ST-33.
- Check ball joints for axial end play.
  Tie-rod outer and inner ball joints axial end play "C":
  Refer to SDS, ST-33.
- Check condition of dust cover. If cracked excessively, replace outer tie-rod.

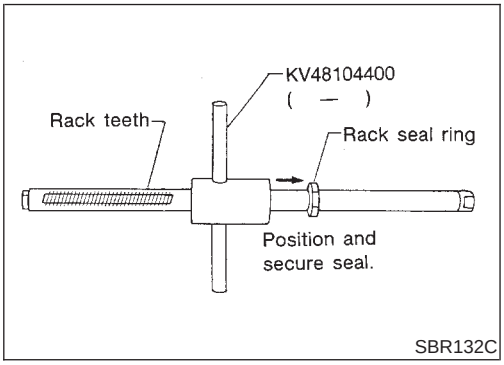


SST083B

Assembly

NAST0030

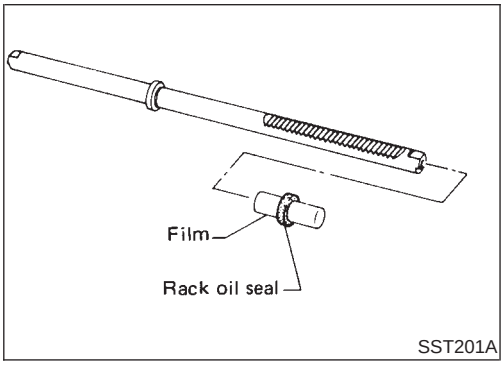
1. Using a heat gun, heat new teflon rack seal ring to approximately 40°C (104°F). Then place it onto rack.



SBR132C

2. Using Tool, compress rack seal ring securely on rack.

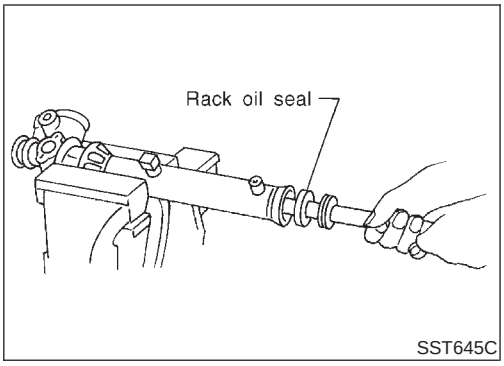
Always insert Tool from the rack gear side.



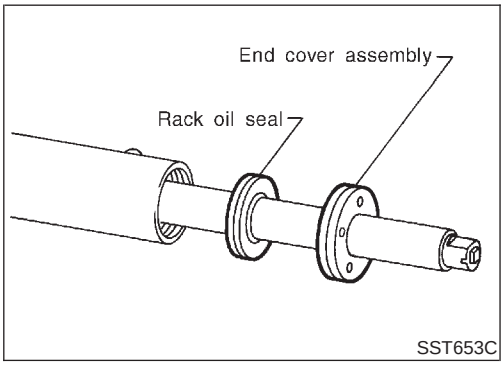
SST201A

3. Insert new rack oil seal.

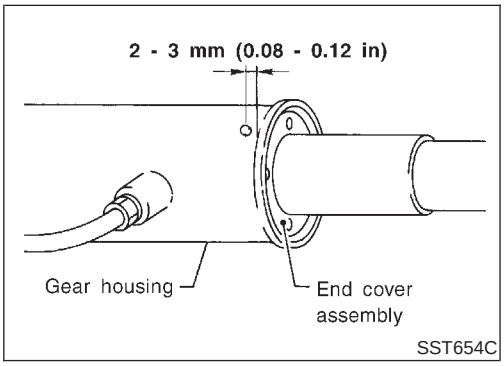
- **Place plastic film into rack oil seal to prevent damage by rack teeth.**
- **Do not forget to remove plastic film after rack oil seal is positioned properly.**
- **Make sure lips of rack oil seal face each other.**



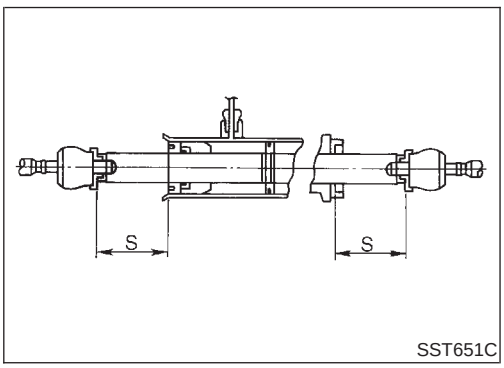
4. Install rack oil seal and rack bushing with rack assembly.



5. Insert rack oil seal and end cover assembly to rack. Then tighten end cover assembly.



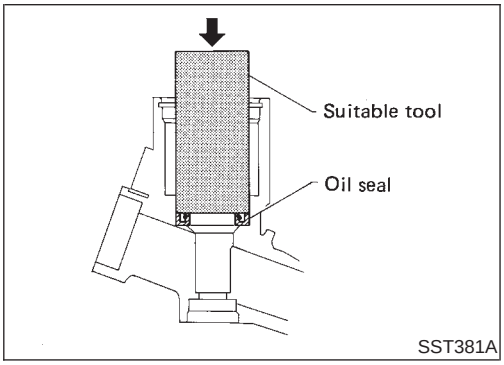
6. Fasten cylinder end cover assembly to gear housing by staking.



7. Set rack gear in the neutral position.

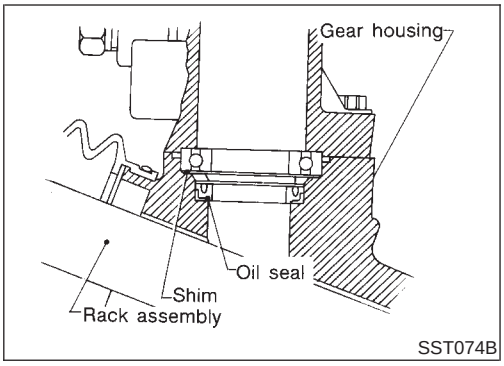
Rack stroke "S":

Refer to SDS, ST-33.

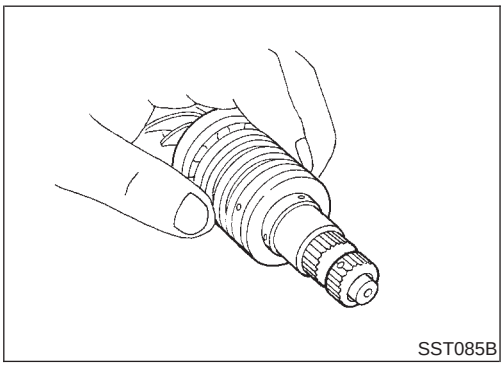


8. Coat seal lip of new pinion oil seal with multi-purpose grease. Install it into pinion housing of gear with a suitable tool.

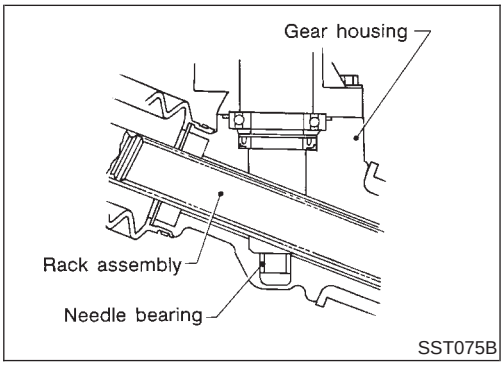
Make sure lip of oil seal faces up when installed.



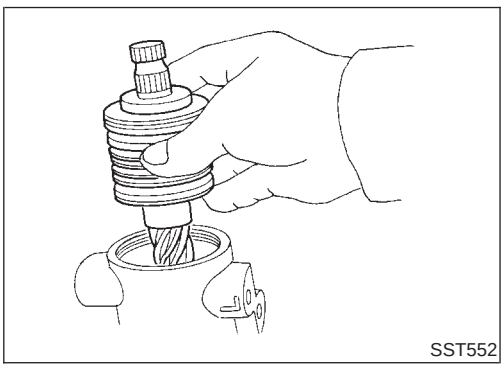
9. Install pinion bearing adjusting shim(s).
- Whenever pinion assembly, gear housing and rear housing are disassembled, replace shim(s) with new ones. Always use the same number of shim(s) when replacing.



10. Install new pinion seal ring (made of Teflon) on pinion gear assembly.
- Using a heat gun, heat pinion seal ring to approximately 40°C (104°F) before installing it onto pinion gear assembly.
- Make sure pinion seal ring is properly settled in valve groove.

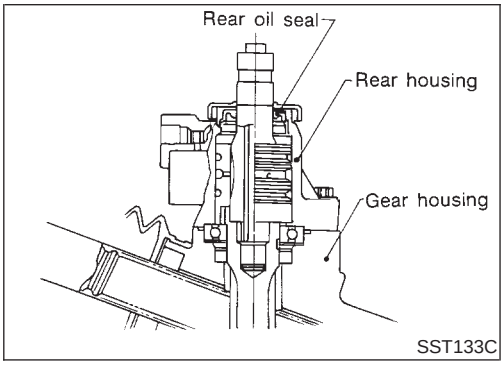


11. Apply a coat of multi-purpose grease to needle bearing roller and oil seal lip.

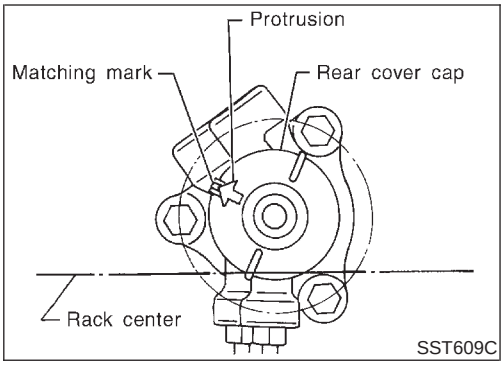


12. Install pinion assembly to rear housing.

Be careful not to damage pinion oil seal.



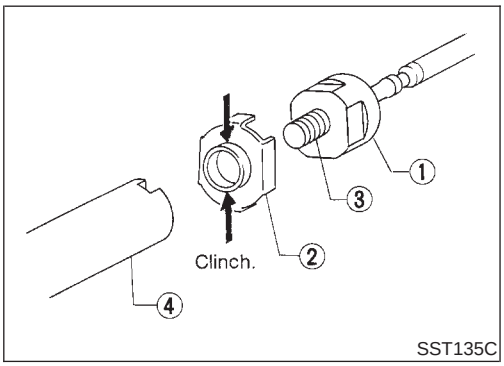
13. Apply a coat of multi-purpose grease to new rear oil seal lip before installing rear housing.



14. Ensure that the rack is centered. Install rear cover cap so that its protrusion is positioned as shown in figure.

Be careful not to damage worm ring and oil seal.

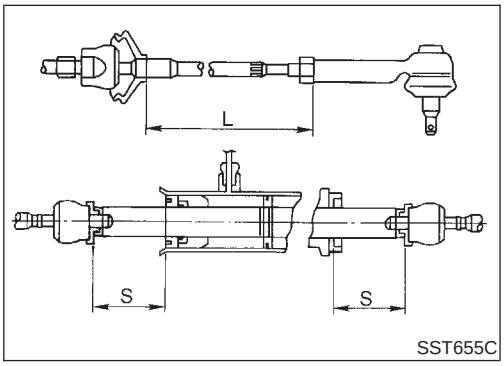
15. Install retainer, spring and adjusting screw temporarily.



16. Install new lock plate.
- Attach lock plate 2 to side rod inner socket 1.
- Apply locking sealant to inner socket threads 3.
  Screw inner socket into rack 4 and tighten to specified torque.
- Clinch two places of lock plate at rack's groove.

CAUTION:

To prevent scratching the boot, remove burrs from lock plate.



17. Tighten outer socket lock nut.

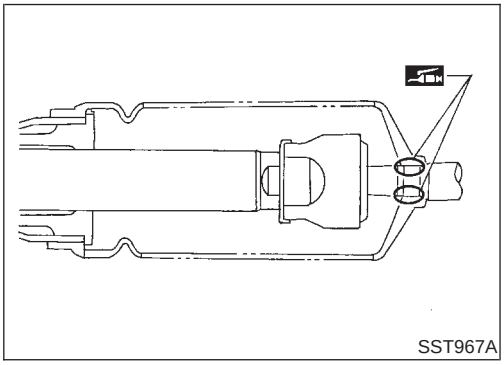
Tie-rod length "L":

Refer to SDS, ST-33.

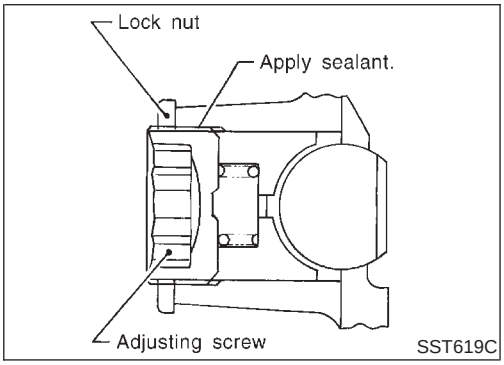
18. Measure rack stroke.

Rack stroke "S":

Refer to SDS, ST-33.



19. Before installing boot, coat the contact surfaces between boot and tie-rod with grease.

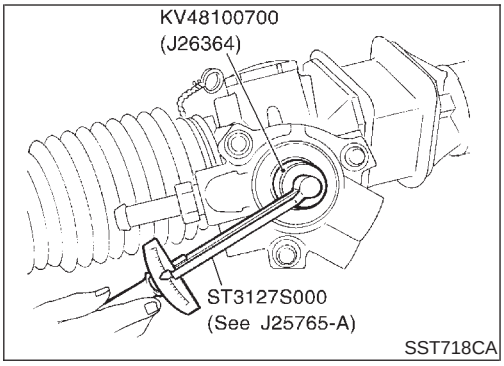


Adjustment

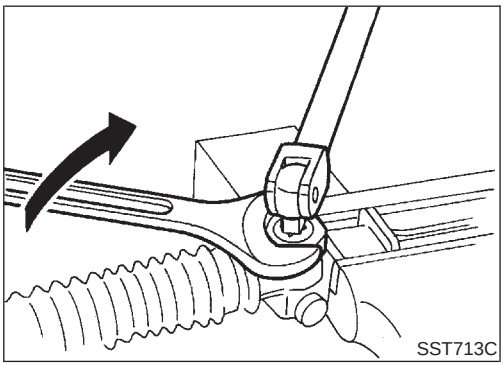
NAST0031

Adjust pinion rotating torque as follows:

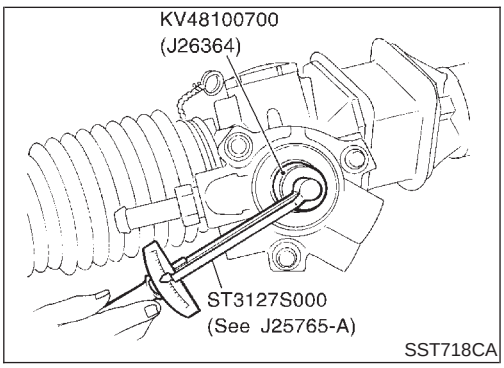
1. Set rack to the neutral position without fluid in the gear.
2. Coat the adjusting screw with locking sealant and screw it in.
3. Lightly tighten lock nut.
4. Tighten adjusting screw to a torque of 4.9 to 5.9 N·m (50 to 60 kg-cm, 43 to 52 in-lb).
5. Loosen adjusting screw, then retighten it to 0.2 N·m (2 kg-cm, 1.7 in-lb).



6. Move rack over its entire stroke several times.
7. Measure pinion rotating torque within the range of 180° from neutral position.
   Stop the gear at the point of maximum torque.
8. Loosen adjusting screw, then retighten it to 4.9 to 5.9 N·m (50 to 60 kg-cm, 43 to 52 in-lb).
9. Loosen adjusting screw by 10° to 20°.



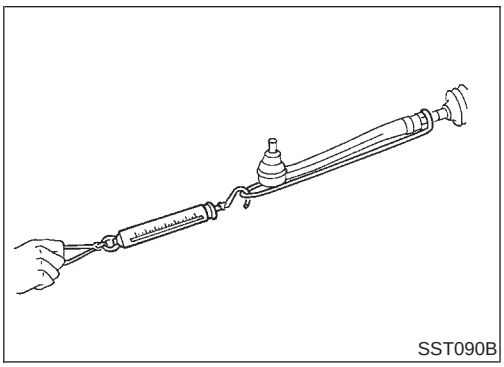
10. Prevent adjusting screw from turning, and tighten lock nut to specified torque.



11. Measure pinion rotating torque.

Lock to lock:
Average rotating torque
0.78 - 1.47 N·m (8.0 - 15.0 kg-cm, 6.9 - 13.0 in-lb)
Within ±100° from the neutral position:
Maximum torque variation
0.4 N·m (4 kg-cm, 3.5 in-lb)
Outside the above range:
Maximum force variation
0.6 N·m (6 kg-cm, 5.2 in-lb)

- If pinion rotating torque is not within specifications, readjust it starting from step 4. If pinion rotating torque is still out of specifications after readjustment, replace steering gear assembly.



12. Check rack sliding force on vehicle as follows:
a. Install steering gear onto vehicle, but do not connect tie-rod to knuckle arm.
b. Connect all piping and fill with steering fluid.
c. Start engine and bleed air completely.
d. Disconnect steering column lower joint from the gear.
e. Keep engine at idle and make sure steering fluid has reached normal operating temperature.
f. Pull tie-rod slowly to move it from neutral position to ±11.5 mm (±0.453 in) at speed of 3.5 mm (0.138 in)/s. Check that rack sliding force is within specification.

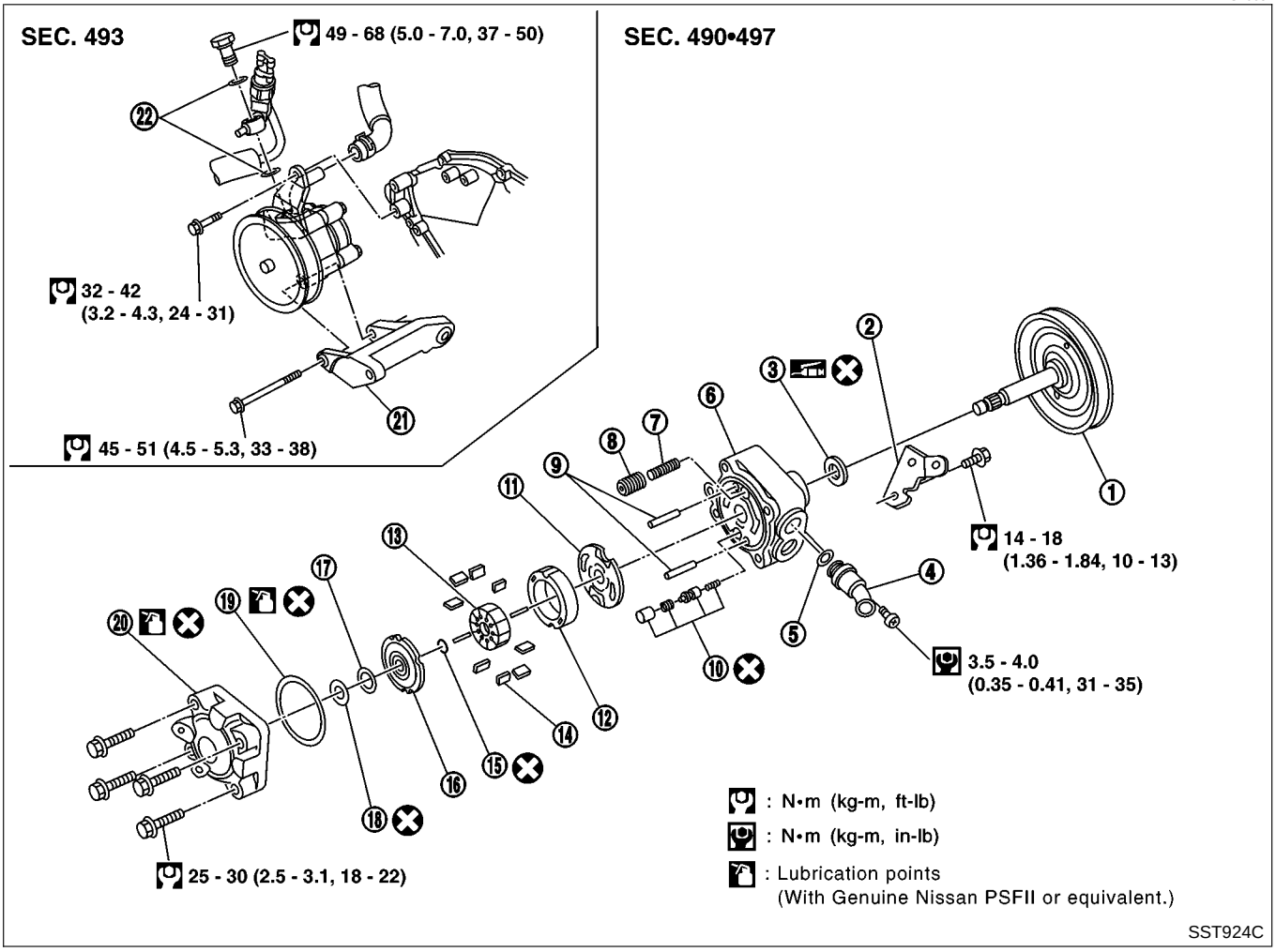
Rack sliding force:

167 - 254 N (17.0 - 25.9 kg, 37 - 57 lb)

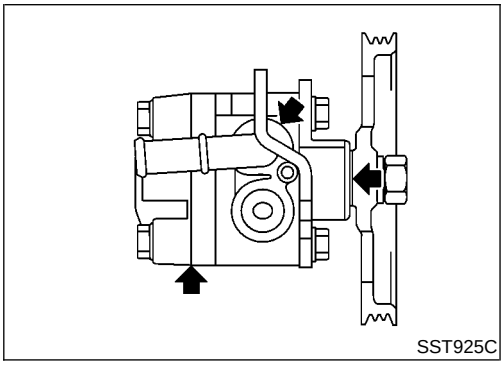
- If rack sliding force is not within specification, readjust by repeating adjustment procedure from the beginning.
- If rack sliding force is still out of specification after readjustment, gear assembly needs to be replaced.

Components

NAST0032



1. Pulley
2. Front bracket
3. Oil seal
4. Suction pipe
5. O-ring
6. Casing
7. Flow control valve spring
8. Flow control A valve
9. Dowel pin
10. Flow control B valve assembly
11. Side plate (Front)
12. Cam ring
13. Rotor
14. Vane
15. Snap ring
16. Side plate (Rear)
17. Side plate inner seal
18. Side plate outer seal
19. O-ring
20. Rear cover
21. Power steering pump bracket
22. Copper washer



Pre-disassembly Inspection

NAST0033

Disassemble the power steering oil pump only if the following items are found.

- Oil leak from any point shown in the figure.
- Deformed or damaged pulley.
- Poor performance.

Disassembly

NAST0034

CAUTION:

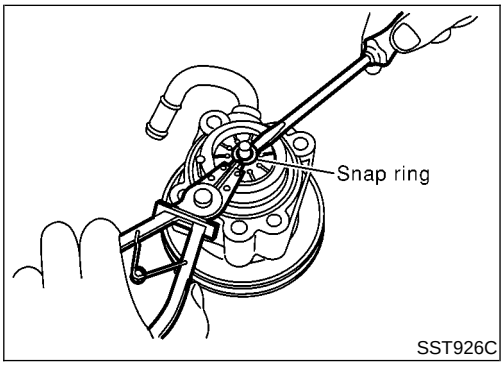
- **Parts which can be disassembled are strictly limited. Never disassemble parts other than those specified.**
- **Disassemble in as clean a place as possible.**
- **Clean your hands before disassembly.**
- **Do not use rags; use nylon cloths or paper towels.**
- **Follow the procedures and cautions in the Service Manual.**
- **When disassembling and reassembling, do not let foreign matter enter or contact the parts.**

1. Fix power steering pump to vise.

CAUTION:

When fixing the pump to vise, use an aluminum plate or such to avoid damaging the fitting plane of the steering pump.

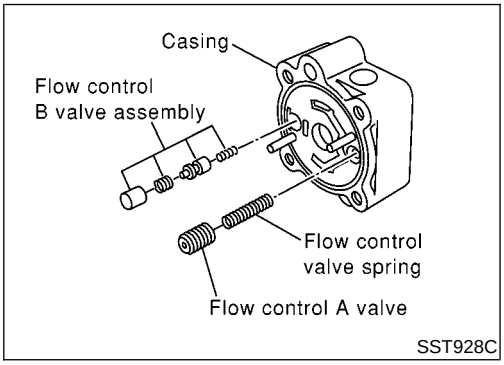
2. Remove the front bracket mounting bolt, and remove the front bracket from the casing.
3. Remove the cover body mounting bolt, and remove the rear cover from the casing.
4. Remove the O-ring from the casing.



5. Remove side plate (rear side) from cam ring, then remove side plate inner/outer seals from side plate (rear side).
6. Remove rotor snap ring using snap ring pliers, and remove pulley from casing.

CAUTION:

Do not damage pulley shaft when removing rotor snap ring.



7. Remove the followings from casing.

- Cam ring
- Rotor
- Vane
- Side plate (front side)
- Flow control A valve
- Flow control valve spring
- Flow control B valve assembly

CAUTION:

Be careful not to drop flow control valve.

8. Remove inlet connector mounting bolt, and remove inlet connector from casing.
9. Remove inlet connector seal from inlet connector.
10. Remove drive shaft seal from casing with a screwdriver.

CAUTION:

Do not damage casing surface with the screwdriver.

Inspection

NAST0035

- If pulley is cracked or deformed, replace it.
- If an oil leak is found around pulley shaft oil seal, replace the seal.
- Check the casing and the inside of the rear body for damage. If damages are found in the rear body, replace the entire rear body. If the casing is damaged, replace the entire power steering pump as an assembly.
- Check the cam ring for damage. If damage is found, replace the cam ring, rotor and vane as a set.
- Check the side plates (front and rear) for damage. If damage is found, replace the side plates as a set (front and rear).

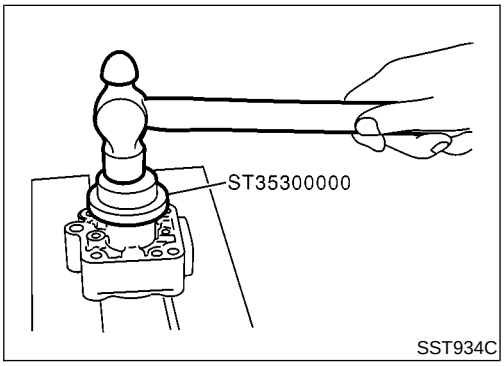
Assembly

NAST0036

1. Apply grease to the lip of the drive shaft seal, and attach the casing.

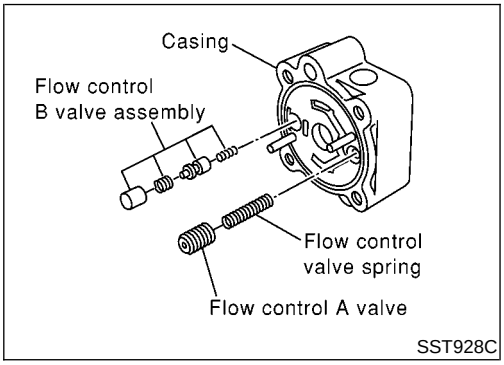
CAUTION:

The drive shaft seal cannot be reused. Always replace after every disassembly.



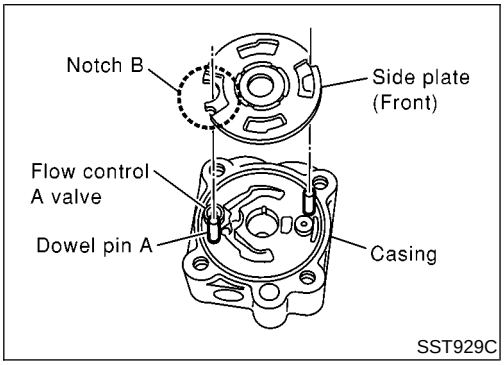
SST934C

2. When removing the dowel pin, if it is difficult to insert with your hands, insert into the casing by tapping lightly with a hammer or similar tool.
3. Attach the flow control A valve, flow control valve spring, and the flow control B valve assembly to the locations indicated in the drawing left.



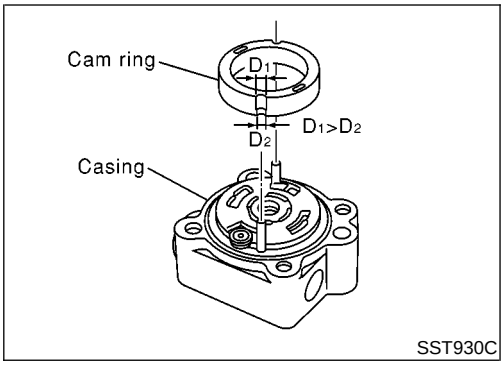
SST928C

4. Match the dowel pin A on the flow control A valve side with the notch B of the side plate (front), and attach the side plate (front) to the casing.



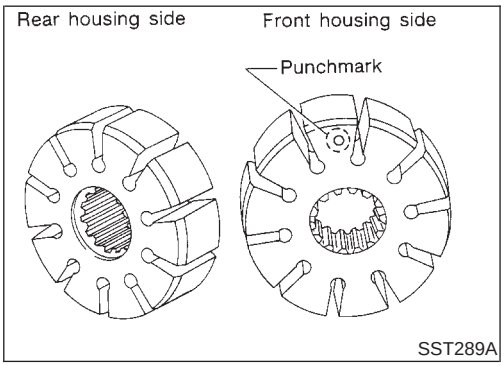
SST929C

Assembly (Cont'd)

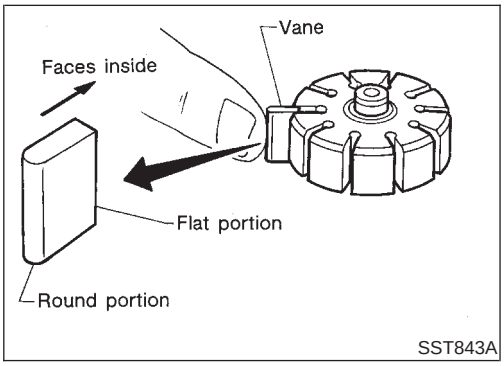


5. Face the cam ring side with fewer pores towards the casing, and attach the cam ring on top of the side plate (front).
6. Attach the pulley to the casing.

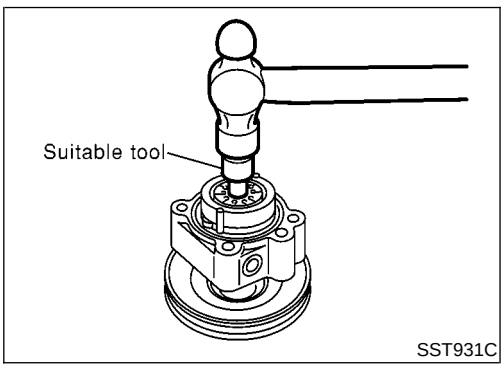
CAUTION:
Attach with care so as not to damage the drive shaft seal.



7. Face the side of the rotor with the punch mark towards the casing, and attach the rotor to the pulley shaft.

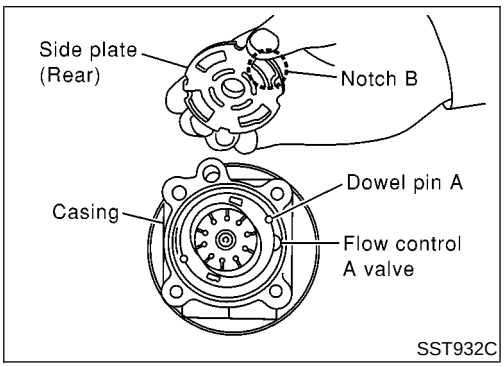


8. Attach the vane to the rotor so that the vane's arc touches the cam ring.



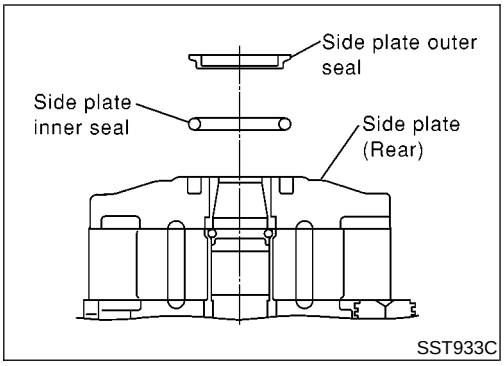
9. Use a hammer or suitable tool to insert the rotor snap ring into the pulley shaft channel.

CAUTION:
- **The rotor snap ring cannot be reused. Always replace after every disassembly.**
- **Insert with care so as not to damage the rotor or the pulley shaft.**
- **If the rotor is damaged, replace the power steering as an assembly.**



10. Match the dowel pin A on the flow control A valve side with the notch B of the side plate (rear), and attach the side plate (rear) to the cam ring.
11. Apply Genuine Nissan PSF II or equivalent to O-ring and attach to the casing.

CAUTION:
The O-ring cannot be reused. Always replace after every disassembly.



12. Attach a side plate inner seal and side plate outer seal with Genuine Nissan PSF II or equivalent applied, to the side plate (rear).

CAUTION:

The side plate inner seal and outer seal cannot be reused. Always replace after every disassembly.

13. Set the power steering pump on the vice.

CAUTION:

When securing to the vice, use an aluminum plate or other material to protect the installation surface of the power steering pump from damage.

14. Attach the rear body to the casing, and secure the bolts (4 bolts) in a diagonal order to the specified torque.
15. Attach the front bracket to the casing, and secure the bolts (2 bolts) to the specified torque.
16. Attach the inlet collector seal to the grooves of the inlet collector, and attach the inlet collector to the casing with attachment bolts.

CAUTION:

The inlet collector seal cannot be reused. Always replace after every disassembly.

General Specifications

NAST0037

Applied model	All
Steering model	Power steering
Steering gear type	PR32K
Steering overall gear ratio	17.2
Turns of steering wheel (Lock to lock)	3.09
Steering column type	Collapsible, tilt

Steering Wheel

NAST0038

Unit: mm (in)

Steering wheel axial play	0 (0)
Steering wheel play	35 (1.38) or less
Movement of gear housing	±2 (±0.08) or less

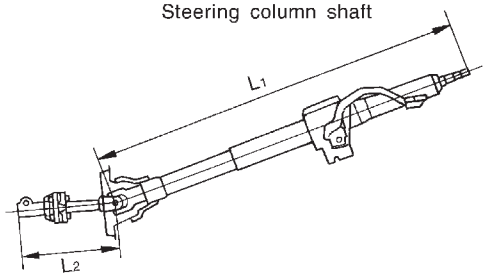
Steering Column

NAST0039

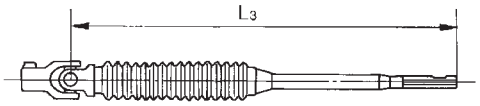
Unit: mm (in)

Steering column length "L_1"	716.7 - 718.7 (28.22 - 28.30)
Steering column lower shaft length "L_2"	178 - 180 (7.01 - 7.09)
Steering column upper joint length "L_3"	430.7 - 432.7 (16.96 - 17.04)

Steering column shaft



Steering column upper joint



SST739C

Steering Transfer Gear

NAST0041

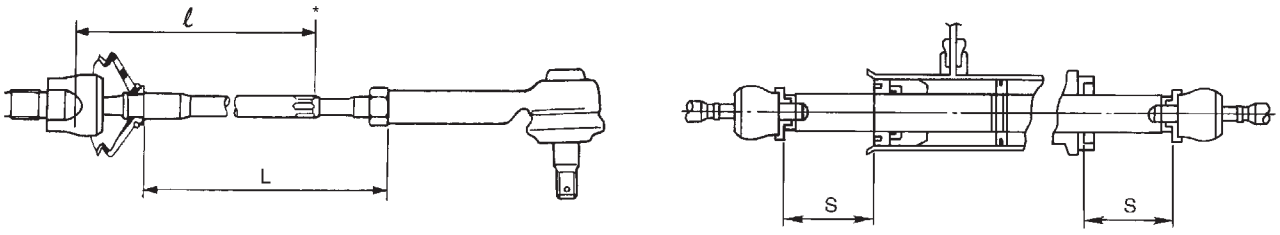
Rotating torque	0.25 - 0.69 N·m (2.5 - 7.0 kg-cm, 2.2 - 6.1 in-lb)

Steering Gear and Linkage

NAST0040

Applied model		All
Steering gear type		PR32K
Tie-rod outer ball joint	Swinging force at cotter pin hole: “A”	4.9 - 47.1 N (0.5 - 4.8 kg, 1.1 - 10.6 lb)
	Rotating torque: “B”	0.3 - 2.9 N·m (3 - 30 kg-cm, 2.6 - 26.0 in-lb)
	Axial end play: “C”	0.1 mm (0.004 in) or less
Tie-rod inner ball joint	Swinging force*: “A”	3.9 - 32.4 N (0.4 - 3.3 kg, 0.9 - 7.3 lb)
	Axial end play: “C”	0.3 mm (0.012 in) or less
Tie-rod standard length “L”		200 mm (7.87 in)
Rack stroke “S”		72.0 mm (2.835 in)
Pinion gear preload without gear fluid	Lock to lock Average rotating torque	0.78 - 1.47 N·m (8.0 - 15.0 kg-cm, 6.9 - 13.0 in-lb)
	Within ±100° from the neutral position Maximum torque variation	0.4 N·m (4 kg-cm, 3.5 in-lb)
	Outside the above range Maximum torque variation	0.6 N·m (6 kg-cm, 5.2 in-lb)

*: Measuring point [ℓ: 240 mm (9.45 in)]



SST740C

Power Steering

NAST0042

Steering gear type		PR32K
Rack sliding force Under normal operating oil pressure		137 - 255 N (14 - 26 kg, 31 - 57 lb)
Retainer adjustment (Adjustment screw)	Initial tightening torque	4.9 - 5.9 N·m (50 - 60 kg-cm, 43 - 52 in-lb)
	Retightening torque after loosening	0.2 N·m (2 kg-cm, 1.7 in-lb)
	Tightening torque after gear has settled	4.9 - 5.9 N·m (50 - 60 kg-cm, 43 - 52 in-lb)
	Returning angle	10° - 20°
Steering wheel turning force (Measured at one full turn from the neutral position)		39 N (4 kg, 9 lb) or less
Fluid capacity (Approximate)		0.9ℓ (1 US qt, 3/4 Imp qt)
Oil pump maximum pressure		8,630 - 9,219 kPa (88 - 94 kg/cm^2, 1,251 - 1,337 psi)

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RESTRAINT SYSTEM

SECTION RS

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Precautions

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) “AIR BAG” AND “SEAT BELT PRE-TENSIONER”

NARS0001

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS composition which is available to NISSAN MODEL R50 is as follows:

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.**

PRECAUTION FOR SEAT BELT SERVICE

NARS0002

CAUTION:

- **Before removing the seat belt pre-tensioner assembly, turn the ignition switch off, disconnect both battery cables and wait at least 3 minutes.**
- **Do not use electrical test equipment for seat belt pre-tensioner connector.**
- **After replacing or reinstalling seat belt pre-tensioner assembly, or reconnecting seat belt pre-tensioner connector, check the system function. Refer to “SRS Operation Check” (RS-38) for details.**
- **Do not use disassemble buckle or seat belt assembly.**
- **Replace anchor bolts if they are deformed or worn out.**
- **Never oil tongue and buckle.**
- **If any component of seat belt assembly is questionable, do not repair. Replace the whole seat belt assembly.**
- **If webbing is cut, frayed, or damaged, replace seat belt assembly.**
- **When replacing seat belt assembly, use a genuine seat belt assembly.**

After A Collision

NARS0002S01

WARNING:

Inspect all seat belt assemblies including retractors and attaching hardware after any collision. NISSAN recommends that all seat belt assemblies in use during a collision be replaced unless the collision was minor and the belts show no damage and continue to operate properly. Failure to do so could result in serious personal injury in an accident. Seat belt assemblies not in use during a collision should also be replaced if either damage or improper operation is noted. Seat belt pre-tensioner should be replaced even if the seat belts are not in use during a frontal collision in which the air bags are deployed.

Replace any seat belt assembly if:

- The seat belt was in use at the time of a collision (except for minor collisions and the belts, retractors and buckles show no damage and continue to operate properly).
- The seat belt was damaged in an accident. (i.e. torn webbing, bent retractor or guide, etc.)
- The seat belt attaching point was damaged in an accident. Inspect the seat belt attaching area for damage or distortion and repair as necessary before installing a new seat belt assembly.
- Anchor bolts are deformed or worn out.
- The seat belt pre-tensioner should be replaced even if the seat belts are not in use during the collision in which the air bags are deployed.

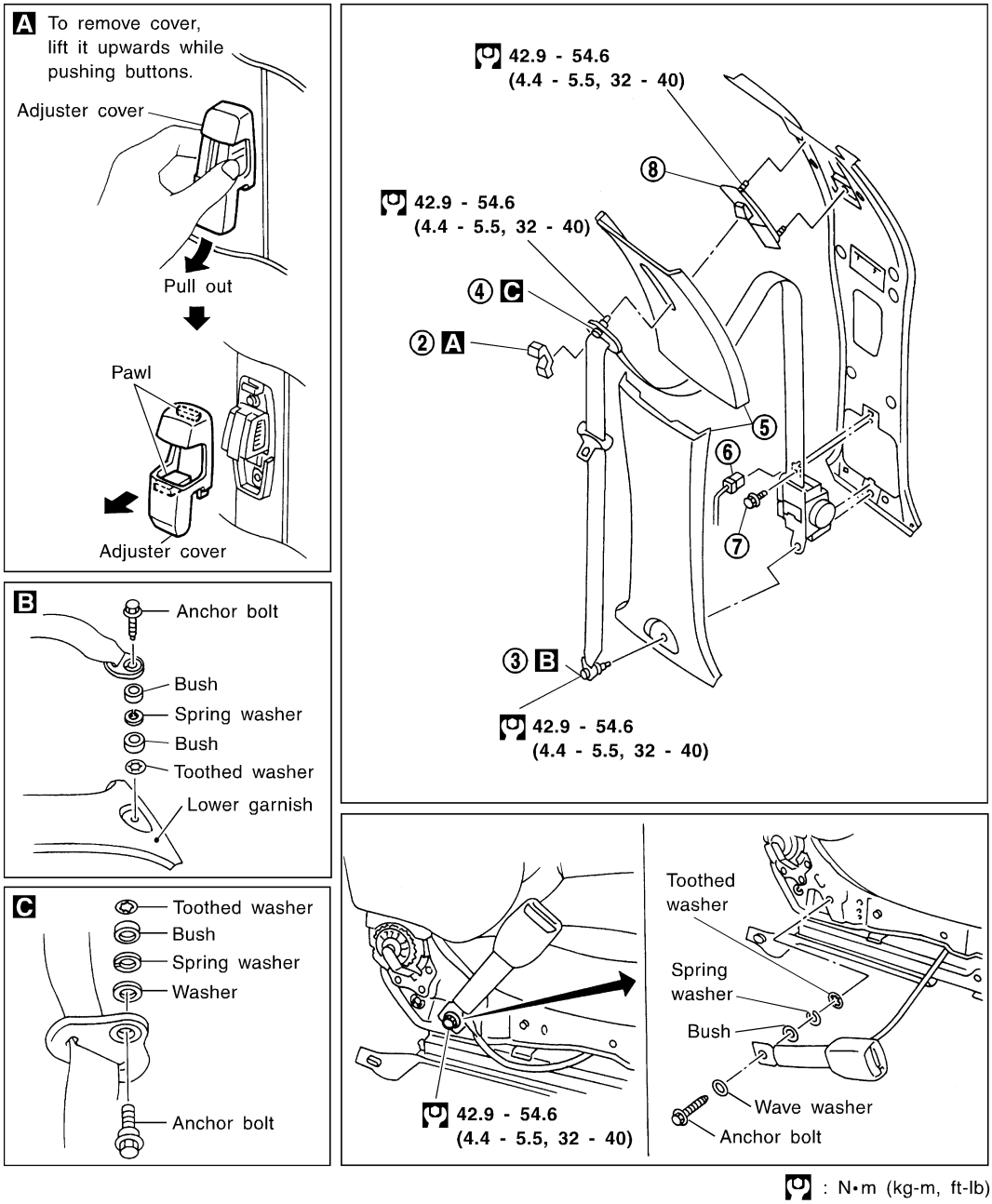
Front Seat Belt

REMOVAL AND INSTALLATION

=NARS0003

1. Slide the seat all the way forward and tilt the seatback toward the front.
2. Remove adjuster cover. A
3. Remove floor anchor bolt. B
4. Remove shoulder anchor bolt. C
5. Remove center pillar upper and lower garnish. Refer to BT-29, “SIDE AND FLOOR TRIM” for details.
6. Disconnect seat belt pre-tensioner connector.
7. Remove the bolt securing seat belt retractor, then remove seat belt and seat belt retractor.
8. Remove bolts securing seat belt adjuster, then remove seat belt adjuster.

SEC. 769•868•870



: N•m (kg-m, ft-lb)

SRS873

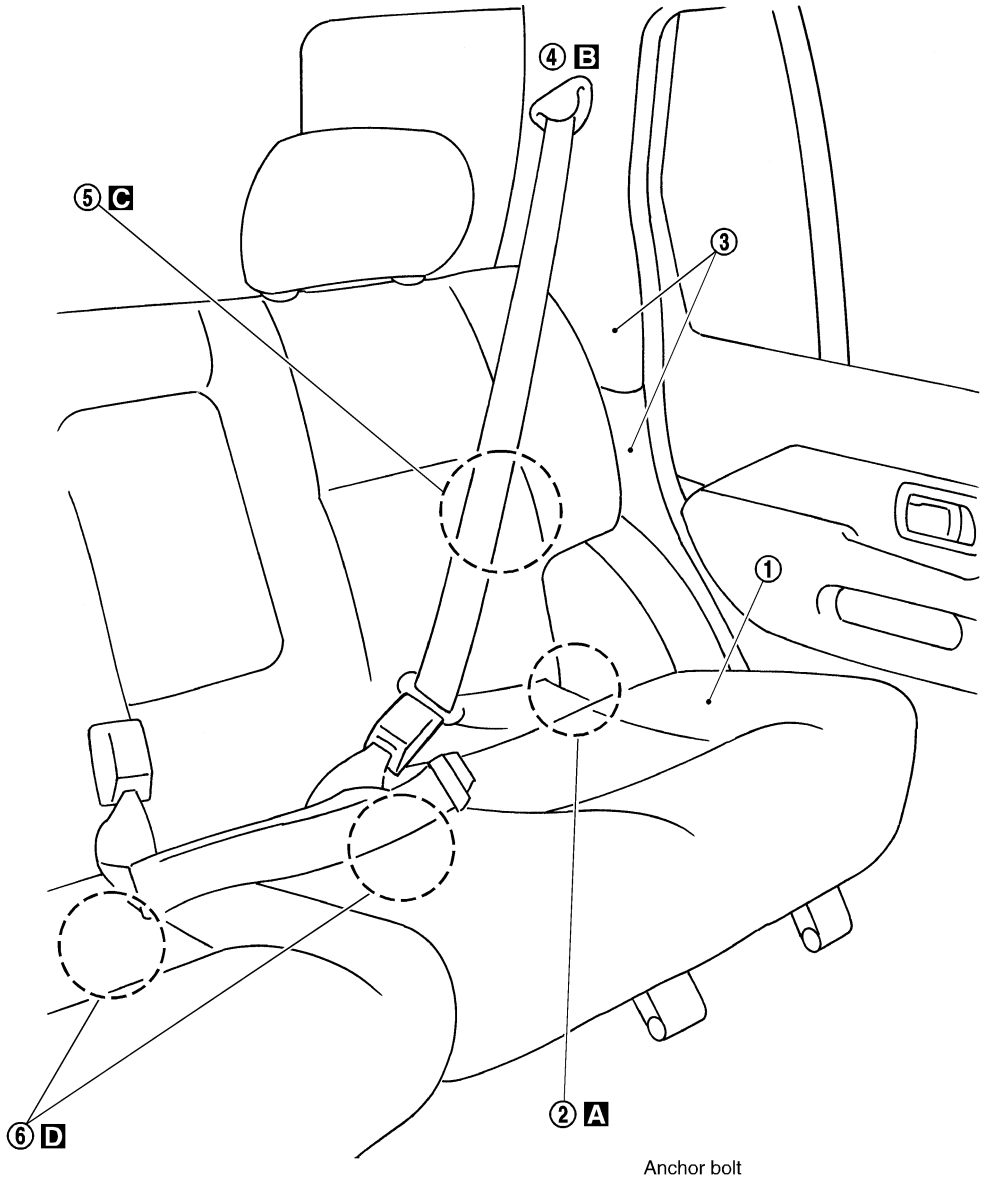
Rear Seat Belt

REMOVAL AND INSTALLATION

=NARS0004

1. Raise up rear seat cushion.
2. Remove outer anchor bolt. A
3. Remove rear side upper and lower garnish. Refer to BT-29, “SIDE AND FLOOR TRIM” for details.
4. Remove anchor through-bolt. B
5. Remove anchor bolt and bolt securing rear seat belt retractor, then remove seat belt and seat belt retractor. C
6. Remove each anchor bolt. D

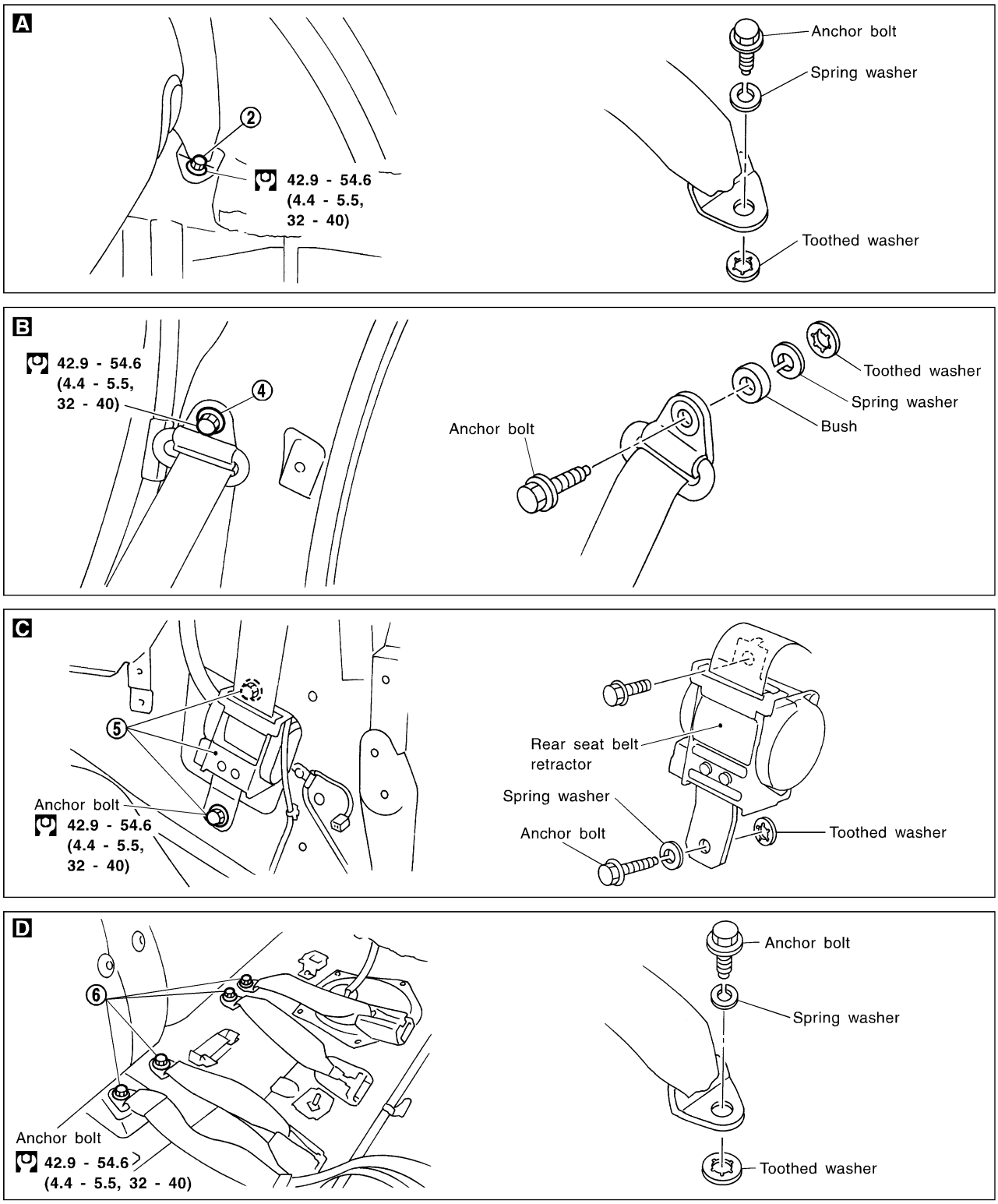
SEC. 869



Anchor bolt
42.9 - 54.6 N·m (4.4 - 5.5 kg-m, 32 - 40 ft-lb)

SRS654-A

Rear Seat Belt (Cont'd)



: N•m (kg-m, ft-lb)

SRS781-B

Seat Belt Inspection

=NARS0029

AFTER A COLLISION

NARS0029S01

WARNING:

Inspect all seat belt assemblies including retractors and attaching hardware after any collision. NISSAN recommends that all seat belt assemblies in use during a collision be replaced unless the collision was minor and the belts show no damage and continue to operate properly. Failure to do so could result in serious personal injury in an accident. Seat belt assemblies not in use during a collision should also be replaced if either damage or improper operation is noted. Seat belt pre-tensioner should be replaced even if the seat belts are not in use during a frontal collision in which the air bags are deployed.

Replace any seat belt assembly if:

- The seat belt was in use at the time of a collision (except for minor collisions and the belts, retractors and buckles show no damage and continue to operate properly).
- The seat belt was damaged in an accident. (i.e. torn webbing, bent retractor or guide, etc.)
- The seat belt attaching point was damaged in an accident. Inspect the seat belt attaching area for damage or distortion and repair as necessary before installing a new seat belt assembly.
- Anchor bolts are deformed or worn out.
- The seat belt pre-tensioner should be replaced even if the seat belts are not in use during the collision in which the air bags are deployed.

PRELIMINARY CHECKS

NARS0029S02

1. Check the seat belt warning lamp/chime for proper operation as follows:

a. Switch ignition ON. The seat belt warning lamp should illuminate. Also, the seat belt warning chime should sound for about seven seconds.

b. Fasten driver's seat belt. The seat belt warning lamp should go out and the chime (if sounding) should stop.

c. If the air bag warning lamp is blinking, conduct self-diagnosis using CONSULT-II, and air bag warning lamp. Refer to "SRS Operation Check", RS-38.

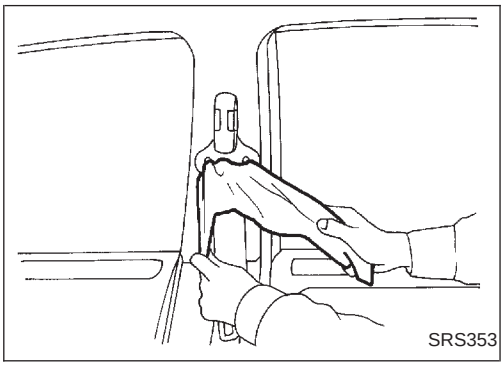
2. Check that the seat belt retractor, seat belt anchor and buckle bolts are securely attached.

3. Check the shoulder seat belt guide and shoulder belt height adjuster for front seats. Ensure guide swivels freely and that belt lays flat and does not bind in guide. Ensure height adjuster operates properly and holds securely.

4. Check retractor operation:

a. Fully extend the seat belt webbing and check for twists, tears or other damage.

b. Allow the seat belt to retract. Ensure that belt returns smoothly and completely into the retractor. If the seat belt does not returns smoothly, wipe the inside of the loops with a clean paper cloth etc. because dirt built up in the loops of the upper anchors can cause the seat belts to retractor slowly.


SRS353

c. Fasten the seat belt. Pull firmly on belt and buckle to ensure belt remains latched. Unfasten seat belt. Ensure belt releases freely and buckle button returns to original position.

5. For center (non-retractable) seat belts, check that the seat belt are accessible. Check seat belt webbing for twists, tears or other damage. Fasten the seat belt. Pull firmly on belt and buckle to ensure belt remains latched. Unfasten seat belts. Ensure belt releases freely and buckle button returns to original position.

6. Repeat steps above as necessary to check the other seat belts.

SEAT BELT RETRACTOR ON-VEHICLE CHECK

NARS0029S03

Emergency Locking Retractors (ELR) and Automatic Locking Retractors (ALR)

NARS0029S0301

NOTE:

All seat belt retractors are of the Emergency Locking Retractors (ELR) type. In an emergency (sudden stop) the retractor will lock and prevent the belt from extending any further. All 3-point type seat belt retractors except the driver's seat belt also have an Automatic Locking Retractors (ALR) mode. The ALR mode (also called child restraint mode) is used when installing child seats. The ALR mode is activated when the seat belt is fully extended. When the belt is then retracted partially, the ALR mode automatically locks the seat belt in a specific position so the belt cannot be extended any further. To cancel the ALR mode, allow the seat belt to fully wind back into the retractor.

Check the seat belt retractors using the following test(s) to determine if a retractor assembly is operating properly.

ELR Function Stationary Check

NARS0029S0302

Grasp the shoulder belt and pull forward quickly. The retractor should lock and prevent the belt from extending further.

ALR Function Stationary Check

NARS0029S0304

1. Pull out entire length of seat belt from retractor until a click is heard.
2. Retract the belt partially. A clicking noise should be heard as the belt retracts indicating that the retractor is in the Automatic Locking Retractors (ALR) mode.
3. Grasp the seat belt and try to pull out the retractor. The belt must lock and not extend any further. If NG, replace the retractor assembly.
4. Allow the entire length of the belt to retract to cancel the automatic locking mode.

ELR Function Moving Check

NARS0029S0303

WARNING:

Perform the following test in a safe, open area clear of other vehicles and obstructions (for example, a large, empty parking lot). Road surface must be paved and dry. DO NOT perform the following test on wet or gravel roads or on public streets and highways. This could result in an accident and serious personal injury. The driver and passenger must be prepared to brace themselves in the event the retractor does not lock.

1. Fasten driver's seat belt. Buckle a passenger into the seat for the belt that is to be tested.
2. Proceed to the designated safe area.
3. Drive the vehicle at approximately 16 km/h (10 MPH). Notify any passengers of a pending sudden stop and the driver and passenger must be prepared to brace themselves in the event the retractor does not lock, apply brakes firmly and make a very hard stop.

During stop, seat belts should lock and not be extended. If the seat belt retractor assembly does not lock, perform the retractor off-vehicle check.

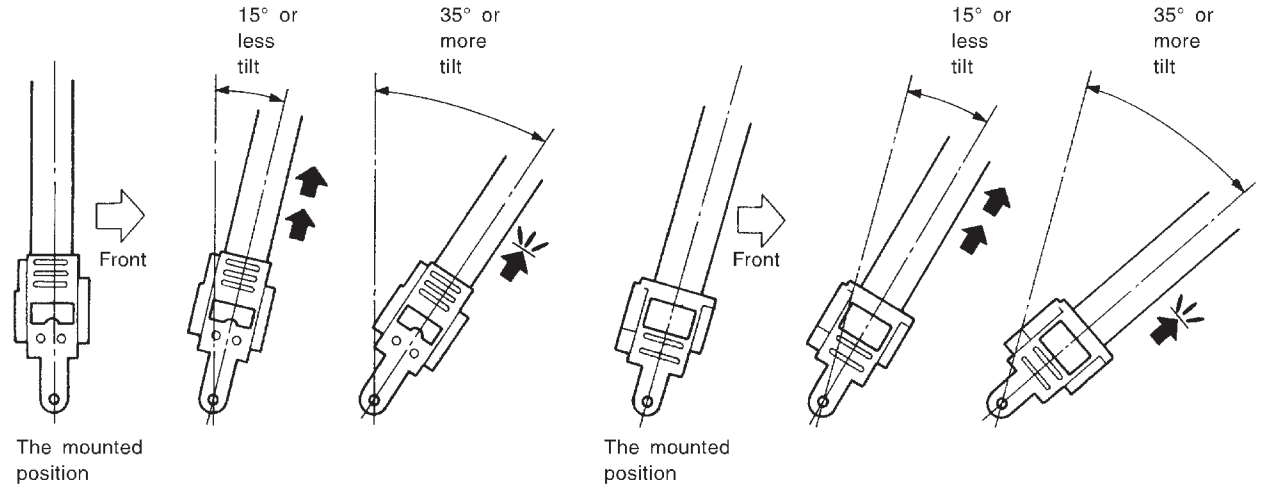
SEAT BELT RETRACTOR OFF-VEHICLE CHECK

NARS0029S04

1. Remove the seat belt retractor assembly.
2. Slowly pull out belt while tilting the retractor assembly forward from the mounted position without twisting the retractor assembly as shown in the illustration.

15 degrees or less tilt: Belt can be pulled out.

35 degrees or more tilt: Belt locks and cannot be pulled out.



Tilt the seat belt retractor assembly forward from the mounted position without twisting the retractor assembly.

SRS361

If NG, replace the retractor assembly.

Precautions

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) “AIR BAG” AND “SEAT BELT PRE-TENSIONER”

NARS0005

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS composition which is available to NISSAN MODEL R50 is as follows:

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.**

PRECAUTIONS FOR SRS “AIR BAG” AND “SEAT BELT PRE-TENSIONER” SERVICE

NARS0006

- Do not use electrical test equipment to check SRS circuits unless instructed to in this Service Manual.
- Before servicing the SRS, turn ignition switch “OFF”, disconnect both battery cables and wait at least 3 minutes.
  For approximately 3 minutes after the cables are removed, it is still possible for the air bag and seat belt pre-tensioner to deploy. Therefore, do not work on any SRS connectors or wires until at least 3 minutes have passed.
- Diagnosis sensor unit must always be installed with their arrow marks “⇐” pointing towards the front of the vehicle for proper operation. Also check diagnosis sensor unit for cracks, deformities or rust before installation and replace as required.
- The spiral cable must be aligned with the neutral position since its rotations are limited. Do not attempt to turn steering wheel or column after removal of steering gear.
- Handle air bag module carefully. Always place driver and passenger air bag modules with the pad side facing upward and side air bag module (built-in type) standing with the stud bolt side setting bottom.
- Conduct self-diagnosis to check entire SRS for proper function after replacing any components.
- After air bag inflates, the front instrument panel assembly should be replaced if damaged.

WIRING DIAGRAMS AND TROUBLE DIAGNOSIS

NARS0007

When you read wiring diagrams, refer to the following:

- GI-11, “HOW TO READ WIRING DIAGRAMS”
- EL-9, “POWER SUPPLY ROUTING” for power distribution circuit

When you perform trouble diagnosis, refer to the following:

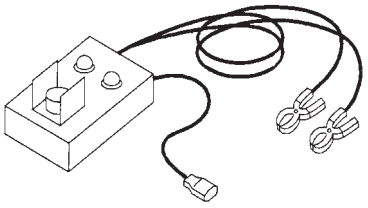
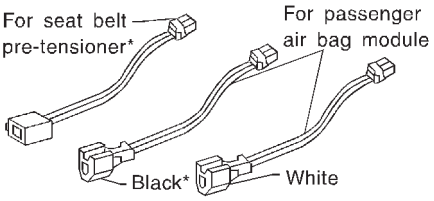
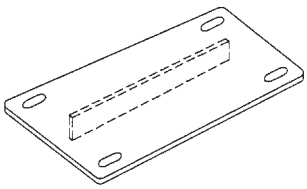
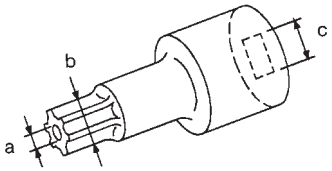
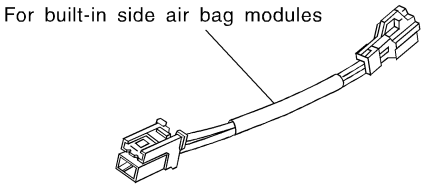
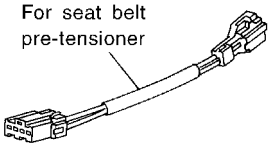
- GI-35, “HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSIS”
- GI-24, “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”

Preparation

SPECIAL SERVICE TOOLS

=NARS0008

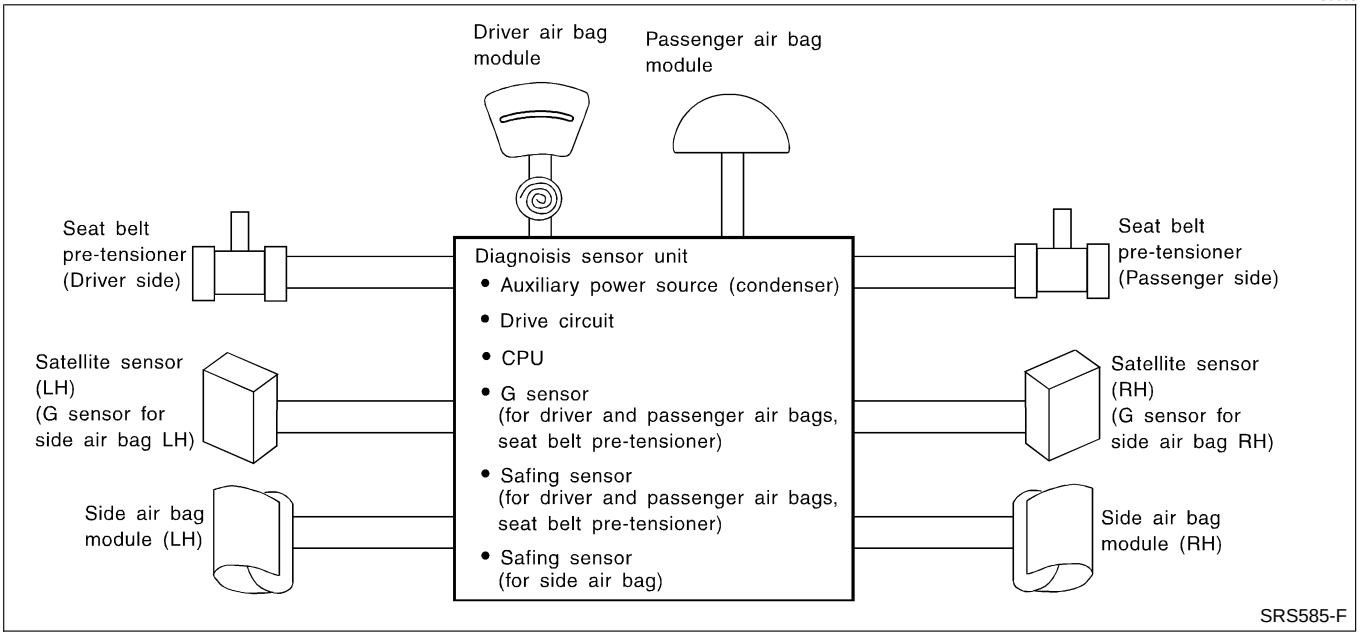
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
KV99106400 (J38381) Deployment tool	 NT357	Disposing of air bag module
KV991065S0 (J38381-30) Deployment tool adapters	 NT762	* Deployment tool adapters for seat belt pre-tesioner and for passenger air bag module with black connector are not necessary for servicing NISSAN MODEL R50.
KV99105300 (J41246) Air bag module bracket	 NT354	Anchoring air bag module
HT61961000 and HT62152000 combined (J38219) *Special torx bit	 NT361	Use for special bolts [TAMPER RESISTANT TORX (Size T50)] **a: 3.5 (0.138) dia.** **b: 8.5 - 8.6 (0.335 - 0.339) dia.** **c: approx. 10 (0.39) sq.** Unit: mm (in)
KV99109000 (J44230) Deployment tool adapter for built-in side air bags	 NT827	
KV99108200 (J38381-50) Deployment tool adapter for seat belt pre-tensioner	 NT721	

*: Special tool or commercial equivalent

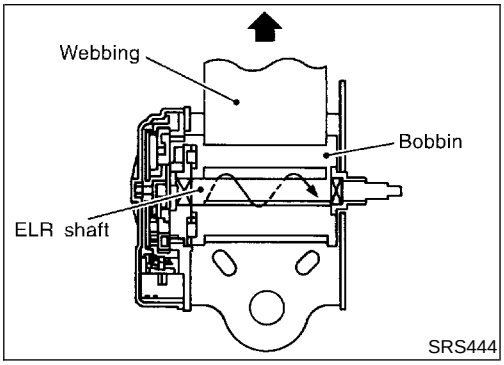
Description

NARS0009



The air bag deploys if the diagnosis sensor unit activates while the ignition switch is in the “ON” or “START” position.
The collision modes for which supplemental restraint systems are activated are different among the SRS systems. For example, the driver air bag module and passenger air bag module are activated in a frontal collision but not in a side collision.
SRS configurations which are activated for some collision modes are as follows;

SRS configuration	Frontal collision	Left side collision	Right side collision
Driver air bag module	○	—	—
Passenger air bag module	○	—	—
Seat belt pre-tensioner (Driver side)	○	—	—
Seat belt pre-tensioner (Passenger side)	○	—	—
Side air bag module (LH)	—	○	—
Side air bag module (RH)	—	—	○

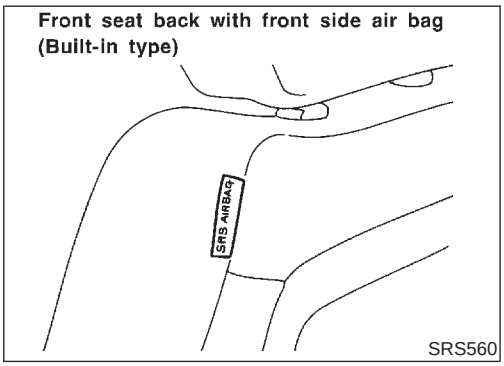


Seat Belt Pre-tensioner with Load Limiter

NARS0032

The seat belt pre-tensioner system with load limiter is installed to both the driver’s seat and the front passenger’s seat. It operates simultaneously with the SRS air bag system in the event of a frontal collision with an impact exceeding a specified level.
When the frontal collision with an impact exceeding a specified level occurs, seat belt slack resulting from clothing or other factors is immediately taken up by the pre-tensioner. Vehicle passengers are securely restrained.
When passengers in a vehicle are thrown forward in a collision and the restraining force of the seat belt exceeds a specified level, the

load limiter permits the specified extension of the seat belt by the twisting of the ELR shaft, and a relaxation of the chest-area seat belt web tension while maintaining force.



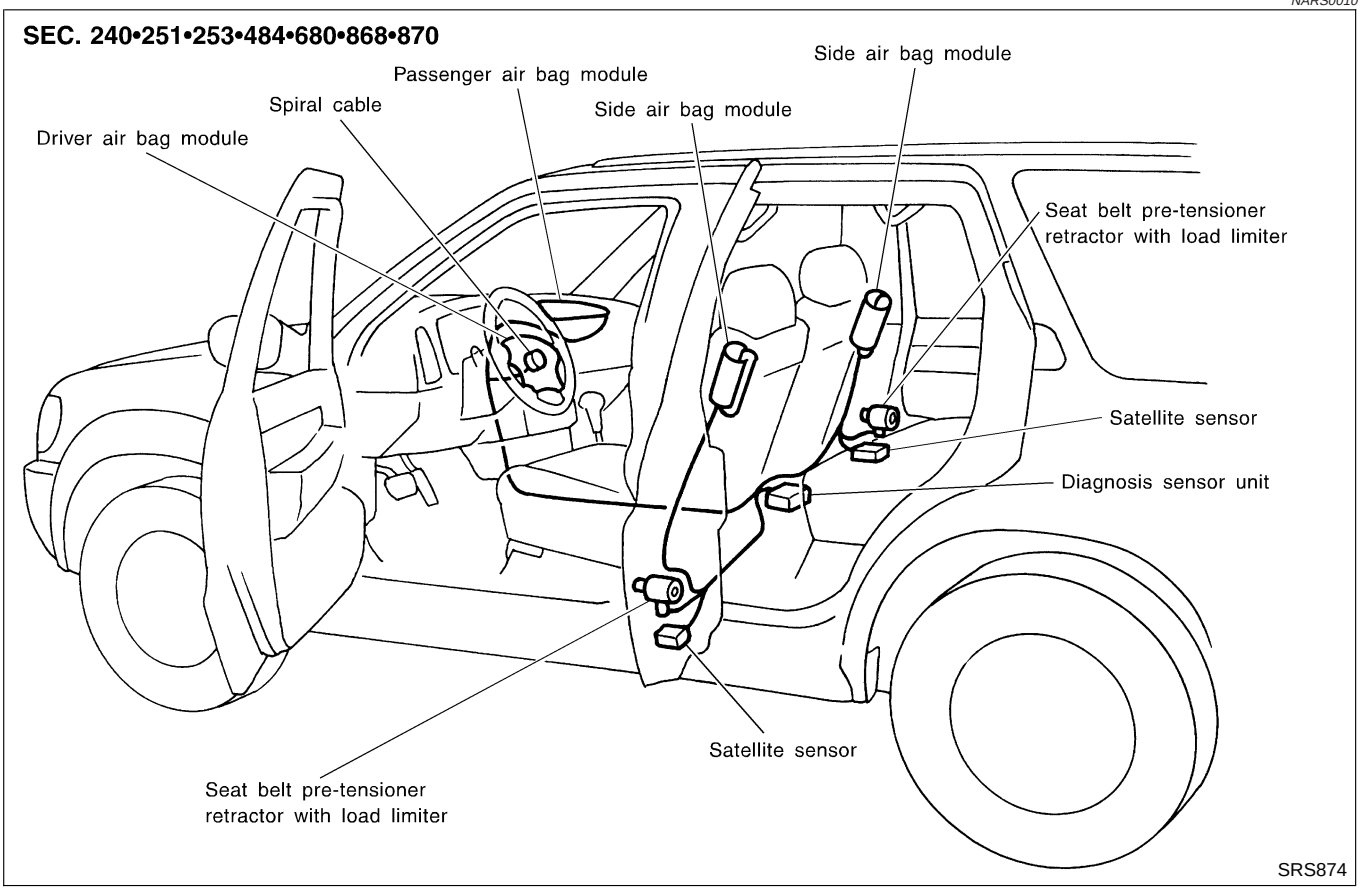
Built-in Type Side Air Bag

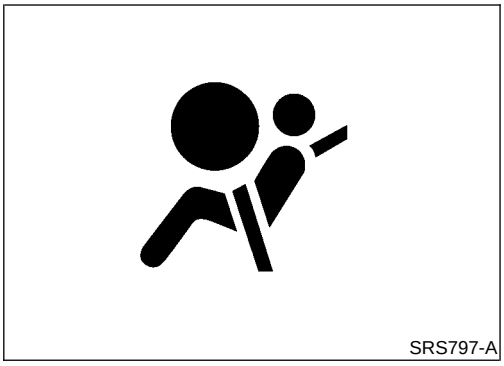
NARS0033

Front side air bag is built-in type.
The front seat backs with built-in type side air bag have the labels shown in figures at left.

SRS Component Parts Location

NARS0010




SRS797-A

Maintenance Items

NARS0011

CAUTION:

Do not use electrical test equipment to check SRS circuit.

1. Check operation of “AIR BAG” warning lamp.
After turning ignition key to “ON” position, air bag warning lamp illuminates. The “AIR BAG” warning lamp will go off after about 7 seconds if no malfunction is detected. If any of the following warning lamp conditions occur, immediately check the air bag or seat belt pre-tensioner system. Refer to RS-38 for details.

- The “AIR BAG” warning lamp does not illuminate when the ignition switch is turned “ON”.
- The “AIR BAG” warning lamp does not go off about 7 seconds after the ignition switch is turned “ON”.
- The “AIR BAG” warning lamp blinks after about 7 seconds after the ignition switch is turned “ON”.

2. Visually check SRS components.

1) Diagnosis sensor unit

- Check diagnosis sensor unit and bracket for dents, cracks and deformities.
- Check connectors for damage, and terminals for deformities.

2) Air bag module and steering wheel

- Remove air bag module from steering wheel, instrument panel or seatback. Check harness cover and connectors for damage, terminals for deformities, and harness for binding.
- Install driver air bag module to steering wheel to check fit or alignment with the wheel.
- Check steering wheel for excessive free play.
- Install passenger air bag module to instrument panel to check fit or alignment with the instrument panel.
- Install side air bag module to seatback to check fit and alignment with the seat.

3) Spiral cable

- Check spiral cable for dents, cracks, or deformities.
- Check connectors and protective tape for damage.
- Check steering wheel for noise, binding or heavy operation.

4) Main harness, air bag harness, body harness, side air bag module sub-harness

- Check connectors for poor connections, damage, and terminals for deformities.
- Check harnesses for binding, chafing or cut.

5) Seat belt pre-tensioner

- Check harness cover and connectors for damage, terminals for deformities, and harness for binding.
- Check belts for damage and anchors for loose mounting.
- Check retractor for smooth operation.
- Perform self-diagnosis for seat belt pre-tensioner using air bag warning lamp or CONSULT-II. Refer to “SRS Operation Check” for details. (RS-38)

6) Satellite sensor

- Check satellite sensor (including bracket portion) for dents, cracks or deformities.
- Check connectors for damage, and terminals for deformities.

CAUTION:

Replace previously used special bolts and ground bolt with new ones.

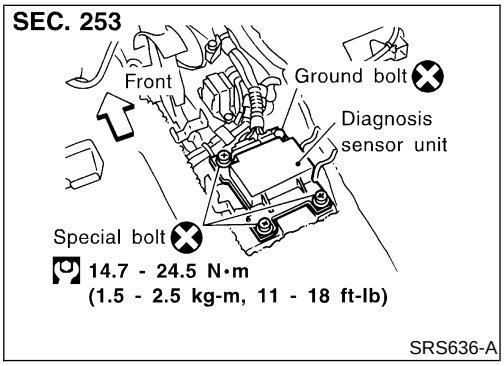
Diagnosis Sensor Unit

REMOVAL AND INSTALLATION

NARS0012

CAUTION:

- **Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait for at least 3 minutes.**
- **The special bolts are coated with bonding agent while the other bolt is for ground. Do not use old bolts after removal; replace with new ones.**
- **Check diagnosis sensor unit for proper installation.**
- **Check diagnosis sensor unit to ensure it is free of deformities, dents, cracks or rust. If they show any visible signs of damage, replace them with new ones.**
- **Check diagnosis sensor unit brackets to ensure they are free of deformities or rust.**
- **Replace diagnosis sensor unit if it has been dropped or sustained an impact.**
- **After replacement of diagnosis sensor unit, perform self-diagnosis for SRS. Refer to "SRS Operation Check" for details (RS-38).**



1. Disconnect connectors for driver and passenger air bag modules and seat belt pre-tensioner.
2. Remove console box. Refer to BT-22, "INSTRUMENT PANEL ASSEMBLY".
3. Disconnect diagnosis sensor unit connector.
4. Remove ground bolt and also remove special bolts using the TAMPER RESISTANT TORX (Size T50), from diagnosis sensor unit.
   Then remove the diagnosis sensor unit.

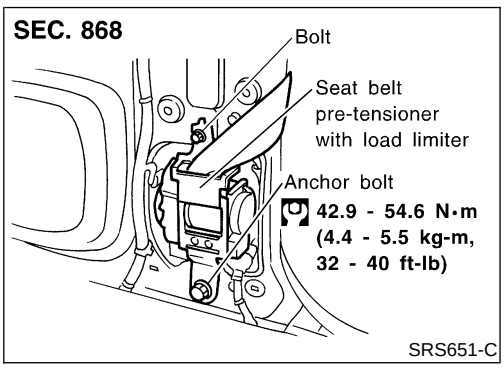
NOTE:

- To install, reverse the removal procedure sequence.

Seat Belt Pre-tensioner

REMOVAL AND INSTALLATION

NARS0034



CAUTION:

- **Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait at least 3 minutes.**
- **Check seat belt pre-tensioner with load limiter for proper installation.**
- **After replacement of seat belt pre-tensioner, check SRS function and perform self-diagnosis for SRS. Refer to "SRS Operation Check" for details. (RS-38)**
- **Do not attempt to disassemble seat belt pre-tensioner with load limiter.**
- **Replace seat belt pre-tensioner if it has been dropped or sustained an impact.**
- **Do not expose seat belt pre-tensioner to temperatures exceeding 80°C (176°F).**

For removal of seat belt pre-tensioner, refer to "Front Seat Belt" for details. (RS-4)

NOTE:

- **To install, reverse the removal procedure sequence.**

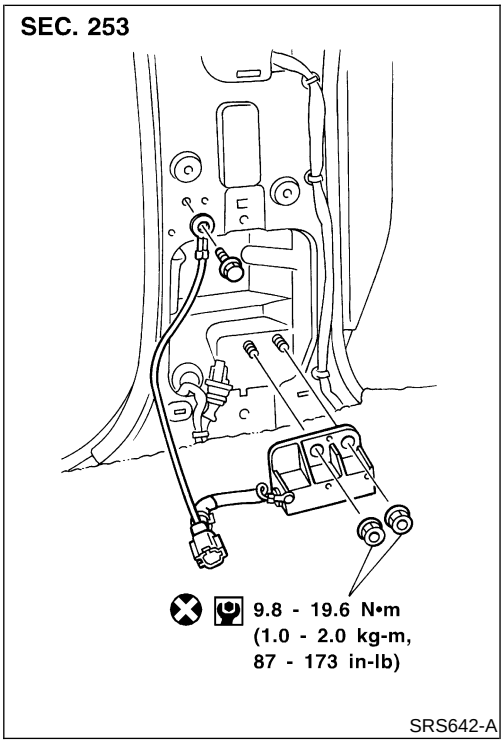
Satellite Sensor

REMOVAL AND INSTALLATION

NARS0035

CAUTION:

- **Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait at least 3 minutes.**
- **Do not use old bolts coated with bonding agent after removal; replace with new ones.**
- **Check satellite sensor for proper installation.**
- **Check satellite sensor to ensure they are free of deformities, dents, cracks or rust. If it shows any visible signs of damage, replace it with new one.**
- **After replacement of satellite sensor, check SRS function and perform self-diagnosis for SRS. Refer to "SRS Operation Check" for details. (RS-38)**
- **Do not attempt to disassemble satellite sensor.**
- **Replace satellite sensor if it has been dropped or sustained an impact.**



1. Remove seat belt pre-tensioner with load limiter. Refer to "Front Seat Belt" for details. (RS-4)
2. Disconnect satellite sensor connector.
3. Remove bolt and nuts from satellite sensor unit. Then remove the satellite sensor.

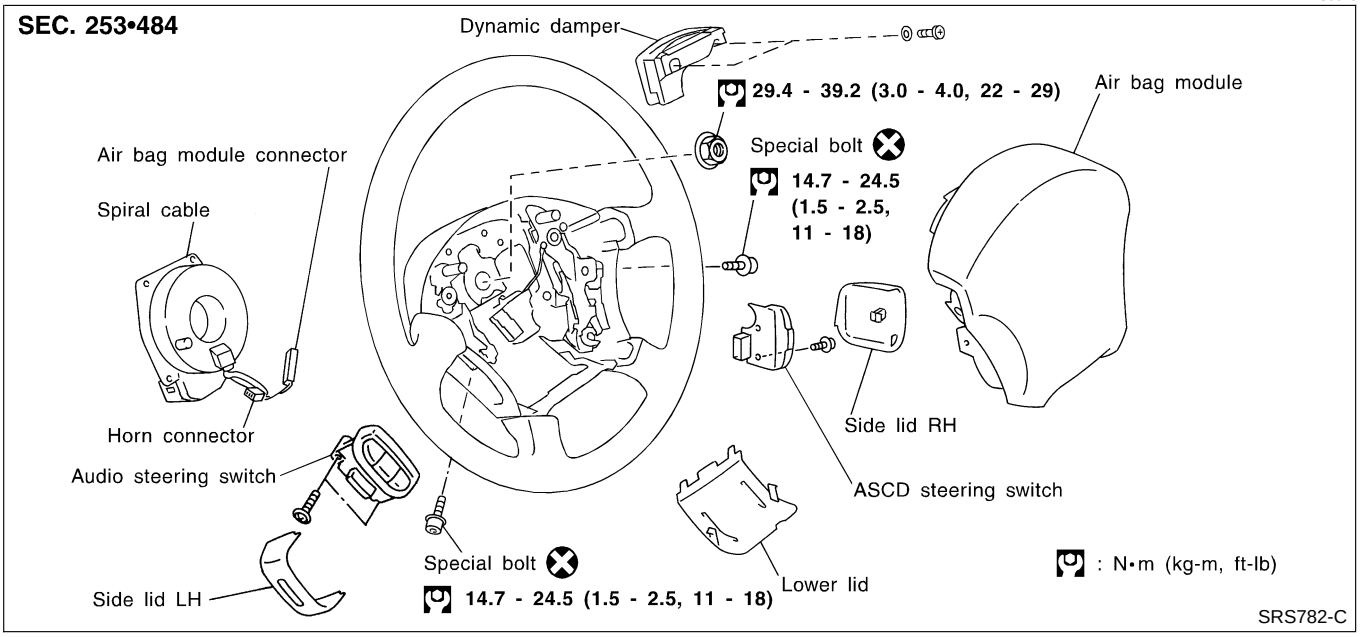
NOTE:

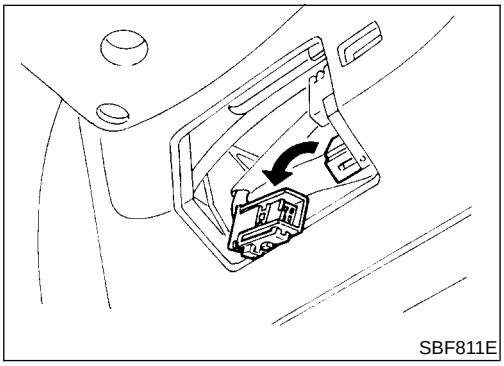
- To install, reverse the removal procedure sequence.

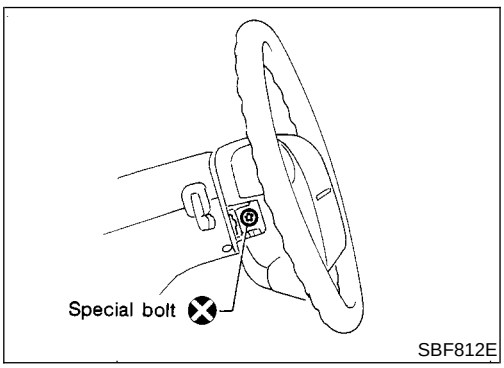
Driver Air Bag Module and Spiral Cable

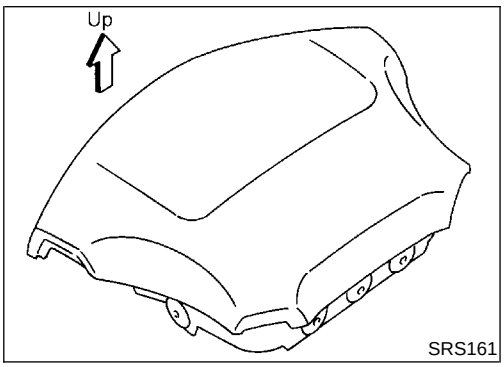
REMOVAL AND INSTALLATION

NARS0013









REMOVAL

NARS0014

CAUTION:

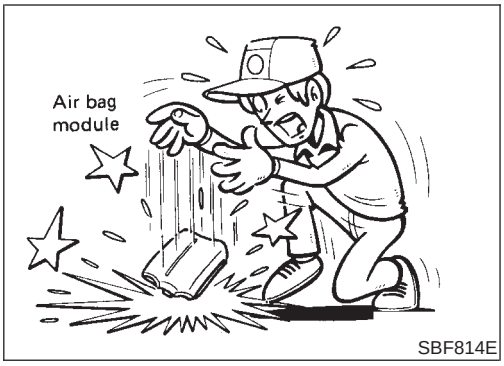
- **Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait at least 3 minutes.**
- **Always work from the side of air bag module.**

1. Remove lower lid from steering wheel, and disconnect air bag module connector.

2. Remove side lids, ASCD steering switch and audio steering switch. Using the TAMPER RESISTANT TORX (Size T50), remove left and right special bolts. Air bag module can then be removed.

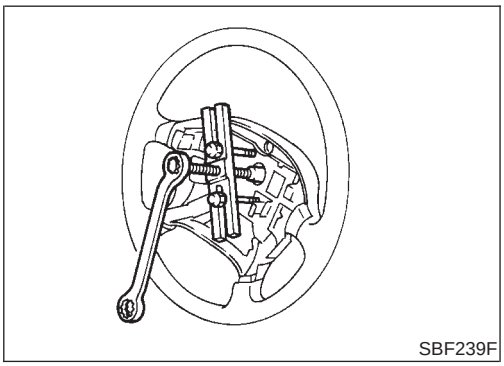
CAUTION:

- **Always place air bag module with pad side facing upward.**
- **Do not attempt to disassemble air bag module.**
- **The special bolts are coated with bonding agent. Do not use old bolts after removal; replace with new ones.**
- **Do not insert any foreign objects (screwdriver, etc.) into air bag module connector.**



SBF814E

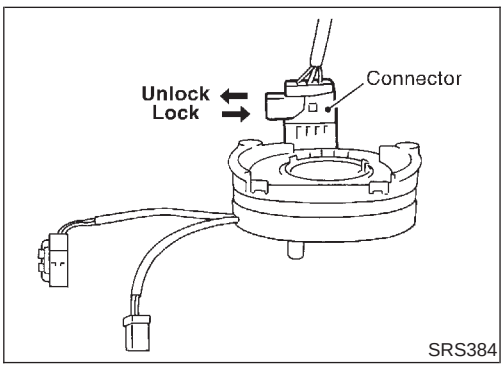
- **Replace air bag module if it has been dropped or sustained an impact.**
- **Do not expose the air bag module to temperatures exceeding 90°C (194°F).**
- **Do not allow oil, grease or water to come in contact with the air bag module.**


SBF239F

3. Set steering wheel in the neutral position.
4. Disconnect horn connector and remove nuts.
5. Remove dynamic damper. Then using steering wheel puller, remove steering wheel. Be careful not to over-tighten puller bolt on steering wheel.

CAUTION:
- **Do not tap or bump the steering wheel.**

6. Remove steering column cover.



SRS384

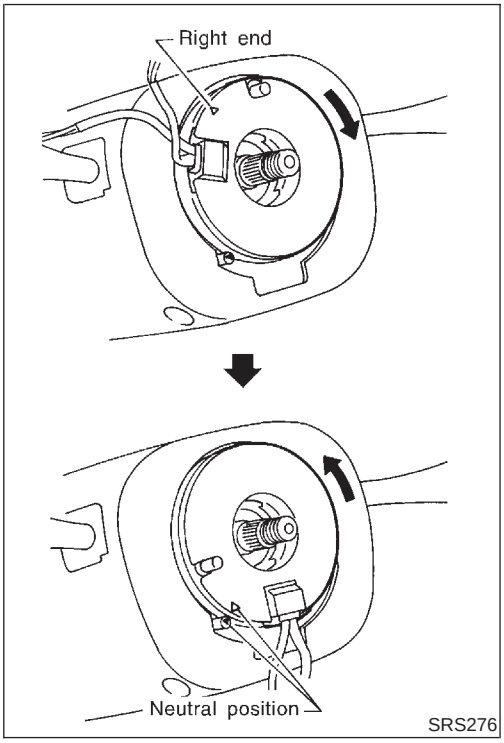
7. Unlock the spiral cable connector. Then disconnect connectors and remove the four screws. The spiral cable can then be removed.

CAUTION:
- **Do not attempt to disassemble spiral cable.**
- **Do not apply lubricant to the spiral cable.**

INSTALLATION

NARS0015

1. Set the front wheels in the straight-ahead position.
2. Make sure that the spiral cable is in the neutral position. The neutral position is detected by turning left about 2.5 revolutions from the right end position. Align the two marks (⧗).

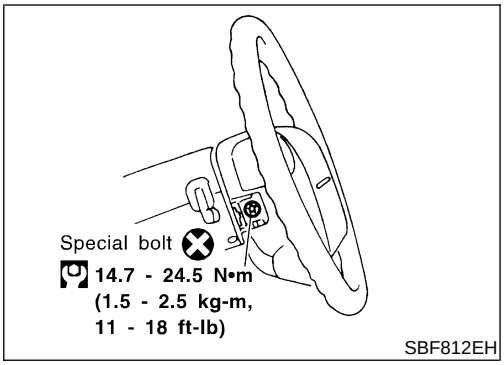


SRS276

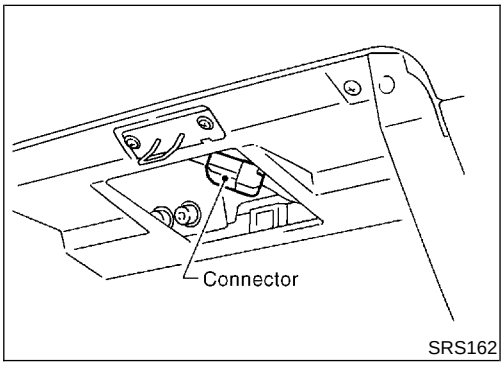
CAUTION:
- **The spiral cable may snap due to steering operation if the cable is installed in an improper position.**
- **Also, with the steering linkage disconnected, the cable may snap by turning the steering wheel beyond the limited number of turns. The spiral cable can be turned to the left about 2.5 turns from the right end position.**

3. Connect spiral cable connector and tighten with screws. Install steering column cover.
4. Install steering wheel, aligning with spiral cable pin guides, and pull spiral cable through.
5. Connect horn connector and engage spiral cable with pawls in steering wheel. Move air bag module connector away from steering wheel lower lid opening.
6. Tighten nut.

   : 29.4 - 39.2 N·m (3.0 - 4.0 kg-m, 22 - 28 ft-lb)
7. Install dynamic damper.



8. Position air bag module and tighten with new special bolts.
9. Connect air bag module connector.
10. Install steering switches and lids.
11. Conduct self-diagnosis to ensure entire SRS operates properly. (Use CONSULT-II or warning lamp check.)
    Before performing self-diagnosis, connect both battery cables.
12. Turn steering wheel to the left end and then to the right end fully to make sure that spiral cable is set in the neutral position.
    If air bag warning lamp blinks or stays ON (at the user mode), it shows the spiral cable may be snapped due to its improper position. Perform self-diagnosis again (use CONSULT-II or warning lamp). If a malfunction is detected, replace the spiral cable with a new one.
13. Perform self-diagnosis again to check that no malfunction is detected.



Front Passenger Air Bag Module

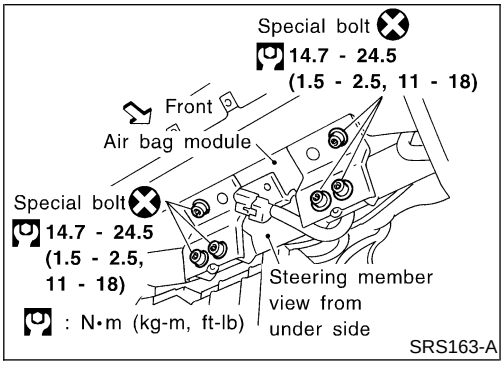
REMOVAL

NARS0016

CAUTION:

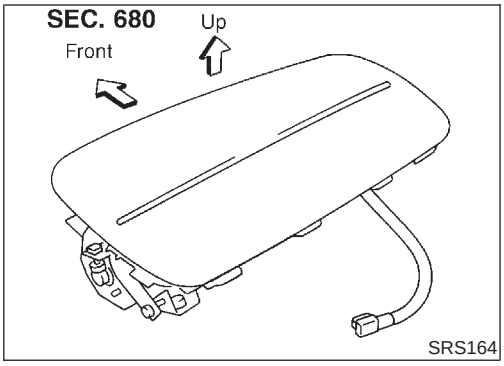
- **Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait for at least 3 minutes.**
- **Always work from the side of or under air bag module.**

1. Remove glove box assembly. Refer to BT-22, "INSTRUMENT PANEL ASSEMBLY" for details.
2. Disconnect front passenger air bag module connector from air bag harness connector.
3. Remove instrument lower panel on passenger side. Refer to BT-22, "INSTRUMENT PANEL ASSEMBLY" for details.



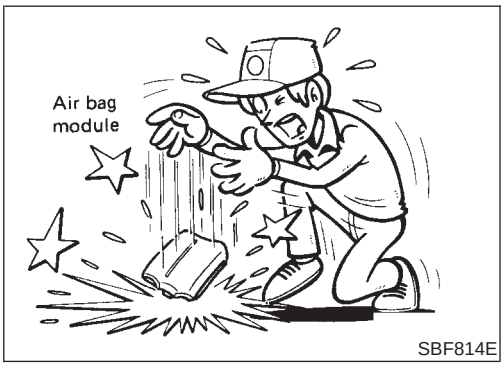
4. Remove special bolts using the TAMPER RESISTANT TORX (Size T50) from front passenger air bag module.
5. Remove instrument panel assembly. Refer to BT-22, "INSTRUMENT PANEL ASSEMBLY" for details.
6. Remove the bolts from left and right sides of front passenger air bag module. Then remove the air bag module from the instrument panel assembly.

- The air bag module is heavy and should be supported using both hands during removal.

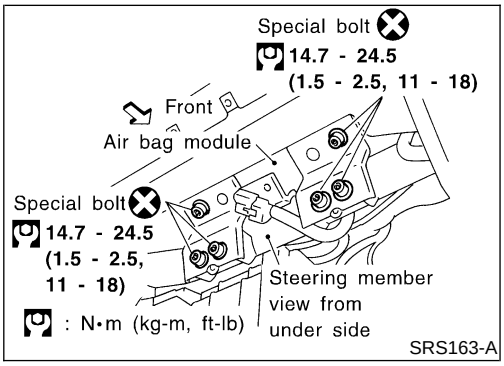


CAUTION:

- **Always place air bag module with pad side facing upward.**
- **Do not attempt to disassemble air bag module.**
- **The special bolts are coated with bonding agent. Do not use old bolts after removal; replace with new coated bolts.**
- **Do not insert any foreign objects (screwdriver, etc.) into air bag module connector.**



- **Replace air bag module if it has been dropped or sustained an impact.**
- **Do not expose the air bag module to temperatures exceeding 90°C (194°F).**
- **Do not allow oil, grease or water to come in contact with the air bag module.**
- **After air bag inflates, the front instrument panel assembly should be replaced if damaged.**



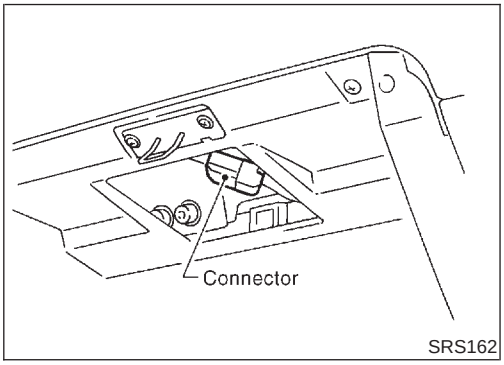
INSTALLATION

NARS0017

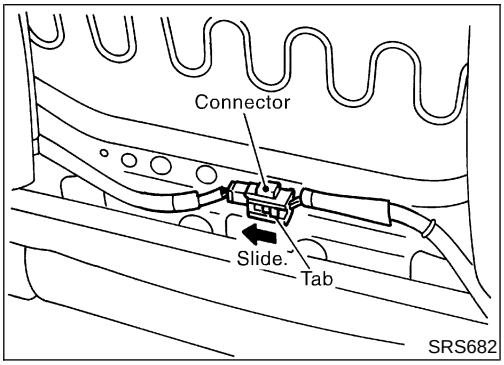
CAUTION:

- **Always work from the side of or under air bag module.**

1. Install front passenger air bag module to instrument panel assembly.
2. Install instrument panel.
   - Ensure harness is not caught between rear of air bag module and steering member.
3. Install front passenger air bag module to steering member.



4. Install instrument lower panel on passenger side.
5. Connect air bag module connector to air bag harness connector.
6. Install glove box assembly.
7. Connect both battery cables.
8. Conduct self-diagnosis to ensure entire SRS operates properly. (Use CONSULT-II or warning lamp check.)



Side Air Bag Module

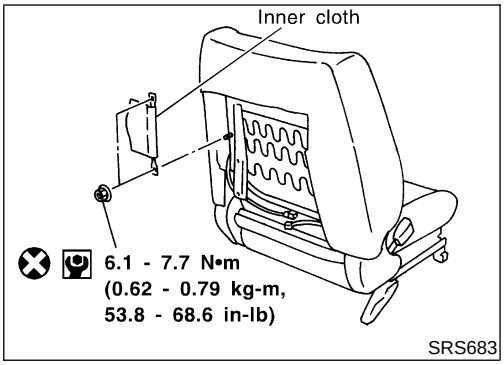
REMOVAL

NARS0036

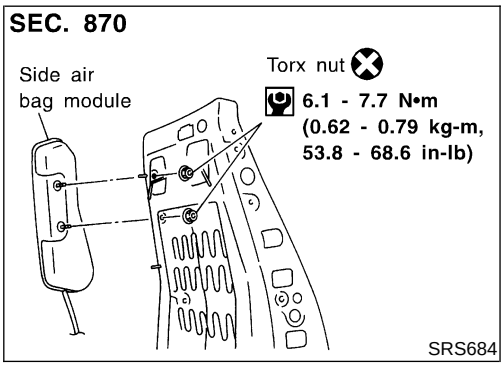
CAUTION:

- **Before servicing SRS, turn the ignition switch OFF, disconnect both battery cables and wait at least 3 minutes.**
- **Always work from the rear of the air bag module.**

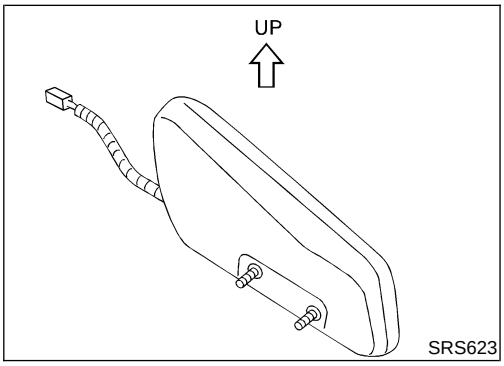
1. Remove seatback board.
   - **When using a clip removal tool to remove the seatback board, take care not to damage the air bag harness.**
2. Disconnect side air bag module connector by sliding tab.



3. Pull up the seatback trim.
4. Remove the nuts securing the inner cloth with seatback frame. Then pull up the inner cloth.
5. Remove seatback trim. Refer to BT-43, "FRONT SEAT" for details.



6. Remove the torx nuts coated with bonding agent from the side air bag module.
7. Remove side air bag connector. Side air bag module can then be removed.

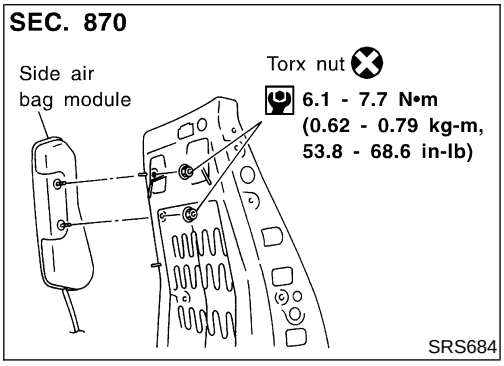


CAUTION:

- **Always place the air bag module stading with the stud bolt side setting bottom.**
- **Do not attempt to disassemble air bag module.**
- **The torx nuts are coated with bonding agent. Do not use old nuts after removal; replace with new coated nuts.**
- **Do not insert any foreign objects (screwdriver, etc.) into air bag module connector.**



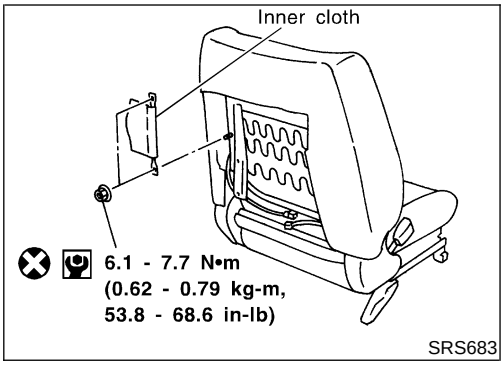
- **Replace air bag module if it has been dropped or sustained an impact.**
- **Do not expose the air bag module to temperatures exceeding 90°C (194°F).**
- **Do not allow oil, grease or water to come in contact with the air bag module.**
- **After air bag inflates, all parts of front seatback (including front seatback frame) should be replaced.**



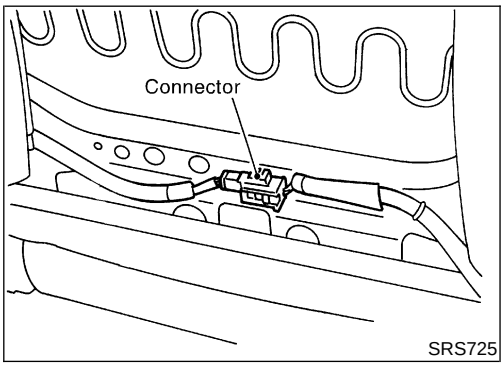
INSTALLATION

NARS0037

1. Install side air bag module on seatback frame with new torx nuts coated with bonding agent.
2. Install side air bag connector.
3. Install seatback trim. Refer to BT-43, "FRONT SEAT" for details.



4. Secure the inner cloth which covers the side air bag module with nuts.

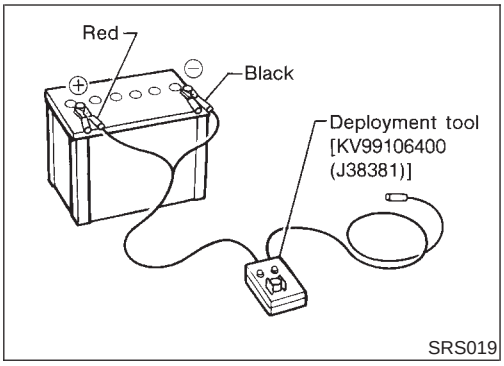


5. Connect side air bag module connector.
6. Install seatback board with new clips.
7. Connect both battery cables.
8. Go to "SRS Operation Check", RS-38 and perform self-diagnosis to ensure entire SRS operates properly. (Use CONSULT-II or air bag warning lamp.)

Disposal of Air Bag Module and Seat Belt Pre-tensioner

NARS0018

- Before disposing of air bag module and seat belt pre-tensioner, or vehicles equipped with such systems, deploy the systems. If such systems have already been deployed due to an accident, dispose of them as indicated in "DISPOSING OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER" (RS-27).
- When deploying the air bag module and seat belt pre-tensioner, always use the Special Service Tool; Deployment tool KV99106400 (Kent-Moore No. J38381).
- When deploying the air bag module and seat belt pre-tensioner, stand at least 5 m (16 ft) away from the deployment component.
- When deploying air bag module and seat belt pre-tensioner, a fairly loud noise is made, followed by smoke being released. The smoke is not poisonous, however, be careful not to inhale smoke since it irritates the throat and can cause choking.
- Always activate one air bag module at a time.
- Due to heat, leave air bag module unattended for more than 30 minutes after deployment. Also leave seat belt pre-tensioner unattended for move than 10 minutes after deployment.
- Be sure to wear gloves when handling a deployed air bag module and seat belt pre-tensioner.
- Never apply water to the deployed air bag module and seat belt pre-tensioner.
- Wash your hands clean after finishing work.
- Place the vehicle outdoors with an open space of at least 6 m (20 ft) on all sides when deploying air bag module and seat belt pre-tensioner while mounted in vehicle.
- Use a voltmeter to make sure the vehicle battery is fully charged.
- Do not dispose of the air bag module and seat belt pre-tensioner un-deployed.



CHECKING DEPLOYMENT TOOL

NARS0018S01

Connecting to Battery

NARS0018S0101

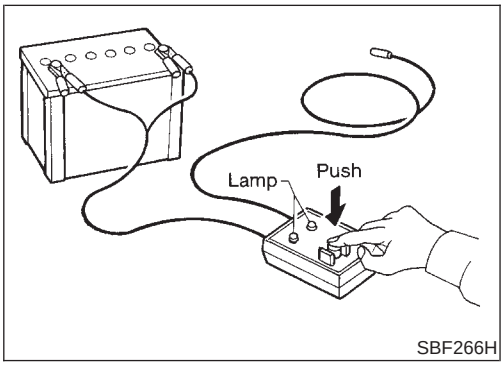
CAUTION:

The battery must show voltage of 9.6V or more.

Remove the battery from the vehicle and place it on dry wood blocks approximately 5 m (16 ft) away from the vehicle.

- Wait 3 minutes after the vehicle battery is disconnected before proceeding.
- Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.

Make sure the polarity is correct. The right side lamp in the tool, marked "deployment tool power", should glow with a green light. If the right side lamp glows red, reverse the connections to the battery.



Deployment Tool Check

NARS0018S0102

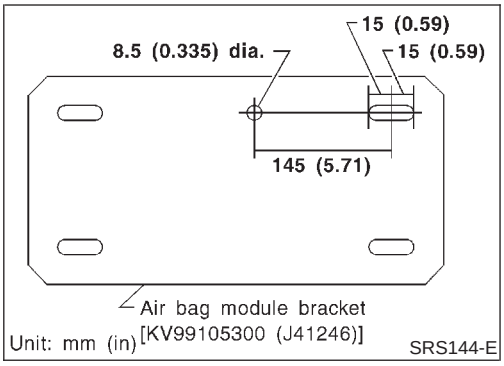
Press the deployment tool switch to the "ON" position. The left side lamp in the tool, marked "air bag connector voltage" should illuminate. If it does not illuminate, replace the tool.

Air Bag Deployment Tool Lamp Illumination Chart (Battery connected)

NARS0018S0103

Switch operation	Left side lamp, green* "AIR BAG CONNECTOR VOLTAGE"	Right side lamp, green* "DEPLOYMENT TOOL POWER"
OFF	OFF	ON
ON	ON	ON

*: If this lamp glows red, the tool is connected to the battery incorrectly. Reverse the connections and make sure the lamp glows green.



DEPLOYMENT PROCEDURES FOR AIR BAG MODULE (OUTSIDE OF VEHICLE)

NARS0018S02

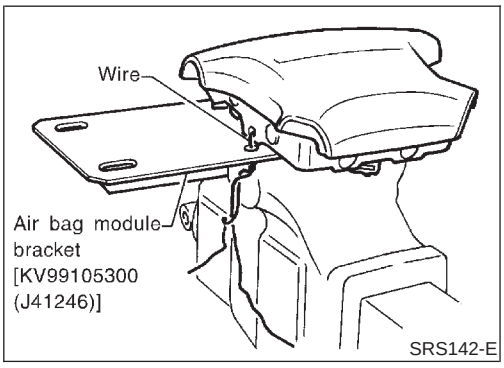
Unless the vehicle is being scrapped, deploying the air bag in the vehicle is not recommended. This may cause damage to the vehicle interior.

Anchor air bag module bracket [KV99105300 (J41246)] in a vise secured to a firm foundation during deployment.

Deployment of Driver's Air Bag Module (Outside of vehicle)

NARS0018S0201

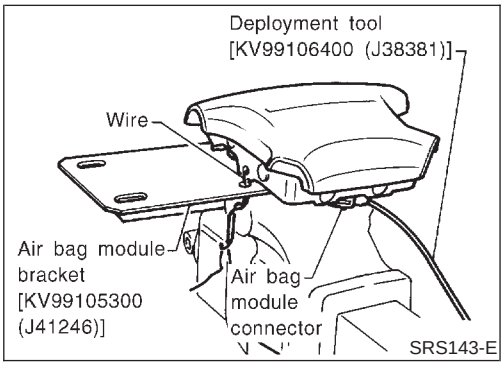
1. Make an 8.5 mm (0.335 in) diameter hole in air bag module bracket [SST: KV99105300 (J41246)] at the position shown in figure at left.
2. Using wire, secure air bag module to air bag module bracket [SST: KV99105300 (J41246)] at two places.



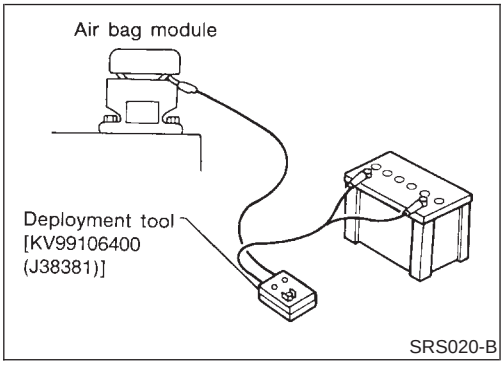
CAUTION:

Use wire of at least 1 mm (0.04 in) diameter.

3. Firmly secure air bag module bracket [SST: KV99105300 (J41246)] with air bag module attached, in a vise.



4. Connect deployment tool [SST: KV99106400 (J38381)] to air bag module connector.



5. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.
6. The lamp on the right side of the tool, marked "deployment tool power", should glow green, not red.
7. Press the button on the deployment tool. The left side lamp on the tool, marked "air bag connector voltage", will illuminate and the air bag module will deploy.

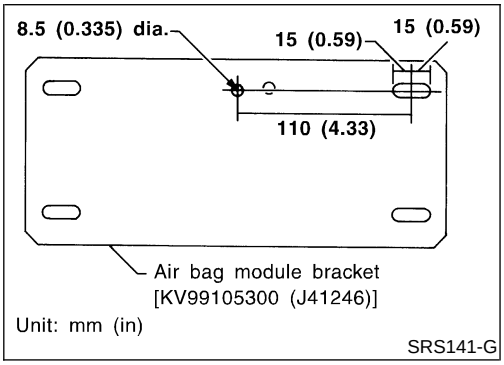
CAUTION:

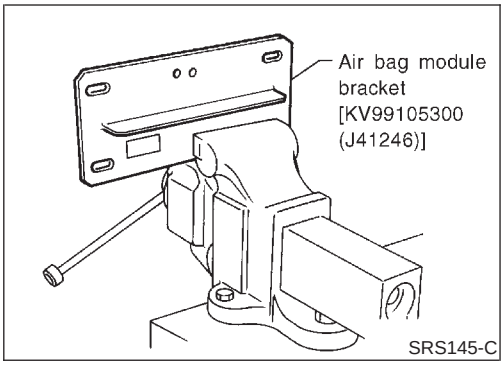
When deploying the air bag module, stand at least 5 m (16 ft) away from the air bag module.

Deployment of Passenger Air Bag Module (Outside of vehicle)

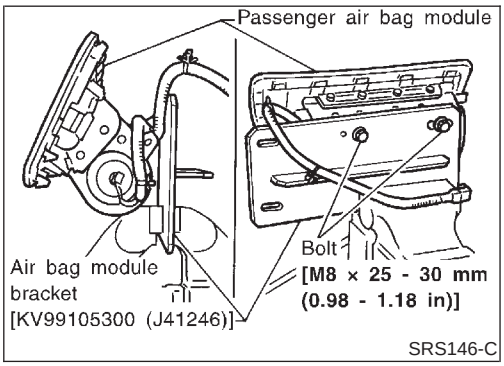
NARS0018S0202

1. Make an 8.5 mm (0.335 in) diameter hole in air bag module bracket [SST: KV99105300 (J41246)] at the position shown in figure at left.



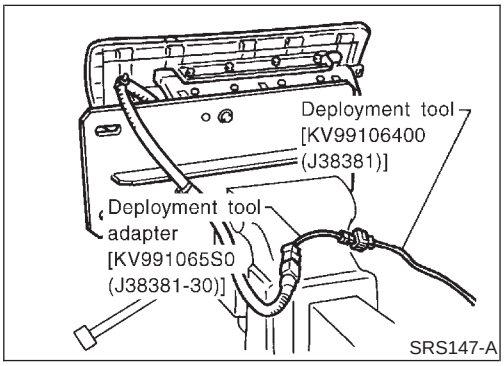


2. Firmly secure air bag module bracket [SST: KV99105300 (J41246)] in a vise.

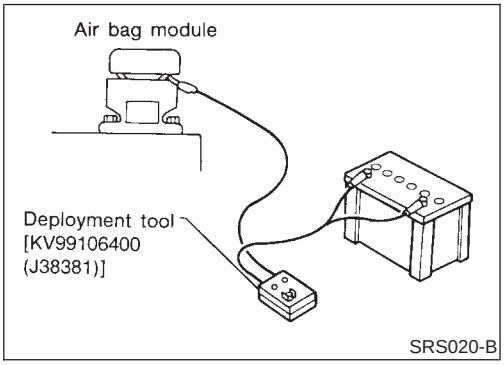


3. Match the two holes in air bag module bracket (held in vise) and passenger air bag module and fix them with two bolts [M8 × 25 - 30 mm (0.98 - 1.18 in)].

CAUTION:
If a gap exists between passenger air bag module and air bag module bracket, use a piece of wood inserted in the gap to stabilize the air bag module.



4. Connect deployment tool adapter [SST: KV991065S0 (J38381-30)] to deployment tool [SST: KV99106400 (J38381)] connector and air bag module connector.
5. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.
6. The lamp on the right side of the tool, marked "deployment tool power", should glow green, not red.
7. Press the button on the deployment tool. The left side lamp on the tool, marked "air bag connector voltage", will illuminate and the air bag module will deploy.

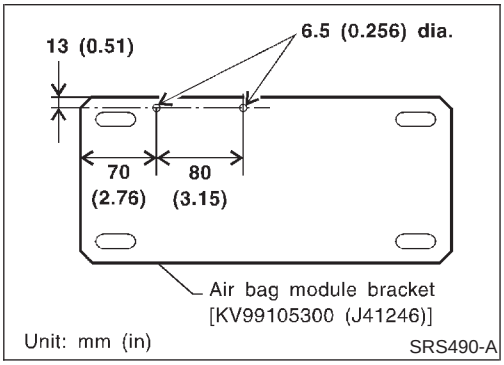


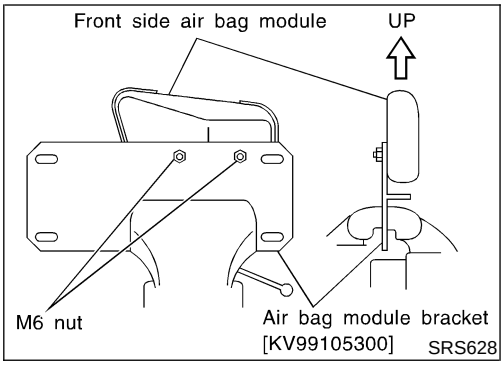
CAUTION:
- **When deploying the air bag module, do not stand on the deploying side.**
- **Stand at least 5 m (16 ft) away from the air bag module.**

Deployment of Side Air Bag Module (Built-in type) (Outside of vehicle)

NARS0018S0203

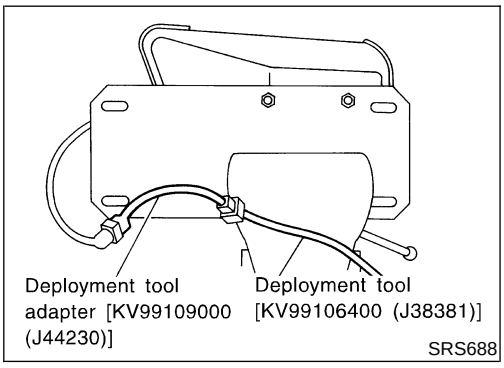
1. Make 6.5 mm (0.256 in) diameter holes in air bag module bracket [SST: KV99105300 (J41246)] at the position shown in figure at left.



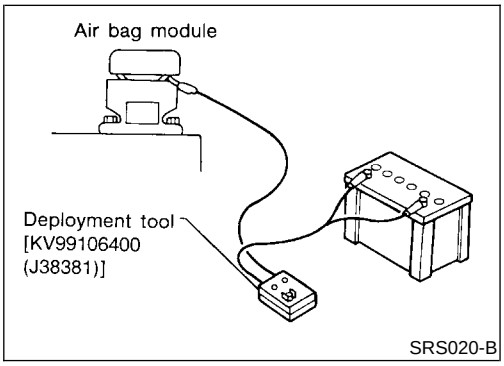


2. Firmly secure air bag module bracket [SST: KV99105300 (J41246)] in a vase.
3. Insert the stud bolts of side air bag module (built-in type) into the two holes in air bag module bracket (held in vise) and fix them with two M6 nuts.

CAUTION:
Side air bag module should be secured to air bag module bracket [SST: KV99105300 (J41246)] in a vise with metal portion facing down.



4. Connect deployment tool adapter [SST: KV99109000 (J44230)] to deployment tool [SST: KV99106400 (J38381)] connector and connector on air bag module.



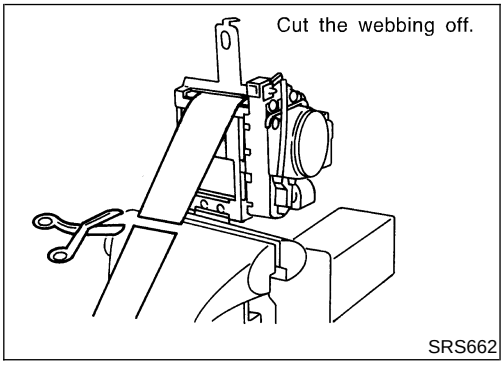
5. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.
6. The lamp on the right side of the tool, marked "deployment tool power", should glow green, not red.
7. Press the button on the deployment tool. The left side lamp on the tool, marked "air bag connector voltage", will illuminate and the air bag module will deploy.

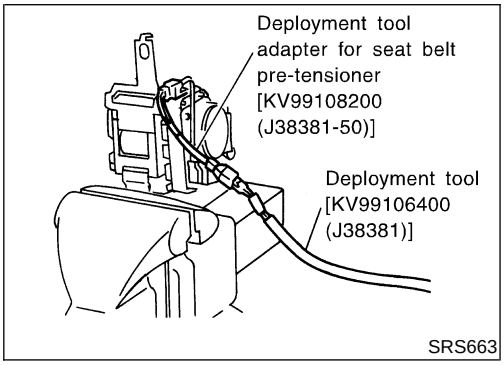
CAUTION:
When deploying the air bag module, stand at least 5 m (16 ft) away from the air bag module.

DEPLOYMENT PROCEDURES FOR SEAT BELT PRE-TENSIONER (OUTSIDE OF VEHICLE)

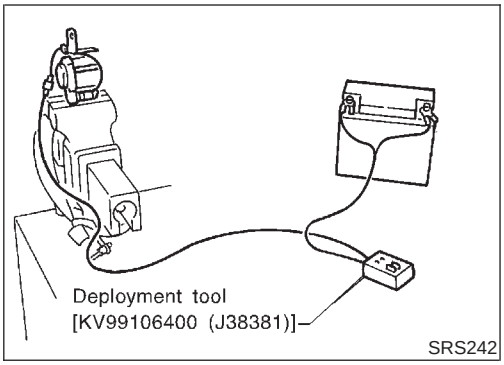
NARS0018S05

1. Firmly grip pre-tensioner in a vise and cut the webbing off.





2. Connect deployment tool adapter [SST: KV99108200 (J38381-50)] to deployment tool [SST: KV99106400 (J38381)] connector and seat belt pre-tensioner connector.



SRS242

3. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.
4. The lamp on the right side of the tool, marked "deployment tool power", should glow green, not red.
5. Press the button on the deployment tool. The left side lamp on the tool, marked "seat belt pre-tensioner connector voltage", will illuminate and the seat belt pre-tensioner will deploy.

CAUTION:
When deploying the seat belt pre-tensioner, stand at least 5 m (16 ft) away from the seat belt pre-tensioner.

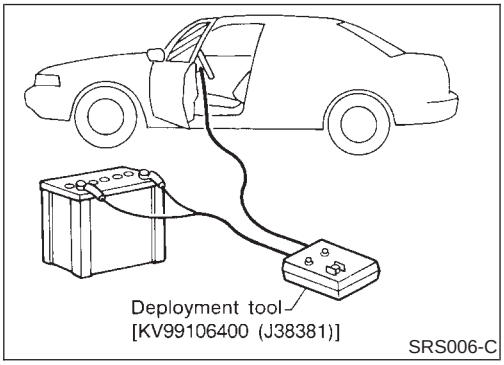
DEPLOYMENT OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER WHILE MOUNTED IN VEHICLE

NARS0018S03

When disposing of a vehicle, deploy air bag module and seat belt pre-tensioners while they are mounted in vehicle.

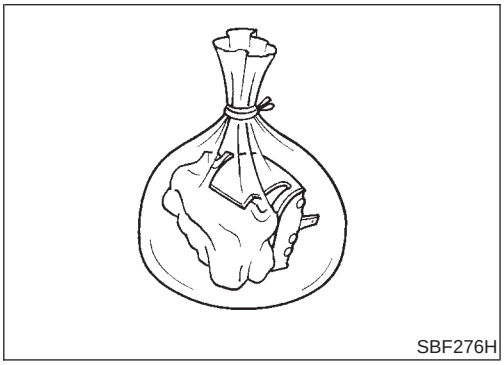
CAUTION:
When deploying air bag module or seat belt pre-tensioner, ensure vehicle is empty.

1. Disconnect both the vehicle battery cables and wait 3 minutes.
2. Disconnect air bag module and seat belt pre-tensioner connector.
3. Connect deployment tool [SST: KV99106400 (J38381)] to air bag module or seat belt pre-tensioner.
   For front passenger air bag module, attach deployment tool adapter [SST: KV991065S0 (J38381-30)] to the tool connector. For side air bag module (built-in type), attach deployment tool adapter [SST: KV99109000 (J44230)]. For seat belt pre-tensioner, attach deployment tool adapter [SST: KV99108200 (J38381-50)] to the tool connector.



SRS006-C

4. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.
5. The lamp on the right side of the tool, marked "deployment tool power", should glow green, not red.
6. Press the button on the deployment tool. The left side lamp on the tool, marked "air bag connector voltage", will illuminate and the air bag module will deploy.


SBF276H

DISPOSING OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER

NARS0018S04

Deployed air bag module and seat belt pre-tensioner are very hot. Before disposing of air bag module, and seat belt pre-tensioner wait at least 30 minutes, and 10 minutes, respectively. Seal them in a plastic bag before disposal.

CAUTION:
- **Never apply water to a deployed air bag module and seat belt pre-tensioner.**
- **Be sure to wear gloves when handling a deployed air bag module and seat belt pre-tensioner.**

- **No poisonous gas is produced upon air bag module deployment. However, be careful not to inhale gas since it irritates throat and can cause choking.**
- **Do not attempt to disassemble air bag module and seat belt pre-tensioner.**
- **Air bag module and seat belt pre-tensioner cannot be reused.**
- **Wash your hands clean after finishing work.**

Trouble Diagnoses Introduction

=NARS0040

CAUTION:

- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.**
- **Do not attempt to repair, splice or modify the SRS wiring harness. If the harness is damaged, replace it with a new one.**
- **Keep ground portion clean.**

DIAGNOSIS FUNCTION

NARS0040S01

The SRS self-diagnosis results can be read by using "AIR BAG" warning lamp and/or CONSULT-II. The reading of these results is accomplished using one of two modes — "User mode" and "Diagnosis mode".
The User mode is exclusively prepared for the customer (driver). This mode warns the driver of a system malfunction through the operation of the "AIR BAG" warning lamp.
The Diagnosis mode allows the technician to locate and inspect the malfunctioning part.
The mode applications for the "AIR BAG" warning lamp and CONSULT-II are as follows:

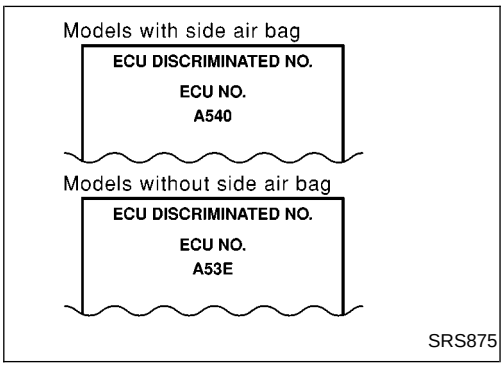
	User mode	Diagnosis mode	Display type
"AIR BAG" warning lamp	X	X	ON-OFF operation
CONSULT-II	—	X	Monitoring

NOTE:
Seat belt pre-tensioner malfunction is indicated by "AIR BAG" warning lamp.

DIAGNOSIS MODE FOR CONSULT-II

NARS0040S02

- "SELF-DIAG [CURRENT]"
  A current Self-diagnosis result (also indicated by the number of warning lamp flashes in the Diagnosis mode) is displayed on the CONSULT-II screen in real time. This refers to a malfunctioning part requiring repairs.
- "SELF-DIAG [PAST]"
  Diagnosis results previously stored in the memory are displayed on the CONSULT-II screen. The stored results are not erased until memory erasing is executed.
- "TROUBLE DIAG RECORD"
  With TROUBLE DIAG RECORD, diagnosis results previously erased by a reset operation can be displayed on the CONSULT-II screen.
- "ECU DISCRIMINATED NO."
  The diagnosis sensor unit for each vehicle model is assigned with its own, individual classification number. This number will be displayed on the CONSULT-II screen, as shown below. When replacing the diagnosis sensor unit, refer to the part number for the compatibility. After installation, replacement with a correct unit can be checked by confirming this classification number on the CONSULT-II screen.



For NISSAN MODEL R50, the diagnosis sensor unit classification numbers assigned is A540 (Models with side air bag) and A53E (Models without side air bag).

HOW TO CHANGE SELF-DIAGNOSIS MODE WITH CONSULT-II

=NARS0040S03

From User Mode to Diagnosis Mode

NARS0040S0301

After selecting "AIR BAG" on the "SELECT SYSTEM" screen, User mode automatically changes to Diagnosis mode.



From Diagnosis Mode to User Mode

NARS0040S0302

To return to User mode from Diagnosis mode, touch "BACK" key of CONSULT-II until "SELECT SYSTEM" appears, Diagnosis mode automatically changes to User mode.



HOW TO CHANGE SELF-DIAGNOSIS MODE WITHOUT CONSULT-II

NARS0040S04

From User Mode to Diagnosis Mode

NARS0040S0401

Diagnosis mode activates only when a malfunction is detected, by turning ignition switch as follows:

1) Turn ignition switch "ON".
2) After "AIR BAG" warning lamp lights for 7 seconds, turn ignition switch "OFF" within 1 second.
3) Wait more than 3 seconds.
4) Repeat steps 1 to 3 three times.
5) Turn ignition switch "ON".

SRS will not enter Diagnosis mode, if no malfunction is detected.

From Diagnosis Mode to User Mode

NARS0040S0402

After a malfunction is repaired, switch the ignition "OFF" for at least one second, then back "ON". Diagnosis mode is returned to User mode.
If switching Diagnosis mode to User mode is required while malfunction is being detected, by turning ignition switch as follows:

1) Turn ignition switch "ON".
2) After "AIR BAG" warning lamp lights for 7 seconds, turn ignition switch "OFF" within 1 second.
3) Wait more than 3 seconds.
4) Repeat steps 1 to 3 three times.
5) Turn ignition switch "ON".

HOW TO ERASE SELF-DIAGNOSIS RESULTS

NARS0040S05

With CONSULT-II

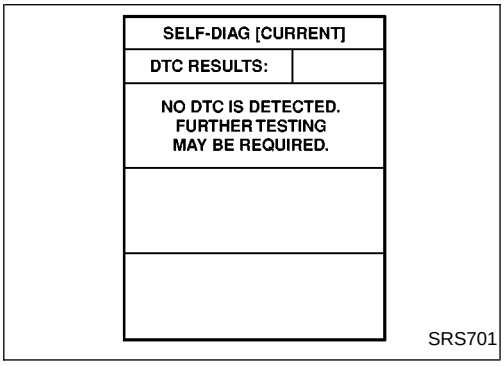
NARS0040S0501

- "SELF-DIAG [CURRENT]"
  A current Self-diagnosis result is displayed on the CONSULT-II screen in real time.

After the malfunction is repaired completely, no malfunction is detected on "SELF-DIAG [CURRENT]".

- "SELF-DIAG [PAST]"
  Return to the "SELF-DIAG [CURRENT]" CONSULT-II screen by pushing "BACK" key of CONSULT-II and select "SELF-DIAG [CURRENT]" in SELECT DIAG MODE. Touch "ERASE" in "SELF-DIAG [CURRENT]" mode.

NOTE:
If the memory of the malfunction in "SELF-DIAG [PAST]" is not erased, the User mode shows the system malfunction by the operation of the warning lamp even if the malfunction is repaired completely.



- "TROUBLE DIAG RECORD"
  The memory of "TROUBLE DIAG RECORD" cannot be erased.

Without CONSULT-II

NARS0040S0502

After a malfunction is repaired, switch the ignition "OFF" for at least one second, then back "ON". Diagnosis mode returns to the User mode. At that time, the self-diagnostic result is cleared.

How to Perform Trouble Diagnoses for Quick and Accurate Repair

=NARS0041

A good understanding of the malfunction conditions can make troubleshooting faster and more accurate. In general, each customer feels differently about a malfunction. It is important to fully understand the symptoms or conditions for a customer complaint.

INFORMATION FROM CUSTOMER

NARS0041S01

WHAT ..... Vehicle model
WHEN ..... Date, Frequencies
WHERE ..... Road conditions
HOW ..... Operating conditions, Symptoms

PRELIMINARY CHECK

NARS0041S02

Check that the following parts are in good order.

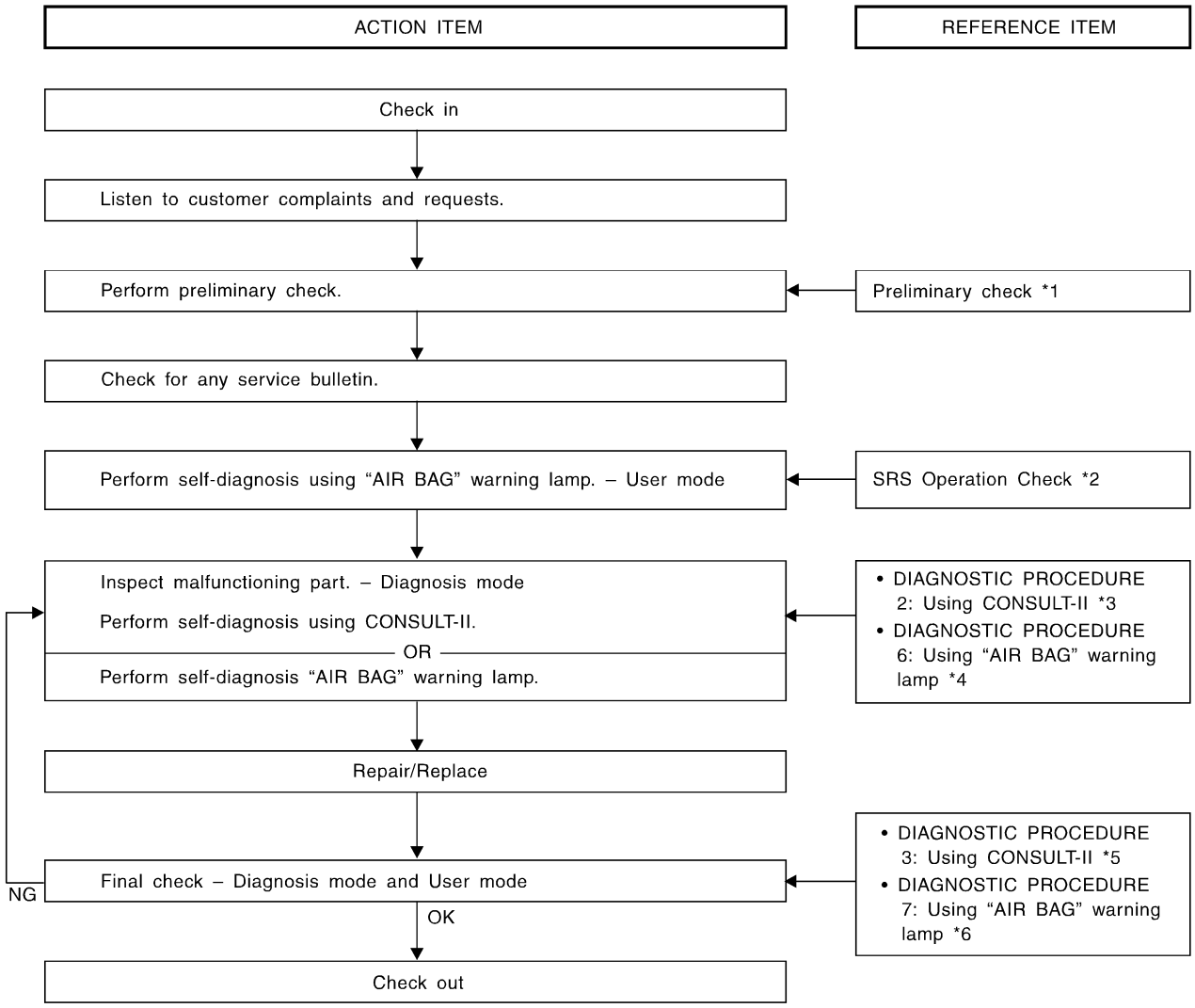
- Battery [Refer to SC-4, “BATTERY”.]
- Fuse [Refer to EL-16, “Fuse”, “POWER SUPPLY ROUTING”.]
- System component-to-harness connections

WORK FLOW

=NARS0041S03

NOTE:

Seat belt pre-tensioner malfunction is indicated by "AIR BAG" warning lamp.

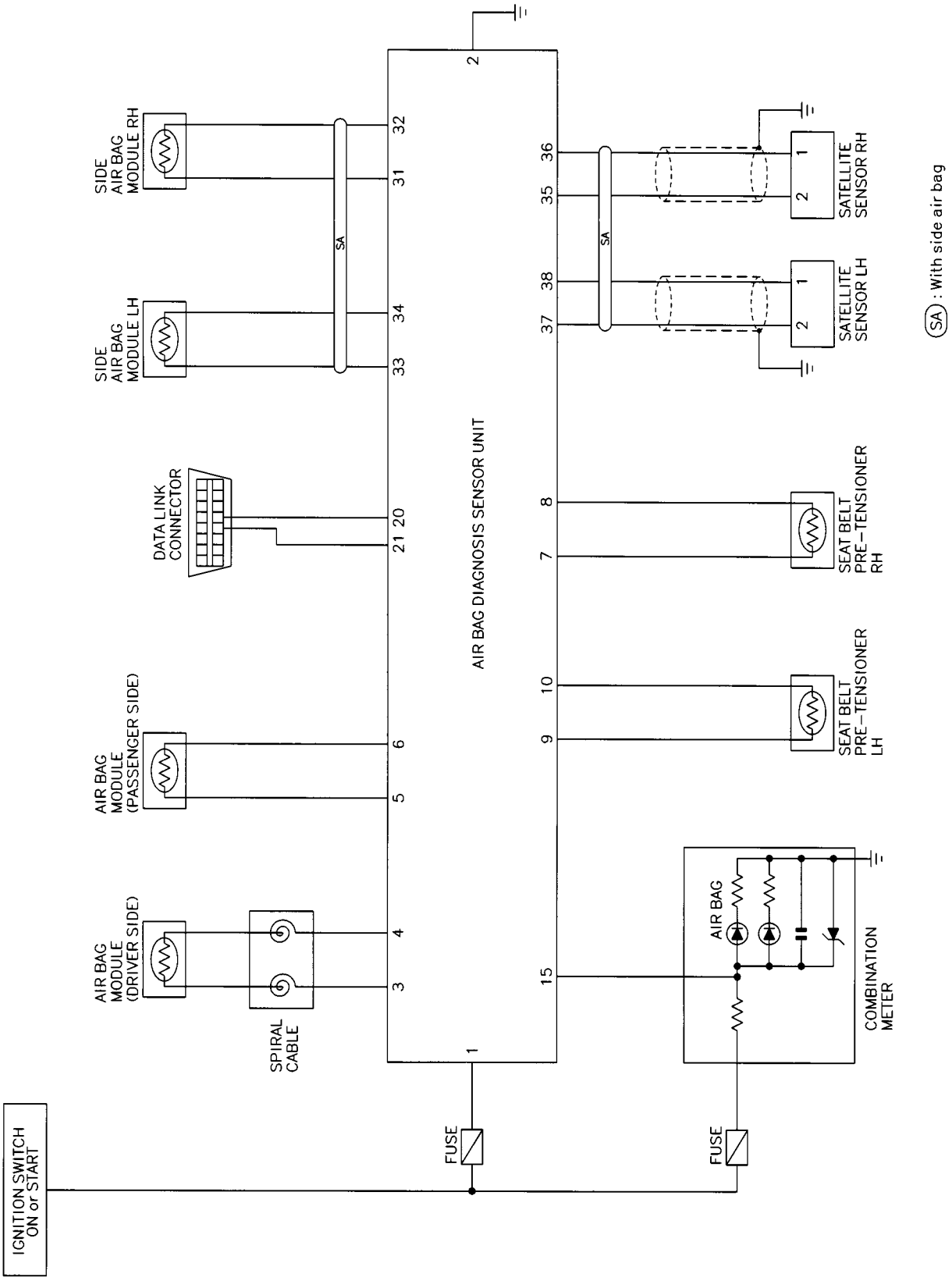


SRS799

*1: RS-32
*2: RS-38
*3: RS-39
*4: RS-48
*5: RS-42
*6: RS-53

Schematic

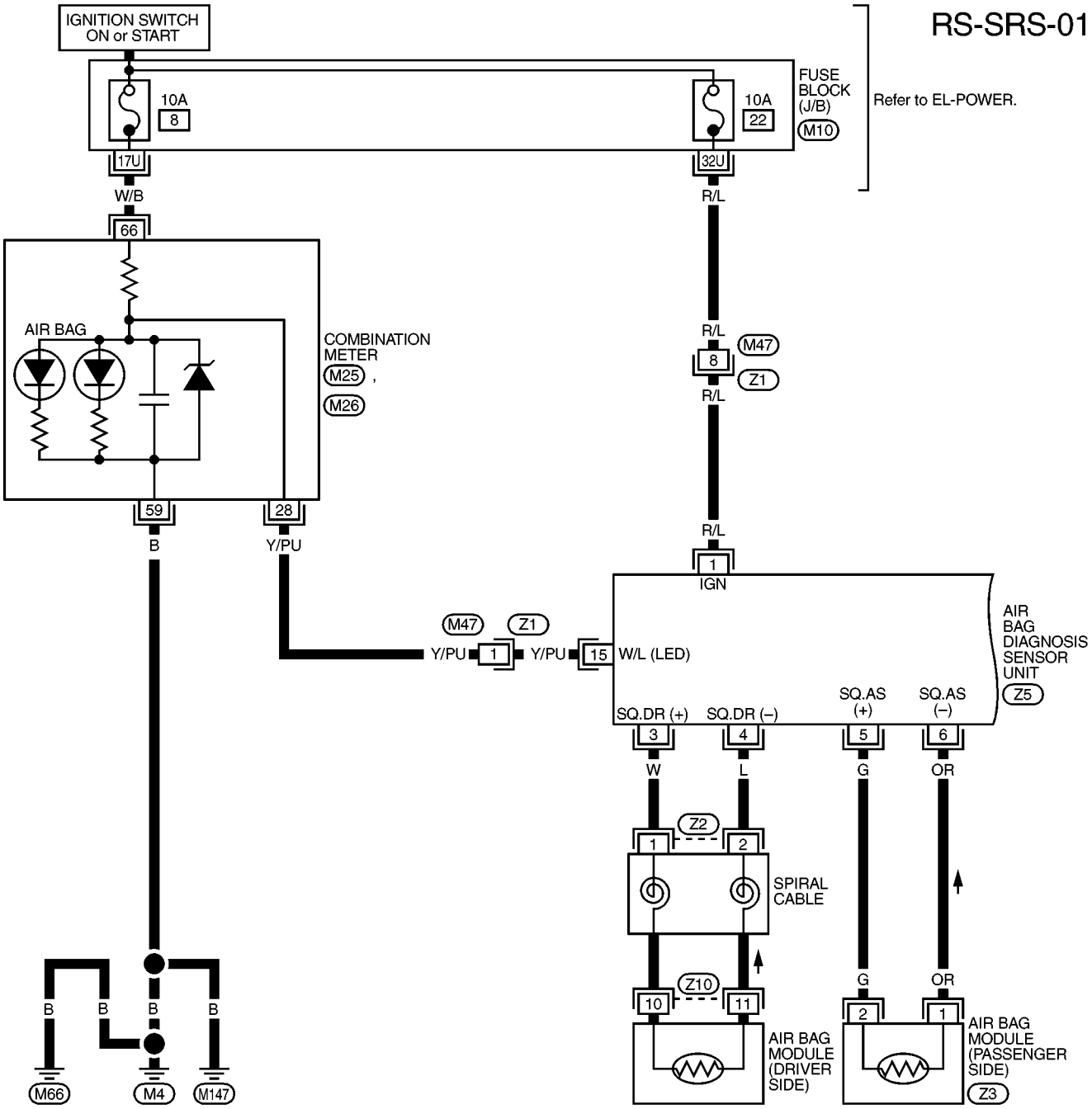
NARS0042

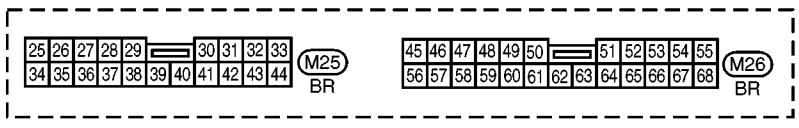


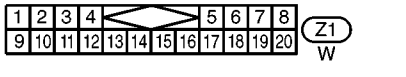
MRS329A

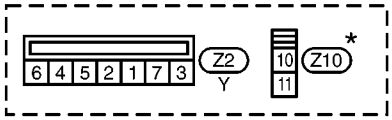
Wiring Diagram — SRS —

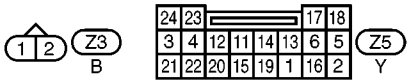
NARS0043









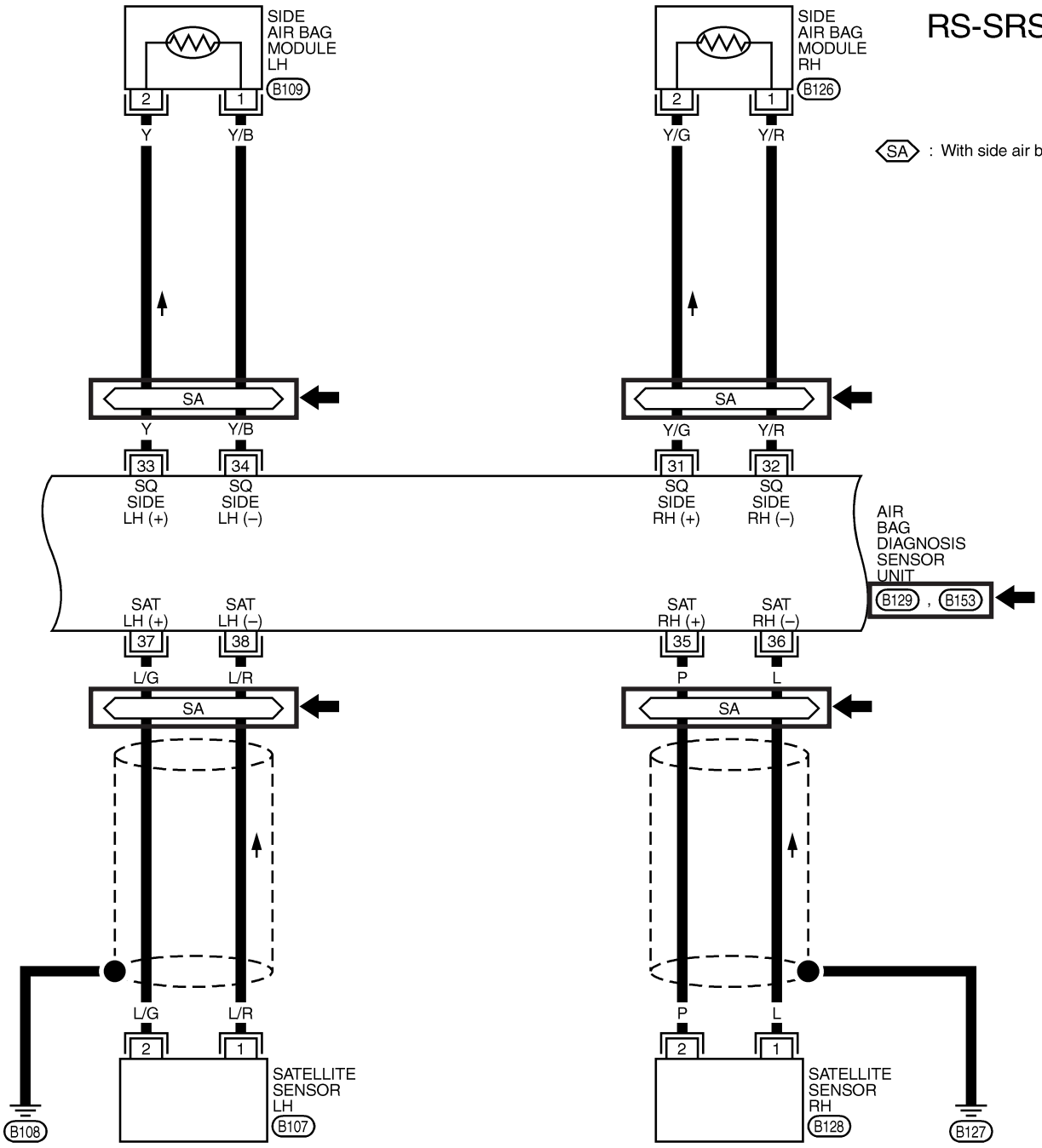


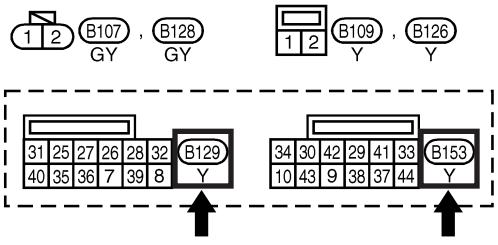
* This connector is not shown in "HARNESS LAYOUT", EL section.

REFER TO THE FOLLOWING.
M10 - FUSE BLOCK - JUNCTION BOX (J/B)

MRS330A

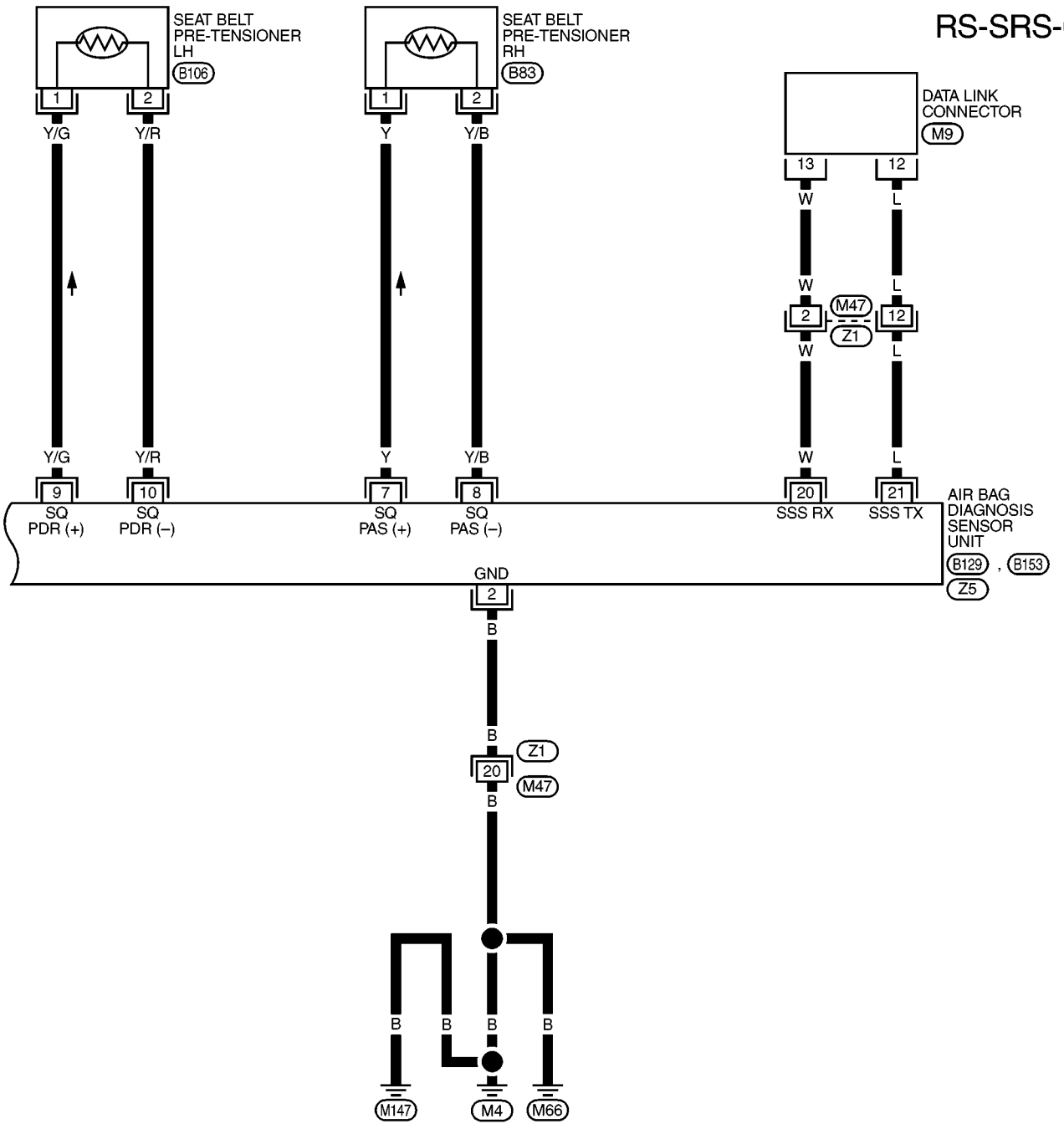
RS-SRS-02

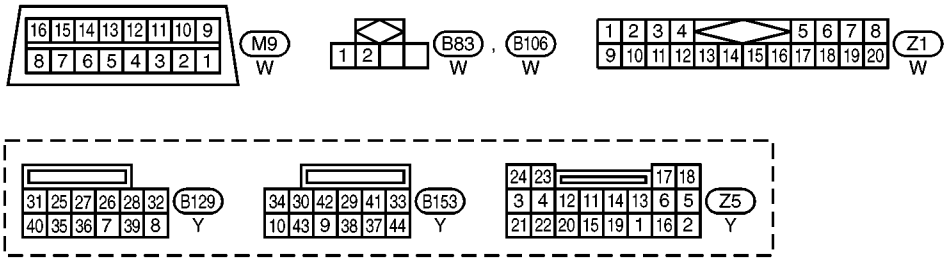




TB080100	2001 PATHFINDER	FEB 2000 (06)	SM1E-1R50U0
← ARROW INDICATES AMENDED INFORMATION			

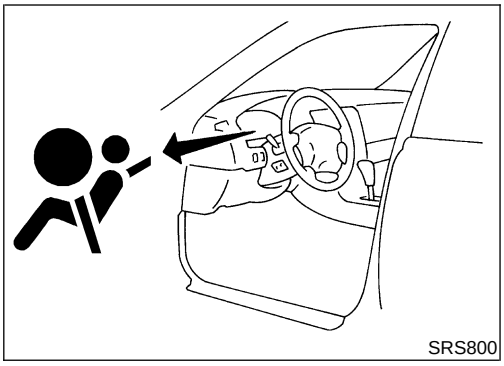
MRS359A





REFER TO THE FOLLOWING.
B1 - SUPER MULTIPLE JUNCTION (SMJ)

MRS331A


SRS800

SRS Operation Check

NARS0044

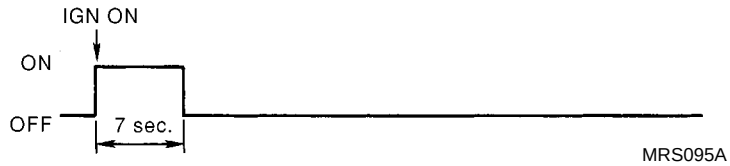
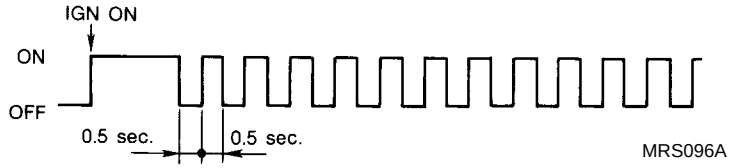
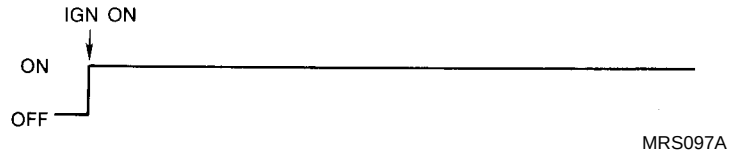
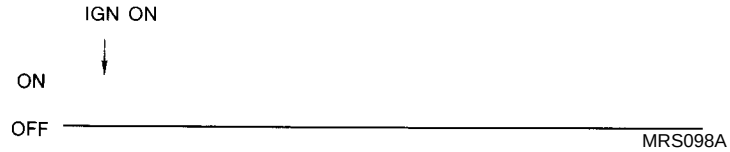
DIAGNOSTIC PROCEDURE 1

NARS0044S01

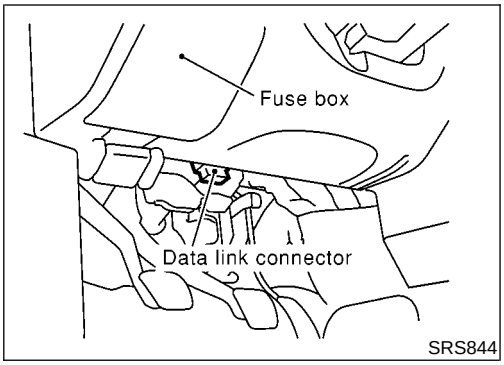
Checking Air Bag Operation by Using "AIR BAG" Warning Lamp — User Mode

NARS0044S0101

1. After turning ignition switch from "OFF" to "ON", "AIR BAG" warning lamp operates.
2. Compare "AIR BAG" warning lamp operation to the chart below.

"AIR BAG" warning lamp operation — User mode —	SRS condition	Reference item
 MRS095A	No malfunction is detected. No further action is necessary.	—
 MRS096A	The system is malfunctioning and needs to be repaired as indicated.	Go to DIAGNOSTIC PROCEDURE 2 or 6 (RS-39 or RS-48).
 MRS097A	Air bag is deployed. Seat belt pre-tensioner is deployed.	Go to COLLISION DIAGNOSIS (RS-56).
	Air bag fuse, diagnosis sensor unit or harness is malfunctioning and needs to be repaired.	Go to DIAGNOSTIC PROCEDURE 9 RS-59).
 MRS098A	One of the following has occurred and needs to be repaired. ● Meter fuse is blown. ● "AIR BAG" warning lamp circuit has open or short. ● Diagnosis sensor unit is malfunctioning.	Go to DIAGNOSTIC PROCEDURE 10 (RS-58).

NOTE:
If "AIR BAG" warning lamp operates differently from the operations shown above, refer to "AIR BAG" warning lamp operation — Diagnosis mode —, DIAGNOSTIC PROCEDURE 6 (step 4), RS-48.



SRS844

Trouble Diagnoses with CONSULT-II

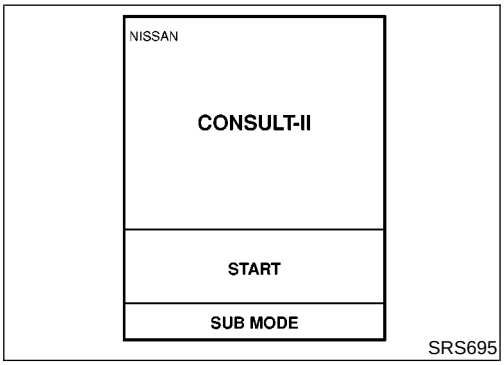
=NARS0045

DIAGNOSTIC PROCEDURE 2

NARS0045S01

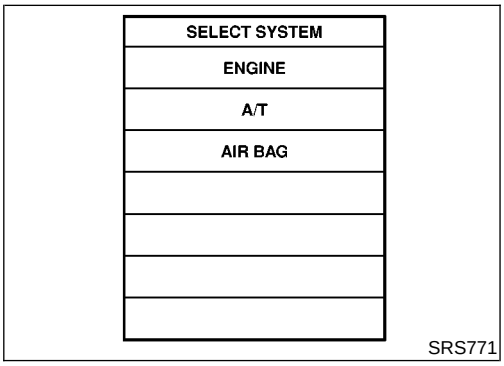
Inspecting SRS malfunctioning parts by using CONSULT-II — Diagnosis mode

1. Turn ignition switch “OFF”.
2. Connect CONSULT-II to data link connector.



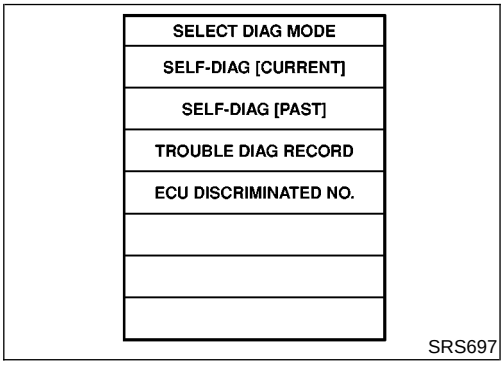
SRS695

3. Turn ignition switch “ON”.
4. Touch “START”.



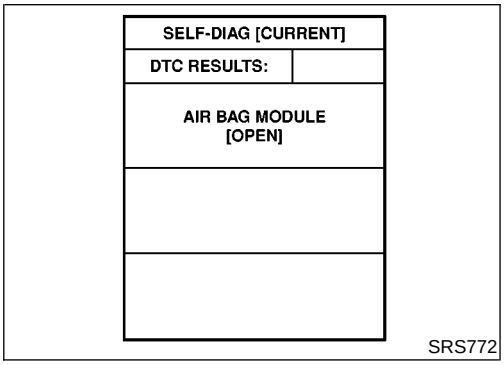
SRS771

5. Touch “AIR BAG”.



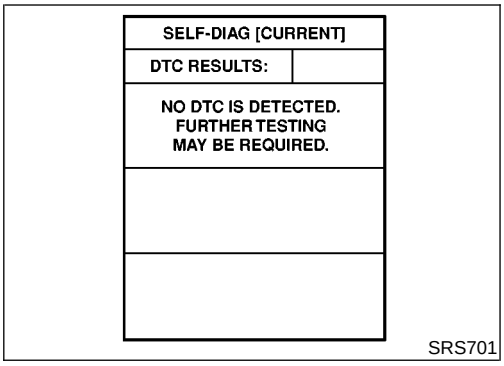
SRS697

6. Touch “SELF-DIAG [CURRENT]”.



SRS772

7. Diagnostic codes are displayed on “SELF-DIAG [CURRENT]”.



If no malfunction is detected on "SELF-DIAG [CURRENT]" even though malfunction is detected in "SRS Operation Check", check the battery voltage.
If the battery voltage is less than 9V, charge the battery. Then go to DIAGNOSTIC PROCEDURE 3, page RS-42.
If the battery voltage is OK, go to DIAGNOSTIC PROCEDURE 4, page RS-44, to diagnose the following cases:

- Self-diagnostic result "SELF-DIAG [PAST]" (previously stored in the memory) might not be erased after repair.
- The SRS system malfunctions intermittently.

8. Touch "PRINT".
9. Compare diagnostic codes to "CONSULT-II Diagnostic Code Chart", page RS-40.
10. Touch "BACK" key of CONSULT-II until "SELECT SYSTEM" appears in order to return to User mode from Diagnosis mode.
11. Turn ignition switch "OFF", then turn off and disconnect CONSULT-II, and disconnect both battery cables.
12. Repair the system as outlined by the "Repair order" in "CONSULT-II Diagnostic Code Chart", that corresponds to the self-diagnostic result. For replacement procedure of component parts, refer to RS-15.
13. After repairing the system, go to DIAGNOSTIC PROCEDURE 3, page RS-42 for final checking.

CONSULT-II Diagnostic Code Chart ("SELF-DIAG [CURRENT]")

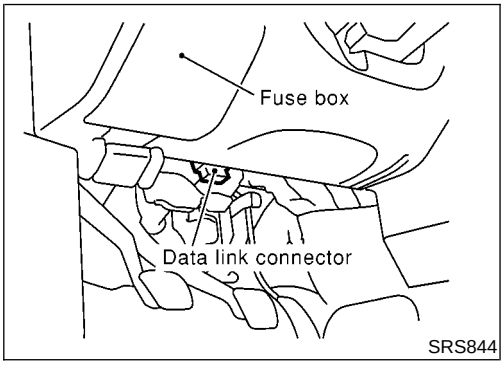
NARS0045S0101

Diagnostic item	Explanation		Repair order **"Recheck SRS at each replacement."**
NO DTC IS DETECTED.	When malfunction is indicated by the "AIR BAG" warning lamp in User mode	• Low battery voltage (Less than 9V)	• Go to DIAGNOSTIC PROCEDURE 3 (RS-42) after charging battery.
		• Self-diagnostic result "SELF-DIAG [PAST]" (previously stored in the memory) might not be erased after repair. • Intermittent malfunction has been detected in the past.	• Go to DIAGNOSTIC PROCEDURE 4 (RS-44).
	• No malfunction is detected.		• Go to DIAGNOSTIC PROCEDURE 3 (RS-42).
AIRBAG MODULE [OPEN]	• Driver's air bag module circuit is open. (including the spiral cable)		1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace driver's air bag module. (Before disposal of it, it must be deployed.) 4. Replace the spiral cable. 5. Replace the diagnosis sensor unit. 6. Replace the related harness.

Diagnostic item	Explanation	Repair order **"Recheck SRS at each replacement."**
AIRBAG MODULE [VB-SHORT]	• Driver's air bag module circuit is shorted to some power supply circuit. (including the spiral cable)	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the spiral cable. 4. Replace driver's air bag module. (Before disposal of it, it must be deployed.) 5. Replace the diagnosis sensor unit. 6. Replace the related harness.
AIRBAG MODULE [GND-SHORT]	• Driver's air bag module circuit is shorted to ground. (including the spiral cable)	
AIRBAG MODULE [SHORT]	• Driver's air bag module circuits are shorted to each other.	
ASSIST A/B MODULE [VB-SHORT]	• Front passenger air bag module circuit is shorted to some power supply circuit.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace front passenger air bag module. (Before disposal of it, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
ASSIST A/B MODULE [OPEN]	• Front passenger air bag module circuit is open.	
ASSIST A/B MODULE [GND-SHORT]	• Front passenger air bag module circuit is shorted to ground.	
ASSIST A/B MODULE [SHORT]	• Front passenger air bag module circuits are shorted to each other.	
SIDE MODULE LH [OPEN]	• Side air bag module (LH) circuit is open.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace side air bag module (LH). (Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
SIDE MODULE LH [VB-SHORT]	• Side air bag module (LH) circuit is shorted to some power supply circuits.	
SIDE MODULE LH [GND-SHORT]	• Side air bag module (LH) circuit is shorted to ground.	
SIDE MODULE LH [SHORT]	• Side air bag module (LH) circuits are shorted to each other.	
SIDE MODULE RH [OPEN]	• Side air bag module (RH) circuit is open.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace side air bag module (RH). (Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
SIDE MODULE RH [VB-SHORT]	• Side air bag module (RH) circuit is shorted to some power supply circuits.	
SIDE MODULE RH [GND-SHORT]	• Side air bag module (RH) circuit is shorted to ground.	
SIDE MODULE RH [SHORT]	• Side air bag module (RH) circuits are shorted to each other.	
SATELLITE SENS LH [UNIT FAIL] SATELLITE SENS LH [COMM FAIL]	• Satellite sensor (LH)	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the satellite sensor (LH). 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
SATELLITE SENS RH [UNIT FAIL] SATELLITE SENS RH [COMM FAIL]	• Satellite sensor (RH)	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the satellite sensor (RH). 4. Replace the diagnosis sensor unit. 5. Replace the related harness.

Diagnostic item	Explanation	Repair order **"Recheck SRS at each replacement."**
PRE-TEN FRONT LH [OPEN/VB-SHORT]	• The circuit for front LH pre-tensioner is open or shorted to some power supply circuit.	1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace front LH seat belt. (Before disposing, it must be deactivated.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
PRE-TEN FRONT LH [GND-SHORT]	• The circuit for front LH pre-tensioner is shorted to ground.	
PRE-TEN FRONT RH [OPEN/VB-SHORT]	• The circuit for front RH pre-tensioner is open or shorted to some power supply circuit.	1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace front RH seat belt. (Before disposing, it must be deactivated.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
PRE-TEN FRONT RH [GND-SHORT]	• The circuit for front RH pre-tensioner is shorted to ground.	
CONTROL UNIT	• Diagnosis sensor unit is malfunctioning.	1. Visually check the wiring harness connection. 2. Replace the diagnosis sensor unit.

*** Follow the procedures in numerical order when repairing malfunctioning parts. Confirm whether malfunction is eliminated using the air bag warning lamp or CONSULT-II each time repair is finished. If malfunction is still observed, proceed to the next step. When malfunction is eliminated, further repair work is not required.**



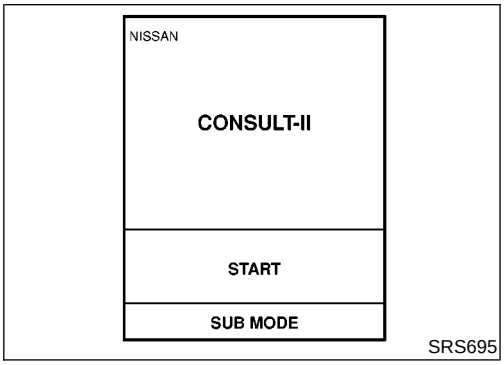
SRS844

DIAGNOSTIC PROCEDURE 3

NARS0045S02

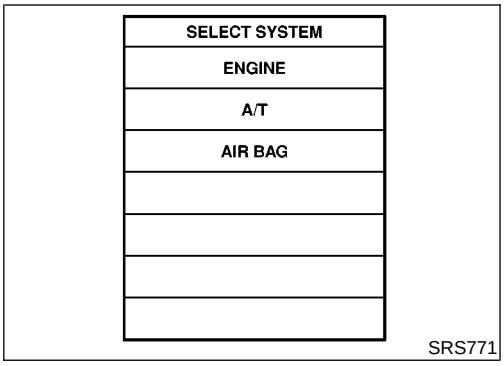
Final checking after repairing SRS by using CONSULT-II — Diagnosis mode

1. After repairing SRS, connect both battery cables.
2. Connect CONSULT-II to Data link connector.
3. Turn ignition switch from "OFF" to "ON".

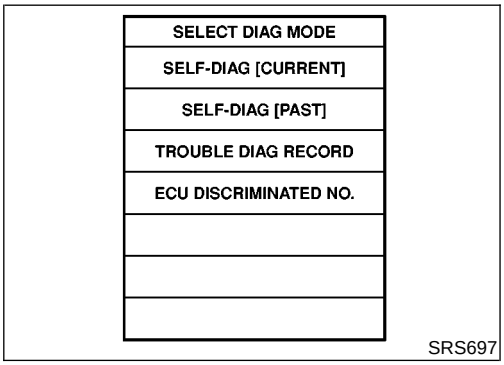


SRS695

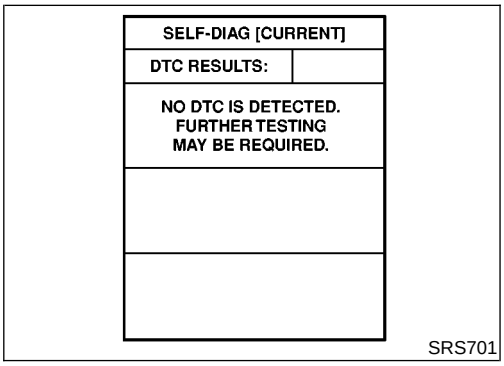
4. Touch "START".



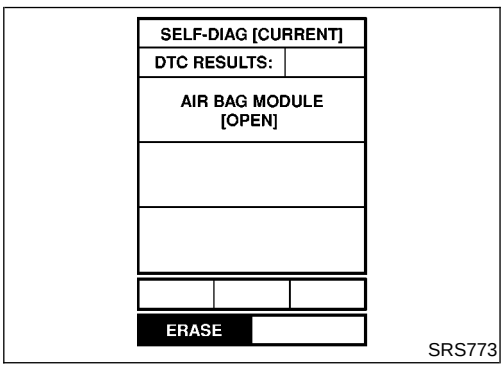
5. Touch "AIR BAG".



6. Touch "SELF-DIAG [CURRENT]".

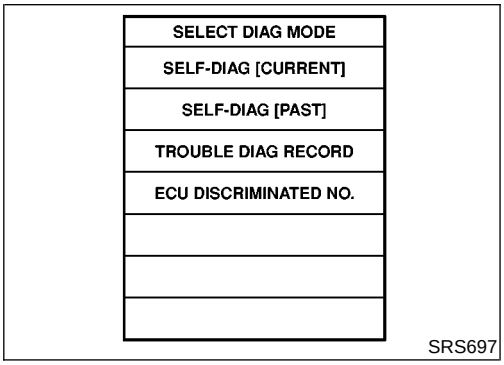


7. If no malfunction is detected on "SELF-DIAG [CURRENT]", repair of SRS is completed. Go to step 8.
If any malfunction is displayed on "SELF-DIAG [CURRENT]", the malfunctioning part is not repaired completely or another malfunctioning part is detected. Go to DIAGNOSTIC PROCEDURE 2, page RS-39, and repair malfunctioning part completely.

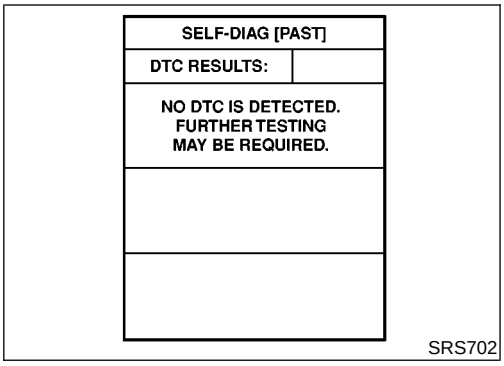


8. Touch "ERASE".

NOTE:
Touch "ERASE" to clear the memory of the malfunction ("SELF-DIAG [PAST]").
If the memory of the malfunction in "SELF-DIAG [PAST]" is not erased, the User mode shows the system malfunction by the operation of the warning lamp even if the malfunction is repaired completely.



9. Touch "BACK" key of CONSULT-II to "SELECT SYSTEM" screen. Touch "SELF-DIAG [PAST]".



SRS702

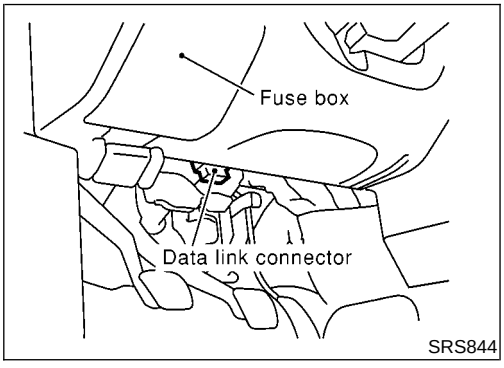
10. Check that no malfunction is detected on "SELF-DIAG [PAST]".
11. Touch "BACK" key of CONSULT-II until "SELECT SYSTEM" appears in order to return to User mode from Diagnosis mode.
12. Turn ignition switch "OFF", then turn off and disconnect CONSULT-II.
13. Go to "SRS Operation Check", page RS-38 to check SRS operation by using "AIR BAG" warning lamp with User mode.

DIAGNOSTIC PROCEDURE 4 (CONTINUED FROM DIAGNOSTIC PROCEDURE 2)

NARS0045S03

Inspecting SRS malfunctioning record

1	CONSIDER POSSIBILITY OF NOT ERASING SELF-DIAGNOSTIC RESULT AFTER REPAIRING	
Is it the first time for maintenance of SRS? **Yes or No**		
Yes	▶	Go to DIAGNOSTIC PROCEDURE 5 (RS-44).
No	▶	Self-diagnostic result "SELF-DIAG [PAST]" (previously stored in the memory) might not be erased after repair. Go to DIAGNOSTIC PROCEDURE 3, step 8 (RS-42).



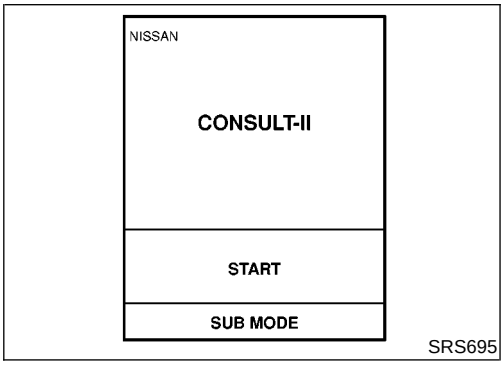
SRS844

DIAGNOSTIC PROCEDURE 5

NARS0045S04

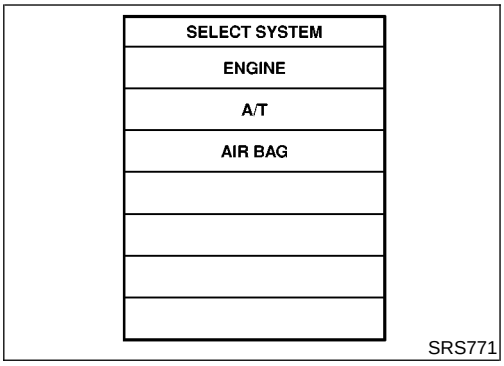
Inspecting SRS intermittent malfunction by using CONSULT-II — Diagnosis mode

1. Turn ignition switch "OFF".
2. Connect CONSULT-II to data link connector.

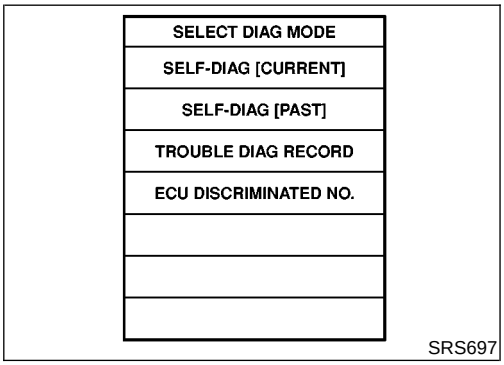


SRS695

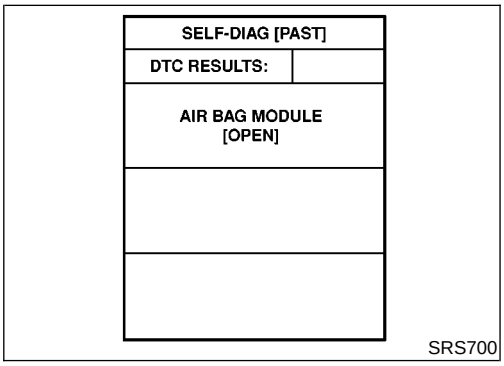
3. Turn ignition switch "ON".
4. Touch "START".



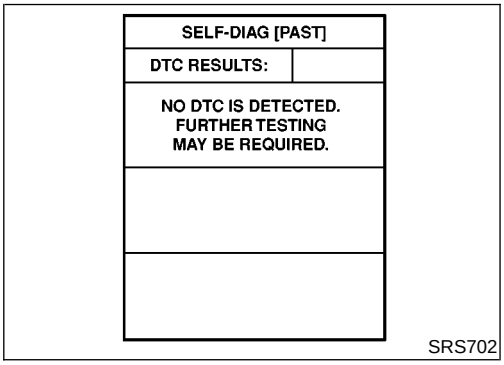
5. Touch "AIR BAG".



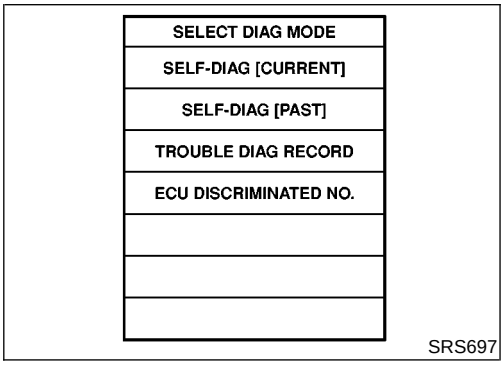
6. Touch "SELF-DIAG [PAST]".



7. If diagnostic codes are displayed on "SELF-DIAG [PAST]", go to step 10.

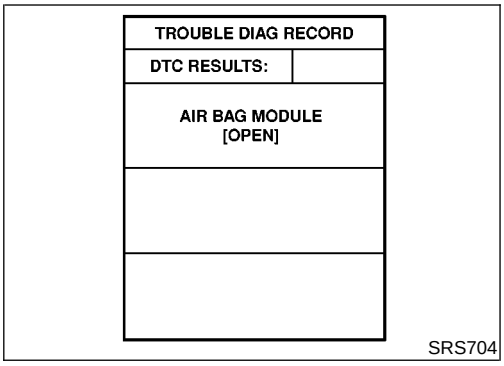


If no malfunction is detected on "SELF-DIAG [PAST]", touch "BACK" and go back to "SELECT DIAG MODE".



8. Touch "TROUBLE DIAG RECORD".

NOTE:
With "TROUBLE DIAG RECORD", diagnosis results previously erased by a reset operation can be displayed.



9. Diagnostic code is displayed on "TROUBLE DIAG RECORD".
10. Touch "PRINT".
11. Compare diagnostic codes to "Intermittent Malfunction Diagnostic Code Chart", page RS-46.
12. Touch "BACK" key of CONSULT-II until "SELECT SYSTEM" appears.
13. Turn ignition switch "OFF", then turn off and disconnect CONSULT-II, and disconnect both battery cables.
14. Repair the system as outlined by the "Repair order" in "Intermittent Malfunction Diagnostic Code Chart", that corresponds to the self-diagnostic result. For replacement procedure of component parts, refer to RS-15.
15. Go to DIAGNOSTIC PROCEDURE 3, page RS-42, for final checking.

Intermittent Malfunction Diagnostic Code Chart ("SELF-DIAG [PAST]" or "TROUBLE DIAG RECORD")

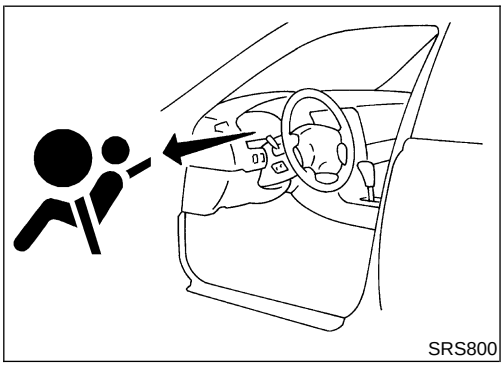
NARS0045S0401

Diagnostic item	Explanation		Repair order
NO DTC IS DETECTED.	When malfunction is indicated by the "AIR BAG" warning lamp in User mode	• Low battery voltage (Less than 9V)	• Go to DIAGNOSTIC PROCEDURE 3 (RS-42) after charging battery.
	• No malfunction is detected.		• Go to DIAGNOSTIC PROCEDURE 3 (RS-42).
AIRBAG MODULE [OPEN]	• Driver's air bag module circuit is open. (including the spiral cable)		1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check result is OK, replace driver's air bag module (Before disposal of it, it must be deployed.), diagnosis sensor unit and spiral cable.
AIRBAG MODULE [VB-SHORT]	• Driver's air bag module circuit is shorted to some power supply circuit. (including the spiral cable)		
AIRBAG MODULE [GND-SHORT]	• Driver's air bag module circuit is shorted to ground. (including the spiral cable)		
AIRBAG MODULE [SHORT]	• Driver's air bag module circuits are shorted to each other.		
ASSIST A/B MODULE [VB-SHORT]	• Front passenger air bag module circuit is shorted to some power supply circuit.		1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check result is OK, replace front air bag module (Before disposal of it, it must be deployed.), and diagnosis sensor unit.
ASSIST A/B MODULE [OPEN]	• Front passenger air bag module circuit is open.		
ASSIST A/B MODULE [GND-SHORT]	• Front passenger air bag module circuit is shorted to ground.		
ASSIST A/B MODULE [SHORT]	• Front passenger air bag module circuits are shorted to each other.		

Diagnostic item	Explanation	Repair order
SIDE MODULE LH [OPEN]	• Side air bag module (LH) circuit is open.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and side air bag module (LH). (Before disposing the side air bag module (LH), it must be deployed.)
SIDE MODULE LH [VB-SHORT]	• Side air bag module (LH) circuit is shorted to some power supply circuits.	
SIDE MODULE LH [GND-SHORT]	• Side air bag module (LH) circuit is shorted to ground.	
SIDE MODULE LH [SHORT]	• Side air bag module (LH) circuits are shorted to each other.	
SIDE MODULE RH [OPEN]	• Side air bag module (RH) circuit is open.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and side air bag module (RH). (Before disposing the side air bag module (RH), it must be deployed.)
SIDE MODULE RH [VB-SHORT]	• Side air bag module (RH) circuit is shorted to some power supply circuits.	
SIDE MODULE RH [GND-SHORT]	• Side air bag module (RH) circuit is shorted to ground.	
SIDE MODULE RH [SHORT]	• Side air bag module (RH) circuits are shorted to each other.	
SATELLITE SENS LH [UNIT FAIL] SATELLITE SENS LH [COMM FAIL]	• Satellite sensor (LH)	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and satellite sensor (LH).
SATELLITE SENS RH [UNIT FAIL] SATELLITE SENS RH [COMM FAIL]	• Satellite sensor (RH)	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and satellite sensor (RH).
PRE-TEN FRONT LH [OPEN/VB-SHORT]	• The circuit for front LH pre-tensioner is open or shorted to some power supply circuit.	1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and front LH seat belt. (Before disposing the front LH seat belt pre-tensioner, it must be deployed.)
PRE-TEN FRONT LH [GND-SHORT]	• The circuit for front LH pre-tensioner is shorted to ground.	
PRE-TEN FRONT RH [OPEN/VB-SHORT]	• The circuit for front RH pre-tensioner is open or shorted to some power supply circuit.	1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and front RH seat belt. (Before disposing the front RH seat belt pre-tensioner, it must be deployed.)
PRE-TEN FRONT RH [GND-SHORT]	• The circuit for front RH pre-tensioner is shorted to ground.	

Diagnostic item	Explanation	Repair order
CONTROL UNIT	• Diagnosis sensor unit is malfunctioning.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit.

* Follow the procedures in numerical order when repairing malfunctioning parts, then make the final system check.


SRS800

Trouble Diagnoses without CONSULT-II

NARS0046

DIAGNOSTIC PROCEDURE 6

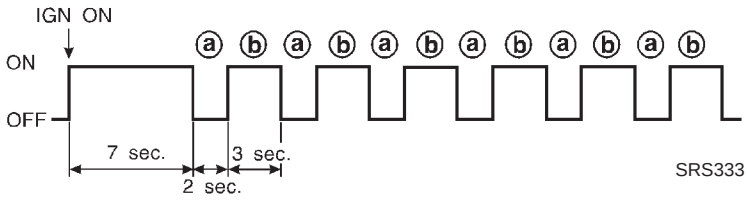
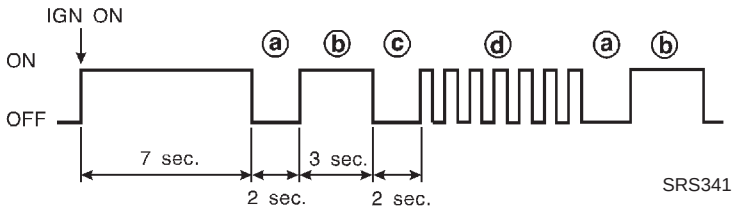
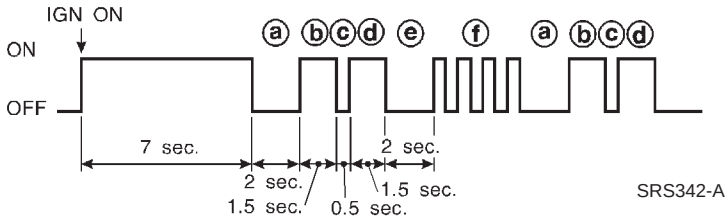
NARS0046S01

Inspecting SRS malfunctioning parts by using "AIR BAG" warning lamp — Diagnosis mode

NOTE:
SRS will not enter Diagnosis mode if no malfunction is detected in User mode.

1. Turn ignition switch "ON".
2. After "AIR BAG" warning lamp lights for 7 seconds, turn ignition switch "OFF" within 1 second.
3. Wait more than 3 seconds.
4. Repeat steps 1 to 3 three times.
5. Turn ignition switch "ON".
   SRS is now in Diagnosis mode.
6. "AIR BAG" warning lamp operates in Diagnosis mode as follows:

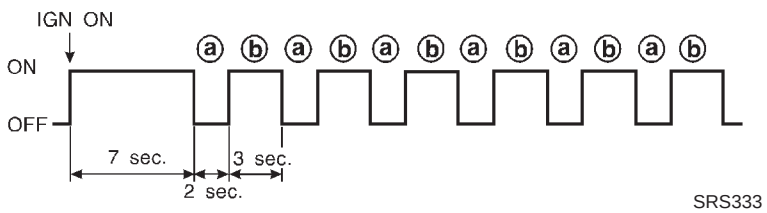
NOTE:
If SRS does not enter Diagnosis mode even though malfunction is detected in User mode, check the battery voltage.
If the battery voltage is less than 9V, charge the battery. Then go to DIAGNOSTIC PROCEDURE 7, page RS-53.
If the battery voltage is OK, replace the diagnosis sensor unit.

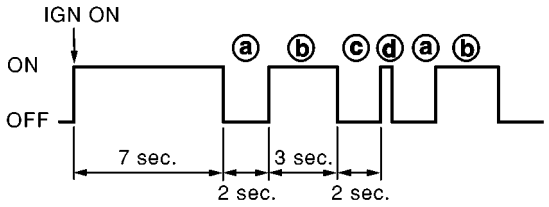
No.	"AIR BAG" warning lamp flash pattern — Diagnosis mode —		SRS condition
1		**a** through **b** are repeated.	• Diagnosis results (previously stored in the memory) might not be erased after repair. • Intermittent malfunction has been detected in the past. Go to DIAGNOSTIC PROCEDURE 8 (RS-55).
2		**a** through **d** are repeated. **b** — Driver and passenger air bag and seat belt pre-tensioner marker (For identifying driver air bag, passenger air bag and/or seat belt pre-tensioners malfunctioning) **d** — Indicates malfunctioning part. The number of flash varies with malfunctioning part (0.5 sec. ON and 0.5 sec. OFF is counted as one flash.)	The system is malfunctioning and needs to be repaired.
3		**a** through **f** are repeated. **b**, **c**, **d** — Side air bag marker (For identifying side air bag malfunctioning) **f** — Indicates malfunctioning part. The number of flash varies with malfunctioning part (0.5 sec. ON and 0.5 sec. OFF is counted as one flash.)	

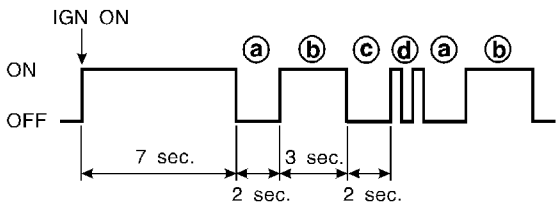
7. Malfunctioning part is indicated by the number of flashes (part **d** or **f**). Compare the number of flashes to "Air Bag Warning Lamp Flash Code Chart", page RS-50, and locate malfunctioning part.
8. Turn ignition switch "OFF", and disconnect both battery cables.
9. Repair the system as outlined by the "Repair order" in "Warning Lamp Flash Code Chart" that corresponds to the flash code. For replacement procedure of component parts, refer to RS-15.
10. After repairing the system, go to DIAGNOSTIC PROCEDURE 7, page RS-53.

Air Bag Warning Lamp Flash Code Chart (Diagnosis mode)

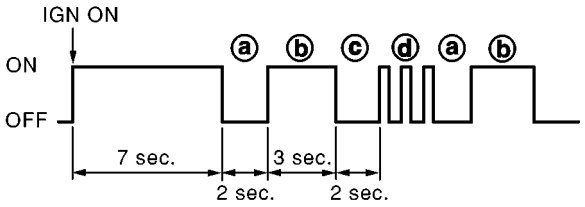
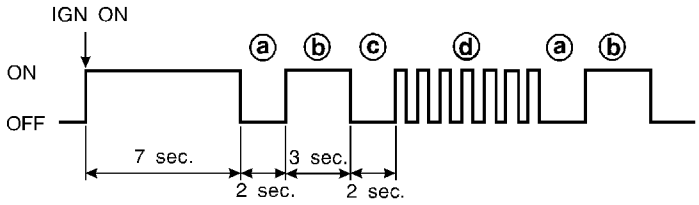
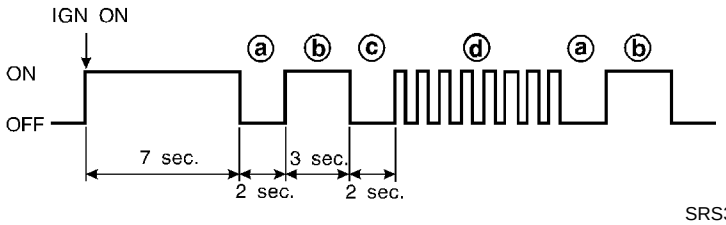
NARS0046S0101

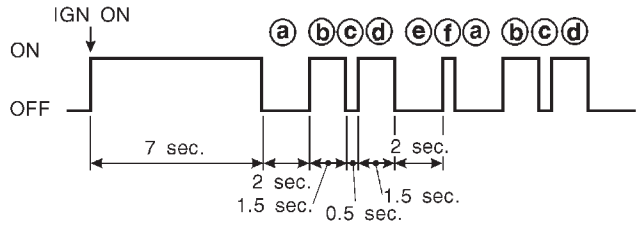
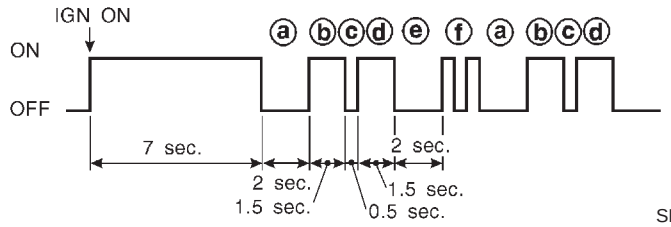
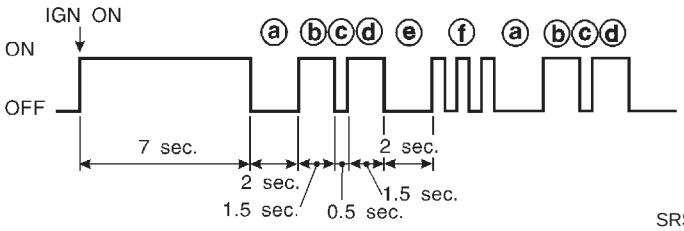
<table>
<tr><td rowspan="3">• Diagnosis results (previously stored in the memory) might not be erased after repair.
• Intermittent malfunction has been detected in the past.</td><td>Flash pattern</td></tr>
<tr><td> 

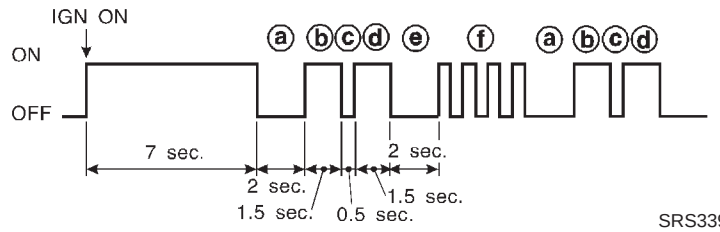
SRS333</td><td>a through b are repeated.</td></tr>
<tr><td colspan="2">Repair order
• Go to DIAGNOSTIC PROCEDURE 8 (RS-55).</td></tr>
<tr><td rowspan="3">The front RH seat belt pre-tensioner circuit is malfunctioning.
(d: 1 flash)</td><td colspan="2">Flash pattern</td></tr>
<tr><td> 

SRS801</td><td>a through d are repeated.
d — One flash indicates malfunctioning front RH pre-tensioner circuit.</td></tr>
<tr><td colspan="2">Repair order (“Recheck SRS at each replacement.”)
1. Visually check the wiring harness connections.
2. Replace the harness if it has visible damage.
3. Replace front RH seat belt pre-tensioner.
(Before disposing, it must be deactivated.)
4. Replace the diagnosis sensor unit.
5. Replace the related harness.</td></tr>
<tr><td rowspan="3">The driver's air bag module circuit is malfunctioning.
(d: 2 flashes)</td><td colspan="2">Flash pattern</td></tr>
<tr><td> 

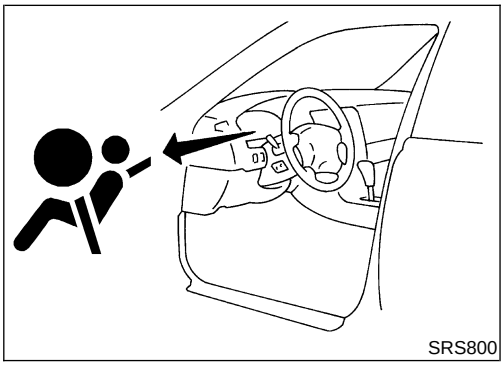
SRS334</td><td>a through d are repeated.
d — Two flashes indicate malfunctioning driver's air bag module circuit.</td></tr>
<tr><td colspan="2">Repair order (“Recheck SRS at each replacement.”)
1. Visually check the wiring harness connection.
2. Replace the harness if it has visible damage.
3. Replace the spiral cable.
4. Replace driver's air bag module.
(Before disposal, it must be deployed.)
5. Replace the diagnosis sensor unit.
6. Replace the related harness.</td></tr>
</table>

The front LH seat belt pre-tensioner circuit is malfunctioning. (**d**: 3 flashes)	Flash pattern	
	 SRS802	**a** through **d** are repeated. **d** — Three flashes indicate malfunctioning front LH pre-tensioner circuit.
	Repair order ("Recheck SRS at each replacement.")	
	1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace front LH seat belt pre-tensioner. (Before disposing, it must be deactivated.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	
The diagnosis sensor unit is malfunctioning. (**d**: 7 flashes)	Flash pattern	
	 SRS335	**a** through **d** are repeated. **d** — Seven flashes indicate malfunctioning diagnosis sensor unit.
	Repair order ("Recheck SRS at each replacement.")	
	1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace the diagnosis sensor unit. 4. Replace the related harness.	
The front passenger air bag module circuit is malfunctioning. (**d**: 8 flashes)	Flash pattern	
	 SRS336	**a** through **d** are repeated. **d** — Eight flashes indicate malfunctioning front passenger air bag module circuit.
	Repair order ("Recheck SRS at each replacement.")	
	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace front passenger air bag module. (Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	

The side air bag module (RH) circuit is malfunctioning. (**f**: 1 flash)	Flash pattern	
	 SRS338	**a** through **f** are repeated. **f** — One flash indicates malfunctioning side air bag module (RH) circuit.
	Repair order ("Recheck SRS at each replacement.")	
	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace side air bag module (RH). (Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	
The side air bag module (LH) circuit is malfunctioning. (**f**: 2 flashes)	Flash pattern	
	 SRS337	**a** through **f** are repeated. **f** — Two flashes indicate malfunctioning side air bag module (LH) circuit.
	Repair order ("Recheck SRS at each replacement.")	
	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace side air bag module (LH). (Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	
The satellite sensor (RH) is malfunctioning. (**f**: 3 flashes)	Flash pattern	
	 SRS340	**a** through **f** are repeated. **f** — Three flashes indicate malfunctioning satellite sensor (RH) circuit.
	Repair order ("Recheck SRS at each replacement.")	
	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the satellite sensor (RH). 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	

The satellite sensor (LH) is malfunctioning. (**f**: 4 flashes)	Flash pattern	
	 SRS339-A	**a** through **f** are repeated. **f** — Four flashes indicate malfunctioning satellite sensor (LH) circuit.
	Repair order ("Recheck SRS at each replacement.")	
	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the satellite sensor (LH). 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	

*** Follow the procedures in numerical order when repairing malfunctioning parts. Confirm whether malfunction is eliminated using the air bag warning lamp or CONSULT-II each time repair is finished. If malfunction is still observed, proceed to the next step. When malfunction is eliminated, further repair work is not required.**

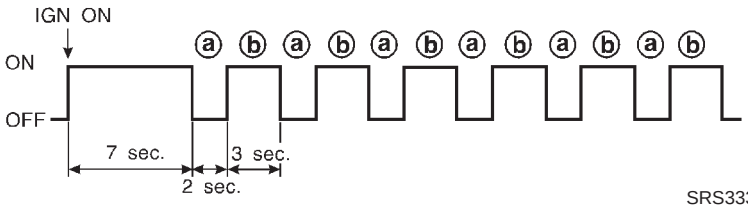
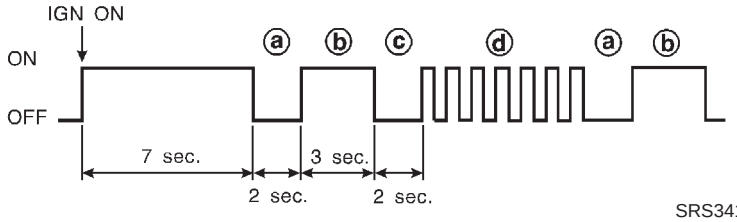
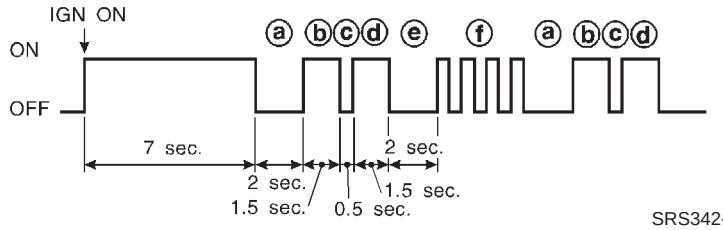

SRS800

DIAGNOSTIC PROCEDURE 7

NARS0046S02

Final checking after repairing SRS by using "AIR BAG" warning lamp — Diagnosis mode and User mode

1. After repairing SRS connect both battery cables.
2. Open driver's door.
3. Turn ignition switch from "OFF" to "ON".
4. "AIR BAG" warning lamp operates in Diagnosis mode as follows:

No.	"AIR BAG" warning lamp flash pattern — Diagnosis mode —		SRS condition
1	 SRS333	**a** through **b** are repeated.	No malfunction is detected or repair is completed. No further action is necessary.
2	 SRS341	**a** through **d** are repeated. **b** — Driver and passenger air bag and seat belt pre-tensioner marker (For identifying driver air bag, passenger air bag and/or seat belt pre-tensioners malfunctioning) **d** — Indicates malfunctioning part. The number of flashes varies with malfunctioning part (0.5 sec. ON and 0.5 sec. OFF is counted as one flash.)	The system is malfunctioning and needs to be repaired.
3	 SRS342-A	**a** through **f** are repeated. **b**, **c**, **d** — Side air bag marker (For identifying side air bag malfunctioning) **f** — Indicates malfunctioning part. The number of flashes varies with malfunctioning part (0.5 sec. ON and 0.5 sec. OFF is counted as one flash.)	

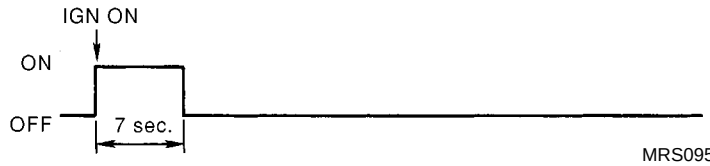
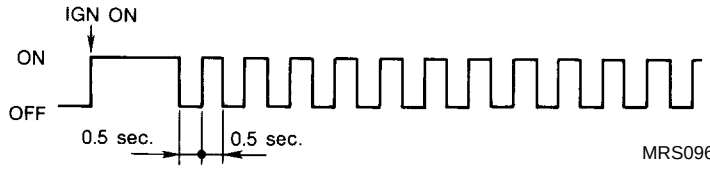
NOTE:
When diagnosis sensor unit is replaced with new one, "AIR BAG" warning lamp will operate in User mode. Checking "AIR BAG" warning lamp operation in Diagnosis mode is not required. Go to step 6.

5. If "AIR BAG" warning lamp operates as shown in No. 1 in chart above, turn ignition switch "OFF" to reset from Diagnosis mode to User mode and to erase the memory of the malfunction. Then go to step 6.
   If "AIR BAG" warning lamp operates as shown in No. 2 or No. 3 in chart above, the malfunctioning part is not repaired completely, or another malfunctioning part is detected. Go to DIAGNOSTIC PROCEDURE 6, page RS-48, and repair malfunctioning part completely.
6. Turn ignition switch "ON". "AIR BAG" warning lamp operates in User mode. Compare "AIR BAG" warning lamp operation to the chart below.

NOTE:
If switching Diagnosis mode to User mode is required while malfunction is being detected, by turning ignition switch as follows:

1) Turn ignition switch "ON".
2) After "AIR BAG" warning lamp lights for 7 seconds, turn ignition switch "OFF" within 1 second.
3) Wait more than 3 seconds.
4) Repeat steps 1 to 3 three times.
5) Turn ignition switch "ON".

SRS is now in User mode.

"AIR BAG" warning lamp operation — User mode —	SRS condition	Reference item
 MRS095A	No malfunction is detected. No further action is necessary.	—
 MRS096A	The system is malfunctioning and needs to be repaired as indicated.	Go to DIAGNOSTIC PROCEDURE 6 (RS-48).
 MRS097A	Air bag is deployed. Seat belt pre-tensioner is deployed.	Go to COLLISION DIAGNOSIS (RS-59).
	Air bag fuse, diagnosis sensor unit or harness is malfunctioning and needs to be repaired.	Go to DIAGNOSTIC PROCEDURE 9 (RS-56).
 MRS098A	One of the following has occurred and needs to be repaired. ● Meter fuse is blown. ● "AIR BAG" warning lamp circuit has open or short. ● Diagnosis sensor unit is malfunctioning.	Go to DIAGNOSTIC PROCEDURE 10 (RS-58).

DIAGNOSTIC PROCEDURE 8 (CONTINUED FROM DIAGNOSTIC PROCEDURE 6)

NARS0046S03

Inspecting SRS malfunctioning record

1	CONSIDER POSSIBILITY OF NOT ERASING SELF-DIAGNOSTIC RESULT AFTER REPAIRING	
Is it the first time for maintenance of SRS? **Yes or No**		
Yes	▶	Go to DIAGNOSTIC PROCEDURE 5 (RS-44). (Further inspection cannot be performed without CONSULT-II.)
No	▶	Diagnosis results (previously stored in the memory) might not be erased after repair. Go to DIAGNOSTIC PROCEDURE 7, step 5 (RS-53).

Trouble Diagnoses: “AIR BAG” Warning Lamp Does Not Turn Off

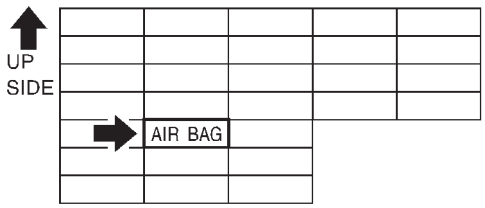
=NARS0047

DIAGNOSTIC PROCEDURE 9

NARS0047S01

1	SEE THE DEPLOYMENT OF AIR BAG MODULE	
Is air bag module deployed?		
Yes or No		
Yes	▶	Refer to COLLISION DIAGNOSIS (RS-59).
No	▶	GO TO 2.

2	CHECK AIR BAG FUSE	
Is SRS “Air Bag” fuse OK?		



SRS577

OK or NG		
OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	CHECK AIR BAG FUSE AGAIN	
Replace “AIR BAG” fuse and turn ignition switch ON.		
Is “AIR BAG” fuse blown again?		
Yes	▶	Repair main harness and/or replace air bag harness.
No	▶	**INSPECTION END**

4	CHECK DIAGNOSIS SENSOR UNIT

Connect CONSULT-II and touch "START".
- Is "AIR BAG" displayed on CONSULT-II?

SELECT SYSTEM
ENGINE
A/T
AIR BAG

SRS771

Yes or No

Yes	▶	GO TO 5.
No	▶	Visually check the wiring harness connection of diagnosis sensor unit. If the harness connection check result is OK, replace diagnosis sensor unit.

5	CHECK HARNESS CONNECTION

Is harness connection between warning lamp and diagnosis sensor unit OK?

OK or NG

OK	▶	Replace diagnosis sensor unit.
NG	▶	Connect "AIR BAG" warning lamp and diagnosis sensor unit connector properly. If "AIR BAG" warning lamp still does not go off, replace harness.

Trouble Diagnoses: “AIR BAG” Warning Lamp Does Not Turn On

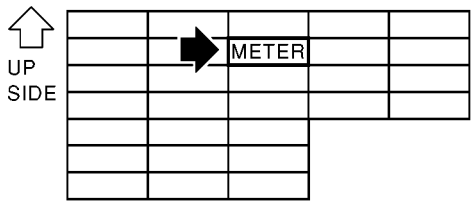
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DIAGNOSTIC PROCEDURE 10

NARS0048S01

1	CHECK “METER” FUSE

Is meter fuse OK?



SRS852

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	CHECK “METER” FUSE AGAIN

Replace meter fuse and turn ignition switch ON.

Is meter fuse blown again?

Yes	▶	Repair main harness.
No	▶	**INSPECTION END**

3	CHECK “AIR BAG” WARNING LAMP LED

Is “AIR BAG” warning lamp LED OK?

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace “AIR BAG” warning lamp LED.

4	CHECK HARNESS CONNECTION BETWEEN DIAGNOSIS SENSOR UNIT AND “AIR BAG” WARNING LAMP

Disconnect diagnosis sensor unit connector and turn ignition switch “ON”.

- Does “AIR BAG” warning lamp turn on?

Yes or No

Yes	▶	Replace diagnosis sensor unit.
No	▶	Check the ground circuit of “AIR BAG” warning lamp.

Collision Diagnosis

=NARS0049

FOR FRONTAL COLLISION

NARS0049S01

To repair the SRS, perform the following steps.

When SRS (except the side air bag) is activated in a collision:

1) Replace the diagnosis sensor unit.
2) Remove the air bag modules (except the side air bag module) and seat belt pre-tensioner assemblies.
3) Check the SRS components using the table shown below:

- Replace any SRS components showing visible signs of damage (dents, cracks and deformation).

4) Install new air bag modules (except the side air bag module) and seat belt pre-tensioner assemblies.
5) Conduct self-diagnosis using CONSULT-II or “AIR BAG” warning lamp. Refer to “SRS Operation Check” for details (RS-38). Ensure entire SRS operation properly.

When SRS is not activated in a collision:

1) Check the SRS components using the table shown below:

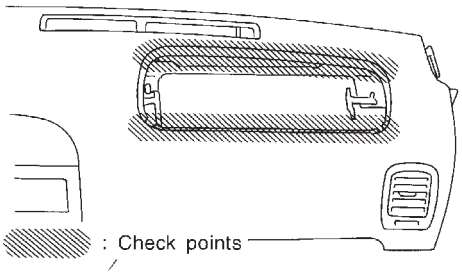
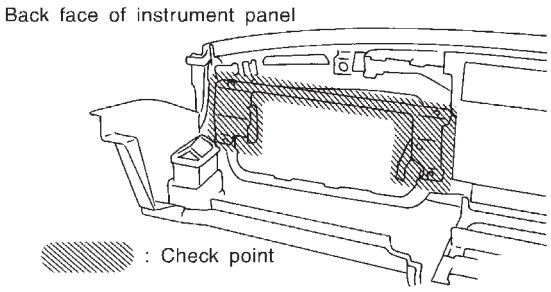
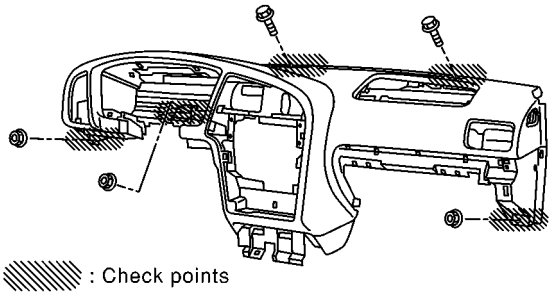
- Replace any SRS components showing visible signs of damage (dents, cracks and deformation).

2) Conduct self-diagnosis using CONSULT-II or “AIR BAG” warning lamp. Refer to “SRS Operation Check” for details (RS-38). Ensure entire SRS operation properly.

SRS Inspection (For frontal collision)

NARS0049S0101

Part	SRS is activated	SRS is NOT activated
Air bag module (driver and passenger side)	REPLACE Install with new special bolts coated with bonding agent.	1. Remove air bag module. Check harness cover and connectors for damage, terminals for deformities, and harness for binding. 2. a. Install driver air bag module into the steering wheel to check fit and alignment with the wheel. b. Install passenger air bag module into the instrument panel to check fit with the instrument panel. 3. No damage found, reinstall with new bolts coated with bonding agent. 4. If damaged—REPLACE. Install air bag modules with new special bolts coated with bonding agent. Air bag must be deployed before discarding.
Seat belt pre-tensioner assembly	REPLACE Install seat belt pre-tensioner with new bolts.	1. Remove seat belt pre-tensioners. Check harness cover and connectors for damage, terminals for deformities, and harness for binding. 2. Check belts for damage and anchors for loose mounting. 3. Check retractor for smooth operation. 4. If no damage is found, reinstall seat belt pre-tensioner assembly. 5. If damaged—REPLACE. Install the seat belt pre-tensioners with new bolts coated with bonding agent. Seat belt pre-tensioners must be deployed before discarding.
Diagnosis sensor unit	REPLACE Install with new bolts coated with bonding agent.	1. Check case for dents, cracks or deformities. 2. Check connectors for damage, and terminals for deformities. 3. If no damage is found, reinstall with new special bolts and ground bolt coated with bonding agent. 4. If damaged—REPLACE. Install diagnosis sensor unit with new special bolts and ground bolt coated with bonding agent.
Steering wheel	1. Visually check steering wheel for deformities. 2. Check harness (built into steering wheel) and connectors for damage, and terminals for deformities. 3. Install air bag module to check fit or alignment with steering wheel. 4. Check steering wheel for excessive free play. 5. If no damage is found, reinstall with bolts. 6. If damaged—REPLACE.	
Spiral cable	1. Visually check spiral cable and combination switch for damage. 2. Check connectors and protective tape for damage. 3. Check steering wheel for noise, binding or heavy operation. 4. If no damage is found, reinstall with bolts. 5. If damaged—REPLACE.	

Part	SRS is activated	SRS is NOT activated
Harness and Connectors	1. Check connectors for poor connection, damage, and terminals for deformities. 2. Check harness for binding, chafing, cuts, or deformities. 3. If no damage is found, reinstall the harness and connectors. 4. Damaged—REPLACE damaged section of harness. Do not attempt to repair, splice or modify any SRS harness.	
Instrument panel	1. When passenger air bag inflates, check the following points for bending, deformities or cracks. ● Opening portion for passenger air bag  SRS366 ● Passenger air bag module brackets  SRS367 ● The portions securing the instrument panel  SRS876 2. If no damage is found, reinstall the instrument panel. 3. If damaged—REPLACE the instrument panel with bolts.	

FOR SIDE COLLISION

=NARS0049S02

To repair the SRS for a side collision, perform the following steps.

When the side air bag is activated in the side collision:

1) Replace the following component:

− All parts of front seatback (including front seatback frame) with side air bag module (on the side on which side air bag is activated)
− Diagnosis sensor unit
− Satellite sensor (on the side on which side air bag is activated)

2) Check the SRS components and the related parts using the table shown below.

- Replace any SRS components and the related parts showing visible signs of damage (dents, cracks, deformation).

3) Conduct self-diagnosis using CONSULT-II or "AIR BAG" warning lamp. Refer to "SRS Operation Check" for details (RS-38). Ensure entire SRS operation properly.

When SRS is not activated in the side collision:

1) Check the SRS components and the related parts using the table shown below.

- Replace any SRS components and the related parts showing visible signs of damage (dents, cracks, deformation).

2) Conduct self-diagnosis using CONSULT-II or "AIR BAG" warning lamp. Refer to "SRS Operation Check" for details (RS-38). Ensure entire SRS operation properly.

SRS Inspection (For side collision)

NARS0049S0201

Part	Side air bag is activated	SRS is NOT activated
Built-in side air bags module (LH or RH)	REPLACE all parts of front seatback with deployed side air bag module.	1. Check for visible signs of damage (dents, tears, deformation) of the seatback on the collision side. 2. If damaged—REPLACE the damaged seat parts with new bolts and remove the side air bag module. 3. Check for visible signs of damaged (tesrs etc.) of the side air bag module. 4. Check harness and connectors for damage, and terminals for deformities. 5. If no damaged is found, reinstall the side air bag module with new torx nuts coated with bonding agent. 6. If damaged—REPLACE the side air bag module with new torx nuts coated with bonding agent. Air bag must be deployed before disposing of it.
Satellite sensor (LH or RH)	REPLACE the satellite sensor on the collision side with new nuts coated with bonding agent. (Repair the center pillar inner, etc. before installing new one if damaged.)	1. Remove the satellite sensor on the collision side. Check harness connectors for damage, terminals for deformities, and harness for binding. 2. Check for visible signs of damage (dents, cracks, deformation) of the satellite sensor. 3. Install the satellite sensor to check fit. 4. If no damage is found, reinstall the satellite sensor with new nuts coated with bonding agent. 5. If damaged—REPLACE the satellite sensor with new nuts coated with bonding agent.
Diagnosis sensor unit	REPLACE the diagnosis sensor unit with the new bolts.	1. Check case and bracket for dents, cracks or deformities. 2. Check connectors for damage, and terminals for deformities. 3. If no damage is found, reinstall the diagnosis sensor unit with new special bolts and ground bolt. 4. If damaged—REPLACE. Install the diagnosis sensor unit with new special bolts and ground bolt.
Seat belt pre-tensioner assembly	1. Check if the seat belt can be extended smoothly. If the seat belt cannot be extended smoothly. – Check for deformities of the center pillar inner. – If the center pillar inner has no damage, REPLACE the seat belt pre-tensioner assembly. 2. Remove the seat belt pre-tensioner assembly on the collision side. Check harness cover and connectors for damage, terminals for deformities, and harness for binding. 3. Check for visible signs of damage (dents, cracks, deformation) of the seat belt pre-tensioner assembly. 4. If no damage is found, reinstall the seat belt pre-tensioner assembly. 5. If damaged—REPLACE the seat belt pre-tensioner assembly with new bolts coated with bonding agent. The seat belt pre-tensioner assembly must be deployed before disposing of it.	

Collision Diagnosis (Cont'd)

Part	Side air bag is activated	SRS is NOT activated
Seat with built-in side air bag	REPLACE all parts of front seatback (including front seatback frame)	1. Visually check the seat on the collision side. 2. Remove the seat on the collision side and check the following for damage and deformities. ● Harness, connectors and terminals ● Frame and recliner (for front and rear seat), and also adjuster and slides (for front seat) 3. If no damage is found, reinstall the seat. 4. If damaged—REPLACE the damaged seat parts with new bolts.
Center pillar inner	1. Check the center pillar inner on the collision side for damage (dents, cracks, deformation). 2. If damaged—REPAIR the center pillar inner.	
Trim	1. Check for visible signs of damage (dents, cracks, deformation) of the interior trim on the collision side. 2. If damaged—REPLACE the damaged trim parts.	

BODY & TRIM

SECTION BT

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Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

NABT0023

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL R50 is as follows:

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

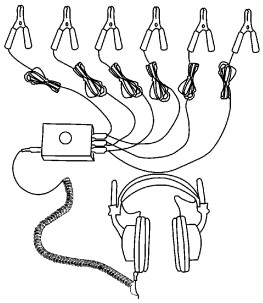
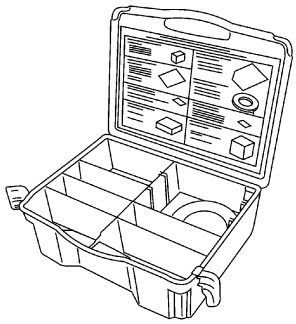
WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.**

Special Service Tools

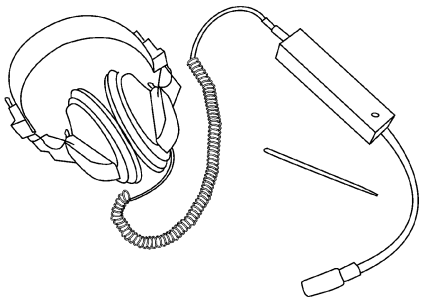
NABT0024

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
— (J-39570) Chassis ear	Locating the noise  SBT839
— (J-43980) Nissan Squeak and Rattle kit	Repairing the cause of noize  SBT840

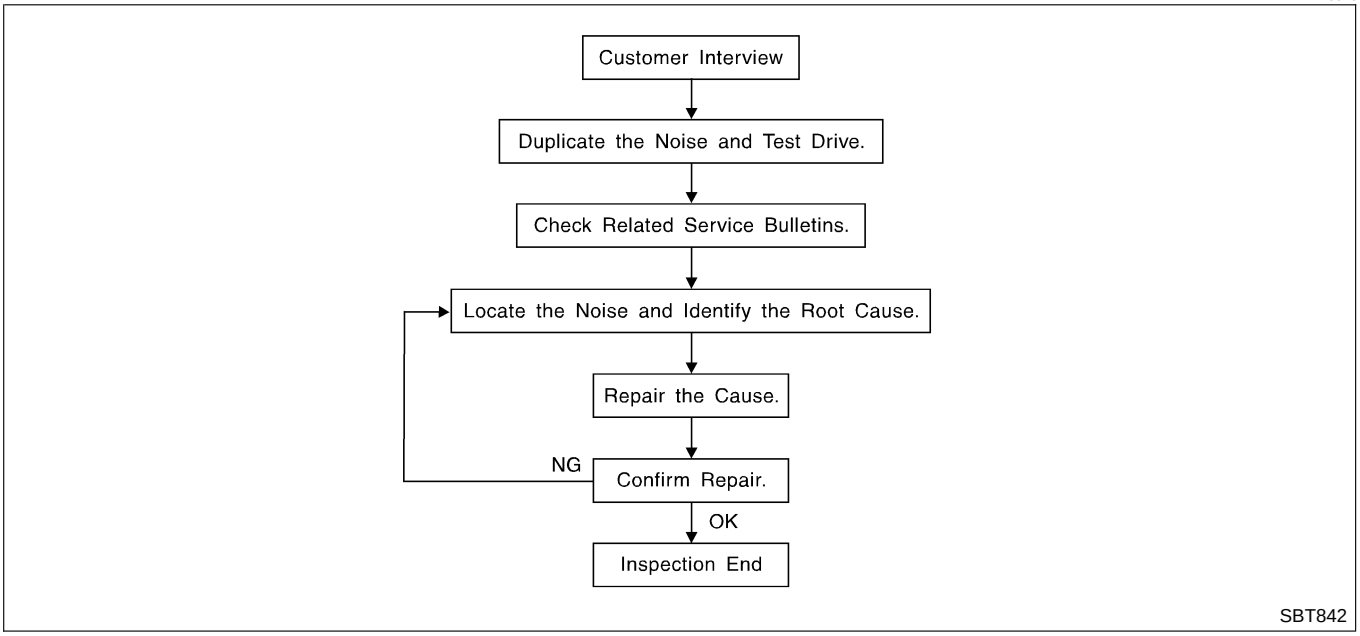
Commercial Service Tool

NABT0025

Tool name	Description
Engine ear	Locating the noise  SBT841

Work Flow

NABT0026



CUSTOMER INTERVIEW

NABT0026S01

Interview the customer, if possible, to determine the conditions that exist when the noise occurs. Use the Diagnostic Worksheet during the interview to document the facts and conditions when the noise occurs and any customer's comments; refer to BT-9. This information is necessary to duplicate the conditions that exist when the noise occurs.

- The customer may not be able to provide a detailed description or the location of the noise. Attempt to obtain all the facts and conditions that exist when the noise occurs (or does not occur).
- If there is more than one noise in the vehicle, be sure to diagnose and repair the noise that the customer is concerned about. This can be accomplished by test driving the vehicle with the customer.
- After identifying the type of noise, isolate the noise in terms of its characteristics. The noise characteristics are provided so the customer, service adviser and technician are all speaking the same language when defining the noise.
- Squeak — (Like tennis shoes on a clean floor)
  Squeak characteristics include the light contact/fast movement/brought on by road conditions/hard surfaces = higher pitch noise/softer surfaces = lower pitch noises/edge to surface = chirping
- Creak — (Like walking on an old wooden floor)
  Creak characteristics include firm contact/slow movement/twisting with a rotational movement/pitch dependent on materials/often brought on by activity.
- Rattle — (Like shaking a baby rattle)
  Rattle characteristics include the fast repeated contact/vibration or similar movement/loose parts/missing clip or fastener/incorrect clearance.
- Knock — (Like a knock on a door)
  Knock characteristics include hollow sounding/sometimes repeating/often brought on by driver action.
- Tick — (Like a clock second hand)
  Tick characteristics include gentle contacting of light materials/loose components/can be caused by driver action or road conditions.
- Thump — (Heavy, muffled knock noise)
  Thump characteristics include softer knock/dead sound often brought on by activity.
- Buzz — (Like a bumble bee)
  Buzz characteristics include high frequency rattle/firm contact.
- Often the degree of acceptable noise level will vary depending upon the person. A noise that you may judge as acceptable may be very irritating to the customer.
- Weather conditions, especially humidity and temperature, may have a great effect on noise level.

Work Flow (Cont'd)

DUPLICATE THE NOISE AND TEST DRIVE

NABT0026S02

If possible, drive the vehicle with the customer until the noise is duplicated. Note any additional information on the Diagnostic Worksheet regarding the conditions or location of the noise. This information can be used to duplicate the same conditions when you confirm the repair.
If the noise can be duplicated easily during the test drive, to help identify the source of the noise, try to duplicate the noise with the vehicle stopped by doing one or all of the following:

1) Close a door.
2) Tap or push/pull around the area where the noise appears to be coming from.
3) Rev the engine.
4) Use a floor jack to recreate vehicle "twist".
5) At idle, apply engine load (electrical load, half-clutch on M/T model, drive position on A/T model).
6) Raise the vehicle on a hoist and hit a tire with a rubber hammer.

- Drive the vehicle and attempt to duplicate the conditions the customer states exist when the noise occurs.
- If it is difficult to duplicate the noise, drive the vehicle slowly on an undulating or rough road to stress the vehicle body.

CHECK RELATED SERVICE BULLETINS

NABT0026S03

After verifying the customer concern or symptom, check ASIST for Technical Service Bulletins (TSBs) related to that concern or symptom.
If a TSB relates to the symptom, follow the procedure to repair the noise.

LOCATE THE NOISE AND IDENTIFY THE ROOT CAUSE

NABT0026S04

1. Narrow down the noise to a general area. To help pinpoint the source of the noise, use a listening tool (Chassis Ear: J-39570, Engine Ear: J-39565 and mechanics stethoscope).
2. Narrow down the noise to a more specific area and identify the cause of the noise by:

- removing the components in the area that you suspect the noise is coming from.
  Do not use too much force when removing clips and fasteners, otherwise clips and fastener can be broken or lost during the repair, resulting in the creation of new noise.
- tapping or pushing/pulling the component that you suspect is causing the noise.
  Do not tap or push/pull the component with excessive force, otherwise the noise will be eliminated only temporarily.
- feeling for a vibration with your hand by touching the component(s) that you suspect is (are) causing the noise.
- placing a piece of paper between components that you suspect are causing the noise.
- looking for loose components and contact marks.

  Refer to "Generic Squeak and Rattle Troubleshooting", BT-7.

REPAIR THE CAUSE

NABT0026S05

- If the cause is a loose component, tighten the component securely.
- If the cause is insufficient clearance between components:

− separate components by repositioning or loosening and retightening the component, if possible.
− insulate components with a suitable insulator such as urethane pads, foam blocks, felt cloth tape or urethane tape. A Nissan Squeak and Rattle Kit (J-43980) is available through your authorized Nissan Parts Department.

CAUTION:
Do not use excessive force as many components are constructed of plastic and may be damaged.
Always check with the Parts Department for the latest parts information.

The following materials are contained in the Nissan Squeak and Rattle Kit (J-43980). Each item can be ordered separately as needed.
URETHANE PADS [1.5 mm (0.059 in) thick]
Insulates connectors, harness, etc.
76268-9E005: 100 x 135 mm (3.94 x 5.31 in)/76884-71L01: 60 x 85 mm (2.36 x 3.35 in)/76884-71L02: 15 x 25 mm (0.59 x 0.98 in)
INSULATOR (Foam blocks)
Insulates components from contact. Can be used to fill space behind a panel.
73982-9E000: 45 mm (1.77 in) thick, 50 x 50 mm (1.97 x 1.97 in)/73982-50Y00: 10 mm (0.39 in) thick, 50 x 50 mm (1.97 x 1.97 in)
INSULATOR (Light foam block)

80845-71L00: 30 mm (1.18 in) thick, 30 x 50 mm (1.18 x 1.97 in)
FELT CLOTH TAPE
Used to insulate where movement does not occur. Ideal for instrument panel applications.
68370-4B000: 15 x 25 mm (0.59 x 0.98 in) pad/68239-13E00: 5 mm (0.20 in) wide tape roll
The following materials, not found in the kit, can also be used to repair squeaks and rattles.
UHMW (TEFLON) TAPE
Insulates where slight movement is present. Ideal for instrument panel applications.
SILICONE GREASE
Used in place of UHMW tape that will be visible or not fit.
Note: Will only last a few months.
SILICONE SPRAY
Use when grease cannot be applied.
DUCT TAPE
Use to eliminate movement.

CONFIRM THE REPAIR

NABT0026S06

Confirm that the cause of a noise is repaired by test driving the vehicle. Operate the vehicle under the same conditions as when the noise originally occurred. Refer to the notes on the Diagnostic Worksheet.

Generic Squeak and Rattle Troubleshooting

NABT0027

Refer to Table of Contents for specific component removal and installation information.

INSTRUMENT PANEL

NABT0027S01

Most incidents are caused by contact and movement between:

1. The cluster lid A and instrument panel
2. Acrylic lens and combination meter housing
3. Instrument panel to front pillar garnish
4. Instrument panel to windshield
5. Instrument panel mounting pins
6. Wiring harnesses behind the combination meter
7. A/C defroster duct and duct joint

These incidents can usually be located by tapping or moving the components to duplicate the noise or by pressing on the components while driving to stop the noise. Most of these incidents can be repaired by applying felt cloth tape or silicon spray (in hard to reach areas). Urethane pads can be used to insulate wiring harness.

CAUTION:

Do not use silicone spray to isolate a squeak or rattle. If you saturate the area with silicone, you will not be able to recheck the repair.

CENTER CONSOLE

NABT0027S02

Components to pay attention to include:

1. Shifter assembly cover to finisher
2. A/C control unit and cluster lid C
3. Wiring harnesses behind audio and A/C control unit

The instrument panel repair and isolation procedures also apply to the center console.

DOORS

NABT0027S03

Pay attention to the:

1. Finisher and inner panel making a slapping noise
2. Inside handle escutcheon to door finisher
3. Wiring harnesses tapping
4. Door striker out of alignment causing a popping noise on starts and stops

Tapping or moving the components or pressing on them while driving to duplicate the conditions can isolate many of these incidents. You can usually insulate the areas with felt cloth tape or insulator foam blocks from the Nissan Squeak and Rattle Kit (J-43980) to repair the noise.

TRUNK

=NABT0027S04

Trunk noises are often caused by a loose jack or loose items put into the trunk by the owner.
In addition look for:

1. Trunk lid bumpers out of adjustment
2. Trunk lid striker out of adjustment
3. The trunk lid torsion bars knocking together
4. A loose license plate or bracket

Most of these incidents can be repaired by adjusting, securing or insulating the item(s) or component(s) causing the noise.

SUNROOF/HEADLINER

NABT0027S05

Noises in the sunroof/headliner area can often be traced to one of the following:

1. Sunroof lid, rail, linkage or seals making a rattle or light knocking noise
2. Sunvisor shaft shaking in the holder
3. Front or rear windshield touching headliner and squeaking

Again, pressing on the components to stop the noise while duplicating the conditions can isolate most of these incidents. Repairs usually consist of insulating with felt cloth tape.

SEATS

NABT0027S06

When isolating seat noises it's important to note the position the seat is in and the load placed on the seat when the noise is present. These conditions should be duplicated when verifying and isolating the cause of the noise.
Cause of seat noise include:

1. Headrest rods and holders
2. A squeak between the seat pad cushion and frame
3. The rear seat back lock and bracket

These noises can be isolated by moving or pressing on the suspected components while duplicating the conditions under which the noise occurs. Most of these incidents can be repaired by repositioning the component or applying urethane tape to the contact area.

UNDERHOOD

NABT0027S07

Some interior noises may be caused by components under the hood or on the engine wall. The noise is then transmitted into the passenger compartment.
Causes of transmitted underhood noises include:

1. Any component mounted to the engine wall
2. Components that pass through the engine wall
3. Engine wall mounts and connectors
4. Loose radiator mounting pins
5. Hood bumpers out of adjustment
6. Hood striker out of adjustment

These noises can be difficult to isolate since they cannot be reached from the interior of the vehicle. The best method is to secure, move or insulate one component at a time and test drive the vehicle. Also, engine RPM or load can be changed to isolate the noise. Repairs can usually be made by moving, adjusting, securing, or insulating the component causing the noise.

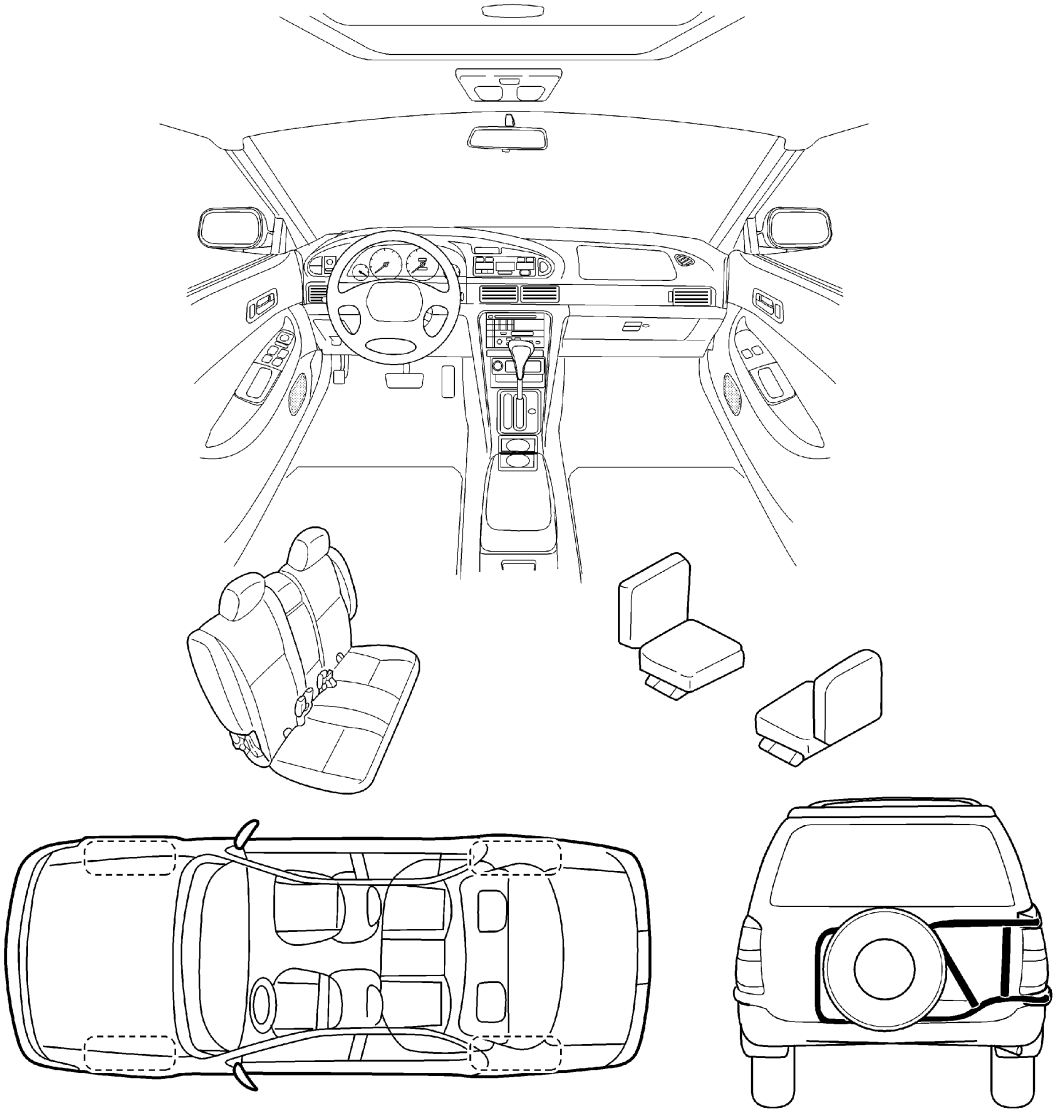
Diagnostic Worksheet

NABT0028

SQUEAK & RATTLE DIAGNOSTIC WORKSHEET

Dear Nissan Customer:
We are concerned about your satisfaction with your Nissan vehicle. Repairing a squeak or rattle sometimes can be very difficult. To help us fix your Nissan right the first time, please take a moment to note the area of the vehicle where the squeak or rattle occurs and under what conditions. You may be asked to take a test drive with a service advisor or technician to ensure we confirm the noise you are hearing.

I. WHERE DOES THE NOISE COME FROM? (circle the area of the vehicle)
The illustrations are for reference only, and may not reflect the actual configuration of your vehicle.



Continue to the back of the worksheet and briefly describe the location of the noise or rattle. In addition, please indicate the conditions which are present when the noise occurs.

SBT843

SQUEAK & RATTLE DIAGNOSTIC WORKSHEET- page 2

Briefly describe the location where the noise occurs:

_____

_____

II. WHEN DOES IT OCCUR? (check the boxes that apply)

❑ anytime
❑ 1st time in the morning
❑ only when it is cold outside
❑ only when it is hot outside
❑ after sitting out in the sun
❑ when it is raining or wet
❑ dry or dusty conditions
❑ other: _____

III. WHEN DRIVING:

❑ through driveways
❑ over rough roads
❑ over speed bumps
❑ only at about ____ mph
❑ on acceleration
❑ coming to a stop
❑ on turns : left, right or either (circle)
❑ with passengers or cargo
❑ other: _____
❑ after driving ____ miles or ____ minutes

IV. WHAT TYPE OF NOISE?

❑ squeak (like tennis shoes on a clean floor)
❑ creak (like walking on an old wooden floor)
❑ rattle (like shaking a baby rattle)
❑ knock (like a knock on a door)
❑ tick (like a clock second hand)
❑ thump (heavy, muffled knock noise)
❑ buzz (like a bumble bee)

TO BE COMPLETED BY DEALERSHIP PERSONNEL
Test Drive Notes:

_____

_____

	YES	NO	Initials of person performing
Vehicle test driven with customer	❑	❑	_____
- Noise verified on test drive	❑	❑	
- Noise source located and repaired	❑	❑	_____
- Follow up test drive performed to confirm repair	❑	❑	_____

VIN: _____ Customer Name: _____

W.O. #: _____ Date: _____

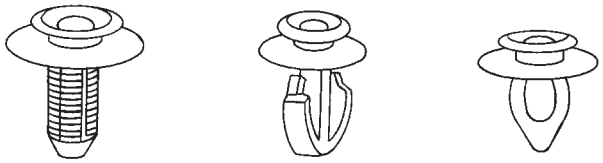
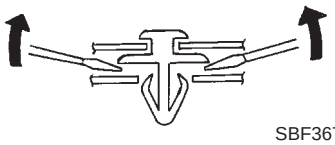
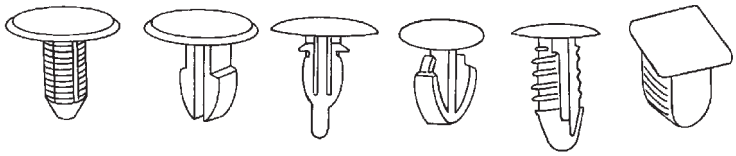
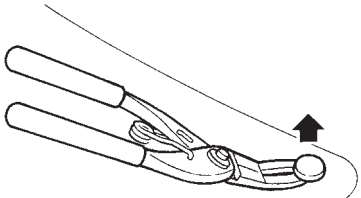
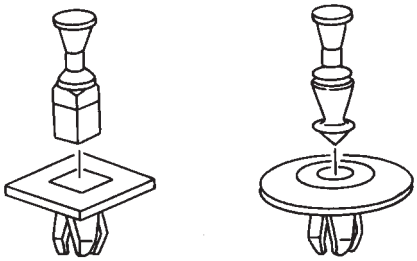
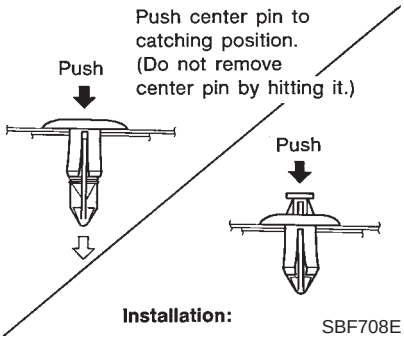
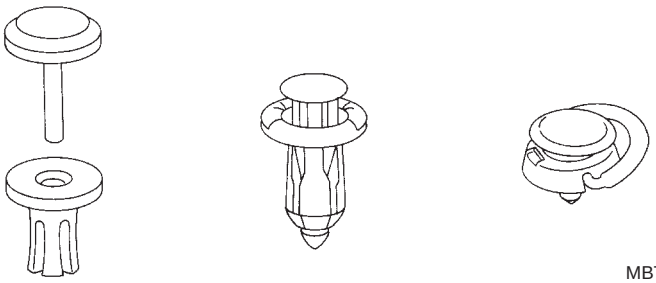
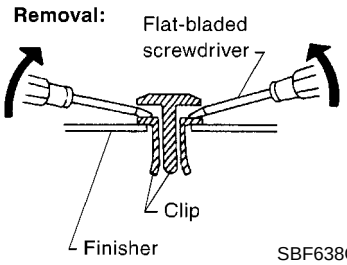
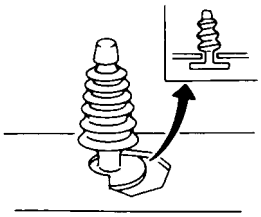
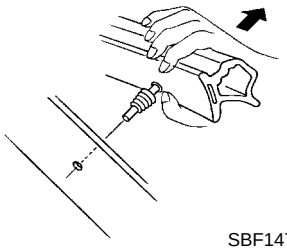
This form must be attached to Work Order

SBT844

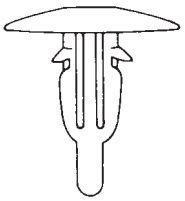
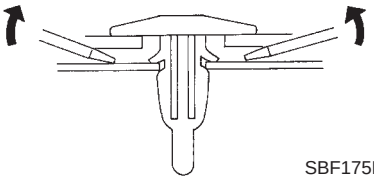
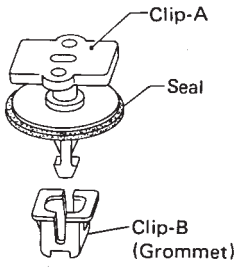
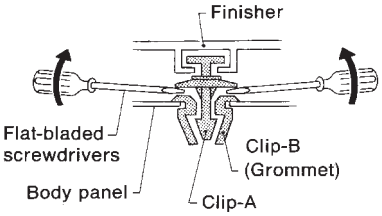
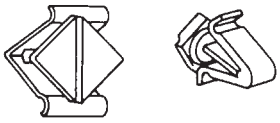
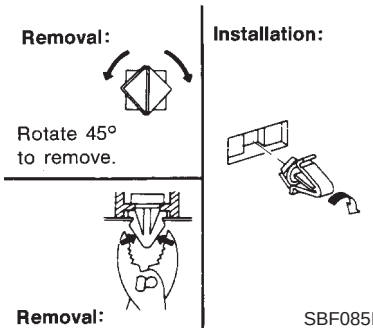
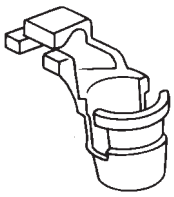
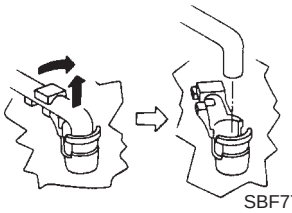
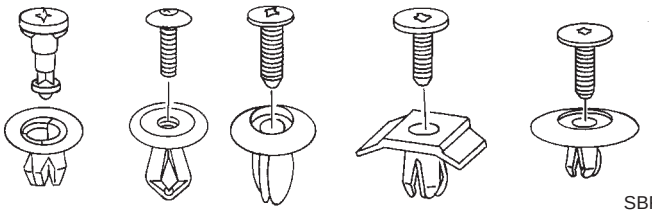
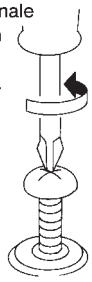
Description

NABT0003

- Clips and fasteners in BT section correspond to the following numbers and symbols.
- Replace any clips and/or fasteners which are damaged during removal or installation.

Symbol No.	Shapes	Removal & Installation
C101 	 SBF302H	**Removal:** Remove by bending up with flat-bladed screwdrivers or clip remover.  SBF367BA
C103 	 SBT095	 **Removal:** Remove with a clip remover. SBF423H
C203 	 SBF258G	 Push center pin to catching position. (Do not remove center pin by hitting it.) Push Push **Installation:** SBF708E
C205 	 MBT080A	 **Removal:** Flat-bladed screwdriver Clip Finisher SBF638CA
CE103 	 SBF104B	**Removal:**  SBF147B

Description (Cont'd)

Symbol No.	Shapes	Removal & Installation
CE117 	 SBF174D	**Removal:** Remove with a flat-bladed screwdriver or pliers.  SBF175D
CF109 	 SBF651B	**Removal:**  SBF652B
CG101 	 SBF145B	 SBF085B
CR103	 SBF768B	**Removal:** Holder portion of clip must be spread out to remove rod.  SBF770B
CS101 	 SBF078B	**Removal:** 1. Screw out with a Phillips screwdriver. 2. Remove female portion with flat-bladed screwdriver.  SBF992G

Removal and Installation

NABT0004

- When removing or installing hood, place a cloth or other padding on front fender panel and cowl top. This prevents vehicle body from being scratched.
- Bumper fascia is made of plastic. Do not use excessive force and be sure to keep oil away from it.
- Hood adjustment: Adjust at hinge portion.
- Hood lock adjustment: After adjusting, check hood lock control operation. Apply a coat of grease to hood locks engaging mechanism.
- Hood opener: Do not attempt to bend cable forcibly. Doing so increases effort required to unlock hood.

FRONT BUMPER ASSEMBLY

NABT0004S01

1. Remove bolts securing left and right side combination lamps and remove the lamps. B
2. Remove clips securing center radiator grille and remove the center radiator grille.
3. Remove bolts securing left and right radiator grille and remove the grilles. C
4. Remove clips and screws securing left and right sides of fender protector.
5. Remove screws securing bumper fascia. D
6. Remove clips securing radiator core support lower. E
7. Remove clips securing bumper reinforcement.
8. Extract bumper fasica. F
9. Remove bolts and nuts securing bumper reinforcement. G
10. Extract bumper reinforcement. (When installing bumper reinforcement, remove washer tank.)

SEC. 260•261•262•620•623•630•650

Hood lock adjustment

- Adjust hood so that hood primary lock meshes at a position 1 to 1.5 mm (0.039 to 0.059 in) lower than fender.
- After hood lock adjustment, adjust bumper rubber.
- When securing hood lock, ensure it does not tilt. Striker must be positioned at the center of hood primary lock.
- After adjustment, ensure that hood primary and secondary lock operate properly.

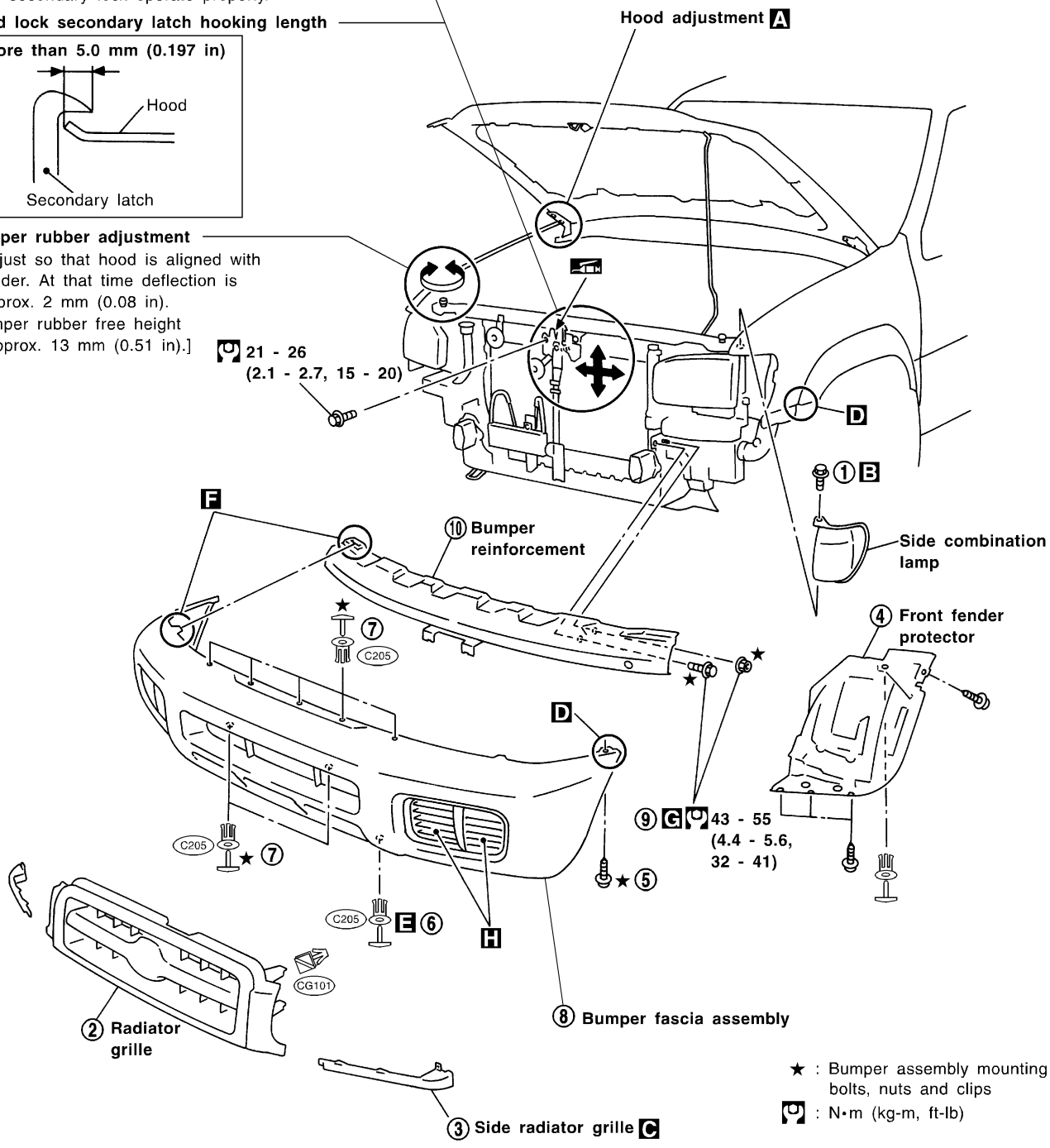
Hood lock secondary latch hooking length

More than 5.0 mm (0.197 in)

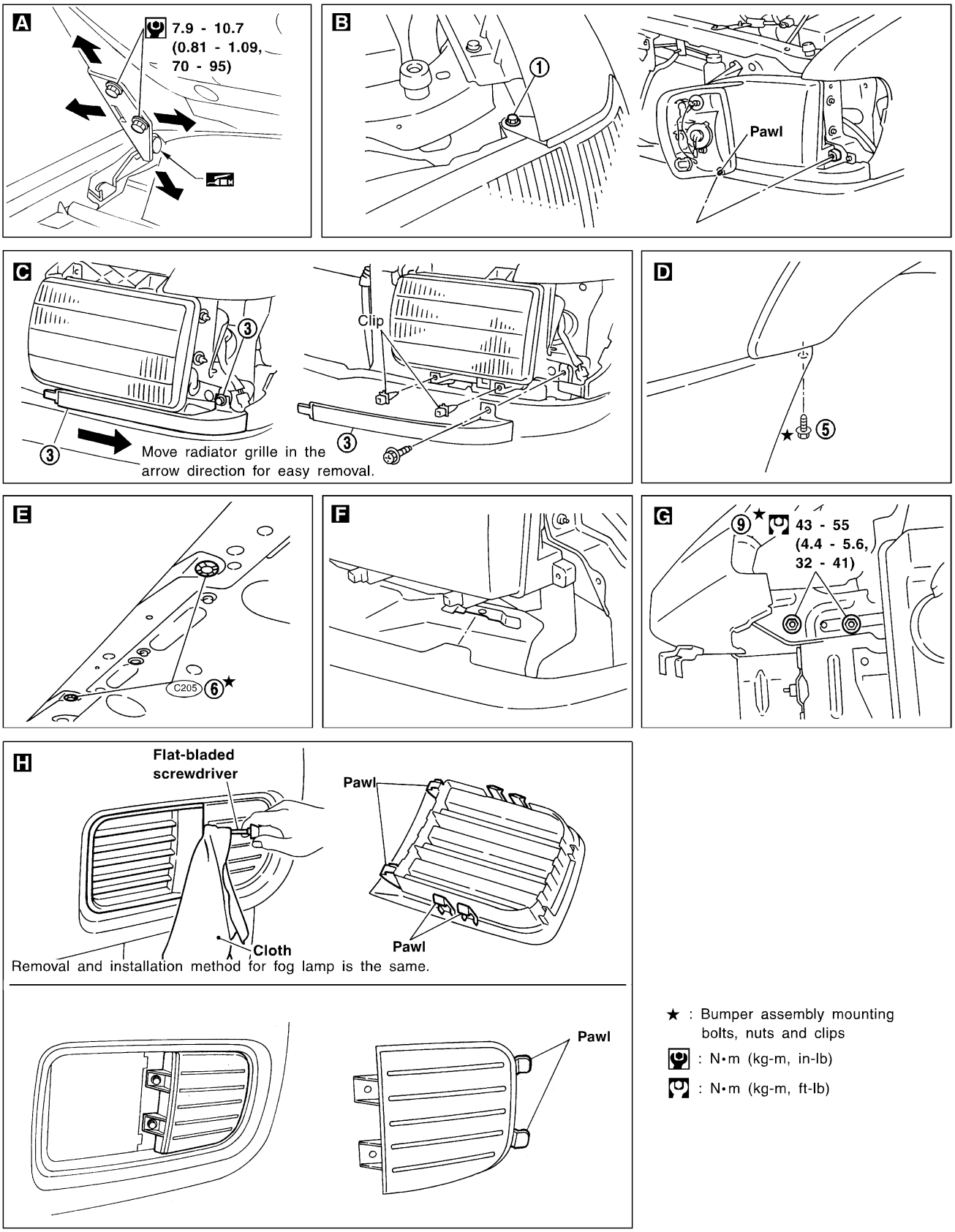
Bumper rubber adjustment

- Adjust so that hood is aligned with fender. At that time deflection is approx. 2 mm (0.08 in).

[Bumper rubber free height is approx. 13 mm (0.51 in).]



SBT699



★ : Bumper assembly mounting bolts, nuts and clips

: N•m (kg-m, in-lb)

: N•m (kg-m, ft-lb)

SBT700

Removal and Installation

NABT0005

- Bumper fascia is made of plastic. Do not use excessive force and be sure to keep oil away from it.
- Back door lock system adjustment: Adjust lock & striker so that they are in the center. After adjustment, check back door lock operation.
- Back door hatch lock system adjustment: Adjust lock & striker so that they are in the center. After adjustment, check back door hatch lock operation.
- Opener cable: Do not attempt to bend cable using excessive force.
- After installation, make sure that back door and fuel filler lid open smoothly.

WARNING:

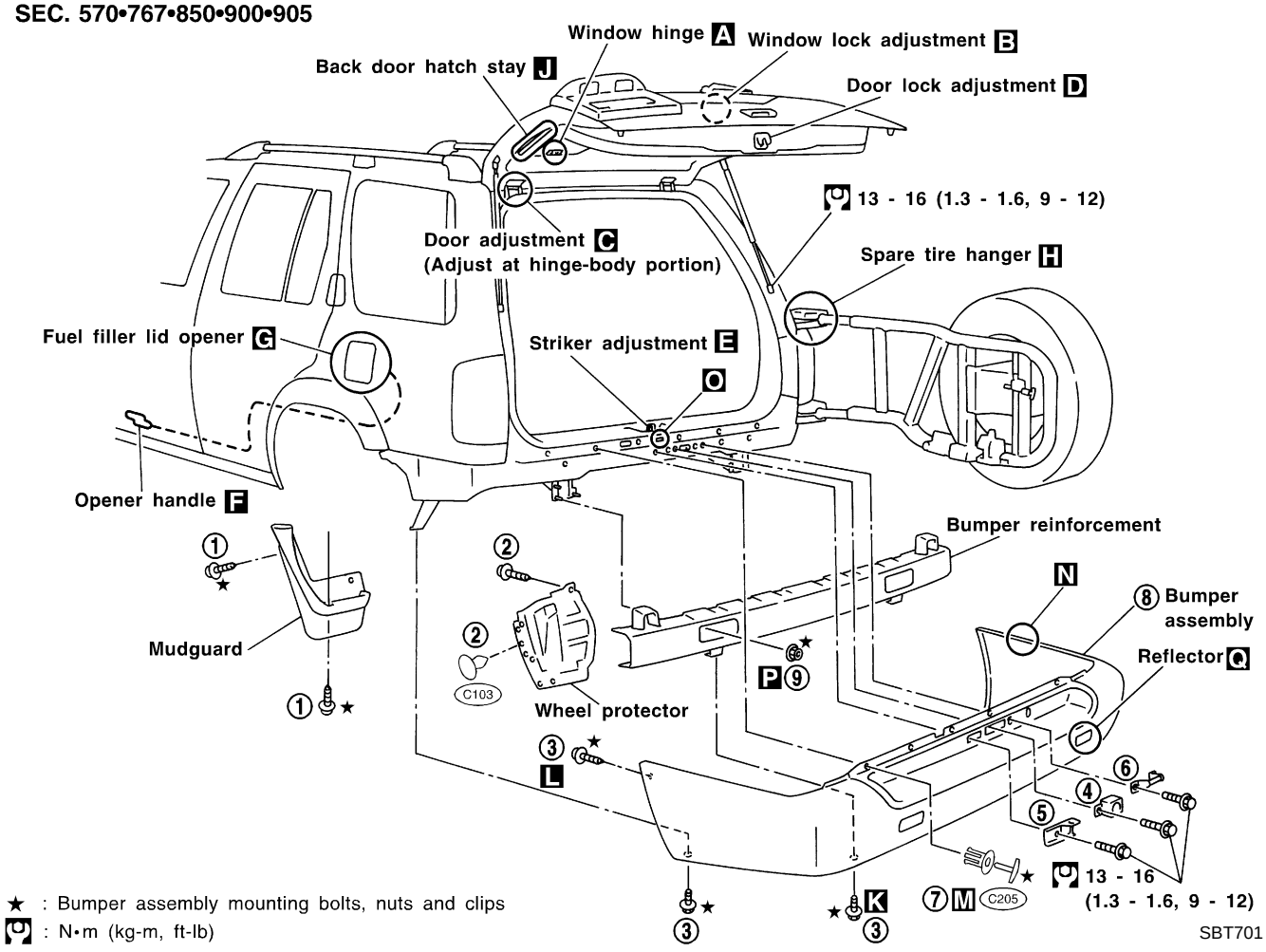
- **Be careful not to scratch back door stay and/or back door hatch stay when installing back door and/or back door hatch. A scratched stay may cause gas leakage.**
- **The contents of the back door stay and back door hatch stay are under pressure. Do not take apart, puncture, apply heat or allow fire near them.**

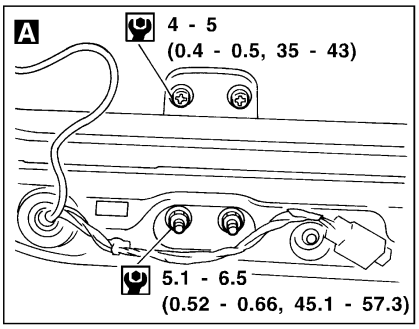
REAR BUMPER ASSEMBLY

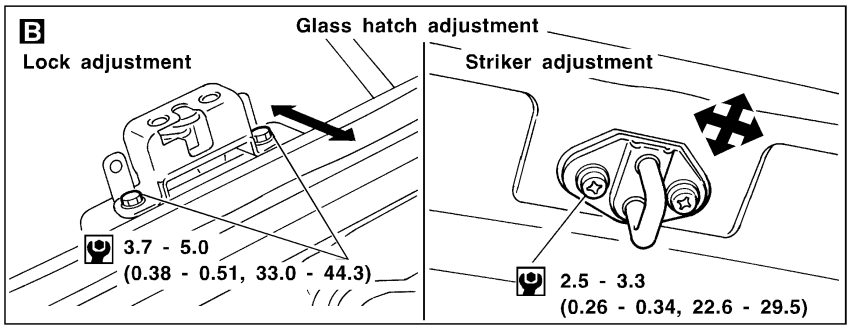
NABT0005S01

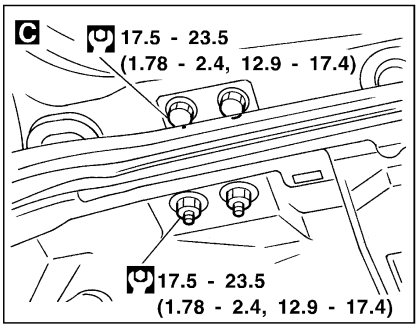
1. Remove screws securing left and right mudguards and remove the mudguards.
2. Remove clips and screws securing left and right sides of wheel protector.
3. Remove bolts and screws securing lower side and side of bumper assembly. K L
4. Remove bolts securing bumper rubber assembly.
5. Remove bolts securing spare tire hanger striker assembly.
6. Remove bolts securing spare tire hanger guide assembly.
7. Remove clips from upper side of bumper assembly. M
8. Extract bumper assembly.
9. Remove nuts securing bumper reinforcement and remove the bumper reinforcement. P

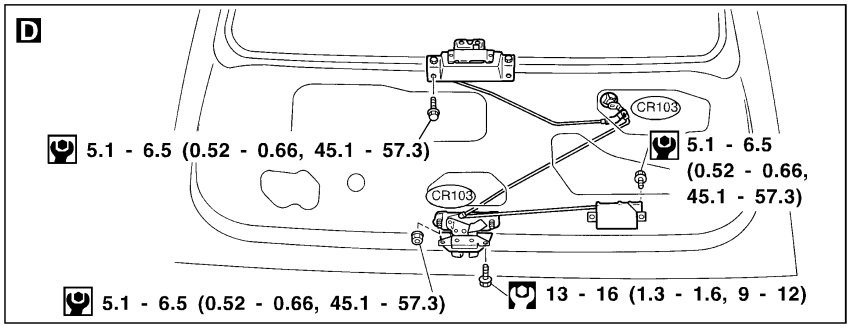
SEC. 570•767•850•900•905

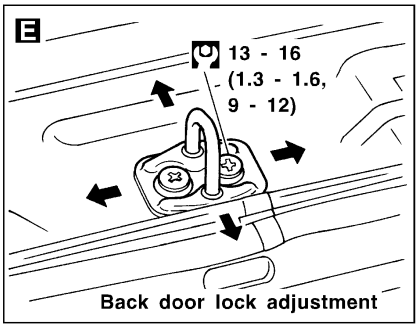


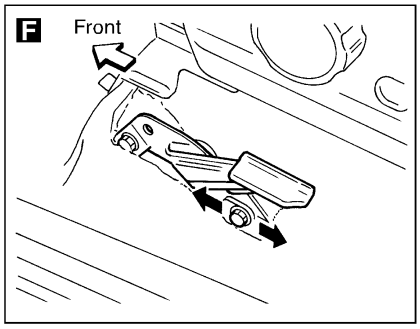


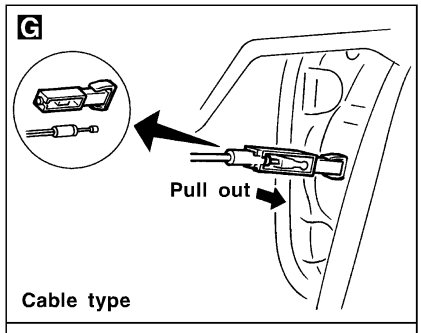


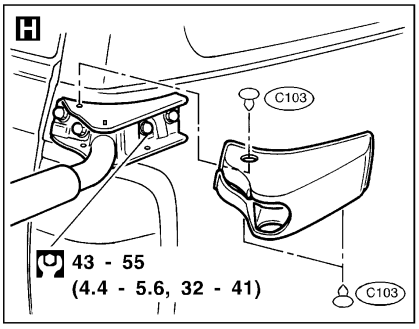


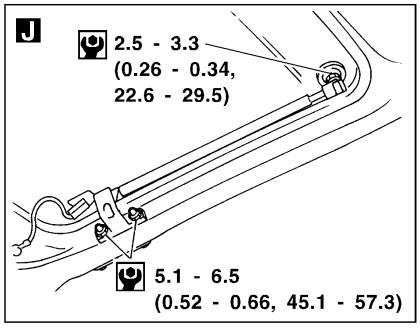


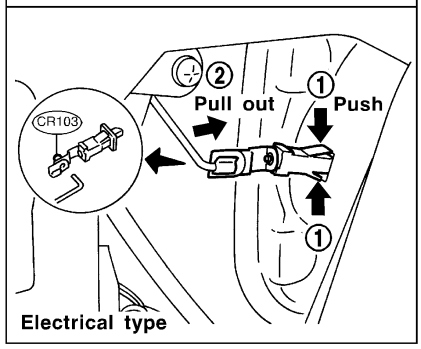








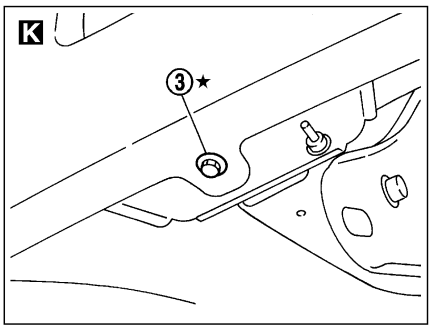


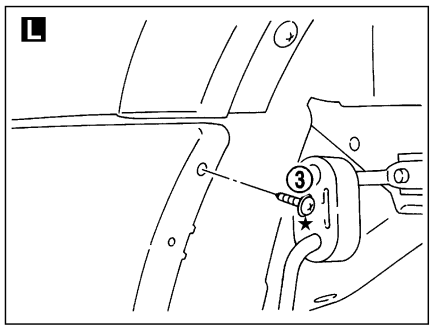


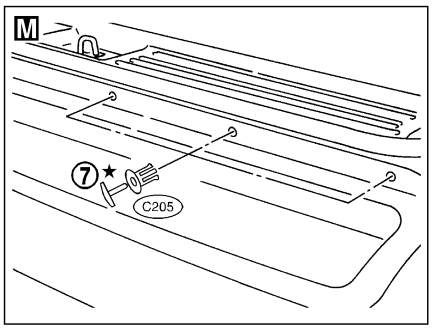
: N•m (kg-m, in-lb)

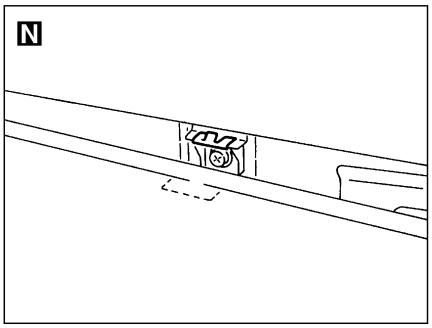
: N•m (kg-m, ft-lb)

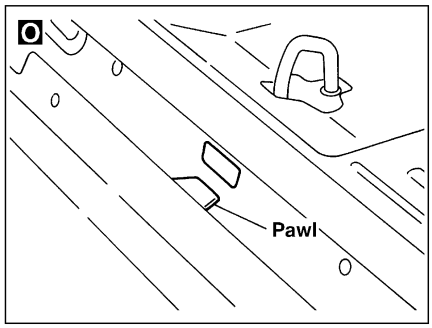
SBT893

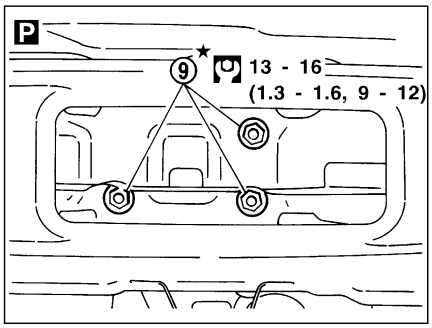


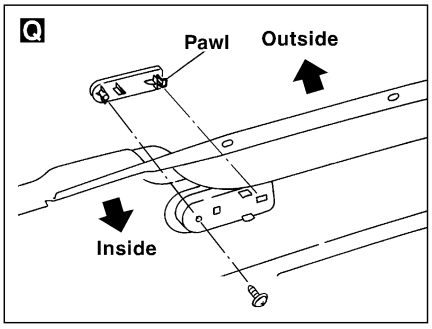












★ : Bumper assembly mounting bolts, nuts and clips
: N•m (kg-m, ft-lb)

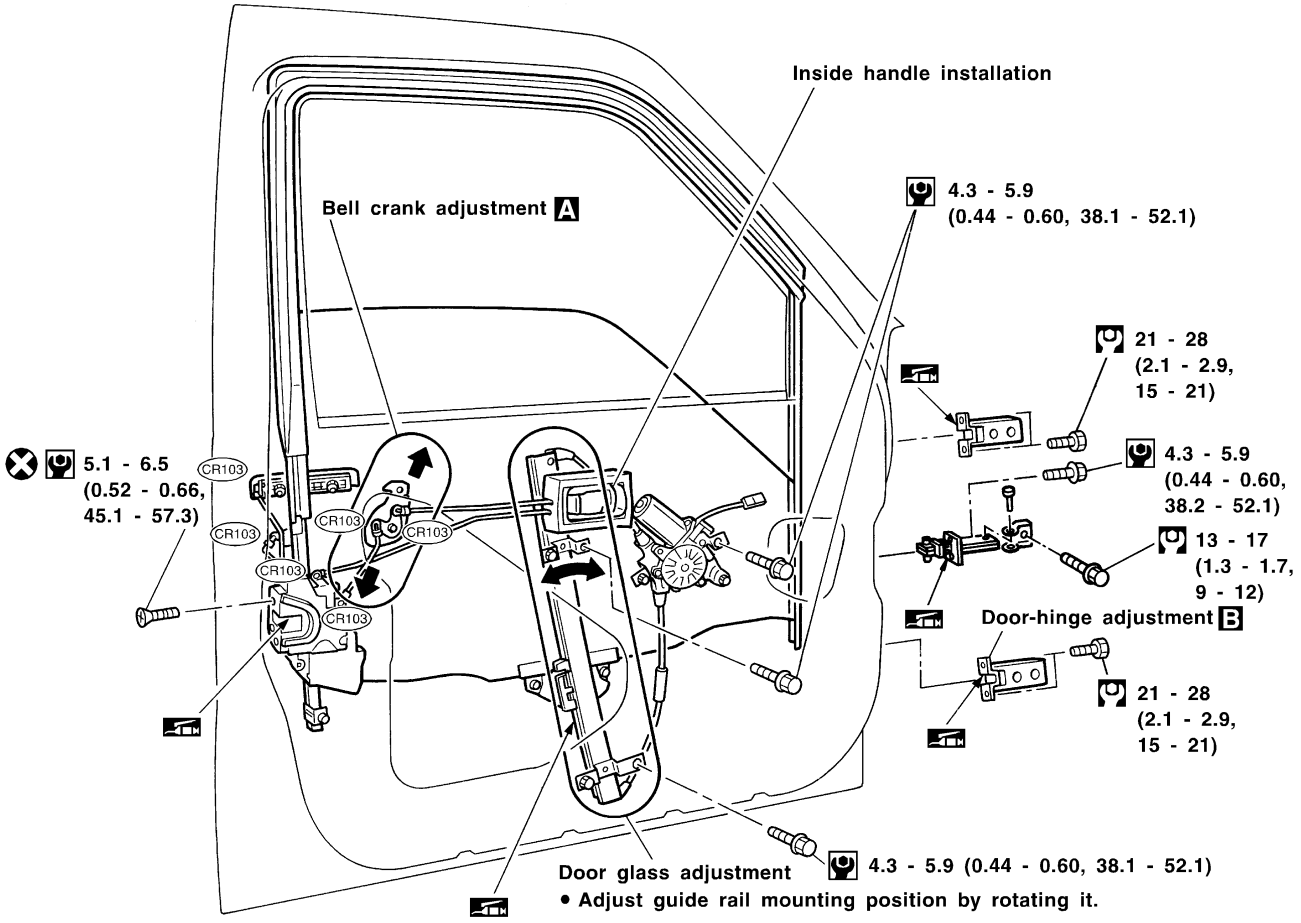
SBT703

Overhaul

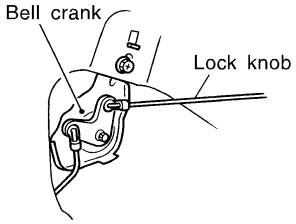
NABT0006

- For removal of door trim, refer to “DOOR TRIM” (BT-31).
- After adjusting door or door lock, check door lock operation.

SEC. 800•803•805•998

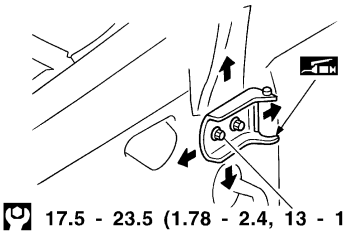


A Bell crank adjustment

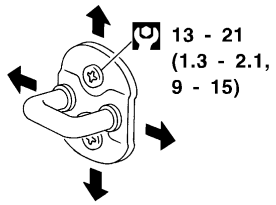


Lock door after setting door lock assembly and inside handle in position. Move bell crank in direction of arrow (shown in figure at left) to take up knob free play, and secure with bolts.

B Door-hinge adjustment



Striker adjustment



: N•m (kg-m, in-lb)
: N•m (kg-m, ft-lb)

SBT512-A

Front Door Limit Switch Reset

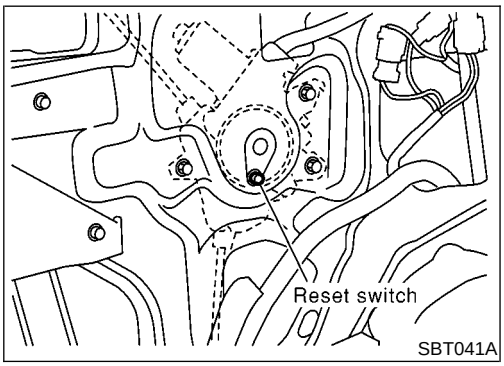
NABT0029

RESET CONDITIONS

NABT0029S01

After each of the following operations are performed, reset the limit switch (with built-in motor).

- Regulator removal and installation
- Removal of motor from regulator
- Operation of regulator as a single unit
- Door glass removal and installation
- Glass run removal and installation



RESET PROCEDURES

NABT0029S02

After installing parts, proceed as follows:

1. Close the door window completely.
2. Press the reset switch and open the door window completely.
3. Release the reset switch. After making sure the reset switch has returned to the original position, close the door window completely.
4. The limit switch is now reset.

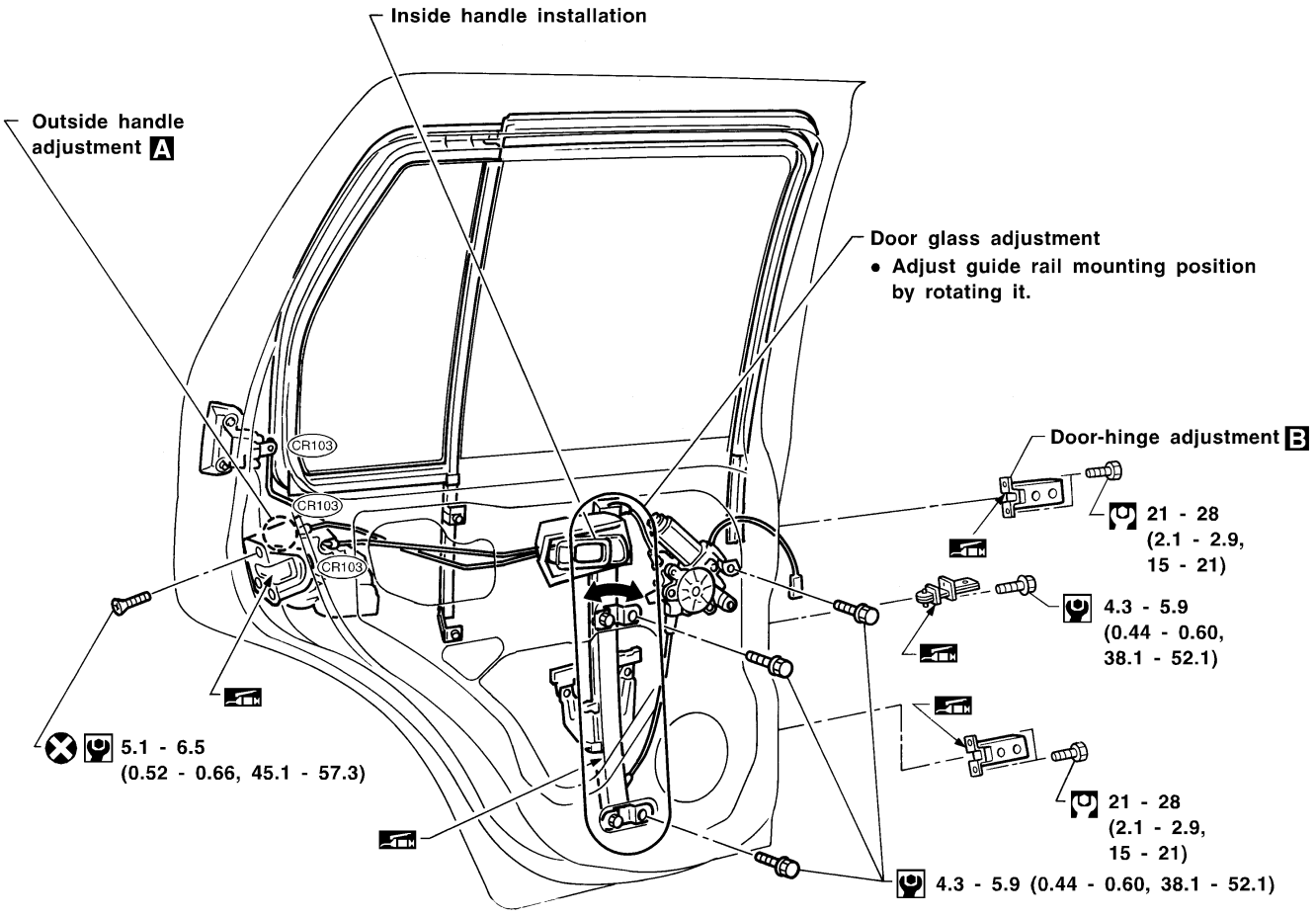
CAUTION:

Be sure to manually open or close the door window. (Do not use the automatic open-close procedures.)

Overhaul

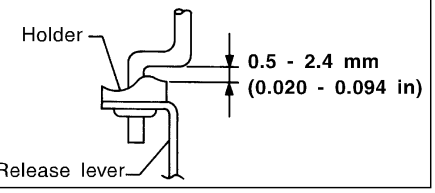
NABT0007

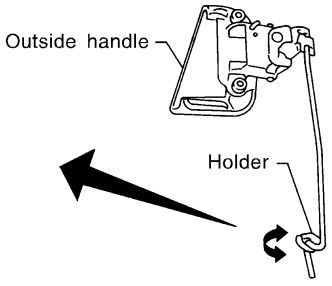
SEC. 820•823•825



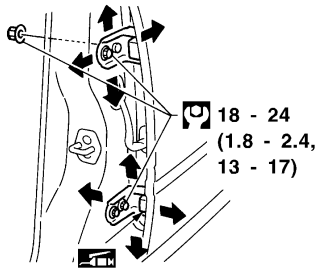
A Outside handle adjustment

Turn holder until the clearance between holder & rod is the specified value.

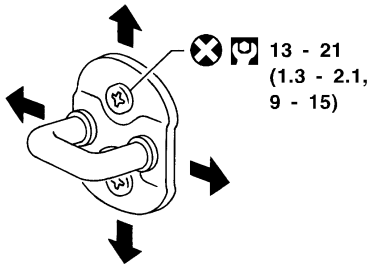




B Door-hinge adjustment



Striker adjustment



: N•m (kg-m, in-lb)
: N•m (kg-m, ft-lb)

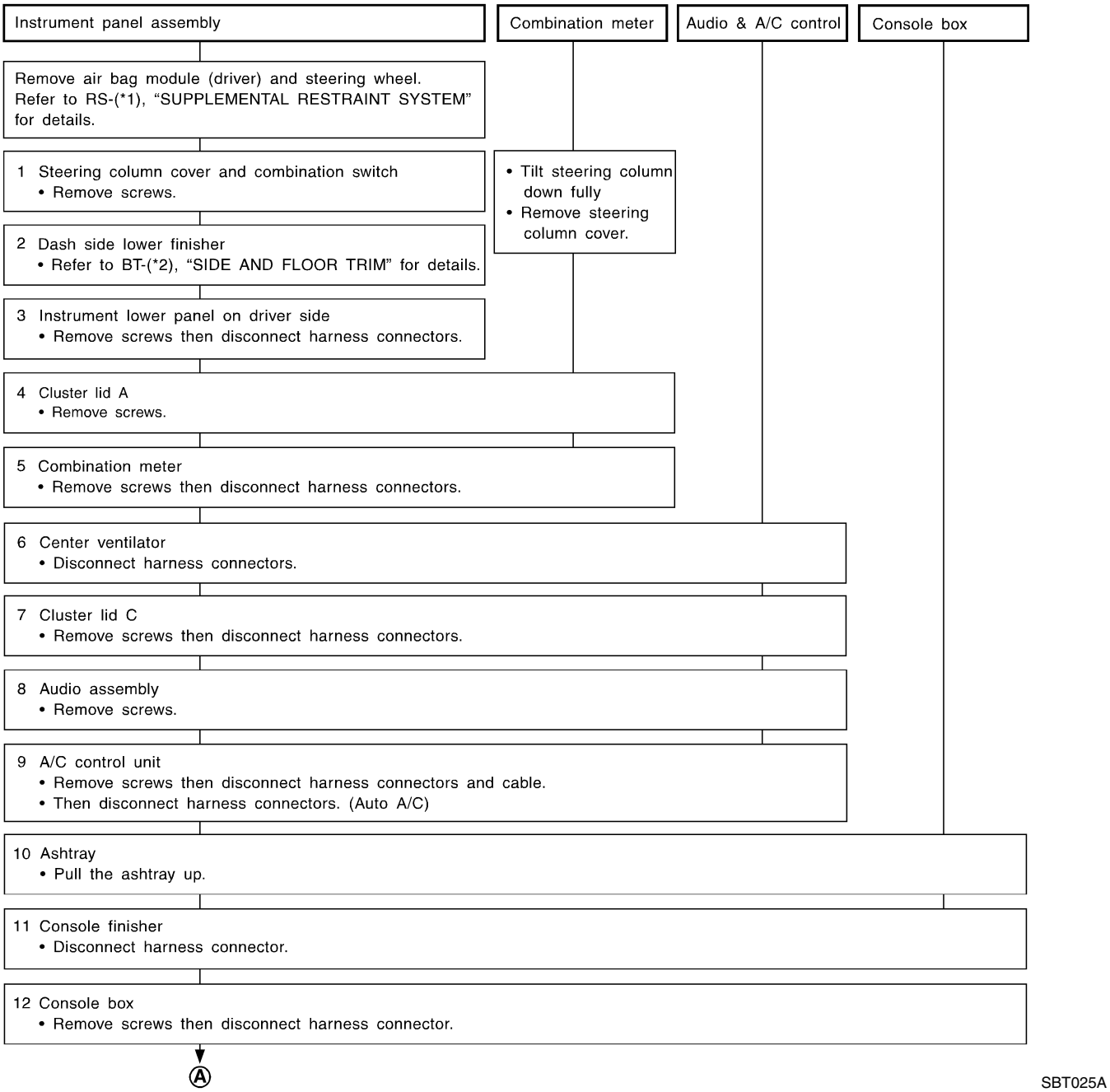
SBT736

Removal and Installation

NABT0008

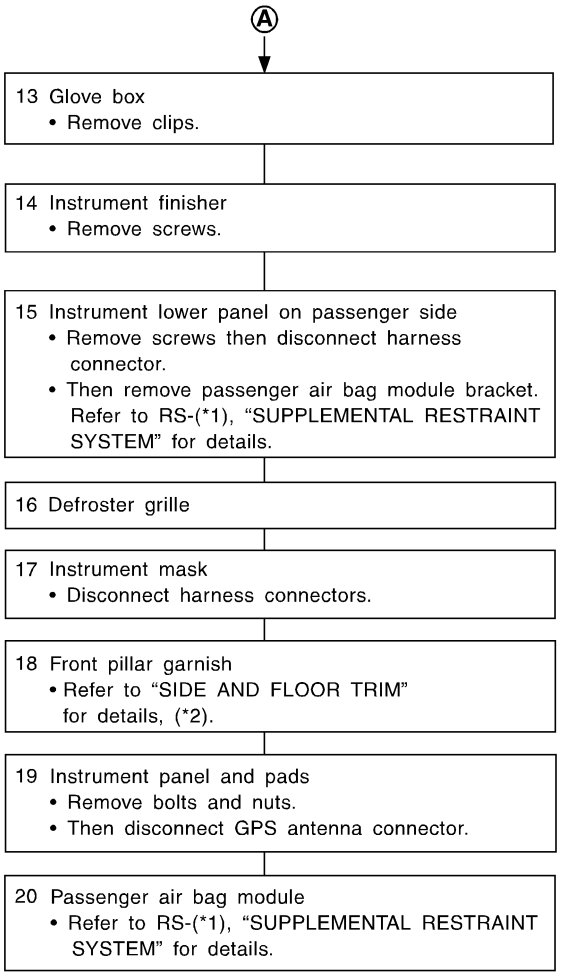
CAUTION:

- **Lock the CD changer unit mechanism (models with CD changer).**
  Refer to EL-189, "LOCKING CD CHANGER UNIT MECHANISM".
- **Disconnect both battery cables in advance.**
- **Disconnect air bag system line in advance.**
- **Never tamper with or force air bag lid open, as this may adversely affect air bag performance.**
- **Be careful not to scratch pad and other parts.**



SBT025A

*1 RS-17 *2 BT-29

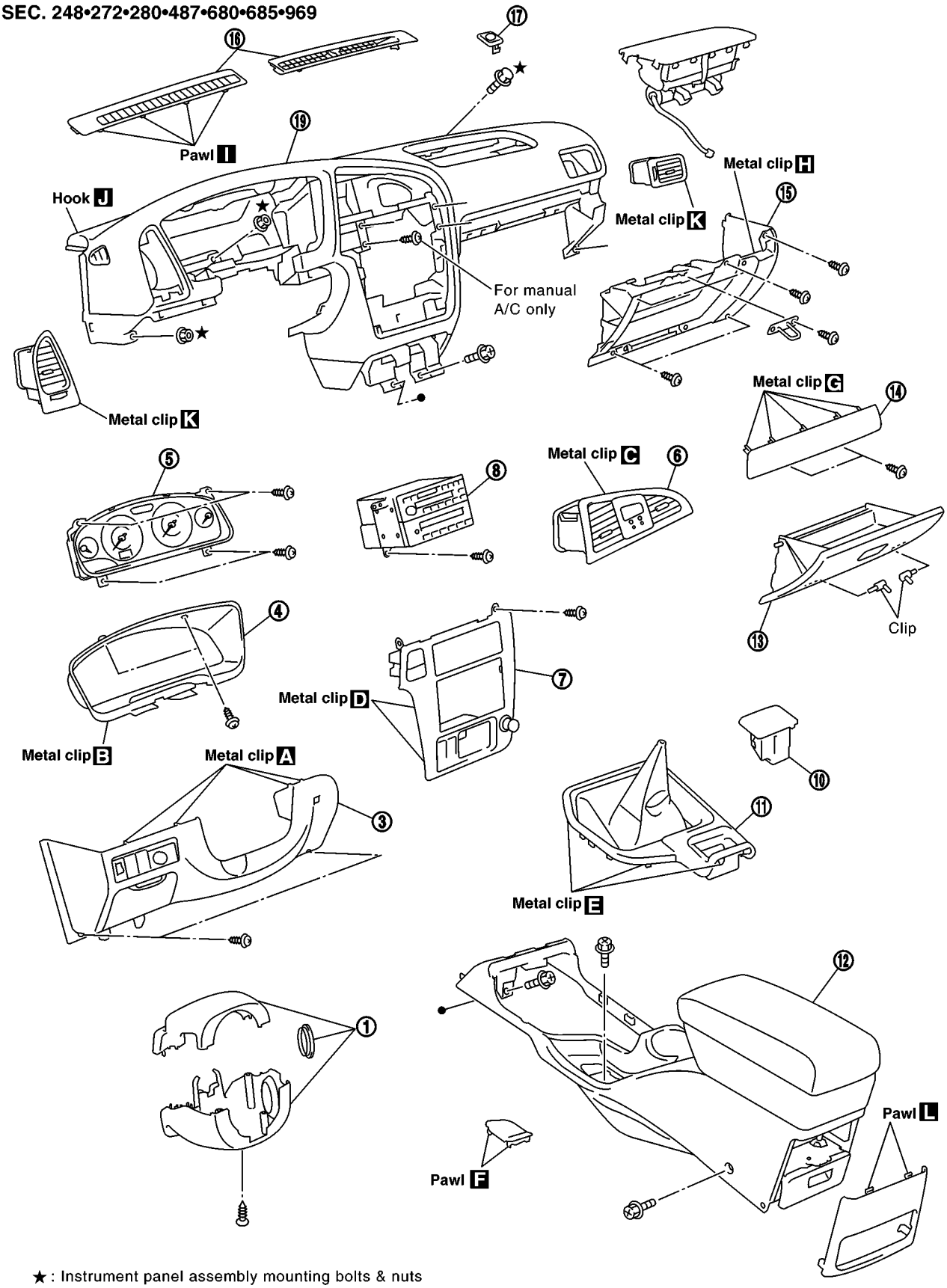


SBT026A

*1 RS-19

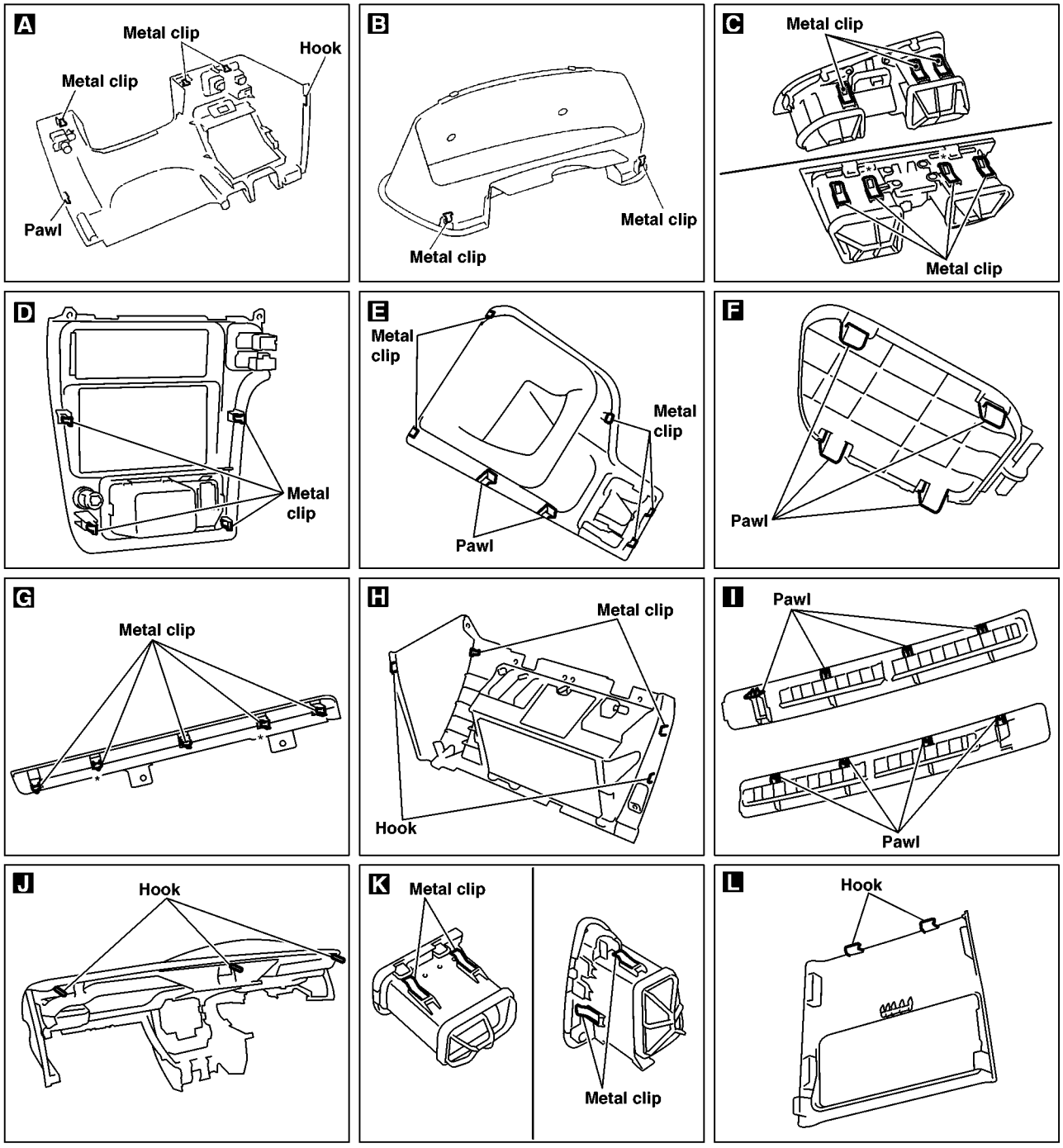
*2 BT-29

SEC. 248•272•280•487•680•685•969



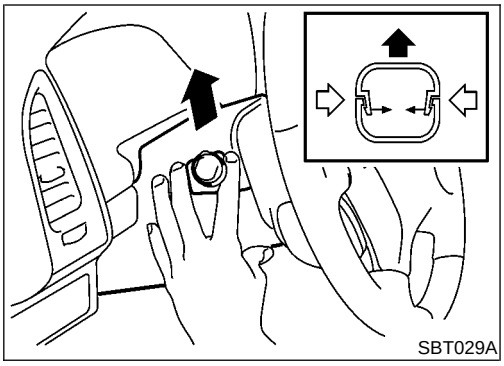
★ : Instrument panel assembly mounting bolts & nuts

SBT021A

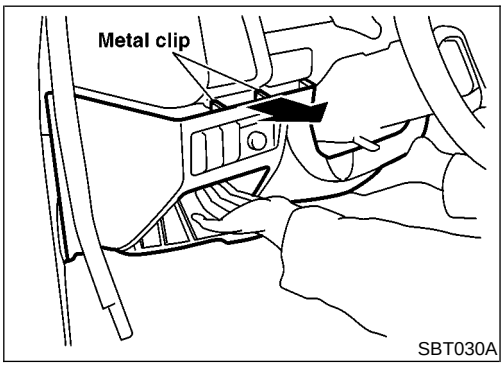


*: Not installed on some models

SBT027A

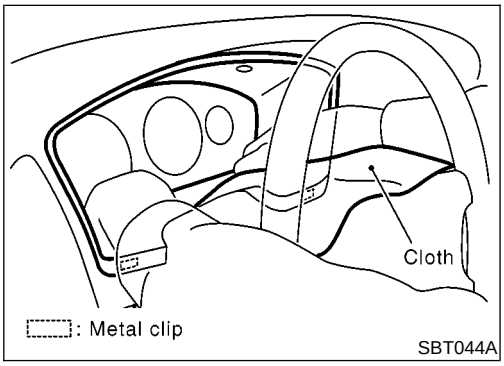

SBT029A

Steering column cover
After removing the screws, release the pawls by pressing on the upper cover where it meets (the bottom cover) from both sides.



SBT030A

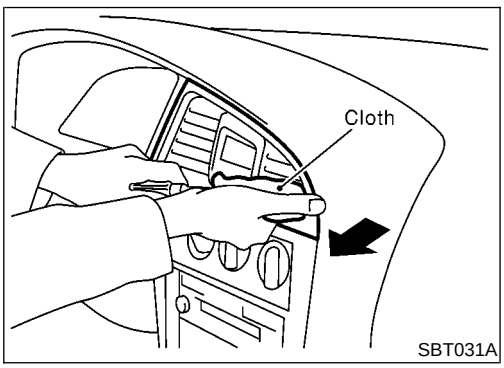
Instrument lower panel on the driver side
Open the pocket after removing the screws. Hold the opening and the bottom and pull out horizontally.



SBT044A

Cluster lid A
After removing the screws, hold the bottom and pull out.

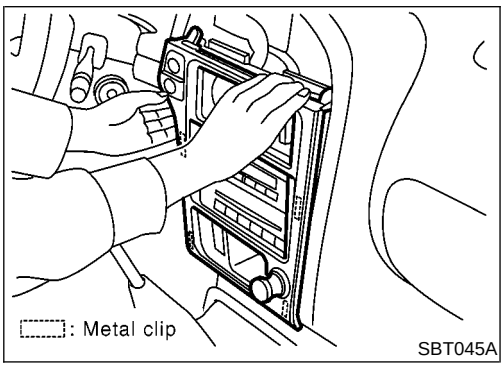
CAUTION:
Cover the surroundings with a cloth to prevent damage.



SBT031A

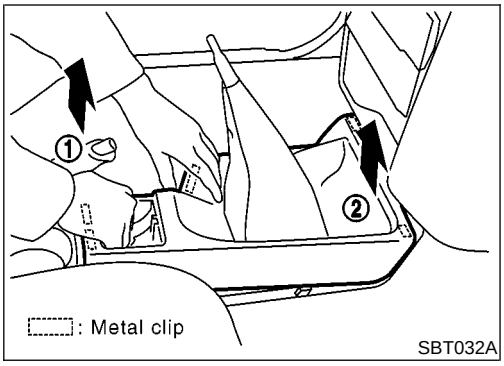
Center ventilator
Hook a cloth-covered flat-bladed screwdriver into the right-side groove section, and pull out.

CAUTION:
To prevent the screwdriver from slipping and causing damage to the surface, pull out while applying pressure on the screwdriver towards the right.



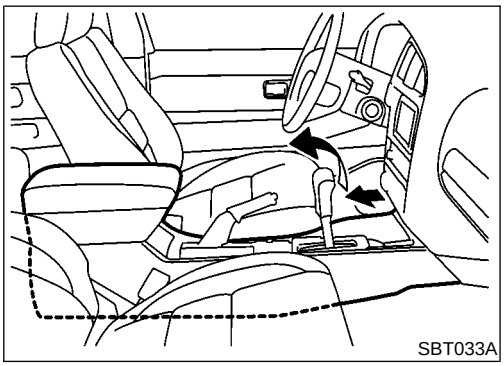
SBT045A

Cluster lid C
After removing the screws, place hands on the metal clip section, and pull forward to remove the metal clips.



Console finisher

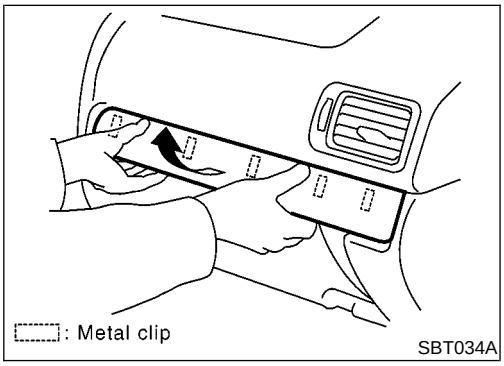
1) After removing the ashtray, place hands on the opening and pull out in an upward direction to remove the clips at the back.
2) Hold the front of the finisher, pull out in an upward direction and remove the clips at the front.



Console box

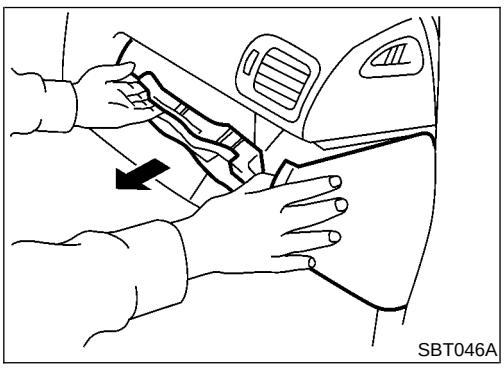
1) Pull up the parking brake lever.
2) Remove the screws, pull the console towards the back of the car until it is free of the instrument panel, lift up the front and remove.

- It will be easier to remove if the parking brake lever is pulled up for more than 10 notches.



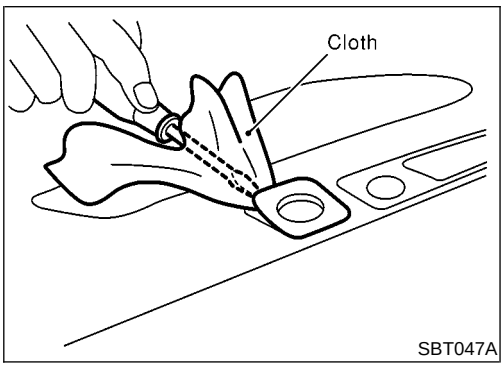
Instrument finisher

Remove the screws and pull up.



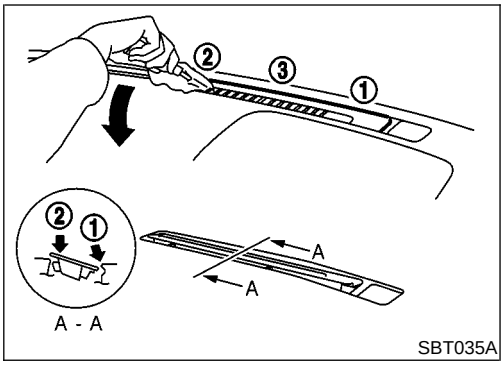
Instrument lower panel on the passenger side

After removing the screws, hold both sides and pull out horizontally.



Instrument mask

Insert a cloth-covered flat-bladed screwdriver, and remove by lifting up.



Defroster grille

REMOVAL

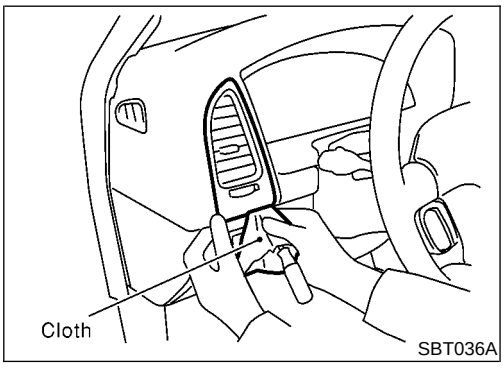
Insert a cloth-covered flat-bladed screwdriver into the grilles of the outside, center and central grilles, respectively, lift up the front of the grilles and remove.

INSTALLATION

After inserting the front section, insert the rear section (pawls) to attach.

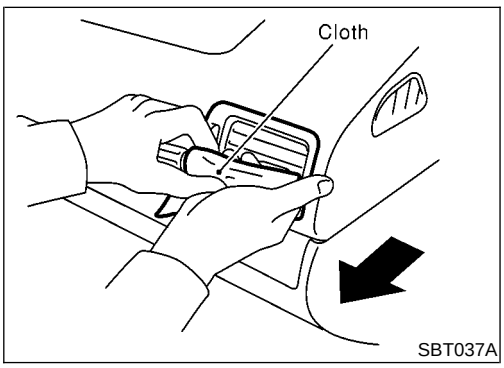
CAUTION:

Confirm that the pawls at the rear are securely attached.



Side ventilator-left

Insert a cloth-covered flat-bladed screwdriver into the lower section, and pull out forward.



Side ventilator-right

Insert a cloth-covered flat-bladed screwdriver into the corner of the lower section, and pull out forward. (Securely press the screwdriver against the ventilator.) Or, after removing the Instrument lower panel, push the ventilator out from the back.

Side defroster grille

After removing the side ventilator, reach in with hands from the opening, push on the pawls from behind the grille, and remove by pushing out.

Removal and Installation

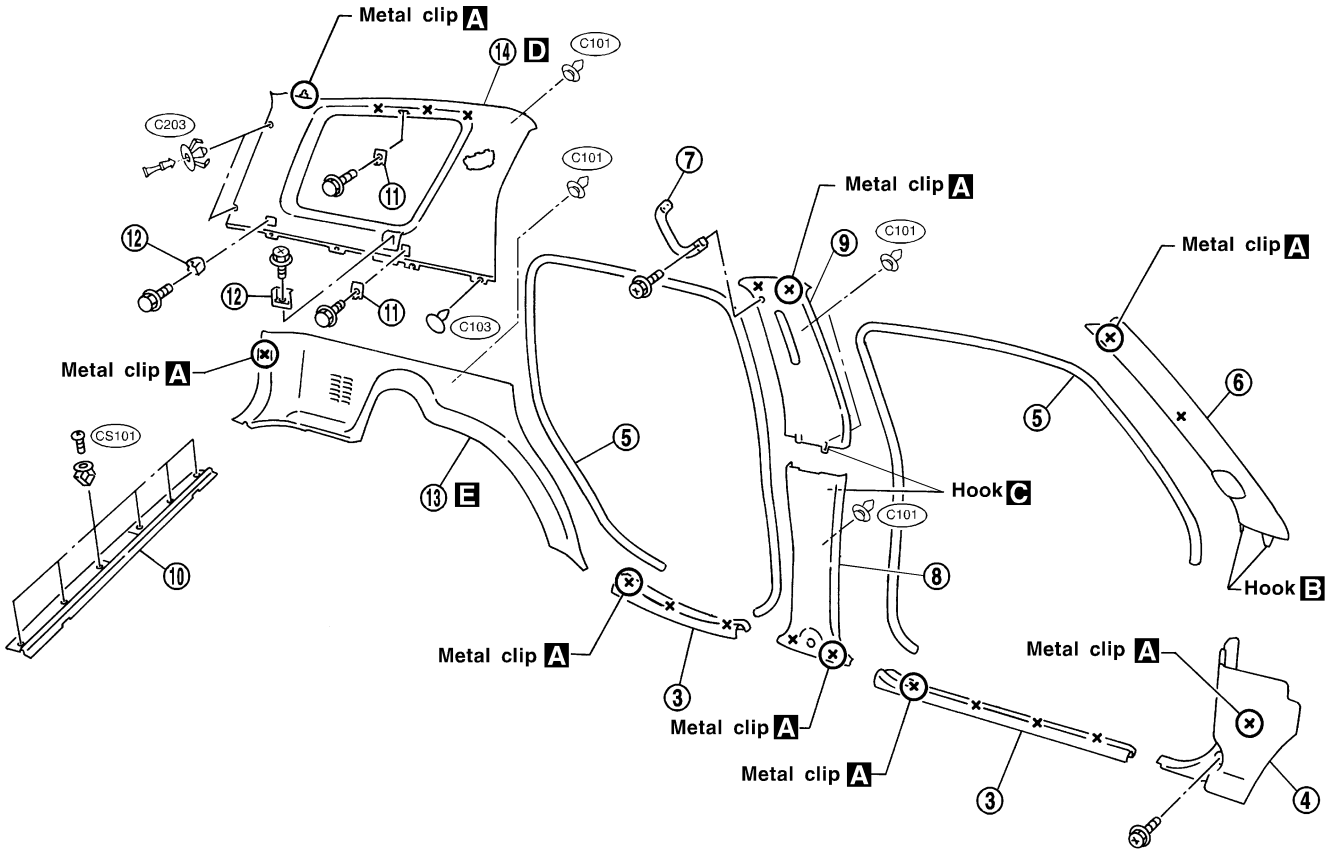
NABT0009

CAUTION:

Wrap the tip of flat-bladed screwdriver with a cloth when removing metal clips from garnishes.

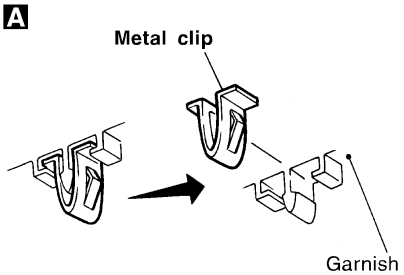
1. Remove front and rear seats. Refer to “FRONT SEAT” and “REAR SEAT” for details, BT-43, BT-47.
2. Remove front and rear seat belts. Refer to RS-3, “SEAT BELT” for details.
3. Remove front and rear kicking plates.
4. Remove dash side lower finishers.
5. Remove front and rear body side welts.
6. Remove front pillar garnishes. B
7. Remove center assist grips.
8. Remove center pillar lower garnishes. C
9. Remove center pillar upper garnishes. C
10. Remove rear gate kicking plate.
11. Remove rear net hooks.
12. Remove tonneau cover assembly and rear parcel holder.
13. Remove rear side lower garnishes. E
14. Remove rear side upper garnishes. D

SEC. 678•738•769•799•849

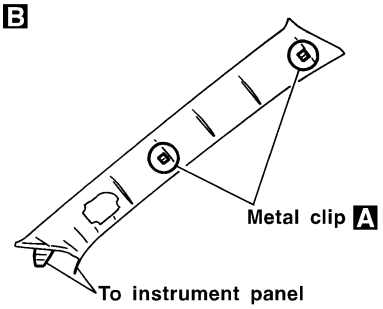


SBT694

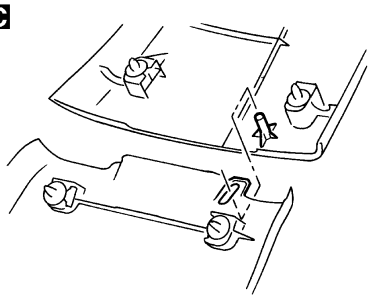
A



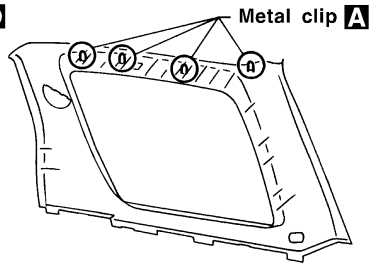
B



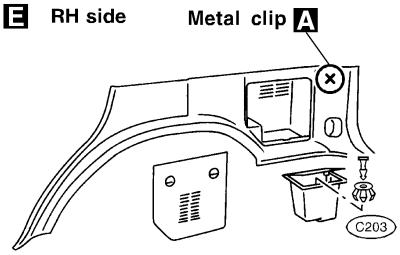
C



D



E



SBT728

Removal and Installation

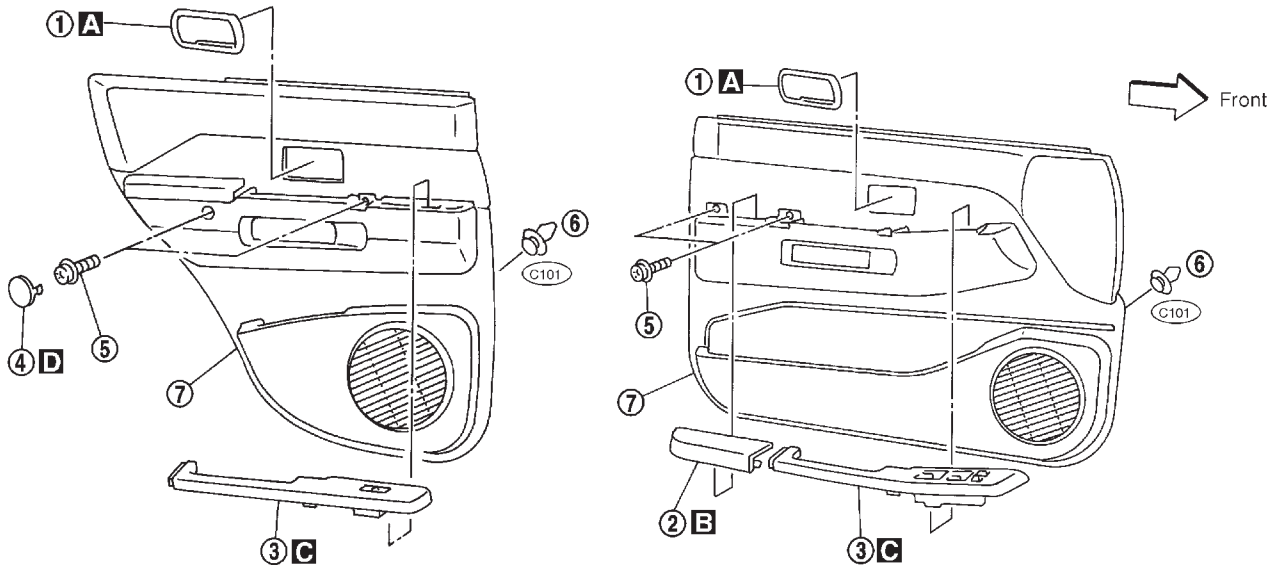
NABT0010

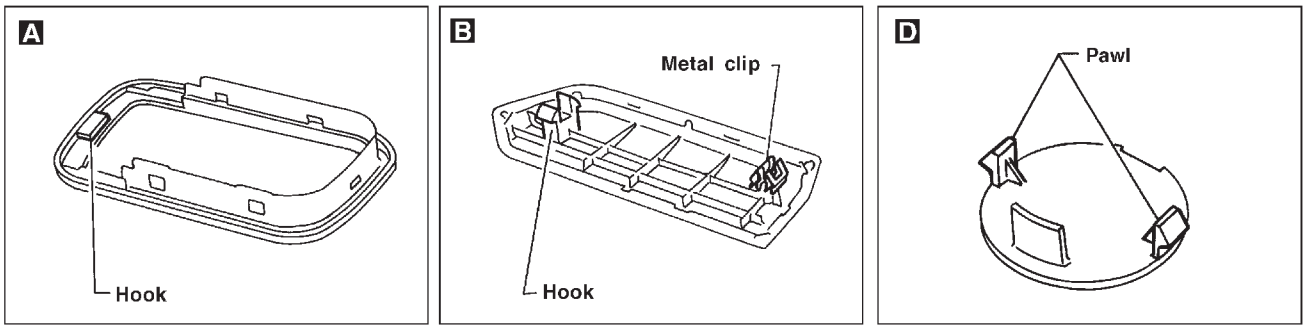
NABT0010S01

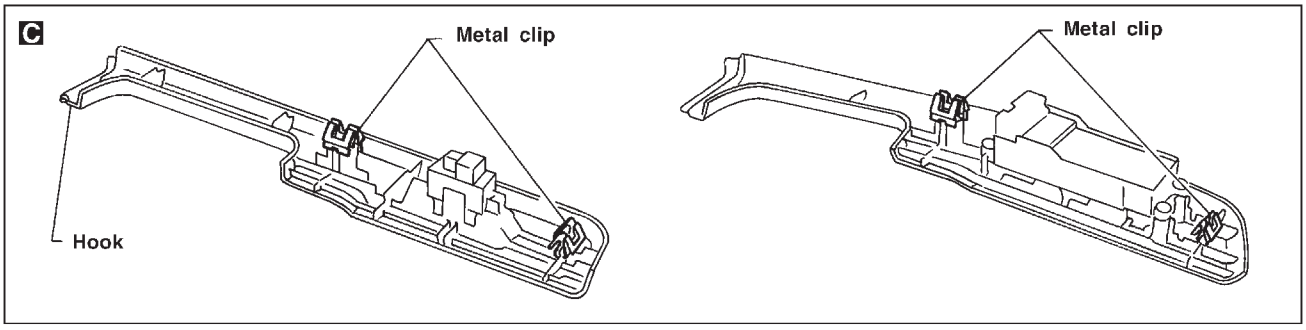
TYPE A

1. Remove inside handle escutcheon. A
2. Remove door armrest. (Front door only) B
3. Remove power window switches, then disconnect the connectors. C
4. Remove door finisher cover. (Rear door only) D
5. Remove bolts securing door finisher.
6. Remove clips securing door finisher.
7. Lift out door finisher.

SEC. 251•809•828







SBT207

TYPE B

=NABT0010S02

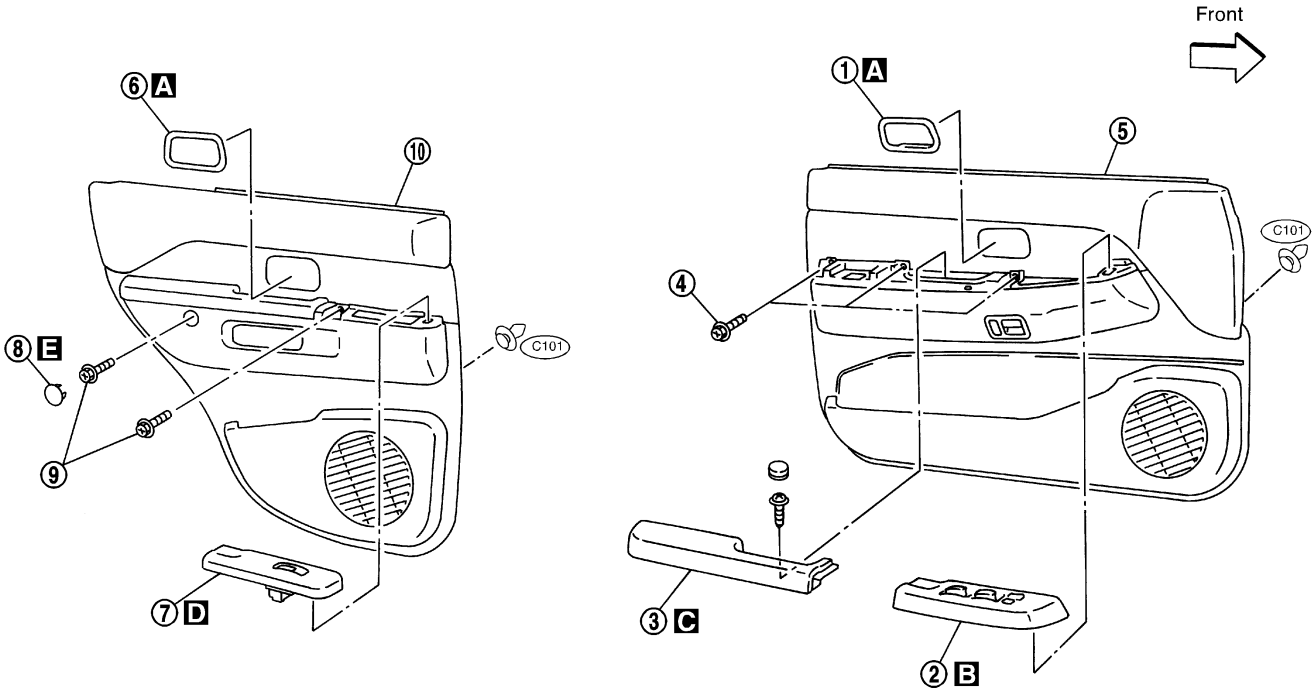
Front Door Trim

1. Remove inside handle escutcheon. A
2. Remove power window switch, then disconnect the connectors. B
3. Remove door armrest. C
4. Remove bolts securing door finisher.
5. Pull on door finisher to remove clips from door panel and remove door finisher, then disconnect glass hatch and fuel lid opener switch connector.

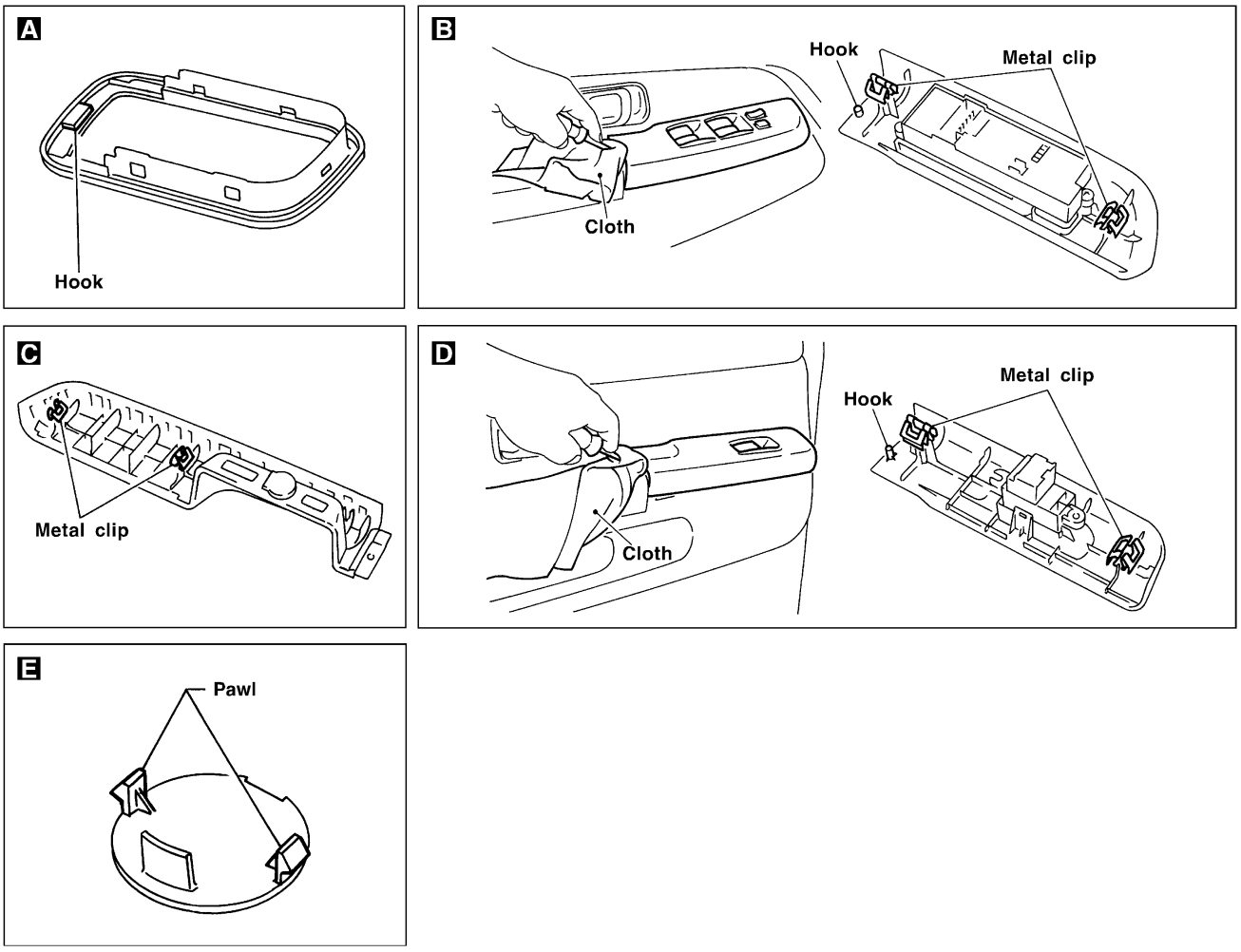
Rear Door Trim

6. Remove inside handle escutcheon. A
7. Remove power window switch, then disconnect the connector. D
8. Remove door armrest cap. E
9. Remove bolts securing door finisher.
10. Pull on door finisher to remove clips from door panel and remove door finisher.

SEC. 251•809•828



SBT696


A
Hook
B
Hook
Metal clip
Cloth
C
Metal clip
D
Metal clip
Hook
Cloth
E
Pawl

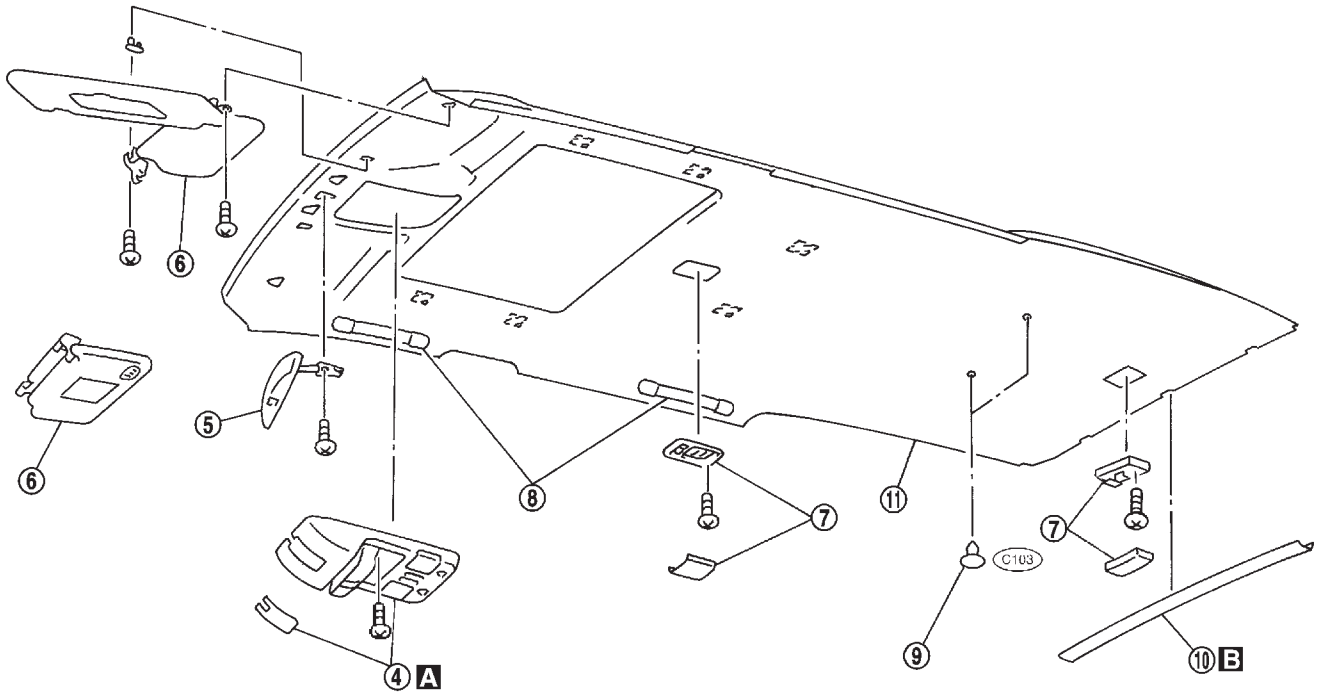
SBT697

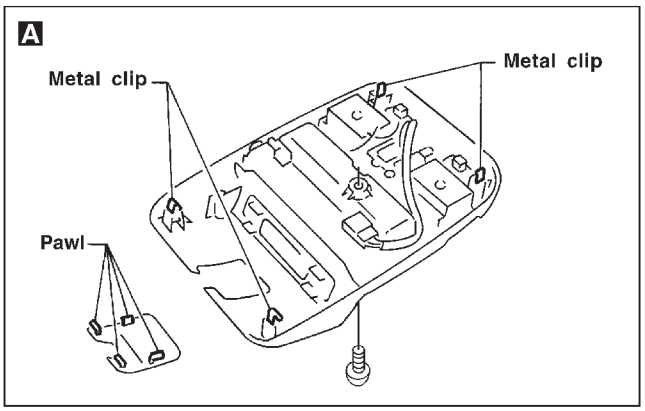
Removal and Installation

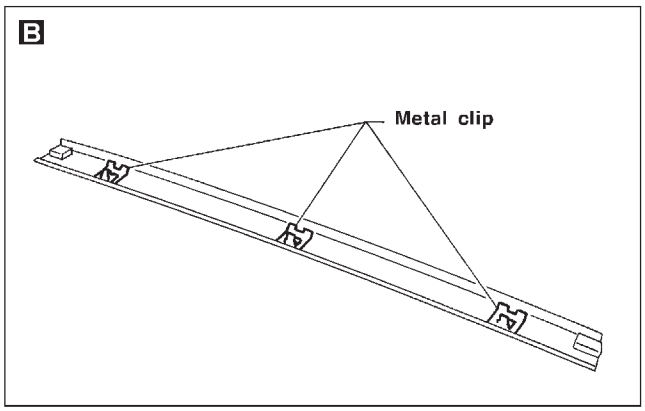
NABT0011

1. Remove front and rear seats. Refer to “FRONT SEAT” and “REAR SEAT” for details, BT-43, BT-47.
2. Remove front and rear seat belts. Refer to RS-3, “SEAT BELTS” for details.
3. Remove body side trim. Refer to “SIDE AND FLOOR TRIM” for details, BT-29.
4. Remove roof console assembly. A
5. Remove inside mirror assembly.
6. Remove sun visors.
7. Remove interior lamp assembly and luggage room lamp assembly.
8. Remove assist grips.
9. Remove clips securing headlining.
10. Remove rear roof garnish. B
11. Remove headlining from vehicle through either back door.

SEC. 264•738•963•964•970







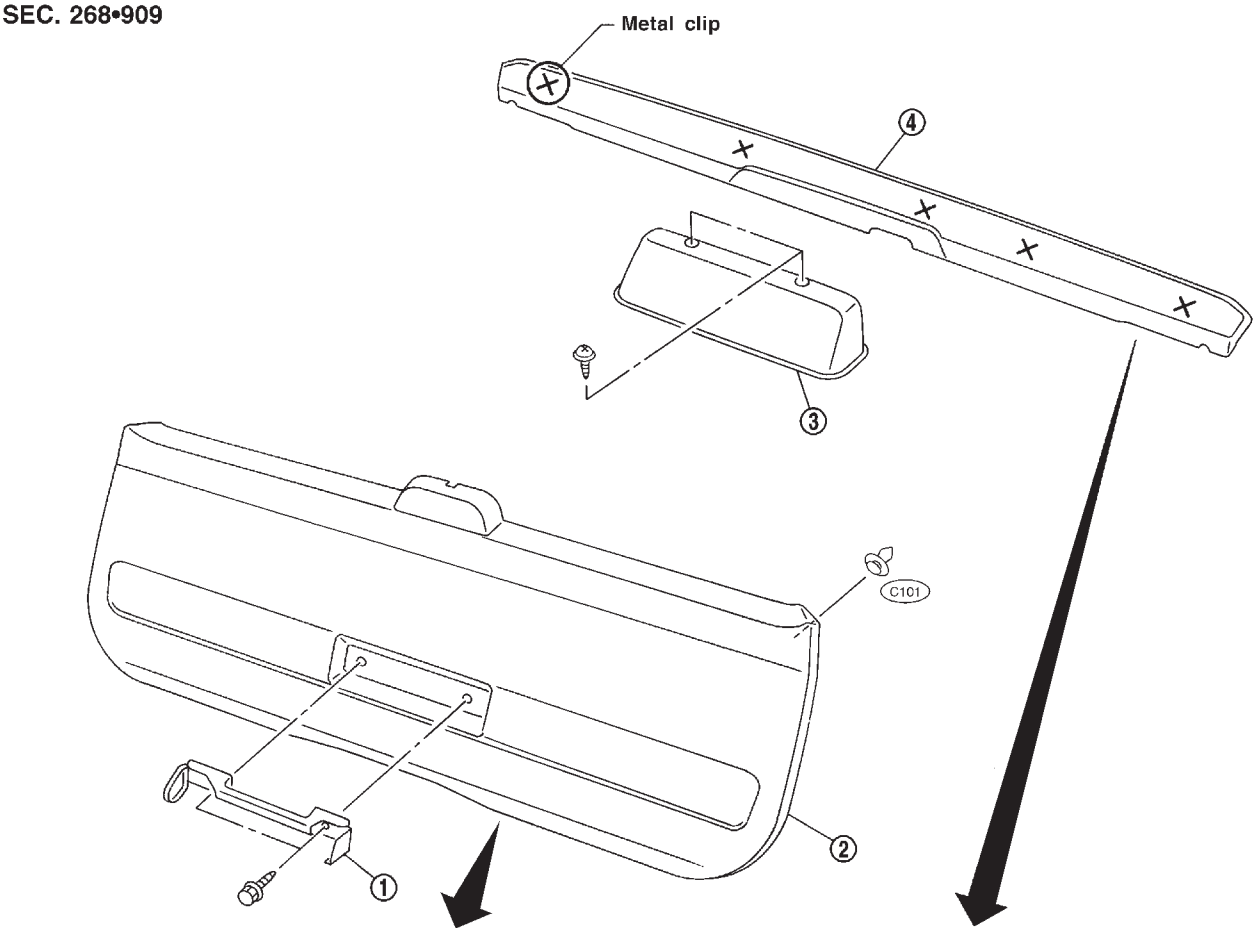
SBT487

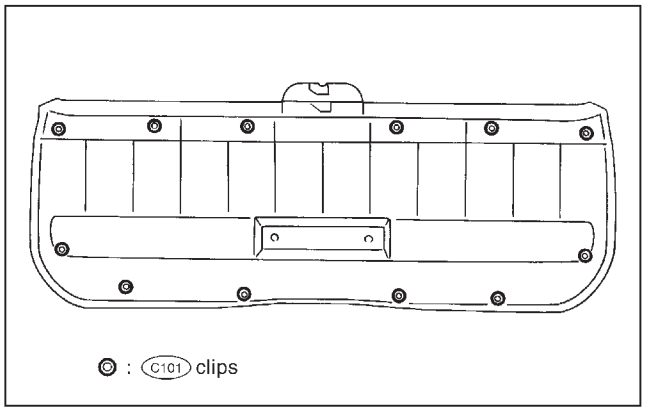
Removal and Installation

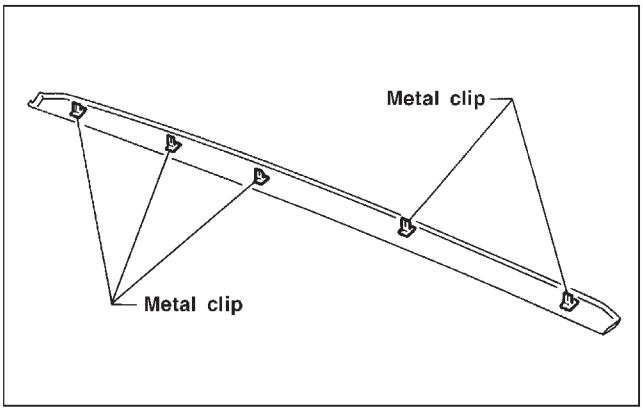
NABT0012

1. Remove back door grip.
2. Remove back door finisher assembly.
3. Remove high-mounted stop lamp.
4. Remove back door upper finisher assembly.

SEC. 268•909



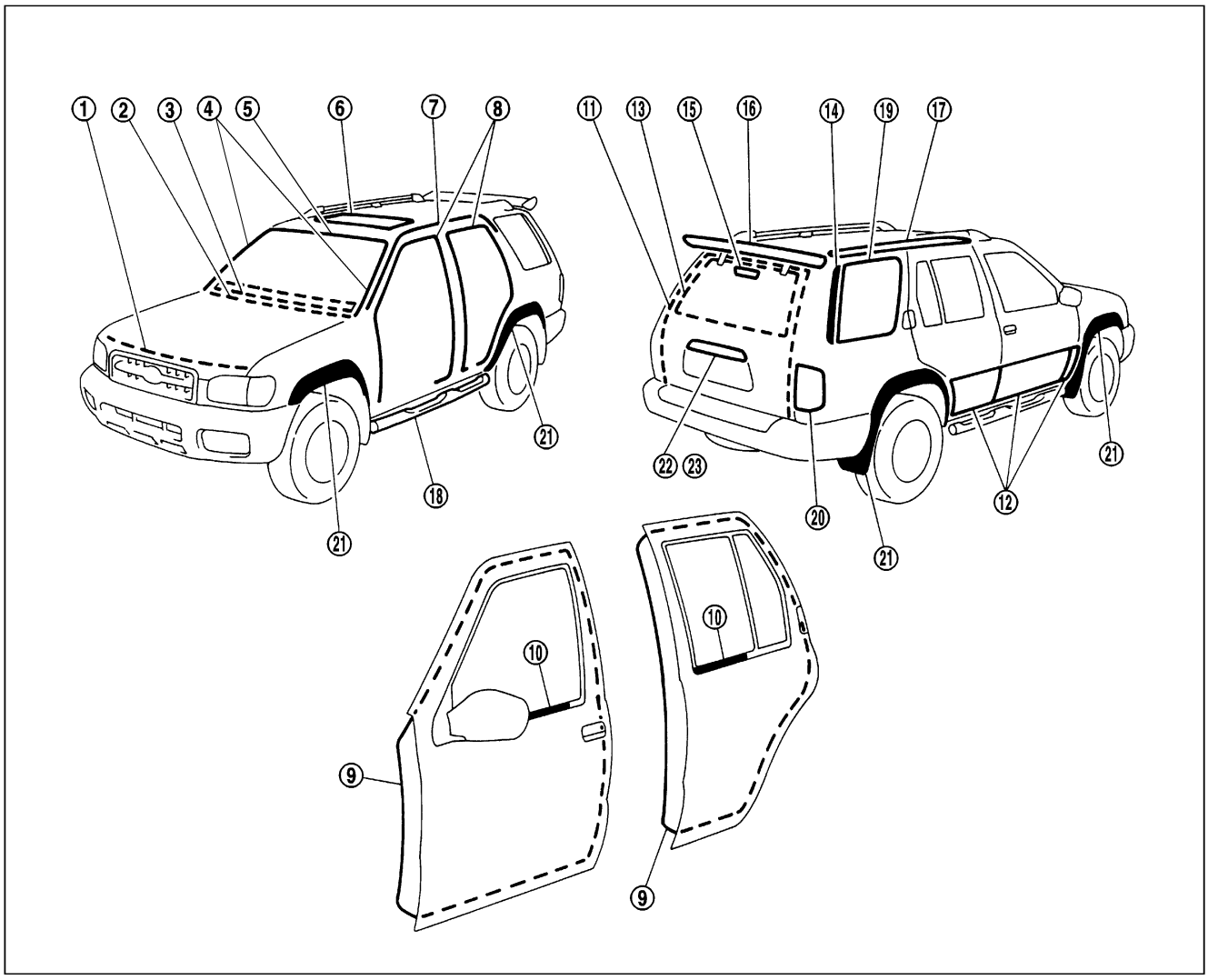




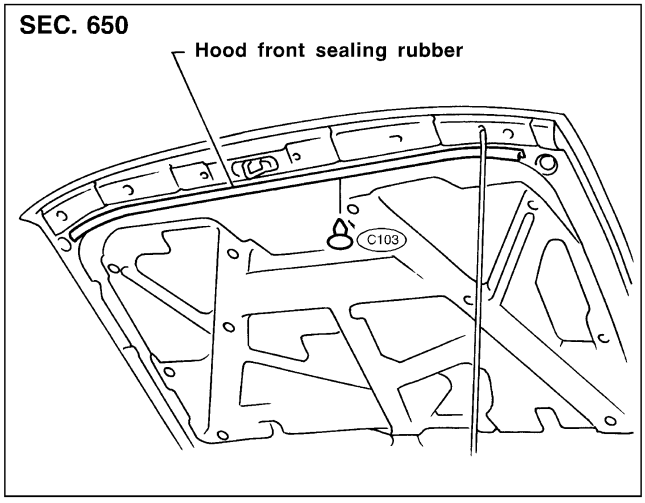
SBT223

Removal and Installation

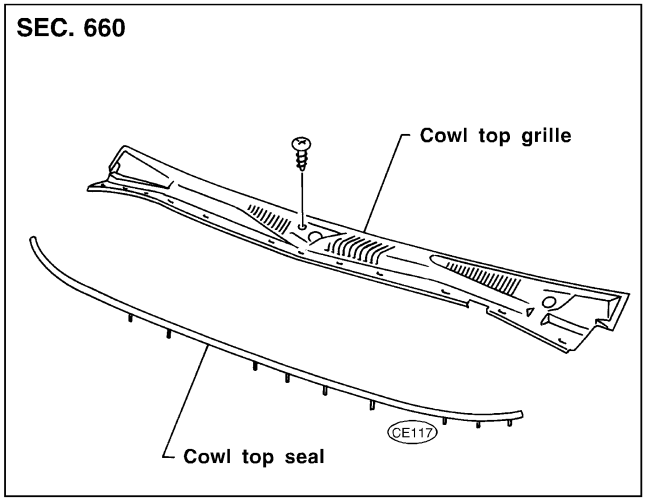
NABT0013



① Hood front seal



② ③ Cowl top seal and cowl top grille



④ Windshield side molding

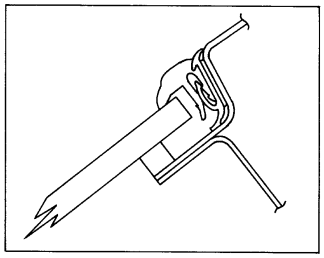
Mounted with screws.

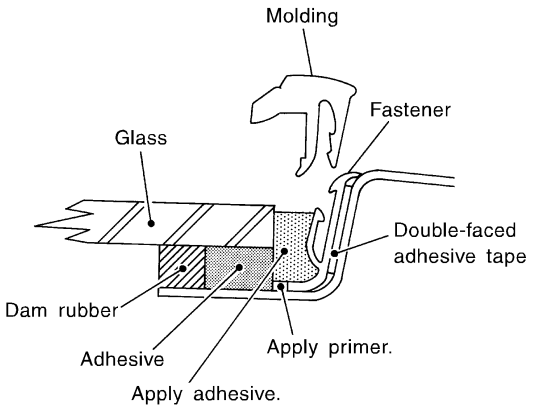
SBT729

⑤ Windshield upper molding

SEC. 720

1. Cut off adhesive at glass end.
2. Remove old adhesive from panel surface.
3. Set molding fastener and apply primer to body panel, and apply adhesive to body.

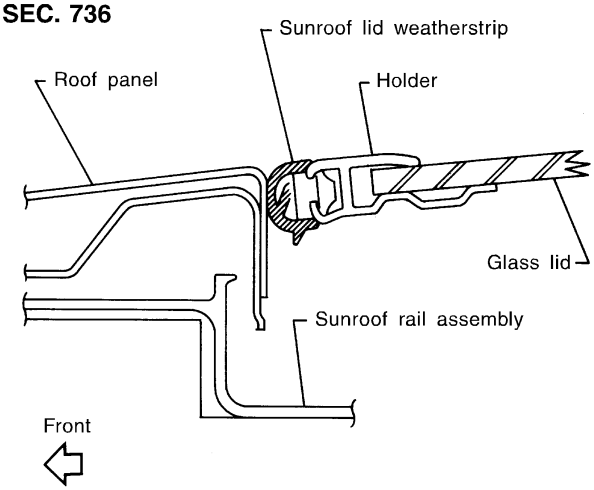




4. Install molding by aligning the molding mark located on center with vehicle center. Be sure to install tightly so that there is no gap around the corner.

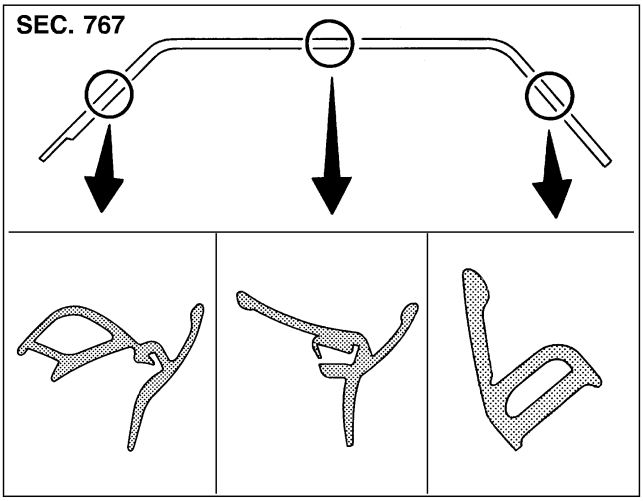
⑥ Sunroof lid weatherstrip

SEC. 736



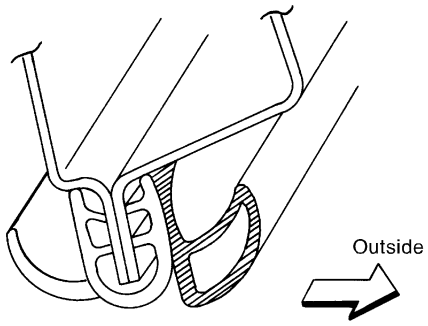
⑦ Drip weatherstrip

SEC. 767



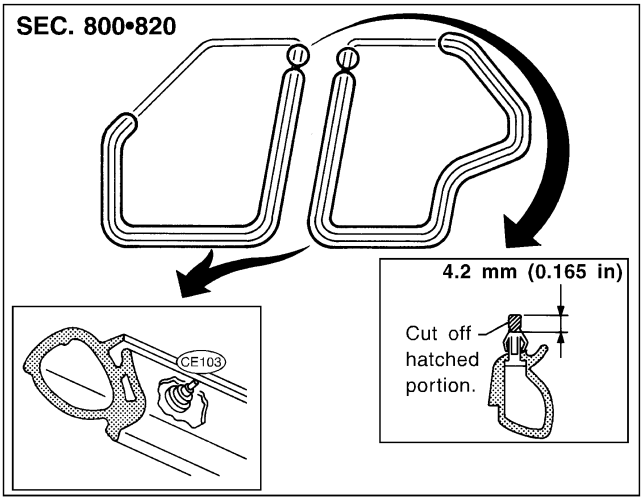
⑧ Body side welt

SEC. 769



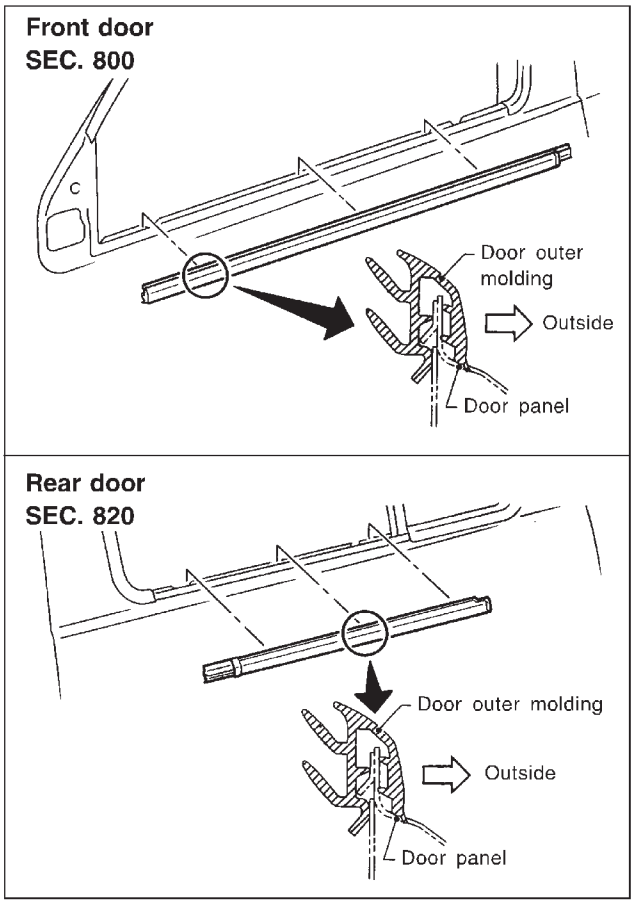
⑨ Door weatherstrip

SEC. 800•820

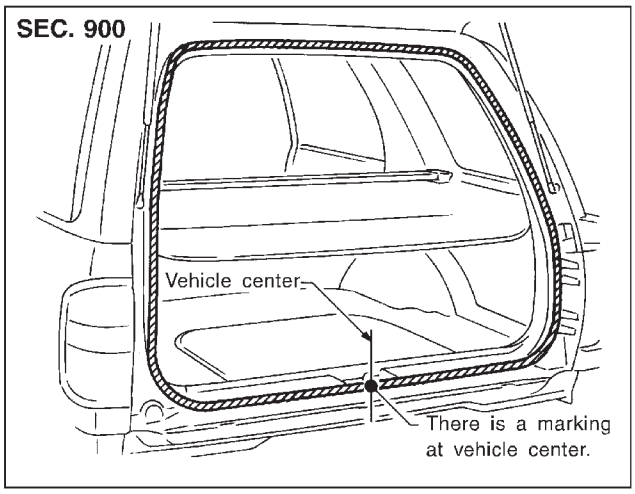


SBT730

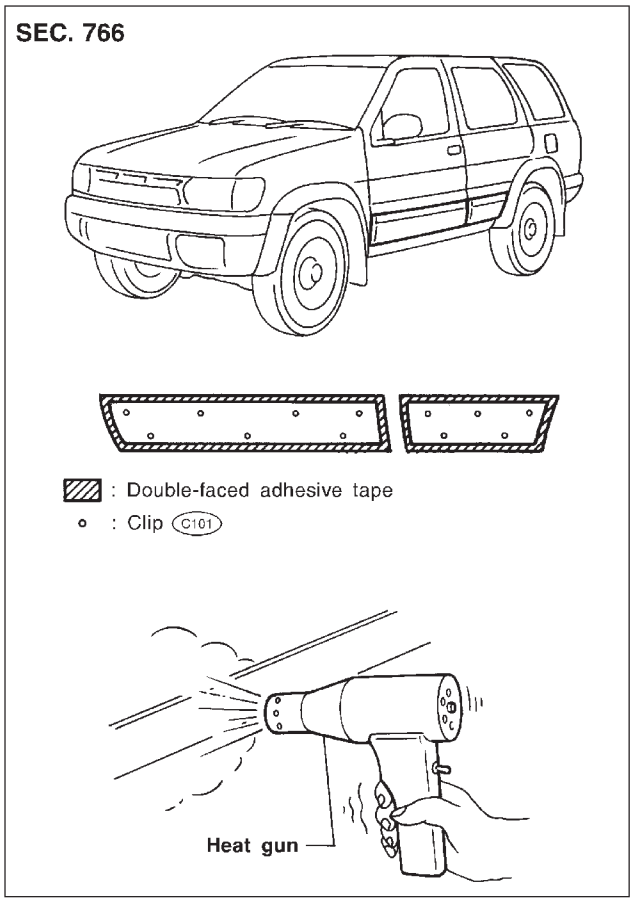
⑩ Door outside molding



⑪ Back door weatherstrip

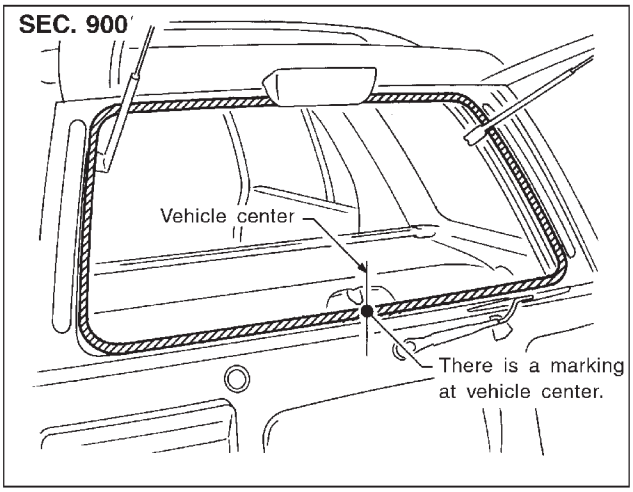


⑫ Side guard molding



- **With a vehicle coated with Hard Clear Coat, use double-faced 3M adhesive tape Product No. 4210 or equivalent, after priming with 3M primer Product No. N-200 or C-100 or equivalent.**

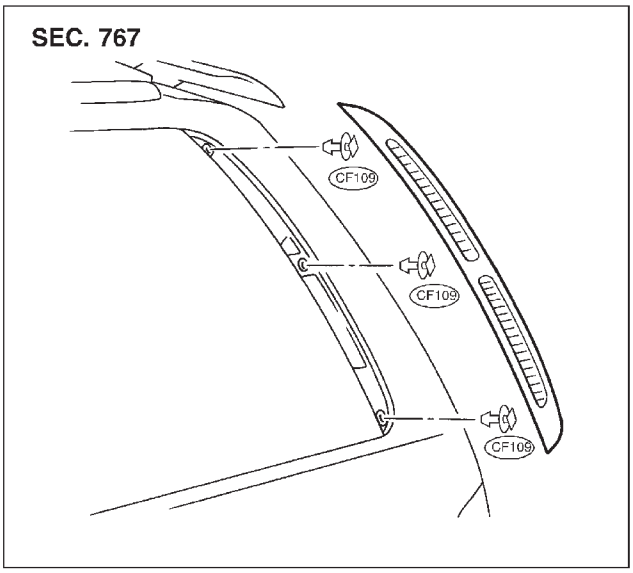
⑬ Back door window weatherstrip



SBT490-A

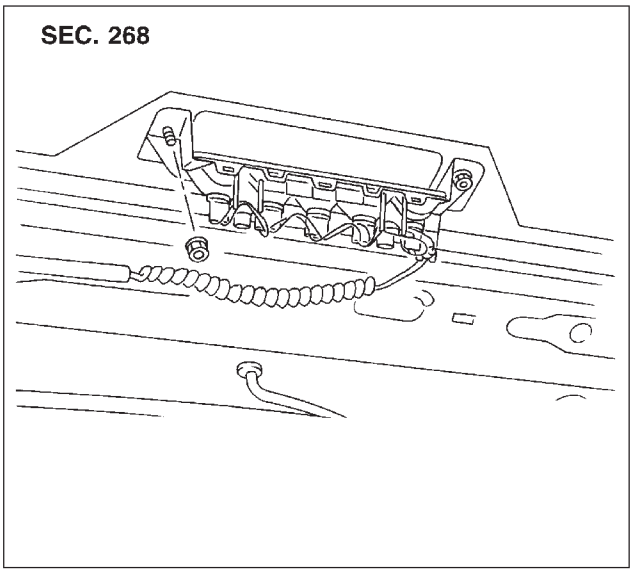
⑭ Air outlet grille

SEC. 767



⑮ High-mounted stop lamp

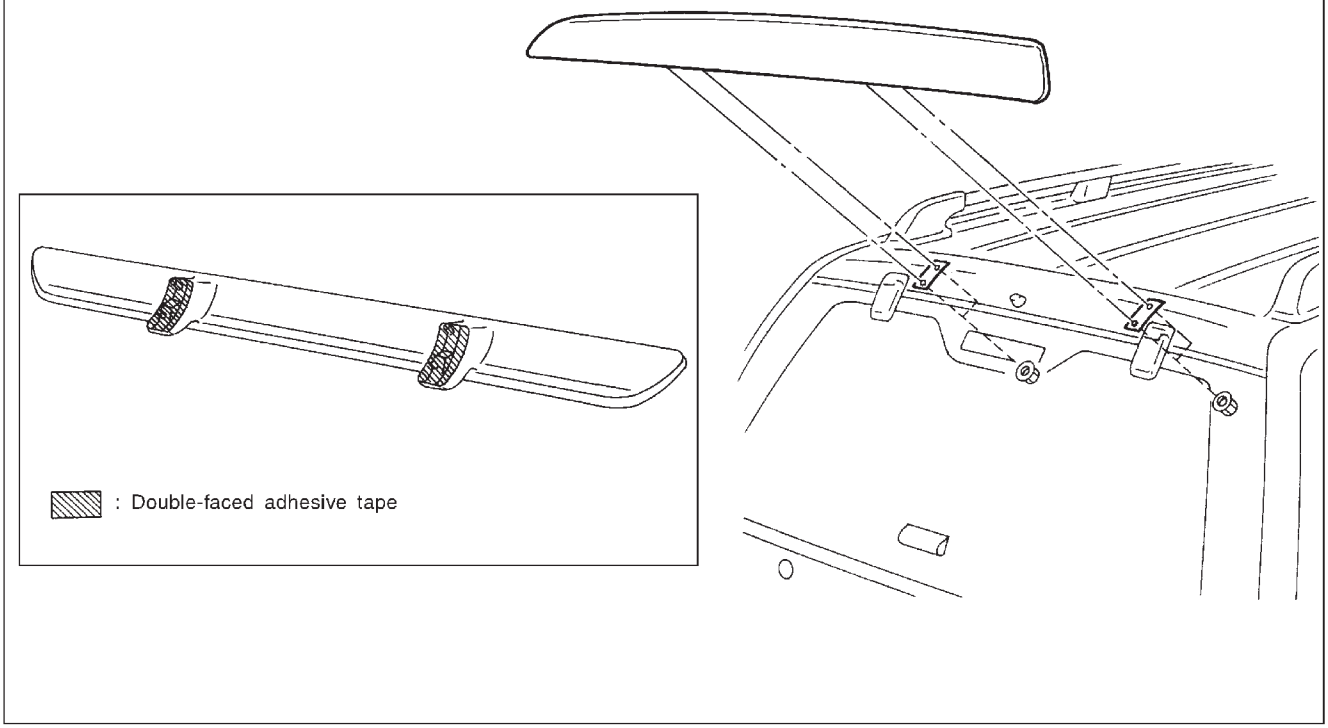
SEC. 268



⑯ Back door deflector

- When installing, make sure that there are not gaps or waves at ends of deflector.
- Before installing deflector, clean and remove oil from surface where deflector will be mounted.

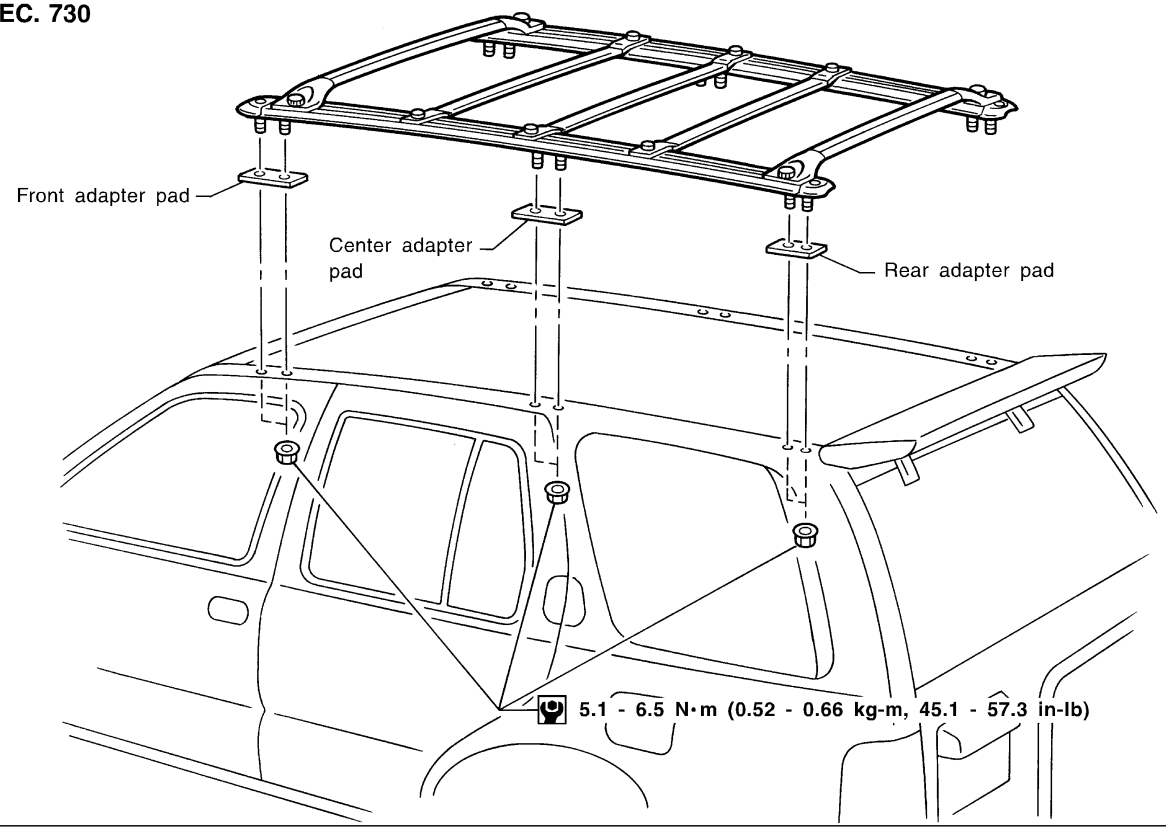
SEC. 960



SBT491-A

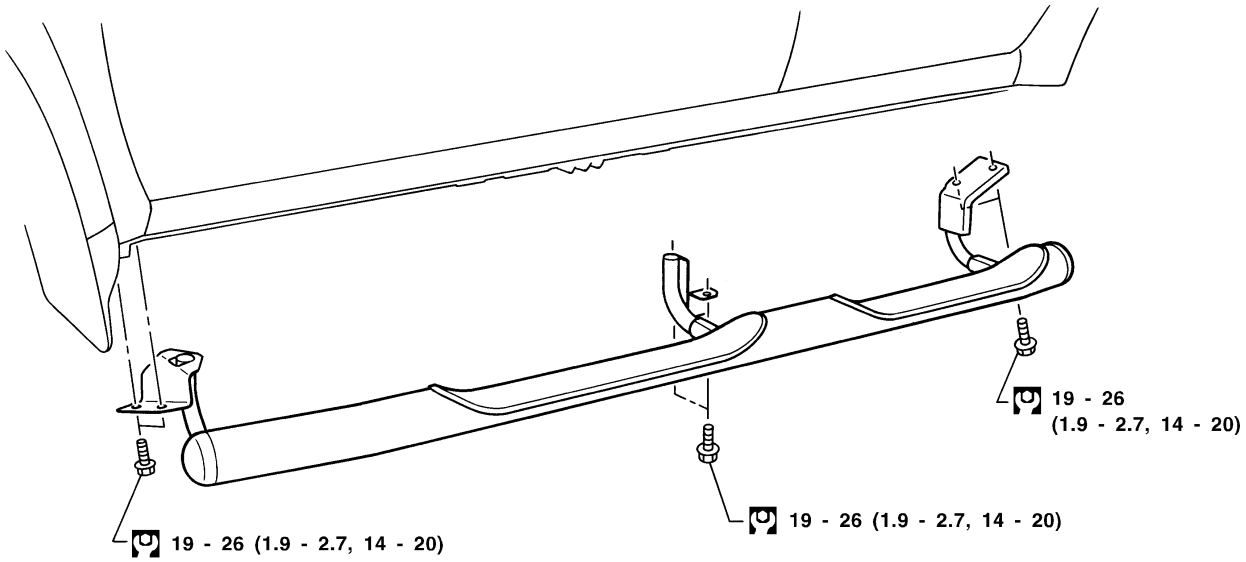
⑰ Roof rack

SEC. 730



⑱ Side step

SEC. 767



• Pipe type and board type outer steps are only different in shape. Removal and installation method for both types is the same.

: N·m (kg-m, ft-lb)

SBT492-B

⑲ **Rear side window molding**

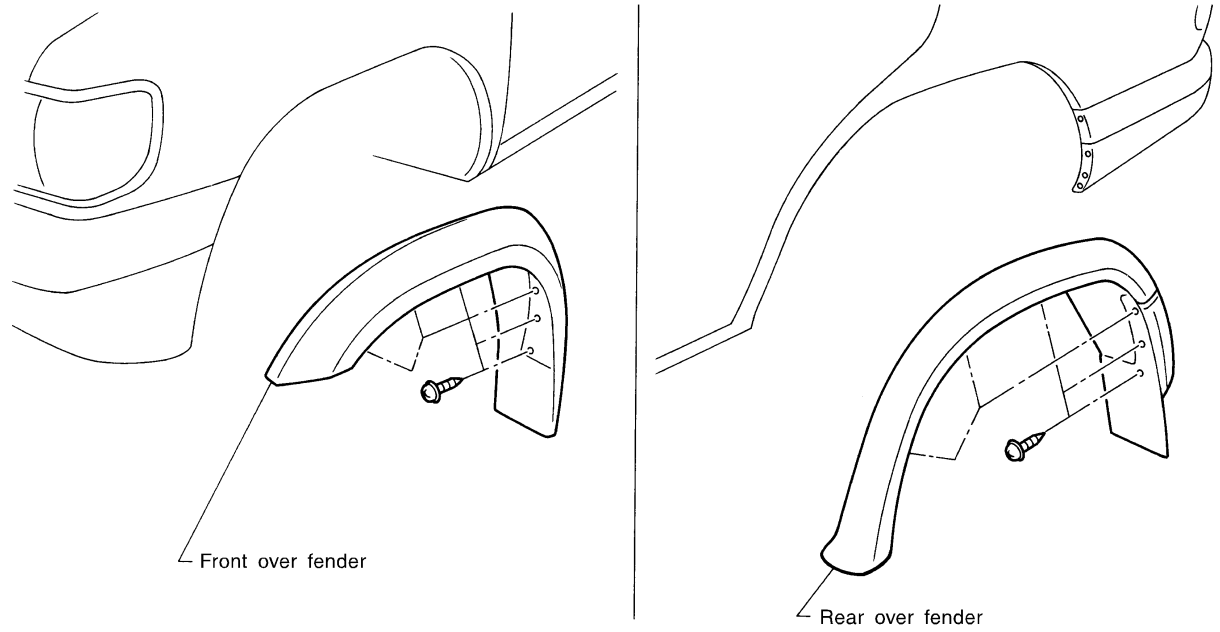
Refer to the applicable sections on the preceding pages.

⑳ **Rear combination lamp**

Rear combination lamps are installed with nuts.

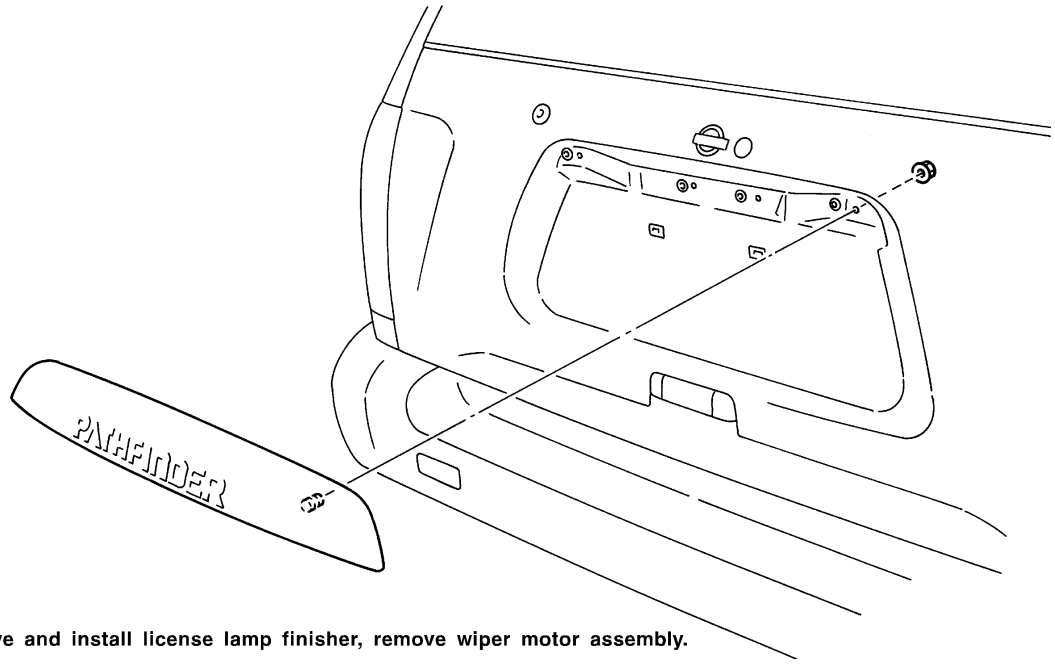
㉑ **Over fender**

SEC. 630•780



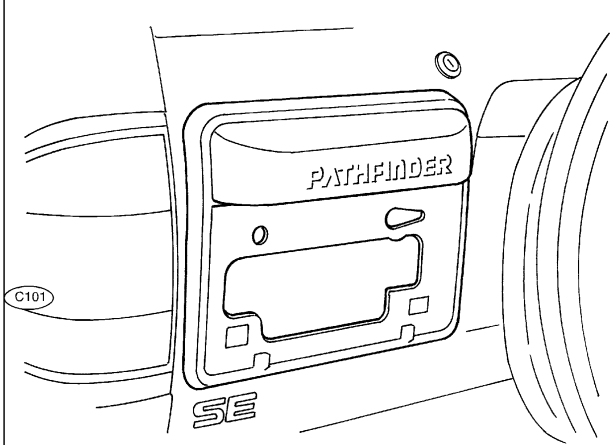
SBT493-A

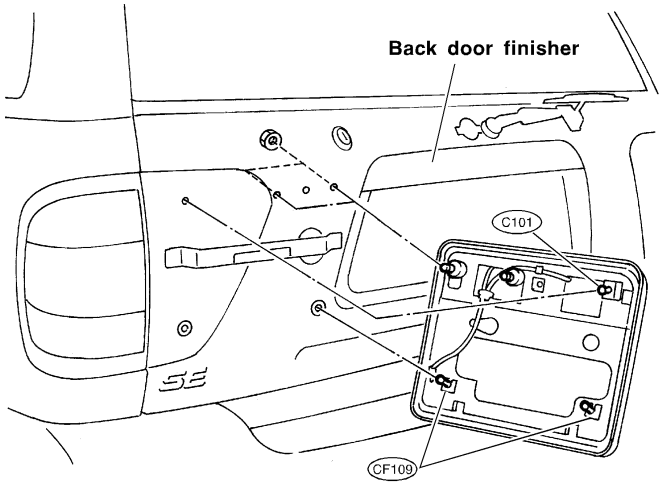
㉒ License lamp finisher (Without spare tire hanger models)



To remove and install license lamp finisher, remove wiper motor assembly.

㉓ License lamp finisher (With spare tire hanger models)





Removal and installation methods for ㉒ license lamp finisher and back door finisher are the same.

SBT731

Removal and Installation

NABT0014

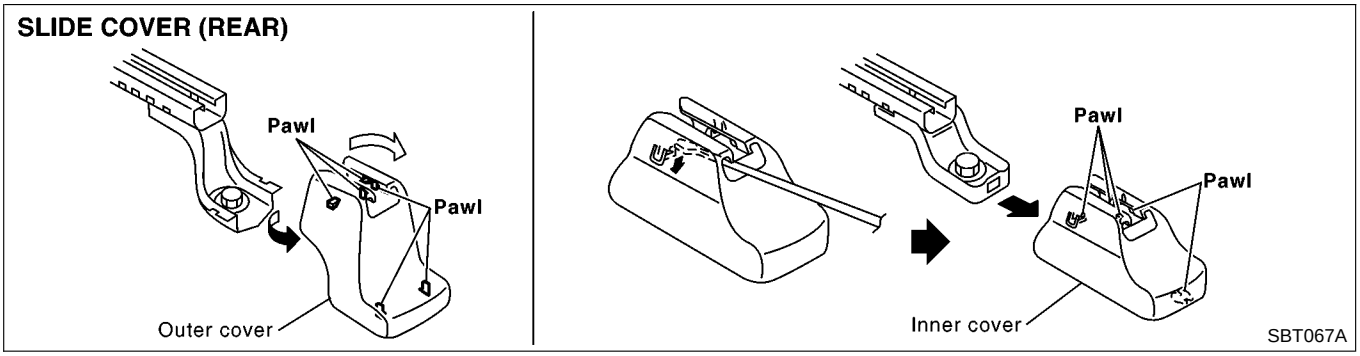
- When removing or installing the seat trim, handle carefully to keep dirt out and avoid damage.

★ For Wiring Diagram, refer to EL-200, “POWER SEAT”.

CAUTION:

- **Before removing the front seat, turn the ignition switch off, disconnect both battery cables and wait at least 3 minutes.**
- **When checking the power seat circuit for continuity using a circuit tester, do not confuse its connector with the side air bag module connector. Such an error may cause the air bag to deploy.**
- **Do not drop, tilt, or bump the side air bag module installed in the seat. Always handle it with care.**
- **Disconnect the side air bag, power seat switch, and heated seat harness connectors from under the seat before removing the seat.**
- **Disconnect the side air bag harness connector before removing the seat back. (Refer to RS-20, “Side Air Bag Module”.)**

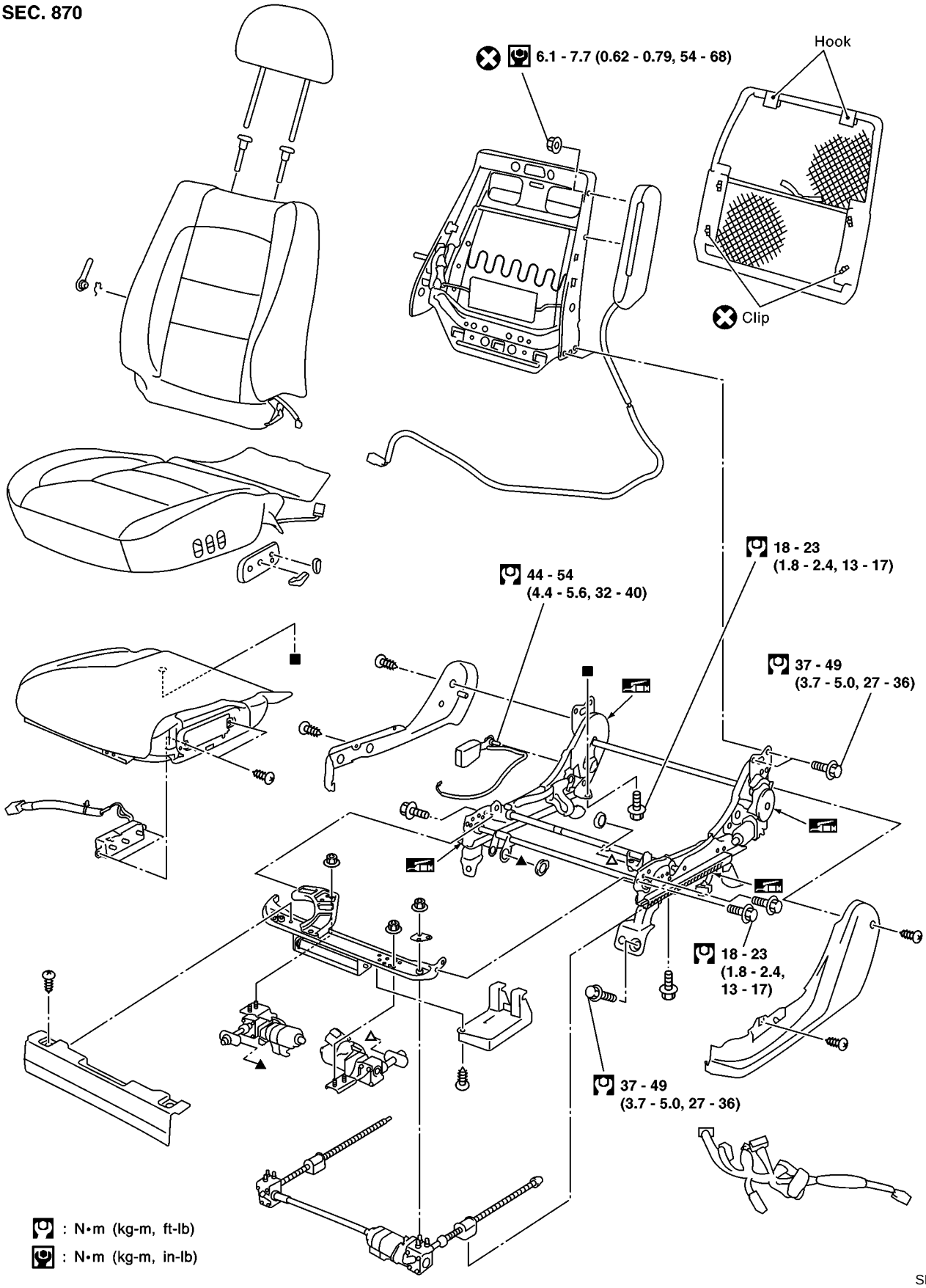
SLIDE COVER (REAR)



POWER SEAT

=NABT0014S01

SEC. 870

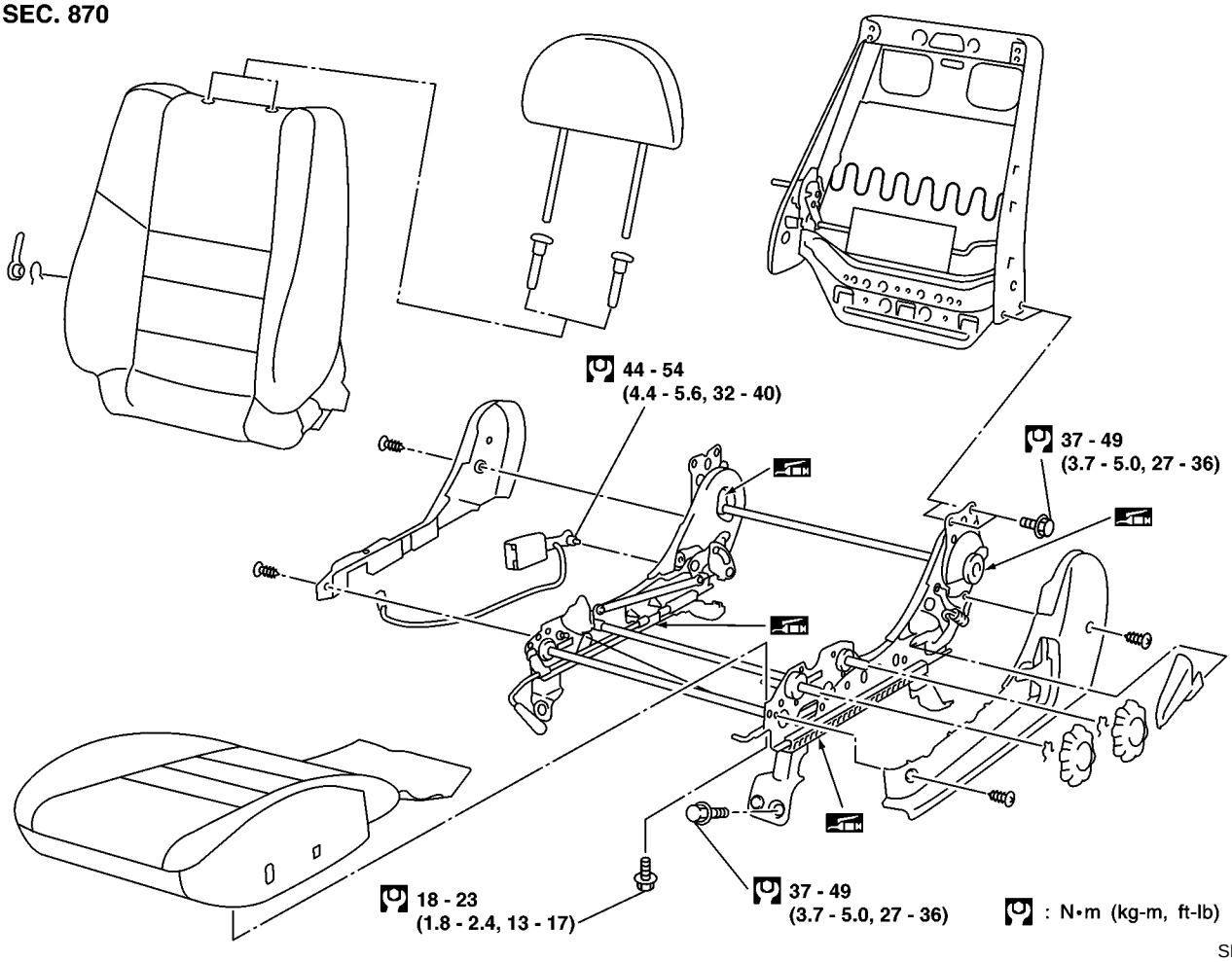


SBT019A

MANUAL SEAT

NABT0014S02

SEC. 870



SBT020A

Removal and Installation (Cont'd)

HEATED SEAT

=NABT0014S03

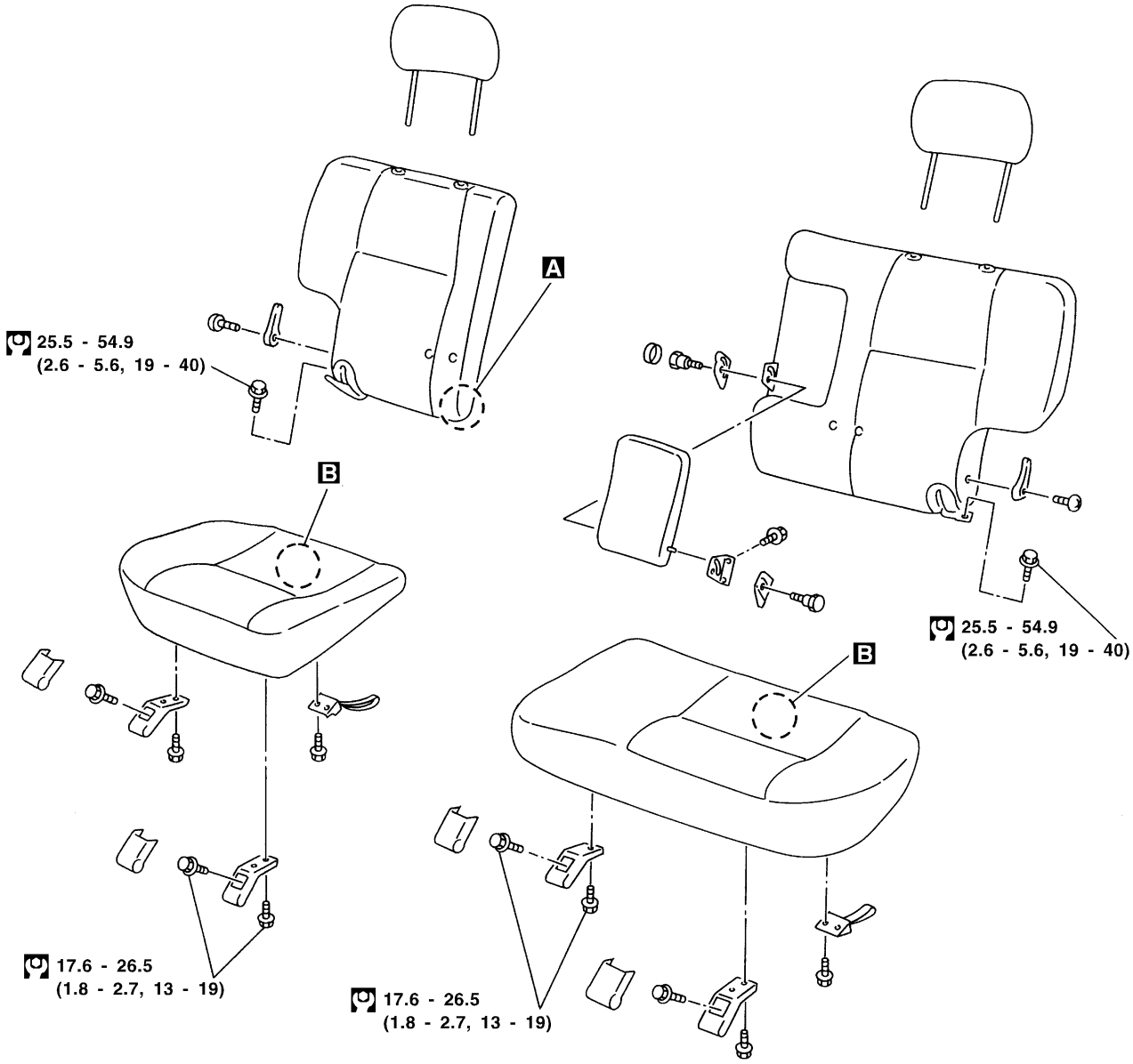
- When handling seat, be extremely careful not to scratch heating unit.
- To replace heating unit, seat trim and pad should be separated.
- Do not use any organic solvent, such as thinner, benzene, alcohol, gasoline, etc. to clean trims.

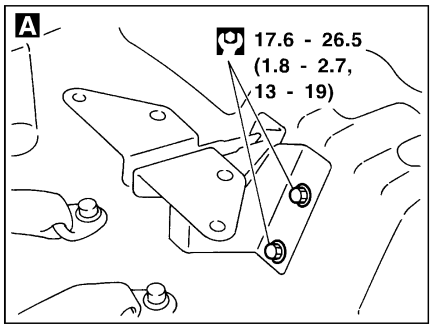
★ **For Wiring Diagram, refer to EL-202, "HEATED SEAT".**

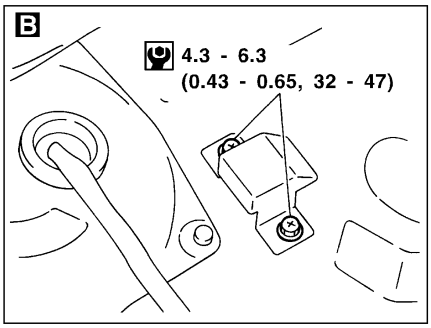
Removal and Installation

NABT0015

SEC. 870







: N•m (kg-m, in-lb)
: N•m (kg-m, ft-lb)

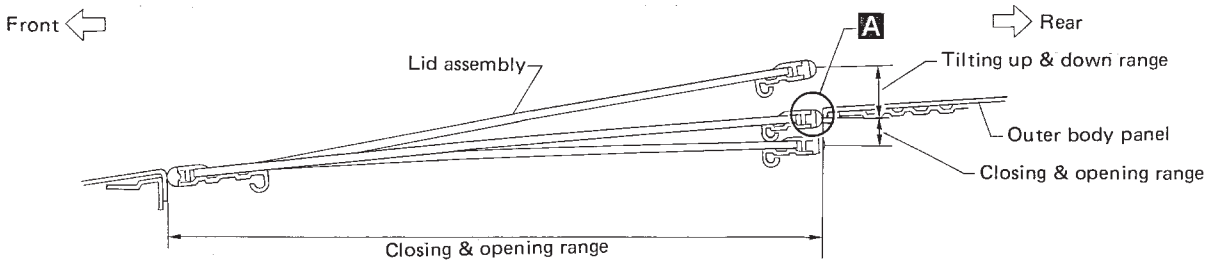
SBT190-B

Adjustment

NABT0016

Install motor & limit SW assembly and sunroof rail assembly in the following sequence:

1. Arrange equal lengths of link and wire assemblies on both sides of sunroof opening.
2. Connect sunroof connector to sunroof switch and positive (+) power supply.
3. Set lid assembly to fully closed position A by operating OPEN switch and TILT switch.
4. Fit outer side of lid assembly to the surface of roof on body outer panel.
5. Remove motor, and keep OPEN switch pressed until motor pinion gear reaches the end of its rotating range.
6. Install motor.
7. Check that motor drive gear fits properly in wires.
8. Press TILT-UP switch to check lid assembly for normal tilting.
9. Check sunroof lid assembly for normal operations (tilt-up, tilt-down, open, and close).



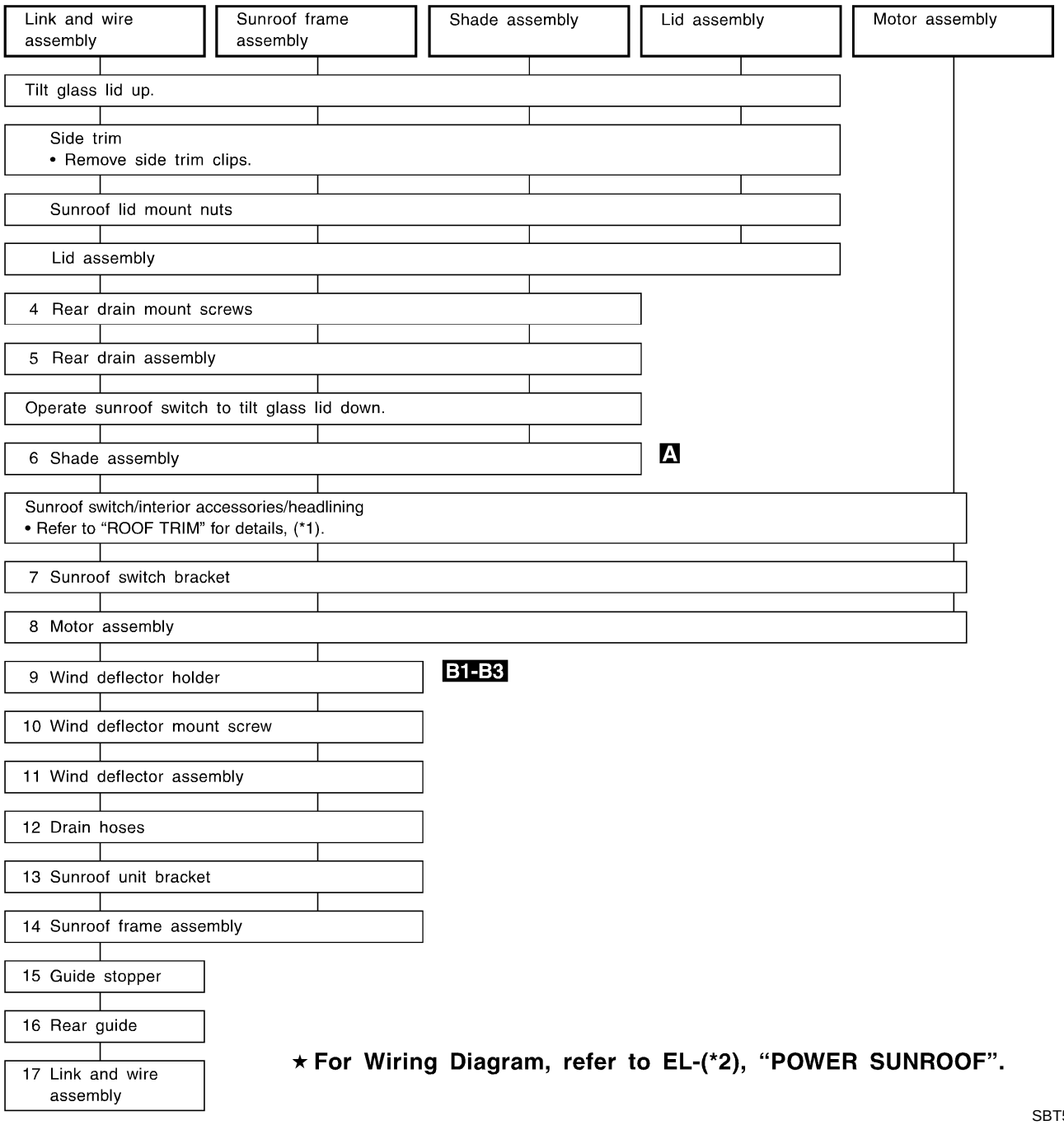
SBF920F

Removal and Installation

=NABT0017

- After any adjustment, check sunroof operation and lid alignment.
- Handle finisher plate and glass lid with care so not to cause damage.
- It is desirable for easy installation to mark each point before removal.

CAUTION:
Always work with a helper.

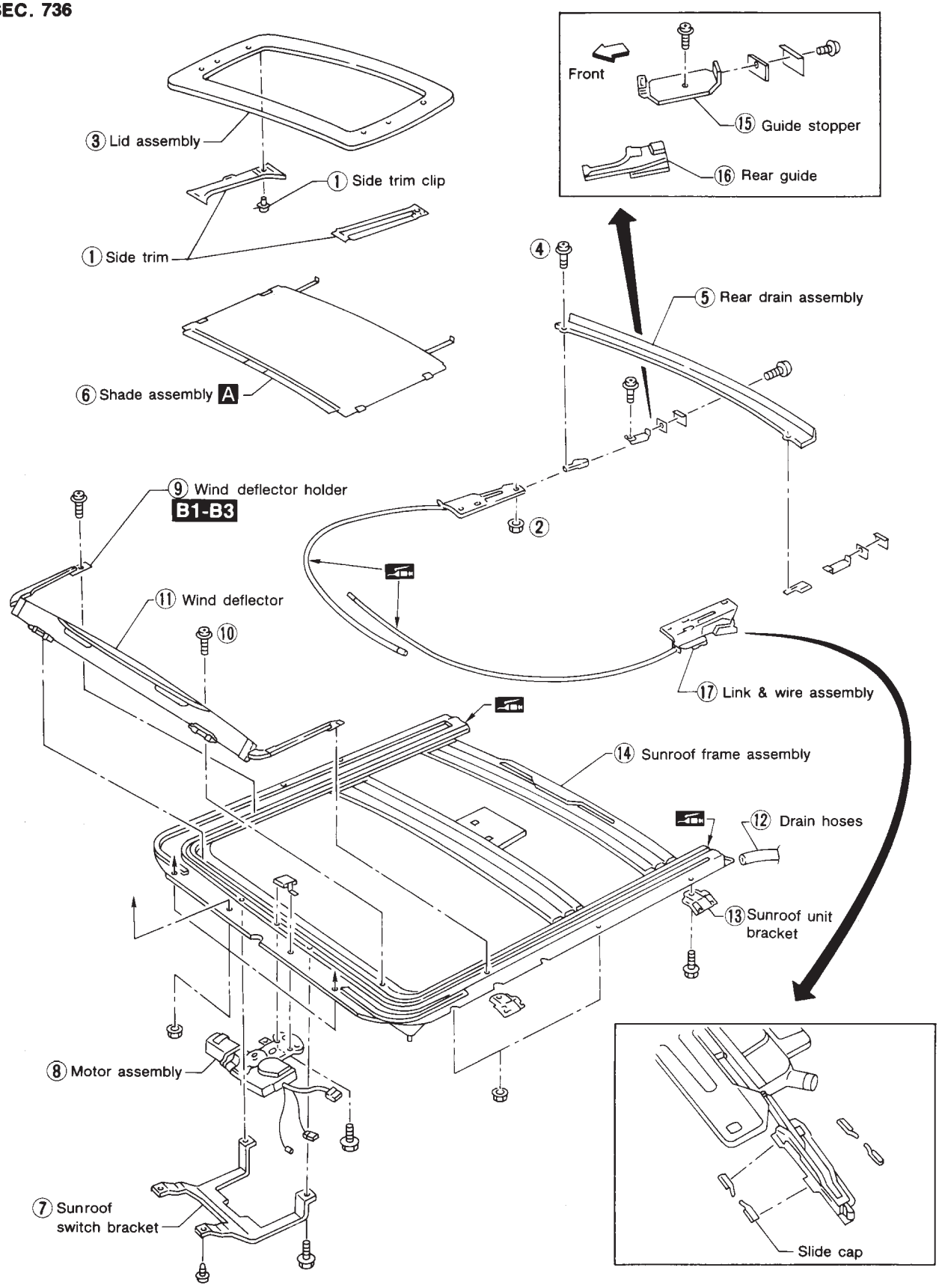


★ **For Wiring Diagram, refer to EL-(*2), "POWER SUNROOF".**

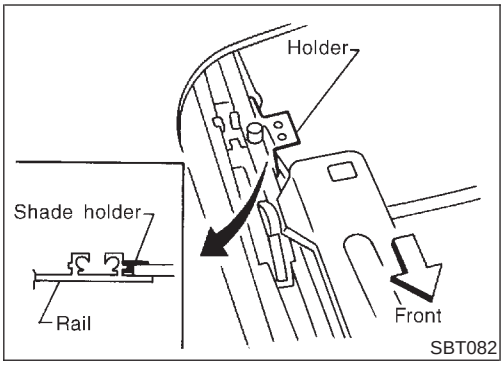
SBT515-D

*1 BT-34 *2 EL-196

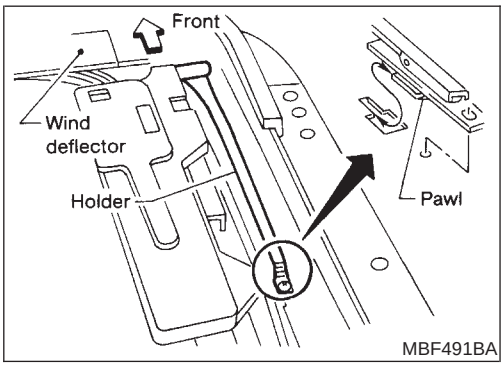
SEC. 736



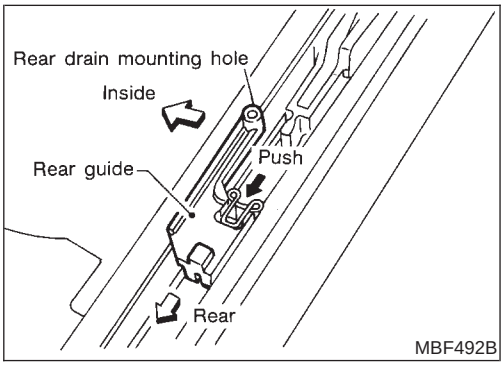
MBF462BG



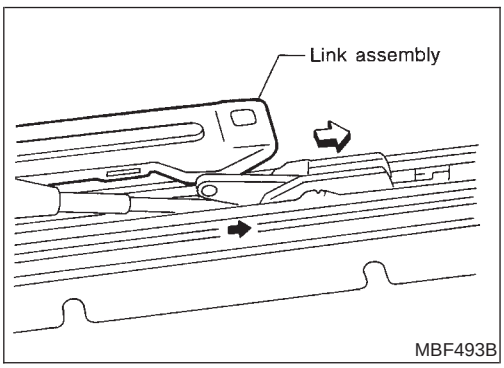
A Using flat-bladed screwdriver, pry shade assembly holder off rail. Then pull shade assembly forward to remove it from rail.



B1 Disengage pawls from rail, then remove wind deflector holder.



B2 Using flat-bladed screwdriver, pry stopper spring off rail groove. Then slide rear guide backward to remove it from rail.



B3 Remove wire and link assembly from rail while pushing link back with flat-bladed screwdriver.

Trouble Diagnoses

=NABT0018

DIAGNOSTIC TABLE

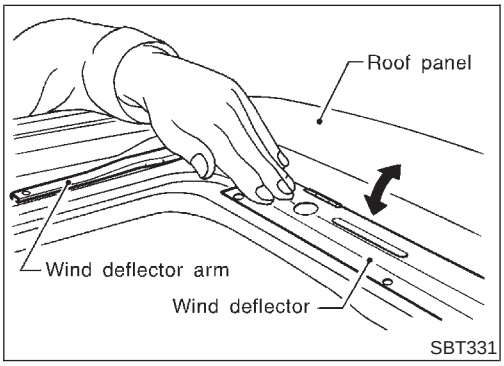
NABT0018S01

NOTE:

For diagnosing electric problem, refer to EL-198, “POWER SUNROOF”.

		Check items (Components)				
		Wind deflector	Adjustment	Drain hoses	Weatherstrip	Link and wire assembly
	Reference page	BT-52	BT-53	BT-54	BT-54	BT-55
Symptom	Excessive wind noise	1	2		3	
	Water leaks		1	2	3	
	Sunroof rattles		1	4	2	3
	Excessive operation noise		1		2	3

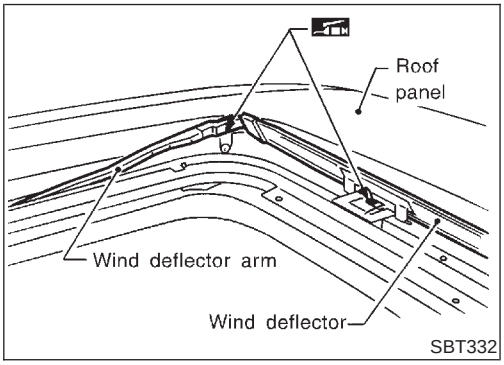
The numbers in this table mean checking order.



WIND DEFLECTOR

NABT0018S02

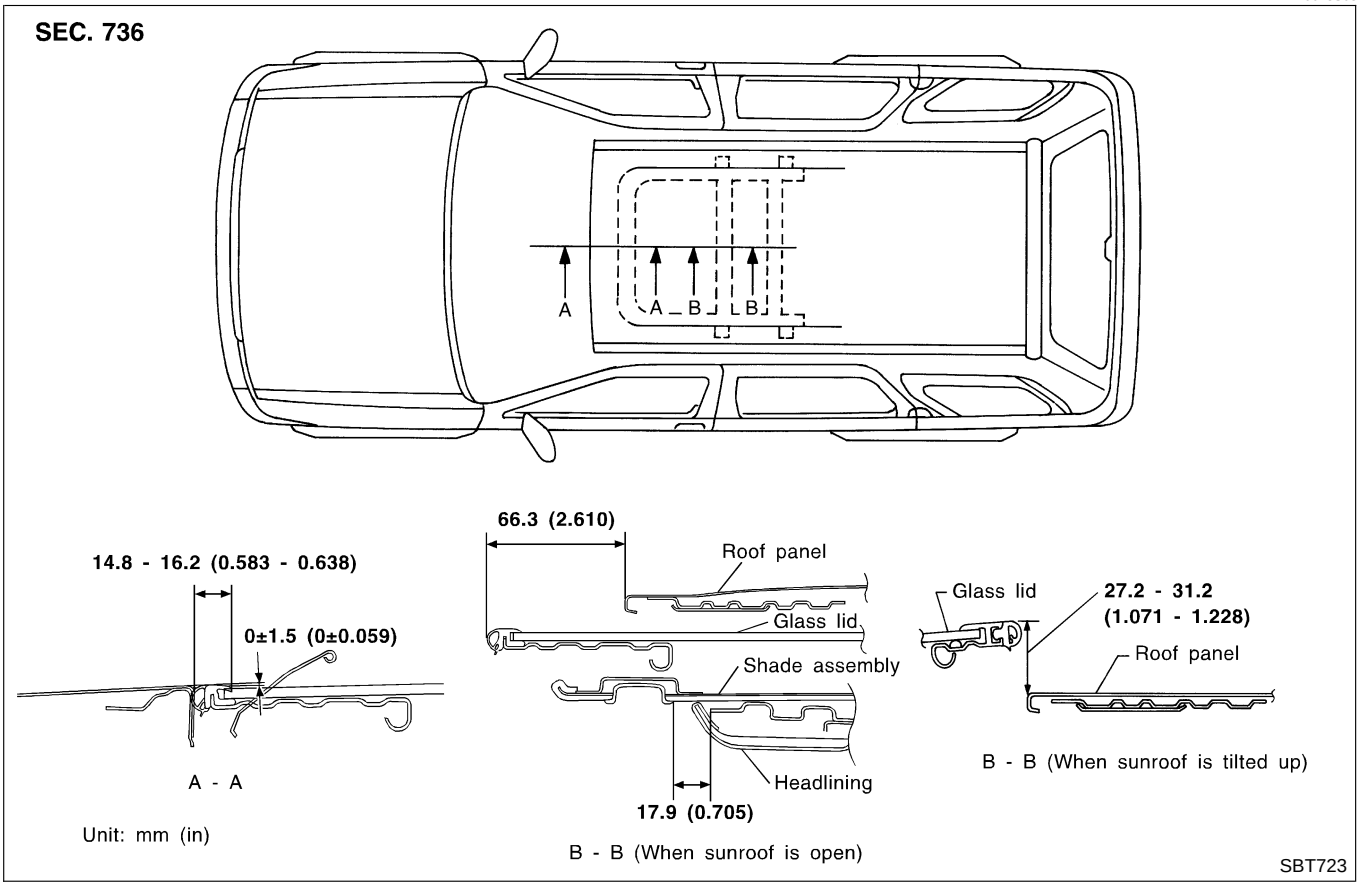
1. Open lid.
2. Check visually for proper installation.
3. Check to ensure a proper amount of petroleum jelly has been applied to wind deflector connection points; apply if necessary.



4. Check that wind deflector is properly retracted by hand. If it is not, remove and visually check condition. (Refer to removal procedures, BT-49.) If wind deflector is damaged, replace with new one. If wind deflector is not damaged, re-install properly.

ADJUSTMENT

NABT0018S03



If any gap or height difference between glass lid and roof is found, check glass lid fit and adjust as follows:

Gap Adjustment

NABT0018S0301

1. Open shade assembly.
2. Tilt glass lid up then remove side trim.
3. Loosen glass lid securing nuts (3 each on left and right sides), then tilt glass lid down.
4. Adjust glass lid from outside of vehicle so it resembles "A-A" as shown in the figure above.
5. Tilt glass lid up and down until it is adjusted to "B-B" as shown in the figure above.
6. After adjusting glass lid, tilt glass lid up and tighten nuts.
7. Tilt glass lid up and down several times to check that it moves smoothly.

Height Difference Adjustment

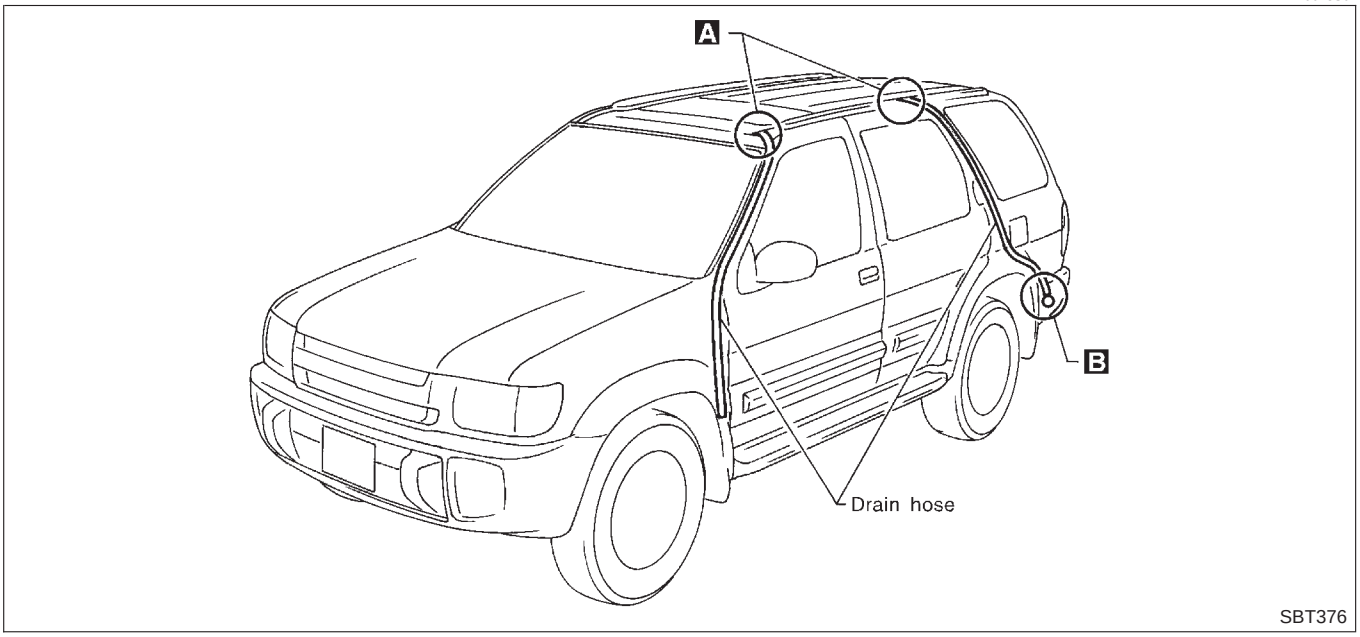
NABT0018S0302

1. Tilt glass lid up and down.
2. Check height difference between roof panel and glass lid to see if it is as "A-A" as shown in the figure above.
3. If necessary, adjust it by using one of following procedures.

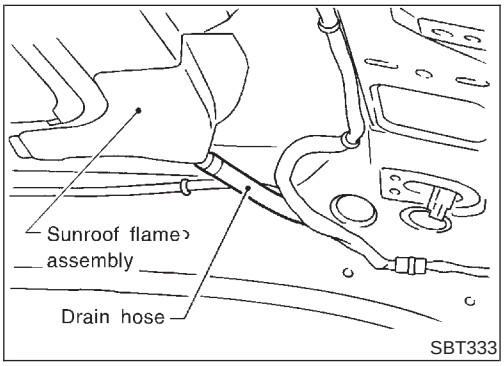
- Adjust by adding or removing adjustment shim(s) between glass lid and link assembly.
- If glass lid protrudes above roof panel, add shim(s) or plain washer(s) at sunroof mounting bracket or stud bolt locations to adjust sunroof installation as required.

DRAIN HOSES

NABT0018S04

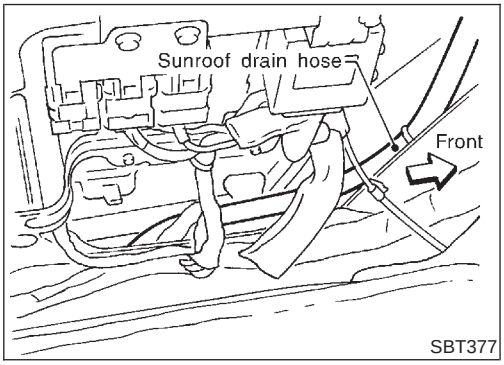


SBT376



SBT333

1. Remove headlining to access drain hose connections. (Refer to "Removal and Installation" in "ROOF TRIM", BT-34, for detail.)
2. Check visually for proper connections, damage or deterioration. A (The figure shows only the front side.)



SBT377

3. If leakage occurs around luggage room, remove luggage room side trim and check connecting area. Check for proper connection, damage or tear. B
4. Remove drain hoses and check visually for any damage, cracks, or deterioration.
5. Pour water into drain hoses and find damaged portion.

- If any damaged portion is found at each step, replace the damaged part.

WEATHERSTRIP

NABT0018S05

- In the case of leakage around glass lid, close glass lid and pour water over glass lid to find damaged or gap portion.

1. Remove glass lid assembly. (Refer to removal procedures, BT-49, for details.)
2. Visually check weatherstrip for proper installation. If a gap exists between glass lid and weatherstrip, check for sufficient amount of butyl seal. If required, remove weatherstrip and apply butyl seal.
   Refer to "EXTERIOR" (BT-36), for details.

3. Check weatherstrip visually for any damage, deterioration, or flattening.

- If any damage is found, replace weatherstrip.

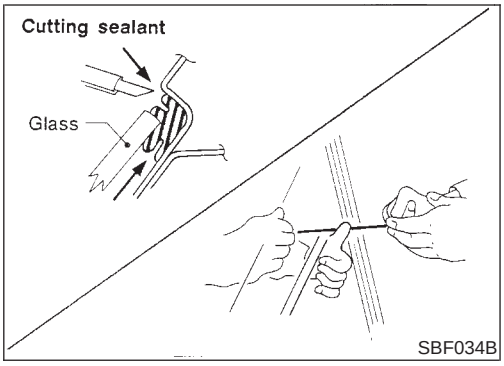
CAUTION:
Do not remove weatherstrip except when replacing, or filling up butyl seal.

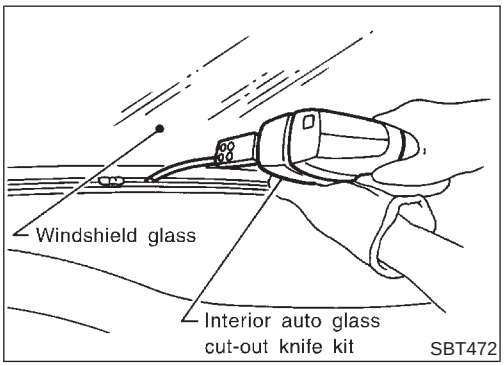
LINK AND WIRE ASSEMBLY

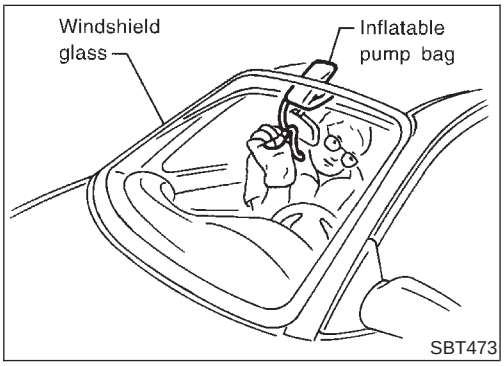
NABT0018S06

NOTE:
Before replacing a suspect part, carefully ensure it is the source of noise being experienced.

1. Check link to determine if coating film has peeled off to such an extent that substrate is visible. Check also to determine if link is the source of noise. If it is, replace it.
2. Visually check to determine if a sufficient amount of petroleum jelly has been applied to wire or rail groove. If not, add petroleum jelly as required.
3. Check wire for any damage or deterioration. If any damage is found, remove rear guide (refer to removal procedures, BT-49 for details), then replace wire.







Removal and Installation

NABT0019

REMOVAL

NABT0019S01

After removing moldings, remove glass using piano wire or power cutting tool and an inflatable pump bag.

WARNING:

When cutting the glass from the vehicle, always wear safety glasses and heavy gloves to help prevent glass splinters from entering your eyes or cutting your hands.

CAUTION:

- **Be careful not to scratch the glass when removing.**
- **Do not set or stand the glass on its edge. Small chips may develop into cracks.**

INSTALLATION

NABT0019S02

- **Use a genuine Nissan Urethane Adhesive Kit or equivalent and follow the instructions furnished with it.**
- **While the urethane adhesive is curing, open a door window. This will prevent the glass from being forced out by passenger compartment air pressure when a door is closed.**
- **The molding must be installed securely so that it is in position and leaves no gap.**
- **Inform the customer that the vehicle should remain stationary until the urethane adhesive has completely cured (preferably 24 hours). Curing time varies with temperature and humidity.**

WARNING:

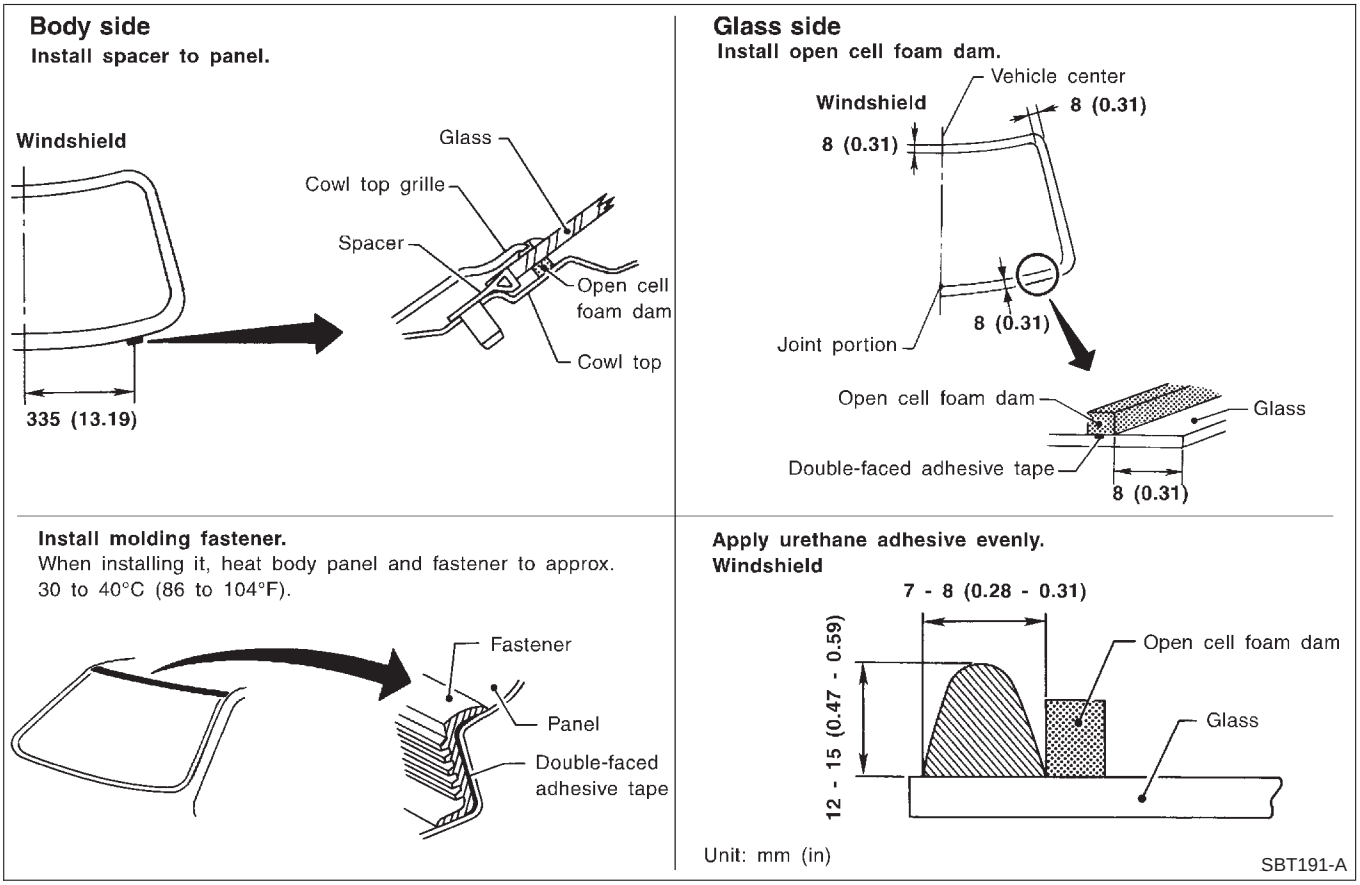
- **Keep heat and open flames away as primers and adhesive are flammable.**
- **The materials contained in the kit are harmful if swallowed, and may irritate skin and eyes. Avoid contact with the skin and eyes.**
- **Use in an open, well ventilated location. Avoid breathing the vapors. They can be harmful if inhaled. If affected by vapor inhalation, immediately move to an area with fresh air.**
- **Driving the vehicle before the urethane adhesive has completely cured may affect the performance of the windshield in case of an accident.**

CAUTION:

- **Do not use an adhesive which is past its usable term. Shelf life of this product is limited to six months after the date of manufacture. Carefully adhere to the expiration or manufacture date printed on the box.**
- **Keep primers and adhesive in a cool, dry place. Ideally, they should be stored in a refrigerator.**
- **Do not leave primers or adhesive cartridge unattended with their caps open or off.**
- **The vehicle should not be driven for at least 24 hours or until the urethane adhesive has completely cured. Curing time varies depending on temperature and humidities. The curing time will increase under higher temperatures and lower humidities.**

WINDSHIELD

NABT0019S03



Repairing Water Leaks for Windshield

NABT0019S0301

Leaks can be repaired without removing and reinstalling glass.

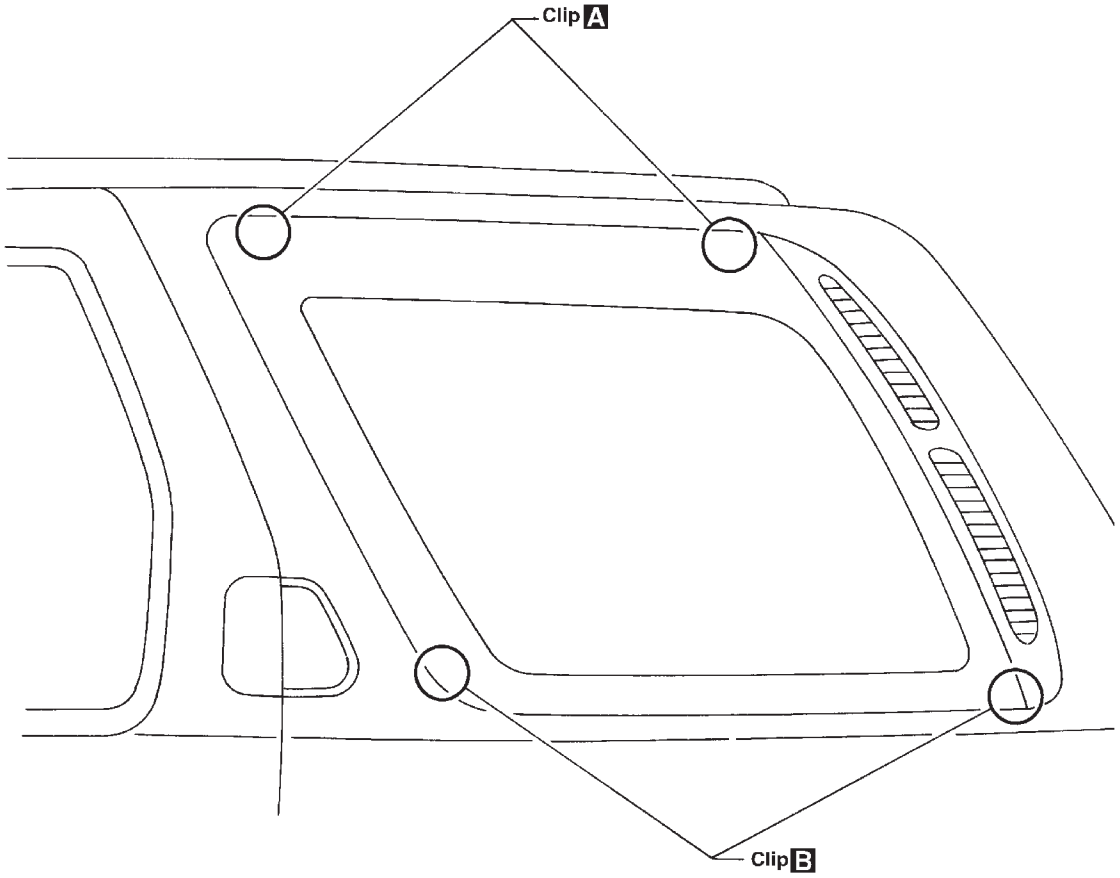
If water is leaking between the urethane adhesive material and body or glass, determine the extent of leakage. This can be done by applying water to the windshield area while pushing glass outward.

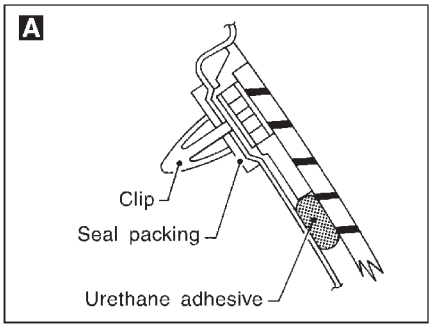
To stop the leak, apply primer (if necessary) and then urethane adhesive to the leak point.

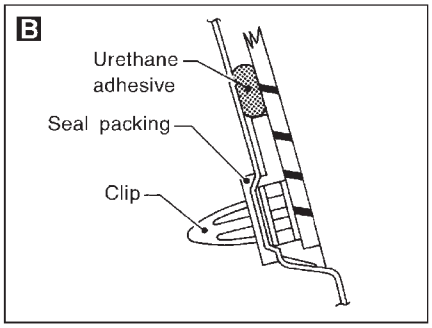
REAR SIDE WINDOW

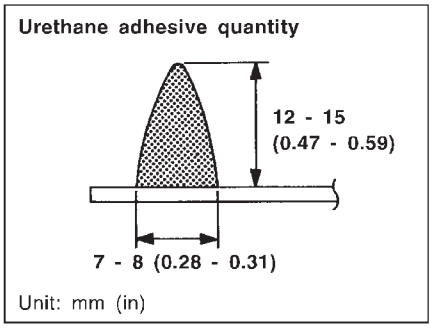
NABT0019S04

SEC. 830









SBT359-A

Removal and Installation

NABT0020

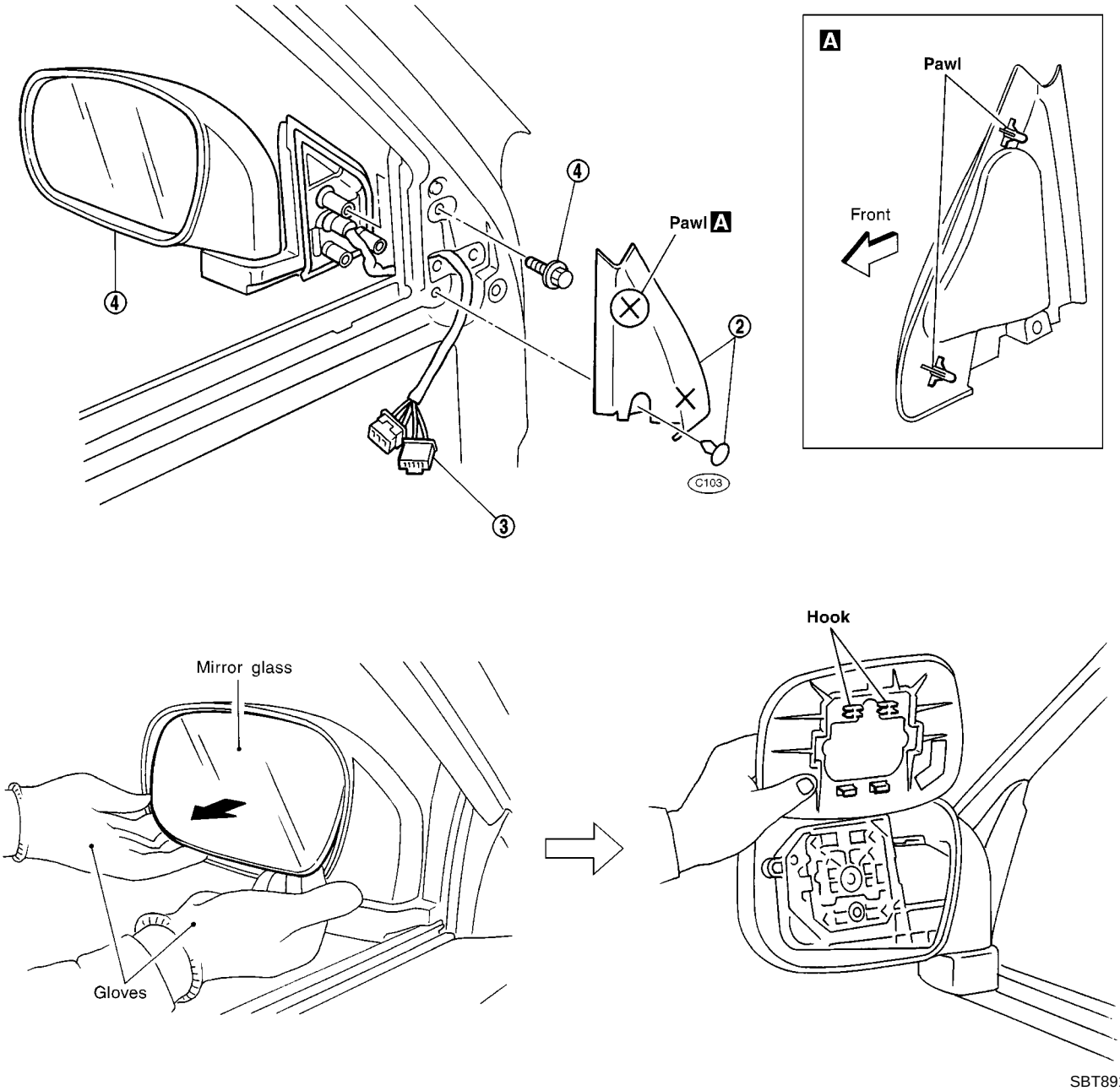
CAUTION:

Be careful not to scratch door rearview mirror body.

★ For Wiring Diagram, refer to EL-199, “DOOR MIRROR”.

1. Remove door trim. Refer to “DOOR TRIM” for details, BT-31.
2. Remove clip securing inner cover from front corner of door.
3. Disconnect door mirror harness connector.
4. Remove bolts securing door mirror, then remove door mirror assembly.

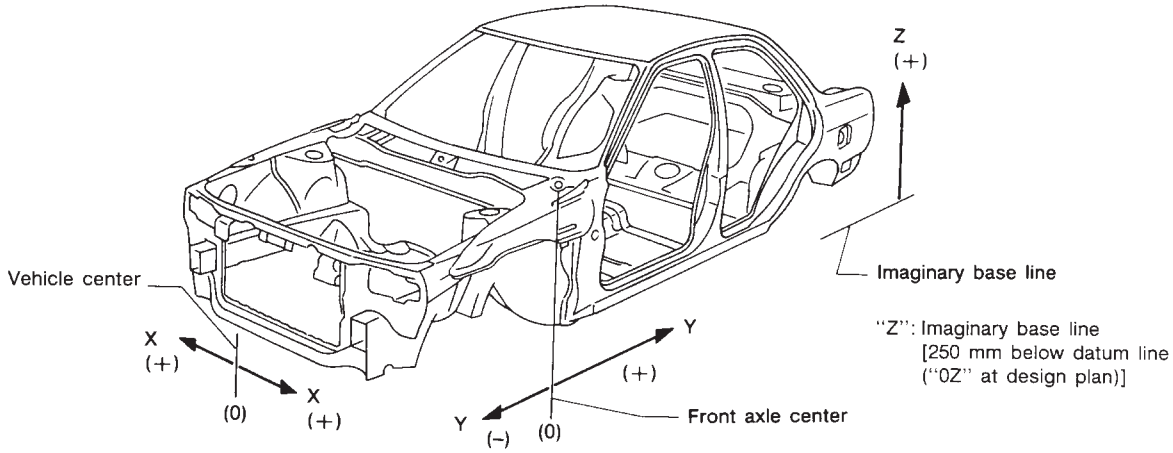
SEC. 963



Alignment

NABT0021

- All dimensions indicated in figures are actual ones.
- When using a tracking gauge, adjust both pointers to equal length. Then check the pointers and gauge itself to make sure there is no free play.
- When a measuring tape is used, check to be sure there is no elongation, twisting or bending.
- Measurements should be taken at the center of the mounting holes.
- An asterisk (★) following the value at the measuring point indicates that the measuring point on the other side is symmetrically the same value.
- The coordinates of the measurement points are the distances measured from the standard line of “X”, “Y” and “Z”.



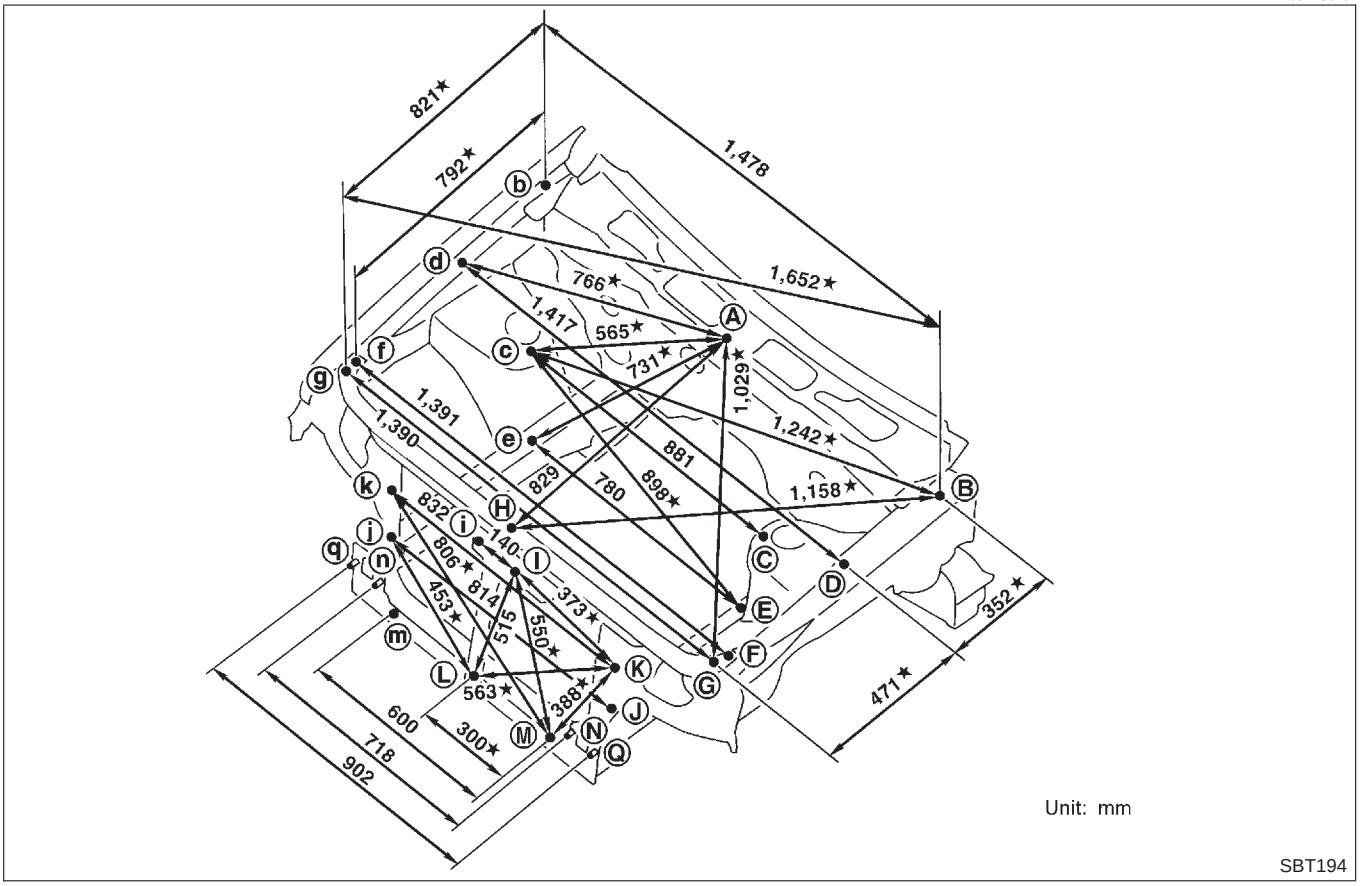
SBF874GD

ENGINE COMPARTMENT

Measurement

NABT0021S01

NABT0021S0101

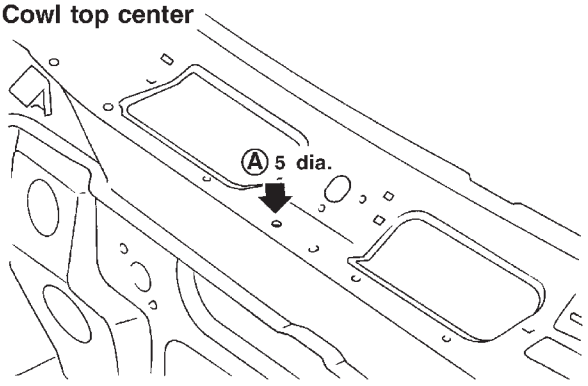


Measurement Points

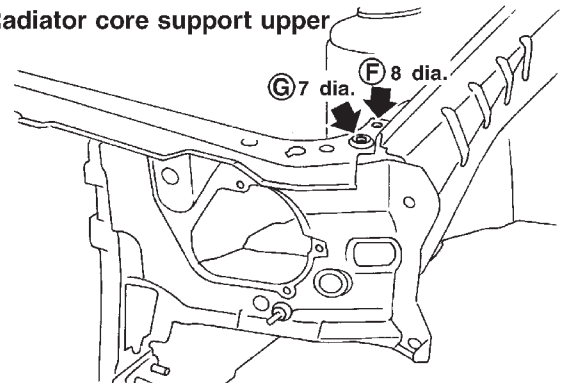
NABT0021S0102

Unit: mm

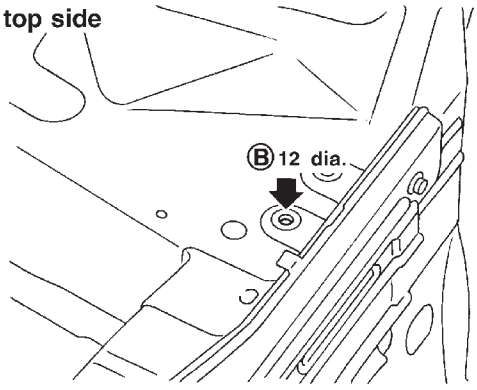
Cowl top center



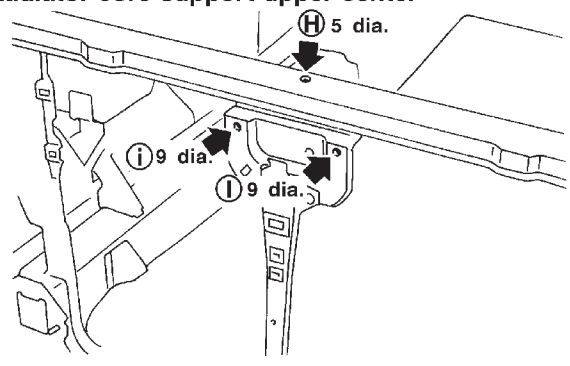
Radiator core support upper



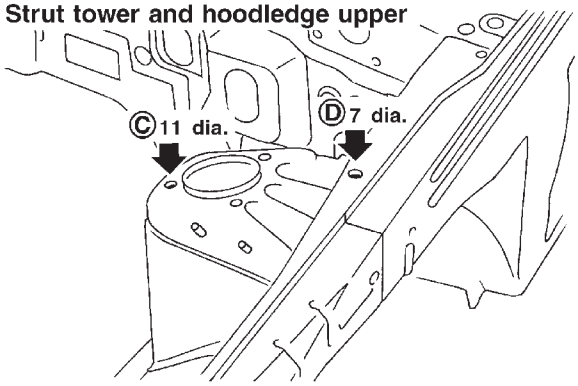
Cowl top side



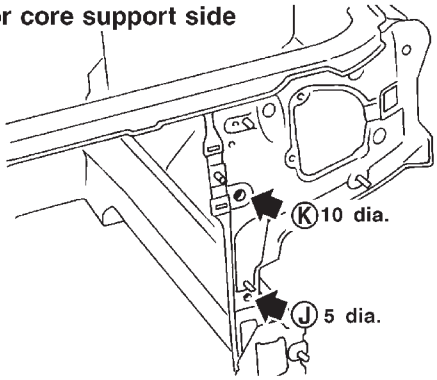
Radiator core support upper center



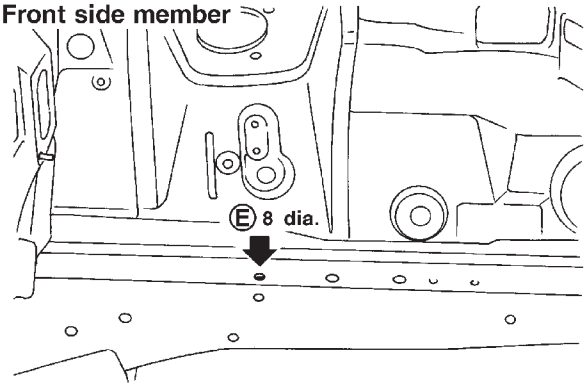
Strut tower and hoodledge upper



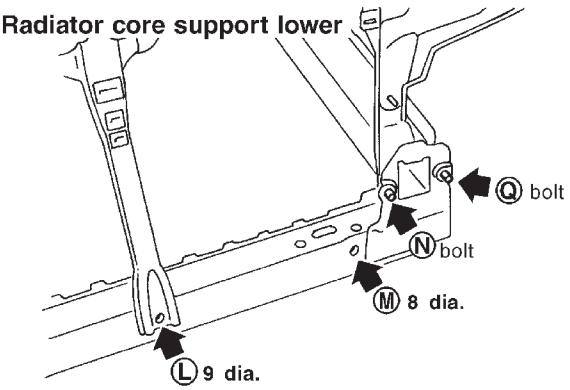
Radiator core support side



Front side member



Radiator core support lower

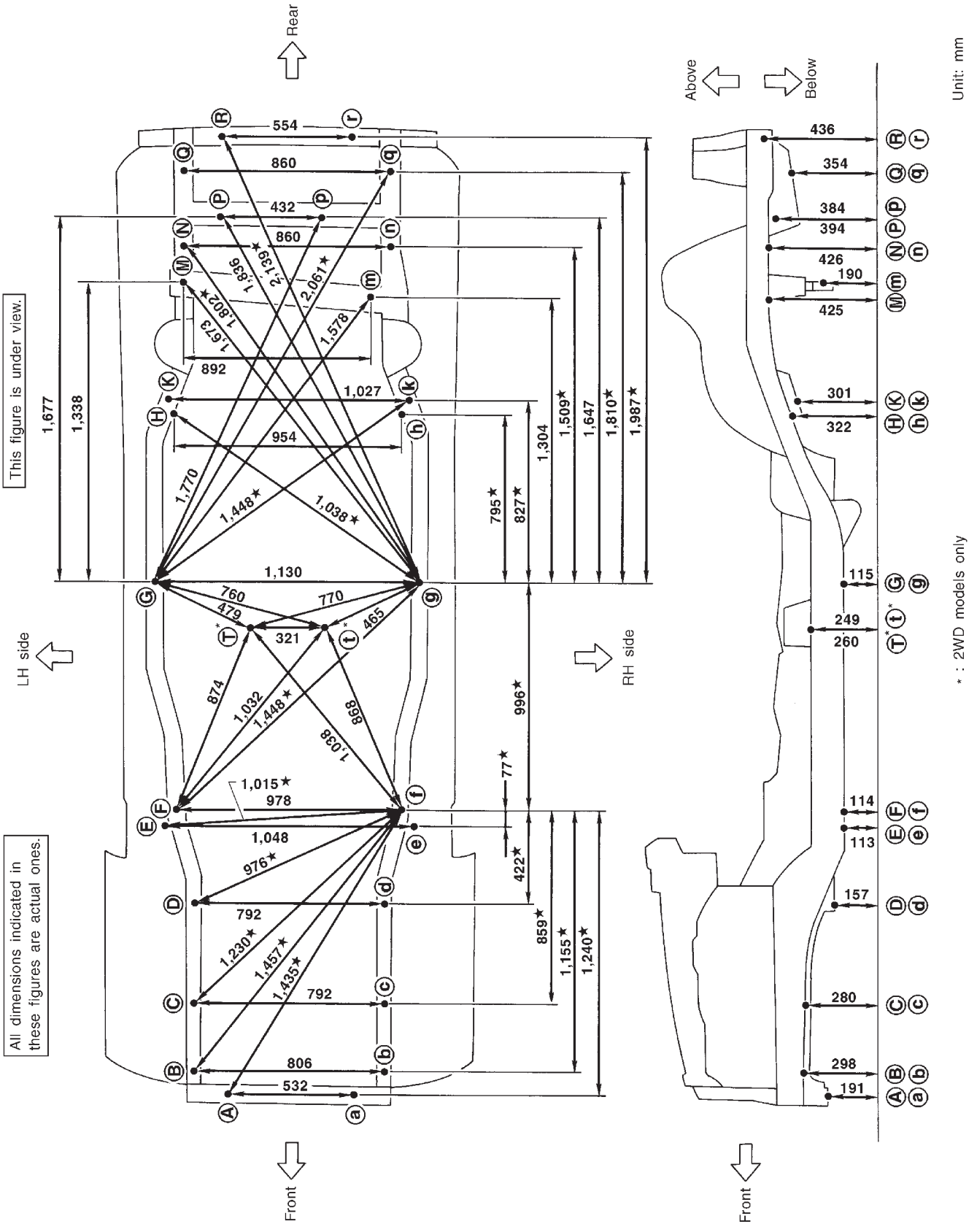


SBT195

UNDERBODY
Measurement

NABT0021S02

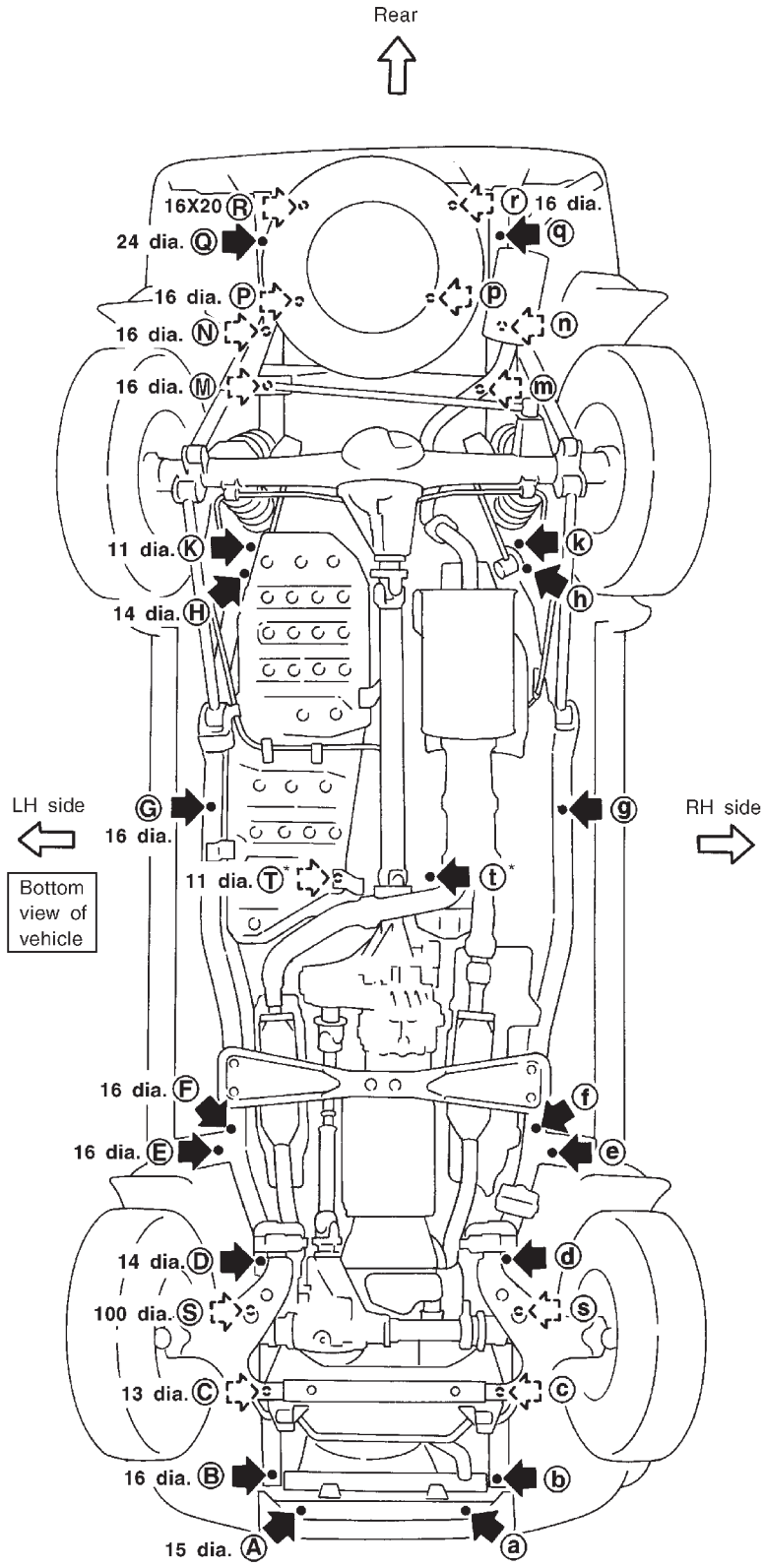
NABT0021S0201



SBT196

Measurement Points

NABT0021S0202



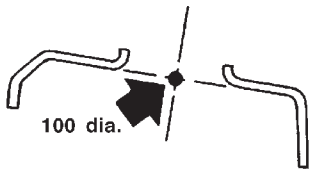
Front coordinates:	Rear coordinates:	
Ⓐ, ⓐ	Ⓖ, ⓖ	Ⓟ
X: 266	X: 565	X: –142
Y: –580.4	Y: 1,630	Y: 3,230
Z: 191.4	Z: 115	Z: 383.6
Ⓑ, ⓑ	Ⓗ, ⓗ	Ⓠ, ⓠ
X: 403	X: 476.9	X: 430
Y: –500	Y: 2,392.6	Y: 3,419.3
Z: 297.7	Z: 321.9	Z: 353.6
Ⓒ, ⓒ	Ⓚ, ⓚ	Ⓡ, ⓡ
X: 396	X: 513.3	X: 277
Y: –201	Y: 2,434.5	Y: 3,570
Z: 279.7	Z: 301.4	Z: 435.6
Ⓓ, ⓓ	Ⓜ	Ⓣ*
X: 396	X: 446.1	X: 154.5
Y: 228	Y: 2,960.2	Y: 1,431
Z: 156.7	Z: 190	Z: 259.6
Ⓔ, ⓔ	ⓜ	ⓣ*
X: 524	X: –350	X: –166.5
Y: 568	Y: 2,878	Y: 1,431
Z: 112.7	Z: 424.8	Z: 248.6
Ⓕ, ⓕ	Ⓝ, ⓝ	
X: 489	X: 430	
Y: 637	Y: 3,100	
Z: 114.1	Z: 426.2	
	Ⓟ	
	X: 290	
	Y: 3,230	
	Z: 394.1	

Unit: mm

Front strut tower center coordinates:

Ⓢ, ⓢ

X: 499.9
Y: 41.2
Z: 748.9



* : 2WD models only

• Components of the 2WD system are the same as for the 4WD.

SBT197

HEATER & AIR CONDITIONER

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Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

NAHA0153

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL R50 is as follows:

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.**

Precautions for Working with HFC-134a (R-134a)

NAHA0154

WARNING:

- **CFC-12 (R-12) refrigerant and HFC-134a (R-134a) refrigerant are not compatible. If the refrigerants are mixed and compressor failure is likely to occur, refer to “CONTAMINATED REFRIGERANT” below. To determine the purity of HFC-134a (R-134a) in the vehicle and recovery tank, use Refrigerant Recovery/Recycling Recharging equipment (ACR4) (J-39500-NI) and Refrigerant Identifier.**
- **Use only specified lubricant for the HFC-134a (R-134a) A/C system and HFC-134a (R-134a) components. If lubricant other than that specified is used, compressor failure is likely to occur.**
- **The specified HFC-134a (R-134a) lubricant rapidly absorbs moisture from the atmosphere. The following handling precautions must be observed:**

a) When removing refrigerant components from a vehicle, immediately cap (seal) the component to minimize the entry of moisture from the atmosphere.

b) When installing refrigerant components to a vehicle, do not remove the caps (unseal) until just before connecting the components. Connect all refrigerant loop components as quickly as possible to minimize the entry of moisture into system.

c) Only use the specified lubricant from a sealed container. Immediately reseal containers of lubricant. Without proper sealing, lubricant will become moisture saturated and should not be used.

d) Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. Remove R-134a from the A/C system, using certified service equipment meeting requirements of SAE J2210 (R-134a recycling equipment), or J2209 (R-134a recovery equipment). If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.

e) Do not allow lubricant (Nissan A/C System Oil Type S) to come in contact with styrofoam parts. Damage may result.

CONTAMINATED REFRIGERANT

NAHA0154S01

If a refrigerant other than pure R-134a is identified in a vehicle, your options are:

- Explain to the customer that environmental regulations prohibit the release of contaminated refrigerant into the atmosphere.
- Explain that recovery of the contaminated refrigerant could damage your service equipment and refrigerant supply.

- Suggest the customer return the vehicle to the location of previous service where the contamination may have occurred.
- If you choose to perform the repair, recover the refrigerant using only **dedicated equipment and containers. Do not recover contaminated refrigerant into your existing service equipment.** If your facility does not have dedicated recovery equipment, you may contact a local refrigerant product retailer for available service. This refrigerant must be disposed of in accordance with all federal and local regulations. In addition, replacement of all refrigerant system components on the vehicle is recommended.
- If the vehicle is within the warranty period, the air conditioner warranty is void. Please contact Nissan Customer Affairs for further assistance.

General Refrigerant Precautions

NAHA0155

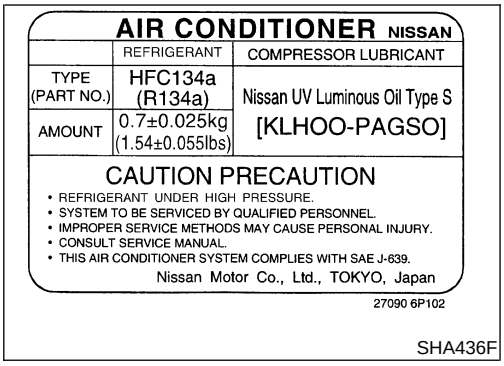
WARNING:

- **Do not release refrigerant into the air. Use approved recovery/recycling equipment to capture the refrigerant every time an air conditioning system is discharged.**
- **Always wear eye and hand protection (goggles and gloves) when working with any refrigerant or air conditioning system.**
- **Do not store or heat refrigerant containers above 52°C (125°F).**
- **Do not heat a refrigerant container with an open flame; if container warming is required, place the bottom of the container in a warm pail of water.**
- **Do not intentionally drop, puncture, or incinerate refrigerant containers.**
- **Keep refrigerant away from open flames: poisonous gas will be produced if refrigerant burns.**
- **Refrigerant will displace oxygen, therefore be certain to work in well ventilated areas to prevent suffocation.**
- **Do not pressure test or leak test HFC-134a (R-134a) service equipment and/or vehicle air conditioning systems with compressed air during repair. Some mixtures of air and R-134a have been shown to be combustible at elevated pressures. These mixtures, if ignited, may cause injury or property damage. Additional health and safety information may be obtained from refrigerant manufacturers.**

Precautions for Leak Detection Dye

NAHA0247

- The A/C system contains a fluorescent leak detection dye used for locating refrigerant leaks. An ultraviolet (UV) lamp is required to illuminate the dye when inspecting for leaks.
- Always wear fluorescence enhancing UV safety glasses to protect your eyes and enhance the visibility of the fluorescent dye.
- The fluorescent dye leak detector is not a replacement for an electronic refrigerant leak detector. The fluorescent dye leak detector should be used in conjunction with an electronic refrigerant leak detector to (J-41995) pin-point refrigerant leaks.
- For your safety and your Customer's satisfaction, read and follow all manufacture's operating instructions and precautions prior to performing the work.
- A compressor shaft seal should not be repaired because of dye seepage. The compressor shaft seal should only be repaired after confirming the leak with an electronic refrigerant leak detector (J-41995).
- Always remove and dye from the leak area after repairs are complete to avoid a misdiagnosis during a future service.
- Do not allow dye to come into contact with painted body panels or interior components. If dye is spilled, clean immediately with the approved dye cleaner. Fluorescent dye left on a surface for an extended period of time cannot be removed.
- Do not spray the fluorescent dye cleaning agent on hot surfaces (engine exhaust manifold, etc.).
- Do not use more than one refrigerant dye bottle (1/4 ounce /7.4 cc) per A/C system.
- Leak detection dyes for R-134a and R12 A/C systems are different. Do not use R-134a leak detection dye in R-12 A/C system or R-12 leak detector dye in R-134a A/C systems or A/C system damage may result.
- The fluorescent properties of the dye will remain for over three (3) years unless a compressor failure occurs.



Identification

NAHA0248

IDENTIFICATION LABEL FOR VEHICLE

NAHA0248S01

Vehicles with factory installed fluorescent dye have this identification label on the under side of hood.

NOTE:

Vehicles with factory installed fluorescent dye have a green label.
Vehicles without factory installed fluorescent dye have a blue label.

Precautions for Refrigerant Connection

NAHA0156

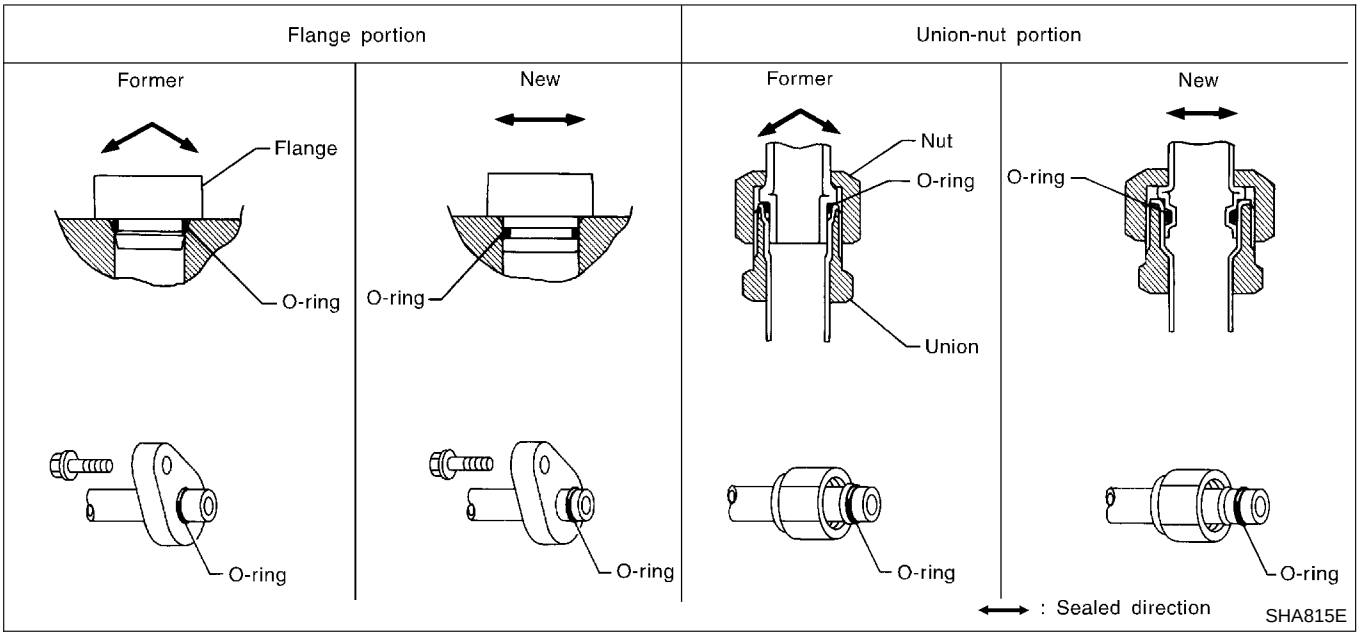
A new type refrigerant connection has been introduced to all refrigerant lines except the following location.

- Expansion valve to cooling unit

FEATURES OF NEW TYPE REFRIGERANT CONNECTION

NAHA0156S01

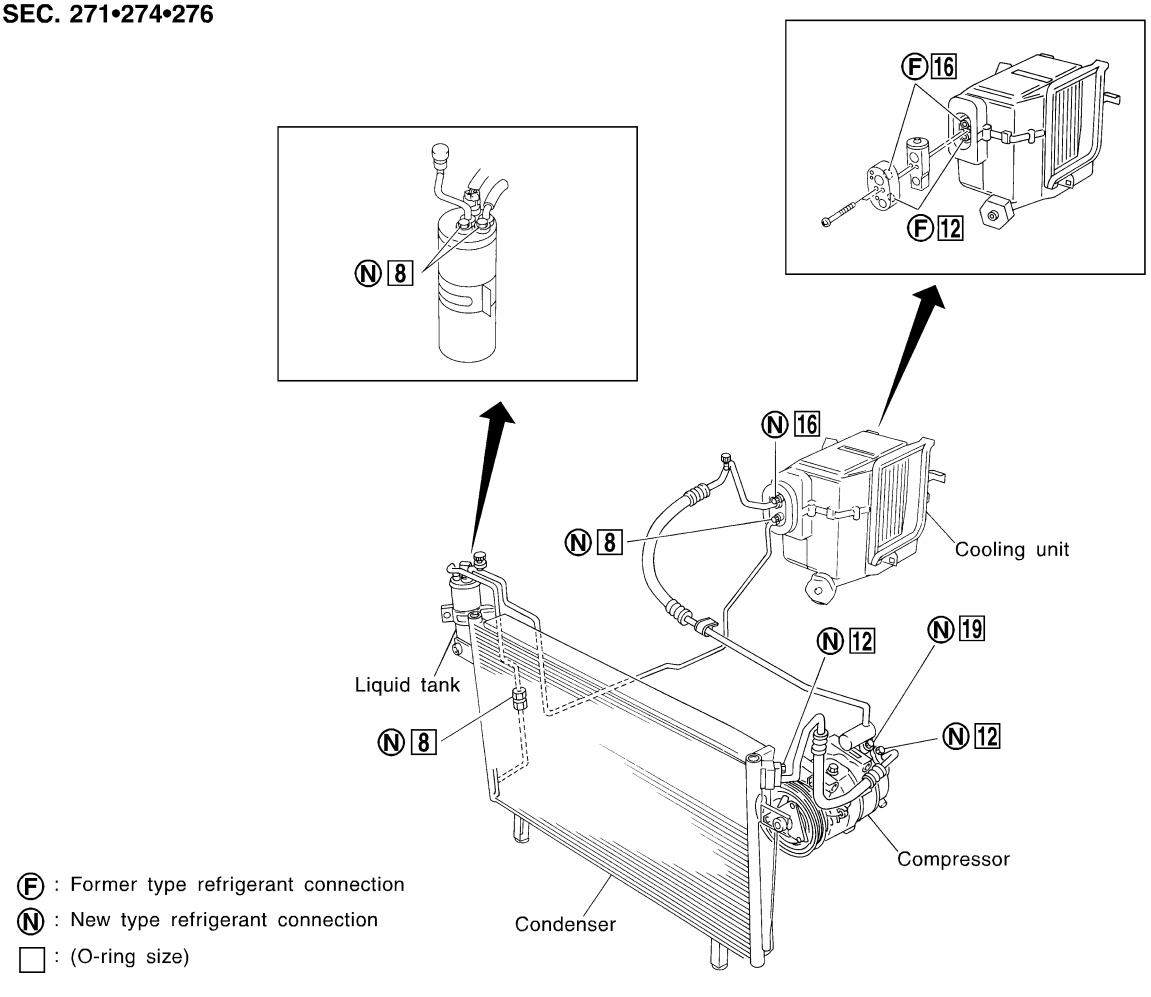
- The O-ring has been relocated. It has also been provided with a groove for proper installation. This eliminates the chance of the O-ring being caught in, or damaged by, the mating part. The sealing direction of the O-ring is now set vertically in relation to the contacting surface of the mating part to improve sealing characteristics.
- The reaction force of the O-ring will not occur in the direction that causes the joint to pull out, thereby facilitating piping connections.



O-RING AND REFRIGERANT CONNECTION

NAHA0156S02

SEC. 271•274•276



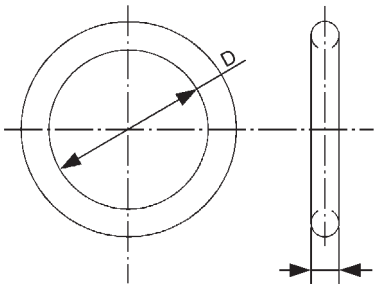
RHA816H

CAUTION:

The new and former refrigerant connections use different O-ring configurations. Do not confuse O-rings since they are not interchangeable. If a wrong O-ring is installed, refrigerant will leak at, or around, the connection.

O-Ring Part Numbers and Specifications

NAHA0156S0201



SHA814E

Connection type	O-ring size	Part number	D mm (in)	W mm (in)
New	8	92471 N8210	6.8 (0.268)	1.85 (0.0728)
Former		92470 N8200	6.07 (0.2390)	1.78 (0.0701)
New	12	92472 N8210	10.9 (0.429)	2.43 (0.0957)
Former		92475 71L00	11.0 (0.433)	2.4 (0.094)
New	16	92473 N8210	13.6 (0.535)	2.43 (0.0957)
Former		92475 72L00	14.3 (0.563)	2.3 (0.0906)
New	19	92474 N8210	16.5 (0.650)	2.43 (0.0957)
Former		92477 N8200	17.12 (0.6740)	1.78 (0.0701)

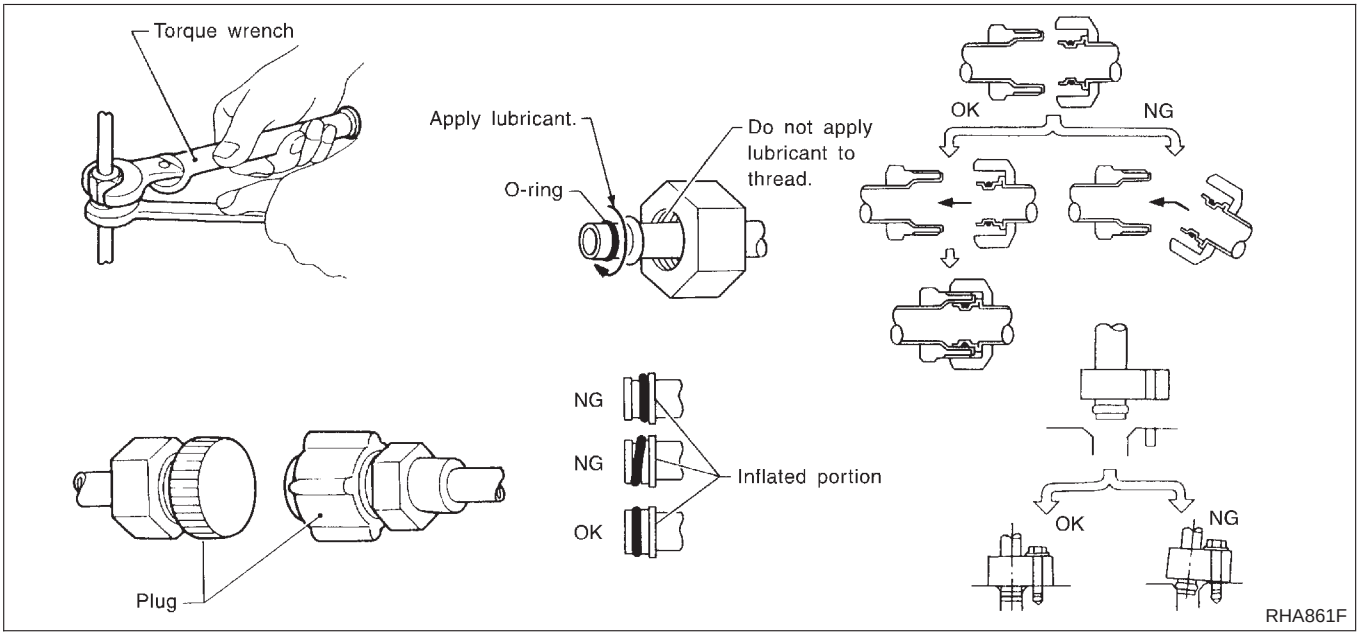
WARNING:

Make sure all refrigerant is discharged into the recycling equipment and the pressure in the system is less than atmospheric pressure. Then gradually loosen the discharge side hose fitting and remove it.

CAUTION:

When replacing or cleaning refrigerant cycle components, observe the following.

- **When the compressor is removed, store it in the same position as it is when mounted on the car. Failure to do so will cause lubricant to enter the low pressure chamber.**
- **When connecting tubes, always use a torque wrench and a back-up wrench.**
- **After disconnecting tubes, immediately plug all openings to prevent entry of dirt and moisture.**
- **When installing an air conditioner in the vehicle, connect the pipes as the final stage of the operation. Do not remove the seal caps of pipes and other components until just before required for connection.**
- **Allow components stored in cool areas to warm to working area temperature before removing seal caps. This prevents condensation from forming inside A/C components.**
- **Thoroughly remove moisture from the refrigeration system before charging the refrigerant.**
- **Always replace used O-rings.**
- **When connecting tube, apply lubricant to circle of the O-rings shown in illustration. Be careful not to apply lubricant to threaded portion.**
  Lubricant name: Nissan A/C System Oil Type S
  Part number: KLH00-PAGS0
- **O-ring must be closely attached to dented portion of tube.**
- **When replacing the O-ring, be careful not to damage O-ring and tube.**
- **Connect tube until you hear it click, then tighten the nut or bolt by hand until snug. Make sure that the O-ring is installed to tube correctly.**
- **After connecting line, conduct leak test and make sure that there is no leakage from connections. When the gas leaking point is found, disconnect that line and replace the O-ring. Then tighten connections of seal seat to the specified torque.**



Precautions for Servicing Compressor

NAHA0157

- **Plug all openings to prevent moisture and foreign matter from entering.**
- **When the compressor is removed, store it in the same position as it is when mounted on the car.**
- **When replacing or repairing compressor, follow "Maintenance of Lubricant Quantity in Compressor" exactly. Refer to HA-113.**
- **Keep friction surfaces between clutch and pulley clean. If the surface is contaminated, with lubricant, wipe it off by using a clean waste cloth moistened with thinner.**
- **After compressor service operation, turn the compressor shaft by hand more than five turns in both directions. This will equally distribute lubricant inside the compressor. After the compressor is installed, let the engine idle and operate the compressor for one hour.**
- **After replacing the compressor magnet clutch, apply voltage to the new one and check for normal operation.**

Precautions for Service Equipment

NAHA0158

RECOVERY/RECYCLING EQUIPMENT

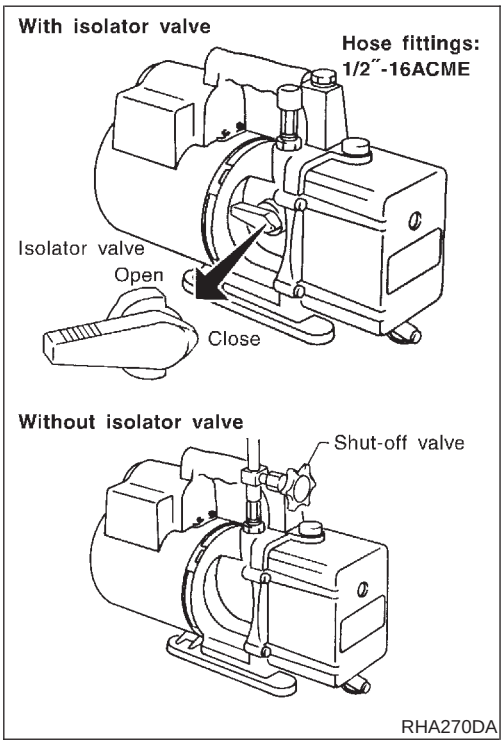
NAHA0158S01

Be certain to follow the manufacturers instructions for machine operation and machine maintenance. Never introduce any refrigerant other than that specified into the machine.

ELECTRONIC LEAK DETECTOR

NAHA0158S02

Be certain to follow the manufacturer's instructions for tester operation and tester maintenance.



RHA270DA

VACUUM PUMP

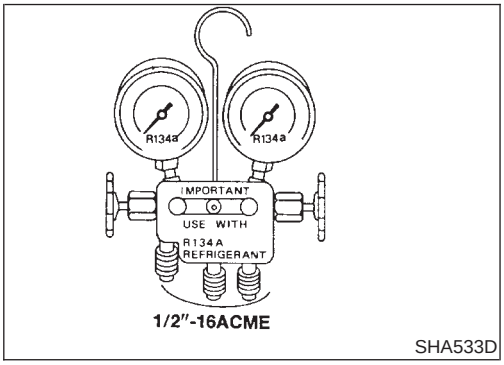
NAHA0158S03

The lubricant contained inside the vacuum pump is not compatible with the specified lubricant for HFC-134a (R-134a) A/C systems. The vent side of the vacuum pump is exposed to atmospheric pressure. So the vacuum pump lubricant may migrate out of the pump into the service hose. This is possible when the pump is switched off after evacuation (vacuuming) and hose is connected to it.

To prevent this migration, use a manual valve placed near the hose-to-pump connection, as follows.

- Usually vacuum pumps have a manual isolator valve as part of the pump. Close this valve to isolate the service hose from the pump.
- For pumps without an isolator, use a hose equipped with a manual shut-off valve near the pump end. Close the valve to isolate the hose from the pump.
- If the hose has an automatic shut off valve, disconnect the hose from the pump. As long as the hose is connected, the valve is open and lubricating oil may migrate.

Some one-way valves open when vacuum is applied and close under a no vacuum condition. Such valves may restrict the pump's ability to pull a deep vacuum and are not recommended.

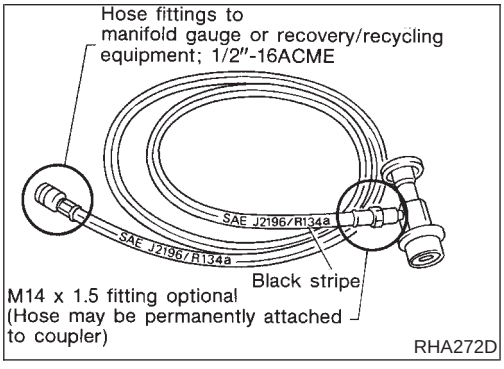


SHA533D

MANIFOLD GAUGE SET

NAHA0158S04

Be certain that the gauge face indicates R-134a or 134a. Be sure the gauge set has 1/2″-16 ACME threaded connections for service hoses. Confirm the set has been used only with refrigerant HFC-134a (R-134a) and specified lubricants.

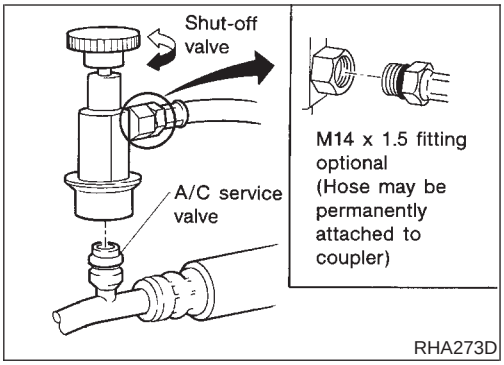


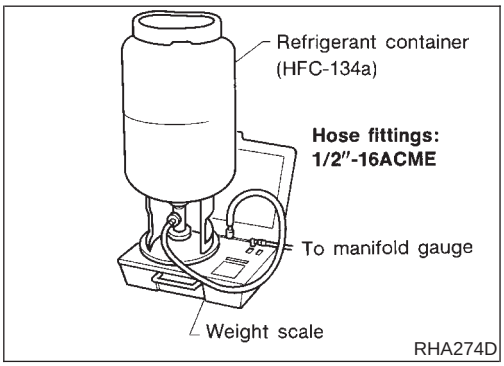
RHA272D

SERVICE HOSES

NAHA0158S05

Be certain that the service hoses display the markings described (colored hose with black stripe). All hoses must include positive shut off devices (either manual or automatic) near the end of the hoses opposite the manifold gauge.





SERVICE COUPLERS

NAHA0158S06

Never attempt to connect HFC-134a (R-134a) service couplers to an CFC-12 (R-12) A/C system. The HFC-134a (R-134a) couplers will not properly connect to the CFC-12 (R-12) system. However, if an improper connection is attempted, discharging and contamination may occur.

Shut-off valve rotation	A/C service valve
Clockwise	Open
Counterclockwise	Close

REFRIGERANT WEIGHT SCALE

NAHA0158S07

Verify that no refrigerant other than HFC-134a (R-134a) and specified lubricants have been used with the scale. If the scale controls refrigerant flow electronically, the hose fitting must be 1/2″-16 ACME.

CALIBRATING ACR4 WEIGHT SCALE

NAHA0158S08

Calibrate the scale every three months.
To calibrate the weight scale on the ACR4 (J-39500-NI):

1. Press **Shift/Reset** and **Enter** at the same time.
2. Press **8787**. "**A1**" will be displayed.
3. Remove all weight from the scale.
4. Press **0**, then press **Enter**. "**0.00**" will be displayed and change to "**A2**".
5. Place a known weight (dumbbell or similar weight), between 4.5 and 8.6 kg (10 and 19 lb) on the center of the weight scale.
6. Enter the known weight using four digits. (Example 10 lb = 10.00, 10.5 lb = 10.50)
7. Press **Enter** — the display returns to the vacuum mode.
8. Press **Shift/Reset** and **Enter** at the same time.
9. Press **6** — the known weight on the scale is displayed.
10. Remove the known weight from the scale. "**0.00**" will be displayed.
11. Press **Shift/Reset** to return the ACR4 to the program mode.

CHARGING CYLINDER

NAHA0158S09

Using a charging cylinder is not recommended. Refrigerant may be vented into air from cylinder's top valve when filling the cylinder with refrigerant. Also, the accuracy of the cylinder is generally less than that of an electronic scale or of quality recycle/recharge equipment.

Wiring Diagrams and Trouble Diagnoses

NAHA0159

When you read wiring diagrams, refer to the following:

- GI-11, “HOW TO READ WIRING DIAGRAMS”
- EL-10, “Wiring Diagram — POWER —”.

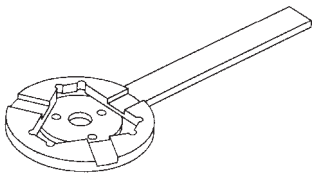
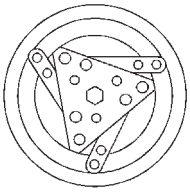
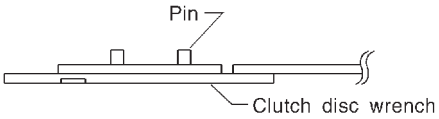
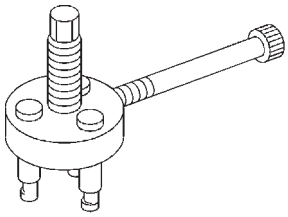
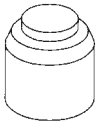
When you perform trouble diagnoses, refer to the following:

- GI-34, “HOW TO FOLLOW TROUBLE DIAGNOSES”
- GI-24, “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”

Special Service Tools

NAHA0160

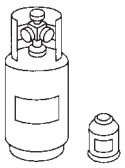
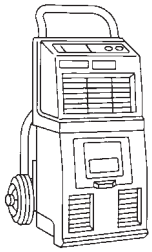
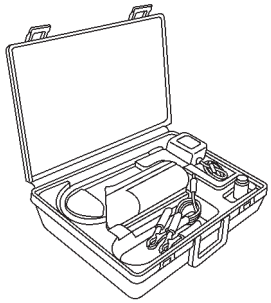
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

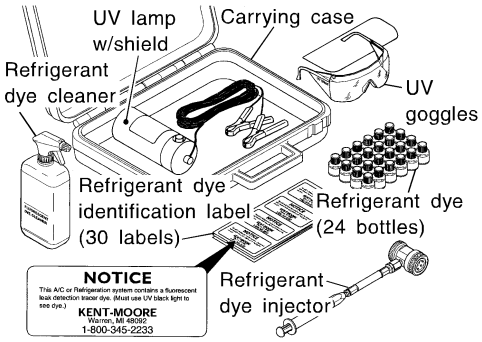
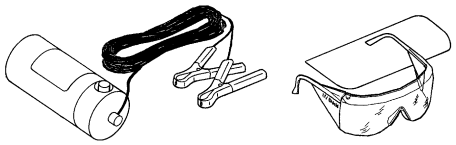
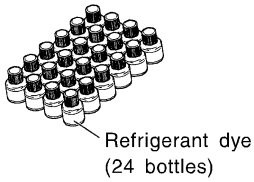
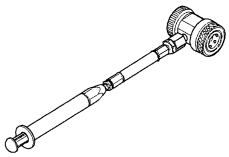
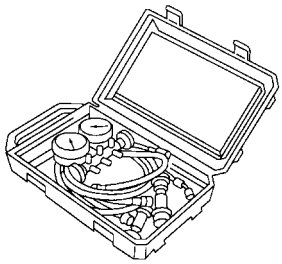
Tool number (Kent-Moore No.) Tool name	Description	
KV99106100 (J-41260) Clutch disc wrench	 NT232	Removing center bolt
	 When replacing the magnet clutch in the above compressor, use a clutch disc wrench with the pin side on the clutch disc to remove it.  NT378	
KV99232340 (J-38874) or KV992T0001 (—) Clutch disc puller	 NT376	Removing clutch disc
KV99106200 (J-41261) Pulley installer	 NT235	Installing pulley

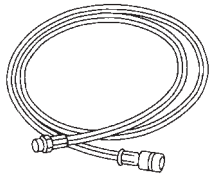
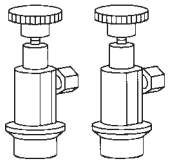
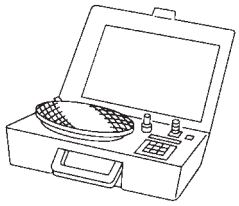
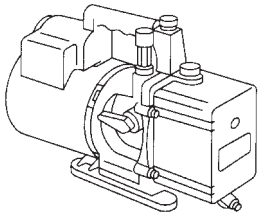
HFC-134a (R-134a) Service Tools and Equipment

=NAHA0161

Never mix HFC-134a refrigerant and/or its specified lubricant with CFC-12 (R-12) refrigerant and/or its lubricant.
Separate and non-interchangeable service equipment must be used for handling each type of refrigerant/lubricant.
Refrigerant container fittings, service hose fittings and service equipment fittings (equipment which handles refrigerant and/or lubricant) are different between CFC-12 (R-12) and HFC-134a (R-134a). This is to avoid mixed use of the refrigerants/lubricant.
Adapters that convert one size fitting to another must never be used: refrigerant/lubricant contamination will occur and compressor failure will result.

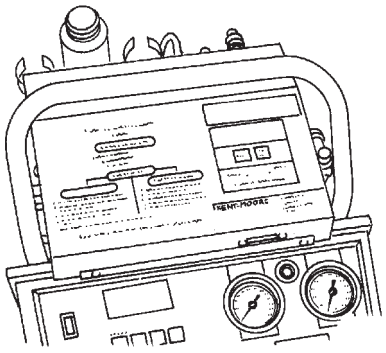
Tool number (Kent-Moore No.) Tool name	Description	
HFC-134a (R-134a) refrigerant	 NT196	Container color: Light blue Container marking: HFC-134a (R-134a) Fitting size: Thread size ● Large container 1/2″-16 ACME
KLH00-PAGS0 (—) Nissan A/C System Oil Type S	 NT197	Type: Poly alkylene glycol oil (PAG), type S Application: HFC-134a (R-134a) swash plate (piston) compressors (Nissan only) Lubricity: 40 mℓ (1.4 US fl oz, 1.4 Imp fl oz)
(J-39500-NI) Recovery/Recycling Recharging equipment (ACR4)	 NT195	Function: Refrigerant Recovery and Recycling and Recharging
(J-41995) Electrical leak detector	 AHA281A	Power supply: ● DC 12V (Cigarette lighter)

Tool number (Kent-Moore No.) Tool name	Description	
(J-43926) Refrigerant dye leak detection kit Kit includes: (J-42220) UV lamp and UV safety glasses (J-41459) Refrigerant dye injector (J-41447) qty. 24 R-134a refrigerant dye (J-43872) Refrigerant dye cleaner	 SHA437F	Power supply: DC 12V (Battery terminal)
(J-42220) Fluorescent dye leak detector	UV lamp  SHA438F	Power supply: DC12V (Battery terminal) For checking refrigerant leak when fluorescent dye is installed in A/C system. Includes: UV lamp and UV safety glasses UV safety glasses
(J-41447) R134a Fluorescent Leak Detection Dye (Box of 24, 1/4 ounce bottles)	Dye  SHA439F	Application: For R-134a PAG oil Container: 1/4 ounce (7.4 cc) bottle (Includes self-adhesive dye identification labels for affixing to vehicle after charging system with dye.)
(J-41459) R134a Dye Injector Use with J-41447, 1/4 ounce bottle	Dye injector  SHA440F	For injecting 1/4 ounce of Fluorescent Leak Detection Dye into A/C system.
(J-43872) Dye cleaner	 SHA441F	For cleaning dye spills.
(J-39183) Manifold gauge set (with hoses and couplers)	 NT199	Identification: • The gauge face indicates R-134a. Fitting size: Thread size • 1/2″-16 ACME

Tool number (Kent-Moore No.) Tool name	Description	
Service hoses ● High side hose (J-39501-72) ● Low side hose (J-39502-72) ● Utility hose (J-39476-72)	 NT201	Hose color: ● Low hose: Blue with black stripe ● High hose: Red with black stripe ● Utility hose: Yellow with black stripe or green with black stripe Hose fitting to gauge: ● 1/2″-16 ACME
Service couplers ● High side coupler (J-39500-20) ● Low side coupler (J-39500-24)	 NT202	Hose fitting to service hose: ● M14 x 1.5 fitting is optional or permanently attached.
(J-39650) Refrigerant weight scale	 NT200	For measuring of refrigerant Fitting size: Thread size ● 1/2″-16 ACME
(J-39649) Vacuum pump (Including the isolator valve)	 NT203	Capacity: ● Air displacement: 4 CFM ● Micron rating: 20 microns ● Oil capacity: 482 g (17 oz) Fitting size: Thread size ● 1/2″-16 ACME

COMMERCIAL SERVICE TOOL

NAHA0161S01

Tool name	Description	
Refrigerant identifier equipment	 NT765	For checking refrigerant purity and for system contamination

Refrigeration System

REFRIGERATION CYCLE

NAHA0162

Refrigerant Flow

NAHA0162S01

The refrigerant flows in the standard pattern, that is, through the compressor, the condenser, the liquid tank, through the evaporator, and back to the compressor. The refrigerant evaporation through the evaporator coil is controlled by an externally equalized expansion valve, located inside the evaporator case.

Freeze Protection

NAHA0162S02

Under Normal Operating Conditions, When The A/C Is Switched On, The Compressor Runs Continuously, And The Evaporator Pressure, And Therefore Temperature, Is Controlled By The V-6 Variable Displacement Compressor To Prevent Freeze Up.

Refrigerant System Protection

NAHA0162S03

Refrigerant Pressure Sensor

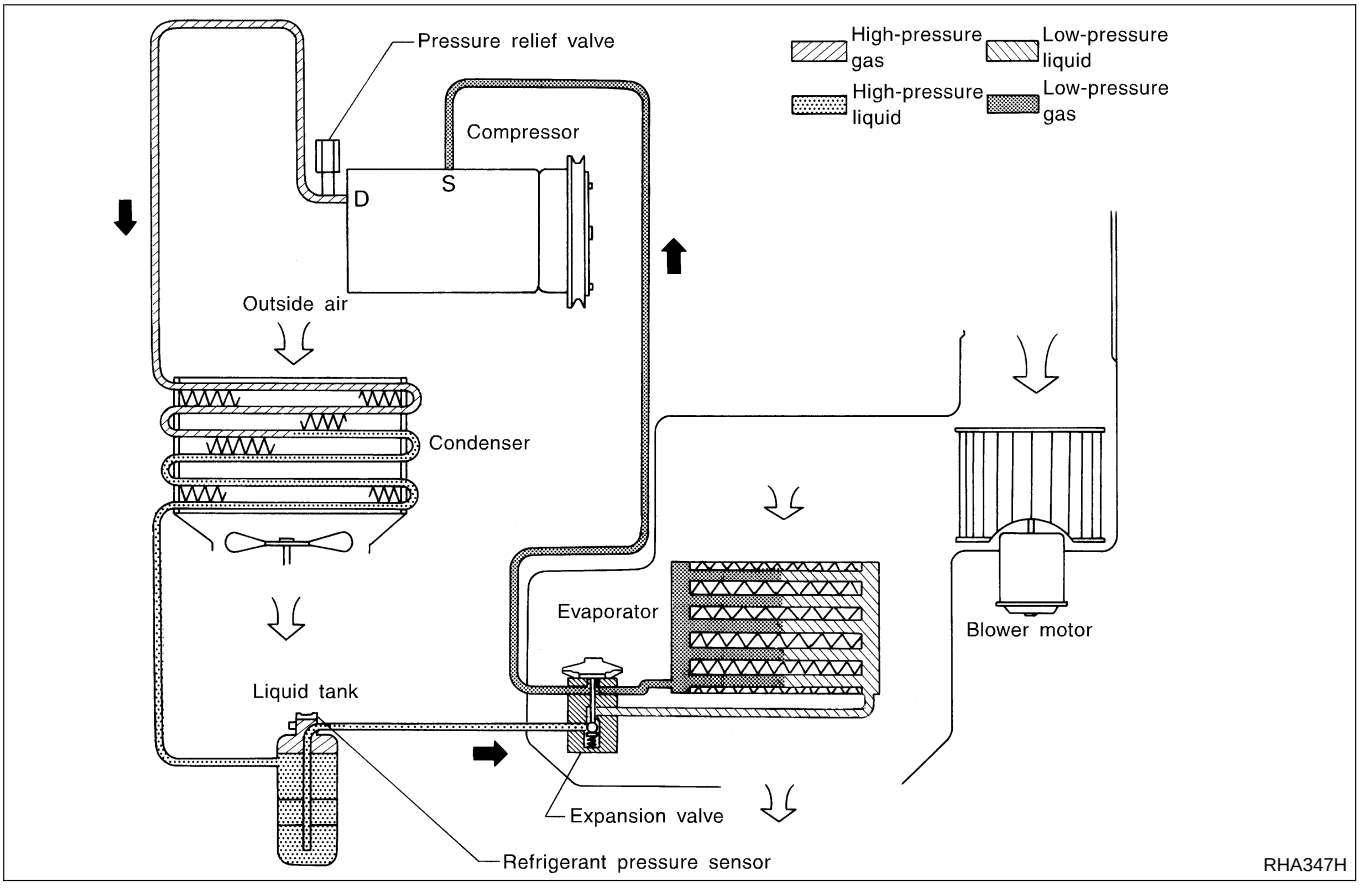
NAHA0162S0301

The refrigerant system is protected against excessively high or low pressures by the refrigerant pressure sensor, located on the liquid tank. If the system pressure rises above, or falls below the specifications, the refrigerant pressure sensor detects the pressure inside the refrigerant line and sends the voltage signal to the ECM. ECM makes the A/C relay go OFF and stops the compressor when pressure on the high pressure side detected by refrigerant pressure sensor is over about 2,746 kPa (28 kg/cm^2, 398 psi) or below about 177 kPa (1.8 kg/cm^2, 26 psi).

Pressure Relief Valve

NAHA0162S0302

The refrigerant system is also protected by a pressure relief valve, located in the rear head of the compressor. When the pressure of refrigerant in the system increases to an abnormal level [more than 3,727 kPa (38 kg/cm^2, 540 psi)], the release port on the pressure relief valve automatically opens and releases refrigerant into the atmosphere.



V-6 Variable Displacement Compressor

GENERAL INFORMATION

=NAHA0163

1. The V-6 variable compressor differs from previous units. The vent temperatures of the V-6 variable compress do not drop too far below 5°C (41°F) when:

- evaporator intake air temperature is less than 20°C (68°F)
- engine is running at speeds less than 1,500 rpm.

   This is because the V-6 compressor provides a means of “capacity” control.

2. The V-6 variable compressor provides refrigerant control under varying conditions. During cold winters, it may not produce high refrigerant pressure discharge (compared to previous units) when used with air conditioning systems.
3. A “clanking” sound may occasionally be heard during refrigerant charge. The sound indicates that the tilt angle of the swash plate has changed and is not a problem.
4. For air conditioning systems with the V-6 compressor, the clutch remains engaged unless: the system main switch, fan switch or ignition switch is turned OFF. When ambient (outside) temperatures are low or when the amount of refrigerant is insufficient, the clutch is disengaged to protect the compressor.
5. A constant range of suction pressure is maintained when engine speed is greater than a certain value. It normally ranges from 147 to 177 kPa (1.5 to 1.8 kg/cm^2, 21 to 26 psi) under varying conditions.
   In previous compressors, however, suction pressure was reduced with increases in engine speed.

DESCRIPTION

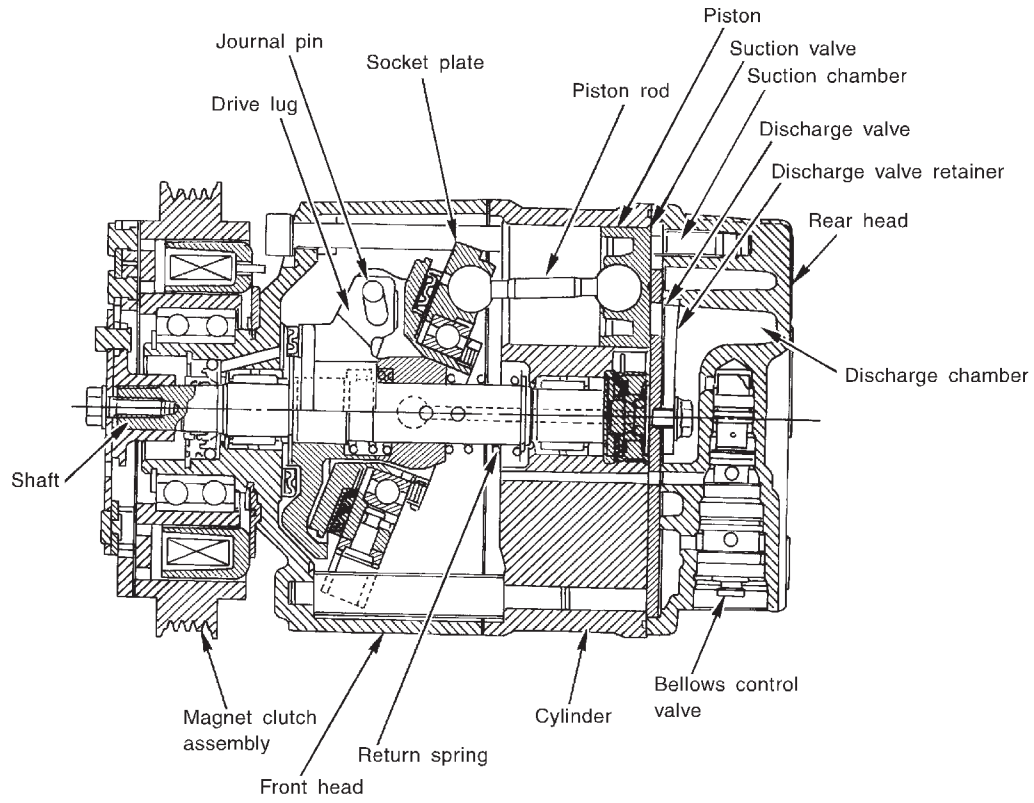
General

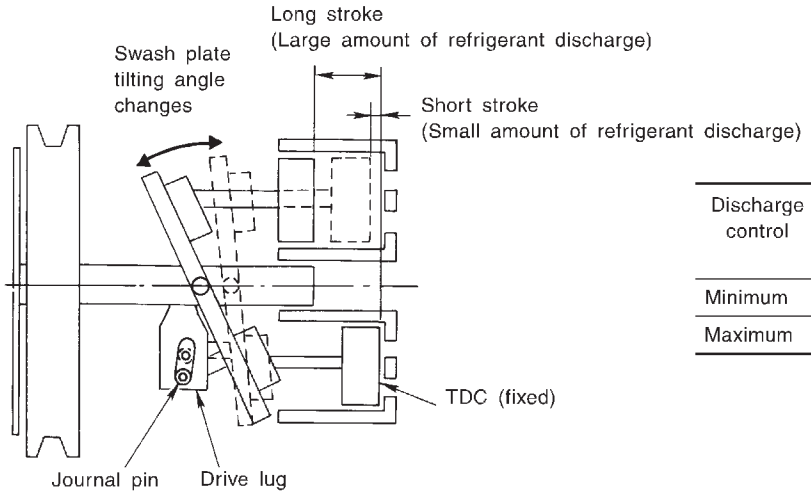
=NAHA0164

NAHA0164S01

The variable compressor is basically a swash plate type that changes piston stroke in response to the required cooling capacity.

The tilt of the swash plate allows the piston's stroke to change so that refrigerant discharge can be continuously changed from 14.5 to 184 cm^3 (0.885 to 11.228 cu in).





Discharge control	Discharge capacity cm^3 (cu in)/rev.	Piston stroke length mm (in)
Minimum	14.5 (0.885)	2.3 (0.091)
Maximum	184 (11.228)	28.6 (1.126)

RHA037DD

Operation

=NAHA0164S02

1. Operation Control Valve

NAHA0164S0201

Operation control valve is located in the suction port (low-pressure) side, and opens or closes in response to changes in refrigerant suction pressure.
Operation of the valve controls the internal pressure of the crankcase.
The angle of the swash plate is controlled between the crankcase's internal pressure and the piston cylinder pressure.

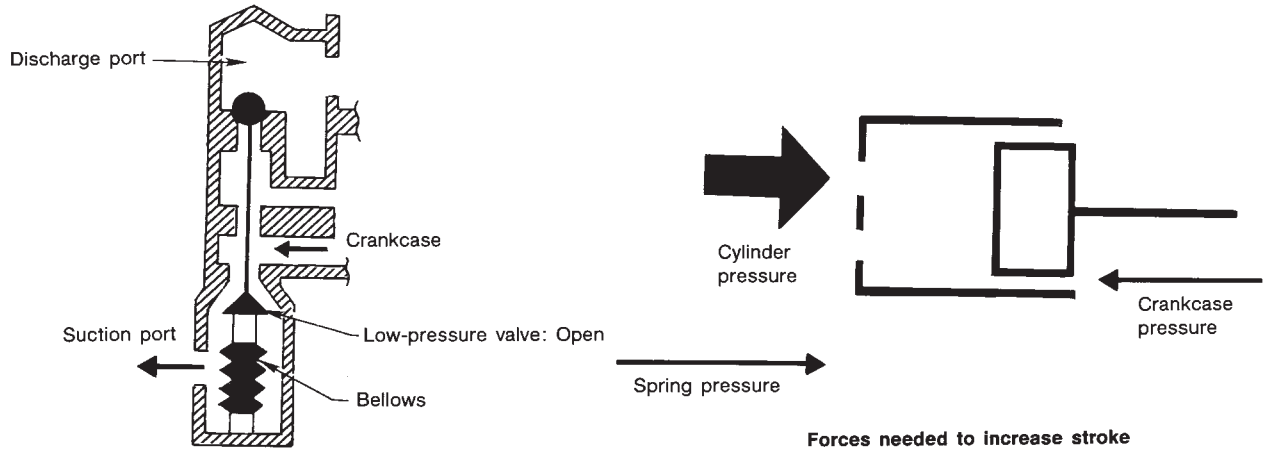
2. Maximum Cooling

NAHA0164S0202

Refrigerant pressure on the low-pressure side increases with an increase in heat loads.
When this occurs, the control valve's bellows compress to open the low-pressure side valve and close the high-pressure side valve.
This causes the following pressure changes:

- the crankcase's internal pressure to equal the pressure on the low-pressure side;
- the cylinder's internal pressure to be greater than the crankcase's internal pressure.

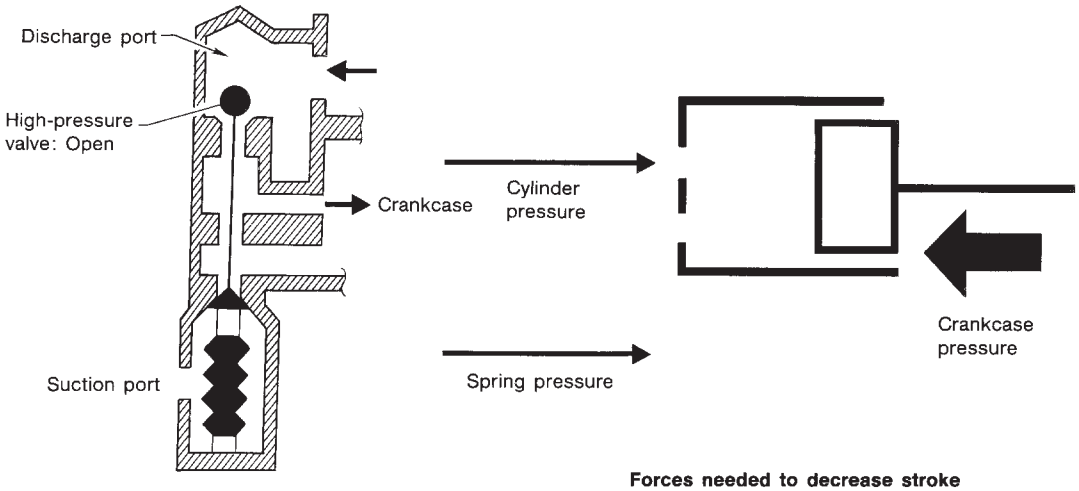
Under this condition, the swash plate is set to the maximum stroke position.



3. Capacity Control

=NAHA0164S0203

- Refrigerant pressure on suction side is low during high speed driving or when ambient or interior temperature is low.
- The bellows expands when refrigerant pressure on the suction pressure side drops below approximately 177 kPa (1.8 kg/cm^2, 26 psi).
  Since suction pressure is low, it makes the suction port close and the discharge port open. Thus, crankcase pressure becomes high as high pressure enters the crankcase.
- The force acts around the journal pin near the swash plate, and is generated by the pressure difference before and behind the piston.
  The drive lug and journal pin are located where the piston generates the highest pressure. Piston pressure is between suction pressure Ps and discharge pressure Pd, which is near suction pressure Ps. If crankcase pressure Pc rises due to capacity control, the force around the journal pin makes the swash plate angle decrease and also the piston stroke decrease. In other words, crankcase pressure increase triggers pressure difference between the piston and the crankcase. The pressure difference changes the angle of the swash plate.



Valve position for raising crankcase pressure

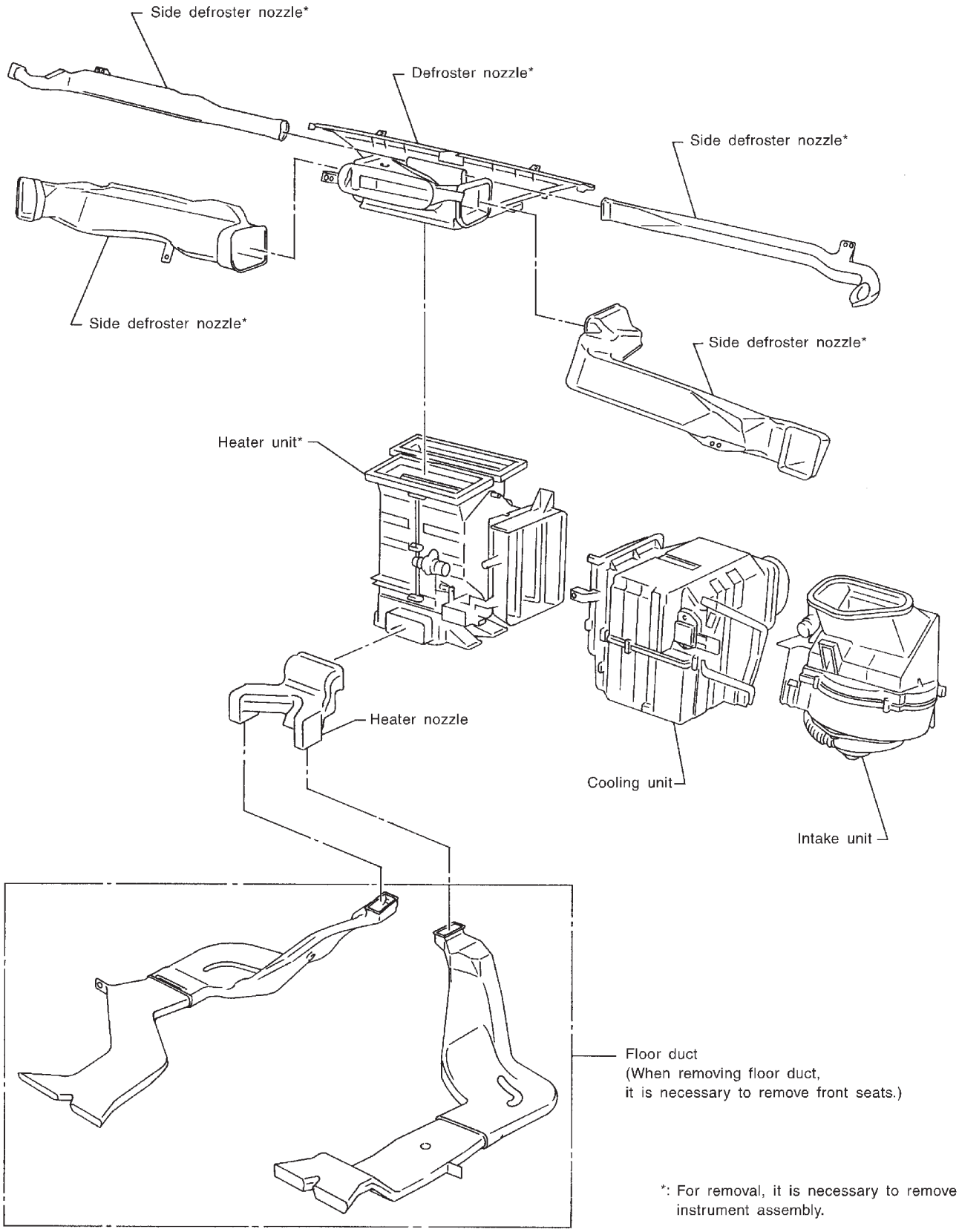
Forces needed to decrease stroke

RHA474C

Component Layout

NAHA0166

SEC. 270•271•272•273



RHA451G

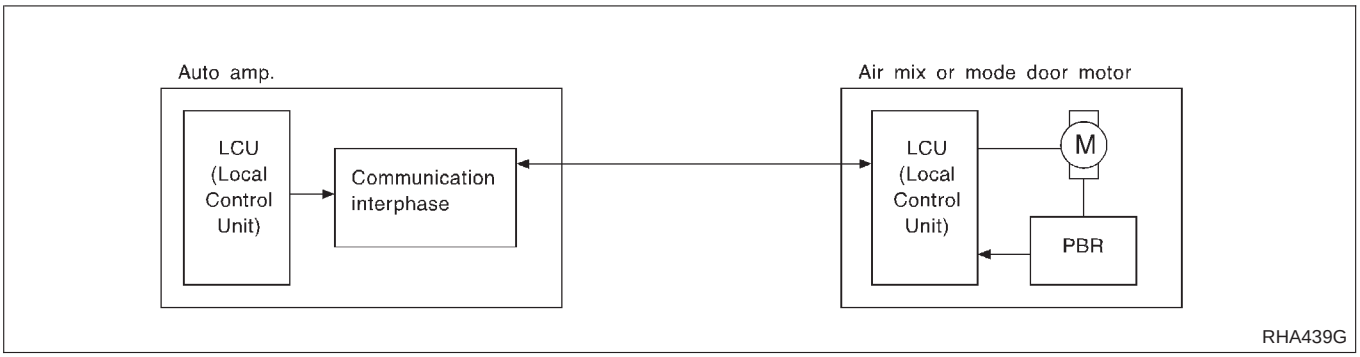
Introduction

NAHA0167

AIR CONDITIONER LAN SYSTEM OVERVIEW CONTROL SYSTEM

NAHA0167S01

The LAN system consists of auto amp., mode door motor and air mix door motor.
A configuration of these components is shown in the diagram below.



Features

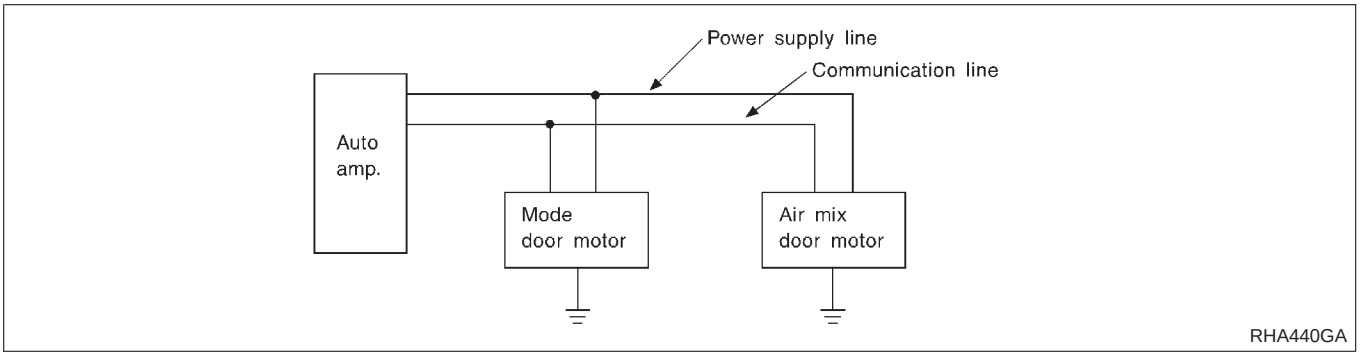
NAHA0168

SYSTEM CONSTRUCTION (LAN)

NAHA0168S01

A small network is constructed between the auto amplifier, mode door motor and air mix door motor. The auto amplifier and motors are connected by data transmission lines and motor power supply lines. The LAN network is built through the ground circuits of the two motors.
Addresses, motor opening angle signals, motor stop signals and error checking messages are all transmitted through the data transmission lines connecting the auto amplifier and two motors.
The following functions are contained in LCUs built into the mode door motor and the air mix door motor.

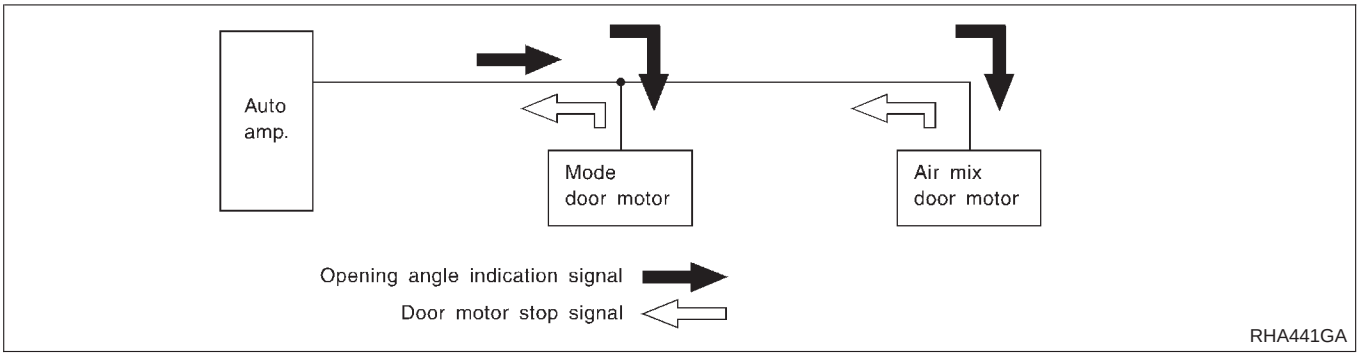
- Address
- Motor opening angle signals
- Data transmission
- Motor stop and drive decision
- Opening angle sensor (PBR function)
- Comparison
- Decision (Auto amplifier indicated value and motor opening angle comparison)



Operation

NAHA0168S0101

The auto amplifier receives data from each of the sensors. The amplifier sends mode door and air mix door opening angle data to the mode door motor LCU and air mix door motor LCU.
The mode door motor and air mix door motor read their respective signals according to the address signal. Opening angle indication signals received from the auto amplifier and each of the motor position sensors are compared by the LCUs in each motor with the existing decision and opening angles. Subsequently, HOT/COLD or DEFROST/VENT operation is selected. The new selection data is returned to the auto amplifier.



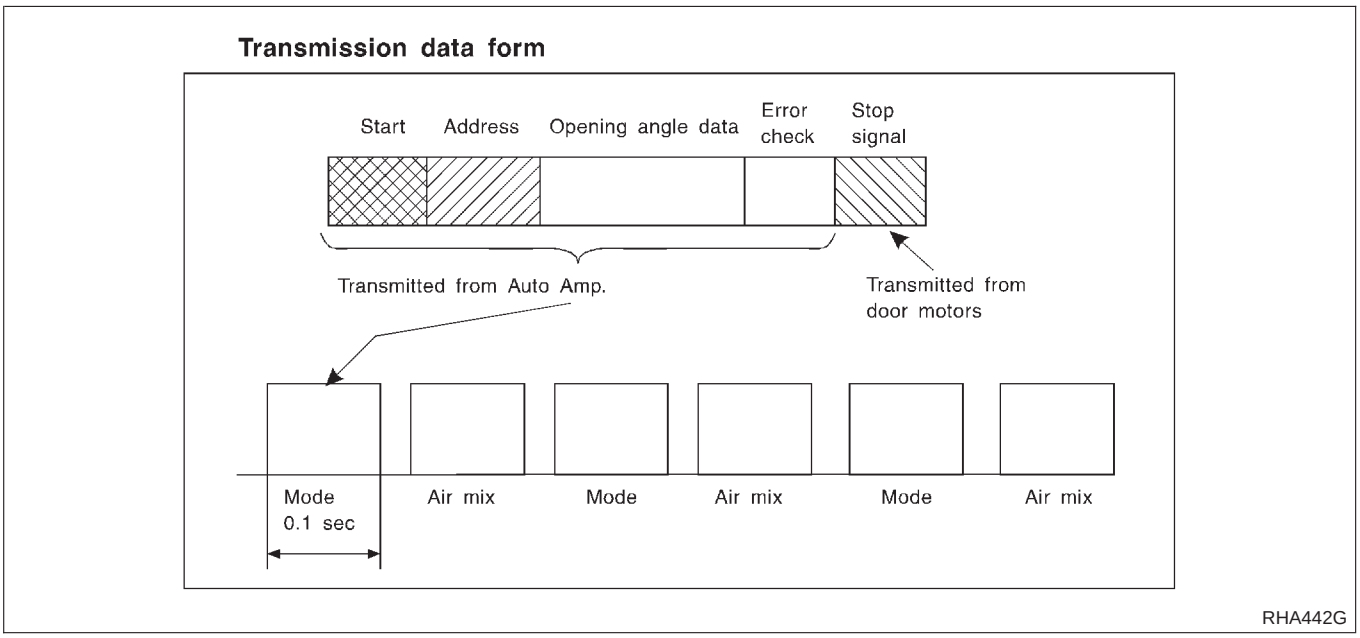
Transmission Data and Transmission Order

NAHA0168S0102

Amplifier data is transmitted consecutively to each of the door motors following the form shown in figure below.
Start: Initial compulsory signal sent to each of the door motors.
Address: Data sent from the auto amplifier is selected according to data-based decisions made by the mode door motor and air mix door motor.
If the addresses are identical, the opening angle data and error check signals are received by the door motor LCUs. The LCUs then make the appropriate error decision. If the opening angle data is normal, door control begins.
If an error exists, the received data is rejected and corrected data received. Finally, door control is based upon the corrected opening angle data.
Opening angle: Data that shows the indicated door opening angle of each door motor.
Error check: Procedure by which sent and received data is checked for errors. Error data is then compiled. The error check prevents corrupted data from being used by the mode door motor and air mix door motor. Error data can be related to the following problems.

- Abnormal electrical frequency
- Poor electrical connections
- Signal leakage from transmission lines
- Signal level fluctuation

Stop signal: At the end of each transmission, a stop operation, in-operation, or internal problem message is delivered to the auto amplifier. This completes one data transmission and control cycle.



Air Mix Door Control (Automatic Temperature Control)

NAHA0168S0103

The air mix door is automatically controlled so that in-vehicle temperature is maintained at a predetermined value by: The temperature setting, ambient temperature, in-vehicle temperature and amount of sunload.

Fan Speed Control

NAHA0168S0104

Blower speed is automatically controlled based on temperature setting, ambient temperature, in-vehicle temperature, intake temperature, amount of sunload and air mix door position.
With FAN switch set to "AUTO", the blower motor starts to gradually increase air flow volume.
When engine coolant temperature is low, the blower motor operation is delayed to prevent cool air from flowing.

Intake Door Control

NAHA0168S0105

The intake doors are automatically controlled by: The temperature setting, ambient temperature, in-vehicle temperature, intake temperature, amount of sunload and ON-OFF operation of the compressor.

Outlet Door Control

NAHA0168S0106

The outlet door is automatically controlled by: The temperature setting, ambient temperature, in-vehicle temperature, intake temperature and amount of sunload.

Magnet Clutch Control

NAHA0168S0107

The ECM controls compressor operation using input signals from the throttle position sensor and auto amplifier.

Self-diagnostic System

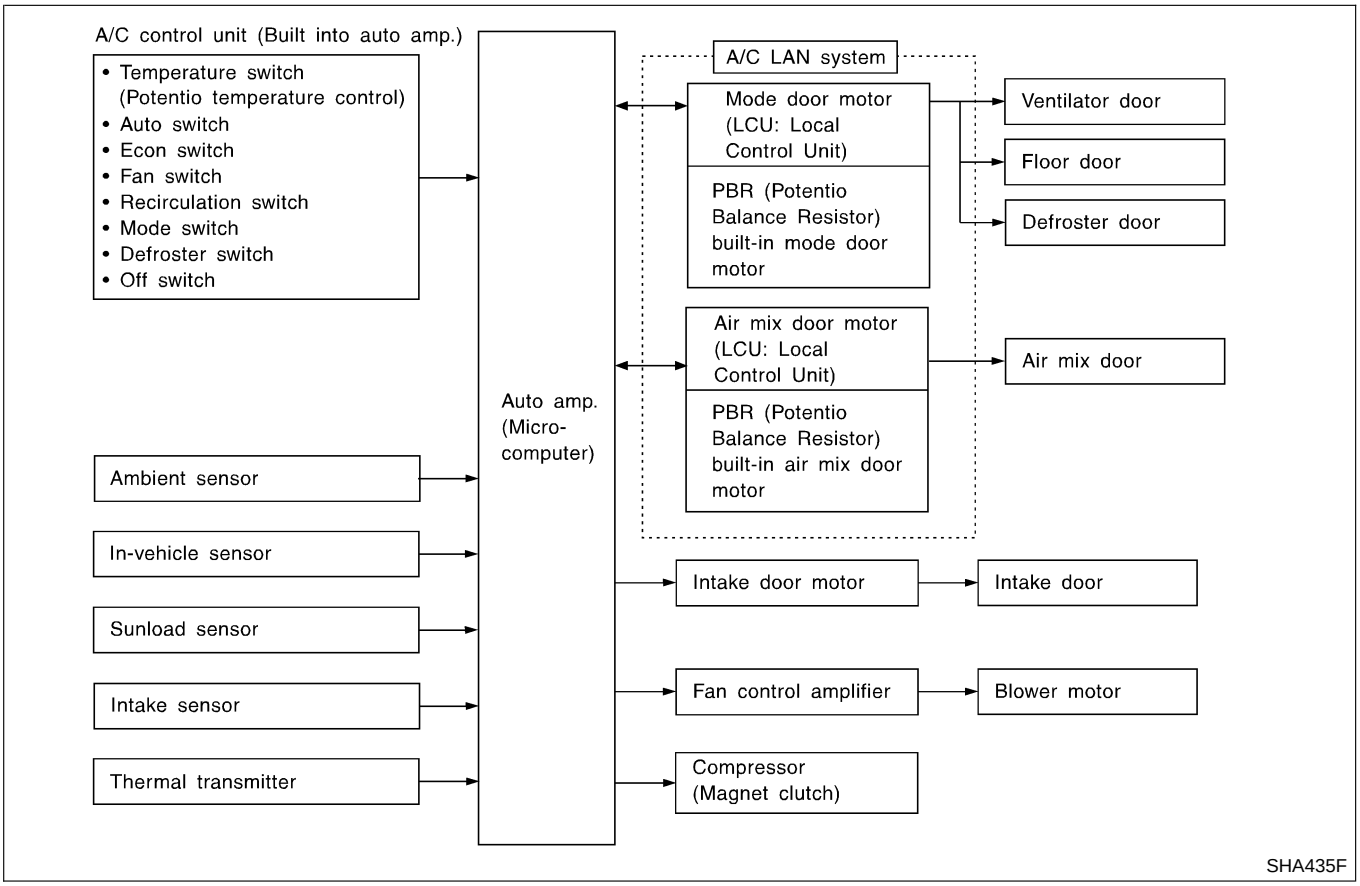
NAHA0168S0108

The self-diagnostic system is built into the auto amplifier (LCU) to quickly locate the cause of problems.

Overview of Control System

=NAHA0169

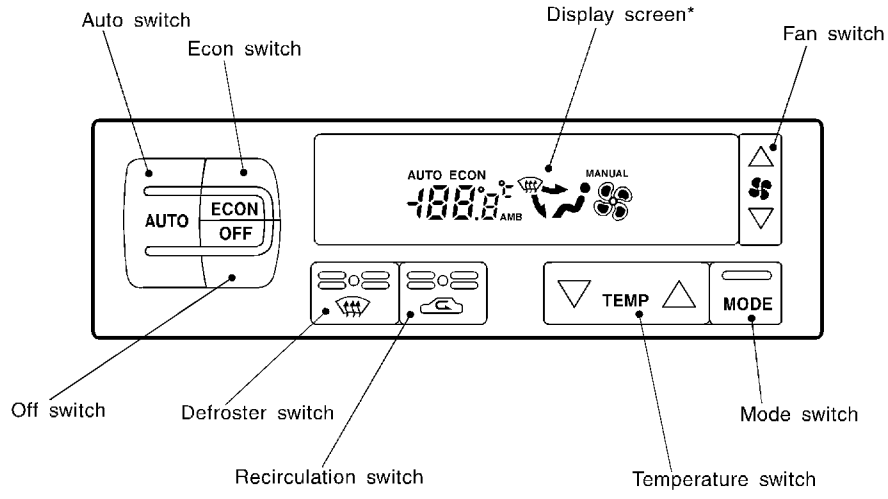
The control system consists of input sensors, switches, the automatic amplifier (microcomputer) and outputs. The relationship of these components is shown in the diagram below:



SHA435F

Control Operation

NAHA0170



* Display the operation of the system.

RHA452G

DISPLAY SCREEN

NAHA0170S01

Displays the operational status of the system.

AUTO SWITCH
NAHA0170S02
The compressor, intake doors, air mix door, outlet doors, and blower speed are automatically controlled so that the in-vehicle temperature will reach, and be maintained at the set temperature selected by the operator.

ECON SWITCH
NAHA0170S03
By pressing the ECON switch, the display should indicate ECON and the compressor always turns OFF. With the compressor OFF, the system will not remove heat (cool) or de-humidify. The system will maintain the in-vehicle temperature at the set temperature when the set temperature is above the ambient (outside) temperature. The system will set the intake doors to the outside air position.

TEMPERATURE SWITCH (POTENTIO TEMPERATURE CONTROL)
NAHA0170S04
Increases or decreases the set temperature.

OFF SWITCH
NAHA0170S05
The compressor and blower are OFF, the intake doors are set to the outside air position, and the air outlet doors are set to the foot (80% foot and 20% defrost) position.

FAN SWITCH
NAHA0170S06
Manual control of the blower speed. Four speeds are available for manual control (as shown on the display screen):
low , medium low , medium high , high

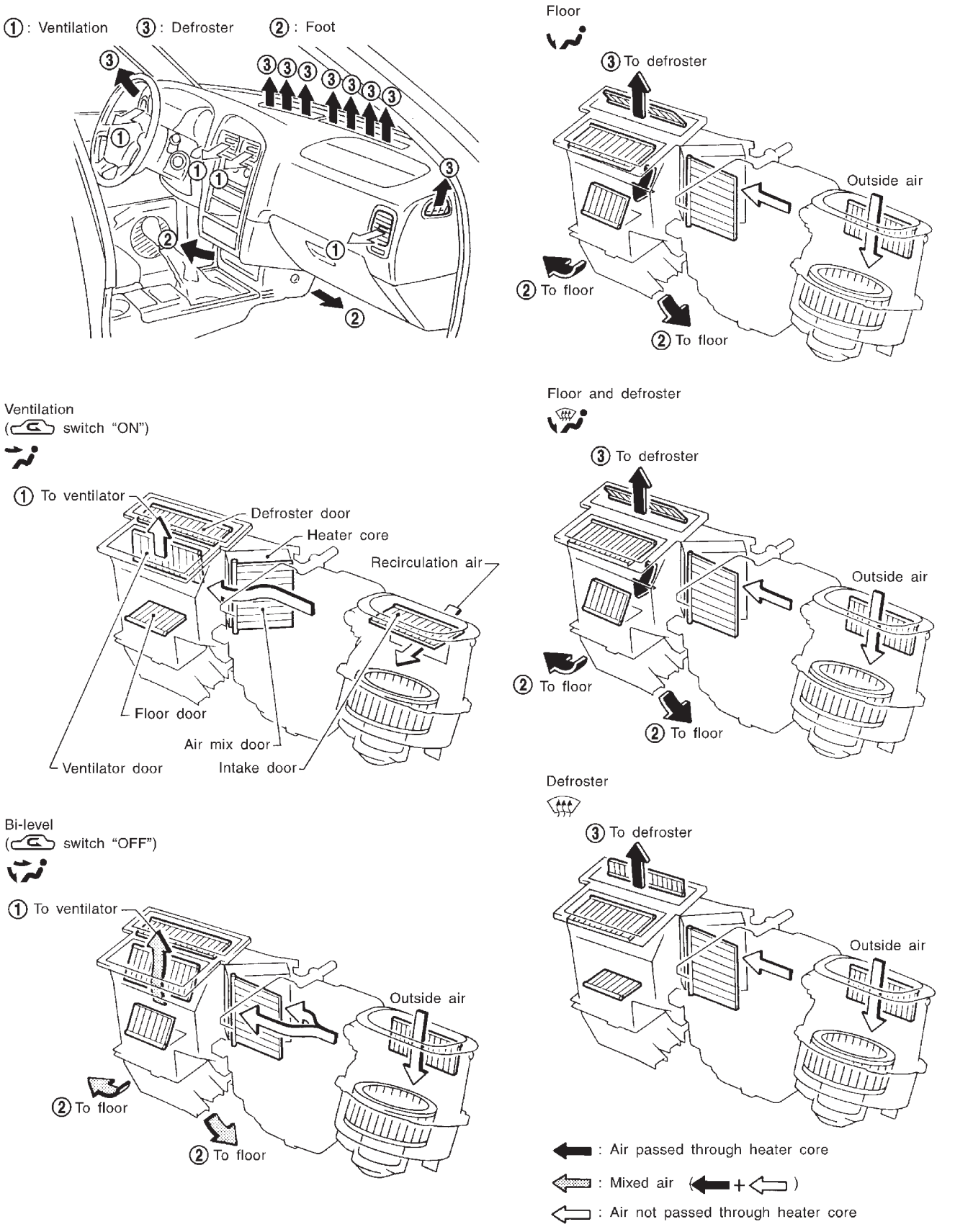
RECIRCULATION (REC) SWITCH
NAHA0170S07
OFF position: Outside air is drawn into the passenger compartment.
ON position: Interior air is recirculated inside the vehicle.

DEFROSTER (DEF) SWITCH
NAHA0170S08
Positions the air outlet doors to the defrost position. Also positions the intake doors to the outside air position.

MODE SWITCH
NAHA0170S09
Controls the air discharge outlets.

Discharge Air Flow

NAHA0171



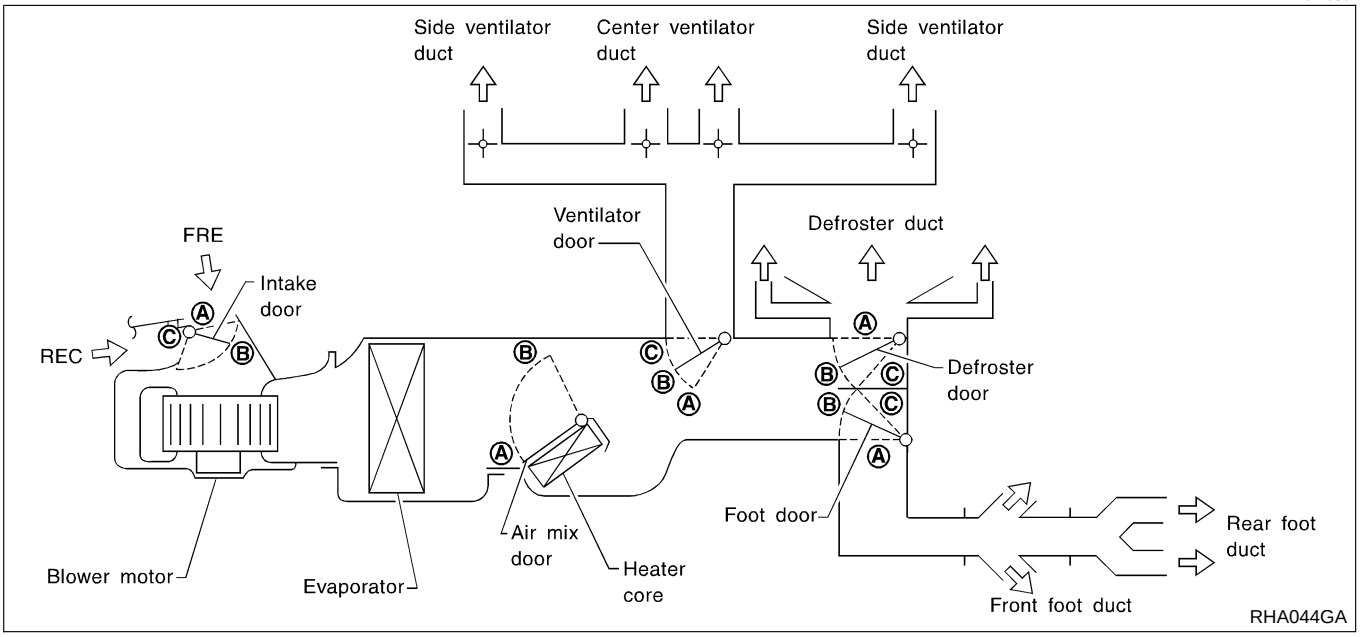
RHA043G

System Description

NAHA0246

SWITCHES AND THEIR CONTROL FUNCTIONS

NAHA0246S01



Position or switch	MODE SW				DEF SW		AUTO SW	ECON SW	REC SW		Temperature SW		
	VENT	B/L	FOOT	D/F	ON	OFF			ON	OFF	▼ TEMP ▲		
							AUTO	ECON					
Door											18.0°C (65°F)	—	32.0°C (85°F)
Ventilator door	A	B	C	C	C	—	AUTO	AUTO	—		—		
Foot door	A	B	C	C	A				—		—		
Defroster door	A	A	B	C	C				—		—		
Air mix door	—				—				—		A	AUTO	B
Intake door	—				C				A	AUTO*1	—		

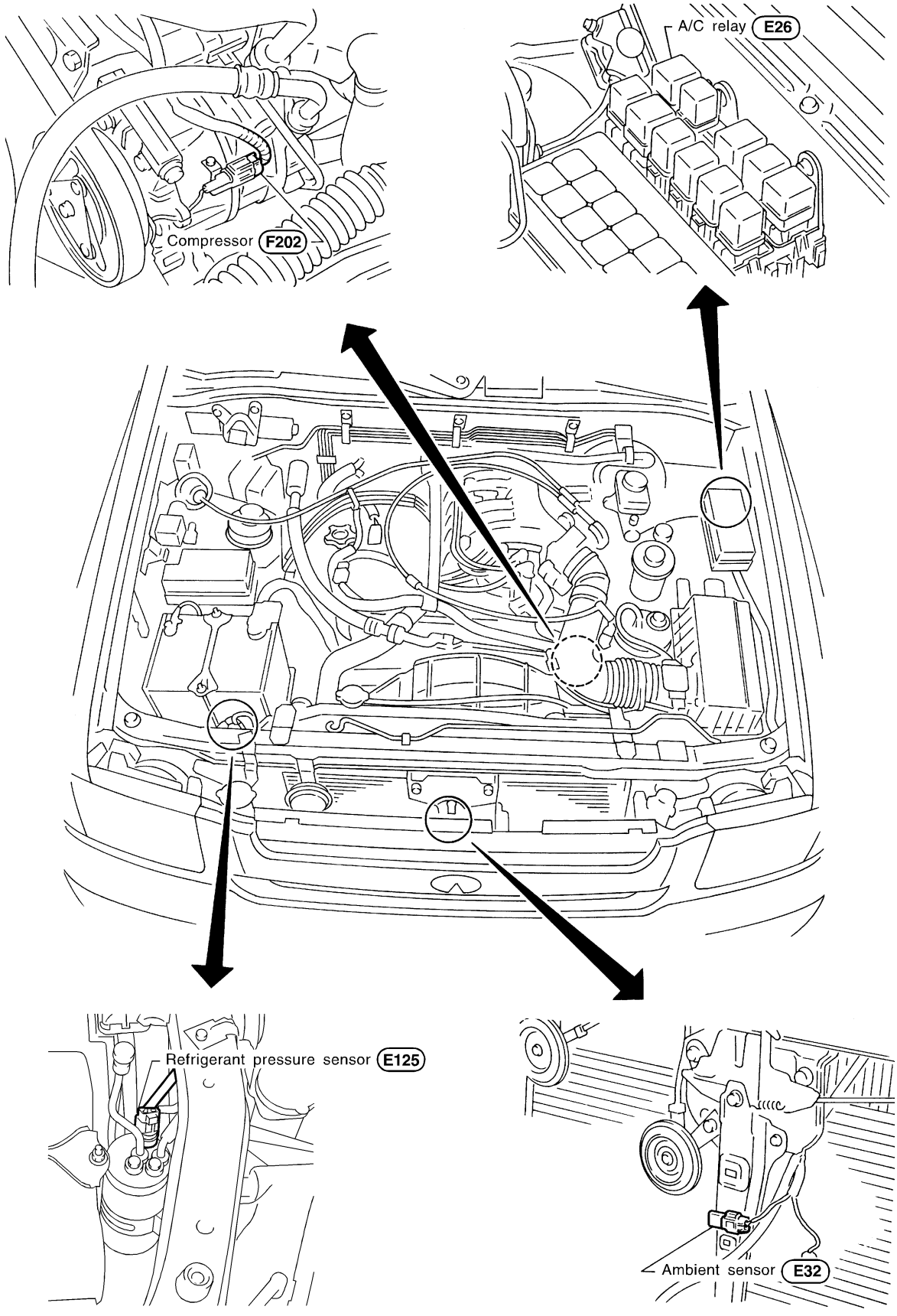
*1: Automatically controlled when REC switch is OFF.

Component Location

NAHA0172

ENGINE COMPARTMENT

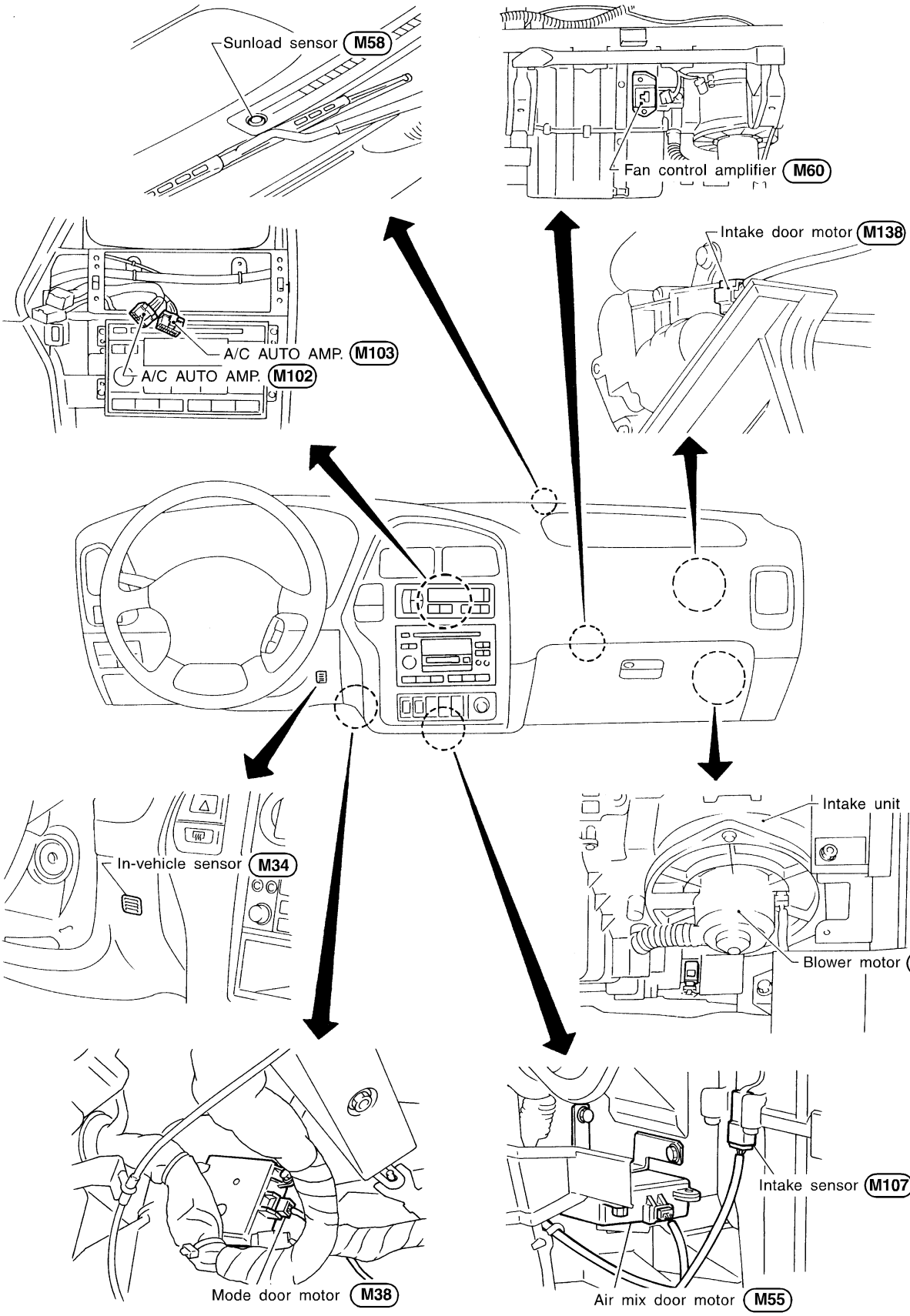
NAHA0172S01



SHA281FA

PASSENGER COMPARTMENT

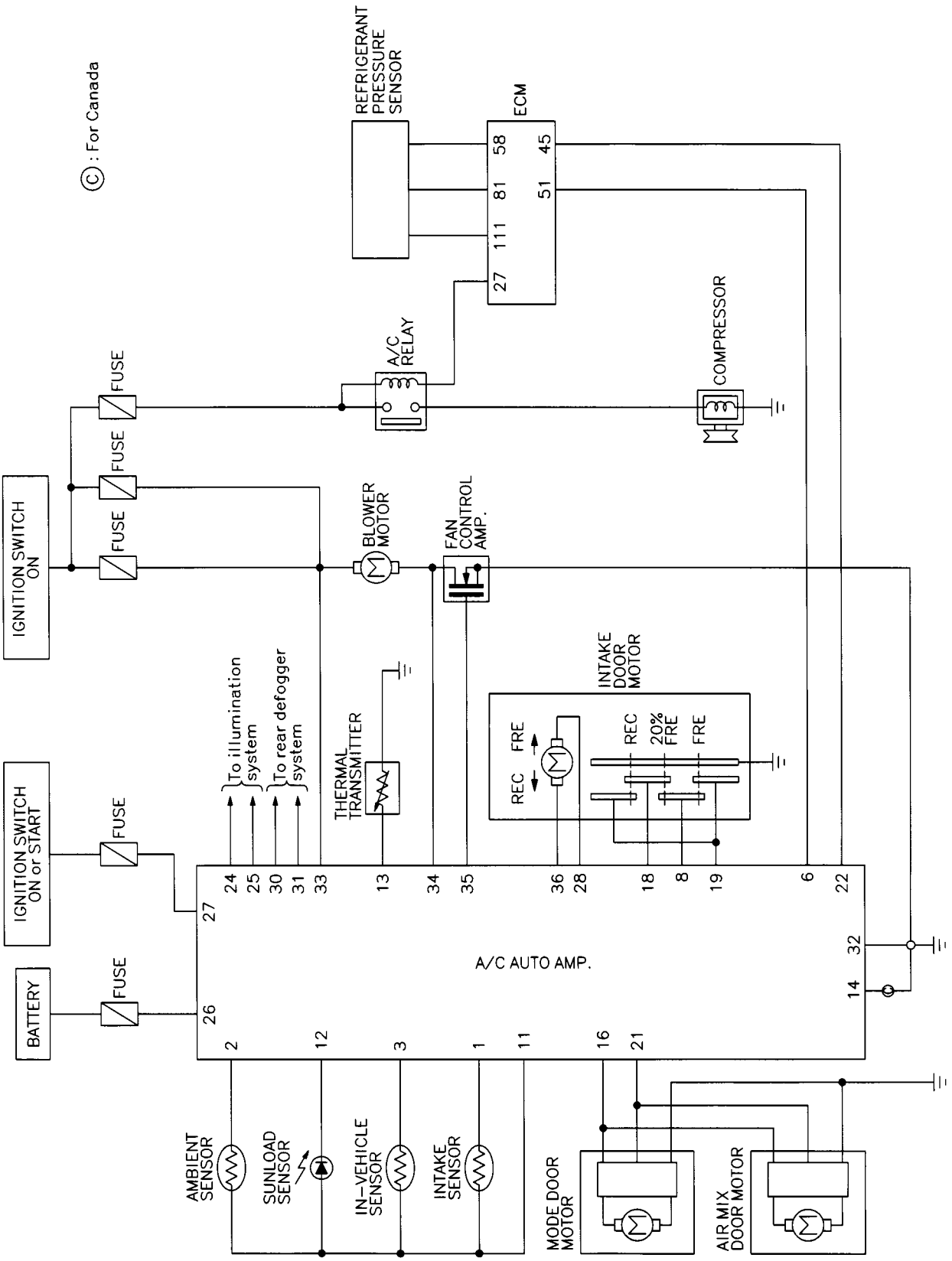
NAHA0172S02



RHA498GB

Circuit Diagram

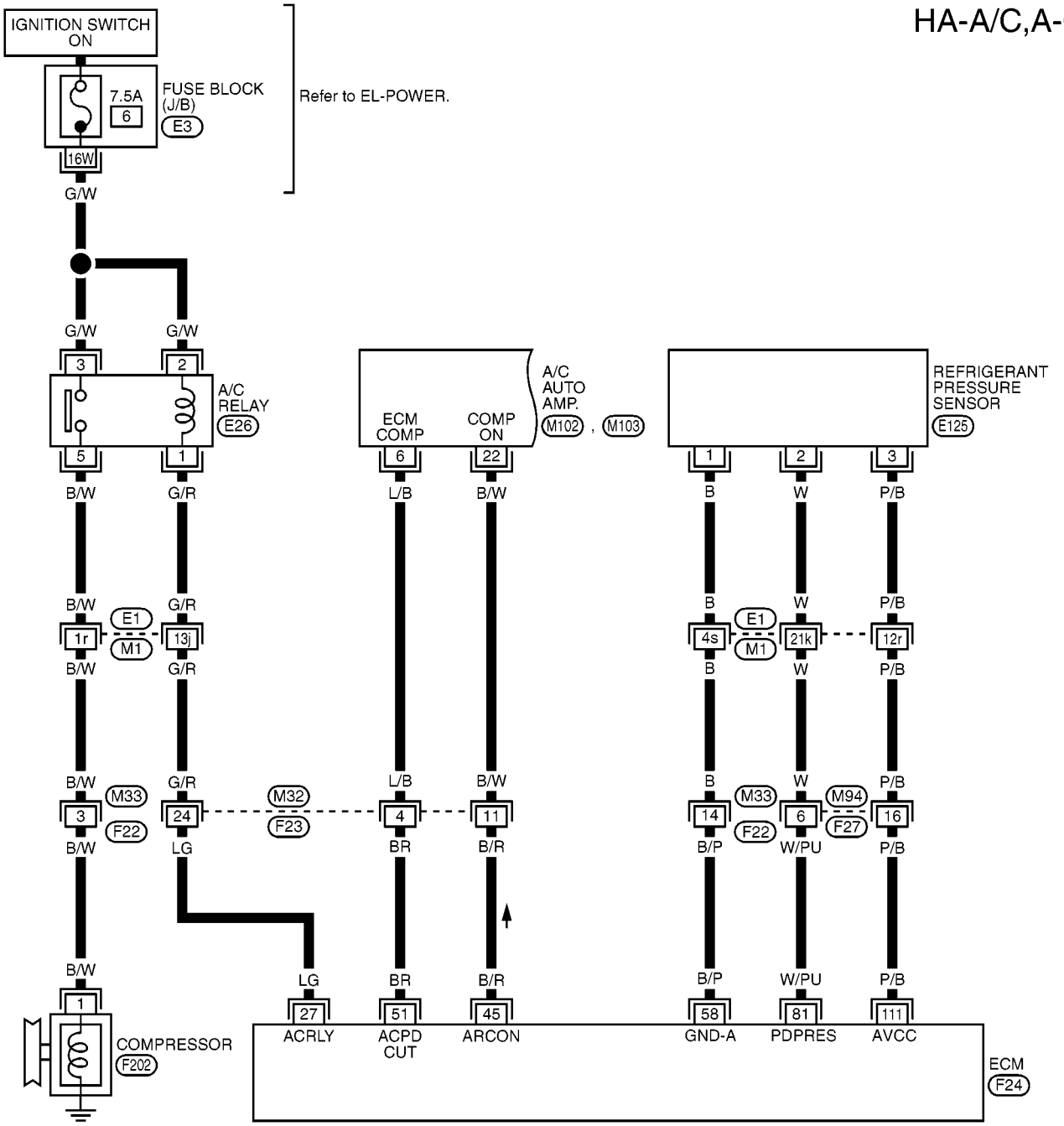
NAHA0173

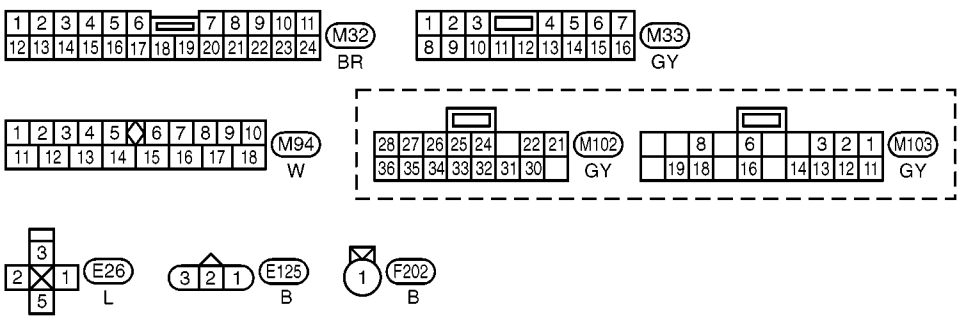


MHA973A

Wiring Diagram — A/C, A —

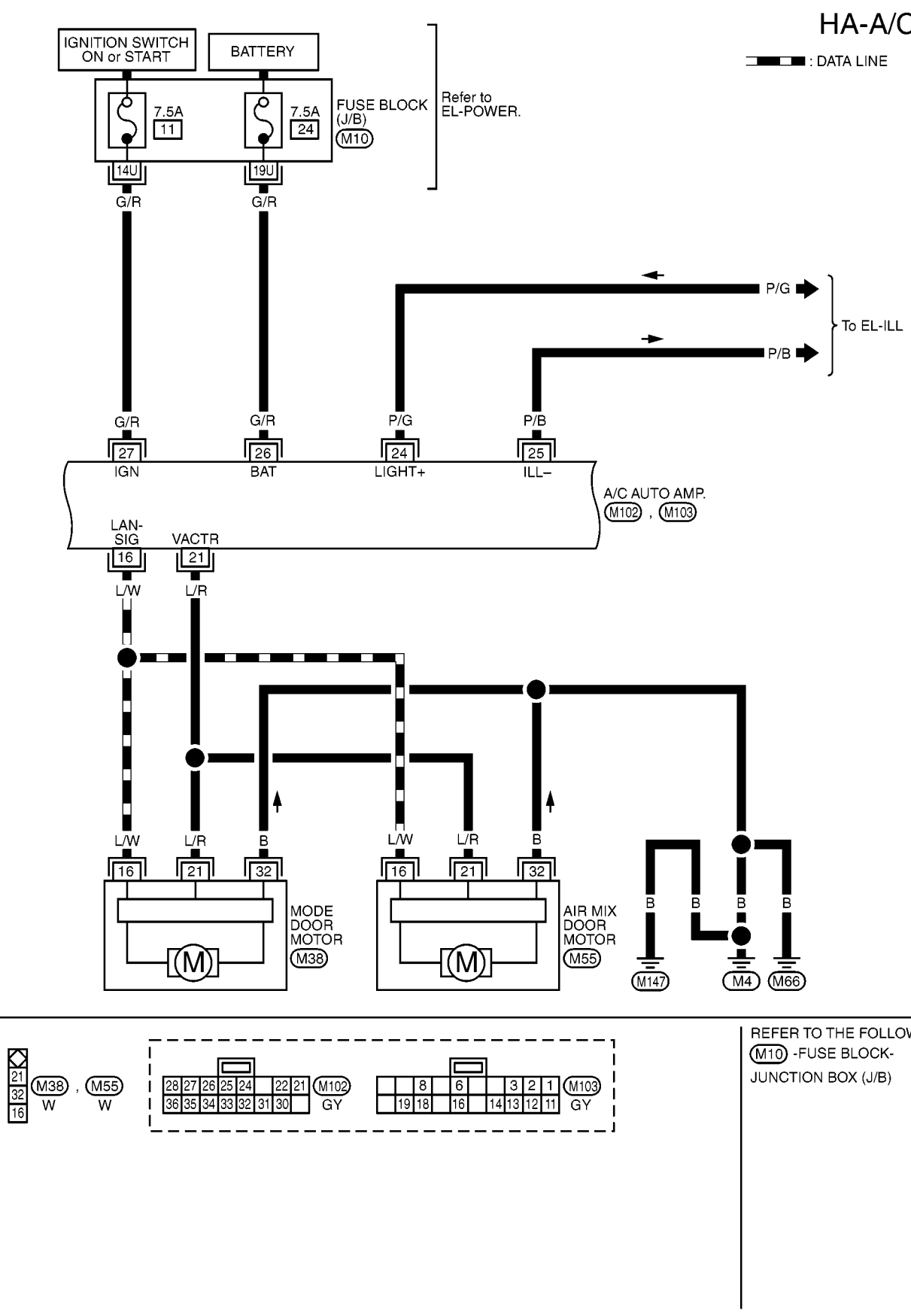
NAHA0174





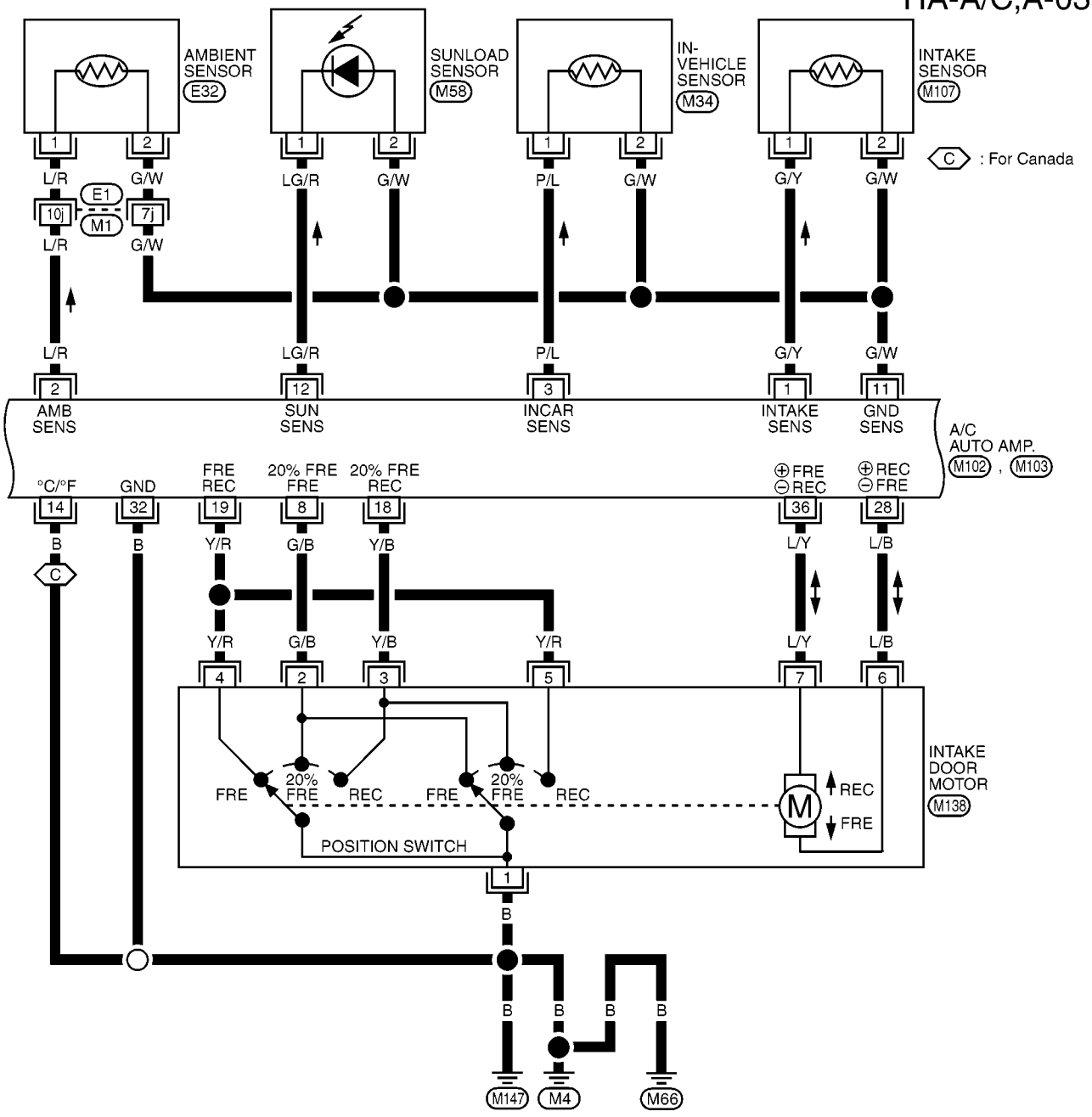
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
E3 -FUSE BLOCK-JUNCTION BOX (J/B)
F24 -ELECTRICAL UNITS

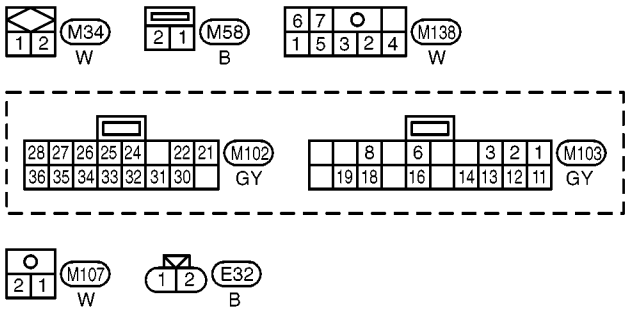
MHA983A


HA-A/C,A-02
: DATA LINE
IGNITION SWITCH ON or START
BATTERY
7.5A 11
7.5A 24
FUSE BLOCK (J/B) M10
Refer to EL-POWER.
14U
19U
G/R
G/R
P/G
P/B
To EL-ILL
27 IGN
26 BAT
24 LIGHT+
25 ILL–
A/C AUTO AMP. M102 , M103
LAN-SIG 16
VACTR 21
L/W
L/R
B
32
MODE DOOR MOTOR M38
AIR MIX DOOR MOTOR M55
M147
M4
M66
M38 W , M55 W
M102 GY
M103 GY
REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

MHA984A

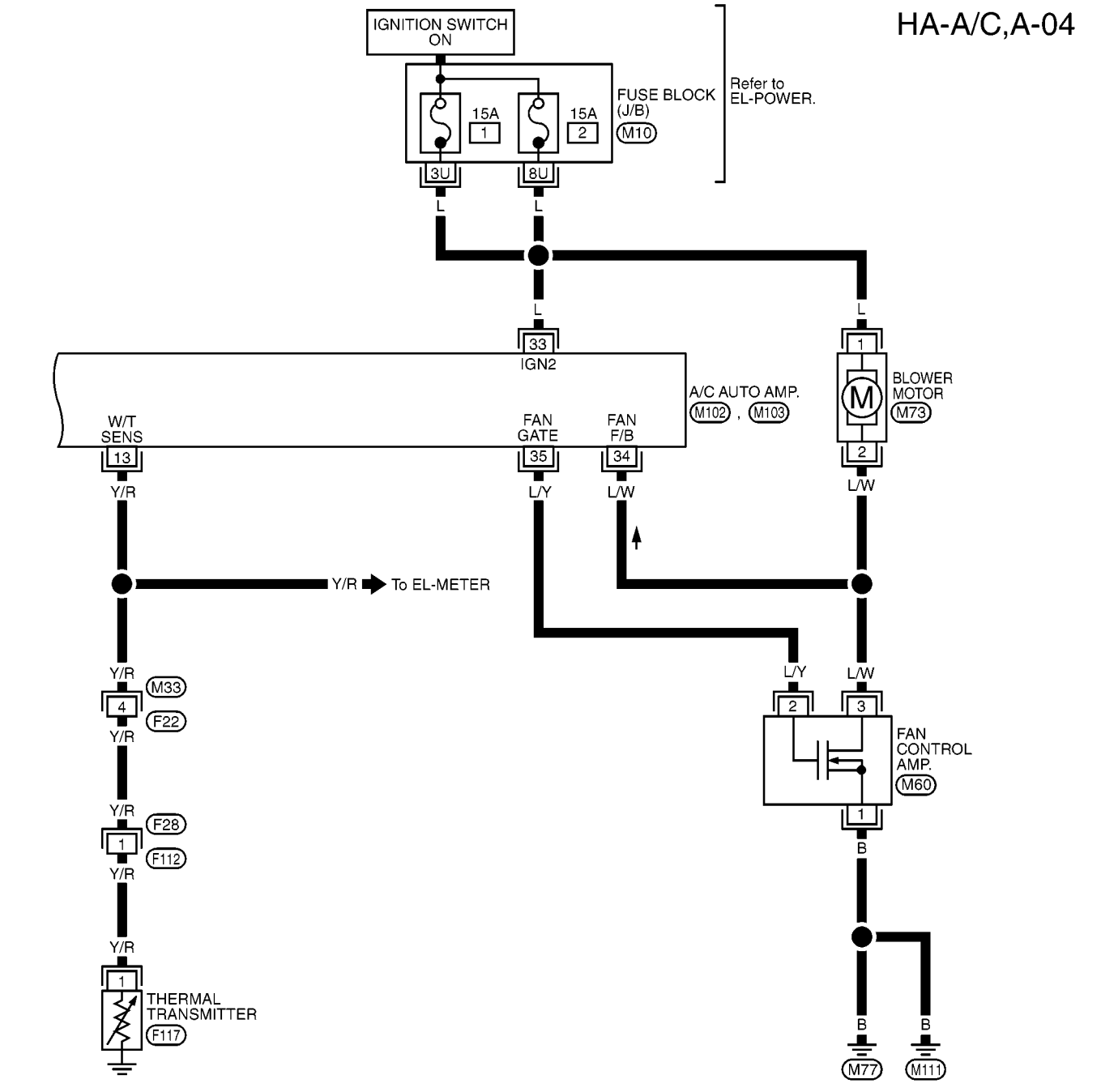
HA-A/C,A-03

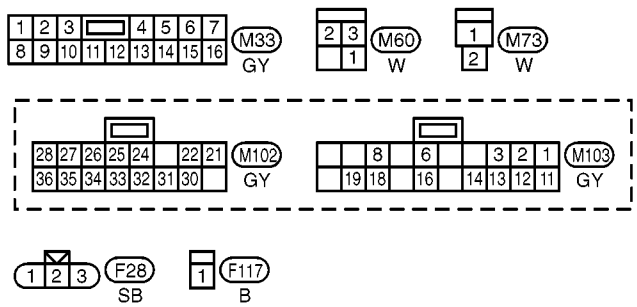




REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

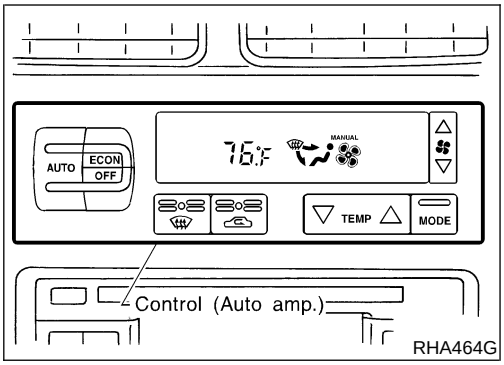
MHA985A





REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

MHA977A



Auto Amp. Terminals and Reference Value

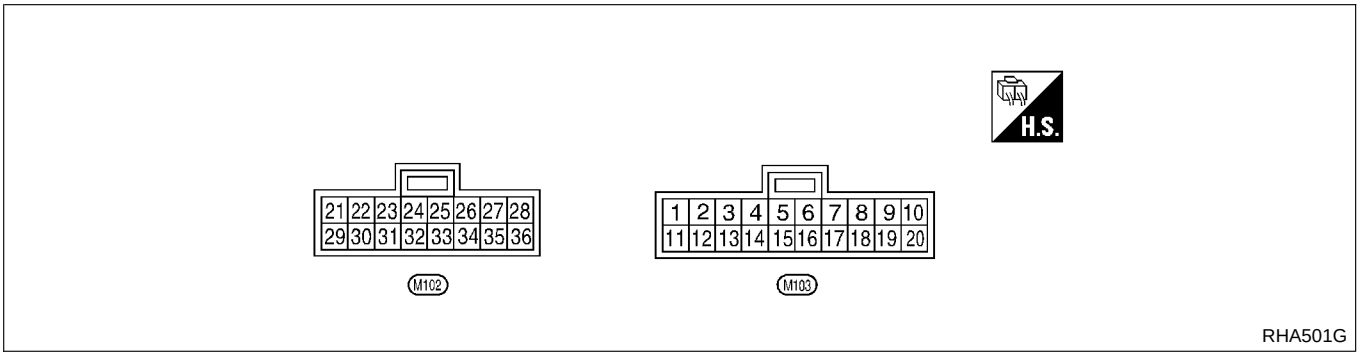
NAHA0175

INSPECTION OF AUTO AMP.

NAHA0175S01

- Measure voltage between each terminal and body ground by following “AUTO AMP. INSPECTION TABLE”.

- Pin connector terminal layout



AUTO AMP. INSPECTION TABLE

NAHA0175S02

TERMINAL NO.	ITEM	CONDITION			Voltage V
1	Intake sensor	—			—
2	Ambient sensor	—			—
3	In-vehicle sensor	—			—
6	ECM signal	ON	Compressor: ON		Approximately 0
			Compressor: OFF (by Refrigerant Pressure Sensor		Approximately 4.6
8	Intake door position switch	ON	Intake door position	FRESH or 20% FRESH	Approximately 0
				RECIRCULATION	Approximately 4.6
11	Sensor ground		—		Approximately 0
12	Sunload sensor	—			—

Auto Amp. Terminals and Reference Value (Cont'd)

TERMINAL NO.	ITEM	CONDITION			Voltage V
13	Thermal transmitter		Engine coolant temperature	Approximately 30°C (86°F)	Approximately 9.4
				Approximately 55°C (131°F)	Approximately 6.5
				Approximately 100°C (212°F)	Approximately 2.4
14	Ground (for Canada)		—		Approximately 0
16	A/C LAN signal		—		Approximately 5.5
18	Intake door position switch		Intake door position	20% FRE or RECIRCULATION	Approximately 0
				FRESH	Approximately 4.6
19	Intake door position switch		Intake door position	RECIRCULATION or FRESH	Approximately 0
				20% FRE	Approximately 4.7
21	Power supply for mode door motor and air mix door motor		—		Approximately 12
22	Compressor ON signal		Compressor	ON	Approximately 0
				OFF	Approximately 4.6
24	Power supply for illumination		Lighting switch	OFF	Approximately 0
				1st	Approximately 12
25	Illumination ground		—		Approximately 0
26	Power supply for BAT		—		BATTERY VOLTAGE
27	Power supply for IGN		—		Approximately 12
28	Power supply for intake door motor		Intake door position	FRESH	Approximately 12
				RECIRC	Approximately 0
32	Ground		—		Approximately 0
33	Power source for A/C		Ignition voltage feed back		Approximately 12
34	Blower motor feed back		Fan speed: Low		Approximately 7 - 10
35	Fan control AMP. control signal		Fan speed	Low, Middle low or Middle high	Approximately 2.5 - 3.0
				High	Approximately 9 - 10
36	Power supply for intake door motor		Intake door position	FRESH	Approximately 0
				RECIRC	Approximately 12

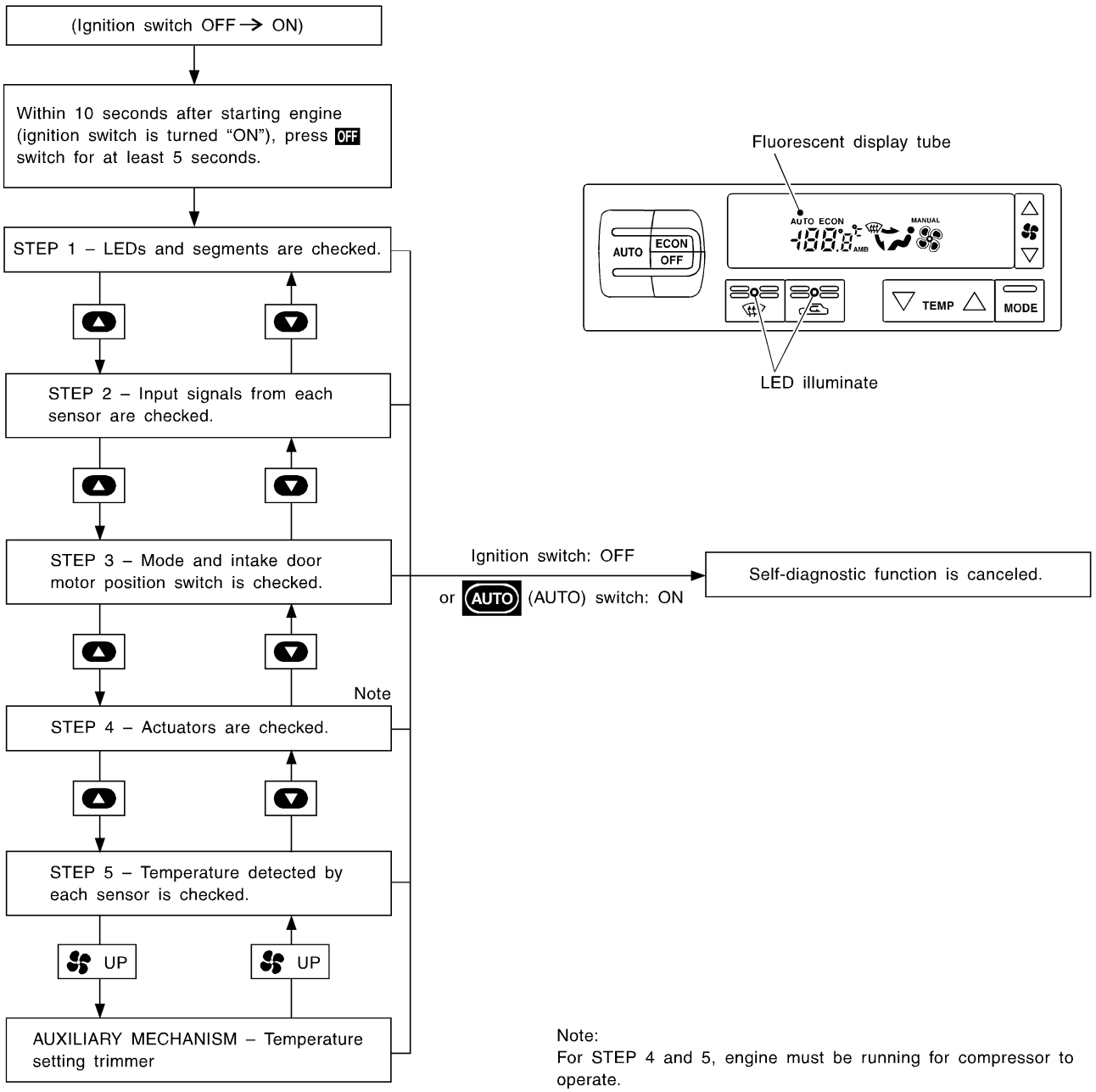
Self-diagnosis

=NAHA0176

INTRODUCTION AND GENERAL DESCRIPTION

NAHA0176S01

The self-diagnostic system diagnoses sensors, door motors, blower motor, etc. by system line. Refer to applicable sections (items) for details. Shifting from normal control to the self-diagnostic system is accomplished by starting the engine (turning the ignition switch from “OFF” to “ON”) and pressing “ OFF ” switch for at least 5 seconds. The “ OFF ” switch must be pressed within 10 seconds after starting the engine (ignition switch is turned “ON”). This system will be canceled by either pressing AUTO (AUTO) switch or turning the ignition switch “OFF”. Shifting from one step to another is accomplished by means of pushing ▲ (HOT) or ▼ (COLD) switch, as required.
Additionally shifting from STEP 5 to AUXILIARY MECHANISM is accomplished by means of pushing (fan) UP switch.



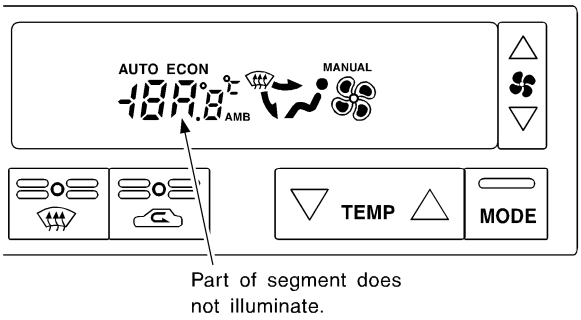
Note:
For STEP 4 and 5, engine must be running for compressor to operate.

RHA453GA

STEP-BY-STEP PROCEDURE

=NAHA0176S02

1	SET IN SELF-DIAGNOSTIC MODE
1. Turn ignition switch ON. 2. Set in self-diagnostic mode as follows. Within 10 seconds after starting engine (ignition switch is turned "ON".), press OFF switch for at least 5 seconds.	
▶	GO TO 2.

2	STEP 1 - ALL LEDs AND SEGMENT ARE CHECKED
Do all LEDs and segments illuminate? **Display malfunction**  Part of segment does not illuminate. RHA454G	
Yes or No	
Yes ▶	GO TO 3.
No ▶	Malfunctioning OFF switch, LED or fluorescent display tube. Replace A/C auto amp.

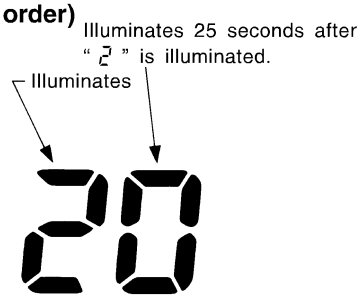
3	CHECK TO ADVANCE SELF-DIAGNOSIS STEP 2
1. Press ▲ (HOT) switch. 2. Advance to self-diagnosis STEP 2?	
Yes or No	
Yes ▶	GO TO 4.
No ▶	Malfunctioning ▲ (HOT) switch. Replace A/C auto amp.

4	CHECK TO RETURN SELF-DIAGNOSIS STEP 1
1. Press ▼ (COLD) switch. 2. Return to self-diagnosis STEP 1?	
Yes or No	
Yes ▶	GO TO 5.
No ▶	Malfunctioning ▼ (COLD) switch. Replace A/C auto amp.

5	STEP 2 - SENSOR CIRCUITS ARE CHECKED FOR OPEN OR SHORT CIRCUIT

Press ▲ (HOT) switch.
Does code No. 20 appear on the display?

Display (when all sensors are in good order)



RHA970DB

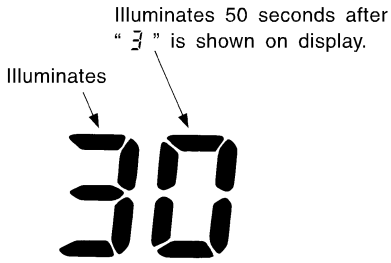
Yes or No

Yes	▶	GO TO 6.
No	▶	GO TO 13.

6	STEP 3 - MODE DOOR AND INTAKE DOOR POSITIONS ARE CHECKED

Press ▲ (HOT) switch.
Does code No. 30 appear on the display?

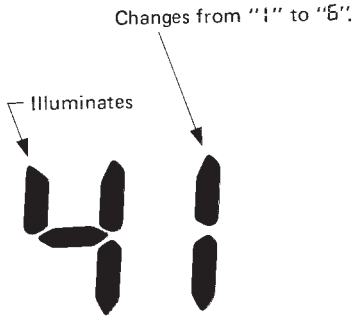
Display (when all doors are in good order)



RHA869DD

Yes or No

Yes	▶	GO TO 7.
No	▶	GO TO 14.

7	STEP 4 - OPERATION OF EACH ACTUATOR IS CHECKED
Press ▲ (HOT) switch. Engine running. Press DEF switch, code No. of each actuator test is indicated on the display.  RHA495A	
▶	GO TO 8.

8	CHECK ACTUATORS

Refer to the following chart and confirm discharge air flow, air temperature, blower motor voltage and compressor operation.

Checks must be made visually, by listening to any noise, or by touching air outlets with your hand, etc. for improper operation.

Code No.	Actuator test pattern				
	Mode door	Intake door	Air mix door	Blower motor	Compressor
41	VENT	REC	Full Cold	4 - 5V	ON
42	B/L	REC	Full Cold	9 - 11V	ON
43	B/L	20% FRE	Full Hot	7 - 9V	OFF
44	FOOT	FRE	Full Hot	7 - 9V	OFF
45	D/F	FRE	Full Hot	7 - 9V	ON
46	DEF	FRE	Full Hot	10 - 12V	ON

MTBL0200

Discharge air flow

Mode control knob	Air outlet/distribution		
	Face	Foot	Defroster
	100%		
	60%	40%	
		80%	20%
		60%	40%
			100%

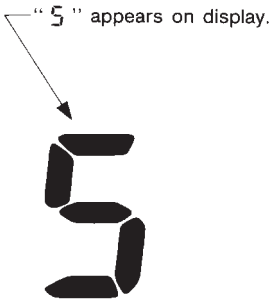
MTBL0044

OK or NG

OK	▶	GO TO 9.
NG	▶	• Air outlet does not change. Go to "Mode Door Motor" (HA-53). • Intake door does not change. Go to "Intake Door Motor" (HA-63). • Blower motor operation is malfunctioning. Go to "Blower Motor" (HA-70). • Magnet clutch does not engage. Go to "Magnet Clutch" (HA-78). • Discharge air temperature does not change. Go to "Air Mix Door Motor" (HA-59).

9	STEP 5 - TEMPERATURE OF EACH SENSOR IS CHECKED

Press (HOT) switch.
Code No. 5 appears on the display.

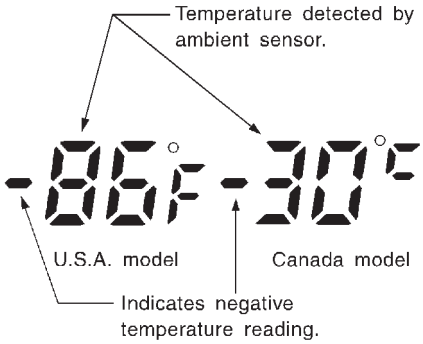


RHA492A

	▶	GO TO 10.

10	CHECK AMBIENT SENSOR

Press (DEF) switch one time, temperature detected by ambient sensor is indicated on the display.
ECON shown in display indicates negative temperature reading.
NOTE:
If temperature shown on display greatly differs from actual temperature, check sensor circuit first, then inspect sensor.



RHA499G

OK or NG

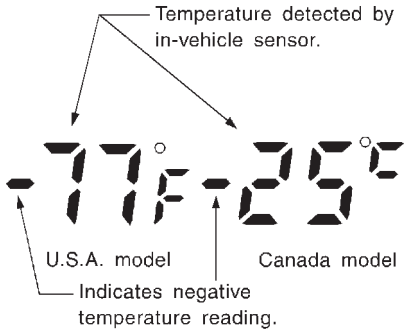
OK	▶	GO TO 11.
NG	▶	Go to Ambient Sensor Circuit (HA-97).

11	CHECK IN-VEHICLE SENSOR

Press (DEF) switch the second time, temperature detected by in-vehicle sensor is indicated on the display screen. ECON shown in display indicates negative temperature reading.

NOTE:

If temperature shown on display greatly differs from actual temperature, check sensor circuit first, then inspect sensor.



RHA500G

OK or NG

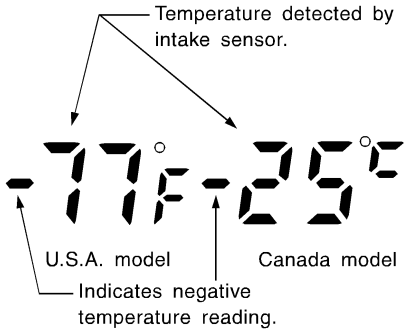
OK	▶	GO TO 12.
NG	▶	Go to In-vehicle Sensor Circuit (HA-101).

12	CHECK INTAKE SENSOR

Press (DEF) switch the third time, temperature detected by intake sensor is indicated on the display.

NOTE:

If temperature shown on display greatly differs from actual temperature, check sensor circuit first, then inspect sensor.



RHA500GB

OK or NG

OK	▶	1. Press (DEF) switch the fourth time. Display returns to original presentation 5. 2. Turn ignition switch OFF or (AUTO) switch ON. 3. END
NG	▶	Go to Intake Sensor Circuit (HA-108).

13	CHECK MALFUNCTIONING SENSOR

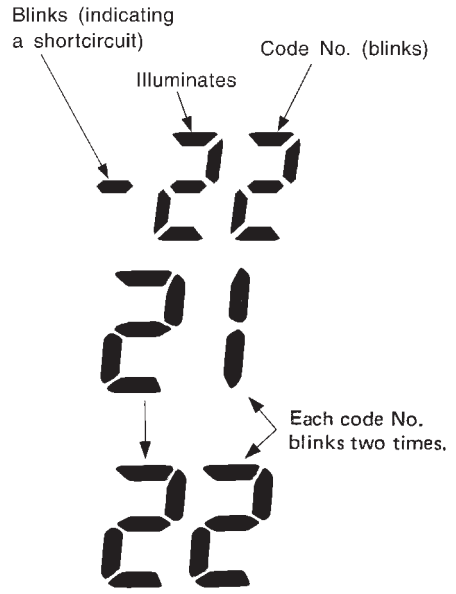
Refer to the following chart for malfunctioning code No.
(If two or more sensors malfunction, corresponding code Nos. blink respectively two times.)

Code No.	Malfunctioning sensor (including circuits)	Reference page
21 -21	Ambient sensor	*2
22 -22	In-vehicle sensor	*3
24 -24	Intake sensor	*4
25 -25	Sunload sensor*1	*5
26 -26	Air mix door motor (LCU) PBR	*6

MTBL0083

***1: Conduct self-diagnosis STEP 2 under sunshine.**
When conducting indoors, aim a light (more than 60W) at sunload sensor, otherwise Code No. 25 will indicate despite that sunload sensor is functioning properly.
*2: HA-97
*3: HA-101
*4: HA-108
*5: HA-104
*6: HA-110

Display (when sensor malfunctions)



RHA455G

RHA501A

▶	INSPECTION END

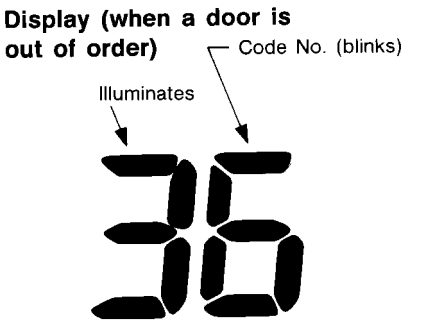
14	CHECK MALFUNCTIONING DOOR MOTOR POSITION SWITCH

Mode or (and) intake door motor position switch(es) is (are) malfunctioning.
(If two or more mode or intake doors are out of order, corresponding code numbers blink respectively two times.)

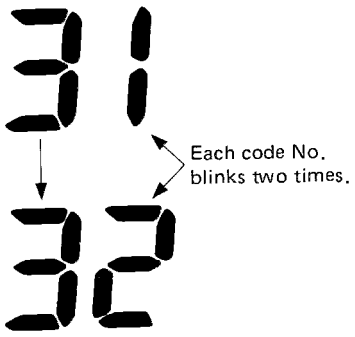
Code No. *1 *2	Mode or intake door position		Reference page
31	VENT	Mode door motor	*3
32	B/L		
34	FOOT		
35	D/F		
36	DEF		
37	FRE	Intake door motor	*4
38	20% FRE		
39	REC		

MTBL0514

*1: If mode door motor harness connector is disconnected, the following display pattern will appear.
31 → 32 → 34 → 35 → 36 → Return to 31
*2: If intake door motor harness connector is disconnected, the following display pattern will appear.
37 → 38 → 39 → Return to 37
*3: HA-53
*4: HA-63



RHA168DA



RHA498A

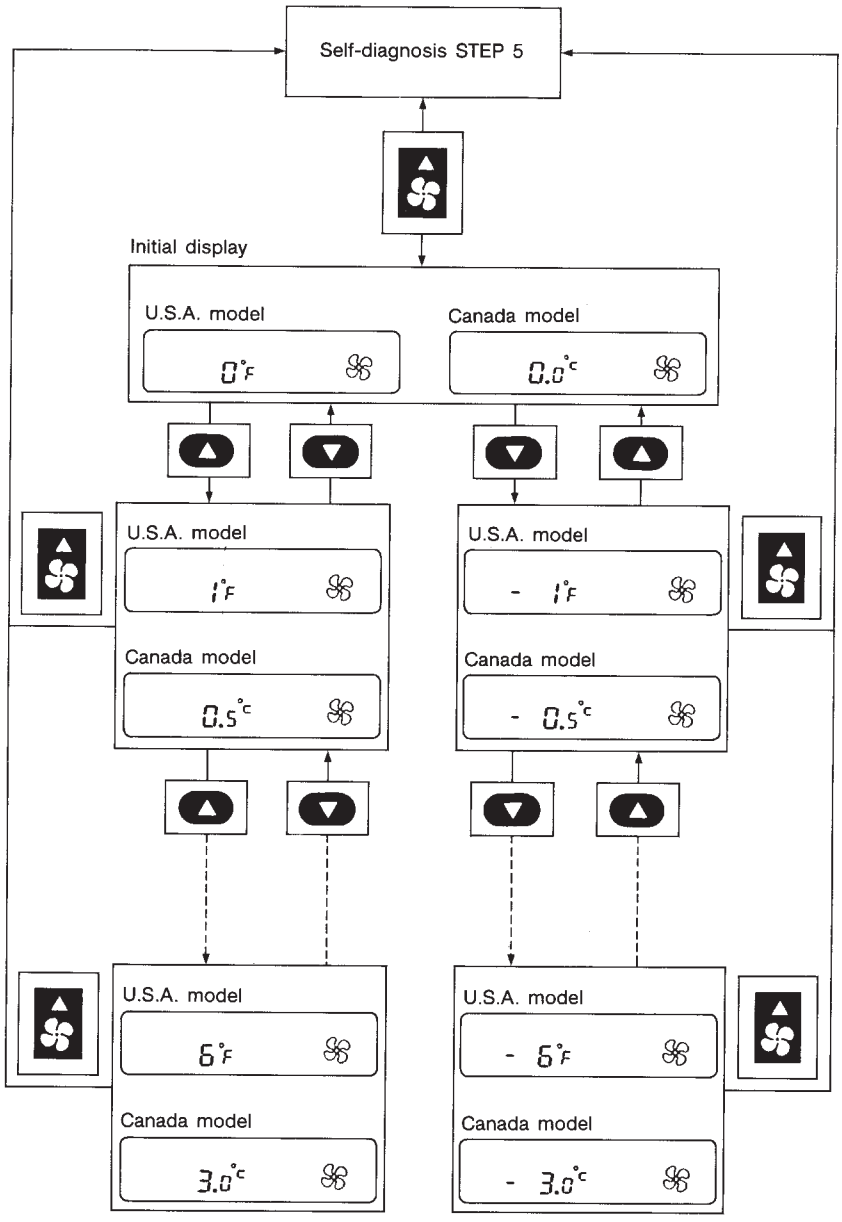
▶ INSPECTION END

AUXILIARY MECHANISM: TEMPERATURE SETTING TRIMMER

=NAHA0176S03

The trimmer compensates for differences in range of ±3°C (±6°F) between temperature setting (displayed digitally) and temperature felt by driver.
Operating procedures for this trimmer are as follows:

- Begin Self-diagnosis STEP 5 mode.
- Press ❀ (fan) UP switch to set system in auxiliary mode.
- Display shows "61" in auxiliary mechanism.
  It takes approximately 3 seconds.
- Press either ▲ (HOT) or ▼ (COLD) switch as desired. Temperature will change at a rate of 0.5°C (1°F) each time a switch is pressed.



SHA197E

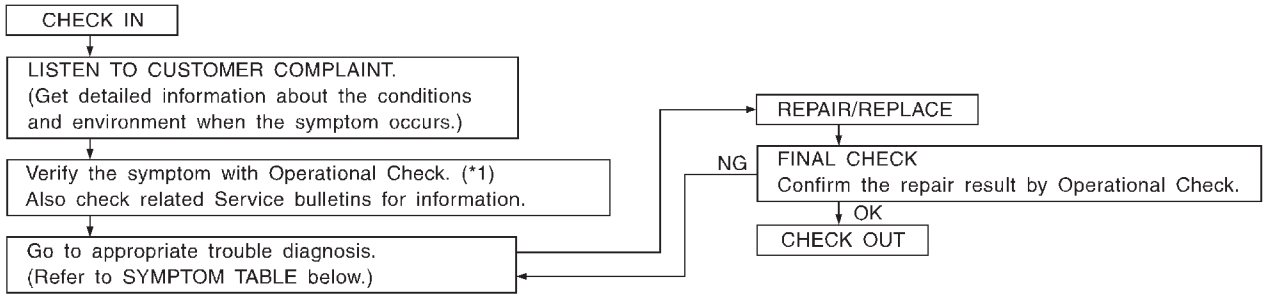
When battery cable is disconnected, trimmer operation is canceled. Temperature set becomes that of initial condition, i.e. 0°C (0°F).

How to Perform Trouble Diagnoses for Quick and Accurate Repair

=NAHA0177

WORK FLOW

NAHA0177S01



SHA900E

*1: Operational Check (HA-48)

SYMPTOM TABLE

NAHA0177S02

Symptom	Reference Page	
• A/C system does not come on.	• Go to Trouble Diagnosis Procedure for A/C system.	HA-51
• Air outlet does not change. • Mode door motor does not operate normally.	• Go to Trouble Diagnosis Procedure for Mode Door Motor. (LAN)	HA-53
• Discharge air temperature does not change. • Air mix door motor does not operate normally.	• Go to Trouble Diagnosis Procedure for Air Mix Door Motor. (LAN)	HA-59
• Intake door does not change. • Intake door motor does not operate normally.	• Go to Trouble Diagnosis Procedure for Intake Door Motor.	HA-63
• Blower motor operation is malfunctioning. • Blower motor operation is malfunctioning under out of starting fan speed control.	• Go to Trouble Diagnosis Procedure for Blower Motor.	HA-70
• Magnet clutch does not engage.	• Go to Trouble Diagnosis Procedure for Magnet Clutch.	HA-78
• Insufficient cooling.	• Go to Trouble Diagnosis Procedure for Insufficient Cooling.	HA-85
• Insufficient heating.	• Go to Trouble Diagnosis Procedure for Insufficient Heating.	HA-93
• Noise.	• Go to Trouble Diagnosis Procedure for Noise.	HA-94
• Self-diagnosis can not be performed.	• Go to Trouble Diagnosis Procedure for Self-diagnosis.	HA-95
• Memory function does not operate.	• Go to Trouble Diagnosis Procedure for Memory Function.	HA-96
• ECON mode does not operate.	• Go to Trouble Diagnosis Procedure for ECON (ECONOMY) — mode.	HA-97

Operational Check

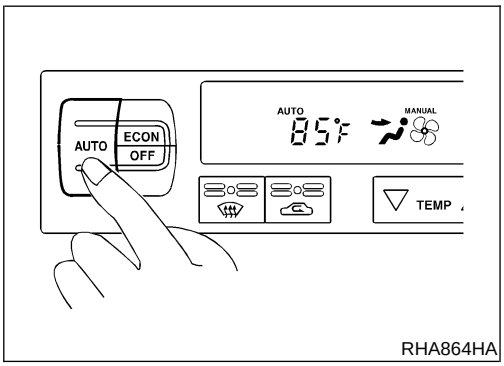
NAHA0178

The purpose of the operational check is to confirm that the system operates properly.

CONDITIONS:

NAHA0178S01

- **Engine running and at normal operating temperature.**



RHA864HA

PROCEDURE:

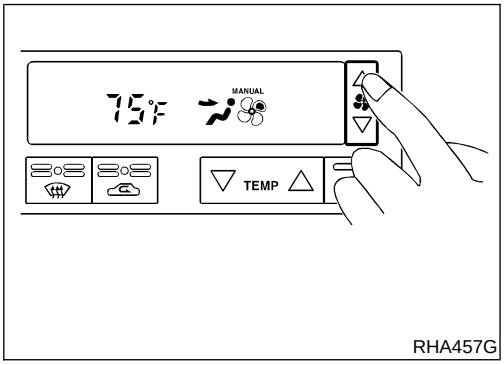
NAHA0178S02

1. Check Memory Function

NAHA0178S0201

1. Set the temperature 85°F or 32°C.
2. Press OFF switch.
3. Turn the ignition off.
4. Turn the ignition on.
5. Press the AUTO switch.
6. Confirm that the set temperature remains at previous temperature.
7. Press OFF switch.

If NG, go to trouble diagnosis procedure for memory function (HA-96).
If OK, continue with next check.



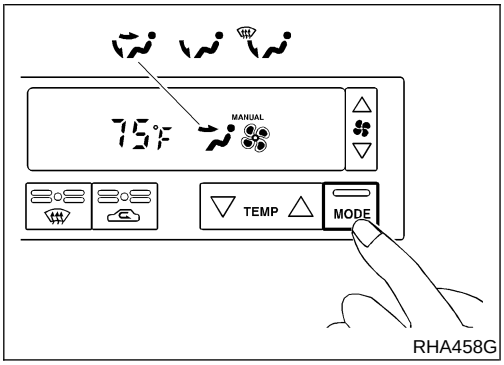
RHA457G

2. Check Blower

NAHA0178S0202

1. Press fan switch (up side) one time.
   Blower should operate on low speed.
   The fan symbol should have one blade lit .
2. Press fan switch (up side) one more time, and continue checking blower speed and fan symbol until all speeds are checked.
3. Leave blower on MAX speed .

If NG, go to trouble diagnosis procedure for blower motor (HA-70).
If OK, continue with next check.



RHA458G

3. Check Discharge Air

NAHA0178S0203

1. Press mode switch four times and DEF button.
2. Each position indicator should change shape.

Discharge air flow

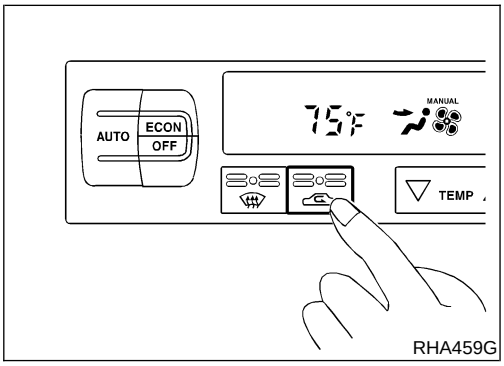
Mode control knob	Air outlet/distribution		
	Face	Foot	Defroster
	100%	–	–
	60%	40%	–
	–	80%	20%
	–	60%	40%
	–	–	100%

RHA654F

3. Confirm that discharge air comes out according to the air distribution table at left.
   Refer to "Discharge Air Flow" (HA-26).

NOTE:
Confirm that the compressor clutch is engaged (visual inspection) and intake door position is at FRESH when the DEF is selected.

Intake door position is checked in the next step.
If NG, go to trouble diagnosis procedure for mode door motor (HA-53).
If OK, continue with next check.



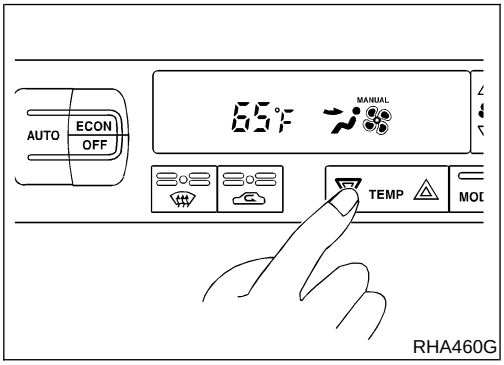
RHA459G

4. Check Recirculation

NAHA0178S0204

1. Press REC switch.
   Recirculation indicator should illuminate.
2. Listen for intake door position change (you should hear blower sound change slightly).

If NG, go to trouble diagnosis procedure for intake door (HA-63).
If OK, continue with next check.



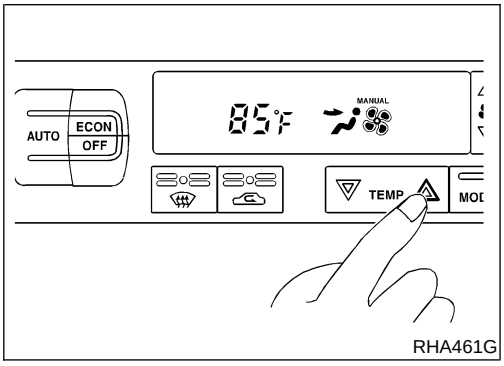
RHA460G

5. Check Temperature Decrease

NAHA0178S0205

1. Press the temperature decrease button until 18°C (65°F) is displayed.
2. Check for cold air at discharge air outlets.

If NG, go to trouble diagnosis procedure for insufficient cooling (HA-85).
If OK, continue with next check.



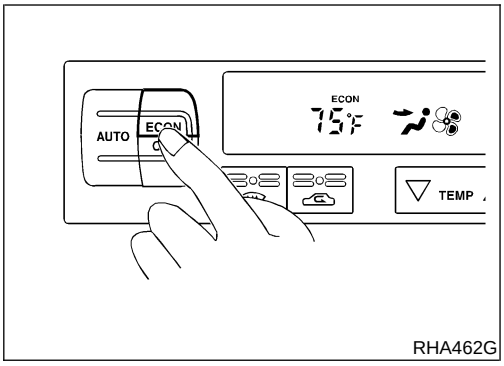
RHA461G

6. Check Temperature Increase

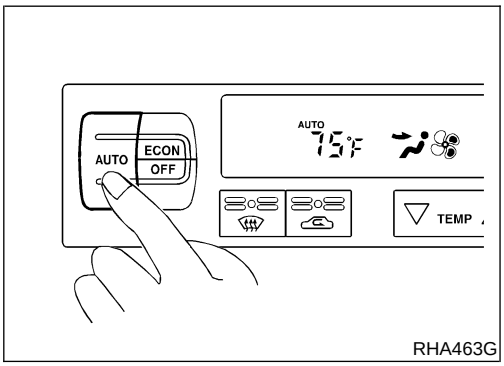
NAHA0178S0206

1. Press the temperature increase button until 32°C (85°F) is displayed.
2. Check for hot air at discharge air outlets.

If NG, go to trouble diagnosis procedure for insufficient heating (HA-93).
If OK, continue with next check.



RHA462G



RHA463G

7. Check ECON (Economy) Mode

NAHA0178S0207

1. Set the temperature 75°F or 25°C.
2. Press ECON switch.
3. Display should indicate ECON (no AUTO).
   Confirm that the compressor clutch is not engaged (visual inspection).
   (Discharge air and blower speed will depend on ambient, in-vehicle and set temperatures.)

If NG, go to trouble diagnosis procedure for ECON (Economy) mode (HA-97).
If OK, continue with next check.

8. Check AUTO Mode

NAHA0178S0208

1. Press AUTO switch.
2. Display should indicate AUTO (no ECON).
   Confirm that the compressor clutch engages (audio or visual inspection).
   (Discharge air and blower speed will depend on ambient, in-vehicle and set temperatures.)

If NG, go to trouble diagnosis procedure for A/C system (HA-51), then if necessary, trouble diagnosis procedure for magnet clutch (HA-78).

If all operational check are OK (symptom can not be duplicated), go to "Incident Simulation Tests" (GI-25) and perform tests as outlined to simulate driving conditions environment. If symptom appears, refer to "Symptom Table" (HA-47) and perform applicable trouble diagnosis procedures.

A/C System

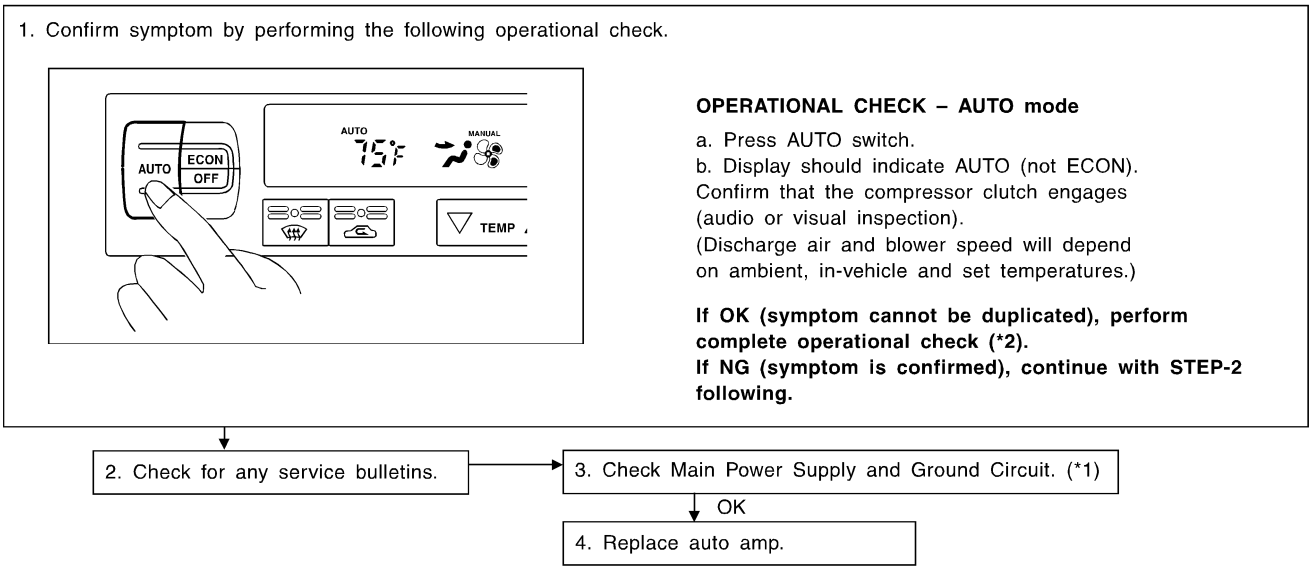
TROUBLE DIAGNOSIS PROCEDURE FOR A/C SYSTEM

=NAHA0179

SYMPTOM:

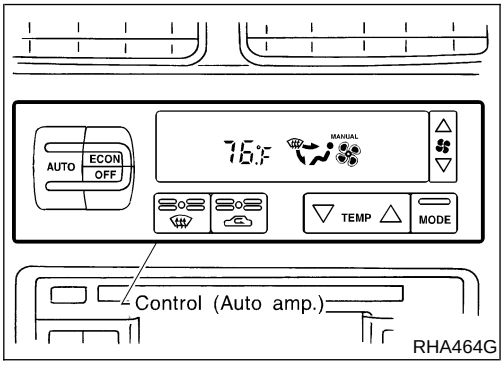
- **A/C system does not come on.**

INSPECTION FLOW



SHA888EB

*1: HA-51 *2: HA-48



MAIN POWER SUPPLY AND GROUND CIRCUIT CHECK

NAHA0180

Component Description

NAHA0180S01

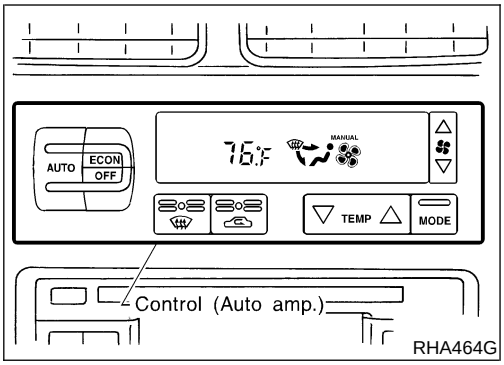
Automatic Amplifier (Auto Amp.)

NAHA0180S0101

The auto amplifier has a built-in microcomputer which processes information sent from various sensors needed for air conditioner operation. The air mix door motor, mode door motor, intake door motor, blower motor and compressor are then controlled.

The auto amplifier is unitized with control mechanisms. Signals from various switches and Potentio Temperature Control (PTC) are directly entered into auto amplifier.

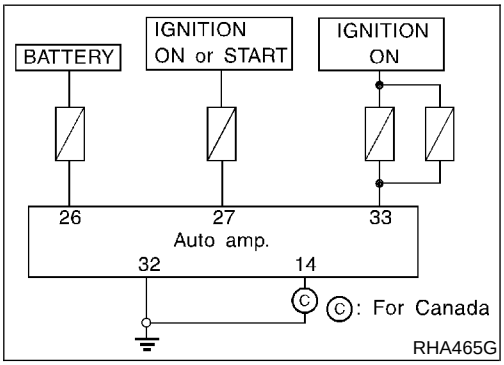
Self-diagnostic functions are also built into auto amplifier to provide quick check of malfunctions in the auto air conditioner system.



Potentio Temperature Control (PTC)

NAHA0180S0102

The PTC is built into the A/C auto amp. It can be set at an interval of 0.5°C (1.0°F) in the 18°C (65°F) to 32°C (85°F) temperature range by pushing the temperature button. The set temperature is digitally displayed.

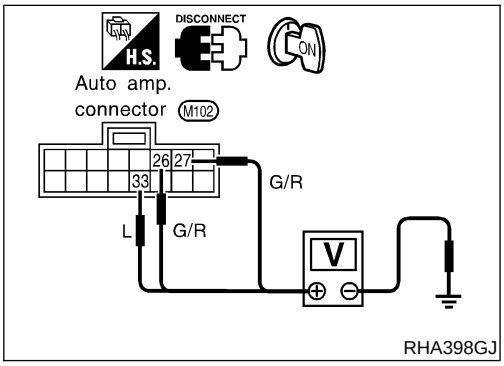


DIAGNOSTIC PROCEDURE

NAHA0181

SYMPTOM:

- **A/C system does not come on.**



Auto Amp. Check

NAHA0181S01

Check power supply circuit for auto amp. with ignition switch ON. Measure voltage across terminal Nos. 26, 27, 33 and body ground.

Voltmeter terminal		Voltage
(+)	(−)	
26	Body ground	Approx. 12V
27		
33		

Check body ground circuit for auto amp. with ignition switch OFF. Check for continuity between terminal Nos. 32, 14 and body ground.

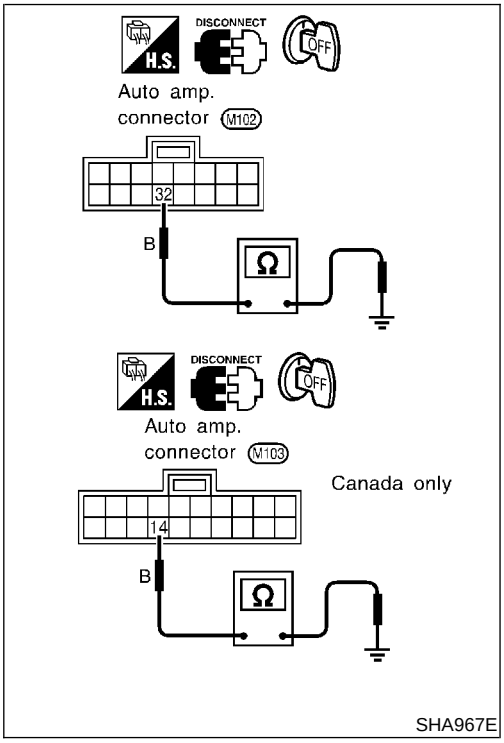
Ohmmeter terminal		Continuity
(+)	(−)	
32	Body ground	Yes
14 (Canada only)		

If OK, check auto amp. ground circuit, see below.

- If NG, check 7.5A fuses (Nos. 11 and 24, located in the fuse block) and 15A fuses (Nos. 1 and 2, located in the fuse block).
- If fuses are OK, check for open circuit in wiring harness. Repair or replace as necessary.
- If fuses are NG, replace fuse and check wiring harness for short circuit. Repair or replace as necessary.

NOTE:

If OK, replace auto amp.
If NG, repair or replace harness.



Mode Door Motor

TROUBLE DIAGNOSIS PROCEDURE FOR MODE DOOR MOTOR (LAN)

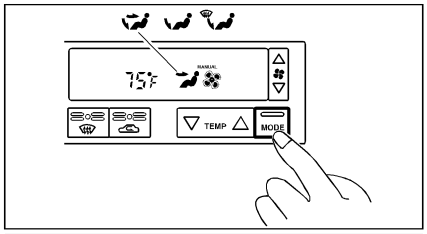
=NAHA0182

SYMPTOM:

- **Air outlet does not change.**
- **Mode door motor does not operate normally.**

INSPECTION FLOW

1. Confirm symptom by performing the following operational check.



OPERATIONAL CHECK – Discharge air

a. Press mode switch four times and DEF button.
b. Each position indicator should change shape.

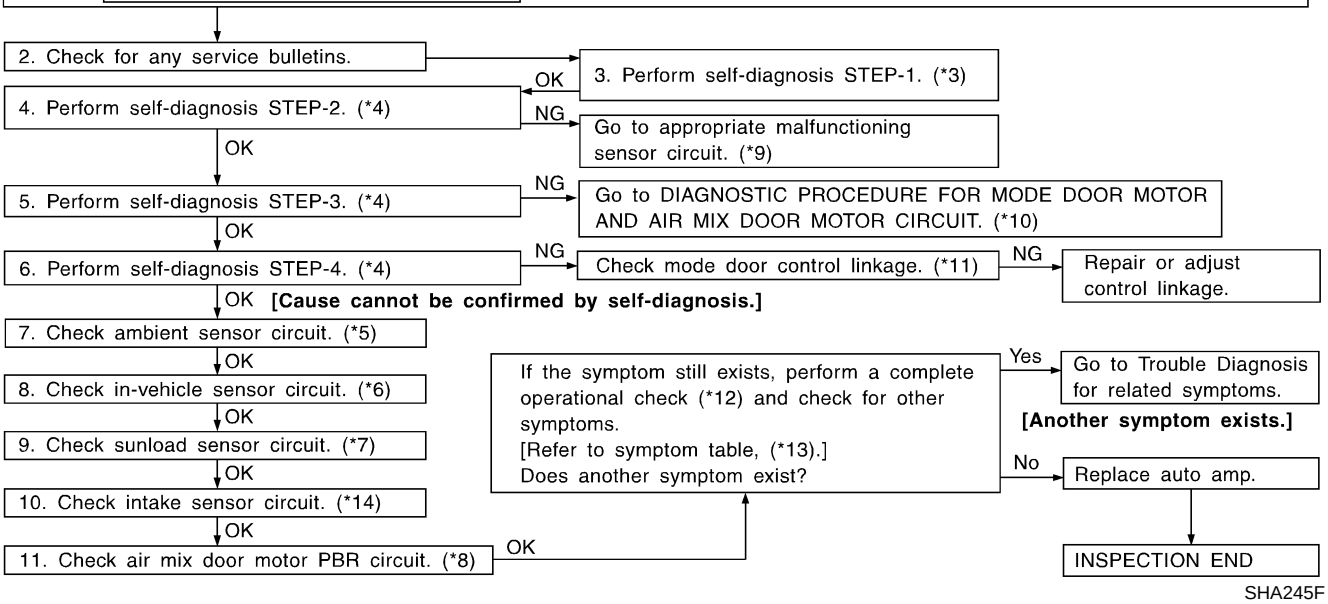
Discharge air flow

Mode control knob	Air outlet/distribution		
	Face	Foot	Defroster
	100%	–	–
	60%	40%	–
	–	80%	20%
	–	60%	40%
	–	–	100%

c. Confirm that discharge air comes out according to the air distribution table at left.
Refer to "Discharge Air Flow" (*1).

NOTE:

- **If OK (symptom cannot be duplicated), perform complete operational check (*2).**
  If NG (symptom is confirmed), continue with STEP-2 following.
- **Confirm that the compressor clutch is engaged (visual inspection) and intake door position is at FRESH when DEF is selected.**
  Intake door position is checked in the next step.



SHA245F

*1: HA-26
*2: HA-48
*3: HA-37
*4: HA-38
*5: HA-97
*6: HA-101
*7: HA-104
*8: HA-110
*9: STEP-BY-STEP PROCEDURE (HA-38), see No. 13.
*10: HA-55
*11: HA-58
*12: HA-48
*13: HA-47
*14: HA-108

SYSTEM DESCRIPTION

=NAHA0183

Component Parts

NAHA0183S01

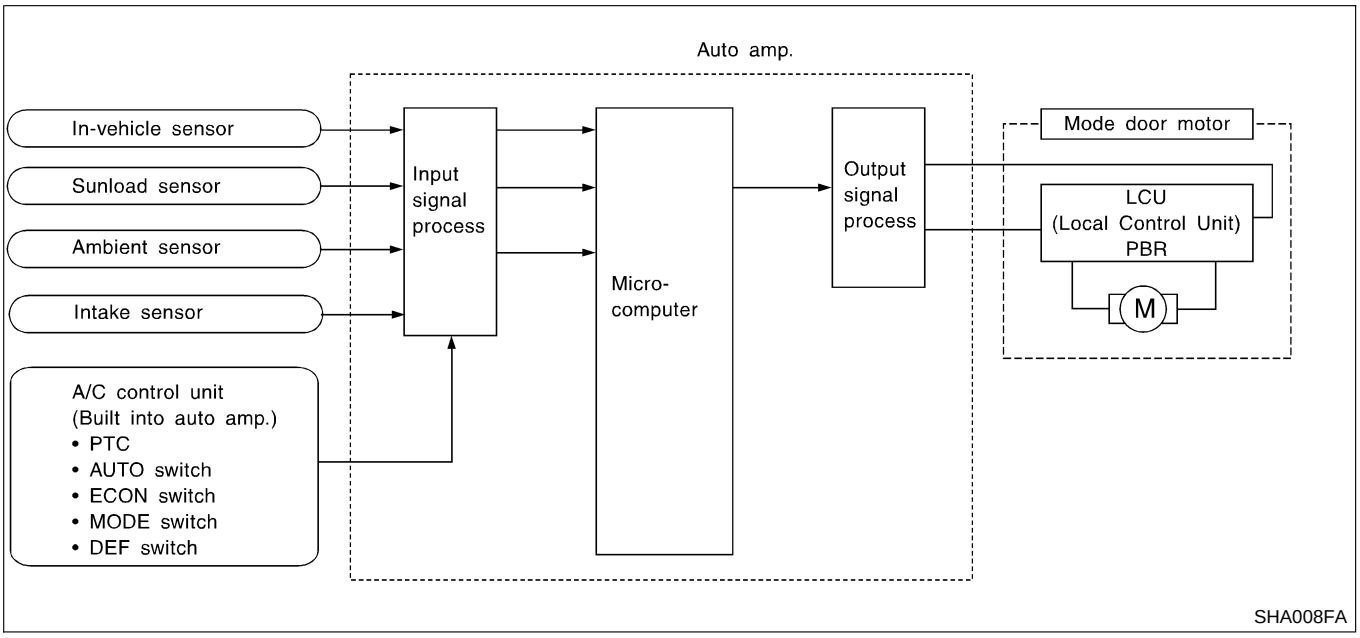
Mode door control system components are:

1) Auto amp.
2) Mode door motor (LCU)
3) In-vehicle sensor
4) Ambient sensor
5) Sunload sensor
6) Intake sensor

System Operation

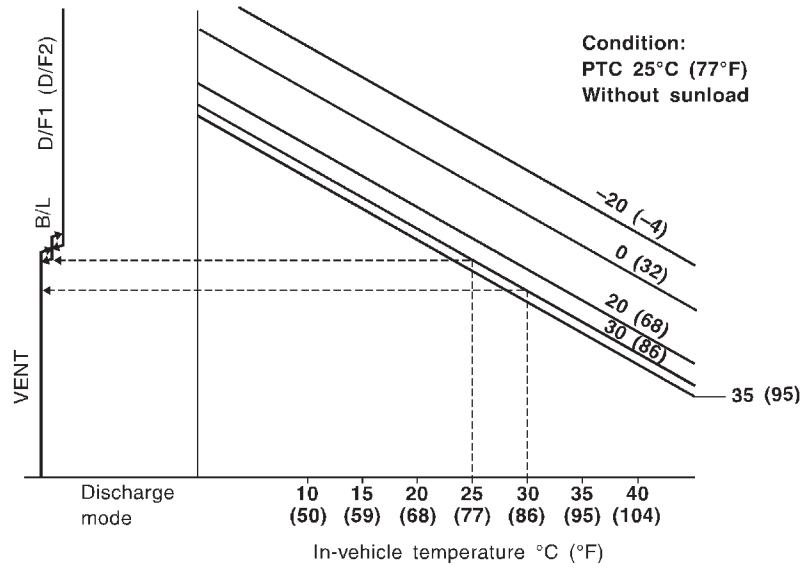
NAHA0183S02

The auto amplifier receives data from each of the sensors. The amplifier sends mode door and air mix door opening angle data to the mode door motor LCU and air mix door motor LCU.
The mode door motor and air mix door motor read their respective signals according to the address signal. Opening angle indication signals received from the auto amplifier and each of the motor position sensors are compared by the LCUs in each motor with the existing decision and opening angles. Subsequently, HOT/COLD or DEFROST/VENT operation is selected. The new selection data is returned to the auto amplifier.



Mode Door Control Specification

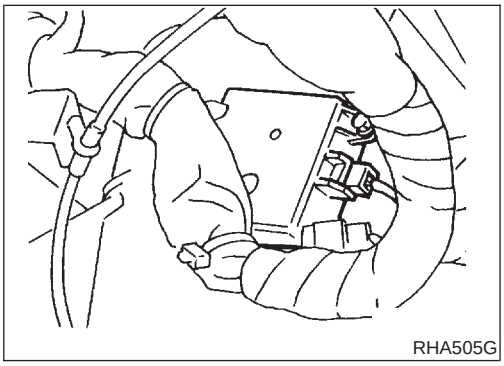
NAHA0183S03



Example:

- Mode door is automatically set in VENT position under the following no sunload conditions:
  1) Temperature set at 25°C (77°F)
  2) Ambient and in-vehicle temperatures are 30°C (86°F).
- Then in-vehicle temperature will lower. When target temperature of 25°C (77°F) is reached, mode door will shift from VENT to B/L position.

RHA135G

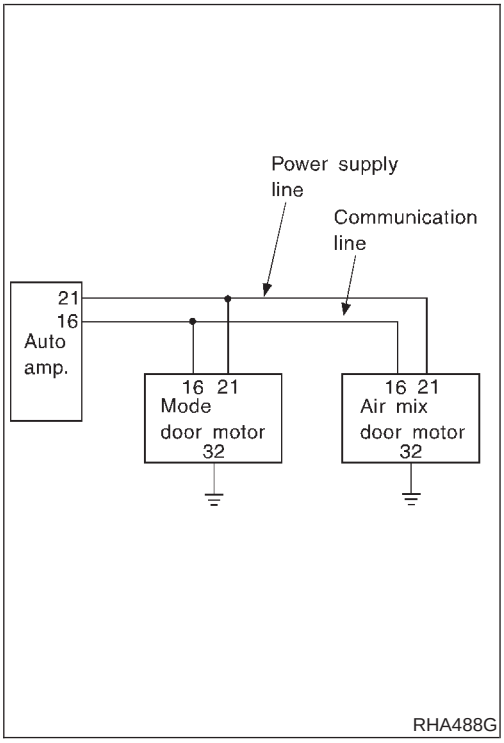


RHA505G

COMPONENT DESCRIPTION

NAHA0184

The mode door motor is attached to the heater unit. It rotates so that air is discharged from the outlet set by the auto amplifier. Motor rotation is conveyed to a link which activates the mode door.



RHA488G

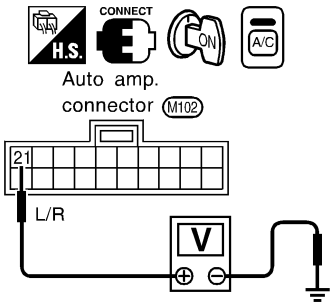
DIAGNOSTIC PROCEDURE FOR MODE DOOR MOTOR AND AIR MIX DOOR MOTOR CIRCUIT

NAHA0185

SYMPTOM: Mode door motor and/or air mix door motor does not operate normally.

1	CHECK POWER SUPPLY FOR AUTO AMP. (LCU) SIDE

Do approx. 12 volts exist between auto amp. (LCU) harness terminal No. 21 and body ground?



SHA966EC

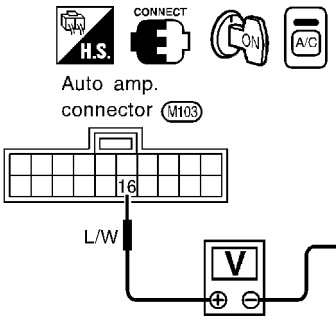
NOTE:
If the result is NG or No after checking circuit continuity, repair harness or connector.

Yes or No

Yes	▶	GO TO 2.
No	▶	Replace auto amp. (LCU).

2	CHECK SIGNAL FOR AUTO AMP. (LCU) SIDE

Do approx. 5.5 volts exist between auto amp. (LCU) terminal No. 16 and body ground?



SHA965E

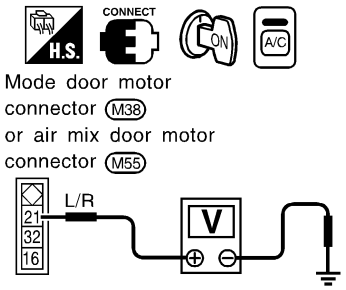
NOTE:
If the result is NG or No after checking circuit continuity, repair harness or connector.

Yes or No

Yes	▶	GO TO 3.
No	▶	Replace auto amp. (LCU).

3	CHECK POWER SUPPLY FOR MOTOR SIDE

Do approx. 12 volts exist between door motor (LCU) harness terminal No. 21 and body ground?



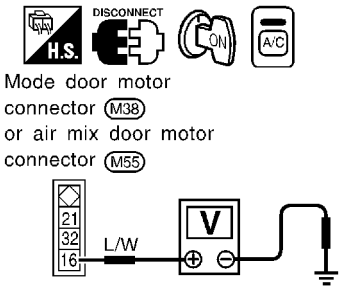
RHA489GC

Yes or No

Yes	▶	GO TO 4.
No	▶	Repair harness or connector.

4	CHECK SIGNAL FOR MOTOR SIDE

Do approx. 5.5 volts exist between door motor (LCU) terminal No. 16 and body ground?



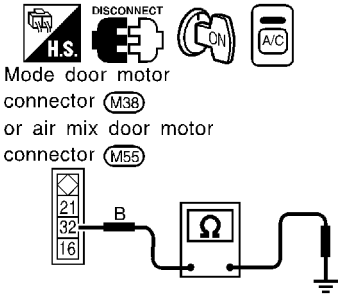
RHA490G

Yes or No

Yes	▶	GO TO 5.
No	▶	Repair harness or connector.

5	CHECK MOTOR GROUND CIRCUIT

Does continuity exist between door motor (LCU) harness terminal No. 32 and body ground?



RHA491G

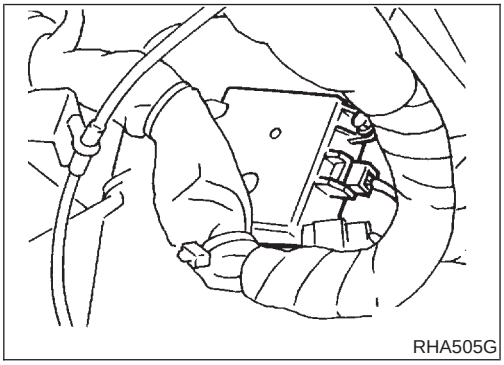
Yes or No

Yes	▶	GO TO 6.
No	▶	Repair harness or connector.

6	CHECK MOTOR OPERATION
Disconnect and reconnect the motor connector and confirm the motor operation.	
OK or NG	
OK (Return to operate normally) ▶	Poor contacting the motor connector
NG (Does not operate normally) ▶	GO TO 7.

7	CHECK MODE DOOR MOTOR OPERATION
1. Disconnect the mode door motor and air mix door motor connector. 2. Reconnect the mode door motor and confirm the motor operation.	
OK or NG	
OK (Mode door motor operates normally) ▶	Replace the air mix door motor.
NG (Mode door motor does not operate normally) ▶	GO TO 8.

8	CHECK AIR MIX DOOR MOTOR OPERATION
1. Disconnect the mode door motor connector. 2. Reconnect the air mix door motor and confirm the air mix door motor operation.	
OK or NG	
OK (Air mix door motor operates normally) ▶	Replace mode door motor.
NG (Air mix door motor does not operate normally) ▶	Replace auto amp.


RHA505G

CONTROL LINKAGE ADJUSTMENT

NAHA0186

Mode Door

NAHA0186S01

1. Install mode door motor on heater unit and connect it to main harness.
2. Set up code No. in Self-diagnosis STEP 4. Refer to HA-38.
3. Move side link by hand and hold mode door in DEF mode.
4. Attach mode door motor rod to side link rod holder.
5. Make sure mode door operates properly when changing from code No. 41 to 46 by pushing DEF switch.

41	42	43	44	45	46
VENT	B/L	B/L	FOOT	D/F	DEF

Air Mix Door Motor

TROUBLE DIAGNOSIS PROCEDURE FOR AIR MIX DOOR (LAN)

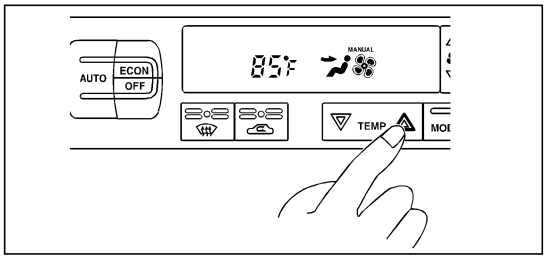
=NAHA0187

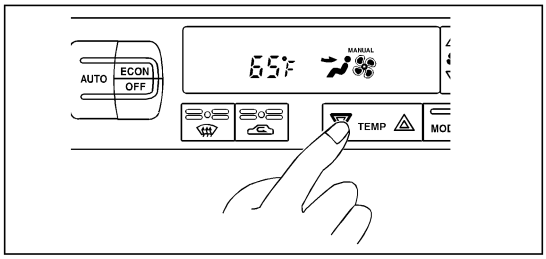
SYMPTOM:

- **Discharge air temperature does not change.**
- **Air mix door motor does not operate.**

INSPECTION FLOW

1. Confirm symptom by performing the following operational check.





OPERATIONAL CHECK

Temperature increase

a. Press the temperature increase button until 32°C (85°F) is displayed.
b. Check for hot air at discharge air outlets.

Temperature decrease

a. Press the temperature decrease button until 18°C (65°F) is displayed.
b. Check for cold air at discharge air outlets.

If OK (symptom cannot be duplicated), perform complete operational check (*10).
If NG (symptom is confirmed), continue with STEP-2 following.

2. Check for any service bulletins.
3. Perform self-diagnosis STEP-1. (*1)
OK
4. Perform self-diagnosis STEP-2. (*15)
NG → Go to appropriate malfunctioning sensor circuit. (*6)
OK
5. Perform self-diagnosis STEP-4. (*15)
NG → Go to DIAGNOSTIC PROCEDURE FOR MODE DOOR MOTOR AND AIR MIX DOOR MOTOR CIRCUIT. (*7)
OK → Check air mix door control linkage. (*8)
NG → Repair or adjust control linkage. (*9)
OK **[Cause cannot be confirmed by self-diagnosis.]**
6. Check ambient sensor circuit. (*2)
OK
7. Check in-vehicle sensor circuit. (*3)
OK
8. Check sunload sensor circuit. (*4)
OK
9. Check intake sensor circuit. (*14)
OK
10. Check air mix door motor PBR circuit. (*5)
OK
If the symptom still exists, perform a complete operational check (*12) and check for other symptoms. [Refer to symptom table, (*13).] Does another symptom exist?
Yes → Go to Trouble Diagnosis for related symptom.
Another symptom exists.
No
Replace auto amp. → INSPECTION END

SHA246F

*1: HA-37
*2: HA-97
*3: HA-101
*4: HA-104
*5: HA-110
*6: STEP-BY-STEP PROCEDURE (HA-38), see No. 13.
*7: HA-55
*8: HA-61
*9: HA-61
*10: HA-48
*12: HA-48
*13: HA-47
*14: HA-108
*15: HA-38

SYSTEM DESCRIPTION

=NAHA0188

Component Parts

NAHA0188S01

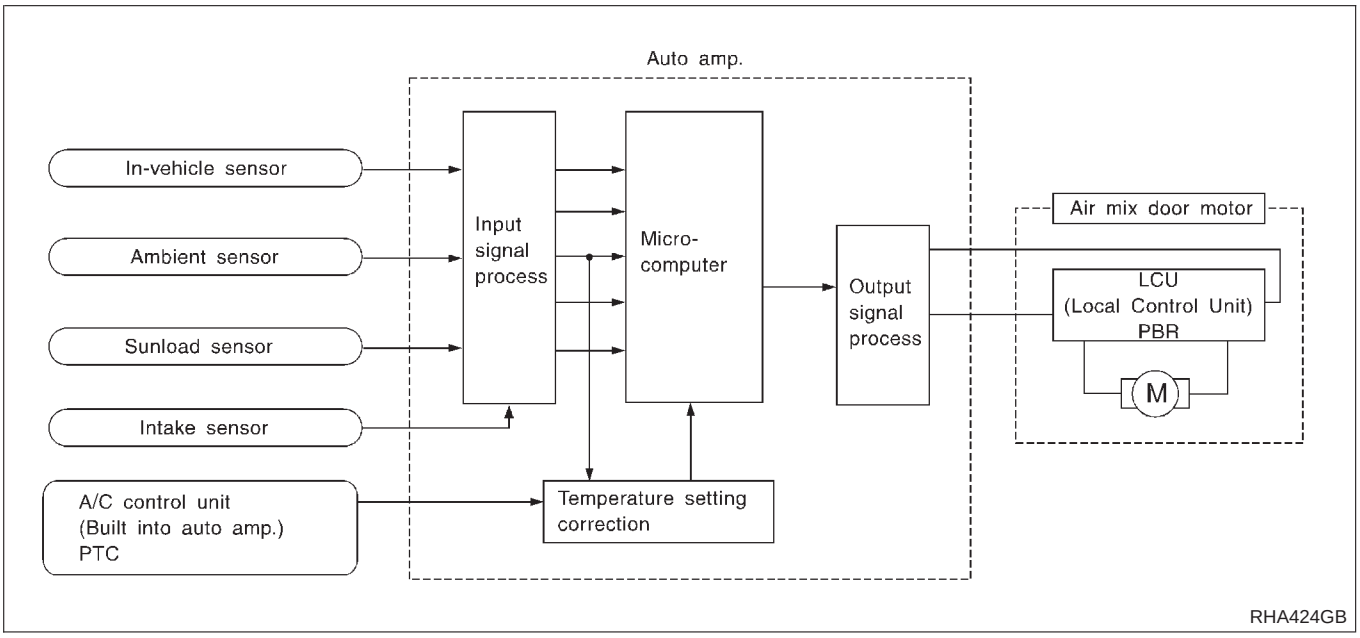
Air mix door control system components are:

1) Auto amp.
2) Air mix door motor (LCU)
3) In-vehicle sensor
4) Ambient sensor
5) Sunload sensor
6) Intake sensor

System Operation

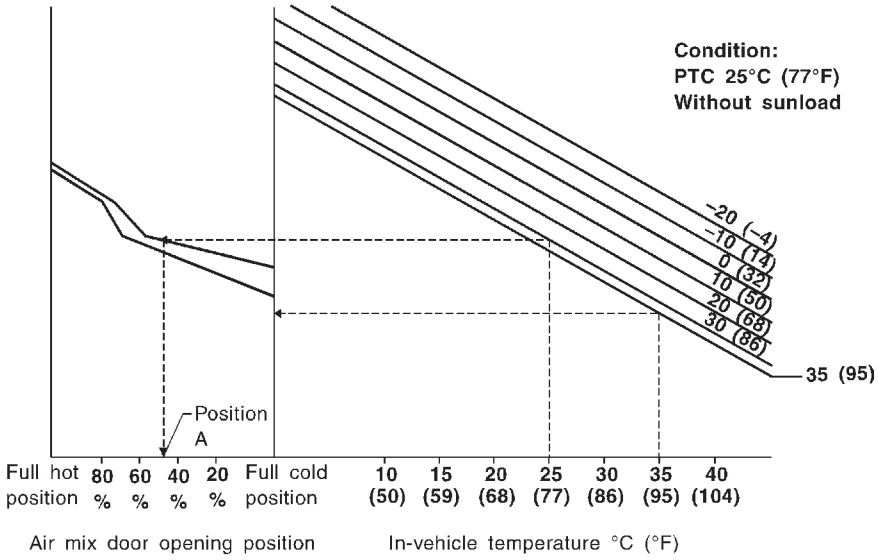
NAHA0188S02

The auto amplifier receives data from each of the sensors. The amplifier sends air mix door and mode door opening angle data to the air mix door motor LCU and mode door motor LCU.
The air mix door motor and mode door motor read their respective signals according to the address signal. Opening angle indication signals received from the auto amplifier and each of the motor position sensors are compared by the LCUs in each motor with the existing decision and opening angles. Subsequently, HOT/COLD or DEFROST/VENT operation is selected. The new selection data is returned to the auto amplifier.



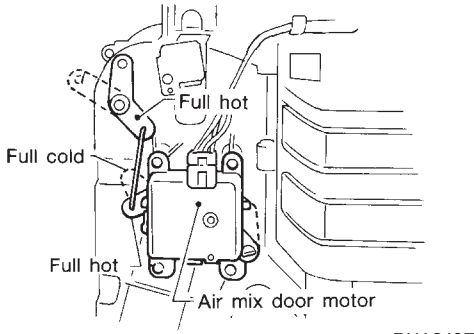
Air Mix Door Control Specification

NAHA0188S03



Example:
- Air mix door is initially automatically set in full cold position under the following no sunload conditions:
  1) Temperature set at 25°C (77°F)
  2) Ambient and in-vehicle temperatures are 35°C (95°F).
- Within some period, in-vehicle temperature will lower towards the objective temperature, and the air mix door position will shift gradually towards the cold side and finally stay in this position (A).
  Air mix door opening position is always fed back to auto amp. by PBR built-in air mix door.

RHA137G

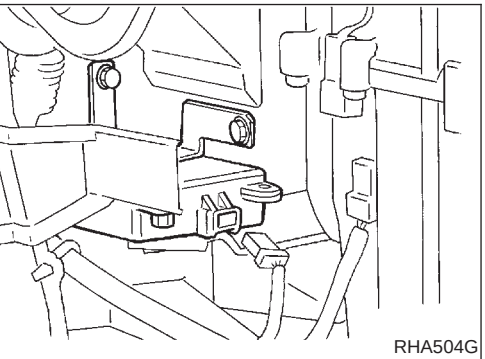


RHA849E

COMPONENT DESCRIPTION

NAHA0189

The air mix door motor is attached to the heater unit. It rotates so that the air mix door is opened or closed to a position set by the auto amplifier. Motor rotation is then conveyed through a shaft and the air mix door position is then fed back to the auto amplifier by PBR built-in air mix door motor.



RHA504G

CONTROL LINKAGE ADJUSTMENT

NAHA0190

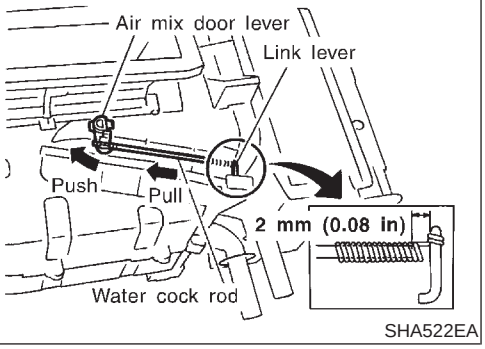
Air Mix Door (Water Cock)

NAHA0190S01

1. Install air mix door motor on heater unit and connect it to main harness.
2. Set up code No. 41 in Self-diagnosis STEP 4. Refer to HA-37.
3. Move air mix door lever by hand and hold it in full cold position.
4. Attach air mix door lever to rod holder.
5. Make sure air mix door operates properly when changing from code No. 41 to 46 by pushing DEF switch.

41	42	43	44	45	46
Full cold		Full hot			

6. Set up code No. 41 in Self-diagnosis STEP 4.
7. Attach water cock rod to air mix door lever and secure with clip.
8. Rotate air mix door lever (CLOCKWISE completely) and hold water cock rod and link lever in the full cold position.
9. Attach water cock rod to link lever and secure with clip (white mark on cable housing should be centered under the retaining clip).



SHA522EA

10. Check that water cock operates properly when changing from code No. 41 to 46 by pushing DEF switch. (After several cycles, water cock lever should be midpoint of plate opening when code No. 41 is set.)

Intake Door Motor

TROUBLE DIAGNOSIS PROCEDURE FOR INTAKE DOOR

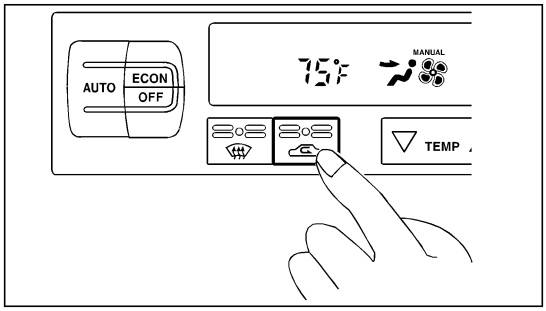
=NAHA0191

SYMPTOM:

- **Intake door does not change.**
- **Intake door motor does not operate normally.**

INSPECTION FLOW

1. Confirm symptom by performing the following operational check.



OPERATIONAL CHECK – Recirculation

a. Press REC switch.
Recirculation indicator should illuminate.
b. Listen for intake door position change (you should hear blower sound change slightly).

If OK (symptom cannot be duplicated), perform complete operational check (*9).
If NG (symptom is confirmed), continue with STEP-2 following.

2. Check for any service bulletins.
3. Perform self-diagnosis STEP-1. (*1)
OK
4. Perform self-diagnosis STEP-2. (*10)
NG → Go to appropriate malfunctioning sensor circuit. (*6)
OK
5. Perform self-diagnosis STEP-4. (*10)
NG → Check intake door control linkage. (*8)
NG → Repair or adjust control linkage.
OK → Go to Intake Door Motor Circuit. (*7)
OK
[Cause cannot be confirmed by self-diagnosis.]
6. Check ambient sensor circuit. (*2)
OK
7. Check in-vehicle sensor circuit. (*3)
OK
8. Check sunload sensor circuit. (*4)
OK
9. Check intake sensor circuit. (*13)
OK
10. Check air mix door motor PBR circuit. (*5)
OK
If the symptom still exists, perform a complete operational check (*11) and check for other symptoms. [Refer to symptom table, (*12).] Does another symptom exist?
Yes → Follow the instruction in the "system table".
Another symptom exists.
No → Replace auto amp.
INSPECTION END

SHA247F

*1: HA-37
*2: HA-97
*3: HA-101
*4: HA-104
*5: HA-110
*6: STEP-BY-STEP PROCEDURE (HA-38), see No. 13.
*7: HA-65
*8: HA-69
*9: HA-48
*10: HA-38
*11: HA-48
*12: HA-47
*13: HA-108

SYSTEM DESCRIPTION

=NAHA0192

Component Parts

NAHA0192S01

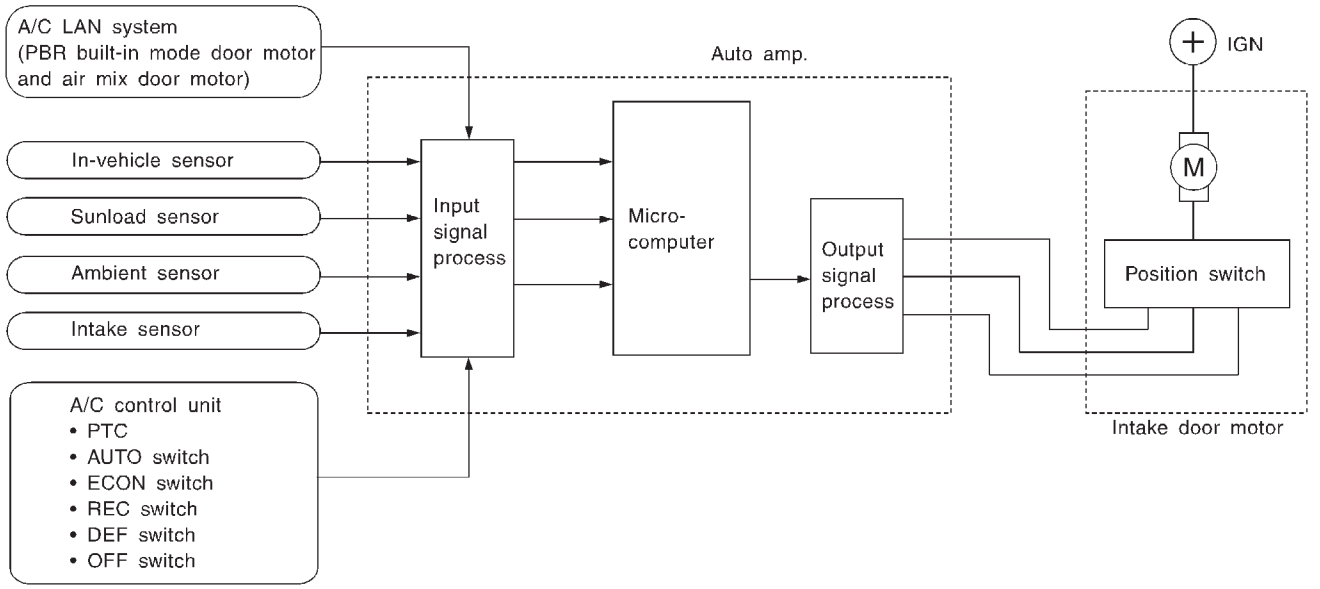
Intake door control system components are:

1) Auto amp.
2) Intake door motor
3) A/C LAN system (PBR built-in mode motor and air mix door motor)
4) In-vehicle sensor
5) Ambient sensor
6) Sunload sensor
7) Intake sensor

System Operation

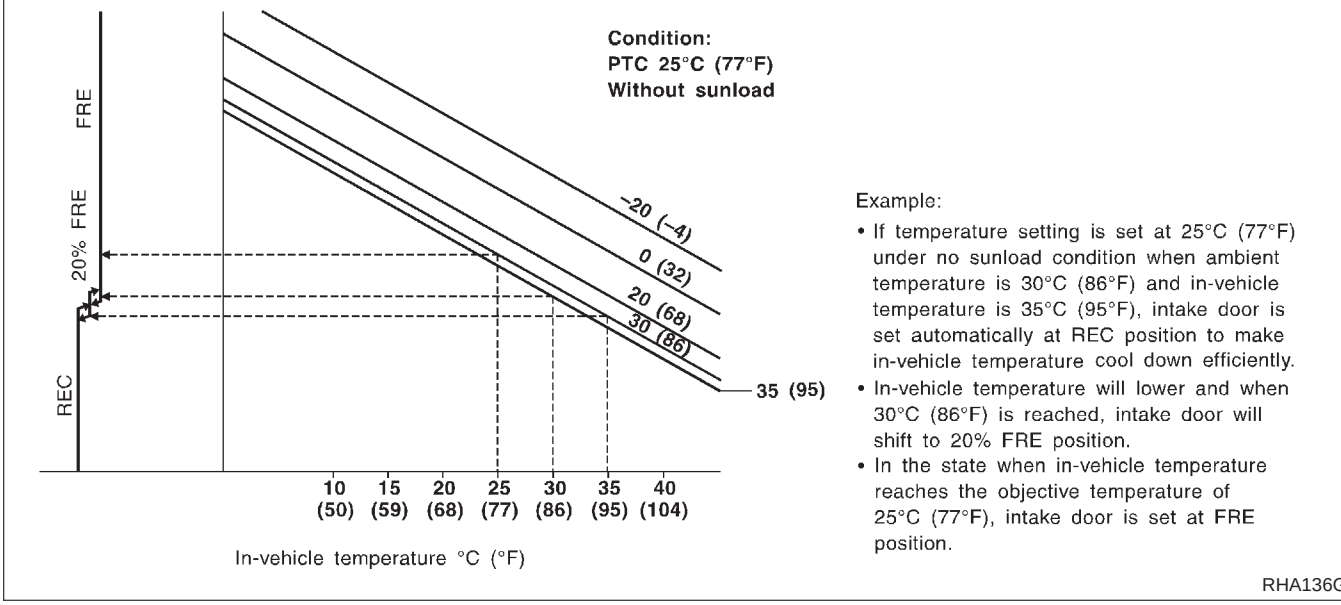
NAHA0192S02

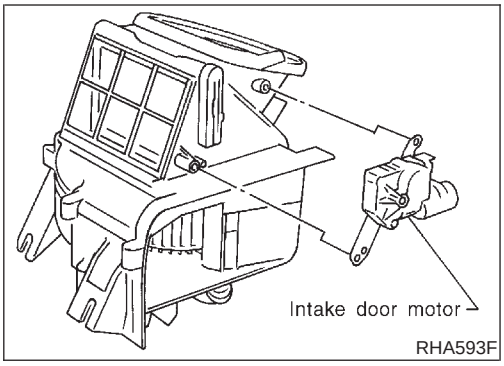
The intake door control determines intake door position based on the ambient temperature, the intake air temperature and the in-vehicle temperature. When the ECON, DEFROST, or OFF switches are pushed, the auto amplifier sets the intake door at the "Fresh" position.



Intake Door Control Specification

NAHA0192S03

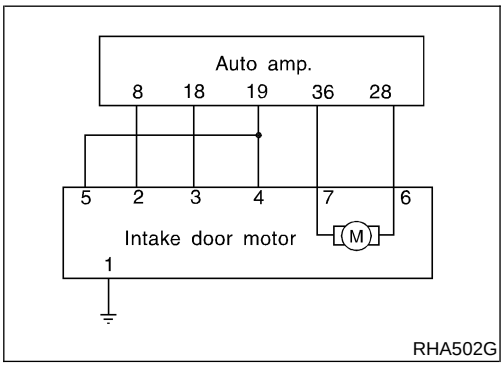




COMPONENT DESCRIPTION

NAHA0193

The intake door motor is attached to the intake unit. It rotates so that air is drawn from inlets set by the auto amplifier. Motor rotation is conveyed to a lever which activates the intake door.



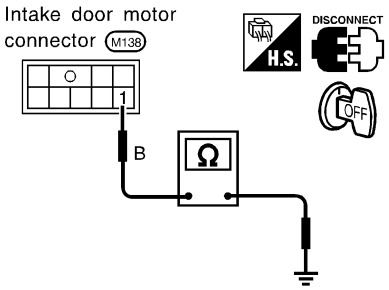
DIAGNOSTIC PROCEDURE

NAHA0194

SYMPTOM: Intake door motor does not operate normally.

1	CHECK BODY GROUND CIRCUIT FOR INTAKE DOOR MOTOR

Does continuity exist between intake door harness terminal No. 1 and body ground?

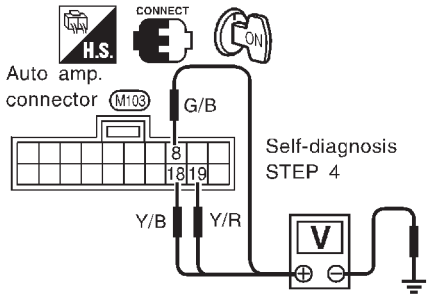


Yes or No

Yes	▶	GO TO 2.
No	▶	Repair harness or connector.

2	CHECK FOR AUTO AMP. OUTPUT

Set up Self-diagnosis STEP 4.
Measure voltage across auto amp. harness terminals and body ground.



RHA493G

Code No.	Terminals No. (+)	Terminals No. (−)	Condition	Voltage V
41 42	8	Body ground	REC	5
	18 or 19			0
43	19		20% FRE	5
	8 or 18			0
44 45 46	18		FRE	5
	8 or 19			0

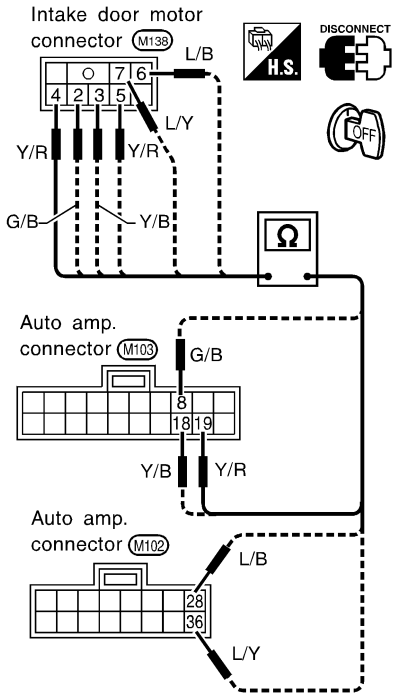
0V: Approx. 0V
5V: Approx. 5V

MTBL0076

OK or NG

OK	▶	INSPECTION END
NG	▶	GO TO 3.

3	CHECK CIRCUIT CONTINUITY BETWEEN EACH TERMINAL ON AUTO AMP. AND ON INTAKE DOOR MOTOR



RHA494GB

Terminal No.		Continuity
Auto amp.	Intake door motor	
(19)	(4)	Yes
(8)	(2)	
(18)	(3)	
(19)	(5)	
(28)	(6)	
(36)	(7)	

MTBL0077

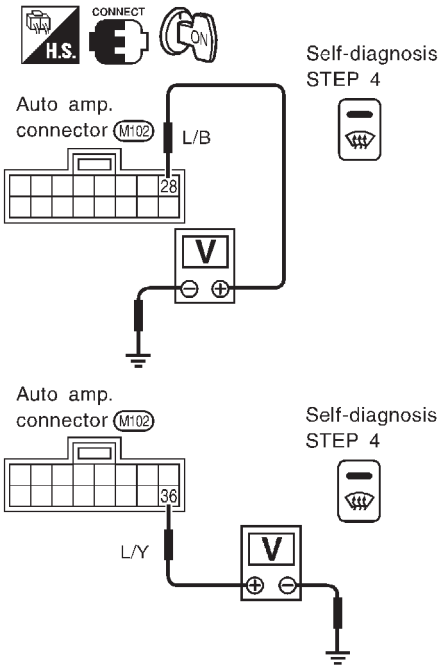
If OK, check harness for short.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair harness or connector.

4	CHECK FOR AUTO AMP. OUTPUT

Set up Self-diagnosis STEP 4.
Measure voltage across auto amp. harness terminals and body ground.



RHA506G

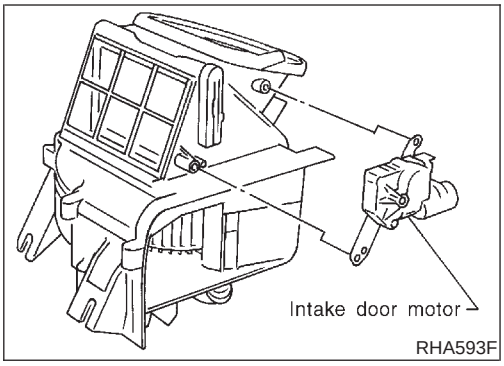
Code No.	Terminals No. (+)	Terminals No. (–)	Condition	Voltage V
41 42	28	Body ground	REC	12
	36			0
44 45 46	28		FRE	0
	36			12

0V: Approx. 0V
12V: Approx. 12V

MTBL0078

OK or NG

OK	▶	Replace intake door motor.
NG	▶	Replace auto amp.



CONTROL LINKAGE ADJUSTMENT

=NAHA0195

Intake Door

NAHA0195S01

1. Install intake door motor on intake unit and connect it to main harness.
2. Set up code No. 41 in Self-diagnosis STEP 4. Refer to HA-38.
3. Move intake door link by hand and hold it in REC position.
4. Attach intake door lever to rod holder.
5. Make sure intake door operates properly when changing from code No. 41 to 46 by pushing DEF switch.

41	42	43	44	45	46
REC		20% FRE	FRE		

Blower Motor

TROUBLE DIAGNOSIS PROCEDURE FOR BLOWER MOTOR

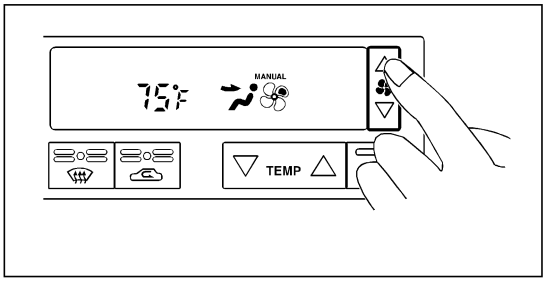
=NAHA0196

SYMPTOM:

- **Blower motor operation is malfunctioning.**
- **Blower motor operation is malfunctioning under out of starting fan speed control.**

INSPECTION FLOW

1. Confirm symptom by performing the following operational check.



OPERATIONAL CHECK – Blower

a. Press fan switch (up side) one time.
Blower should operate on low speed.
The fan symbol should have one blade lit.

b. Press fan switch (up side) one more time, and continue checking blower speed and fan symbol until all speeds are checked.

c. Leave blower on MAX speed.

If OK (symptom cannot be duplicated), perform complete operational check (*12).
If NG (symptom is confirmed), continue with STEP-2 following.

2. Check for any service bulletins.

3. Perform self-diagnosis STEP-1. (*1)

OK

4. Perform self-diagnosis STEP-2. (*9)
Code No. 20 should be displayed after approx. 4 second.

NG → Go to appropriate malfunctioning sensor circuit. (*6)

OK

5. Perform self-diagnosis STEP-4. (*9)
Does blower motor speed change according to each code No.?

Code No.	41	42	43	44	45	46
Blower motor speed	Low	Middle high	Middle low			High

No → Go to Blower Motor Circuit. (*7)

Yes

6. Is engine coolant temperature below 50°C (122°F) and ambient temperature below 15°C (59°F)?

No → Blower motor operation is normal.

Yes

7. Is blower motor operating under starting blower speed control?

No → Go to Blower Motor Circuit. (*8)

OK → Check thermal transmitter control circuit. Refer to EL-(*14), “Electrical Component Inspection”.

Yes **[Cause cannot be confirmed by self-diagnosis.]**

8. Check ambient sensor circuit. (*2)

OK

9. Check in-vehicle sensor circuit. (*3)

OK

10. Check sunload sensor circuit. (*4)

OK

11. Check intake sensor circuit. (*13)

OK

12. Check air mix door motor PBR circuit. (*5)

OK

If the symptom still exists, perform a complete operational check (*10) and check for other symptoms. [Refer to symptom table, (*11).] Does another symptom exist?

Yes → Go to Trouble Diagnosis for related symptom.

Another symptom exists.

No

Replace auto amp. → INSPECTION END

SHA248FB

*1: HA-37
*2: HA-97
*3: HA-101
*4: HA-104
*5: HA-110
*6: STEP-BY-STEP PROCEDURE (HA-38), see No. 13.
*7: HA-72
*8: HA-72
*9: HA-38
*10: HA-48
*11: HA-47
*12: HA-48
*13: HA-108
*14: EL-128

SYSTEM DESCRIPTION

=NAHA0197

Component parts

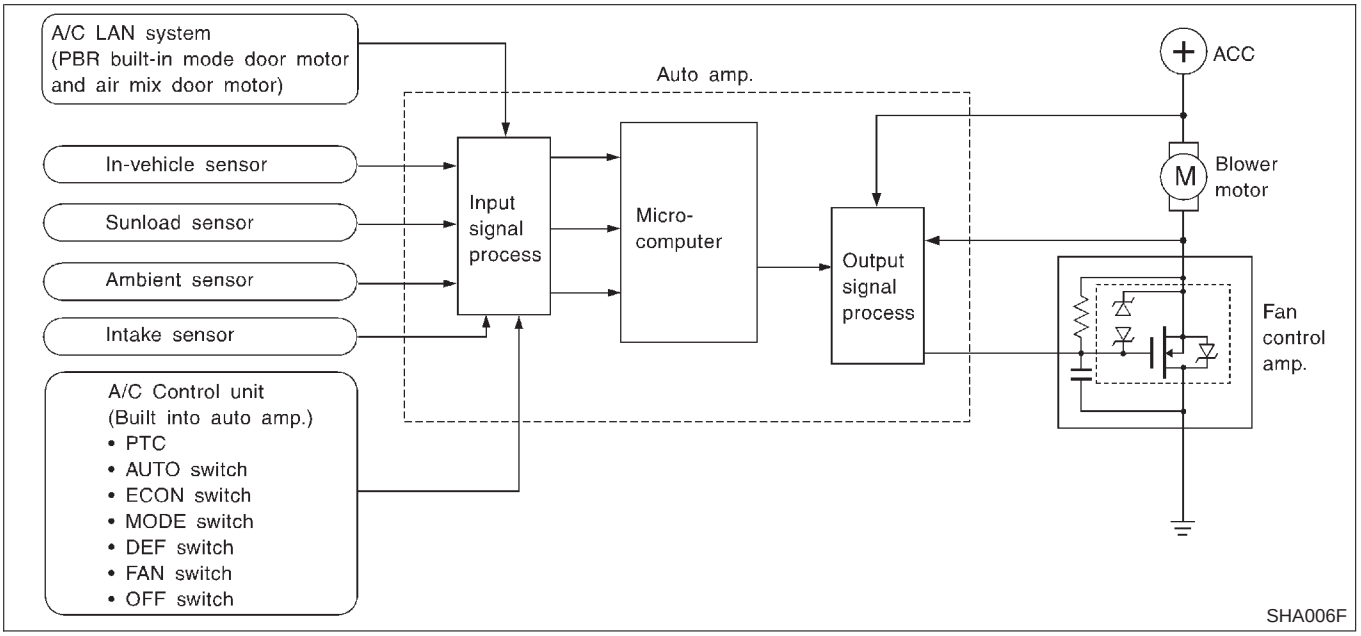
NAHA0197S01

Fan speed control system components are:

1) Auto amp.
2) Fan control amp.
3) A/C LAN system (PBR built-in mode door motor and air mix door motor)
4) In-vehicle sensor
5) Ambient sensor
6) Sunload sensor
7) Intake sensor

System Operation

NAHA0197S02



Automatic Mode

NAHA0197S03

In the automatic mode, the blower motor speed is calculated by the automatic amplifier based on inputs from the PBR, in-vehicle sensor, sunload sensor, intake sensor and ambient sensor. The blower motor applied voltage ranges from approximately 5 volts (lowest speed) to 12 volts (highest speed).
The control blower speed (in the range of 5 to 12V), the automatic amplifier supplies a gate voltage to the fan control amplifier. Based on this voltage, the fan control amplifier controls the voltage supplied to the blower motor.

Starting Fan Speed Control

NAHA0197S04

Start Up From "COLD SOAK" Condition (Automatic mode)

NAHA0197S0401

In a cold start up condition where the engine coolant temperature is below 50°C (122°F), the blower will not operate for a short period of time (up to 126 seconds). The exact start delay time varies depending on the ambient and engine coolant temperature.
In the most extreme case (very low ambient) the blower starting delay will be 126 seconds as described above. After this delay, the blower will operate at low speed until the engine coolant temperature rises above 55°C (131°F), at which time the blower speed will increase to the objective speed.

Start Up From Normal or "HOT SOAK" Condition (Automatic mode)

NAHA0197S0402

The blower will begin operation momentarily after the AUTO button is pushed. The blower speed will gradually rise to the objective speed over a time period of 3 seconds or less (actual time depends on the objective blower speed).

Blower Speed Compensation

NAHA0197S05

Sunload

NAHA0197S0501

When the in-vehicle temperature and the set temperature are very close, the blower will be operating at low speed. The low speed will vary depending on the sunload. During conditions of high sunload, the blower low speed is "normal" low speed (approx. 6V). During low or no sunload conditions, the low speed will drop to "low" low speed (approx. 5V).

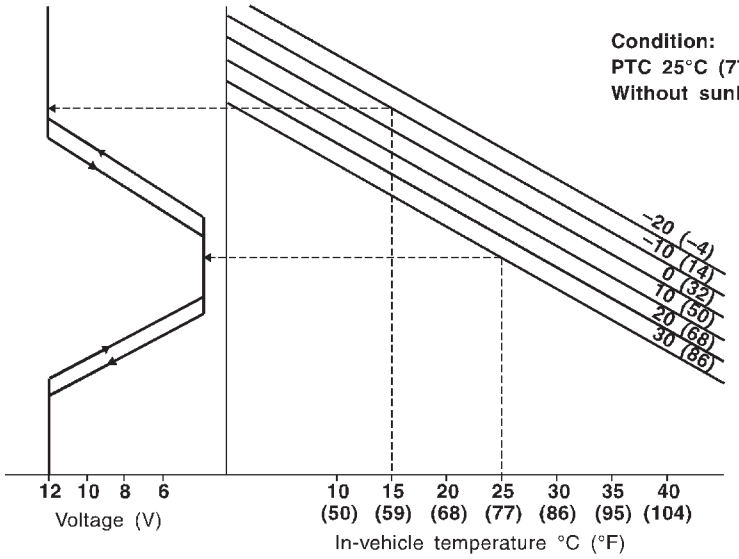
Ambient

NAHA0197S0502

When the ambient temperature is in the "moderate" range [10 - 15°C (50 - 59°F)], the computed blower voltage will be compensated (reduced) by up to 3.5V (depending on the blower speed). In the "extreme" ambient ranges [below 0°C (32°F) and above 20°C (68°F)] the computed objective blower voltage is not compensated at all. In the ambient temperature ranges between "moderate" and "extreme" [0 - 10°C (32 - 50°F) and 15 - 20°C (59 - 68°F)], the amount of compensation (for a given blower speed) varies depending on the ambient temperature.

Fan Speed Control Specification

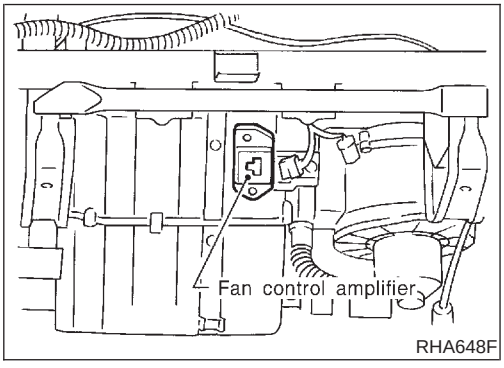
NAHA0197S06



Example:

- If temperature setting is set at 25°C (77°F) under no sunload condition when ambient temperature is −10°C (14°F) and in-vehicle temperature is 15°C (59°F), blower motor voltage is approx. 12 volts.
- When ambient temperature is 30°C (86°F) and in-vehicle temperature is reduced to 25°C (77°F) under the same condition above, blower motor voltage is approx. 5 volts.

RHA138G



RHA648F

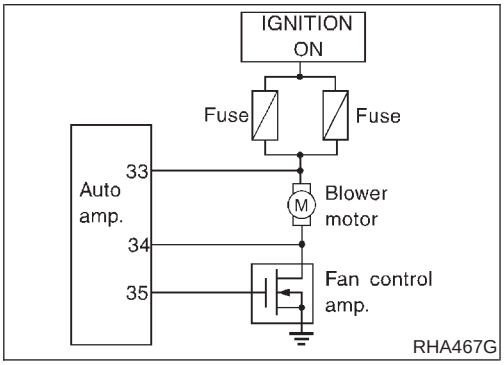
COMPONENT DESCRIPTION

NAHA0198

Fan Control Amplifier

NAHA0198S01

The fan control amplifier is located on the cooling unit. The fan control amp. receives a gate voltage from the auto amp. to steplessly maintain the blower fan motor voltage in the 5 to 12 volt range (approx.).



RHA467G

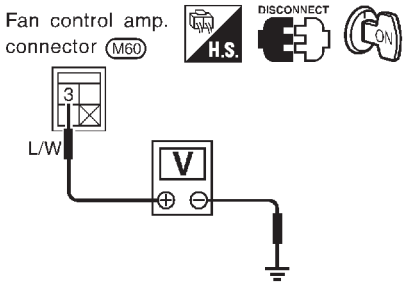
DIAGNOSTIC PROCEDURE

NAHA0199

SYMPTOM: Blower motor operation is malfunctioning under Starting Fan Speed Control.

1	CHECK POWER SUPPLY FOR FAN CONTROL AMP.

Disconnect fan control amp. harness connector.
Do approx. 12 volts exist between fan control amp. harness terminal No. 3 and body ground?



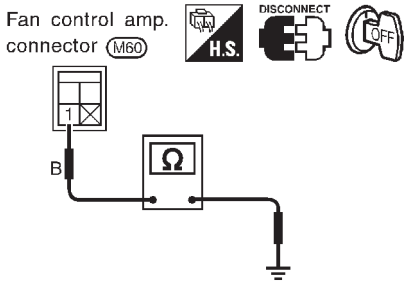
RHA480G

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 8.

2	CHECK BODY GROUND CIRCUIT FOR FAN CONTROL AMP.

Does continuity exist between fan control amp. harness terminal No. 1 and body ground?



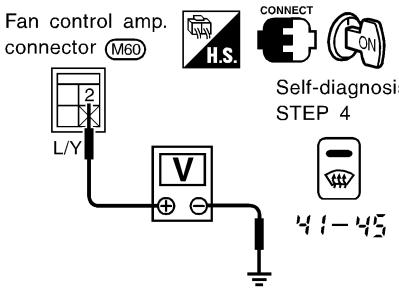
RHA089G

Yes or No

Yes	▶	Reconnect fan control amp. harness connector. And GO TO 3.
No	▶	Repair harness or connector.

3	CHECK VOLTAGE FOR FAN CONTROL AMP.

Set up Self-diagnosis STEP 4.
Measure voltage across fan control amp. harness terminal No. 2 and body ground.



RHA481GC

Code No.	Terminal No.		Voltage
	(+)	(–)	
41 – 45	(2)	Body ground	Approx. 2.5 - 3V

MTBL0465

OK or NG

OK	▶	GO TO 5.
NG	▶	• The result is less than 2.5V. Replace fan control amp. • The result is more than 3.0V. GO TO 4.

4	CHECK FAN CONTROL AMP.

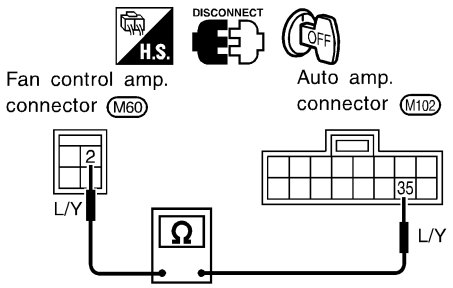
Refer to HA-77

OK or NG

OK	▶	GO TO 5.
NG	▶	1. Replace fan control amp. 2. Go to "STEP-BY-STEP PROCEDURE", HA-38 and perform self-diagnosis STEP 4. Confirm that blower motor operation is normal.

5	CHECK FAN CONTROL AMP. CIRCUIT BETWEEN FAN CONTROL AMP. AND AUTO AMP. (LCU)

1. Disconnect auto amp. (LCU) and fan control amp. harness connector.
2. Check circuit continuity between auto amp. (LCU) harness terminal No. 35 and fan control amp. harness terminal No. 2.



RHA901H

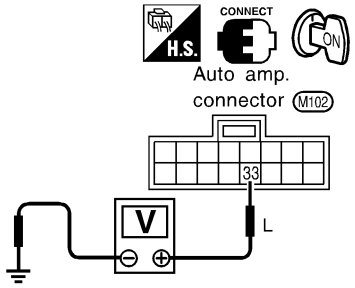
Continuity should exist.
If OK, check harness for short.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair harness or connector.

6	CHECK FAN FEED BACK CIRCUIT

Reconnect auto amp. (LCU) harness connector.
Do approx. 12 volts exist between auto amp. (LCU) harness terminal No. 33 and body ground?



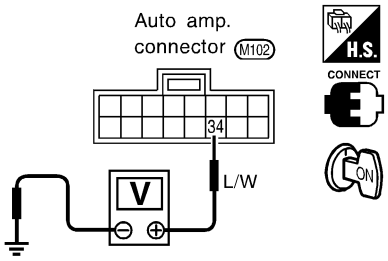
RHA902H

Yes or No

Yes	▶	GO TO 7.
No	▶	Check power supply circuit and 15A fuses (Nos. 1 and 2, located in the fuse block). Refer to EL-14, "Wiring Diagram — POWER —". ● If OK, check for open circuit in wiring harness. Repair or replace as necessary. ● If NG, replace fuse and check wiring harness for short circuit. Repair or replace as necessary.

7	CHECK POWER SUPPLY FOR AUTO AMP.

Do approx. 12 volts exist between auto amp. harness terminal No. 34 and body ground?



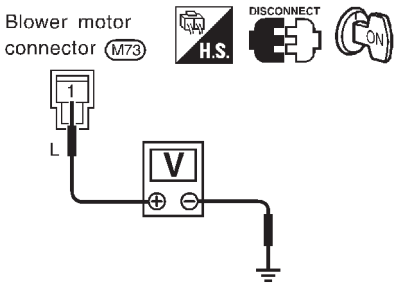
RHA903H

Yes or No

Yes	▶	1. Replace auto amp. 2. Go to self-diagnosis step-by-step procedure (HA-38) and perform self-diagnosis STEP-4. Confirm that blower motor operation is normal.
No	▶	GO TO 10.

8	CHECK POWER SUPPLY FOR BLOWER MOTOR

Disconnect blower motor harness connector.
Do approx. 12 volts exist between blower motor harness terminal No. 1 and body ground?



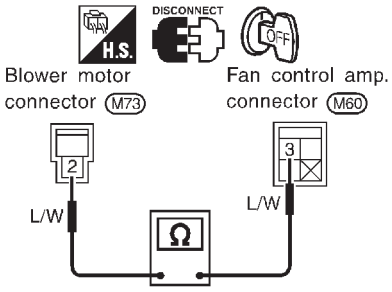
RHA091G

Yes or No

Yes	▶	GO TO 9.
No	▶	**Check power supply circuit and 15A fuses (Nos. 1 and 2, located in the fuse block).** ● If OK, check for open circuit in wiring harness. Repair or replace as necessary. ● If NG, replace fuse and check wiring harness for short circuit. Repair or replace as necessary.

9	CHECK CIRCUIT CONTINUITY BETWEEN BLOWER MOTOR AND FAN CONTROL AMP.

Disconnect blower motor connector and auto amp. (LCU) connector.
Check circuit continuity between blower motor harness terminal No. 2 and fan control amp. harness terminal No. 3.



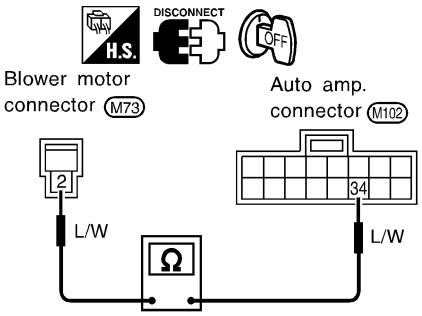
RHA472G

OK or NG

OK	▶	**Check blower motor. (Refer to HA-77.)** 1. If NG, replace blower motor. 2. Go to self-diagnosis step-by-step procedure (HA-38) and perform self-diagnosis STEP-4. Confirm that blower motor operation is normal.
NG	▶	Repair harness or connector.

10	CHECK BLOWER MOTOR CIRCUIT BETWEEN BLOWER MOTOR AND AUTO AMP. (LCU)

Check circuit continuity between blower motor harness terminal No. 2 and auto amp. (LCU) harness terminal No. 34.

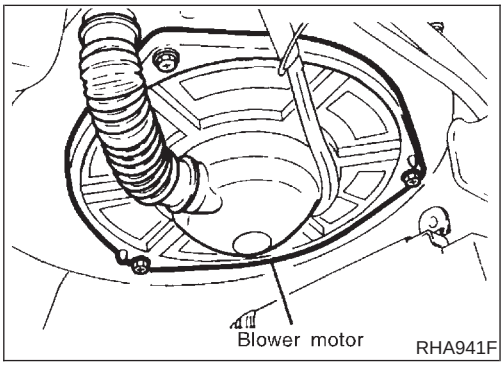


RHA904H

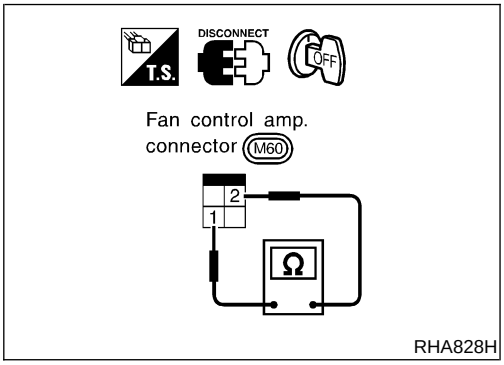
Continuity should exist.

OK or NG

OK	▶	Check harness for short.
NG	▶	Repair harness or connector.



RHA941F



RHA828H

COMPONENT INSPECTION

NAHA0200

Blower Motor

NAHA0200S01

Confirm smooth rotation of the blower motor.

- Ensure that there are no foreign particles inside the intake unit.

Fan Control Amp.

NAHA0200S02

Check continuity between terminals.

Terminal Nos.	Continuity
1-2	Yes

Magnet Clutch

TROUBLE DIAGNOSIS PROCEDURE FOR MAGNET CLUTCH

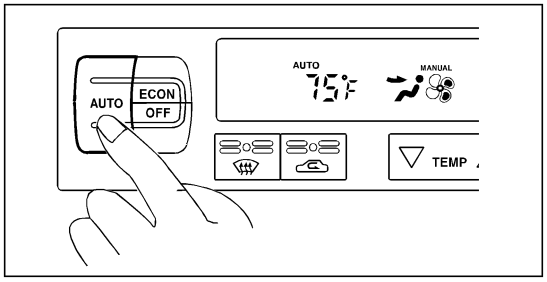
=NAHA0201

SYMPTOM:

- **Magnet clutch does not engage.**

INSPECTION FLOW

1. Confirm symptom by performing operational check.



OPERATIONAL CHECK – AUTO mode

a. Press AUTO switch.
b. Display should indicate AUTO (not ECON).
Confirm that the compressor clutch engages (audio or visual inspection).
(Discharge air and blower speed will depend on ambient, in-vehicle and set temperatures.)

If OK (symptom cannot be duplicated), perform complete operational check (*10).
If NG (symptom is confirmed), continue with STEP-2 following.

2. Check for any service bulletins.
3. Perform self-diagnosis STEP-1. (*1)
OK
4. Perform self-diagnosis STEP-2. (*11)
NG → Go to appropriate malfunctioning sensor circuit. (*6)
OK
5. Perform self-diagnosis STEP-4. (*11)
NG → Go to Magnet Clutch Circuit. (*7)
- Check Magnet Clutch Mechanism.
- Check for refrigerant pressure. (*9)

OK

[Cause cannot be confirmed by self-diagnosis.]

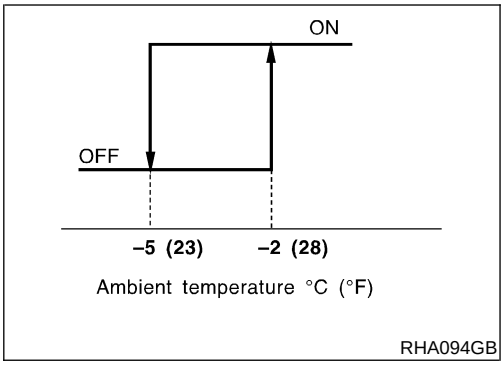
6. Check ambient sensor circuit. (*2)
OK
7. Check in-vehicle sensor circuit. (*3)
OK
8. Check sunload sensor circuit. (*4)
OK
9. Check intake sensor circuit. (*14)
OK
10. Check air mix door motor PBR circuit. (*5)
OK
If the symptom still exists, perform a complete operational check (*12) and check for other symptoms. [Refer to symptom table, (*13).] Does another symptom exist?
Yes → Go to Trouble Diagnosis for related symptom.

Another symptom exists.

No
Replace auto amp. → INSPECTION END

SHA249F

*1: STEP-BY-STEP PROCEDURE (HA-37)
*2: HA-97
*3: HA-101
*4: HA-104
*5: HA-110
*6: STEP-BY-STEP PROCEDURE (HA-38), see No. 13.
*7: HA-79
*8: HA-116
*9: HA-121
*10: HA-48
*11: HA-38
*12: HA-48
*13: HA-47
*14: HA-108



SYSTEM DESCRIPTION

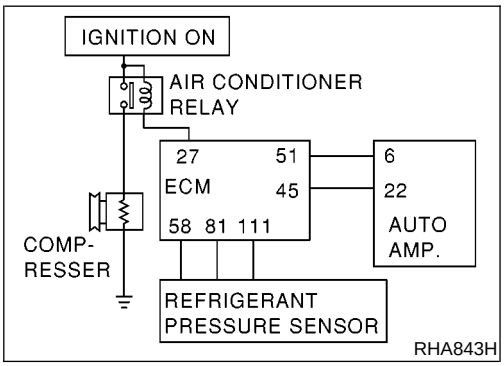
=NAHA0202

Auto amplifier controls compressor operation by ambient temperature and signal from ECM.

Low Temperature Protection Control

NAHA0202S01

Auto amplifier will turn the compressor "ON" or "OFF" as determined by a signal detected by ambient sensor.
When ambient temperatures are greater than −2°C (28°F), the compressor turns "ON". The compressor turns "OFF" when ambient temperatures are less than −5°C (23°F).



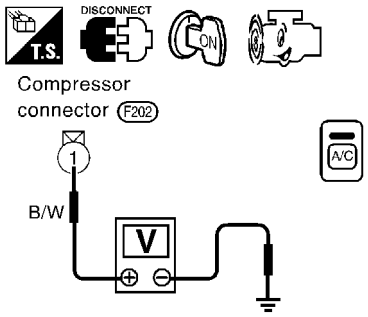
DIAGNOSTIC PROCEDURE

NAHA0203

SYMPTOM: Magnet clutch does not engage when AUTO switch is ON.

1	CHECK POWER SUPPLY FOR COMPRESSOR

Disconnect compressor harness connector. Do approx. 12 volts exist between compressor harness terminal No. 1 and body ground?



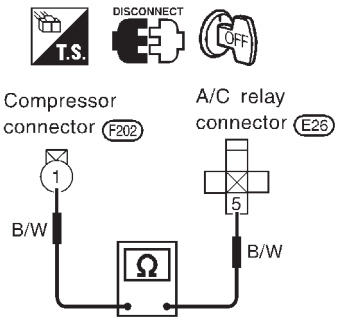
RHA096G

Yes or No

Yes	▶	**Check magnet clutch coil.** 1. If NG, replace magnet clutch. Refer to HA-116. 2. Go to self-diagnosis step-by-step procedure (HA-38) and perform self-diagnosis STEP-4. Confirm that magnet clutch operation is normal.
No	▶	Disconnect A/C relay. And GO TO 2.

2	CHECK CIRCUIT CONTINUITY BETWEEN A/C RELAY AND COMPRESSOR

Check circuit continuity between A/C relay harness terminal No. 5 and compressor harness terminal No. 1.



RHA748FB

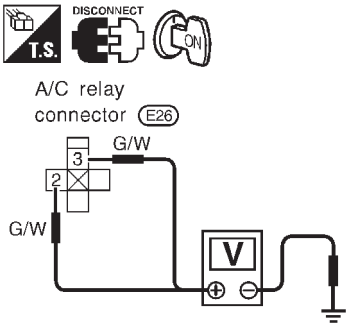
Continuity should exist.
If OK, check harness for short.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair harness or connector.

3	CHECK POWER SUPPLY FOR A/C RELAY

Disconnect A/C relay.
Do approx. 12 volts exist between A/C relay harness terminal Nos. 2, 3 and body ground?



RHA614F

Yes or No

Yes	▶	GO TO 4.
No	▶	Check power supply circuit and 7.5A (No. 6) fuse at fuse block. Refer to EL-14, "Wiring Diagram — POWER —". ● If OK, check for open circuit in wiring harness. Repair or replace as necessary. ● If NG, replace fuse and check wiring harness for short circuit. Repair or replace as necessary.

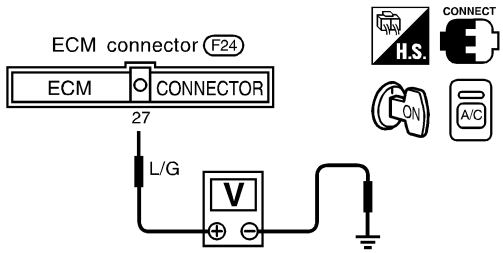
4	CHECK A/C RELAY AFTER DISCONNECTING IT

Refer to HA-83.

OK or NG

OK	▶	Reconnect A/C relay. And GO TO 5.
NG	▶	1. Replace A/C relay. 2. Go to self-diagnosis step-by-step procedure (HA-38) and perform self-diagnosis STEP-4. Confirm that magnet clutch operation is normal.

5	CHECK COIL SIDE CIRCUIT OF A/C RELAY	
Do approx. 12 volts exist between ECM harness terminal No. 27 and body ground?		

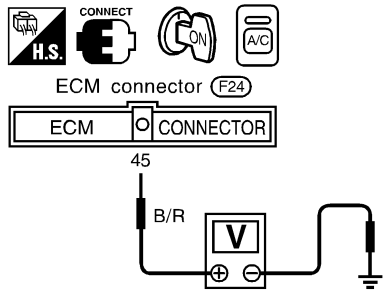


RHA482GG

Yes or No

Yes	▶	GO TO 6.
No	▶	Disconnect A/C relay. Disconnect ECM harness connector. GO TO 11.

6	CHECK VOLTAGE FOR ECM	
Do approx. 4.6 volts exist between ECM harness terminal No. 45 and body ground?		



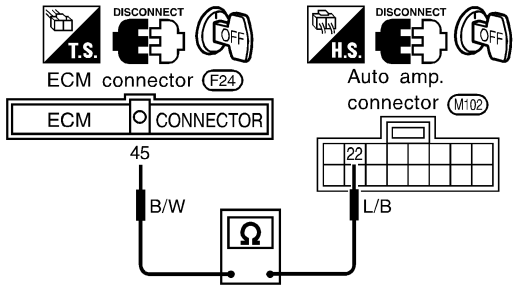
RHA701FK

Yes or No

Yes	▶	Disconnect ECM harness connector. Disconnect auto amp. harness connector. GO TO 7.
No	▶	Check ECM. Refer to EC-126, "ECM Terminals and Reference Value".

7	CHECK CIRCUIT CONTINUITY BETWEEN ECM AND AUTO AMP.

Check circuit continuity between ECM harness terminal No. 45 and auto amp. harness terminal No. 22.



RHA844H

Continuity should exist.
If OK, check harness for short.

OK or NG

OK	▶	GO TO 8.
NG	▶	1. Repair harness or connector. 2. Go to "SETP-BY-STEP PROCEDURE", "Self-diagnosis", HA-38 and perform self-diagnosis STEP-4. Confirm that magnet clutch operation is normal.

8	CHECK REFRIGERANT PRESSURE SWITCH

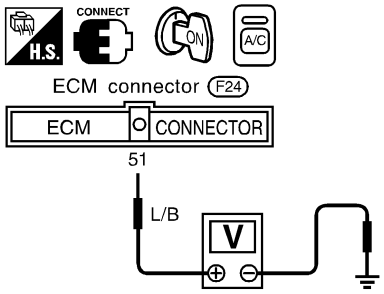
Refer to HA-84.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace refrigerant pressure sensor.

9	CHECK VOLTAGE FOR ECM

Do aprox. 4.6 volts exist between ECM harness terminal No. 51 and body ground?



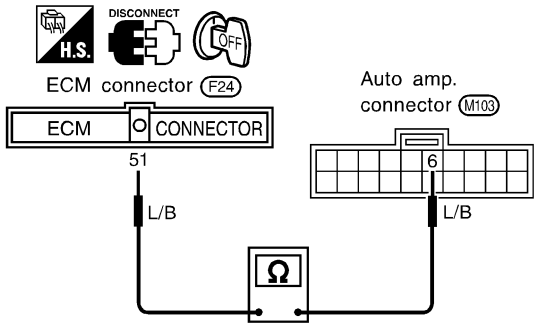
RHA701FL

OK or NG

OK	▶	Check ECM. Refer to "ECM Terminals and Reference Value", EC-126.
NG	▶	GO TO 10.

10	CHECK CIRCUIT CONTINUITY BETWEEN ECM AND AUTO AMP.

Check circuit continuity between ECM harness terminal No. 51 and auto amp. harness terminal No. 6.



RHA845H

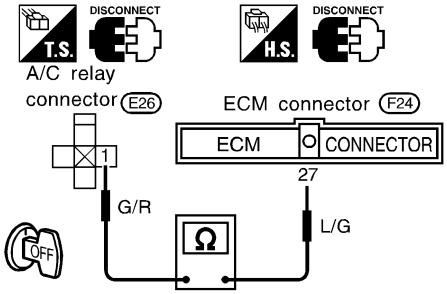
Continuity should exist.
If OK, check harness for short.

OK or NG

OK	▶	Replace auto amp.
NG	▶	1. Repair harness or connector. 2. Go to "FUNCTION CONFIRMATION PROCEDURE", "Self-diagnosis", HA-38 and perform self-diagnosis STEP-4. Confirm that magnet clutch operation is normal.

11	CHECK CIRCUIT CONTINUITY BETWEEN A/C RELAY AND ECM

Check circuit continuity between A/C relay harness terminal No. 1 and ECM harness terminal No. 27.

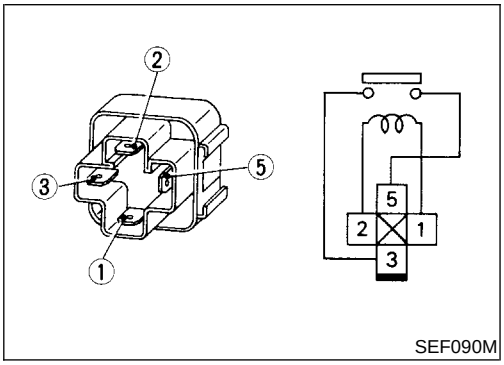


RHA474GB

Continuity should exist.

OK or NG

OK	▶	Check harness for short.
NG	▶	Repair harness or connector.



SEF090M

COMPONENT INSPECTION

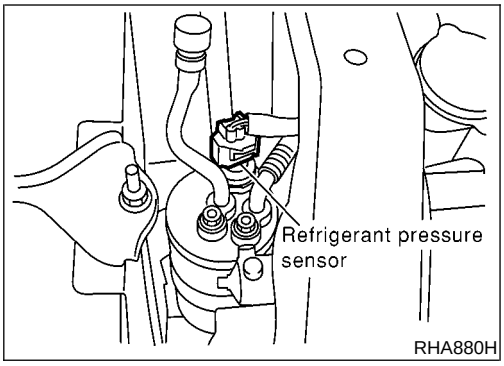
A/C Relay

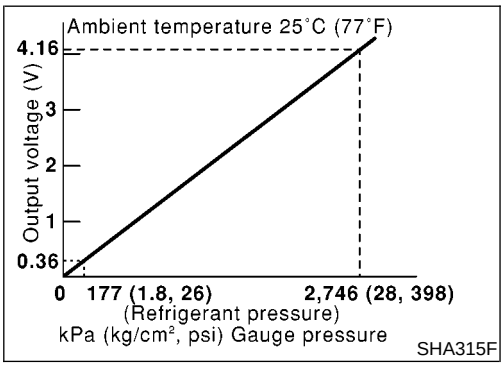
NAHA0204
NAHA0204S01

Check continuity between terminal Nos. 3 and 5.

Conditions	Continuity
12V direct current supply between terminal Nos. 1 and 2	Yes
No current supply	No

If NG, replace relay.





Refrigeralt Pressure Sensor

NAHA0204S02

Make sure that higher A/C refrigerant-pressure results in higher refrigerant-pressure sensor output voltage.

Check voltage between ECM harness terminal No. 81 and body ground.

Insufficient Cooling

TROUBLE DIAGNOSIS PROCEDURE FOR INSUFFICIENT COOLING

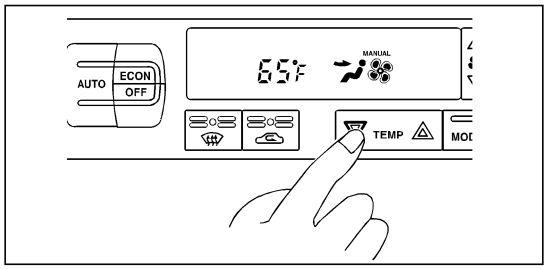
=NAHA0205

SYMPTOM:

- **Insufficient cooling**

INSPECTION FLOW

1. Confirm symptom by performing the following operational check.



OPERATIONAL CHECK – Temperature decrease

a. Press the temperature decrease button until 18°C (65°F) is displayed.

b. Check for cold air at discharge air outlets.

If OK (symptom cannot be duplicated), perform complete operational check (*11).
If NG (symptom is confirmed), continue with STEP-2 following.

2. Check for any service bulletins.

3. Perform self-diagnosis STEP-1. (*1)

OK

4. Perform self-diagnosis STEP-2. (*12)

NG → Go to appropriate malfunctioning sensor circuit. (*5)

OK

5. Perform self-diagnosis STEP-4. (*12)

NG → **Go to appropriate malfunctioning items.**
- Check mode door motor and air mix door motor circuit. (*6)
- Check intake door circuit. (*7)
- Check blower motor circuit. (*8)
- Check magnet clutch circuit. (*9)

OK

6. Check compressor belt tension. Refer to MA-(*14), “Checking Drive Belts”.

NG → Adjust or replace compressor belt.

OK

7. Check air mix door operation. (*2)

NG → Adjust or replace air mix door control linkage.

OK

8. Check cooling fan motor operation.

NG → Refer to LC-(*15), “Cooling Fan”.

OK

9. Before connecting ACR4 to vehicle, check ACR4 gauges. No refrigerant pressure should be displayed. If NG, recover refrigerant from equipment lines.

10. Confirm refrigerant purity in supply tank using ACR4 and refrigerant identifier.

NG → Refer to Contaminated refrigerant. (*13)

OK

11. Connect ACR4 to vehicle.
Confirm refrigerant purity in vehicle A/C system using ACR4 and refrigerant identifier.

NG → Refer to Contaminated refrigerant. (*13)

OK

12. Check refrigeration cycle pressure with manifold gauge connected. Refer to (*3).

NG → Perform performance test diagnoses. Refer to (*10).

OK

13. Check for evaporator coil freeze up.

NG (Freeze up.) → Replace compressor.

(Does not freeze up.)

OK

14. Check ducts for air leaks.

NG → Repair air leaks.

OK

15. Perform temperature setting trimmer. (*4)
(1) Set up AUXILIARY MECHANISM mode in self-diagnosis.
(2) Press ▼ (COLD) switch as desired.

OK

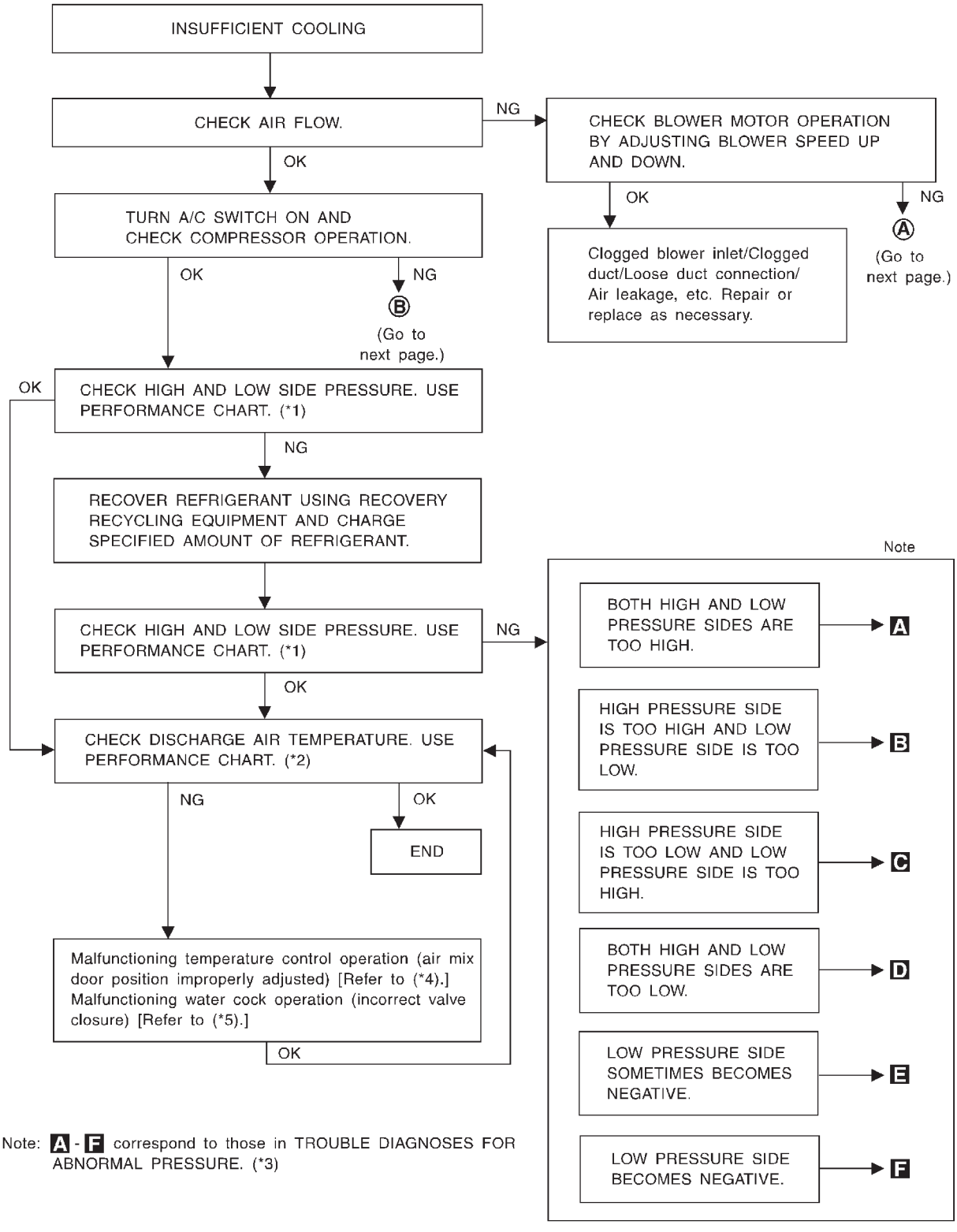
INSPECTION END

SHA190FB

*1: HA-37
*2: HA-61
*3: HA-88
*4: HA-46
*5: STEP-BY-STEP PROCEDURE (HA-38), see No. 13.
*6: HA-54
*7: HA-64
*8: HA-71
*9: HA-79
*10: HA-86
*11: HA-48
*12: HA-38
*13: HA-3
*14: MA-14
*15: LC-21

PERFORMANCE TEST DIAGNOSES

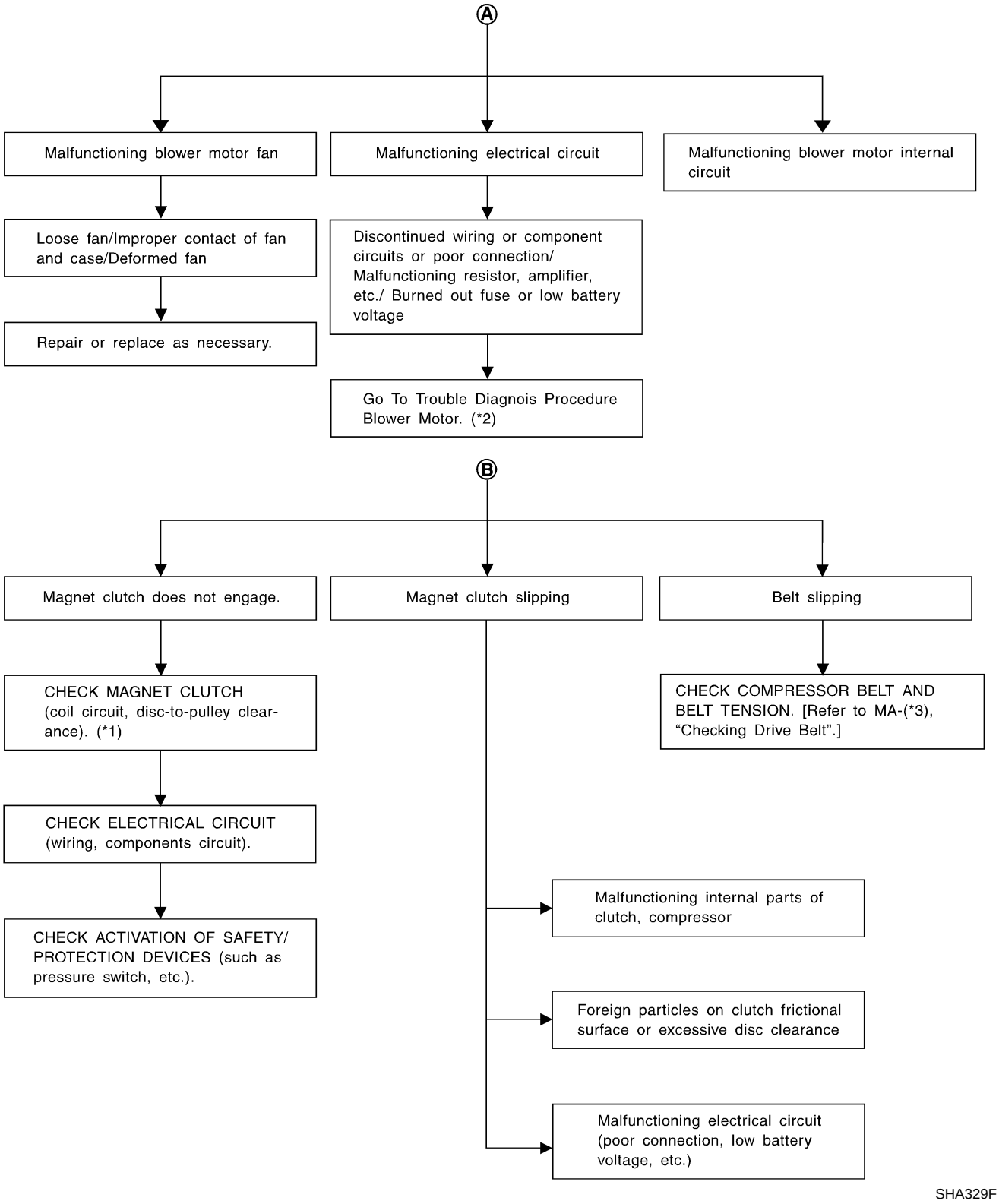
NAHA0206



Note: A - F correspond to those in TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE. (*3)

SHA893E

*1: HA-88
*2: HA-88
*3: HA-88
*4: HA-61
*5: HA-61



SHA329F

*1: HA-116 *2: HA-70 *3: MA-14

PERFORMANCE CHART

NAHA0207

Test Condition

NAHA0207S01

Testing must be performed as follows:

Vehicle location	Indoors or in the shade (in a well-ventilated place)
Doors	Closed
Door windows	Open
Hood	Open
TEMP.	Max. COLD
Mode switch	(Ventilation) set
REC switch	(Recirculation) set
(blower) speed	Max. speed set
Engine speed	Idle speed
Operate the air conditioning system for 10 minutes before taking measurements.	

Test Reading

NAHA0207S02

Recirculating-to-discharge Air Temperature Table

NAHA0207S0201

Inside air (Recirculating air) at blower assembly inlet		Discharge air temperature at center ventilator °C (°F)
Relative humidity %	Air temperature °C (°F)	
50 - 60	25 (77)	6.0 - 9.0 (43 - 48)
	30 (86)	10.0 - 13.6 (50 - 56)
	35 (95)	15.2 - 19.5 (59 - 67)
	40 (104)	22.5 - 27.1 (73 - 81)
60 - 70	25 (77)	9.0 - 12.2 (48 - 54)
	30 (86)	13.6 - 17.2 (56 - 63)
	35 (95)	19.5 - 23.7 (67 - 75)
	40 (104)	27.1 - 32.3 (81 - 90)

Ambient Air Temperature-to-operating Pressure Table

NAHA0207S0202

Ambient air		High-pressure (Discharge side) kPa (kg/cm^2, psi)	Low-pressure (Suction side) kPa (kg/cm^2, psi)
Relative humidity %	Air temperature °C (°F)		
50 - 70	25 (77)	1,226 - 1,638 (12.5 - 16.7, 178 - 237)	172 - 250 (1.75 - 2.55, 25 - 36)
	30 (86)	1,422 - 1,883 (14.5 - 19.2, 206 - 273)	196 - 275 (2.0 - 2.8, 28 - 40)
	35 (95)	1,657 - 2,187 (16.9 - 22.3, 240 - 317)	231 - 309 (2.35 - 3.15, 33 - 45)
	40 (104)	1,922 - 2,501 (19.6 - 25.5, 279 - 363)	280 - 373 (2.85 - 3.8, 41 - 54)

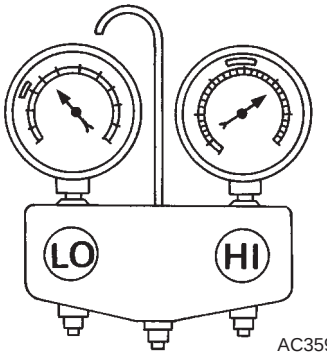
TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE

NAHA0208

Whenever system's high and/or low side pressure is abnormal, diagnose using a manifold gauge. The marker above the gauge scale in the following tables indicates the standard (normal) pressure range. Since the standard (normal) pressure, however, differs from vehicle to vehicle, refer to HA-88 ("Ambient air temperature-to-operating pressure table").

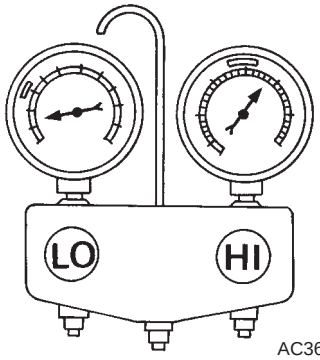
Both High- and Low-pressure Sides are Too High.

NAHA0208S01

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Both high- and low-pressure sides are too high. A  AC359A	• Pressure is reduced soon after water is splashed on condenser.	Excessive refrigerant charge in refrigeration cycle	Reduce refrigerant until specified pressure is obtained.
	Air suction by cooling fan is insufficient.	Insufficient condenser cooling performance ↓ 1. Condenser fins are clogged. 2. Improper fan rotation of cooling fan	• Clean condenser. • Check and repair cooling fan as necessary.
	• Low-pressure pipe is not cold. • When compressor is stopped high-pressure value quickly drops by approximately 196 kPa (2 kg/cm^2, 28 psi). It then decreases gradually thereafter.	Poor heat exchange in condenser (After compressor operation stops, high pressure decreases too slowly.) ↓ Air in refrigeration cycle	Evacuate repeatedly and recharge system.
	Engine tends to overheat.	Engine cooling systems malfunction.	Check and repair each engine cooling system.
	• An area of the low-pressure pipe is colder than areas near the evaporator outlet. • Plates are sometimes covered with frost.	• Excessive liquid refrigerant on low-pressure side • Excessive refrigerant discharge flow • Expansion valve is open a little compared with the specification. ↓ 1. Improper thermal valve installation 2. Improper expansion valve adjustment	Replace expansion valve.

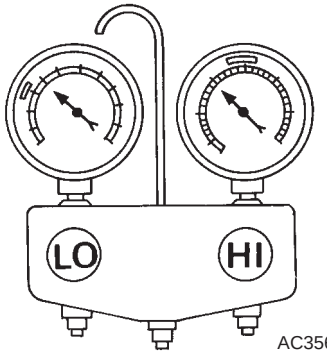
High-pressure Side is Too High and Low-pressure Side is Too Low.

NAHA0208S02

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
High-pressure side is too high and low-pressure side is too low. B  AC360A	Upper side of condenser and high-pressure side are hot, however, liquid tank is not so hot.	High-pressure tube or parts located between compressor and condenser are clogged or crushed.	• Check and repair or replace malfunctioning parts. • Check lubricant for contamination.

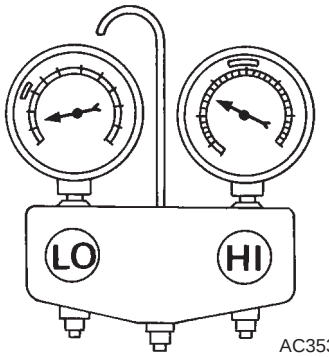
High-pressure Side is Too Low and Low-pressure Side is Too High.

NAHA0208S03

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
High-pressure side is too low and low-pressure side is too high. C  AC356A	High and low-pressure sides become equal soon after compressor operation stops.	Compressor pressure operation is improper. ↓ Damaged inside compressor packings	Replace compressor.
	No temperature difference between high and low-pressure sides	Compressor pressure operation is improper. ↓ Damaged inside compressor packings.	Replace compressor.

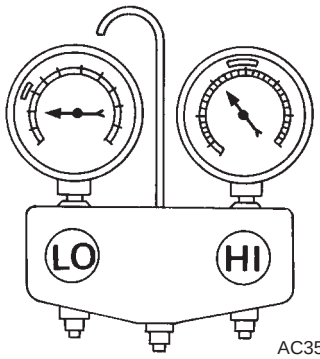
Both High- and Low-pressure Sides are Too Low.

NAHA0208S04

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Both high- and low-pressure sides are too low. D  AC353A	• There is a big temperature difference between receiver drier outlet and inlet. Outlet temperature is extremely low. • Liquid tank inlet and expansion valve are frosted.	Compressor discharge capacity does not change. (Compressor stroke is set at maximum.)	• Replace liquid tank. • Check lubricant for contamination.
	• Temperature of expansion valve inlet is extremely low as compared with areas near liquid tank. • Expansion valve inlet may be frosted. • Temperature difference occurs somewhere in high-pressure side	High-pressure pipe located between receiver drier and expansion valve is clogged.	• Check and repair malfunctioning parts. • Check lubricant for contamination.
	• Expansion valve and liquid tank are warm or only cool when touched.	Low refrigerant charge ↓ Leaking fittings or components	Check refrigerant for leaks. Refer to "Checking Refrigerant Leaks", HA-121.
	There is a big temperature difference between expansion valve inlet and outlet while the valve itself is frosted.	Expansion valve closes a little compared with the specification. ↓ 1. Improper expansion valve adjustment 2. Malfunctioning thermal valve 3. Outlet and inlet may be clogged.	• Remove foreign particles by using compressed air. • Check lubricant for contamination.
	An area of the low-pressure pipe is colder than areas near the evaporator outlet.	Low-pressure pipe is clogged or crushed.	• Check and repair malfunctioning parts. • Check lubricant for contamination.
	Air flow volume is not enough or is too low.	Evaporator is frozen. ↓ Compressor discharge capacity does not change. (Compressor stroke is set at maximum length.)	Replace compressor.

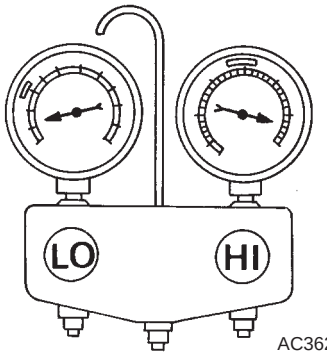
Low-pressure Side Sometimes Becomes Negative.

NAHA0208S05

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Low-pressure side sometimes becomes negative. E  AC354A	• Air conditioning system does not function and does not cyclically cool the compartment air. • The system constantly functions for a certain period of time after compressor is stopped and restarted.	Refrigerant does not discharge cyclically. ↓ Moisture is frozen at expansion valve outlet and inlet. ↓ Water is mixed with refrigerant.	• Drain water from refrigerant or replace refrigerant. • Replace liquid tank.

Low-pressure Side Becomes Negative.

NAHA0208S06

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Low-pressure side becomes negative. F  AC362A	Liquid tank or front/rear side of expansion valve's pipe is frosted or dewed.	High-pressure side is closed and refrigerant does not flow. ↓ Expansion valve or liquid tank is frosted.	Leave the system at rest until no frost is present. Start it again to check whether or not the problem is caused by water or foreign particles. • If water is the cause, initially cooling is okay. Then the water freezes causing a blockage. Drain water from refrigerant or replace refrigerant. • If due to foreign particles, remove expansion valve and remove the particles with dry and compressed air (not shop air). • If either of the above methods cannot correct the problem, replace expansion valve. • Replace liquid tank. • Check lubricant for contamination.

Insufficient Heating

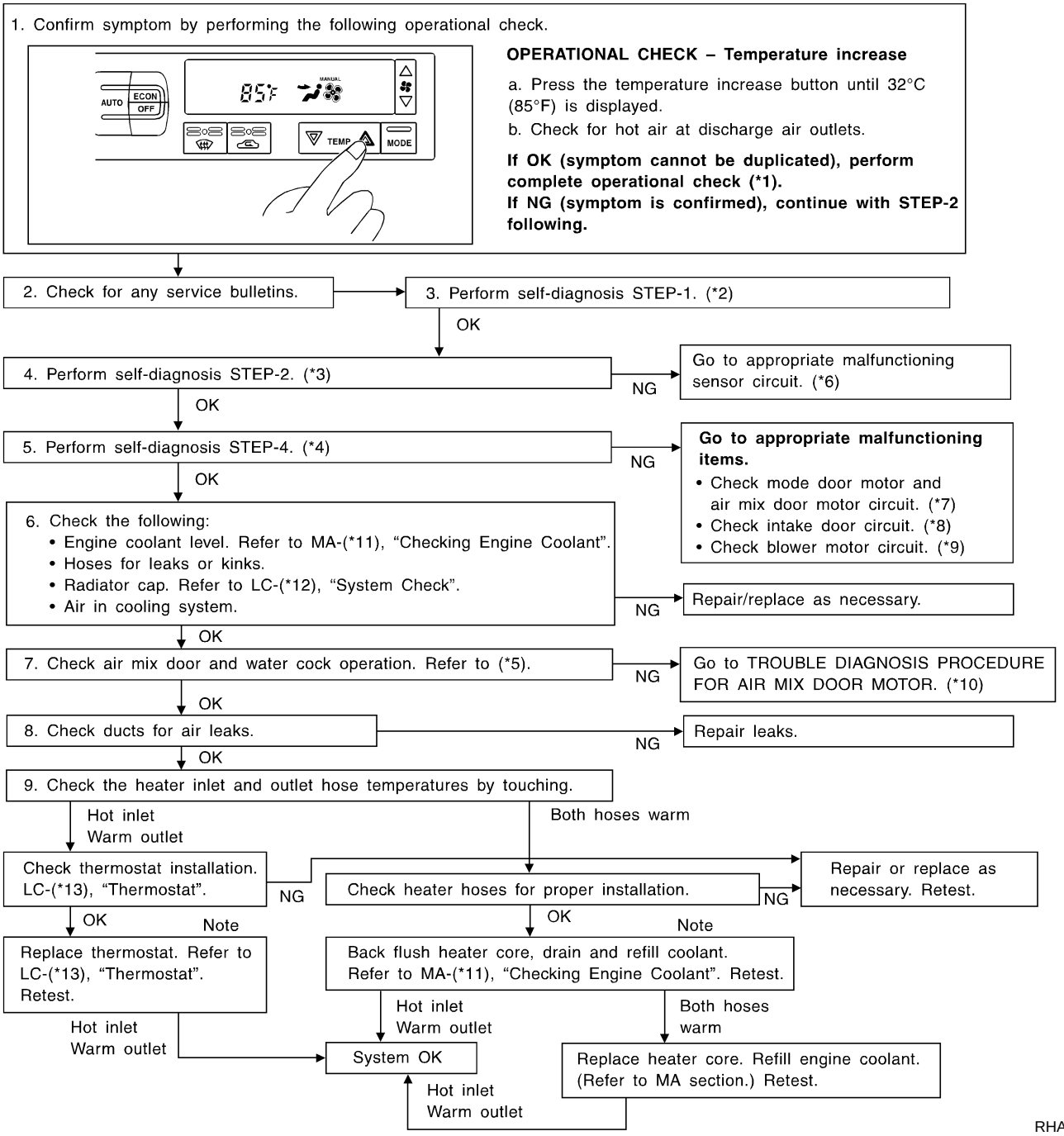
TROUBLE DIAGNOSIS PROCEDURE FOR INSUFFICIENT HEATING

=NAHA0209

SYMPTOM:

- **Insufficient heating**

INSPECTION FLOW



RHA585H

*1: HA-48
*2: HA-37
*3: HA-38
*4: HA-38
*5: HA-61
*6: STEP-BY-STEP PROCEDURE (HA-38), see No. 13.
*7: HA-55
*8: HA-65
*9: HA-72
*10: HA-59
*11: MA-15
*12: LC-12
*13: LC-17

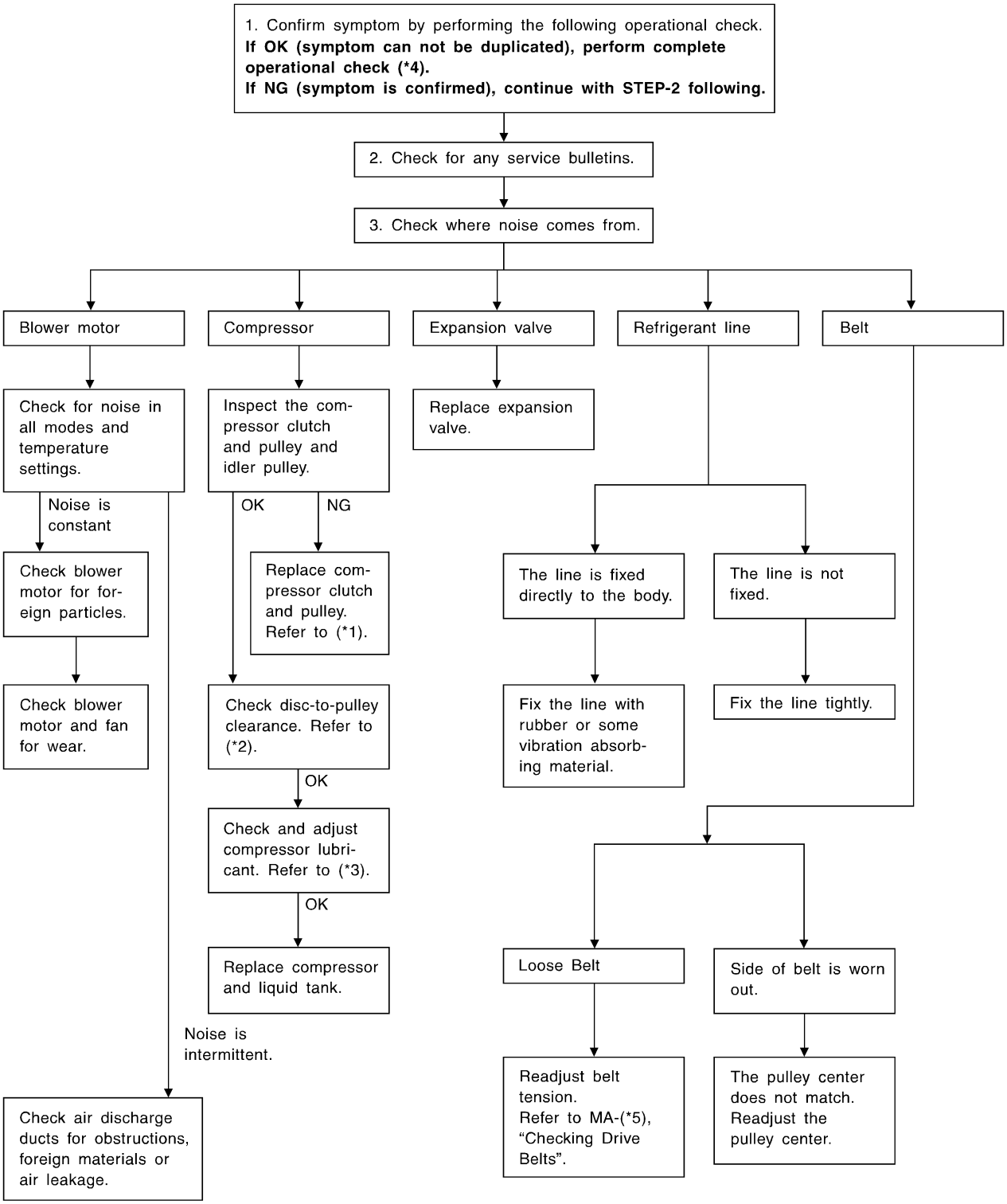
Noise

TROUBLE DIAGNOSIS PROCEDURE FOR NOISE

=NAHA0210

SYMPTOM:

- **Noise**



SHA331F

*1: HA-116
*2: HA-118
*3: HA-113
*4: HA-48
*5: MA-14

Self-diagnosis

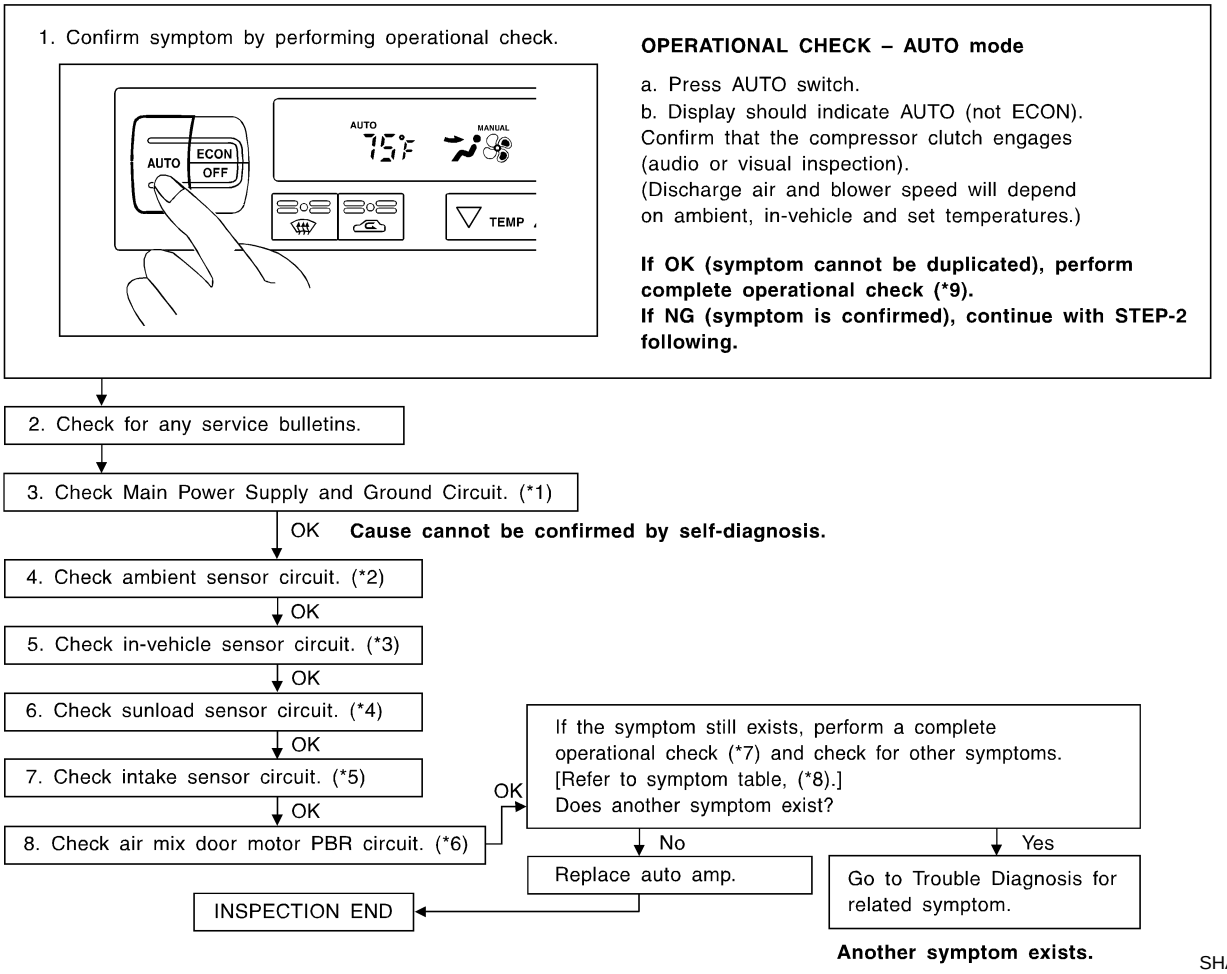
TROUBLE DIAGNOSIS PROCEDURE FOR SELF-DIAGNOSIS

=NAHA0211

SYMPTOM:

- **Self-diagnosis cannot be performed.**

INSPECTION FLOW



SHA250F

*1: HA-51
*2: HA-97
*3: HA-101
*4: HA-104
*5: HA-108
*6: HA-110
*7: HA-48
*8: HA-47
*9: HA-48

Memory Function

TROUBLE DIAGNOSIS PROCEDURE FOR MEMORY FUNCTION

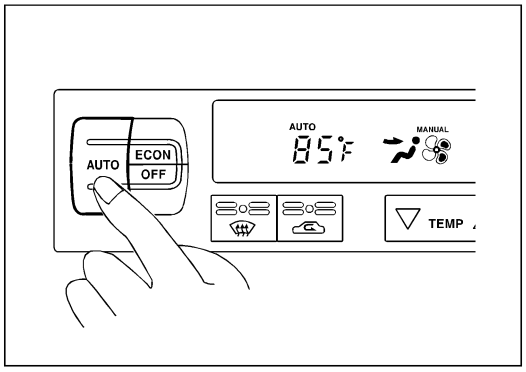
=NAHA0212

SYMPTOM:

- **Memory function does not operate.**

INSPECTION FLOW

1. Confirm symptom by performing the following operational check.



OPERATIONAL CHECK – Memory function

a. Set the temperature 85°F or 32°C.
b. Press OFF switch.
c. Turn the ignition off.
d. Turn the ignition on.
e. Press the AUTO switch.
f. Confirm that the set temperature remains at previous temperature.
g. Press OFF switch.

If OK (symptom cannot be duplicated), perform complete operational check (*2).
If NG (symptom is confirmed), continue with STEP-2 following.

2. Check for any service bulletins.

3. Check Main Power Supply and Ground Circuit. (*1)

OK

4. Replace auto amp.

5. FINAL CHECK
   Go to self-diagnosis step-by-step procedure (*3) and perform self-diagnosis STEP-2.
   Confirm that code No. 20 is displayed.

RHA885H

*1: HA-51 *2: HA-48 *3: HA-38

ECON (ECONOMY) Mode

TROUBLE DIAGNOSIS PROCEDURE FOR ECON (ECONOMY) MODE

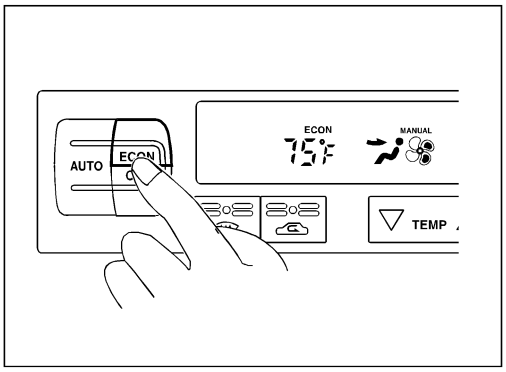
=NAHA0213

SYMPTOM:

- **ECON mode does not operate.**

INSPECTION FLOW

1. Confirm symptom by performing the following operational check.



OPERATIONAL CHECK – ECON (ECONOMY) mode

a. Set the temperature 75°F or 25°C.
b. Press ECON switch.
c. Display should indicate ECON (not AUTO).
Confirm that the compressor clutch is not engaged (visual inspection).
(Discharge air and blower speed will depend on ambient, in-vehicle and set temperatures.)

If OK (symptom cannot be duplicated), perform complete operational check (*2).
If NG (symptom is confirmed), continue with STEP-2 following.

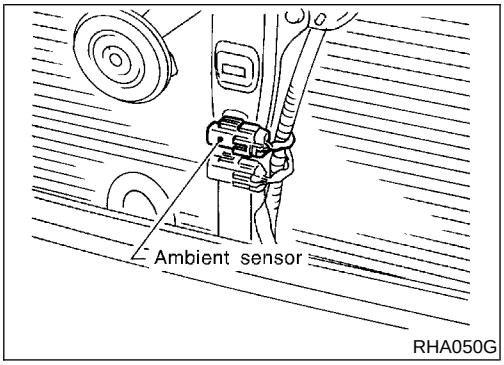
2. Check for any service bulletins.
3. Check Main Power Supply and Ground Circuit. (*1)

OK

4. Replace auto amp.
5. FINAL CHECK
   Go to self-diagnosis step-by-step procedure (*3) and perform self-diagnosis STEP-2.
   Confirm that code No. 20 is displayed.

SHA920EA

*1: HA-51 *2: HA-48 *3: HA-38



RHA050G

Ambient Sensor Circuit

COMPONENT DESCRIPTION

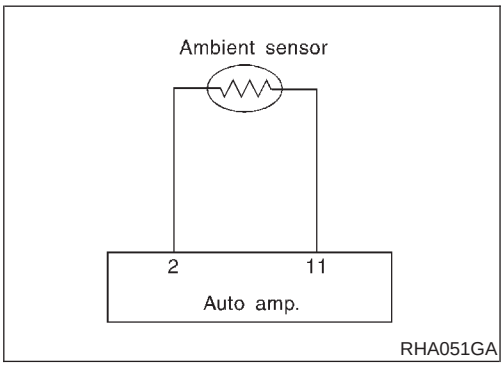
NAHA0214

The ambient sensor is located on the hood lock stay. It detects ambient temperature and converts it into a resistance value which is then input into the auto amplifier.

AMBIENT TEMPERATURE INPUT PROCESS

NAHA0215

The automatic amplifier includes a "processing circuit" for the ambient sensor input. However, when the temperature detected by the ambient sensor increases quickly, the processing circuit retards the auto amp. function. It only allows the auto amp. to recognize an ambient temperature increase of 0.33°C (0.6°F) per 100 seconds. As an example, consider stopping for a cup of coffee after high speed driving. Although the actual ambient temperature has not changed, the temperature detected by the ambient sensor will increase. This is because the heat from the engine compartment can radiate to the front grille area, location of the ambient sensor.



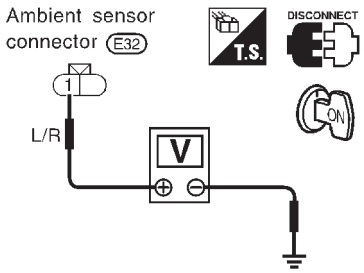
DIAGNOSTIC PROCEDURE

NAHA0216

SYMPTOM: Ambient sensor circuit is open or shorted. (21 or −21 is indicated on the display as a result of conducting Self-diagnosis STEP 2.)

1	CHECK VOLTAGE BETWEEN AMBIENT SENSOR HARNESS CONNECTOR AND BODY GROUND

Disconnect ambient sensor harness connector.
Do approx. 5 volts exist between ambient sensor harness terminal No. 1 and body ground?

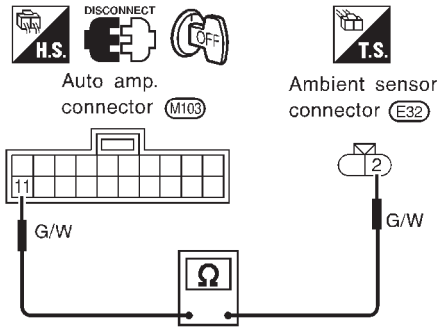


Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 4.

2	CHECK AMBIENT SENSOR CIRCUIT BETWEEN AMBIENT SENSOR AND AUTO AMP. (LCU)

1. Disconnect auto amp. (LCU) harness connector.
2. Check circuit continuity between ambient sensor harness terminal No. 2 and auto amp. (LCU) harness terminal No. 11.



RHA475G

Continuity should exist.
If OK, check harness for short.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair harness or connector.

3	CHECK AMBIENT SENSOR

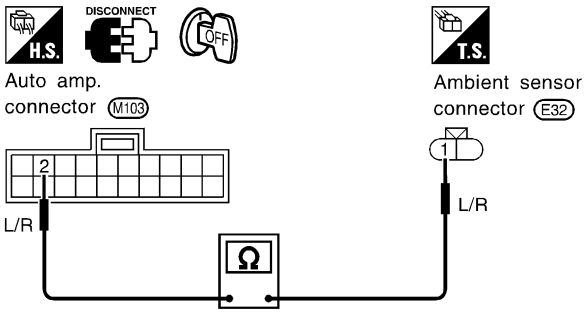
Refer to HA-100.

OK or NG

OK	▶	1. Replace auto amp. (LCU). 2. Go to self-diagnosis step-by-step procedure (HA-38) and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.
NG	▶	Replace ambient sensor.

4	CHECK AMBIENT SENSOR CIRCUIT BETWEEN AMBIENT SENSOR AND AUTO AMP. (LCU)

1. Disconnect auto amp. (LCU) harness connector.
2. Check circuit continuity between ambient sensor harness terminal No. 1 and auto amp. (LCU) harness terminal No. 2.

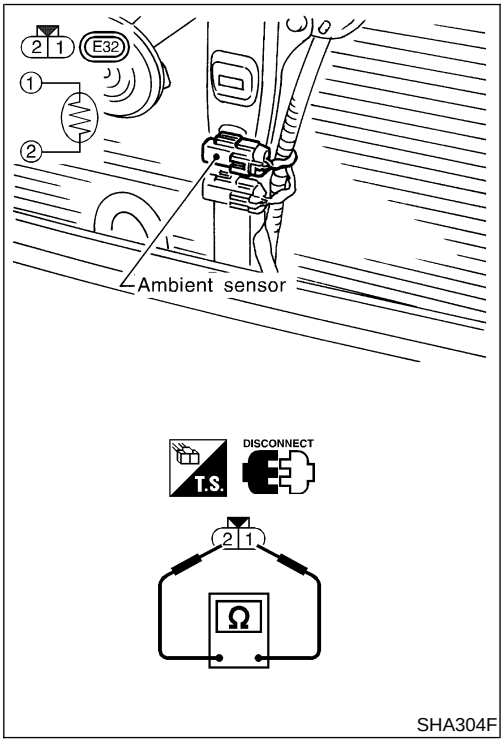


RHA906H

Continuity should exist.
If OK, check harness for short.

OK or NG

OK	▶	1. Replace auto amp. (LCU). 2. Go to self-diagnosis step-by-step procedure (HA-38) and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.
NG	▶	Repair harness or connector.



SHA304F

COMPONENT INSPECTION

NAHA0217

Ambient Sensor

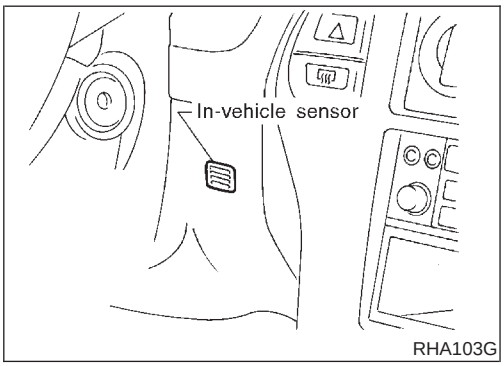
NAHA0217S01

After disconnecting ambient sensor harness connector, measure resistance between terminals 2 and 1 at sensor harness side, using the table below.

Temperature °C (°F)	Resistance kΩ
−15 (5)	12.73
−10 (14)	9.92
−5 (23)	7.80
0 (32)	6.19
5 (41)	4.95
10 (50)	3.99
15 (59)	3.24
20 (68)	2.65
25 (77)	2.19
30 (86)	1.81

Temperature °C (°F)	Resistance kΩ
35 (95)	1.51
40 (104)	1.27
45 (113)	1.07

If NG, replace ambient sensor.



RHA103G

In-vehicle Sensor Circuit

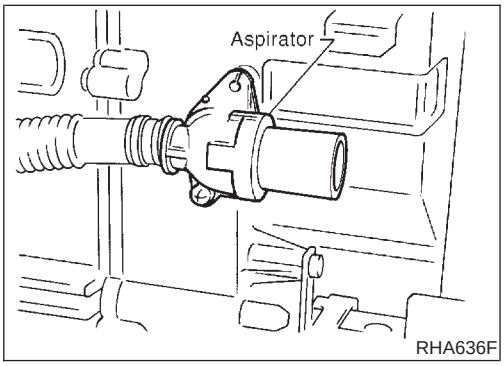
COMPONENT DESCRIPTION

NAHA0218

In-vehicle sensor

NAHA0218S01

The in-vehicle sensor is located on instrument lower panel. It converts variations in temperature of compartment air drawn from the aspirator into a resistance value. It is then input into the auto amplifier.

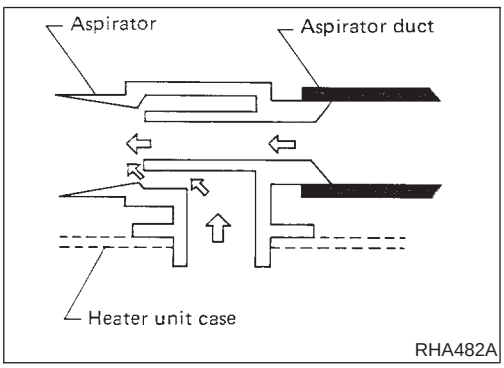


RHA636F

Aspirator

NAHA0218S02

The aspirator is located in front of heater unit. It produces vacuum pressure due to air discharged from the heater unit, continuously taking compartment air in the aspirator.

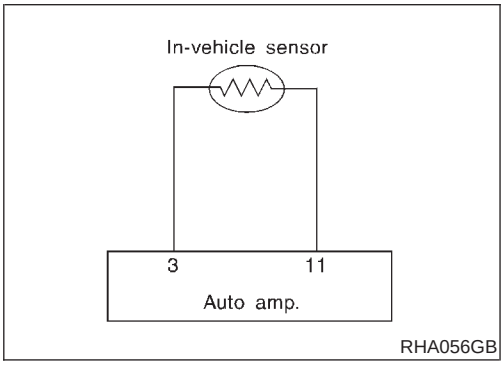


RHA482A

DIAGNOSTIC PROCEDURE

NAHA0219

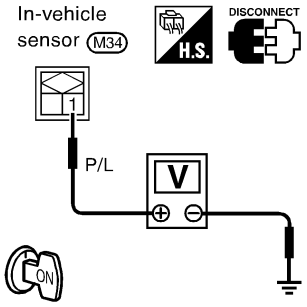
SYMPTOM: In-vehicle sensor circuit is open or shorted. (22 or –22 is indicated on the display as a result of conducting Self-diagnosis STEP 2.)



RHA056GB

1	CHECK IN-VEHICLE SENSOR CIRCUIT BETWEEN IN-VEHICLE SENSOR AND BODY GROUND

Disconnect in-vehicle sensor harness connector.
Do approx. 5 volts exist between in-vehicle sensor harness terminal No. 1 and body ground?



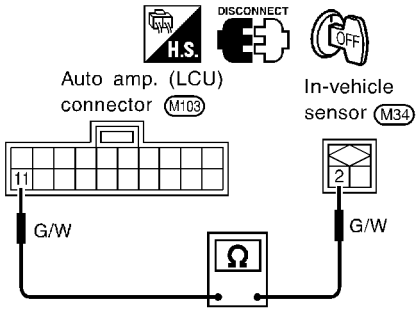
RHA579H

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 4.

2	CHECK IN-VEHICLE SENSOR CIRCUIT BETWEEN IN-VEHICLE SENSOR AND AUTO AMP. (LCU)

1. Disconnect auto amp. (LCU) harness connector.
2. Check circuit continuity between in-vehicle sensor harness terminal No. 2 and auto amp. (LCU) harness terminal No. 11.



RHA478G

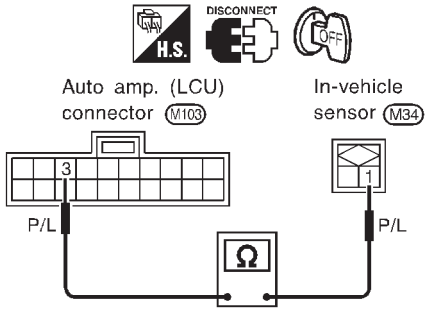
Continuity should exist.
If OK, check harness for short.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair harness or connector.

3	CHECK IN-VEHICLE SENSOR
Refer to HA-104.	
OK or NG	
OK ▶	1. Replace auto amp. 2. Go to self-diagnosis step-by-step procedure (HA-38) and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.
NG ▶	1. Replace in-vehicle sensor. 2. Go to self-diagnosis step-by-step procedure (HA-38) and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.

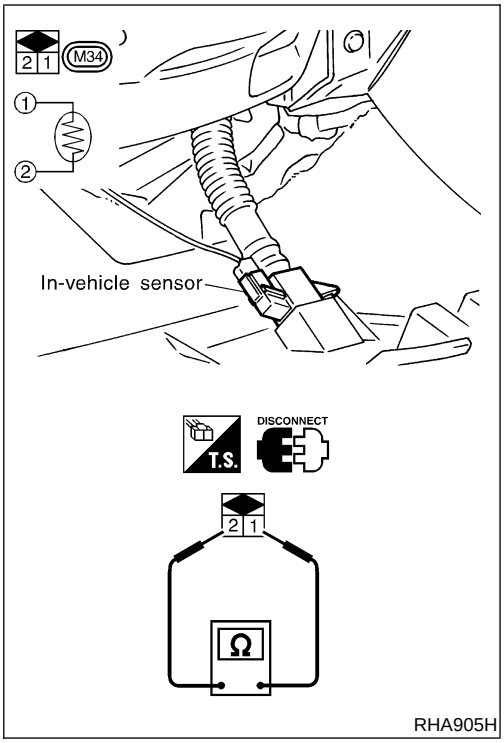
4	CHECK IN-VEHICLE SENSOR CIRCUIT BETWEEN AMBIENT SENSOR AND AUTO AMP. (LCU)
1. Disconnect auto amp. (LCU) harness connector. 2. Check circuit continuity between in-vehicle sensor harness terminal No. 1 and auto amp. (LCU) harness terminal No. 3.	



RHA479G

Continuity should exist.
If OK, check harness for short.

OK or NG	
OK ▶	1. Replace auto amp. (LCU). 2. Go to self-diagnosis step-by-step procedure (HA-38) and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.
NG ▶	Repair harness or connector.



COMPONENT INSPECTION

NAHA0220

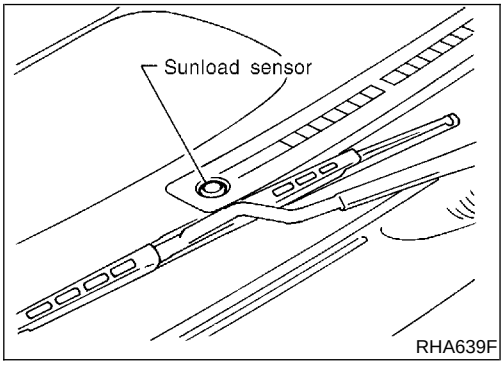
In-vehicle Sensor

NAHA0220S01

After disconnecting in-vehicle sensor harness connector, measure resistance between terminals 1 and 2 at sensor harness side, using the table below.

Temperature °C (°F)	Resistance kΩ
−15 (5)	12.73
−10 (14)	9.92
−5 (23)	7.80
0 (32)	6.19
5 (41)	4.95
10 (50)	3.99
15 (59)	3.24
20 (68)	2.65
25 (77)	2.19
30 (86)	1.81
35 (95)	1.51
40 (104)	1.27
45 (113)	1.07

If NG, replace in-vehicle sensor.



Sunload Sensor Circuit

COMPONENT DESCRIPTION

NAHA0221

The sunload sensor is located on the right defroster grille. It detects sunload entering through windshield by means of a photo diode. The sensor converts the sunload into a current value which is then input into the auto amplifier.

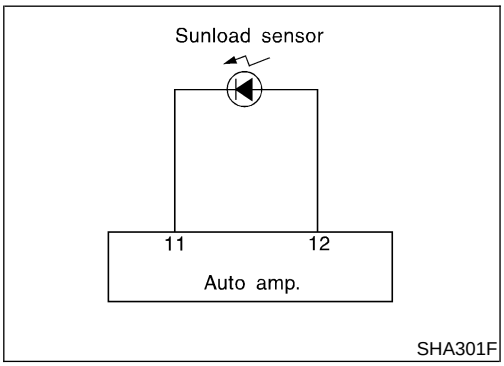
SUNLOAD INPUT PROCESS

NAHA0222

The auto amp. also includes a processing circuit which "average" the variations in detected sunload over a period of time. This prevents drastic swings in the ATC system operation due to small or quick variations in detected sunload.

For example, consider driving along a road bordered by an occasional group of large trees. The sunload detected by the sunload sensor will vary whenever the trees obstruct the sunlight. The processing circuit averages the detected sunload over a period of time, so that the (insignificant) effect of the trees momentarily

obstructing the sunlight does not cause any change in the ATC system operation. On the other hand, shortly after entering a long tunnel, the system will recognize the change in sunload, and the system will react accordingly.



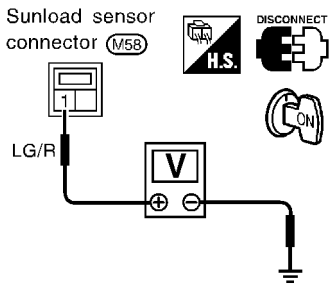
DIAGNOSTIC PROCEDURE

NAHA0223

SYMPTOM: Sunload sensor circuit is open or shorted. (25 or −25 is indicated on the display as a result of conducting Self-diagnosis STEP 2.)

1	CHECK SUNLOAD SENSOR CIRCUIT BETWEEN SUNLOAD SENSOR AND BODY GROUND

Disconnect sunload sensor harness connector.
Do approx. 5 volts exist between sunload sensor harness terminal No. 1 and body ground?

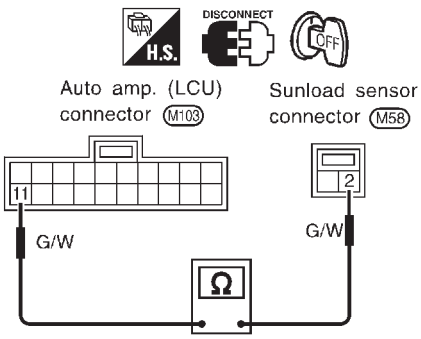


Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 4.

2	CHECK SUNLOAD SENSOR CIRCUIT BETWEEN SUNLOAD SENSOR AND AUTO AMP. (LCU)

1. Disconnect auto amp. (LCU) harness connector.
2. Check circuit continuity between sunload sensor harness terminal No. 2 and auto amp. (LCU) harness terminal No. 11.



RHA483G

Continuity should exist.
If OK, check harness for short.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair harness or connector.

3	CHECK SUNLOAD SENSOR

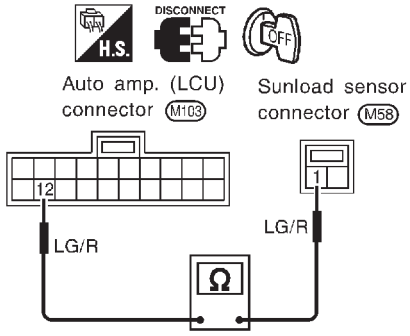
Refer to HA-107.

OK or NG

OK	▶	1. Replace auto amp. (LCU). 2. Go to self-diagnosis step-by-step procedure (HA-38) and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.
NG	▶	1. Replace sunload sensor. 2. Go to self-diagnosis step-by-step procedure (HA-38) and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.

4	CHECK SUNLOAD SENSOR CIRCUIT BETWEEN SUNLOAD SENSOR AND AUTO AMP. (LCU)

1. Disconnect auto amp. (LCU) harness connector.
2. Check circuit continuity between sunload sensor harness terminal No. 1 and auto amp. (LCU) harness terminal No. 12.

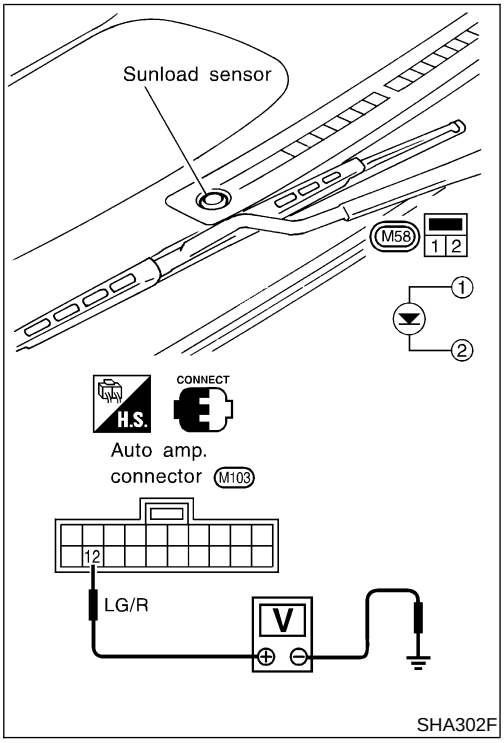


RHA484G

Continuity should exist.
If OK, check harness for short.

OK or NG

OK	▶	1. Replace auto amp. 2. Go to self-diagnosis step-by-step procedure (HA-38) and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.
NG	▶	Repair harness or connector.



SHA302F

COMPONENT INSPECTION

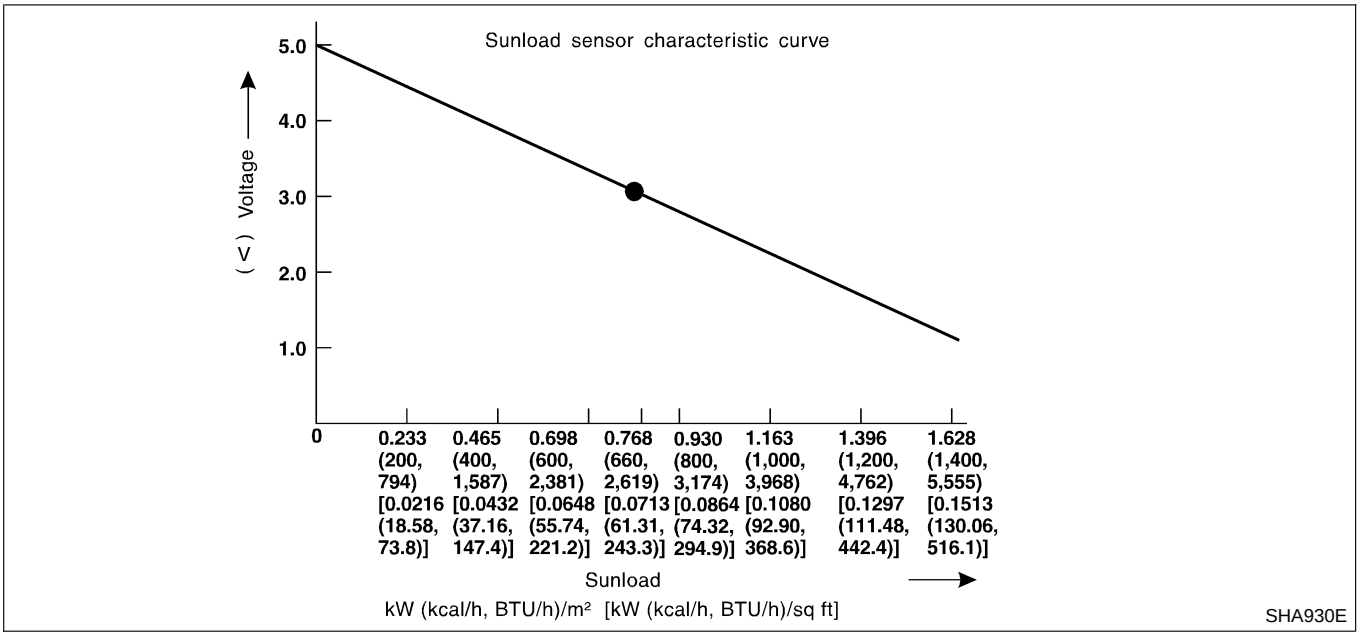
NAHA0224

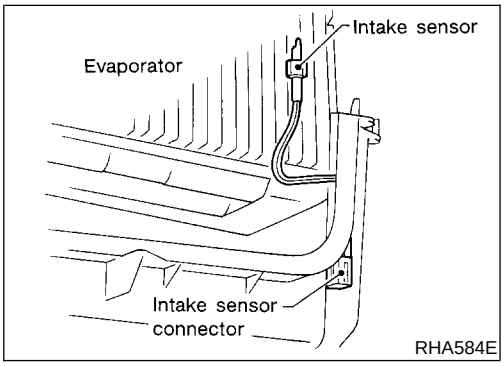
Sunload Sensor

NAHA0224S01

Measure voltage between auto amp. terminal No. 12 and body ground.
If NG, replace sunload sensor.

- **When checking sunload sensor, select a place where sun shines directly on it.**





Intake Sensor Circuit

COMPONENT DESCRIPTION

NAHA0225

Intake Sensor

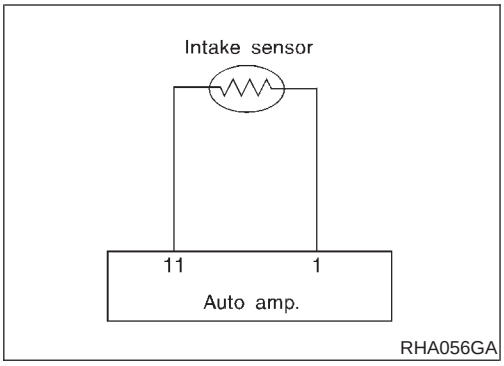
NAHA0225S01

The intake sensor is located on the cooling unit. It converts temperature of air after it passes through the evaporator into a resistance value which is then input to the auto amp.

After disconnecting intake sensor harness connector, measure resistance between terminals 1 and 2 at sensor harness side, using the table below.

Temperature °C (°F)	Resistance kΩ
−15 (5)	12.73
−10 (14)	9.92
−5 (23)	7.80
0 (32)	6.19
5 (41)	4.95
10 (50)	3.99
15 (59)	3.24
20 (68)	2.65
25 (77)	2.19
30 (86)	1.81
35 (95)	1.51
40 (104)	1.27
45 (113)	1.07

If NG, replace intake sensor.



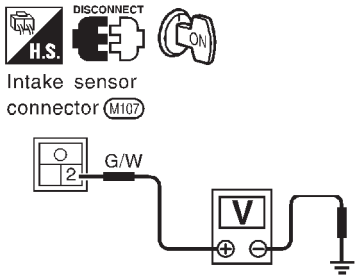
DIAGNOSTIC PROCEDURE

NAHA0226

SYMPTOM: Intake sensor circuit is open or shorted. (24 or −24 is indicated on the display as a result of conducting Self-diagnosis STEP 2.)

1	CHECK INTAKE SENSOR CIRCUIT BETWEEN INTAKE SENSOR AND BODY GROUND

Disconnect intake sensor harness connector.
Do approx. 5 volts exist between intake sensor harness terminal No. 2 and body ground?

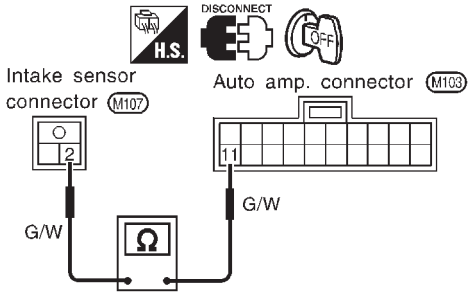


Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 4.

2	CHECK INTAKE SENSOR CIRCUIT BETWEEN INTAKE SENSOR AND AUTO AMP. (LCU)

1. Disconnect auto amp. (LCU) harness connector.
2. Check circuit continuity between intake sensor harness terminal No. 2 and auto amp. (LCU) harness terminal No. 11.

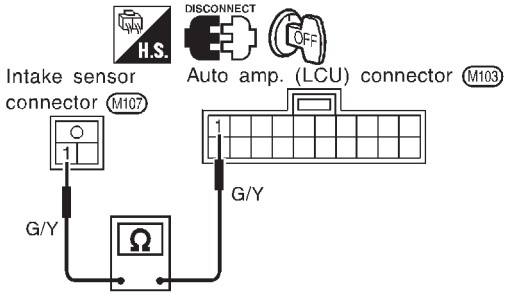


Continuity should exist.
If OK, check harness for short.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair harness or connector.

3	CHECK INTAKE SENSOR	
Refer to HA-108.		
	OK or NG	
OK	▶	1. Replace auto amp. 2. Go to self-diagnosis step-by-step procedure (HA-38) and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.
NG	▶	1. Replace intake sensor. 2. Go to self-diagnosis step-by-step procedure (HA-38) and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.

4	CHECK INTAKE SENSOR CIRCUIT BETWEEN AMBIENT SENSOR AND AUTO AMP. (LCU)	
1. Disconnect auto amp. (LCU) harness connector. 2. Check circuit continuity between intake sensor harness terminal No. 1 and auto amp. (LCU) harness terminal No. 1.		
 RHA497G		
Continuity should exist. If OK, check harness for short.		
	OK or NG	
OK	▶	1. Replace auto amp. 2. Go to self-diagnosis step-by-step procedure (HA-38) and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.
NG	▶	Repair harness or connector.

Air Mix Door Motor PBR Circuit

DIAGNOSTIC PROCEDURE

NAHA0227

For description of mode door motor and air mix door motor circuit, refer to HA-60.

SYMPTOM: If PBR circuit is open or shorted. (–26 or 26 is indicated on the display as a result of conducting Self-diagnosis STEP 2.)

Perform diagnostic procedure for mode door motor and air mix door motor. Refer to HA-55.

HFC-134a (R-134a) Service Procedure

NAHA0228

SETTING OF SERVICE TOOLS AND EQUIPMENT

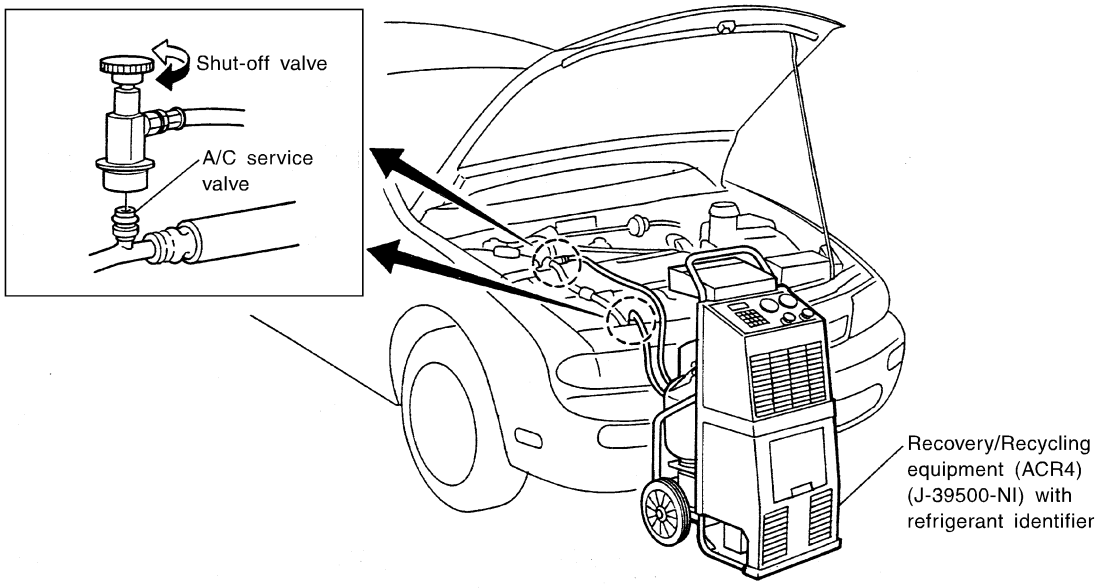
NAHA0228S01

Discharging Refrigerant

NAHA0228S0101

WARNING:

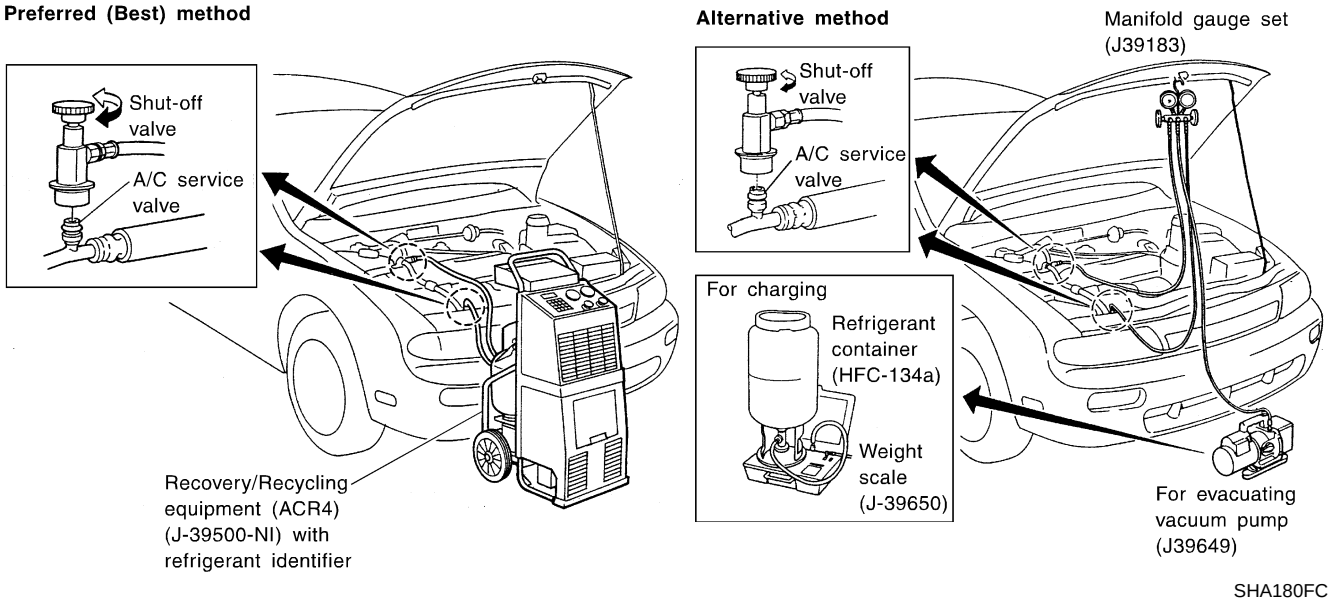
Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. Remove HFC-134a (R-134a) from A/C system using certified service equipment meeting requirements of SAE J2210 (R-134a recycling equipment) or J2209 (R-134a recovery equipment). If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.



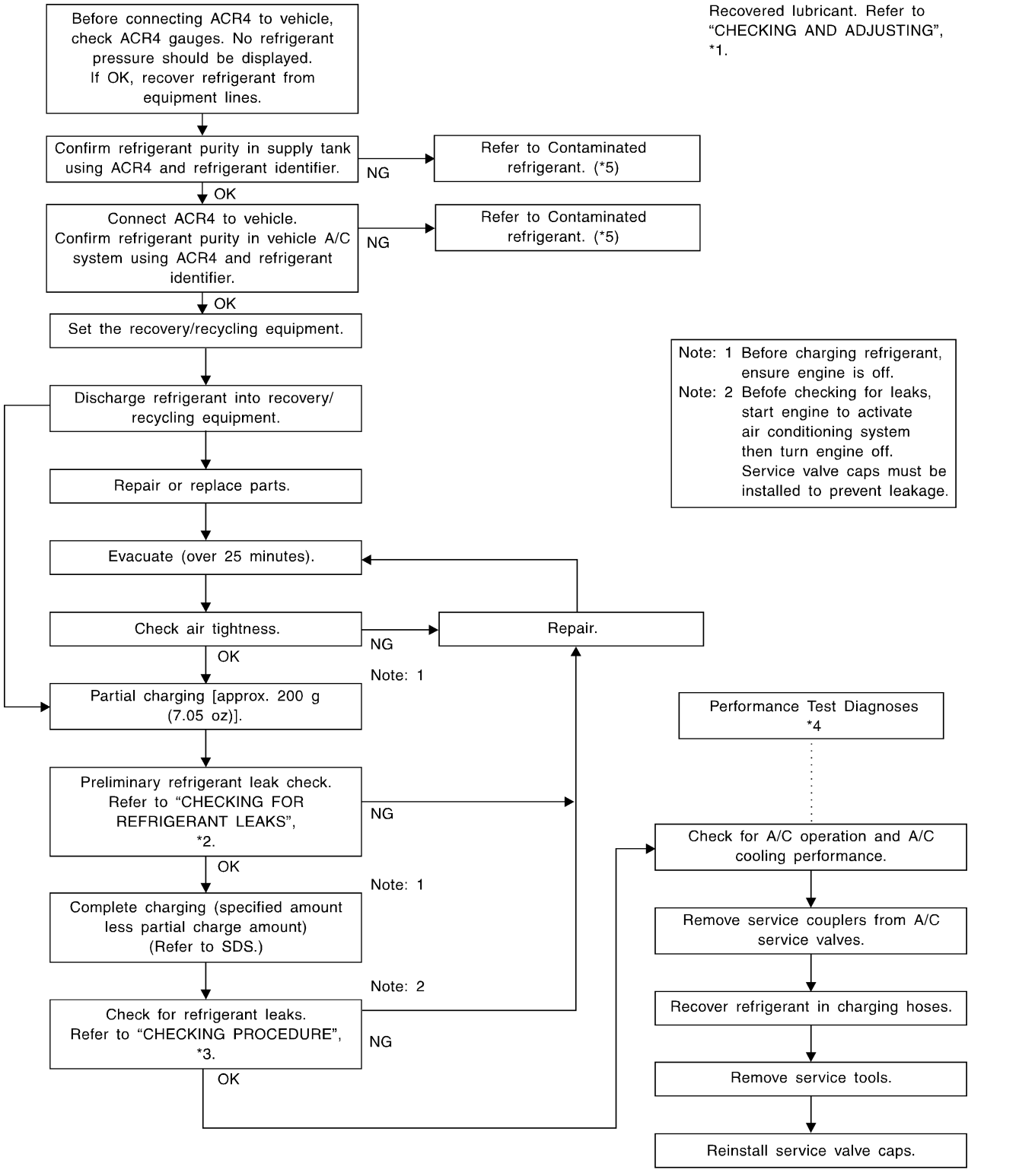
SHA179FC

Evacuating System and Charging Refrigerant

NAHA0228S0102



SHA180FC



SHA251FA

*1: HA-113
*2: HA-121
*3: HA-123
*4: HA-86
*5: HA-3

Maintenance of Lubricant Quantity in Compressor

NAHA0229

The lubricant in the compressor circulates through the system with the refrigerant. Add lubricant to compressor when replacing any component or after a large gas leakage occurred. It is important to maintain the specified amount.
If lubricant quantity is not maintained properly, the following malfunctions may result:

- Lack of lubricant: May lead to a seized compressor
- Excessive lubricant: Inadequate cooling (thermal exchange interference)

LUBRICANT

NAHA0229S01

Name: Nissan A/C System Oil Type S
Part number: KLH00-PAGS0

CHECKING AND ADJUSTING

NAHA0229S02

Adjust the lubricant quantity according to the test group shown below.

1	CHECK LUBRICANT RETURN OPERATION	
Can lubricant return operation be performed? ● A/C system works properly. ● There is no evidence of a large amount of lubricant leakage.		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	PERFORM LUBRICANT RETURN OPERATION, PROCEEDING AS FOLLOWS:	
1. Start engine, and set the following conditions: ● **Test condition** **Engine speed: Idling to 1,200 rpm** **A/C or AUTO switch: ON** **Blower speed: Max. position** **Temp. control: Optional [Set so that intake air temperature is 25 to 30°C (77 to 86°F).]** 2. **Next item is for V-5 or V-6 compressor. Connect the manifold gauge, and check that the high pressure side pressure is 588 kPa (6 kg/cm^2, 85 psi) or higher.** **If less than the reference level, attach a cover to the front face of the condenser to raise the pressure.** 3. Perform lubricant return operation for about 10 minutes. 4. Stop engine. **CAUTION:** **If excessive lubricant leakage is noted, do not perform the lubricant return operation.**		
OK	▶	GO TO 3.

3	CHECK COMPRESSOR	
Should the compressor be replaced?		
Yes or No		
Yes	▶	Go to “Lubricant Adjustment Procedure for Compressor Replacement”, (HA-114).
No	▶	GO TO 4.

4	CHECK ANY PART	
Is there any part to be replaced? (Evaporator, condenser, liquid tank or in case there is evidence of a large amount of lubricant leakage.)		
	Yes or No	
Yes	▶	Go to "Lubricant Adjusting Procedure for Components Replacement Except Compressor", (HA-114).
No	▶	Carry out the A/C performance test.

Lubricant Adjusting Procedure for Components Replacement Except Compressor

NAHA0229S0201

After replacing any of the following major components, add the correct amount of lubricant to the system.

Amount of lubricant to be added

Part replaced	Lubricant to be added to system	Remarks
	Amount of lubricant mℓ (US fl oz, Imp fl oz)	
Evaporator	75 (2.5, 2.6)	—
Condenser	75 (2.5, 2.6)	—
Liquid tank	5 (0.2, 0.2)	Add if compressor is not replaced. *1
In case of refrigerant leak	30 (1.0, 1.1)	Large leak
	—	Small leak *2

*1: If compressor is replaced, addition of lubricant is included in the table.

*2: If refrigerant leak is small, no addition of lubricant is needed.

Lubricant Adjusting Procedure for Compressor Replacement

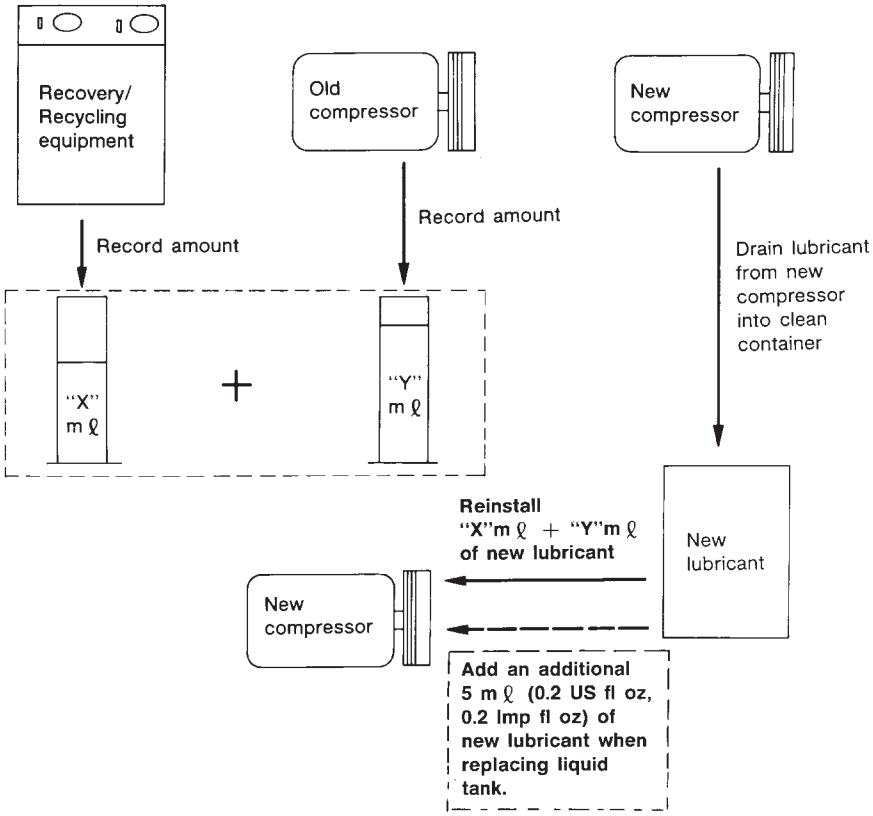
NAHA0229S0202

1. Before connecting ACR4 to vehicle, check ACR4 gauges. No refrigerant pressure should be displayed. If NG, recover refrigerant from equipment lines.
2. Connect ACR4 to vehicle. Confirm refrigerant purity in supply tank using ACR4 and refrigerant identifier. If NG, refer to "CONTAMINATED REFRIGERANT", HA-3.
3. Confirm refrigerant purity in vehicle A/C system using ACR4 and refrigerant identifier. If NG, refer to "CONTAMINATED REFRIGERANT", HA-3.
4. Discharge refrigerant into the refrigerant recovery/recycling equipment. Measure lubricant discharged into the recovery/recycling equipment.
5. Remove the drain plug of the "old" (removed) compressor. Drain the lubricant into a graduated container and record the amount of drained lubricant.
6. Remove the drain plug and drain the lubricant from the "new" compressor into a separate, clean container.
7. Measure an amount of new lubricant installed equal to amount drained from "old" compressor. Add this lubricant to "new" compressor through the suction port opening.
8. Measure an amount of new lubricant equal to the amount recovered during discharging. Add this lubricant to "new" compressor through the suction port opening.
9. Torque the drain plug.

18 - 19 N·m (1.8 - 1.9 kg-m, 13 - 14 ft-lb)

10. If the liquid tank also needs to be replaced, add an additional 5 mℓ (0.2 US fl oz, 0.2 Imp fl oz) of lubricant at this time.
Do not add this 5 mℓ (0.2 US fl oz, 0.2 Imp fl oz) of lubricant if only replacing the compressor.

Lubricant adjusting procedure for compressor replacement

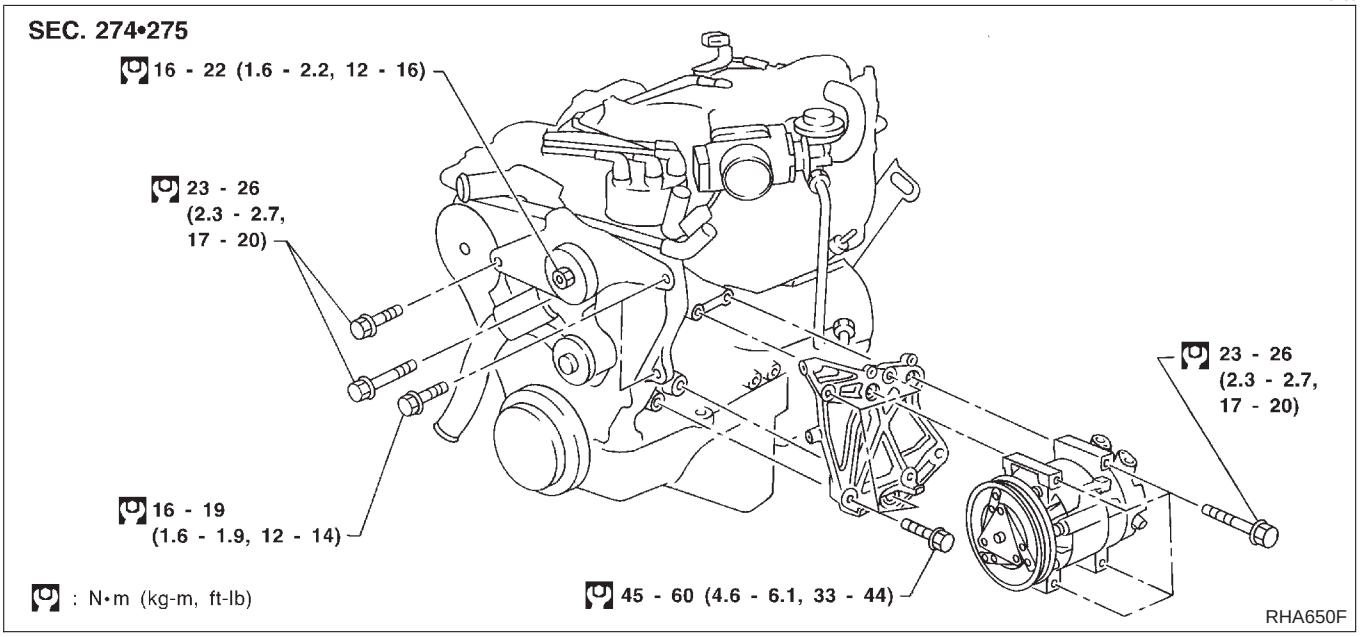


RHA065DD

Compressor

REMOVAL AND INSTALLATION

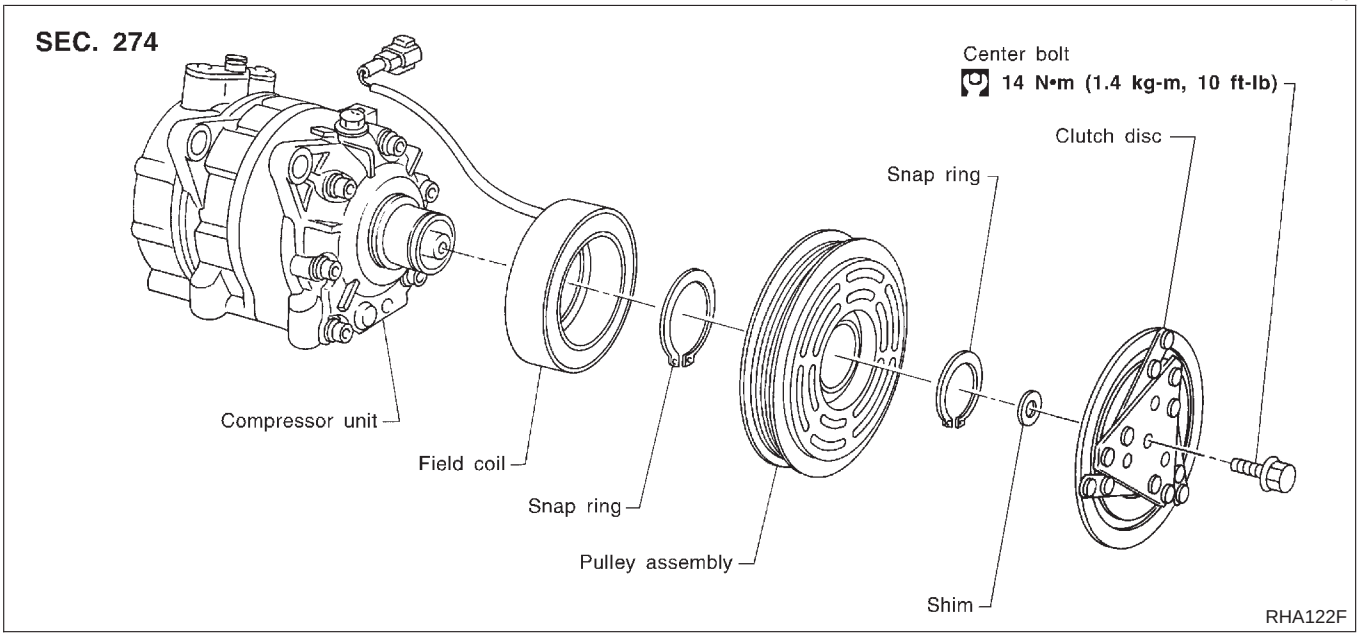
NAHA0230

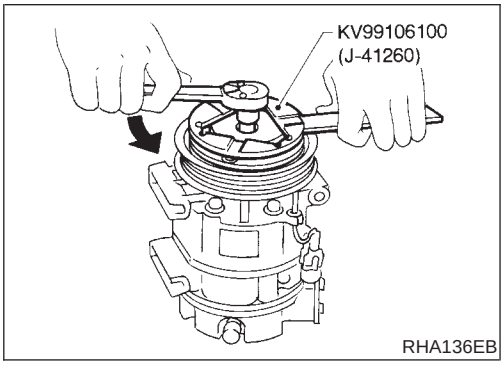


Compressor Clutch

OVERHAUL

NAHA0231

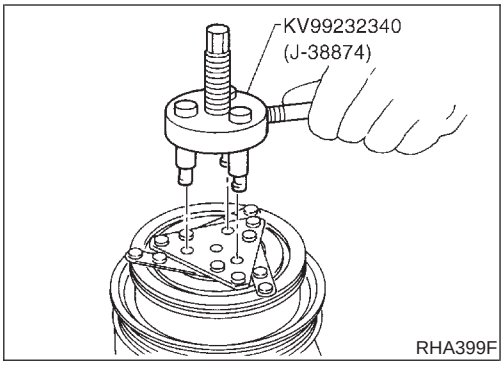


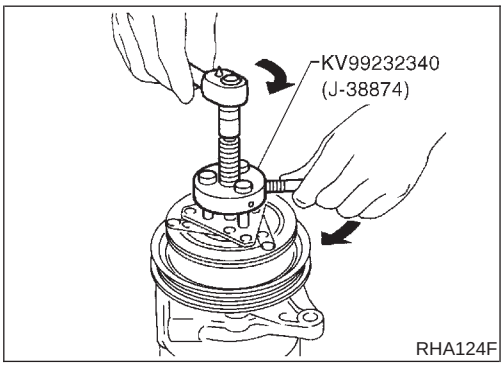


REMOVAL

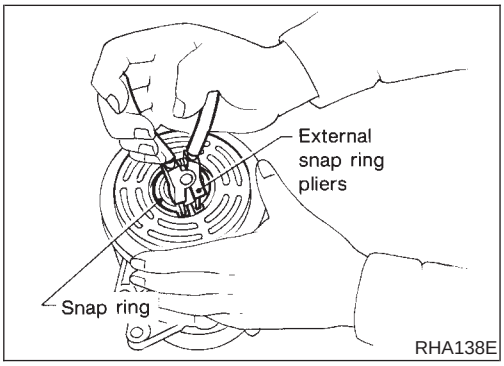
NAHA0232

- When removing center bolt, hold clutch disc with clutch disc wrench.

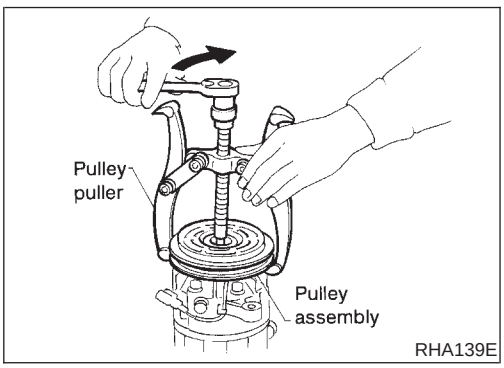




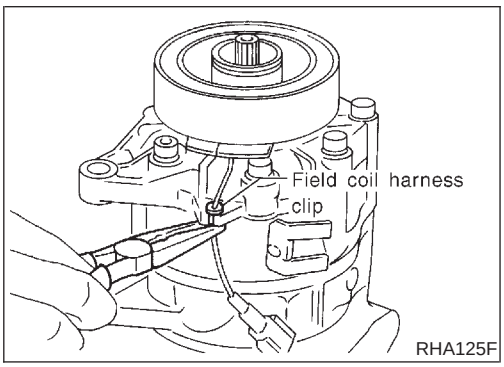
- Remove the clutch disc using the clutch disc puller.
  Insert the holder's three pins into the holes in the clutch disc. Rotate the holder clockwise to hook it onto the plate. Then, tighten the center bolt to remove the clutch disc.
  After removing the clutch disc, remove the shims from either the drive shaft or the clutch disc.



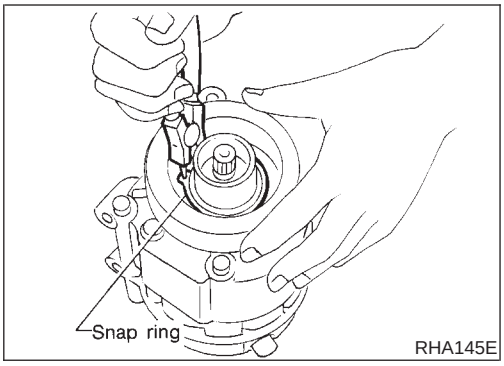
- Remove the snap ring using external snap ring pliers.



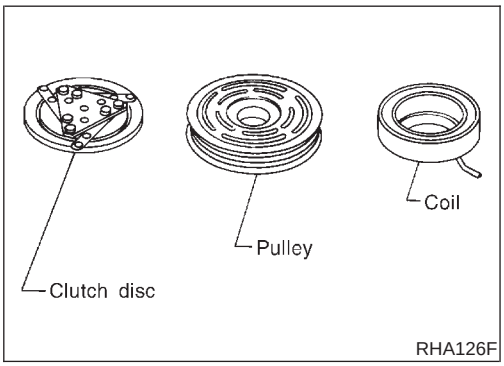
- Pulley removal
  Position the center pulley puller on the end of the drive shaft, and remove the pulley assembly using any commercially available pulley puller.
  To prevent the pulley groove from being deformed, the puller claws should be positioned onto the edge of the pulley assembly.



- Remove the field coil harness clip using a pair of pliers.



- Remove the snap ring using external snap ring pliers.



INSPECTION

NAHA0233

Clutch Disc

NAHA0233S01

If the contact surface shows signs of damage due to excessive heat, replace clutch disc and pulley.

Pulley

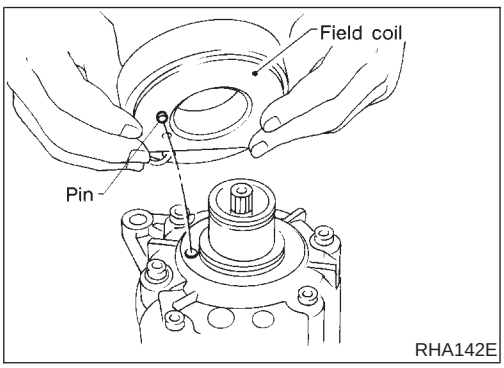
NAHA0233S02

Check the appearance of the pulley assembly. If the contact surface of pulley shows signs of excessive grooving, replace clutch disc and pulley. The contact surfaces of the pulley assembly should be cleaned with a suitable solvent before reinstallation.

Coil

NAHA0233S03

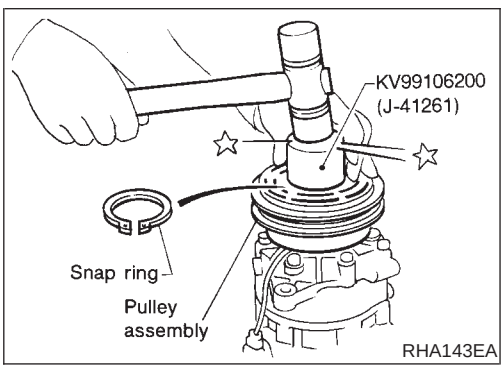
Check coil for loose connection or cracked insulation.



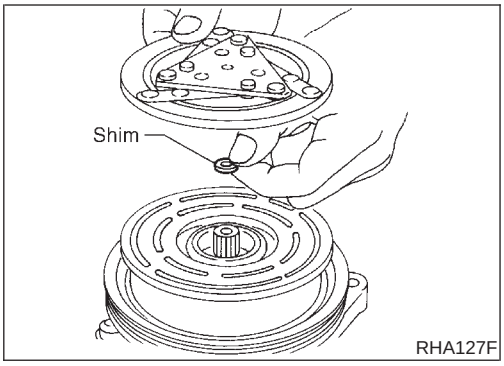
INSTALLATION

NAHA0234

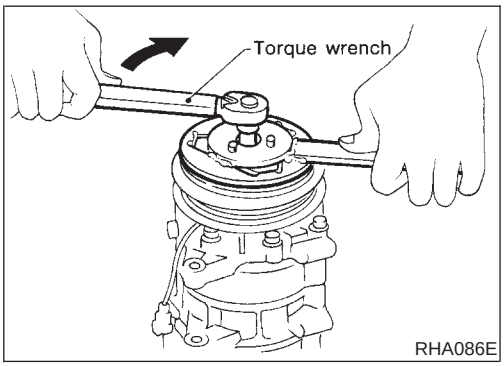
- Install the field coil.
  Be sure to align the coil's pin with the hole in the compressor's front head.
- Install the field coil harness clip using a screwdriver.



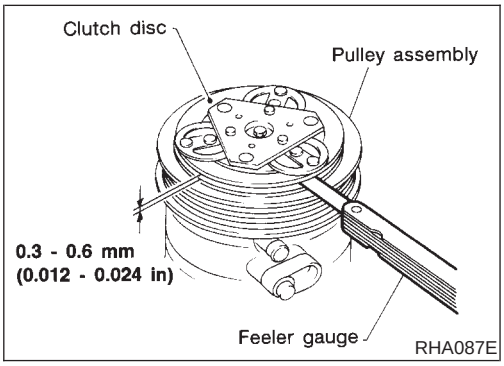
- Install the pulley assembly using the installer and a hand press, and then install the snap ring using snap ring pliers.



- Install the clutch disc on the drive shaft, together with the original shim(s). Press the clutch disc down by hand.



- Using the holder to prevent clutch disc rotation, tighten the bolt to 14 N·m (1.4 kg-m, 10 ft-lb) torque.
  After tightening the bolt, check that the pulley rotates smoothly.



- Check clearance around the entire periphery of clutch disc.
  Disc-to-pulley clearance:
  0.3 - 0.6 mm (0.012 - 0.024 in)
  If the specified clearance is not obtained, replace adjusting spacer and readjust.

Break-in Operation

NAHA0234S01

When replacing compressor clutch assembly, always carry out the break-in operation. This is done by engaging and disengaging the clutch about thirty times. Break-in operation raises the level of transmitted torque.

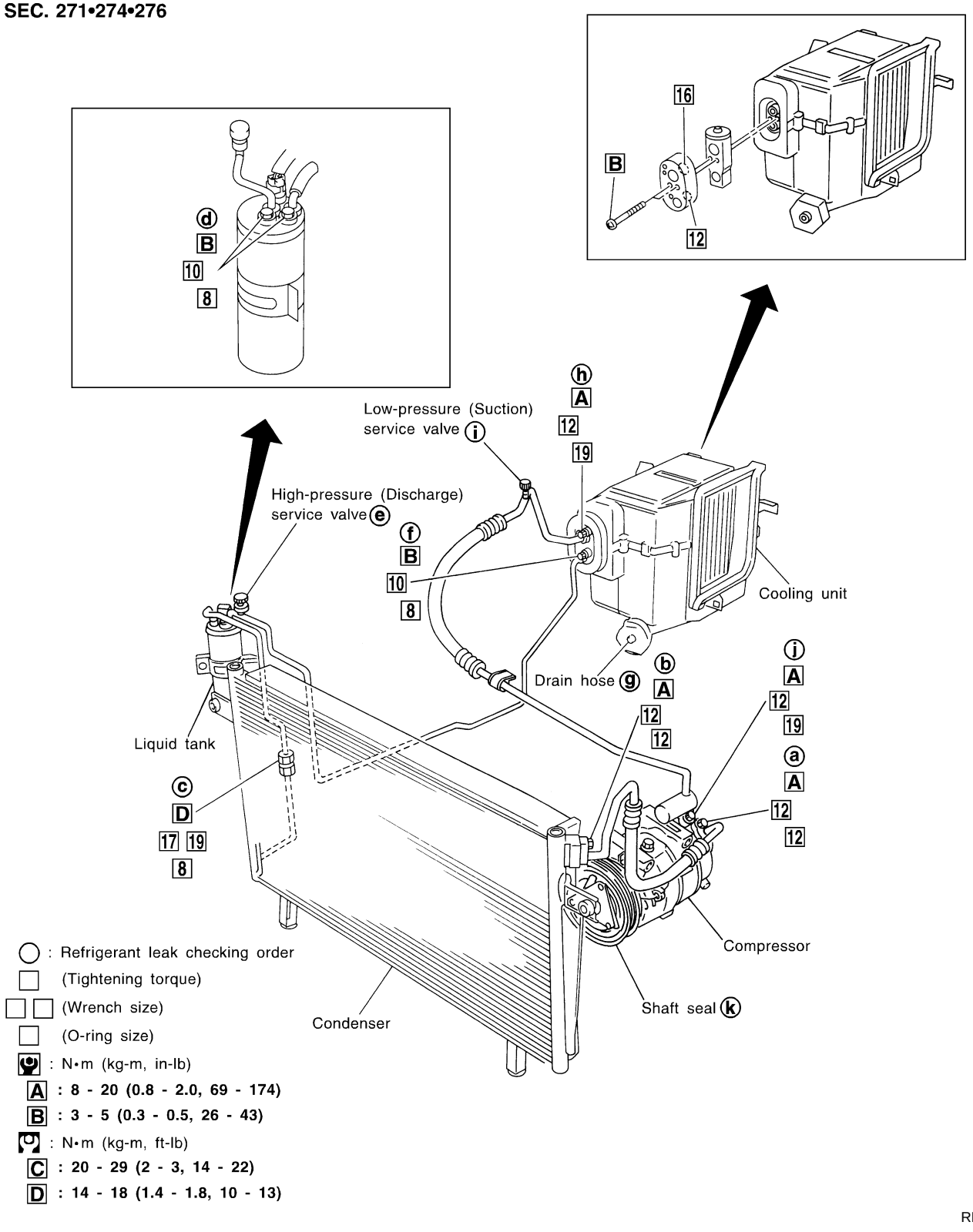
Refrigerant Lines

REMOVAL AND INSTALLATION

=NAHA0235

- Refer to page HA-5 regarding “Precautions for Refrigerant Connection”.

SEC. 271•274•276



RHA838H

CHECKING FOR REFRIGERANT LEAKS

=NAHA0236

- Perform a visual inspection of all refrigeration parts, fittings, hoses and components for signs of A/C lubricant leakage, damage and corrosion. A/C lubricant leakage may indicate an area of refrigerant leakage. Allow extra inspection time in these areas when using either an electronic refrigerant leak detector or fluorescent dye leak detector.
- If dye is observed, confirm the leak with an electronic refrigerant leak detector. It is possible a prior leak was repaired and not properly cleaned.
- When searching for leaks, do not stop when one leak is found but continue to check for additional leaks at all system components and connections.
- When searching for refrigerant leaks using an electronic leak detector, move the probe along the suspected leak area at 1 to 2 inches per second and no further than 1/4 inch from the component.

NOTE:
Moving the electronic leak detector probe slower and closer to the suspected leak area will improve the chances of finding a leak.

CHECKING SYSTEM FOR LEAKS USING THE FLUORESCENT LEAK DETECTOR

NAHA0249

1. Check A/C system for leaks using the UV lamp and safety glasses (J-42220) in a low sunlight area (area without windows preferable). Illuminate all components, fittings and lines. The dye will appear as a bright green/yellow area at the point of leakage. Fluorescent dye observed at the evaporator drain opening indicates an evaporator core assembly (tubes, core or TXV) leak.
2. If the suspected area is difficult to see, use an adjustable mirror or wipe the area with a clean shop rag or cloth, then check the cloth with the UV lamp for dye residue.
3. After the leak is repaired, remove any residual dye using dye cleaner (J-43872) or prevent future misdiagnosis.
4. Perform a system performance check and verify the leak repair with an approved electronic refrigerant leak detector.

NOTE:
- **Other gases in the work area or substances on the A/C components, for example, anti-freeze, windshield washer fluid, solvents and lubricants, may falsely trigger the leak detector. Make sure the surfaces to be checked are clean. Clean with a dry cloth or blow off with shop air.**
- **Do not allow the sensor tip of the detector to contact with any substance. This can also cause false readings and may damage the detector.**

DYE INJECTION

NAHA0255

(This procedure is only necessary when re-charging the system or when the compressor has seized and was replaced.)

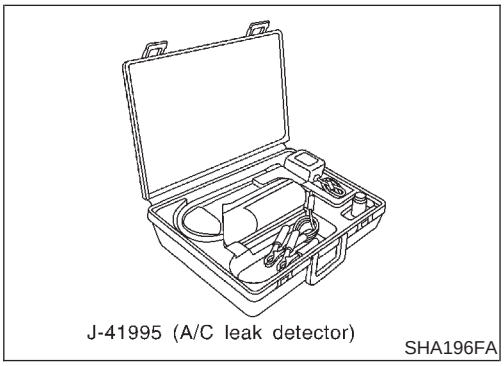
1. Check A/C system static (at rest) pressure. Pressure must be at least 345 kPa (50 psi).
2. Pour one bottle (1/4 ounce/7.4 cc) of the A/C refrigerant dye into the injector tool (J-41459).
3. Connect the injector tool to the A/C LOW PRESSURE side sevice fitting.
4. Start engine and switch A/C ON.

5. With the A/C operating (compressor running), inject one bottle (1/4 ounce/7.4 cc) of fluorescent dye through the low-pressure service valve using dye injector tool J-41459 (refer to the manufacture's operating instructions).
6. With the engine still running, disconnect the injector tool from the service fitting.

CAUTION:
Be careful not to allow dye to spray or drip when disconnecting the injector from the system.

NOTE:
If repairing the A/C system or replacing a component, pour the dye directly into the open system connection and proceed with the service procedures.

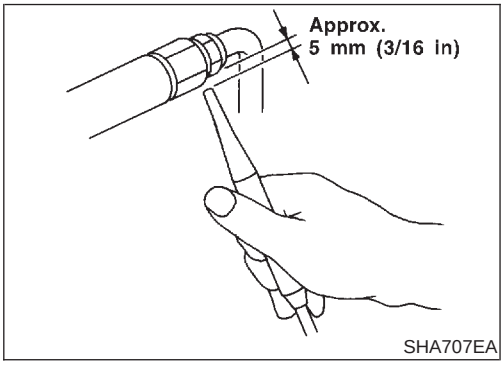
7. Operate the A/C system for a minimum of 20 minutes to mix the dye with the system oil. Depending on the leak size, operating conditions and location of the leak, it may take from minutes to days for the dye to penetrate a leak and become visible.


J-41995 (A/C leak detector)
SHA196FA

ELECTRONIC REFRIGERANT LEAK DETECTOR
NAHA0250

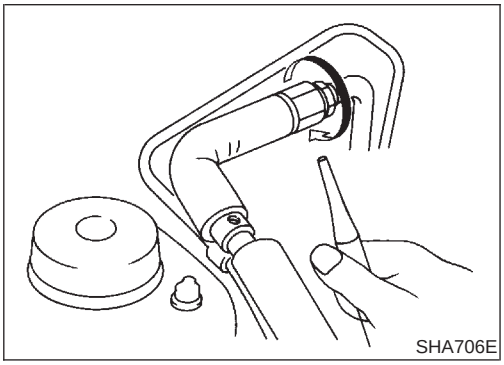
Precautions for Handling Leak Detector
NAHA0250S01

When performing a refrigerant leak check, use a J-41995 A/C leak detector or equivalent. Ensure that the instrument is calibrated and set properly per the operating instructions.
The leak detector is a delicate device. In order to use the leak detector properly, read the operating instructions and perform any specified maintenance.

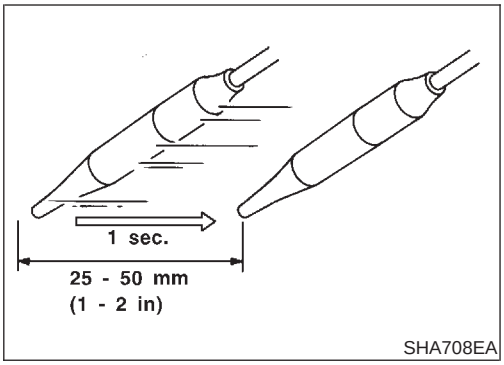


SHA707EA

1. Position probe approximately 5 mm (3/16 in) away from point to be checked.


SHA706E

2. When testing, circle each fitting completely with probe.



SHA708EA

3. Move probe along component approximately 25 to 50 mm (1 to 2 in)/sec.

Checking Procedure

NAHA0250S02

To prevent inaccurate or false readings, make sure there is no refrigerant vapor, shop chemicals, or cigarette smoke in the vicinity of the vehicle. Perform the leak test in calm area (low air/wind movement) so that the leaking refrigerant is not dispersed.

1. Turn engine off.
2. Connect a suitable A/C manifold gauge set to the A/C service ports.
3. Check if the A/C refrigerant pressure is at least 345 kPa (3.52 kg/cm^2, 50 psi) above 16°C (61°F). If less than specification, recover/evacuate and recharge the system with the specified amount of refrigerant.

NOTE:
At temperatures below 16°C (61°F), leaks may not be detected since the system may not reach 345 kPa (3.52 kg/cm^2, 50 psi).

4. Conduct the leak test from the high side (compressor discharge **a** to evaporator inlet **f**) to the low side (evaporator drain hose **g** to shaft seal **k**). Refer to HA-120. Perform a leak check for the following areas carefully. Clean the component to be checked and move the leak detector probe completely around the connection/component.

- **Compressor**
  Check the fitting of high and low pressure hoses, relief valve and shaft seal.
- **Liquid tank**
  Check the pressure switch, tube fitting, weld seams and the fusible plug mount.
- **Service valves**
  Check all around the service valves. Ensure service valve caps are secured on the service valves (to prevent leaks).

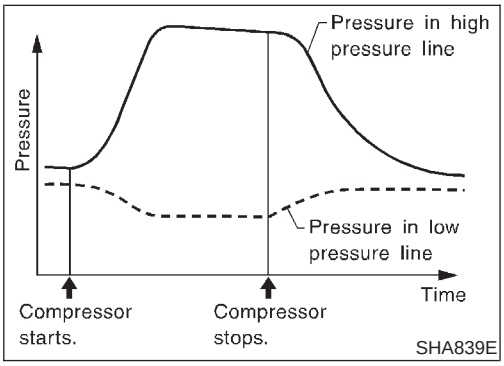
NOTE:
After removing A/C manifold gauge set from service valves, wipe any residue from valves to prevent any false readings by leak detector.

- **Cooling unit (Evaporator)**
  With engine OFF, turn blower fan on "High" for at least 15 seconds to dissipate any refrigerant trace in the cooling unit. Wait a minimum of 10 minutes accumulation time (refer to the manufacturer's recommended procedure for actual wait time) before inserting the leak detector probe into the drain hose. Keep the probe inserted for at least ten seconds. Use caution not to contaminate the ptobe tip with water or dirt that may be in the drain hose.

5. If a leak detector detects a leak, verify at least once by blowing compressed air into area of suspected leak, then repeat check as outlined above.
6. Do not stop when one leak is found. Continue to check for additional leaks at all system components.
   If no leaks are found, perform steps 7 - 10.
7. Start engine.
8. Set the heater A/C control as follows:

1) A/C switch ON.
2) Face mode
3) Recirculation switch ON
4) Max cold temperature
5) Fan speed high

9. Run engine at 1,500 rpm for at least 2 minutes.
10. Turn engine off and perform leak check again following steps 4 through 6 above.



Refrigerant leaks should be checked immediately after stopping the engine. Begin with the leak detector at the compressor. The pressure on the high pressure side will gradually drop after refrigerant circulation stops and pressure on the low pressure side will gradually rise, as shown in the graph. Some leaks are more easily detected when pressure is high.

11. Before connecting ACR4 to vehicle, check ACR4 gauges. No refrigerant pressure should be displayed. If pressure is displayed, recover refrigerant from equipment lines and then check refrigerant purity.
12. Confirm refrigerant purity in supply tank using ACR4 and refrigerant identifier.
13. Confirm refrigerant purity in vehicle A/C system using ACR4 and refrigerant identifier.
14. Discharge A/C system using approved refrigerant recovery equipment. Repair the leaking fitting or component as necessary.
15. Evacuate and recharge A/C system and perform the leak test to confirm no refrigerant leaks.
16. Conduct A/C performance test to ensure system works properly.

Belt

TENSION ADJUSTMENT

NAHA0237

- **Refer to MA-14, “Checking Drive Belts”.**

Auto

COMPRESSOR

NAHA0241

Model		CALSONIC make V-6
Type		V-6 variable displacement
Displacement cm^3 (cu in)/rev.	Max.	184 (11.228)
	Min.	14.5 (0.885)
Cylinder bore x stroke mm (in)		37 (1.46) x [2.3 - 28.6 (0.091 - 1.126)]
Direction of rotation		Clockwise (viewed from drive end)
Drive belt		Poly V

LUBRICANT

NAHA0242

Model		CALSONIC make V-6
Name		Nissan A/C System Oil Type S
Part number*		KLH00-PAGS0
Capacity mℓ (US fl oz, Imp fl oz)	Total in system	200 (6.8, 7.0)
	Compressor (Service part) charging amount	200 (6.8, 7.0)

*: Always check with the Parts Department for the latest parts information.

REFRIGERANT

NAHA0243

Type	HFC-134a (R-134a)
Capacity kg (lb)	0.60 - 0.70 (1.32 - 1.54)

ENGINE IDLING SPEED (WHEN A/C IS ON)

NAHA0244

- **Refer to EC-647, “Idle Speed and Ignition Timing”.**

BELT TENSION

NAHA0245

- **Refer to MA-14, “Checking Drive Belts”.**

Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

NAHA0060

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL R50 is as follows:

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.**

Precautions for Working with HFC-134a (R-134a)

NAHA0061

WARNING:

- **CFC-12 (R-12) refrigerant and HFC-134a (R-134a) refrigerant are not compatible. If the refrigerants are mixed and compressor failure is likely to occur, refer to "CONTAMINATED REFRIGERANT" below. To determine the purity of HFC-134a (R-134a) in the vehicle and recovery tank, use Refrigerant Recovery/Recycling Recharging equipment (ACR4) (J-39500-NI) and Refrigerant Identifier.**
- **Use only specified lubricant for the HFC-134a (R-134a) A/C system and HFC-134a (R-134a) components. If lubricant other than that specified is used, compressor failure is likely to occur.**
- **The specified HFC-134a (R-134a) lubricant rapidly absorbs moisture from the atmosphere. The following handling precautions must be observed:**

a) When removing refrigerant components from a vehicle, immediately cap (seal) the component to minimize the entry of moisture from the atmosphere.

b) When installing refrigerant components to a vehicle, do not remove the caps (unseal) until just before connecting the components. Connect all refrigerant loop components as quickly as possible to minimize the entry of moisture into system.

c) Only use the specified lubricant from a sealed container. Immediately reseal containers of lubricant. Without proper sealing, lubricant will become moisture saturated and should not be used.

d) Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. Remove R-134a from the A/C system, using certified service equipment meeting requirements of SAE J2210 (R-134a recycling equipment), or J2209 (R-134a recovery equipment). If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.

e) Do not allow lubricant (Nissan A/C System Oil Type S) to come in contact with styrofoam parts. Damage may result.

CONTAMINATED REFRIGERANT

NAHA0061S01

If a refrigerant other than pure R-134a is identified in a vehicle, your options are:

- Explain to the customer that environmental regulations prohibit the release of contaminated refrigerant into the atmosphere.
- Explain that recovery of the contaminated refrigerant could damage your service equipment and refrigerant supply.

- Suggest the customer return the vehicle to the location of previous service where the contamination may have occurred.
- If you choose to perform the repair, recover the refrigerant using only **dedicated equipment and containers. Do not recover contaminated refrigerant into your existing service equipment.** If your facility does not have dedicated recovery equipment, you may contact a local refrigerant product retailer for available service. This refrigerant must be disposed of in accordance with all federal and local regulations. In addition, replacement of all refrigerant system components on the vehicle is recommended.
- If the vehicle is within the warranty period, the air conditioner warranty is void. Please contact Nissan Customer Affairs for further assistance.

General Refrigerant Precautions

NAHA0062

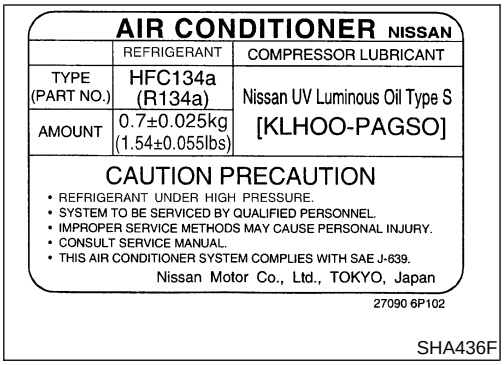
WARNING:

- **Do not release refrigerant into the air. Use approved recovery/recycling equipment to capture the refrigerant every time an air conditioning system is discharged.**
- **Always wear eye and hand protection (goggles and gloves) when working with any refrigerant or air conditioning system.**
- **Do not store or heat refrigerant containers above 52°C (125°F).**
- **Do not heat a refrigerant container with an open flame; if container warming is required, place the bottom of the container in a warm pail of water.**
- **Do not intentionally drop, puncture, or incinerate refrigerant containers.**
- **Keep refrigerant away from open flames: poisonous gas will be produced if refrigerant burns.**
- **Refrigerant will displace oxygen, therefore be certain to work in well ventilated areas to prevent suffocation.**
- **Do not pressure test or leak test HFC-134a (R-134a) service equipment and/or vehicle air conditioning systems with compressed air during repair. Some mixtures of air and R-134a have been shown to be combustible at elevated pressures. These mixtures, if ignited, may cause injury or property damage. Additional health and safety information may be obtained from refrigerant manufacturers.**

Precautions for Leak Detection Dye

NAHA0251

- The A/C system contains a fluorescent leak detection dye used for locating refrigerant leaks. An ultraviolet (UV) lamp is required to illuminate the dye when inspecting for leaks.
- Always wear fluorescence enhancing UV safety glasses to protect your eyes and enhance the visibility of the fluorescent dye.
- The fluorescent dye leak detector is not a replacement for an electronic refrigerant leak detector. The fluorescent dye leak detector should be used in conjunction with an electronic refrigerant leak detector to (J-41995) pin-point refrigerant leaks.
- For your safety and your Customer's satisfaction, read and follow all manufacture's operating instructions and precautions prior to performing the work.
- A compressor shaft seal should not be repaired because of dye seepage. The compressor shaft seal should only be repaired after confirming the leak with an electronic refrigerant leak detector (J-41995).
- Always remove and dye from the leak area after repairs are complete to avoid a misdiagnosis during a future service.
- Do not allow dye to come into contact with painted body panels or interior components. If dye is spilled, clean immediately with the approved dye cleaner. Fluorescent dye left on a surface for an extended period of time cannot be removed.
- Do not spray the fluorescent dye cleaning agent on hot surfaces (engine exhaust manifold, etc.).
- Do not use more than one refrigerant dye bottle (1/4 ounce /7.4 cc) per A/C system.
- Leak detection dyes for R-134a and R12 A/C systems are different. Do not use R-134a leak detection dye in R-12 A/C system or R-12 leak detector dye in R-134a A/C systems or A/C system damage may result.
- The fluorescent properties of the dye will remain for over three (3) years unless a compressor failure occurs.



Identification

NAHA0252

IDENTIFICATION LABEL FOR VEHICLE

NAHA0252S01

Vehicles with factory installed fluorescent dye have this identification label on the under side of hood.

NOTE:

Vehicles with factory installed fluorescent dye have a green label.
Vehicles without factory installed fluorescent dye have a blue label.

Precautions for Refrigerant Connection

NAHA0063

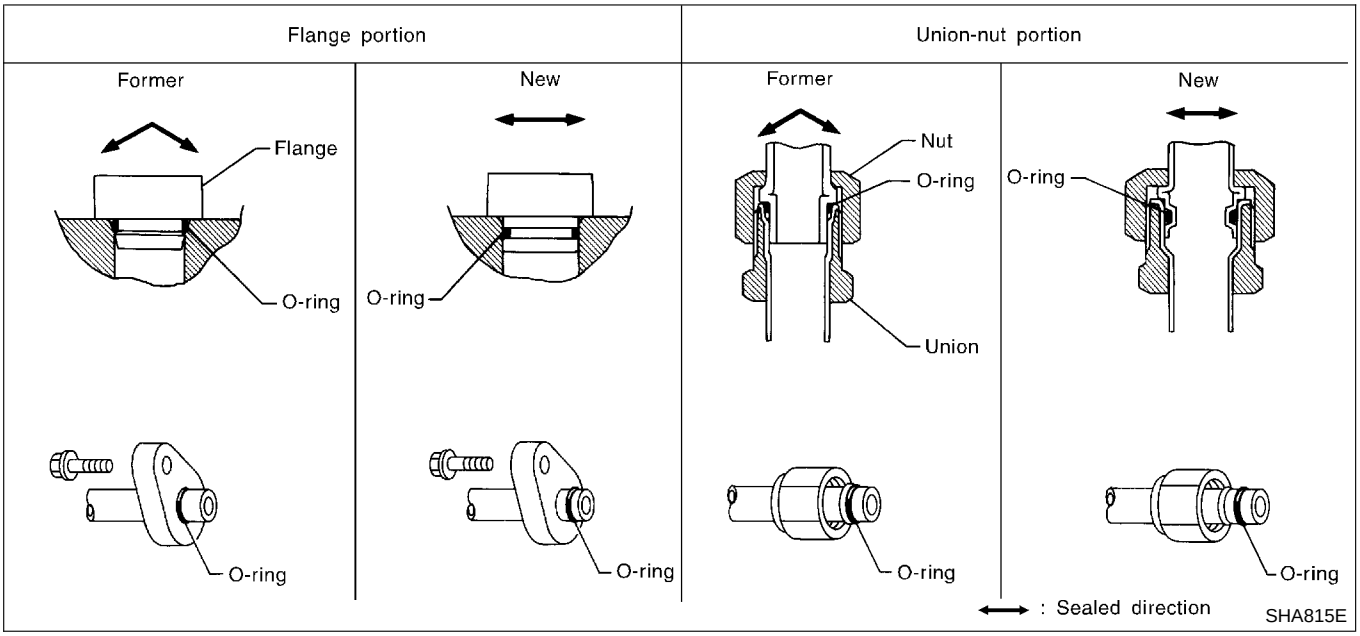
A new type refrigerant connection has been introduced to all refrigerant lines except the following portion.

- Expansion valve to cooling unit

FEATURES OF NEW TYPE REFRIGERANT CONNECTION

NAHA0063S01

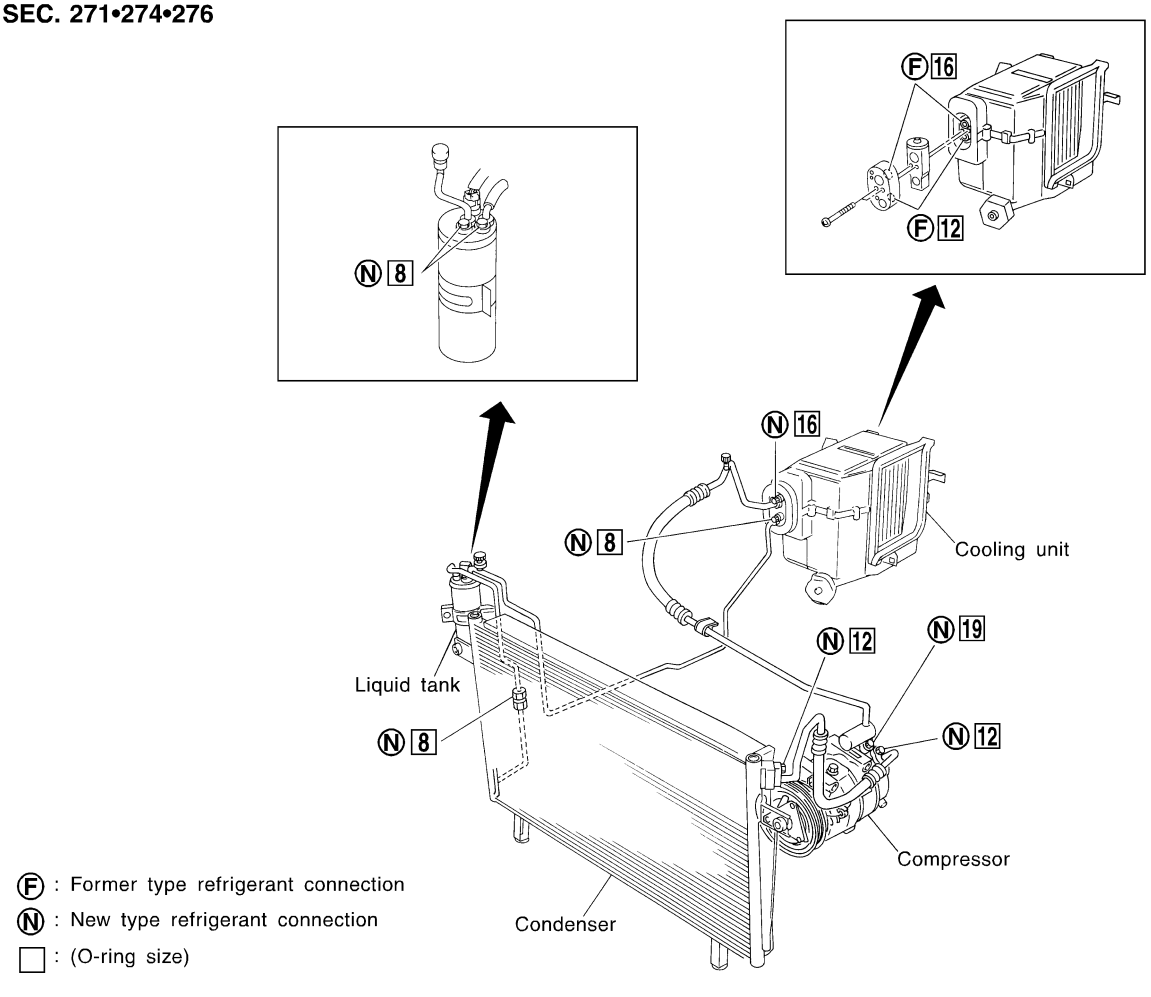
- The O-ring has been relocated. It has also been provided with a groove for proper installation. This eliminates the chance of the O-ring being caught in, or damaged by, the mating part. The sealing direction of the O-ring is now set vertically in relation to the contacting surface of the mating part to improve sealing characteristics.
- The reaction force of the O-ring will not occur in the direction that causes the joint to pull out, thereby facilitating piping connections.



O-RING AND REFRIGERANT CONNECTION

NAHA0063S02

SEC. 271•274•276



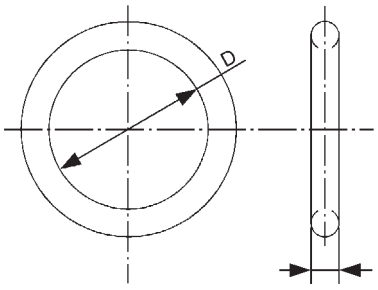
RHA816H

CAUTION:

The new and former refrigerant connections use different O-ring configurations. Do not confuse O-rings since they are not interchangeable. If a wrong O-ring is installed, refrigerant will leak at, or around, the connection.

O-Ring Part Numbers and Specifications

NAHA0063S0201



SHA814E

Connection type	O-ring size	Part number	D mm (in)	W mm (in)
New	8	92471 N8210	6.8 (0.268)	1.85 (0.0728)
Former		92470 N8200	6.07 (0.2390)	1.78 (0.0701)
New	12	92472 N8210	10.9 (0.429)	2.43 (0.0957)
Former		92475 71L00	11.0 (0.433)	2.4 (0.094)
New	16	92473 N8210	13.6 (0.535)	2.43 (0.0957)
Former		92475 72L00	14.3 (0.563)	2.3 (0.0906)
New	19	92474 N8210	16.5 (0.650)	2.43 (0.0957)
Former		92477 N8200	17.12 (0.6740)	1.78 (0.0701)

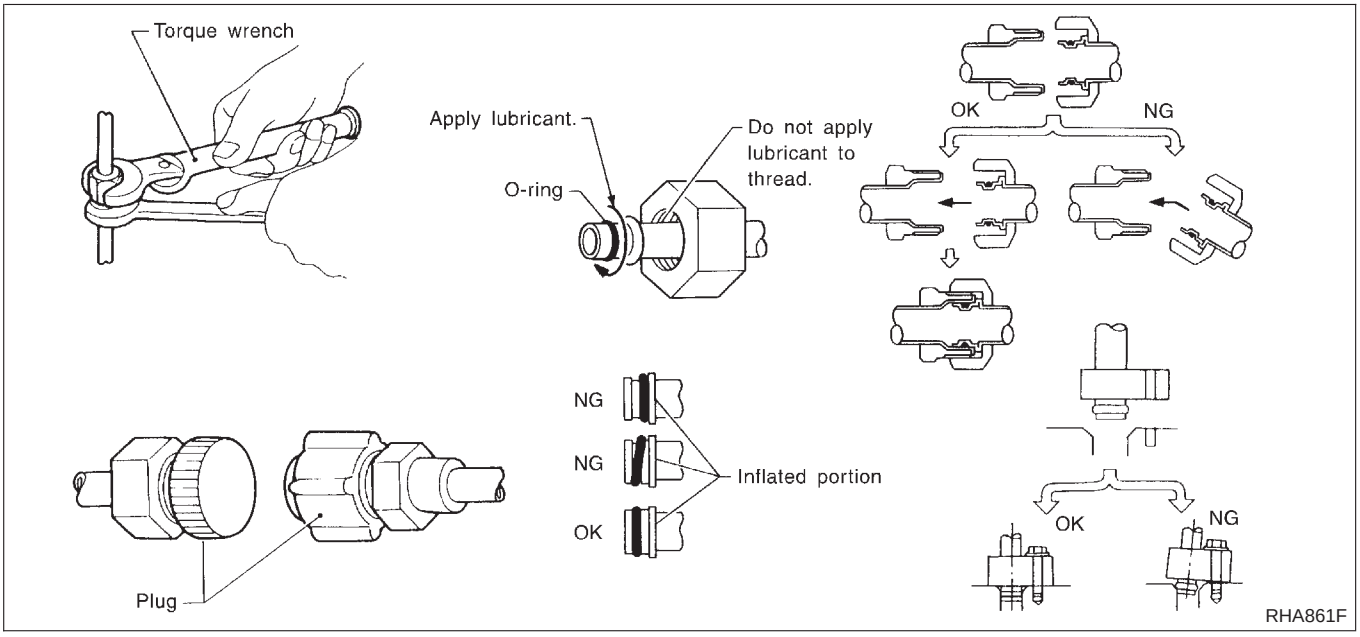
WARNING:

Make sure all refrigerant is discharged into the recycling equipment and the pressure in the system is less than atmospheric pressure. Then gradually loosen the discharge side hose fitting and remove it.

CAUTION:

When replacing or cleaning refrigerant cycle components, observe the following.

- **When the compressor is removed, store it in the same position as it is when mounted on the car. Failure to do so will cause lubricant to enter the low pressure chamber.**
- **When connecting tubes, always use a torque wrench and a back-up wrench.**
- **After disconnecting tubes, immediately plug all openings to prevent entry of dirt and moisture.**
- **When installing an air conditioner in the vehicle, connect the pipes as the final stage of the operation. Do not remove the seal caps of pipes and other components until just before required for connection.**
- **Allow components stored in cool areas to warm to working area temperature before removing seal caps. This prevents condensation from forming inside A/C components.**
- **Thoroughly remove moisture from the refrigeration system before charging the refrigerant.**
- **Always replace used O-rings.**
- **When connecting tube, apply lubricant to circle of the O-rings shown in illustration. Be careful not to apply lubricant to threaded portion.**
  Lubricant name: Nissan A/C System Oil Type S
  Part number: KLH00-PAGS0
- **O-ring must be closely attached to dented portion of tube.**
- **When replacing the O-ring, be careful not to damage O-ring and tube.**
- **Connect tube until you hear it click, then tighten the nut or bolt by hand until snug. Make sure that the O-ring is installed to tube correctly.**
- **After connecting line, conduct leak test and make sure that there is no leakage from connections. When the gas leaking point is found, disconnect that line and replace the O-ring. Then tighten connections of seal seat to the specified torque.**



Precautions for Servicing Compressor

NAHA0064

- **Plug all openings to prevent moisture and foreign matter from entering.**
- **When the compressor is removed, store it in the same position as it is when mounted on the car.**
- **When replacing or repairing compressor, follow "Maintenance of Lubricant Quantity in Compressor" exactly. Refer to HA-194.**
- **Keep friction surfaces between clutch and pulley clean. If the surface is contaminated, with lubricant, wipe it off by using a clean waste cloth moistened with thinner.**
- **After compressor service operation, turn the compressor shaft by hand more than five turns in both directions. This will equally distribute lubricant inside the compressor. After the compressor is installed, let the engine idle and operate the compressor for one hour.**
- **After replacing the compressor magnet clutch, apply voltage to the new one and check for normal operation.**

Precautions for Service Equipment

NAHA0065

RECOVERY/RECYCLING EQUIPMENT

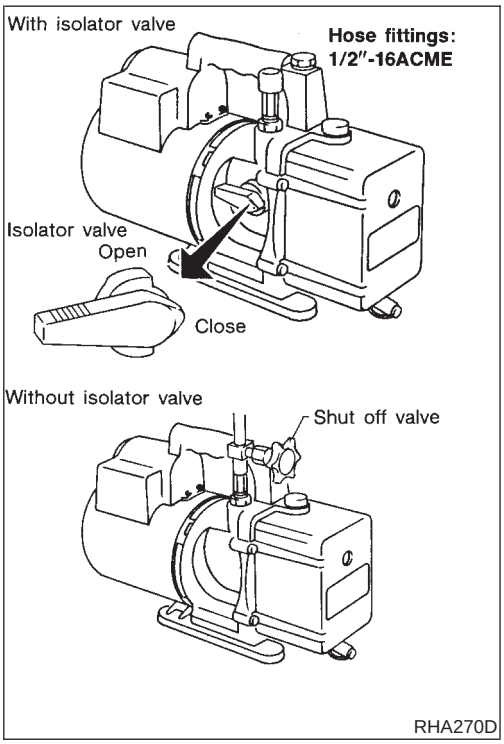
NAHA0065S01

Follow the manufacturer's instructions for machine operation and machine maintenance. Never introduce any refrigerant other than that specified into the machine.

ELECTRONIC LEAK DETECTOR

NAHA0065S02

Follow the manufacture's instructions for tester operation and tester maintenance.



RHA270D

VACUUM PUMP

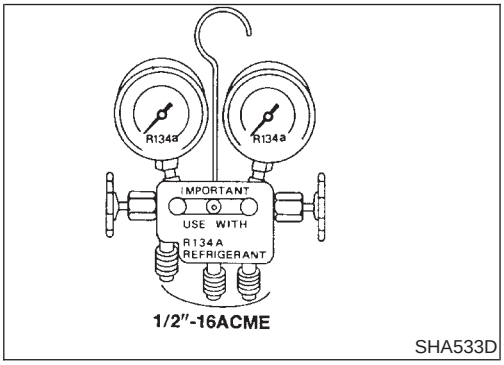
NAHA0065S03

The lubricant contained inside the vacuum pump is not compatible with the specified lubricant for HFC-134a (R-134a) A/C systems. The vent side of the vacuum pump is exposed to atmospheric pressure. So the vacuum pump lubricant may migrate out of the pump into the service hose. This is possible when the pump is switched off after evacuation (vacuuming) and hose is connected to it.

To prevent this migration, use a manual valve situated near the hose-to-pump connection, as follows.

- Usually vacuum pumps have a manual isolator valve as part of the pump. Close this valve to isolate the service hose from the pump.
- For pumps without an isolator, use a hose equipped with a manual shut-off valve near the pump end. Close the valve to isolate the hose from the pump.
- If the hose has an automatic shut off valve, disconnect the hose from the pump: as long as the hose is connected, the valve is open and lubricating oil may migrate.

Some one-way valves open when vacuum is applied and close under a no vacuum condition. Such valves may restrict the pump's ability to pull a deep vacuum and are not recommended.

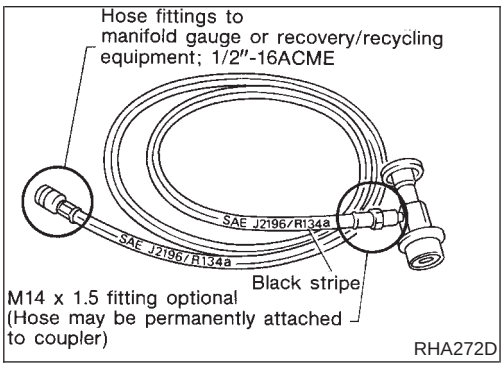


SHA533D

MANIFOLD GAUGE SET

NAHA0065S04

Be certain that the gauge face indicates R-134a or 134a. Make sure the gauge set has 1/2″-16 ACME threaded connections for service hoses. Confirm the set has been used only with refrigerant HFC-134a (R-134a) along with specified lubricant.

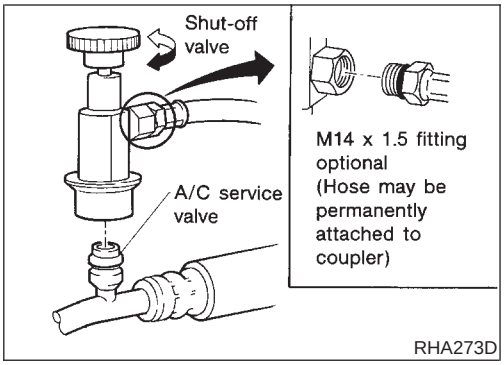


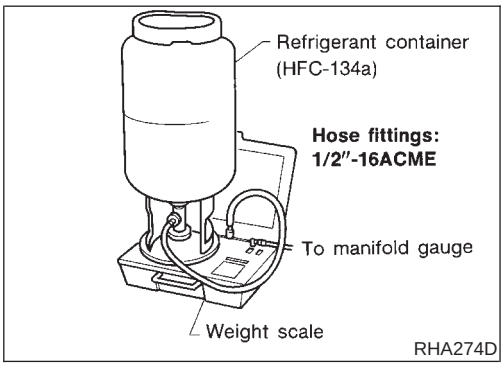
RHA272D

SERVICE HOSES

NAHA0065S05

Be certain that the service hoses display the markings described (colored hose with black stripe). All hoses must include positive shut off devices (either manual or automatic) near the end of the hoses opposite the manifold gauge.





SERVICE COUPLERS

NAHA0065S06

Never attempt to connect HFC-134a (R-134a) service couplers to an CFC-12 (R-12) A/C system. The HFC-134a (R-134a) couplers will not properly connect to the CFC-12 (R-12) system. However, if an improper connection is attempted, discharging and contamination may occur.

Shut-off valve rotation	A/C service valve
Clockwise	Open
Counterclockwise	Close

REFRIGERANT WEIGHT SCALE

NAHA0065S07

Verify that no refrigerant other than HFC-134a (R-134a) and specified lubricants have been used with the scale. If the scale controls refrigerant flow electronically, the hose fitting must be 1/2″-16 ACME.

CALIBRATING ACR4 WEIGHT SCALE

NAHA0065S09

Calibrate the scale every three months.
To calibrate the weight scale on the ACR4 (J-39500-NI):

1. Press **Shift/Reset** and **Enter** at the same time.
2. Press **8787**. "**A1**" will be displayed.
3. Remove all weight from the scale.
4. Press **0**, then press **Enter**. "**0.00**" will be displayed and change to "**A2**".
5. Place a known weight (dumbbell or similar weight), between 4.5 and 8.6 kg (10 and 19 lb) on the center of the weight scale.
6. Enter the known weight using four digits. (Example 10 lb = 10.00, 10.5 lb = 10.50)
7. Press **Enter** — the display returns to the vacuum mode.
8. Press **Shift/Reset** and **Enter** at the same time.
9. Press **6** — the known weight on the scale is displayed.
10. Remove the known weight from the scale. "**0.00**" will be displayed.
11. Press **Shift/Reset** to return the ACR4 to the program mode.

CHARGING CYLINDER

NAHA0065S08

Using a charging cylinder is not recommended. Refrigerant may be vented into air from cylinder's top valve when filling the cylinder with refrigerant. Also, the accuracy of the cylinder is generally less than that of an electronic scale or of quality recycle/recharge equipment.

Wiring Diagrams and Trouble Diagnoses

NAHA0066

When you read wiring diagrams, refer to the following:

- GI-11, “HOW TO READ WIRING DIAGRAMS”
- EL-10, “Wiring Diagram — POWER —”

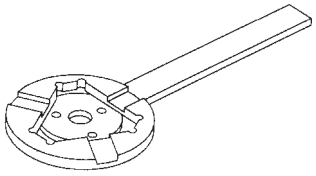
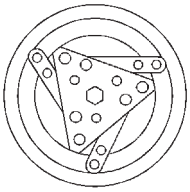
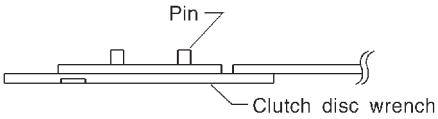
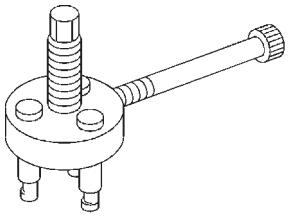
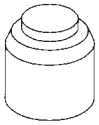
When you perform trouble diagnoses, refer to the following:

- GI-34, “HOW TO FOLLOW TROUBLE DIAGNOSES”
- GI-24, “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”

Special Service Tools

NAHA0067

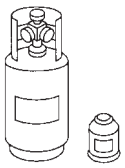
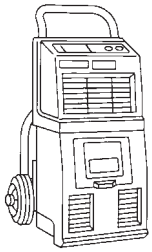
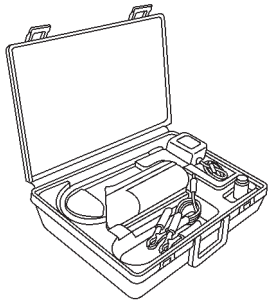
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

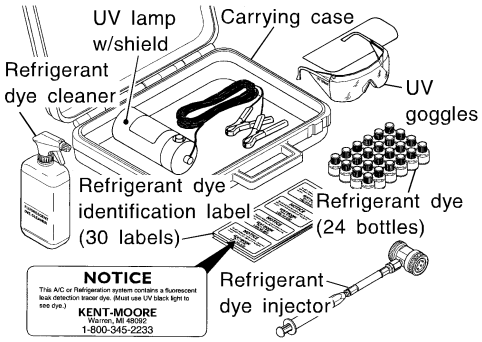
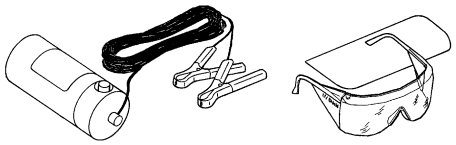
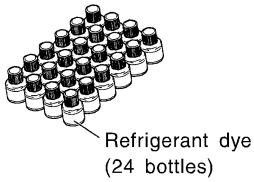
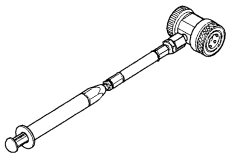
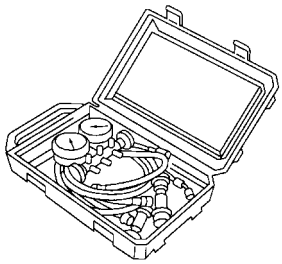
Tool number (Kent-Moore No.) Tool name	Description	
KV99106100 (J-41260) Clutch disc wrench	 NT232	Removing center bolt
	 When replacing the magnet clutch in the above compressor, use a clutch disc wrench with the pin side on the clutch disc to remove it.  NT378	
KV99232340 (J-38874) or KV992T0001 (—) Clutch disc puller	 NT376	Removing clutch disc
KV99106200 (J-41261) Pulley installer	 NT235	Installing pulley

HFC-134a (R-134a) Service Tools and Equipment

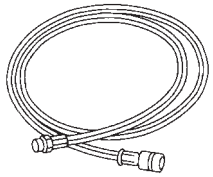
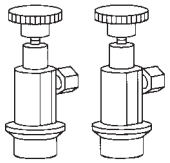
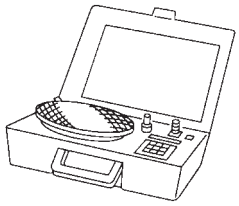
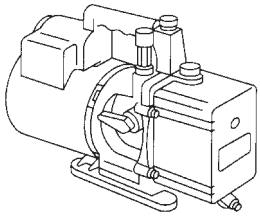
=NAHA0068

Never mix HFC-134a refrigerant and/or its specified lubricant with CFC-12 (R-12) refrigerant and/or its lubricant.
Separate and non-interchangeable service equipment must be used for handling each type of refrigerant/lubricant.
Refrigerant container fittings, service hose fittings and service equipment fittings (equipment which handles refrigerant and/or lubricant) are different between CFC-12 (R-12) and HFC-134a (R-134a). This is to avoid mixed use of the refrigerants/lubricant.
Adapters that convert one size fitting to another must never be used: refrigerant/lubricant contamination will occur and compressor failure will result.

Tool number (Kent-Moore No.) Tool name	Description	
HFC-134a (R-134a) refrigerant	 NT196	Container color: Light blue Container marking: HFC-134a (R-134a) Fitting size: Thread size ● Large container 1/2″-16 ACME
KLH00-PAGS0 (—) Nissan A/C System Oil Type S	 NT197	Type: Poly alkylene glycol oil (PAG), type S Application: HFC-134a (R-134a) swash plate (piston) compressors (Nissan only) Lubricity: 40 mℓ (1.4 US fl oz, 1.4 Imp fl oz)
(J-39500-NI) Recovery/Recycling Recharging equipment (ACR4)	 NT195	Function: Refrigerant Recovery and Recycling and Recharging
(J-41995) Electrical leak detector	 AHA281A	Power supply: ● DC 12V (Cigarette lighter)

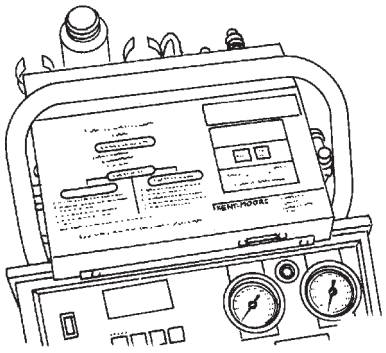
Tool number (Kent-Moore No.) Tool name	Description	
(J-43926) Refrigerant dye leak detection kit Kit includes: (J-42220) UV lamp and UV safety glasses (J-41459) Refrigerant dye injector (J-41447) qty. 24 R-134a refrigerant dye (J-43872) Refrigerant dye cleaner	 SHA437F	Power supply: DC 12V (Battery terminal)
(J-42220) Fluorescent dye leak detector	UV lamp  SHA438F	Power supply: DC12V (Battery terminal) For checking refrigerant leak when fluorescent dye is installed in A/C system. Includes: UV lamp and UV safety glasses UV safety glasses
(J-41447) R134a Fluorescent Leak Detection Dye (Box of 24, 1/4 ounce bottles)	Dye  SHA439F	Application: For R-134a PAG oil Container: 1/4 ounce (7.4 cc) bottle (Includes self-adhesive dye identification labels for affixing to vehicle after charging system with dye.)
(J-41459) R134a Dye Injector Use with J-41447, 1/4 ounce bottle	Dye injector  SHA440F	For injecting 1/4 ounce of Fluorescent Leak Detection Dye into A/C system.
(J-43872) Dye cleaner	 SHA441F	For cleaning dye spills.
(J-39183) Manifold gauge set (with hoses and couplers)	 NT199	Identification: • The gauge face indicates R-134a. Fitting size: Thread size • 1/2″-16 ACME

HFC-134a (R-134a) Service Tools and Equipment (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
Service hoses ● High side hose (J-39501-72) ● Low side hose (J-39502-72) ● Utility hose (J-39476-72)	 NT201	Hose color: ● Low hose: Blue with black stripe ● High hose: Red with black stripe ● Utility hose: Yellow with black stripe or green with black stripe Hose fitting to gauge: ● 1/2″-16 ACME
Service couplers ● High side coupler (J-39500-20) ● Low side coupler (J-39500-24)	 NT202	Hose fitting to service hose: ● M14 x 1.5 fitting is optional or permanently attached.
(J-39650) Refrigerant weight scale	 NT200	For measuring of refrigerant Fitting size: Thread size ● 1/2″-16 ACME
(J-39649) Vacuum pump (Including the isolator valve)	 NT203	Capacity: ● Air displacement: 4 CFM ● Micron rating: 20 microns ● Oil capacity: 482 g (17 oz) Fitting size: Thread size ● 1/2″-16 ACME

COMMERCIAL SERVICE TOOL

NAHA0068S01

Tool name	Description	
Refrigerant identifier equipment	 NT765	For checking refrigerant purity and for system contamination

Refrigeration System

REFRIGERATION CYCLE

NAHA0069

Refrigerant Flow

NAHA0069S01

The refrigerant flows in the standard pattern, that is, through the compressor, the condenser, the liquid tank, through the evaporator, and back to the compressor. The refrigerant evaporation through the evaporator coil is controlled by an externally equalized expansion valve, located inside the evaporator case.

Freeze Protection

NAHA0069S02

Under normal operating conditions, when the A/C is switched on, the compressor runs continuously, and the evaporator pressure, and therefore temperature, is controlled by the V-6 variable displacement compressor to prevent freeze up.

Refrigerant System Protection

NAHA0069S03

Refrigerant Pressure Sensor

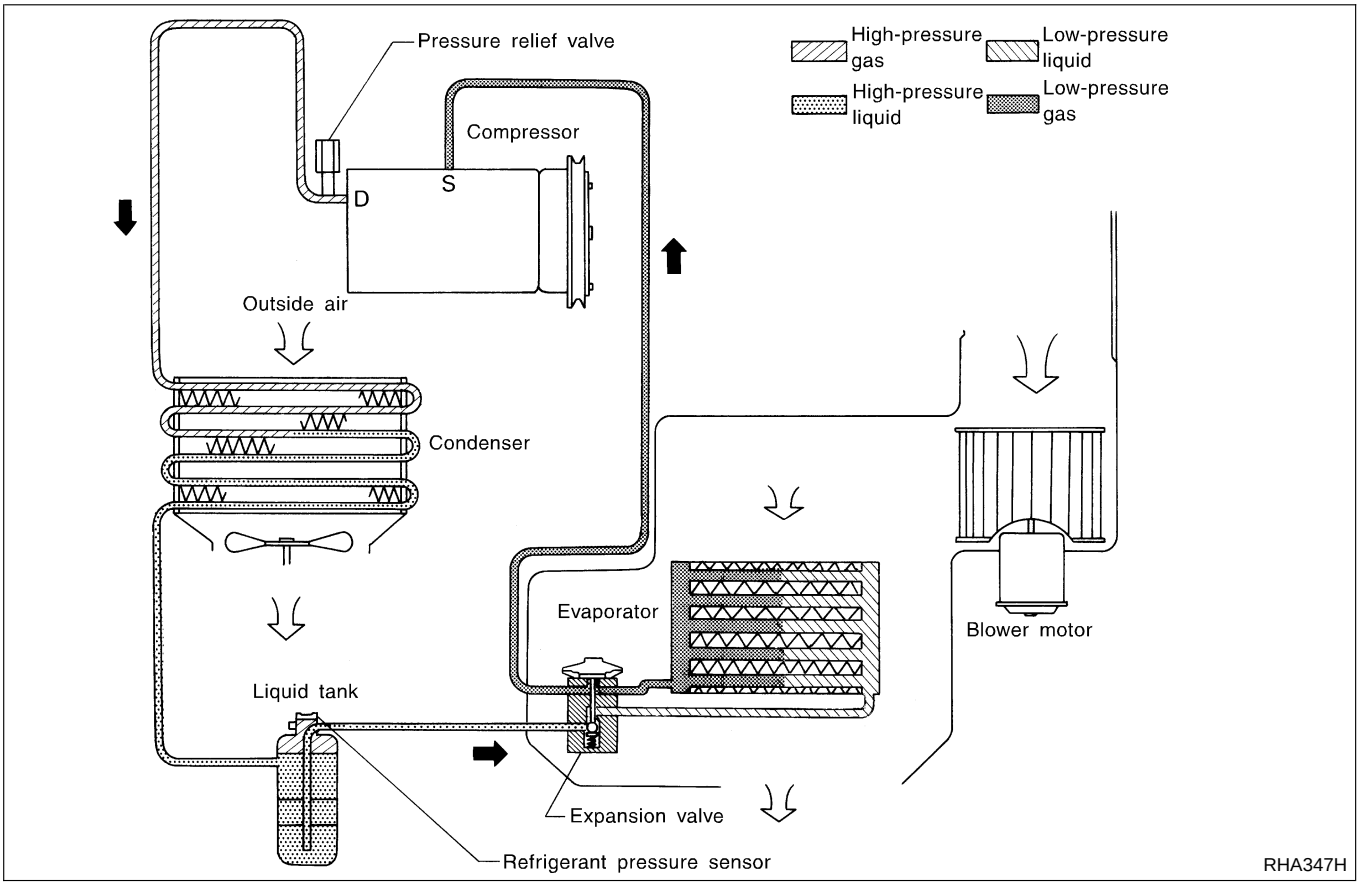
NAHA0069S0301

The refrigerant system is protected against excessively high or low pressures by the refrigerant pressure sensor, located on the liquid tank. If the system pressure rises above, or falls below the specifications, the refrigerant pressure sensor detects the pressure inside the refrigerant line and sends the voltage signal to the ECM. ECM makes the A/C relay go OFF and stops the compressor when pressure on the high pressure side detected by refrigerant pressure sensor is over about 2,746 kPa (28 kg/cm^2, 398 psi) or below about 177 kPa (1.8 kg/cm^2, 26 psi).

Pressure Relief Valve

NAHA0069S0302

The refrigerant system is also protected by a pressure relief valve, located in the rear head of the compressor. When the pressure of refrigerant in the system increases to an abnormal level [more than 3,727 kPa (38 kg/cm^2, 540 psi)], the release port on the pressure relief valve automatically opens and releases refrigerant into the atmosphere.



V-6 Variable Displacement Compressor

GENERAL INFORMATION

=NAHA0070

1. The V-6 variable compressor differs from previous units. The vent temperatures of the V-6 variable compress do not drop too far below 5°C (41°F) when:

- evaporator intake air temperature is less than 20°C (68°F)
- engine is running at speeds less than 1,500 rpm.

   This is because the V-6 compressor provides a means of “capacity” control.

2. The V-6 variable compressor provides refrigerant control under varying conditions. During cold winters, it may not produce high refrigerant pressure discharge (compared to previous units) when used with air conditioning systems.
3. A “clanking” sound may occasionally be heard during refrigerant charge. The sound indicates that the tilt angle of the swash plate has changed and is not a problem.
4. For air conditioning systems with the V-6 compressor, the clutch remains engaged unless: the system main switch, fan switch or ignition switch is turned OFF. When ambient (outside) temperatures are low or when the amount of refrigerant is insufficient, the clutch is disengaged to protect the compressor.
5. A constant range of suction pressure is maintained when engine speed is greater than a certain value. It normally ranges from 147 to 177 kPa (1.5 to 1.8 kg/cm^2, 21 to 26 psi) under varying conditions.
   In previous compressors, however, suction pressure was reduced with increases in engine speed.

DESCRIPTION

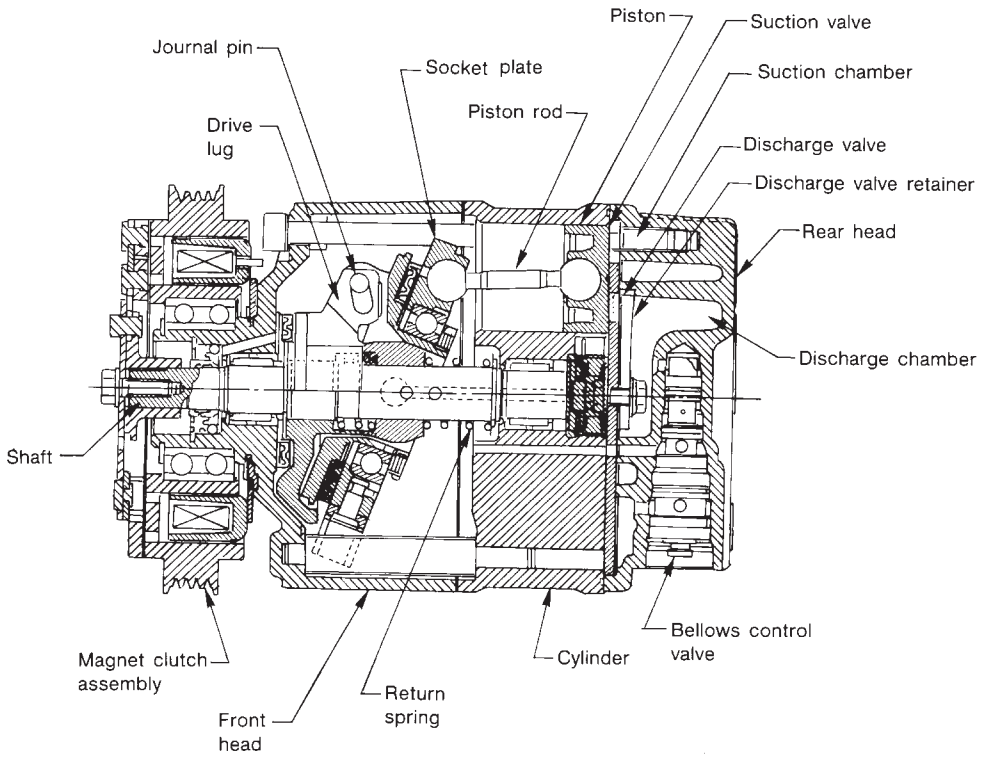
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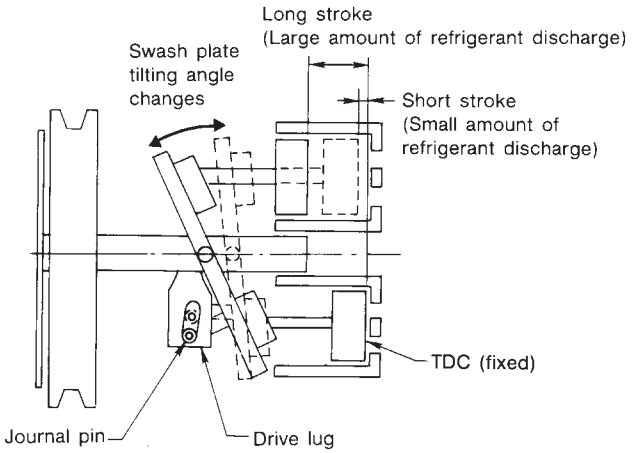
General

NAHA0132S01

The variable compressor is basically a swash plate type that changes piston stroke in response to the required cooling capacity.

The tilt of the swash plate allows the piston's stroke to change so that refrigerant discharge can be continuously changed from 14.5 to 184 cm^3 (0.885 to 11.228 cu in).





Discharge control	Discharge capacity cm^3 (cu in)/rev.	Piston stroke length mm (in)
Minimum	14.5 (0.885)	2.3 (0.091)
Maximum	184 (11.228)	28.6 (1.126)

RHA037DB

Operation

=NAHA0132S02

1. Operation Control Valve

NAHA0132S0201

Operation control valve is located in the suction port (low-pressure) side, and opens or closes in response to changes in refrigerant suction pressure.
Operation of the valve controls the internal pressure of the crankcase.
The angle of the swash plate is controlled between the crankcase's internal pressure and the piston cylinder pressure.

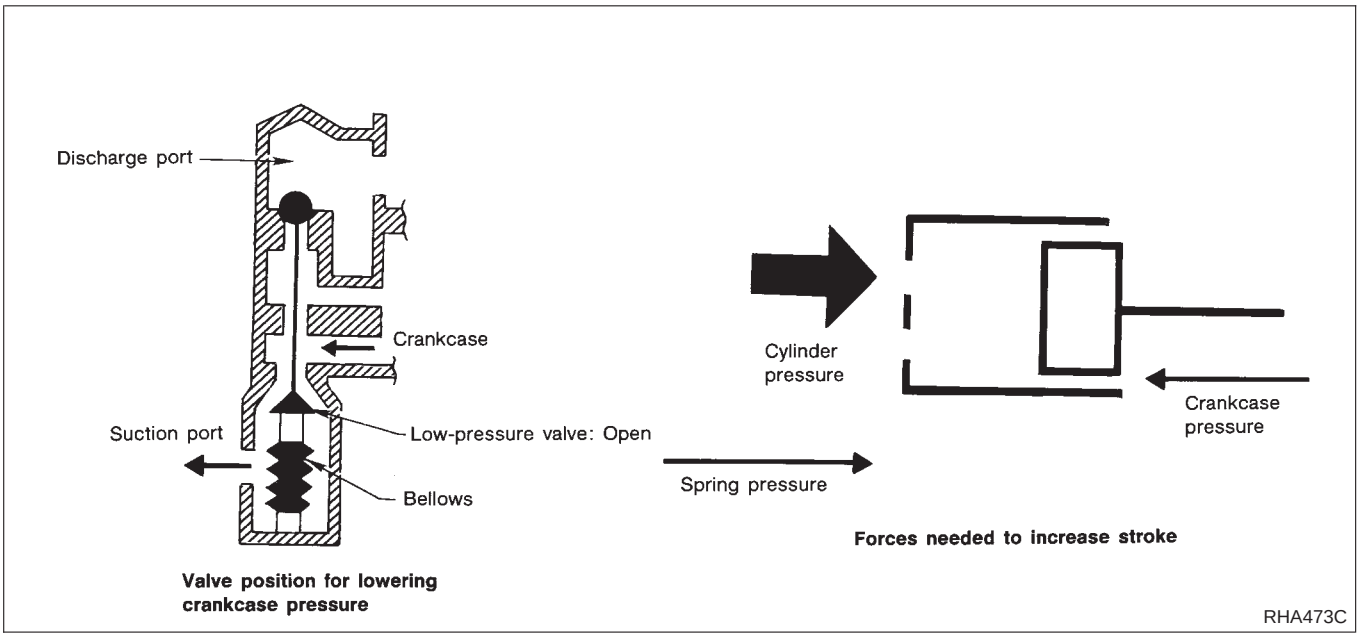
2. Maximum Cooling

NAHA0132S0202

Refrigerant pressure on the low-pressure side increases with an increase in heat loads.
When this occurs, the control valve's bellows compress to open the low-pressure side valve and close the high-pressure side valve.
This causes the following pressure changes:

- the crankcase's internal pressure to equal the pressure on the low-pressure side;
- the cylinder's internal pressure to be greater than the crankcase's internal pressure.

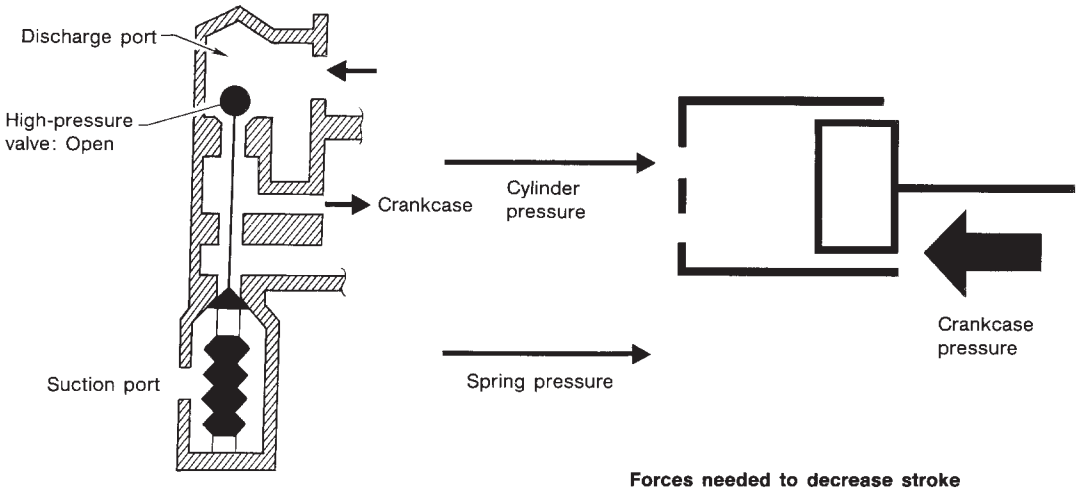
Under this condition, the swash plate is set to the maximum stroke position.



3. Capacity Control

=NAHA0132S0203

- Refrigerant pressure on suction side is low during high speed driving or when ambient or interior temperature is low.
- The bellows expands when refrigerant pressure on the suction pressure side drops below approximately 177 kPa (1.8 kg/cm^2, 26 psi).
  Since suction pressure is low, it makes the suction port close and the discharge port open. Thus, crankcase pressure becomes high as high pressure enters the crankcase.
- The force acts around the journal pin near the swash plate, and is generated by the pressure difference before and behind the piston.
  The drive lug and journal pin are located where the piston generates the highest pressure. Piston pressure is between suction pressure Ps and discharge pressure Pd, which is near suction pressure Ps. If crankcase pressure Pc rises due to capacity control, the force around the journal pin makes the swash plate angle decrease and also the piston stroke decrease. In other words, crankcase pressure increase triggers pressure difference between the piston and the crankcase. The pressure difference changes the angle of the swash plate.



Valve position for raising crankcase pressure

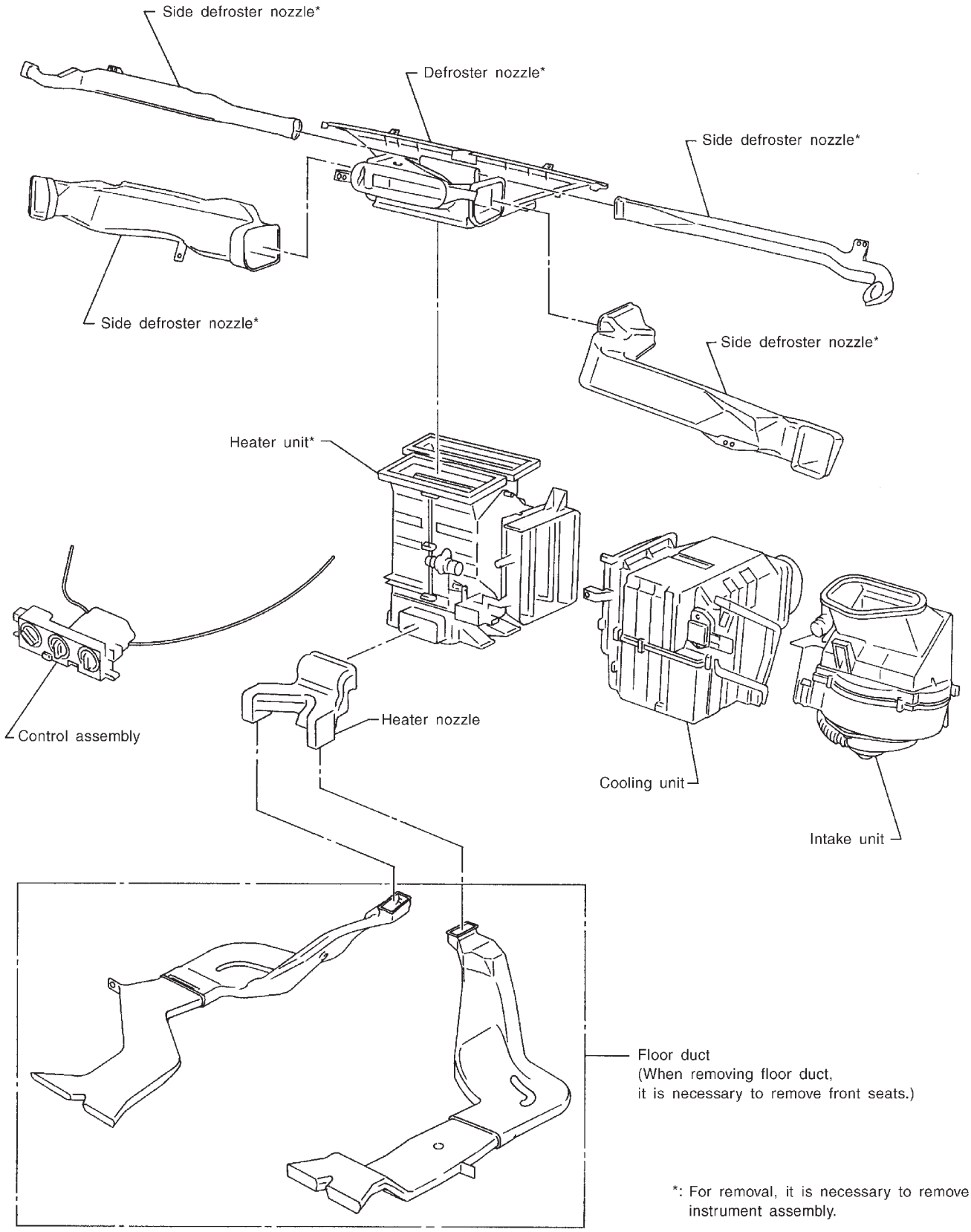
Forces needed to decrease stroke

RHA474C

Component Layout

NAHA0071

SEC. 270•271•272•273



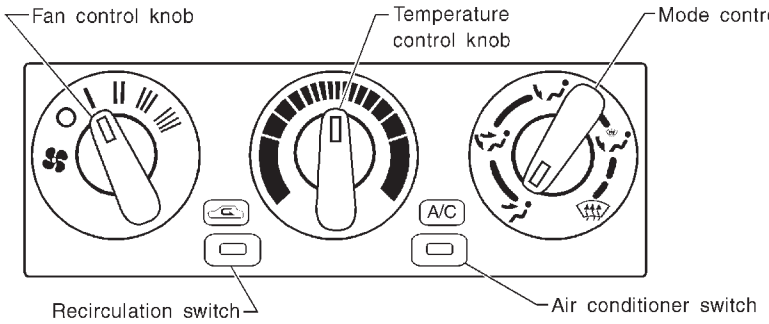
*: For removal, it is necessary to remove instrument assembly.

RHA573F

Control Operation

NAHA0072

Manual air conditioner



RHA606F

FAN CONTROL KNOB

NAHA0072S01

This knob turns the fan ON and OFF, and controls fan speed.

MODE CONTROL KNOB

NAHA0072S02

This knob controls the outlet air flow.
In “DEF” or “D/F” mode, the intake door is set to “FRESH”.

TEMPERATURE CONTROL KNOB

NAHA0072S03

This knob allows adjustment of the temperature of the outlet air.

RECIRCULATION (REC) SWITCH

NAHA0072S04

OFF position: Outside air is drawn into the passenger compartment.
ON position: Interior air is recirculated inside the vehicle. The indicator lamp will also light.

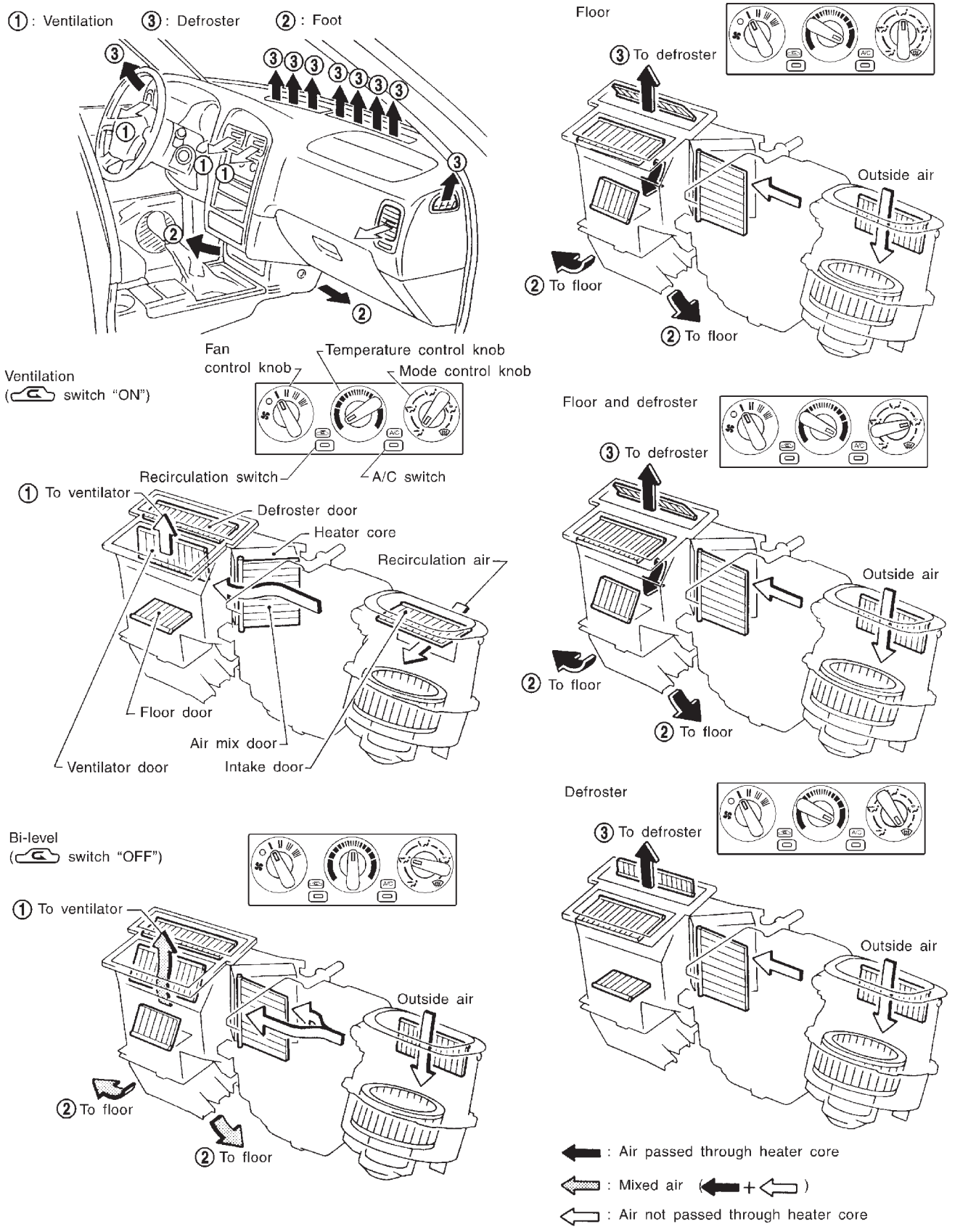
AIR CONDITIONER SWITCH

NAHA0072S05

The air conditioner switch controls the A/C system. When the switch is depressed with the fan ON, the compressor will turn ON. The indicator lamp will also light.
The air conditioner cooling function operates only when the engine is running.

Discharge Air Flow

NAHA0073



SHA963E

System Description

NAHA0074

SWITCHES AND THEIR CONTROL FUNCTIONS

NAHA0074S01

Knob/Switch		Knob/Switch position							Air outlet	Intake air	Compressor
		A/C									
A/C		○							—	—	ON*1
Mode			○						VENT	—	—
				○					B/L	—	—
					○				FOOT	—	—
						○			D/F	FRE	—
							○		DEF	FRE	—
								○	—	REC*2	—

*1: Compressor is operated by dual-pressure switch.

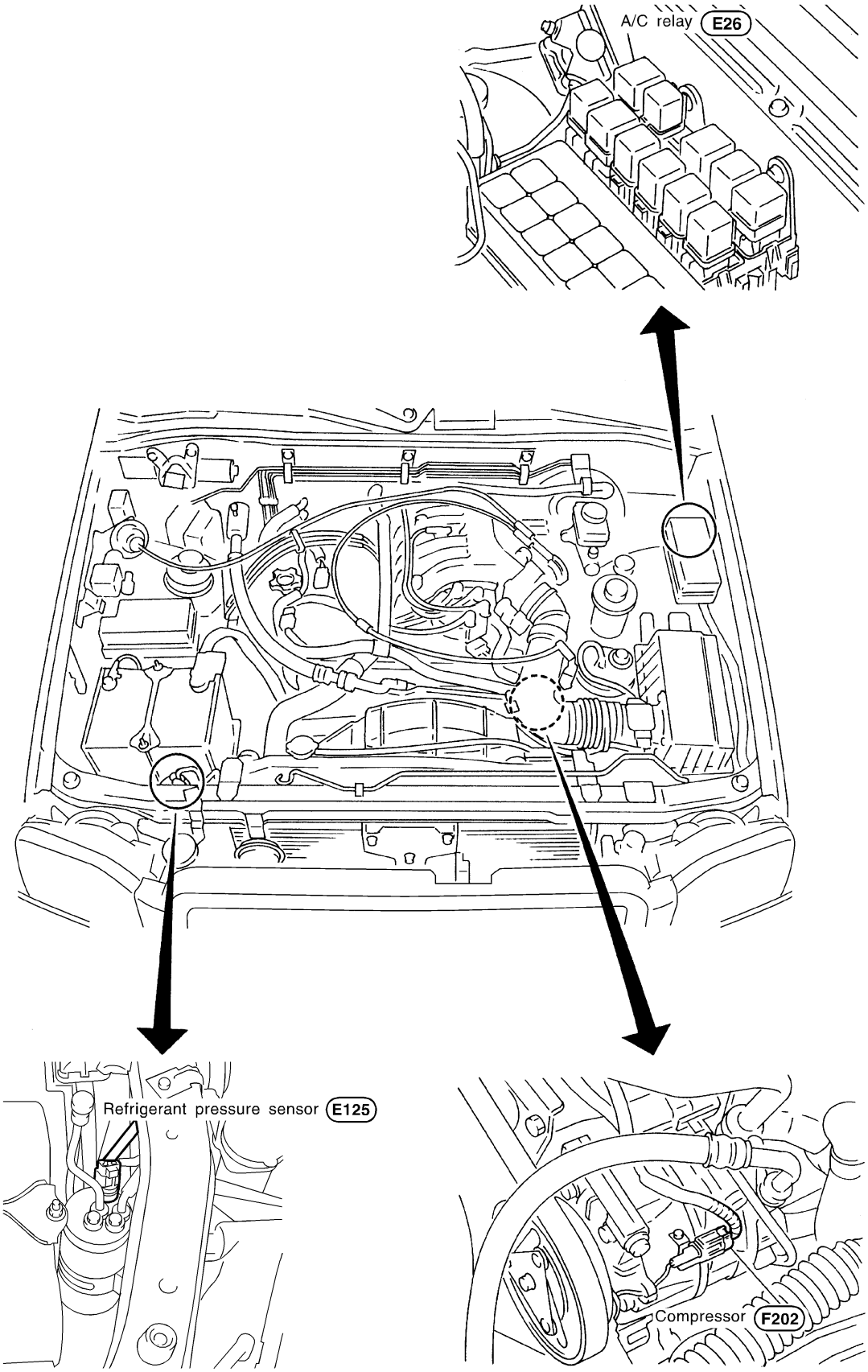
*2: In DEF and D/F modes, REC switch is canceled.

Component Location

NAHA0085

NAHA0085S01

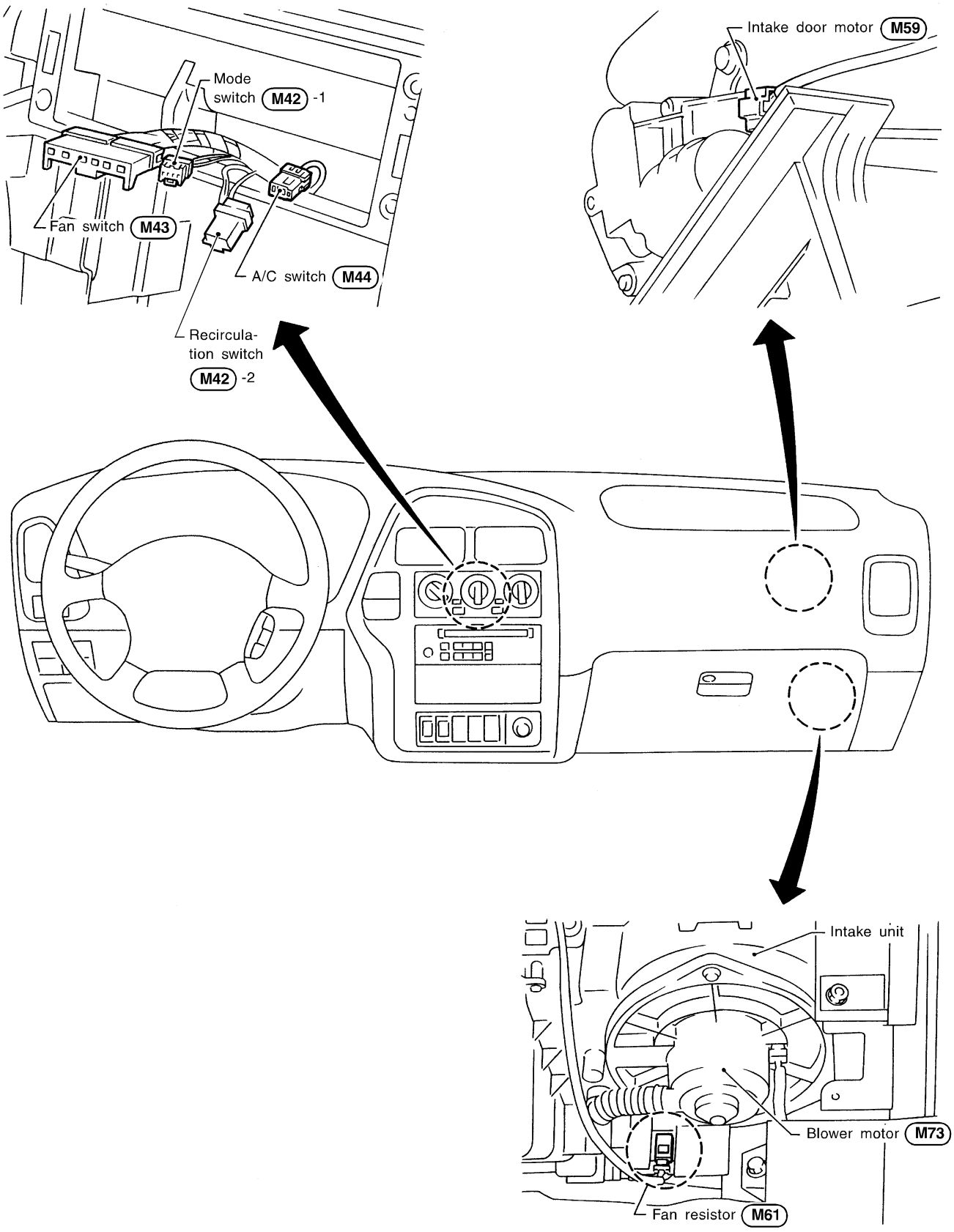
ENGINE COMPARTMENT



RHA326HA

PASSENGER COMPARTMENT

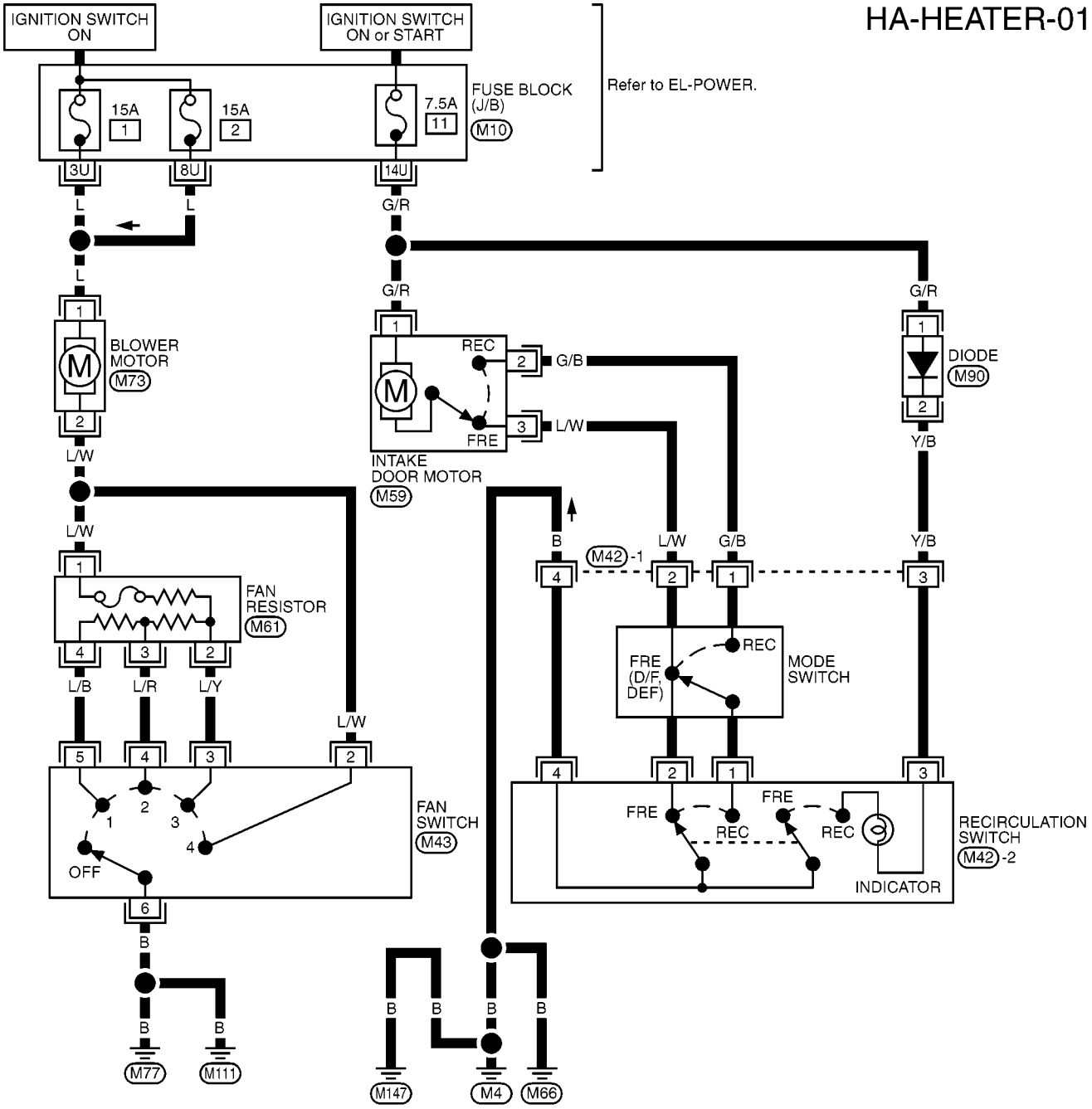
NAHA0085S02

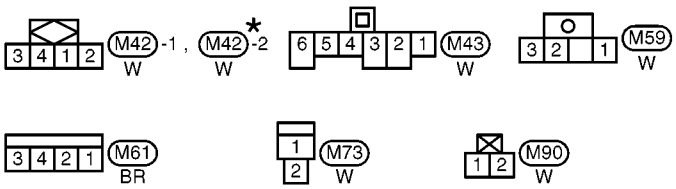


SHA265F

Wiring Diagram — HEATER —

NAHA0086





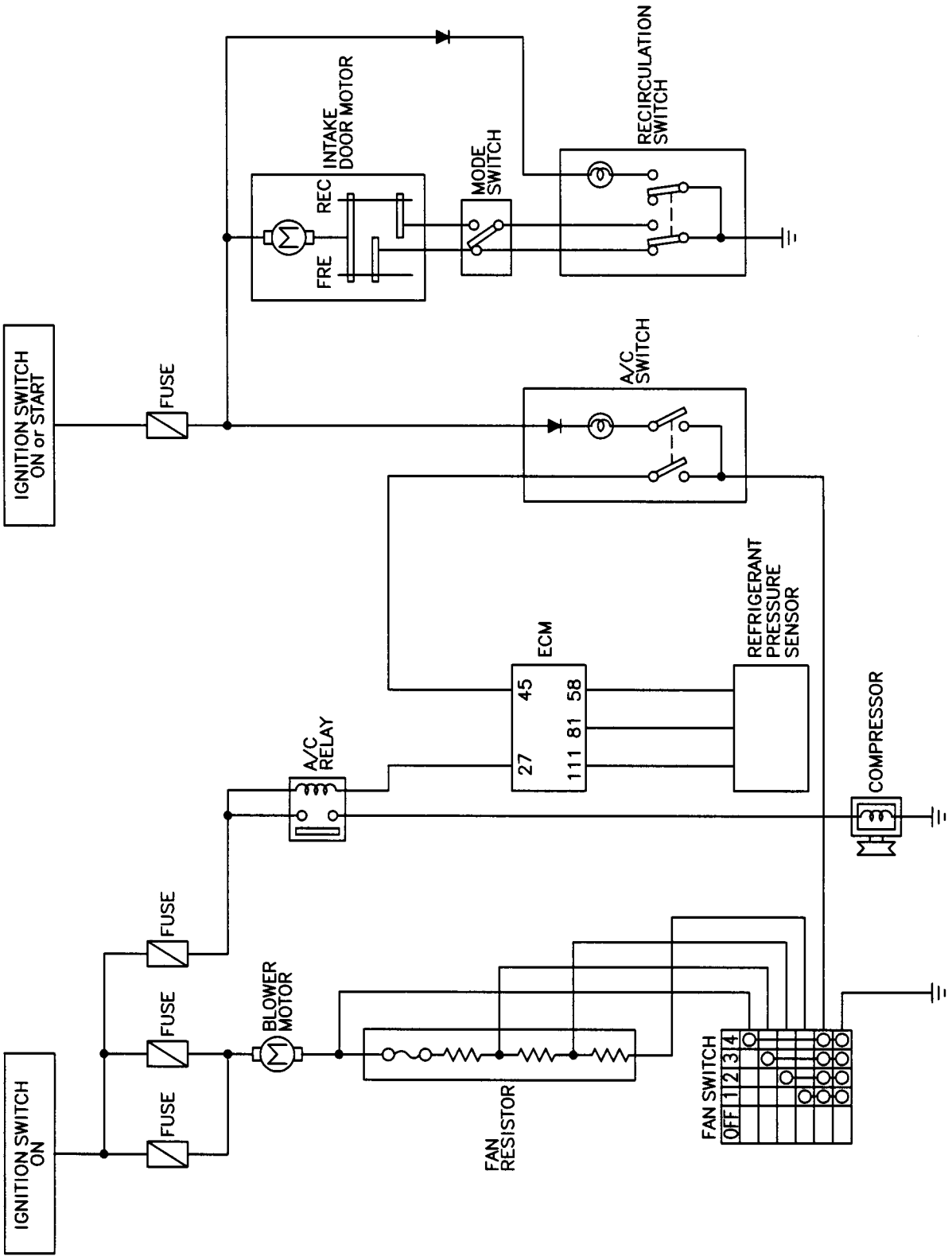
★ : This connector is not shown in "HARNESS LAYOUT", EL section.

REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

MHA987A

Circuit Diagram — Air Conditioner

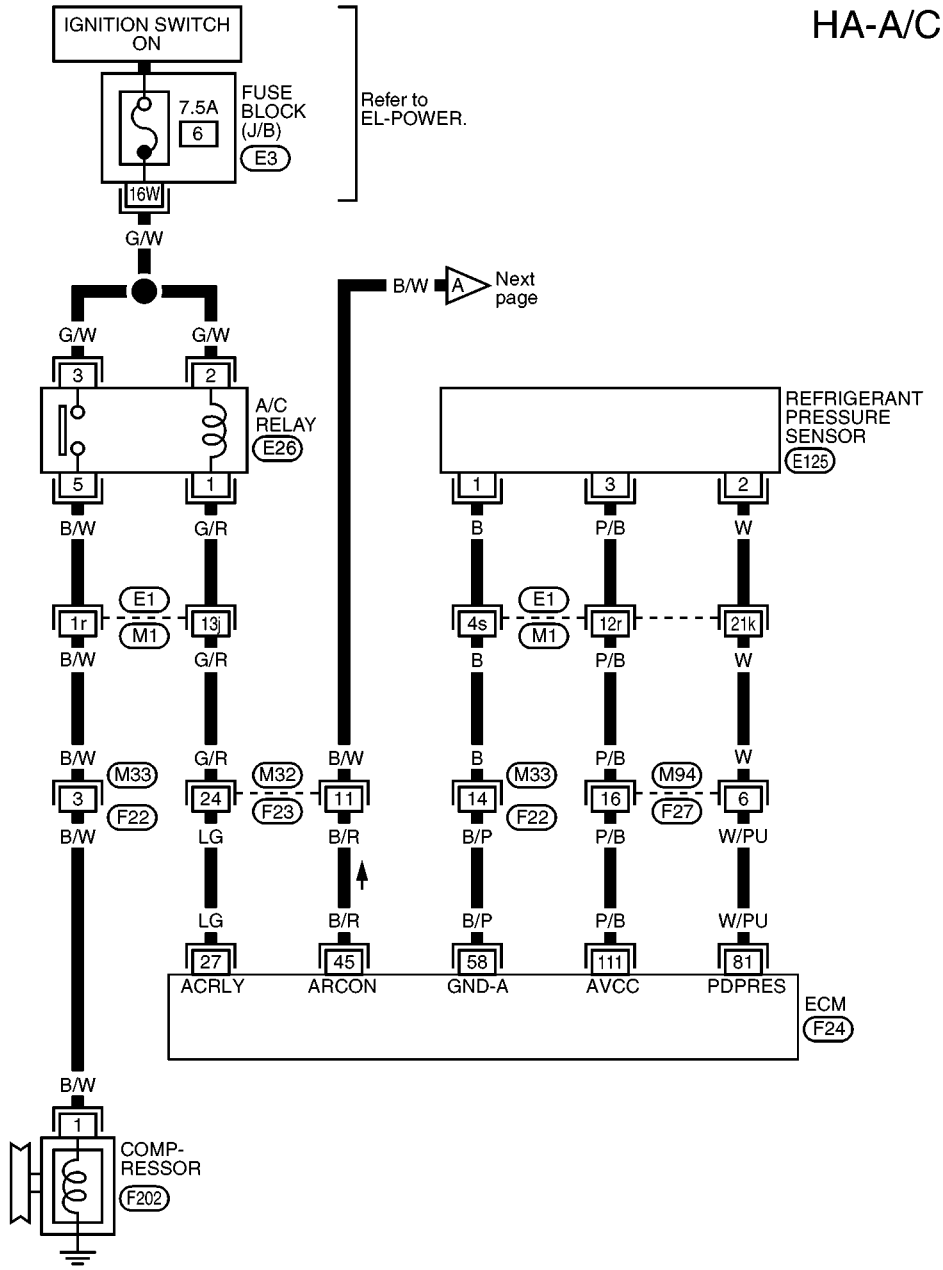
NAHA0087

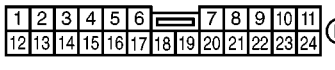


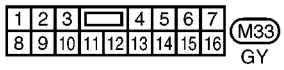
MHA996A

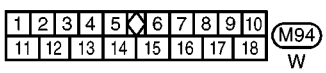
Wiring Diagram — A/C, M —

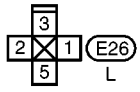
NAHA0088

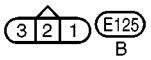


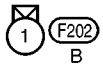






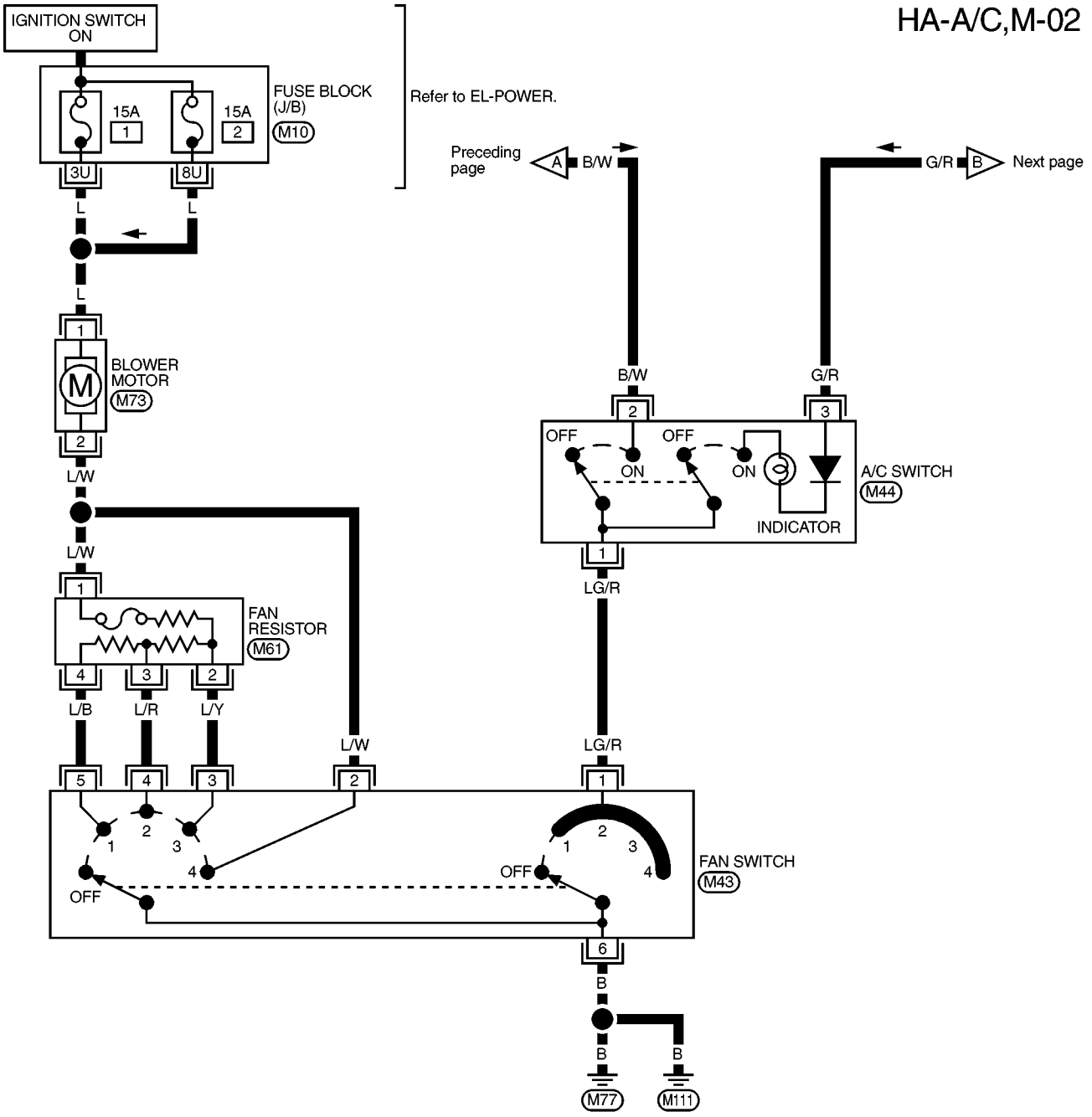


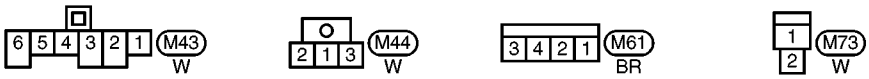




REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
E3 -FUSE BLOCK-JUNCTION BOX (J/B)
F24 -ELECTRICAL UNITS

MHA988A

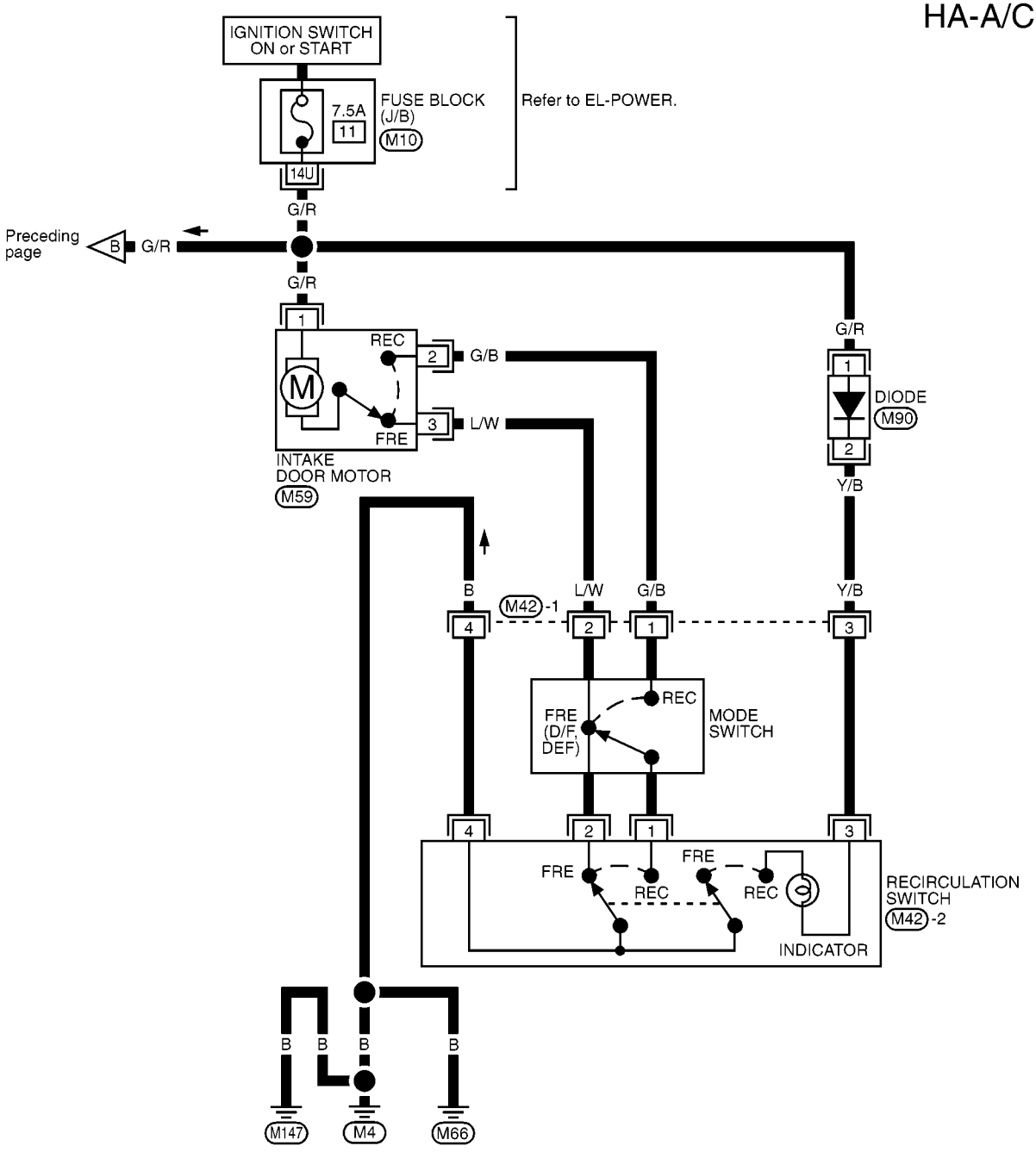


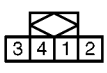


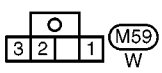
REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-JUNCTION BOX (J/B)

MHA997A

HA-A/C,M-03









★ : This connector is not shown in "HARNESS LAYOUT", EL section.

REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

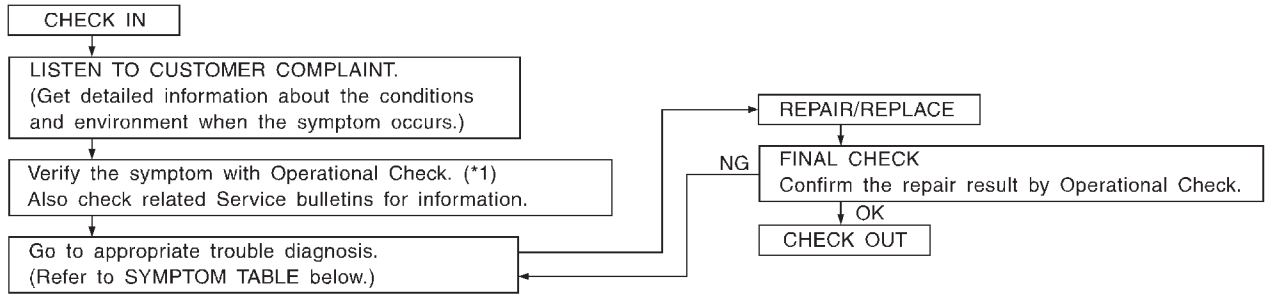
MHA989A

How to Perform Trouble Diagnoses for Quick and Accurate Repair

NAHA0075

WORK FLOW

NAHA0075S01



SHA900E

*1: HA-156

SYMPTOM TABLE

NAHA0075S02

Symptom	Reference page	
• Intake door does not change in VENT, B/L or FOOT mode.	• Go to Trouble Diagnosis Procedure for Intake Door.	HA-158
• Blower motor does not rotate at all.	• Go to Trouble Diagnosis Procedure for Blower Motor.	HA-165
• Insufficient cooling.	• Go to Trouble Diagnosis Procedure for Insufficient cooling.	HA-172
• Insufficient heating.	• Go to Trouble Diagnosis Procedure for Insufficient heating.	HA-180
• Air outlet does not change.	• Go to Trouble Diagnosis Procedure for Air Outlet.	HA-182
• Magnet clutch does not engage when A/C switch and fan switch are ON.	• Go to Trouble Diagnosis Procedure for Magnet Clutch.	HA-184
• Noise	• Go to Trouble Diagnosis Procedure for Noise.	HA-191

Operational Check

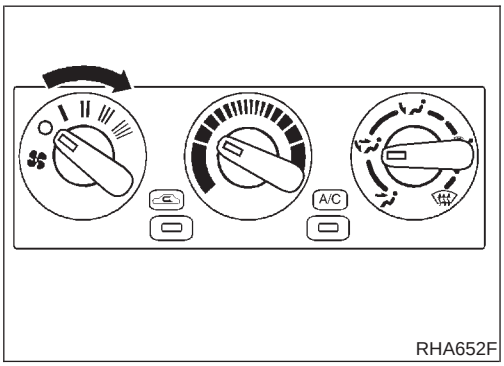
=NAHA0076

The purpose of the operational check is to confirm that the system operates as it should. The systems which are checked are the blower, mode (discharge air), intake air, temperature decrease, temperature increase.

CONDITIONS:

NAHA0076S01

Engine running at normal operating temperature.



RHA652F

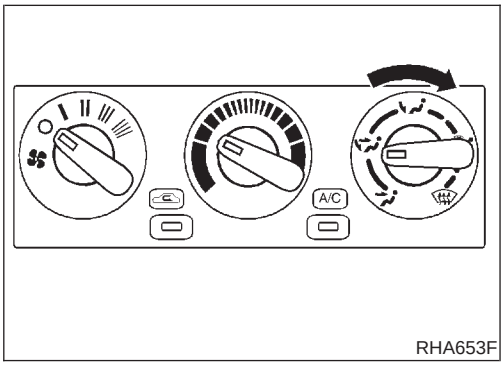
PROCEDURE:

NAHA0076S02

1. Check Blower

NAHA0076S0201

1. Turn fan control knob to 1-speed.
   Blower should operate on 1-speed.
2. Then turn fan control knob to 2-speed.
3. Continue checking blower speed until all four speeds are checked.
4. Leave blower on 4-speed.



RHA653F

2. Check Discharge Air

NAHA0076S0202

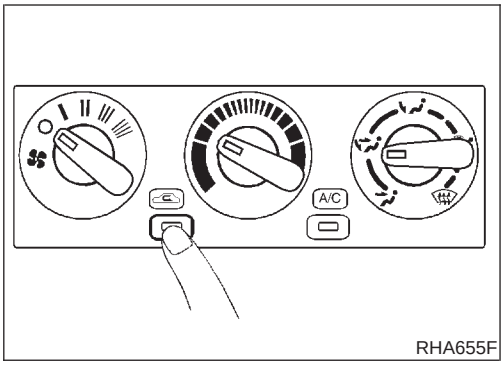
1. Turn mode control knob.

Discharge air flow

Mode control knob	Air outlet/distribution		
	Face	Foot	Defroster
	100%	–	–
	60%	40%	–
	–	80%	20%
	–	60%	40%
	–	–	100%

RHA654F

2. Confirm that discharge air comes out according to the air distribution table at left.
   Refer to “Discharge Air Flow” in “DESCRIPTION” (HA-146).



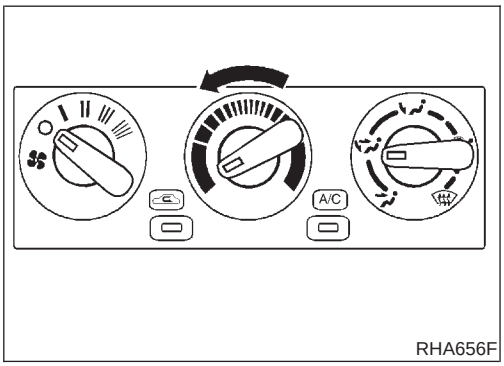
RHA655F

3. Check Recirculation

NAHA0076S0203

1. Press recirculation switch.
   Recirculation indicator should light.
2. Listen for intake door position change (you should hear blower sound change slightly).

NOTE:
Confirm that the RECIRCULATION (REC) switch is canceled in the DEF ( ) and D/F ( ) mode.

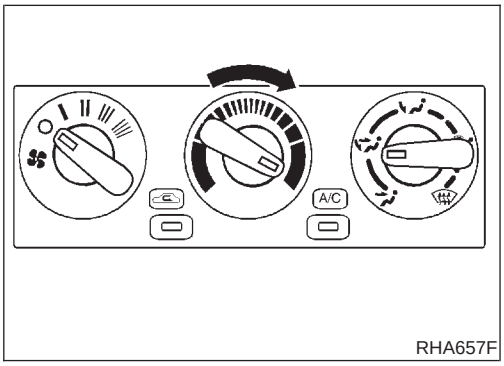


RHA656F

4. Check Temperature Decrease

NAHA0076S0204

1. Turn temperature control knob to full cold.
2. Check for cold air at discharge air outlets.

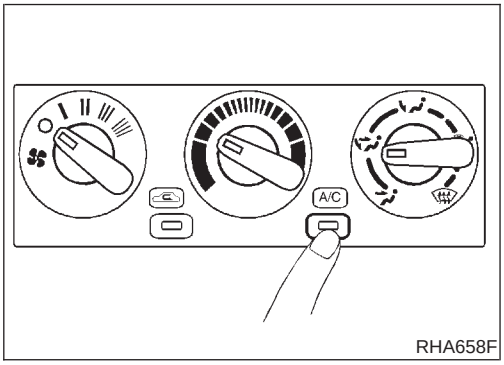


RHA657F

5. Check Temperature Increase

NAHA0076S0205

1. Turn temperature control knob to full hot.
2. Check for hot air at discharge air outlets.



RHA658F

6. Check Air Conditioner Switch

NAHA0076S0206

Turn fan control knob to the desired (1 to 4-speed) position and push the air conditioner switch to turn ON the air conditioner.
The indicator light should come on when air conditioner is ON.

Intake Door

TROUBLE DIAGNOSIS PROCEDURE FOR INTAKE DOOR

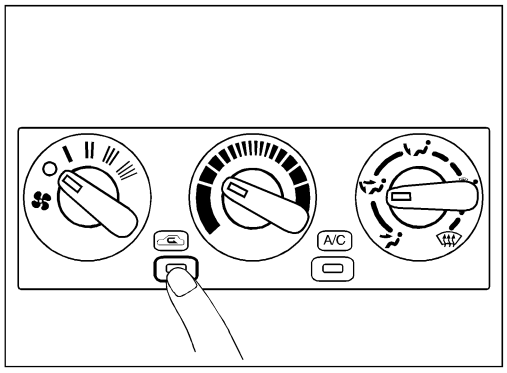
=NAHA0135

Symptom:

- **Intake door does not change in VENT, B/L or FOOT mode.**

Inspection Flow

1. Confirm symptom by performing the following operational check.



OPERATIONAL CHECK – Recirculation

1) Press recirculation switch.
   Recirculation indicator should light.
2) Listen for intake door position change (you should hear blower sound change slightly).

NOTE:
Confirm that the RECIRCULATION (REC) switch is canceled in the DEF ( ) and D/F ( ) mode.

2. Check for any service bulletins.

3. Check intake door motor circuit. (*1)

OK

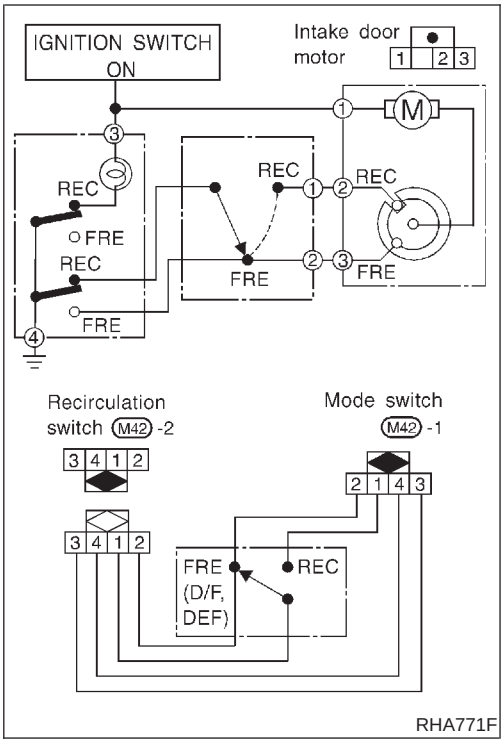
If the symptom still exist, perform a complete operational check (*2) and check for other symptoms.
[Refer to symptom table, (*3).]
Does another symptom exist?

Yes → Go to Trouble Diagnosis for related symptom.
[Another symptom exists.]

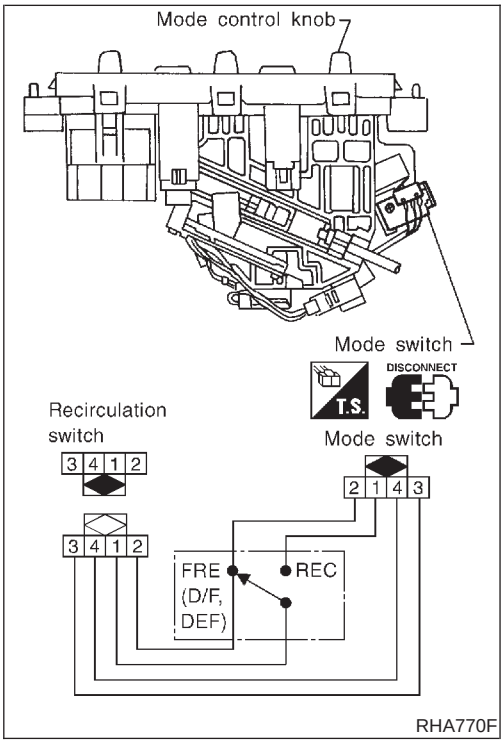
INSPECTION END

SHA260F

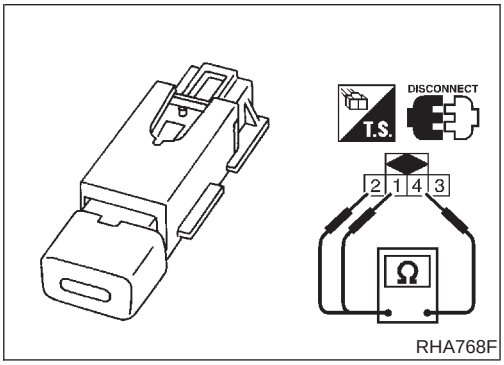
*1: HA-160 *2: HA-156 *3: HA-155



RHA771F



RHA770F



RHA768F

SYSTEM DESCRIPTION

NAHA0136

Intake Door Motor

NAHA0136S01

The intake door motor is installed on the intake unit. Using a link it opens and closes the intake door.

When RECIRCULATION switch is at REC (except DEF and D/F modes), the ground line of the motor is switched from intake door motor terminal 3 to 2. This starts the motor because the position switch contacts built into it make current flow. When RECIRCULATION switch is at FRE (except DEF and D/F modes), the ground line is switched from intake door motor terminal 2 to 3. The contacts turn along with the motor. When they reach the non-current flow position, the motor will stop. The motor always turns in the same direction.

RECIRCULATION switch is canceled by MODE switch in DEF and D/F modes.

ELECTRICAL COMPONENTS INSPECTION

NAHA0137

Mode Switch

NAHA0137S01

Check continuity between terminals at each switch position.

Terminal No.		Mode control knob condition	Continuity
Mode switch (+)	Recirculation switch connector (−)		
1	1	VENT, B/L, FOOT	Yes
		D/F, DEF	No
2	1	VENT, B/L, FOOT	No
		D/F, DEF	Yes
2	2	All	Yes
3	3	All	Yes
3	3	All	Yes

Recirculation Switch

NAHA0137S02

Check continuity between terminals at each switch position.

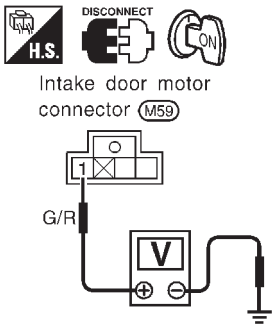
Terminal No.		Recirculation switch condition	Continuity
(+)	(−)		
1	4	REC	Yes
		FRE	No
2	4	REC	No
		FRE	Yes

INTAKE DOOR MOTOR CIRCUIT

=NAHA0090

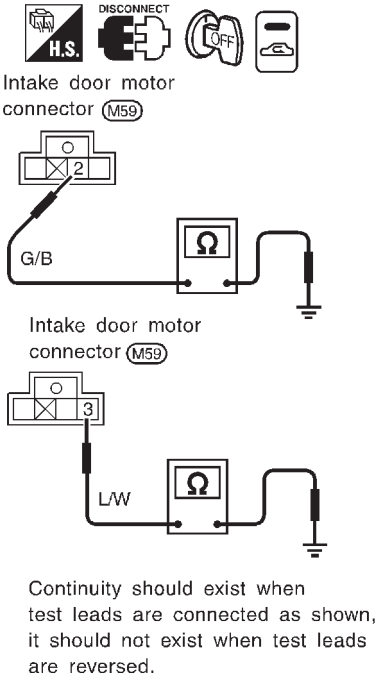
SYMPTOM:

- **Intake door does not change in VENT, B/L or FOOT mode.**

1	CHECK POWER SUPPLY FOR INTAKE DOOR MOTOR	
Disconnect intake door motor harness connector. Do approx. 12 volts exist between intake door motor harness terminal No. 1 and body ground?  RHA350FA **Yes or No**		
Yes	▶	GO TO 2.
No	▶	Check 7.5A (No. 11) fuse at fuse block. (Refer to EL-14, "Wiring Diagram — POWER —".)

2	CHECK GROUND CIRCUIT FOR INTAKE DOOR MOTOR

Check continuity between intake door motor harness terminals and body ground.



Continuity should exist when test leads are connected as shown, it should not exist when test leads are reversed.

RHA580F

Recirculation switch condition	Terminal No. (+)	Terminal No. (–)	Continuity
REC	(2)	Body ground	Yes
	(3)		No
FRE	(2)		No
	(3)		Yes

MTBL0033

OK or NG

OK	▶	GO TO 3.
NG	▶	Disconnect mode switch harness connector. GO TO 4.

3	CHECK INTAKE DOOR LINKAGE

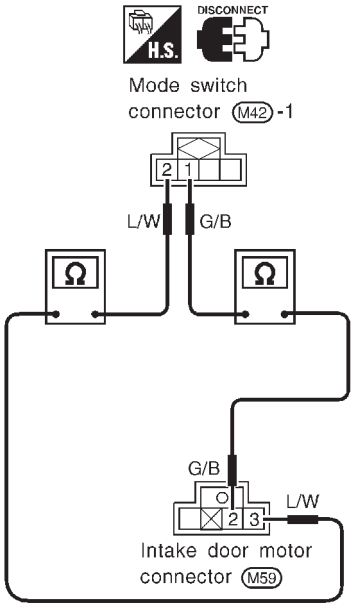
Refer to Control Linkage Adjustment.
(HA-164)

OK or NG

OK	▶	Replace intake door motor.
NG	▶	Repair or adjust.

4	CHECK CONTINUITY BETWEEN MODE SWITCH AND INTAKE DOOR MOTOR

Check circuit continuity between mode switch harness terminal No. 1 (2) and intake door motor harness terminal No. 2 (3).



RHA581F

Continuity should exist.
If OK, check harness for short.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair harness or connector.

5	CHECK MODE SWITCH

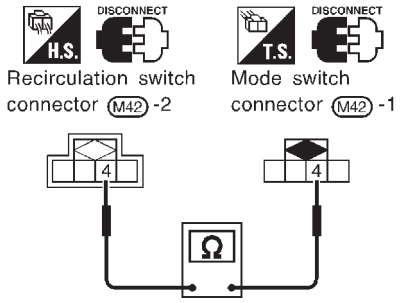
(Refer to Electrical Components Inspection.)
(HA-159)

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace mode switch.

6	CHECK CIRCUIT CONTINUITY BETWEEN MODE SWITCH AND RECIRCULATION SWITCH

Check circuit continuity between mode switch harness terminal No. 4 and recirculation switch harness terminal No. 4.



RHA769FB

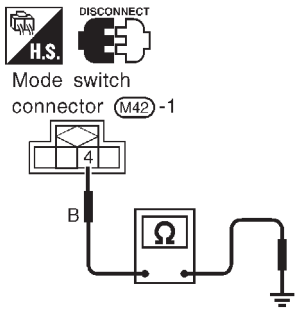
Continuity should exist.
If OK, check harness for short.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace mode switch.

7	CHECK GROUND CIRCUIT FOR MODE SWITCH

Check circuit continuity between mode switch harness terminal No. 4 and body ground.



RHA582F

Continuity should exist.
If OK, check harness for short.

OK or NG

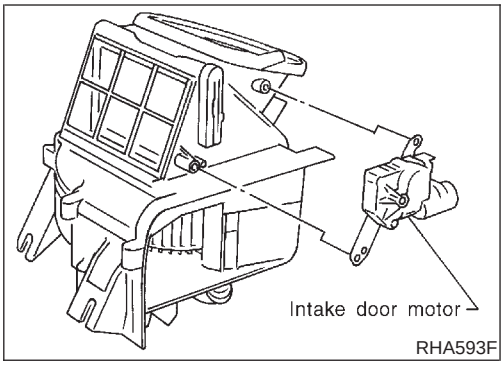
OK	▶	GO TO 8.
NG	▶	Repair harness or connector.

8	CHECK RECIRCULATION SWITCH

(Refer to Electrical Components Inspection.)
(HA-159)

OK or NG

OK	▶	INSPECTION END
NG	▶	Replace recirculation switch.



CONTROL LINKAGE ADJUSTMENT

NAHA0093

Intake Door Motor

NAHA0093S04

1. Install intake door motor on intake unit.
   Ensure that the intake door motor lever is fitted into the slit portion of intake door link.
2. Connect the intake door motor harness connector.
3. Turn ignition switch to ON.
4. Check that intake door operates properly when RECIRCULATION switch is turned ON and OFF.

Blower Motor

TROUBLE DIAGNOSIS PROCEDURE FOR BLOWER MOTOR

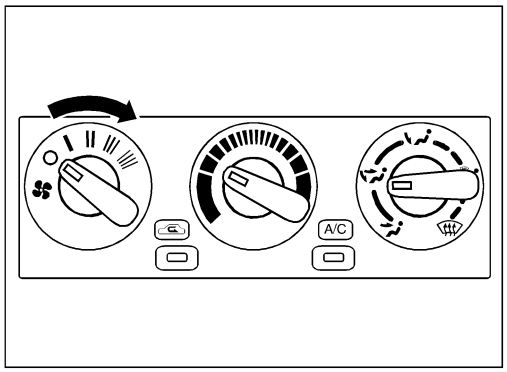
=NAHA0138

Symptom:

- **Blower motor does not rotate at all.**

Inspection Flow

1. Confirm symptom by performing the following operational check.



OPERATIONAL CHECK – Blower motor

1) Turn fan control knob to 1-speed.
   Blower should operate on 1-speed.
2) Then turn fan control knob to 2-speed.
3) Continue checking blower speed until all four speeds are checked.
4) Leave blower on 4-speed.

2. Check for any service bulletins.

3. Check blower motor circuit. (*1)

OK

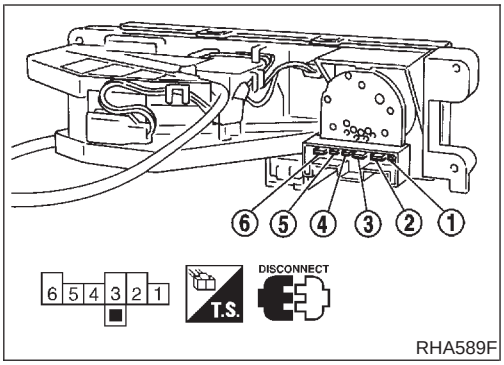
If the symptom still exist, perform a complete operational check (*2) and check for other symptoms.
[Refer to symptom table, (*3).]
Does another symptom exist?

Yes → Go to Trouble Diagnosis for related symptom.
[Another symptom exists.]

INSPECTION END

SHA261F

*1: HA-167 *2: HA-156 *3: HA-155



ELECTRICAL COMPONENTS INSPECTION

=NAHA0139

Fan Switch

NAHA0139S01

Check continuity between terminals at each switch position.

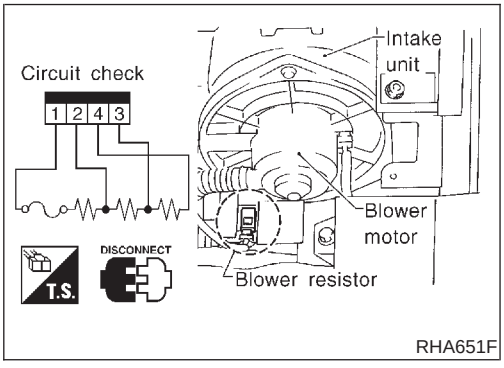
KNOB POSITION	Continuity between terminals
OFF	
1	5 — 1 — 6
2	4 — 1 — 6
3	3 — 1 — 6
4	2 — 1 — 6

Blower Motor

NAHA0139S02

Confirm smooth rotation of the blower motor.

- Ensure that there are no foreign particles inside the intake unit.



Blower Resistor

NAHA0139S03

Check resistance between terminals.

Terminal No.		Resistance
(+)	(−)	
3	1	Approx. 1.4 - 1.6Ω
4		Approx. 2.5 - 2.8Ω
2		Approx. 0.5 - 0.6Ω

BLOWER MOTOR CIRCUIT

=NAHA0089

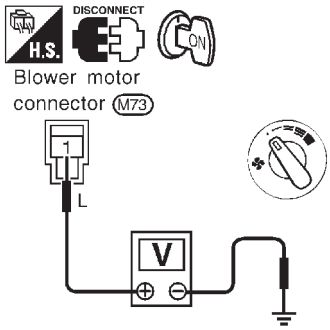
SYMPTOM:

- **Blower motor does not rotate.**

Test group No.	INCIDENT
1	Fan fails to rotate.
2	Fan does not rotate at 1-speed.
3	Fan does not rotate at 2-speed.
4	Fan does not rotate at 3-speed.
5	Fan does not rotate at 4-speed.

1	**DIAGNOSTIC PROCEDURE**	
Check if blower motor rotates properly at each fan speed. Conduct checks as per table at above.		
1	▶	GO TO 2.
2, 3, 4	▶	GO TO 8.
5	▶	GO TO 10.

2	**CHECK POWER SUPPLY FOR BLOWER MOTOR**	
1. Disconnect blower motor harness connector. 2. Do approx. 12 volts exist between blower motor harness terminal No. 1 and body ground?		



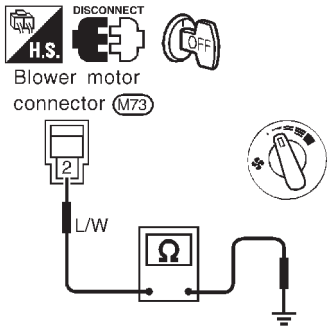
RHA343FA

Yes or No

Yes	▶	GO TO 3.
No	▶	Check 15A (Nos. 1 and No. 2) fuses at fuse block. (Refer to EL-14, "Wiring Diagram — POWER".)

3	CHECK CIRCUIT CONTINUITY FOR BLOWER MOTOR

1. Turn fan control knob to any position except OFF.
2. Check circuit continuity between blower motor harness terminal No. 2 and body ground.



RHA344FA

Continuity should exist.

OK or NG

OK	▶	GO TO 4.
NG	▶	Reconnect blower motor harness connector. GO TO 5.

4	CHECK BLOWER MOTOR

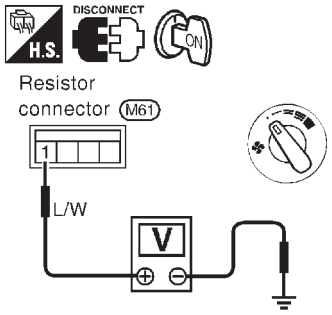
(Refer to Electrical Components Inspection.)
(HA-166)

OK or NG

OK	▶	INSPECTION END
NG	▶	Replace blower motor.

5	CHECK BLOWER MOTOR CIRCUIT BETWEEN BLOWER MOTOR AND RESISTOR

Do approx. 12 volts exist between resistor harness terminal No. 1 and body ground?



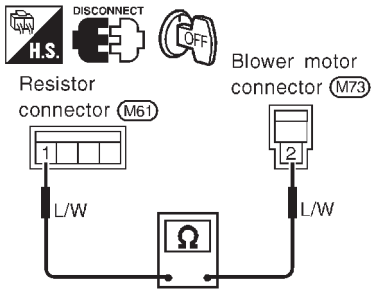
RHA575F

Yes or No

Yes	▶	Disconnect fan switch harness connector. GO TO 7.
No	▶	Disconnect blower motor and resistor harness connectors. GO TO 6.

6	CHECK CIRCUIT CONTINUITY BETWEEN BLOWER MOTOR AND RESISTOR

Check circuit continuity between blower motor harness terminal No. 2 and resistor harness terminal No. 1.



RHA576F

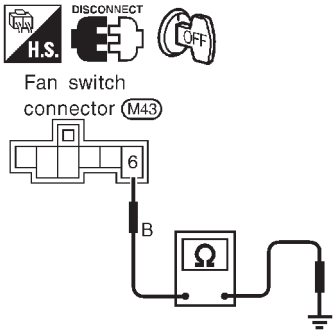
Continuity should exist.

OK or NG

OK	▶	Check harness for short.
NG	▶	Repair harness or connector.

7	CHECK GROUND CIRCUIT FOR FAN SWITCH

Check circuit continuity between fan switch harness terminal No. 6 and body ground.



RHA577F

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair harness or connector.

8	CHECK RESISTOR AFTER DISCONNECTING IT

(Refer to Electrical Components Inspection.)
(HA-166)

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace resistor.

9	CHECK RESISTOR HARNESS CONNECTOR

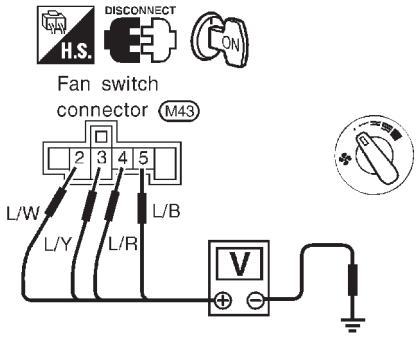
Reconnect resistor harness connector.

OK or NG

1	▶	GO TO 12.
2, 3, 4	▶	GO TO 10.

10	CHECK FAN SWITCH CIRCUIT

Do approx. 12 volts exist between each fan switch harness terminal and body ground?



RHA578F

Test group No.	Terminal No. (+)	Terminal No. (–)	Voltage
2	(5)	Body ground	Approx. 12V
3	(4)		
4	(3)		
5	(2)		

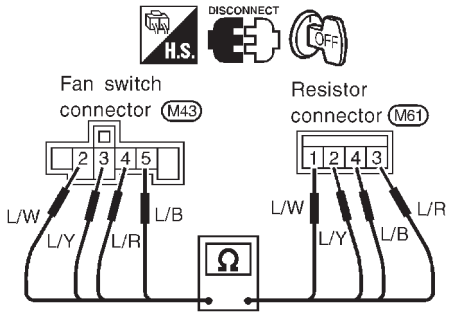
MTBL0310

Yes or No

Yes	▶	GO TO 12.
No	▶	GO TO 11.

11	CHECK CIRCUIT CONTINUITY BETWEEN FAN SWITCH AND RESISTOR

Check circuit continuity between fan switch harness terminal and resistor harness terminal.



RHA579F

Terminal No.		Continuity
Fan Switch	Resistor	
(2)	(1)	Yes
(3)	(2)	
(4)	(3)	
(5)	(4)	

MTBL0032

Continuity should exist.

OK or NG

OK	▶	Check harness for short.
NG	▶	Repair harness or connector.

12	CHECK FAN SWITCH AFTER DISCONNECTING IT

(Refer to Electrical Components Inspection.)
(HA-166)

OK or NG

OK	▶	INSPECTION END
NG	▶	Replace fan switch.

Insufficient Cooling

TROUBLE DIAGNOSIS PROCEDURE FOR INSUFFICIENT COOLING

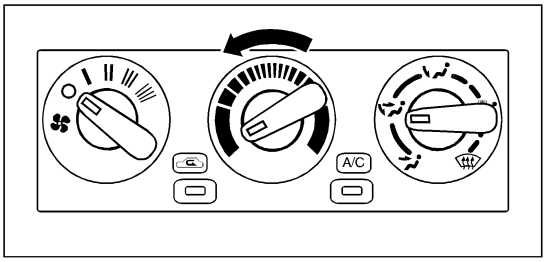
=NAHA0150

Symptom:

- **Insufficient Cooling.**

Inspection Flow

1. Confirm symptom by performing the following operational check.



OPERATIONAL CHECK – Temperature decrease

1) Turn temperature control knob to full cold.
2) Check for cold air at discharge air outlets.

2. Check for any service bulletins.

3. Check compressor belt tension. Refer to MA-(*8), “Checking Drive Belts”.
NG → Adjust or replace compressor belt.
OK ↓

4. Check air mix door. (*1)
NG → Adjust or replace air mix door.
OK ↓

5. Check cooling fan motor operation.
NG → Refer to LC-(*9), “Cooling Fan”.
OK ↓

Before connecting ACR4 to vehicle, check ACR4 gauges. No refrigerant pressure should be displayed. If NG, recover refrigerant from equipment lines.

Confirm refrigerant purity in supply tank using ACR4 and refrigerant identifier.
NG → Refer to Contaminated refrigerant. (*7)
OK ↓

Connect ACR4 to vehicle.
Confirm refrigerant purity in vehicle A/C system using ACR4 and refrigerant identifier.
NG → Refer to Contaminated refrigerant. (*7)
OK ↓

6. Check refrigeration cycle pressure with manifold gauge connected. Refer to (*2).
NG → Perform Performance Test Diagnoses. Refer to (*3).
OK ↓

7. Check for evaporator coil freeze up.
NG (Freeze up) → Replace compressor. (*6)
(Does not freeze up.)
OK ↓

8. Check ducts for air leaks.
NG → Repair air leaks.
OK ↓

If the symptom still exist, perform a complete operational check (*4) and check for other symptoms.
[Refer to symptom table, (*5).]
Does another symptom exist?
Yes → Go to Trouble Diagnosis for related symptom.
[Another symptom exists.]
No ↓

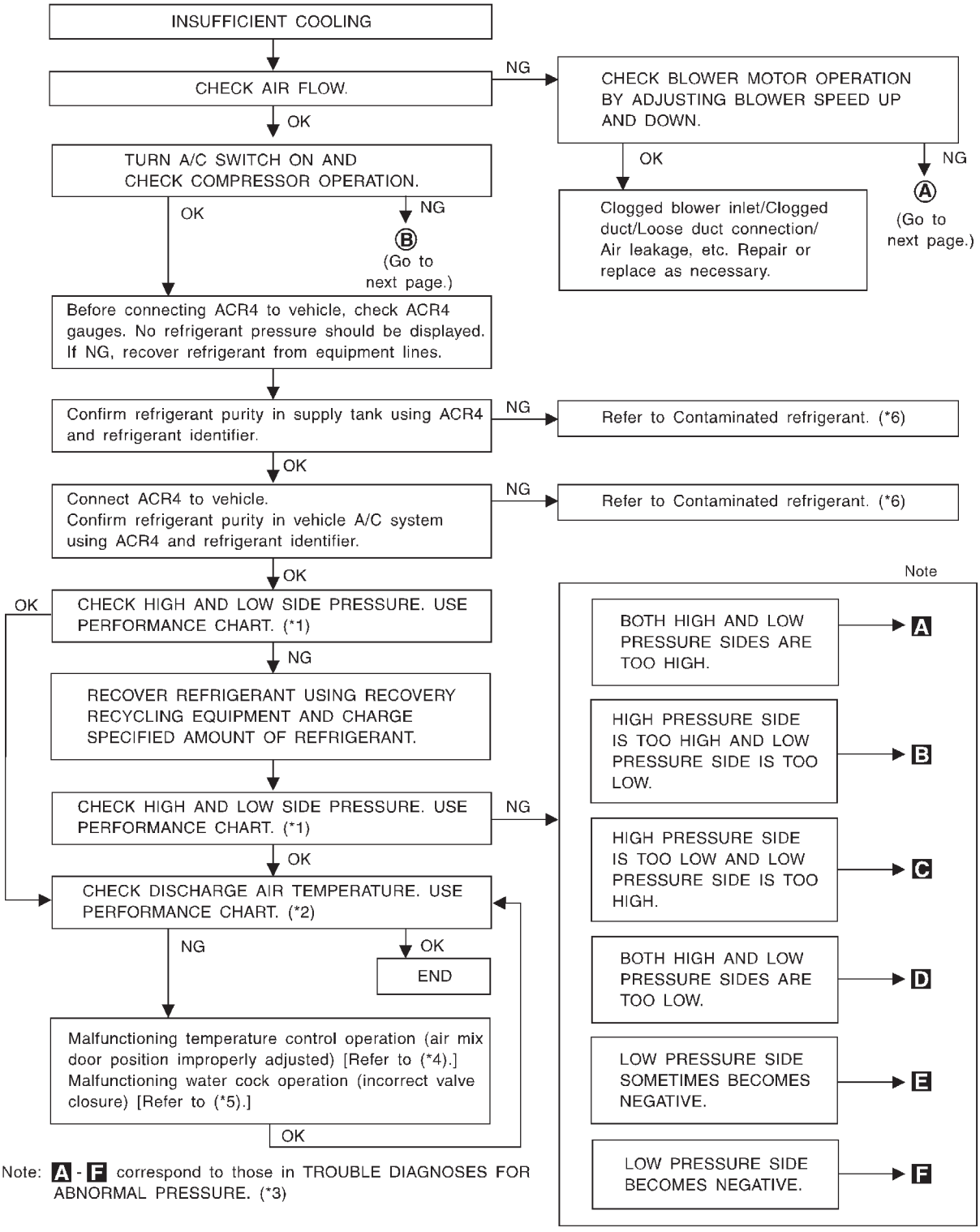
INSPECTION END

SHA262FA

*1: HA-181
*2: HA-175
*3: HA-173
*4: HA-156
*5: HA-155
*6: HA-197
*7: HA-127
*8: MA-14
*9: LC-21

PERFORMANCE TEST DIAGNOSES

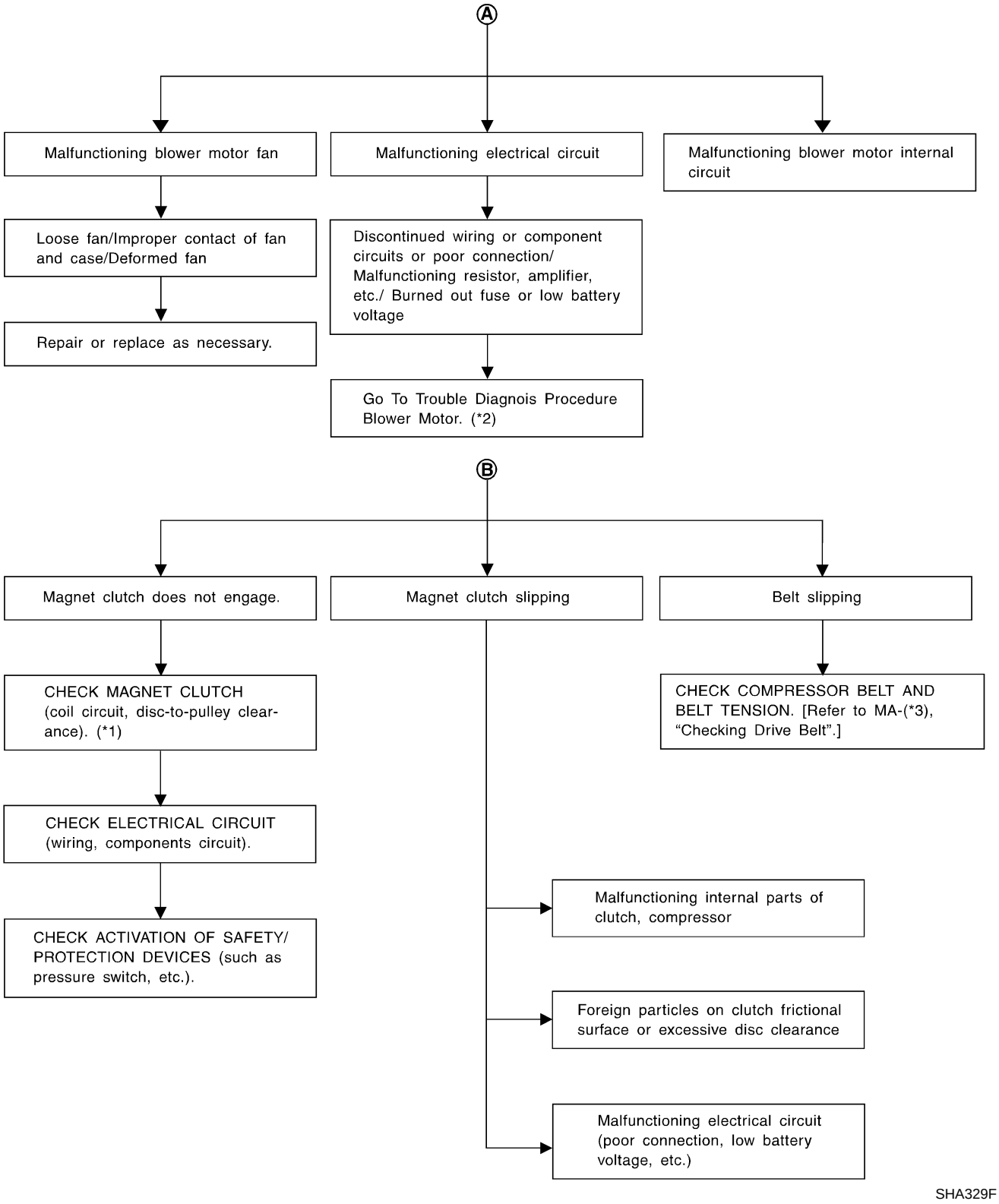
NAHA0082



Note: A - F correspond to those in TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE. (*3)

SHA194F

*1: HA-175
*2: HA-175
*3: HA-175
*4: HA-181
*5: HA-181
*6: HA-127



SHA329F

*1: HA-199 *2: HA-165 *3: MA-14

PERFORMANCE CHART

=NAHA0083

Test Condition

NAHA0083S01

Testing must be performed as follows:

Vehicle location	Indoors or in the shade (in a well-ventilated place)
Doors	Closed
Door windows	Open
Hood	Open
TEMP.	Max. COLD
Discharge Air	Face (Ventilation) set
REC switch	(Recirculation) set
FAN speed	High speed
Engine speed	Idle speed
Operate the air conditioning system for 10 minutes before taking measurements.	

Test Reading

NAHA0083S02

Recirculating-to-discharge Air Temperature Table

NAHA0083S0201

Inside air (Recirculating air) at blower assembly inlet		Discharge air temperature at center ventilator °C (°F)
Relative humidity %	Air temperature °C (°F)	
50 - 60	25 (77)	6.0 - 9.0 (43 - 48)
	30 (86)	10.0 - 13.6 (50 - 56)
	35 (95)	15.2 - 19.5 (59 - 67)
	40 (104)	22.5 - 27.1 (73 - 81)
60 - 70	25 (77)	9.0 - 12.2 (48 - 54)
	30 (86)	13.6 - 17.2 (56 - 63)
	35 (95)	19.5 - 23.7 (67 - 75)
	40 (104)	27.1 - 32.3 (81 - 90)

Ambient Air Temperature-to-operating Pressure Table

NAHA0083S0202

Ambient air		High-pressure (Discharge side) kPa (kg/cm^2, psi)	Low-pressure (Suction side) kPa (kg/cm^2, psi)
Relative humidity %	Air temperature °C (°F)		
50 - 70	25 (77)	1,226 - 1,638 (12.5 - 16.7, 178 - 237)	172 - 250 (1.75 - 2.55, 25 - 36)
	30 (86)	1,422 - 1,883 (14.5 - 19.2, 206 - 273)	196 - 275 (2.0 - 2.8, 28 - 40)
	35 (95)	1,657 - 2,187 (16.9 - 22.3, 240 - 317)	231 - 309 (2.35 - 3.15, 33 - 45)
	40 (104)	1,922 - 2,501 (19.6 - 25.5, 279 - 363)	280 - 373 (2.85 - 3.8, 41 - 54)

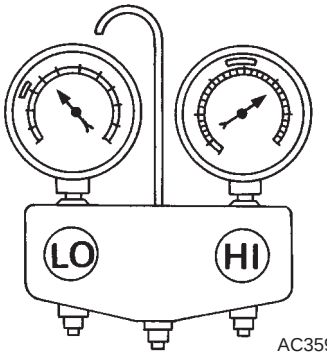
TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE

NAHA0084

Whenever system's high and/or low side pressure is abnormal, diagnose using a manifold gauge. The marker above the gauge scale in the following tables indicates the standard (normal) pressure range. Since the standard (normal) pressure, however, differs from vehicle to vehicle, refer to HA-175 ("Ambient air temperature-to-operating pressure table").

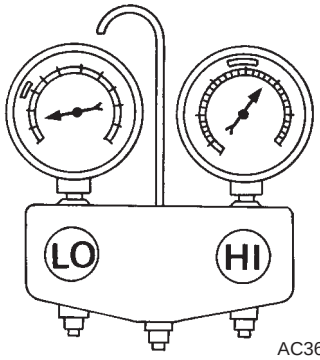
Both High- and Low-pressure Sides are Too High.

NAHA0084S01

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Both high- and low-pressure sides are too high. A  AC359A	• Pressure is reduced soon after water is splashed on condenser.	Excessive refrigerant charge in refrigeration cycle	Reduce refrigerant until specified pressure is obtained.
	Air suction by cooling fan is insufficient.	Insufficient condenser cooling performance ↓ 1. Condenser fins are clogged. 2. Improper fan rotation of cooling fan	• Clean condenser. • Check and repair cooling fan as necessary.
	• Low-pressure pipe is not cold. • When compressor is stopped high-pressure value quickly drops by approximately 196 kPa (2 kg/cm^2, 28 psi). It then decreases gradually thereafter.	Poor heat exchange in condenser (After compressor operation stops, high pressure decreases too slowly.) ↓ Air in refrigeration cycle	Evacuate repeatedly and recharge system.
	Engine tends to overheat.	Engine cooling systems malfunction.	Check and repair each engine cooling system.
	• An area of the low-pressure pipe is colder than areas near the evaporator outlet. • Plates are sometimes covered with frost.	• Excessive liquid refrigerant on low-pressure side • Excessive refrigerant discharge flow • Expansion valve is open a little compared with the specification. ↓ 1. Improper thermal valve installation 2. Improper expansion valve adjustment	Replace expansion valve.

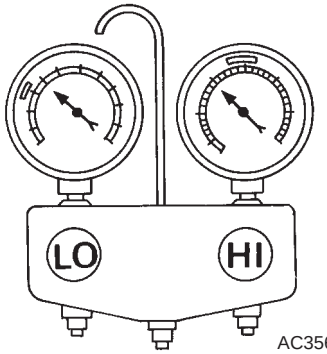
High-pressure Side is Too High and Low-pressure Side is Too Low.

NAHA0084S02

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
High-pressure side is too high and low-pressure side is too low. B  AC360A	Upper side of condenser and high-pressure side are hot, however, liquid tank is not so hot.	High-pressure tube or parts located between compressor and condenser are clogged or crushed.	• Check and repair or replace malfunctioning parts. • Check lubricant for contamination.

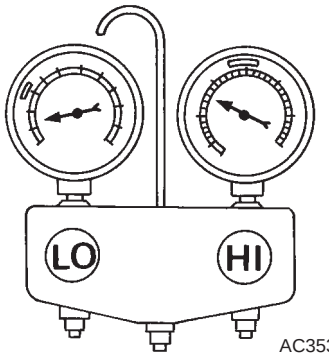
High-pressure Side is Too Low and Low-pressure Side is Too High.

NAHA0084S03

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
High-pressure side is too low and low-pressure side is too high. C  AC356A	High and low-pressure sides become equal soon after compressor operation stops.	Compressor pressure operation is improper. ↓ Damaged inside compressor packings	Replace compressor.
	No temperature difference between high and low-pressure sides	Compressor pressure operation is improper. ↓ Damaged inside compressor packings.	Replace compressor.

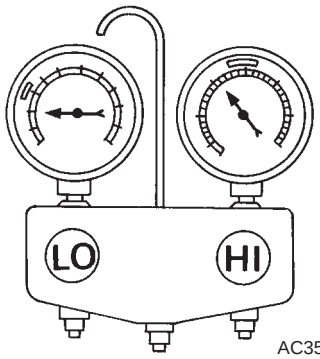
Both High- and Low-pressure Sides are Too Low.

NAHA0084S04

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Both high- and low-pressure sides are too low. D  AC353A	• There is a big temperature difference between receiver drier outlet and inlet. Outlet temperature is extremely low. • Liquid tank inlet and expansion valve are frosted.	Compressor discharge capacity does not change. (Compressor stroke is set at maximum.)	• Replace liquid tank. • Check lubricant for contamination.
	• Temperature of expansion valve inlet is extremely low as compared with areas near liquid tank. • Expansion valve inlet may be frosted. • Temperature difference occurs somewhere in high-pressure side	High-pressure pipe located between receiver drier and expansion valve is clogged.	• Check and repair malfunctioning parts. • Check lubricant for contamination.
	• Expansion valve and liquid tank are warm or only cool when touched.	Low refrigerant charge ↓ Leaking fittings or components	Check refrigerant for leaks. Refer to "Checking Refrigerant Leaks", HA-202.
	There is a big temperature difference between expansion valve inlet and outlet while the valve itself is frosted.	Expansion valve closes a little compared with the specification. ↓ 1. Improper expansion valve adjustment 2. Malfunctioning thermal valve 3. Outlet and inlet may be clogged.	• Remove foreign particles by using compressed air. • Check lubricant for contamination.
	An area of the low-pressure pipe is colder than areas near the evaporator outlet.	Low-pressure pipe is clogged or crushed.	• Check and repair malfunctioning parts. • Check lubricant for contamination.
	Air flow volume is not enough or is too low.	Evaporator is frozen. ↓ Compressor discharge capacity does not change. (Compressor stroke is set at maximum length.)	Replace compressor.

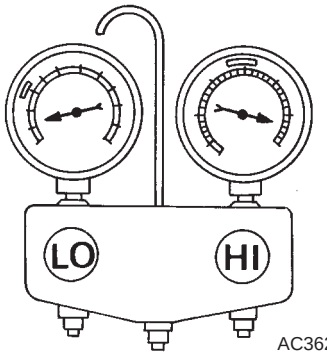
Low-pressure Side Sometimes Becomes Negative.

NAHA0084S05

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Low-pressure side sometimes becomes negative. E  AC354A	• Air conditioning system does not function and does not cyclically cool the compartment air. • The system constantly functions for a certain period of time after compressor is stopped and restarted.	Refrigerant does not discharge cyclically. ↓ Moisture is frozen at expansion valve outlet and inlet. ↓ Water is mixed with refrigerant.	• Drain water from refrigerant or replace refrigerant. • Replace liquid tank.

Low-pressure Side Becomes Negative.

NAHA0084S06

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Low-pressure side becomes negative. F  AC362A	Liquid tank or front/rear side of expansion valve's pipe is frosted or dewed.	High-pressure side is closed and refrigerant does not flow. ↓ Expansion valve or liquid tank is frosted.	Leave the system at rest until no frost is present. Start it again to check whether or not the problem is caused by water or foreign particles. • If water is the cause, initially cooling is okay. Then the water freezes causing a blockage. Drain water from refrigerant or replace refrigerant. • If due to foreign particles, remove expansion valve and remove particles with dry and compressed air (not shop air). • If either of the above methods cannot correct the problem, replace expansion valve. • Replace liquid tank. • Check lubricant for contamination.

Insufficient Heating

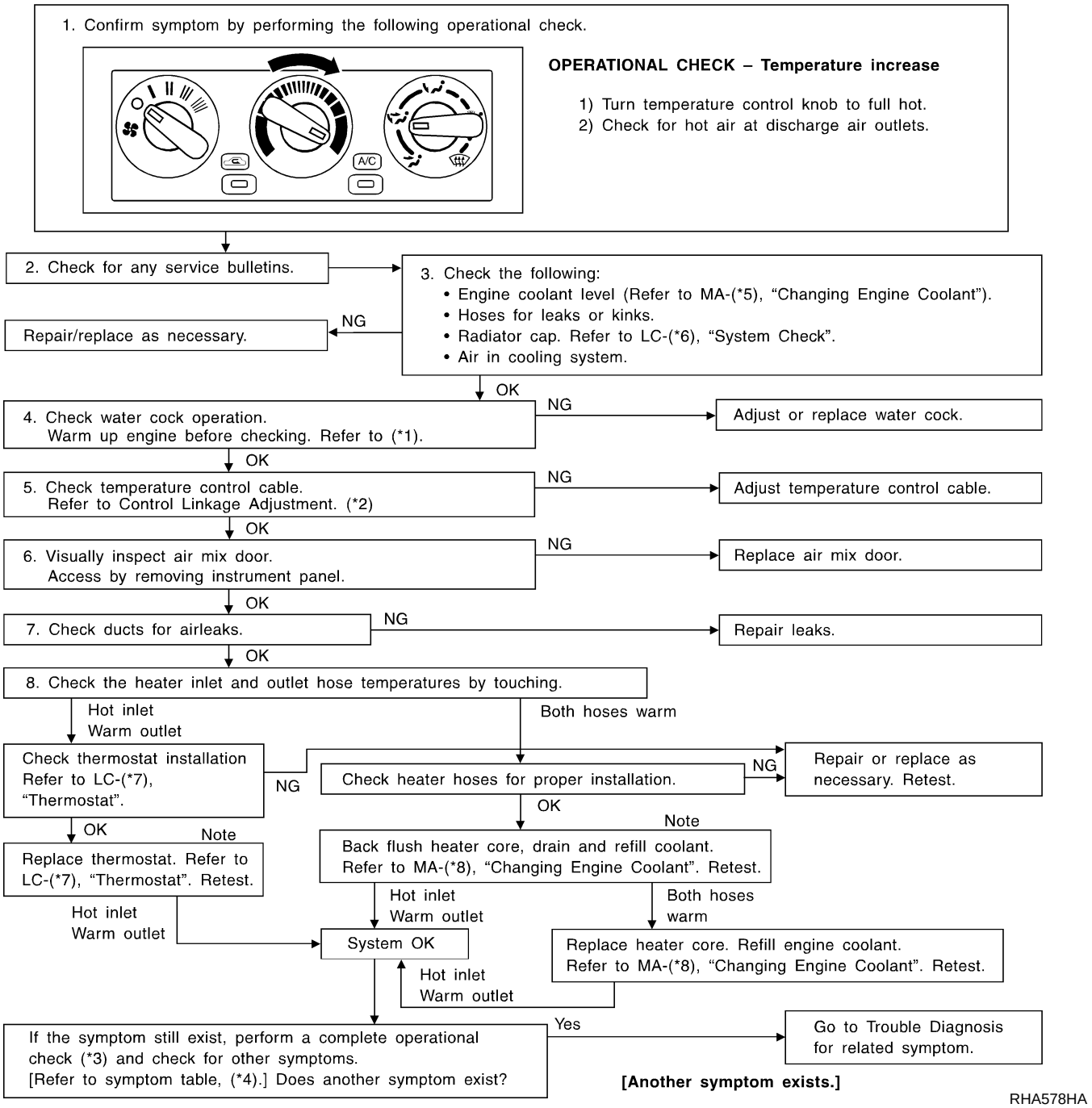
TROUBLE DIAGNOSIS PROCEDURE FOR INSUFFICIENT HEATING

=NAHA0140

Symptom:

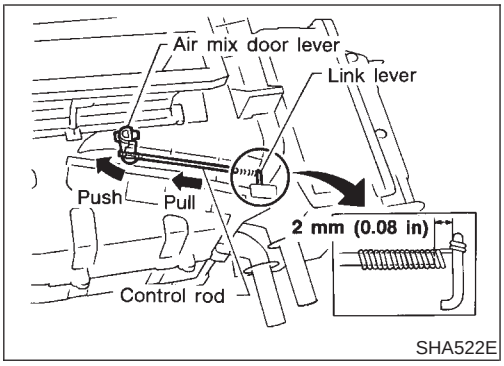
- **Insufficient Heating.**

Inspection Flow



RHA578HA

*1: HA-181
*2: HA-181
*3: HA-156
*4: HA-155
*5: MA-15
*6: LC-12
*7: LC-17
*8: MA-15



CONTROL LINKAGE ADJUSTMENT

NAHA0141

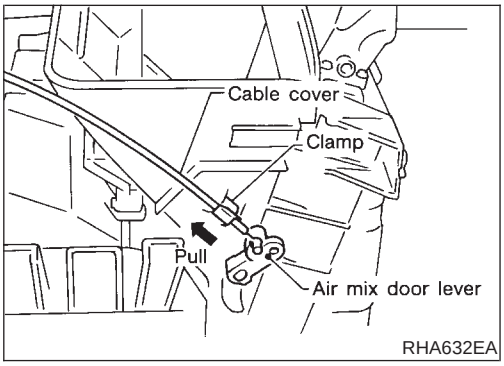
Water Cock Control Rod

NAHA0141S01

- **When adjusting water cock control rod, first disconnect temperature control cable from air mix door lever and then adjust control rod. Reconnect temperature control cable and readjust it. (Refer to TEMPERATURE CONTROL CABLE.)**

1. Push air mix door lever in direction of arrow.
2. Pull control rod of water cock in direction of arrow so as to make clearance of about 2 mm (0.08 in) between ends of rod and link lever and connect the rod to door lever.

After connecting control rod, check it operates properly.



Temperature Control Cable

NAHA0141S02

1. Move the temperature control knob to the full hot position.
2. Set the air mix door lever in the full hot position.
3. Pull on the cable cover in the direction of the arrow, then clamp it.

After positioning control cable, check that it operates properly.

Air Outlet

TROUBLE DIAGNOSIS PROCEDURE FOR AIR OUTLET

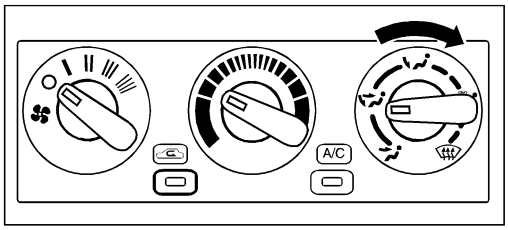
=NAHA0142

Symptom:

- **Air outlet does not change.**

Inspection Flow

1. Confirm symptom by performing the following operational check.



OPERATIONAL CHECK – Discharge air.

1) Turn mode control knob.

Discharge air flow

Mode control knob	Air outlet/distribution		
	Face	Foot	Defroster
	100%	–	–
	60%	40%	–
	–	80%	20%
	–	60%	40%
	–	–	100%

2) Confirm that discharge air comes out according to the air distribution table at left.
Refer to “Discharge Air Flow” in “DESCRIPTION” (*4).

2. Check for any service bulletins.

3. Check mode control cable. (*1)

OK

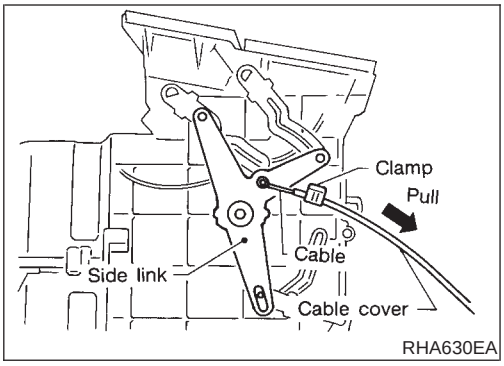
If the symptom still exist, perform a complete operational check (*2) and check for other symptoms.
[Refer to symptom table, (*3).]
Does another symptom exist?

Yes → Go to Trouble Diagnosis for related symptom.
[Another symptom exists.]

INSPECTION END

SHA263F

*1: HA-183
*2: HA-156
*3: HA-155
*4: HA-146



CONTROL LINKAGE ADJUSTMENT

NAHA0151

Mode Control Cable

NAHA0151S01

1. Turn the mode control knob to the DEF position.
2. Set the side link in the DEF position by hand.
3. Pull on the cable cover in the direction of the arrow, then clamp it.

After positioning control cable, check that it operates properly.

Magnet Clutch

TROUBLE DIAGNOSIS PROCEDURE FOR MAGNET CLUTCH

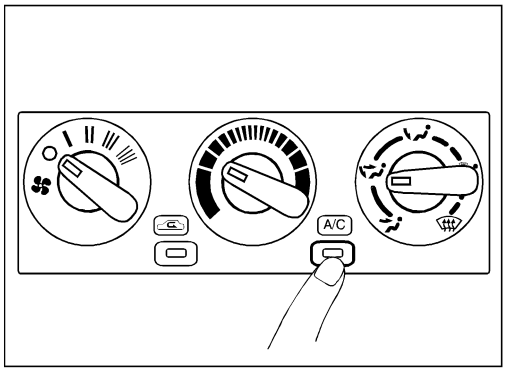
=NAHA0119

Symptom:

- **Magnet clutch does not operate when A/C switch and fan switch are ON.**

Inspection Flow

1. Confirm symptom by performing the following operational check.



OPERATIONAL CHECK – A/C switch

Turn fan control knob to the desired (1 to 4-speed) position and push the air conditioner switch to turn ON the air conditioner. The indicator light should come on when air conditioner is ON.

2. Check for any service bulletins.

3. Check compressor belt tension.
   Refer to MA-(*5), “Checking Drive Belts”.
   - NG → Adjust or replace compressor belt.
   - OK ↓

4. Check refrigerant.
   Connect manifold gauge then check system pressure.
   - NG → Check for refrigerant leaks. Refer to (*1).
   - OK ↓

5. Check magnet clutch circuit. (*2)
   - OK ↓

If the symptom still exist, perform a complete operational check (*3) and check for other symptoms.
[Refer to symptom table, (*4).]
Does another symptom exist?

- Yes → Go to Trouble Diagnosis for related symptom. **[Another symptom exists.]**
- INSPECTION END

SHA264FA

*1: HA-202
*2: HA-185
*3: HA-156
*4: HA-155
*5: MA-14

MAGNET CLUTCH CIRCUIT

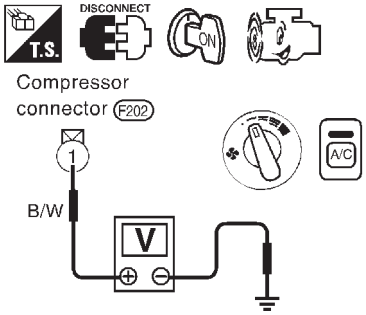
=NAHA0091

SYMPTOM:

- **Magnet clutch does not engage when A/C switch and fan switch are ON.**

1	CHECK POWER SUPPLY FOR COMPRESSOR

Disconnect compressor harness connector.
Do approx. 12 volts exist between compressor harness terminal No. 1 and body ground?



RHA747FA

Yes or No

Yes	▶	GO TO 2.
No	▶	Disconnect A/C relay. GO TO 3.

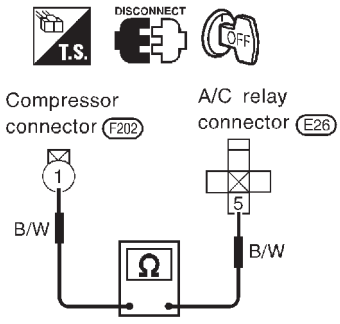
2	CHECK MAGNET CLUTCH COIL

OK or NG

NG	▶	Replace magnet clutch. Refer to HA-197.

3	CHECK CIRCUIT CONTINUITY BETWEEN A/C RELAY AND COMPRESSOR

Check circuit continuity between A/C relay harness terminal No. 5 and compressor harness terminal No. 1.



RHA748FA

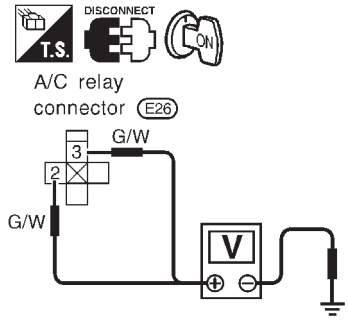
Continuity should exist.
If OK, check harness for short.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair harness or connector.

4	CHECK POWER SUPPLY FOR A/C RELAY

Disconnect A/C relay.
Do approx. 12 volts exist between A/C relay harness terminal Nos. 2, 3 and body ground?



RHA583F

Yes or No

Yes	▶	GO TO 5.
No	▶	Check power supply circuit and 7.5A (No. 6) fuse at fuse block. Refer to EL-14, "Wiring Diagram — POWER —".

5	CHECK A/C RELAY AFTER DISCONNECTING IT

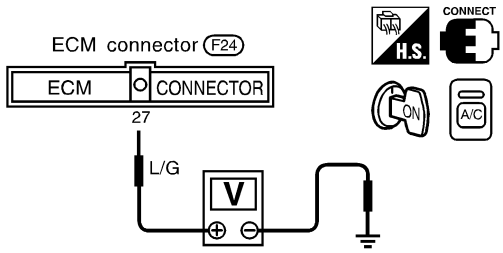
Refer to HA-190.

OK or NG

OK	▶	Reconnect A/C relay. GO TO 6.
NG	▶	Replace A/C relay.

6	CHECK COIL SIDE CIRCUIT OF A/C RELAY

Do approx. 12 volts exist between ECM harness terminal No. 27 and body ground?



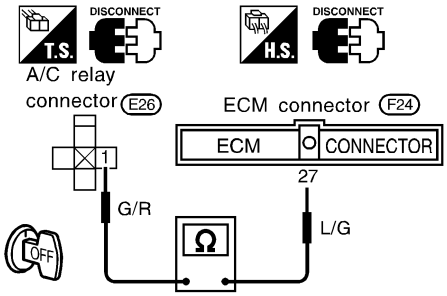
RHA482GG

Yes or No

Yes	▶	GO TO 8.
No	▶	Disconnect A/C relay. Disconnect ECM harness connector. GO TO 7.

7	CHECK CIRCUIT CONTINUITY BETWEEN A/C RELAY AND ECM

Check circuit continuity between A/C relay harness terminal No. 1 and ECM harness terminal No. 27.



RHA474GB

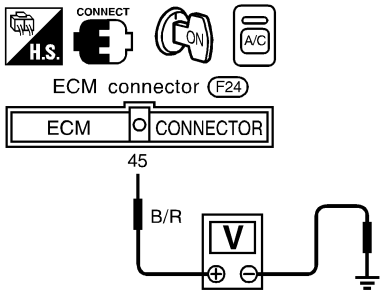
Continuity should exist.

OK or NG

OK	▶	Check harness for short.
NG	▶	Repair harness or connector.

8	CHECK VOLTAGE FOR ECM

Do approx. 4.6 volts exist between ECM harness terminal No. 45 and body ground?



RHA701FK

Yes or No

Yes	▶	Disconnect ECM harness connector. Disconnect dual-pressure switch harness connector. GO TO 9.
No	▶	Check ECM. Refer to EC-126, "ECM Terminals and Reference Value".

9	CHECK REFRIGERANT PRESSURE SENSOR

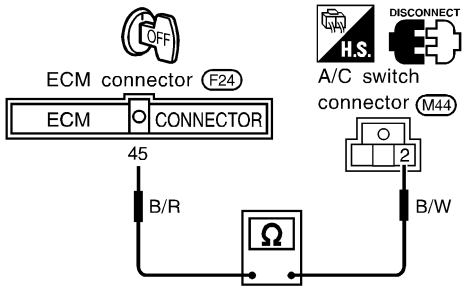
Refer to HA-190.

OK or NG

OK	▶	Disconnect A/C switch harness connector. GO TO 10.
NG	▶	Replace refrigerant pressure sensor.

10	CHECK CIRCUIT CONTINUITY BETWEEN ECM AND A/C SWITCH

Check circuit continuity between ECM harness terminal No. 45 and A/C switch harness terminal No. 2.



RHA847H

Continuity should exist.
If OK, check harness for short.

OK or NG

OK	▶	GO TO 11.
NG	▶	Repair harness or connector.

11	CHECK A/C SWITCH

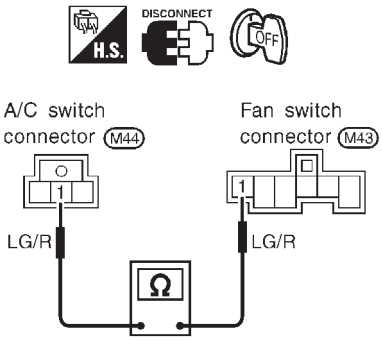
Refer to HA-190.

OK or NG

OK	▶	Disconnect fan switch harness connector. GO TO 12.
NG	▶	Replace A/C switch.

12	CHECK CIRCUIT CONTINUITY BETWEEN A/C SWITCH AND FAN SWITCH

Check circuit continuity between A/C switch harness terminal No. 1 and fan switch harness terminal No. 1.



RHA617F

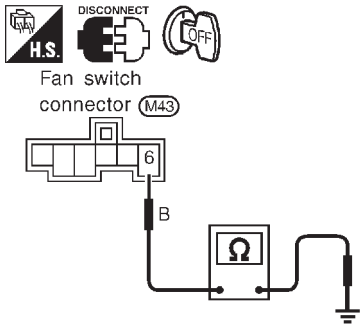
Continuity should exist.
If OK, check harness for short.

OK or NG

OK	▶	GO TO 13.
NG	▶	Repair harness or connector.

13	CHECK BODY GROUND CIRCUIT FOR FAN SWITCH

Does continuity exist between fan switch harness terminal No. 6 and body ground?



RHA588F

Yes or No

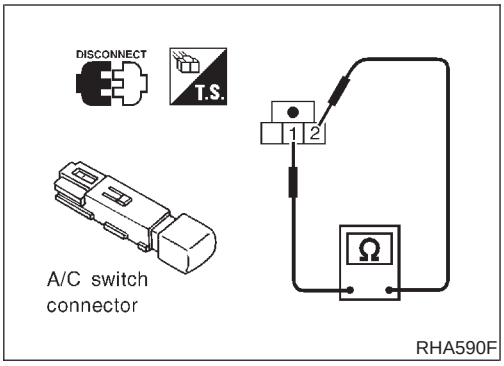
Yes	▶	GO TO 14.
No	▶	Repair harness or connector.

14	CHECK FAN SWITCH

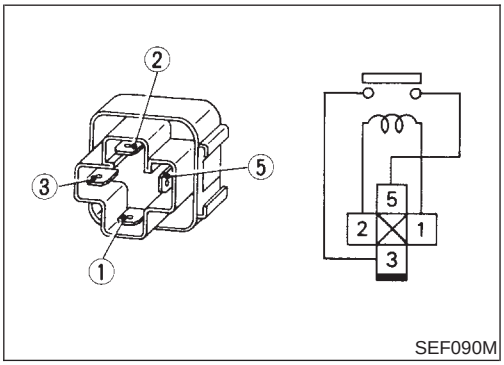
Refer to HA-166.

OK or NG

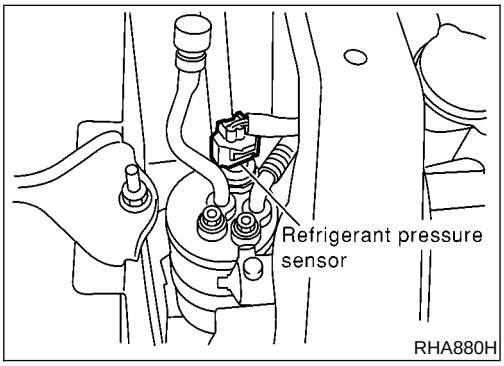
OK	▶	INSPECTION END
NG	▶	Replace fan switch.



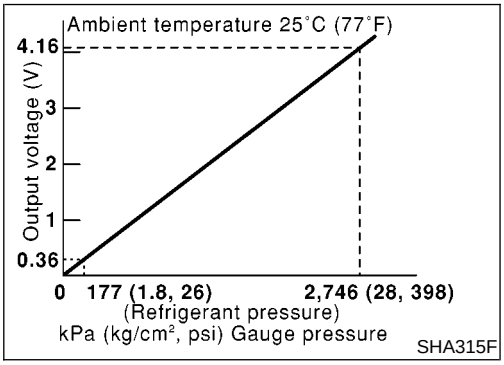
RHA590F



SEF090M



RHA880H



SHA315F

ELECTRICAL COMPONENTS INSPECTION

=NAHA0092

A/C Switch

NAHA0092S04

Check continuity between terminals at each switch position.

Switch condition	Terminal No.		Continuity
A/C	(+)	(−)	
ON	2	1	Yes
OFF			No

A/C Relay

NAHA0092S07

Check continuity between terminal Nos. 3 and 5.

Conditions	Continuity
12V direct current supply between terminal Nos. 1 and 2	Yes
No current supply	No

If NG, replace relay.

Refrigerant Pressure Sensor

NAHA0092S08

Make sure that higher A/C refrigerant pressure results in higher refrigerant-pressure sensor output voltage.

Check voltage between ECM harness terminal No. 81 and body ground.

Noise

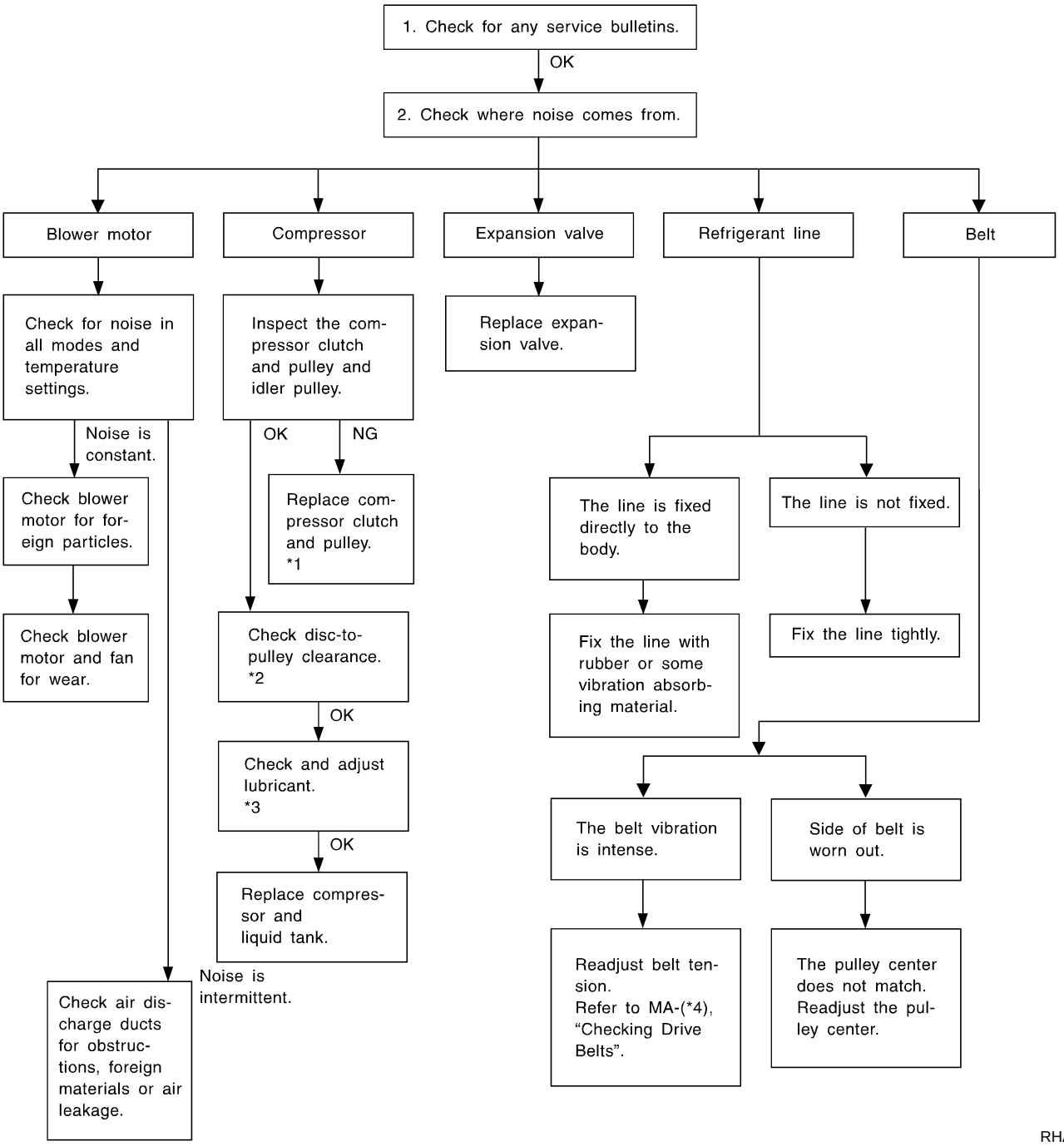
TROUBLE DIAGNOSIS PROCEDURE FOR NOISE

=NAHA0080

Symptom:

- **Noise**

Inspection Flow



RHA586H

*1: HA-199
*2: HA-199
*3: HA-194
*4: MA-14

HFC-134a (R-134a) Service Procedure

NAHA0094

SETTING OF SERVICE TOOLS AND EQUIPMENT

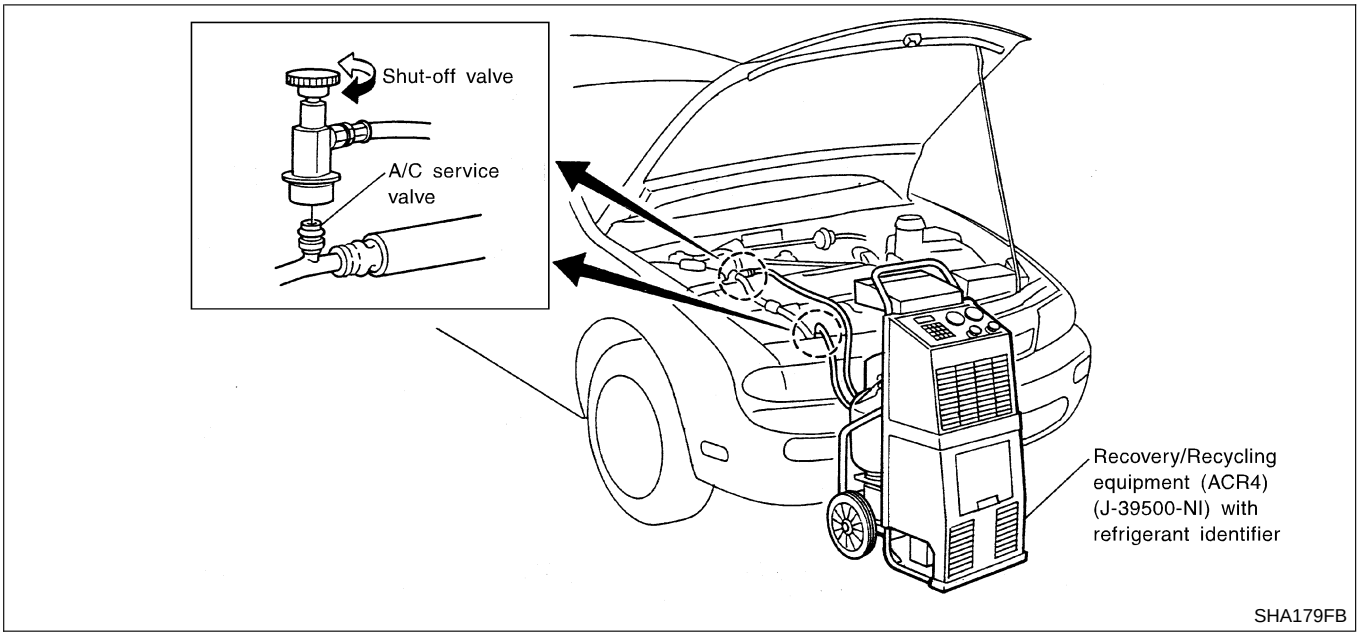
NAHA0094S01

Discharging Refrigerant

NAHA0094S0101

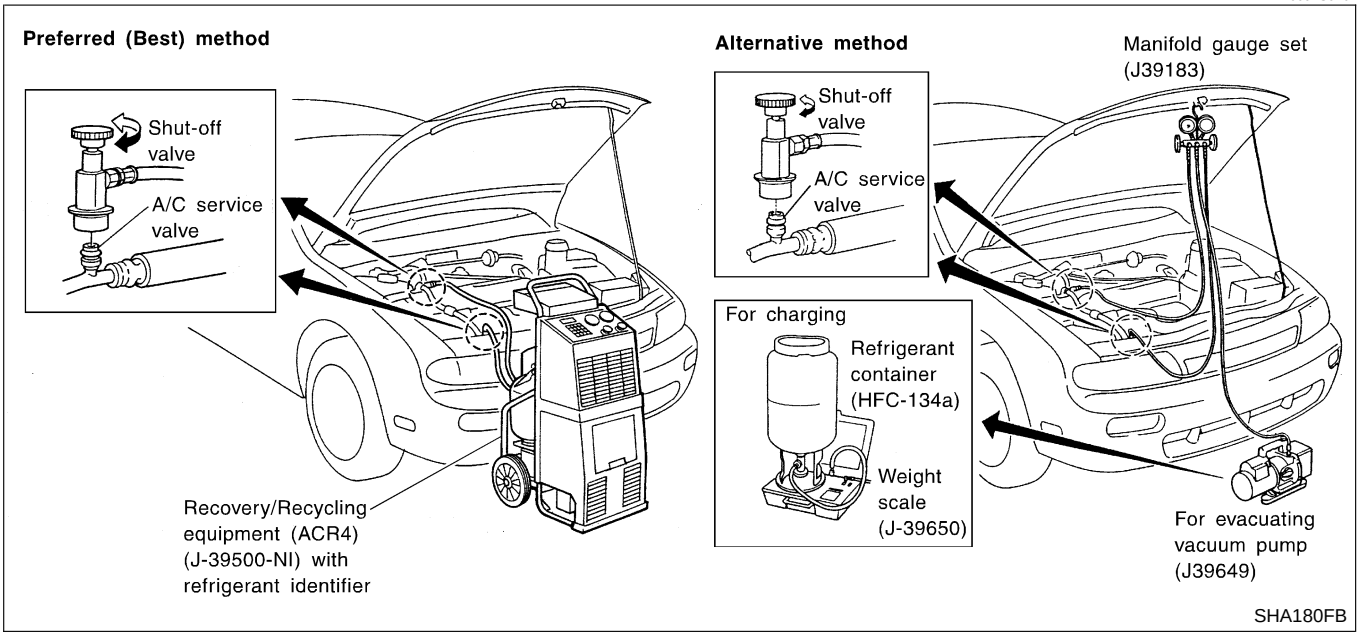
WARNING:

Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. Remove HFC-134a (R-134a) from A/C system using certified service equipment meeting requirements of SAE J2210 (R-134a recycling equipment) or J2209 (R-134a recovery equipment). If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.

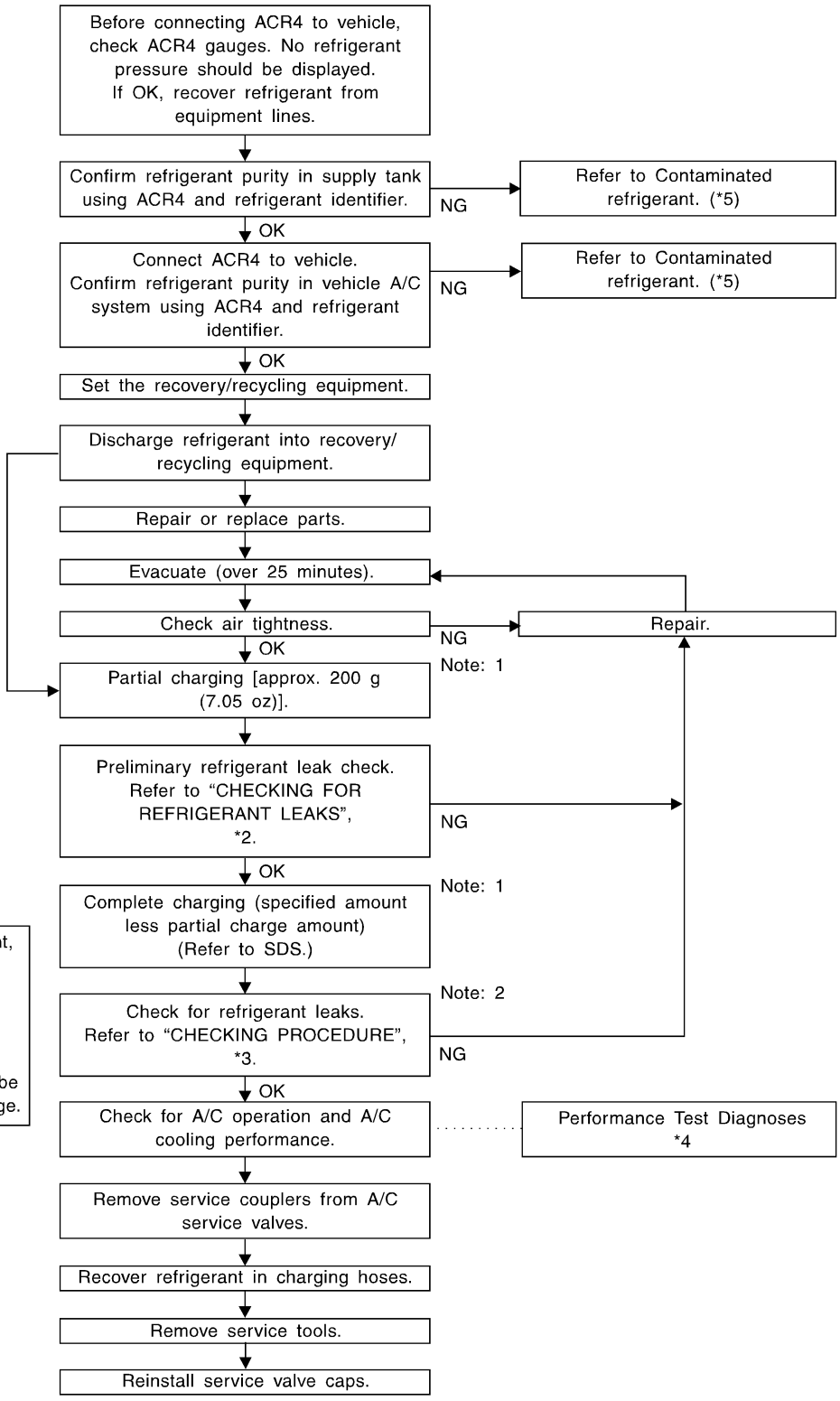


Evacuating System and Charging Refrigerant

NAHA0094S0102



Recovered lubricant. Refer to "CHECKING AND ADJUSTING", *1.



Note: 1 Before charging refrigerant, ensure engine is off.
Note: 2 Befofe checking for leaks, start engine to activate air conditioning system then turn engine off. Service valve caps must be installed to prevent leakage.

SHA193FA

*1: HA-194
*2: HA-202
*3: HA-204
*4: HA-173
*5: HA-127

Maintenance of Lubricant Quantity in Compressor

NAHA0095

The lubricant in the compressor circulates through the system with the refrigerant. Add lubricant to compressor when replacing any component or after a large gas leakage occurred. It is important to maintain the specified amount.
If lubricant quantity is not maintained properly, the following malfunctions may result:

- Lack of lubricant: May lead to a seized compressor
- Excessive lubricant: Inadequate cooling (thermal exchange interference)

LUBRICANT

NAHA0095S01

Name: Nissan A/C System Oil Type S
Part number: KLH00-PAGS0

CHECKING AND ADJUSTING

NAHA0095S02

Adjust the lubricant quantity according to the test group shown below.

1	LUBRICANT RETURN OPERATION	
Can lubricant return operation be performed? ● A/C system works properly. ● There is no evidence of a large amount of lubricant leakage.		
	Yes or No	
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	PERFORM LUBRICANT RETURN OPERATION, PROCEEDING AS FOLLOWS	
1. Start engine, and set the following conditions: ● **Test condition** **Engine speed: Idling to 1,200 rpm** **A/C or AUTO switch: ON** **Blower speed: Max. position** **Temp. control: Optional [Set so that intake air temperature is 25 to 30°C (77 to 86°F).]** 2. **Next item is for V-5 or V-6 compressor. Connect the manifold gauge, and check that the high pressure side pressure is 588 kPa (6 kg/cm^2, 85 psi) or higher.** **If less than the reference level, attach a cover to the front face of the condenser to raise the pressure.** 3. Perform lubricant return operation for about 10 minutes. 4. Stop engine. **CAUTION:** **If excessive lubricant leakage is noted, do not perform the lubricant return operation.**		
	▶	GO TO 3.

3	CHECK COMPRESSOR	
Should the compressor be replaced?		
	Yes or No	
Yes	▶	GO TO HA-195.
No	▶	GO TO 4.

4	CHECK ANY PART	
Is there any part to be replaced? (Evaporator, condenser, liquid tank or in case there is evidence of a large amount of lubricant leakage.)		
Yes or No		
Yes	▶	GO TO HA-195.
No	▶	Carry out the A/C performance test.

Lubricant Adjusting Procedure for Components Replacement Except Compressor

NAHA0095S0201

After replacing any of the following major components, add the correct amount of lubricant to the system.

Amount of lubricant to be added

Part replaced	Lubricant to be added to system	Remarks
	Amount of lubricant mℓ (US fl oz, Imp fl oz)	
Evaporator	75 (2.5, 2.6)	—
Condenser	75 (2.5, 2.6)	—
Liquid tank	5 (0.2, 0.2)	Add if compressor is not replaced. *1
In case of refrigerant leak	30 (1.0, 1.1)	Large leak
	—	Small leak *2

*1: If compressor is replaced, addition of lubricant is included in the table.
*2: If refrigerant leak is small, no addition of lubricant is needed.

Lubricant Adjustment Procedure for Compressor Replacement

NAHA0095S0202

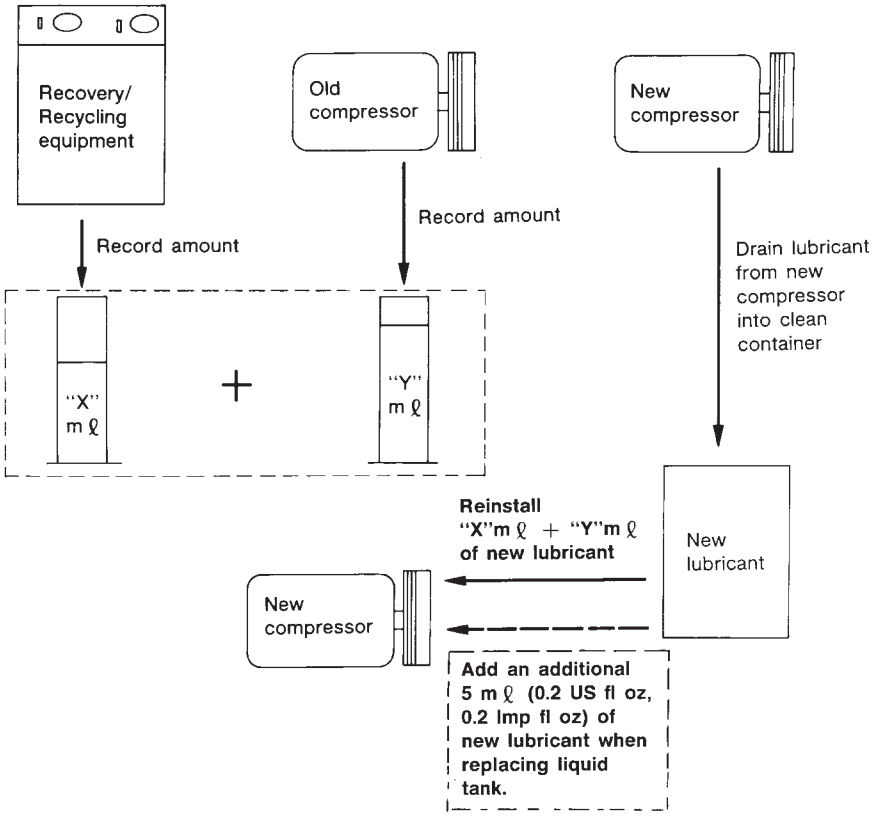
1. Before connecting ACR4 to vehicle, check ACR4 gauges. No refrigerant pressure should be displayed. If OK, recover refrigerant from equipment lines.
2. Confirm refrigerant purity in supply tank using ACR4 and refrigerant identifier. If NG, refer to "CONTAMINATED REFRIGERANT", HA-127.
3. Connect ACR4 to vehicle. Confirm refrigerant purity in vehicle A/C system using ACR4 and refrigerant identifier. If NG, refer to "CONTAMINATED REFRIGERANT", HA-127.
4. Discharge refrigerant into the refrigerant recovery/recycling equipment. Measure lubricant discharged into the recovery/recycling equipment.
5. Remove the drain plug of the "old" (removed) compressor. Drain the lubricant into a graduated container and record the amount of drained lubricant.
6. Remove the drain plug and drain the lubricant from the "new" compressor into a separate, clean container.
7. Measure an amount of new lubricant installed equal to amount drained from "old" compressor. Add this lubricant to "new" compressor through the suction port opening.
8. Measure an amount of new lubricant equal to the amount recovered during discharging. Add this lubricant to "new" compressor through the suction port opening.
9. Torque the drain plug.

   V-6 compressor:

   18 - 19 N·m (1.8 - 1.9 kg-m, 13 - 14 ft-lb)

10. If the liquid tank also needs to be replaced, add an additional 5 mℓ (0.2 US fl oz, 0.2 Imp fl oz) of lubricant at this time.
Do not add this 5 mℓ (0.2 US fl oz, 0.2 Imp fl oz) of lubricant if only replacing the compressor.

Lubricant adjusting procedure for compressor replacement

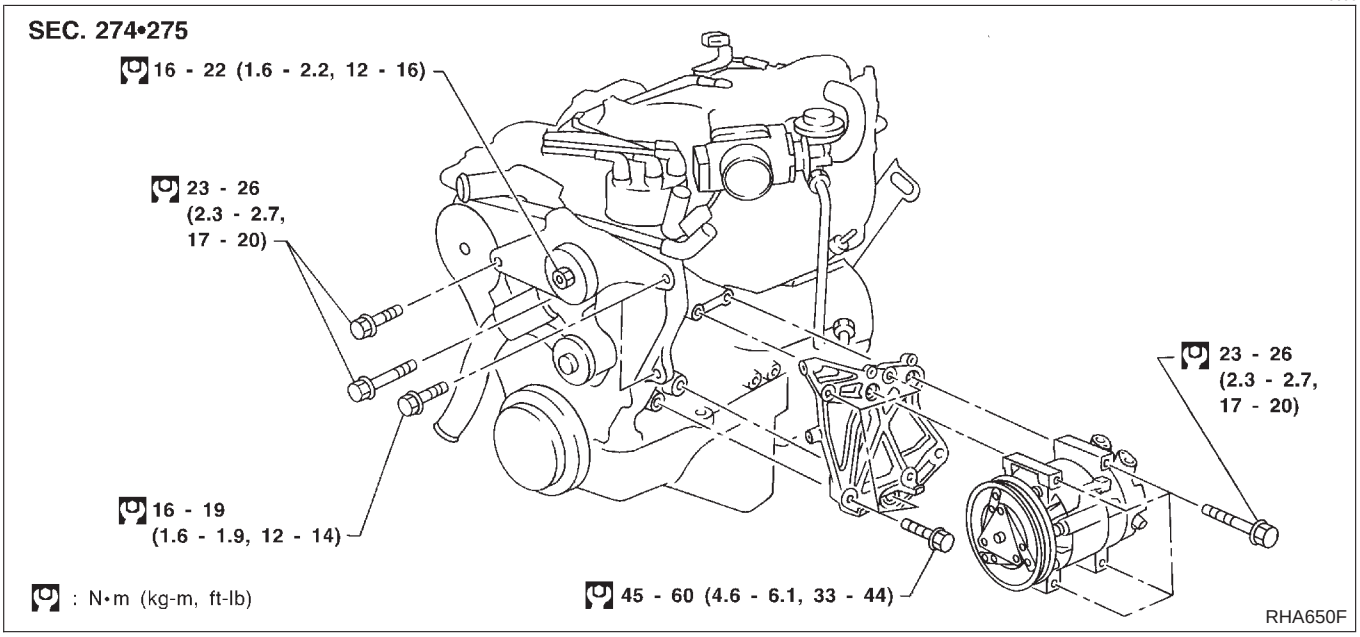


RHA065DD

Compressor

REMOVAL AND INSTALLATION

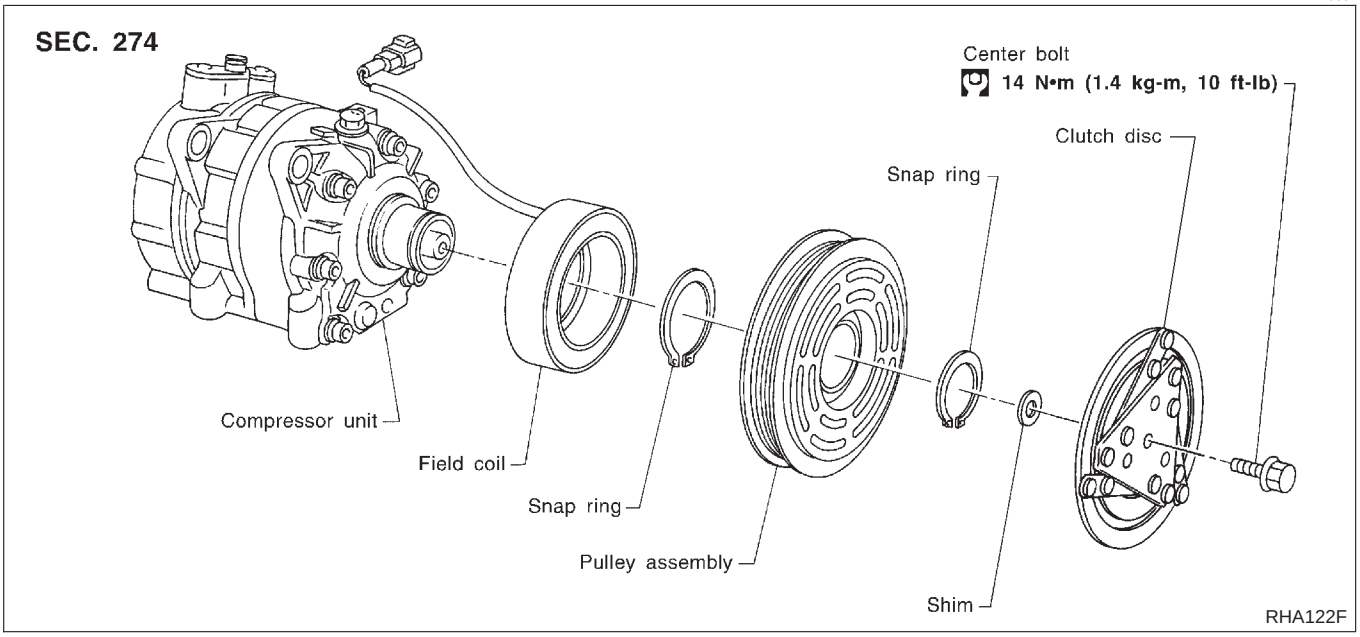
NAHA0096

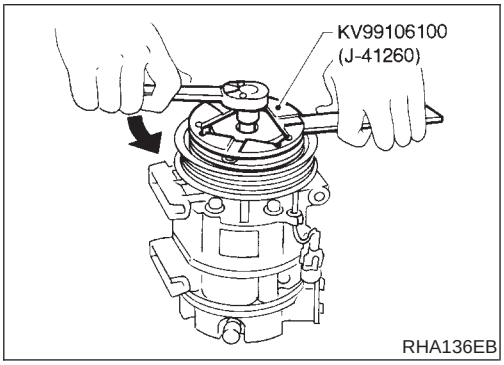


Compressor Clutch

OVERHAUL

NAHA0097

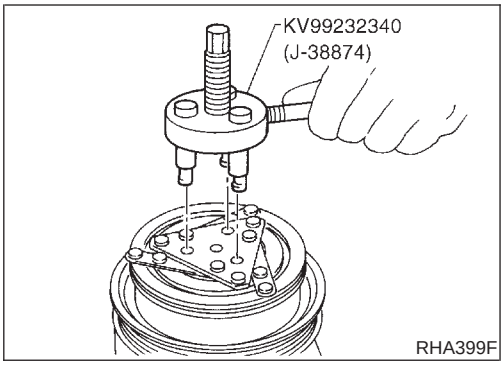


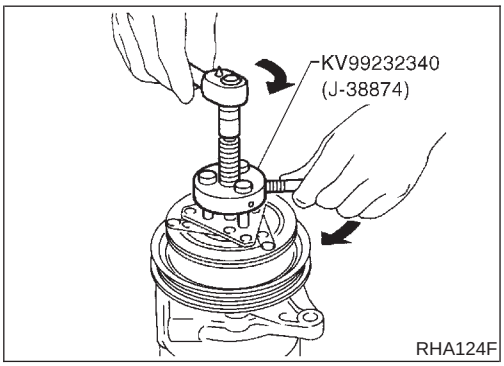


REMOVAL

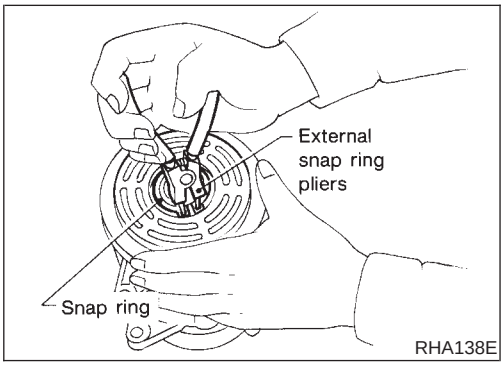
NAHA0098

- When removing center bolt, hold clutch disc with clutch disc wrench.

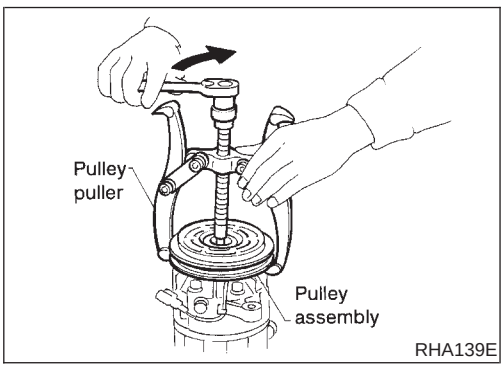




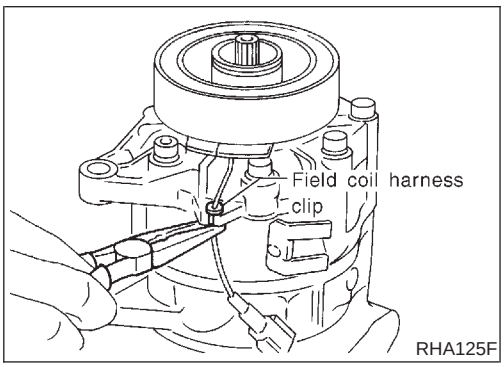
- Remove the clutch disc using the clutch disc puller.
  Insert the holder's three pins into the holes in the clutch disc. Rotate the holder clockwise to hook it onto the plate. Then, tighten the center bolt to remove the clutch disc.
  After removing the clutch disc, remove the shims from either the drive shaft or the clutch disc.



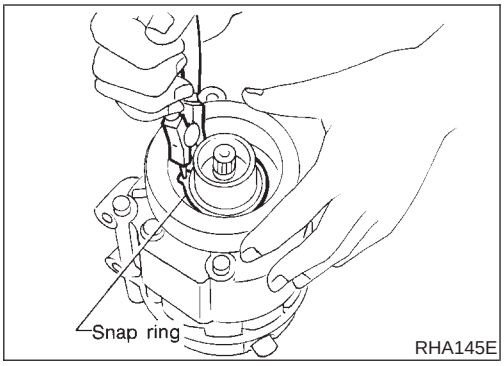
- Remove the snap ring using external snap ring pliers.



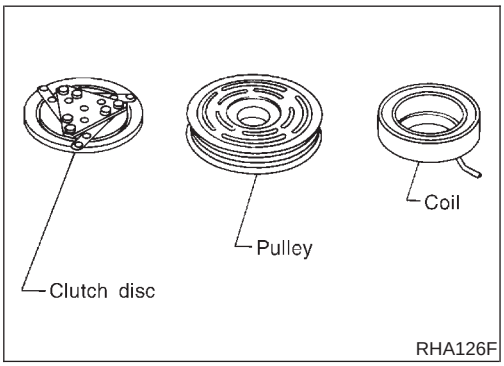
- Pulley removal
  Position the center pulley puller on the end of the drive shaft, and remove the pulley assembly using any commercially available pulley puller.
  To prevent the pulley groove from being deformed, the puller claws should be positioned onto the edge of the pulley assembly.



- Remove the field coil harness clip using a pair of pliers.



- Remove the snap ring using external snap ring pliers.



INSPECTION

NAHA0099

Clutch Disc

NAHA0099S01

If the contact surface shows signs of damage due to excessive heat, replace clutch disc and pulley.

Pulley

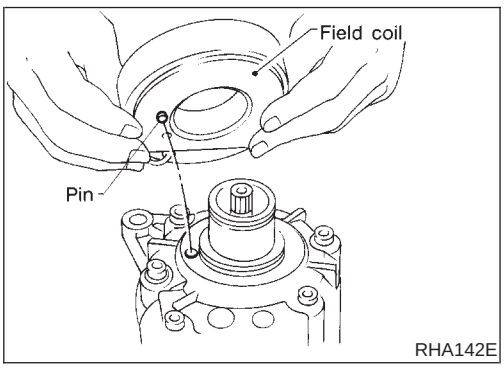
NAHA0099S02

Check the appearance of the pulley assembly. If the contact surface of pulley shows signs of excessive grooving, replace clutch disc and pulley. The contact surfaces of the pulley assembly should be cleaned with a suitable solvent before reinstallation.

Coil

NAHA0099S03

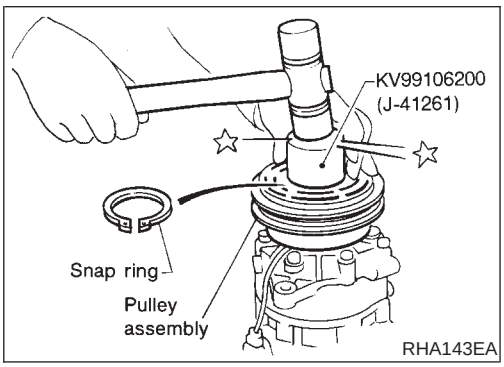
Check coil for loose connection or cracked insulation.



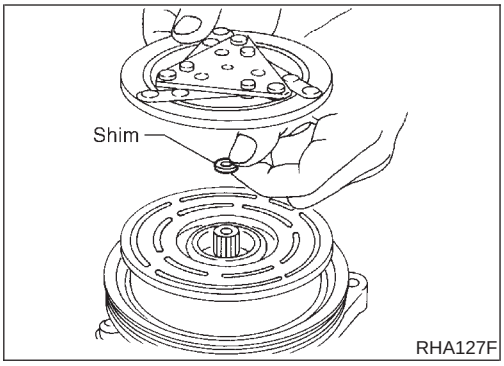
INSTALLATION

NAHA0100

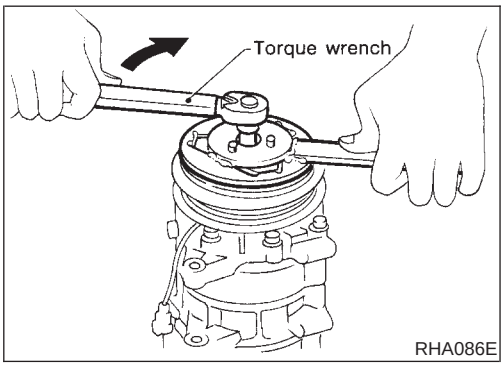
- Install the field coil.
  Be sure to align the coil's pin with the hole in the compressor's front head.
- Install the field coil harness clip using a screwdriver.



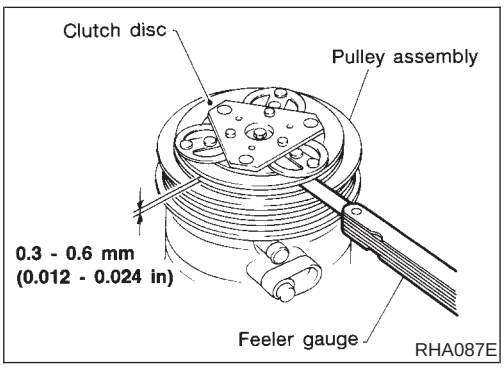
- Install the pulley assembly using the installer and a hand press, and then install the snap ring using snap ring pliers.



- Install the clutch disc on the drive shaft, together with the original shim(s). Press the clutch disc down by hand.



- Using the holder to prevent clutch disc rotation, tighten the bolt to 14 N·m (1.4 kg-m, 10 ft-lb) torque.
  After tightening the bolt, check that the pulley rotates smoothly.



- Check clearance around the entire periphery of clutch disc.
  Disc-to-pulley clearance:
  0.3 - 0.6 mm (0.012 - 0.024 in)
  If the specified clearance is not obtained, replace adjusting spacer and readjust.

Break-in Operation

NAHA0100S01

When replacing compressor clutch assembly, always carry out the break-in operation. This is done by engaging and disengaging the clutch about thirty times. Break-in operation raises the level of transmitted torque.

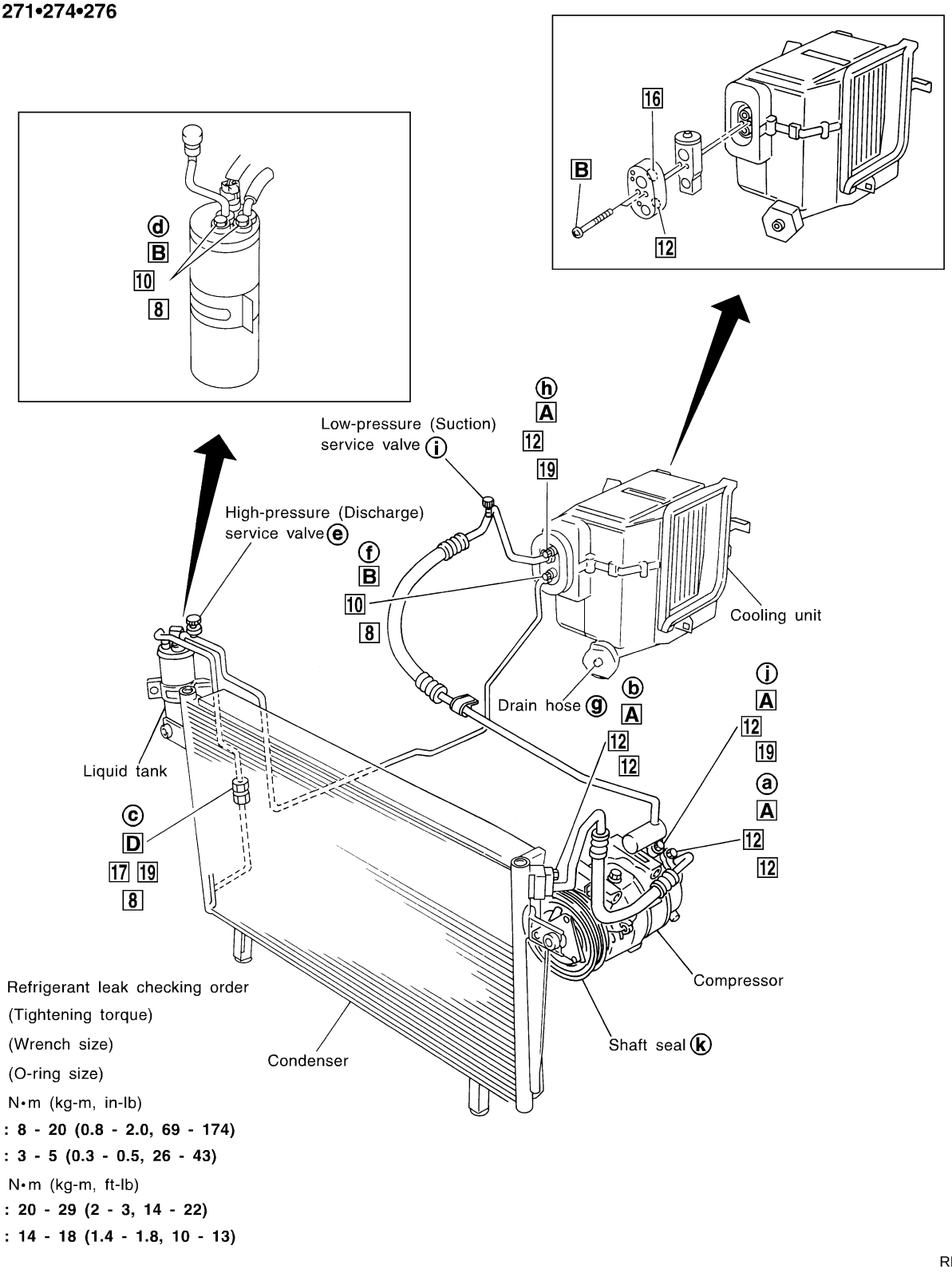
Refrigerant Lines

REMOVAL AND INSTALLATION

=NAHA0101

- Refer to page HA-129 regarding “Precautions for Refrigerant Connection”.

SEC. 271•274•276



◯ : Refrigerant leak checking order
□ (Tightening torque)
□□ (Wrench size)
□ (O-ring size)
: N•m (kg-m, in-lb)
A : 8 - 20 (0.8 - 2.0, 69 - 174)
B : 3 - 5 (0.3 - 0.5, 26 - 43)
: N•m (kg-m, ft-lb)
C : 20 - 29 (2 - 3, 14 - 22)
D : 14 - 18 (1.4 - 1.8, 10 - 13)

RHA838H

CHECKING FOR REFRIGERANT LEAKS

=NAHA0102

- Perform a visual inspection of all refrigeration parts, fittings, hoses and components for signs of A/C lubricant leakage, damage and corrosion. A/C lubricant leakage may indicate an area of refrigerant leakage. Allow extra inspection time in these areas when using either an electronic refrigerant leak detector or fluorescent dye leak detector.
- If dye is observed, confirm the leak with an electronic refrigerant leak detector. It is possible a prior leak was repaired and not properly cleaned.
- When searching for leaks, do not stop when one leak is found but continue to check for additional leaks at all system components and connections.
- When searching for refrigerant leaks using an electronic leak detector, move the probe along the suspected leak area at 1 to 2 inches per second and no further than 1/4 inch from the component.

NOTE:
Moving the electronic leak detector probe slower and closer to the suspected leak area will improve the chances of finding a leak.

CHECKING SYSTEM FOR LEAKS USING THE FLUORESCENT LEAK DETECTOR

NAHA0253

1. Check A/C system for leaks using the UV lamp and safety glasses (J-42220) in a low sunlight area (area without windows preferable). Illuminate all components, fittings and lines. The dye will appear as a bright green/yellow area at the point of leakage. Fluorescent dye observed at the evaporator drain opening indicates an evaporator core assembly (tubes, core or TXV) leak.
2. If the suspected area is difficult to see, use an adjustable mirror or wipe the area with a clean shop rag or cloth, then check the cloth with the UV lamp for dye residue.
3. After the leak is repaired, remove any residual dye using dye cleaner (J-43872) or prevent future misdiagnosis.
4. Perform a system performance check and verify the leak repair with an approved electronic refrigerant leak detector.

NOTE:
- **Other gases in the work area or substances on the A/C components, for example, anti-freeze, windshield washer fluid, solvents and lubricants, may falsely trigger the leak detector. Make sure the surfaces to be checked are clean. Clean with a dry cloth or blow off with shop air.**
- **Do not allow the sensor tip of the detector to contact with any substance. This can also cause false readings and may damage the detector.**

DYE INJECTION

NAHA0256

(This procedure is only necessary when re-charging the system or when the compressor has seized and was replaced.)

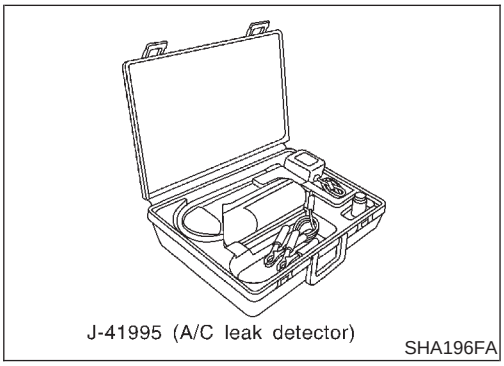
1. Check A/C system static (at rest) pressure. Pressure must be at least 345 kPa (50 psi).
2. Pour one bottle (1/4 ounce/7.4 cc) of the A/C refrigerant dye into the injector tool (J-41459).
3. Connect the injector tool to the A/C LOW PRESSURE side service fitting.
4. Start engine and switch A/C ON.

5. With the A/C operating (compressor running), inject one bottle (1/4 ounce/7.4 cc) of fluorescent dye through the low-pressure service valve using dye injector tool J-41459 (refer to the manufacture's operating instructions).
6. With the engine still running, disconnect the injector tool from the service fitting.

CAUTION:
Be careful not to allow dye to spray or drip when disconnecting the injector from the system.

NOTE:
If repairing the A/C system or replacing a component, pour the dye directly into the open system connection and proceed with the service procedures.

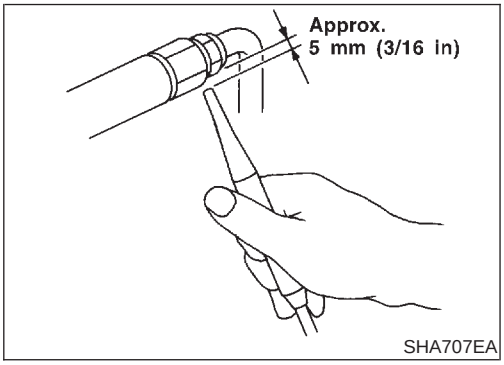
7. Operate the A/C system for a minimum of 20 minutes to mix the dye with the system oil. Depending on the leak size, operating conditions and location of the leak, it may take from minutes to days for the dye to penetrate a leak and become visible.


J-41995 (A/C leak detector)
SHA196FA

ELECTRONIC REFRIGERANT LEAK DETECTOR
NAHA0254

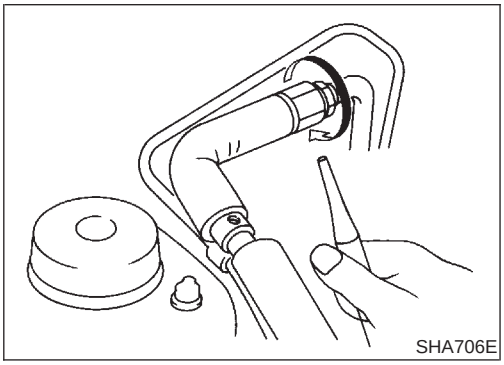
Precautions for Handling Leak Detector
NAHA0254S01

When performing a refrigerant leak check, use a J-41995 A/C leak detector or equivalent. Ensure that the instrument is calibrated and set properly per the operating instructions.
The leak detector is a delicate device. In order to use the leak detector properly, read the operating instructions and perform any specified maintenance.

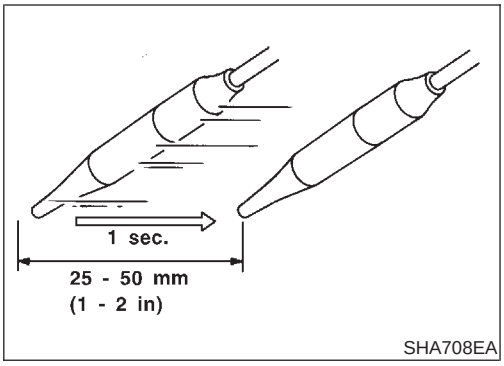


SHA707EA

1. Position probe approximately 5 mm (3/16 in) away from point to be checked.


SHA706E

2. When testing, circle each fitting completely with probe.



3. Move probe along component approximately 25 to 50 mm (1 to 2 in)/sec.

Checking Procedure

NAHA0254S02

To prevent inaccurate or false readings, make sure there is no refrigerant vapor, shop chemicals, or cigarette smoke in the vicinity of the vehicle. Perform the leak test in calm area (low air/wind movement) so that the leaking refrigerant is not dispersed.

1. Turn engine off.
2. Connect a suitable A/C manifold gauge set to the A/C service ports.
3. Check if the A/C refrigerant pressure is at least 345 kPa (3.52 kg/cm^2, 50 psi) above 16°C (61°F). If less than specification, recover/evacuate and recharge the system with the specified amount of refrigerant.

NOTE:
At temperatures below 16°C (61°F), leaks may not be detected since the system may not reach 345 kPa (3.52 kg/cm^2, 50 psi).

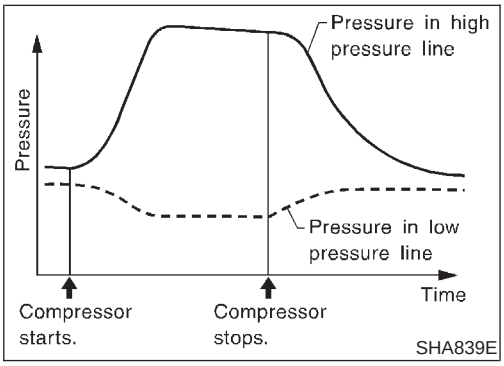
4. Conduct the leak test from the high side (compressor discharge **a** to evaporator inlet **f**) to the low side (evaporator drain hose **g** to shaft seal **k**). Refer to HA-201. Perform a leak check for the following areas carefully. Clean the component to be checked and move the leak detector probe completely around the connection/component.

- **Compressor**
  Check the fitting of high and low pressure hoses, relief valve and shaft seal.
- **Liquid tank**
  Check the pressure switch, tube fitting, weld seams and the fusible plug mount.
- **Service valves**
  Check all around the service valves. Ensure service valve caps are secured on the service valves (to prevent leaks).

NOTE:
After removing A/C manifold gauge set from service valves, wipe any residue from valves to prevent any false readings by leak detector.

- **Cooling unit (Evaporator)**
  With engine OFF, turn blower fan on "High" for at least 15 seconds to dissipate any refrigerant trace in the cooling unit. Wait a minimum of 10 minutes accumulation time (refer to the manufacturer's recommended procedure for actual wait time) before inserting the leak detector probe into the drain hose. Keep the probe inserted for at least ten seconds. Use caution not to contaminate the ptobe tip with water or dirt that may be in the drain hose.

5. If a leak detector detects a leak, verify at least once by blowing compressed air into area of suspected leak, then repeat check as outlined above.
6. Do not stop when one leak is found. Continue to check for additional leaks at all system components.
   If no leaks are found, perform steps 7 - 10.
7. Start engine.
8. Set the heater A/C control as follows:
   1) A/C switch ON.
   2) Face mode
   3) Recirculation switch ON
   4) Max cold temperature
   5) Fan speed high
9. Run engine at 1,500 rpm for at least 2 minutes.
10. Turn engine off and perform leak check again following steps 4 through 6 above.



Refrigerant leaks should be checked immediately after stopping the engine. Begin with the leak detector at the compressor. The pressure on the high pressure side will gradually drop after refrigerant circulation stops and pressure on the low pressure side will gradually rise, as shown in the graph. Some leaks are more easily detected when pressure is high.

11. Before connecting ACR4 to vehicle, check ACR4 gauges. No refrigerant pressure should be displayed. If pressure is displayed, recover refrigerant from equipment lines and then check refrigerant purity.
12. Confirm refrigerant purity in supply tank using ACR4 and refrigerant identifier.
13. Confirm refrigerant purity in vehicle A/C system using ACR4 and refrigerant identifier.
14. Discharge A/C system using approved refrigerant recovery equipment. Repair the leaking fitting or component as necessary.
15. Evacuate and recharge A/C system and perform the leak test to confirm no refrigerant leaks.
16. Conduct A/C performance test to ensure system works properly.

Belt

TENSION ADJUSTMENT

NAHA0103

- **Refer to MA-14, “Checking Drive Belts”.**

Manual

COMPRESSOR

NAHA0105

Model		CALSONIC make V-6
Type		V-6 variable displacement
Displacement cm^3 (cu in)/rev.	Max.	184 (11.228)
	Min.	14.5 (0.885)
Cylinder bore x stroke mm (in)		37 (1.46) x [2.3 - 28.6 (0.091 - 1.126)]
Direction of rotation		Clockwise (viewed from drive end)
Drive belt		Poly V

LUBRICANT

NAHA0106

Model		CALSONIC make V-6
Name		Nissan A/C System Oil Type S
Part number*		KLH00-PAGS0
Capacity mℓ (US fl oz, Imp fl oz)	Total in system	200 (6.8, 7.0)
	Compressor (Service part) charging amount	200 (6.8, 7.0)

*: Always check with the Parts Department for the latest parts information.

REFRIGERANT

NAHA0107

Type	HFC-134a (R-134a)
Capacity kg (lb)	0.60 - 0.70 (1.32 - 1.54)

ENGINE IDLING SPEED (WHEN A/C IS ON)

NAHA0108

- **Refer to EC-647, “Idle Speed and Ignition Timing”.**

BELT TENSION

NAHA0109

- **Refer to MA-14, “Checking Drive Belts”.**

NOTES

STARTING & CHARGING SYSTEM

SECTION SC

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Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

NASC0001

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL R50 is as follows:

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, Refer to RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.**

Wiring Diagrams and Trouble Diagnosis

NASC0002

When you read wiring diagrams, refer to the following:

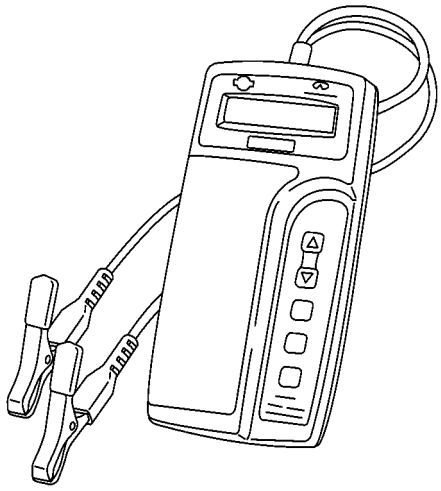
- GI-11, “HOW TO READ WIRING DIAGRAMS”
- EL-9, “POWER SUPPLY ROUTING” for power distribution circuit

When you perform trouble diagnosis, refer to the following:

- GI-35, “HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSIS”
- GI-24, “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”

Special Service Tool

NASC0017

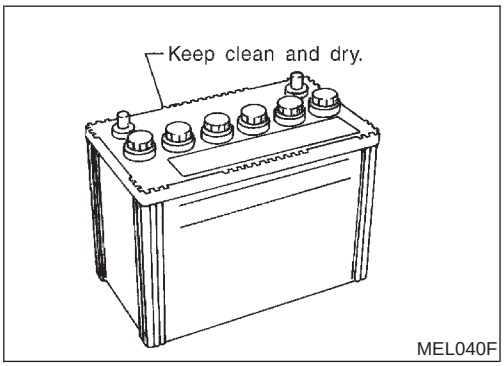
Tool number Tool name	Description
J-44373 Model 620 Battery/Starting/Charging system tester	 SEL403X

How to Handle Battery

NASC0003

CAUTION:

- **If it becomes necessary to start the engine with a booster battery and jumper cables, use a 12-volt booster battery.**
- **After connecting battery cables, ensure that they are tightly clamped to battery terminals for good contact.**
- **Never add distilled water through the hole used to check specific gravity.**



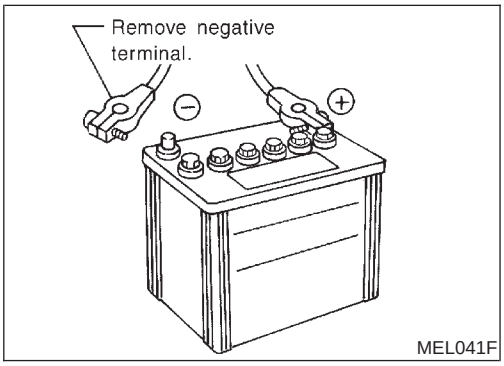
MEL040F

METHODS OF PREVENTING OVER-DISCHARGE

NASC0003S01

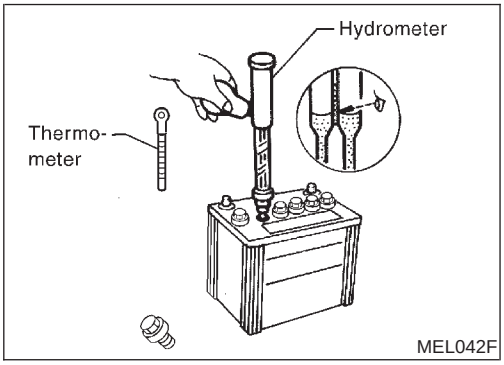
The following precautions must be taken to prevent over-discharging a battery.

- The battery surface (particularly its top) should always be kept clean and dry.
- The terminal connections should be clean and tight.
- At every routine maintenance, check the electrolyte level. This also applies to batteries designated as “low maintenance” and “maintenance-free”.



MEL041F

- When the vehicle is not going to be used over a long period of time, disconnect the negative battery terminal. (If the vehicle has an extended storage switch, turn it off.)



MEL042F

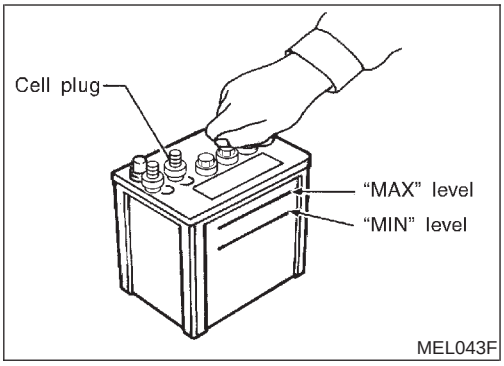
- Check the charge condition of the battery. Periodically check the specific gravity of the electrolyte. Keep a close check on charge condition to prevent over-discharge.

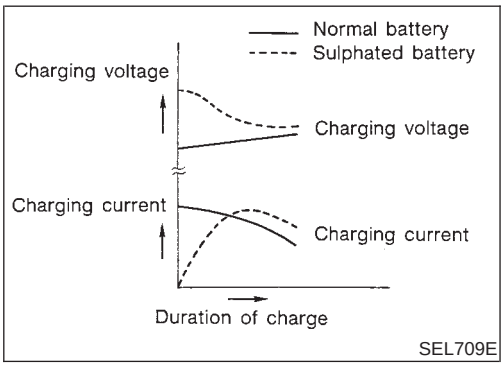
CHECKING ELECTROLYTE LEVEL

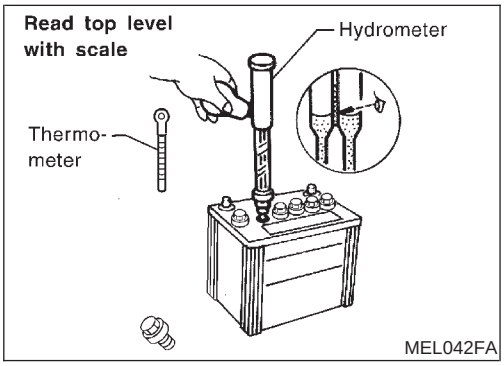
NASC0003S02

WARNING:

Do not allow battery fluid to come in contact with skin, eyes, fabrics, or painted surfaces. After touching a battery, do not touch or rub your eyes until you have thoroughly washed your hands. If acid contacts eyes, skin or clothing, immediately flush with water for 15 minutes and seek medical attention.







- Remove the cell plug using a suitable tool.
- Add distilled water up to the MAX level.

Sulphation

NASC0003S0201

A battery will be completely discharged if it is left unattended for a long time and the specific gravity will become less than 1.100. This may result in sulphation on the cell plates.
To determine if a battery has been "sulphated", note its voltage and current when charging it. As shown in the figure, less current and higher voltage are observed in the initial stage of charging sulphated batteries.
A sulphated battery may sometimes be brought back into service by means of a long, slow charge, 12 hours or more, followed by a battery capacity test.

SPECIFIC GRAVITY CHECK

NASC0003S03

1. Read hydrometer and thermometer indications at eye level.

2. Use the chart below to correct your hydrometer reading according to electrolyte temperature.

Hydrometer Temperature Correction

NASC0003S0301

Battery electrolyte temperature °C (°F)	Add to specific gravity reading
71 (160)	0.032
66 (150)	0.028
60 (140)	0.024
54 (130)	0.020
49 (120)	0.016
43 (110)	0.012
38 (100)	0.008
32 (90)	0.004
27 (80)	0
21 (70)	−0.004
16 (60)	−0.008
10 (50)	−0.012

Battery electrolyte temperature °C (°F)	Add to specific gravity reading
4 (40)	−0.016
−1 (30)	−0.020
−7 (20)	−0.024
−12 (10)	−0.028
−18 (0)	−0.032

Corrected specific gravity	Approximate charge condition
1.260 - 1.280	Fully charged
1.230 - 1.250	3/4 charged
1.200 - 1.220	1/2 charged
1.170 - 1.190	1/4 charged
1.140 - 1.160	Almost discharged
1.110 - 1.130	Completely discharged

CHARGING THE BATTERY

NASC0003S04

CAUTION:

- **Do not "quick charge" a fully discharged battery.**
- **Keep the battery away from open flame while it is being charged.**
- **When connecting the charger, connect the leads first, then turn on the charger. Do not turn on the charger first, as this may cause a spark.**
- **If battery electrolyte temperature rises above 60°C (140°F), stop charging. Always charge battery at a temperature below 60°C (140°F).**

Charging Rates

NASC0003S0401

Amps	Time
50	1 hour
25	2 hours
10	5 hours
5	10 hours

Do not charge at more than 50 ampere rate.

NOTE:

The ammeter reading on your battery charger will automatically decrease as the battery charges. This indicates that the voltage of the battery is increasing normally as the state of charge improves. The charging amps indicated above refer to initial charge rate.

- If, after charging, the specific gravity of any two cells varies more than .050, the battery should be replaced.

Trouble Diagnoses with Battery/Starting/Charging System Tester

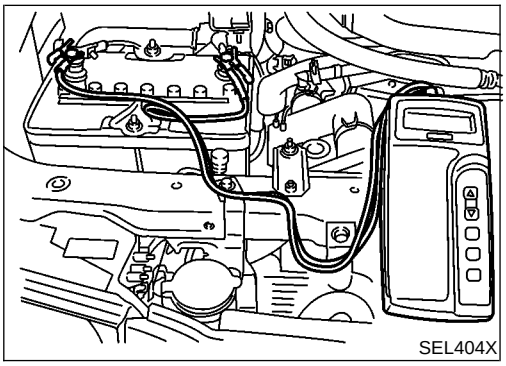
NASC0018

CAUTION:

When working with batteries, always wear appropriate eye protection.

NOTE:

- To ensure a complete and thorough diagnosis, the battery, starter and alternator test segments must be done as a set from start to finish.
- If battery surface charge is detected while testing, the tester will prompt you to turn on the headlights to remove the surface charge.
- If necessary, the tester will prompt you to determine if the battery temperature is above or below 0°C (32°F). Choose the appropriate selection by pressing the up or down arrow button, then press “ENTER” to make the selection.



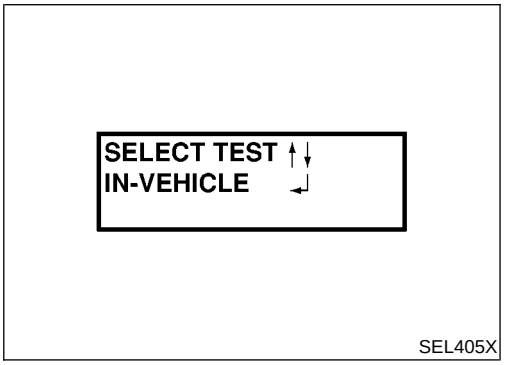
SEL404X

1. Turn off all loads on the vehicle electrical system. Clean or repair as necessary.
2. Visually inspect the battery, battery terminals and cable ends with ignition switch in “OFF” position.

NOTE:

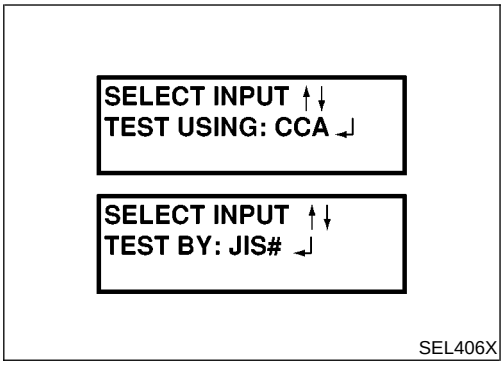
The contact surface between the battery terminals, cable ends and tester leads must be clean for a valid test. A poor connection will prevent testing and a “CHECK CONNECTION” message will appear during the test procedures. If this occurs, clean the battery post and terminals, reconnect them and restart the test.

3. Connect the red tester lead clamp to the positive battery terminal, and the black to the negative terminal.



SEL405X

4. The tester will turn on automatically. Using the arrow keys, select “IN VEHICLE” on the tester and then press the “ENTER” key.



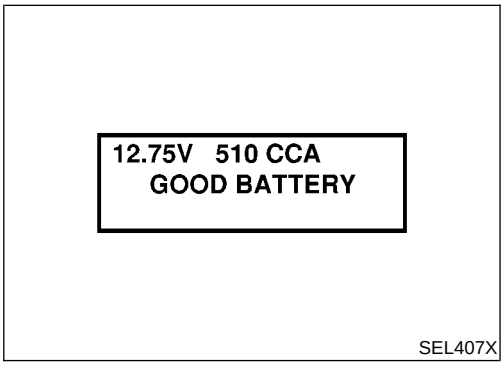
5. Locate the battery type and rating stamped or written on the top case of the battery to be tested.

NOTE:
The battery type and rating will have either of the following.

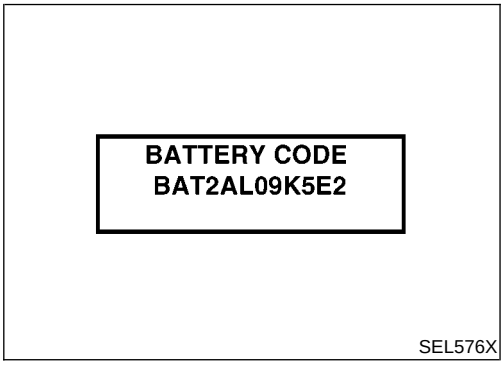
CCA: Cold Cranking Amps (490 CCA, 550 CCA, etc.)
JIS: Japanese Industrial Standard.
Battery is stamped with a number such as:
80D26L: 80 (rank of output), D (physical size-depth), 26 (width in cm). The last character L (post configuration) is not input into the tester.
The tester requires the rating for the battery be entered exactly as it is written or stamped on the battery. Do not attempt a CCA conversion for JIS stamped batteries. JIS must be input directly.

6. Using the arrow and "ENTER" keys alternately, select the battery type and rating.

NOTE:
The tester lists five choices; CCA, JIS, IEC, DIN, and EN. Only use CCA or JIS.



7. Press "ENTER" to begin the test. Diagnosis results are displayed on the tester. Refer to "DIAGNOSTIC RESULT ITEM CHART" on the next page.



8. Press "ENTER", then test output code is displayed. Record the test output code on the repair order.
9. Toggle back to the "DIAGNOSTIC SCREEN" for test results.

NOTE:
- If necessary, the tester will ask the user to determine if the battery has just been charged. Choose the appropriate selection by pressing the up or down arrow button and then press the "ENTER" button to make the selection.
- When testing a battery installed in a vehicle that has recently been driven, select "BEFORE CHANGE".
- If the battery has just been slow charged due to a "CHARGE & RETEST" decision by the tester, and the tester asks the user "BEFORE CHARGE/AFTER CHARGE", select "AFTER CHARGE".

DIAGNOSTIC RESULT ITEM CHART

NASC0018S01

Diagnostic item	Service procedure
GOOD BATTERY	Battery is OK, go to "Trouble Diagnoses", "STARTING SYSTEM". Refer to SC-13.
REPLACE BATTERY	Replace battery. Before replacing battery, clean the battery cable clamps and battery posts. Perform battery test again with Battery/Starting/Charging system tester. If second test result is "Replace Battery", then do so. Perform battery test again to confirm repair.
BAD CELL-REPLACE	Replace the battery. Perform battery test again with Battery/Starting/Charging system tester to confirm repair.
GOOD-RECHARGE	Perform the slow battery charging procedure. (Initial rate of charge is 10A for 12 hours.) Perform battery test again with Battery/Starting/Charging system tester.
CHARGE & RETEST	Perform the slow battery charging. (Initial rate of charge is 10A for 12 hours.) Perform battery test again with Battery/Starting/Charging system tester to confirm repair. **NOTE:** **If the tester asks the user "BEFORE CHARGE/AFTER CHARGE", select "AFTER CHARGE".**

System Description

NASC0004

WITH M/T

NASC0004S02

Power is supplied at all times

- to ignition switch terminal 1
- through 40A fusible link (letter **e**, located in the fuse and fusible link box).

With the ignition switch in the START position, power is supplied

- through terminal 5 of the ignition switch
- to clutch interlock relay terminal 5.

With the ignition switch in the ON or START position, power is supplied

- through 10A fuse [No. 21, located in the fuse block (J/B)]
- to clutch interlock relay terminal 1.

If clutch pedal is depressed, ground is supplied

- to clutch interlock relay terminal 2.
- through clutch interlock switch.

The clutch interlock relay is energized and power is supplied

- from terminal 3 of the clutch interlock relay
- to terminal 2 of the starter motor windings.

The starter motor plunger closes and provides a closed circuit between the battery and the starter motor. The starter motor is grounded to the cylinder block. With power and ground supplied, cranking occurs and the engine starts.

WITH A/T

NASC0004S01

Power is supplied at all times

- to ignition switch terminal 1
- through 40A fusible link (letter **e**, located in the fuse and fusible link box).

With the ignition switch in the ON or START position, power is supplied through 10A fuse [No. 18, located in the fuse block (J/B)].

- to park/neutral position relay terminal 1.

Also, with the ignition switch in the START position, power is supplied

- from ignition switch terminal 5
- to park/neutral position relay terminal 6.

With the selector lever in the P or N position, ground is supplied

- to park/neutral position relay terminal 2 through the park/neutral position switch.

Then park/neutral position relay is energized and power is supplied

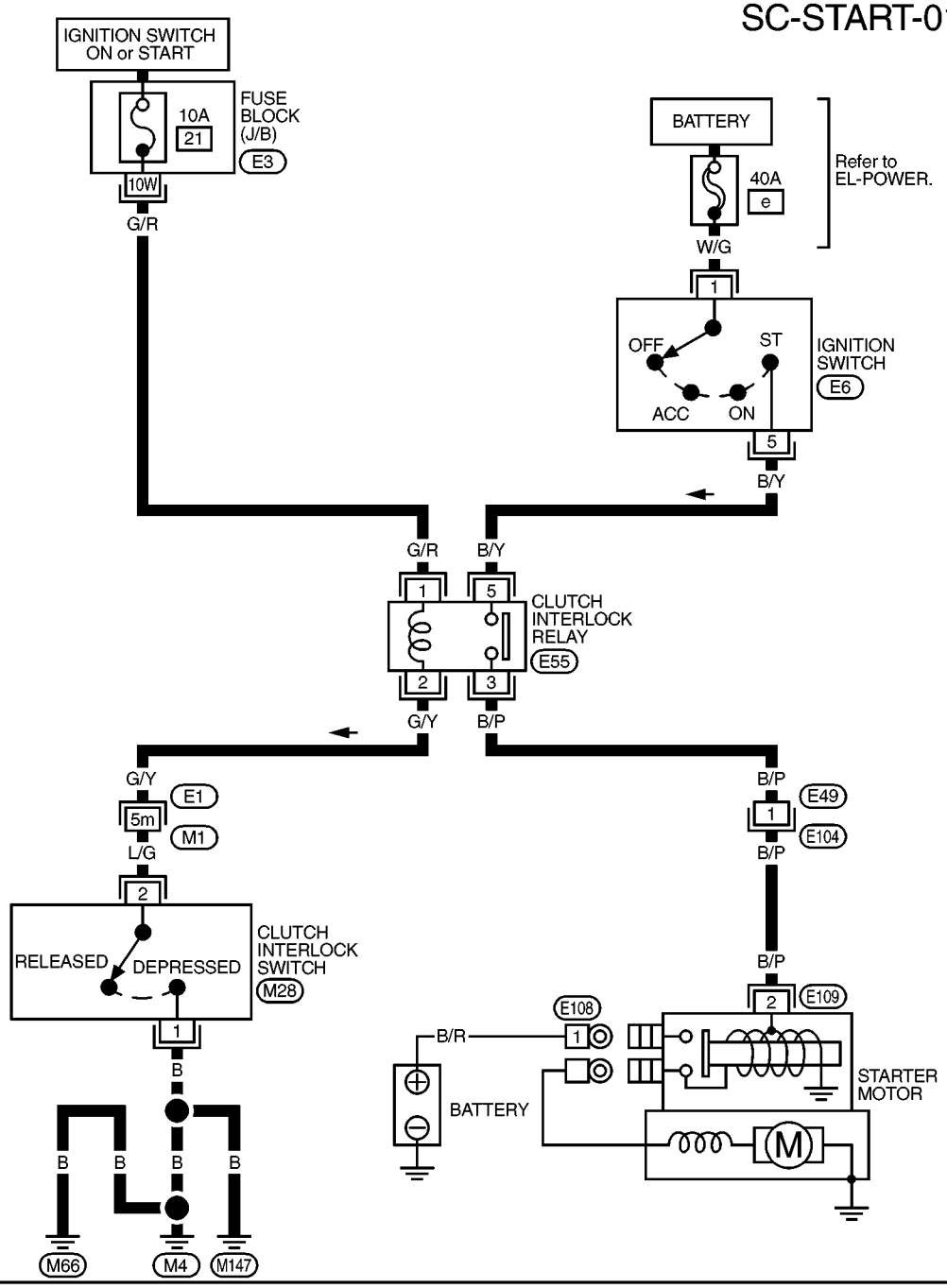
- from park/neutral position relay terminal 7
- to terminal 2 of the starter motor windings.

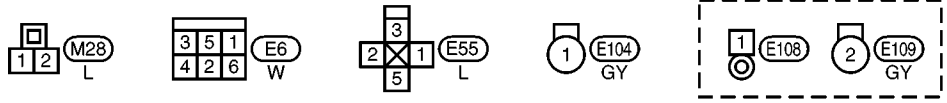
The starter motor plunger closes and provides a closed circuit between the battery and starter motor. The starter motor is grounded to the engine block. With power and ground supplied, cranking occurs and the engine starts.

Wiring Diagram — START —/With M/T

NASC0005

SC-START-01



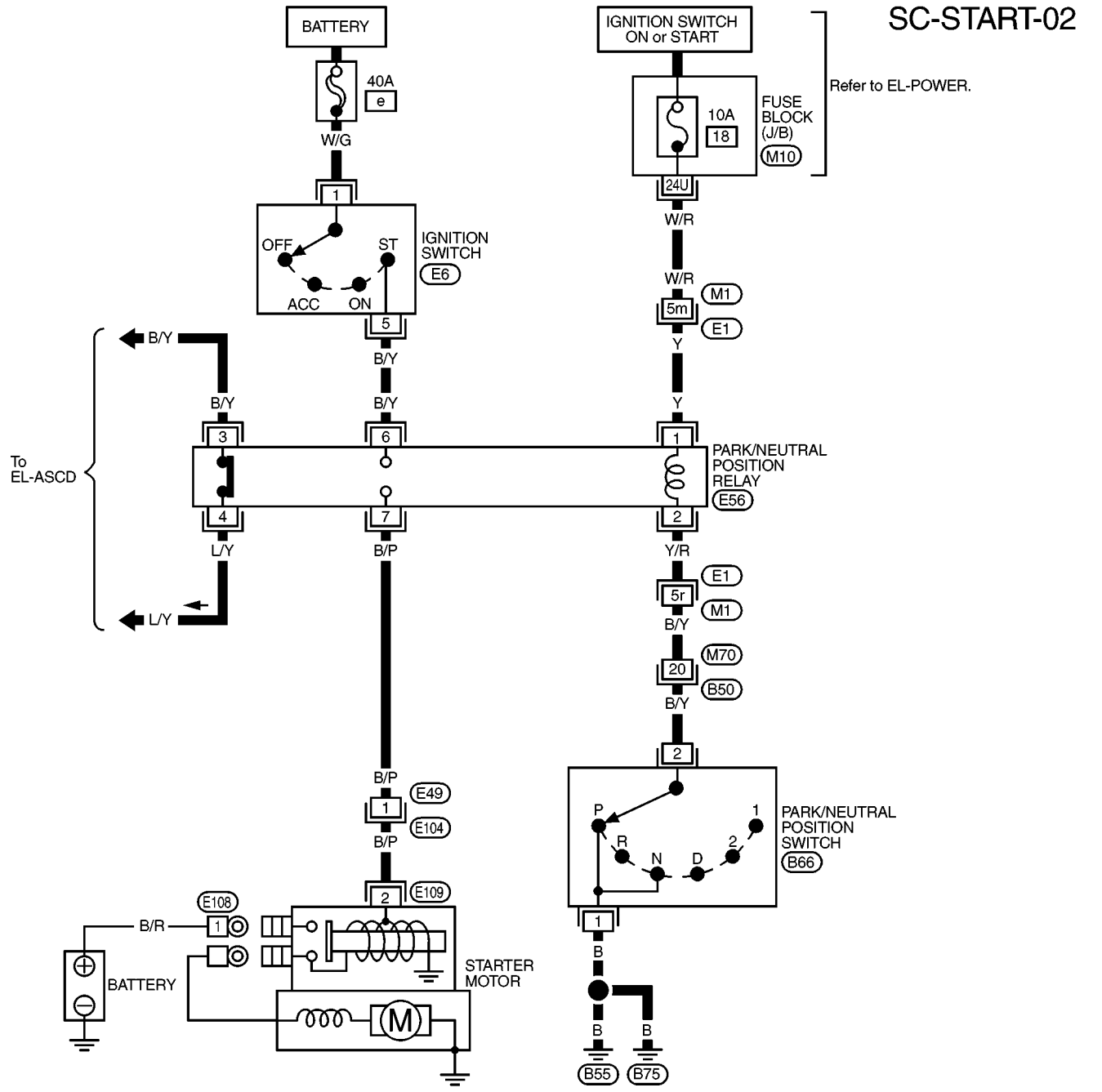


REFER TO THE FOLLOWING.
E1 - SUPER MULTIPLE JUNCTION (SMJ)
E3 - FUSE BLOCK - JUNCTION BOX (J/B)

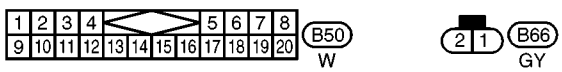
MEL947L

Wiring Diagram — START —/With A/T

NASC0021







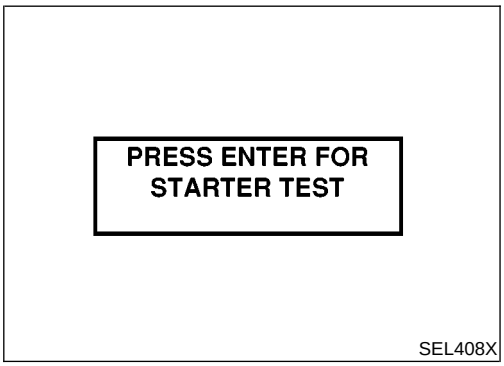
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK- JUNCTION BOX (J/B)

MEL948L

Trouble Diagnoses with Battery/Starting/Charging System Tester

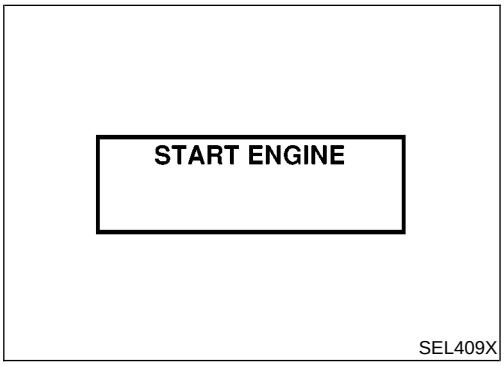
NASC0019

NOTE:
To ensure a complete and thorough diagnosis, the battery, starter and alternator test segments must be done as a set from start to finish.



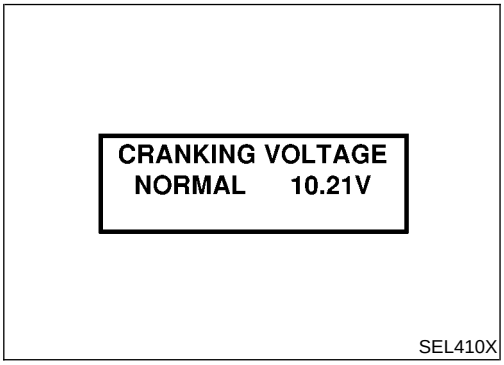
SEL408X

1. Turn off all loads on the vehicle electrical system.
2. Perform battery test with Battery/Starting/Charging system tester. Refer to SC-7.
3. Press “ENTER” to begin the starting system test.



SEL409X

4. Start the engine.



SEL410X

5. Diagnosis result is displayed on the tester. Refer to “DIAGNOSTIC RESULT ITEM CHART” on the next page.

NOTE:
- If the starter performs normally but the engine does not start, perform engine diagnosis.
- For intermittent “NO CRANK” or “NO STARTER OPERATION” incidents, go to DIAGNOSTIC PROCEDURE 2.

Trouble Diagnoses with Battery/Starting/Charging System Tester (Cont'd)

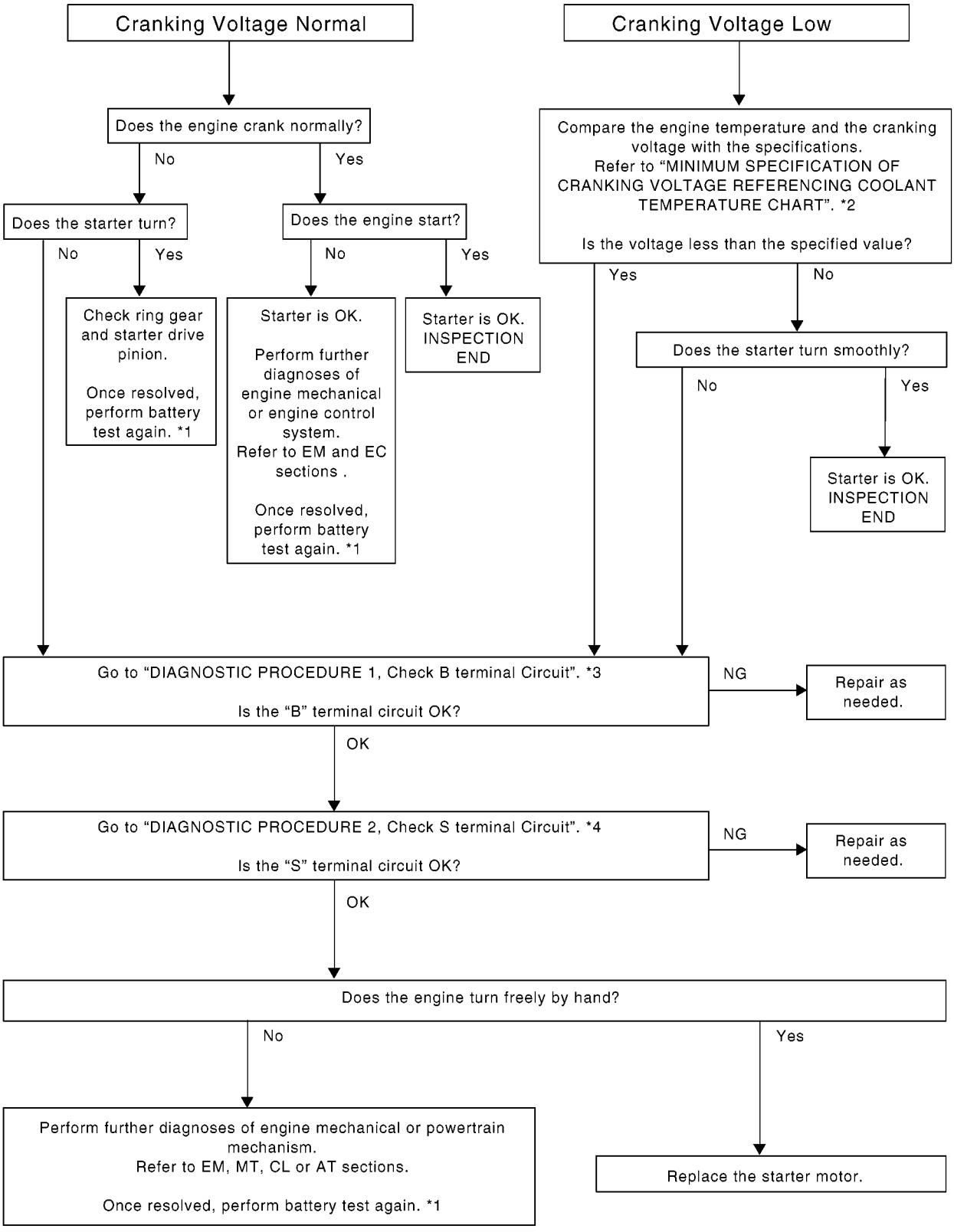
DIAGNOSTIC RESULT ITEM CHART

NASC0019S01

Diagnostic item	Service procedure
CRANKING VOLTAGE NORMAL	Go to "WORK FLOW", SC-15.
CRANKING VOLTAGE LOW	Go to "WORK FLOW", SC-15.
CHARGE BATTERY	Perform the slow battery charging procedure. (Initial rate of charge is 10A for 12 hours.) Perform battery test again with Battery/Starting/Charging system tester. Refer to SC-7.
REPLACE BATTERY	Before replacing battery, clean the battery cable clamps and battery posts. Perform battery test again with Battery/Starting/Charging system tester. Refer to SC-7. If second test result is "REPLACE BATTERY", then do so. Perform battery test again to confirm repair.

WORK FLOW

NASC0019S02



SEL411X

*1 SC-7
*2 SC-18
*3 SC-16
*4 SC-18

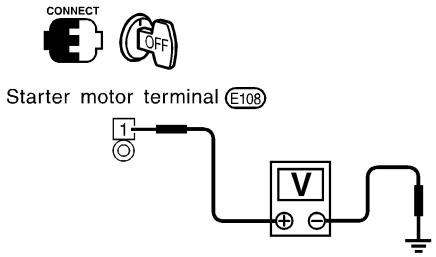
DIAGNOSTIC PROCEDURE 1
Check "B" Terminal Circuit

NASC0019S03

NASC0019S0301

1	CHECK POWER SUPPLY FOR STARTER MOTOR "B" TERMINAL

1. Remove the fuel pump fuse.
2. Crank or start the engine (where possible) until the fuel pressure is released.
3. Turn the ignition OFF.
4. Check that the starter motor terminal 1 connection is clean and tight.
5. Check voltage between starter motor terminal 1 and ground using a digital circuit tester.



Battery voltage should exist.

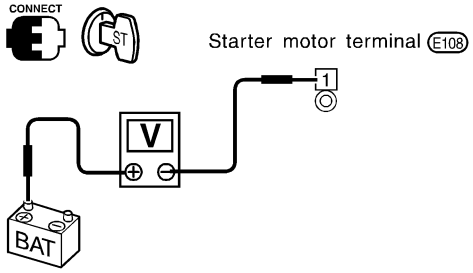
SEL412X

OK or NG

OK	▶	GO TO 2.
NG	▶	Check harness between the battery and the starter motor for open circuit.

2	CHECK BATTERY CABLE CONNECTION QUALITY (VOLTAGE DROP TEST)

1. Check voltage between starter motor terminal 1 and battery positive terminal using a digital circuit tester.



When the ignition switch is in START position,
Voltage: Less than 0.5V

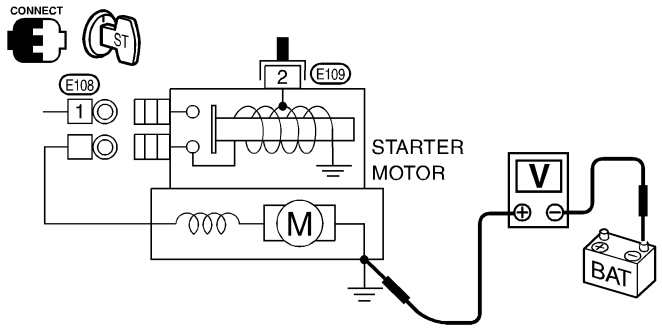
SEL413X

OK or NG

OK	▶	GO TO 3.
NG	▶	Check harness between the battery and the starter motor for poor continuity.

3	CHECK STARTER MOTOR GROUND CIRCUIT (VOLTAGE DROP TEST)

1. Check voltage between starter motor case and battery negative terminal using a digital circuit tester.



When the ignition switch is in START position,
Voltage: Less than 0.2V

SEL414X

OK or NG

OK	▶	Starter motor "B" terminal circuit is OK. Further inspection necessary. Refer to "WORK FLOW", SC-15.
NG	▶	Check the starter motor case and ground for poor continuity.

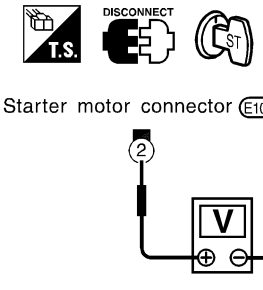
DIAGNOSTIC PROCEDURE 2
Check "S" Terminal Circuit

=NASC0019S04

NASC0019S0401

1	CHECK POWER SUPPLY FOR STARTER MOTOR "S" TERMINAL

1. Remove the fuel pump fuse.
2. Crank or start the engine (where possible) until the fuel pressure is released.
3. Turn the ignition OFF.
4. Disconnect starter motor terminal 2 connector.
5. Check voltage between starter motor terminal 2 and ground using a digital circuit tester.



When the ignition switch is in START position,
Battery voltage should exist.

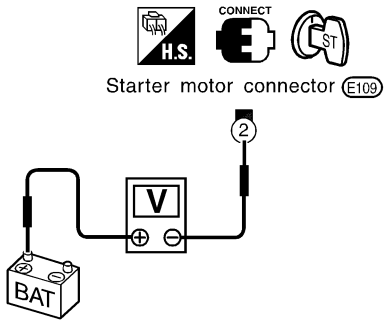
SEL415X

OK or NG

OK	▶	GO TO 2.
NG	▶	**Check the following.** ● 40A fusible link (letter **e**, located in fuse and fusible link box) ● Park/neutral position relay ● Harness for open or short

2	CHECK "S" TERMINAL CONNECTION QUALITY (VOLTAGE DROP TEST)

1. Connect starter motor terminal 2 connector.
2. Check voltage between starter motor terminal 2 and battery positive terminal using a digital tester.



When the ignition switch is in START position,
Voltage: Less than 1V

SEL416X

OK or NG

OK	▶	Starter motor "S" terminal circuit is OK. Further inspection necessary. Refer to "WORK FLOW", SC-15.
NG	▶	Check harness between the battery and the starter motor "S" terminal for poor continuity.

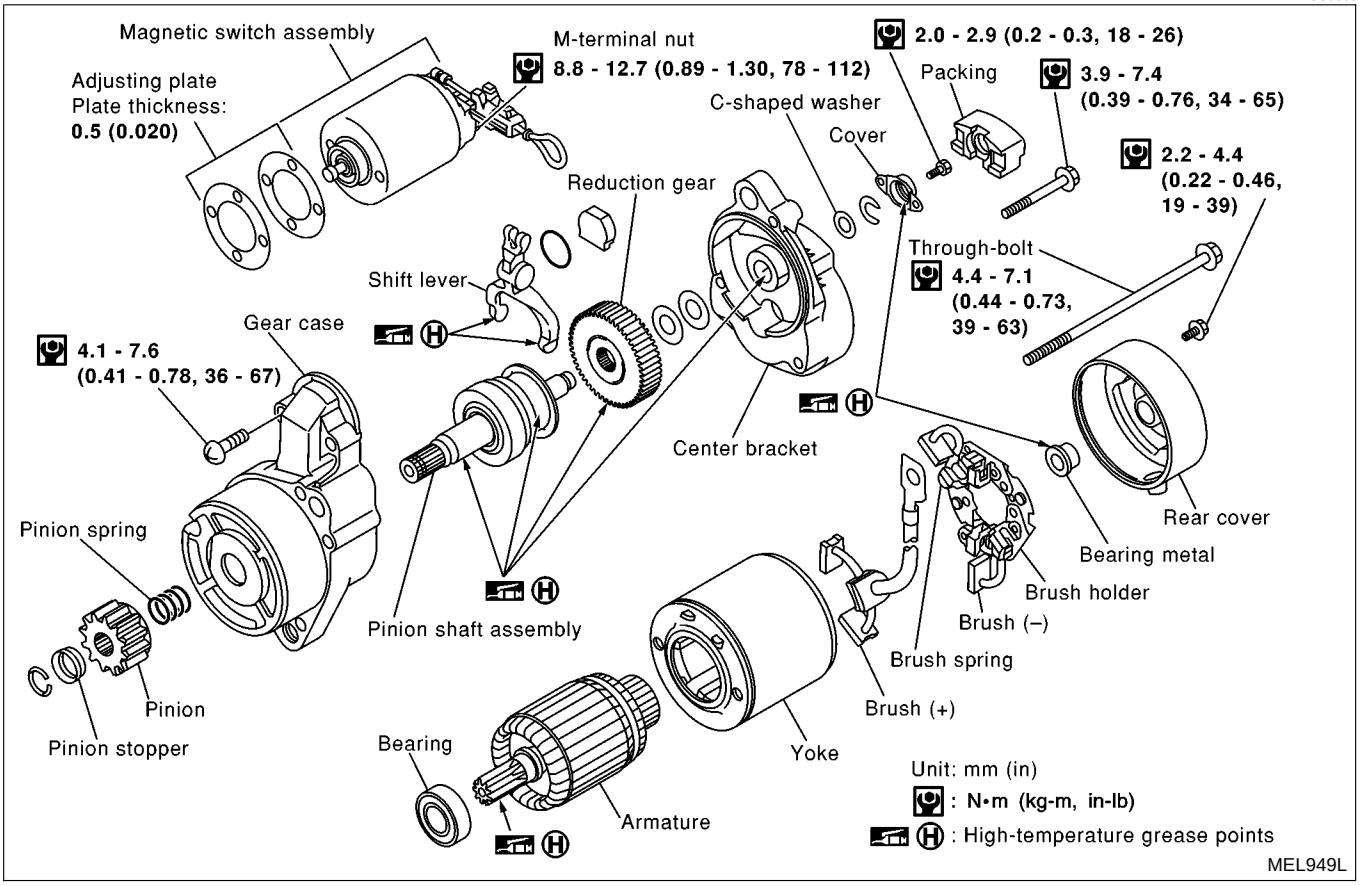
MINIMUM SPECIFICATION OF CRANKING VOLTAGE REFERENCING COOLANT TEMPERATURE

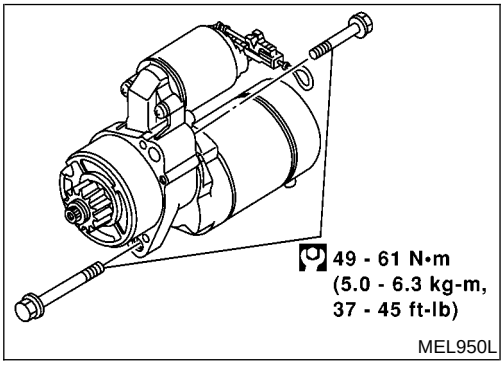
NASC0019S05

Engine coolant temperature	Voltage V
−30°C to −20°C (−22°F to −4°F)	8.6
−19°C to −10°C (−2°F to 14°F)	9.1
−9°C to 0°C (16°F to 32°F)	9.5
More than 1°C (More than 34°F)	9.9

Construction

NASC0006





Removal and Installation

NASC0007

Pinion/Clutch Check

NASC0008

1. Inspect pinion teeth.
- Replace pinion if teeth are worn or damaged. (Also check condition of ring gear teeth.)
2. Inspect reduction gear teeth.
- Replace reduction gear if teeth are worn or damaged. (Also check condition of armature shaft gear teeth.)
3. Check to see if pinion locks in one direction and rotates smoothly in the opposite direction.
- If it locks or rotates in both directions, or unusual resistance is evident, replace.

System Description

NASC0009

The alternator provides DC voltage to operate the vehicle's electrical system and to keep the battery charged. The voltage output is controlled by the IC regulator.
Power is supplied at all times to alternator terminal S through:

- 120A fusible link (letter **a**, located in the fuse and fusible link box), and
- 7.5A fuse (No. 65, located in the fuse and fusible link box).

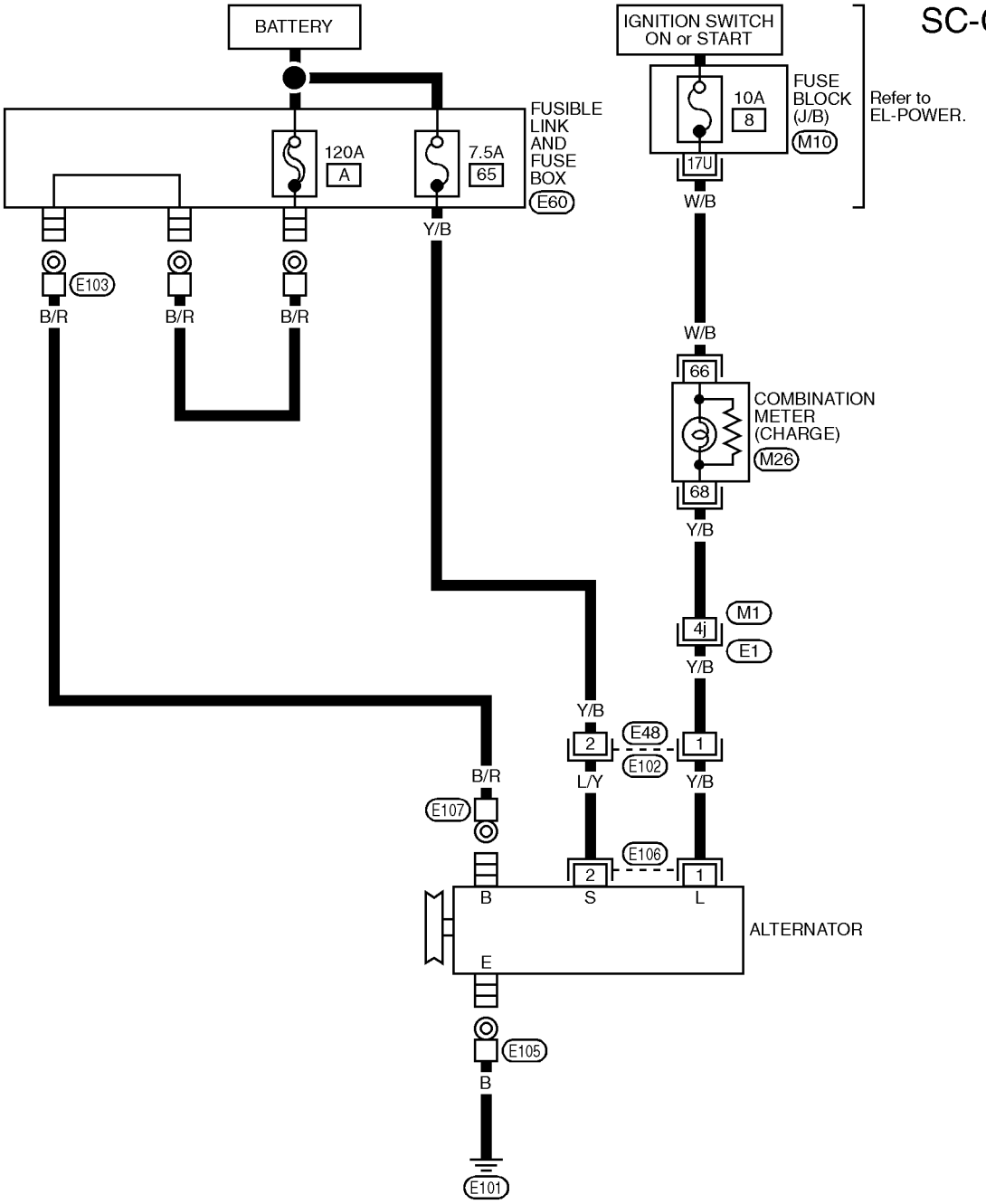
Terminal B supplies power to charge the battery and operate the vehicle's electrical system. Output voltage is controlled by the IC regulator at terminal S detecting the input voltage. The charging circuit is protected by the 120A fusible link.
Terminal E of the alternator supplies ground through body ground E101.
With the ignition switch in the ON or START position, power is supplied

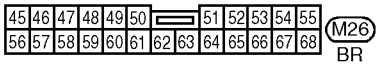
- through 10A fuse [No. 8, located in the fuse block (J/B)]
- to combination meter terminal 12 for the charge warning lamp.

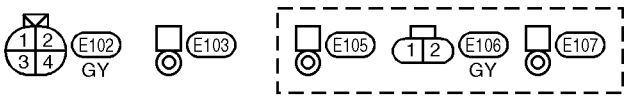
Ground is supplied to terminal 43 of the combination meter through terminal L of the alternator. With power and ground supplied, the charge warning lamp will illuminate. When the alternator is providing sufficient voltage with the engine running, the ground is opened and the charge warning lamp will go off.
If the charge warning lamp illuminates with the engine running, a fault is indicated.

Wiring Diagram — CHARGE —

NASC0010







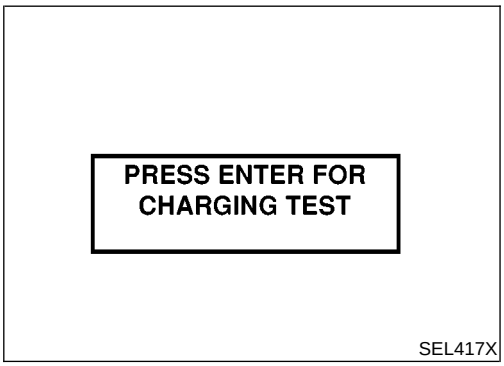
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK- JUNCTION BOX (J/B)
E60 -FUSIBLE LINK AND FUSE BOX

MEL653L

Trouble Diagnoses with Battery/Starting/Charging System Tester

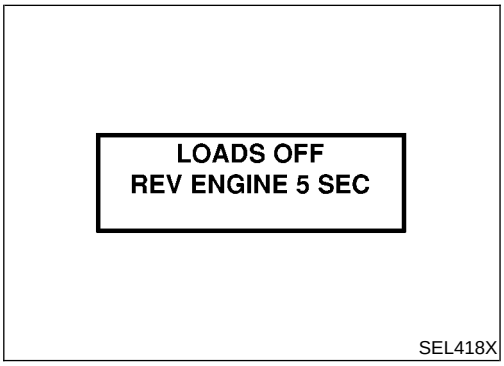
NASC0020

NOTE:
To ensure a complete and thorough diagnosis, the battery, starter and alternator test segments must be done as a set from start to finish.



SEL417X

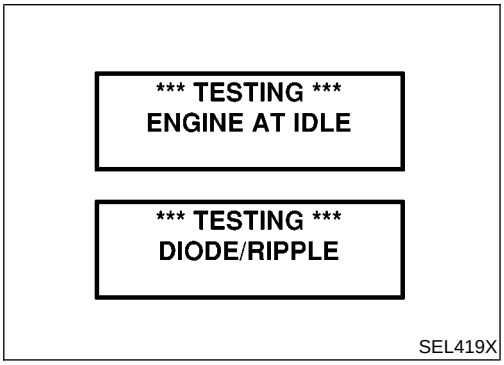
1. Turn off all loads on the vehicle electrical system.
2. Perform battery and starting system test with Battery/Starting/Charging system tester.
3. Press “ENTER” to begin the charging system test.
4. Start engine.



SEL418X

5. Press “ENTER” until “LOADS OFF REV ENGINE 5 SEC” is displayed.
6. Raise and hold the engine speed at 1,500 to 2,000 rpm for about 5 seconds, then return to the engine to idle.
   Once the increase in engine rpm is detected, press “ENTER” to continue.

NOTE:
- If after 30 seconds an increase in engine idle speed is not detected, “RPM NOT DETECTED” will display.
- Some engines may have a higher idle initially after starting, particularly when the engine is cold. The tester may detect this without any other action being taken. If this occurs, continue on with the testing process. The final results will not be affected.

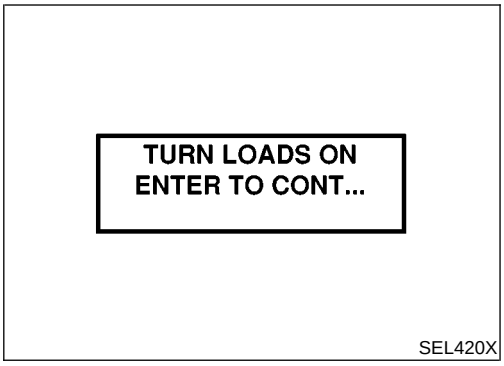


SEL419X

7. The tester now checks the engine at idle and performs the DIODE/RIPPLE check.
8. When complete, the tester will prompt you to turn on the following electrical loads.

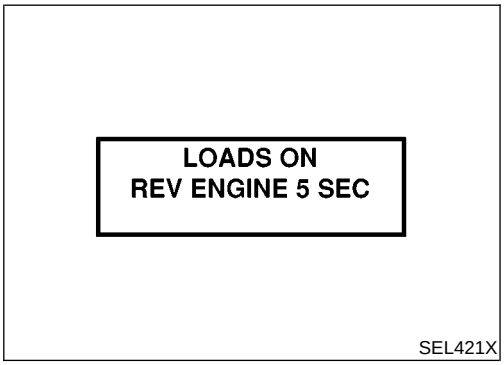
- Heater fun set to highest. Do not run the A/C or windshield defroster.
- Headlamp high beam
- Rear window defogger

NOTE:
Do not run the windshield wipers or any other cyclical loads.



SEL420X

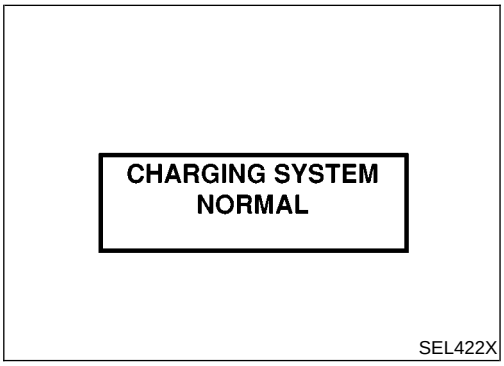
9. Press "ENTER" to continue.



SEL421X

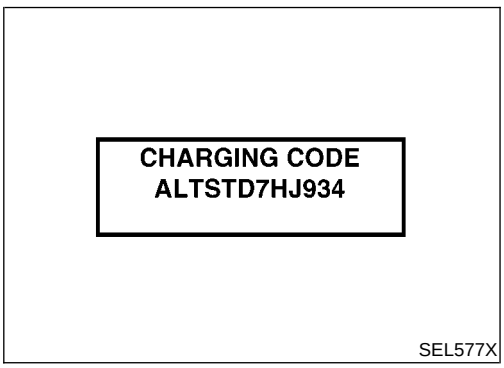
10. Raise and hold the engine speed at 1,500 to 2,000 rpm for about 5 seconds, then return the engine to idle. Once the increase in engine rpm is detected, press "ENTER" to continue.

NOTE:
If after 30 seconds an increase in engine idle speed is not detected, "RPM NOT DETECTED" will be displayed. Press "ENTER" to restart the test.



SEL422X

11. Diagnostic result is displayed on the tester. Refer to the following "DIAGNOSTIC RESULT ITEM CHART" on the next page.



SEL577X

12. Press "ENTER" then test output code is displayed. Record the test output code on the repair order.
13. Toggle back to the "DIAGNOSTIC SCREEN" for test results.

Trouble Diagnoses with Battery/Starting/Charging System Tester (Cont'd)

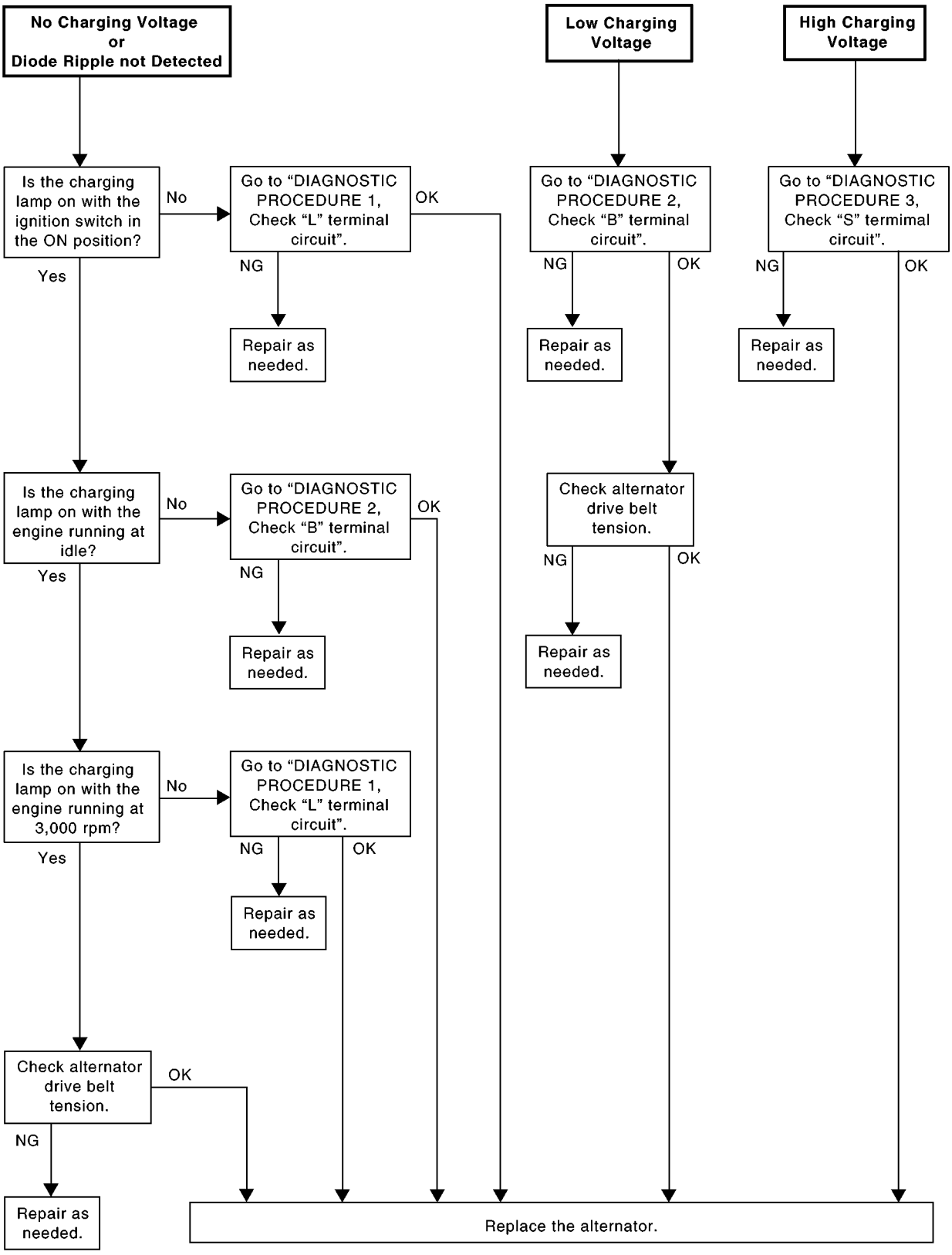
DIAGNOSTIC RESULT ITEM CHART

NASC0020S01

Diagnostic item	Service procedure
CHARGING SYSTEM NORMAL	Charging system is normal and will also show DIODE RIPPLE test result.
NO CHARGING VOLTAGE	Go to "WORK FLOW", SC-25.
LOW CHARGING VOLTAGE	Go to "WORK FLOW", SC-25.
HIGH CHARGING VOLTAGE	Go to "WORK FLOW", SC-25.
DIODE RIPPLE NORMAL	Diode ripple is OK and will also show CHARGING VOLTAGE test result.
EXCESS RIPPLE DETECTED	Replace the alternator. Perform "DIODE RIPPLE" test again using Battery/Starting/ Charging system tester to confirm repair.
DIODE RIPPLE NOT DETECTED	Go to "WORK FLOW", SC-25.

WORK FLOW

NASC0020S02



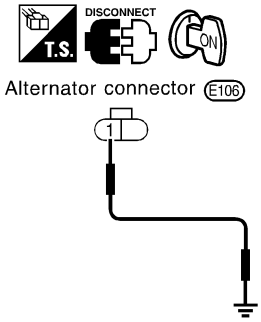
SEL423X

DIAGNOSTIC PROCEDURE 1
Check "L" Terminal Circuit

NASC0020S03

NASC0020S0301

1	CHECK "L" TERMINAL CONNECTION	
Check to see if "L" terminal is clean and tight. **OK or NG**		
OK	▶	GO TO 2.
NG	▶	Repair "L" terminal connection. Confirm repair by performing complete Battery/Starting/Charging system test.

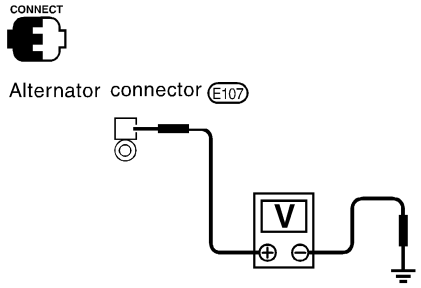
2	CHECK "L" TERMINAL CIRCUIT	
1. Disconnect E106 connector from alternator. 2. Apply ground to E106 connector terminal 1 with the ignition switch in the ON position.  **CHARGE lamp should light up.** SEL424X **OK or NG**		
OK	▶	Replace the alternator. Confirm repair by performing complete Battery/Starting/Charging system test.
NG	▶	**Check the following.** ● 10A fuse [No. 8, located in fuse block (J/B)] ● CHARGE lamp ● Harness for open or short between combination meter and fuse ● Harness for open or short between combination meter and alternator

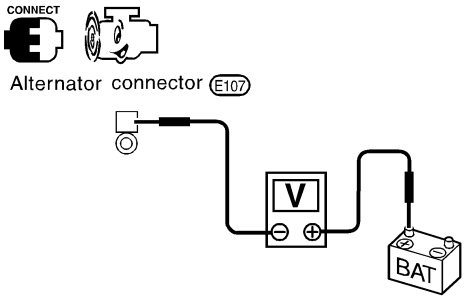
DIAGNOSTIC PROCEDURE 2
Check "B" Terminal Circuit

=NASC0020S04

NASC0020S0401

1	CHECK "B" TERMINAL CONNECTION	
Check to see if "B" terminal is clean and tight.		
OK or NG		
OK	▶	GO TO 2. Confirm repair by performing complete Battery/Starting/Charging system test.
NG	▶	Repair "B" terminal connection.

2	CHECK ALTERNATOR "B" TERMINAL CIRCUIT	
Check voltage between alternator terminal B and ground using a digital circuit tester.		
 SEL425X	**Battery voltage should exist.**	
OK or NG		
OK	▶	GO TO 3.
NG	▶	**Check the following.** ● 120A fusible link (letter **a**, located in fuse and fusible link box) ● Harness for open or short between alternator and fusible link

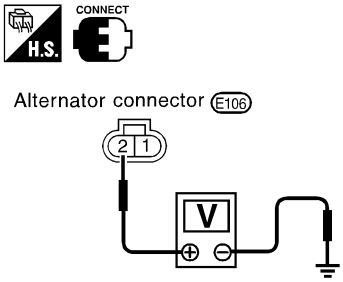
3	CHECK "B" TERMINAL CONNECTION QUALITY (VOLTAGE DROP TEST)	
Check voltage between alternator terminal B and battery positive terminal using a digital tester.		
 SEL426X	When the engine running at idle and warm, **Voltage: Less than 0.2V**	
OK or NG		
OK	▶	Replace the alternator. Confirm repair by performing complete Battery/Starting/Charging system test.
NG	▶	Check harness between the battery and the alternator for poor continuity.

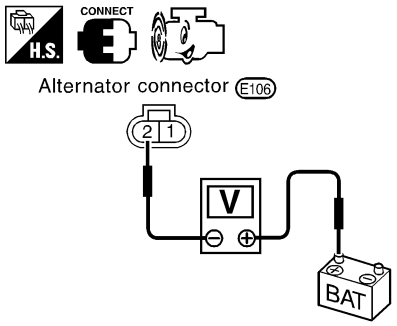
DIAGNOSTIC PROCEDURE 3
Check "S" Terminal Circuit

=NASC0020S05

NASC0020S0501

1	CHECK "S" TERMINAL CONNECTION	
Check to see if "S" terminal is clean and tight.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair "S" terminal connection. Confirm repair by performing complete Battery/Starting/Charging system test.

2	CHECK ALTERNATOR "S" TERMINAL CIRCUIT	
Check voltage between alternator terminal 2 and ground using a digital circuit tester.		
 **Battery voltage should exist.** SEL427X		
OK or NG		
OK	▶	GO TO 3.
NG	▶	**Check the following.** ● 7.5A fuse (No. 65, located in fuse and fusible link box) ● Harness for open or short between alternator and fuse

3	CHECK "S" TERMINAL CONNECTION QUALITY (VOLTAGE DROP TEST)	
Check voltage between alternator terminal 2 and battery positive terminal using a digital tester.		
 When the engine running at idle and warm, **Voltage: Less than 0.2V** SEL428X		
OK or NG		
OK	▶	Replace the alternator. Confirm repair by performing complete Battery/Starting/Charging system test.
NG	▶	Check harness between the battery and the alternator for poor continuity.

MALFUNCTION INDICATOR

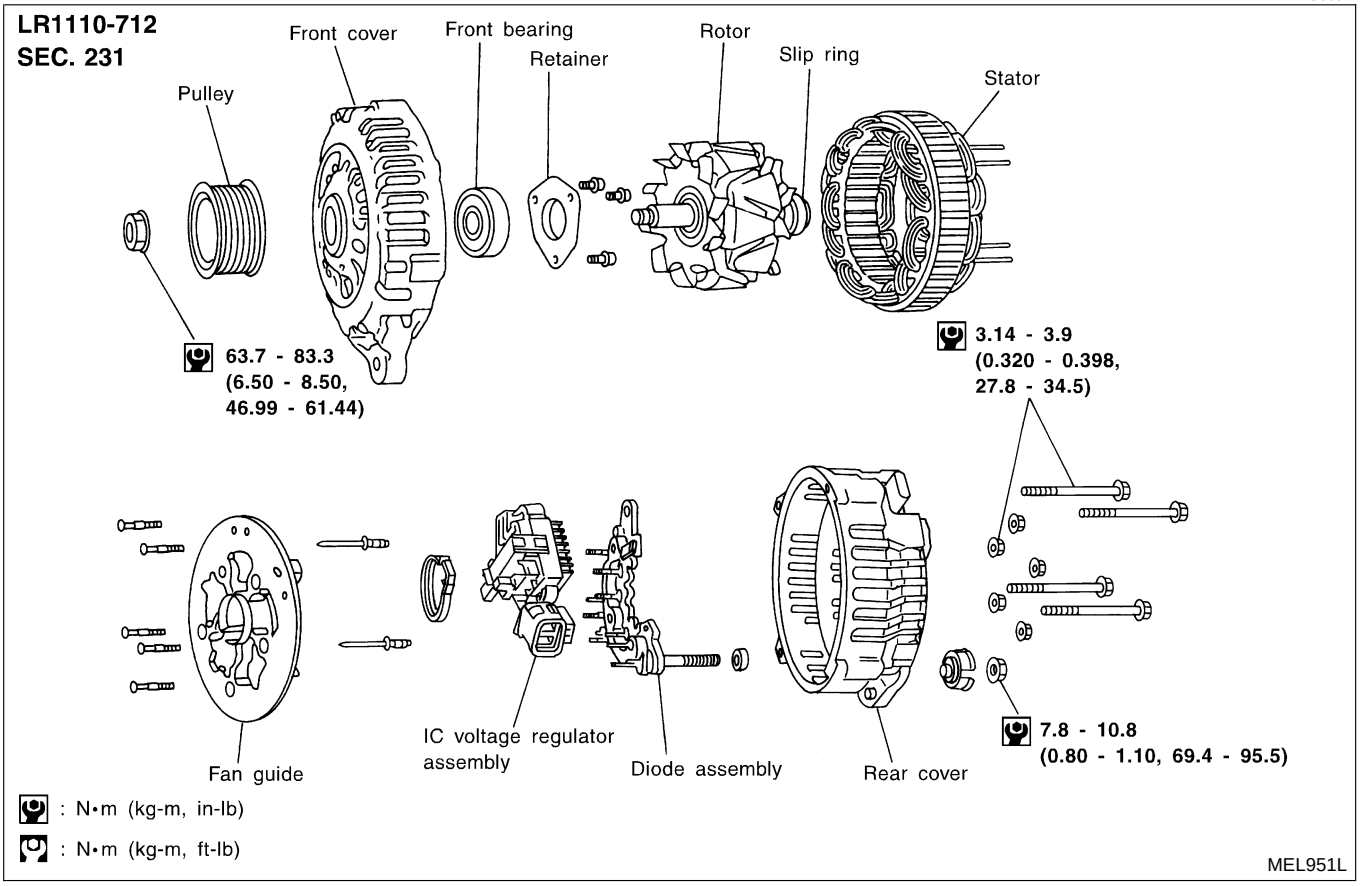
NASC0020S06

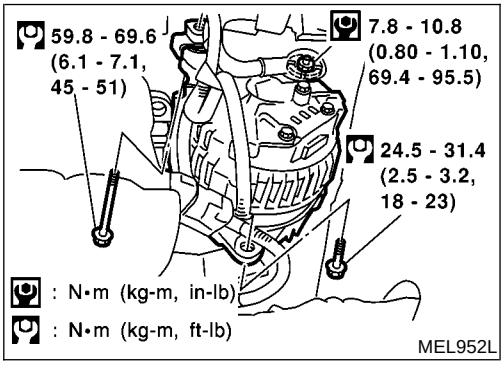
The IC regulator warning function activates to illuminate "CHARGE" warning lamp, if any of the following symptoms occur while alternator is operating:

- Excessive voltage is produced.
- No voltage is produced.

Construction

NASC0012





Removal and Installation

NASC0013

Battery

NASC0014

Applied area	USA	Canada
Type	80D26R	
Capacity V-AH	12-65	
Cold cranking current A (For reference value)	582	

Starter

NASC0015

Type		M1T40371
		MITSUBISHI make
		Reduction gear type
System voltage		12V
No-load	Terminal voltage	11.0V
	Current	Less than 90A
	Revolution	More than 3,200 rpm
Minimum diameter of commutator		28.8 mm (1.134 in)
Minimum length of brush		10 mm (0.39 in)
Brush spring tension		17.5 - 23.7 N (1.78 - 2.42 kg, 3.92 - 5.34 lb)
Movement "ℓ" in height of pinion assembly		0.5 - 2.0 mm (0.020 - 0.079 in)

Alternator

NASC0016

Type	LR1110-712
	HITACHI make
Nominal rating	12V-110A
Ground polarity	Negative
Minimum revolution under no-load (When 13.5 volts is applied)	Less than 1,000 rpm
Hot output current (When 13.5 volts is applied)	More than 35A/1,300 rpm More than 85A/2,500 rpm More than 110A/5,000 rpm
Regulated output voltage	14.1 - 14.7V
Minimum length of brush	More than 6.0 mm (0.236 in)
Brush spring pressure	1.0 - 3.43 N (102 - 350 g, 3.60 - 12.34 oz)
Slip ring minimum outer diameter	More than 26.0 mm (1.024 in)
Rotor (Field coil) resistance	2.31Ω

ELECTRICAL SYSTEM

SECTION EL

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Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

NAEL0001

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL R50 is as follows:

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.**

Wiring Diagrams and Trouble Diagnosis

NAEL0002

When you read wiring diagrams, refer to the following:

- GI-11, “HOW TO READ WIRING DIAGRAMS”
- EL-9, “POWER SUPPLY ROUTING” for power distribution circuit

When you perform trouble diagnosis, refer to the following:

- GI-35, “HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSIS”
- GI-24, “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”

Check for any Service bulletins before servicing the vehicle.

Description

NAEL0003

HARNESS CONNECTOR (TAB-LOCKING TYPE)

NAEL0003S01

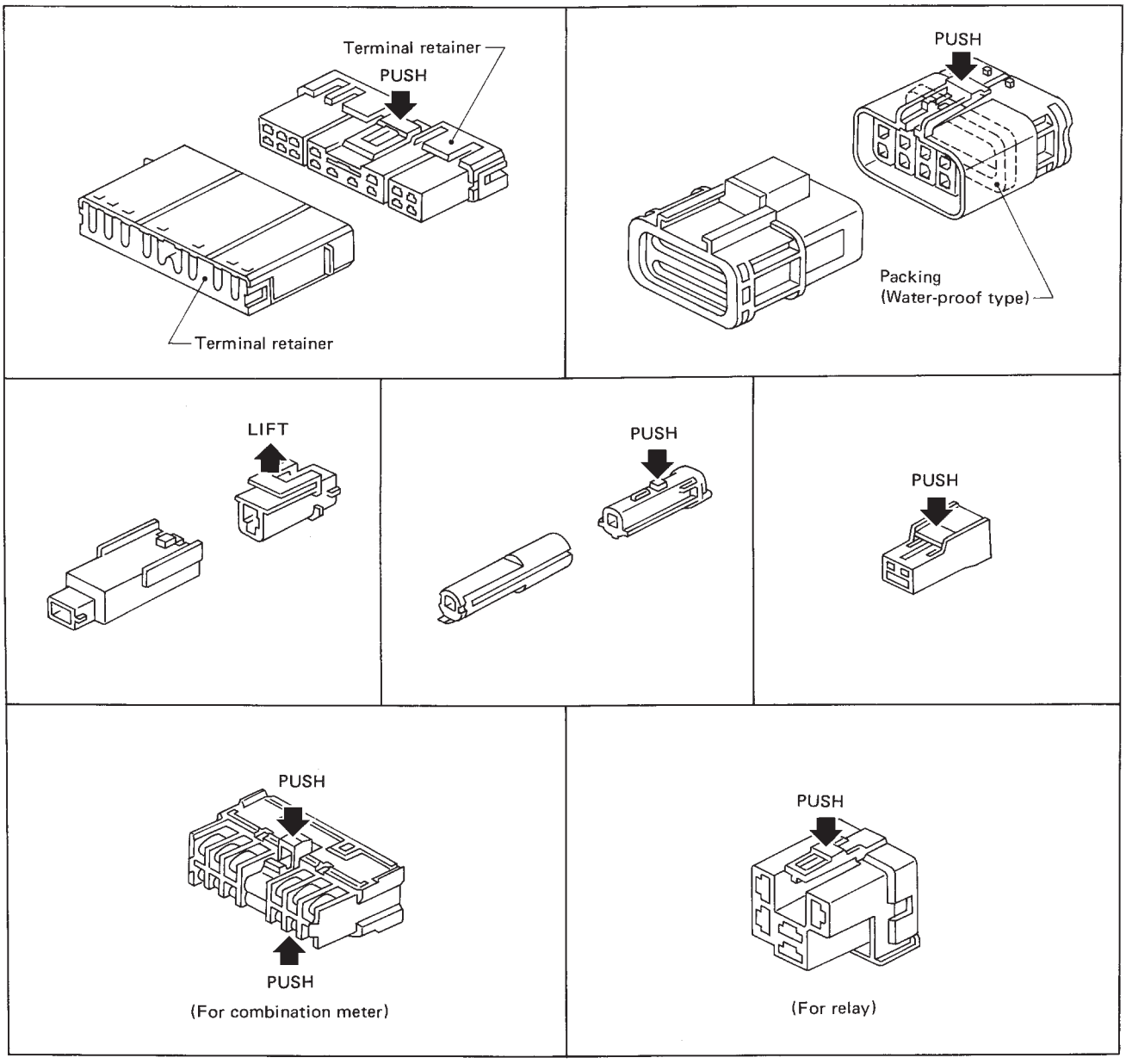
- The tab-locking type connectors help prevent accidental looseness or disconnection.
- The tab-locking type connectors are disconnected by pushing or lifting the locking tab(s). Refer to the illustration below.

Refer to the next page for description of the slide-locking type connector.

CAUTION:

Do not pull the harness when disconnecting the connector.

[Example]



SEL769D

Description (Cont'd)

HARNESS CONNECTOR (SLIDE-LOCKING TYPE)

=NAEL0003S02

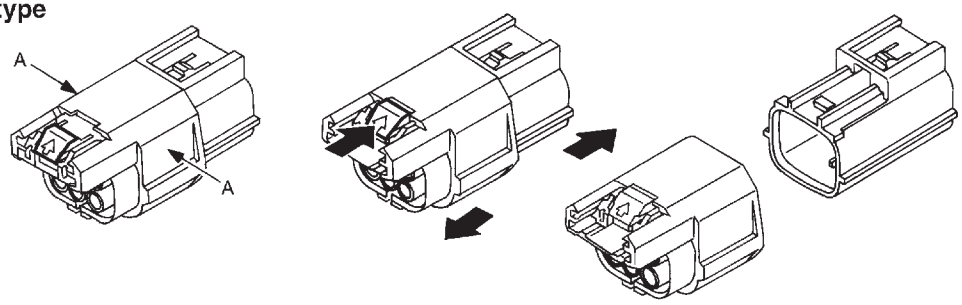
- A new style slide-locking type connector is used on certain systems and components, especially those related to OBD.
- The slide-locking type connectors help prevent incomplete locking and accidental looseness or disconnection.
- The slide-locking type connectors are disconnected by pushing or pulling the slider. Refer to the illustration below.

CAUTION:

- **Do not pull the harness or wires when disconnecting the connector.**
- **Be careful not to damage the connector support bracket when disconnecting the connector.**

[Example]

Waterproof type

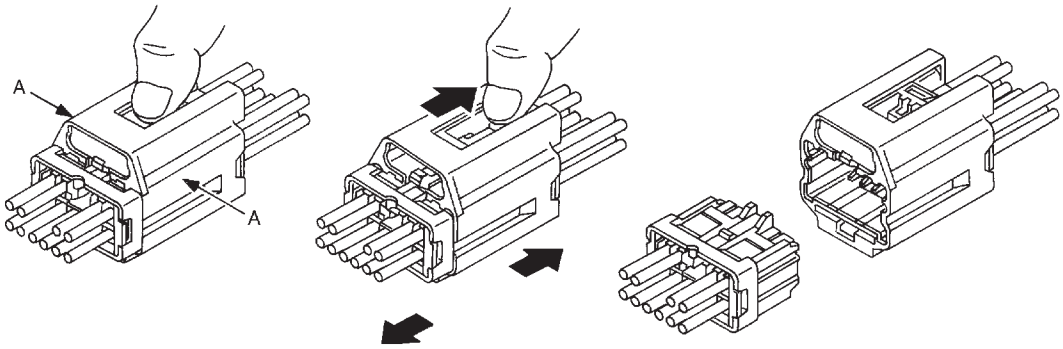


① Firmly grasp shell of connector housing at A.

② Push slider until connector pops or snaps apart.

③ Disconnect harness connector.

Non-waterproof type



① Firmly grasp shell of connector housing at A.

② Pull back on the slider while pulling apart male and famale halves of connector.

③ Disconnect harness connector.

SEL769V

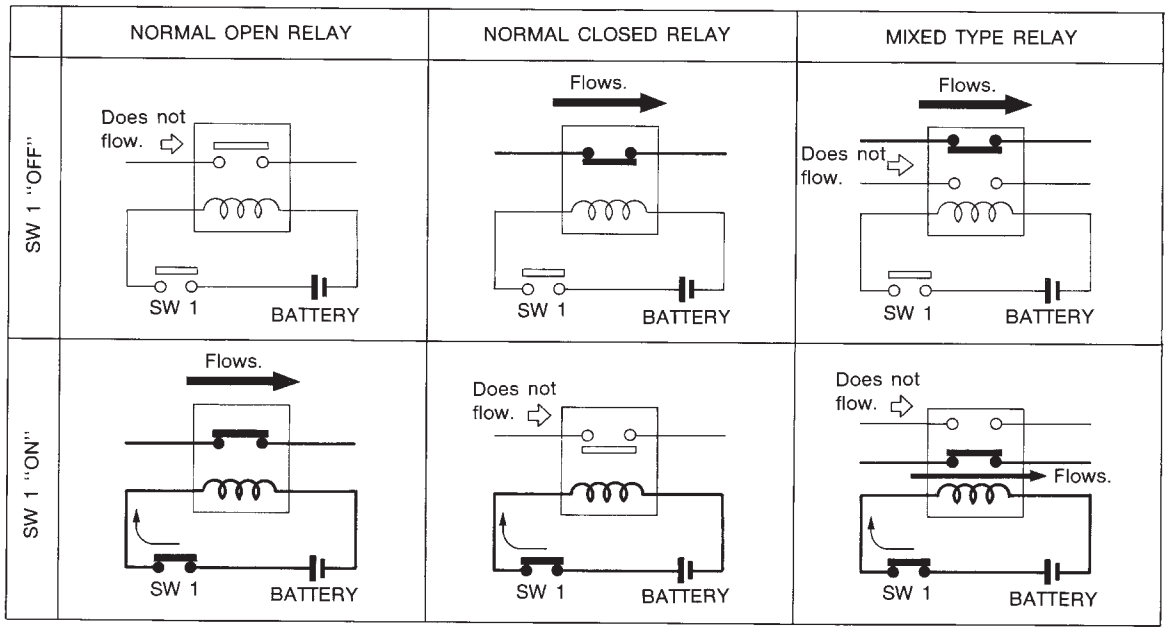
Description

NAEL0004

NORMAL OPEN, NORMAL CLOSED AND MIXED TYPE RELAYS

NAEL0004S01

Relays can mainly be divided into three types: normal open, normal closed and mixed type relays.

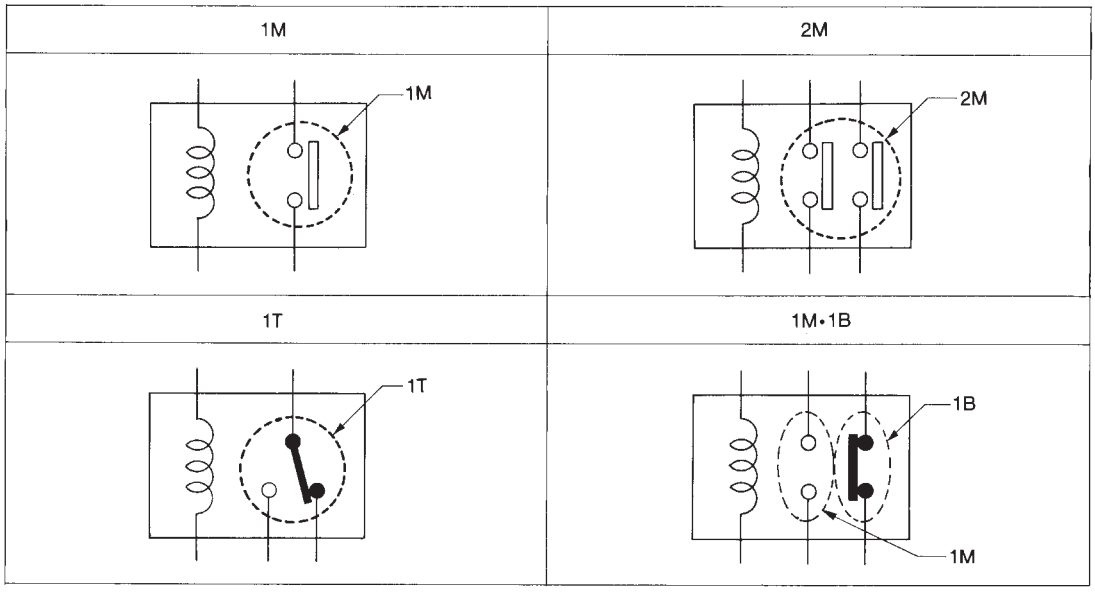


SEL881H

TYPE OF STANDARDIZED RELAYS

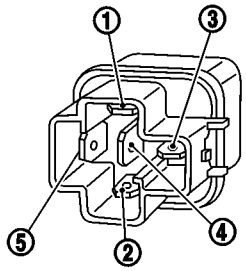
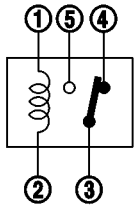
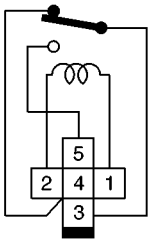
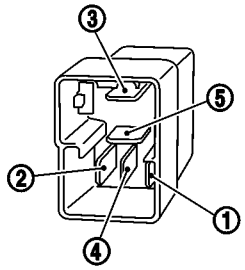
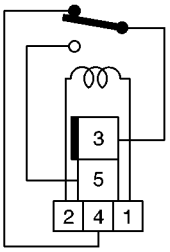
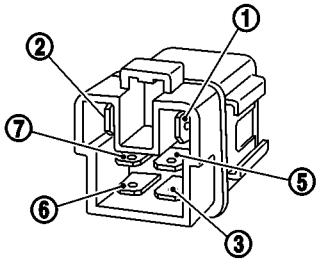
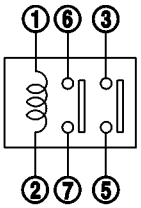
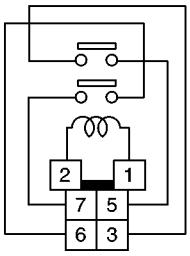
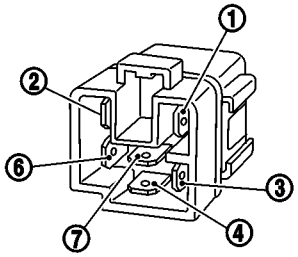
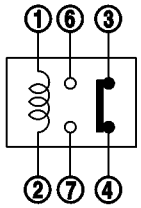
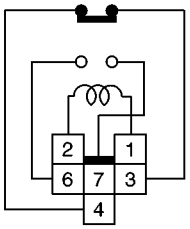
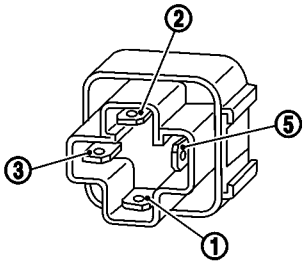
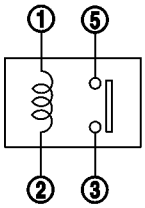
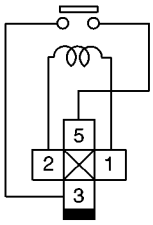
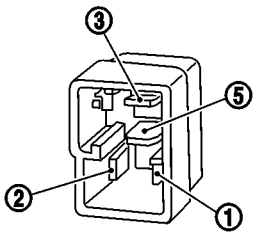
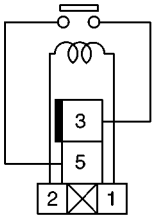
NAEL0004S02

1M	1 Make	2M	2 Make
1T	1 Transfer	1M·1B	1 Make 1 Break



SEL882H

Description (Cont'd)

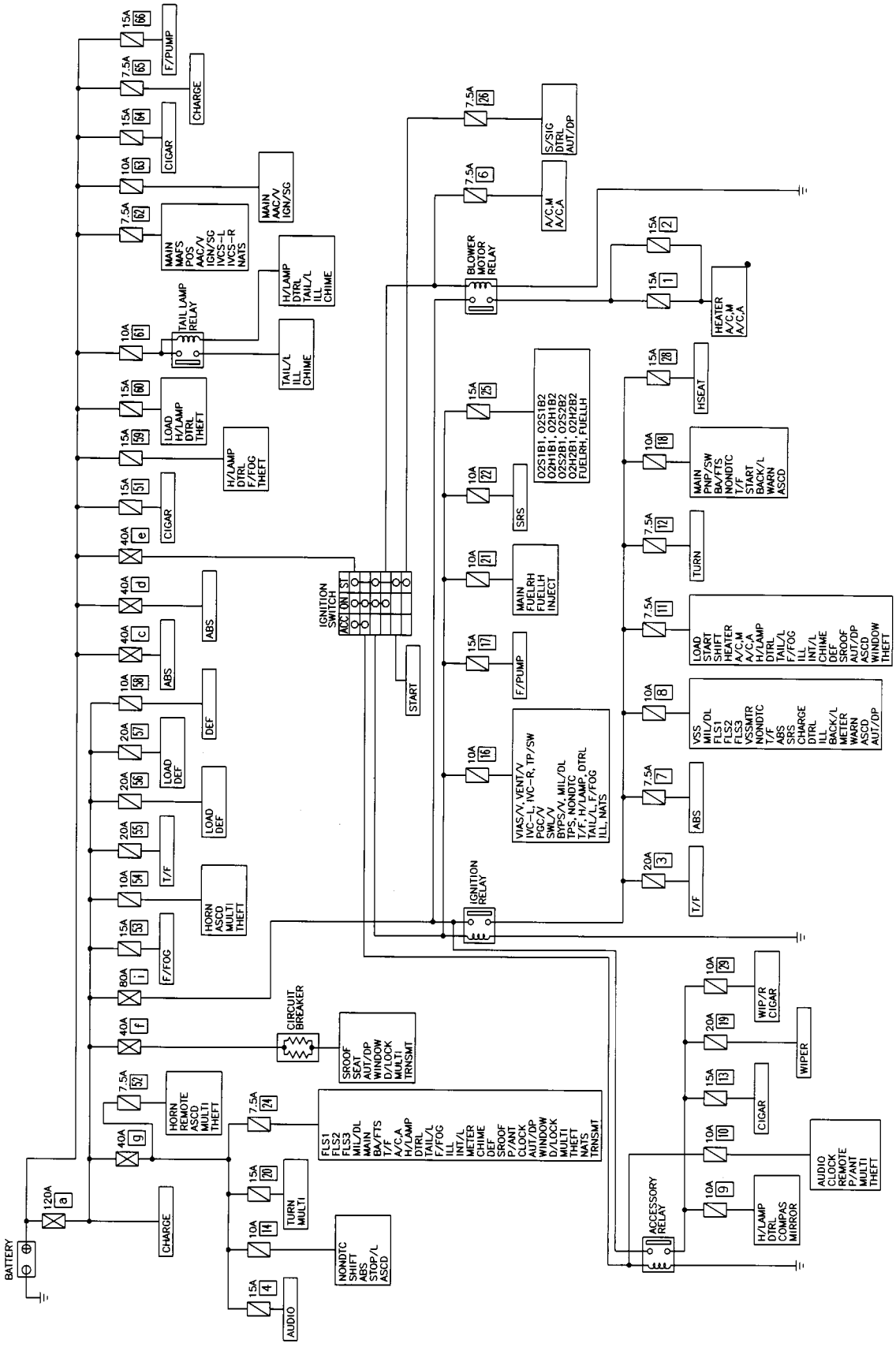
Type	Outer view	Circuit	Connector symbol and connector	Case color
1T				BLACK
				
2M				BROWN
1M•1B				GRAY
1M				BLUE
				

The arrangement of terminal numbers on the actual relays may differ from those shown above.

GEL264

Schematic

NAEL0005



MEL973L

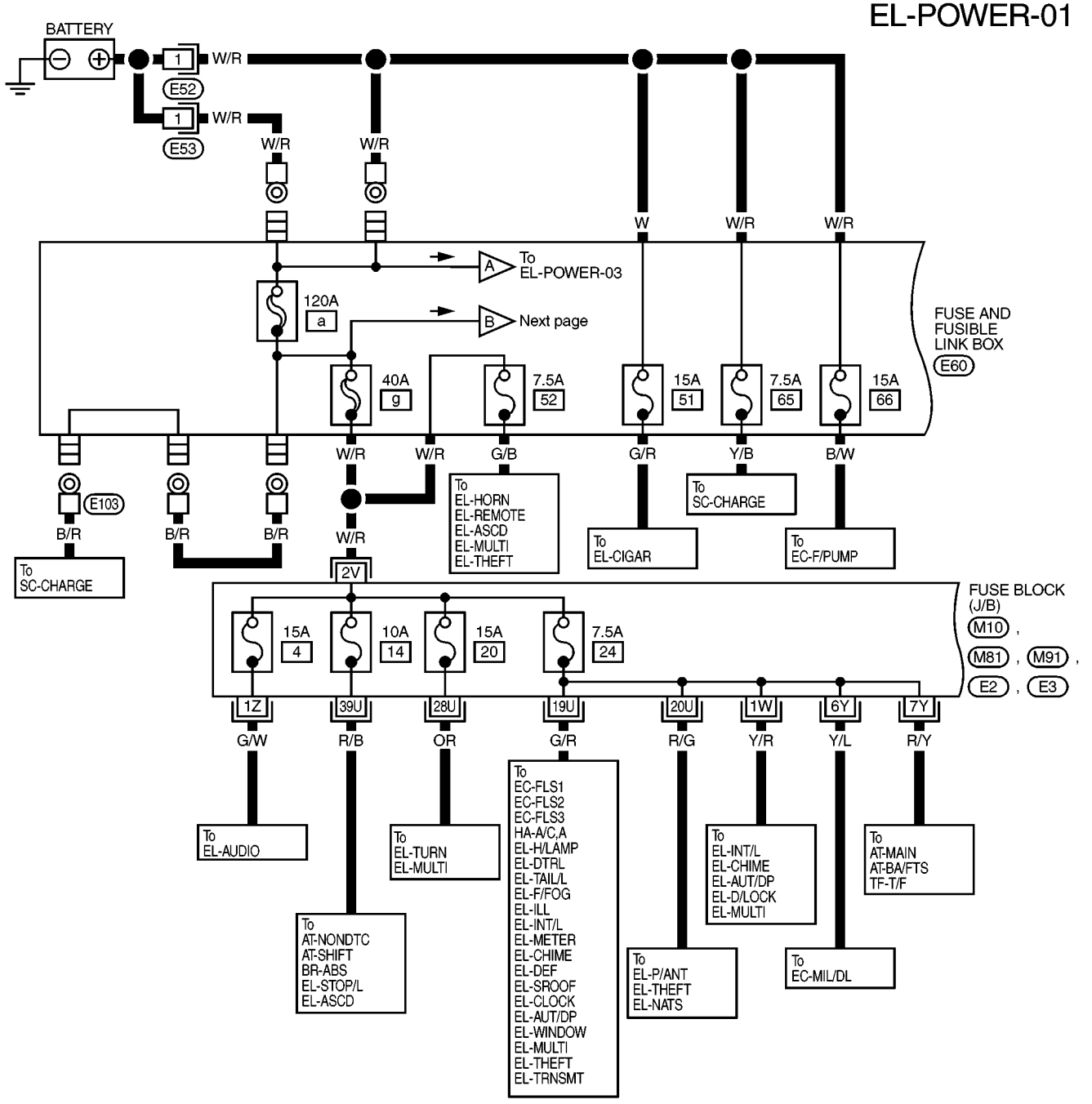
Wiring Diagram — POWER —

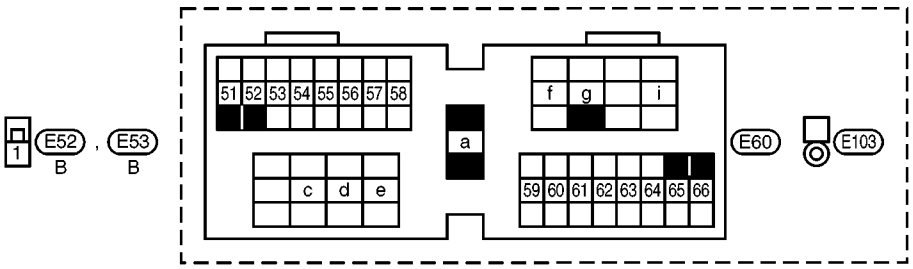
NAEL0006

BATTERY POWER SUPPLY — IGNITION SW. IN ANY POSITION

NAEL0006S01

EL-POWER-01





REFER TO THE FOLLOWING.

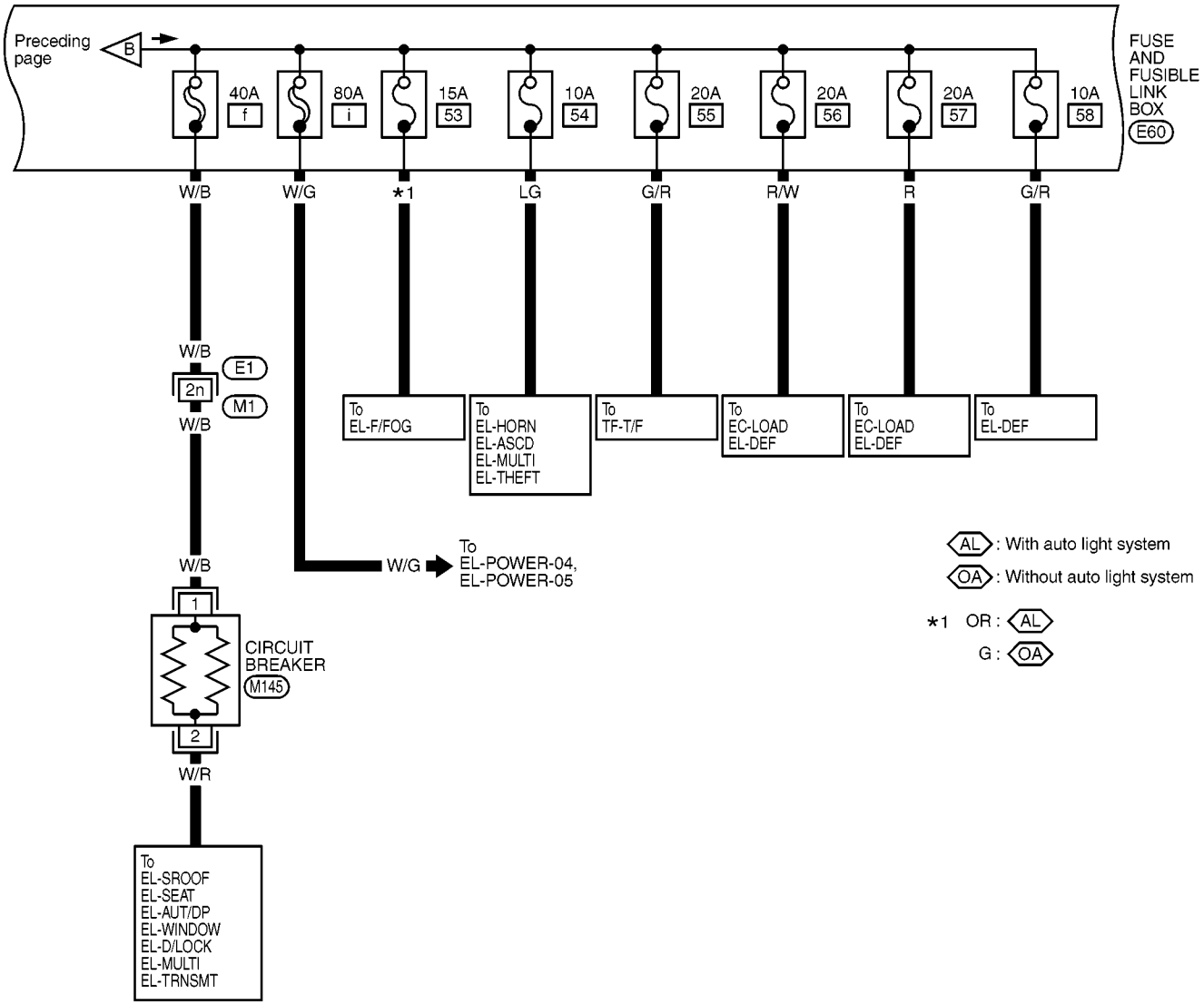
M10 , M81 , M91 ,
E2 , E3

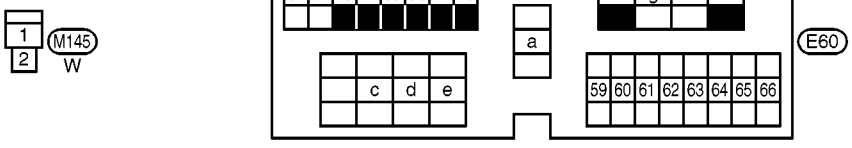
-FUSE BLOCK-
JUNCTION BOX (J/B)

1	2	3	4	
6	7	8	9	10
11	12	13	14	
16	17	18	19	20
21	22			
24	25	26		
	28	29		

MEL974L

EL-POWER-02



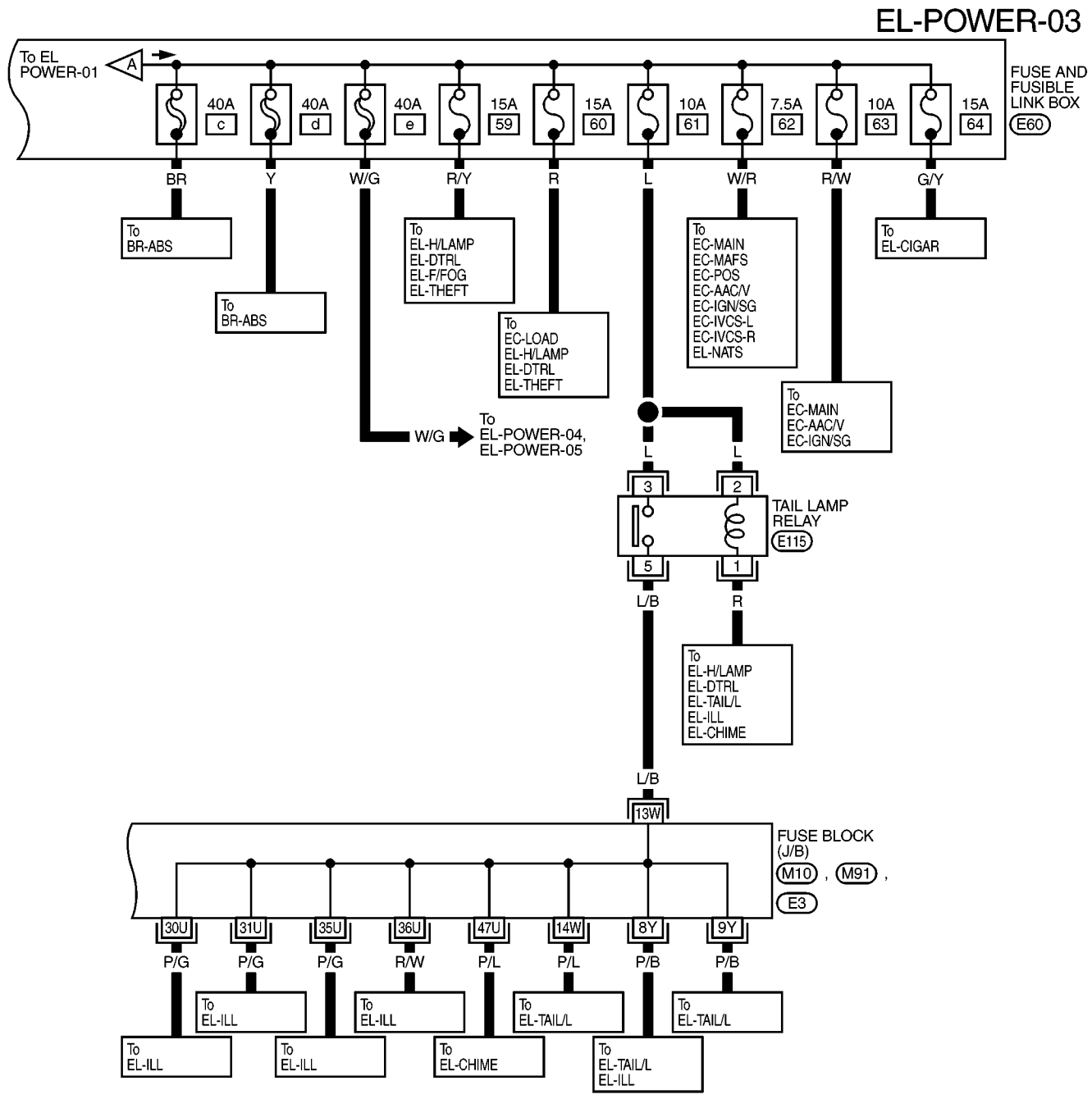


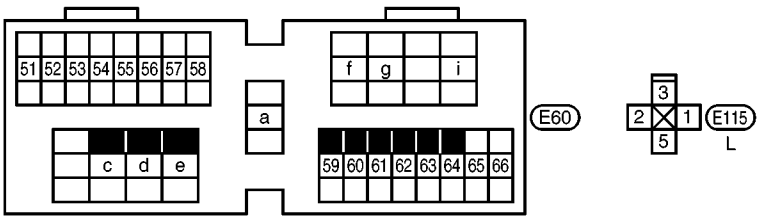
REFER TO THE FOLLOWING.

E1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL975L

Wiring Diagram — POWER — (Cont'd)





REFER TO THE FOLLOWING.

M10 , M91 , E3

-FUSE BLOCK- JUNCTION BOX (J/B)

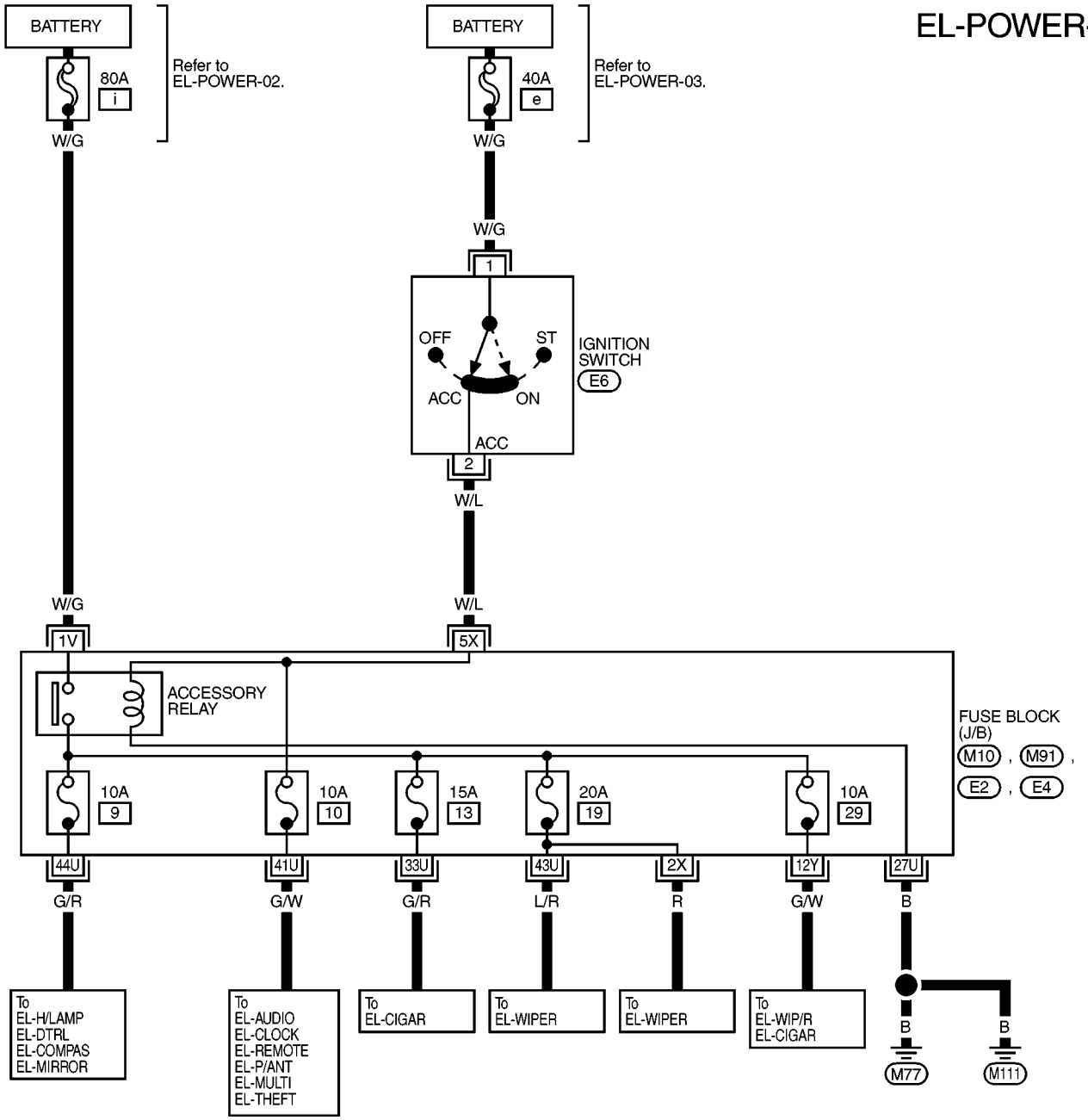
1	2	3	4	
6	7	8	9	10
11	12	13	14	
16	17	18	19	20
21	22			
24	25	26		
	28	29		

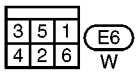
MEL976L

ACCESSORY POWER SUPPLY — IGNITION SW. IN "ACC" OR "ON"

NAEL0006S02

EL-POWER-04





REFER TO THE FOLLOWING.

M10 , M91 , E2 , E4
- FUSE BLOCK -
JUNCTION BOX (J/B)

1	2	3	4	
6	7	8	9	10
11	12	13	14	
16	17	18	19	20
21	22			
24	25	26		
	28	29		

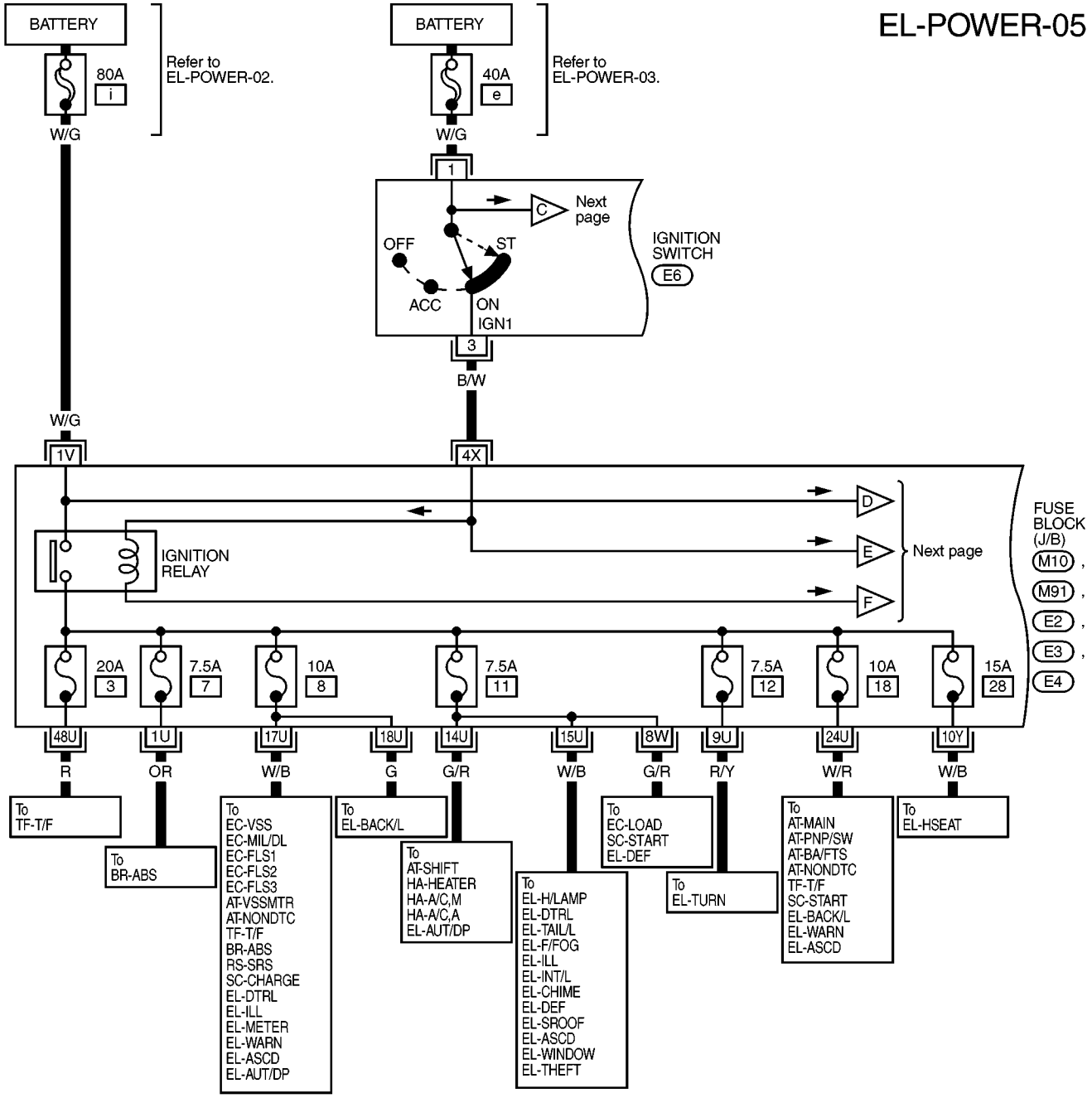
MEL977L

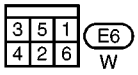
Wiring Diagram — POWER — (Cont'd)

IGNITION POWER SUPPLY — IGNITION SW. IN "ON" AND/OR "START"

NAEL0006S03

EL-POWER-05





REFER TO THE FOLLOWING.

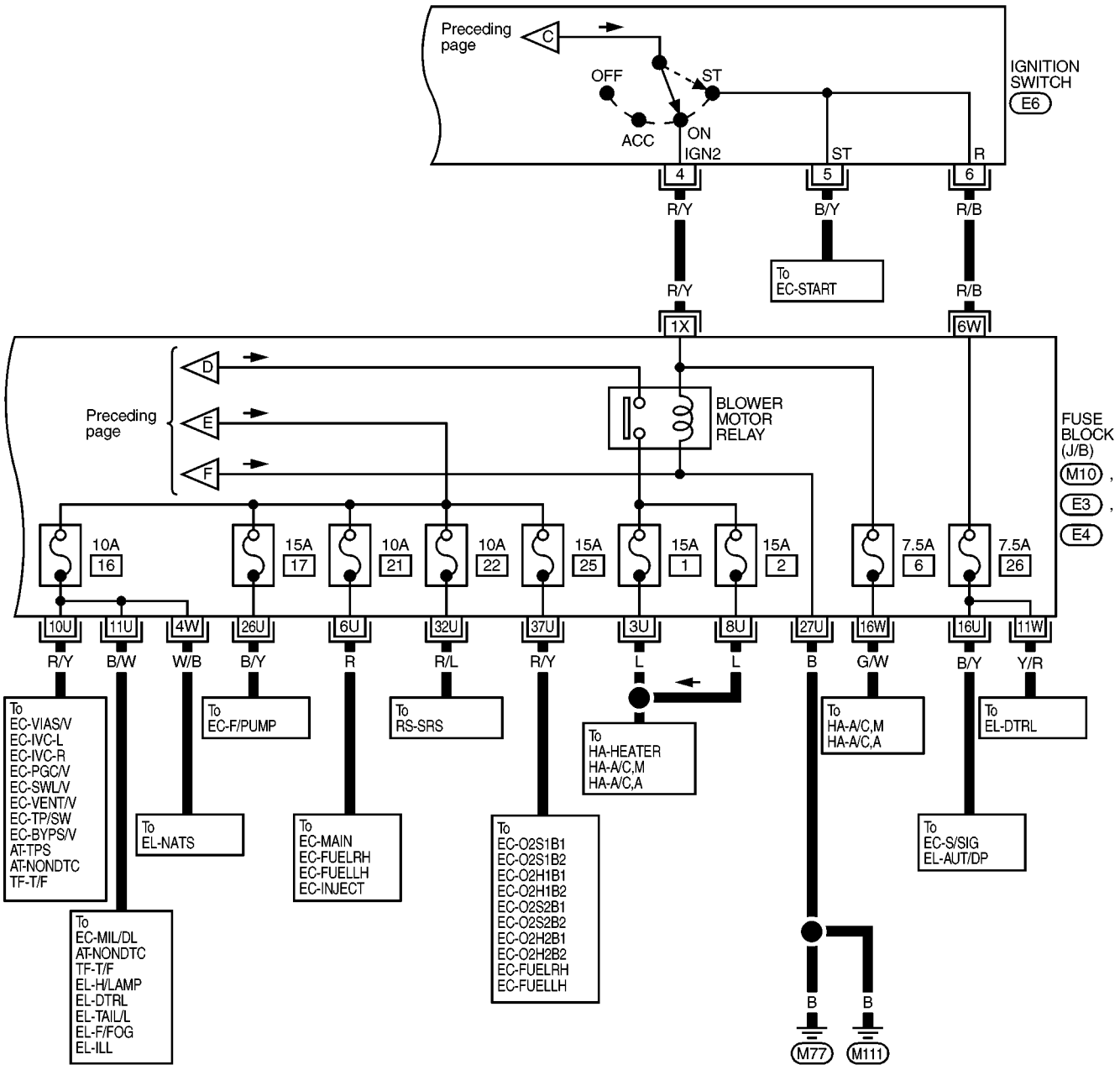
M10 , M91 , E2 , E3 , E4

-FUSE BLOCK-
JUNCTION BOX (J/B)

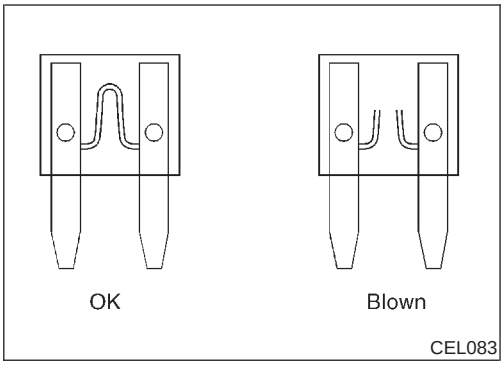
1	2	3	4	
6	7	8	9	10
11	12	13	14	
16	17	18	19	20
21	22			
24	25	26		
	28	29		

MEL978L

EL-POWER-06



MEL979L



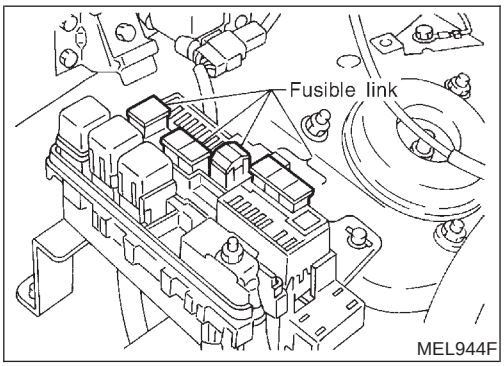
Inspection

NAEL0007

FUSE

NAEL0007S01

- **If fuse is blown, be sure to eliminate cause of problem before installing new fuse.**
- **Use fuse of specified rating. Never use fuse of more than specified rating.**
- **Do not partially install fuse; always insert it into fuse holder properly.**
- **Remove fuse for “ELECTRICAL PARTS (BAT)” if vehicle is not used for a long period of time.**



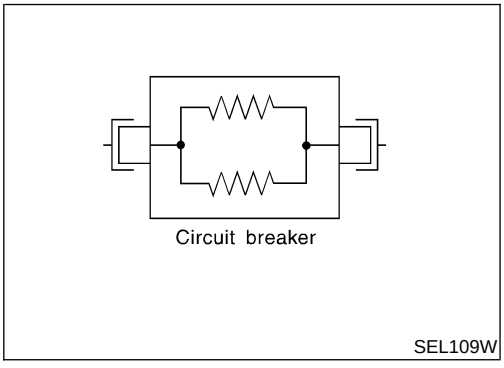
FUSIBLE LINK

NAEL0007S02

A melted fusible link can be detected either by visual inspection or by feeling with finger tip. If its condition is questionable, use circuit tester or test lamp.

CAUTION:

- **If fusible link should melt, it is possible that critical circuit (power supply or large current carrying circuit) is shorted. In such a case, carefully check and eliminate cause of problem.**
- **Never wrap outside of fusible link with vinyl tape. Important: Never let fusible link touch any other wiring harness, vinyl or rubber parts.**



CIRCUIT BREAKER (PTC THERMISTOR TYPE)

NAEL0007S03

The PTC thermistor generates heat in response to current flow. The temperature (and resistance) of the thermistor element varies with current flow. Excessive current flow will cause the element’s temperature to rise. When the temperature reaches a specified level, the electrical resistance will rise sharply to control the circuit current.

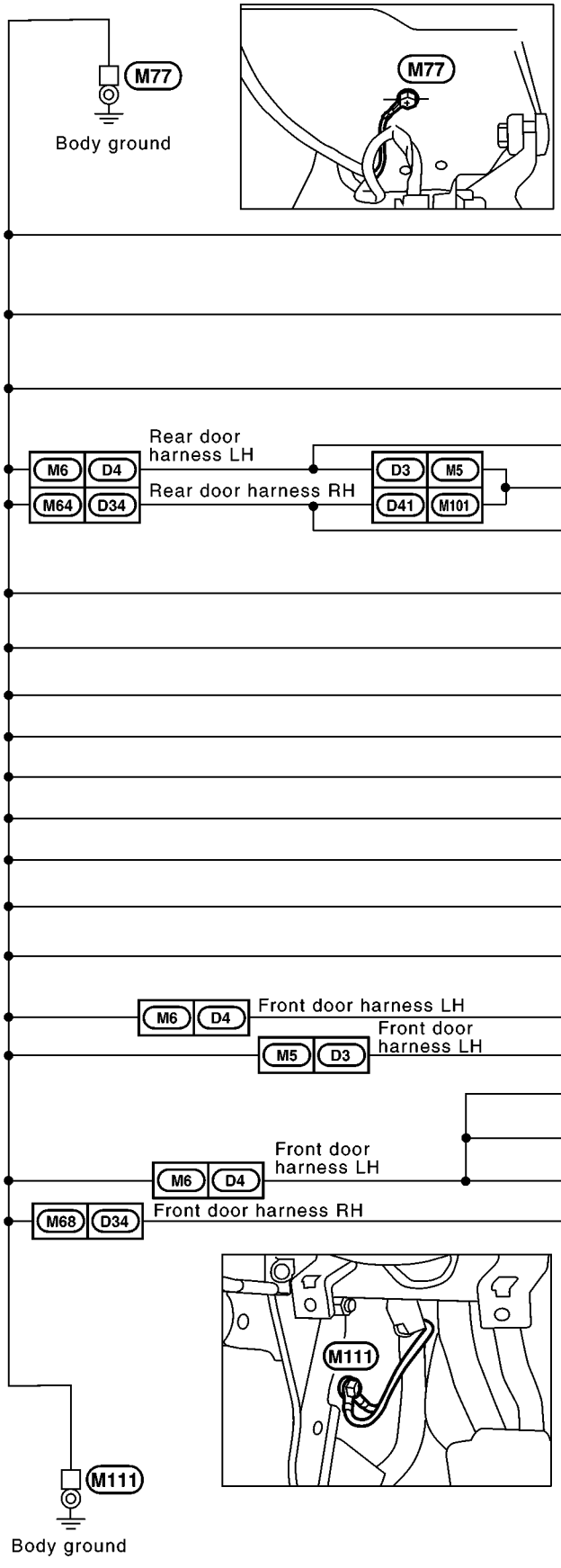
Reduced current flow will cause the element to cool. Resistance falls accordingly and normal circuit current flow is allowed to resume.

Ground Distribution

NAEL0008

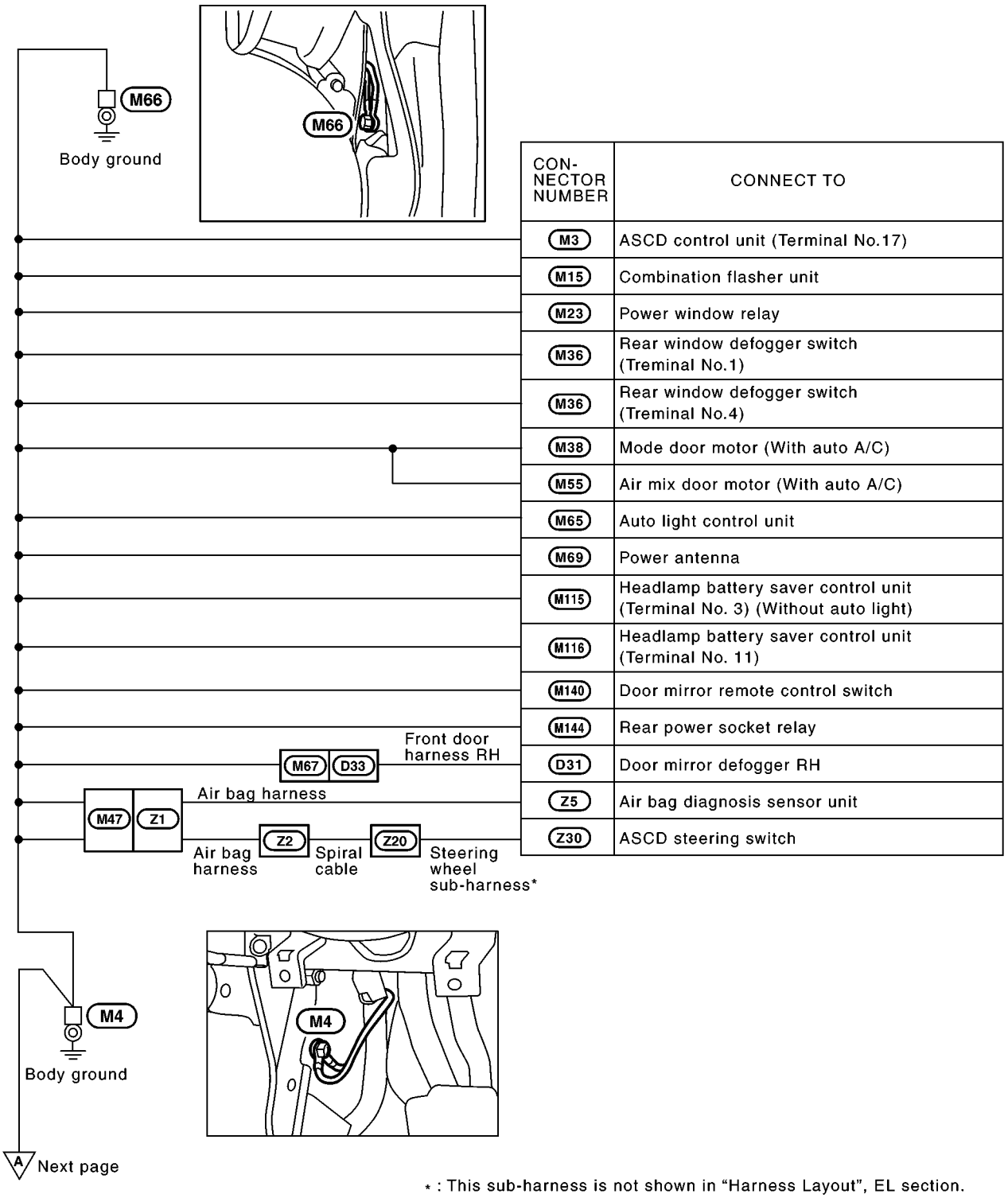
MAIN HARNESS

NAEL0008S01



CONNECTOR NUMBER	CONNECT TO
M9	Data link connector (Terminal No. 4)
M10	Fuse block (J/B) • Accessory relay • Blower motor relay • Ignition relay
M19	Illumination control switch
D12	Front door speaker LH
M48	Shield wire (Audio unit)
D42	Front door speaker RH
M42	Recirculation switch (With heater and manual A/C)
M43	Fan switch (With heater and manual A/C)
M52	Heated seat switch LH
M53	Heated seat switch RH
M56	Cigarette lighter socket
M60	Fan control amp.
M78	Front wiper motor
M115	Headlamp battery saver control unit (Terminal No. 4)
M121	Smart entrance control unit
D1	Door mirror defogger LH
D7	Front door lock actuator LH
D6	Front power window main switch
D9	Front door key cylinder switch LH
D16	Seat memory switch
D37	Front door lock actuator RH

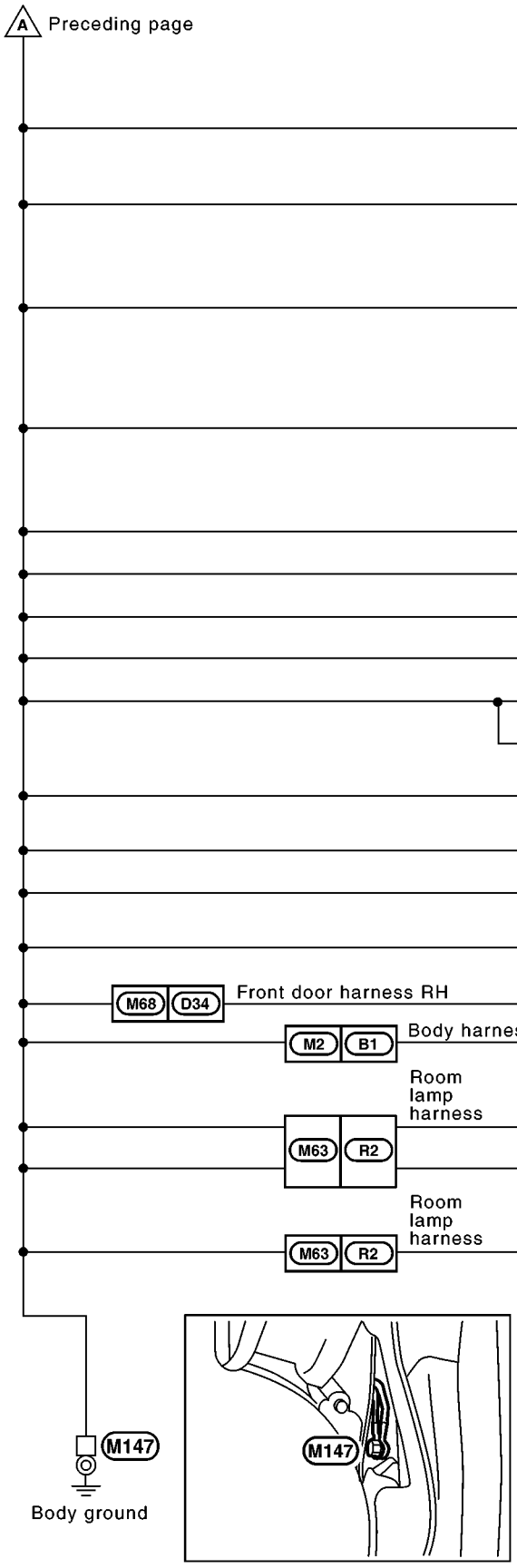
MEL253M



CONNECTOR NUMBER	CONNECT TO
M3	ASCD control unit (Terminal No.17)
M15	Combination flasher unit
M23	Power window relay
M36	Rear window defogger switch (Treminal No.1)
M36	Rear window defogger switch (Treminal No.4)
M38	Mode door motor (With auto A/C)
M55	Air mix door motor (With auto A/C)
M65	Auto light control unit
M69	Power antenna
M115	Headlamp battery saver control unit (Terminal No. 3) (Without auto light)
M116	Headlamp battery saver control unit (Terminal No. 11)
M140	Door mirror remote control switch
M144	Rear power socket relay
D31	Door mirror defogger RH
Z5	Air bag diagnosis sensor unit
Z30	ASCD steering switch

* : This sub-harness is not shown in "Harness Layout", EL section.

MEL254M

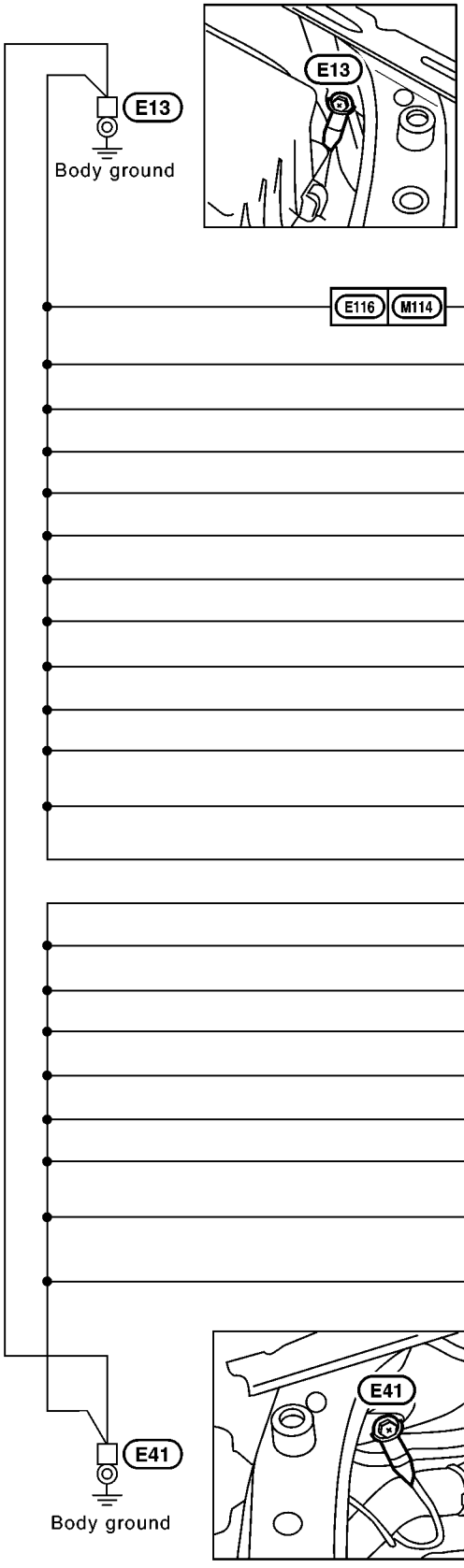


CON-NECTOR NUMBER	CONNECT TO
M17	Memory seat cancel switch
M25	Combination meter (Terminal No. 30) • Turn signal RH • Turn signal LH • ABS warning lamp
M26	Combination meter (Terminal No. 53) • 4WD warning lamp (With part-time 4-wheel drive)
M26	Combination meter (Terminal No. 59) • Vehicle speed sensor • Water temp. gauge • Fuel gauge • Air bag warning lamp • Unified meter control unit
M28	Clutch interlock switch (With M/T)
M30	Glove box lamp
M40	Clock
M41	Steering wheel receiver control switch
M102	A/C auto amp. (With auto A/C)
M103	A/C auto amp. (For Canada) (With auto A/C)
M116	Headlamp battery saver control unit (Terminal No. 9) (Without auto light)
M125	CD auto changer
M138	Intake door motor (With auto A/C)
M142	Transfer control unit (Terminal No. 3) (With all-mode 4-wheel drive)
D43	Front power window switch RH
B47	Audio amp. relay
R3	Vanity mirror RH illumination
R4	Compass and thermometer
R5	Integrated home link transmitter
R5	Vanity mirror LH illumination
R6	Spot lamp
R11	Sunroof motor

MEL255M

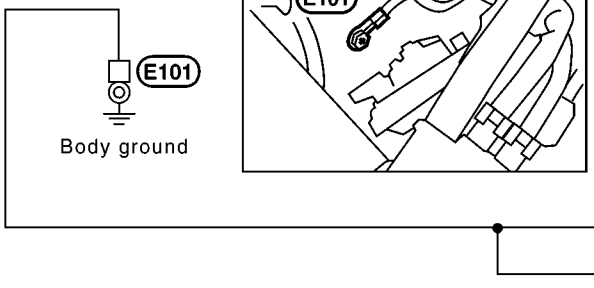
ENGINE ROOM HARNESS

NAEL0008S02

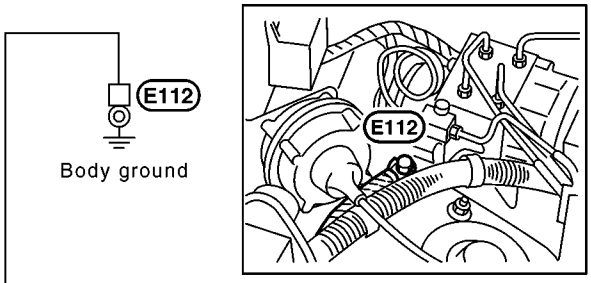


CON-NECTOR NUMBER	CONNECT TO
M25	Combination meter (Terminal No. 27) • High beam indicator (Without auto light)
E7	Combination switch
E8	Combination switch
E9	Combination switch (front wiper switch)
E12	Parking lamp LH, Front turn signal lamp LH
E24	ATP relay (With A/T and part-time 4-wheel drive)
E28	Brake fluid level switch
E29	Headlamp LH
E31	Hood switch
E45	Daytime light control unit (With auto light)
E61	Front fog lamp LH
E63	Combination switch (Front fog lamp switch) (Without auto light)
E114	Combination switch (rear wiper switch)
E38	Headlamp RH
E40	Parking lamp RH, Front turn signal lamp RH
E42	Washer level switch
E43	Rear washer motor
E45	Daytime light control unit (Without auto light)
E54	Fuel pump relay-2
E62	Front fog lamp RH
E95	Transfer shift Hi relay (With all-mode 4-wheel drive)
E99	Transfer shift Low relay (With all-mode 4-wheel drive)

MEL256M



CON-NECTOR NUMBER	CONNECT TO
E105	Alternator
E110	Power steering oil pressure switch

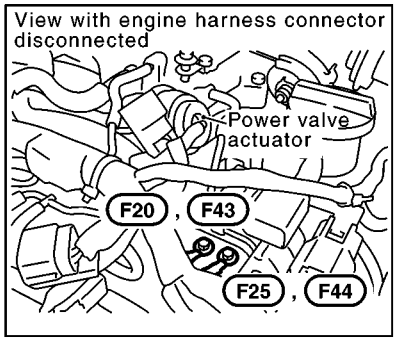


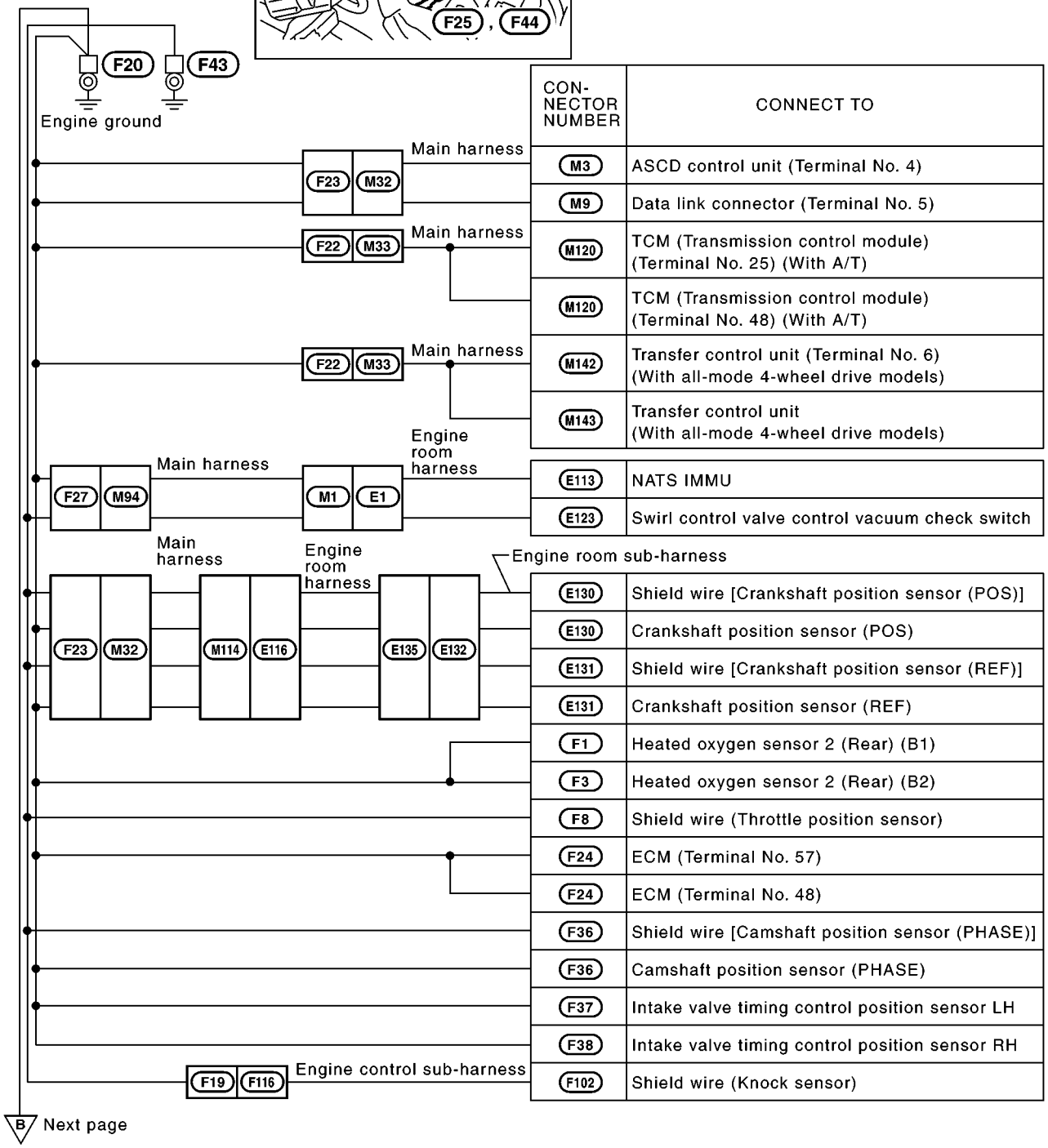
CON-NECTOR NUMBER	CONNECT TO
E111	ABS actuator and electric control unit (Terminal No. 19)
E111	ABS actuator and electric control unit (Terminal No. 16)
E111	Shield wire (ABS actuator and electric control unit)

MEL146M

ENGINE CONTROL HARNESS

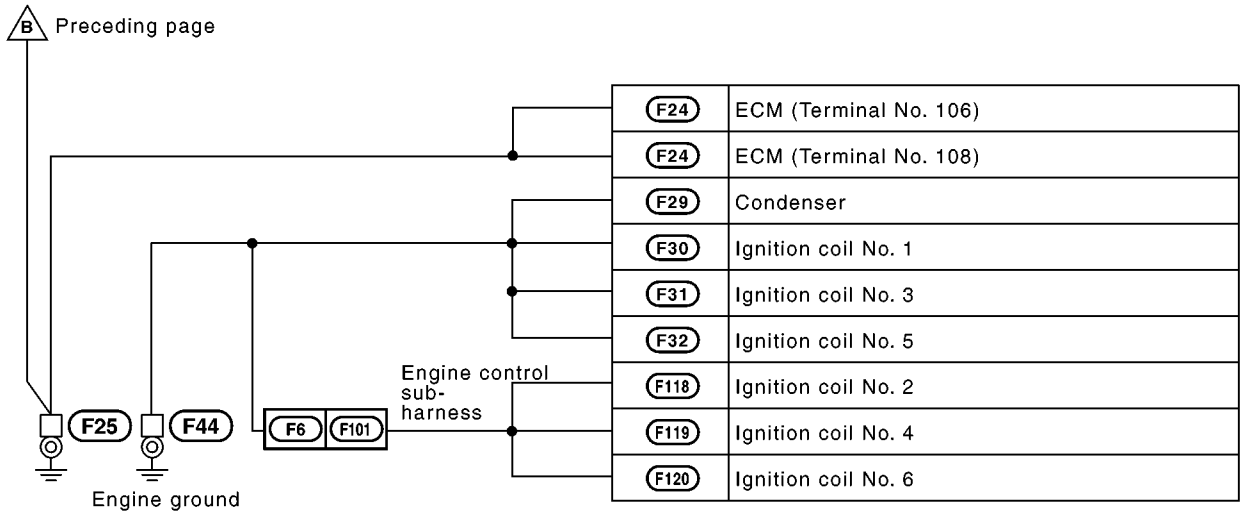
NAEL0008S03





CONNECTOR NUMBER	CONNECT TO
M3	ASCD control unit (Terminal No. 4)
M9	Data link connector (Terminal No. 5)
M120	TCM (Transmission control module) (Terminal No. 25) (With A/T)
M120	TCM (Transmission control module) (Terminal No. 48) (With A/T)
M142	Transfer control unit (Terminal No. 6) (With all-mode 4-wheel drive models)
M143	Transfer control unit (With all-mode 4-wheel drive models)
E113	NATS IMMU
E123	Swirl control valve control vacuum check switch
E130	Shield wire [Crankshaft position sensor (POS)]
E130	Crankshaft position sensor (POS)
E131	Shield wire [Crankshaft position sensor (REF)]
E131	Crankshaft position sensor (REF)
F1	Heated oxygen sensor 2 (Rear) (B1)
F3	Heated oxygen sensor 2 (Rear) (B2)
F8	Shield wire (Throttle position sensor)
F24	ECM (Terminal No. 57)
F24	ECM (Terminal No. 48)
F36	Shield wire [Camshaft position sensor (PHASE)]
F36	Camshaft position sensor (PHASE)
F37	Intake valve timing control position sensor LH
F38	Intake valve timing control position sensor RH
F102	Shield wire (Knock sensor)

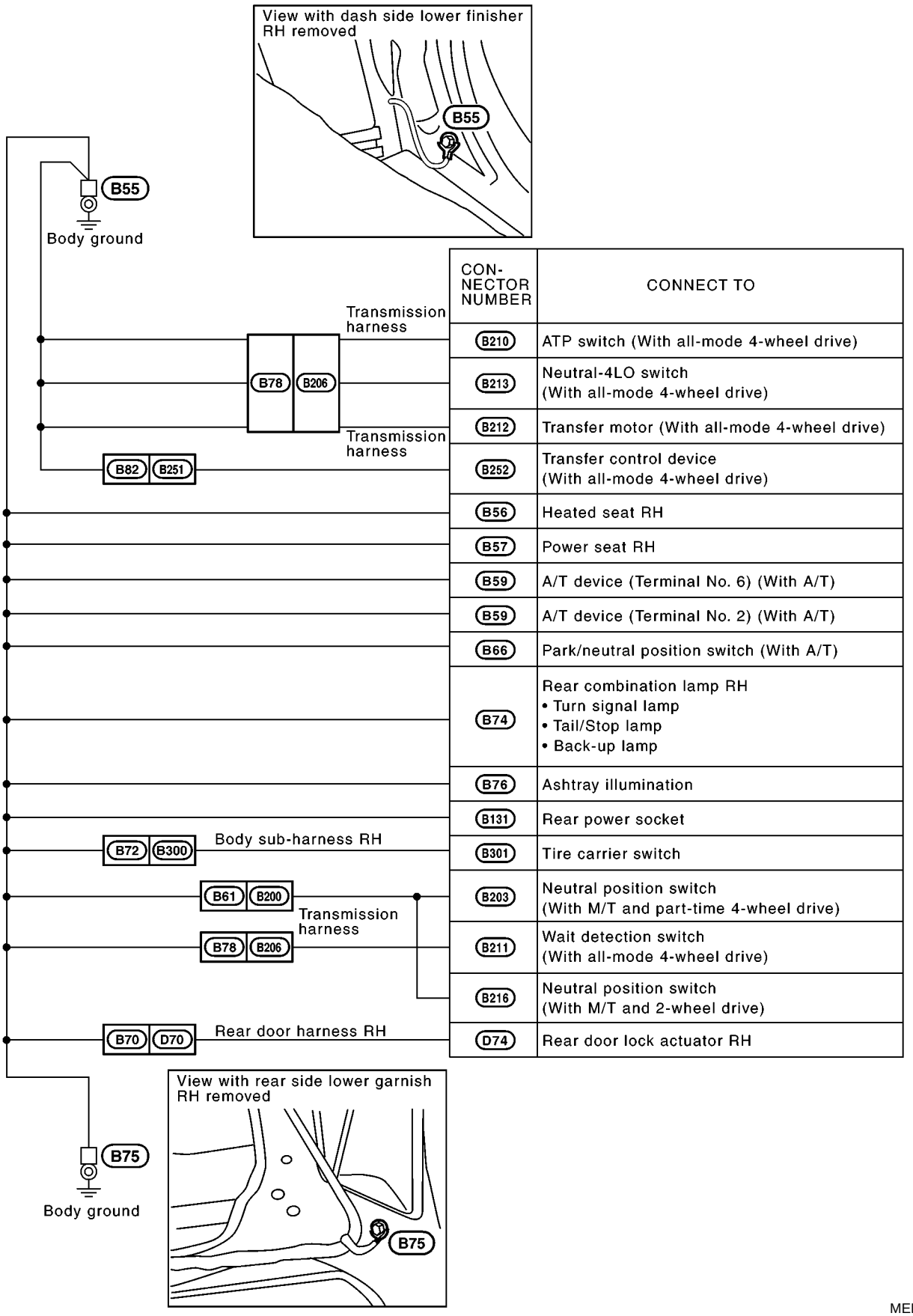
MEL257M


B
Preceding page
F25
F44
F6
F101
Engine control sub-harness
Engine ground
F24
ECM (Terminal No. 106)
F24
ECM (Terminal No. 108)
F29
Condenser
F30
Ignition coil No. 1
F31
Ignition coil No. 3
F32
Ignition coil No. 5
F118
Ignition coil No. 2
F119
Ignition coil No. 4
F120
Ignition coil No. 6

MEL233M

BODY HARNESS RH

NAEL0008S04

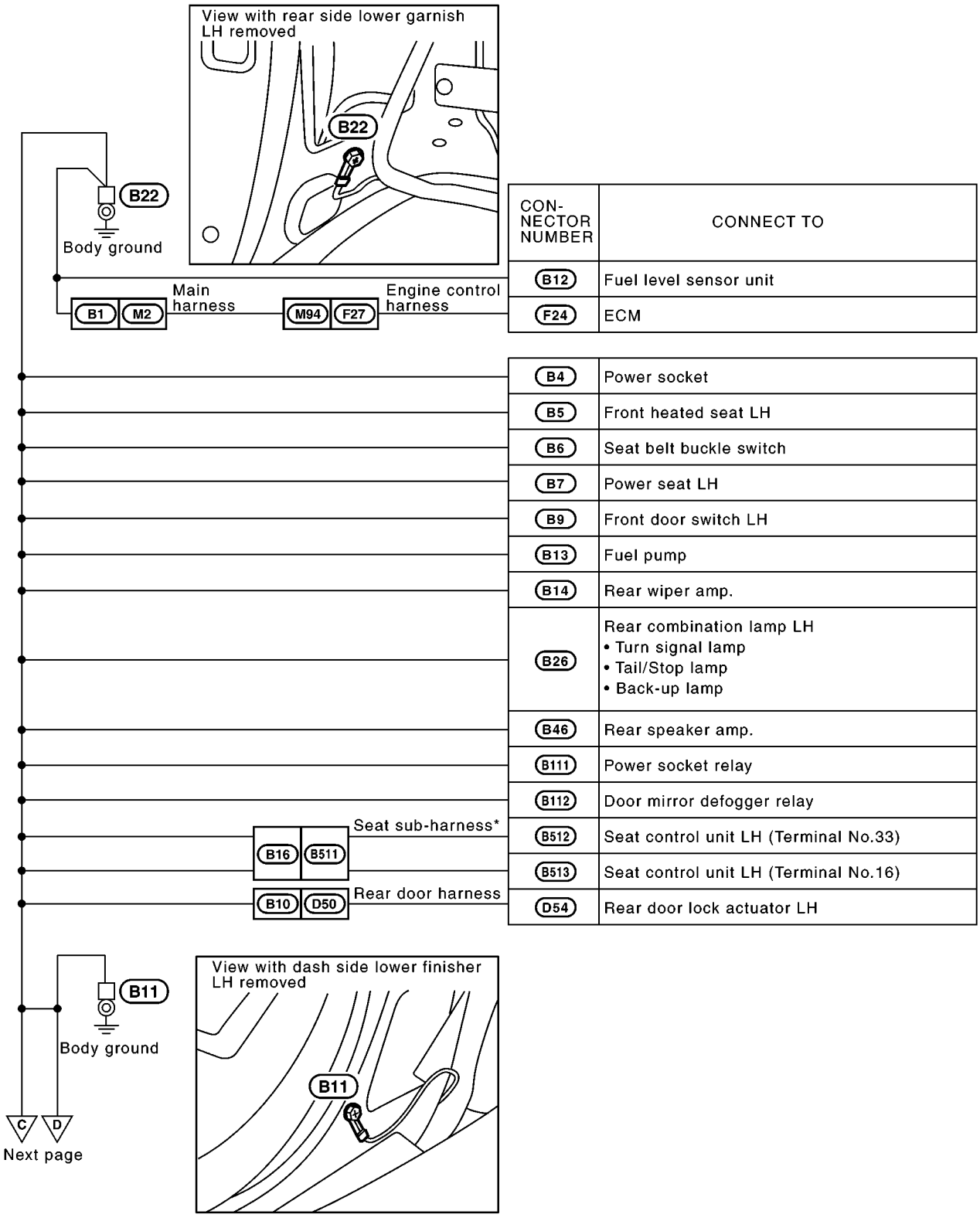


CONNECTOR NUMBER	CONNECT TO
B210	ATP switch (With all-mode 4-wheel drive)
B213	Neutral-4LO switch (With all-mode 4-wheel drive)
B212	Transfer motor (With all-mode 4-wheel drive)
B252	Transfer control device (With all-mode 4-wheel drive)
B56	Heated seat RH
B57	Power seat RH
B59	A/T device (Terminal No. 6) (With A/T)
B59	A/T device (Terminal No. 2) (With A/T)
B66	Park/neutral position switch (With A/T)
B74	Rear combination lamp RH • Turn signal lamp • Tail/Stop lamp • Back-up lamp
B76	Ashtray illumination
B131	Rear power socket
B301	Tire carrier switch
B203	Neutral position switch (With M/T and part-time 4-wheel drive)
B211	Wait detection switch (With all-mode 4-wheel drive)
B216	Neutral position switch (With M/T and 2-wheel drive)
D74	Rear door lock actuator RH

MEL258M

BODY HARNESS LH

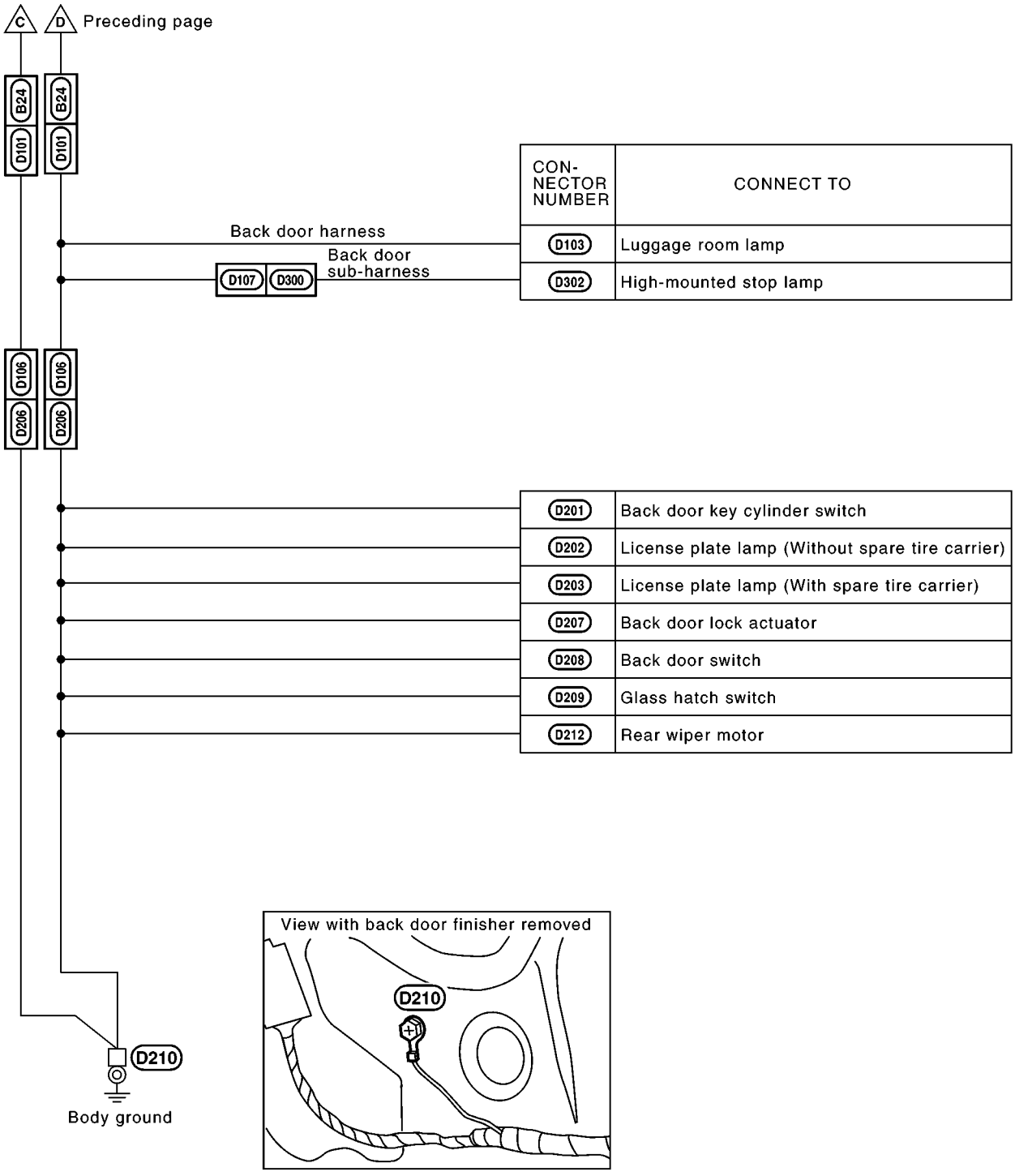
NAEL0008S05



CONNECTOR NUMBER	CONNECT TO
B12	Fuel level sensor unit
F24	ECM
B4	Power socket
B5	Front heated seat LH
B6	Seat belt buckle switch
B7	Power seat LH
B9	Front door switch LH
B13	Fuel pump
B14	Rear wiper amp.
B26	Rear combination lamp LH • Turn signal lamp • Tail/Stop lamp • Back-up lamp
B46	Rear speaker amp.
B111	Power socket relay
B112	Door mirror defogger relay
B512	Seat control unit LH (Terminal No.33)
B513	Seat control unit LH (Terminal No.16)
D54	Rear door lock actuator LH

∗ : This sub-harness is not shown in "Harness Layout", EL section.

MEL259M



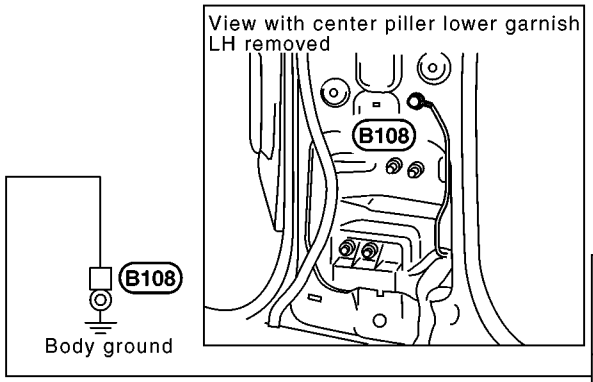
CON-NECTOR NUMBER	CONNECT TO
D103	Luggage room lamp
D302	High-mounted stop lamp

D201	Back door key cylinder switch
D202	License plate lamp (Without spare tire carrier)
D203	License plate lamp (With spare tire carrier)
D207	Back door lock actuator
D208	Back door switch
D209	Glass hatch switch
D212	Rear wiper motor

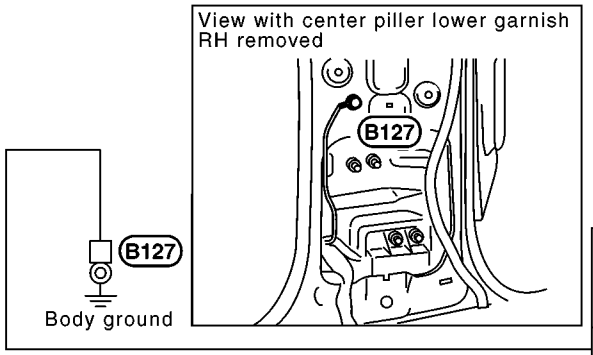
MEL260M

BODY HARNESS

NAEL0008S07

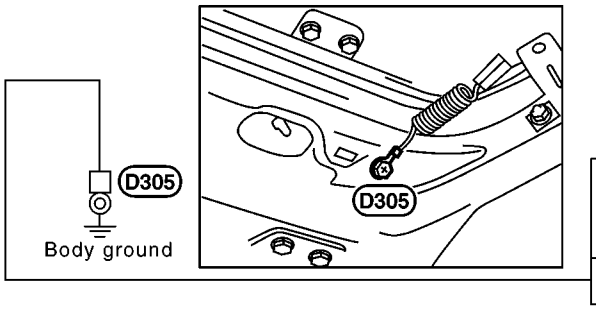


CON-NECTOR NUMBER	CONNECT TO
B107	Shield wire (Satellite sensor LH)



CON-NECTOR NUMBER	CONNECT TO
B128	Shield wire (Satellite sensor RH)

MEL151M



CON-NECTOR NUMBER	CONNECT TO
D304	Rear window defogger

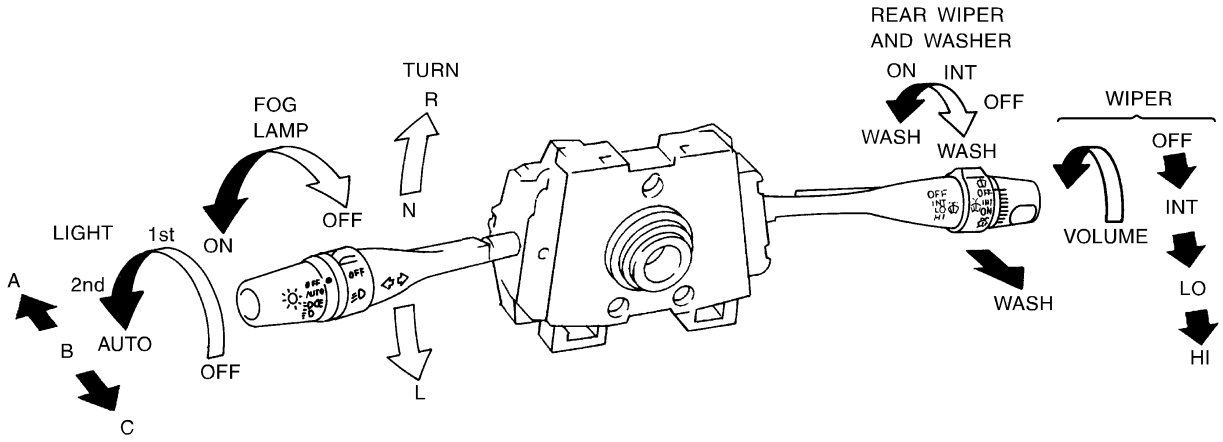
MEL152M

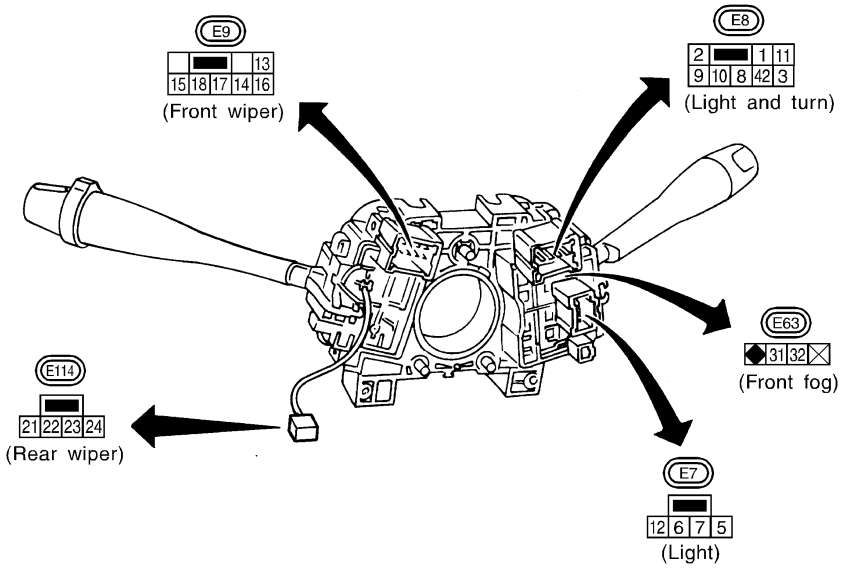
Check

WITH AUTO LIGHT SYSTEM

NAEL0009

NAEL0009S01





LIGHTING SWITCH

	OFF	AUTO	1ST	2ND
5			○	○
11			○	○
8				○
12				○
42		○		
(8)		○		

	A	B	C
(5)	○	○	○
7		○	
6	○		○
(8)	○	○	○
10		○	
9	○		○
(12)			○

FRONT WIPER AND WASHER SWITCH

	LO	AUTO STOP	AMP	WASH	HI	EARTH
OFF	○	○				
INT	○	○	○			○
LO	○					○
HI					○	○
WASH				○		○

VARIABLE INTERMITTENT WIPER VOLUME

WIPER AMP.

(14) (15) (13) (16) (17) (18)

FOG LAMP SWITCH

	OFF	ON
31		○
32		○

TURN SIGNAL LAMP SWITCH

	L	N	R
1	○		○
2			○
3	○		

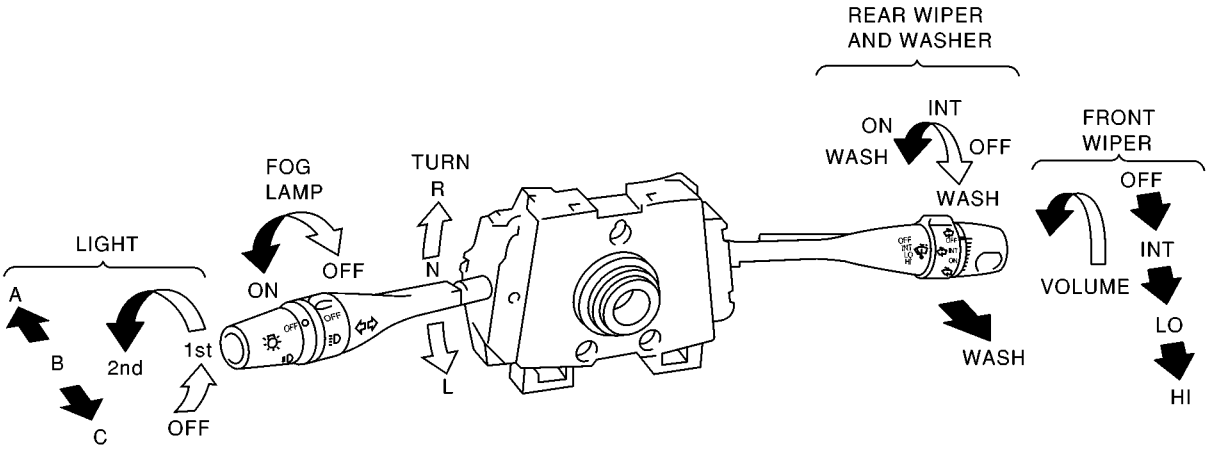
REAR WIPER SWITCH

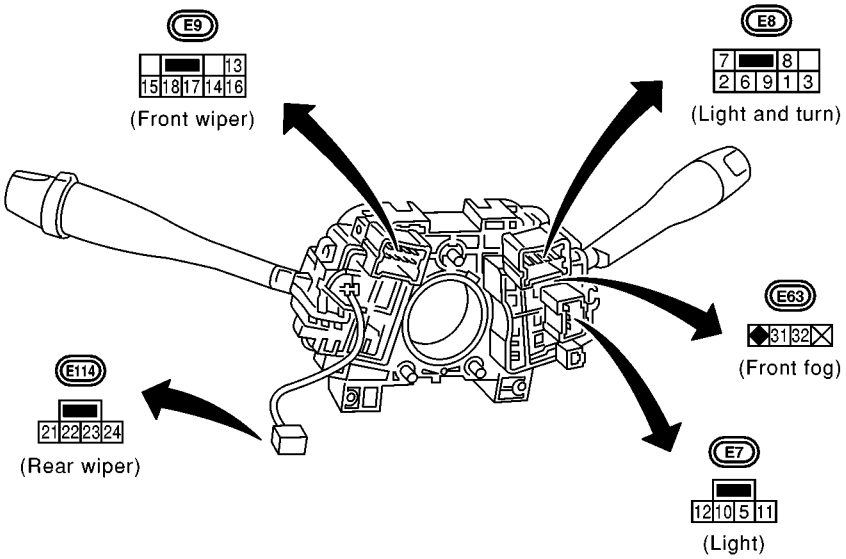
	WASH	OFF	INT	ON	WASH
21			○		
22				○	○
23	○			○	○
24	○		○	○	○

MEL132M

WITHOUT AUTO LIGHT SYSTEM

NAEL0009S02





LIGHTING SWITCH

	OFF	1ST	2ND
11		○	○
12		○	○
			○
5			○
			○
8			○

	A	B	C
	○	○	○
6	○		○
7		○	
(5)			○
	○	○	○
9	○		○
10		○	
(8)			○

FRONT WIPER AND WASHER SWITCH

	LO	AUTO STOP	AMP	WASH	HI	EARTH
OFF	○	○				
INT	○	○	○			○
LO	○					○
HI					○	○
WASH				○		○

WIPER AMP.
(14) (15) (13) (16) (17) (18)

VARIABLE INTERMITTENT WIPER VOLUME

FOG LAMP SWITCH

	OFF	ON
31		○
32		○

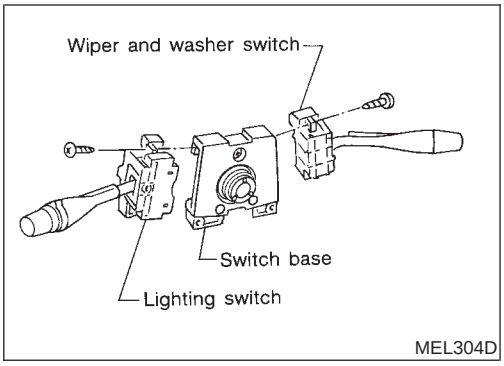
TURN SIGNAL LAMP SWITCH

	L	N	R
1	○		○
2			○
3	○		

REAR WIPER SWITCH

	WASH	OFF	INT	ON	WASH
21			○		
22				○	○
23	○				○
24	○		○	○	○

MEL249M

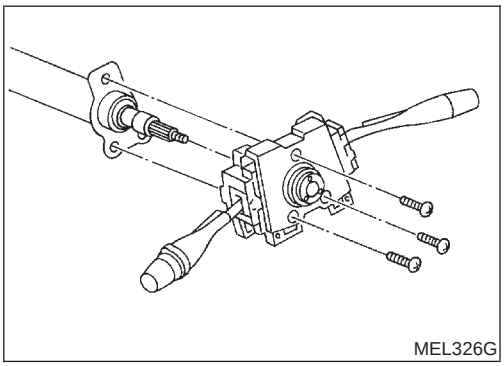


Replacement

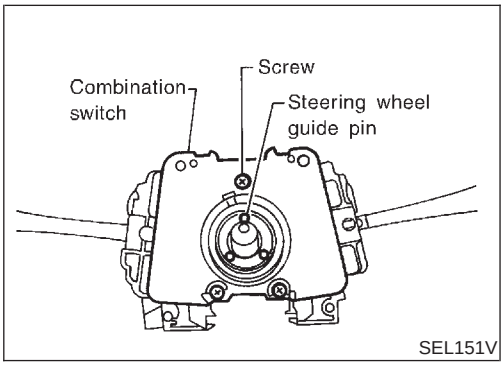
NAEL0010

For removal and installation of spiral cable, refer to RS-18, “Installation — Air Bag Module and Spiral Cable”.

- Each switch can be replaced without removing combination switch base.



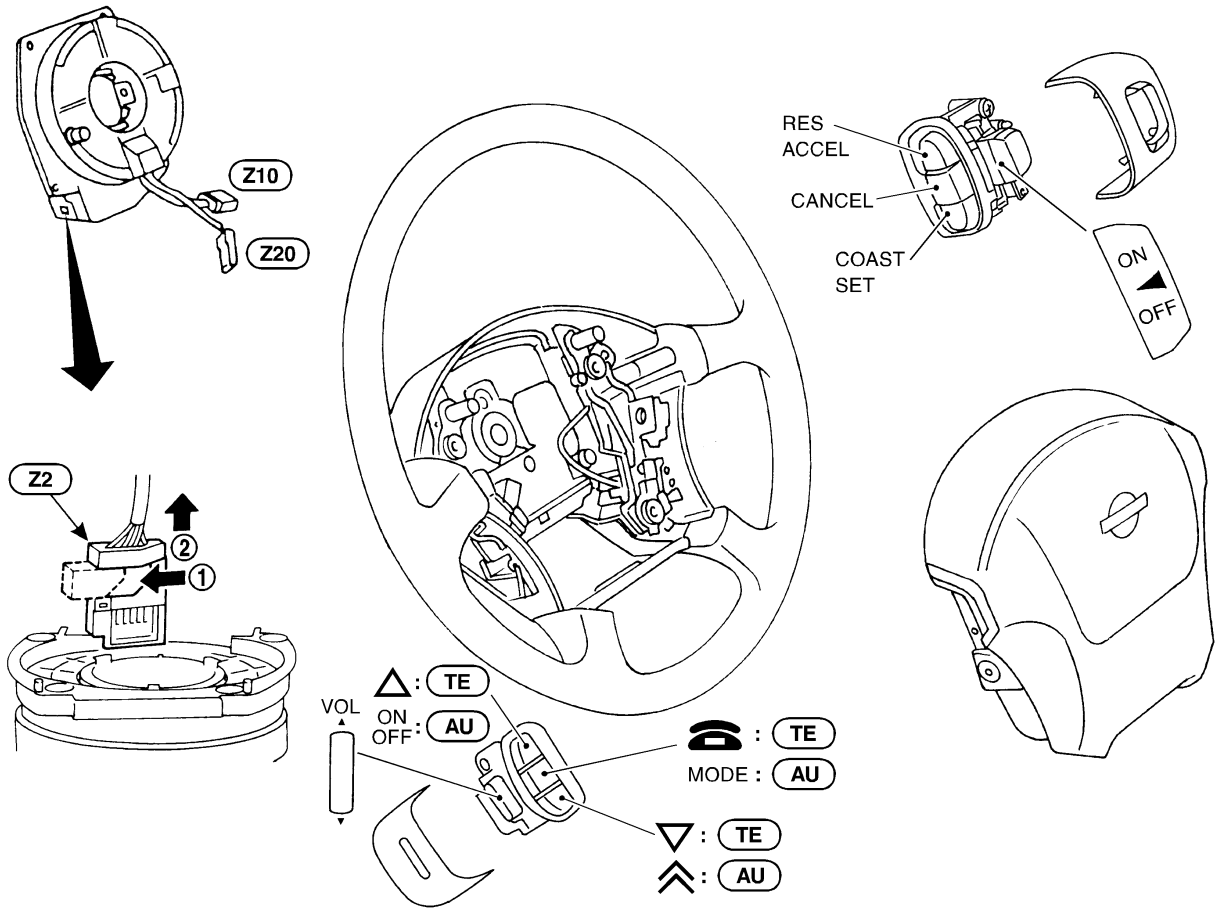
- To remove combination switch base, remove base attaching screw.

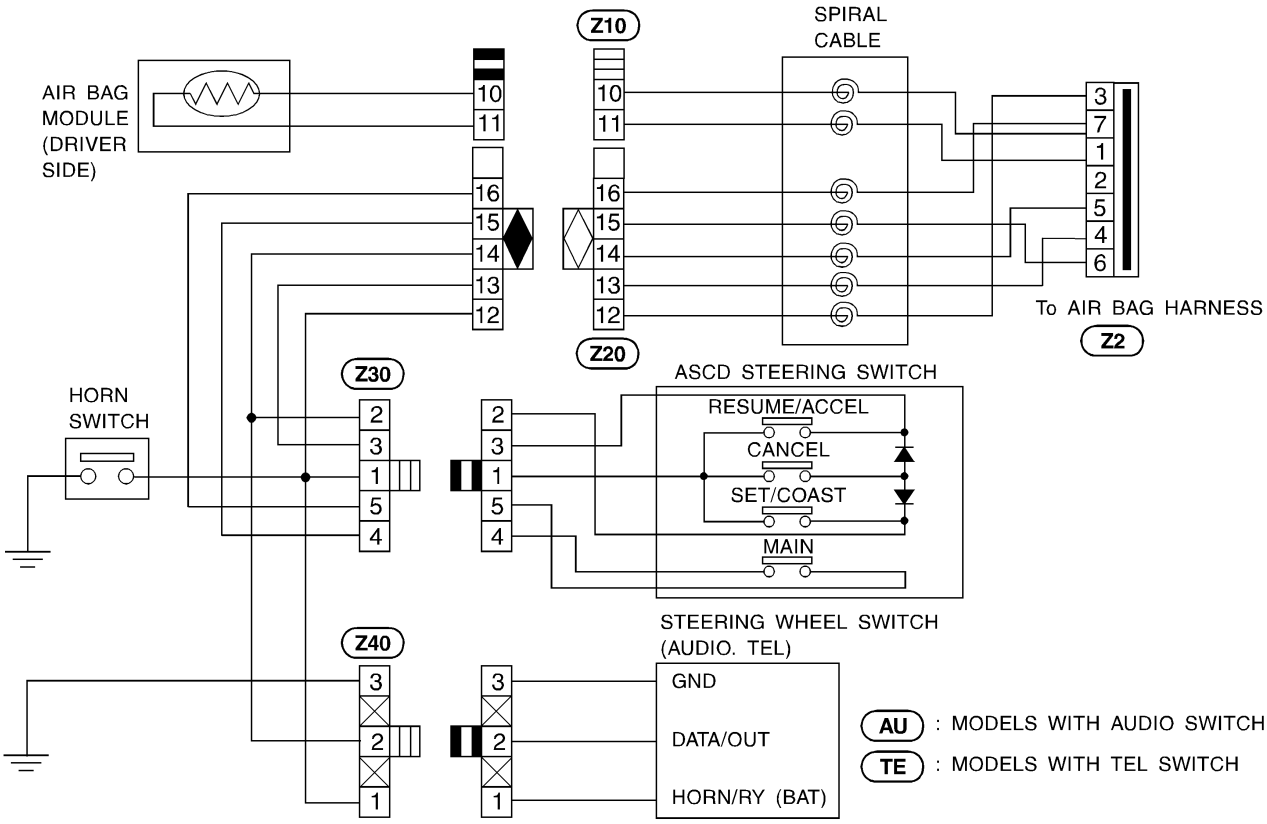


- Before installing the steering wheel, align the steering wheel guide pins with the screws which secure the combination switch as shown in the left figure.

Check

NAEL0011

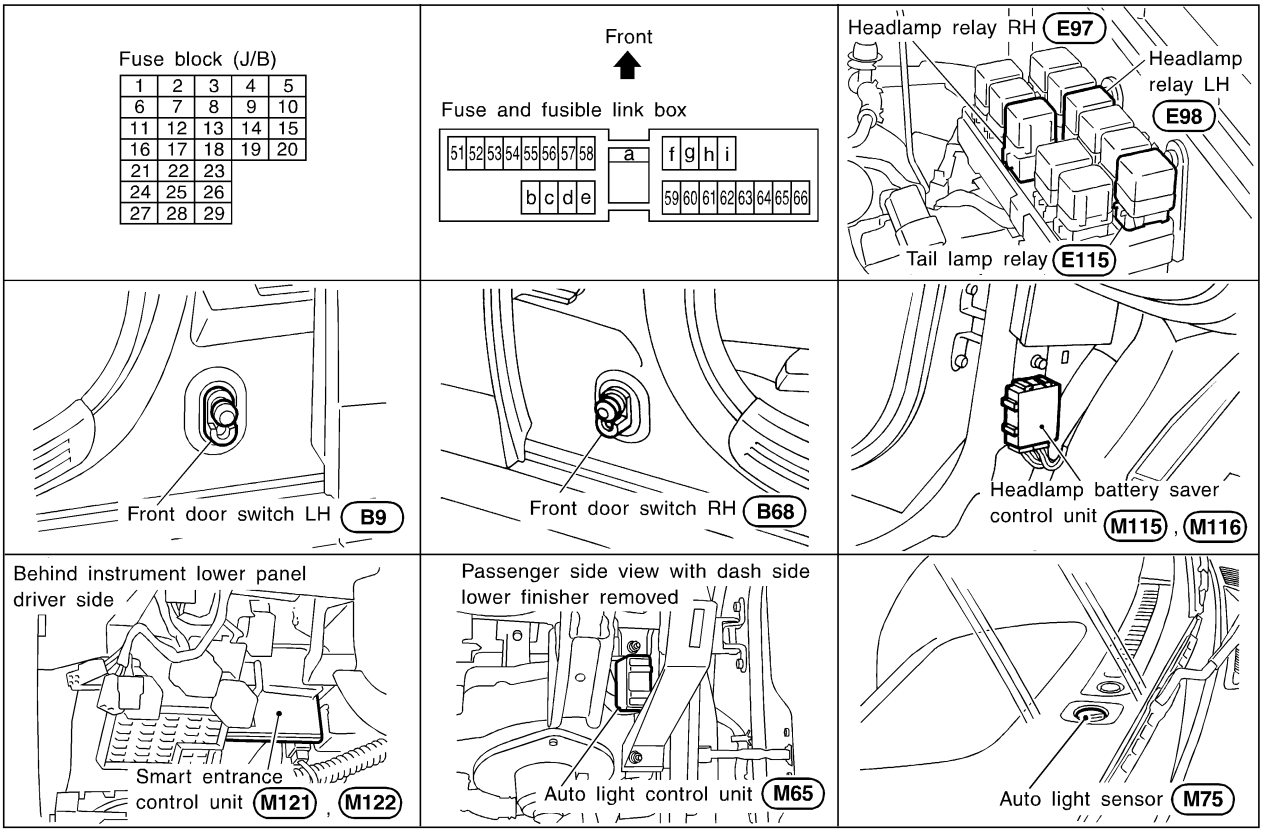




MEL133M

Component Parts and Harness Connector Location

NAEL0159



SEL460X

System Description

NAEL0188

WITH AUTO LIGHT SYSTEM

NAEL0188S08

The headlamp operation is controlled by the lighting switch which is built into the combination switch and headlamp battery saver control unit. And the headlamp battery saver system is controlled by the headlamp battery saver control unit and smart entrance control unit.

Outline

NAEL0188S0801

Power is supplied at all times

- to headlamp LH relay terminals 2 and 3
- through 15A fuse (No. 60, located in the fuse and fusible link box), and
- to headlamp RH relay terminals 2 and 3
- through 15A fuse (No. 59, located in the fuse and fusible link box), and
- to headlamp battery saver control unit terminal 7, and
- to smart entrance control unit terminal 10
- through 7.5A fuse [No. 24, located in the fuse block (J/B)].

When the ignition switch is in the ON or START position, power is supplied

- to headlamp battery saver control unit terminal 1
- through 10A fuse [No. 16, located in the fuse block (J/B)], and
- to headlamp battery saver control unit terminal 10,
- to auto light control unit terminal 1 and
- to smart entrance control unit terminal 33
- through 7.5A fuse [No. 11, located in the fuse block (J/B)].

When the ignition switch is in the ACC or ON position, power is supplied

- to auto light control unit terminal 2
- through 10A fuse [No. 9, located in the fuse block (J/B)]

Ground is supplied
- to headlamp battery saver control unit terminals 4 and 11
- through body grounds M77 and M111, and M4, M66 and M147
- to auto light control unit terminal 5
- through body grounds M4, M66 and M147.

Power Supply to Low Beam and High Beam
When lighting switch is in 2ND or PASS position, ground is supplied
- to headlamp relay (LH and RH) terminal 2 from headlamp battery saver control unit terminals 2 and 8
- through headlamp battery saver control unit terminals 3 and 9,
- from lighting switch terminal 12.

Headlamp relays (LH and RH) are energized and then power is supplied to headlamps (LH and RH).

Low Beam Operation

NAEL0188S0802

When the lighting switch is turned to the 2ND position and placed in LOW ("B") position, power is supplied
- from terminal 5 of each headlamp relay
- to terminal 3 of each headlamp

Ground is supplied
- to headlamp LH terminal 2
- through lighting switch terminals 7 and 5
- through body grounds E13 and E41.
- to headlamp RH terminal 2
- through lighting switch terminals 10 and 8
- through body grounds E13 and 41.

With power and ground supplied, the headlamp(s) will illuminate.

High Beam Operation/Flash-to-pass Operation

NAEL0188S0803

When the lighting switch is turned to the 2ND position and placed in HIGH ("A") position or PASS ("C") position, power is supplied
- from terminal 5 of headlamp LH relay
- to terminal 3 of headlamp LH and
- to combination meter terminal 26 for the HIGH BEAM indicator
- from terminal 5 of headlamp RH relay
- to terminal 3 of headlamp RH.

Ground is supplied
- to headlamp LH terminal 1 and
- to combination meter terminal 27 for the HIGH BEAM indicator
- through lighting switch terminals 6 and 5
- through body grounds E13 and E41, and
- to headlamp RH terminal 1
- through lighting switch terminals 9 and 8
- through body grounds E13 and E41.

With power and ground supplied, the high beams and the high beam indicator illuminate.

Battery Saver Control

NAEL0188S0804

When the ignition switch is turned from ON (or START) to OFF (or ACC) positions while headlamps illuminate, the RAP signal is supplied to terminal 10 of the headlamp battery saver control unit from smart entrance control unit terminal 5.
After counting 45 seconds by the RAP signal from the smart entrance control unit to headlamp battery saver control unit, the ground supply to terminal 1 of the headlamp LH and RH relay from headlamp battery saver control unit terminals 2 and 8 is terminated.
Then the headlamps are turned off.
The headlamps are turned off when driver or passenger side door is opened even if 45 seconds have not

passed after ignition switch is turned from ON (or START) to OFF (or ACC) positions while headlamps are illuminated.
When the lighting switch is turned from OFF to 2ND after headlamps are turned to off by the battery saver control, ground is supplied

- to headlamp LH and RH relays terminal 1 from headlamp battery saver control unit terminals 2 and 8
- through headlamp battery saver control unit terminals 3 and 9, and
- through lighting switch terminal 12.

Then headlamps illuminate again.

Auto Light Operation

NAEL0188S0805

When lighting switch is in "AUTO" position, ground is supplied

- to auto light control unit terminal 10
- from lighting switch terminal 42.

When ignition switch is turn to "ON" or "START" position and outside brightness is darker than prescribed level. Ground is supplied

- to headlamp relay LH and RH terminals 1
- through battery saver control unit
- from auto light control unit terminal 6, and
- to tail lamp relay terminal 1
- through battery saver control unit
- from auto light control unit terminal 7.

Then both headlamp relays and tail lamp relay are energized, headlamps (low or high) and tail lamps are illuminate according to switch position.
Auto light operation allows headlamps and tail lamps to go off when

- Ignition switch is turned to "OFF" position or
- Outside brightness is brighter than prescribed level.

NOTE:
The delay time varies up to maximum of 20 seconds as the outside brightness changes.

For parking license and tail lamp auto operation, refer to "PARKING, LICENSE AND TAIL LAMPS".

Theft Warning System

NAEL0188S0806

The theft warning system will flash the low beams if the system is triggered. Refer to "THEFT WARNING SYSTEM" (EL-314).

WITHOUT AUTO LIGHT SYSTEM

=NAEL0188S09

The headlamp operation is controlled by the lighting switch which is built into the combination switch and headlamp battery saver control unit. And the headlamp battery saver system is controlled by the headlamp battery saver control unit and smart entrance control unit.

Outline

NAEL0188S0901

Power is supplied at all times

- to headlamp LH relay terminals 2 and 3
- through 15A fuse (No. 60, located in the fuse and fusible link box), and
- to headlamp RH relay terminals 2 and 3
- through 15A fuse (No. 59, located in the fuse and fusible link box), and
- to headlamp battery saver control unit terminal 7
- to smart entrance control unit terminal 10
- through 7.5A fuse [No. 24, located in the fuse block (J/B)].

When the ignition switch is in the ON or START position, power is supplied

- to headlamp battery saver control unit terminal 1
- through 10A fuse [No. 16, located in the fuse block (J/B)], and
- to headlamp battery saver control unit terminal 10, and
- to smart entrance control unit terminal 33
- through 7.5A fuse [No. 11, located in the fuse block (J/B)]

Ground is supplied

- to headlamp battery saver control unit terminals 4, and 3, 9 and 11.
- through body grounds M77 and M111, and M4, M66 and M147.

When Ignition Switch is in ON or START Position

Ground is supplied

- to headlamp LH relay terminal 1 from headlamp battery saver control unit terminal 2
- through headlamp battery saver control unit terminals 3 and 11, and
- through body grounds M4, M66 and M147, and
- to headlamp RH relay terminal 1 from headlamp battery saver control unit terminal 8
- through headlamp battery saver control unit terminals 4 and 9, and
- through body grounds M77 and M111, and M4, M66 and M147.

Headlamp relays (LH and RH) are then energized.

When Ignition Switch is in OFF or ACC Position

When lighting switch is in 2ND (or 1ST) position, ground is supplied

- to headlamp battery saver control unit terminals 5 and 13
- from lighting switch terminal 11.

And then, ground is also supplied to headlamp LH and RH relays terminal 1 from headlamp battery saver control unit. Headlamp relays (LH and RH) are then energized.

Low Beam Operation

NAEL0188S0902

When the lighting switch is turned to the 2ND position and placed in LOW ("B") position, power is supplied

- from lighting switch terminal 10
- to terminal 2 of the headlamp LH, and
- from lighting switch terminal 7
- to terminal 2 of the headlamp RH.

Terminal 3 of each headlamp supplies ground through body grounds E13 and E41.
With power and ground supplied, the headlamp(s) will illuminate.

High Beam Operation/Flash-to-pass Operation

NAEL0188S0903

When the lighting switch is turned to the 2ND position and placed in HIGH ("A") position or PASS ("C") position, power is supplied

- from lighting switch terminal 6
- to terminal 1 of the headlamp RH, and
- from lighting switch terminal 9

- to terminal 1 of the headlamp LH, and
- to combination meter terminal 26 for the high beam indicator.

Ground is supplied to terminal 27 of the combination meter terminal 3 of each headlamp through body grounds E13 and E41.
With power and ground supplied, the high beams and the high beam indicator illuminate.

Battery Saver Control

NAEL0188S0904

When the ignition switch is turned from ON (or START) to OFF (or ACC) positions while headlamps illuminate, the RAP signal is supplied to terminal 10 of the headlamp battery saver control unit from smart entrance control unit terminal 5.
After counting 45 seconds by the RAP signal from the smart entrance control unit to headlamp battery saver control unit, the ground supply to terminal 1 of the headlamp LH and RH relay from headlamp battery saver control unit terminals 2 and 8 is terminated.
Then the headlamps are turned off.
The headlamps are turned off when driver or passenger side door is opened even if 45 seconds have not passed after ignition switch is turned from ON (or START) to OFF (or ACC) positions while headlamps are illuminated.
When the lighting switch is turned from OFF to 2ND after headlamps are turned to off by the battery saver control, ground is supplied

- to headlamp battery saver control unit terminals 5 and 13 from lighting switch terminal 11, and
- to headlamp LH and RH relays terminal 1 from headlamp battery saver control unit terminals 2 and 8.

Then headlamps illuminate again.

Theft Warning System

NAEL0188S0905

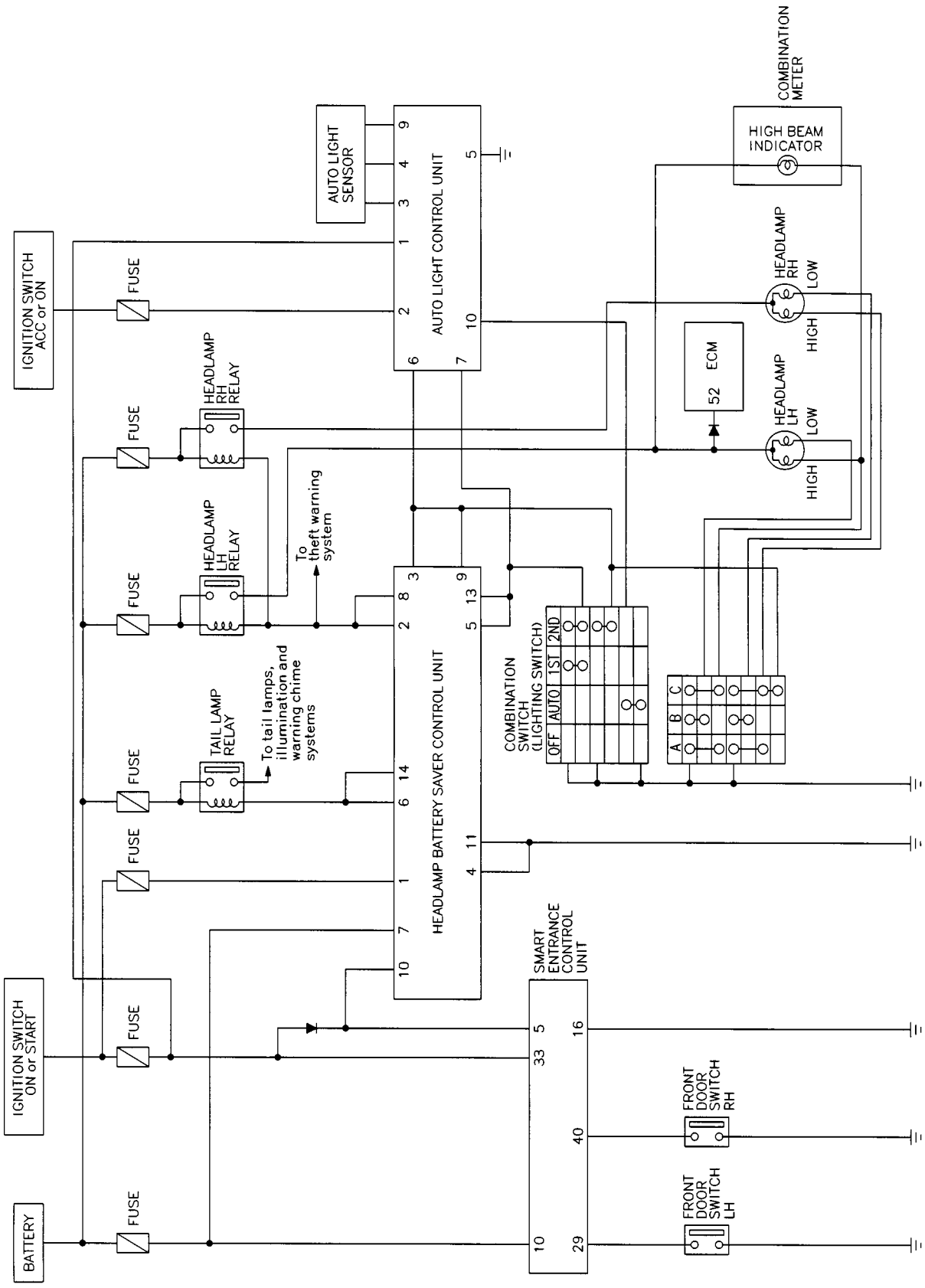
The theft warning system will flash the high beams if the system is triggered. Refer to "THEFT WARNING SYSTEM" (EL-313).

Schematic

NAEL0160

NAEL0160S01

WITH AUTO LIGHT SYSTEM

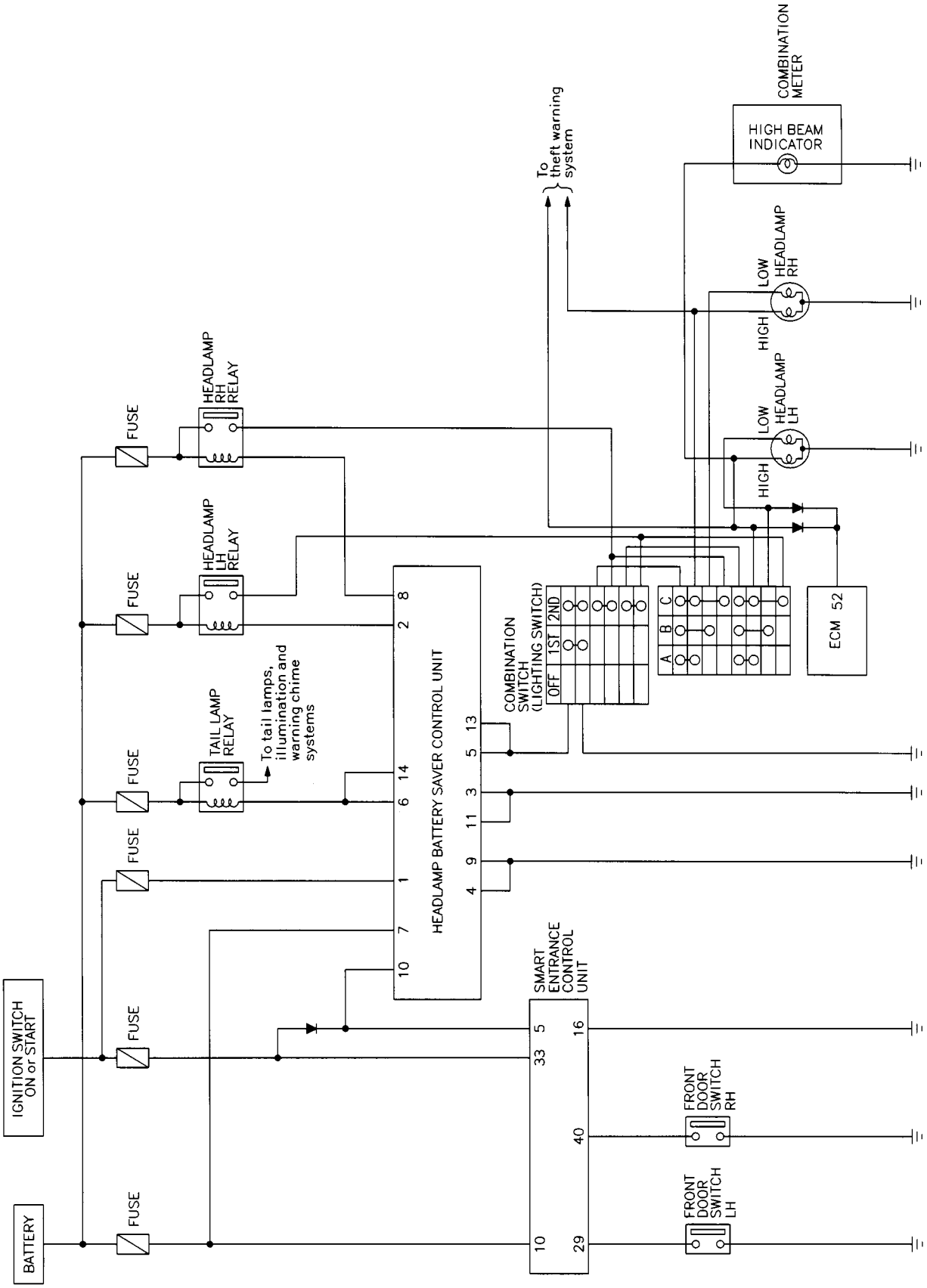


MEL980L

Schematic (Cont'd)

WITHOUT AUTO LIGHT SYSTEM

NAEL0160S02



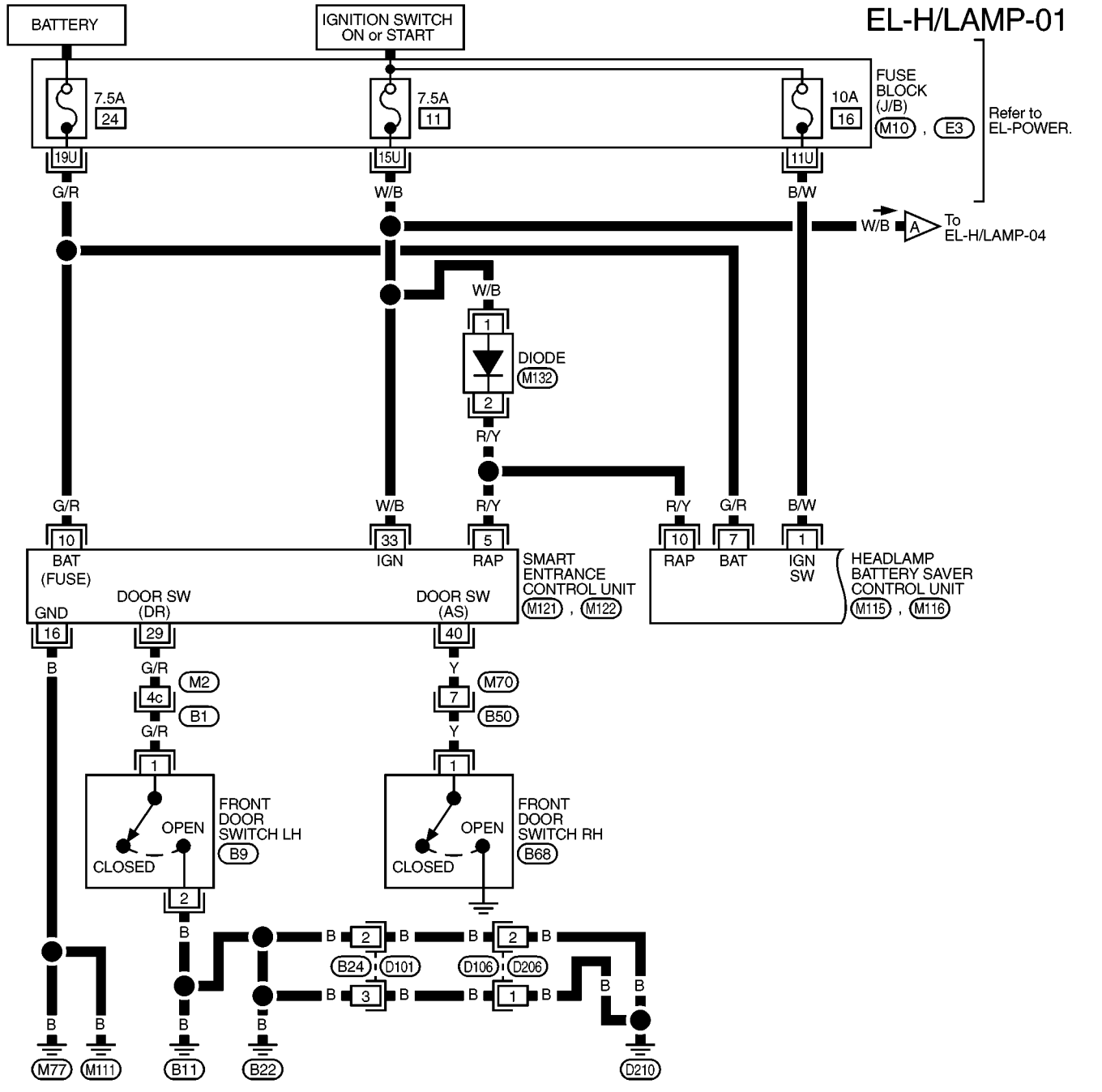
MEL985L

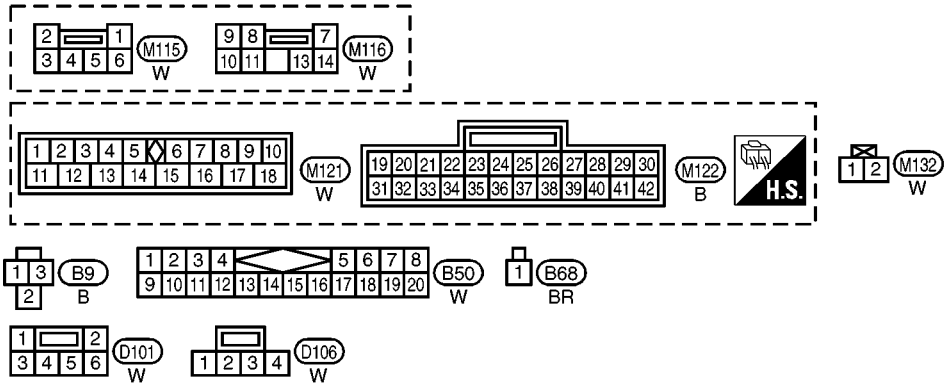
Wiring Diagram — H/LAMP —

NAEL0013

WITH AUTO LIGHT SYSTEM

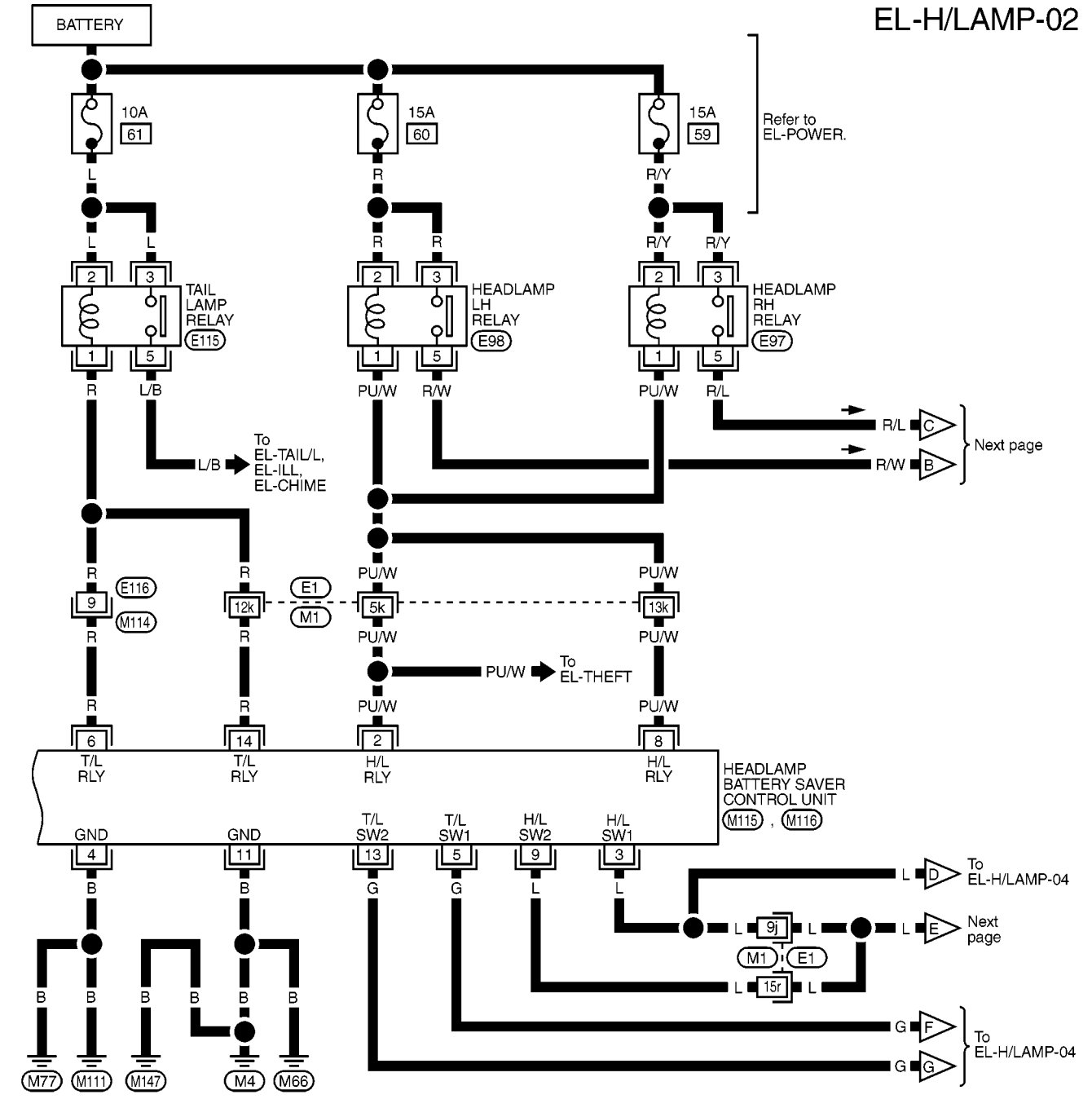
NAEL0013S01

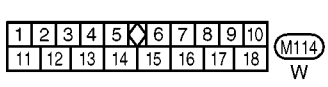


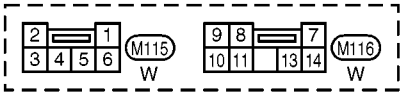


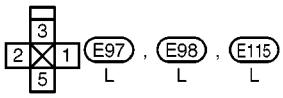
REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 , E3 -FUSE BLOCK-JUNCTION BOX (J/B)

MEL981L







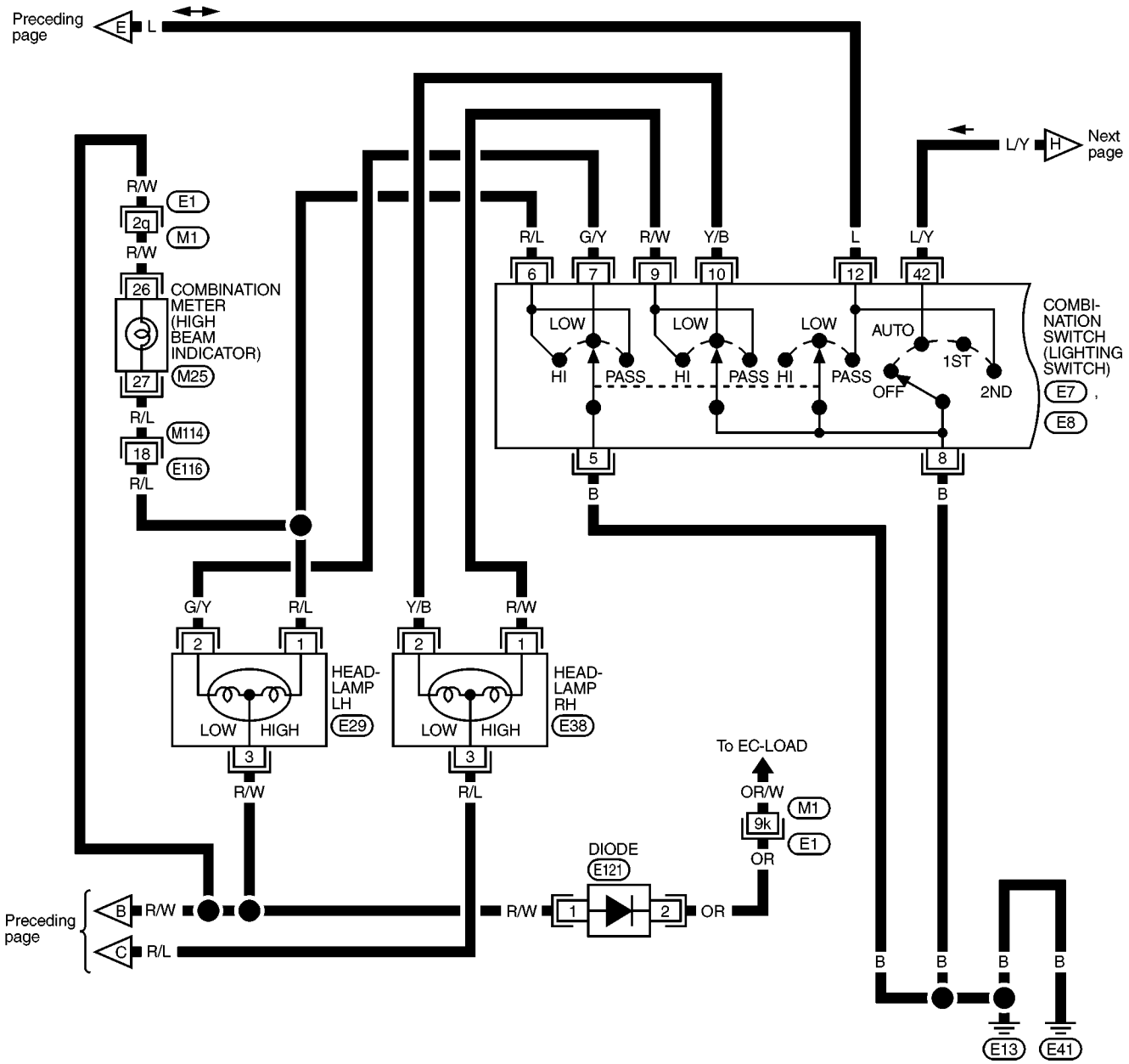


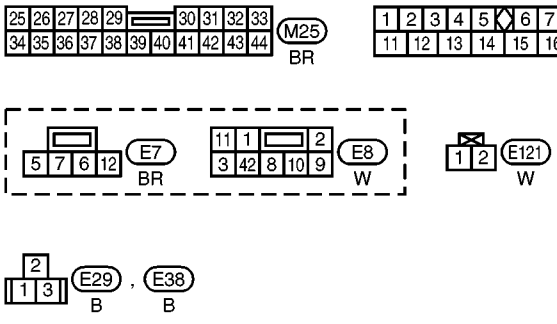
REFER TO THE FOLLOWING.

E1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL982L

EL-H/LAMP-03

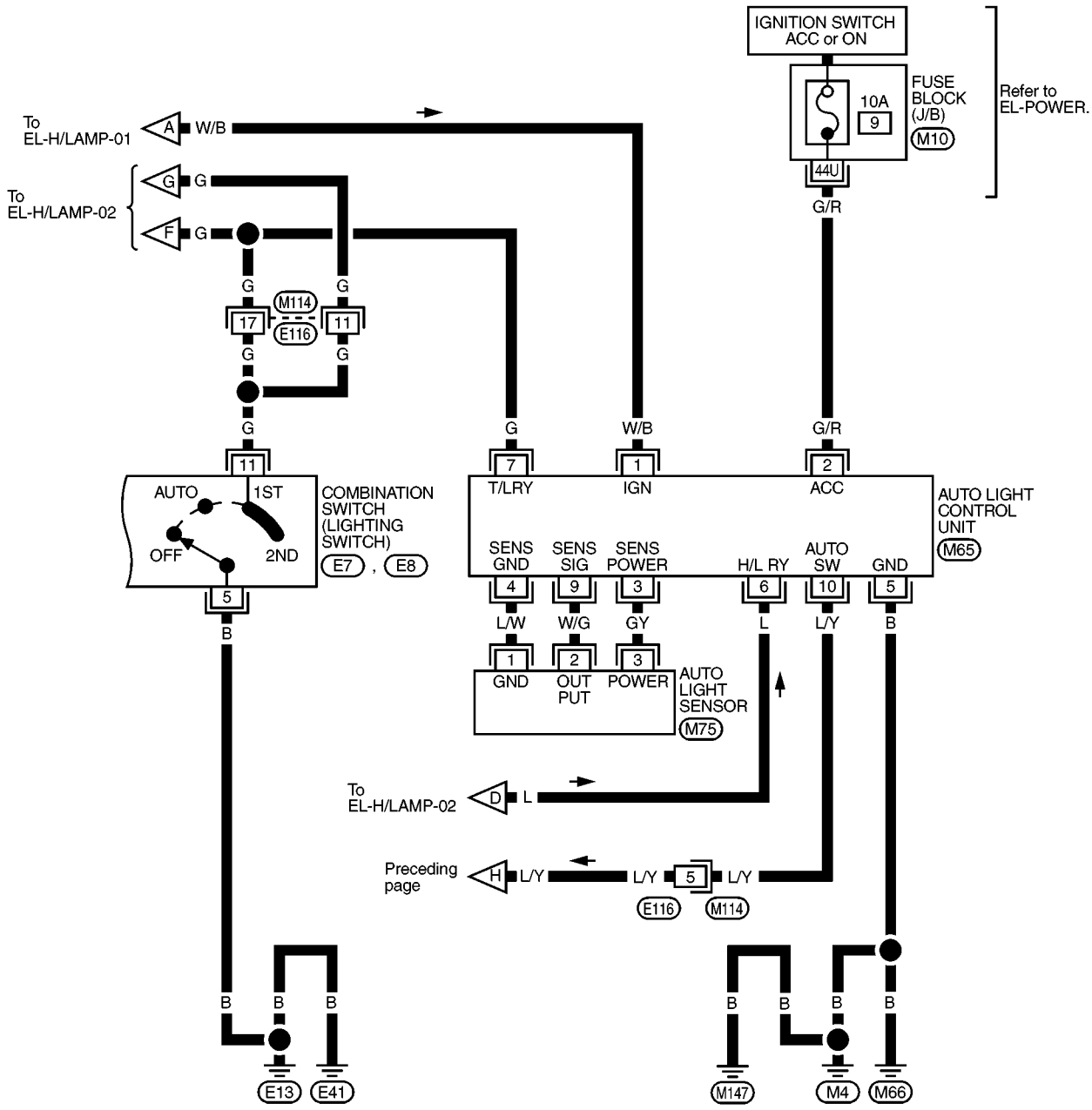


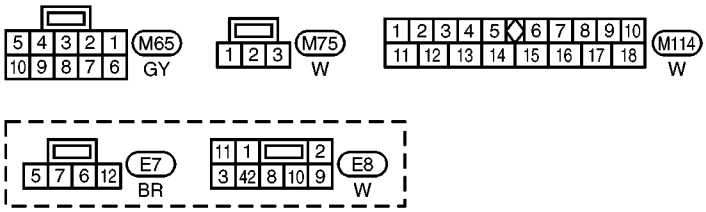


REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL983L

EL-H/LAMP-04



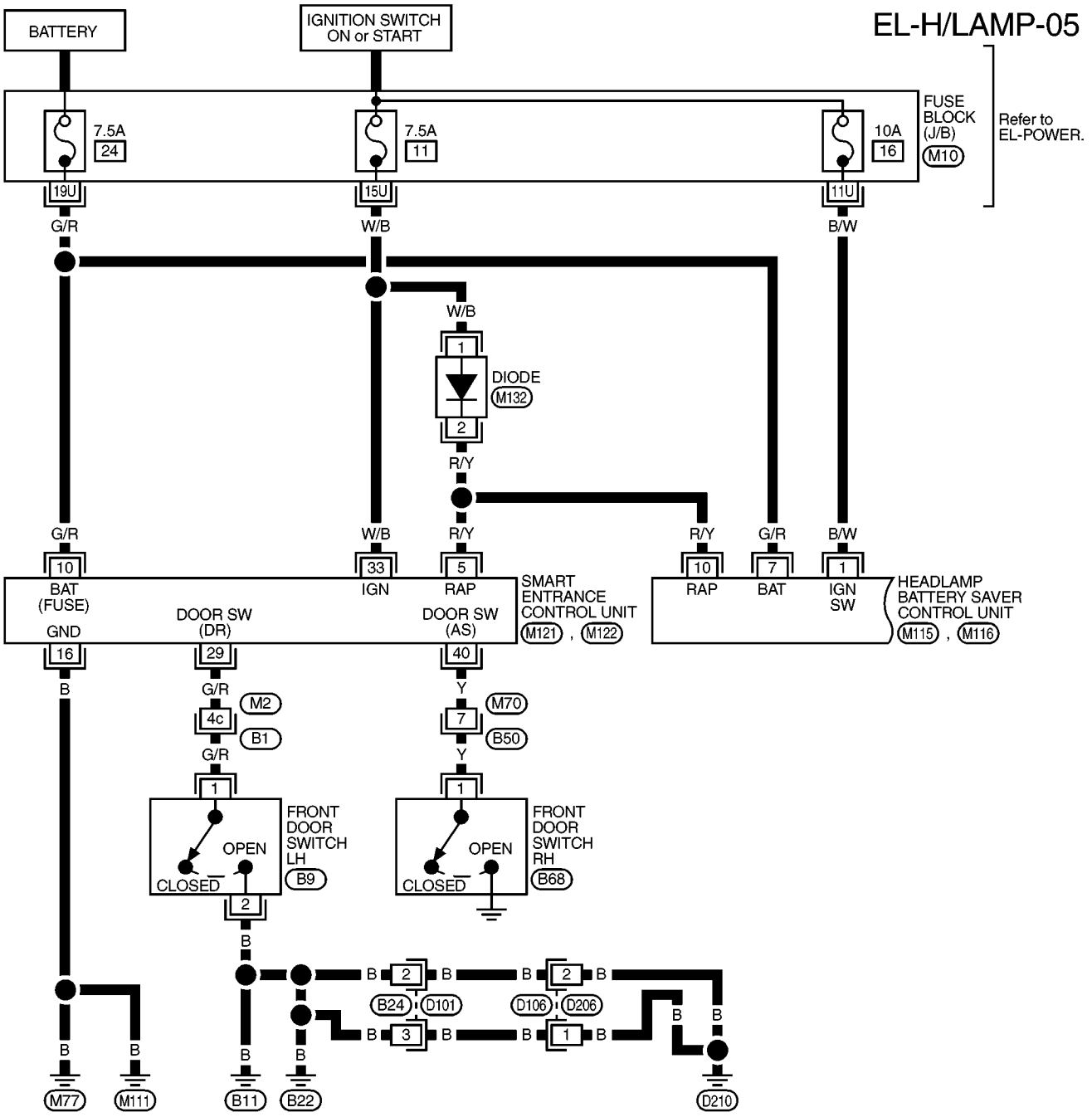


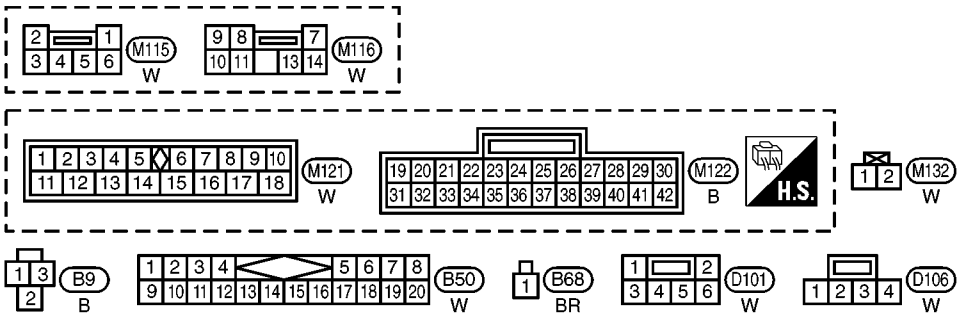
REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEL984L

WITHOUT AUTO LIGHT SYSTEM

NAEL0013S02





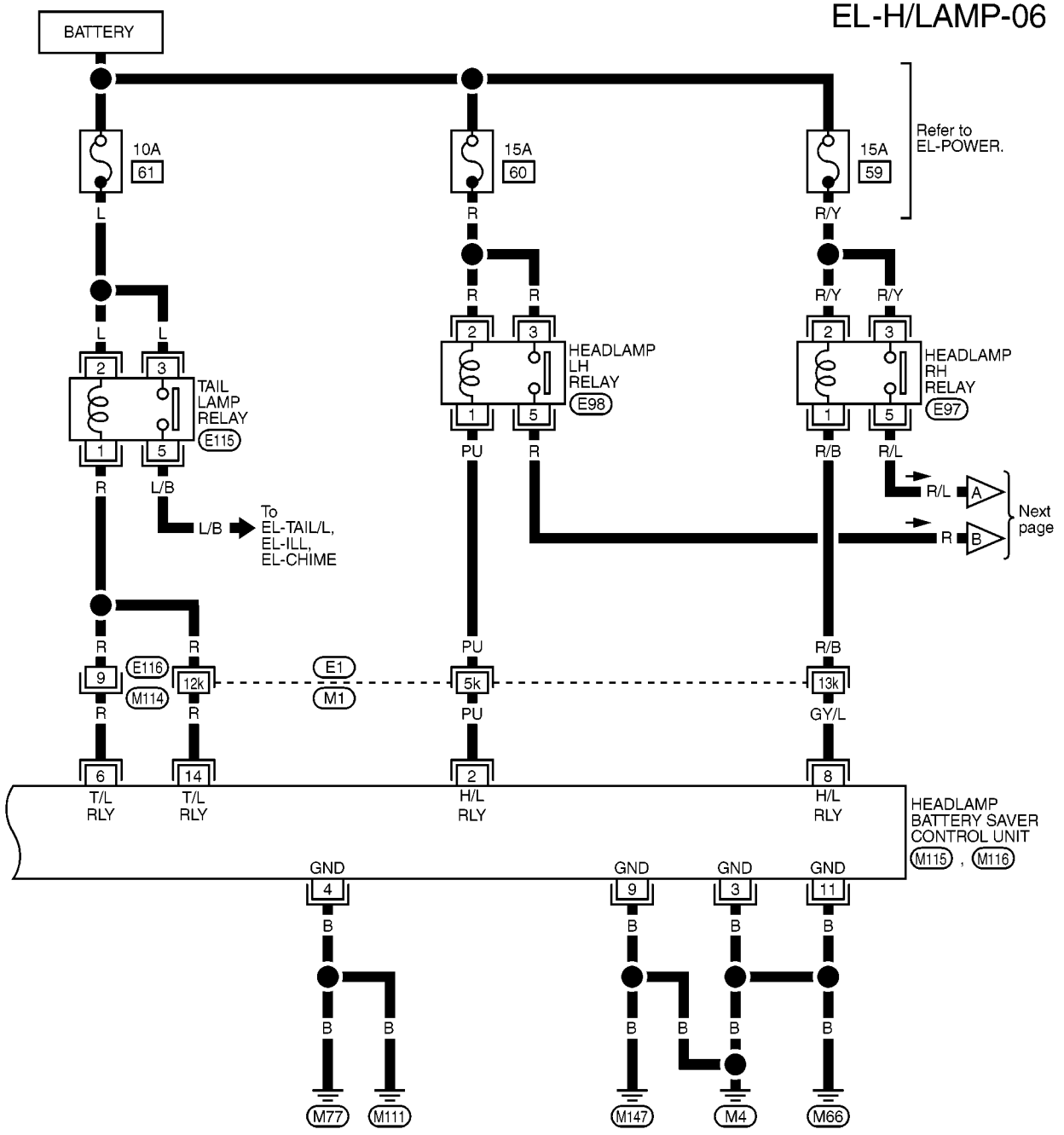
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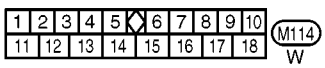
B1 -SUPER MULTIPLE JUNCTION (SMJ)

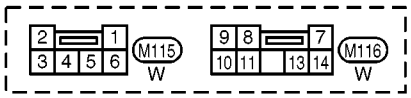
M10 -FUSE BLOCK-JUNCTION BOX (J/B)

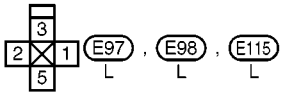
MEL986L

EL-H/LAMP-06







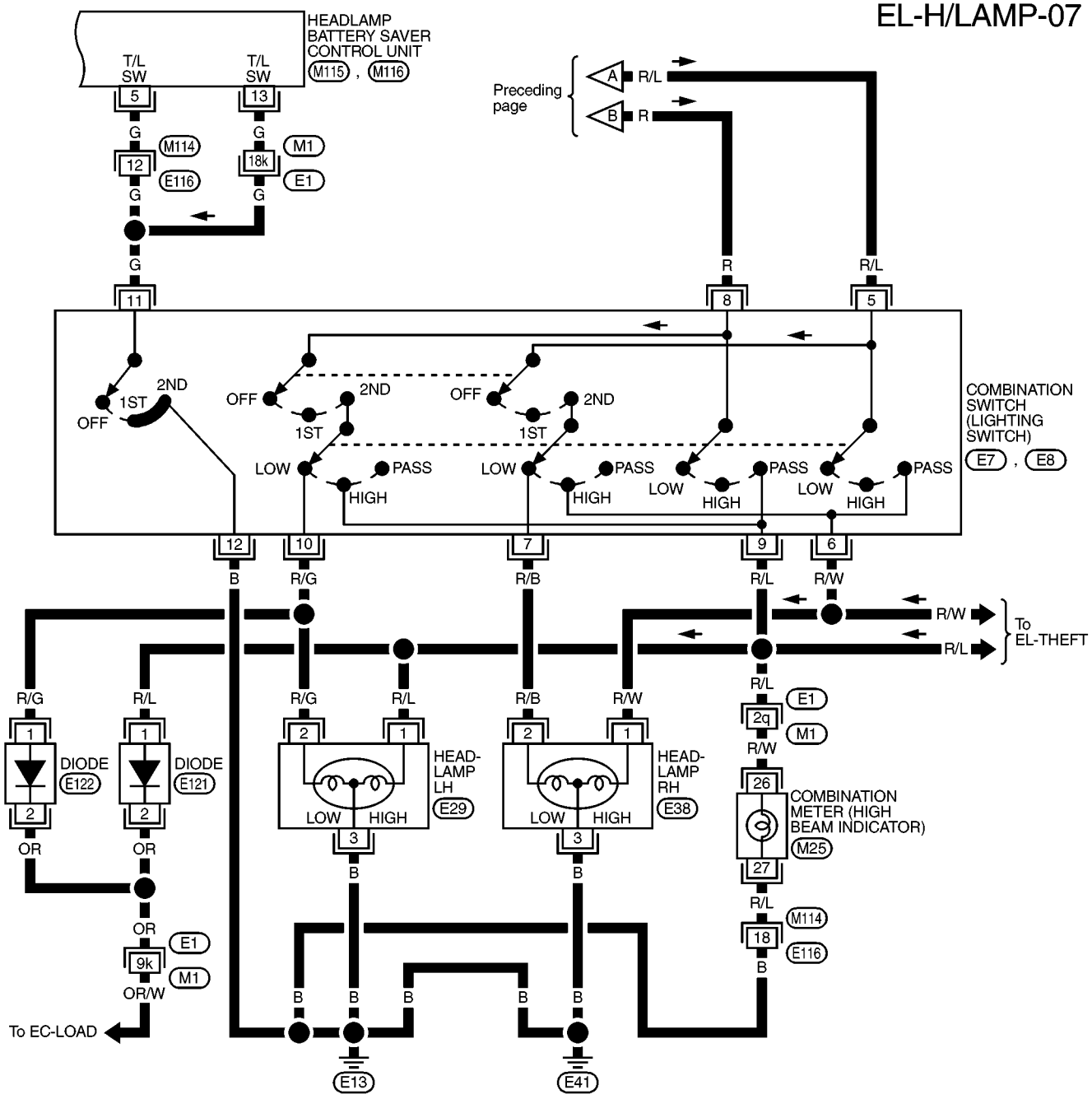


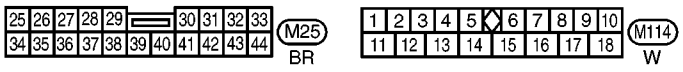
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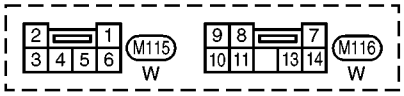
E1 -SUPER MULTIPLE JUNCTION (SMJ)

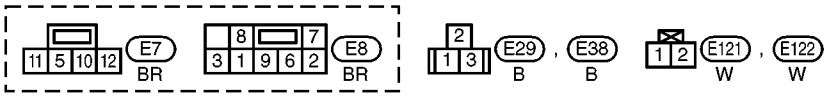
MEL987L

EL-H/LAMP-07









REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL988L

Trouble Diagnoses

NAEL0189

WITH AUTO LIGHT SYSTEM

NAEL0189S02

Symptom	Possible cause	Repair order
Neither headlamp operates.	1. 7.5A fuse 2. Headlamp relay circuit 3. Lighting switch 4. Lighting switch ground circuit 5. Headlamp battery saver control unit	1. Check 7.5A fuse [No. 24, located in fuse block (J/B)]. Verify battery positive voltage is present at terminal 7 of headlamp battery saver control unit. 2. Check between battery saver control unit and headlamp relays (LH and RH). 3. Check Lighting switch. 4. Check harness between lighting switch terminal 8 and ground. 5. Check headlamp battery saver control unit.
Headlamp LH (low and high beam) does not operate, but headlamp RH (low and high beam) does operate.	1. 15A fuse 2. Headlamp LH relay 3. Headlamp LH relay circuit	1. Check 15A fuse (No. 60, located in fusible link and fuse box). Verify battery positive voltage is present at terminals 2 and 3 of headlamp LH relay. 2. Check headlamp LH relay. 3. Check harness between headlamp LH relay and headlamp battery saver control unit.
Headlamp RH (low and high beam) does not operate, but headlamp LH (low and high beam) does operate.	1. 15A fuse 2. Headlamp RH relay 3. Headlamp RH relay circuit	1. Check 15A fuse (No. 59, located in fusible link and fuse box). Verify battery positive voltage is present at terminals 2 and 3 of headlamp RH relay. 2. Check headlamp RH relay. 3. Check harness between headlamp RH relay and headlamp battery saver control unit.
LH high beam does not operate, but LH low beam operates.	1. Bulb 2. Open in the LH high beams circuit 3. Lighting switch 4. Lighting switch ground circuit	1. Check bulb. 2. Check harness between headlamp LH and lighting switch for open circuit. 3. Check lighting switch. 4. Check harness between lighting switch and ground.
LH low beam does not operate, but LH high beam operates.	1. Bulb 2. Open in the LH low beam circuit 3. Lighting switch 4. Lighting switch ground circuit	1. Check bulb. 2. Check harness between headlamp LH and lighting switch for open circuit. 3. Check lighting switch. 4. Check harness between lighting switch and ground.
RH high beam does not operate, but RH low beam operates.	1. Bulb 2. Open in the RH high beams circuit 3. Lighting switch 4. Lighting switch ground circuit	1. Check bulb. 2. Check harness between headlamp RH and lighting switch for open circuit. 3. Check lighting switch. 4. Check harness between lighting switch and ground.
RH low beam does not operate, but RH high beam operates.	1. Bulb 2. Open in the RH low beam circuit 3. Lighting switch 4. Lighting switch ground circuit	1. Check bulb. 2. Check harness between headlamp RH and lighting switch for open circuit. 3. Check lighting switch. 4. Check harness between lighting switch and ground.
High beam indicator does not work.	1. Bulb 2. Open in high beam circuit	1. Check bulb in combination meter. 2. Check the following. a. Harness between headlamp LH relay and combination meter for an open circuit b. Harness between high beam indicator and lighting switch

Symptom	Possible cause	Repair order
Battery saver control does not operate properly.	1. RAP signal circuit 2. Door switch LH or RH circuit 3. Lighting switch circuit 4. Headlamp battery saver control unit 5. Smart entrance control unit	1. Check harness between headlamp battery saver control unit terminal 10 and smart entrance control unit terminal 5 for open or short circuit. 2. Check the following. a. Harness between smart entrance control unit and LH or RH door switch for open or short circuit. b. LH or RH door switch ground circuit. c. LH or RH door switch. 3. Check the following. a. Harness between headlamp battery saver control unit terminals 5 or 13 and lighting switch terminal 11 for open or short circuit. b. Harness between lighting switch terminal 5 and ground. c. Lighting switch. 4. Check headlamp battery saver control unit. 5. Check smart entrance control unit. (EL-348)

Battery Saver Control Unit Inspection Table

NAEL0189S0201

Terminal No.	Wire color	Item	Condition			Voltage (Approximate value)
1	B/W	Ignition ON power supply	Ignition switch	OFF or ACC		Less than 1V
				ON or START		Battery voltage
2	PU/W	Headlamp relays (LH and RH)	Ignition switch (with lighting switch except OFF or 1ST)	OFF or ACC	More than 45 seconds after ignition switch is turned OFF or ACC	Battery voltage
					Within 45 seconds after ignition switch is turned OFF or ACC	Less than 1V
				ON or START		Less than 1V
			Headlamps illuminate by auto light control.			Less than 1V
3	L	Headlamp switch	Ignition switch ON	Lighting switch	Except PASS or 2ND	Battery voltage
					PASS or 2ND	Less than 1V
			Headlamps illuminate by auto light control.			Less than 1V
4	B	Ground	—			—
5	G	Tail lamp switch	Lighting switch	OFF		Battery voltage
				1ST or 2ND		Less than 1V
6	R	Tail lamp relay	Ignition switch (with lighting switch 1ST or 2ND)	OFF or ACC	More than 45 seconds after ignition switch is turned OFF or ACC	Battery voltage
					Within 45 seconds after ignition switch is turned OFF or ACC	Less than 1V
				ON or START		Less than 1V
			Headlamps illuminate by auto light control.			Less than 1V
7	G/R	Power supply	—			Battery voltage

Terminal No.	Wire color	Item	Condition			Voltage (Approximate value)
8	PU/W	Headlamp relays (LH and RH)	Ignition switch (with lighting switch except OFF or 1ST)	OFF or ACC	More than 45 seconds after ignition switch is turned OFF or ACC	Battery voltage
					Within 45 seconds after ignition switch is turned OFF or ACC	Less than 1V
				ON or START		Less than 1V
			Headlamps illuminate by auto light control.			Less than 1V
9	L	Headlamp switch	Ignition switch ON	Lighting switch	Except PASS or 2ND	Battery voltage
					PASS or 2ND	Less than 1V
			Headlamps illuminate by auto light control.			Less than 1V
10	R/Y	RAP signal	Ignition switch	OFF or ACC (After more than 45 seconds with ignition switch turned OFF or ACC)		Less than 1V
				ON or START		Battery voltage
11	B	Ground	—			—
13	G	Tail lamp switch	Lighting switch	OFF		Battery voltage
				1ST or 2ND		Less than 1V
14	R	Tail lamp relay	Ignition switch (with lighting switch 1ST or 2ND)	OFF or ACC	More than 45 seconds after ignition switch is turned OFF or ACC	Battery voltage
					Within 45 seconds after ignition switch is turned OFF or ACC	Less than 1V
				ON or START		Less than 1V
			Headlamps illuminate by auto light control.			Less than 1V

WITHOUT AUTO LIGHT SYSTEM

=NAEL0189S03

Symptom	Possible cause	Repair order
Neither headlamp operates.	1. 7.5A fuse 2. Lighting switch 3. Headlamp battery saver control unit	1. Check 7.5A fuse [No. 24, located in fuse block (J/B)]. Verify battery positive voltage is present at terminal 7 of headlamp battery saver control unit. 2. Check Lighting switch. 3. Check headlamp battery saver control unit.
Headlamp LH (low and high beam) does not operate, but headlamp RH (low and high beam) does operate.	1. Bulb 2. Headlamp LH ground circuit 3. 15A fuse 4. Headlamp LH relay 5. Headlamp LH relay circuit 6. Lighting switch 7. Headlamp battery saver control unit	1. Check bulb. 2. Check harness between headlamp LH and ground. 3. Check 15A fuse (No. 60, located in fusible link and fuse box). Verify battery positive voltage is present at terminals 2 and 3 of headlamp LH relay. 4. Check headlamp LH relay. 5. Check the following. a. Harness between headlamp LH relay and lighting switch. b. Harness between headlamp LH relay and headlamp battery saver control unit. 6. Check lighting switch. 7. Check headlamp battery saver control unit.
Headlamp RH (low and high beam) does not operate, but headlamp LH (low and high beam) does operate.	1. Bulb 2. Headlamp RH ground circuit 3. 15A fuse 4. Headlamp RH relay 5. Headlamp RH relay circuit 6. Lighting switch 7. Headlamp battery saver control unit	1. Check bulb. 2. Check harness between headlamp RH and ground. 3. Check 15A fuse (No. 59, located in fusible link and fuse box). Verify battery positive voltage is present at terminals 2 and 3 of headlamp RH relay. 4. Check headlamp RH relay. 5. Check the following. a. Harness between headlamp RH relay and lighting switch. b. Harness between headlamp RH relay and headlamp battery saver control unit. 6. Check lighting switch. 7. Check headlamp battery saver control unit.
LH high beam does not operate, but LH low beam does operate.	1. Bulb 2. Open in LH high beams circuit 3. Lighting switch	1. Check bulb. 2. Check harness between lighting switch and headlamp LH for an open circuit. 3. Check lighting switch.
LH low beam does not operate, but LH high beam does operate.	1. Bulb 2. Open in LH low beams circuit 3. Lighting switch	1. Check bulb. 2. Check harness between lighting switch and headlamp LH for an open circuit. 3. Check lighting switch.
RH high beam does not operate, but RH low beam does operate.	1. Bulb 2. Open in RH high beams circuit 3. Lighting switch	1. Check bulb. 2. Check harness between lighting switch and headlamp RH for an open circuit. 3. Check lighting switch.
RH low beam does not operate, but RH high beam does operate.	1. Bulb 2. Open in RH low beams circuit 3. Lighting switch	1. Check bulb. 2. Check harness between lighting switch and headlamp RH for an open circuit. 3. Check lighting switch.
High beam indicator does not work.	1. Bulb 2. Ground circuit 3. Open in high beam circuit	1. Check bulb in combination meter. 2. Check the following. a. Harness between high beam indicator and ground. b. Harness between lighting switch and combination meter for an open circuit.

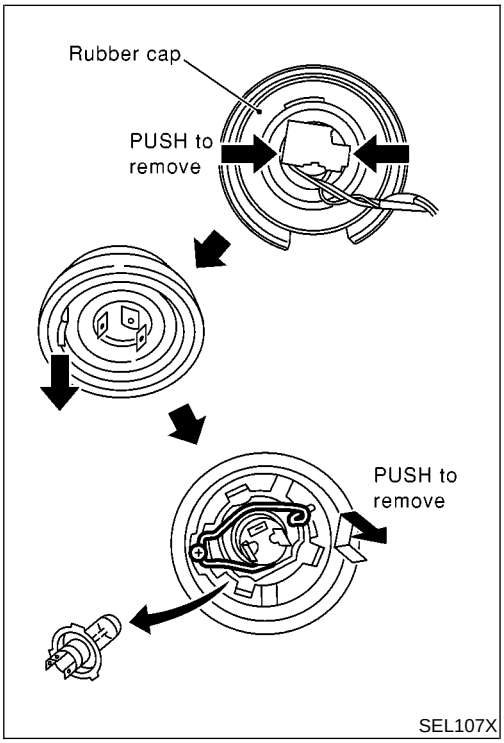
Symptom	Possible cause	Repair order
Battery saver control does not operate properly.	1. RAP signal circuit 2. Driver or passenger side door switch circuit 3. Lighting switch circuit 4. Headlamp battery saver control unit 5. Smart entrance control unit	1. Check harness between headlamp battery saver control unit terminal 10 and smart entrance control unit terminal 5 for open or short circuit. 2. Check the following. a. Harness between smart entrance control unit and driver or passenger side door switch for open or short circuit. b. Driver or passenger side door switch ground circuit. c. Driver or passenger side door switch. 3. Check the following. a. Harness between headlamp battery saver control unit terminals 5 or 13 and lighting switch terminal 11 for open or short circuit. b. Harness between lighting switch terminal 12 and ground. c. Lighting switch. 4. Check headlamp battery saver control unit. 5. Check smart entrance control unit. (EL-348)

Battery Saver Control Unit Inspection Table

NAEL0189S0301

Terminal No.	Item	Condition		Voltage (Approximate value)
1	Ignition ON power supply	Ignition switch	OFF or ACC	Less than 1V
			ON or START	Battery voltage
2	Headlamp LH relay	Ignition switch (with lighting switch OFF)	OFF or ACC	Battery voltage
			ON or START	Less than 1V
		Lighting switch (with ignition switch OFF)	OFF	Battery voltage
			1ST or 2ND	Less than 1V
3	Ground	—		—
4	Ground	—		—
5	Tail lamp switch	Lighting switch	OFF	Battery voltage
			1ST or 2ND	Less than 1V
6	Tail lamp relay	Ignition switch (with lighting switch OFF)	OFF or ACC	Battery voltage
			ON or START	Less than 1V
		Lighting switch (with ignition switch OFF)	OFF	Battery voltage
			1ST or 2ND	Less than 1V
7	Power supply	—		Battery voltage
8	Headlamp RH relay	Ignition switch (with lighting switch OFF)	OFF or ACC	Battery voltage
			ON or START	Less than 1V
		Lighting switch (with ignition switch OFF)	OFF	Battery voltage
			1ST or 2ND	Less than 1V
9	Ground	—		—

Terminal No.	Item	Condition		Voltage (Approximate value)
10	RAP signal	Ignition switch	OFF or ACC (After more than 45 seconds with ignition switch turned OFF or ACC)	Less than 1V
			ON or START	Battery voltage
11	Ground	—		—
13	Tail lamp switch	Lighting switch	OFF	Battery voltage
			1ST or 2ND	Less than 1V
14	Tail lamp relay	Ignition switch (with lighting switch OFF)	OFF or ACC	Battery voltage
			ON or START	Less than 1V
		Lighting switch (with ignition switch OFF)	OFF	Battery voltage
			1ST or 2ND	Less than 1V



Bulb Replacement

NAEL0190

The headlamp is a semi-sealed beam type which uses a replaceable halogen bulb. The bulb can be replaced from the engine compartment side without removing the headlamp body.

- **Grasp only the plastic base when handling the bulb. Never touch the glass envelope.**

1. Disconnect the battery cable.
2. Disconnect the harness connector from the back side of the bulb.
3. Pull off the rubber cap.
4. Remove the headlamp bulb carefully. Do not shake or rotate the bulb when removing it.
5. Install in the reverse order of removal.

CAUTION:

Do not leave headlamp reflector without bulb for a long period of time. Dust, moisture, smoke, etc. entering headlamp body may affect the performance of the headlamp. Remove headlamp bulb from the headlamp reflector just before a replacement bulb is installed.

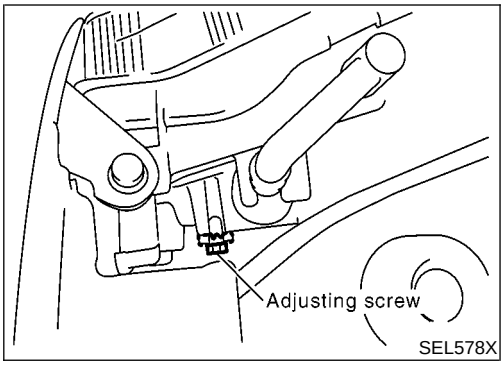
Aiming Adjustment

NAEL0191

Before performing aiming adjustment, check the following.

For details, refer to the regulations in your own country.

1) Keep all tires inflated to correct pressures.
2) Place vehicle flat surface.
3) See that there is no-load in vehicle (coolant, engine oil filled up to correct level and full fuel tank) other than the driver (or equivalent weight placed in driver's position).

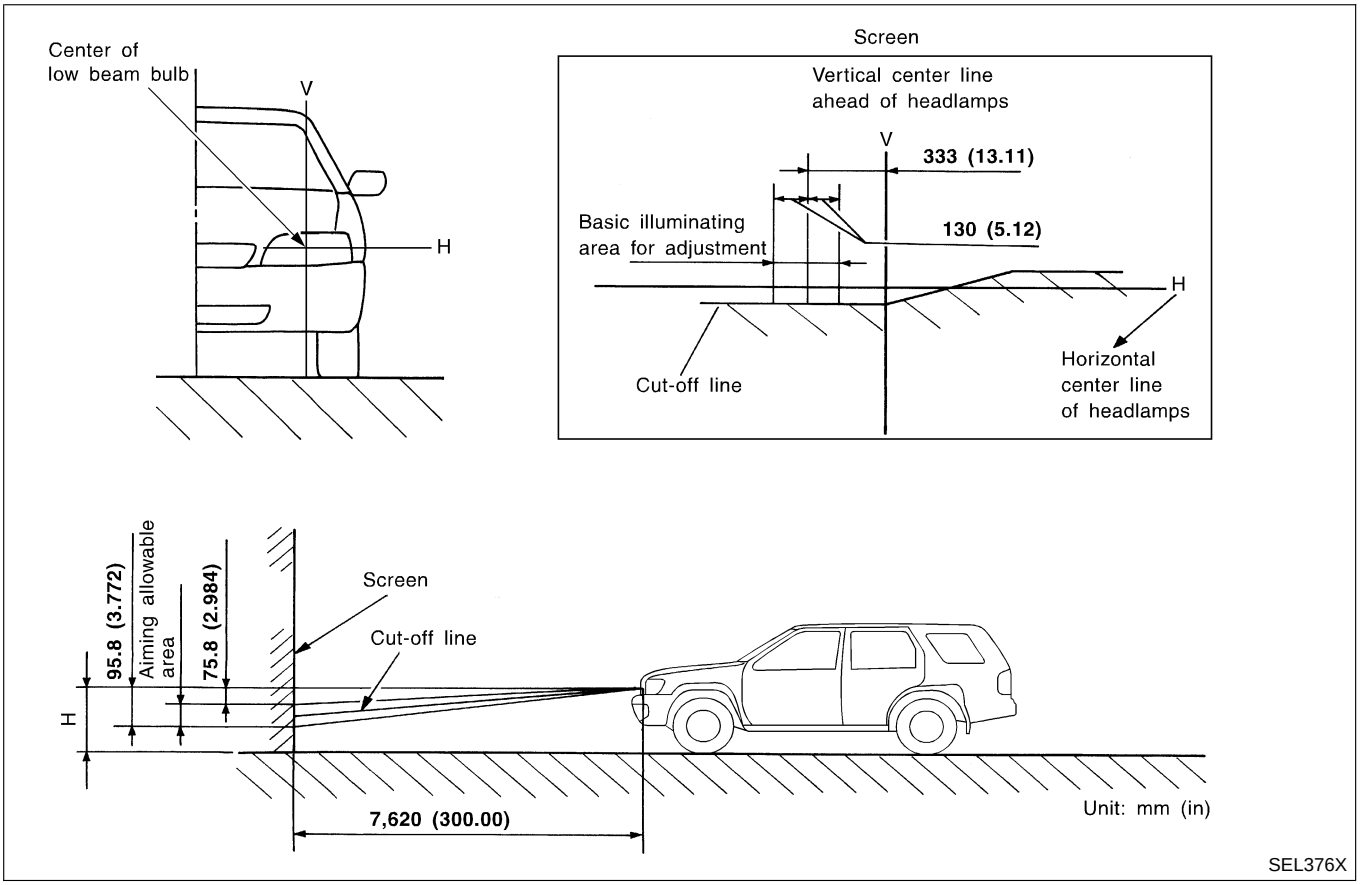


LOW BEAM

NAEL0191S01

1. Turn headlamp low beam on.
2. Use adjusting screws to perform aiming adjustment.

- **First tighten the adjusting screw all the way and then make adjustment by loosening the screw.**

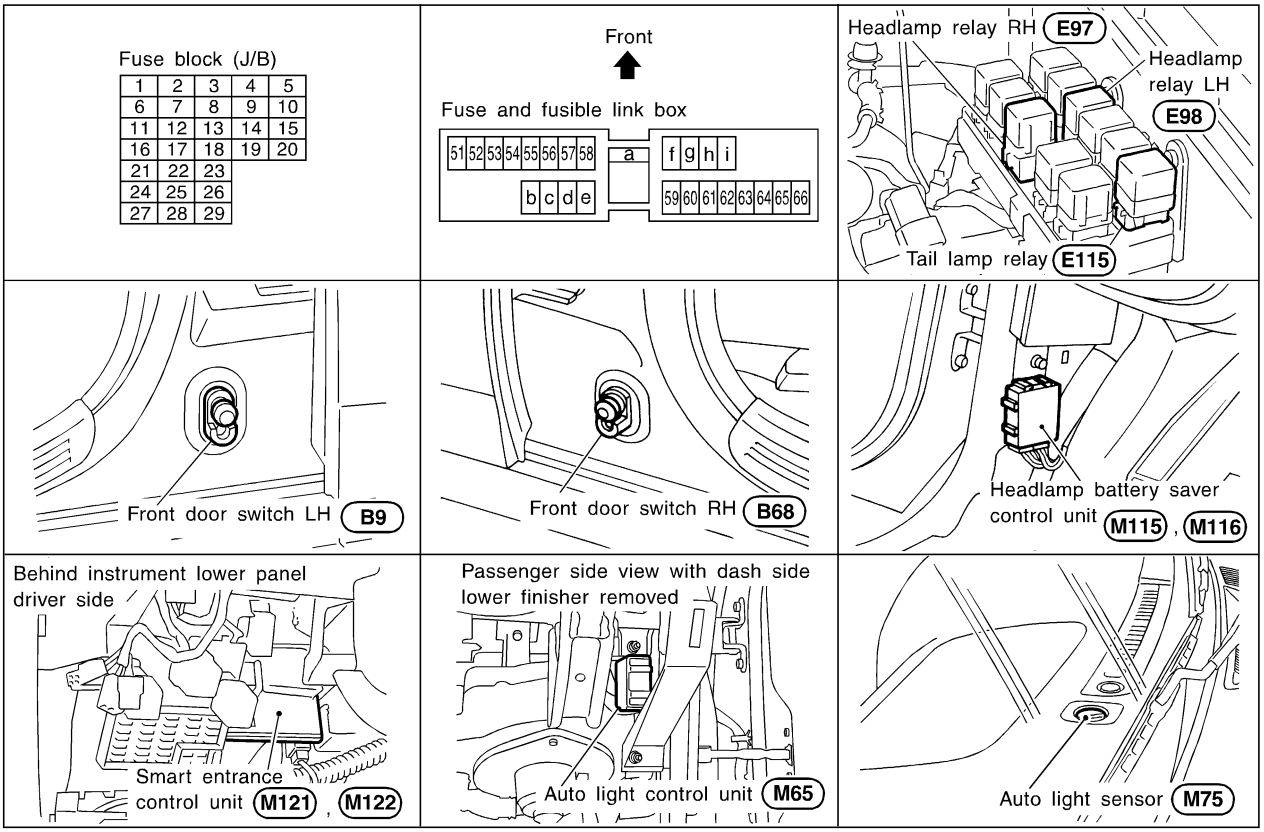


If the vehicle front body has been repaired and/or the headlamp assembly has been replaced, check aiming. Use the aiming chart shown in the figure.

- **Basic illuminating area for adjustment should be within the range shown on the aiming chart. Adjust headlamps accordingly.**

Component Parts and Harness Connector Location

NAEL0161



SEL460X

System Description

NAEL0192

WITH AUTO LIGHT SYSTEM

NAEL0192S06

The headlamp system for Canada vehicles contains a daytime light control unit that activates the high beam headlamps at approximately half illumination whenever the engine is running. If the parking brake is applied before the engine is started the daytime lights will not be illuminated. The daytime lights will illuminate once the parking brake is released. Thereafter, the daytime lights will continue to operate when the parking brake is applied.

And battery saver system is controlled by the headlamp battery saver control unit and smart entrance control unit.

Power is supplied at all times

- to headlamp LH relay terminals 2 and 3
- through 15A fuse (No. 60, located in the fuse and fusible link box), and
- to headlamp RH relay terminals 2 and 3
- through 15A fuse (No. 59, located in the fuse and fusible link box), and
- to headlamp battery saver control unit terminal 7, and
- to smart entrance control unit terminal 10
- through 7.5A fuse [No. 24, located in the fuse block (J/B)].

Ground is supplied

- to daytime light control unit terminal 16,
- to auto light control unit terminal 5 and
- to headlamp battery saver control unit terminals 4 and 11.

When the ignition switch is in the ON or START position, power is also supplied

- to daytime light control unit terminal 3,
- to auto light control unit terminal 1,
- to headlamp battery saver control unit terminal 10, and

- to smart entrance control unit terminal 33
- through 7.5A fuse [No. 11, located in the fuse block (J/B)], and
- to headlamp battery saver control unit terminal 1
- through 10A fuse [No. 16, located in the fuse block (J/B)].

When the ignition switch is in the START position, power is supplied

- to daytime light control unit terminal 2
- through 7.5A fuse [No. 26, located in the fuse block (J/B)].

When the ignition switch is in the ACC or ON position, power is supplied

- to auto light control unit terminal 2
- through 10A fuse [No. 9, located in the fuse block (J/B)].

Headlamp Operation

NAEL0192S0601

Power Supply to Low Beam and High Beam

When lighting switch is in 2ND or PASS position, ground is supplied

- to headlamp relay (LH and RH) terminal 1 from headlamp battery saver control unit terminals 2 and 8
- through headlamp battery saver control unit terminal 3 and 9
- from lighting switch terminal 12.

Headlamp relays (LH and RH) are energized.

Low Beam Operation

When the lighting switch is turned to 2ND and LOW ("B") positions, power is supplied

- to terminal 3 of headlamp LH
- through daytime light control unit terminals 6 and 5
- from headlamp relay LH terminal 5, and
- to terminal 3 of headlamp RH
- through daytime light control unit terminals 7 and 4
- from headlamp relay RH terminal 5.

Ground is supplied

- to terminal 2 of headlamp LH
- through daytime light control unit terminals 11 and 12
- through lighting switch terminals 10 and 8,
- through body grounds E13 and E41, and
- to terminal 2 of headlamp RH
- through daytime light control unit terminals 8 and 15
- through lighting switch terminals 9 and 8

With power and ground supplied, the low beam headlamps illuminate.

High Beam Operation/Flash-to-pass Operation

When the lighting switch is turned to 2ND and HIGH ("A") or PASS ("C") positions, power is supplied

- to terminal 3 of headlamp LH
- through daytime light control unit terminals 6 and 5
- from headlamp relay LH terminal 5
- to terminal 3 of headlamp RH
- through daytime light control unit terminals 7 and 4
- from headlamp relay RH terminal 5, and
- to combination meter terminal 26 for HIGH BEAM indicator
- from headlamp LH relay terminal 5.

Ground is supplied

- to terminal 1 of headlamp LH
- through daytime light control unit terminals 10 and 13, and
- to combination meter terminal 27 for the HIGH BEAM indicator
- through lighting switch terminals 6 and 5
- through body grounds E13 and E41, and
- to terminal 1 of headlamp RH
- through daytime light control unit terminals 9 and 14

- through lighting switch terminals 9 and 8
- through body grounds E13 and E41.

With power and ground supplied, the high beam headlamps and HIGH BEAM indicator illuminate.

Battery Saver Control

NAEL0192S0602

When the ignition switch is turned from ON (or START) to OFF (or ACC) positions while headlamps are illuminated, The RAP signal is supplied to terminal 10 of the headlamp battery saver control unit from smart entrance control unit terminal 5.
After counting 45 seconds by the RAP signal from the smart entrance control unit to headlamp battery saver control unit, the ground supply to terminal 2 of headlamp LH and RH relays from headlamp battery saver control unit terminals 2 and 8 is terminated.
Then headlamps are turned off.
The headlamps are turned off when LH or RH door is opened even if 45 seconds have not passed after the ignition switch is turned from ON (or START) to OFF (or ACC) positions while headlamps are illuminated.
When the lighting switch is turned from OFF to 2ND after headlamps are turned to off by the battery saver control, ground is supply

- to headlamp battery saver control unit terminals 5 and 13 from lighting switch terminal 11, and
- to headlamp LH and RH relays terminal 2 from headlamp battery saver control unit terminals 2 and 8
- through headlamp battery saver control unit terminals 3 and 9, and
- through lighting switch terminal 12.

Then headlamps illuminate again.

Auto Light Operation

NAEL0192S0603

For auto light operation, refer to "HEADLAMP" (EL-34).

Daytime Light Operation

NAEL0192S0604

With the engine running, the lighting switch in the OFF or 1ST position and parking brake released, power is supplied

- through daytime light control unit terminals 3 and 7
- to terminal 3 of headlamp RH
- through terminal 1 of headlamp RH
- to daytime light control unit terminal 9
- through daytime light control unit terminal 6
- to terminal 3 of headlamp LH.

Ground is supplied to terminal 1 of headlamp LH.

- through daytime light control unit terminals 10 and 16
- through body grounds E13 and E41.

Because the high beam headlamps are now wired in series, they operate at half illumination.

System Description (Cont'd)

Operation

=NAEL0192S0605

After starting the engine with the lighting switch in the "OFF" or "1ST" position, the headlamp high beam automatically turns on. Lighting switch operations other than the above are the same as conventional light systems.

Engine		With engine stopped									With engine running								
Lighting switch		OFF			1ST			2ND			OFF			1ST			2ND		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Headlamp	High beam	X	X	O	X	X	O	O	X	O	△*	△*	O	△*	△*	O	O	X	O
	Low beam	X	X	X	X	X	X	X	O	X	X	X	X	X	X	X	X	O	X
Clearance and tail lamp		X	X	X	O	O	O	O	O	O	X	X	X	O	O	O	O	O	O
License and instrument illumination lamp		X	X	X	O	O	O	O	O	O	X	X	X	O	O	O	O	O	O

A: "HIGH BEAM" position

B: "LOW BEAM" position

C: "FLASH TO PASS" position

O : Lamp "ON"

X : Lamp "OFF"

△ : Lamp dims. (Added functions)

*: When starting the engine with the parking brake released, the daytime light will come ON.
When starting the engine with the parking brake pulled, the daytime light won't come ON.

WITHOUT AUTO LIGHT SYSTEM

=NAEL0192S07

The headlamp system for Canada vehicles contains a daytime light control unit that activates the high beam headlamps at approximately half illumination whenever the engine is running. If the parking brake is applied before the engine is started the daytime lights will not be illuminated. The daytime lights will illuminate once the parking brake is released. Thereafter, the daytime lights will continue to operate when the parking brake is applied.

And battery saver system is controlled by the headlamp battery saver control unit and smart entrance control unit.

Power is supplied at all times

- to daytime light control unit terminal 3, and
- to headlamp LH relay terminals 2 and 3
- through 15A fuse (No. 60, located in the fuse and fusible link box), and
- to daytime light control unit terminal 2 and
- to headlamp RH relay terminals 2 and 3
- through 15A fuse (No. 59, located in the fuse and fusible link box), and
- to headlamp battery saver control unit terminal 7 and
- to smart entrance control unit terminal 10
- through 7.5A fuse [No. 24, located in the fuse block (J/B)].

Ground is supplied

- to daytime light control unit terminal 9
- through body grounds E13 and E41, and
- to headlamp battery saver control unit terminals 4, and 3, 9 and 11
- through body grounds M77 and M111, and M4, M66 and M147.

When the ignition switch is in the ON or START position, power is also supplied

- to daytime light control unit terminal 12,
- to headlamp battery saver control unit terminal 10, and
- to smart entrance control unit terminal 33
- through 7.5A fuse [No. 11, located in the fuse block (J/B)], and
- to headlamp battery saver control unit terminal 1
- through 10A fuse [No. 16, located in the fuse block (J/B)].

When the ignition switch is in the START position, power is supplied

- to daytime light control unit terminal 1
- through 7.5A fuse [No. 26, located in the fuse block (J/B)].

Headlamp Operation

NAEL0192S0701

When Ignition Switch is in ON or START Position

Ground is supplied

- to headlamp LH relay terminal 1 from headlamp battery saver control unit terminal 2
- through headlamp battery saver control unit terminal 3, and
- to headlamp RH relay terminal 1 from headlamp battery saver control unit terminal 8
- through headlamp battery saver control unit terminal 9, and
- through body grounds M4, M66 and M147.

Headlamp relays (LH and RH) are then energized.

When Ignition Switch is in OFF or ACC Position

When lighting switch is in 1ST (or 2ND) position, ground is supplied

- to headlamp battery saver control unit terminals 5 and 13
- from lighting switch terminal 11.

And then, ground is also supplied to headlamp LH and RH relays terminal 1 from headlamp battery saver control unit. Headlamp relays (LH and RH) are then energized.

Low Beam Operation

When the lighting switch is turned to the 2ND position and placed in LOW ("B") position, power is supplied

- from lighting switch terminal 7
- to headlamp RH terminal 2
- to daytime light control unit terminal 4.

Ground is supplied to headlamp RH terminal 3 through body grounds E13 and E41.
Also, when the lighting switch is turned to the 2ND position and placed in LOW ("B") position, power is supplied

- from lighting switch terminal 10
- to headlamp LH terminal 2.

Ground is supplied

- to headlamp LH terminal 3
- from daytime light control unit terminal 7
- through daytime light control unit terminal 9
- through body grounds E13 and E41.

With power and ground supplied, the low beam headlamps illuminate.

High Beam Operation/Flash-to-pass Operation

When the lighting switch is turned to the 2ND position and placed in HIGH ("A") position, power is supplied

- from lighting switch terminal 6
- to terminal 1 of RH headlamp, and
- from lighting switch terminal 9
- to daytime light control terminal 5
- to combination meter terminal 26 for the high beam indicator, and
- through daytime light control terminal 5
- to terminal 1 of headlamp LH.

Ground is supplied in the same manner as low beam operation.
Ground is supplied to terminal 19 of the combination meter through body grounds M77 and M111.
With power and ground supplied, the high beam headlamps and HI BEAM indicator illuminate.

Battery Saver Control

NAEL0192S0702

When the ignition switch is turned from ON (or START) to OFF (or ACC) positions while headlamps are illuminated, The RAP signal is supplied to terminal 10 of the headlamp battery saver control unit from smart entrance control unit terminal 5.
After counting 45 seconds by the RAP signal from the smart entrance control unit to headlamp battery saver control unit, the ground supply to terminal 1 of headlamp LH and RH relays from headlamp battery saver control unit terminals 2 and 8 is terminated.
Then headlamps are turned off.
The headlamps are turned off when driver or passenger side door is opened even if 45 seconds have not passed after the ignition switch is turned from ON (or START) to OFF (or ACC) positions while headlamps are illuminated.
When the lighting switch is turned from OFF to 2ND after headlamps are turned to off by the battery saver control, ground is supply

- to headlamp battery saver control unit terminals 5 and 13 from lighting switch terminal 11, and
- to headlamp LH and RH relays terminal 1 from headlamp battery saver control unit terminals 2 and 8.

Then headlamps illuminate again.

Daytime Light Operation

NAEL0192S0703

With the engine running, the lighting switch in the OFF or 1ST position and parking brake released, power is supplied

- through daytime light control unit terminal 6
- to terminal 1 of headlamp LH, and
- through terminal 3 of headlamp LH
- to daytime light control unit terminal 7, and
- through daytime light control unit terminal 8
- to terminal 1 of headlamp RH.

Ground is supplied to terminal 3 of headlamp RH through body grounds E13 and E41.
Because the high beam headlamps are now wired in series, they operate at half illumination.

Operation

=NAEL0192S0704

After starting the engine with the lighting switch in the "OFF" or "1ST" position, the headlamp high beam automatically turns on. Lighting switch operations other than the above are the same as conventional light systems.

Engine		With engine stopped									With engine running								
Lighting switch		OFF			1ST			2ND			OFF			1ST			2ND		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Headlamp	High beam	X	X	O	X	X	O	O	X	O	△*	△*	O	△*	△*	O	O	X	O
	Low beam	X	X	X	X	X	X	X	O	X	X	X	X	X	X	X	X	O	X
Clearance and tail lamp		X	X	X	O	O	O	O	O	O	X	X	X	O	O	O	O	O	O
License and instrument illumination lamp		X	X	X	O	O	O	O	O	O	X	X	X	O	O	O	O	O	O

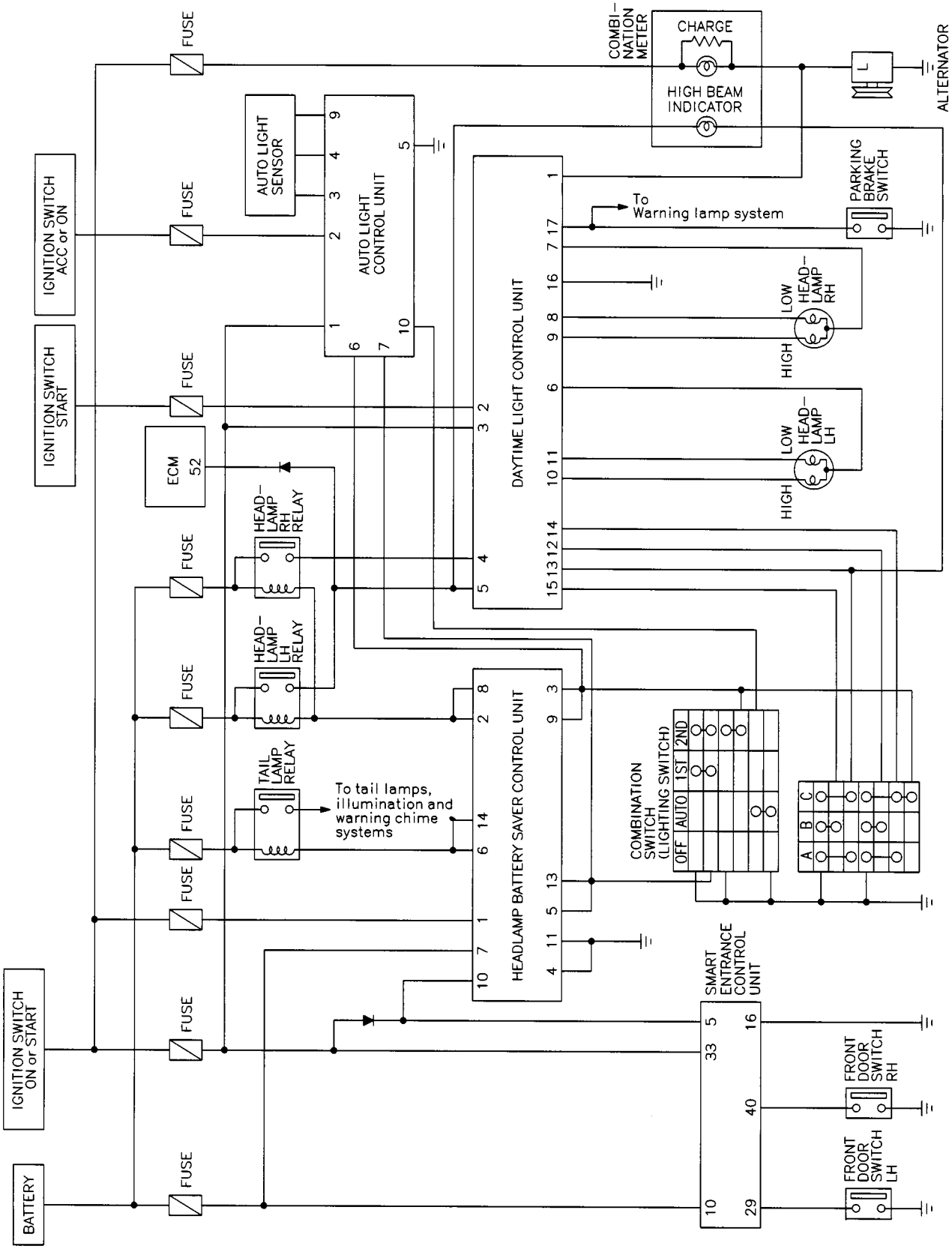
A: "HIGH BEAM" position
B: "LOW BEAM" position
C: "FLASH TO PASS" position
O : Lamp "ON"
X : Lamp "OFF"
△ : Lamp dims. (Added functions)
*: When starting the engine with the parking brake released, the daytime light will come ON.
When starting the engine with the parking brake pulled, the daytime light won't come ON.

Schematic

NAEL0019

WITH AUTO LIGHT SYSTEM

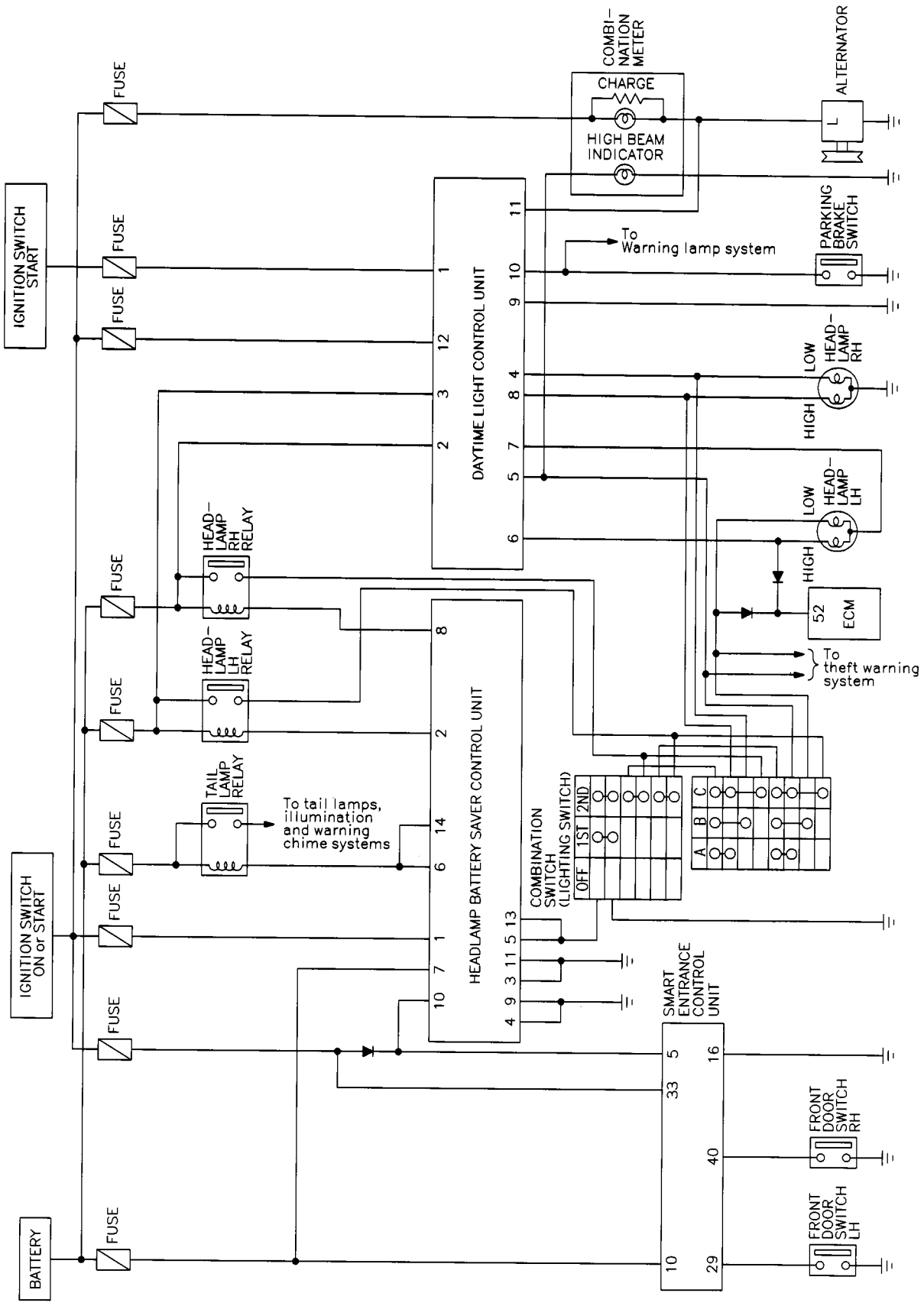
NAEL0019S01



MEL989L

WITHOUT AUTO LIGHT SYSTEM

NAEL0019S02



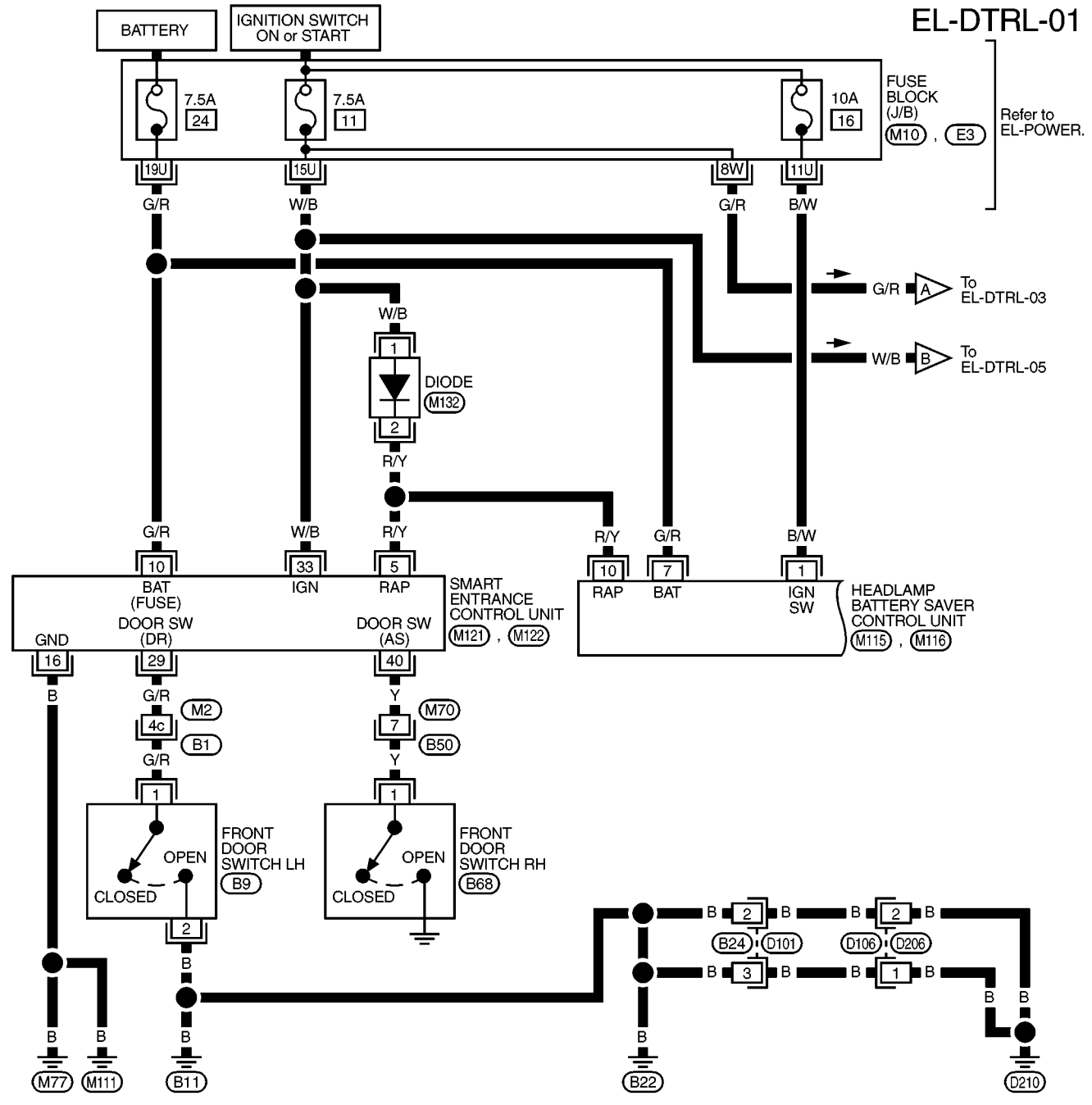
MEL994L

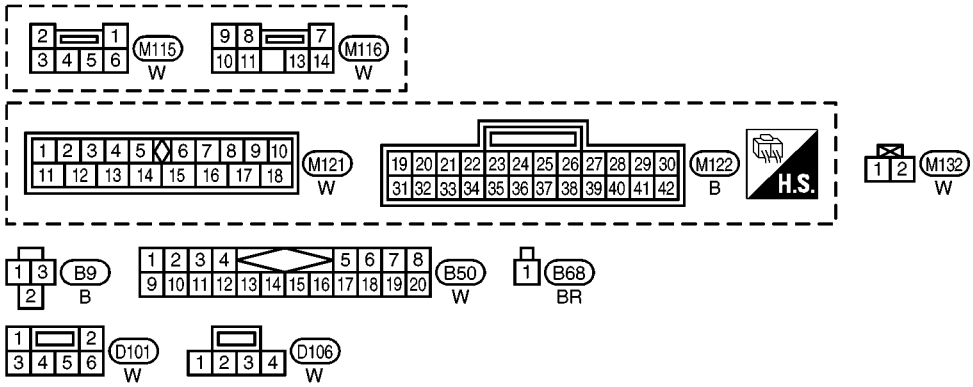
Wiring Diagram — DTRL —

NAEL0020

WITH AUTO LIGHT SYSTEM

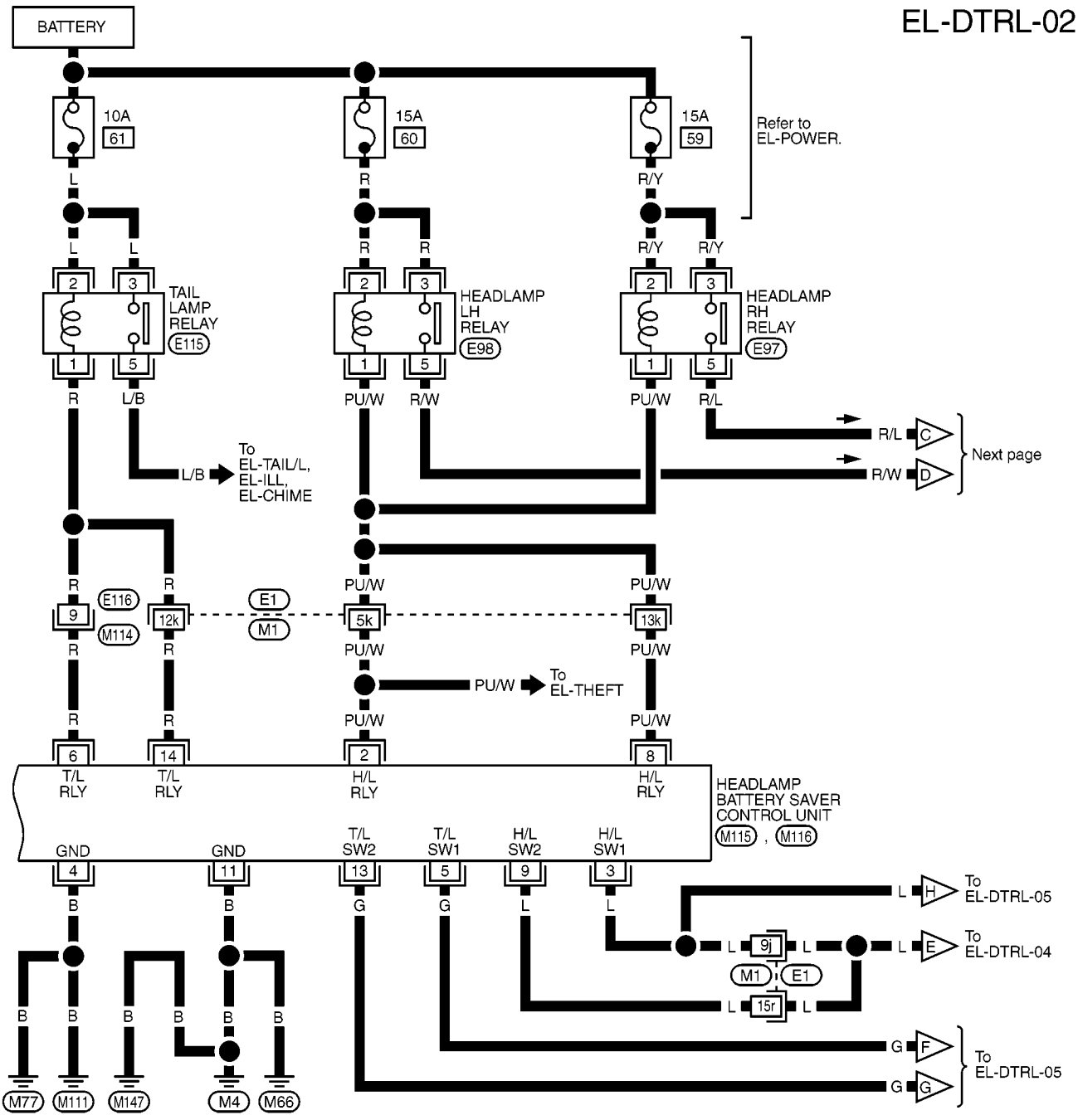
NAEL0020S01





REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 , E3 -FUSE BLOCK- JUNCTION BOX (J/B)

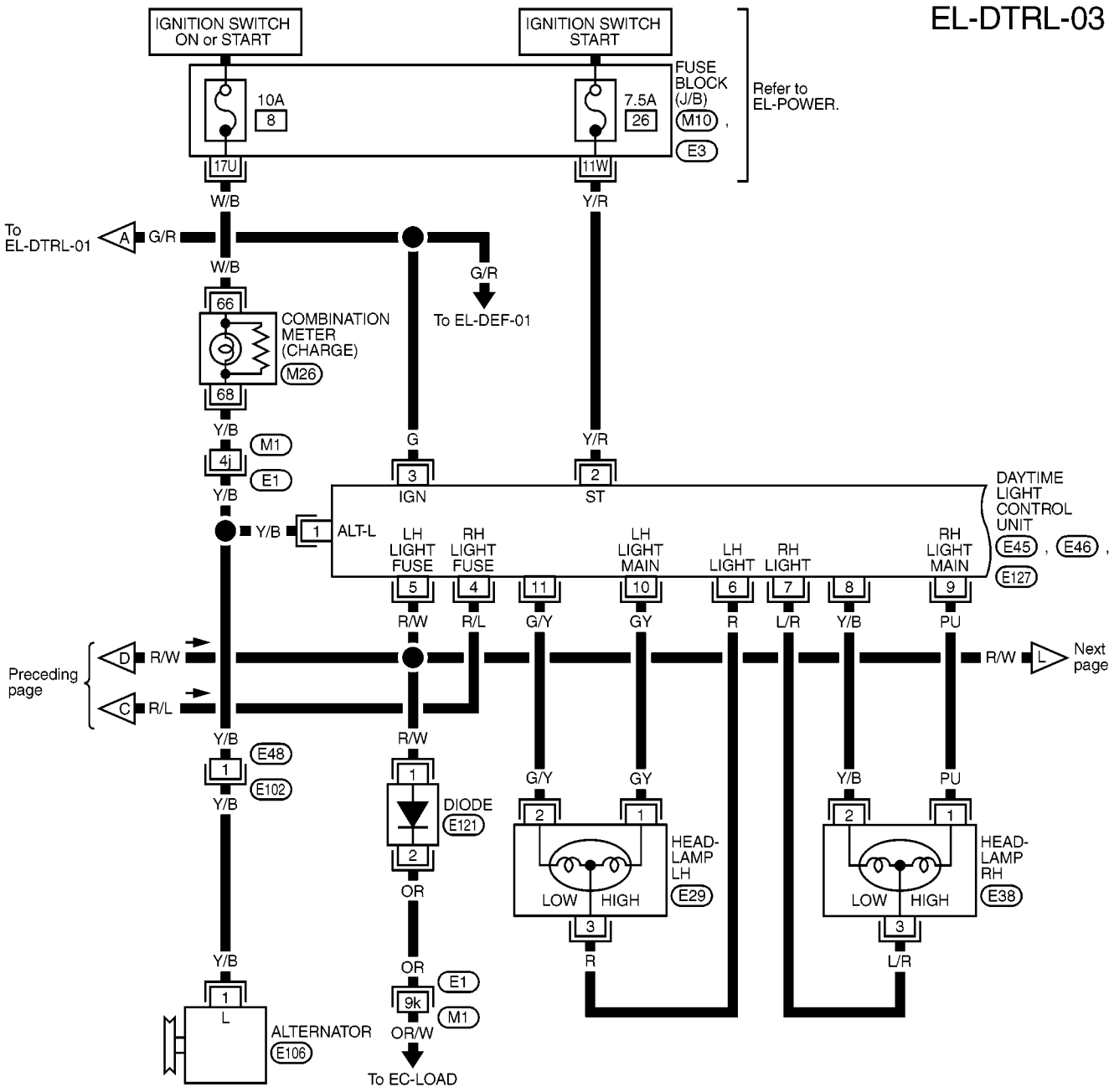
MEL767L

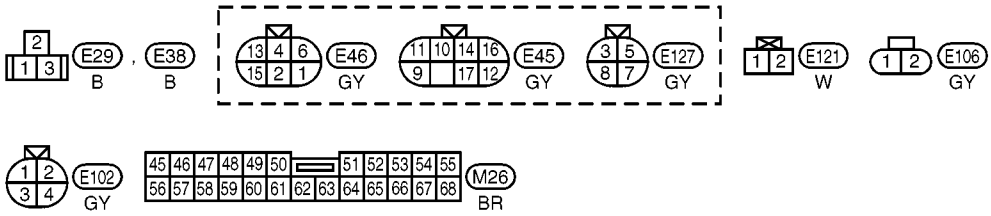


REFER TO THE FOLLOWING.
E1 -SUPER
MULTIPLE JUNCTION (SMJ)

MEL990L

Wiring Diagram — DTRL — (Cont'd)

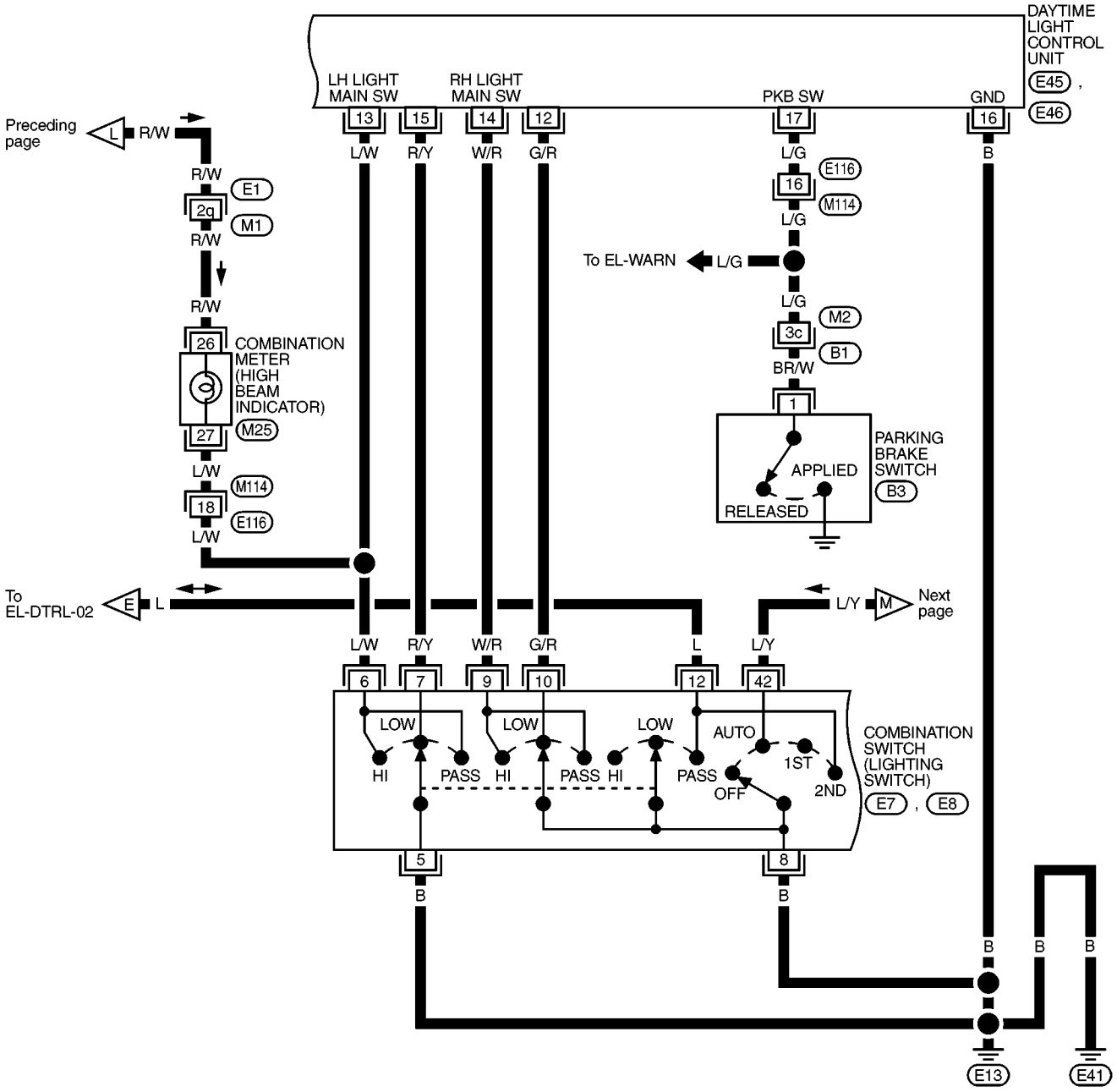


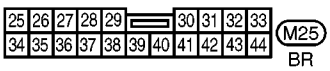


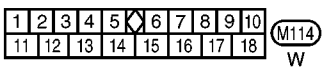
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 , E3 -FUSE BLOCK- JUNCTION (J/B)

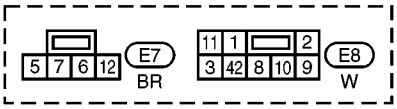
MEL991L

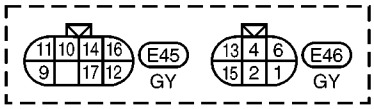
EL-DTRL-04











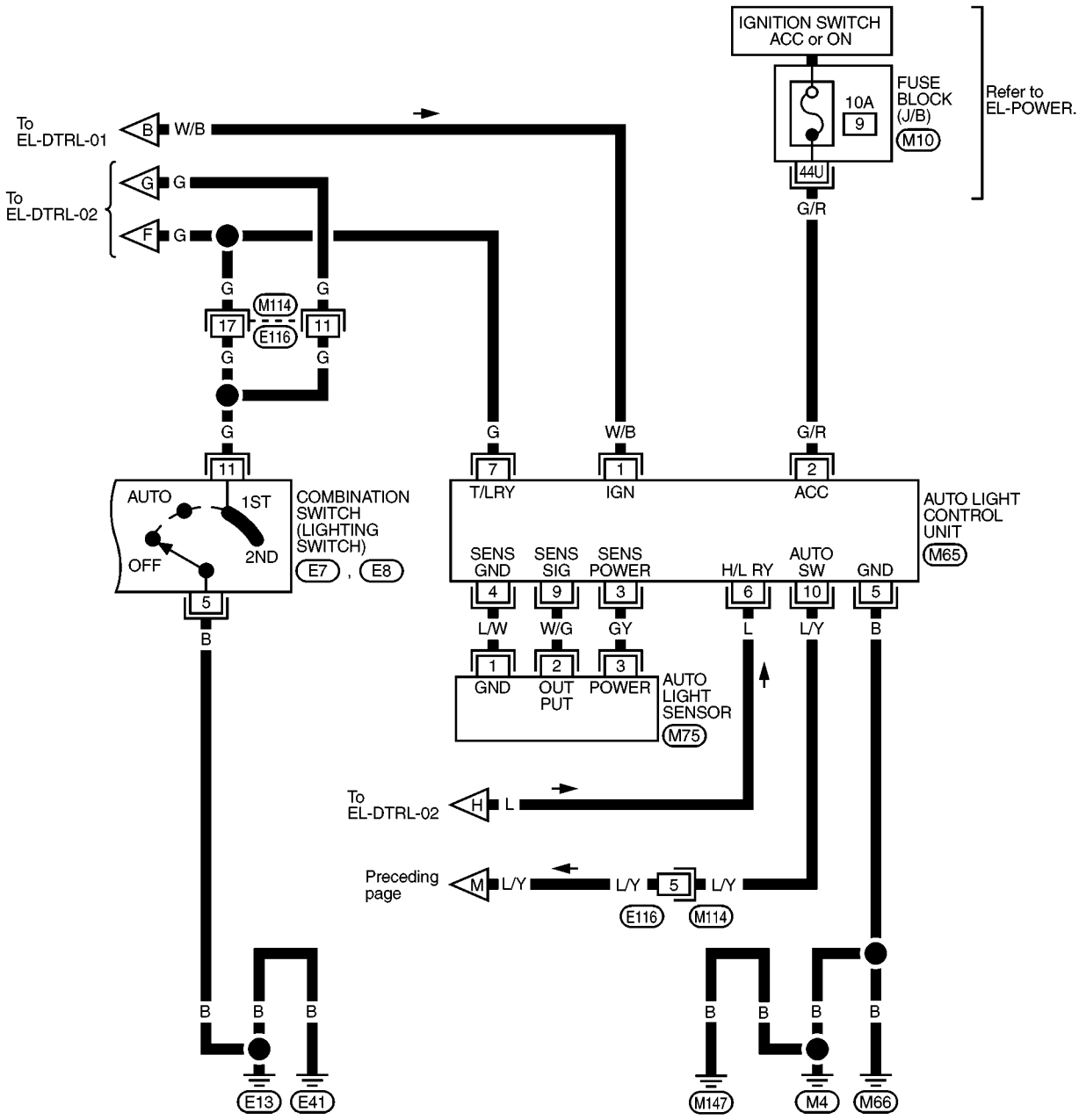


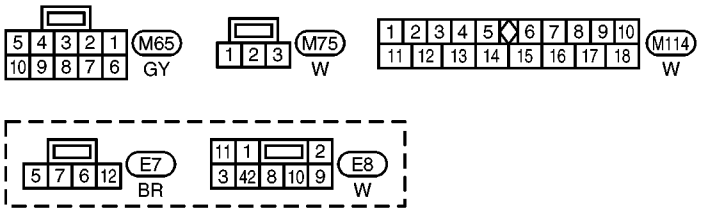
REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL992L

Wiring Diagram — DTRL — (Cont'd)

EL-DTRL-05



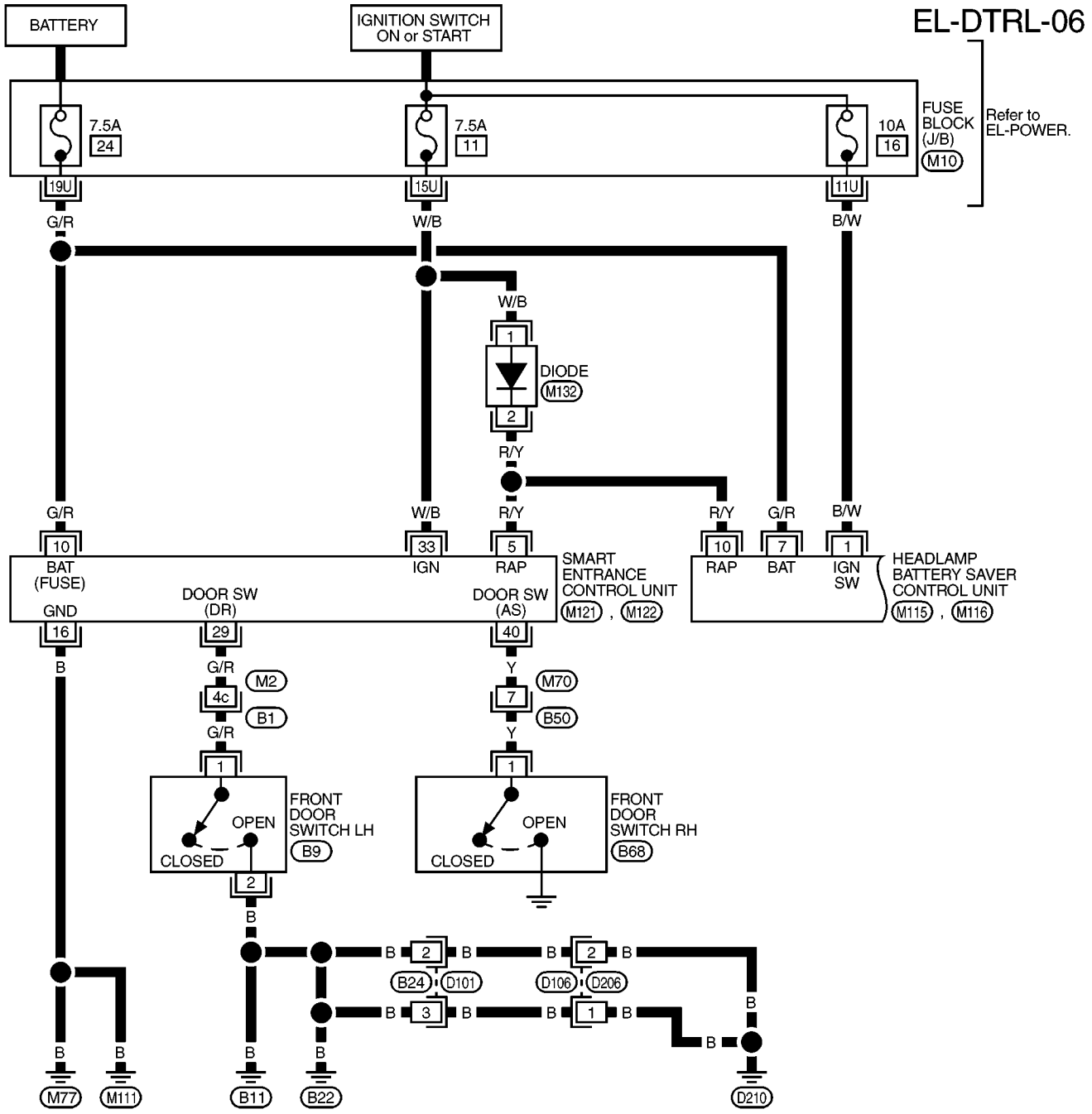


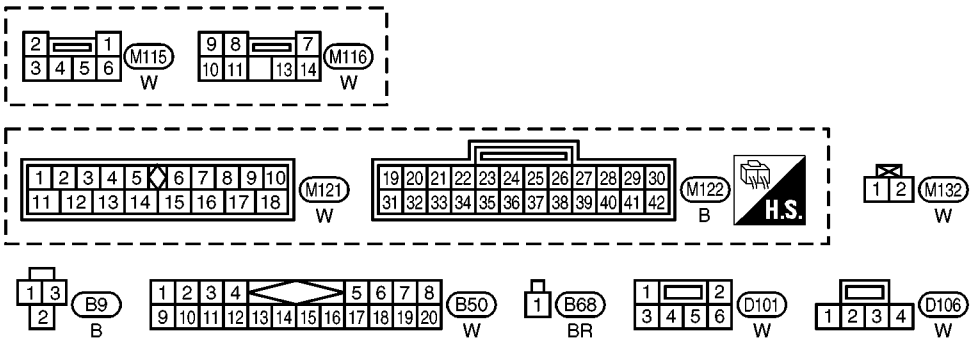
REFER TO THE FOLLOWING.
(M10) -FUSE BLOCK-
JUNCTION BOX (J/B)

MEL993L

WITHOUT AUTO LIGHT SYSTEM

NAEL0020S02

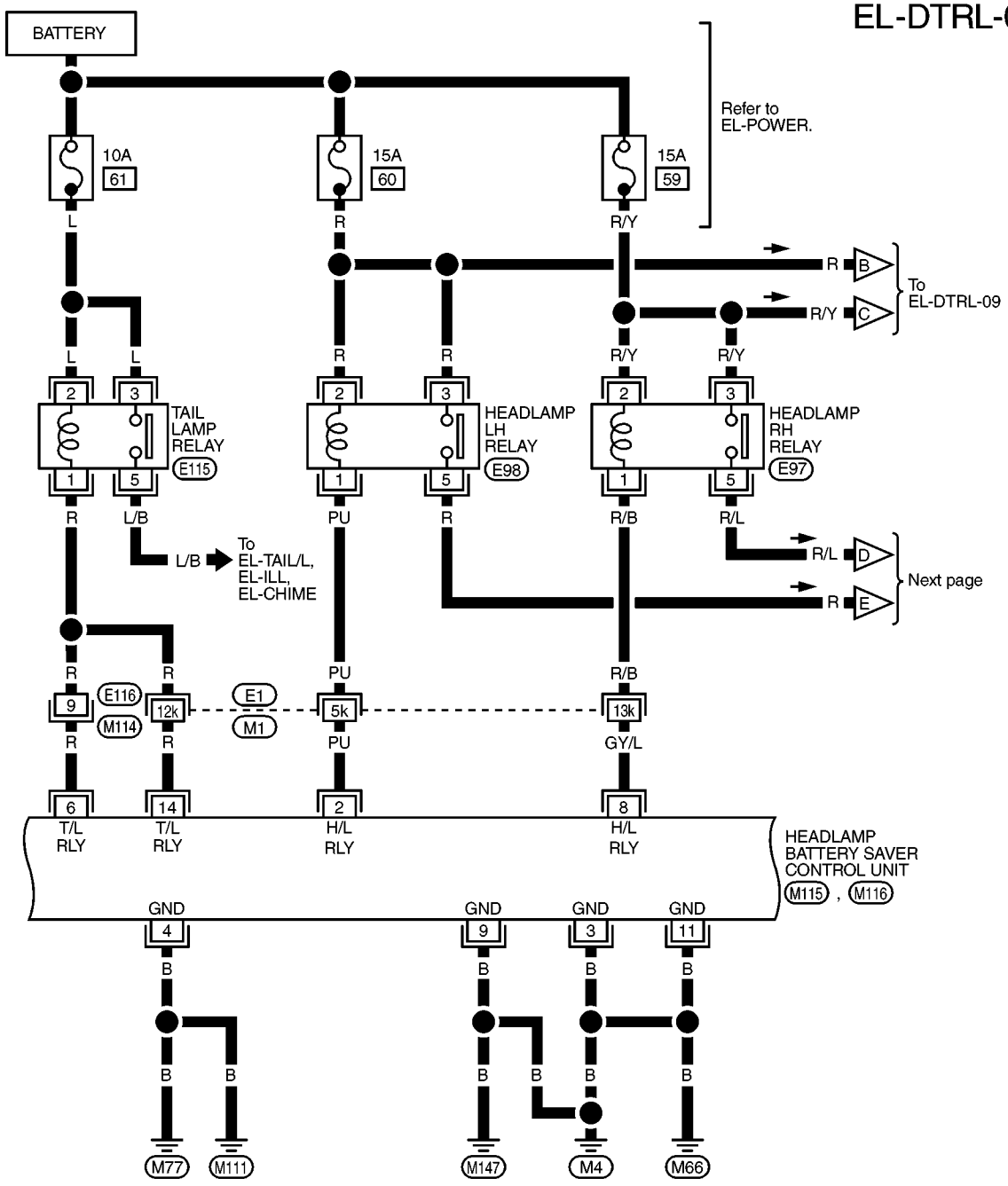


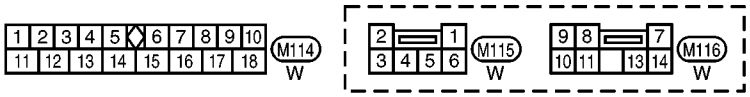


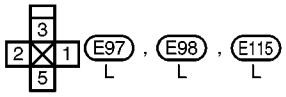
REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK-JUNCTION BOX (J/B)

MEL995L

EL-DTRL-07





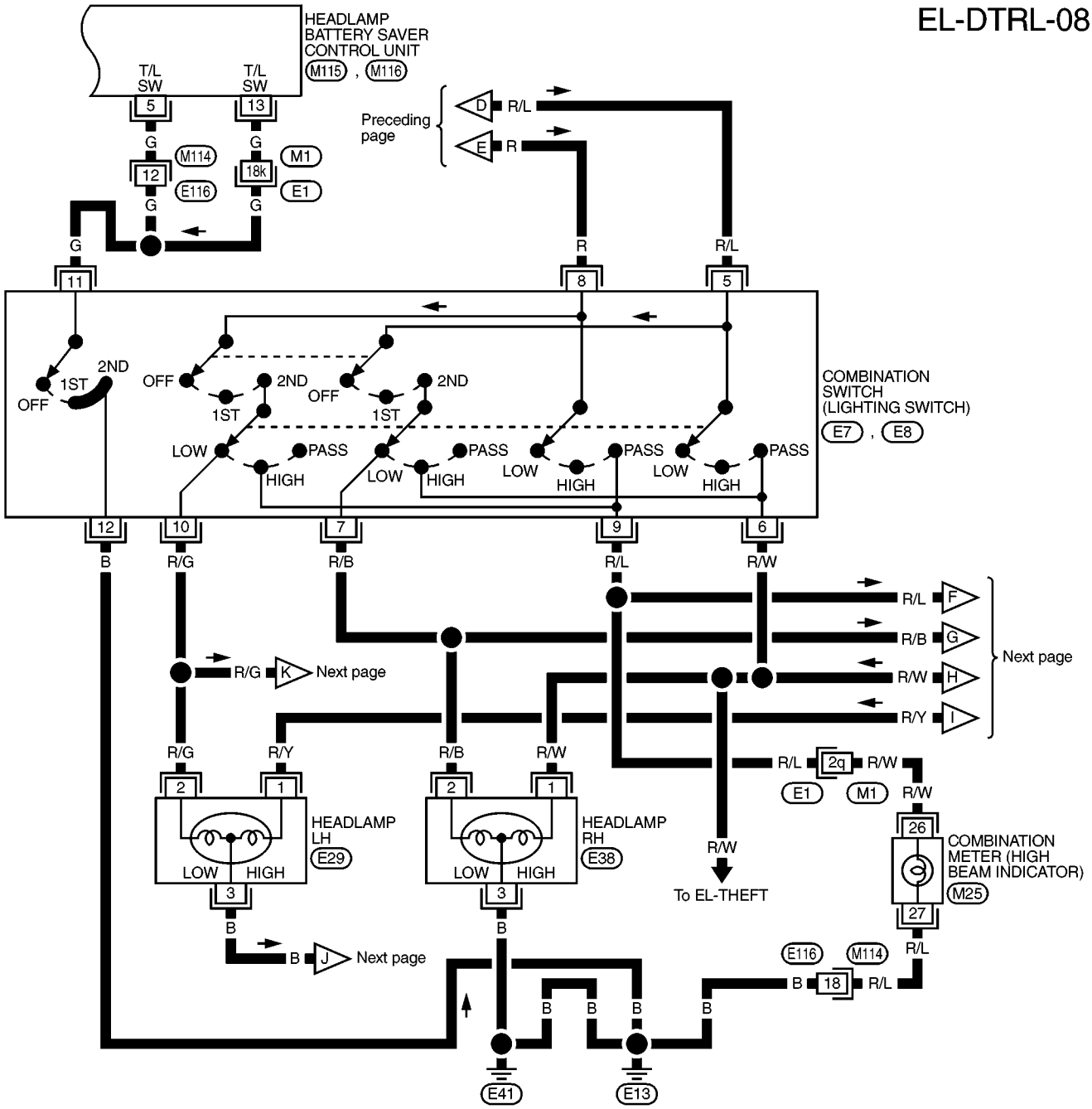


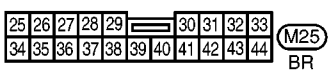
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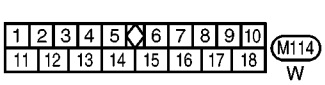
E1 -SUPER MULTIPLE JUNCTION (SMJ)

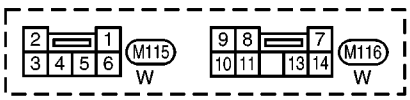
MEL996L

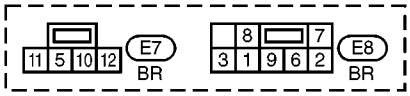
EL-DTRL-08

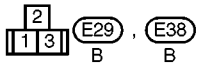








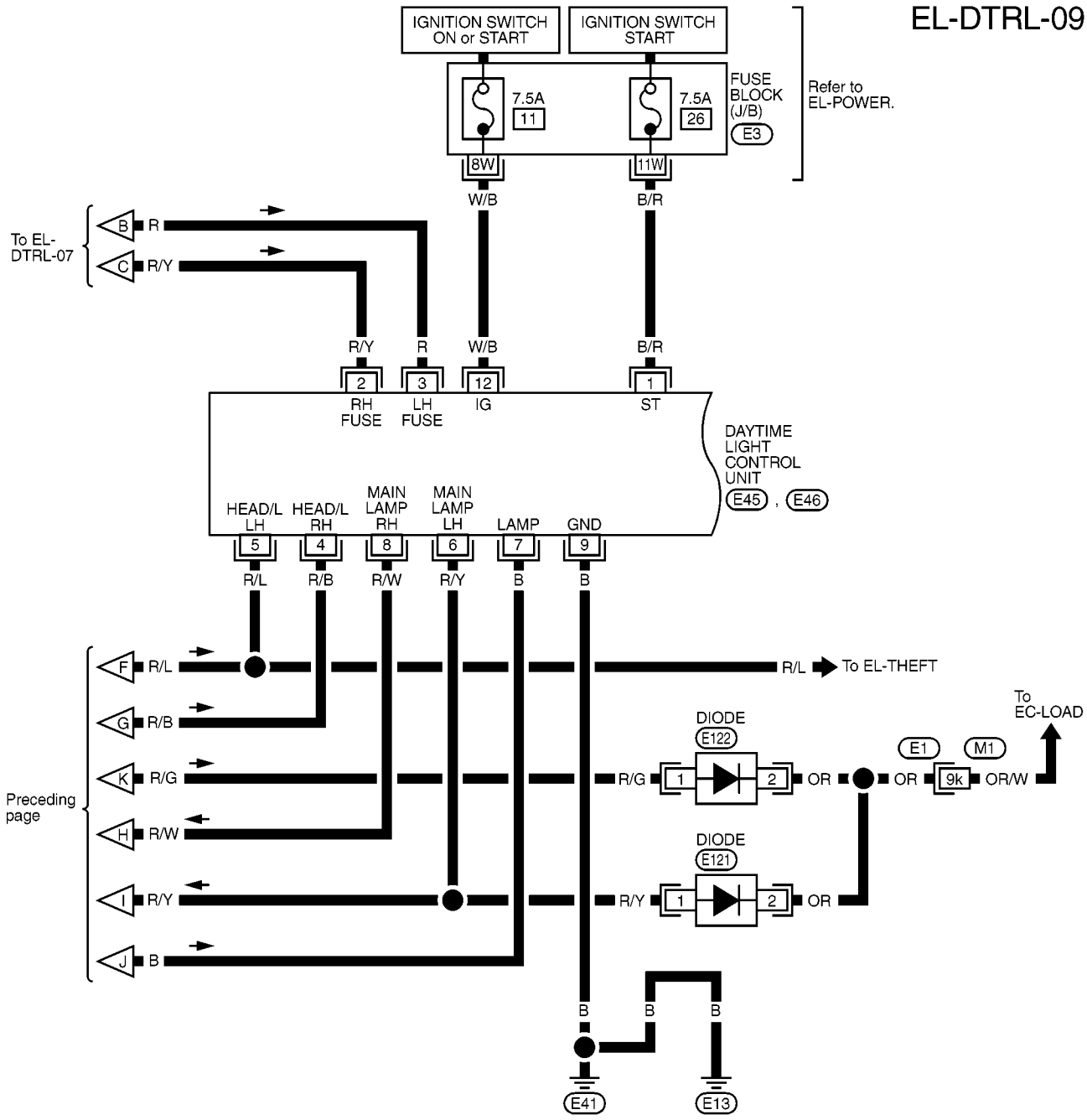


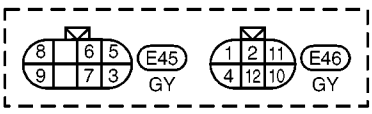


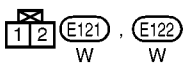
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL997L

Wiring Diagram — DTRL — (Cont'd)



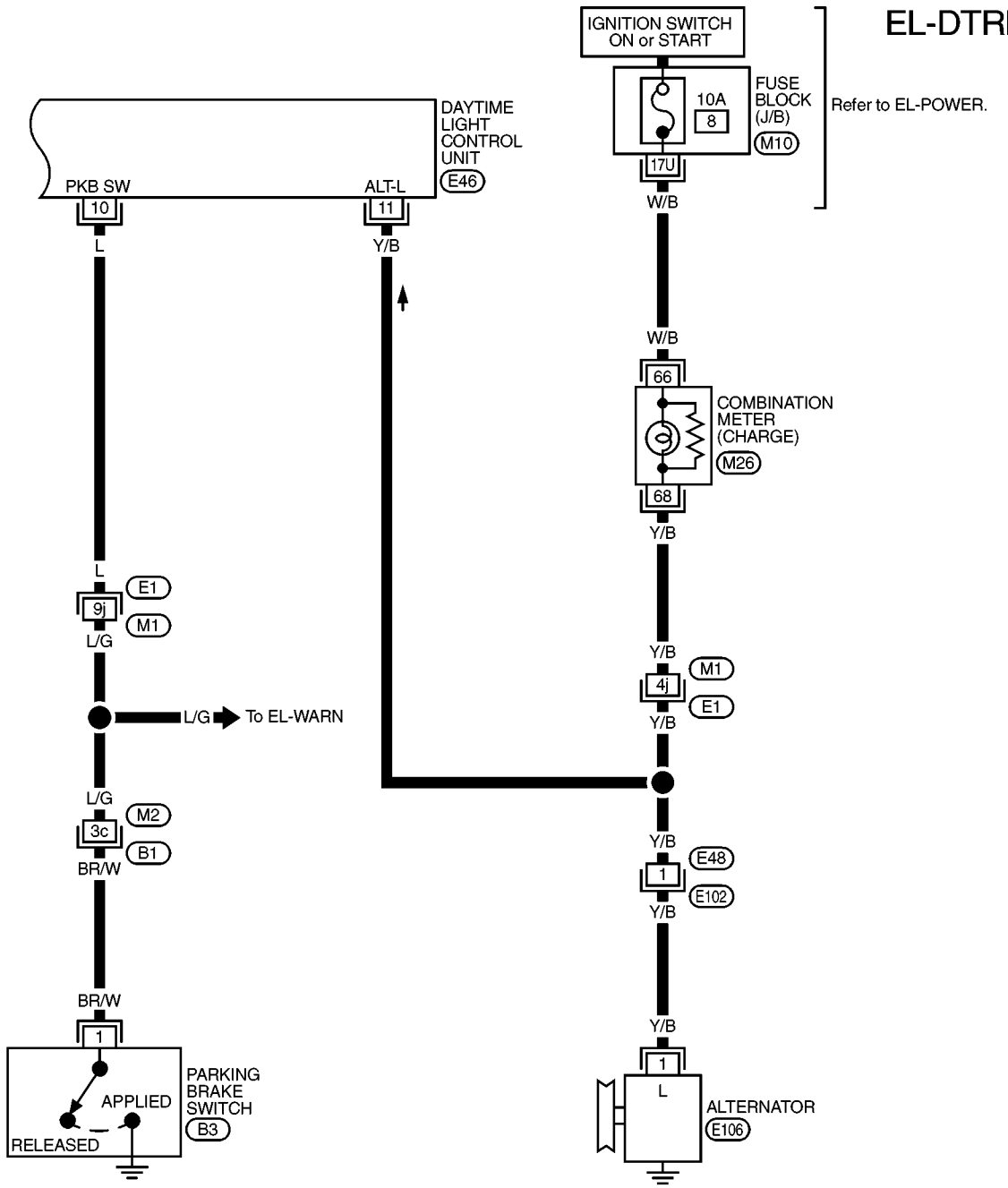


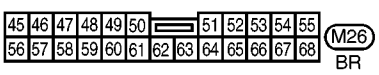


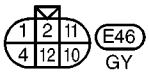
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
E3 -FUSE BLOCK-JUNCTION BOX (J/B)

MEL998L

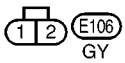
EL-DTRL-10













REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK-JUNCTION BOX (J/B)

MEL999L

Trouble Diagnoses

NAEL0193

WITH AUTO LIGHT SYSTEM

NAEL0193S03

Daytime Light Control Unit Inspection Table

NAEL0193S0301

Terminal No.	Wire color	Item	Condition		Voltage (Approximate values)
1	Y/B	Alternator		When turning ignition switch to “ON”	Less than 1V
				When engine is running	Battery voltage
				When turning ignition switch to “OFF”	Less than 1V
2	Y/R	Start signal		When turning ignition switch to “ST”	Battery voltage
				When turning ignition switch to “ON” from “ST”	Less than 1V
				When turning ignition switch to “OFF”	Less than 1V
3	G	Power source		When turning ignition switch to “ON”	Battery voltage
				When turning ignition switch to “ST”	Battery voltage
				When turning ignition switch to “OFF”	Less than 1V
4	R/L	Power source		When turning ignition switch to “ON”	Battery voltage
				When turning ignition switch to “OFF”	Battery voltage
5	R/W	Power source		When turning ignition switch to “ON”	Battery voltage
				When turning ignition switch to “OFF”	Battery voltage
6	R	LH hi beam		When lighting switch is turned to the 2ND position with “HI BEAM” position	Battery voltage
				When releasing parking brake with engine running and turning lighting switch to “OFF” (daytime light operation) **CAUTION:** **Block wheels and ensure selector lever is in N or P position.**	Approx. half battery voltage

Terminal No.	Wire color	Item	Condition		Voltage (Approximate values)
7	L/R	RH hi beam		When lighting switch is turned to the 2ND position with "HI BEAM" position	Battery voltage
				When releasing parking brake with engine running and turning lighting switch to "OFF" (daytime light operation) **CAUTION:** **Block wheels and ensure selector lever is in N or P position.**	Approx. half battery voltage
9	PU	RH hi beam (ground)		When lighting switch is turned to the 2ND position with "HI BEAM" position	Less than 1V
				When releasing parking brake with engine running and turning lighting switch to "OFF" (daytime light operation) **CAUTION:** **Block wheels and ensure selector lever is in N or P position.**	Approx. half battery voltage
10	GY	LH hi beam (ground)		When lighting switch is turned to the 2ND position with "HI BEAM" position	Less than 1V
				When releasing parking brake with engine running and turning lighting switch to "OFF" (daytime light operation) **CAUTION:** **Block wheels and ensure selector lever is in N or P position.**	Approx. half battery voltage
13 14	L/W W/R	Lighting switch (Hi beam)		When turning lighting switch to "HI BEAM"	Battery voltage
				When turning lighting switch to "FLASH TO PASS"	Battery voltage
16	B	Ground		—	—
17	L/G	Parking brake switch		When parking brake is released	Battery voltage
				When parking brake is set	Less than 1.5V

Battery Saver Control Unit Inspection Table

NAEL0193S0302

Refer to "HEADLAMP (FOR USA)", EL-47.

WITHOUT AUTO LIGHT SYSTEM

Daytime Light Control Unit Inspection Table

=NAEL0193S04

NAEL0193S0401

Terminal No.	Item	Condition		Voltage (Approximate values)
1	Start signal		When turning ignition switch to "ST"	Battery voltage
			When turning ignition switch to "ON" from "ST"	Less than 1V
			When turning ignition switch to "OFF"	Less than 1V
2	Power source		When turning ignition switch to "ON"	Battery voltage
			When turning ignition switch to "OFF"	Battery voltage
3	Power source		When turning ignition switch to "ON"	Battery voltage
			When turning ignition switch to "OFF"	Battery voltage
4	Lighting switch (Lo beam)		When lighting switch is turned to the 2ND position with "LOW BEAM" position	Battery voltage
5	Lighting switch (Hi beam)		When turning lighting switch to "HI BEAM"	Battery voltage
			When turning lighting switch to "FLASH TO PASS"	Battery voltage
6	LH hi beam		When turning lighting switch to "HI BEAM"	Battery voltage
			When releasing parking brake with engine running and turning lighting switch to "OFF" (daytime light operation) **CAUTION:** **Block wheels and ensure selector lever is in N or P position.**	Battery voltage
7	LH headlamp control (ground)		When lighting switch is turned to the 2ND position with "LOW BEAM" position	Less than 1V
			When releasing parking brake with engine running and turning lighting switch to "OFF" (daytime light operation) **CAUTION:** **Block wheels and ensure selector lever is in N or P position.**	Approx. half battery voltage
8	RH hi beam		When lighting switch is turned to the 2ND position with "HI BEAM" position	Battery voltage
			When releasing parking brake with engine running and turning lighting switch to "OFF" (daytime light operation) **CAUTION:** **Block wheels and ensure selector lever is in N or P position.**	Approx. half battery voltage
9	Ground		—	—

Terminal No.	Item	Condition		Voltage (Approximate values)
10	Parking brake switch		When parking brake is released	Battery voltage
			When parking brake is set	Less than 1.5V
11	Alternator		When turning ignition switch to "ON"	Less than 1V
			When engine is running	Battery voltage
			When turning ignition switch to "OFF"	Less than 1V
12	Power source		When turning ignition switch to "ON"	Battery voltage
			When turning ignition switch to "ST"	Battery voltage
			When turning ignition switch to "OFF"	Less than 1V

Battery Saver Control Unit Inspection Table

NAEL0193S0402

Refer to "HEADLAMP (FOR USA)" EL-50.

Bulb Replacement

NAEL0194

Refer to "HEADLAMP (FOR USA)" (EL-51).

Aiming Adjustment

NAEL0195

Refer to "HEADLAMP (FOR USA)" (EL-51).

System Description

NAEL0162

The parking, license and tail lamp operation is controlled by the lighting switch which is built into the combination switch and headlamp battery saver control unit. The battery saver system is controlled by the headlamp battery saver control unit and smart entrance control unit.
Power is supplied at all times

- to tail lamp relay terminals 2 and 3
- through 10A fuse (No. 61, located in the fuse and fusible link box), and
- to headlamp battery saver control unit terminal 7, and
- to smart entrance control unit terminal 10
- through 7.5A fuse [No. 24, located in the fuse block (J/B)].

When ignition switch is in ON or START position, power is supplied

- to headlamp battery saver control unit terminal 1
- through 10A fuse [No. 16, located in the fuse block (J/B)], and
- to headlamp battery saver control unit terminal 10, and
- to smart entrance control unit terminal 33
- through 7.5A fuse [No. 11, located in the fuse block (J/B)].

Ground is supplied to headlamp battery saver control unit terminals 4 and 11 (with auto light system) or headlamp battery saver control unit terminals 4, and 3, 9 and 11 (without auto light system).

LIGHTING OPERATION BY LIGHTING SWITCH

NAEL0162S01

When lighting switch is in 1ST (or 2ND) position, ground is supplied

- to tail lamp relay terminal 1 from headlamp battery saver control unit terminals 6 and 14
- through headlamp battery saver control unit terminals 5 and 13, and
- to lighting switch terminal 11
- through lighting switch terminal 5 (with auto light system), or lighting switch terminal 12 (without auto light system)
- through body grounds E13 and E41.

Tail lamp relay is then energized and the parking, license and tail lamps illuminate.

LIGHTING OPERATION BY AUTO LIGHT CONTROL SYSTEM

NAEL0162S03

When auto light control system is operated, ground is supplied

- to tail lamp relay terminal 1 from headlamp battery saver control unit terminals 6 and 14
- through headlamp battery saver control unit terminals 5 and 13, and
- through auto light control unit terminal 7.

Tail lamp relay is then energized and the parking, license and tail lamps illuminate.

BATTERY SAVER CONTROL

NAEL0162S02

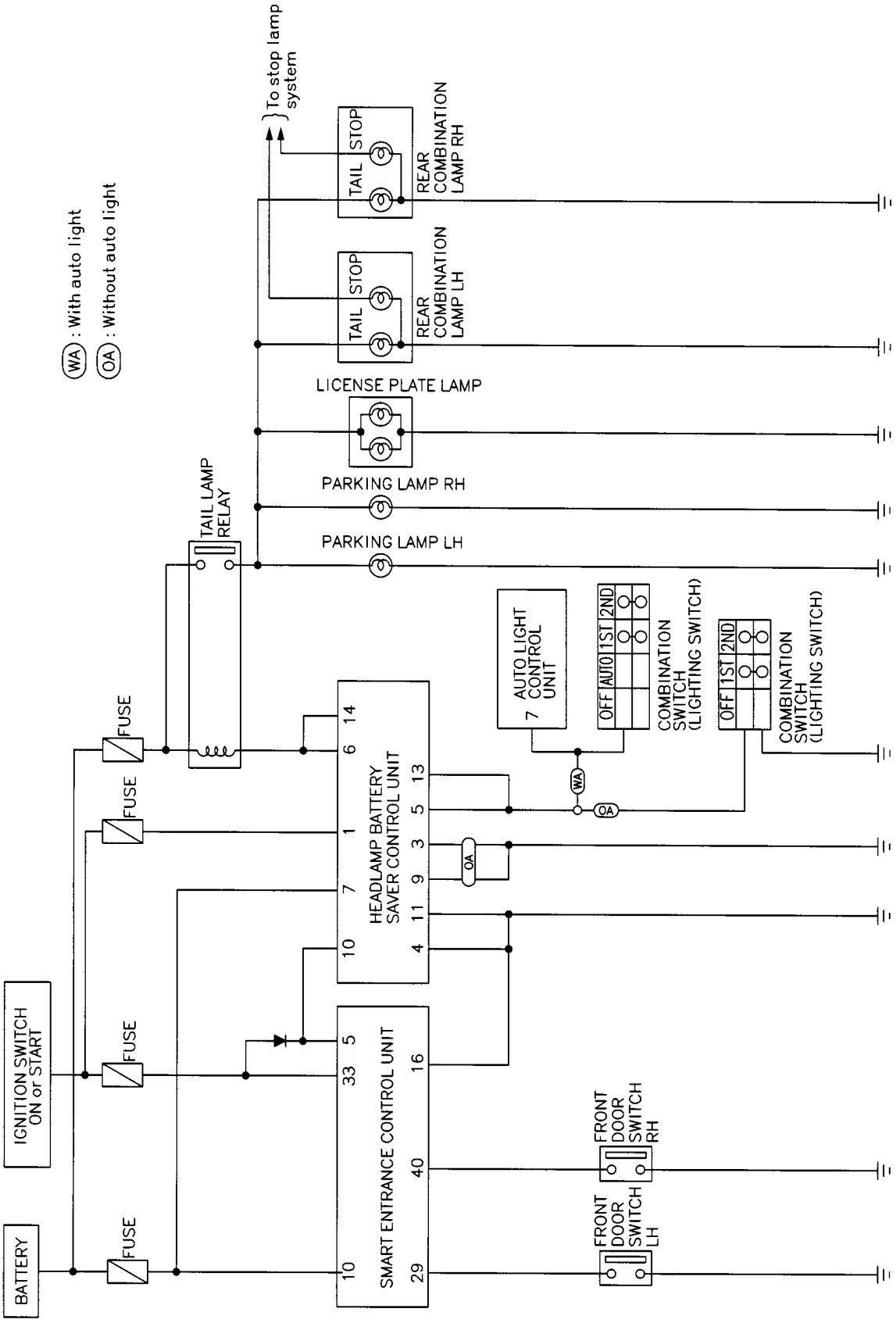
When the ignition switch is turned from ON (or START) to OFF (or ACC) positions while parking, license and tail lamps are illuminated, the RAP signal is supplied to terminal 10 of the headlamp battery saver control unit from smart entrance control unit terminal 5.
After counting 45 seconds by the RAP signal from the smart entrance control unit to headlamp battery saver control unit, the ground supply to terminal 1 of the tail lamp relay from headlamp battery saver control unit terminals 6 and 14 is terminated.
Then the parking, license and tail lamps are turned off.
The parking, license and tail lamps are turned off when driver or passenger side door is opened even if 45 seconds have not passed after the ignition switch is turned from ON (or START) to OFF (or ACC) positions while parking, license and tail lamps are illuminated.
When the lighting switch is turned from OFF to 1ST (or 2ND) after the parking, license and tail lamps are turned off by the battery saver control, ground is supplied.

- to headlamp battery saver control unit terminals 5 and 13 from lighting switch terminal 11, and
- to tail lamp relay terminal 1 from headlamp battery saver control unit terminals 6 and 14.

Then the parking, license and tail lamps illuminate again.

Schematic

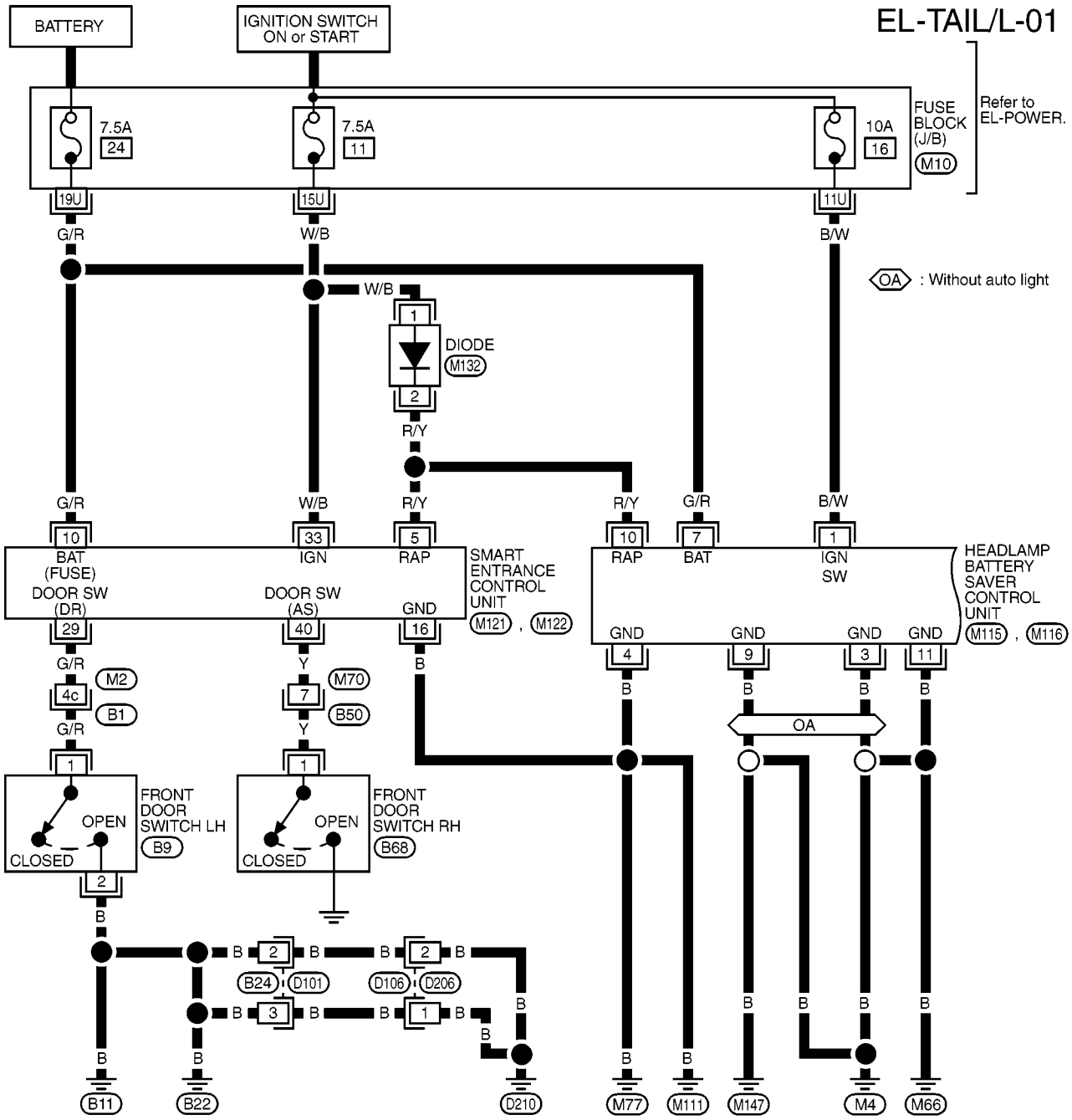
NAEL0163

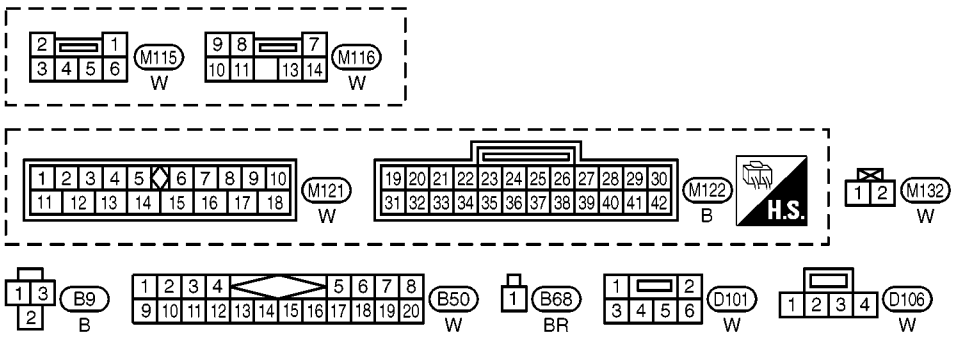


MEL001M

Wiring Diagram — TAIL/L —

NAEL0024





REFER TO THE FOLLOWING.

B1 -SUPER MULTIPLE JUNCTION (SMJ)

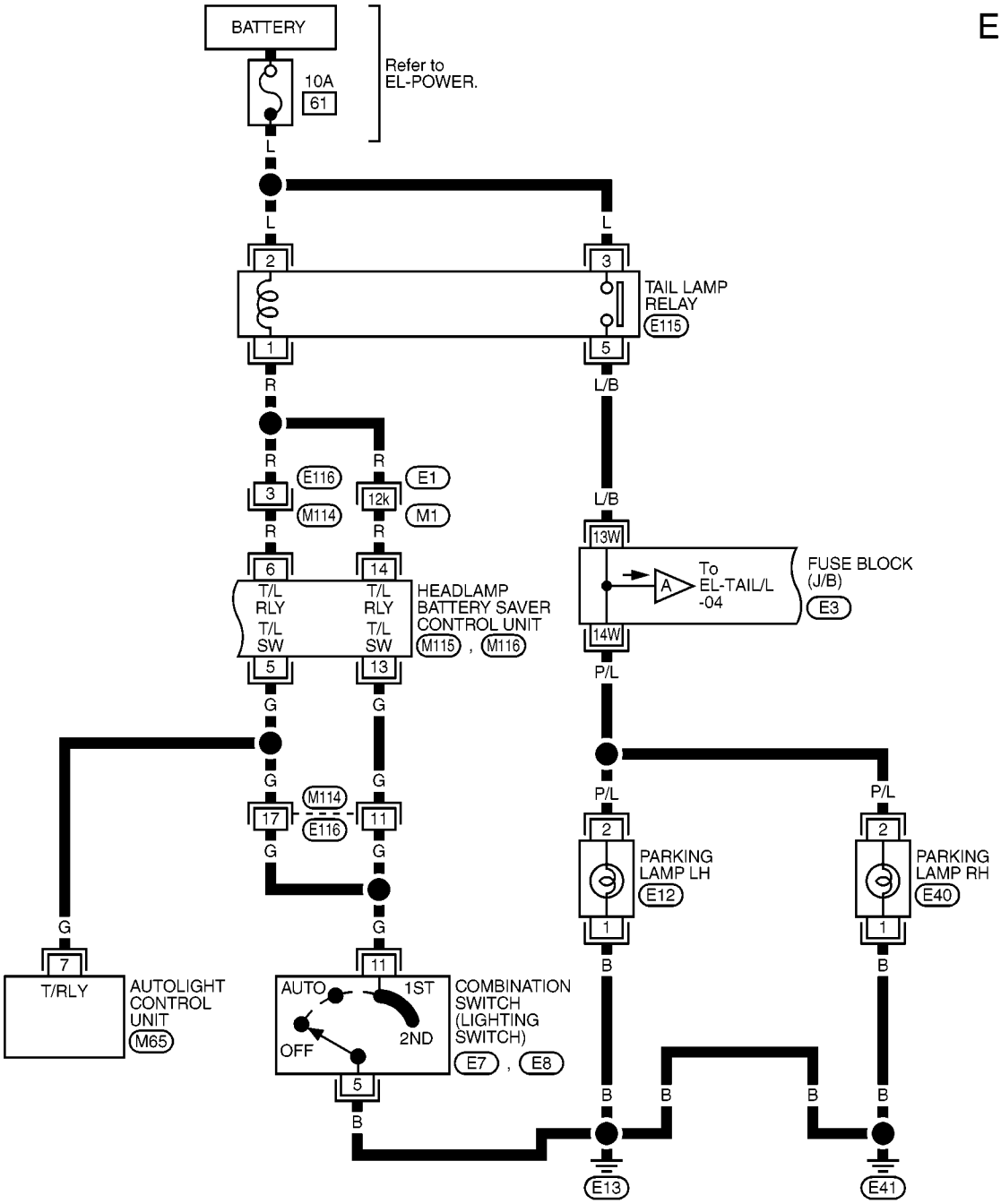
M10 -FUSE BLOCK-JUNCTION BOX (J/B)

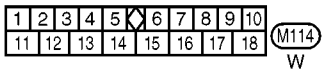
MEL002M

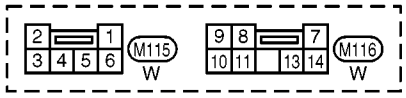
WITH AUTO LIGHT SYSTEM

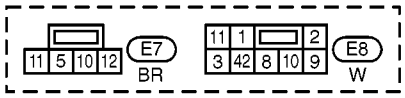
NAEL0024S01

EL-TAIL/L-02











REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
E3 -FUSE BLOCK-JUNCTION BOX (J/B)

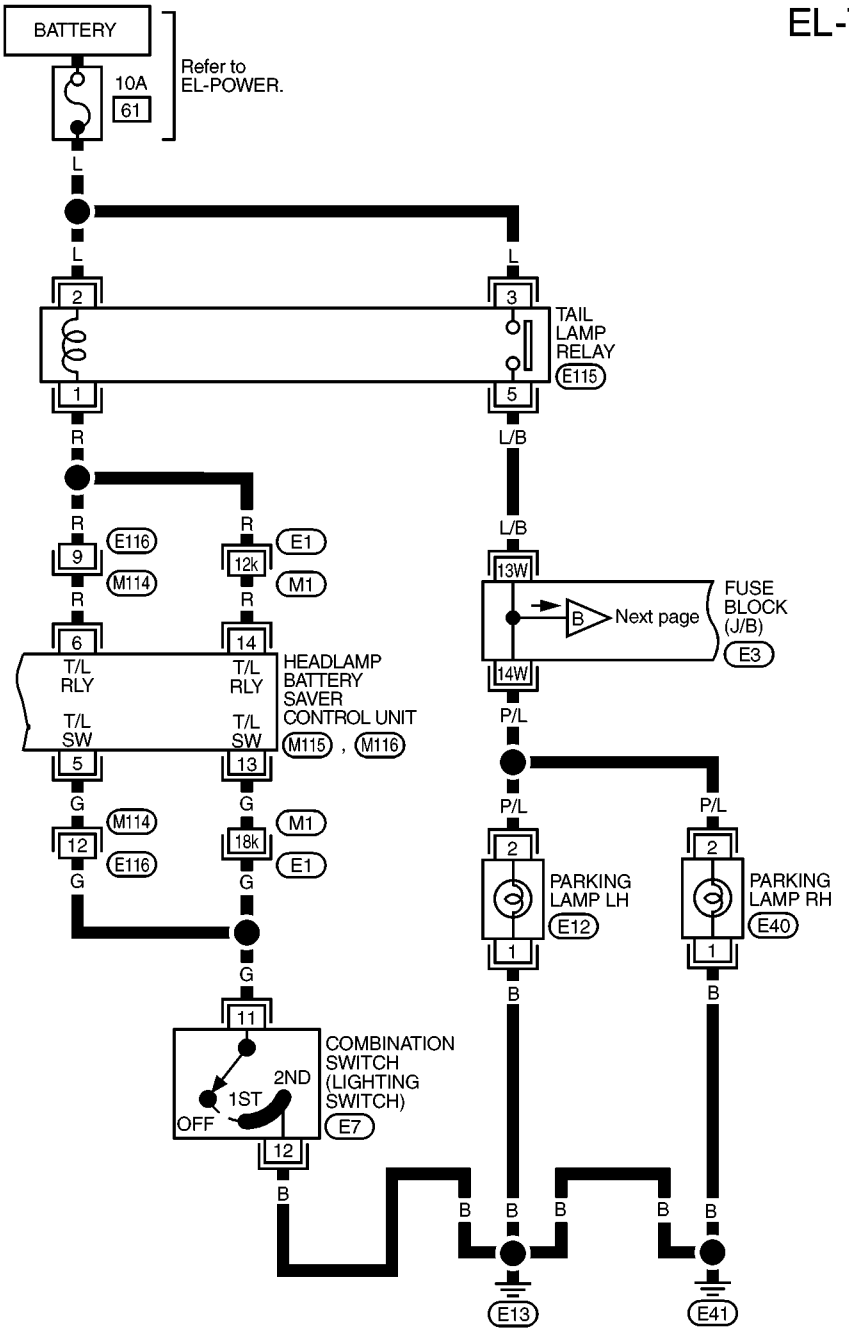
MEL003M

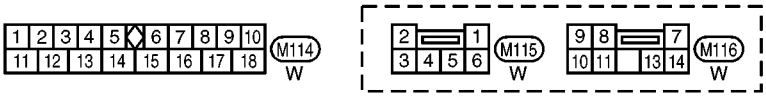
Wiring Diagram — TAIL/L — (Cont'd)

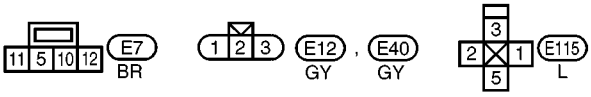
WITHOUT AUTO LIGHT SYSTEM

NAEL0024S02

EL-TAIL/L-03





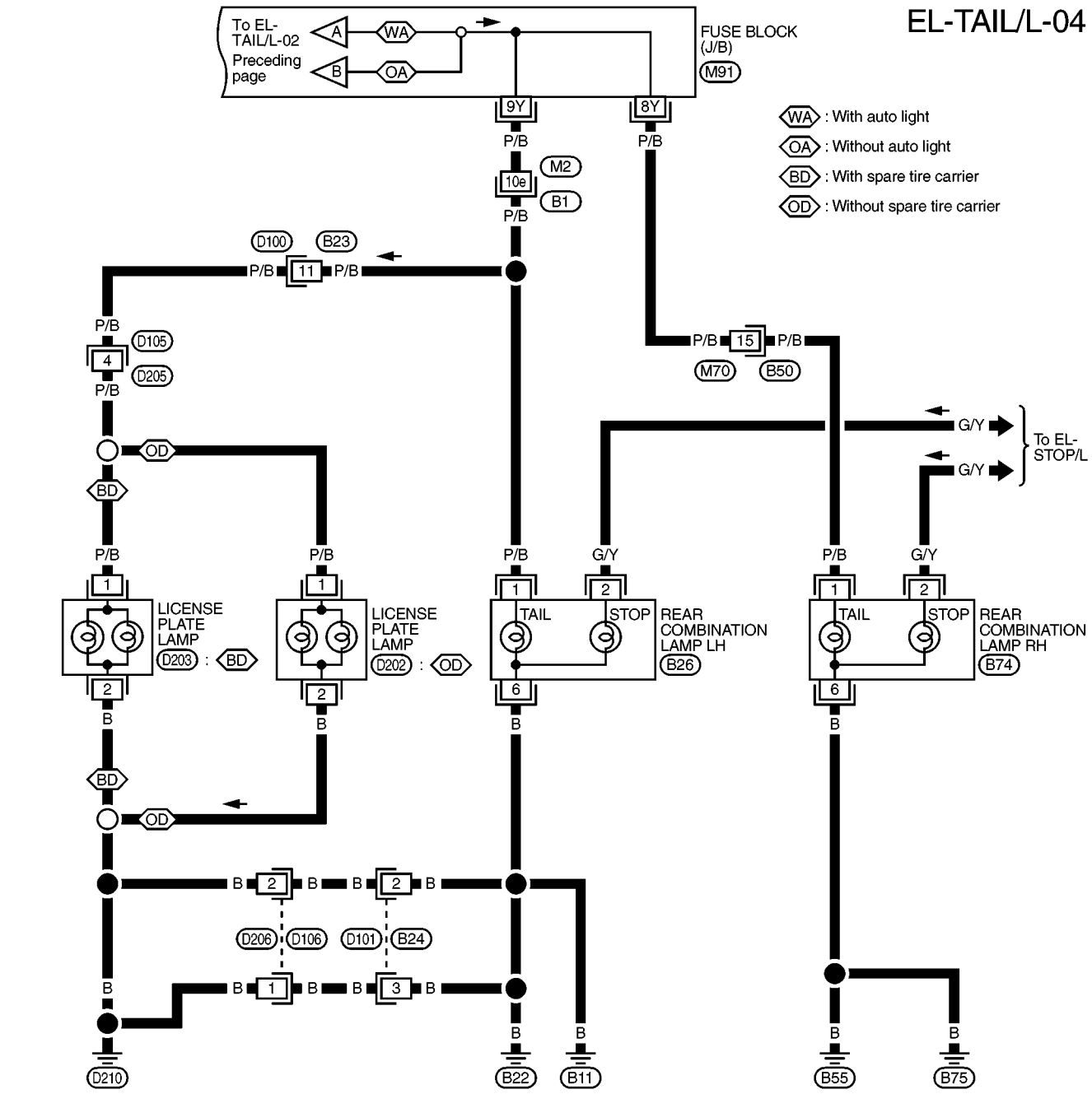


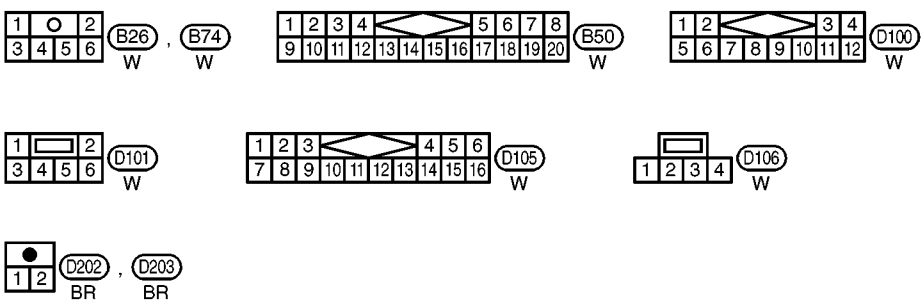
REFER TO THE FOLLOWING.

E1 -SUPER MULTIPLE JUNCTION (SMJ)

E3 -FUSE BLOCK-JUNCTION BOX (J/B)

MEL004M





REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)
M91 -FUSE BLOCK- JUNCTION BOX (J/B)

MEL005M

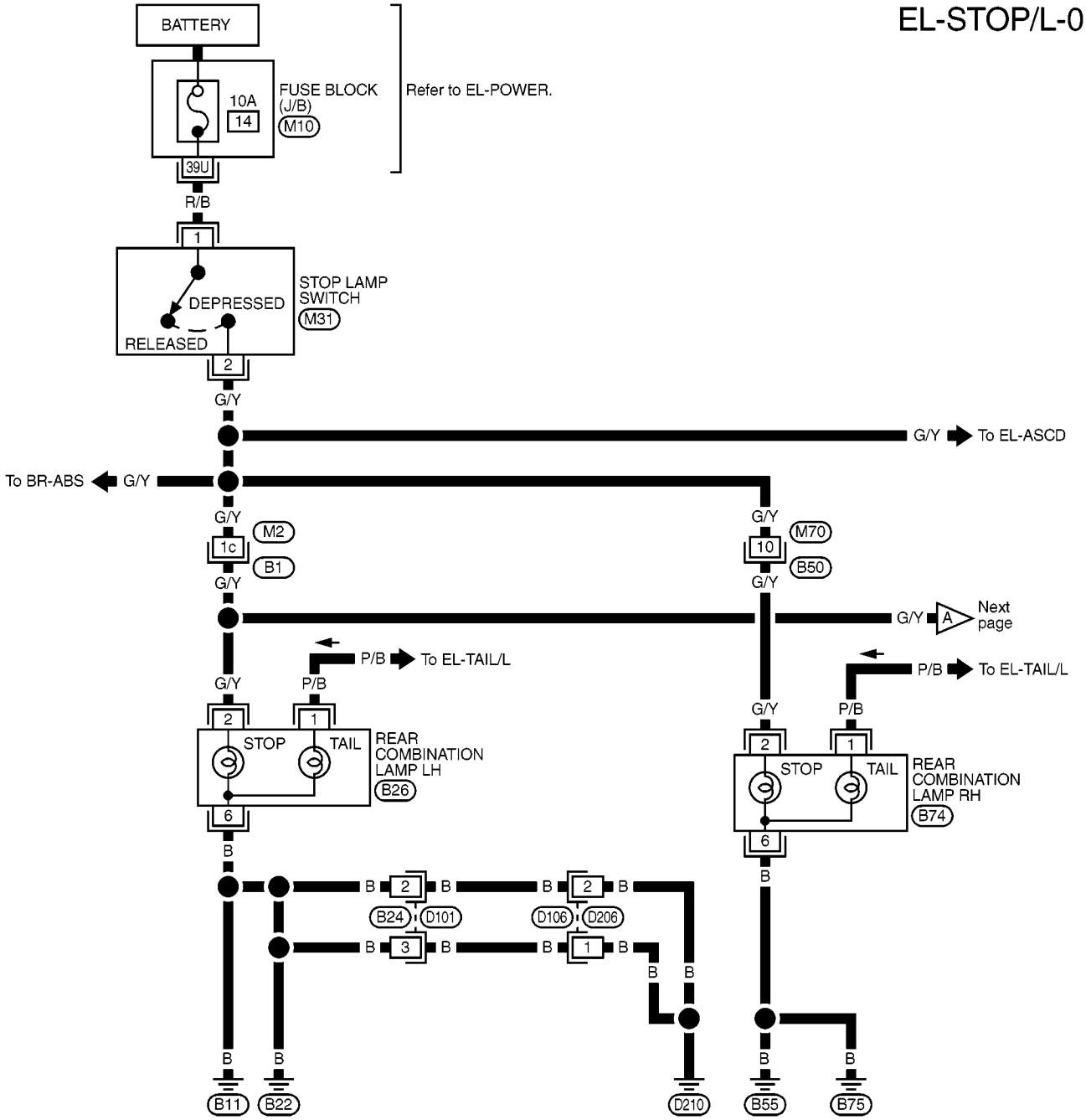
Trouble Diagnoses

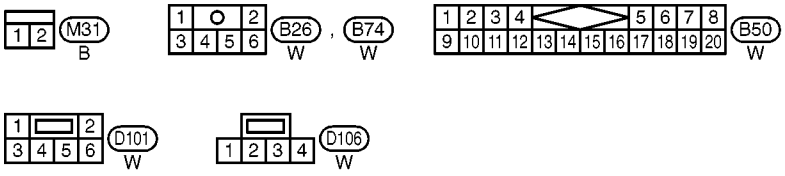
NAEL0164

Symptom	Possible cause	Repair order
No lamps operate (including headlamps).	1. 7.5A fuse 2. Lighting switch 3. Headlamp battery saver control unit	1. Check 7.5A fuse [No. 24, lacated in fuse block (J/B)]. Verify battery positive voltage is present at terminal 7 of headlamp battery saver control unit. 2. Check lighting switch. 3. Check headlamp battery saver control unit. (EL-47)
No parking, license and tail lamps operate, but headlamps do operate.	1. 10A fuse 2. Tail lamp relay 3. Tail lamp relay circuit 4. Lighting switch 5. Lighting switch circuit 6. Headlamp battery saver control unit	1. Check 10A fuse (No. 61, located in fusible and fuse block). Verify battery positive voltage is present at terminals 2 and 3 of tail lamp relay. 2. Check tail lamp relay. 3. Check the following. a. Harness between headlamp battery saver control unit terminals 6 and 14 and tail lamp relay terminal 1 b. Harness between tail lamp relay terminal 5 and fuse block 4. Check lighting switch. 5. Check the following. a. Harness between lighting switch terminal 11 and headlamp battery saver control unit terminals 5 and 13 b. Harness between lighting switch terminal 5 (with auto light system) or lighting switch terminal 12 (without auto light system) and ground 6. Check headlamp battery saver control unit. (EL-47)
Battery saver control does not operate properly.	1. RAP signal circuit 2. Driver or passenger side door switch circuit 3. Lighting switch circuit 4. Headlamp battery saver control unit 5. Smart entrance control unit	1. Check harness between headlamp battery saver control unit terminal 10 and smart entrance control unit terminal 5 for open or short circuit. 2. Check the following. a. Harness between smart entrance control unit and driver or passenger side door switch for open or short circuit b. Driver or passenger side door switch ground circuit c. Driver or passenger side door switch. 3. Check the following. a. Harness between headlamp battery saver control unit terminals 5 or 13 and lighting switch terminal 11 for open or short circuit b. Harness between lighting switch terminal 5 and ground c. Lighting switch 4. Check headlamp battery saver control unit. (EL-47) 5. Check smart entrance control unit. (EL-348)

Wiring Diagram — STOP/L —

NAEL0025





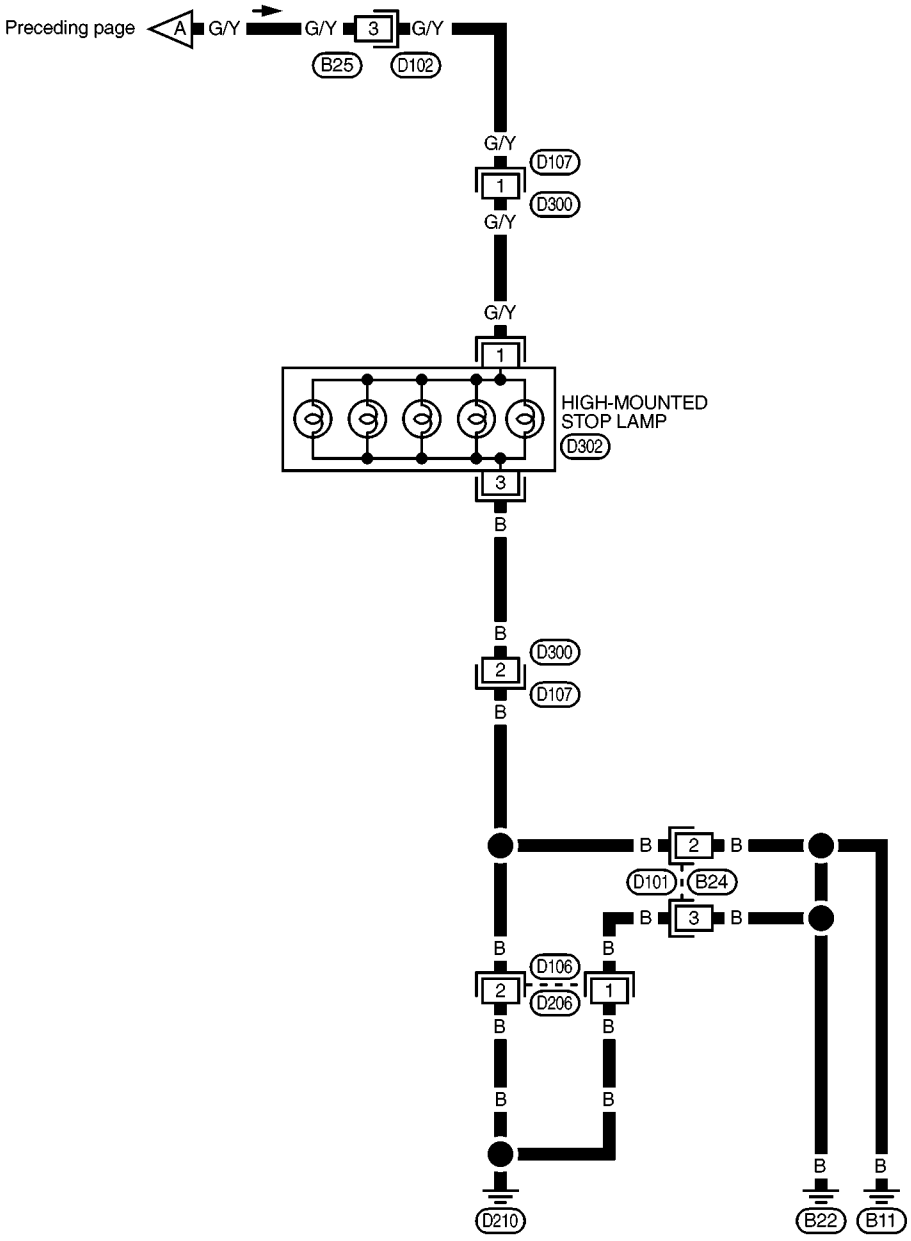
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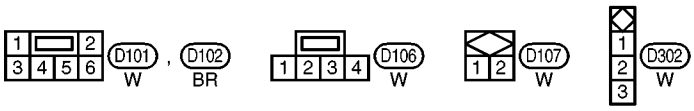
B1 -SUPER MULTIPLE JUNCTION (SMJ)

M10 -FUSE BLOCK-JUNCTION BOX (J/B)

MEL777L

EL-STOP/L-02

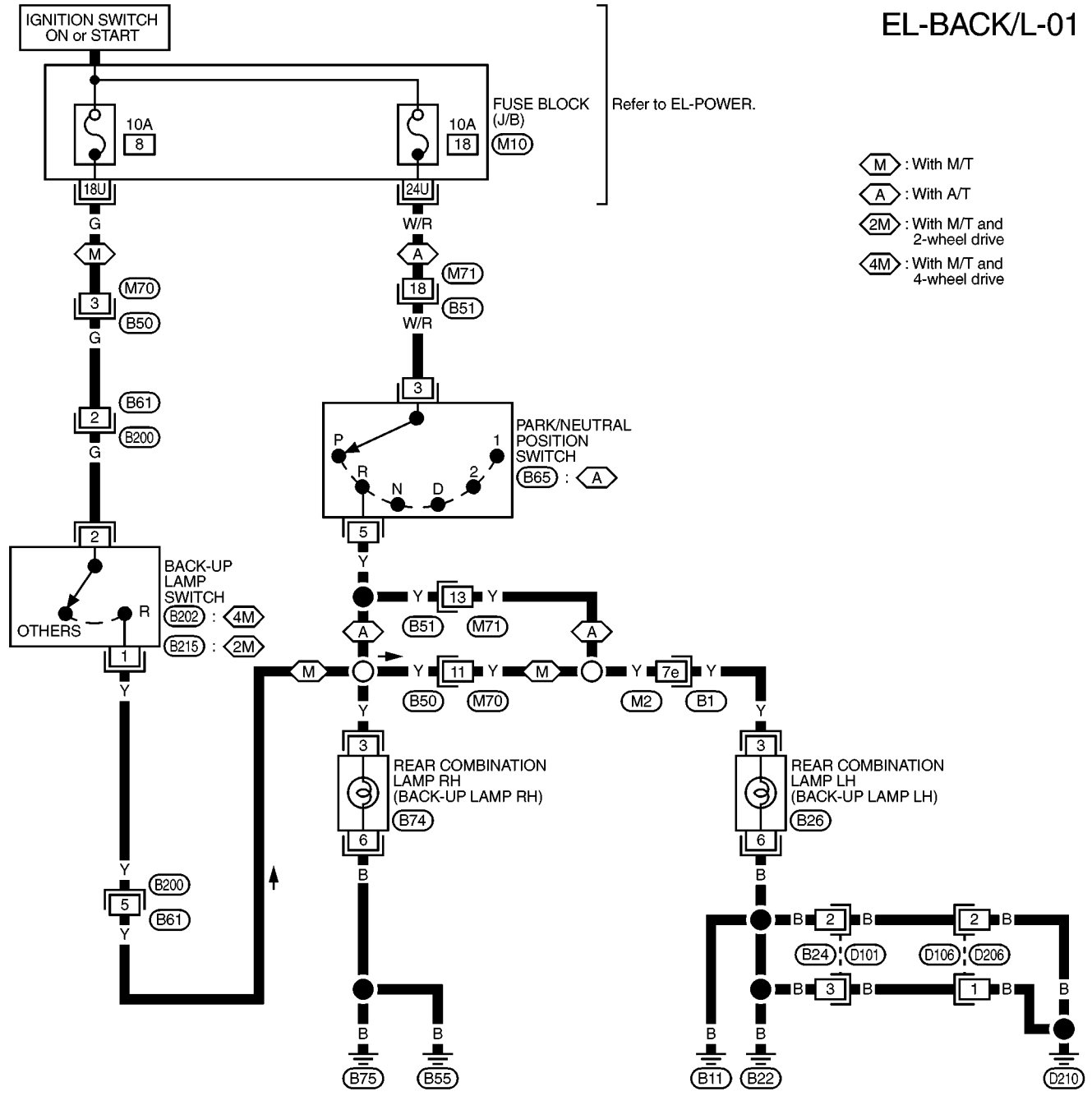


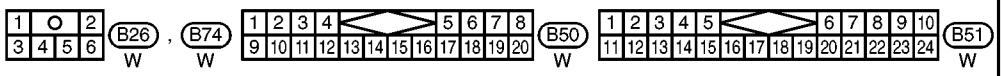


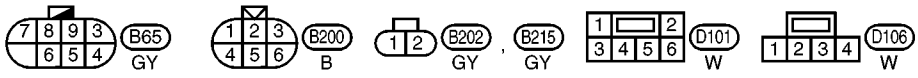
MEL262M

Wiring Diagram — BACK/L —

NAEL0026







REFER TO THE FOLLOWING.

B1 -SUPER MULTIPLE JUNCTION (SMJ)

M10 -FUSE BLOCK- JUNCTION BOX (J/B)

MEL006M

System Description

NAEL0027

WITH AUTO LIGHT SYSTEM

NAEL0027S04

Outline

NAEL0027S0401

Power is supplied at all times

- to headlamp RH relay terminals 1 and 3
- through 15A fuse (No. 59, located in the fuse and fusible link box), and
- to headlamp battery saver control unit terminal 7
- to smart entrance control unit terminal 10
- through 7.5A fuse [No. 24, located in the fuse block (J/B)], and
- to front fog lamp relay terminal 3
- through 15A fuse (No. 53, located in the fuse and fusible link box).

When ignition switch is in ON or START position, power is supplied

- to headlamp battery saver control unit terminal 1
- through 10A fuse [No. 16, located in the fuse block (J/B)], and
- to headlamp battery saver control unit terminal 10, and
- to smart entrance control unit terminal 33
- through 7.5A fuse [No. 11, located in the fuse block (J/B)].

Ground is supplied to headlamp battery saver control unit terminals 4 and 11.
When lighting system is in 2ND position, ground is supplied

- to headlamp RH relay terminal 2 from headlamp battery saver control unit terminals 2 and 8
- through headlamp battery saver control unit terminals 3 and 9,
- through lighting switch terminal 11, and
- through body grounds E13 and E41.

Headlamp RH relay is then energized.

Fog Lamp Operation

NAEL0027S0402

The fog lamp switch is built into the combination switch. The lighting switch must be in the 2ND position and LOW (“B”) position for fog lamp operation.
With the fog lamp switch in the ON position, ground is supplied

- to fog lamp relay terminal 2
- through the fog lamp switch, lighting switch and body grounds E13 and E41.

The fog lamp relay is energized and power is supplied

- from fog lamp relay terminal 5
- to terminal 1 of each fog lamp.

Ground is supplied to terminal 2 of each fog lamp through body grounds E13 and E41.
With power and ground supplied, the fog lamps illuminate.

Battery Saver Control

NAEL0027S0403

When the ignition switch is turned from ON (or START) to OFF (or ACC) positions while fog lamps are illuminated, the RAP signal is supplied to terminal 10 of the headlamp battery saver control unit from smart entrance control unit terminal 5.
After counting 45 seconds by the RAP signal from the smart entrance control unit to headlamp battery saver control unit, the ground supply to terminal 2 of headlamp RH relay from headlamp battery saver control unit teminals 2 and 8 are terminated. Then fog lamps are turned to off.
Fog lamps are turned off when driver or passenger side door is opened even if 45 seconds have not passed after the ignition switch is turned from ON (or START) to OFF (or ACC) positions while fog lamps are illuminated.
When the lighting switch is turned from OFF to 2ND after fog lamps are turned off by the battery saver control, ground is supplied

- to headlamp battery saver control unit terminals 5 and 13 from lighting switch terminal 11, and
- to headlamp RH relay terminal 2 from headlamp battery saver control unit terminals 2 and 8
- through headlamp battery saver control unit terminals 3 and 9, and
- through lighting switch terminal 11.

Then the fog lamps illuminate again.

NOTE:
For Trouble Diagnoses for battery saver control, refer to "HEADLAMP (FOR USA)" EL-46.

WITHOUT AUTO LIGHT SYSTEM

NAEL0027S05

Outline

NAEL0027S0501

Power is supplied at all times

- to headlamp RH relay terminals 2 and 3
- through 15A fuse (No. 59, located in the fuse and fusible link box), and
- to headlamp battery saver control unit terminal 7
- through 7.5A fuse [No. 24, located in the fuse block (J/B)], and
- to front fog lamp relay terminal 3
- through 15A fuse (No. 53, located in the fuse and fusible link box).

When ignition switch is in ON or START position, power is supplied

- to headlamp battery saver control unit terminal 1
- through 10A fuse [No. 16, located in the fuse block (J/B)], and
- to headlamp battery saver control unit terminal 10, and
- to smart entrance control unit terminal 33
- through 7.5A fuse [No. 11, located in the fuse block (J/B)].

Ground is supplied to headlamp battery saver control unit terminals 3, 4, 9 and 11.
When Ignition Switch is in ON or START Position
Ground is supplied

- to headlamp RH relay terminal 1 from headlamp battery saver control unit terminal 8.
- through headlamp battery saver control unit terminal 9, and
- through body grounds M4, M66 and M147.

Headlamp RH relay is then energized.
When Ignition Switch is in OFF or ACC Position
When lighting switch is in 2ND (or 1ST) position, ground is supplied

- to headlamp battery saver control unit terminals 5 and 13
- from lighting switch terminal 11.

And then, ground is also supplied to headlamp RH relay terminal 1 from the headlamp battery saver control unit. The headlamp RH relay is then energized.

Fog Lamp Operation

NAEL0027S0502

The fog lamp switch is built into the combination switch. The lighting switch must be in the 2ND position and LOW ("B") position for fog lamp operation.
With the fog lamp switch in the ON position, ground is supplied

- to fog lamp relay terminal 2
- through the fog lamp switch and body grounds E13 and E41.

The fog lamp relay is energized and power is supplied

- from fog lamp relay terminal 5
- to terminal 1 of each fog lamp.

Ground is supplied to terminal 2 of each fog lamp through body grounds E13 and E41.
With power and ground supplied, the fog lamps illuminate.

Battery Saver Control

NAEL0027S0503

When the ignition switch is turned from ON (or START) to OFF (or ACC) positions while fog lamps are illuminated, the RAP signal is supplied to terminal 10 of the headlamp battery saver control unit from smart entrance control unit terminal 5.
After counting 45 seconds by the RAP signal from the smart entrance control unit to headlamp battery saver control unit, the ground supply to terminal 1 of headlamp RH relay from headlamp battery saver control unit teminal 8 is terminated.
Then fog lamps are turned to off.
Fog lamps are turned off when driver or passenger side door is opened even if 45 seconds have not passed

System Description (Cont'd)

after the ignition switch is turned from ON (or START) to OFF (or ACC) positions while fog lamps are illuminated.
When the lighting switch is turned from OFF to 2ND after fog lamps are turned off by the battery saver control, ground is supplied

- to headlamp battery saver control unit terminals 5 and 13 from lighting switch terminal 11, and
- to headlamp RH relay terminal 1 from headlamp battery saver control unit terminal 8.

Then the fog lamps illuminate again.

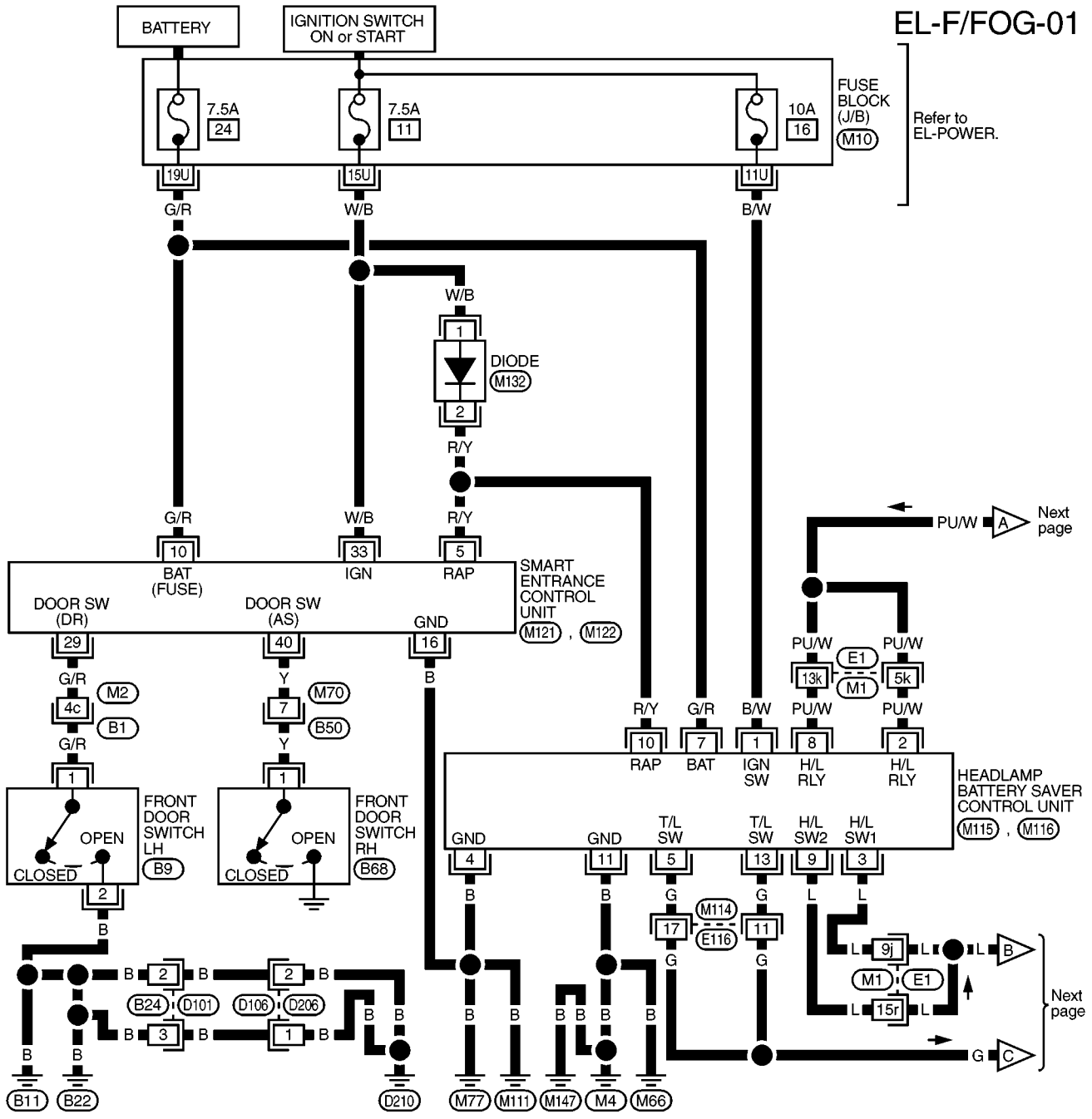
NOTE:
F**or Trouble Diagnoses for battery saver control, refer to "HEADLAMP (FOR USA)" (EL-49).**

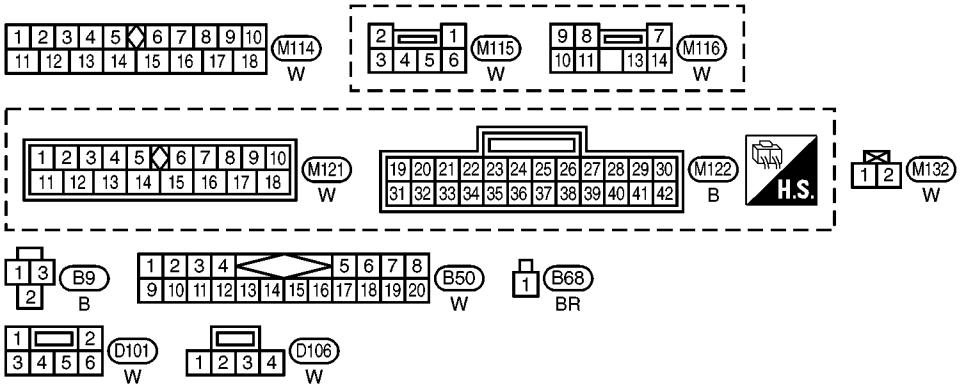
Wiring Diagram — F/FOG —

NAEL0028

WITH AUTO LIGHT SYSTEM

NAEL0028S01

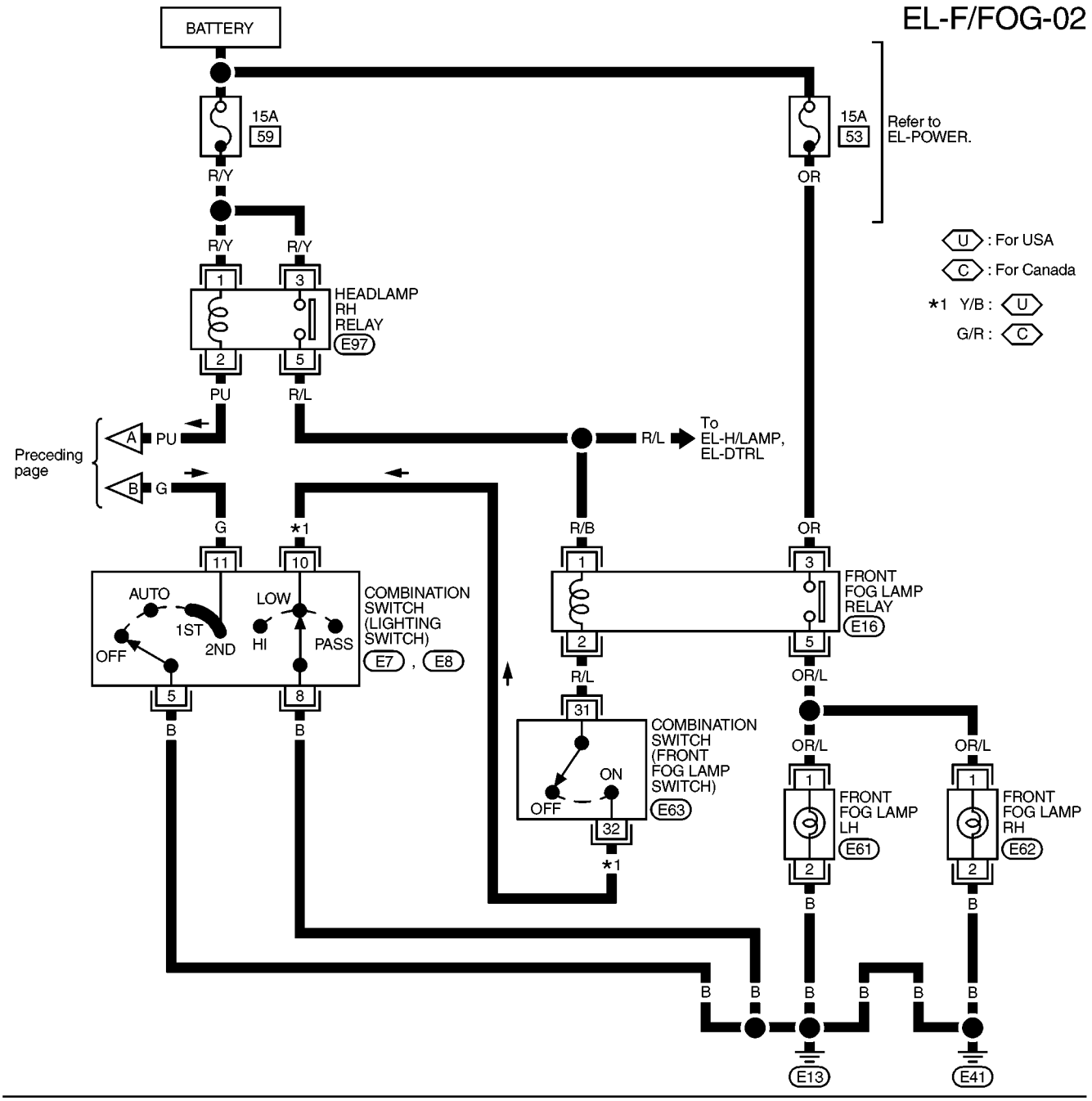


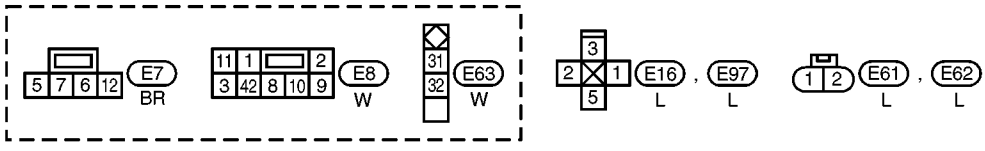


REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK-JUNCTION BOX (J/B)

MEL779L

Wiring Diagram — F/FOG — (Cont'd)

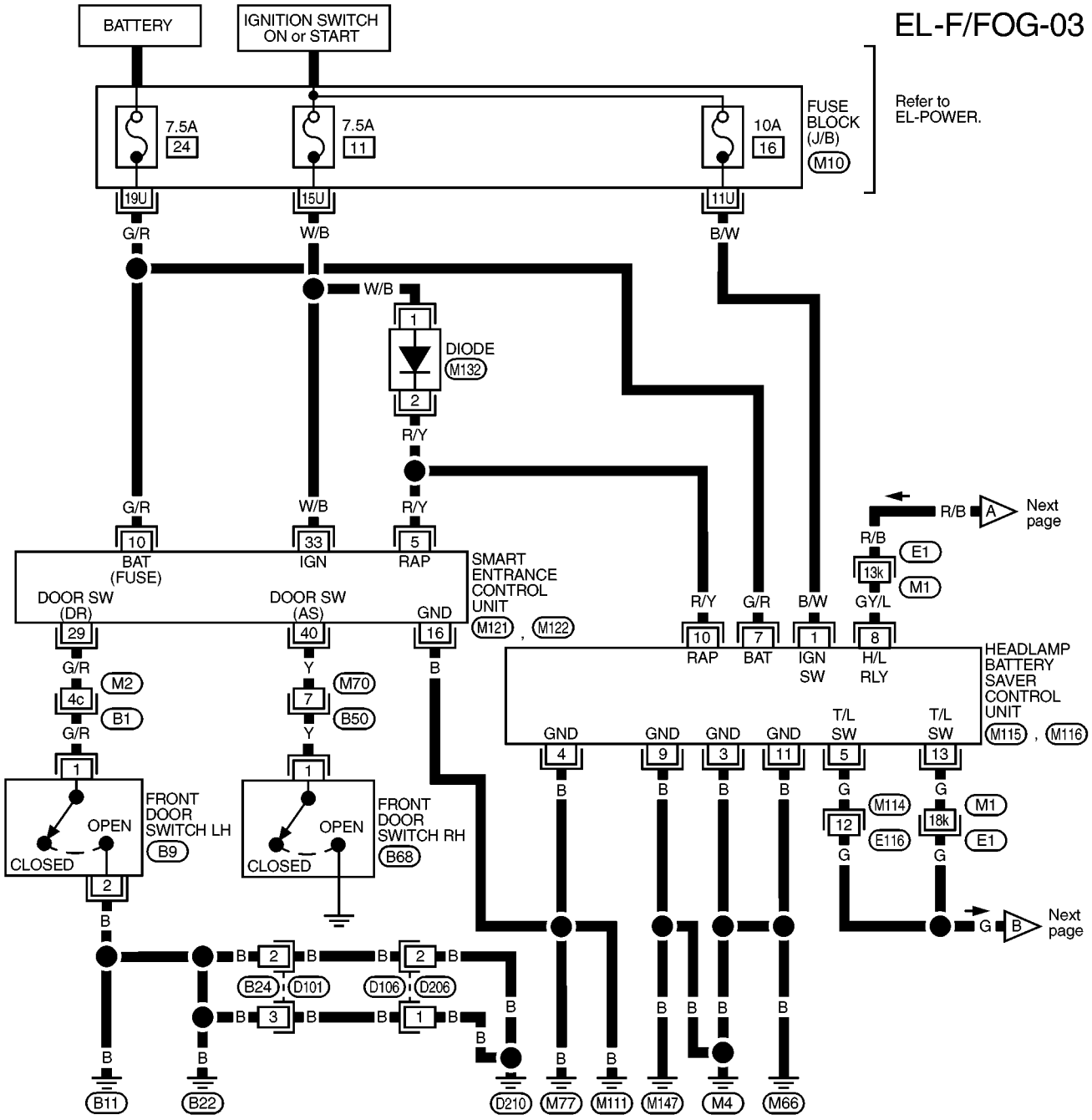


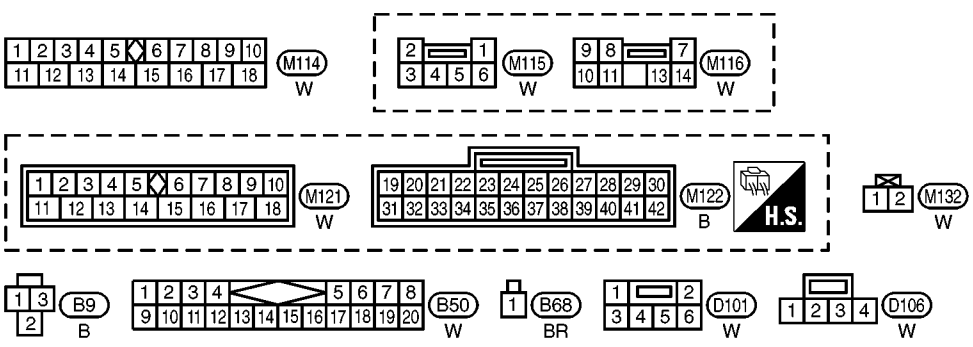


MEL007M

WITHOUT AUTO LIGHT SYSTEM

NAEL0028S02





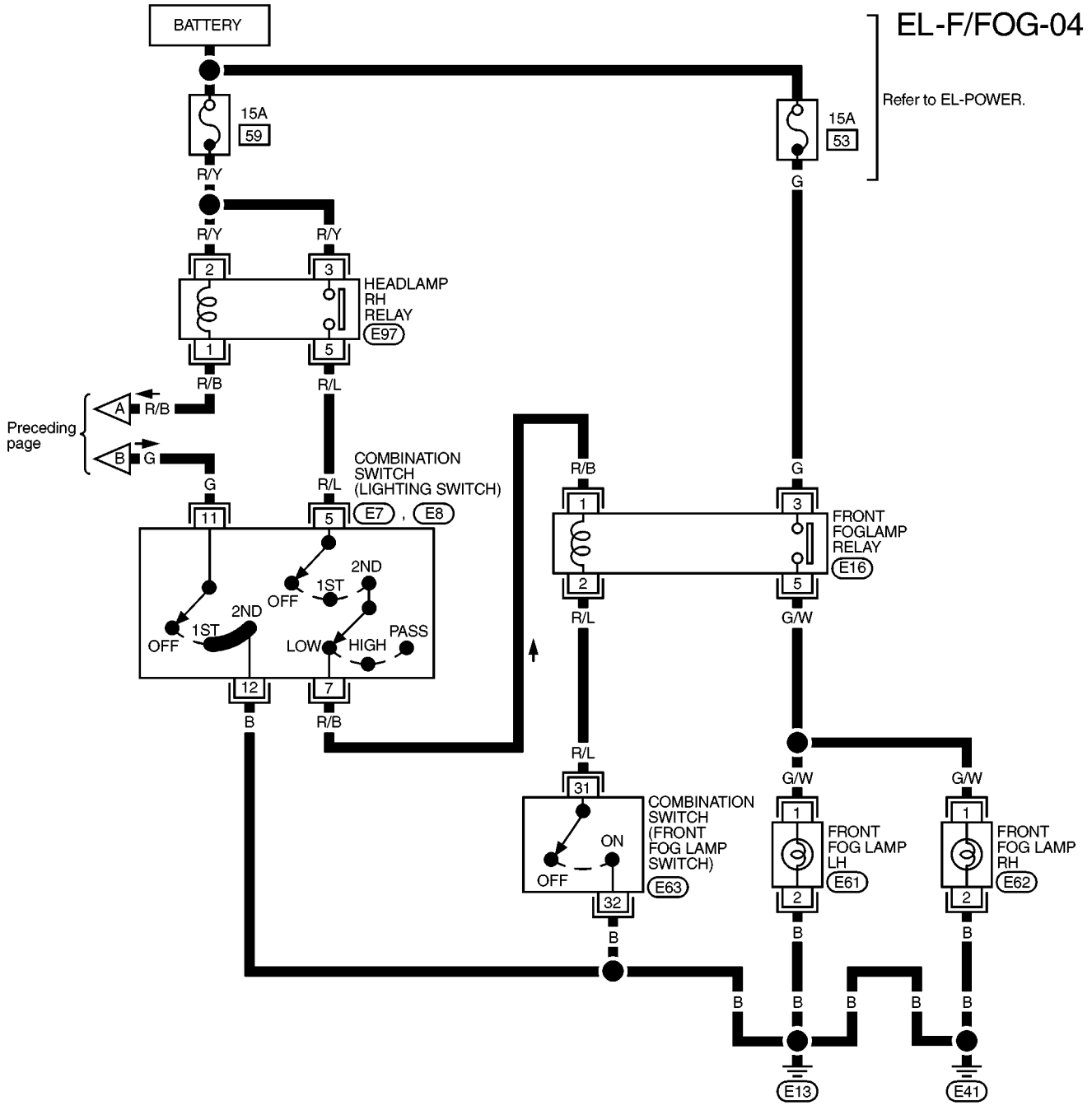
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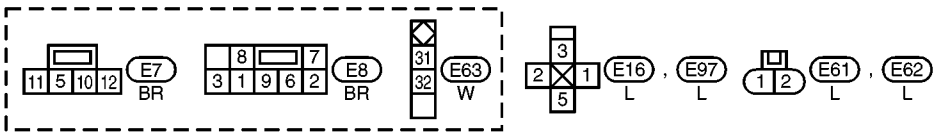
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)

M10 -FUSE BLOCK- JUNCTION BOX (J/B)

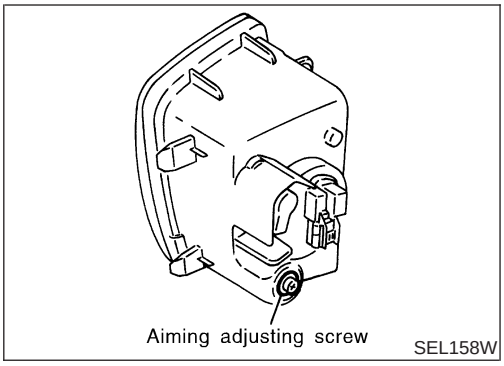
MEL008M

Wiring Diagram — F/FOG — (Cont'd)





MEL009M



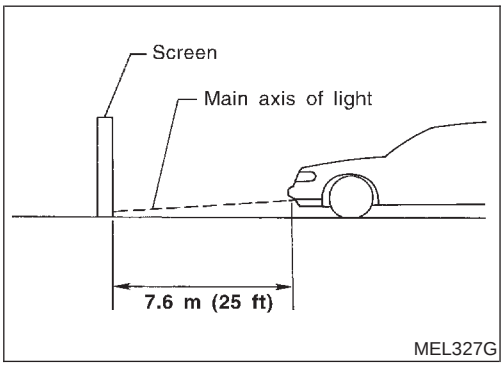
Aiming Adjustment

NAEL0029

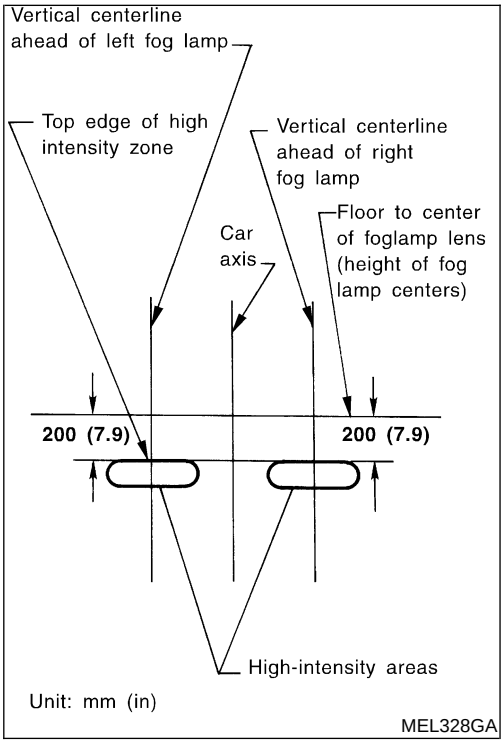
Before performing aiming adjustment, make sure of the following.

1) Keep all tires inflated to correct pressure.
2) Place vehicle on level ground.
3) See that vehicle is unloaded (except for full levels of coolant, engine oil and fuel, and spare tire, jack, and tools). Have the driver or equivalent weight placed in driver's seat.

Adjust aiming in the vertical direction by turning the adjusting screw.



1. Set the distance between the screen and the center of the fog lamp lens as shown at left.
2. Turn front fog lamps ON.



3. Adjust front fog lamps so that the top edge of the high intensity zone is 200 mm (7.9 in) below the height of the fog lamp centers as shown at left.

- When performing adjustment, if necessary, cover the headlamps and opposite fog lamp.

System Description

NAEL0030

TURN SIGNAL OPERATION

NAEL0030S01

With the hazard switch in the OFF position and the ignition switch in the ON or START position, power is supplied

- through 7.5A fuse [No. 12, located in the fuse block (J/B)]
- to hazard switch terminal 2
- through terminal 1 of the hazard switch
- to combination flasher unit terminal 1
- through terminal 3 of the combination flasher unit
- to turn signal switch terminal 1.

Ground is supplied to combination flasher unit terminal 2 through body grounds M4, M66 and M147.

LH Turn

NAEL0030S0101

When the turn signal switch is moved to the LH position, power is supplied from turn signal switch terminal 3

- to front turn signal lamp LH terminal 3
- to combination meter terminal 25
- to rear combination lamp LH terminal 5.

Ground is supplied to the turn signal lamp LH terminal 1 through body grounds E13 and E41.
Ground is supplied to the rear combination lamp LH terminal 6 through body grounds B11, B22 and D210.
Ground is supplied to combination meter terminal 30 through body grounds M4, M66 and M147.
With power and ground supplied, the combination flasher unit controls the flashing of the LH turn signal lamps.

RH Turn

NAEL0030S0102

When the turn signal switch is moved to the RH position, power is supplied from turn signal switch terminal 2

- to front turn signal lamp RH terminal 3
- to combination meter terminal 29
- to rear combination lamp RH terminal 5.

Ground is supplied to turn signal terminal 3 through body grounds E13 and E41.
Ground is supplied to the rear combination lamp RH terminal 6 through body grounds B55 and B75.
Ground is supplied to combination meter terminal 30 through body grounds M4, M66 and M147.
With power and ground supplied, the combination flasher unit controls the flashing of the RH turn signal lamps.

HAZARD LAMP OPERATION

NAEL0030S02

Power is supplied at all times

- to hazard switch terminal 3
- through 15A fuse [No. 20, located in the fuse block (J/B)].

With the hazard switch in the ON position, power is supplied

- through terminal 1 of the hazard switch
- to combination flasher unit terminal 1
- through terminal 3 of the combination flasher unit
- to hazard switch terminal 4.

Ground is supplied

- to combination flasher unit terminal 2
- through body grounds M4, M66 and M147.

Power is supplied

- through terminal 5 of the hazard switch
- to front turn signal lamp LH terminal 3
- combination meter terminal 25
- rear combination lamp LH terminal 5, and
- through terminal 6 of the hazard switch
- to front turn signal lamp RH terminal 3
- combination meter terminal 29
- rear combination lamp RH terminal 5.

Ground is supplied to terminal 3 of each front turn signal lamp through body grounds E13 and E41.
Ground is supplied to terminal 6 of the rear combination lamp LH through body grounds B11, B22 and D210.
Ground is supplied to terminal 6 of the rear combination lamp RH through body grounds B55 and B75.
Ground is supplied to combination meter terminal 30 through body grounds M4, M66 and M147.
With power and ground supplied, the combination flasher unit controls the flashing of the hazard warning lamps.

MULTI-REMOTE CONTROL SYSTEM OPERATION

NAEL0030S03

Power is supplied at all times

- through 15A fuse [No. 20, located in the fuse block (J/B)]
- to multi-remote control relay terminals 1, 3 and 6.

Ground is supplied to multi-remote control relay terminal 2, when the multi-remote control system is triggered through the smart entrance control unit.
Refer to "MULTI-REMOTE CONTROL SYSTEM", EL-288.
The multi-remote control relay is energized.
Power is supplied through terminal 7 of the multi-remote control relay

- to front turn signal lamp LH terminal 2
- to combination meter terminal 25
- to rear combination lamp LH terminal 5.

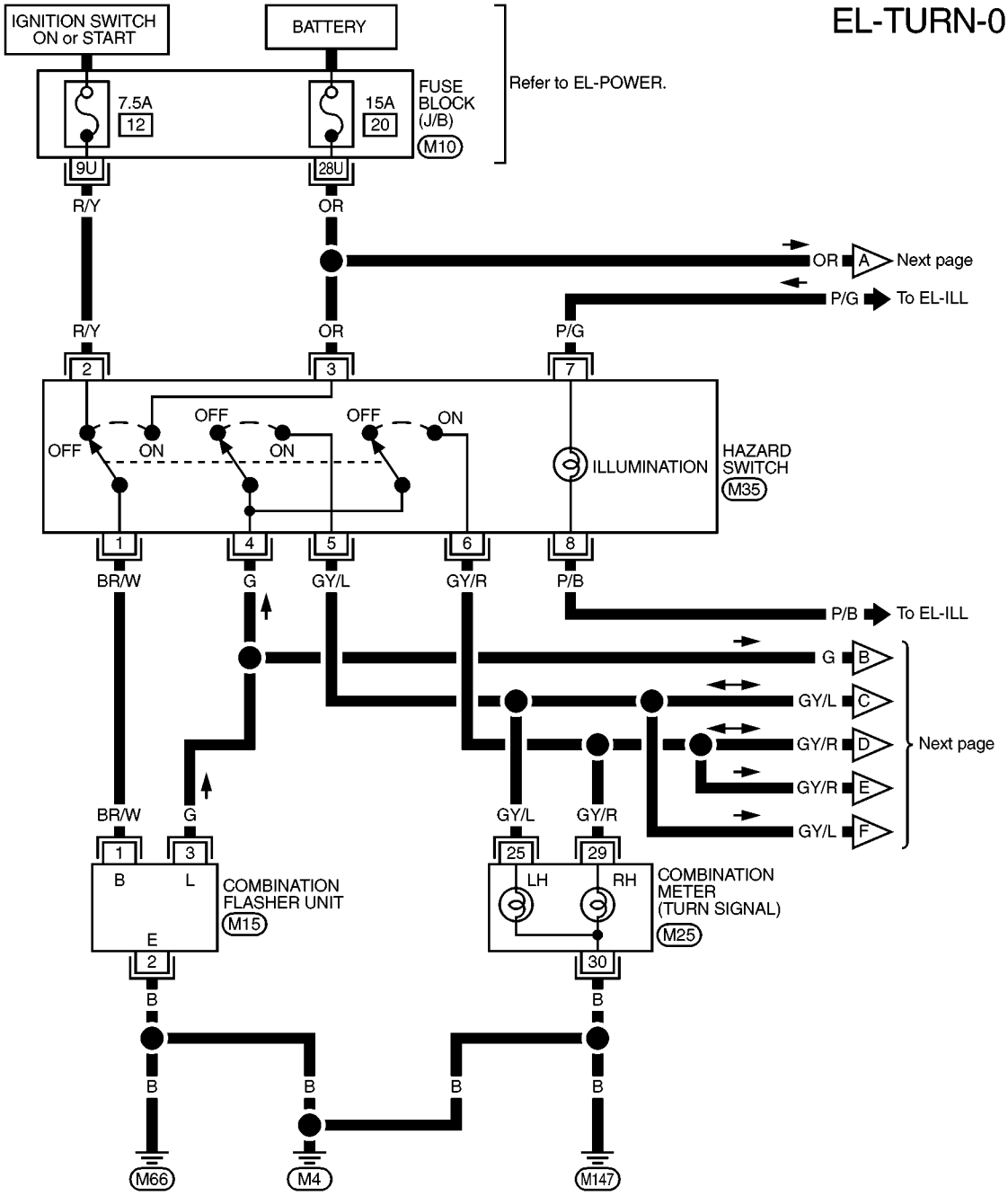
Power is supplied through terminal 5 of the multi-remote control relay

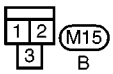
- to front turn signal lamp RH terminal 2
- to combination meter terminal 29
- to rear combination lamp RH terminal 5.

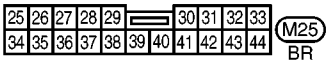
Ground is supplied to terminal 3 of each front turn signal lamp through body grounds E13 and E41.
Ground is supplied to terminal 6 of the rear combination lamp LH through body grounds B11, B22 and D210.
Ground is supplied to terminal 6 of the rear combination lamp RH through body grounds B55 and B75.
Ground is supplied to combination meter terminal 30 through body grounds M4, M66 and M147.
With power and ground supplied, the smart entrance control unit controls the flashing of the hazard warning lamps.

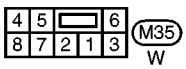
Wiring Diagram — TURN —

NAEL0032





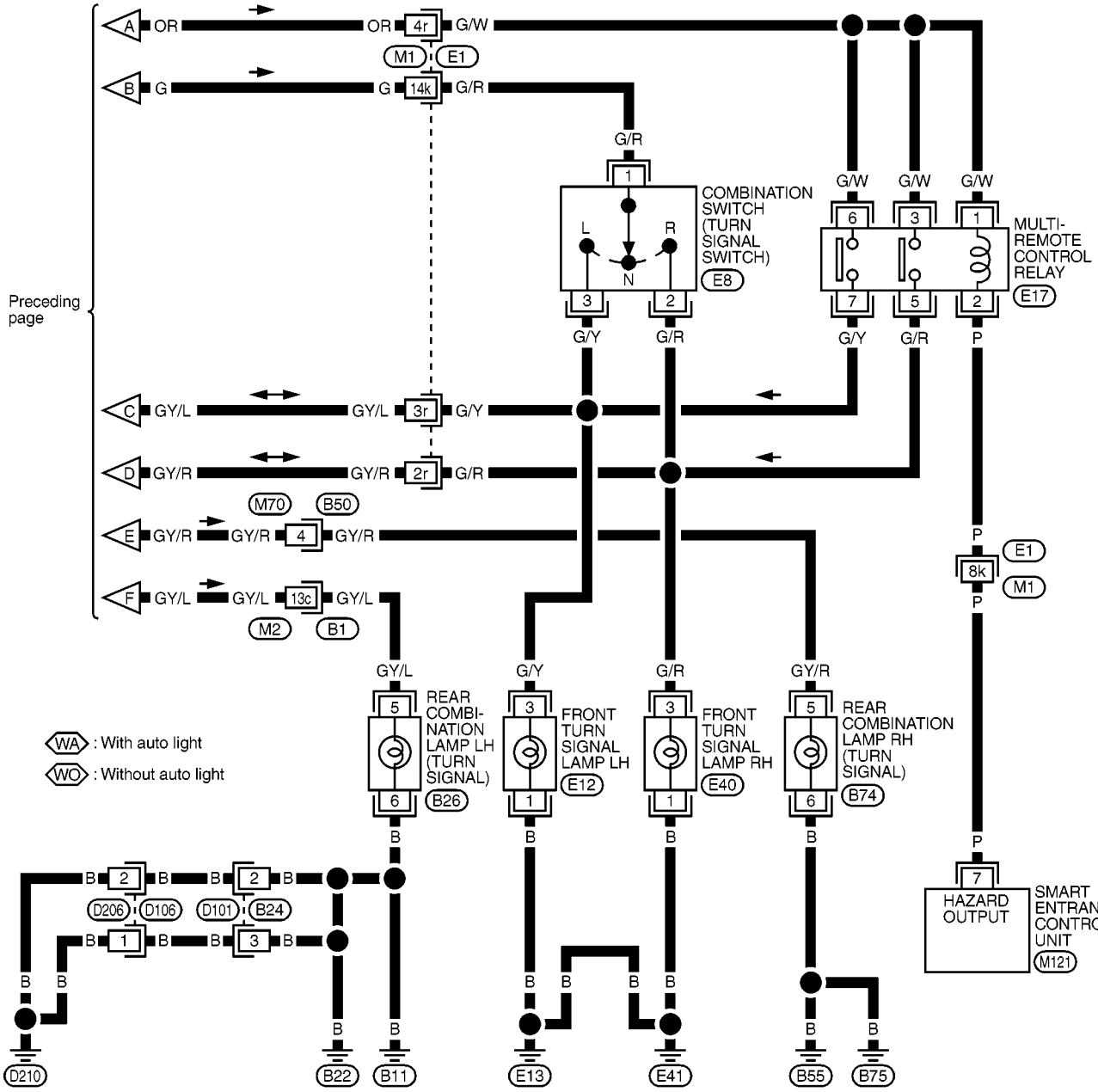


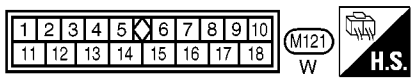


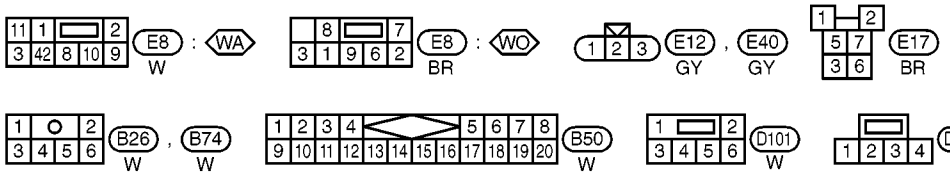
REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-JUNCTION BOX (J/B)

MEL010M

EL-TURN-02







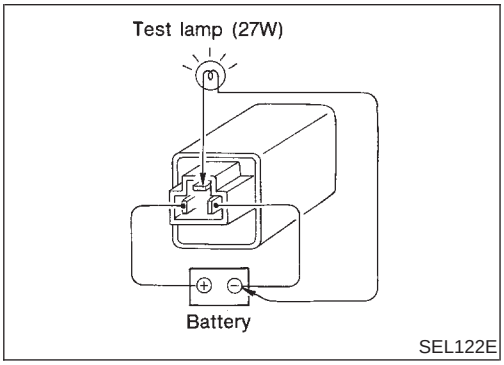
REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL011M

Trouble Diagnoses

NAEL0033

Symptom	Possible cause	Repair order
Turn signal and hazard warning lamps do not operate.	1. Hazard switch 2. Combination flasher unit 3. Open in combination flasher unit circuit	1. Check hazard switch. 2. Refer to combination flasher unit check. 3. Check wiring to combination flasher unit for open circuit.
Turn signal lamps do not operate but hazard warning lamps operate.	1. 7.5A fuse 2. Hazard switch 3. Combination switch (turn signal) 4. Open in combination switch (turn signal) circuit	1. Check 7.5A fuse [No. 12, located in fuse block (J/B)]. Turn ignition switch ON and verify battery positive voltage is present at terminal 2 of hazard switch. 2. Check hazard switch. 3. Check combination switch (turn signal). 4. Check the wire between combination flasher unit terminal 3 and combination switch (turn signal) terminal 1 for open circuit.
Hazard warning lamps do not operate but turn signal operate.	1. 15A fuse 2. Hazard switch 3. Open in hazard switch circuit	1. Check 15A fuse [No. 20, located in fuse block (J/B)]. Verify battery positive voltage is present at terminal 3 of hazard switch. 2. Check hazard switch. 3. Check the wire between combination flasher unit terminal 3 and hazard switch terminal 4 for open circuit.
Front turn signal lamp LH or RH does not operate.	1. Bulb 2. Grounds E13 and E41 3. Open in front turn signal lamp circuit	1. Check bulb. 2. Check grounds E13 and E41. 3. Check harness between front turn signal lamp and combination switch.
Rear combination lamp LH does not operate.	1. Bulb 2. Grounds B11, B22 and D210 3. Open in rear combination lamp LH circuit	1. Check bulb. 2. Check grounds B11, B22 and D210. 3. Check harness between rear combination lamp LH and hazard switch.
Rear combination lamp RH does not operate.	1. Bulb 2. Grounds B55 and B75 3. Open in rear combination lamp RH circuit	1. Check bulb. 2. Check grounds B55 and B75. 3. Check harness between rear combination lamp RH and hazard switch.
LH and RH turn indicators do not operate.	1. Ground	1. Check grounds M4, M66 and M147.
LH or RH turn indicator does not operate.	1. Bulb 2. Open in turn indicator circuit	1. Check bulb in combination meter. 2. Check harness between combination meter and hazard switch.



SEL122E

Electrical Components Inspection

NAEL0034

COMBINATION FLASHER UNIT CHECK

NAEL0034S01

- Before checking, ensure that bulbs meet specifications.
- Connect a battery and test lamp to the combination flasher unit, as shown. Combination flasher unit is properly functioning if it blinks when power is supplied to the circuit.

System Description

NAEL0035

The illumination lamp operation is controlled by the lighting switch which is built into the combination switch and headlamp battery saver control unit. The battery saver system is controlled by the headlamp battery saver control unit and smart entrance control unit.
Power is supplied at all times

- to tail lamp relay terminals 2 and 3
- through 10A fuse (No. 61, located in the fuse and fusible link box), and
- to headlamp battery saver control unit terminal 7, and
- to smart entrance control unit terminal 10
- through 7.5A fuse [No. 24, located in the fuse block (J/B)].

When ignition switch is in ON or START position, power is supplied

- to headlamp battery saver control unit terminal 1
- through 10A fuse [No. 16, located in the fuse block (J/B)], and
- to headlamp battery saver control unit terminal 10, and
- to smart entrance control unit terminal 33
- through 7.5A fuse [No. 11, located in the fuse block (J/B)].

Ground is supplied to headlamp battery saver control unit terminals 4 and 11.

LIGHTING OPERATION BY LIGHTING SWITCH

NAEL0035S01

When lighting switch is 1ST (or 2ND) position, ground is supplied

- to tail lamp relay terminal 1 from headlamp battery saver control unit terminals 6 and 14
- through headlamp battery saver control unit terminals 5 and 13, and
- through body grounds E13 and E41.

Tail lamp relay is then energized and illumination lamps illuminate.
The lighting switch must be in the 1ST or 2ND position for illumination.

LIGHTING OPERATION BY AUTO LIGHT CONTROL SYSTEM

NAEL0035S03

When auto light operation is operated, ground is supplied

- to tail lamp relay terminal 1 from headlamp battery saver control unit terminals 6 and 14
- through headlamp battery saver control unit terminals 5 and 13, and
- through auto light control unit terminal 7.

Tail lamp relay is then energized and the illumination lamps illuminate.
The illumination control switch that controls the amount of current to the illumination system. As the amount of current increases, the illumination becomes brighter.
The following chart shows the power and ground connector terminals for the components included in the illumination system.

Component	Connector No.	Power terminal	Ground terminal
Illumination control switch	M19	1	3
A/C switch	M45	2	1
4WD shift switch	M141	7	8
Ashtray	M54	1	2
A/T indicator	B59	3	4
Cigarette lighter	M57	3	4
Audio unit	M48	8	7
CD player	M92, M93	3	5
Compass and thermometer	R4	5	2
Hazard switch	M35	7	8
Rear window defogger switch	M36	5	6
CD auto changer	M125	2	9

System Description (Cont'd)

Component	Connector No.	Power terminal	Ground terminal
Headlamp aiming switch	M16	3	4
Power window main switch	D6	16	18
Front power window switch RH	D36	10	17
A/C auto amp.	M102	24	25
Clock	M39	3	4
Globe box lamp	M30	1	2

The ground for all of the components except for compass, glove box lamp and ashtray are controlled through terminals 2 and 3 of the illumination control switch and body grounds M77 and M111.

BATTERY SAVER CONTROL

NAEL0035S02

When the ignition switch is turned from ON (or START) to OFF (or ACC) positions while illumination lamps are illuminated, the RAP signal is supplied to terminal 10 of the headlamp battery saver control unit from smart entrance control unit terminal 5.
After counting 45 seconds by the RAP signal from the smart entrance control unit to headlamp battery saver control unit, the ground supply to terminal 1 of the tail lamp relay from headlamp battery saver control unit teminals 6 and 14 is terminated.
Then illumination lamps are turned off.
Illumination lamps are turned off when driver or passenger side door is opened even if 45 seconds have not passed after the ignition switch is turned from ON (or START) to OFF (or ACC) positions while illumination lamps are illuminated.
When the lighting switch is turned from OFF to 1ST (or 2ND) after illumination lamps are turned off by the battery saver control, ground is supplied

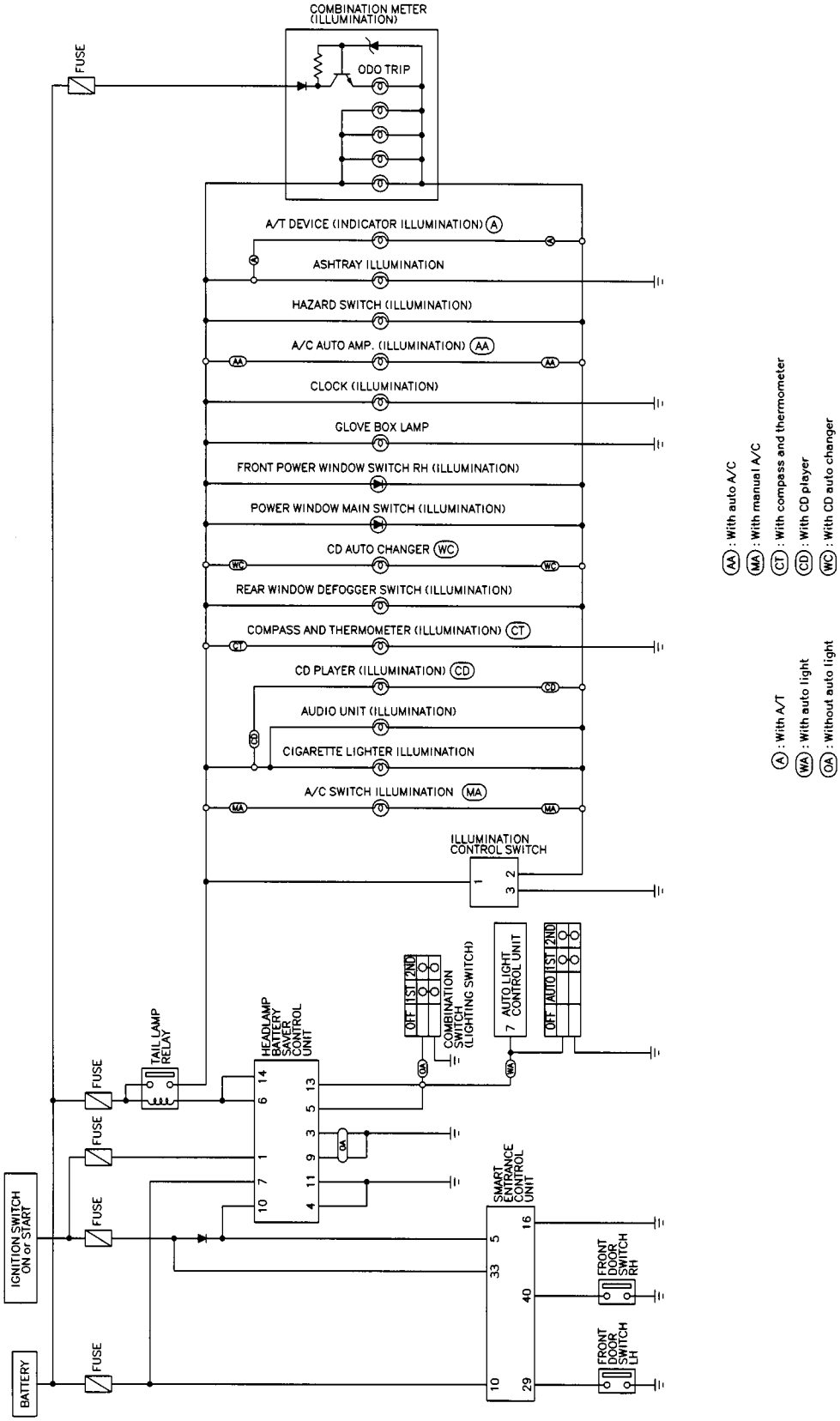
- to headlamp battery saver control unit terminals 5 and 13 from lighting switch terminal 11, and
- to tail lamp relay terminal 1 from headlamp battery saver control unit terminals 6 and 14.

Then illumination lamps illuminate again.

NOTE:
For Trouble Diagnoses for battery saver control, refer to "PARKING, LICENSE AND TAIL LAMPS" (EL-82).

Schematic

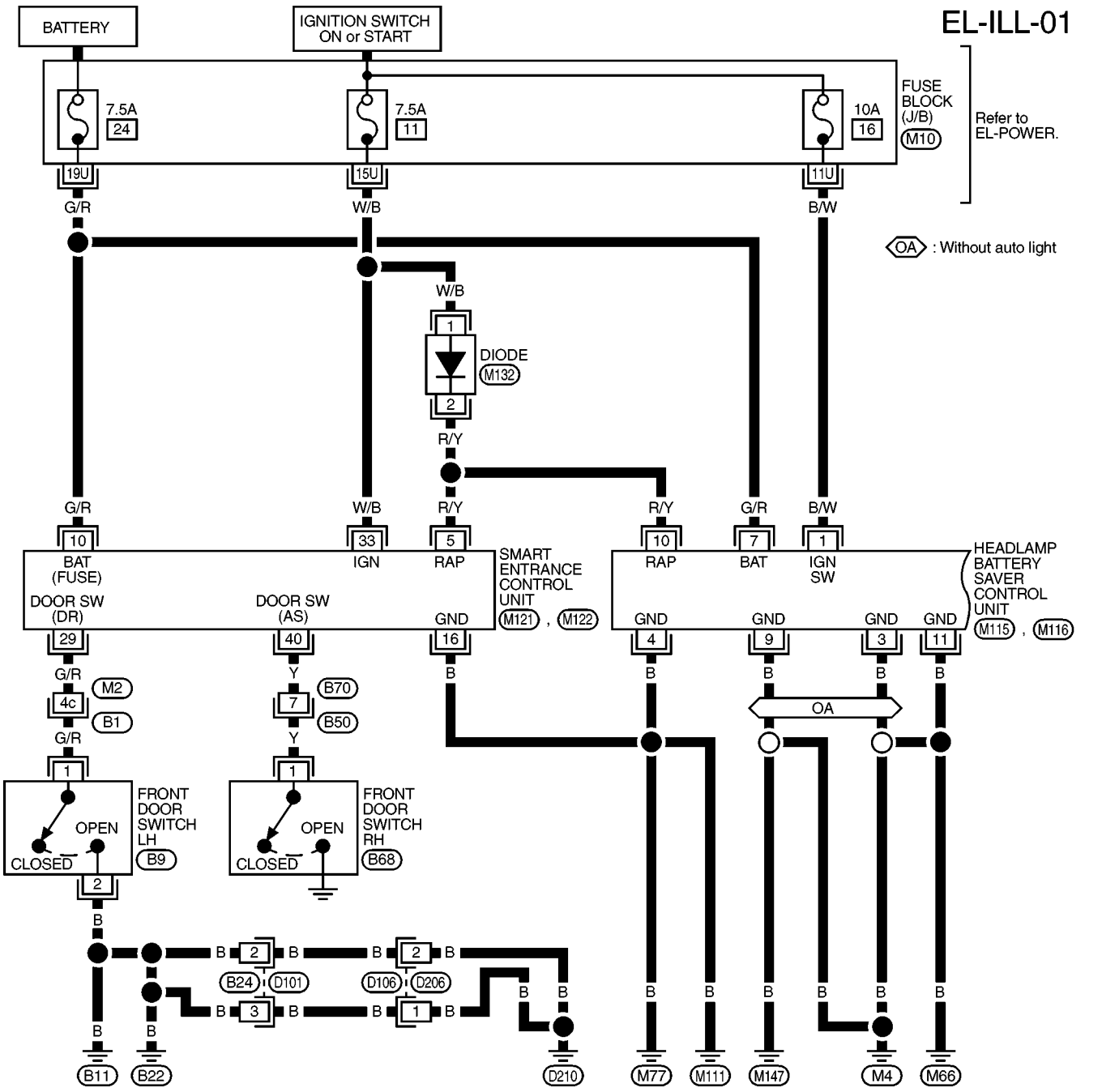
NAEL0036

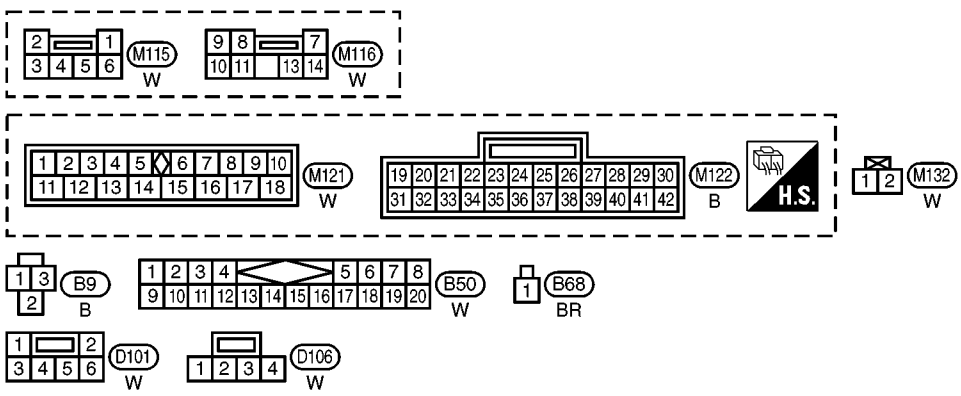


MEL012M

Wiring Diagram — ILL —

NAEL0037





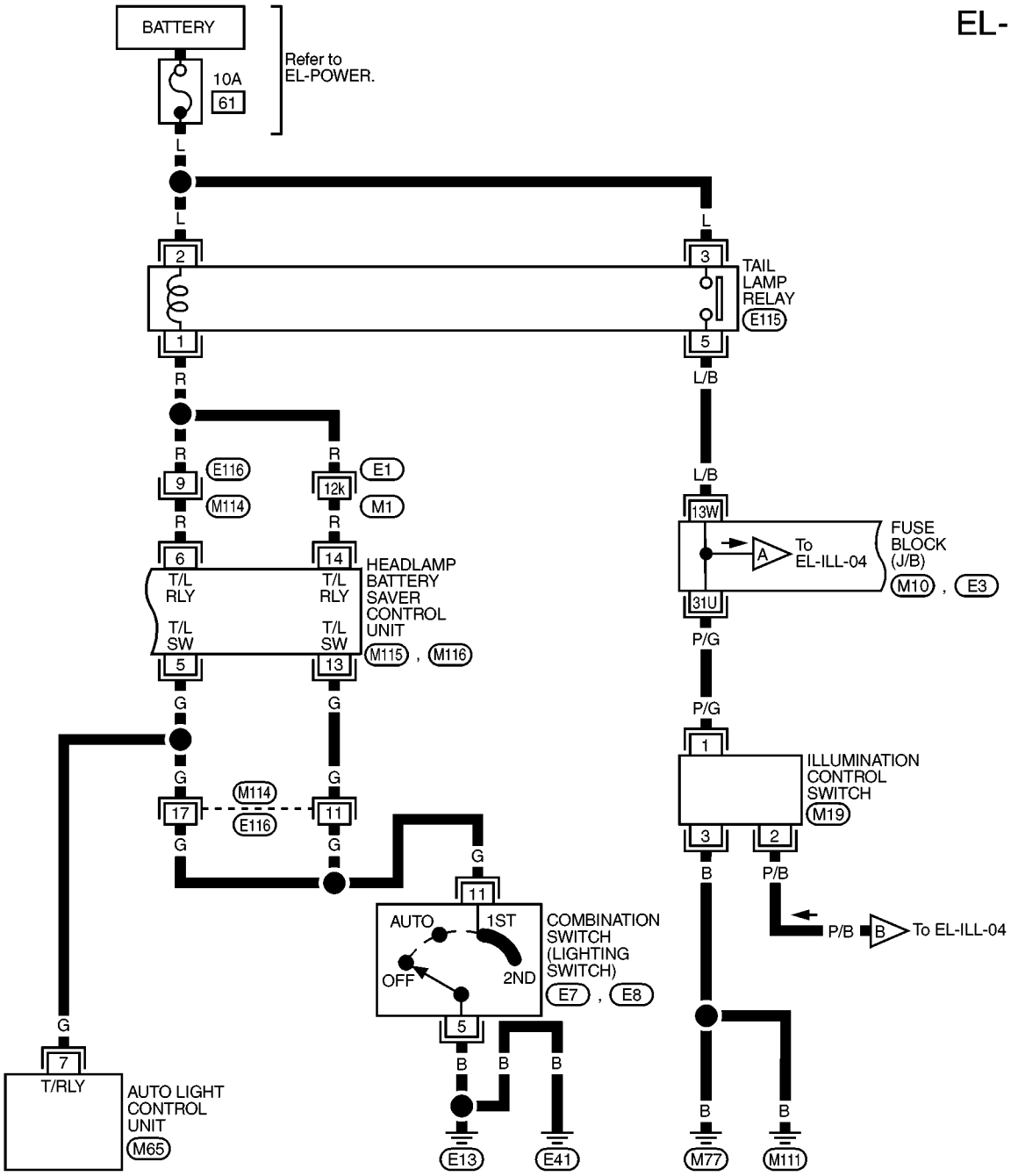
REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK-JUNCTION BOX (J/B)

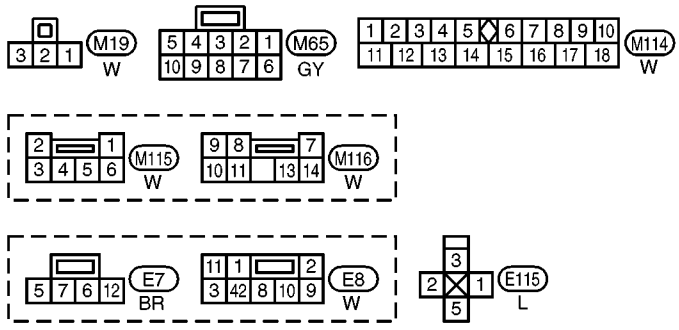
MEL013M

WITH AUTO LIGHT SYSTEM

NAEL0037S01

EL-ILL-02





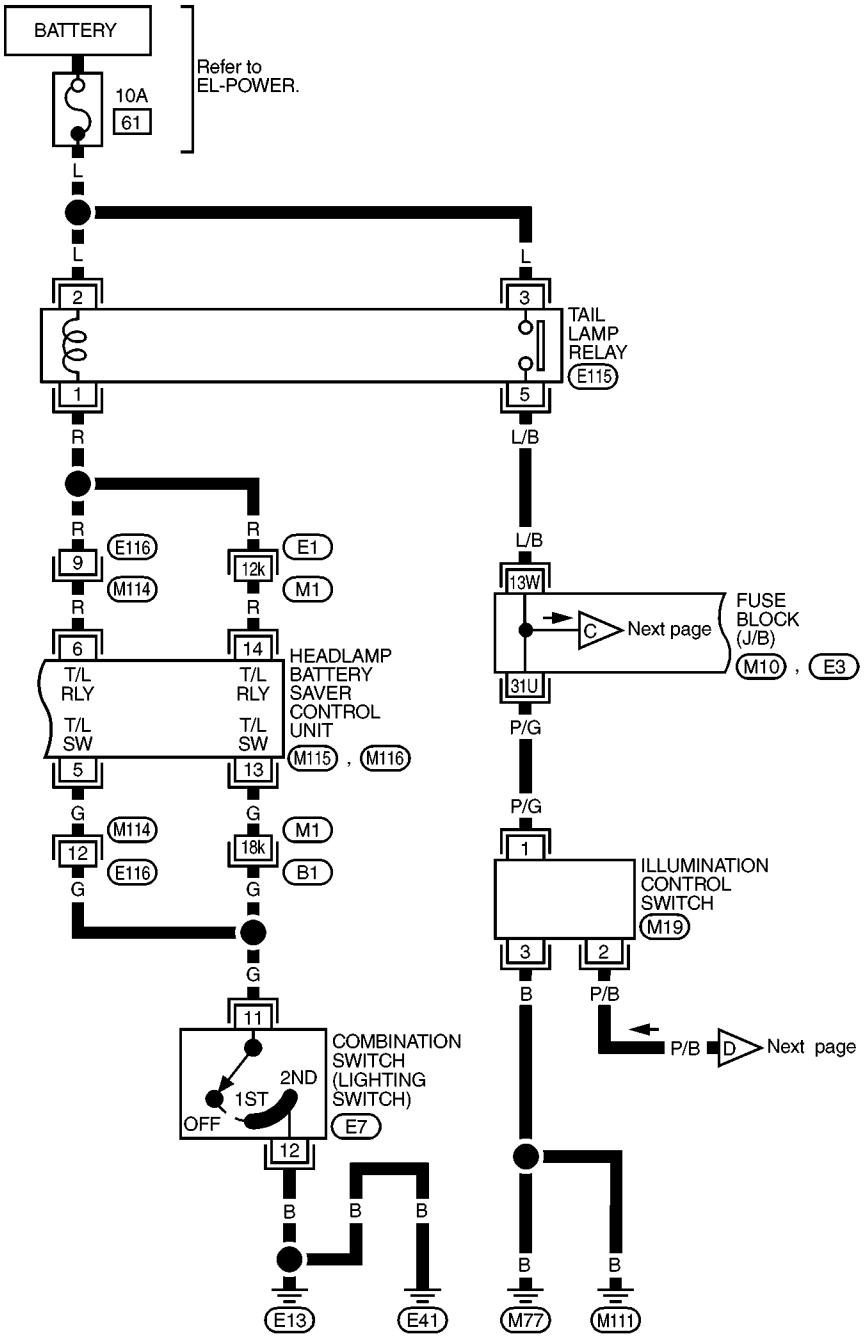
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 , E3 -FUSE BLOCK-JUNCTION BOX (J/B)

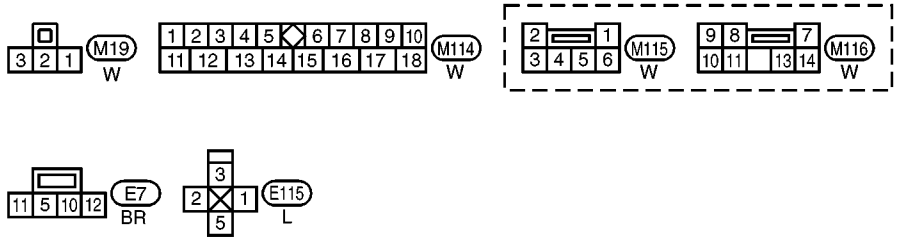
MEL014M

WITHOUT AUTO LIGHT SYSTEM

NAEL0037S02

EL-ILL-03



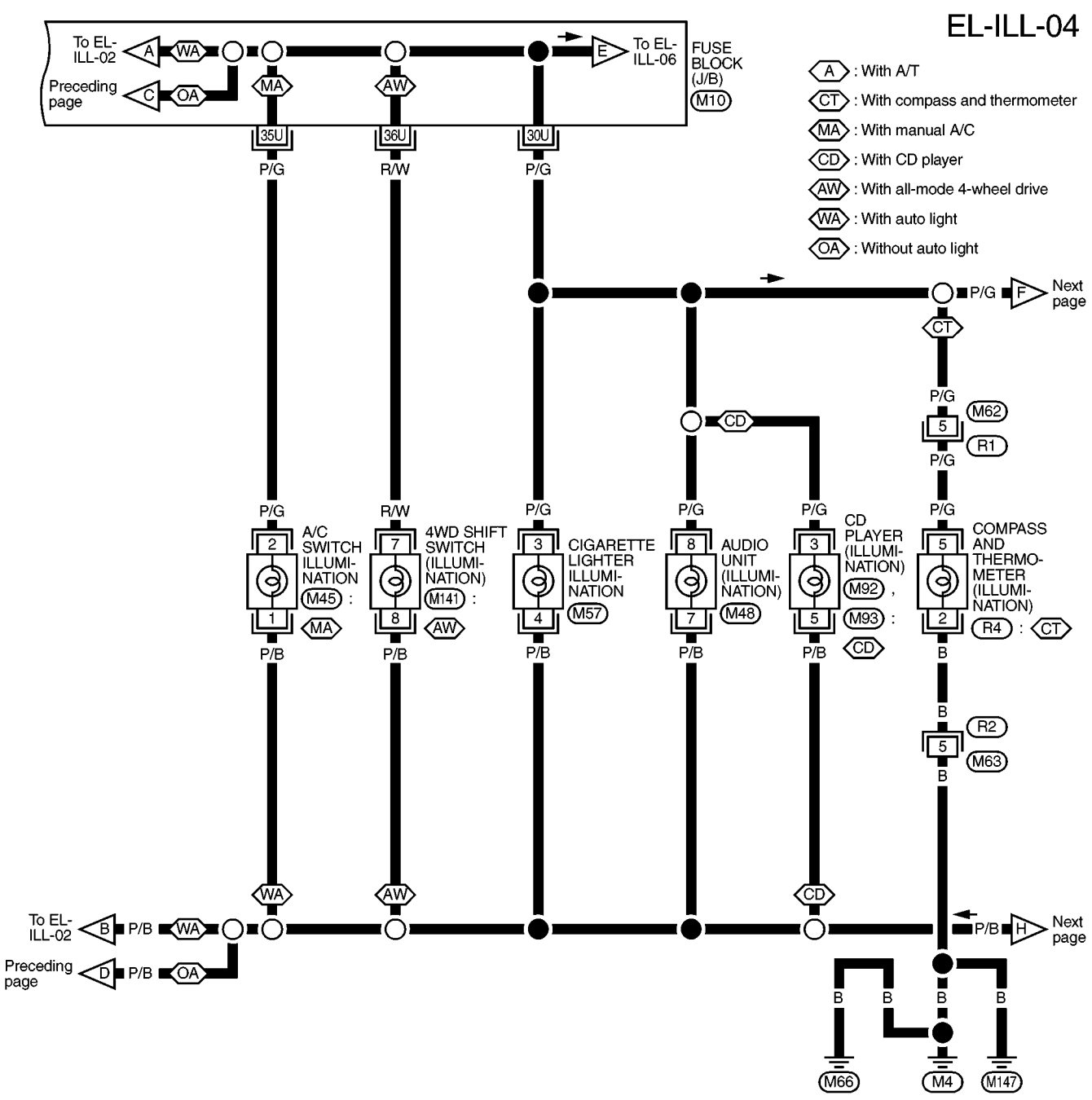


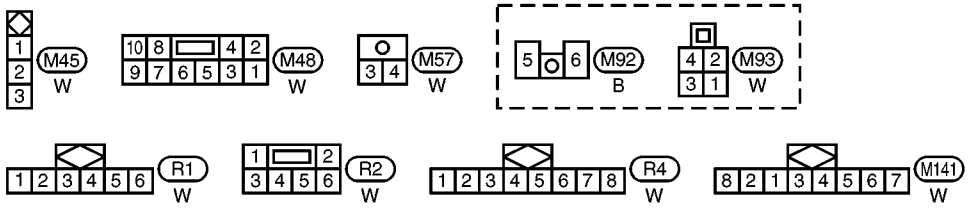
REFER TO THE FOLLOWING.

E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)

M10 , E3 -FUSE BLOCK-JUNCTION BOX (J/B)

MEL015M

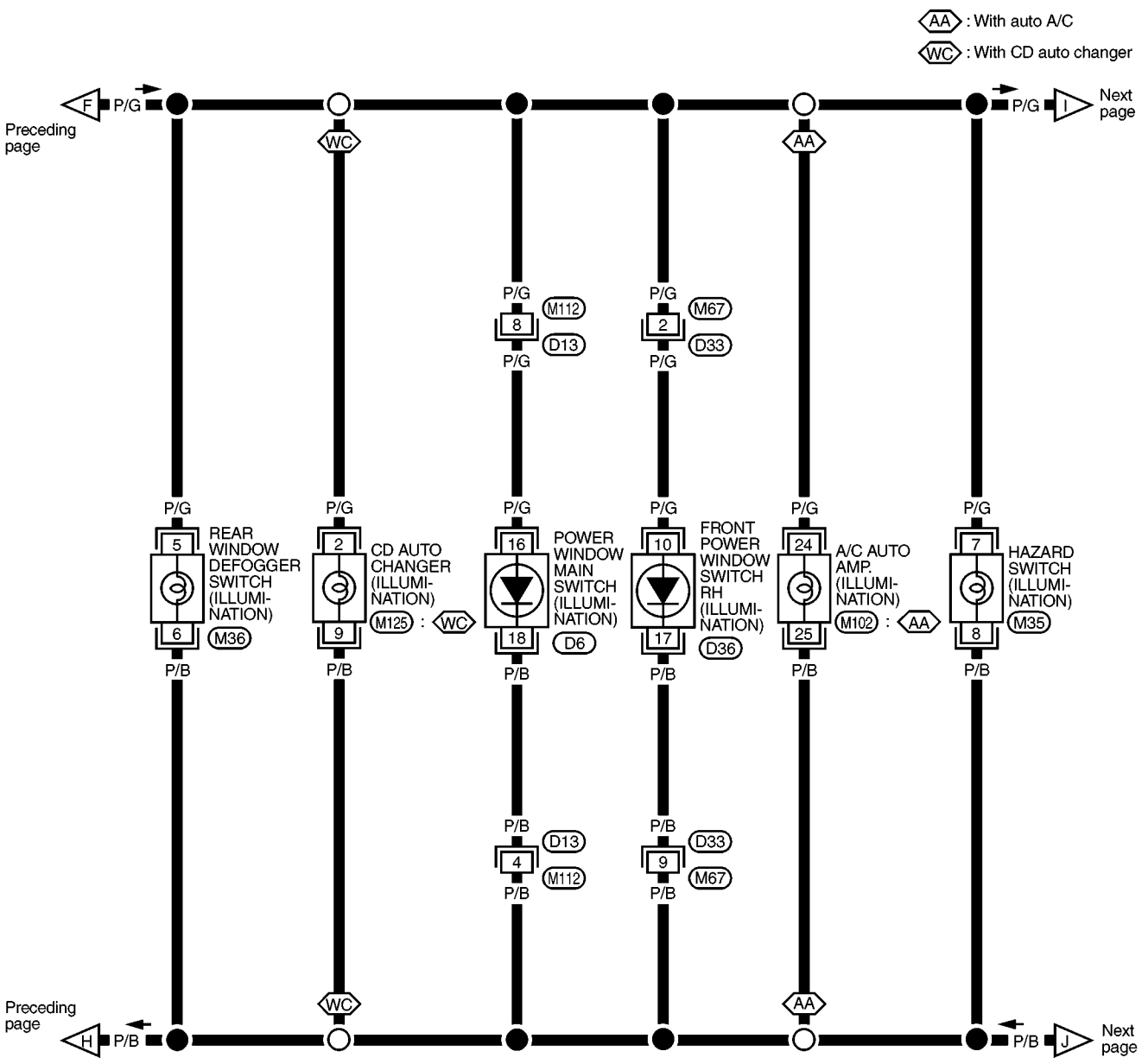


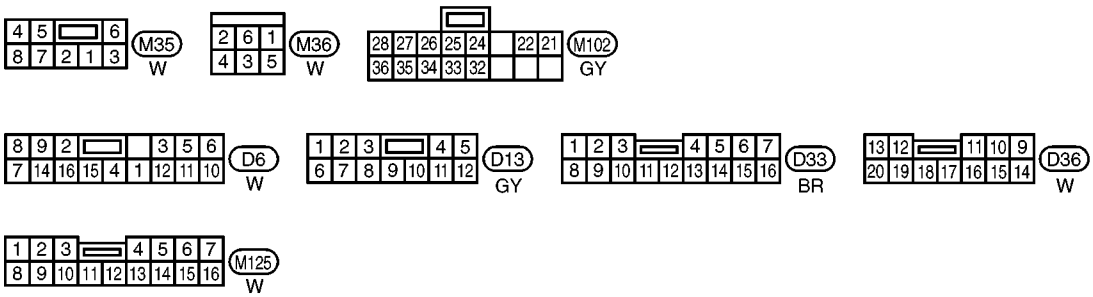


REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-JUNCTION BOX (J/B)

MEL016M

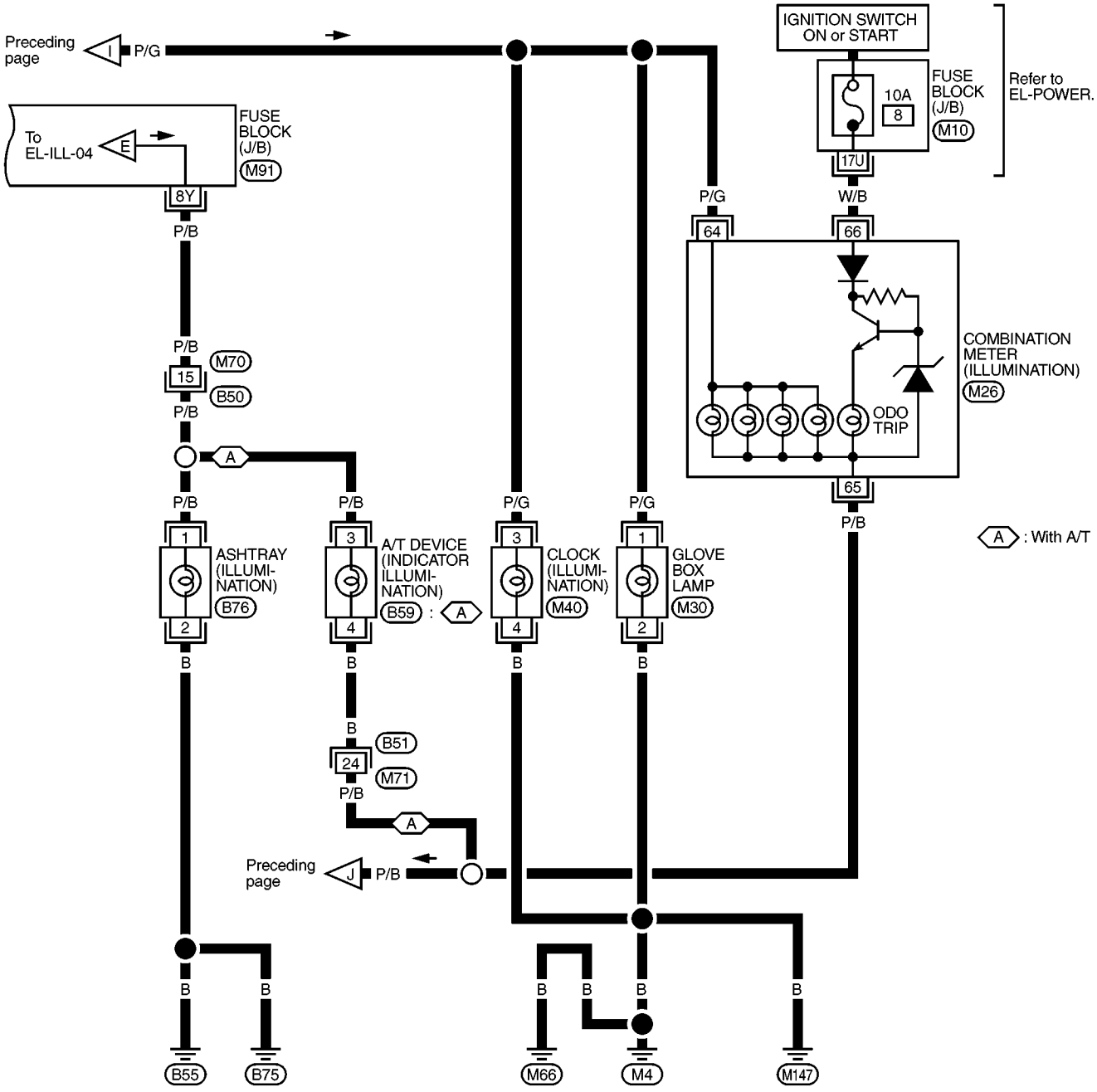
EL-ILL-05

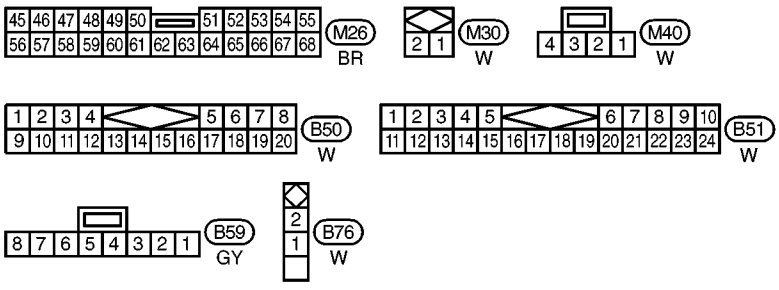




MEL017M

EL-ILL-06





REFER TO THE FOLLOWING.
M10 , M91 -FUSE BLOCK-JUNCTION BOX (J/B)

MEL018M

System Description

NAEL0038

POWER SUPPLY AND GROUND

NAEL0038S06

Power is supplied at all times:
- through 7.5A fuse [No. 24, located in the fuse block (J/B)]
- to key switch terminal 2 and
- to smart entrance control unit terminal 10.

When the key is removed from ignition key cylinder, power is interrupted:
- through key switch terminal 1
- to smart entrance control unit terminal 32.

With the ignition key switch in the ON or START position, power is supplied:
- through 7.5A fuse [No. 11, located in the fuse block (J/B)]
- to smart entrance control unit terminal 33.

Ground is supplied:
- to smart entrance control unit terminal 16
- through body grounds terminals M77 and M111.

When the front driver side door is opened, ground is supplied:
- through body grounds B11, B22 and D210
- to front door switch (LH) terminal 2
- from front door switch (LH) terminal 1
- to smart entrance control unit terminal 29.

When the front passenger side door is opened, ground is supplied:
- through case ground of front door switch (RH)
- from front door switch (RH) terminal 1
- to smart entrance control unit terminal 40.

When any other door (except front door) is opened, ground is supplied to smart entrance control unit terminal 28 in the same manner as the front door switch (front passenger side).
When the front driver side door is unlocked, the smart entrance control unit receives a ground signal:
- through body grounds terminals M77 and M111
- to front door lock actuator (driver side unlock sensor) terminal 2
- from front door lock actuator (driver side unlock sensor) terminal 4
- to smart entrance control unit terminal 36.

When a signal, or combination of signals is received by the smart entrance control unit, ground is supplied:
- through smart entrance control unit terminal 8
- to interior lamp terminal 2.

With power and ground supplied, the interior lamp illuminates.

SWITCH OPERATION

NAEL0038S07

When interior lamp switch is ON, ground is supplied:
- through case grounds of interior lamp
- to interior lamp.

And power is supplied:
- to interior lamp terminal 1
- from smart entrance control unit terminal 17.

When spot lamp (LH and/or RH) is ON, ground is supplied:
- through body grounds M4, M66 and M147
- to spot lamp terminal 2.

And power is supplied:
- to spot lamp terminal 1
- from smart entrance control unit terminal 17.

When vanity mirror illumination (LH and/or RH) is ON, ground is supplied:
- through body grounds M4, M66 and M147
- to vanity mirror illuminations (LH and RH) terminals 2.

And power is supplied:

- to vanity mirror illuminations (LH and RH) terminals 1
- from smart entrance control unit terminal 17.

With power and ground supplied, interior lamps turn ON.

INTERIOR LAMP TIMER OPERATION

NAEL0038S08

When interior lamp switch is in the "DOOR" position, the smart entrance control unit keeps the interior lamp illuminated for about 30 seconds when:

- unlock signal is supplied from driver's door unlock sensor while all doors are closed and key is removed from ignition key cylinder
- unlock signal is supplied from multi-remote controller while all doors are closed and driver's door is locked
- key is removed from ignition key cylinder while all doors are closed
- driver's door is opened and then closed while key is removed from the iginition key cylinder. (However, if the driver's door is closed with the key insered in the ignition key cylinder after the driver's door is opened with the key removed, the timer is operated.)

The timer is canceled when:

- driver's door is locked,
- driver's door is opened, or
- ignition switch is turned ON.

ON-OFF CONTROL

NAEL0038S09

When the driver side door, front passenger door, rear LH, RH door or back door is opened, the interior room lamp turns on while the interior room lamp switch is in the "DOOR" position.

BATTERY SAVER

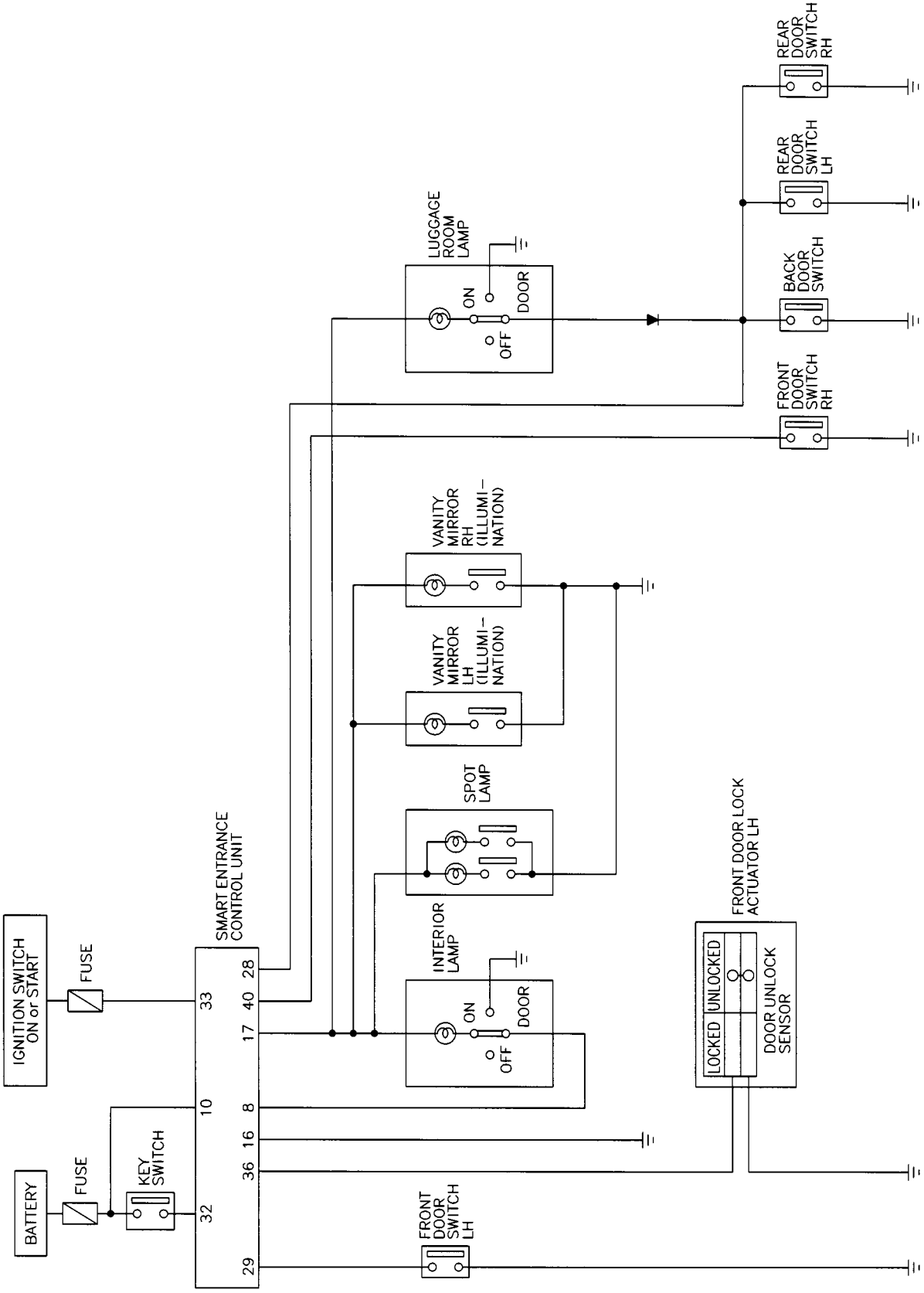
NAEL0038S10

The lamp turns off automatically when interior lamp, luggage room lamp, spot lamp and/or vanity mirror illumination is illuminated with the ignition key is in OFF position, if the lamp remains lit by the door switch open signal or if the lamp switch is in ON position for more than 10 minutes.
After lamps turn OFF by the battery saver system, the lamps illuminate again when:

- driver's door is locked or unlocked,
- door is opened or closed,
- key is inserted or removed in ignition key cylinder.

Schematic

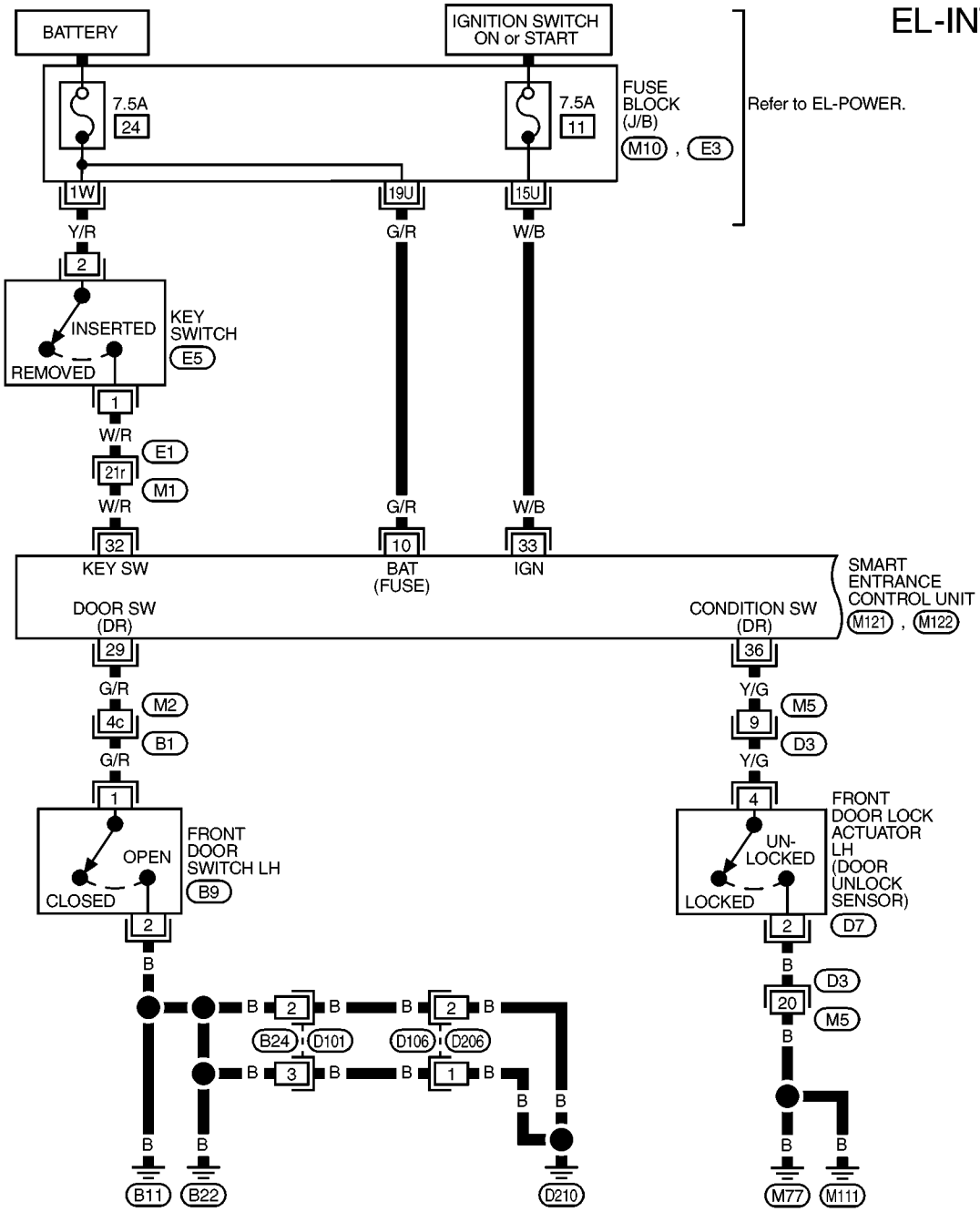
NAEL0158

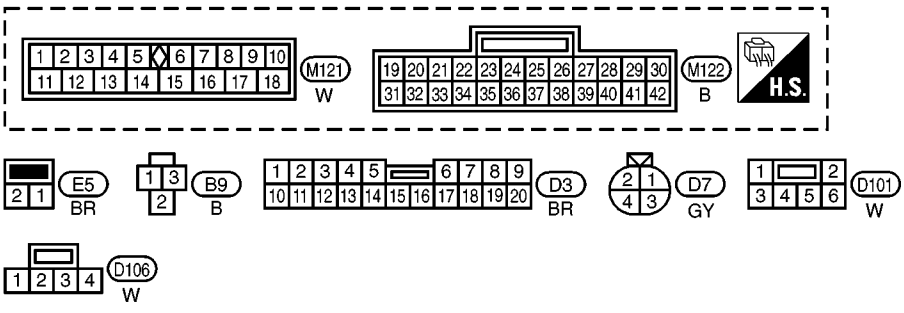


MEL209M

Wiring Diagram — INT/L —

NAEL0040

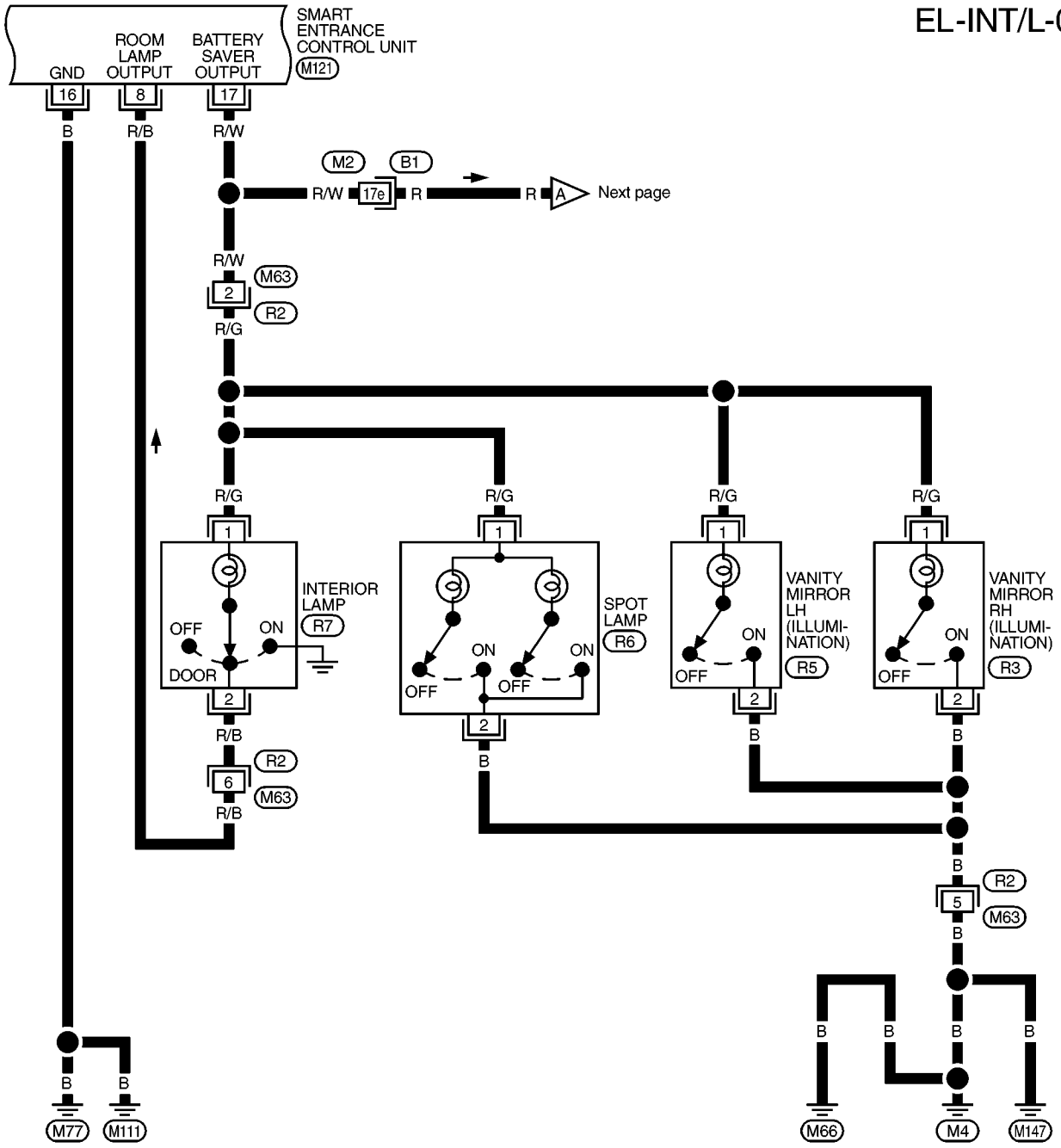


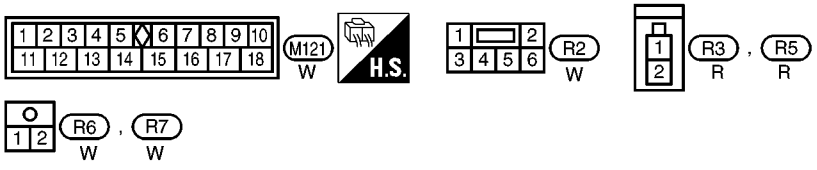


REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 , E3 -FUSE BLOCK-JUNCTION BOX (J/B)

MEL789L

EL-INT/L-02

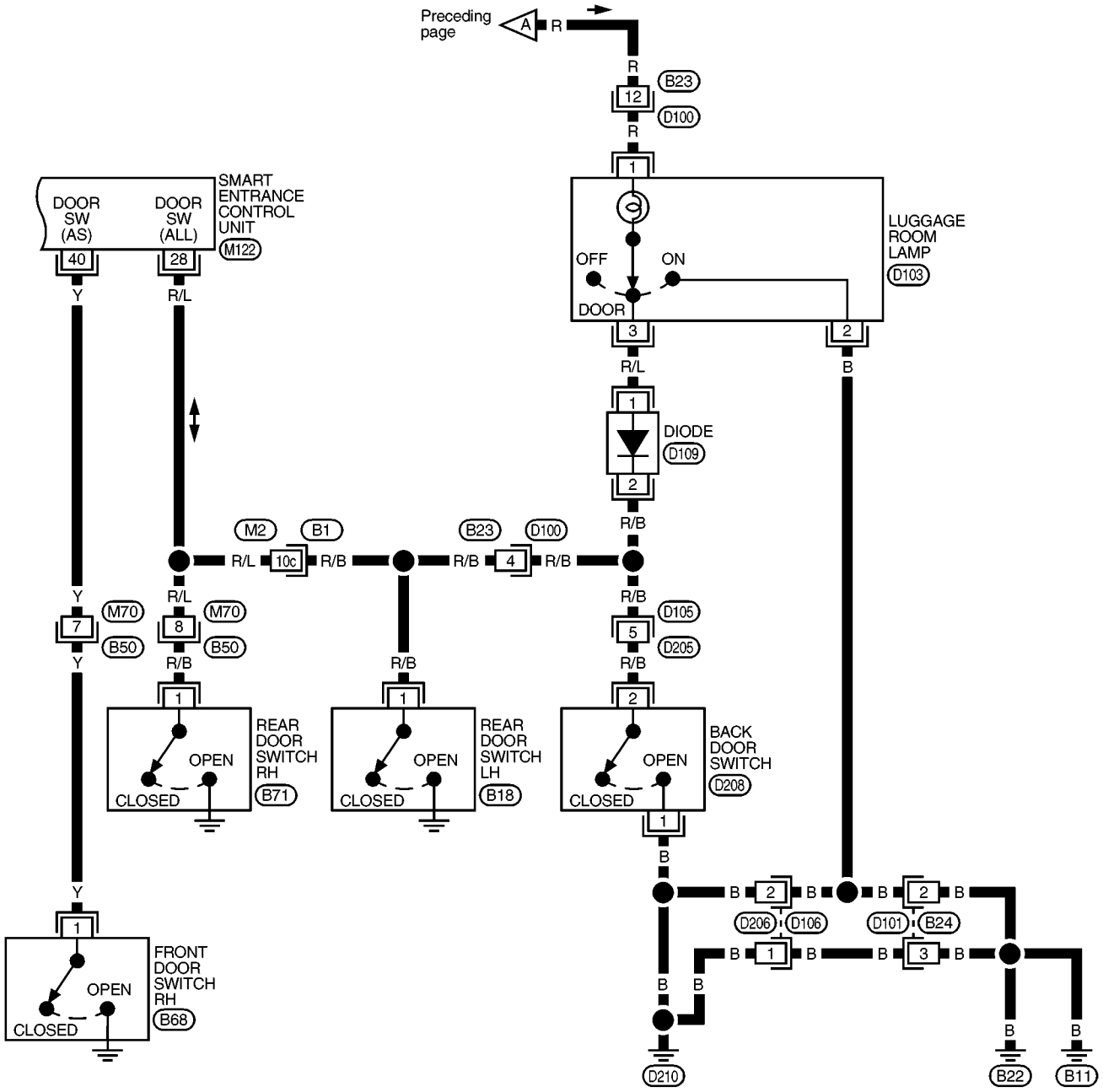


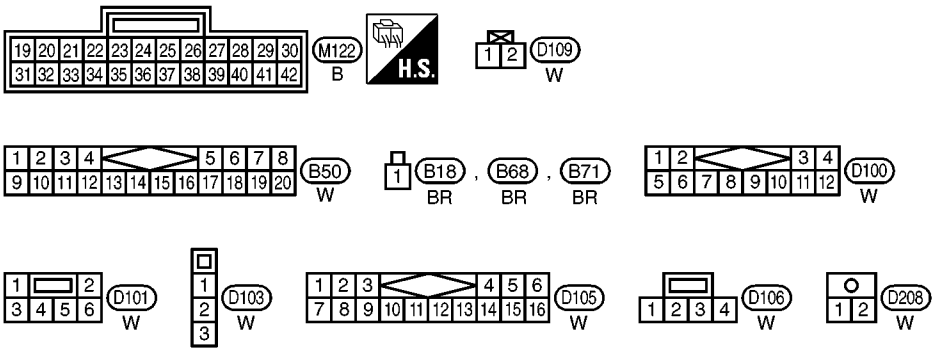


REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL790L

EL-INT/L-03



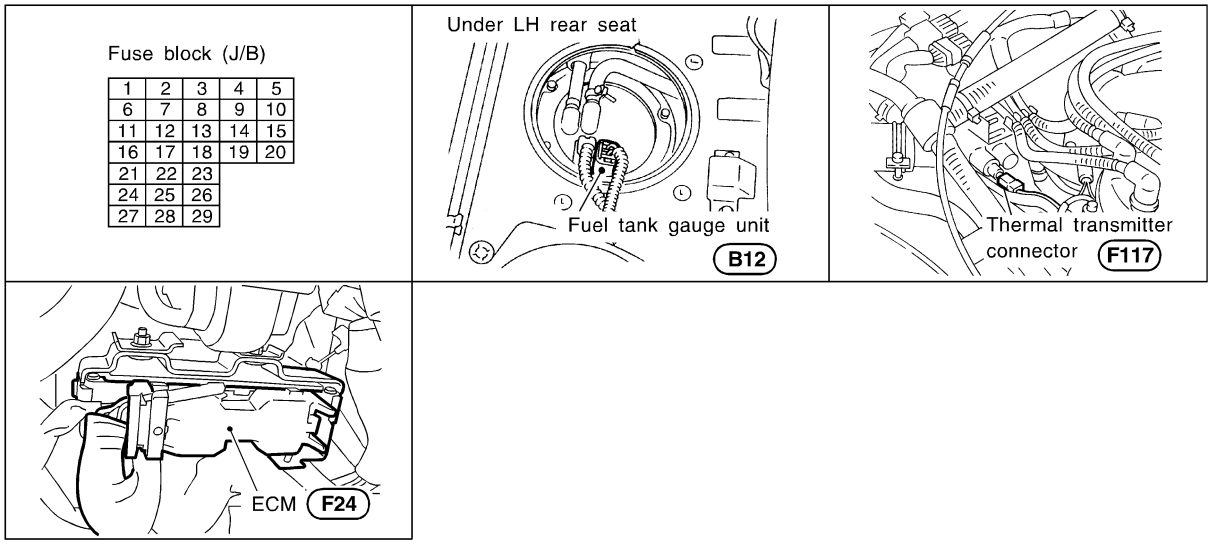


REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL791L

Component Parts and Harness Connector Location

NAEL0041



SEL351X

System Description

NAEL0042

UNIFIED CONTROL METER

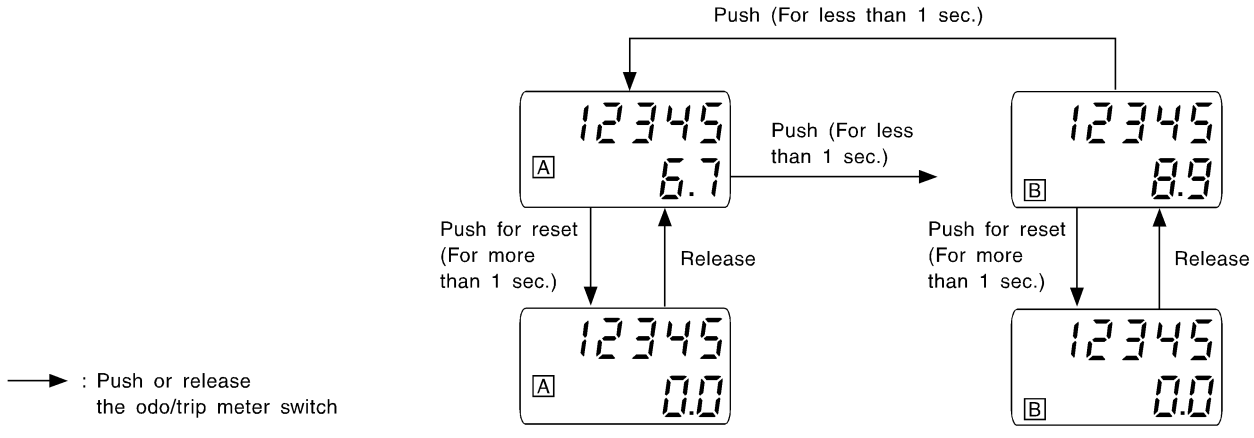
NAEL0042S06

- Speedometer, odo/trip meter, tachometer, fuel gauge and water temperature gauge are controlled totally by control unit.
- Digital meter is adopted for odo/trip meter.*
  *The record of the odo meter is kept even if the battery cable is disconnected. The record of the trip meter is erased when the battery cable is disconnected.
- Odo/trip meter is indicated for about 30 seconds after ignition switch has been turned OFF.
- Odo/trip meter segment can be checked in diagnosis mode.
- Meter/gauge can be checked in diagnosis mode.

HOW TO CHANGE THE DISPLAY FOR ODO/TRIP METER

NAEL0042S07

The display is changed by pushing the odo/trip meter switch.



SEL175W

NOTE:
Turn ignition switch to the “ON” position to operate odo/trip meter.

POWER SUPPLY AND GROUND CIRCUIT

NAEL0042S08

Power is supplied at all times

- through 7.5A fuse [No. 24, located in the fuse block (J/B)]
- to combination meter terminal 62.

With the ignition switch in the ON or START position, power is supplied

- through 10A fuse [No. 8, located in the fuse block (J/B)]
- to combination meter terminal 66.

Ground is supplied

- to combination meter terminal 59
- through body grounds M4, M66 and M147.

WATER TEMPERATURE GAUGE

NAEL0042S01

The water temperature gauge indicates the engine coolant temperature. The reading on the gauge is based on the resistance of the thermal transmitter.
As the temperature of the coolant increases, the resistance of the thermal transmitter decreases. A variable ground is supplied to terminal 18 of the combination meter for the water temperature gauge. The needle on the gauge moves from "C" to "H".

TACHOMETER

NAEL0042S02

The tachometer indicates engine speed in revolutions per minute (rpm).
The tachometer is regulated by a signal

- from terminal 25 of the ECM
- to combination meter terminal 16 for the tachometer.

FUEL GAUGE

NAEL0042S03

The fuel gauge indicates the approximate fuel level in the fuel tank.
The fuel gauge is regulated by a variable ground signal supplied

- to combination meter terminal 17 for the fuel gauge
- from terminal 3 of the fuel level sensor unit
- through terminal 2 of the fuel level sensor unit and
- through body grounds B11, B22 and D210.

SPEEDOMETER

NAEL0042S04

The vehicle speed sensor provides a voltage signal to the combination meter for the speedometer.
The voltage is supplied

- from combination meter terminal 15 for the speedometer
- to terminal 2 of the vehicle speed sensor.

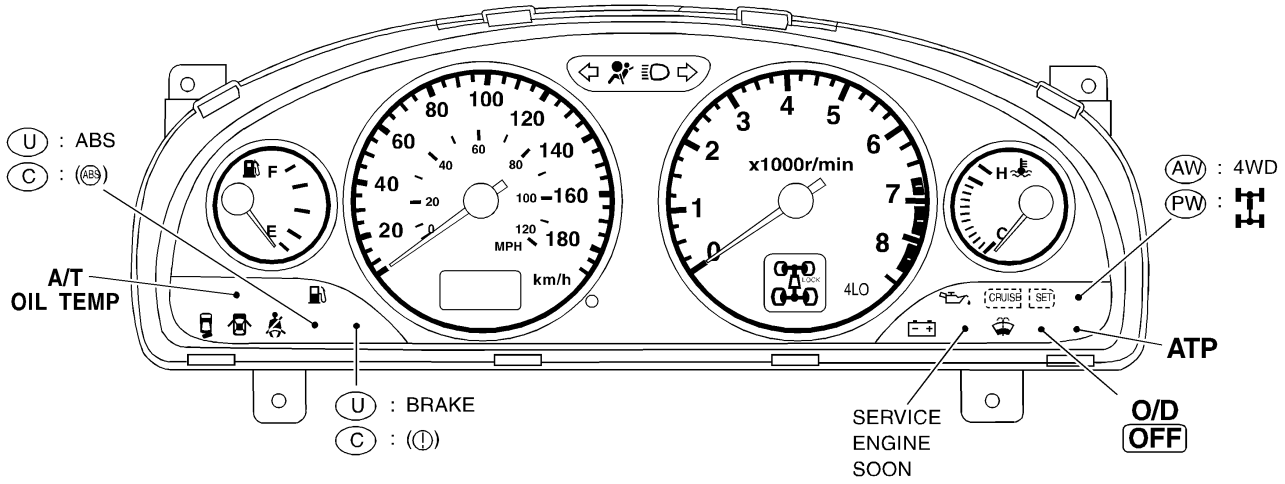
The speedometer converts the voltage into the vehicle speed displayed.

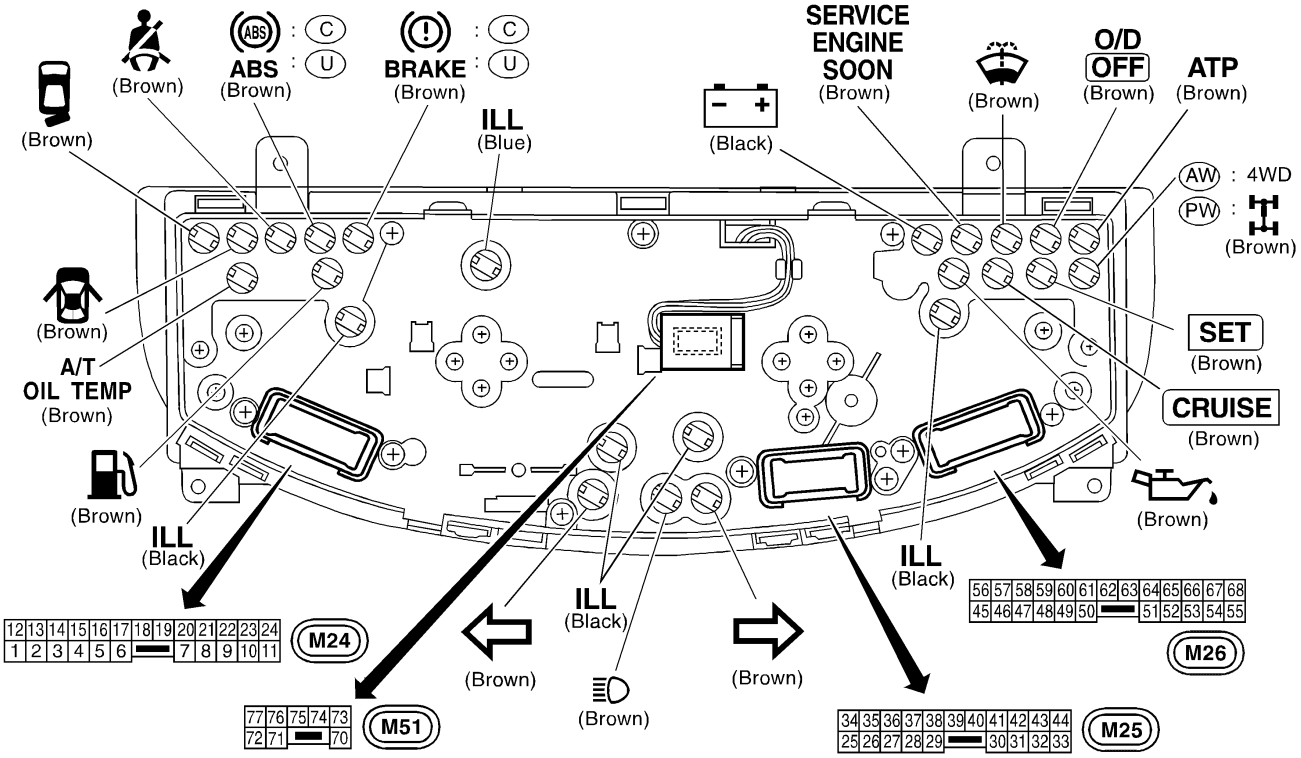
Combination Meter

CHECK

NAEL0043

NAEL0043S01





Bulb socket color	Bulb wattage
Brown	1.4W
Blue	2.0W
Black	3.0W

( ): Warning bulb socket color

U : For USA

C : For Canada

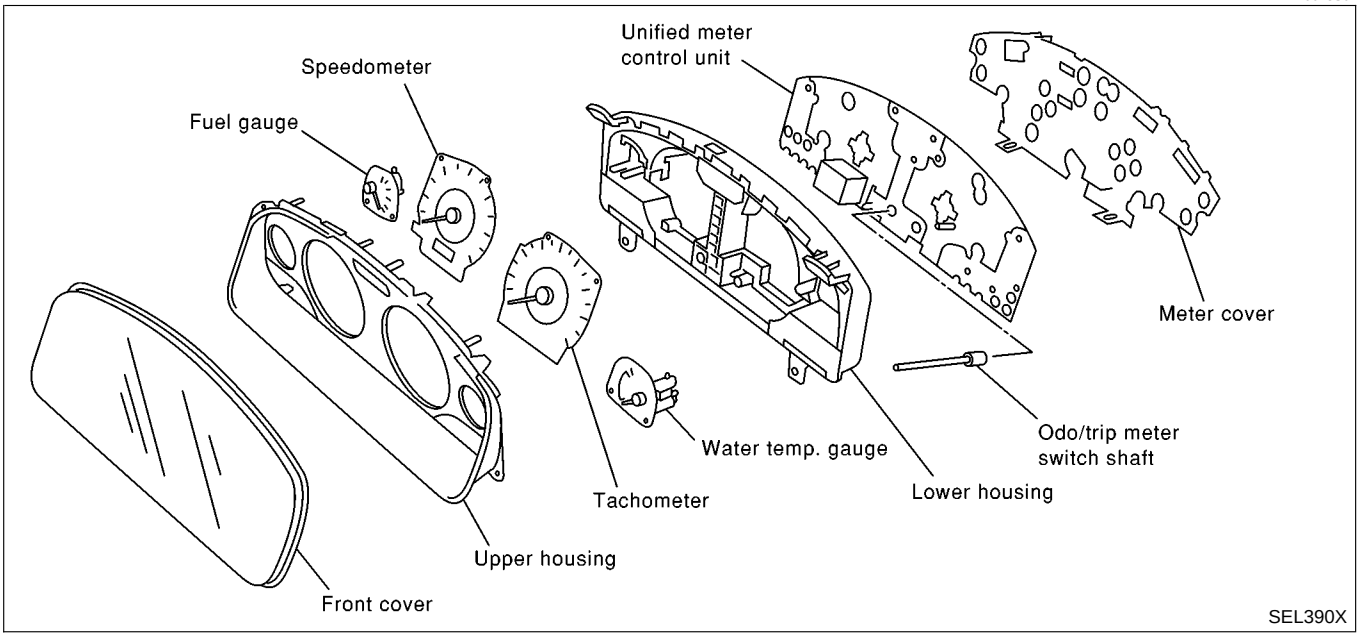
AW : With all-mode 4-wheel drive

PW : With part-time 4-wheel drive

MEL247M

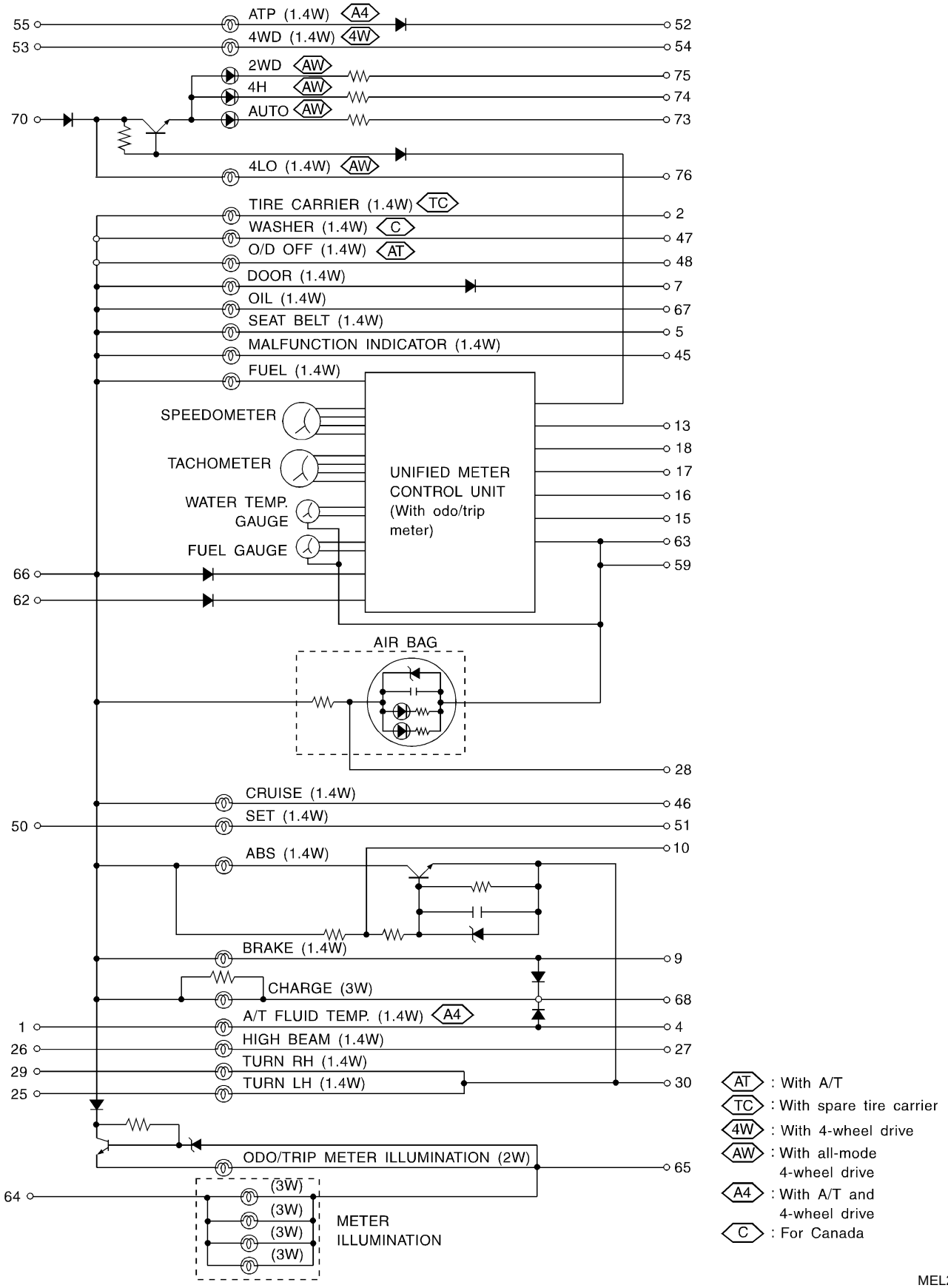
CONSTRUCTION

NAEL0043S02



Schematic

NAEL0199

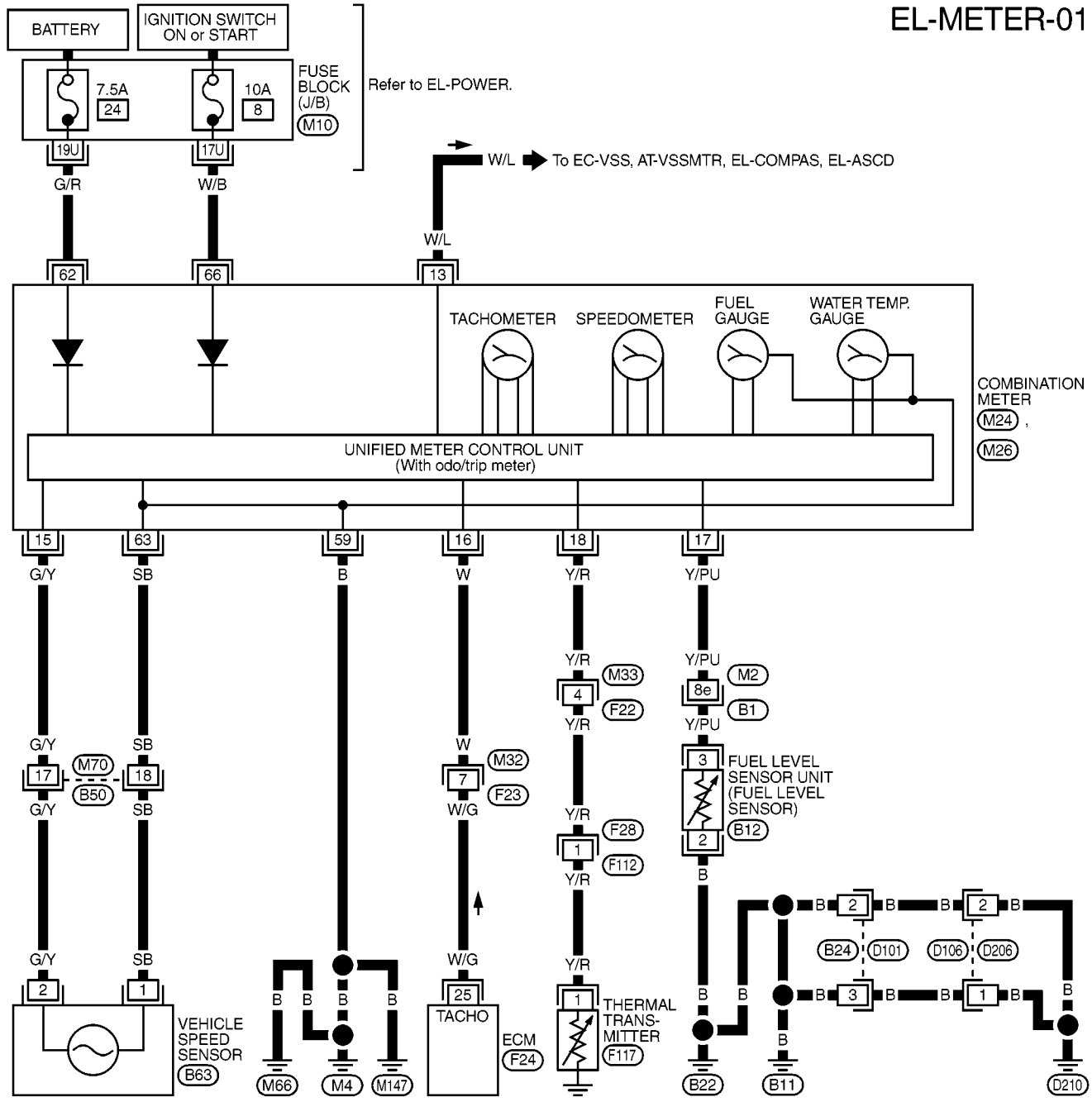


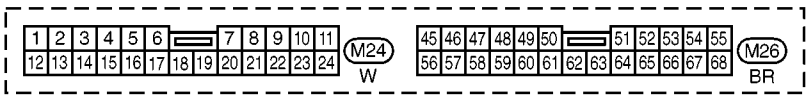
MEL248M

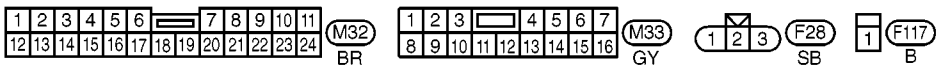
Wiring Diagram — METER —

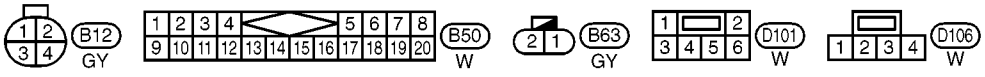
NAEL0045

EL-METER-01









REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK- JUNCTION BOX (J/B)
F24 -ELECTRICAL UNITS-

MEL020M

Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode

NAEL0200

DIAGNOSIS FUNCTION

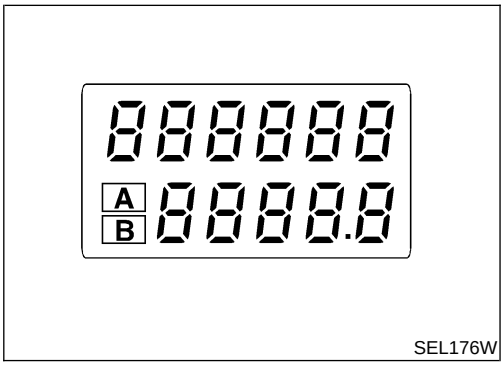
NAEL0200S01

- Odo/trip meter segment can be checked in diagnosis mode.
- Meters/gauges can be checked in diagnosis mode.

HOW TO ALTERNATE DIAGNOSIS MODE

NAEL0200S02

1. Turn ignition switch to ON and change odo/trip meter to “TRIP A” or “TRIP B”.
2. Turn ignition switch to OFF.
3. Turn ignition switch to ON when pushing odo/trip meter switch.
4. Push odo/trip meter switch 1 second.
5. Release odo/trip meter switch.
6. Push odo/trip meter switch more than three times within 7 seconds.

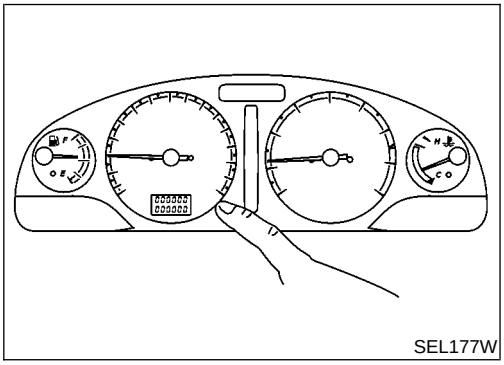


SEL176W

7. All odo/trip meter segments should be turned on.

NOTE:
If some segments are not turned on, unified meter control unit with odo/trip meter should be replacted.

At this point, the unified control meter is turned to diagnosis mode.


SEL177W

8. Push odo/trip meter switch. Indication of each meter/gauge should be as shown left during pushing odo/trip meter switch if it is no malfunctioning.

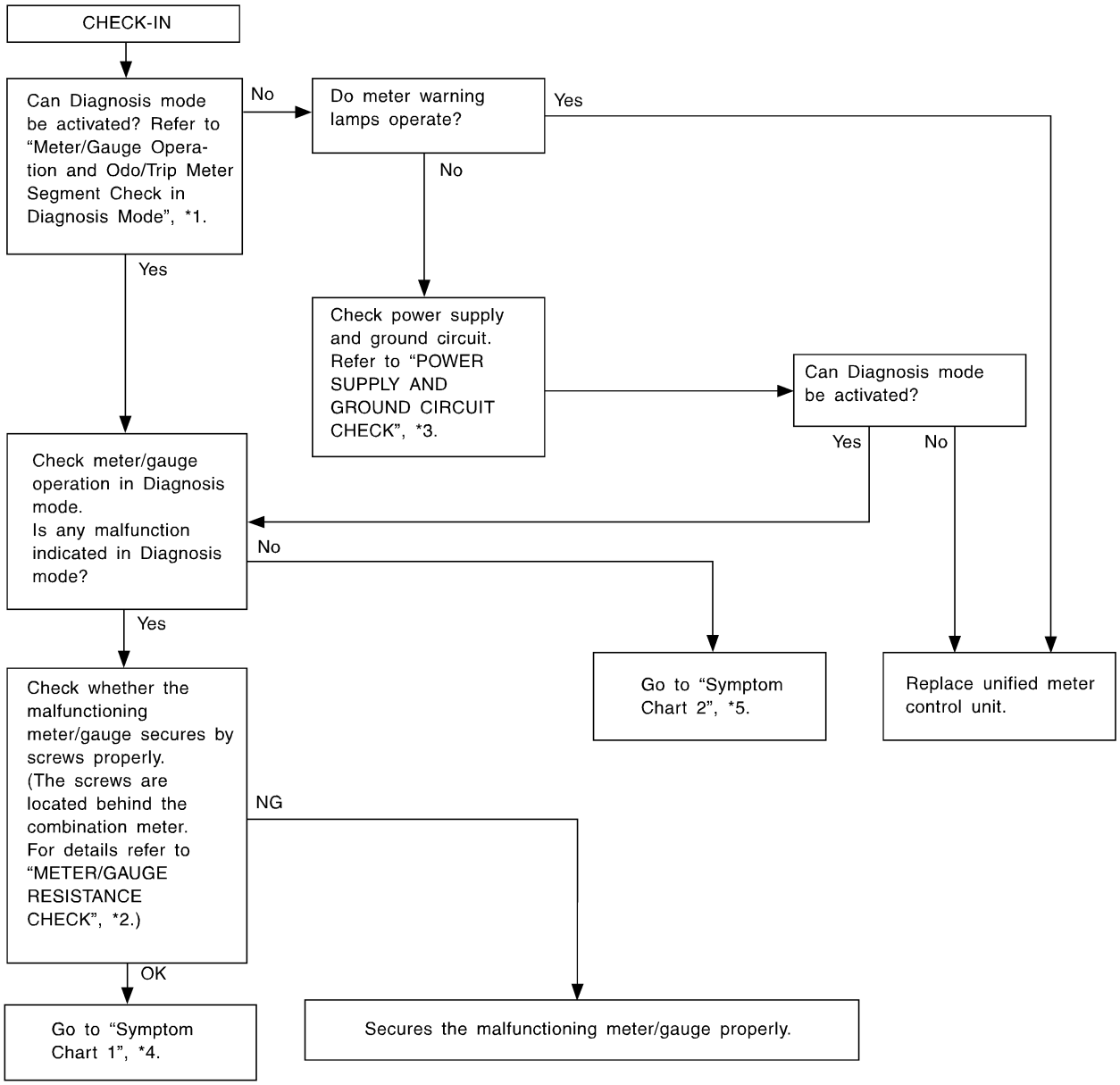
NOTE:
It takes about a few seconds for indication of fuel gauge and water temperature gauge to become stable.

Trouble Diagnoses

PRELIMINARY CHECK

NAEL0201

NAEL0201S01



SEL361W

*1: Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode (EL-120)

*2: METER/GAUGE RESISTANCE CHECK (EL-128)

*3: POWER SUPPLY AND GROUND CIRCUIT CHECK (EL-123)

*4: Symptom Chart 1 (EL-122)

*5: Symptom Chart 2 (EL-122)

Trouble Diagnoses (Cont'd)

SYMPTOM CHART

NAEL0201S02

Symptom Chart 1 (Malfunction is Indicated in Diagnosis Mode)

NAEL0201S0201

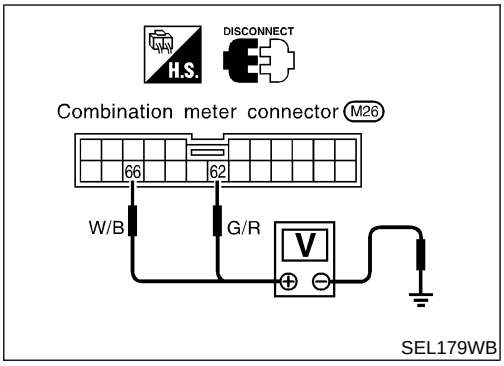
Symptom	Possible causes	Repair order
Odo/trip meter indicate(s) malfunction in Diagnosis mode.	Unified meter control unit	Replace unified meter control unit.
Multiple meter/gauge indicate malfunction in Diagnosis mode.		
One of speedometer/ tachometer/fuel gauge/ water temp. gauge indicates malfunction in Diagnosis mode.	1. Meter/Gauge 2. Unified meter control unit	1. Check resistance of meter/gauge indicating malfunction. If the resistance is NG, replace the meter/ gauge. Refer to "METER/GAUGE RESISTANCE CHECK", EL-128. 2. If the resistance of meter/gauge is OK, replace unified meter control unit.

Symptom Chart 2 (No Malfunction is Indicated in Diagnosis Mode)

NAEL0201S0202

Symptom	Possible causes	Repair order
One of speedometer/ tachometer/fuel gauge/ water temp. gauge is malfunctioning.	1. Sensor signal - Vehicle speed signal - Engine revolution signal - Fuel gauge - Water temp. gauge 2. Unified meter control unit	1. Check the sensor for malfunctioning meter/gauge. INSPECTION/VEHICLE SPEED SENSOR (Refer to EL-124.) INSPECTION/ENGINE REVOLUTION SIGNAL (Refer to EL-125.) INSPECTION/FUEL LEVEL SENSOR UNIT (Refer to EL-126.) INSPECTION/THERMAL TRANSMITTER (Refer to EL-127.) 2. Replace unified meter control unit.
Multiple meter/gauge are malfunctioning. (except odo/trip meter)		

Before starting trouble diagnoses below, perform PRELIMINARY CHECK, EL-121.



POWER SUPPLY AND GROUND CIRCUIT CHECK

=NAEL0201S03

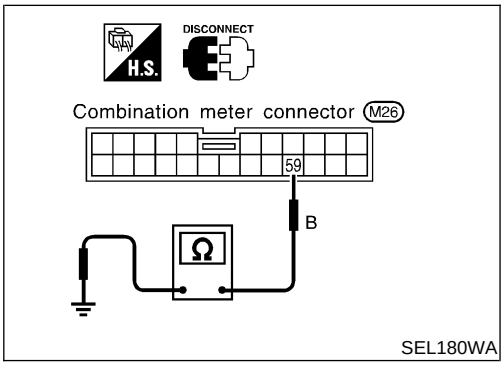
Power Supply Circuit Check

NAEL0201S0301

Terminals		Ignition switch position		
(+)	(−)	OFF	ACC	ON
62	Ground	Battery voltage	Battery voltage	Battery voltage
66	Ground	0V	0V	Battery voltage

If NG, check the following.

- 10A fuse [No. 12, located in fuse block (J/B)]
- 10A fuse [No. 30, located in fuse block (J/B)]
- Harness for open or short between fuse and combination meter



Ground Circuit Check

NAEL0201S0302

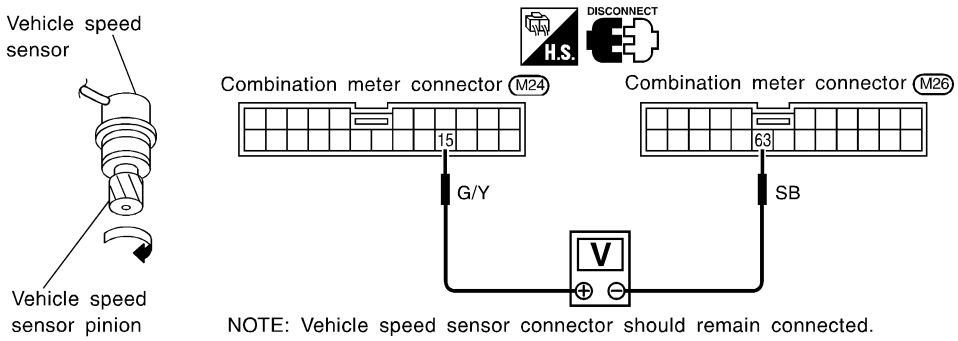
Terminals	Continuity
59 - Ground	Yes

INSPECTION/VEHICLE SPEED SENSOR

=NAEL0201S04

1	CHECK VEHICLE SPEED SENSOR OUTPUT

1. Remove vehicle speed sensor from transmission.
2. Check voltage between combination meter terminals 15 and 63 while quickly turning speed sensor pinion.



Voltage: Approx. 0.5V

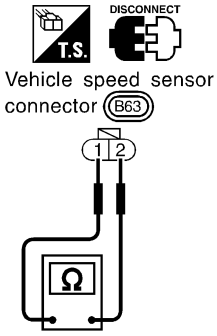
SEL297X

OK or NG

OK	▶	Vehicle speed sensor is OK.
NG	▶	GO TO 2.

2	CHECK VEHICLE SPEED SENSOR

Check resistance between vehicle speed sensor terminals 1 and 2.



Resistance: Approx. 250Ω

SEL298X

OK or NG

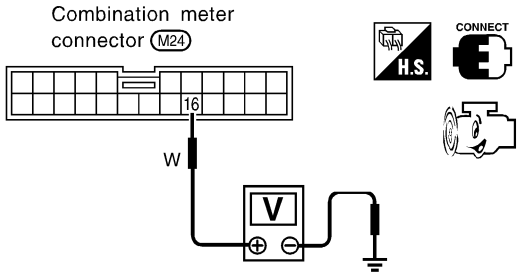
OK	▶	Check harness or connector between speedometer and vehicle speed sensor.
NG	▶	Replace vehicle speed sensor.

INSPECTION/ENGINE REVOLUTION SIGNAL

NAEL0201S05

1	CHECK ECM OUTPUT

1. Start engine.
2. Check voltage between combination meter terminals 16 and ground at idle and 2,000 rpm.



Higher rpm = Higher voltage
Lower rpm = Lower voltage
Voltage should change with rpm.

SEL364WB

OK or NG

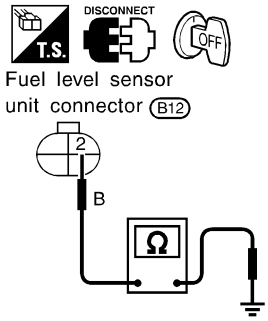
OK	▶	Engine revolution signal is OK.
NG	▶	Harness for open or short between ECM and combination meter

INSPECTION/FUEL LEVEL SENSOR UNIT

=NAEL0201S06

1	CHECK GROUND CIRCUIT FOR FUEL LEVEL SENSOR UNIT

Check harness continuity between fuel level sensor unit terminal 2 and ground.



Continuity should exist.

SEL299X

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair harness or connector.

2	CHECK FUEL LEVEL SENSOR UNIT

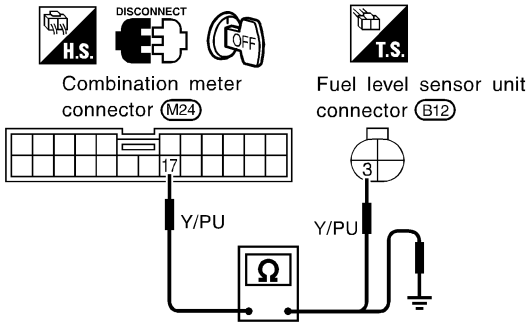
Refer to "FUEL LEVEL SENSOR UNIT CHECK" (EL-128).

OK or NG

OK	▶	GO TO 3.
NG	▶	Replace fuel level sensor unit.

3	CHECK HARNESS FOR OPEN OR SHORT

1. Disconnect combination meter connector and fuel level sensor unit connector.
2. Check continuity between combination meter terminal 17 and fuel level sensor unit terminal 3.
3. Check continuity between combination meter terminal 17 and ground.



Continuity:
Combination meter terminal 17 and fuel level sensor unit terminal 3
Yes
Combination meter terminal 17 and ground
No

SEL300X

OK or NG

OK	▶	Fuel level sensor unit is OK.
NG	▶	Repair harness or connector.

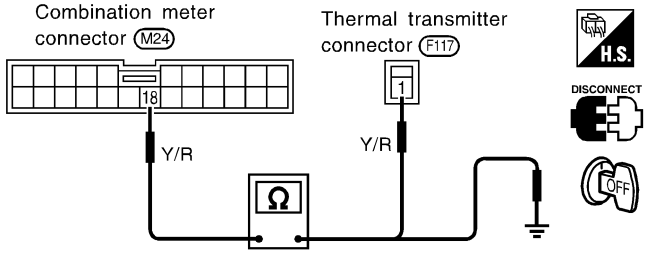
INSPECTION/THERMAL TRANSMITTER

=NAEL0201S07

1	CHECK THERMAL TRANSMITTER	
Refer to "THERMAL TRANSMITTER CHECK" (EL-128).		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace.

2	CHECK HARNESS FOR OPEN OR SHORT	

1. Disconnect combination meter connector and thermal transmitter connector.
2. Check continuity between combination meter terminal 18 and thermal transmitter terminal 1.
   Continuity should exist.
3. Check continuity between combination meter terminal 18 and ground.
   Continuity should not exist.



SEL184WA

OK or NG		
OK	▶	Thermal transmitter is OK.
NG	▶	Repair harness or connector.

Electrical Components Inspection

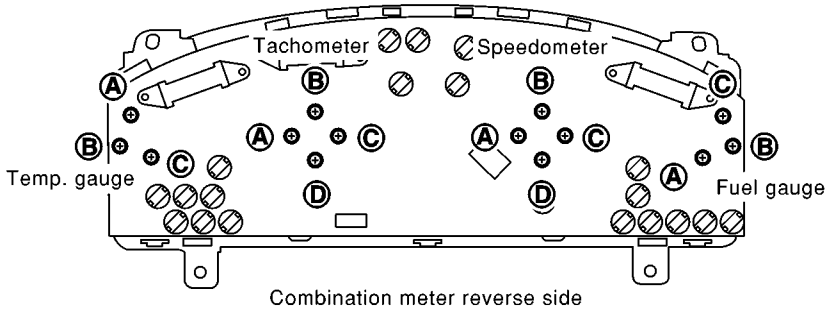
=NAEL0202

METER/GAUGE RESISTANCE CHECK

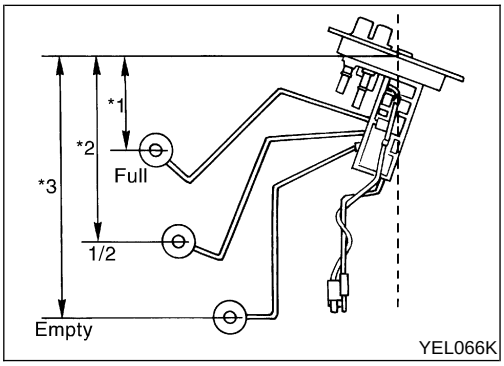
NAEL0202S01

Check resistance between installation screws of meter/gauge.

Screws		Resistance Ω
Tacho/Speedometer	Fuel/Temp. gauge	
A - C	A - C	Approx. 190 - Approx. 260
B - D	B - C	Approx. 230 - Approx. 310



SEL391X



YEL066K

FUEL LEVEL SENSOR UNIT CHECK

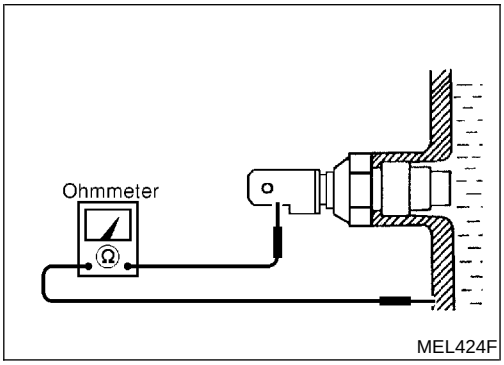
NAEL0202S02

- For removal, refer to FE-4, “FUEL SYSTEM”.

Check the resistance between terminals 3 and 2.

Ohmmeter		Float position mm (in)			Resistance value Ω
(+)	(−)				
3	2	*1	Full	95 (3.74)	Approx. 4 - 6
		*2	1/2	184 (7.24)	31 - 34
		*3	Empty	265 (10.43)	80 - 83

*1 and *3: When float rod is in contact with stopper.



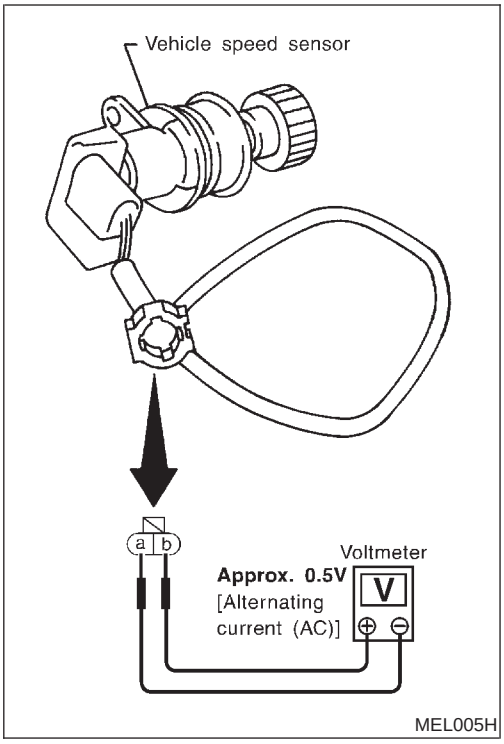
MEL424F

THERMAL TRANSMITTER CHECK

NAEL0202S03

Check the resistance between the terminals of thermal transmitter and body ground.

Water temperature	Resistance
60°C (140°F)	Approx. 170 - 210Ω
100°C (212°F)	Approx. 47 - 53Ω



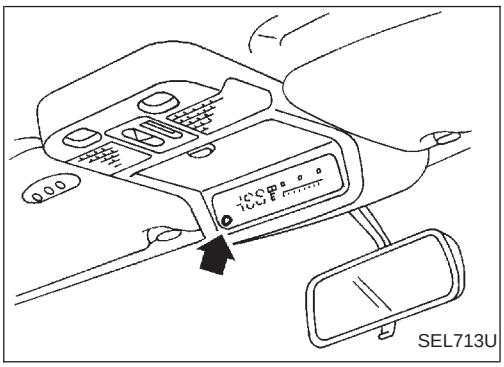
VEHICLE SPEED SENSOR SIGNAL CHECK

NAEL0202S04

1. Remove vehicle speed sensor from transmission.
2. Turn vehicle speed sensor pinion quickly and measure voltage across a and b.

System Description

NAEL0153



This unit displays following items:

- Earth magnetism and heading direction of vehicle.
- Outside air temperature.
- Caution for frozen road surfaces.

OUTSIDE TEMPERATURE DISPLAY

NAEL0153S01

Push the switch when the ignition key is in the “ACC” or “ON” position. The outside temperature will be displayed in “°F”.

- Selecting the indication range
  Push the switch to change from “°F” to “°C”.
- When the outside temperature drops below freezing point, ICE is displayed on the unit.
- When the outside temperature is between 55°C (130°F) and 70°C (158°F), the display shows 55°C (130°F).
- When the outside temperature is lower than −30°C (−20°F) or higher than 70°C (158°F), the display shows only “---” though it is operating. This is not a problem.
- The indicated temperature on the thermometer is not readily affected by engine heat. It changes only when one of the following conditions is present.

a) The temperature detected by the ambient air temperature sensor is lower than the indicated temperature on the thermometer.

b) The difference in temperature detected during a period of 40 seconds is less than 1°C (1.8°F) when vehicle speed has been greater than 24 km/h (15 MPH) for more than 100 seconds.
(This is to prevent the indicated temperature from being affected by engine heat or cooling fan operation during low-speed driving.)

c) The ignition key has been turned to the “OFF” position for more than 4 hours. (The engine is cold.)

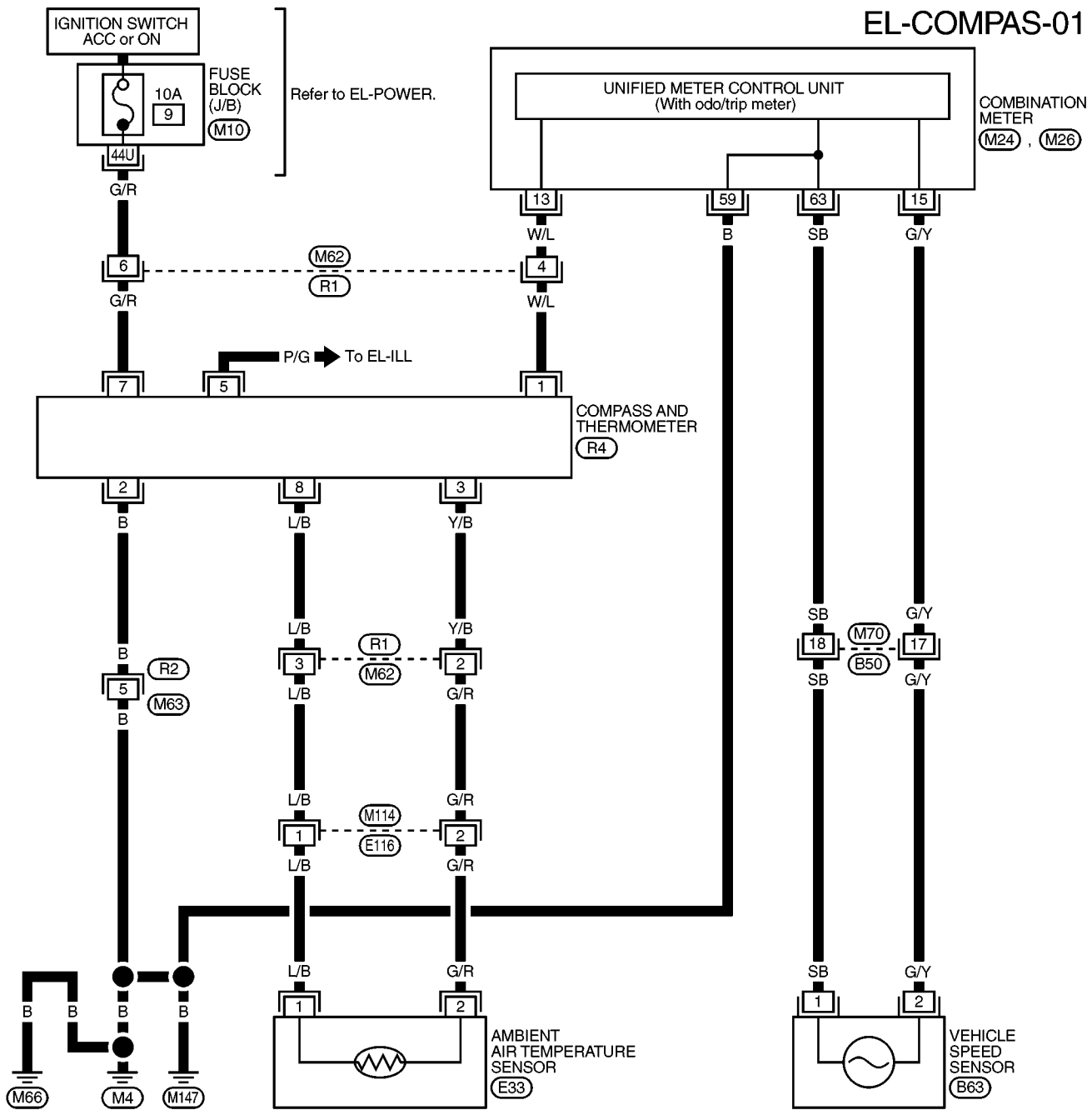
DIRECTION DISPLAY

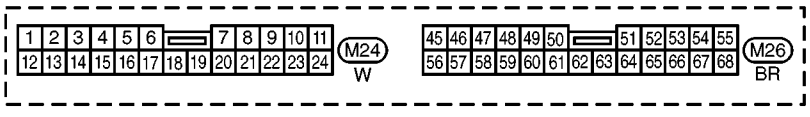
NAEL0153S02

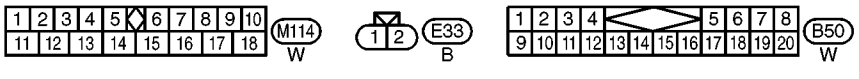
Push the switch when the ignition key is in the “ACC” or “ON” position. The direction will be displayed.

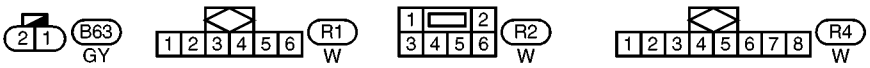
Wiring Diagram — COMPAS —

NAEL0154









REFER TO THE FOLLOWING.
M10 -FUSE BLOCK- JUNCTION BOX (J/B)

MEL029M

Trouble Diagnoses

NAEL0048

PRELIMINARY CHECK FOR THERMOMETER

NAEL0048S02

1	COOL DOWN CHECK	
1. Turn the ignition key switch to the “ACC” position. 2. Cool down the ambient air temperature sensor with water or ice, so that the indicated temperature falls. **Does the indicated temperature fall?**		
Yes	▶	GO TO 2.
No	▶	The system is malfunctioning. Check the system following “INSPECTION/COMPASS AND THERMOMETER”.

2	WARM UP CHECK	
1. Leave the vehicle for 10 minutes, so that the indicated temperature rises. 2. With the ignition key in the “ACC” position, disconnect and reconnect the ambient air temperature sensor connector. **Does the indicated temperature rise?**		
Yes	▶	The system is OK.
No	▶	The system is malfunctioning. Check the system following “INSPECTION/COMPASS AND THERMOMETER”.

NOTE:

- When the outside temperature is between 55°C (130°F) and 70°C (158°F), the display shows 55°C (130°F). When the outside temperature is lower than −30°C (−20°F) or higher than 70°C (158°F), the display shows only “---”.
- The indicated temperature on the thermometer is not readily affected by engine heat. It changes only when one of the following conditions is present.

a) The temperature detected by the ambient air temperature sensor is lower than the indicated temperature on the thermometer.

b) The difference in temperature detected during a period of 40 seconds is less than 1°C (1.8°F) when vehicle speed has been greater than 24 km/h (15 MPH) for more than 100 seconds.
(This is to prevent the indicated temperature from being affected by engine heat or cooling fan operation during low-speed driving.)

c) The ignition key has been turned to the “OFF” position for more than 4 hours. (The engine is cold.)

INSPECTION/COMPASS AND THERMOMETER

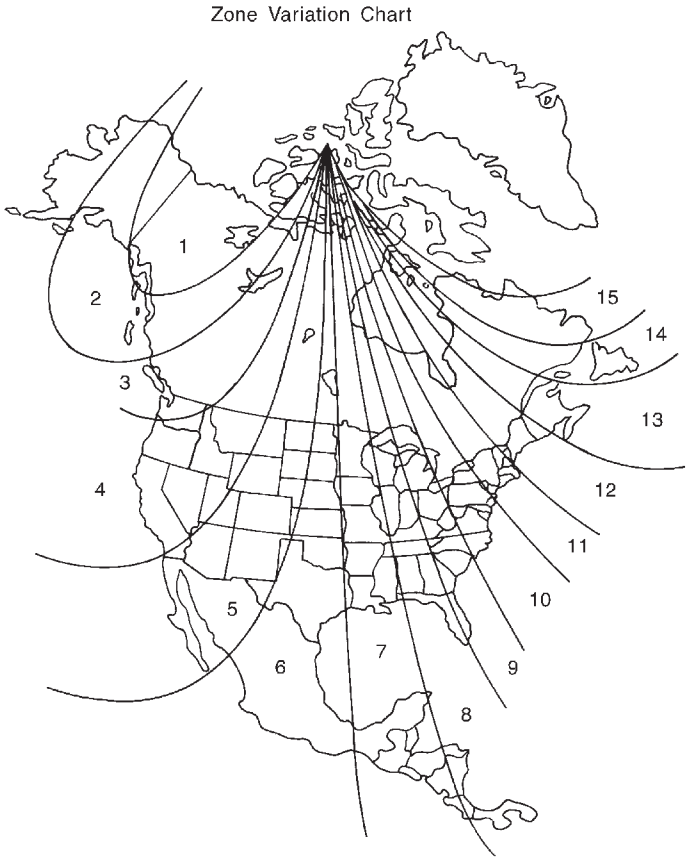
NAEL0048S01

Symptom	Possible causes	Repair order
No display at all	1. 10A fuse 2. Ground circuit 3. Compass and thermometer	1. Check 10A fuse [No. 9, located in fuse block (J/B)]. Turn the ignition switch ON and verify that battery positive voltage is at terminal 7 of compass and thermometer. 2. Check ground circuit for compass and thermometer. 3. Replace compass and thermometer.
Forward direction indication slips off the mark or incorrect.	1. In manual correction mode (Bar and display vanish.) 2. Zone variation change is not done.	1. Drive the vehicle and turn at an angle of 90°. 2. Perform the zone variation change.
Compass reading remains unchanged.	1. Vehicle speed sensor is not entered. 2. Compass and thermometer	1. Check harness for open or short between combination meter terminal 13 and compass and thermometer terminal 1. 2. Replace compass and thermometer.
Displays wrong temperature when ambient temperature is between −30°C (−20°F) and 55°C (130°F). (See NOTE above.)	1. Check operation 2. Ambient air temperature sensor circuit 3. Vehicle speed sensor is not entered. 4. Ambient air temperature sensor 5. Compass and thermometer	1. Perform preliminary check shown above. 2. Check harness for open or short between ambient air temperature sensor and compass and thermometer. 3. Check harness for open or short between combination meter terminal 13 and compass and thermometer terminal 1. 4. Replace ambient air temperature sensor. 5. Replace compass and thermometer.

Calibration Procedure for Compass

=NAEL0155

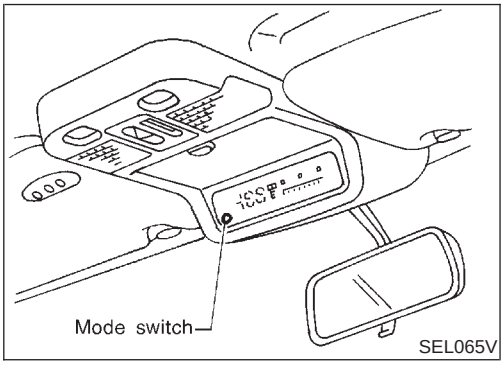
The difference between magnetic North and geographical North can sometimes be great enough to cause false compass readings. In order for the compass to operate accurately in a particular zone, it must be calibrated using the following procedure.



1. Determine your location on the zone map. Record your zone number.
2. Turn the ignition switch to ACC or ON position.
3. Push the "Mode" switch continuously for five seconds until the current zone entry number is displayed.
4. Press the "Mode" switch repeatedly until the desired zone number is displayed.

Once the desired zone number is displayed, stop pressing the "Mode" switch and the display will show compass direction after a few seconds.

SEL738UA



SEL065V

CORRECTION FUNCTIONS OF COMPASS

NAEL0155S01

The direction display is equipped with automatic correction function. If the direction is not shown correctly, carry out initial correction.

INITIAL CORRECTION PROCEDURE FOR COMPASS

NAEL0155S02

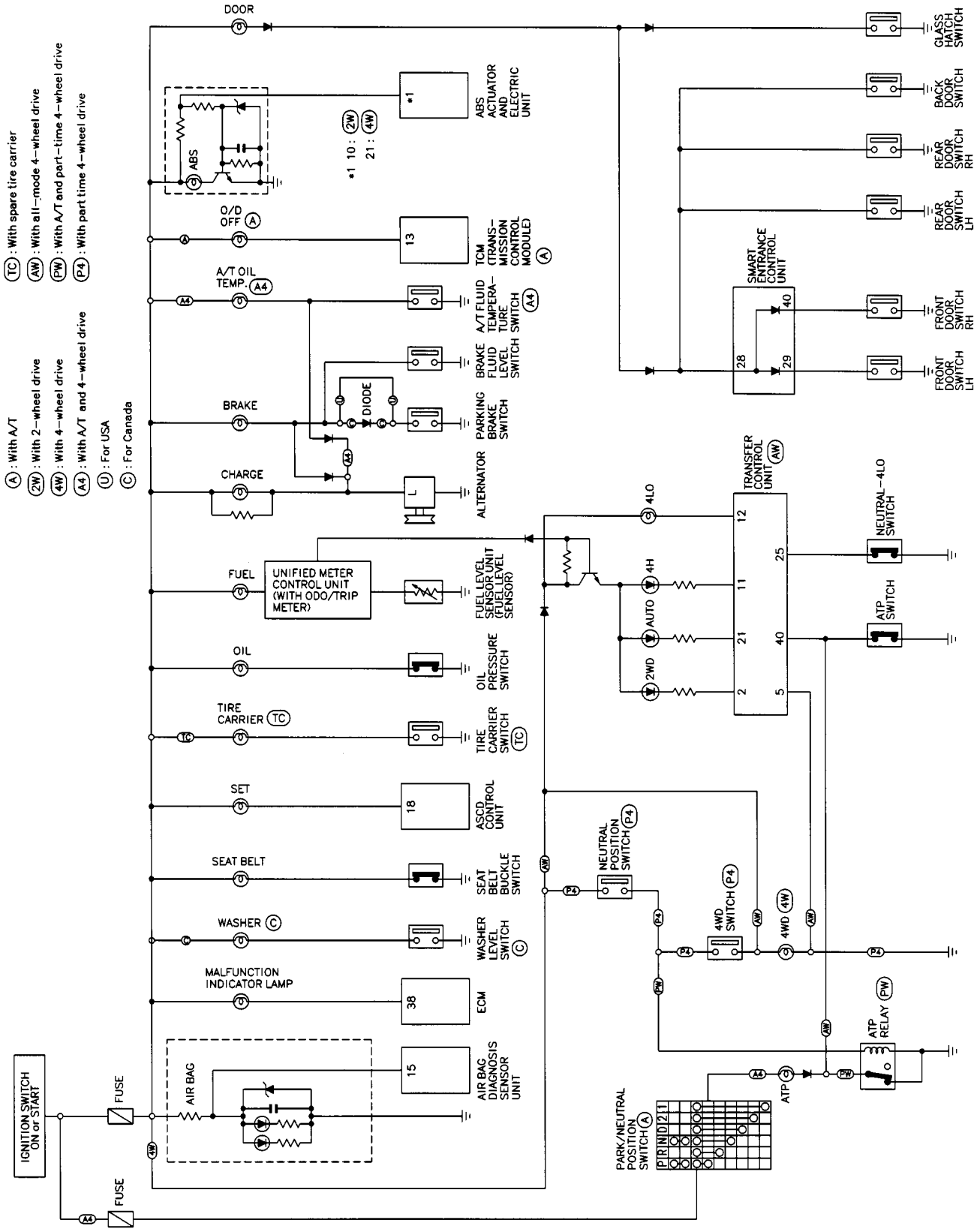
1. Pushing the "Mode" switch for about 10 seconds will enter the initial correction mode. The direction bar starts blinking.
2. Turn the vehicle slowly in an open, safe place. The initial correction is completed in one or two turns.

NOTE:

In places where the terrestrial magnetism is extremely disturbed, the initial correction may start automatically.

Schematic

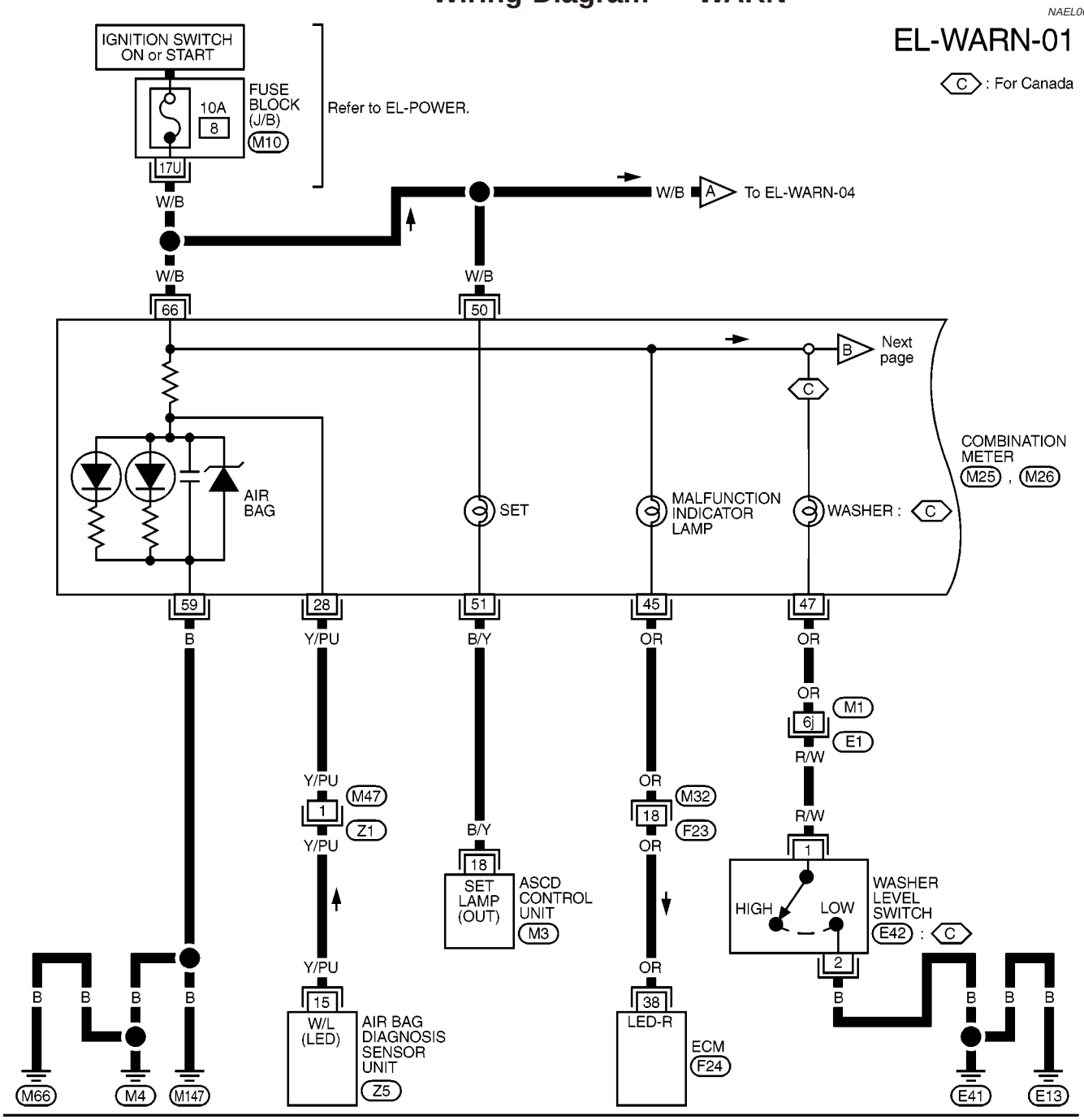
NAEL0049

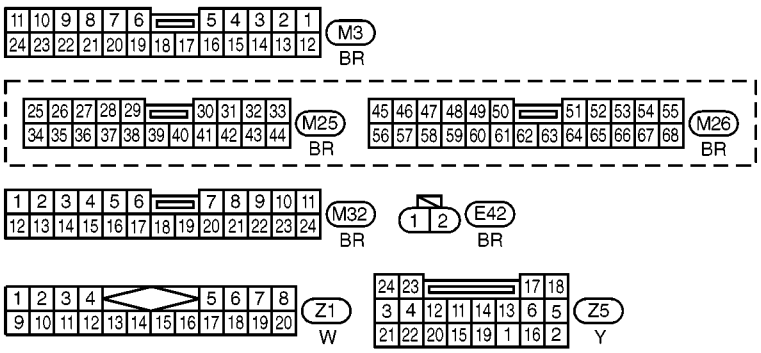


MEL021M

Wiring Diagram — WARN —

NAEL0050

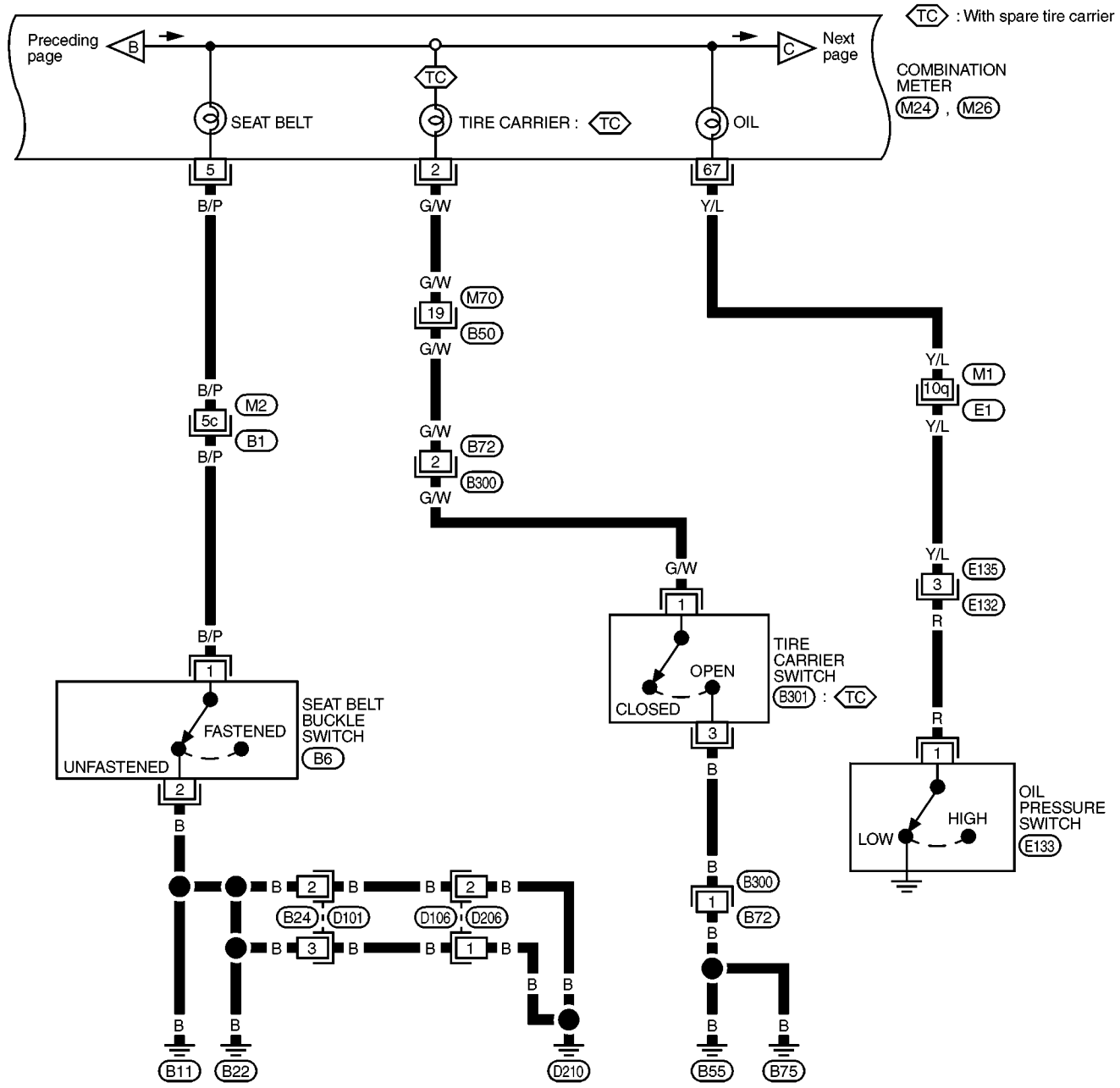


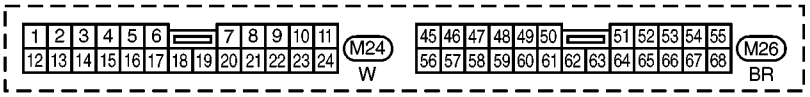


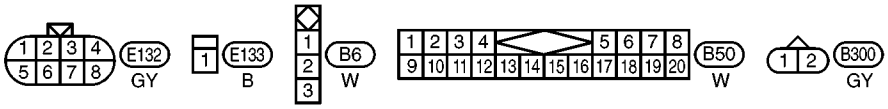
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK- JUNCTION BOX (J/B)
F24 -ELECTRICAL UNITS-

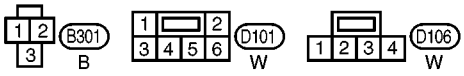
MEL022M

EL-WARN-02



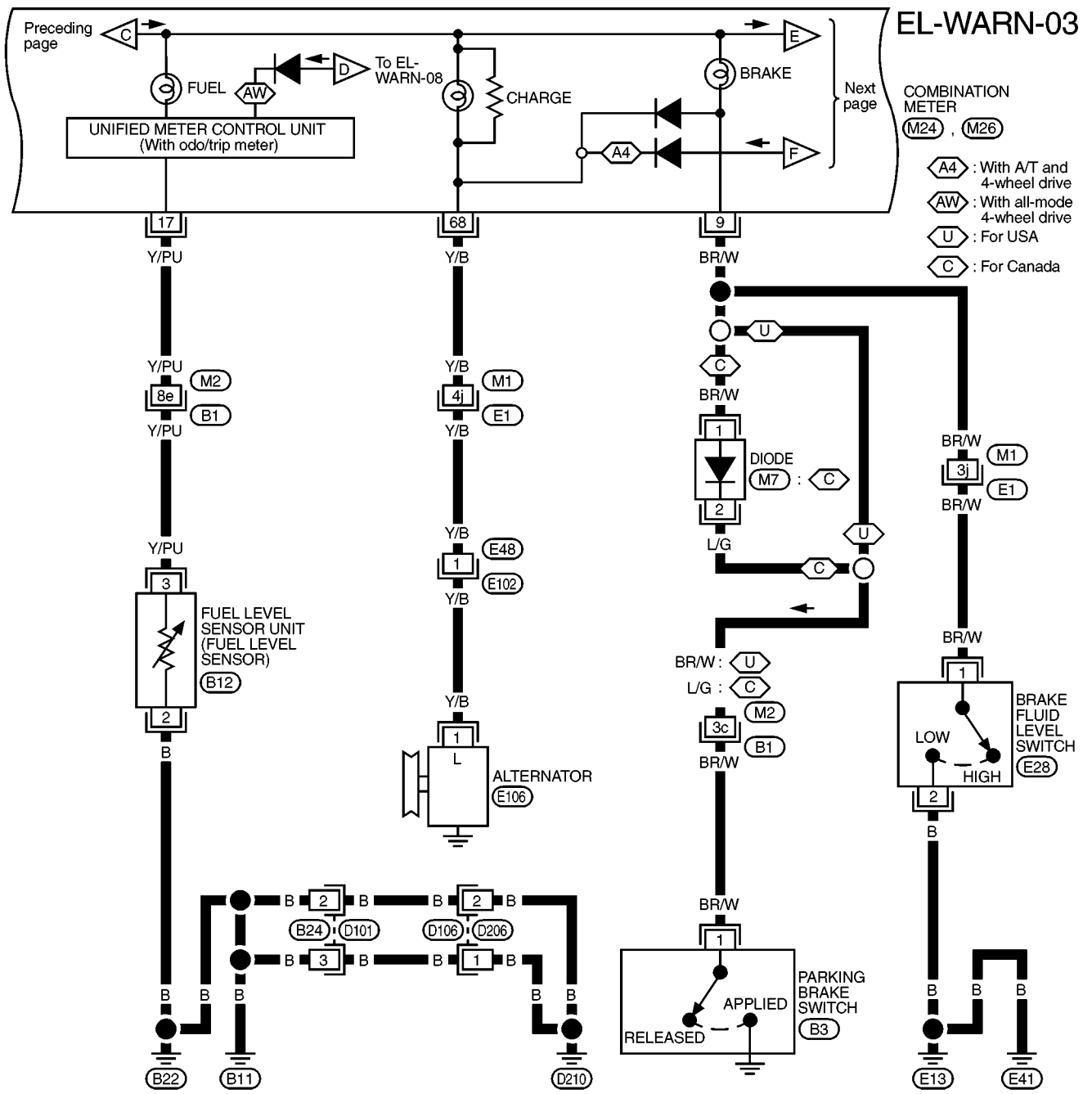


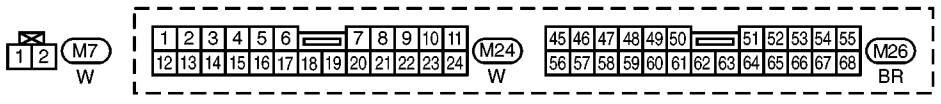


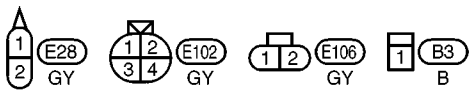


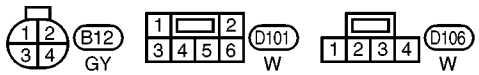
REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL023M





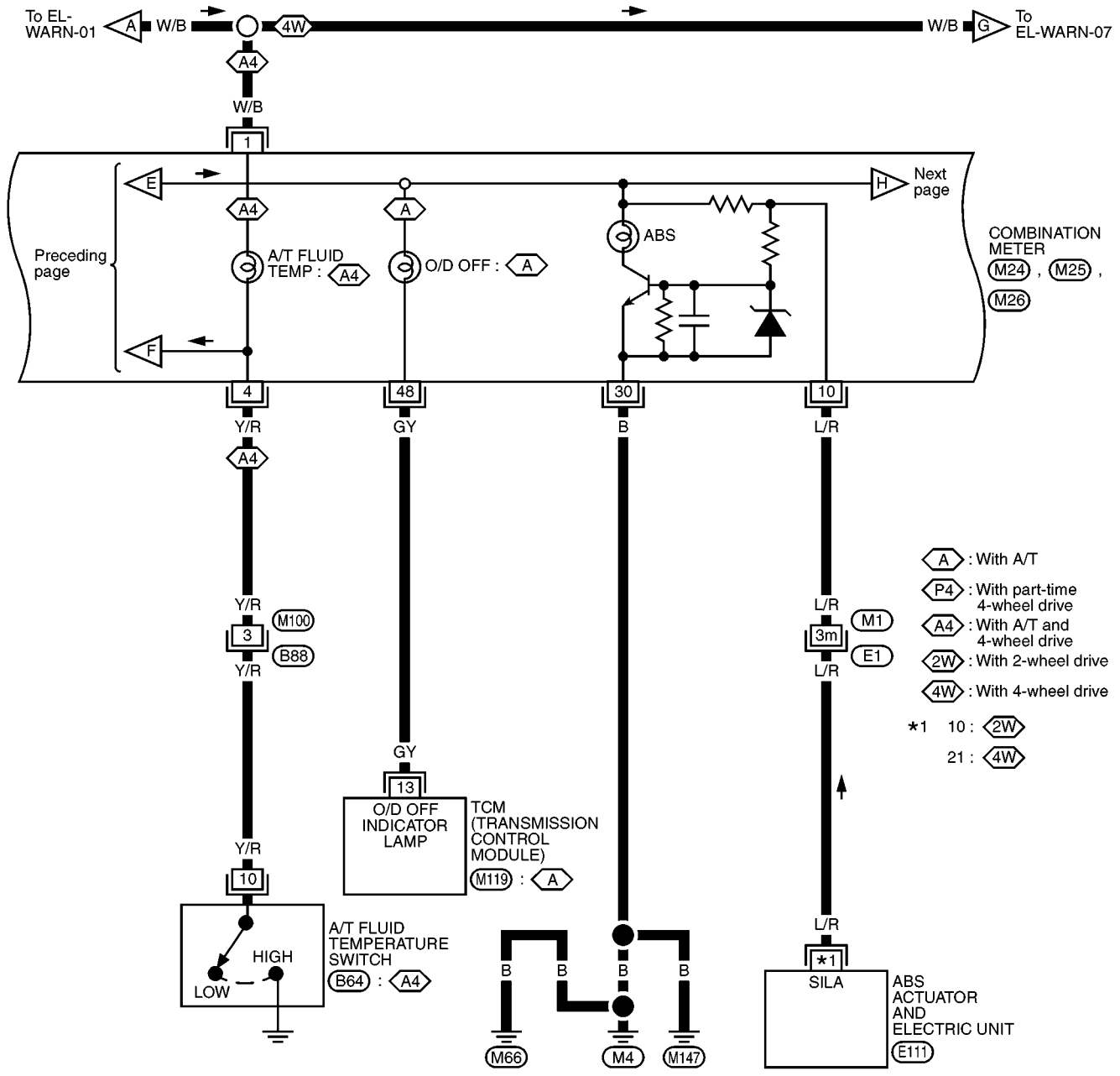


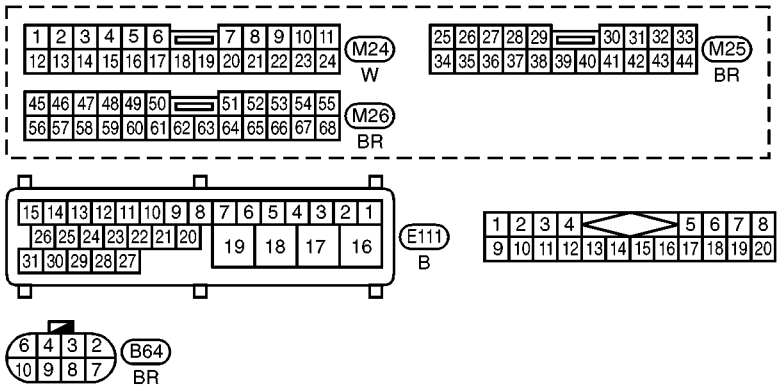


REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL024M

EL-WARN-04





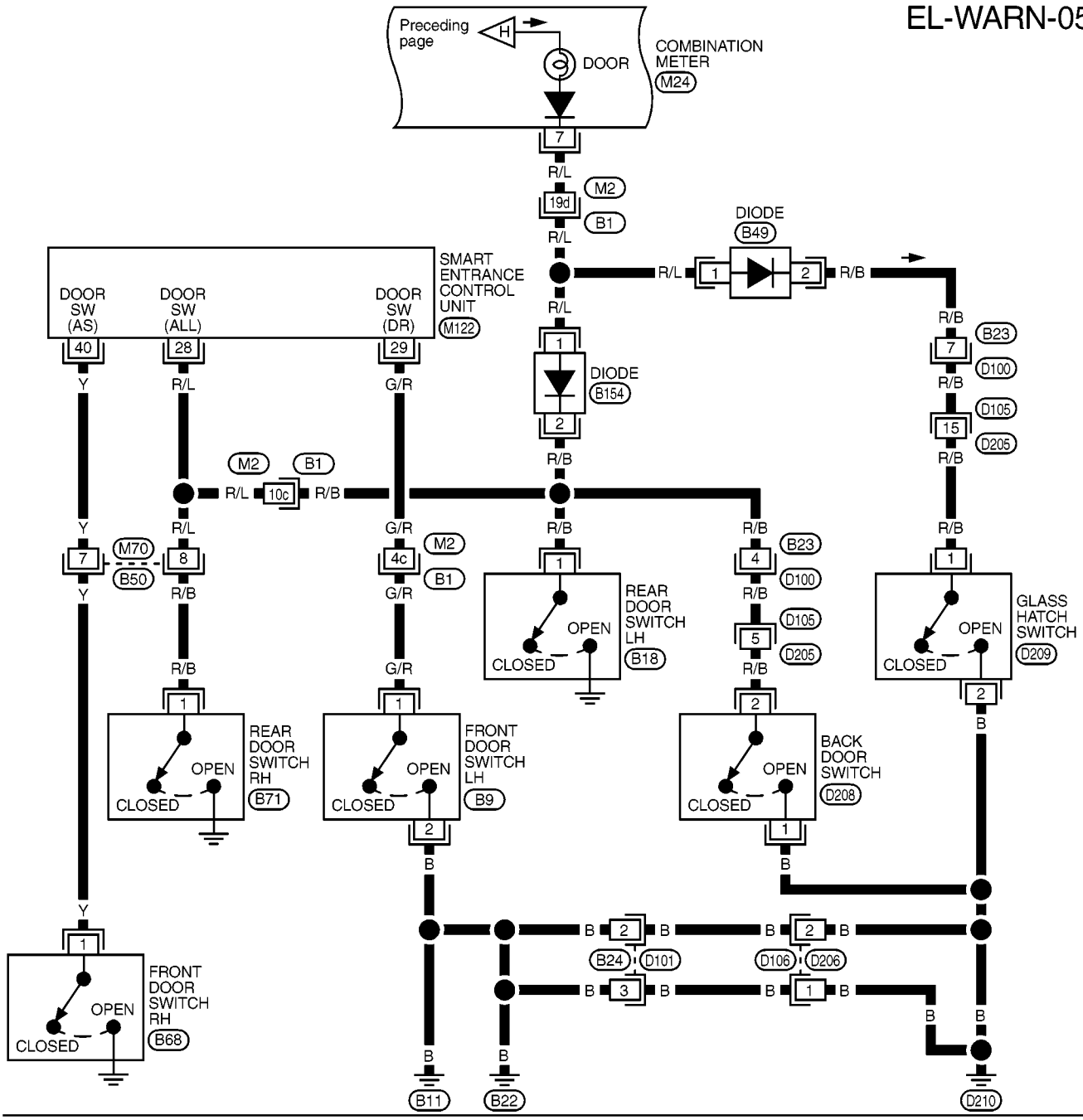
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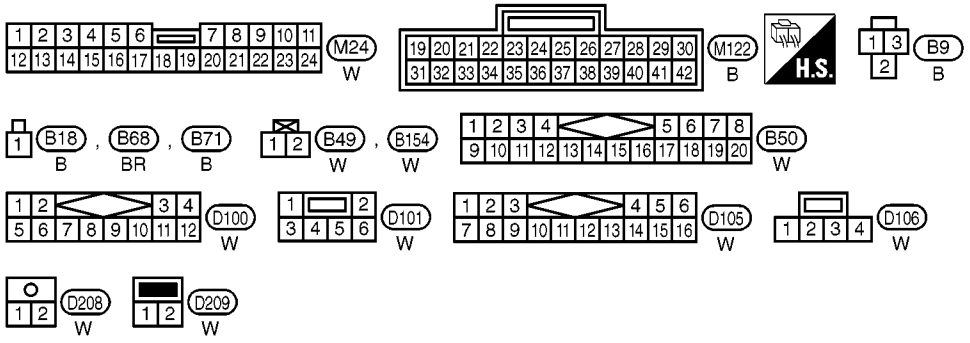
E1 -SUPER MULTIPLE JUNCTION (SMJ)

M119 -ELECTRICAL UNIT-

MEL025M

EL-WARN-05

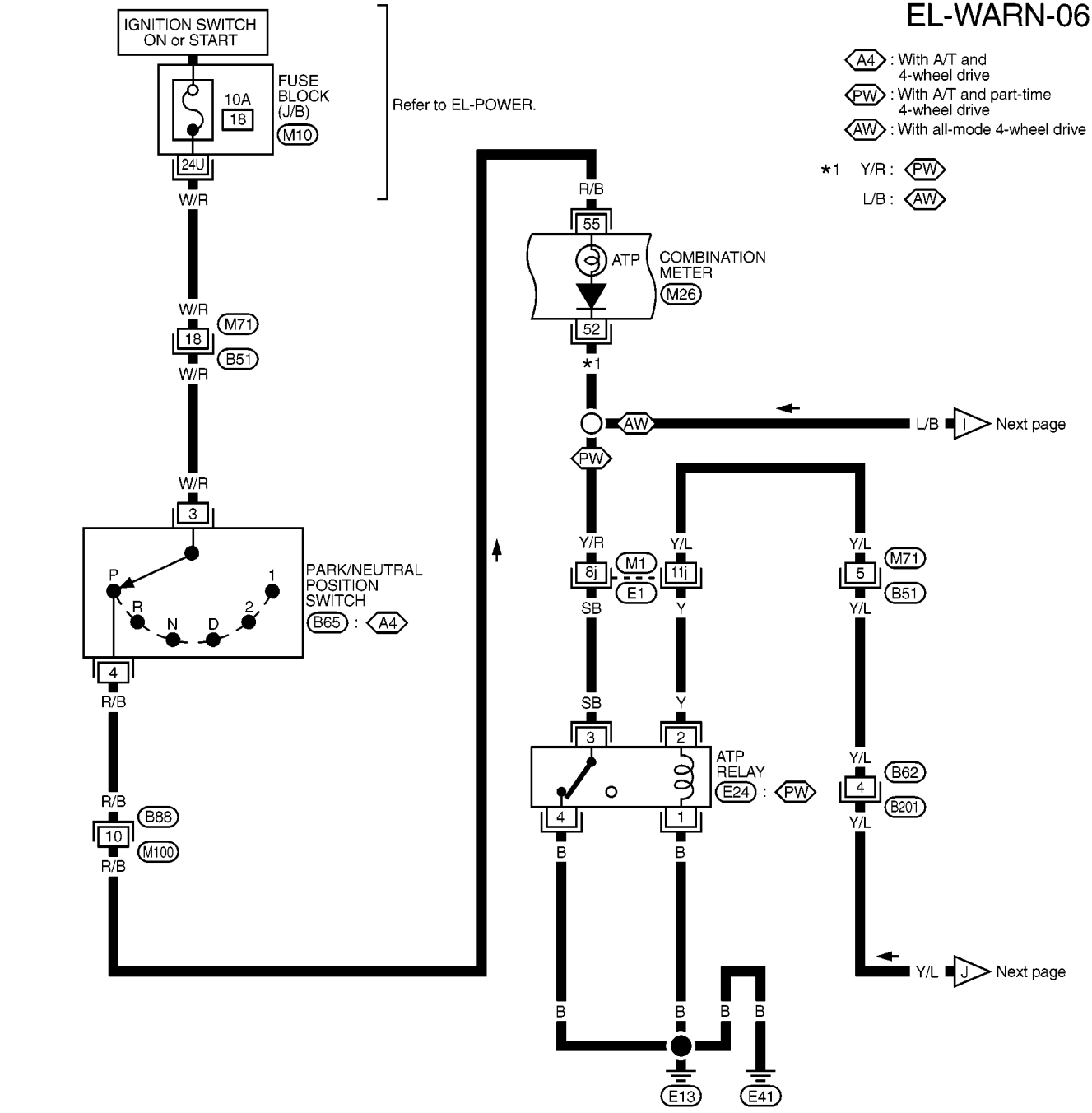


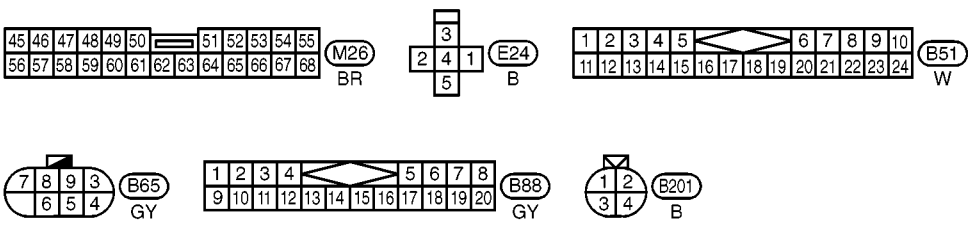


REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL246M

Wiring Diagram — WARN — (Cont'd)

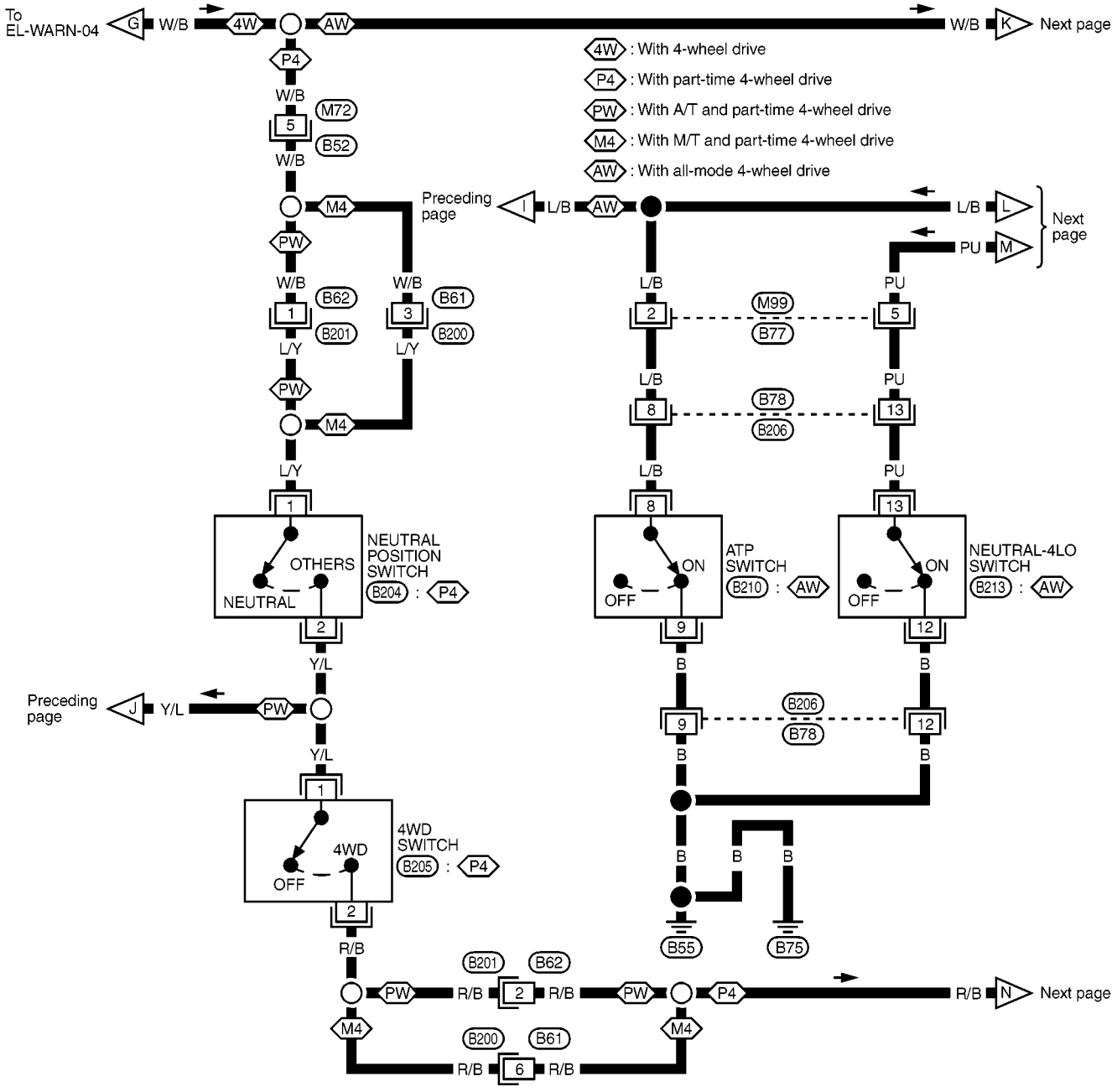


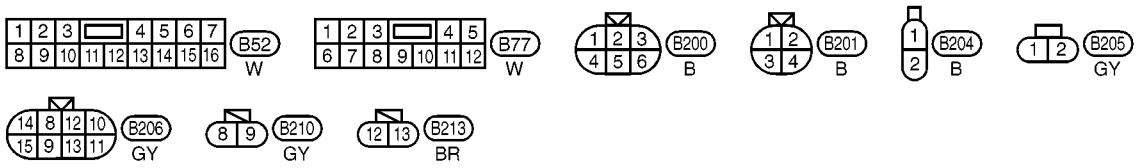


REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK- JUNCTION BOX (J/B)

MEL026M

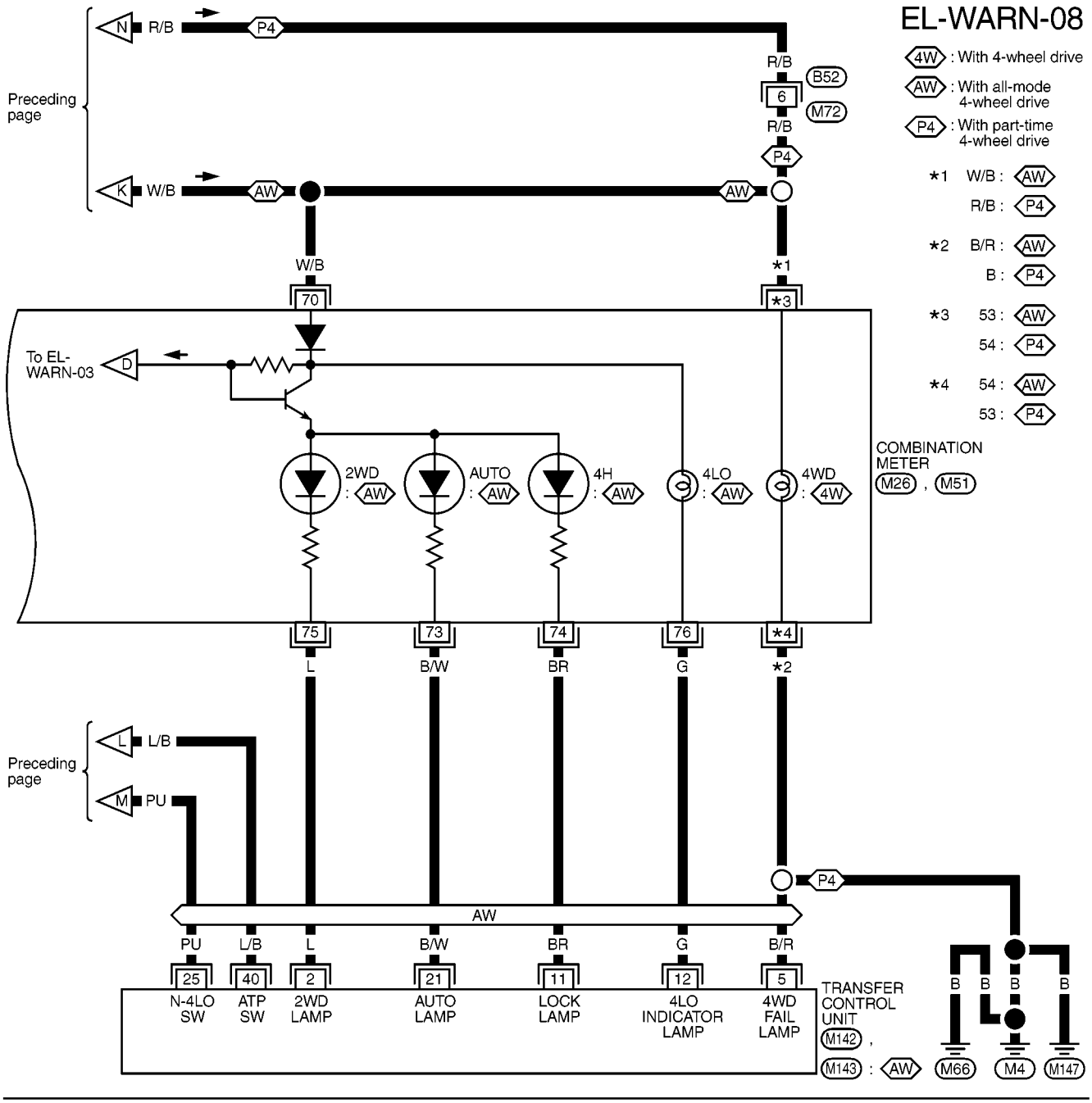
EL-WARN-07



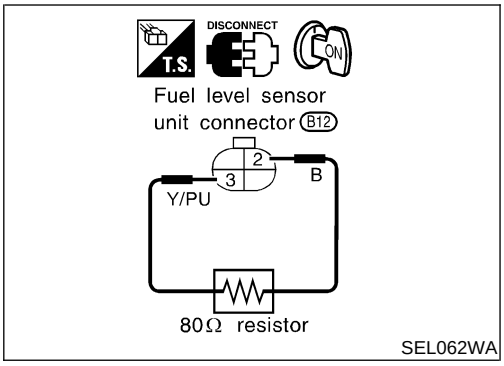


MEL027M

Wiring Diagram — WARN — (Cont'd)



MEL028M



SEL062WA

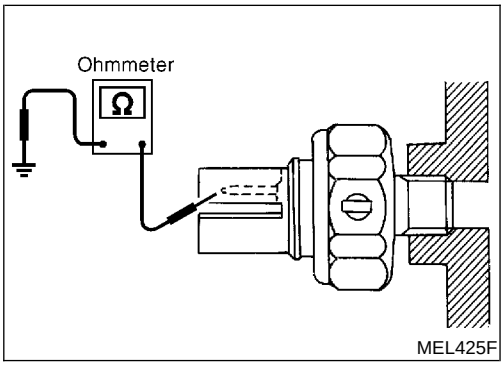
Fuel Warning Lamp Sensor Check

NAEL0166

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit harness connector B12.
3. Connect a resistor (80Ω) between fuel tank gauge unit harness connector terminals 2 and 3.
4. Turn ignition switch “ON”.

The fuel warning lamp should come on.

NOTE:
ECM might store the 1st trip DTC P0180 during this inspection.
If the DTC is stored in ECM memory, erase the DTC after reconnecting fuel tank gauge unit harness connector.
Refer to EC-71, “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.



MEL425F

Electrical Components Inspection

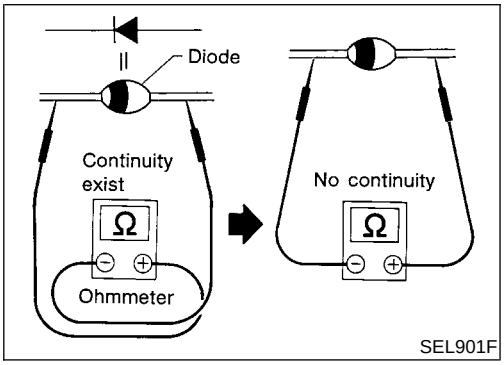
NAEL0051

OIL PRESSURE SWITCH CHECK

NAEL0051S02

	Oil pressure kPa (kg/cm^2, psi)	Continuity
Engine start	More than 10 - 20 (0.1 - 0.2, 1 - 3)	NO
Engine stop	Less than 10 - 20 (0.1 - 0.2, 1 - 3)	YES

Check the continuity between the terminals of oil pressure switch and body ground.



SEL901F

DIODE CHECK

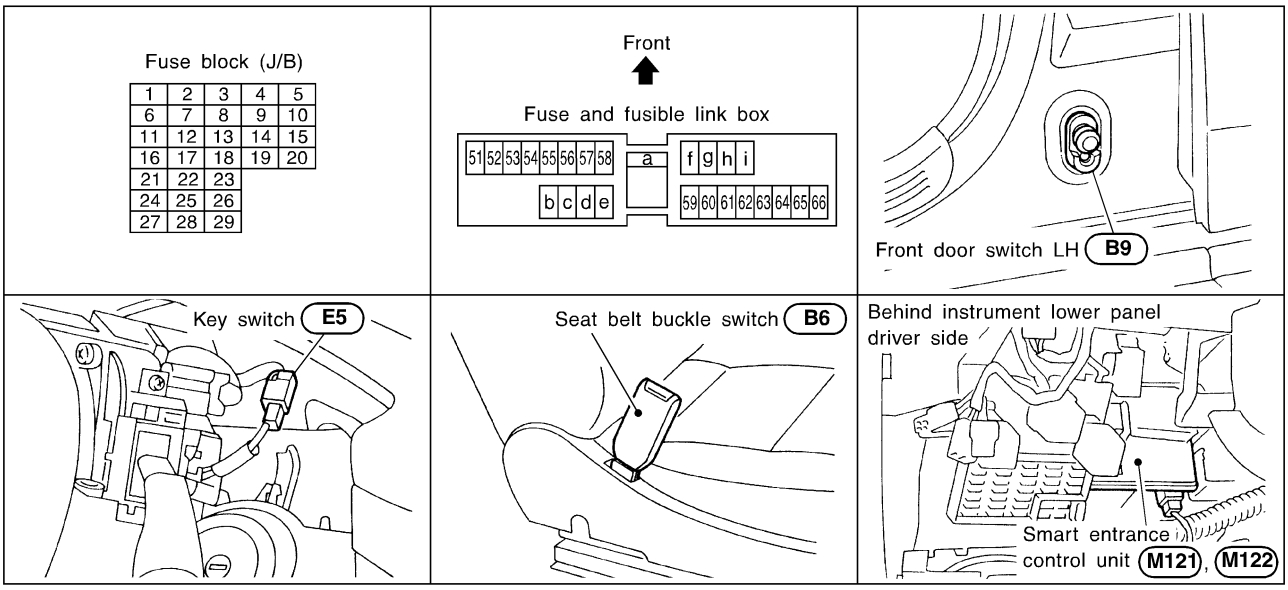
NAEL0051S03

- Check continuity using an ohmmeter.
- Diode is functioning properly if test results are as shown in the figure at left.
- Check diodes at the combination meter harness connector instead of checking them on the combination meter assembly. Refer to EL-135, “WARNING LAMP” wiring diagrams.

NOTE:
Specification may vary depending on the type of tester. Before performing this inspection, be sure to refer to the instruction manual for the tester to be used.

Component Parts and Harness Connector Location

NAEL0052



SEL046W

System Description

NAEL0053

The warning chime is controlled by the smart entrance control unit.
The warning chime is located in the smart entrance control unit.
Power is supplied at all times

- through 7.5A fuse [No. 24, located in the fuse block (J/B)]
- to smart entrance control unit terminal 10, and
- to key switch terminal 2, and
- through 10A fuse [No. 61, located in the fuse block (J/B)]
- to tail lamp relay terminals 2 and 3.

With the ignition switch in the ON or START position, power is supplied

- through 7.5A fuse [No. 11, located in the fuse block (J/B)]
- to smart entrance control unit terminal 33.

Ground is supplied to smart entrance control unit terminal 16 through body grounds M77 and M111.

IGNITION KEY WARNING CHIME

NAEL0053S01

With the key in the ignition switch in the OFF or ACC position, and the driver's door open, the warning chime will sound. Power is supplied

- from key switch terminal 1
- to smart entrance control unit terminal 32.

Ground is supplied

- from front door switch LH terminal 1
- to smart entrance control unit terminal 29.

Front door switch LH terminal 2 is grounded through body grounds B11, B22 and D210.

LIGHT WARNING CHIME

NAEL0053S02

With ignition switch OFF or ACC, driver's door open, warning chime will sound. [Except when headlamp battery saver control operates (for 45 seconds after ignition switch is turned to OFF or ACC position) and headlamps do not illuminate.] Power is supplied.

- from tail lamp relay terminal 5
- to smart entrance control unit terminal 34.

Ground is supplied

- from front door switch LH terminal 1

- to smart entrance control unit terminal 29.

Front door switch LH terminal 2 is grounded through body grounds B11, B22 and D210.

SEAT BELT WARNING CHIME

NAEL0053S03

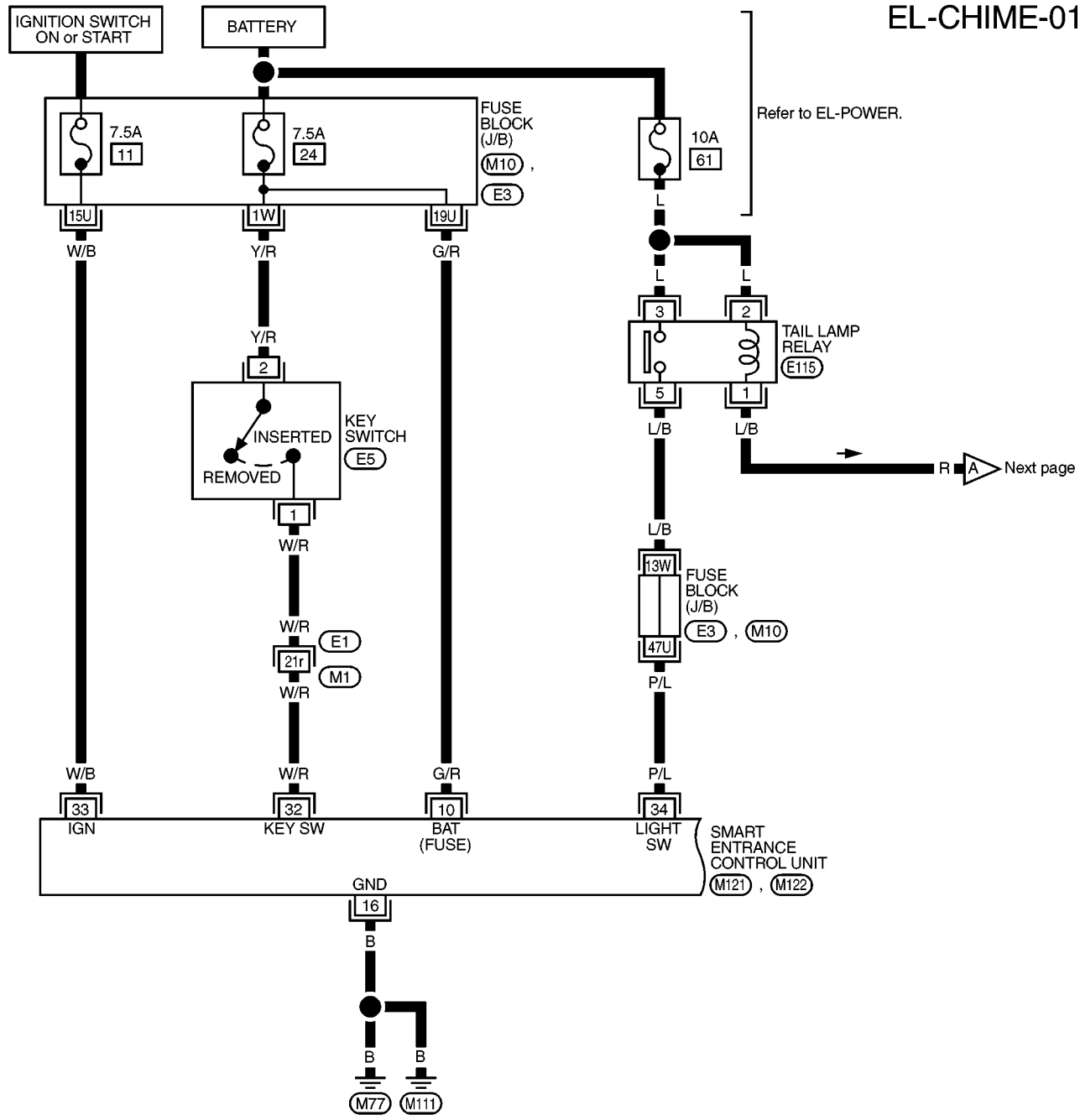
With ignition switch turned ON and seat belt unfastened (seat belt switch ON), warning chime will sound for approximately 6 seconds.
Ground is supplied

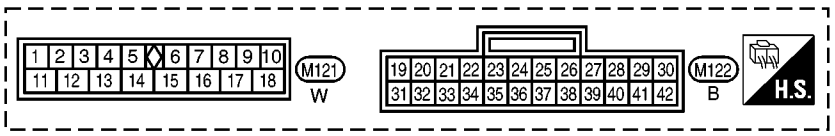
- from seat belt switch terminal 1
- to smart entrance control unit terminal 22.

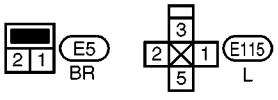
Seat belt switch terminal 2 is grounded through body grounds B11, B22 and D210.

Wiring Diagram — CHIME —

NAEL0054



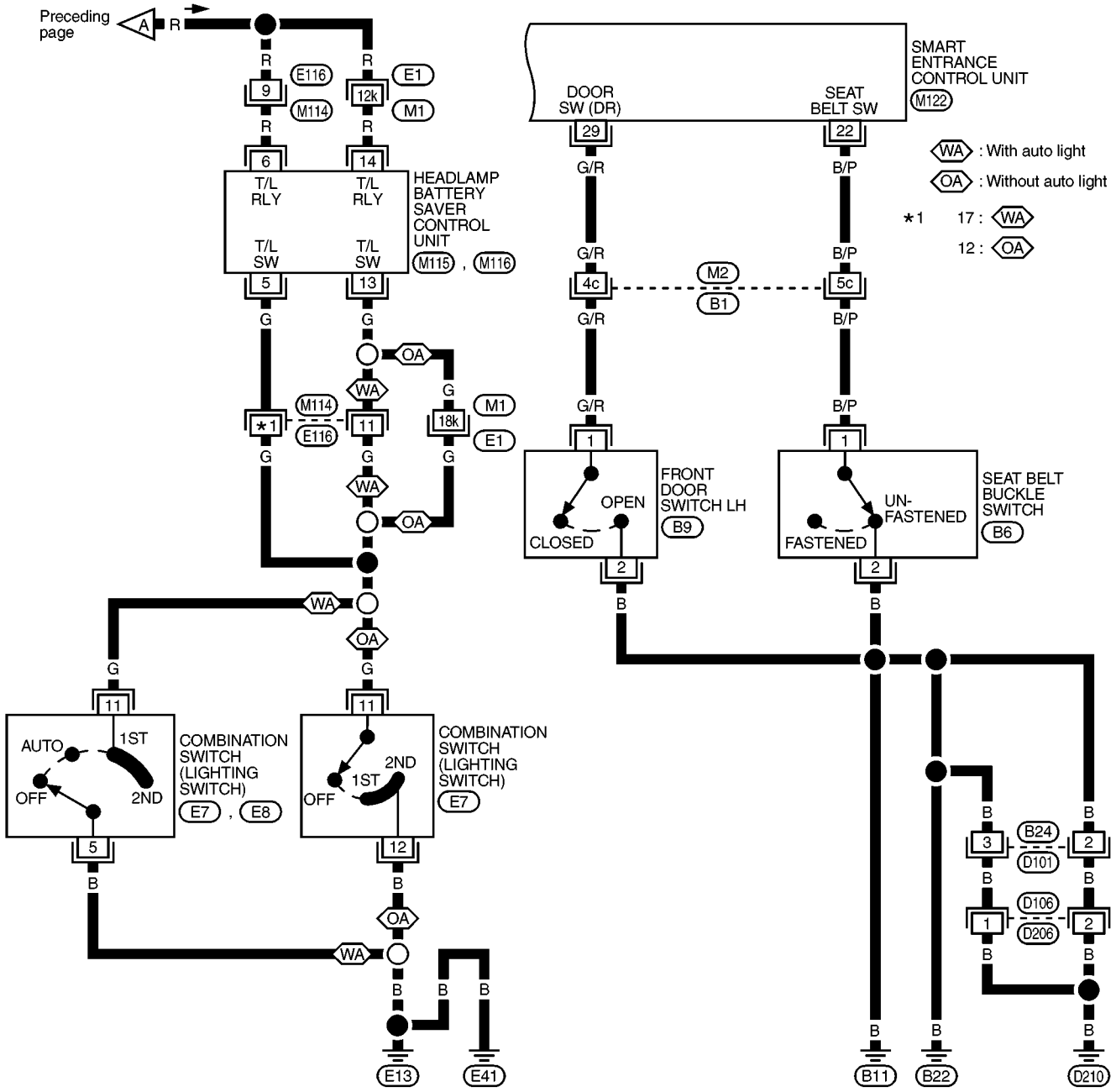


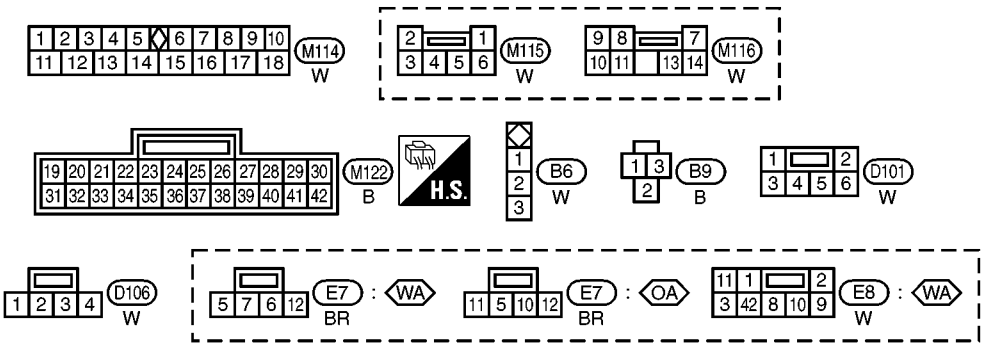


REFER TO THE FOLLOWING.
E1 - SUPER MULTIPLE JUNCTION (SMJ)
M10 , E3 - FUSE BLOCK - JUNCTION BOX (J/B)

MEL804L

EL-CHIME-02





REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL030M

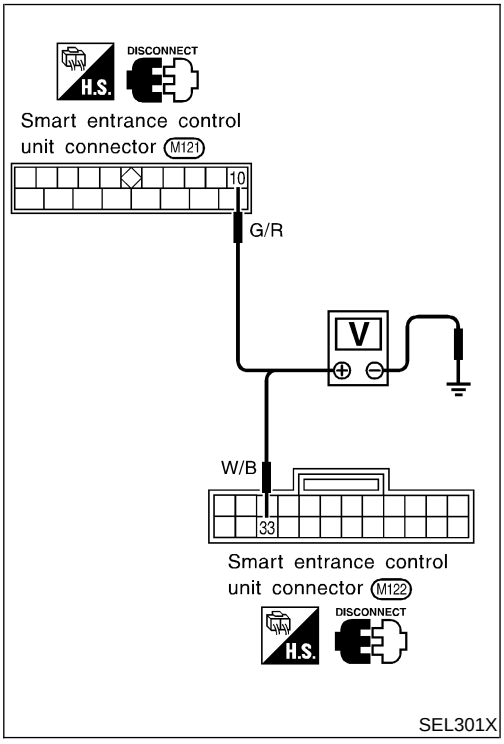
Trouble Diagnoses

NAEL0055

SYMPTOM CHART

NAEL0055S01

REFERENCE PAGE (EL-)	148	150	152	153	154
SYMPTOM	POWER SUPPLY AND GROUND CIRCUIT CHECK	LIGHTING SWITCH INPUT SIGNAL CHECK	KEY SWITCH (INSERT) CHECK	SEAT BELT BUCKLE SWITCH CHECK	DRIVER SIDE DOOR SWITCH CHECK
Light warning chime does not activate.	X	X			X
Ignition key warning chime does not activate.	X		X		X
Seat belt warning chime does not activate.	X			X	
All warning chimes do not activate.	X				



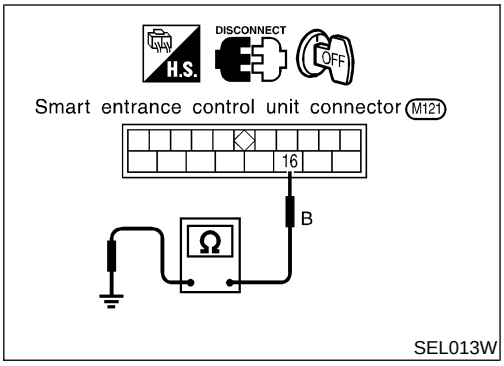
POWER SUPPLY AND GROUND CIRCUIT CHECK

NAEL0055S02

Power Supply Circuit Check

NAEL0055S0201

Terminals		Ignition switch position		
(+)	(−)	OFF	ACC	ON
10	Ground	Battery voltage	Battery voltage	Battery voltage
33	Ground	0V	0V	Battery voltage



Ground Circuit Check

NAEL0055S0202

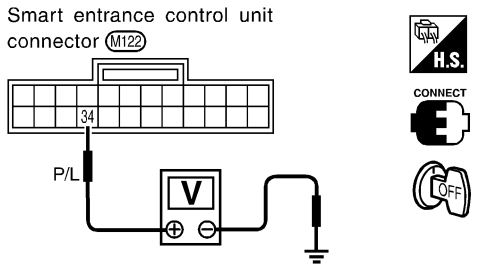
Terminals	Continuity
16 - Ground	Yes

LIGHTING SWITCH INPUT SIGNAL CHECK

=NAEL0055S03

1	CHECK LIGHTING SWITCH INPUT SIGNAL

Check voltage between smart entrance control unit terminal 34 and ground.



Voltage [V]:
Condition of lighting switch: 1ST or 2ND
Approx. 12
Condition of lighting switch: OFF
0

SEL377X

OK or NG

OK	▶	Lighting switch is OK.
NG	▶	GO TO 2.

2	CHECK FUSE

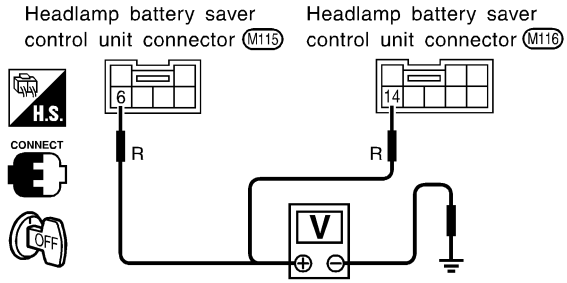
Is 10A fuse (No. 61, located in the fuse and fusible link box) OK?

OK or NG

OK	▶	GO TO 3.
NG	▶	Replace fuse.

3	CHECK TAIL LAMP RELAY CIRCUIT

Check voltage between headlamp battery saver control unit terminal 6, 14 and ground.



Voltage [V]:
Condition of lighting switch: 1ST or 2ND
0
Condition of lighting switch: OFF
Approx. 12

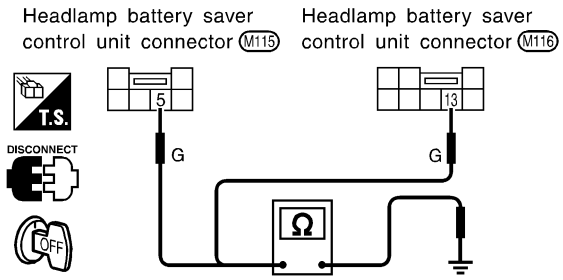
SEL378X

OK or NG

OK	▶	**Check the following.** • Tail lamp relay • Harness for open or short between smart entrance control unit and tail lamp relay.
NG	▶	GO TO 4.

4	CHECK TAIL LAMP SWITCH GROUND CIRCUIT

1. Disconnect headlamp battery saver control unit connector.
2. Check continuity between headlamp battery saver control unit terminal 5, 13 and ground.



Continuity:
Condition of lighting switch: 1ST or 2ND
Yes
Condition of lighting switch: OFF
No

SEL379X

OK or NG

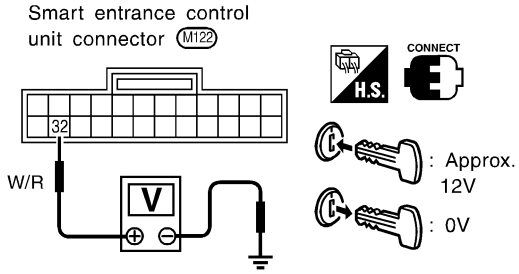
OK	▶	Check headlamp battery saver control unit. Refer to EL-47.
NG	▶	**Check the following.** ● Lighting switch ● Harness for open or short between headlamp battery saver control unit terminal 5, 13 and lighting switch terminal 11 ● Harness between lighting switch terminal 5 (with auto light system) or lighting switch terminal 12 (without auto light system) and ground

KEY SWITCH (INSERT) CHECK

=NAEL0055S04

1	CHECK KEY SWITCH INPUT SIGNAL

Check voltage between smart entrance control unit terminal 32 and ground.



Voltage [V]:
Condition of key switch: Key is inserted.
Approx. 12
Condition of key switch: Key is removed.
0

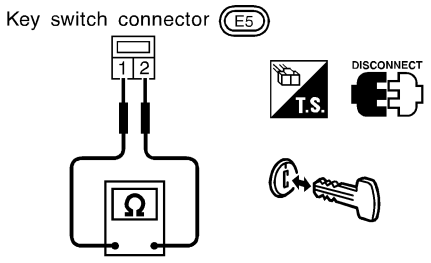
SEL307X

OK or NG

OK	▶	Key switch is OK.
NG	▶	GO TO 2.

2	CHECK KEY SWITCH (INSERT)

Check continuity between terminals 1 and 2.



Continuity:
Condition of key switch: Key is inserted.
Yes
Condition of key switch: Key is removed.
No

SEL308X

OK or NG

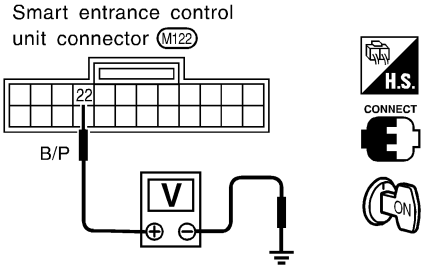
OK	▶	**Check the following.** ● 7.5A fuse [No. 24, located in fuse block (J/B)] ● Harness for open or short between key switch and fuse ● Harness for open or short between smart entrance control unit and key switch
NG	▶	Replace key switch.

SEAT BELT BUCKLE SWITCH CHECK

=NAEL0055S05

1	CHECK SEAT BELT BUCKLE SWITCH INPUT SIGNAL

1. Turn ignition switch "ON".
2. Check voltage between smart entrance control unit terminal 22 and ground.



Voltage [V]:
Condition of seat belt buckle switch: Fastened
Approx. 12
Condition of seat belt buckle switch: Unfastened
0

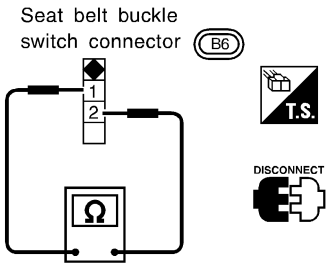
SEL380X

OK or NG

OK	▶	Seat belt buckle switch is OK.
NG	▶	GO TO 2.

2	CHECK SEAT BELT BUCKLE SWITCH

Check continuity between terminals 1 and 2 when seat belt is fastened and unfastened.



Continuity:
Seat belt is fastened.
No
Seat belt is unfastened.
Yes

SEL381X

OK or NG

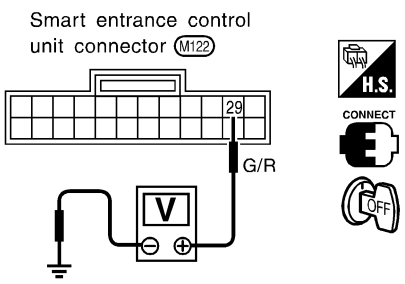
OK	▶	**Check the following.** • Seat belt buckle switch ground circuit • Harness for open or short between smart entrance control unit and seat belt buckle switch
NG	▶	Replace seat belt buckle switch.

DRIVER SIDE DOOR SWITCH CHECK

NAEL0055S06

1	CHECK DOOR SWITCH INPUT SIGNAL

Check voltage between smart entrance control unit terminal 29 and ground.



Voltage [V]:
Condition of driver's door: CLOSED
Approx. 5
Condition of driver's door: OPENED
0

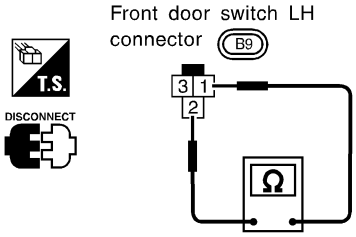
SEL382X

OK or NG

OK	▶	Front door switch LH is OK.
NG	▶	GO TO 2.

2	CHECK DRIVER SIDE DOOR SWITCH

Check continuity between terminals 1 and 2.



Continuity:
Door switch is pushed.
No
Door switch is released.
Yes

SEL383X

OK or NG

OK	▶	**Check the following.** ● Door switch ground circuit ● Harness for open or short between smart entrance control unit and door switch
NG	▶	Replace front door switch LH.

System Description

NAEL0057

WIPER OPERATION

NAEL0057S01

The front wiper switch is controlled by a lever built into the combination switch.
There are three wiper switch positions:

- LO speed
- HI speed
- INT (Intermittent)

With the ignition switch in the ACC or ON position, power is supplied

- through 20A fuse [No. 19, located in the fuse block (J/B)]
- to front wiper motor terminal 4, and
- to front wiper switch terminal 15.

Low and High Speed Wiper Operation

NAEL0057S0101

Ground is supplied to front wiper switch terminal 17 through body grounds E13 and E41.
When the wiper switch is placed in the LO position, ground is supplied

- through terminal 14 of the front wiper switch
- to front wiper motor terminal 3.

With power and ground supplied, the front wiper motor operates at low speed.
When the front wiper switch is placed in the HI position, ground is supplied

- through terminal 16 of the front wiper switch
- to front wiper motor terminal 1.

With power and ground supplied, the front wiper motor operates at high speed.

Auto Stop Operation

NAEL0057S0102

With front wiper switch turned OFF, front wiper motor will continue to operate until wiper arms reach windshield base.
When wiper arms are not located at base of windshield with front wiper switch OFF, ground is provided

- from terminal 14 of the front wiper switch
- to front wiper motor terminal 3, in order to continue front wiper motor operation at low speed.

Ground is also supplied

- to terminal 13 of the front wiper switch
- through front wiper motor terminal 2
- through terminal 6 of the front wiper motor, and
- through body grounds M77 and M111.

When wiper arms reach base of windshield, front wiper motor terminals 2 and 4 are connected instead of terminals 2 and 6. Wiper motor will then stop wiper arms at the PARK position.

Intermittent Operation

NAEL0057S0103

The front wiper motor operates the wiper arms one time at low speed at a set interval of approximately 2 to 13 seconds. This feature is controlled by the wiper amplifier built in the front wiper switch.
When the front wiper switch is placed in the INT position, ground is supplied

- to wiper amplifier (INT SW)
- from front wiper switch terminal 17
- through body grounds E13 and E41, and
- to front wiper motor terminal 3
- through the front wiper switch terminal 14
- through wiper amplifier (OUTPUT)

WASHER OPERATION

NAEL0057S02

With the ignition switch in the ACC or ON position, power is supplied

- through 20A fuse [No. 19, located in the fuse block (J/B)]
- to front washer motor terminal 1.

When the lever is pulled to the WASH position, ground is supplied

- to front washer motor terminal 2
- through terminal 18 of the front wiper switch

System Description (Cont'd)

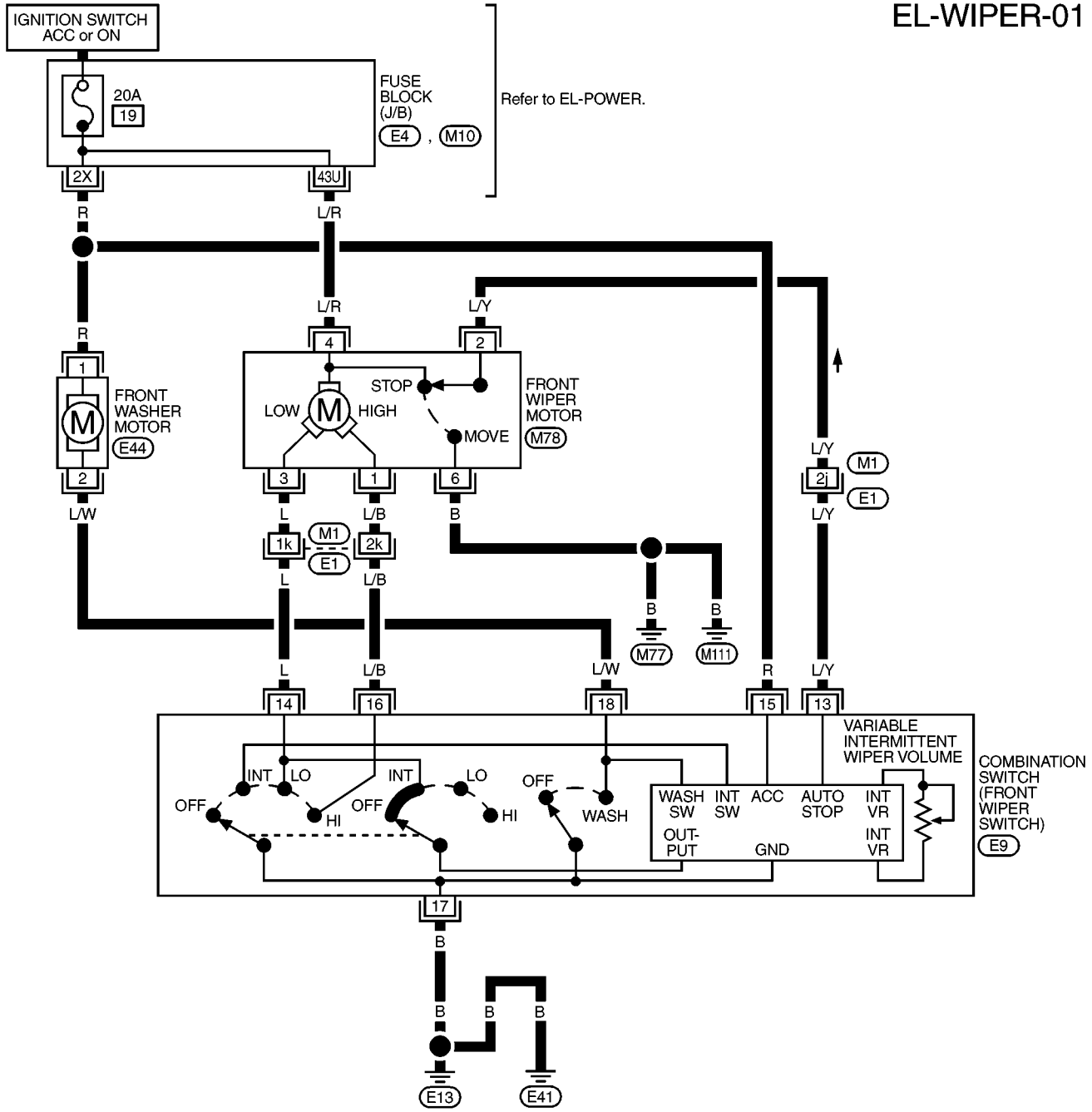
- through terminal 17 of the front wiper switch, and
- through body grounds E13 and E41.

With power and ground supplied, the front washer motor operates.
When the lever is pulled to the WASH position for one second or more, the front wiper motor operates at low speed for approximately 3 seconds to clean windshield. This feature is controlled by the wiper amplifier in the same manner as the intermittent operation.

Wiring Diagram — WIPER —

NAEL0058

EL-WIPER-01



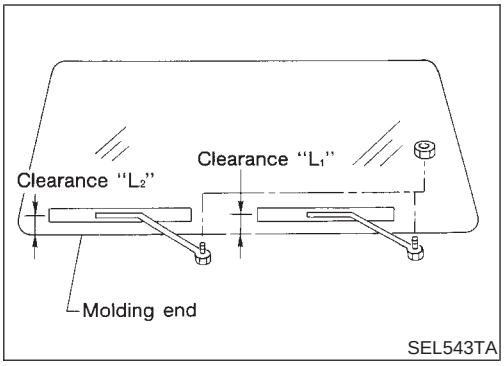
M78 GY

E9 GY

E44 GY

REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 , E4 -FUSE BLOCK-JUNCTION BOX (J/B)

MEL806L



SEL543TA

Removal and Installation

NAEL0060

WIPER ARMS

NAEL0060S01

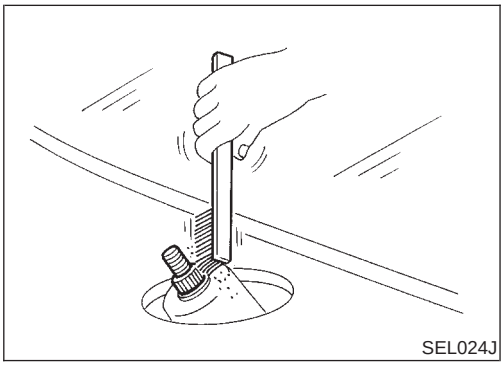
1. Prior to wiper arm installation, turn on wiper switch to operate wiper motor and then turn it "OFF" (Auto Stop).
2. Lift the blade up and then set it down onto glass surface to set the blade center to clearance "L_1" & "L_2" immediately before tightening nut.
3. Eject washer fluid. Turn on wiper switch to operate wiper motor and then turn it "OFF".
4. Ensure that wiper blades stop within clearance "L_1" & "L_2".

Clearance "L_1": 29 - 30 mm (1.14 - 1.18 in)

Clearance "L_2": 32 - 42 mm (1.26 - 1.65 in)

- Tighten wiper arm nuts to specified torque.

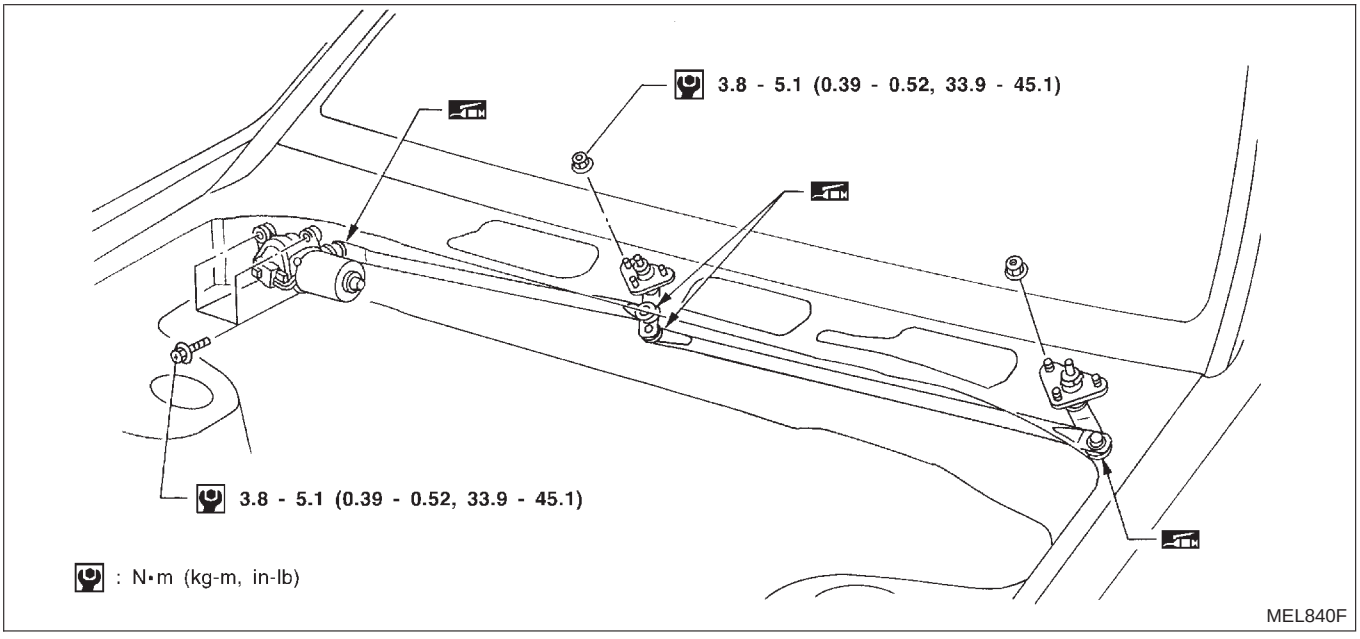
Front wiper: 21 - 26 N·m (2.1 - 2.7 kg-m, 15 - 20 ft-lb)


SEL024J

- **Before reinstalling wiper arm, clean up the pivot area as illustrated. This will reduce possibility of wiper arm looseness.**

WIPER LINKAGE

NAEL0060S02



MEL840F

Removal

NAEL0060S0201

1. Remove 4 bolts that secure wiper motor.
2. Detach wiper motor from wiper linkage at ball joint.
3. Remove wiper linkage.

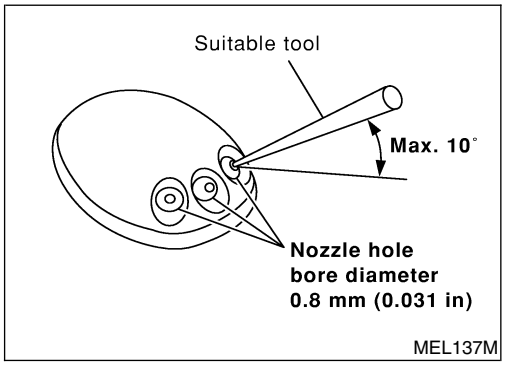
Be careful not to break ball joint rubber boot.

Installation

NAEL0060S0202

- Grease ball joint portion before installation.

1. Installation is the reverse order of removal.

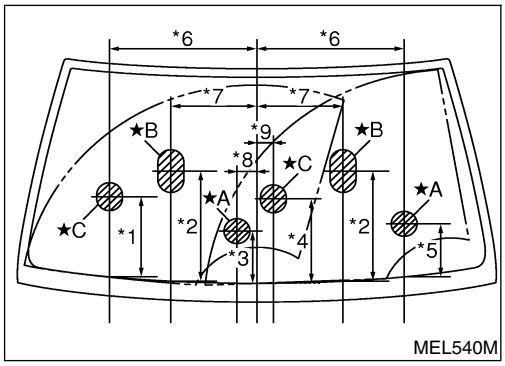


Washer Nozzle Adjustment

NAEL0061

- Adjust washer nozzle with suitable tool as shown in the figure at left.

Adjustable range: ±10



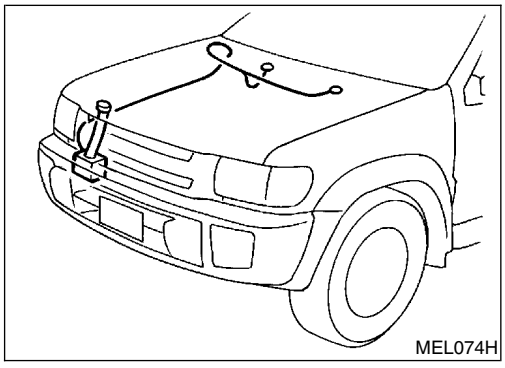
Unit: mm (in)

*1	251 (9.88)	*6	459 (18.07)
*2	351 (13.82)	*7	256 (10.08)
*3	165 (6.50)	*8	67 (2.64)
*4	269 (10.59)	*9	42 (1.65)
*5	167 (6.57)		

*A: The diameters of these circles are less than 80 mm (3.15 in).
*B: The diameter of this circle is less than 138 X 80 mm (5.43 X 3.15 in).
*C: The diameter of this circle is less than 96 X 80 mm (3.78 X 3.15 in).

Washer Tube Layout

NAEL0062



System Description

NAEL0063

WIPER OPERATION

NAEL0063S01

Power Supply and Ground

NAEL0063S0101

With ignition switch in the ACC or ON position, power is supplied
- through 10A fuse [No. 29, located in the fuse block (J/B)]
- to rear wiper amp. terminal 6.

When the glass hatch switch is OPEN, ground is supplied
- to rear wiper amp. terminal 3
- through glass hatch switch terminal 1 and 2
- through body grounds B11, B22 and D210.

Ground is supplied
- to rear wiper amp. terminal 9
- through body grounds B11, B22 and D210.

Low Speed Wiper Operation

NAEL0063S0103

When the rear wiper switch is turned ON, ground is supplied
- to rear wiper amp. terminal 2
- through combination switch terminals 22 and 24
- through body grounds E13 and E41.

Then, power is supplied
- through rear wiper amp. terminal 11
- to rear wiper motor terminal 4.

Ground is supplied
- to rear wiper motor terminal 3
- through rear wiper amp. terminal 8.

With power and ground supplied, the wiper motor operates at low speed.

Auto Stop Operation

NAEL0063S0104

With rear wiper switch turned OFF, rear wiper motor will continue to operate until wiper arm reaches rear wiper stopper.
When rear wiper arm is not located at bottom with wiper switch OFF, ground is supplied
- to rear wiper amp. terminal 10
- through wiper motor terminals 7 and 8
- through body grounds B11, B22 and D210.

Then rear wiper motor continues to operate until wiper arm reaches bottom.
When wiper arm reaches bottom, power is supplied
- through 10A fuse [No. 29, located in the fuse block (J/B)]
- through rear wiper motor terminals 6 and 7 and
- through rear wiper amp. terminals 10 and 8
- to rear wiper motor terminal 3.

Ground is supplied
- to rear wiper motor 4
- through rear wiper amp. terminal 11.

Then wiper motor turns the other way and wiper arm moves once until wiper arm reaches stopper.

Intermittent Operation

NAEL0063S0105

The rear wiper motor operates the wiper arms at low speed approximately every 7 seconds. This feature is controlled by the wiper amp.
When the wiper switch is placed in the INT position, ground is supplied
- to wiper amp. terminal 4
- through rear combination switch terminal 21 and 24
- through body grounds E13 and E41.

Then, power is supplied
- through rear wiper amp. terminal 11

- to rear wiper motor terminal 4.

Ground is supplied

- to rear wiper motor terminal 3
- through rear wiper amp. terminal 8.

With power and ground supplied, rear wiper operates at low speed intermittent.

WIPER OPERATION PROHIBIT CONTROL

NAEL0063S03

When glass hatch is open with back door key cylinder while rear wiper is operated, wiper operation is stopped. (Wiper operation prohibit control)
When glass hatch is closed and rear wiper switch turns from OFF and then rear wiper switch is turned to ON, wiper operation prohibit control is canceled.

WASHER OPERATION

NAEL0063S02

When the rear wiper switch is turned to WASH position, ground is supplied

- to rear wiper amp. terminal 1
- through terminals 23 and 24
- through body grounds E13 and E41.

Then, power is supplied

- through rear wiper amp. terminal 7
- to rear washer motor terminal 2.

Ground is supplied

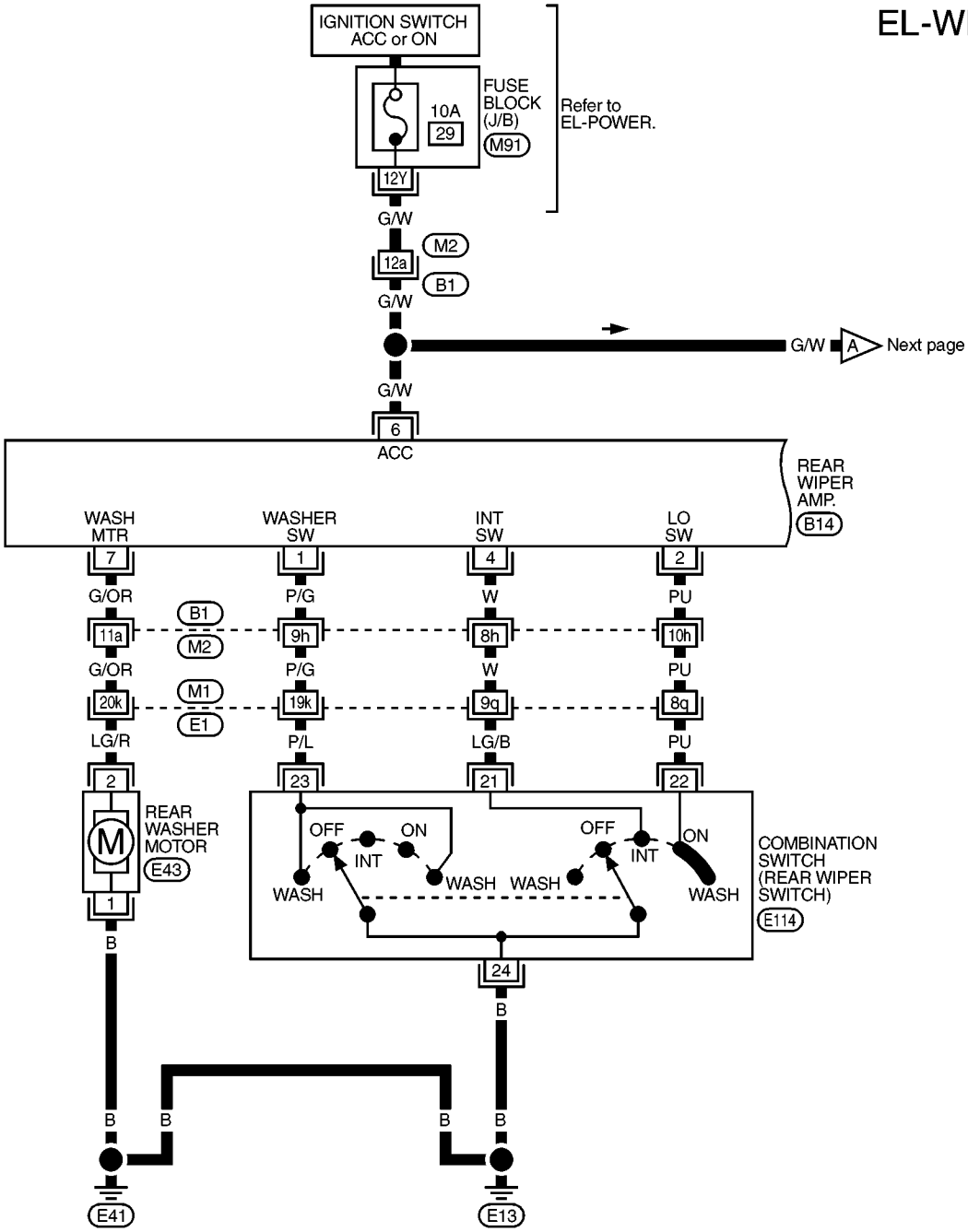
- to rear washer motor terminal 1
- through body grounds E13 and E41.

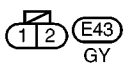
With power and ground supplied, the rear washer motor operates.
When the rear wiper switch is turned to WASH position for one second or more, the rear wiper motor operates at low speed for approximately 3 seconds after the rear wiper switch is released. This feature is controlled by the rear wiper amp. in the same manner as the low speed operation.

Wiring Diagram — WIP/R —

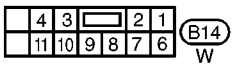
NAEL0065

EL-WIP/R-01





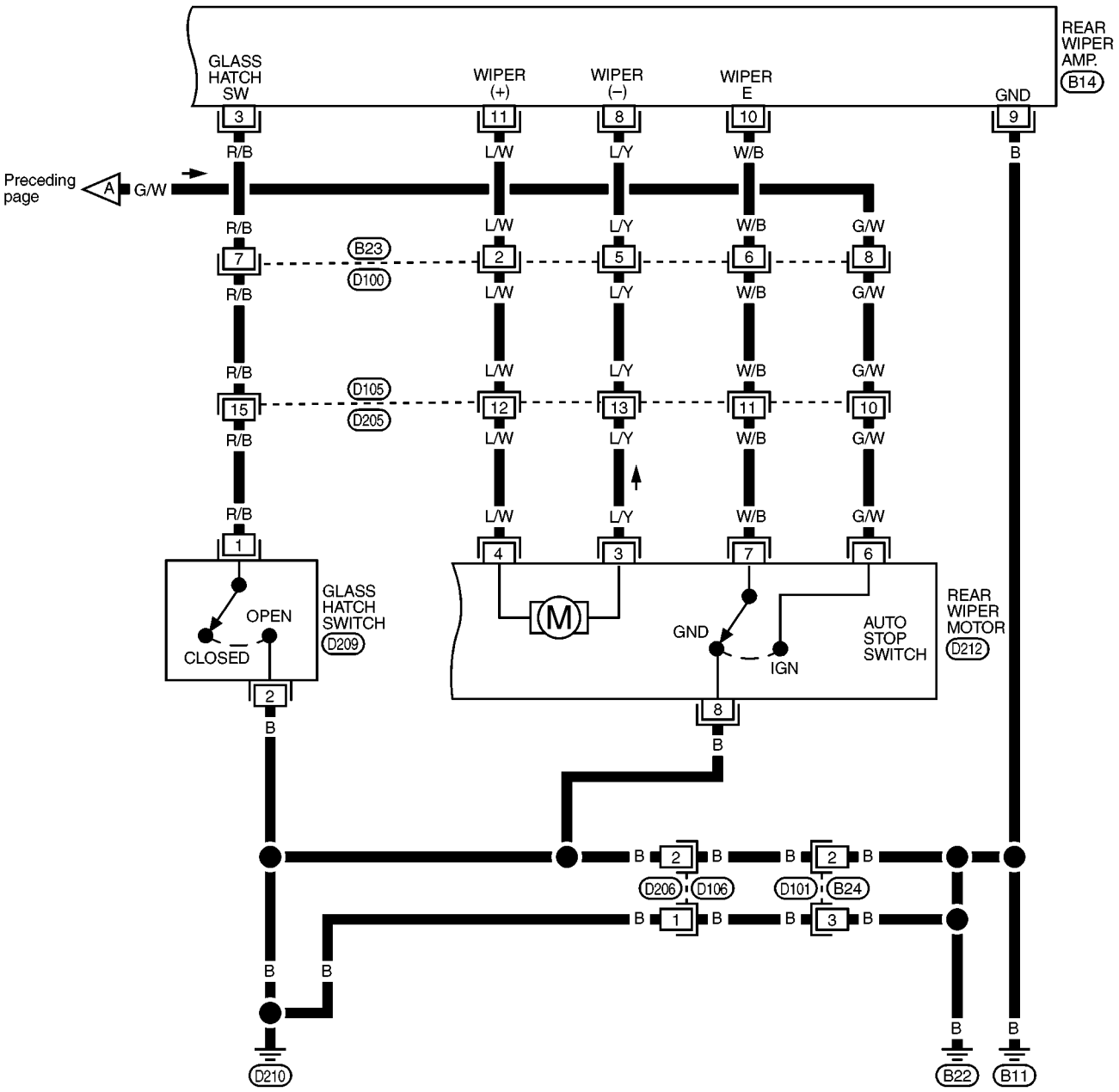


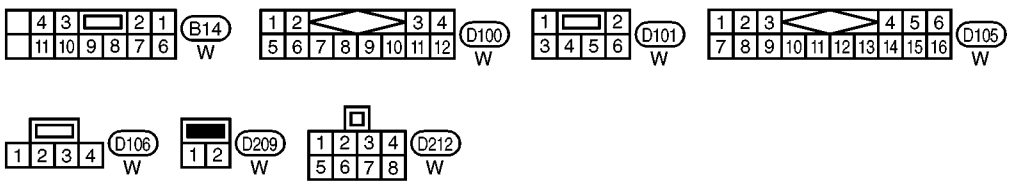


REFER TO THE FOLLOWING.
(B1) , (E1) -SUPER MULTIPLE JUNCTION (SMJ)
(M91) -FUSE BLOCK-JUNCTION BOX (J/B)

MEL031M

EL-WIP/R-02





MEL032M

Trouble Diagnoses

NAEL0066

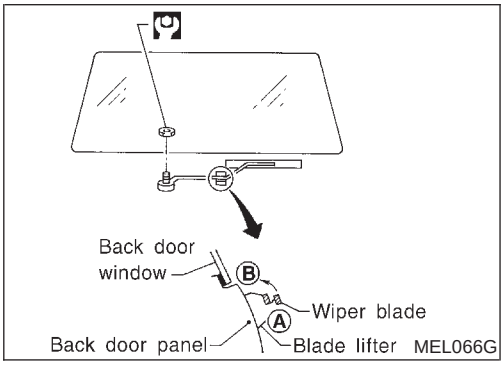
REAR WIPER AMP. INSPECTION TABLE

NAEL0066S01

(Data are reference values.)

Terminal No.	Item	Condition			Voltage (Approximate value)
1	Washer switch	ACC	Rear wiper switch	WASH	Less than 1V
				OFF, ON or INT	Battery voltage
2	Low switch	ACC	Rear wiper switch	ON	Less than 1V
				OFF or INT	Battery voltage
3	Glass hatch switch	ACC	Glass hatch	Open	Less than 1V
				Closed	Battery voltage
4	Intermittent switch	ACC	Rear wiper switch	INT	Less than 1V
				OFF, ON or WASH	Battery voltage
6	Power supply (ACC)	ACC	—		Battery voltage
7	Washer motor	ACC	Rear washer switch	WASH	Battery voltage
				OFF, ON or INT	Less than 1V
8	Rear wiper motor	ACC	Wiper is moving (except final drive)		Less than 1V
			Wiper stop		Less than 1V
			During wiper final drive		Battery voltage
9	Ground	—			—
10	Auto stop switch	ACC	Rear wiper switch should be at “INT” to inspect the value for wiper movement.	Wiper is moving	Less than 1V
				Wiper stop	Battery voltage
11	Rear wiper motor	ACC	Wiper is moving (except final drive)		Battery voltage
			Wiper stop		Battery voltage
			During wiper final drive		Less than 1V

NOTE:
Power to the rear wiper amp. will be interrupted when the rear glass hatch is opened. In that case, conduct the inspection of the rear wiper amp. with the rear glass hatch closed, unless otherwise indicated.



Removal and Installation

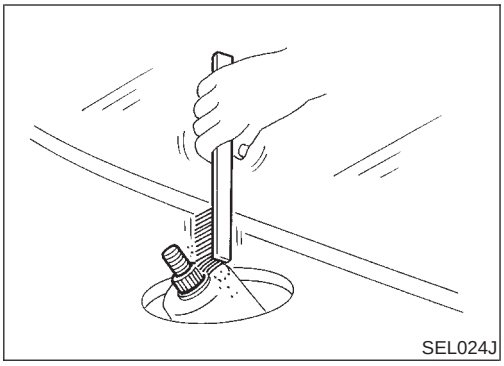
NAEL0067

WIPER ARMS

NAEL0067S01

1. Prior to wiper arm installation, turn on wiper switch to operate wiper motor and then turn it “OFF” (Auto Stop).
2. Install wiper arm to portion A as in figure below and tighten wiper arm nut to specification.
3. Then, set wiper arm to portion B.

: 13 - 18 N·m (1.3 - 1.8 kg-m, 9 - 13 ft-lb)


SEL024J

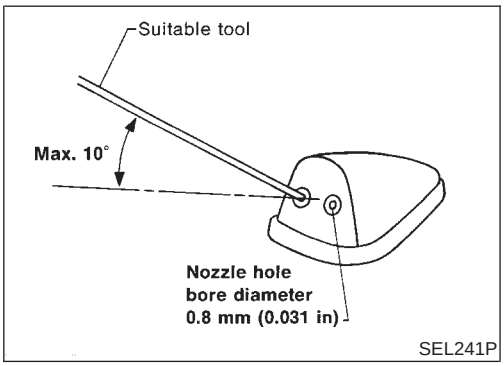
- **Before reinstalling wiper arm, clean up the pivot area as illustrated. This will reduce possibility of wiper arm looseness.**

Washer Nozzle Adjustment

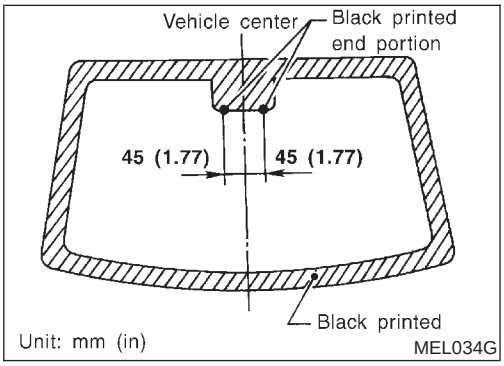
NAEL0068

- Adjust washer nozzle with suitable tool as shown in the figure at left.

  Adjustable range: ±10° (In any direction)



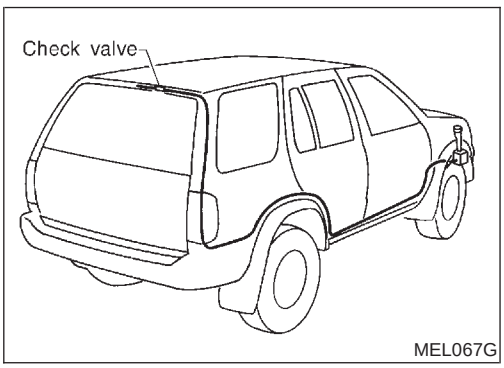
SEL241P



MEL034G

Washer Tube Layout

NAEL0069

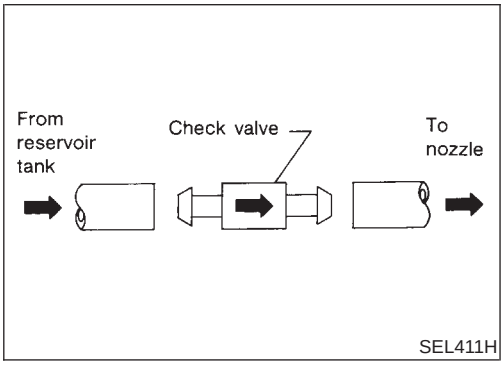


MEL067G

Check Valve

NAEL0070

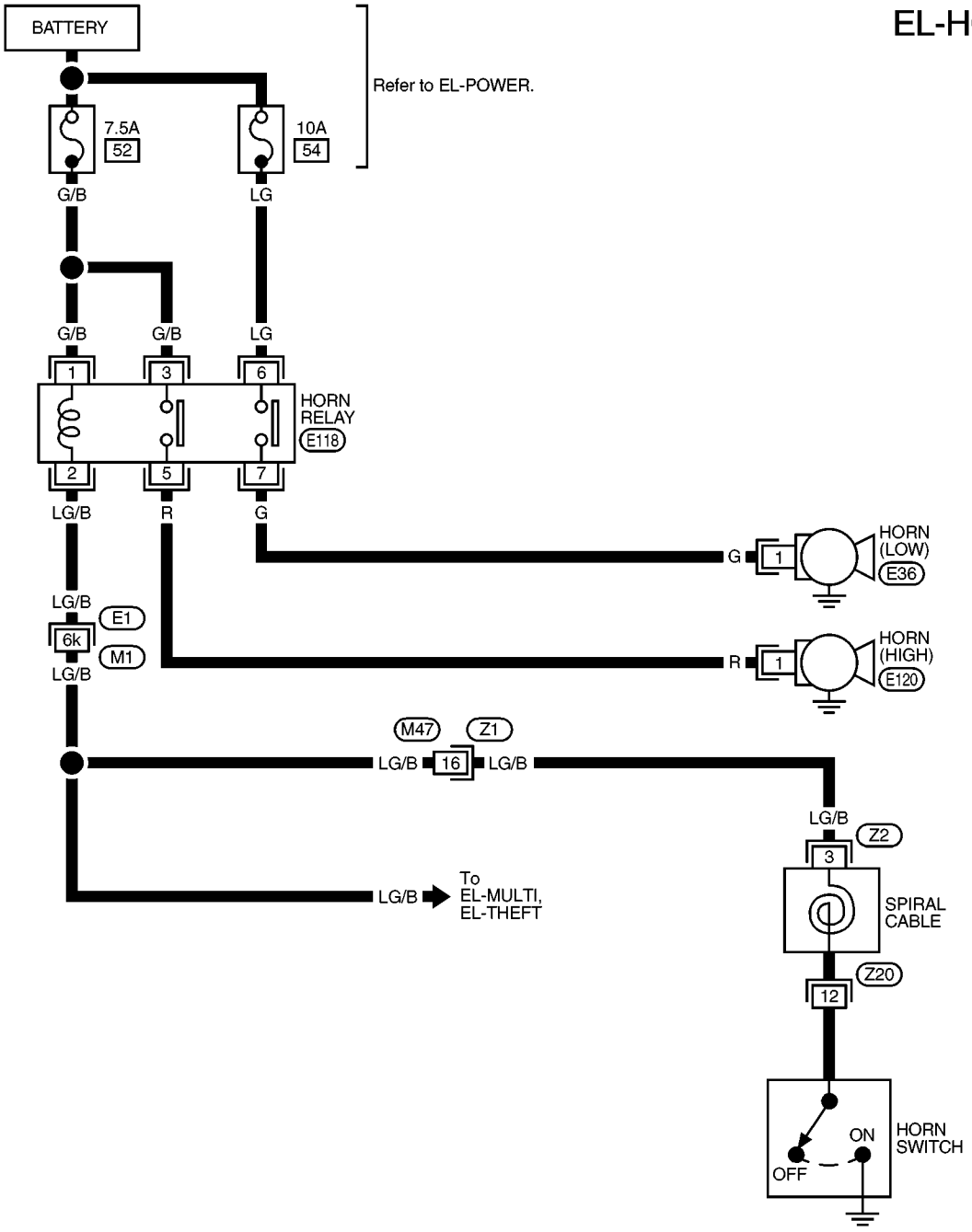
- A check valve is provided in the washer fluid line. Be careful not to connect check valve to washer tube in the wrong direction.

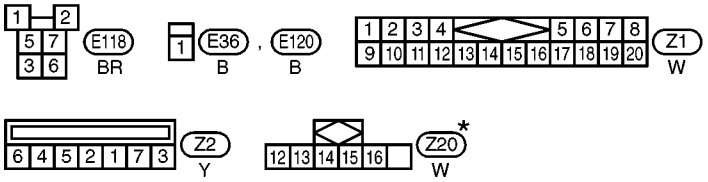


SEL411H

Wiring Diagram — HORN —

NAEL0071





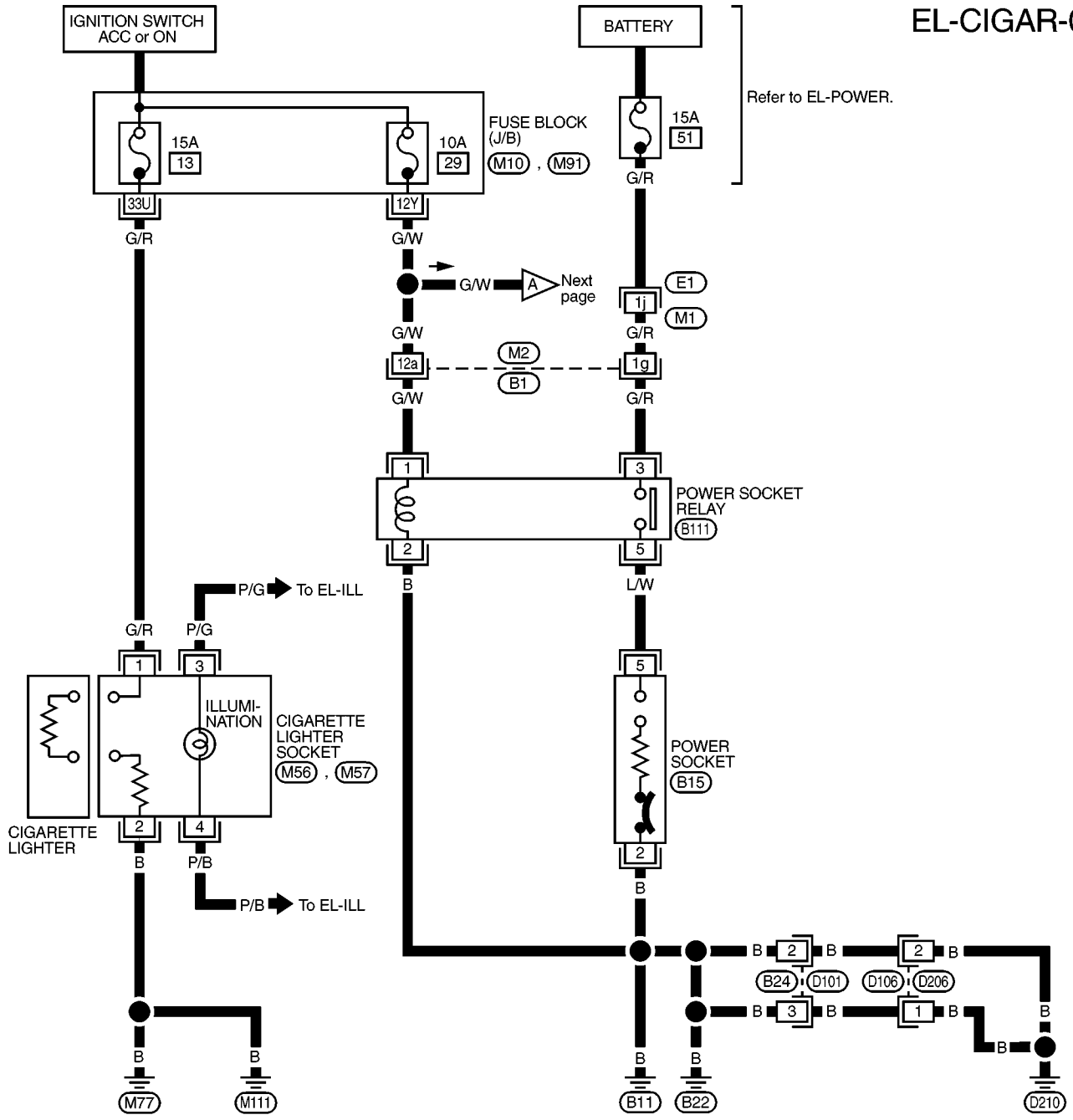
∗: This connector is not shown in "HARNESS LAYOUT", EL section.

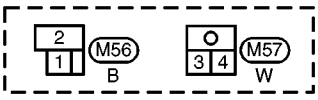
REFER TO THE FOLLOWING.
E1 -SUPER
MULTIPLE JUNCTION (SMJ)

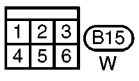
MEL033M

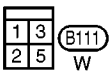
Wiring Diagram — CIGAR —

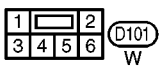
NAEL0156

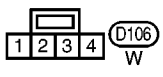












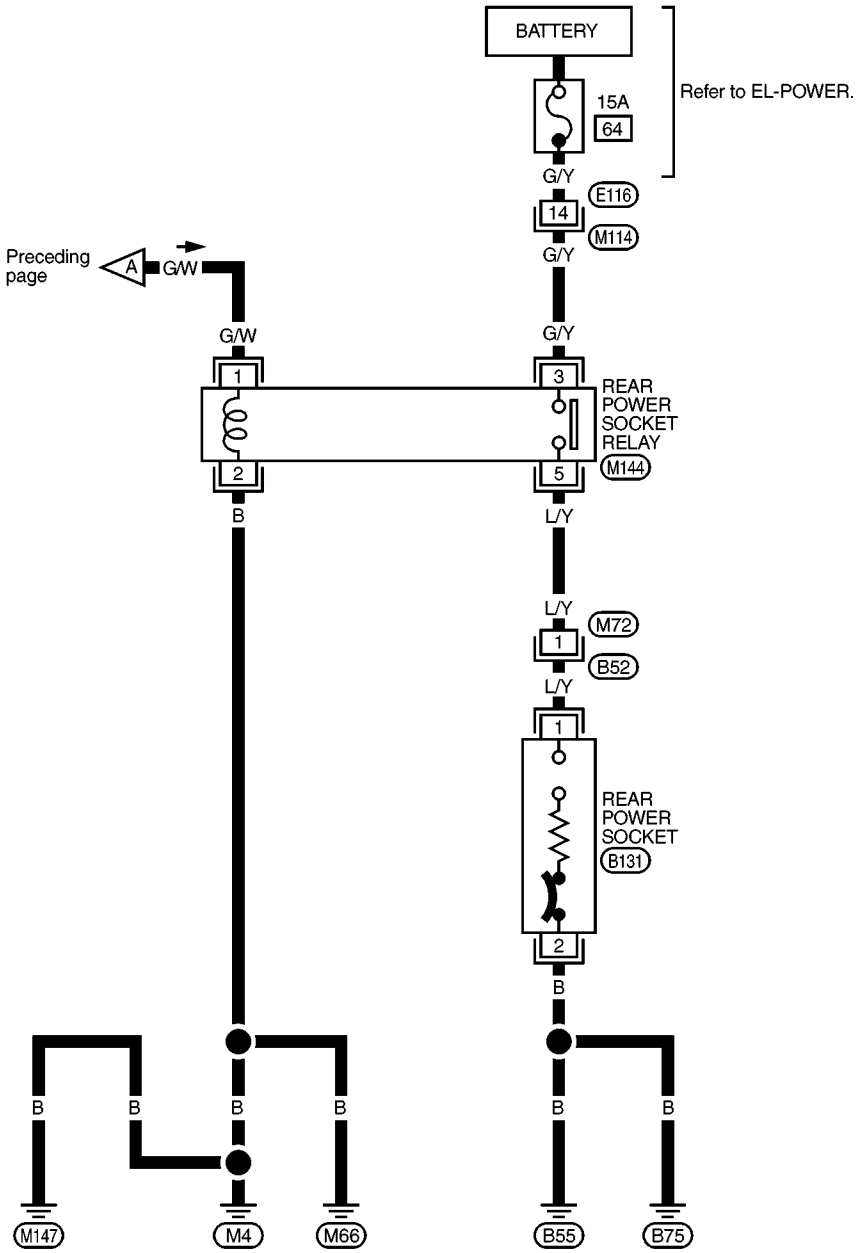
REFER TO THE FOLLOWING.

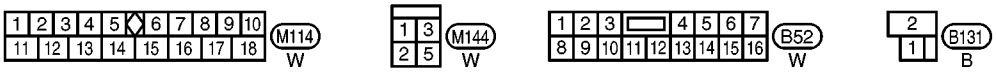
E1 , B1 - SUPER MULTIPLE JUNCTION (SMJ)

M10 , M91 - FUSE BLOCK - JUNCTION BOX (J/B)

MEL812L

EL-CIGAR-02

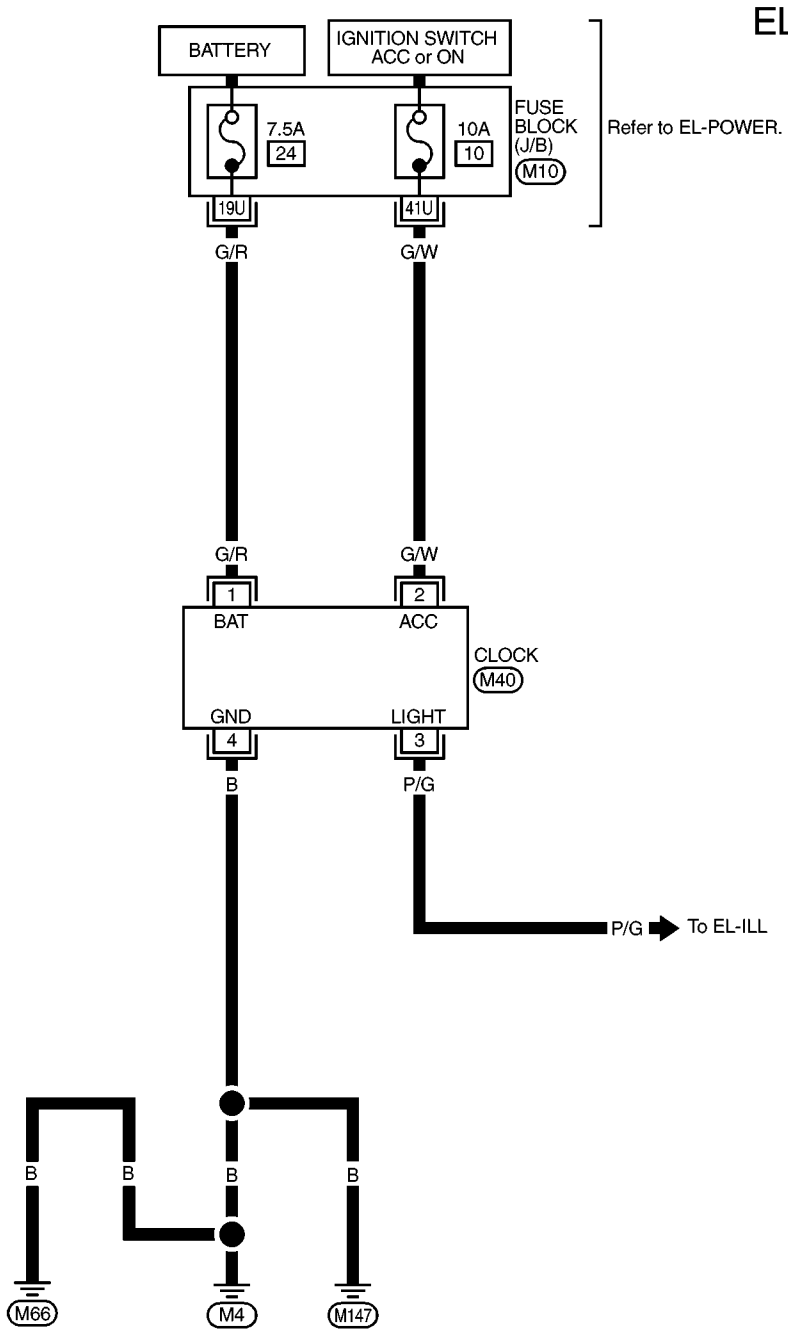


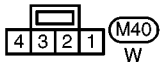


MEL034M

Wiring Diagram — CLOCK —

NAEL0204



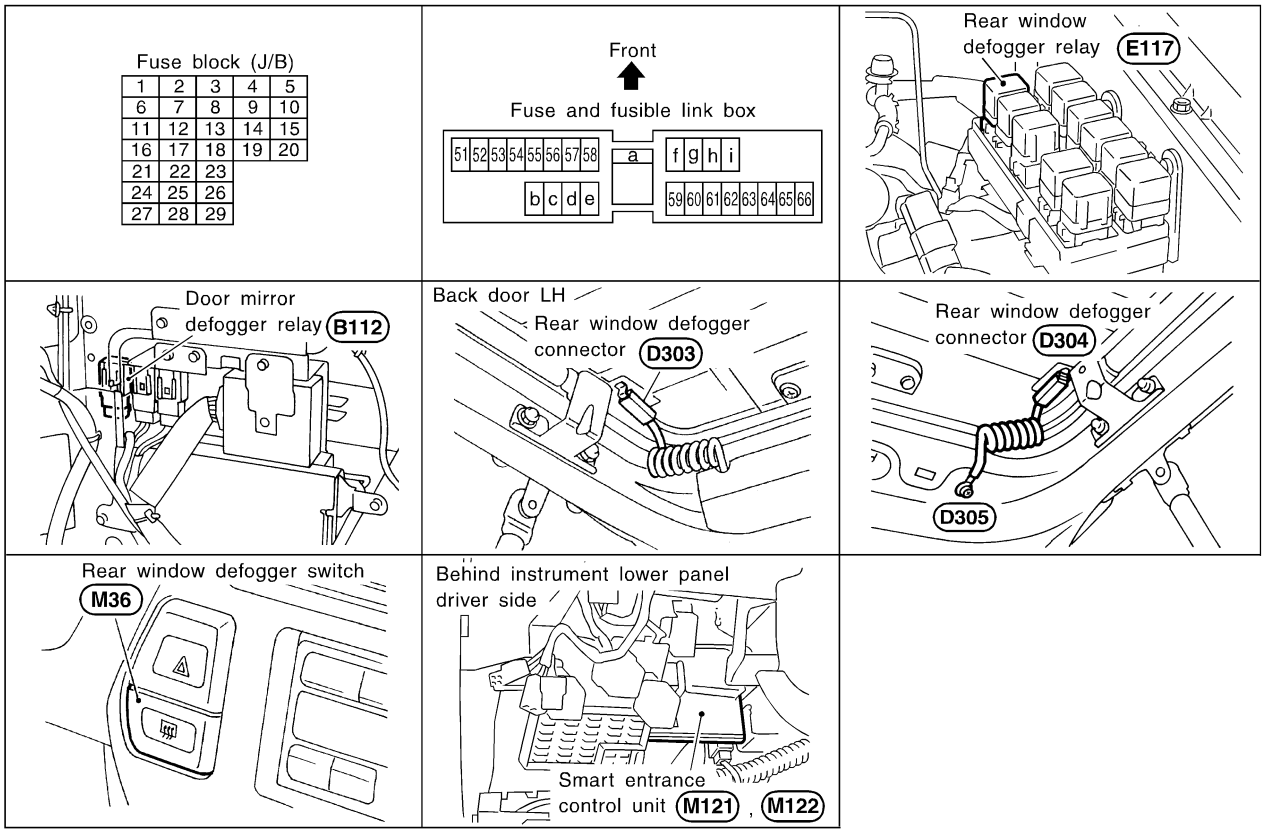


REFER TO THE FOLLOWING.
(M10) -FUSE BLOCK-
JUNCTION BOX (J/B)

MEL035M

Component Parts and Harness Connector Location

NAEL0072



SEL465XA

System Description

NAEL0073

The rear window defogger system is controlled by the smart entrance control unit. The rear window defogger operates only for approximately 15 minutes.
Power is supplied at all times

- to rear window defogger relay terminal 3
- through 20A fuse (No. 56, located in the fuse and fusible link box) and
- to rear window defogger relay terminal 6
- through 20A fuse (No. 57, located in the fuse and fusible link box)
- to smart entrance control unit terminal 10
- through 7.5A [No. 24, located in fuse block (J/B)]

With the ignition switch in the ON or START position, power is supplied

- through 7.5A fuse [No. 11, located in the fuse block (J/B)]
- to the rear window defogger relay terminal 1, and
- to smart entrance control unit terminal 33.

Ground is supplied

- to terminal 1 of the rear window defogger switch
- through body grounds M4, M66 and M147
- to smart entrance control unit terminal 16
- through body grounds M77 and M111.

When the rear window defogger switch is turned ON, ground is supplied

- through terminal 2 of the rear window defogger switch
- to smart entrance control unit terminal 39.

Terminal 2 of the smart entrance control unit then supplies ground to the rear window defogger relay terminal 2.
With power and ground supplied, the rear window defogger relay is energized.
Power is supplied

- through terminals 5 and 7 of the rear window defogger relay
- to the rear window defogger.

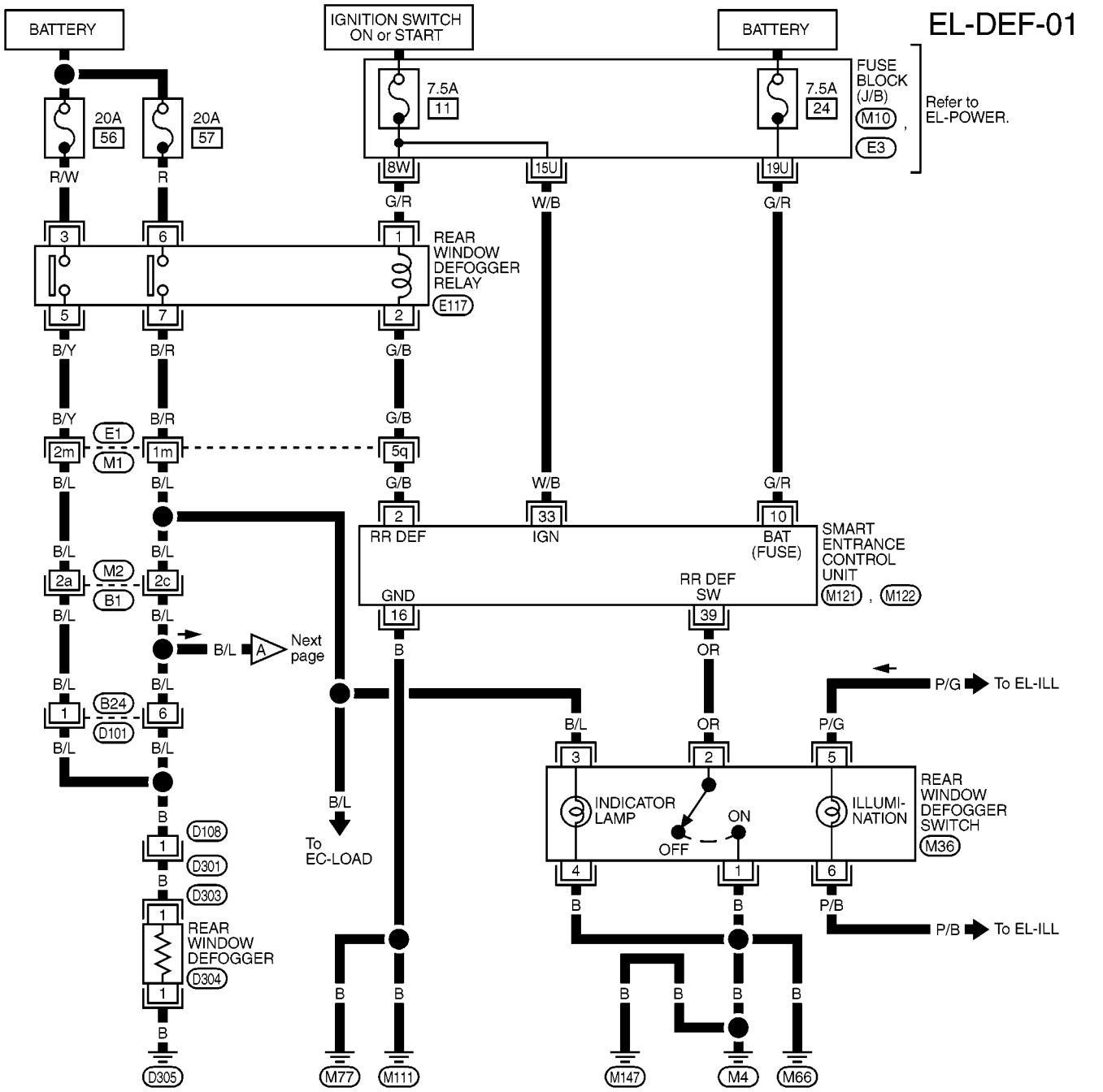
The rear window defogger has an independent ground.
With power and ground supplied, the rear window defogger filaments heat and defog the rear window.
When the system is activated, the rear window defogger indicator illuminates in the rear window defogger switch.
Power is supplied

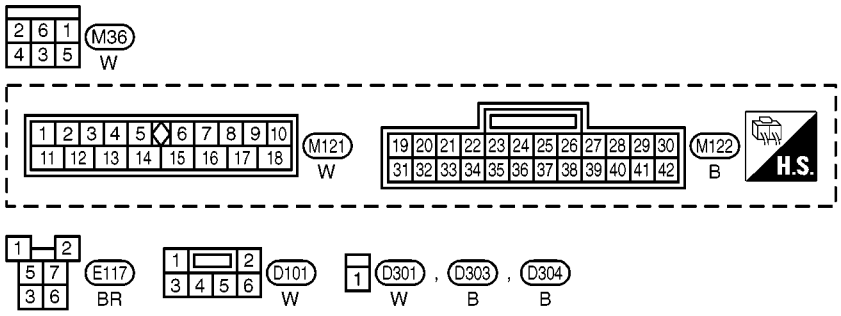
- to terminal 3 of the rear window defogger switch
- from terminal 7 of the rear window defogger relay.

Terminal 4 of the rear window defogger switch is grounded through body grounds M4, M66 and M147.

Wiring Diagram — DEF —

NAEL0074

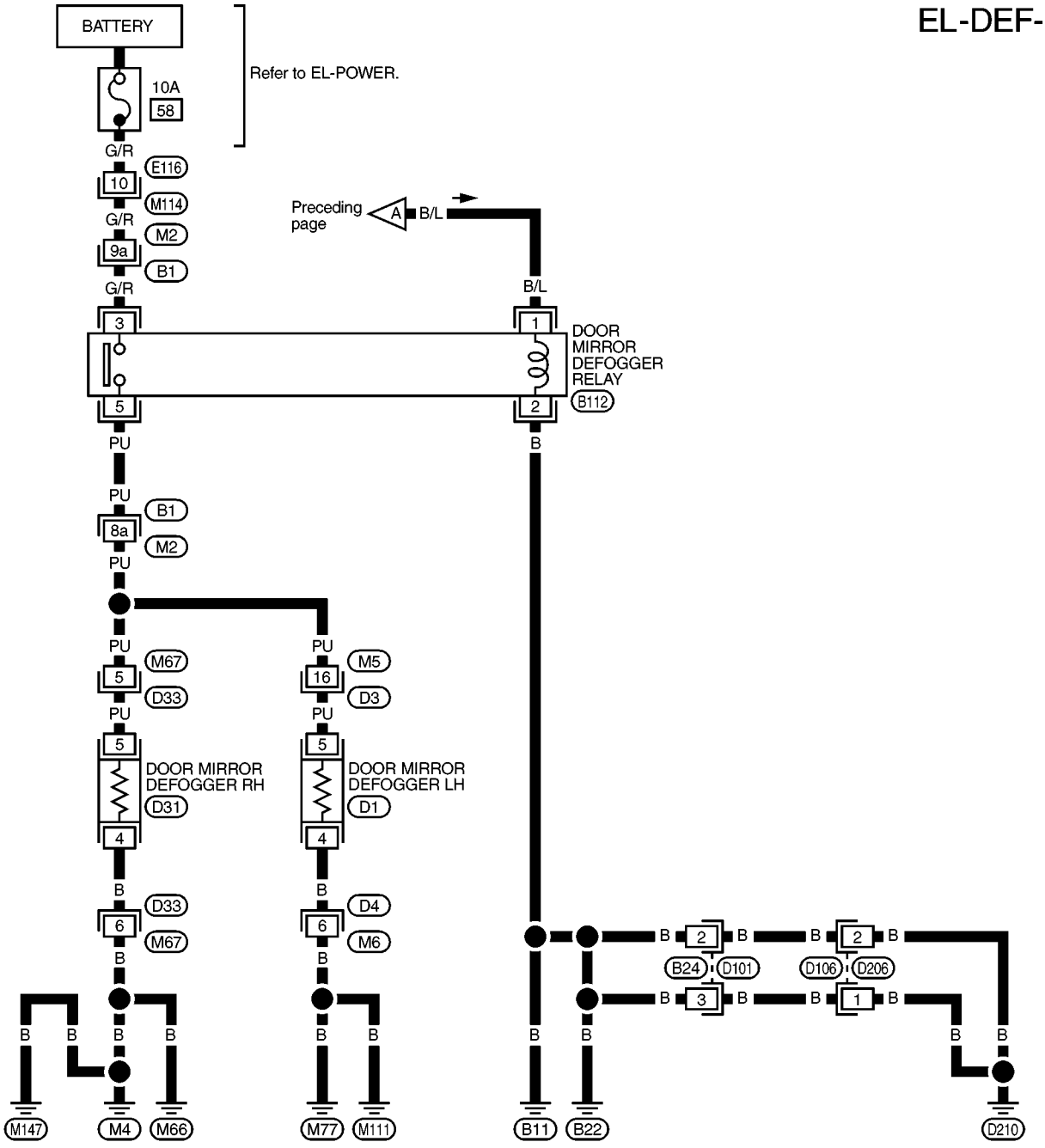


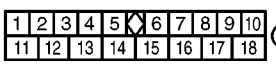


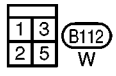
REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 , E3 -FUSE BLOCK-JUNCTION BOX (J/B)

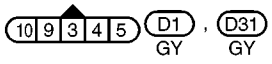
MEL036M

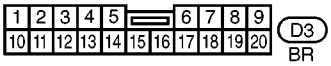
EL-DEF-02

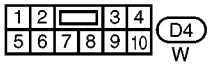


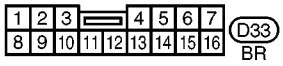


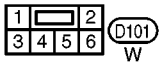


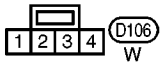












REFER TO THE FOLLOWING.

B1 - SUPER MULTIPLE JUNCTION (SMJ)

MEL816L

Trouble Diagnoses

NAEL0075

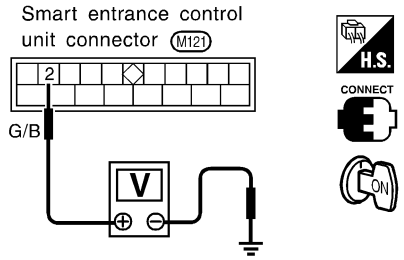
DIAGNOSTIC PROCEDURE

NAEL0075S01

SYMPTOM: Rear window defogger does not activate, or does not go off after activating.

1	CHECK REAR WINDOW DEFOGGER OUTPUT SIGNAL

1. Turn ignition switch to ON position.
2. Check voltage between smart entrance control unit harness terminal 2 and ground.



Voltage [V]:
Rear window defogger switch is "OFF".
Approx. 12
Rear window defogger switch is "ON".
0

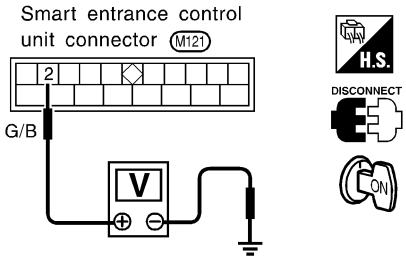
SEL384X

OK or NG

OK	▶	**Check the following.** ● Rear window defogger relay (Refer to EL-176.) ● Rear window defogger circuit ● Rear window defogger filament (Refer to EL-176.)
NG	▶	GO TO 2.

2	CHECK DEFOGGER RELAY COIL SIDE CIRCUIT

1. Disconnect smart entrance control unit connector.
2. Turn ignition switch to ON position.
3. Check voltage between smart entrance control unit terminal 2 and ground.



Battery voltage should exist.

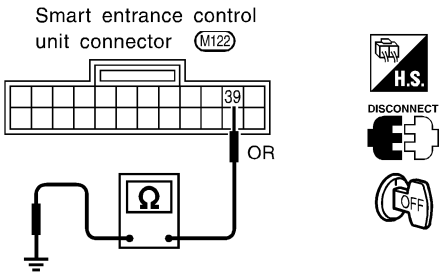
SEL385X

OK or NG

OK	▶	GO TO 3.
NG	▶	**Check the following.** ● 7.5A fuse [No. 11, located in the fuse block (J/B)] ● Rear window defogger relay ● Harness for open or short between rear window defogger relay and smart entrance control unit

3	CHECK REAR WINDOW DEFOGGER SWITCH INPUT SIGNAL

Check continuity between smart entrance control unit terminal 39 and ground.



Continuity:
Rear window defogger switch is pushed.
Yes
Rear window defogger switch is released.
No

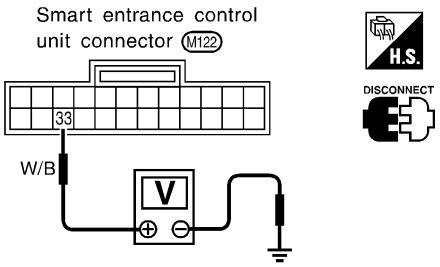
SEL386X

OK or NG

OK	▶	GO TO 4.
NG	▶	**Check the following.** ● Rear window defogger switch (with navigation system) (Refer to EL-176.) ● Harness for open or short between smart entrance control unit and rear window defogger switch ● Rear window defogger switch ground circuit

4	CHECK IGNITION INPUT SIGNAL

Check voltage between smart entrance control unit terminal 33 and ground.



Voltage [V]:
Ignition switch is "ON".
Approx. 12
Ignition switch is "OFF".
0

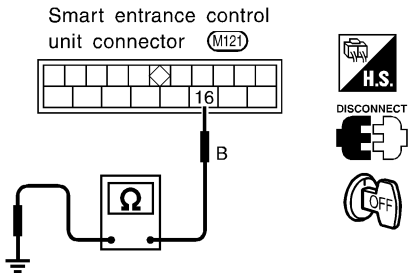
SEL387X

OK or NG

OK	▶	GO TO 5.
NG	▶	**Check the following.** ● 7.5A fuse [No. 11, located in the fuse block (J/B)] ● Harness for open or short between smart entrance control unit and fuse

5	CHECK SMART ENTRANCE CONTROL UNIT GROUND CIRCUIT

Check continuity between smart entrance control unit terminal 16 and ground.

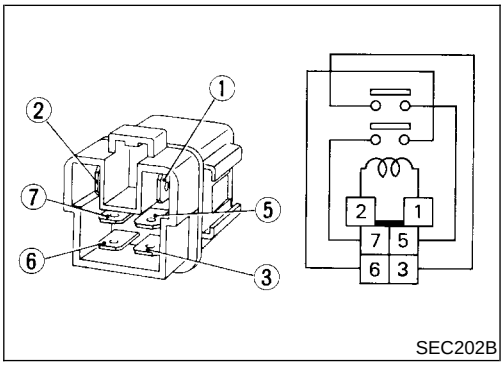


Continuity should exist.

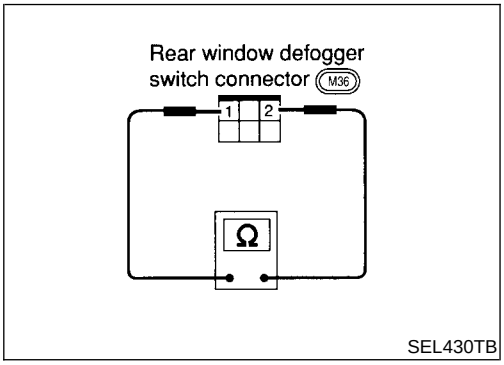
SEL388X

OK or NG

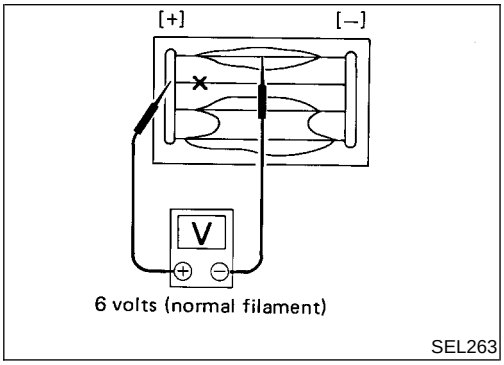
OK	▶	Replace smart entrance control unit.
NG	▶	Repair harness or connectors.



SEC202B



SEL430TB



SEL263

Electrical Components Inspection

NAEL0076

REAR WINDOW DEFOGGER RELAY

NAEL0076S01

Check continuity between terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

REAR WINDOW DEFOGGER SWITCH

NAEL0076S02

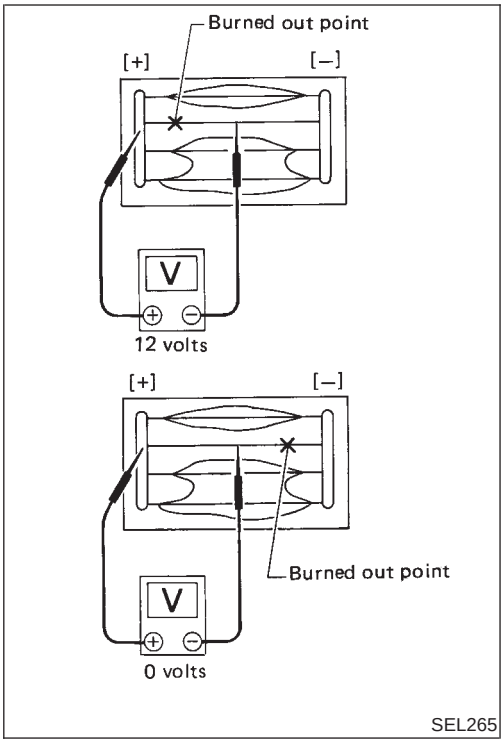
Check continuity between terminals when rear window defogger switch is pushed and released.

Terminals	Condition	Continuity
1 - 2	Rear window defogger switch is pushed	Yes
	Rear window defogger switch is released	No

Filament Check

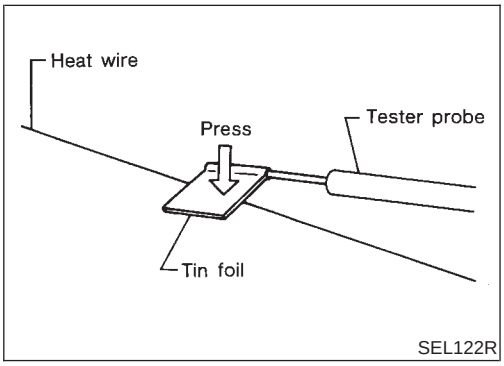
NAEL0077

1. Attach probe circuit tester (in volt range) to middle portion of each filament.



SEL265

2. If a filament is burned out, circuit tester registers 0 or 12 volts.
3. To locate burned out point, move probe to left and right along filament. Test needle will swing abruptly when probe passes the point.



SEL122R

- **When measuring voltage, wrap tin foil around the top of the negative probe. Then press the foil against the wire with your finger.**

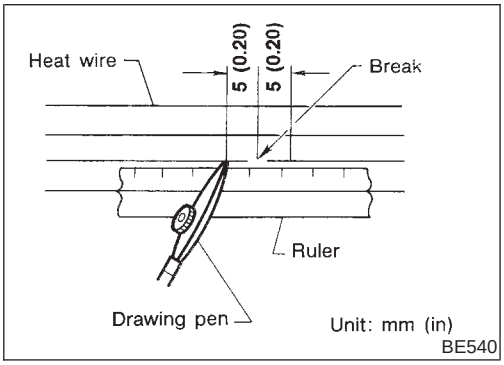
Filament Repair

NAEL0078

REPAIR EQUIPMENT

NAEL0078S01

1) Conductive silver composition (Dupont No. 4817 or equivalent)
2) Ruler 30 cm (11.8 in) long
3) Drawing pen
4) Heat gun
5) Alcohol
6) Cloth



BE540

REPAIRING PROCEDURE

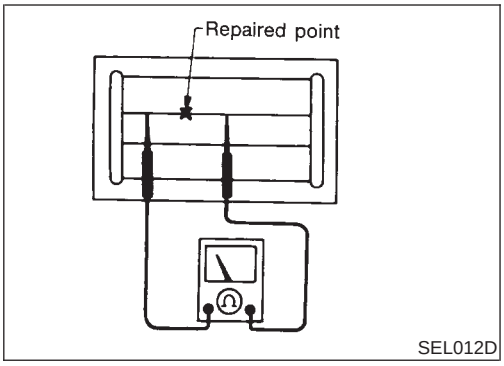
NAEL0078S02

1. Wipe broken heat wire and its surrounding area clean with a cloth dampened in alcohol.
2. Apply a small amount of conductive silver composition to tip of drawing pen.

Shake silver composition container before use.

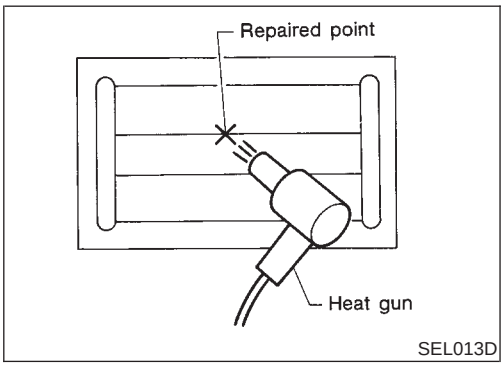
3. Place ruler on glass along broken line. Deposit conductive silver composition on break with drawing pen. Slightly overlap existing heat wire on both sides [preferably 5 mm (0.20 in)] of the break.

Filament Repair (Cont'd)



4. After repair has been completed, check repaired wire for continuity. This check should be conducted 10 minutes after silver composition is deposited.

Do not touch repaired area while test is being conducted.



5. Apply a constant stream of hot air directly to the repaired area for approximately 20 minutes with a heat gun. A minimum distance of 3 cm (1.2 in) should be kept between repaired area and hot air outlet. If a heat gun is not available, let the repaired area dry for 24 hours.

System Description

NAEL0226

Refer to Owner's Manual for audio system operating instructions.

BASE SYSTEM

NAEL0226S01

Power is supplied at all times

- through 15A fuse [No. 4, located in the fuse block (J/B)]
- to audio unit terminal 6.

With the ignition switch in the ACC or ON position, power is supplied

- through 10A fuse [No. 10, located in the fuse block (J/B)]
- to audio unit terminal 10.

Ground is supplied through the case of the audio unit.
When the audio unit power knob is pushed to the ON position, audio signals are supplied

- through audio unit terminals 1, 2, 3, 4, 13, 14, 15 and 16
- to the front and rear speakers.

BOSE SYSTEM

NAEL0226S02

Power is supplied at all times

- through 15A fuse [No. 4, located in the fuse block (J/B)]
- to audio unit terminal 6,
- to audio amp. relay terminal 3 and
- to rear speaker amp. terminal 11.

With the ignition switch in the ACC or ON position, power is supplied

- through 10A fuse [No. 10, located in the fuse block (J/B)]
- to audio unit terminal 10.

Ground is supplied through the case of the audio unit.
Ground is supplied

- to audio amp. relay terminal 2,
- through body grounds M4, M66 and M147
- to front door speaker LH terminal 5 and
- to front door speaker RH terminal 5
- through body grounds M77 and M111
- to rear speaker amp. terminal 24
- through body grounds B11, B22 and D210.

When the audio unit POWER button is pressed, power is supplied to rear speaker amp. terminal 9 and audio amp. relay terminal 1 from audio unit terminal 12. Then audio amp. relay is energized and power is supplied

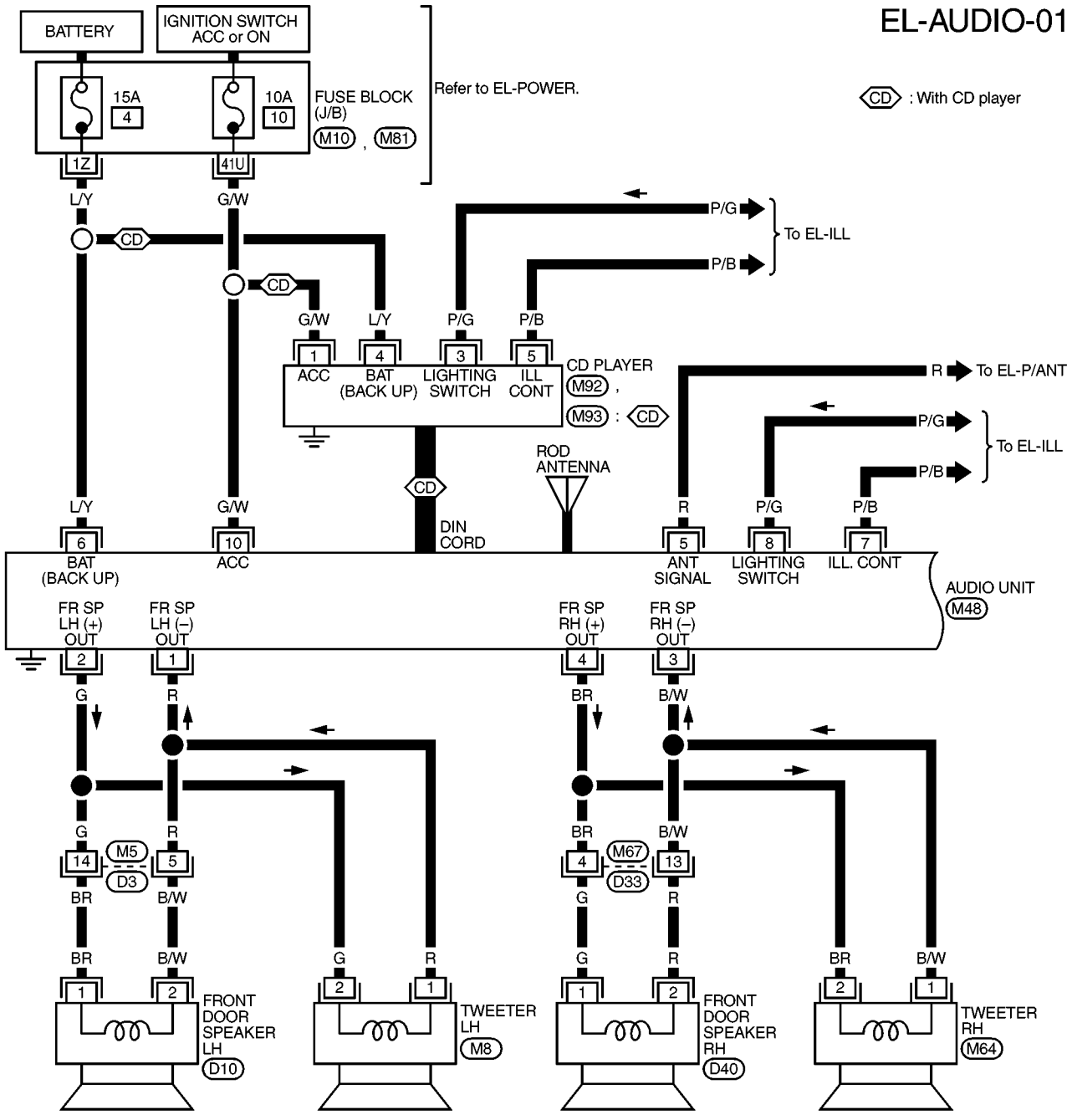
- to front door speaker LH terminal 4 and
- to front door speaker RH terminal 4.

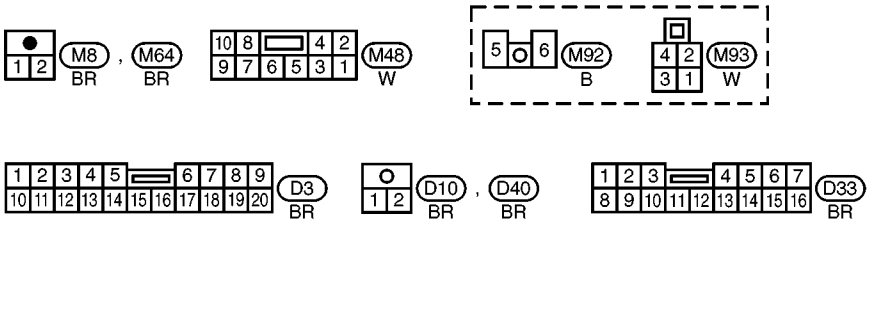
Audio signals are supplied

- through audio unit terminals 1, 2, 3, 4, 13, 14, 15 and 16
- to terminals 2 and 6 of the LH and RH front speakers and terminals 5, 7, 18 and 20 of the rear speaker amp.
- to LH and RH tweeters through terminals 1 and 3 of the front speakers
- to rear LH and RH speakers through terminals 1, 2, 25 and 26 of the rear speaker amp.

Wiring Diagram — AUDIO —/Base System

NAEL0227

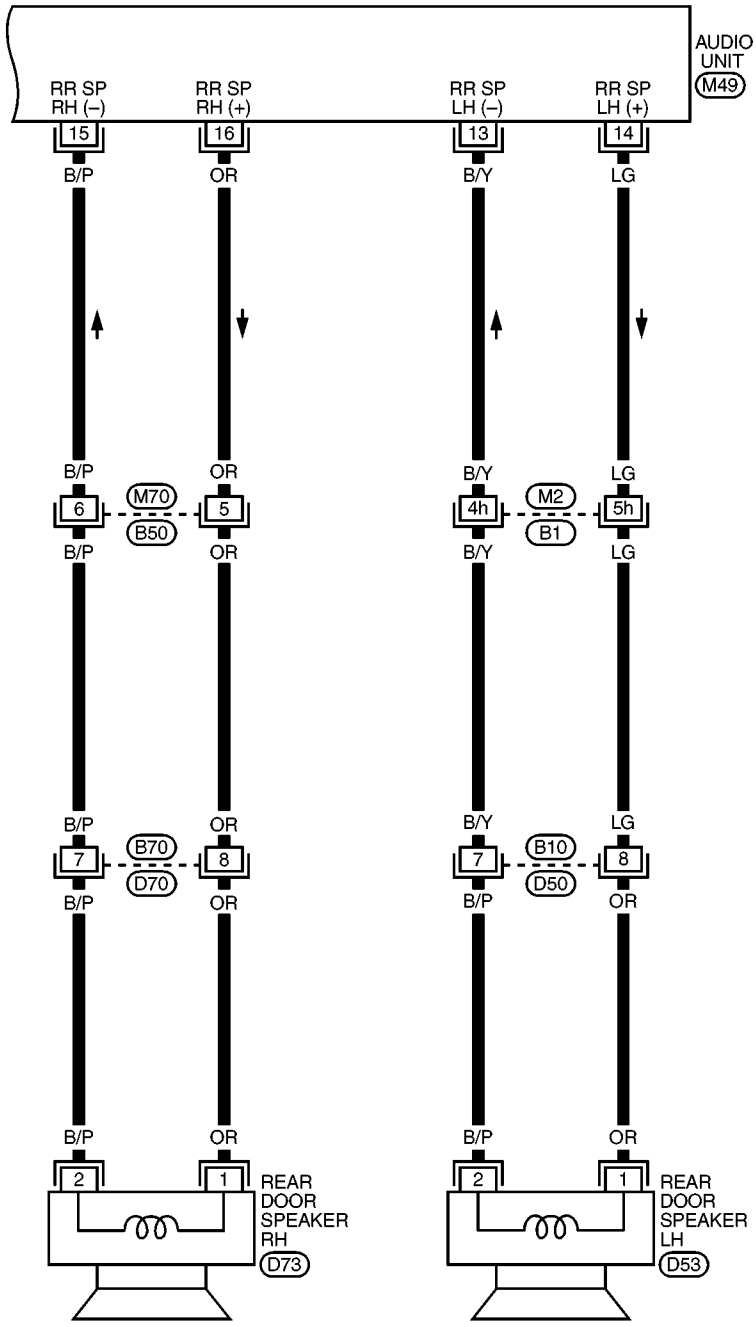


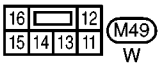


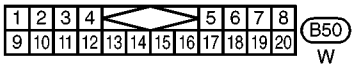
REFER TO THE FOLLOWING.
M10 , M81 -FUSE BLOCK-JUNCTION BOX (J/B)

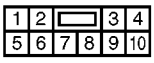
MEL037M

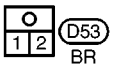
EL-AUDIO-02




M49
W


B50
W


D50 , D70
W W

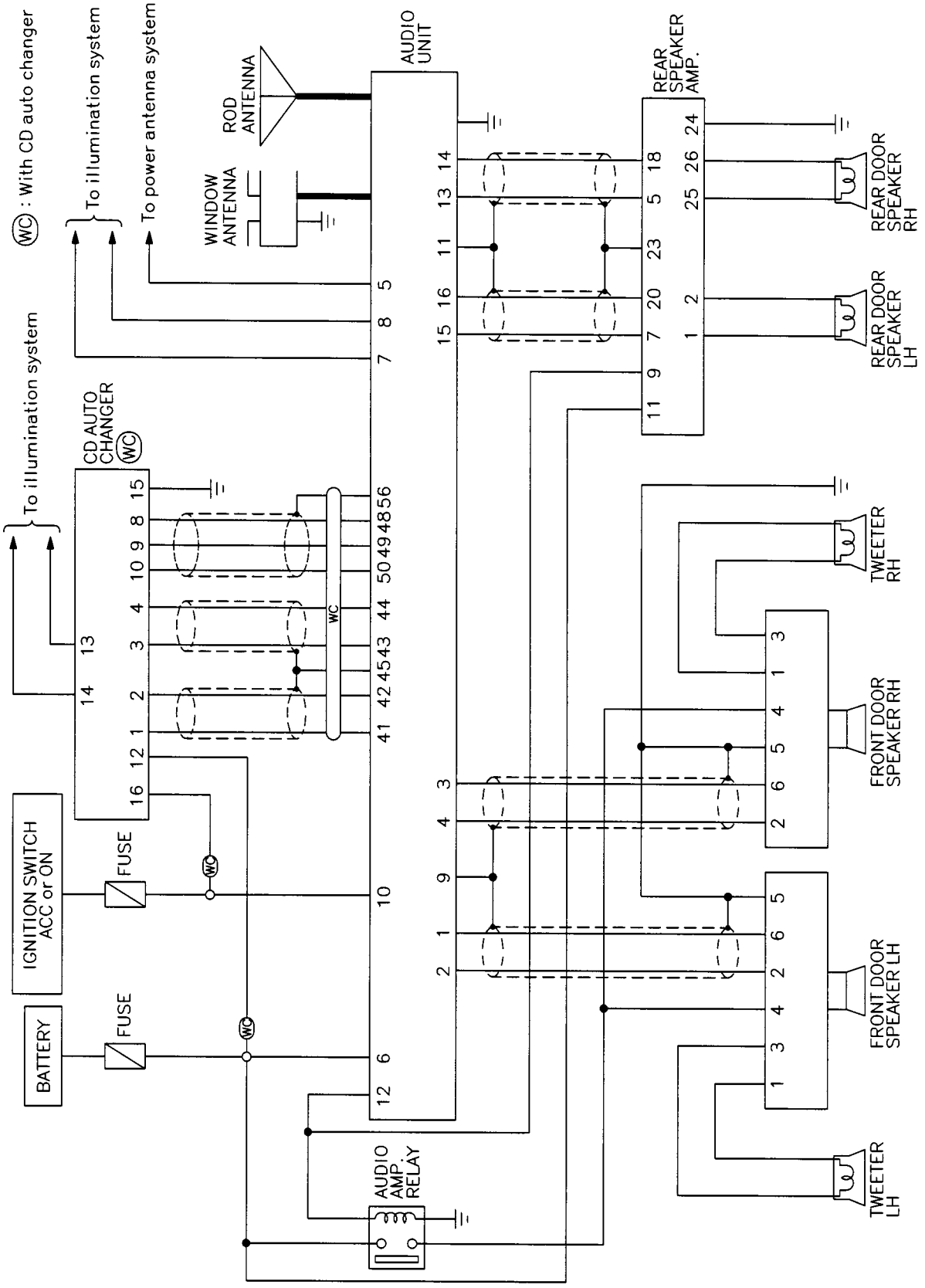

D53 , D73
BR BR

REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL038M

Schematic/BOSE System

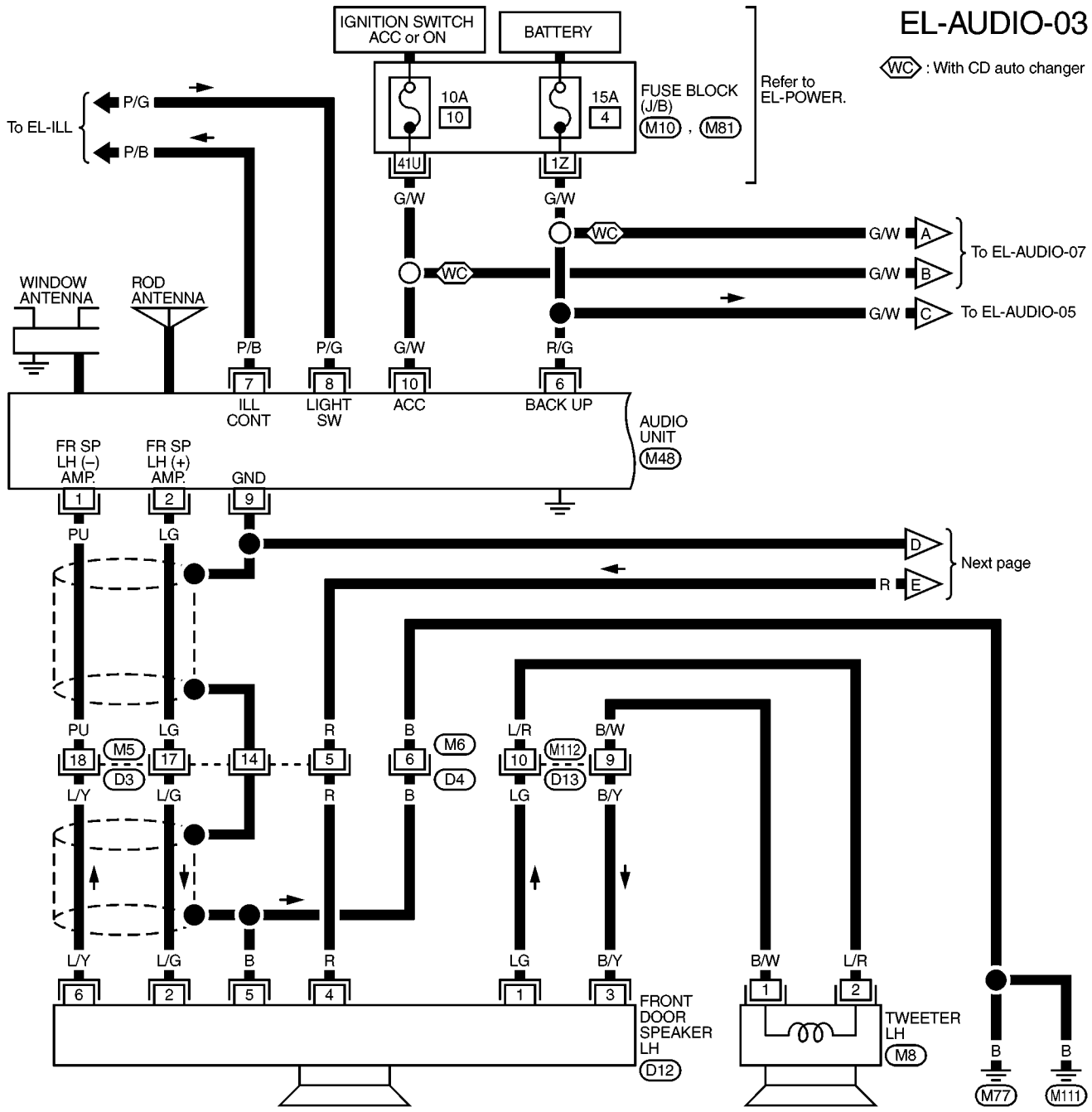
NAEL0080

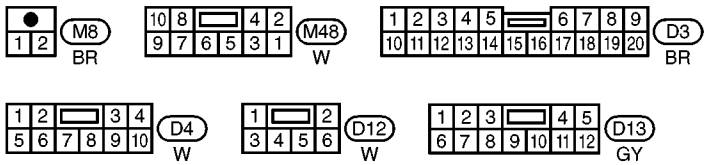


MEL039M

Wiring Diagram — AUDIO —/BOSE System

NAEL0081

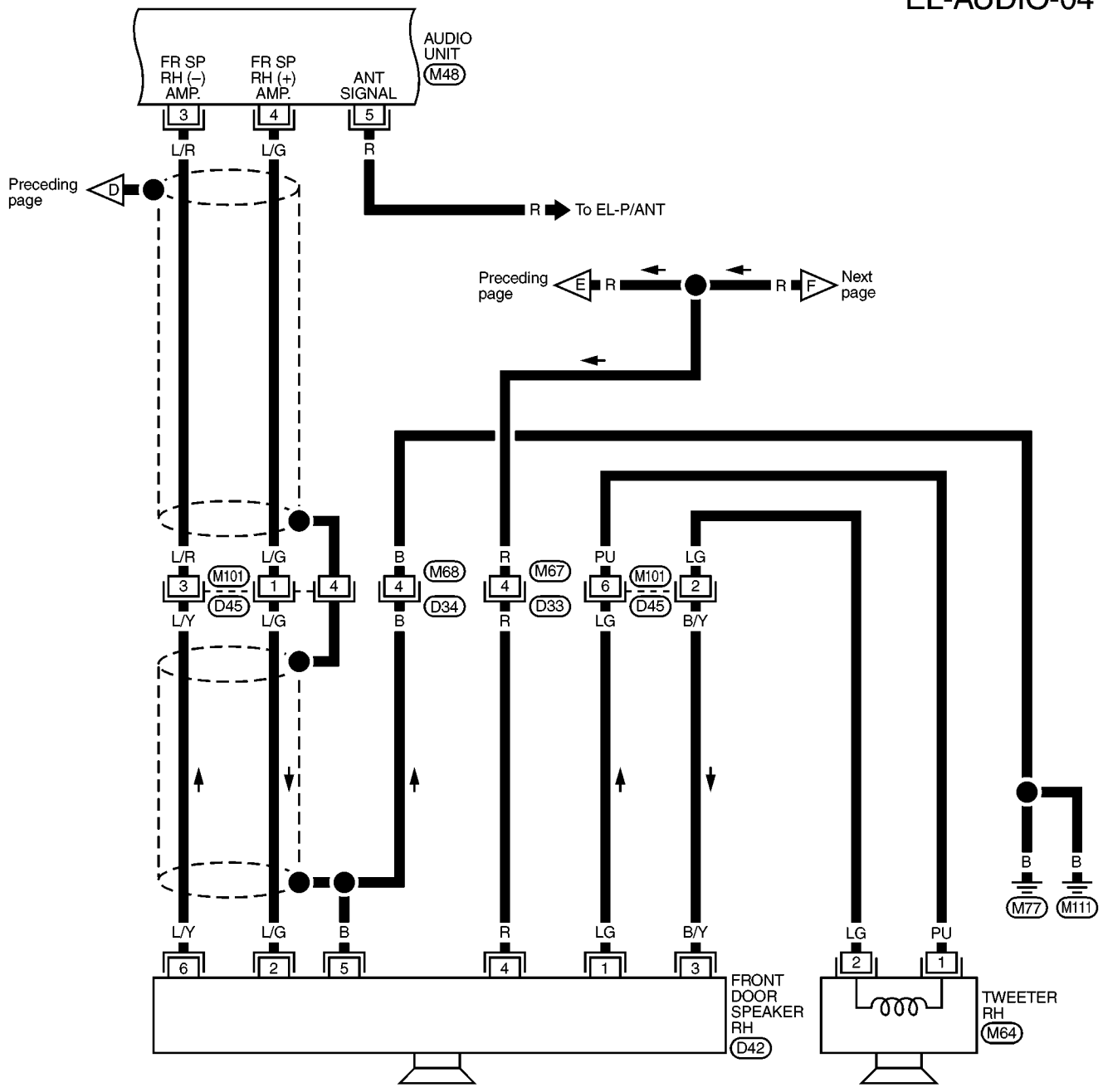


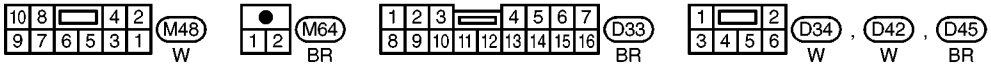


REFER TO THE FOLLOWING.
M10 , M81 -FUSE BLOCK-JUNCTION BOX (J/B)

MEL040M

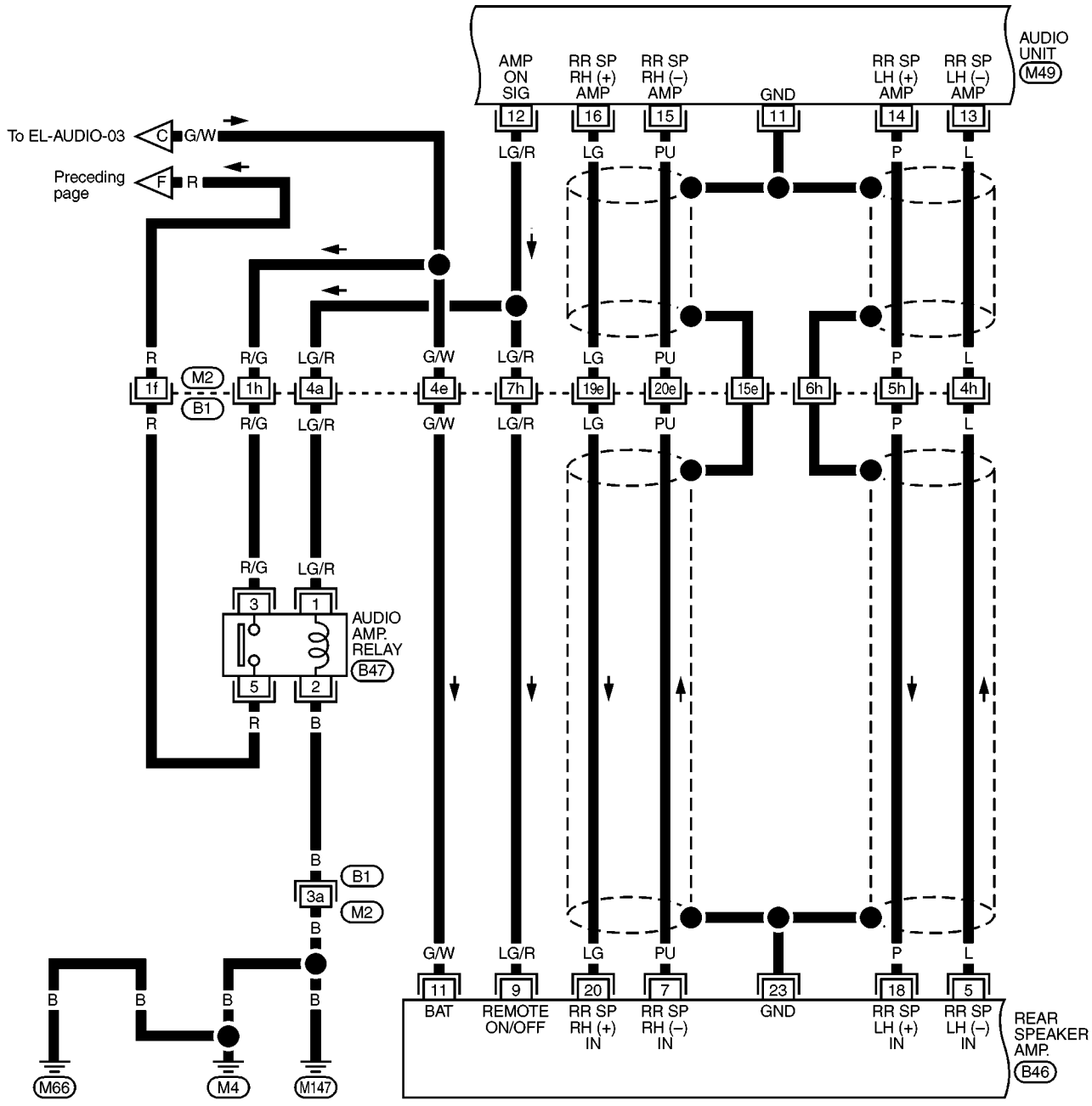
EL-AUDIO-04

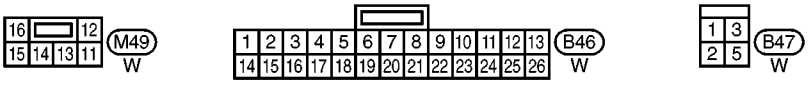




MEL041M

EL-AUDIO-05



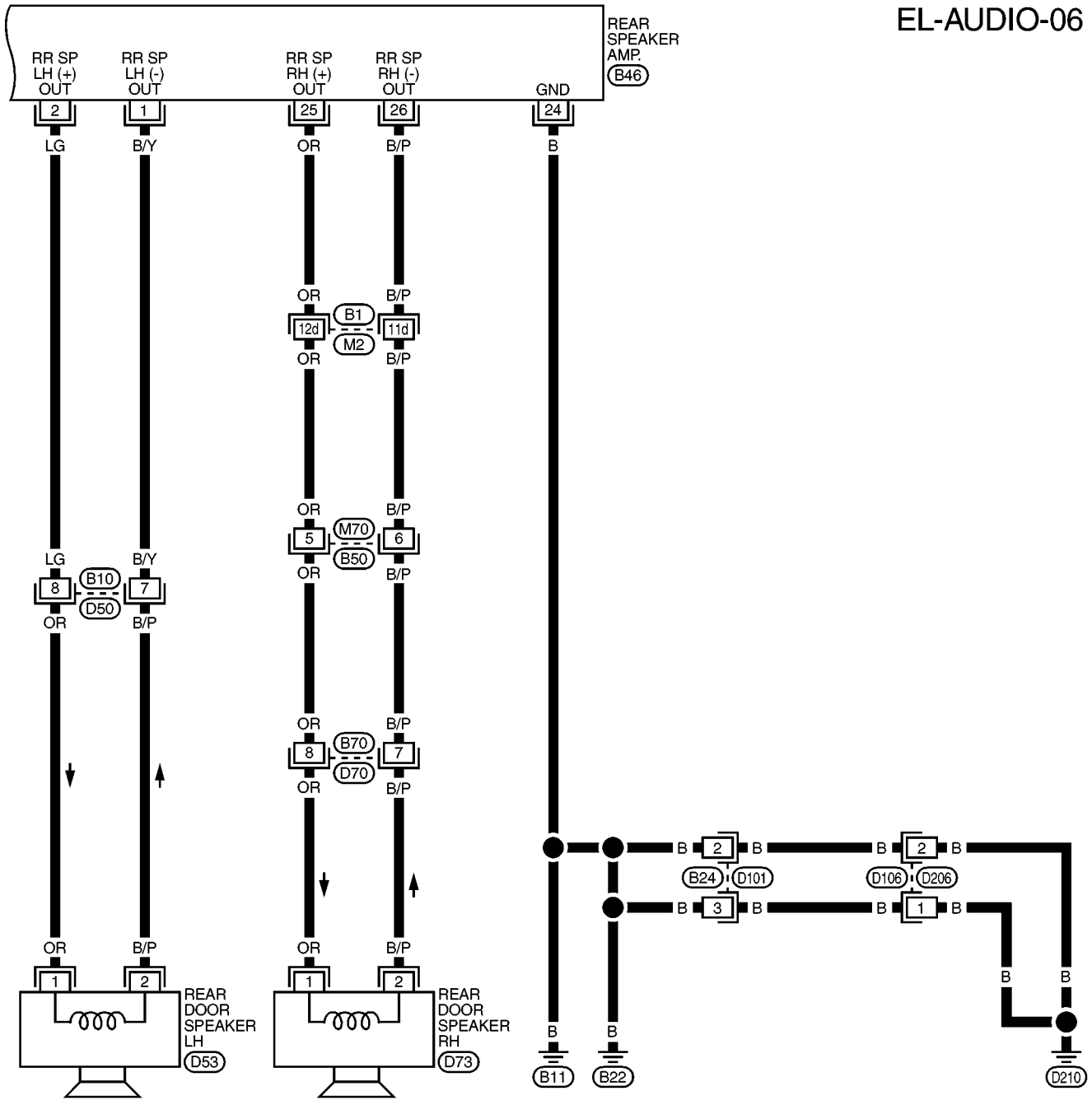


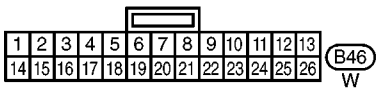
REFER TO THE FOLLOWING.

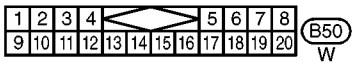
B1 - SUPER MULTIPLE JUNCTION (SMJ)

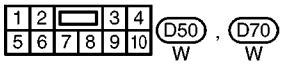
MEL042M

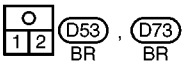
EL-AUDIO-06

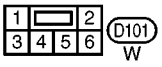


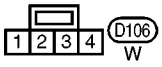










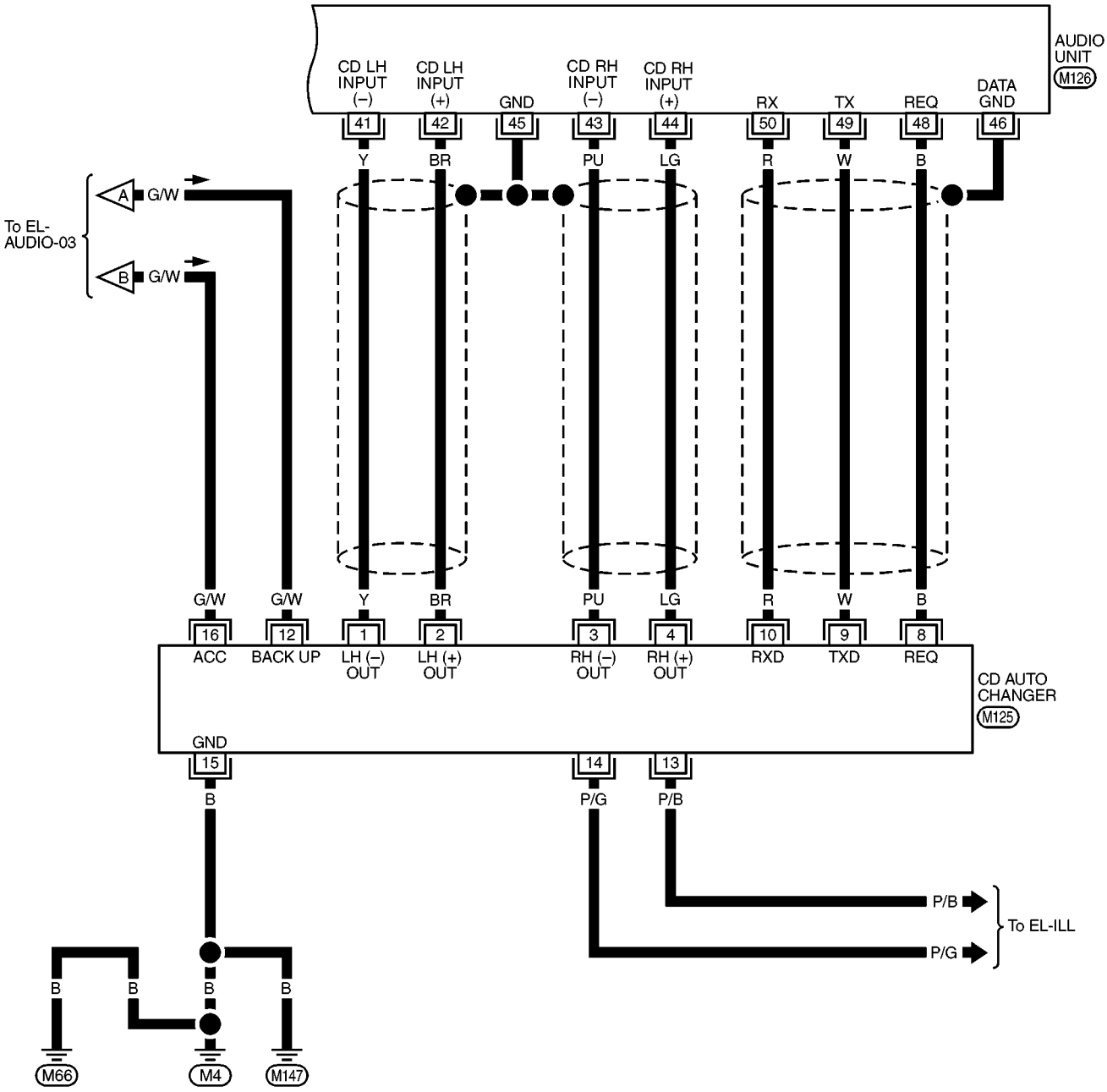


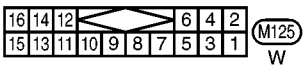
REFER TO THE FOLLOWING.

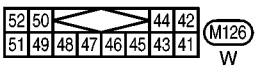
B1 - SUPER MULTIPLE JUNCTION (SMJ)

MEL043M

EL-AUDIO-07







MEL044M

Trouble Diagnoses

NAEL0228

AUDIO UNIT

NAEL0228S01

Symptom	Possible causes	Repair order
Audio unit inoperative (no digital display and no sound from speakers).	1. 10A fuse 2. Poor audio unit case ground 3. Audio unit	1. Check 10A fuse [No. 10, located in fuse block (J/B)]. Turn ignition switch ON and verify that battery positive voltage is present at terminal 10 of audio unit. 2. Check audio unit case ground. 3. Remove audio unit for repair.
Audio unit presets are lost when ignition switch is turned OFF.	1. 15A fuse 2. Audio unit	1. Check 15A fuse [No. 4, located in fuse block (J/B)] and verify that battery positive voltage is present at terminal 6 of audio unit. 2. Remove audio unit for repair.
AM stations are weak or noisy (FM stations OK).	1. Antenna 2. Poor audio unit ground 3. Audio unit	1. Check antenna. 2. Check audio unit ground. 3. Remove audio unit for repair.
FM stations are weak or noisy (AM stations OK).	1. Window antenna 2. Audio unit	1. Check window antenna. 2. Remove audio unit for repair.
Audio unit generates noise in AM and FM modes with engine running.	1. Poor audio unit ground 2. Loose or missing ground bonding straps 3. Ignition condenser or rear window defogger noise suppressor condenser 4. Alternator 5. Ignition coil or secondary wiring 6. Audio unit	1. Check audio unit ground. 2. Check ground bonding straps. 3. Replace ignition condenser or rear window defogger noise suppressor condenser. 4. Check alternator. 5. Check ignition coil and secondary wiring. 6. Remove audio unit for repair.
Audio unit generates noise in AM and FM modes with accessories on (switch pops and motor noise).	1. Poor audio unit ground 2. Antenna 3. Accessory ground 4. Faulty accessory	1. Check audio unit ground. 2. Check antenna. 3. Check accessory ground. 4. Replace accessory.

BASE SYSTEM

NAEL0228S02

Symptom	Possible causes	Repair order
Individual speaker is noisy or inoperative.	1. Speaker 2. Audio unit output 3. Speaker circuit 4. Audio unit	1. Check speaker. 2. Check audio unit output voltages. 3. Check wires for open or short between audio unit and speaker. 4. Remove audio unit for repair.

BOSE SYSTEM

NAEL0228S03

Symptom	Possible causes	Repair order
Audio unit controls are operational, but no sound is heard from any speaker.	1. 15A fuse 2. Audio unit output 3. Audio unit	1. Check 15A fuse [No. 4, located in fuse block (J/B)]. Verify battery positive voltage is present at terminal 2 of audio amp. relay. 2. Check audio unit output voltage (Terminal 12). 3. Remove audio unit for repair.
All front speakers are inoperative.	1. Audio amp. relay 2. Audio amp. relay ground 3. Amp. ON signal	1. Check audio amp. relay. 2. Check audio amp. relay ground (Terminal 3). 3. Turn ignition switch ACC and audio unit ON. Verify battery positive voltage is present at terminal 1 of audio amp. relay.
Individual front speaker is noisy or inoperative.	1. Speaker ground 2. Power supply 3. Audio unit output 4. Speaker	1. Check speaker ground (Terminal 5). 2. Check power supply for speaker (Terminal 4). 3. Check audio unit output voltage for speaker. 4. Replace speaker.

Symptom	Possible causes	Repair order
Both rear speakers are inoperative.	1. Poor rear speaker amp. ground 2. Power supply 3. Amp. ON signal 4. Rear speaker amp.	1. Check rear speaker amp. ground circuit. 2. Check power supply for rear speaker amp. (Terminal 11). 3. Turn ignition switch ACC and audio unit ON. Verify battery positive voltage is present at terminal 9 of rear speaker amp. 4. Remove rear speaker amp. for repair.
Individual rear speaker is noisy or inoperative.	1. Speaker 2. Audio unit/amp. output 3. Speaker circuit 4. Audio unit	1. Check speaker. 2. Check audio unit/amp. output. 3. Check wires for open or short between audio unit/amp. and speakers. 4. Remove audio unit for repair.

Inspection

NAEL0229

AUDIO UNIT AND AMP.

NAEL0229S01

All voltage inspections are made with:

- Ignition switch ON or ACC
- Audio unit ON
- Audio unit and amps. connected (If audio unit or amp. is removed for inspection, supply a ground to the case using a jumper wire.)

ANTENNA

NAEL0229S02

1. Using a jumper wire, clip an auxiliary ground between antenna and body.

- If reception improves, check antenna ground (at body surface).
- If reception does not improve, check main feeder cable for short circuit or open circuit.

Audio Unit Removal and Installation

NAEL0230

1. Lock the CD changer unit mechanism (if so equipped) prior to removing a malfunctioning CD changer unit. Refer to "LOCKING CD CHANGER UNIT MECHANISM", EL-189.
2. Remove CD changer unit. Refer to BT-22, "INSTRUMENT PANEL ASSEMBLY".

LOCKING CD CHANGER UNIT MECHANISM

NAEL0230S01

CAUTION:

- **Prior to removing a malfunctioning CD changer unit that will be shipped for repair, the changer mechanism MUST BE LOCKED to prevent the mechanism from being damaged during shipping.**
- **If a CD is jammed or unable to be removed from the unit, do NOT lock the changer mechanism. If the unit is to be shipped for repair, carefully package the unit to prevent vibration and shock.**

1. Eject and remove any CDs from the CD changer unit.
2. Turn ignition switch OFF. Wait until CD changer unit display is off and mechanism stops moving (mechanism sound stops).
3. Press any one of the disc selection buttons once. When a display shows on the CD changer unit, press the same disc selection button again within 5 seconds.

- The changer mechanism will lock itself within 10 seconds.

4. After mechanism stops moving (mechanism sound stops), disconnect the CD changer unit connectors.

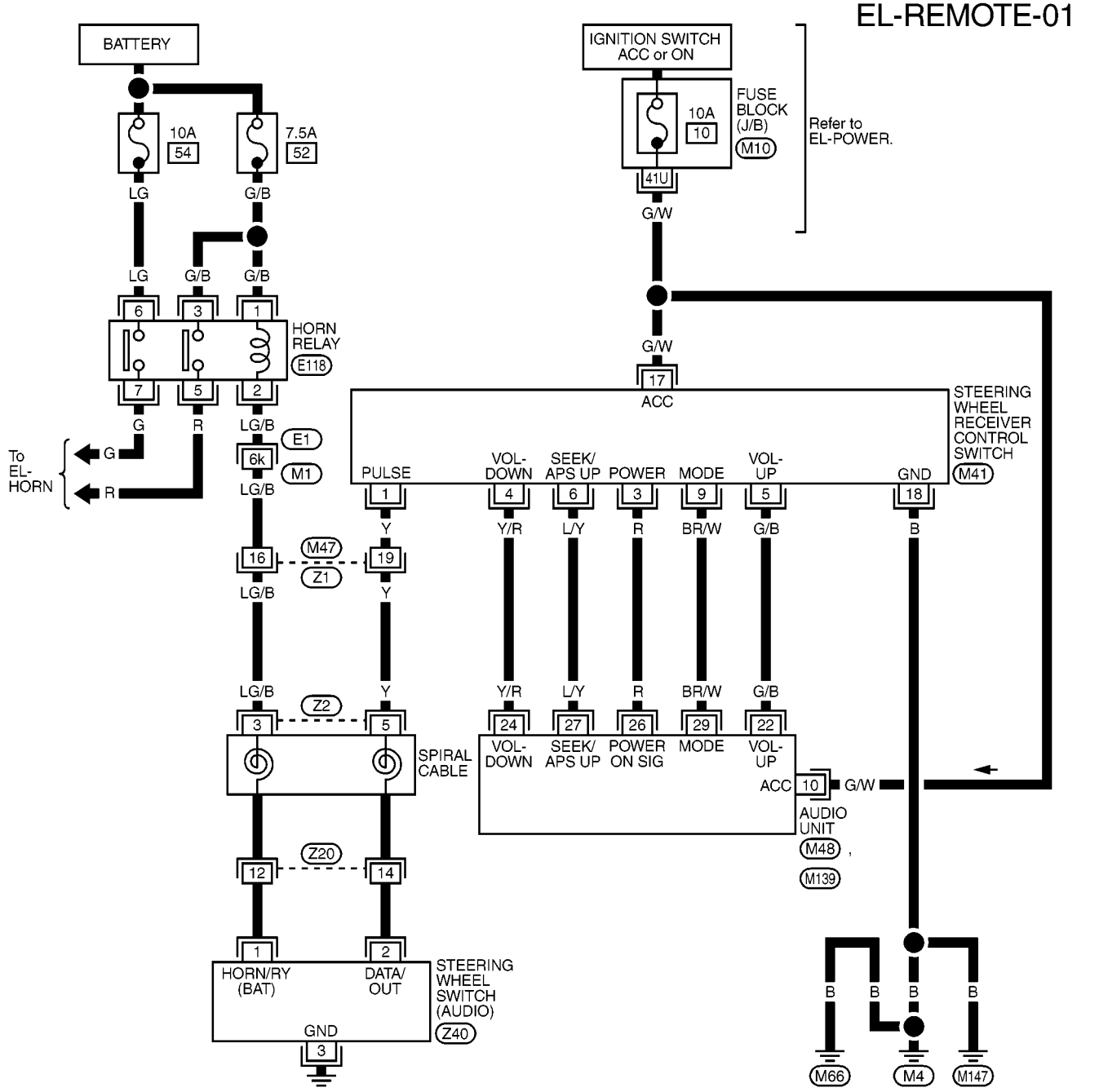
NOTE:

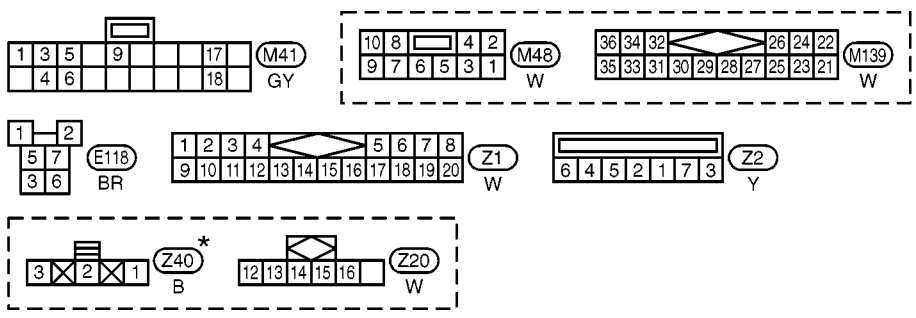
After installing a new or remanufactured CD changer unit, switching the CD changer unit ON will automatically unlock the mechanism. A special unlocking procedure is not required.

Wiring Diagram — REMOTE —

NAEL0205

EL-REMOTE-01





★ : This connector is not shown in "HARNESS LAYOUT", EL section.

REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK- JUNCTION BOX (J/B)

MEL822L

System Description

NAEL0084

Power is supplied at all times

- through 7.5A fuse [No. 24, located in the fuse block (J/B)]
- to power antenna terminal 6.

Ground is supplied to the power antenna terminal 2 through body grounds M4, M66 and M147.
When the audio unit is turned to the ON position, battery positive voltage is supplied

- through audio unit terminal 5
- to power antenna terminal 4.

The antenna raises and is held in the extended position.
When the audio unit is turned to the OFF position, battery positive voltage is interrupted

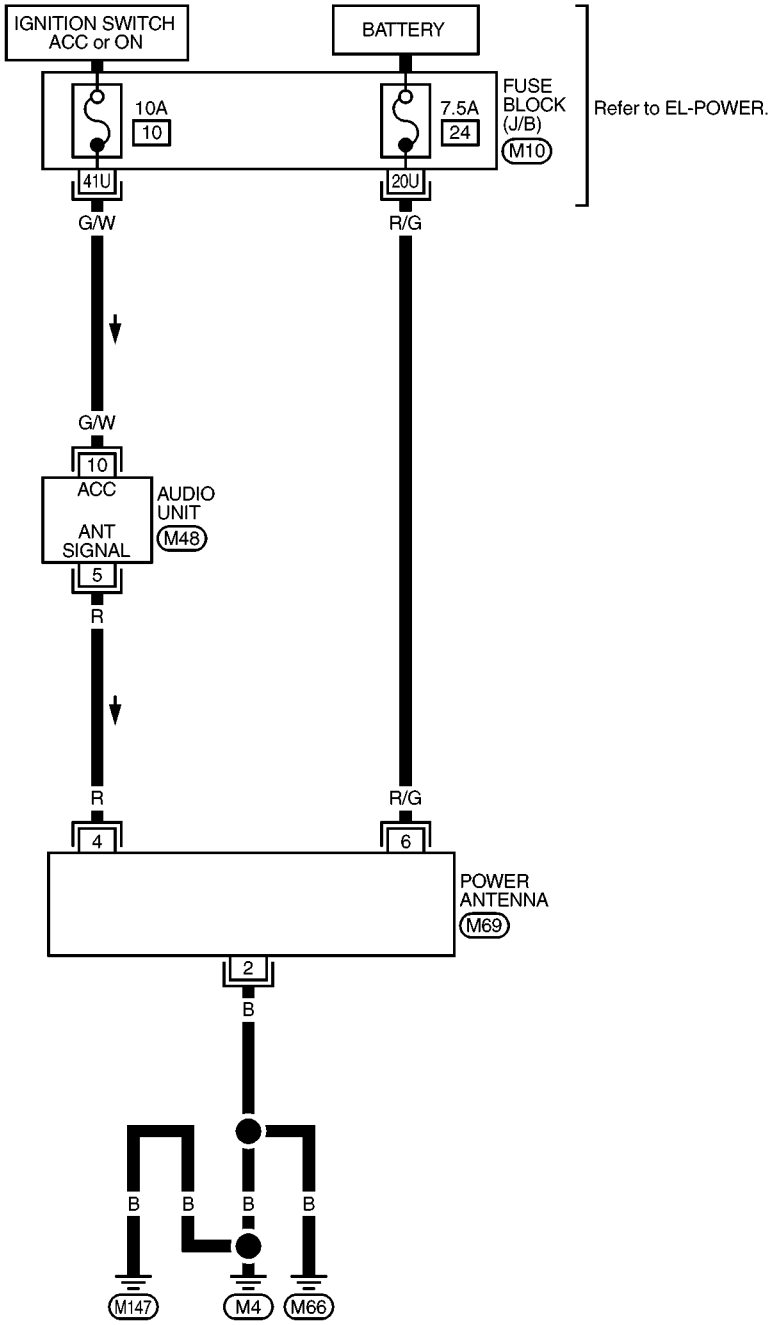
- from audio unit terminal 5
- to power antenna terminal 4.

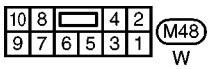
The antenna retracts.

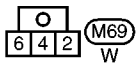
Wiring Diagram — P/ANT —

NAEL0085

EL-P/ANT-01







REFER TO THE FOLLOWING.
M10 - FUSE BLOCK - JUNCTION BOX (J/B)

MEL824L

Trouble Diagnoses

NAEL0086

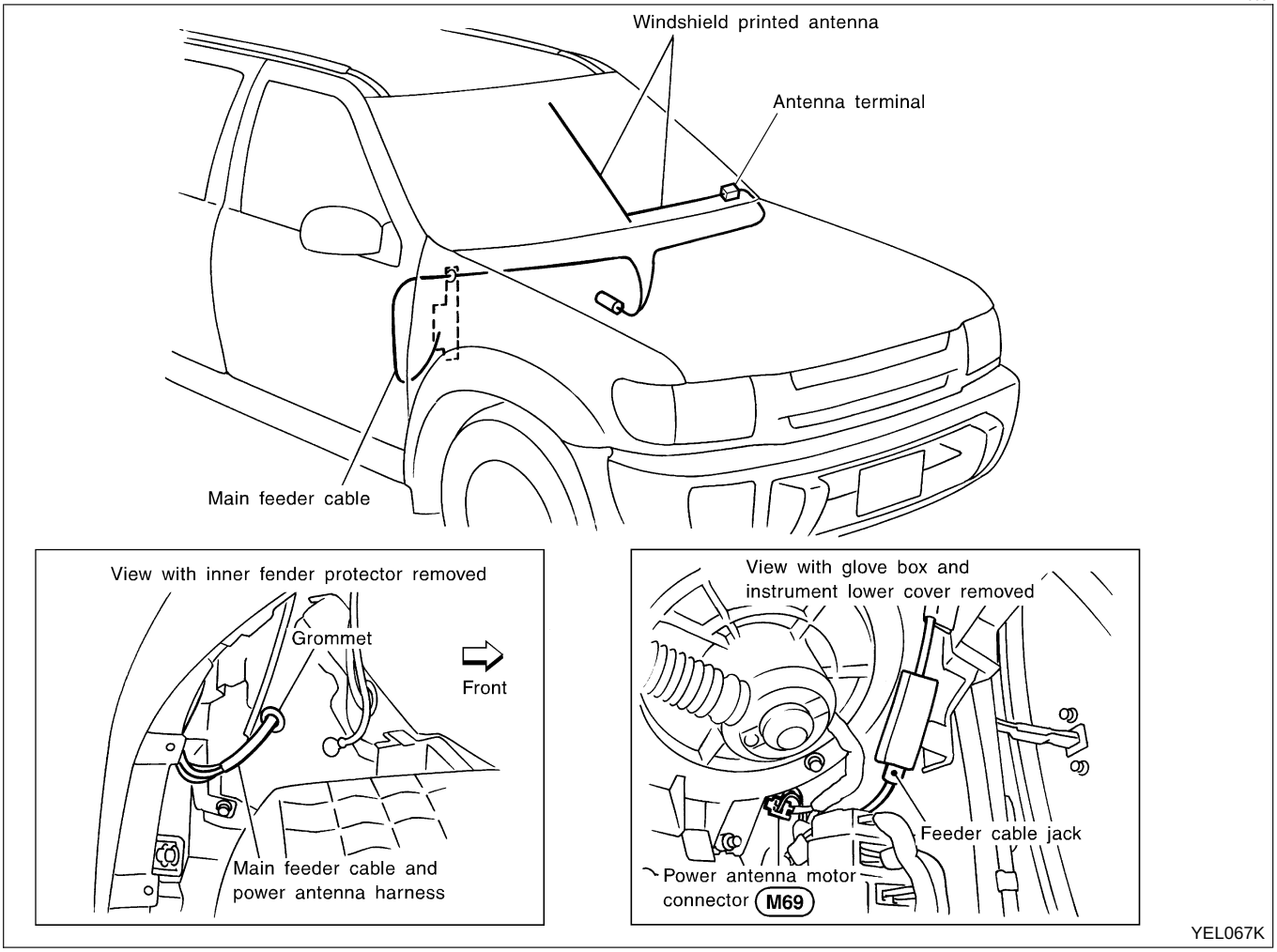
POWER ANTENNA

NAEL0086S01

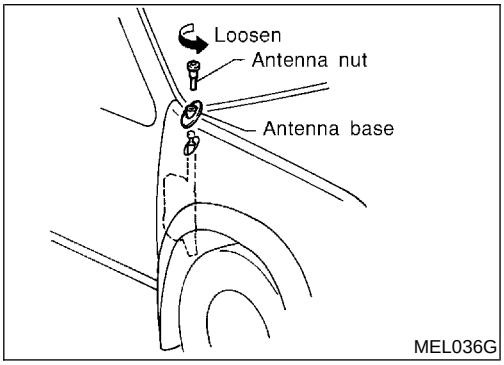
Symptom	Possible causes	Repair order
Power antenna does not operate.	1. 7.5A fuse 2. Audio unit signal 3. Grounds M4, M66 and M147	1. Check 7.5A fuse [No. 24, located in fuse block (J/B)]. Verify that battery positive voltage is present at terminal 6 of power antenna. 2. Turn ignition switch and audio unit ON. Verify that battery positive voltage is present at terminal 4 of power antenna. 3. Check grounds M4, M66 and M147.

Location of Antenna

NAEL0087



YEL067K



MEL036G

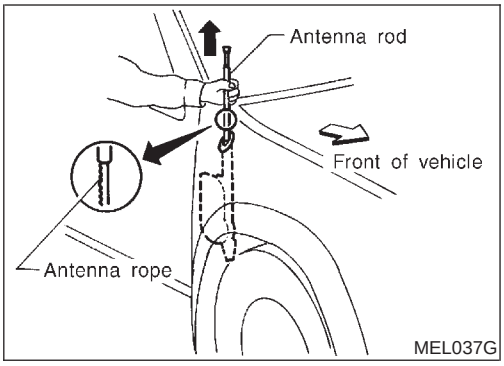
Antenna Rod Replacement

NAEL0088

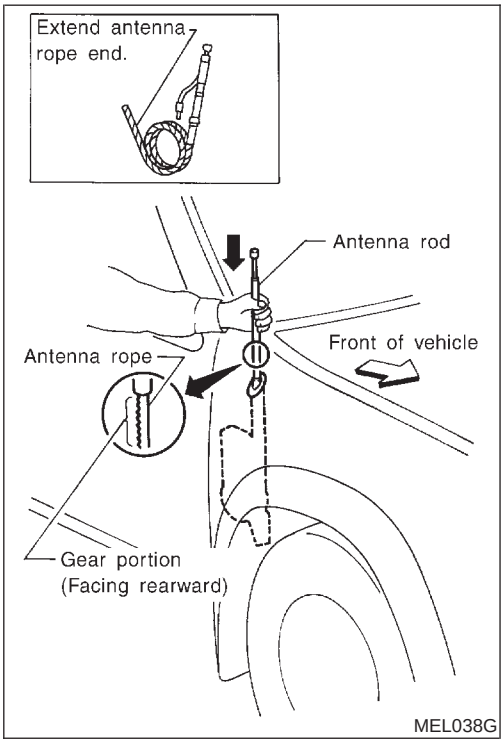
REMOVAL

NAEL0088S01

1. Remove antenna nut and antenna base.



2. Withdraw antenna rod while raising it by operating antenna motor.



INSTALLATION

NAEL0088S02

1. Lower antenna rod by operating antenna motor.
2. Insert gear section of antenna rope into place with it facing toward antenna motor.
3. As soon as antenna rope is wound on antenna motor, stop antenna motor. Insert antenna rod lower end into antenna motor pipe.
4. Retract antenna rod completely by operating antenna motor.
5. Install antenna nut and base.

System Description

NAEL0206

OUTLINE

NAEL0206S01

Electric sunroof system consists of

- Sunroof switch
- Sunroof motor
- Power window relay
- Smart entrance control unit

Smart entrance control unit controls retained power operation.

OPERATION

NAEL0206S02

The sunroof can be opened or closed and tilted up or down with the sunroof switch.

AUTO OPERATION

NAEL0206S03

The power sunroof AUTO feature makes it possible to open and close the sunroof without holding the sunroof switch in the down or up position.

RETAINED POWER OPERATION

NAEL0206S04

When the ignition switch is turned to OFF position from ON or START position, power is supplied for 45 seconds

- to power window relay terminal 2
- from smart entrance control unit terminal 5.

Ground is always supplied

- to power window relay terminal 1
- through body grounds.

When power and ground are supplied, power window relay continues to be energized, and the electrical sunroof can be operated.
The retained power operation is canceled when the driver or passenger side door is opened.

INTERRUPTION DETECTION FUNCTION

NAEL0206S05

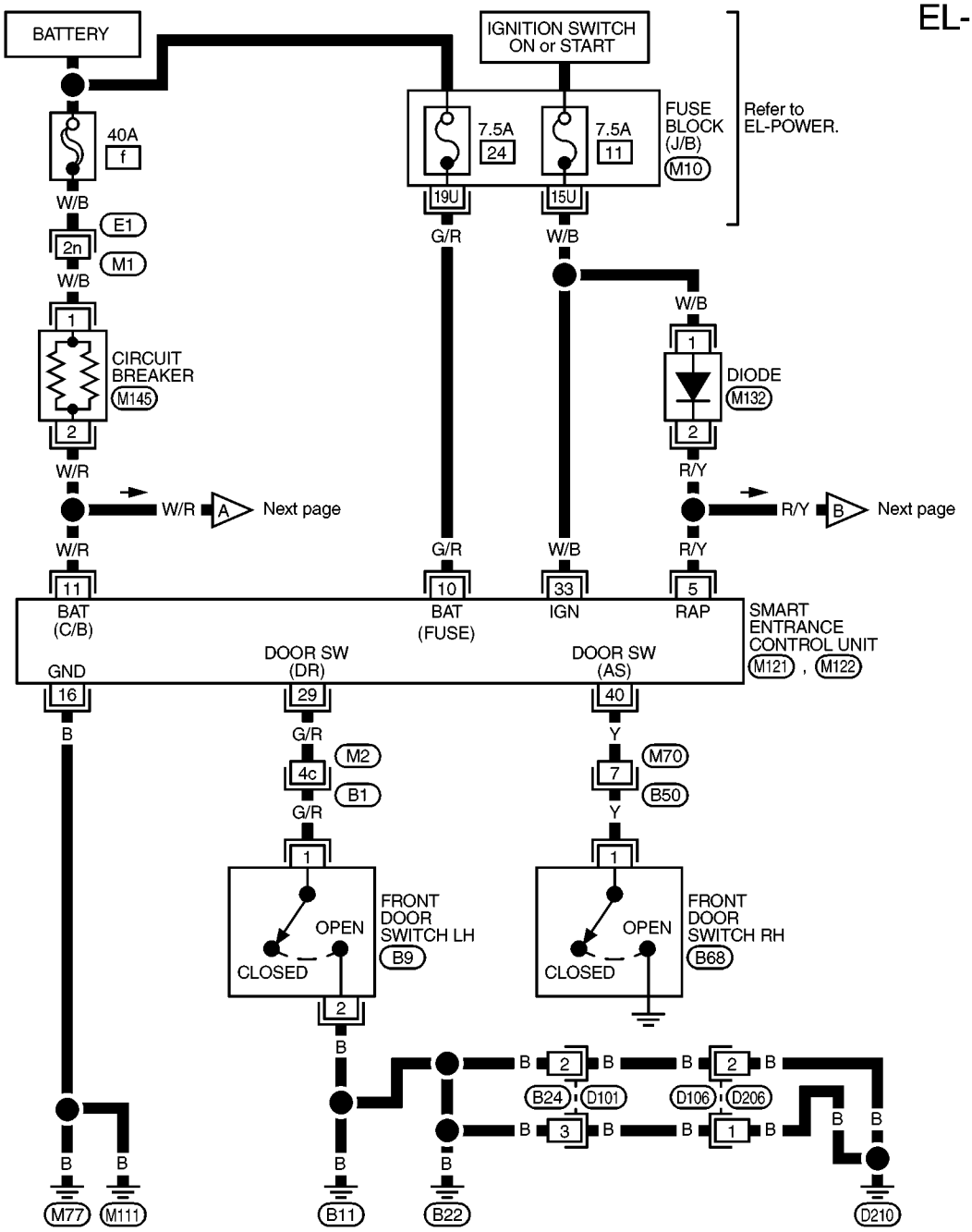
The CPU of sunroof motor monitors the sunroof motor operation and the sunroof position (full closed or other) for sunroof by the signals from encoder and limit switch in sunroof motor.
When sunroof motor detects interruption during the following close operation,

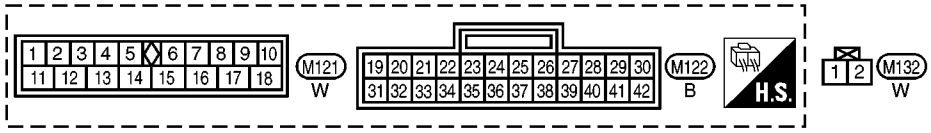
- automatic close operation when ignition switch is in the “ON” position
- automatic close operation during retained power operation

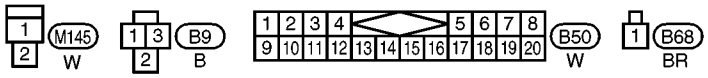
sunroof switch controls the motor for open and the sunroof will operate about 150 mm (5.91 in).

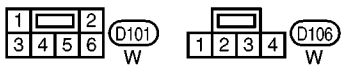
Wiring Diagram — SROOF —

NAEL0089









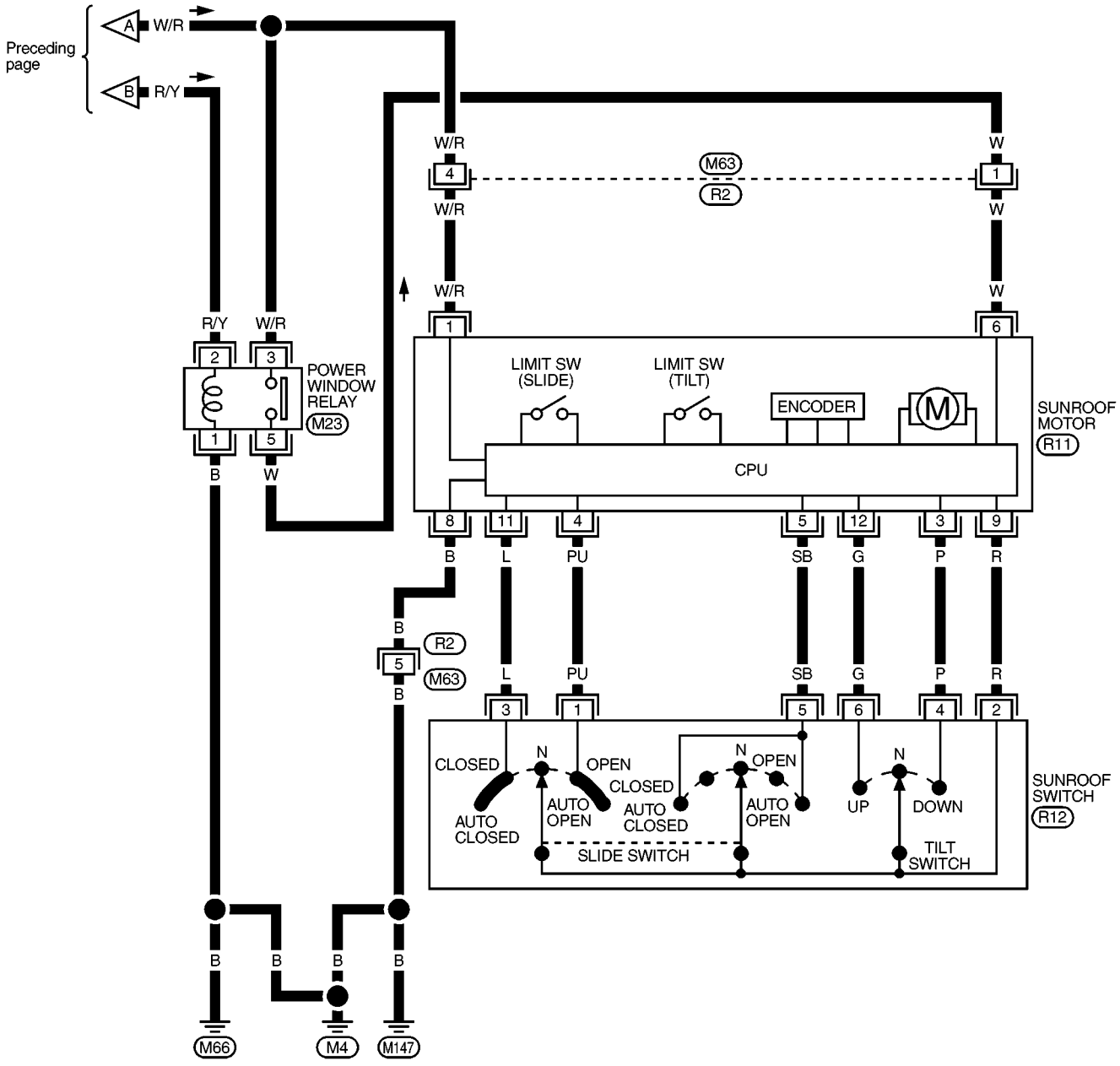
REFER TO THE FOLLOWING.

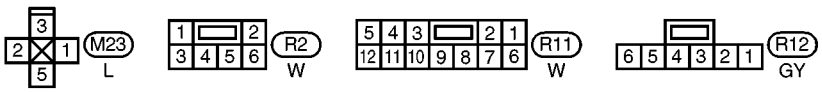
E1 , B1 - SUPER MULTIPLE JUNCTION (SMJ)

M10 - FUSE BLOCK - JUNCTION BOX (J/B)

MEL825L

EL-SROOF-02





MEL826L

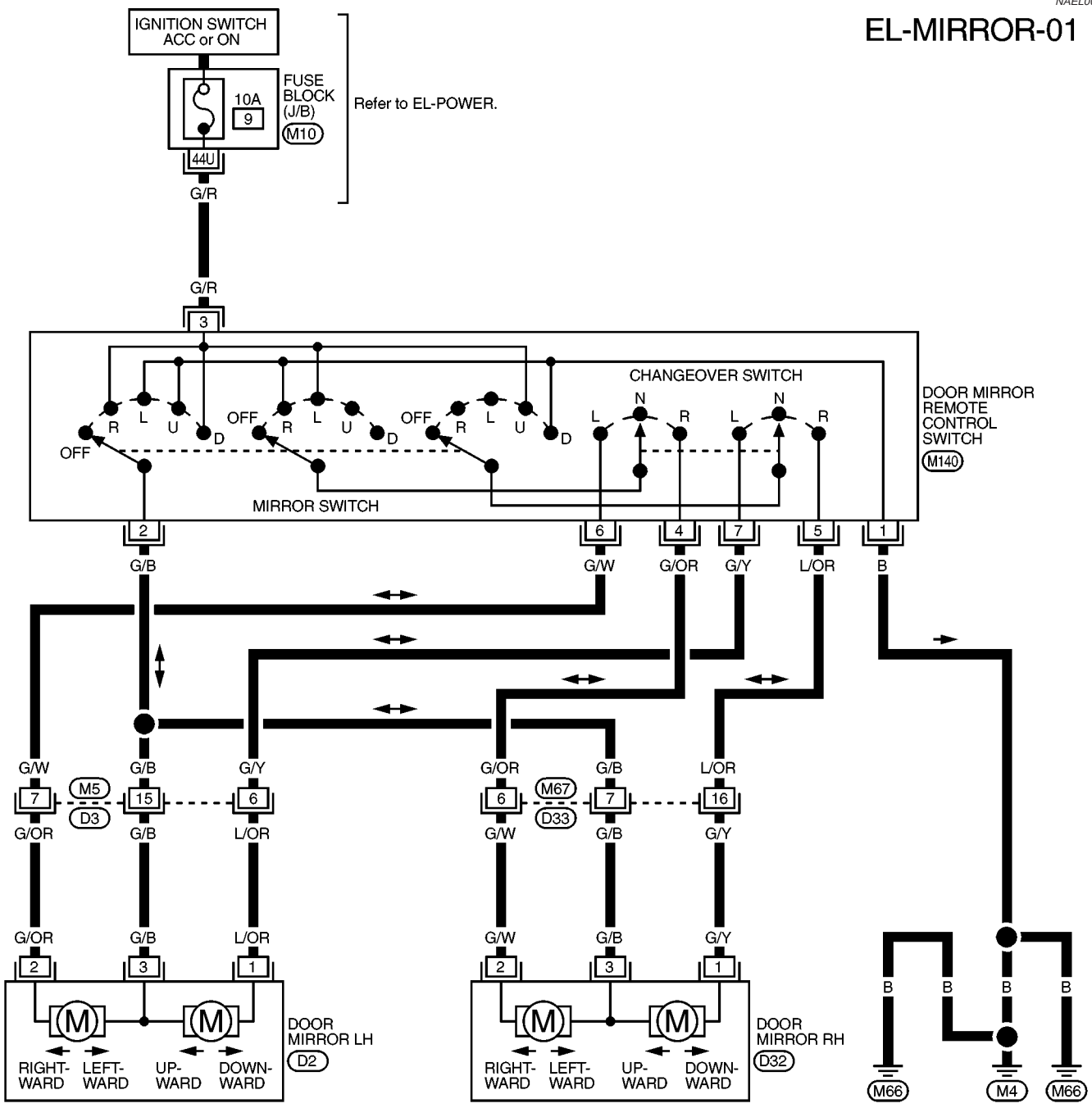
Trouble Diagnoses

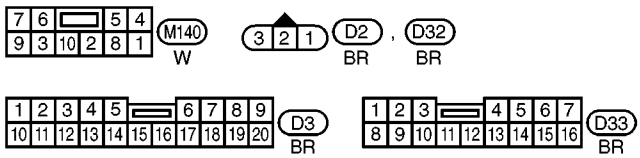
NAEL0207

Symptom	Possible cause	Repair order
Power sunroof cannot be operated using any switch.	1. 7.5A fuse, 40A fusible link and M145 circuit breaker 2. Power window relay ground circuit 3. Sunroof motor ground circuit 4. Power window relay 5. Sunroof motor circuit 6. Sunroof switch 7. Sunroof switch circuit 8. Sunroof motor	1. Check 7.5A fuse [No. 11, located in fuse block (J/B)], 40A fusible link (letter **f**, located in fuse and fusible link box) and M145 circuit breaker. Turn ignition switch “ON” and verify battery positive voltage is present at terminals 2 and 3 of power window relay and terminal 1 of sunroof motor. 2. Check power window relay ground circuit. 3. Check sunroof motor ground circuit. 4. Check power window relay. 5. Check the wire between power window relay and sunroof motor. 6. Check sunroof switch. 7. Check harness between sunroof switch and sunroof motor. 8. Check sunroof motor.
Power sunroof cannot be operated using one of the sunroof switches.	1. Sunroof switch 2. Sunroof switch circuit	1. Check sunroof switch. 2. Check the harness between sunroof motor and sunroof switch.
Power sunroof auto function cannot be operated properly.	1. Sunroof slide mechanism 2. Sunroof switch 3. Sunroof switch circuit 4. Sunroof motor	1. Check the following. a. Check obstacles in sunroof, etc. b. Check worn or deformed sunroof. c. Check sunroof sash tilted too far inward or outward. 2. Check sunroof switch. 3. Check harness between sunroof motor and sunroof switch. 4. Replace sunroof motor.
Retained power operation does not operate properly.	1. RAP signal circuit 2. Driver or passenger side door switch circuit 3. Smart entrance control unit	1. Check harness between power window relay terminal 2 and smart entrance control unit terminal 5. 2. Check the following. a. Harness between smart entrance control unit and driver or passenger side door switch for short circuit b. Driver or passenger side door switch ground circuit c. Driver or passenger side door switch 3. Check smart entrance control unit. (EL-348)

Wiring Diagram — MIRROR —

NAEL0090





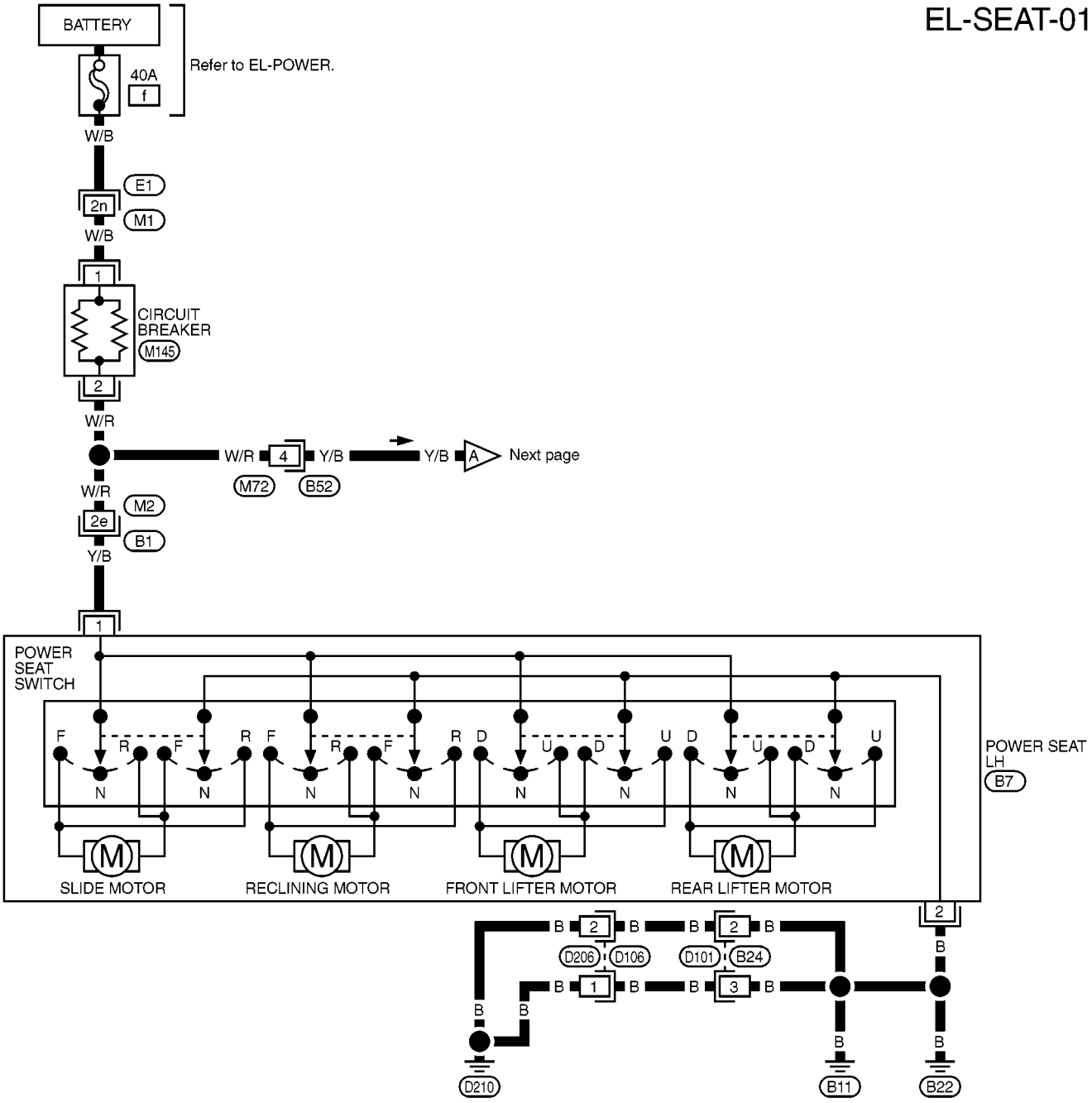
REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

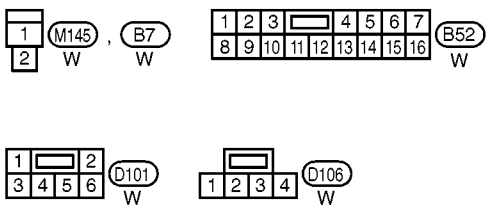
MEL045M

Wiring Diagram — SEAT —

NAEL0092

EL-SEAT-01

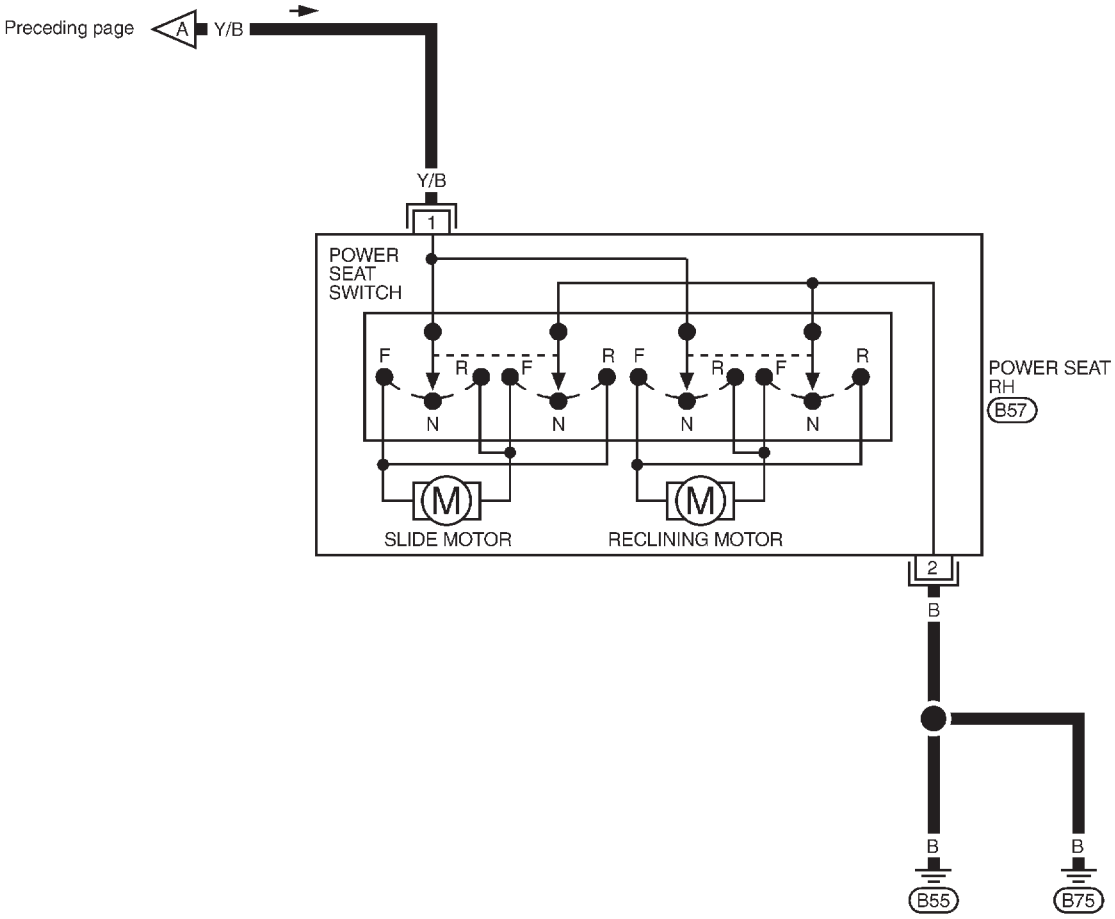


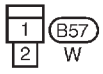


REFER TO THE FOLLOWING.

E1 , B1 - SUPER MULTIPLE JUNCTION (SMJ)

MEL830L


Preceding page
A
Y/B
Y/B
1
POWER SEAT SWITCH
F
R
N
SLIDE MOTOR
RECLINING MOTOR
POWER SEAT RH
B57
2
B
B55
B75

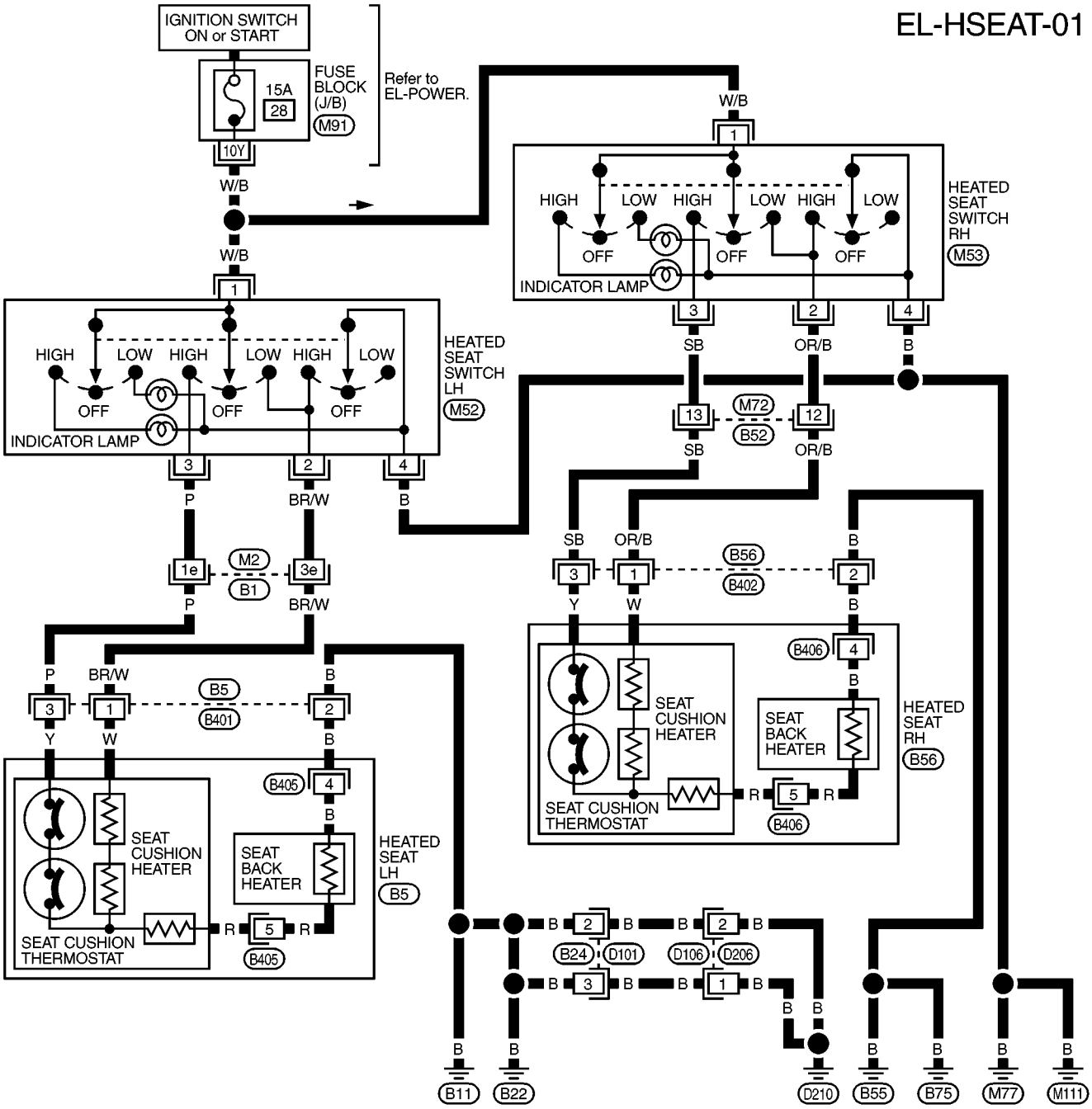

1
2
B57
W

MEL601F

Wiring Diagram — HSEAT —

NAEL0093

EL-HSEAT-01



M52 L, M53 W

B5 GY, B56 GY

B52 W

D101 W

D106 W

B405* L, B406* L

* : This connector is not shown in "HARNESS LAYOUT", EL section.

REFER TO THE FOLLOWING.

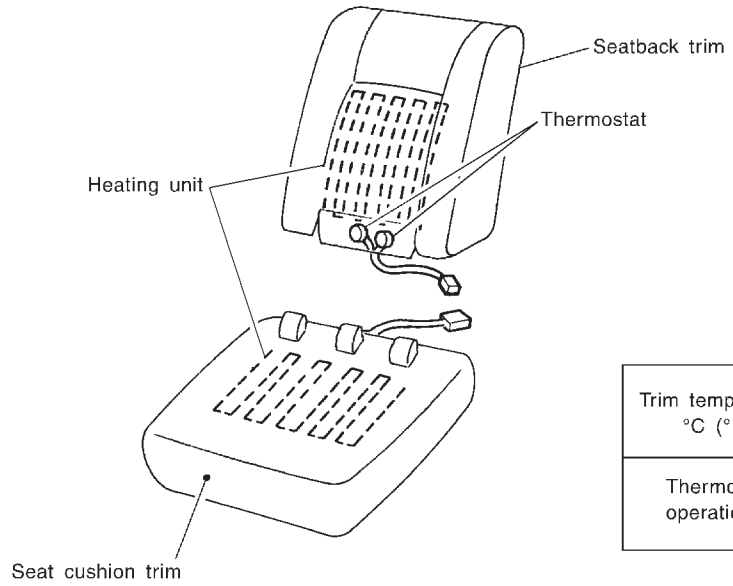
B1 -SUPER MULTIPLE JUNCTION (SMJ)

M91 -FUSE BLOCK- JUNCTION BOX (J/B)

MEL046M

Seatback Heating Unit

NAEL0215

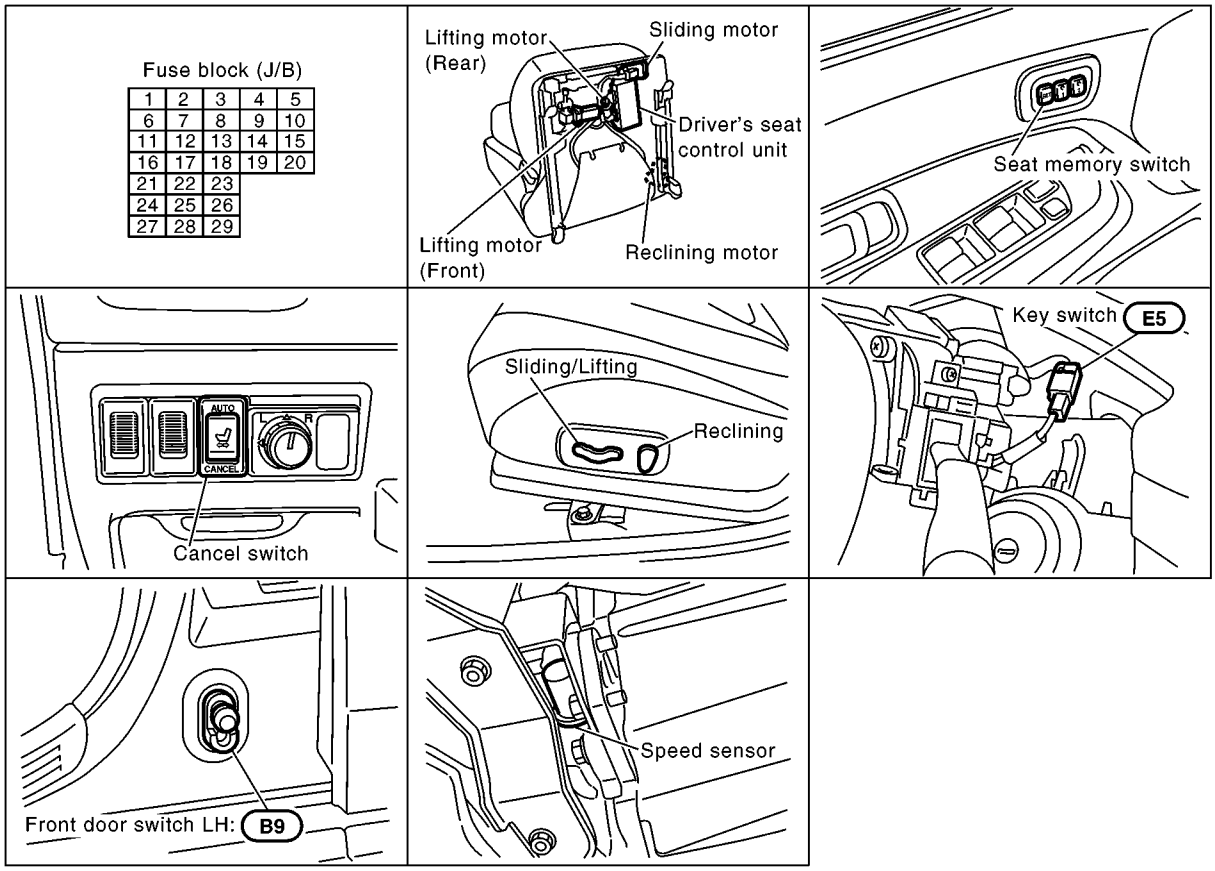


Trim temperature °C (°F)	Increasing to 35 - 45 (95 - 113)	Decreasing to 25 - 35 (77 - 95)
Thermostat operation	OFF	ON

SBT314

Component Parts and Harness Connector Location

NAEL0209



SEL353X

System Description

=NAEL0210

OPERATIVE CONDITION

NAEL0210S01

The drive position can be set in 2 ways, manually and automatically.

Manual Operation

NAEL0210S0101

The driver's seat can be adjusted for sliding, reclining, front cushion height and rear cushion height with the LH power seat switches. The manual operation can be adjusted with the IGN key in any position.

Automatic Operation

NAEL0210S0102

The driver's seat is adjusted to the proper positions for the driver automatically, in 3 different ways: MEMORY AUTOMATIC SET, AUTOMATIC EXITING SETTING and AUTOMATIC SET RETURN. (Automatic Drive Positioner = ADP)

CONDITIONS INHIBITING AUTOMATIC OPERATION

NAEL0210S02

Automatic memory setting procedures are suspended under any of the following conditions:

1) When vehicle speed is more than 7 km/h (4 MPH).
2) When driver's side power seat switch is turned on.
3) When any two of the switches (set switch and memory switches 1 and 2) are turned ON.
4) When cancel switch is turned on.
5) When selector lever is in any position other than "P".
6) When ignition switch is turned to "START" position.
   (Operation resumes when ignition switch is returned to "ON".)
7) When detention switch malfunction is detected:

- Detention switch failure is sensed when detention switch remains off for at least 2 seconds at a vehicle speed of greater than 7 km/h (4 MPH).

FAIL-SAFE SYSTEM

NAEL0210S03

Output Failure

NAEL0210S0301

When the ignition switch is in the ON position, if any of the parts (indicated in the following chart) move more than the specified amount within a period "T2" when no "ON" input is sent from any of the switches (indicated in the following chart), or an output from the automatic drive positioner is not produced, an output failure is sensed. Motor operation will be suspended automatically, and all automatic operations will be ineffective. (In this case, the motor will not operate manually.)

OPERATED PORTION	T2	Allowable measurement
Seat sliding	Approx. 2.5 sec.	Within 6 mm (0.24 in)
Seat reclining	Same as above	Change angle within 1°

Absolving

NAEL0210S0302

When moving selector lever back to "P" position after having moved it to any position except "P", fail-safe operation will be canceled.

INITIALIZATION

NAEL0210S04

After reconnecting battery cable, perform initialization procedure A or B. If initialization has not been performed, automatic drive positioner will not operate.

PROCEDURE A

1) Insert key in the ignition key cylinder. (Ignition switch is in "OFF" position.)
2) Open → close → open driver side door. (Do not perform with the door switch operation.)
3) End

PROCEDURE B

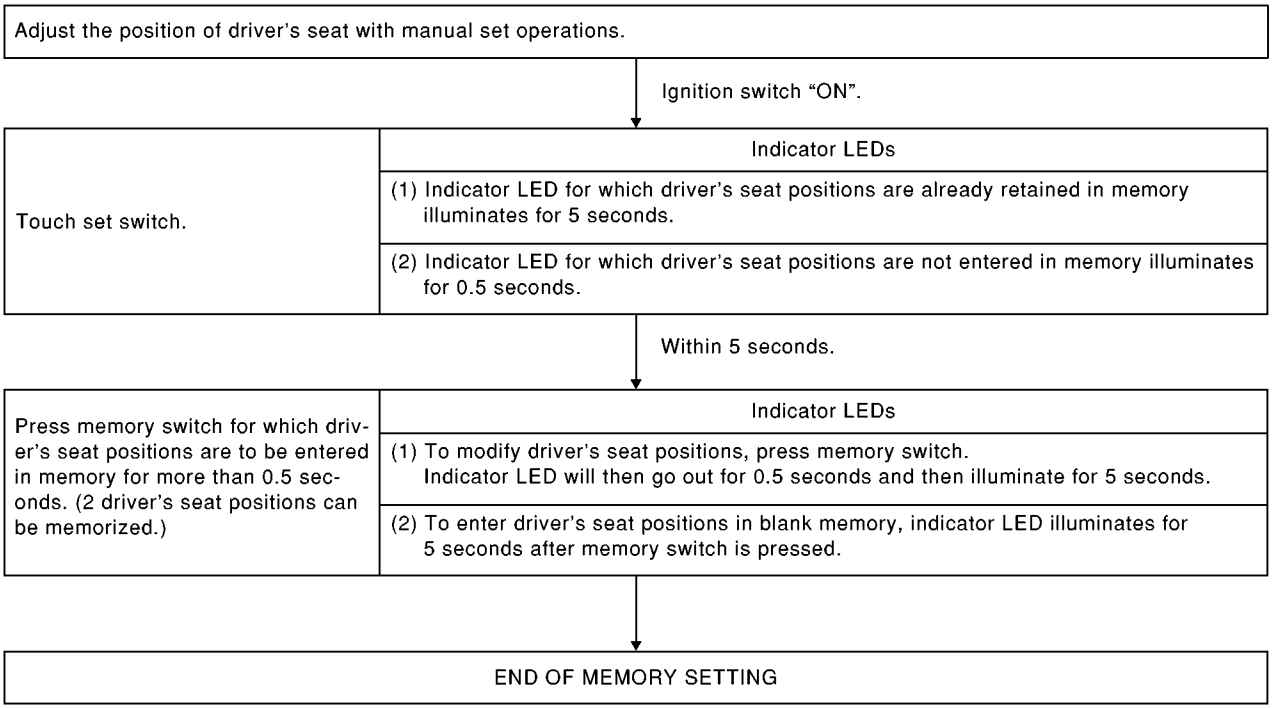
1) Drive the vehicle at more than 25 km/h (16 MPH).
2) End

MEMORY AUTOMATIC SET

=NAEL0210S05

Two drive positions can be retained in the memory. Press memory switch to set driver's seat to preset position.

PROCEDURE FOR STORING MEMORY

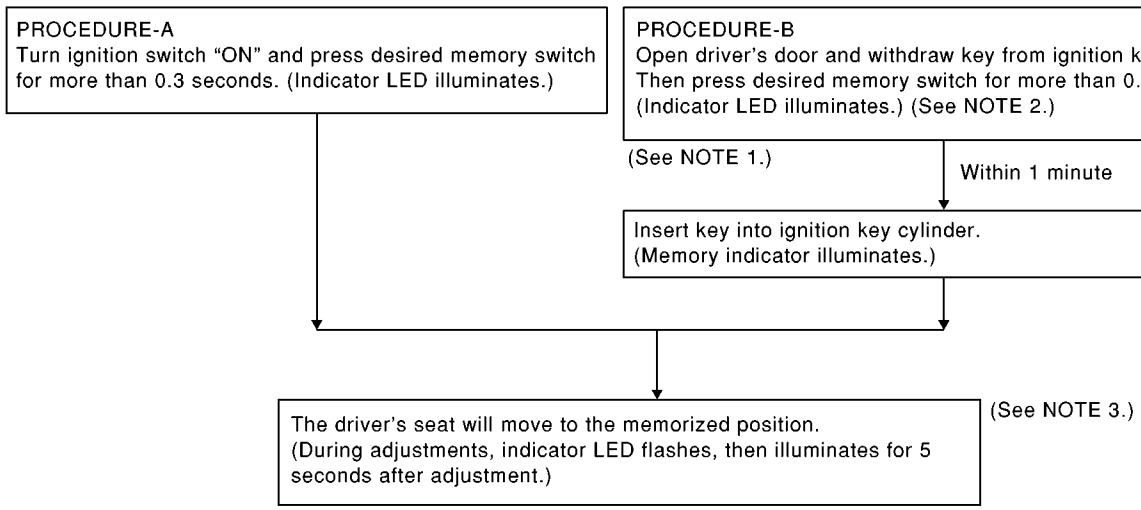


SEL592W

NOTE:

- When memory switch for which driver's seat positions are already retained in memory is pressed, new seat positions will be retained in memory in place of the previously set positions.
- Drive position is erased from the memory when battery cable is disconnected more than 30 seconds. After connecting battery cable, perform initialization procedures.

SELECTING THE MEMORIZED POSITION



SEL593W

NOTE:

1) Do not keep cancel switch pressed as it will not operate.
2) Automatic exiting setting will be performed.
3) The driver's seat position (see the following Table) operates in the order of priority.

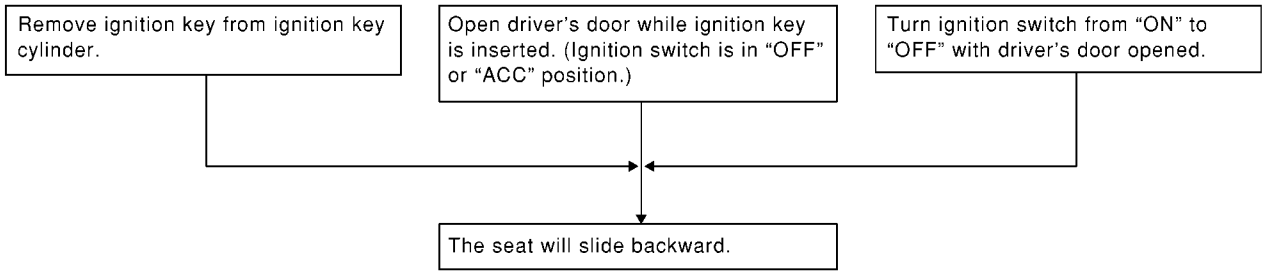
The order of priority	Operated portion
1	Seat sliding
2	Seat reclining
3	Seat front lifting
4	Seat rear lifting

AUTOMATIC EXITING SETTING

NAEL0210S06

"Exiting" positions:

Driver's seat ... Slides about 40 mm (1.57 in) rear from normal sitting position.

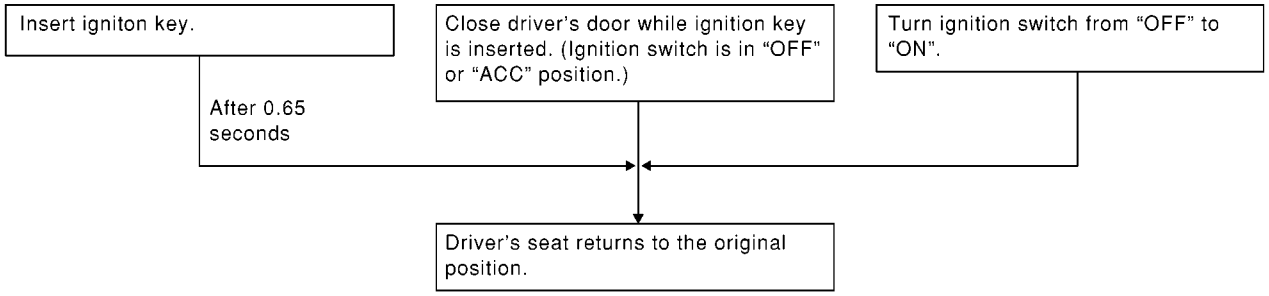


SEL594W

AUTOMATIC SET RETURN

NAEL0210S07

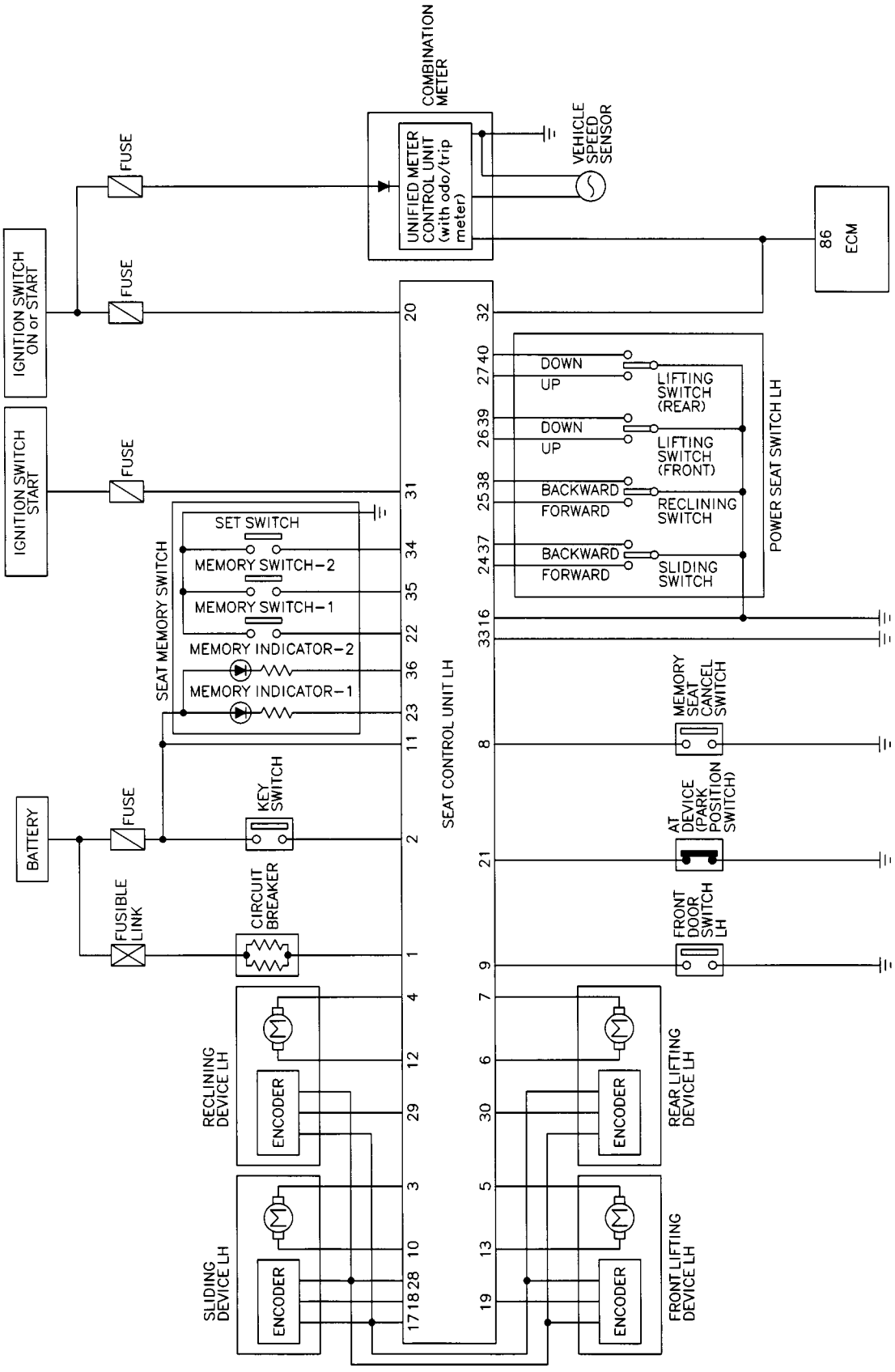
With driver's seat set to the "exiting" position, operating one of the following procedures moves it to the position previously retained in memory.



SEL595W

Schematic

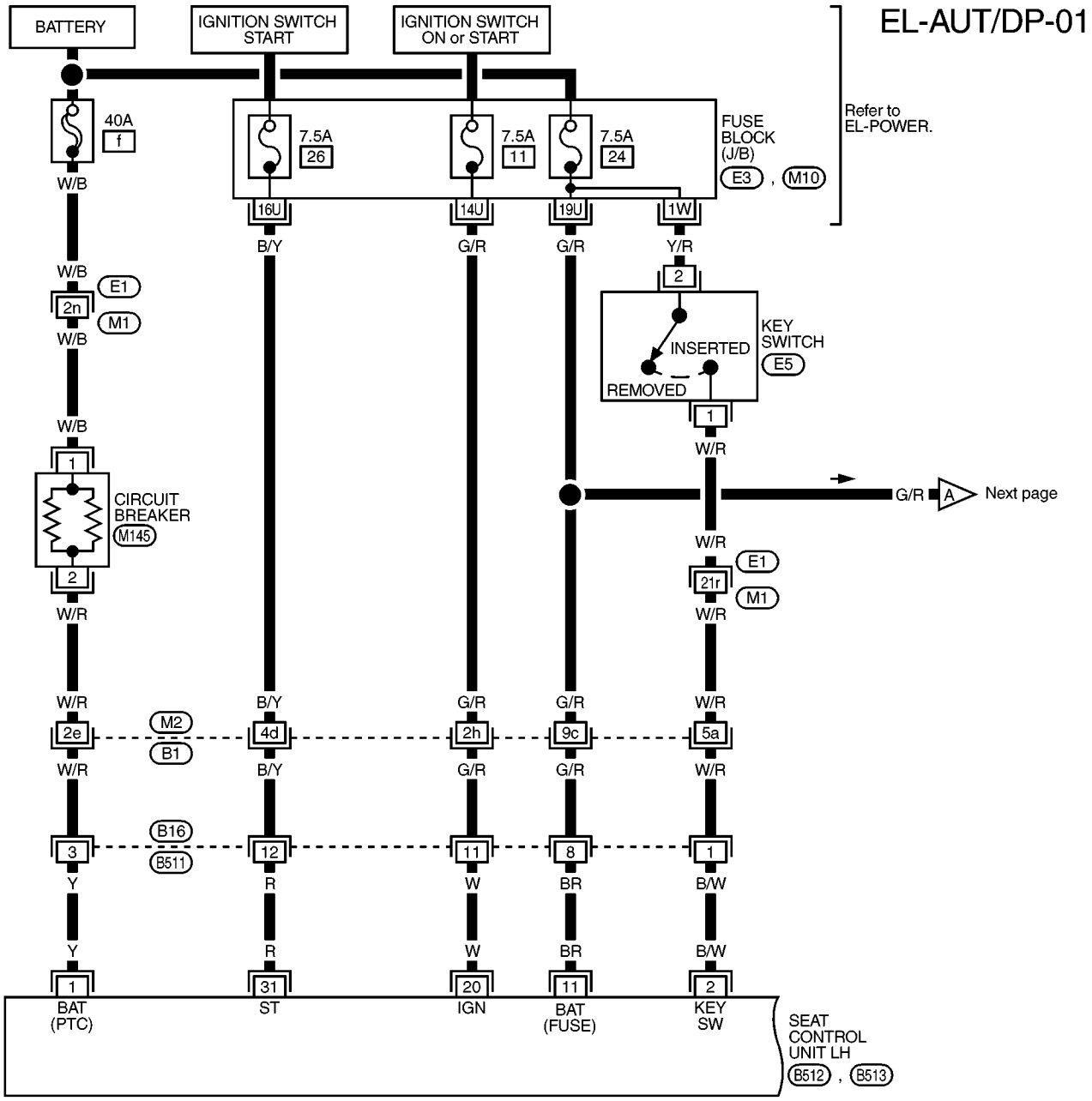
NAEL0211

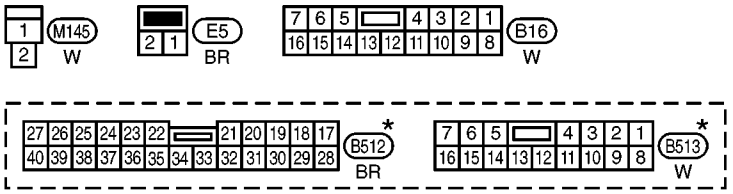


MEL833L

Wiring Diagram — AUT/DP —

NAEL0212



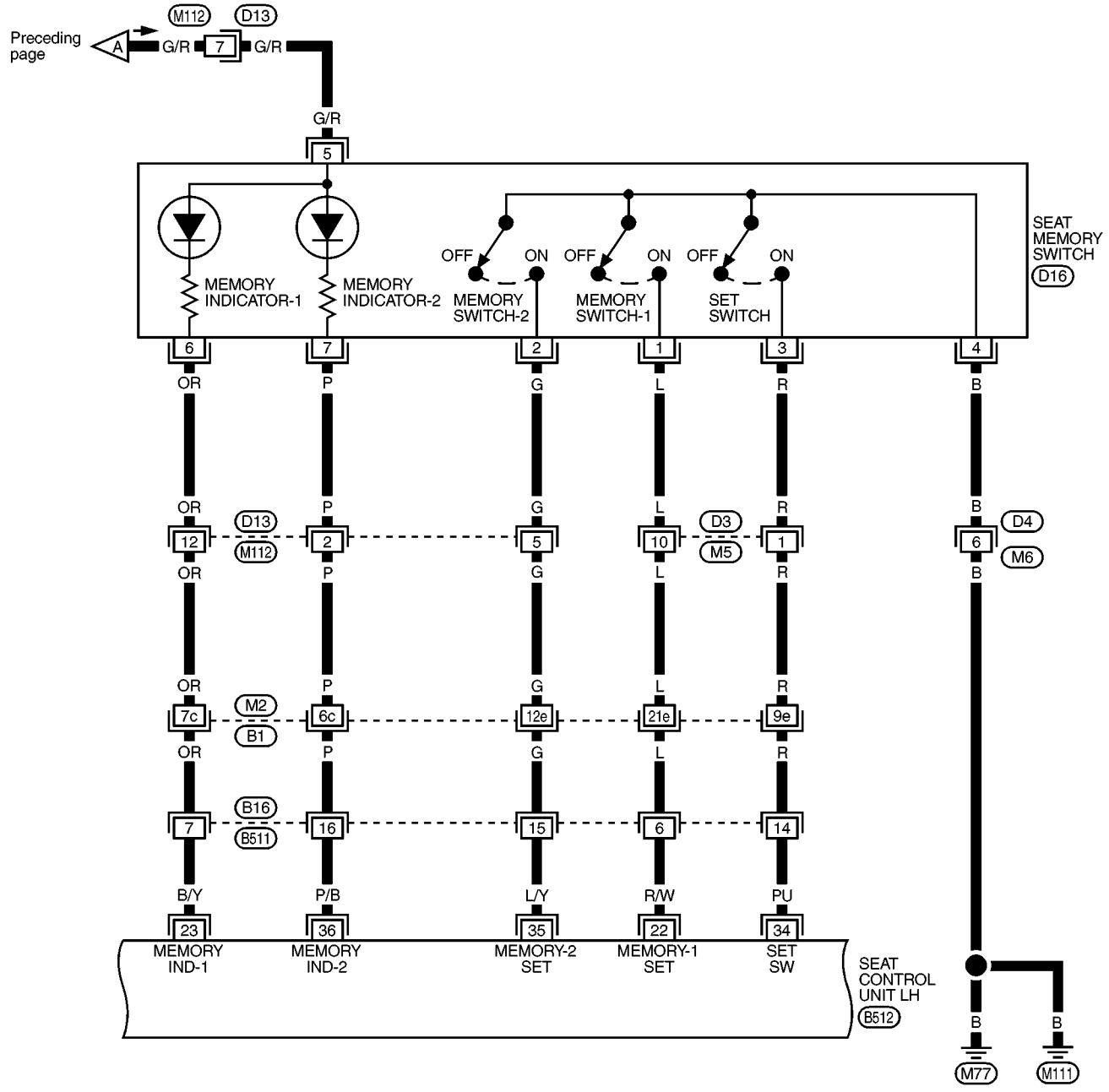


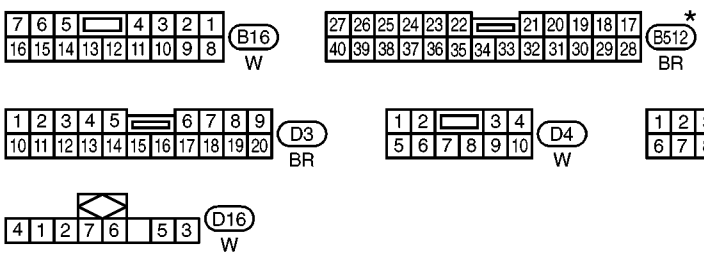
★ : This connector is not shown in "HARNESS LAYOUT", EL section.

REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 , E3 -FUSE BLOCK-JUNCTION BOX (J/B)

MEL834L

EL-AUT/DP-02



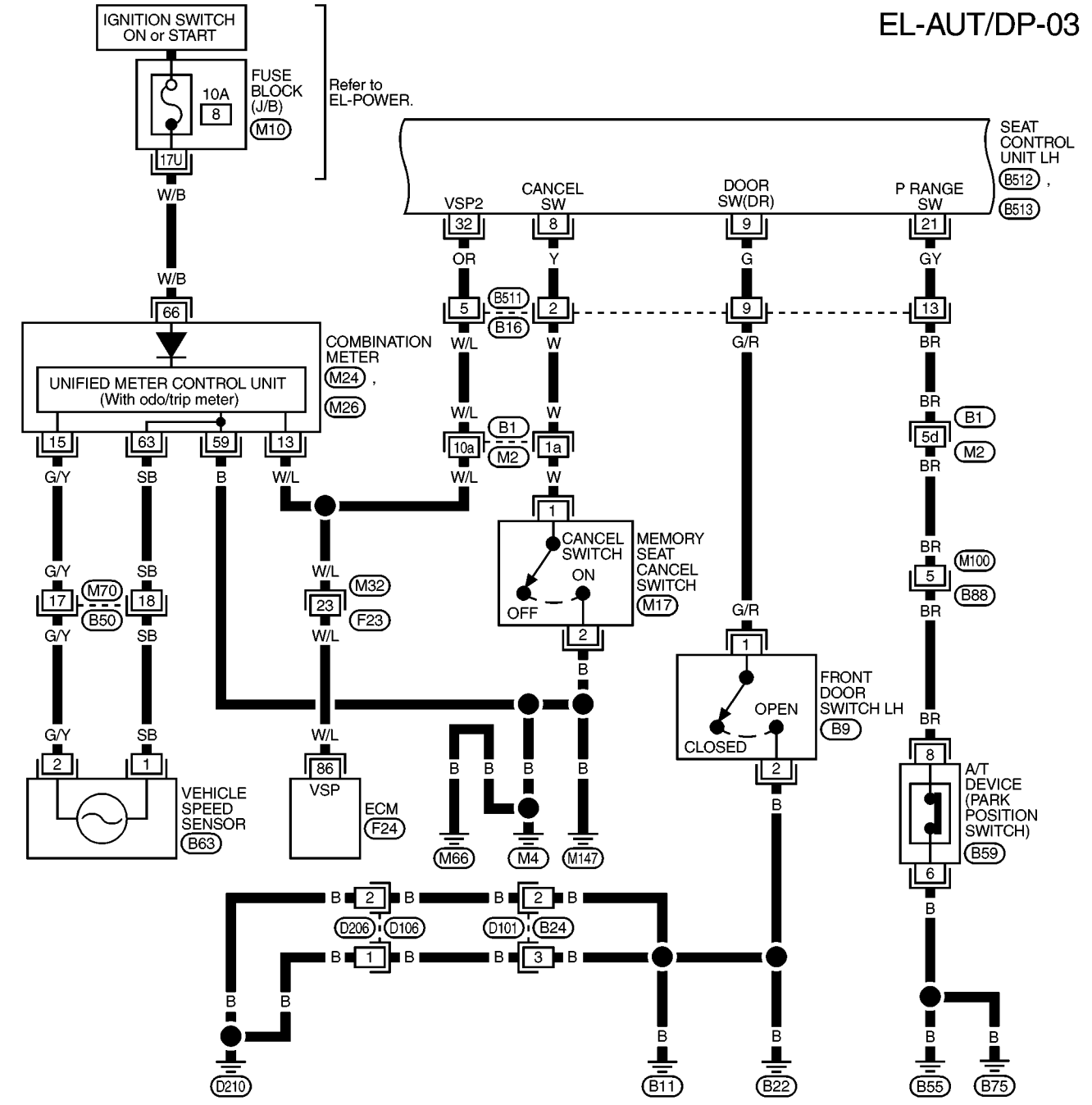


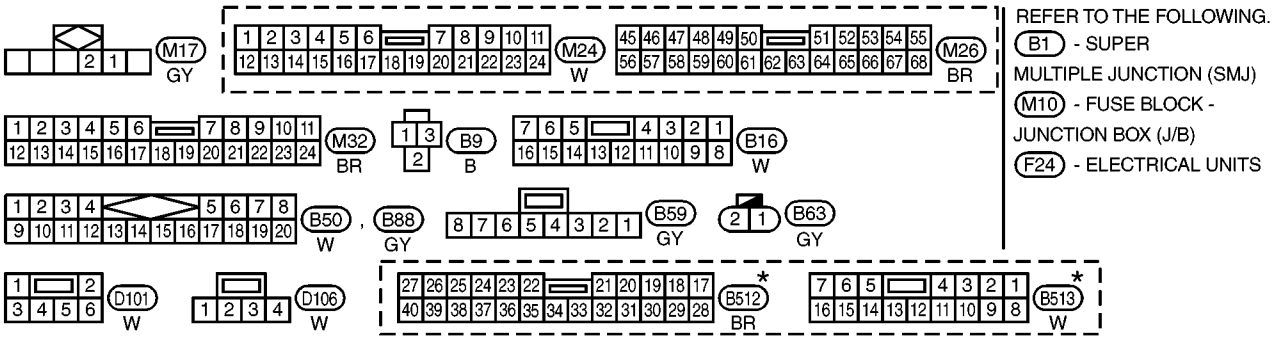
∗ : This connector is not shown in "HARNESS LAYOUT", EL section.

REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL835L

EL-AUT/DP-03



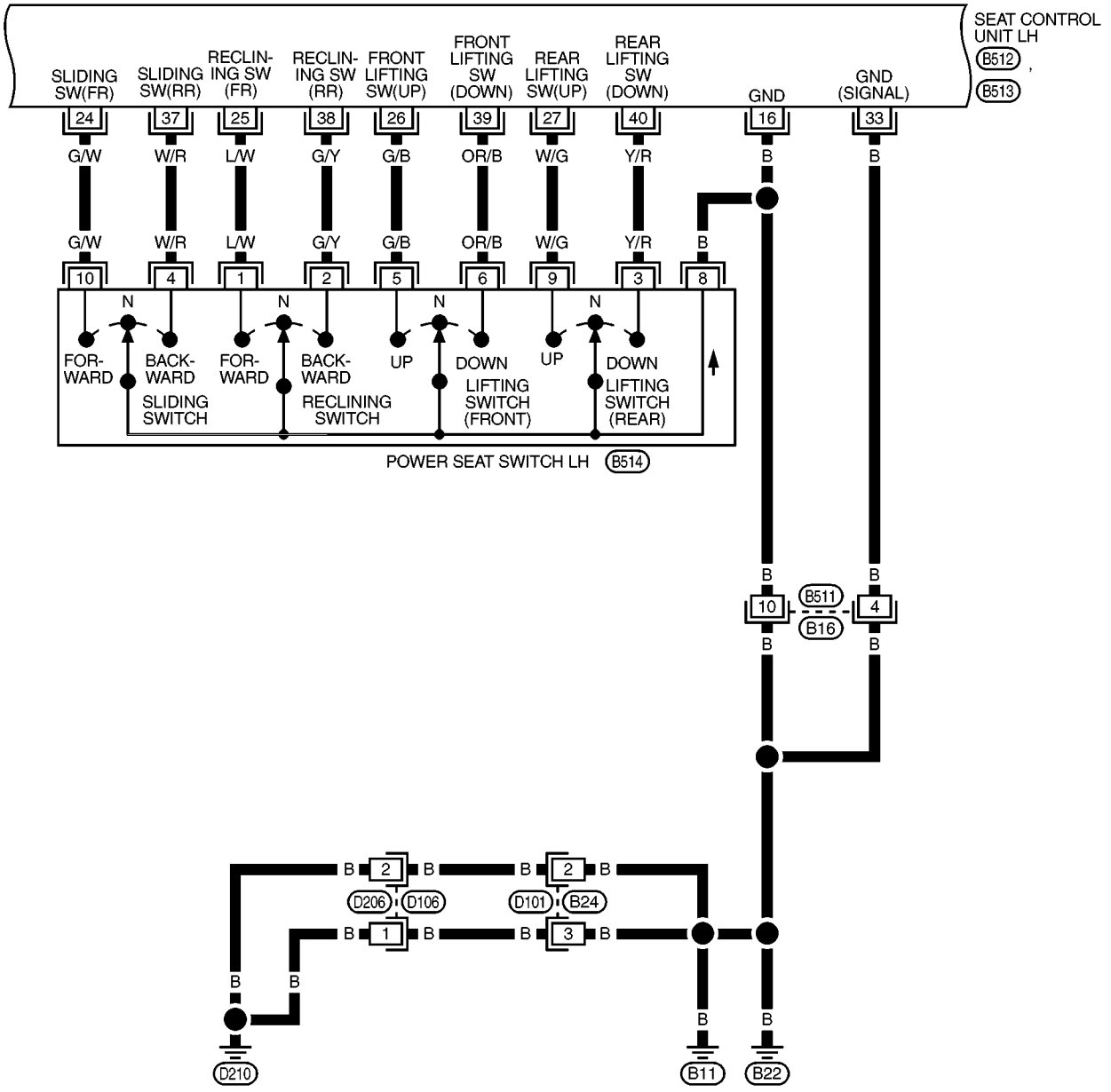


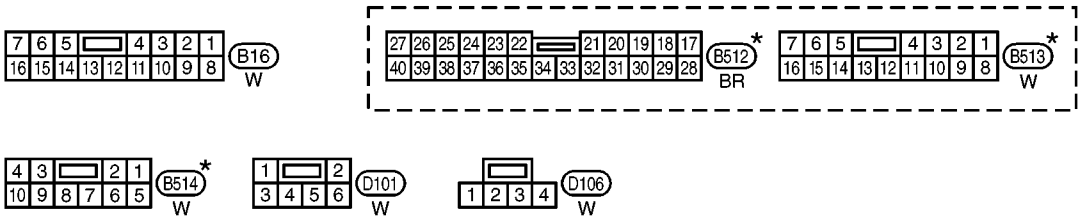
REFER TO THE FOLLOWING.
B1 - SUPER MULTIPLE JUNCTION (SMJ)
M10 - FUSE BLOCK - JUNCTION BOX (J/B)
F24 - ELECTRICAL UNITS

* : This connector is not shown in "HARNESS LAYOUT", EL section.

MEL836L

EL-AUT/DP-04

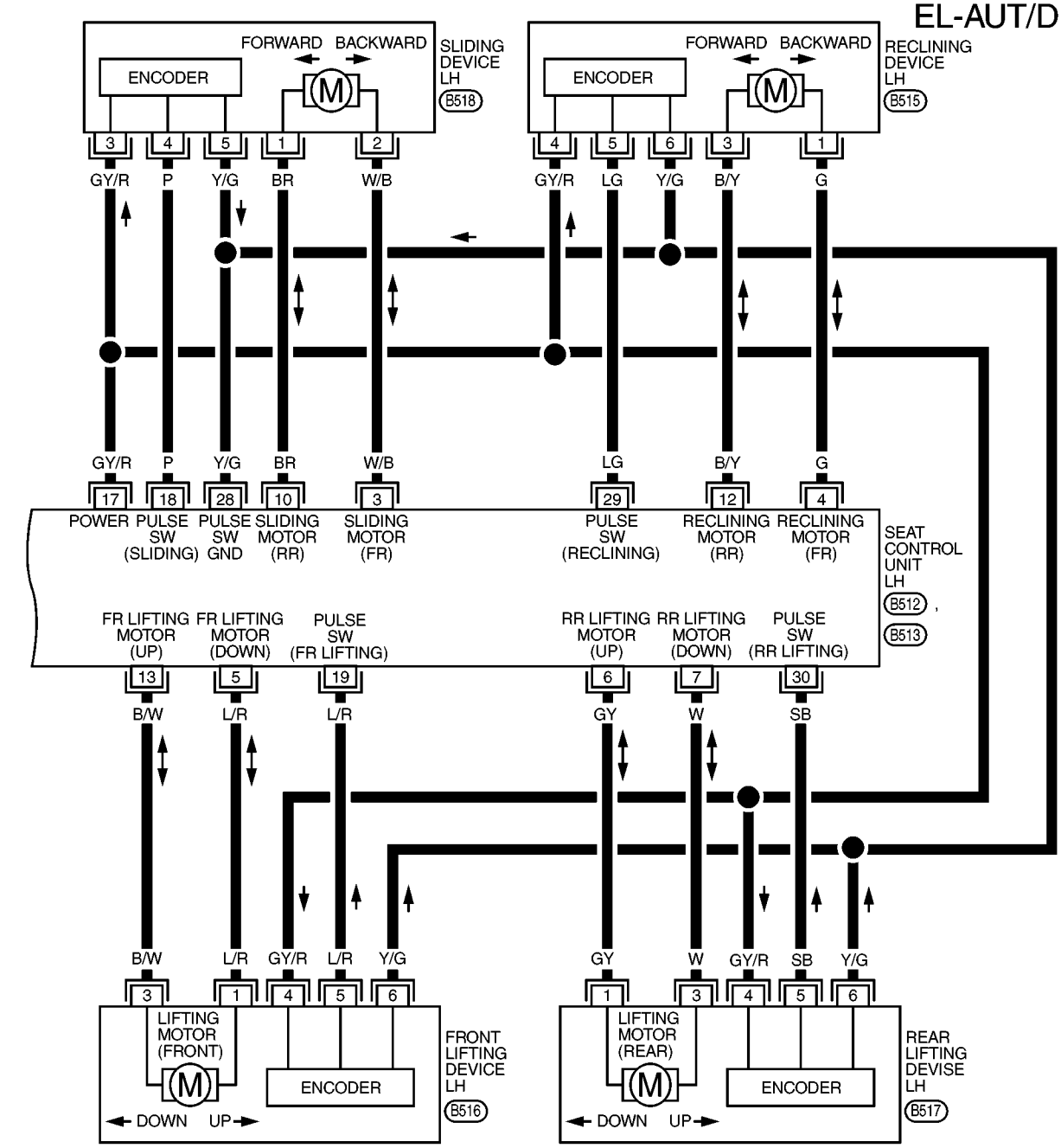


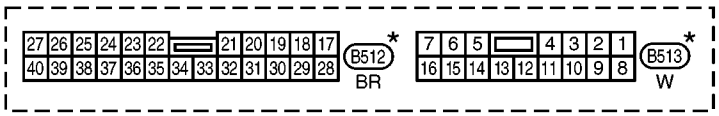


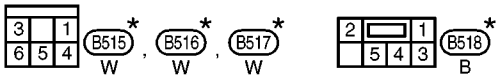
★ : This connector is not shown in "HARNESS LAYOUT", EL section.

MEL186M

EL-AUT/DP-05





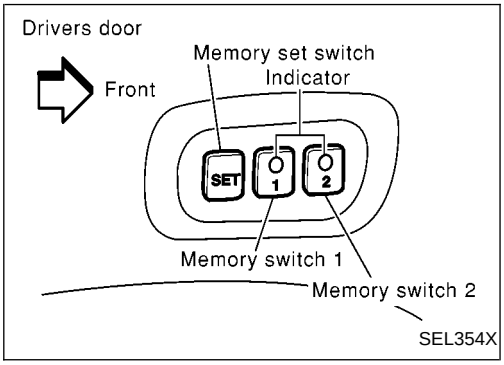


∗ : This connector is not shown in "HARNESS LAYOUT", EL section.

MEL187M

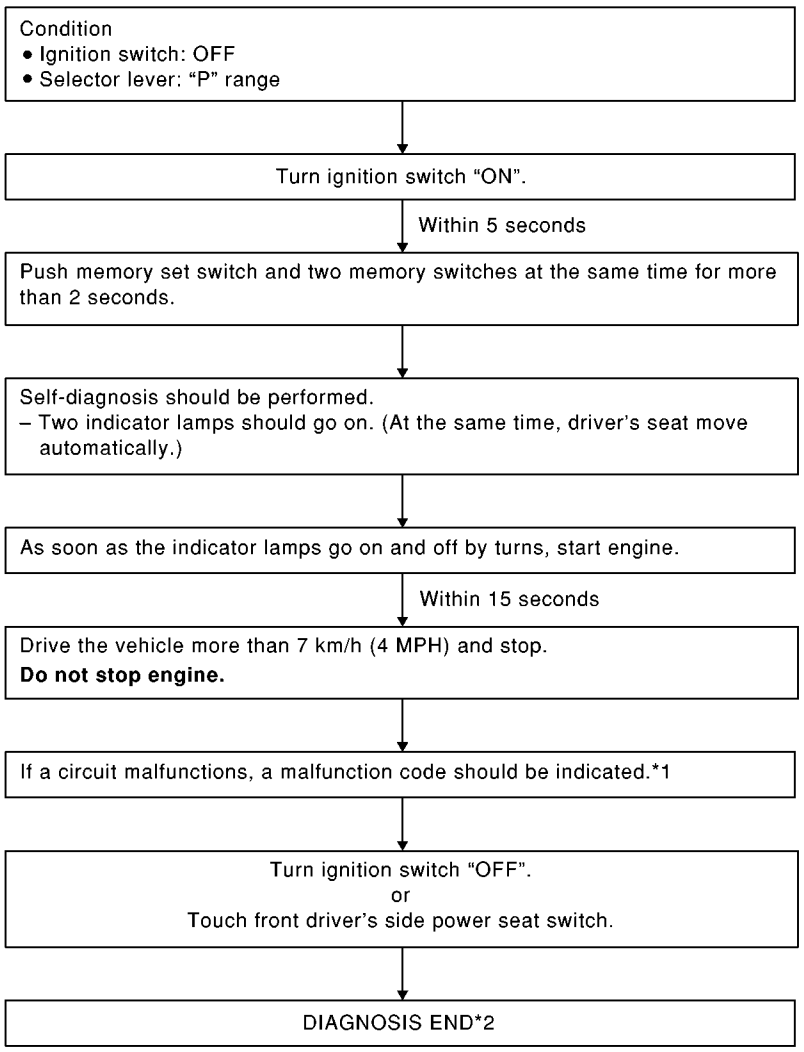
On Board Diagnosis

NAEL0213



HOW TO PERFORM SELF-DIAGNOSIS

NAEL0213S01



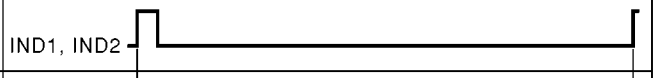
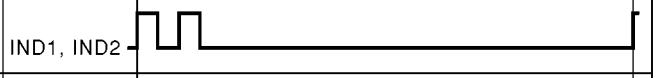
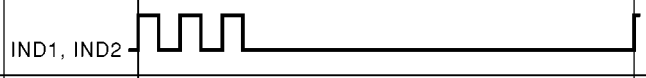
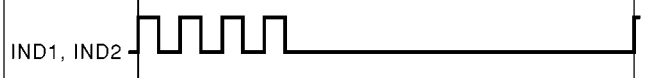
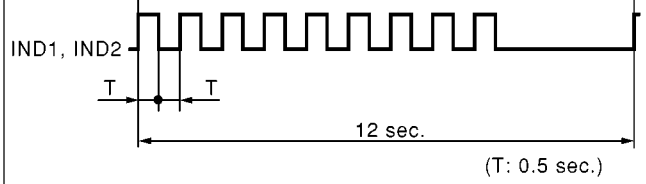
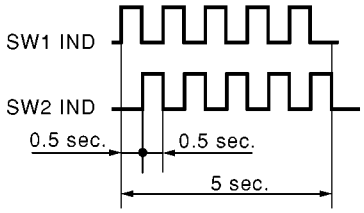
SEL596W

*1: If no malfunction is indicated, self-diagnosis will end after the vehicle speed sensor diagnosis is performed.
*2: Diagnosis ends after self-diagnostic results have been indicated for 10 minutes if left unattended.

MALFUNCTION CODE TABLE

=NAEL0213S02

In this mode, a malfunction code is indicated by the number of flashes from the automatic drive positioner indicator lamps (indicator lamp 1, indicator lamp 2) as shown below.

Code No.	Detected items	Indication of seat memory switches 1 and 2	Explanation
1	Seat sliding		While the seat motors are moving for 2.5 seconds, if the number of seat sliding/reclining/lifting encoder pulses changes 2 times or less, the seat device is determined to be malfunctioning.
2	Seat reclining		
3	Seat lifting front		
4	Seat lifting rear		
9	Vehicle speed sensor circuit		If the vehicle speed sensor output of less than 7 km/h (4 MPH) is detected, the vehicle speed sensor is determined to be malfunctioning.
–	No malfunction in the above items		—

SEL597W

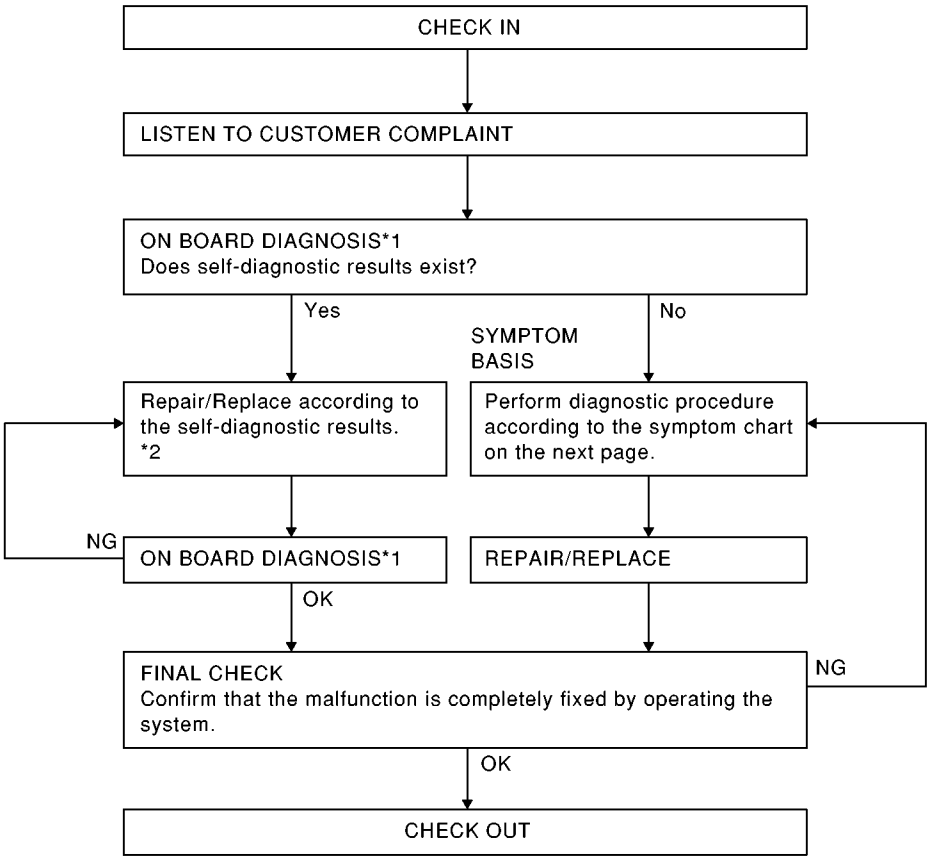
Code No.	Detected items	Diagnostic procedure	Reference page	Code No.	Detected items	Diagnostic procedure	Reference page
1	Seat sliding	PROCEDURE 2 (Sliding encoder check) PROCEDURE 6 (Sliding motor check)	EL-221 EL-229	4	Seat lifting rear	PROCEDURE 5 [Lifting encoder (rear) check] PROCEDURE 9 [Lifting motor (rear) check]	EL-227 EL-232
2	Seat reclining	PROCEDURE 3 (Reclining encoder check) PROCEDURE 7 (Reclining motor check)	EL-223 EL-230	9	Vehicle speed sensor	PROCEDURE 12 (Vehicle speed sensor check)	EL-235
3	Seat lifting front	PROCEDURE 4 [Lifting encoder (front) check] PROCEDURE 8 [Lifting motor (front) check]	EL-225 EL-231				

Trouble Diagnoses

NAEL0214

WORK FLOW

NAEL0214S01

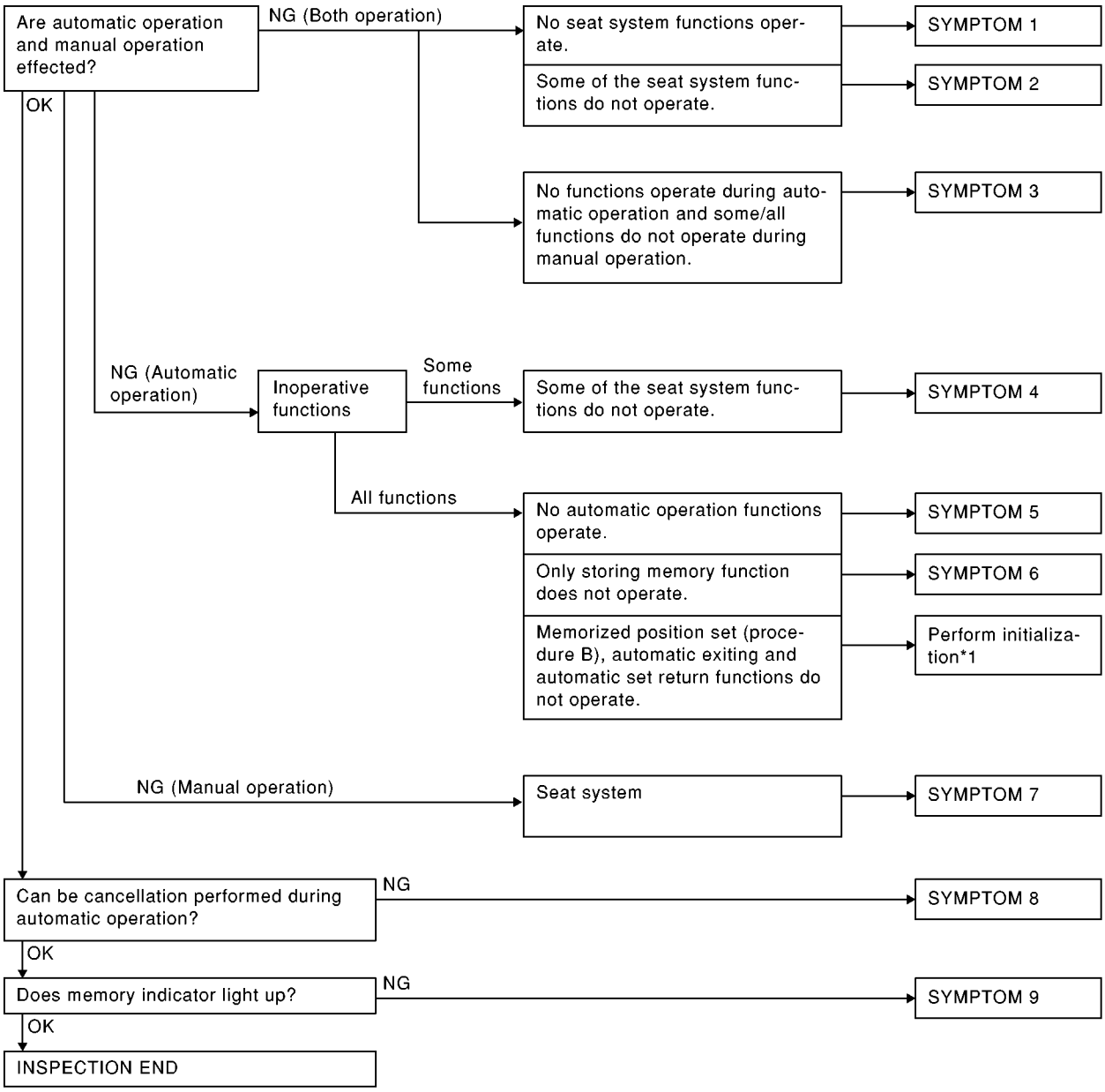


SEL599W

*1 EL-214 *2 EL-215

PRELIMINARY CHECK

NAEL0214S02



SEL600W

*1: After reconnecting battery cable, perform initialization procedure A or B.
If initialization has not been performed, automatic drive positioner will not operate.

PROCEDURE A

1) Insert key in the ignition key cylinder. (Ignition switch is in "OFF" position.)
2) Open → close → open driver side door. (Do not perform with the door switch operation.)
3) End

PROCEDURE B

1) Drive the vehicle at more than 30 km/h (19 MPH).

2) End

After performing preliminary check, go to symptom chart below.

Before starting trouble diagnoses below, perform preliminary check, EL-217. Symptom numbers in the symptom chart correspond with those of preliminary check.

SYMPTOM CHART

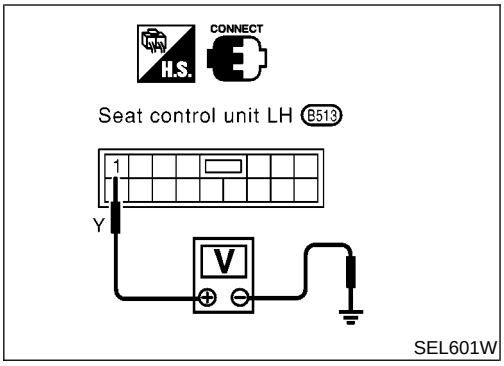
NAEL0214S03

PROCEDURE			Diagnostic procedure						
REFERENCE PAGE (EL-)			220	221	223	225	227	229	230
SYMPTOM			DIAGNOSTIC PROCEDURE 1 (Power supply and ground circuit for Driver's seat control unit)	DIAGNOSTIC PROCEDURE 2 (Sliding encoder check)	DIAGNOSTIC PROCEDURE 3 (Reclining encoder check)	DIAGNOSTIC PROCEDURE 4 [Lifting encoder (front) check]	DIAGNOSTIC PROCEDURE 5 [Lifting encoder (rear) check]	DIAGNOSTIC PROCEDURE 6 (Sliding motor check)	DIAGNOSTIC PROCEDURE 7 (Reclining motor check)
1	No seat system functions operate.		X						
2	Some of the seat system functions do not operate during automatic/ manual operation.	Sliding						X	
		Reclining							X
		Lifting (Front)							
		Lifting (Rear)							
3	No functions operate during automatic operation, and some/all functions do not during manual operation.								
4	Some of the seat system functions do not operate during automatic operation.	Sliding		X					
		Reclining			X				
		Lifting (Front)				X			
		Lifting (Rear)					X		
5	No automatic operation functions operate.								
6	Drive position cannot be retained in the memory.								
7	Does not operate during manual operation. (Operates during automatic operation.)	Sliding							
		Reclining							
		Lifting (Front)							
		Lifting (Rear)							
8	Automatic operation cannot be canceled.								
9	Memory indicator does not light up.								

X : Applicable

PROCEDURE			Diagnostic procedure						
REFERENCE PAGE (EL-)			231	232	233	234	235	238	238
SYMPTOM			DIAGNOSTIC PROCEDURE 8 [Lifting motor (front) check]	DIAGNOSTIC PROCEDURE 9 [Lifting motor (rear) check]	DIAGNOSTIC PROCEDURE 10 (Power seat switch check)	DIAGNOSTIC PROCEDURE 11 (Cancel switch check)	DIAGNOSTIC PROCEDURE 12 (Key, park position, door switch and vehicle speed sensor check)	DIAGNOSTIC PROCEDURE 13 (Seat memory switch check)	DIAGNOSTIC PROCEDURE 14 (Memory indicator check)
1	No seat system functions operate.								
2	Some of the seat system functions do not operate during automatic/ manual operation.	Sliding							
		Reclining							
		Lifting (Front)	X						
		Lifting (Rear)		X					
3	No functions operate during automatic operation, and some/all functions do not during manual operation.				X		X (ACC, ON START signal)		
4	Some of the seat system functions do not operate during automatic operation.	Sliding							
		Reclining							
		Lifting (Front)							
		Lifting (Rear)							
5	No automatic operation functions operate.					X	X		
6	Drive position cannot be retained in the memory.						X (IGN ON signal)	X	
7	Does not operate during manual operation. (Operates during automatic operation.)	Sliding			X				
		Reclining			X				
		Lifting (Front)			X				
		Lifting (Rear)			X				
8	Automatic operation cannot be canceled.					X			
9	Memory indicator does not light up.								X

X : Applicable



DIAGNOSTIC PROCEDURE 1

=NAEL0214S04

(Power supply and ground circuit for driver's seat control unit)

Power Supply Circuit Check

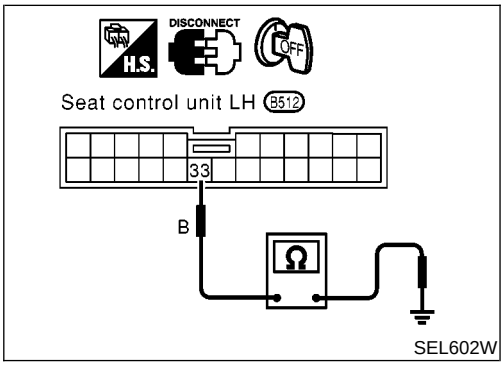
NAEL0214S0401

Check voltage between seat control unit LH terminal 1 and ground.

Terminals	Ignition switch position			
	OFF	ACC	ON	START
1 - Ground	Battery voltage			

If NG, check the following.

- 40A fusible link (letter **f**, located in the fuse and fusible link box)
- Circuit breaker
- Harness for open or short between circuit breaker and seat control unit LH



Ground Circuit Check

NAEL0214S0402

Check continuity between seat control unit LH terminal 33 and ground.

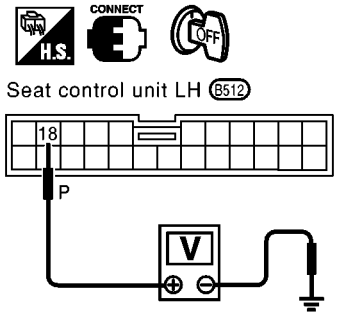
Terminals	Continuity
33 - Ground	Yes

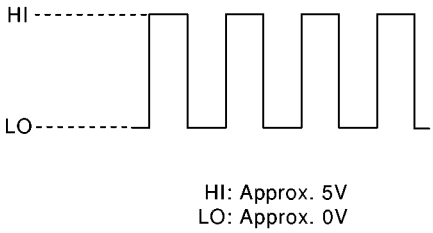
DIAGNOSTIC PROCEDURE 2
(Sliding encoder check)

=NAEL0214S05

1	CHECK SLIDING ENCODER OUTPUT SIGNAL

Measure voltage between seat control unit LH terminal 18 and ground with CONSULT-II or oscilloscope when power seat slide is operated.





HI: Approx. 5V
LO: Approx. 0V

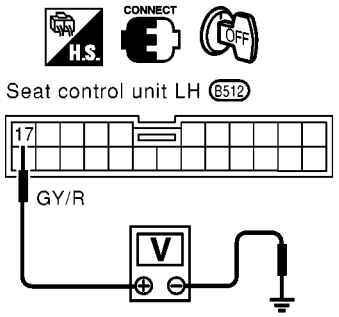
SEL603W

OK or NG

OK	▶	Sliding encoder is OK.
NG	▶	GO TO 2.

2	CHECK SLIDING ENCODER INPUT SIGNAL

Check voltage between seat control unit LH terminal 17 and ground.



Battery voltage should exist.

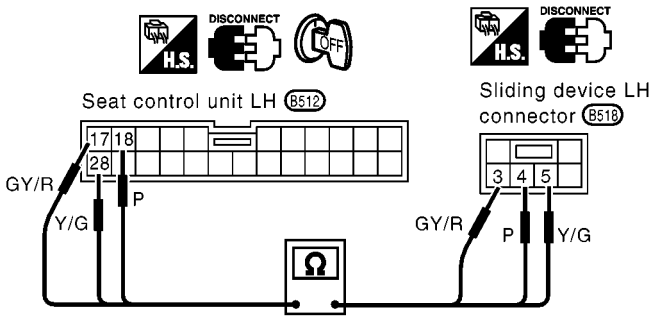
SEL604W

OK or NG

OK	▶	GO TO 3.
NG	▶	Replace seat control unit LH.

3	CHECK SLIDING ENCODER OPEN CIRCUIT

1. Disconnect seat control unit LH connector and sliding device LH connector.
2. Check harness continuity between seat control unit LH connector and sliding device LH connector.



Terminals		Continuity
Seat control unit LH	Sliding device LH (Sliding encoder)	
17	3	Yes
18	4	
28	5	

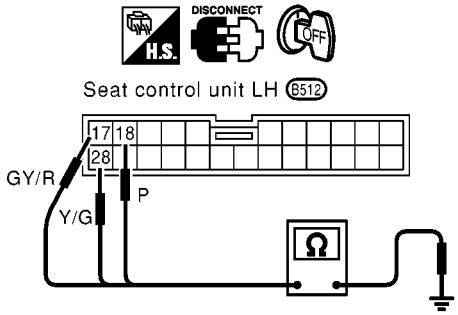
SEL605WA

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair harness.

4	CHECK SLIDING ENCODER SHORT CIRCUIT

Check harness continuity between seat control unit LH connector and ground.



Terminals	Continuity
17 - Ground	No
18 - Ground	
28 - Ground	

SEL606W

OK or NG

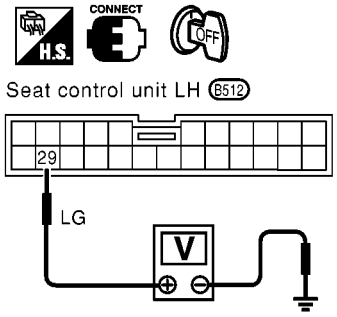
OK	▶	Replace sliding encoder.
NG	▶	Repair harness.

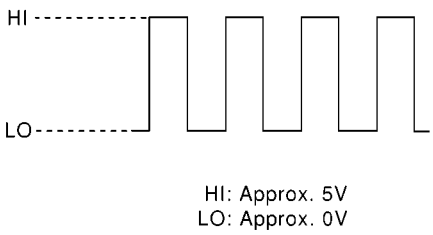
DIAGNOSTIC PROCEDURE 3
(Reclining encoder check)

=NAEL0214S06

1	CHECK RECLINING ENCODER OUTPUT SIGNAL

Measure voltage between seat control unit LH terminal 29 and ground with CONSULT-II or oscilloscope when power seat reclining is operated.





HI: Approx. 5V
LO: Approx. 0V

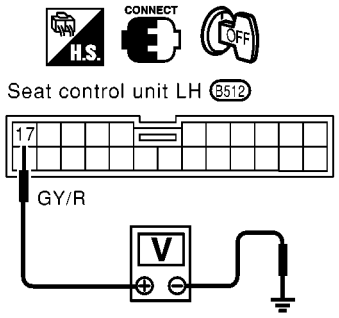
SEL607W

OK or NG

OK	▶	Reclining encoder is OK.
NG	▶	GO TO 2.

2	CHECK RECLINING ENCODER INPUT SIGNAL

Check voltage between seat control unit LH terminal 17 and ground.



Battery voltage should exist.

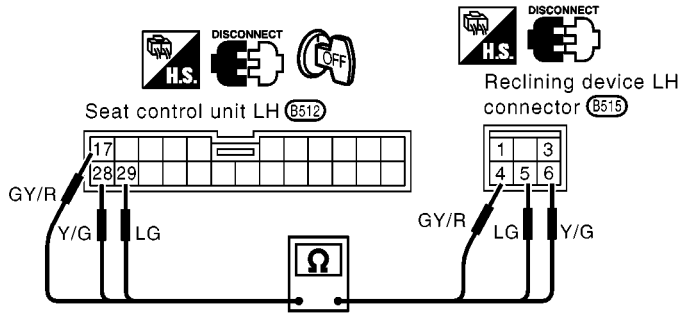
SEL608W

OK or NG

OK	▶	GO TO 3.
NG	▶	Replace seat control unit LH.

3	CHECK RECLINING ENCODER OPEN CIRCUIT

1. Disconnect seat control unit LH connector and reclining device LH connector.
2. Check harness continuity between seat control unit LH connector and reclining LH connector.



Terminals		Continuity
Seat control unit LH	Reclining device LH (Reclining encoder)	
17	4	Yes
28	6	
29	5	

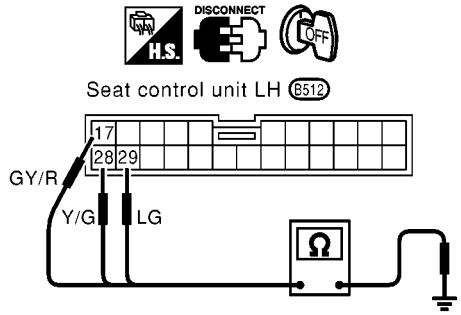
SEL609WA

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair harness.

4	CHECK RECLINING ENCODER SHORT CIRCUIT

Check harness continuity between seat control unit LH connector and ground.



Terminals	Continuity
17 - Ground	No
28 - Ground	
29 - Ground	

SEL610W

OK or NG

OK	▶	Replace reclining encoder.
NG	▶	Repair harness.

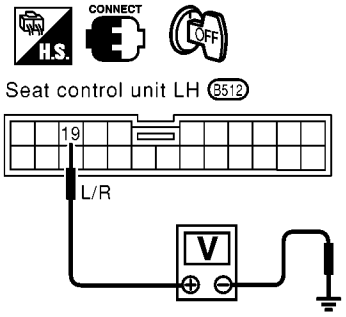
DIAGNOSTIC PROCEDURE 4

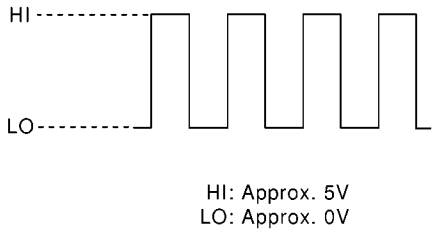
=NAEL0214S07

[Lifting encoder (front) check]

1	CHECK LIFTING ENCODER (FRONT) OUTPUT SIGNAL

Measure voltage between seat control unit LH terminal 19 and ground with CONSULT-II or oscilloscope when power seat lifting (front) is operated.





HI: Approx. 5V
LO: Approx. 0V

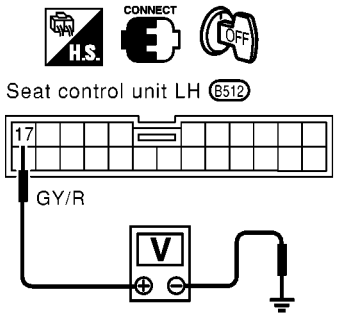
SEL611W

OK or NG

OK	▶	Lifting encoder (front) is OK.
NG	▶	GO TO 2.

2	CHECK LIFTING ENCODER (FRONT) INPUT SIGNAL

Check voltage between seat control unit LH terminal 17 and ground.



Battery voltage should exist.

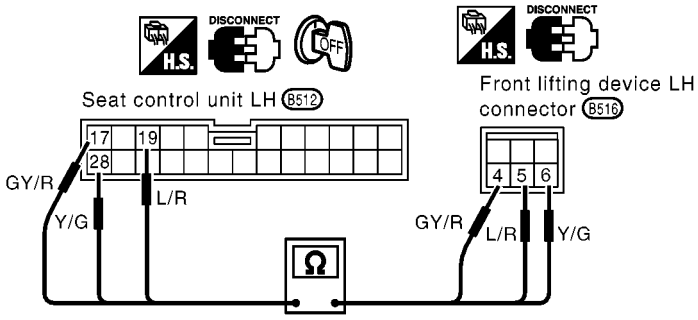
SEL612W

OK or NG

OK	▶	GO TO 3.
NG	▶	Replace seat control unit LH.

3	CHECK LIFTING ENCODER (FRONT) OPEN CIRCUIT

1. Disconnect seat control unit LH connector and front lifting device LH connector.
2. Check harness continuity between seat control unit LH connector and front lifting device LH connector.



Terminals		Continuity
Seat control unit LH	Front lifting device LH Lifing encoder (front)	
17	4	Yes
19	5	
28	6	

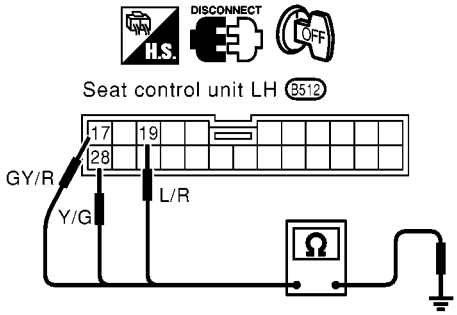
SEL613WA

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair harness.

4	CHECK LIFTING ENCODER (FRONT) SHORT CIRCUIT

Check harness continuity between seat control unit LH connector and ground.



Terminals	Continuity
17 - Ground	No
19 - Ground	
28 - Ground	

SEL614W

OK or NG

OK	▶	Replace lifting encoder (front).
NG	▶	Repair harness.

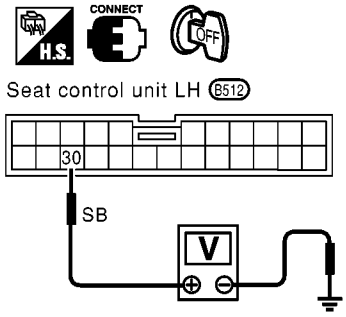
DIAGNOSTIC PROCEDURE 5

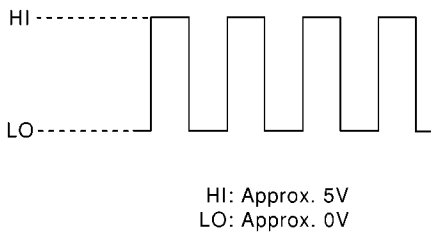
=NAEL0214S08

[Lifting encoder (rear) check]

1	CHECK LIFTING ENCODER (REAR) OUTPUT SIGNAL

Measure voltage between seat control unit LH terminal 30 and ground with CONSULT-II or oscilloscope when power seat lifting (rear) is operated.





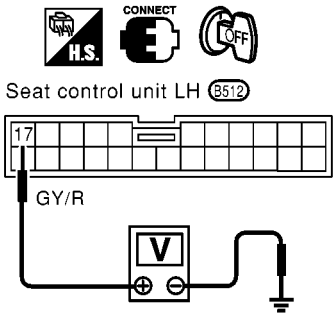
SEL615W

OK or NG

OK	▶	Lifting encoder (rear) is OK.
NG	▶	GO TO 2.

2	CHECK LIFTING ENCODER (REAR) INPUT SIGNAL

Check voltage between seat control unit LH terminal 17 and ground.



Battery voltage should exist.

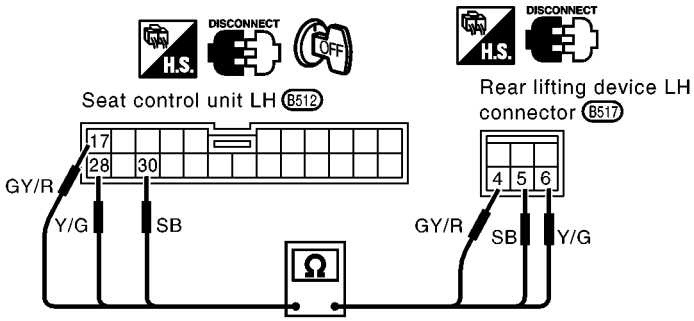
SEL616W

OK or NG

OK	▶	GO TO 3.
NG	▶	Replace seat control unit LH.

3	CHECK LIFTING ENCODER (REAR) OPEN CIRCUIT

1. Disconnect seat control unit LH connector and rear lifting device LH connector.
2. Check harness continuity between seat control unit LH connector and rear lifting device LH connector.



Terminals		Continuity
Seat control unit LH	Rear lifting device LH Lifing encoder (rear)	
17	4	Yes
28	6	
30	5	

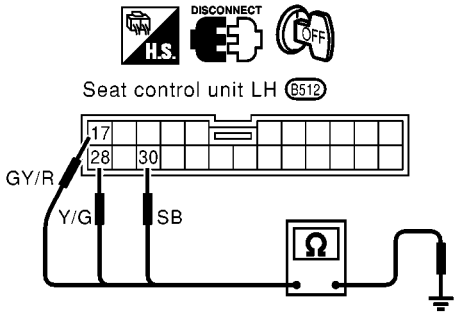
SEL617WA

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair harness.

4	CHECK LIFTING ENCODER (REAR) SHORT CIRCUIT

Check harness continuity between seat control unit LH connector and ground.



Terminals	Continuity
17 - Ground	No
28 - Ground	
30 - Ground	

SEL618W

OK or NG

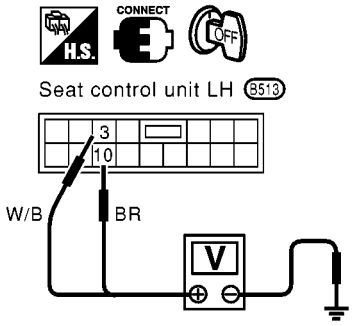
OK	▶	Replace lifting encoder (rear).
NG	▶	Repair harness.

DIAGNOSTIC PROCEDURE 6
(Sliding motor check)

=NAEL0214S09

1	CHECK OUTPUT SIGNAL TO SLIDING MOTOR

Check voltage between seat control unit LH terminals 3 or 10 and ground.



Condition of sliding switch	Terminals		Voltage [V]
	+	−	
Forward	3	Ground	Approx. 12
Backward	10	Ground	Approx. 12

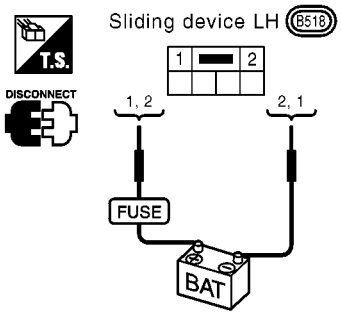
SEL619W

OK or NG

OK	▶	GO TO 2.
NG	▶	Replace seat control unit LH.

2	CHECK SLIDING MOTOR

1. Disconnect sliding device LH connector.
2. Apply 12V DC direct current to motor and check operation.



Terminals		Operation
+	−	
2	1	Forward
1	2	Backward

SEL620WA

OK or NG

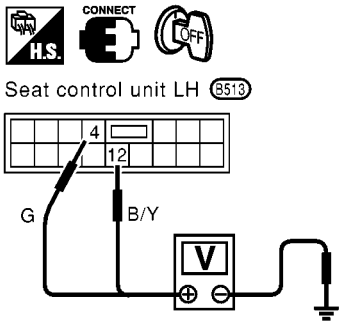
OK	▶	Check harness for operation between seat control unit LH and sliding motor.
NG	▶	Replace sliding motor.

DIAGNOSTIC PROCEDURE 7
(Reclining motor check)

=NAEL0214S10

1	CHECK OUTPUT SIGNAL TO RECLINING MOTOR

Check voltage between seat control unit LH terminals 4 or 12 and ground.



Condition of reclining switch	Terminals +	Terminals −	Voltage [V]
Forward	4	Ground	Approx. 12
Backward	12	Ground	Approx. 12

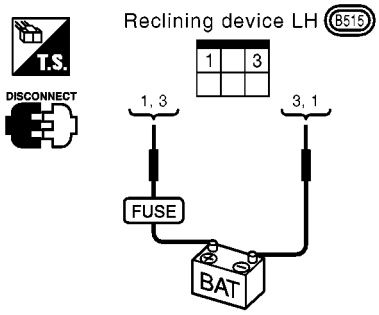
SEL621W

OK or NG

OK	▶	GO TO 2.
NG	▶	Replace seat control unit LH.

2	CHECK RECLINING MOTOR

1. Disconnect reclining device LH connector.
2. Apply 12V DC direct current to motor and check operation.



Terminals +	Terminals −	Operation
1	3	Forward
3	1	Backward

SEL622WA

OK or NG

OK	▶	Check harness for operation between seat control unit LH and reclining motor.
NG	▶	Replace reclining motor.

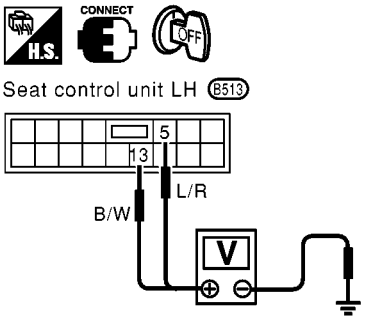
DIAGNOSTIC PROCEDURE 8

=NAEL0214S11

[Lifting motor (front) check]

1	CHECK OUTPUT SIGNAL TO LIFTING MOTOR (FRONT)

Check voltage between seat control unit LH terminals 5 or 13 and ground.



Condition of lifting switch (front)	Terminals +	Terminals −	Voltage [V]
Up	13	Ground	Approx. 12
Down	5	Ground	Approx. 12

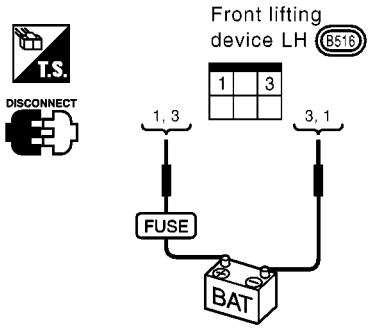
SEL623W

OK or NG

OK	▶	GO TO 2.
NG	▶	Replace seat control unit LH.

2	CHECK LIFTING MOTOR (FRONT)

1. Disconnect front lifting device LH connector.
2. Apply 12V DC direct current to motor and check operation.



Terminals +	Terminals −	Operation
3	1	Up
1	3	Down

SEL624WA

OK or NG

OK	▶	Check harness for operation between seat control unit LH and lifting motor (front).
NG	▶	Replace lifting motor (front).

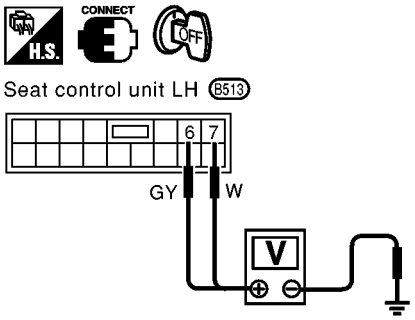
DIAGNOSTIC PROCEDURE 9

=NAEL0214S12

[Lifting motor (rear) check]

1	CHECK OUTPUT SIGNAL TO LIFTING MOTOR (REAR)

Check voltage between seat control unit LH terminals 6 or 7 and ground.



Condition of lifting switch (rear)	Terminals		Voltage [V]
	+	–	
Up	6	Ground	Approx. 12
Down	7	Ground	Approx. 12

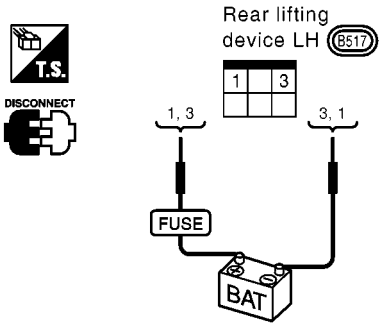
SEL625W

OK or NG

OK	▶	GO TO 2.
NG	▶	Replace seat control unit LH.

2	CHECK LIFTING MOTOR (REAR)

1. Disconnect rear lifting device LH connector.
2. Apply 12V DC direct current to motor and check operation.



Terminals		Operation
+	–	
1	3	Up
3	1	Down

SEL626WA

OK or NG

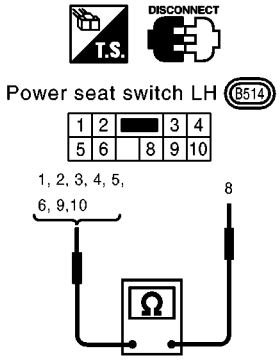
OK	▶	Check harness for operation between seat control unit LH and lifting motor (rear).
NG	▶	Replace lifting motor (rear).

DIAGNOSTIC PROCEDURE 10
(Power seat switch check)

=NAEL0214S13

1	CHECK POWER SEAT SWITCH

1. Disconnect power seat switch LH connector.
2. Check continuity between power seat switch terminals.



Switch	Condition	Terminals								
		8	1	2	3	4	5	6	9	10
Sliding	Forward	○								○
	Backward	○					○			
Reclining	Forward	○	○							
	Backward	○		○						
Lifting (Front)	Up	○					○			
	Down	○						○		
Lifting (Rear)	Up	○							○	
	Down	○			○					

SEL569X

OK or NG

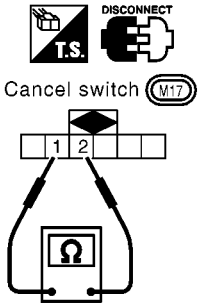
OK	▶	**Check the following.** ● Ground circuit for power seat switch ● Harness for open or short between seat control unit LH and power seat switch
NG	▶	Replace power seat switch.

DIAGNOSTIC PROCEDURE 11
(Cancel switch check)

=NAEL0214S14

1	CHECK CANCEL SWITCH

1. Disconnect cancel switch connector.
2. Check continuity between cancel switch terminals.



Terminals	Cancel switch condition	Continuity
1-2	ON	Yes
	OFF	No

SEL628WA

OK or NG

OK	▶	**Check the following.** ● Ground circuit for cancel switch ● Harness for open or short between seat control unit LH and cancel switch
NG	▶	Replace cancel switch.

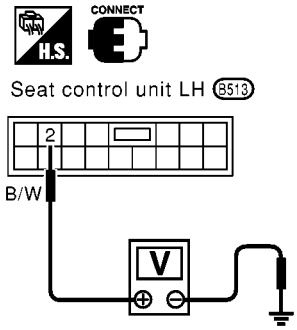
DIAGNOSTIC PROCEDURE 12

=NAEL0214S15

(Key, detention, door switch and vehicle speed sensor check)

1	CHECK KEY SWITCH INPUT SIGNAL

Check voltage between seat control unit LH terminal 2 and ground.



Condition	Voltage [V]
Key is inserted	Approx. 12
Key is removed	0

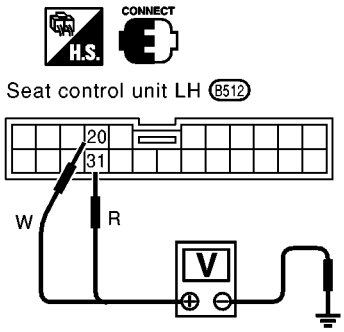
SEL629W

OK or NG

OK	▶	GO TO 2.
NG	▶	**Check the following.** ● 7.5A fuse [No. 24, located in fuse block (J/B)] ● Key switch ● Harness for open or short between key switch and fuse ● Harness for open or short between seat control unit LH and key switch

2	CHECK IGNITION SWITCH INPUT SIGNAL (ON AND START)

Check voltage between seat control unit LH terminals and ground.



Terminals		Ignition switch position		
+	–	OFF	ON	START
20	Ground	Approx. 0V	Battery voltage	
31	Ground	Approx. 0V		Battrery voltage

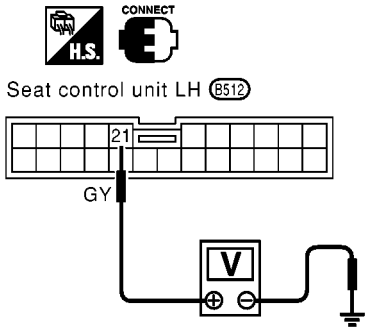
SEL630W

OK or NG

OK	▶	GO TO 3.
NG	▶	**Check the following.** ● 7.5A fuse [No. 11, located in fuse block (J/B)] ● 7.5A fuse [No. 26, located in fuse block (J/B)] ● Harness for open or short between seat control unit LH and fuse

3	CHECK PARK POSITION SWITCH INPUT SIGNAL

Check voltage between seat control unit LH terminal 21 and ground.



Condition	Voltage [V]
Selector lever is in "P" position	0
Except above	Approx. 12

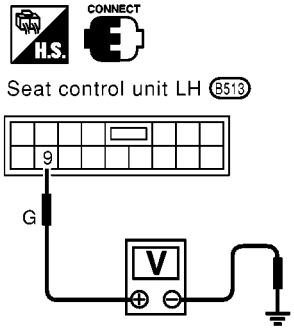
SEL631W

OK or NG

OK	▶	GO TO 4.
NG	▶	**Check the following.** ● Park position switch ● Park position switch ground circuit ● Harness for open or short between seat control unit LH and park position switch

4	CHECK DRIVER DOOR SWITCH INPUT SIGNAL

Check voltage between seat control unit LH terminal 9 and ground.



Condition	Voltage [V]
Driver's door is open	0
Driver's door is closed	Approx. 12

SEL632W

OK or NG

OK	▶	GO TO 5.
NG	▶	**Check the following.** ● Driver door switch ● Driver door switch ground circuit ● Harness for open or short between seat control unit LH and driver door switch

5	CHECK VEHICLE SPEED SENSOR

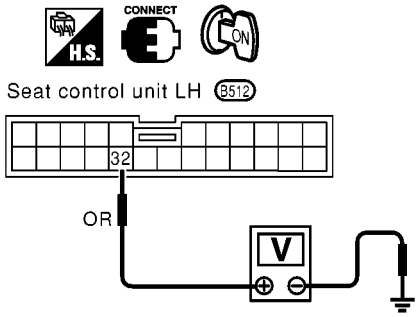
Does speedometer operate normally?

Yes or No

OK	▶	GO TO 6.
NG	▶	Check speedometer and vehicle speed sensor circuit. Refer to EL-124.

6	CHECK VEHICLE SPEED SENSOR PULL UP VOLTAGE

1. Turn ignition switch "ON".
2. Check voltage between seat control unit LH terminal 32 and ground.



Approx. 5V should exist.

SEL633W

OK or NG

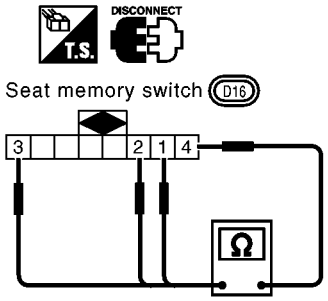
OK	▶	Harness for open or short between seat control unit LH and combination meter.
NG	▶	Repair harness.

DIAGNOSTIC PROCEDURE 13
(Seat memory switch check)

=NAEL0214S16

1	CHECK SEAT MEMORY SWITCH

1. Disconnect seat memory switch connector.
2. Check continuity between seat memory switch terminals.



Switch	Condition	Terminals			
		1	2	3	4
Memory-1	ON	○			○
Memory-2	ON		○		○
Set	ON			○	○

SEL634WA

OK or NG

OK	▶	**Check the following.** ● Ground circuit for seat memory switch ● Harness for open or short between seat control unit LH and seat memory switch
NG	▶	Replace seat memory switch.

DIAGNOSTIC PROCEDURE 14
(Memory indicator check)

NAEL0214S17

1	CHECK INDICATOR LAMP

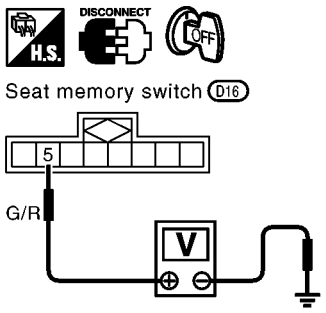
Check indicator lamp illumination.

OK or NG

OK	▶	GO TO 2.
NG	▶	Replace seat memory switch (indicator lamp).

2	CHECK POWER SUPPLY CIRCUIT FOR INDICATOR LAMP

1. Disconnect seat memory switch connector.
2. Check voltage between seat memory switch terminal and ground.



Battery voltage should exist.

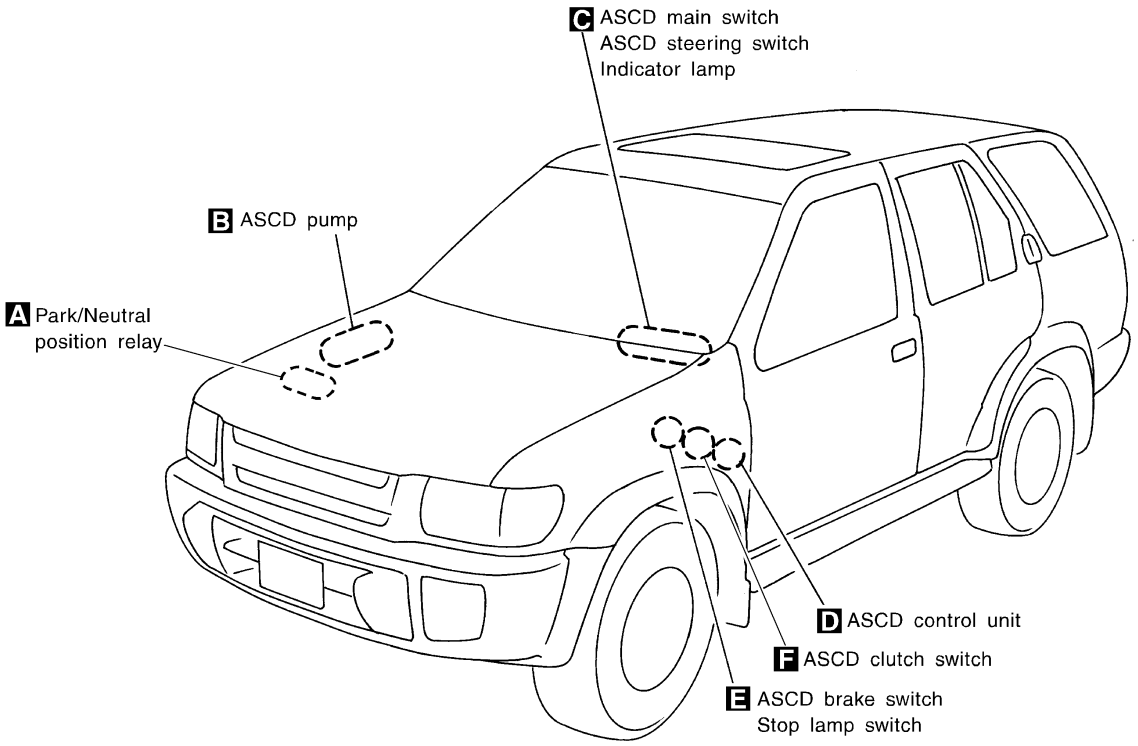
SEL635WA

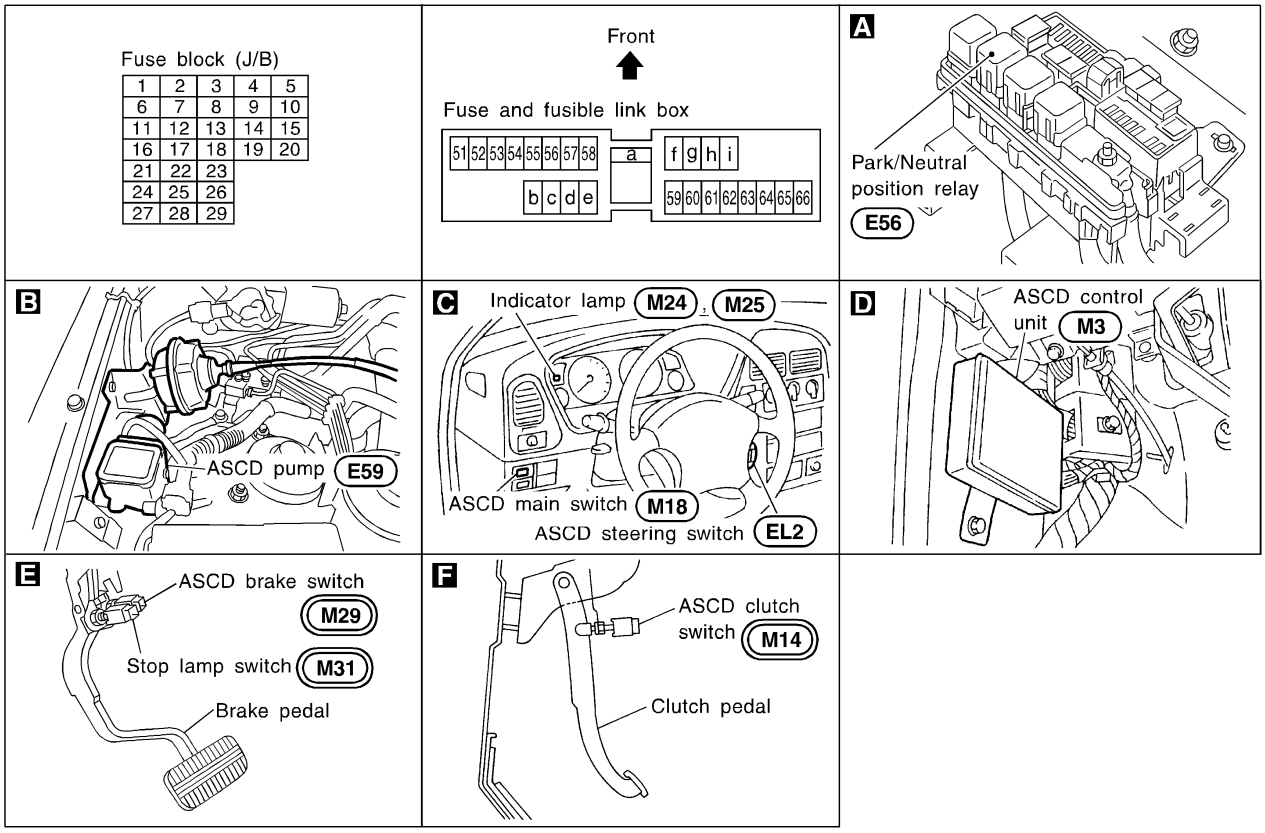
OK or NG

OK	▶	Check harness for open or short between seat control unit LH and seat memory switch
NG	▶	**Check the following.** ● 7.5A fuse [No. 24 located in the fuse block (J/B)] ● Harness for open or short between fuse and indicator lamp

Component Parts and Harness Connector Location

NAEL0094





SEL634X

System Description

NAEL0216

Refer to Owner's Manual for ASCD operating instructions.

POWER SUPPLY AND GROUND

NAEL0216S01

Power is supplied at all times:

- through 10A fuse [No. 14, located in the fuse block (J/B)]
- to the stop lamp switch terminal 1, and
- through 7.5A fuse (No. 52, located in fuse and fusible link box)
- to the horn relay terminals 1 and 3.

When ignition switch is in the ON or START position, power is supplied:

- through 7.5A fuse [No. 11, located in the fuse block (J/B)]
- to ASCD brake switch terminal 1 and
- to ASCD control unit terminal 5,
- through 10A fuse [No. 18, located in the fuse block (J/B)]
- to park/neutral position relay terminal 1,
- through 10A fuse [No. 8, located in the fuse block (J/B)]
- to combination meter terminal 66, and

When park/neutral position switch is in the P or N position (A/T models), ground is supplied:

- to park/neutral position relay terminal 2
- through park/neutral position switch and body grounds B55 and B75.

When ASCD main switch is depressed (ON), ground is supplied:

- to ASCD control unit terminal 9
- from ASCD steering switch terminal 4
- to ASCD steering switch terminal 5
- through body grounds M4, M66 and M147

then ASCD control unit holds CRUISE condition and illuminates CRUISE indicator.
Ground is supplied:

- from ASCD control unit terminal 15
- to combination meter terminal 46.

OPERATION

NAEL0216S02

Set Operation

NAEL0216S0201

To activate the ASCD, all following conditions must exist.

- Ground is supplied to ASCD control unit terminal 9 (Main switch is in ON position.)
- Power is supplied to ASCD control unit terminal 8 [Brake pedal and clutch pedal are released (M/T models) and brake pedal is released and A/T selector lever is in other than P and N position (A/T models)].
- Vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH). (Signal from combination meter)

When the SET/COAST switch is depressed, power is supplied:

- from ASCD steering switch terminal 2
- to ASCD control unit terminal 11.

And then ASCD pump is activated to control throttle wire and ASCD control unit supply ground

- to combination meter terminals 51 to illuminate SET indicator.

A/T Overdrive Control during Cruise Control Driving (A/T models)

NAEL0216S0202

When the vehicle speed is approximately 3 km/h (2 MPH) below set speed, a signal is sent

- from ASCD control unit terminal 10
- to TCM (transmission control module) terminal 24.

When this occurs, the TCM (transmission control module) cancels overdrive.
After vehicle speed is approximately 1 km/h (1 MPH) below set speed, overdrive is reactivated.

ASCD Shifting Control (A/T models)

NAEL0216S0203

During ASCD cruise, ASCD control unit controls A/T shifting to avoid uncomfortable shifting.
This is used to control the signals below.

- Throttle position sensor from ECM

- A/T shift solenoid valve A

Coast Operation

NAEL0216S0204

When the SET/COAST switch is depressed during cruise control driving, ASCD actuator returns the throttle cable to decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

Accel Operation

NAEL0216S0205

When the RESUME/ACCEL switch is depressed, power is supplied

- from ASCD steering switch terminal 3
- to ASCD control unit terminal 24.

If the RESUME/ACCEL switch is depressed during cruise control driving, ASCD actuator pulls the throttle cable to increase the vehicle speed until the switch is released or vehicle speed is reached to maximum controlled speed by the system. And then ASCD will keep the new set speed.

Cancel Operation

NAEL0216S0206

When any of following condition exists, cruise operation will be canceled.

- CANCEL switch is depressed. (Power supply to ASCD control unit terminals 11 and 24)
- Brake pedal is depressed. (Power supply to ASCD control unit terminal 23 from stop lamp switch)
- Brake pedal or clutch pedal is depressed (M/T models)/brake pedal is depressed or A/T selector lever is shifted to P or N position (A/T models). (Power supply to ASCD control unit terminal 8 is interrupted.)

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operation will be canceled and vehicle speed memory will be erased.

Resume Operation

NAEL0216S0207

When the RESUME/ACCEL switch is depressed after cancel operation other than depressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released.
- Clutch pedal is released (M/T models).
- A/T selector lever is in other than P and N position (A/T models).
- Vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH).

ASCD PUMP OPERATION

NAEL0216S03

The ASCD pump consists of a vacuum motor, an air valve and a release valve. When the ASCD activates, power is supplied

- from terminal 12 of ASCD control unit
- to ASCD pump terminal 1.

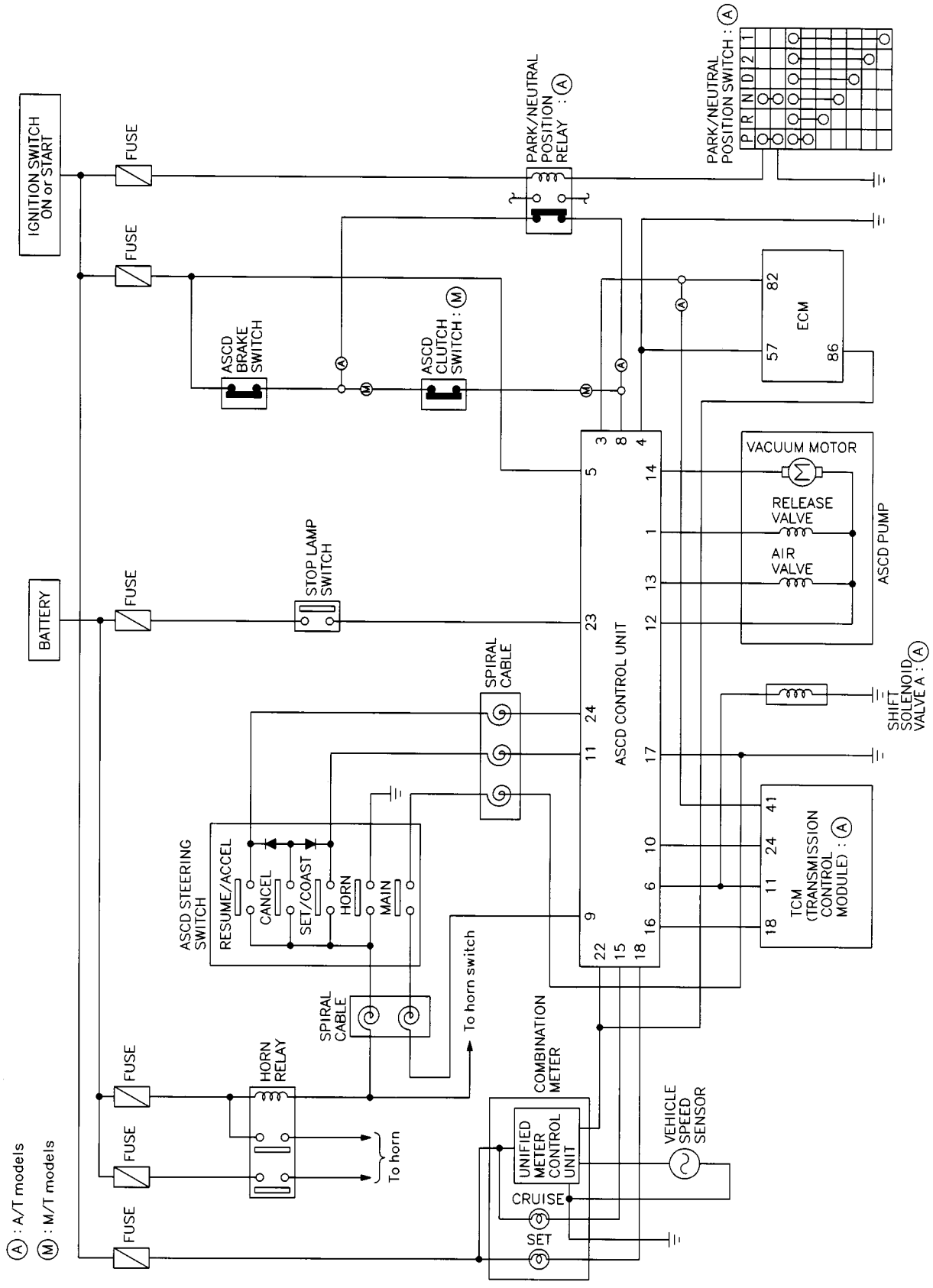
Ground is supplied to vacuum motor, air valve and release valve from ASCD control unit depending on the operated condition as shown in the below table.
The pump is connected to ASCD actuator by vacuum hose. When the ASCD pump is activated, the ASCD pump vacuum the diaphragm of ASCD actuator to control throttle cable.

		Air valve (*1)	Release valve (*1)	Vacuum motor	Actuator inner pressure
ASCD not operating		Open	Open	Stopped	Atmosphere
ASCD operating	Releasing throttle cable	Open	Closed	Stopped	Vacuum
	Holding throttle position	Closed	Closed	Stopped	Vacuum (*2)
	Pulling throttle cable	Closed	Closed	Operated	Vacuum

*1: When power and ground is supplied, valve is closed.
*2: Set position held.

Schematic

NAEL0096



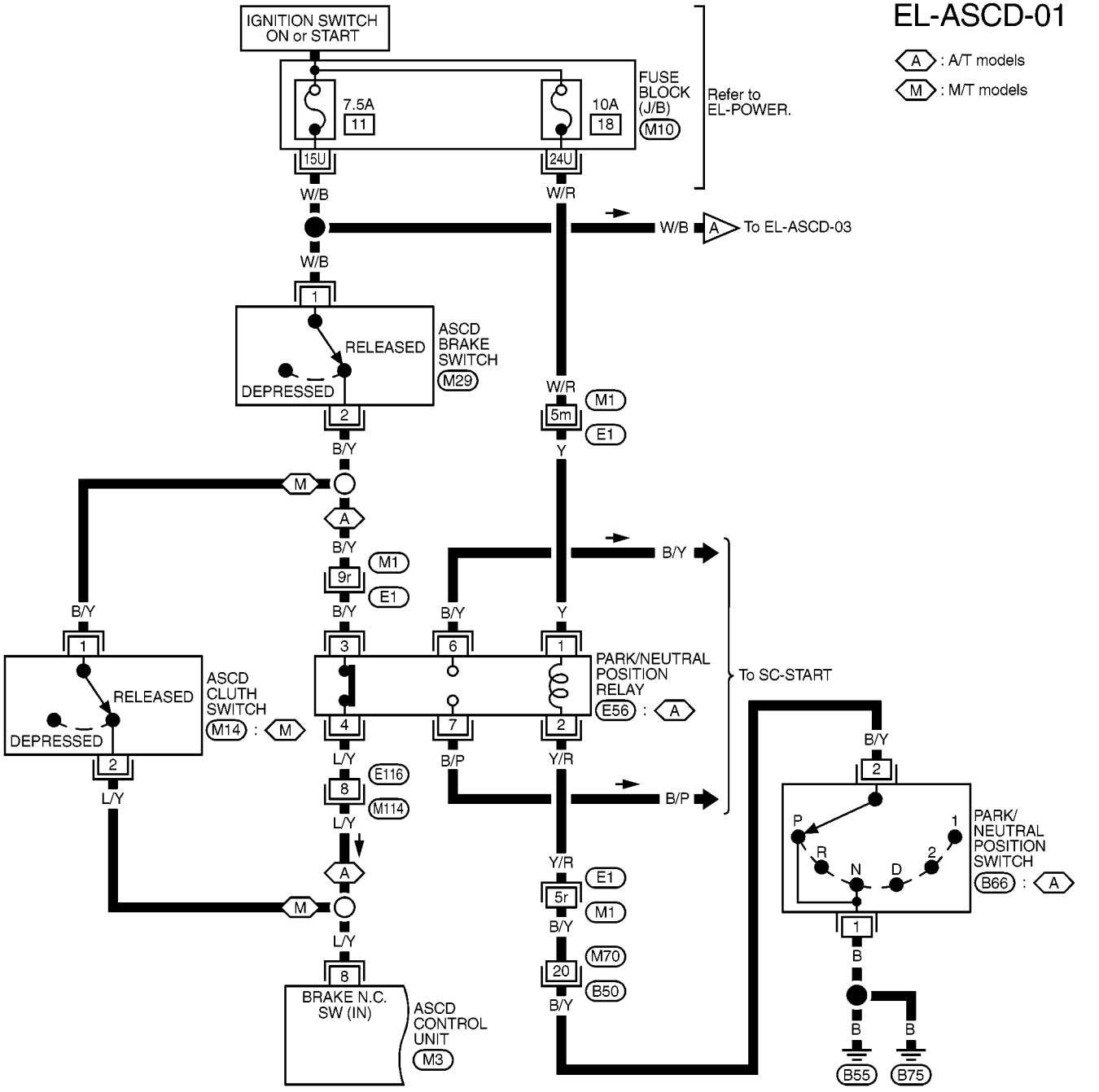
MEL047M

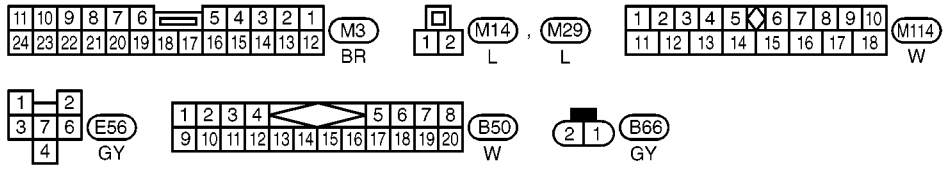
Wiring Diagram — ASCD —

NAEL0097

FIG. 1

NAEL0097S01





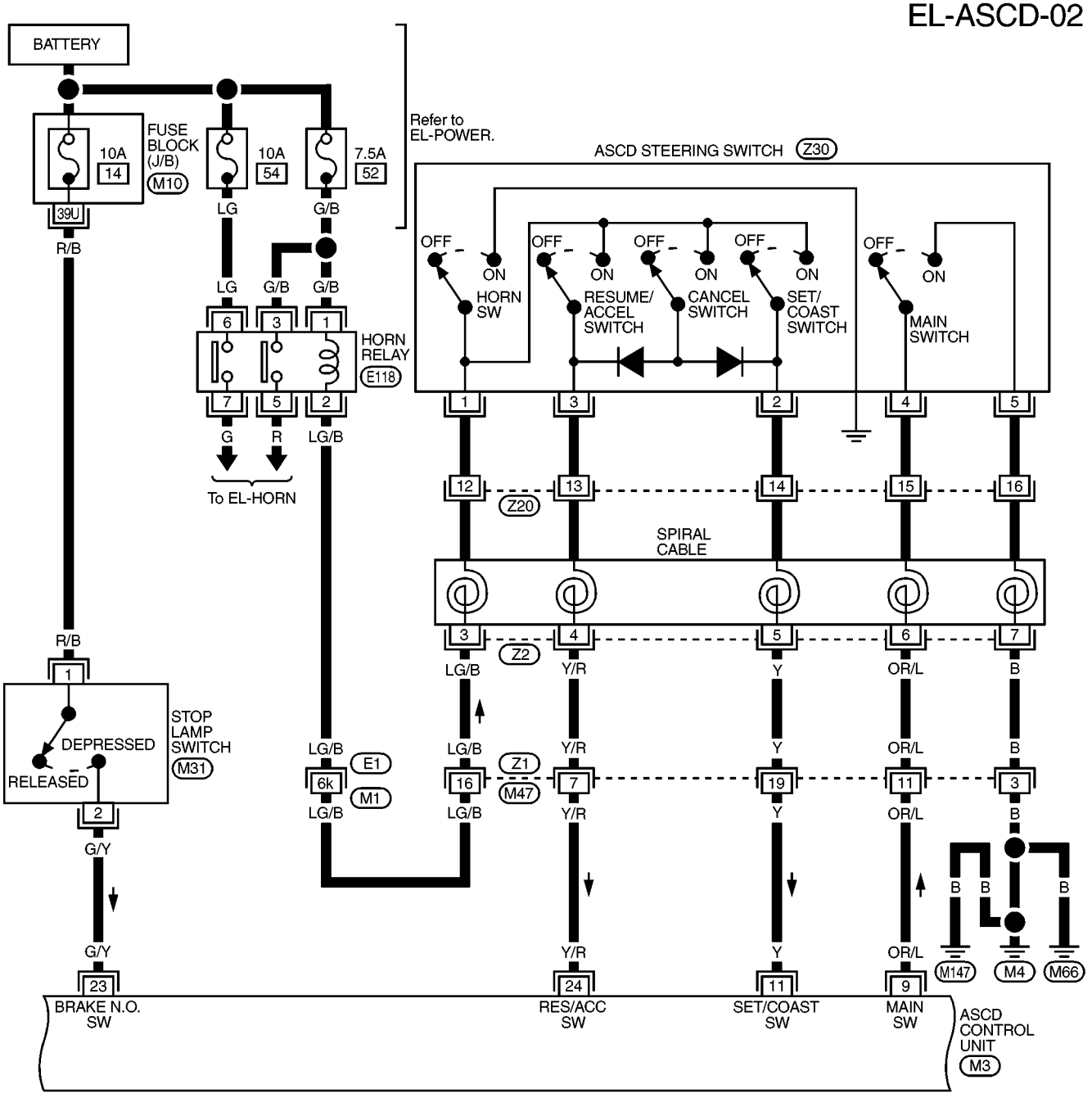
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK- JUNCTION BOX (J/B)

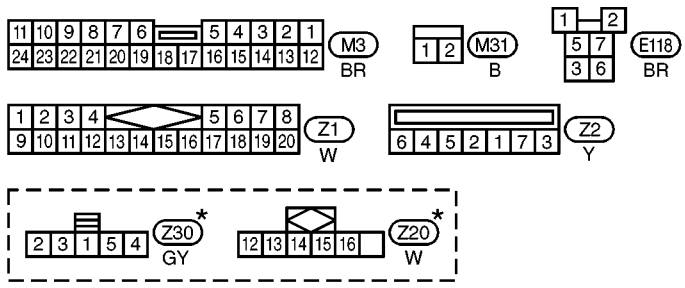
MEL048M

FIG. 2

NAEL0097S02

EL-ASCD-02





∗ : This connector is not shown in "HARNESS LAYOUT", EL section.

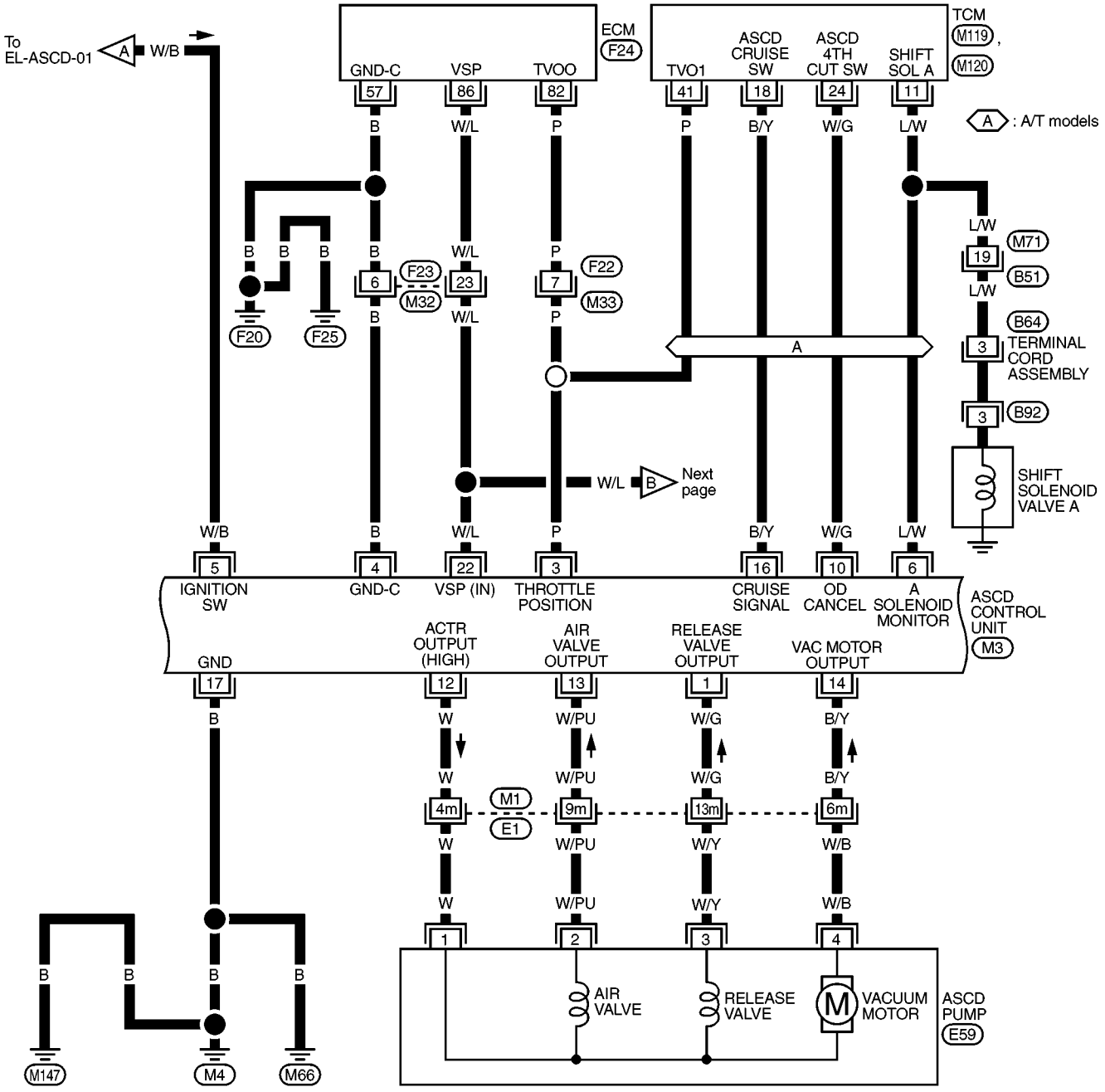
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK- JUNCTION BOX (J/B)

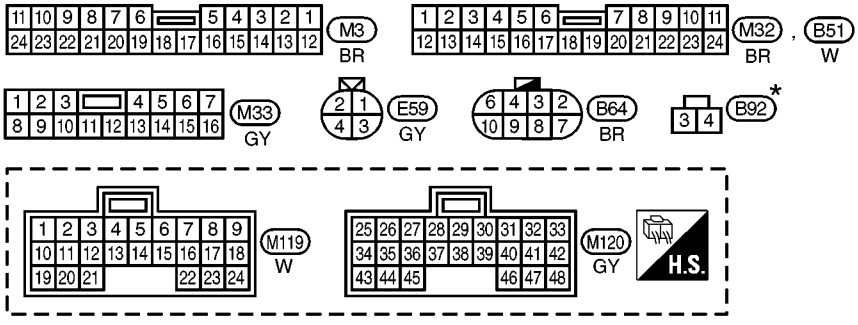
MEL839L

FIG. 3

NAEL0097S03

EL-ASCD-03





REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
F24 -ELECTRICAL UNITS

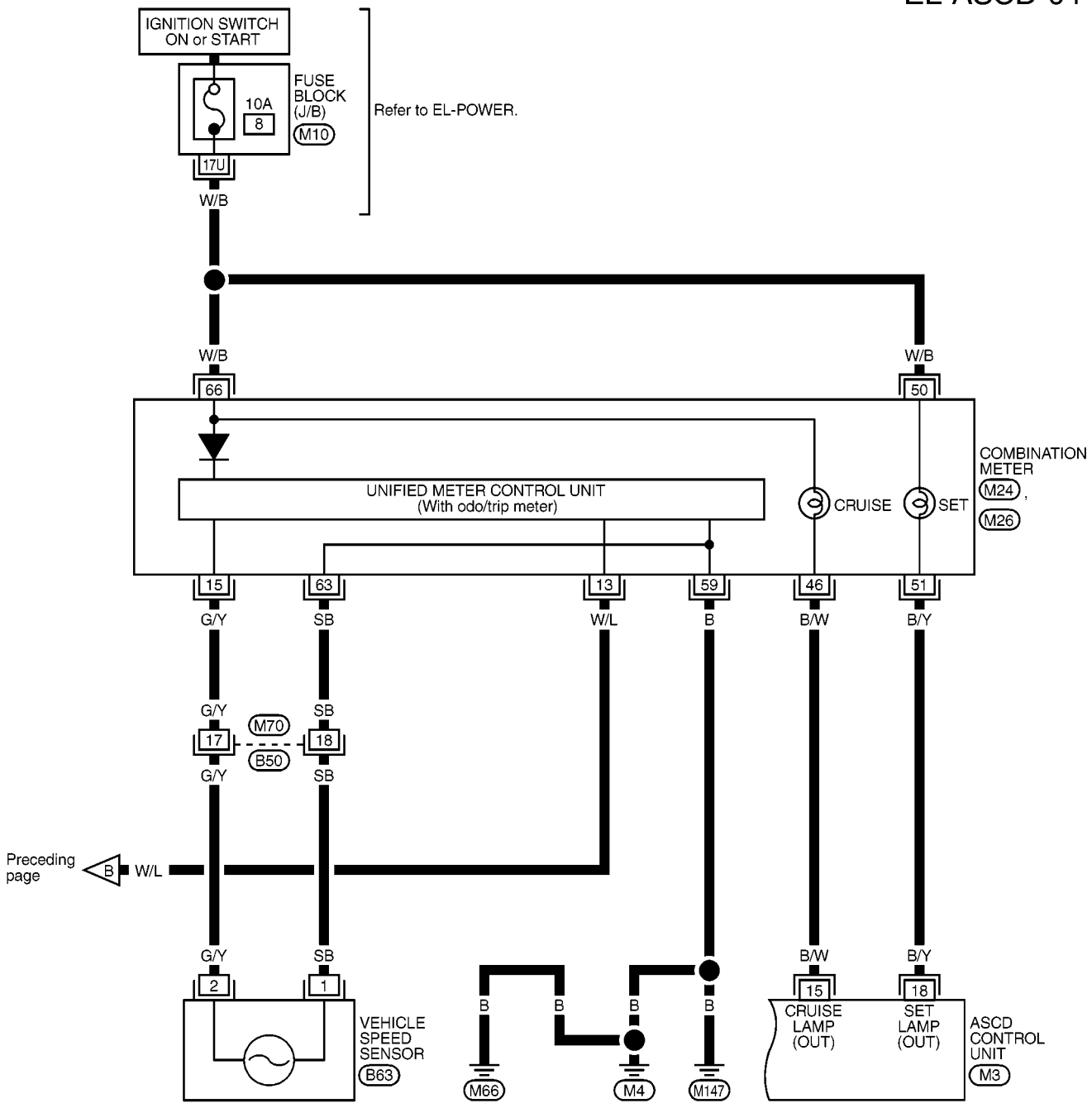
* : This connector is not shown in "HARNESS LAYOUT", EL section.

MEL049M

FIG. 4

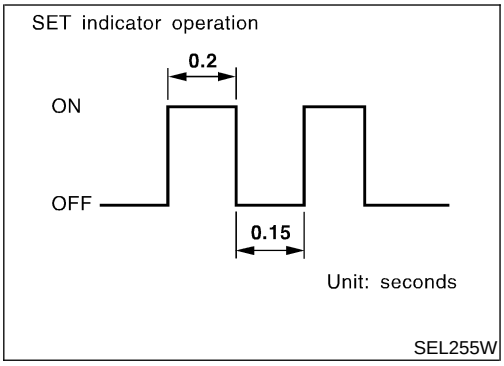
NAEL0097S04

EL-ASCD-04



REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

MEL050M



Fail-safe System

NAEL0217

DESCRIPTION

NAEL0217S01

When the fail-safe system senses a malfunction, it deactivates ASCD operation. The SET indicator in the combination meter will then flash.

MALFUNCTION DETECTION CONDITIONS

NAEL0217S02

Detection conditions	ASCD operation during malfunction detection
• ASCD steering (RESUME/ACCEL, CANCEL, SET/COAST) switch is stuck. • Vacuum motor ground circuit or power circuit is open or shorted. • Air valve ground circuit or power circuit is open or shorted. • Release valve ground circuit or power circuit is open or shorted. • Vehicle speed sensor is faulty. • ASCD control unit internal circuit is malfunctioning.	• ASCD is deactivated. • Vehicle speed memory is canceled.
• ASCD brake switch or stop lamp switch is faulty.	• ASCD is deactivated. • Vehicle speed memory is not canceled.

Trouble Diagnoses

NAEL0218

SYMPTOM CHART

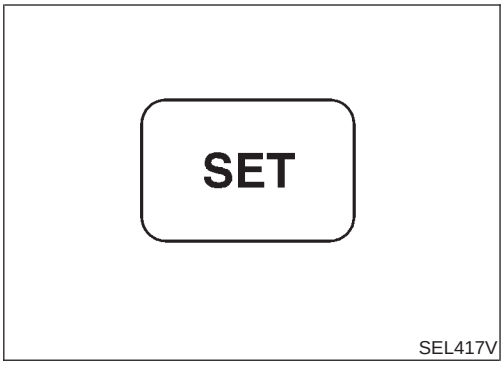
NAEL0218S01

PROCEDURE	Diagnostic procedure						
REFERENCE PAGE (EL-)	249	250	251	252	253	253	255
SYMPTOM	FAIL-SAFE SYSTEM CHECK	POWER SUPPLY AND GROUND CIRCUIT CHECK	ASCD BRAKE/STOP LAMP SWITCH CHECK	ASCD STEERING SWITCH CHECK	VEHICLE SPEED SENSOR CHECK	ASCD PUMP CIRCUIT CHECK	ASCD ACTUATOR/PUMP CHECK
ASCD cannot be set. (“CRUISE” indicator lamp does not ON.)		X		X★3			
ASCD cannot be set. (“SET” indicator lamp does not blink.)			X	X	X		
ASCD cannot be set. (“SET” indicator lamp blinks.★1)	X		X	X	X	X	
Vehicle speed does not decrease after SET/COAST switch has been pressed.				X			X
Vehicle speed does not return to the set speed after RESUME/ACCEL switch has been pressed.★2				X			X
Vehicle speed does not increase after RESUME/ACCEL switch has been pressed.				X			X
System is not released after CANCEL switch (steering) has been pressed.				X			X
Large difference between set speed and actual vehicle speed.					X	X	X
Deceleration is greatest immediately after ASCD has been set.					X	X	X

★1: It indicates that system is in fail-safe. After completing diagnostic procedures, perform “FAIL-SAFE SYSTEM CHECK” (EL-249) to verify repairs.

★2: If vehicle speed is greater than 40 km/h (25 MPH) after system has been released, pressing RESUME/ACCEL switch returns vehicle speed to the set speed previously achieved. However, doing so when the ASCD main switch is turned to “OFF”, vehicle speed will not return to the set speed since the memory is canceled.

★3: Check only main switch built-in steering switch.

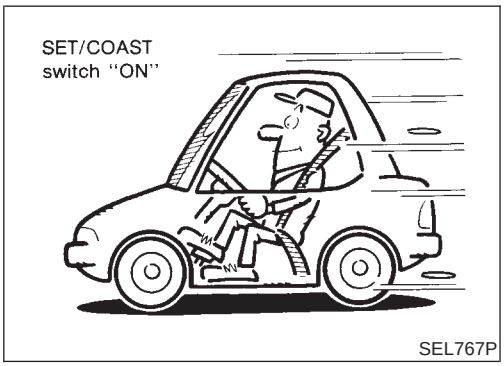


SEL417V

FAIL-SAFE SYSTEM CHECK

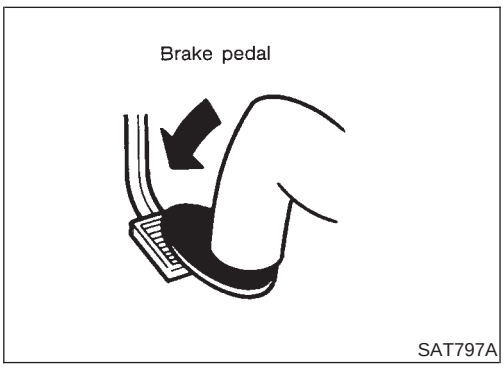
=NAEL0218S02

1. Turn ignition switch to ON position.
2. Turn ASCD main switch to ON and check if the SET indicator blinks.
   If the indicator lamp blinks, check the following.
- ASCD steering switch. Refer to EL-252.



SEL767P

3. Drive the vehicle at more than 40 km/h (25 MPH) and push SET/COAST switch.
   If the indicator lamp blinks, check the following.
- Vehicle speed sensor. Refer to EL-253.
- ASCD pump circuit. Refer to EL-253.
- Replace control unit.



SAT797A

4. Depress brake pedal slowly (brake pedal should be depressed more than 5 seconds).
   If the indicator lamp blinks, check the following.
- ASCD brake/stop lamp switch. Refer to EL-251.

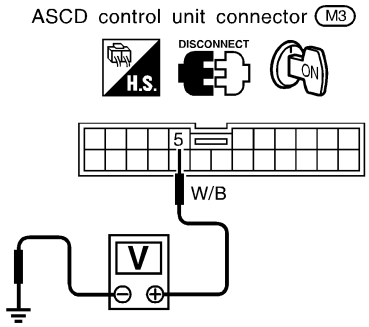
5. END. (System is OK.)

POWER SUPPLY AND GROUND CIRCUIT CHECK

=NAEL0218S03

1	CHECK POWER SUPPLY CIRCUIT FOR ASCD CONTROL UNIT

1. Disconnect ASCD control unit harness connector.
2. Turn ignition switch ON.
3. Check voltage between ASCD control unit harness connector terminal 5 and ground.



Does battery voltage exist?

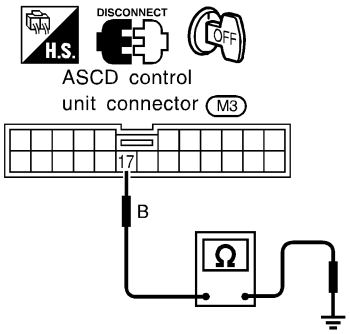
SEL256WB

Refer to wiring diagram in EL-245.

Yes	▶	GO TO 2.
No	▶	**Check the following.** ● 7.5A fuse (No. 11 located in the fuse block) ● Harness for open or short

2	CHECK GROUND CIRCUIT FOR ASCD CONTROL UNIT

Check continuity between ASCD control unit harness connector terminal 17 and body ground.



Does continuity exist?

SEL257WB

Refer to wiring diagram in EL-245.

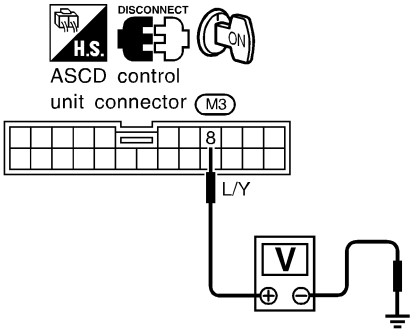
Yes	▶	Power supply and ground circuit is OK.
No	▶	Repair harness.

ASCD BRAKE/STOP LAMP SWITCH CHECK

=NAEL0218S04

1 CHECK ASCD BRAKE SWITCH CIRCUIT

1. Disconnect ASCD control unit harness connector.
2. Turn ignition switch ON.
3. Check voltage between ASCD control unit harness connector terminal 8 and ground.



When brake pedal is depressed or A/T selector lever is in "N" or "P" range:
Apporox. 0V
When both brake pedal is released and A/T selector lever is not in "N" or "P" range:
Battery voltage should exist.

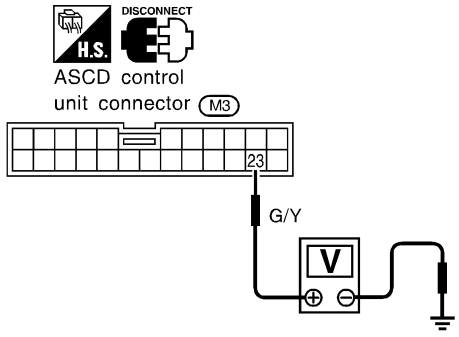
SEL258WD

OK or NG

OK	▶	GO TO 2.
NG	▶	**Check the following.** ● ASCD brake switch Refer to "Electrical Component Inspection" (EL-257). ASCD clutch switch (M/T models) Refer to "Electrical Component Inspection" (EL-257). ● Park/neutral position switch (A/T models) Refer to "Electrical Component Inspection" (EL-257). ● Park/neutral position relay (A/T models) ● Harness for open or short

2 CHECK STOP LAMP SWITCH CIRCUIT

1. Disconnect ASCD control unit harness connector.
2. Check voltage between ASCD control unit harness connector terminal 23 and ground.



Voltage [V]:
Stop lamp switch: Depressed
Approx. 12
Stop lamp switch: Released
0

SEL259WB

Refer to wiring diagram in EL-244.

OK or NG

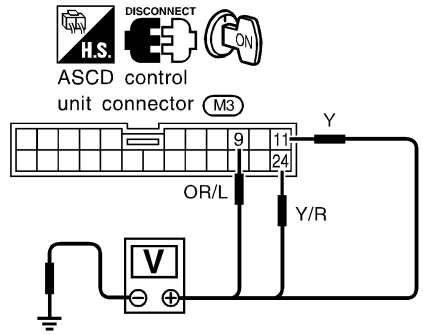
OK	▶	ASCD brake/stop lamp switch is OK.
NG	▶	**Check the following.** ● 10A fuse [No. 14, located in the fuse block (J/B)] ● Harness for open or short between ASCD control unit and stop lamp switch ● Harness for open or short between fuse and stop lamp switch ● Stop lamp switch Refer to "Electrical Component Inspection" (EL-257).

ASCD STEERING SWITCH CHECK

=NAEL0218S05

1 CHECK ASCD STEERING SWITCH CIRCUIT FOR ASCD CONTROL UNIT

Check voltage between ASCD control unit harness connector terminals and ground.



	Terminal No.		Switch condition	
	(+)	(–)	Pressed	Released
MAIN SW	9	Ground	0V	Approx. 9V
SET/COAST SW	11	Ground	12V	0V
RESUME/ACC SW	24	Ground	12V	0V
CANCEL SW	11	Ground	12V	0V
	24	Ground	12V	0V

SEL260WC

Refer to wiring diagram in EL-244.

OK or NG

OK	▶	ASCD steering switch is OK.
NG	▶	GO TO 2.

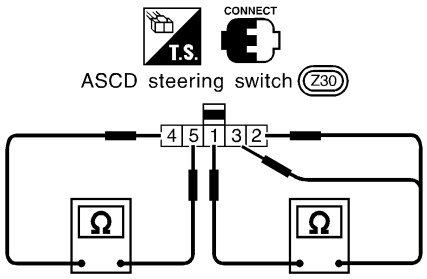
2 CHECK POWER SUPPLY FOR ASCD STEERING SWITCH

Does horn work?

Yes	▶	GO TO 3.
No	▶	**Check the following.** ● 7.5A fuse (No. 52, located in the relay box) ● Horn relay ● Horn circuit

3 CHECK ASCD STEERING SWITCH

1. Disconnect ASCD steering switch.
2. Check continuity between terminals by pushing each switch.



Switch	Condition	Terminal				
		1	2	3	4	5
MAIN	ON				○——	——○
RESUME/ACCEL	ON	○——		——○		
SET/COAST	ON	○——	——○			
CANCEL	ON	○——	▶——○			
		○——	——▶	——○		

SEL764WA

OK or NG

OK	▶	Check harness for open or short between ASCD steering switch and ASCD control unit.
NG	▶	Replace ASCD steering switch.

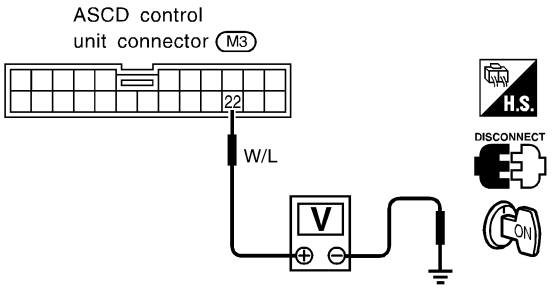
VEHICLE SPEED SENSOR CHECK

=NAEL0218S06

1	CHECK SPEEDOMETER OPERATION	
Does speedometer operate normally?		
Yes	▶	GO TO 2.
No	▶	Check speedometer and vehicle speed sensor circuit. Refer to wiring diagram in EL-246.

2	CHECK VEHICLE SPEED INPUT	

1. Apply wheel chocks and jack up drive wheel.
2. Disconnect ASCD control unit harness connector.
3. Check voltage between control unit terminal 22 and ground with turning drive wheel slowly by hand.



Does voltage pointer deflect?

SEL263WB

Refer to wiring diagram in EL-245.

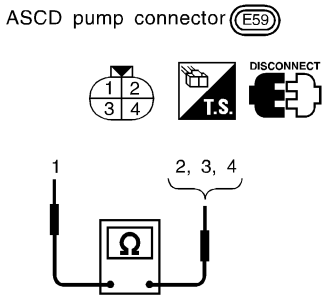
Yes	▶	Vehicle speed sensor is OK.
No	▶	Check harness for open or short between ASCD control unit terminal 22 and combination meter terminal 13.

ASCD PUMP CIRCUIT CHECK

NAEL0218S07

1	CHECK ASCD PUMP	

1. Disconnect ASCD pump connector.
2. Measure resistance between ASCD pump terminals 1 and 2, 3, 4.



Terminals		Resistance Ω
1	2	Approx. 65
	3	Approx. 65
	4	Approx. 3

SEL262WB

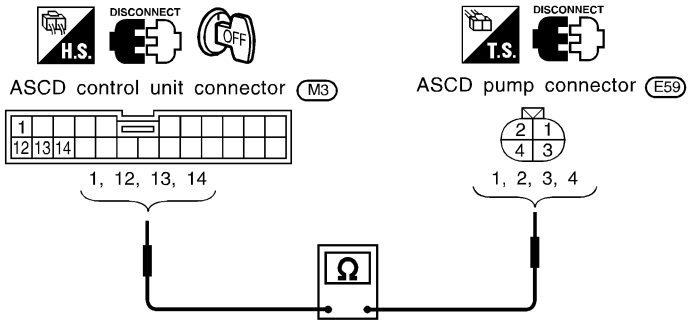
Refer to wiring diagram in EL-245.

OK or NG

OK	▶	GO TO 2.
NG	▶	Replace ASCD pump.

2	CHECK ASCD PUMP CIRCUIT

1. Disconnect ASCD control unit harness connector.
2. Check harness for open or short between ASCD control unit and ASCD pump.



Circuit	Terminal	
	ASCD control unit	ASCD pump
ASCD pump power supply	12	1
Air valve	13	2
Release valve	1	3
Vacuum motor	14	4

Continuity should exist.

SEL269WB

OK or NG

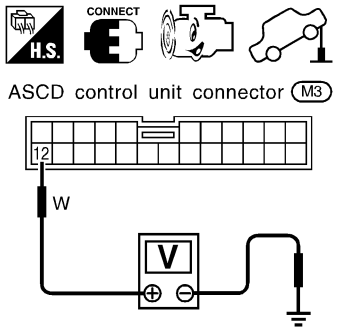
OK	▶	GO TO 3.
NG	▶	Repair harness.

3	CHECK ASCD PUMP POWER SUPPLY

1. Jack-up the drive wheels.
2. Maintain the conditions below.

- Vehicle speed is more than 40 km/h (25 MPH).
- Main switch (CRUISE lamp) is ON.
- Set/coast switch (SET lamp) is ON.

Check voltage between ASCD control unit harness connector terminal 12 and ground.



Battery voltage should exist.

SEL381WB

OK or NG

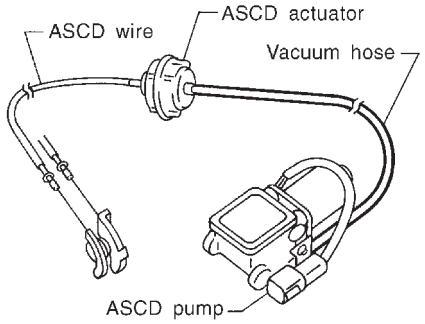
OK	▶	ASCD pump power supply is OK.
NG	▶	Replace ASCD control unit.

ASCD ACTUATOR/PUMP CHECK

=NAEL0218S08

1	CHECK VACUUM HOSE

Check vacuum hose (between ASCD actuator and ASCD pump) for breakage, cracks or fracture.



MEL402G

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace hose.

2	CHECK ASCD WIRE

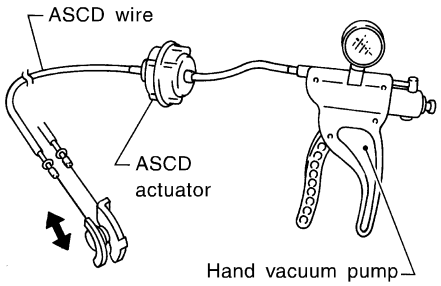
Check wire for improper installation, rust formation or breaks.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace wire. Refer to "ASCD Wire Adjustment" (EL-258).

3	CHECK ASCD ACTUATOR

1. Disconnect vacuum hose from ASCD actuator.
2. Connect the hose of hand vacuum pump to ASCD actuator.



Apply –40 kPa (–0.41 kg/cm^2, –5.8 psi) vacuum to ASCD actuator with hand vacuum pump.
ASCD wire should move to pull throttle drum.
Wait 10 seconds and check for decrease in vacuum pressure.

Vacuum pressure decrease:
Less than 2.7 kPa (0.028 kg/cm^2, 0.39 psi)

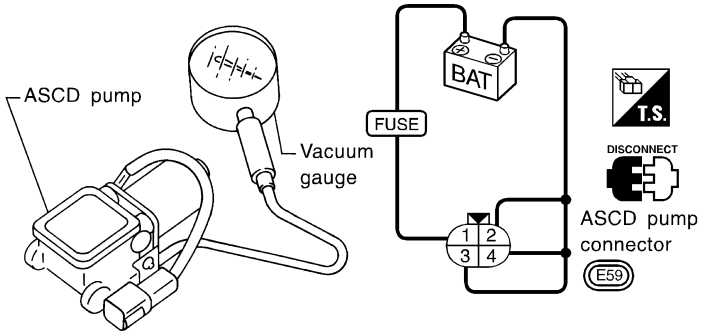
SEL264W

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace ASCD actuator.

4	CHECK ASCD PUMP

1. Disconnect vacuum hose from ASCD pump and ASCD pump connector.
2. If necessary remove ASCD pump.
3. Connect vacuum gauge to ASCD pump.
4. Apply 12V direct current to ASCD pump and check operation.



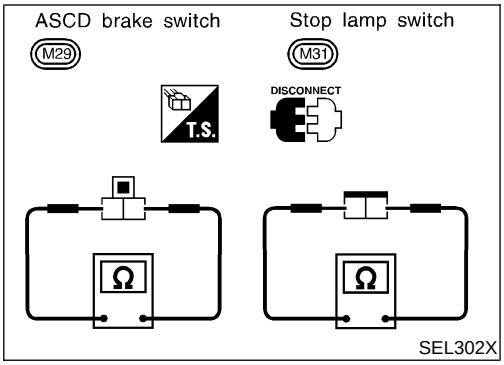
	12V direct current supply terminals		Operation
	(+)	(–)	
Air valve	1	2	Close
Release valve		3	Close
Vacuum motor		4	Operate

A vacuum pressure of at least –40 kPa (–0.41 kg/cm^2, –5.8 psi) should be generated.

SEL265WB

OK or NG

OK	▶	INSPECTION END
NG	▶	Replace ASCD pump.



Electrical Component Inspection

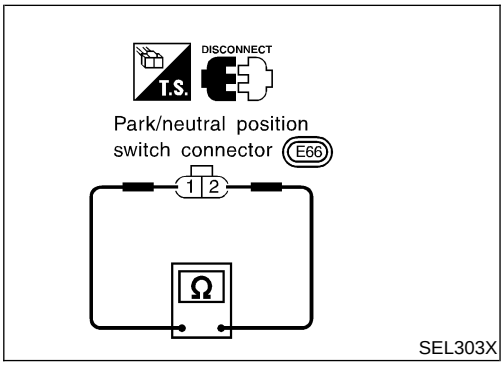
=NAEL0219

ASCD BRAKE SWITCH AND STOP LAMP SWITCH

NAEL0219S02

Condition	Continuity	
	ASCD brake switch	Stop lamp switch
When brake pedal is depressed	No	Yes
When brake pedal is released	Yes	No

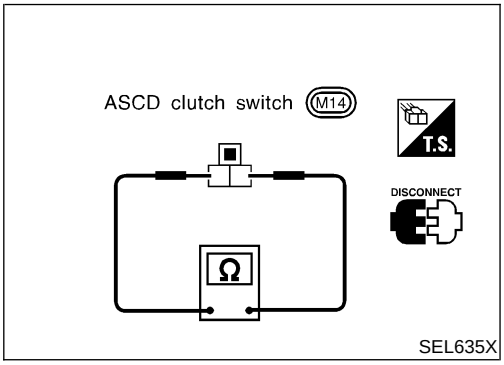
Check each switch after adjusting brake pedal — refer to BR-14, "BRAKE PEDAL AND BRACKET".



PARK/NEUTRAL POSITION SWITCH (FOR A/T MODELS)

NAEL0219S03

A/T selector lever position	Continuity
	Between terminals 1 and 2
"P"	Yes
"N"	Yes
Except "P" and "N"	No



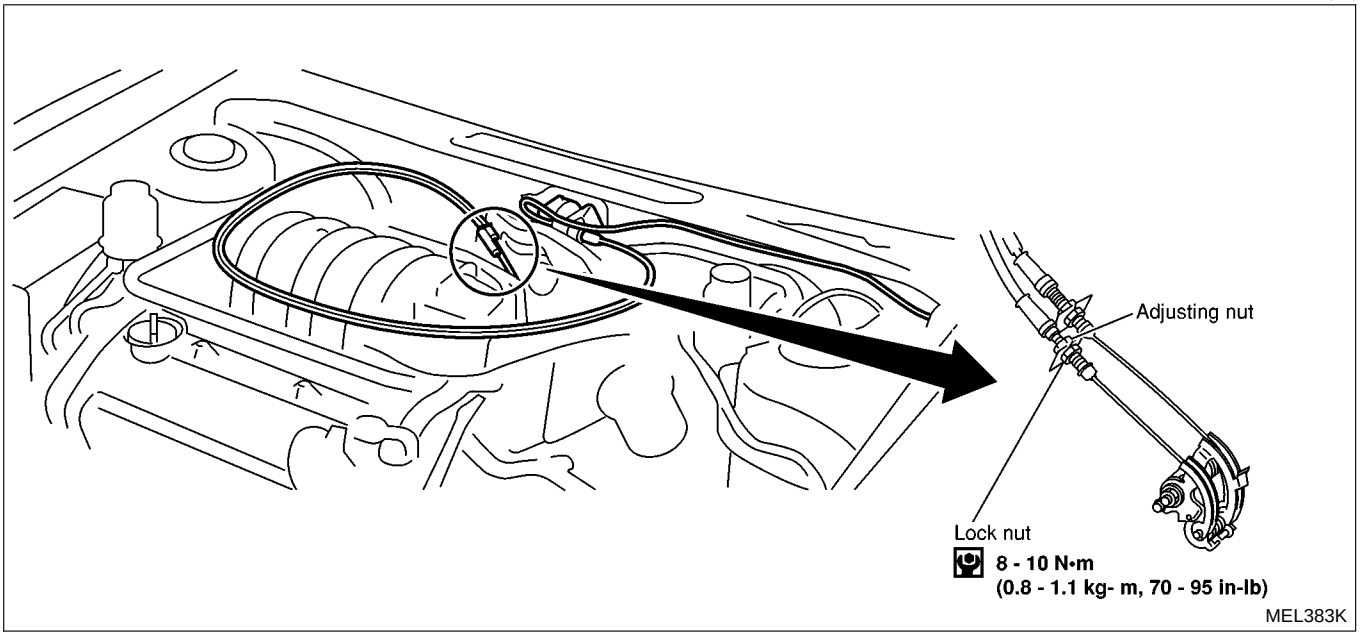
ASCD CLUTCH SWITCH (FOR M/T MODELS)

NAEL0219S05

Condition	Continuity
When clutch pedal is depressed	No
When clutch pedal is released	Yes

ASCD Wire Adjustment

=NAEL0220



CAUTION:

- **Be careful not to twist ASCD wire when removing it.**
- **Do not tense ASCD wire excessively during adjustment.**

Adjust the tension of ASCD wire in the following manner.

1. Loosen lock nut and adjusting nut.
2. Make sure that accelerator wire is properly adjusted. Refer to FE-3, “ACCELERATOR CONTROL SYSTEM”.
3. Tighten adjusting nut just until throttle drum starts to move.
4. Loosen adjusting nut again 1/2 to 1 turn.
5. Tighten lock nut.

System Description

NAEL0102

Power is supplied at all times
- from 40A fusible link (letter **f**, located in the fuse and fusible link box)
- to circuit breaker terminal 1
- through circuit breaker terminal 2
- to power window relay terminal 3,
- to front power window main switch terminal 4, and
- to front power window switch RH terminal 6.

With ignition switch in ON or START position, power is supplied
- through 7.5A fuse [No. 11, located in the fuse block (J/B)]
- to power window relay terminal 2, and
- to smart entrance control unit terminal 33.

Ground is supplied to power window relay terminal 1
- through body grounds M4, M66 and M147.

The power window relay is energized and power is supplied
- through power window relay terminal 5
- to front power window main switch terminal 11,
- to front power window switch RH terminal 13,
- to rear power window switch LH and RH terminals 5.

MANUAL OPERATION

NAEL0102S01

Front Door LH

NAEL0102S0101

Ground is supplied
- to front power window main switch terminal 5
- through body grounds M77 and M111.

WINDOW UP
When the front LH switch in the front power window main switch is pressed in the up position, power is supplied
- to front power window regulator LH terminal 1
- through front power window main switch terminal 2.

Ground is supplied
- to front power window regulator LH terminal 3
- through front power window main switch terminal 3.

Then, the motor raises the window until the switch is released.

WINDOW DOWN
When the LH switch in the front power window main switch is pressed in the down position, power is supplied
- to front power window regulator LH terminal 3
- through front power window main switch terminal 3.

Ground is supplied
- to front power window regulator LH terminal 1
- through front power window main switch terminal 2.

Then, the motor lowers the window until the switch is released.

Front Door RH

NAEL0102S0102

Ground is supplied
- to front power window main switch terminal 5
- through body grounds M77 and M111.

NOTE:
Numbers in parentheses are terminal numbers, when power window switch is pressed in the UP and DOWN positions respectively.

FRONT POWER WINDOW MAIN SWITCH OPERATION
When front RH switch in the front power window main switch is pressed UP or DOWN position, a signal is supplied

- through front power window main switch terminal 8
- to front power window switch RH terminal 11.

The subsequent operation is the same as the front power window switch RH operation.
FRONT POWER WINDOW SWITCH RH OPERATION
Power is supplied

- through front power window switch RH (5, 4)
- to front power window regulator RH (1, 3).

Ground is supplied

- to front power window regulator RH (3, 1)
- through front power window switch RH (4, 5)
- to front power window switch RH terminal 12
- through front power window main switch terminal 1.

Then, the motor raises or lowers the window until the switch is released.

Rear Door LH

NAEL0102S0104

Ground is supplied

- to front power window main switch terminal 5
- through body grounds the M77 and M111.

NOTE:
Numbers in parentheses are terminal numbers, when the power window switch is pressed in the UP and DOWN positions.

FRONT POWER WINDOW MAIN SWITCH OPERATION
Power is supplied

- through front power window main switch terminal (13, 12)
- to rear power window switch LH terminal (3, 4)

The subsequent operation is the same as the rear power window switch LH operation.
REAR POWER WINDOW SWITCH LH
Power is supplied

- through rear power window switch LH (1, 2)
- to rear power window regulator LH (1, 2)

Ground is supplied

- to rear power window regulator LH (2, 1)
- through rear power window switch LH (2, 1)
- to rear power window switch LH terminal (4, 3)
- through front power window main switch terminal (12, 13)

Then, the motor raises or lowers the window until the switch is released.

Rear Door RH

NAEL0102S0105

Rear door RH windows will rise and lower in the same manner as the rear door LH window.

AUTO OPERATION

NAEL0102S02

The power window AUTO feature enables the driver or front passenger to open or close the driver's and front passenger's window without holding the window switch in the up or down position.
The AUTO feature only operates on the driver's and front passenger's window upward and downward movement.

POWER WINDOW LOCK

NAEL0102S03

The power window lock is designed to lock operation of all windows except for driver's door window.
When the lock switch is pressed to lock position, the ground of the front and rear power window switches, in the power window main switch, is disconnected. This prevents the power window motors from operating.

RETAINED POWER OPERATION

NAEL0102S04

When the ignition switch is turned to OFF position from ON or START position, power is supplied for 45 seconds

- to power window relay terminal 2
- from smart entrance control unit terminal 5.

Ground is always supplied

- to power window relay terminal 1
- through body grounds.

When power and ground are supplied, the power window relay continues to be energized, and the power window can be operated.
The retained power operation is canceled when the driver or passenger side door is opened.

INTERRUPTION DETECTION FUNCTION

NAEL0102S05

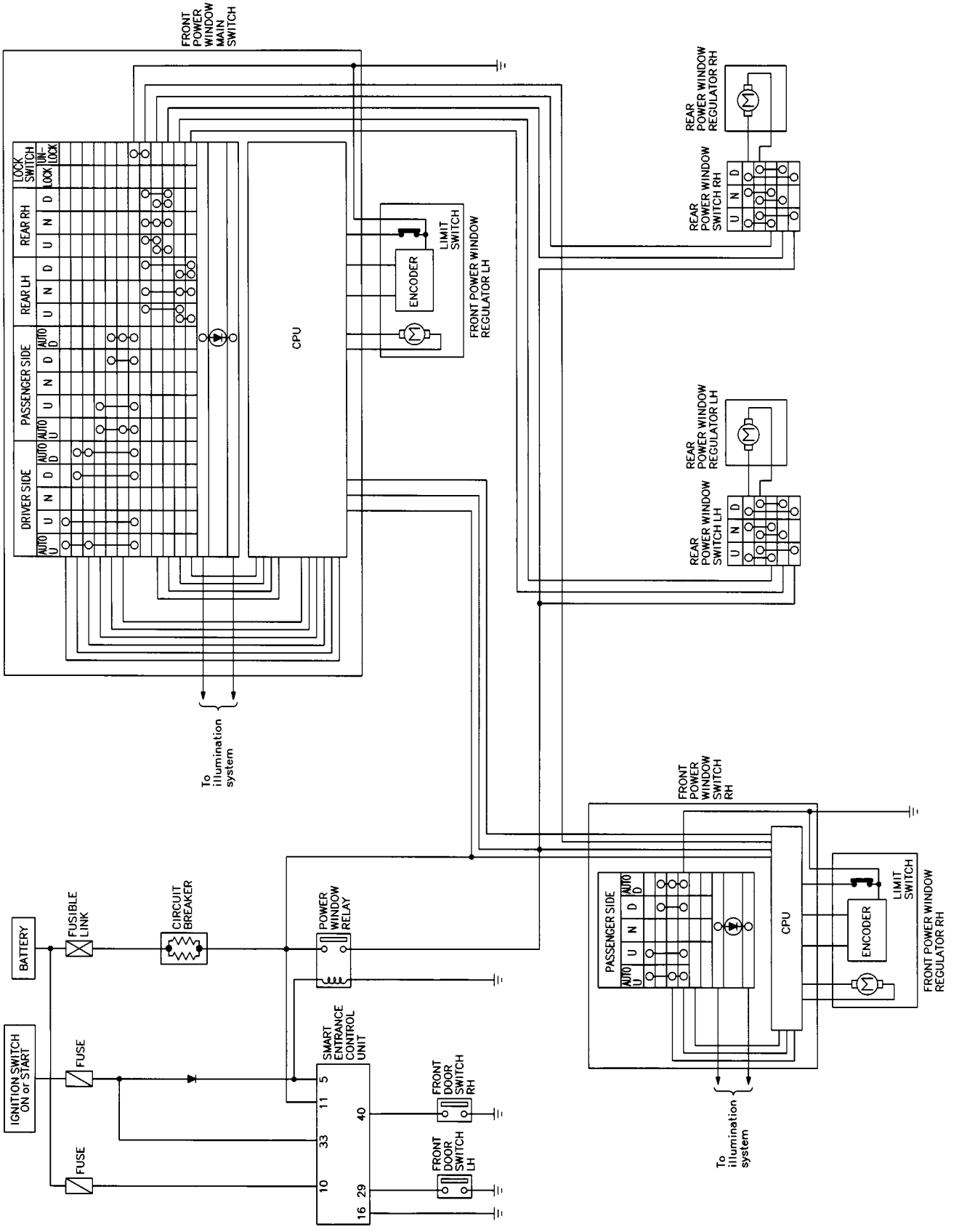
Front power window main switch and front power window switch RH monitor the power window regulator motor operation and the power window position (full closed or other) for driver's and passenger's power window by the signals from encoder and limit switch in front power window regulator LH or RH.
When front power window main switch or front power window switch RH detects interruption during the following close operation in the driver's or front passenger's side door,

- automatic close operation when ignition switch is in the "ON" position
- automatic close operation during retained power operation

front power window main switch or front power window switch RH controls driver's or front passenger's power window regulator motor for open and the power window will be lowered about 150 mm (5.91 in).

Schematic

NAEL0103

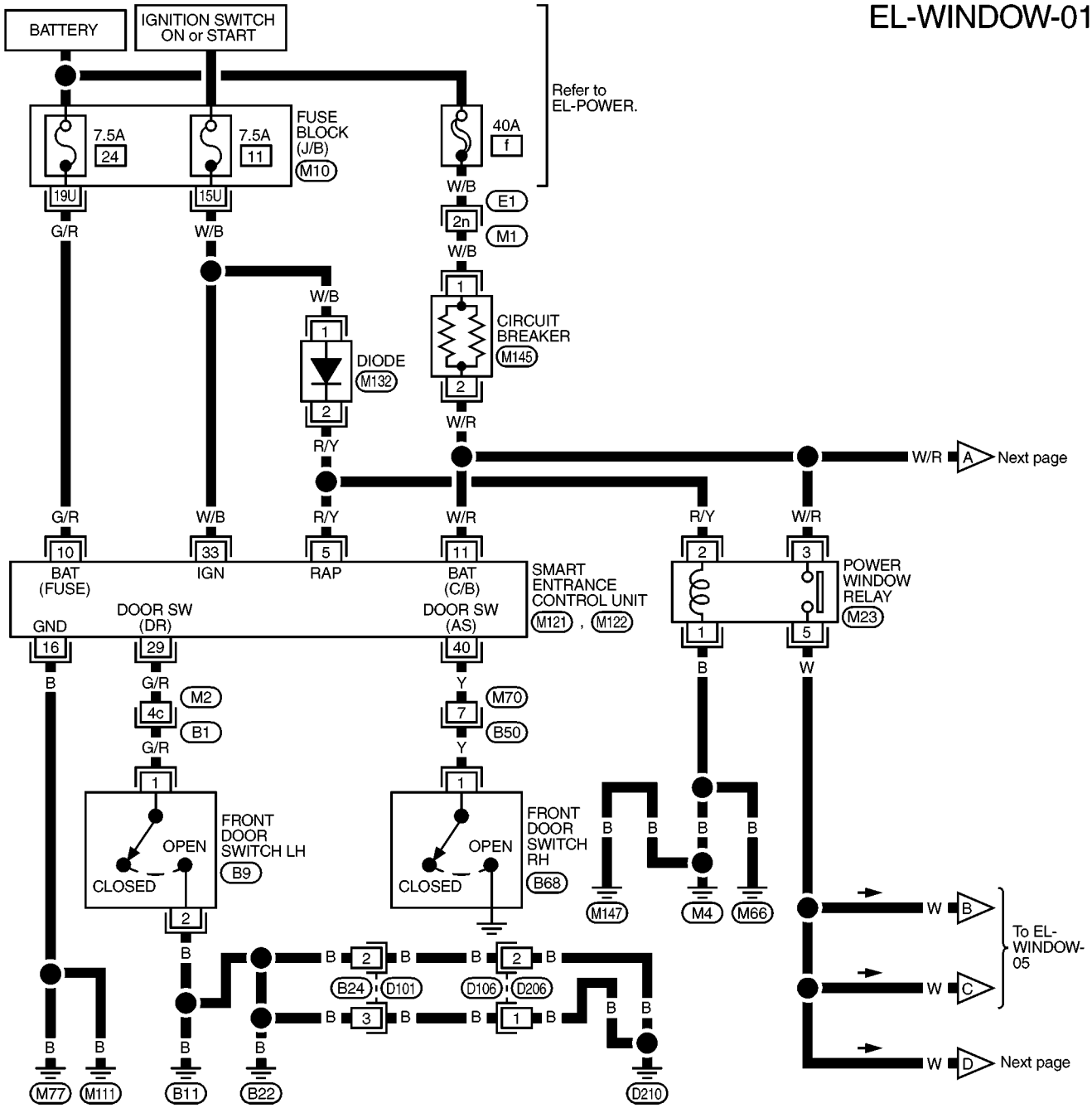


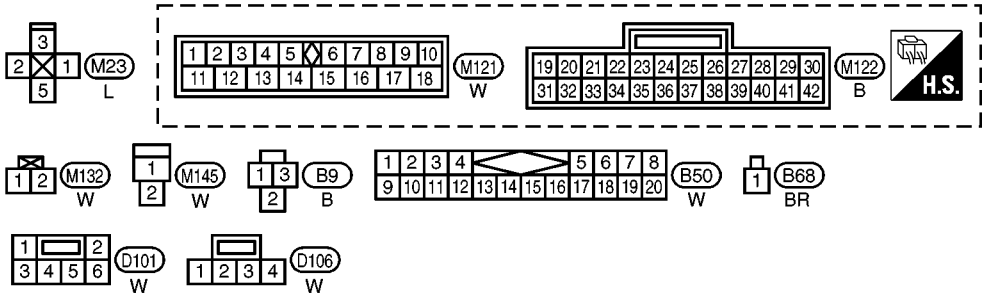
MEL842L

Wiring Diagram — WINDOW —

NAEL0104

EL-WINDOW-01

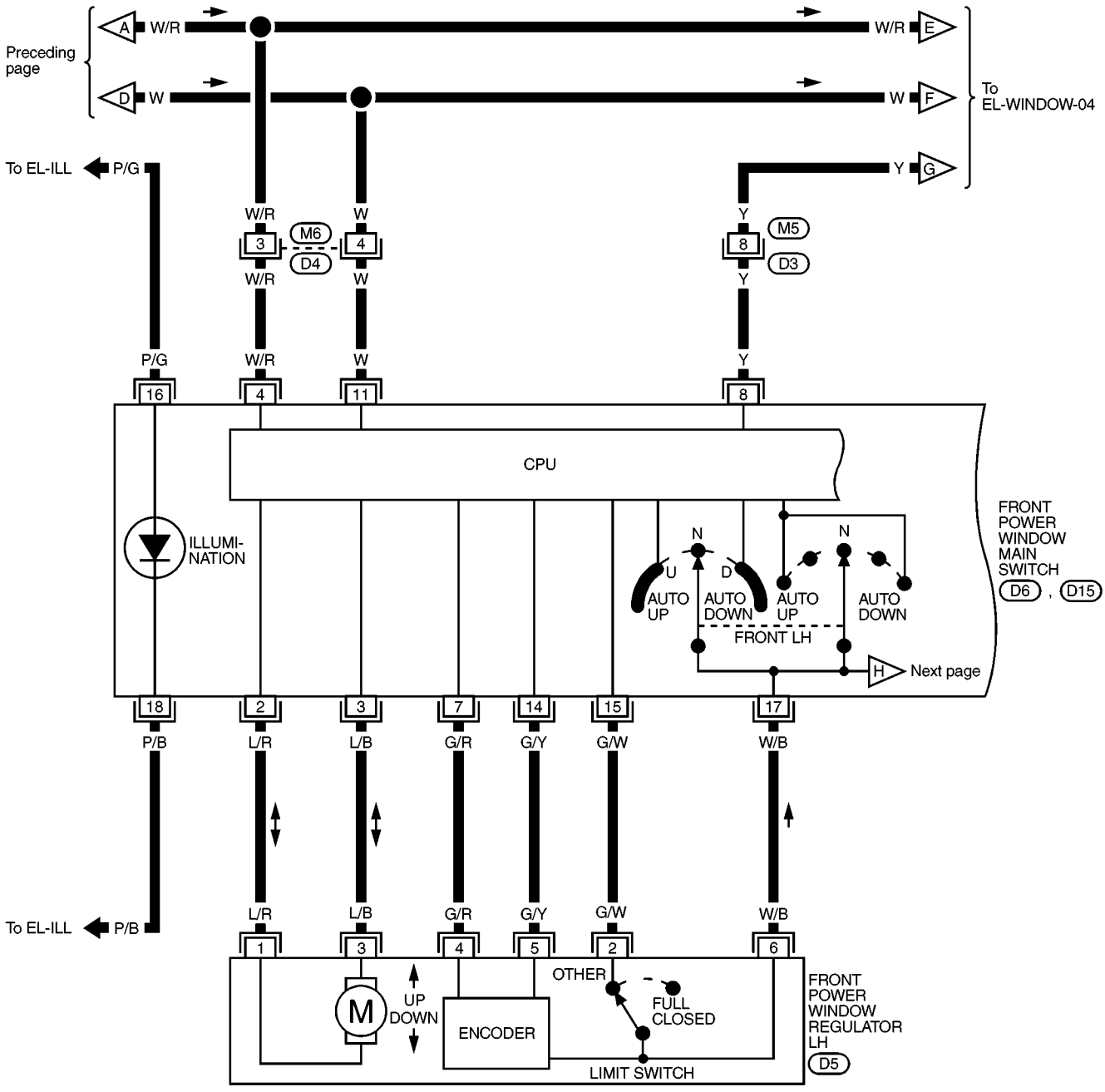


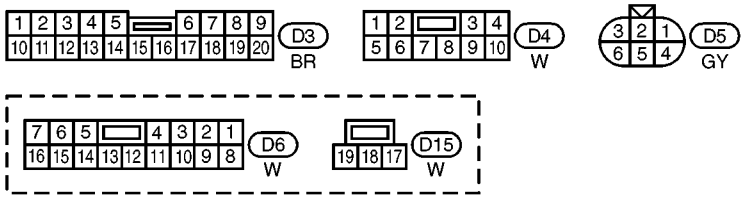


REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK - JUNCTION BOX (J/B)

MEL843L

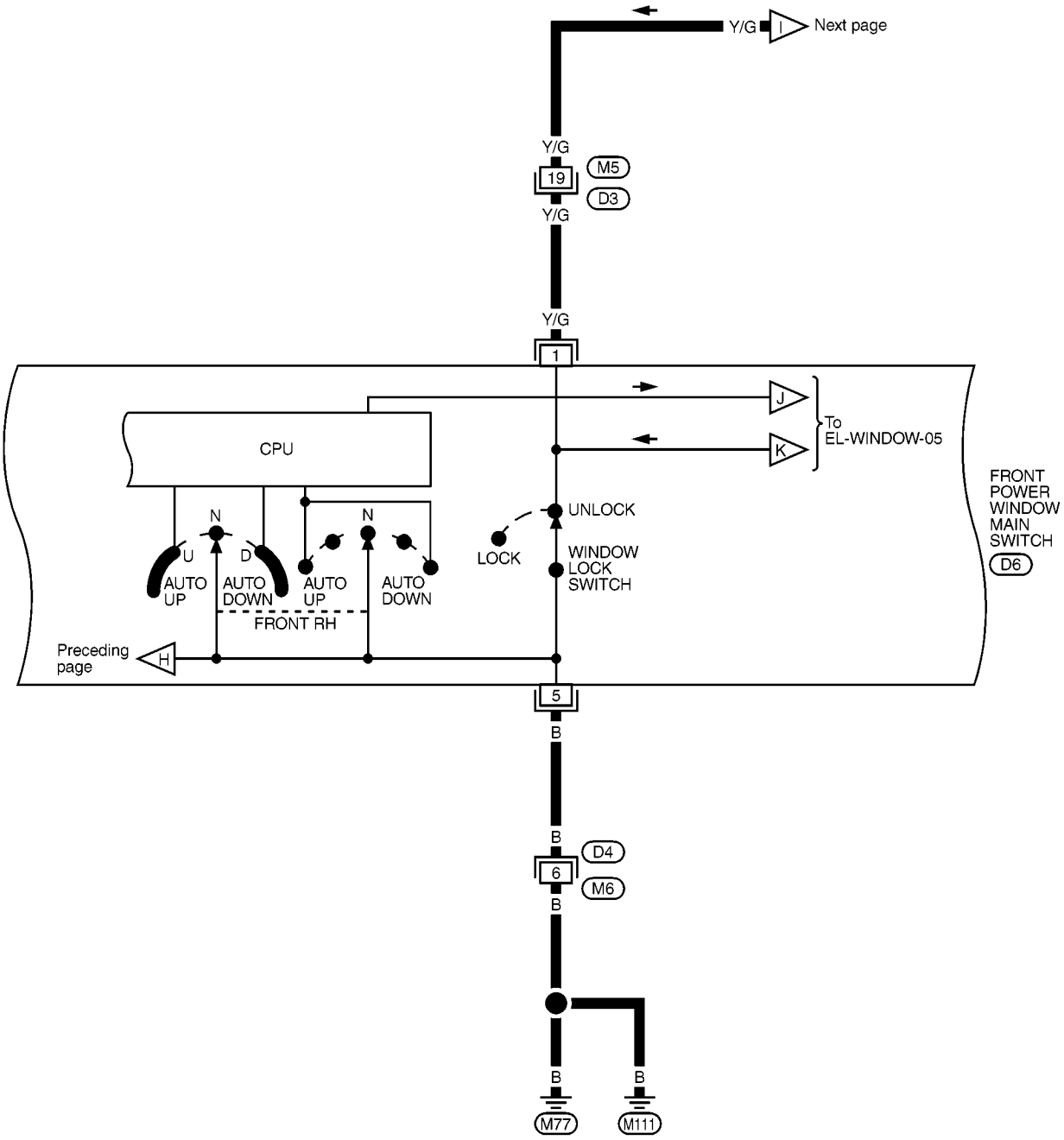
EL-WINDOW-02

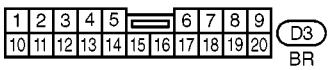


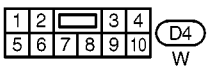


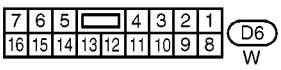
MEL844L

EL-WINDOW-03



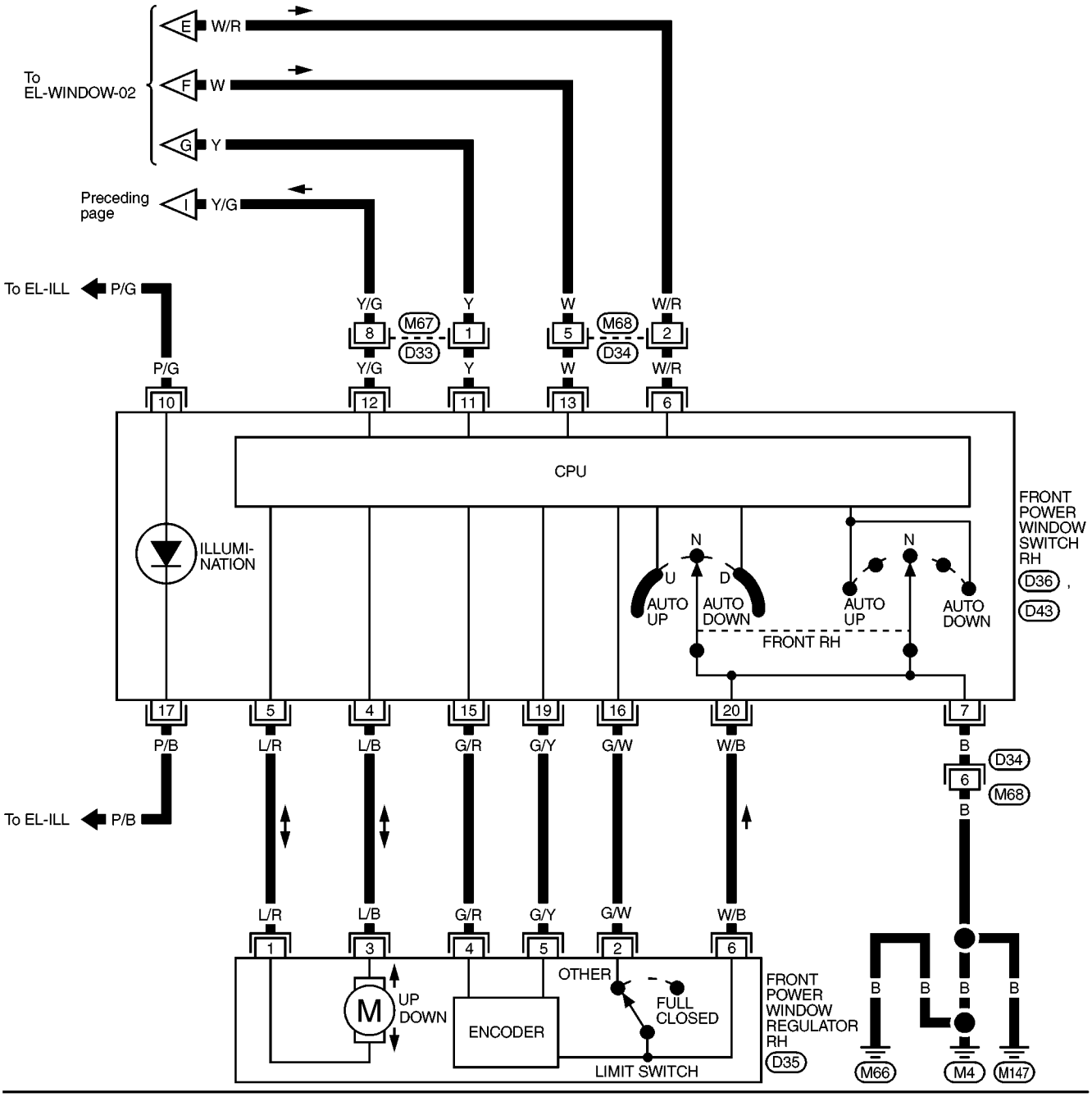


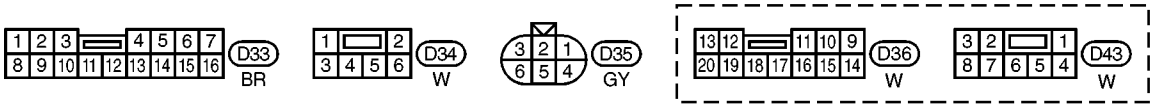




MEL845L

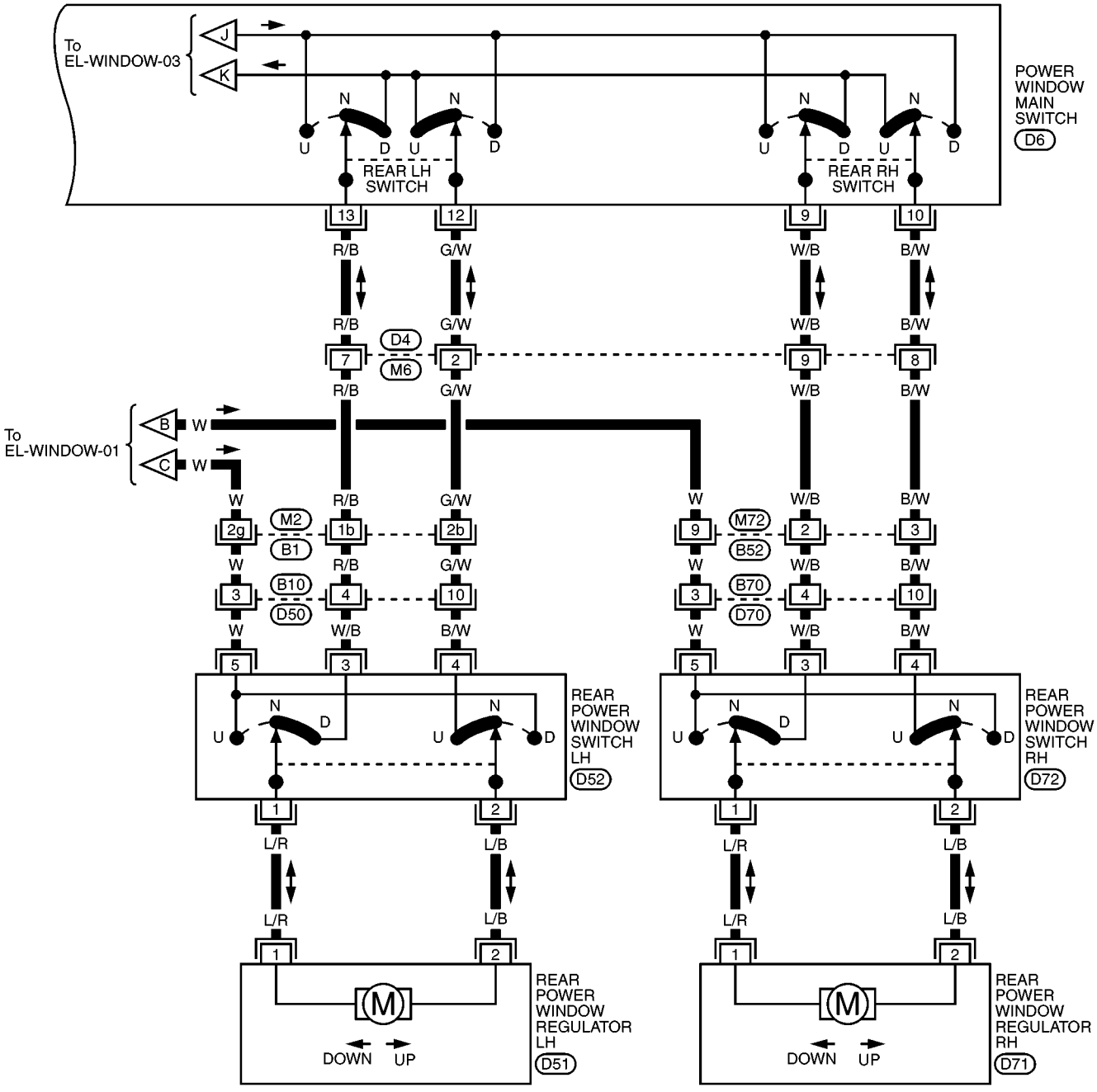
EL-WINDOW-04





MEL846L

EL-WINDOW-05



B52 W

D4 , D50 , D70 W W W

D6 W

D51 , D71 B B

D52 , D72 W W

REFER TO THE FOLLOWING.

B1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL847L

Trouble Diagnoses

NAEL0221

Symptom	Possible cause	Repair order
None of the power windows can be operated using any switch.	1. 7.5A fuse, 40A fusible link 2. M145 circuit breaker 3. Power window relay 4. M145 circuit breaker circuit 5. Power window relay circuit 6. Ground circuit 7. Power window main switch	1. Check 7.5A fuse [No. 11, located in fuse block (J/B)], 40A fusible link (letter **f**, located in fuse and fusible link box). 2. Check M145 circuit breaker. 3. Check power window relay. 4. Check the following. a. Harness between M145 circuit breaker and 40A fusible link b. Harness between M145 circuit breaker and front power window main switch 5. Check the following. a. Harness between 7.5A fuse and power window relay b. Harness between M145 circuit breaker and power window relay 6. Check the following. a. Ground circuit of power window main switch terminal 5 b. Power window relay ground circuit 7. Check power window main switch.
Driver side power window cannot be operated but other windows can be operated.	1. Driver side power window regulator circuit 2. Driver side power window regulator 3. Power window main switch	1. Check harness between power window main switch and driver side power window regulator for open or short circuit. 2. Check driver side power window regulator. 3. Check power window main switch.
Passenger side power window cannot be operated but other window can be operated.	1. Power supply for front power window switch RH 2. Front power window switch RH ground circuit 3. Front power window switch RH circuit 4. Front power window regulator RH circuit 5. Front power window regulator RH 6. Front power window main switch 7. Front power window switch RH	1. Check power supply for front power window switch RH terminals 6 and 13. 2. Check front power window switch RH ground circuit. 3. Check harness between front power window switch RH and power window main switch. 4. Check harness between front power window switch RH and front power window regulator RH for open or short circuit. 5. Check front power window regulator RH. 6. Check front power window main switch. 7. Check front power window switch RH.
One or more rear power windows except front window cannot be operated.	1. Rear power window switches 2. Rear power window regulators 3. Power window main switch 4. Rear power window circuit	1. Check rear power window switches. 2. Check rear power window regulator. 3. Check power window main switch. 4. Check the following. a. Harness between the rear power window switches terminal 5 and power window relay b. Harnesses between power window main switch and rear power window switches for open/short circuit c. Harnesses between rear power window switches and rear power window regulator for open/short circuit
Power windows except driver's side window cannot be operated using power window main switch but can be operated by power window switches.	1. Power window main switch	1. Check power window main switch.
Driver side power window automatic operation does not function properly.	1. Power window main switch 2. Encoder and limit switch	1. Check power window main switch. 2. Check encoder and limit switch. (EL-270)

Symptom	Possible cause	Repair order
Front passenger side power window automatic operation does not function properly.	1. Front power window switch RH 2. Encoder and limit switch	1. Check front power window switch RH. 2. Check encoder and limit switch. (EL-270)
Retained power operation does not operate properly.	1. RAP signal circuit 2. Driver or passenger side door switch circuit 3. Smart entrance control unit	1. Check harness between power window relay terminal 2 and smart entrance control unit terminal 5 for open or short circuit. 2. Check the following. a. Harness between smart entrance control unit and driver or passenger side door switch for short circuit b. Driver or passenger side door switch ground circuit c. Driver or passenger side door switch 3. Check smart entrance control unit. (EL-348)

ENCODER AND LIMIT SWITCH CHECK

=NAEL0221S01

1	CHECK DOOR WINDOW SLIDE MECHANISM

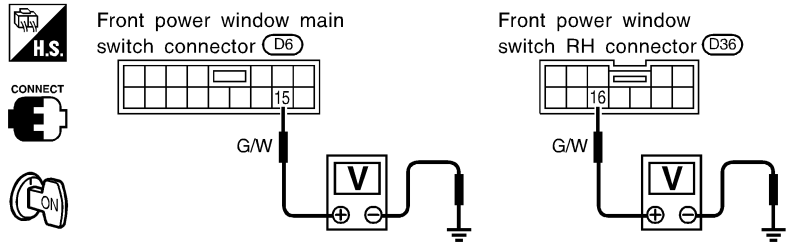
Check the following.
- Obstacles in window, glass molding, etc.
- Worn or deformed glass molding
- Door sash tilted too far inward or outward
- Door window regulator

OK or NG

OK	▶	GO TO 2.
NG	▶	Remove obstacles or repair door window slide mechanism.

2	CHECK POWER SUPPLY TO LIMIT SWITCH

1. Disconnect front power window regulator LH or RH harness connector.
2. Check voltage between front power window main switch terminal 15 or front power window switch RH terminal 16 and ground.



Voltage: 5V

NOTE: Check voltage when front power window regulator LH or RH harness connector is disconnected.

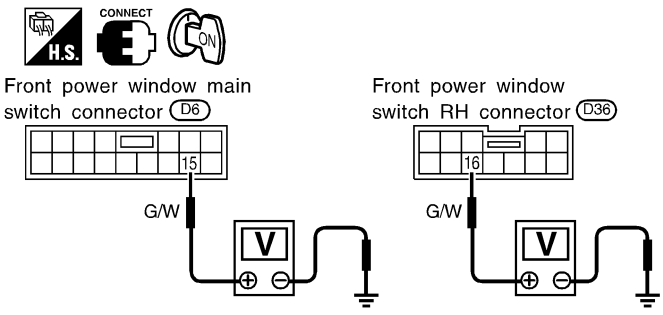
SEL725WA

OK or NG

OK	▶	GO TO 3.
NG	▶	Replace power window main switch or front power window switch RH.

3	CHECK LIMIT SWITCH OPERATION

1. Connect front power window regulator LH or RH harness connector.
2. Check voltage between front power window main switch terminal 15 or front power window switch RH terminal 16 and ground during power window closing operation.



Terminal No.	Condition	Voltage (DCV)
Front power window main switch: 15 Front power window switch RH: 16	Approx.15 mm (0.59 in) below the full closed position to full closed position	Approx. 5
	Other positions	Approx. 0

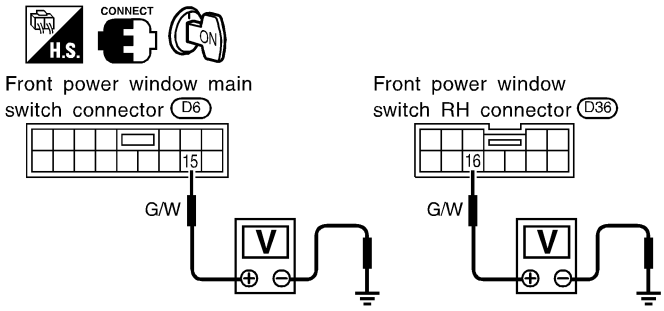
SEL726WA

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	RESET LIMIT SWITCH

Reset limit switch. Refer to BT-7, "Front Door Glass Limit Switch Reset". Then check voltage between front power window main switch terminal 15 or front power window switch RH terminal 16 and ground during power window closing operation at least ten times.



Terminal No.	Condition	Voltage (DCV)
Front power window main switch: 15 Front power window switch RH: 16	Approx.15 mm (0.59 in) below the full closed position to full closed position	Approx. 5
	Other positions	Approx. 0

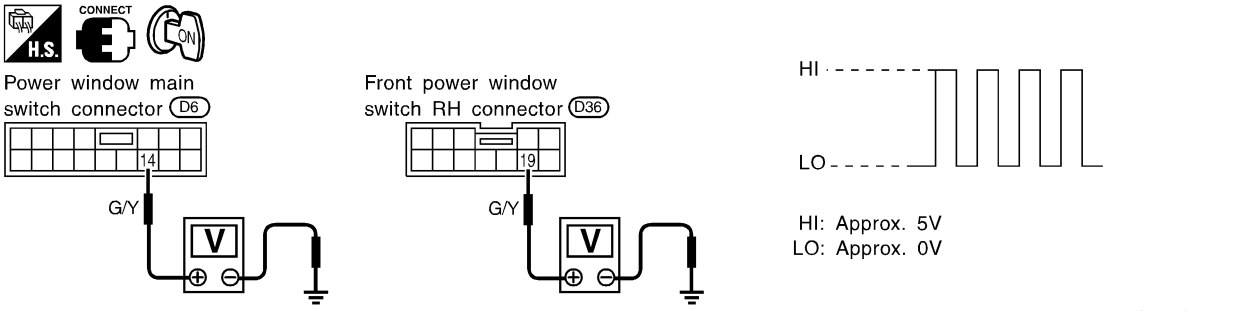
SEL726WA

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace power window regulator motor.

5	CHECK ENCODER

Measure voltage between front power window main switch terminal 14 or front power window switch RH terminal 19 and ground with oscilloscope when power window is in automatic closing operation.



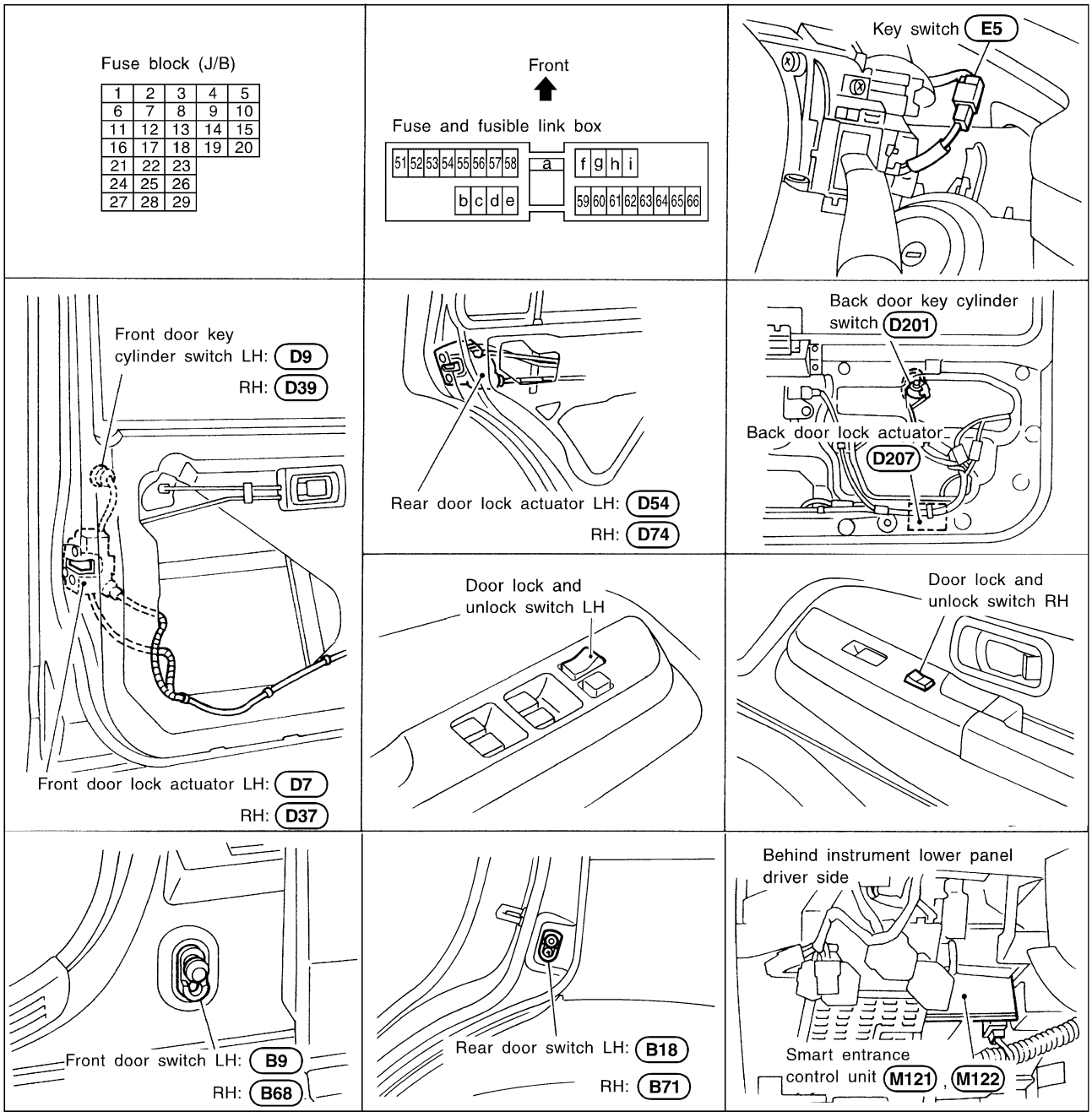
SEL727WA

OK or NG

OK	▶	Replace power window main switch.
NG	▶	Replace power window regulator motor.

Component Parts and Harness Connector Location

NAEL0106



SEL065W

System Description

NAEL0107

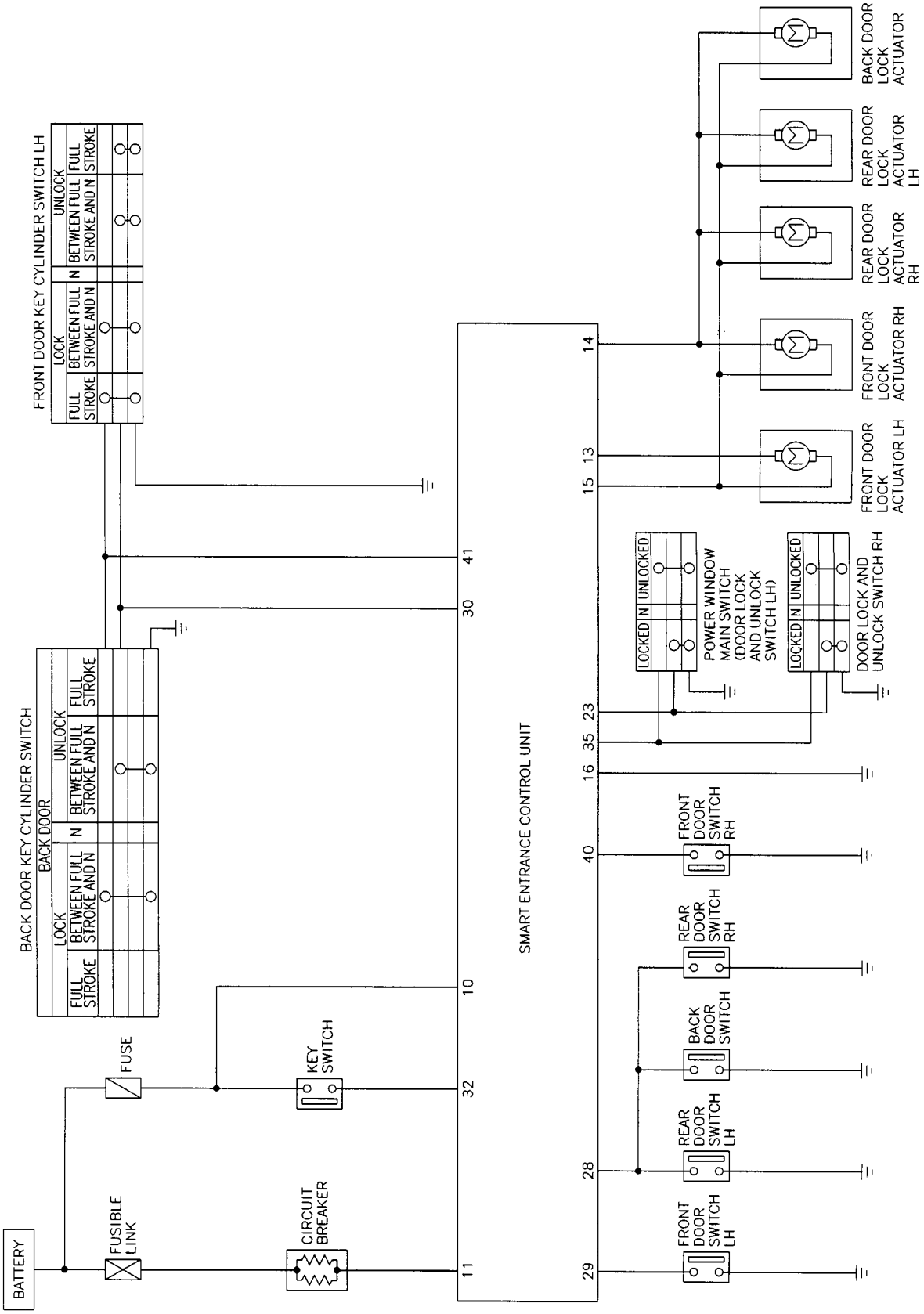
OPERATION

NAEL0107S04

- The lock/unlock switch (LH and RH) on door trim can lock and unlock all doors.
- With the door key inserted in the key cylinder on front LH, RH or back door, turning it to “LOCK”, will lock all doors; turning it to “UNLOCK” once unlocks the corresponding door; turning it to “UNLOCK” again within 5 seconds after the first unlock operation unlocks all of the other doors. (Signals from door key cylinder switch)
- If the ignition key is in the ignition key cylinder and one or more of doors are open, setting the lock/unlock switch to “LOCK” locks the doors once but then immediately unlock them. (Combination signals from key switch and door switches) - (KEY REMINDER DOOR SYSTEM)

Schematic

NAEL0108



MEL211M

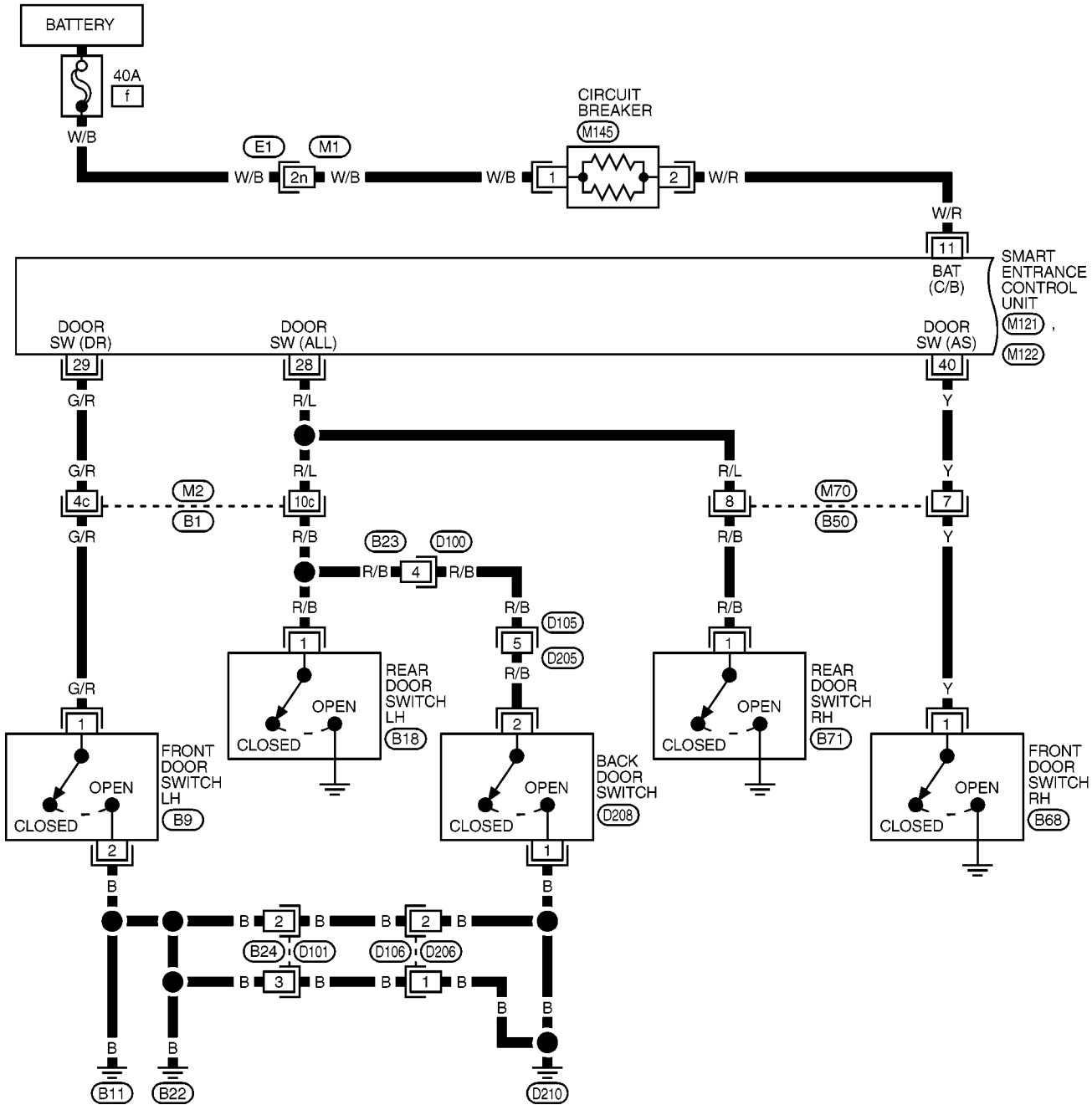
Wiring Diagram — D/LOCK —

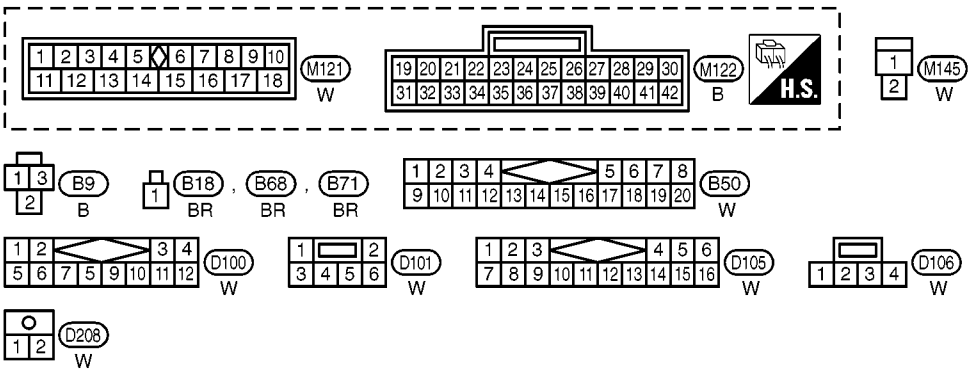
NAEL0109

FIG. 1

NAEL0109S01

EL-D/LOCK-01



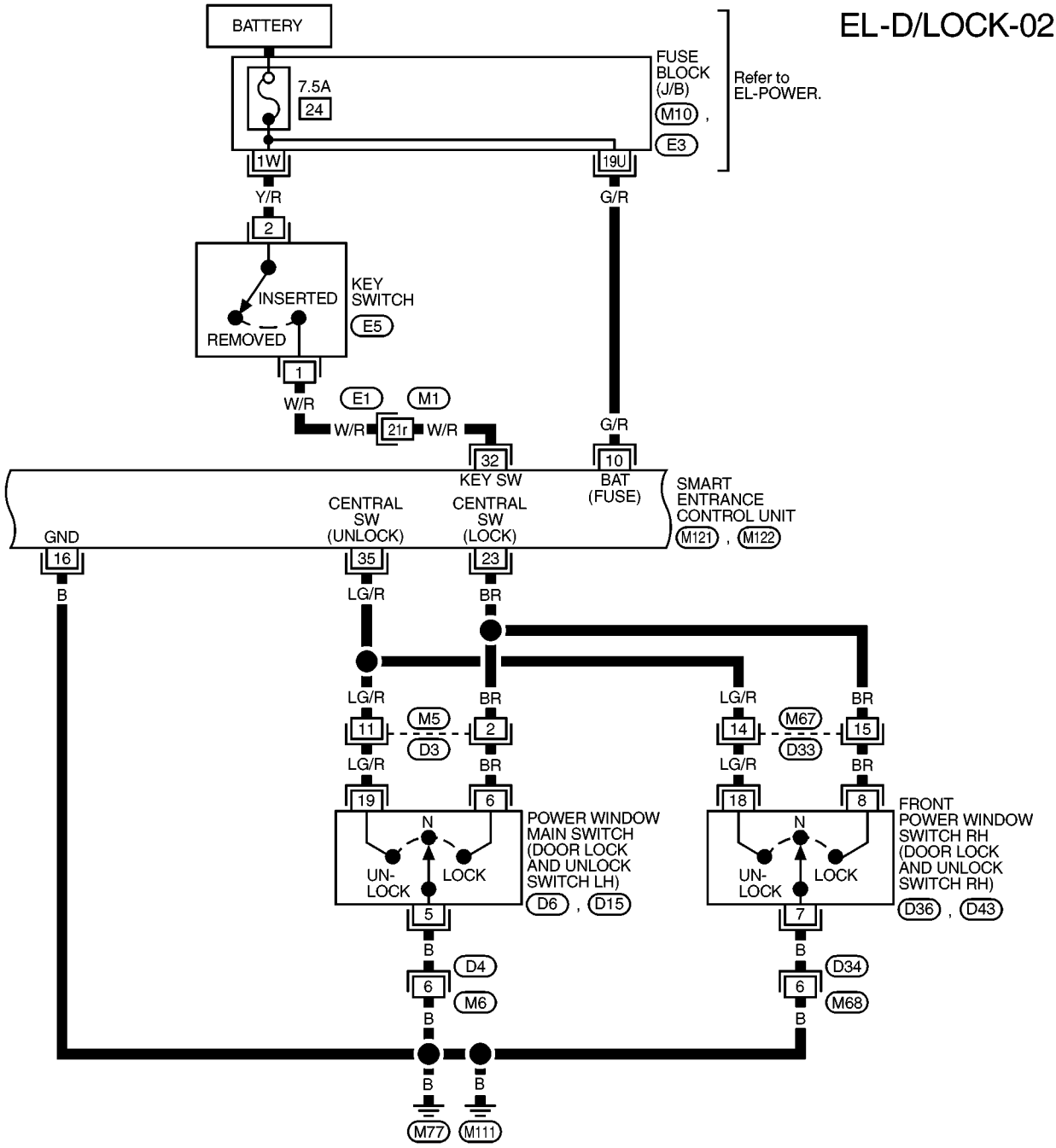


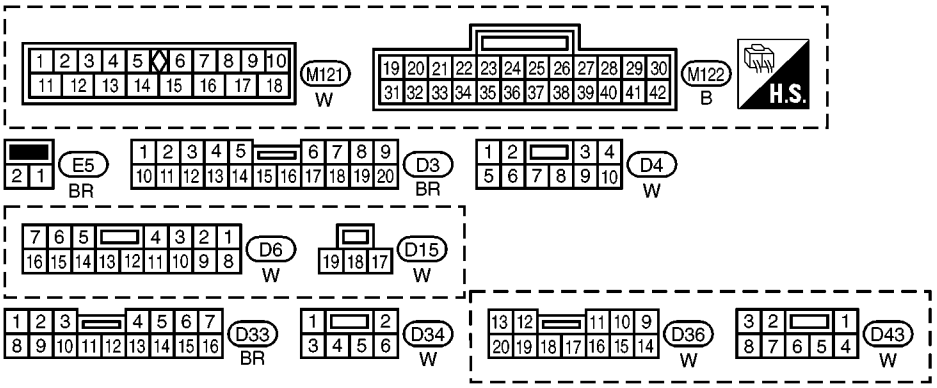
REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL848L

FIG. 2

NAEL0109S02





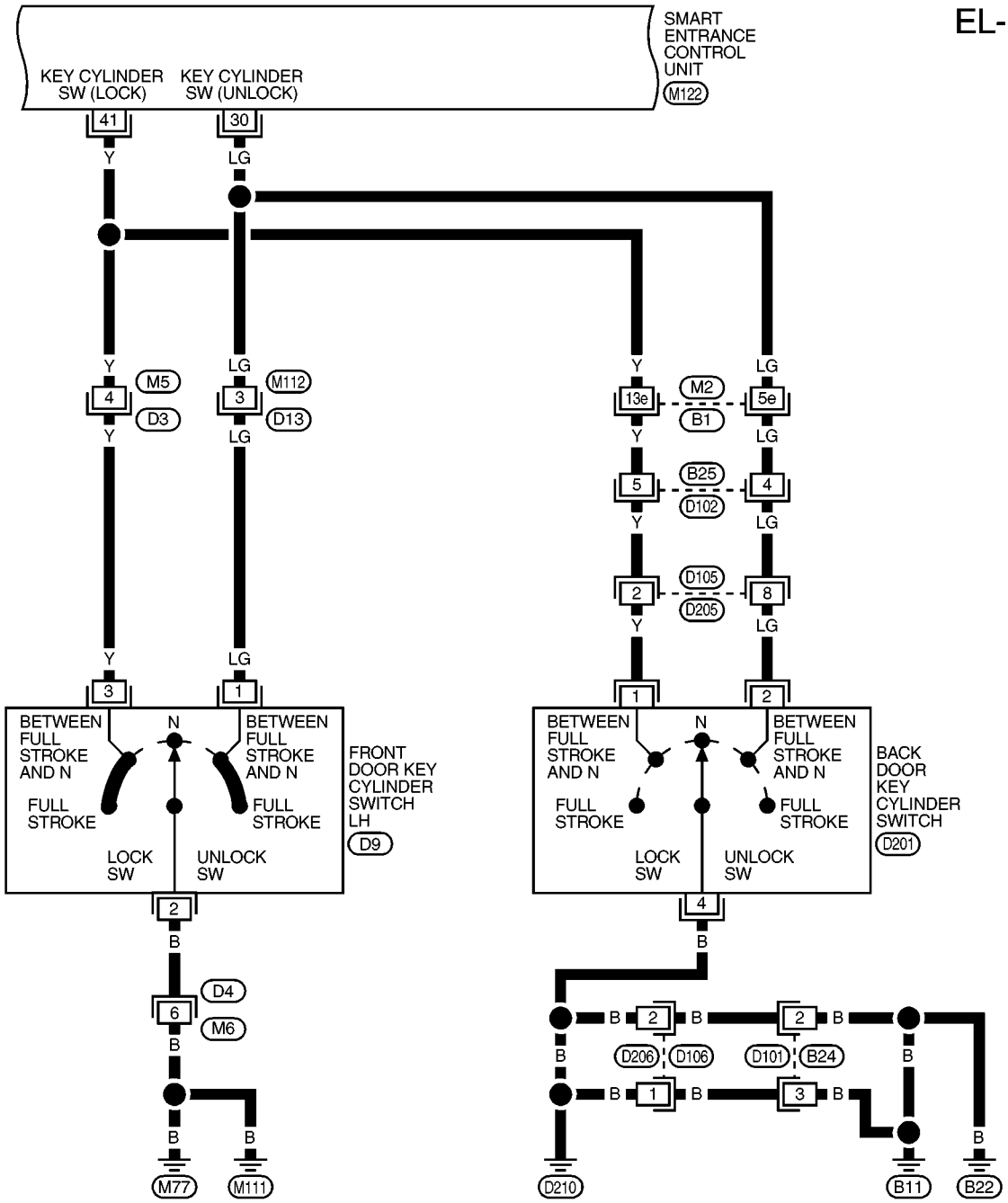
REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 , E3 -FUSE BLOCK-JUNCTION BOX (J/B)

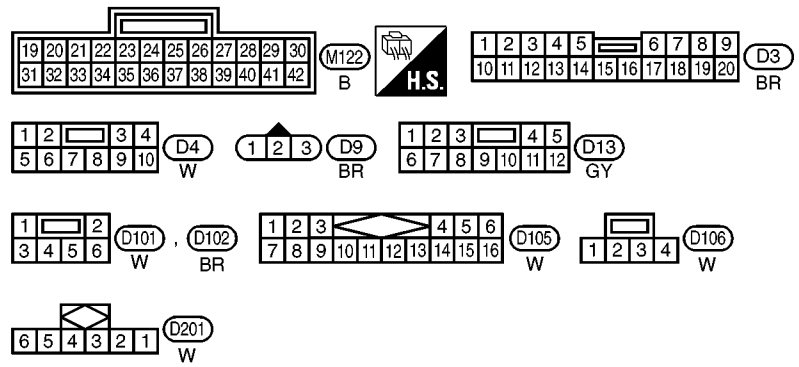
MEL849L

FIG. 3

NAEL0109S03

EL-D/LOCK-03





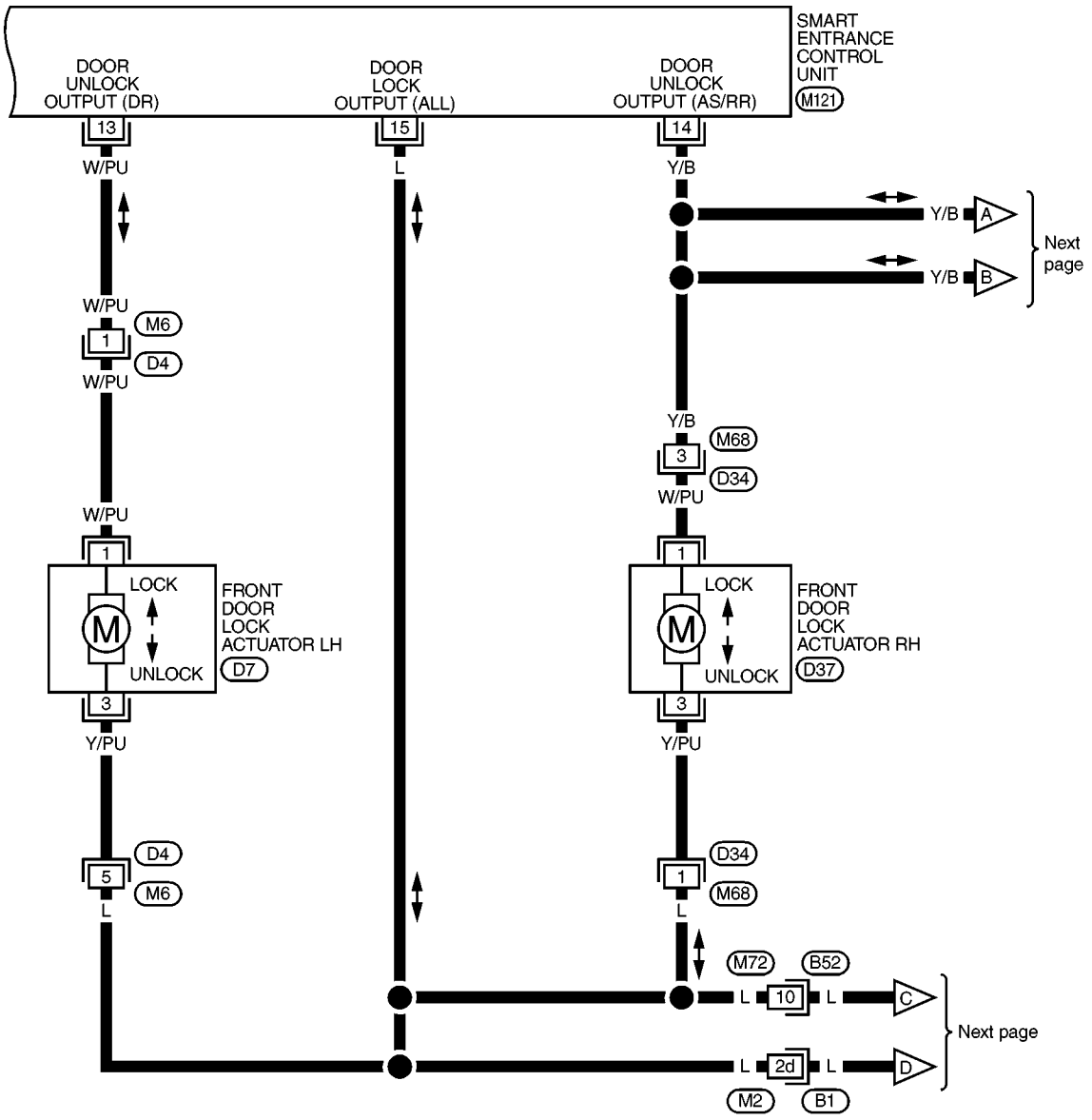
REFER TO THE FOLLOWING.
(B1) - SUPER MULTIPLE JUNCTION (SMJ)

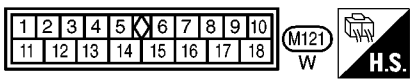
MEL850L

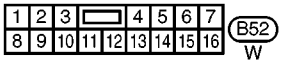
FIG. 4

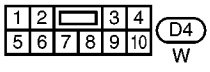
NAEL0109S04

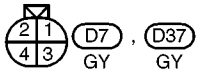
EL-D/LOCK-04

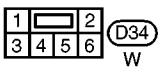












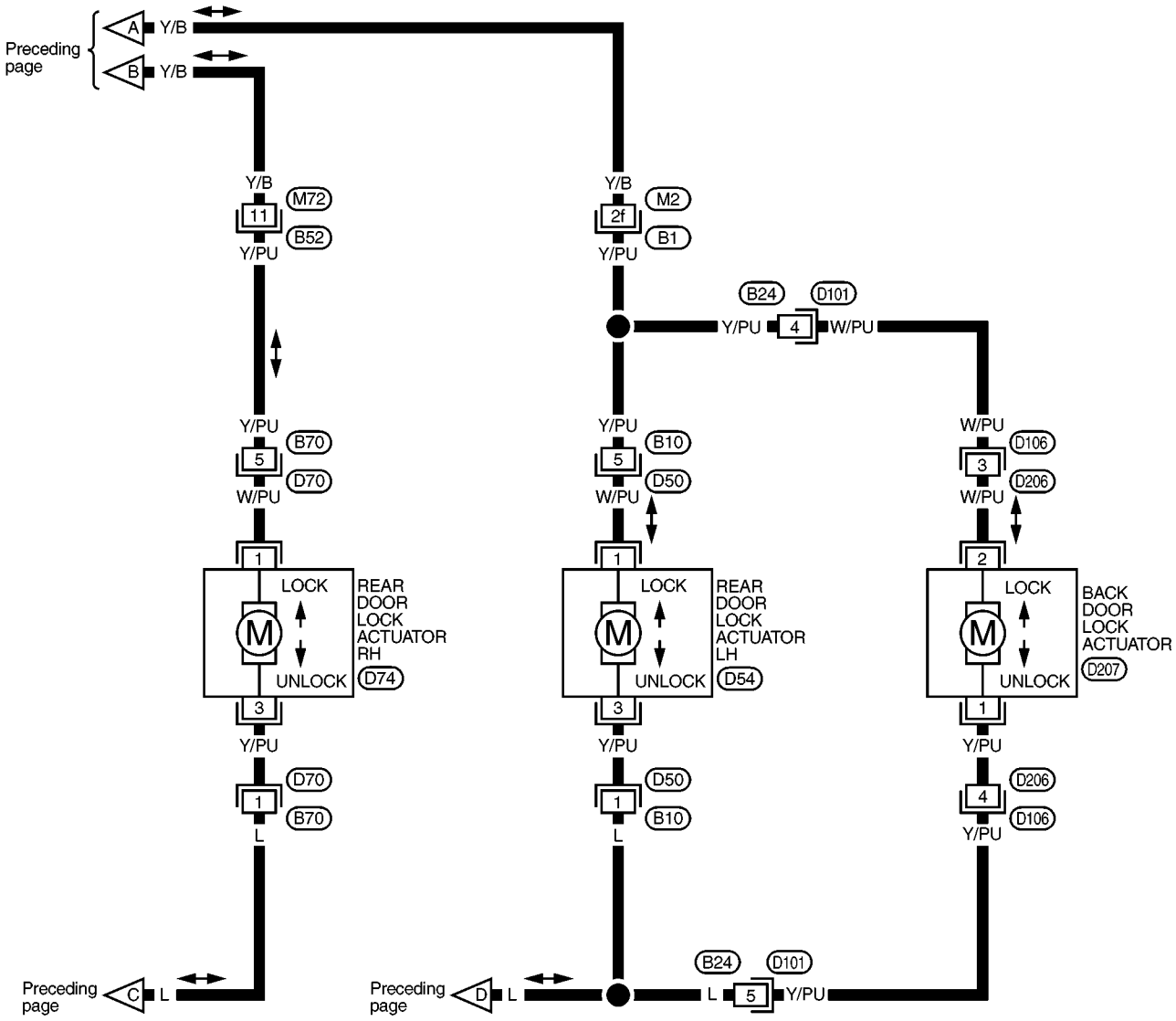
REFER TO THE FOLLOWING.
(B1) - SUPER MULTIPLE JUNCTION (SMJ)

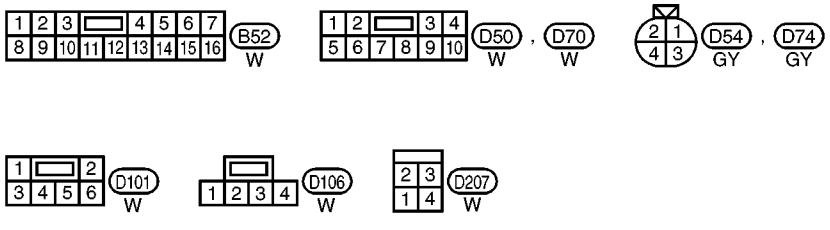
MEL851L

FIG. 5

NAEL0109S05

EL-D/LOCK-05





REFER TO THE FOLLOWING.
(B1) - SUPER MULTIPLE JUNCTION (SMJ)

MEL852L

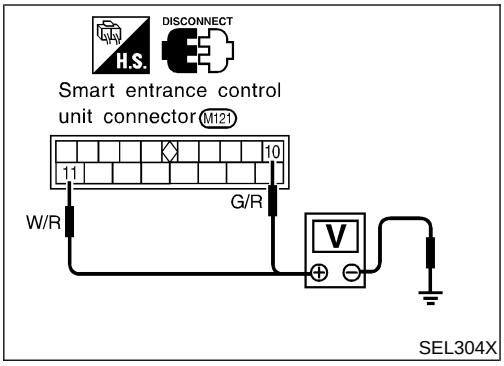
Trouble Diagnoses

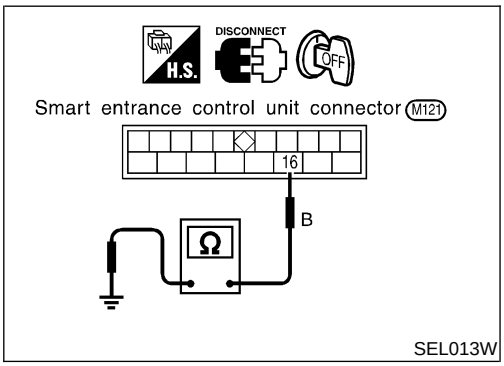
SYMPTOM CHART

NAEL0110

NAEL0110S01

REFERENCE PAGE (EL-)	280	281	282	283	284	285	286
SYMPTOM	MAIN POWER SUPPLY AND GROUND CIRCUIT CHECK	DOOR SWITCH CHECK	KEY SWITCH (INSERT) CHECK	DOOR LOCK/UNLOCK SWITCH CHECK	FRONT DOOR KEY CYLINDER SWITCH CHECK	BACK DOOR KEY CYLINDER SWITCH CHECK	DOOR LOCK ACTUATOR CHECK
Key reminder door system does not operate properly.	X	X	X				X
Specific door lock actuator does not operate.	X						X
Power door lock does not operate with door lock and unlock switch (LH and RH) on door trim.	X			X			
Power door lock does not operate with front door key cylinder operation.	X				X		
Power door lock does not operate with back door key cylinder operation.	X					X	





MAIN POWER SUPPLY AND GROUND CIRCUIT CHECK

=NAEL0110S02

Main Power Supply Circuit Check

NAEL0110S0201

Terminal		Ignition switch		
(+)	(−)	OFF	ACC	ON
10	Ground	Battery voltage	Battery voltage	Battery voltage
11				

Ground Circuit Check

NAEL0110S0202

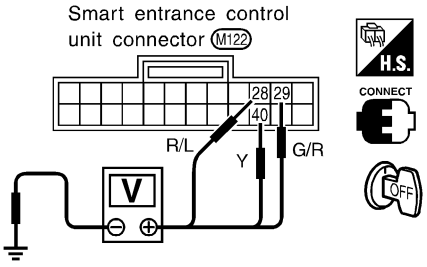
Terminals	Continuity
16 - Ground	Yes

DOOR SWITCH CHECK

=NAEL0110S05

1 CHECK DOOR SWITCH INPUT SIGNAL

Check voltage between smart entrance control unit terminals 28, 29 or 40 and ground.



	Terminals (+)	Terminals (−)	Condition	Voltage [V]
Front LH door switch	29	ground	Open	0
			Closed	Approx. 5
Front RH door switch	40	ground	Open	0
			Closed	Approx. 5
Rear and back door switches	28	ground	Open	0
			Closed	Approx. 5

SEL305X

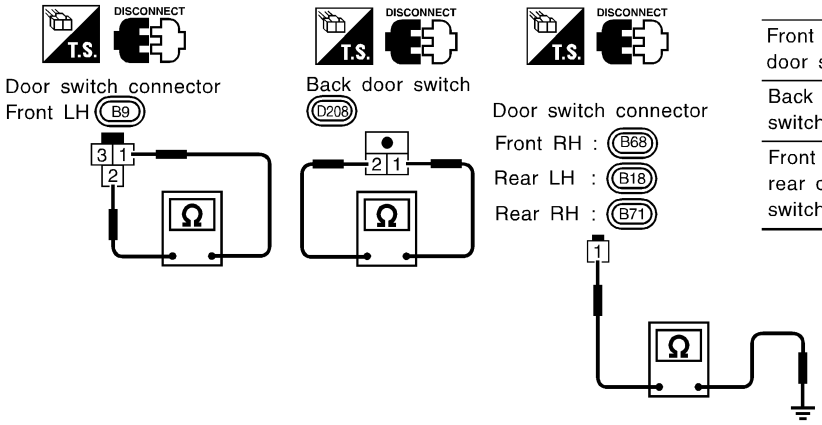
Refer to wiring diagram in EL-274.

OK or NG

OK	▶	Door switch is OK.
NG	▶	GO TO 2.

2 CHECK DOOR SWITCH

1. Disconnect door switch connector.
2. Check continuity between door switch terminals.



	Terminals	Condition	Continuity
Front LH door switch	1 - 2	Closed	No
		Open	Yes
Back door switch	1 - 2	Closed	No
		Open	Yes
Front RH and rear door switches	1 - ground	Closed	No
		Open	Yes

SEL306X

OK or NG

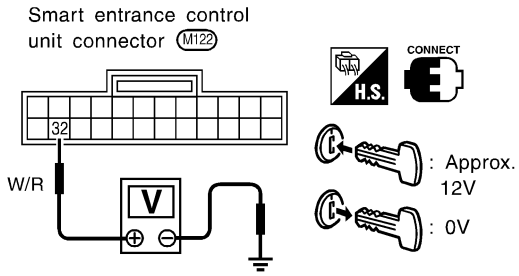
OK	▶	**Check the following.** • Door switch ground circuit (Front LH, back door) or door switch ground condition • Harness for open or short between smart entrance control unit and door switch
NG	▶	Replace door switch.

KEY SWITCH (INSERT) CHECK

=NAEL0110S06

1	CHECK KEY SWITCH INPUT SIGNAL

Check voltage between smart entrance control unit terminal 32 and ground.



Voltage [V]:
Condition of key switch: Key is inserted.
Approx. 12
Condition of key switch: Key is removed.
0

SEL307X

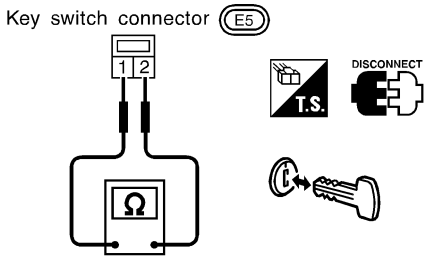
Refer to wiring diagram in EL-275.

OK or NG

OK	▶	Key switch is OK.
NG	▶	GO TO 2.

2	CHECK KEY SWITCH (INSERT)

Check continuity between terminals 1 and 2.



Continuity:
Condition of key switch: Key is inserted.
Yes
Condition of key switch: Key is removed.
No

SEL308X

OK or NG

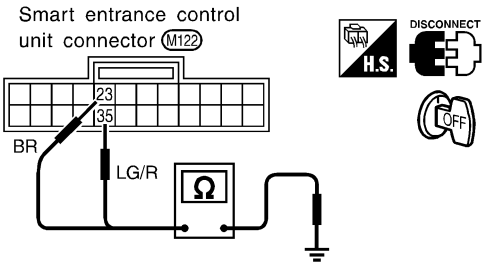
OK	▶	**Check the following.** ● 7.5A fuse [No. 24, located in fuse block (J/B)] ● Harness for open or short between key switch and fuse ● Harness for open or short between smart entrance control unit and key switch
NG	▶	Replace key switch.

DOOR LOCK/UNLOCK SWITCH CHECK

=NAEL0110S03

1 CHECK DOOR LOCK/UNLOCK SWITCH INPUT SIGNAL

1. Disconnect smart entrance control unit connector.
2. Check continuity between control unit terminal 23 or 35 and ground.



Terminals	Door lock/unlock switch (LH or RH) condition	Continuity
23 - ground	Lock	Yes
	N and Unlock	No
35 - ground	Unlock	Yes
	N and Lock	No

SEL309X

Refer to wiring diagram in EL-275.

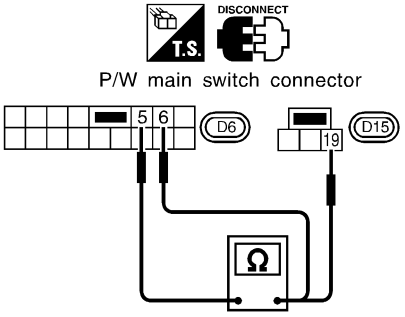
OK or NG

OK	▶	Door lock/unlock switch is OK.
NG	▶	GO TO 2.

2 CHECK DOOR LOCK/UNLOCK SWITCH

1. Disconnect door lock/unlock switch connector.
2. Check continuity between each door lock/unlock switch terminals.

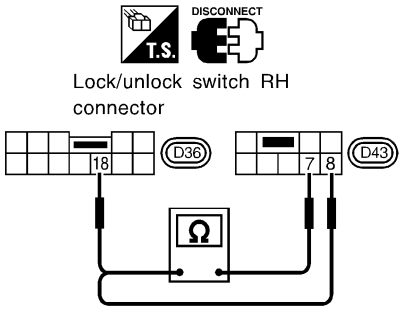
- Power window main switch (Door lock/unlock switch LH)



Condition	Terminals		
	5	19	6
Lock	○		○
N	No continuity		
Unlock	○	○	

SEL310X

- Door lock/unlock switch RH



Condition	Terminals		
	7	18	8
Lock	○		○
N	No continuity		
Unlock	○	○	

SEL311X

OK or NG

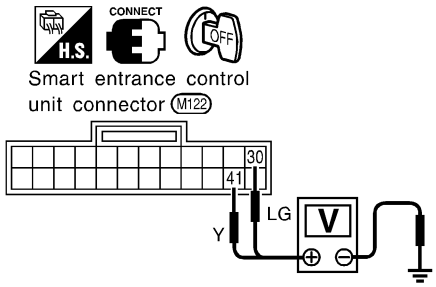
OK	▶	**Check the following.** • Ground circuit for door lock/unlock switch • Harness for open or short between door lock/unlock switch and smart entrance control unit connector
NG	▶	Replace door lock/unlock switch.

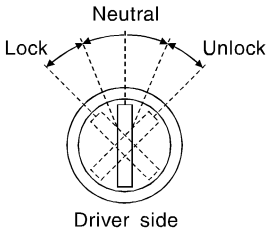
FRONT DOOR KEY CYLINDER SWITCH CHECK

=NAEL0110S07

1 **CHECK DOOR KEY CYLINDER SWITCH INPUT SIGNAL (LOCK/UNLOCK SIGNAL)**

Check voltage between smart entrance control unit terminals 30 or 41 and ground.





Terminals		Key position	Voltage [V]
(+)	(–)		
41	Ground	Neutral/Unlock	Approx. 5
		Lock	0
30	Ground	Neutral/Lock	Applox. 5
		Unlock	0

SEL312X

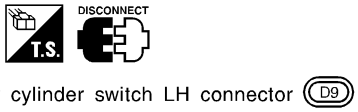
Refer to wiring diagram in EL-276.

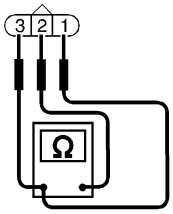
OK or NG

OK	▶	Door key cylinder switch is OK.
NG	▶	GO TO 2.

2 **CHECK DOOR KEY CYLINDER SWITCH**

1. Disconnect door key cylinder switch connector.
2. Check continuity between door key cylinder switch terminals.





① : Door unlock switch terminal
② : Ground terminal
③ : Door lock switch terminal

Terminals	Key position	Continuity
LH: 3 - 2	Neutral/Unlock	No
	Lock	Yes
LH: 1 - 2	Neutral/Lock	No
	Unlock	Yes

SEL313X

OK or NG

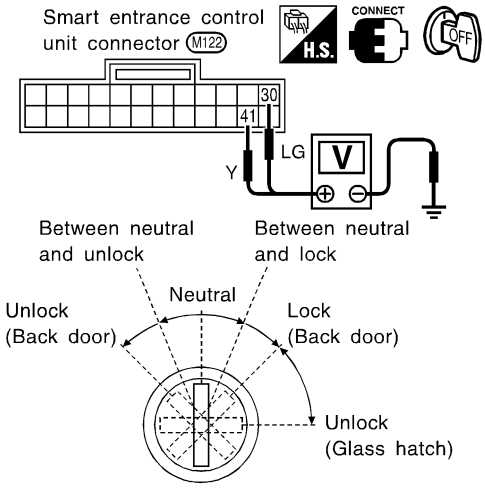
OK	▶	**Check the following.** ● Door key cylinder switch ground circuit ● Harness for open or short between smart entrance control unit and door key cylinder switch
NG	▶	Replace door key cylinder switch.

BACK DOOR KEY CYLINDER SWITCH CHECK

=NAEL0110S08

1 CHECK BACK DOOR KEY CYLINDER SWITCH INPUT SIGNAL (LOCK/UNLOCK SIGNAL)

Check voltage between smart entrance control unit terminals 30 or 41 and ground.



	Terminals (+)	Terminals (−)	Key position	Voltage [V]
Back door	41	Ground	Between neutral and lock	0
			Other positions	Applox. 5
	30	Ground	Between neutral and unlock	0
			Other positions	Applox. 5

SEL314X

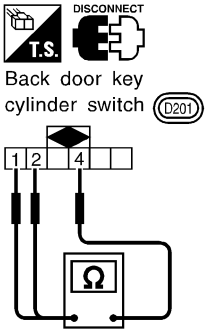
Refer to wiring diagram in EL-276.

OK or NG

OK	▶	Back door key cylinder switch is OK.
NG	▶	GO TO 2.

2 CHECK BACK DOOR KEY CYLINDER SWITCH

1. Disconnect back door key cylinder switch connector.
2. Check continuity between back door key cylinder switch terminals.



Key position	Terminals 1	Terminals 2	Terminals 4
Between neutral and lock (Back door)	○		○
Between neutral and unlock (Back door)		○	○

SEL315X

OK or NG

OK	▶	**Check the following.** ● Back door key cylinder switch ground circuit ● Harness for open or short between smart entrance control unit and back door key cylinder switch
NG	▶	Replace back door key cylinder switch.

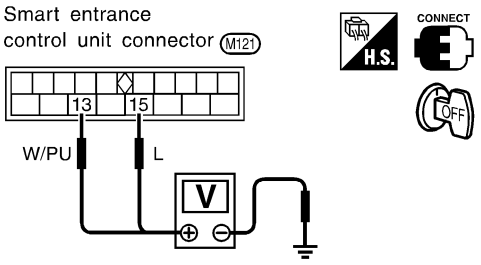
DOOR LOCK ACTUATOR CHECK

=NAEL0110S04

1 CHECK DOOR LOCK ACTUATOR CIRCUIT

Check voltage for door lock actuator.

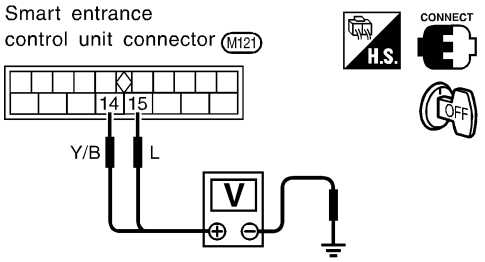
- Door lock actuator front LH



Door lock/unlock switch condition	Terminal No. (+)	Terminal No. (–)	Voltage (V)
Lock	15	ground	Approx. 12
Unlock	13	ground	

SEL316X

- Door lock actuator front RH, rear and back



Door lock/unlock switch condition	Terminal No. (+)	Terminal No. (–)	Voltage (V)
Lock	15	ground	Approx. 12
Unlock	14	ground	

SEL317X

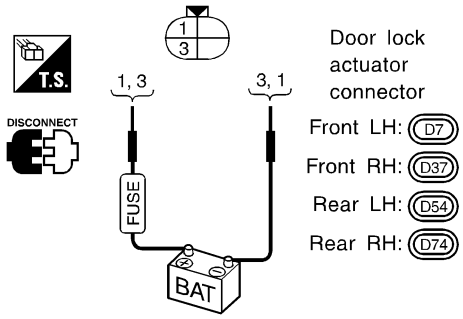
Refer to wiring diagram in EL-277.

OK or NG

OK	▶	GO TO 2.
NG	▶	Replace smart entrance control unit. (Before replacing smart entrance control unit, perform "DOOR LOCK/UNLOCK SWITCH CHECK".)

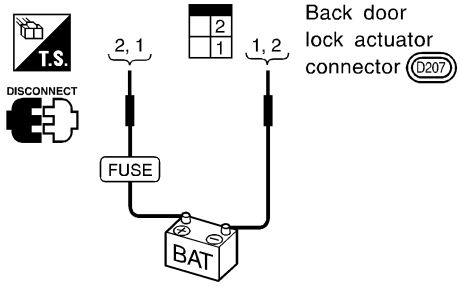
2	CHECK DOOR LOCK ACTUATOR

1. Disconnect door lock actuator connector.
2. Apply 12V direct current to door lock actuator and check operation.



- **Door lock actuator operation:**
  Terminals between (+): 3 and (–): 1
  Unlocked → Locked
  Terminals between (+): 1 and (–): 3
  Locked → Unlocked

SEL318X



- **Back door lock actuator operation:**
  Terminals between (+): 1 and (–): 2
  Unlocked → Locked
  Terminals between (+): 2 and (–): 1
  Locked → Unlocked

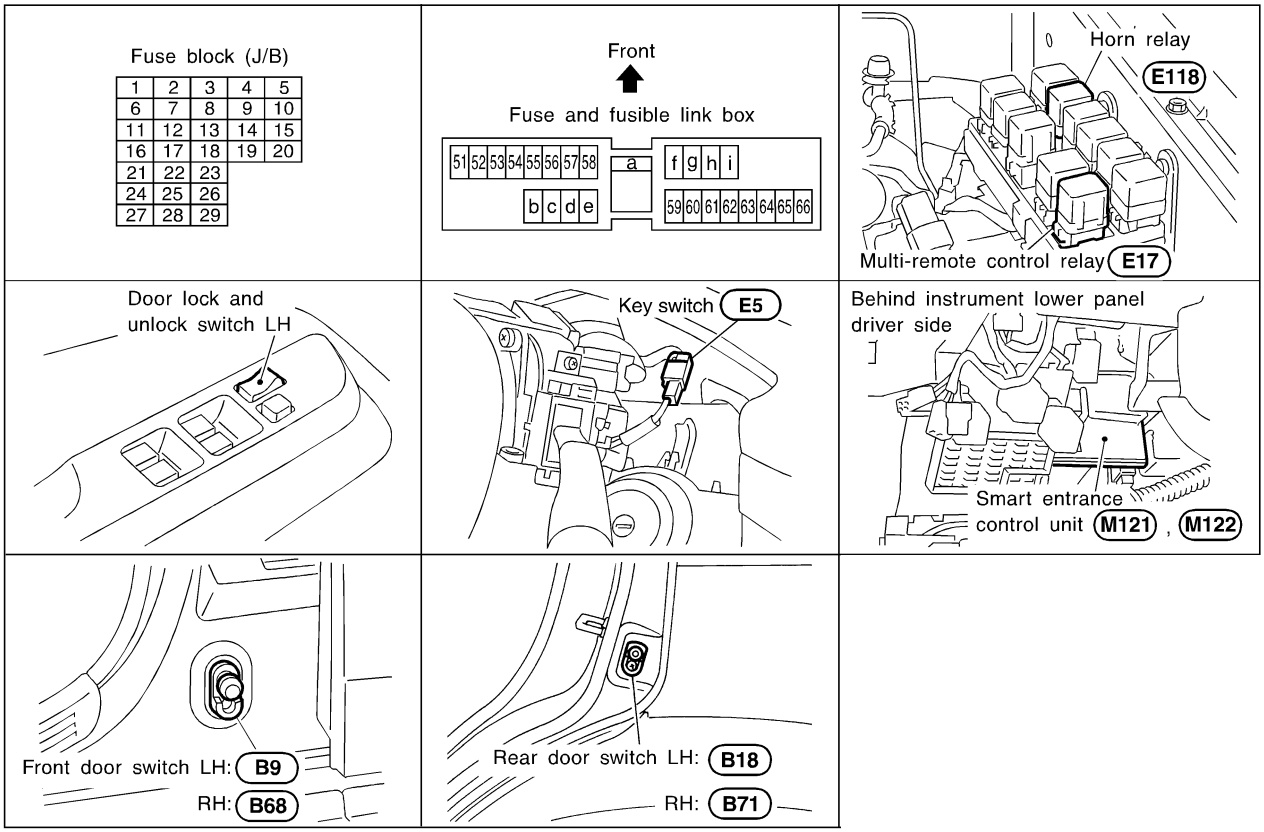
SEL319X

OK or NG

OK	▶	Check harness for open or short between smart entrance control unit connector and door lock actuator.
NG	▶	Replace door lock actuator.

Component Parts and Harness Connector Location

NAEL0111



SEL355X

System Description

NAEL0112

INPUTS

NAEL0112S01

Power is supplied at all times

- to smart entrance control unit terminal 11
- through circuit breaker
- through 40A fusible link (letter **f** located in the fuse and fusible link box),
- to key switch terminal 2, and
- to smart entrance control unit terminal 10
- through 7.5A fuse [No. 24, located in the fuse block (J/B)].
- to multi-remote control relay terminals 1, 3 and 6
- through 15A fuse [No. 20, located in the fuse block (J/B)].
- to horn relay terminals 1 and 3
- through 7.5A fuse [No. 52, located in the fuse block (J/B)].
- to horn relay terminal 6
- through 10A fuse [No. 54, located in the fuse block (J/B)].

When the ignition switch is in the ACC or ON position, power is supplied to smart entrance control unit terminal 21.

When the key switch is ON (ignition key is inserted in key cylinder), power is supplied

- through key switch terminal 1
- to smart entrance control unit terminal 32.

When the front door switch LH is OPEN, ground is supplied
- to smart entrance control unit terminal 29
- through front door switch LH terminal 1
- to front door switch LH terminal 2
- through body grounds B11, B22 and D210.

When the front door switch RH is OPEN, ground is supplied
- to smart entrance control unit terminal 40
- through front door switch RH body ground.

When the other door switches are OPEN, ground is supplied
- to smart entrance control unit terminal 28
- through other door switches body grounds.

Remote controller signal is inputted to smart entrance control unit (The antenna of the system is combined with smart entrance control unit).

OPERATION

NAEL0112S03

The multi-remote control system controls operation of the
- power door lock
- interior lamp
- panic alarm
- hazard and horn reminder

OPERATED PROCEDURE

NAEL0112S02

Power Door Lock Operation

NAEL0112S0201

Smart entrance control unit receives a LOCK signal from remote controller. Smart entrance control unit locks all doors with input of LOCK signal from remote controller.
When an UNLOCK signal is sent from remote controller once, driver's door will be unlocked.
Then, if an UNLOCK signal is sent from remote controller again within 5 seconds, all other door will be unlocked.

Hazard and Horn Reminder

NAEL0112S0204

When smart entrance control unit receives LOCK or UNLOCK signal from remote controller with all doors closed, ground is supplied
- to multi-remote control relay terminal 2
- through smart entrance control unit terminal 7, and
- to horn relay terminal 2
- through smart entrance control unit terminal 19

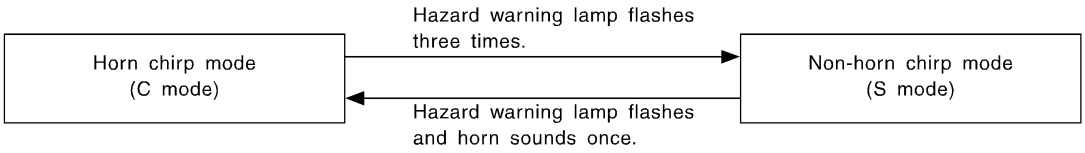
Multi-remote control relay and horn relay are now energized, and hazard warning lamp flashes and horn sounds as a reminder.
The hazard and horn reminder has a horn chirp mode (C mode) and a non-horn chirp mode (S mode).

Operating function of hazard and horn reminder

	Horn chirp mode (C mode)		Non-horn chirp mode (S mode)	
	Hazard warning lamp flash	Horn sound	Hazard warning lamp flash	Horn sound
Lock	Twice	Once	Twice	—
Unlock	Once	—	—	—

How to change hazard and horn reminder mode

When LOCK and UNLOCK signals are sent from the remote controller for more than 2 seconds at the same time, the hazard and horn reminder mode is changed and hazard warning lamp flashes and horn sounds as follows:



SEL153WB

Interior Lamp Operation

NAEL0112S0202

When the following input signals are both supplied:

- door switch CLOSED (when all the doors are closed);
- driver's door LOCKED;

multi-remote control system turns on interior lamp (for 30 seconds) with input of UNLOCK signal from remote controller.
For detailed description, refer to "INTERIOR, SPOT, VANITY MIRROR AND LUGGAGE ROOM LAMPS" (EL-108).

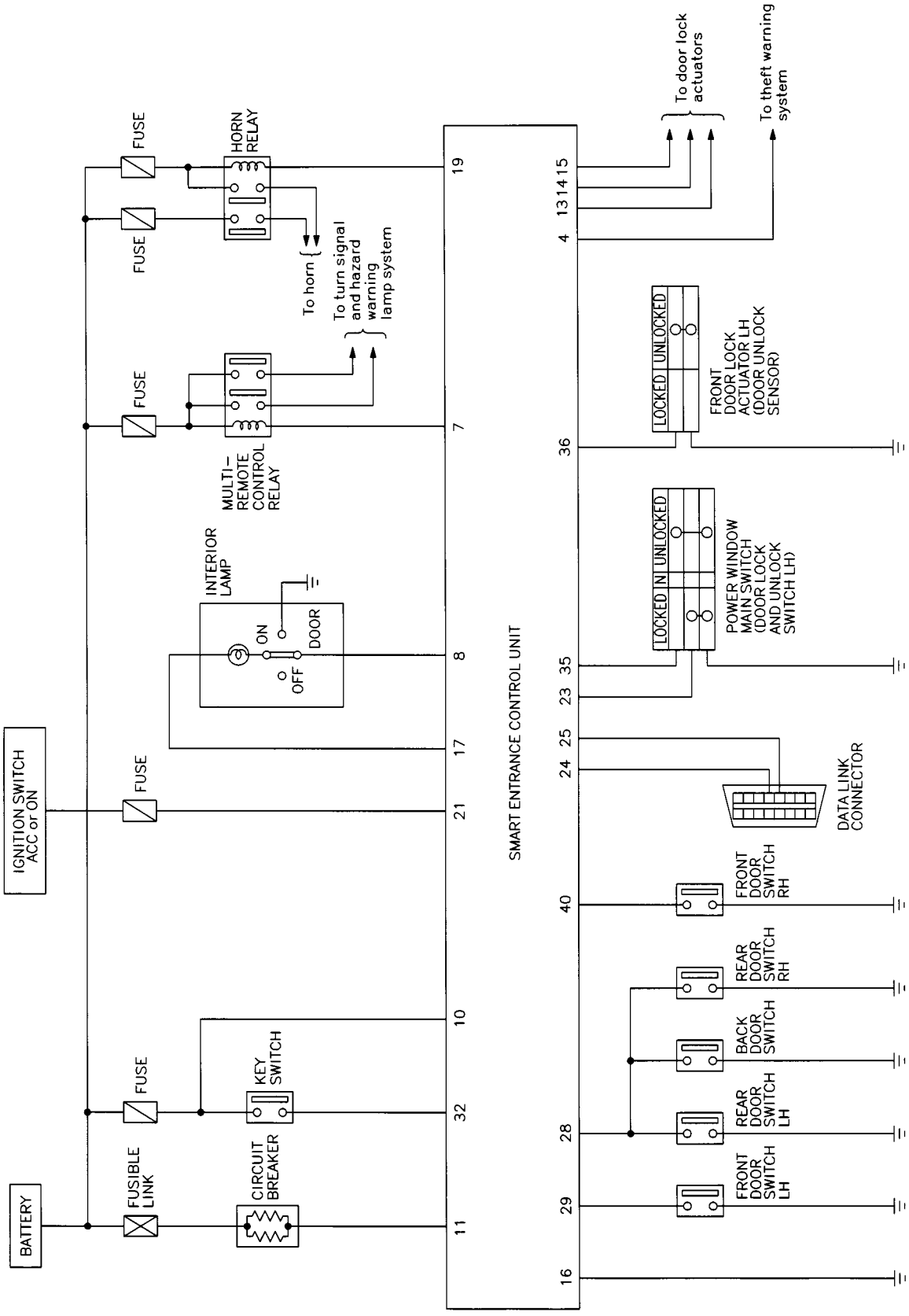
Panic Alarm Operation

NAEL0112S0203

When key switch is OFF (when ignition key is not inserted in key cylinder), multi-remote control system turns on and off horn and headlamp intermittently with input of PANIC ALARM signal from remote controller.
For detailed description, refer to "THEFT WARNING SYSTEM" (EL-315).

Schematic

NAEL0113



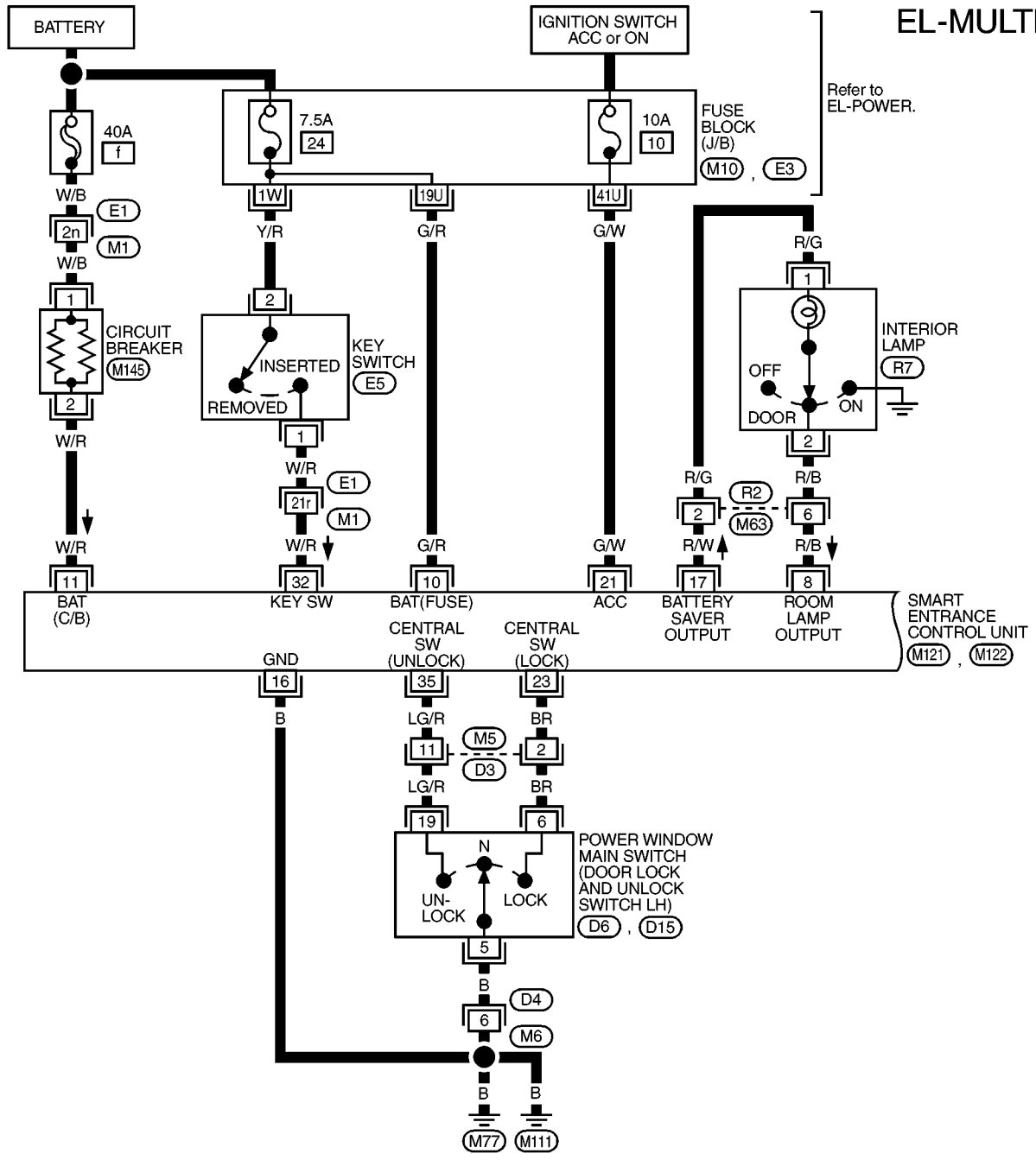
MEL853L

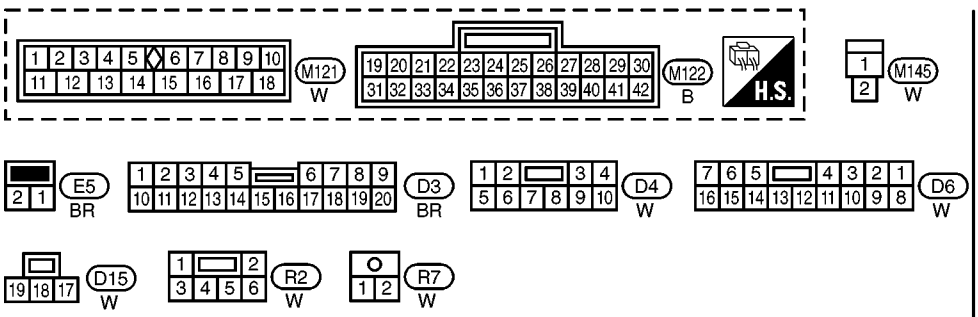
Wiring Diagram — MULTI —

NAEL0114

FIG. 1

NAEL0114S01





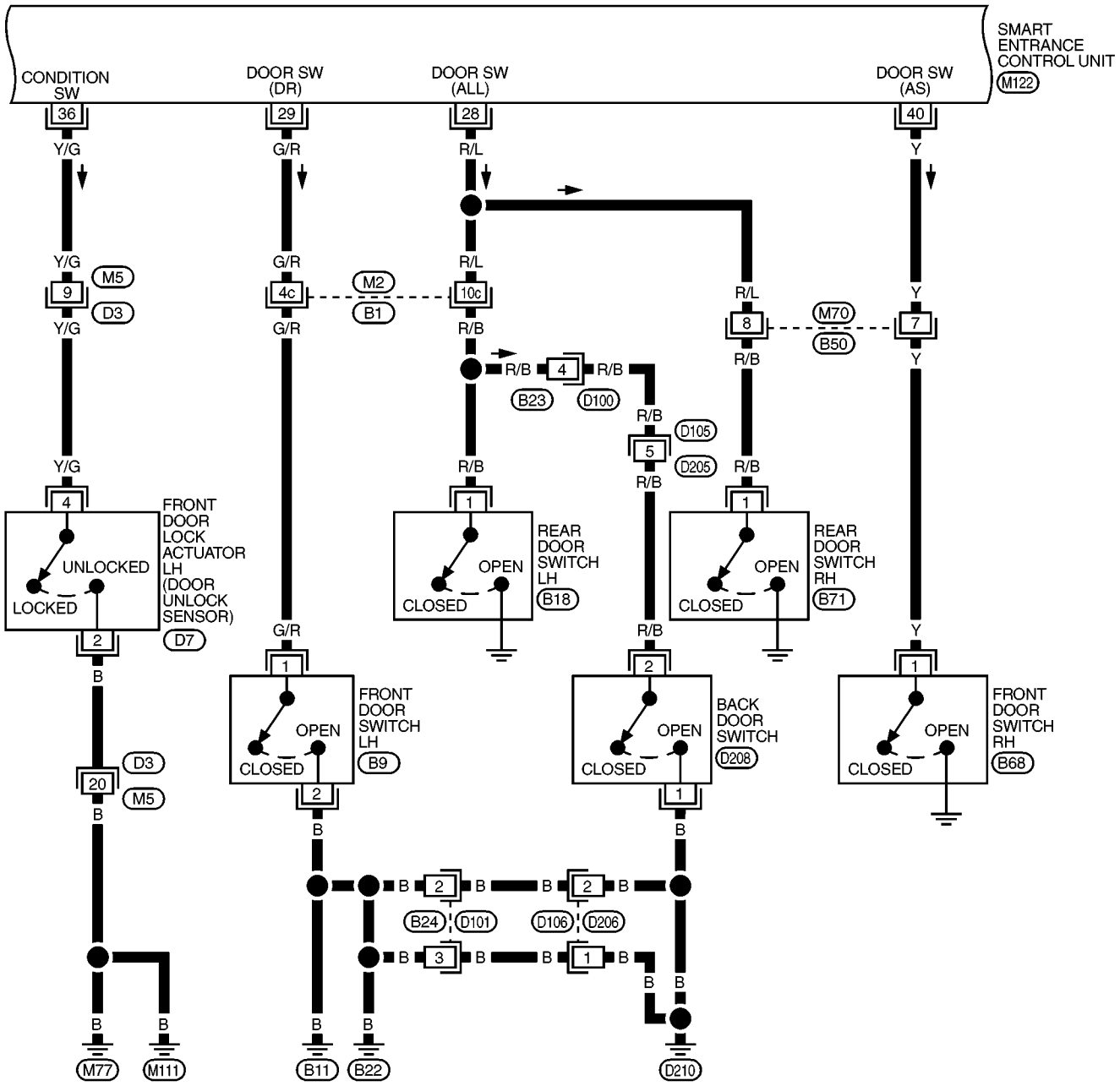
REFER TO THE FOLLOWING.
E1 - SUPER MULTIPLE JUNCTION (SMJ)
M10 , E3 - FUSE BLOCK - JUNCTION BOX (J/B)

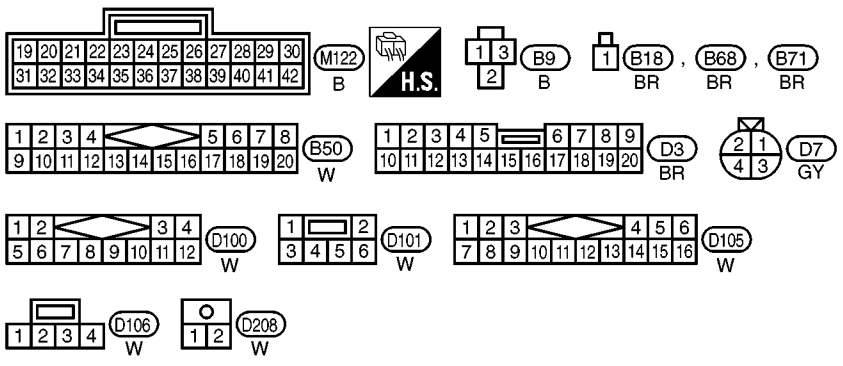
MEL854L

FIG. 2

NAEL0114S02

EL-MULTI-02



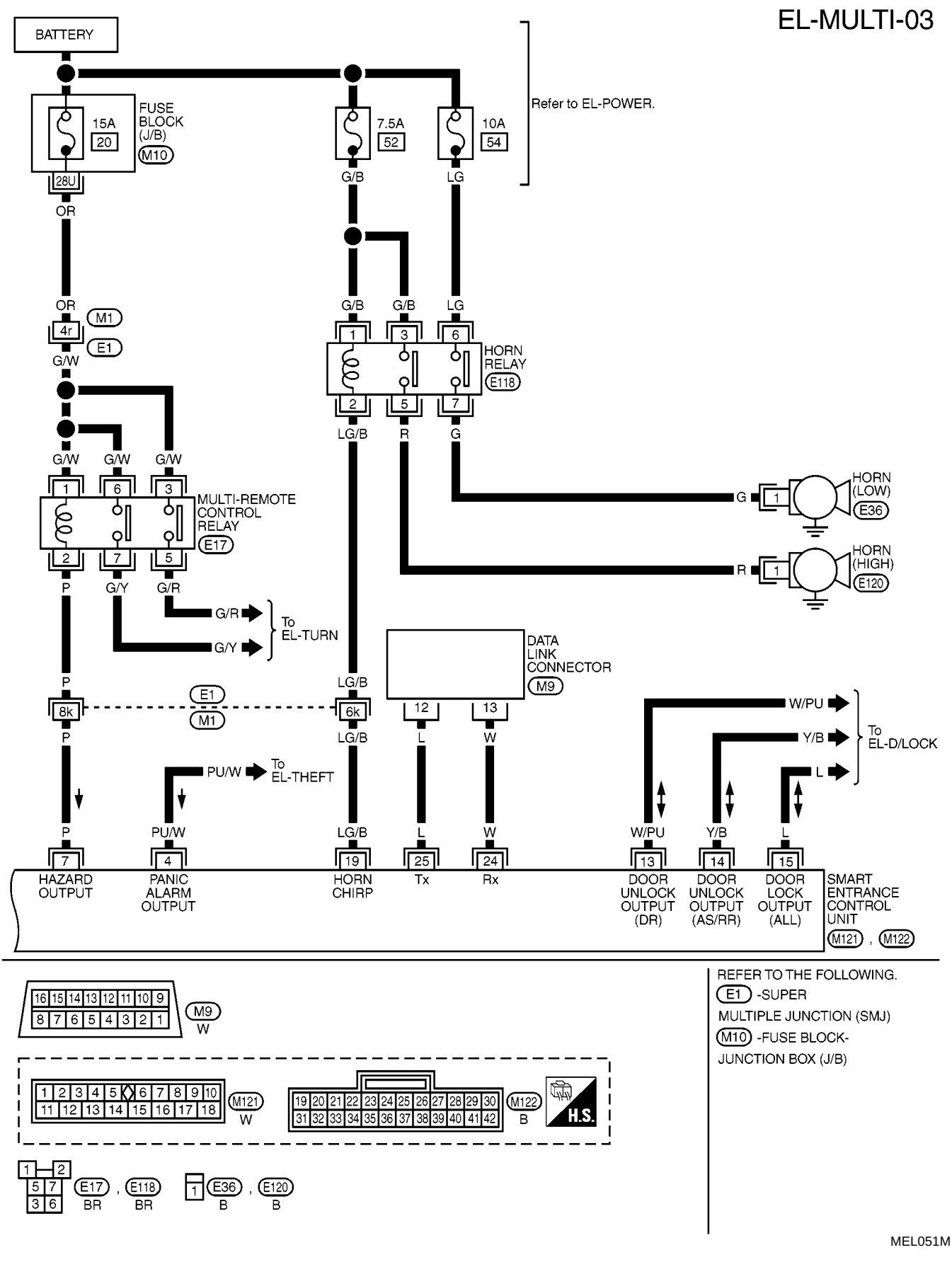


REFER TO THE FOLLOWING.
(B1) -SUPER MULTIPLE JUNCTION (SMJ)

MEL855L

FIG. 3

NAEL0114S03



Trouble Diagnoses

NAEL0115

SYMPTOM CHART

NAEL0115S01

NOTE:

- Always check remote controller battery before replacing remote controller.
- The panic alarm operation of multi-remote control system does not activate with the ignition key inserted in the ignition key cylinder.

Symptom	Diagnoses/service procedure	Reference page (EL-)
All function of multi-remote control system do not operate.	1. Remote controller battery check	296
	2. Power supply and ground circuit for control unit check	297
	3. Replace romote controller. Refer to ID Code Entry Procedure.	309
The new ID of remote controller cannot be entered.	1. Remote controller battery check	296
	2. Key switch (insert) check	300
	3. Door switch check	299
	4. Door lock/unlock switch LH check	301
	5. Power supply and ground circuit for control unit check	297
	6. Replace romote controller. Refer to ID Code Entry Procedure.	309
Door lock or unlock does not function. (If the power door lock system does not operate manually, check power door lock system. Refer to EL-279.)	1. Replace remote controller. Refer to ID Code Entry Procedure.	309
Hazard and horn reminder does not activate properly when pressing lock or unlock button of remote controller.	1. Harzard reminder check	303
	2. Horn reminder check* *: Horn chirp can be activated or deactivated. First check the horn chirp setting. Refer to “System Description”, EL-288.	305
	3. Door switch check	299
	4. Replace remote controller. Refer to ID Code Entry Procedure.	309
Interior lamp operation does not activate properly.	1. Interior room lamp operation check	306
	2. Door switch check	299
	3. Front LH door unlock sensor check	302
Panic alarm (horn and headlamp) does not activate when panic alarm button is continuously pressed.	1. Theft warning operation check. Refer to “PRELIMINALY CHECK” in “THEFT WARNING SYSTEM”.	328
	2. Key switch (insert) check	300
	3. Replace remote controller. Refer to ID Code Entry Procedure.	309

REMOTE CONTROLLER BATTERY CHECK

=NAEL0115S02

1	CHECK REMOTE CONTROLLER BATTERY

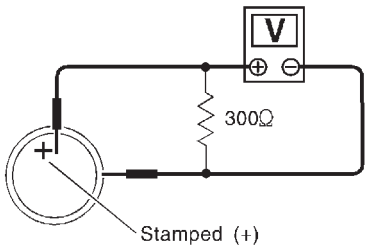
Remove battery (refer to EL-311) and measure voltage across battery positive and negative terminals, (+) and (−).

Voltage [V]:

2.5 - 3.0

NOTE:

Remote controller does not function if battery is not set correctly.



SEL277V

OK or NG

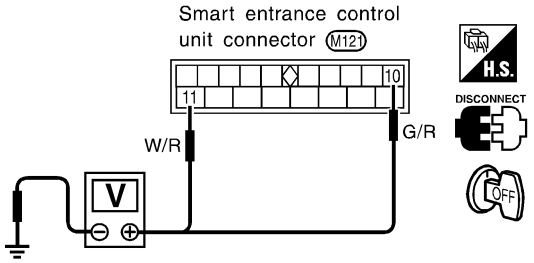
OK	▶	Check remote controller battery terminals for corrosion or damage.
NG	▶	Replace battery.

POWER SUPPLY AND GROUND CIRCUIT CHECK

=NAEL0115S04

1	CHECK MAIN POWER SUPPLY CIRCUIT FOR CONTROL UNIT

1. Disconnect connector from control unit.
2. Check voltage between smart entrance control unit terminal 10 or 11 and ground.



Battery voltage should exist.

SEL320X

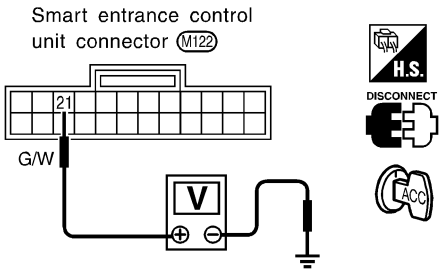
Refer to wiring diagram in EL-292.

OK or NG

OK	▶	GO TO 2.
NG	▶	**Check the following.** ● 40A fusible link (letter **f**, located in fuse and fusible link box) ● 7.5A fuse [No. 24, located in fuse block (J/B)] ● M145 circuit breaker ● Harness for open or short between smart entrance control unit and fuse

2	CHECK IGNITION SWITCH "ACC" CIRCUIT

1. Disconnect smart entrance control unit connector.
2. Check voltage between control unit terminal 21 and ground while ignition switch is "ACC".



Battery voltage should exist.

SEL321X

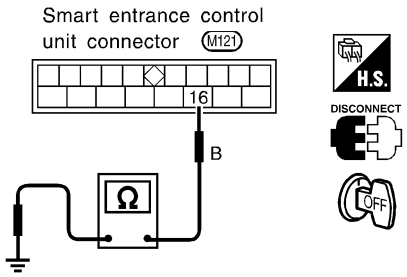
Refer to wiring diagram in EL-292.

OK or NG

OK	▶	GO TO 3.
NG	▶	**Check the following.** ● 10A fuse [No. 10, located in fuse block (J/B)] ● Harness for open or short between smart entrance control unit and fuse

3	CHECK GROUND CIRCUIT FOR CONTROL UNIT

Check continuity between terminal 16 and ground.



Continuity should exist.

SEL322X

Refer to wiring diagram in EL-292.

OK or NG

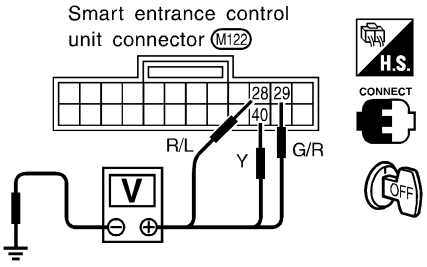
OK	▶	Power supply and ground circuits are OK.
NG	▶	Check ground harness.

DOOR SWITCH CHECK

=NAEL0115S05

1 CHECK DOOR SWITCH INPUT SIGNAL

Check voltage between smart entrance control unit terminals 28, 29 or 40 and ground.



	Terminals (+)	Terminals (−)	Condition	Voltage [V]
Front LH door switch	29	ground	Open	0
			Closed	Approx. 5
Front RH door switch	40	ground	Open	0
			Closed	Approx. 5
Rear and back door switches	28	ground	Open	0
			Closed	Approx. 5

SEL305X

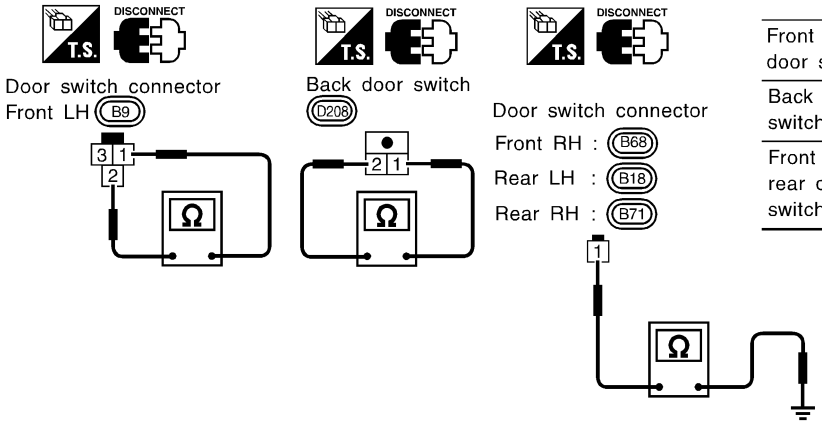
Refer to wiring diagram in EL-293.

OK or NG

OK	▶	Door switch is OK.
NG	▶	GO TO 2.

2 CHECK DOOR SWITCH

1. Disconnect door switch connector.
2. Check continuity between door switch terminals.



	Terminals	Condition	Continuity
Front LH door switch	1 - 2	Closed	No
		Open	Yes
Back door switch	1 - 2	Closed	No
		Open	Yes
Front RH and rear door switches	1 - ground	Closed	No
		Open	Yes

SEL306X

OK or NG

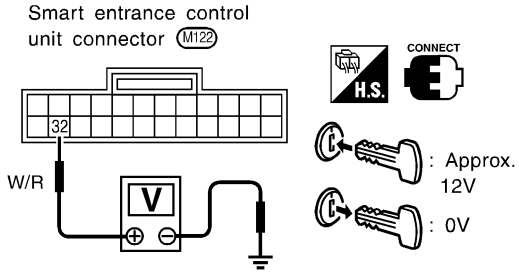
OK	▶	**Check the following.** • Door switch ground circuit (Front, back door) or door switch ground condition • Harness for open or short between smart entrance control unit and door switch
NG	▶	Replace door switch.

KEY SWITCH (INSERT) CHECK

=NAEL0115S07

1	CHECK KEY SWITCH INPUT SIGNAL

Check voltage between smart entrance control unit terminal 32 and ground.



Voltage [V]:
Condition of key switch: Key is inserted.
Approx. 12
Condition of key switch: Key is removed.
0

SEL307X

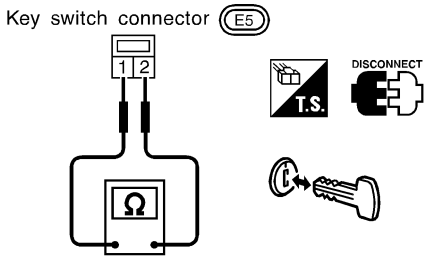
Refer to wiring diagram in EL-292.

OK or NG

OK	▶	Key switch is OK.
NG	▶	GO TO 2.

2	CHECK KEY SWITCH (INSERT)

Check continuity between terminals 1 and 2.



Continuity:
Condition of key switch: Key is inserted.
Yes
Condition of key switch: Key is removed.
No

SEL308X

OK or NG

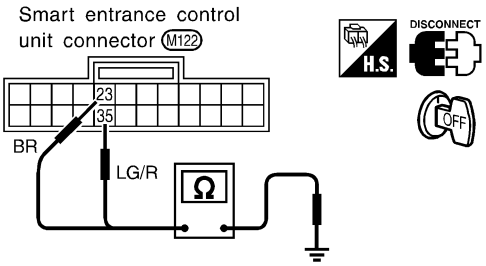
OK	▶	**Check the following.** ● 7.5A fuse [No. 24, located in fuse block (J/B)] ● Harness for open or short between key switch and fuse ● Harness for open or short between smart entrance control unit and key switch
NG	▶	Replace key switch.

DOOR LOCK/UNLOCK SWITCH LH CHECK

=NAEL0115S10

1 CHECK DOOR LOCK/UNLOCK SWITCH INPUT SIGNAL

1. Disconnect smart entrance control unit connector.
2. Check continuity between control unit terminal 23 or 35 and ground.



Terminals	Door lock/unlock switch (LH or RH) condition	Continuity
23 - ground	Lock	Yes
	N and Unlock	No
35 - ground	Unlock	Yes
	N and Lock	No

SEL309X

Refer to wiring diagram in EL-292.

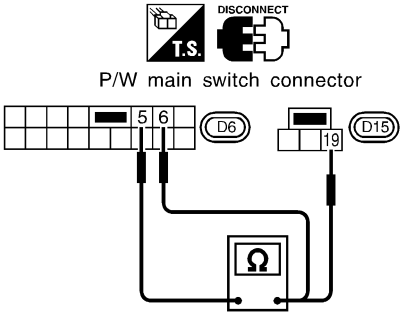
OK or NG

OK	▶	Door lock/unlock switch is OK.
NG	▶	GO TO 2.

2 CHECK DOOR LOCK/UNLOCK SWITCH

1. Disconnect door lock/unlock switch connector.
2. Check continuity between each door lock/unlock switch terminals.

- Power window main switch (Door lock/unlock switch LH)



Condition	Terminals		
	5	19	6
Lock	○		○
N	No continuity		
Unlock	○	○	

SEL310X

OK or NG

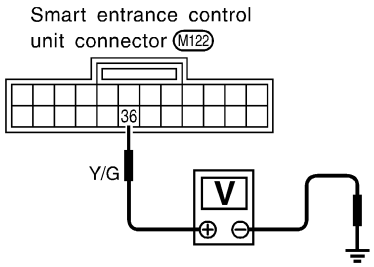
OK	▶	**Check the following.** • Ground circuit for door lock/unlock switch • Harness for open or short between door lock/unlock switch and smart entrance control unit connector
NG	▶	Replace door lock/unlock switch.

FRONT LH DOOR UNLOCK SENSOR CHECK

=NAEL0115S06

1	CHECK FRONT LH DOOR UNLOCK SENSOR INPUT SIGNAL

Check voltage between smart entrance control unit terminal 36 and ground.





	Terminals (+)	Terminals (–)	Condition	Voltage [V]
Front LH door	36	Ground	Locked	Approx. 5
			Unlocked	0

SEL323X

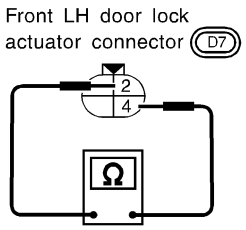
Refer to wiring diagram in EL-293.

OK or NG

OK	▶	Door unlock sensor is OK.
NG	▶	GO TO 2.

2	CHECK FRONT LH DOOR UNLOCK SENSOR

1. Disconnect front LH door unlock sensor connector.
2. Check continuity between door unlock sensor terminals.





Continuity:
Condition: Locked
No
Condition: Unlocked
Yes

SEL324X

OK or NG

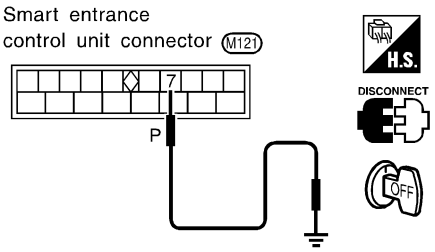
OK	▶	**Check the following.** ● Door unlock sensor ground circuit ● Harness for open or short between smart entrance control unit and door unlock sensor
NG	▶	Replace door unlock sensor.

HAZARD REMINDER CHECK

=NAEL0115S08

1	CHECK HAZARD INDICATOR	
Check if hazard indicator flashes with hazard switch. **Does hazard indicator operate?**		
Yes	▶	GO TO 2.
No	▶	Check "hazard indicator" circuit.

2	CHECK HAZARD REMINDER OPERATION	
1. Disconnect smart entrance control unit connector. 2. Apply ground to control unit terminal 7.		



Hazard indicater illuminate.

SEL325X

Refer to wiring diagram in EL-294.

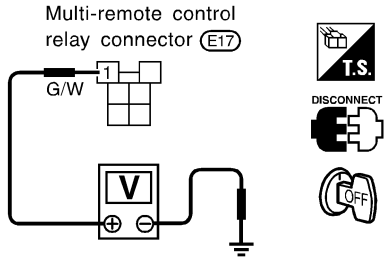
OK or NG

OK	▶	Replace smart entrance control unit.
NG	▶	GO TO 3.

3	CHECK MULTI-REMOTE CONTROL RELAY	
Check multi-remote control relay. **OK or NG**		
OK	▶	GO TO 4.
NG	▶	Replace.

4	CHECK POWER SUPPLY FOR MULTI-REMOTE CONTROL RELAY

1. Disconnect multi-remote control relay connector.
2. Check voltage between terminal 1 and ground.



Battery voltage should exist.

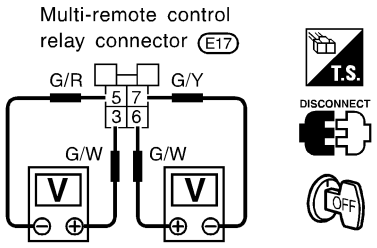
SEL326X

OK or NG

OK	▶	GO TO 5.
NG	▶	**Check the following.** ● 15A fuse [No. 20, located in fuse block (J/B)] ● Harness for open or short between multi-remote control relay and fuse

5	CHECK MULTI-REMOTE CONTROL RELAY CIRCUIT

1. Disconnect multi-remote control relay connector.
2. Check voltage between terminals 3 and 5.
3. Check voltage between terminals 6 and 7.



Battery voltage should exist.

SEL327X

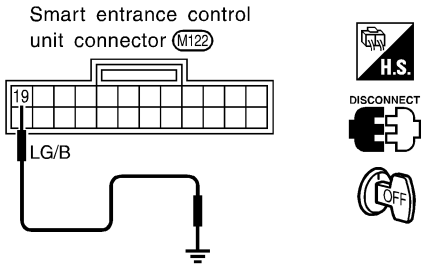
OK or NG

OK	▶	Check harness for open or short between smart entrance control unit and multi-remote control relay.
NG	▶	**Check the following.** ● Harness for open or short between multi-remote control relay and fuse ● Harness for open or short between multi-remote control relay and turn signal lamps

HORN REMINDER CHECK

=NAEL0115S11

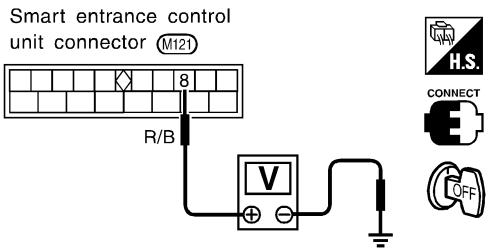
1	CHECK HORN	
Check if horn sounds with horn switch. **Does horn operate?**		
Yes	▶	GO TO 2.
No	▶	Check horn circuit.

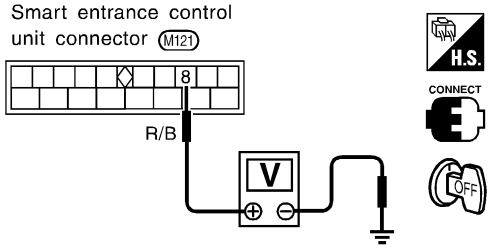
2	CHECK HORN REMINDER OPERATION	
1. Disconnect smart entrance control unit connector. 2. Apply ground to smart entrance control unit terminal 19.  **Horn should sound.** SEL328X Refer to wiring diagram in EL-294. **OK or NG**		
OK	▶	Replace smart entrance control unit.
NG	▶	Check harness for open or short between smart entrance control unit and horn relay.

INTERIOR ROOM LAMP OPERATION CHECK

=NAEL0115S09

1	CHECK INTERIOR ROOM LAMP	
Check if the interior room lamp switch is in the "ON" position and the lamp illuminates. **Does interior room lamp illuminate?**		
Yes	▶	GO TO 2.
No	▶	**Check the following.** ● Harness for open or short between smart entrance control unit and interior room lamp ● Interior room lamp

2	CHECK INTERIOR ROOM LAMP CIRCUIT	
When interior room lamp switch is "DOOR" position, check voltage across smart entrance control unit terminal 8 and ground.  **Battery voltage should exist.** SEL329X Refer to wiring diagram in EL-292. **OK or NG**		
OK	▶	GO TO 3.
NG	▶	Repair harness between smart entrance control unit and interior room lamp.

3	CHECK CONTROL UNIT OUTPUT	
Push unlock button of remote controller with key removed and all doors closed, and check voltage across smart entrance control unit terminal 8 and ground.  **Voltage [V]:** **Unlock button is pushed.** **0 (For approx. 30 seconds.)** **Unlock button is not pushed.** **Battery voltage** SEL330X **OK or NG**		
OK	▶	Check system again.
NG	▶	Replace smart entrance control unit.

ID Code Entry Procedure

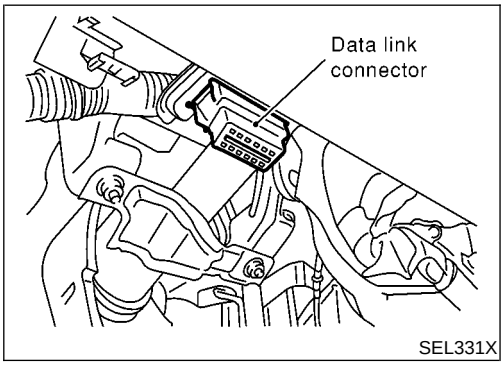
=NAEL0222

REMOTE CONTROLLER ID SET UP WITH CONSULT-II

NAEL0222S01

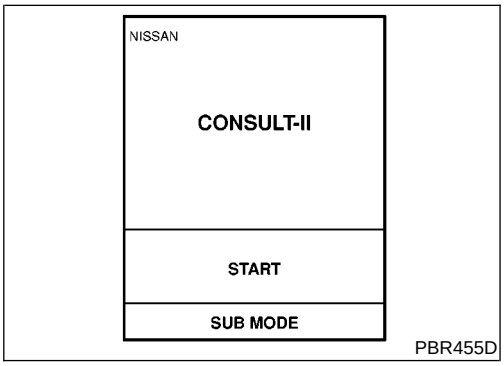
NOTE:

If a remote controller is lost, the ID code of the lost remote controller must be erased to prevent unauthorized use. When the ID code of a lost remote controller is not known, all controller ID codes should be erased. After all ID codes are erased, the ID codes of all remaining and/or new remote controllers must be re-registered.



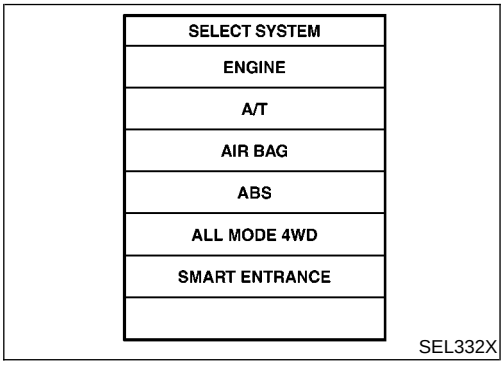
SEL331X

1. Turn ignition switch “OFF”.
2. Connect CONSULT-II to the data link connector.



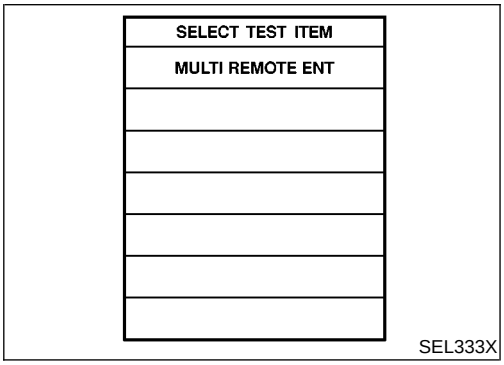
PBR455D

3. Turn ignition switch “ON”.
4. Touch “START”.



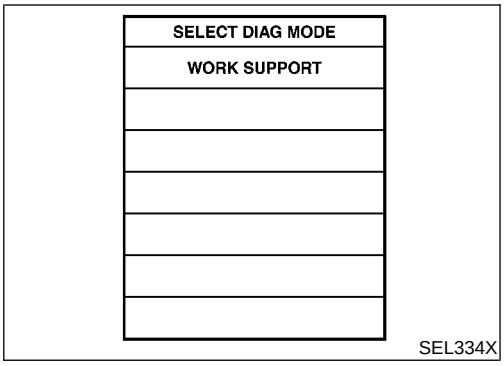
SEL332X

5. Touch “SMART ENTRANCE”.

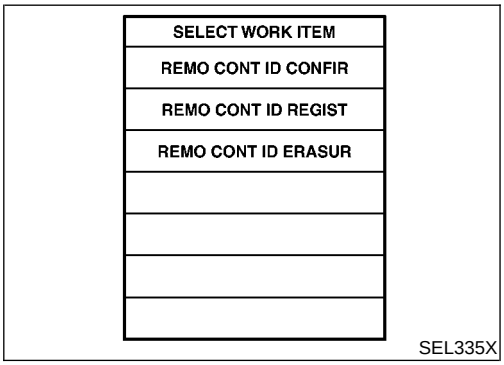


SEL333X

6. Touch “MULTI REMOTE ENT”.



7. Touch "WORK SUPPORT".



8. The items are shown on the figure at left can be set up.

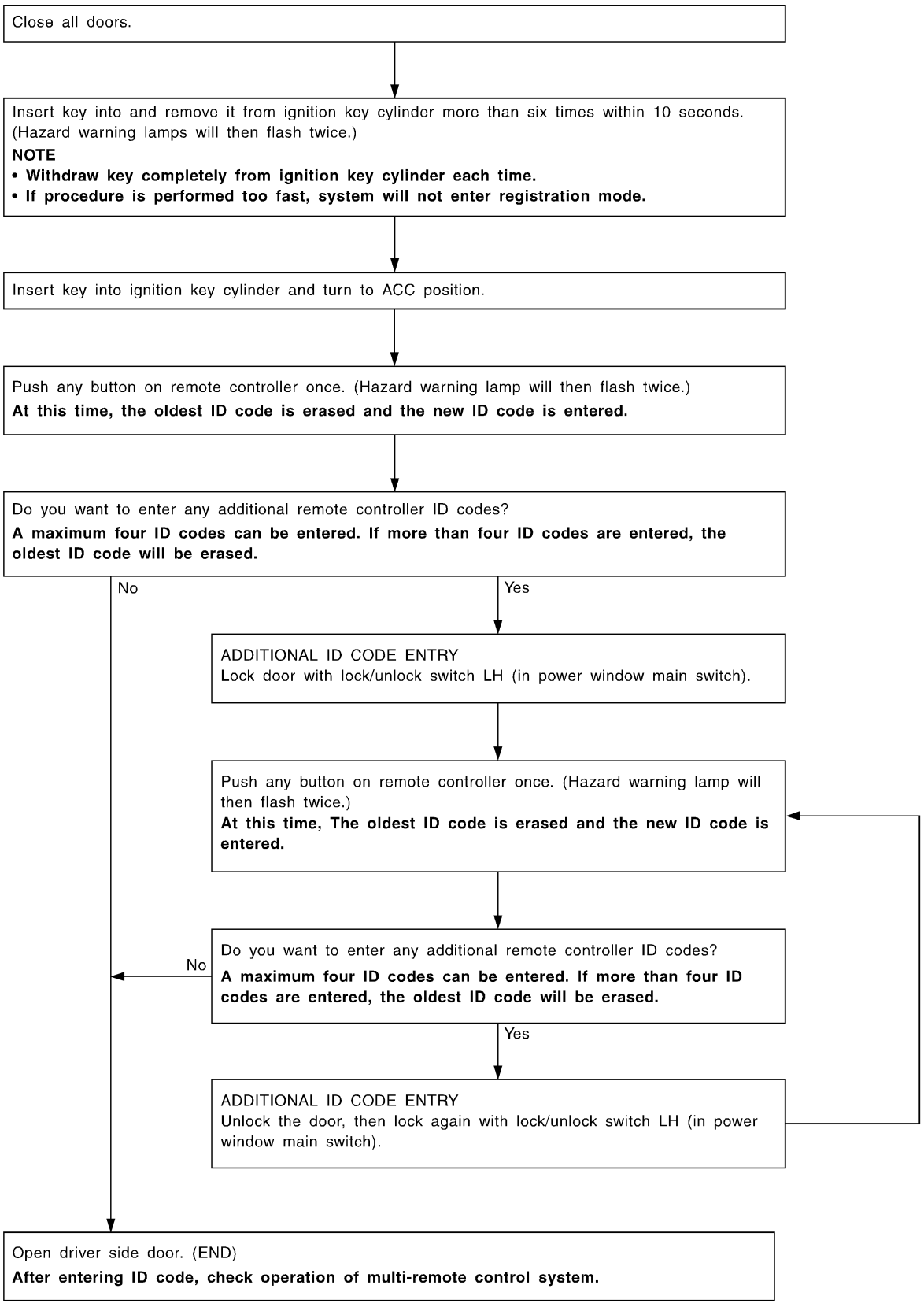
- "REMO CONT ID CONFIR"
  Use this mode to confirm if a remote controller ID code is registered or not.
- "REMO CONT ID REGIST"
  Use this mode to register a remote controller ID code.

NOTE:
Register the ID code when remote controller or smart entrance control unit is replaced, or when additional remote controller is required.

- "REMO CONT ID ERASUR"
  Use this mode to erase a remote controller ID code.

REMOTE CONTROLLER ID SET UP WITHOUT CONSULT-II

NAEL0222S03



SEL332WA

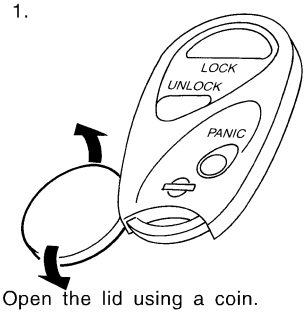
NOTE:

- If a remote controller is lost, the ID code of the lost remote controller must be erased to prevent unauthorized use. A specific ID code can be erased with CONSULT-II. However, when the ID code of a lost remote controller is not known, all controller ID codes should be erased. After all ID codes are erased, the ID codes of all remaining and/or new remote controllers must be re-registered.
  To erase all ID codes in memory, register one ID code (remote controller) four times. After all ID codes are erased, the ID codes of all remaining and/or new remote controllers must be re-registered.
- When registering an additional remote controller, the existing ID codes in memory may or may not be erased. If four ID codes are stored in memory, when an additional code is registered, only the oldest code is erased. If less than four ID codes are stored in memory, when an additional ID code is registered, the new ID code is added and no ID codes are erased.
- If you need to activate more than two additional new remote controllers, repeat the procedure "Additional ID code entry" for each new remote controller.
- Entry of maximum four ID codes is allowed. When more than four ID codes are entered, the oldest ID code will be erased.
- Even if the same ID code that is already in the memory is input, the same ID code can be entered. The code is counted as an additional code.

Remote Controller Battery Replacement

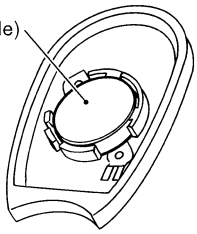
NAEL0118

1.



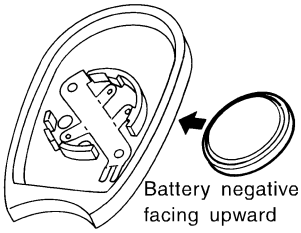
Open the lid using a coin.

2.



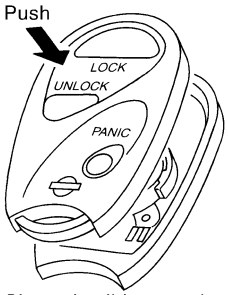
Remove the battery.

3.



Insert the new battery.

4.



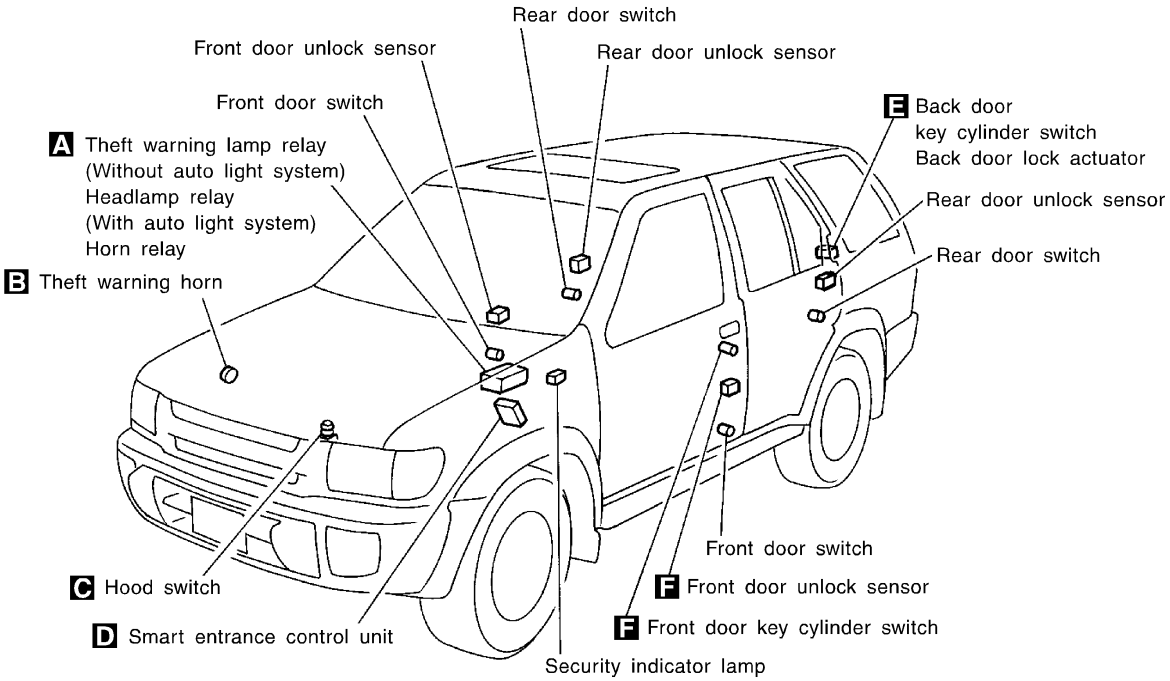
Close the lid securely.
Push the remote controller button two or three times to check its operation.

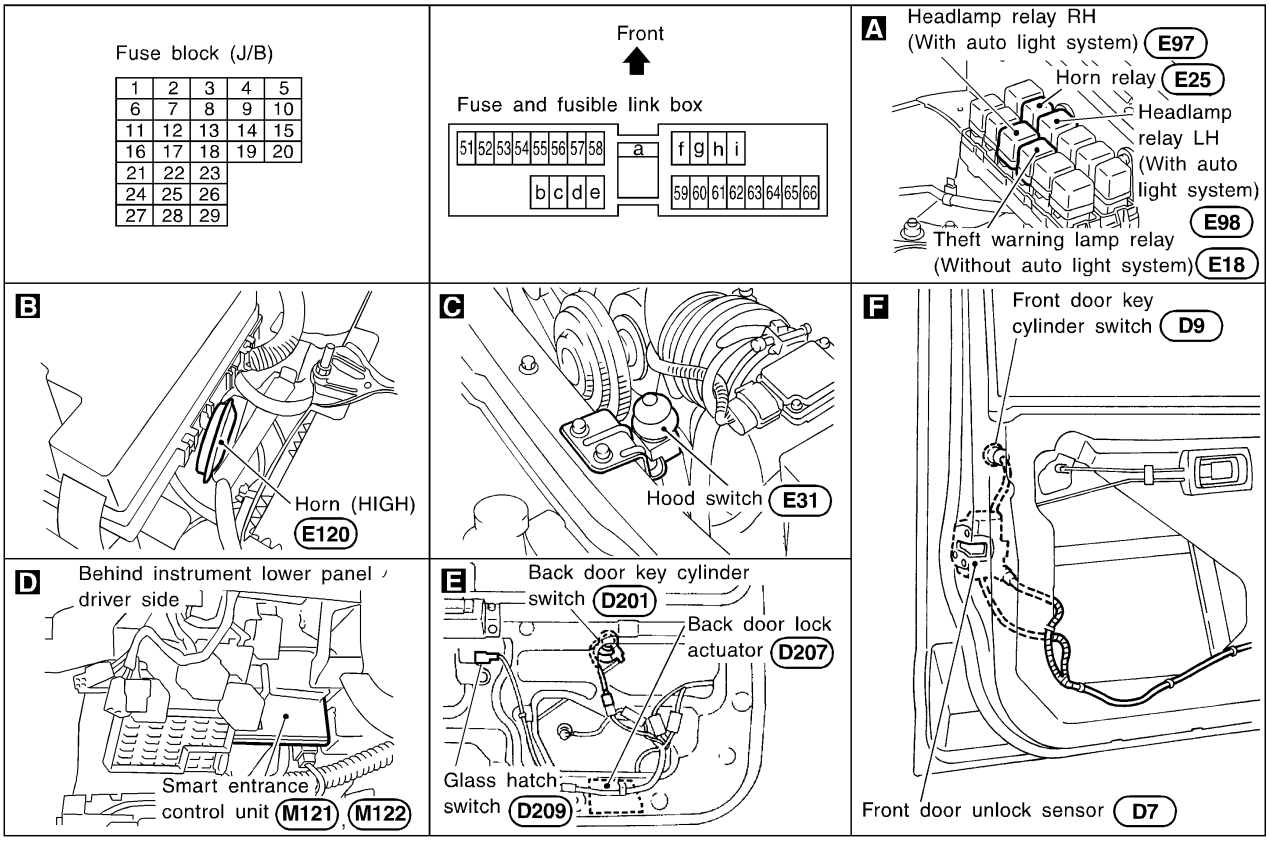
NOTE:
- Be careful not to touch the circuit board or battery terminal.
- The remote controller is water-resistant. However, if it does get wet, immediately wipe it dry.

SEL732W

Component Parts and Harness Connector Location

NAEL0119





SEL572X

System Description

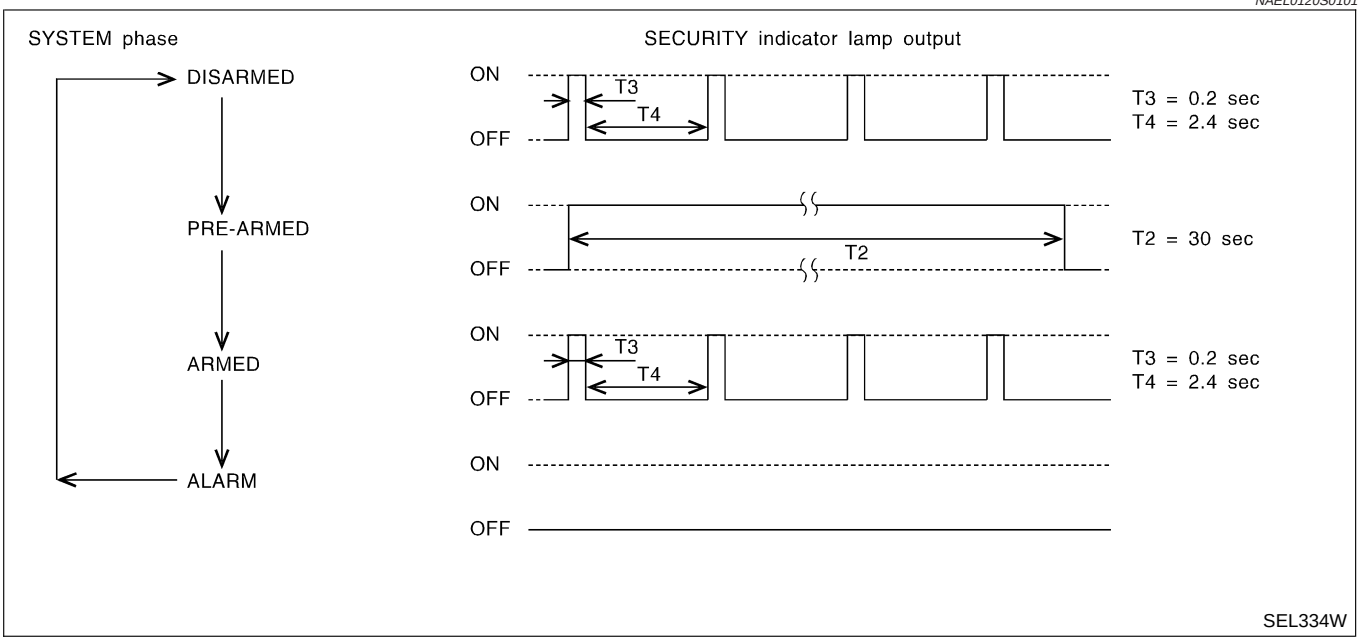
NAEL0120

DESCRIPTION

NAEL0120S01

1. Operation Flow

NAEL0120S0101



2. Setting The Theft Warning System

NAEL0120S0102

Initial condition

1) Close all doors.
2) Close hood and glass hatch.

Disarmed phase

When the theft warning system is in the disarmed phase, the security indicator lamp blinks every 2.6 seconds.

Pre-armed phase and armed phase

The theft warning system turns into the “pre-armed” phase when hood, glass hatch and all doors are closed and the doors are locked by key or multi-remote controller. (The security indicator lamp illuminates.)
After about 30 seconds, the system automatically shifts into the “armed” phase (the system is set). (The security indicator lamp blinks every 2.6 seconds.)

3. Canceling The Set Theft Warning System

NAEL0120S0103

When the following 1) or 2) operation is performed, the armed phase is canceled.

1) Unlock the doors with the key or multi-remote controller.
2) Open the glass hatch with the key.

4. Activating The Alarm Operation of The Theft Warning System

NAEL0120S0104

Make sure the system is in the armed phase. (The security indicator lamp blinks every 2.6 seconds.)
When any of the following operations is performed, the system sounds the horns and flashes the headlamps for about 50 seconds.

1) Engine hood, glass hatch or any door is opened before unlocking door with key or multi-remote controller.
2) Door is unlocked without using key or multi-remote controller.
3) Disconnecting and connecting the battery connector before canceling armed phase.

POWER SUPPLY AND GROUND

NAEL0120S07

Power is supplied at all times

- through 7.5A fuse [No. 24, located in the fuse block (J/B)]
- to security indicator lamp terminal 1, and
- to smart entrance control unit terminal 10.

With the ignition switch in the ON or START position, power is supplied

- through 7.5A fuse [No. 11, located in the fuse block (J/B)]

- to smart entrance control unit terminal 33.

With the ignition switch in the ACC or ON position, power is supplied

- through 10A fuse [No. 10, located in the fuse block (J/B)]
- to smart entrance control unit terminal 21.

Ground is supplied

- to smart entrance control unit terminal 16
- through body grounds M77 and M111.

INITIAL CONDITION TO ACTIVATE THE SYSTEM

NAEL0120S02

The operation of the theft warning system is controlled by the doors, hood and glass hatch.
To activate the theft warning system, the smart entrance control unit must receive signals indicating the doors, hood and glass hatch are closed and the doors are locked.
When a door is open, smart entrance control unit terminal 28, 29 or 40 receives a ground signal from each door switch.
When a door is unlocked, smart entrance control unit terminal 26, 36 or 37 receives a ground signal from terminal 4 of each door unlock sensor or terminal 1 of back door unlock sensor.
When the hood is open, smart entrance control unit terminal 27 receives a ground signal

- from terminal 1 of the hood switch
- through body grounds E13 and E41.

When the glass hatch is open, smart entrance control unit terminal 38 receives a ground signal

- from terminal 1 of the glass hatch switch
- through body grounds D210, B11 and B22.

When the doors are locked with key or multi-remote controller and none of the described conditions exist, the theft warning system will automatically shift to armed mode.

THEFT WARNING SYSTEM ACTIVATION (WITH KEY OR REMOTE CONTROLLER USED TO LOCK DOORS)

NAEL0120S03

If the key is used to lock doors, terminal 41 receives a ground signal

- from terminal 3 of the key cylinder switch LH
- through back grounds M77 and M111
- from terminal 1 of the back door key cylinder switch
- through body grounds B11, B22 and D210.

If this signal or lock signal from remote controller is received by the smart entrance control unit, the theft warning system will activate automatically.
Once the theft warning system has been activated, smart entrance control unit terminal 31 supplies ground to terminal 2 of the security indicator lamp.
The security lamp will illuminate for approximately 30 seconds and then blink.
Now the theft warning system is in armed phase.

THEFT WARNING SYSTEM ALARM OPERATION

NAEL0120S04

The theft warning system is triggered by

- opening a door
- opening the hood or the glass hatch
- unlocking door without using the key or multi-remote controller.

Once the theft warning system is in armed phase, if the smart entrance control unit receives a ground signal at terminal 26, 36, 37 (door unlock sensor), 28, 29, 40 (door switch), 38 (glass hatch switch) or 27 (hood switch), the theft warning system will be triggered. The headlamps flash and the horn sounds intermittently.
Power is supplied at all times

- through 7.5A fuse (No. 52, located in fuse and fusible link box)
- to horn relay terminals 1 and 3 and
- to theft warning lamp relay terminal 1 (without auto light system)
- through 10A fuse (No. 54, located in fuse and fusible link box)
- to horn relay terminal 6.

When the theft warning system is triggered, ground is supplied intermittently

- from terminal 4 of the smart entrance control unit
- to headlamp relay LH and RH terminal 2 (with auto light system), or

- to theft warning lamp relay terminal 2 (without auto light system) and
- from terminal 19 of the smart entrance control unit
- to horn relay terminal 2.

The headlamps flash and the horn sounds intermittently.
The alarm automatically turns off after 50 seconds but will reactivate if the vehicle is tampered with again.

THEFT WARNING SYSTEM DEACTIVATION

NAEL0120S05

To deactivate the theft warning system, a door, the back door or the glass hatch must be unlocked with the key or remote controller.
When the key is used to unlock the door, smart entrance control unit terminal 30 receives a ground signal

- from terminal 1 of the LH key cylinder switch
- from terminal 2 of the back door key cylinder switch.

When the key is used to open the glass hatch, smart entrance control unit terminal 42 receives a ground signal from terminal 3 of the back door key cylinder switch.
When the smart entrance control unit receives either one of these signals or unlock signal from remote controller, the theft warning system is deactivated. (Disarmed phase)

PANIC ALARM OPERATION

NAEL0120S06

Multi-remote control system may or may not operate theft warning system (horn and headlamps) as required.
When the multi-remote control system is triggered, ground is supplied intermittently.

- from smart entrance control unit terminal 4
- to headlamp relay LH and RH terminal 2 (with auto light system), or
- to theft warning lamp relay terminal 2 (without auto light system) and
- from terminal 19 of the smart entrance control unit
- to horn relay terminal 2.

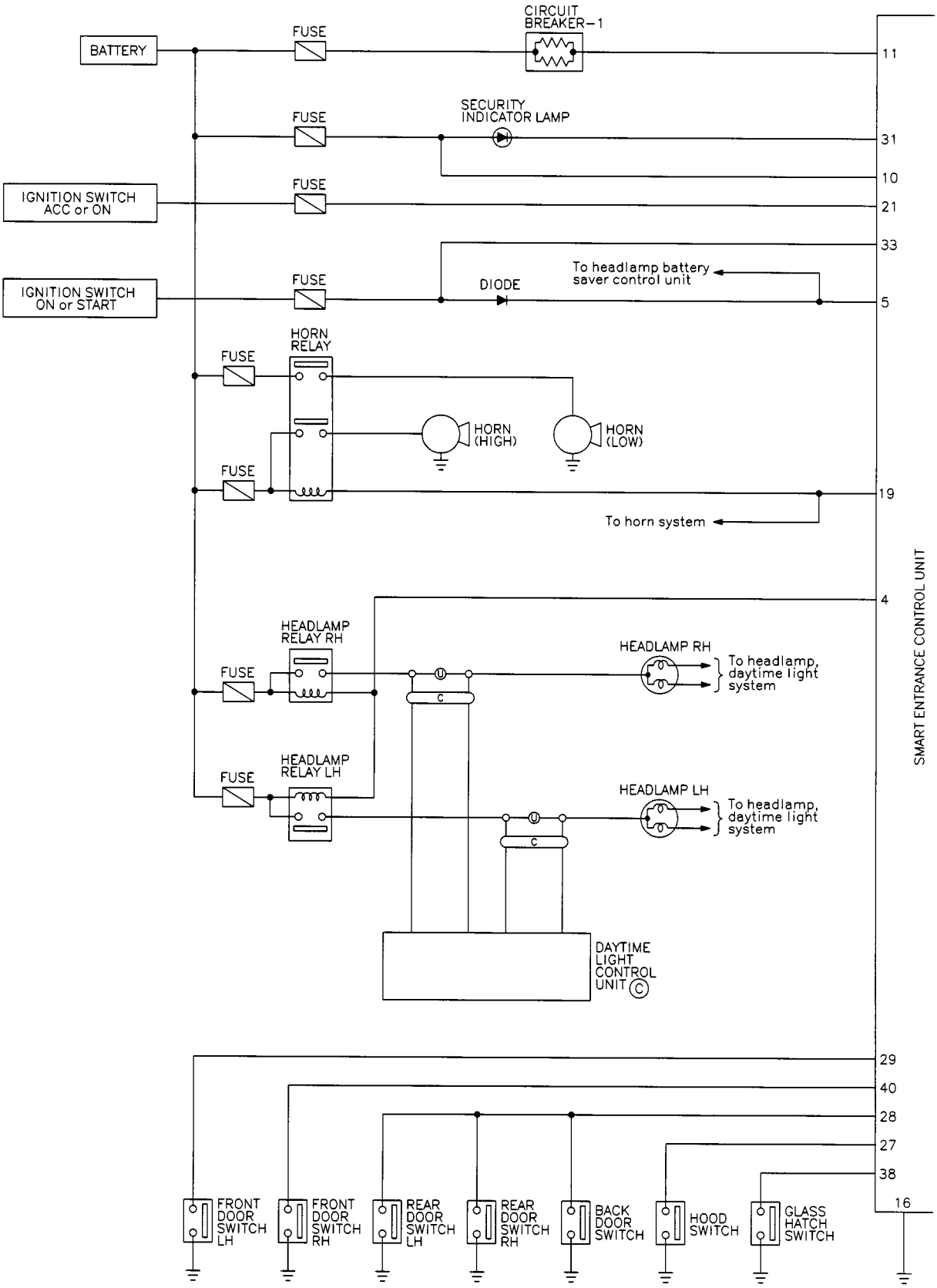
The headlamp flashes and the horn sounds intermittently.
The alarm automatically turns off after 30 seconds or when smart entrance control unit receives any signal from multi-remote controller.

Schematic

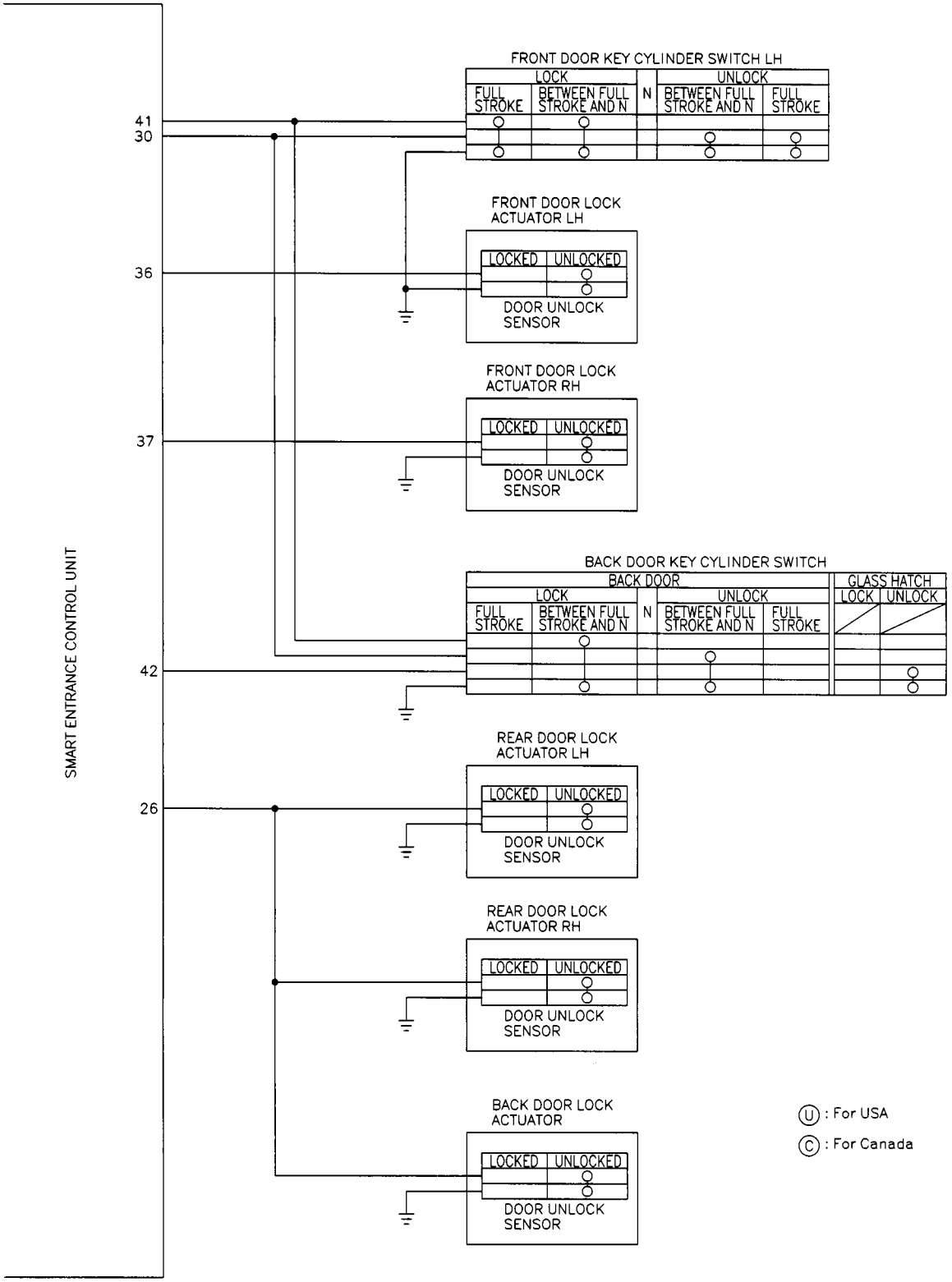
NAEL0121

WITH AUTO LIGHT SYSTEM

NAEL0121S01



MEL054M

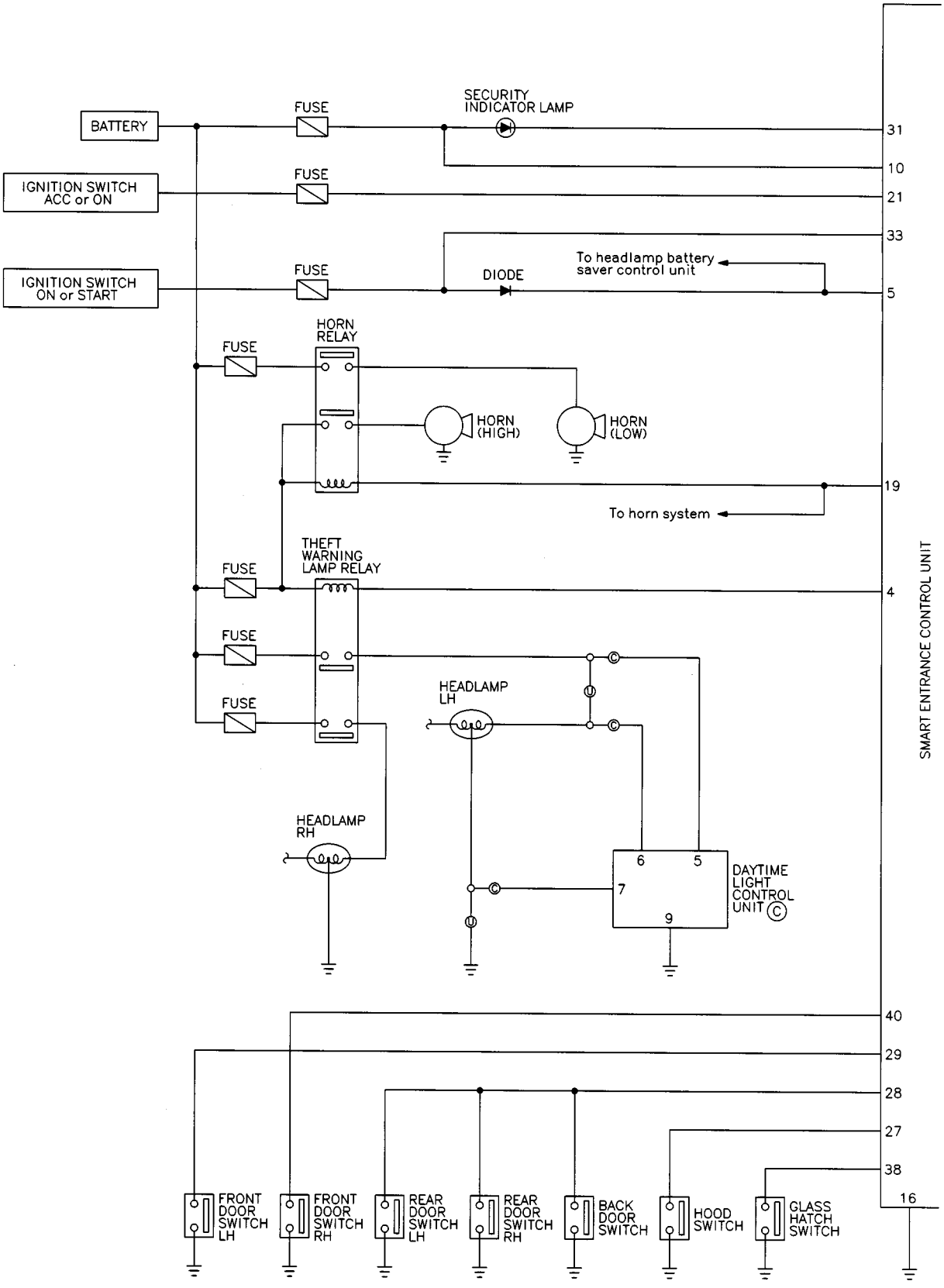

SMART ENTRANCE CONTROL UNIT
41
30
36
37
42
26
FRONT DOOR KEY CYLINDER SWITCH LH
LOCK
UNLOCK
FULL STROKE
BETWEEN FULL STROKE AND N
N
BETWEEN FULL STROKE AND N
FULL STROKE
FRONT DOOR LOCK ACTUATOR LH
LOCKED
UNLOCKED
DOOR UNLOCK SENSOR
FRONT DOOR LOCK ACTUATOR RH
LOCKED
UNLOCKED
DOOR UNLOCK SENSOR
BACK DOOR KEY CYLINDER SWITCH
BACK DOOR
LOCK
UNLOCK
FULL STROKE
BETWEEN FULL STROKE AND N
N
BETWEEN FULL STROKE AND N
FULL STROKE
GLASS HATCH
LOCK
UNLOCK
REAR DOOR LOCK ACTUATOR LH
LOCKED
UNLOCKED
DOOR UNLOCK SENSOR
REAR DOOR LOCK ACTUATOR RH
LOCKED
UNLOCKED
DOOR UNLOCK SENSOR
BACK DOOR LOCK ACTUATOR
LOCKED
UNLOCKED
DOOR UNLOCK SENSOR
Ⓤ : For USA
Ⓒ : For Canada

MEL055M

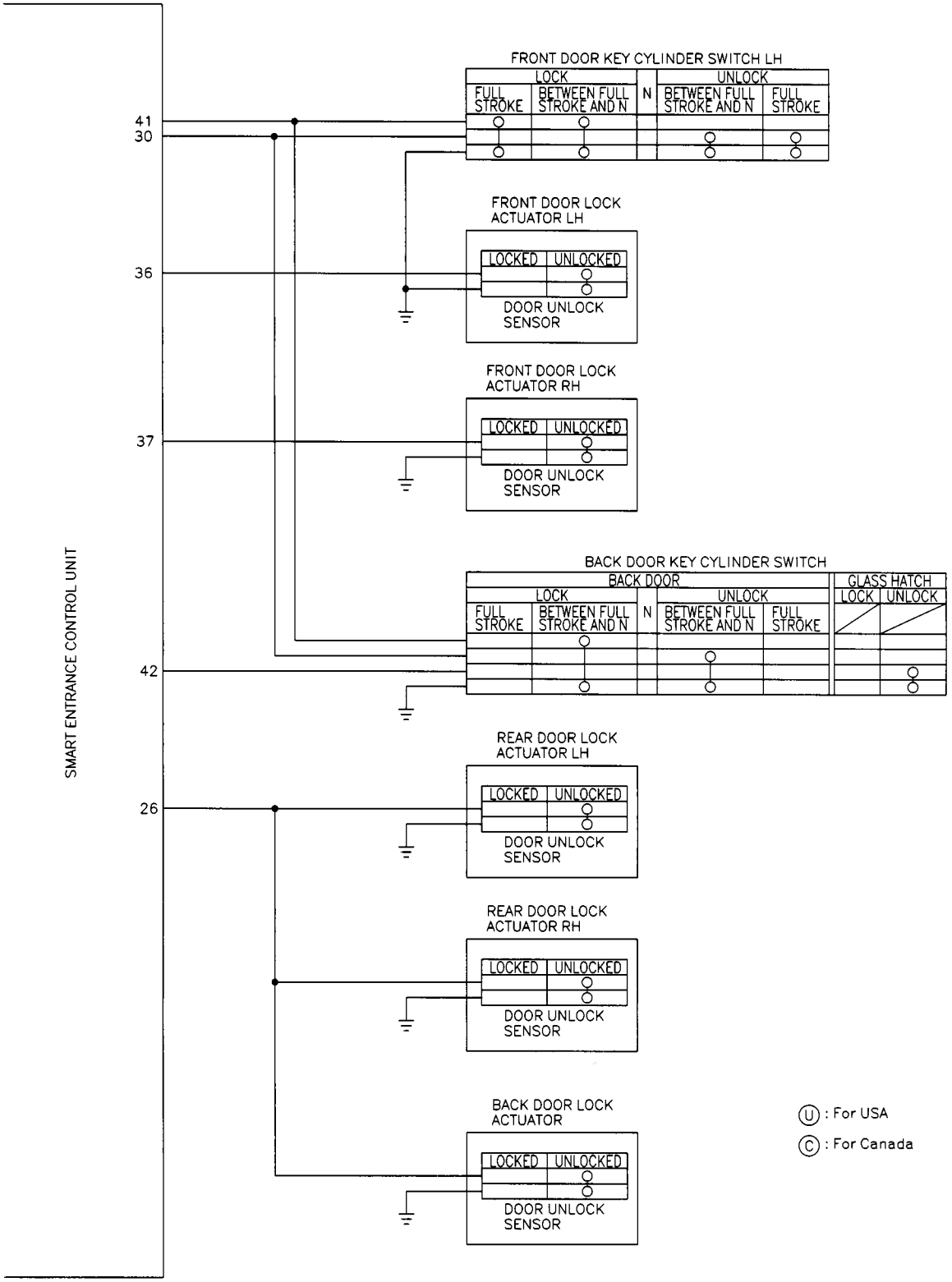
Schematic (Cont'd)

WITHOUT AUTO LIGHT SYSTEM

NAEL0121S02



MEL059M


SMART ENTRANCE CONTROL UNIT
41
30
36
37
42
26
FRONT DOOR KEY CYLINDER SWITCH LH
LOCK
FULL STROKE
BETWEEN FULL STROKE AND N
N
UNLOCK
BETWEEN FULL STROKE AND N
FULL STROKE
FRONT DOOR LOCK ACTUATOR LH
LOCKED
UNLOCKED
DOOR UNLOCK SENSOR
FRONT DOOR LOCK ACTUATOR RH
LOCKED
UNLOCKED
DOOR UNLOCK SENSOR
BACK DOOR KEY CYLINDER SWITCH
BACK DOOR
LOCK
FULL STROKE
BETWEEN FULL STROKE AND N
N
UNLOCK
BETWEEN FULL STROKE AND N
FULL STROKE
GLASS HATCH
LOCK
UNLOCK
REAR DOOR LOCK ACTUATOR LH
LOCKED
UNLOCKED
DOOR UNLOCK SENSOR
REAR DOOR LOCK ACTUATOR RH
LOCKED
UNLOCKED
DOOR UNLOCK SENSOR
BACK DOOR LOCK ACTUATOR
LOCKED
UNLOCKED
DOOR UNLOCK SENSOR
Ⓤ : For USA
Ⓒ : For Canada

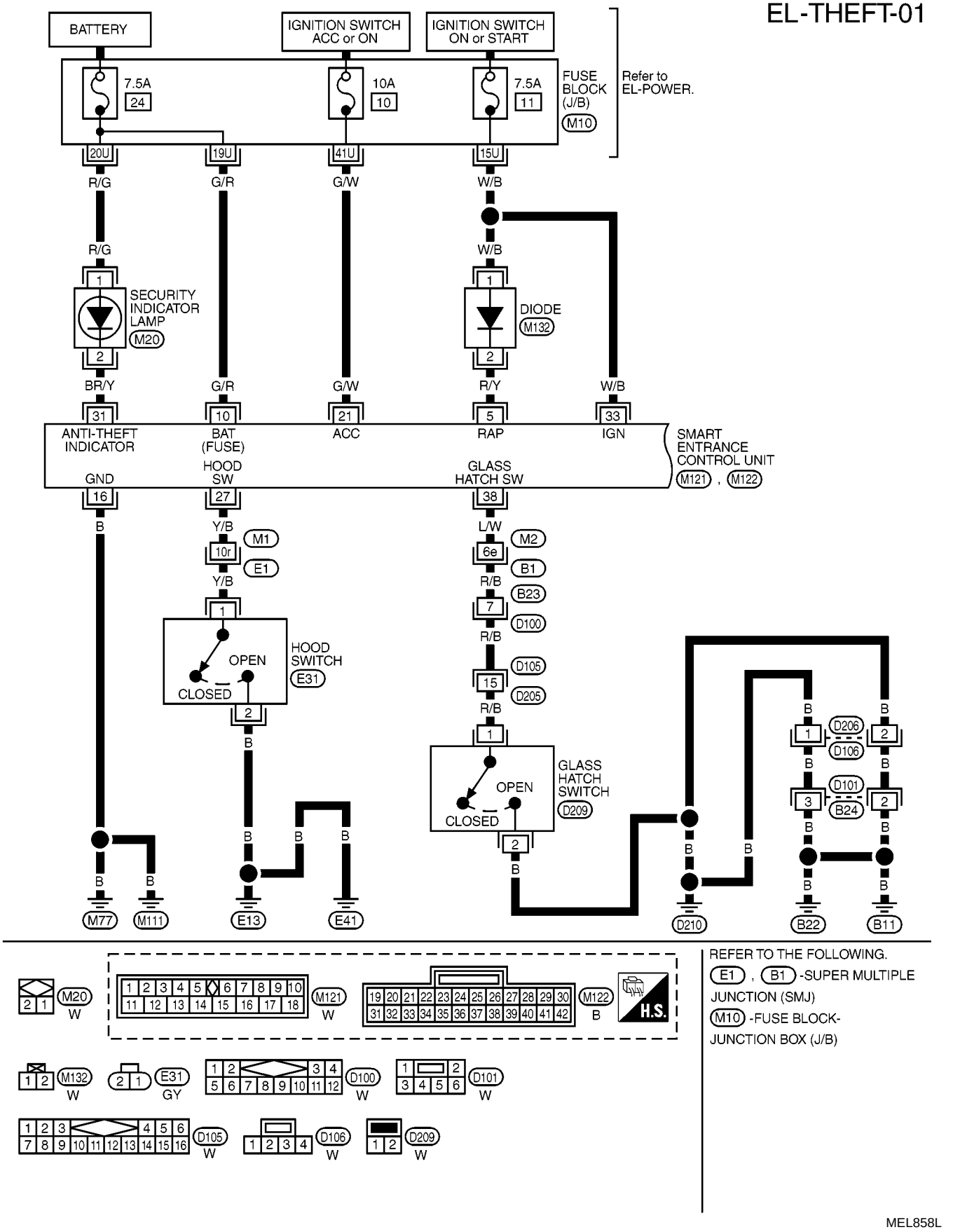
MEL055M

Wiring Diagram — THEFT —

NAEL0122

FIG. 1

NAEL0122S01

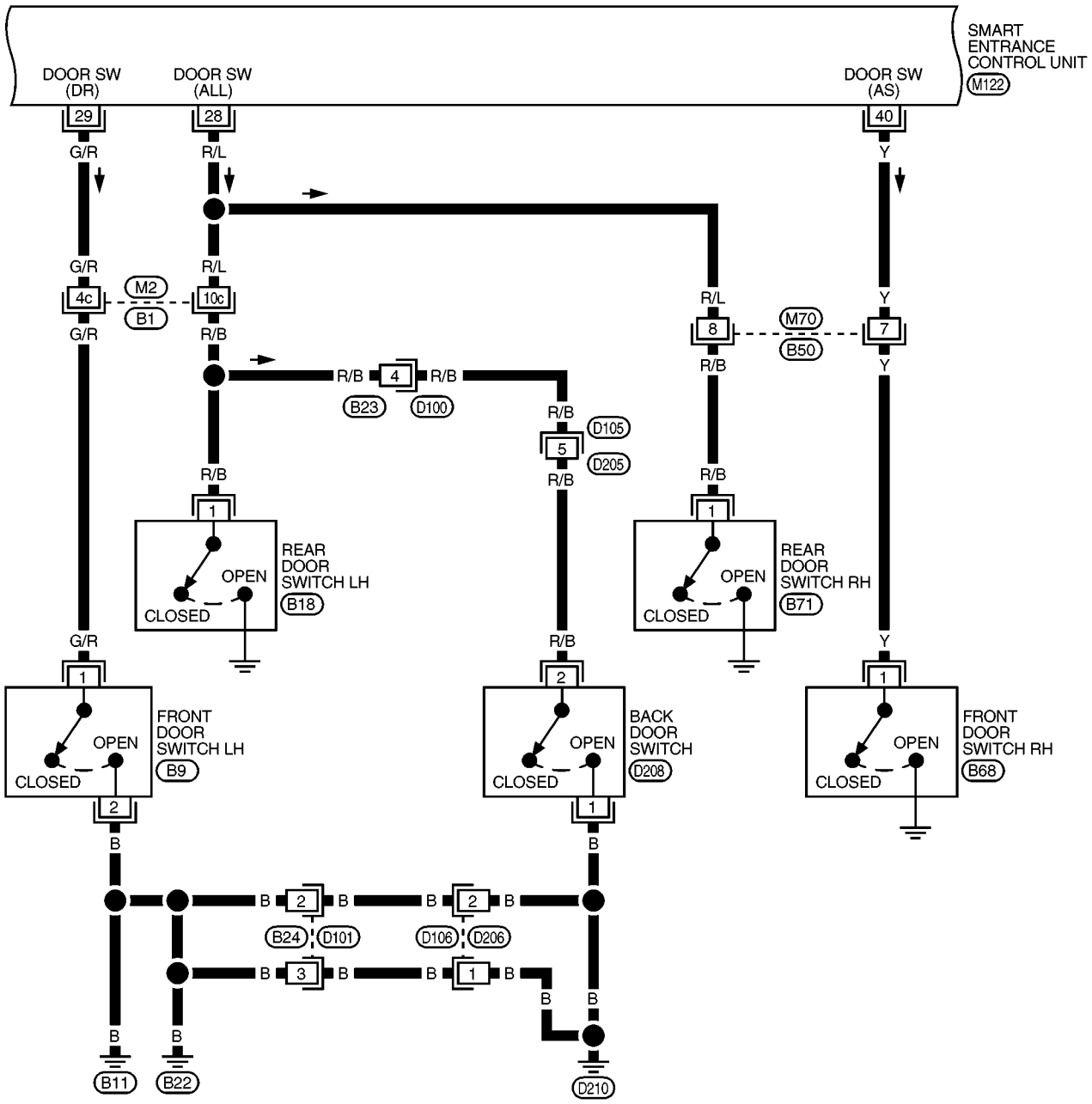


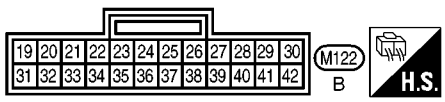
MEL858L

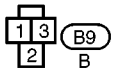
FIG. 2

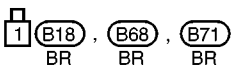
NAEL0122S02

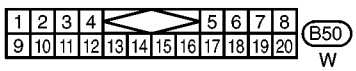
EL-THEFT-02

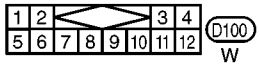


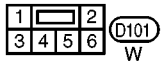


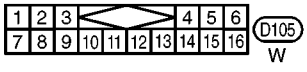


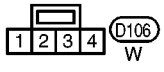


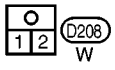










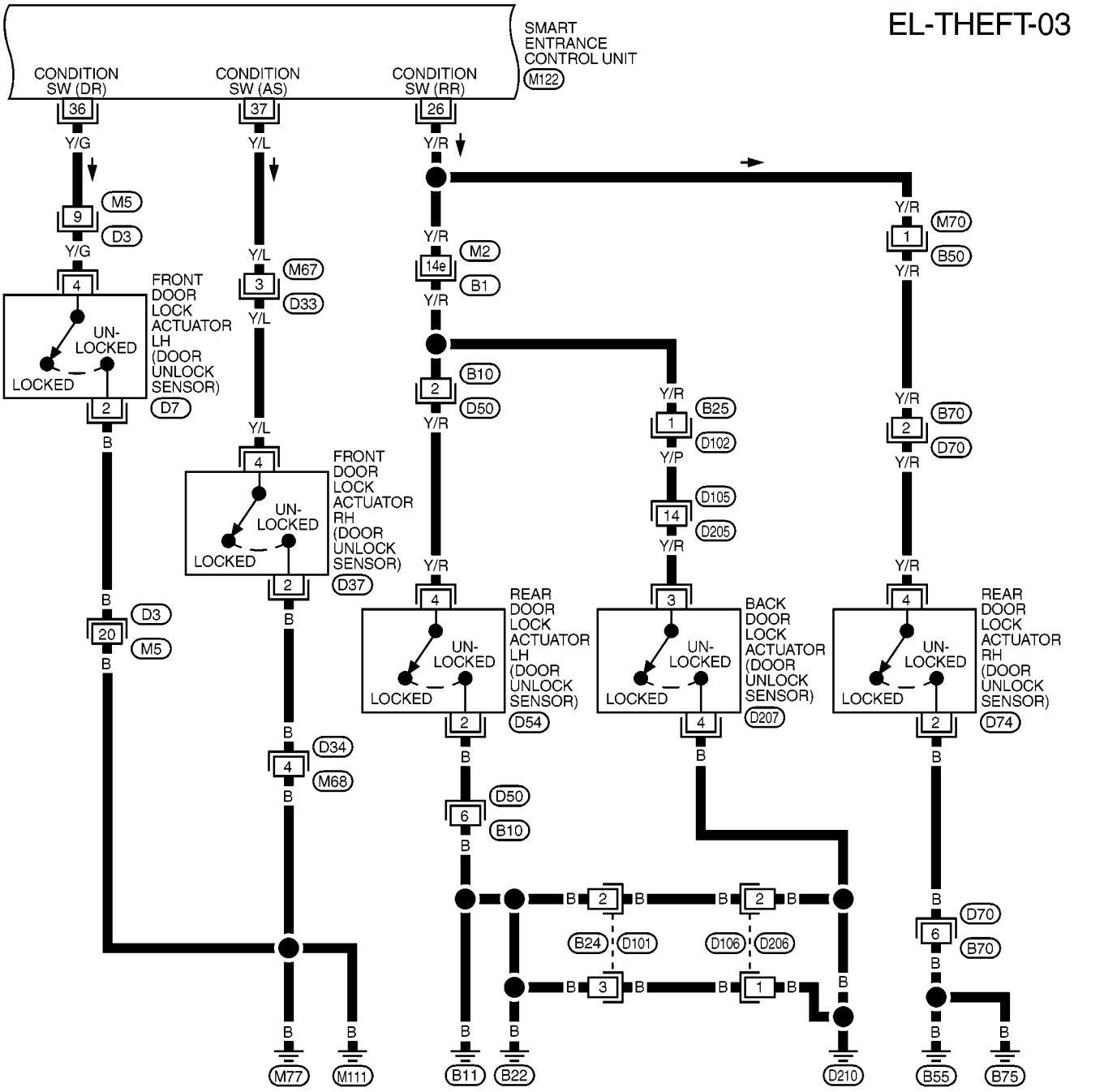


REFER TO THE FOLLOWING.
B1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL859L

FIG. 3

NAEL0122S03



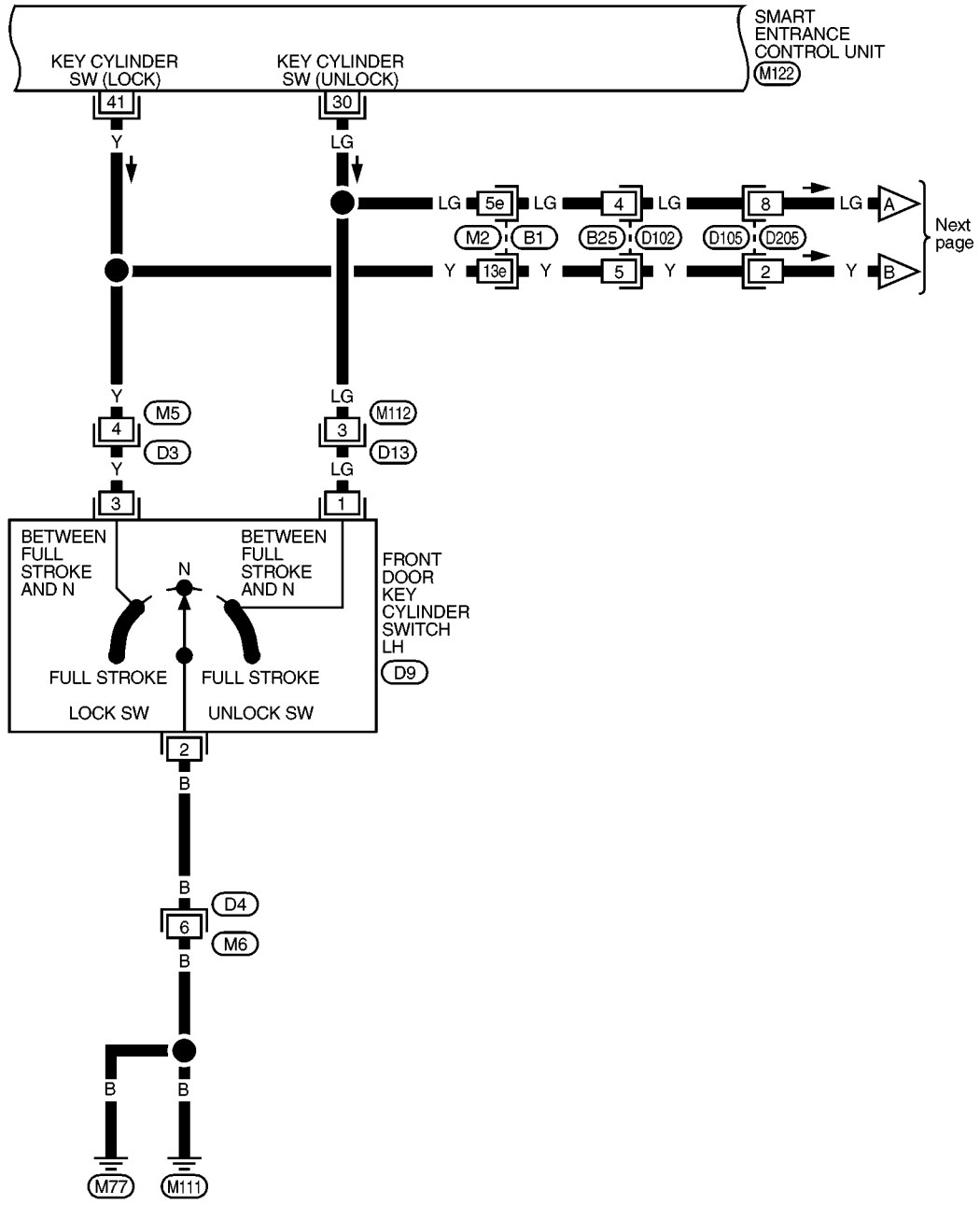
REFER TO THE FOLLOWING.
(B1) - SUPER MULTIPLE JUNCTION (SMJ)

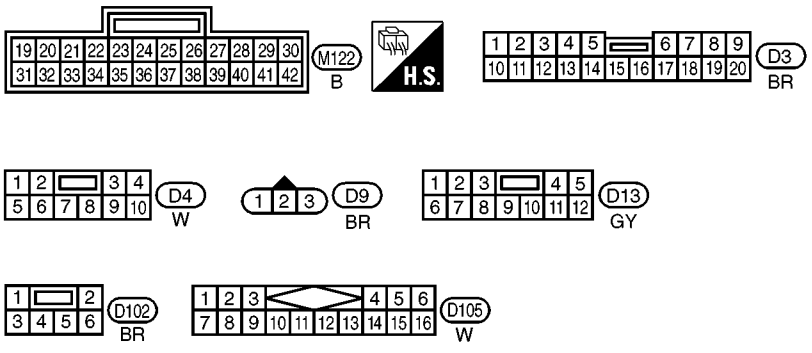
MEL860L

FIG. 4

NAEL0122S04

EL-THEFT-04



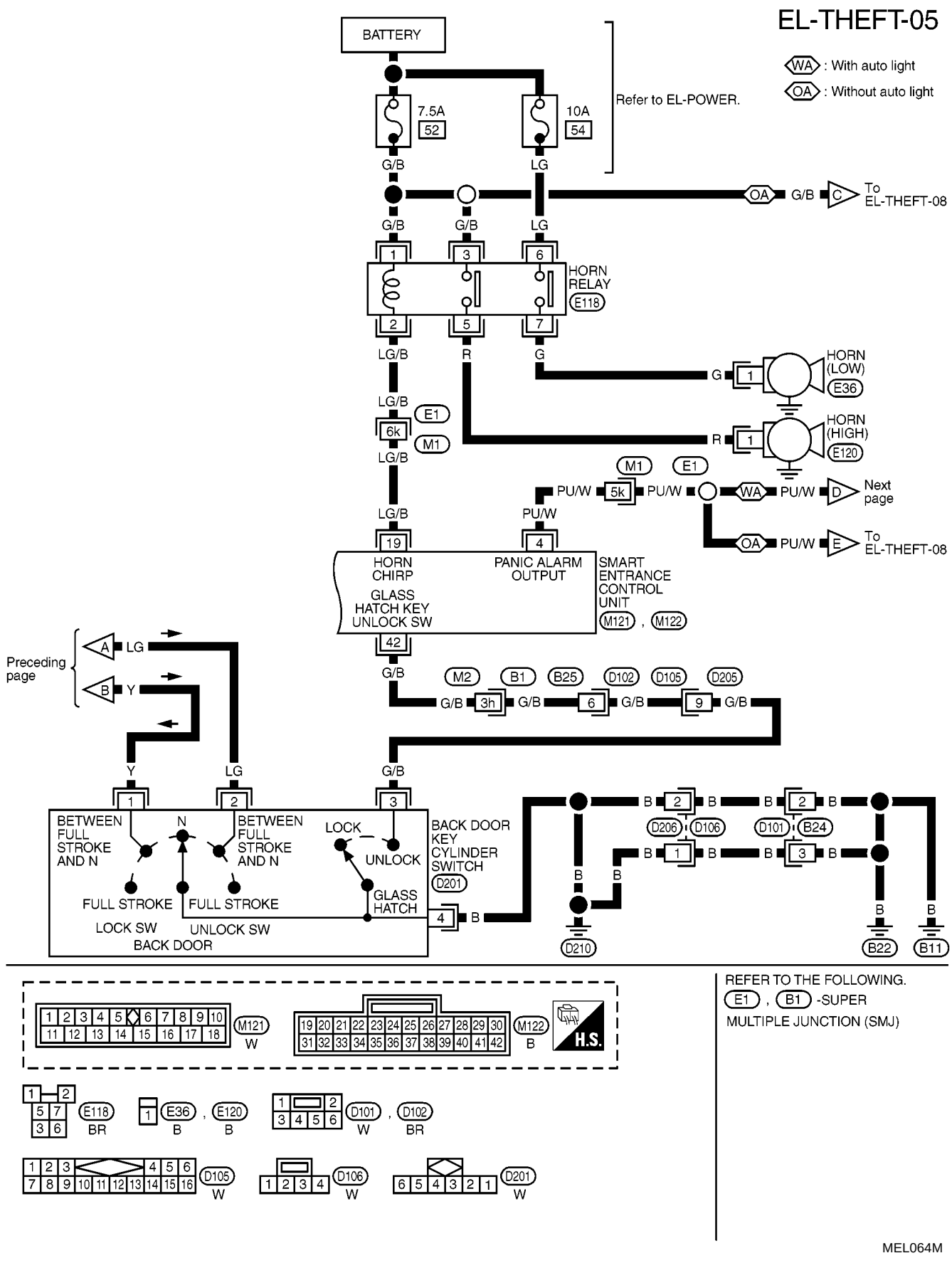


REFER TO THE FOLLOWING.
(B1) - SUPER MULTIPLE JUNCTION (SMJ)

MEL861L

FIG. 5

NAEL0122S05

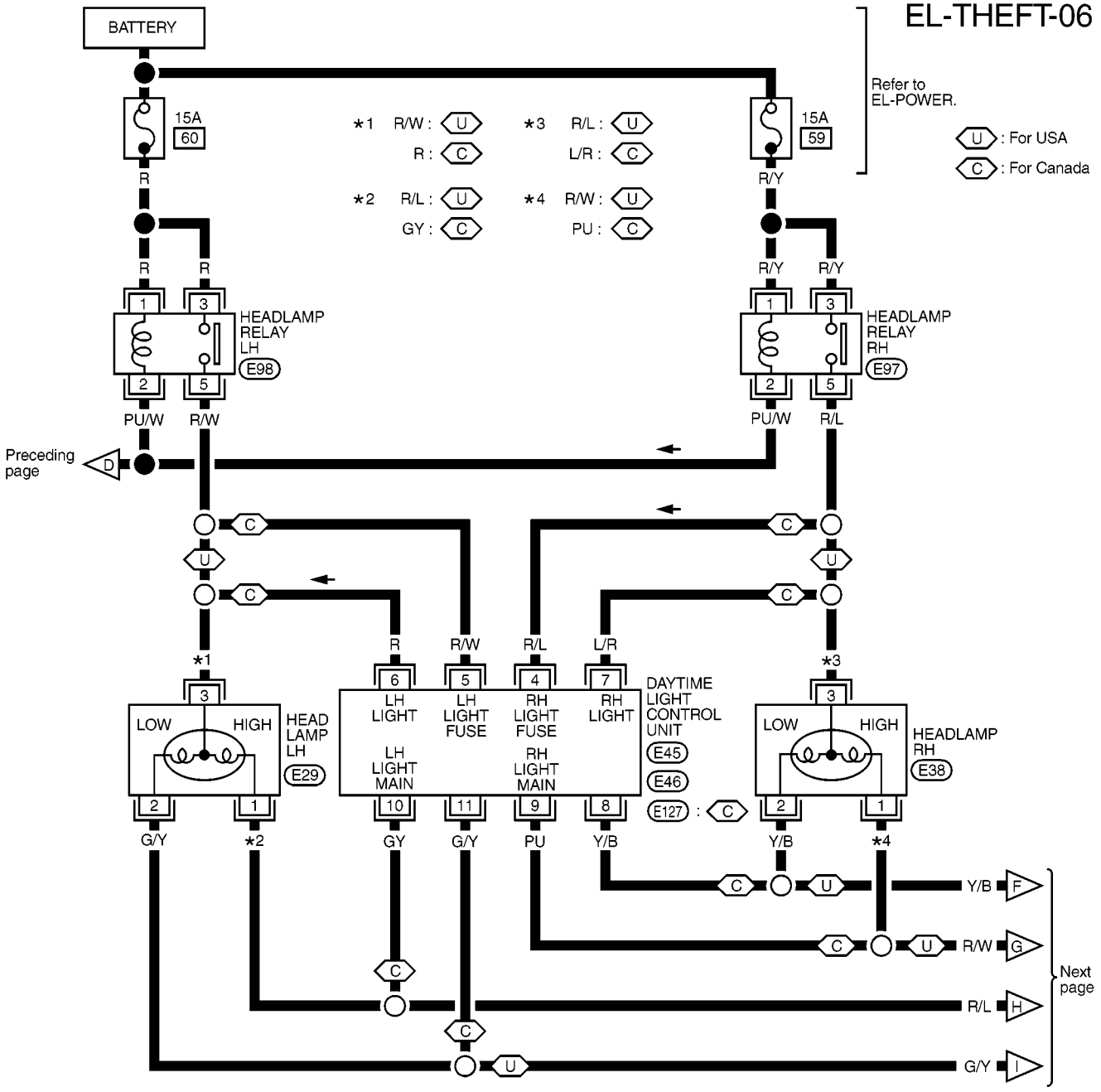


REFER TO THE FOLLOWING.
E1 , B1 -SUPER MULTIPLE JUNCTION (SMJ)

MEL064M

FIG. 6/WITH AUTO LIGHT SYSTEM

NAEL0122S06



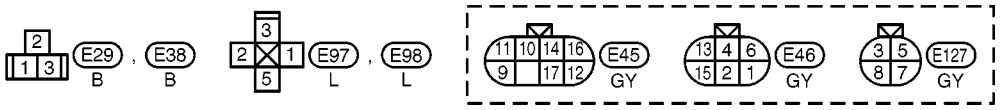
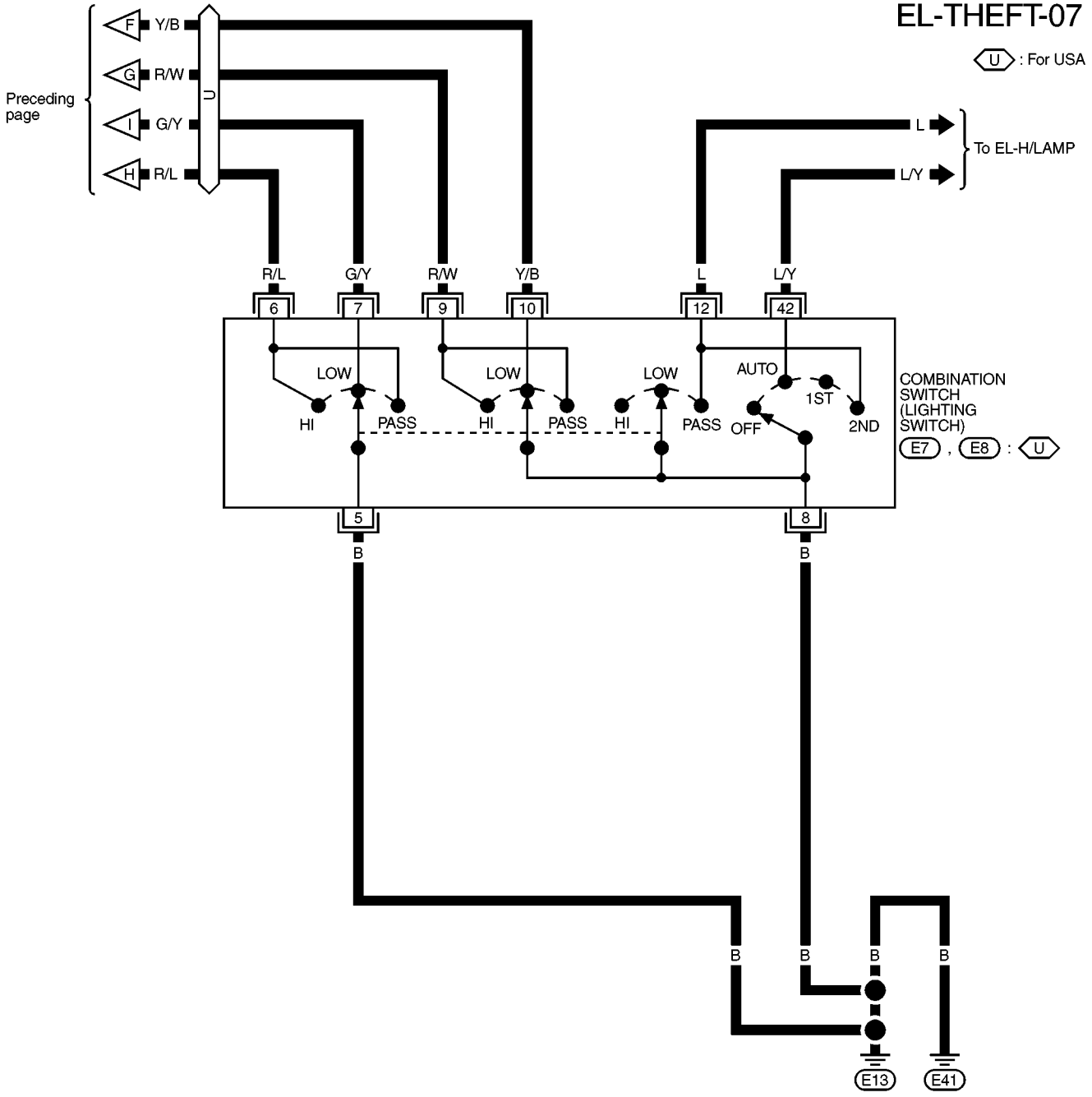
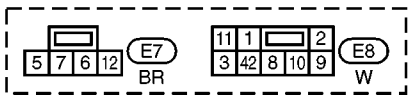


FIG. 7/WITH AUTO LIGHT SYSTEM

NAEL0122S07

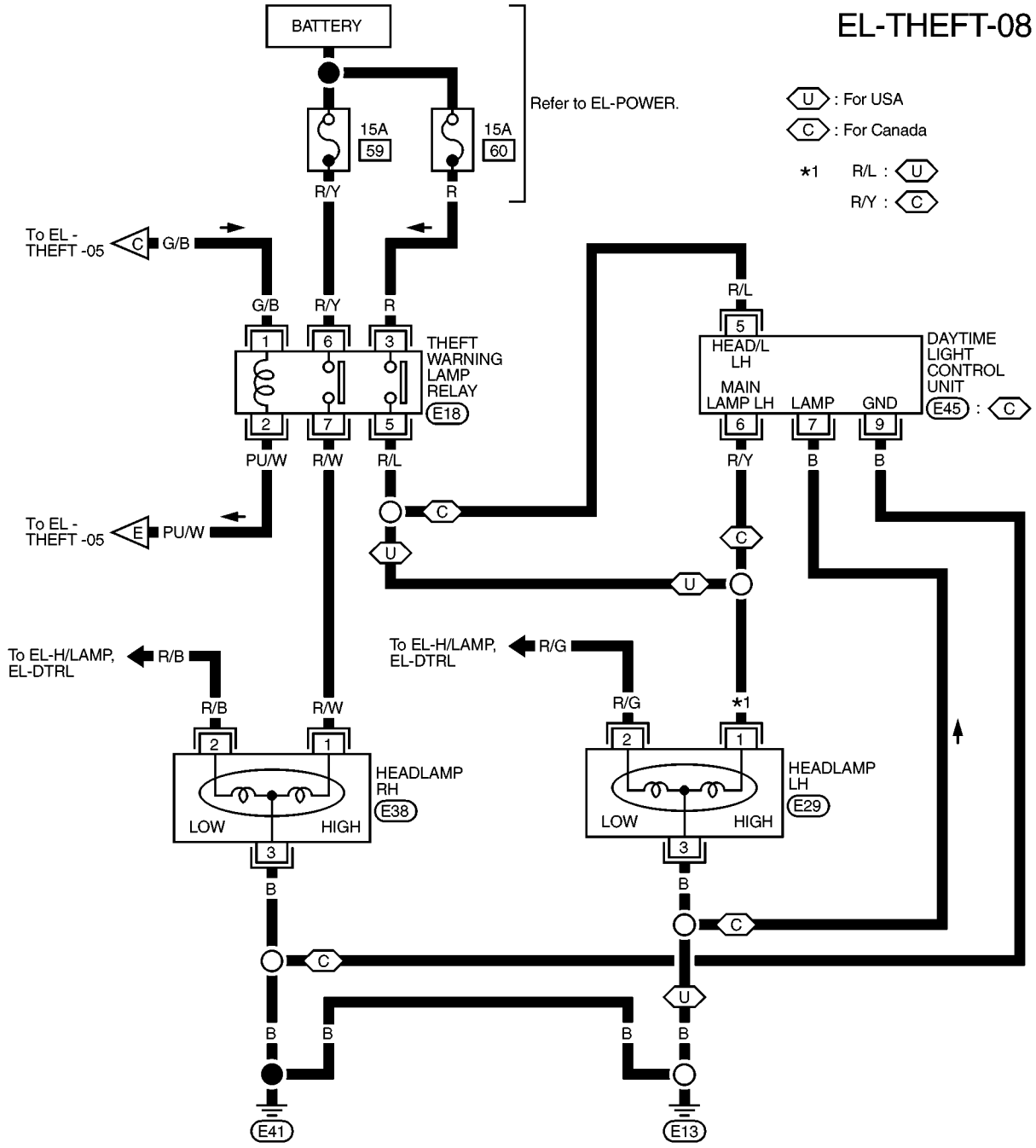


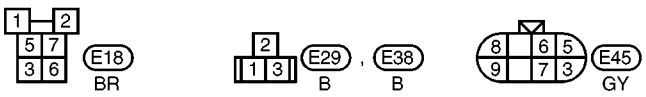


MEL058M

FIG. 8/WITHOUT AUTO LIGHT SYSTEM

NAEL0122S08





MEL065M

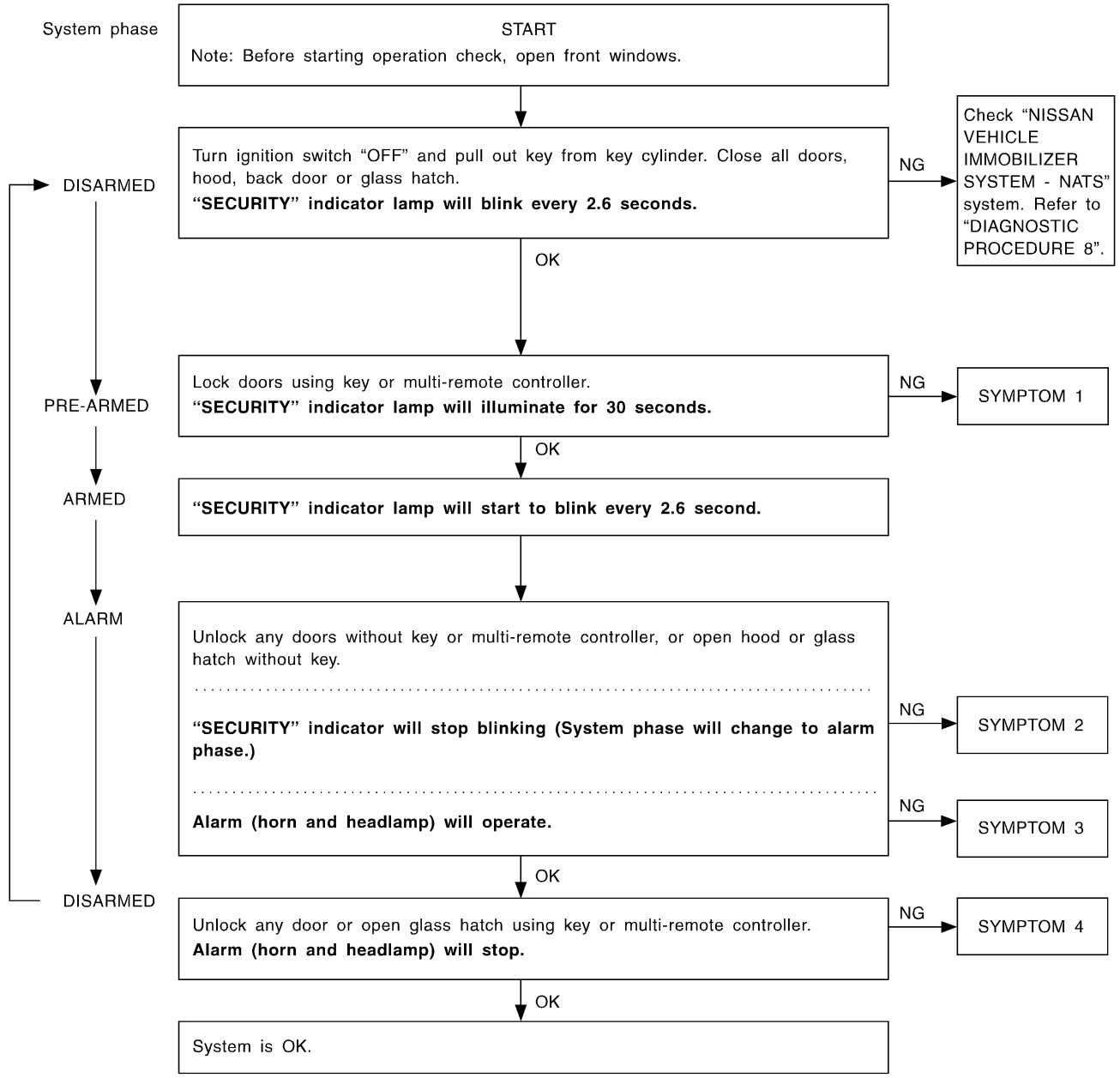
Trouble Diagnoses

NAEL0123

PRELIMINARY CHECK

NAEL0123S01

The system operation is canceled by turning ignition switch to "ACC" at any step between START and ARMED in the following flow chart.



SEL733WC

After performing preliminary check, go to symptom chart in next page.

SYMPTOM CHART

NAEL0123S02

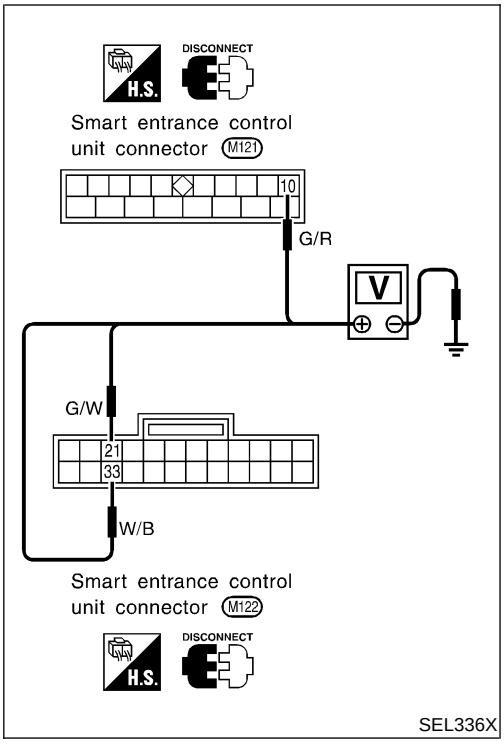
REFERENCE PAGE (EL-)			328	330	331	334	335	336	337	338	340	341	295
SYMPTOM			PRELIMINARY CHECK	POWER SUPPLY AND GROUND CIRCUIT CHECK	DOOR, HOOD AND GLASS HATCH SWITCH CHECK	SECURITY INDICATOR LAMP CHECK	DOOR UNLOCK SENSOR CHECK	DOOR KEY CYLINDER SWITCH CHECK	BACK DOOR KEY CYLINDER SWITCH CHECK	HORN ALARM CHECK	THEFT WARNING HEADLAMP ALARM CHECK (With auto light system)	THEFT WARNING HEADLAMP ALARM CHECK (Without auto light system)	Check "MULTI-REMOTE CONTROL" system.
	Theft warning indicator does not illuminate for 30 seconds.		X	X	X	X							
1	Theft warning system cannot be set by	All items	X	X	X		X						
		Door outside key	X					X					
		Back door key	X						X				
		Multi-remote control	X										X
2	*1 Theft warning system does not alarm when ...	Any door is opened.	X		X								
		Any door is unlocked without using key or multi-remote controller	X				X						
3	Theft warning alarm does not activate.	All function	X		X		X						
		Horn alarm	X							X			
		Headlamp alarm	X								X	X	
4	Theft warning system cannot be canceled by	Door outside key	X					X					
		Back door key	X						X				
		Multi-remote control	X										X

X : Applicable

*1: Make sure the system is in the armed phase.

Before starting trouble diagnoses above, perform preliminary check, EL-328.

Symptom numbers in the symptom chart correspond with those of preliminary check.



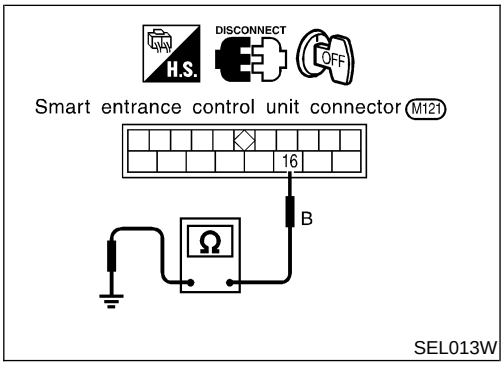
POWER SUPPLY AND GROUND CIRCUIT CHECK

NAEL0123S03

Power Supply Circuit Check

NAEL0123S0301

Terminals		Ignition switch position		
(+)	(−)	OFF	ACC	ON
10	Ground	Battery voltage	Battery voltage	Battery voltage
21	Ground	0V	Battery voltage	Battery voltage
33	Ground	0V	0V	Battery voltage



Ground Circuit Check

NAEL0123S0302

Terminals	Continuity
16 - Ground	Yes

DOOR, HOOD AND GLASS HATCH SWITCH CHECK

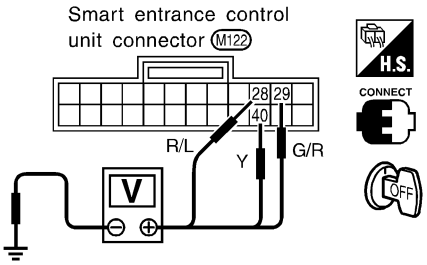
=NAEL0123S04

Door Switch Check

NAEL0123S0401

1 CHECK DOOR SWITCH INPUT SIGNAL

Check voltage between smart entrance control unit terminals 28, 29 or 40 and ground.



	Terminals		Condition	Voltage [V]
	(+)	(−)		
Front LH door switch	29	ground	Open	0
			Closed	Approx. 5
Front RH door switch	40	ground	Open	0
			Closed	Approx. 5
Rear and back door switches	28	ground	Open	0
			Closed	Approx. 5

SEL305X

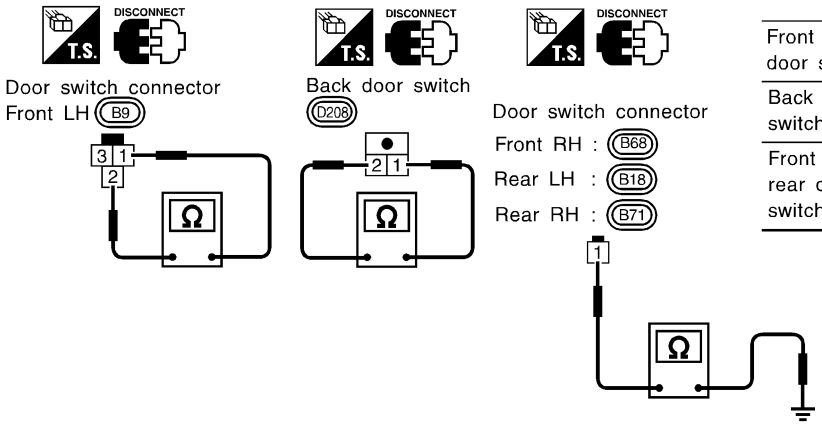
Refer to wiring diagram in EL-321.

OK or NG

OK	▶	Door switch is OK, and go to hood switch check.
NG	▶	GO TO 2.

2 CHECK DOOR SWITCH

1. Disconnect door switch connector.
2. Check continuity between door switch terminals.



	Terminals	Condition	Continuity
Front LH door switch	1 - 2	Closed	No
		Open	Yes
Back door switch	1 - 2	Closed	No
		Open	Yes
Front RH and rear door switches	1 - ground	Closed	No
		Open	Yes

SEL306X

OK or NG

OK	▶	**Check the following.** ● Door switch ground circuit (Front LH, back door) or door switch ground condition ● Harness for open or short between smart entrance control unit and door switch
NG	▶	Replace door switch.

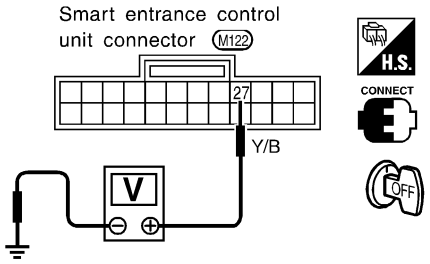
Hood Switch Check

=NAEL0123S0402

1	CHECK HOOD SWITCH FITTING CONDITION	
	OK or NG	
OK	▶	GO TO 2.
NG	▶	Adjust installation of hood switch or hood.

2	CHECK HOOD SWITCH INPUT SIGNAL	

Check voltage between smart entrance control unit terminal 27 and ground.



Voltage [V]:
Hood is open.
0
Hood is closed.
Approx. 5

SEL337X

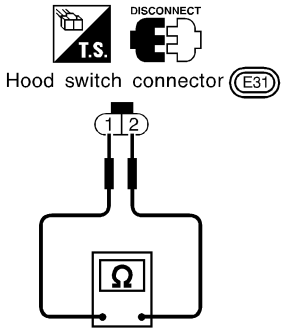
Refer to wiring diagram in EL-320.

OK or NG

OK	▶	Hood switch is OK, and go to glass hatch switch check.
NG	▶	GO TO 3.

3	CHECK HOOD SWITCH	

1. Disconnect hood switch connector.
2. Check continuity between hood switch terminals 1 and 2.



Continuity:
Condition: Pushed
No
Condition: Released
Yes

SEL338X

OK or NG

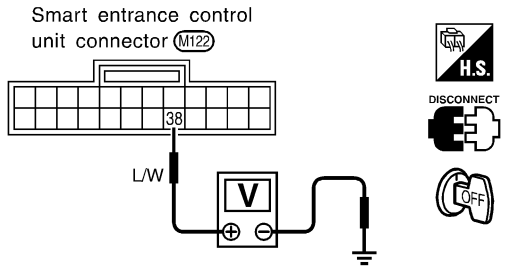
OK	▶	**Check the following.** • Hood switch ground circuit • Harness for open or short between smart entrance control unit and hood switch
NG	▶	Replace hood switch.

Glass Hatch Switch Check

=NAEL0123S0403

1	CHECK GLASS HATCH SWITCH INPUT SIGNAL

Check voltage between smart entrance control unit terminal 38 and ground.



Voltage [V]:
Glass hatch is open.
Approx. 0
Glass hatch is closed.
Approx. 12

SEL339X

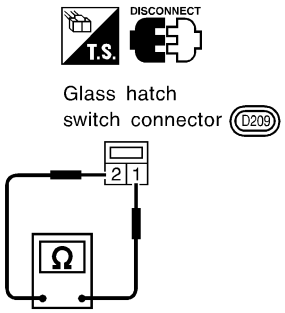
Refer to wiring diagram in EL-320.

OK or NG

OK	▶	Glass hatch switch is OK.
NG	▶	GO TO 2.

2	CHECK GLASS HATCH SWITCH

1. Disconnect glass hatch switch connector.
2. Check continuity between glass hatch switch terminals 1 and 2.



Continuity:
Condition: Closed
No
Condition: Open
Yes

SEL340X

OK or NG

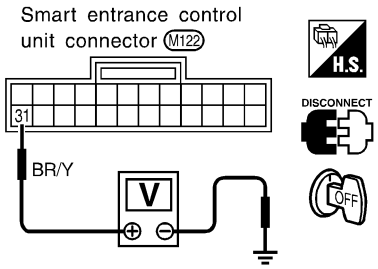
OK	▶	**Check the following.** • Glass hatch switch ground circuit • Harness for open or short between smart entrance control unit and glass hatch switch
NG	▶	Replace glass hatch switch.

SECURITY INDICATOR LAMP CHECK

=NAEL0123S05

1	CHECK INDICATOR LAMP OUTPUT SIGNAL

1. Disconnect smart entrance control unit connector.
2. Check voltage between control unit terminal 31 and ground.



Battery voltage should exist.

SEL341X

Refer to wiring diagram in EL-320.

OK or NG

OK	▶	Security indicator lamp is OK.
NG	▶	GO TO 2.

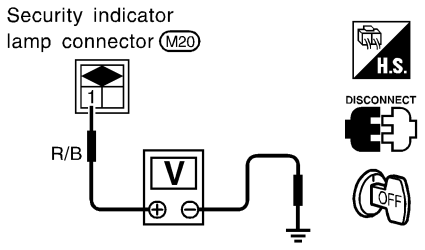
2	CHECK INDICATOR LAMP

OK or NG

OK	▶	GO TO 3.
NG	▶	Replace indicator lamp.

3	CHECK POWER SUPPLY CIRCUIT FOR INDICATOR LAMP

1. Disconnect security lamp connector.
2. Check voltage between indicator lamp terminal 1 and ground.



Battery voltage should exist.

SEL342X

OK or NG

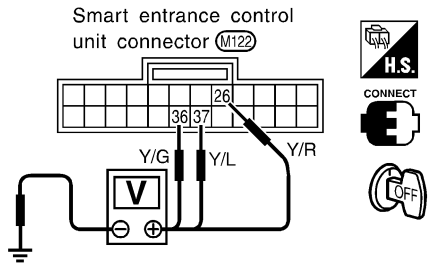
OK	▶	Check harness for open or short between security indicator lamp and control unit.
NG	▶	**Check the following.** ● 7.5A fuse [No. 24, located in fuse block (J/B)] ● Harness for open or short between security indicator lamp and fuse

DOOR UNLOCK SENSOR CHECK

=NAEL0123S06

1	CHECK DOOR UNLOCK SENSOR INPUT SIGNAL

Check voltage between smart entrance control unit terminals 26, 36 or 37 and ground.



	Terminals (+)	Terminals (−)	Condition	Voltage [V]
Front LH door	36	Ground	Locked	Approx. 5
			Unlocked	0
Front RH door	37	Ground	Locked	Approx. 5
			Unlocked	0
Rear and back door	26	Ground	Locked	Approx. 5
			Unlocked	0

SEL343X

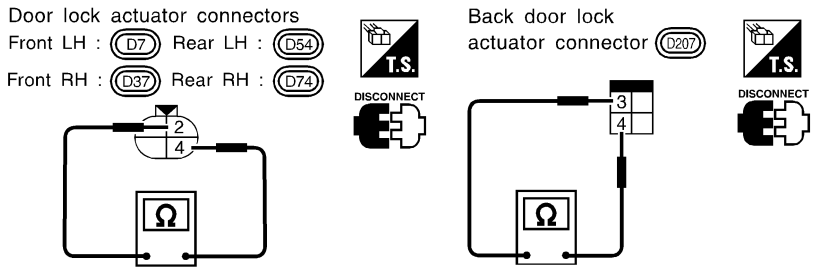
Refer to wiring diagram in EL-324.

OK or NG

OK	▶	Door unlock sensor is OK.
NG	▶	GO TO 2.

2	CHECK DOOR UNLOCK SENSOR

1. Disconnect door unlock sensor connector.
2. Check continuity between door unlock sensor terminals.



Continuity:
Condition: Locked
No
Condition: Unlocked
Yes

SEL344X

OK or NG

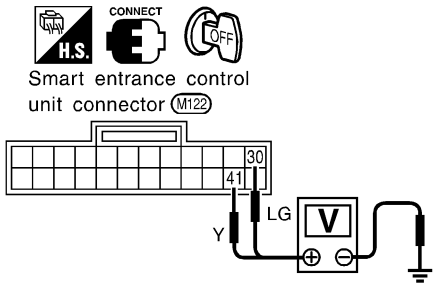
OK	▶	**Check the following.** • Door unlock sensor ground circuit • Harness for open or short between smart entrance control unit and door unlock sensor
NG	▶	Replace door unlock sensor.

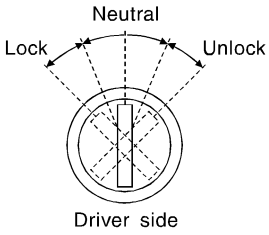
FRONT DOOR KEY CYLINDER SWITCH CHECK

=NAEL0123S07

1 **CHECK DOOR KEY CYLINDER SWITCH INPUT SIGNAL (LOCK/UNLOCK SIGNAL)**

Check voltage between smart entrance control unit terminals 30 or 41 and ground.





Terminals		Key position	Voltage [V]
(+)	(–)		
41	Ground	Neutral/Unlock	Approx. 5
		Lock	0
30	Ground	Neutral/Lock	Applox. 5
		Unlock	0

SEL312X

Refer to wiring diagram in EL-323.

OK or NG

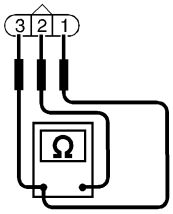
OK	▶	Door key cylinder switch is OK.
NG	▶	GO TO 2.

2 **CHECK DOOR KEY CYLINDER SWITCH**

1. Disconnect door key cylinder switch connector.
2. Check continuity between door key cylinder switch terminals.



Door key cylinder switch LH connector D9



① : Door unlock switch terminal
② : Ground terminal
③ : Door lock switch terminal

Terminals	Key position	Continuity
LH: 3 - 2	Neutral/Unlock	No
	Lock	Yes
LH: 1 - 2	Neutral/Lock	No
	Unlock	Yes

SEL313X

OK or NG

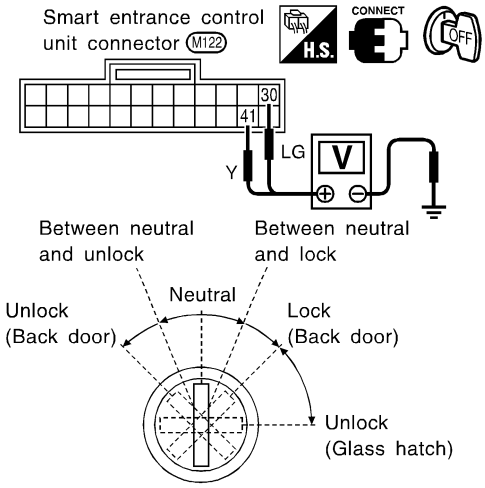
OK	▶	**Check the following.** ● Door key cylinder switch ground circuit ● Harness for open or short between smart entrance control unit and door key cylinder switch
NG	▶	Replace door key cylinder switch.

BACK DOOR KEY CYLINDER SWITCH CHECK

=NAEL0123S08

1	CHECK BACK DOOR KEY CYLINDER SWITCH INPUT SIGNAL (LOCK/UNLOCK SIGNAL)

Check voltage between smart entrance control unit terminals 30, 41 or 42 and ground.



	Terminals (+)	Terminals (−)	Key position	Voltage [V]
Back door	41	Ground	Between neutral and lock	0
			Other positions	Applox. 5
	30	Ground	Between neutral and unlock	0
			Other positions	Applox. 5

SEL314X

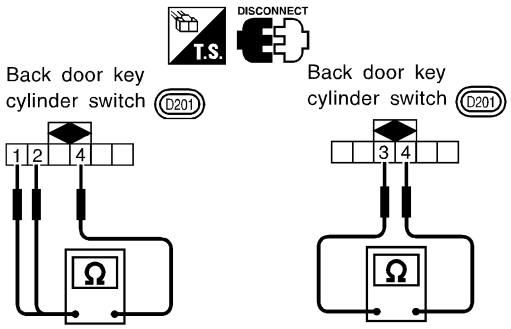
Refer to wiring diagram in EL-324.

OK or NG

OK	▶	Back door key cylinder switch is OK.
NG	▶	GO TO 2.

2	CHECK BACK DOOR KEY CYLINDER SWITCH

1. Disconnect back door key cylinder switch connector.
2. Check continuity between back door key cylinder switch terminals.



Key position	Terminals 1	2	3	4
Between neutral and lock (Back door)	○			○
Between neutral and unlock (Back door)		○		○
Between lock (Back door) and unlock (glass hatch)			○	○

SEL345X

OK or NG

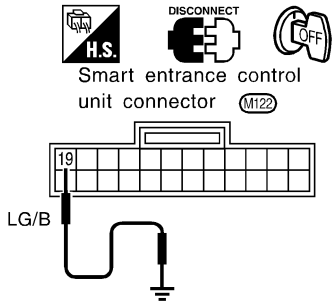
OK	▶	**Check the following.** • Back door key cylinder switch ground circuit • Harness for open or short between smart entrance control unit and back door key cylinder switch
NG	▶	Replace back door key cylinder switch.

HORN ALARM CHECK

=NAEL0123S09

1	CHECK HORN ALARM OPERATION

1. Disconnect smart entrance control unit connector.
2. Apply ground to smart entrance control unit terminal 19.



Horn alarm should operate.

SEL346X

Refer to wiring diagram in EL-324.

OK or NG

OK	▶	Horn alarm is OK.
NG	▶	GO TO 2.

2	CHECK HORN RELAY

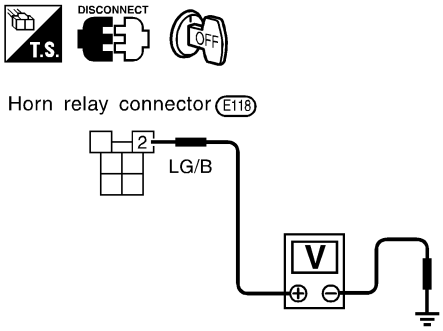
Check horn relay.

OK or NG

OK	▶	GO TO 3.
NG	▶	Replace horn relay.

3	CHECK POWER SUPPLY FOR HORN RELAY

1. Disconnect horn relay connector.
2. Check voltage between terminal 2 and ground.



Battery voltage should exist.

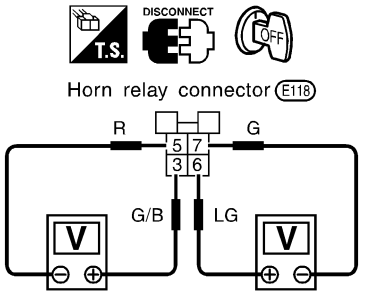
SEL347X

OK or NG

OK	▶	GO TO 4.
NG	▶	**Check the following.** ● 7.5A fuse (No. 52, located in the fuse and fusible link box) ● Harness for open or short between horn relay and fuse

4	CHECK HORN RELAY CIRCUIT

1. Disconnect horn relay connector.
2. Check voltage between terminals 3 and 5.
3. Check voltage between terminals 6 and 7.



Battery voltage should exist.

SEL348X

OK or NG

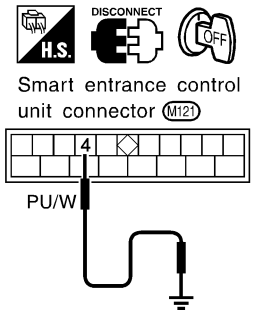
OK	▶	Check harness for open or short between horn relay and smart entrance control unit.
NG	▶	Check harness for open or short.

THEFT WARNING HEADLAMP ALARM CHECK/WITH AUTO LIGHT SYSTEM

=NAEL0123S10

1	CHECK THEFT WARNING HEADLAMP ALARM OPERATION

1. Disconnect smart entrance control unit connector.
2. Apply ground to smart entrance control unit terminal 4.



Headlamp alarm should operate.

SEL570X

Refer to wiring diagram in EL-325.

OK or NG

OK	▶	Headlamp alarm is OK.
NG	▶	GO TO 2.

2	CHECK HEADLAMP OPERATION

Does headlamp come on when turning lighting switch "ON"?

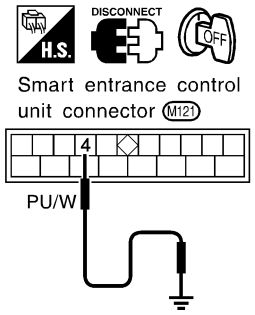
Yes	▶	Check harness for open or short between headlamp relay and smart entrance control unit.
No	▶	Check headlamp system. Refer to "HEADLAMP".

THEFT WARNING HEADLAMP ALARM CHECK/WITHOUT AUTO LIGHT SYSTEM

=NAEL0123S13

1	CHECK THEFT WARNING HEADLAMP ALARM OPERATION

1. Disconnect control unit connector.
2. Apply ground to control unit terminal 4.



Headlamp alarm should operate.

SEL570X

Refer to wiring diagram in EL-327.

Yes	▶	Headlamp alarm is OK.
No	▶	GO TO 2.

2	CHECK HEADLAMP OPERATION

Does headlamp come on when turning lighting switch "ON"?

Yes	▶	GO TO 3.
No	▶	Check headlamp system. Refer to "HEADLAMP".

3	CHECK THEFT WARNING LAMP RELAY

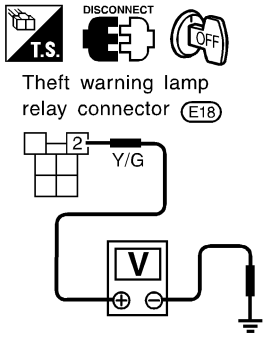
Check theft warning lamp relay.

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace theft warning lamp relay.

4	CHECK POWER SUPPLY FOR THEFT WARNING LAMP RELAY

1. Disconnect theft warning lamp relay connector.
2. Check voltage between terminal 1 and ground.



Battery voltage should exist.

SEL573X

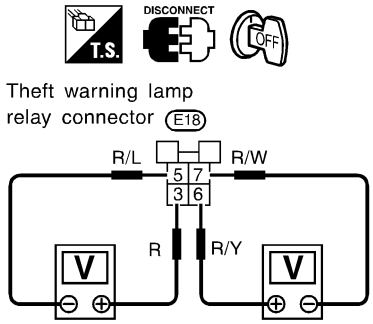
Refer to wiring diagram in EL-327.

Does battery voltage exist?

Yes	▶	GO TO 5.
No	▶	**Check the following.** ● 7.5A fuse (No. 52, located in the fuse and fusible link box) ● Harness for open or short between theft warning lamp relay and fuse

5	CHECK THEFT WARNING LAMP RELAY CIRCUIT

1. Disconnect theft warning lamp relay connector.
2. Check voltage between terminals 3 and 5.
3. Check voltage between terminals 6 and 7.



Battery voltage should exist.

SEL574X

OK or NG

OK	▶	Check harness for open or short between theft warning lamp relay and control unit.
NG	▶	**Check the following.** ● Harness for open or short between fuse and theft warning lamp relay ● Harness for open or short between theft warning lamp relay and headlamps

Description

NAEL0124

The following systems are controlled by the smart entrance control unit.

- Warning chime
- Rear window defogger and door mirror defogger timer
- Power door lock
- Multi-remote control system
- Theft warning system
- Interior lamp timer
- Electric sunroof and power window timer
- Headlamp battery saver
- Battery saver

For detailed description and wiring diagrams, refer to the relevant pages for the each system.
The smart entrance control unit receives data from the switches and sensors to control their corresponding system relays and actuators.

INPUT/OUTPUT

NAEL0124S01

System	Input	Output
Power door lock	Door lock and unlock switch LH and RH Key switch (Insert) Door switches Door key cylinder switches	Door lock actuator
Multi-remote control	Key switch (Insert) Ignition switch (ACC) Door switches Front door unlock sensor LH Door lock and unlock switch LH Remote controller signal	Horn relay Headlamp relay (LH and RH) Interior lamp Multi-remote control relay Door lock actuator
Warning chime	Key switch (Insert) Ignition switch (ON) Lighting switch (1st) Seat belt switch Front door switch LH	Warning chime (located in smart entrance control unit)
Rear window defogger and door mirror defogger timer	Ignition switch (ON) Rear window defogger switch	Rear window defogger relay
Theft warning	Ignition switch (ACC, ON) Door switches Hood switch Glass hatch switch Door key cylinder switches (lock/unlock) Door unlock sensores	Horn relay Headlamp relay (LH and RH) (With auto light system) Theft warning lamp relay (Without auto light system) Security indicator
Interior lamp timer	Door switches Front door unlock sensor LH Ignition switch (ON) Key switch (Insert)	Interior lamp
Electric sunroof and power window timer	Front door switches Ignition switch (ON)	Power window relay
Headlamp battery saver timer	Front door switches Ignition switch (ON)	Headlamp battery saver control unit
Battery saver	Ignition switch (ON) Door switches Driver's door unlock sensor Key switch (Insert)	Interior lamp Luggage room lamp Spot lamp Vanity mirror illumination lamp

Description (Cont'd)

BATTERY SAVER

NAEL0124S02

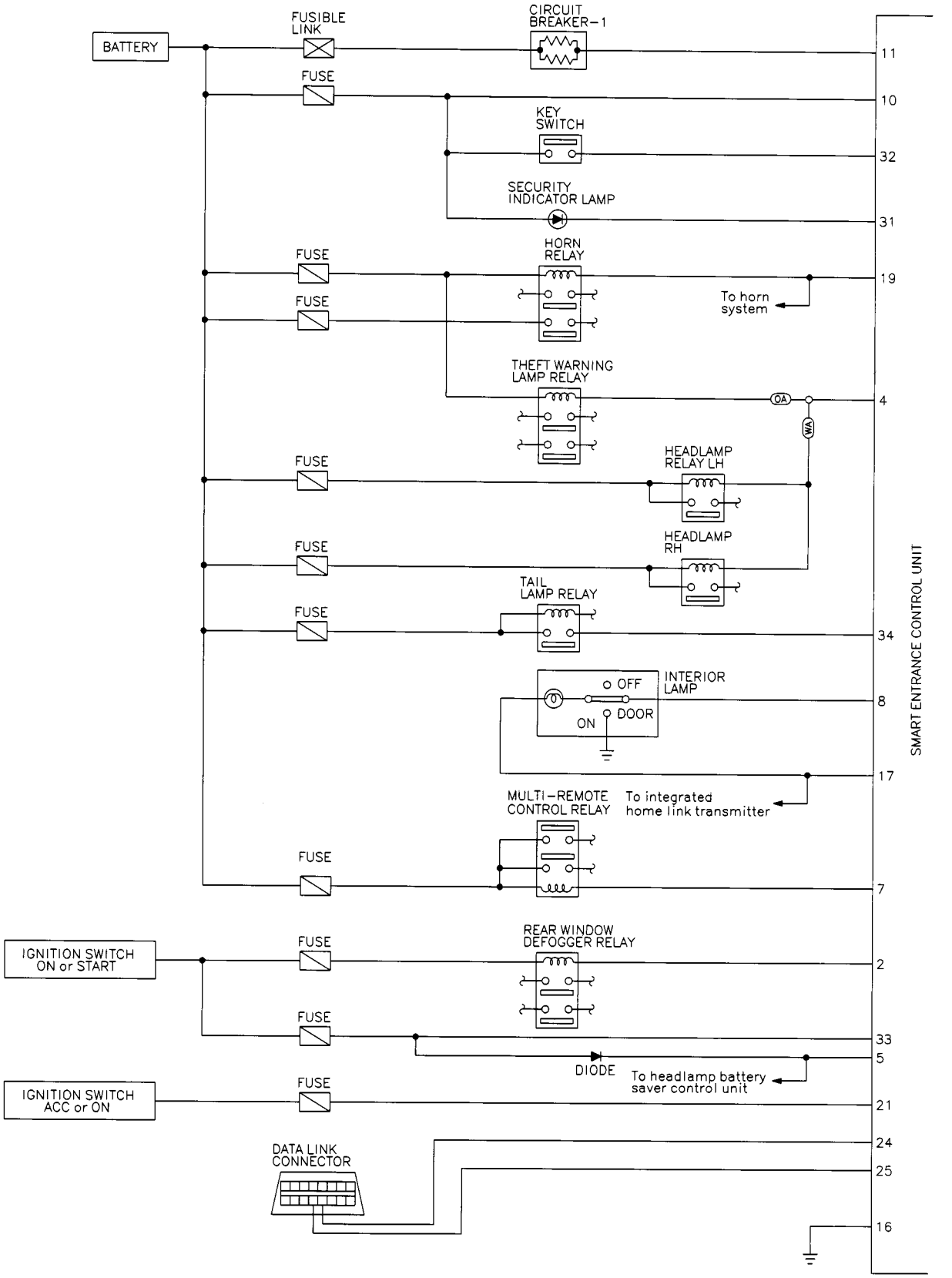
The lamp turns off automatically when the interior lamp, luggage room lamp, spot lamp or/and vanity mirror illumination is illuminated with the ignition key in the OFF position, if the lamp remains lit by the door switch open signal or if the lamp switch is in the ON position for more than 10 minutes.
After lamps turn off by the battery saver system, the lamps illuminate again when:

- driver's door is locked or unlocked,
- door is opened or closed,
- key is inserted in ignition key cylinder.

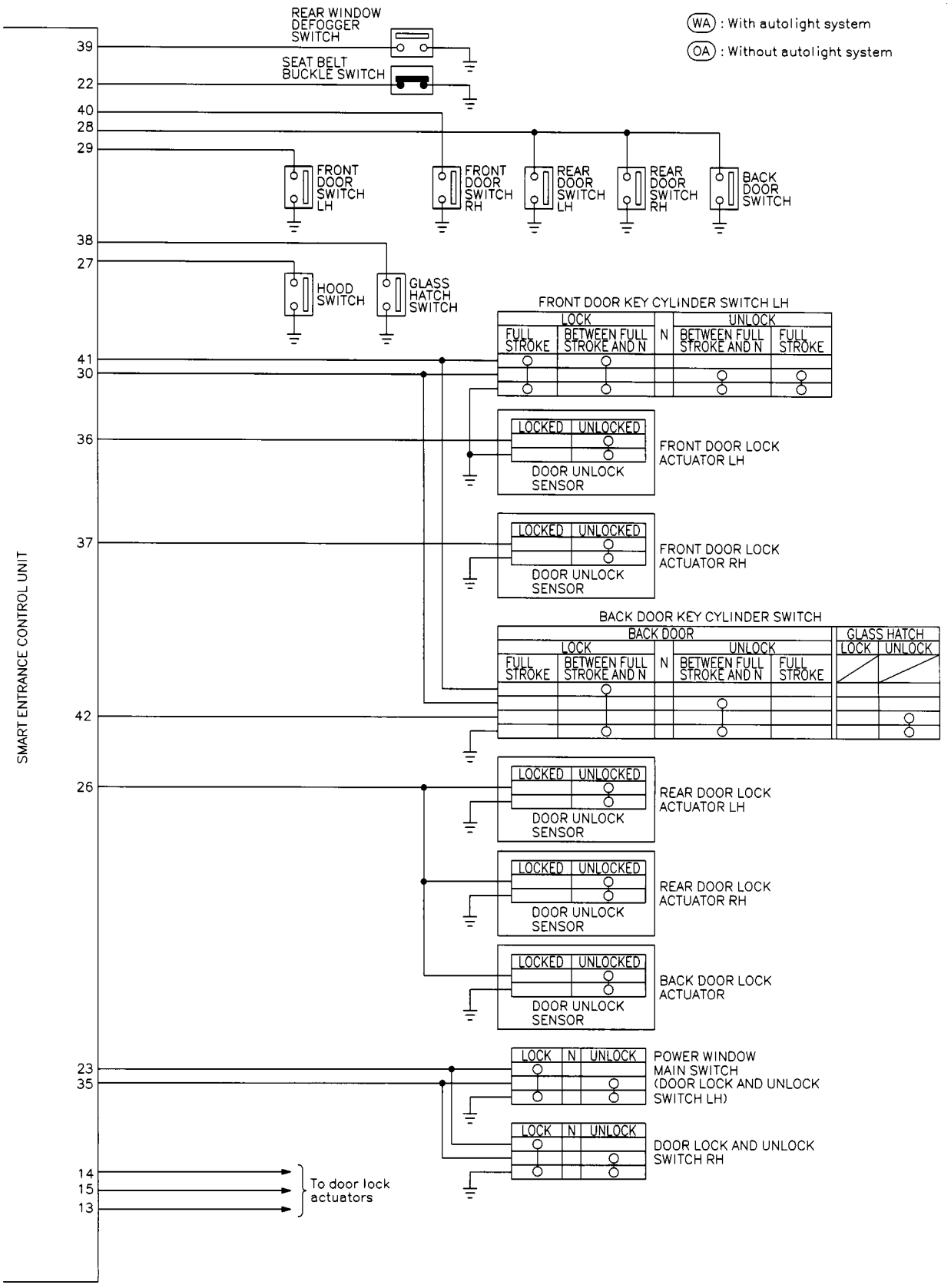
NOTE:

Schematic

NAEL0125



MEL052M


WA : With autolight system
OA : Without autolight system
SMART ENTRANCE CONTROL UNIT
REAR WINDOW DEFOGGER SWITCH
SEAT BELT BUCKLE SWITCH
FRONT DOOR SWITCH LH
FRONT DOOR SWITCH RH
REAR DOOR SWITCH LH
REAR DOOR SWITCH RH
BACK DOOR SWITCH
HOOD SWITCH
GLASS HATCH SWITCH
FRONT DOOR KEY CYLINDER SWITCH LH
LOCK
UNLOCK
FULL STROKE
BETWEEN FULL STROKE AND N
N
BETWEEN FULL STROKE AND N
FULL STROKE
LOCKED
UNLOCKED
DOOR UNLOCK SENSOR
FRONT DOOR LOCK ACTUATOR LH
FRONT DOOR LOCK ACTUATOR RH
BACK DOOR KEY CYLINDER SWITCH
BACK DOOR
GLASS HATCH
REAR DOOR LOCK ACTUATOR LH
REAR DOOR LOCK ACTUATOR RH
BACK DOOR LOCK ACTUATOR
POWER WINDOW MAIN SWITCH (DOOR LOCK AND UNLOCK SWITCH LH)
DOOR LOCK AND UNLOCK SWITCH RH
To door lock actuators
39
22
40
28
29
38
27
41
30
36
37
42
26
23
35
14
15
13

MEL053M

Smart Entrance Control Unit Inspection Table

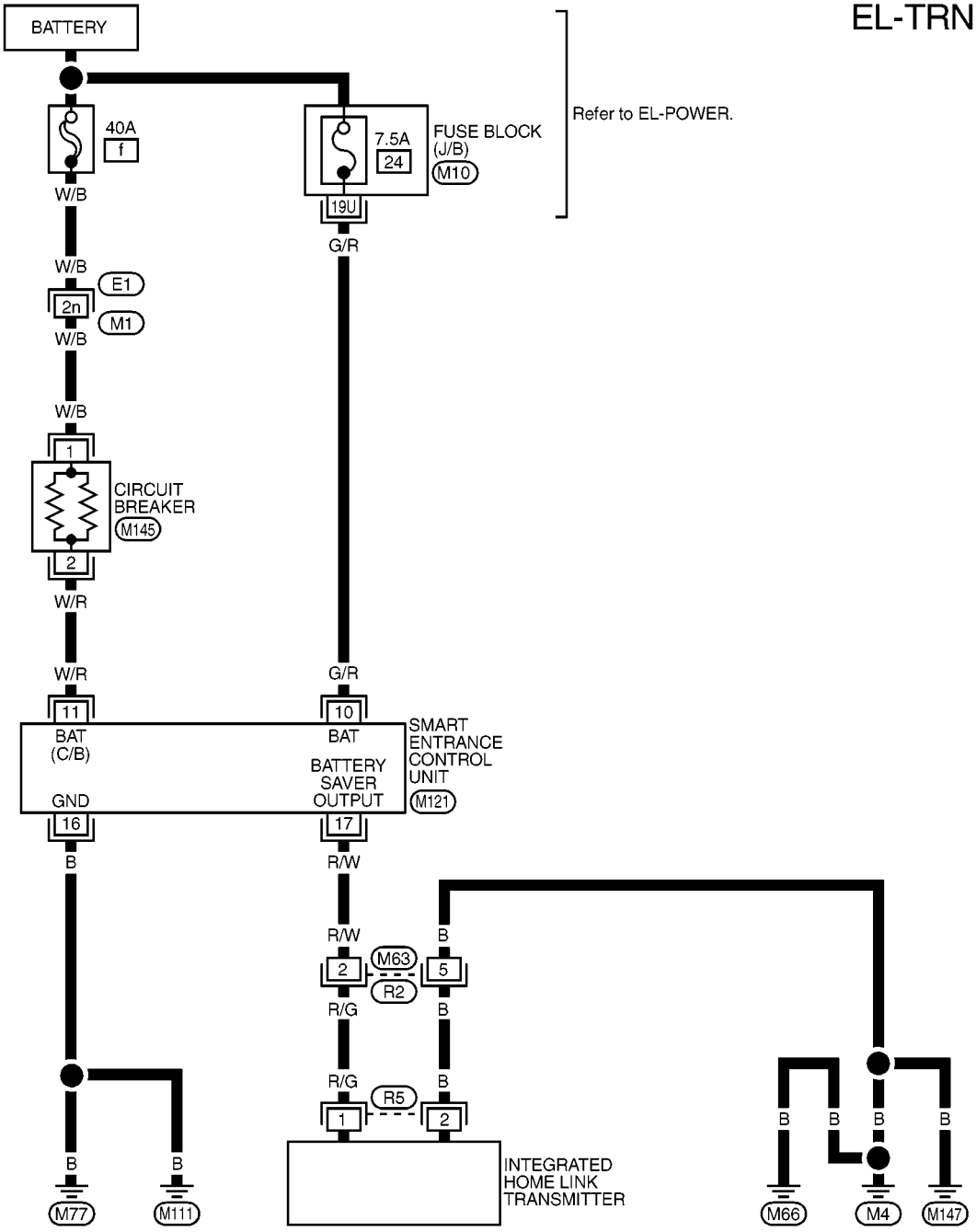
NAEL0126

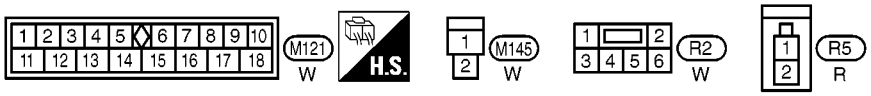
Terminal No.	Wire color	Connections	Operated condition		Voltage (Approximate values)
2	G/B	Rear window defogger relay	OFF → ON (Ignition key is in “ON” position)		0V → 12V
4	PU/W	Theft warning lamp relay	When panic alarm is operated using remote controller		12V → 0V
5	R/Y	Headlamp battery saver control unit	When headlamp battery saver timer is operated		12V
7	P	Multi-remote control relay	When doors are locked using remote controller		12V → 0V
8	R/B	Interior lamp	When interior lamp is operated using remote controller. (Lamp switch in “DOOR” position)		0V → 12V
10	G/R	Power source (Fuse)	—		12V
11	W/R	Power source (C/B)	—		12V
13	W/PU	Driver door lock actuator	Door lock & unlock switch	Free	0V
14	Y/B	Passenger door lock actuator		Unlocked	12V
15	L	Door lock actuators	Door lock & unlock switch	Free	0V
				Locked	12V
16	B	Ground	—		—
17	R/W	Battery saver (Interior lamp)	Battery saver is not operate → Operate		12V → 0V
19	LG/B	Horn relay	When doors are locked using remote controller with horn chirp mode.		12V → 0V
21	G/W	Ignition switch (ACC)	“ACC” position		12V
22	B/P	Seat belt buckle switch	Unfasten → Fasten (Ignition key is in “ON” position)		0V → 12V
23	BR	Door lock & unlock switches	Neutral → Locks		5V → 0V
26	Y/R	Rear and back door unlock sensors	All doors are locked → One or more doors are unlocked		5V → 0V
27	Y/B	Hood open signal	ON (Open) → OFF (Closed)		0V → 5V
28	R/L	Rear and back door switches	OFF (Closed) → ON (Open)		5V → 0V
29	G/R	Driver door switch	OFF (Closed) → ON (Open)		5V → 0V
30	LG	Door key cylinder unlock switch	OFF (Neutral) → ON (Unlocked)		12V → 0V
31	BR/Y	Theft warning indicator	Goes off → Illuminates		12V → 0V
32	W/R	Ignition key switch (Insert)	key inserted → key removed from IGN key cylinder		12V → 0V
33	W/B	Ignition switch (ON)	Ignition key is in “ON” position		12V
35	LG/R	Door lock & unlock switches	Neutral → Unlocks		5V → 0V
36	Y/G	Driver door unlock sensor	Driver door: Locked → Unlocked		5V → 0V
37	Y/L	Passenger door unlock sensor	Passenger door: Locked → Unlocked		5V → 0V
38	L/W	Glass hatch switch	ON (Open) → OFF (Closed)		0V → 12V
39	OR	Rear window defogger switch	OFF → ON		5V → 0V
40	Y	Passenger door switch	OFF (Closed) → ON (Open)		5V → 0V
41	Y	Door key cylinder lock switch	OFF (Neutral) → ON (Locked)		5V → 0V
42	G/B	Back door key unlock switch	OFF (Neutral) → ON (Unlock)		5V → 0V

Wiring Diagram — TRNSMT —

NAEL0127

EL-TRNSMT-01





REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 -FUSE BLOCK-JUNCTION BOX (J/B)

MEL866L

Trouble Diagnoses

NAEL0128

DIAGNOSTIC PROCEDURE

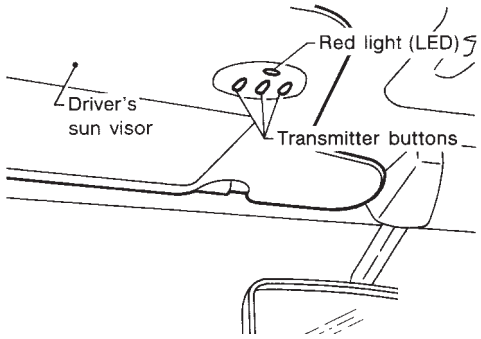
NAEL0128S01

SYMPTOM: Transmitter does not activate receiver.

Before conducting the procedure given below, make sure that system receiver (garage door opener, etc.) operates with original, hand-held transmitter. If NG, receiver or hand-held transmitter is at fault, not vehicle related.

1	PRELIMINARY CHECK

1. Turn ignition switch “OFF”.
2. Does red light (LED) of transmitter illuminate when any button is pressed?



SEL442U

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK TRANSMITTER FUNCTION

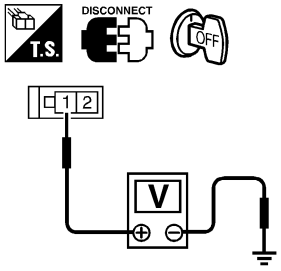
Check transmitter with Tool.
For details, refer to Technical Service Bulletin.

OK or NG

OK	▶	Receiver or handheld transmitter fault, not vehicle related.
NG	▶	Replace transmitter with sun visor assembly.

3	CHECK POWER SUPPLY

1. Disconnect transmitter connector.
2. Turn ignition switch “OFF”.
3. Check voltage between terminal 1 and body ground.



Battery voltage should exist.

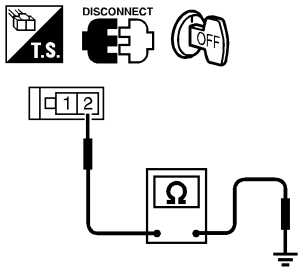
SEL358X

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 5.

4	CHECK GROUND CIRCUIT

Check continuity between terminal 2 and ground.



Continuity should exist.

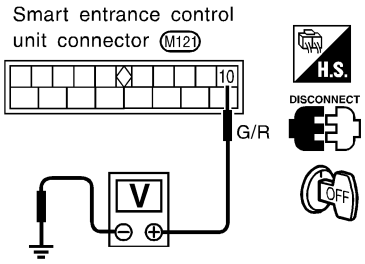
SEL359X

OK or NG

OK	▶	Replace transmitter with sun visor assembly.
NG	▶	Repair harness.

5	CHECK MAIN POWER SUPPLY FOR SMART ENTRANCE CONTROL UNIT

1. Disconnect smart entrance control unit.
2. Check voltage between smart entrance control unit terminal 10 and ground.



Battery voltage should exist.

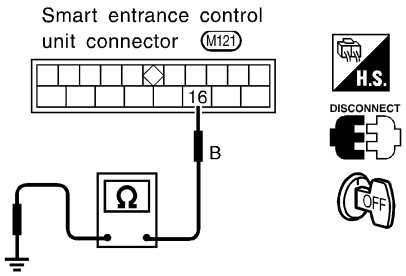
SEL360X

OK or NG

OK	▶	GO TO 6.
NG	▶	**Check the following.** ● 7.5A fuse No. 24, located in fuse block (J/B)

6	CHECK GROUND CIRCUIT FOR SMART ENTRANCE CONTROL UNIT

Check continuity between terminal 16 and ground.



Continuity should exist.

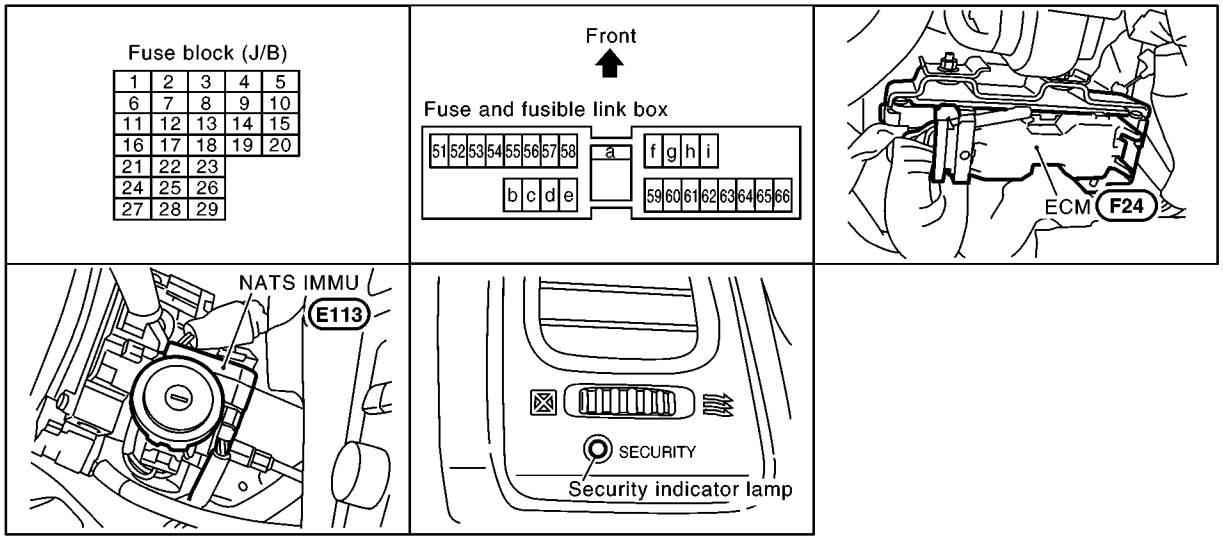
SEL361X

OK or NG

OK	▶	Power supply and ground circuits are OK.
NG	▶	Check ground harness.

Component Parts and Harness Connetor Location

NAEL0170



SEL357X

NOTE:
If customer reports a “No Start” condition, request ALL KEYS to be brought to the Dealer in case of an NVIS (NATS) malfunction.

System Description

=NAEL0171

NATS (Nissan Anti-Theft System) has the following immobilizer functions:

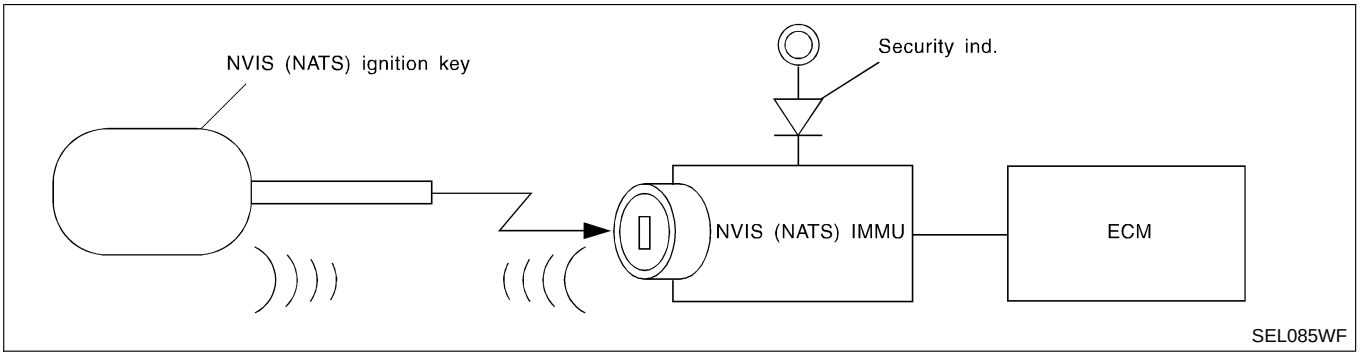
- Since only NVIS (NATS) ignition keys, whose ID nos. have been registered into the ECM and IMMU of NVIS (NATS), allow the engine to run, operation of a stolen vehicle without an NVIS (NATS) registered key is prevented by NVIS (NATS).
  That is to say, NVIS (NATS) will immobilise the engine if someone tries to start it without the registered key of NVIS (NATS).
- All of the originally supplied ignition key IDs (except for card plate key) have been NVIS (NATS) registered.
  If requested by the vehicle owner, a maximum of five key IDs can be registered into the NVIS (NATS) components.
- The security indicator blinks when the ignition switch is in “OFF” or “ACC” position. Therefore, NVIS (NATS) warns outsiders that the vehicle is equipped with the anti-theft system.
- When NVIS (NATS) detects trouble, the security indicator lamp lights up while ignition key is in the “ON” position.
- NVIS (NATS) trouble diagnoses, system initialization and additional registration of other NVIS (NATS) ignition key IDs must be carried out using CONSULT-II hardware and CONSULT-II NVIS (NATS) software. When NVIS (NATS) initialization has been completed, the ID of the inserted ignition key is automatically NVIS (NATS) registered. Then, if necessary, additional registration of other NVIS (NATS) ignition key IDs can be carried out.
  Regarding the procedures of NVIS (NATS) initialization and NVIS (NATS) ignition key ID registration, refer to CONSULT-II operation manual, IVIS/NVIS.
- **When servicing a malfunction of the NVIS (NATS) (indicated by lighting up of Security Indicator Lamp) or registering another NVIS (NATS) ignition key ID no., it is necessary to re-register original key identification. Therefore, be sure to receive ALL KEYS from vehicle owner.**

System Composition

NAEL0172

The immobiliser function of the NVIS (NATS) consists of the following:

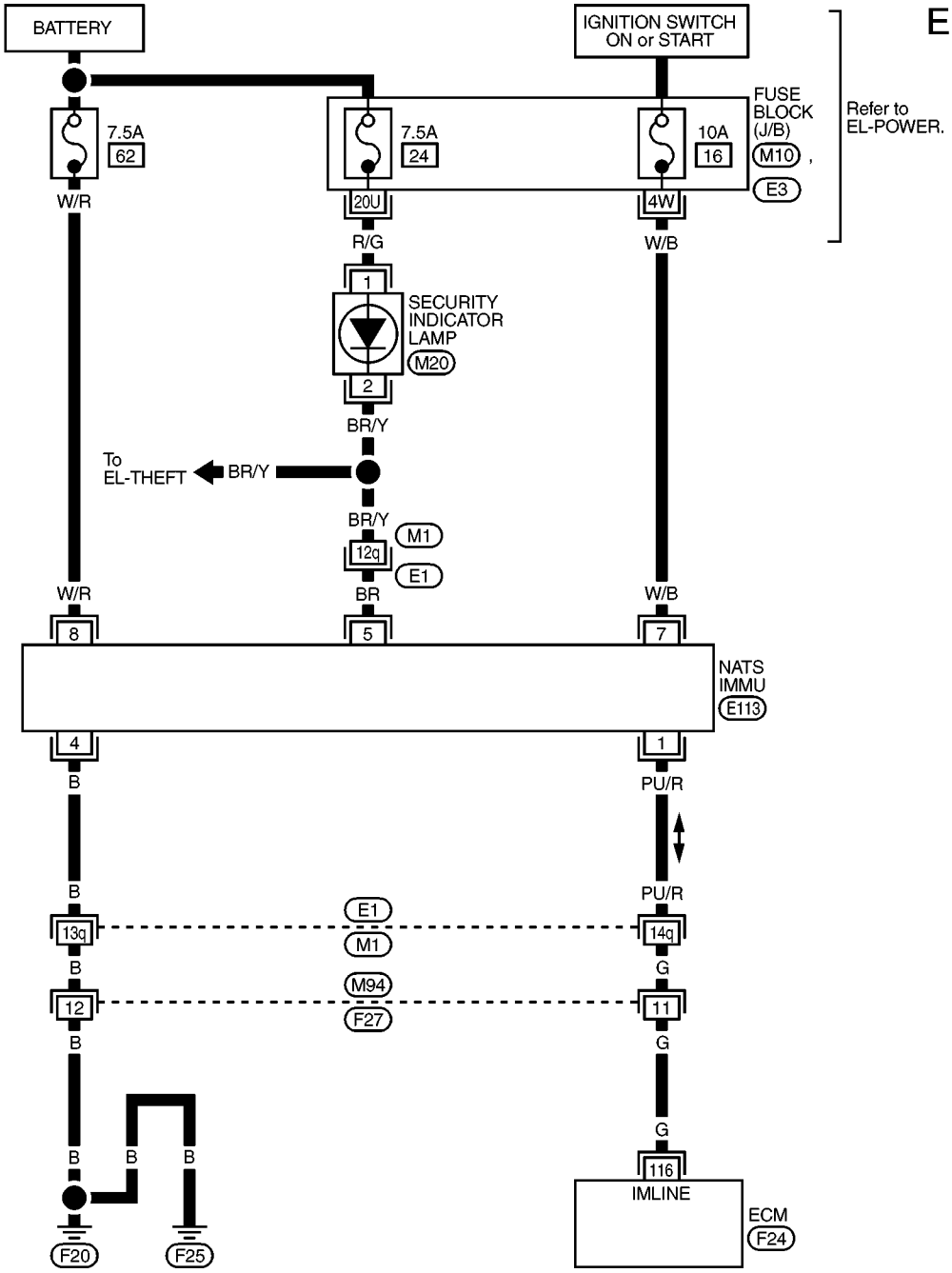
- NVIS (NATS) ignition key
- NVIS (NATS) immobilizer control unit (IMMU) located in the ignition key cylinder
- Engine control module (ECM)
- Security indicator

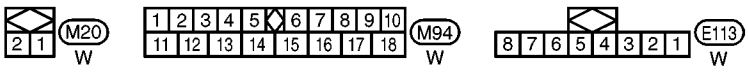


Wiring Diagram — NATS —

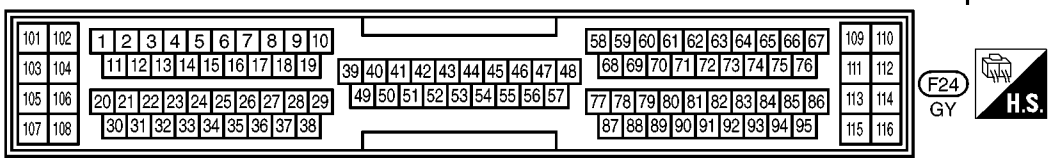
NAEL0173

EL-NATS-01

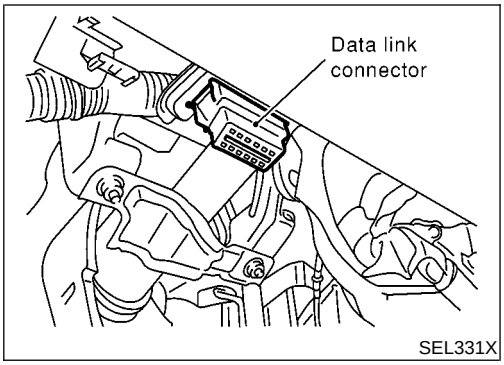




REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)
M10 , E3 -FUSE BLOCK-JUNCTION BOX (J/B)



MEL865L



SEL331X

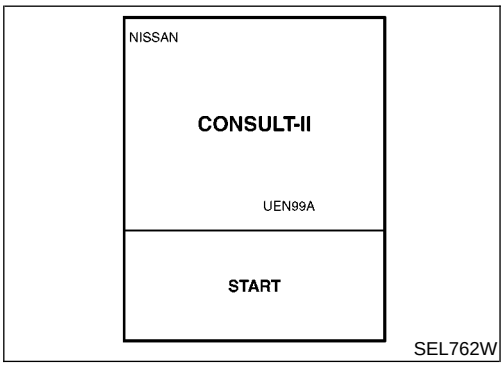
CONSULT-II

NAEL0223

CONSULT-II INSPECTION PROCEDURE

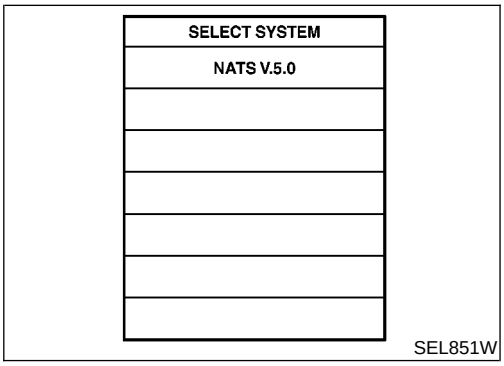
NAEL0223S01

1. Turn ignition switch OFF.
2. Insert NVIS (NATS) program card into CONSULT-II.
   : Program card
   NATS (UEN99A)
3. Connect CONSULT-II to data link connector.



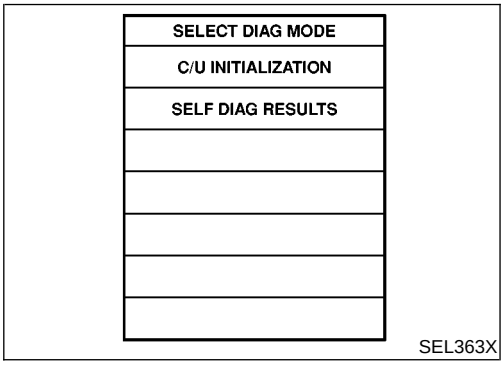
SEL762W

4. Turn ignition switch ON.
5. Touch “START”.



SEL851W

6. Select “NATS V.5.0”.



SEL363X

7. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual, IVIS/NVIS.

CONSULT-II DIAGNOSTIC TEST MODE FUNCTION

NAEL0223S02

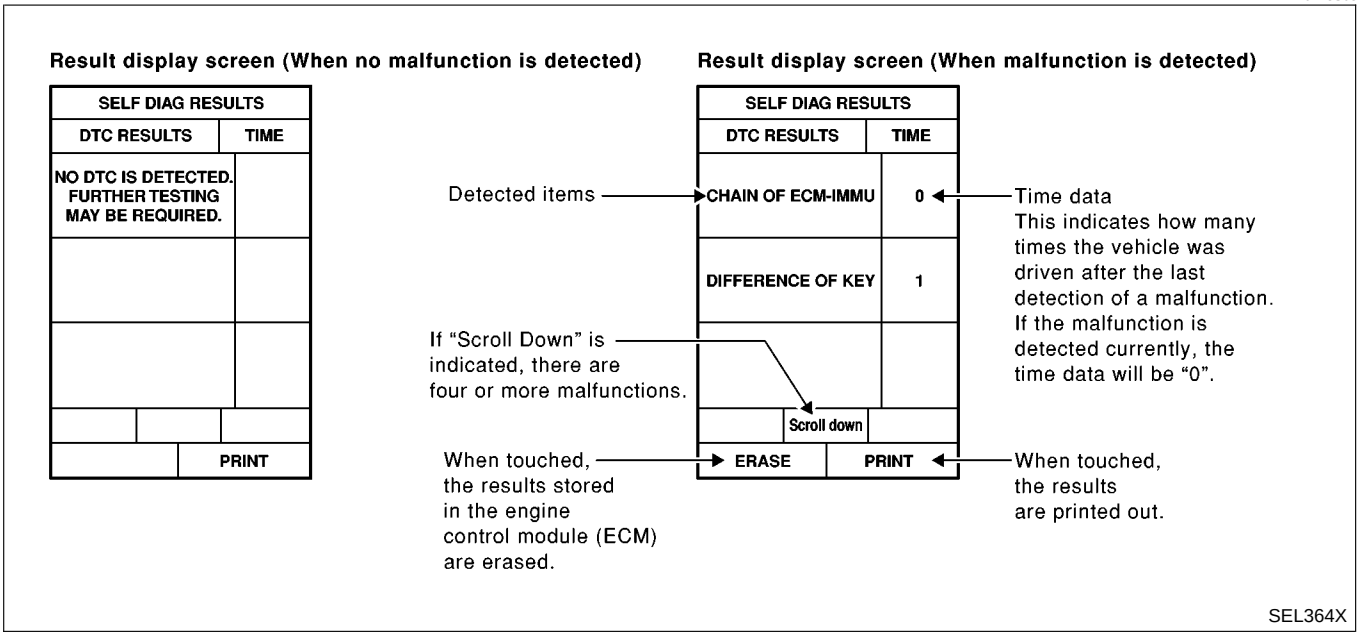
CONSULT-II DIAGNOSTIC TEST MODE	Description
C/U INITIALIZATION	When replacing any of the following three components, C/U initialization and re-registration of all NVIS (NATS) ignition keys are necessary. [NVIS (NATS) ignition key/IMMU/ECM]
SELF-DIAG RESULTS	Detected items (screen terms) are as shown in the chart EL-356.

NOTE:

- **When any initialization is performed, all ID previously registered will be erased and all NVIS (NATS) ignition keys must be registered again.**
- The engine cannot be started with an unregistered key. In this case, the system will show "DIFFERENCE OF KEY" or "LOCK MODE" as a self-diagnostic result on the CONSULT-II screen.
- In rare case, "CHAIN OF ECM-IMMU" might be stored as a self-diagnostic result during key registration procedure, even if the system is not malfunctioning.

HOW TO READ SELF-DIAGNOSTIC RESULTS

NAEL0223S03



SEL364X

NVIS (NATS) SELF-DIAGNOSTIC RESULTS ITEM CHART

NAEL0223S04

Detected items (NATS program card screen terms)	P No. Code (Self-diagnostic result of "ENGINE")	Malfunction is detected when	Reference page
ECM INT CIRC-IMMU	NATS MALFUNCTION P1613	The malfunction of ECM internal circuit of IMMU communication line is detected.	EL-360
CHAIN OF ECM-IMMU	NATS MALFUNCTION P1612	Communication impossible between ECM and IMMU (In rare case, "CHAIN OF ECM-IMMU" might be stored during key registration procedure, even if the system is not malfunctioning.)	EL-361
DIFFERENCE OF KEY	NATS MALFUNCTION P1615	IMMU can receive the key ID signal but the result of ID verification between key ID and IMMU is NG.	EL-365
CHAIN OF IMMU-KEY	NATS MALFUNCTION P1614	IMMU cannot receive the key ID signal.	EL-366
ID DISCORD, IMM-ECM	NATS MALFUNCTION P1611	The result of ID verification between IMMU and ECM is NG. System initialization is required.	EL-367

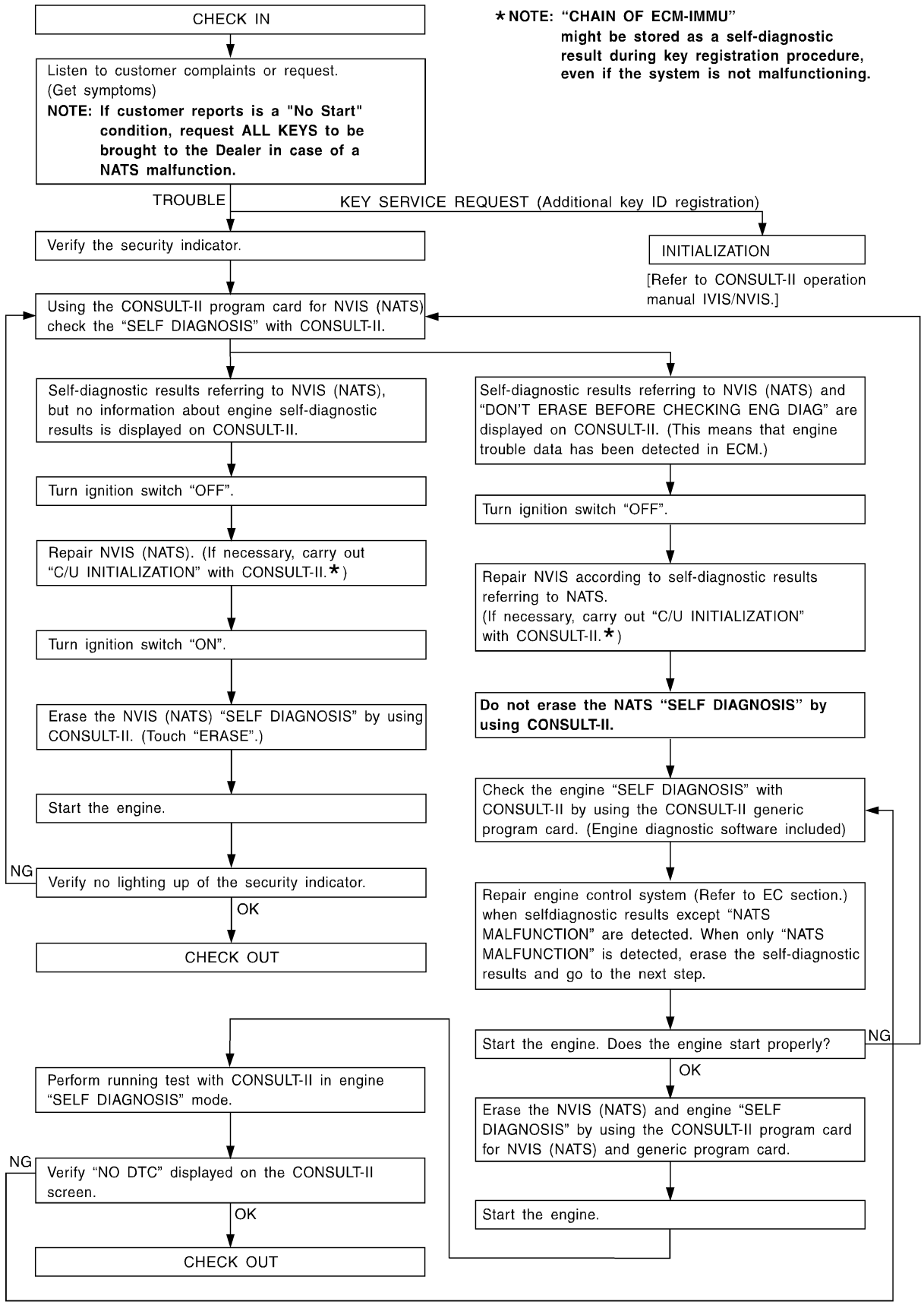
Detected items (NATS program card screen terms)	P No. Code (Self-diagnostic result of "ENGINE"	Malfunction is detected when	Reference page
LOCK MODE	NATS MALFUNCTION P1610	When the starting operation is carried out five or more times consecutively under the following conditions, NVIS (NATS) will shift the mode to one which prevents the engine from being started. ● Unregistered ignition key is used. ● IMMU or ECM's malfunctioning.	EL-370
DON'T ERASE BEFORE CHECKING ENG DIAG	—	All engine trouble codes except NVIS (NATS) trouble code has been detected in ECM.	EL-358

Trouble Diagnoses

NAEL0224

WORK FLOW

NAEL0224S01



SEL004XA

SYMPTOM MATRIX CHART 1
(Self-diagnosis related item)

NAEL0224S02

SYMPTOM	Displayed "SELF-DIAG RESULTS" on CONSULT-II screen.	DIAGNOSTIC PROCEDURE (Reference page)	SYSTEM (Malfunctioning part or mode)	REFERENCE PART NO. OF ILLUSTRATION ON NEXT PAGE
• Security indicator lighting up* • Engine cannot be started.	ECM INT CIRC-IMMU	PROCEDURE 1 (EL-360)	ECM	B
	CHAIN OF ECM-IMMU	PROCEDURE 2 (EL-361)	In rare case, "CHAIN OF ECM-IMMU" might be stored during key registration procedure, even if the system is not malfunctioning.	—
			Open circuit in battery voltage line of IMMU circuit	C1
			Open circuit in ignition line of IMMU circuit	C2
			Open circuit in ground line of IMMU circuit	C3
			Open circuit in communication line between IMMU and ECM	C4
			Short circuit between IMMU and ECM communication line and battery voltage line	C4
			Short circuit between IMMU and ECM communication line and ground line	C4
			ECM	B
			IMMU	A
	DIFFERENCE OF KEY	PROCEDURE 3 (EL-365)	Unregistered key	D
			IMMU	A
	CHAIN OF IMMU-KEY	PROCEDURE 4 (EL-366)	Malfunction of key ID chip	E
			IMMU	A
	ID DISCORD, IMM-ECM	PROCEDURE 5 (EL-367)	System initialization has not yet been completed.	F
			ECM	F
	LOCK MODE	PROCEDURE 7 (EL-370)	LOCK MODE	D
• MIL staying ON • Security indicator lighting up*	DON'T ERASE BEFORE CHECKING ENG DIAG	WORK FLOW (EL-358)	Engine trouble data and NVIS (NATS) trouble data have been detected in ECM	—

*: When NVIS (NATS) detects trouble, the security indicator lights up while ignition key is in the "ON" position.

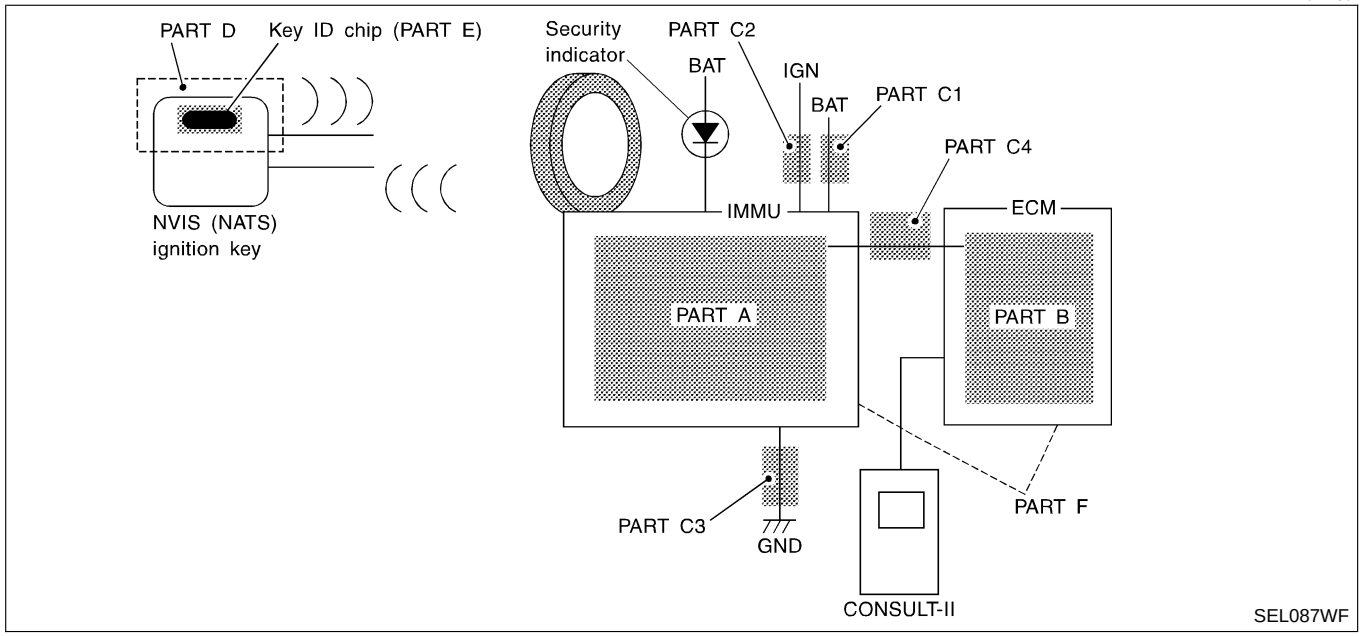
SYMPTOM MATRIX CHART 2
(Non self-diagnosis related item)

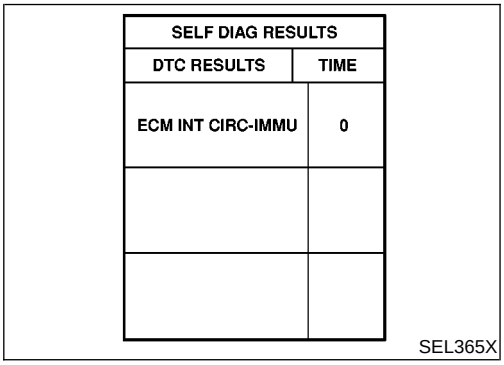
NAEL0224S03

SYMPTOM	DIAGNOSTIC PROCEDURE (Reference page)	SYSTEM (Malfunctioning part or mode)
Security ind. does not light up.	PROCEDURE 6 (EL-368)	Security ind.
		Open circuit between Fuse and IMMU
		Continuation of initialization mode
		IMMU

DIAGNOSTIC SYSTEM DIAGRAM

NAEL0224S04





DIAGNOSTIC PROCEDURE 1

NAEL0224S05

Self-diagnostic results:
"ECM INT CIRC-IMMU" displayed on CONSULT-II screen

1. Confirm SELF-DIAGNOSTIC RESULTS "ECM INT CIRC-IMMU" displayed on CONSULT-II screen. Ref. part No. B.
2. Replace ECM.
3. Perform initialization with CONSULT-II.
   For initialization, refer to "CONSULT-II operation manual IVIS/NVIS".

DIAGNOSTIC PROCEDURE 2

=NAEL0224S06

Self-diagnostic results:
"CHAIN OF ECM-IMMU" displayed on CONSULT-II screen

1	CONFIRM SELF-DIAGNOSTIC RESULTS

Confirm SELF-DIAGNOSTIC RESULTS "CHAIN OF ECM-IMMU" displayed on CONSULT-II screen.

NOTE:
In rare case, "CHAIN OF ECM-IMMU" might be stored during key registration procedure, even if the system is not malfunctioning.

SELF DIAG RESULTS	
DTC RESULTS	TIME
CHAIN OF ECM-IMMU	0

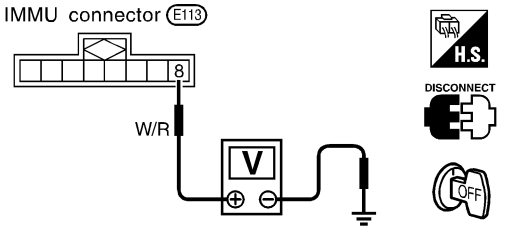
SEL366X

Is CONSULT-II screen displayed as above?

Yes	▶	GO TO 2.
No	▶	GO TO SYMPTOM MATRIX CHART 1.

2	CHECK POWER SUPPLY CIRCUIT FOR IMMU

1. Disconnect IMMU connector.
2. Check voltage between terminal 8 of IMMU and ground with CONSULT-II or tester.



Battery voltage should exist.

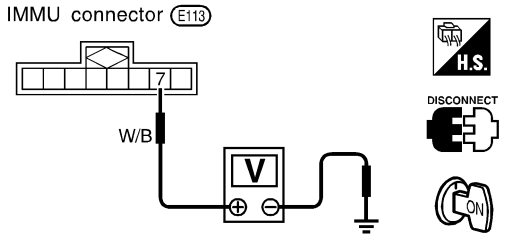
SEL302WD

OK or NG

OK	▶	GO TO 3.
NG	▶	**Check the following** • 7.5A fuse (No. 62, located in the fuse and fusible link box) • Harness for open or short between fuse and IMMU connector **Ref. Part No. C1**

3	CHECK IGN SW. ON SIGNAL

1. Turn ignition switch ON.
2. Check voltage between terminal 7 of IMMU and ground with CONSULT-II or tester.



Battery voltage should exist.

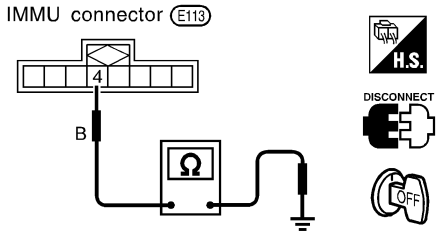
SEL303WF

OK or NG

OK	▶	GO TO 4.
NG	▶	**Check the following** ● 10A fuse [No. 16, located in the fuse block (J/B)] ● Harness for open or short between fuse and IMMU connector **Ref. part No. C2**

4	CHECK GROUND CIRCUIT FOR IMMU

1. Turn ignition OFF.
2. Check harness continuity between IMMU terminal 4 and ground.



Continuity should exist.

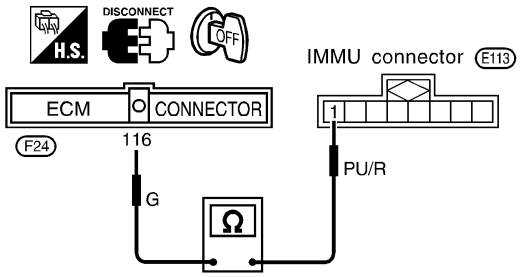
SEL304WD

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair harness. **Ref. part No. C3**

5	CHECK COMMUNICATION LINE OPEN CIRCUIT

1. Disconnect ECM connector.
2. Check harness continuity between ECM terminal 116 and IMMU terminal 1.



Continuity should exist.

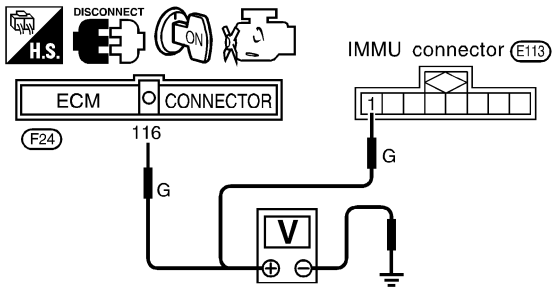
SEL305WD

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair harness or connector. **Ref. part No. C4**

6	CHECK COMMUNICATION LINE BATTERY SHORT CIRCUIT

1. Turn ignition ON.
2. Check voltage between ECM terminal 116 or IMMU terminal 1 and ground.



Voltage: 0V

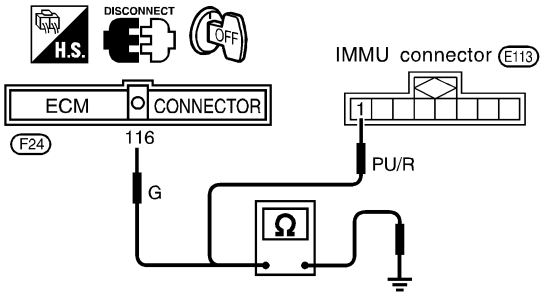
SEL306WD

OK or NG

OK	▶	GO TO 7.
NG	▶	Communication line is short-circuited with battery voltage line or ignition switch ON line. Repair harness or connectors. **Ref. part No. C4**

7	CHECK COMMUNICATION LINE GROUND SHORT CIRCUIT

1. Turn ignition switch OFF.
2. Check continuity between ECM terminal 116 or IMMU terminal 1 and ground.



Continuity should not exist.

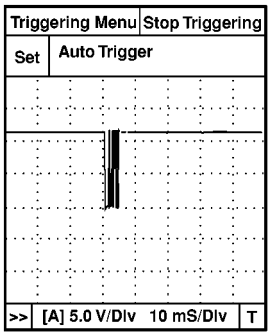
SEL307WD

OK or NG

OK	▶	GO TO 8.
NG	▶	Communication line is short-circuited with ground line. Repair harness or connectors. **Ref. part No. C4**

8	SIGNAL FROM ECM TO IMMU CHECK

1. Check the signal between ECM terminal 116 and ground with CONSULT-II or oscilloscope when ignition switch is turned "ON".
2. Make sure signals which are shown in the figure below can be detected during 750 msec. just after ignition switch is turned "ON".



SEL730W

OK or NG

OK	▶	IMMU is malfunctioning. Replace IMMU. **Ref. part No. A** Perform initialization with CONSULT-II. For the operation of initialization, refer to "CONSULT-II Operation Manual IVIS/NVIS".
NG	▶	ECM is malfunctioning. Replace ECM. **Ref. part No. B** Perform initialization with CONSULT-II. For the operation of initialization, refer to "CONSULT-II Operation Manual IVIS/NVIS".

DIAGNOSTIC PROCEDURE 3

=NAEL0224S07

Self-diagnostic results:
"DIFFERENCE OF KEY" displayed on CONSULT-II screen

1	CONFIRM SELF-DIAGNOSTIC RESULTS

Confirm SELF-DIAGNOSTIC RESULTS "DIFFERENCE OF KEY" displayed on CONSULT-II screen.

SELF DIAG RESULTS	
DTC RESULTS	TIME
DIFFERENCE OF KEY	0

SEL367X

Is CONSULT-II screen displayed as above?

Yes	▶	GO TO 2.
No	▶	GO TO SYMPTOM MATRIX CHART 1.

2	PERFORM INITIALIZATION WITH CONSULT-II

Perform initialization with CONSULT-II. Re-register all NVIS (NATS) ignition key IDs.
For initialization and registration of NVIS (NATS) ignition key IDs, refer to "CONSULT-II operation manual NVIS/NVIS".

IMMU INITIALIZATION
INITIALIZATION FAIL
THEN IGN KEY SW 'OFF' AND 'ON', AFTER CONFIRMING SELF-DIAG AND PASSWORD, PERFORM C/U INITIALIZATION AGAIN.

SEL297W

NOTE:
If the initialization is not completed or fails, CONSULT-II shows above message on the screen.

Can the system be initialized and can the engine be started with re-registered NVIS (NATS) ignition key?

Yes	▶	Ignition key ID was unregistered. **Ref. part No. D**
No	▶	IMMU is malfunctioning. Replace IMMU. **Ref. part No. A** Perform initialization with CONSULT-II. For initialization, refer to "CONSULT-II operation manual IVIS/NVIS".

DIAGNOSTIC PROCEDURE 4

=NAEL0224S08

Self-diagnostic results:
"CHAIN OF IMMU-KEY" displayed on CONSULT-II screen

1	CONFIRM SELF-DIAGNOSTIC RESULTS

Confirm SELF-DIAGNOSTIC RESULTS "CHAIN OF IMMU-KEY" displayed on CONSULT-II screen.

SELF DIAG RESULTS	
DTC RESULTS	TIME
CHAIN OF IMMU-KEY	0

SEL368X

Is CONSULT-II screen displayed as above?

Yes	▶	GO TO 2.
No	▶	GO TO SYMPTOM MATRIX CHART 1.

2	CHECK NVIS (NATS) IGNITION KEY ID CHIP

Start engine with another registered NVIS (NATS) ignition key.

Does the engine start?

Yes	▶	Ignition key ID chip is malfunctioning. Replace the ignition key. **Ref. part No. E** Perform initialization with CONSULT-II. For initialization, refer to "CONSULT-II Operation Manual IVIS/NVIS".
No	▶	GO TO 3.

3	CHECK IMMU INSTALLATION

Check IMMU installation.
Refer to "How to Replace IMMU" in EL-371.

OK or NG

OK	▶	IMMU is malfunctioning. Replace IMMU. **Ref. part No. A** Perform initialization with CONSULT-II. For initialization, refer to "CONSULT-II Operation Manual IVIS/NVIS".
NG	▶	Reinstall IMMU correctly.

DIAGNOSTIC PROCEDURE 5

=NAEL0224S09

Self-diagnostic results:
"ID DISCORD, IMM-ECM" displayed on CONSULT-II screen

1	CONFIRM SELF-DIAGNOSTIC RESULTS

Confirm SELF-DIAGNOSTIC RESULTS "ID DISCORD, IMM-ECM" displayed on CONSULT-II screen.

SELF DIAG RESULTS	
DTC RESULTS	TIME
ID DISCORD, IMM-ECM	0

SEL369X

NOTE:
"ID DISCORD IMMU-ECM":
Registered ID of IMMU is in discord with that of ECM.

Is CONSULT-II screen displayed as above?

Yes	▶	GO TO 2.
No	▶	GO TO SYMPTOM MATRIX CHART 1.

2	PERFORM INITIALIZATION WITH CONSULT-II

Perform initialization with CONSULT-II. Re-register all NVIS (NATS) ignition key IDs.
For initialization, refer to "CONSULT-II operation manual IVIS/NVIS".

IMMU INITIALIZATION
INITIALIZATION FAIL
THEN IGN KEY SW 'OFF' AND 'ON', AFTER CONFIRMING SELF-DIAG AND PASSWORD, PERFORM C/U INITIALIZATION AGAIN.

SEL297W

NOTE:
If the initialization is not completed or fails, CONSULT-II shows above message on the screen.

Can the system be initialized?

Yes	▶	Start engine. (END) (System initialization had not been completed. **Ref. part No. F**)
No	▶	ECM is malfunctioning. Replace ECM. **Ref. part No. F** Perform initialization with CONSULT-II. For initialization, refer to "CONSULT-II operation manual IVIS/NVIS".

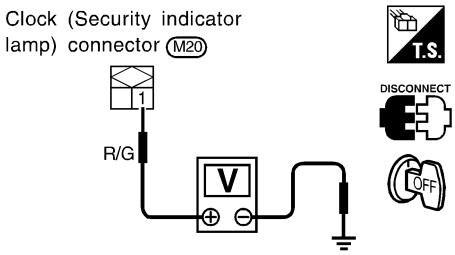
DIAGNOSTIC PROCEDURE 6

=NAEL0224S10

"SECURITY INDICATOR LAMP DOES NOT LIGHT UP"

1	CHECK FUSE	
Check 10A fuse [No. 12, located in the fuse block (J/B)]. **Is 10A fuse OK?**		
Yes	▶	GO TO 2.
No	▶	Replace fuse.

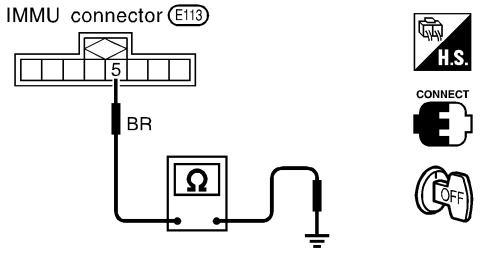
2	CHECK SECURITY INDICATOR LAMP	
1. Install 10A fuse. 2. Perform initialization with CONSULT-II. For initialization, refer to "CONSULT-II Operation Manual IVIS/NVIS". 3. Turn ignition switch OFF. 4. Start engine and turn ignition switch OFF. 5. Check the security indicator lamp lighting. **Security indicator lamp should be blinking.** **OK or NG**		
OK	▶	INSPECTION END
NG	▶	GO TO 3.

3	CHECK SECURITY INDICATOR LAMP POWER SUPPLY CIRCUIT	
1. Disconnect security indicator lamp connector. 2. Check voltage between security indicator lamp connector terminal 1 and ground.  **Battery voltage should exist.** SEL370X **OK or NG**		
OK	▶	GO TO 4.
NG	▶	Check harness for open or short between fuse and security indicator lamp.

4	CHECK SECURITY INDICATOR LAMP	
Check security Indicator Lamp. **Is security indicator lamp OK?**		
Yes	▶	GO TO 5.
No	▶	Replace security indicator lamp.

5	CHECK IMMU FUNCTION

1. Connect IMMU connector.
2. Disconnect security indicator lamp connector.
3. Check continuity between IMMU terminal 5 and ground.



Continuity should exist intermittently.

SEL300WC

OK or NG

OK	▶	Check harness for open or short between security indicator lamp and IMMU.
NG	▶	IMMU is malfunctioning. Replace IMMU. Perform initialization with CONSULT-II. For initialization, refer to "CONSULT-II operation manual IVIS/NVIS".

DIAGNOSTIC PROCEDURE 7

=NAEL0224S11

Self-diagnostic results:
"LOCK MODE" displayed on CONSULT-II screen

1	CONFIRM SELF-DIAGNOSTIC RESULTS

Confirm SELF-DIAGNOSTIC RESULTS "LOCK MODE" is displayed on CONSULT-II screen.

SELF DIAG RESULTS	
DTC RESULTS	TIME
LOCK MODE	0

SEL371X

Is CONSULT-II screen displayed as above?

Yes	▶	GO TO 2.
No	▶	GO TO SYMPTOM MATRIX CHART 1.

2	ESCAPE FROM LOCK MODE

1. Turn ignition switch OFF.
2. Turn ignition switch ON with registered key. (Do not start engine.) Wait 5 seconds.
3. Return the key to OFF position.
4. Repeat steps 2 and 3 twice (total of three cycles).
5. Start the engine.

Does engine start?

Yes	▶	System is OK. (Now system is escaped from "LOCK MODE".)
No	▶	GO TO 3.

3	CHECK IMMU ILLUSTRATION

Check IMMU installation. Refer to "How to Replace IMMU" in EL-371.

OK or NG

OK	▶	GO TO 4.
NG	▶	Reinstall IMMU correctly.

4	PERFORM INITIALIZATION WITH CONSULT-II

Perform initialization with CONSULT-II.
For initialization, refer to "CONSULT-II operation manual IVIS/NVIS".

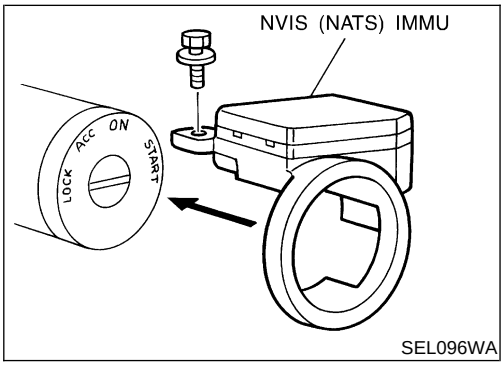
IMMU INITIALIZATION
INITIALIZATION FAIL
THEN IGN KEY SW 'OFF' AND 'ON', AFTER CONFIRMING SELF-DIAG AND PASSWORD, PERFORM C/U INITIALIZATION AGAIN.

SEL297W

NOTE:
If the initialization is not completed or fails, CONSULT-II shows the above message on the screen.

Can the system be initialized?

Yes	▶	System is OK.
No	▶	GO TO DIAGNOSTIC PROCEDURE 4 to check "CHAIN OF IMMU-KEY", refer to EL-366.



SEL096WA

How to Replace NVIS (NATS) IMMU

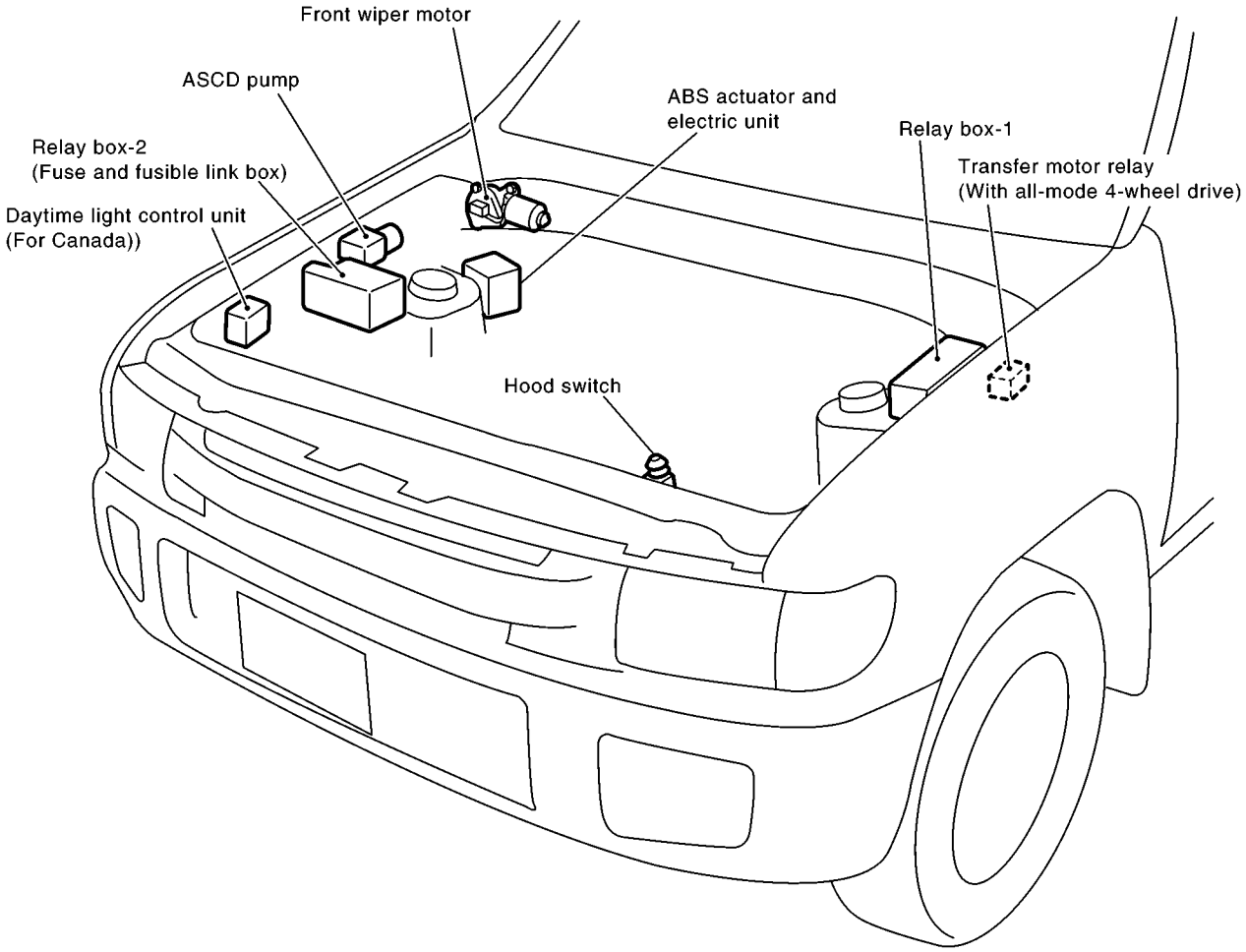
NAEL0225

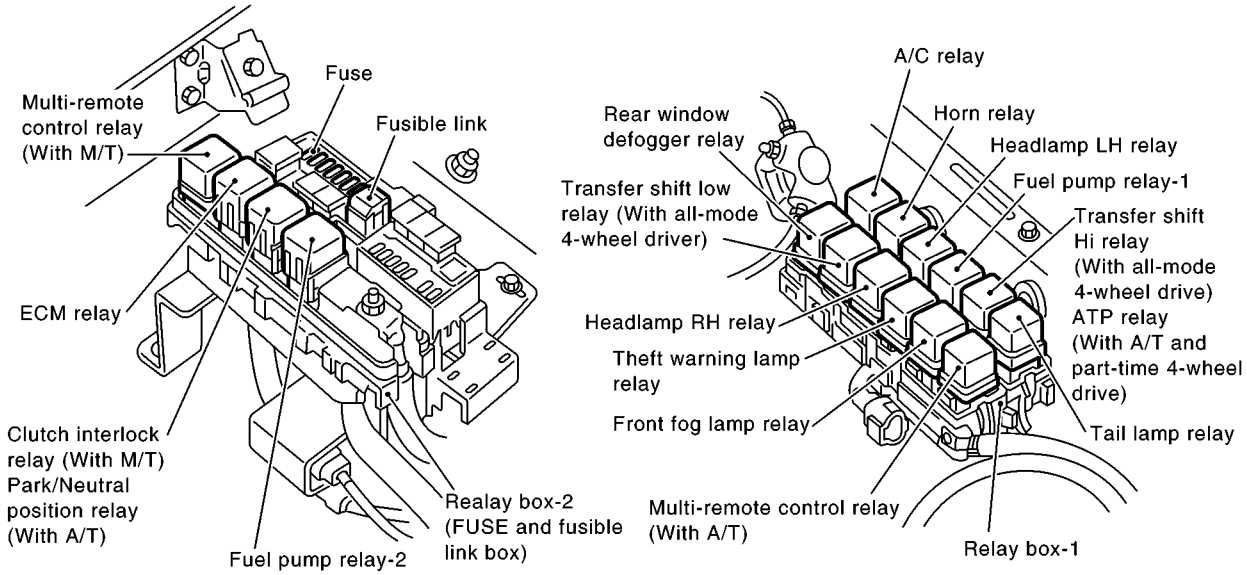
NOTE:

- **If NVIS (NATS) IMMU is not installed correctly, NVIS (NATS) system will not operate properly and SELF-DIAG RESULTS on CONSULT-II screen will show "LOCK MODE".**

Engine Compartment

NAEL0129



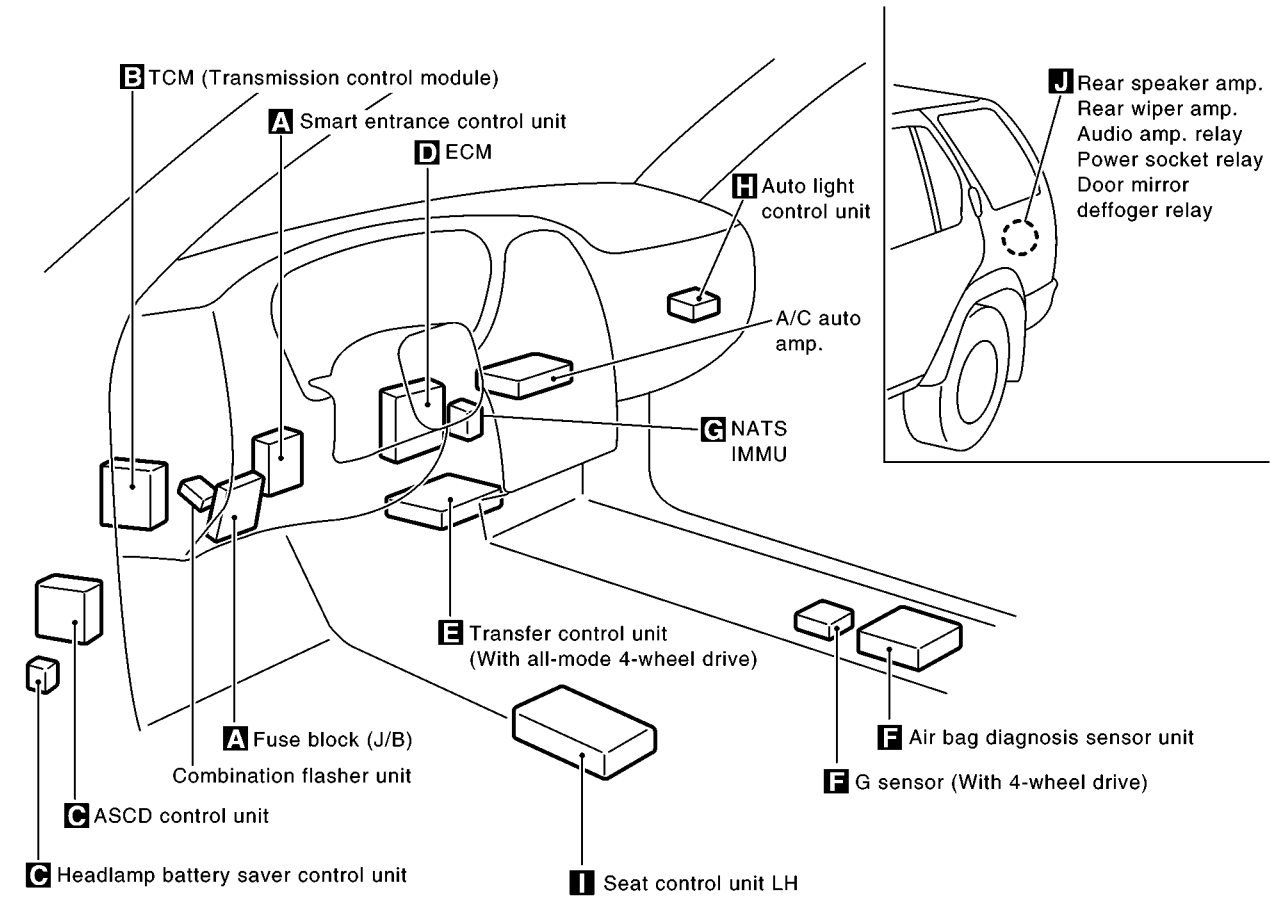


MEL250M

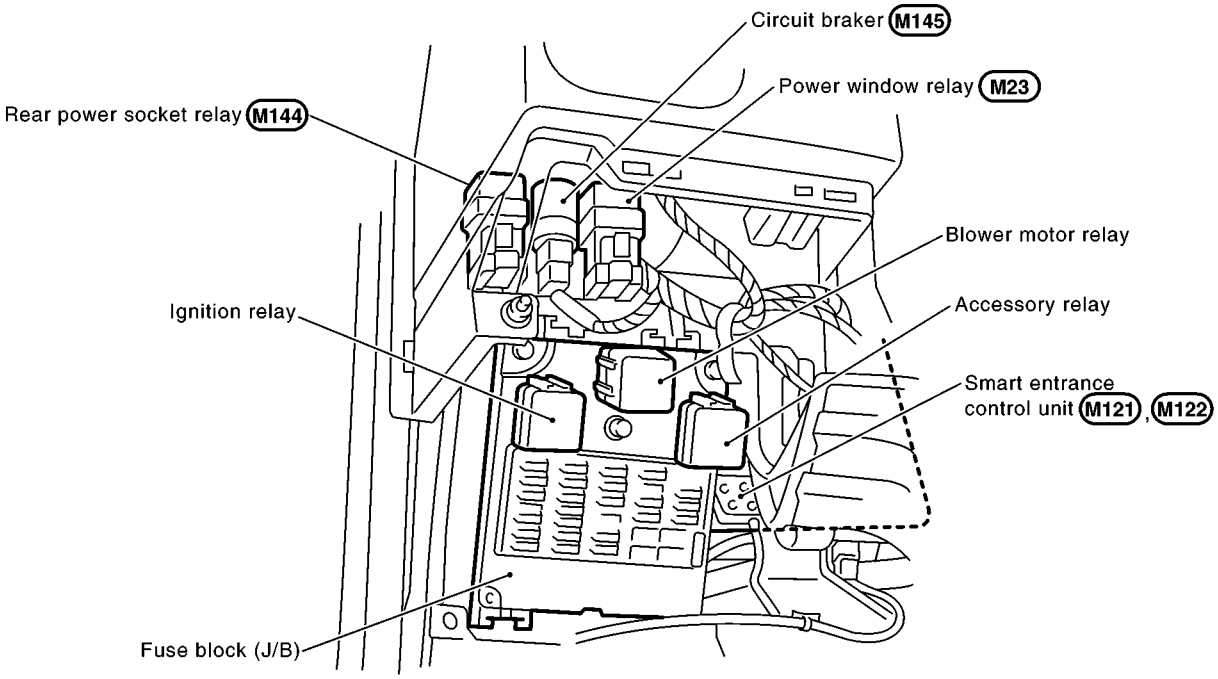
NOTE:

Passenger Compartment

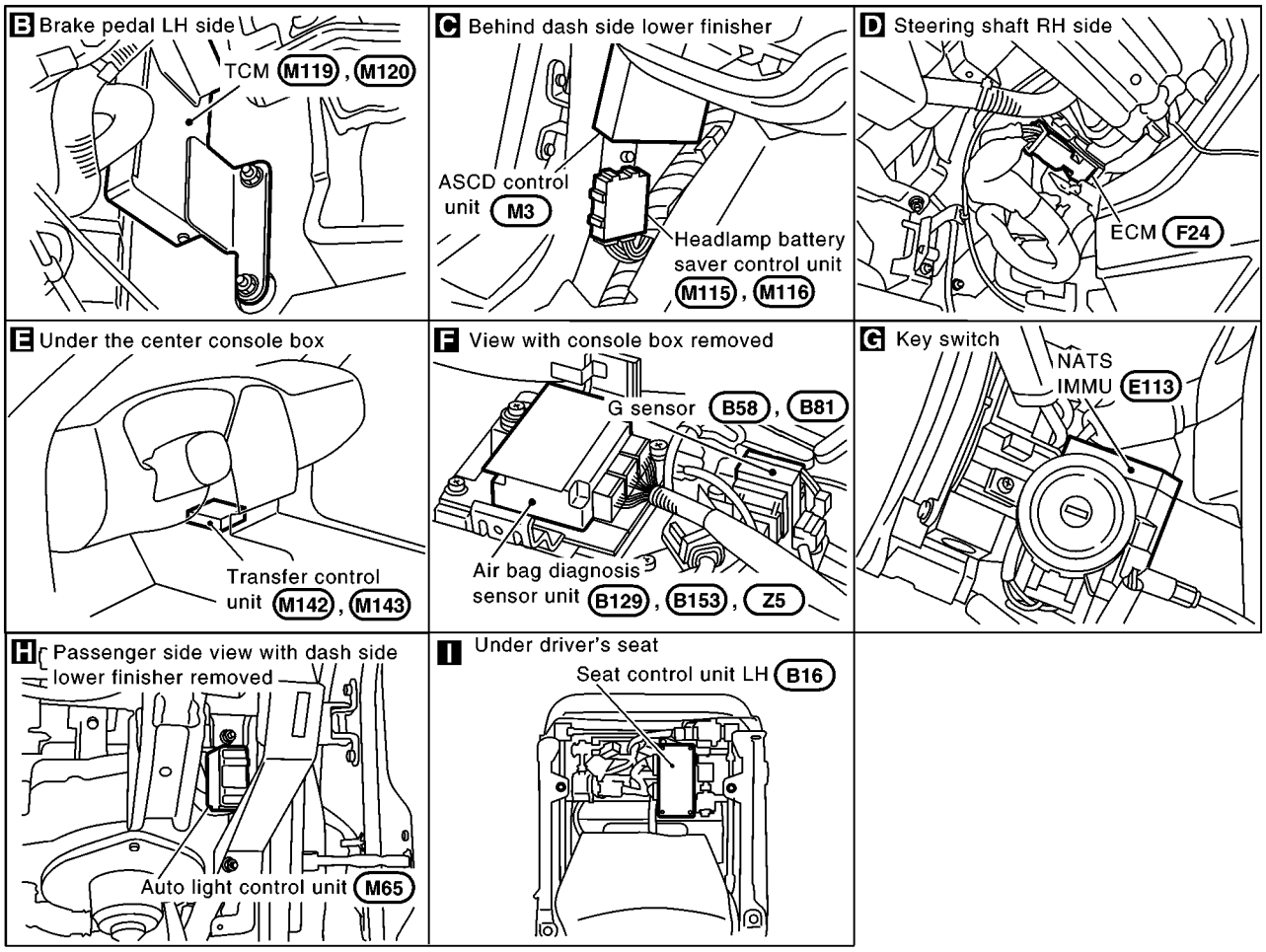
NAEL0130

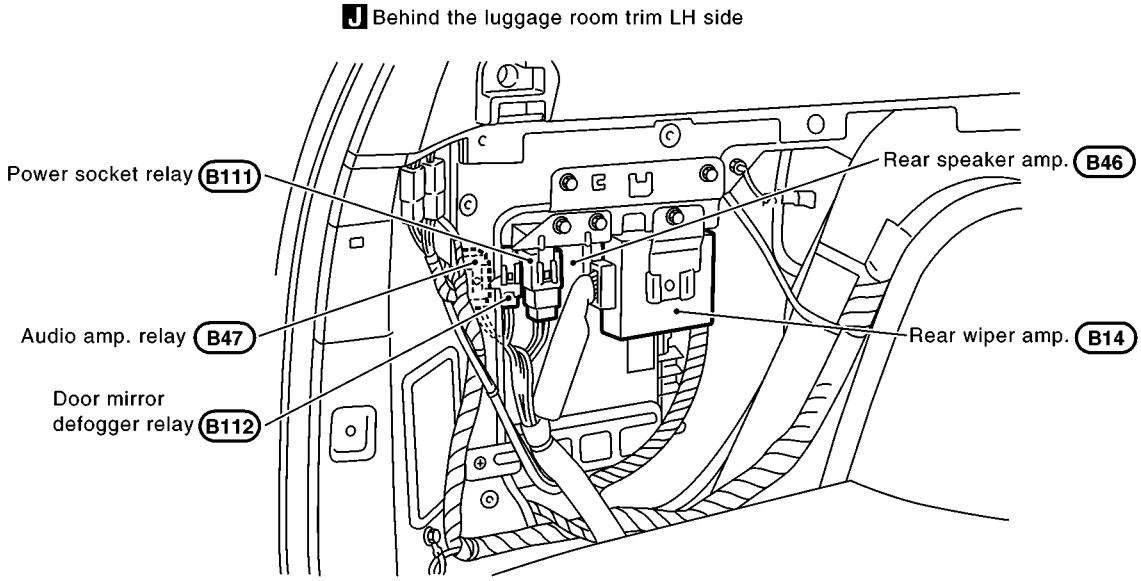


A Instrument panel LH side



MEL251M

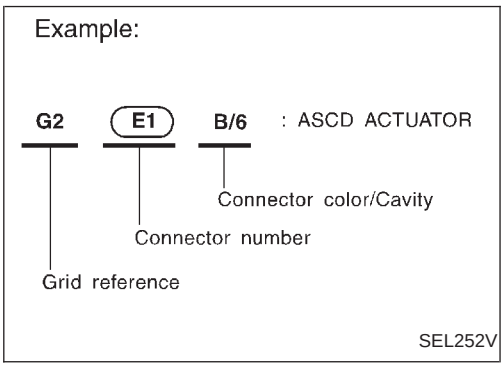

B Brake pedal LH side
TCM M119, M120
C Behind dash side lower finisher
ASCD control unit M3
Headlamp battery saver control unit M115, M116
D Steering shaft RH side
ECM F24
E Under the center console box
Transfer control unit M142, M143
F View with console box removed
G sensor B58, B81
Air bag diagnosis sensor unit B129, B153, Z5
G Key switch
NATS IMMU E113
H Passenger side view with dash side lower finisher removed
Auto light control unit M65
I Under driver's seat
Seat control unit LH B16


J Behind the luggage room trim LH side
Power socket relay B111
Audio amp. relay B47
Door mirror defogger relay B112
Rear speaker amp. B46
Rear wiper amp. B14

MEL252M

How to Read Harness Layout

NAEL0131



The following Harness Layouts use a map style grid to help locate connectors on the drawings:

- Main Harness
- Engine Room Harness (Engine Compartment)
- Engine Control Harness

TO USE THE GRID REFERENCE

NAEL0131S01

1. Find the desired connector number on the connector list.
2. Find the grid reference.
3. On the drawing, find the crossing of the grid reference letter column and number row.
4. Find the connector number in the crossing zone.
5. Follow the line (if used) to the connector.

CONNECTOR SYMBOL

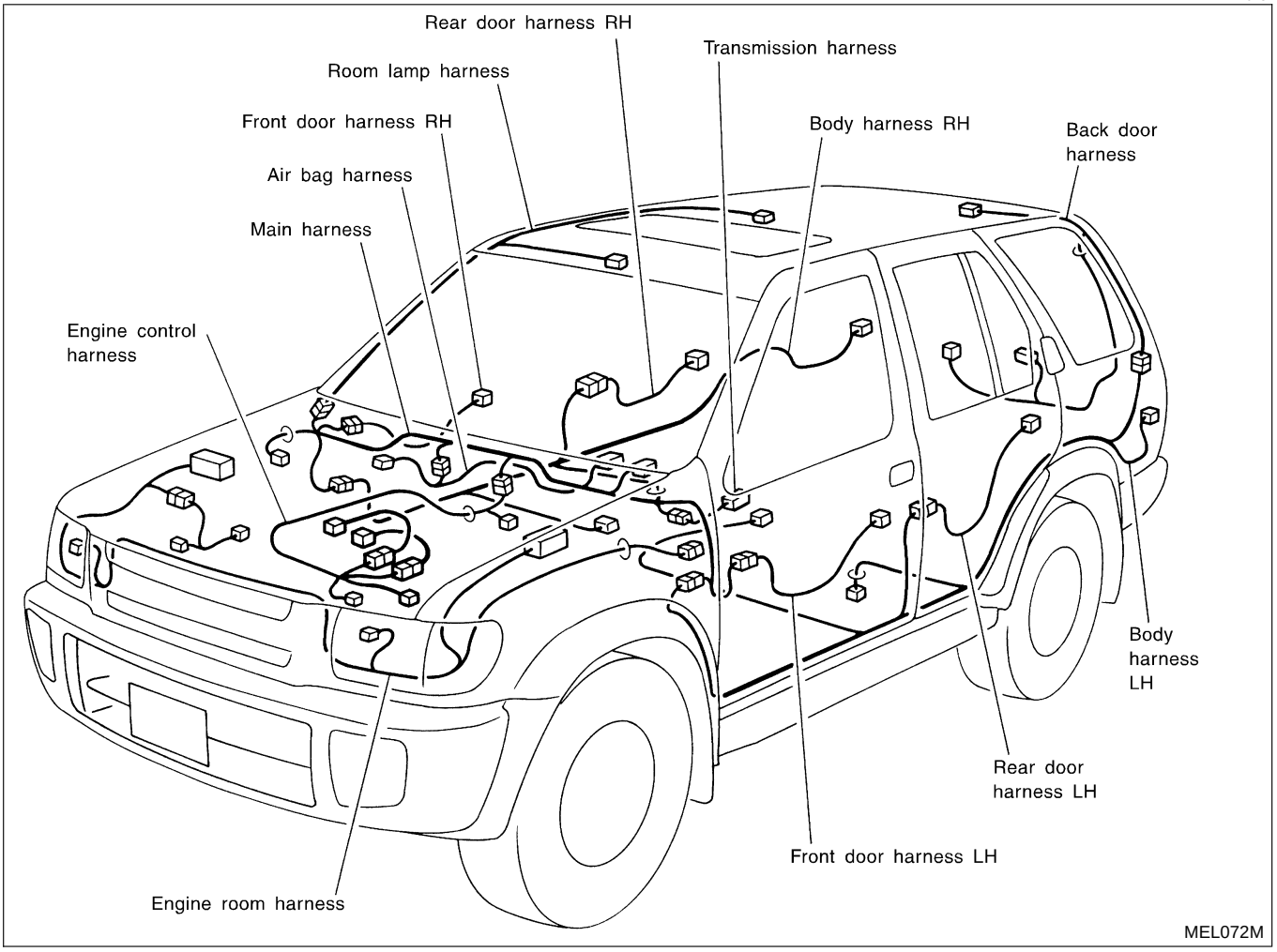
NAEL0131S02

Main symbols of connector (in Harness Layout) are indicated in the below.

Connector type	Water proof type		Standard type	
	Male	Female	Male	Female
• Cavity: Less than 4 • Relay connector				
• Cavity: From 5 to 8				
• Cavity: More than 9	—	—		
• Ground terminal etc.	—			

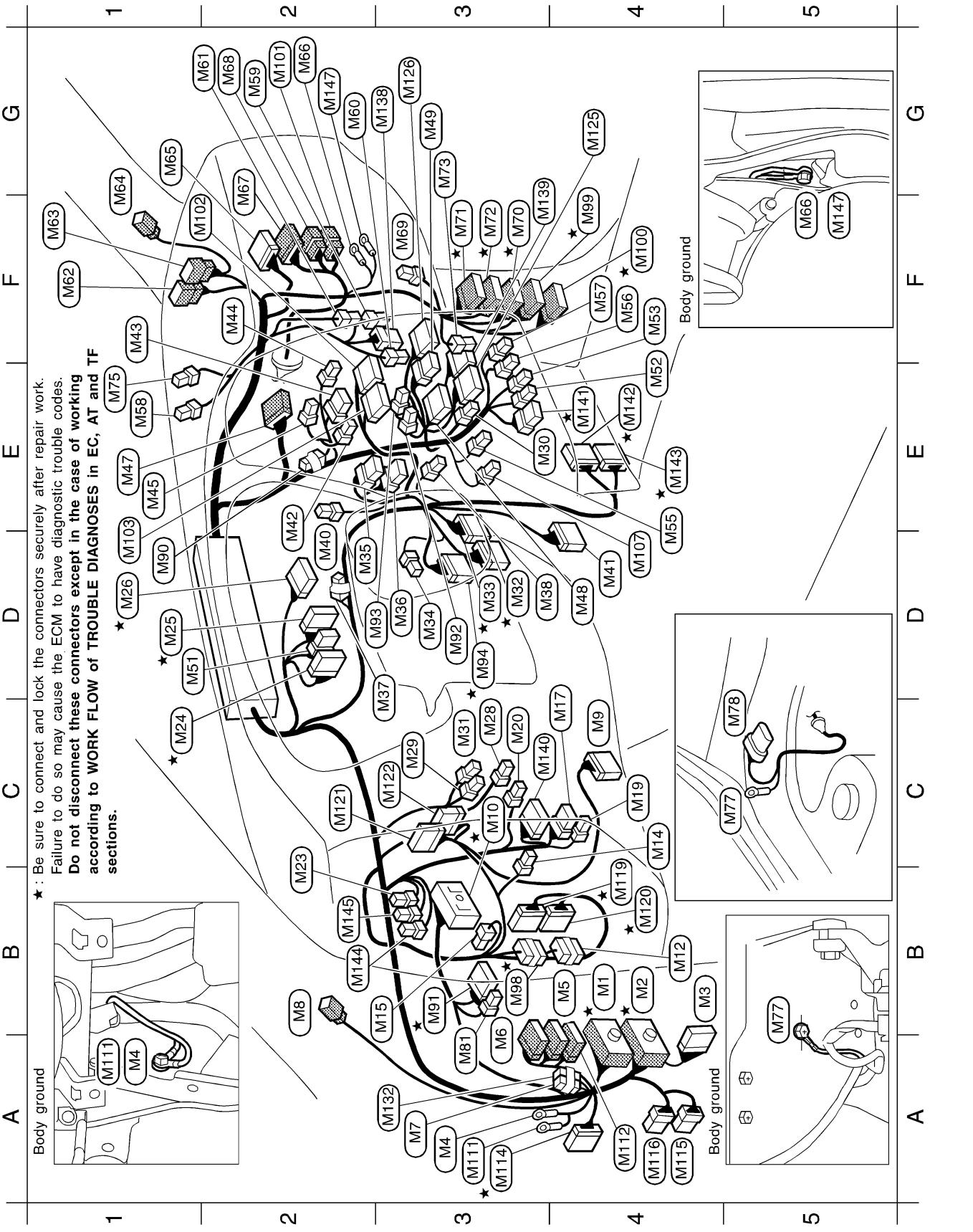
Outline

NAEL0132



Main Harness

NAEL0133



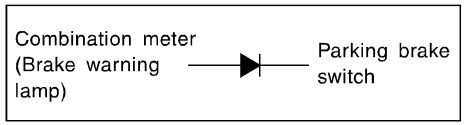
MEL234M

B4★	M1	SMJ	:	To E1
B4★	M2	SMJ	:	To B1
B4	M3	BR/24	:	ASCD control unit
A3	M4	—	:	Body ground
B4	M5	BR/20	:	To D3
A3	M6	W/10	:	To D4
A3	M7	W/2	:	Diode
B2	M8	BR/2	:	Tweeter LH
C4	M9	W/16	:	Data link connector
C3★	M10	SMJ	:	Fuse block (J/B)
B4	M12	SB/6	:	Diode
C4	M14	L/2	:	ASCD clutch switch (With M/T)
B3	M15	B/3	:	Combination flasher unit
C4	M17	GY/6	:	Memory seat cancel switch
C4	M19	W/3	:	Illumination control switch
C3	M20	W/2	:	Security indicator lamp
B2	M23	L/4	:	Power window relay
C1★	M24	W/24	:	Combination meter
D1★	M25	BR/20	:	Combination meter
D1★	M26	BR/24	:	Combination meter
C3	M28	L/2	:	Clutch interlock switch (With M/T)
C3	M29	L/2	:	ASCD brake switch
E3	M30	W/2	:	Glove box lamp
C3	M31	B/2	:	Stop lamp switch
D3★	M32	BR/24	:	To F23
D3★	M33	GY/16	:	To F22
D3	M34	W/2	:	In-vehicle sensor (With auto A/C)
D2	M35	W/8	:	Hazard switch
D3	M36	W/6	:	Rear window defogger switch
C3	M37	W/2	:	Diode
D4	M38	W/3	:	Mode door motor (With auto A/C)
D2	M40	W/4	:	Clock
D4	M41	GY/20	:	Steering wheel receiver control switch
E2	M42	W/4	:	Recirculation switch
F1	M43	W/6	:	Fan switch
F2	M44	W/3	:	A/C switch (With manual A/C)
E1	M45	W/3	:	A/C switch illumination (With manual A/C)
E1	M47	W/20	:	To Z1
D4	M48	W/10	:	Audio unit
G3	M49	W/6	:	Audio unit
D1	M51	W/8	:	Combination meter
E4	M52	L/4	:	Heated seat switch LH
F4	M53	W/4	:	Heated seat switch RH
E4	M55	W/3	:	Air mix door motor (With auto A/C)
F4	M56	B/2	:	Cigarette lighter socket
F4	M57	W/2	:	Cigarette lighter illumination
E1	M58	B/2	:	Sunload sensor (With auto A/C)
G2	M59	W/4	:	Intake door motor (With manual A/C)
G2	M60	W/4	:	Fan control amp. (With auto A/C)
G1	M61	BR/4	:	Fan resistor
F1	M62	W/6	:	To R1
F1	M63	W/6	:	To R2
F1	M64	BR/2	:	Tweeter RH
G1	M65	GY/10	:	Auto light control unit
G2	M66	—	:	Body ground
F2	M67	BR/16	:	To D33
G2	M68	W/6	:	To D34
F3	M69	W/3	:	Power antenna
F3★	M70	W/20	:	To B50
F3★	M71	W/24	:	To B51
F3★	M72	W/16	:	To B52
G3	M73	W/2	:	Blower motor
E1	M75	W/3	:	Auto light sensor
C5	M77	—	:	Body ground
C5	M78	GY/6	:	Front wiper motor
A3	M81	B/2	:	Fuse block (J/B)
D1	M90	W/2	:	Diode (With manual A/C)
B3★	M91	W/12	:	Fuse block (J/B)
D3	M92	B/2	:	CD player
D2	M93	W/4	:	CD player
D3★	M94	W/18	:	To F27
B3★	M98	GY/6	:	Joint connector
F4★	M99	W/12	:	To B77
F4★	M100	GY/20	:	To B88
G2	M101	BR/6	:	To D45
F2	M102	GY/16	:	A/C auto amp. (With auto A/C)
D1	M103	GY/20	:	A/C auto amp. (With auto A/C)
D4	M107	W/2	:	Intake sensor (With auto A/C)
A3	M111	—	:	Body ground
A4	M112	GY/12	:	To D13
A3★	M114	W/18	:	To E116
A4	M115	W/6	:	Headlamp battery saver control unit
A4	M116	W/8	:	Headlamp battery saver control unit
B4★	M119	W/24	:	TCM (Transmission control module) (With A/T)
B4★	M120	GY/24	:	TCM (Transmission control module) (With A/T)
C2	M121	W/18	:	Smart entrance control unit
C3	M122	B/24	:	Smart entrance control unit
G4	M125	W/16	:	CD auto changer
G3	M126	W/12	:	Audio unit (With BOSE system)
A3	M132	W/2	:	Diode
G3	M138	W/8	:	Intake door motor (With auto A/C)
F3	M139	W/16	:	Audio unit
C3	M140	W/10	:	Door mirror remote control switch
E4★	M141	W/8	:	4WD shift switch (With all-mode 4-wheel drive)
E4★	M142	L/24	:	Transfer control unit (With all-mode 4-wheel drive)
E4★	M143	G/24	:	Transfer control unit (With all-mode 4-wheel drive)
B2	M144	W/4	:	Rear power socket relay
B2	M145	W/2	:	Circuit breaker
G2	M147	—	:	Body ground

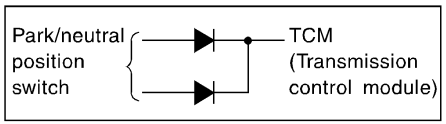
★ : Be sure to connect and lock the connectors securely after repair work. Failure to do so may cause the ECM to have diagnostic trouble codes.

Do not disconnect these connectors except in the case of working according to WORK FLOW of TROUBLE DIAGNOSES in EC, AT and TF sections.

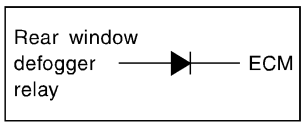
Diode M7



Diode M12



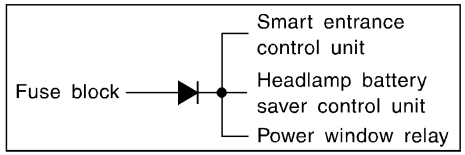
Diode M37



Diode M90



Diode M132

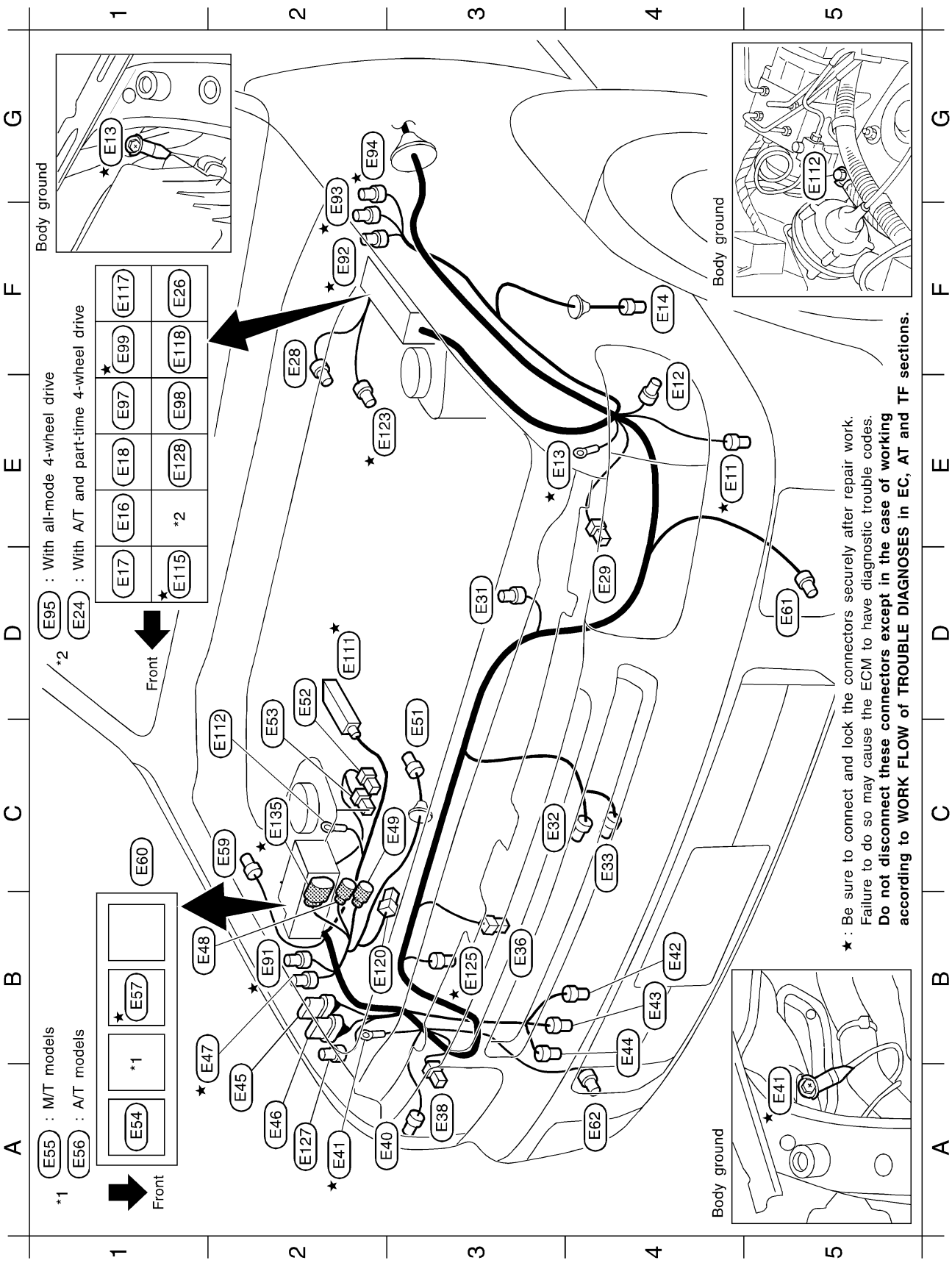


MEL235M

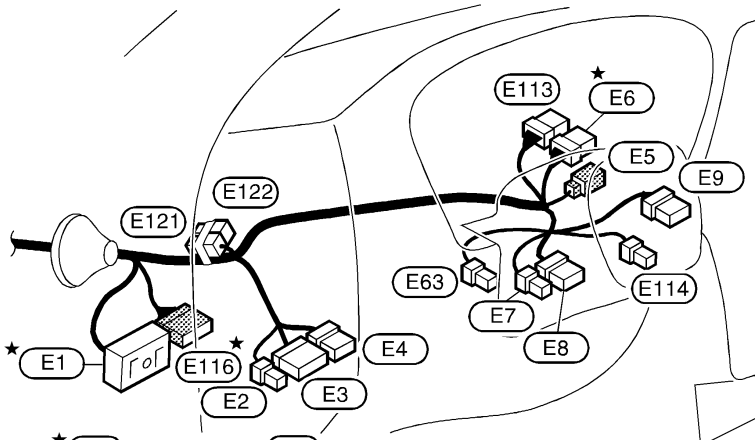
EXIT

Engine Room Harness

NAEL0134



MEL236M



★ : Be sure to connect and lock the connectors securely after repair work. Failure to do so may cause the ECM to have diagnostic trouble codes. **Do not disconnect these connectors except in the case of working according to WORK FLOW of TROUBLE DIAGNOSES in EC, AT and TF sections.**

★	E1	SMJ	:	To M1
	E2	B/2	:	Fuse block (J/B)
	E3	W/16	:	Fuse block (J/B)
	E4	W/4	:	Fuse block (J/B)
	E5	BR/2	:	Key switch
★	E6	W/6	:	Ignition switch
	E7	BR/4	:	Combination switch (Lighting switch)
	E8	W/8	:	Combination switch (Lighting & turn signal switch) (With auto light system)
	E8	BR/8	:	Combination switch (Lighting & turn signal switch) (Without auto light system)
	E9	GY/8	:	Combination switch (Front wiper switch)
E4	★ E11	GY/2	:	Intake air temperature sensor
E4	E12	GY/3	:	Front turn signal and parking lamp LH
E3	★ E13	—	:	Body ground
F4	E14	BR/2	:	Front wheel sensor LH
E1	E16	L/4	:	Front fog lamp relay (Relay box-1)
D1	E17	BR/6	:	Multi-remote control relay (Relay box-1 or 2)
E1	E18	BR/6	:	Theft warning lamp relay (Relay box-1)
E1	E24	B/5	:	ATP relay (With A/T and part-time 4-wheel drive) (Relay box-1)
F1	E26	L/4	:	A/C relay
F2	E28	GY/2	:	Brake fluid level switch
D4	E29	B/3	:	Headlamp LH
D3	E31	GY/2	:	Hood switch
C3	E32	B/2	:	Ambient sensor
C4	E33	B/2	:	Ambient air temperature sensor (For thermometer)
B3	E36	B/1	:	Horn (Low)
A3	E38	B/3	:	Headlamp RH
A2	E40	GY/3	:	Front turn signal and parking lamp RH
A2	★ E41	—	:	Body ground
B4	E42	BR/2	:	Washer level switch
B4	E43	GY/2	:	Rear washer motor
B4	E44	GY/2	:	Front washer motor
A2	E45	GY/8	:	Daytime light control unit
A2	E46	GY/6	:	Daytime light control unit
B1	★ E47	GY/2	:	A/T dropping resistor
B1	E48	GY/4	:	To E102
C2	E49	GY/1	:	To E104
C3	E51	GY/2	:	Front wheel sensor RH
D2	E52	B/1	:	Battery
D2	E53	B/1	:	Battery
A1	E54	L/4	:	Fuel pump relay-2 (Relay box-2)
B1	E55	L/4	:	Clutch interlock relay (With M/T) (Relay box-2)
B1	E56	GY/6	:	Park/Neutral position relay (With A/T and ASCD) (Relay box-2)
B1	★ E57	BR/6	:	ECM relay (Relay box-2)
C2	E59	GY/4	:	ASCD pump
C1	E60	—	:	Fuse and fusible link box
D5	E61	L/2	:	Front fog lamp LH
A4	E62	L/2	:	Front fog lamp RH
	E63	W/3	:	Combination switch (Front fog lamp switch)
B2	★ E91	GY/2	:	Transfer dropping resistor (With all-mode 4-wheel drive)
F2	★ E92	W/1	:	Transfer motor relay (With all-mode 4-wheel drive)
G2	★ E93	W/1	:	Transfer motor relay (With all-mode 4-wheel drive)
G2	★ E94	G/2	:	Transfer motor relay (With all-mode 4-wheel drive)
E1	★ E95	B/5	:	Transfer shift Hi relay (With all-mode 4-wheel drive) (Relay box-1)
E1	E97	L/4	:	Headlamp RH relay (Relay box-1)
E1	E98	L/4	:	Headlamp LH relay (Relay box-1)
F1	★ E99	B/5	:	Transfer shift Low relay (Relay box-1)
D2	★ E111	SMJ	:	ABS actuator and electric unit
C2	E112	–	:	Body ground
	E113	W/8	:	NATS IMMU
	E114	W/4	:	Combination switch (Rear wiper switch)
D1	E115	L/4	:	Tail lamp relay (Relay box-2)
	★ E116	W/18	:	To M114
F1	E117	BR/6	:	Rear window defogger relay (Relay box-1)
F1	E118	BR/6	:	Horn relay
B2	E120	B/1	:	Horn (High)
	E121	W/2	:	Diode
	E122	W/2	:	Diode
E2	★ E123	SB/2	:	Swirl control valve control vacuum check switch
B3	★ E125	B/3	:	Refrigerant pressure sensor
A2	E127	GY/4	:	Daytime light control unit
E1	E128	L/4	:	Fuel pump relay-1 (Relay box-1)
C2	★ E135	GY/8	:	To E132

Diode E121 (With auto light)

Headlamp LH relay → ECM

Diode E121 (Without auto light)

Daytime light control unit (For Canada) / Combination switch (Lighting switch) (For USA) → ECM

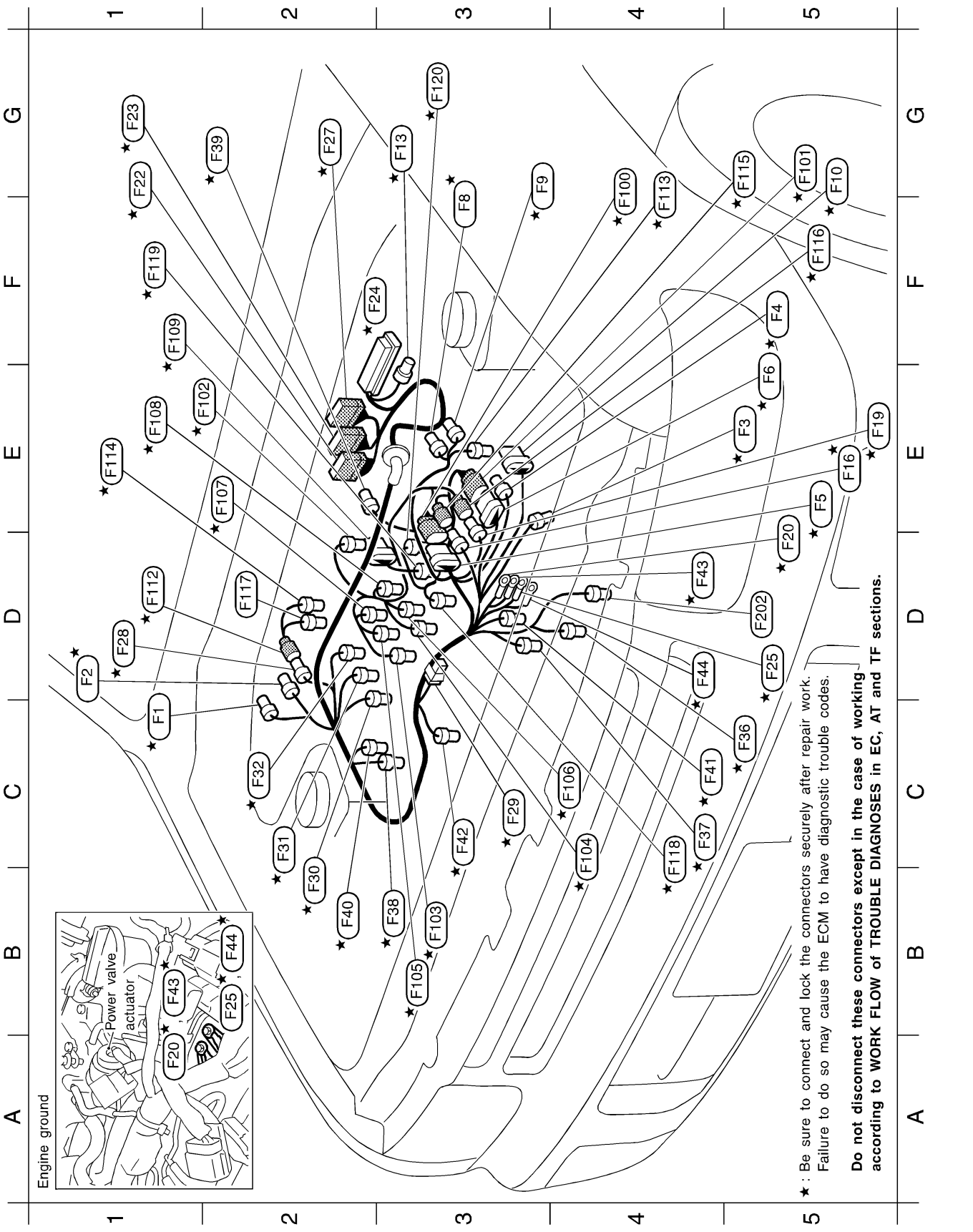
Diode E122 (Without auto light)

Combination switch (Lighting switch) → ECM

MEL237M

Engine Control Harness

NAEL0135



MEL077M

C1★ F1 B/4 : Heated oxygen sensor 2 (Rear) (B1)
D1★ F2 GY/3 : Heated oxygen sensor 1 (Front) (B1)
E5★ F3 GY/4 : Heated oxygen sensor 2 (Rear) (B2)
F5★ F4 GY/3 : Heated oxygen sensor 1 (Front) (B2)
D5★ F5 L/8 : To F100
E5★ F6 G/8 : To F101
F3★ F8 BR/3 : Throttle position sensor
G3★ F9 GY/3 : Throttle position switch
G5★ F10 GY/5 : Mass air flow sensor
G3★ F13 GY/3 : Absolute pressure sensor
E5★ F16 LGY/2 : To F115
E5★ F19 SB/2 : To F116
D5★ F20 — : Engine ground
G1★ F22 GY/16 : To M33
G1★ F23 BR/24 : To M32
F2★ F24 SMJ : ECM
D5★ F25 — : Engine ground
G2★ F27 W/18 : To M94
D1★ F28 SB/3 : To F112
C3★ F29 W/2 : Condenser
B2★ F30 GY/3 : Ignition coil No.1
C2★ F31 GY/3 : Ignition coil No.3
C2★ F32 GY/3 : Ignition coil No.5
D5★ F36 GY/2 : Camshaft position sensor (PHASE)
C4★ F37 B/3 : Intake valve timing control position sensor LH
B3★ F38 B/3 : Intake valve timing control position sensor RH
G2★ F39 G/2 : Intake valve timing control solenoid valve LH
B2★ F40 SB/2 : Intake valve timing control solenoid valve RH
C4★ F41 G/2 : Swirl control valve control solenoid valve
C3★ F42 BR/2 : VIAS control solenoid valve (With A/T)
D4★ F43 — : Engine ground
D4★ F44 — : Engine ground
F4★ F100 L/8 : To F5
G5★ F101 G/8 : To F6

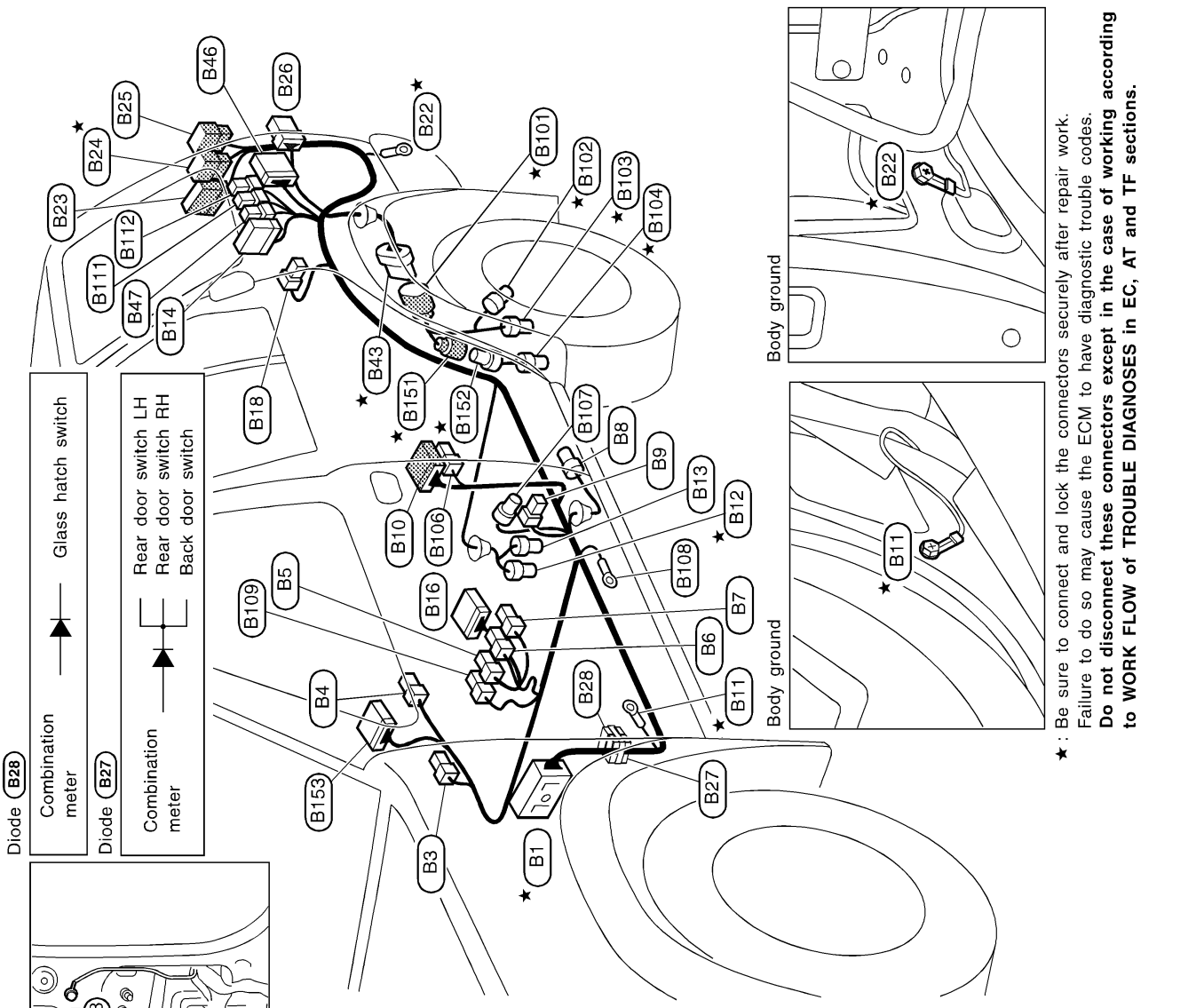
E2★ F102 GY/2 : Knock sensor
B3★ F103 GY/2 : Injector No. 1
C4★ F104 GY/2 : Injector No. 2
B3★ F105 GY/2 : Injector No. 3
C4★ F106 GY/2 : Injector No. 4
E2★ F107 GY/2 : Injector No. 5
E1★ F108 GY/2 : Injector No. 6
F1★ F109 L/6 : IACV-AAC valve
D1★ F112 SB/3 : To F28
F4★ F113 L/2 : EVAP canister purge volume control solenoid valve
E1★ F114 GY/2 : Engine coolant temperature sensor
G5★ F115 LGY/2 : To F16
F5★ F116 SB/2 : To F19
D2 F117 B/1 : Thermal transmitter
C4★ F118 GY/3 : Ignition coil No.2
F1★ F119 GY/3 : Ignition coil No.4
G3★ F120 GY/3 : Ignition coil No.6
D5 F202 B/1 : Compressor (Air conditioner)

★ : Be sure to connect and lock the connectors securely after repair work. Failure to do so may cause the ECM to have diagnostic trouble codes.
★ : **Do not disconnect these connectors except in the case of working according to WORK FLOW of TROUBLE DIAGNOSES in EC, AT and TF sections.**

MEL238M

Body Harness LH

NAEL0136



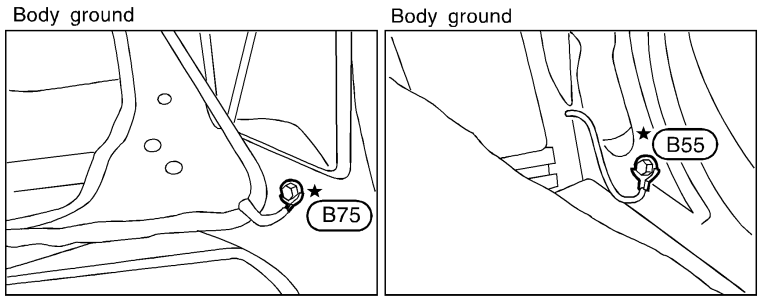
★: Be sure to connect and lock the connectors securely after repair work. Failure to do so may cause the ECM to have diagnostic trouble codes. **Do not disconnect these connectors except in the case of working according to WORK FLOW of TROUBLE DIAGNOSES in EC, AT and TF sections.**

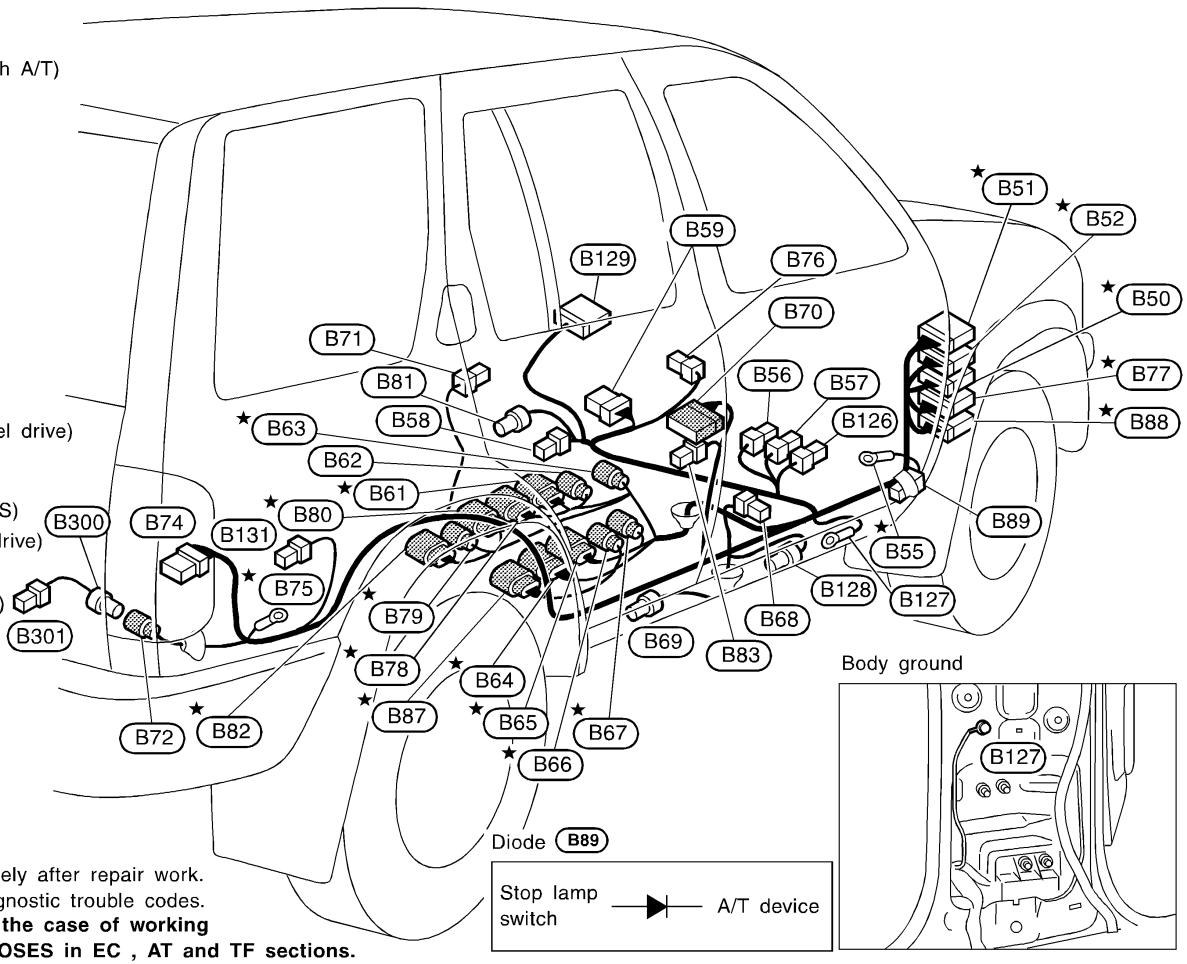
★ B1	SMJ	: To M2	
B3	B/1	: Parking brake switch	
B4	W/2	: Power socket	
B5	GY/3	: Front heated seat LH (Via sub-harness)	
B6	W/3	: Seat belt buckle switch	
B7	W/2	: Power seat LH	
B8	BR/2	: Rear wheel sensor LH	
B9	B/3	: Front door switch LH	
B10	W/10	: To D50	
★ B11	—	: Body ground	
★ B12	GY/4	: Fuel level sensor unit	
B13	GY/2	: Fuel pump	
B14	W/12	: Rear wiper amp.	
B16	W/16	: Seat control unit LH (Via sub-harness)	
B18	BR/1	: Rear door switch LH	
★ B22	—	: Body ground	
B23	W/12	: To D100	
★ B24	W/6	: To D101	
B25	BR/6	: To D102	
B26	W/6	: Rear combination lamp LH	
B27	W/2	: Diode	
B28	W/2	: Diode	
★ B43	GY/8	: To B101	
B46	W/26	: Rear speaker amp. (With BOSE system)	
B47	W/4	: Audio amp. relay (With BOSE system)	
★ B101	GY/8	: To B43	
★ B102	GY/3	: EVAP control system pressure sensor	
★ B103	B/2	: EVAP canister vent control valve	
★ B104	G/2	: Vacuum cut valve bypass valve	
B106	W/4	: Seat belt pre-tensioner LH	
B107	GY/2	: Satellite sensor LH	
B108	—	: Body ground	
B109	Y/2	: Side air bag module LH	
B111	W/4	: Power socket relay	
B112	W/4	: Door mirror defogger relay	
★ B151	GY/2	: To B152	
★ B152	GY/2	: To B151	
B153	Y/12	: Air bag diagnosis sensor unit	

MEL239M

★ B50 W/20 : To M70
★ B51 W/24 : To M71
★ B52 W/16 : To M72
★ B55 – : Body ground
B56 GY/3 : Heated seat RH (Via sub-harness)
B57 W/2 : Power seat RH
B58 GY/2 : G sensor (For 4WD model with ABS)
B59 GY/8 : A/T device (With A/T) (Via sub-harness)
★ B61 B/6 : To B200 (With M/T)
B62 B/4 : To B201 (With A/T and part-time 4-wheel drive)
★ B63 GY/2 : Vehicle speed sensor
★ B64 BR/8 : Terminal cord assembly
★ B65 GY/8 : Park/neutral position switch
★ B66 GY/2 : Park/neutral position switch
★ B67 GY/3 : Rear revolution sensor
(With A/T)
B68 BR/1 : Front door switch RH
B69 GY/2 : Rear wheel sensor RH
B70 W/10 : To D70
B71 BR/1 : Rear door switch RH
B72 GY/2 : To B300
B74 W/6 : Rear combination lamp RH
★ B75 – : Body ground
B76 W/3 : Ashtray illumination
★ B77 W/12 : To M99
★ B78 GY/8 : To B206
★ B79 B/4 : To B208
★ B80 B/8 : To B207
(With all-mode 4-wheel drive)
B81 GY/2 : G sensor (For 4WD model with ABS)
★ B82 GY/6 : To B251 (With all-mode 4-wheel drive)
B83 W/4 : Seat belt pre-tensioner RH
★ B87 BR/4 : Turbine revolution sensor (With A/T)
★ B88 GY/20 : To M100
B89 W/2 : Diode
B126 Y/2 : Side air bag module RH
B127 – : Body ground
B128 GY/2 : Satellite sensor RH
B129 Y/12 : Air bag diagnosis sensor unit

B131 B/2 : Rear power socket
B300 GY/2 : To B72
B301 B/3 : Tire carrier switch





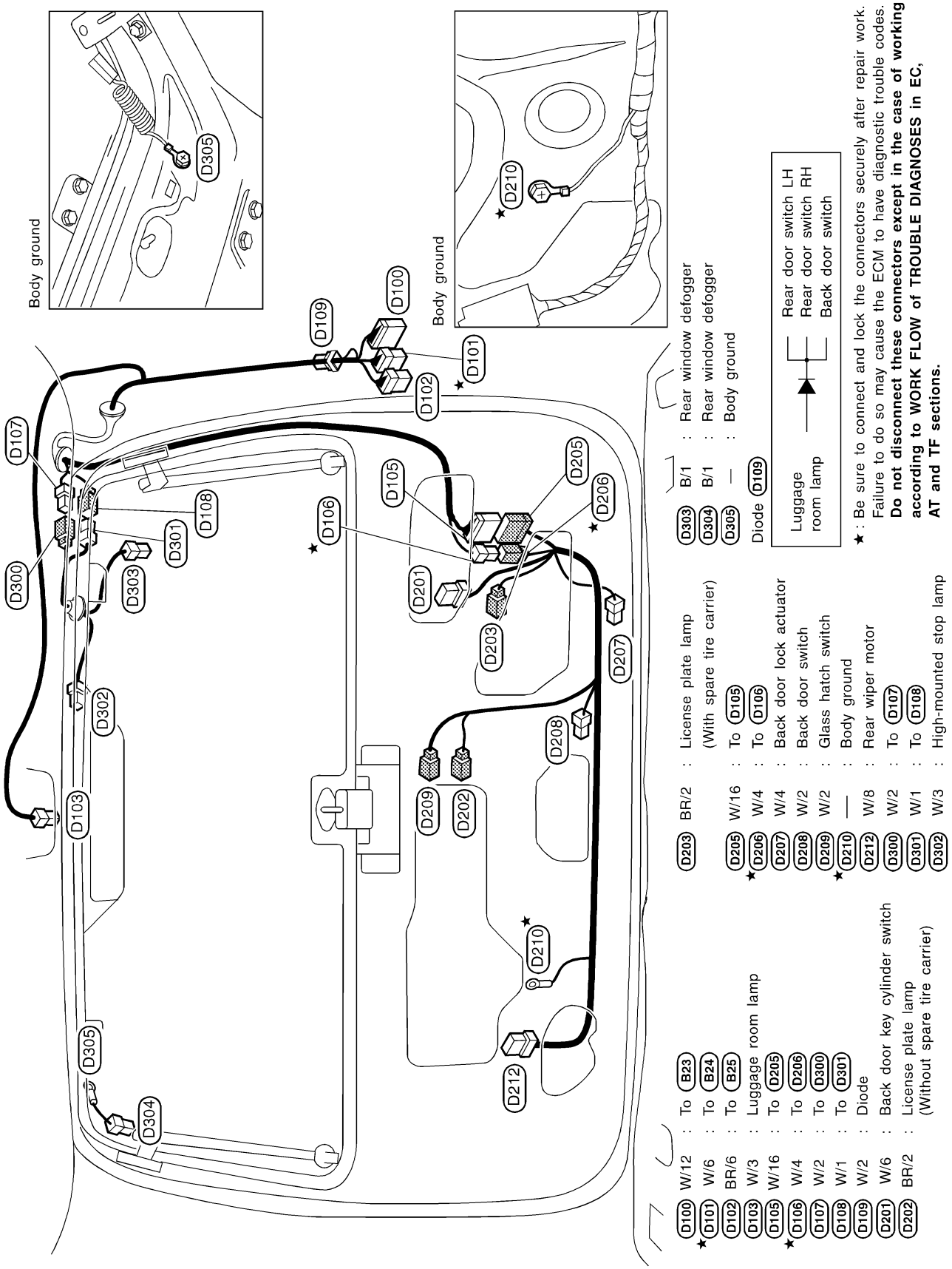
NAEL0137

★ : Be sure to connect and lock the connectors securely after repair work. Failure to do so may cause the ECM to have diagnostic trouble codes. **Do not disconnect these connectors except in the case of working according to WORK FLOW of TROUBLE DIAGNOSES in EC , AT and TF sections.**

MEL240M

Back Door Harness

NAEL0138

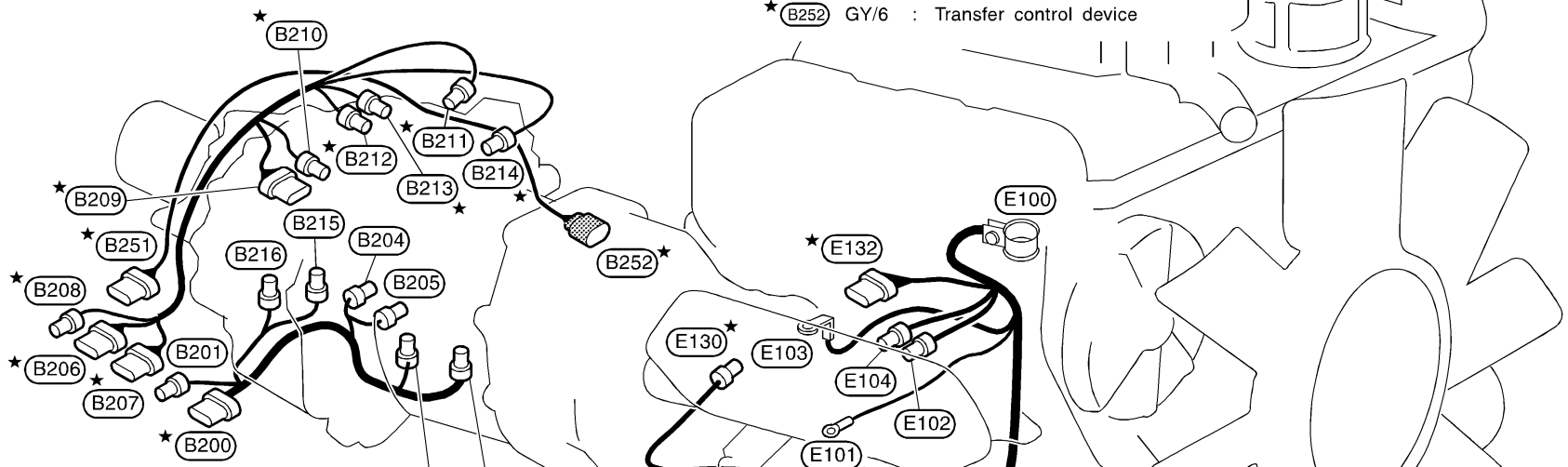


MEL241M

★ B200 B/6 : To B61 (With M/T)
B201 B/4 : To B62 (With A/T and part-time 4-wheel drive)
B202 GY/2 : Back-up lamp switch (With M/T and part-time 4-wheel drive)
★ B203 B/2 : Neutral position switch (With M/T and part-time 4-wheel drive)
B204 B/2 : Neutral position switch (With part-time 4-wheel drive)
B205 GY/2 : 4WD switch (With part-time 4-wheel drive)
B206 GY/2 : Back-up lamp switch (With M/T and 2-wheel drive)
B207 GY/2 : Neutral position switch (With M/T and 2-wheel drive)

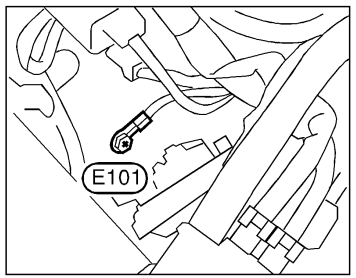
★ B206 GY/8 : To B78
★ B207 B/8 : To B80
★ B208 B/4 : To B79
★ B209 GY/8 : Terminal cord assembly
★ B210 GY/2 : ATP switch
★ B211 B/2 : Wait detection switch
★ B212 B/2 : Transfer motor
★ B213 BR/2 : Neutral-4LO switch
★ B214 GY/3 : Front revolution sensor (Transfer)
★ B251 GY/6 : To B82
★ B252 GY/6 : Transfer control device

(With all-mode 4-wheel drive)



E100 – : Battery
E101 – : Body ground
E102 GY/4 : To E48
E103 – : Fuse and fusible link box
E104 GY/1 : To E49
E105 – : Alternator
E106 GY/2 : Alternator
E107 – : Alternator
E108 – : Starter motor
E109 GY/1 : Starter motor
E110 B/2 : Power steering oil pressure switch
★ E130 GY/3 : Crankshaft position sensor (POS)
★ E131 GY/2 : Crankshaft position sensor (REF)
★ E132 GY/8 : To E135
E133 B/1 : Oil pressure switch

Body ground



★ : Be sure to connect and lock the connectors securely after repair work. Failure to do so may cause the ECM to have diagnostic trouble codes. **Do not disconnect these connectors except in the case of working according to WORK FLOW of TROUBLE DIAGNOSES in EC, AT and TF sections.**

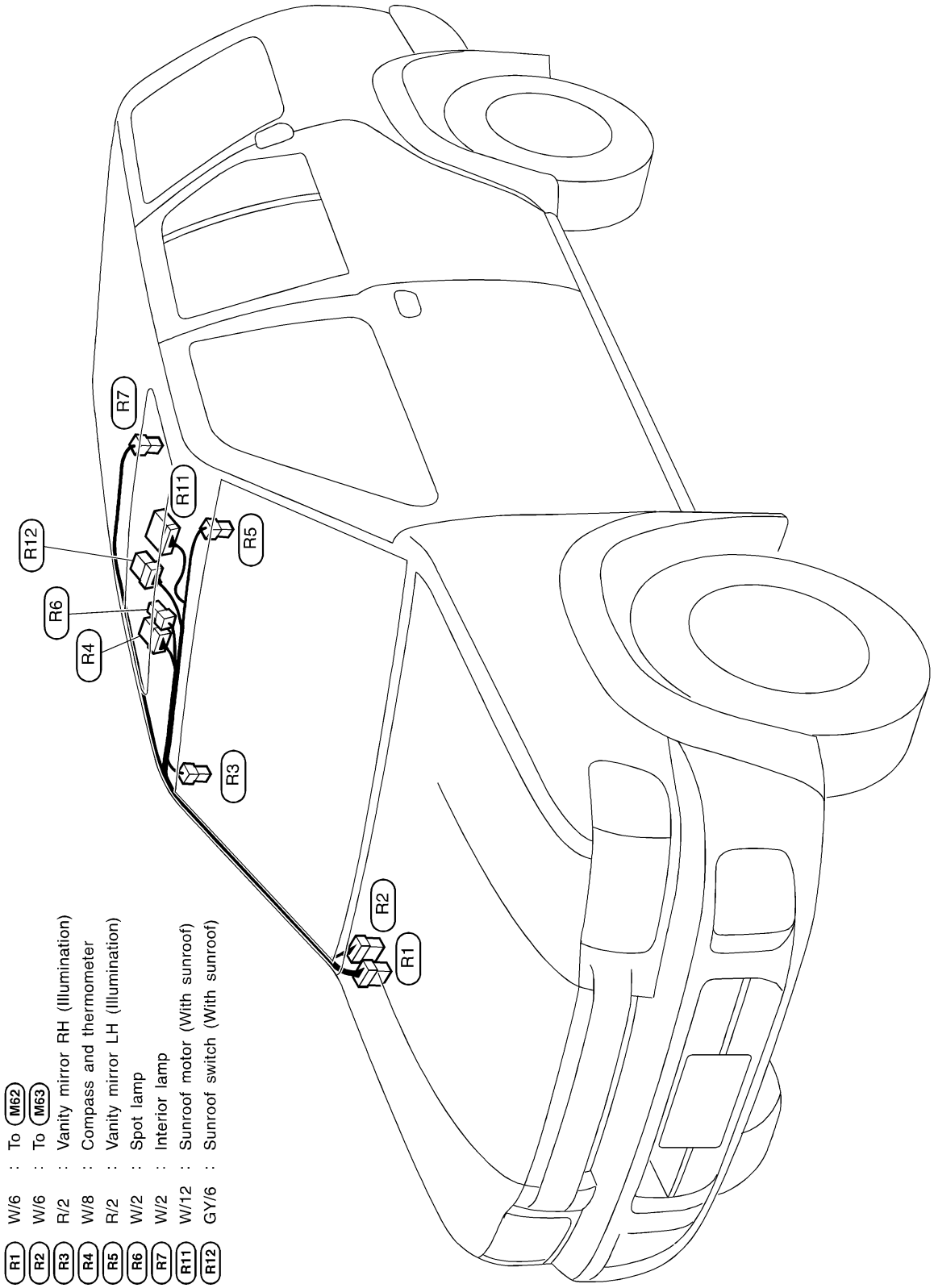
NAEL0139

MEL242M

EXIT

Room Lamp

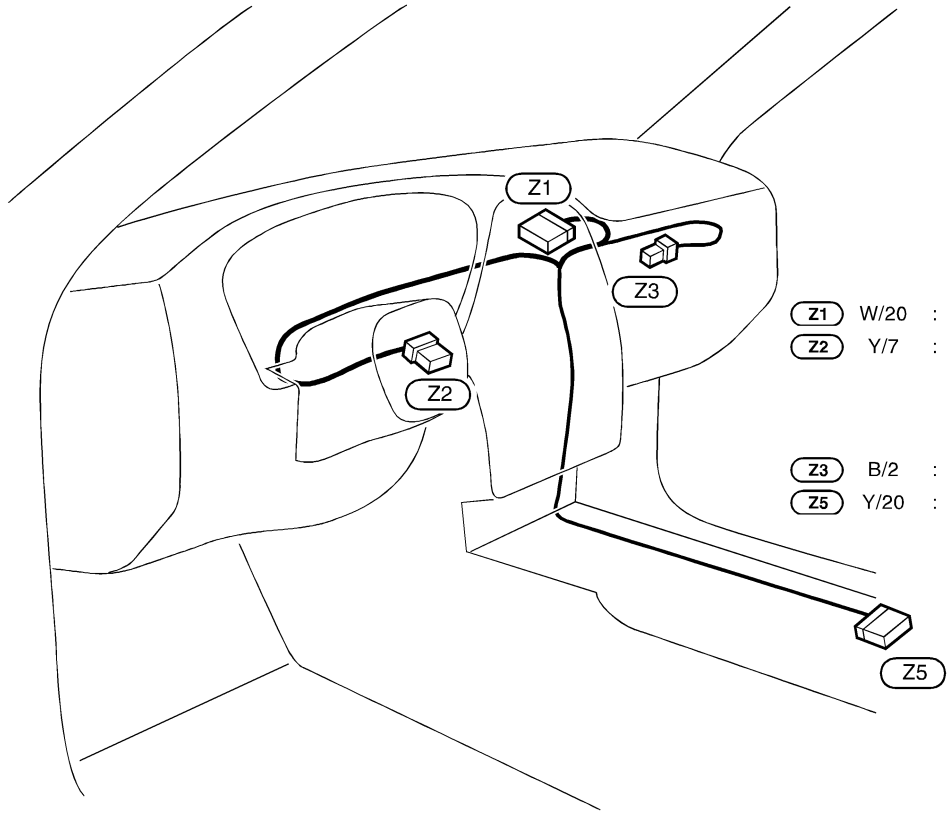
NAEL0140



MEL243M

Air Bag Harness

NAEL0141



Z1 W/20 : To M47
Z2 Y/7 : Air bag module (Driver side), AUDIO switch, ASCD steering switch and horn switch via spiral cable
Z3 B/2 : Air bag module (Passenger side)
Z5 Y/20 : Air bag diagnosis sensor unit

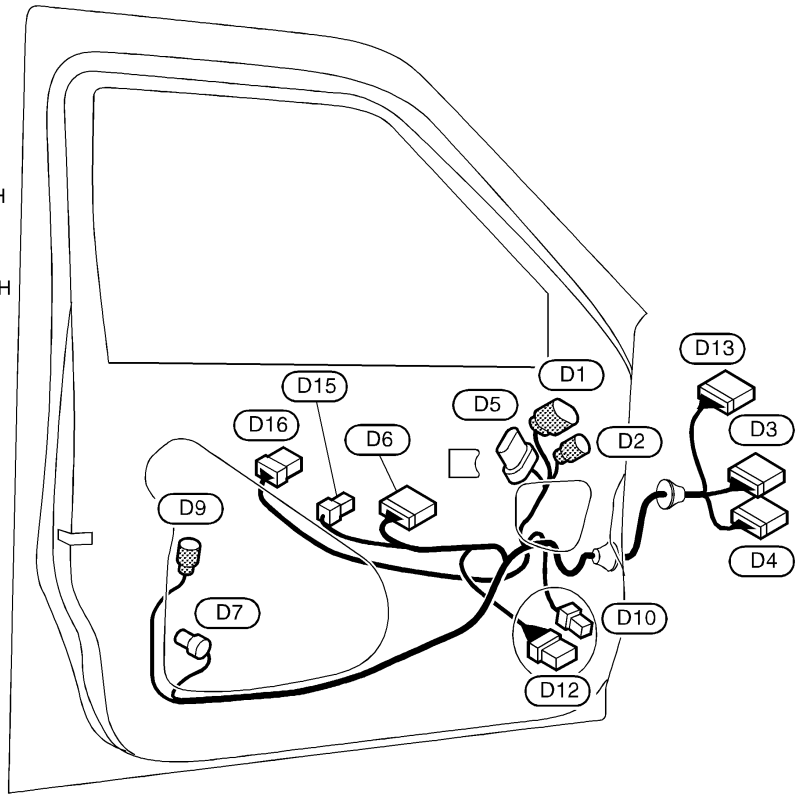
MEL244M

Front Door Harness

NAEL0142

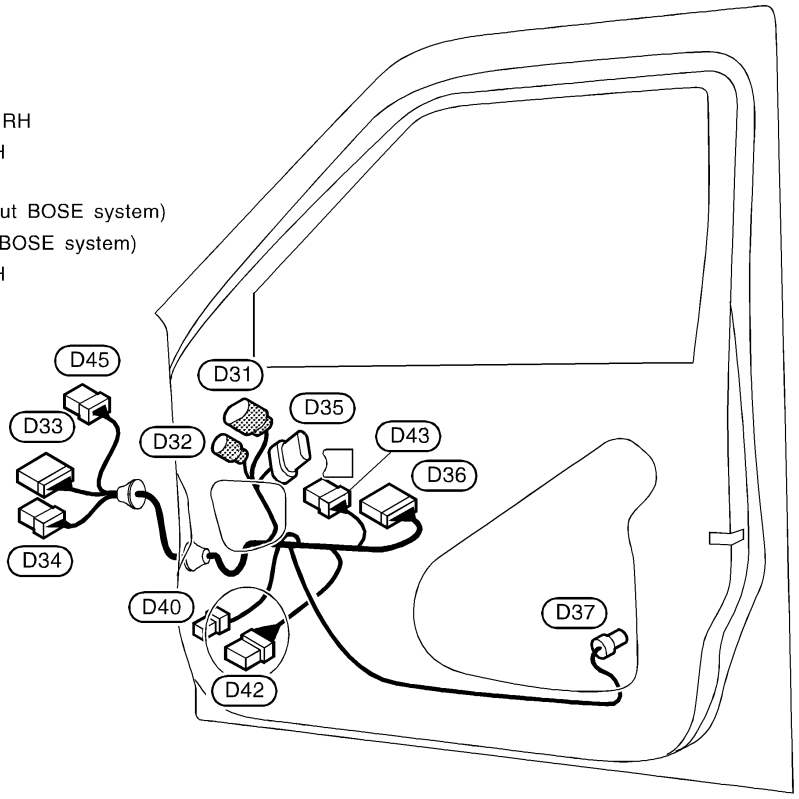
LH side

D1	GY/5	:	Door mirror defogger LH
D2	BR/3	:	Door mirror LH
D3	BR/20	:	To M5
D4	W/10	:	To M6
D5	GY/6	:	Front power window regulator LH
D6	W/16	:	Power window main switch
D7	GY/4	:	Front door lock actuator LH
D9	BR/3	:	Front door key cylinder switch LH
D10	BR/2	:	Front door speaker LH (Without BOSE system)
D12	W/6	:	Front door speaker LH (With BOSE system)
D13	GY/12	:	To M112
D15	W/3	:	Power window main switch
D16	W/8	:	Seat memory switch



RH side

D31	GY/5	:	Door mirror defogger RH
D32	BR/3	:	Door mirror RH
D33	BR/16	:	To M67
D34	W/6	:	To M68
D35	GY/6	:	Front power window regulator RH
D36	W/12	:	Front power window switch RH
D37	GY/4	:	Front door lock actuator RH
D40	BR/2	:	Front door speaker RH (Without BOSE system)
D42	W/6	:	Front door speaker RH (With BOSE system)
D43	W/8	:	Front power window switch RH
D45	BR/6	:	To M101 (With BOSE system)

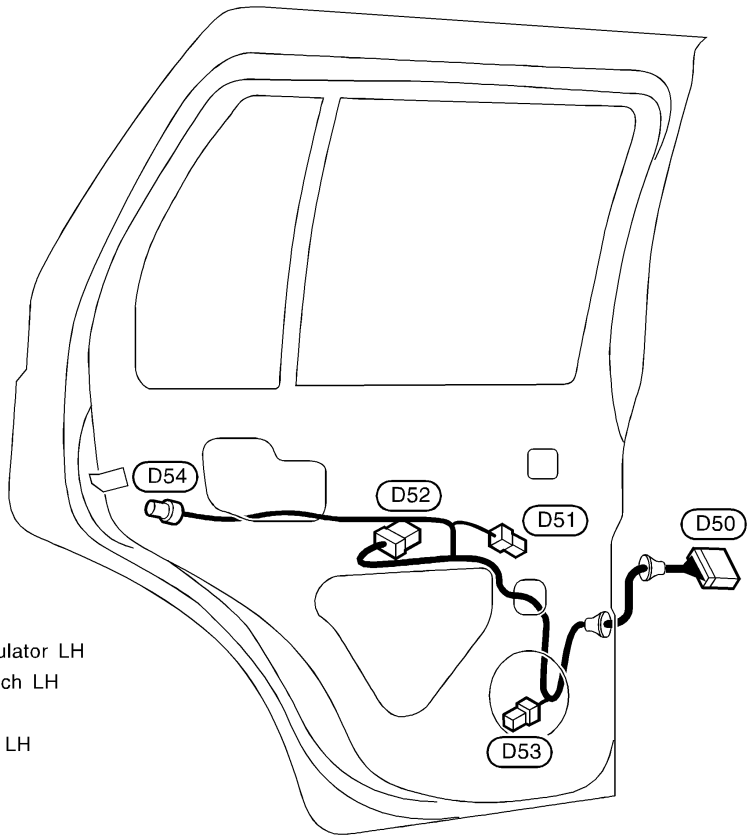


MEL245M

Rear Door Harness

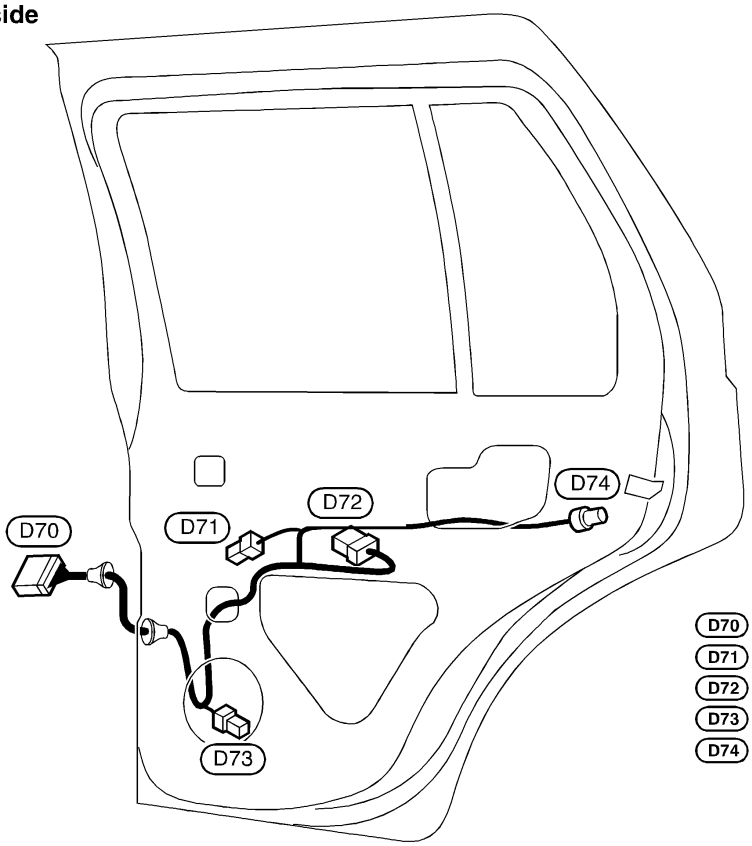
NAEL0143

LH side



D50	W/10	:	To B10
D51	B/2	:	Rear power window regulator LH
D52	W/8	:	Rear power window switch LH
D53	BR/2	:	Rear door speaker LH
D54	GY/4	:	Rear door lock actuator LH

RH side



D70	W/10	:	To B70
D71	B/2	:	Rear power window regulator RH
D72	W/8	:	Rear power window switch RH
D73	BR/2	:	Rear door speaker RH
D74	GY/4	:	Rear door lock actuator RH

MEL261M

BULB SPECIFICATIONS

Headlamp

Headlamp

NAEL0144S03

Item	Wattage W
High/Low (Semi-sealed beam)	65/55 (HB2)

Exterior Lamp

NAEL0144S01

Item		Wattage W
Front fog lamp		55
Front turn signal lamp		27
Parking lamp		5
Rear combination lamp	Turn signal lamp	27
	Stop/Tail lamp	27/8
Back-up lamp		27
License plate lamp		5
High-mounted stop lamp		5

Interior Lamp

NAEL0144S02

Item	Wattage W
Interior lamp	10
Spot lamp	8
Luggage room lamp	10

WIRING DIAGRAM CODES (CELL CODES)

Use the chart below to find out what each wiring diagram code stands for.
Refer to the wiring diagram code in the alphabetical index to find the location (page number) of each wiring diagram.

Code	Section	Wiring Diagram Name
1STSIG	AT	A/T 1ST Signal
2NDSIG	AT	A/T 2ND Signal
3RDSIG	AT	A/T 3RD Signal
4THSIG	AT	A/T 4TH Signal
A/C, A	HA	Auto Air Conditioner
AAC/V	EC	IACV-AAC Valve
ABS	BR	Anti-lock Brake System
AP/SEN	EC	Absolute Pressure Sensor
ASCD	EL	Automatic Speed Control Device
AT/C	EC	A/T Control
ATDIAG	EC	A/T Diagnosis Communication Line
AUDIO	EL	Audio
AUT/DP	EL	Automatic Drive Positioner
BA/FTS	AT	A/T Fluid Temperature Sensor and TCM Power Supply
BACK/L	EL	Back-up Lamp
BYPS/V	EC	Vacuum Cut Valve Bypass Valve
CHARGE	SC	Charging System
CHIME	EL	Warning Chime
CIGAR	EL	Cigarette Lighter
CLOCK	EL	Clock
COMPAS	EL	Compass and Thermometer
D/LOCK	EL	Power Door Lock
DEF	EL	Rear Window Defogger
DTRL	EL	Headlamp — With Daytime Light System —
ECTS	EC	Engine Coolant Temperature Sensor
ENGSS	AT	Engine Speed Signal
F/FOG	EL	Front Fog Lamp
F/PUMP	EC	Fuel Pump Control
FICD	EC	IACV-FICD Solenoid Valve
FLS1	EC	Fuel Gauge
FLS2	EC	Fuel Gauge
FLS3	EC	Fuel Gauge
FTS	AT	A/T Fluid Temperature Sensor
FUELLH	EC	Fuel Injection System Function (Left Bank)
FUELRH	EC	Fuel Injection System Function (Right Bank)
H/LAMP	EL	Headlamp
HORN	EL	Horn
HSEAT	EL	Heated Seat
IATS	EC	Intake Air Temperature Sensor
IGN/SG	EC	Ignition Signal
ILL	EL	Illumination
INJECT	EC	Injector
INT/L	EL	Interior, Spot, Vanity Mirror, and Luggage Room Lamps
IVC-L	EC	Intake Valve Timing Control Solenoid Valve LH
IVC-R	EC	Intake Valve Timing Control Solenoid Valve RH
IVCS-L	EC	Intake Valve Timing Control Position Sensor LH
IVCS-R	EC	Intake Valve Timing Control Position Sensor RH
KS	EC	Knock Sensor
LAN	AT	A/T Communication Line
LOAD	EC	Electrical Load Signal
LPSV	AT	Line Pressure Solenoid Valve
MAFS	EC	Mass Air Flow Sensor
MAIN	AT	Main Power Supply and Ground Circuit
MAIN	EC	Main Power Supply and Ground Circuit
METER	EL	Speedometer, Tachometer, Temp., Oil, and Fuel Gauges
MIL/DL	EC	MIL and Data Link Connectors
MIRROR	EL	Door Mirror
MULTI	EL	Multi-remote Control System
NATS	EL	NVIS (NISSAN Vehicle Immobilizer System)
NONDTC	AT	Non-detectable Items
O2H1B1	EC	Heated Oxygen Sensor 1 Heater (Front) (Bank 1)
O2H1B2	EC	Heated Oxygen Sensor 1 Heater (Front) (Bank 2)

Code	Section	Wiring Diagram Name
O2H2B1	EC	Heated Oxygen Sensor 2 Heater (Rear) (Bank 1)
O2H2B2	EC	Heated Oxygen Sensor 2 Heater (Rear) (Bank 2)
O2S1B1	EC	Heated Oxygen Sensor 1 (Front) (Bank 1)
O2S1B2	EC	Heated Oxygen Sensor 1 (Front) (Bank 2)
O2S2B1	EC	Heated Oxygen Sensor 2 (Rear) (Bank 1)
O2S2B2	EC	Heated Oxygen Sensor 2 (Rear) (Bank 2)
OVRCSV	AT	Overrun Clutch Solenoid Valve
P/ANT	EL	Power Antenna
PGC/V	EC	EVAP Canister Purge Volume Control Solenoid Valve
PHASE	EC	Camshaft Position Sensor (PHASE)
PNP/SW	EC	Park/Neutral Position Switch
PNP/SW	AT	Park/Neutral Position Switch
POS	EC	Crankshaft Position Sensor (CKPS) (POS)
POWER	EL	Power Supply Routing
PRE/SE	EC	EVAP Control System Pressure Sensor
PST/SW	EC	Power Steering Oil Pressure Switch
REF	EC	Crankshaft Position Sensor (CKPS) (REF)
REMOTE	EL	Audio (Remote Control Switch)
RP/SEN	EC	Refrigerant Pressure
S/SIG	EC	Start Signal
S/VCSW	EC	Swirl Control Valve Control Vacuum Check Switch
SEAT	EL	Power Seat
SHIFT	AT	A/T Shift Lock System
SROOF	EL	Sunroof
SRS	RS	Supplemental Restraint System
SSV/A	AT	Shift Solenoid Valve A
SSV/B	AT	Shift Solenoid Valve B
START	SC	Starting System
STOP/L	EL	Stop lamp
SWL/V	EC	Swirl Control Valve Control Solenoid Valve

Code	Section	Wiring Diagram Name
TAIL/L	EL	Parking, License and Tail Lamps
TCCSIG	AT	A/T TCC Signal (Lock up)
TCV	AT	Torque Converter Clutch Solenoid Valve
T/F	TF	Transfer
TFTS	EC	Tank Fuel Temperature Sensor
THEFT	EL	Theft Warning System
TP/SW	EC	Throttle Position Switch
TPS	AT	Throttle Position Sensor
TPS	EC	Throttle Position Sensor
TRNSMT	EL	Integrated HOMELINK™ Transmitter
TRSA/T	AT	Turbine Revolution Sensor
TURN	EL	Turn Signal and Hazard Warning Lamps
VIAS/V	EC	Variable Induction Air Control System
VSS	EC	Vehicle Speed Sensor
VSSA/T	AT	Vehicle Speed Sensor A/T (Revolution Sensor)
VSSMTR	AT	Vehicle Speed Sensor MTR
WARN	EL	Warning Lamps
WINDOW	EL	Power Window
WIP/R	EL	Rear Wiper and Washer
WIPER	EL	Front Wiper and Washer

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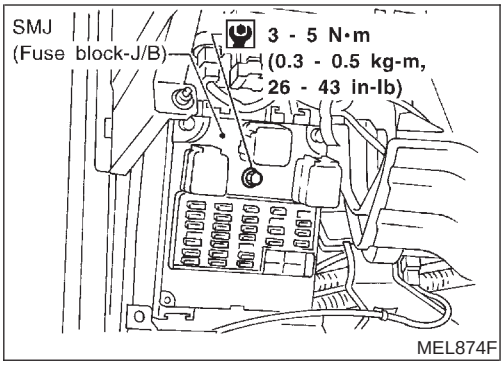
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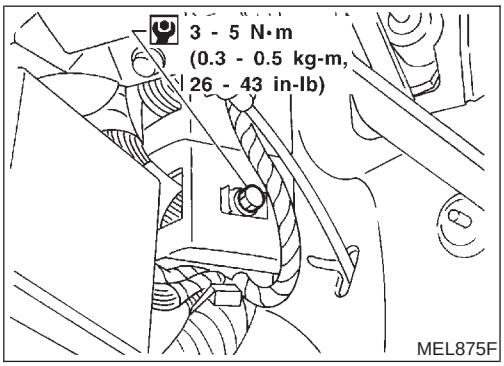
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MEL874F



MEL875F

Installation

NAEL0146

To install SMJ, tighten bolts until orange “fulltight” mark appears and then retighten to specified torque as required.

: 3 - 5 N·m
(0.3 - 0.5 kg-m, 26 - 43 in-lb)

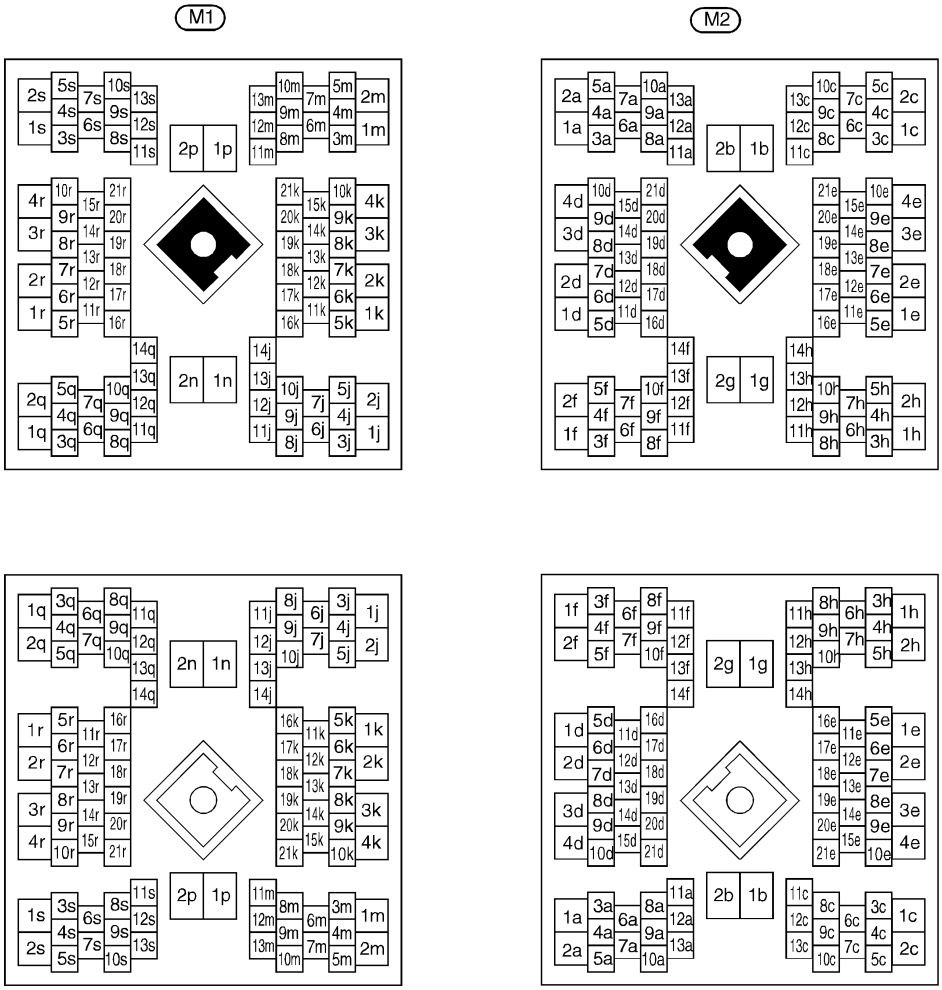
CAUTION:
Do not overtighten bolts, otherwise, they may be damaged.

Terminal Arrangement

NAEL0147

MAIN HARNESS

T.S.

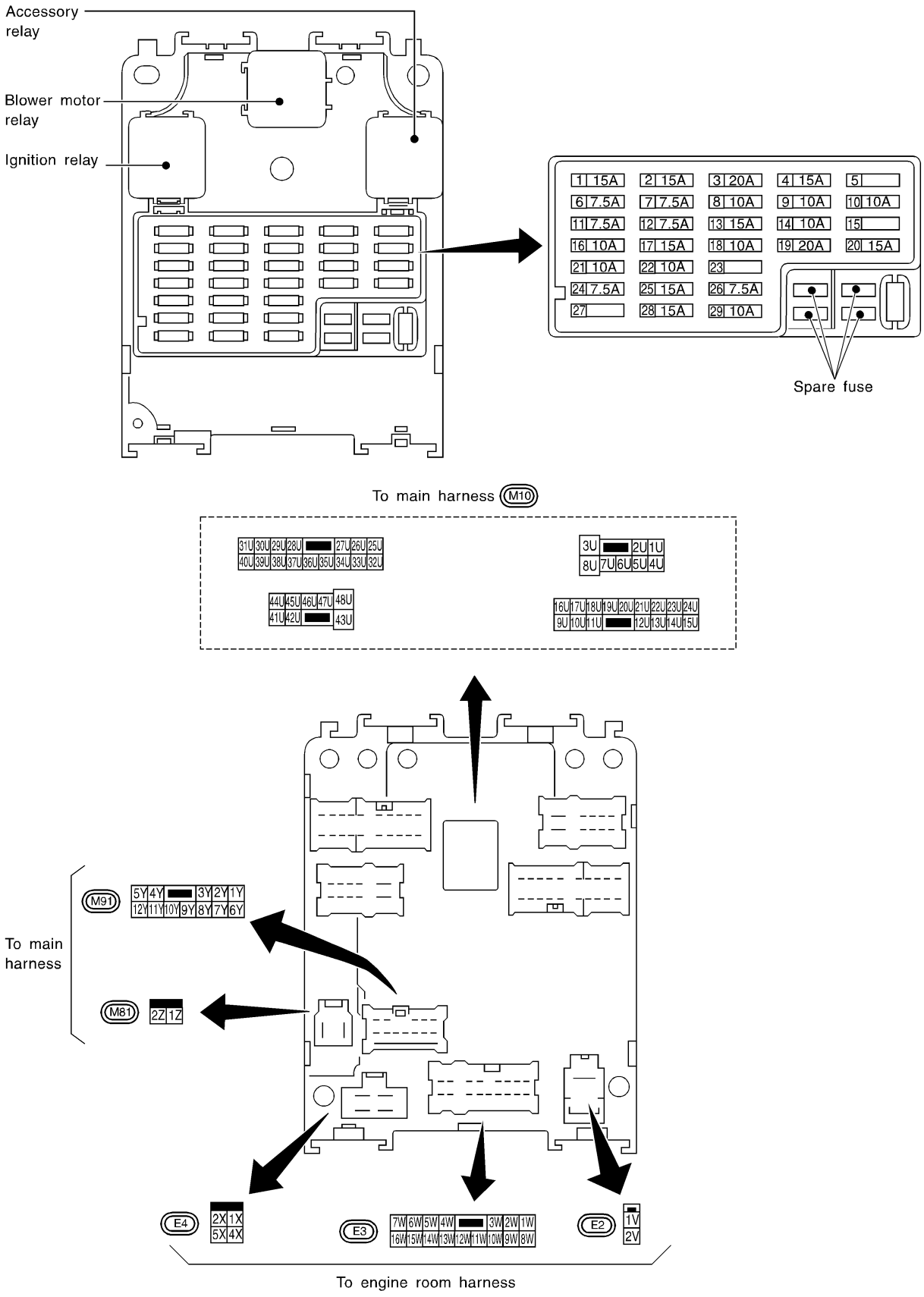


ENGINE ROOM HARNESS

BODY HARNESS

Terminal Arrangement

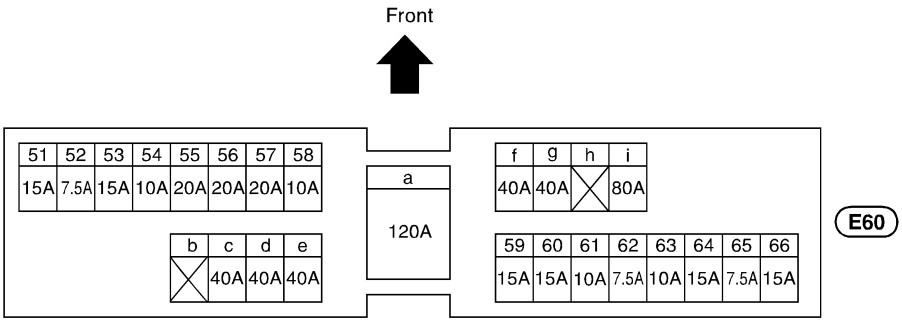
NAEL0148



MEL066M

Terminal Arrangement

NAEL0149



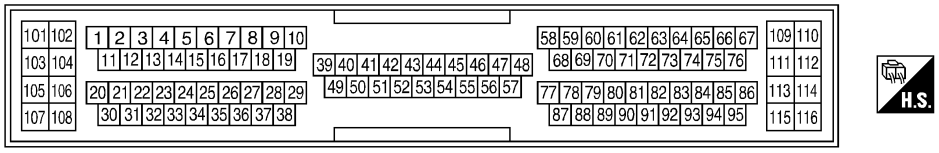
No. 51 - 66: FUSE a - j: FUSIBLE LINK

MEL067M

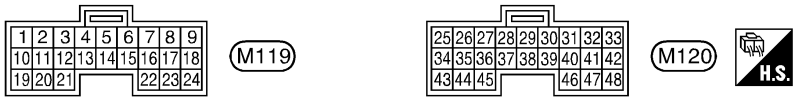
Terminal Arrangement

NAEL0150

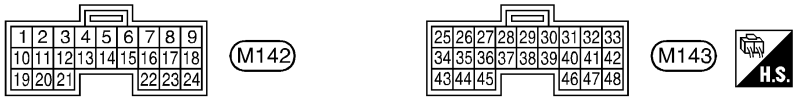
ECM (F24)



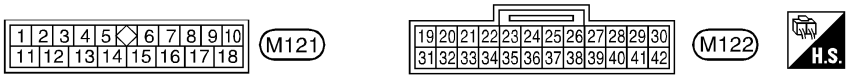
TCM (TRANSMISSION CONTROL MODULE)



TRANSFER CONTROL UNIT



SMART ENTRANCE CONTROL UNIT



QUICK REFERENCE CHART: PATHFINDER 2001

ENGINE TUNE-UP DATA

Engine model		VQ35DE		
Firing order		1-2-3-4-5-6		
Idle speed rpm	M/T	750±50		
	A/T (in "N" position)	750±50		
Ignition timing (degree BTDC at idle speed)		15°±2°		
CO% at idle		Idle mixture screw is preset and sealed at factory.		
Drive belt deflection (Cold) mm (in)		Used belt		Deflection of new belt
		Limit	Deflection after adjustment	
Alternator Power steering oil pump Fan		7 (0.28)	4 - 5 (0.16 - 0.20)	3.5 - 4.5 (0.138 - 0.177)
Air conditioner compressor		12 (0.472)	9 - 10 (0.354 - 0.394)	8 - 9 (0.31 - 0.35)
Applied pressed force N (kg, lb)		98 (10, 22)		
Drive belt tension adjustment (Cold) N (kg, lb)		Used belt		New belt
		Limit	After adjustment	
Alternator Power steering pump Fan		294 (30, 66)	730 - 818 (74.4 - 83.5, 164 - 184)	838 - 926 (85.4 - 94.5, 188 - 208)
Air conditioner compressor		196 (20, 44)	348 - 436 (35.5 - 44.5, 78 - 98)	470 - 559 (47.9 - 57.0, 106 - 126)
Radiator cap relief pressure kPa (kg/cm^2, psi)		78 - 98 (0.8 - 1.0, 11 - 14)		
Cooling system leakage testing pressure kPa (kg/cm^2, psi)		157 (1.6, 23)		
Compression pressure kPa (kg/cm^2, psi)/rpm	Standard	1,275 (13.0, 185)/300		
	Minimum	981 (10.0, 142)/300		
Spark plug	Standard	PLFR5A-11		
	Cold	PLFR6A-11		
	Hot	PLFR4A-11		

CLUTCH PEDAL

Unit: mm (in)

Pedal height	186 - 196 (7.32 - 7.72)
Pedal free play	9 - 16 (0.35 - 0.63)

WHEEL ALIGNMENT (Unladen*)

Camber	Minimum	−0°35′ (−0.58°)
	Nominal	0°10′ (0.17°)
	Maximum	0°55′ (0.92°)
Degree minute (Decimal degree)	Left and right difference	45′ (0.75°) or less
Caster	Minimum	2°15′ (2.25°)
	Nominal	3°00′ (3.00°)
	Maximum	3°45′ (3.75°)
Degree minute (Decimal degree)	Left and right difference	45′ (0.75°) or less
Kingpin inclination	Minimum	13°35′ (13.58°)
	Nominal	14°20′ (14.33°)
Degree minute (Decimal degree)	Maximum	15°05′ (15.08°)
Total toe-in	Minimum	1 (0.04)
Distance (A − B)	Nominal	2 (0.08)
mm (in)	Maximum	3 (0.12)
Angle (left plus right)	Minimum	5′ (0.08°)
	Nominal	10′ (0.17°)
Degree minute (Decimal degree)	Maximum	15′ (0.25°)
Wheel turning angle (Full turn)	Minimum	30°00′ (30.00°)
Inside	Nominal	33°00′ (33.00°)
Degree minute (Decimal degree)	Maximum	34°00′ (34.00°)
Outside	Minimum	28°00′ (28.00°)
Degree minute (Decimal degree)	Nominal	31°00′ (31.00°)
	Maximum	32°00′ (32.00°)

* Fuel, radiator coolant and engine oil full.
Spare tire, jack, hand tools and mats in designated positions.

BRAKE

Unit: mm (in)

Front brake	
Pad wear limit	2.0 (0.079)
Rotor repair limit	26.0 (1.024)
Rear brake	
Lining wear limit	1.5 (0.059)
Drum repair limit	296.5 (11.67)
Pedal free height	
M/T	165 - 175 (6.50 - 6.89)
A/T	175 - 185 (6.89 - 7.28)
Pedal depressed height*1	
M/T	65 (2.56)
A/T	70 (2.76)
Parking brake	
Number of notches*2	6 - 8

*1 Under force of 490 N (50 kg, 110 lb) with engine running
*2 At pulling force: 196 N (20 kg, 44 lb)

REFILL CAPACITIES

Unit			Liter	US measure
Coolant with reservoir			9.2	9-3/4 qt
Engine*	With oil filter		5.0	5-1/4 qt
	Without oil filter		4.8	5-1/8 qt
	Dry engine (engine overhaul)		6.8	7-1/4 qt
Transmission	M/T	2WD	2.8	5-7/8 pt
		4WD	5.1	10-3/4 pt
	A/T	2WD	8.5	9 qt
		4WD		
Transfer	Part-time 4WD		2.2	2-3/8 qt
	All-mode 4WD		3.0	2-5/8 qt
Differential carrier		Front	1.85	3-7/8 pt
		Rear	2.8	5-7/8 pt
Power steering system			0.9	1 qt
Air conditioning system		Refrigerant	0.60 - 0.70 kg	1.32 - 1.54 lb
		Compressor oil	0.20	7.0 fl oz

* For further details, see "Changing Engine Oil" in MA section.

FRONT WHEEL BEARING

Preload (At hub bolt) N (kg, lb)	Wheel bearing lock nut Tightening torque N·m (kg-m, ft-lb)	78 - 98 (8 - 10, 58 - 72)
	Retightening torque after loosening wheel bearing lock nut N·m (kg-m, in-lb)	0.5 - 1.5 (0.05 - 0.15, 4.3 - 13.0)
	Axial end play mm (in)	0 (0)
	Starting force at wheel hub bolt N (kg, lb)	A
	Turning angle degree	15° - 30°
	Starting force at wheel hub bolt N (kg, lb)	B
	Wheel bearing preload at wheel hub bolt B − A N (kg, lb)	7.06 - 20.99 (0.72 - 2.14, 1.59 - 4.72)