

# Nissan 200SX

S14 and S14a

**SXOC**  
NISSAN 200SX OWNERS CLUB



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## Workshop Manual

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# NISSAN

## MODEL S14 SERIES

# FOREWORD

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This manual contains maintenance and repair procedures for the Nissan model S14 series.

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.

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## 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 completely satisfy himself that neither his safety nor the vehicle's safety will be jeopardized by the service method selected.



**NISSAN MOTOR CO., LTD.**

Overseas Service Department  
Tokyo, Japan

# GENERAL INFORMATION

## SECTION **GI**

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GI

MA

EM

LC

EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

RS

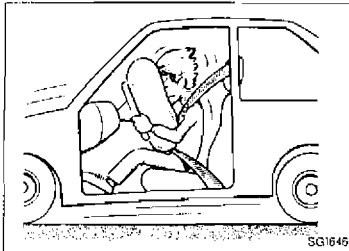
BT

HA

EL

IDX

Observe the following precautions to ensure safe and proper servicing.

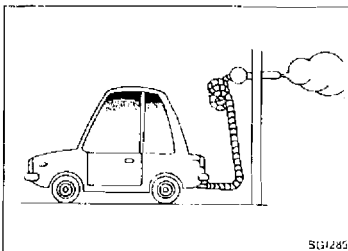


### Precautions for Supplemental Restraint System "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System "Air Bag" and "Seat belt pre-tensioner", used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), a seat belt pre-tensioner, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. 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.
- All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS.

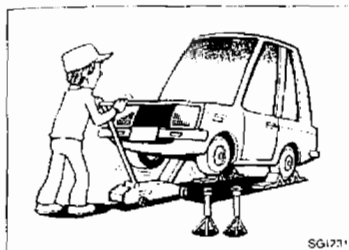


### General Precautions

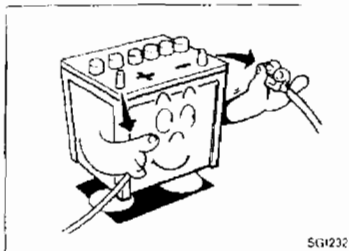
- Do not operate the engine for an extended period of time without proper exhaust ventilation. Keep the work area well ventilated and free of any flammable materials. Special care should be taken when handling any flammable or poisonous materials, such as gasoline, refrigerant gas, etc. When working 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.

## PRECAUTIONS

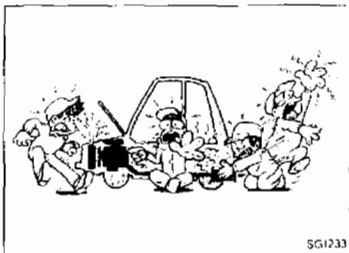
### General Precautions (Cont'd)



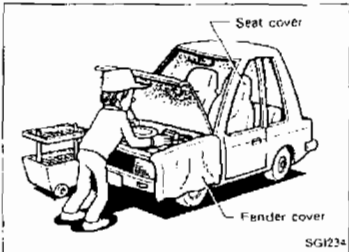
- Before jacking up the vehicle, apply wheel chocks or other tire blocks to the wheels to prevent the vehicle from moving. After jacking up the vehicle, support the vehicle weight with safety stands at the points designated for proper lifting before working on the vehicle. These operations should be 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 them. Also, do not allow them to strike adjacent parts, especially the brake tubes and master cylinder.



- Before starting repairs which do not require battery power, always turn off the ignition switch, then disconnect the ground cable from the battery to prevent accidental short circuit.



- To prevent serious burns, avoid contact with hot metal parts such as the radiator, exhaust manifold, tail pipe and muffler. Do not remove the radiator cap when the engine is hot.



- Before servicing the vehicle, protect fenders, upholstery and carpeting with appropriate covers. Take caution that keys, buckles or buttons on your person do not scratch the 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.

## PRECAUTIONS

### General Precautions (Cont'd)

- After disconnecting vacuum or air hoses, attach a tag to indicate the proper connection.
- Use only the fluids and the lubricants specified in MA section and HA section or their equivalents.
- 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.



### Precautions for Multiport Fuel Injection System or ECSS Engine

- Before connecting or disconnecting multiport fuel injection system or ECM (ECSS control module) harness connector, be sure to turn the ignition switch to the "OFF" position and disconnect the 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 to eliminate danger.
- Be careful not to jar components such as ECM and mass air flow sensor.

### Precautions for Three Way Catalyst

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

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

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

### Precautions for Turbocharger

The turbocharger turbine revolves at extremely high speeds and becomes very hot. Therefore, it is essential to maintain a clean supply of oil flowing through the turbocharger and to follow all required maintenance instructions and operating procedures.

For proper operation of the system, follow the procedure below.

1. Always use the recommended oil. Follow the instructions for proper time to change the oil and proper oil level.
2. Avoid accelerating engine to a high rpm immediately after starting.
3. If engine had been operating at high rpm for an extended period of time, let it idle for a few minutes prior to shutting it off.

## Engine Oils

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.

GI

## HEALTH PROTECTION PRECAUTIONS

- 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

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 the pollution of the environment will vary from country to country.**



## PRECAUTIONS

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### Precautions for Fuel

Unleaded premium gasoline with an octane rating of at least 95 AKI (Anti-Knock Index) number (Research octane number 96).

**CAUTION:**

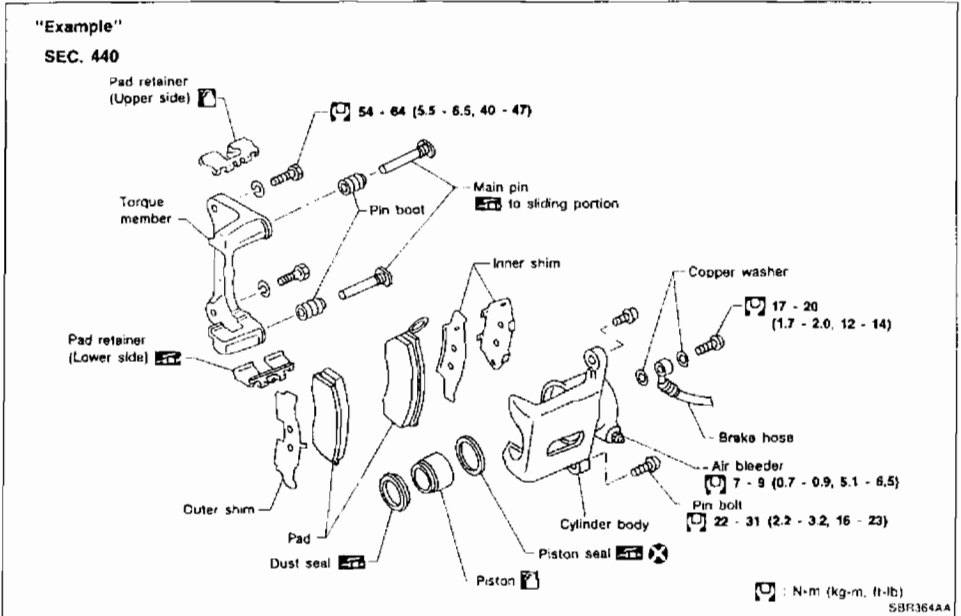
Using a fuel other than that specified could adversely affect the emission control devices and systems, and could also affect the warranty coverage validity.

Under no circumstances should a leaded gasoline be used, since this will damage the three way catalyst.

## HOW TO USE THIS MANUAL

- **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**.



- **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.

## HOW TO USE THIS MANUAL

- The following **SYMBOLS AND ABBREVIATIONS** are used:

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

- 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 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.

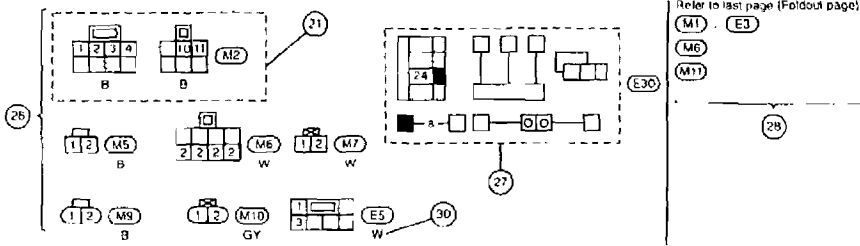
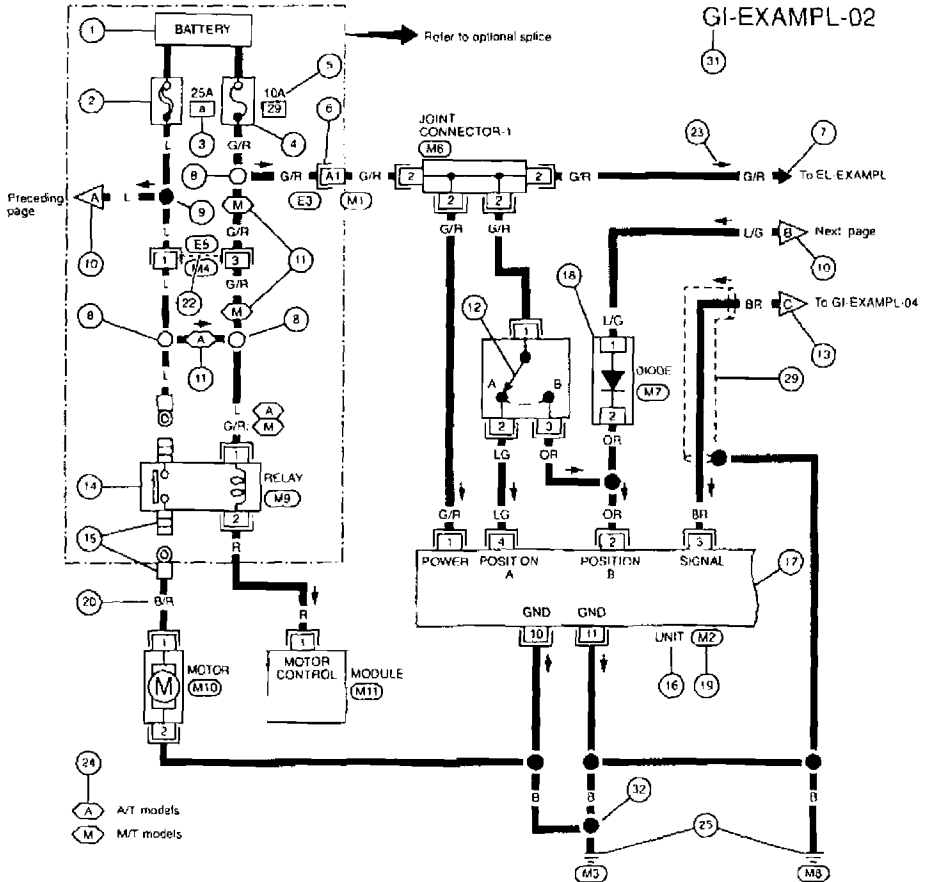
**BOLD TYPED STATEMENTS** except **WARNING** and **CAUTION** give you helpful information.

# HOW TO READ WIRING DIAGRAMS

## Sample/Wiring Diagram — EXAMPL —

GI

GI-EXAMPL-02





## HOW TO READ WIRING DIAGRAMS

### Description

| Number | Item                       | Description   |
|--------|----------------------------|---|
| 1      | Power condition            | <ul style="list-style-type: none"> <li>This shows the condition when the system receives battery positive voltage (can be operated)</li> </ul>  |
| 2      | Fusible link               | <ul style="list-style-type: none"> <li>The double line shows that this is a fusible link</li> <li>The open circle shows current flow in and the shaded circle shows current flow out</li> </ul>   |
| 3      | Fusible link/fuse location | <ul style="list-style-type: none"> <li>This shows the location of the fusible link or fuse in the fusible link or fuse box. See "POWER SUPPLY ROUTING" in EL section for arrangement.</li> </ul>  |
| 4      | Fuse                       | <ul style="list-style-type: none"> <li>The single line shows that this is a fuse.</li> <li>The open circle shows current flow in and the shaded circle shows current flow out</li> </ul>  |
| 5      | Current rating             | <ul style="list-style-type: none"> <li>This shows the current rating of the fusible link or fuse</li> </ul>   |
| 6      | Connectors                 | <ul style="list-style-type: none"> <li>This shows that connector (F) is female and connector (M) is male.</li> <li>The G/R wire is located in the A1 terminal of both connectors</li> <li>Terminal No. with an alphabet (A1, B5, etc.) indicates that the connector is SMJ connector. Refer to GI-16.</li> </ul>            |
| 7      | System branch              | <ul style="list-style-type: none"> <li>This shows that the system branches to another system identified by cell code (section and system)</li> </ul>  |
| 8      | Optional splice            | <ul style="list-style-type: none"> <li>The open circle shows that the splice is optional depending on vehicle application.</li> </ul>   |
| 9      | Splice                     | <ul style="list-style-type: none"> <li>The shaded circle shows that the splice is always on the vehicle.</li> </ul>   |
| 10     | Page crossing              | <ul style="list-style-type: none"> <li>This arrow shows that the circuit continues to an adjacent page</li> <li>The A will match with the A on the preceding or next page</li> </ul>  |
| 11     | Option abbreviation        | <ul style="list-style-type: none"> <li>This shows that the circuit is optional depending on vehicle application</li> </ul>  |
| 12     | Switch                     | <ul style="list-style-type: none"> <li>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.</li> </ul>   |
| 13     | Page Crossing              | <ul style="list-style-type: none"> <li>This arrow shows that the circuit continues to another page identified by cell code.</li> <li>The C will match with the C on another page within the system other than the next or preceding pages.</li> </ul>   |
| 14     | Relay                      | <ul style="list-style-type: none"> <li>This shows an internal representation of the relay. See "STANDARDIZED RELAY" in EL section for details.</li> </ul>   |
| 15     | Connectors                 | <ul style="list-style-type: none"> <li>This shows that the connector is connected to the body or a terminal with bolt or nut.</li> </ul>  |
| 16     | Component name             | <ul style="list-style-type: none"> <li>This shows the name of a component.</li> </ul>   |
| 17     | Component box in wave line | <ul style="list-style-type: none"> <li>This shows that another part of the component is also shown on another page (indicated by wave line) within the system</li> </ul>  |
| 18     | Assembly parts             | <ul style="list-style-type: none"> <li>Connector terminal in component shows that it is a harness incorporated assembly</li> </ul>  |
| 19     | Connector number           | <ul style="list-style-type: none"> <li>This shows the connector number.</li> <li>The letter shows which harness the connector is located. Example: M: main harness. See "HARNES LAYOUT" in EL section to locate the connector. A coordinate grid is included for complex harnesses to aid in locating connectors</li> </ul> |



## HOW TO READ WIRING DIAGRAMS

### Description (Cont'd)

#### CONNECTOR SYMBOLS

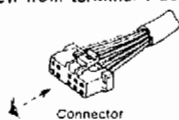
Most of connector symbols in wiring diagrams are shown from the terminal side.

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



#### Example

##### View from terminal side



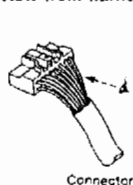
Connector symbol



Single line  
Direction mark



##### View from harness side



Connector symbol



Double line

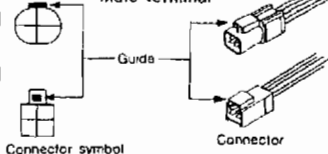
Direction mark



SG1364

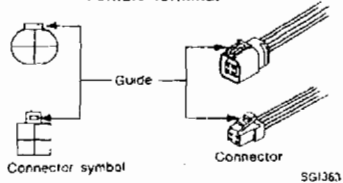
#### Example

##### Male terminal



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

##### Female terminal



SG1363



## HOW TO READ WIRING DIAGRAMS

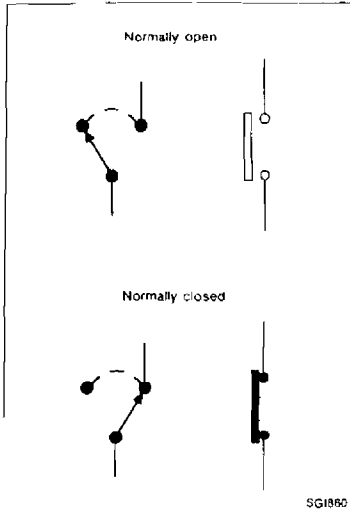
### Description (Cont'd)

#### SWITCH POSITIONS

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

A vehicle is in the "normal" condition when:

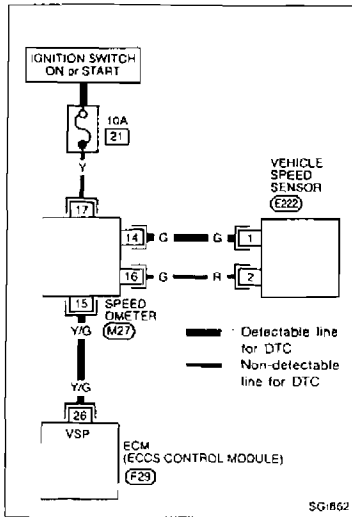
- ignition switch is "OFF",
- doors, hood and trunk lid/back door are closed,
- pedals are not depressed, and
- parking brake is released.



#### DETECTABLE LINES AND NON-DETECTABLE LINES

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 (ECSS 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.



## HOW TO READ WIRING DIAGRAMS

### Description (Cont'd)

#### MULTIPLE SWITCH

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

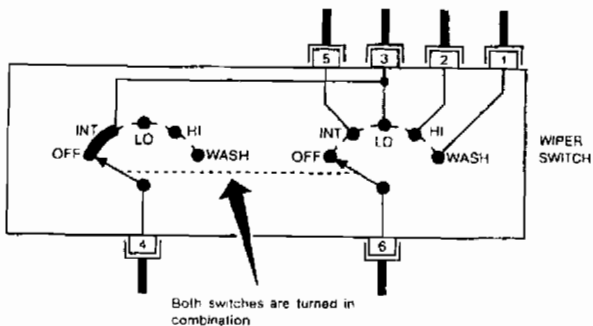
- The switch chart is used in schematic diagrams.
- The switch diagram is used in wiring diagrams.

#### 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                |

SG 875

# HOW TO READ WIRING DIAGRAMS

## Description (Cont'd)

### FOLDOUT PAGE

The foldout should be spread to read the entire wiring diagram.

### Super multiple junction (SMJ)

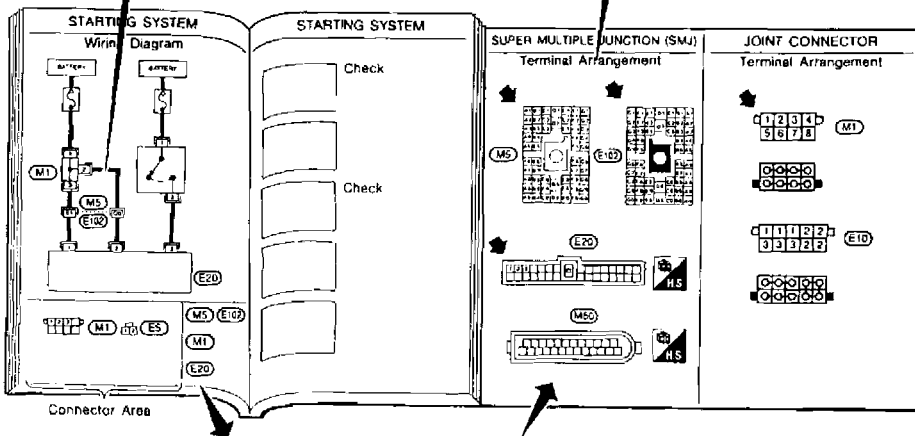
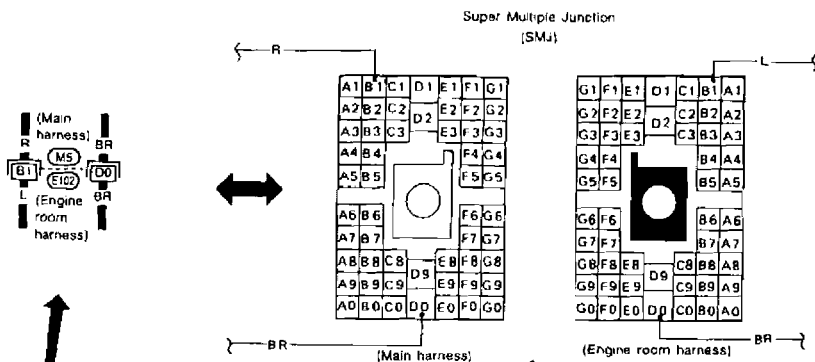
In wiring diagram, connectors consisting of terminals having terminal numbers with an alphabet (B1, D0, etc.) are SMJ connectors.

If connector numbers are shown in Reference Area, these connector symbols are not shown in Connector Area. For terminal arrangement of these connectors, refer to the fold-out page at the end of this manual.

### Joint connector

Joint connector symbols are shown in Connector Area in the wiring diagram concerned. Fold-out page also carries inside wiring layout together with such joint connector symbols.

### Example



## HOW TO READ WIRING DIAGRAMS

### Wiring Diagram Codes (Cell Codes)

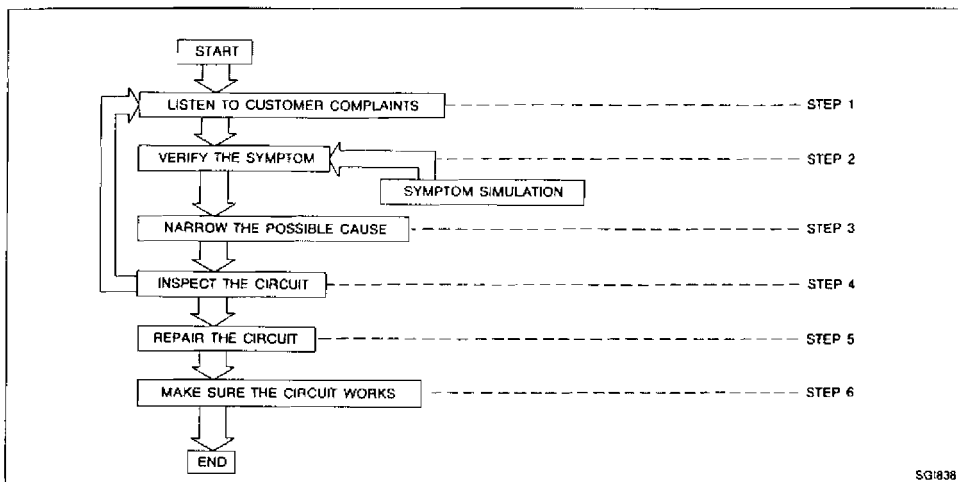
Use the chart below to find out what each wiring diagram code stands for.

| Code   | Section | Wiring Diagram Name                     |
|--------|---------|---|
| AAC/V  | EC      | IACV-AAC Valve                          |
| ABS    | BR      | Anti-lock Brake System                  |
| A/C, A | HA      | Auto Air Conditioner                    |
| A/C, M | HA      | Manual Air Conditioner                  |
| A/T    | AT      | Automatic Transmission                  |
| AJM    | EL      | Headlamp System                         |
| AT/C   | EC      | A/T Control                             |
| AUDIO  | EL      | Audio                                   |
| BACK/L | EL      | Back-up Lamp                            |
| BOOST  | EC      | Boost Pressure Sensor                   |
| CHARGE | EL      | Charging System                         |
| CHIME  | EL      | Warning Chime                           |
| CMPS   | EC      | Camshaft Position Sensor                |
| COOL/F | EC      | Cooling Fan Control                     |
| DEF    | EL      | Rear Window Defogger                    |
| DEF/S  | EC      | Rear Window Defogger Signal             |
| DIFF   | PD      | Differential Oil Cooler                 |
| D/LOCK | EL      | Power Door Lock                         |
| DTRL   | EL      | Headlamp - With Daytime Light System    |
| ECTS   | EC      | Engine Coolant Temperature Sensor       |
| EGRC/V | EC      | EGR and canister Control Solenoid Valve |
| F/FOG  | EL      | Front Fog Lamp                          |
| FICD   | EC      | IACV FICD Solenoid Valve                |
| F/PUMP | EC      | Fuel Pump                               |
| H/LAMP | EL      | Headlamp -Without Daytime Light System  |
| H/SEAT | EL      | Heated Seat                             |
| HEAT   | HA      | Heater                                  |
| HLC    | EL      | Headlamp Washer                         |
| HO2S   | EC      | Heated Oxygen Sensor                    |
| HORN   | EL      | Horn, Cigarette Lighter, Clock          |
| IGN/SG | EC      | Ignition Signal                         |
| ILL    | EL      | Illumination                            |
| INJECT | EC      | Injector                                |
| INT/L  | EL      | Interior, Spot and Trunk Room Lamps     |
| KS     | EC      | Knock Sensor                            |

| Code   | Section | Wiring Diagram Name                           |
|--------|---------|---|
| MAFS   | EC      | Mass Air Flow Sensor                          |
| MAIN   | EC      | Main Power Supply and Ground Circuit          |
| METER  | EL      | Speedometer, Tachometer, Temp and Fuel Gauges |
| MIL    | EC      | MIL, Data Link Connector For Consult          |
| MIRROR | EL      | Door Mirror                                   |
| MULTI  | EL      | Multi-remote Control System                   |
| P/ANT  | EL      | Power Antenna                                 |
| PNP/SW | EC      | Park/Neutral Position Switch                  |
| POWER  | EL      | Power Supply Routing                          |
| PST/SW | EC      | Power Steering Oil Pressure Switch            |
| R/FOG  | EL      | Rear Fog Lamp                                 |
| S/ROOF | EL      | Sun Roof                                      |
| SRS    | RS      | Supplemental Restraint System                 |
| S/SIG  | EC      | Start Signal                                  |
| START  | EL      | Starting System                               |
| STOP/L | EL      | Stop Lamp                                     |
| TAIL/L | EL      | Clearance, License, and Tail Lamps            |
| THEFT  | EL      | Theft Warning System                          |
| TPS    | EC      | Throttle Position Sensor                      |
| TURN   | EL      | Turn Signal and Hazard Warning Lamps          |
| VSS    | EC      | Vehicle Speed Sensor                          |
| VTC    | EC      | VTC Solenoid Valve                            |
| WARN   | EL      | Warning Lamps                                 |
| WG/V   | EC      | Wastegate Valve Control Solenoid Valve        |
| WINDOW | EL      | Power Window                                  |
| WIPER  | EL      | Front Wiper and Washer                        |
| WIP/R  | EL      | Rear Wiper and Washer                         |

# HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT

## Work Flow



SG/838

| 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:<br><b>WHAT</b> Vehicle Model, Engine, Transmission and the System (i.e. Radio).<br><b>WHEN</b> Date, Time of Day, Weather Conditions, Frequency.<br><b>WHERE</b> Road Conditions, Altitude and Traffic Situation.<br><b>HOW</b> 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:<br>POWER SUPPLY ROUTING<br>System Operation Descriptions<br>Applicable Service Manual Sections<br><br>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

### INTRODUCTION

Sometimes the symptom is not present when the vehicle is brought in for service. Therefore, it is necessary to simulate the conditions and environment when the incident occurred. Otherwise, only a No Trouble Found Diagnosis may be found. 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:

1. Vehicle vibration
2. Heat sensitive
3. Freezing
4. Water intrusion
5. Electrical load
6. 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

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

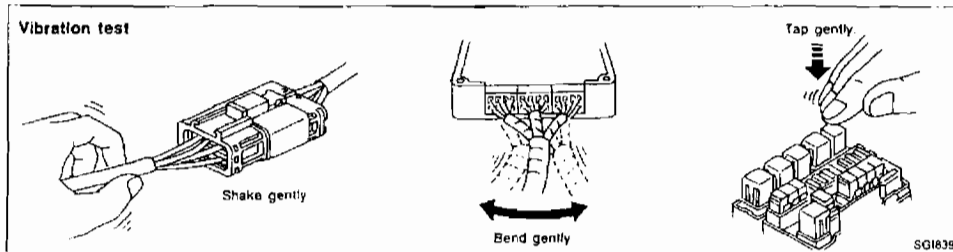
Determine which connectors and wiring harness would affect the electrical system you are inspecting. Gently shake each connector and harness while monitoring the system for the incident you are trying to duplicate. This test may indicate a loose or poor electrical connection.

#### 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

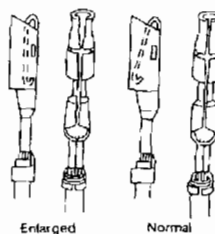
Gently apply a slight vibration to sensors and relays in the system you are inspecting. This test may indicate a loose or poorly mounted sensor or relay.



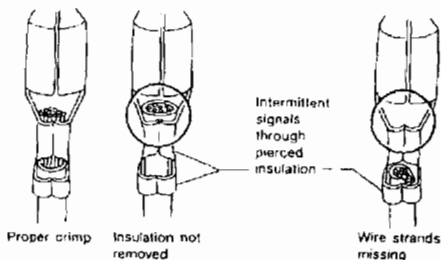
# HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT

## Incident Simulation Tests (Cont'd)

### Possible cause



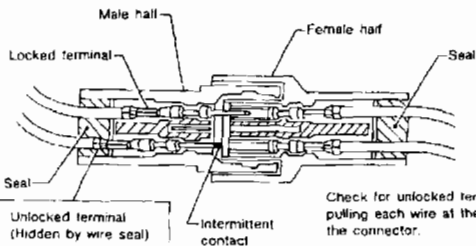
Any probe entering the terminal may enlarge the contact spring opening creating an intermittent signal.



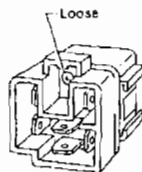
Intermittent signals through pierced insulation

### DEFORMED (ENLARGED) FEMALE TERMINALS

### DEFECTIVE INSULATION STRIPPING

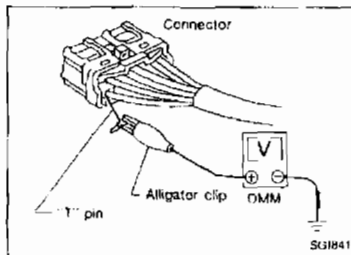


Check for unlocked terminals by pulling each wire at the end of the connector.



### TERMINAL NOT PROPERLY SEATED

SGI840



### Tester probe

When probing a connector it is possible to enlarge the contact spring opening. If this occurs it may create an intermittent signal in the circuit. When probing a connector, use care not to enlarge the opening. The probe of the Digital Multimeter (DMM) may not fit into the connector cavity. In such cases make an extension of a "T" pin and probe it from the harness side of the connector. Most DMMs have accessory alligator clips. Slide these over the probe to allow clipping the "T" pin for a better contact. If you have any difficulty probing a terminal, inspect the terminal. Ensure you have not accidentally opened the contact spring or pulled a wire loose.

## HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT

### Incident Simulation Tests (Cont'd)

#### 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 which are inaccessible for diagnosis probing
- Connectors which may not fully be seated.
- Wiring harness which are not long enough and are being stressed during engine vibrations or rocking.
- Wires laying across brackets or moving components.
- Loose, dirty or corroded ground wires.
- Wires routed too close to hot components.

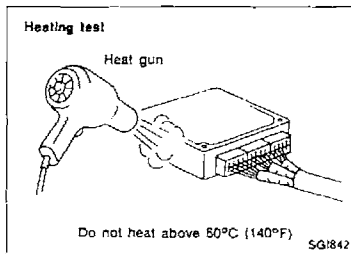
To inspect components under the hood, start by verifying the integrity of ground connections. (Refer to GROUND INSPECTION described later.) First check that the system is properly grounded. Then check for loose connection by **gently shaking** the wiring or components as previously explained. Using the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

#### Behind the instrument panel

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 behind or below the dash.

#### 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

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



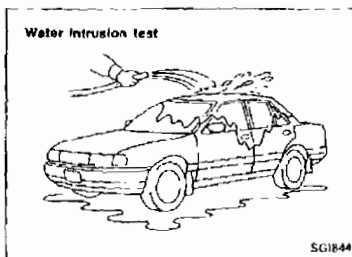
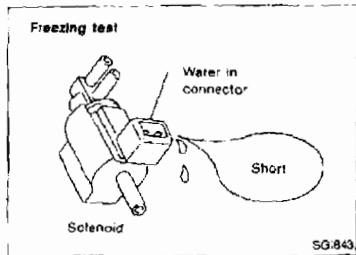
## Incident Simulation Tests (Cont'd)

### FREEZING

The customer may indicate the incident goes away after the car warms up (winter time). In such cases 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.

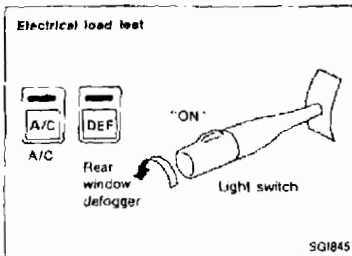
The second method is to put the suspect component into a freezer long enough for any water to freeze. Reinstall the part into the car and check for the recurrence of the incident. If it occurs, repair or replace the component.



### WATER INTRUSION

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

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

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

### INTRODUCTION

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.

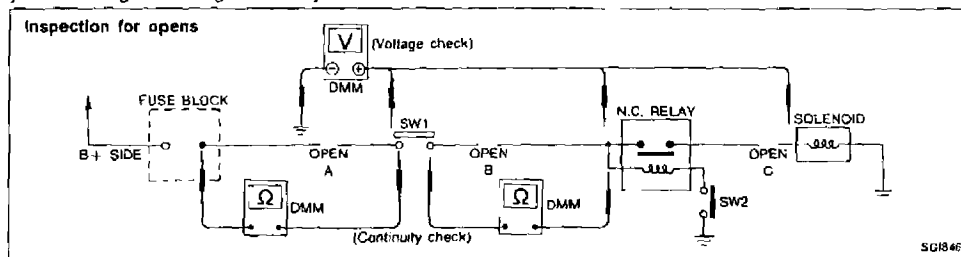
**OPEN** A circuit is open when there is no continuity through a section of the circuit.

**SHORT** There are two types of shorts.

1. **SHORT CIRCUIT** When a circuit contacts another circuit and causes the normal resistance to change.
2. **SHORT TO GROUND** When a circuit contacts a ground source and grounds the circuit.

### TESTING FOR "OPENS" IN THE CIRCUIT

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.

# HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT

## Circuit Inspection (Cont'd)

### Voltage check method

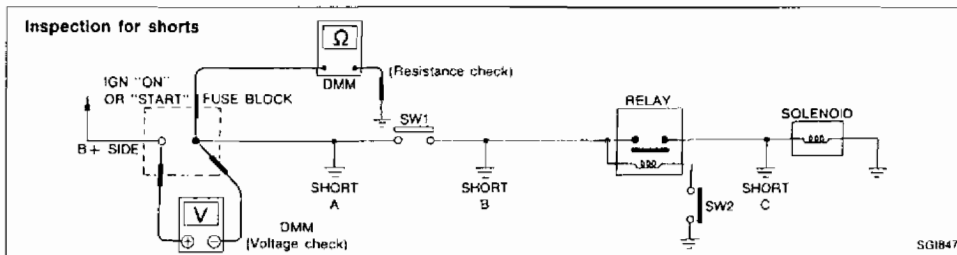
To help in understanding the diagnosis of open circuits please refer to the previous schematic. In any powered circuit, an open can be found by methodically checking the system for the presence of voltage. This is done by switching the DMM to the voltage function.

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

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+ terminal 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)

## HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT

### Circuit Inspection (Cont'd)

- 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

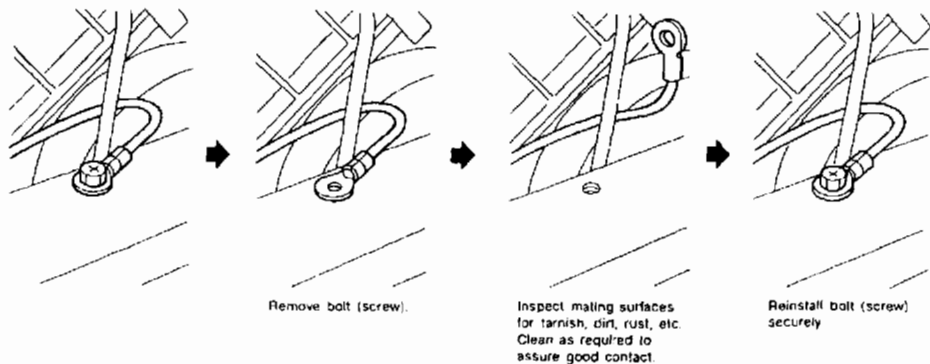
Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.

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 screw or clip.
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



SG1953

# HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT

## Circuit Inspection (Cont'd)

### VOLTAGE DROP TESTS

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:

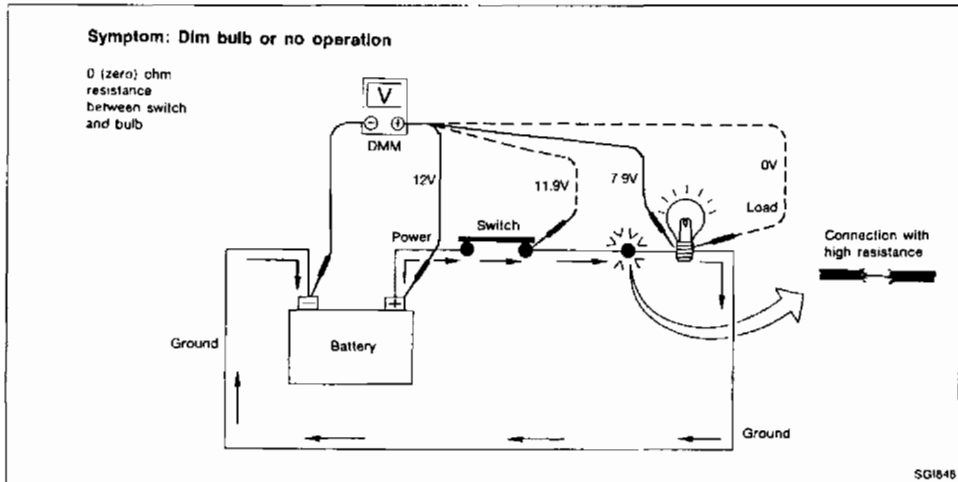
- Undersized wiring (single strand example)
- Corrosion on switch contacts
- Loose wire connections or splices.

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.



### 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").

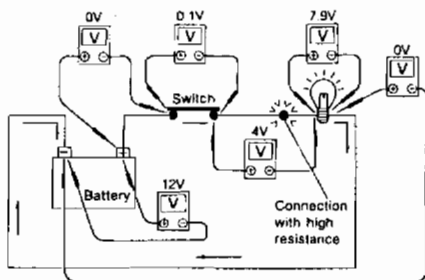
Circuits in the "Computer Controlled System" operate on very low amperage.

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.

# HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT

## Circuit Inspection (Cont'd)



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.

GI

WA

SA

LC

EC

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CL

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AT

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ST

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DD

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 < 0.01 volts |
| Ground Connections | Approx. 0.1 volts       |
| Switch Contacts    | Approx. 0.3 volts       |

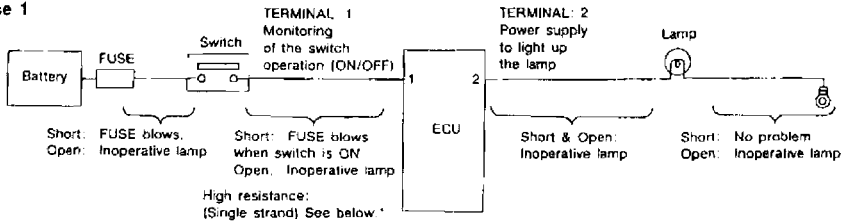
# HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT

## Circuit Inspection (Cont'd)

### Relationship between open/short (high resistance) circuit and the ECU pin control

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

#### Case 1



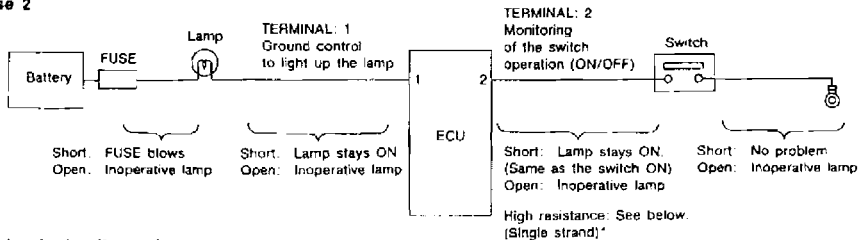
#### Input-output voltage chart

| 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<br>Approx. 8 (Example)      |
|         |        | OFF       | Approx. 0         | Approx. 0  |
| 2       | Lamp   | Switch ON | Battery voltage   | Approx. 0<br>(Inoperative lamp)                        |
|         |        | 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. ECM does not detect the switch is ON even if the switch does turn ON. Therefore, the ECM does not supply power to light up the lamp

#### Case 2



#### 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<br>(Inoperative lamp)                  |
|         |        | OFF       | Battery voltage   | Battery voltage  |
| 2       | Switch | Switch ON | Approx. 0         | Higher than 0<br>Approx. 4 (Example)                   |
|         |        | OFF       | Approx. 5         | Approx. 5  |

The voltage value is based on the body ground.

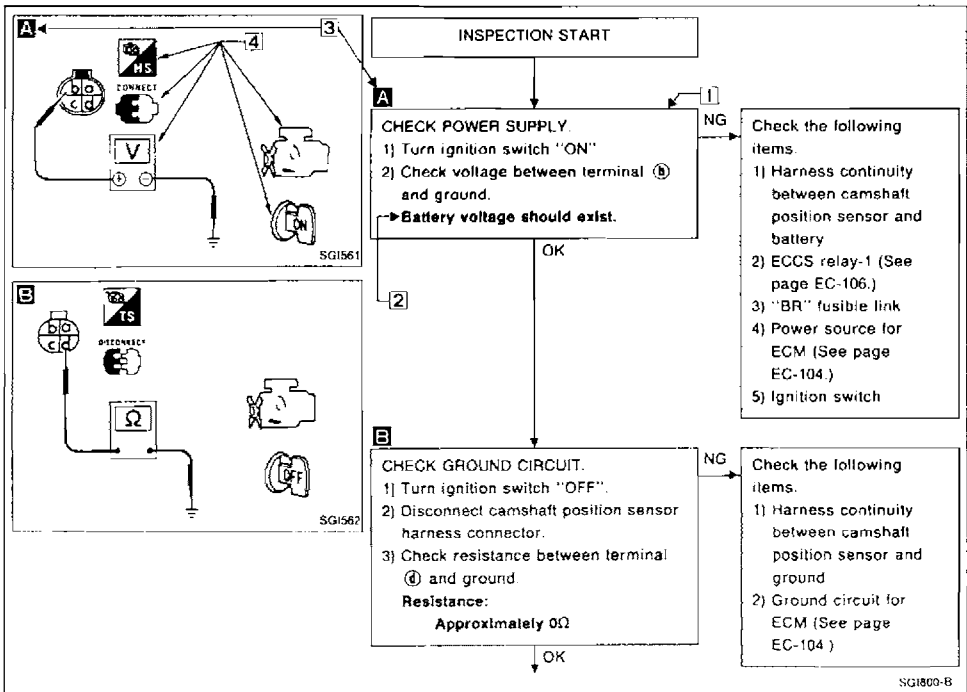
\* : If high resistance exists in the switch side circuit (caused by a single strand), terminal 2 does not detect approx. 0V. ECM does not detect the switch is ON even if the switch does turn ON. Therefore, the ECM does not control ground to light up the lamp.

## NOTICE

The flow chart indicates work procedures required to diagnose problems effectively. Observe the following instructions before diagnosing.

- 1) Use the flow chart after locating probable causes of a problem following the "Preliminary Check" or the "Symptom Chart".
- 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 must 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.

## Example





## HOW TO FOLLOW THIS FLOW CHART

### 1 Work and diagnostic procedure

Start to diagnose a problem using procedures indicated in enclosed blocks, as shown in the following example.

**A**

CHECK POWER SUPPLY.

- 1) Turn ignition switch "ON".
- 2) Check voltage between terminal ① and ground.

**Battery voltage should exist.**

← Check item being performed.

} Procedure, steps or measurement results

### 2 Measurement results

Required results are indicated in bold type in the corresponding block, as shown below:

These have the following meanings:

**Battery voltage** → 11 - 14V or approximately 12V

**Voltage: Approximately 0V** → Less than 1V

### 3 Cross reference of work symbols in the text and illustrations

Illustrations are provided as visual aids for work procedures. For example, symbol **A** indicated in the left upper portion of each illustration corresponds with the symbol in the flow chart for easy identification. More precisely, the procedure under the "CHECK POWER SUPPLY" outlined previously is indicated by an illustration **A**.

### 4 Symbols used in illustrations

Symbols included in illustrations refer to measurements or procedures. Before diagnosing a problem, familiarize yourself with each symbol.

### Direction mark

Refer to "CONNECTOR SYMBOLS" on GI-11.

# HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES

## Key to symbols signifying measurements or procedures

| Symbol | Symbol explanation                                      | Symbol | Symbol explanation  |
|--------|---|--------|---|
|        | Check after disconnecting the connector to be measured. |        | Procedure without CONSULT   |
|        | Check after connecting the connector to be measured.    |        | A/C switch is "OFF".  |
|        | Insert key into 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.               |        | DEF switch is "ON".   |
|        | Turn ignition switch from "OFF" to "ACC" position.      |        | VENT switch is "ON".  |
|        | Turn ignition switch from "ACC" to "OFF" position.      |        | Fan switch is "ON" (At any position except for "OFF" position)  |
|        | Turn ignition switch from "OFF" to "ON" position.       |        | Fan switch is "OFF".  |
|        | Turn ignition switch from "ON" to "OFF" position.       |        | Apply fused battery positive voltage directly to components   |
|        | Do not start engine, or check with engine stopped.      |        | Drive vehicle   |
|        | Start engine, or check with engine running.             |        | Disconnect battery negative cable.  |
|        | Apply parking brake                                     |        | Depress brake pedal   |
|        | Release parking brake                                   |        | Release brake pedal   |
|        | Check after engine is warmed up sufficiently.           |        | Depress accelerator pedal.  |
|        | Voltage should be measured with a voltmeter.            |        | Release accelerator pedal.  |
|        | Circuit resistance should be measured with an ohmmeter  |        | Pin terminal check for SMJ type ECM and A/T control unit connectors.<br><b>For details regarding the terminal arrangement, refer to the foldout page.</b> |
|        | Current should be measured with an ammeter              |        |   |
|        | Procedure with CONSULT                                  |        |   |

GI  
 WA  
 EM  
 LC  
 RC  
 TP  
 DL  
 WT  
 AT  
 EC  
 FA  
 WA  
 SP  
 ST  
 FC  
 BT  
 BA  
 FI  
 SC

# CONSULT CHECKING SYSTEM

## Function and System Application

| Diagnostic test mode    | Function  | ECCS | A/T | AIR BAG* |
|-------------------------|---|------|-----|----------|
| Work support            | This mode enables a technician to adjust some devices faster and more accurately by following the indications on CONSULT.             | X    | —   | —        |
| Self diagnostic results | Self-diagnostic results can be read and erased quickly.   | X    | X   | X        |
| Data monitor            | Input/Output data in the ECM can be read.   | X    | X   | —        |
| Active test             | Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range. | X    | —   | —        |
| ECM part number         | ECM part number can be read.  | X    | X   | —        |
| Function test           | Conducted by CONSULT instead of a technician to determine whether each system is "OK" or "NG".  | X    | —   | —        |

X: Applicable

\* The existing program card (EE922) is applicable only to driver's side air bag system on vehicles outside Europe.

## Lithium Battery Replacement

CONSULT contains a lithium battery. When replacing the battery obey the following:

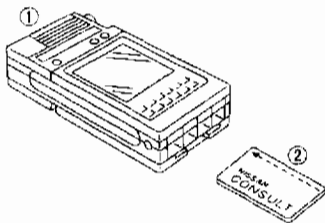
### WARNING:

Replace the lithium battery with SANYO Electric Co., Ltd., CR2032 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 or dispose of in fire.

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

## Checking Equipment

When ordering the below equipment, contact your NISSAN distributor.

| Tool name   | Description   |
|---|---|
| <b>NISSAN CONSULT</b><br>① CONSULT unit and accessories<br>② Program card (EE 922) (AE930)* |  |

NT004

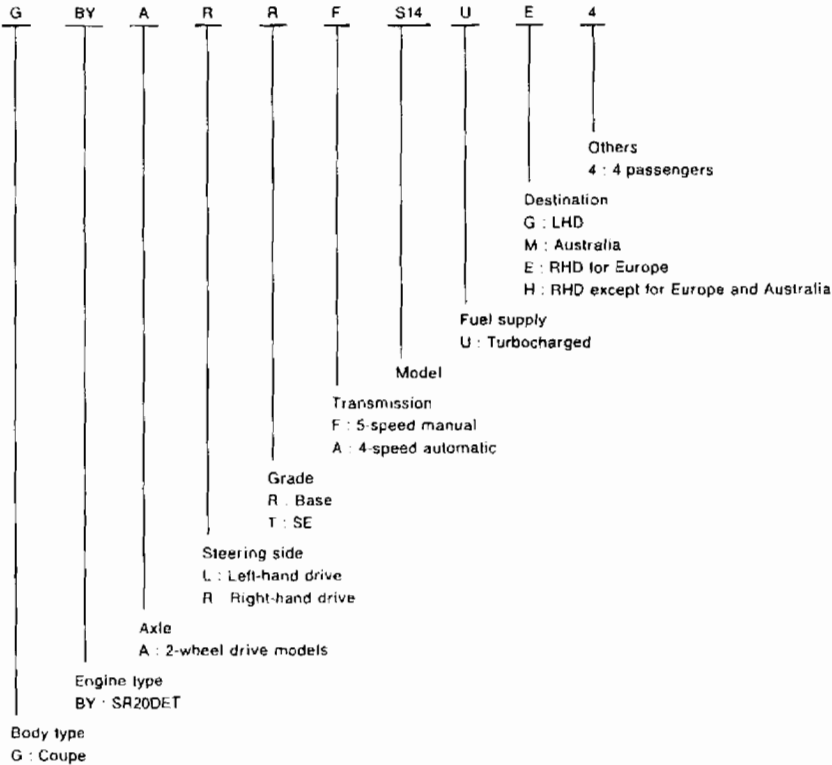
\* For Australia

# IDENTIFICATION INFORMATION

## Model Variation

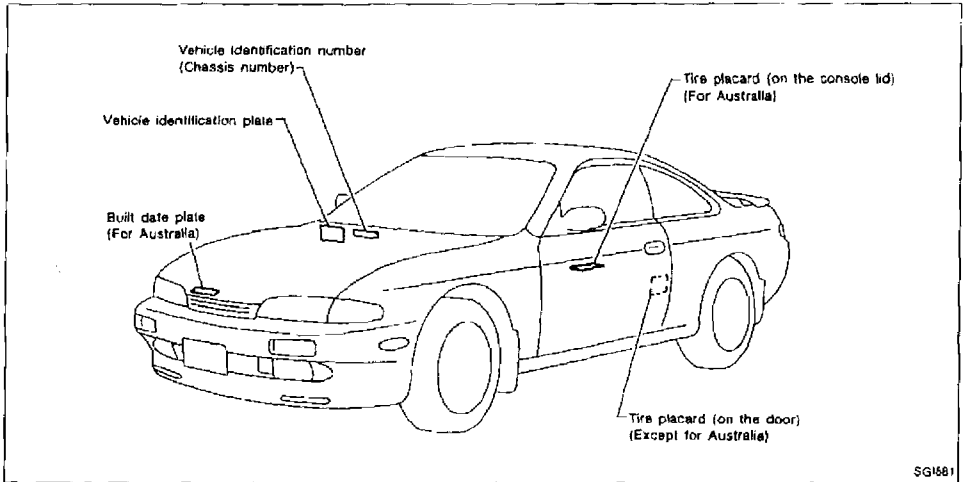
| Body type | Engine  | Destination                 | Axle | Transmission | Applied model    |                 |
|-----------|---------|-----------------------------|------|--------------|------------------|-----------------|
|           |         |                             |      |              | Right-hand drive | Left-hand drive |
| Coupe     | SR20DET | Europe                      | 2WD  | 5-speed M/T  | GBYARRF-UE4      | GBYALRF-UG4     |
|           |         |                             |      | 4-speed A/T  | GBYARRA-UE4      | GBYALRA-UG4     |
|           |         | Australia                   |      | 5-speed M/T  | GBYARRF-UM4      | --              |
|           |         |                             |      | 4-speed A/T  | GBYARRA-UM4      | --              |
|           |         | Except Europe and Australia |      | 5-speed M/T  | GBYARTF-UH4      | GBYALRF-UG4     |
|           |         |                             |      | 4-speed A/T  | GBYARTA-UH4      | GBYALRA-UG4     |

### Prefixed and suffix designations:



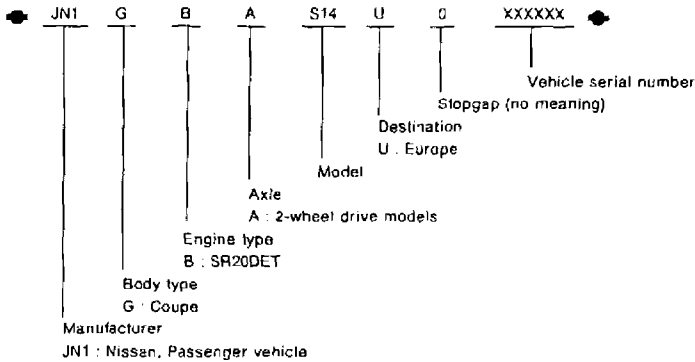
# IDENTIFICATION INFORMATION

## Identification Number



## VEHICLE IDENTIFICATION NUMBER ARRANGEMENT

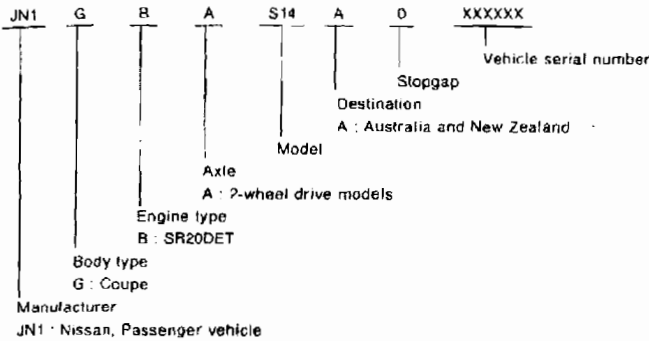
### For Europe



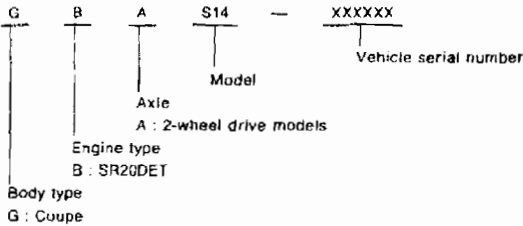
# IDENTIFICATION INFORMATION

## Identification Number (Cont'd)

### For Australia and New Zealand



### Except Europe, Australia and New Zealand



- GI
- MA
- EM
- LC
- EG
- FE
- CL
- MY
- AT
- PD
- FA
- HA
- BA
- ST
- BS
- BT
- HA
- EL
- DX

# IDENTIFICATION INFORMATION

## Identification Number (Cont'd)

### IDENTIFICATION PLATE

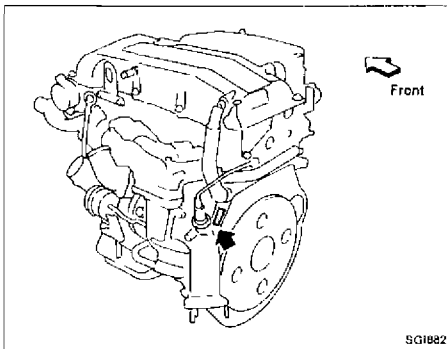
|  |     |               |
|--|-----|---------------|
| NISSAN MOTOR CO. LTD JAPAN<br>型式 TYPE<br>型式 TIPO |     |               |
| CHASSIS NO.<br>NO. DE CHASSIS                    | △   |               |
| MODEL<br>MODELO                                  | △   |               |
| ○ BODY COLOR TRIM<br>* * * COLOR GUARNICION      | △ △ | ○             |
| CC   |     | CC            |
| ENGINE<br>MOTOR                                  | △ △ |               |
| TRANS ASSEMBLY<br>TRANSMIS. CA                   | △ △ |               |
| 工場 PLANT<br>FABRICA                              | △ △ |               |
| 日産自動車株式会社  |     | MADE IN JAPAN |

- 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

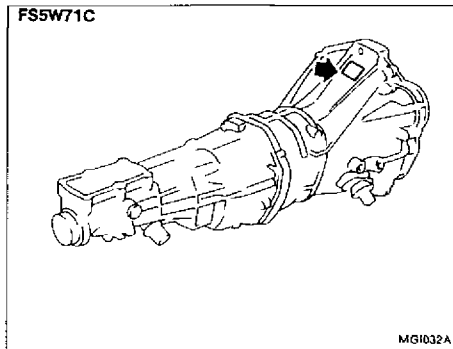
SGI315

### ENGINE SERIAL NUMBER



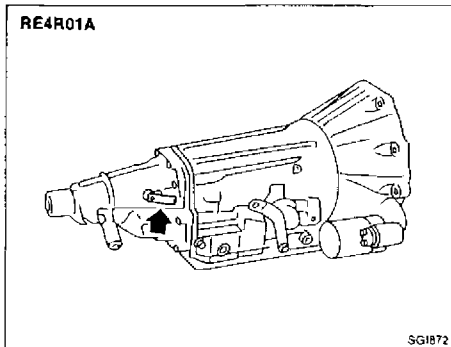
SGI882

### MANUAL TRANSMISSION NUMBER



MG1032A

### AUTOMATIC TRANSMISSION NUMBER



SGI872

# IDENTIFICATION INFORMATION

## Dimensions

|                |         |               |
|----------------|---------|---------------|
| Overall length | mm (in) | 4,520 (178.0) |
| Overall width  | mm (in) | 1,730 (68.1)  |
| Overall height | mm (in) | 1,295 (51.0)  |
| Front tread    | mm (in) | 1,480 (58.3)  |
| Rear tread     | mm (in) | 1,470 (57.9)  |
| Wheelbase      | mm (in) | 2,525 (99.4)  |

GI

GA

GB

## Wheels and Tires

|                          |               |                        |
|--------------------------|---------------|------------------------|
| Road wheel               |               |                        |
| Steel*1                  | 16 x 6-1/2JJ  |                        |
|                          | 16 x 4T*2     |                        |
| Aluminum                 | 16 x 6-1/2JJ  |                        |
| Offset                   | mm (in)       | 40 (1.57), 30 (1.18)*2 |
| Tire size (Conventional) | 205/55R16 89V |                        |
| Spare tire (T-type)*2    | T125/90D16    |                        |

GC

GD

GE

GF

\*1. For Spare tire  
\*2. For Spare tire (T-type) for Australia

GG

GH

GI

GJ

GK

GL

GM

GN

GO

GP

GQ

GR

GS



## LIFTING POINTS AND TOW TRUCK TOWING

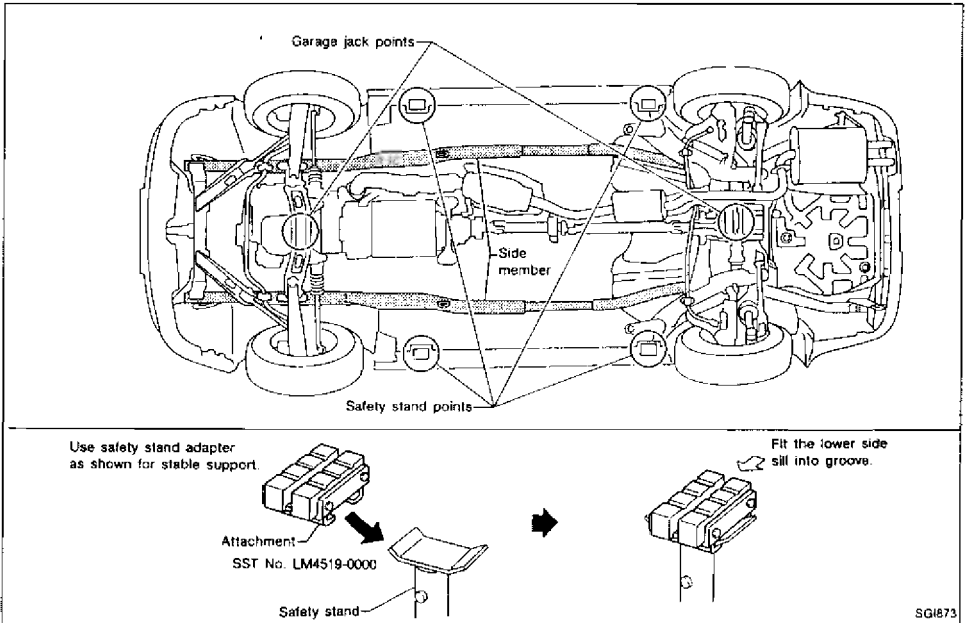
### Garage Jack and Safety Stand

#### 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 the front wheels when the rear wheels are raised and place wheel chocks at the rear wheels when the front wheels are raised.

#### CAUTION:

- Place a wooden or rubber block between safety stand and vehicle body when the supporting body is flat.
- Never place safety stand at the side member.



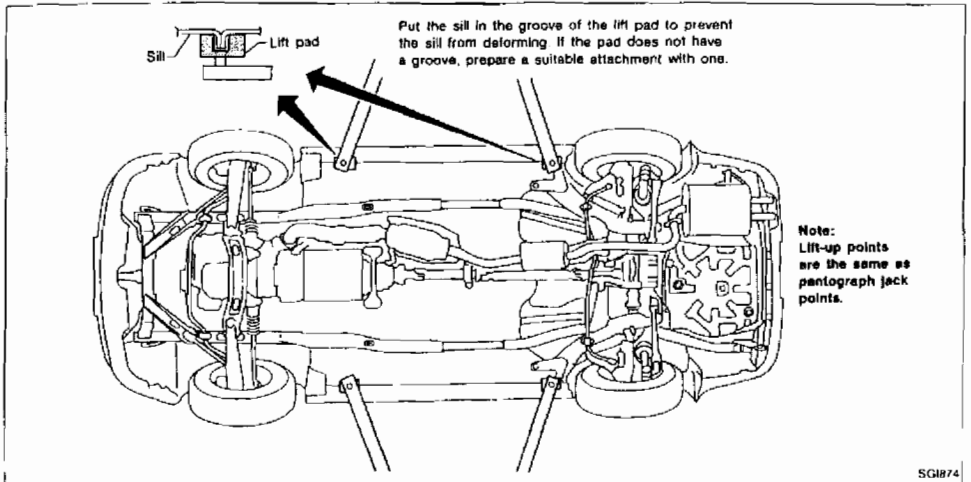
# LIFTING POINTS AND TOW TRUCK TOWING

## WARNING:

## 2-pole Lift

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 and fuel lines.

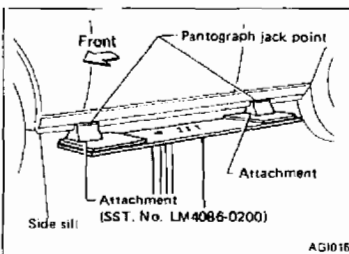


SGH74

## Preparation

### SPECIAL SERVICE TOOLS

| Tool number<br>(Kent-Moore No.)<br>Tool name      | Description |
|---|-------------|
| LM4086-0200<br>( -- )<br>Board-on lift attachment | <br>NT001   |
| LM4519-0000<br>( — )<br>Safety stand attachment   | <br>NT002   |



AG1016

## Board-on Lift

### CAUTION:

Make sure vehicle is empty when lifting.

- The board-on lift attachment (LM4086-0200) set at front end of vehicle should be set on the front of the sill under the front door opening.
- Position attachments at front and rear ends of board-on lift.

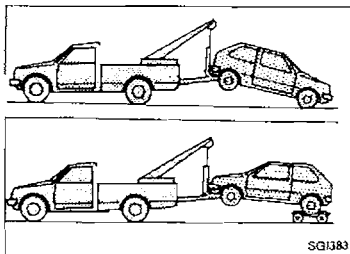
## LIFTING POINTS AND TOW TRUCK TOWING

### Tow Truck Towing

#### CAUTION:

- All applicable 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.
- When towing with the rear wheels on the ground, release the parking brake and move the gearshift lever to neutral position ("N" position).

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



#### TOWING AN AUTOMATIC TRANSMISSION MODEL WITH FOUR WHEELS ON GROUND OR TOWING WITH FRONT WHEELS RAISED (With rear wheels on ground)

Observe the following restricted towing speeds and distances.

##### Speed:

Below 50 km/h (30 MPH)

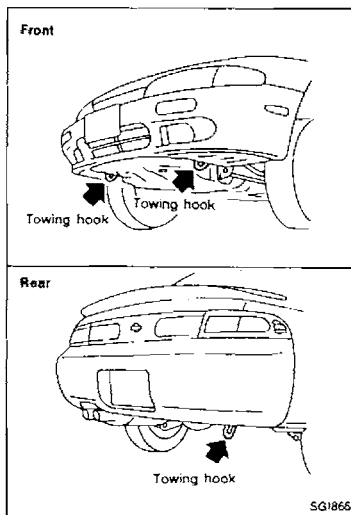
##### Distance:

Less than 65 km (40 miles)

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

#### TOWING POINT

Always pull the cable straight out from the vehicle. Never pull on the hook at a sideways angle.



# TIGHTENING TORQUE OF STANDARD BOLTS

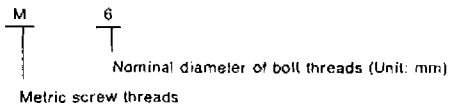
| Grade | Bolt size | Bolt diameter<br>mm | Pitch<br>mm | Tightening torque (Without lubricant) |      |       |                     |      |       |
|-------|-----------|---------------------|-------------|---------------------------------------|------|-------|---------------------|------|-------|
|       |           |                     |             | Hexagon head bolt                     |      |       | Hexagon flange bolt |      |       |
|       |           |                     |             | N·m                                   | kg·m | ft·lb | N·m                 | kg·m | ft·lb |
| 4T    | M6        | 6.0                 | 1.0         | 5.1                                   | 0.52 | 3.8   | 6.1                 | 0.62 | 4.5   |
|       | 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    |
|       |           |                     | 1.75        | 42                                    | 4.3  | 31    | 51                  | 5.2  | 38    |
| M12   | 12.0      | 1.25                | 46          | 4.7                                   | 34   | 56    | 5.7                 | 41   |       |
|       |           | 1.5                 | 74          | 7.5                                   | 54   | 88    | 9.0                 | 65   |       |
| 7T    | M6        | 6.0                 | 1.0         | 8.4                                   | 0.86 | 6.2   | 10                  | 1.0  | 7     |
|       | 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    |
|       |           |                     | 1.75        | 71                                    | 7.2  | 52    | 84                  | 8.6  | 62    |
| M12   | 12.0      | 1.25                | 77          | 7.9                                   | 57   | 92    | 9.4                 | 68   |       |
|       |           | 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    |
|       |           |                     | 1.75        | 98                                    | 10.0 | 72    | 118                 | 12.0 | 87    |
| M12   | 12.0      | 1.25                | 108         | 11.0                                  | 80   | 137   | 14.0                | 101  |       |
|       |           | 1.5                 | 177         | 18.0                                  | 130  | 206   | 21.0                | 152  |       |

1. Special parts are excluded.

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

φ: Nominal diameter

| Grade | Mark |
|-------|------|
| 4T    | 4    |
| 7T    | 7    |
| 9T    | 9    |



## SAE J1930 TERMINOLOGY LIST

### SAE J1930 Terminology List

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.

\*\*\*. Not applicable

| NEW TERM  | NEW ACRONYM /<br>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                  |
| 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                           | ***                                 |
| Data link connector for CONSULT                     | DLC for CONSULT               | Diagnostic connector for CONSULT    |
| 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 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                         | ***                                 |
| Evaporative emission system                         | EVAP system                   | Evaporative emission control system |
| Exhaust gas recirculation valve                     | EGR valve                     | EGR valve                           |

# SAE J1930 TERMINOLOGY LIST

## SAE J1930 Terminology List (Cont'd)

\*\*\*: Not applicable

| NEW TERM  | NEW ACRONYM /<br>ABBREVIATION       | OLD TERM                              |
|---|-------------------------------------|---------------------------------------|
| 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              | EGR temperature sensor              | Exhaust gas temperature sensor        |
| Flash electrically erasable programmable read only memory | FEEPROM                             | ***                                   |
| Flash erasable programmable read only memory              | FEPRM                               | ***                                   |
| Flexible fuel sensor                                      | FFS                                 | ***                                   |
| Flexible fuel system                                      | FF system                           | ***                                   |
| 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 module                                   | ICM                                 | ***                                   |
| Indirect fuel injection system                            | IFI system                          | ***                                   |
| Intake air temperature sensor                             | IATS                                | 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                                | ***                                   |
| 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                        |
| Non-volatile random access memory                         | NVRAM                               | ***                                   |
| On-board diagnostic system                                | OBD system                          | Self-diagnosis                        |
| Open loop   | OL                                  | Open loop                             |
| Oxidation catalyst  | OC                                  | Catalyst                              |

## SAE J1930 TERMINOLOGY LIST

## SAE J1930 Terminology List (Cont'd)

\*\*\*: Not applicable

| NEW TERM  | NEW ACRONYM /<br>ABBREVIATION | OLD TERM                                    |
|---|-------------------------------|---|
| Oxidation catalytic converter system                  | OC system                     | ***   |
| Oxygen sensor   | D2S                           | Exhaust gas sensor                          |
| Park position switch                                  | ***                           | Park switch                                 |
| Park/neutral position switch                          | PNP switch                    | Park/neutral switch                         |
| Periodic trap oxidizer system                         | PTOX system                   | ***   |
| 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                            | ***   |
| 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<br>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<br>Lock-up solenoid |
| Turbocharger  | TC                            | Turbocharger                                |
| Vehicle speed sensor                                  | VSS                           | Vehicle speed sensor                        |
| Volume air flow sensor                                | VAFS                          | Air flow meter                              |

# SAE J1930 TERMINOLOGY LIST

## SAE J1930 Terminology List (Cont'd)

\*\*\*: Not applicable

| NEW TERM                                     | NEW ACRONYM /<br>ABBREVIATION | OLD TERM    |
|--|-------------------------------|-------------|
| 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 |

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# SECTION MA

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## PRECAUTIONS AND PREPARATION

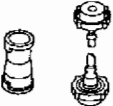

### Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System "Air Bag" and "Seat belt pre-tensioner", used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioner, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the RS section of this Service Manual.

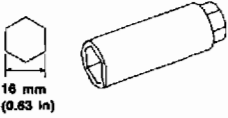
#### WARNING:

- 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.
- All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS.

### Special Service Tools

| Tool number<br>Tool name                                | Description  |
|---|--|
| EG17650301<br>Radiator cap tester<br>adapter            | <br>NT053 |
| KV10115800<br>Oil filter wrench<br>65 mm (2.56 in) dia. | <br>NT006 |

### Commercial Service Tool

| Tool name         | Description   |
|-------------------|---|
| Spark plug wrench | <br>16 mm<br>(0.63 in)<br>Wrench with a magnet to hold spark plug<br>NT047 |

## PRE-DELIVERY INSPECTION ITEMS

Shown below are Pre-delivery Inspection Items required for the new vehicle. It is recommended that necessary items other than those listed here be added, paying due regard to the conditions in each country.

Perform applicable items on each model. Consult text of this section for specifications.

### UNDER HOOD — engine off

- Radiator coolant level and coolant hose connections for leaks
- Battery fluid level, specific gravity and conditions of battery terminals
- Drive belts tension
- Fuel filter for water or dusts, and fuel lines and connections for leaks
- Engine oil level and oil leaks
- Clutch and brake reservoir fluid level and fluid lines for leaks
- Windshield and rear window washer and headlamp cleaner reservoir fluid level
- Power steering reservoir fluid level and hose connections for leaks

### ON INSIDE AND OUTSIDE

- Remove front spring/strut spacer (If applicable)
- Operation of all instruments, gauges, lights and accessories
- Operation of horn(s), wiper and washer
- Steering lock for operation
- Check air conditioner for gas leaks
- Front and rear seats, and seat belts for operation
- All moldings, trims and fittings for fit and alignment
- All windows for operation and alignment
- Hood, trunk lid, door panels for fit and alignment
- Latches, keys and locks for operation
- Weatherstrips for adhesion and fit
- Headlamp aiming
- Tighten wheel nuts (Inc. inner nuts if applicable)
- Tire pressure (Inc. spare tire)
- Check front wheels for toe-in
- Install clock/voltmeter/room lamp fuse (If applicable)
- Install deodorizing filter to air purifier (If applicable)
- Remove wiper blade protectors (If applicable)

### UNDER BODY

- Manual transmission/transaxle and differential gear oil level
- Brake and fuel lines and oil/fluid reservoirs for leaks
- Tighten bolts and nuts of steering linkage and gear box, suspension, propeller shafts and drive shafts
- Tighten rear body bolts and nuts (Models with wooden bed only)

### ROAD TEST

- Clutch operation
- Parking brake operation
- Service brake operation
- Automatic transmission/transaxle shift timing and kickdown
- Steering control and returnability
- Engine performance
- Squeaks and rattles

### ENGINE OPERATING AND HOT

- Adjust idle mixture and speed (and ignition timing\* 1)
- Automatic transmission/transaxle fluid level
- Engine idling and stop knob operation (Diesel only)

### FINAL INSPECTION

- Install necessary parts (outside mirror, wheel covers, seat belts, mat, carpet or mud flaps)
- Inspect for interior and exterior metal and paint damage
- Check for spare tire, jack, tools (wheel chock), and literature
- Wash, clean interior and exterior

\*1: Not required on models with a direct ignition system

⊗: Not applicable on this model

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# 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 the checks and inspections themselves or they can have their NISSAN dealers do them for a nominal charge.

| Item   | Reference pages |
|--|-----------------|
| <b>OUTSIDE THE VEHICLE</b>   |                 |
| The maintenance items listed here should be performed from time to time, unless otherwise specified.   |                 |
| <b>Tires</b> 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.   | ---             |
| <b>Windshield wiper blades</b> Check for cracks or wear if they do not wipe properly.  | —               |
| <b>Doors and engine hood</b> Check that all doors, the engine hood, the trunk lid and back door operate properly. Also ensure 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 for lubrication frequently. | MA-24           |
| <b>Tire rotation</b> Tires should be rotated every 10,000 km (6,000 miles).  | MA-21           |
| <b>INSIDE THE VEHICLE</b>  |                 |
| The maintenance items listed here should be checked on a regular basis, such as when performing periodic maintenance, cleaning the vehicle etc.  |                 |
| <b>Lights</b> Make sure that the headlights, stop lights, tail lights, turn signal lights, and other lights are all operating properly and installed securely. Also check headlight aim.   | —               |
| <b>Warning lights and chimes</b> Make sure that all warning lights and chimes are operating properly.  | —               |
| <b>Steering wheel</b> Check for change in the steering conditions, such as excessive free play, hard steering or strange noises<br><b>Free play: Less than 35 mm (1.38 in)</b>   | —               |
| <b>Seat belts</b> 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-24           |
| <b>UNDER THE HOOD AND VEHICLE</b>  |                 |
| The maintenance items listed here should be checked periodically e.g. each time you check the engine oil or refuel.  |                 |
| <b>Windshield washer fluid</b> Check that there is adequate fluid in the tank.   | —               |
| <b>Engine coolant level</b> Check the coolant level when the engine is cold.   | MA-12           |
| <b>Engine oil level</b> Check the level after parking the vehicle on a level spot and turning off the engine.  | MA-15           |
| <b>Brake and clutch fluid level</b> Make sure that the brake and clutch fluid level is between the "MAX" and "MIN" lines on the reservoir.   | MA-19, 21       |
| <b>Battery</b> Check the fluid level in each cell. It should be between the "MAX" and "MIN" lines.   | —               |

## PERIODIC MAINTENANCE (Except for Europe)

The following tables show the normal maintenance schedule. Depending upon weather and atmospheric conditions, varying road surfaces, individual driving habits and vehicle usage, additional or more frequent maintenance may be required.

**Periodic maintenance beyond the last period shown on the tables requires similar maintenance.**

| MAINTENANCE OPERATION  | MAINTENANCE INTERVAL |       |     |  |      |               |      |      |      |      | Reference page             |       |
|--|----------------------|-------|-----|--|------|---------------|------|------|------|------|----------------------------|-------|
|  | km x 1,000           | 1     | 10  | 20                                       | 30   | 40            | 50   | 60   | 70   | 80   |                            |       |
|  | (Miles x 1,000)      | (0.6) | (6) | (12)                                     | (18) | (24)          | (30) | (36) | (42) | (48) |                            |       |
| Perform either at number of kilometers (miles) or months, whichever comes first  | Months               | —     | 6   | 12                                       | 18   | 24            | 30   | 36   | 42   | 48   |                            |       |
| <b>ENGINE AND EMISSION CONTROL Underhood and under vehicle</b>   |                      |       |     |  |      |               |      |      |      |      |                            |       |
| Check drive belts for cracks, fraying, wear & tension  |                      |       |     |  |      | X             |      |      | X    |      | MA-12                      |       |
| Change engine anti-freeze coolant (Ethylene glycol base) (LLC)   |                      |       |     |  |      | X             |      |      | X    |      | MA-12                      |       |
| Check cooling system   |                      | X     |     | X  |      | X             |      | X    | X    |      | MA-13                      |       |
| Check fuel lines   |                      |       |     |  |      | X             |      |      | X    |      | MA-14                      |       |
| Replace air cleaner filter (Viscous paper type)*   |                      |       |     |  |      | X             |      |      | X    |      | MA-15                      |       |
| Change engine oil (Use API SE, SF, SG or SH oil)*  |                      |       |     | Every 5,000 km (3,000 miles) or 6 months |      |               |      |      |      |      |                            | MA-15 |
| Change engine oil filter* (Use Part No. 15208-65F00)   |                      | X     | X   | X  | X    | X             | X    | X    | X    | X    | MA-16                      |       |
| Replace fuel filter*   |                      |       |     |  |      | X             |      |      | X    |      | MA-15                      |       |
| Replace spark plugs (Use PLATINUM-TIPPED type)   |                      |       |     | Every 100,000 km (60,000 miles)          |      |               |      |      |      |      |                            | MA-16 |
| Check vapor lines and heated oxygen sensor   |                      |       |     |  |      | X             |      |      | X    |      | MA-17, 18                  |       |
| <b>CHASSIS AND BODY Underhood</b>  |                      |       |     |  |      |               |      |      |      |      |                            |       |
| Check brake, clutch & automatic transmission fluid level & leaks*  |                      | X     | X   | X  | X    | X             | X    | X    | X    | X    | MA-19, 20, 21              |       |
| Change brake fluid*  |                      |       |     |  |      | X             |      |      | X    |      | MA-22                      |       |
| Check brake booster vacuum hoses, connections & check valve  |                      |       |     |  |      | X             |      |      | X    |      | MA-22                      |       |
| Check power steering fluid & lines   |                      | X     | X   | X  | X    | X             | X    | X    | X    | X    | MA-23                      |       |
| <b>Under vehicle</b>   |                      |       |     |  |      |               |      |      |      |      |                            |       |
| Check brake, clutch & exhaust systems for proper attachment, leaks, cracks, chaling, abrasion, deterioration, etc.                       |                      | X     | X   | X  | X    | X             | X    | X    | X    | X    | MA-19, 21                  |       |
| Check oil level in manual transmission & differential gear*  |                      | X     | X   | X  | X    | X             | X    | X    | X    | X    | MA-19, 21                  |       |
| Check steering gear & linkage, axle & suspension parts & propeller shaft & drive shaft for damaged, loose & missing parts & lubrication* | X                    |       | X   |  | X    |               | X    |      | X    |      | MA-20, 23<br>FA-5, RA-5, 7 |       |
| <b>Outside and Inside</b>  |                      |       |     |  |      |               |      |      |      |      |                            |       |
| Check wheel alignment. If necessary, rotate & balance wheels   |                      | X     |     | X  |      | X             |      | X    |      | X    | MA-21<br>FA-6              |       |
| Check brake pads, discs & other brake components for wear, deterioration & leaks*  |                      | X     | X   | X  | X    | X             | X    | X    | X    | X    | MA-22                      |       |
| Lubricate locks, hinges & hood latch*  |                      | X     | X   | X  | X    | X             | X    | X    | X    | X    | MA-24                      |       |
| Check seat belts, buckles, retractors, anchors & adjuster  |                      | X     |     | X  |      | X             |      | X    |      | X    | MA-24                      |       |
| Check foot brake, parking brake & clutch for free play, stroke & operation   | X                    | X     | X   | X  | X    | X             | X    | X    | X    | X    | CL-4, BR-7, 23             |       |
| Air bag system   |                      |       |     |  |      | See NOTE (1). |      |      |      |      | RS-5                       |       |

**NOTE: (1) Inspect at the first 10 years and then every 2 years.**

**(2) Maintenance items with "\*" should be performed more frequently according to "Maintenance under severe driving conditions".**

Check: Check. Correct or replace if necessary

## PERIODIC MAINTENANCE (Except for Europe)

### MAINTENANCE UNDER SEVERE DRIVING CONDITIONS

The maintenance intervals shown on the preceding pages are for normal operating conditions. If the vehicle is mainly operated under severe driving conditions as shown below, more frequent maintenance must be performed on the following items as shown in the table.

#### Severe driving conditions

- A — Driving under dusty conditions
- B — Driving repeatedly short distances
- C — Towing a trailer
- D — Extensive idling
- E — Driving in extremely adverse weather conditions or in areas where ambient temperatures are either extremely low or extremely high
- F — Driving in high humidity areas or in mountainous areas
- G — Driving in areas using salt or other corrosive materials
- H — Driving on rough and/or muddy roads or in the desert
- I — Driving with frequent use of braking or in mountainous areas

| Driving condition | Maintenance item  | Maintenance operation | Maintenance interval                           | Reference page             |
|-------------------|---|-----------------------|--|----------------------------|
| A                 | Air cleaner filter  | Replace               |  | MA-15                      |
| A B C D           | Engine oil  | Replace               | More frequently                                | MA-15                      |
| A B C D           | Engine oil filter   | Replace               | Every 5,000 km<br>(3,000 miles) or 3 months    | MA-16                      |
| A                 | Fuel filter   | Replace               | Every 20,000 km<br>(12,000 miles) or 12 months | MA-16                      |
| F                 | Brake fluid   | Replace               | Every 40,000 km<br>(24,000 miles) or 24 months | MA-21                      |
| C H               | Automatic & manual transmission oil & differential gear oil                       | Replace               | Every 40,000 km<br>(24,000 miles) or 24 months | MA-19, 20, 21              |
| G H               | Steering gear & linkage, axle & suspension parts & propeller shaft & drive shafts | Check                 | Every 10,000 km<br>(6,000 miles) or 6 months   | MA-20, 23<br>FA-5, RA-5, 7 |
| A C G H I         | Brake pads, discs & other brake components  | Check                 | Every 5,000 km<br>(3,000 miles) or 3 months    | MA-22                      |
| G                 | Lock, hinges & hood latch   | Lubricate             |  | MA-24                      |

Maintenance operation: Check = Check. Correct or replace if necessary.

## PERIODIC MAINTENANCE (For Europe)

The following tables show the normal maintenance schedule. Depending upon weather and atmospheric conditions, varying road surfaces, individual driving habits and vehicle usage, additional or more frequent maintenance may be required.

Periodic maintenance beyond the last period shown on the tables requires similar maintenance.

### ENGINE OIL SERVICE

Abbreviations: R = Replace.

| MAINTENANCE OPERATION   | MAINTENANCE INTERVAL |     |      |      |      |      |      |      |      |  | Reference page |
|---|----------------------|-----|------|------|------|------|------|------|------|--|----------------|
|   | km x 1,000           | 10  | 20   | 30   | 40   | 50   | 60   | 70   | 80   |  |                |
| Perform on kilometer basis or on month basis if not driven 10,000 km (8,000 miles) within a year. | (Miles x 1,000)      | (6) | (12) | (18) | (24) | (30) | (36) | (42) | (48) |  |                |
|   | Months               | 12  | 24   | 36   | 48   | 60   | 72   | 84   | 96   |  |                |

#### [Engine oil service]

#### Engine compartment and under vehicle

|   |   |   |   |   |   |   |   |   |   |       |
|---|---|---|---|---|---|---|---|---|---|-------|
| Engine oil (Use API SG or SH oil only)*       | R | R | R | R | R | R | R | R | R | MA-15 |
| Engine oil filter (Use Part No. 15208-65F00)* | R | R | R | R | R | R | R | R | R | MA-16 |

**NOTE: (1) Maintenance items with "\*" should be performed more frequently according to "Maintenance under severe driving conditions".**

### MAJOR SERVICE (Engine)

Abbreviations: R = Replace. I = Inspect. Correct or replace if necessary. | | : At the specified mileage only

| MAINTENANCE OPERATION  | MAINTENANCE INTERVAL |      |      |      |      |  | Reference page |
|--|----------------------|------|------|------|------|--|----------------|
|  | Months               | 12   | 24   | 36   | 48   |  |                |
| Perform on month basis or on kilometer basis if driven 30,000 km (18,000 miles) within a year. | km x 1,000           | 30   | 60   | 90   | 120  |  |                |
|  | (Miles x 1,000)      | (18) | (36) | (54) | (72) |  |                |

#### Underhood and under vehicle

|   |               |   |   |   |   |       |
|---|---------------|---|---|---|---|-------|
| Drive belts                                       | See NOTE (1). | I | I | I | I | MA-12 |
| Engine anti-freeze coolant (Ethylene glycol base) | See NOTE (2). |   |   |   |   | MA-12 |
| Cooling system                                    |               | I | I | I | I | MA-13 |
| Fuel lines  |               |   | I |   | I | MA-14 |
| Air cleaner filter (Viscous paper type)*          |               |   | R |   | R | MA-15 |
| Fuel filter*                                      |               |   |   |   | R | MA-15 |
| Spark plug (Use PLATINUM-TIPPED type)             |               |   |   | R |   | MA-16 |
| Heated oxygen sensor (Except for Sweden)          |               |   | I |   | I | MA-18 |
| Vapor lines                                       | See NOTE (3). |   | I |   | I | MA-17 |

**NOTE: (1) After 24 months or 60,000 km (36,000 miles), check every 12 months or 30,000 km (18,000 miles).  
 (2) Change at 60 months or 90,000 km (54,000 miles), then every 24 months or 60,000 km (36,000 miles).  
 (3) For Sweden perform at the first 90,000 km (54,000 miles), and then every 60,000 km (36,000 miles) or 24 months, whichever comes first.  
 (4) Maintenance items with "\*" should be performed more frequently according to "Maintenance under severe driving conditions".**

## PERIODIC MAINTENANCE (For Europe)

### MAJOR SERVICE (Chassis and Body)

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

| MAINTENANCE OPERATION   | MAINTENANCE INTERVAL |      |      |      | Reference page |                            |
|---|----------------------|------|------|------|----------------|----------------------------|
|   | Months               | 12   | 24   | 36   |                | 48                         |
| Perform on month basis or on kilometer basis<br>if driven 30,000 km (18,000 miles) within a year. | km x 1,000           | 30   | 60   | 90   | 120            |                            |
|   | (Miles x 1,000)      | (18) | (36) | (54) | (72)           |                            |
| <b>Underhood and under vehicle</b>  |                      |      |      |      |                |                            |
| Brake & clutch oil level & leak*  | I                    | I    | I    | I    | I              | MA-19, 21                  |
| Automatic transmission fluid (level & leakage)*   | I                    | I    | I    | I    | I              | MA-20                      |
| Brake fluid*  |                      |      | R    |      | R              | MA-22                      |
| Brake booster vacuum hoses, connections & check valve   |                      |      | I    |      | I              | MA-22                      |
| Power steering fluid & lines  | I                    | I    | I    | I    | I              | MA-23                      |
| Brake & clutch system   | I                    | I    | I    | I    | I              | MA-19, 21                  |
| Manual transmission & standard differential gear oil (For leakage)*                               | I                    | I    | I    | I    | I              | MA-19, 21                  |
| Steering gear & linkage, axle & suspension parts, propeller shaft & drive shaft, exhaust system*  |                      |      | I    |      | I              | MA 20, 23<br>RA-5, 7, FA-5 |
| <b>Outside and inside</b>   |                      |      |      |      |                |                            |
| Wheel alignment (if necessary, rotate & balance wheels)   | I                    | I    | I    | I    | I              | MA-21<br>FA-6              |
| Brake pads, discs & other brake components*   | I                    | I    | I    | I    | I              | MA-22                      |
| Headlamp aiming   | I                    | I    | I    | I    | I              | EL-64                      |
| Seat belts, buckles, retractors & adjuster  | I                    | I    | I    | I    | I              | MA-24                      |
| Foot brake, parking brake & clutch (For free play, stroke & operation)                            | I                    | I    | I    | I    | I              | CL-4<br>BR-7, 23           |
| Body corrosion  |                      |      |      |      | Annually       |                            |
| Air bag system  |                      |      |      |      | See NOTE (1).  | RS-5                       |

**NOTE: (1) Inspect at the first 10 years and then every 2 years.**

**(2) Maintenance items with "\*" should be performed more frequently according to "Maintenance under severe driving conditions".**



## PERIODIC MAINTENANCE (For Europe)

### MAINTENANCE UNDER SEVERE DRIVING CONDITIONS

The maintenance intervals shown on the preceding pages are for normal operating conditions. If the vehicle is mainly operated under severe driving conditions as shown below, more frequent maintenance must be performed on the following items as shown in the table.

#### Severe driving conditions

- A — Driving under dusty conditions
- B — Driving repeatedly short distances
- C — Towing a trailer
- D — Extensive idling
- E — Driving in extremely adverse weather conditions or in areas where ambient temperature are either extremely low or extremely high

- F — Driving in high humidity areas or in mountainous areas
- G — Driving in areas using salt or other corrosive materials
- H — Driving on rough and/or muddy roads or in the desert
- I — Driving with frequent use of braking or in mountainous areas

| Driving condition         | Maintenance item  | Maintenance operation | Maintenance interval                        | Reference page             |
|---------------------------|---|-----------------------|---|----------------------------|
| <b>Engine oil service</b> |   |                       |   |                            |
| A B C D                   | Engine oil  | Replace               | Every 5,000 km (3,000 miles) or 6 months    | MA-15                      |
| A B C D                   | Engine oil filler   | Replace               | Every oil change                            | MA-16                      |
| <b>Major service</b>      |   |                       |   |                            |
| A                         | Air cleaner filter  | Replace               |   | MA-15                      |
| A E                       | Fuel filter   | Replace               |   | MA-16                      |
| F                         | Brake fluid   | Replace               | Every 12 months or 30,000 km (18,000 miles) | MA-21                      |
| G H                       | Steering gear & linkage, axle & suspension parts, propeller shaft & drive shaft, exhaust system | Check                 |   | MA-20, 23<br>FA-5, RA-5, 7 |
| C H                       | Automatic & manual transmission & differential gear oil   | Replace               | Every 24 months or 60,000 km (36,000 miles) | MA-19, 20, 21              |
| A C G H I                 | Brake pads, discs & other brake components  | Check                 | Every 6 months or 15,000 km (9,000 miles)   | MA-22                      |

# RECOMMENDED FLUIDS AND LUBRICANTS

## Fluids and Lubricants

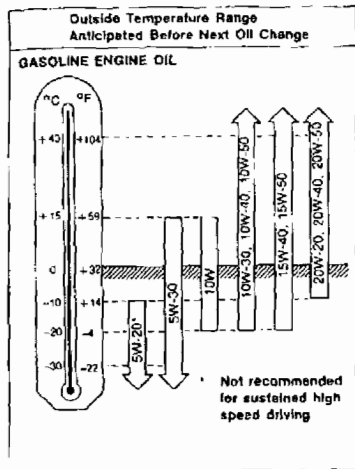
|                                      | Capacity (Approximate) |             | Recommended fluids and lubricants   |
|--------------------------------------|------------------------|-------------|---|
|                                      | Liter                  | Imp measure |   |
| Engine oil (Refill)                  |                        |             |   |
| With oil filter                      | 3.7                    | 3-1/4 qt    | API SF/CC, SF/CD, SE, SG or SH*1  |
| Without oil filter                   | 3.5                    | 3-1/8 qt    |   |
| Cooling system (with reservoir tank) | 6.2                    | 5-1/2 qt    | Anti-freeze coolant (Ethylene glycol base) or soft water  |
| Manual transmission oil              | 2.4                    | 4-1/4 pt    | API GL-4*   |
| Differential carrier gear oil        | 1.8                    | 3-1/8 pt    | API GL-5*   |
| Automatic transmission fluid         | 7.9                    | 7 qt        | Genuine Nissan ATF or equivalent*2  |
| Power steering fluid                 | 0.9                    | 3/4 qt      | Type DEXRON™  |
| Brake and clutch fluid               | —                      | —           | For Europe<br>DOT3 or DOT4 (US FMVSS No. 116)*3<br>Except for Europe<br>DOT3 (US FMVSS No. 116) |
| Multi-purpose grease                 | —                      | —           | NLGI No. 2 (Lithium soap base)  |

\*1: For further details, see "SAE Viscosity Number".

\*2: For more information regarding suitable fluids, contact a Nissan dealership.

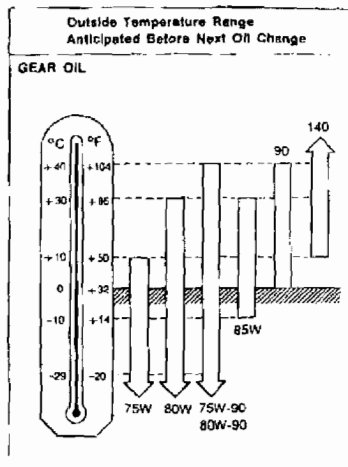
\*3: Never mix different type fluids (DOT3 and DOT4).

SAE Viscosity Number



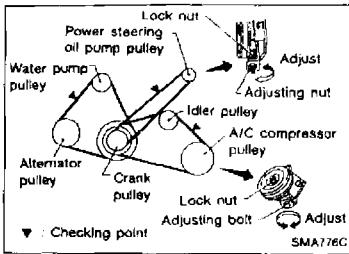
T10005

- 5W-30 or 10W-30 is preferable regardless of driving conditions.



T10003

- For warm and cold areas: 75W-90 for transmission and 80W-90 for differential carrier are preferable.
- For hot areas: 90 is suitable for ambient temperatures below 40°C (104°F).



## Checking Drive Belts

1. Inspect for cracks, fraying, wear or oil adhesion. If necessary, replace with a new one.
2. Inspect drive belt deflections by pushing on the belt midway between pulleys.

**Adjust if belt deflections exceed the limit.**

### Belt deflection:

Unit: mm (in)

|                            | Used belt deflection |                             | Deflection of new belt |
|----------------------------|----------------------|-----------------------------|------------------------|
|                            | Limit                | Deflection after adjustment |                        |
| Alternator                 | 11 (0.43)            | 7 - 8 (0.28 - 0.31)         | 4 - 5 (0.16 - 0.20)    |
| Air conditioner compressor | 7 (0.28)             | 5 - 6 (0.20 - 0.24)         | 6 - 7 (0.24 - 0.28)    |
| Power steering oil pump    | 15 (0.59)            | 11 - 12 (0.43 - 0.47)       | 9 - 10 (0.35 - 0.39)   |
| Applied pushing force      | 98 N (10 kg, 22 lb)  |                             |                        |

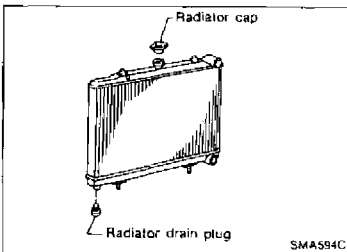
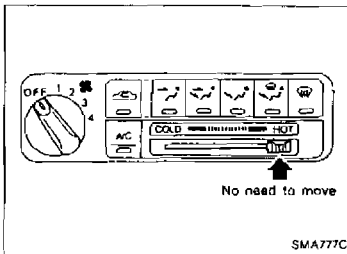
Inspect drive belt deflections when engine is cold.

## Changing Engine Coolant

### WARNING:

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

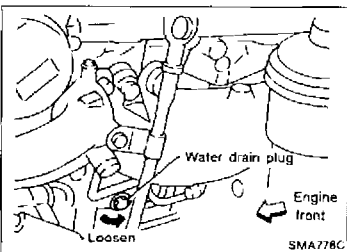
On this model it is unnecessary to move heater "TEMP" control lever or switch before changing the coolant. This is because air mix door is in "HOT" position when ignition switch is "OFF". (This applies to both automatic and manual air conditioners.)



1. Remove radiator drain plug and radiator cap.
2. Remove reservoir tank, drain coolant, then clean reservoir tank.

Install it temporarily.

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



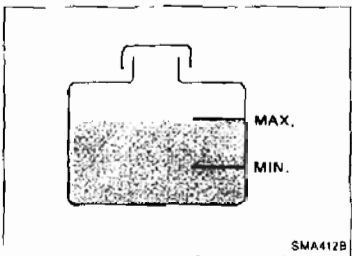
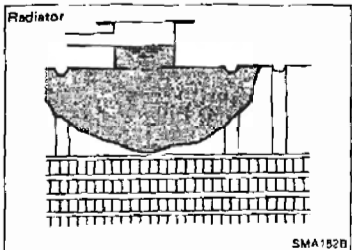
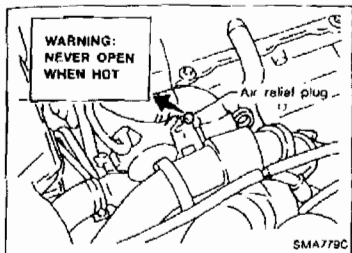
3. Remove cylinder block drain plug, air relief plug and air bleeder cap.
4. Install radiator drain plug and tighten cylinder block drain plug securely.
5. Fill radiator and reservoir tank with water. Air relief plug is reinstalled once coolant spills from the air relief hole during refill. Then fill radiator and reservoir tank with water.

### Air relief plug:

- : 10 N·m (1.0 kg-m, 7 ft-lb)
6. Reinstall radiator cap and air bleeder cap.

## ENGINE MAINTENANCE

### Changing Engine Coolant (Cont'd)



7. Warm up engine until cooling fan operates, then race engine 2 or 3 times under no-load.
  - Make sure that air conditioner switch is "OFF".
8. Stop engine and wait until it cools down.
9. Repeat step 1 through step 8 until clear water begins to drain from radiator.
10. Drain water.
  - Apply sealant to the thread of drain plug.  
□: 8 - 12 N·m (0.8 - 1.2 kg·m, 5.8 - 8.7 ft·lb)
11. Reinstall reservoir tank.

12. Fill radiator and reservoir tank with coolant up to specified level following step 5 through step 8.

Follow instructions attached to anti-freeze container for mixing ratio of anti-freeze to water.

**Coolant capacity (With reservoir tank):**

6.2 ℓ (5-1/2 Imp qt)

[Reservoir tank capacity for "H" level is 1.8 ℓ (1-5/8 Imp qt).] Pour coolant through coolant filler neck slowly to allow air in system to escape.

13. If necessary, add coolant.

14. Start and warm up engine, then increase engine speed to 4,000 rpm. Check that radiator coolant level is not lowered, and that no water noise is heard in heater core. If water noise is heard, bleed air by referring to "Refilling Engine Coolant" in section LC.

### Checking Cooling System

#### CHECKING HOSES

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

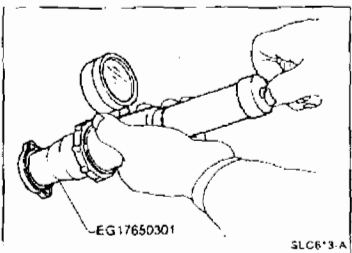
#### CHECKING RADIATOR CAP

Apply pressure to radiator cap with cap tester to see if it is satisfactory.

**Radiator cap relief pressure:**

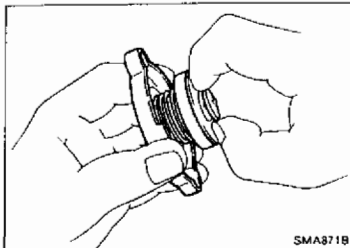
78 - 98 kPa

(0.78 - 0.98 bar, 0.8 - 1.0 kg/cm<sup>2</sup>, 11 - 14 psi)



### Checking Cooling System (Cont'd)

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



### CHECKING COOLING SYSTEM FOR LEAKS

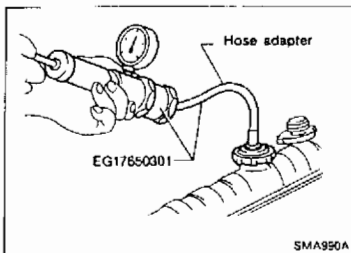
Apply pressure to the cooling system with cap tester to check for leakage.

**Testing pressure:**

**157 kPa (1.57 bar, 1.6 kg/cm<sup>2</sup>, 23 psi)**

**CAUTION:**

Higher pressure than the specified value may cause damage to radiator.



### Checking Fuel Lines

Inspect fuel lines and tank for improper attachment and for leaks, cracks, damage, loose connections, chafing and deterioration.

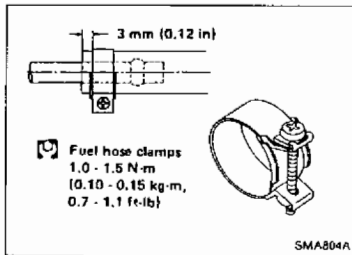
If necessary, repair or replace faulty parts.

**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.

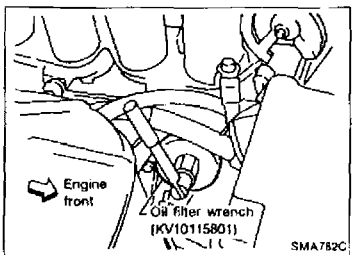
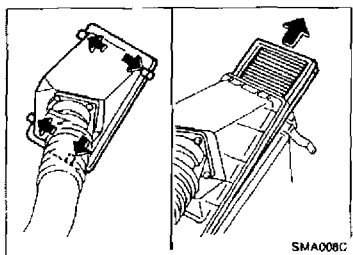
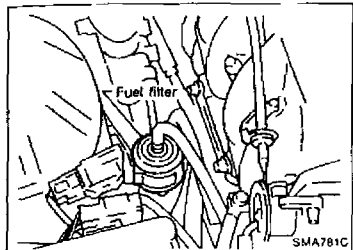
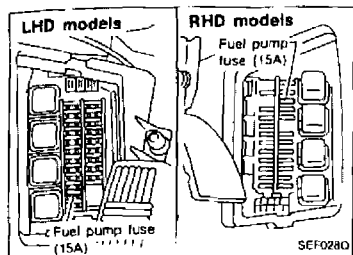


### Changing Fuel Filter

**WARNING:**

Before removing fuel filter, release fuel pressure from fuel line to eliminate danger.

## Changing Fuel Filter (Cont'd)



1. Remove fuse for fuel pump.
2. Start engine.
3. After engine stalls, crank engine two or three times to make sure that fuel pressure is released.
4. Turn ignition switch off and install fuse for fuel pump.

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

### Viscous paper type

The viscous paper type filter does not need cleaning between renewals.

## Changing Engine Oil

### 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. Remove drain plug and oil filler cap.
3. Drain oil and refill with new engine oil.

### Refill oil capacity (Approximate):

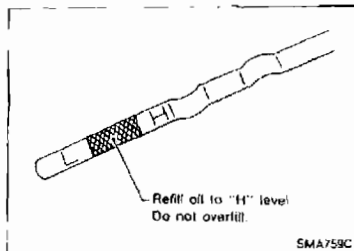
With oil filter change  
3.7 ℓ (3-1/4 Imp qt)

Without oil filter change  
3.5 ℓ (3-1/8 Imp qt)

### CAUTION:

- Be sure to clean drain plug and install with new washer.  
Drain plug:  
Ⓜ: 29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)
- Use recommended engine oil.

## Changing Engine Oil (Cont'd)



4. Check oil level.
5. Start engine and check area around drain plug and oil filter for oil leakage.
6. Run engine for a few minutes, then turn it off. After several minutes, check oil level.

## Changing Oil Filter

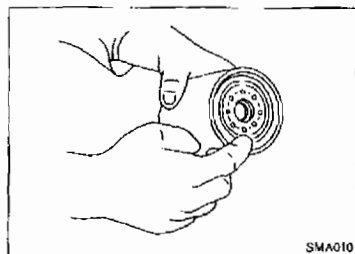
1. Remove oil filter.

### WARNING:

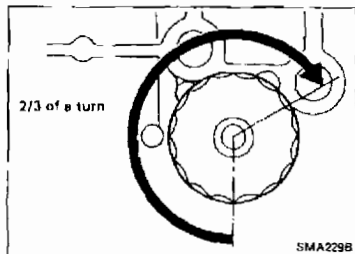
Be careful not to burn yourself, as the engine and the engine oil are hot.

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

Refer to LC section ("OIL FILTER").



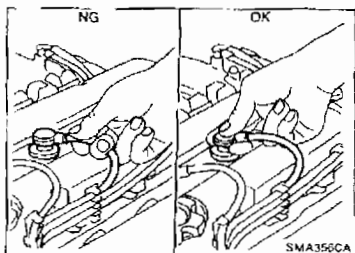
2. Before installing new oil filter, clean the oil filter mounting surface on cylinder block, and coat the rubber seal of oil filter with a little engine oil.



3. Screw in the oil filter until a slight resistance is felt, then tighten additionally more than 2/3 turn.

4. Add engine oil.

Refer to "Changing Engine Oil".




## Changing Spark Plugs

1. Disconnect ignition wires from spark plugs at boot. Do not pull on the wire.
2. Remove spark plugs with 16 mm (0.63 in) spark plug wrench.

### Spark plug:

|               |         |
|---------------|---------|
| Standard type | PFR6B-9 |
| Hot type      | PFR5B-9 |
| Cold type     | PFR7B-9 |

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



## ENGINE MAINTENANCE

### Changing Spark Plugs (Cont'd)

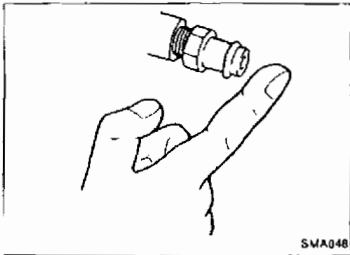
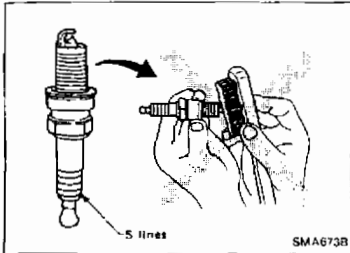
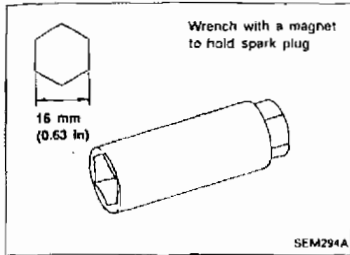
- Checking and adjusting plug gap are not required between renewals.
- Do not use a wire brush for cleaning.
- If plug lip is covered with carbon, spark plug cleaner may be used.

Cleaner air pressure:

Less than 588 kPa (5.9 bar, 6 kg/cm<sup>2</sup>, 85 psi)

Cleaning time:

Less than 20 seconds



### Checking Positive Crankcase Ventilation (PCV) System

#### Checking PCV valve

With engine running at idle, remove ventilation hose from PCV valve; if 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.

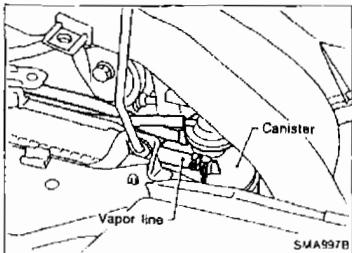
### Checking Vacuum Hoses and Connections

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

### Checking Vapor Lines

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

Refer to "EVAPORATIVE EMISSION SYSTEM" in EC section.

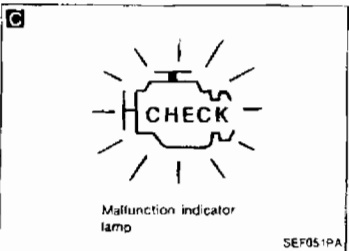
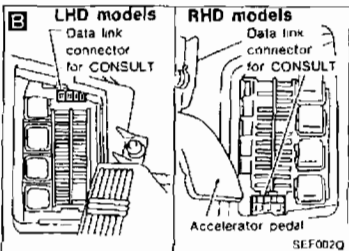
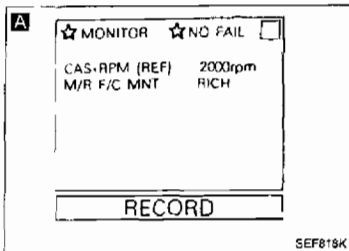


## Checking Heated Oxygen Sensor (HO2S)

### Checking procedure

INSPECTION START

Start engine and warm it up until water temperature indicator points to the middle of gauge.



- A B C**
1. See "M/R F/C MNT" in "Data monitor" mode
  2. Run engine at about 2,000 rpm for about 2 minutes under no-load.
  3. Maintaining engine at 2,000 rpm under no-load (engine is warmed up sufficiently), 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 .....
    - OR

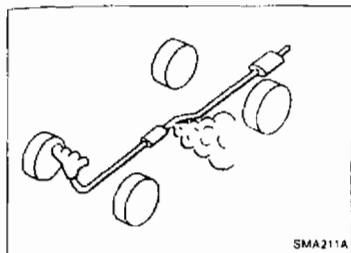
1. Set "Heated oxygen sensor monitor" in the Diagnostic test mode II. (Refer to EC section.)
2. Run engine at about 2,000 rpm for about 2 minutes under no-load.
3. Maintaining engine at 2,000 rpm under no-load, check to make sure that malfunction indicator lamp on the instrument panel goes ON and OFF more than 5 times during 10 seconds.

OK

NG

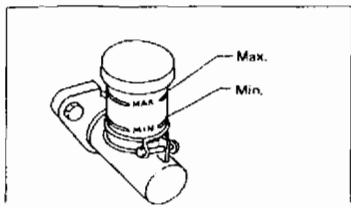
INSPECTION END

Check and adjustment should be made by referring to IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION in EC section.



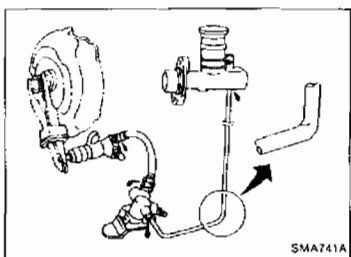
## Checking Exhaust System

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



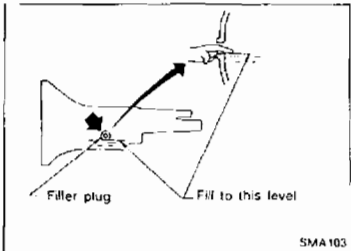
## Checking Clutch Fluid Level and Leaks

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



## Checking Clutch System

Check fluid lines and operating cylinder for improper attachment, cracks, damage, loose connections, chafing and deterioration.



## Checking M/T Oil

- Check oil level and for oil leakage.
- Never start engine while checking oil level.**

**Filler plug:**

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

## Changing M/T Oil

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

**Oil grade: API GL-4**

**Viscosity:**

See "RECOMMENDED FLUIDS AND LUBRICANTS".

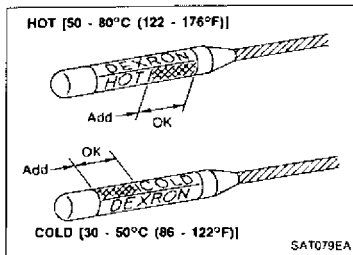
**Capacity: 2.5 L (4-3/8 Imp pt)**

**Drain plug:**

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

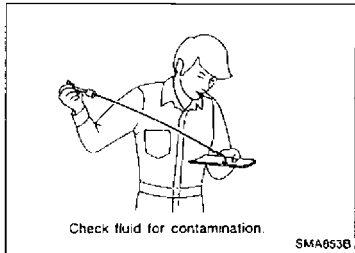
**After refilling oil, leave M/T unattended for about two minutes. Then check oil level again following the above procedure. Add oil if necessary.**

## CHASSIS AND BODY MAINTENANCE



### Checking A/T Fluid

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, add 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 177°F) using "HOT" range on dipstick.
6. Check fluid condition. If fluid is very dark or smells burned, or contains friction material (clutches, band, etc.), check operation of A/T. Refer to AT section for checking operation of A/T.



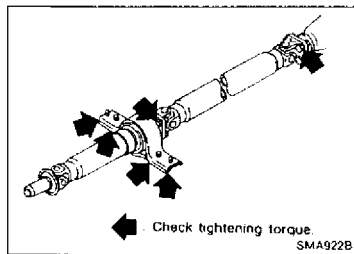
### Changing A/T Fluid

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.

**Oil grade:**  
Genuine Nissan ATF or equivalent.

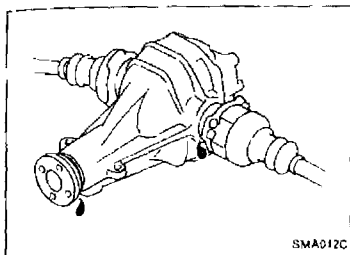
**Oil capacity (With torque converter):**  
7.9 l (7 Imp qt)

**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 "Checking A/T Fluid". If fluid is still dirty, repeat step 2. through 5.



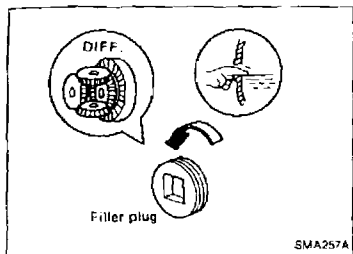
### Checking Propeller Shaft

Check propeller shaft and center bearing for damage, looseness or grease leakage. If greasing points are provided, supply grease as necessary. Refer to PD section.



## Checking Differential Gear Oil

- Check oil level and for oil leakage.  
**Filler plug:**  
 $\square$ : 39 - 59 N·m (4 - 6 kg·m, 29 - 43 ft·lb)

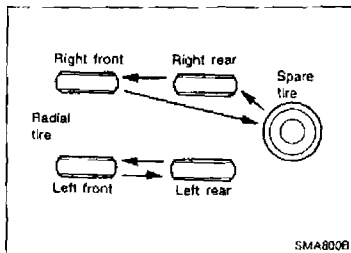


## Changing Differential Gear Oil

1. Drain oil from drain plug and refill with new gear oil.
2. Check oil level.  
**Oil grade:** API GL-5  
**Viscosity:**  
 See "RECOMMENDED FLUIDS AND LUBRICANTS".  
**Capacity:**  
 1.2 - 1.4 l (2-1/8 - 2-1/2 Imp pt)  
**Drain plug:**  
 $\square$ : 39 - 59 N·m (4 - 6 kg·m, 29 - 43 ft·lb)

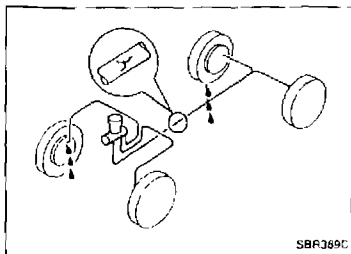
## Balancing Wheels

- Adjust wheel balance using road wheel center.  
**Wheel balance (Maximum allowable unbalance):**  
 Refer to SDS (MA-25).



## Tire Rotation

- Do not include the T-type spare tire when rotating the tires.  
**Wheel nuts:**  
 $\square$ : 99 - 117 N·m (10.1 - 11.9 kg·m, 73.0 - 86.3 ft·lb)



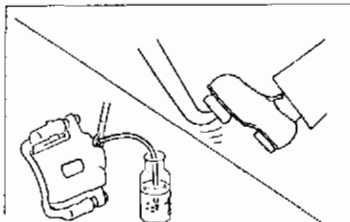
## Checking Brake Fluid Level and Leaks

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

## Checking Brake Lines and Cables

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

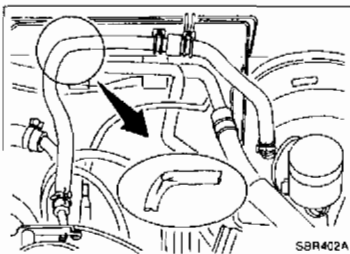
## CHASSIS AND BODY MAINTENANCE



SBR419C

### Changing Brake Fluid

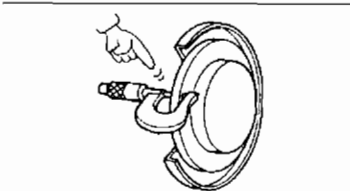
1. Drain brake fluid from each air bleeder valve.
  2. Refill until new brake fluid comes out from each air bleeder valve. Use same procedure as in bleeding hydraulic system to refill brake fluid. Refer to BR section.
- Refill with recommended brake fluid.
  - Never reuse drained brake fluid.
  - Never mix different type fluids (DOT3 and DOT4).
  - Be careful not to splash brake fluid on painted areas.



SBR402A

### Checking Brake Booster, Vacuum Hoses, Connections and Check Valve

Check vacuum lines, connections and check valve for improper attachment, air tightness, chafing and deterioration.



SMA260A

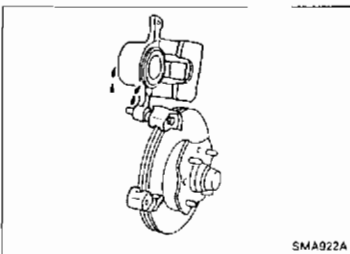
### Checking Disc Brake

#### ROTOR

- Check condition and thickness.

Unit: mm (in)

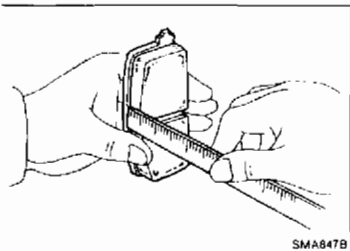
|                    | Front        | Rear        |
|--------------------|--------------|-------------|
| Disc brake type    | OPF25V       | CL11H       |
| Standard thickness | 30.0 (1.181) | 9.0 (0.354) |
| Minimum thickness  | 28.0 (1.102) | 8.0 (0.315) |



SMA922A

#### CALIPER

- Check for leakage.



SMA847B

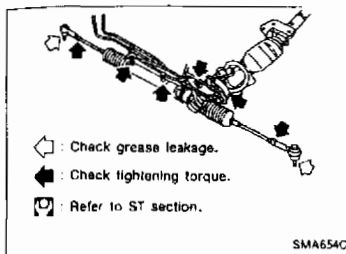
#### PAD

- Check for wear or damage.

Unit: mm (in)

|                    | Front        | Rear        |
|--------------------|--------------|-------------|
| Disc brake type    | OPF25V       | CL11H       |
| Standard thickness | 10.0 (0.394) | 9.5 (0.374) |
| Minimum thickness  |              | 2.0 (0.079) |

## CHASSIS AND BODY MAINTENANCE



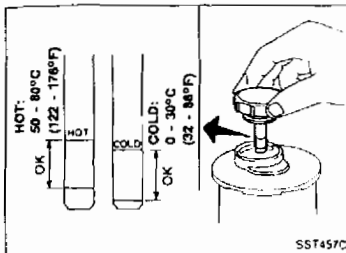
### Checking Steering Gear and Linkage

#### STEERING GEAR

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

#### STEERING LINKAGE

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



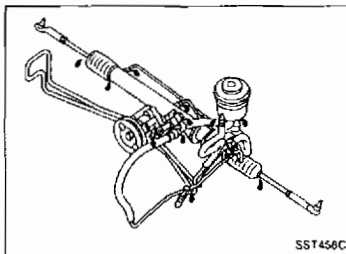
### Checking Power Steering Fluid and Lines

#### CHECKING FLUID LEVEL

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 Automatic Transmission Fluid type "DEXRON™" or equivalent.



#### CHECKING LINES

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

SI

MA

RM

LC

EQ

RE

CL

MT

AT

PD

FA

PA

RM

ST

HS

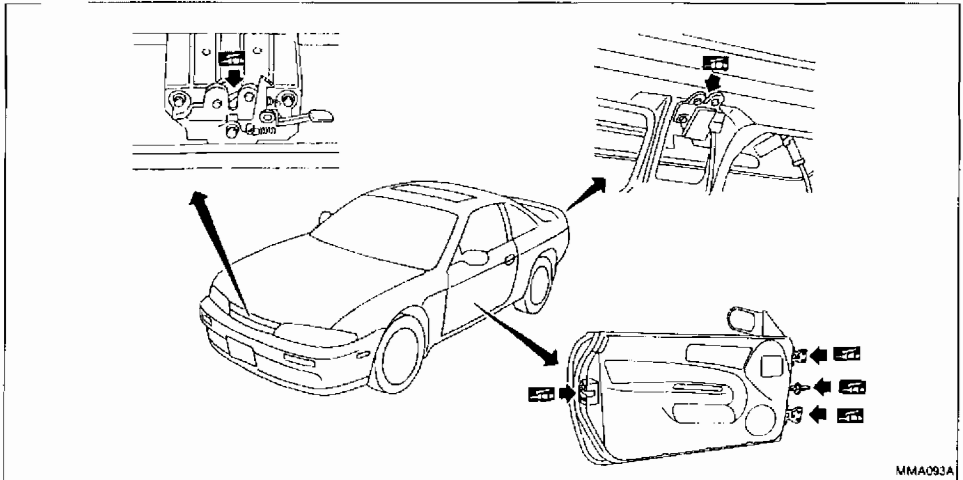
MT

MS

CL

DC

## Lubricating Locks, Hinges and Hood Latches



MMA093A

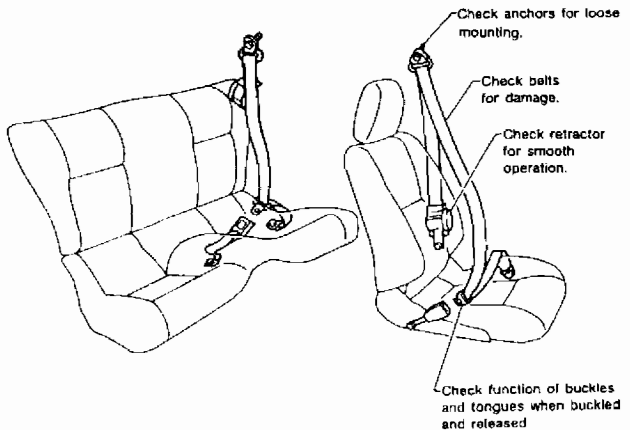
## Checking Seat Belts, Buckles, Retractors, Anchors and Adjusters

### CAUTION:

- After any collision, inspect all seat belt assemblies, including retractors and other attached hardware (i.e. 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.
- 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 alter tongue and buckle.
- Use a genuine seat belt assembly.

For seat belt pre-tensioner, refer to section RS.

Anchor bolt  
 ( ) 43 - 55 N·m  
 ( ) 4.4 - 5.6 kg·m,  
 32 - 41 ft·lb)



MMA084A



# SERVICE DATA AND SPECIFICATIONS (SDS)

## Engine Maintenance

### INSPECTION AND ADJUSTMENT

#### Drive belt deflection

|                            | Used belt deflection |                             | Deflection of new belt  |
|----------------------------|----------------------|-----------------------------|-------------------------|
|                            | Limit                | Deflection after adjustment |                         |
| Alternator                 | 11 (0.43)            | 7 - 8<br>(0.28 - 0.31)      | 4 - 5<br>(0.16 - 0.20)  |
| Air conditioner compressor | 7 (0.28)             | 5 - 6<br>(0.20 - 0.24)      | 6 - 7<br>(0.24 - 0.28)  |
| Power steering oil pump    | 15 (0.59)            | 11 - 12<br>(0.43 - 0.47)    | 9 - 10<br>(0.35 - 0.39) |
| Applied pushing force      | 98 N (10 kg, 22 lb)  |                             |                         |

Unit: mm (in)

#### Coolant and oil capacity

|                               | Unit: l (imp qt)    |
|-------------------------------|---------------------|
| Coolant (with reservoir tank) | Approx. 7.0 (6-1/8) |
| Reservoir tank                | 1.8 (1-5/8)         |
| Engine oil                    |                     |
| With oil filter change        | Approx. 3.7 (3-1/4) |
| Without oil filter change     | Approx. 3.5 (3-1/8) |

### INSPECTION AND ADJUSTMENT

#### Wheel balance

| Maximum allowable unbalance | Dynamic<br>(at rim flange) | 10 (0.35)<br>(One side) |
|-----------------------------|----------------------------|-------------------------|
|                             | g (oz)                     |                         |
|                             | Static                     | 20 (0.71)               |
|                             | g (oz)                     |                         |

### Spark plug

#### Platinum-tipped type

|               |         |
|---------------|---------|
| Standard type | PFR6B-9 |
| Hot type      | PFR5B-9 |
| Cold type     | PFR7B-9 |

### Cooling system

|   | Unit: kPa (bar, kg/cm <sup>2</sup> , psi)    |
|---|--|
| Radiator cap relief pressure            | 78 - 98<br>(0.78 - 0.98, 0.8 - 1.0, 11 - 14) |
| Cooling system leakage testing pressure | 157 (1.57, 1.6, 23)                          |

### TIGHTENING TORQUE

| Unit                             | N·m       | kg·m        | ft·lb     |
|----------------------------------|-----------|-------------|-----------|
| Oil pan drain plug               | 29 - 39   | 3.0 - 4.0   | 22 - 29   |
| Spark plug                       | 20 - 29   | 2.0 - 3.0   | 14 - 22   |
| Camshaft position sensor         | 7 - 8     | 0.7 - 0.8   | 5.1 - 5.8 |
| Crankshaft pulley                | 142 - 152 | 14.5 - 15.5 | 105 - 112 |
| Timing belt tensioner pulley nut | 22 - 29   | 2.2 - 3.0   | 16 - 22   |

## Chassis and Body Maintenance

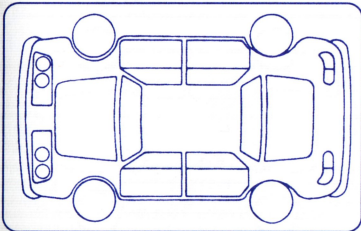
### Brake

|                    | Unit: mm (in) |
|--------------------|---------------|
| Disc brake         |               |
| Pad                |               |
| Standard thickness |               |
| OPF25V             | 10.0 (0.394)  |
| CL11H              | 9.5 (0.374)   |
| Minimum thickness  |               |
| OPF25V             | 2.0 (0.079)   |
| CL11H              | 2.0 (0.079)   |
| Rotor              |               |
| Standard thickness |               |
| OPF25V             | 30.0 (1.181)  |
| CL11H              | 9.0 (0.354)   |
| Minimum thickness  |               |
| OPF25V             | 28.0 (1.102)  |
| CL11H              | 8.0 (0.315)   |

**NOTE BODY DAMAGE**

**Turbocharged Petrol and all Diesel Vehicles  
(except D22 Pickup TD25 n/a)  
1 January 1999 onward  
(Lower mileage)**

Service Interval: 6,000 miles or 6 months, whichever sooner,  
travelling less than 18,000 miles per year.



**JOB CARD NO.** \_\_\_\_\_ **DATE** \_\_\_\_\_ **NOTE ANY ADDITIONAL WORK REQUIRED** \_\_\_\_\_  
**OWNERS NAME** \_\_\_\_\_  
**REG. NO.** \_\_\_\_\_ **MILEAGE** \_\_\_\_\_ **VIN** \_\_\_\_\_

|                                      |                                      |                                      |                                     |  |  |  |                                       |  |  |  |                                       |
|--------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|--|--|--|---------------------------------------|--|--|--|---------------------------------------|
| 3 months or 3,000 miles<br><b>DO</b> | 6 months or 6,000 miles<br><b>D1</b> | 9 months or 9,000 miles<br><b>DO</b> | 1 Year or 12,000 miles<br><b>D2</b> | 15 months or 15,000 miles<br><b>DO</b> | 18 months or 18,000 miles<br><b>D1</b> | 21 months or 21,000 miles<br><b>DO</b> | 24 Years or 24,000 miles<br><b>D3</b> | 27 months or 27,000 miles<br><b>DO</b> | 30 months or 30,000 miles<br><b>D1</b> | 33 months or 33,000 miles<br><b>DO</b> | 36 Years or 36,000 miles<br><b>D2</b> |
|--------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|--|--|--|---------------------------------------|--|--|--|---------------------------------------|

**Drive vehicle into workshop - flat surface**

**Inside the vehicle**

- 1 DASH WARNING LAMPS, GAUGES AND LIGHTS ON BUZZER
- 2 STEERING WHEEL free play
- 3 SEAT BELTS AND OPERATION

**Outside the vehicle**

- 4 EXTERIOR BODYWORK VISUAL INSPECTION
- 5 WIPERS/WIPER BLADES function/condition
- 6 DOORS/DOOR LOCKS
- 7 HOOD LATCHES
- 8 DOOR HINGES, LATCHES, LINKS & ROLLERS
- 9 ALL EXTERIOR LAMPS/INDICATORS FUNCTIONING
- 10 HEADLAMP AIMING

**Drive vehicle on to ramp - ramp work**

- 11\* ENGINE OIL
- 12\* ENGINE OIL FILTER
- 13\* MANUAL TRANSMISSION OIL - levels and leaks  
*Y61, R20, F23 (replace oil at 54K miles)  
Others*
- 14 TRANSFER AND STANDARD DIFFERENTIAL GEAR OIL - levels and leaks  
*Y61, R20, F23 (replace oil at 36K miles)  
Others*
- 15\* A/T FLUID - level, leakage
- 16\* L.S.D. GEAR OIL (except viscous coupling type)
- 17\* STEERING GEAR & LINKAGE (4x4)  
AXLE SUSPENSION, PROPELLER (Others)  
SHAFT and EXHAUST SYSTEM
- 18\* GREASING POINTS OF STEERING GEAR LINKAGE, (4x4)  
PROP SHAFT AND SUSPENSION
- 19\* DRIVE SHAFTS & STEERING DAMPER (4x4)
- 20\* FRONT WHEEL BEARING GREASE (4x4, D21)
- 21\* FRONT AXLE JOINT GREASE IN KNUCKLE FLANGE (Y61)
- 22\* FREE RUNNING HUB GREASE (4x4)
- 23 BODY MOUNTING bolts and nuts (check for security)
- 24 BODY CORROSION
- 25\* FRONT BRAKE PADS, DISCS & OTHER COMPONENTS
- 26\* REAR BRAKE PADS, LININGS, DRUMS & OTHER COMPONENTS
- 27 FOOT BRAKE, PARKING BRAKE: operation / free play / stroke
- 28\* BRAKE FLUID - Check for level and leaks - see additional items
- 29 TYRES LHF RHF LHR RHR SPARE
- 30 WHEEL NUT TORQUES

|   | D0  | D1  | D2  | D3  |
|---|---|---|---|---|
| <b>Key</b>  | <input checked="" type="checkbox"/> Checked/Completed   | <input checked="" type="checkbox"/> Checked/Completed   | <input checked="" type="checkbox"/> Checked/Completed   | <input checked="" type="checkbox"/> Checked/Completed   |
|   | <input type="checkbox"/> Requires Attention   | <input type="checkbox"/> Requires Attention   | <input type="checkbox"/> Requires Attention   | <input type="checkbox"/> Requires Attention   |
|   | <input type="checkbox"/> Not Applicable   | <input type="checkbox"/> Not Applicable   | <input type="checkbox"/> Not Applicable   | <input type="checkbox"/> Not Applicable   |
| 11* ENGINE OIL  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 12* ENGINE OIL FILTER   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 13* MANUAL TRANSMISSION OIL - levels and leaks<br><i>Y61, R20, F23 (replace oil at 54K miles)<br/>Others</i>                    | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 14 TRANSFER AND STANDARD DIFFERENTIAL GEAR OIL - levels and leaks<br><i>Y61, R20, F23 (replace oil at 36K miles)<br/>Others</i> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 15* A/T FLUID - level, leakage  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 16* L.S.D. GEAR OIL (except viscous coupling type)  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 17* STEERING GEAR & LINKAGE (4x4)<br>AXLE SUSPENSION, PROPELLER (Others)<br>SHAFT and EXHAUST SYSTEM                            | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 18* GREASING POINTS OF STEERING GEAR LINKAGE, (4x4)<br>PROP SHAFT AND SUSPENSION  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 19* DRIVE SHAFTS & STEERING DAMPER (4x4)  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 20* FRONT WHEEL BEARING GREASE (4x4, D21)   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 21* FRONT AXLE JOINT GREASE IN KNUCKLE FLANGE (Y61)   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 22* FREE RUNNING HUB GREASE (4x4)   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 23 BODY MOUNTING bolts and nuts (check for security)  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 24 BODY CORROSION   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 25* FRONT BRAKE PADS, DISCS & OTHER COMPONENTS  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 26* REAR BRAKE PADS, LININGS, DRUMS & OTHER COMPONENTS  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 27 FOOT BRAKE, PARKING BRAKE: operation / free play / stroke  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 28* BRAKE FLUID - Check for level and leaks - see additional items  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 29 TYRES LHF RHF LHR RHR SPARE  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 30 WHEEL NUT TORQUES  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |

Rotate as required

**Drive vehicle off ramp - flat surface**

**Engine Bay**

- 31 ALL DRIVE BELTS
  - 32 WINDSHIELD WASHER top-up fluid level
  - 33 BATTERY fluid level
  - 34 CHECK AIR CONDITIONING HOSES AND CONNECTIONS - if fitted
  - 35 CHECK COOLING SYSTEM FOR CONDITION AND LEAKS
  - 36 COOLANT/ANTIFREEZE STRENGTH - see additional items
  - 37\* AIR CLEANER FILTER (CLEAN DRY PAPER TYPE ON D2 SERVICE)
  - 38\* DIESEL FUEL FILTER & DRAIN WATER
  - 39 VALVE CLEARANCE (NOT HLA MODELS)
  - 40 FUEL LINES
  - 41 SPARK PLUGS Conventional Spark Plugs  
Platinum Spark Plugs - see additional items
  - 42 PETROL IGNITION LEADS
  - 43\* FUEL FILTER
  - 44 ENGINES VAPOUR LINES
  - 45 PCV VALVE AND SYSTEM
  - 46\* ONLY PCV FILTER (where applicable)
  - 47 IDLE SPEED (including base idle) & IGNITION TIMING
  - 48 OXYGEN SENSOR/LAMBDA VALVE
  - 49 IDLE SPEED
  - 50 BRAKE BOOSTER VACUUM HOSES, CONNECTIONS, CHECK VALVE
  - 51 CLUTCH SYSTEM - Fluid level & leaks, pedal freeplay
  - 52 MANUAL STEERING GEAR OIL (where applicable)
  - 53 POWER STEERING - levels and leaks
  - 54\* CABIN AIR FILTER
  - 55 CHECK CRUISE CONTROL VACUUM HOSES AND CONNECTIONS
  - 56 ROAD TEST
  - 57 WHEEL ALIGNMENT (if necessary, balance wheels)
  - 58 CHECK EXHAUST EMISSIONS
- Diesel:** If engine power decreases, black exhaust smoke is emitted or engine noise increases, inspect and if necessary, adjust the fuel injector starting pressure and spray pattern.

\*CHANGE FREQUENCY AS REQUIRED UNDER SEVERE DRIVING CONDITIONS  
 = INSPECT/ADJUST IF REQUIRED  = LUBRICATE  = REPLACE  = TIGHTEN  
 DO Service is carried out on Cabstar F23 models with 3,000 mile oil and filter change

**ADDITIONAL SERVICE ITEMS AT ADDITIONAL COST**

BRAKE FLUID CHANGE - EVERY 2 YEARS OR 24,000 MILES WHICHEVER SOONER  
 Maintains maximum braking performance by preventing vapour lock.  
 ANTI-FREEZE CHANGE - EVERY 3 YEARS OR 36,000 MILES WHICHEVER SOONER  
 Not only protects against freezing, but prevents corrosion of internal engine parts.  
 CHANGE INJECTION PUMP TIMING BELT - EVERY 5 YEARS OR 54,000 MILES WHICHEVER SOONER  
 A broken injection pump timing belt would prevent the engine from running and may damage cambelt in the process.  
 CHANGE CAMBELT - EVERY 5 YEARS OR 54,000 MILES WHICHEVER SOONER  
 A broken cambelt can damage the valve mechanism resulting in a very expensive repair.

**Drive vehicle into workshop - flat surface**

**Key**

|  | D0  | D1  | D2  | D3  |
|--|---|---|---|---|
| <b>Key</b>   | <input checked="" type="checkbox"/> Checked/Completed   | <input checked="" type="checkbox"/> Checked/Completed   | <input checked="" type="checkbox"/> Checked/Completed   | <input checked="" type="checkbox"/> Checked/Completed   |
|  | <input type="checkbox"/> Requires Attention   | <input type="checkbox"/> Requires Attention   | <input type="checkbox"/> Requires Attention   | <input type="checkbox"/> Requires Attention   |
|  | <input type="checkbox"/> Not Applicable   | <input type="checkbox"/> Not Applicable   | <input type="checkbox"/> Not Applicable   | <input type="checkbox"/> Not Applicable   |
| 31 ALL DRIVE BELTS   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 32 WINDSHIELD WASHER top-up fluid level  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 33 BATTERY fluid level   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 34 CHECK AIR CONDITIONING HOSES AND CONNECTIONS - if fitted                            | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 35 CHECK COOLING SYSTEM FOR CONDITION AND LEAKS  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 36 COOLANT/ANTIFREEZE STRENGTH - see additional items                                  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 37* AIR CLEANER FILTER (CLEAN DRY PAPER TYPE ON D2 SERVICE)                            | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 38* DIESEL FUEL FILTER & DRAIN WATER   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 39 VALVE CLEARANCE (NOT HLA MODELS)  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 40 FUEL LINES  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 41 SPARK PLUGS Conventional Spark Plugs<br>Platinum Spark Plugs - see additional items | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 42 PETROL IGNITION LEADS   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 43* FUEL FILTER  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 44 ENGINES VAPOUR LINES  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 45 PCV VALVE AND SYSTEM  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 46* ONLY PCV FILTER (where applicable)   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 47 IDLE SPEED (including base idle) & IGNITION TIMING                                  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 48 OXYGEN SENSOR/LAMBDA VALVE  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 49 IDLE SPEED  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 50 BRAKE BOOSTER VACUUM HOSES, CONNECTIONS, CHECK VALVE                                | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 51 CLUTCH SYSTEM - Fluid level & leaks, pedal freeplay                                 | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 52 MANUAL STEERING GEAR OIL (where applicable)   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 53 POWER STEERING - levels and leaks   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 54* CABIN AIR FILTER   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 55 CHECK CRUISE CONTROL VACUUM HOSES AND CONNECTIONS                                   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 56 ROAD TEST   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 57 WHEEL ALIGNMENT (if necessary, balance wheels)                                      | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| 58 CHECK EXHAUST EMISSIONS   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |

CHANGE PLATINUM TIPPED SPARK PLUGS - EVERY 5 YEARS OR 54,000 MILES  
 Ensures maximum engine performance and economy.  
 INSPECT AIR BAG SYSTEM - AFTER 10 YEARS, THEN EVERY 2 YEARS THEREAFTER  
 Ensures the reliability of the air bag system in event of an accident.

# ENGINE MECHANICAL

## SECTION **EM**

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## PRECAUTIONS

### Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System "Air Bag" and "Seat Belt Pre-tensioner", used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. 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.
- All SRS air bag electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS.

### Parts Requiring Angular Tightening

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

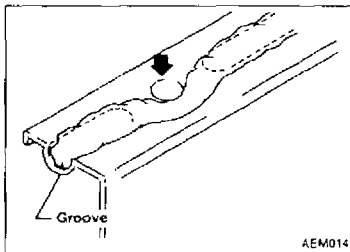
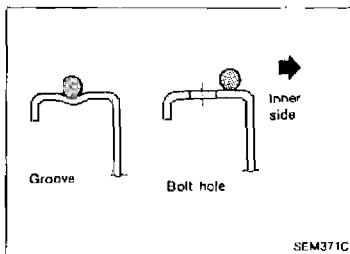
- Cylinder head bolts
- Main bearing cap bolts
- Connecting rod bearing cap nuts

Do not use a torque value for final tightening.

The torque values for these parts are for a preliminary step. Ensure thread and seat surfaces are clean and coated with engine oil.

### Liquid Gasket Application Procedure

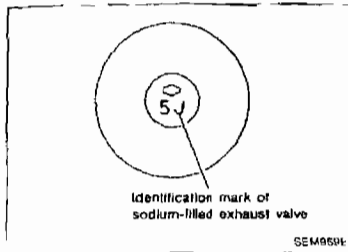
- Use a scraper to remove all traces of old liquid gasket from mating surfaces and grooves. Also, completely clean any oil from these areas.
- Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine Liquid Gasket or equivalent.)
  - Be sure liquid gasket is 4.0 to 5.0 mm (0.157 to 0.197 in) wide (for oil pan).
  - Be sure liquid gasket is 2.0 to 3.0 mm (0.079 to 0.118 in) wide (in areas except oil pan).
- Apply liquid gasket to inner surface around hole perimeter area.  
(Assembly should be done within 5 minutes after coating.)
- Wait at least 30 minutes before refilling engine oil and engine coolant.



## PRECAUTIONS

### Special Cautions to Ensure the Safe Disposal of Sodium-filled Exhaust Valves

The handling and disposal of sodium-filled exhaust valves requires special care and consideration. Under conditions such as breakage with subsequent exposure to water, the sodium metal will react violently. The sodium metal, which lines the inner portion of the exhaust valve, forms sodium hydroxide. Also, it releases hydrogen gas which may result in an explosion or fire.



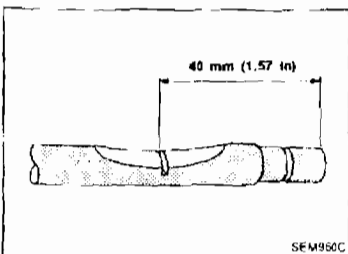
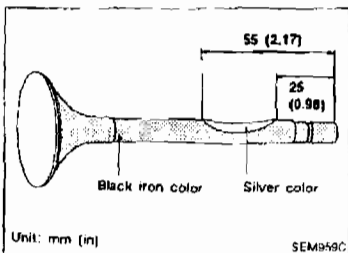
A sodium-filled exhaust valve is identified on the top of its stem as shown in illustration.

### DEALER DISPOSAL INSTRUCTIONS

#### CAUTION:

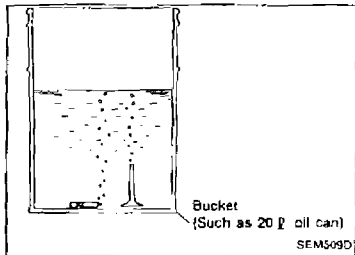
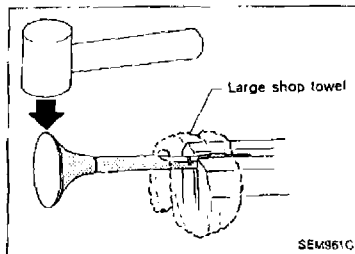
- Use approved shatter-resistant eye protection when performing this procedure.
- Perform this and all subsequent disposal work procedures in an open room, away from flammable liquids. Keep a fire extinguisher, rated at least 10 ABC, in close proximity to the work area.
- Be sure to wear rubber gloves when performing the following operations.

1. Clamp valve stem in a vice.
2. The valve has a specially-hardened surface. To cut through it, first remove a half-round section, approximately 30 mm (1.18 in) long. Use an air-powered grinder until the black iron color is removed and the silver-colored metal appears.
3. Use a hacksaw to cut through approximately half the diameter of the valve stem. Make the serration at a point 40 mm (1.57 in) from the end of the stem.



## PRECAUTIONS

### Special Cautions to Ensure the Safe Disposal of Sodium-filled Exhaust Valves (Cont'd)



4. Cover the serrated end of the valve with a large shop towel. Strike the valve face end with a hammer, separating it into two pieces.
5. Fill a bucket (such as a 20 lb oil can) with at least 10 l (2-1/4 imp gal) of water. Using a pair of large tweezers, carefully place the already-cut (serrated) valves into the water one at a time. Quickly move away at least 2.7 m (9 ft). Place the valves in a standing position as shown in the figure. This allows complete reaction of the sodium with the water. The major portion of the resultant chemical reaction lasts 1 to 2 minutes. After the bubbling action has subsided, additional valves can be placed into the water. Wait until each subsequent chemical reaction subsides before placing additional valves into the water. However, no more than 8 valves should be placed in the same 10 l (2-1/4 imp gal) amount of water. The complete chemical reaction may take as long as 4 to 5 hours. Remove the valves using a set of large tweezers after the chemical reaction has stopped. Afterwards, the valves can be mixed with ordinary scrap metal.

#### CAUTION:

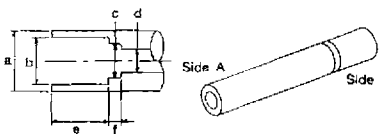
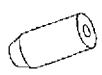
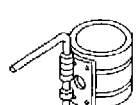
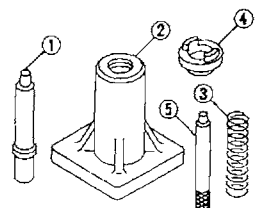
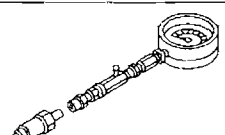
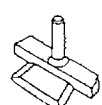
- Make sure the resultant (high alkalinity) waste water does not contact your skin. If the waste water does contact you, wash the contacted area immediately with large quantities of water.
- Check country and local regulations concerning any chemical treatment or waste water discharge permits. These may be required to dispose of the resultant (high alkalinity) waste water.



# PREPARATION

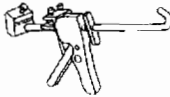
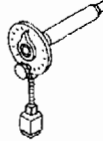

## Special Service Tools (Cont'd)

†: Special tool or commercial equivalent

| Tool number<br>Tool name  | Description  |   |        |         |        |        |               |               |                   |                   |                   |                      |                      |                   |                  |                  |                 |                      |             |             |
|---|--|---|--------|---------|--------|--------|---------------|---------------|-------------------|-------------------|-------------------|----------------------|----------------------|-------------------|------------------|------------------|-----------------|----------------------|-------------|-------------|
| KV10115600<br>Valve oil seal drift  | Installing valve oil seal<br><br>                     | <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 50%;">Intake</th> <th style="width: 50%;">Exhaust</th> </tr> <tr> <th style="width: 50%;">Side A</th> <th style="width: 50%;">Side B</th> </tr> </thead> <tbody> <tr> <td><b>Side A</b></td> <td><b>Side B</b></td> </tr> <tr> <td>a: 20 (0.79) dia.</td> <td>a: 20 (0.79) dia.</td> </tr> <tr> <td>b: 13 (0.51) dia.</td> <td>b: 14.2 (0.559) dia.</td> </tr> <tr> <td>c: 10.3 (0.406) dia.</td> <td>c: 11 (0.43) dia.</td> </tr> <tr> <td>d: 8 (0.31) dia.</td> <td>d: 8 (0.31) dia.</td> </tr> <tr> <td>e: 10.7 (0.421)</td> <td>e: 10.7 (0.421) dia.</td> </tr> <tr> <td>f: 5 (0.20)</td> <td>f: 5 (0.20)</td> </tr> </tbody> </table> <p style="text-align: right;">Unit: mm (in)</p> | Intake | Exhaust | Side A | Side B | <b>Side A</b> | <b>Side B</b> | a: 20 (0.79) dia. | a: 20 (0.79) dia. | b: 13 (0.51) dia. | b: 14.2 (0.559) dia. | c: 10.3 (0.406) dia. | c: 11 (0.43) dia. | d: 8 (0.31) dia. | d: 8 (0.31) dia. | e: 10.7 (0.421) | e: 10.7 (0.421) dia. | f: 5 (0.20) | f: 5 (0.20) |
| Intake  | Exhaust  |   |        |         |        |        |               |               |                   |                   |                   |                      |                      |                   |                  |                  |                 |                      |             |             |
| Side A  | Side B   |   |        |         |        |        |               |               |                   |                   |                   |                      |                      |                   |                  |                  |                 |                      |             |             |
| <b>Side A</b>   | <b>Side B</b>  |   |        |         |        |        |               |               |                   |                   |                   |                      |                      |                   |                  |                  |                 |                      |             |             |
| a: 20 (0.79) dia.   | a: 20 (0.79) dia.  |   |        |         |        |        |               |               |                   |                   |                   |                      |                      |                   |                  |                  |                 |                      |             |             |
| b: 13 (0.51) dia.   | b: 14.2 (0.559) dia.   |   |        |         |        |        |               |               |                   |                   |                   |                      |                      |                   |                  |                  |                 |                      |             |             |
| c: 10.3 (0.406) dia.  | c: 11 (0.43) dia.  |   |        |         |        |        |               |               |                   |                   |                   |                      |                      |                   |                  |                  |                 |                      |             |             |
| d: 8 (0.31) dia.  | d: 8 (0.31) dia.   |   |        |         |        |        |               |               |                   |                   |                   |                      |                      |                   |                  |                  |                 |                      |             |             |
| e: 10.7 (0.421)   | e: 10.7 (0.421) dia.   |   |        |         |        |        |               |               |                   |                   |                   |                      |                      |                   |                  |                  |                 |                      |             |             |
| f: 5 (0.20)   | f: 5 (0.20)  |   |        |         |        |        |               |               |                   |                   |                   |                      |                      |                   |                  |                  |                 |                      |             |             |
| KV10115700<br>Dial gauge stand  | Adjusting shims<br><br>                               | NT012   |        |         |        |        |               |               |                   |                   |                   |                      |                      |                   |                  |                  |                 |                      |             |             |
| EM03470000<br>Piston ring compressor  | Installing piston assembly into cylinder bore<br><br> | NT044   |        |         |        |        |               |               |                   |                   |                   |                      |                      |                   |                  |                  |                 |                      |             |             |
| KV10107400<br>Piston pin press stand<br>① KV10107310<br>Center shaft<br>② ST13040020<br>Stand<br>③ ST13040030<br>Spring<br>④ KV10107320<br>Cap<br>⑤ ST13040050<br>Drift | Disassembling and assembling piston pin<br><br>      | NT013   |        |         |        |        |               |               |                   |                   |                   |                      |                      |                   |                  |                  |                 |                      |             |             |
| ED19600000*<br>Compression gauge set  |   | NT626   |        |         |        |        |               |               |                   |                   |                   |                      |                      |                   |                  |                  |                 |                      |             |             |
| KV10111100<br>Seal cutter   | Removing oil pan<br><br>                            | NT046   |        |         |        |        |               |               |                   |                   |                   |                      |                      |                   |                  |                  |                 |                      |             |             |



**PREPARATION**  
**Special Service Tools (Cont'd)**

| Tool number<br>Tool name           | Description   |
|------------------------------------|---|
| WS39930000<br>Tube presser         |  <p align="right">Pressing the tube of liquid gasket</p> <p>NT052</p>                    |
| KV10112100<br>Angle wrench         |  <p align="right">Tightening bolts for bearing cap, cylinder head, etc.</p> <p>NT014</p> |
| ST16610001<br>Pilot bushing puller |  <p align="right">Removing pilot bushing</p> <p>NT045</p>                                |

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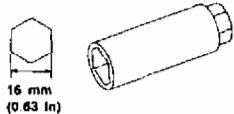



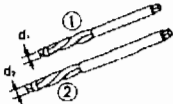
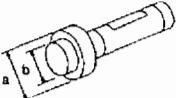
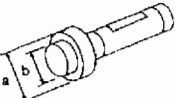
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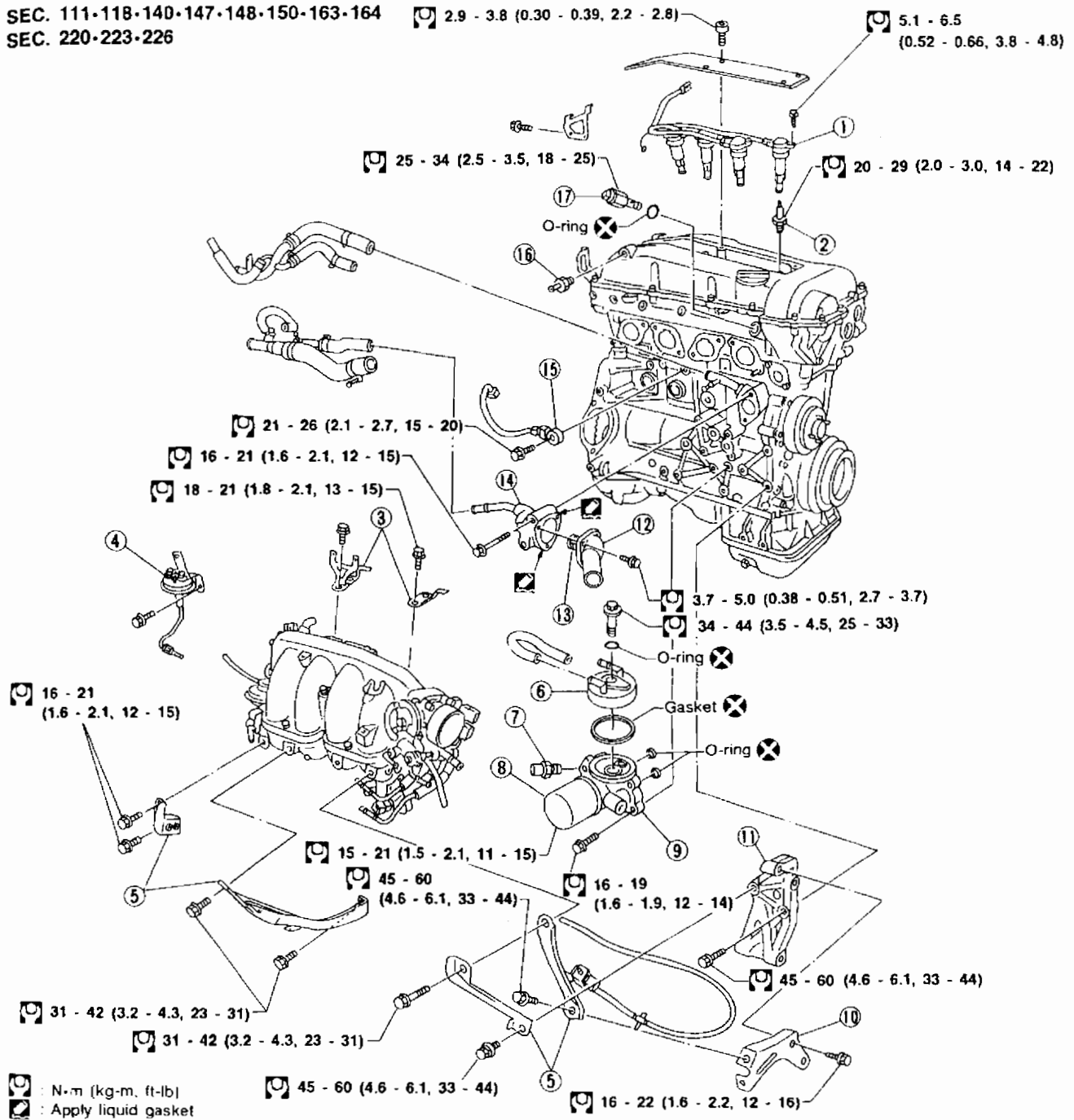
# PREPARATION

## Commercial Service Tools

| Tool name             | Description  |   |  |                |                |        |             |                    |         |             |                    |
|-----------------------|--|---|--|----------------|----------------|--------|-------------|--------------------|---------|-------------|--------------------|
| Spark plug wrench     |  <p>16 mm<br/>(0.63 in)</p> | Removing and installing spark plug  |  |                |                |        |             |                    |         |             |                    |
| Valve seal cutter set |                             | Finishing valve seal dimensions   |  |                |                |        |             |                    |         |             |                    |
| Piston ring expander  |                             | Removing and installing piston ring   |  |                |                |        |             |                    |         |             |                    |
| Valve guide drift     |                             | Removing and installing valve guide<br><br>Intake a = 9.5 mm (0.374 in) dia.<br>b = 5.0 mm (0.197 in) dia.<br><br>Exhaust a = 10.5 mm (0.413 in) dia.<br>b = 6.0 mm (0.236 in) dia.   |  |                |                |        |             |                    |         |             |                    |
| Valve guide reamer    |                             | Reaming valve guide ① or hole for<br>oversize valve guide ②<br>Unit: mm (in)  |  |                |                |        |             |                    |         |             |                    |
|                       |  | <table border="1"> <thead> <tr> <th></th> <th>d<sub>1</sub></th> <th>d<sub>2</sub></th> </tr> </thead> <tbody> <tr> <td>Intake</td> <td>6.0 (0.236)</td> <td>10.175<br/>(0.4006)</td> </tr> <tr> <td>Exhaust</td> <td>7.0 (0.276)</td> <td>11.175<br/>(0.4400)</td> </tr> </tbody> </table> |  | d <sub>1</sub> | d <sub>2</sub> | Intake | 6.0 (0.236) | 10.175<br>(0.4006) | Exhaust | 7.0 (0.276) | 11.175<br>(0.4400) |
|                       | d <sub>1</sub>   | d <sub>2</sub>  |  |                |                |        |             |                    |         |             |                    |
| Intake                | 6.0 (0.236)  | 10.175<br>(0.4006)  |  |                |                |        |             |                    |         |             |                    |
| Exhaust               | 7.0 (0.276)  | 11.175<br>(0.4400)  |  |                |                |        |             |                    |         |             |                    |
| Front oil seal drift  |                           | Installing front oil seal<br><br>a = 75 mm (2.95 in) dia.<br>b = 45 mm (1.77 in) dia.   |  |                |                |        |             |                    |         |             |                    |
| Rear oil seal drift   |                           | Installing rear oil seal<br><br>a = 110 mm (4.33 in) dia.<br>b = 80 mm (3.15 in) dia.   |  |                |                |        |             |                    |         |             |                    |

# OUTER COMPONENT PARTS

SEC. 111-118-140-147-148-150-163-164  
SEC. 220-223-226



- ① Ignition coil
- ② Spark plug
- ③ Intake manifold collector support
- ④ EGRC-BPT valve
- ⑤ Intake manifold support
- ⑥ Oil cooler

- ⑦ Oil pressure switch
- ⑧ Oil filter
- ⑨ Oil filter bracket
- ⑩ Alternator adjusting bar
- ⑪ Alternator bracket
- ⑫ Water outlet

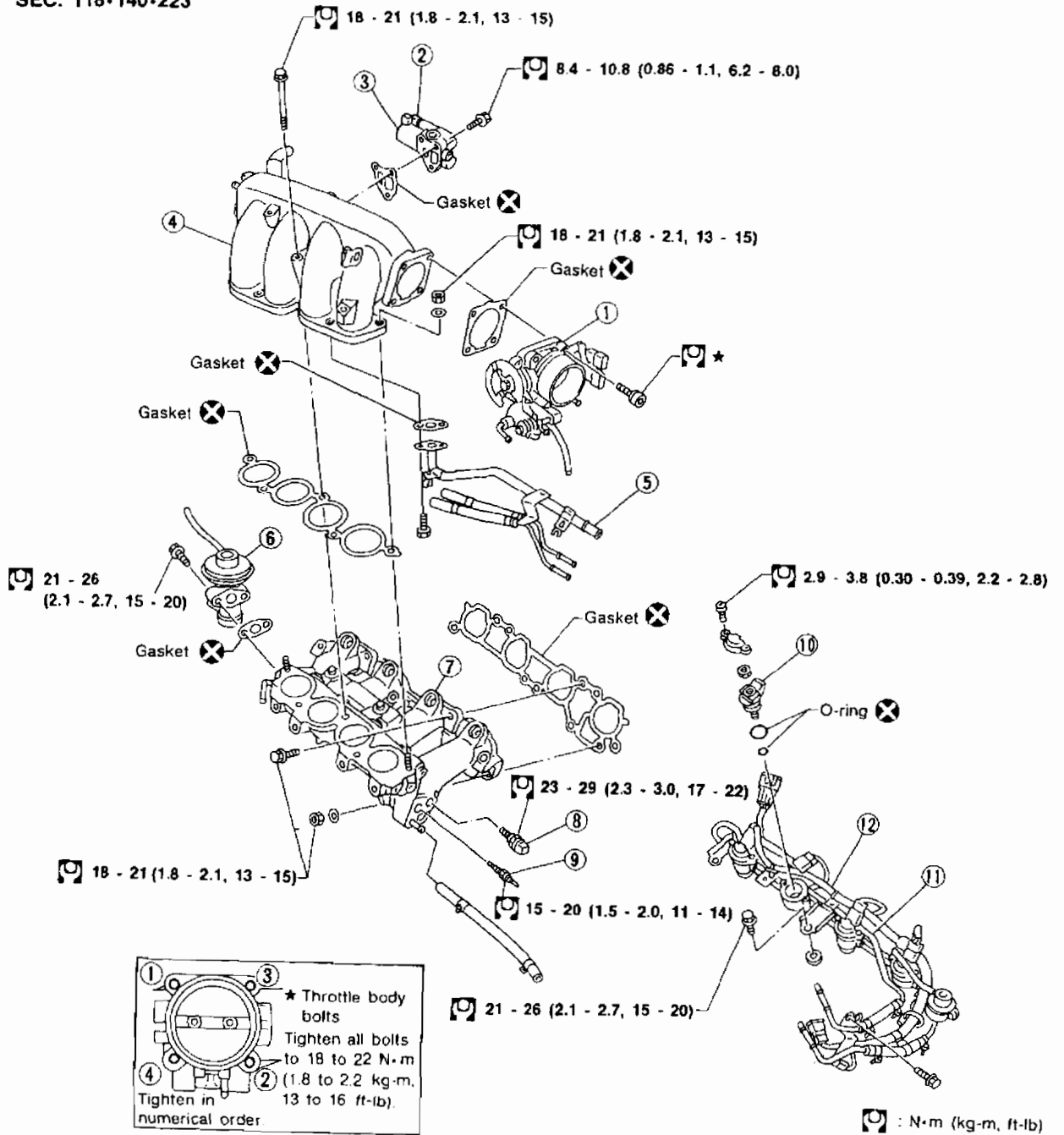
- ⑬ Thermostat
- ⑭ Thermostat housing
- ⑮ Knock sensor
- ⑯ Blow-by control valve
- ⑰ VTC solenoid valve

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SEM970E

# OUTER COMPONENT PARTS

SEC. 118-140-223

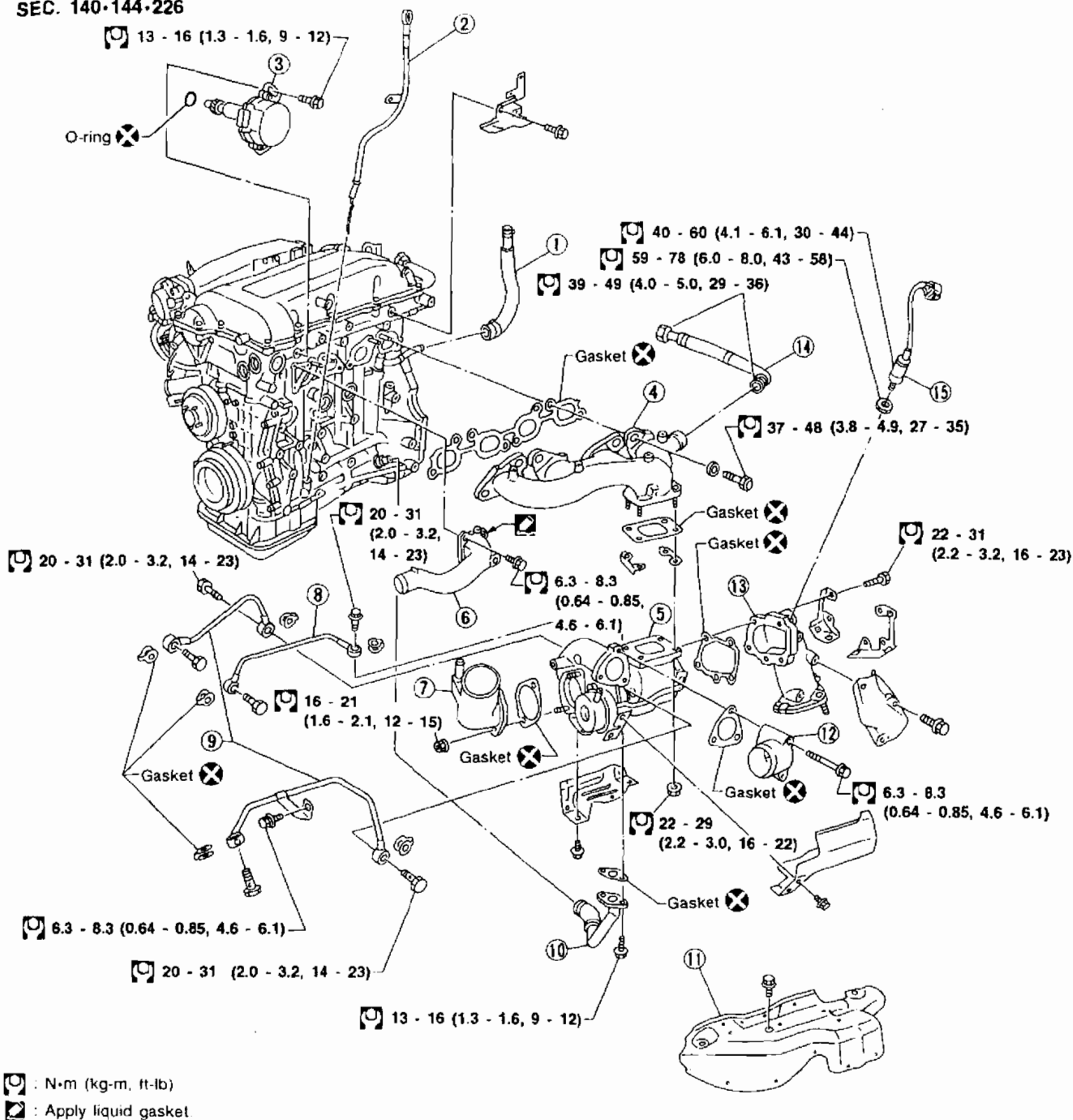


SEM971E

- |                             |                                     |                      |
|-----------------------------|-------------------------------------|----------------------|
| ① Throttle body             | ⑥ EGR valve                         | ⑩ Injector           |
| ② IACV-FICD valve           | ⑦ Intake manifold                   | ⑪ Fuel tube assembly |
| ③ IACV-AAC valve            | ⑧ Engine coolant temperature sensor | ⑫ Injector harness   |
| ④ Intake manifold collector | ⑨ Thermal transmitter               |                      |
| ⑤ Air pipe                  |                                     |                      |

# OUTER COMPONENT PARTS

SEC. 140-144-226



- ① Blow-by hose
- ② Oil level gauge
- ③ Camshaft position sensor
- ④ Exhaust manifold
- ⑤ Turbocharger

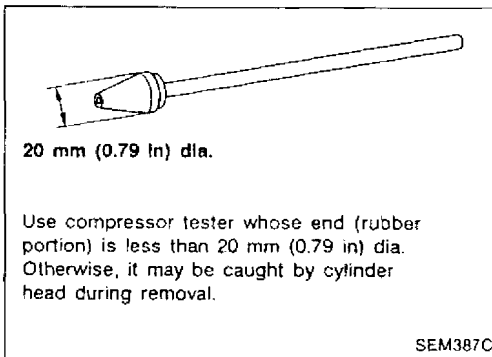
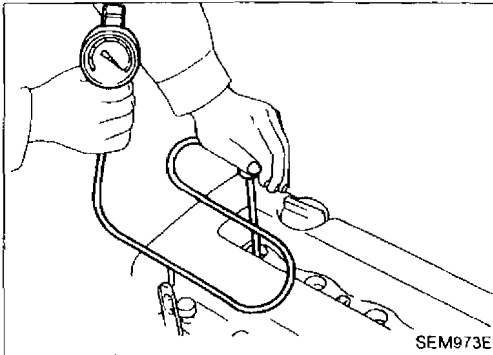
- ⑥ Water outlet
- ⑦ Air inlet
- ⑧ Oil tube
- ⑨ Water tube
- ⑩ Oil return pipe

- ⑪ Exhaust manifold cover
- ⑫ Air outlet
- ⑬ Exhaust manifold outlet
- ⑭ EGR pipe
- ⑮ Heated oxygen sensor

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## Measurement of Compression Pressure

1. Warm up engine.
2. Turn ignition switch off.
3. Release fuel pressure.  
Refer to "Releasing Fuel Pressure" in EC section.
4. Remove all spark plugs.
5. Disconnect distributor center cable.



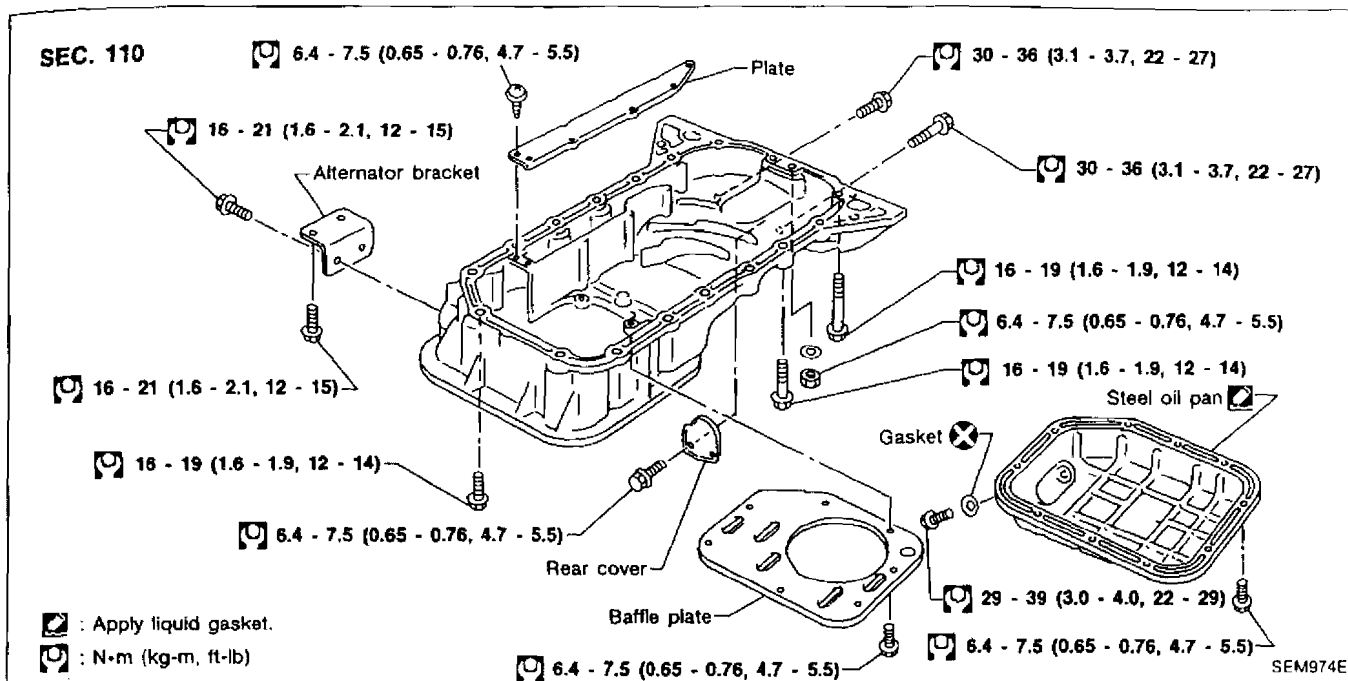
6. Attach a compression tester to No. 1 cylinder.
  7. Depress accelerator pedal fully to keep throttle valve wide open.
  8. Crank engine and record highest gauge indication.
  9. Repeat the measurement on each cylinder as shown above.
- **Always use a fully-charged battery to obtain specified engine revolution.**

### Compression pressure:

| Unit: kPa (bar, kg/cm <sup>2</sup> , psi)/300 rpm |                          |
|---|--------------------------|
| Standard  | 1,079 (10.79, 11.0, 156) |
| Minimum   | 883 (8.83, 9.0, 128)     |
| Difference limit between cylinders                | 98 (0.98, 1.0, 14)       |

10. If compression in one or more cylinders is low:
  - a. Pour a small amount of engine oil into cylinders through spark plug holes.
  - b. Re-test compression.
    - **If adding oil helps compression, piston rings may be worn or damaged. If so, replace piston rings after checking piston for wear or damage.**
    - **If pressure stays low, a valve may be sticking or seating improperly. Inspect and repair valve and valve seat. (Refer to SDS.) If valve or valve seat is damaged excessively, replace them.**
    - **If compression stays low in two cylinder 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.

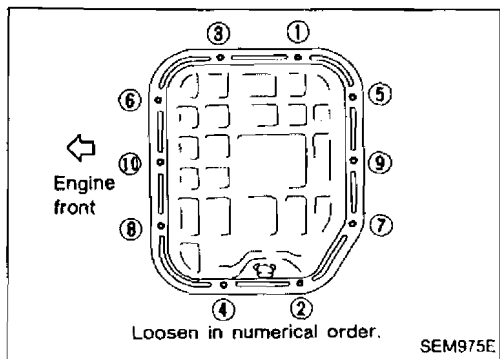
# OIL PAN



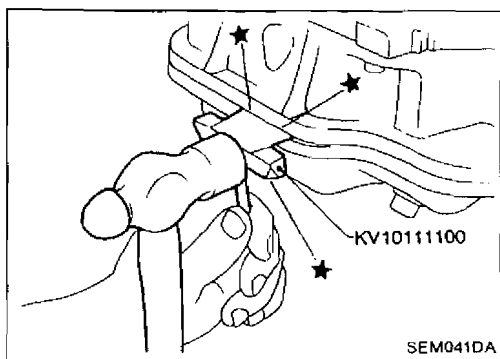
## Removal

1. Remove engine under cover.
2. Drain engine oil.

3. Remove steel oil pan bolts.

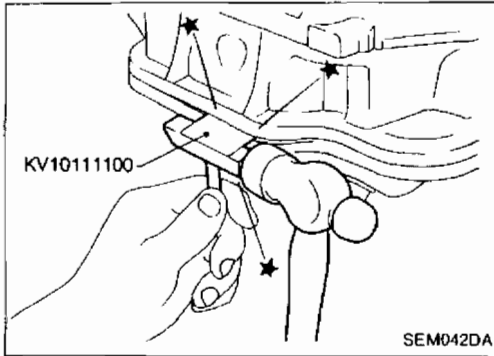


4. Remove steel oil pan.
  - (1) Insert Tool between aluminum oil pan and steel oil pan.
    - Be careful not to damage aluminum mating surface.
    - Do not insert screwdriver, or oil pan flange will be deformed.

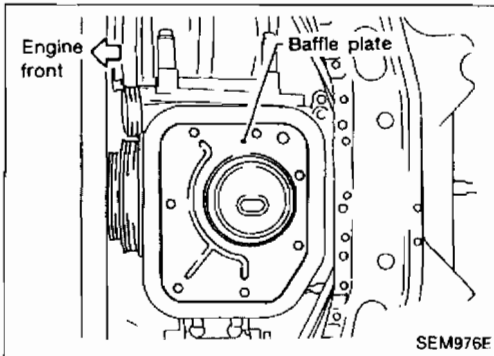


## OIL PAN

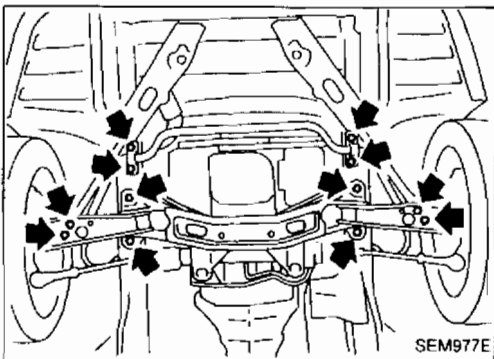
### Removal (Cont'd)



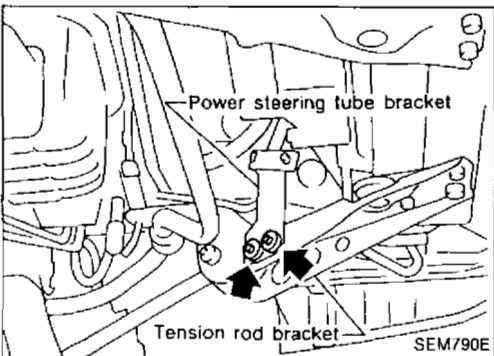
- (2) Slide Tool by tapping on the side of the Tool with a hammer.



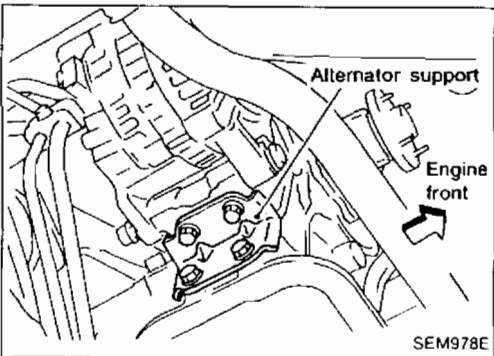
- (3) Remove steel oil pan.  
(4) Remove baffle plate.



5. Install engine slingers to cylinder head. Refer to "ENGINE REMOVAL" (EM-55).  
6. Set a suitable hoist on engine slinger and hold the engine.  
7. Remove the following parts.
- Tension rod bolts at transverse links
  - Front stabilizer bar securing bolts and nuts from side member.
  - Both left and right side engine mounting bolts. Refer to "ENGINE REMOVAL" (EM-55).
8. Disconnect steering shaft lower joint.



9. Remove power steering tube bracket securing bolts at left tension rod bracket.  
10. Remove front suspension member securing bolts while supporting with a jack.  
11. Lower front suspension member by around 60 mm (2.36 in).



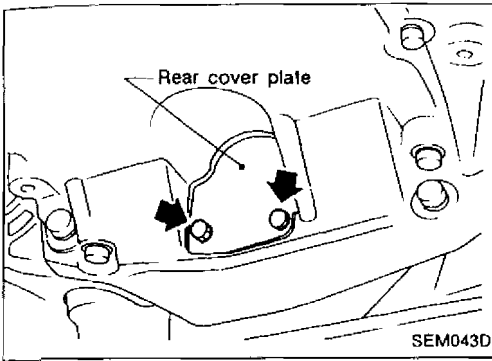
12. Remove alternator support.



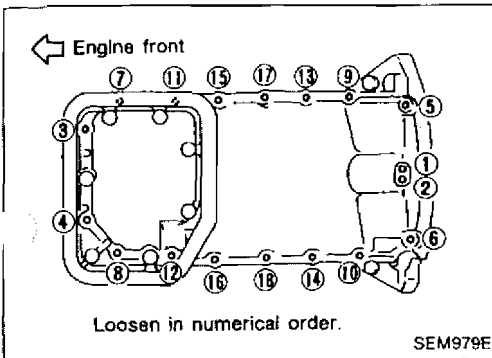
# OIL PAN

## Removal (Cont'd)

13. Remove rear cover plate.

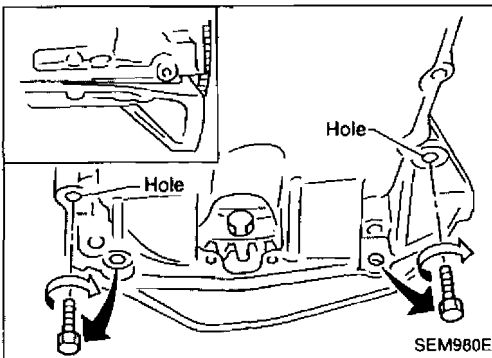


14. Remove aluminum oil pan bolts.



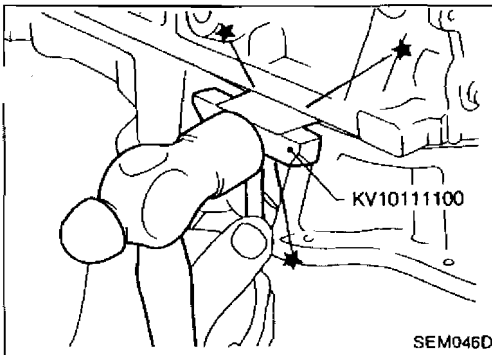
15. Remove four oil pan-to-transmission bolts.

16. Remove two engine-to-transmission bolts and install them into open bolt holes shown. Tighten the two bolts to release aluminum oil pan from cylinder block.

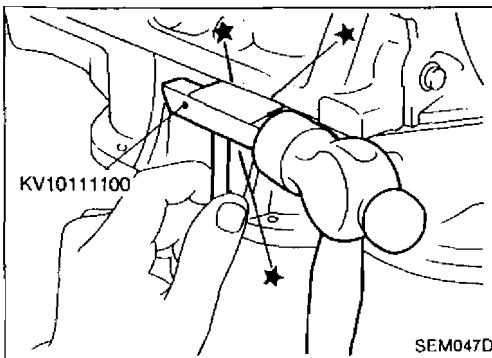


17. Remove aluminum oil pan.

- (1) Insert Tool between cylinder block and aluminum oil pan.
  - Be careful not to damage aluminum mating surface.
  - Do not insert screwdriver, or oil pan flange will be deformed.



- (2) Slide Tool by tapping on the side of the Tool with a hammer.



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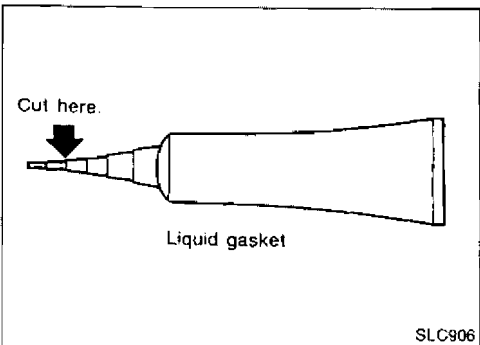
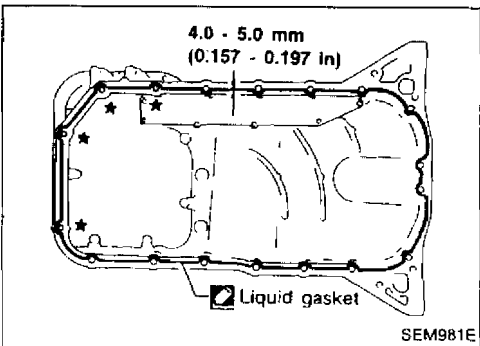
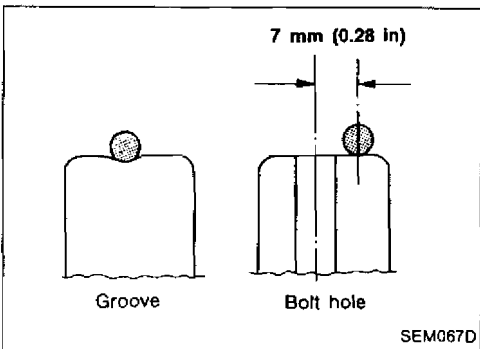
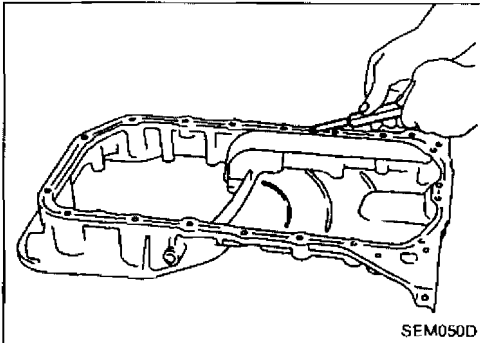
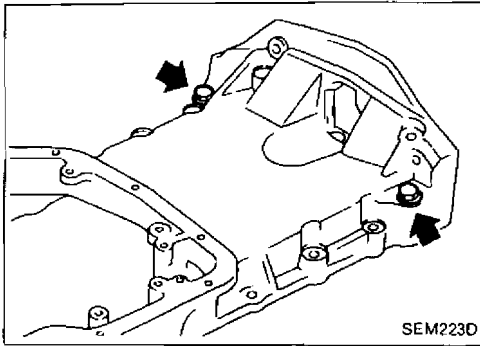
EL

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## OIL PAN

### Removal (Cont'd)

18. Remove the two oil pan-to-transmission bolts previously installed in aluminum oil pan.



### Installation

1. Install aluminum oil pan.
  - (1) Before installing aluminum oil pan, remove all traces of liquid gasket from mating surfaces using a scraper.
    - Also remove traces of liquid gasket from mating surface of cylinder block and front cover.

- (2) Apply a continuous bead of liquid gasket to mating surface of aluminum oil pan.

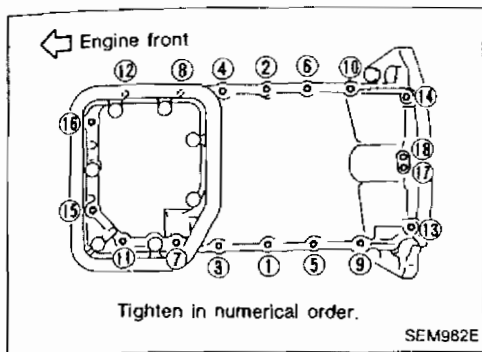
- Use Genuine Liquid Gasket or equivalent.

- For areas marked with "★", apply liquid gasket to the outer side of the bolt hole.

- Be sure liquid gasket is 4.0 to 5.0 mm (0.157 to 0.197 in) wide.
- Attaching should be done within 5 minutes after coating.

## OIL PAN

### Installation (Cont'd)



(3) Install aluminum oil pan.

- Tighten bolts in numerical order shown.

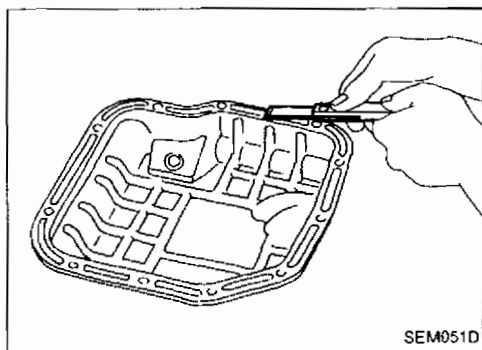
① - ⑯ bolts:

⊗: 16 - 19 N·m (1.6 - 1.9 kg-m, 12 - 14 ft-lb)

⑰, ⑱ bolts:

⊗: 6.4 - 7.5 N·m (0.65 - 0.76 kg-m, 4.7 - 5.5 ft-lb)

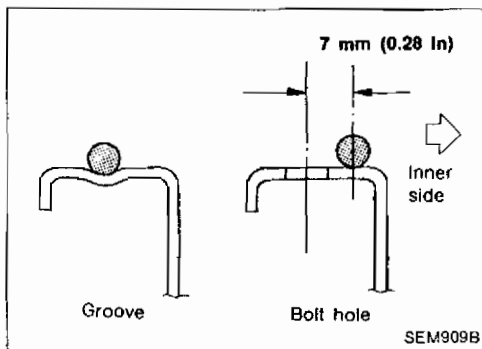
2. Install the four oil pan-to-transmission bolts.
3. Install rear cover plate.
4. Install alternator support.
5. Tighten front suspension member securing bolts.
6. Install all removed parts after removing steel oil pan.



7. Install steel oil pan.

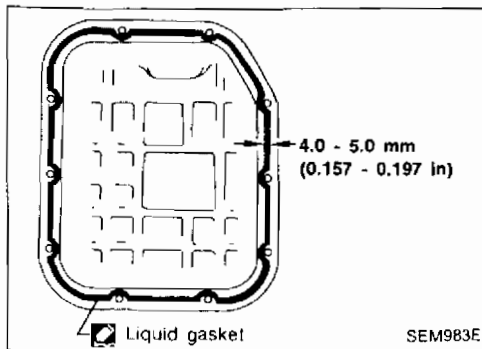
(1) Before installing steel oil pan, remove all traces of liquid gasket from mating surfaces using a scraper.

- Also remove traces of liquid gasket from mating surface of aluminum oil pan.



(2) Apply a continuous bead of liquid gasket to mating surface of steel oil pan.

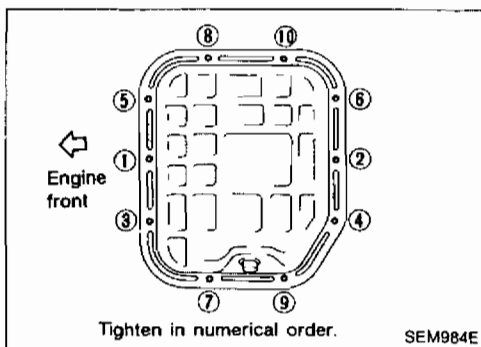
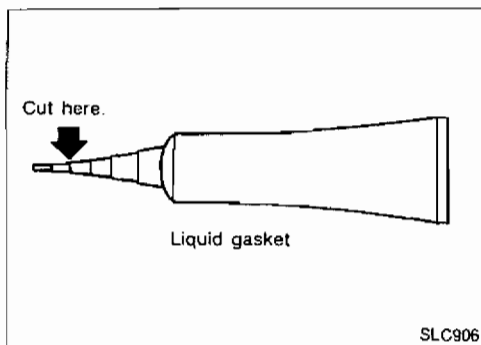
- Use Genuine Liquid Gasket or equivalent.



## OIL PAN

### Installation (Cont'd)

- Be sure liquid gasket is 4.0 to 5.0 mm (0.157 to 0.197 in) wide.
- Attaching should be done within 5 minutes after coating.



- (3) Install steel oil pan.
- Install bolts in numerical order shown.
  - Wait at least 30 minutes before refilling engine oil.

# TIMING CHAIN

SEC. 120-130-135-210

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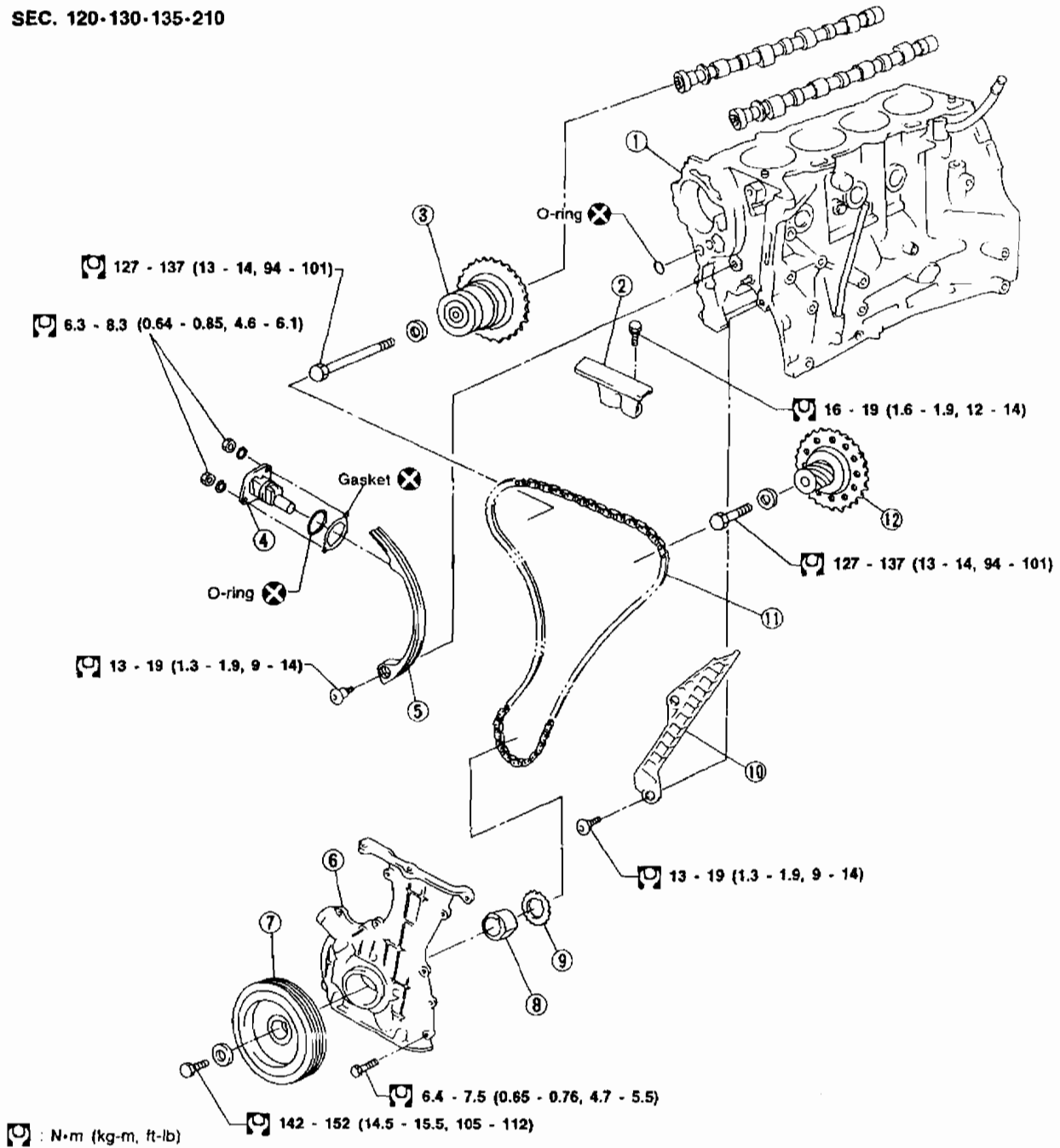
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- ① Cylinder block
- ② Chain guide
- ③ RH camshaft sprocket
- ④ Chain tensioner

- ⑤ Chain guide
- ⑥ Front cover
- ⑦ Crank pulley
- ⑧ Oil pump spacer

- ⑨ Crankshaft sprocket
- ⑩ Chain guide
- ⑪ Timing chain
- ⑫ LH camshaft sprocket

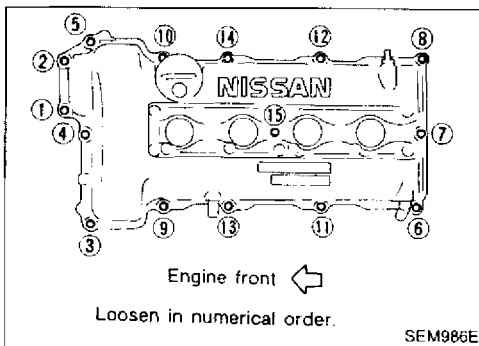
## TIMING CHAIN

### CAUTION:

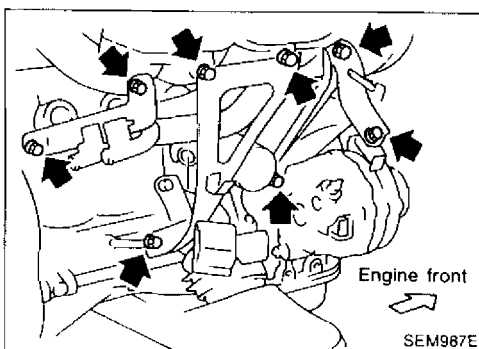
- After removing timing chain, do not turn crankshaft and camshaft separately, or valves will strike piston heads.
- When installing rocker arms, camshafts, chain tensioner, oil seals, or other sliding parts, lubricate contacting surfaces with new engine oil.
- Apply new engine oil to bolt threads and seat surfaces when installing cylinder head, camshaft sprocket, crankshaft pulley, and camshaft brackets.

### Removal

1. Release fuel pressure.  
Refer to "Releasing Fuel Pressure" in EC section.
2. Remove engine under covers.
3. Drain coolant.
4. Remove radiator.
5. Remove air duct to intake manifold and air recirculation duct.
6. Remove PCV hoses from rocker cover.
7. Remove drive belts and water pump pulley.
8. Remove alternator.
9. Remove power steering oil pump.
10. Remove the following parts from cylinder head and intake manifold: vacuum hoses, fuel hoses, water hoses, wires, harness, connectors and so on.
11. Remove ignition coils and all spark plugs.



12. Remove rocker cover.

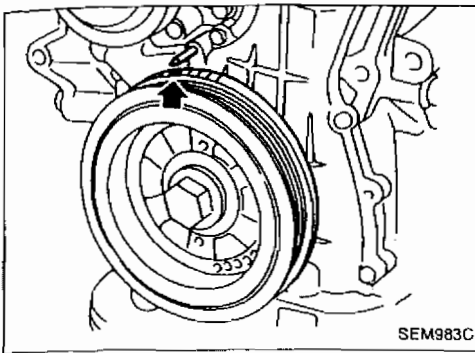


13. Remove intake manifold supports.

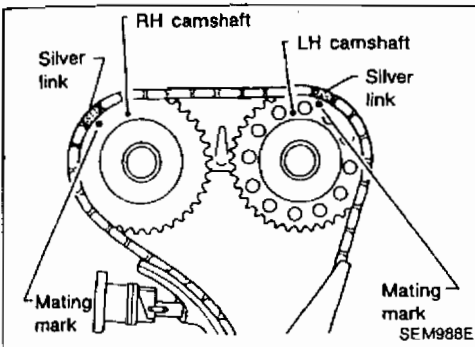
## TIMING CHAIN

### Removal (Cont'd)

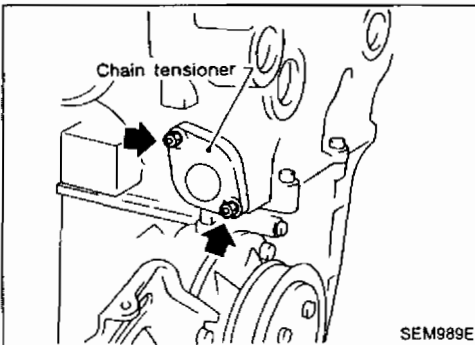
14. Set No. 1 piston at TDC on the compression stroke by rotating crankshaft.



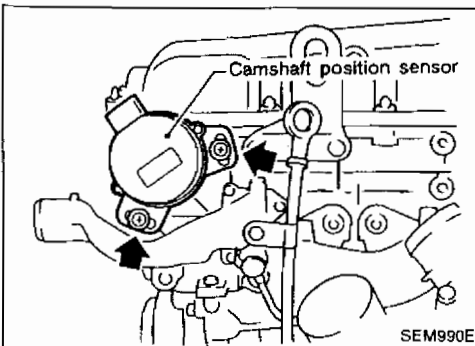
- Rotate crankshaft until mating mark on camshaft sprocket is set at position indicated in figure at left.



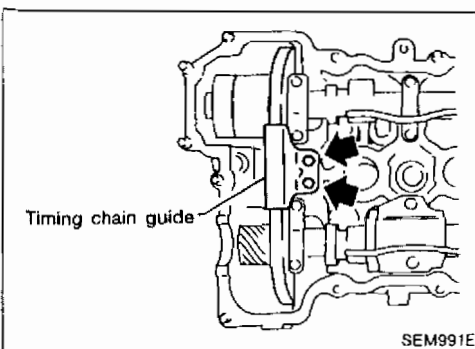
15. Remove chain tensioner.



16. Remove camshaft position sensor.



17. Remove timing chain guide.



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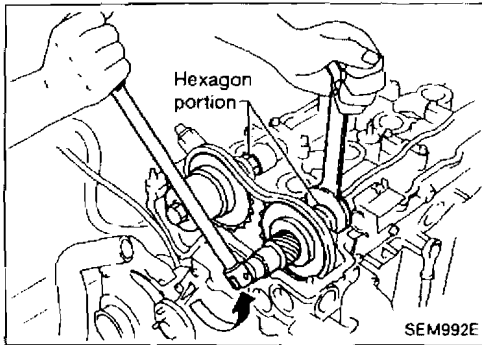
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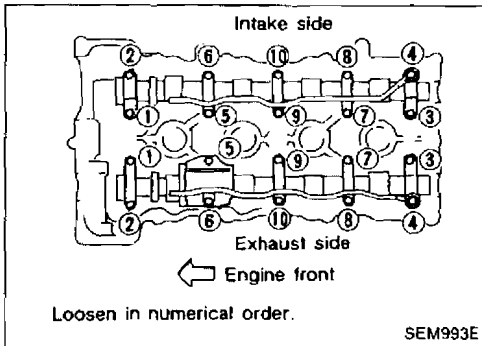
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## TIMING CHAIN

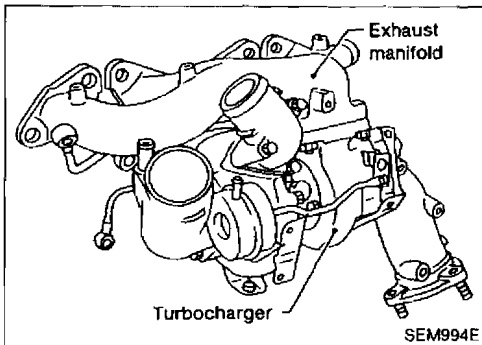
### Removal (Cont'd)



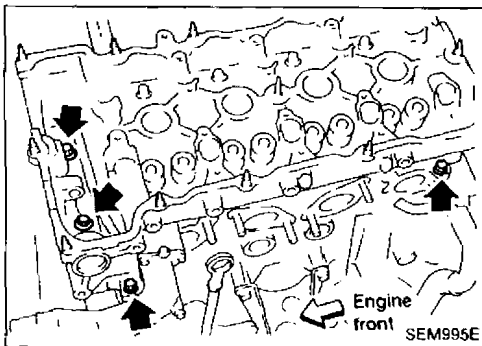
18. Remove camshaft sprockets.



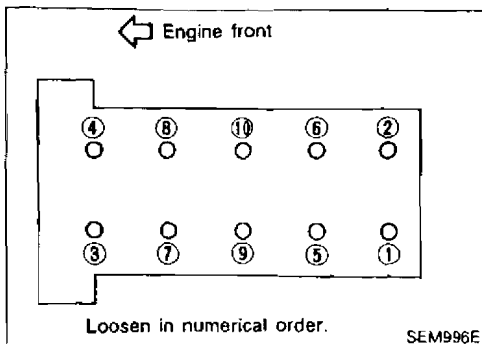
19. Remove camshafts, camshaft brackets, oil tubes and baffle plate.



20. Remove exhaust manifold with turbocharger. Refer to "Removal" in "TURBOCHARGER" (EM-49).



21. Remove cylinder head outside bolts and inside sub bolts.



22. Remove cylinder head bolts.

- A warped or cracked cylinder head may result from removing in incorrect order.

- Bolts should be loosened in two or three steps.

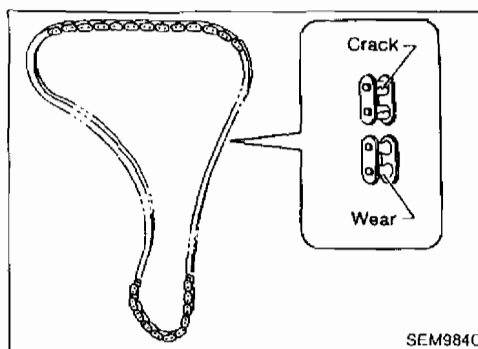
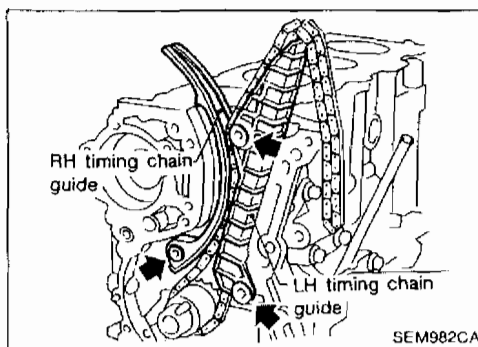
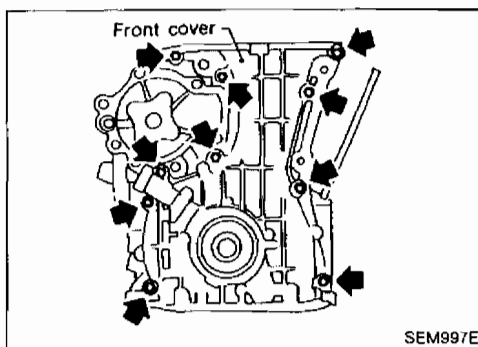
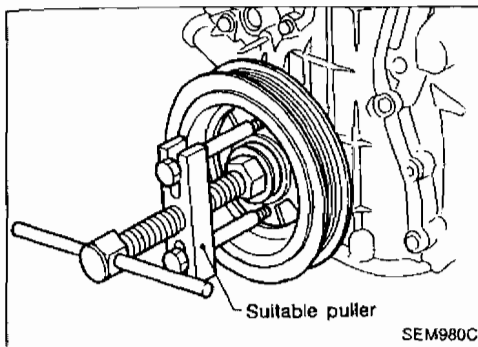
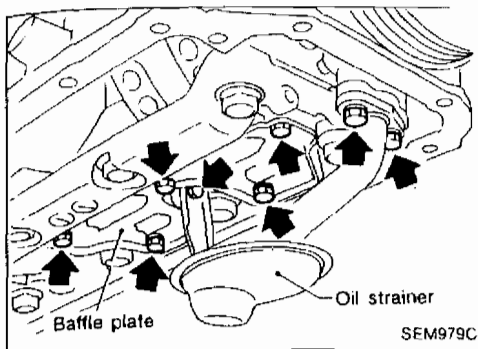
23. Remove cylinder head with intake manifold.



## TIMING CHAIN

### Removal (Cont'd)

24. Remove oil pans.  
Refer to "Removal" in "OIL PAN" (EM-13).
25. Remove oil strainer and baffle plate.



26. Remove crankshaft pulley.

27. Remove front cover.

28. Remove timing chain guides and timing chain.

### Inspection

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

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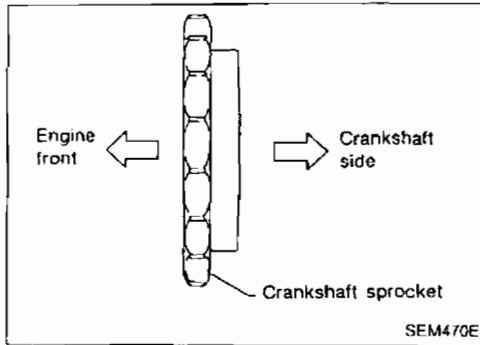
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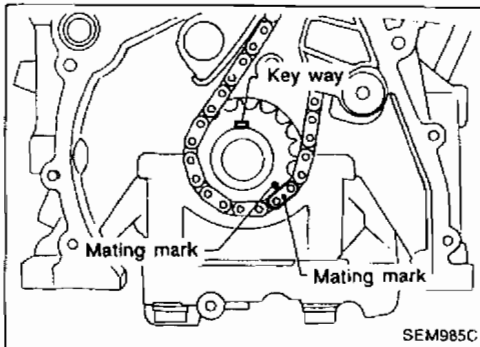
IX

# TIMING CHAIN

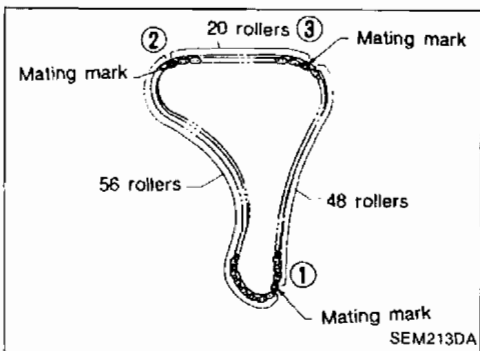


## Installation

1. Install crankshaft sprocket on crankshaft.

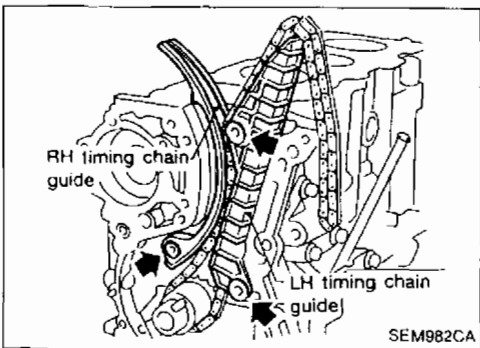


2. Position crankshaft so that No. 1 piston is set at TDC and key way is at 12 o'clock. Fit timing chain on crankshaft sprocket, aligning the mating marks.

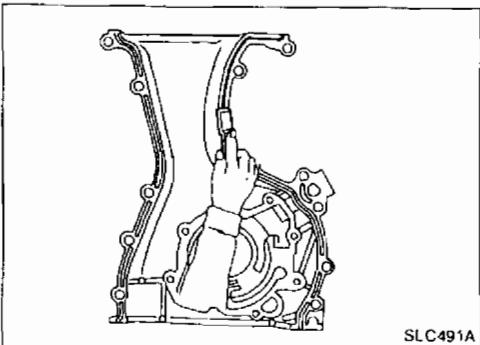


● Mating mark color on timing chain.

- ① : Gold
- ②, ③ : Silver



3. Install timing chain and timing chain guides.

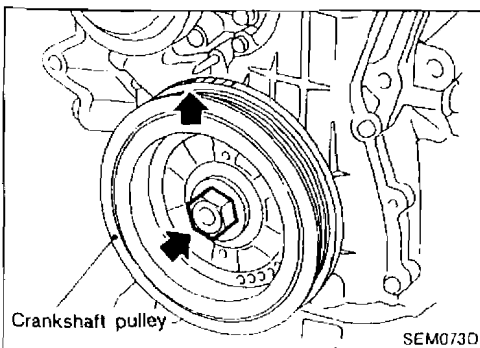
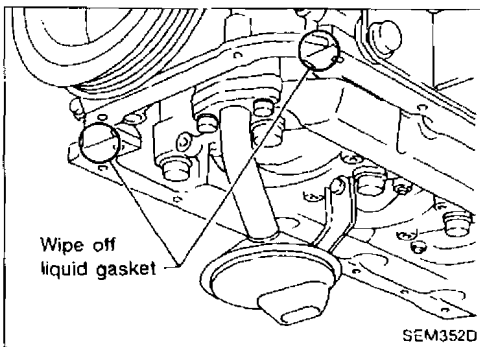
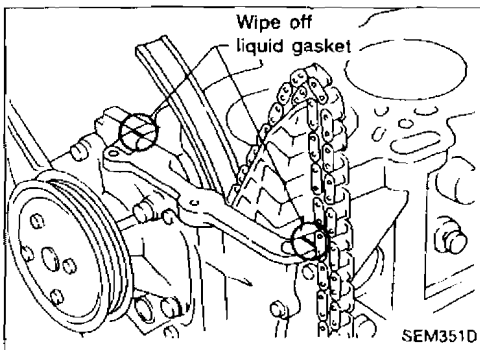
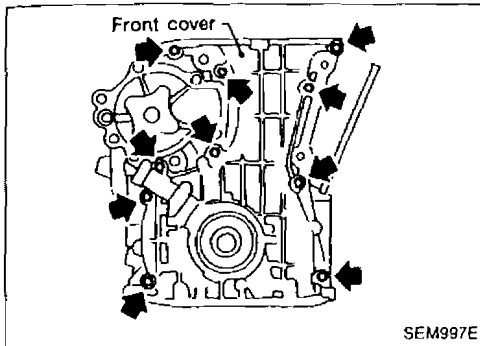
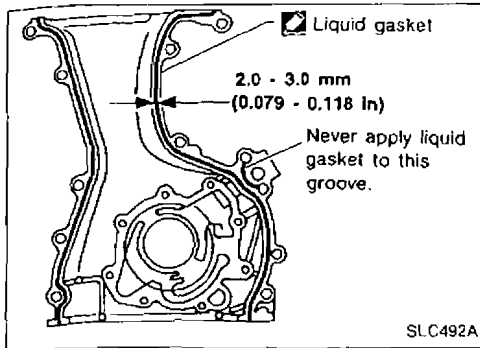


4. Before installing front cover, remove all traces of liquid gasket from mating surface using a scraper.

● Also remove traces of liquid gasket from mating surface of cylinder block.

# TIMING CHAIN

## Installation (Cont'd)



5. Apply a continuous bead of liquid gasket to mating surface of front cover.

- Use Genuine Liquid Gasket or equivalent.

6. Install oil pump drive spacer and front cover.

- Make sure that O-ring is installed on oil pump outlet passage of cylinder block.

- Wipe off excessive liquid gasket.

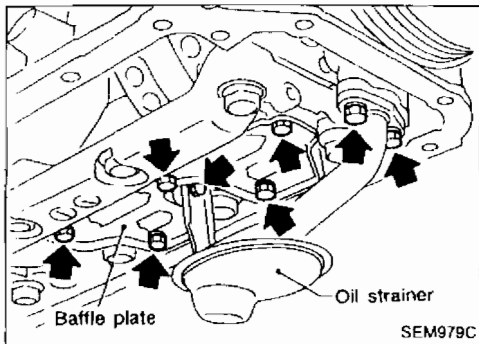
7. Install crankshaft pulley.

8. Set No. 1 piston at TDC on its compression stroke.

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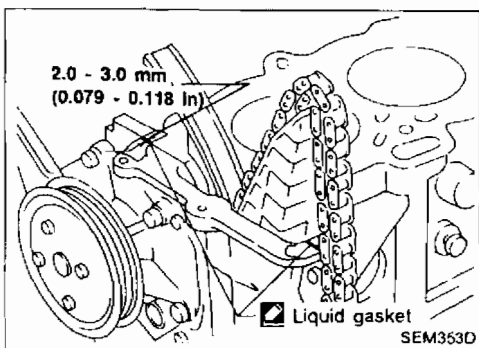
## TIMING CHAIN

### Installation (Cont'd)

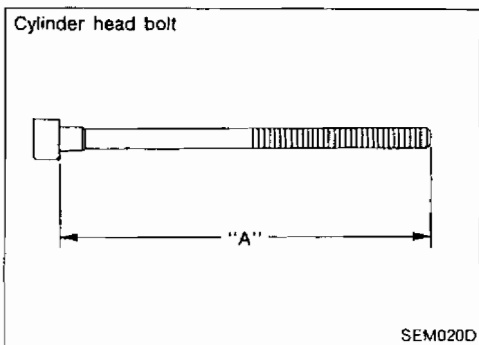


9. Install oil strainer and baffle plate.

10. Install oil pan.  
Refer to "Installation" in "OIL PAN" (EM-13).



11. Before installing cylinder head gasket, apply a continuous bead of liquid gasket to mating surface of cylinder block.

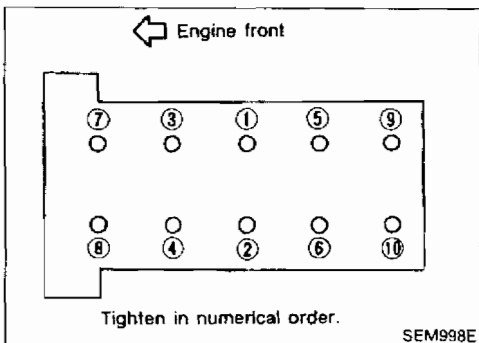


12. Install cylinder head with intake manifold.

#### CAUTION:

The cylinder head bolts can be reused providing dimension "A" is not exceeded.

Dimension "A":  
158.2 mm (6.23 in)



- Cylinder head bolts tightening procedure:
  - a. Tighten all bolts to 39 N·m (4.0 kg-m, 29 ft-lb).
  - b. Tighten all bolts to 78 N·m (8.0 kg-m, 58 ft-lb).
  - c. Loosen all bolts completely.
  - d. Tighten all bolts to 34 to 44 N·m (3.5 to 4.5 kg-m, 25 to 33 ft-lb).

## TIMING CHAIN

### Installation (Cont'd)

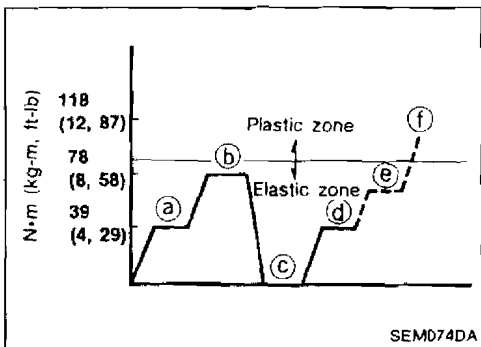
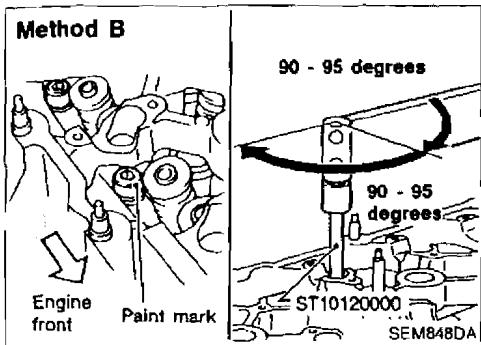
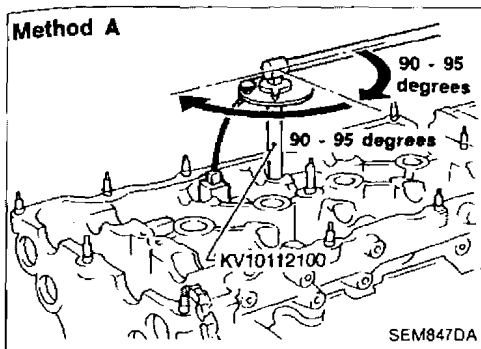
e. Method A: Turn all bolts 90 to 95 degrees clockwise with Tool or suitable angle wrench.

Method B: If an angle wrench is not available, mark all cylinder head bolts on the side facing engine front. Then, turn each cylinder head bolt 90 to 95 degrees clockwise.

f. Turn all bolts 90 to 95 degrees clockwise.

g. Ensure that paint mark on each bolt faces the rear of the engine. (Method B only)

Do not turn any bolt 180 to 190 degrees clockwise all at once.



|   | Tightening torque N.m (kg-m, ft-lb)   |
|---|---------------------------------------|
| a | 39 (4.0, 29)                          |
| b | 78 (8.0, 58)                          |
| c | 0 (0, 0)                              |
| d | 39 ± 5 (4.0 ± 0.5, 28.9 ± 3.6)        |
| e | 90 <sup>+5</sup> <sub>0</sub> degrees |
| f | 90 <sup>+5</sup> <sub>0</sub> degrees |

13. Install cylinder head outside bolts and inner sub-bolts.

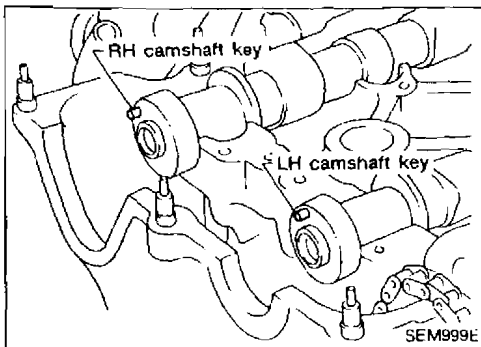
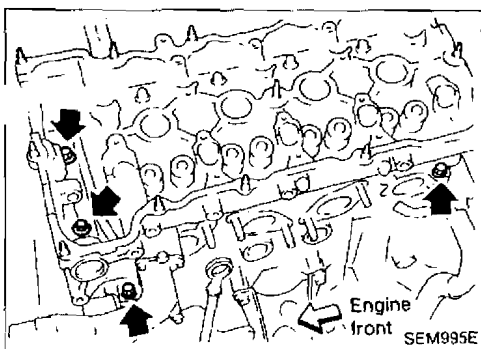
14. Install exhaust manifold with turbocharger. Refer to "Installation" in "TURBOCHARGER" (EM-53).

15. Install camshafts, camshaft brackets, oil tubes and baffle plate.

● Position camshaft.

a. LH camshaft key at about 12 o'clock

b. RH camshaft key at about 10 o'clock



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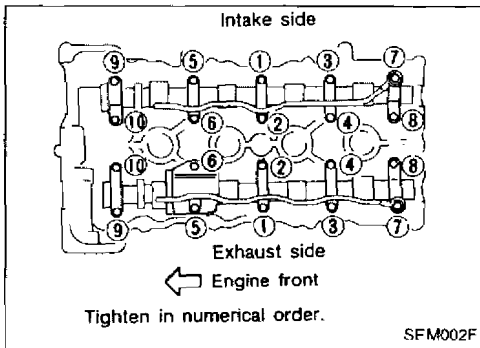
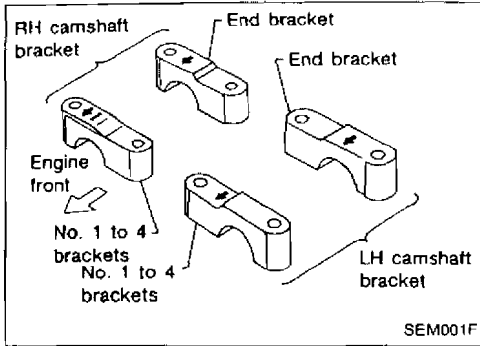
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# TIMING CHAIN

## Installation (Cont'd)



- Position camshaft bracket.

- Camshaft bracket bolts tightening procedure

### STEP 1:

Tighten bolts ⑨ - ⑩ in that order then tighten bolts ① - ⑧ in that order.

Ⓜ: 2 N·m (0.2 kg·m, 1.4 ft·lb)

### STEP 2:

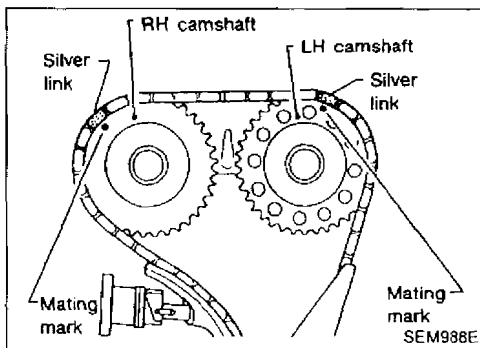
Tighten bolts in the specified order.

Ⓜ: 6 N·m (0.6 kg·m, 4.3 ft·lb)

### STEP 3:

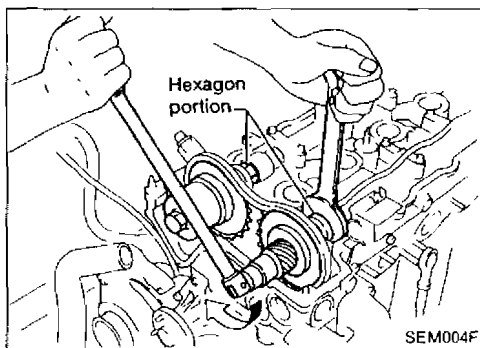
Tighten bolts in the specified order.

Ⓜ: 9.0 - 11.8 N·m  
(0.92 - 1.2 kg·m, 6.7 - 8.7 ft·lb)



- 16. Install camshaft sprockets.

Line up mating marks on timing chain with mating marks on camshaft sprockets.



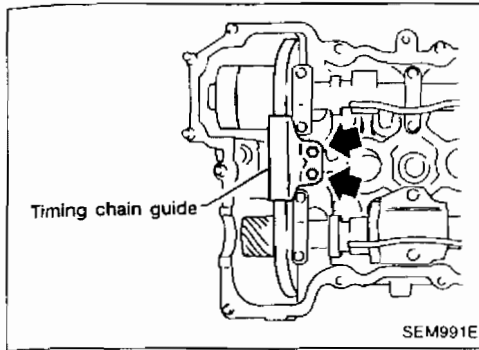
- Lock camshafts as shown in figure and tighten to specified torque.

Ⓜ: 127 - 137 N·m  
(13 - 14 kg·m, 94 - 101 ft·lb)

# TIMING CHAIN

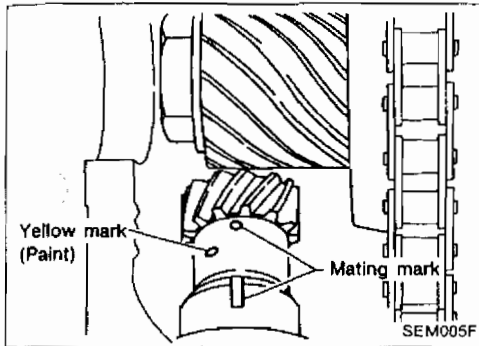
## Installation (Cont'd)

17. Install timing chain guide.



18. Install camshaft position sensor.

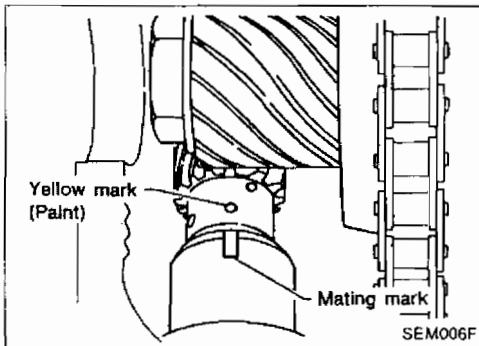
- Make sure that No. 1 piston is at TDC on its compression stroke.
- Set mating marks on rotor shaft of camshaft position sensor as shown.



c. Install camshaft position sensor aligning the center of fixing bolt hole.

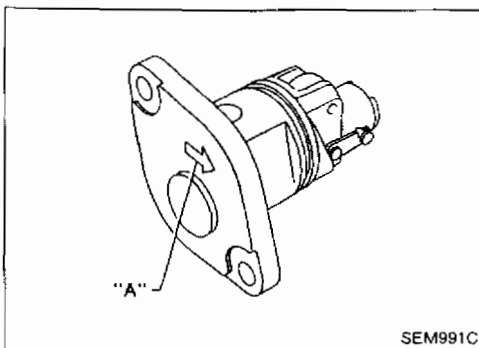
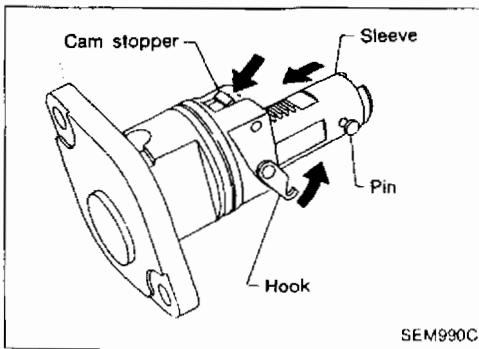
- After installing, confirm that mating marks on rotor shaft of camshaft position sensor are as shown.

d. Tighten fixing bolts.



19. Install chain tensioner.

Press cam stopper down and "press-in" sleeve until hook can be engaged on pin. When tensioner is bolted in position the hook will release automatically. Ensure arrow "A" faces the front of the engine.



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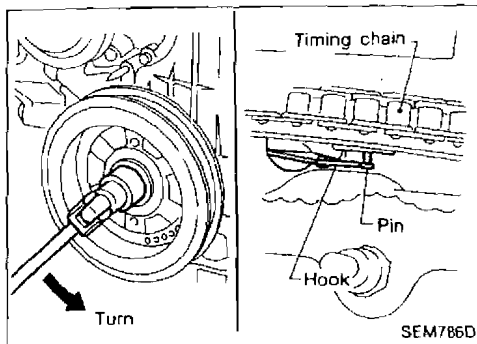
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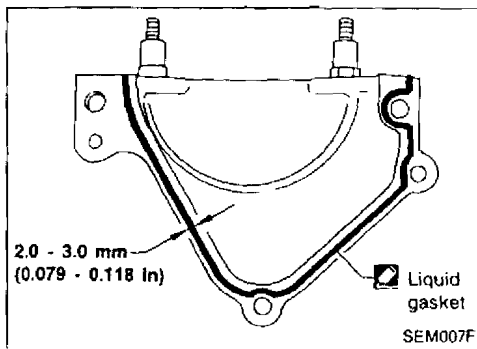
DX

## TIMING CHAIN

### Installation (Cont'd)

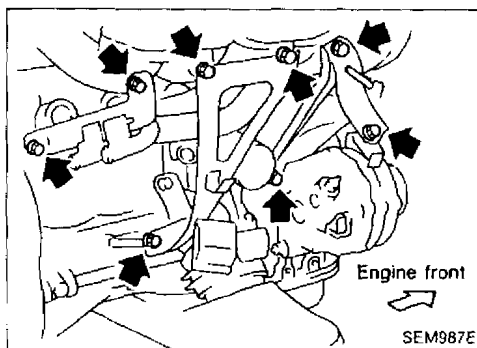


- If hook does not release automatically, turn crankshaft counterclockwise until it does release.

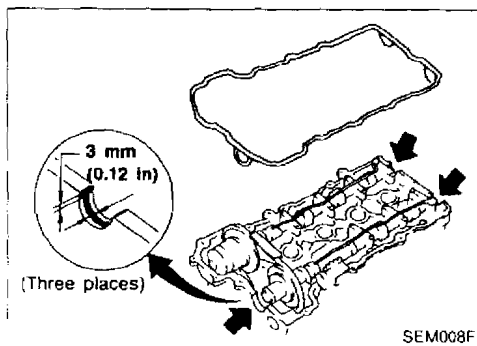


20. Install cylinder head front cover.

- Before installing, remove all traces of liquid gasket from mating surface of cylinder head and the cover using a scraper.
- Apply a continuous bead of liquid gasket to mating surface of cylinder head front cover.
- **Use Genuine Liquid Gasket or equivalent.**



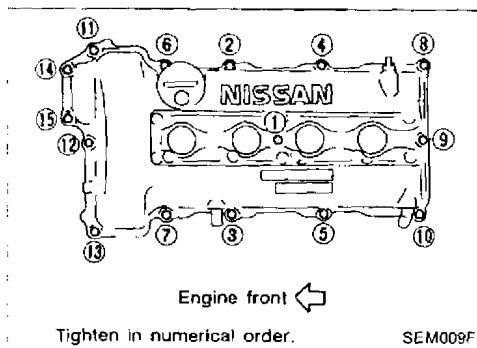
21. Install intake manifold supports.



22. Remove all old liquid gasket from mating surfaces of rocker cover and cylinder head.

23. Apply a continuous bead of liquid gasket to mating surface of rocker cover gasket and cylinder head.

- **Use Genuine Liquid Gasket or equivalent.**



24. Install rocker cover.

#### Rocker cover tightening procedure:

- (1) Tighten nuts ① - ⑩ - ⑪ - ⑬ - ⑧ in that order to 4 N-m (0.4 kg-m, 2.9 ft-lb).
- (2) Tighten nuts ① to ⑬ as indicated in figure to 8 to 10 N-m (0.8 to 1.0 kg-m, 5.8 to 7.2 ft-lb).



## TIMING CHAIN

### Installation (Cont'd)

25. Reinstall any parts removed in reverse order of removal.
- When refilling engine coolant, refer to "Engine Maintenance" in MA section.

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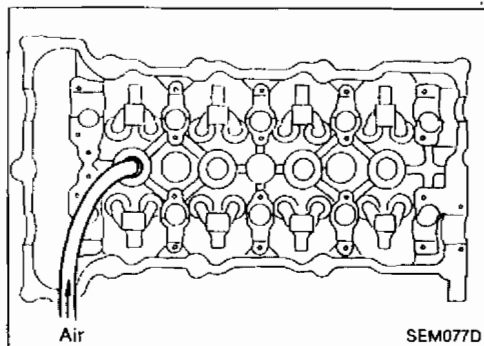
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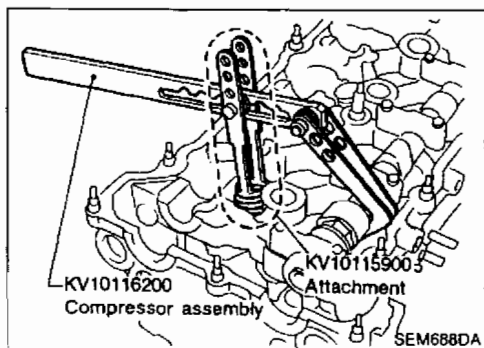
# OIL SEAL REPLACEMENT

## VALVE OIL SEAL

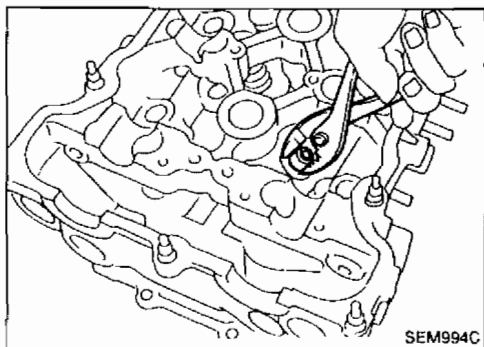
1. Remove rocker cover.
2. Remove camshafts and sprockets.  
Refer to "Removal" in "TIMING CHAIN" (EM-20).
3. Remove ignition coils on spark plugs.



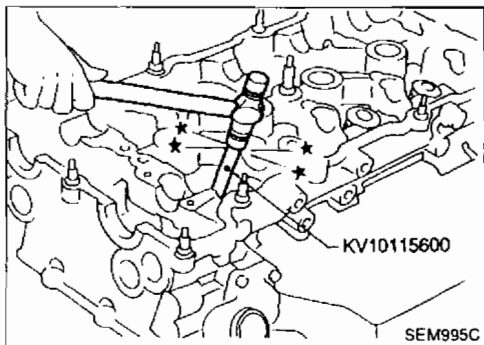
4. Install air hose adapter into spark plug hole and apply air pressure to hold valves in place. Apply a pressure of 490 kPa (4.9 bar, 5 kg/cm<sup>2</sup>, 71 psi).
5. Remove rocker arm, rocker arm guide and shim.



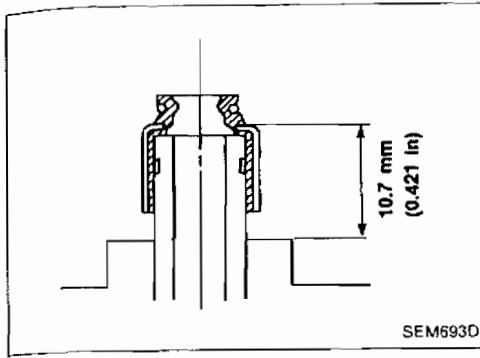
6. Remove valve spring with Tool.  
**Piston concerned should be set at TDC to prevent valve from falling.**



7. Remove valve oil seal.

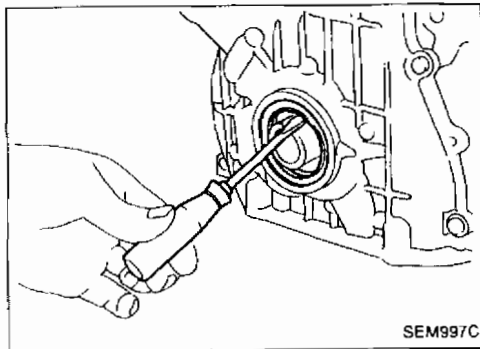


8. Apply engine oil to new valve oil seal and install it with Tool.

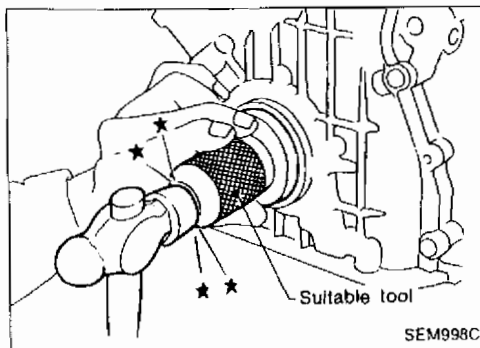
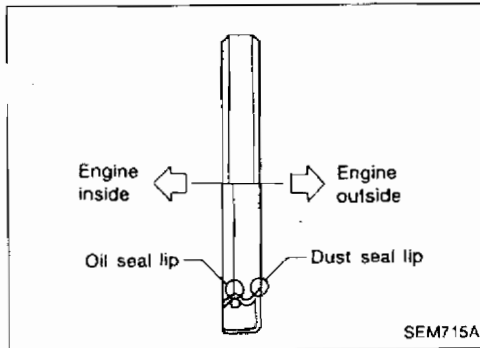


## FRONT OIL SEAL

1. Remove the following parts:
  - Engine under cover
  - Drive belts
  - Crankshaft pulley



2. Remove front oil seal.  
**Be careful not to scratch front cover.**



3. Apply engine oil to new oil seal and install it using a suitable tool.

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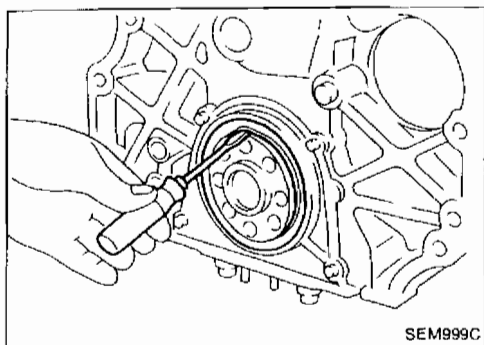
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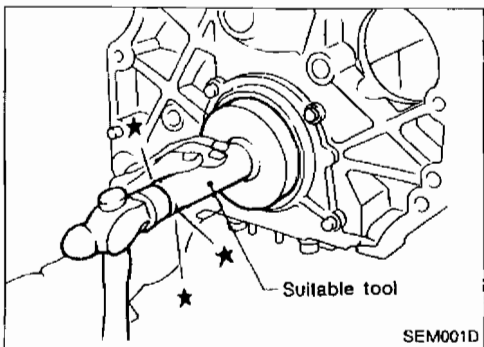
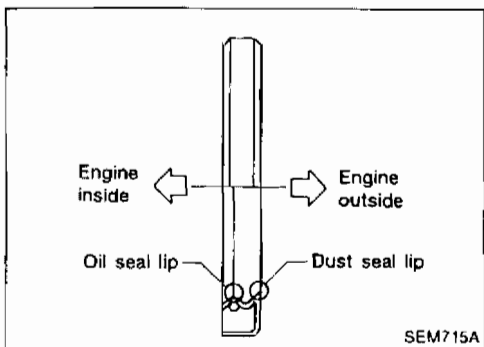
## OIL SEAL REPLACEMENT



### REAR OIL SEAL

1. Remove transmission. (Refer to MT or AT section.)
2. Remove flywheel or drive plate.
3. Remove rear oil seal.

**Be careful not to scratch rear oil seal retainer.**



4. Apply engine oil to new oil seal and install it using a suitable tool.

## Removal

1. Release fuel pressure.  
Refer to "Releasing Fuel Pressure" in EC section.
2. Drain coolant.
3. Remove air duct from intake manifold.
4. Remove PCV hoses from rocker cover.
5. Remove vacuum hoses, fuel hoses, water hoses, wires, harnesses, connectors, etc. from intake manifold.

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6. Remove intake manifold collector supports.

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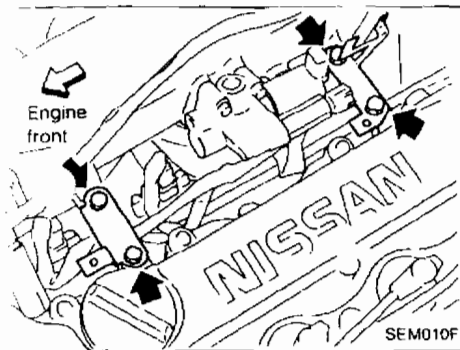
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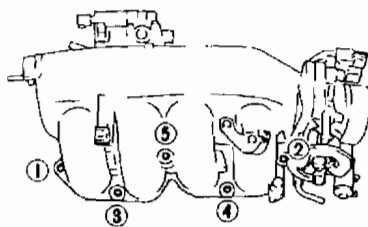
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SEM010F

7. Remove intake manifold collector.

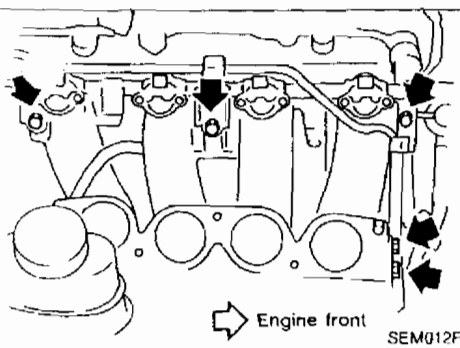


→ Engine front

Loosen in numerical order.

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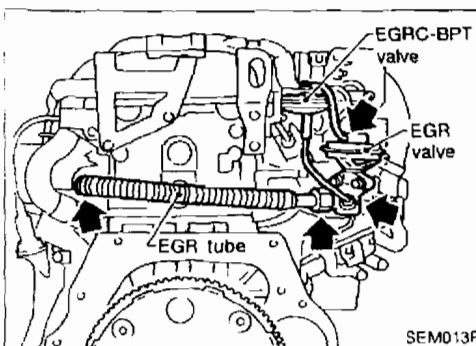
8. Remove harness connectors of engine coolant temperature sensor and thermal transmitter.
9. Remove fuel tube assembly.



→ Engine front

SEM012F

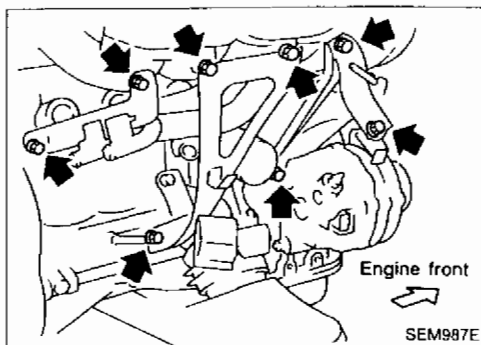
10. Remove EGR tube.
11. Remove hose and tube between EGR valve and EGRC-BPT valve.



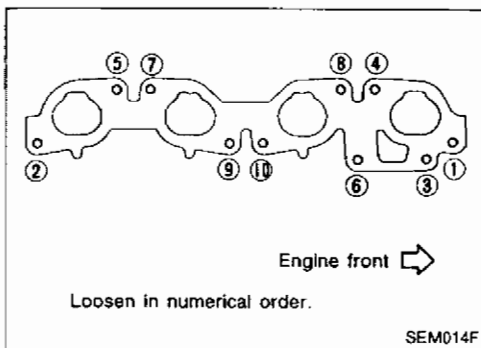
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## INTAKE MANIFOLD

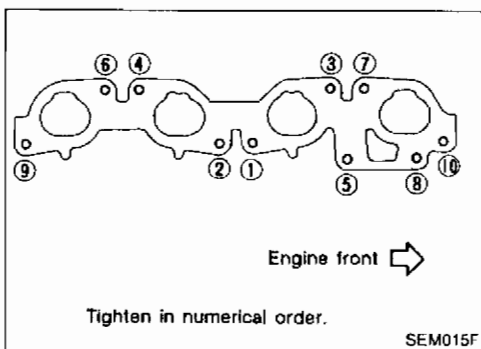
### Removal (Cont'd)



12. Remove intake manifold supports.

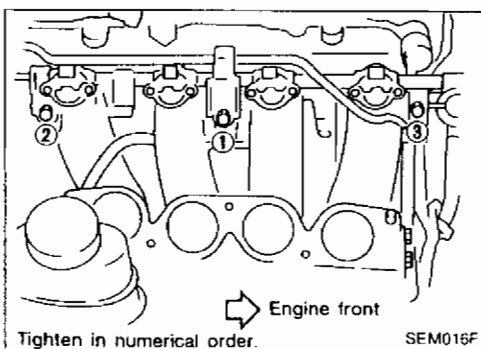


13. Remove intake manifold.



### Installation

1. Install intake manifold.
2. Install intake manifold supports.
3. Install EGR tube.
4. Install hose and tube between EGR valve and EGRC-BPT valve.



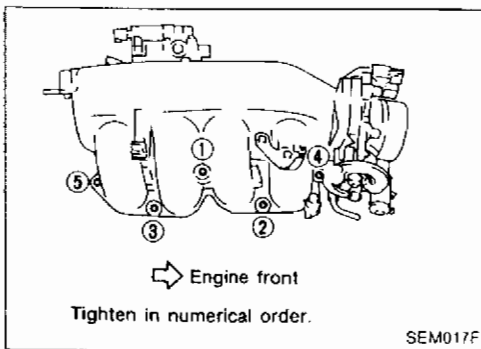
5. Install fuel tube assembly.

● **Tighten bolts in two steps.**

1st: 9.3 - 10.8 N·m (0.95 - 1.1 kg·m, 6.9 - 8.0 ft·lb)

2nd: 21 - 26 N·m (2.1 - 2.7 kg·m, 15 - 20 ft·lb)

6. Connect harness connectors of engine coolant temperature sensor and thermal transmitter.



7. Install intake manifold collector.

# INTAKE MANIFOLD

## Installation (Cont'd)

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

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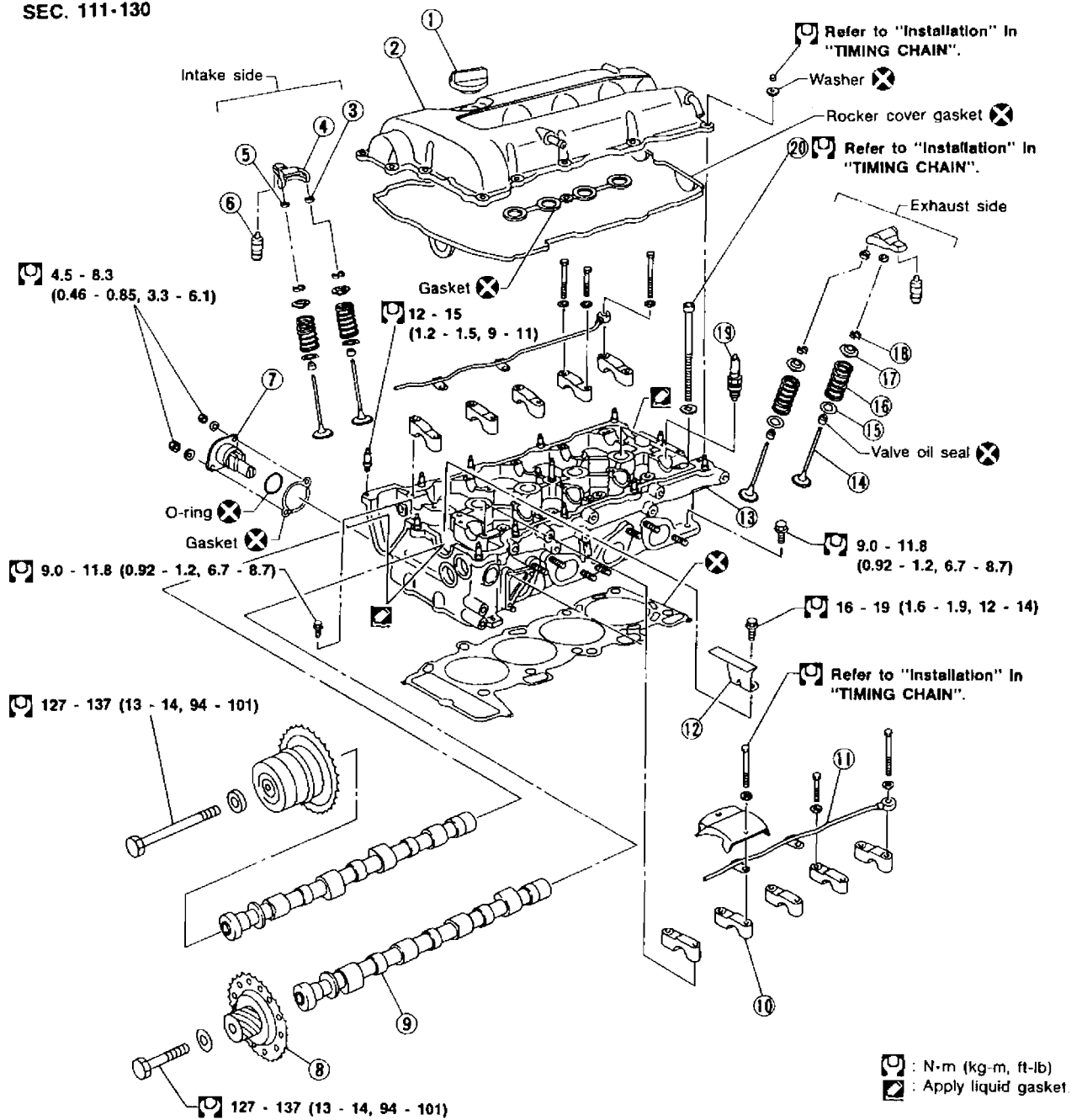
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# CYLINDER HEAD

SEC. 111-130



SEM018F

- ① Oil filler cap
- ② Rocker cover
- ③ Rocker arm guide
- ④ Rocker arm
- ⑤ Shim
- ⑥ Hydraulic lash adjuster
- ⑦ Chain tensioner

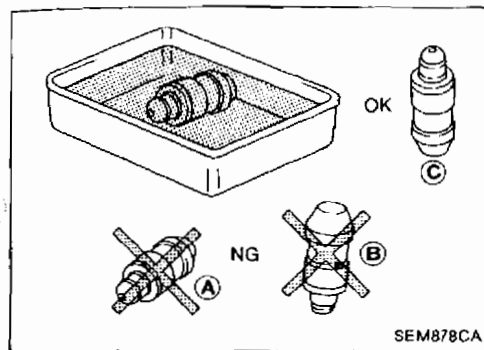
- ⑧ Camshaft sprocket
- ⑨ Camshaft
- ⑩ Camshaft bracket
- ⑪ Oil tube
- ⑫ Chain guide
- ⑬ Cylinder head
- ⑭ Valve

- ⑮ Valve spring seat
- ⑯ Valve spring
- ⑰ Valve spring retainer
- ⑱ Valve collet
- ⑲ Spark plug
- ⑳ Cylinder head bolt



## CAUTION:

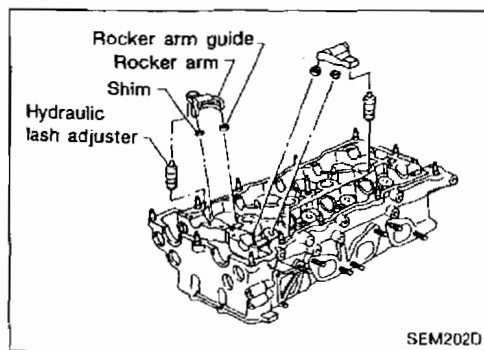
- When installing rocker arms, camshaft and oil seal, lubricate contacting surfaces with new engine oil.
- When tightening cylinder head bolts, camshaft sprocket bolts and camshaft bracket bolts, lubricate thread portions and seat surfaces of bolts with new engine oil.



- If a hydraulic lash adjuster is kept on its side, there is a risk of air entering it. When hydraulic lash adjusters are removed, stand them straight up or soak them in new engine oil.
- Do not disassemble hydraulic lash adjusters.
- Attach tags to lash adjusters so as not to mix them up.

## Removal and Installation

Removal and installation procedures are the same as those for timing chain. Refer to "Removal" and "Installation" in "TIMING CHAIN" (EM-20, EM-24).



## Disassembly

1. Remove rocker arms, shims, rocker arm guides and hydraulic lash adjusters from cylinder head.

## CAUTION:

Keep parts in order so that they can be installed in their original positions during assembly. (Install parts in their original positions.)

2. Remove intake manifold. Refer to "Removal" in "INTAKE MANIFOLD" (EM-35).
3. Remove water outlet.

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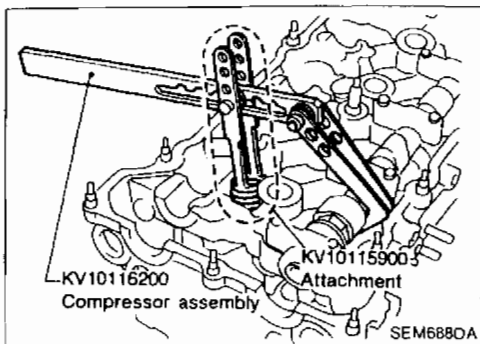
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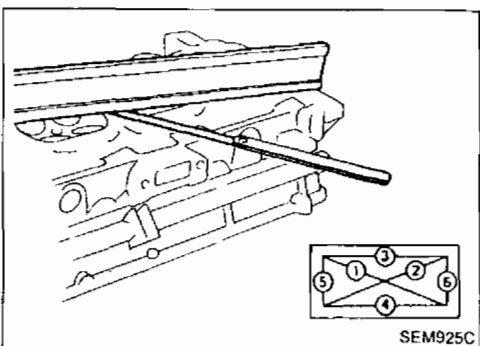
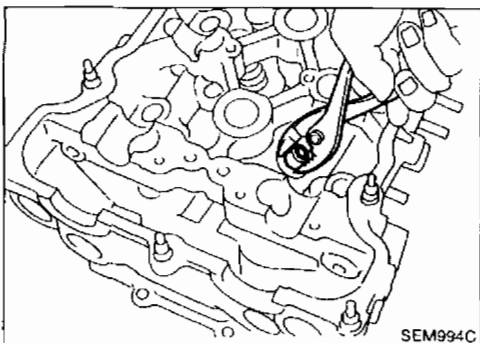
## CYLINDER HEAD

### Disassembly (Cont'd)

4. Remove valve components with Tool.



5. Remove valve oil seal with a suitable tool.



### Inspection

#### CYLINDER HEAD DISTORTION

Measure the distortion in the directions as shown.

##### Head surface distortion:

**Standard**

**Less than 0.03 mm (0.0012 in)**

**Limit**

**0.1 mm (0.004 in)**

If beyond the specified limit, replace or resurface.

##### Resurfacing limit:

**The resurfacing limit of cylinder head is determined by the cylinder block resurfacing in an engine.**

**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)**

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

**Nominal cylinder head height:**

**136.9 - 137.1 mm (5.390 - 5.398 in)**

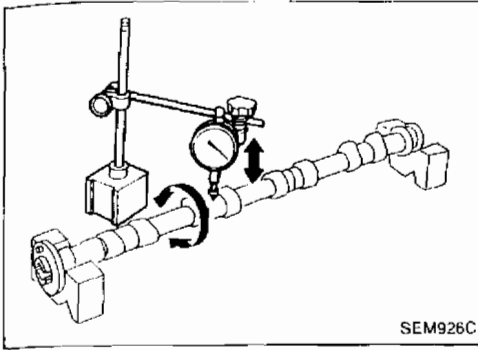
#### CAMSHAFT VISUAL CHECK

Check camshaft for scratches, seizure and wear.

# CYLINDER HEAD

## Inspection (Cont'd)

### CAMSHAFT RUNOUT



SEM926C

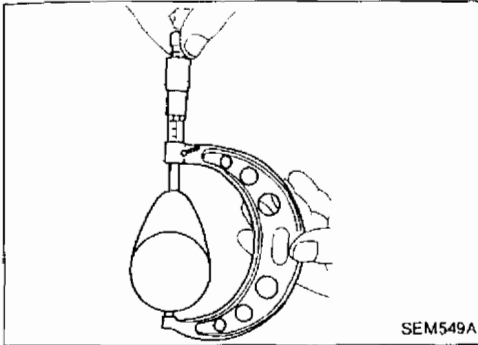
1. Measure camshaft runout at the center journal.  
**Runout (Total indicator reading):**  
**Standard**  
Less than 0.02 mm (0.0008 in)  
**Limit**  
0.1 mm (0.004 in)
2. If it exceeds the limit, replace camshaft.

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### CAMSHAFT CAM HEIGHT



SEM549A

1. Measure camshaft cam height.  
**Standard cam height:**  
**Intake & Exhaust**  
37.920 - 38.110 mm (1.4929 - 1.5004 in)  
**Cam wear limit:**  
**Intake & Exhaust**  
0.20 mm (0.0079 in)
2. If wear is beyond the limit, replace camshaft.

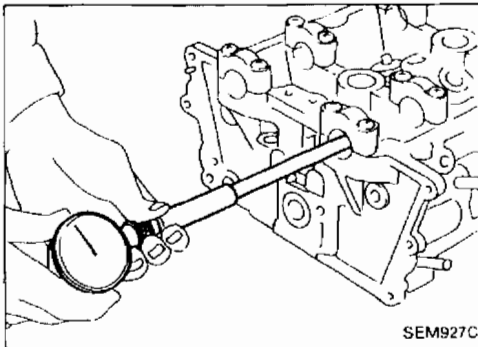
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### CAMSHAFT JOURNAL CLEARANCE



SEM927C

1. Install camshaft bracket and tighten bolts to the specified torque.
2. Measure inner diameter of camshaft bearing.  
**Standard inner diameter:**  
28.000 - 28.021 mm (1.1024 - 1.1032 in)

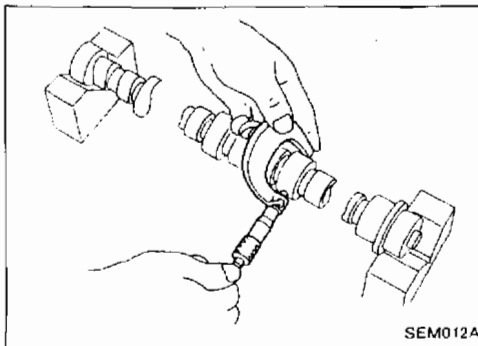
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SEM012A

3. Measure outer diameter of camshaft journal.  
**Standard outer diameter:**  
27.935 - 27.955 mm (1.0998 - 1.1006 in)
4. If clearance exceeds the limit, replace camshaft and/or cylinder head.  
**Camshaft journal clearance:**  
**Standard**  
0.045 - 0.086 mm (0.0018 - 0.0034 in)  
**Limit**  
0.15 mm (0.0059 in)

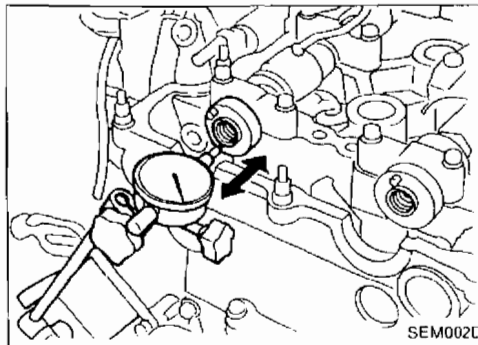
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### CAMSHAFT END PLAY



SEM002D

1. Install camshaft in cylinder head.
2. Measure camshaft end play.  
**Camshaft end play:**  
**Standard**  
0.092 - 0.173 mm (0.0036 - 0.0068 in)  
**Limit**  
0.20 mm (0.0079 in)

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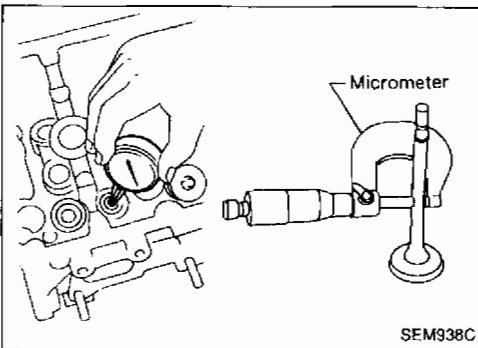
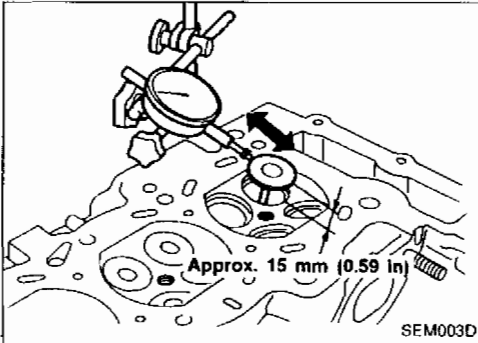
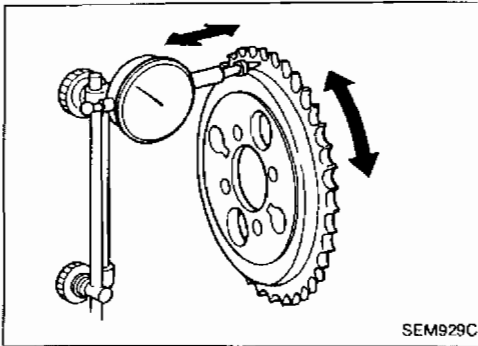
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## CYLINDER HEAD

### Inspection (Cont'd)

#### CAMSHAFT SPROCKET RUNOUT

1. Install sprocket on camshaft.
2. Measure camshaft sprocket runout.  
**Runout (Total indicator reading):**  
**Limit 0.25 mm (0.0098 in)**
3. If it exceeds the limit, replace camshaft sprocket.



#### VALVE GUIDE CLEARANCE

1. Measure valve deflection in a parallel direction with rocker arm. (Valve and valve guide mostly wear in this direction.)  
**Valve deflection limit (Dial gauge reading):**  
**Intake & Exhaust**  
**0.2 mm (0.008 in)**

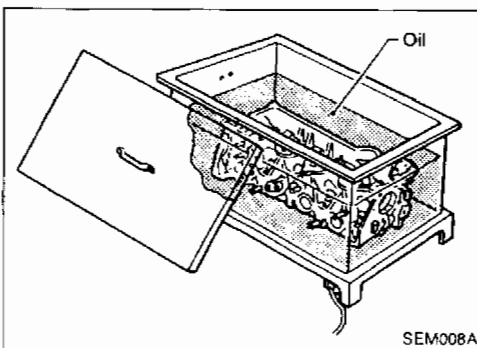
2. If it exceeds the limit, check valve to valve guide clearance.
  - a. Measure valve stem diameter and valve guide inner diameter.
  - b. Check that clearance is within specification.

#### Valve to valve guide clearance:

Unit: mm (in)

|         | Standard                           | Limit         |
|---------|------------------------------------|---------------|
| Intake  | 0.020 - 0.053<br>(0.0008 - 0.0021) | 0.08 (0.0031) |
| Exhaust | 0.040 - 0.073<br>(0.0016 - 0.0029) | 0.1 (0.004)   |

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



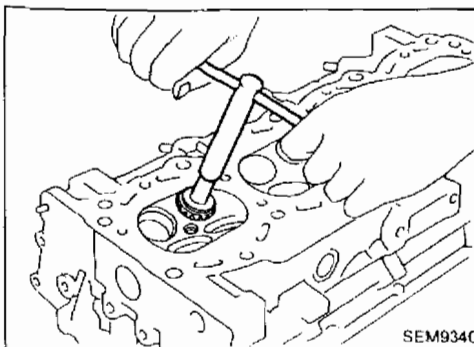
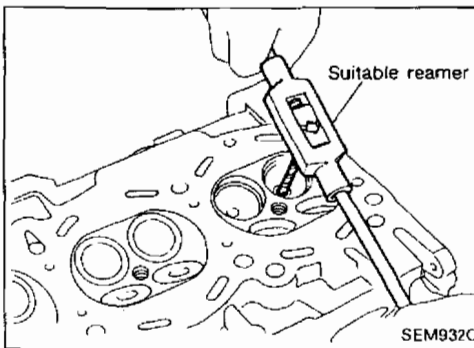
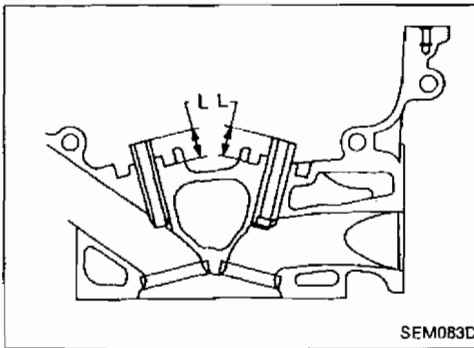
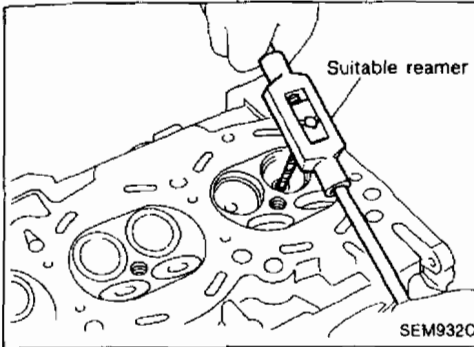
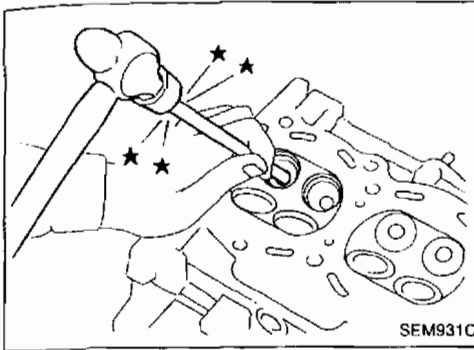
#### VALVE GUIDE REPLACEMENT

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

# CYLINDER HEAD

## Inspection (Cont'd)

2. Press out valve guide or use a hammer and suitable tool.



3. Ream cylinder head valve guide hole.

**Valve guide hole diameter  
(for service parts):**

**Intake**

10.175 - 10.196 mm (0.4006 - 0.4014 in)

**Exhaust**

11.175 - 11.196 mm (0.4400 - 0.4408 in)

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

**Projection "L":**

14.0 - 14.2 mm (0.551 - 0.559 in)

5. Ream valve guide.

**Valve guide inner diameter:**

**Intake**

6.000 - 6.018 mm (0.2362 - 0.2369 in)

**Exhaust**

7.000 - 7.018 mm (0.2756 - 0.2763 in)

## VALVE SEATS

Check valve seats for pitting at contact surface. Resurface or replace if excessively worn.

- Before repairing valve seats, check valve and valve guide for wear. If they have worn, replace them. Then correct valve seat.
- Cut with both hands to uniform the cutting surface.

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## CYLINDER HEAD

### Inspection (Cont'd)

#### REPLACING VALVE SEAT FOR SERVICE PARTS

1. Bore out old seat until it collapses. Set machine depth stop so that boring cannot contact bottom face of seat recess in cylinder head.

2. Ream cylinder head recess.

##### Reaming bore for service valve seat

Oversize [0.5 mm (0.020 in)]:

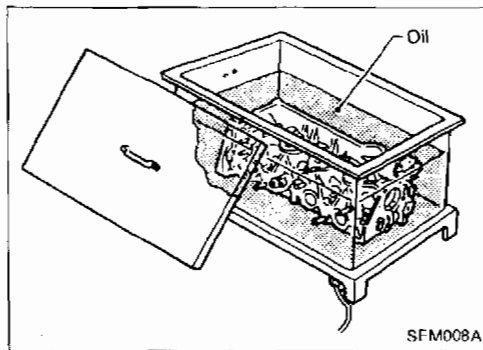
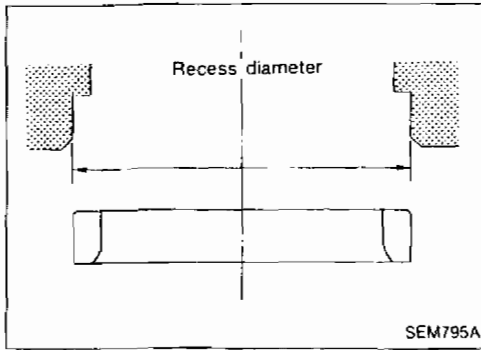
##### Intake

35.500 - 35.516 mm (1.3976 - 1.3983 in)

##### Exhaust

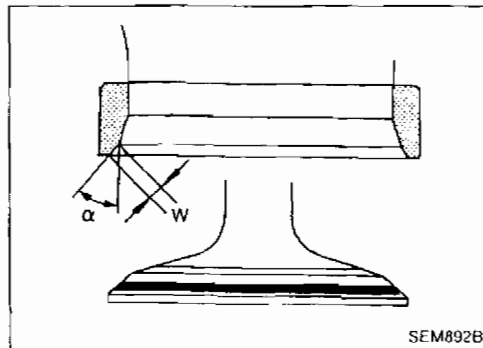
31.500 - 31.516 mm (1.2402 - 1.2408 in)

Use the valve guide center for reaming to ensure valve seat will have the correct fit.



3. Heat cylinder head to 110 to 130°C (230 to 266°F).

4. Press fit valve seat until it seats on the bottom.



5. Cut or grind valve seat using a suitable tool at the specified dimensions as shown in SDS.

6. After cutting, lap valve seat with abrasive compound.

7. Check valve seating condition.

##### Seat face angle " $\alpha$ ":

44°53' - 45°07' deg.

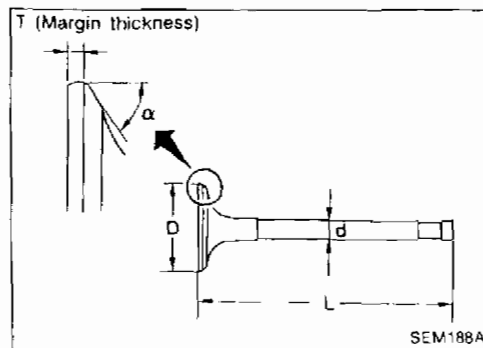
##### Contacting width "W":

##### Intake

1.4 - 1.7 mm (0.055 - 0.067 in)

##### Exhaust

1.7 - 2.0 mm (0.067 - 0.079 in)



#### VALVE DIMENSIONS

Check dimensions in each valve. For dimensions, refer to SDS.

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.

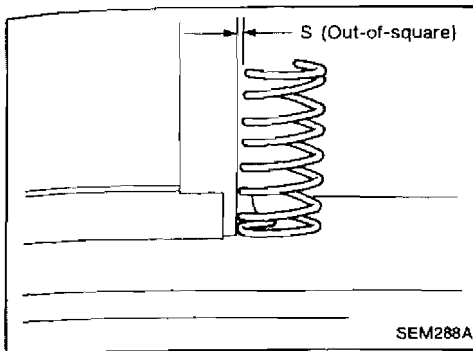
## CYLINDER HEAD

### Inspection (Cont'd)

#### VALVE SPRING

##### Squareness

1. Measure "S" dimension.  
**Out-of-square:**  
**Less than 2.2 mm (0.087 in)**
2. If it exceeds the limit, replace spring.



##### Pressure

Check valve spring pressure.

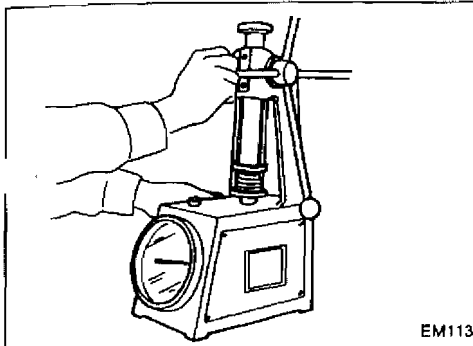
##### Standard:

**578.02 - 641.57 N**  
**(58.94 - 65.42 kg, 129.96 - 144.25 lb)**  
**at 30.0 mm (1.181 in)**

##### Limit:

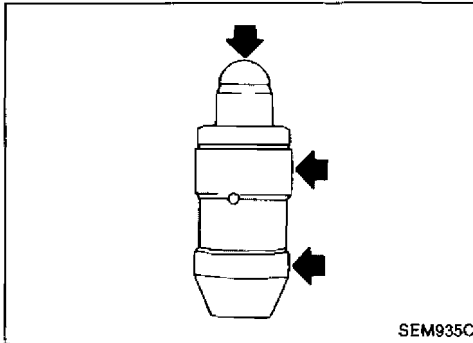
**More than 549.2 N (56.0 kg, 123.5 lb)**  
**at 30.0 mm (1.181 in)**

If it exceeds the limit, replace spring.



#### HYDRAULIC LASH ADJUSTER

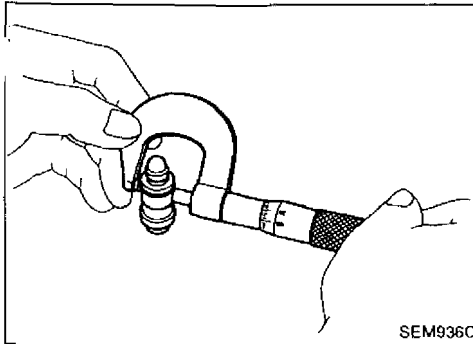
1. Check contact and sliding surfaces for wear or scratches.



2. Check diameter of lash adjuster.

##### Outer diameter:

**16.980 - 16.993 mm (0.6685 - 0.6690 in)**



3. Check lash adjuster guide inner diameter.

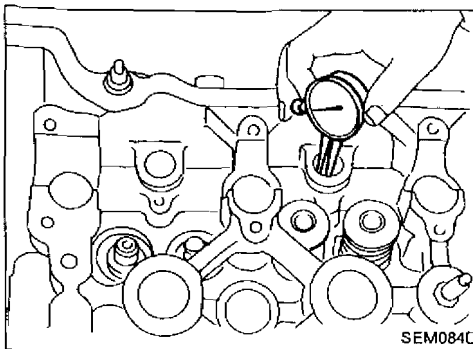
##### Inner diameter:

**17.000 - 17.020 mm (0.6693 - 0.6701 in)**

##### Standard clearance between lash adjuster and

##### adjuster guide:

**0.007 - 0.040 mm (0.0003 - 0.0016 in)**



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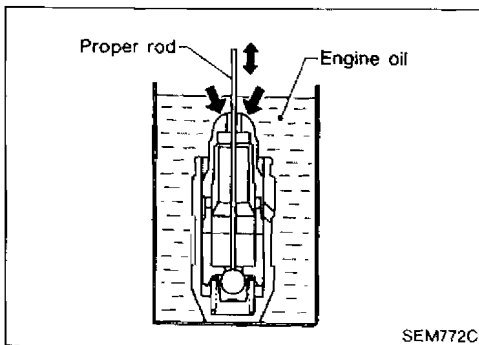
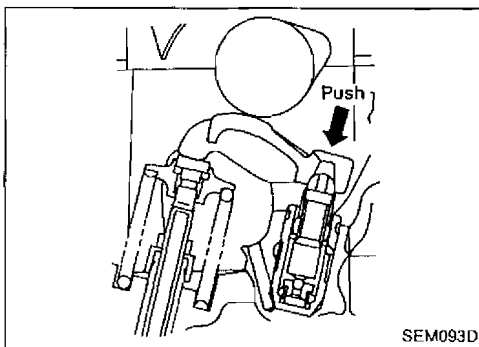
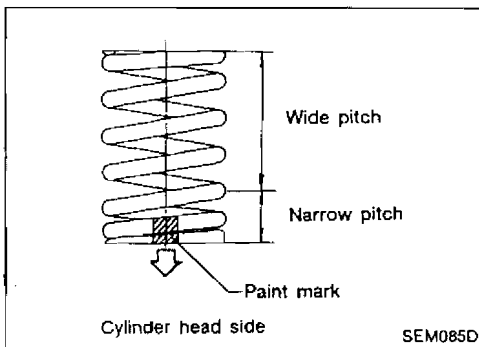
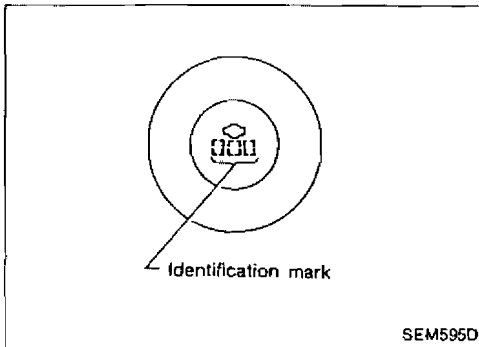
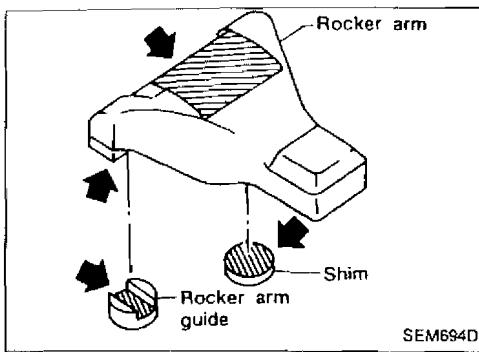
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## CYLINDER HEAD

### Inspection (Cont'd)

#### ROCKER ARM, SHIM AND ROCKER ARM GUIDE

Check contact and sliding surfaces of rocker arms, shims and rocker arm guides for wear or scratches.



### Assembly

1. Install valve component parts.

- Install valves, noting their identification marks as indicated in the table below.

| Valve         | Identification mark |
|---------------|---------------------|
| Intake valve  | 53J                 |
| Exhaust valve | 5J                  |

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

2. Check hydraulic lash adjusters.

- a. Push on the rocker arm above the hydraulic lash adjuster. If it moves 1 mm (0.04 in) or more, there is air in the high pressure chamber. Noise will be emitted from hydraulic lash adjuster if engine is started without bleeding air.

- b. Remove hydraulic lash adjuster and dip in a container filled with engine oil. While pushing plunger as shown in figure, lightly push check ball using a thin rod. Air is completely bled when plunger no longer moves.

**Air cannot be bled from this type of lash adjuster by running the engine.**



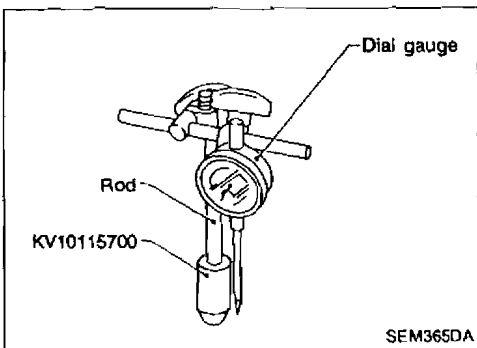
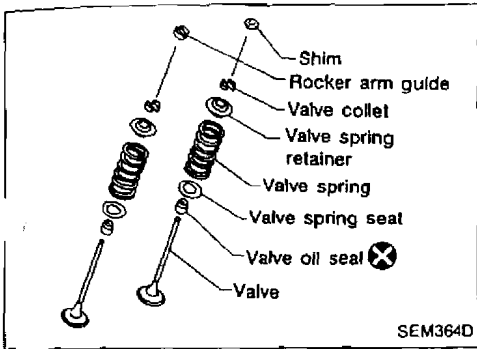
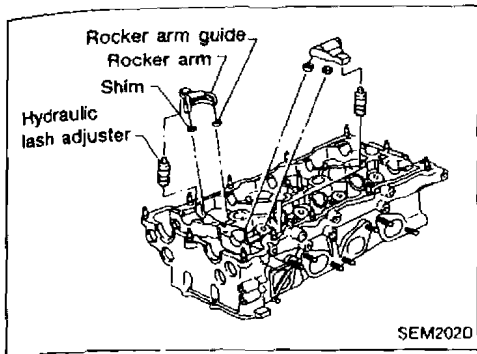
# CYLINDER HEAD

## Assembly (Cont'd)

3. Install rocker arms, shims, rocker arm guides and hydraulic lash adjusters.

### CAUTION:

Install all parts in their original positions.

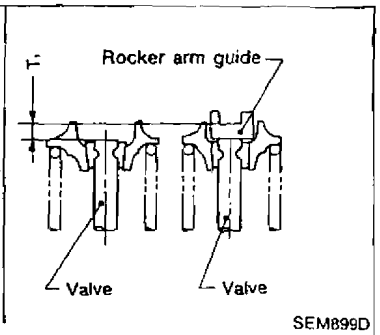
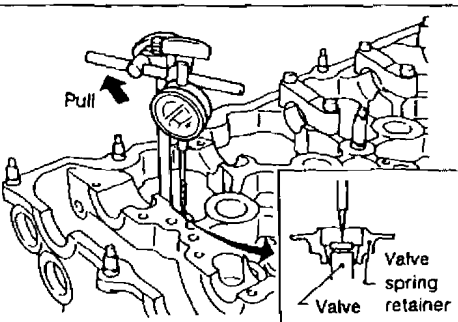
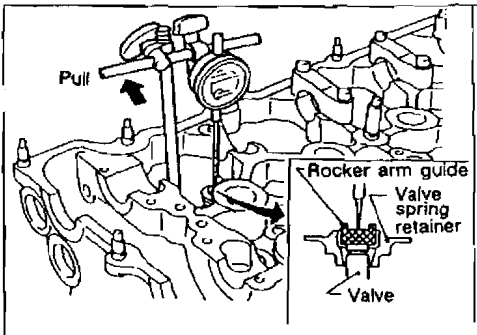


### Valve shim clearance adjustment

4. Determine proper shim size when replacing valve, cylinder head, shim, rocker arm guide, or valve seat.
  - a. Install valve component parts to cylinder head (Except shim).
    - Always replace rocker arm guide with a new one.

- b. Remove hydraulic lash adjuster.
- c. Install Tool\* into hydraulic lash adjuster fixing hole.

\* Tool (KV10115700) is screwed into magnetic stand rod used with dial gauge.



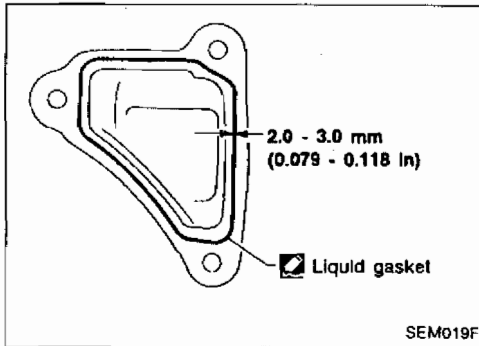
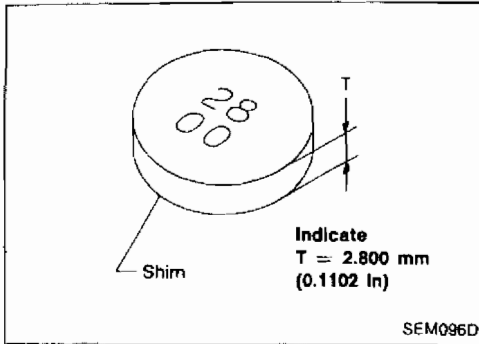
- d. Before measuring, make sure the following parts are installed in the cylinder head: valve, valve spring, collet, retainer, and rocker arm guide (except shim). On shim side, measure difference ( $T_1$ ) between contact surfaces of rocker arm guide and valve stem end.

When measuring, lightly pull dial indicator rod toward you to eliminate play in Tool (KV10115700).

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## CYLINDER HEAD

### Assembly (Cont'd)



e. Select proper shim.

**Shim thickness (T):  $T_1 \pm 0.025$  mm (0.0010 in)**

- Shims are available in thicknesses from 2.800 mm (0.1102 in) to 3.200 mm (0.1260 in) in steps of 0.025 mm (0.0010 in).

5. Install water outlet.

(1) Before installing water outlet, remove all traces of liquid gasket from mating surface using a scraper.

- Also remove traces of liquid gasket from mating surface of cylinder head.

(2) Apply a continuous bead of liquid gasket to mating surface of water outlet.

- **Use Genuine Liquid Gasket or equivalent.**

6. Install intake manifold.

Refer to "Installation" in "INTAKE MANIFOLD" (EM-36).

# TURBOCHARGER

## Removal

1. Drain coolant from radiator and cylinder block.
2. Remove engine under cover.
3. Remove front exhaust tube.
4. Remove air ducts for turbocharger unit.
5. Remove air cleaner case.
6. Remove wastegate valve control solenoid and its hoses.

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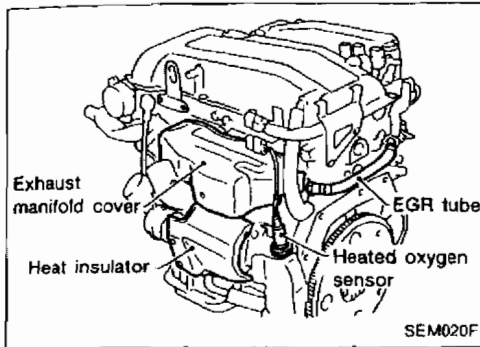
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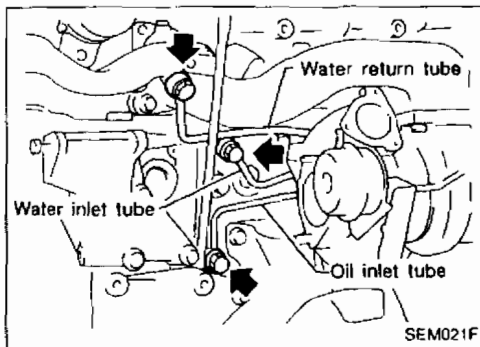
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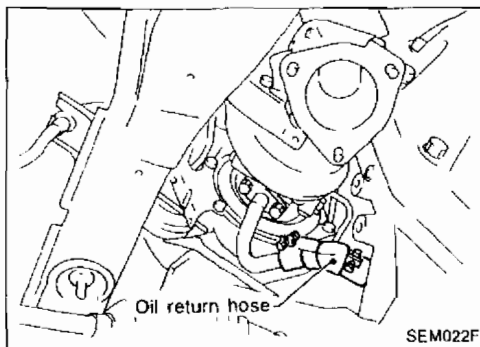
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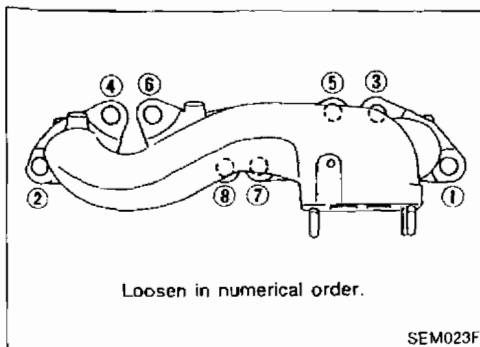
7. Remove exhaust manifold cover.
8. Remove heat insulator.
9. Remove heated oxygen sensor.
10. Remove EGR tube.



11. Remove connector bolts for water inlet and return tubes and oil inlet tube.



12. Remove oil return hose from cylinder block.

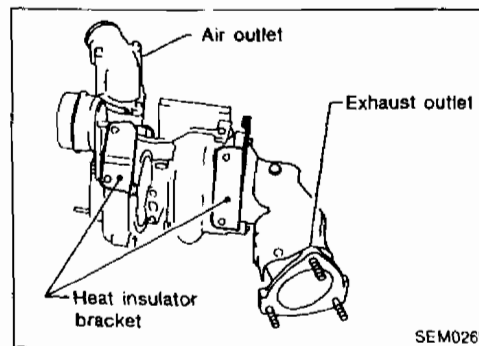
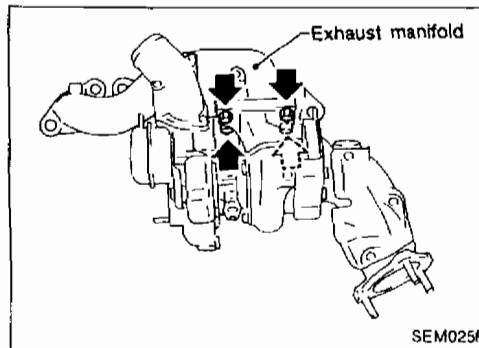
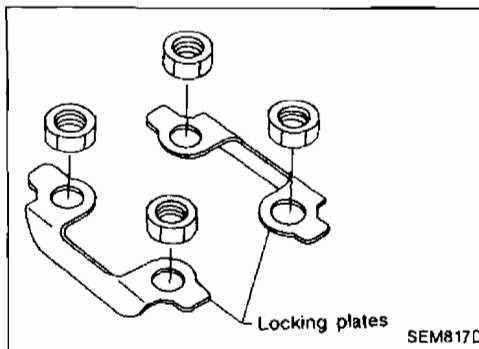
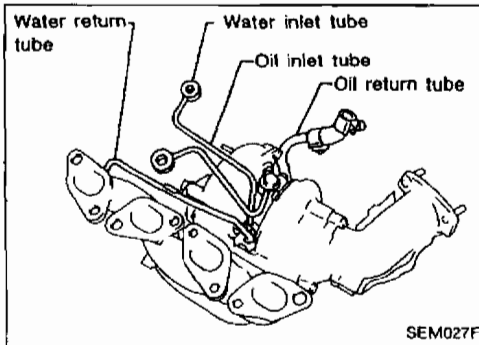
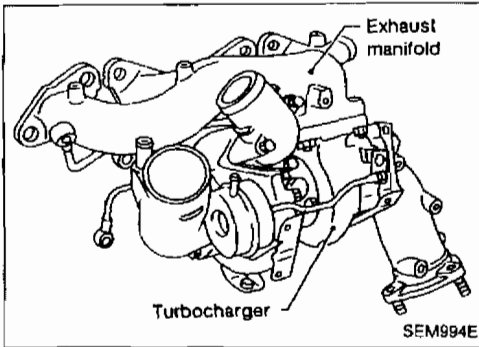


13. Remove exhaust manifold fixing nuts.

## TURBOCHARGER

### Removal (Cont'd)

14. Remove steering column shaft lower joint (LHD model only).
15. Remove exhaust manifold with turbocharger unit.



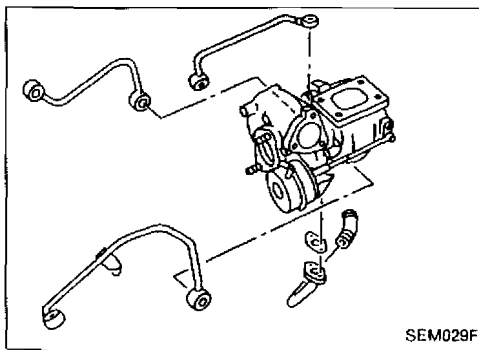
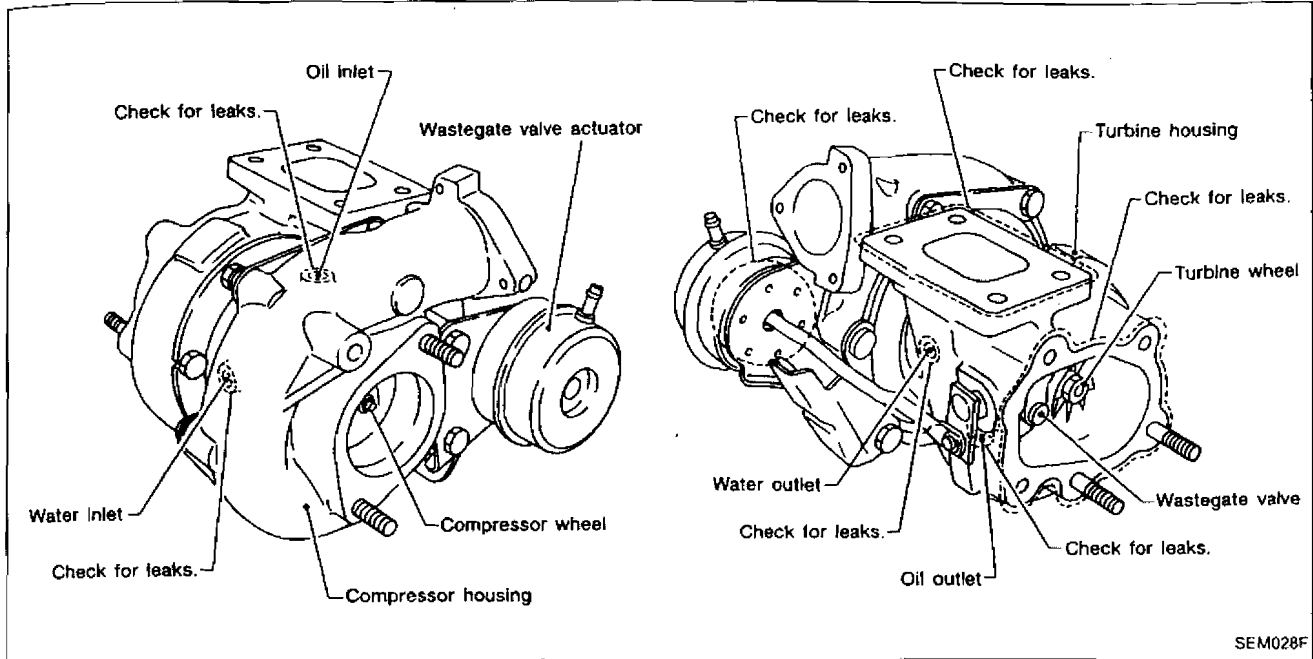
### Disassembly

1. Remove oil tubes and water tubes. Before removing tubes, put mating marks on tube connectors and turbocharger.
2. Unbend locking plates for turbocharger unit fastening nuts.
3. Remove exhaust manifold.
4. Remove exhaust outlet, air outlet and heat insulator brackets.

# TURBOCHARGER

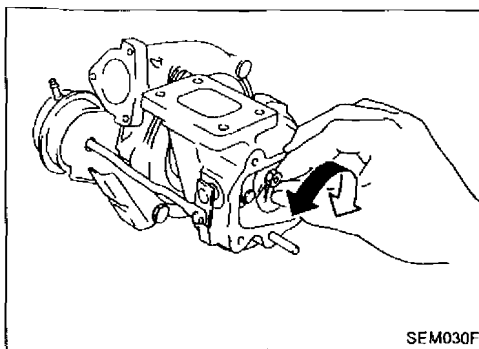
## Inspection

Perform the following checks. If NG, replace turbocharger unit.



### OIL AND WATER TUBES

Check tubes for clogging.



### ROTOR SHAFT

1. Check rotor shaft for smooth rotation.

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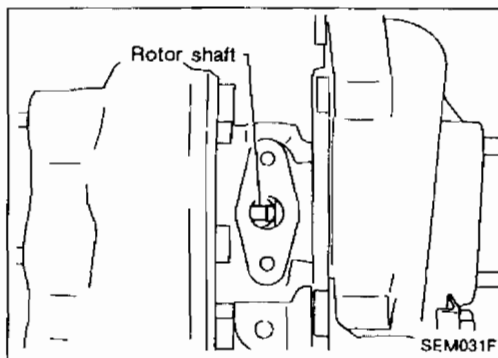
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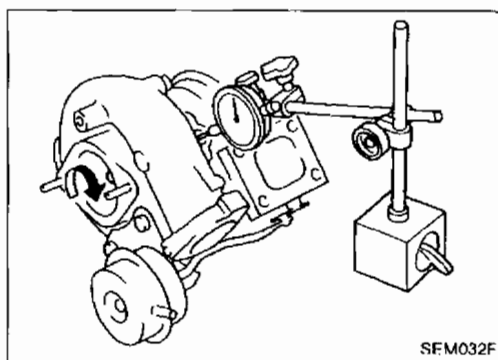
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# TURBOCHARGER

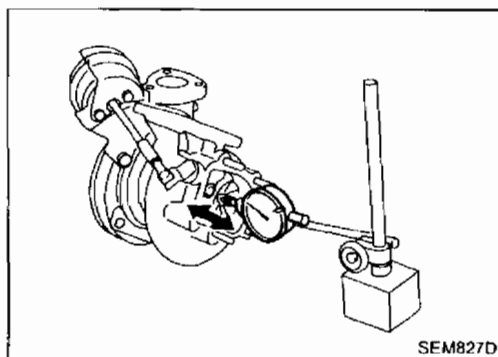
## Inspection (Cont'd)



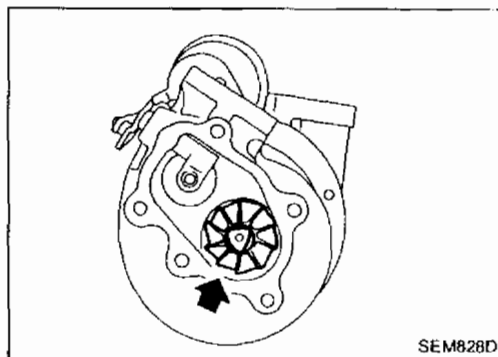
2. Check rotor shaft for carbon deposits.



3. Measure rotor shaft runout.  
**Runout (Total Indicator Reading):**  
**Standard**  
0.056 - 0.127 mm (0.0022 - 0.0050 in)



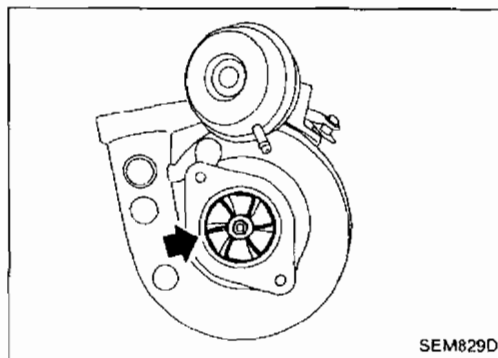
4. Measure rotor shaft end play.  
**End play:**  
**Standard**  
0.013 - 0.097 mm (0.0005 - 0.0038 in)
- Do not allow wheels to turn when axial play is being measured.



### TURBINE WHEEL

Check turbine wheel for the following.

- Oil
- Carbon deposits
- Deformed fins
- Contact with turbine housing



### COMPRESSOR WHEEL

Check compressor wheel for the following.

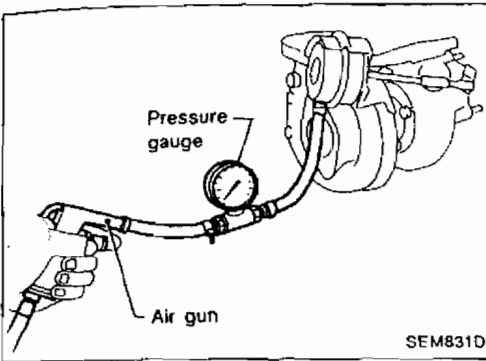
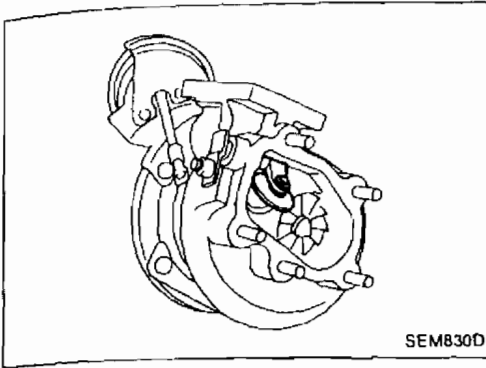
- Oil
- Deformed fins
- Contact with compressor housing

# TURBOCHARGER

## Inspection (Cont'd)

### WASTEGATE VALVE

Remove rod pin and check wastegate valve for cracks, deformation and smooth movement. Check valve seat surface for smoothness.



### WASTEGATE VALVE ACTUATOR

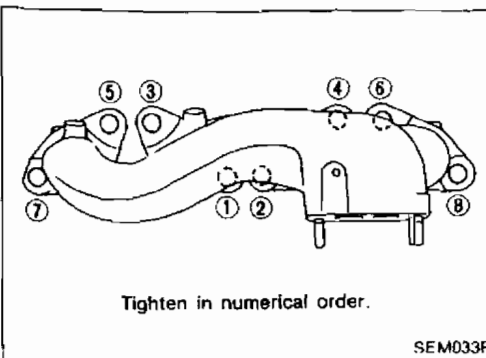
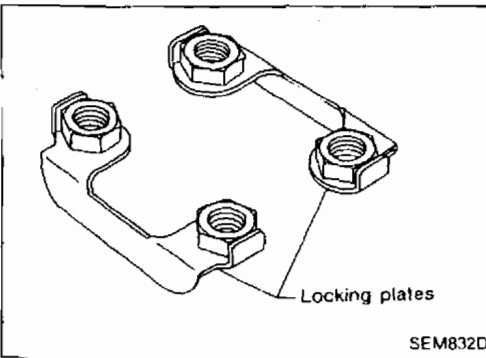
Apply compressed air to wastegate valve actuator and check it for smooth movement.

- Do not apply compressed air to the actuator continuously.
- The air pressure should be in the range of 38.7 to 44.0 kPa (387 to 440 mbar, 290 to 330 mmHg, 11.42 to 12.99 inHg).

## Assembly

Assembly is the reverse order of disassembly.

- Install gasket between exhaust manifold and turbocharger with lappet side facing exhaust manifold.



Tighten in numerical order.

- Bend locking plates along the side of turbocharger fastening nuts.

## Installation

1. Install exhaust manifold fixing nuts.

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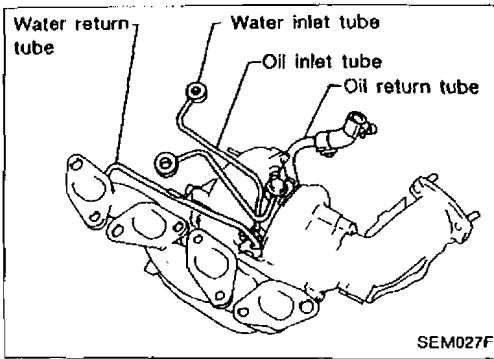
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## TURBOCHARGER

### Installation (Cont'd)

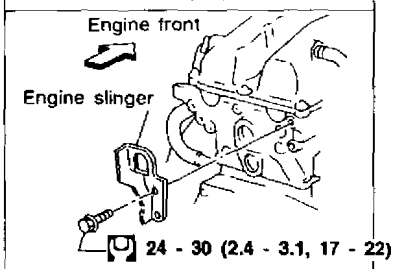
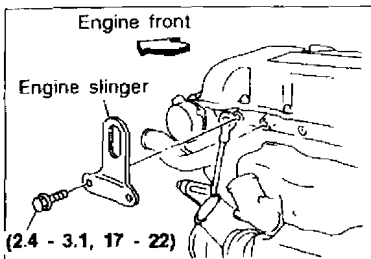


2. Installation is the reverse order of removal.
  - Install oil tubes and water tubes in the following order, aligning the mating marks.
    - a. Oil feed tube
    - b. Water return tube
    - c. Water feed tube
    - d. Oil return tube

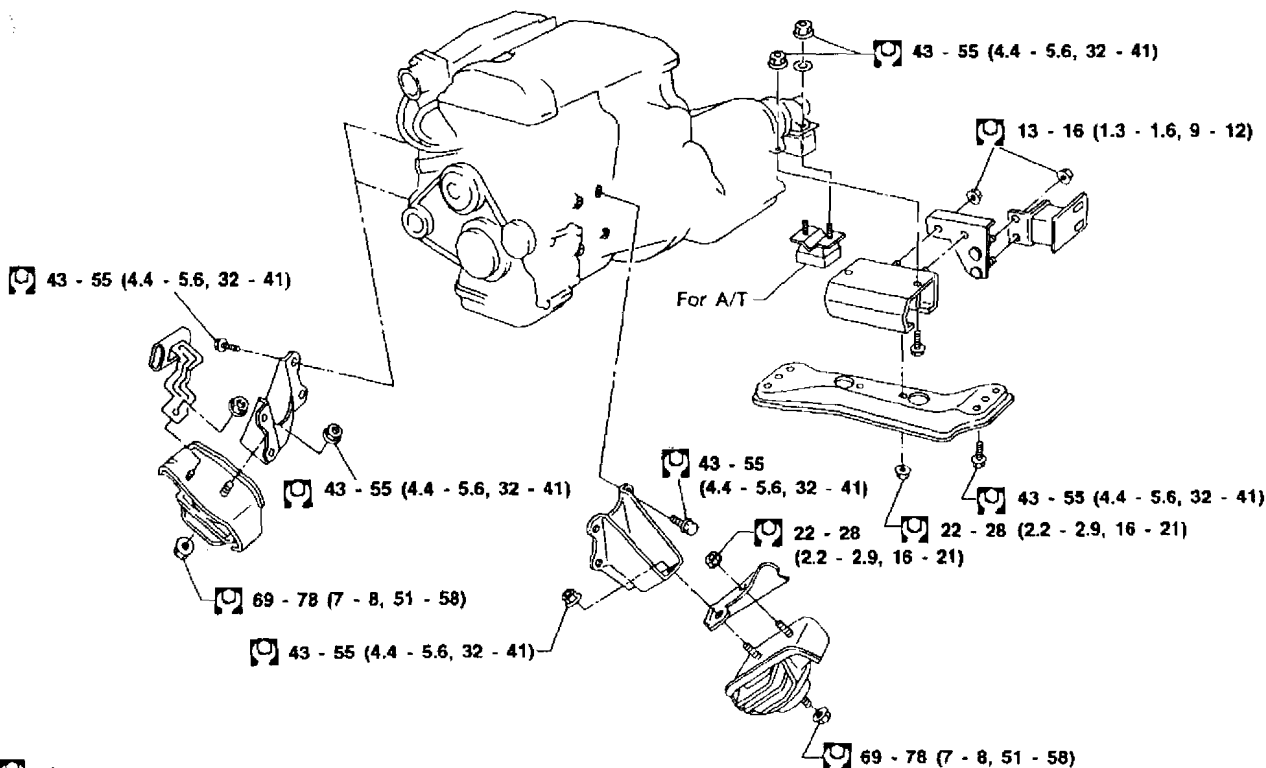
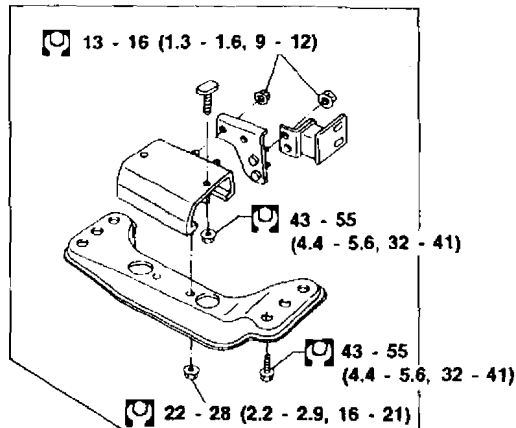


# ENGINE REMOVAL

SEC. 112-111



M/T model



: N·m (kg-m, ft-lb)

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## ENGINE REMOVAL

### 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 "Releasing Fuel Pressure" in EC section.
- 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 sure to clear surrounding parts. Take special care for accelerator wire casing, brake lines and brake master cylinder.
- In hoisting the engine, always use engine slingers in a safe manner.

### Removal

1. Remove transmission.

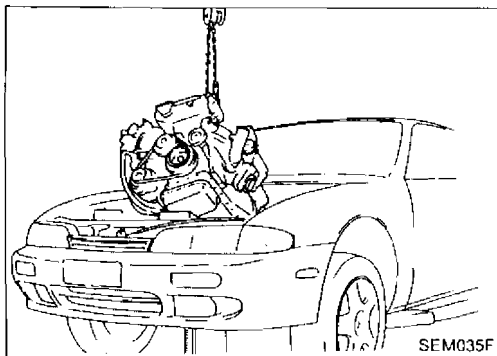
Refer to AT or MT section.

2. Remove engine under cover and hood.
3. Drain coolant from both cylinder block drain plug, and radiator drain cock.
4. Drain engine oil from drain plug of oil pan.
5. Remove vacuum hoses, fuel tubes, wires, harness and connectors and so on.
6. Remove front exhaust tubes.
7. Remove radiator and shroud.
8. Remove drive belts.
9. Remove A/C compressor and power steering oil pump from engine.
10. Install engine slingers to cylinder head.
11. Set a suitable hoist on engine slinger.
12. Remove engine mounting bolts from both sides and then slowly raise engine.

13. Remove engine as shown.

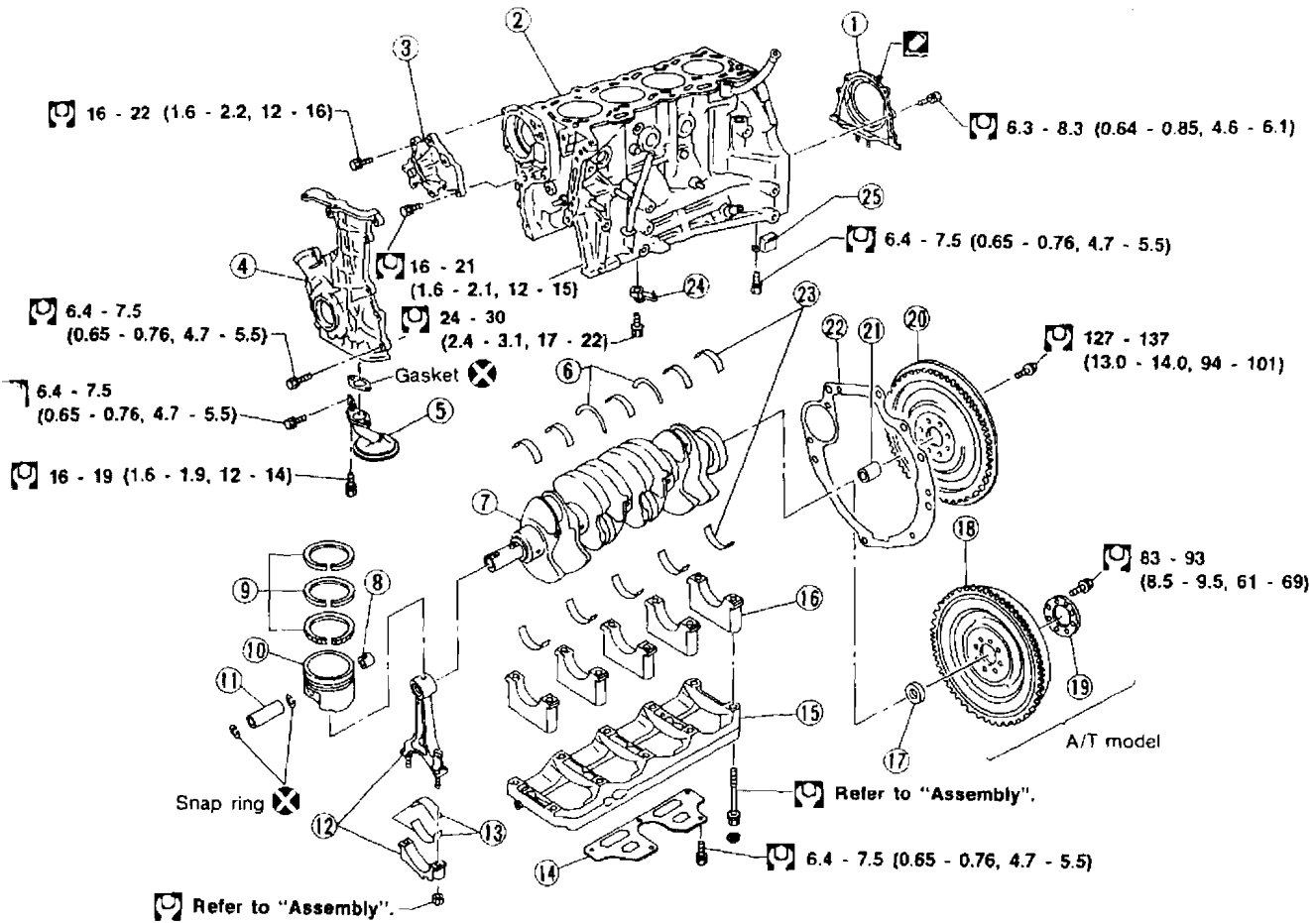
### Installation

Installation is in the reverse order of removal.



# CYLINDER BLOCK

SEC.110-120



Refer to "Assembly".

Apply liquid gasket  
N·m (kg·m, ft·lb)

- ① Rear oil seal retainer
- ② Cylinder block
- ③ Water pump
- ④ Front cover with oil pump
- ⑤ Oil strainer
- ⑥ Thrust bearing
- ⑦ Crankshaft
- ⑧ Connecting rod bushing
- ⑨ Piston rings

- ⑩ Piston
- ⑪ Piston pin
- ⑫ Connecting rod
- ⑬ Connecting rod bearing
- ⑭ Baffle plate
- ⑮ Main bearing beam
- ⑯ Main bearing cap
- ⑰ Pilot converter

- ⑱ Drive plate
- ⑲ Reinforcement plate
- ⑳ Flywheel
- ㉑ Pilot bushing
- ㉒ Rear plate
- ㉓ Main bearing
- ㉔ Oil jet
- ㉕ Baffle plate

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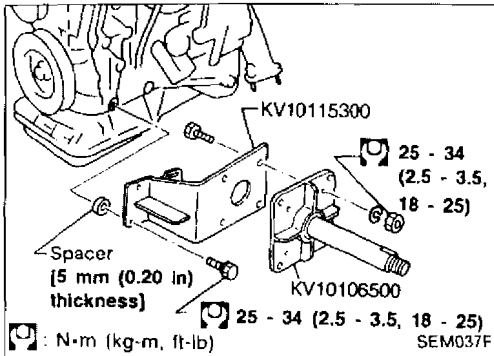
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# CYLINDER BLOCK

## CAUTION:

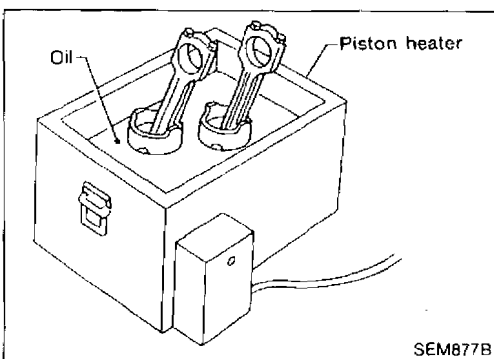
- When installing bearings, pistons, or other sliding parts, lubricate contacting surfaces with new engine oil.
- Place removed parts such as bearings and bearing caps in their proper order and direction.
- When installing connecting rod nuts, and main bearing cap bolts, apply new engine oil to threads and seating surfaces.



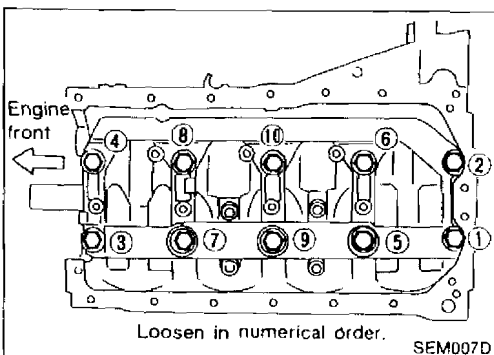
## Disassembly

### PISTON AND CRANKSHAFT

1. Remove engine.  
Refer to "ENGINE REMOVAL" (EM-55).
2. Remove compressor bracket and engine mounting bracket, then install engine on engine stand (ST0501S000).
3. Remove cylinder head.  
Refer to "Removal" in "TIMING CHAIN" (EM-20).
4. Remove oil pan.  
Refer to "Removal" in "OIL PAN" (EM-13).
5. Remove timing chain.  
Refer to "Removal" in "TIMING CHAIN" (EM-20).



6. 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), or use piston pin press stand at room temperature.
7. Remove rear oil seal retainer.

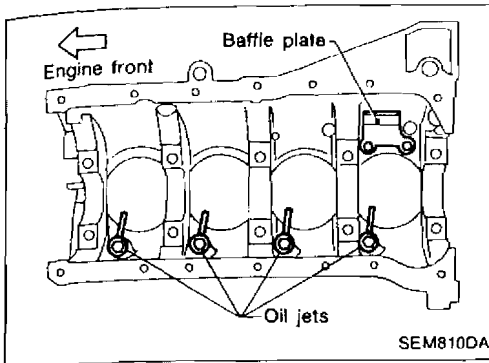


8. Remove bearing beam, bearing cap and crankshaft.
  - Before removing bearing cap, measure crankshaft end play.
  - Bolts should be loosened in two or three steps.

## CYLINDER BLOCK

### Disassembly (Cont'd)

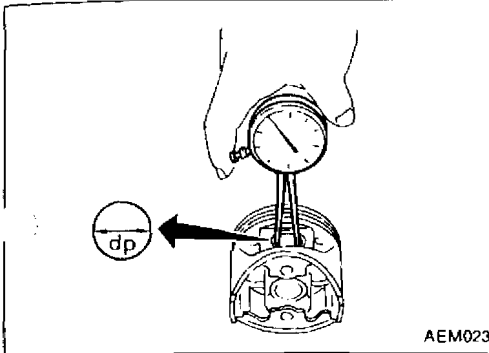
9. Remove baffle plate.
10. Remove oil jets.



### Inspection

#### PISTON AND PISTON PIN CLEARANCE

1. Measure inner diameter of piston pin hole "dp".  
**Standard diameter "dp":**  
21.987 - 21.999 mm (0.8656 - 0.8661 in)

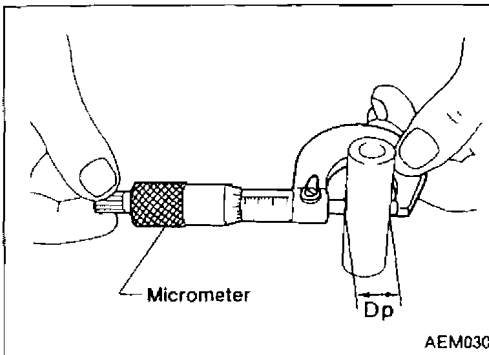


2. Measure outer diameter of piston pin "Dp".  
**Standard diameter "Dp":**  
21.989 - 22.001 mm (0.8657 - 0.8662 in)

3. Calculate piston pin clearance.

$$dp - Dp = -0.004 \text{ to } 0 \text{ mm } (-0.0002 \text{ to } 0 \text{ in})$$

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



#### PISTON RING SIDE CLEARANCE

**Side clearance:**

**Top ring**

$$0.045 - 0.080 \text{ mm } (0.0018 - 0.0031 \text{ in})$$

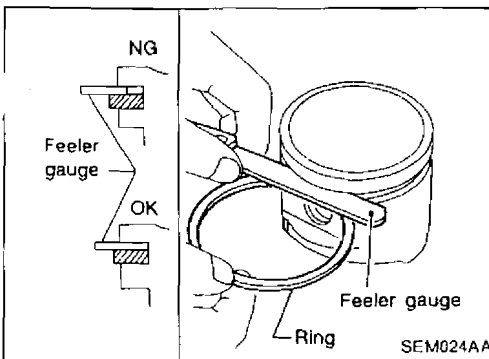
**2nd ring**

$$0.030 - 0.065 \text{ mm } (0.0012 - 0.0026 \text{ in})$$

**Max. limit of side clearance:**

$$0.1 \text{ mm } (0.004 \text{ in})$$

If out of specification, replace piston and/or piston ring assembly.



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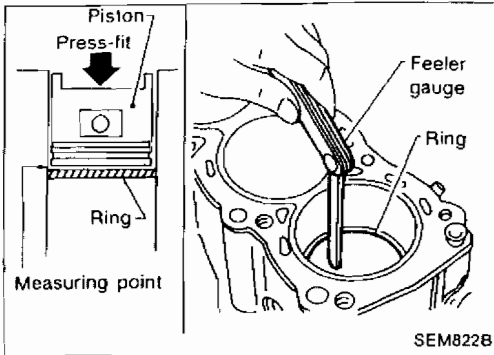
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# CYLINDERBLOCK

## Inspection (Cont'd)

### PISTON RING END GAP



#### Top ring:

##### Standard

0.20 - 0.30 mm (0.0079 - 0.0118 in)

##### Limit

0.39 mm (0.0154 in)

#### 2nd ring:

##### Standard

0.35 - 0.50 mm (0.0138 - 0.0197 in)

##### Limit

0.59 mm (0.0232 in)

#### Oil ring:

##### Standard

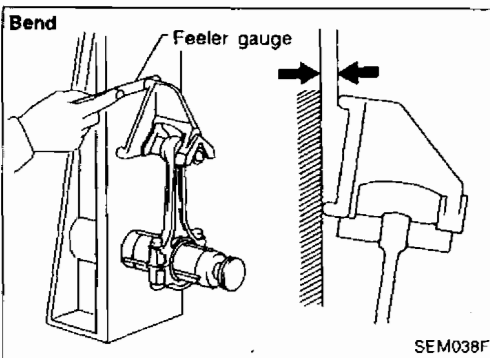
0.20 - 0.60 mm (0.0079 - 0.0236 in)

##### Limit

0.60 mm (0.0272 in)

If out of specification, replace piston ring. If gap exceeds maximum limit with new ring, rebore cylinder and use oversize piston and piston rings.

Refer to SDS (EM-78).



### CONNECTING ROD BEND AND TORSION

#### Bend:

Limit 0.15 mm (0.0059 in)

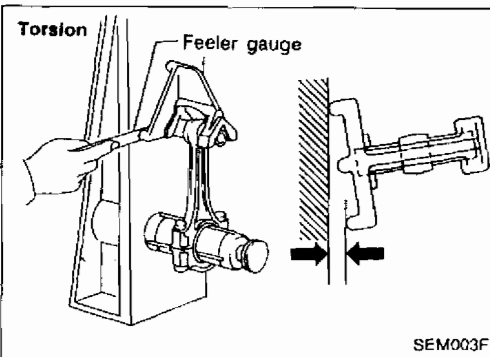
per 100 mm (3.94 in) length

#### 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

## Inspection (Cont'd)

### CYLINDER BLOCK DISTORTION AND WEAR

1. Clean upper face of cylinder block and measure the distortion in the directions as shown.

**Standard:**

Less than 0.03 mm (0.0012 in)

**Limit:**

0.10 mm (0.0039 in)

2. If out of specification, resurface it.

The resurfacing limit is determined by cylinder head resurfacing in engine.

**Amount of cylinder head resurfacing is "A".**

**Amount of cylinder block resurfacing is "B".**

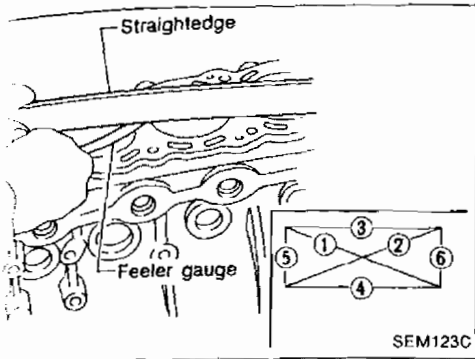
The maximum limit is as follows:

$A + B = 0.2 \text{ mm (0.008 in)}$

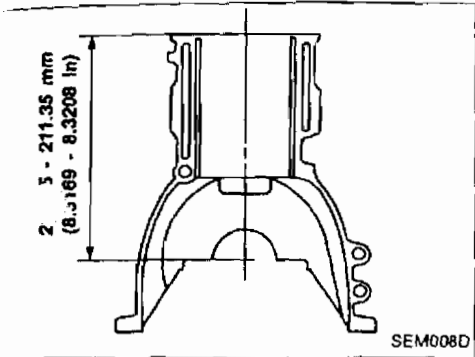
**Nominal cylinder block height from crankshaft center:**

211.25 - 211.35 mm (8.3169 - 8.3208 in)

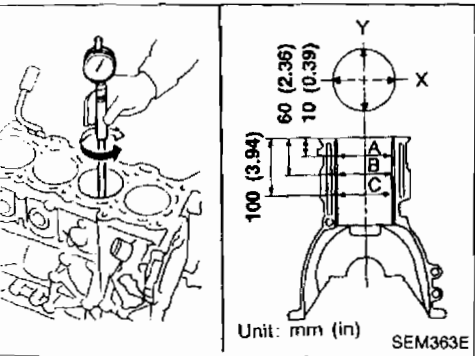
3. If necessary, replace cylinder block.



SEM123C



SEM008D



Unit: mm (in) SEM363E

### PISTON-TO-BORE CLEARANCE

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

**Standard inner diameter:**

86.000 - 86.030 mm (3.3858 - 3.3870 in)

**Wear limit:**

0.20 mm (0.0079 in)

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

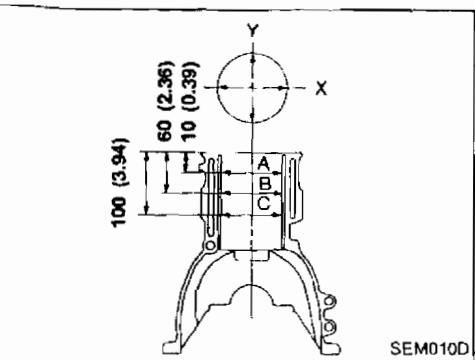
**Out-of-round (X - Y) standard:**

0.015 mm (0.0006 in)

**Taper (A - B and A - C) standard:**

0.010 mm (0.0004 in)

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



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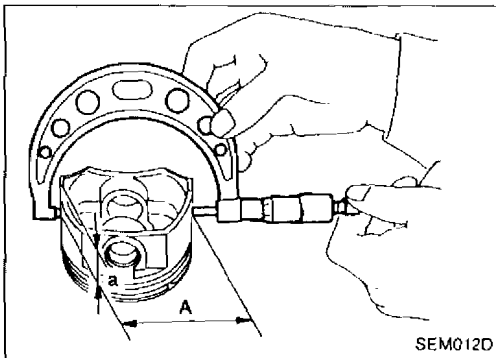
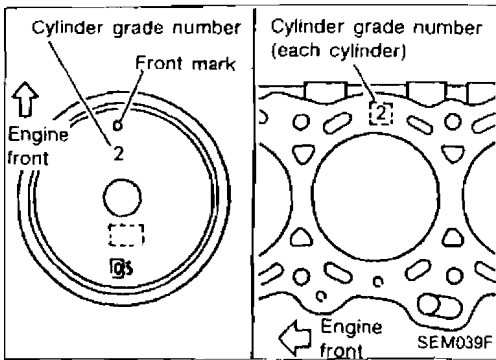
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# CYLINDER BLOCK

## Inspection (Cont'd)

- If cylinder block or piston is replaced, match piston grade with grade number on cylinder block upper surface.



3. Measure piston skirt diameter.

**Piston diameter "A":**

**Refer to SDS (EM-78).**

**Measuring point "a" (Distance from the bottom):**

**10.5 mm (0.413 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-78).**

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 bolts to the specified torque. This will prevent distortion of cylinder bores.

8. Cut cylinder bores.

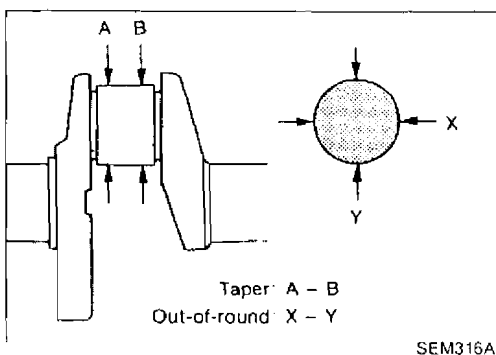
- **When any cylinder needs boring, all other cylinders must also be bored.**

- **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

1. Check crankshaft main and pin journals for score, wear or cracks.

2. With a micrometer, measure journals for taper and out-of-round.

Unit: mm (in)

|   |              |                           |
|---|--------------|---------------------------|
| Out of-round (X - Y) and<br>Taper (A - B) | Main journal | Less than 0.005 (0.0002)  |
|   | Pin journal  | Less than 0.0025 (0.0001) |

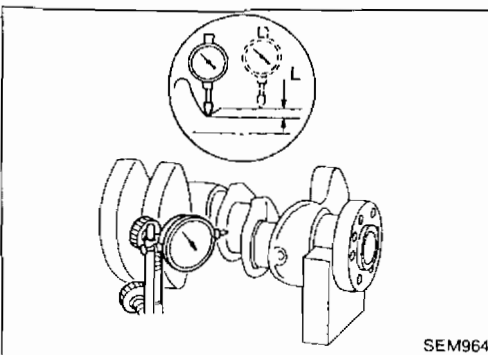
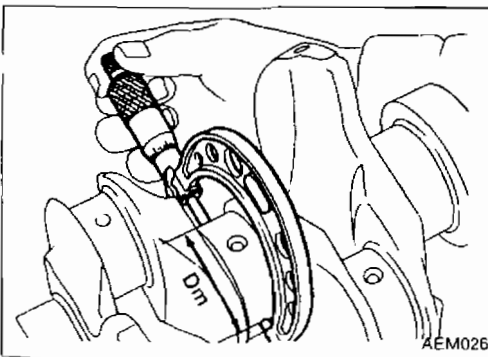
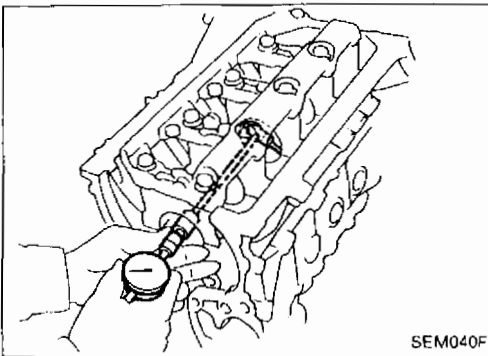
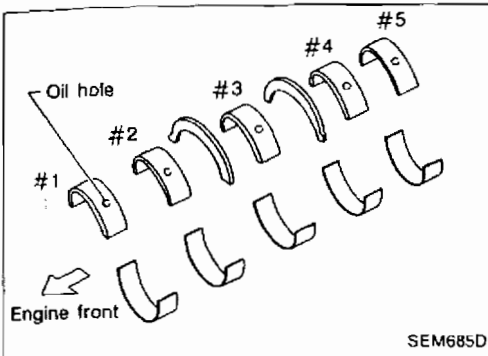
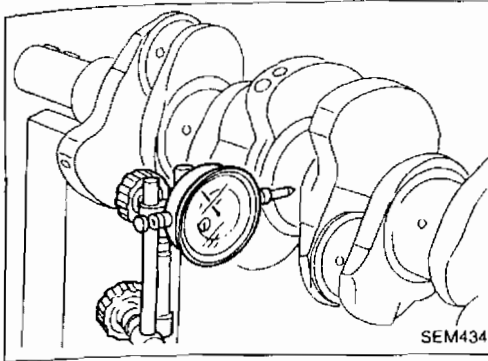


# CYLINDER BLOCK

## Inspection (Cont'd)

3. Measure crankshaft runout.

**Runout (Total indicator reading):**  
**Less than 0.05 mm (0.0020 in)**



## BEARING CLEARANCE

- Use Method A or Method B. Method A is preferred because it is more accurate.

### Method A (Using bore gauge & micrometer)

#### Main bearing

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

2. Install main bearing cap and main bearing beam to cylinder block.

**Tighten all bolts in specified procedure. Refer to "CRANKSHAFT" in "Cylinder Block Assembly" (EM-68).**

3. Measure inner diameter "A" of each main bearing.

4. Measure outer diameter "Dm" of each crankshaft main journal.

5. Calculate main bearing clearance.

$$\text{Main bearing clearance} = A - D_m$$

**Standard: 0.004 - 0.022 mm (0.0002 - 0.0009 in)**

**Limit: 0.050 mm (0.0020 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.

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 (EM-80).

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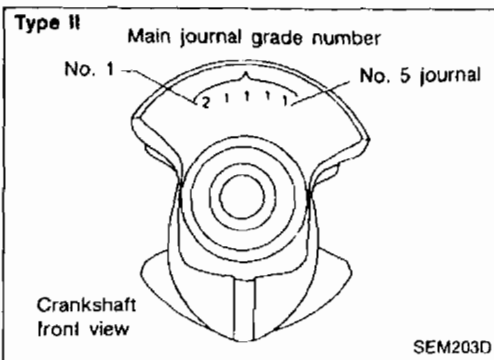
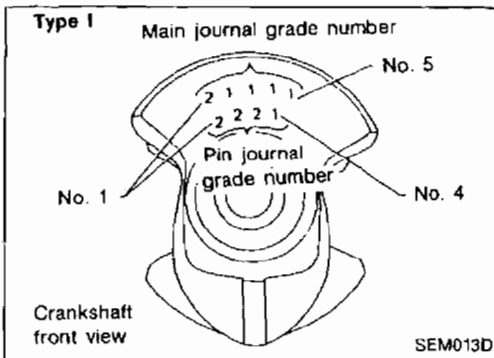
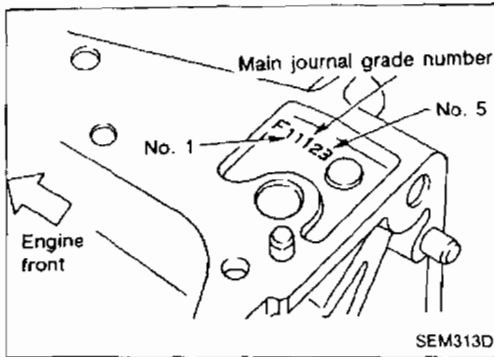
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# CYLINDER BLOCK

## Inspection (Cont'd)



8. If crankshaft is reused, measure main bearing clearances and select thickness of main bearings.  
If crankshaft is replaced, select thickness of main bearings as follows:
- Grade number of each cylinder block main journal is punched on the respective cylinder block. These numbers are punched in either Arabic or Roman numerals.
  - Grade number of each crankshaft main journal is punched on the respective crankshaft. These numbers are punched in either Arabic or Roman numerals.

- Select main bearing with suitable thickness according to the following table.

### How to select main bearings (Identification mark and color)

| Crankshaft journal grade number | Main journal grade number |                  |                  |                    |
|---------------------------------|---------------------------|------------------|------------------|--------------------|
|                                 | 0                         | 1                | 2                | 3                  |
| 0                               | 0<br>(A, Black)           | 1<br>(B, Brown)  | 2<br>(C, Green)  | 3<br>(D, Yellow)   |
| 1                               | 1<br>(B, Brown)           | 2<br>(C, Green)  | 3<br>(D, Yellow) | 4<br>(E, Blue)     |
| 2                               | 2<br>(C, Green)           | 3<br>(D, Yellow) | 4<br>(E, Blue)   | 5<br>(F, Pink)     |
| 3                               | 3<br>(D, Yellow)          | 4<br>(E, Blue)   | 5<br>(F, Pink)   | 6<br>(G, No color) |

For example:

Main journal grade number: 1

Crankshaft journal grade number: 2

Main bearing grade number = 1 + 2

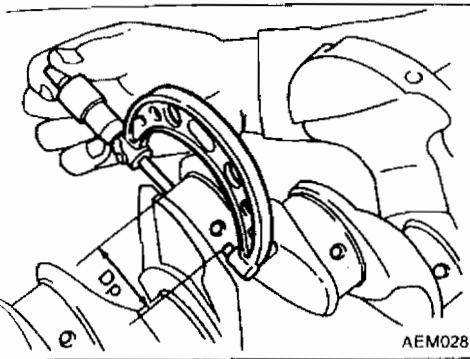
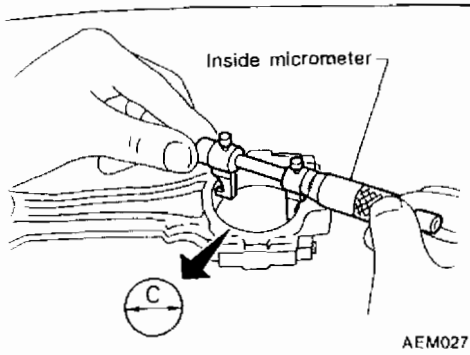
= 3 (D, Yellow)

# CYLINDER BLOCK

## Inspection (Cont'd)

### Connecting rod bearing (Big end)

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 each bearing.



4. Measure outer diameter "Dp" of each crankshaft pin journal.
5. Calculate connecting rod bearing clearance.

#### Connecting rod bearing clearance (C - Dp):

##### Standard

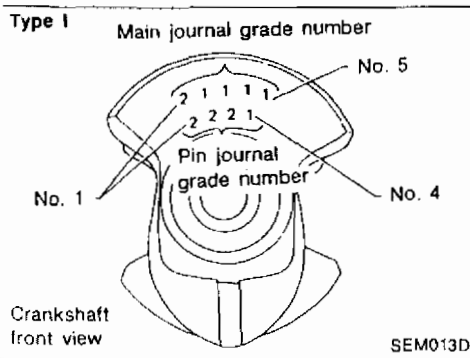
0.020 - 0.045 mm (0.0008 - 0.0018 in)

##### Limit

0.65 mm (0.0256 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 step 7 of "BEARING CLEARANCE — Main bearing" (EM-63).



8. If crankshaft is replaced with a new one, select connecting rod bearing according to the following table.

#### Connecting rod bearing grade number:

These numbers are punched in either Arabic or Roman numerals.

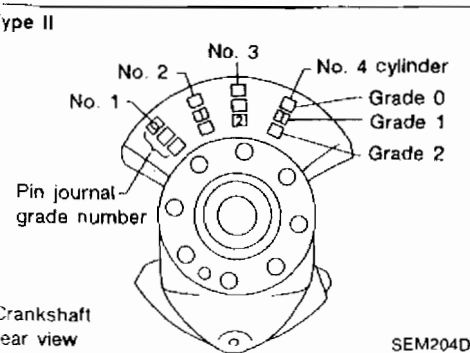
| Crank pin journal grade number | Connecting rod bearing grade number |
|--------------------------------|-------------------------------------|
| 0                              | 0                                   |
| 1                              | 1                                   |
| 2                              | 2                                   |

#### Identification colors of connecting rod bearing:

Grade 0; No color

Grade 1; Black

Grade 2; Brown



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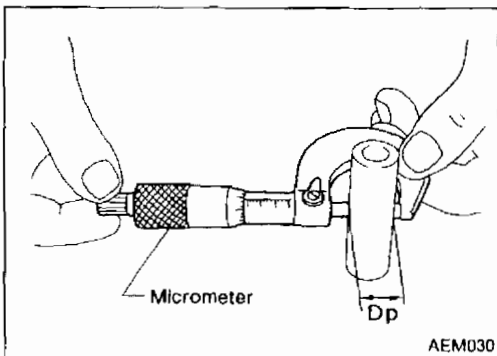
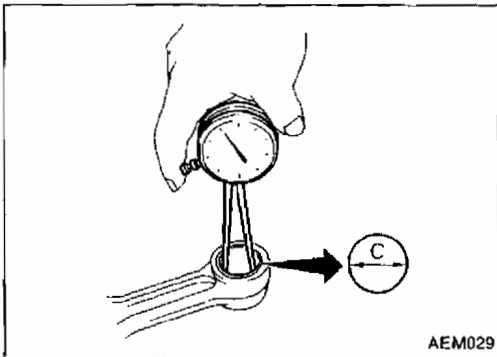
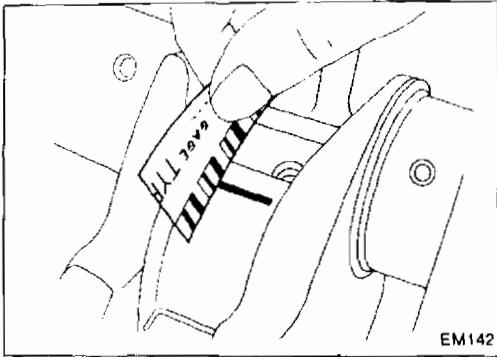
# CYLINDER BLOCK

## Inspection (Cont'd)

### 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 clearance cannot be adjusted using any standard bearing grade, grind crankshaft journal and use undersized bearing.



### CONNECTING ROD BUSHING CLEARANCE (Small end)

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:

0.023 mm (0.0009 in)

If it exceeds the limit, replace connecting rod assembly or connecting rod bushing and/or piston set with pin.

### REPLACEMENT OF CONNECTING ROD BUSHING (Small end)

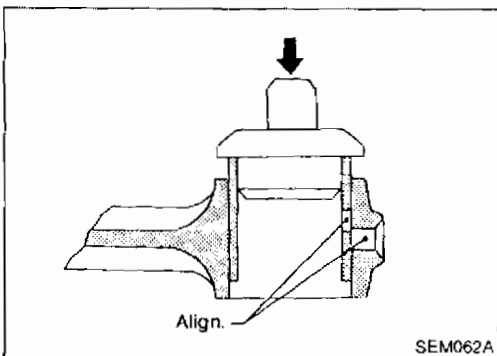
1. Drive in small end bushing until it is flush with end surface of rod.

#### Be sure to align the oil holes.

2. Ream the bushing so that clearance with piston pin is within specification.

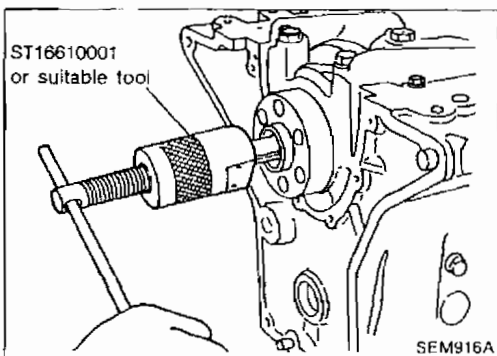
#### Clearance between connecting rod bushing and piston pin:

0.005 - 0.017 mm (0.0002 - 0.0007 in)



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

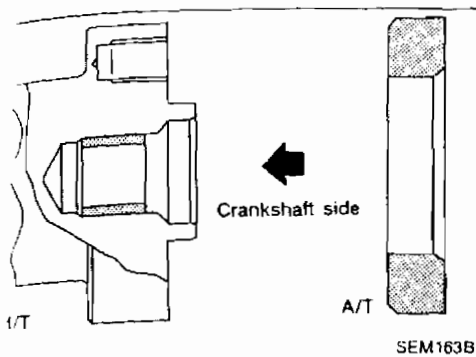
1. Remove pilot bushing or pilot converter using Tool or suitable tool.



# CYLINDER BLOCK

## Inspection (Cont'd)

2. Install pilot bushing or pilot converter as shown.



## FLYWHEEL/DRIVE PLATE RUNOUT

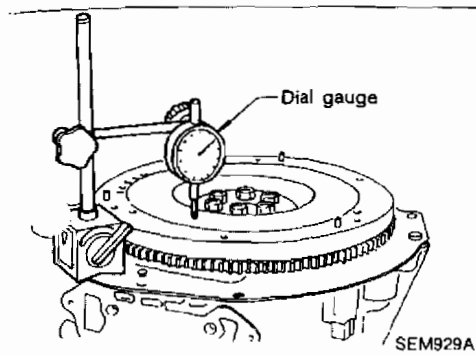
Runout (Total indicator reading):

Flywheel (M/T model)

Less than 0.15 mm (0.0059 in)

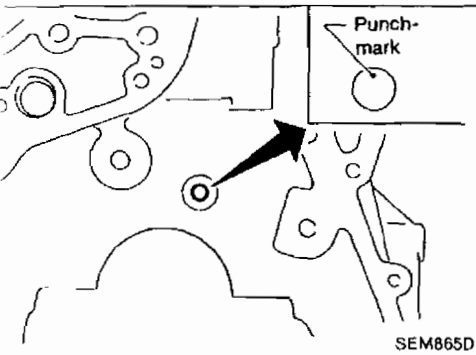
Drive plate (A/T model)

Less than 0.20 mm (0.0079 in)

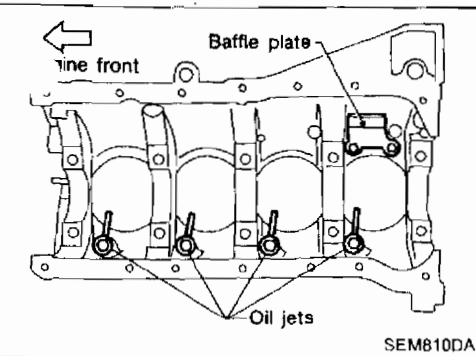


## Assembly

1. Install timing chain oil jet.
- Drive oil jet into cylinder block with punchmark facing up.

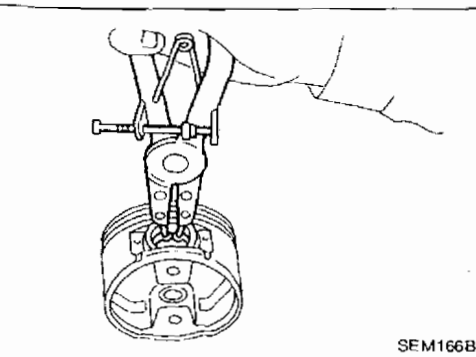


2. Install piston oil jets.
3. Install baffle plate.



## PISTON

1. Install new snap ring on one side of piston pin hole.



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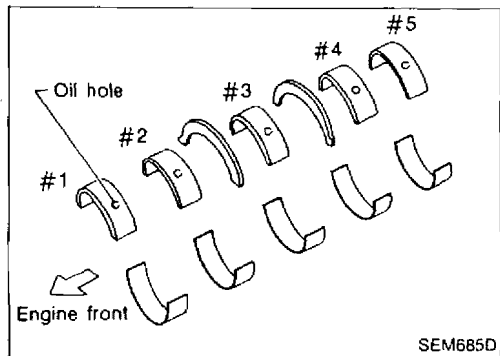
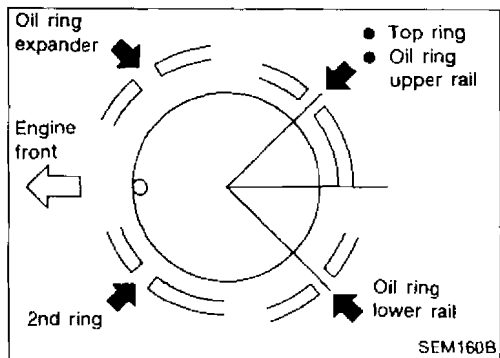
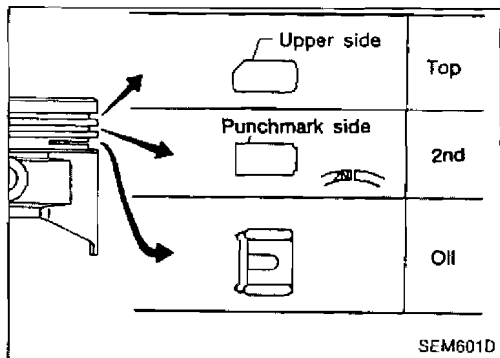
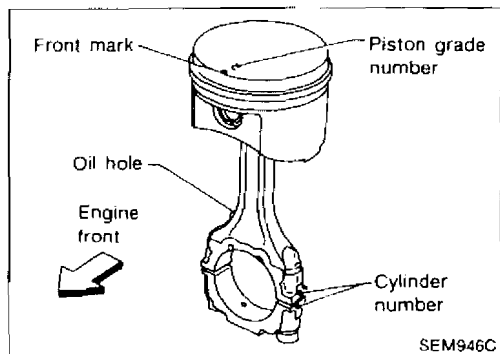
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# CYLINDER BLOCK

## Assembly (Cont'd)



- 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.

- Set piston rings as shown.

### CAUTION:

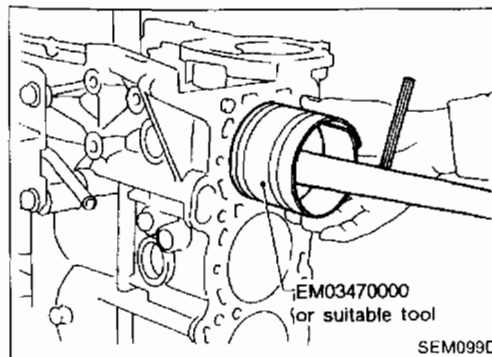
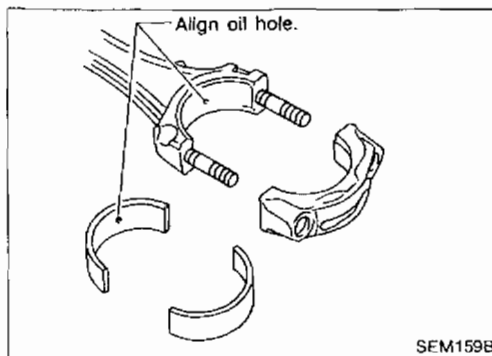
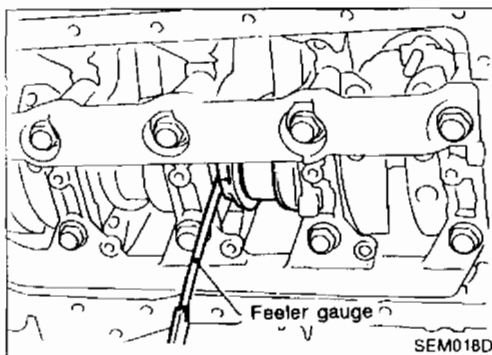
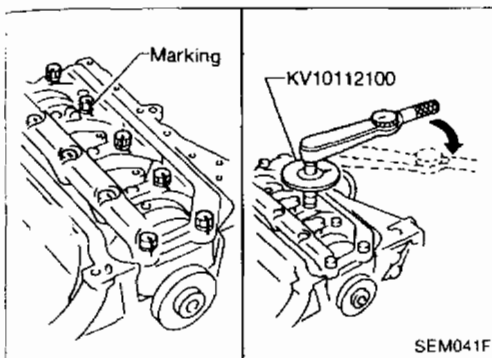
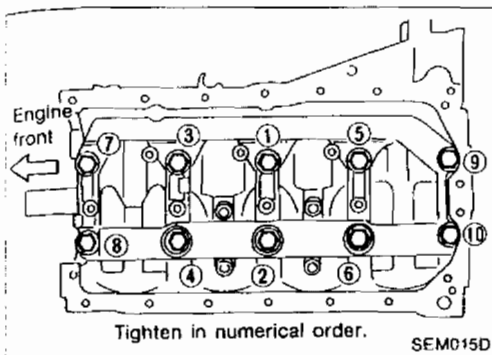
- When piston rings are not replaced, make sure that piston rings are mounted in their original positions.
- When replacing piston rings, if there is no punchmark, install with either side up.

- Locate the ring gap as shown.

## CRANKSHAFT

- Set main bearings and thrust bearings in their proper positions on cylinder block and main bearing cap.
  - Confirm that correct main bearings are used. Refer to "Inspection" of this section.
  - Direct the oil grooved side of thrust bearing to crankshaft arm side.

## Assembly (Cont'd)



2. Install crankshaft, main bearing caps and beam and tighten bolts to the specified torque.

- Prior to tightening bearing cap bolts, shift crankshaft back and forth to properly seat the bearing cap.

- Tightening procedure

- Tighten all bolts to 26 to 32 N·m (2.7 to 3.3 kg-m, 20 to 24 ft-lb).

- Turn all bolts 75 to 80 degrees clockwise with Tool or suitable angle wrench.

- Loosen all bolts completely.

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

- Turn all bolts 45 to 50 degrees clockwise with Tool or suitable angle wrench.

- If an angle wrench is not available, mark all bearing cap bolts on the side facing engine rear. Then, turn each bolt specified degrees clockwise. Confirm angle of degrees with a graduator, not by eye-measurement.

- After securing bearing cap bolts, make sure crankshaft turns smoothly by hand.

3. Measure crankshaft end play.

**Crankshaft end play:**

**Standard**

0.10 - 0.26 mm (0.0039 - 0.0102 in)

**Limit**

0.30 mm (0.0118 in)

If beyond the limit, replace thrust bearings with new ones.

4. Install connecting rod bearings in connecting rods and connecting rod bearing caps.

- Confirm that correct bearings are used. Refer to "Inspection".

- Install bearings so that oil hole in connecting rod aligns with oil hole of bearing.

5. Install pistons with connecting rods.

- Install them into corresponding cylinders with Tool.

- Be careful not to scratch cylinder wall by connecting rod.

- Arrange so that front mark on piston head faces toward engine front.

- Be careful not to hit oil jet with connecting rod.

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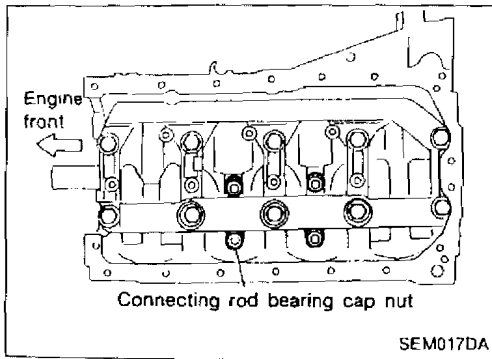
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# CYLINDER BLOCK

## Assembly (Cont'd)



- b. Install connecting rod bearing caps. Tighten connecting rod bearing cap nuts in the following two steps.

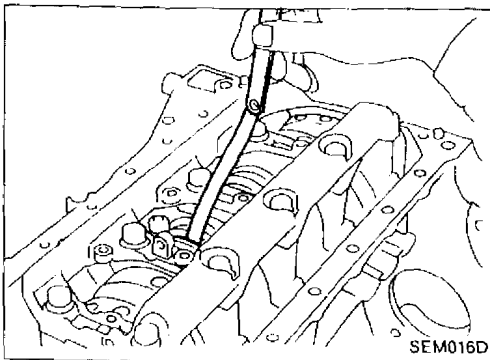
### Step 1

Tighten nuts to 14 to 16 N·m (1.4 to 1.6 kg-m, 10 to 12 ft-lb).

### Step 2

Turn nuts 60 to 65 degrees clockwise with angle wrench. If angle wrench is not available, tighten nuts to 38 to 44 N·m (3.9 to 4.5 kg-m, 28 to 33 ft-lb).

- After securing connecting rod cap nuts, make sure crankshaft turns smoothly by hand.



6. Measure connecting rod side clearance.

### Connecting rod side clearance:

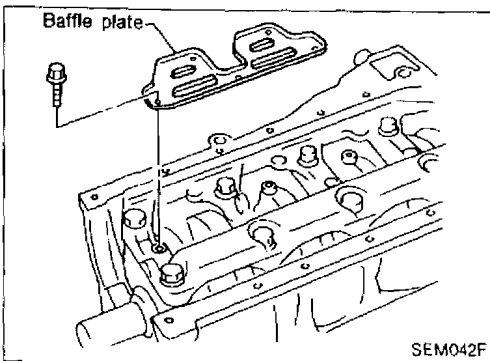
#### Standard

0.20 - 0.35 mm (0.0079 - 0.0138 in)

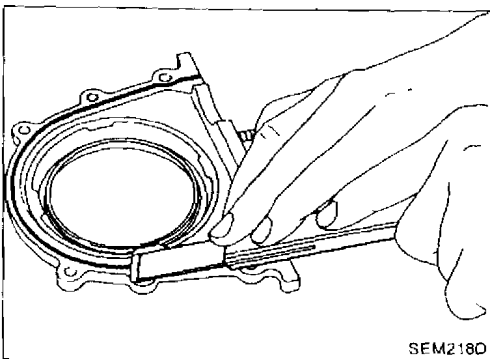
#### Limit

0.50 mm (0.0197 in)

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



7. Install baffle plate.



8. Install rear oil seal retainer.

(1) Before installing rear oil seal retainer, remove all traces of liquid gasket from mating surface using a scraper.

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

(2) Install rear oil seal. Refer to "REAR OIL SEAL" in "Oil Seal Replacement" (EM-34).

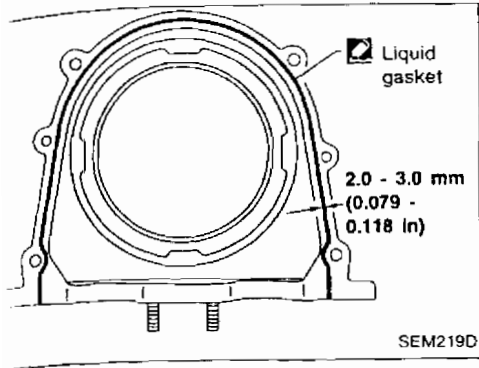


# CYLINDER BLOCK

## Assembly (Cont'd)

(3) Apply a continuous bead of liquid gasket to mating surface of rear oil seal retainer.

- Use Genuine Liquid Gasket or equivalent.



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# SERVICE DATA AND SPECIFICATIONS (SDS)

## General Specifications

|                         |                         |                       |
|-------------------------|-------------------------|-----------------------|
| Cylinder arrangement    |                         | In-line 4             |
| Displacement            | cm <sup>3</sup> (cu in) | 1,998 (121.92)        |
| Bore and stroke         | mm (in)                 | 86 x 86 (3.39 x 3.39) |
| Valve arrangement       |                         | DOHC                  |
| Firing order            |                         | 1-3-4-2               |
| Number of piston rings  |                         |                       |
| Compression             |                         | 2                     |
| Oil                     |                         | 1                     |
| Number of main bearings |                         | 5                     |
| Compression ratio       |                         | 8.5                   |

## COMPRESSION PRESSURE

Unit: kPa (bar, kg/cm<sup>2</sup>, psi)/300 rpm

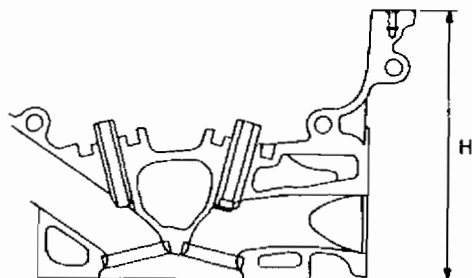
|                                      |                          |
|--------------------------------------|--------------------------|
| Standard                             | 1,079 (10.79, 11.0, 156) |
| Minimum                              | 883 (8.83, 9.0, 128)     |
| Differential limit between cylinders | 98 (0.98, 1.0, 14)       |

# SERVICE DATA AND SPECIFICATIONS (SDS)

## Inspection and Adjustment

### CYLINDER HEAD

|                         | Unit: mm (in)              |             |
|-------------------------|----------------------------|-------------|
|                         | Standard                   | Limit       |
| Head surface distortion | Less than<br>0.03 (0.0012) | 0.1 (0.004) |



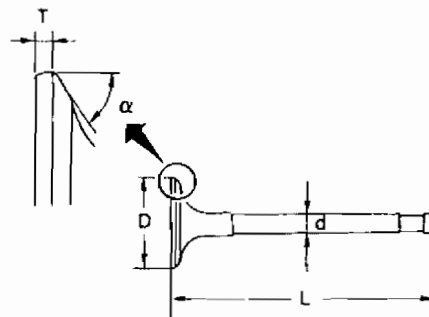
SEM043F

|                                     |                               |
|-------------------------------------|-------------------------------|
| Nominal cylinder head height<br>"H" | 136.9 - 137.1 (5.390 - 5.398) |
| Resurfacing limit                   | 0.2 (0.008)*                  |

\* Sum of resurfacing cylinder head and cylinder block

### VALVE

Unit: mm (in)



SEM188-B

|                                       |                                      |
|---------------------------------------|--------------------------------------|
| Valve head diameter "D"               |                                      |
| Intake                                | 34.0 - 34.2 (1.339 - 1.346)          |
| Exhaust                               | 30.0 - 30.2 (1.181 - 1.189)          |
| Valve length "L"                      |                                      |
| Intake                                | 101.19 - 101.61<br>(3.9839 - 4.0004) |
| Exhaust                               | 102.11 - 102.53<br>(4.0201 - 4.0366) |
| Valve stem diameter "d"               |                                      |
| Intake                                | 5.965 - 5.980 (0.2348 - 0.2354)      |
| Exhaust                               | 6.945 - 6.960 (0.2734 - 0.2740)      |
| Valve seat angle "α"                  |                                      |
| Intake                                | 45°15' - 45°45'                      |
| Exhaust                               |                                      |
| Valve margin "T"                      |                                      |
| Intake                                | 1.1 (0.043)                          |
| Exhaust                               | 1.3 (0.051)                          |
| Valve margin "T" limit                | More than 0.5 (0.020)                |
| Valve stem end surface grinding limit | Less than 0.2 (0.008)                |

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# SERVICE DATA AND SPECIFICATIONS (SDS)

## Inspection and Adjustment (Cont'd)

### Valve spring

|  |          |  |
|--|----------|--|
| Free height                              | mm (in)  | 49.36 (1.9433)   |
| Pressure<br>N (kg, lb) at height mm (in) | Standard | 578.02 - 641.57<br>(58.94 - 65.42, 129.96 - 144.25)<br>at 30.0 (1.181) |
|  |          | Limit  |
| Out-of-square                            | mm (in)  | Less than 2.2 (0.087)  |

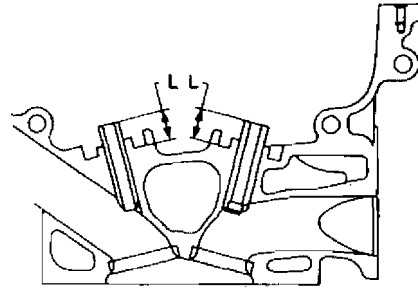
### Hydraulic lash adjuster (HLA)

Unit: mm (in)

|                                     |                                      |
|-------------------------------------|--------------------------------------|
| HLA outer diameter                  | 16.980 - 16.993<br>(0.6685 - 0.6690) |
| HLA guide inner diameter            | 17.000 - 17.020<br>(0.6693 - 0.6701) |
| Clearance between HLA and HLA guide | 0.007 - 0.040<br>(0.0003 - 0.0016)   |

### Valve guide

Unit: mm (in)



SEM083D

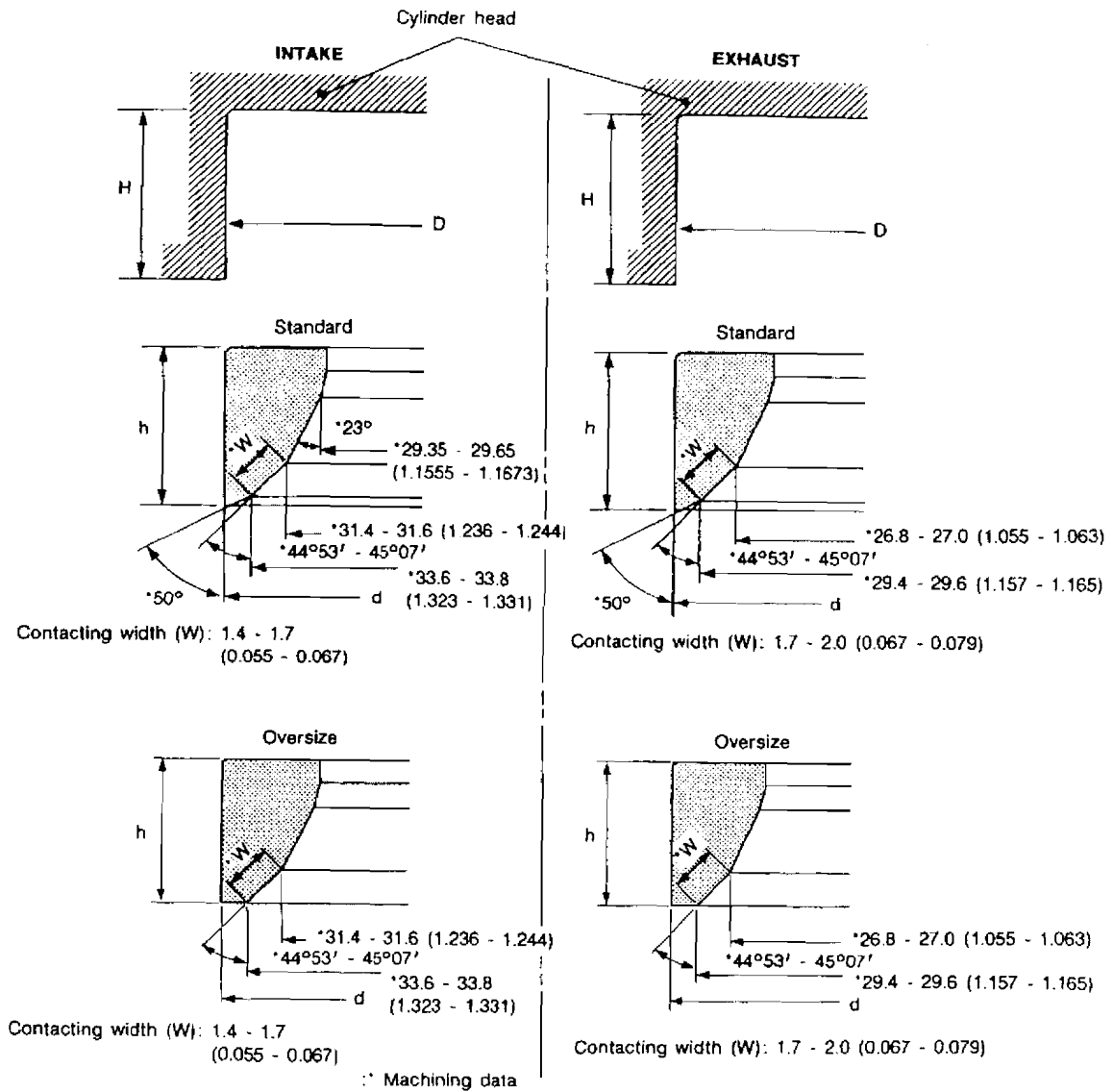
|   |                                   | Standard                             | Service                              |
|---|-----------------------------------|--------------------------------------|--------------------------------------|
| Valve guide                             | Outer diameter                    | Intake                               | 10.023 - 10.034<br>(0.3946 - 0.3950) |
|   |                                   | Exhaust                              | 11.023 - 11.034<br>(0.4340 - 0.4344) |
| Valve guide                             | Inner diameter<br>(Finished size) | Intake                               | 6.000 - 6.018 (0.2362 - 0.2369)      |
|   |                                   | Exhaust                              | 7.000 - 7.018 (0.2756 - 0.2763)      |
| Cylinder head valve guide hole diameter | Intake                            | 9.975 - 9.996<br>(0.3927 - 0.3935)   | 10.175 - 10.196<br>(0.4006 - 0.4014) |
|   | Exhaust                           | 10.975 - 10.996<br>(0.4321 - 0.4329) | 11.175 - 11.196<br>(0.4400 - 0.4408) |
| Interference fit of valve guide         |                                   | 0.027 - 0.059 (0.0011 - 0.0023)      |                                      |
|   |                                   | Standard                             | Limit                                |
| Stem to guide clearance                 | Intake                            | 0.020 - 0.053<br>(0.0008 - 0.0021)   | 0.08 (0.0031)                        |
|   | Exhaust                           | 0.040 - 0.073<br>(0.0016 - 0.0029)   | 0.1 (0.004)                          |
| Valve deflection limit                  |                                   | 0.2 (0.008)                          |                                      |
| Projection length "L"                   |                                   | 14.0 - 14.2 (0.551 - 0.559)          |                                      |

# SERVICE DATA AND SPECIFICATIONS (SDS)

## Inspection and Adjustment (Cont'd)

### Valve seat

Unit: mm (in)



SEM651D

|  |     | Standard                          | Service                           |
|--|-----|-----------------------------------|-----------------------------------|
| Cylinder head seat recess diameter (D) | In. | 35.000 - 35.016 (1.3780 - 1.3786) | 35.500 - 35.516 (1.3976 - 1.3983) |
|  | Ex. | 31.000 - 31.016 (1.2205 - 1.2211) | 31.500 - 31.516 (1.2402 - 1.2408) |
| Valve seat interference fit            | In. | 0.064 - 0.096 (0.0025 - 0.0038)   |                                   |
|  | Ex. | 0.064 - 0.096 (0.0025 - 0.0038)   |                                   |
| Valve seat outer diameter (d)          | In. | 35.080 - 35.096 (1.3811 - 1.3817) | 35.580 - 35.596 (1.4008 - 1.4014) |
|  | Ex. | 31.080 - 31.096 (1.2236 - 1.2242) | 31.580 - 31.596 (1.2433 - 1.2439) |
| Depth (H)                              | In. | 6.25 (0.2461)                     |                                   |
|  | Ex. | 6.25 (0.2461)                     |                                   |
| Height (h)                             |     | 6.2 - 6.3 (0.244 - 0.248)         | 5.4 - 5.5 (0.213 - 0.217)         |

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# SERVICE DATA AND SPECIFICATIONS (SDS)

## Inspection and Adjustment (Cont'd)

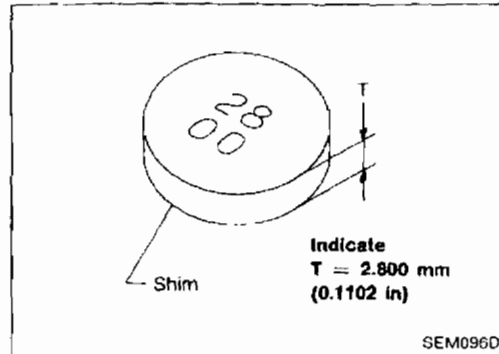
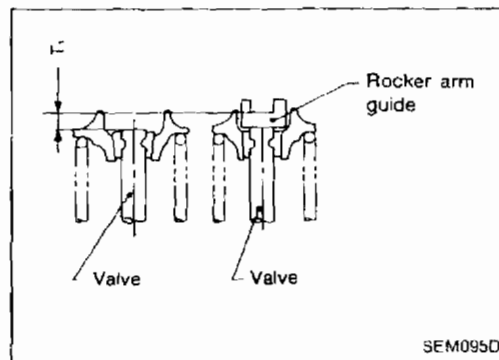
### Valve shim clearance adjustment

Unit: mm (in)

|                             |                         |
|-----------------------------|-------------------------|
| Valve shim clearance (Cold) | Less than 0.025 (0.001) |
| Shim thickness "T"          | $T_1 \pm 0.025$ (0.001) |

### Available shims

| Thickness mm (in) | Identification mark |
|-------------------|---------------------|
| 2.800 (0.1102)    | 28<br>00            |
| 2.825 (0.1112)    | 28<br>25            |
| 2.850 (0.1122)    | 28<br>50            |
| 2.875 (0.1132)    | 28<br>75            |
| 2.900 (0.1142)    | 29<br>00            |
| 2.925 (0.1152)    | 29<br>25            |
| 2.950 (0.1161)    | 29<br>50            |
| 2.975 (0.1171)    | 29<br>75            |
| 3.000 (0.1181)    | 30<br>00            |
| 3.025 (0.1191)    | 30<br>25            |
| 3.050 (0.1201)    | 30<br>50            |
| 3.075 (0.1211)    | 30<br>75            |
| 3.100 (0.1220)    | 31<br>00            |
| 3.125 (0.1230)    | 31<br>25            |
| 3.150 (0.1240)    | 31<br>50            |
| 3.175 (0.1250)    | 31<br>75            |
| 3.200 (0.1260)    | 32<br>00            |



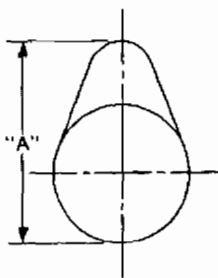
# SERVICE DATA AND SPECIFICATIONS (SDS)

## Inspection and Adjustment (Cont'd)

### CAMSHAFT AND CAMSHAFT BEARING

Unit: mm (in)

|                                       | Standard                             | Limit         |
|---------------------------------------|--------------------------------------|---------------|
| Camshaft journal to bearing clearance | 0.045 - 0.086<br>(0.0018 - 0.0034)   | 0.15 (0.0059) |
| Inner diameter of camshaft bearing    | 28.000 - 28.021<br>(1.1024 - 1.1032) | —             |
| Outer diameter of camshaft journal    | 27.935 - 27.955<br>(1.0998 - 1.1006) | —             |
| Camshaft runout [TIR*]                | Less than<br>0.02 (0.0008)           | 0.1 (0.004)   |
| Camshaft sprocket runout [TIR*]       | Less than<br>0.25 (0.0098)           | —             |
| Camshaft end play                     | 0.092 - 0.173<br>(0.0036 - 0.0068)   | 0.20 (0.0079) |



EM671

#### Cam height "A"

|         |                                   |
|---------|-----------------------------------|
| Intake  | 37.920 - 38.110 (1.4929 - 1.5004) |
| Exhaust | 37.920 - 38.110 (1.4929 - 1.5004) |

#### Wear limit of cam height

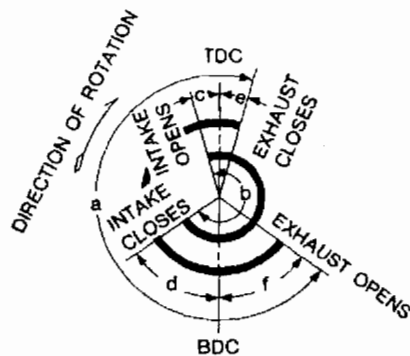
0.2 (0.008)

#### Valve lift

|         |             |
|---------|-------------|
| Intake  | 9.2 (0.362) |
| Exhaust | 9.2 (0.362) |

\*Total indicator reading

Valve timing (VTC solenoid valve OFF)



EM120

Unit: degree

| a    | b    | c   | d   | e  | f   |
|------|------|-----|-----|----|-----|
| 240° | 240° | -6° | 66° | 7° | 53° |

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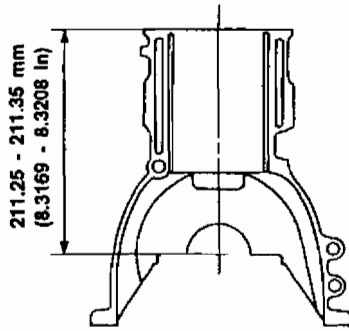
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# SERVICE DATA AND SPECIFICATIONS (SDS)

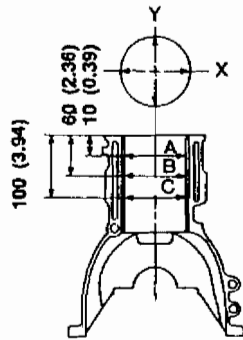
## Inspection and Adjustment (Cont'd)

### CYLINDER BLOCK

Unit: mm (in)



SEM008D



SEM686D

#### Surface flatness

|          |                         |
|----------|-------------------------|
| Standard | Less than 0.03 (0.0012) |
| Limit    | 0.10 (0.0039)           |

#### Cylinder bore

##### Inner diameter

###### Standard

|             |                                   |
|-------------|-----------------------------------|
| Grade No. 1 | 86.000 - 86.010 (3.3858 - 3.3862) |
| Grade No. 2 | 86.010 - 86.020 (3.3862 - 3.3866) |
| Grade No. 3 | 86.020 - 86.030 (3.3866 - 3.3870) |

Wear limit 0.20 (0.0079)

Out-of-round (X - Y) Less than 0.015 (0.0006)

Taper (A - B and A - C) Less than 0.010 (0.0004)

#### Difference in inner diameter between cylinders

Limit Less than 0.05 (0.0020)

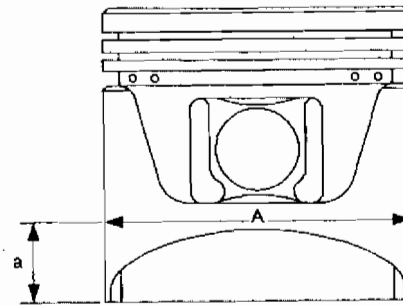
#### Main journal inner diameter

|             |                                   |
|-------------|-----------------------------------|
| Grade No. 0 | 58.944 - 58.950 (2.3206 - 2.3209) |
| Grade No. 1 | 58.950 - 58.956 (2.3209 - 2.3211) |
| Grade No. 2 | 58.956 - 58.962 (2.3211 - 2.3213) |
| Grade No. 3 | 58.962 - 58.968 (2.3213 - 2.3216) |

### PISTON, PISTON RING AND PISTON PIN

#### Available piston

Unit: mm (in)



SEM750C

#### Piston skirt diameter "A"

##### Standard

|                                   |                                   |
|-----------------------------------|-----------------------------------|
| Grade No. 1                       | 85.980 - 85.990 (3.3850 - 3.3854) |
| Grade No. 2                       | 85.990 - 86.000 (3.3854 - 3.3858) |
| Grade No. 3                       | 86.000 - 86.010 (3.3858 - 3.3862) |
| 0.20 (0.0079) over-size (Service) | 86.180 - 86.210 (3.3929 - 3.3941) |

"a" dimension 10.5 (0.413)

Piston clearance to cylinder block 0.010 - 0.030 (0.0004 - 0.0012)

Piston pin hole diameter 21.987 - 21.999 (0.8656 - 0.8661)



# SERVICE DATA AND SPECIFICATIONS (SDS)

## Inspection and Adjustment (Cont'd)

### Piston ring

|                       |                                    | Unit: mm (in) |
|-----------------------|------------------------------------|---------------|
| <b>Side clearance</b> |                                    |               |
| <b>Top</b>            |                                    |               |
| Standard              | 0.045 - 0.080<br>(0.0018 - 0.0031) |               |
| Limit                 | 0.1 (0.004)                        |               |
| <b>2nd</b>            |                                    |               |
| Standard              | 0.030 - 0.065<br>(0.0012 - 0.0026) |               |
| Limit                 | 0.1 (0.004)                        |               |
| <b>End gap</b>        |                                    |               |
| <b>Top</b>            |                                    |               |
| Standard              | 0.20 - 0.30 (0.0079 - 0.0118)      |               |
| Limit                 | 0.39 (0.0154)                      |               |
| <b>2nd</b>            |                                    |               |
| Standard              | 0.35 - 0.50 (0.0138 - 0.0197)      |               |
| Limit                 | 0.59 (0.0232)                      |               |
| <b>Oil</b>            |                                    |               |
| Standard              | 0.20 - 0.60 (0.0079 - 0.0236)      |               |
| Limit                 | 0.69 (0.0272)                      |               |

### CONNECTING ROD

|   |                                   | Unit: mm (in) |
|---|-----------------------------------|---------------|
| Center distance                         | 136.30 (5.3661)                   |               |
| <b>Bend [per 100 (3.94)]</b>            |                                   |               |
| Limit                                   | 0.15 (0.0059)                     |               |
| <b>Torsion [per 100 (3.94)]</b>         |                                   |               |
| Limit                                   | 0.3 (0.0012)                      |               |
| Connecting rod small end inner diameter | 24.980 - 25.000 (0.9835 - 0.9843) |               |
| Piston pin bushing inner diameter*      | 22.000 - 22.012 (0.8661 - 0.8666) |               |
| Connecting rod big end inner diameter   | 51.000 - 51.013 (2.0079 - 2.0084) |               |
| <b>Side clearance</b>                   |                                   |               |
| Standard                                | 0.20 - 0.35 (0.0079 - 0.0138)     |               |
| Limit                                   | 0.5 (0.020)                       |               |

\*After installing in connecting rod

### Piston pin

|   |                                   | Unit: mm (in) |
|---|-----------------------------------|---------------|
| Piston pin outer diameter                             | 21.989 - 22.001 (0.8657 - 0.8662) |               |
| Interference fit of piston pin to piston              | 0 - 0.004 (0 - 0.0002)            |               |
| <b>Piston pin to connecting rod bushing clearance</b> |                                   |               |
| Standard  | 0.005 - 0.017 (0.0002 - 0.0007)   |               |
| Limit   | 0.023 (0.0009)                    |               |

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

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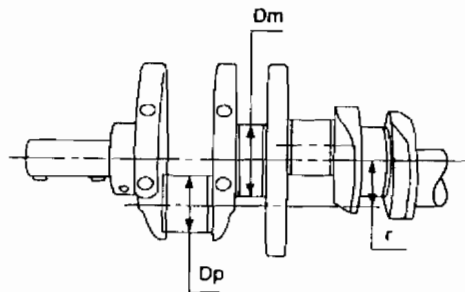
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**Inspection and Adjustment (Cont'd)**

**CRANKSHAFT**

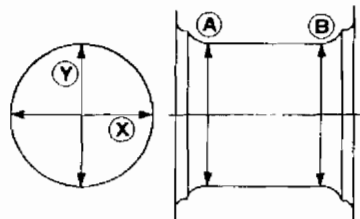
Unit: mm (in)

|                        |                                   |
|------------------------|-----------------------------------|
| Main journal dia. "Dm" |                                   |
| Grade No. 0            | 54.974 - 54.980 (2.1643 - 2.1646) |
| Grade No. 1            | 54.968 - 54.974 (2.1641 - 2.1643) |
| Grade No. 2            | 54.962 - 54.968 (2.1639 - 2.1641) |
| Grade No. 3            | 54.956 - 54.962 (2.1636 - 2.1639) |
| Pin journal dia. "Dp"  |                                   |
| Grade No. 0            | 47.968 - 47.974 (1.8885 - 1.8887) |
| Grade No. 1            | 47.962 - 47.968 (1.8883 - 1.8885) |
| Grade No. 2            | 47.956 - 47.962 (1.8880 - 1.8883) |
| Center distance "r"    |                                   |
|                        | 42.96 - 43.04 (1.6913 - 1.6945)   |
| Out-of-round (X - Y)   |                                   |
| Standard               |                                   |
| Main journal           | Less than 0.005 (0.0002)          |
| Pin journal            | Less than 0.0025 (0.0001)         |
| Taper (A - B)          |                                   |
| Standard               |                                   |
| Main journal           | Less than 0.005 (0.0002)          |
| Pin journal            | Less than 0.0025 (0.0001)         |
| Runout [TIR]           |                                   |
| Standard               |                                   |
|                        | Less than 0.025 (0.0010)          |
| Limit                  |                                   |
|                        | Less than 0.05 (0.0020)           |
| Free end play          |                                   |
| Standard               |                                   |
|                        | 0.10 - 0.26 (0.0039 - 0.0102)     |
| Limit                  |                                   |
|                        | 0.30 (0.0118)                     |



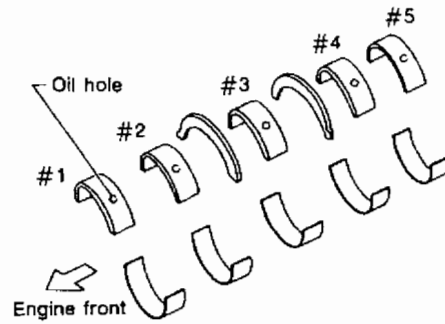
SEM954C

Out-of-round (X - Y)  
Taper (A - B)



EM715

**AVAILABLE MAIN BEARING**



SEM685D

**Main bearing (Standard)**

Unit: mm (in)

| Grade number | Thickness "T"                      | Width "W"                      | Identification color (mark) |
|--------------|------------------------------------|--------------------------------|-----------------------------|
| 0            | 1.977 - 1.980<br>(0.0778 - 0.0780) | 18.9 - 19.1<br>(0.744 - 0.752) | Black (A)                   |
| 1            | 1.980 - 1.983<br>(0.0780 - 0.0781) |                                | Brown (B)                   |
| 2            | 1.983 - 1.986<br>(0.0781 - 0.0782) |                                | Green (C)                   |
| 3            | 1.986 - 1.989<br>(0.0782 - 0.0783) |                                | Yellow (D)                  |
| 4            | 1.989 - 1.992<br>(0.0783 - 0.0784) |                                | Blue (E)                    |
| 5            | 1.992 - 1.995<br>(0.0784 - 0.0785) |                                | Pink (F)                    |
| 6            | 1.995 - 1.998<br>(0.0785 - 0.0787) |                                | No color (G)                |

**Main bearing (Undersize)**

Unit: mm (in)

| Undersize     | Thickness "T"                      | Main journal diameter "Dm"                              |
|---------------|------------------------------------|---|
| 0.25 (0.0098) | 2.109 - 2.117<br>(0.0830 - 0.0833) | Grind so that bearing clearance is the specified value. |

# SERVICE DATA AND SPECIFICATIONS (SDS)

## Inspection and Adjustment (Cont'd)

### AVAILABLE CONNECTING ROD BEARING

#### Connecting rod bearing

#### Standard size

Unit: mm (in)

| Grade number | Thickness "T"                      | Width "W"                      | Identification color (mark) |
|--------------|------------------------------------|--------------------------------|-----------------------------|
| 0            | 1.500 - 1.503<br>(0.0591 - 0.0592) | 16.9 - 17.1<br>(0.665 - 0.673) | No color (A)                |
| 1            | 1.503 - 1.506<br>(0.0592 - 0.0593) |                                | Black (B)                   |
| 2            | 1.506 - 1.509<br>(0.0593 - 0.0594) |                                | Brown (C)                   |

#### Undersize

Unit: mm (in)

| Undersize     | Thickness "T"                      | Crank pin journal diameter "Dp"                         |
|---------------|------------------------------------|---|
| 0.08 (0.0031) | 1.541 - 1.549<br>(0.0607 - 0.0610) | Grind so that bearing clearance is the specified value. |
| 0.12 (0.0047) | 1.561 - 1.569<br>(0.0615 - 0.0618) |   |
| 0.25 (0.0098) | 1.626 - 1.634<br>(0.0640 - 0.0643) |   |

#### Bearing clearance

Unit: mm (in)

|   |                                 |
|---|---------------------------------|
| <b>Main bearing clearance</b>           |                                 |
| Standard                                | 0.004 - 0.022 (0.0002 - 0.0009) |
| Limit                                   | 0.05 (0.0020)                   |
| <b>Connecting rod bearing clearance</b> |                                 |
| Standard                                | 0.020 - 0.045 (0.0008 - 0.0018) |
| Limit                                   | 0.65 (0.0256)                   |

### MISCELLANEOUS COMPONENTS

Unit: mm (in)

|                                      |               |
|--------------------------------------|---------------|
| Camshaft sprocket runout limit [TIR] | 0.25 (0.0098) |
| Flywheel runout limit [TIR]          | 0.15 (0.0059) |

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# ENGINE LUBRICATION & COOLING SYSTEMS

## SECTION **LC**

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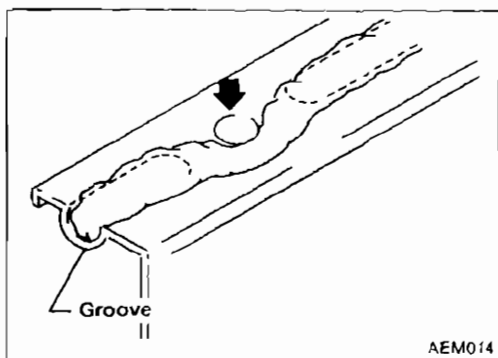
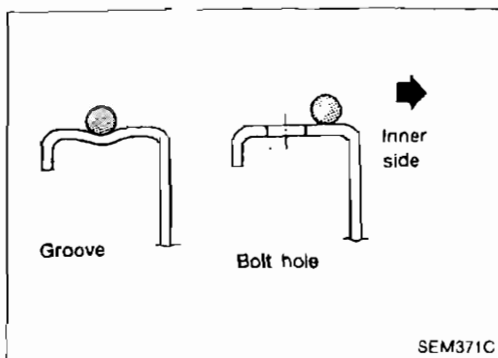
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|   |    |   |    |
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| Precaution .....                        | 2  | Refilling Engine Coolant .....                        | 11 |
| Special Service Tools .....             | 2  | Water Pump .....                                      | 11 |
| <b>ENGINE LUBRICATION SYSTEM</b> .....  | 4  | Thermostat .....                                      | 12 |
| Lubrication Circuit .....               | 4  | Water Outlet .....                                    | 13 |
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| Cooling Circuit .....                   | 10 |   |    |

## PRECAUTION AND PREPARATION

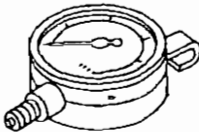
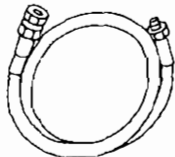
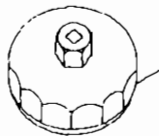
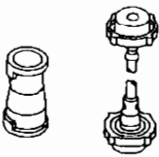


### Precaution

#### LIQUID GASKET APPLICATION PROCEDURE

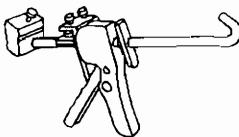

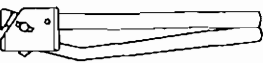
- a. Use a scraper to remove all traces of old liquid gasket from mating surfaces and grooves. Also, completely clean any oil from these areas.
- b. Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine Liquid Gasket or equivalent.)
  - Be sure liquid gasket is 4.0 to 5.0 mm (0.157 to 0.197 in) wide (for oil pan).
  - Be sure liquid gasket is 2.0 to 3.0 mm (0.079 to 0.118 in) wide (in areas except oil pan).
- c. Apply liquid gasket to inner surface around hole perimeter area. (Assembly should be done within 5 minutes after coating.)
- d. Wait at least 30 minutes before refilling engine oil and engine coolant.

### Special Service Tools

| Tool number<br>Tool name                  | Description   |
|---|---|
| ST25051001<br>Oil pressure gauge          | <br>NT050  |
| ST25052000<br>Hose                        | <br>Adapting oil pressure gauge to cylinder block<br>NT051   |
| KV10115801<br>Oil filter wrench           | <br>Removing oil filter<br>14 faces<br>Inner span 64.3 mm (2.531 in)<br>(Face to opposite face)<br>NT362 |
| EG17650301<br>Radiator cap tester adapter | <br>Adapting radiator cap tester to radiator filler neck<br>NT053  |

# PRECAUTION AND PREPARATION

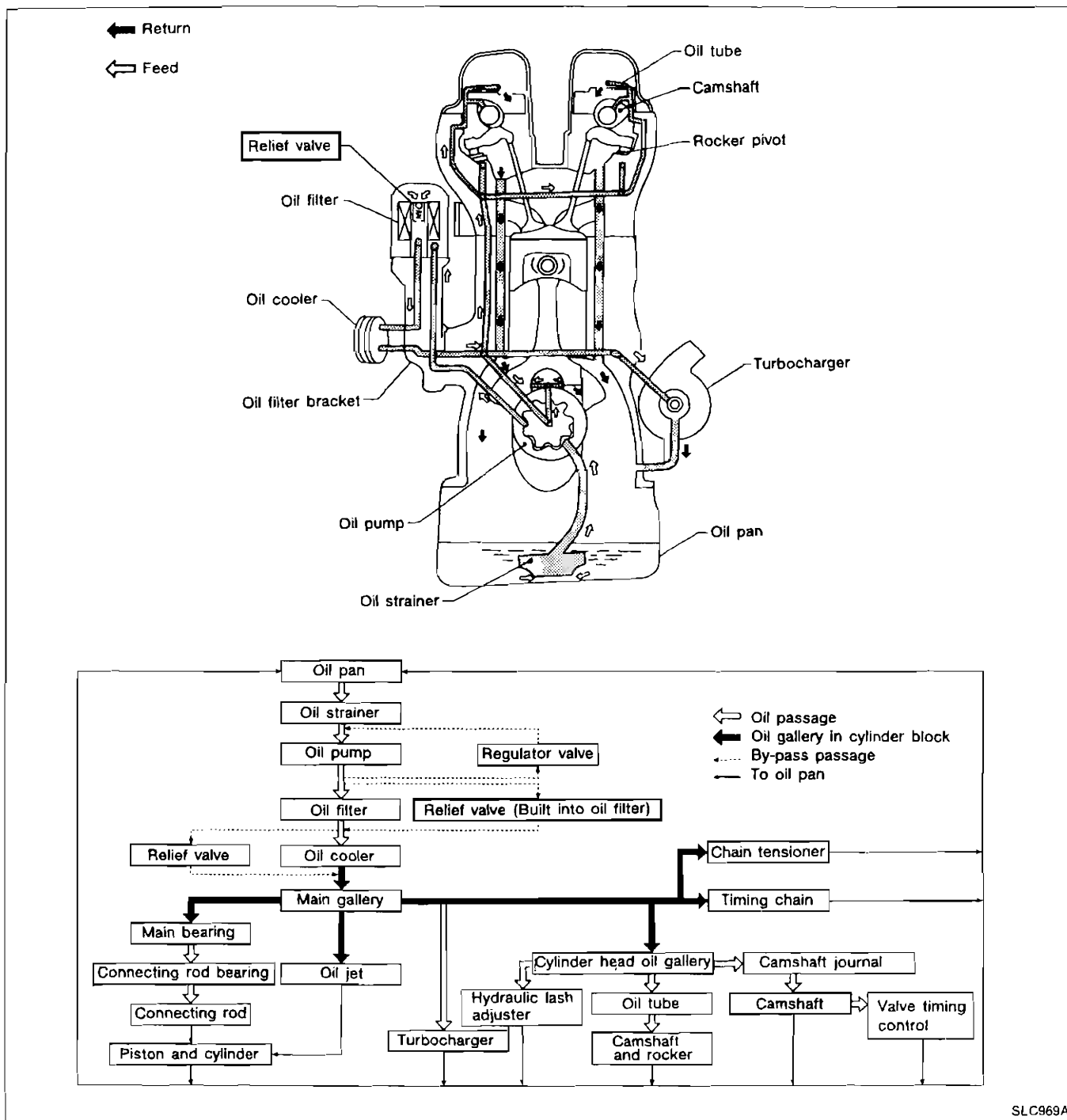
## Special Service Tools (Cont'd)

| Tool number<br>Tool name              | Description  |   |
|---------------------------------------|--|---|
| WS39930000<br>Tube presser            | <br>NT052 | Pressing the tube of liquid gasket<br>CI<br>MA<br>EM      |
| KV99103510<br>Radiator plate pliers A | <br>NT224 | Installing radiator upper and lower tanks<br>LC<br>EC     |
| KV99103520<br>Radiator plate pliers B | <br>NT225 | Removing radiator upper and lower tanks<br>FE<br>CL<br>MT |

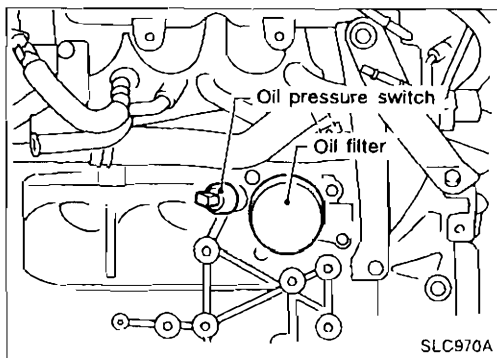
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# ENGINE LUBRICATION SYSTEM

## Lubrication Circuit



SLC969A



SLC970A

## Oil Pressure Check

### WARNING:

- Be careful not to burn yourself, as the engine and oil may hot.
  - Oil pressure check should be done in "Neutral position".
1. Check oil level.
  2. Remove oil pressure switch.

# ENGINE LUBRICATION SYSTEM

## Oil Pressure Check (Cont'd)

3. Install pressure gauge.
4. Start engine and warm it up to normal operating temperature.
5. Check oil pressure with engine running under no-load.

**Approximate discharge pressure: kPa (bar, kg/cm<sup>2</sup>, psi)**

**Engine speed at idle**

**More than 78 (0.78, 0.8, 11)**

**Engine speed at 3,200 rpm**

**314 - 392 (3.14 - 3.92, 3.2 - 4.0, 46 - 57)**

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

6. Install oil pressure switch with sealant.

## Oil Pump

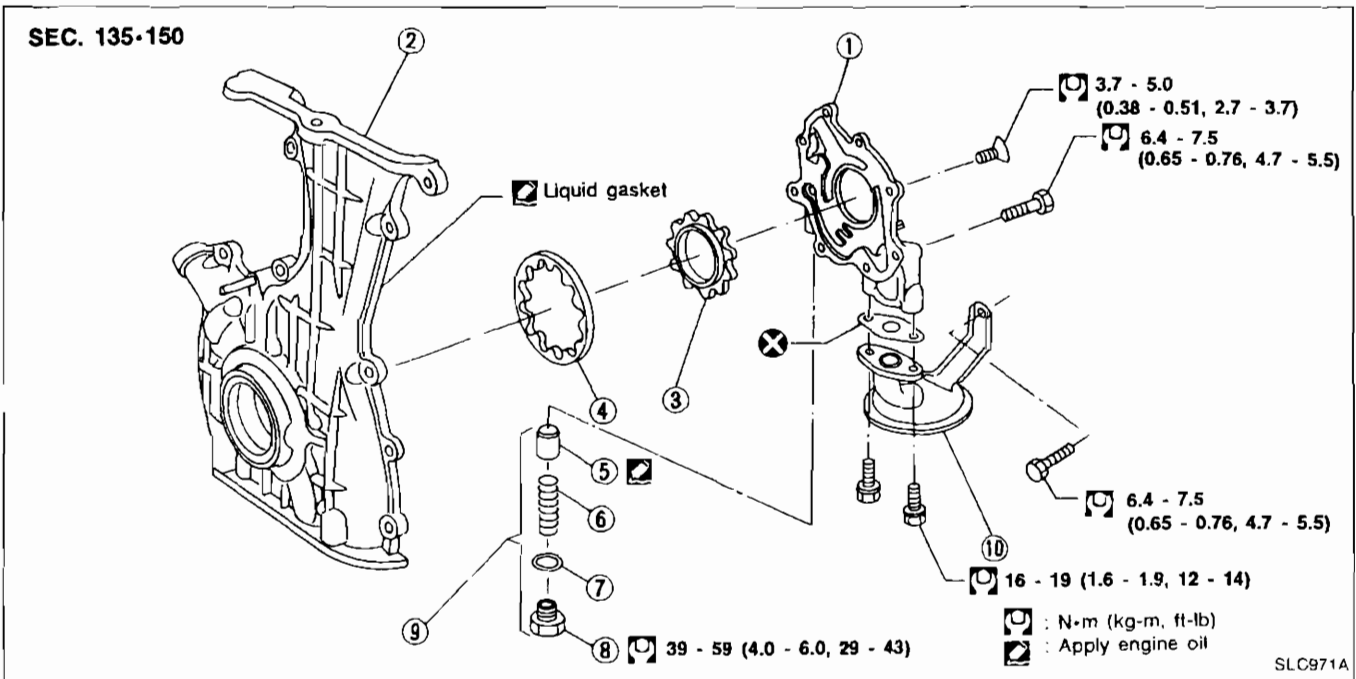
### REMOVAL

1. Remove front cover.

**Refer to "TIMING CHAIN" in EM section.**

2. Remove oil pump cover.

### DISASSEMBLY AND ASSEMBLY



- Always replace oil seals and gaskets with new ones.
- When installing oil pump, apply engine oil to inner and outer gears.

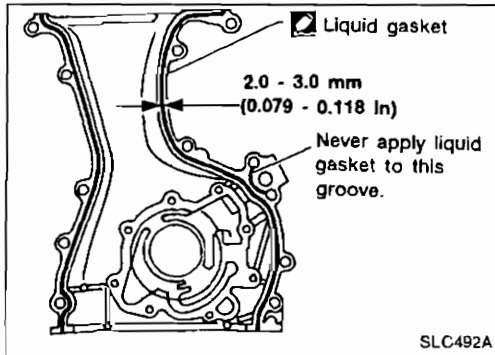
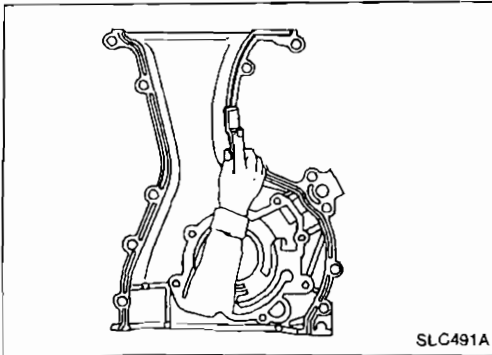


## ENGINE LUBRICATION SYSTEM

### Oil Pump (Cont'd)

#### INSTALLATION

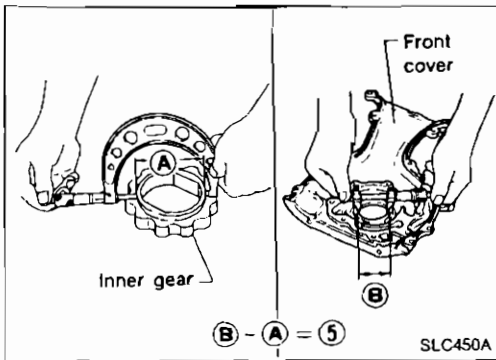
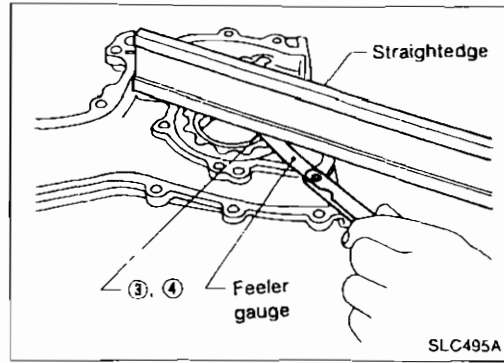
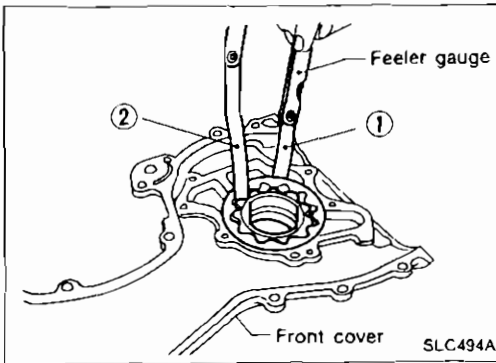
- Before installing front cover assembly, remove all traces of liquid gasket from mating surface using a scraper.
- Also remove traces of liquid gasket from mating surface of cylinder block.



1. Apply a continuous bead of liquid gasket to mating surface of front cover assembly.
- Use Genuine Liquid Gasket or equivalent.
2. Installation is in reverse order of removal.

# ENGINE LUBRICATION SYSTEM

## Oil Pump (Cont'd)



SLC860A

### INSPECTION

Using a feeler gauge, check the following clearances:

Unit: mm (in)

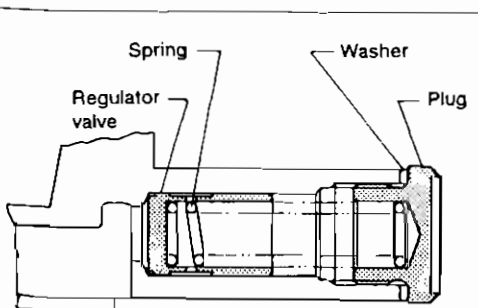
|   |                                 |
|---|---------------------------------|
| Body to outer gear clearance ①                      | 0.114 - 0.200 (0.0045 - 0.0079) |
| Inner gear to outer gear tip clearance ②            | Below 0.18 (0.0071)             |
| Body to inner gear side clearance ③                 | 0.05 - 0.09 (0.0020 - 0.0035)   |
| Body to outer gear side clearance ④                 | 0.05 - 0.11 (0.0020 - 0.0043)   |
| Inner gear to brazed portion of housing clearance ⑤ | 0.045 - 0.091 (0.0018 - 0.0036) |

- If the tip clearance (②) exceeds the limit, replace gear set.
- If body to gear side clearances (①, ③, ④, ⑤) exceed the limit, replace front cover assembly.

### REGULATOR VALVE INSPECTION

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 freely into the valve hole by its own weight.

If damaged, replace regulator valve set or front cover assembly.



SLC295-A

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## ENGINE LUBRICATION SYSTEM

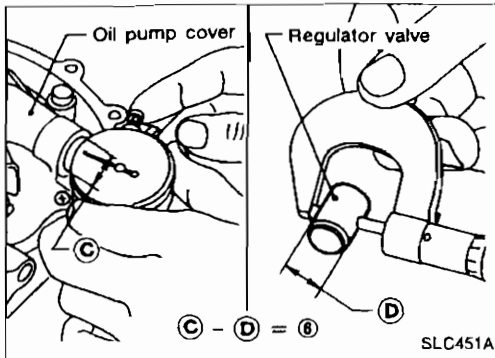
### Oil Pump (Cont'd)

4. Check regulator valve to oil pump cover clearance.

Clearance:

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

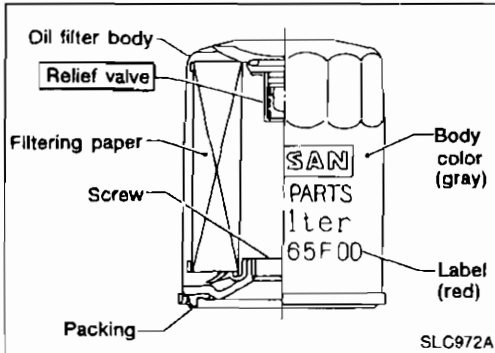
If it exceeds the limit, replace oil pump cover.



### Oil Filter

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

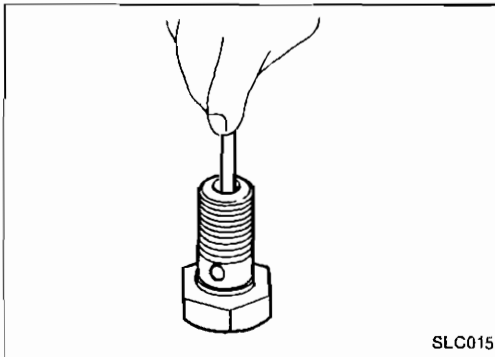
- The new and existing oil filter designs differ from each other and are not interchangeable.
- Use Tool KV10115801 for removing oil filter.



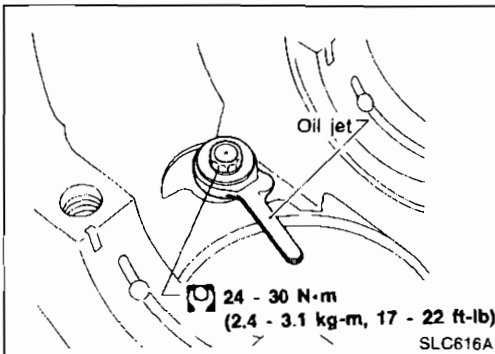
### Oil Jet (For piston)

#### INSPECTION

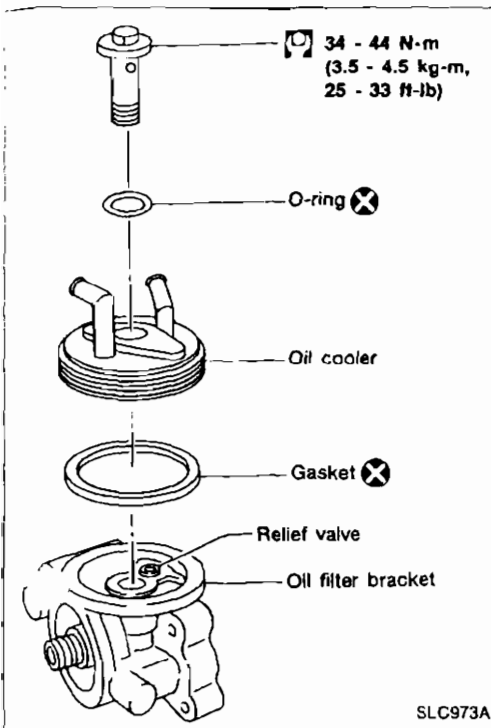
1. Blow through outlet of oil jet and make sure that air comes out of inlet.
2. Push cut-off valve of oil jet bolt with a clean resin or brass rod and make sure that cut-off valve moves smoothly with proper repulsion.



When installing oil jet, align oil jet's boss with hole on cylinder block.



# ENGINE LUBRICATION SYSTEM



## Oil Cooler

### REMOVAL AND INSTALLATION

1. Drain engine oil and coolant.
2. Remove oil cooler.
3. Installation is in reverse order of removal.

### INSPECTION

#### Oil cooler

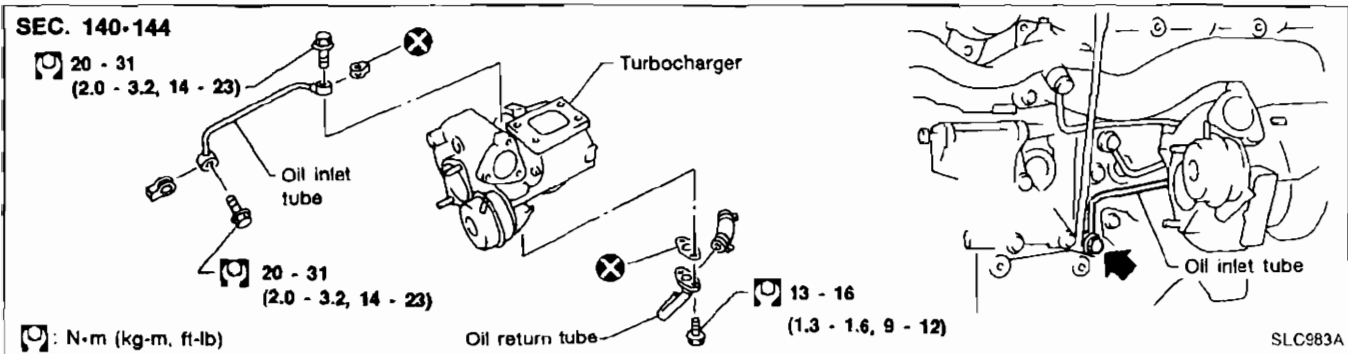
1. Check oil cooler for cracks.
2. Check oil cooler for clogging by blowing through coolant inlet.

If necessary, replace oil cooler assembly.

#### Oil pressure relief valve

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.

## Turbocharger Oil Tube



- For installation, first hand-tighten bolts connecting tubes. Then tighten bolts to the specified torques.
- Be careful not to deform tubes.
- After installation, run engine for a few minutes, and check for oil leakage.

GI

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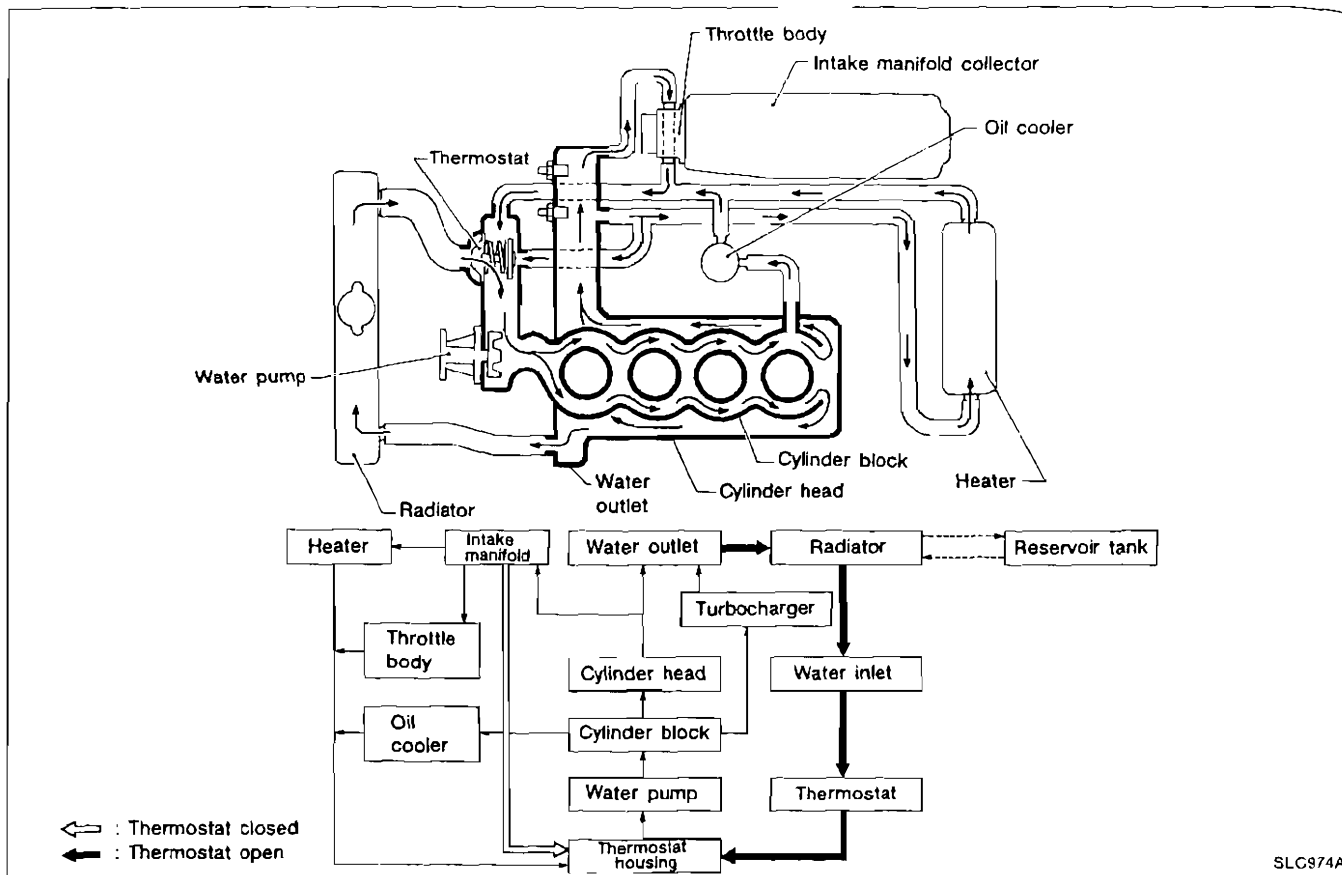
HA

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# ENGINE COOLING SYSTEM

## Cooling Circuit



## System Check

### 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 cap and carefully remove the cap 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

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

### CHECKING COOLING SYSTEM FOR LEAKS

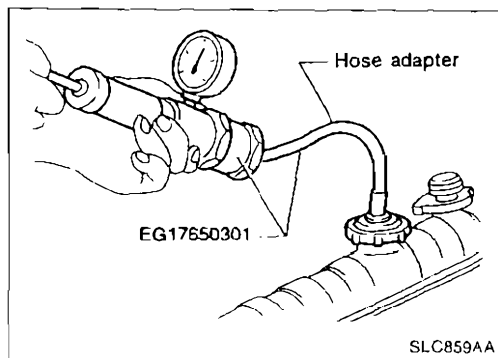
To check for leakage, apply pressure to the cooling system with a tester.

#### Testing pressure:

157 kPa (1.57 bar, 1.6 kg/cm<sup>2</sup>, 23 psi)

### CAUTION:

Higher than the specified pressure may cause radiator damage.



# ENGINE COOLING SYSTEM

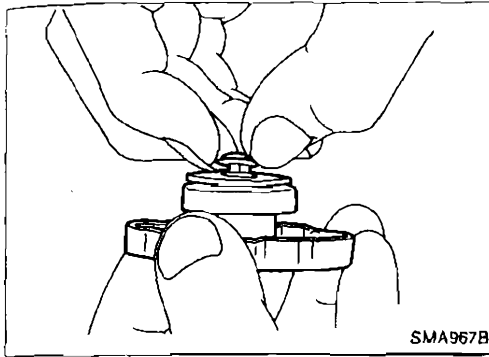
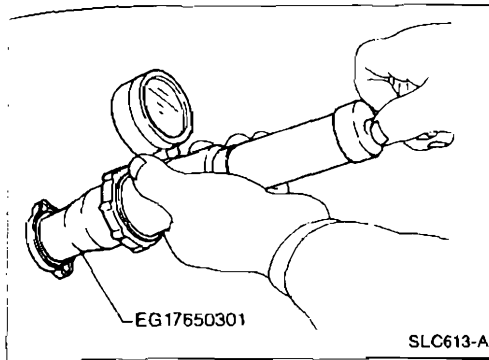
## System Check (Cont'd)

### CHECKING RADIATOR CAP

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

**Radiator cap relief pressure:**

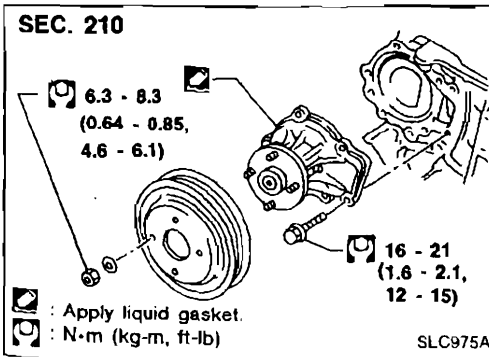
78 - 98 kPa (0.78 - 0.98 bar, 0.8 - 1.0 kg/cm<sup>2</sup>, 11 - 14 psi)



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

### Refilling Engine Coolant

Refer to "Changing Engine coolant" in MA section.



### Water Pump

#### 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

1. Drain coolant from cylinder block and radiator.
2. Remove fan coupling with fan.
3. Remove power steering pump drive belt, alternator drive belt and air compressor drive belt.
4. Remove water pump.

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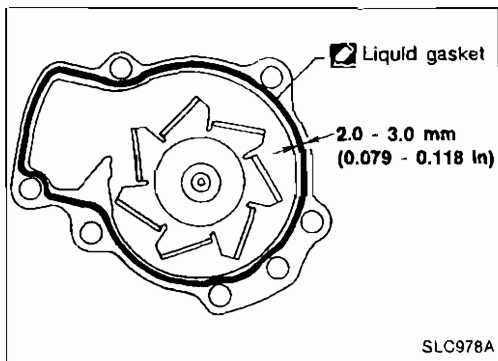
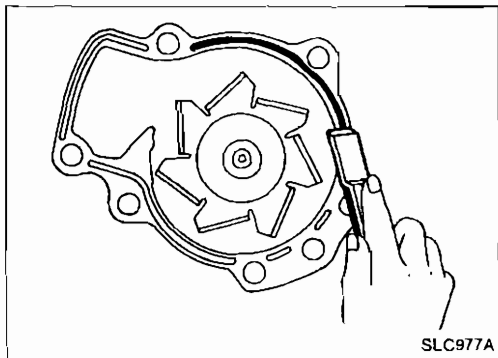
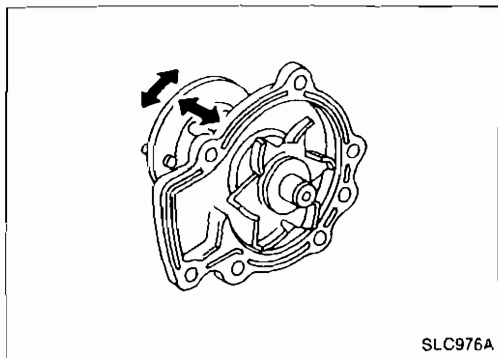
DX

# ENGINE COOLING SYSTEM

## Water Pump (Cont'd)

### INSPECTION

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

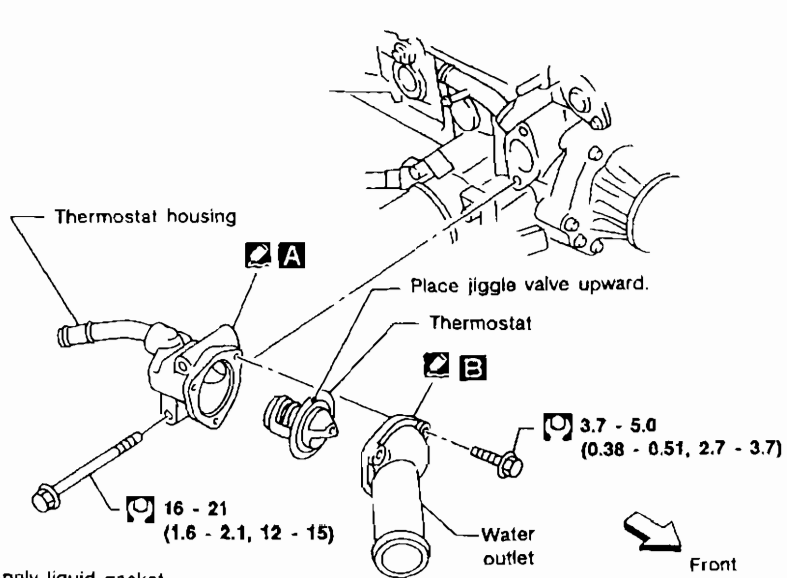


### INSTALLATION

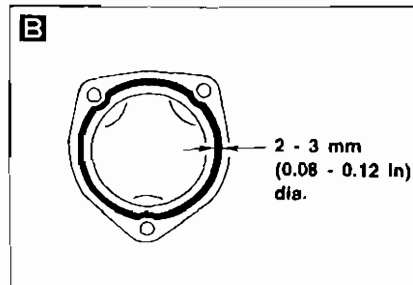
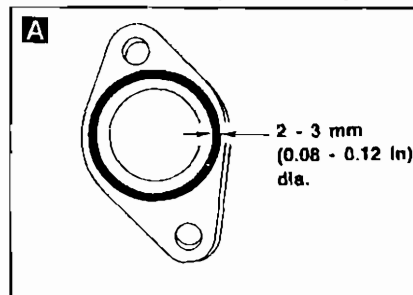
1. Use a scraper to remove old liquid gasket from water pump.
  - Also remove traces of liquid gasket from mating surface of cylinder block.
2. Apply a continuous bead of liquid gasket to mating surface of water pump.
  - Use genuine liquid gasket or equivalent.

## Thermostat

### SEC. 210



### Liquid gasket application places



SLC979A

# ENGINE COOLING SYSTEM

## Thermostat (Cont'd)

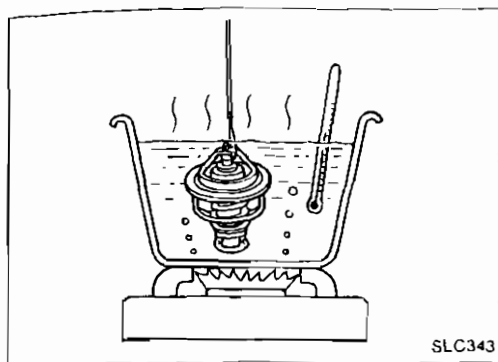
### INSPECTION

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

|                           |               |                            |
|---------------------------|---------------|----------------------------|
| Valve opening temperature | °C (°F)       | 76.5 (170)                 |
| Maximum valve lift        | mm/°C (in/°F) | More than 10/90 (0.39/194) |

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

- Apply a continuous bead of liquid gasket to mating surface of water inlet. Refer to "Water Pump (LC-11)".
- 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.



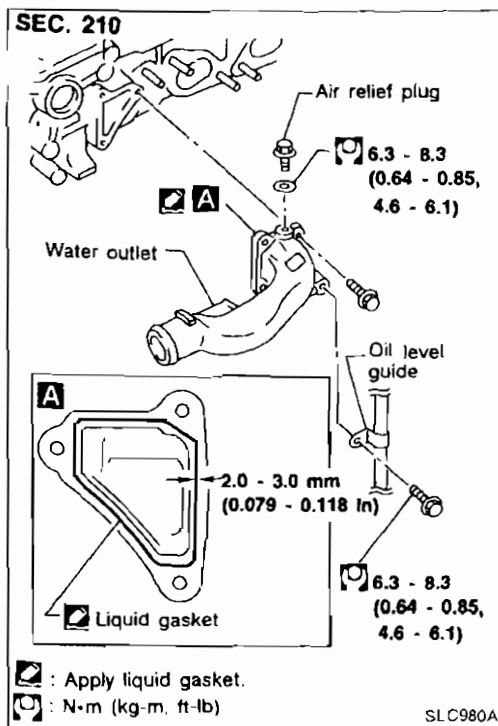
## Water Outlet

### INSPECTION

Visually inspect for water leaks. If there is leakage, apply liquid gasket.

### INSTALLATION

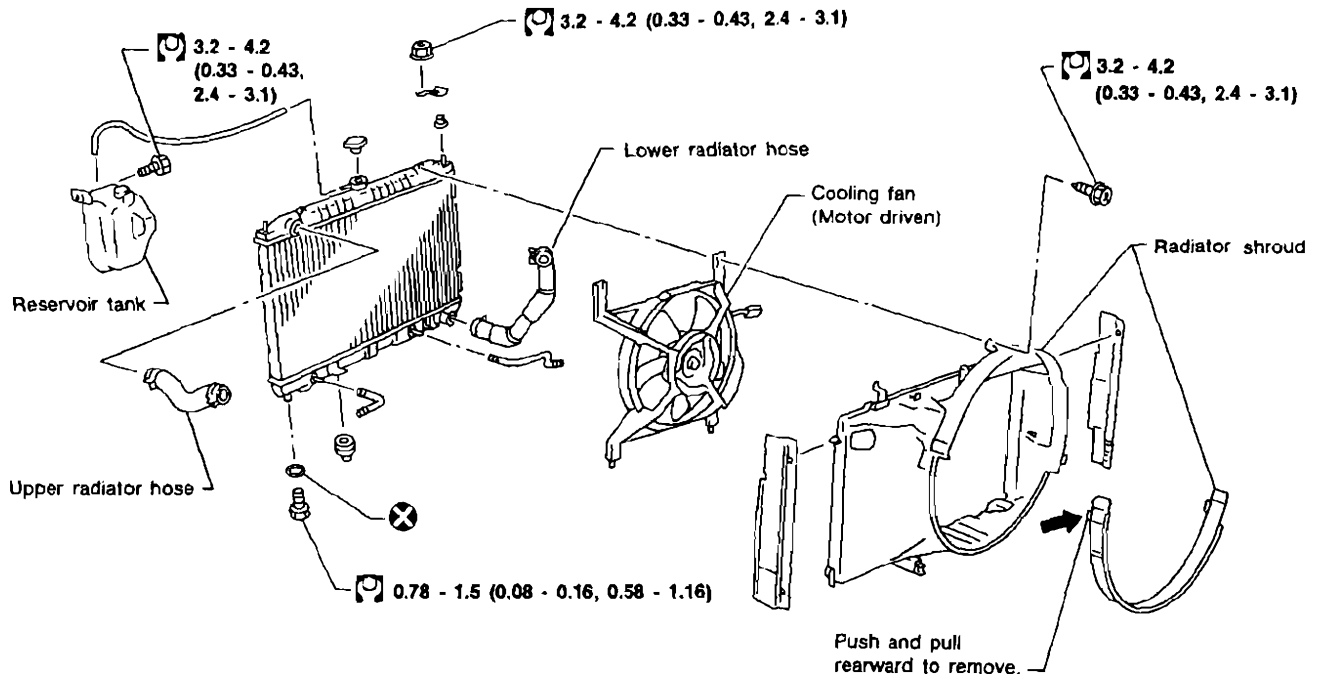
1. Use a scraper to remove old liquid gasket from water outlet.
- Also remove traces of liquid gasket from mating surface of cylinder head.
2. Apply a continuous bead of liquid gasket to mating surface of water outlet.
- Use Genuine Liquid Gasket or equivalent.





# ENGINE COOLING SYSTEM

## SEC. 214



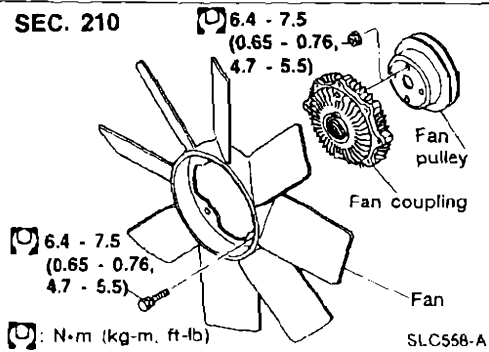
: N·m (kg-m, ft-lb)

SLC981A

## Cooling Fan Control System (Motor driven)

Fans are controlled by ECM. For details, refer to EC section.

## SEC. 210

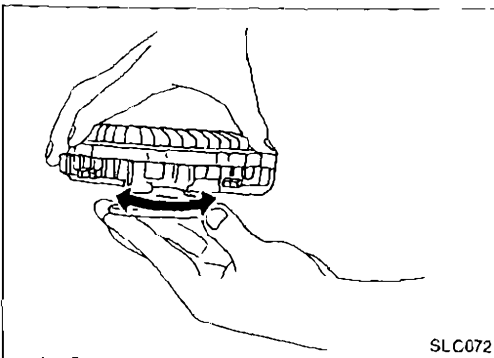


## Cooling Fan (Crankshaft driven)

### DISASSEMBLY AND ASSEMBLY

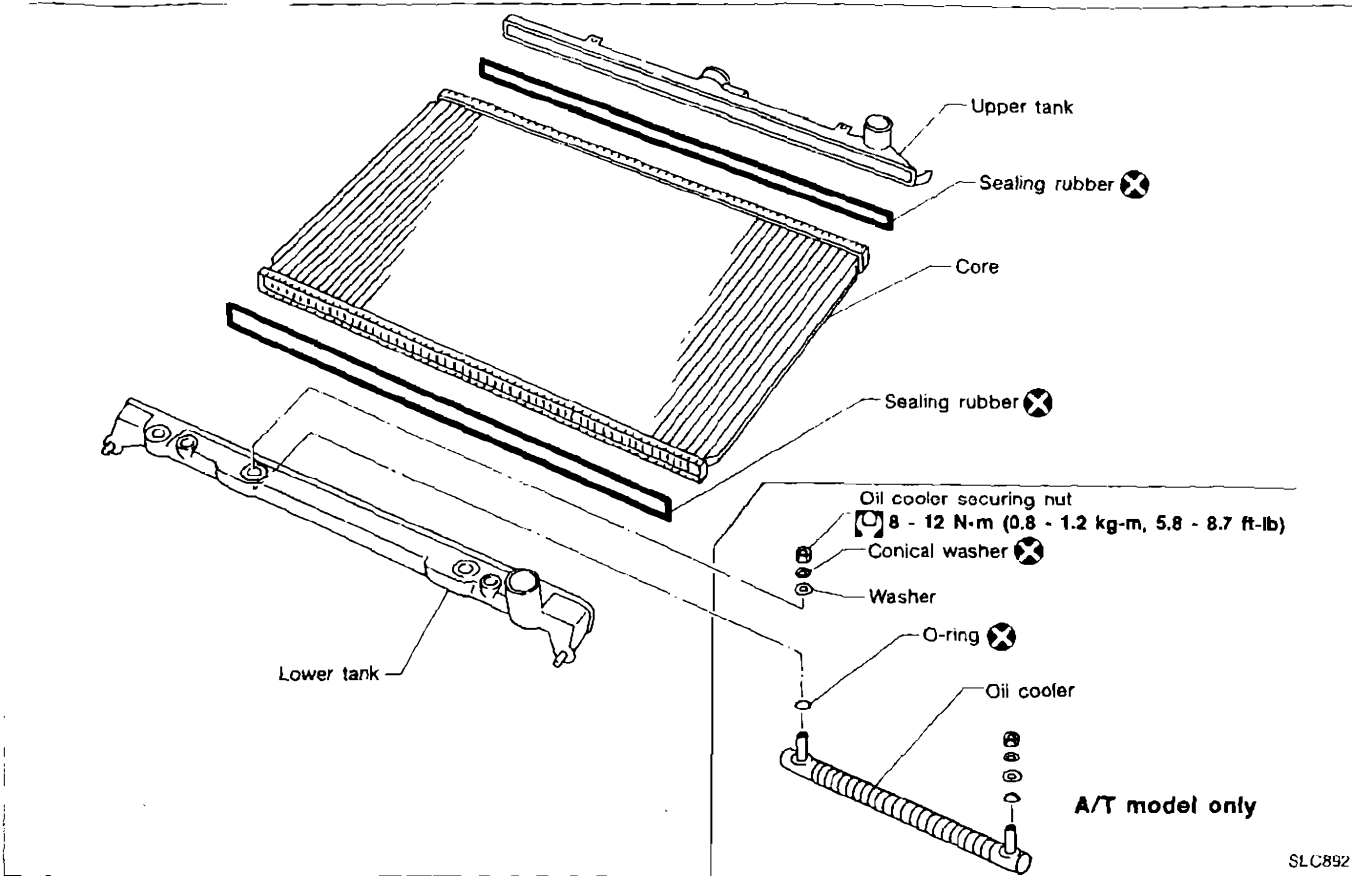
### INSPECTION

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



# ENGINE COOLING SYSTEM

## Radiator (Aluminum type)



GT  
MA  
EM  
LC  
FC  
EE  
CL  
MT  
AT  
PD  
FA  
RA  
BR  
ST  
RS  
ST  
HA  
EL  
FDX

Aluminum radiator can be disassembled by using special procedures and special service tools.

### PREPARATION

#### Modification of radiator plate pliers A

For proper maintenance of aluminum radiator, modify the radiator plate pliers A (KV99103510) as described below. The modified tool will be usable for radiators with either square or circular sealing rubber.

For radiators with circular sealing rubber, avoid excessive crimping. The standard crimping height for this type is larger.

#### Step 1

1. Draw out pin at (a) and disassemble (b) from (c). Then, grind (b). (Fig. 1)
2. Grind (c). Finish the surface as smoothly as possible. (Fig. 2)

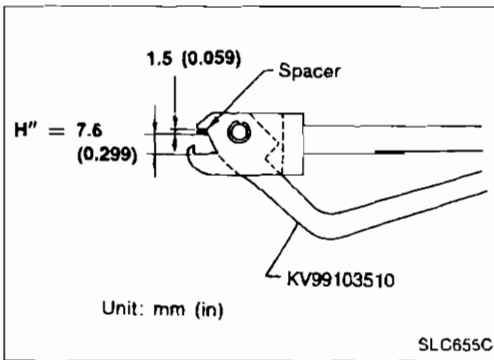
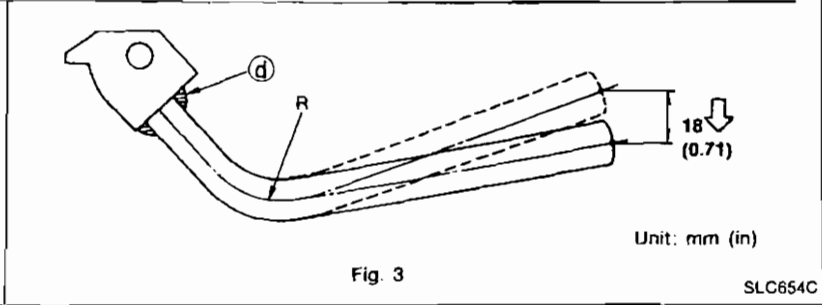
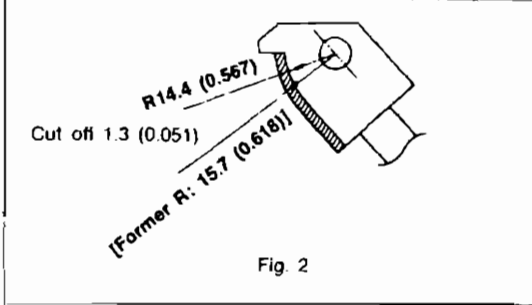
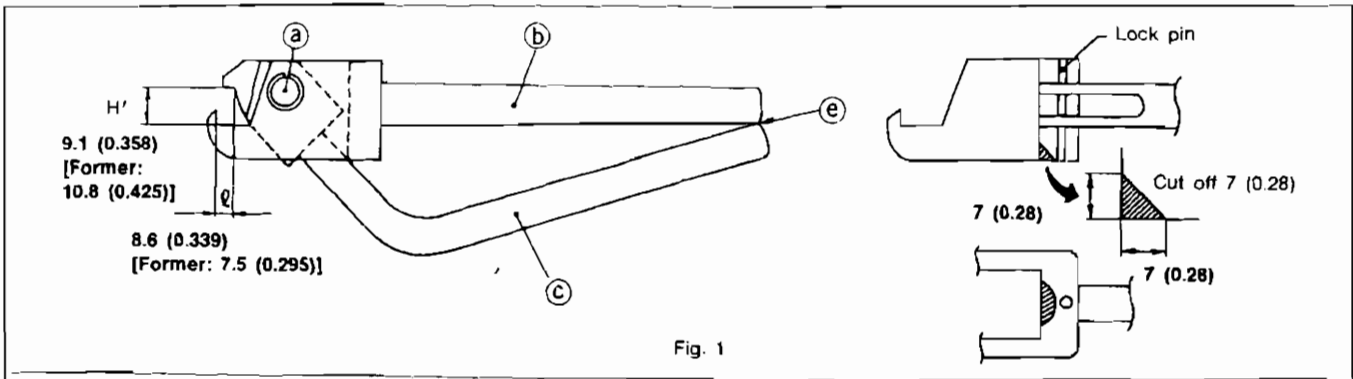
#### CAUTION:

**Be careful not to over-grind the standard size since it might damage washer when caulking.**

3. Using a burner on the curved portion, straighten (c) until its end is 18 mm (0.71 in) lower as shown in the figure (Fig. 3) Avoid applying too much force to (d).
4. Reassemble the tool in such a way that H' is approx. 9.1 mm (0.358 in) when (e) portion is joined. (Fig. 1)
5. If dimension H' can not be attained, adjust by grinding portion (b) or by straightening the curve (R) further. (Fig. 1, 3)

# ENGINE COOLING SYSTEM

## Radiator (Aluminum type) (Cont'd)

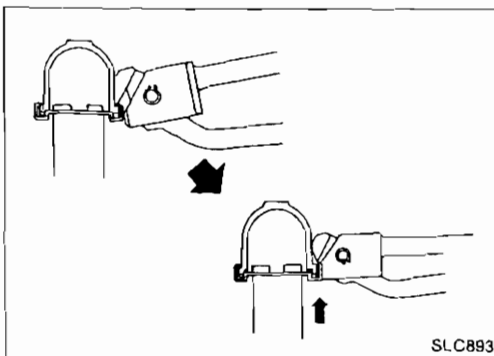
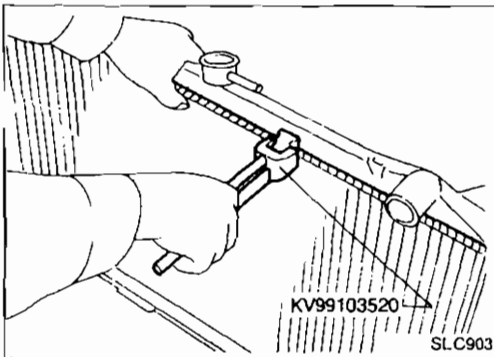


### Step 2

1. Make spacers (steel) with a specification of 1.5 mm (0.059 in) thick x 18 mm (0.71 in) wide x 8.5 mm (0.335 in) long.
2. Using double sided tape or adhesive, attach the spacer to the tip of the modified radiator plate pliers A.
3. Make sure that when radiator plate pliers A are closed dimension H'' is approx. 7.6 mm (0.299 in).
4. If dimension H'' is out of specification, adjust with the spacer.

### DISASSEMBLY

1. Remove tank with Tool.



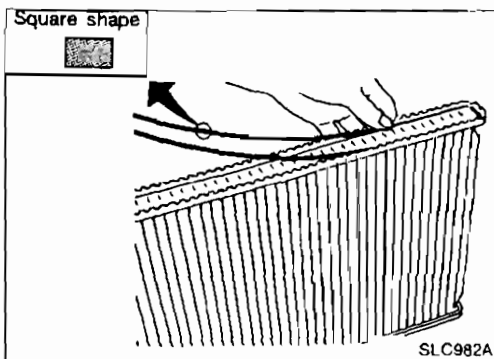
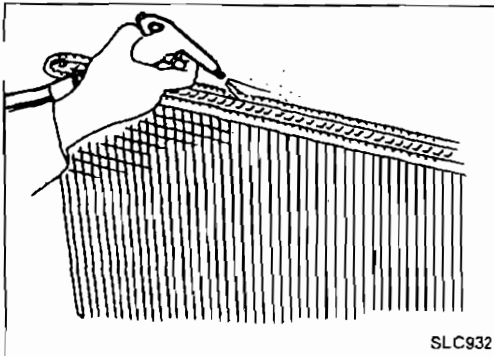
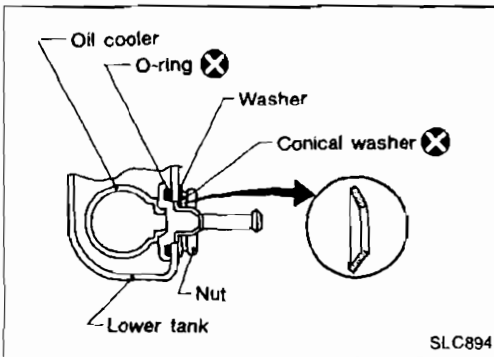
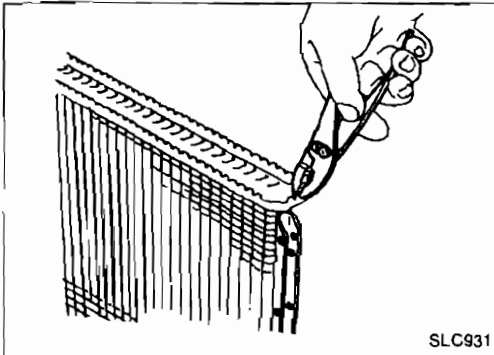
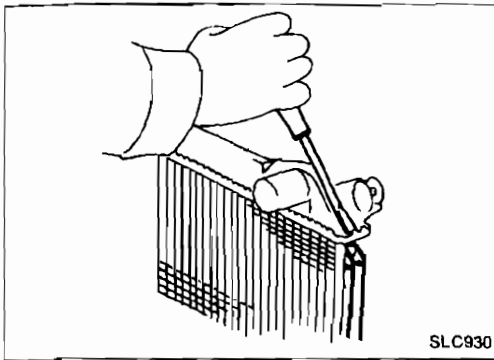
- Grip the crimped edge and bend it upwards so that Tool slips off.  
**Do not bend excessively.**

## ENGINE COOLING SYSTEM

### Radiator (Aluminum type) (Cont'd)

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

**Be careful not to damage tank.**



2. Make sure the edge stands straight up.
3. Remove oil cooler from tank. (A/T models only)

### ASSEMBLY

1. Install oil cooler. (A/T models only)  
**Pay attention to direction of conical washer.**

2. Clean contact portion of tank.

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

GI

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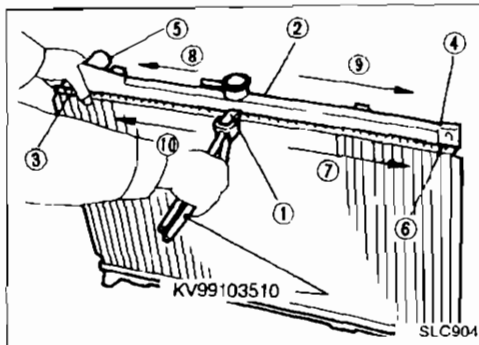
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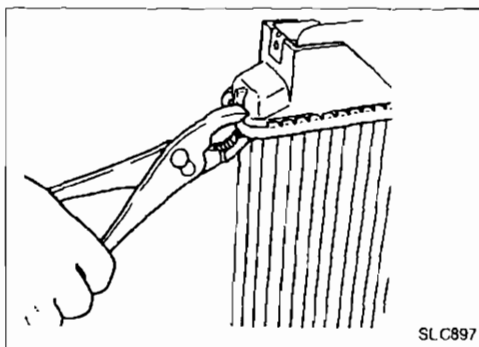
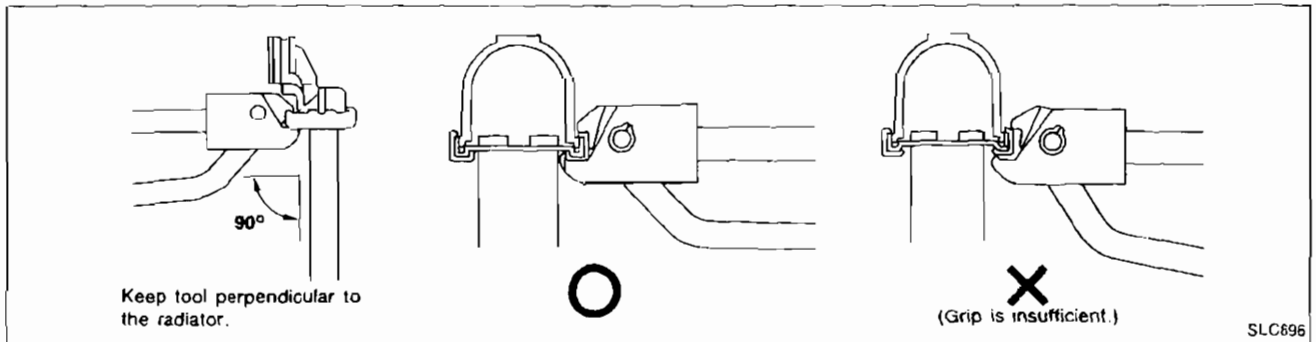
# ENGINE COOLING SYSTEM

## Radiator (Aluminum type) (Cont'd)

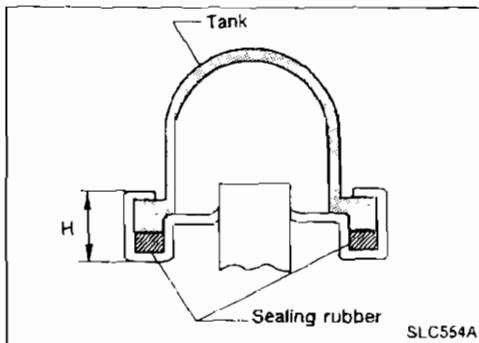


4. Caulk tank in specified sequence with Tool.

Be careful not to excessively caulk the radiator with circular shaped rubber. The Tool is not designed for the standard caulking height (H).



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



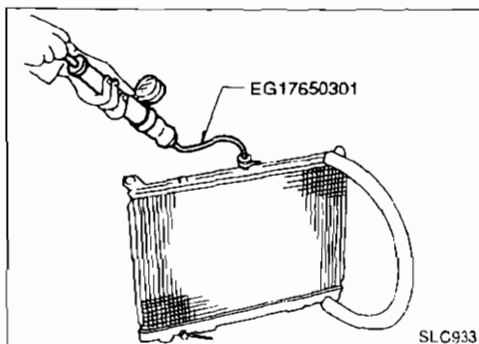
5. Make sure that the rim is completely crimped down.

Standard height "H":

8.0 - 8.4 mm (0.315 - 0.331 in)

6. Confirm that there is no leakage.

Refer to Inspection.



### INSPECTION

Apply pressure with Tool.

Specified pressure value:

157 kPa (1.57 bar, 1.6 kg/cm<sup>2</sup>, 23 psi)

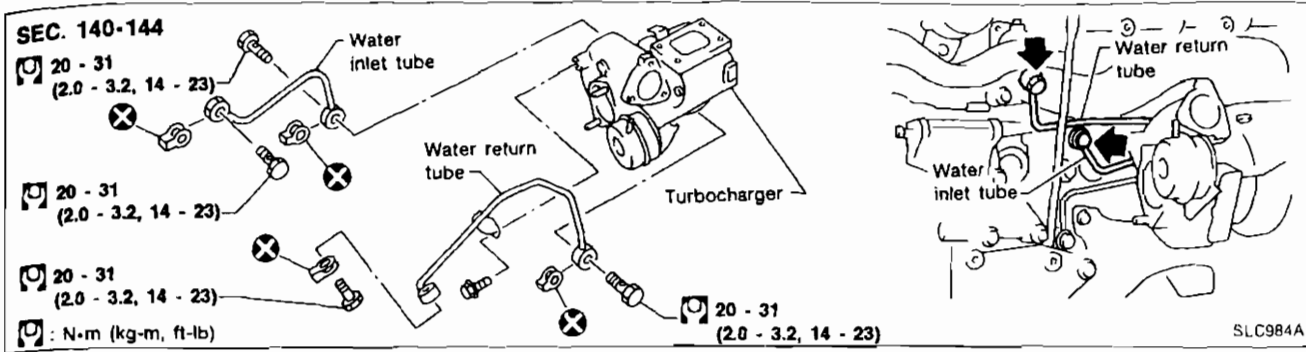
### WARNING:

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. (A/T models only)

# ENGINE COOLING SYSTEM

## Turbocharger Water Tube



- When installing water tubes, first hand-tighten bolts connecting tubes, then slightly tighten bracket securing bolts. Finally, tighten bolts securely.
- Be careful not to deform tubes.
- After installation, run engine for a few minutes, and check for water leakage.

GI

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# SERVICE DATA AND SPECIFICATIONS (S.D.S.)

## Engine Lubrication System

### Oil pressure

| Engine rpm | Approximate discharge pressure<br>kPa (bar, kg/cm <sup>2</sup> , psi) |
|------------|---|
| Idle speed | More than 78 (0.78, 0.8, 11)  |
| 3,200      | 314 - 392 (3.14 - 3.92, 3.2 - 4.0, 46 - 57)                           |

### Regulator valve

| Unit: mm (in)                               |                                 |
|---|---------------------------------|
| Regulator valve to oil pump cover clearance | 0.040 - 0.097 (0.0016 - 0.0038) |

### Oil pump

| Unit: mm (in)                                     |                                 |
|---|---------------------------------|
| Body to outer gear clearance                      | 0.114 - 0.200 (0.0045 - 0.0079) |
| Inner gear to outer gear tip clearance            | Below 0.18 (0.0071)             |
| Body to inner gear side clearance                 | 0.05 - 0.09 (0.0020 - 0.0035)   |
| Body to outer gear side clearance                 | 0.05 - 0.11 (0.0020 - 0.0043)   |
| Inner gear to brazed portion of housing clearance | 0.045 - 0.091 (0.0018 - 0.0036) |

## Engine Cooling System

### Cooling system leakage test

| Unit: kPa (bar, kg/cm <sup>2</sup> , psi) |                     |
|---|---------------------|
| Testing pressure                          | 157 (1.57, 1.6, 23) |

### Radiator cap

| Unit: kPa (bar, kg/cm <sup>2</sup> , psi) |   |
|---|---|
| Relief pressure                           | 78 - 98<br>(0.78 - 0.98,<br>0.8 - 1.0, 11 - 14) |

### Thermostat

|                           |               |                               |
|---------------------------|---------------|-------------------------------|
| Valve opening temperature | °C (°F)       | 76.5 (170)                    |
| Max. valve lift           | mm/°C (in/°F) | More than<br>10/90 (0.39/194) |

# ENGINE CONTROL SYSTEM

## SECTION **EC**

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- Read GI section, "HOW TO READ WIRING DIAGRAMS".
- See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.

When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".

## PREPARATION AND PRECAUTIONS

### Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System "Air Bag" and "Seat Belt Pre-tensioner", used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. 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.
- All SRS air bag electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS.

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## Engine Fuel & Emission Control System

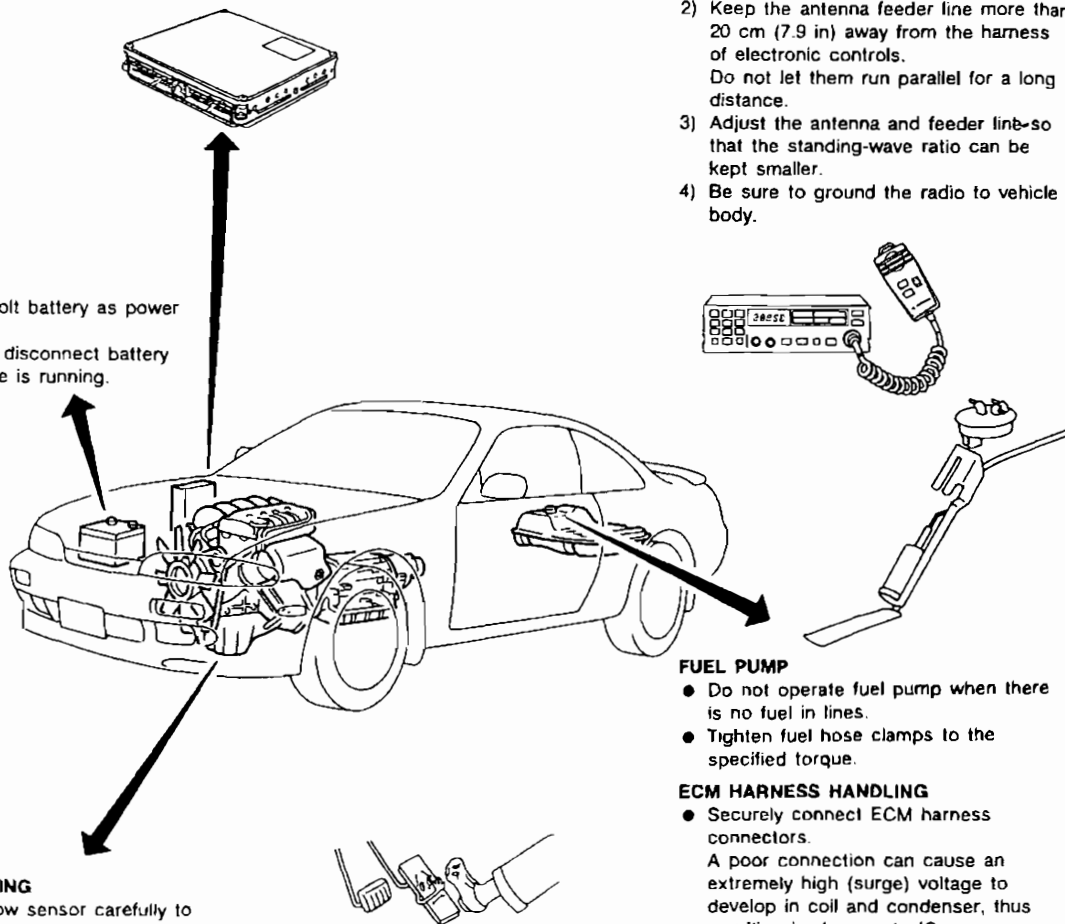
### ECM

- Do not disassemble ECM (ECCS control module).
- Do not turn diagnosis mode selector forcibly
- If a battery terminal is disconnected, the memory will return to the ECM value. The ECM will now 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.

### BATTERY

- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.



### ECSS 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.

### 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.

### WIRELESS EQUIPMENT

- When installing C.B. 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 as possible away from the ECM.
  - 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.

### FUEL PUMP

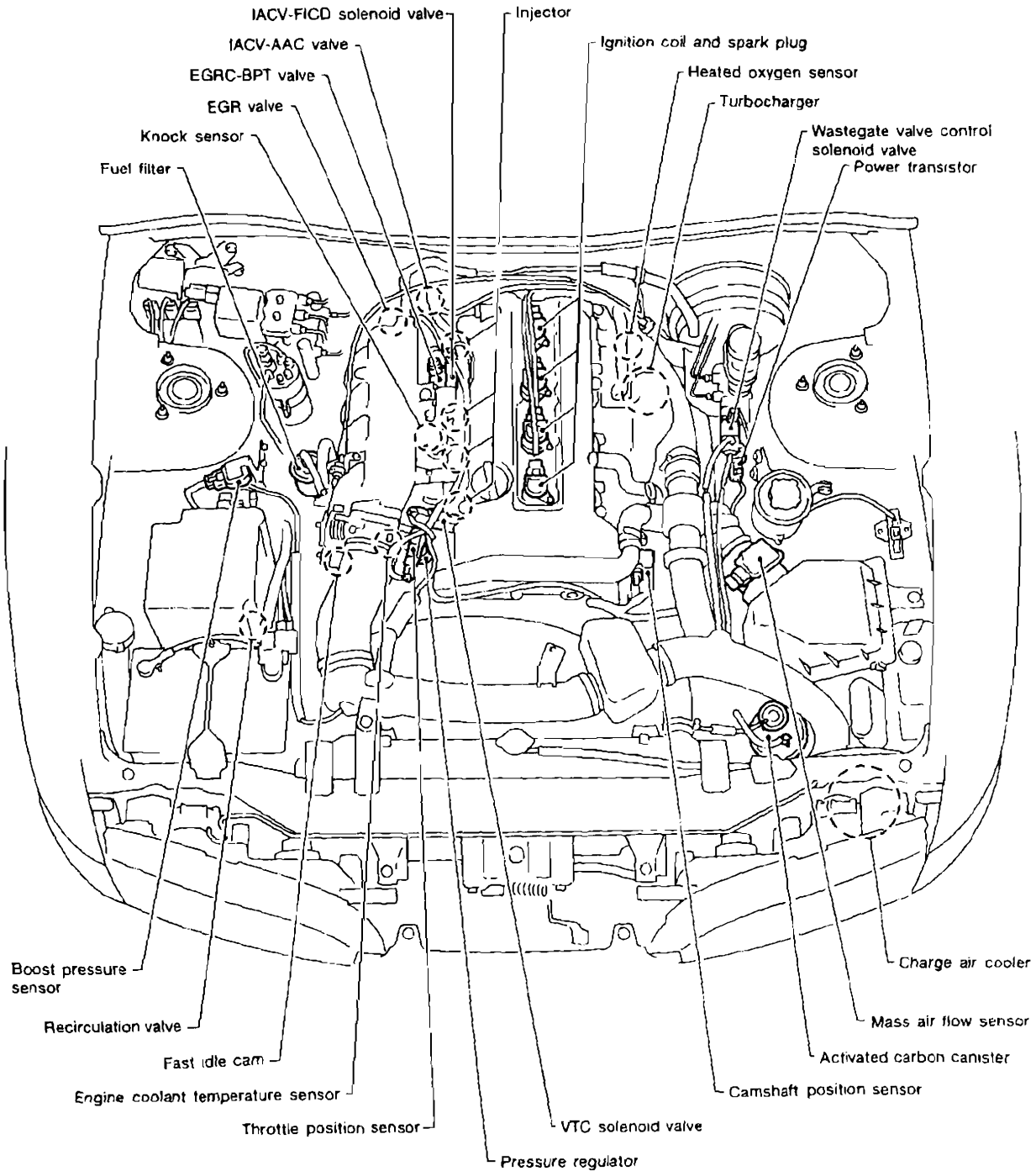
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.

### 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.

# ENGINE AND EMISSION CONTROL OVERALL SYSTEM

## ECCS Component Parts Location



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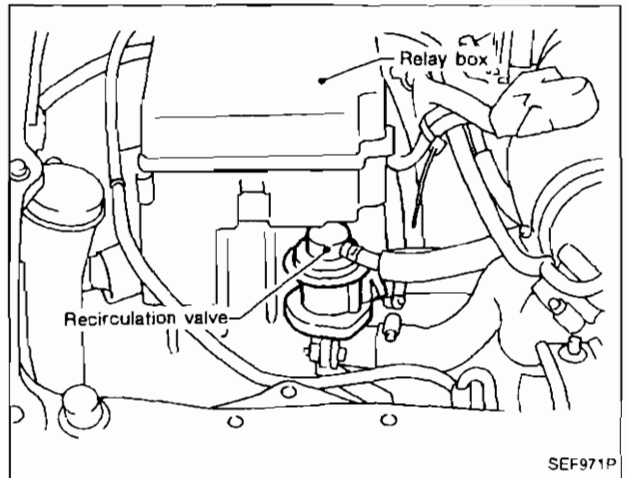
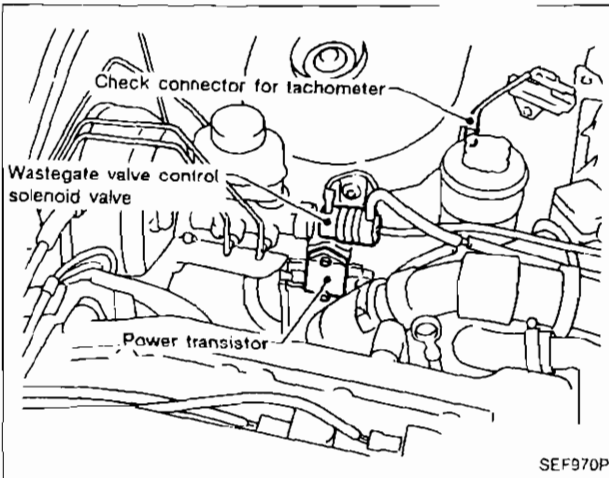
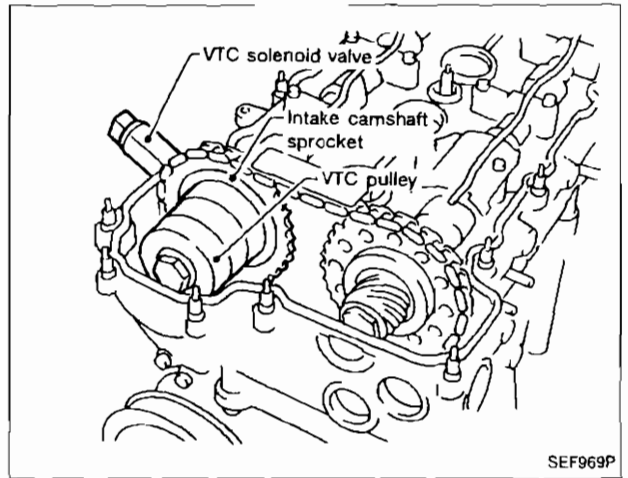
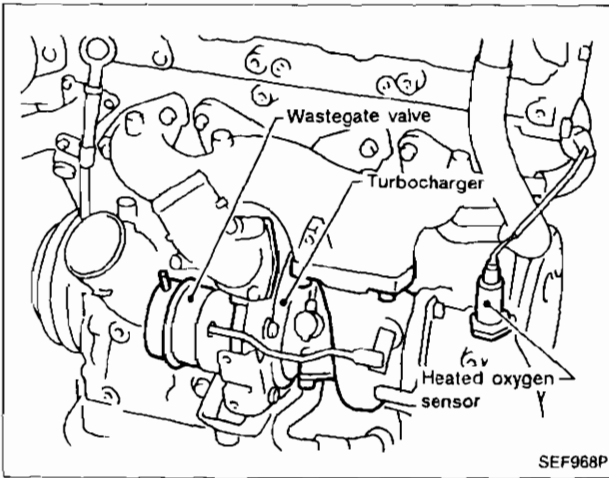
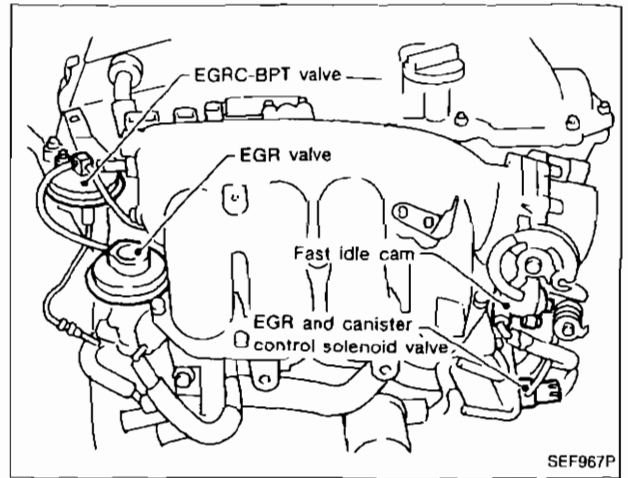
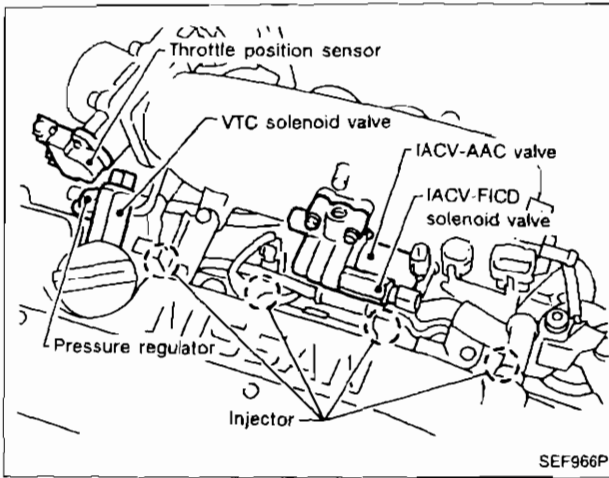
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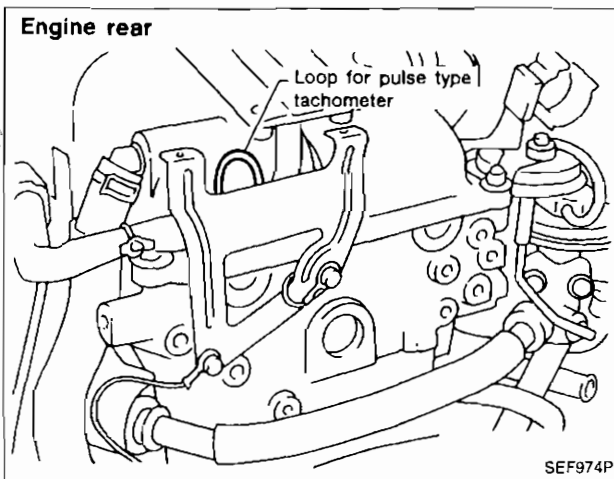
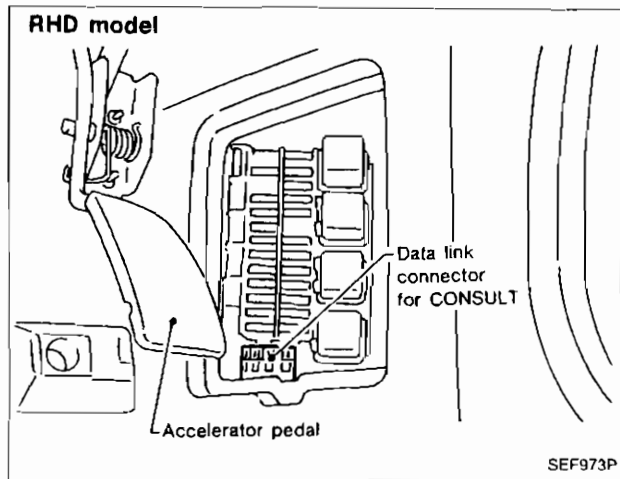
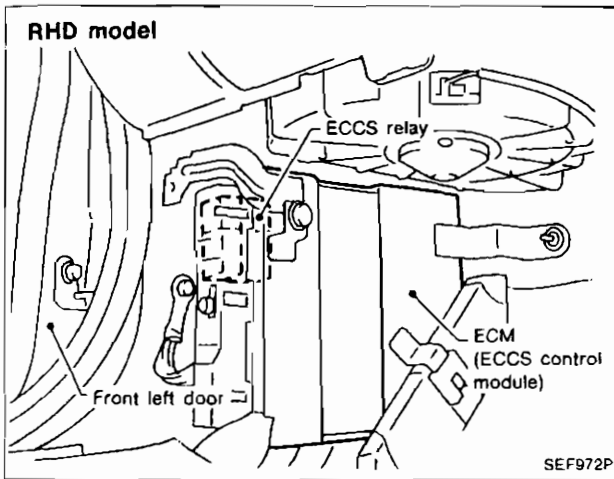
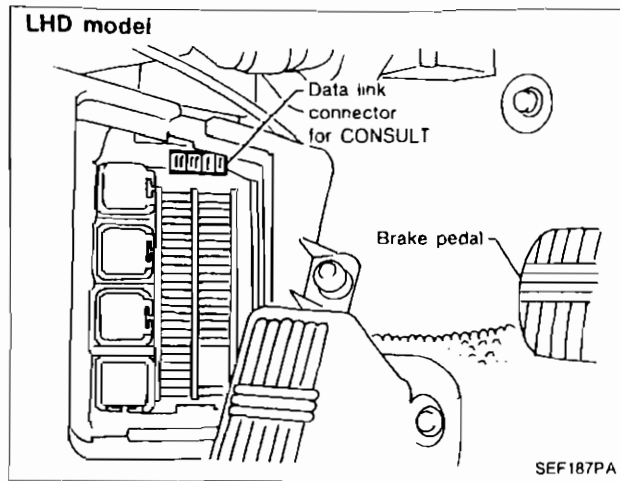
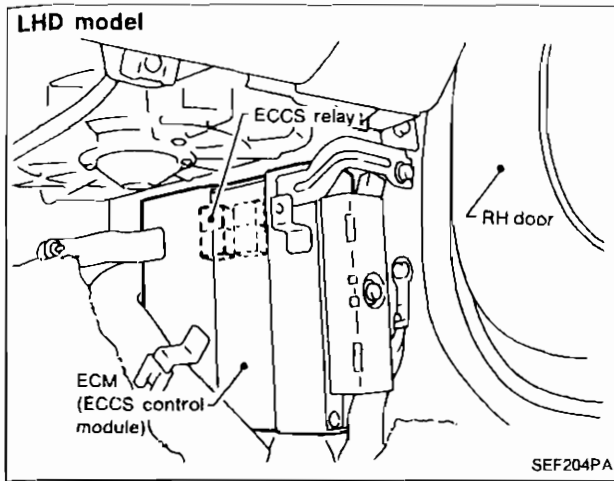
# ENGINE AND EMISSION CONTROL OVERALL SYSTEM

## ECCS Component Parts Location (Cont'd)



# ENGINE AND EMISSION CONTROL OVERALL SYSTEM

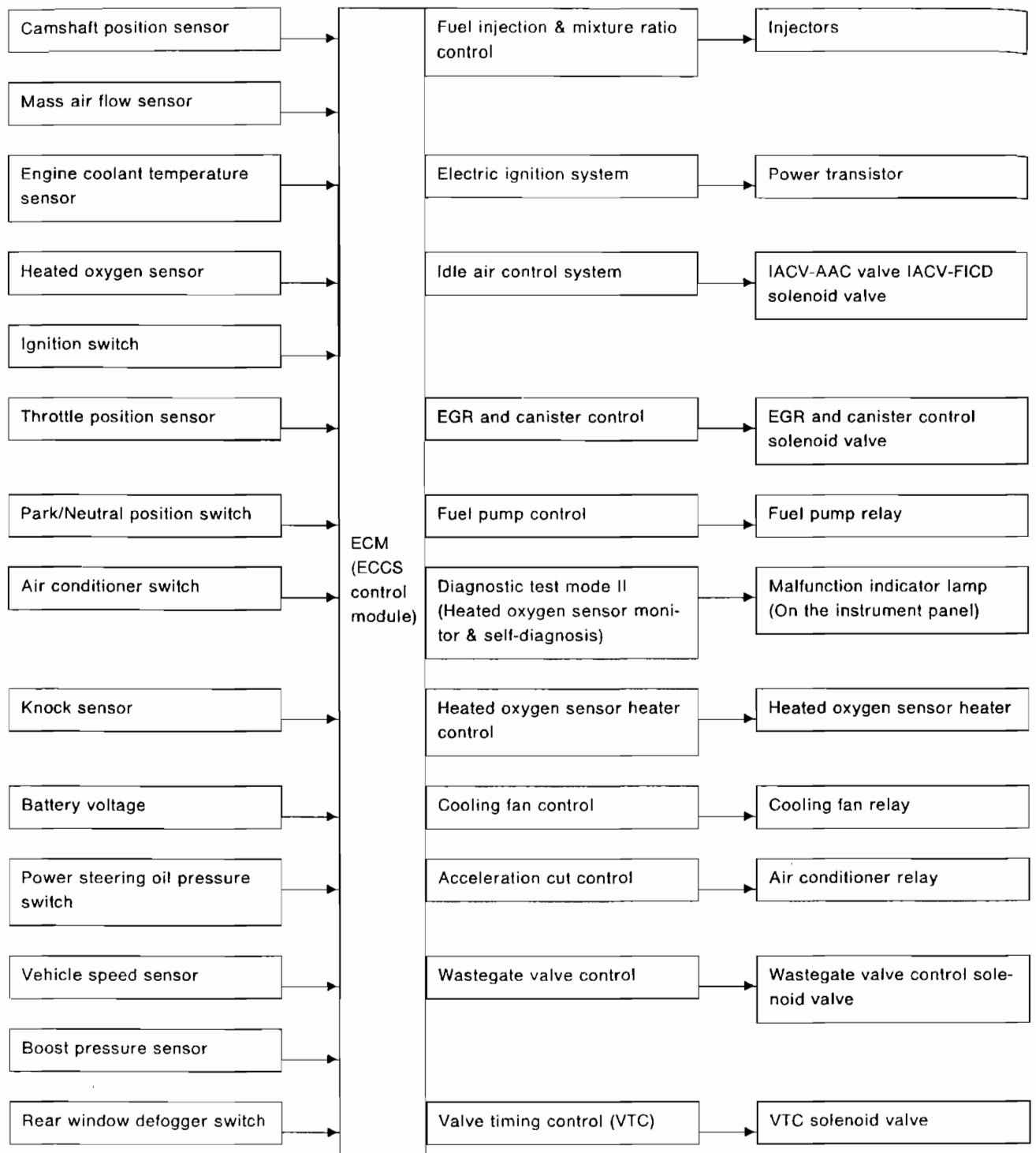
## ECCS Component Parts Location (Cont'd)



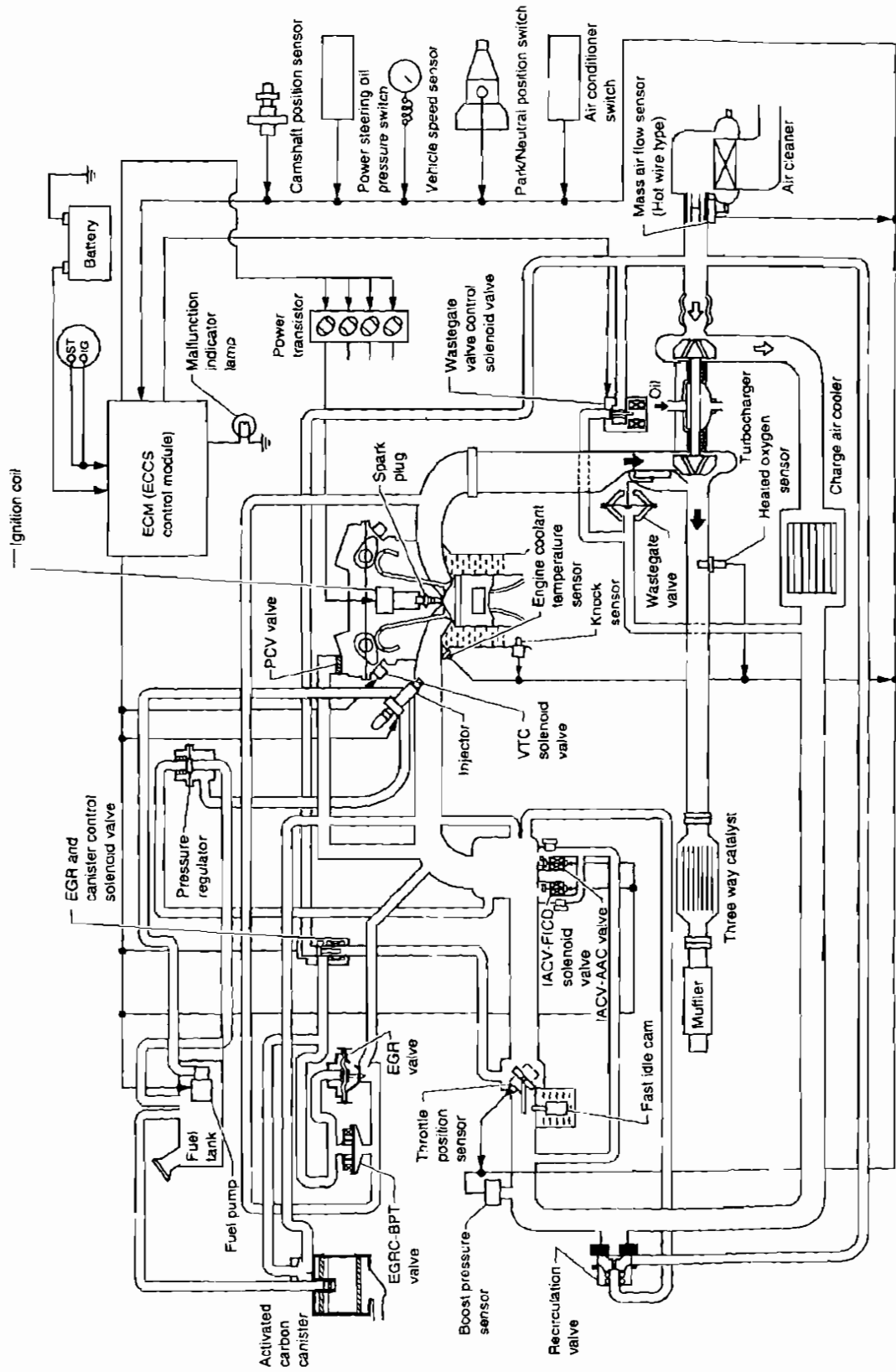
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# ENGINE AND EMISSION CONTROL OVERALL SYSTEM

## System Chart



## System Diagram

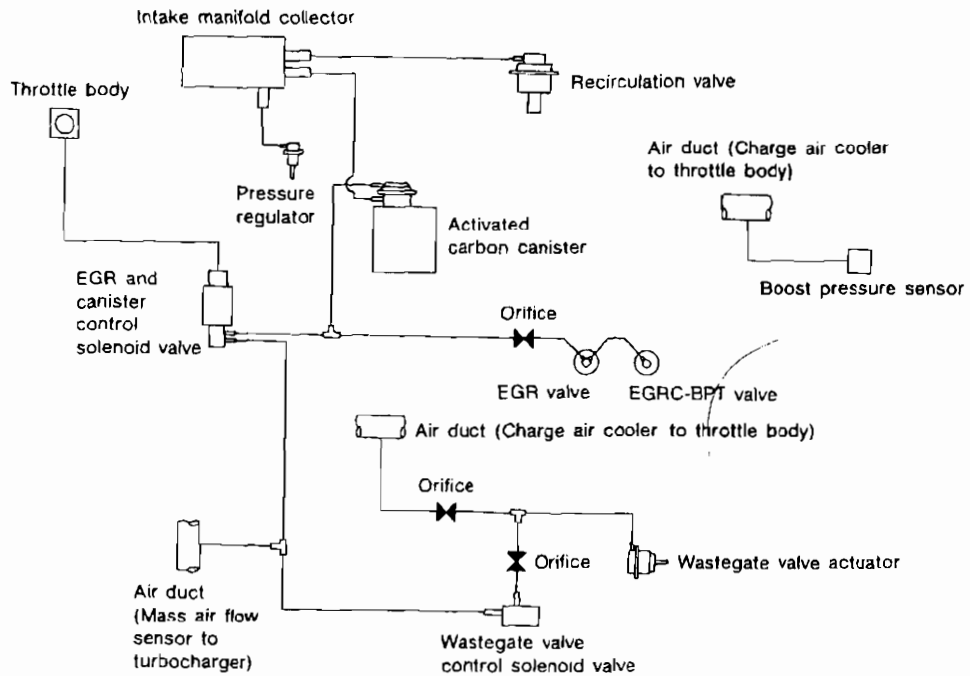
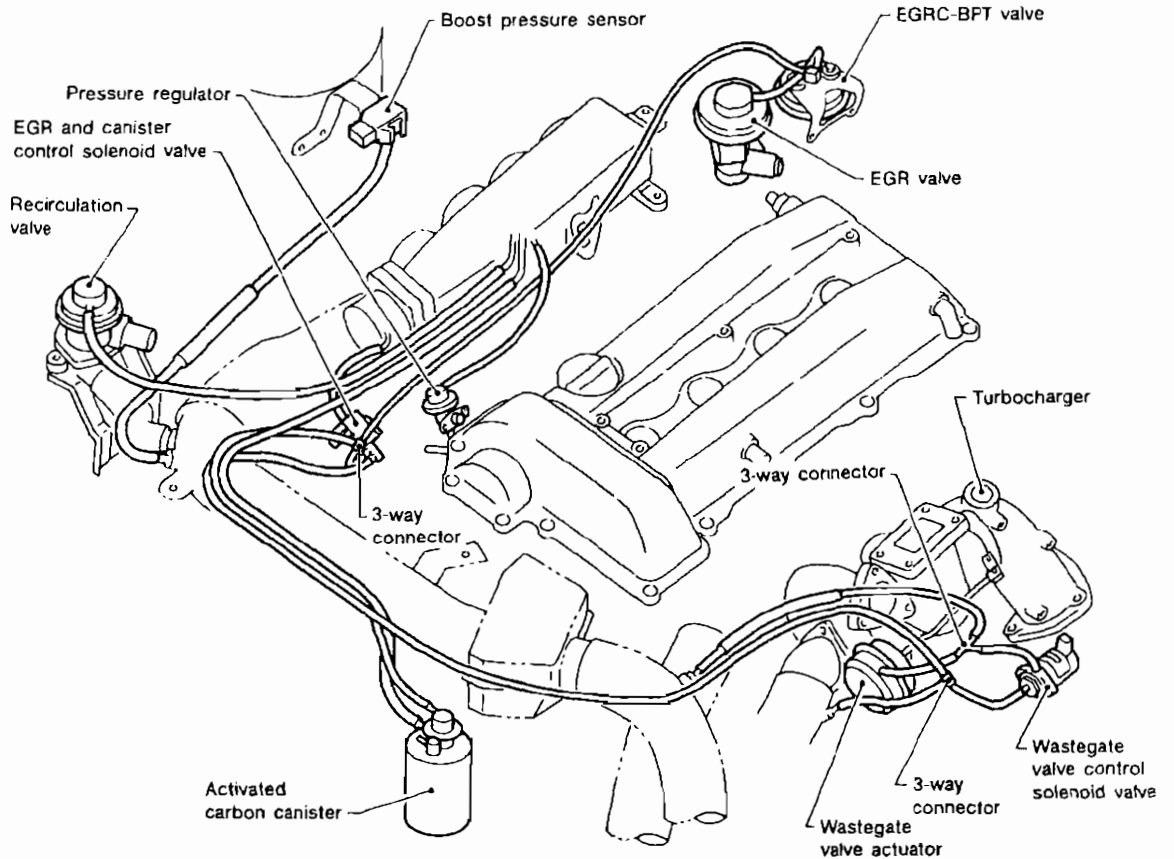


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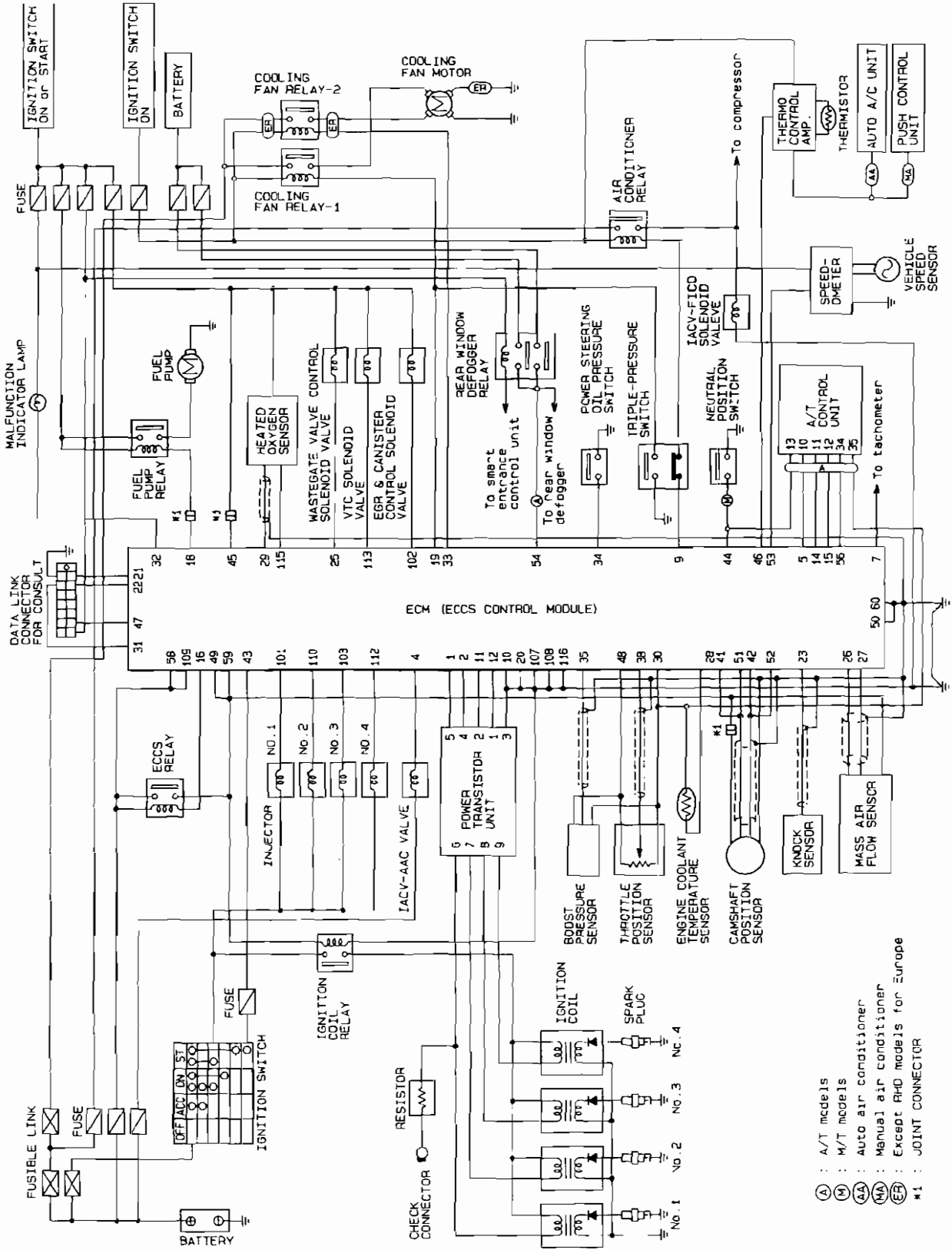


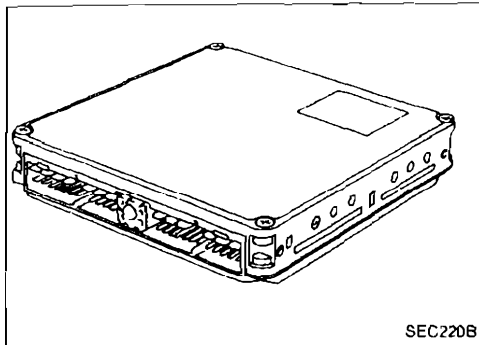
Vacuum Hose Drawing



# ENGINE AND EMISSION CONTROL OVERALL SYSTEM

## Circuit Diagram

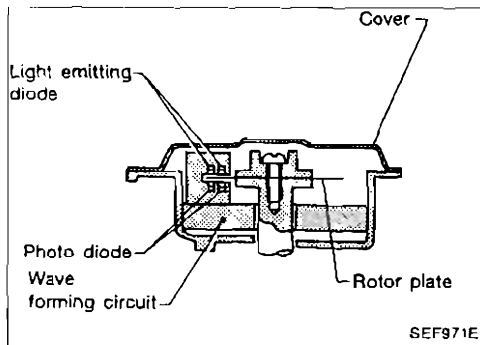




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## Engine Control Module (ECM)-ECCS Control Module

The ECM consists of a microcomputer, an inspection lamp, a diagnostic test mode selector, and connectors for signal input and output and for power supply. The unit controls the engine.



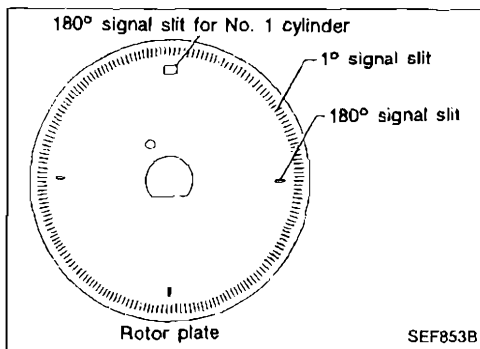
SEF971E

## Camshaft Position Sensor (CMPS)

The camshaft position sensor is a basic component of the ECCS. It monitors engine speed and piston position, and sends signals to the ECM to control fuel injection, ignition timing and other functions.

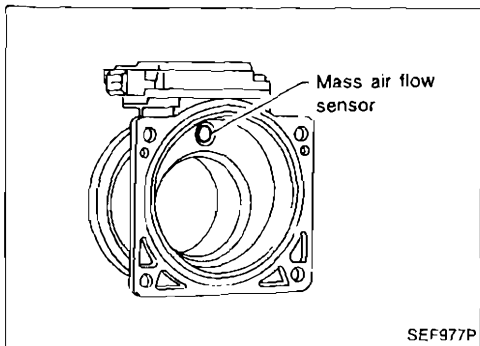
The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for 1° signal and 4 slits for 180° signal. Light Emitting Diodes (LED) and photo diodes are built in the wave-forming circuit.

When the rotor plate passes between the LED and the photo diode, the slits in the rotor plate continually cut the light being transmitted to the photo diode from the LED. This generates rough-shaped pulses which are converted into on-off pulses by the wave-forming circuit, which are sent to the ECM. For diagnosis, refer to EC-109, 201.



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## Mass Air Flow Sensor (MAFS)

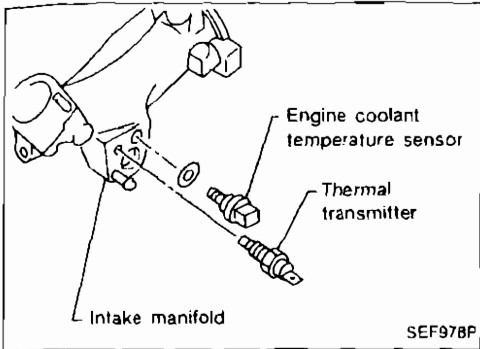


SEF977P

The mass air flow sensor measures the intake air flow rate by measuring a part of the entire flow. Measurements are made in such a way that the ECM receives electrical output signals varied by the amount of heat emitting from the hot film placed in the stream of the intake air.

When intake air flows into the intake manifold through a route around the hot film, the heat generated from the hot film is taken away by the air. The amount of heat reduction depends on the air flow. The temperature of the hot film is automatically controlled to a certain number of degrees.

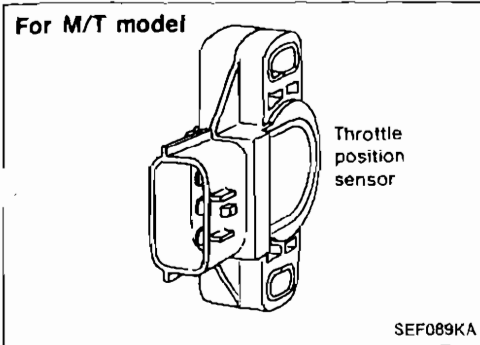
Therefore, it is necessary to supply the hot film with more electric current in order to maintain the temperature of the hot film. The ECM detects the air flow by means of this current change. For diagnosis, refer to EC-113, 201.



## Engine Coolant Temperature Sensor (ECTS)

The engine coolant temperature sensor, located on the top of thermostat housing, detects engine coolant temperature and transmits a signal to the ECM.

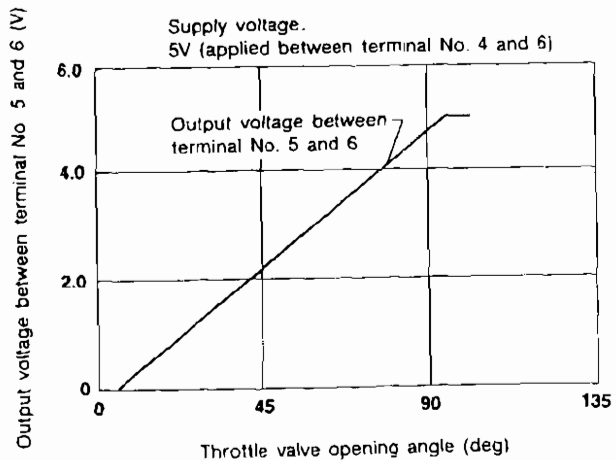
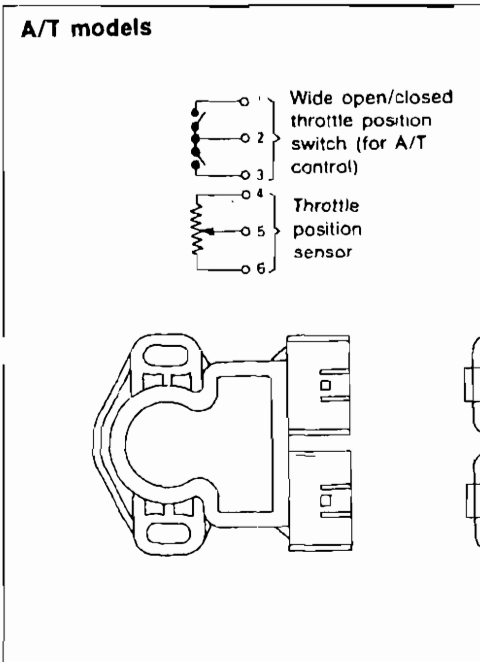
The temperature sensing unit employs a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise. For diagnosis, refer to EC-116, 201.



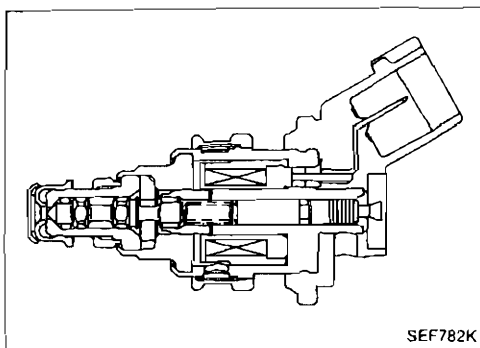
## Throttle Position Sensor (TPS) & Soft Closed Throttle Position (CTP) Switch

The throttle position sensor responds to 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.

Closed throttle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This system is called "soft closed throttle position switch". It controls engine operation such as fuel cut. For diagnosis, refer to EC-135, 204.

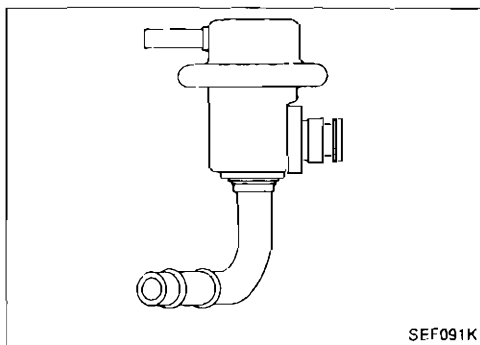


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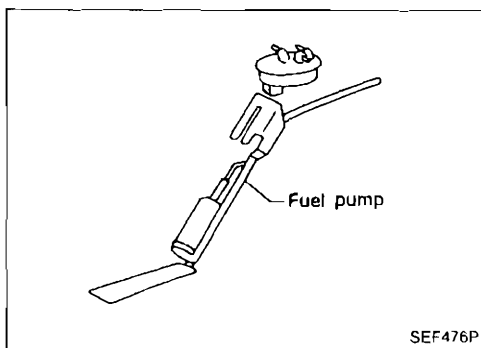
## Fuel Injector

The fuel injector is a small, elaborate solenoid valve. As the ECM sends injection signals to the injector, the coil in the injector pulls the needle valve back and fuel is released into the intake manifold through the nozzle. The injected fuel is controlled by the ECM in terms of injection pulse duration. For diagnosis, refer to EC-156, 205.



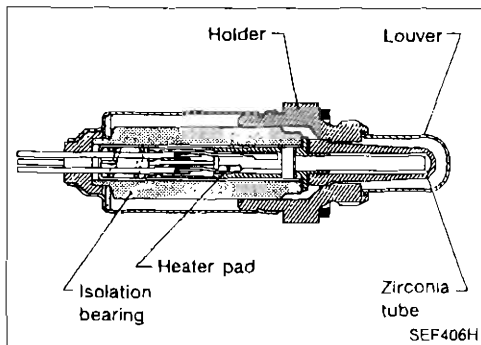
## Fuel Pressure Regulator

The pressure regulator maintains the fuel pressure at 299.1 kPa (2.991 bar, 3.05 kg/cm<sup>2</sup>, 43.4 psi). Since the injected fuel amount depends on injection pulse duration, it is necessary to maintain the pressure at the above value. For diagnosis, refer to EC-208.



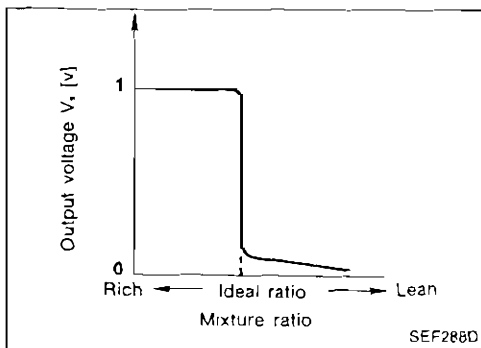
## Fuel Pump

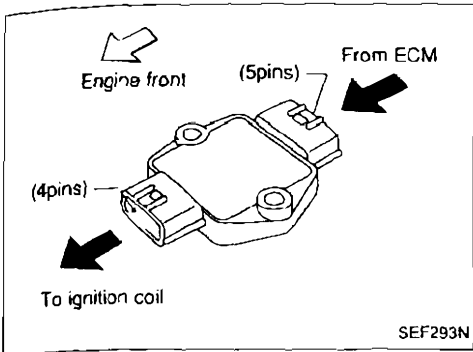
The fuel pump is a turbine type located in the fuel tank. For diagnosis, refer to EC-159, 202.



## Heated Oxygen Sensor (HO2S)

The heated oxygen sensor, which is placed into the exhaust outlet, monitors the amount of oxygen in the exhaust gas. The sensor has a closed-end tube made of ceramic zirconia. The outer surface of the tube is exposed to exhaust gas, and the inner surface to atmosphere. The zirconia of the tube compares the oxygen density of exhaust gas with that of atmosphere, and generates electricity. In order to improve generating power of the zirconia, its tube is coated with platinum. The voltage is approximately 1V in a richer condition of the mixture ratio than the ideal air-fuel ratio, while approximately 0V in leaner conditions. The radical change from 1V to 0V occurs at around the ideal mixture ratio. In this way, the heated oxygen sensor detects the amount of oxygen in the exhaust gas and sends the signal of approximately 1V or 0V to the ECM. A heater is used to activate the sensor. For diagnosis, refer to EC-152, 203.

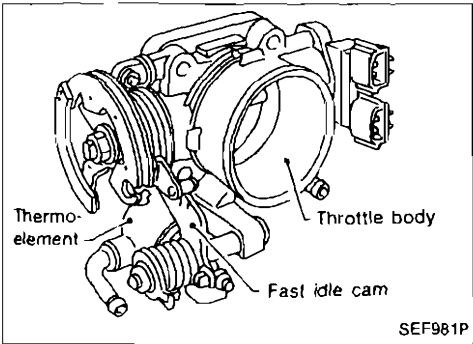
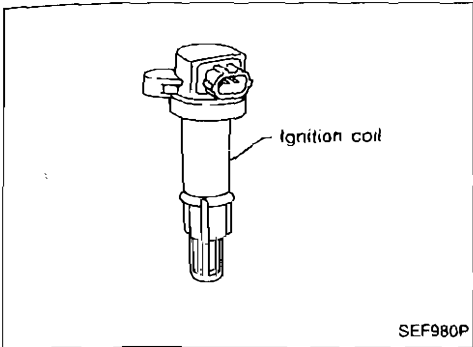




## Power Transistor Unit & Ignition Coil

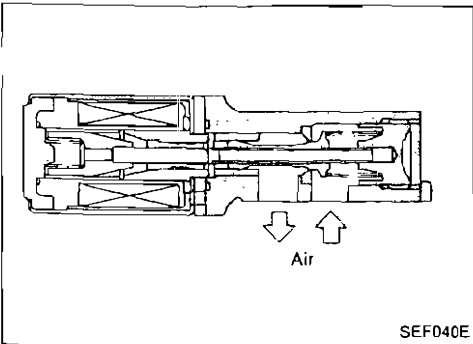
The ignition signal from the ECM is amplified by the power transistor, which turns the ignition coil primary circuit on and off, inducing the proper high voltage in the secondary circuit. The ignition coil is a small, molded type located on the spark plug.

For diagnosis, refer to EC-120, 202.



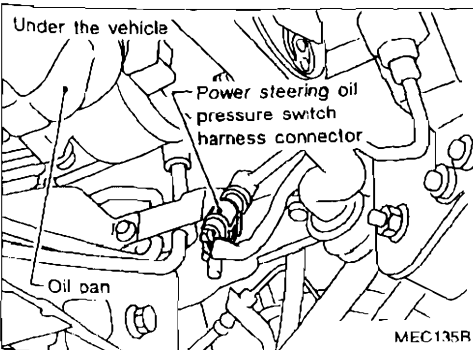
## Fast Idle Cam (FIC)

The FIC is installed on the throttle body to maintain adequate engine speed while the engine is cold. It is operated by a volumetric change in wax located inside the thermo-element. The thermo-element is controlled by engine coolant temperature. For diagnosis, refer to EC-207.



## Idle Air Control Valve (IACV)-Auxiliary Air Control (AAC) Valve

The ECM actuates the IACV-AAC valve by an ON/OFF pulse. The longer that ON duty is left on, the larger the amount of air that will flow through the IACV-AAC valve. For diagnosis, refer to EC-169, 204.



## Power Steering Oil Pressure Switch

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects the power steering load, sending the load signal to the ECM. The ECM then sends the idle-up signal to the IACV-AAC valve. For diagnosis, refer to EC-184, 206.

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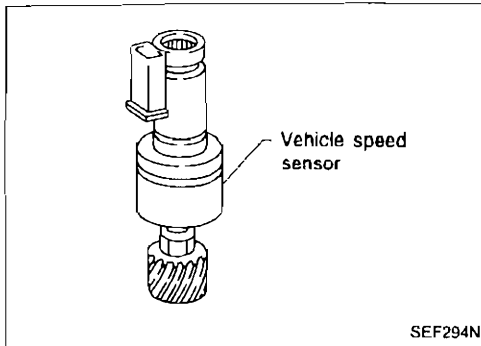
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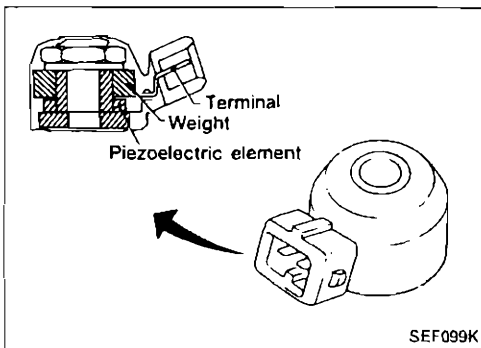
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## Vehicle Speed Sensor (VSS)

The vehicle speed sensor provides a vehicle speed signal to the speedometer and the speedometer sends a signal to the ECM.

The speed sensor consists of a pulse generator which is installed in the transmission. For diagnosis, refer to EC-145, 202.

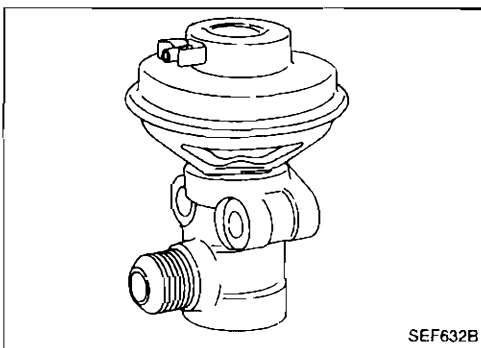


## Knock Sensor (KS)

The knock sensor is attached to the cylinder block and senses engine knocking conditions.

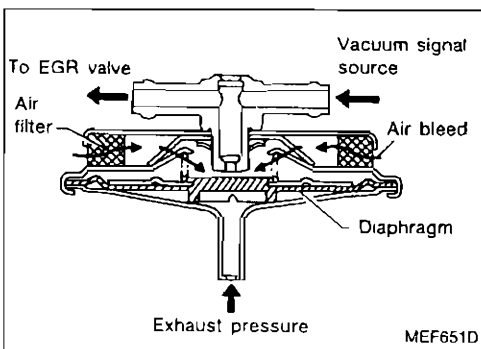
A knocking vibration from the cylinder block is applied as pressure to the piezoelectric element. This vibrational pressure is then converted into a voltage signal which is sent to the ECM.

For diagnosis, refer to EC-132, 205.



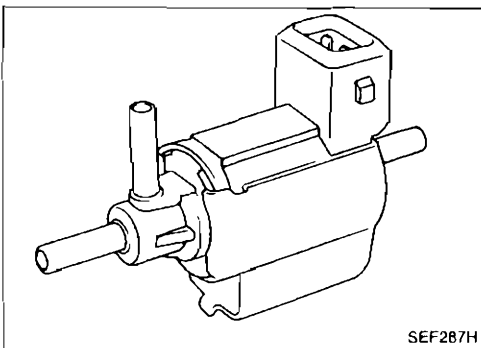
## Exhaust Gas Recirculation (EGR) Valve

The EGR valve controls the quantity of exhaust gas to be diverted to the intake manifold through vertical movement of a taper valve connected to the diaphragm. Vacuum is applied to the diaphragm in response to the opening of the throttle valve. For diagnosis, refer to EC-148, 203.



## EGR Control (EGRC)-BPT Valve

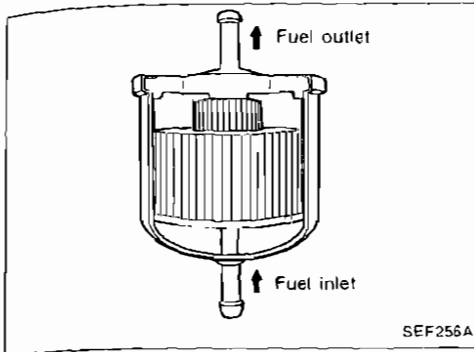
The EGRC-BPT valve monitors exhaust pressure to activate the diaphragm, controlling throttle body vacuum applied to the EGR valve. In other words, recirculated exhaust gas is controlled in response to positioning of the EGR valve or to engine operation. For diagnosis, refer to EC-148, 203.



## EGR and Canister Control Solenoid Valve

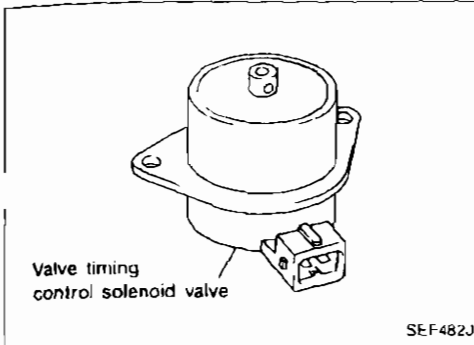
The EGR and canister control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. A plunger will then move to cut the vacuum signal (from the throttle body to the EGR valve and canister purge valve).

When the ECM sends an OFF signal, the vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve and carbon canister. For diagnosis, refer to EC-148, 203.



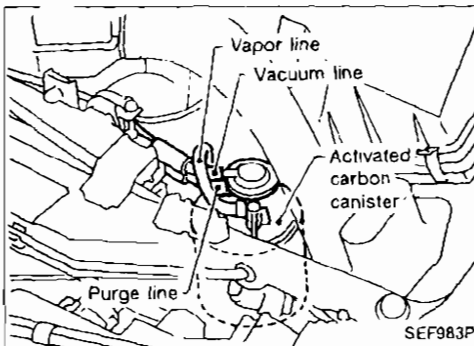
## Fuel Filter

The specially designed fuel filter has a metal case in order to withstand high fuel pressure.



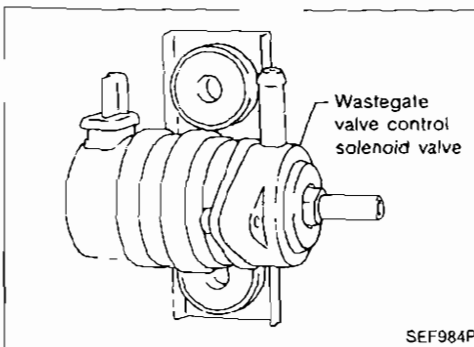
## Valve Timing Control (VTC) Solenoid Valve

The valve timing control solenoid is installed at the front right of the cylinder head, and controls oil pressure which regulates the position of the intake camshafts. For diagnosis, refer to EC-166, 205.



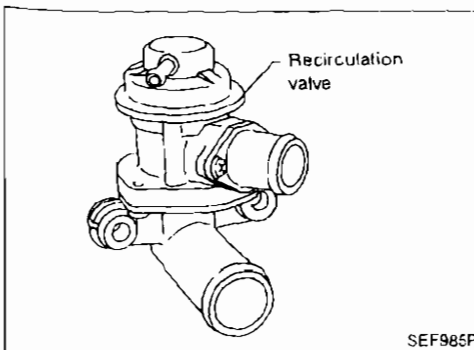
## Carbon Canister

The carbon canister is filled with active charcoal to absorb evaporative gases produced in the fuel tank. These absorbed gases are then delivered to the intake manifold by manifold vacuum for combustion purposes. For diagnosis, refer to EC-148, 210.



## Wastegate Valve Control Solenoid Valve

The solenoid valve is actuated by the ON/OFF pulse from the ECM. The longer that ON duty is left on the larger the amount of vacuum signals from the suction pipe or compressor outlet are fed into the wastegate valve actuator. The actuator is hard to open at this time. When the ECM sends an OFF signal, the coil pulls the plunger and cuts the route to the suction pipe. For diagnosis, refer to EC-163, 205.



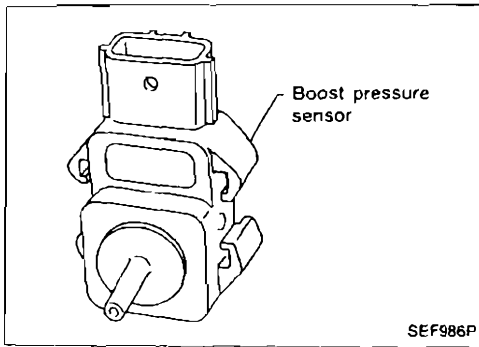
## Recirculation Valve

The recirculation valve reduces the noise occurring in the compressor of the turbocharger during deceleration. This valve recirculates air compressed downstream of the inter-cooler to upstream of the compressor using the intake manifold vacuum that occurs when the throttle chamber is suddenly closed.

The recirculation valve also must not be disassembled or adjusted. For diagnosis, refer to EC-206.

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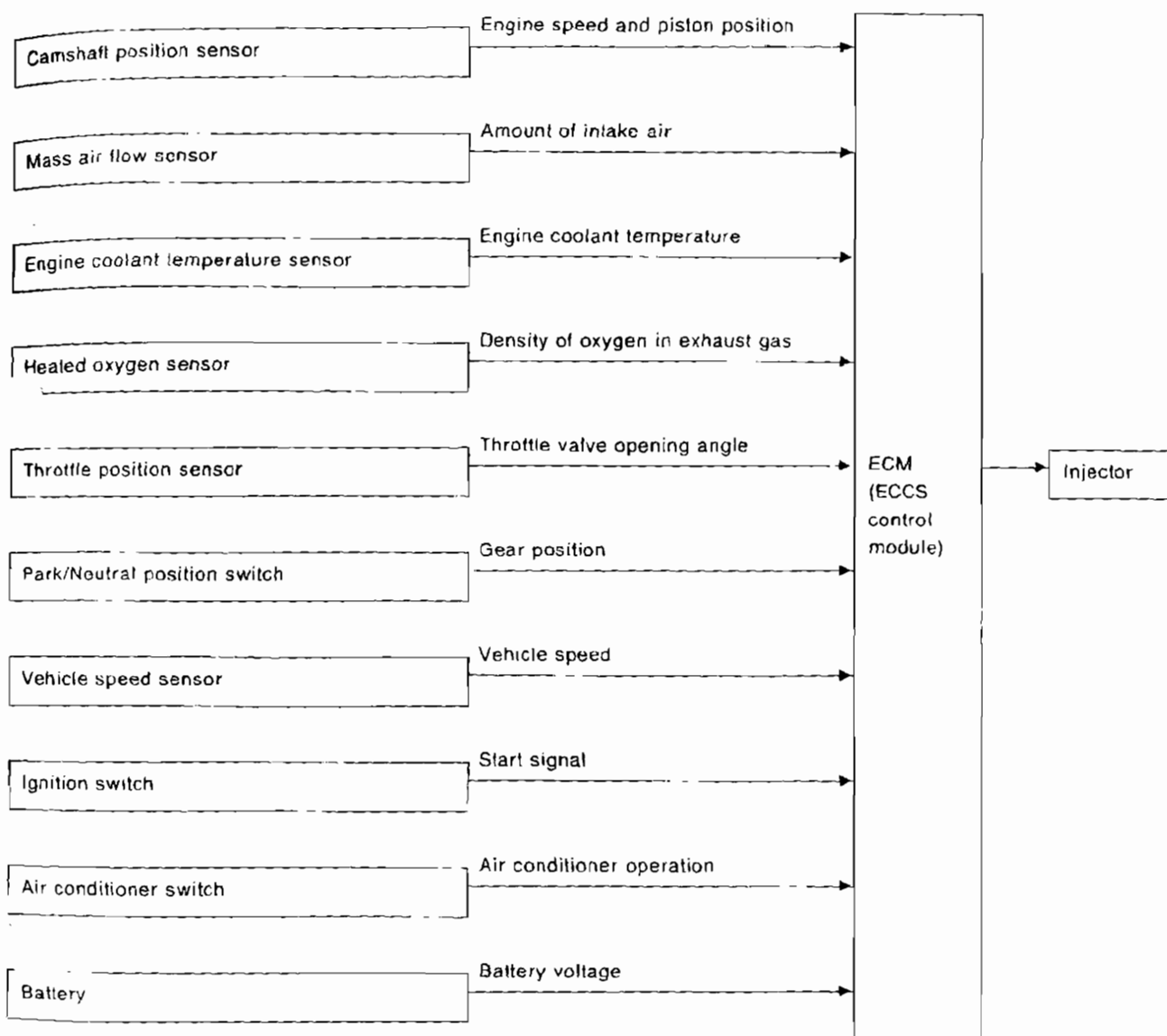


## Boost Pressure Sensor

The boost pressure sensor detects boost pressure at the upstream of the throttle body. The pressure signal is transmitted to the ECM to control the boost pressure precisely. For diagnosis, refer to EC-128, 206.

## Multiport Fuel Injection (MFI) System

### INPUT/OUTPUT SIGNAL LINE



### BASIC MULTIPOINT FUEL INJECTION SYSTEM

The amount of fuel injected from the fuel injector, or the length of time the valve remains open, is determined by the ECM. The amount of fuel injected is a program value mapped in the ECM memory. In other words, the program value is preset by engine operating conditions determined by input signals (for engine speed and air intake) from both the camshaft position sensor and the mass air flow sensor.

### VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

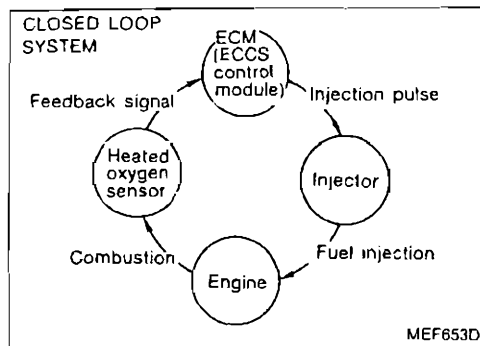
The amount of fuel injection is compensated for to improve engine performance. This will be made under various operating conditions as listed below.

< Fuel increase >

- 1) During warm-up
- 2) When starting the engine
- 3) During acceleration
- 4) Hot-engine operation

< Fuel decrease >

- 1) During deceleration



## Multiport Fuel Injection (MFI) System (Cont'd)

### MIXTURE RATIO FEEDBACK CONTROL

The mixture ratio feedback system is used for precise control of the mixture ratio to the stoichiometric point, so that the three way catalyst can reduce CO, HC and NO<sub>x</sub> emissions. This system uses a heated oxygen sensor in the exhaust manifold to check the air-fuel ratio. The ECM adjusts the injection pulse width according to the sensor voltage so the mixture ratio will be within the range of the stoichiometric air-fuel ratio. This stage refers to the closed loop control condition.

### OPEN LOOP CONTROL

The open loop control condition refers to that under which the ECM detects any of the following conditions and feedback control stops in order to maintain stabilized fuel combustion.

- 1) Deceleration
- 2) High-load, high-speed operation
- 3) Engine idling
- 4) Malfunction of heated oxygen sensor or its circuit
- 5) Insufficient activation of heated oxygen sensor at low engine coolant temperature
- 6) Engine starting

### MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the heated oxygen sensor. This feedback signal is then sent to the ECM to control the amount of fuel injection to provide a 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 "fuel injection duration" to automatically compensate for the difference between the two ratios.

## Multiport Fuel Injection (MFI) System (Cont'd)

### FUEL INJECTION TIMING

Two types of systems are used — sequential multiport fuel injection system and simultaneous multiport fuel injection system.

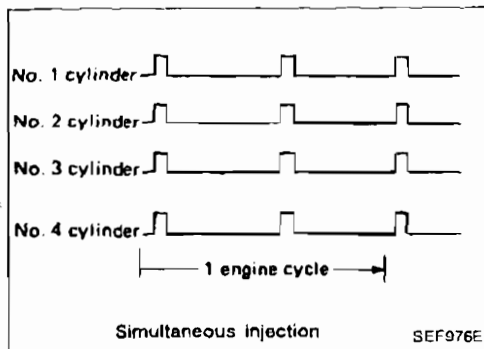
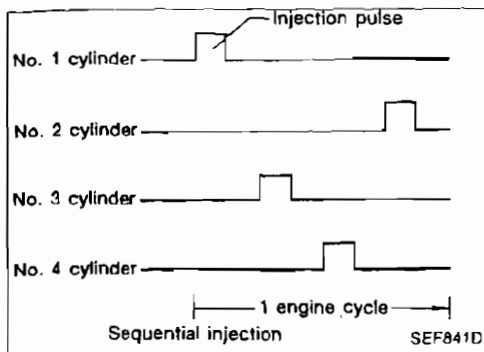
1) Sequential multiport fuel injection system  
Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

2) Simultaneous multiport fuel injection system  
Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM. The four 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

Fuel to each cylinder is cut off during deceleration or operation of the engine at excessively high speeds.



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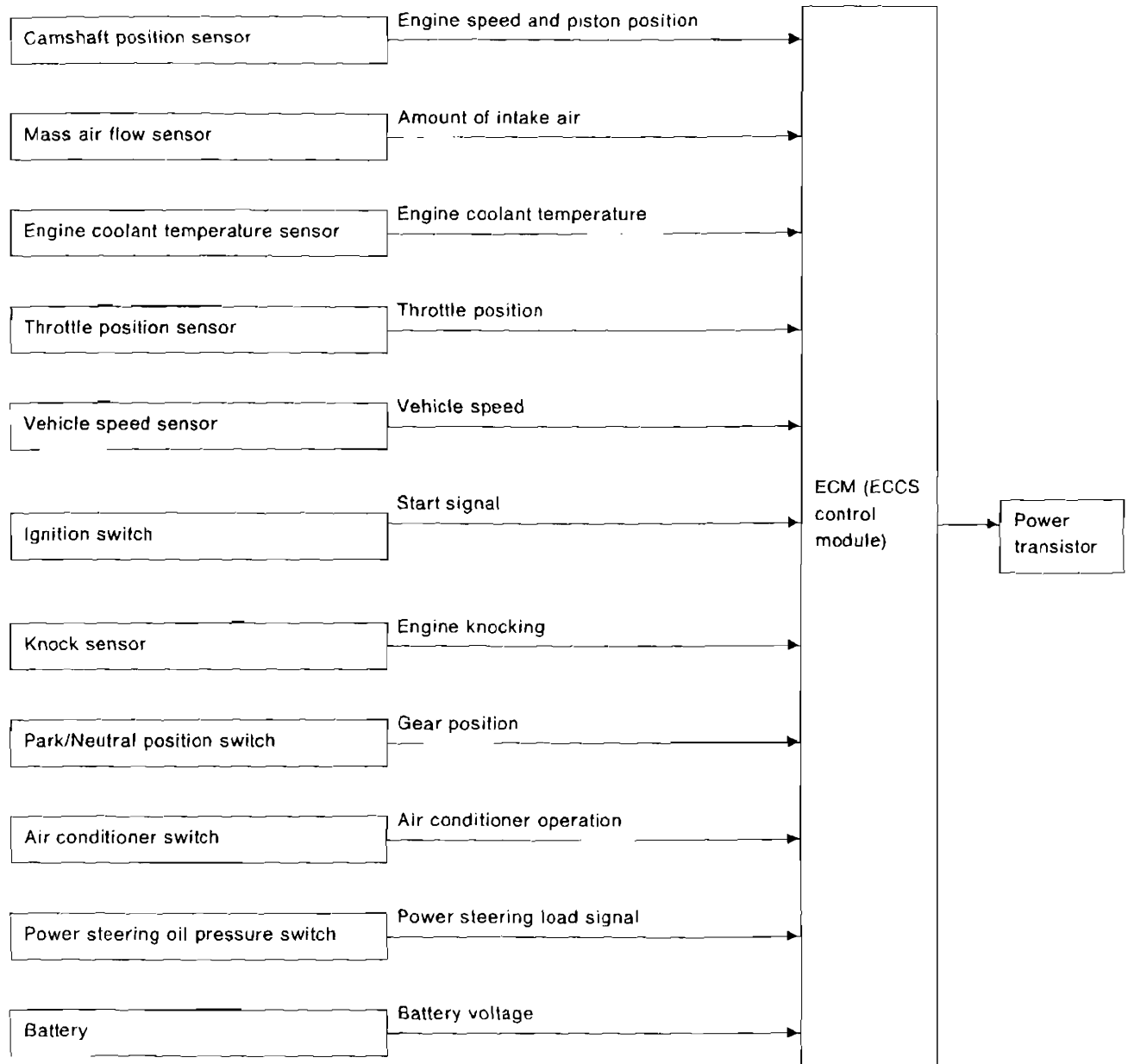
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**Electronic Ignition (EI) System**

**INPUT/OUTPUT SIGNAL LINE**



# ENGINE AND EMISSION CONTROL SYSTEM DESCRIPTION

## Electronic Ignition (EI) System (Cont'd)

### SYSTEM DESCRIPTION

The ignition timing is controlled by the ECM in order 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 below.

The ECM detects information such as the injection pulse width and camshaft position sensor signal which varies every moment. Then responding to this information, ignition signals

are transmitted to the power transistor.

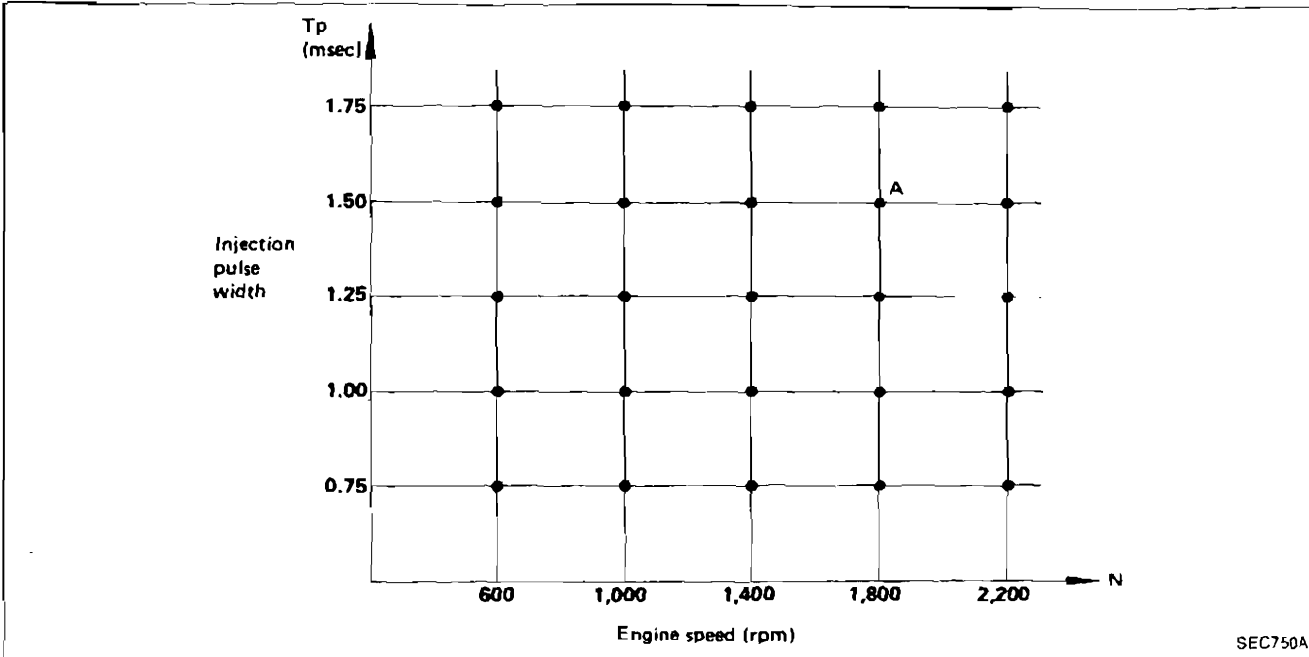
e.g. N: 1,800 rpm,  $T_p$ : 1.50 msec

A °BTDC

In addition to this,

- 1) At starting
- 2) During warm-up
- 3) At idle
- 4) At low battery voltage

the ignition timing is revised by the ECM according to the other data stored in the ECM.



The retard system, actuated by the knock sensor, is designed only for emergencies. The basic ignition timing is pre-programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. Consequently, the retard system does not operate under normal driving conditions.

However, if engine knocking occurs, the knock sensor monitors the condition and the signal is transmitted to the ECM (ECCS control module). After receiving it, the ECM retards the ignition timing to eliminate the knocking condition.

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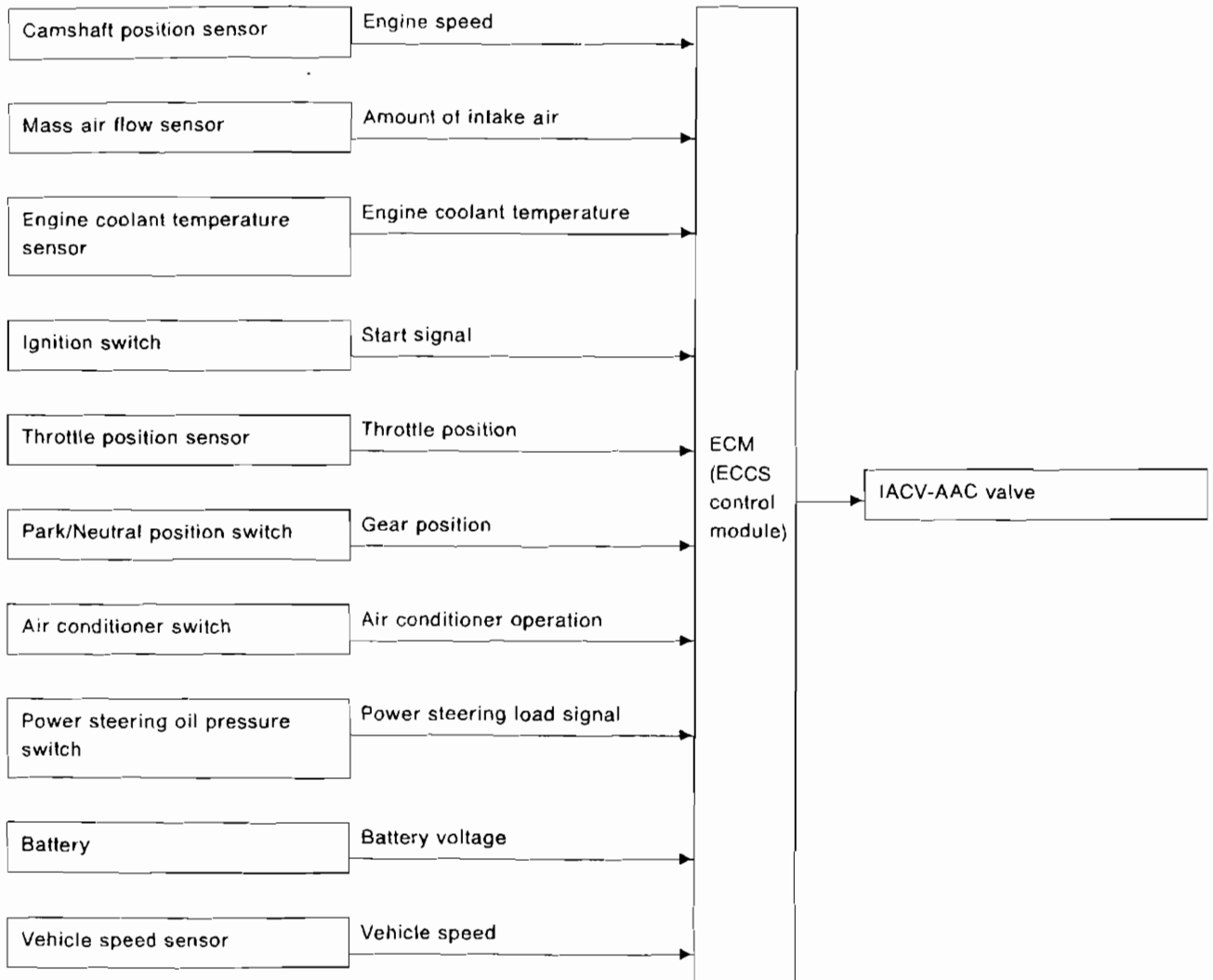
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## Idle Air Control (IAC) System

### INPUT/OUTPUT SIGNAL LINE



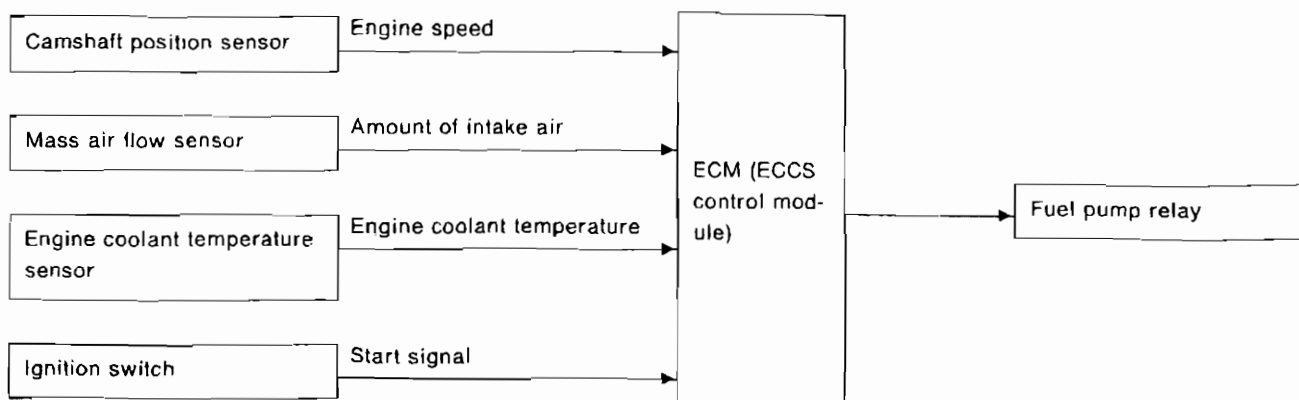
### SYSTEM DESCRIPTION

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 the IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM.

The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in the 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 taking into consideration various engine conditions, such as noise and vibration transmitted to the vehicle interior, fuel consumption, and engine load.

## Fuel Pump Control

### INPUT/OUTPUT SIGNAL LINE



### SYSTEM DESCRIPTION

#### Fuel pump ON-OFF control

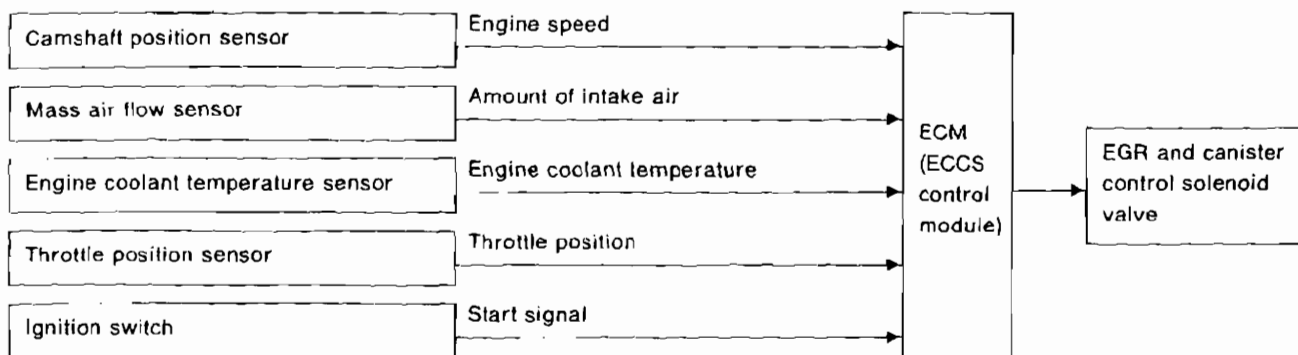
The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine start-up. If the ECM receives a 1° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to activate. If the 1° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents the battery from 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 second     |
| Except as shown above            | Stops                 |



## Exhaust Gas Recirculation (EGR) and Canister Control System

### INPUT/OUTPUT SIGNAL LINE



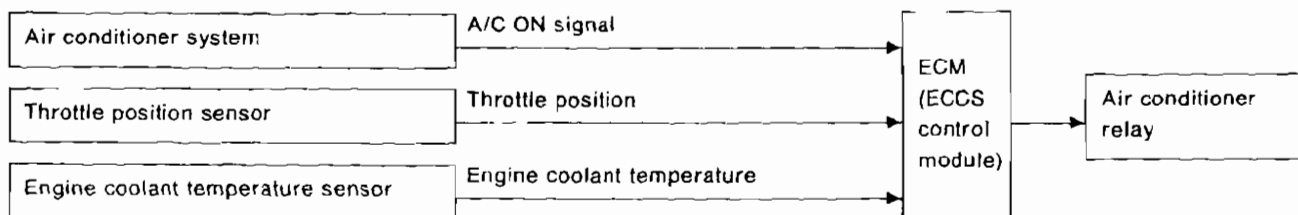
### SYSTEM DESCRIPTION

This system cuts and controls vacuum applied to EGR valve and canister to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGR & canister control solenoid valve. When the ECM detects any of the following conditions, current flows through the solenoid valve. This causes the port vacuum to be discharged into the atmosphere. The EGR valve and canister remain closed.

- 1) Low engine coolant temperature
- 2) Engine starting
- 3) High-speed engine operation
- 4) Engine idling
- 5) Excessively high engine coolant temperature
- 6) Mass air flow sensor malfunction

## Air Conditioner Cut Control

### INPUT/OUTPUT SIGNAL LINE



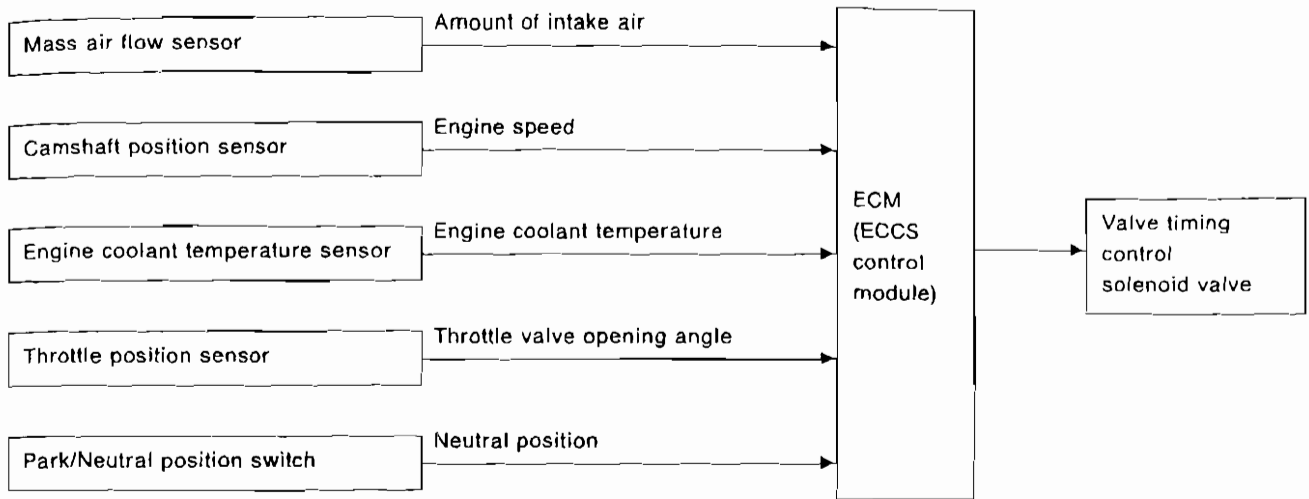
### SYSTEM DESCRIPTION

When the accelerator pedal is fully depressed, or engine coolant temperature is extremely high, the air conditioner is turned off for a few seconds.

This system improves acceleration when the air conditioner is used.

## Valve Timing Control (VTC)

### INPUT/OUTPUT SIGNAL LINE



### SYSTEM DESCRIPTION

The valve timing control system is utilized to increase engine performance. Intake valve opening and closing time is controlled, according to the engine operating conditions, by the ECM.

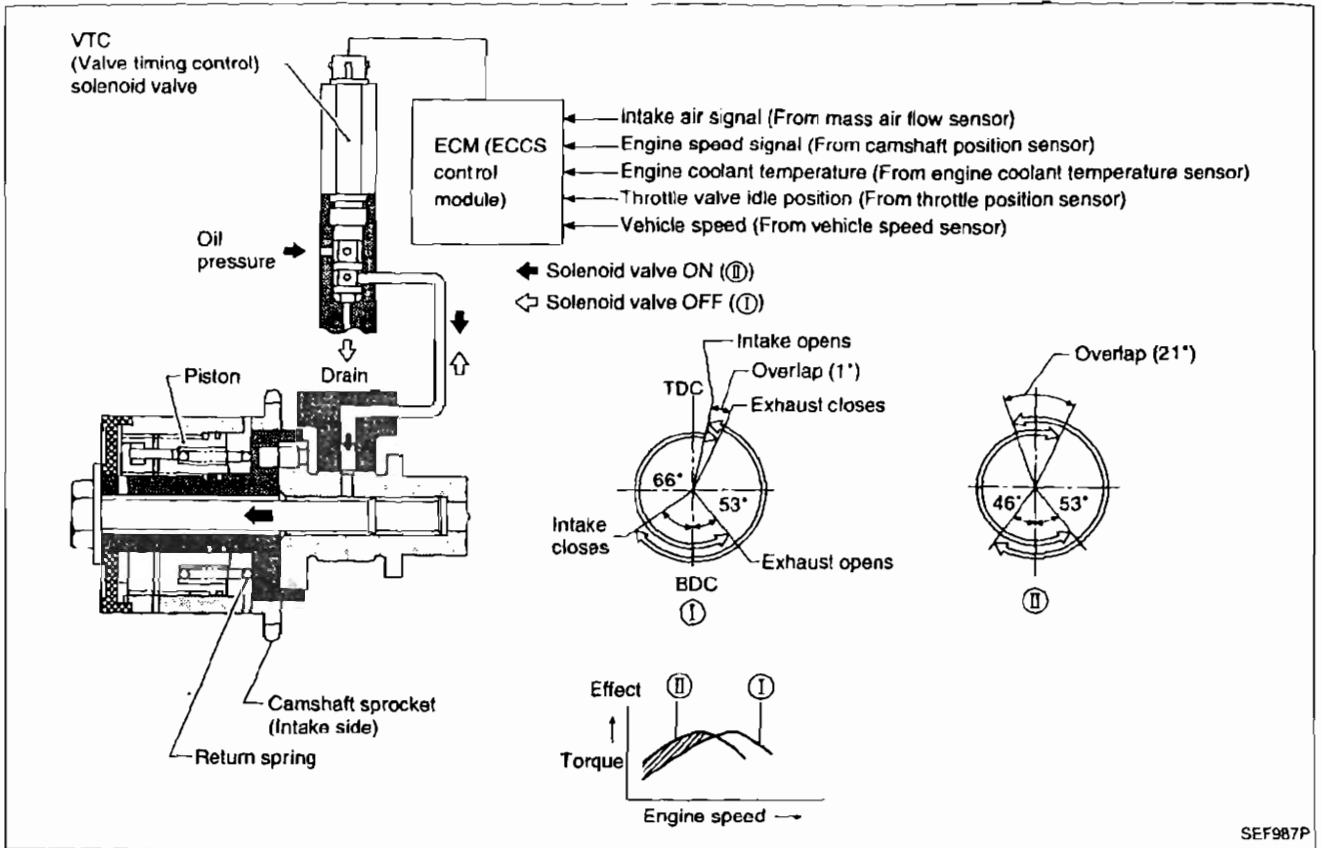
Engine coolant temperature signals, engine speed, amount of intake air, throttle position, vehicle speed and gear position are used to determine intake valve timing.

The intake camshaft pulley position is regulated by oil pressure, which is controlled by the valve timing control solenoid valve.

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# ENGINE AND EMISSION CONTROL SYSTEM DESCRIPTION

## Valve Timing Control (VTC) (Cont'd)



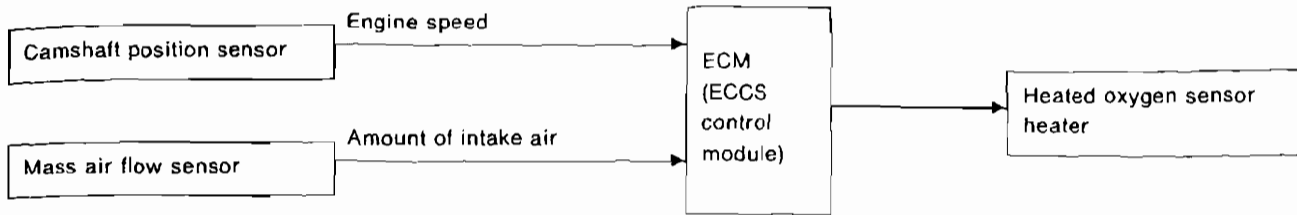
### OPERATION

| Engine operating condition   | Valve timing control solenoid valve | Intake valve opening and closing time | Valve overlap | Engine torque curve |
|--|-------------------------------------|---------------------------------------|---------------|---------------------|
| <ul style="list-style-type: none"> <li>Vehicle is running.</li> <li>Engine coolant temperature is 50°C (122°F) or more.</li> <li>Engine speed is between 1,050 rpm and 5,700 rpm.</li> </ul> | ON                                  | Advance                               | Increased     | II                  |
| <ul style="list-style-type: none"> <li>Engine load is high.</li> <li>Engine speed is 1,050 rpm or less</li> </ul>  | ON                                  | Advance                               | Increased     | II                  |
| Those other than above   | OFF                                 | Normal                                | Normal        | I                   |

# ENGINE AND EMISSION CONTROL SYSTEM DESCRIPTION

## Heated Oxygen Sensor (HO2S) Heater Control

### INPUT/OUTPUT SIGNAL LINE



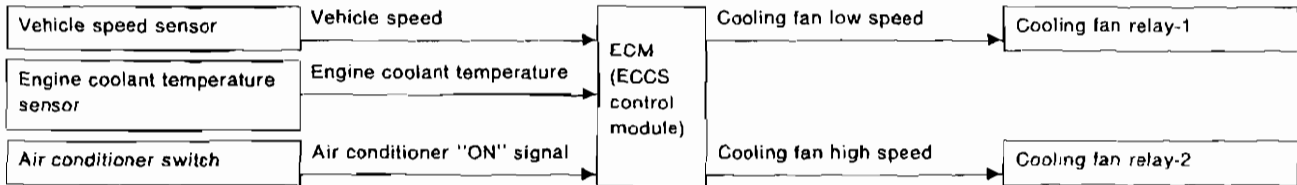
The ECM performs ON/OFF control of the heated oxygen sensor heater corresponding to the engine speed and engine load.

### OPERATION

| Engine operating condition           | Heated oxygen sensor heater |
|--------------------------------------|-----------------------------|
| Engine speed is more than 4,000 rpm. | OFF                         |
| Heavy load                           | OFF                         |
| Except above                         | ON                          |

## Cooling Fan Control

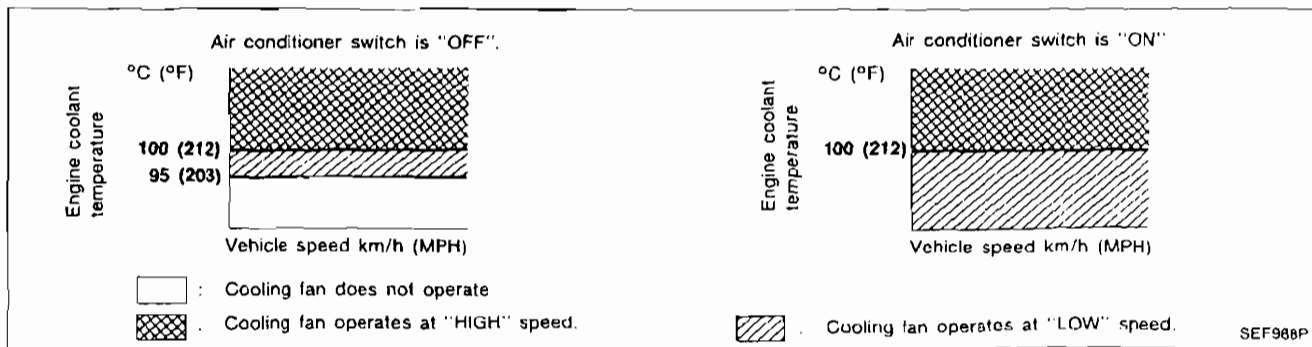
### INPUT/OUTPUT SIGNAL LINE



The ECM controls the cooling fan corresponding to vehicle speed, engine coolant temperature

and air conditioner ON signal. The control system has a 2-step control {HIGH/LOW/OFF}.

### OPERATION

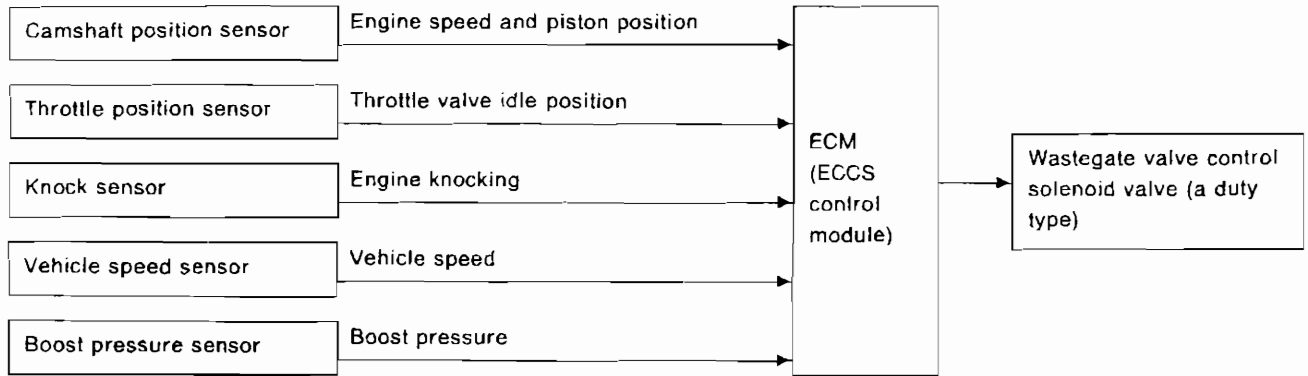


The cooling fan operates at HIGH speed if diagnostic test mode II (self-diagnostic results) for engine coolant temperature sensor is "NG".

# ENGINE AND EMISSION CONTROL SYSTEM DESCRIPTION

## Boost Pressure Control

### INPUT/OUTPUT SIGNAL LINE



### SYSTEM DESCRIPTION

The output signal maps of the ECM are selected according to fuel octane rating, gear position (M/T model) and vehicle speed (A/T model). The wastegate valve control solenoid valve

changes the source vacuum which activates the actuator. This results in a proportional boost pressure to the acceleration. Knock signs are used to determine fuel octane rating.

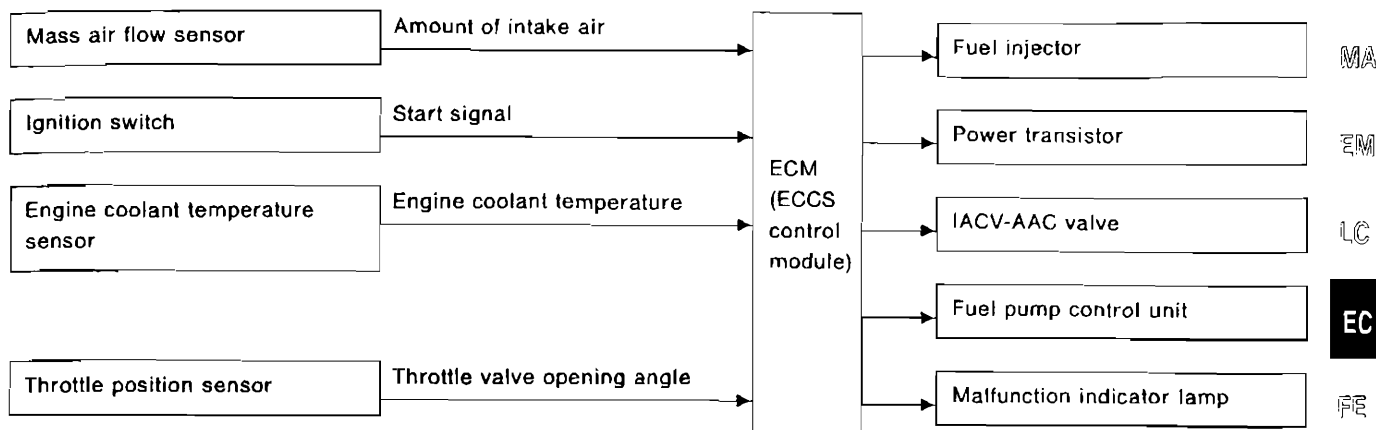
### OPERATION

| Fuel octane rating   | Gear position or vehicle speed   | Boost pressure control map |
|----------------------|--|----------------------------|
| Premium              | <ul style="list-style-type: none"> <li>● 1, 2 and 3 speed gears (M/T model)</li> <li>● Less than 46 km/h (29 MPH) (A/T model)</li> </ul> | A slow response type       |
|                      | <ul style="list-style-type: none"> <li>● 4 and 5 speed gears (M/T model)</li> <li>● More than 46 km/h (29 MPH) (A/T model)</li> </ul>    | A quick response type      |
| Lower than the above | Any  | Fixed                      |

## Fail-safe System

### CPU MALFUNCTION

#### Input/output signal line



#### Outline

The fail-safe system makes engine starting possible if there is something malfunctioning in the ECM's CPU circuit.

In former models, engine starting was difficult under the previously mentioned conditions. But with the provisions in this fail-safe system, it is possible to start the engine.

#### Fail-safe system activating condition when ECM is malfunctioning

The fail-safe mode operates when the computing function of the ECM is judged to be malfunctioning.

When the fail-safe system activates, i.e. if a malfunction condition is detected in the CPU of the ECM, the MALFUNCTION INDICATOR LAMP on the instrument panel lights to warn the driver.

#### Engine control with fail-safe system, operates when ECM is malfunctioning

When the fail-safe system is operating, fuel injection, ignition timing, fuel pump operation, engine idle speed, and so on are controlled under certain limitations.

#### Operation (Mass air flow sensor malfunction)

| Engine condition | Starter switch | Fail-safe system  | Fail-safe functioning  |
|------------------|----------------|-------------------|--|
| Stopped          | ANY            | Does not operate. | —  |
| Cranking         | ON             | Operates.         | Engine will be started by a pre-determined injection pulse on ECM. |
| Running          | OFF            |                   | Engine speed will not rise above 2,400 rpm                         |

#### Cancellation of fail-safe system when ECM is malfunctioning

Activation of the fail-safe system is canceled each time the ignition switch is turned OFF. The system is reactivated if all of the activating conditions are satisfied after turning the ignition switch from OFF to ON.

#### MASS AIR FLOW SENSOR MALFUNCTION

If the mass air flow sensor output voltage is below the specified value, the ECM senses an mass air flow sensor malfunction. In the case of a malfunction, the throttle position sensor substitutes for the mass air flow sensor.

Although the mass air flow sensor is malfunctioning, it is possible to start the engine and drive the vehicle. But engine speed will not rise more than 2,400 rpm in order to inform the driver of fail-safe system operation while driving.

# ENGINE AND EMISSION CONTROL SYSTEM DESCRIPTION

## Fail-safe System (Cont'd)

### ENGINE COOLANT TEMPERATURE SENSOR MALFUNCTION

When engine coolant temperature sensor output voltage is below or above the specified value, engine coolant temperature is fixed at the preset value as follows:

| Engine condition | Engine coolant temperature preset value °C (°F) |
|------------------|---|
| Start            | 20 (68)   |
| Running          | 80 (176)  |

### THROTTLE POSITION SENSOR MALFUNCTION

#### Description

When the output signal of throttle position sensor is abnormal the ECM judges it as a malfunctioning of throttle position sensor.

The ECM do not use the throttle position sensor signal.

### KNOCK SENSOR MALFUNCTION

When ECM judged to be malfunctioning, ignition timing is controlled numerical value for regular gasoline.

### START SIGNAL FOR MALFUNCTION

If the ECM always receives a start signal, the ECM will judge the start signal "OFF" when engine speed is above 1,000 rpm to prevent extra enrichment.

After the engine speed is below 200 rpm, start-up enrichment will be allowed until the engine speed reaches 1,000 rpm.

### BOOST PRESSURE SENSOR MALFUNCTION

When ECM judged to be malfunctioning, the duty of wastegate valve control solenoid valve is fixed at 20%.

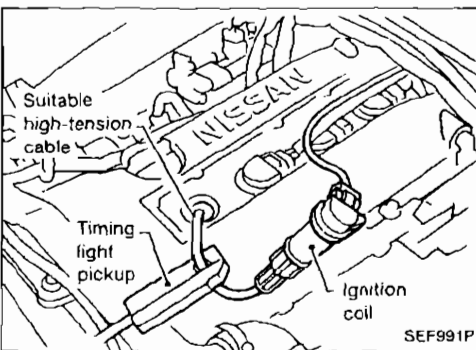
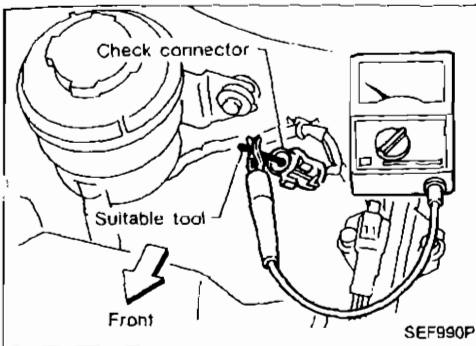
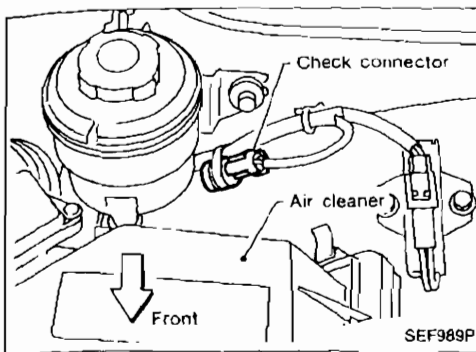
# ENGINE AND EMISSION CONTROL SYSTEM DESCRIPTION

## Direct Ignition System

### CHECKING IDLE SPEED AND IGNITION TIMING

#### Idle speed

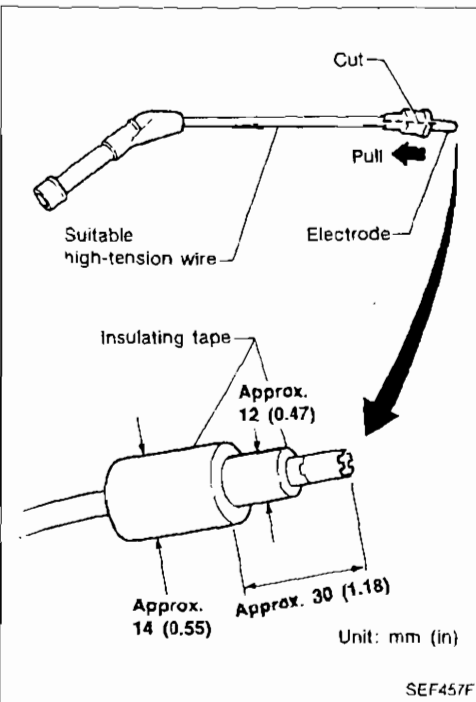
1. Disconnect check connector for voltage type tachometer.
2. Connect tachometer using a suitable tool.



#### Ignition timing

##### ● Method A (Without SST)

1. Remove No. 1 ignition coil.
2. Connect No. 1 ignition coil and No.1 spark plug with a suitable high-tension wire as shown, and attach timing light. For the above procedures, enlarge the end of a suitable high-tension wire with insulating tape as shown.
3. Check ignition timing.



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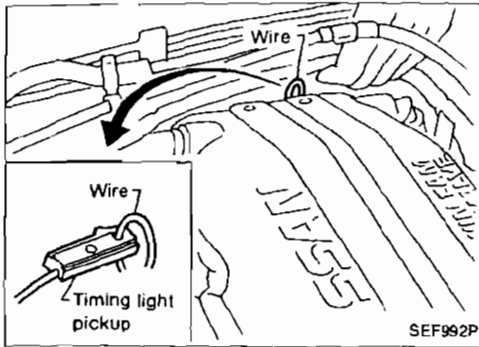


## Direct Ignition System (Cont'd)

- **Method B (Without SST)**

Clamp wire as shown.

This wire is provided at the rear end of the engine.



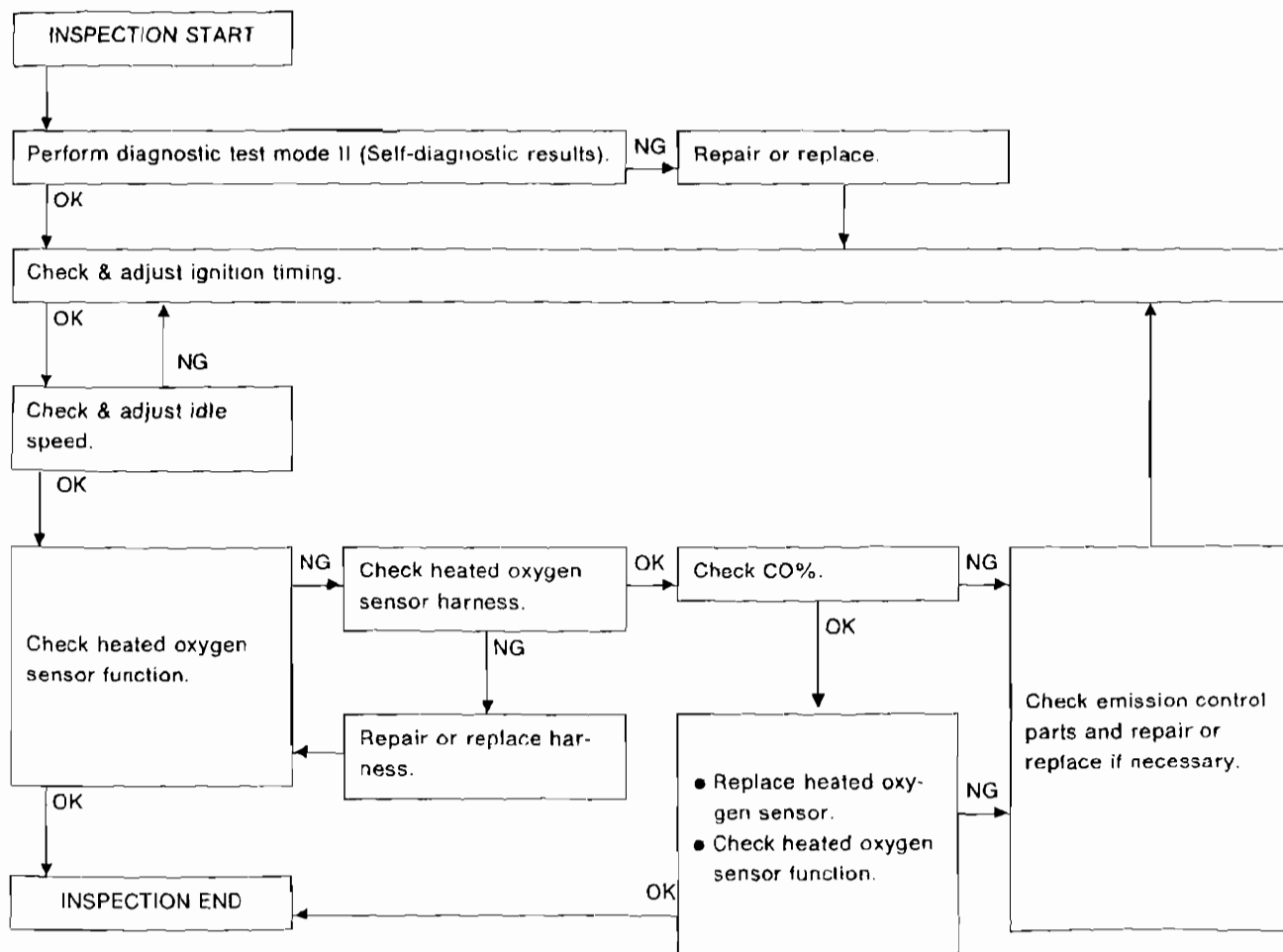
# IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION

## 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
  - EGR valve operation
  - Throttle valve

2. On air conditioner equipped models, checks should be carried out while the air conditioner is "OFF".
3. When checking idle speed, ignition timing and mixture ratio of A/T models, shift lever to "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



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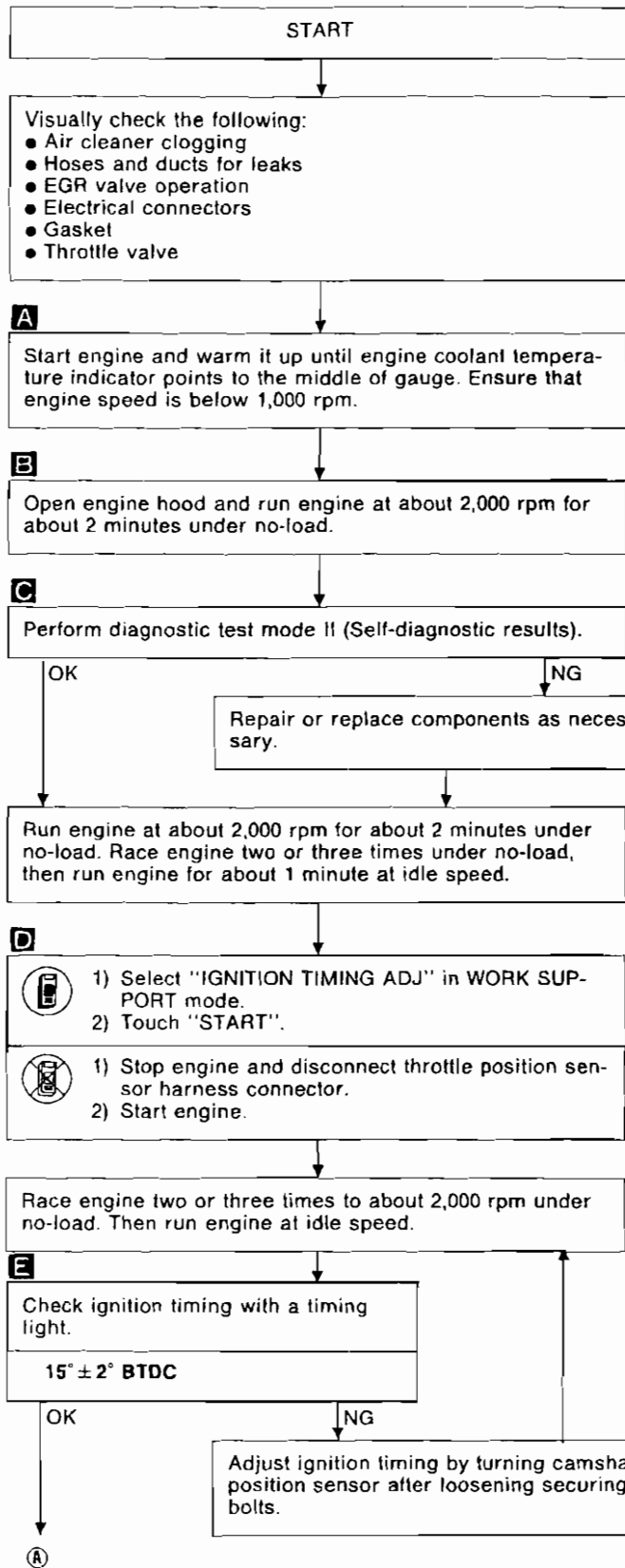
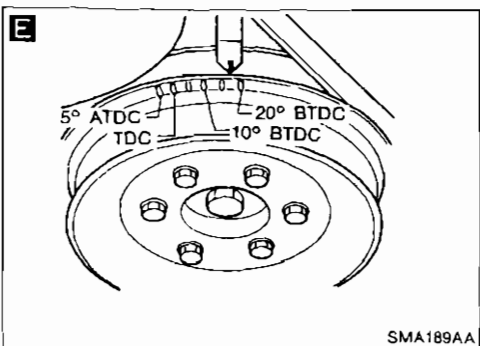
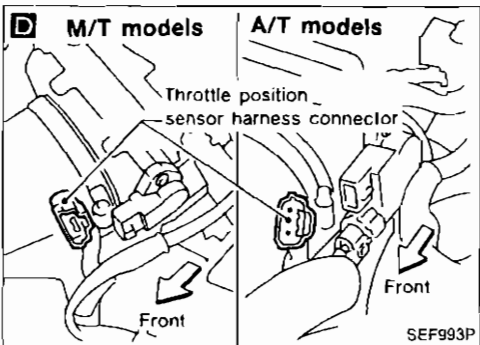
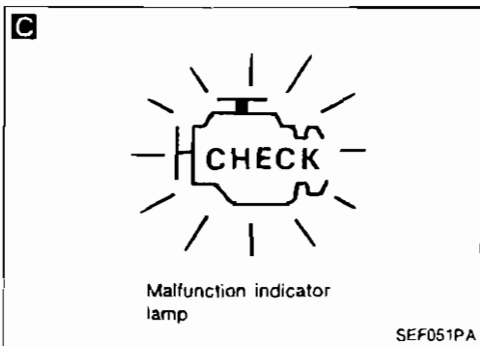
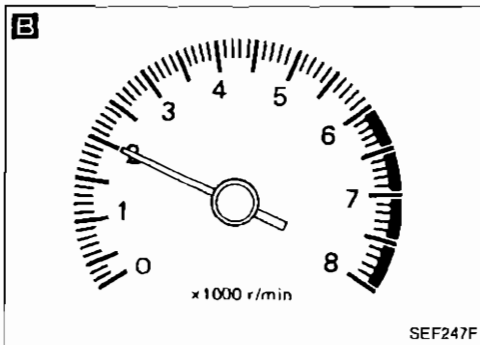
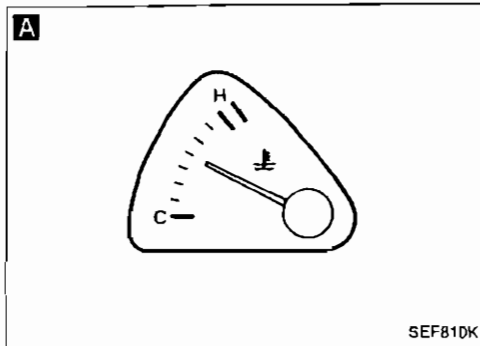
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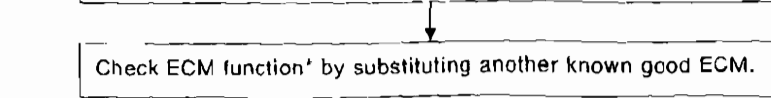
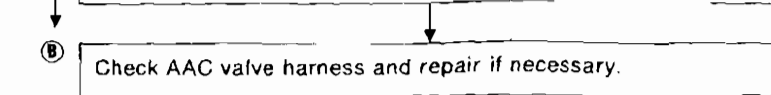
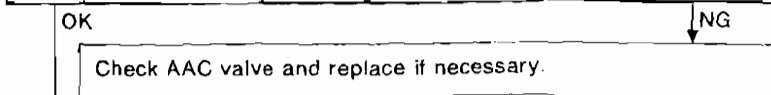
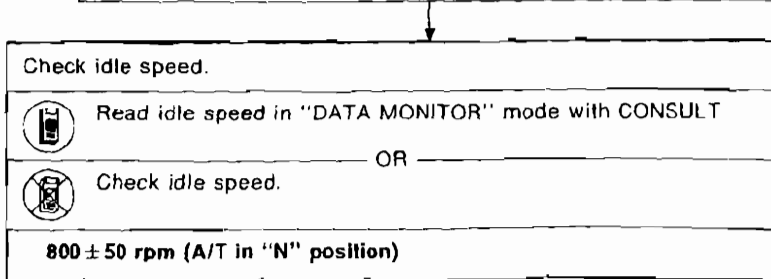
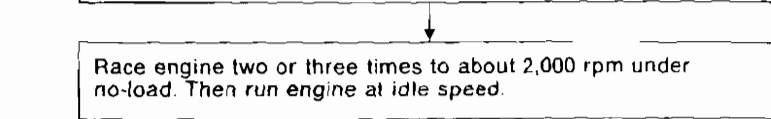
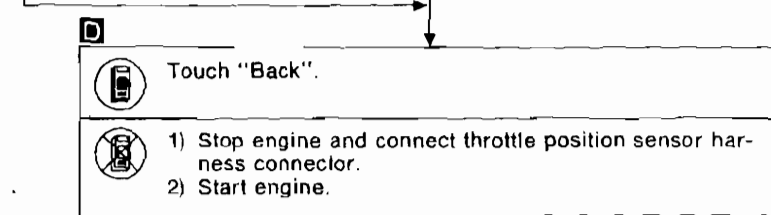
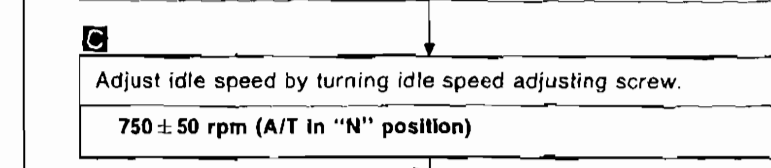
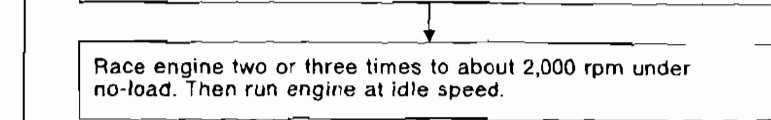
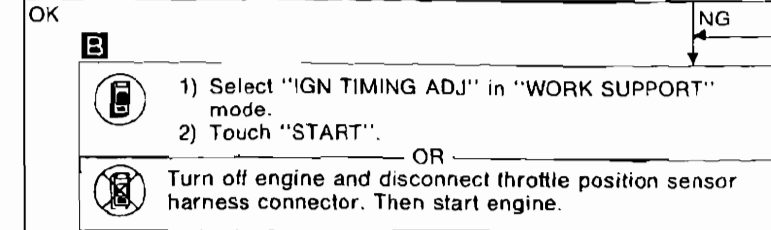
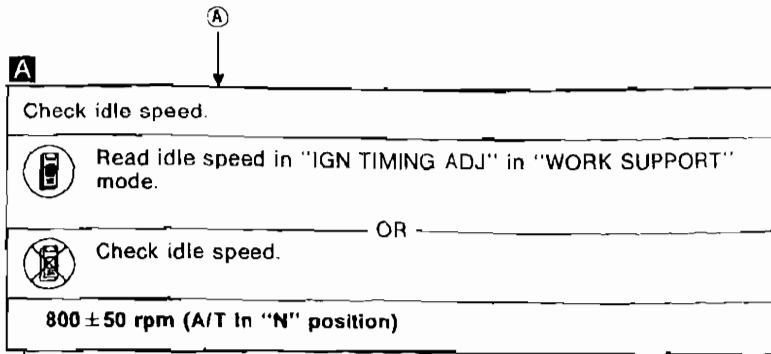
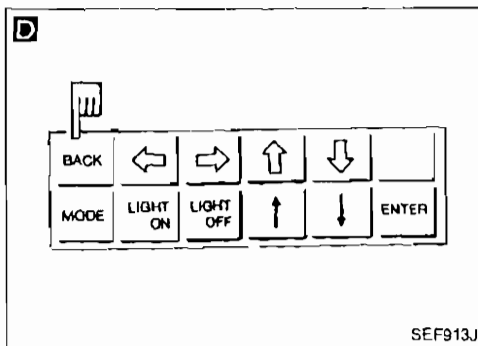
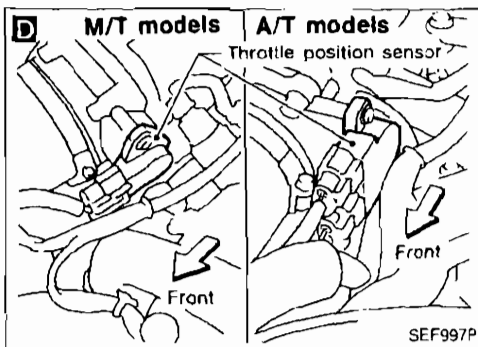
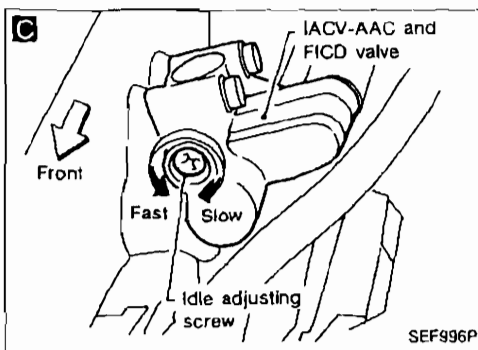
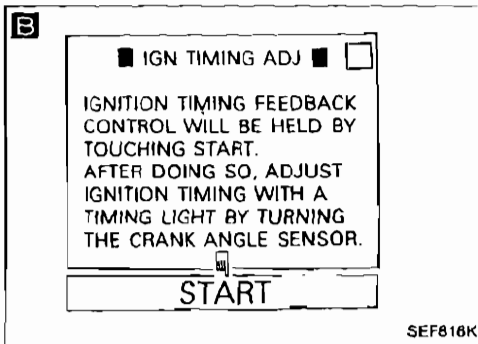
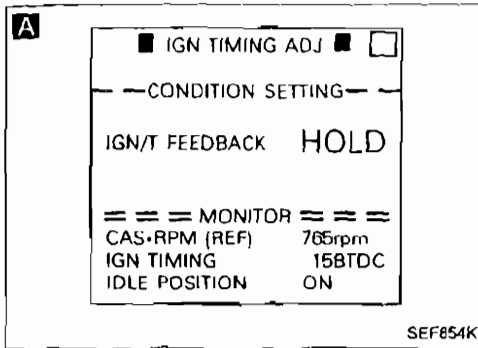
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# IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION



# IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION

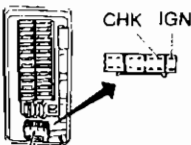


\*: ECM may be the cause of a problem, but this is rarely the case. **I**

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 IX

# IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION

**A**

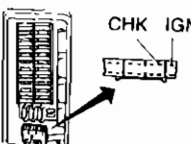


CHK IGN

Data link connector for CONSULT  
(Connect CHK and IGN terminals with a suitable harness.)

SEF265LB

**B**



CHK IGN

Data link connector for CONSULT  
(Disconnect the harness.)

SEF273LB

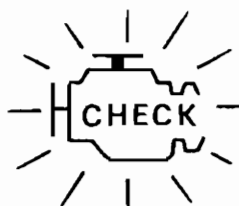
**B**

|               |           |                          |
|---------------|-----------|--------------------------|
| ☆ MONITOR     | ☆ NO FAIL | <input type="checkbox"/> |
| CAS-RPM (REF) | 2000rpm   |                          |
| M/R F/C MNT   | RICH      |                          |

RECORD

SEF818K

**C**

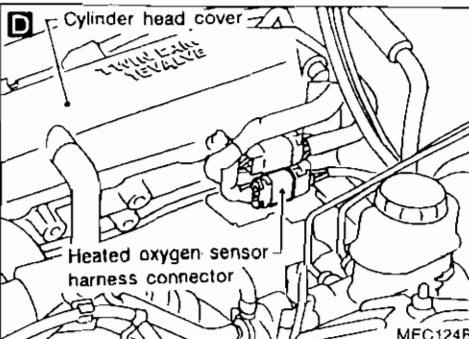


CHECK

Malfunction indicator lamp

SEF051PA

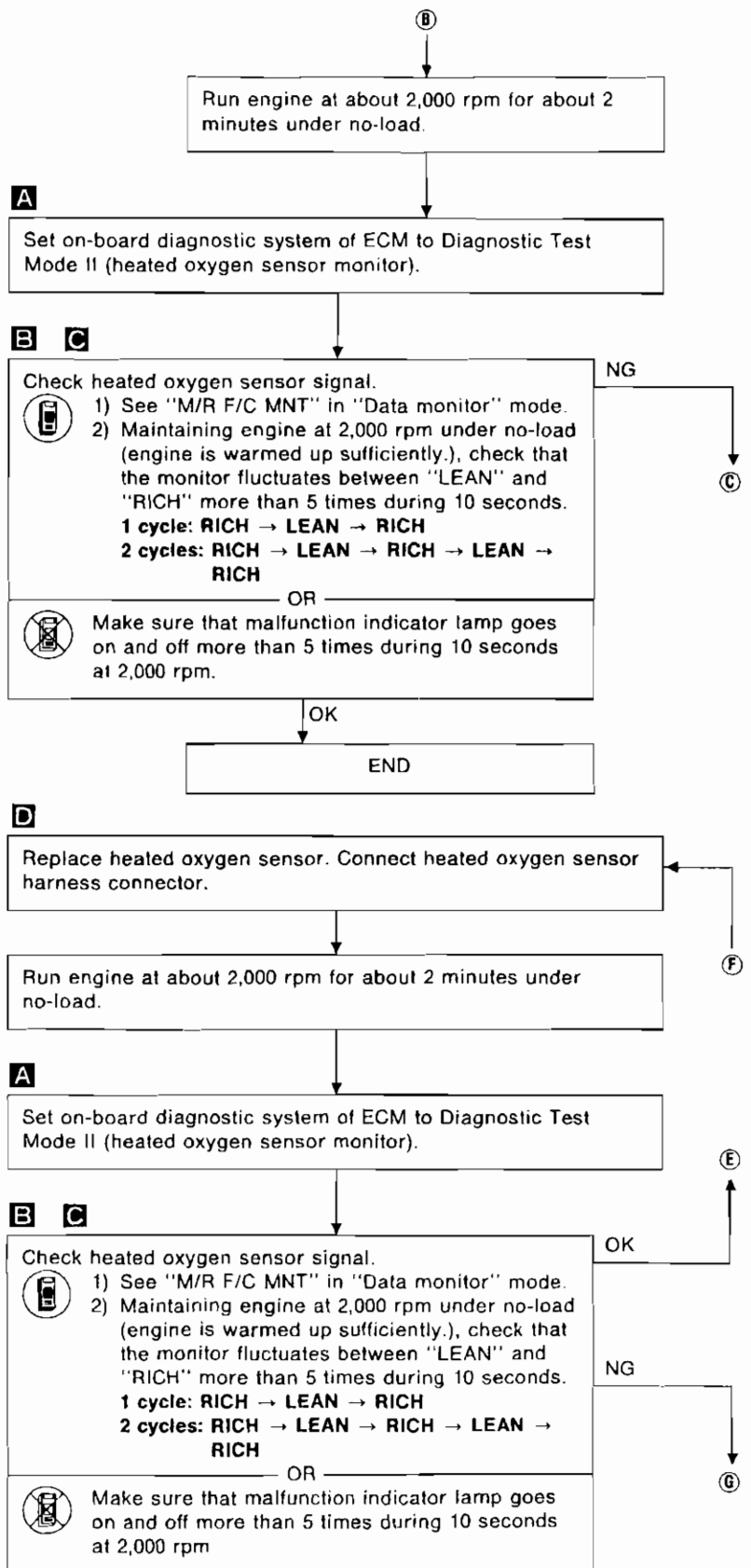
**D**



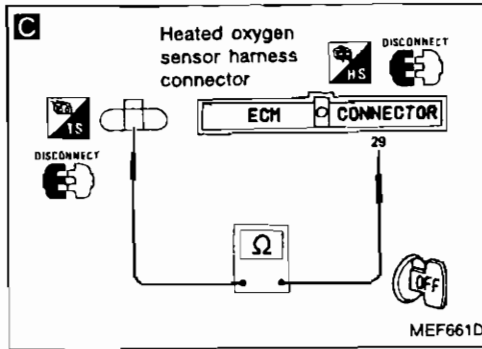
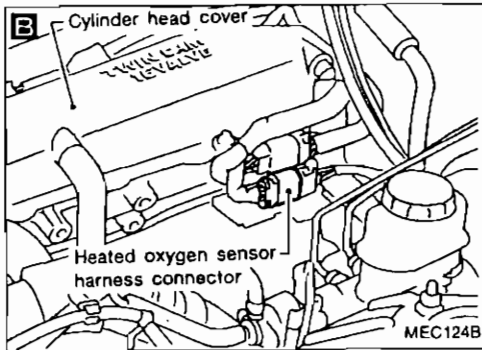
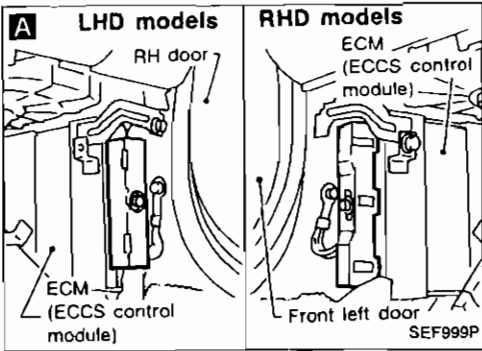
Cylinder head cover

Heated oxygen sensor harness connector

MEC124B



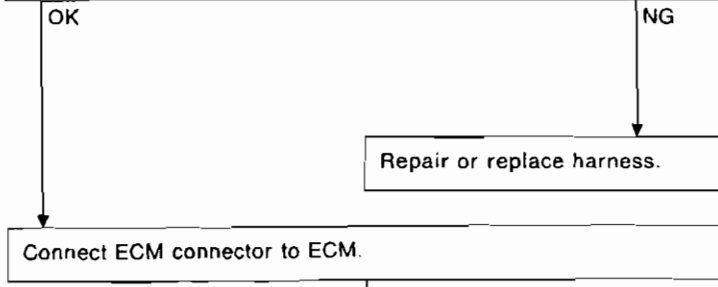
# IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION



**A B C**

- Check heated oxygen sensor harness:
- 1) Turn off engine and disconnect battery ground cable
  - 2) Disconnect ECM connector from ECM.
  - 3) Disconnect heated oxygen sensor harness connector. Then connect harness side terminal for heated oxygen sensor to ground with a jumper wire.
  - 4) Check for continuity between terminal No. 29 of ECM connector and ground metal on vehicle body.

Continuity exists .....OK  
 Continuity does not exist .....NG



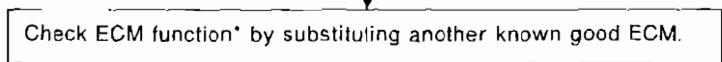
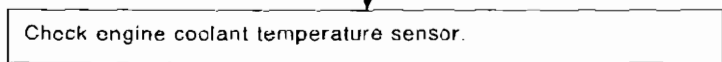
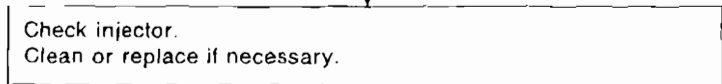
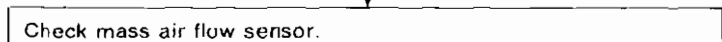
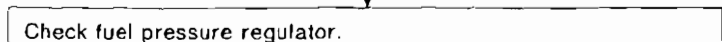
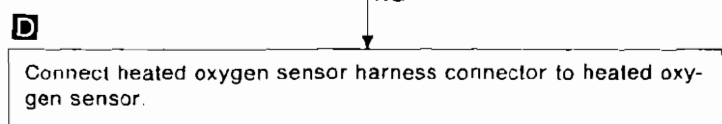
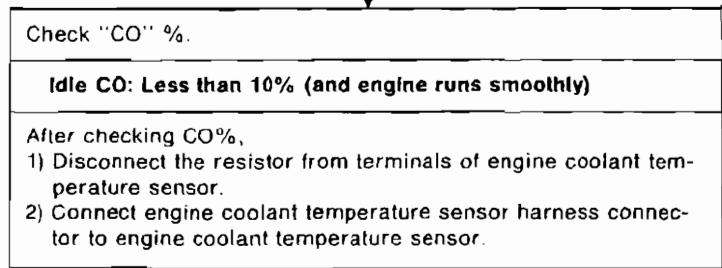
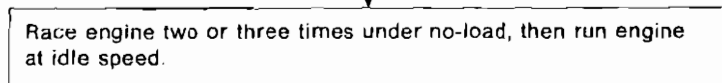
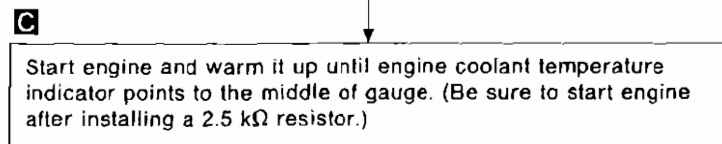
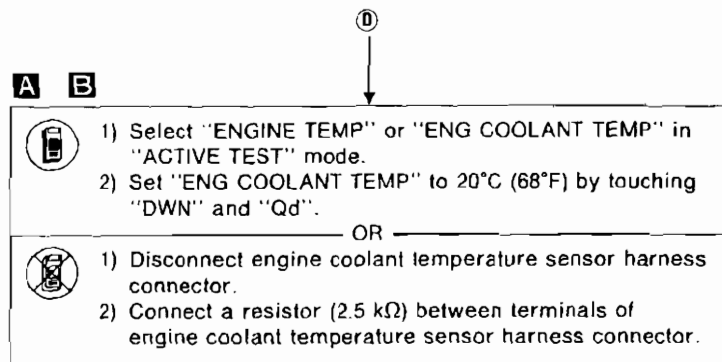
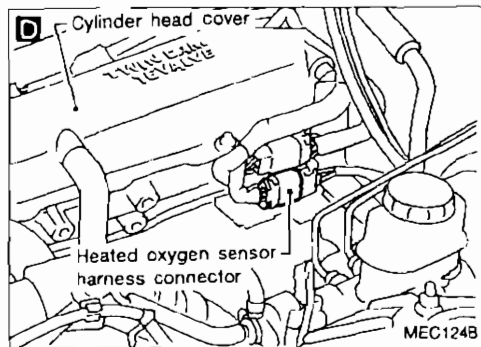
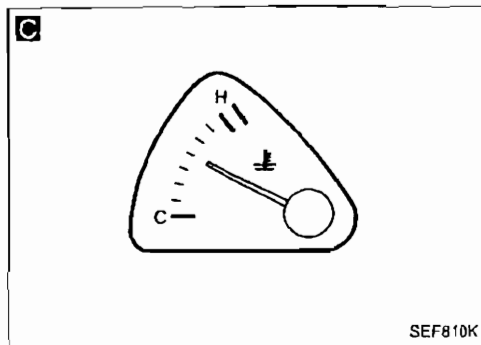
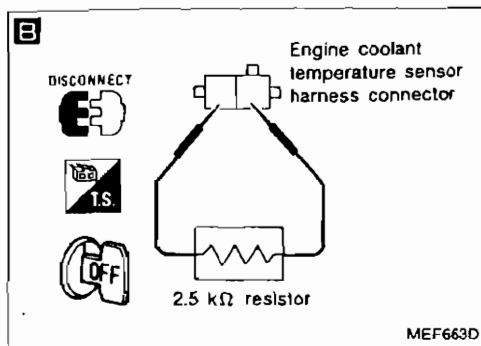
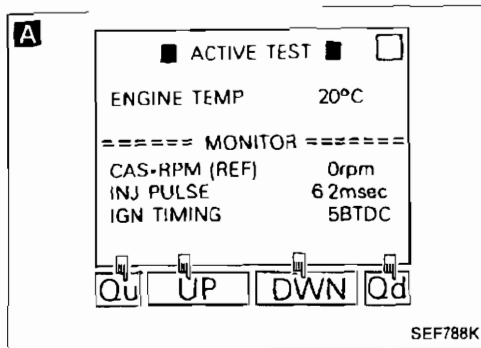
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 IDX

# IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION



\*: ECM may be the cause of a problem, but this is rarely the case.

# TROUBLE DIAGNOSES

## Contents

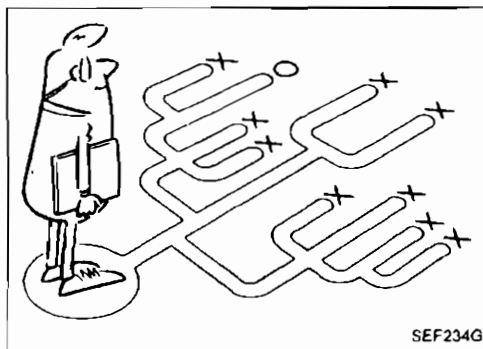
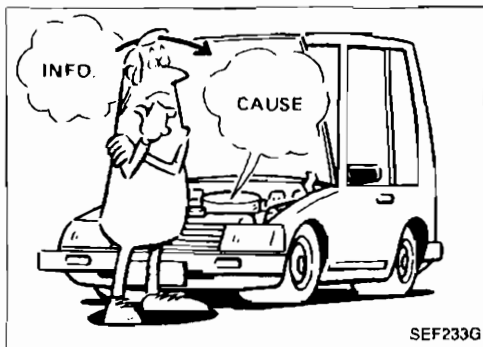
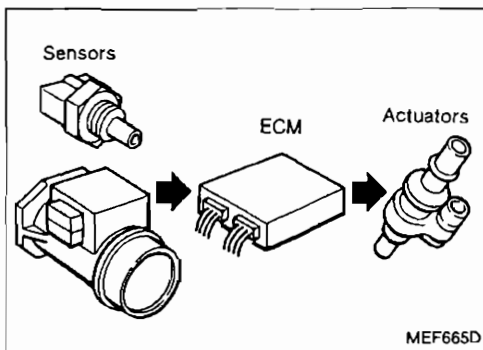
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# TROUBLE DIAGNOSES

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## How to Perform Trouble Diagnoses for Quick and Accurate Repair

### INTRODUCTION

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 kinds of signals are proper and stable. At the same time, it is important that there are no conventional 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, so a road test with a circuit tester connected to a suspected circuit should be performed.

Before checking, talk to customer about drivability complaint. The customer is a very good supplier of information on such problems, especially intermittent ones. Through interaction with the customer, find out what symptoms are present and under what conditions they occur.

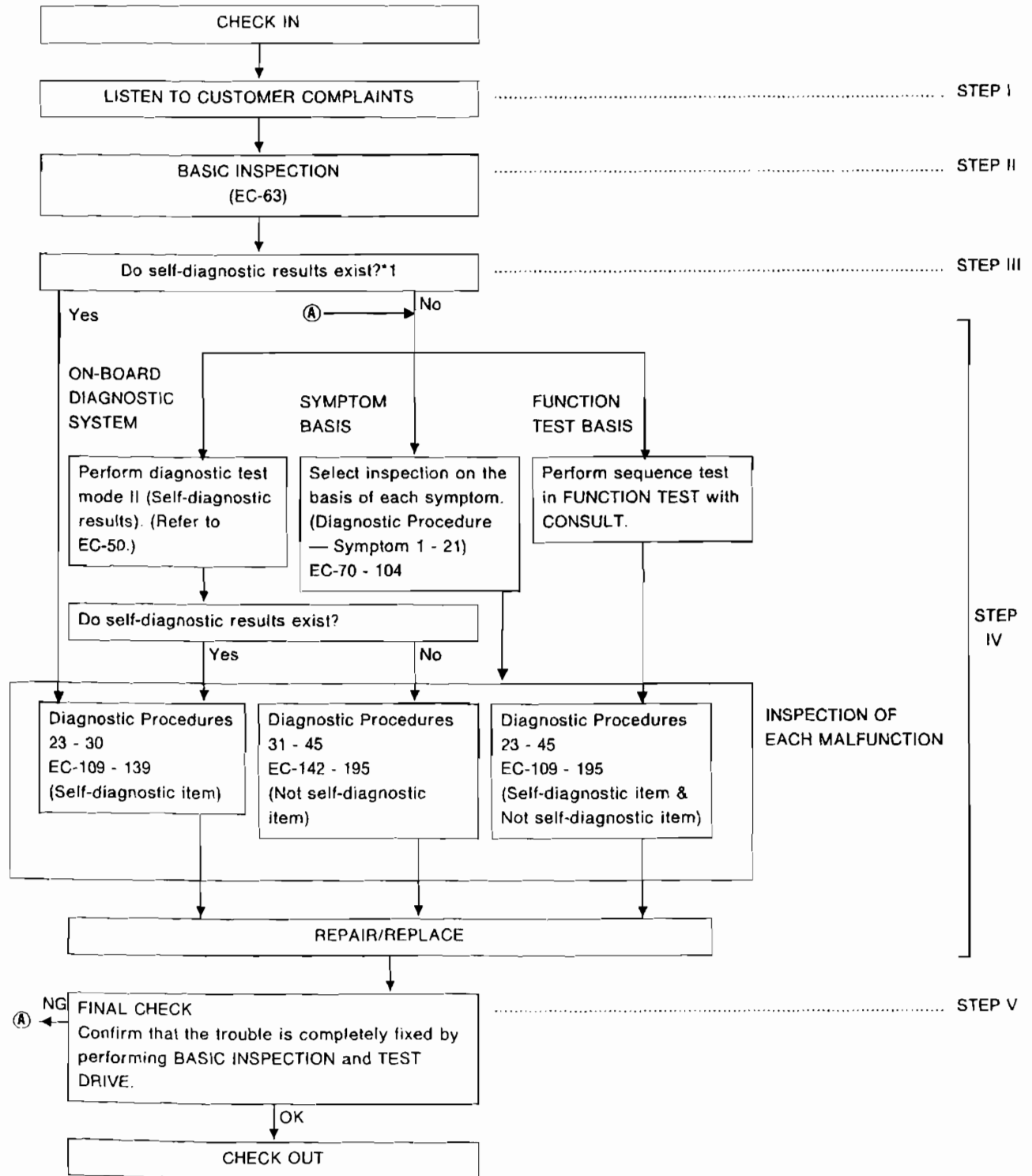
Start your diagnosis by looking for "conventional" problems first. This is one of the best ways to troubleshoot drivability problems on an electronically controlled engine vehicle.

1. Verify the complaint.
2. Isolate the cause.
3. Repair
4. Recheck and be sure no new symptoms have been caused.

# TROUBLE DIAGNOSES

## How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont'd)

### WORK FLOW



\*1: If the on-board diagnostic system cannot be performed, check main power supply and ground circuit. (See Diagnostic Procedure 22)

\*2: If the trouble is not duplicated, see INTERMITTENT PROBLEM SIMULATION (EC-47).

# TROUBLE DIAGNOSES

## How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont'd)

### DESCRIPTION FOR WORK FLOW

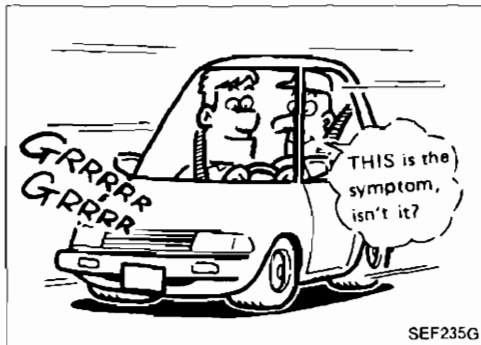
| STEP     | DESCRIPTION   |
|----------|---|
| STEP I   | Identify the trouble using the "DIAGNOSTIC WORKSHEET" as shown on the next page   |
| STEP II  | Be sure to carry out the Basic Inspection, or the results of inspections thereafter may be misinterpreted.  |
| STEP III | Check the self-diagnostic results stored in the ECM of the failed vehicle.  |
| STEP IV  | <p>Perform inspection often selecting from the following three tests according to the trouble observed.</p> <ol style="list-style-type: none"> <li>1. ON-BOARD DIAGNOSTIC SYSTEM<br/>Follow the self-diagnostic procedure for each item described in "How to Execute On-board Diagnostic System in Diagnostic Test Mode II". Non-self-diagnostic procedures described for some items will also provide results which are equal to the self-diagnostic results.</li> <li>2. SYMPTOM BASIS<br/>This inspection is of a simplified method. When performing inspection of a part, the corresponding system must be checked thoroughly by selecting the appropriate check item from Diagnostic Procedures 23 - 45.</li> <li>3. FUNCTION TEST BASIS (Sequence test)<br/>In this inspection, the CONSULT judges "OK" or "NG" on each system in place of a technician. When performing inspection of a part, the corresponding system must be checked thoroughly by selecting the appropriate check item from Diagnostic Procedures 23 - 45.</li> <li>4. Diagnostic Procedure <ul style="list-style-type: none"> <li>● This inspection program is prepared using the data obtained when disconnection of harness or connectors has occurred in the respective circuit.</li> <li>● Inspection of the "Not self-diagnostic item" does not actually start with the execution of diagnostic test mode II (self-diagnostic results). However, inspection is started by assuming that the diagnostic test mode II (self-diagnostic results) has already been performed.</li> <li>● When a system having the diagnostic test mode II (self-diagnostic results) function contains any circuit placed outside the range of this diagnostic test mode II (self-diagnostic results) function, it is arranged that the "Not self-diagnostic item" of such a system will be performed when the self-diagnostic result is OK.</li> </ul> <p>Example: CAMSHAFT POSITION SENSOR</p> </li> </ol> |
| STEP V   | <ol style="list-style-type: none"> <li>1. FINAL CHECK item is not described in the "Not self-diagnostic item". However, this FINAL CHECK must be performed without fail in order to ensure that the trouble has been repaired, and also that the unit disassembled in the course of the repair work has been reassembled correctly.</li> <li>2. If the same trouble phenomenon is observed again in the final check:<br/>Go back to STEP IV, and perform the inspection using a method which is different from the previous method.</li> <li>3. If the cause of the trouble is still unknown even after conducting step 2 above, check the circuit of each system for a short by using the voltage available at the "ECM INPUT/OUTPUT SIGNAL INSPECTION" terminal.</li> </ol>   |

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## TROUBLE DIAGNOSES

### How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont'd)



#### INTERMITTENT PROBLEM SIMULATION

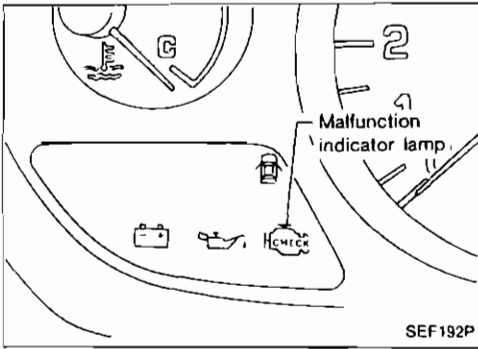
In order to duplicate an intermittent problem, it is effective to create similar conditions for component parts, under which the problem might occur.

Perform the activity listed under Service procedure and note the result.

|    | Variable factor                             | Influential part             | Target condition                              | Service procedure  |
|----|---|------------------------------|---|--|
| 1  | Mixture ratio                               | Pressure regulator           | Made lean                                     | Remove vacuum hose and apply vacuum.   |
|    |   |                              | Made rich                                     | Remove vacuum hose and apply pressure.   |
| 2  | Ignition timing                             | Camshaft position sensor     | Advanced                                      | Rotate distributor counter clockwise.  |
|    |   |                              | Retarded                                      | Rotate distributor clockwise.  |
| 3  | Mixture ratio feedback control              | Heated oxygen sensor         | Suspended                                     | Disconnect heated oxygen sensor harness connector.   |
|    |   | ECM                          | Operation check                               | Perform diagnostic test mode II (Self-diagnostic results) at 2,000 rpm.                                      |
| 4  | Idle speed                                  | IACV-AAC valve               | Raised  | Turn idle adjusting screw counterclockwise.  |
|    |   |                              | Lowered                                       | Turn idle adjusting screw clockwise.   |
| 5  | Electrical connection (Electric continuity) | Harness connectors and wires | Poor electrical connection or improper wiring | Tap or wiggle.<br>Race engine rapidly. See if the torque reaction of the engine unit causes electric breaks. |
| 6  | Temperature                                 | ECM                          | Cooled  | Cool with an icing spray or similar device.  |
|    |   |                              | Warmed  | Heat with a hair drier.<br><b>[WARNING: Do not overheat the unit.]</b>                                       |
| 7  | Moisture                                    | Electric parts               | Damp  | Wet.<br><b>[WARNING: Do not directly pour water on components. Use a mist sprayer.]</b>                      |
| 8  | Electric loads                              | Load switches                | Loaded  | Turn on headlamps, air conditioner, rear defogger, etc.  |
| 9  | Throttle position sensor condition          | ECM                          | ON-OFF switching                              | Rotate throttle position sensor body.  |
| 10 | Ignition spark                              | Timing light                 | Spark power check                             | Try to flash timing light for each cylinder.   |

- Select the "Variable factor" when the symptom occurs. Perform the "Service procedure" to try to simulate the intermittent.

# TROUBLE DIAGNOSES





## On-board Diagnostic System

### MALFUNCTION INDICATOR LAMP (MIL)

A malfunction indicator lamp has been adopted on all models.

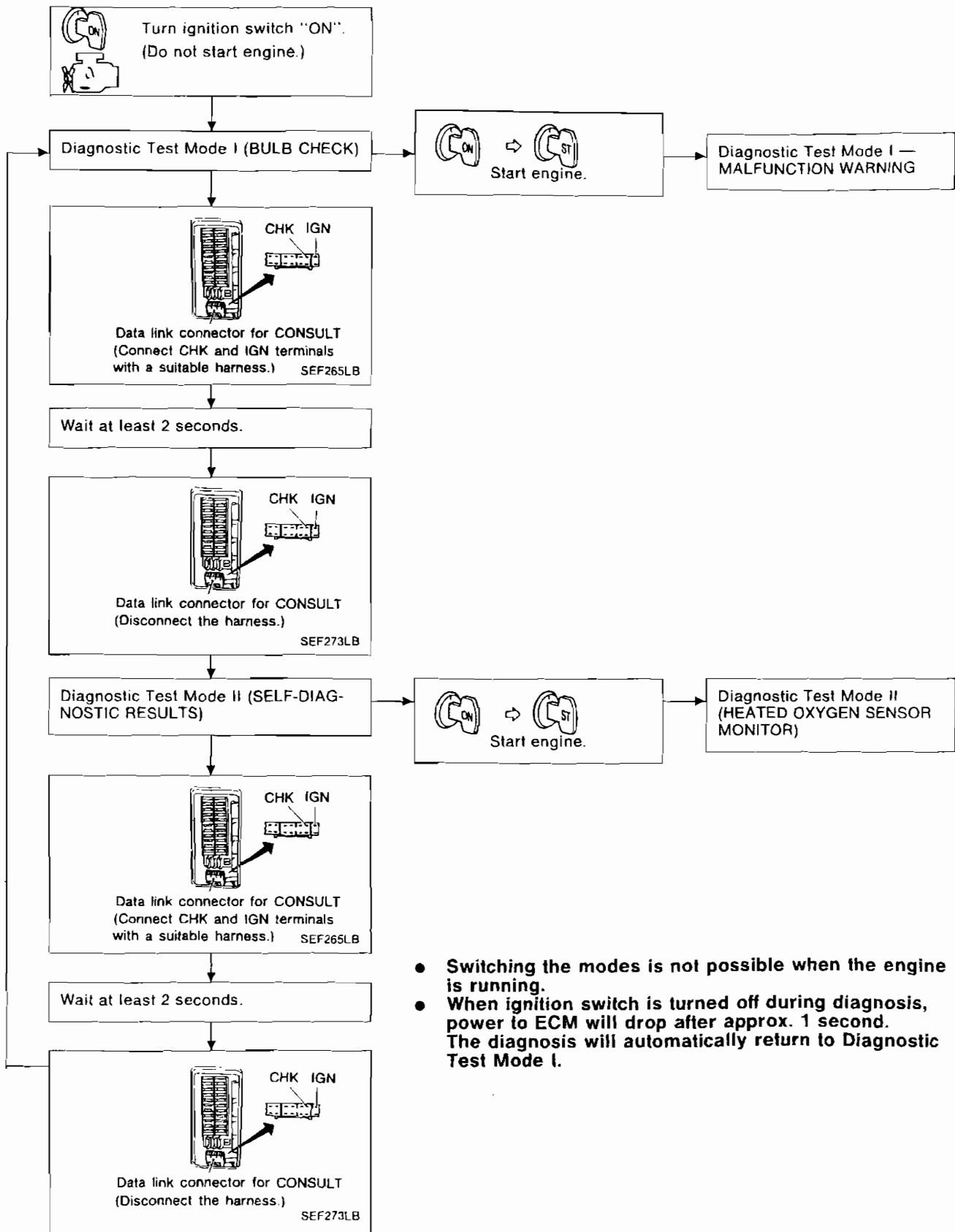
### ON-BOARD DIAGNOSTIC SYSTEM FUNCTION

| Condition                        |   | Diagnostic Test Mode   |                              |
|----------------------------------|---|------------------------|------------------------------|
|                                  |   | Diagnostic Test Mode I | Diagnostic Test Mode II      |
| Ignition switch in "ON" position | Engine stopped<br> | BULB CHECK             | SELF-DIAGNOSTIC RESULTS      |
|                                  | Engine running<br> | MALFUNCTION WARNING    | HEATED OXYGEN SENSOR MONITOR |

# TROUBLE DIAGNOSES

## On-board Diagnostic System (Cont'd)

### HOW TO SWITCH MODES



- Switching the modes is not possible when the engine is running.
- When ignition switch is turned off during diagnosis, power to ECM will drop after approx. 1 second. The diagnosis will automatically return to Diagnostic Test Mode I.

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# TROUBLE DIAGNOSES

## On-board Diagnostic System — Diagnostic Test Mode I

### DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the MALFUNCTION INDICATOR LAMP in the instrument panel stays "ON".

If it remains "OFF", check the bulb in the MALFUNCTION INDICATOR LAMP.

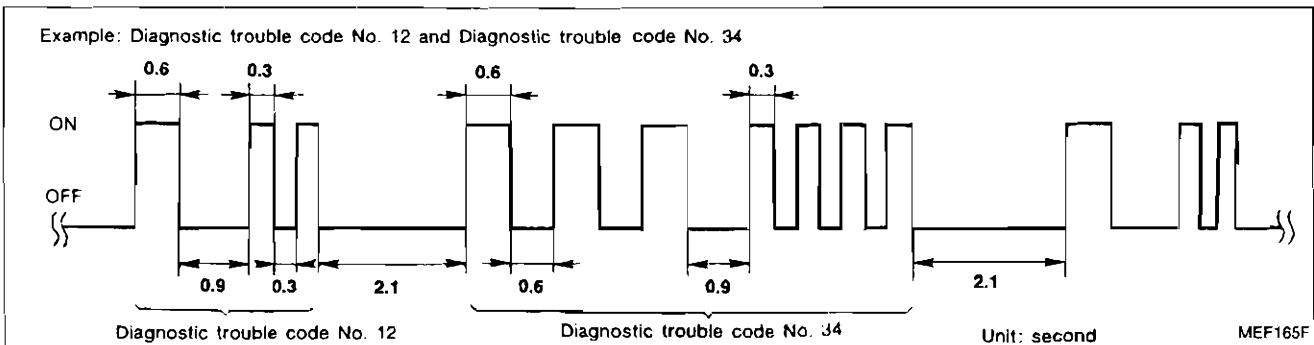
### DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

| MALFUNCTION INDICATOR LAMP | Condition   |
|----------------------------|---|
| ON                         | When the ECM's CPU or camshaft position sensor is malfunctioning. |
| OFF                        | OK  |

## On-board Diagnostic System — Diagnostic Test Mode II (Self-diagnostic results)

### DESCRIPTION

In this mode, a diagnostic trouble code is indicated by the number of flashes from the MALFUNCTION INDICATOR LAMP (MIL) as shown below:



Long (0.6 second) blinking indicates the number of ten digits and short (0.3 second) blinking indicates the number of single digits.

For example, the MIL flashes for 0.6 seconds once and then it flashes for 0.3 seconds twice. This indicates the number "12" and refers to a malfunction in the mass air flow sensor. In this way, all the problems are classified by their diagnostic trouble code numbers.

The diagnostic results will remain in the ECM memory.

# TROUBLE DIAGNOSES

## On-board Diagnostic System — Diagnostic Test Mode II (Self-diagnostic results) (Cont'd)

### Display diagnostic trouble code table

| Diagnostic trouble code No. | Detected items                              |
|-----------------------------|---|
| 11*                         | Camshaft position sensor circuit            |
| 12                          | Mass air flow sensor circuit                |
| 13                          | Engine coolant temperature sensor circuit   |
| 21*                         | Ignition signal circuit                     |
| 26                          | Boost pressure sensor circuit               |
| 34                          | Knock sensor circuit                        |
| 43                          | Throttle position sensor circuit            |
| 54                          | Signal circuit from A/T control unit to ECM |
| 55                          | No malfunction in the above circuits        |

\*: Check items causing a malfunction of camshaft position sensor circuit first, if both "CAMSHAFT POSITION SENSOR (No. 11)" and "IGN SIGNAL-PRIMARY (No. 21)" are displayed one after the other.

| Diagnostic trouble code No. | Detected items   | Malfunction is detected when ...   | Check item (remedy)  |
|-----------------------------|--|--|--|
| 11*                         | Camshaft position sensor circuit                       | <ul style="list-style-type: none"> <li>● Either 1° or 180° signal is not entered for the first few seconds during engine cranking.</li> <li>● Either 1° or 180° signal is not input often enough while the engine speed is higher than the specified rpm.</li> </ul> | <ul style="list-style-type: none"> <li>● Harness and connector (If harness and connector are normal, replace camshaft position sensor.)</li> </ul> |
| 12                          | Mass air flow sensor circuit                           | <ul style="list-style-type: none"> <li>● The mass air flow sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)</li> </ul>   | <ul style="list-style-type: none"> <li>● Harness and connector (If harness and connector are normal, replace mass air flow sensor.)</li> </ul>     |
| 13                          | Engine coolant temperature sensor circuit              | <ul style="list-style-type: none"> <li>● The engine coolant temperature sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)</li> </ul>   | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Engine coolant temperature sensor</li> </ul>                             |
| 21*                         | Ignition signal circuit                                | <ul style="list-style-type: none"> <li>● The ignition signal in the primary circuit is not entered during engine cranking or running.</li> </ul>   | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Power transistor unit</li> </ul>   |
| 26                          | Boost pressure sensor circuit                          | <ul style="list-style-type: none"> <li>● The boost pressure sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)</li> </ul>   | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Boost pressure sensor</li> </ul>   |
| 34                          | Knock sensor circuit                                   | <ul style="list-style-type: none"> <li>● The knock sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)</li> </ul>   | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Knock sensor</li> </ul>  |
| 43                          | Throttle position sensor circuit                       | <ul style="list-style-type: none"> <li>● The throttle position sensor circuit is open or shorted (An abnormally high or low voltage is entered.)</li> </ul>  | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Throttle position sensor</li> </ul>                                      |
| 54                          | Signal circuit from A/T control unit to ECM (A/T only) | <ul style="list-style-type: none"> <li>● The A/T communication line is open or shorted.</li> </ul>   | <ul style="list-style-type: none"> <li>● Harness and connector</li> </ul>  |

\*: Check items causing a malfunction of camshaft position sensor circuit first, if both "CAMSHAFT POSITION SENSOR (No. 11)" and "IGN SIGNAL-PRIMARY (No. 21)" are displayed one after the other.

## TROUBLE DIAGNOSES

### On-board Diagnostic System — Diagnostic Test Mode II (Self-diagnostic results) (Cont'd)

#### HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

The diagnostic trouble code is erased from the backup memory on the ECM when the diagnostic test mode is changed from Diagnostic Test Mode II to Diagnostic Test Mode I. (Refer to "HOW TO SWITCH DIAGNOSTIC TEST MODES".)

- When the battery terminal is disconnected, the diagnostic trouble code will be lost from the backup memory within 24 hours.
- Do not erase the stored memory before beginning diagnostic test mode II (Self-diagnostic results).

### On-board Diagnostic System — Diagnostic Test Mode II (Heated oxygen sensor monitor)

#### DESCRIPTION

In this mode, the MALFUNCTION INDICATOR LAMP displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor.

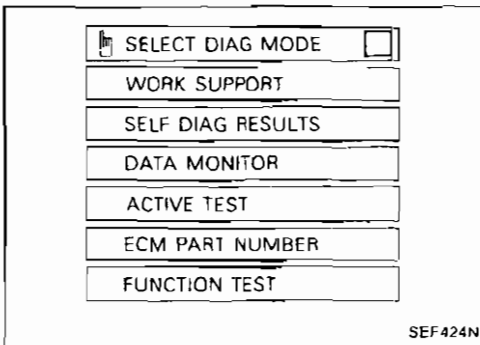
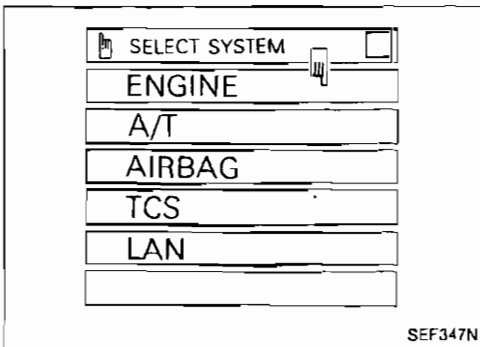
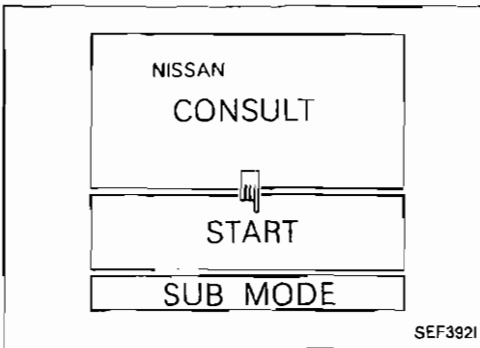
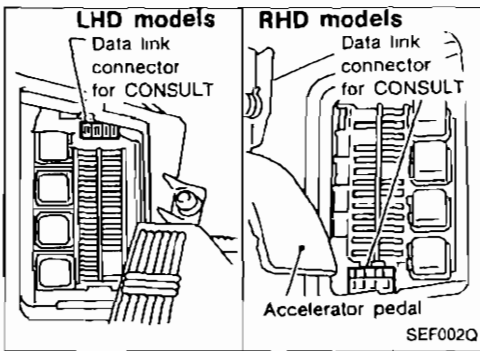
| MALFUNCTION INDICATOR LAMP | Fuel mixture condition in the exhaust gas | Air fuel ratio feedback control condition |
|----------------------------|---|---|
| ON                         | Lean                                      | Closed loop system                        |
| OFF                        | Rich                                      |   |
| *Remains ON or OFF         | Any condition                             | Open loop system                          |

\*: Maintain conditions just before switching to open loop.

#### HOW TO CHECK HEATED OXYGEN SENSOR

1. Set Diagnostic Test Mode II. (Refer to "HOW TO SWITCH DIAGNOSTIC TEST MODES".)
2. Start engine and warm it up until engine coolant temperature indicator points to the middle of the gauge.
3. Run engine at about 2,000 rpm for about 2 minutes under no-load conditions.
4. Make sure MALFUNCTION INDICATOR LAMP goes ON and OFF more than 5 times every 10 seconds; measured at 2,000 rpm under no-load.

# TROUBLE DIAGNOSES



## Consult

### CONSULT INSPECTION PROCEDURE

1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector for CONSULT. (Data link connector for CONSULT is located behind the fuse box cover.)

3. Turn on ignition switch.
4. Touch "START".

5. Touch "ENGINE".

6. Perform each diagnostic test mode according to the inspection sheet as follows:

**For further information, read the CONSULT Operation Manual.**

GI

MA

EM

LC

EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

RS

BT

HA

EI

IOX

# TROUBLE DIAGNOSES

## Consult (Cont'd)

### ECCS COMPONENT PARTS APPLICATION

| ECCS COMPONENT PARTS                   |                                     | DIAGNOSTIC TEST MODE |                                |                   |             |                  |
|--|-------------------------------------|----------------------|--------------------------------|-------------------|-------------|------------------|
|  |                                     | WORK SUP-<br>PORT    | SELF-<br>DIAGNOSTIC<br>RESULTS | DATA MONI-<br>TOR | ACTIVE TEST | FUNCTION<br>TEST |
| <b>INPUT</b>                           | Camshaft position sensor            |                      | X                              | X                 |             |                  |
|  | Mass air flow sensor                |                      | X                              | X                 |             |                  |
|  | Engine coolant temperature sensor   |                      | X                              | X                 | X           |                  |
|  | Heated oxygen sensors               |                      |                                | X                 |             | X                |
|  | Vehicle speed sensors               |                      |                                | X                 |             | X                |
|  | Throttle position sensor            | X                    | X                              | X                 |             | X                |
|  | Knock sensor                        |                      | X                              |                   |             |                  |
|  | Boost pressure sensor               |                      | X                              |                   |             |                  |
|  | Ignition switch (start signal)      |                      |                                | X                 |             | X                |
|  | Air conditioner switch              |                      |                                | X                 |             |                  |
|  | Park/Neutral position switch        |                      |                                | X                 |             | X                |
|  | Power steering oil pressure switch  |                      |                                | X                 |             | X                |
|  | Battery                             |                      |                                | X                 |             |                  |
|  | A/T signal                          |                      | X                              |                   |             |                  |
| <b>OUTPUT</b>                          | Injectors                           |                      |                                | X                 | X           | X                |
|  | Power transistor (ignition timing)  | X                    | X (Ignition<br>signal)         | X                 | X           | X                |
|  | IACV-AAC valve                      | X                    |                                | X                 | X           | X                |
|  | Valve timing control solenoid valve |                      |                                | X                 | X           | X                |
|  | EGRC-solenoid valve                 |                      |                                | X                 | X           | X                |
|  | Air conditioner relay               |                      |                                | X                 |             |                  |
|  | Fuel pump relay                     | X                    |                                | X                 | X           | X                |
|  | Cooling fan relay                   |                      |                                | X                 | X           | X                |
| Wastegate valve control solenoid valve |                                     |                      | X                              |                   |             |                  |

X: Applicable

### FUNCTION

| 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 unit.    |
| Self-diagnostic results | Self-diagnostic results can be read and erased quickly.   |
| Data monitor            | Input/Output data in the ECM can be read.   |
| Active test             | Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range. |
| ECM part number         | ECM part number can be read.  |
| Function test           | Conducted by CONSULT instead of a technician to determine whether each system is "OK" or "NG".  |

# TROUBLE DIAGNOSES

## Consult (Cont'd)

### WORK SUPPORT MODE

| WORK ITEM  | CONDITION  | USAGE  |
|--|--|--|
| THRTL POS SEN ADJ<br>(THROTTLE SENSOR<br>ADJUSTMENT) | CHECK THE THROTTLE POSITION SENSOR SIGNAL.<br>ADJUST IT TO THE SPECIFIED VALUE BY ROTATING THE<br>SENSOR BODY UNDER THE FOLLOWING CONDITIONS.<br><ul style="list-style-type: none"> <li>● IGN SW "ON"</li> <li>● ENG NOT RUNNING</li> <li>● ACC PEDAL NOT PRESSED</li> </ul> | When adjusting throttle position sensor initial position |
| IGNITION TIMING ADJUST-<br>MENT                      | <ul style="list-style-type: none"> <li>● IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING "START". AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR.</li> </ul>   | When adjusting initial ignition timing                   |
| IACV-AAC VALVE ADJ<br>(AAC VALVE ADJUSTMENT)         | SET ENGINE RPM AT THE SPECIFIED VALUE UNDER THE<br>FOLLOWING CONDITIONS.<br><ul style="list-style-type: none"> <li>● ENGINE WARMED UP</li> <li>● NO-LOAD</li> </ul>  | When adjusting idle speed                                |
| FUEL PRESSURE RELEASE                                | <ul style="list-style-type: none"> <li>● FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLE.<br/>CRANK A FEW TIMES AFTER ENGINE STALLS.</li> </ul>  | When releasing fuel pressure from fuel line              |

### SELF-DIAGNOSTIC RESULTS MODE

| DIAGNOSTIC ITEM                             | DIAGNOSTIC ITEM IS DETECTED WHEN ....  | CHECK ITEM (REMEDY)  |
|---|--|--|
| CAMSHAFT POSI SEN*<br>(CRANK ANGLE SENSOR*) | <ul style="list-style-type: none"> <li>● Either 1° or 180° signal is not entered for the first few seconds during engine cranking.</li> <li>● Either 1° or 180° signal is not input often enough while the engine speed is higher than the specified rpm.</li> </ul> | <ul style="list-style-type: none"> <li>● Harness and connector<br/>(If harness and connector are normal, replace camshaft position sensor.)</li> </ul> |
| MASS AIR FLOW SEN<br>(AIR FLOW METER)       | <ul style="list-style-type: none"> <li>● The mass air flow sensor circuit is open or shorted.<br/>(An abnormally high or low voltage is entered.)</li> </ul>   | <ul style="list-style-type: none"> <li>● Harness and connector<br/>(If harness and connector are normal, replace mass air flow sensor.)</li> </ul>     |
| COOLANT TEMP SEN<br>(ENGINE TEMP SENSOR)    | <ul style="list-style-type: none"> <li>● The engine coolant temperature sensor circuit is open or shorted.<br/>(An abnormally high or low output voltage is entered.)</li> </ul>   | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Engine coolant temperature sensor</li> </ul>                                 |
| IGN SIGNAL — PRIMARY*                       | <ul style="list-style-type: none"> <li>● The ignition signal in primary circuit is not entered during engine cranking or running</li> </ul>  | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Power transistor unit</li> </ul>   |
| KNOCK SENSOR<br>(DETONATION SENSOR)         | <ul style="list-style-type: none"> <li>● The knock sensor circuit is open or shorted<br/>(An abnormally high or low voltage is entered.)</li> </ul>  | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Knock sensor</li> </ul>  |
| THROTTLE POSI SEN<br>(THROTTLE SENSOR)      | <ul style="list-style-type: none"> <li>● The throttle position sensor circuit is open or shorted.<br/>(An abnormally high or low voltage is entered.)</li> </ul>   | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Throttle position sensor</li> </ul>  |
| A/T COMM LINE                               | <ul style="list-style-type: none"> <li>● The A/T communication line is open or shorted.</li> </ul>   | <ul style="list-style-type: none"> <li>● Harness and connector</li> </ul>  |

\*: Check items causing a malfunction of camshaft position sensor circuit first, if both "CAMSHAFT POSI SEN (No. 11)" and "IGN SIGNAL-PRIMARY (No. 21)" are displayed one after the other.

- Sensor failures which set a self-diagnosis code are listed as due to an open or short circuit.
- A sensor sending a signal which is inaccurate but not open or short will NOT set a self-diagnosis code.
- If a driveability symptom is present but no self-diagnosis code is set, perform further inspections using DATA MONITOR.

# TROUBLE DIAGNOSES

## Consult (Cont'd)

### DATA MONITOR MODE

Remarks : ● Specification data are reference values.

● Specification data are output/input values which are detected or supplied by ECM at the connector.

\*Specification data may not be directly related to their components signals/values/operations

ie. 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 being not adjusted to the specification data. This IGN TIMING monitors the calculated data by ECM according to the input signals from camshaft position sensor and other ignition timing related sensors.

● If the real-time diagnosis results are NG and the self-diagnostic 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   | CHECK ITEM WHEN OUTSIDE SPEC.  |
|--------------------------------------|---|---|---|--|
| CMPS-RPM<br>(REF)<br>(CAS-RPM (REF)) | <ul style="list-style-type: none"> <li>● Tachometer: Connect</li> <li>● Run engine and compare tachometer indication with the CONSULT value.</li> </ul>                             |   | Almost the same speed as the CONSULT value.                 | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Camshaft position sensor</li> </ul>  |
| MAS AIR/ FL SE<br>(AIR FLOW MTR)     | <ul style="list-style-type: none"> <li>● Engine: After warming up, idle the engine</li> <li>● A/C switch "OFF"</li> <li>● Selector lever "N" position</li> <li>● No-load</li> </ul> | Idle  | 0.8 - 1.5V  | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Mass air flow sensor</li> </ul>  |
|                                      |   | 3,000 rpm   | 1.4 - 2.0V  |  |
| COOLANT TEMP/S<br>(ENG TEMP SEN)     | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> </ul>  |   | More than 70°C (158°F)                                      | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Engine coolant temperature sensor</li> </ul>   |
| O2 SEN<br>(EXH GAS SEN)              | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> </ul>  | Maintaining engine speed at 2,000 rpm                               | 0 - 0.3V → 0.6 - 0.9V                                       | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Heated oxygen sensor</li> <li>● Intake air leaks</li> <li>● Injectors</li> </ul>                                       |
| M/R F/C MNT                          |   |   | LEAN → RICH<br>Changes more than 5 times during 10 seconds. |  |
| VHCL SPEED SE<br>(CAR SPEED SEN)     | <ul style="list-style-type: none"> <li>● Turn drive wheels and compare speedometer indication with the CONSULT value</li> </ul>   |   | Almost the same speed as the CONSULT value                  | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Vehicle speed sensor</li> </ul>  |
| BATTERY VOLT                         | <ul style="list-style-type: none"> <li>● Ignition switch: ON (Engine stopped)</li> </ul>  |   | 11 - 14V  | <ul style="list-style-type: none"> <li>● Battery</li> <li>● ECM power supply circuit</li> </ul>  |
| THRTL POS SEN<br>(THROTTLE SEN)      | <ul style="list-style-type: none"> <li>● Ignition switch: ON (Engine stopped)</li> </ul>  | Throttle valve fully closed (Engine: After warming up)              | 0.35 - 0.65V  | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Throttle position sensor</li> <li>● Throttle position sensor adjustment</li> </ul>                                     |
|                                      |   | Throttle valve fully open   | Approx. 4.0V  |  |
| START SIGNAL                         | <ul style="list-style-type: none"> <li>● Ignition switch: ON → START</li> </ul>   |   | OFF → ON  | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Starter switch</li> </ul>  |
| CLOSED TH/POS<br>(IDLE POSITION)     | <ul style="list-style-type: none"> <li>● Ignition switch: ON (Engine stopped)</li> </ul>  | Throttle valve: Closed throttle position (Engine: After warming up) | ON  | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Throttle position sensor</li> <li>● Throttle position sensor adjustment</li> <li>● Throttle position switch</li> </ul> |
|                                      |   | Throttle valve: Slightly open                                       | OFF   |  |
| AIR COND SIG                         | <ul style="list-style-type: none"> <li>● Engine: After warming up, idle the engine</li> </ul>   | A/C switch "OFF"  | OFF   | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Air conditioner switch</li> </ul>  |
|                                      |   | A/C switch "ON"   | ON  |  |
| NEUT POSI SW<br>(NEUTRAL SW)         | <ul style="list-style-type: none"> <li>● Ignition switch: ON</li> </ul>   | Shift lever "P" or "N"  | ON  | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Neutral position switch</li> </ul>   |
|                                      |   | Except above  | OFF   |  |
| PW/ST SIGNAL                         | <ul style="list-style-type: none"> <li>● Engine: After warming up, idle the engine</li> </ul>   | Steering wheel in neutral position (forward direction)              | OFF   | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Power steering oil pressure switch</li> </ul>  |
|                                      |   | The steering wheel is turned  | ON  |  |

# TROUBLE DIAGNOSES

## Consult (Cont'd)

| MONITOR ITEM               | CONDITION  |   | SPECIFICATION      | CHECK ITEM WHEN OUTSIDE SPEC.  |
|----------------------------|--|---|--------------------|--|
| INJ PULSE                  | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● A/C switch "OFF"</li> <li>● Selector lever "N" position</li> <li>● No-load</li> </ul>                                       | Idle  | 1.7 - 2.5 msec.    | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Injector</li> <li>● Mass air flow sensor</li> <li>● Intake air system</li> </ul>   |
|                            |  | 2,000 rpm   | 1.5 - 2.3 msec.    |  |
| IGN TIMING                 | ditto  | Idle  | 15° BTDC           | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Camshaft position sensor</li> </ul>  |
|                            |  | 2,000 rpm   | More than 25° BTDC |  |
| IACV-AAC/V (AAC VALVE)     | ditto  | Idle  | 20 - 40%           | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● IACV-AAC valve</li> </ul>  |
|                            |  | 2,000 rpm   | —                  |  |
| A/F ALPHA                  | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> </ul>   | Maintaining engine speed at 2,000 rpm   | 75 - 125%          | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Injector</li> <li>● Mass air flow sensor</li> <li>● Heated oxygen sensor</li> <li>● Carbon canister purge line</li> <li>● Intake air system</li> </ul> |
| AIR COND RLY               | Engine: After warming up, idle the engine<br>Air conditioner switch OFF → ON   |   | OFF → ON           | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Air conditioner switch</li> <li>● Air conditioner relay</li> </ul>   |
| FUEL PUMP RLY              | <ul style="list-style-type: none"> <li>● Ignition switch is turned to ON (Operates for 1 second)</li> <li>● Engine running and cranking</li> <li>● When engine is stopped (stops in 1 second)</li> </ul> |   | ON                 | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Fuel pump relay</li> </ul>   |
|                            | Except as shown above  |   | OFF                |  |
| VALVE TIM SOL              | <ul style="list-style-type: none"> <li>● Jack up rear wheel</li> <li>● Engine: After warming up</li> </ul>   | ● Idle  | OFF                | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Valve timing solenoid valve</li> </ul>   |
|                            |  | <ul style="list-style-type: none"> <li>● Shift selector lever to any position except "N" or "P" position</li> <li>● Quickly depress accelerator pedal, then quickly release it</li> </ul> | OFF → ON → OFF     |  |
| COOLING FAN (RADIATOR FAN) | ● When cooling fan is stopped.   |   | OFF                | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Cooling fan relay</li> <li>● Cooling fan motor</li> </ul>  |
|                            | ● When cooling fan operates at low speed   |   | LOW                |  |
|                            | ● When cooling fan operates at high speed  |   | HI                 |  |
| EGRC SOL/V (EGR CQNT S/V)  | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● A/C switch "OFF"</li> <li>● Shift lever "N"</li> <li>● No-load</li> </ul>   | Idle  | ON                 | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● EGRC-solenoid valve</li> </ul>   |
|                            |  | 2,000 rpm   | OFF                |  |
| W/G CONT S/V               | ditto  | Idle  | 0%                 | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Wastegate valve control solenoid valve</li> </ul>  |
|                            |  | Racing up to 4,000 rpm  | 20%                |  |



## TROUBLE DIAGNOSES

### Consult (Cont'd)

#### ACTIVE TEST MODE

| TEST ITEM                                   | CONDITION   | JUDGEMENT  | CHECK ITEM (REMEDY)  |
|---|---|--|--|
| FUEL INJECTION                              | <ul style="list-style-type: none"> <li>● Engine: Return to the original trouble condition</li> <li>● Change the amount of fuel injection with the CONSULT.</li> </ul>   | If trouble symptom disappears, see CHECK ITEM.         | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Fuel injectors</li> <li>● Heated oxygen sensors</li> </ul>   |
| IACV-AAC/V OPENING<br>(AAC/V OPENING)       | <ul style="list-style-type: none"> <li>● Engine: After warming up, idle the engine.</li> <li>● Change the IACV-AAC valve opening percent with the CONSULT.</li> </ul>   | Engine speed changes according to the opening percent. | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● IACV-AAC valve</li> </ul>  |
| ENG COOLANT TEMP<br>(ENGINE TEMPERATURE)    | <ul style="list-style-type: none"> <li>● Engine: Return to the original trouble condition</li> <li>● Change the engine coolant temperature with the CONSULT.</li> </ul>   | If trouble symptom disappears, see CHECK ITEM.         | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Engine coolant temperature sensor</li> <li>● Fuel injectors</li> </ul>   |
| IGNITION TIMING                             | <ul style="list-style-type: none"> <li>● Engine: Return to the original trouble condition</li> <li>● Timing light: Set</li> <li>● Retard the ignition timing with the CONSULT.</li> </ul>   | If trouble symptom disappears, see CHECK ITEM.         | <ul style="list-style-type: none"> <li>● Adjust initial ignition timing</li> </ul>   |
| POWER BALANCE                               | <ul style="list-style-type: none"> <li>● Engine: After warming up, idle the engine.</li> <li>● A/C switch "OFF"</li> <li>● Selector lever "N" position</li> <li>● Cut off each injector signal one at a time with the CONSULT.</li> </ul> | Engine runs rough or dies.                             | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Compression</li> <li>● Injectors</li> <li>● Power transistor</li> <li>● Spark plugs</li> <li>● Ignition coils</li> </ul> |
| COOLING FAN<br>(RADIATOR FAN)               | <ul style="list-style-type: none"> <li>● Ignition switch: ON</li> <li>● Turn cooling fan "LOW", "HI" and "OFF" with CONSULT</li> </ul>  | Cooling fan moves at low and high speed, and stops.    | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Cooling fan relay</li> <li>● Cooling fan motor</li> </ul>  |
| FUEL PUMP RELAY                             | <ul style="list-style-type: none"> <li>● Ignition switch: ON (Engine stopped)</li> <li>● Turn the fuel pump relay "ON" and "OFF" with the CONSULT and listen to operating sound.</li> </ul>   | Fuel pump relay makes the operating sound.             | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Fuel pump relay</li> </ul>   |
| EGRC SOLENOID VALVE<br>(EGR CONT SOL VALVE) | <ul style="list-style-type: none"> <li>● Ignition switch: ON</li> <li>● Turn solenoid valve "ON" and "OFF" with the CONSULT and listen to operating sound.</li> </ul>   | Each solenoid valve makes an operating sound.          | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Solenoid valve</li> </ul>  |
| VALVE TIM SOL                               |   |  |  |
| SELF-LEARNING CONT                          | <ul style="list-style-type: none"> <li>● In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen.</li> </ul>   |  |  |

# TROUBLE DIAGNOSES

## Consult (Cont'd)

### FUNCTION TEST MODE

| FUNCTION TEST ITEM   | CONDITION  | JUDGEMENT  |                | CHECK ITEM (REMEDY)  |
|--|--|--|----------------|--|
| SELF-DIAG RESULTS  | <ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> <li>Displays the self-diagnostic results.</li> </ul>  | —  |                | Objective system   |
| CLOSED THROTTLE POSI (CLOSED THROTTLE POSITION SWITCH CIRCUIT) (IDLE POSITION (IDLE SWITCH CIRCUIT)) | <ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> <li>Closed throttle position switch circuit is tested when throttle is opened and closed fully. ("CLOSED THROTTLE POSI" is the test item name for the vehicles in which idle is selected by throttle position sensor.)</li> </ul> | Throttle valve: opened   | OFF            | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>Throttle position sensor (Closed throttle position switch)</li> <li>Throttle position sensor (Closed throttle position switch) adjustment</li> <li>Throttle linkage</li> <li>Verify operation in DATA MONITOR mode.</li> </ul> |
|  |  | Throttle valve: closed   | ON             |  |
| THROTTLE POSI SEN CKT (THROTTLE SENSOR CKT)  | <ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> <li>Throttle position sensor circuit is tested when throttle is opened and closed fully.</li> </ul>   | Range (Throttle valve fully opened — Throttle valve fully closed)                                    | More than 3.0V | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>Throttle position sensor</li> <li>Throttle position sensor adjustment</li> <li>Throttle linkage</li> <li>Verify operation in DATA MONITOR mode.</li> </ul>   |
| NEUTRAL POSI SW CKT (NEUTRAL SW CIRCUIT)   | <ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> <li>Neutral position switch circuit is tested when shift lever is manipulated.</li> </ul>   | OUT OF N/P-POSITION  | OFF            | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>Neutral position switch/Inhibitor switch</li> <li>Linkage + Inhibitor switch adjustment</li> </ul>   |
|  |  | IN N-POSITION  | ON             |  |
| FUEL PUMP CIRCUIT  | <ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> <li>Fuel pump circuit is tested by checking the pulsation in fuel pressure when fuel tube is pinched.</li> </ul>  | There is pressure pulsation on the fuel feed hose.   |                | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>Fuel pump</li> <li>Fuel pump relay</li> <li>Fuel filter clogging</li> <li>Fuel level</li> </ul>  |
| EGRC SOL/V CIRCUIT (EGR CONT S/V CIRCUIT)  | <ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> <li>EGR control S/V circuit is tested by checking solenoid valve operating noise.</li> </ul>  | The solenoid valve makes an operating sound every 3 seconds  |                | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>EGRC-solenoid valve</li> </ul>   |
| VALVE TIMING S/V CKT   | <ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> <li>Valve timing S/V circuit is tested by checking solenoid valve operating noise.</li> </ul>   | The solenoid valve makes an operating sound every 3 seconds.   |                | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>Valve timing solenoid valve</li> </ul>   |
| COOLING FAN CIRCUIT (RADIATOR FAN CIRCUIT)   | <ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> <li>Cooling fan circuit is tested by checking cooling fan operation.</li> </ul>   | <ul style="list-style-type: none"> <li>The cooling fan rotates and stops every 3 seconds.</li> </ul> |                | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>Cooling fan relay</li> <li>Cooling fan motor</li> </ul>  |

## TROUBLE DIAGNOSES

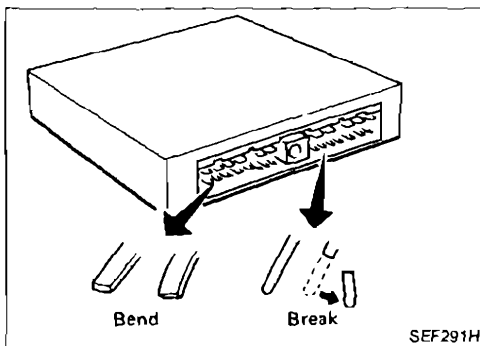
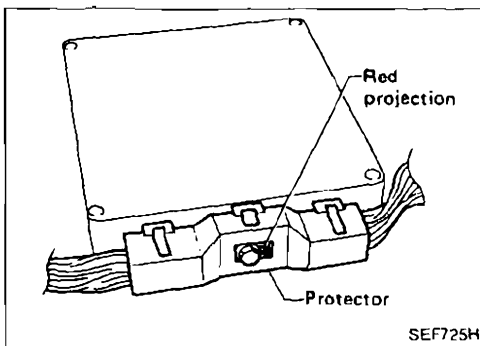
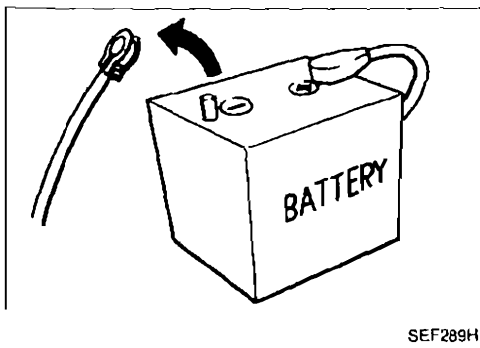
### Consult (Cont'd)

| FUNCTION TEST ITEM                            | CONDITION  | JUDGEMENT   |     | CHECK ITEM (REMEDY)   |
|---|--|---|-----|---|
| START SIGNAL CIRCUIT                          | <ul style="list-style-type: none"> <li>● Ignition switch: ON → START</li> <li>● Start signal circuit is tested when engine is started by operating the starter. Battery voltage and water temperature before cranking, and average battery voltage, mass air flow sensor output voltage and cranking speed during cranking are displayed.</li> </ul> | Start signal: OFF → ON  |     | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Ignition switch</li> </ul>  |
| PW/ST SIGNAL CIRCUIT                          | <ul style="list-style-type: none"> <li>● Ignition switch: ON (Engine running)</li> <li>● Power steering circuit is tested when steering wheel is rotated fully and then set to a straight line running position.</li> </ul>  | Locked position   | ON  | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Power steering oil pressure switch</li> <li>● Power steering oil pump</li> </ul>  |
|   |  | Neutral position  | OFF |   |
| VEHICLE SPEED SEN CKT (CAR SPEED SEN CIRCUIT) | <ul style="list-style-type: none"> <li>● Vehicle speed sensor circuit is tested when vehicle is running at a speed of 10 km/h (6 mph) or higher.</li> </ul>  | Vehicle speed sensor input signal is greater than 4 km/h (2 MPH)                                      |     | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Vehicle speed sensor</li> <li>● Electric speedometer</li> </ul>   |
| IGN TIMING ADJ                                | <ul style="list-style-type: none"> <li>● After warming up, idle the engine.</li> <li>● Ignition timing adjustment is checked by reading ignition timing with a timing light and checking whether it agrees with specifications.</li> </ul>   | The timing light indicates the same value on the screen.  |     | <ul style="list-style-type: none"> <li>● Adjust ignition timing (by moving camshaft position sensor or distributor)</li> <li>● Camshaft position sensor drive mechanism</li> </ul>  |
| MIXTURE RATIO TEST                            | <ul style="list-style-type: none"> <li>● Air-fuel ratio feedback circuit (injection system, ignition system, vacuum system, etc.) is tested by examining the heated oxygen sensor output at 2,000 rpm under non-loaded state.</li> </ul>   | <ul style="list-style-type: none"> <li>● O2 SEN COUNT: More than 5 times during 10 seconds</li> </ul> |     | <ul style="list-style-type: none"> <li>● INJECTION SYS (Injector, fuel pressure regulator, harness or connector)</li> <li>● IGNITION SYS (Spark plug, power transistor, ignition coil, harness or connector)</li> <li>● VACUUM SYS (Intake air leaks)</li> <li>● Heated oxygen sensor circuit</li> <li>● Heated oxygen sensor operation</li> <li>● Fuel pressure high or low</li> <li>● Mass air flow sensor</li> </ul> |

# TROUBLE DIAGNOSES

## Consult (Cont'd)

| FUNCTION TEST ITEM                      | CONDITION   | JUDGEMENT  | CHECK ITEM (REMEDY)  |
|---|---|--|--|
| POWER BALANCE                           | <ul style="list-style-type: none"> <li>After warming up, idle the engine.</li> <li>Injector operation of each cylinder is stopped one after another, and resultant change in engine rotation is examined to evaluate combustion of each cylinder. (This is only displayed for models where a sequential multipoint fuel injection system is used.)</li> </ul> | Difference in engine speed is greater than 25 rpm before and after cutting off the injector of each cylinder.              | <ul style="list-style-type: none"> <li>Injector circuit (Injector, harness or connector)</li> <li>Ignition circuit (Spark plug, power transistor, ignition coil, harness or connector)</li> <li>Compression</li> <li>Valve timing</li> </ul> |
| IACV-AAC/V SYSTEM<br>(AAC VALVE SYSTEM) | <ul style="list-style-type: none"> <li>After warming up, idle the engine.</li> <li>IACV-AAC valve system is tested by detecting change in engine speed when IACV-AAC valve opening is changed to 0%, 20% and 80%.</li> </ul>  | Difference in engine speed is greater than 150 rpm between when valve opening is at 80% (102 steps) and at 20% (25 steps). | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>IACV-AAC valve</li> <li>Air passage restriction between air inlet and IACV-AAC valve</li> <li>IAS (Idle adjusting screw) adjustment</li> </ul>                         |



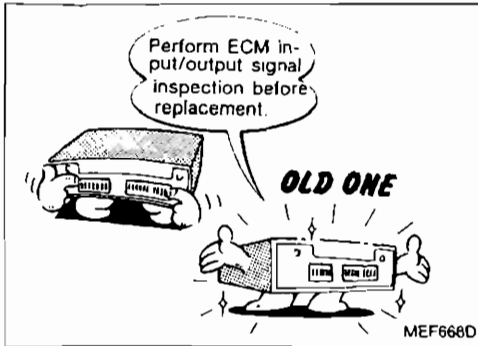
### Diagnostic Procedure

#### CAUTION:

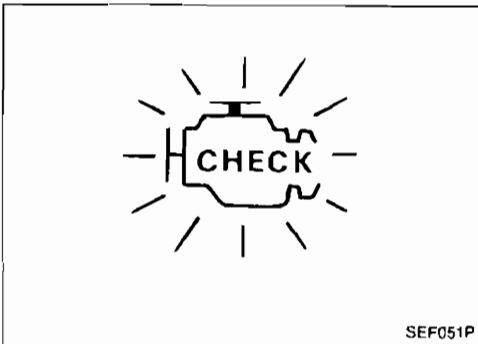
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the ECM. Because battery voltage is applied to ECM even if ignition switch is turned off.
- When connecting ECM harness connector, tighten securing bolt until red projection is in line with connector face.
- 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.

## TROUBLE DIAGNOSES

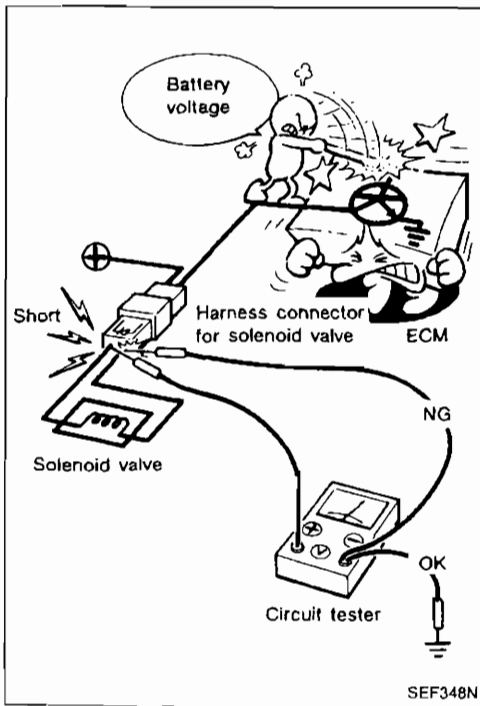
### Diagnostic Procedure (Cont'd)



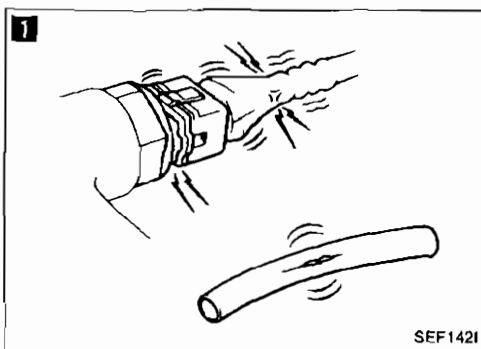
5. Before replacing ECM, perform ECM input/output signal inspection and make sure whether ECM functions properly or not. (See page EC-196.)



6. After performing this "Diagnostic Procedure", perform diagnostic test mode II (Self-diagnostic results) and driving test.

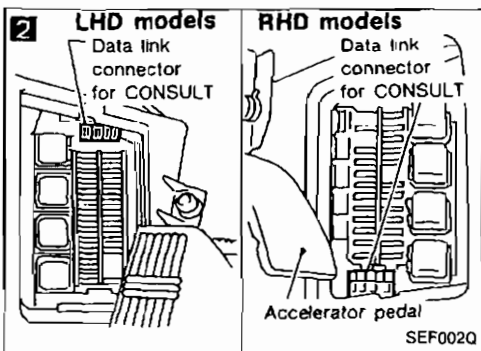


7. When measuring ECM signals with a circuit tester, never bring the two tester probes into contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.

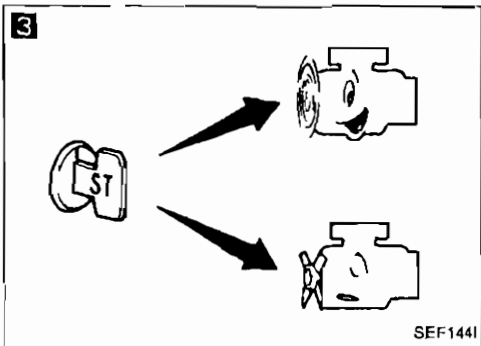


## Basic Inspection

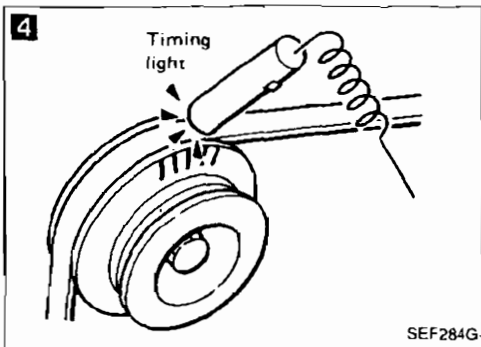
- 1**
- BEFORE STARTING**
1. Check service records for any recent repairs that may indicate a related problem, or the current need for scheduled maintenance.
  2. Open engine hood and check the following:
    - Harness connectors for proper connections
    - Vacuum hoses for splits, kinks, and proper connections
    - Wiring for proper connections, pinches, and cuts



- 2**
- CONNECT CONSULT TO THE VEHICLE.**  
Connect "CONSULT" to the data link connector for CONSULT and select "ENGINE" from the menu. (Refer to page EC-53.)



- 3**
- DOES ENGINE START?**
- No → Go to **6**
- Yes ↓



- 4**
- CHECK IGNITION TIMING.**  
Warm up engine sufficiently and check ignition timing at idle using timing light. (Refer to page EC-33.)  
**Ignition timing: 15° ± 2° BTDC**
- NG → Adjust ignition timing by turning camshaft position sensor.
- OK ↓

(Go to **A** on next page.)

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**EC**

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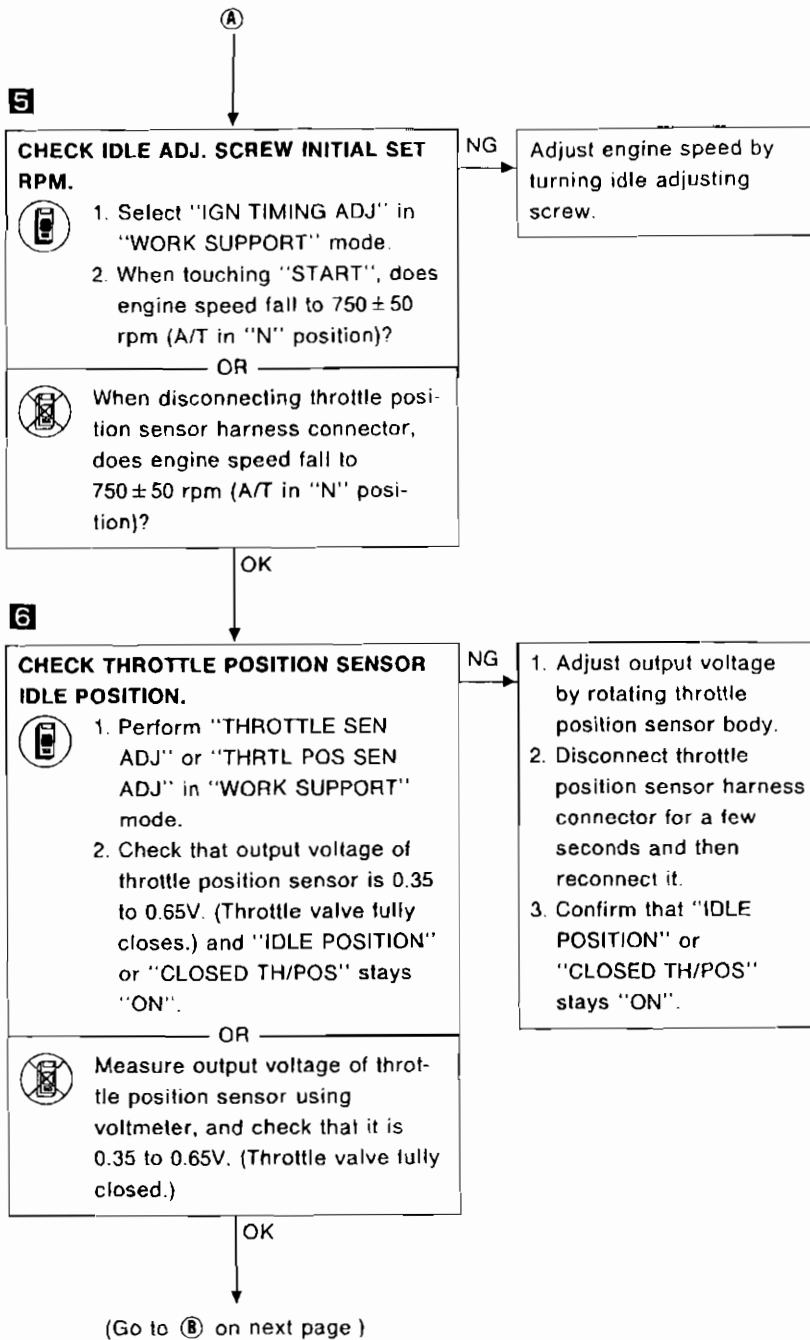
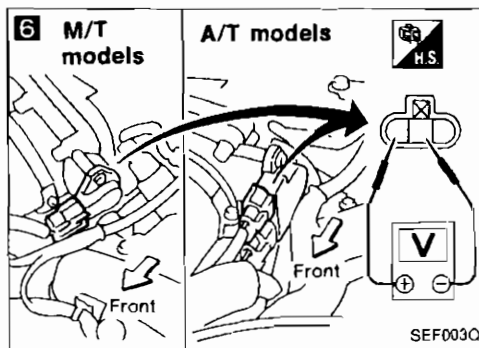
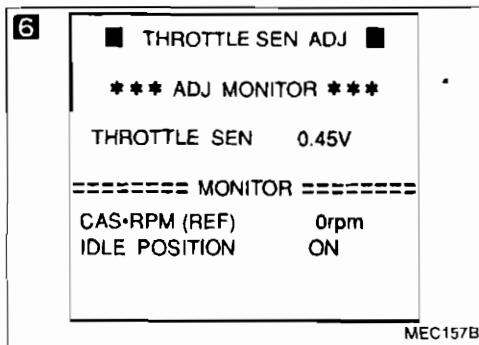
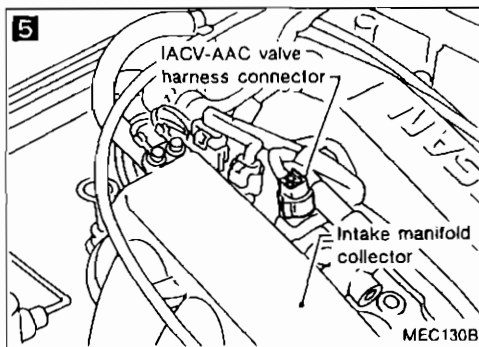
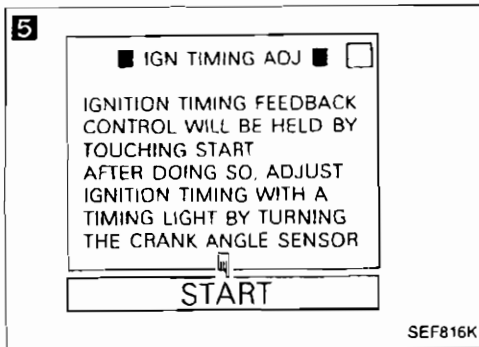
HA

EL

IDX

# TROUBLE DIAGNOSES

## Basic Inspection (Cont'd)



# TROUBLE DIAGNOSES

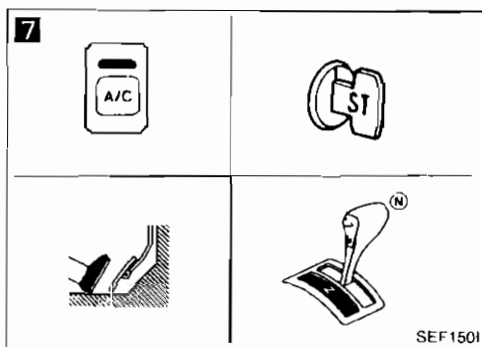
## Basic Inspection (Cont'd)

**7**

|               |           |                          |
|---------------|-----------|--------------------------|
| ☆ MONITOR     | ☆ NO FAIL | <input type="checkbox"/> |
| START SIGNAL  | OFF       |                          |
| IDLE POSITION | ON        |                          |
| AIR COND SIG  | OFF       |                          |
| NEUTRAL SW    | ON        |                          |

RECORD

SEF384J



**7**

**CHECK SWITCH INPUT SIGNAL.**

Select the following switches in "DATA MONITOR" mode,

- Start signal,
- Idle position or closed throttle position,
- Air conditioner signal,
- Neutral (Parking) position switch, and check the switches' ON-OFF operation.

OR

Remove ECM from front dash side and check the above switches' ON-OFF operation using voltmeter at each ECM terminal.

| Switch                            | Condition   | Voltage (V)                 |
|-----------------------------------|---|-----------------------------|
| Start signal                      | IGN ON  | 0 → Battery voltage         |
|                                   | → IGN START   |                             |
| Closed throttle position          | Accelerator pedal released  | 0.35 - 0.65 →<br>Approx 4.0 |
|                                   | → Accelerator pedal fully depressed                                 |                             |
| A/C signal                        | A/C OFF → A/C ON (Engine running)                                   | Battery voltage → Approx 0  |
| Neutral (Parking) position switch | Selector lever is "N" or "P" position → Except "N" and "P" position | 0 → 4.0 - 5.0               |

NG Repair or replace the malfunctioning switch or its circuit.

**8**

■ SELF-DIAG RESULTS ■

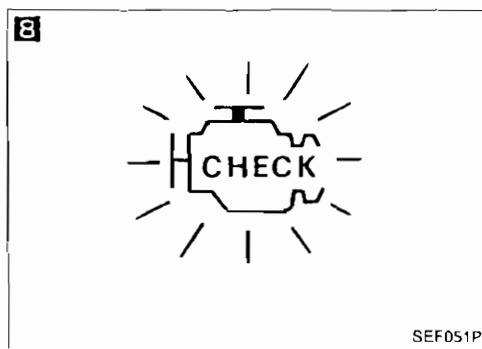
FAILURE DETECTED TIME

• NO SELF DIAGNOSTIC FAILURE INDICATED

FURTHER TESTING MAY BE REQUIRED \*\*

ERASE PRINT

MEF674D



**8**

**READ SELF-DIAGNOSTIC RESULTS.**

- Perform "SELF-DIAG RESULTS" mode.
- Read out self-diagnostic results.
- Is a failure detected?

OR

- Set Diagnostic Test Mode II. (Self-diagnostic results) (Refer to page EC-50.)
- Count the number of malfunction indicator lamp flashes and read out the diagnostic trouble codes.
- Are the diagnostic trouble codes being output?

Yes Go to the relevant inspection procedure.

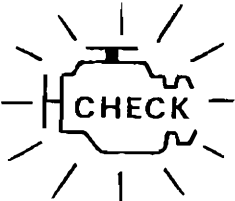


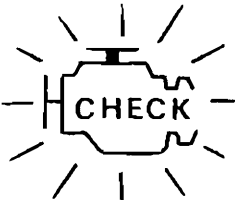


No  
INSPECTION END

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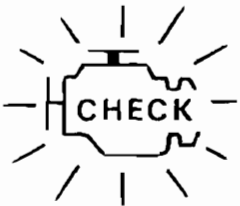
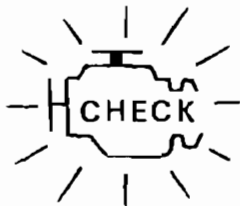
# TROUBLE DIAGNOSES

## How to Execute On-board Diagnostic System in Diagnostic Test Mode II

| Detected items                   | Display Diagnostic trouble code No. | How to perform diagnostic test mode II (Self-diagnostic results) judgement  |              |        |              |       |              |      |             |       |             |      |               |       |   |
|----------------------------------|-------------------------------------|---|--------------|--------|--------------|-------|--------------|------|-------------|-------|-------------|------|---------------|-------|---|
|                                  |                                     | Illustration  | Method       |        |              |       |              |      |             |       |             |      |               |       |   |
| Camshaft position sensor circuit | 11                                  | <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <div style="display: flex; justify-content: space-between;"> <span>☆ MONITOR</span> <span>☆ NO FAIL <input type="checkbox"/></span> </div> <table style="width: 100%; border-collapse: collapse;"> <tr><td>CAS•RPM(REF)</td><td style="text-align: right;">800rpm</td></tr> <tr><td>AIR FLOW MTR</td><td style="text-align: right;">1.55V</td></tr> <tr><td>ENG TEMP SEN</td><td style="text-align: right;">81°C</td></tr> <tr><td>EXH GAS SEN</td><td style="text-align: right;">0.06V</td></tr> <tr><td>M/R F/C MNT</td><td style="text-align: right;">LEAN</td></tr> <tr><td>CAR SPEED SEN</td><td style="text-align: right;">0km/h</td></tr> </table> <div style="border: 1px solid black; text-align: center; padding: 2px; font-weight: bold;">RECORD</div> </div> <p style="text-align: right; font-size: small;">SEF004Q</p> <div style="text-align: center; margin-top: 20px;">  </div> <p style="text-align: right; font-size: small;">SEF051P</p>   | CAS•RPM(REF) | 800rpm | AIR FLOW MTR | 1.55V | ENG TEMP SEN | 81°C | EXH GAS SEN | 0.06V | M/R F/C MNT | LEAN | CAR SPEED SEN | 0km/h | <p><b>PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).</b></p> <p>1) Start engine.</p> <p> 2) Select "DATA MONITOR" mode with CONSULT.<br/>☆ NO FAIL</p> <p style="text-align: center;">OR</p> <p> 2) Turn ignition switch "OFF" and then "ON".</p> <p>3) Perform diagnostic test mode II (Self-diagnostic results) with ECM.<br/><b>Malfunction indicator lamp displays diagnostic trouble code No. 55.</b></p>                |
| CAS•RPM(REF)                     | 800rpm                              |   |              |        |              |       |              |      |             |       |             |      |               |       |   |
| AIR FLOW MTR                     | 1.55V                               |   |              |        |              |       |              |      |             |       |             |      |               |       |   |
| ENG TEMP SEN                     | 81°C                                |   |              |        |              |       |              |      |             |       |             |      |               |       |   |
| EXH GAS SEN                      | 0.06V                               |   |              |        |              |       |              |      |             |       |             |      |               |       |   |
| M/R F/C MNT                      | LEAN                                |   |              |        |              |       |              |      |             |       |             |      |               |       |   |
| CAR SPEED SEN                    | 0km/h                               |   |              |        |              |       |              |      |             |       |             |      |               |       |   |
| Mass air flow sensor circuit     | 12                                  | <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <div style="display: flex; justify-content: space-between;"> <span>☆ MONITOR</span> <span>☆ NO FAIL <input type="checkbox"/></span> </div> <table style="width: 100%; border-collapse: collapse;"> <tr><td>CAS•RPM(REF)</td><td style="text-align: right;">800rpm</td></tr> <tr><td>AIR FLOW MTR</td><td style="text-align: right;">1.55V</td></tr> <tr><td>ENG TEMP SEN</td><td style="text-align: right;">81°C</td></tr> <tr><td>EXH GAS SEN</td><td style="text-align: right;">0.06V</td></tr> <tr><td>M/R F/C MNT</td><td style="text-align: right;">LEAN</td></tr> <tr><td>CAR SPEED SEN</td><td style="text-align: right;">0km/h</td></tr> </table> <div style="border: 1px solid black; text-align: center; padding: 2px; font-weight: bold;">RECORD</div> </div> <p style="text-align: right; font-size: small;">SEF004Q</p> <div style="text-align: center; margin-top: 20px;">  </div> <p style="text-align: right; font-size: small;">SEF051P</p> | CAS•RPM(REF) | 800rpm | AIR FLOW MTR | 1.55V | ENG TEMP SEN | 81°C | EXH GAS SEN | 0.06V | M/R F/C MNT | LEAN | CAR SPEED SEN | 0km/h | <p><b>PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).</b></p> <p>1) Turn ignition switch "ON" wait for at least 5 seconds and then start engine.</p> <p> 2) Select "DATA MONITOR" mode with CONSULT.<br/>☆ NO FAIL</p> <p style="text-align: center;">OR</p> <p> 2) Perform diagnostic test mode II (Self-diagnostic results) with ECM.<br/><b>Malfunction indicator lamp displays diagnostic trouble code No. 55.</b></p> |
| CAS•RPM(REF)                     | 800rpm                              |   |              |        |              |       |              |      |             |       |             |      |               |       |   |
| AIR FLOW MTR                     | 1.55V                               |   |              |        |              |       |              |      |             |       |             |      |               |       |   |
| ENG TEMP SEN                     | 81°C                                |   |              |        |              |       |              |      |             |       |             |      |               |       |   |
| EXH GAS SEN                      | 0.06V                               |   |              |        |              |       |              |      |             |       |             |      |               |       |   |
| M/R F/C MNT                      | LEAN                                |   |              |        |              |       |              |      |             |       |             |      |               |       |   |
| CAR SPEED SEN                    | 0km/h                               |   |              |        |              |       |              |      |             |       |             |      |               |       |   |

# TROUBLE DIAGNOSES

## How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

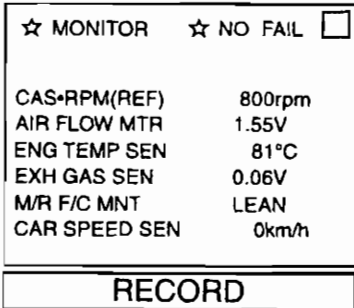
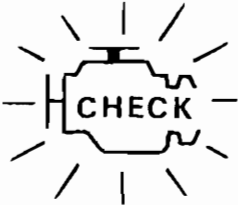


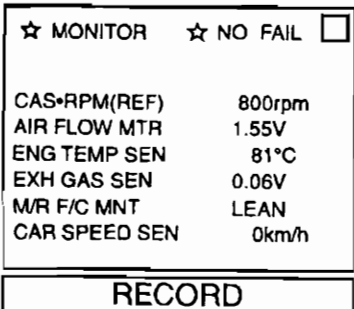
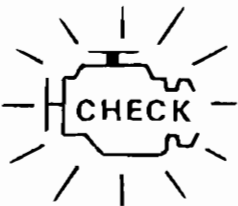


| Detected items                            | Display Diagnostic trouble code No. | How to perform diagnostic test mode II (Self-diagnostic results) judgement   |   |
|---|-------------------------------------|--|---|
|   |                                     | Illustration   | Method  |
| Engine coolant temperature sensor circuit | 13                                  | <div> <p>☆ MONITOR    ☆ NO FAIL <input type="checkbox"/></p> <p>CAS-RPM(REF)    800rpm<br/>           AIR FLOW MTR    1.55V<br/>           ENG TEMP SEN    81°C<br/>           EXH GAS SEN    0.06V<br/>           M/R F/C MNT    LEAN<br/>           CAR SPEED SEN    0km/h</p> <p><b>RECORD</b></p> </div> <p>SEF004Q</p> <div>  </div> <p>SEF051P</p>      | <p><b>PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).</b></p> <p>1) Turn ignition switch "ON" or start engine</p> <p>2) Select "DATA MONITOR" mode with CONSULT.<br/>           ☆ NO FAIL</p> <p>OR</p> <p>2) Perform diagnostic test mode II (Self-diagnostic results) with ECM.<br/> <b>Malfunction indicator lamp displays diagnostic trouble code No. 55.</b></p>                        |
| Ignition signal circuit                   | 21                                  | <div> <p>☆ MONITOR    ☆ NO FAIL <input type="checkbox"/></p> <p>CAS-RPM(REF)    800rpm<br/>           AIR FLOW MTR    1.55V<br/>           ENG TEMP SEN    81°C<br/>           EXH GAS SEN    0.06V<br/>           M/R F/C MNT    LEAN<br/>           CAR SPEED SEN    0km/h</p> <p><b>RECORD</b></p> </div> <p>SEF004Q</p> <div>  </div> <p>SEF051P</p> | <p><b>PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).</b></p> <p>1) Start engine.</p> <p>2) Select "DATA MONITOR" mode with CONSULT.<br/>           ☆ NO FAIL</p> <p>OR</p> <p>2) Turn ignition switch "OFF" and then "ON"</p> <p>3) Perform diagnostic test mode II (Self-diagnostic results) with ECM.<br/> <b>Malfunction indicator lamp displays diagnostic trouble code No. 55.</b></p> |

\* Diagnostic test mode II (Self-diagnostic results) is not performed but this method provides results which are equal to the self-diagnostic results.

01  
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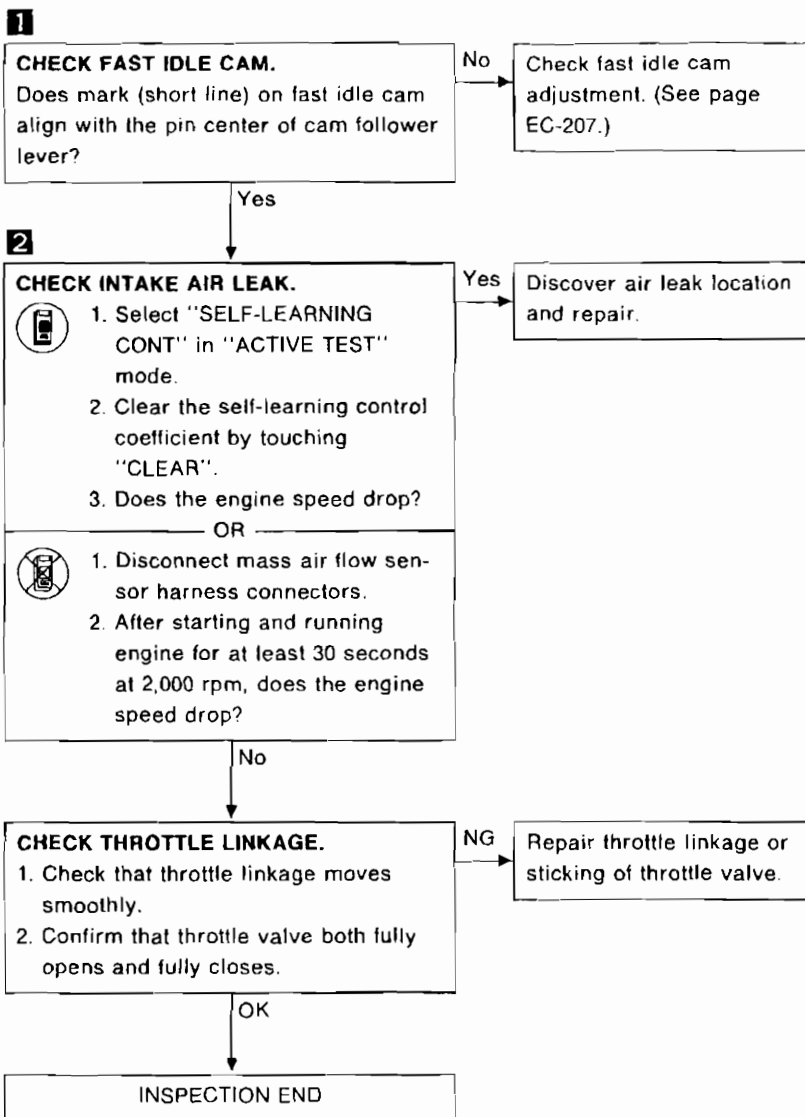
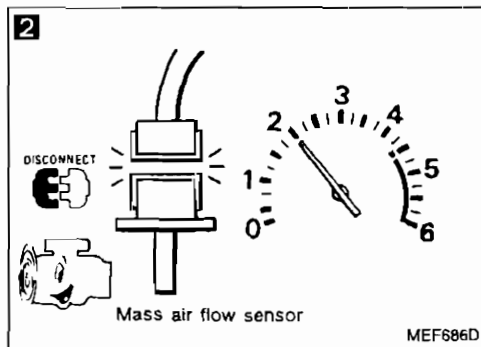
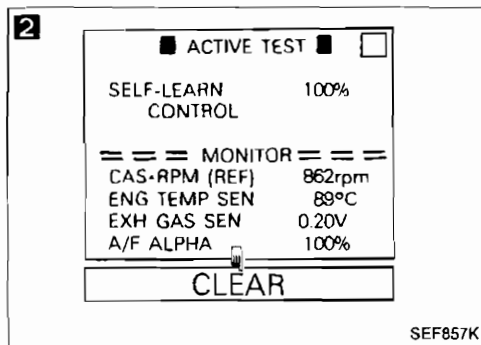
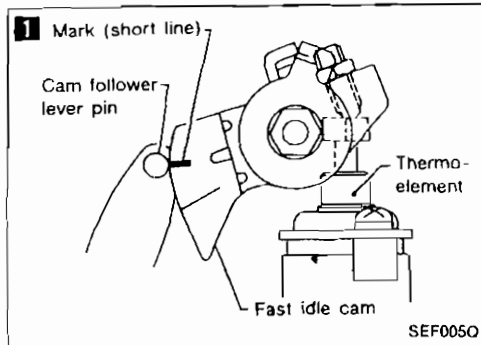
# TROUBLE DIAGNOSES

## How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

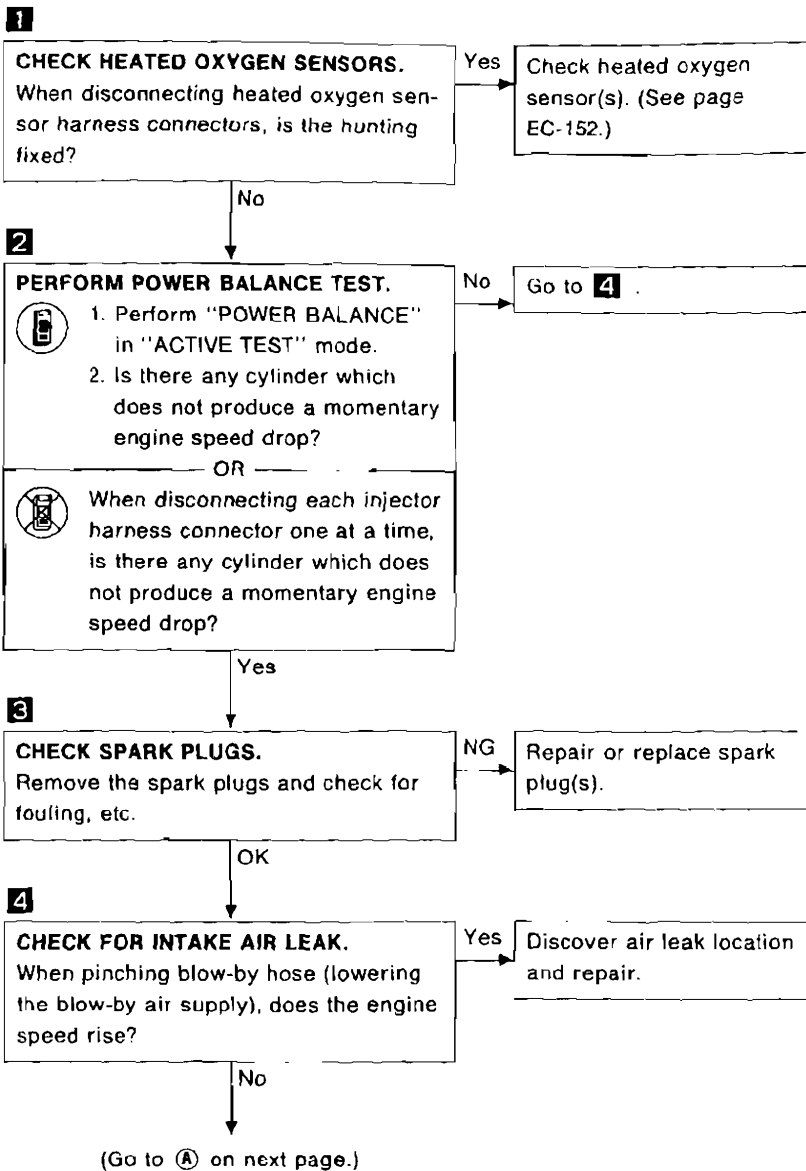
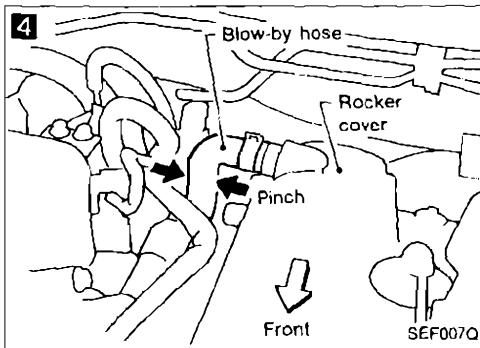
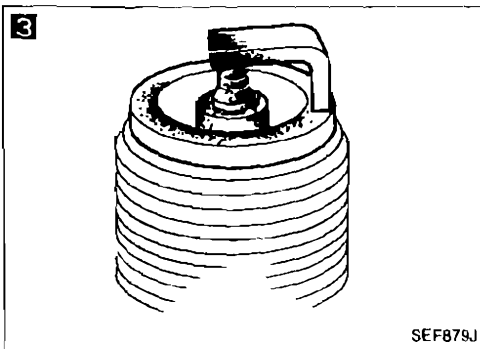
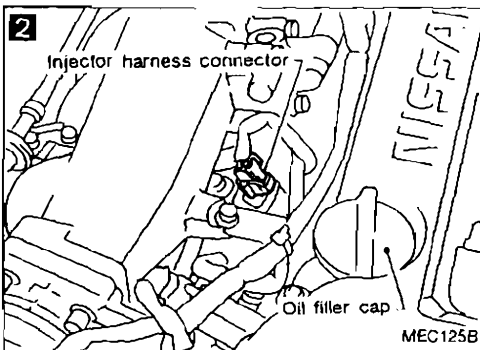
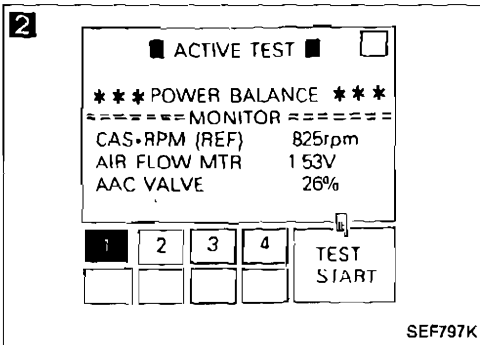
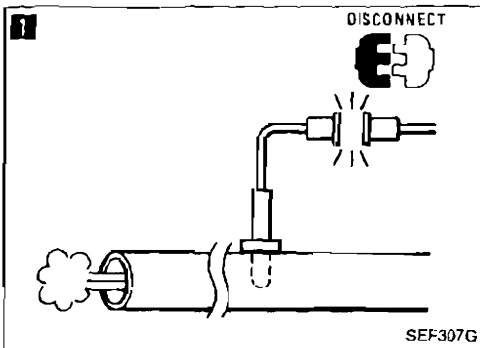
| Detected items                | Display Diagnostic trouble code No. | How to perform diagnostic test mode II (Self-diagnostic results) judgement   |   |
|-------------------------------|-------------------------------------|--|---|
|                               |                                     | Illustration   | Method  |
| Boost pressure sensor circuit | 26                                  |  <p>SEF004Q</p>  <p>SEF051P</p>    | <p><b>PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).</b></p> <p> 1) Start engine.<br/>2) Select "DATA MONITOR" mode with CONSULT.<br/>☆ <b>NO FAIL</b></p> <p>OR</p> <p> 1) Turn ignition switch "OFF" and then "ON".<br/>2) Perform diagnostic test mode II (Self-diagnostic results) with ECM.<br/><b>Malfunction indicator lamp displays diagnostic trouble code No. 55.</b></p>     |
|                               |                                     |  <p>SEF004Q</p>  <p>SEF051P</p> | <p><b>PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).</b></p> <p>1) Start engine.<br/> 2) Select "DATA MONITOR" mode with CONSULT.<br/>☆ <b>NO FAIL</b></p> <p>OR</p> <p> 2) Turn ignition switch "OFF" and then "ON".<br/>3) Perform diagnostic test mode II (Self-diagnostic results) with ECM.<br/><b>Malfunction indicator lamp displays diagnostic trouble code No. 55.</b></p> |

\*: Diagnostic test mode II (Self-diagnostic results) is not performed but this method provides results which are equal to the self-diagnostic results.

## Diagnostic Procedure 1 — Symptom — High Idling after Warm-up



Diagnostic Procedure 2 — Symptom — Hunting



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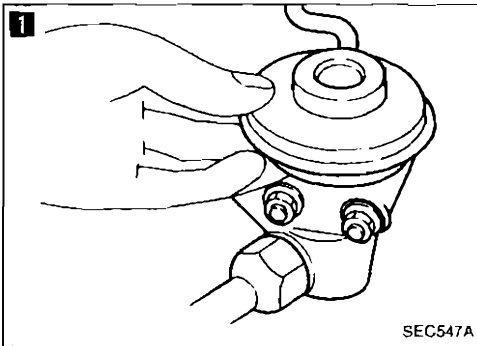
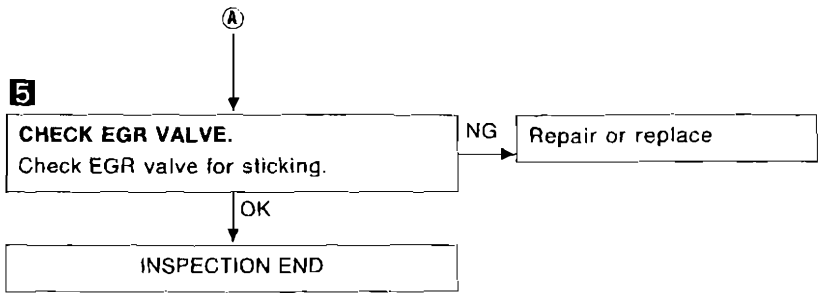
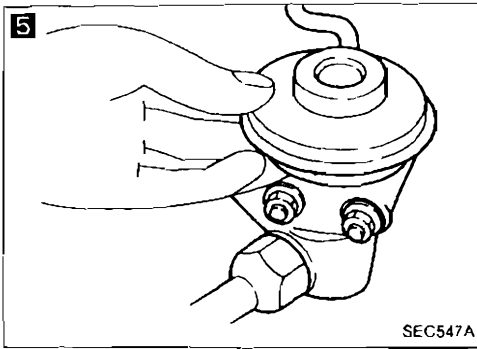
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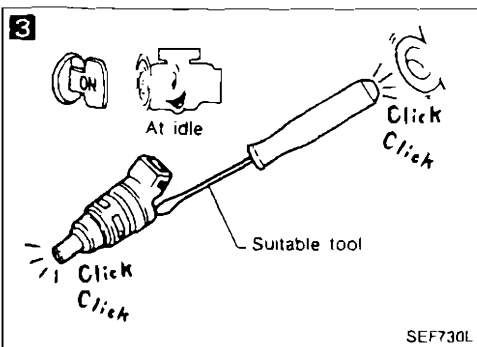
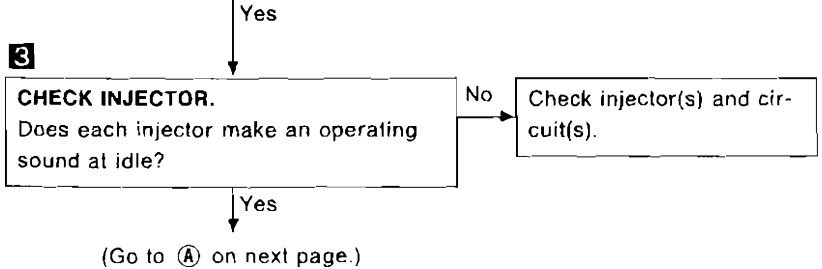
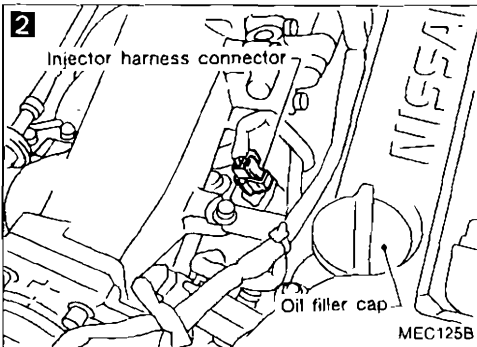
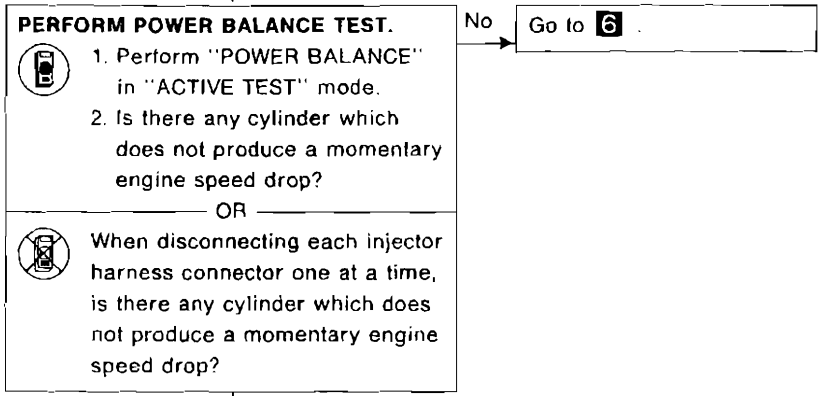
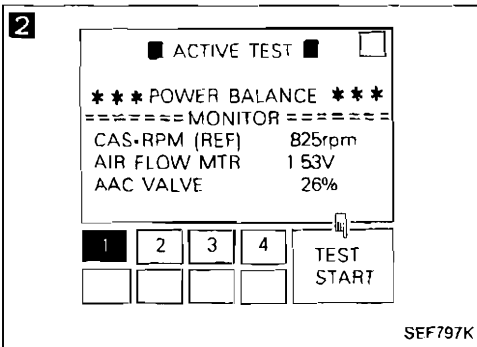
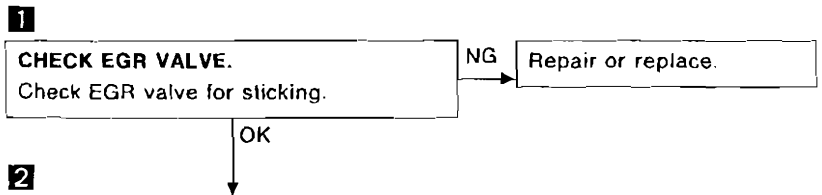
IDX

# TROUBLE DIAGNOSES

## Diagnostic Procedure 2 — Symptom — Hunting (Cont'd)

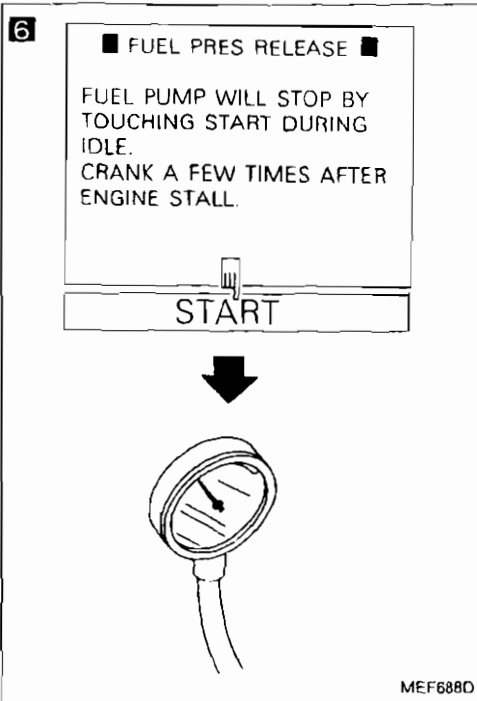
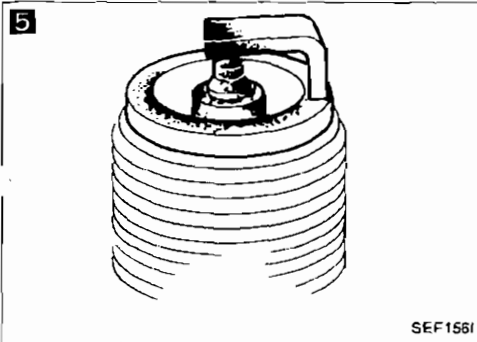
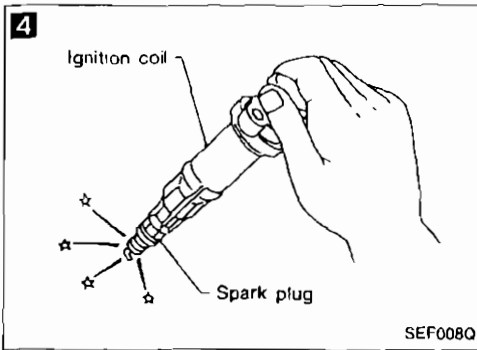


## Diagnostic Procedure 3 — Symptom — Unstable Idle



# TROUBLE DIAGNOSES

## Diagnostic Procedure 3 — Symptom — Unstable Idle (Cont'd)



**4**

**CHECK IGNITION SPARK.**

1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

NG → Check ignition coil, power transistor unit and their circuits. (See page EC-120, 202.)

**5**

**CHECK SPARK PLUGS.**

Remove the spark plugs and check for fouling, etc.

NG → Repair or replace spark plug(s).

**6**

**CHECK FUEL PRESSURE.**

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.  
**At idle approx. 245 kPa (2.45 bar, 2.5 kg/cm<sup>2</sup>, 36 psi)**

OR

1. Release fuel pressure to zero. (Refer to page EC-208.)
2. Install fuel pressure gauge and check fuel pressure.

NG → Check fuel pump and circuit.

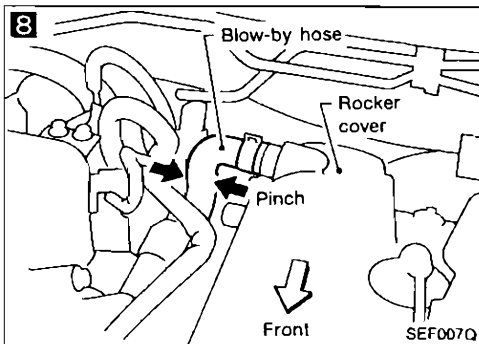
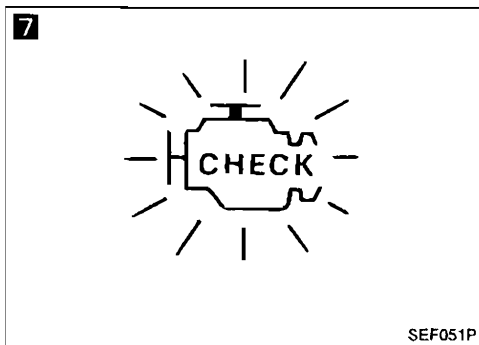
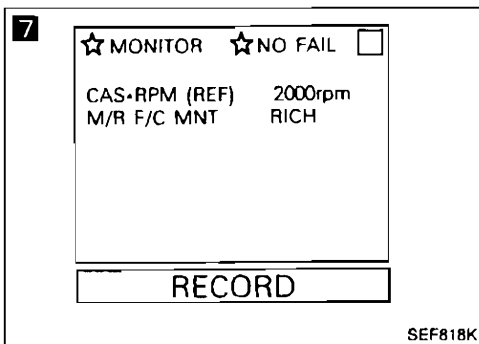
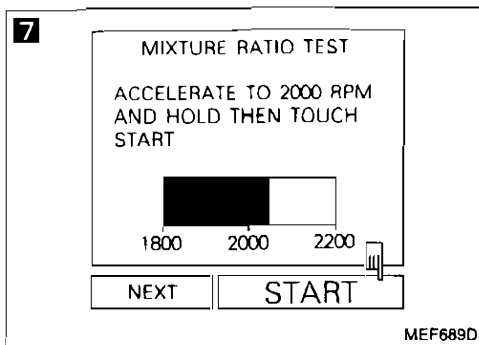
OK

(Go to **Ⓑ** on next page.)

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# TROUBLE DIAGNOSES

## Diagnostic Procedure 3 — Symptom — Unstable Idle (Cont'd)



ⓑ

**7**

### CHECK HEATED OXYGEN SENSOR.

1. Start engine and warm it up sufficiently.
2. Perform "MIXTURE RATIO TEST" in "FUNCTION TEST" mode.

NG

Replace heated oxygen sensor(s).

OR



2. See "M/R F/C MNT" in "Data monitor" mode.
3. Maintaining engine at 2,000 rpm under no-load (engine is warmed up sufficiently), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.

1 cycle: RICH → LEAN → RICH

2 cycles: RICH → LEAN →  
RICH → LEAN →  
RICH

OR



2. Set "Heated oxygen sensor monitor" in Diagnostic Test Mode II. (See page EC-52.)
3. Maintaining engine at 2,000 rpm under no-load, check to make sure that malfunction indicator lamp goes ON and OFF more than 5 times during 10 seconds.

OK

**8**

### CHECK FOR INTAKE AIR LEAK.

When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

Yes

Discover air leak location and repair.

No

(Go to Ⓒ on next page.)



# TROUBLE DIAGNOSES

## Diagnostic Procedure 3 — Symptom — Unstable Idle (Cont'd)

**9**

■ IGN TIMING ADJ ■ □

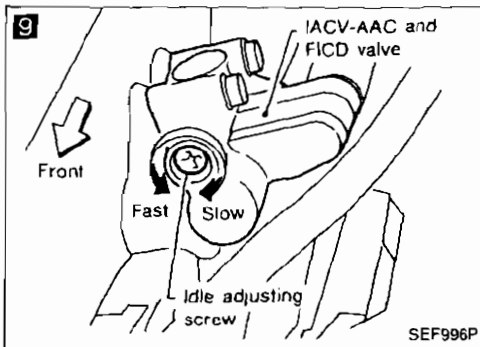
-- CONDITION SETTING --

IGN/T FEEDBACK HOLD

===== MONITOR =====

|               |        |
|---------------|--------|
| CAS-RPM (REF) | 762rpm |
| IGN TIMING    | 15BTDC |
| IDLE POSITION | ON     |

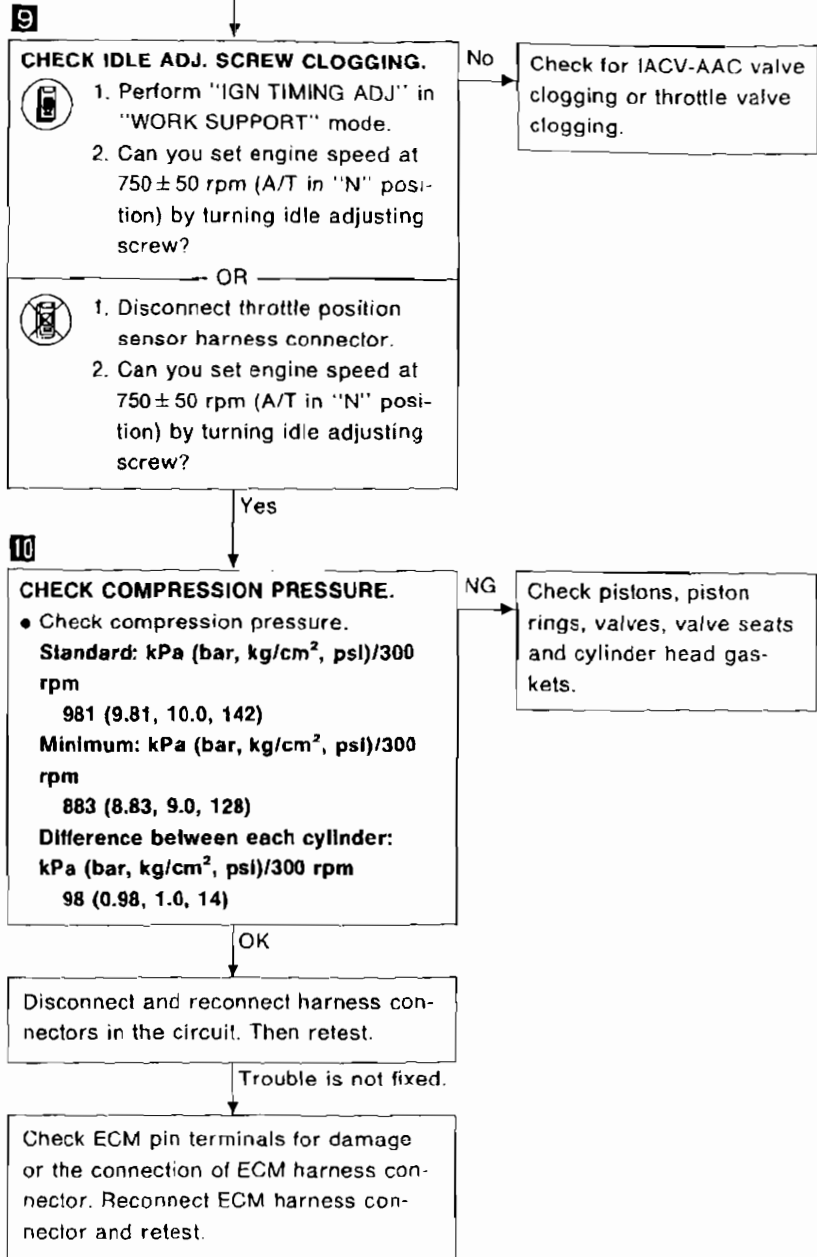
SEF786K



**10**

**COMPRESSION PRESSURE**

SEF309G



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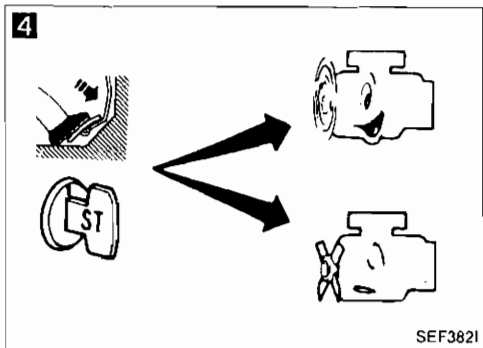
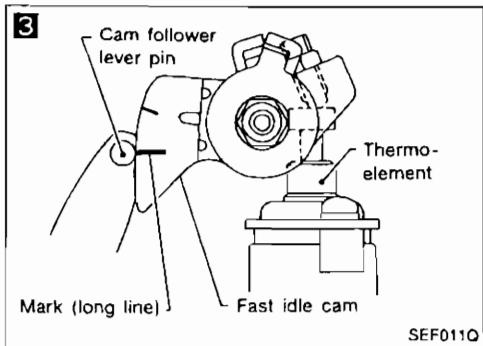
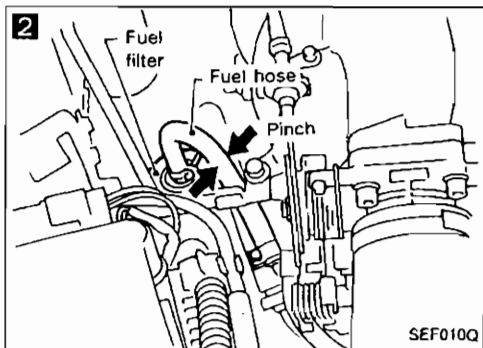
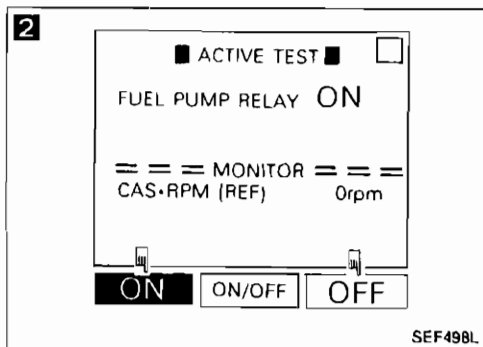
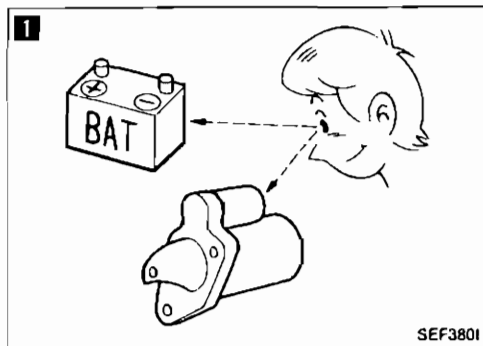
BT

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IDX

## Diagnostic Procedure 4 — Symptom — Hard to Start or Impossible to Start when the Engine is Cold



**1**

**CHECK BATTERY AND STARTER.**  
Check battery and starter condition.  
(Refer to EL section.)

NG → Repair or replace.

OK ↓

**2**

**CHECK FUEL PRESSURE.**

1. Turn ignition switch "ON".  
2. Perform "FUEL PUMP RELAY" in "ACTIVE TEST" mode.  
3. Pinch fuel feed hose with fingers.

**Is fuel pressure pulsation felt on the fuel feed hose?**

No → Check fuel pump and circuit. (See page EC-159.)

OR

1. Pinch fuel feed hose with fingers.  
2. When cranking the engine, is there any pressure on the fuel feed hose?

Yes ↓

**3**

**CHECK FAST IDLE CAM.**  
When the engine is cold, does mark (long line) on fast idle cam align with the pin center of cam follower lever?

No → Check fast idle cam adjustment. (See page EC-207.)

Yes ↓

**4**

**CHECK IACV-AAC VALVE.**  
When pressing accelerator pedal fully, can you start the engine.

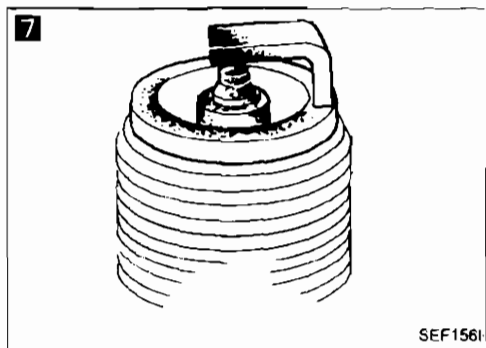
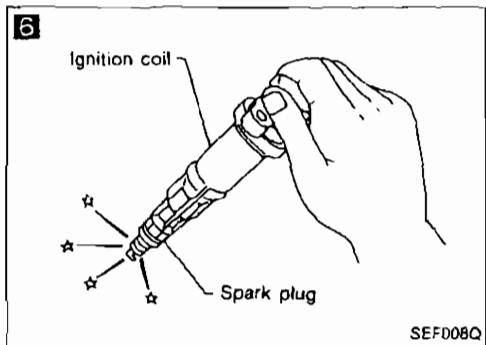
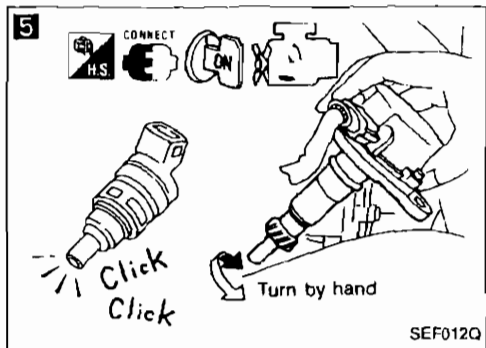
Yes → Check IACV-AAC valve and circuit. (See page EC-169.)

No ↓

(Go to Ⓐ on next page.)

# TROUBLE DIAGNOSES

## Diagnostic Procedure 4 — Symptom — Hard to Start or Impossible to Start when the Engine is Cold (Cont'd)



**5**

**CHECK INJECTOR.**

1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. Disconnect power transistor harness connector.
3. Turn ignition switch ON. (Do not start engine.)
4. When rotating camshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s).

Yes

**6**

**CHECK IGNITION SPARK.**

1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

NG → Check ignition coil, power transistor unit and their circuits. (See page EC-120, 202)

OK

**7**

**CHECK SPARK PLUGS.**  
Remove the spark plugs and check for fouling, etc.

NG → Repair or replace spark plug(s).

OK

**CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.**  
Refer to page EC-105.

NG → Repair or replace.

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

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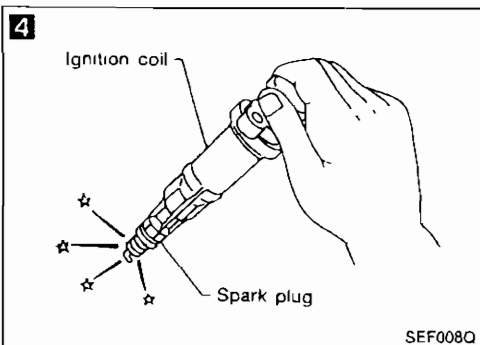
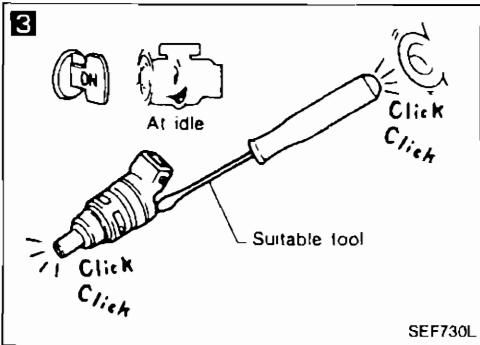
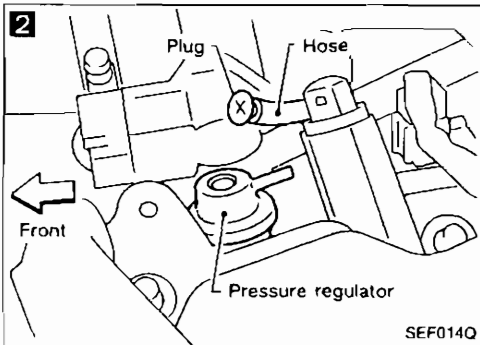
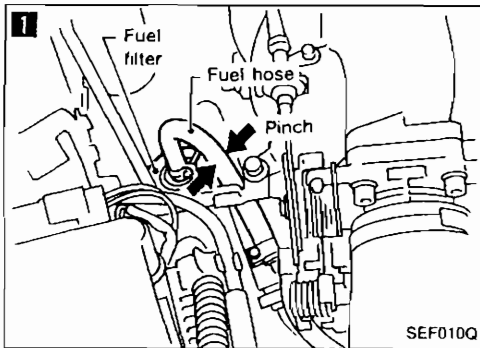
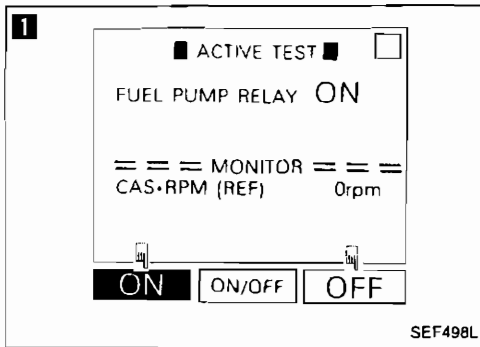
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# TROUBLE DIAGNOSES

## Diagnostic Procedure 5 — Symptom — Hard to Start or Impossible to Start when the Engine is Hot



**1**

**CHECK FUEL PRESSURE.**

1. Turn ignition switch "ON".
2. Perform "FUEL PUMP RELAY" in "ACTIVE TEST" mode.
3. Pinch fuel feed hose with fingers.

No → Check fuel pump and circuit. (See page EC-159.)

**Is fuel pressure pulsation felt on the fuel feed hose?**

OR

1. Pinch fuel feed hose with fingers.
2. When cranking the engine, is there any pressure on the fuel feed hose?

Yes

**2**

**CHECK FUEL VAPOR.**

1. Disconnect fuel pressure regulator vacuum hose and plug hose.
2. Can you start engine?

Yes → Check fuel properties.

No

**3**

**CHECK INJECTOR.**

Does each injector make an operating sound at idle?

No → Check injector(s) and circuit(s).

Yes

**4**

**CHECK IGNITION SPARK.**

1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine
4. Check for spark.

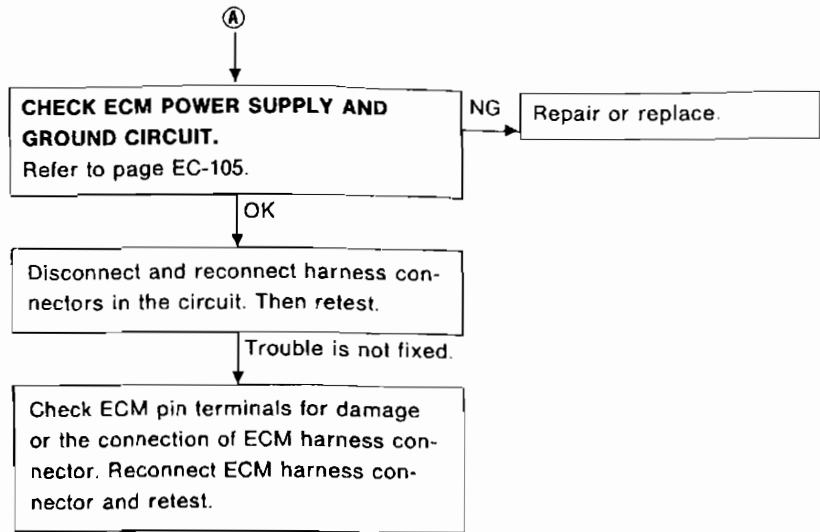
NG → Check ignition coil, power transistor unit and circuits. (See page EC-120, 202.)

OK

(Go to (A) on next page.)

# TROUBLE DIAGNOSES

## Diagnostic Procedure 5 — Symptom — Hard to Start or Impossible to Start when the Engine is Hot (Cont'd)



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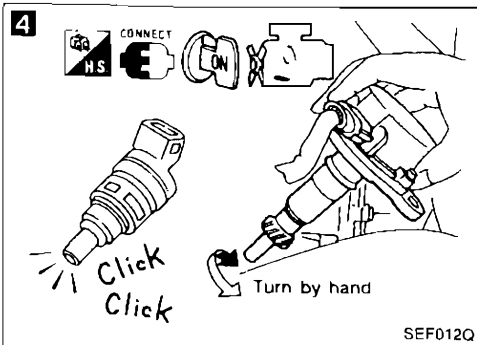
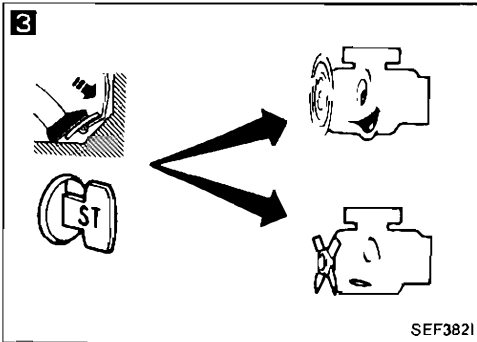
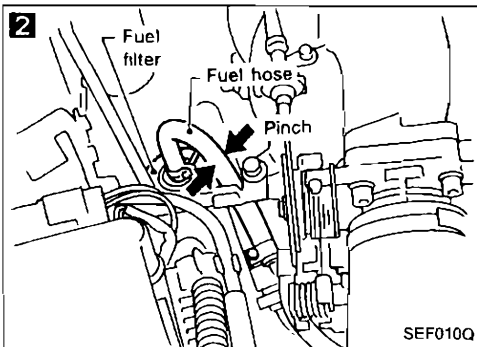
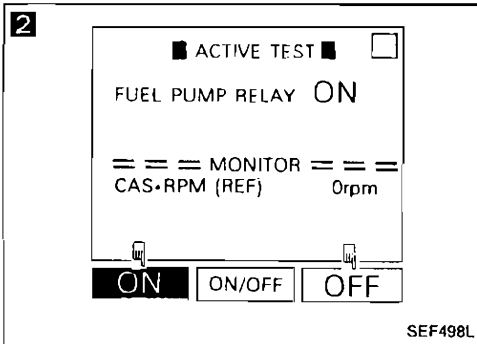
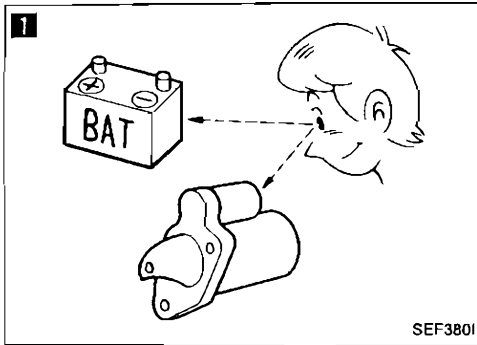
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# TROUBLE DIAGNOSES

## Diagnostic Procedure 6 — Symptom — Hard to Start or Impossible to Start under Normal Conditions



**1**

**CHECK BATTERY AND STARTER.** Check battery and starter operation. (Refer to EL section.)

NG → Repair or replace.

OK ↓

**2**

**CHECK FUEL PRESSURE.**

1. Turn ignition switch "ON".  
2. Perform "FUEL PUMP RELAY" in "ACTIVE TEST" mode.  
3. Pinch fuel feed hose with fingers.

Is fuel pressure pulsation felt on the fuel feed hose?

No → Check fuel pump and circuit (See page EC-159.)

OR

1. Pinch fuel feed hose with fingers.  
2. When cranking the engine, is there any pressure on the fuel feed hose?

Yes ↓

**3**

**CHECK INJECTOR FOR LEAKAGE.** When pressing accelerator pedal fully, can you start the engine.

Yes → Check injector(s) for leakage.

No ↓

**4**

**CHECK INJECTOR.**

1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)  
2. Disconnect power transistor harness connector  
3. Turn ignition switch ON. (Do not start engine.)  
4. When rotating camshaft position sensor shaft, does each injector make an operating sound?

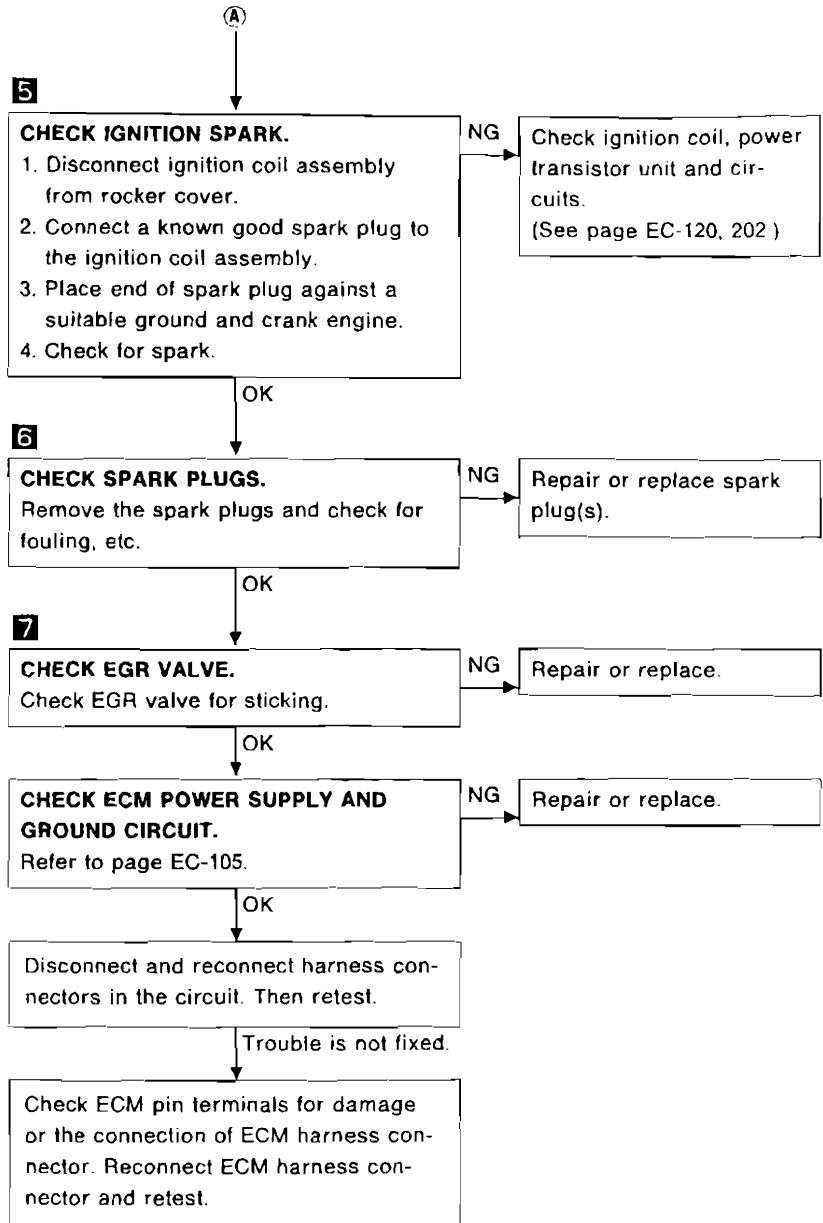
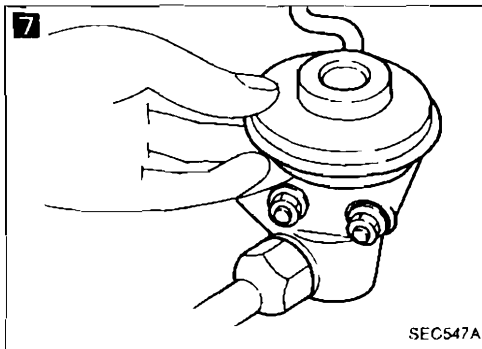
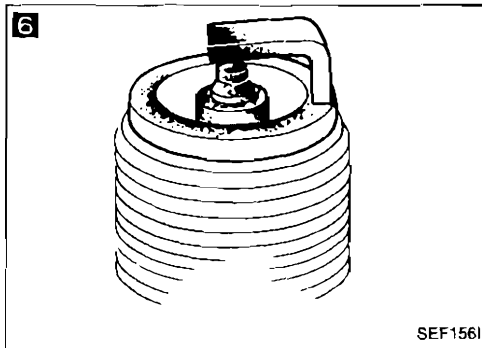
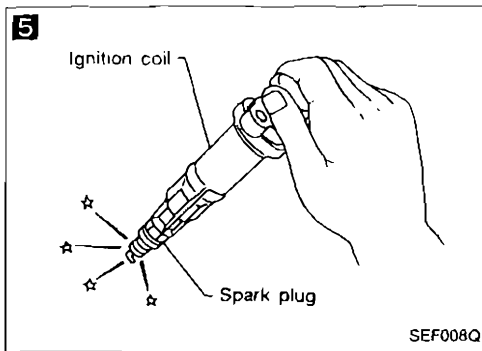
No → Check injectors and circuits.

Yes ↓

(Go to Ⓐ on next page.)

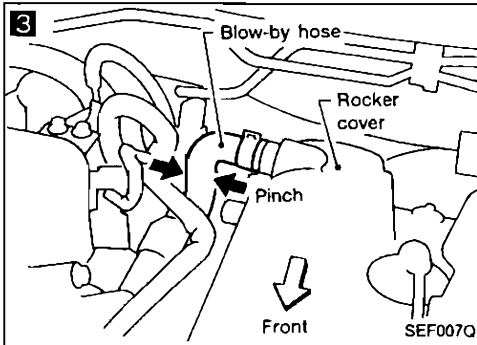
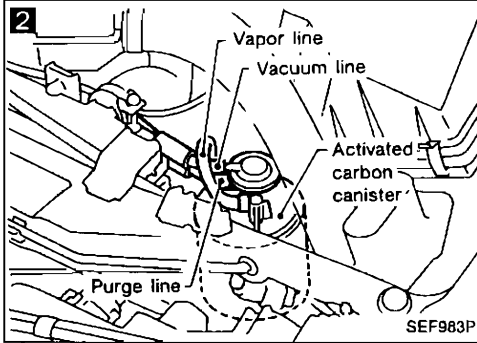
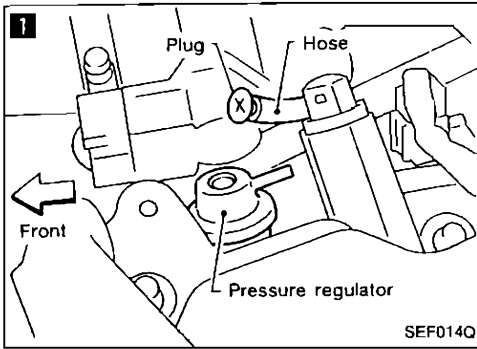
# TROUBLE DIAGNOSES

## Diagnostic Procedure 6 — Symptom — Hard to Start or Impossible to Start under Normal Conditions (Cont'd)

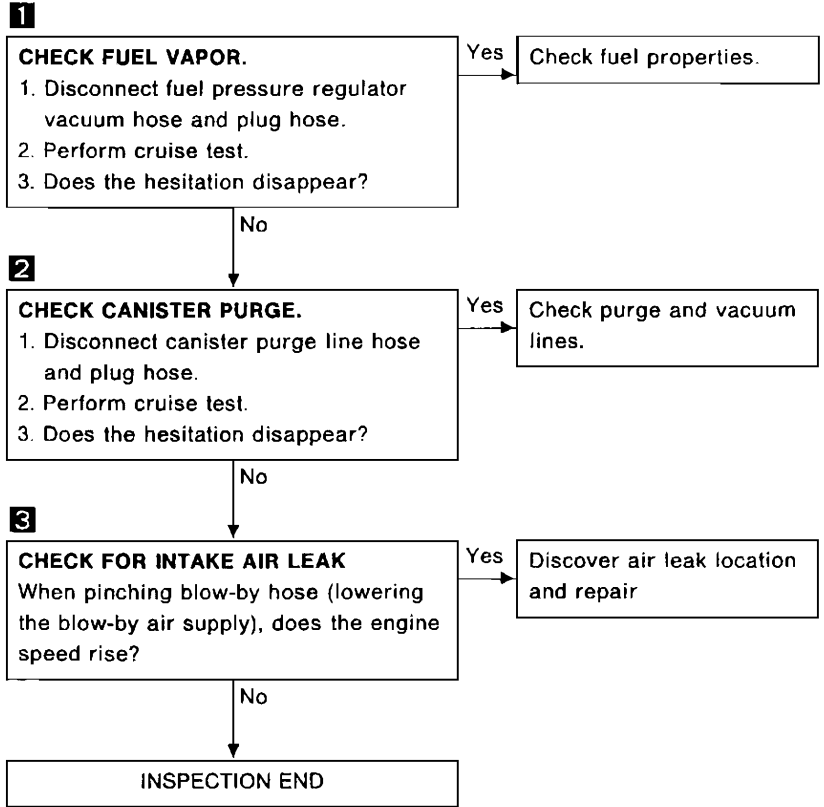


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# TROUBLE DIAGNOSES

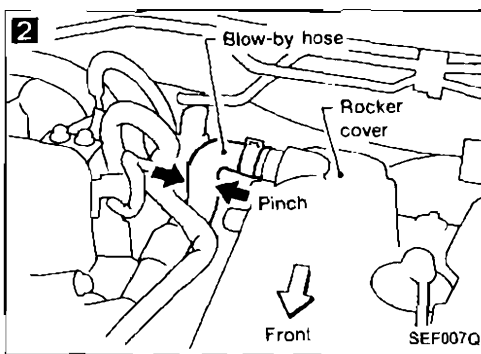
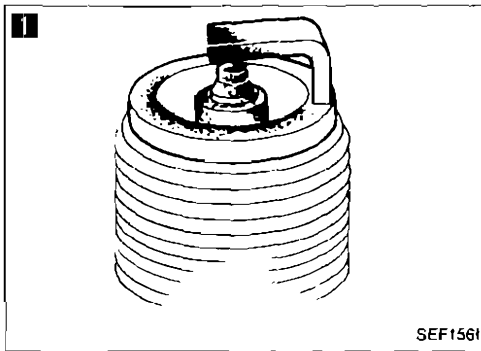


## Diagnostic Procedure 7 — Symptom — Hesitation when the Engine is Hot

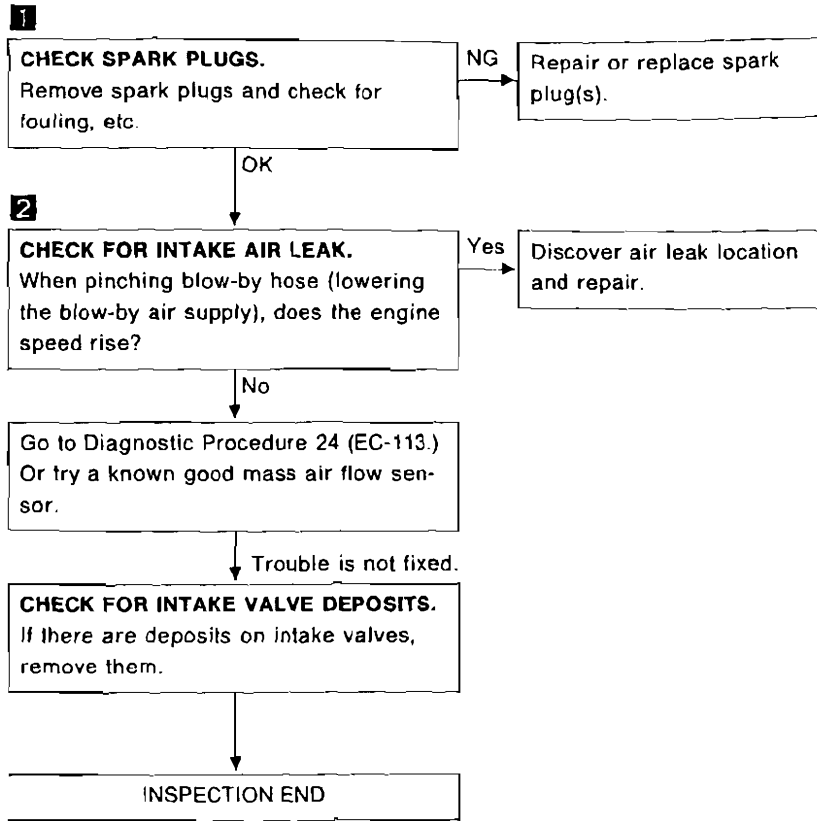




# TROUBLE DIAGNOSES

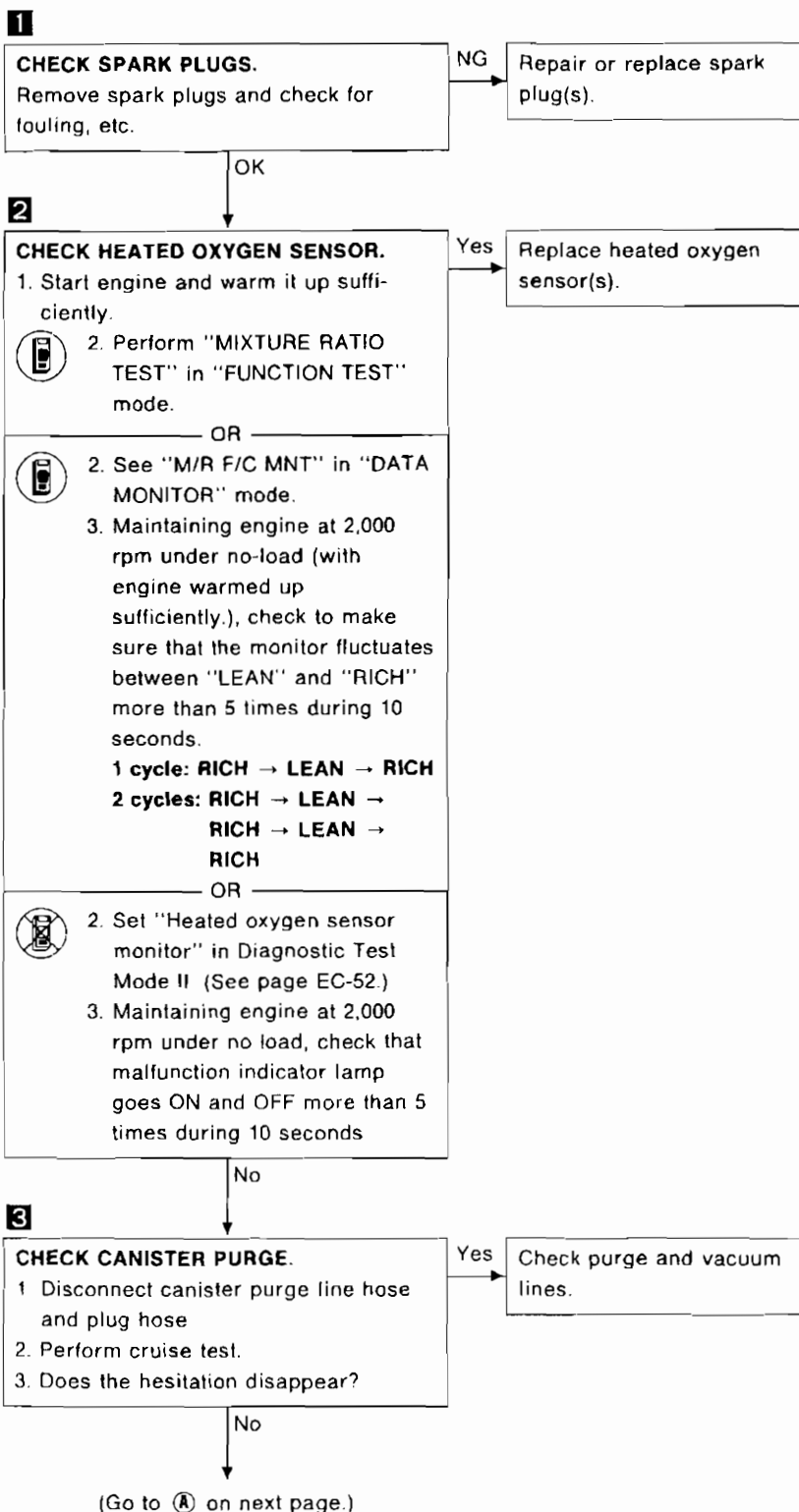
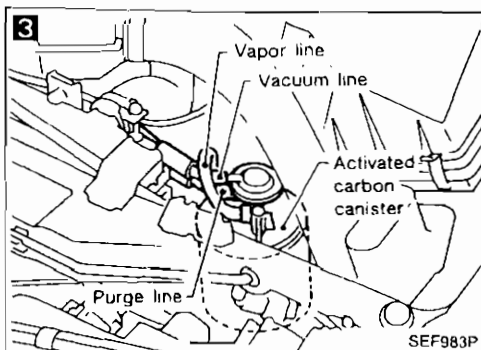
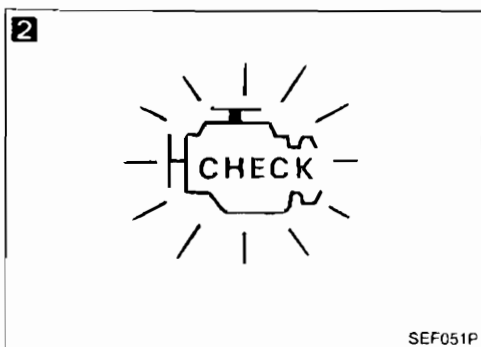
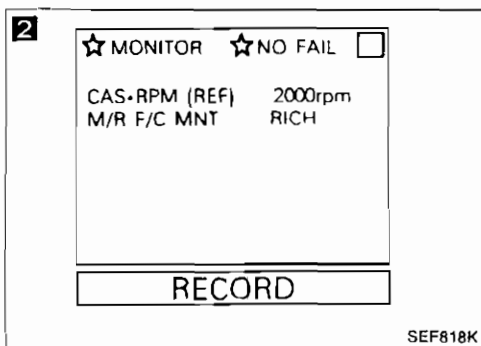
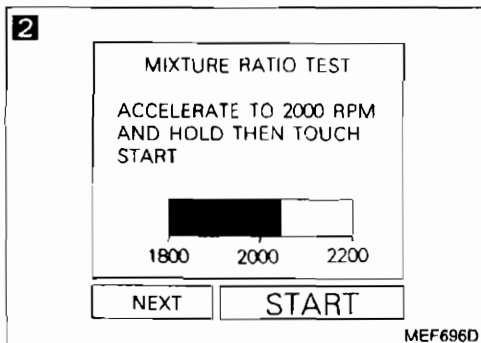
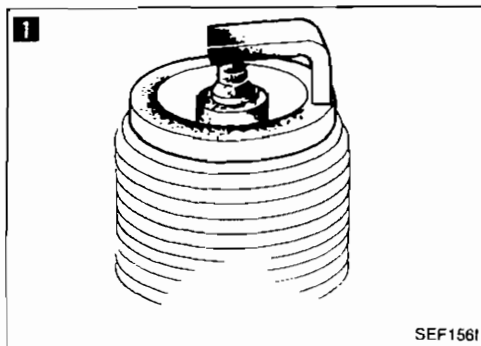


## Diagnostic Procedure 8 — Symptom — Hesitation when the Engine is Cold



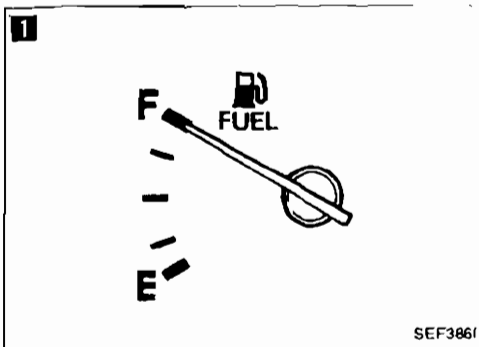
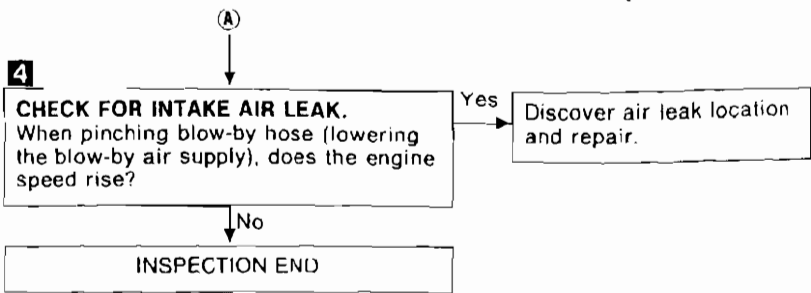
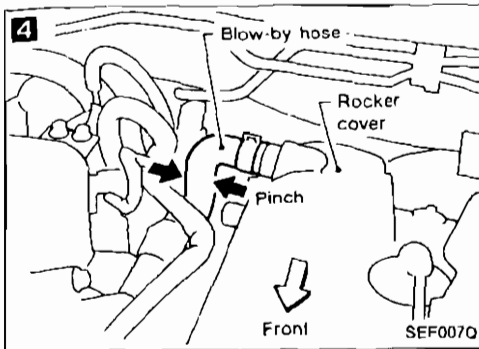
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## Diagnostic Procedure 9 — Symptom — Hesitation under Normal Conditions

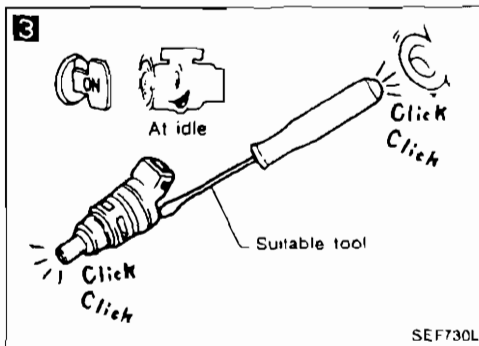
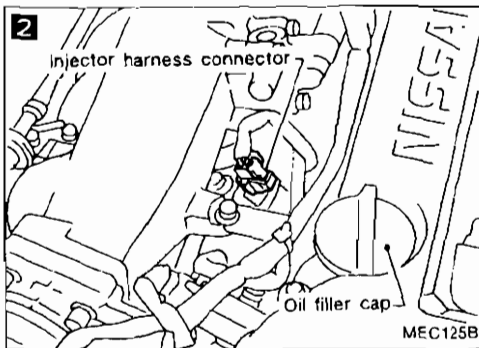
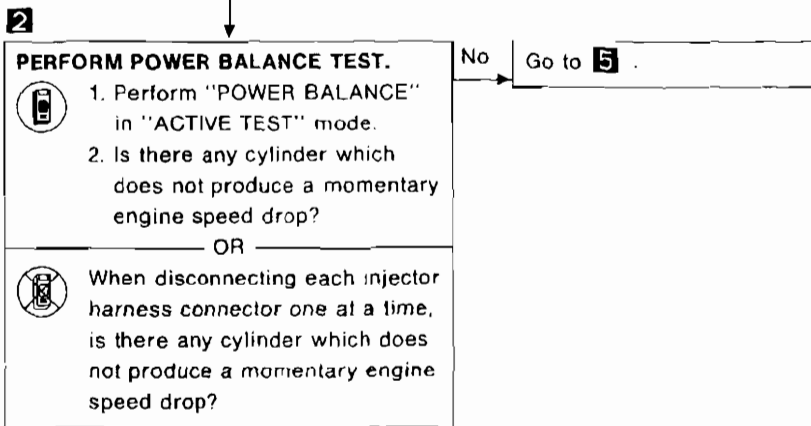
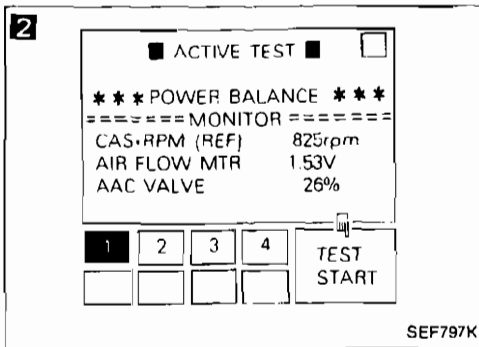
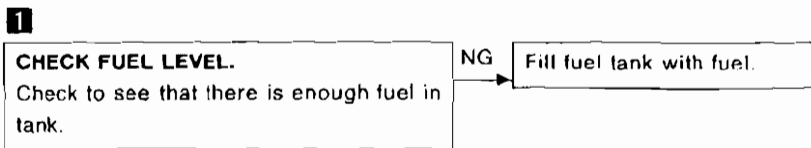


# TROUBLE DIAGNOSES

## Diagnostic Procedure 9 — Symptom — Hesitation under Normal Conditions (Cont'd)

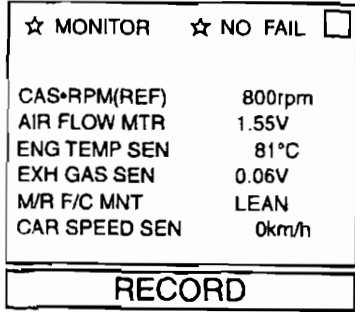


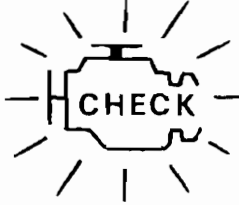
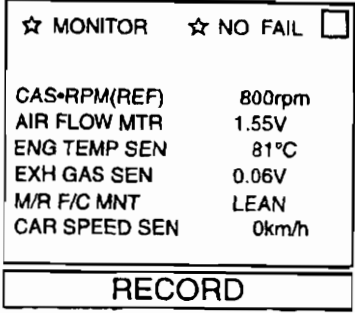


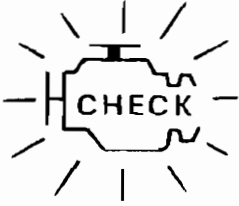


## Diagnostic Procedure 10 — Symptom — Engine Stalls when Turning



# TROUBLE DIAGNOSES

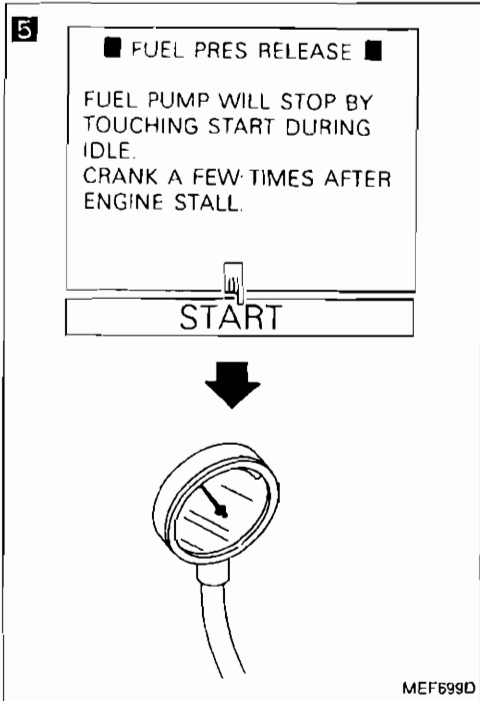
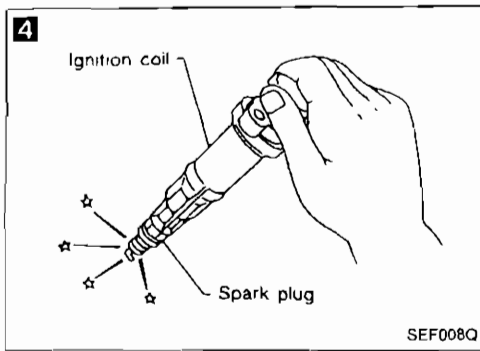
## How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

| Detected items                              | Display Diagnostic trouble code No. | How to perform diagnostic test mode II (Self-diagnostic results) judgement  |  |
|---|-------------------------------------|---|--|
|   |                                     | Illustration  | Method   |
| Throttle position sensor circuit            | 43                                  |  <p>☆ MONITOR ☆ NO FAIL <input type="checkbox"/></p> <p>CAS-RPM(REF) 800rpm<br/>         AIR FLOW MTR 1.55V<br/>         ENG TEMP SEN 81°C<br/>         EXH GAS SEN 0.06V<br/>         M/R F/C MNT LEAN<br/>         CAR SPEED SEN 0km/h</p> <p>RECORD</p> <p>SEF004Q</p>  | <p><b>PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).</b></p> <p>1) Jack up drive wheels<br/>           2) Start engine.<br/>           3) Shift to a suitable gear position (Except "P" or "N" position), and run engine at vehicle speed of 5 km/h (3 MPH) or higher for at least 10 seconds.</p> <p> 4) Select "DATA MONITOR" mode with CONSULT.<br/>           ☆ NO FAIL</p> <p>OR</p> <p> 4) Turn ignition switch "OFF" and then "ON".<br/>           5) Perform diagnostic test mode II (Self-diagnostic results) with ECM.<br/> <b>Malfunction indicator lamp displays diagnostic trouble code No. 55.</b></p> |
|   |                                     |  <p>SEF051P</p>  |  |
| Signal circuit from A/T control unit to ECM | 54                                  |  <p>☆ MONITOR ☆ NO FAIL <input type="checkbox"/></p> <p>CAS-RPM(REF) 800rpm<br/>         AIR FLOW MTR 1.55V<br/>         ENG TEMP SEN 81°C<br/>         EXH GAS SEN 0.06V<br/>         M/R F/C MNT LEAN<br/>         CAR SPEED SEN 0km/h</p> <p>RECORD</p> <p>SEF004Q</p> | <p><b>PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).</b></p> <p>1) Turn ignition switch "ON" or start engine.</p> <p> 2) Select "DATA MONITOR" mode with CONSULT.<br/>           ☆ NO FAIL</p> <p>OR</p> <p> 2) Perform diagnostic test mode II (Self-diagnostic results) with ECM.<br/> <b>Malfunction indicator lamp displays diagnostic trouble code No. 55.</b></p>  |
|   |                                     |  <p>SEF051P</p>  |  |

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# TROUBLE DIAGNOSES

## Diagnostic Procedure 10 — Symptom — Engine Stalls when Turning (Cont'd)



4

### CHECK IGNITION SPARK.

1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

NG

Check ignition coil, power transistor unit and circuits.  
(See page EC-120, 202 )

OK

5

### CHECK FUEL PRESSURE.



1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure  
**At Idle approx. 245 kPa (2.45 bar, 2.5 kg/cm<sup>2</sup>, 36 psi)**  
**The moment throttle valve is fully open:**  
**approx. 294 kPa (2.94 bar, 3.0 kg/cm<sup>2</sup>, 43 psi)**

NG

Check fuel pressure regulator diaphragm.

OR



1. Release fuel pressure to zero. (Refer to page EC-208.)
2. Install fuel pressure gauge and check fuel pressure.

OK

### CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.

Refer to page EC-105.

NG

Repair or replace.

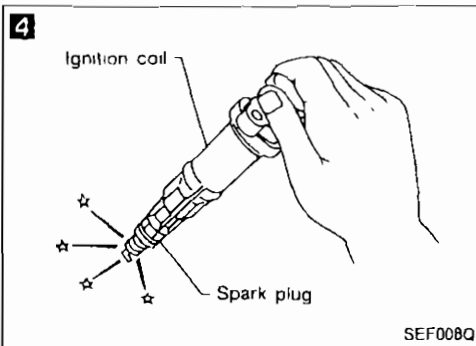
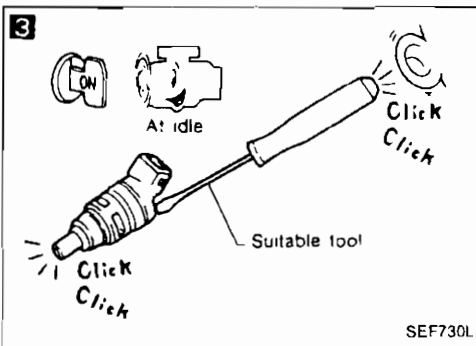
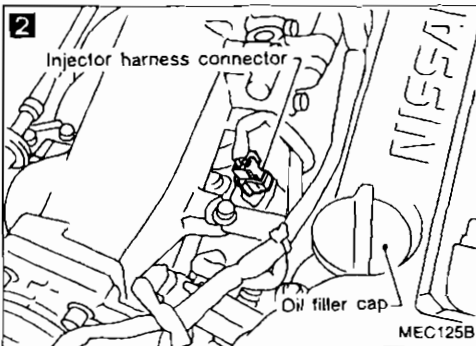
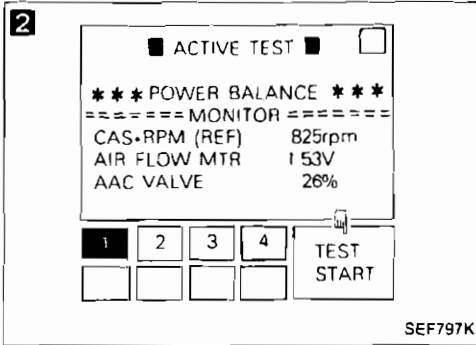
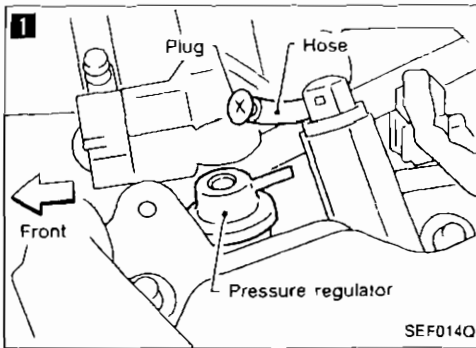
OK

Disconnect and reconnect harness connectors in the circuit. Then retest

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

## Diagnostic Procedure 11 — Symptom — Engine Stalls when the Engine is Hot



**1**

**CHECK FUEL VAPOR.**

1. Disconnect fuel pressure regulator vacuum hose and plug hose.
2. Perform cruise test.
3. Does the engine stall disappear?

Yes → Check fuel properties.

No

**2**

**PERFORM POWER BALANCE TEST.**

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

OR

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

No → Go to 5.

Yes

**3**

**CHECK INJECTOR.**

Does each injector make an operating sound at idle?

No → Check injector(s) and circuit(s).

Yes

**4**

**CHECK IGNITION SPARK.**

1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

NG → Check ignition coil, power transistor unit and their circuits. (See page EC-120, 202.)

OK

(Go to (A) on next page.)

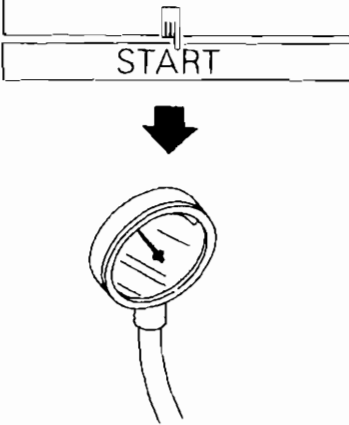
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# TROUBLE DIAGNOSES

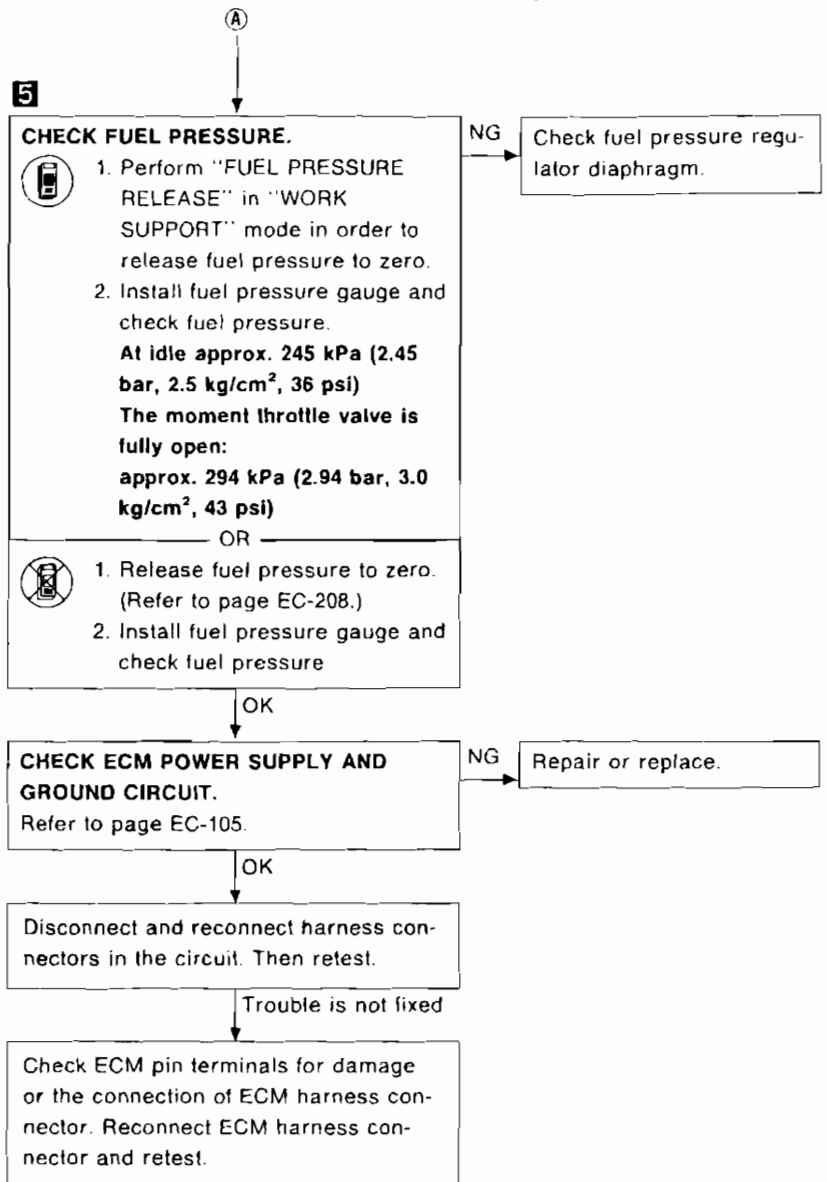
## Diagnostic Procedure 11 — Symptom — Engine Stalls when the Engine is Hot (Cont'd)

**5** ■ FUEL PRES RELEASE ■

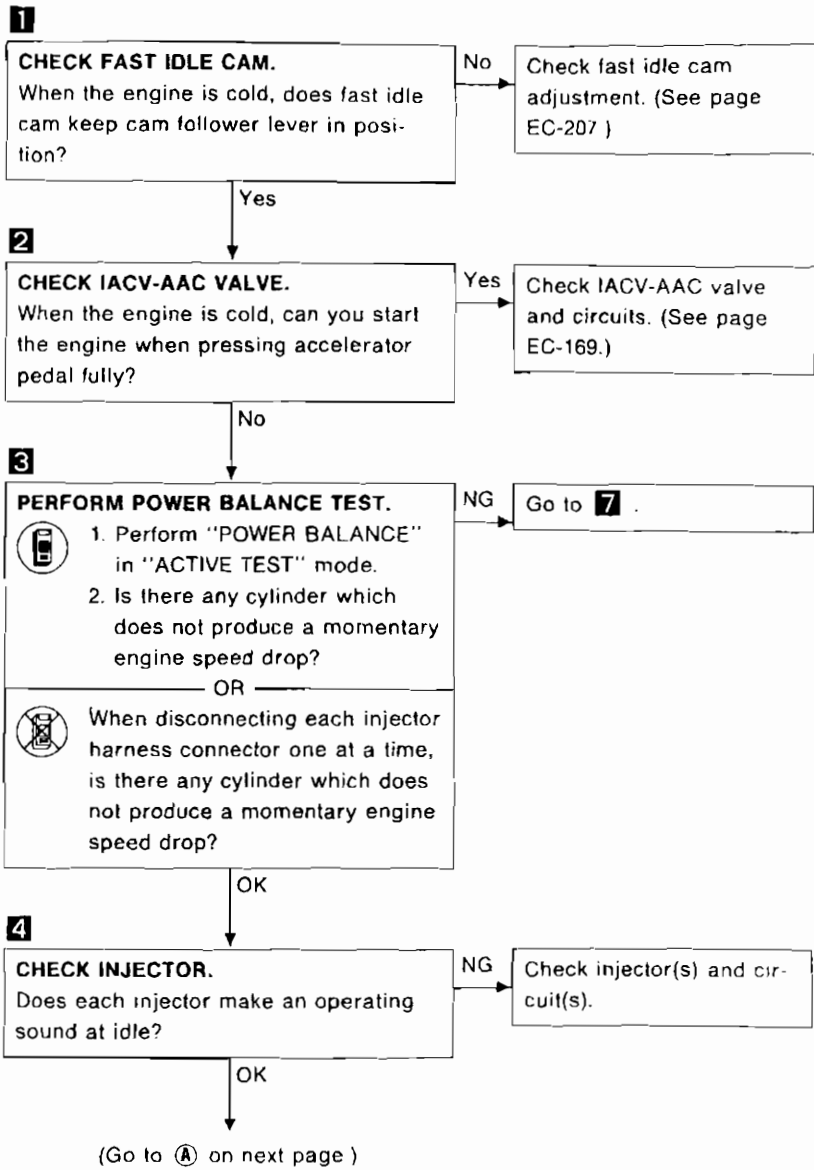
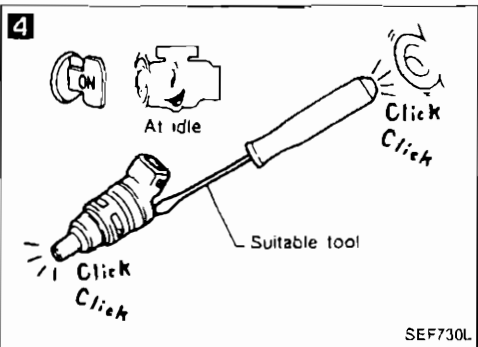
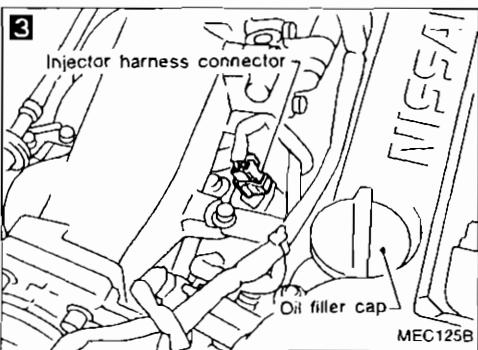
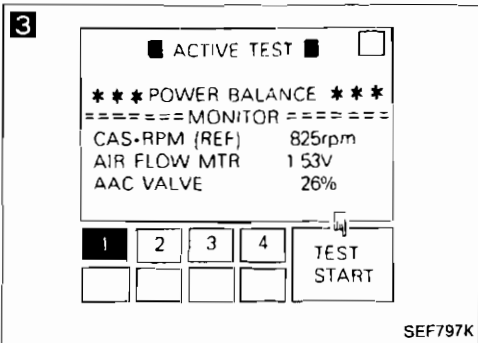
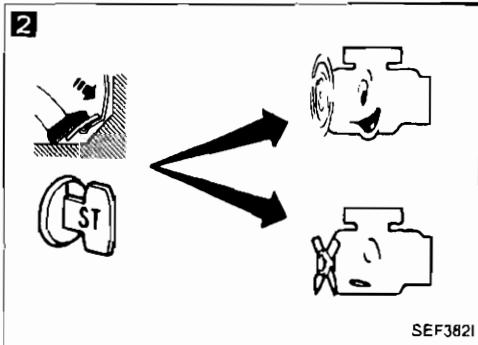
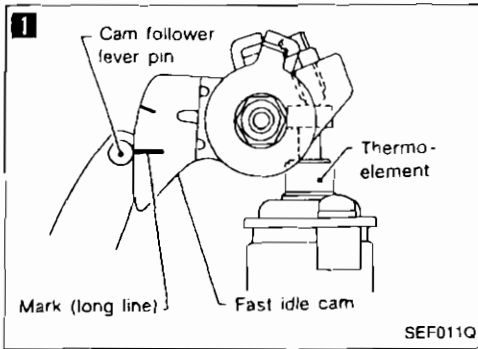
FUEL PUMP WILL STOP BY TOUCHING START DURING IDLE  
CRANK A FEW TIMES AFTER ENGINE STALL



MEF699D



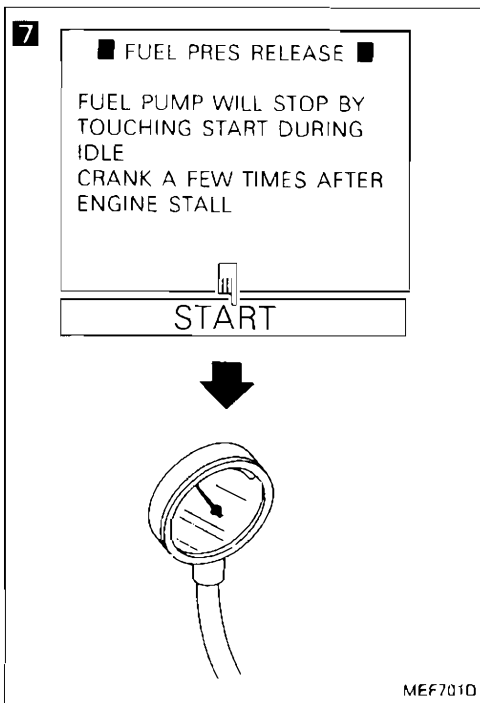
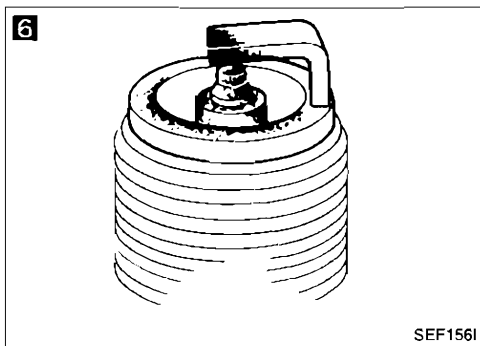
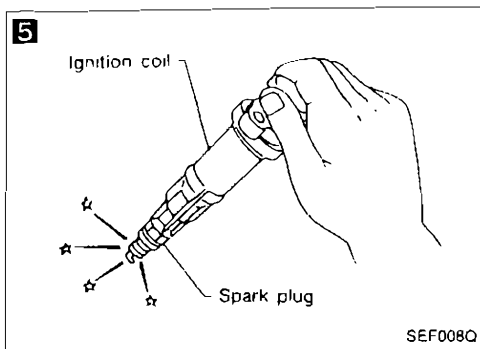
## Diagnostic Procedure 12 — Symptom — Engine Stalls when the Engine is Cold





# TROUBLE DIAGNOSES

## Diagnostic Procedure 12 — Symptom — Engine Stalls when the Engine is Cold (Cont'd)



**5**

**CHECK IGNITION SPARK.**

1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

NG → Check ignition coil, power transistor unit and circuits. (See page EC-120, 202)

OK

**6**

**CHECK SPARK PLUGS.**

Remove the spark plugs and check for fouling, etc.

NG → Repair or replace spark plug(s).

OK

**7**

**CHECK FUEL PRESSURE.**

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.  
**At idle approx. 245 kPa (2.45 bar, 2.5 kg/cm<sup>2</sup>, 36 psi)**  
**The moment throttle valve is fully open: approx. 294 kPa (2.94 bar, 3.0 kg/cm<sup>2</sup>, 43 psi)**

OR

1. Release fuel pressure to zero. (Refer to page EC-208.)
2. Install fuel pressure gauge and check fuel pressure.

NG → Check fuel pressure regulator diaphragm.

OK

**CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.**

Refer to page EC-105.

NG → Repair or replace.

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

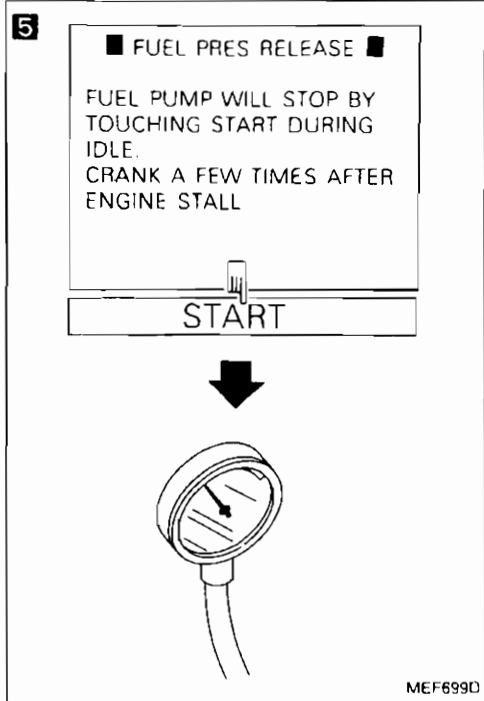
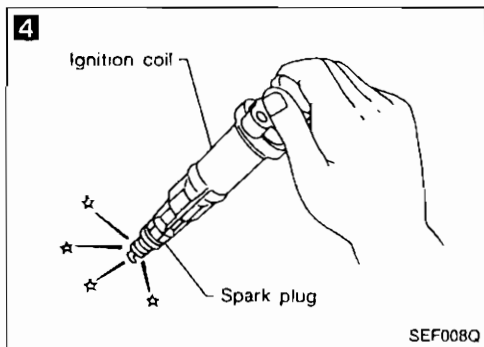
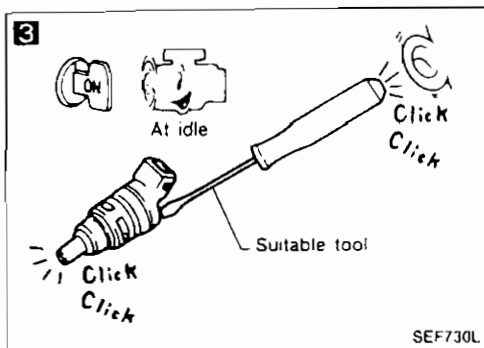
Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.



# TROUBLE DIAGNOSES

## Diagnostic Procedure 13 — Symptom — Engine Stalls when Stepping on the Accelerator Momentarily (Cont'd)



**4**

**CHECK IGNITION SPARK.**

1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against an earth point with engine cranking.
4. Check for spark.

NG → Check ignition coil, power transistor unit and their circuits. (See page EC-120, 202.)

**5**

**CHECK FUEL PRESSURE.**

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero
2. Install fuel pressure gauge and check fuel pressure.

**At idle approx. 245 kPa (2.45 bar, 2.5 kg/cm<sup>2</sup>, 36 psi)**  
**The moment throttle valve is fully open: approx. 294 kPa (2.94 bar, 3.0 kg/cm<sup>2</sup>, 43 psi)**

OR

1. Release fuel pressure to zero. (Refer to page EC-208.)
2. Install fuel pressure gauge and check fuel pressure.

NG → Check fuel pressure regulator diaphragm.

**CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.**  
 Refer to page EC-105.

NG → Repair or replace.

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

## Diagnostic Procedure 14 — Symptom — Engine Stalls after Decelerating

**1**

■ AAC VALVE SYSTEM ■

LET ENGINE IDLE  
THEN  
TOUCH START  
(A/C SW-LIGHT SW OFF)

NEXT    START

SEF196L

**1**

■ ACTIVE TEST ■

AAC/V OPENING    34%

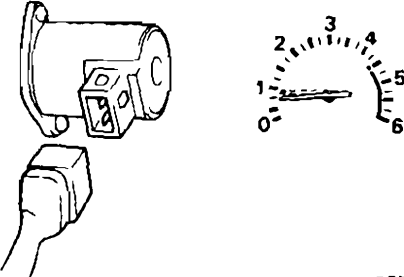
== MONITOR ==

CAS-RPM (REF)    875rpm  
AIR FLOW MTR    1.60V  
ENG TEMP SEN    83°C

Qu    UP    DWN    Qd

SEF319L

**1**



SEF:461

**2**

■ IGN TIMING ADJ ■

-- CONDITION SETTING --

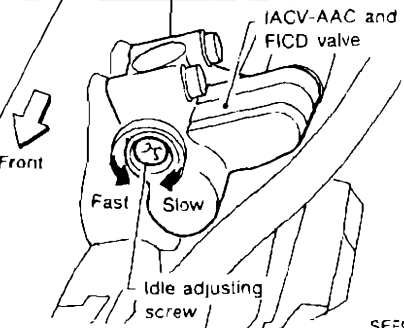
IGN/T FEEDBACK: HOLD

===== MONITOR =====

CAS-RPM (REF)    762rpm  
IGN TIMING        15BTDC  
IDLE POSITION      ON

SEF786K

**2**



SEF996P

**1**

**CHECK IACV-AAC VALVE.**

1. Start engine and warm it up sufficiently.

2. Perform "AAC/V SYSTEM" or "IACV-AAC/V SYSTEM" in "FUNCTION TEST" mode.

OR

1. Select "AAC/V OPENING" or "IACV-AAC/V OPENING" in "ACTIVE TEST" mode.

2. When touching "Qu" and "Qd", does the engine speed change according to the percent of IACV-AAC valve opening?

OR

When disconnecting IACV-AAC valve harness connector, does the engine speed drop?

No → Check IACV-AAC valve and circuit. (See page EC-169.)

Yes ↓

**2**

**CHECK IDLE ADJ. SCREW CLOGGING.**

1. Perform "IGN TIMING ADJ" in "WORK SUPPORT" mode

2. Can you set engine speed at  $750 \pm 50$  rpm (A/T in "N" position) by turning idle adjusting screw?

OR

1. Disconnect throttle position sensor harness connector

2. Can you set engine speed at  $750 \pm 50$  rpm (A/T in "N" position) by turning idle adjusting screw?

No → Check for IACV-AAC valve clogging or throttle body clogging.

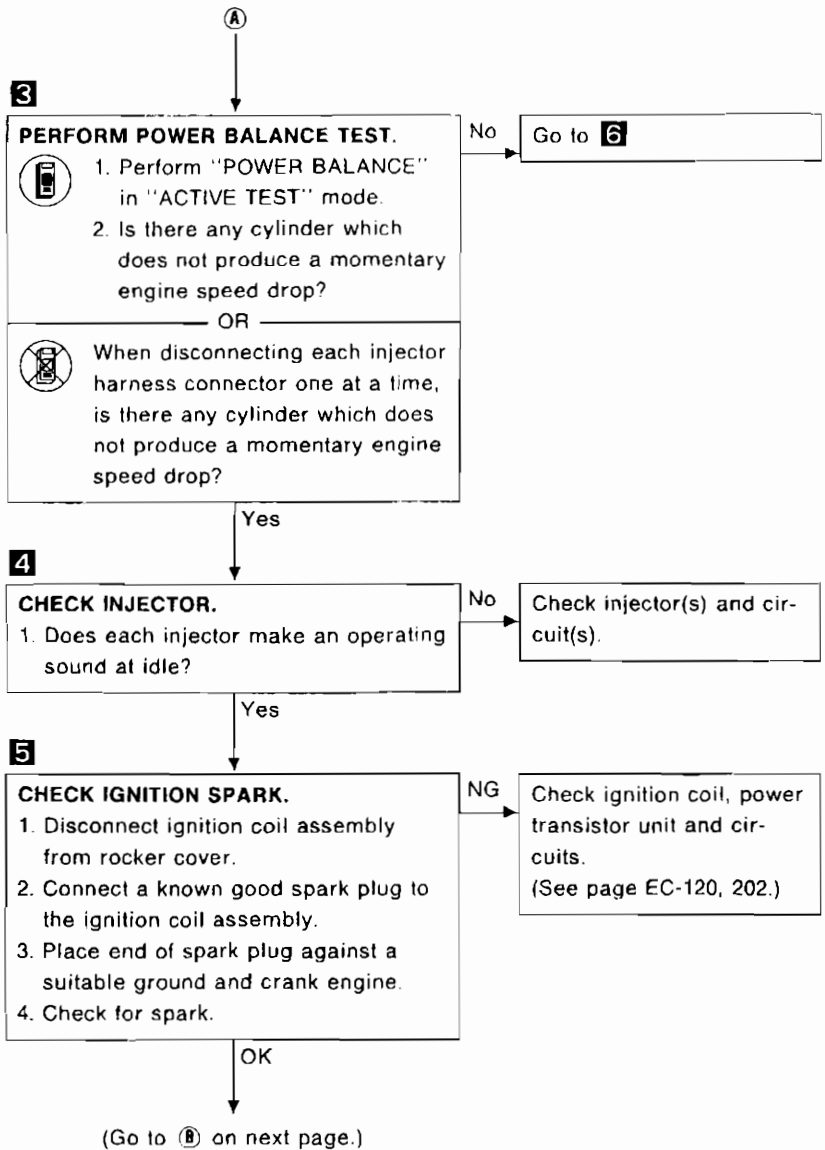
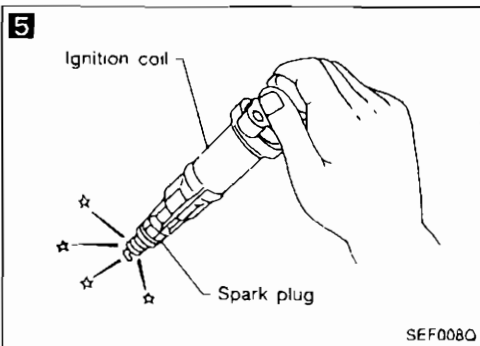
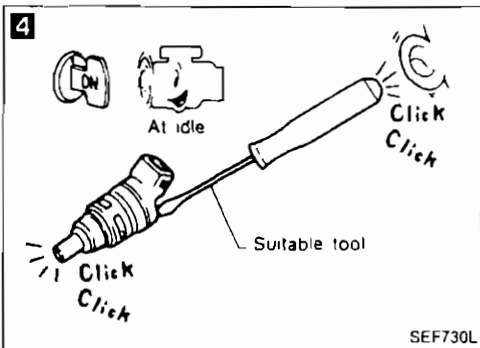
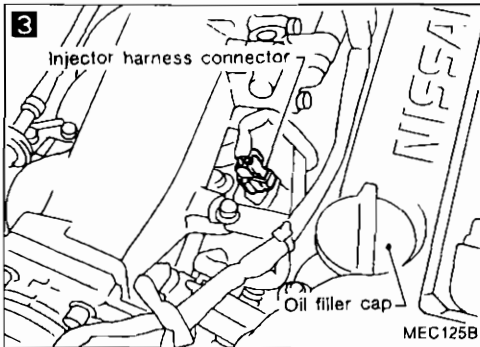
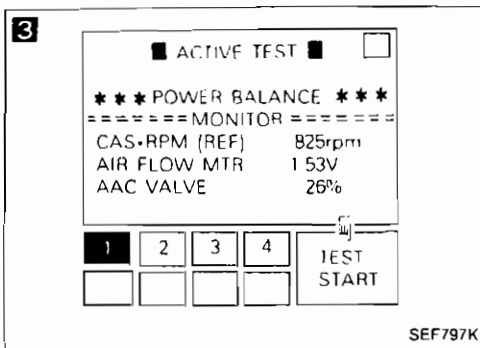
Yes ↓

(Go to **A** on next page)

EC

# TROUBLE DIAGNOSES

## Diagnostic Procedure 14 — Symptom — Engine Stalls after Decelerating (Cont'd)



# TROUBLE DIAGNOSES


## Diagnostic Procedure 14 — Symptom — Engine Stalls after Decelerating (Cont'd)

**6**

■ FUEL PRES RELEASE ■

FUEL PUMP WILL STOP BY TOUCHING START DURING IDLE  
CRANK A FEW TIMES AFTER ENGINE STALL

START




MEF588D

**7**

MIXTURE RATIO TEST!

ACCELERATE TO 2000 RPM AND HOLD THEN TOUCH START



1800 2000 2200

NEXT START

MEF689D

**7**

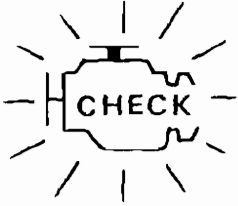
☆ MONITOR ☆ NO FAIL

CAS-RPM (REF) 2000rpm  
M/R F/C MNT RICH

RECORD

SEF818K

**7**



CHECK

SEF051P

**6**

**CHECK FUEL PRESSURE.**

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.

2. Install fuel pressure gauge and check fuel pressure.

**At idle approx. 245 kPa (2.45 bar, 2.5 kg/cm<sup>2</sup>, 36 psi)**

**The moment throttle valve is fully open: approx. 294 kPa (2.94 bar, 3.0 kg/cm<sup>2</sup>, 43 psi)**

OR

1. Release fuel pressure to zero (Refer to page EC-208.)

2. Install fuel pressure gauge and check fuel pressure.

NG → Check fuel pressure regulator diaphragm.

OK

**7**

**CHECK HEATED OXYGEN SENSOR.**

1. Start engine and warm it up sufficiently.

2. Perform "MIXTURE RATIO TEST" in "FUNCTION TEST" mode.

OR

2. See "M/R F/C MNT" in "DATA MONITOR" mode

3. Maintaining engine at 2,000 rpm under no-load (with engine warmed up sufficiently), check to make sure that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.

1 cycle: RICH → LEAN → RICH

2 cycles: RICH → LEAN → RICH → LEAN → RICH

OR

2. Set "Heated oxygen sensor monitor" in Diagnostic Test Mode II (See page EC-52.)

3. Maintaining engine at 2,000 rpm under no-load, check that malfunction indicator lamp goes ON and OFF more than 5 times during 10 seconds.

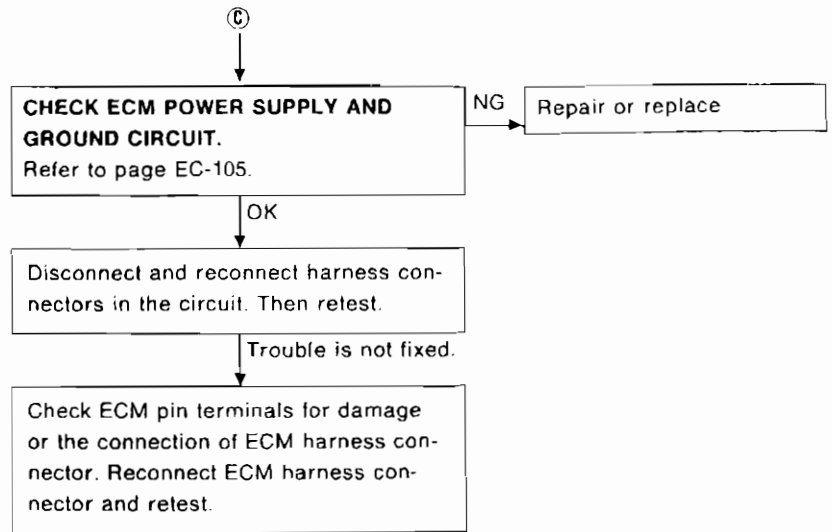
NG → Replace heated oxygen sensor(s).

OK

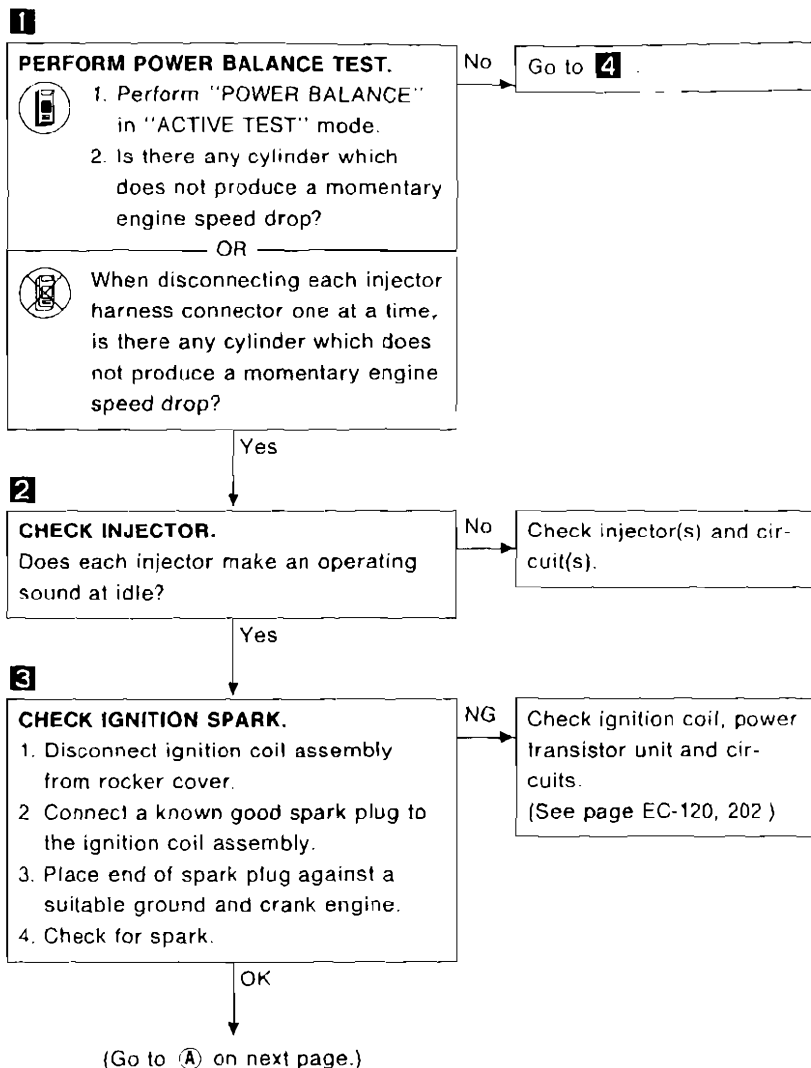
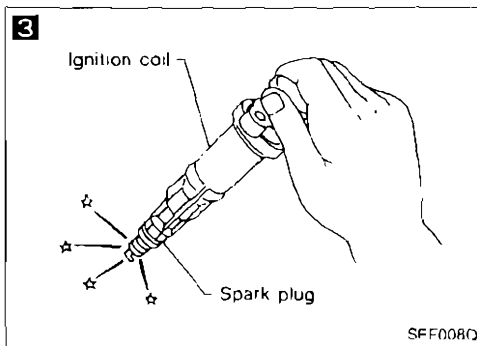
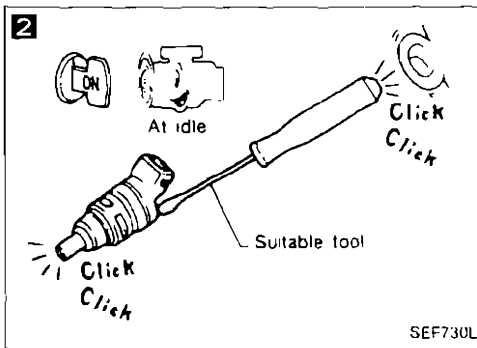
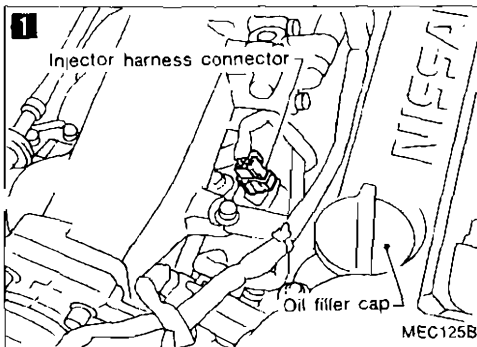
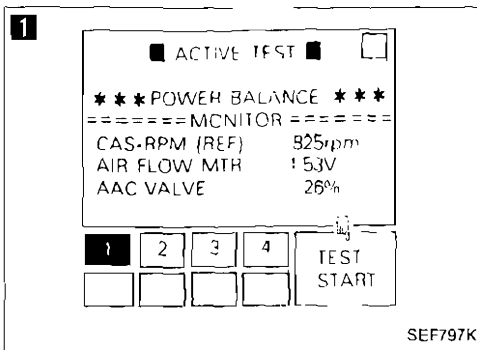
(Go to ⑥ on next page.)

## TROUBLE DIAGNOSES

### Diagnostic Procedure 14 — Symptom — Engine Stalls after Decelerating (Cont'd)



## Diagnostic Procedure 15 — Symptom — Engine Stalls when Accelerating or when Driving at Constant Speed



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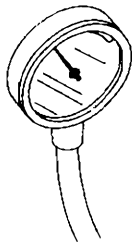


# TROUBLE DIAGNOSES

## Diagnostic Procedure 15 — Symptom — Engine Stalls when Accelerating or when Driving at Constant Speed (Cont'd)

**4** ■ FUEL PRES RELEASE ■

FUEL PUMP WILL STOP BY TOUCHING START DURING IDLE  
CRANK A FEW TIMES AFTER ENGINE STALL



START

MEF707D

**5**

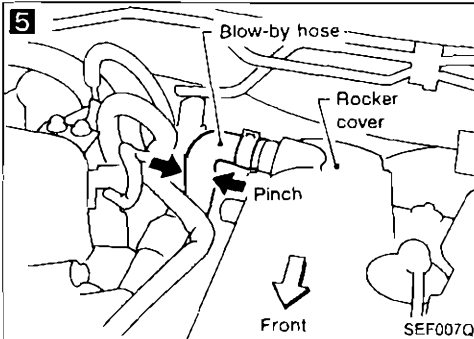
Blow-by hose

Rocker cover

Pinch

Front

SEF007Q



**4**

**CHECK FUEL PRESSURE.**

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.

2. Install fuel pressure gauge and check fuel pressure

**At idle approx. 245 kPa (2.45 bar, 2.5 kg/cm<sup>2</sup>, 36 psi)**

**The moment throttle valve is fully open: approx. 294 kPa (2.94 bar, 3.0 kg/cm<sup>2</sup>, 43 psi)**

OR

1. Release fuel pressure to zero. (Refer to page EC-208.)

2. Install fuel pressure gauge and check fuel pressure.

NG → Check fuel pump, circuit and fuel pressure regulator.

**5**

**CHECK FOR INTAKE AIR LEAK.**

When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

Yes → Discover air leak location and repair.

No →

**CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.**

Refer to page EC-105.

Yes → Repair or replace.

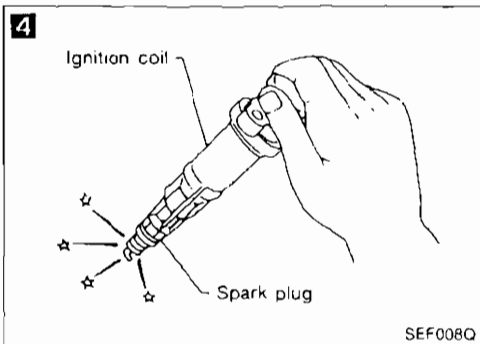
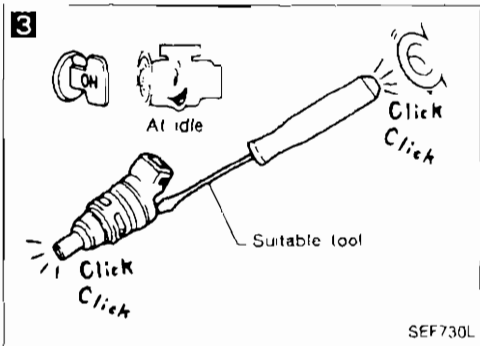
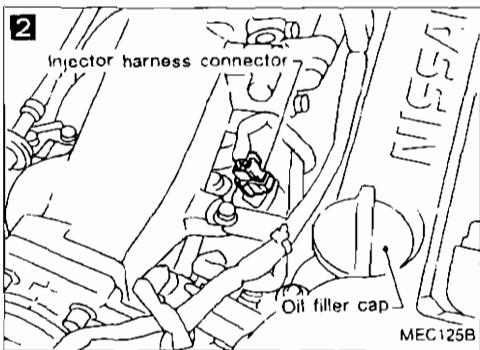
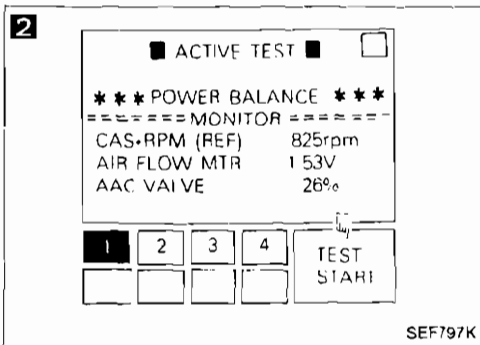
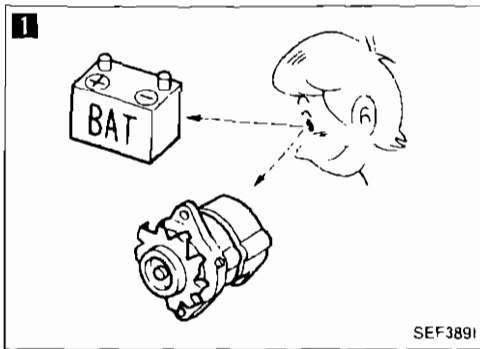
No →

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

## Diagnostic Procedure 16 — Symptom — Engine Stalls when the Electrical Load is Heavy



**1**

**CHECK BATTERY AND ALTERNATOR.** Check battery and alternator condition (Refer to EL section )

NG → Repair or replace.

OK →

**2**

**PERFORM POWER BALANCE TEST.**

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.

2. Is there any cylinder which does not produce a momentary engine speed drop?

OR

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

No → Go to **5**.

Yes →

**3**

**CHECK INJECTOR.** Does each injector make an operating sound at idle?

No → Check injector(s) and circuit(s)

Yes →

**4**

**CHECK IGNITION SPARK.**

1. Disconnect ignition coil assembly from rocker cover

2. Connect a known good spark plug to the ignition coil assembly.

3. Place end of spark plug against a suitable ground and crank engine.

4. Check for spark.

NG → Check ignition coil, power transistor unit and circuits (See page EC-120 202.)

OK →

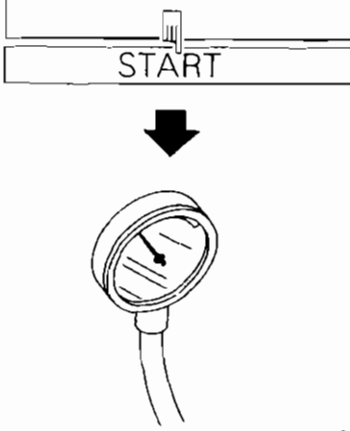
(Go to **A** on next page )

# TROUBLE DIAGNOSES

## Diagnostic Procedure 16 — Symptom — Engine Stalls when the Electrical Load is Heavy (Cont'd)

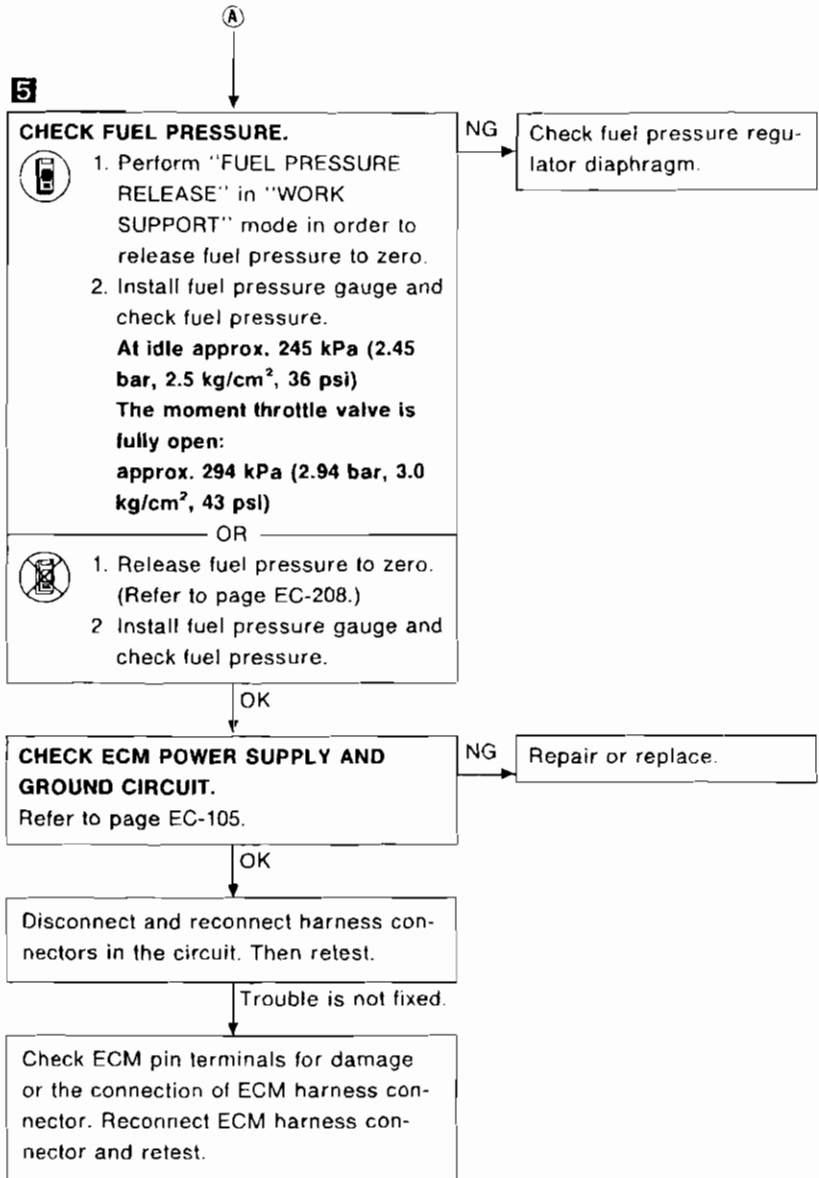
**5** ■ FUEL PRES RELEASE ■

FUEL PUMP WILL STOP BY TOUCHING START DURING IDLE  
CRANK A FEW TIMES AFTER ENGINE STALL



START

MEF699D



Diagnostic Procedure 17 — Symptom — Lack of Power and Stumble

**1** ■ FUEL PRES RELEASE ■

FUEL PUMP WILL STOP BY TOUCHING START DURING IDLE  
CRANK A FEW TIMES AFTER ENGINE STALL

START

MEF708D

**2**

Blow-by hose

Rocker cover

Pinch

Front

SEF0070

**1**

**CHECK FUEL PRESSURE.**

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero

2. Install fuel pressure gauge and check fuel pressure.

**At idle approx. 245 kPa (2.45 bar, 2.5 kg/cm<sup>2</sup>, 36 psi)**

**The moment throttle valve is fully open: approx. 294 kPa (2.94 bar, 3.0 kg/cm<sup>2</sup>, 43 psi)**

OR

1. Release fuel pressure to zero. (Refer to page EC-208.)

2. Install fuel pressure gauge and check fuel pressure.

NG → Check fuel pressure regulator diaphragm.

**2**

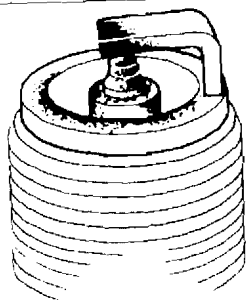
**CHECK FOR INTAKE AIR LEAK.**

When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

Yes → Discover air leak location and repair.

No → INSPECTION END

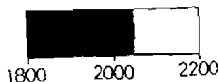
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SEF156I

## MIXTURE RATIO TEST

ACCELERATE TO 2000 RPM  
AND HOLD THEN TOUCH  
START



NEXT

START

MEF711D

☆ MONITOR ☆ NO FAIL

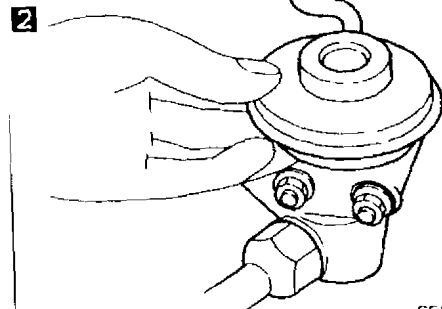
CAS-RPM (REF) 2000rpm  
M/R F/C MNT RICH

RECORD

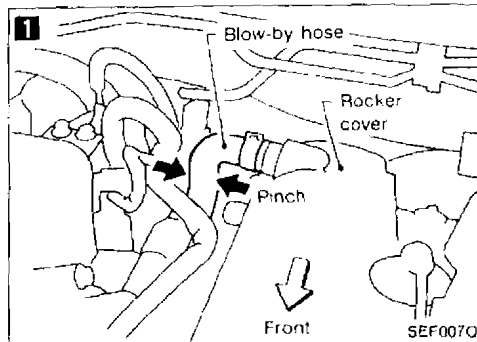
SEF818K

CHECK

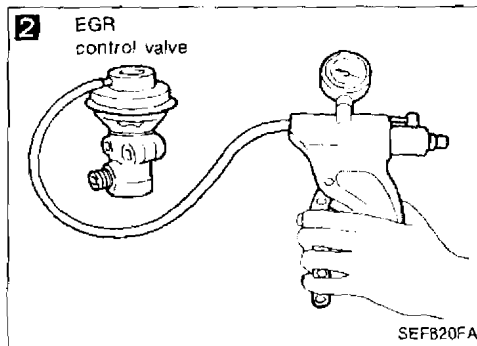
SEF051P



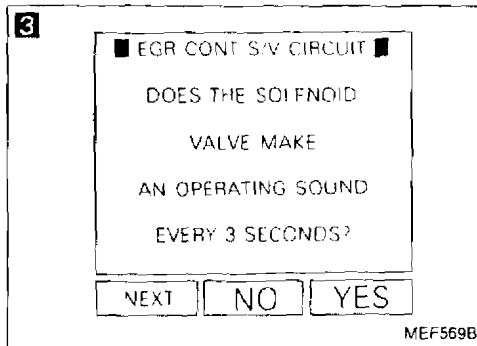
SEC547A



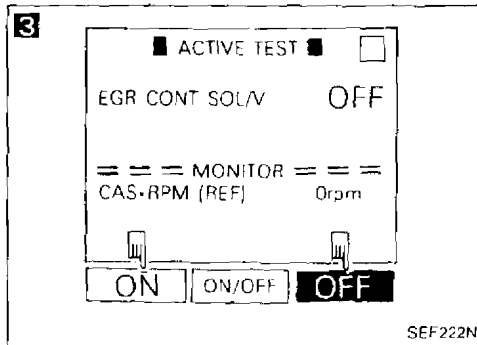
SEF007O



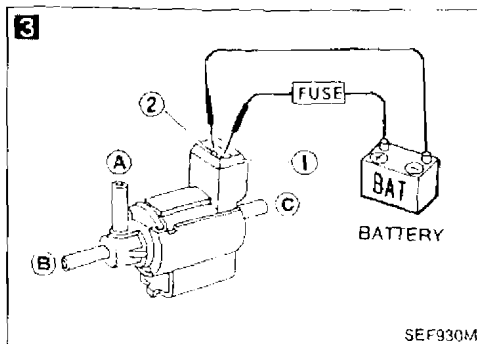
SEF820FA



MEF569B



SEF222N



SEF930M

## Diagnostic Procedure

1

## CHECK FOR INTAKE AIR LEAK.

When pinching blow-by hose (lower the blow-by air supply), does the engine speed rise?

No

2

## CHECK EGR OPERATION.

1. Apply vacuum directly to the EGR valve using a handy vacuum pump.  
2. Check to see that the engine runs rough or dies.

Yes

3

## CHECK EGRC-SOLENOID VALVE.

1. Turn ignition switch "ON".  
2. Perform "EGR CONT S/V CIRCUIT" or "EGRC S/V CIRCUIT" in "FUNCTION TEST" mode.

OR

1. Turn ignition switch "ON".  
2. Select "EGR CONT SOL/V" or "EGRC SOL VALVE" in "ACTIVE TEST" mode.  
3. Turn EGRC-solenoid valve ON and OFF.  
4. Check operating sound.

OR

1. Disconnect EGRC-solenoid valve harness connector.  
2. Supply EGRC-solenoid valve terminals with battery current and check operating sound.

OK

4

## CHECK VACUUM HOSES.

Check the following vacuum hoses for clogging, cracks and poor connections:  
a) Vacuum hose between EGR valve and EGRC-solenoid valve.  
b) Vacuum hose between EGRC-solenoid valve and throttle body port.  
c) Vacuum hose between EGRC-solenoid valve and air duct.

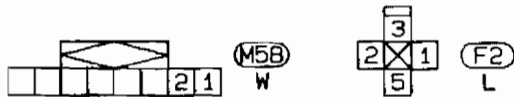
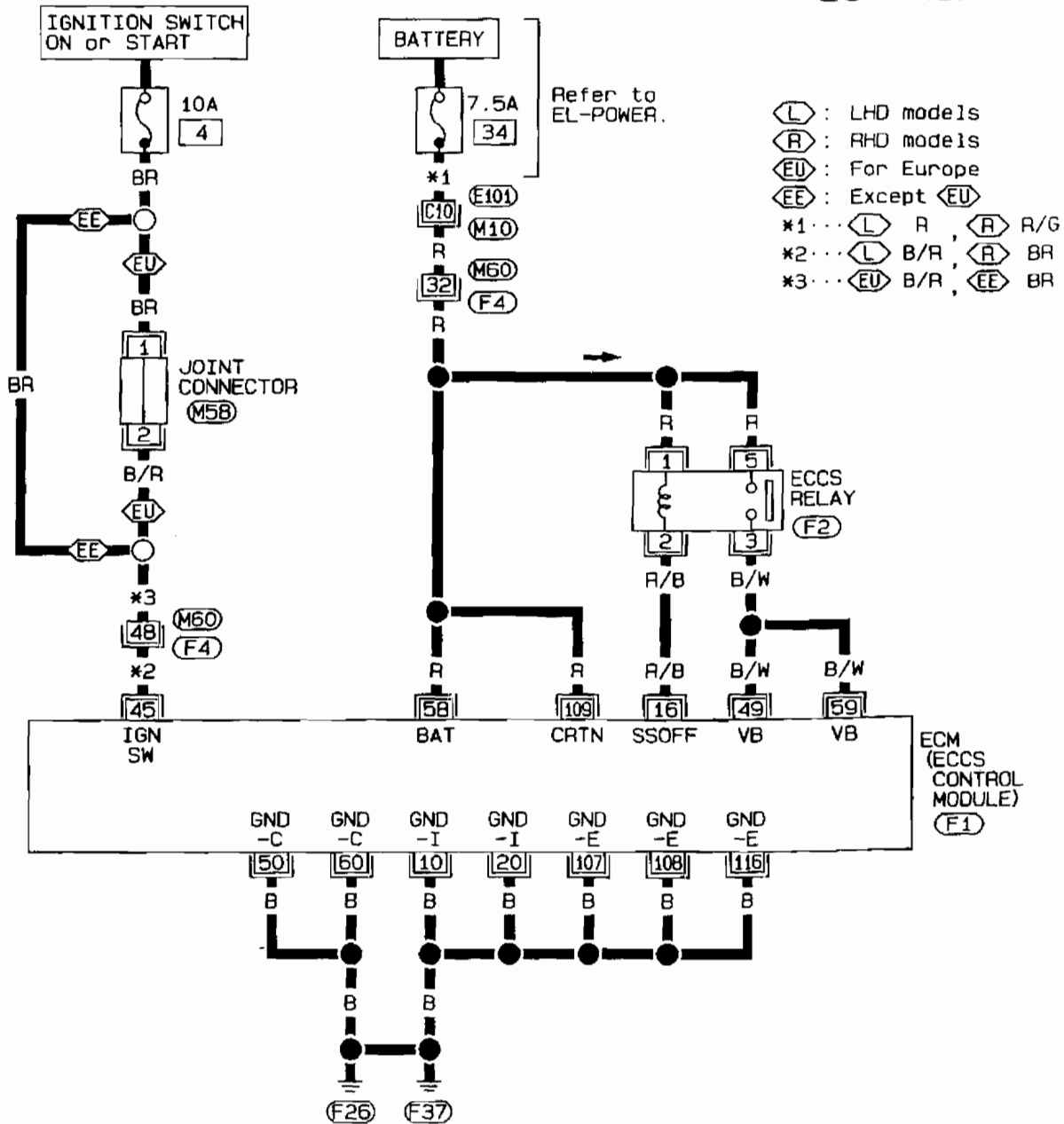
OK

(Go to (A) on next page.)

Diagnostic Procedure 22

MAIN POWER SUPPLY AND GROUND CIRCUIT (Not self-diagnostic item)

EC-MAIN-01



Refer to last page (Foldout page).

- (M10) (E101)
- (M60) (F4)

|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

(F1)  
L

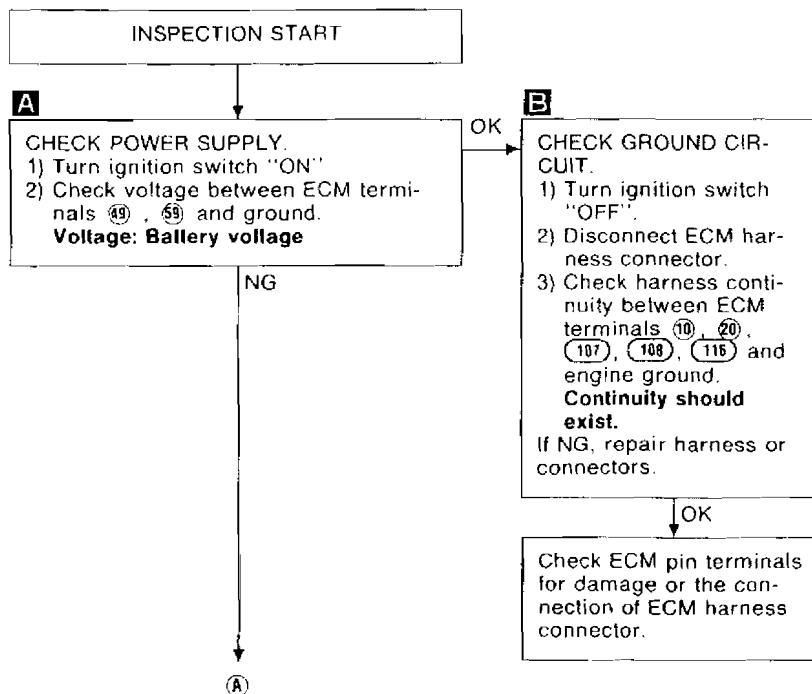
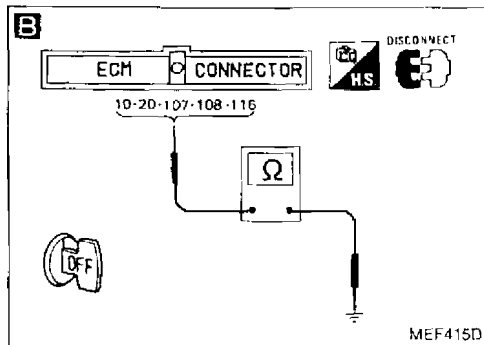
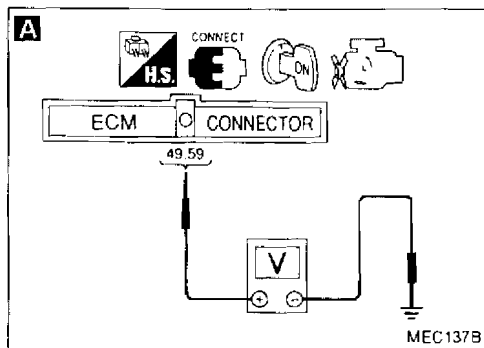
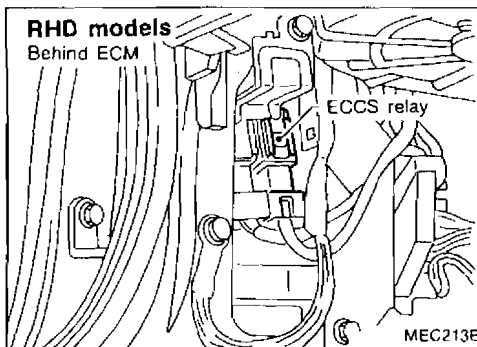
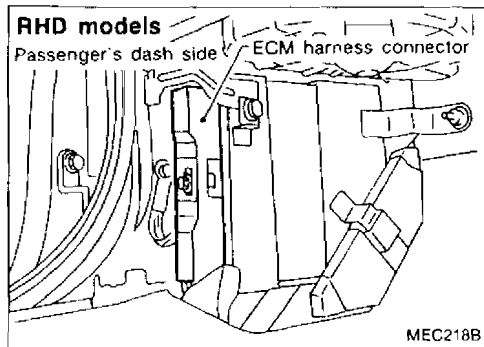
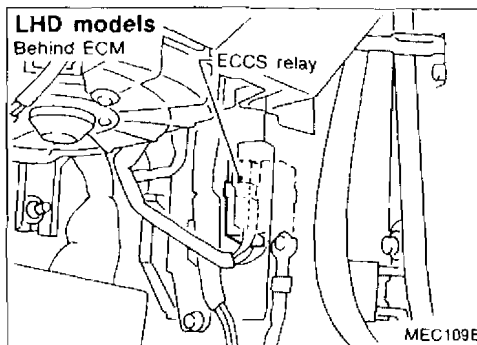
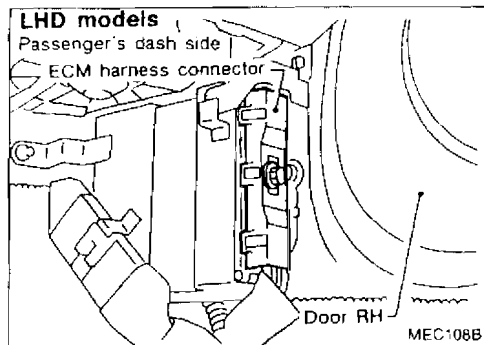


SEF824P

# TROUBLE DIAGNOSES

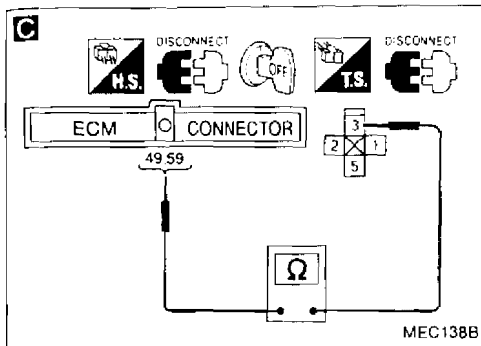
## Diagnostic Procedure 22 (Cont'd)

### Harness layout



# TROUBLE DIAGNOSES

## Diagnostic Procedure 22 (Cont'd)



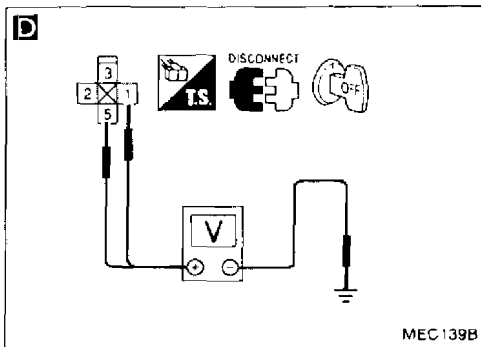
**C**

**CHECK HARNESS CONTINUITY BETWEEN ECCS RELAY AND ECM**

- 1) Turn ignition switch "OFF".
- 2) Disconnect ECM harness connector
- 3) Disconnect ECCS relay.
- 4) Check harness continuity between ECM terminals (49) , (59) and terminal (3)

**Continuity should exist.**

NG → Repair harness or connectors



**D**

**CHECK VOLTAGE BETWEEN ECCS RELAY AND GROUND.**

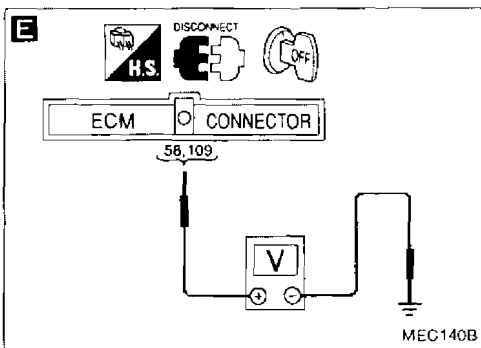
- 1) Check voltage between terminals (1) , (5) and ground.

**Voltage: Battery voltage**

NG → Check the following.

- 7.5A fuse
- Harness connectors (E101) , (M10)
- Harness connectors (M60) , (F4)
- Harness continuity between ECCS relay and battery

If NG, repair harness or connectors.



**E**

**CHECK VOLTAGE BETWEEN ECM AND GROUND**

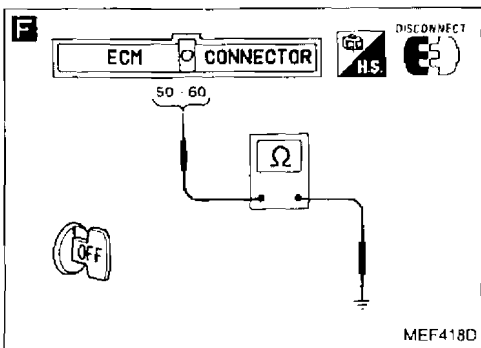
- 1) Check voltage between ECM terminals (58) , (109) and ground.

**Voltage: Battery voltage**

NG → Check the following.

- Harness continuity between ECM and harness connector (F4)

If NG, repair harness or connectors.



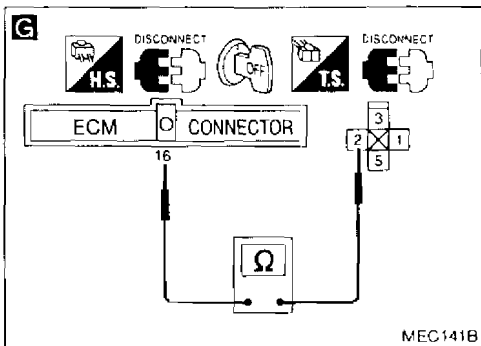
**F**

**CHECK GROUND CIRCUIT.**

- 1) Check harness continuity between ECM terminals (50) , (60) and engine ground.

**Continuity should exist.**

NG → Repair harness or connectors.



**G**

**CHECK OUTPUT SIGNAL CIRCUIT.**

- 1) Check harness continuity between ECM terminal (16) and terminal (2).

**Continuity should exist.**

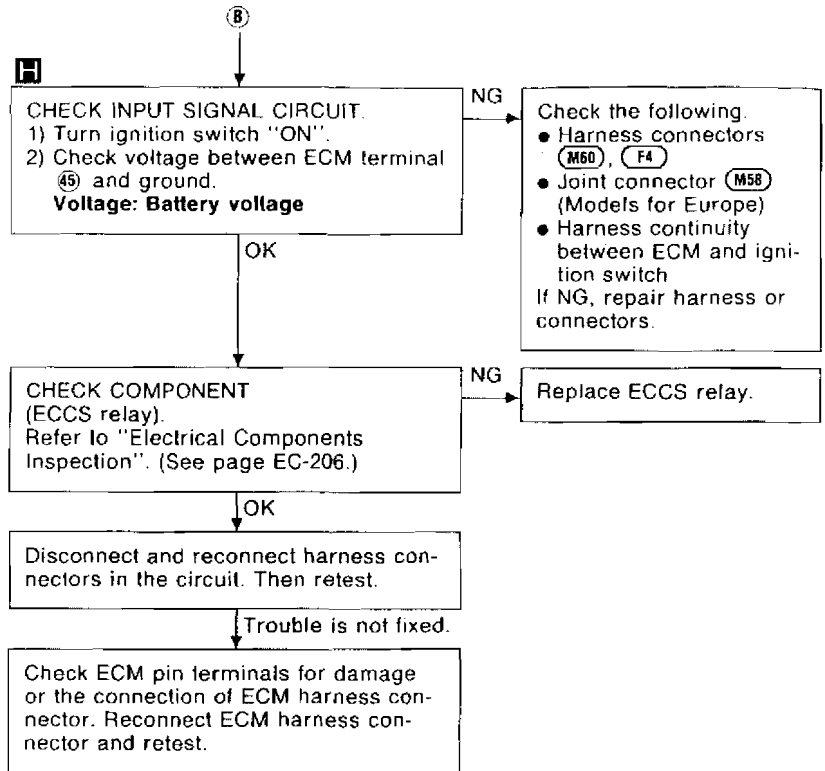
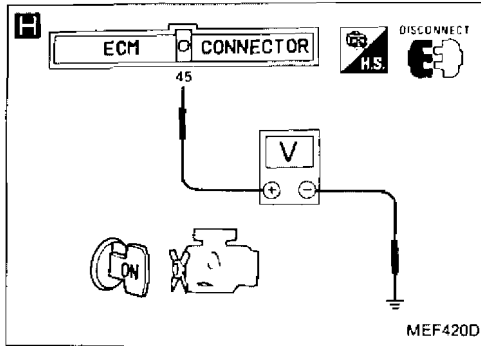
NG → Repair harness or connectors.

OK → (B)



# TROUBLE DIAGNOSES

## Diagnostic Procedure 22 (Cont'd)

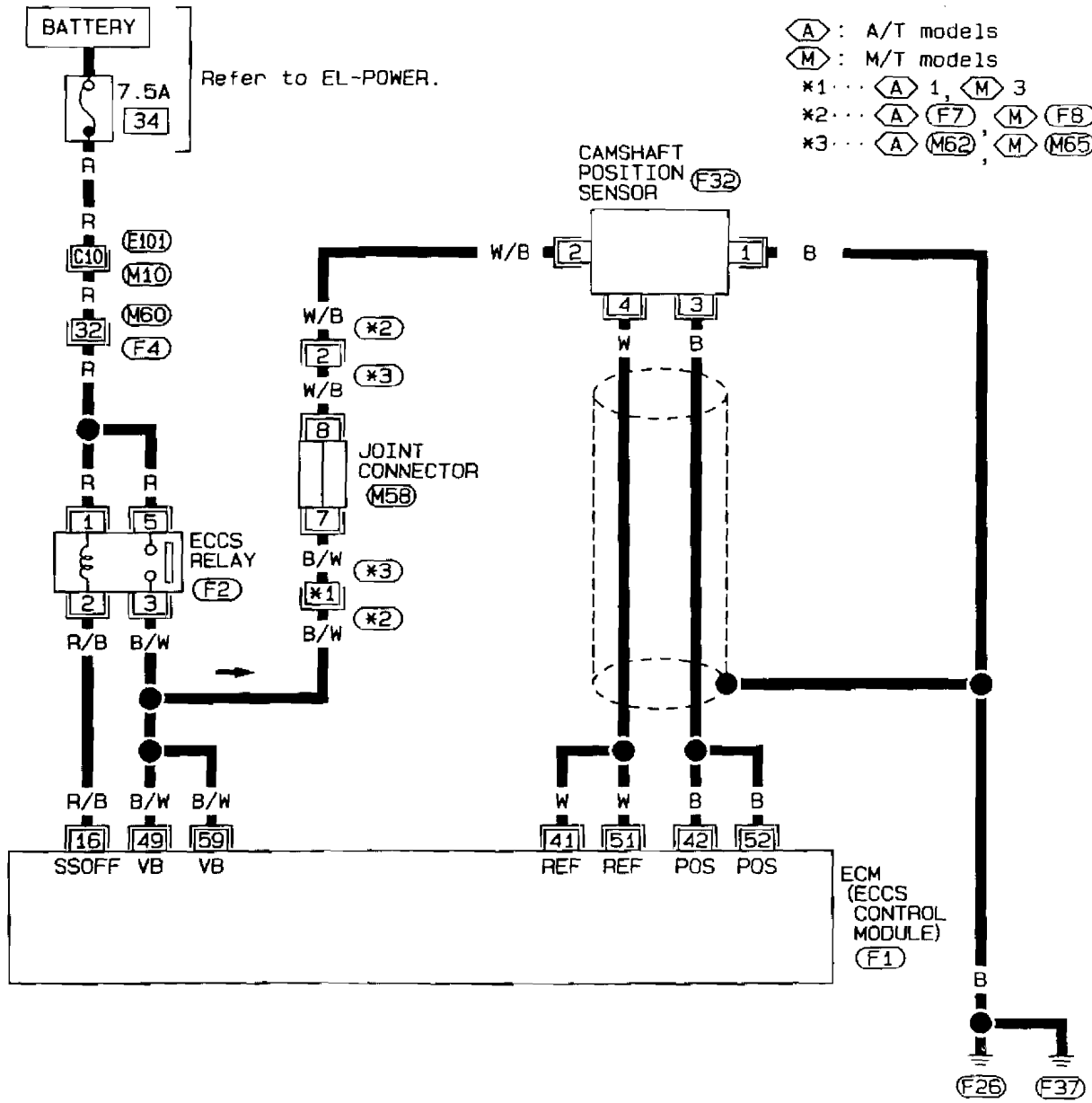


Diagnostic Procedure 23

CAMSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)

LHD MODELS

EC-CMPS-01



- Ⓐ : A/T models
- Ⓜ : M/T models
- \*1... Ⓐ 1, Ⓜ 3
- \*2... Ⓐ F7, Ⓜ F8
- \*3... Ⓐ M62, Ⓜ M65

EC

RE

CI

MT

ST

PO

EA

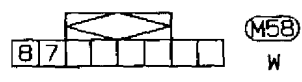
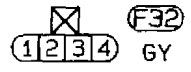
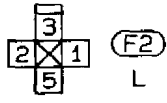
KA

SA

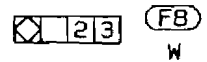
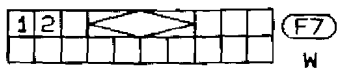
ST

RS

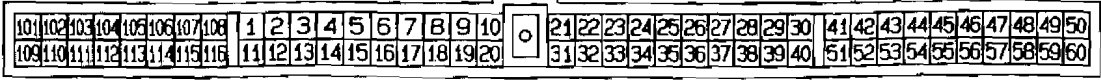
WT



Refer to last page (Foldout page).



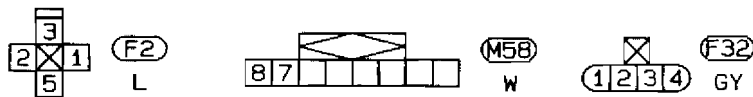
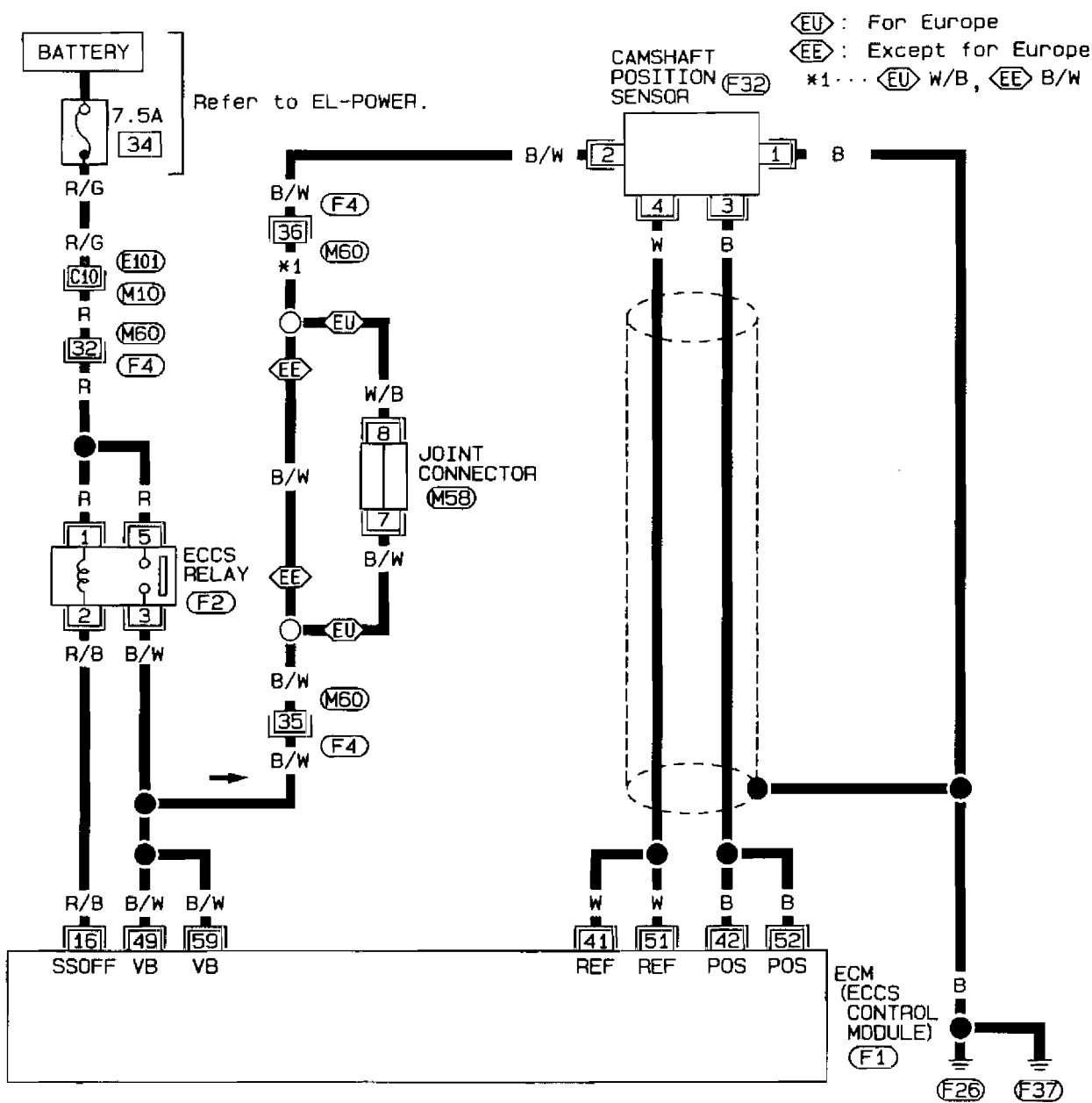
- M10 E101
- M60 F4



SEF825P

RHD MODELS

EC-CMPS-02



Refer to last page (Foldout page).

- (M10) (E101)
- (M60) (F4)

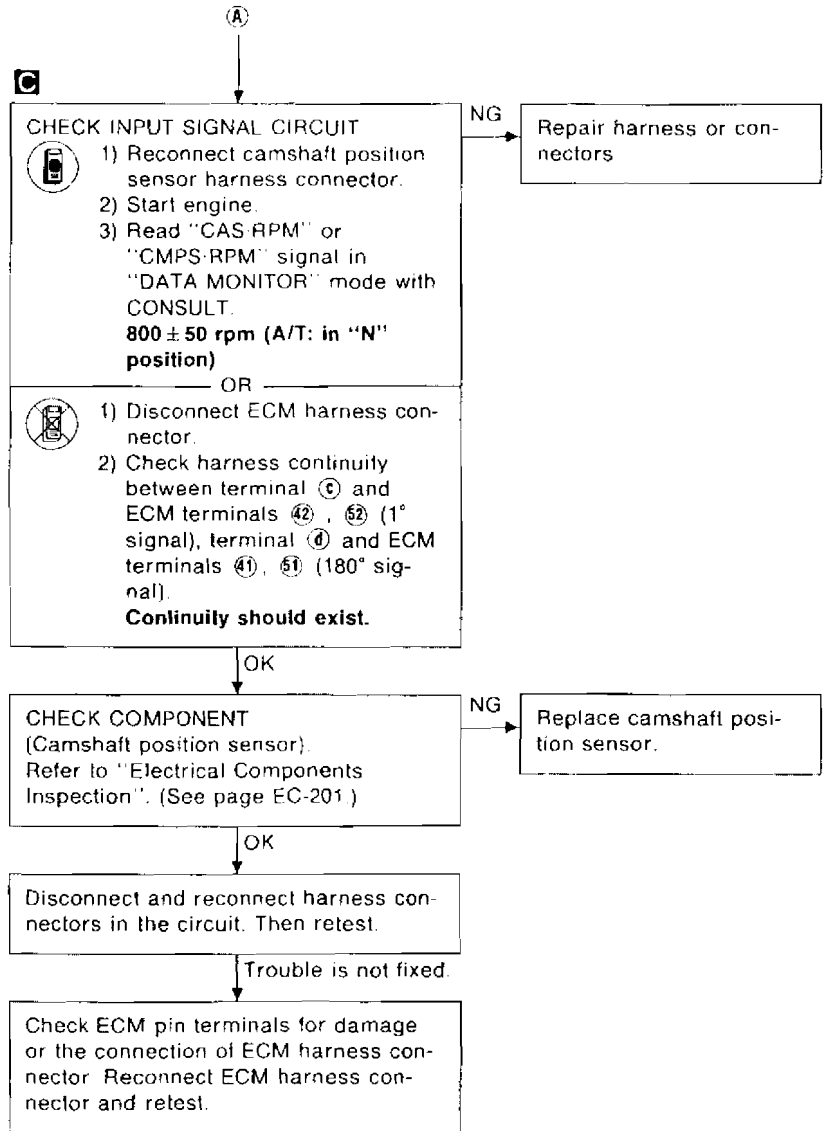
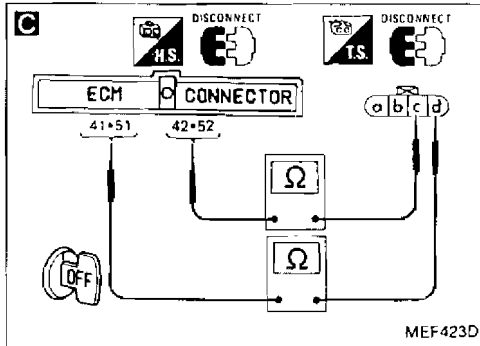
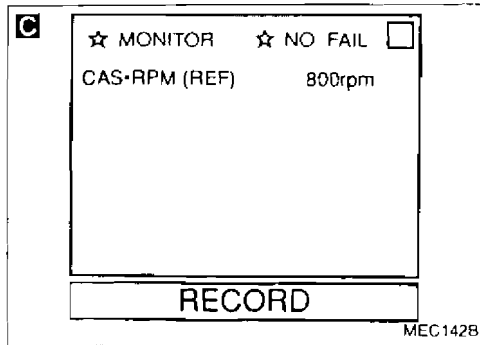
|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

(F1)  
L

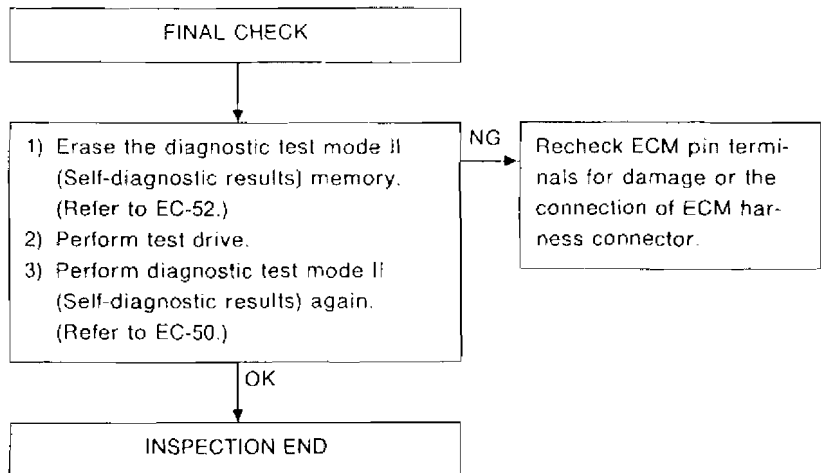




## Diagnostic Procedure 23 (Cont'd)



**Perform FINAL CHECK by the following procedure after repair is completed.**

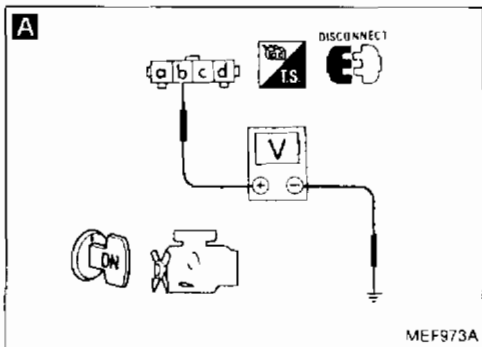
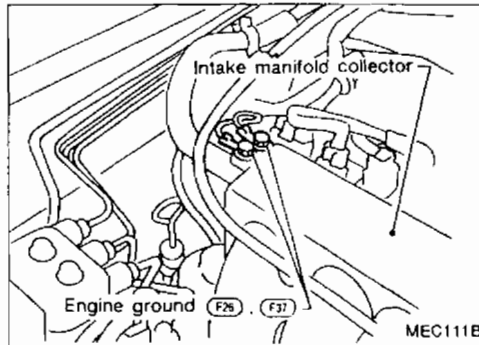
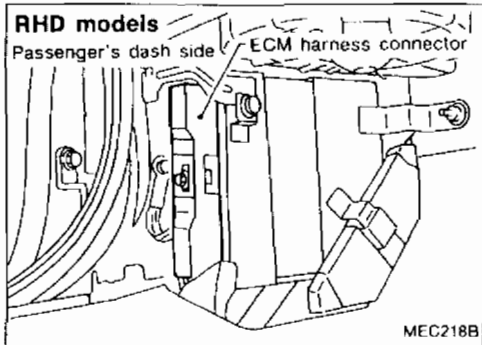
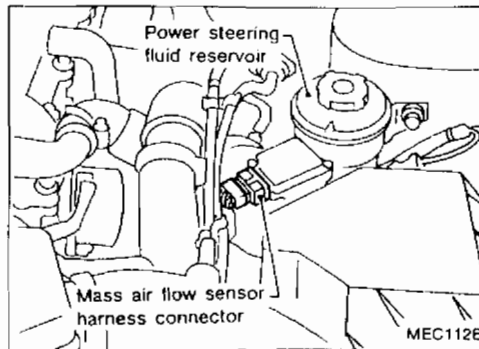
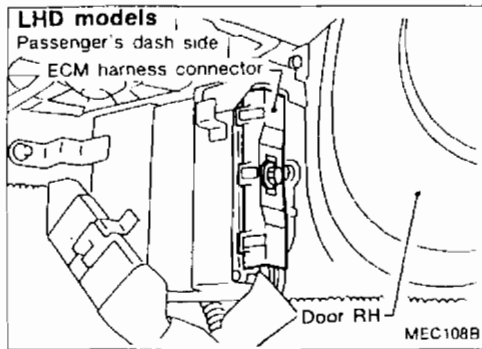




# TROUBLE DIAGNOSES

## Diagnostic Procedure 24 (Cont'd)

### Harness layout



INSPECTION START

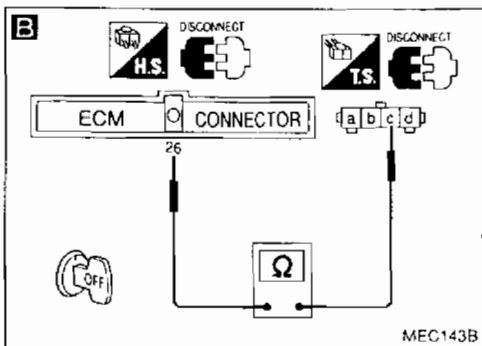
- A**
- CHECK POWER SUPPLY.**
- 1) Disconnect mass air flow sensor harness connector.
  - 2) Turn ignition switch "ON".
  - 3) Check voltage between terminal (b) and ground.
- Voltage: Battery voltage**

NG

Check the following.

- Harness continuity between mass air flow sensor and ECCS relay

If NG, repair harness or connectors.



- B**
- CHECK GROUND CIRCUIT.**
- 1) Turn ignition switch "OFF"
  - 2) Disconnect ECM harness connector.
  - 3) Loosen and retighten ground screws.
  - 4) Check harness continuity between terminal (c) and ECM terminal 26.
- Continuity should exist.**

NG

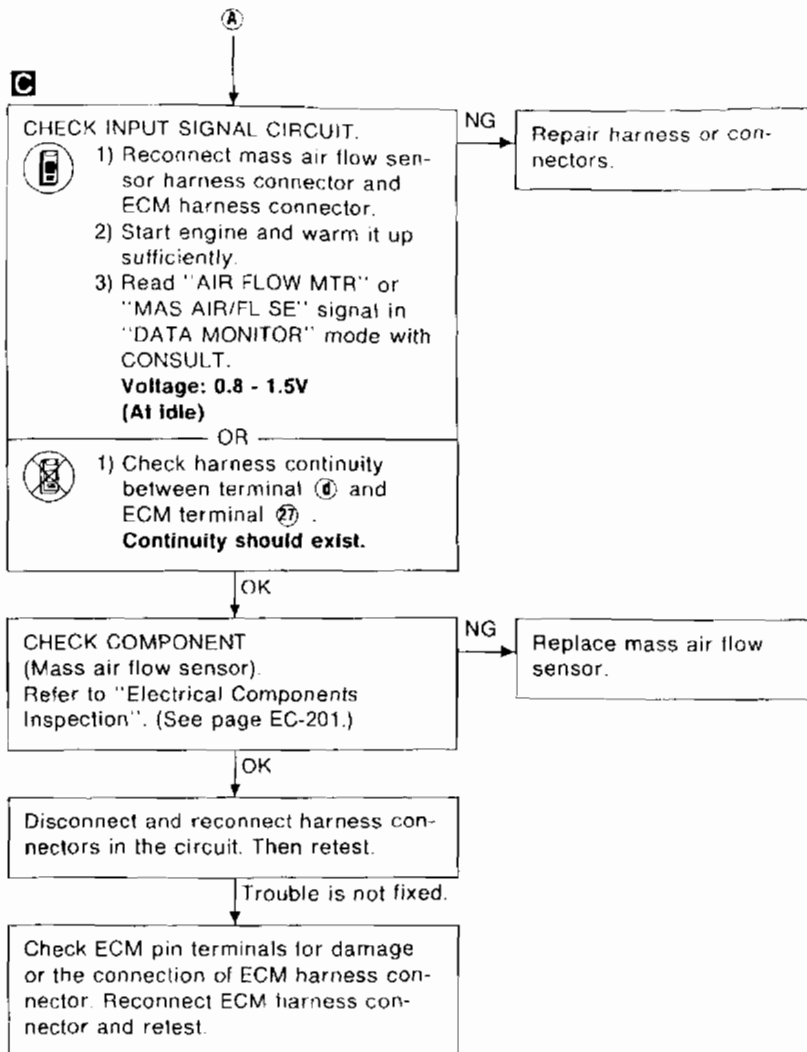
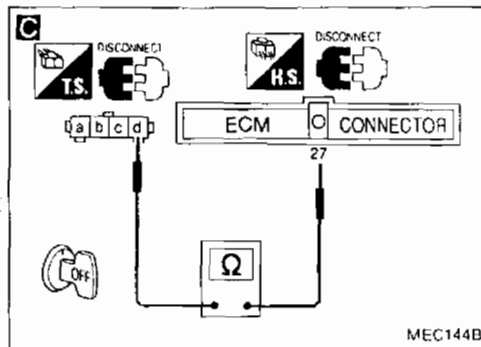
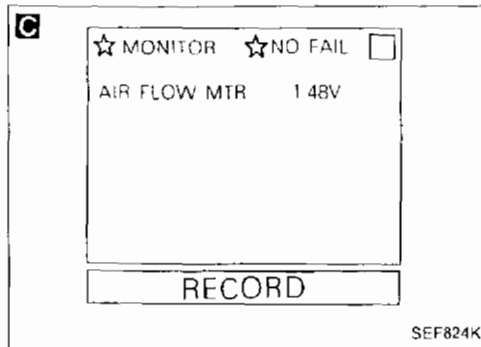
Repair harness or connectors.

OK

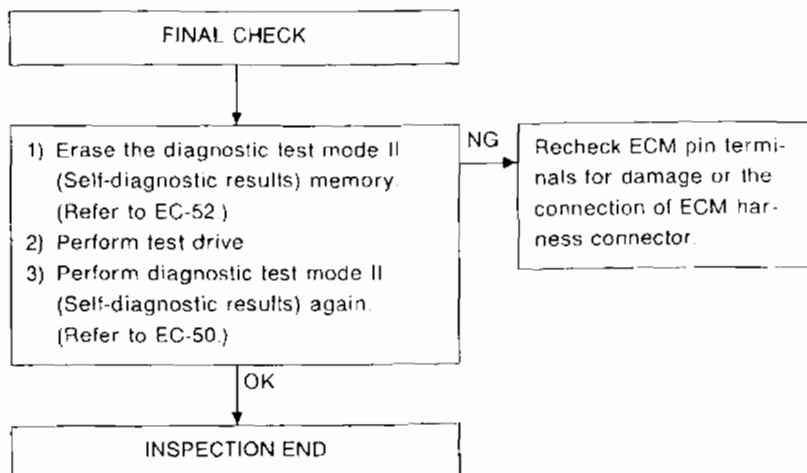
**A**

# TROUBLE DIAGNOSES

## Diagnostic Procedure 24 (Cont'd)



**Perform FINAL CHECK by the following procedure after repair is completed.**



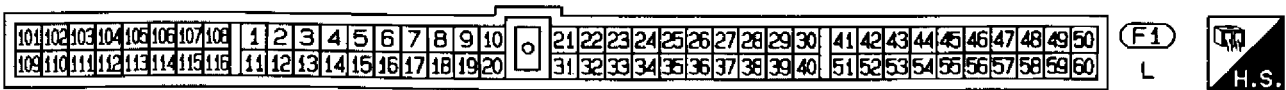
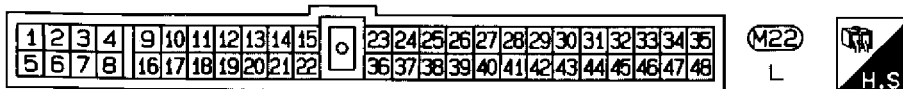
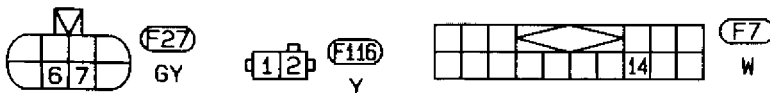
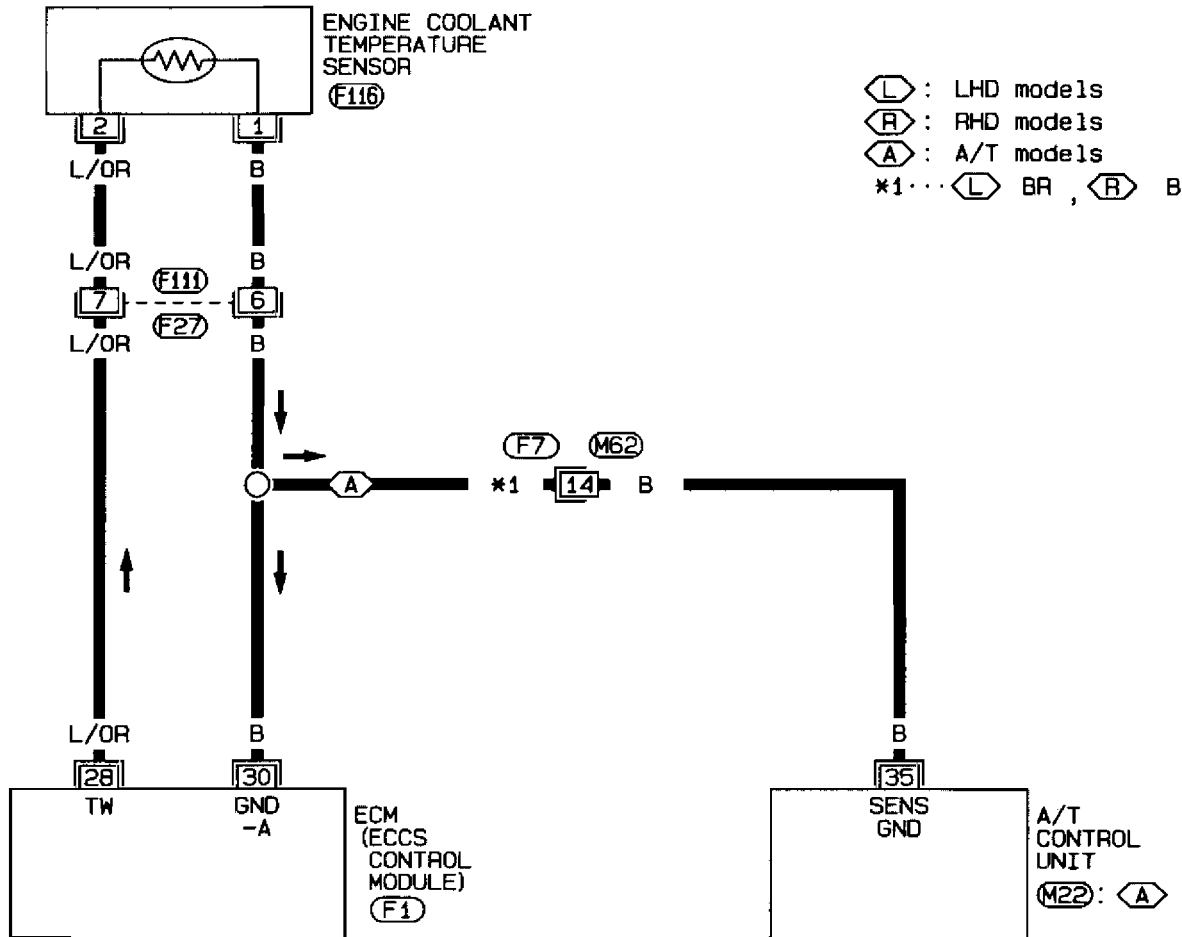


# TROUBLE DIAGNOSES

## Diagnostic Procedure 25

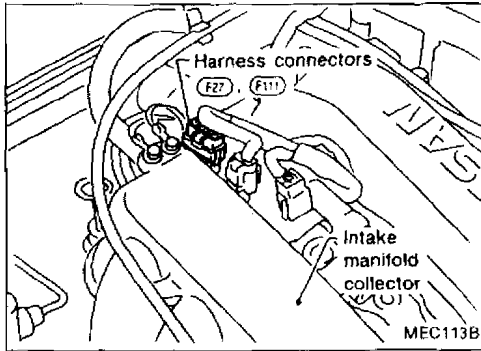
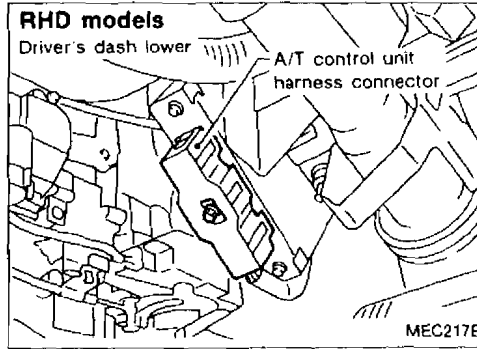
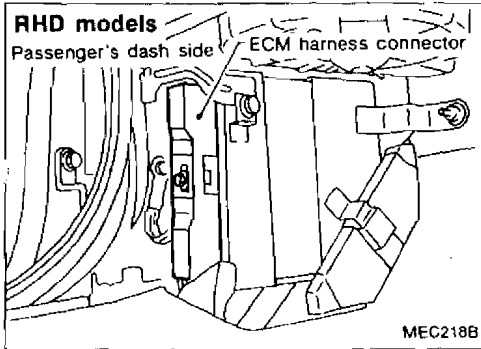
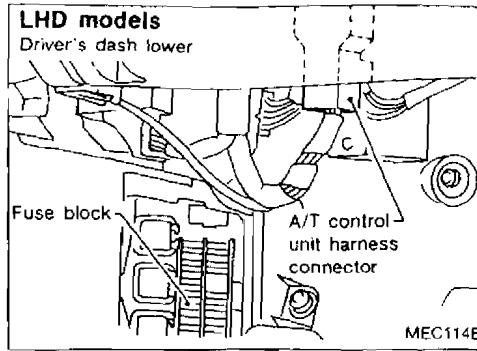
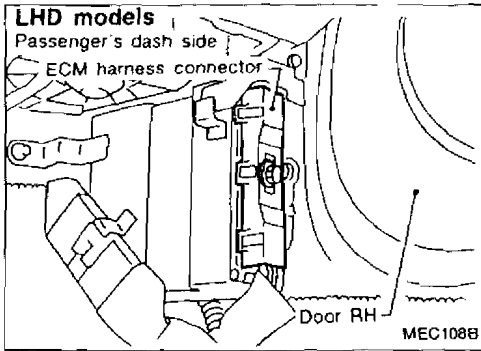
### ENGINE COOLANT TEMPERATURE SENSOR (Diagnostic trouble code No. 13)

EC-ECTS-01



SEF827P

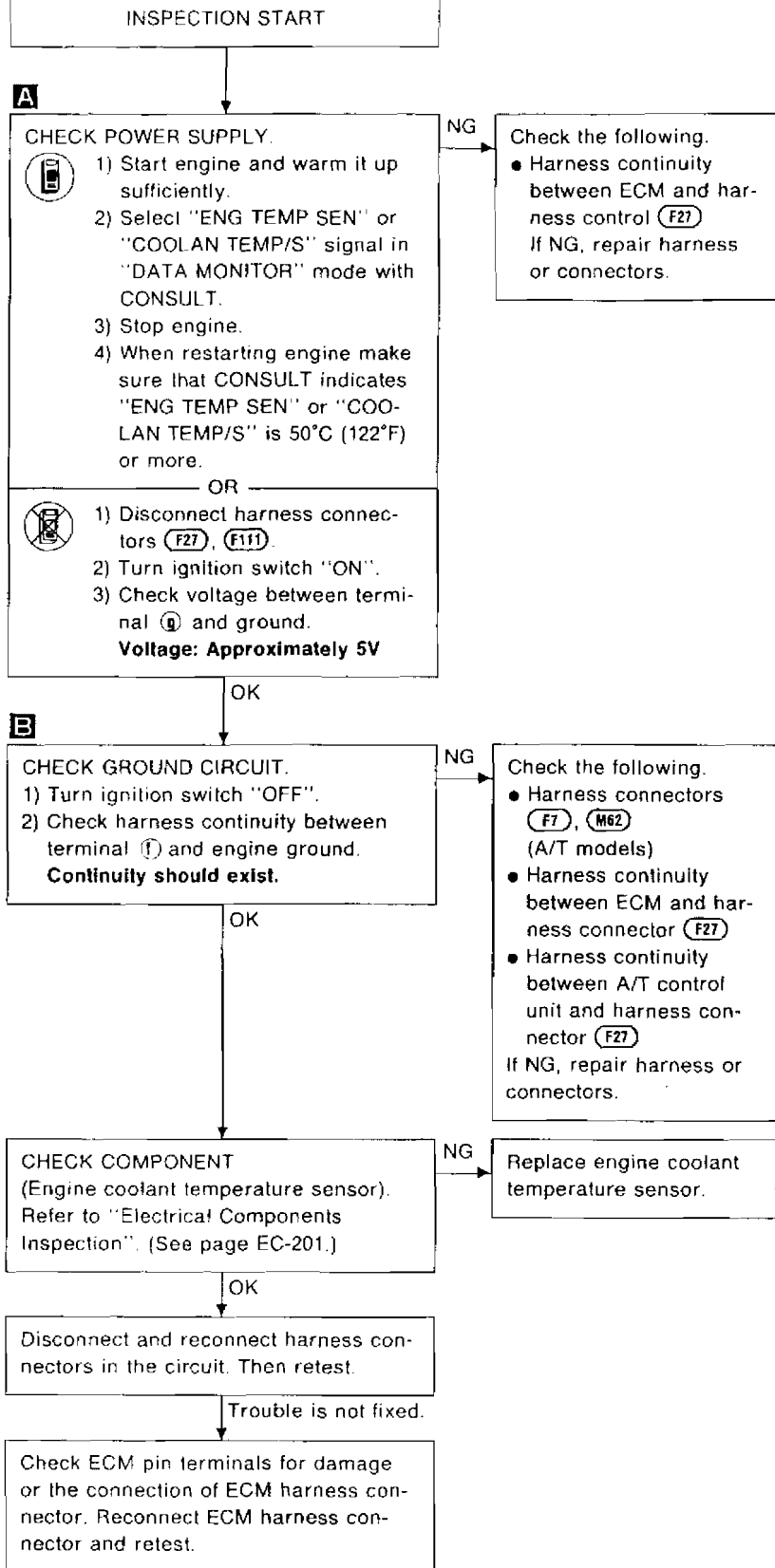
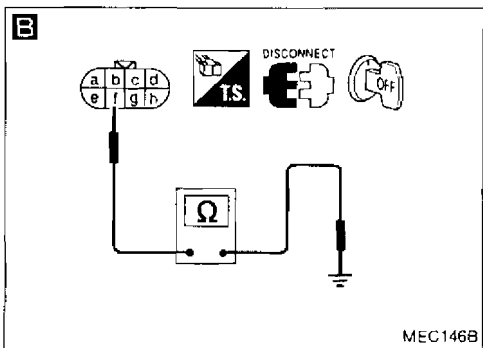
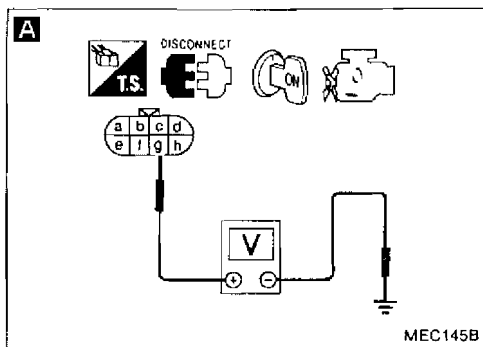
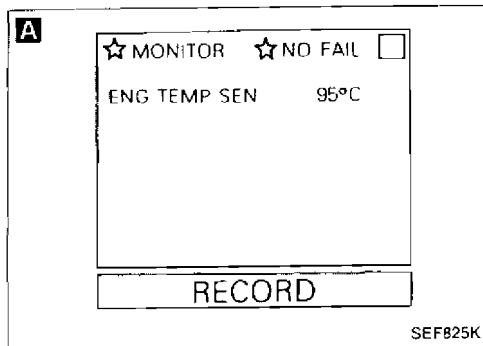
Harness layout



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# TROUBLE DIAGNOSES

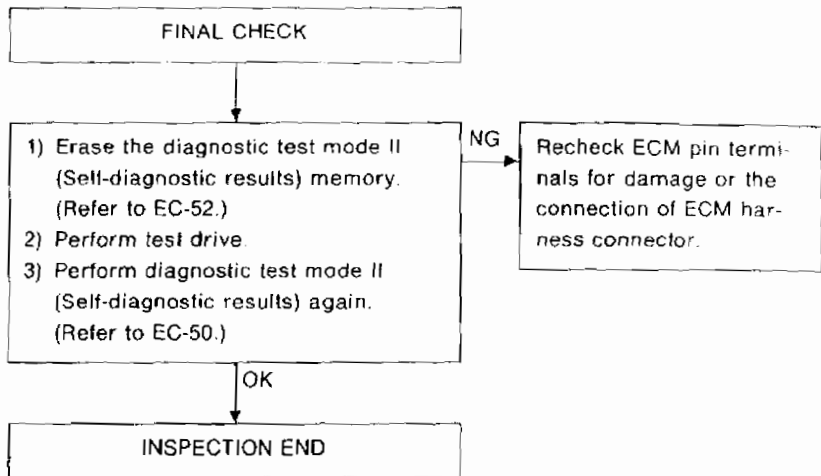
## Diagnostic Procedure 25 (Cont'd)



# TROUBLE DIAGNOSES

## Diagnostic Procedure 25 (Cont'd)

Perform **FINAL CHECK** by the following procedure after repair is completed.



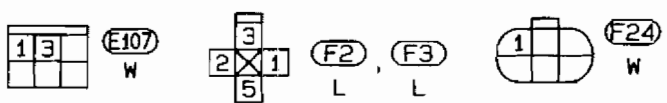
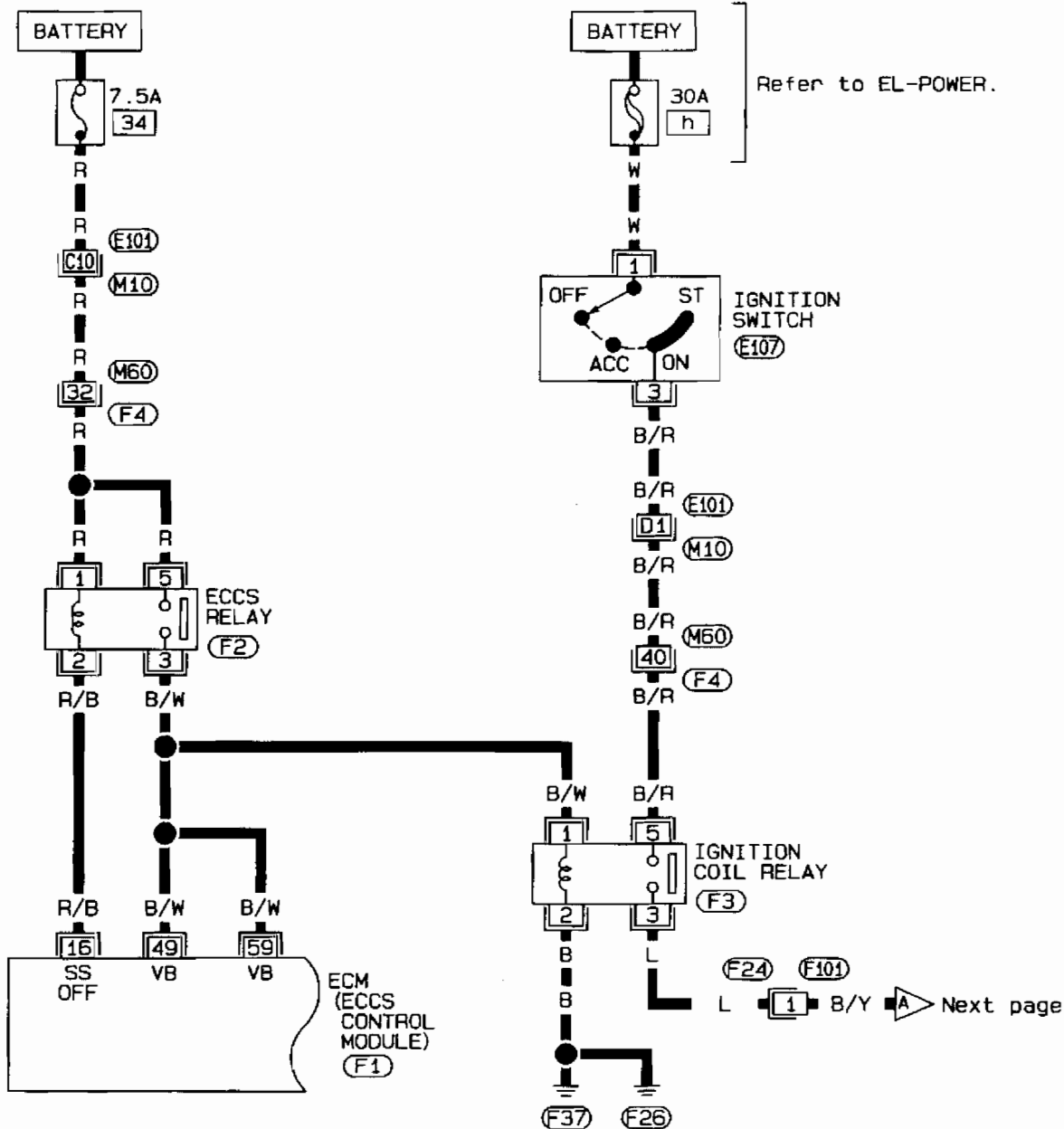
DI  
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EI  
TEX

Diagnostic Procedure 26

IGNITION SIGNAL (Diagnostic trouble code No. 21)

LHD MODELS

EC-IGN/SG-01



Refer to last page (Foldout page).

- M10, E101
- M60, F4

|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

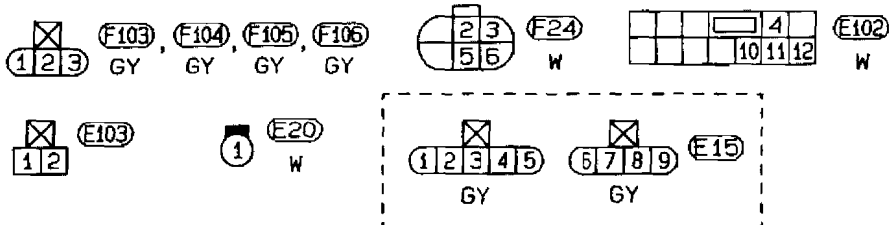
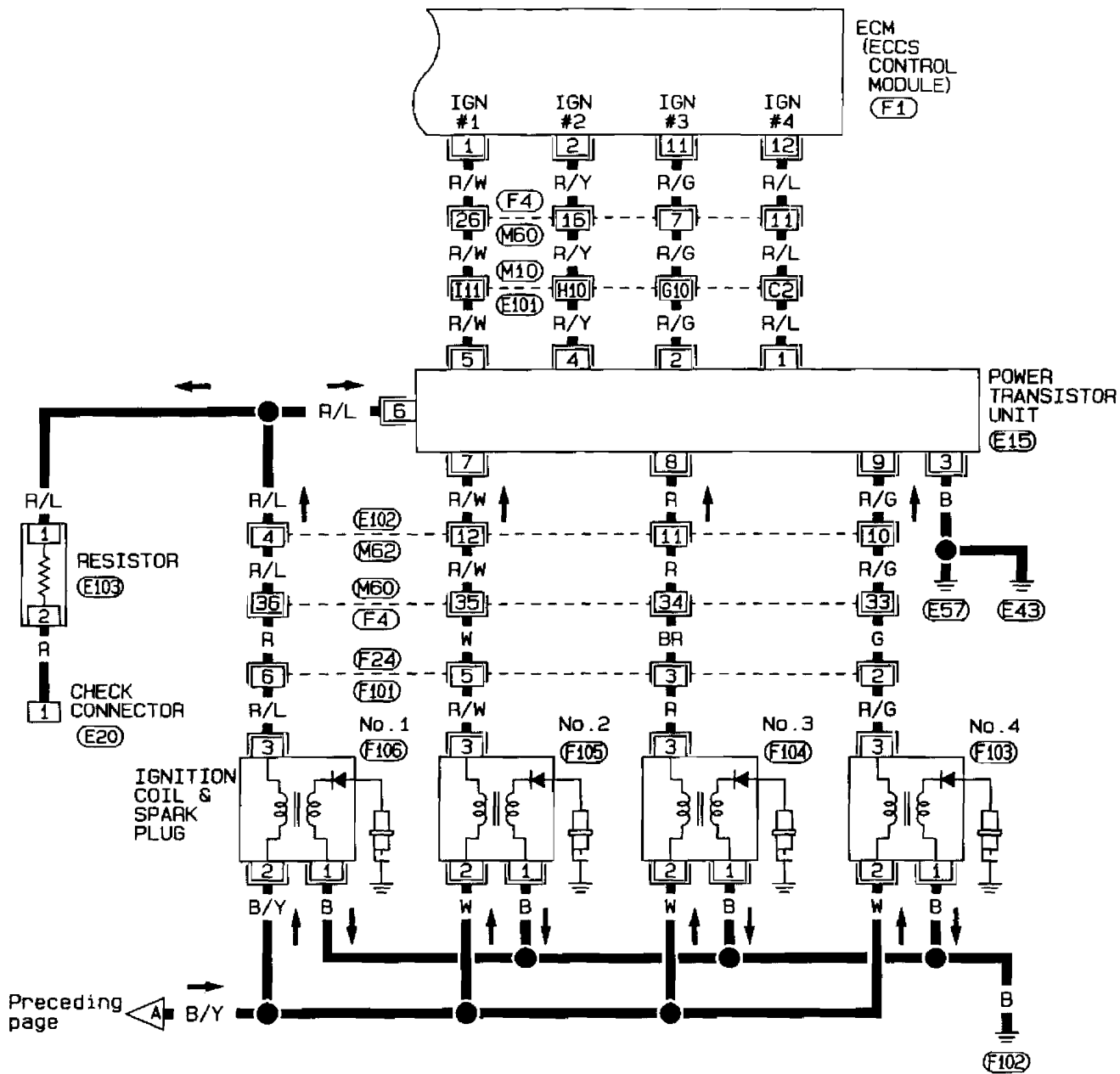
F1  
L



# TROUBLE DIAGNOSES

## Diagnostic Procedure 26 (Cont'd)

EC-IGN/SG-02



Refer to last page (Foldout page).

(M10), (E101)  
(M60), (F4)

|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

(F1)  
L



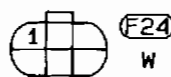
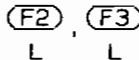
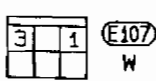
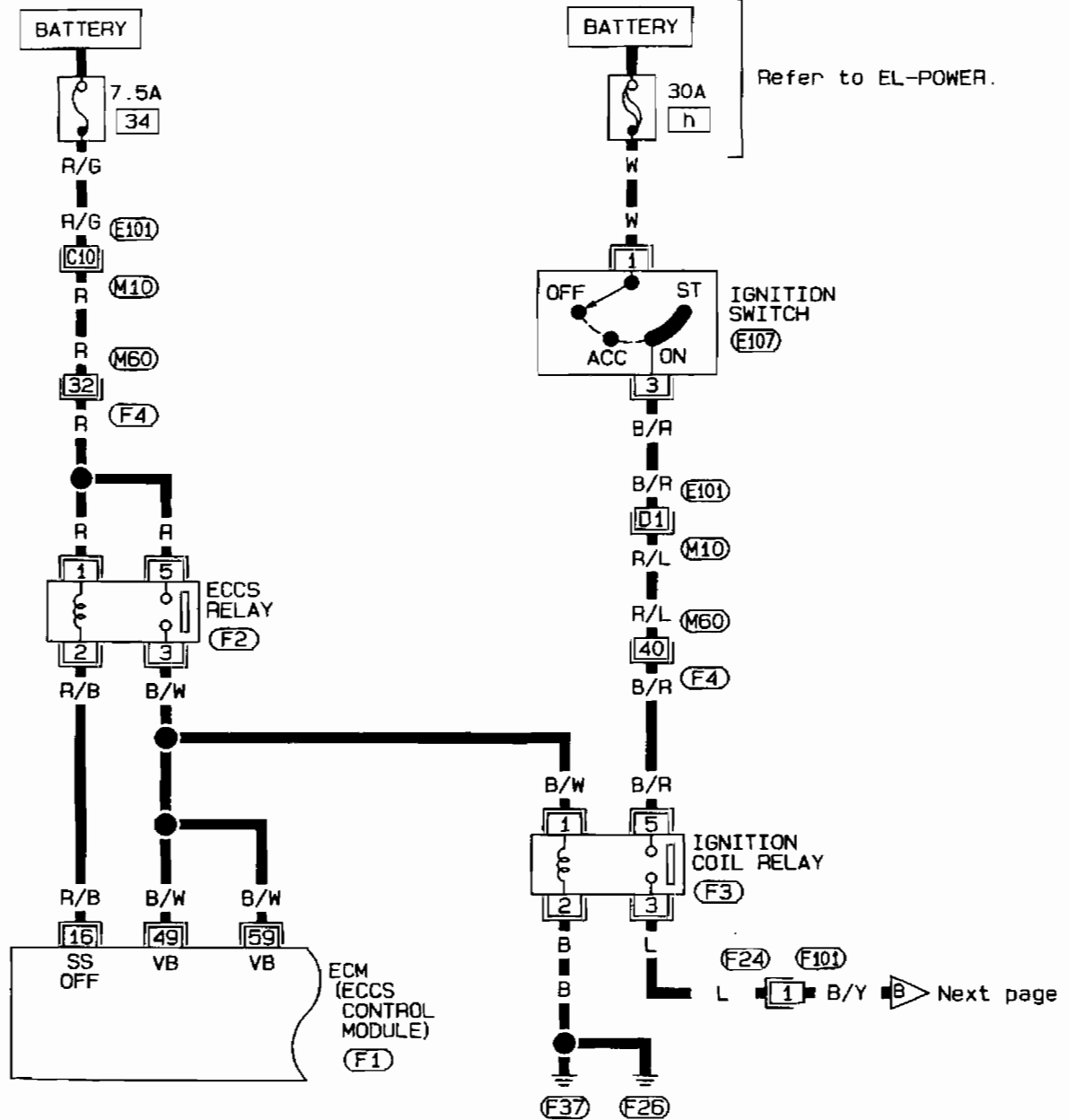
SEF829P

# TROUBLE DIAGNOSES

## Diagnostic Procedure 26 (Cont'd)

RHD MODELS

EC-IGN/SG-03



Refer to last page (Foldout page).

- (M10) (E101)
- (M60) (F4)

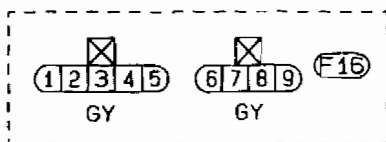
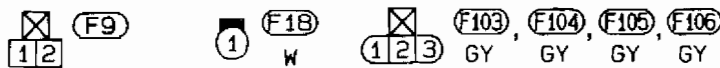
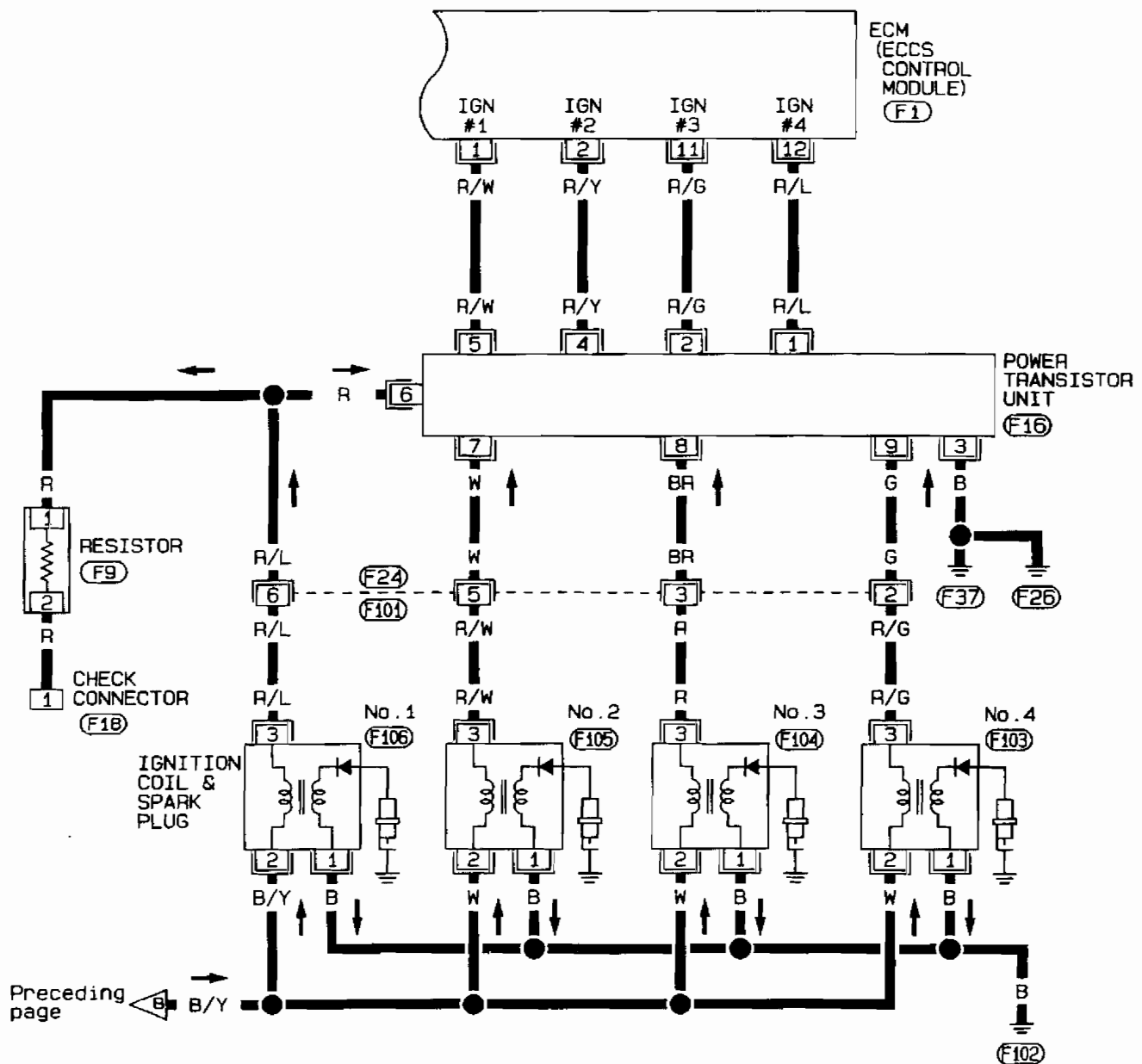
|     |     |     |     |     |     |     |     |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
|-----|-----|-----|-----|-----|-----|-----|-----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|



# TROUBLE DIAGNOSES

## Diagnostic Procedure 26 (Cont'd)

EC-IGN/SG-04



|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 0 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |   | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

(F1)  
L



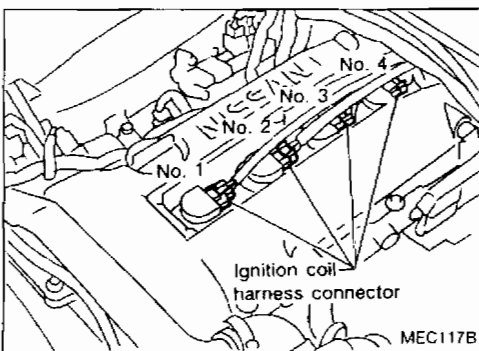
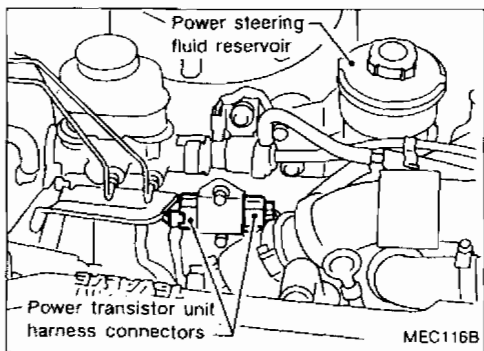
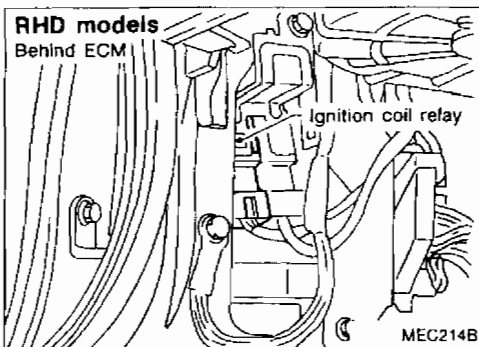
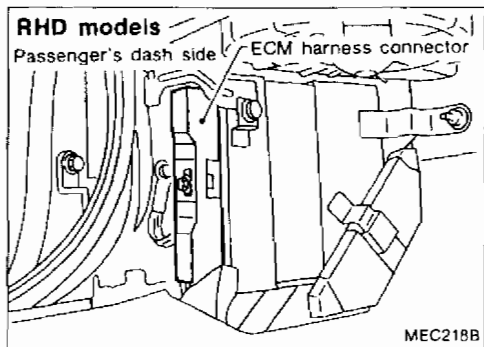
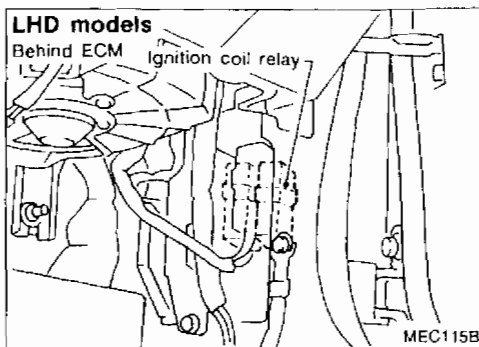
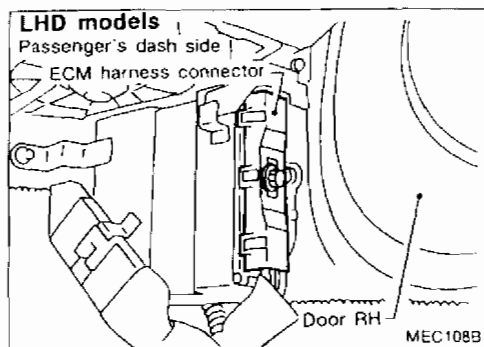
SEF831P



# TROUBLE DIAGNOSES

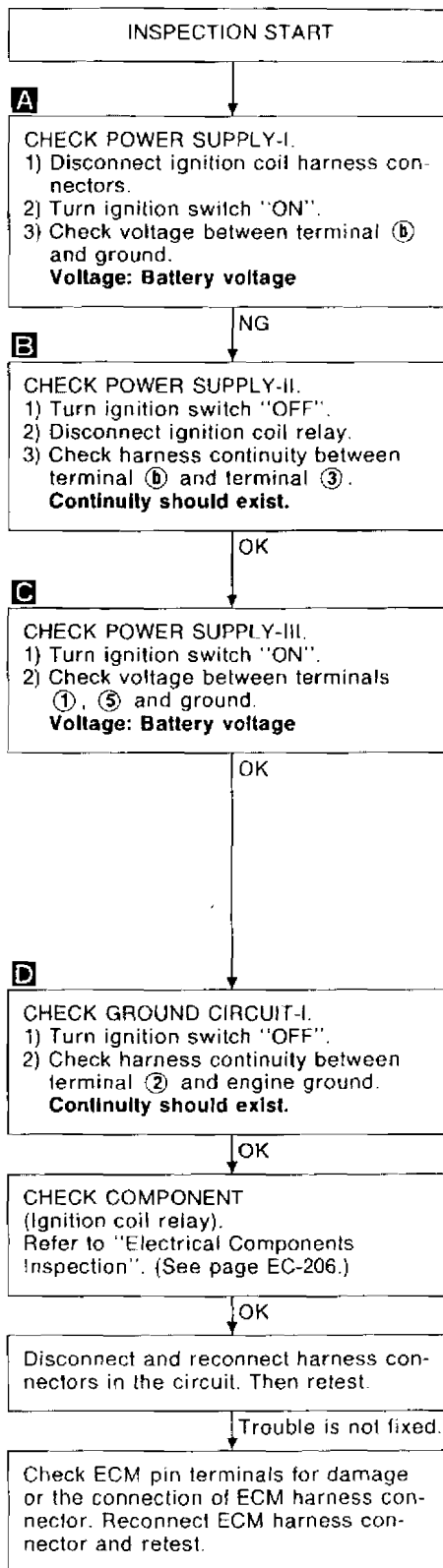
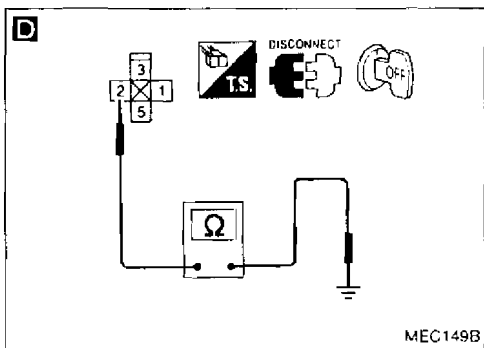
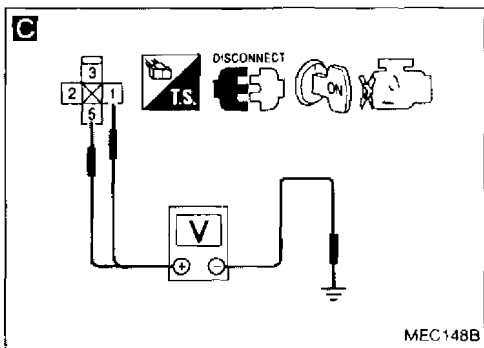
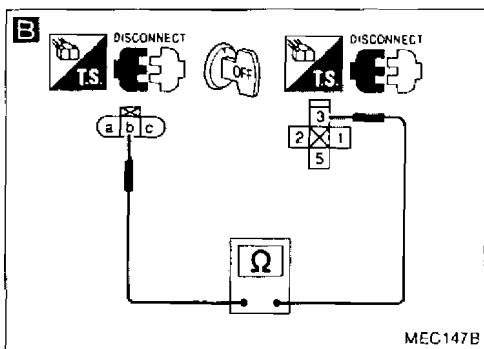
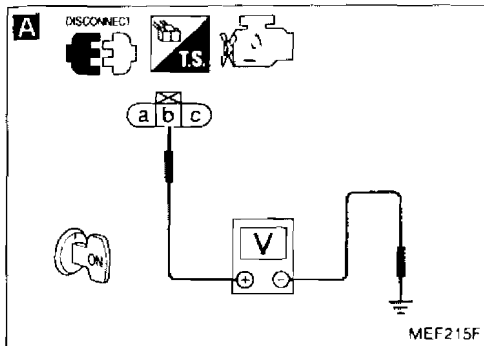
## Diagnostic Procedure 26 (Cont'd)

### Harness layout



# TROUBLE DIAGNOSES

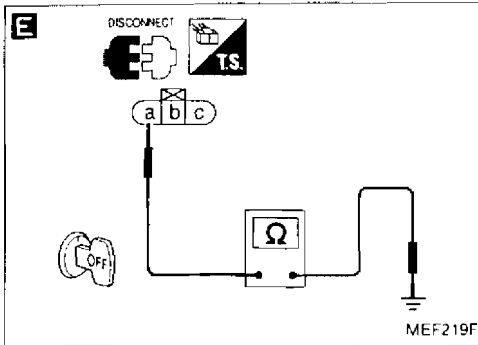
## Diagnostic Procedure 26 (Cont'd)



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# TROUBLE DIAGNOSES

## Diagnostic Procedure 26 (Cont'd)



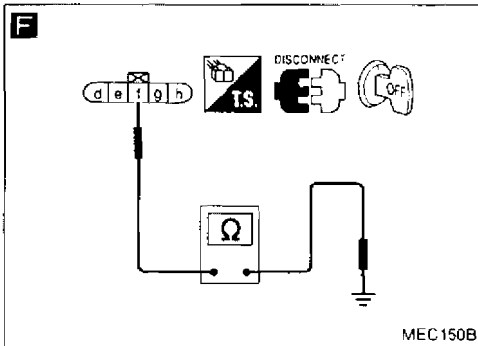
### CHECK GROUND CIRCUIT-II.

- 1) Turn ignition switch "OFF"
- E** 2) Check harness continuity between terminal **a** and engine ground.  
**Continuity should exist.**
- 3) Disconnect power transistor unit harness connector.
- F** 4) Check harness continuity between terminal **f** and engine ground.  
**Continuity should exist.**

NG

Repair harness or connectors

OK



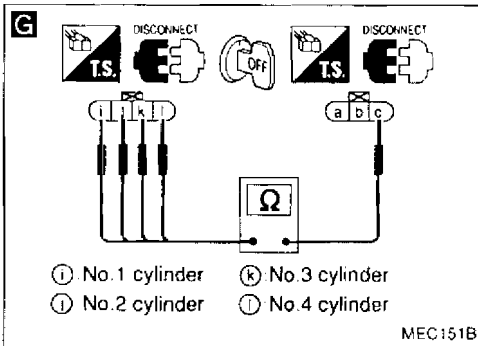
### CHECK OUTPUT SIGNAL CIRCUIT.

- G** 1) Check harness continuity between terminals **i**, **l**, **k**, **l** and terminal **e**.  
**Continuity should exist.**
- 2) Disconnect ECM harness connector.
- H** 3) Check harness continuity between following terminals.  
**Continuity should exist.**

NG

- Check the following.
- Harness connectors **F24**, **F101**
  - Harness connectors **M60**, **F4** (LHD models)
  - Harness connectors **E102**, **M62** (LHD models)
  - Harness connectors **M10**, **E101** (LHD models)
  - Harness continuity between ignition coil and power transistor unit
  - Harness continuity between ECM and power transistor unit
- If NG, repair harness or connectors.

OK



### CHECK COMPONENTS

(Ignition coil and power transistor unit). Refer to "Electrical Components Inspection". (See pages EC-202.)

NG

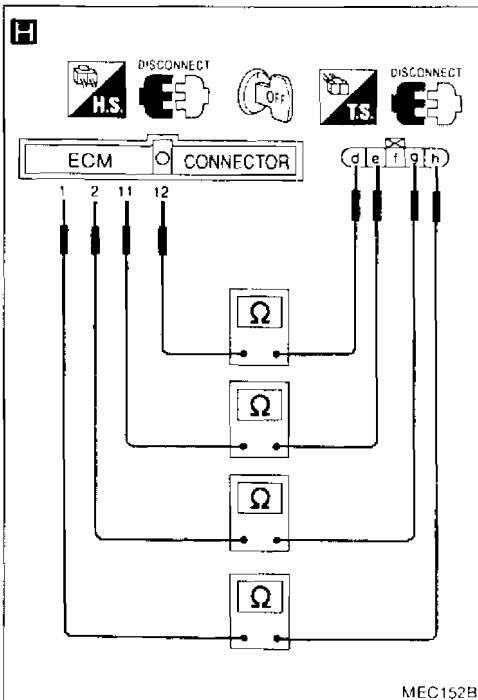
Replace malfunctioning component(s).

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

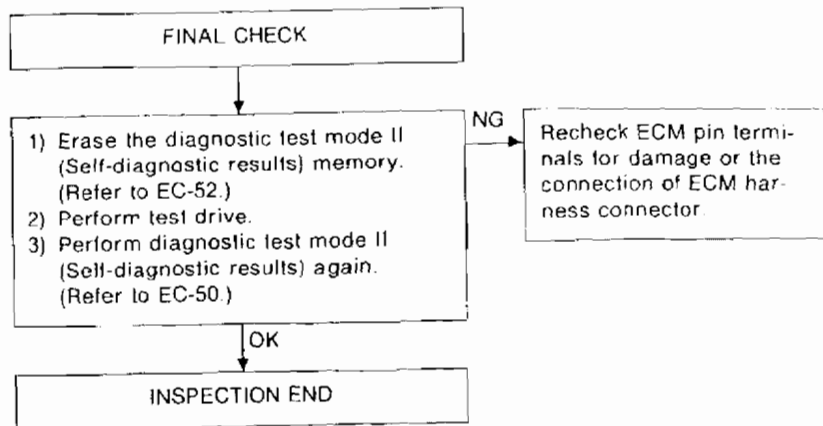
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.



# TROUBLE DIAGNOSES

## Diagnostic Procedure 26 (Cont'd)

Perform FINAL CHECK by the following procedure after repair is completed.

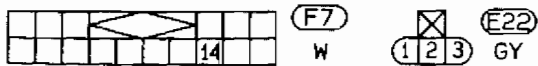
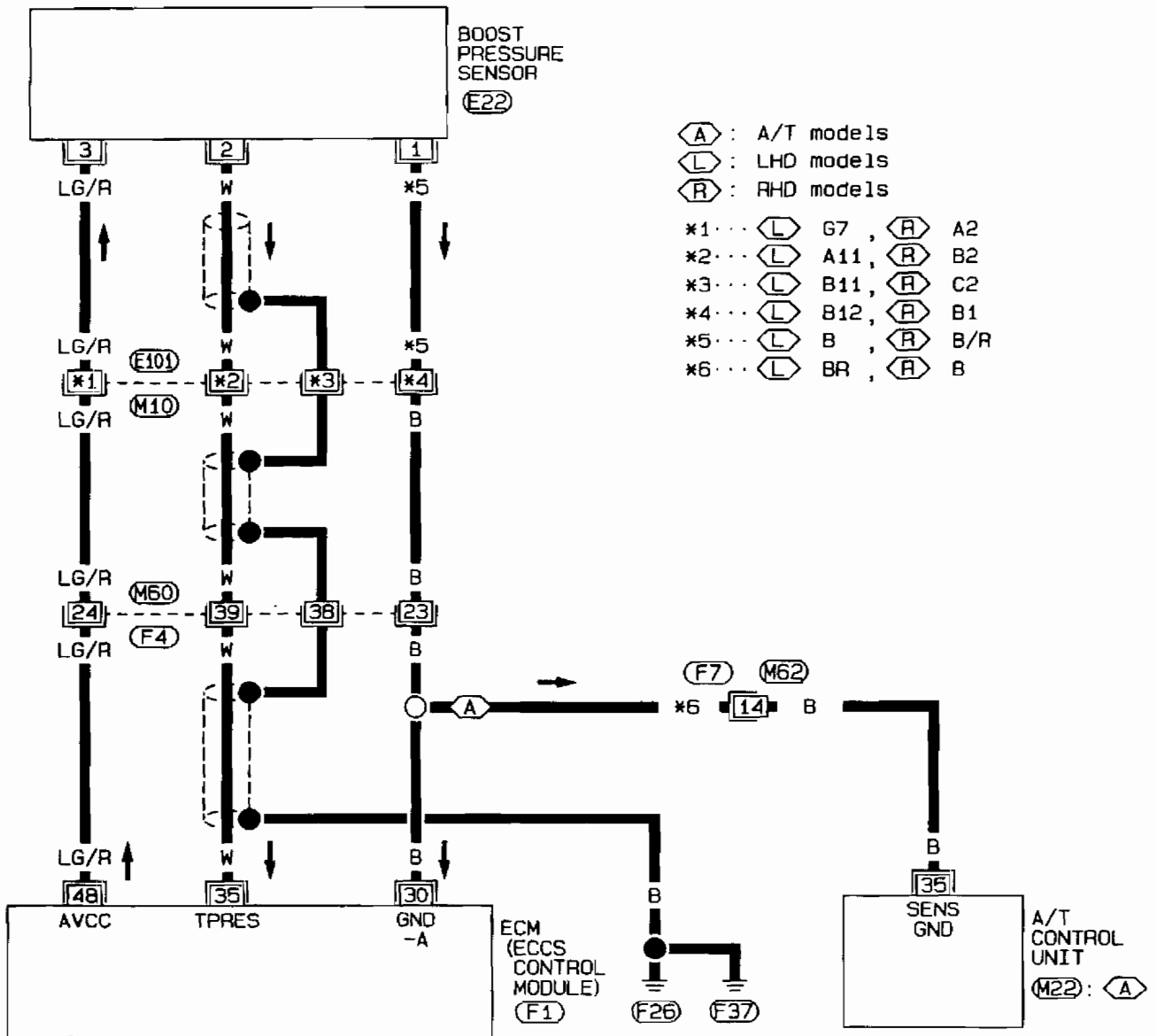


EC

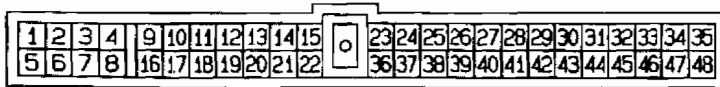
## Diagnostic Procedure 27

**BOOST PRESSURE SENSOR (Diagnostic trouble code No. 26)**

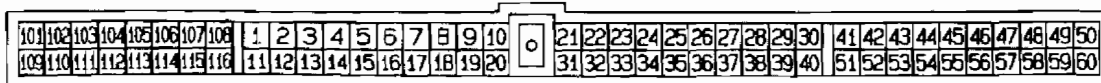
EC-BOOST-01



Refer to last page (Foldout page).



(M10), (E101)  
 (M50), (F4)

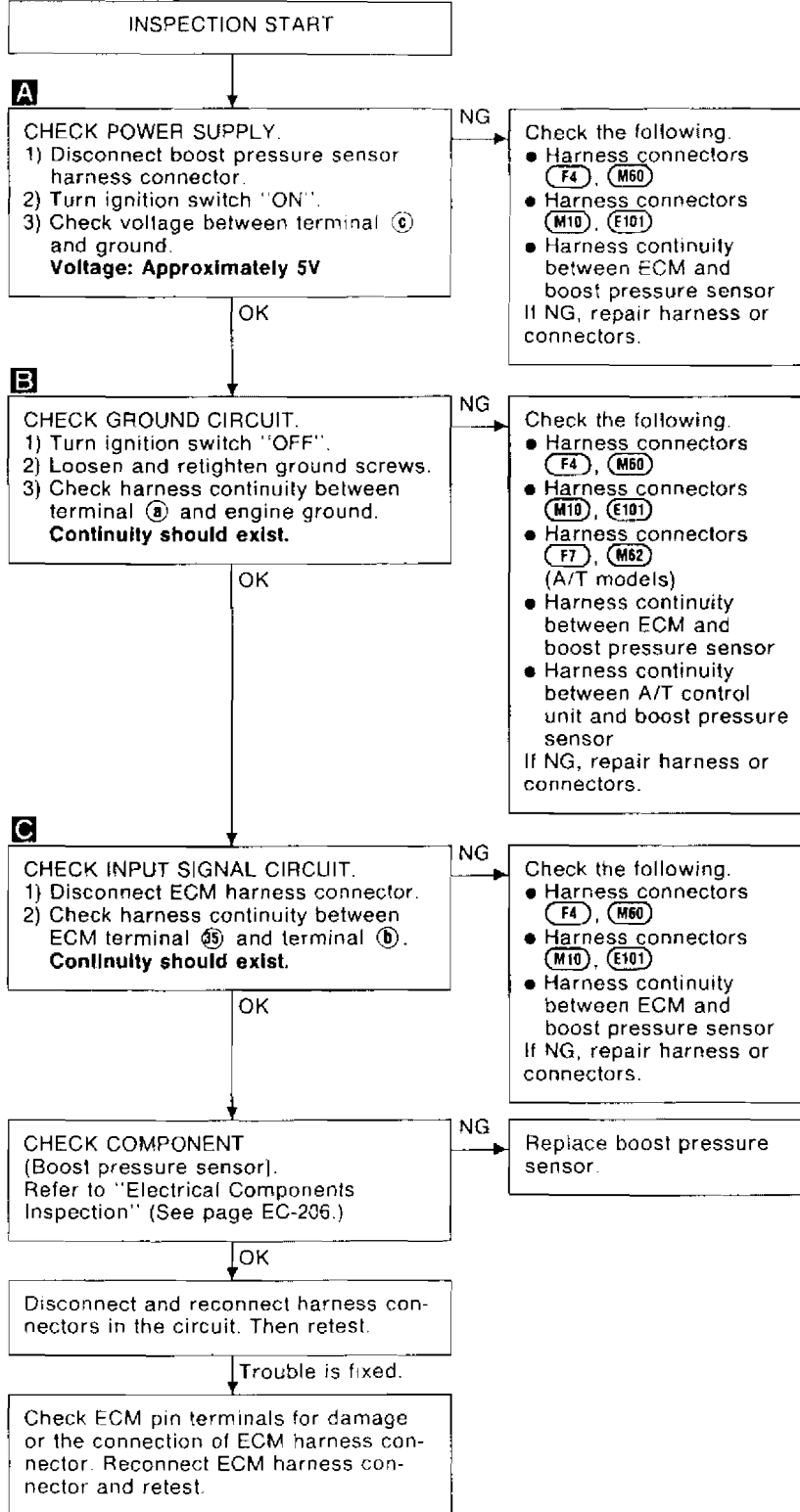
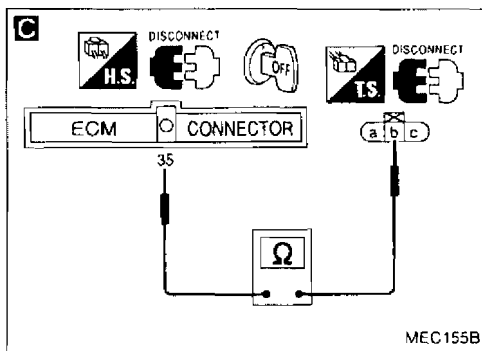
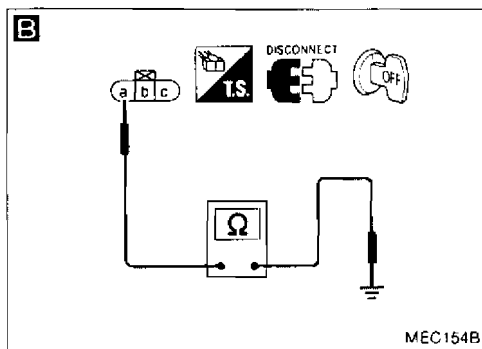
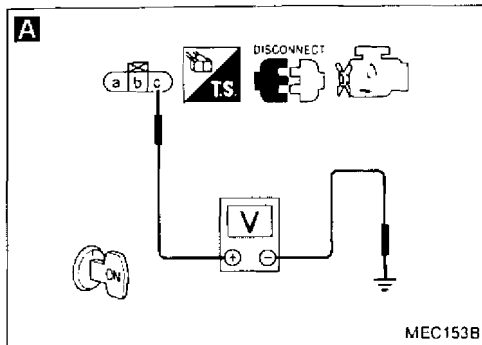


SEF838P



# TROUBLE DIAGNOSES

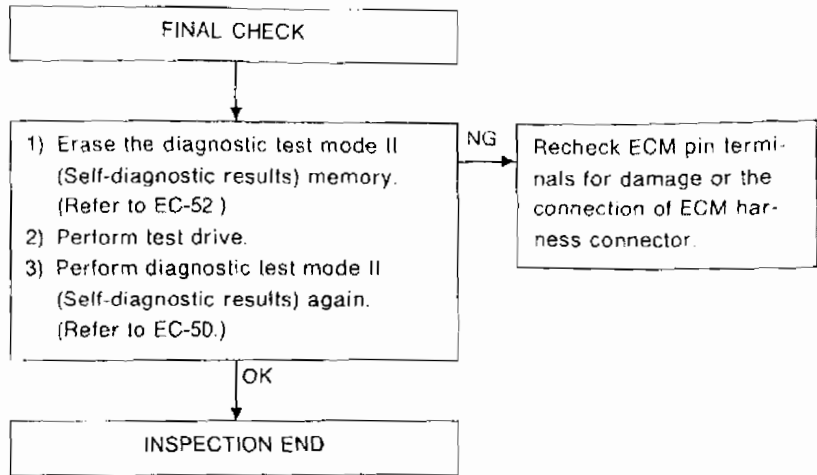
## Diagnostic Procedure 27 (Cont'd)



# TROUBLE DIAGNOSES

## Diagnostic Procedure 27 (Cont'd)

Perform FINAL CHECK by the following procedure after repair is completed.



GI

MI

FI

LI

**EC**

FI

LI

MI

AT

PI

FA

RA

RI

SI

SI

SI

RI

LI

DX

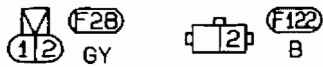
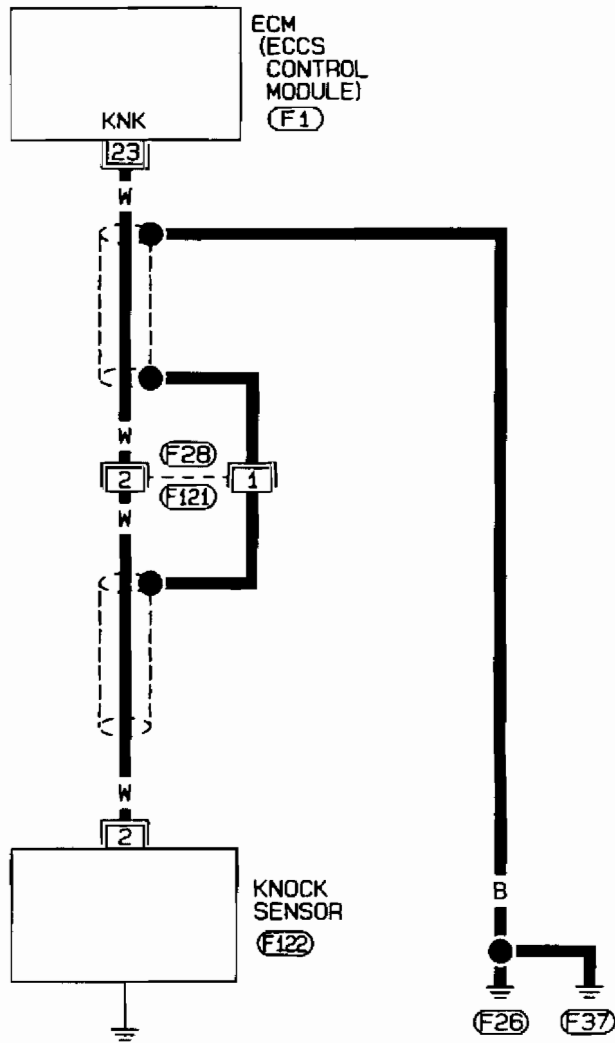


# TROUBLE DIAGNOSES

## Diagnostic Procedure 28

**KNOCK SENSOR (Diagnostic trouble code No. 34)**

EC-KS-01



|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

(F1)  
L

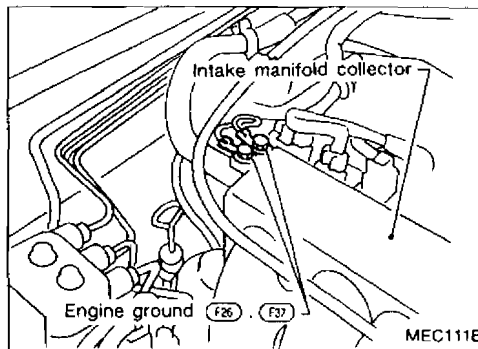
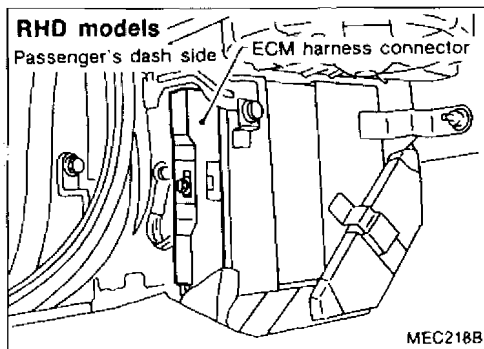
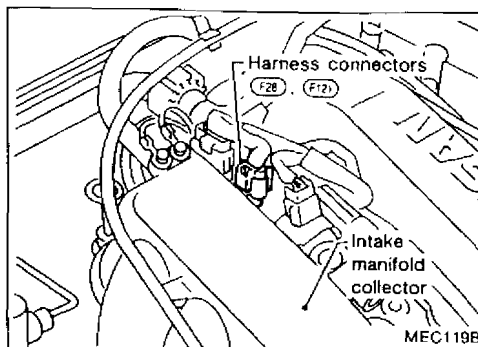
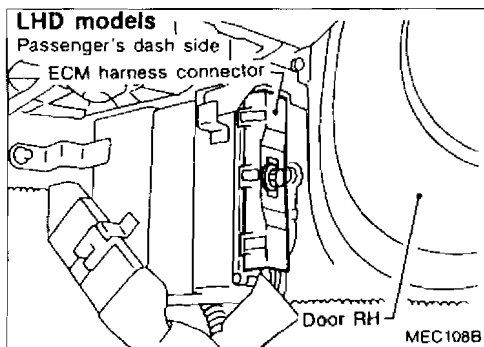


SEF836P

# TROUBLE DIAGNOSES

## Diagnostic Procedure 28 (Cont'd)

### Harness layout



GE

MA

EM

LC

**EC**

FE

CL

WT

AT

PD

FA

RA

BR

ST

RS

BT

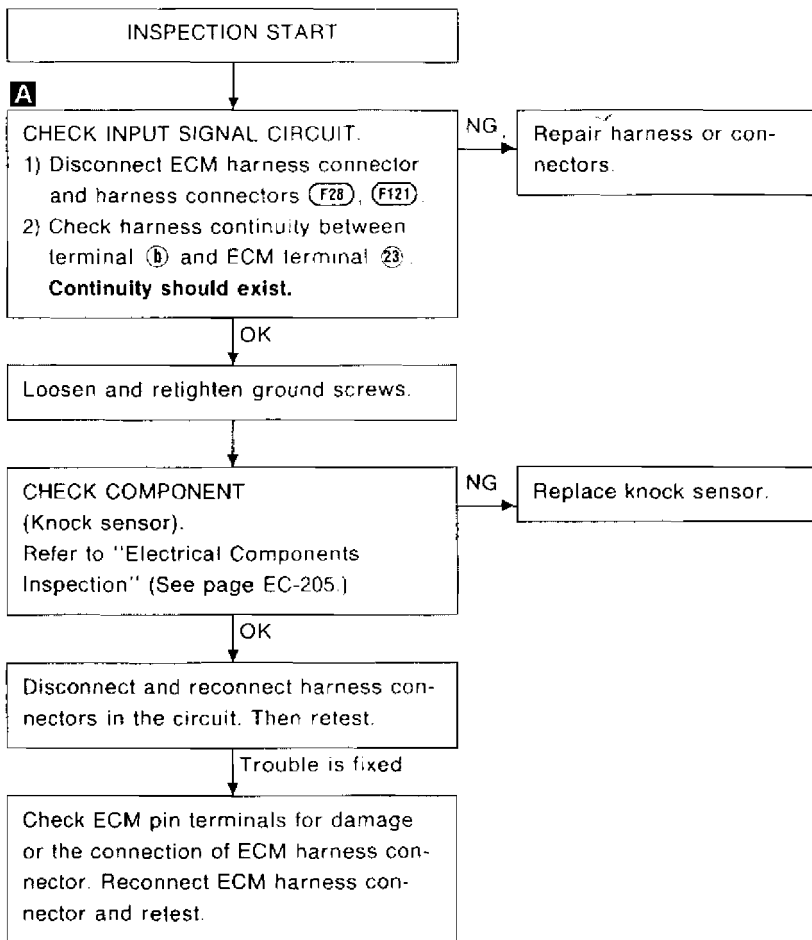
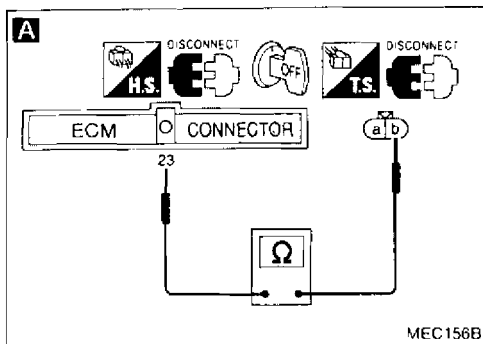
HA

EL

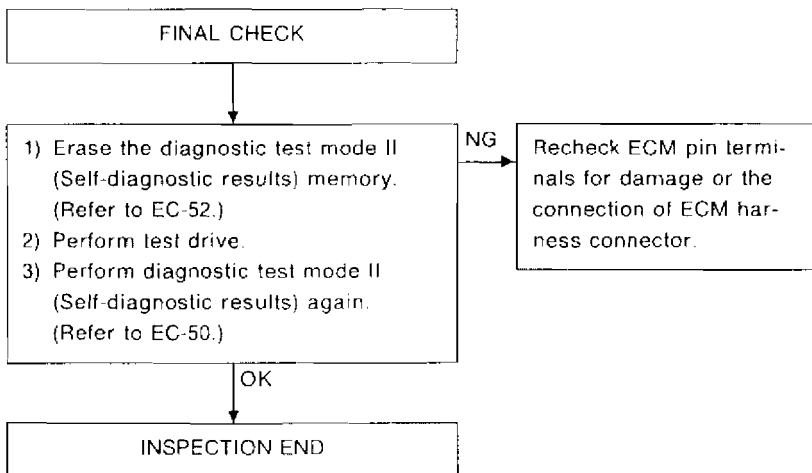
DX

# TROUBLE DIAGNOSES

## Diagnostic Procedure 28 (Cont'd)



**Perform FINAL CHECK by the following procedure after repair is completed.**

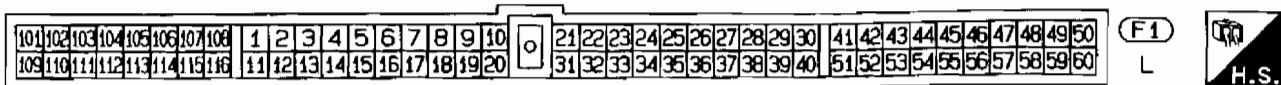
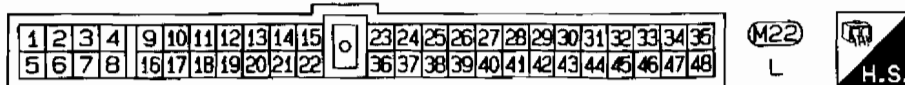
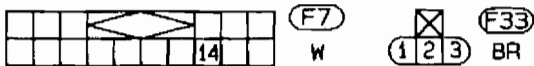
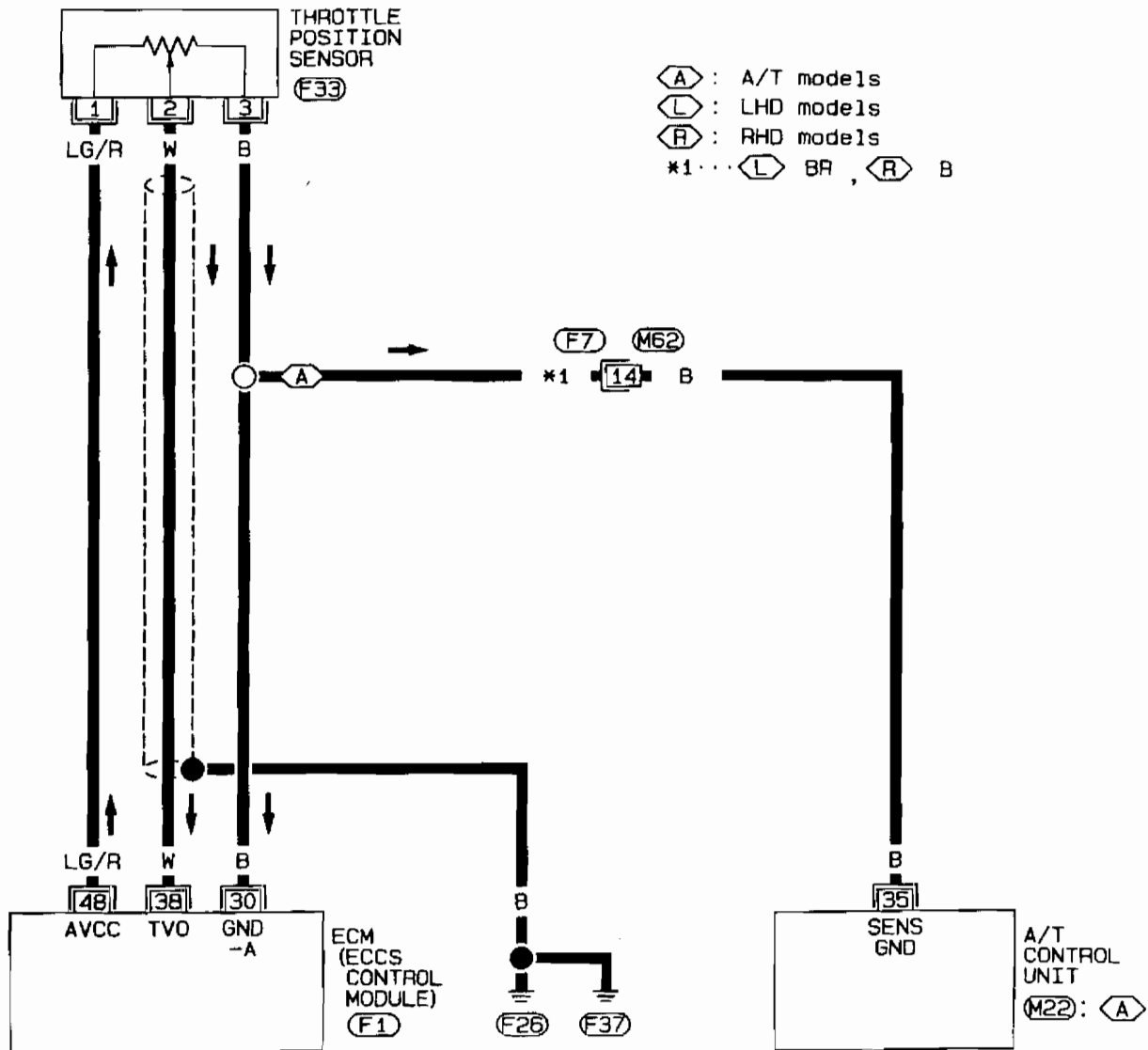


# TROUBLE DIAGNOSES

## Diagnostic Procedure 29

### THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43)

EC-TPS-01

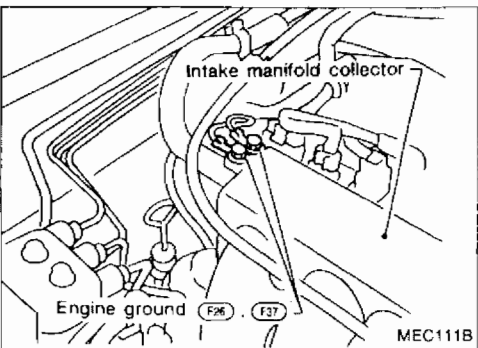
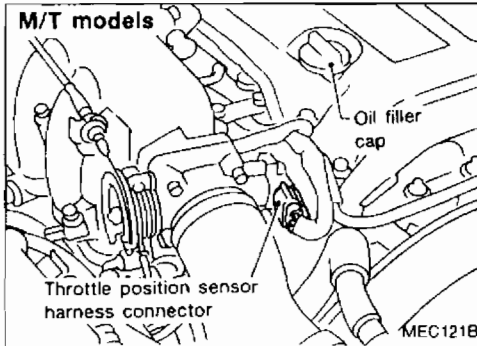
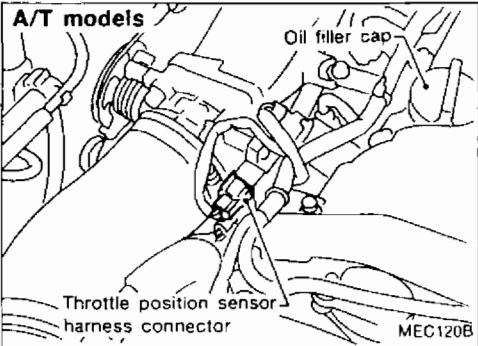
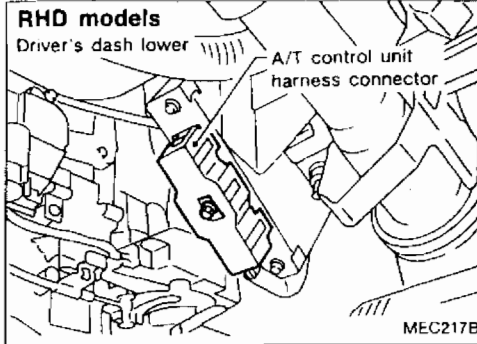
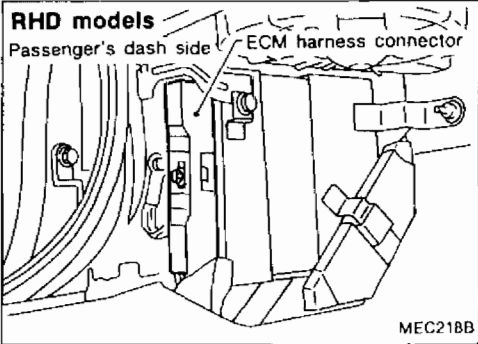
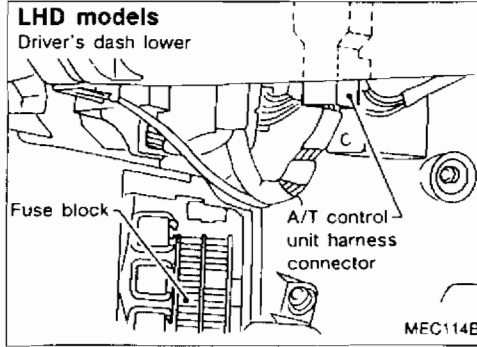
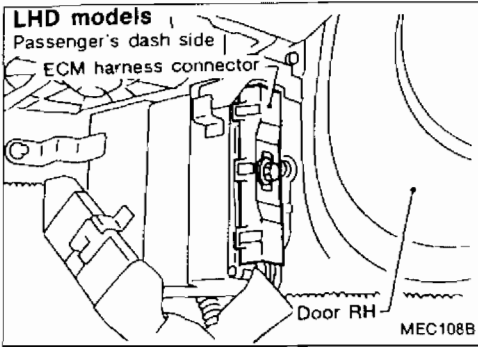


SEF835P

# TROUBLE DIAGNOSES

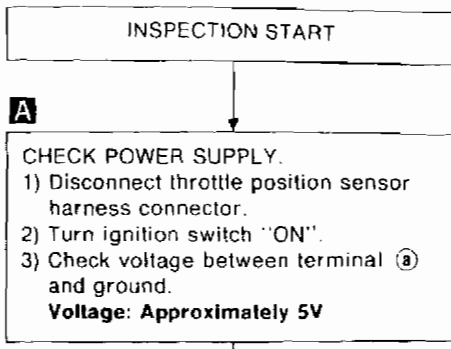
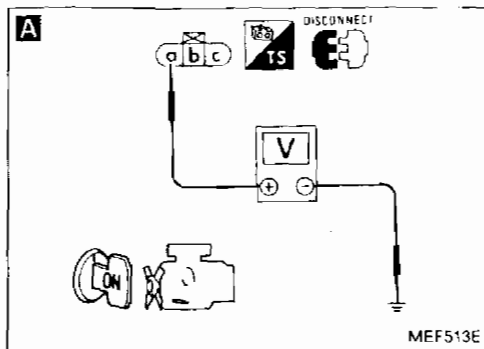
## Diagnostic Procedure 29 (Cont'd)

### Harness layout

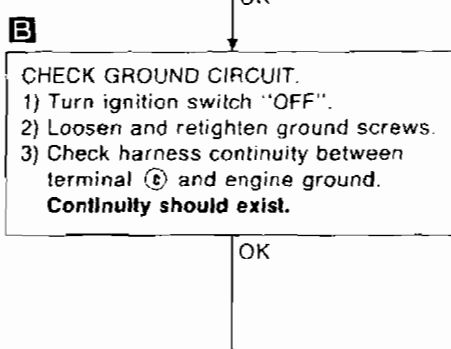
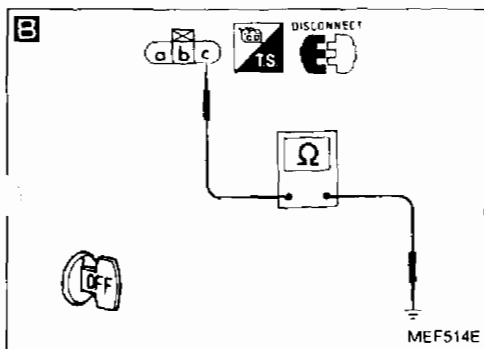


# TROUBLE DIAGNOSES

## Diagnostic Procedure 29 (Cont'd)



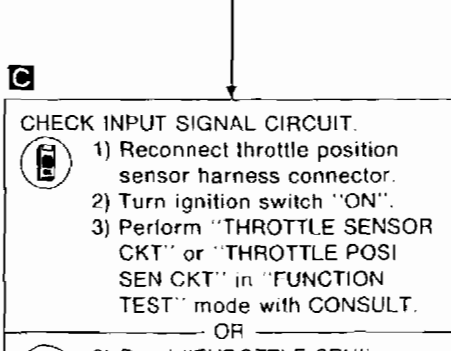
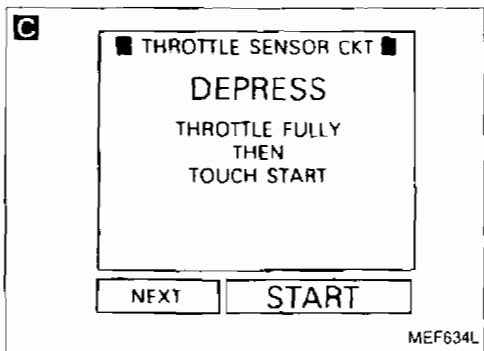
NG → Repair harness or connectors.



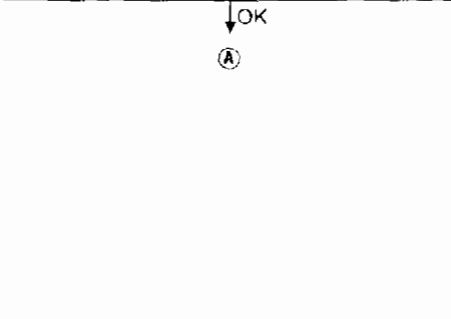
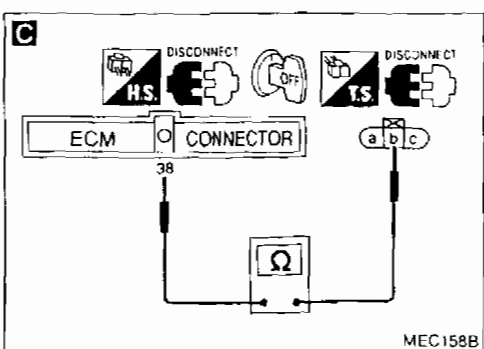
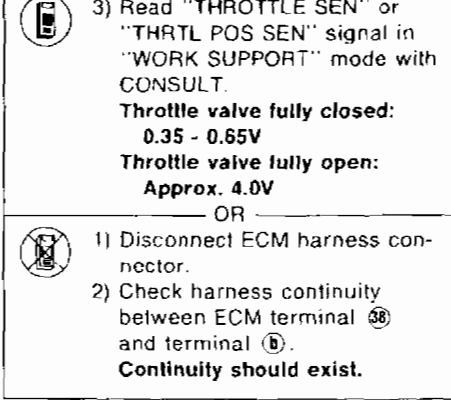
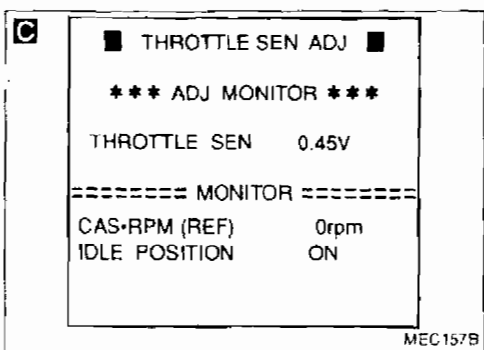
NG → Check the following:

- Harness connectors (F7, M62) (A/T models)
- Harness continuity between ECM and throttle position sensor
- Harness continuity between A/T control unit and throttle position sensor

If NG, repair harness or connectors.

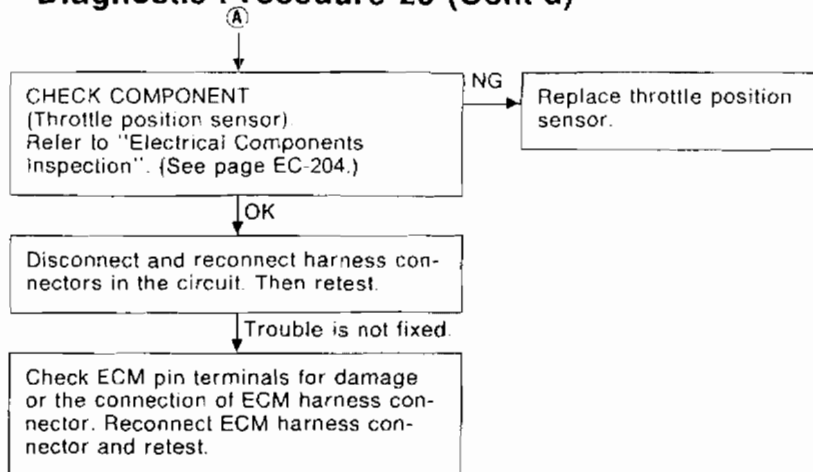


NG → Repair harness or connectors.

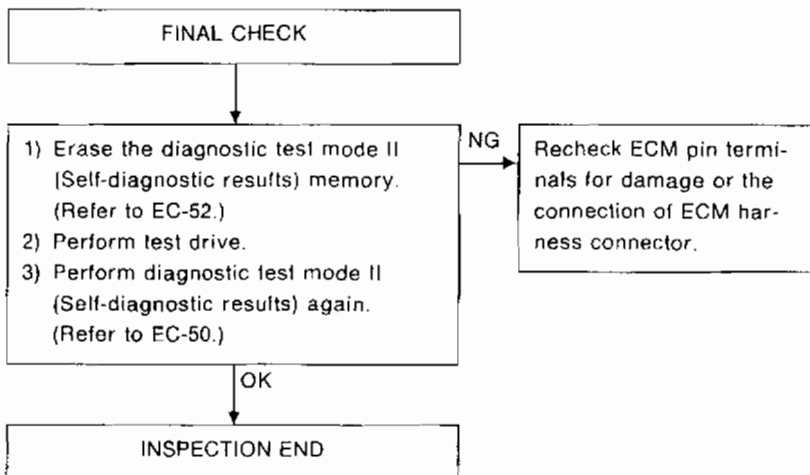


# TROUBLE DIAGNOSES

## Diagnostic Procedure 29 (Cont'd)



**Perform FINAL CHECK by the following procedure after repair is completed.**

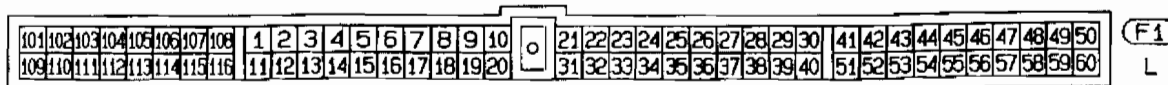
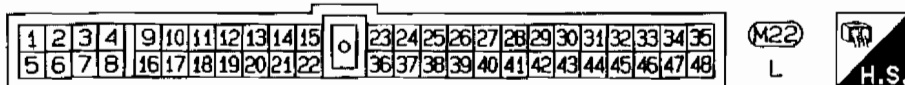
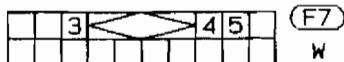
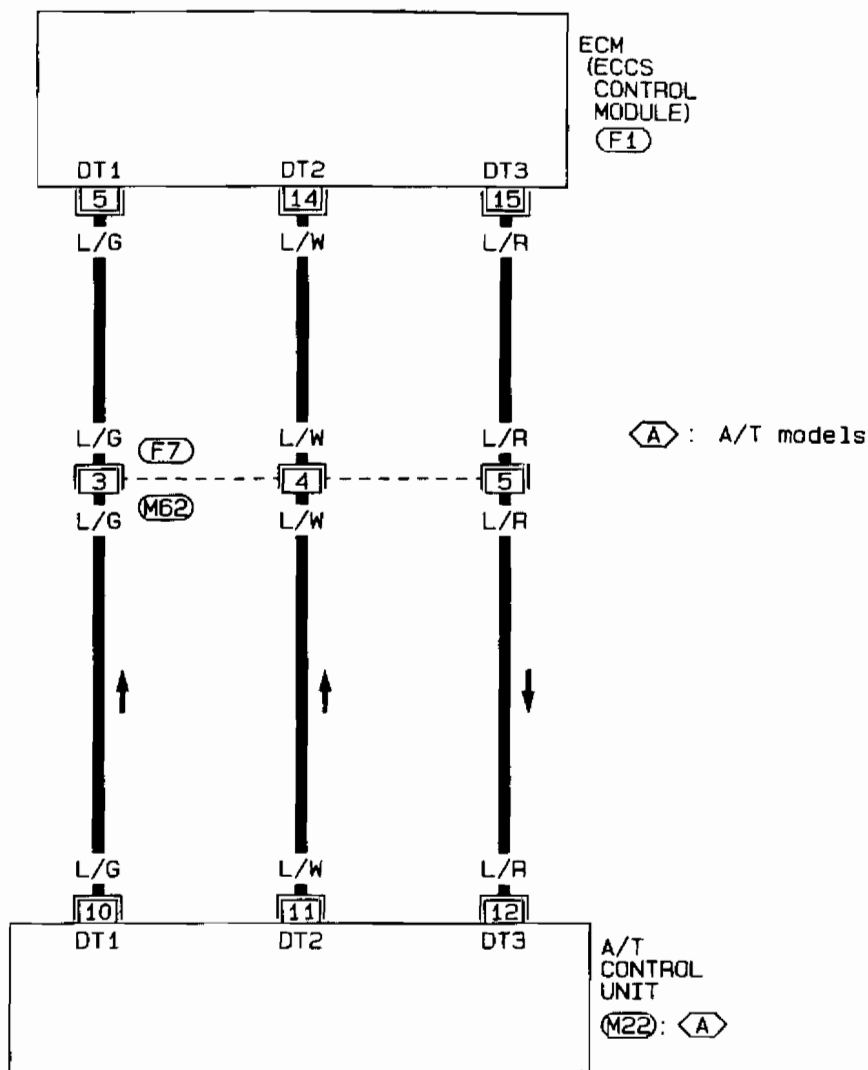


# TROUBLE DIAGNOSES

## Diagnostic Procedure 30

A/T CONTROL (Diagnostic trouble code No. 54)

EC-AT/C-01



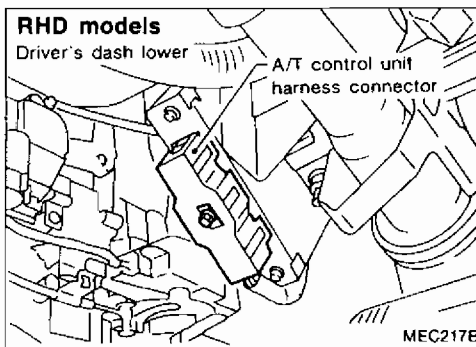
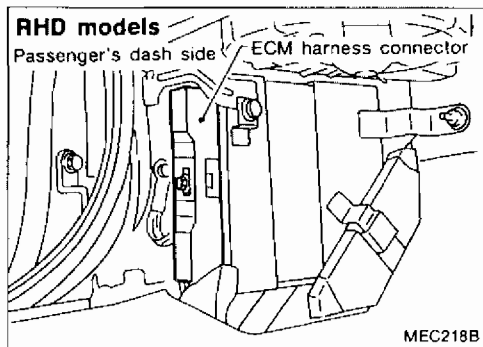
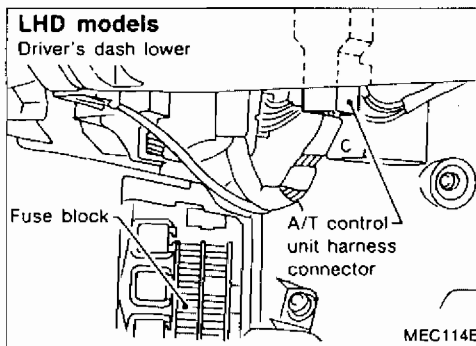
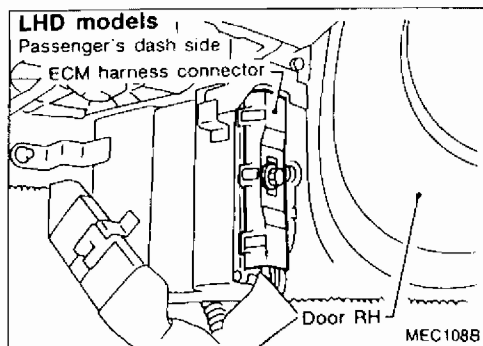
SEF839P



# TROUBLE DIAGNOSES

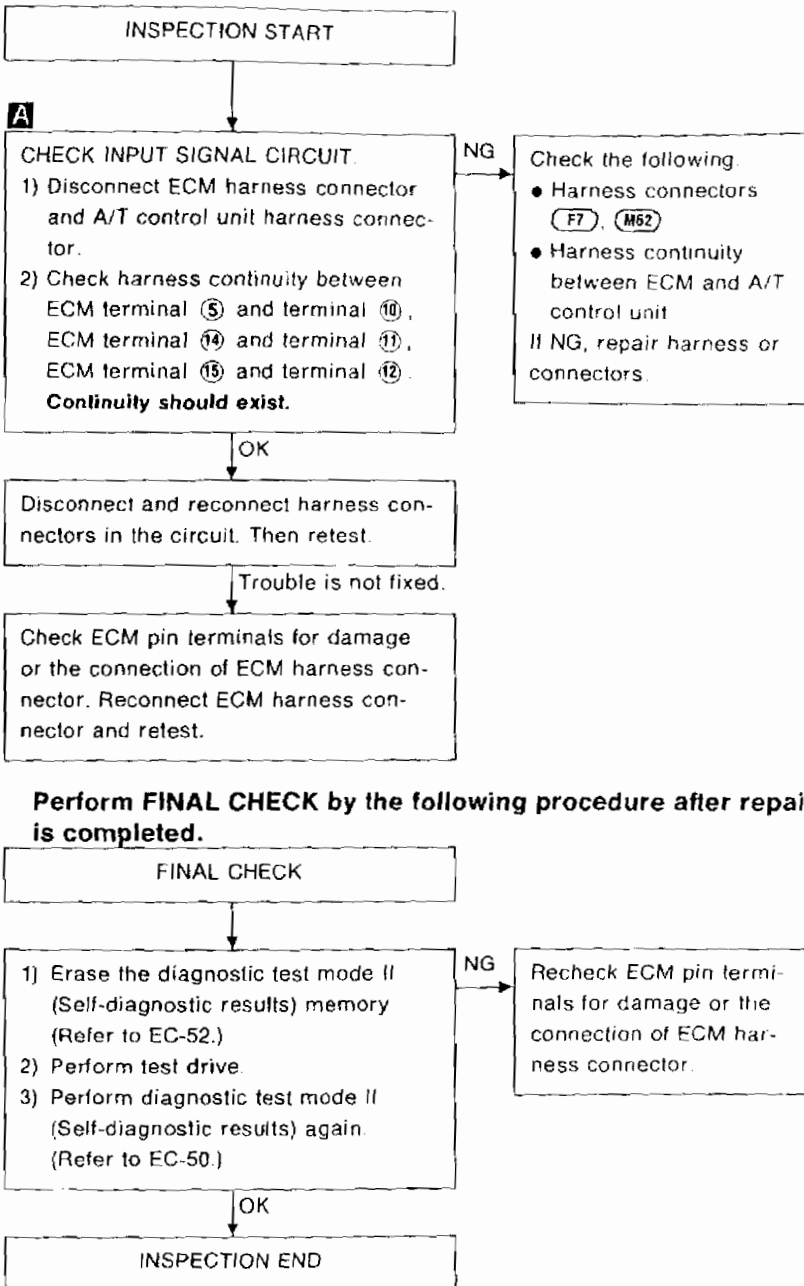
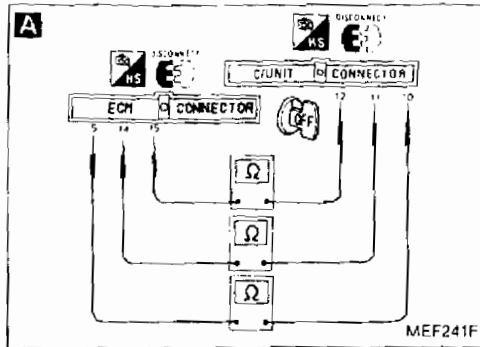
## Diagnostic Procedure 30 (Cont'd)

### Harness layout



# TROUBLE DIAGNOSES

## Diagnostic Procedure 30 (Cont'd)

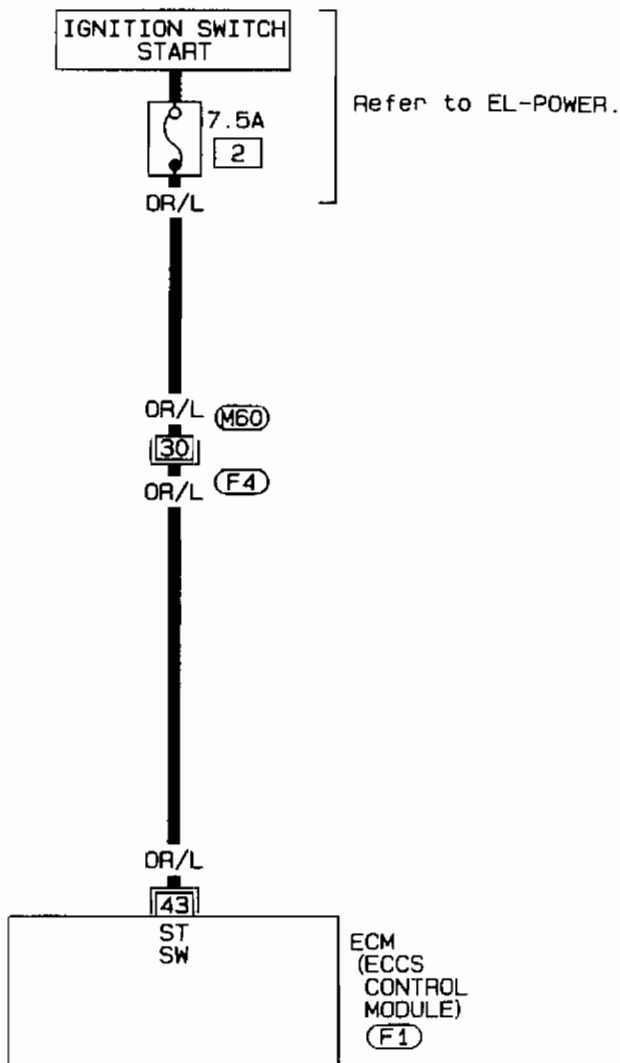


# TROUBLE DIAGNOSES

## Diagnostic Procedure 31

START SIGNAL (Not self-diagnostic item)

EC-S/SIG-01



Refer to last page (Foldout page).

(M60) (F4)

|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

(F1)  
L

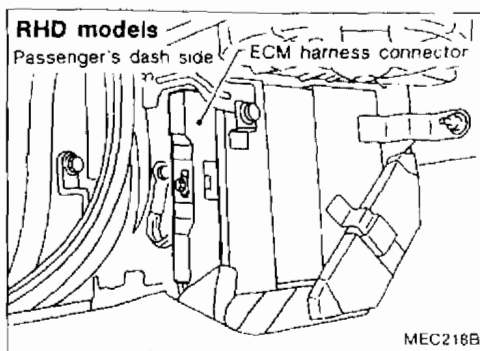
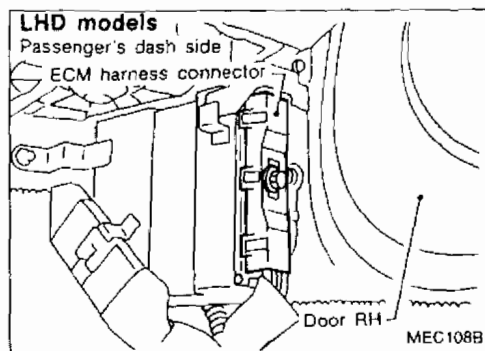


SEF844P

# TROUBLE DIAGNOSES

## Diagnostic Procedure 31 (Cont'd)

### Harness layout



**A**

■ **START SIGNAL CKT** ■

1. CLOSE THROTTLE. SHIFT TO P OR N RANGE.
2. TOUCH START AND START ENGINE IMMEDIATELY

NEXT    START

MEF481B

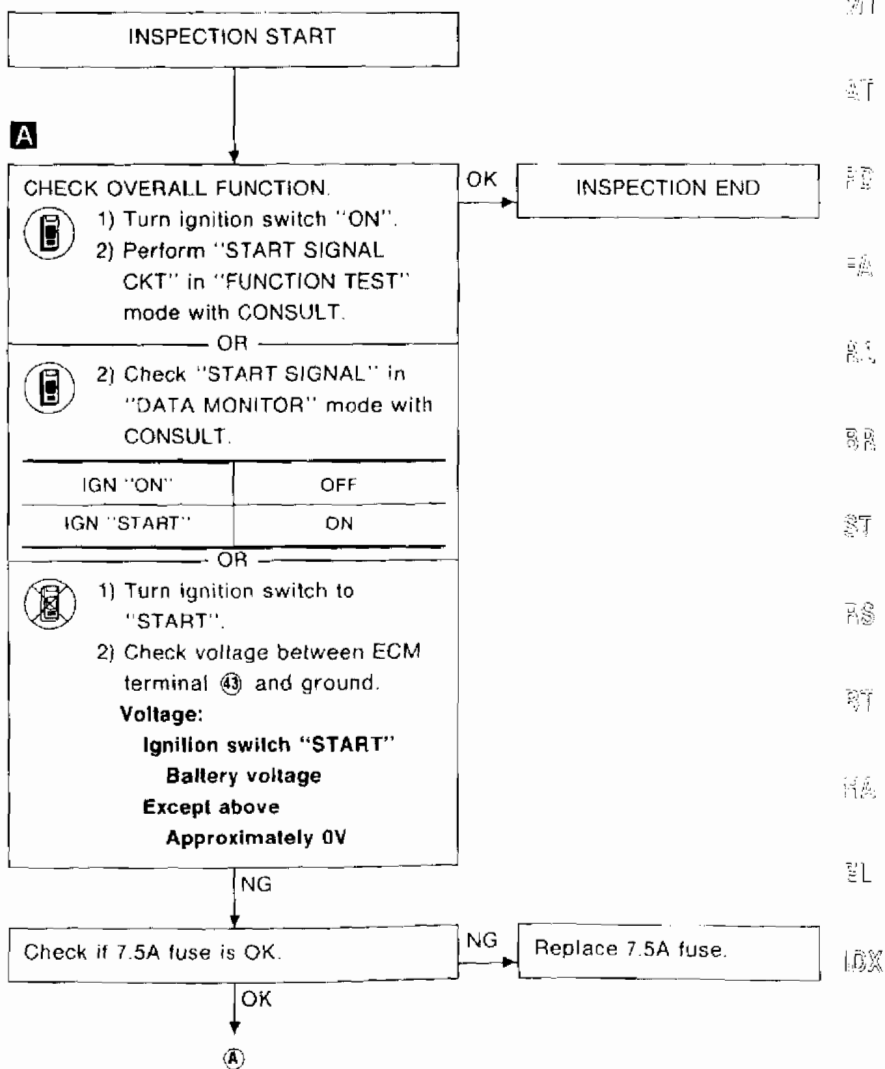
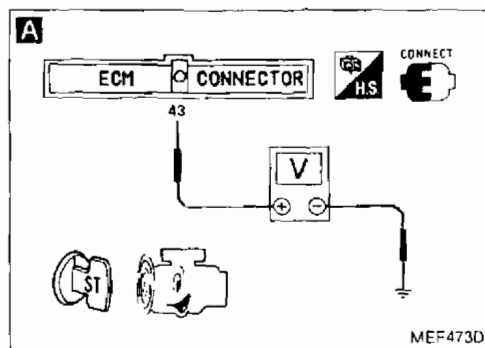
**A**

☆ MONITOR    ☆ NO FAIL   

|               |     |
|---------------|-----|
| START SIGNAL  | OFF |
| IDLE POSITION | ON  |
| AIR COND SIG  | OFF |
| NEUTRAL SW    | ON  |

RECORD

SEF384J



EC

EC

OL

WT

WT

TE

FA

RL

SR

ST

TS

WT

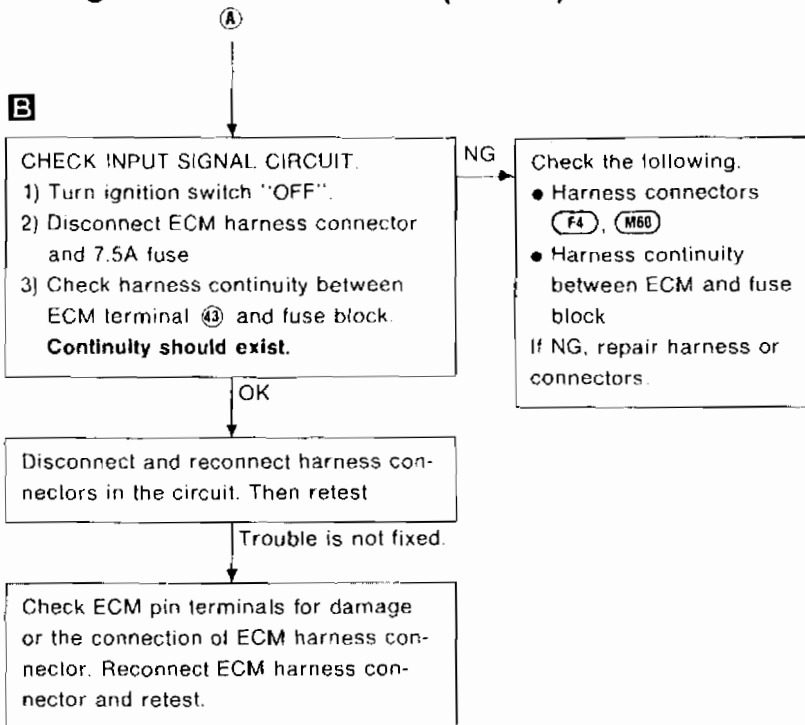
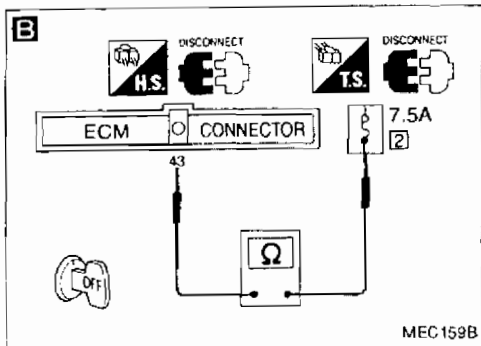
HA

EL

LOX

# TROUBLE DIAGNOSES

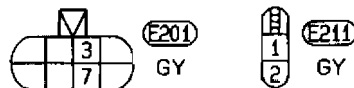
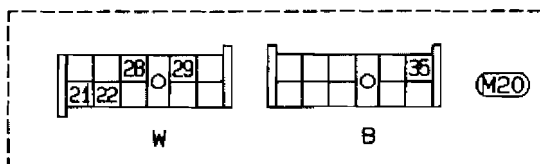
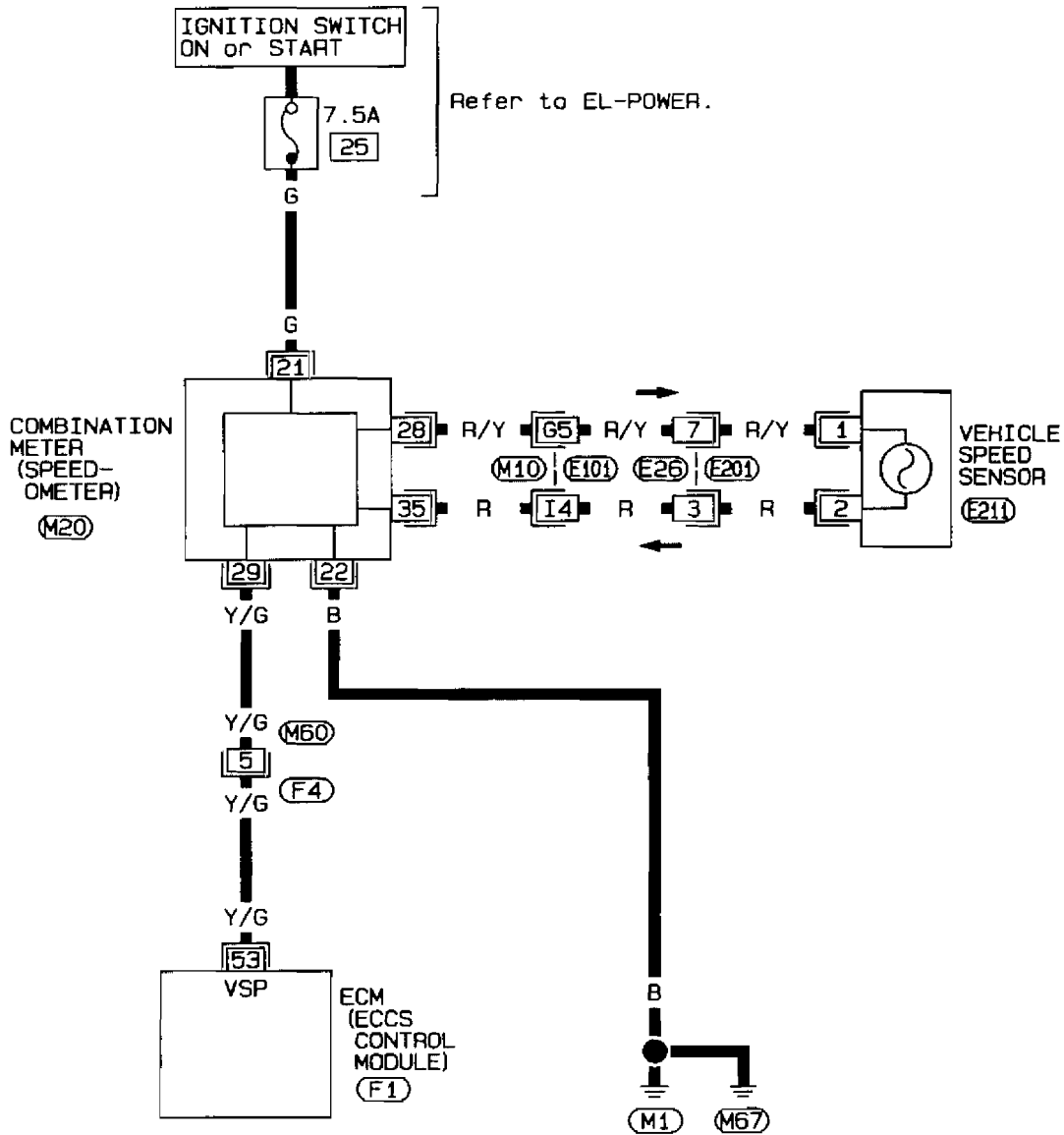
## Diagnostic Procedure 31 (Cont'd)



## Diagnostic Procedure 32

### VEHICLE SPEED SENSOR (Not self-diagnostic item)

EC-VSS-01



Refer to last page (Foldout page).

M10 E101  
M60 F4

|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

F1  
L

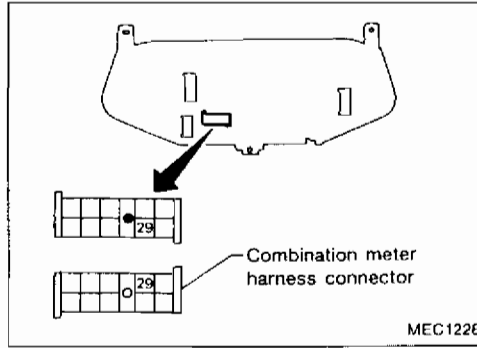
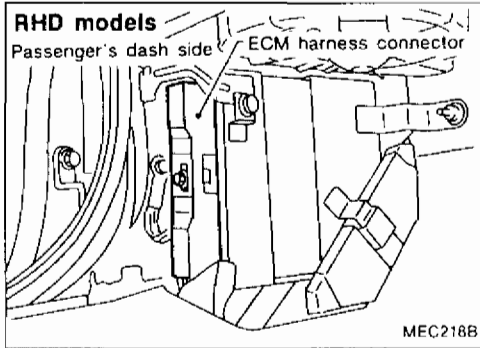
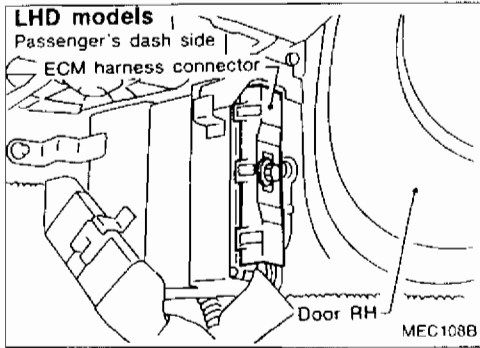


SEF837P

# TROUBLE DIAGNOSES

## Diagnostic Procedure 32 (Cont'd)

### Harness layout



# TROUBLE DIAGNOSES

## Diagnostic Procedure 32 (Cont'd)

**A**

■ CAR SPEED SEN CIRCUIT ■

AFTER TOUCH START,  
DRIVE VEHICLE  
AT 10 km/h (6 mph) OR  
MORE WITHIN 15 sec

NEXT      START

SEF631L

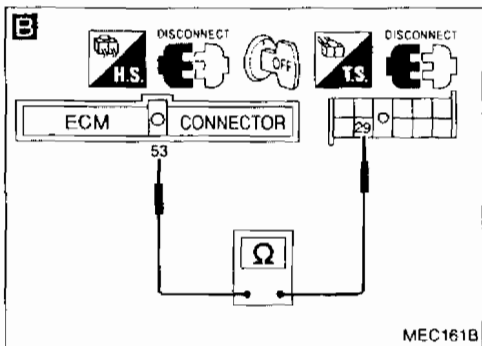
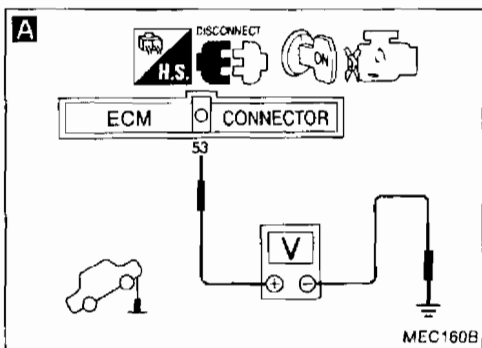
**A**

☆ MONITOR ☆ NO FAIL

CAR SPEED SEN      0mph

RECORD

SEF5871



INSPECTION START

**A**

CHECK OVERALL FUNCTION.

- 1) Jack up drive wheels.
- 2) Perform "CAR SPEED SEN CIRCUIT" or "VEHICLE SPEED SEN CKT" in "FUNCTION TEST" mode with CONSULT.

OK → INSPECTION END

OR

- 2) Read "CAR SPEED SEN" or "VHCL SPEED SE" signal in "DATA MONITOR" mode with CONSULT.  
**CONSULT value should be the same as the speedometer indication.**

OR

- 2) Disconnect ECM harness connector.
- 3) Turn ignition switch "ON".
- 4) Rotate drive wheel by hand.
- 5) Check voltage between ECM terminal 53 and body ground.  
**Voltage should vary between approx. 0 to 5V.**

NG

CHECK SPEEDOMETER FUNCTION.  
Make sure that speedometer functions properly.

NG → Check vehicle speed sensor and circuit.  
(Refer to EL section.)

OK

**B**

CHECK INPUT SIGNAL CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Disconnect ECM harness connector and combination meter harness connector.
- 3) Check harness continuity between ECM terminal 53 and terminal 29.  
**Continuity should exist.**

NG → Check the following

- Harness connectors (F4, M60)
- Harness continuity between ECM and combination meter

If NG, repair harness or connectors.

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

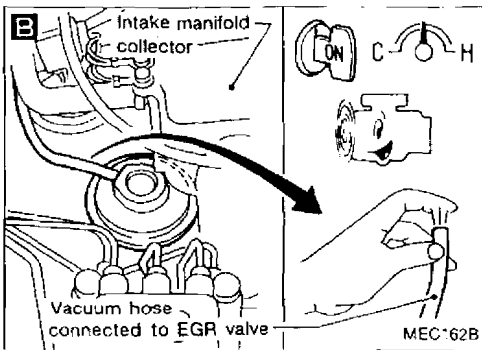
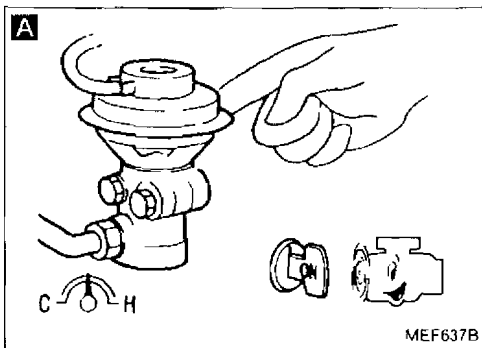
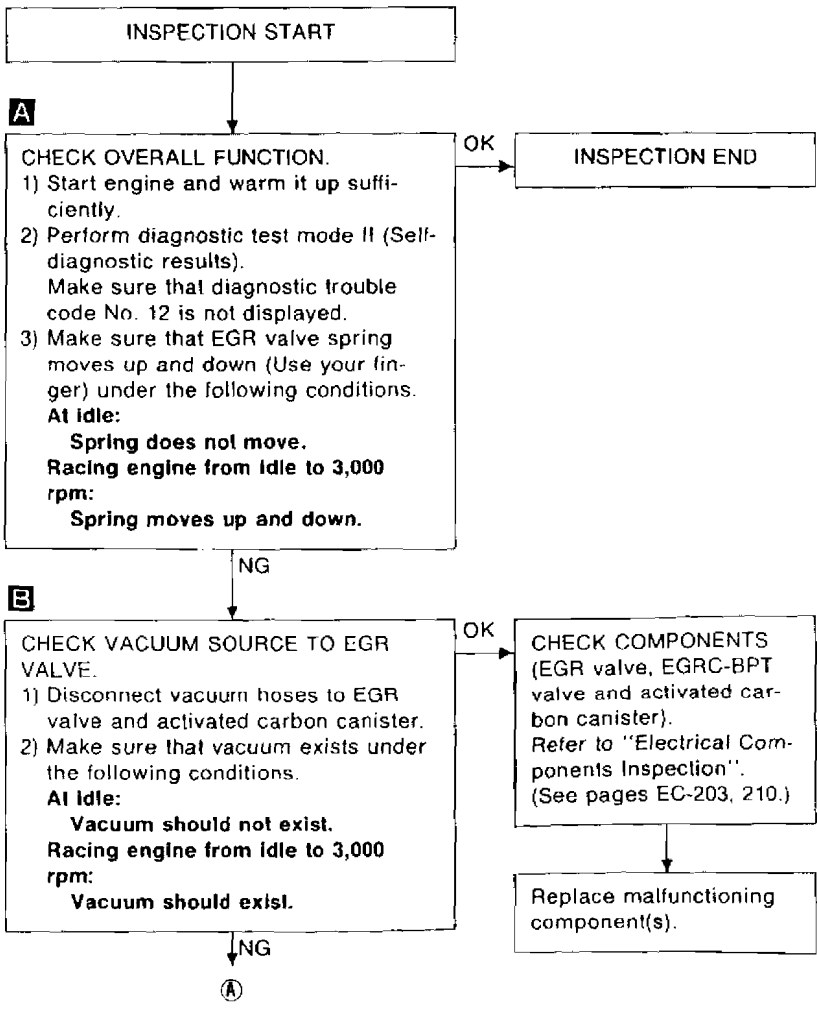
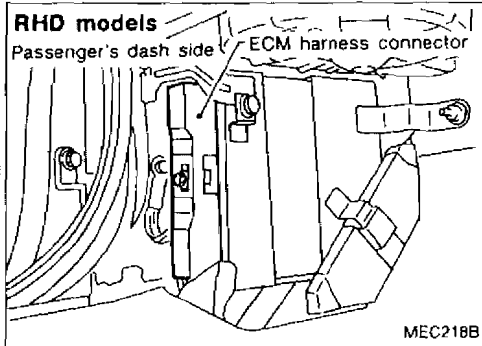
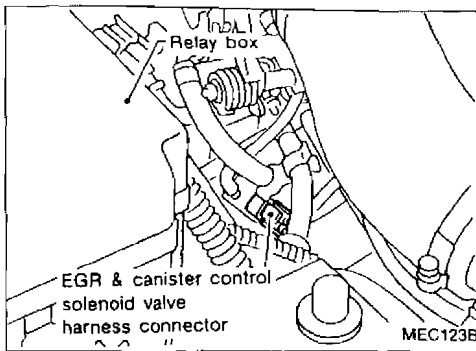
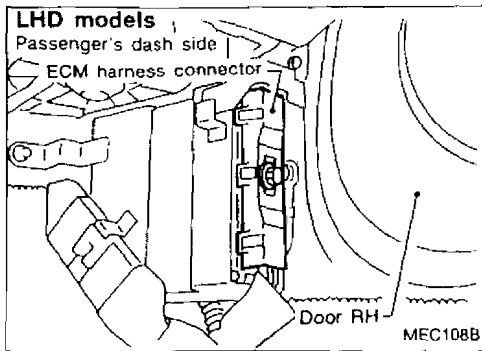
SI  
MA  
EQ  
LC  
EC  
FE  
CL  
MT  
AT  
PD  
EA  
PA  
PB  
ST  
RS  
BT  
HJ  
EL  
DX





Diagnostic Procedure 33 (Cont'd)

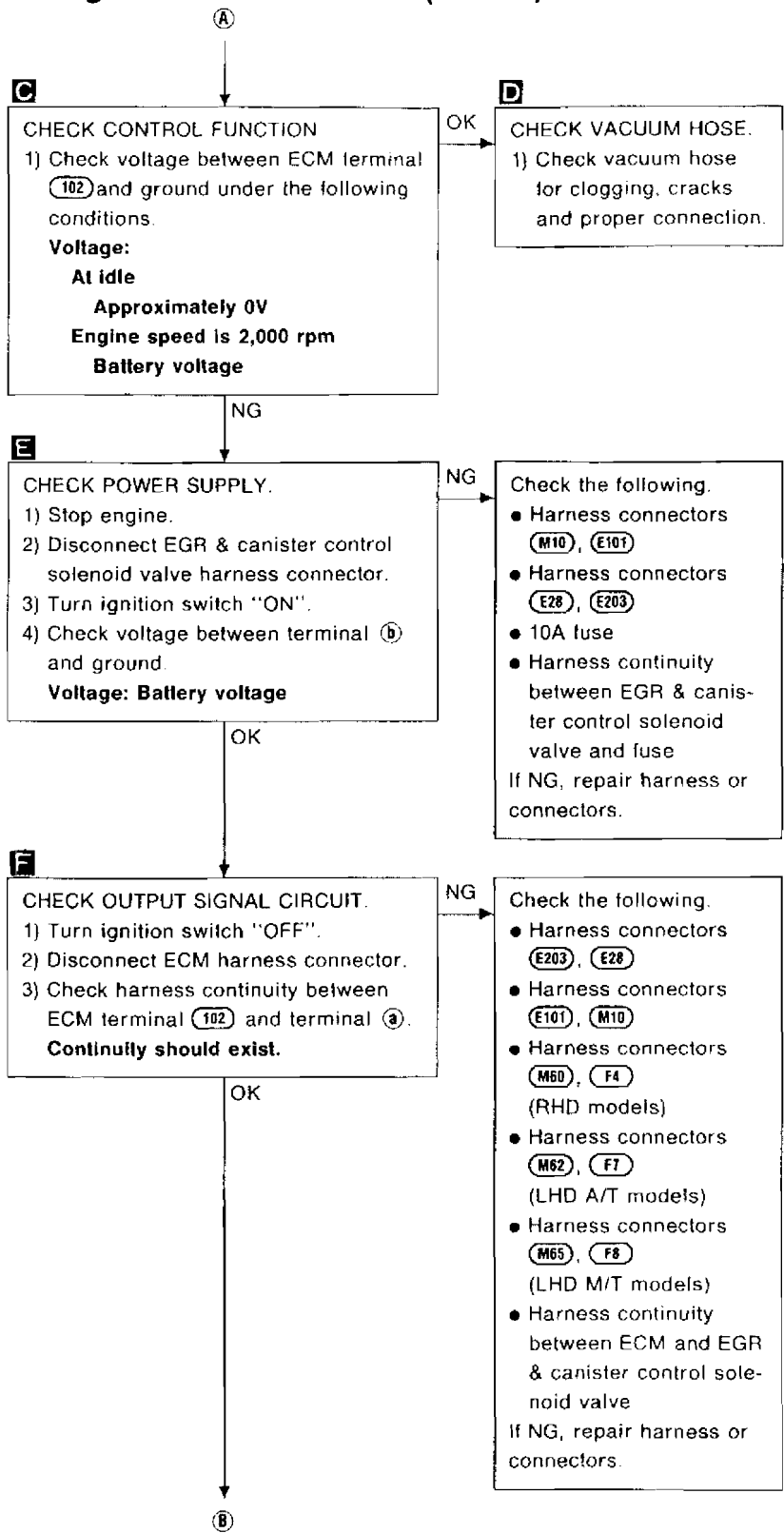
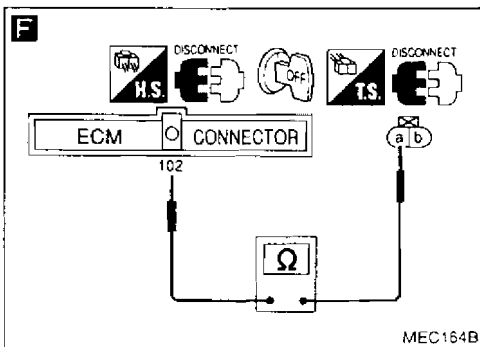
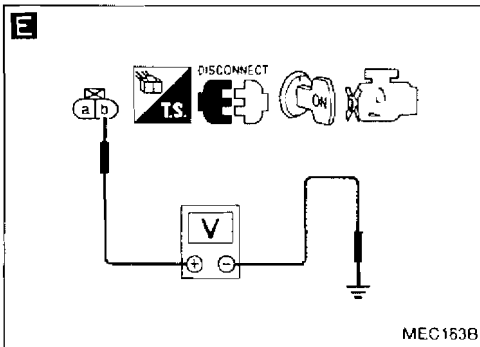
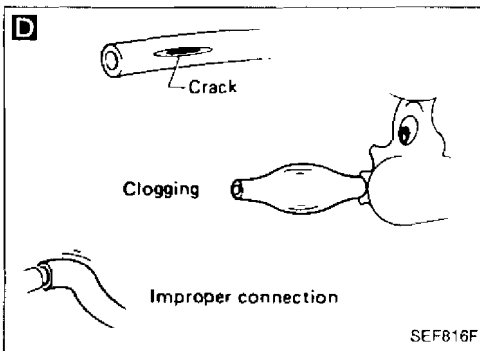
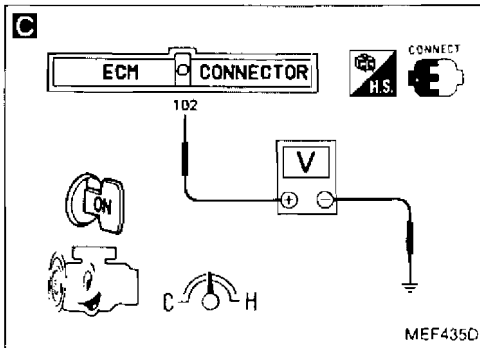
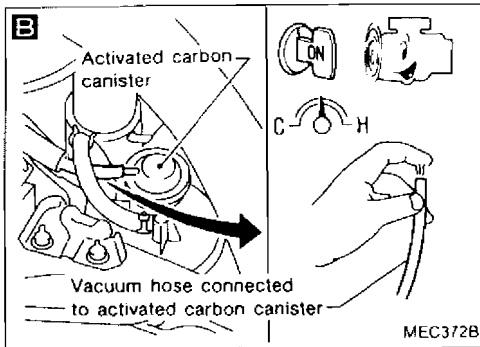
Harness layout



EC  
FE  
CL  
MT  
AT  
PD  
FA  
RA  
RR  
ST  
RS  
RT  
HA  
EL  
DX

# TROUBLE DIAGNOSES

## Diagnostic Procedure 33 (Cont'd)



# TROUBLE DIAGNOSES

## Diagnostic Procedure 33 (Cont'd)

**G**

■ EGR CONT S/V CIRCUIT ■

DOES THE SOLENOID VALVE MAKE AN OPERATING SOUND EVERY 3 SECONDS?

NEXT NO YES

MEF569B

**G**

■ ACTIVE TEST ■

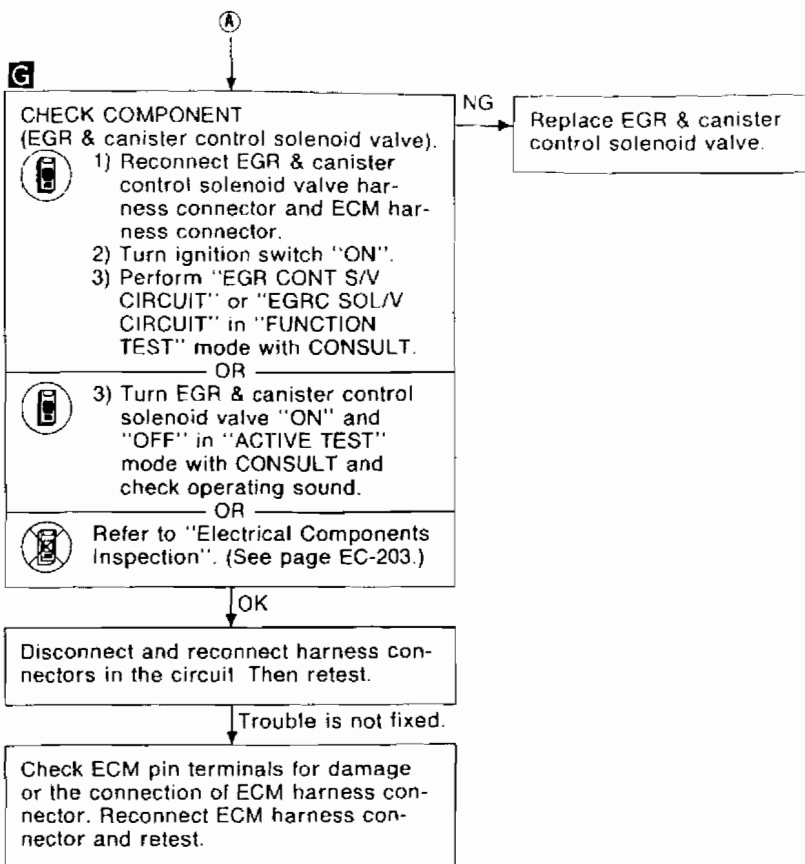
EGR CONT SOL/V OFF

=== MONITOR ===

CAS-RPM (REF) 0rpm

ON ON/OFF OFF

SEF222N



BT

VA

EM

LC

EC

EE

CL

MT

AT

PD

EA

RA

RR

ST

RS

BT

KA

EL

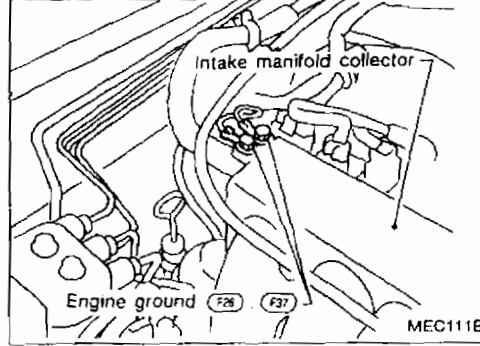
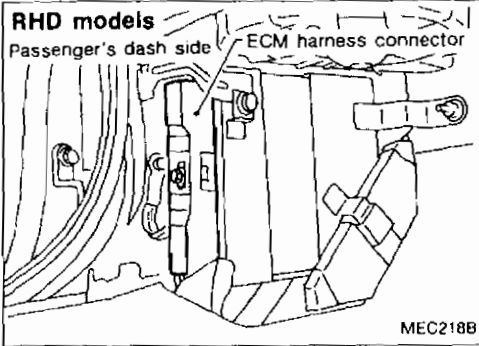
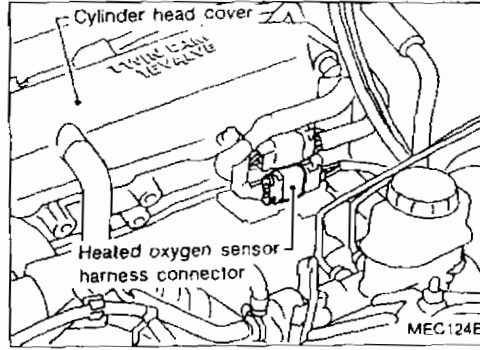
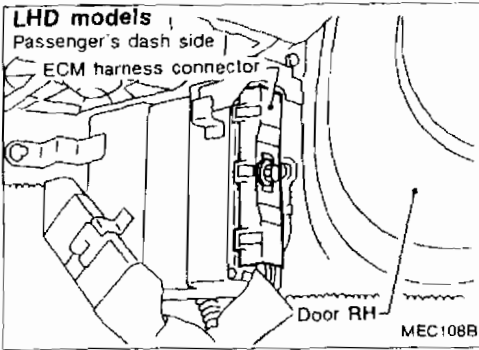
IDX



# TROUBLE DIAGNOSES

## Diagnostic Procedure 34 (Cont'd)

### Harness layout



GI

MA

FM

LC

**EC**

FE

CL

MT

AT

PD

FA

RA

BR

ST

RS

BT

HA

EL

DX

# TROUBLE DIAGNOSES

## Diagnostic Procedure 34 (Cont'd)

**A**

■ MIXTURE RATIO TEST ■

ACCELERATE TO 2000 RPM AND HOLD THEN TOUCH START

1800 2000 2200

NEXT START

SEF815L

**A**

☆ MONITOR ☆ NO FAIL

CAS-RPM (REF) 2000rpm  
M/R F/C MNT RICH

RECORD

SEF818K

**A**

Malfunction indicator lamp

MEC219B

**B**

DISCONNECT T.S.

V

ON

SEF327J

**C**

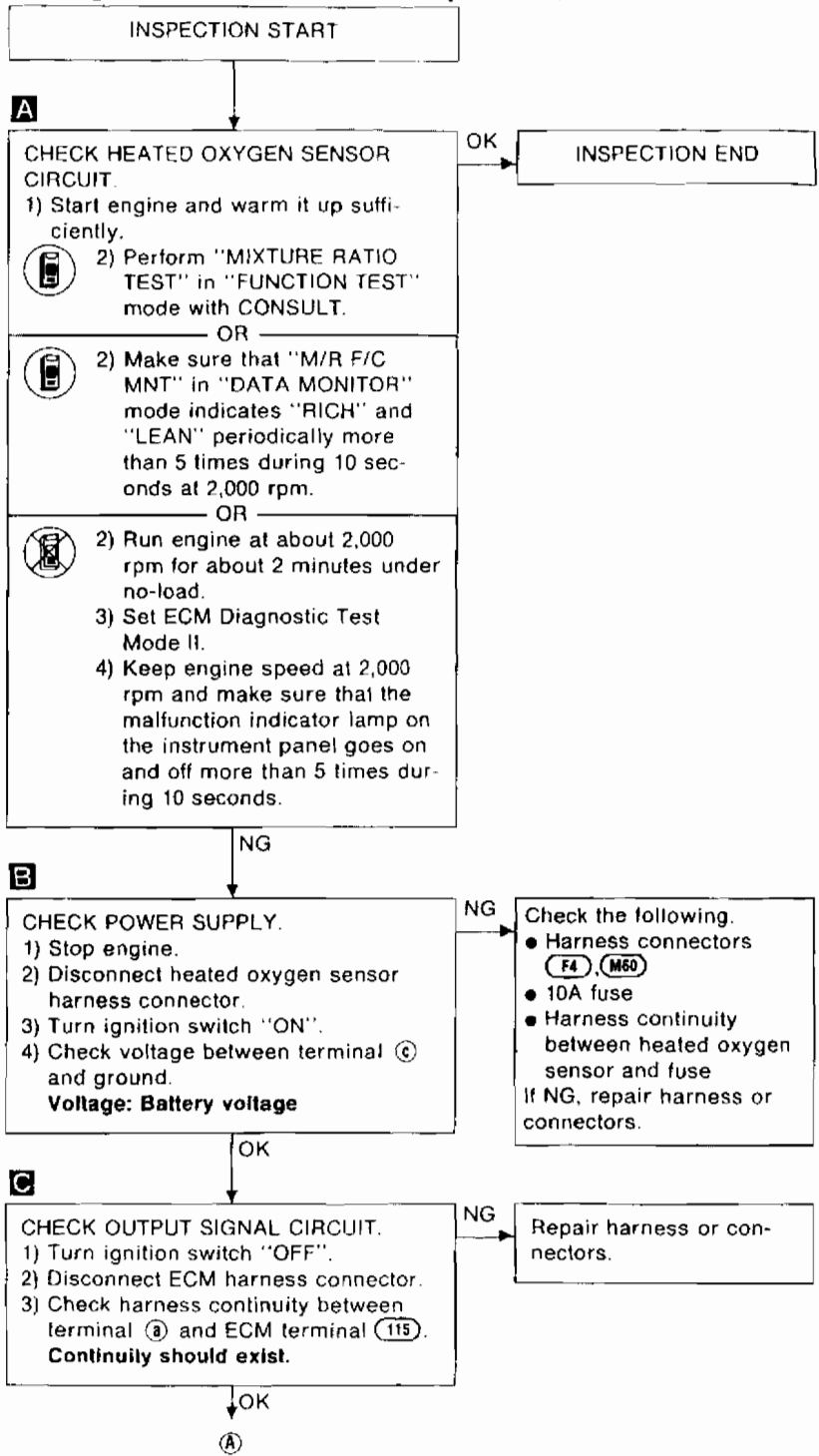
DISCONNECT H.S. DISCONNECT T.S.

ECM CONNECTOR

115

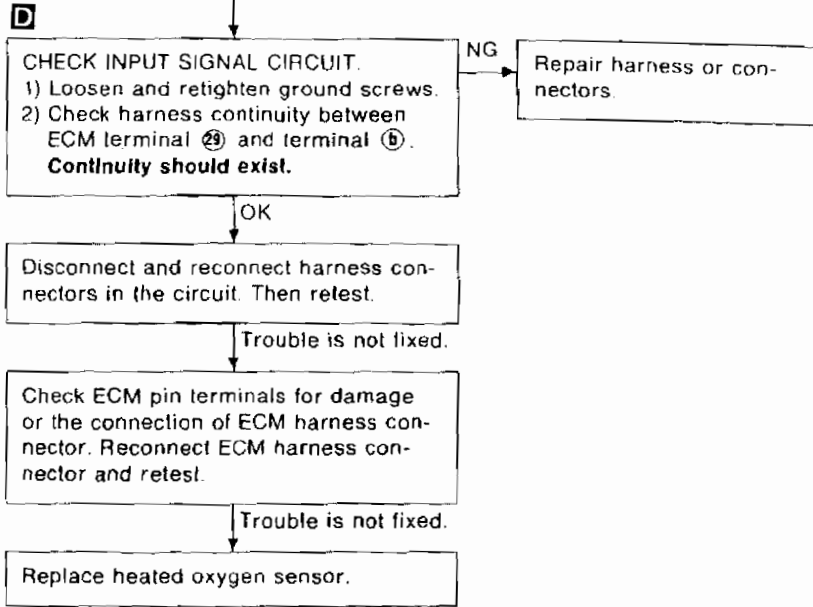
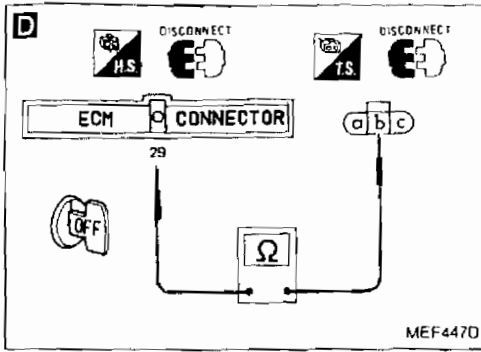
Ω

MEC165B



# TROUBLE DIAGNOSES

## Diagnostic Procedure 34 (Cont'd)



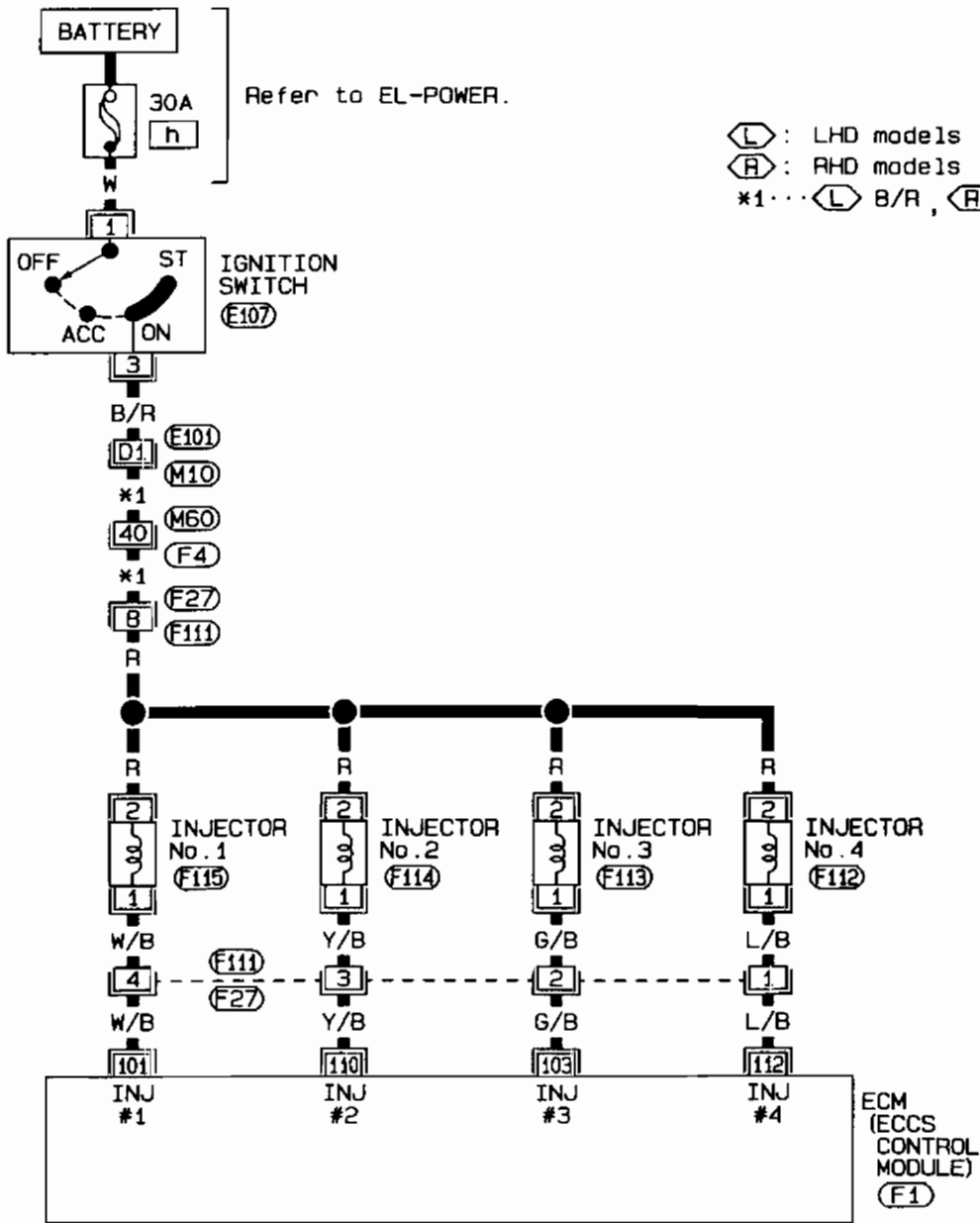
CI  
WA  
EM  
LC  
EC  
FE  
CL  
MT  
AT  
PD  
FA  
RA  
RR  
ST  
PS  
ST  
RE  
EL  
IDE



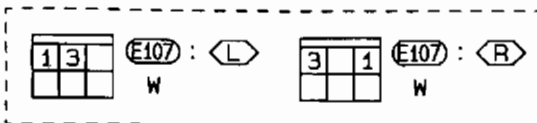
Diagnostic Procedure 35

INJECTOR CIRCUIT (NoI self-diagnostic item)

EC-INJECT-01

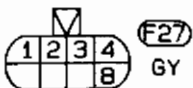


◁ L : LHD models  
 ▷ R : RHD models  
 \*1... ◁ B/R, ▷ R/L



Refer to last page (Foldout page).

M10, E101  
 M60, F4



|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | o | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |   | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

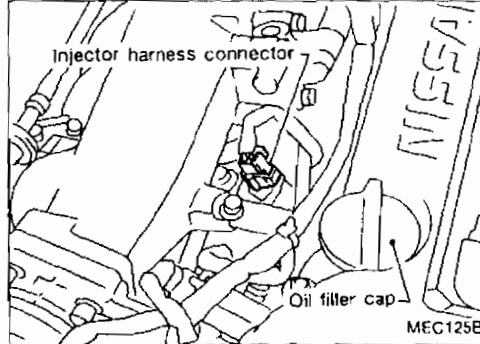
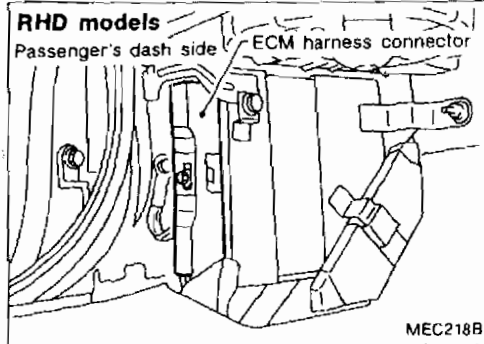
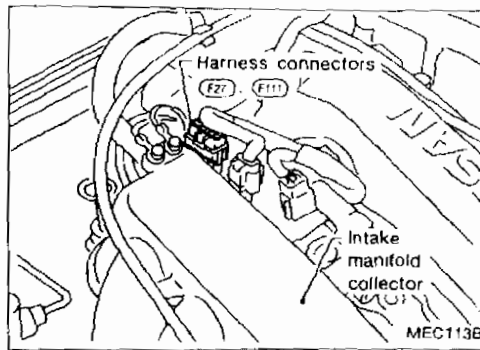
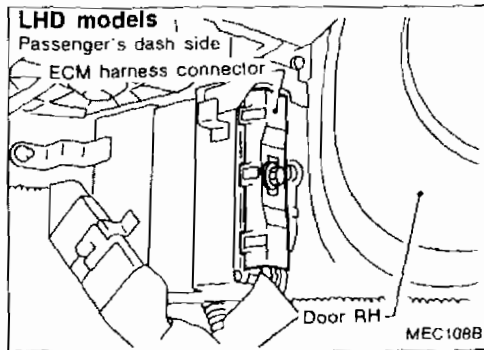
F1  
 L



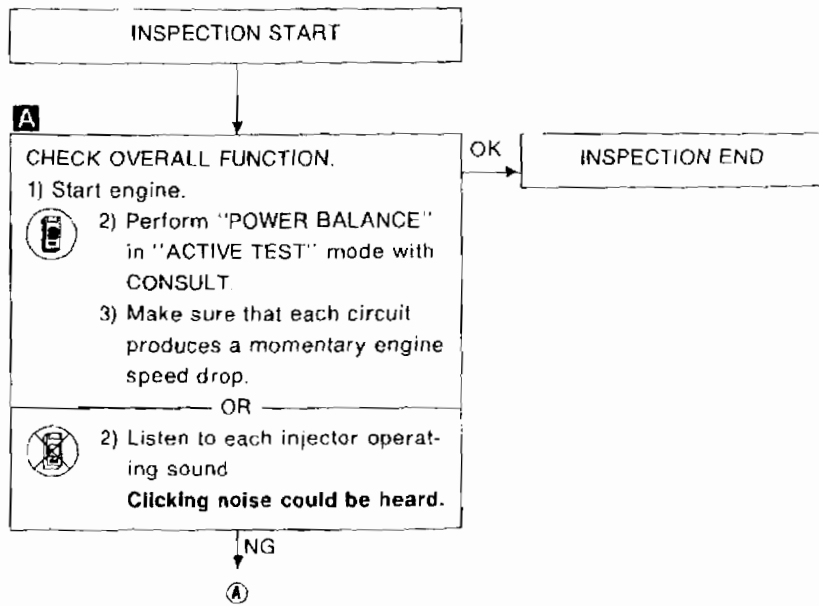
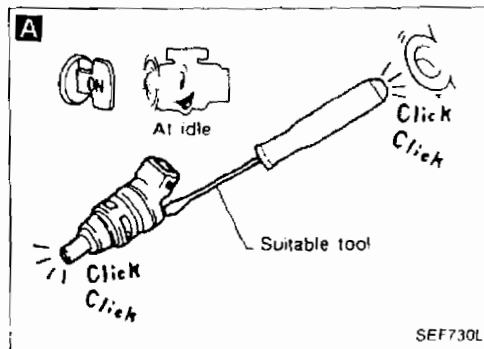
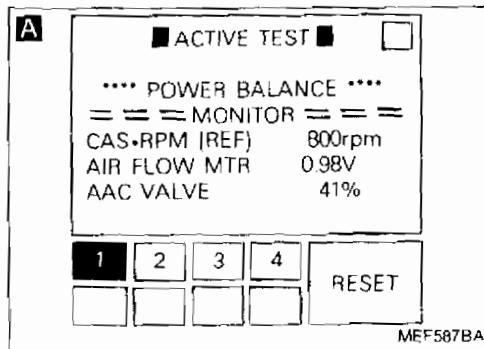
# TROUBLE DIAGNOSES

## Diagnostic Procedure 35 (Cont'd)

### Harness layout

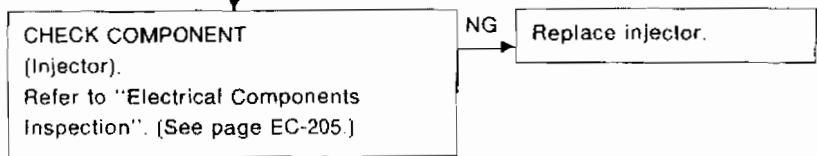
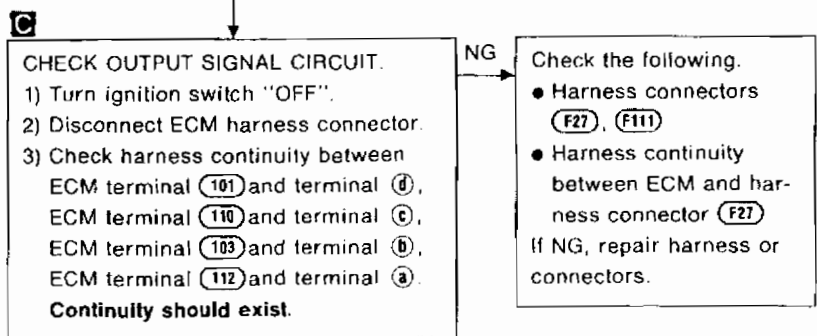
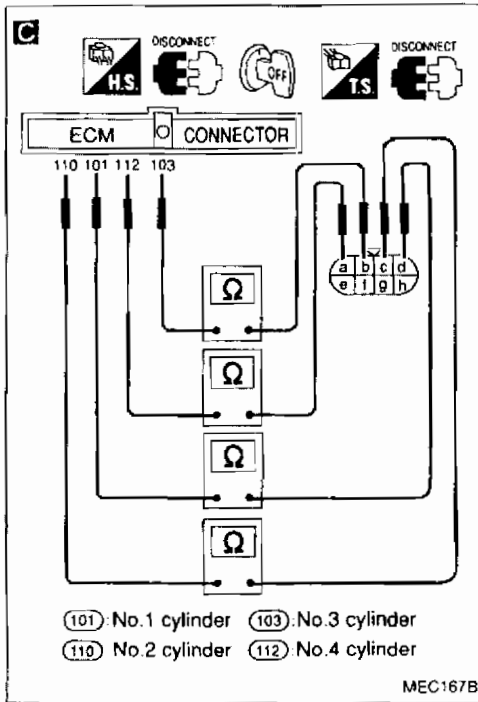
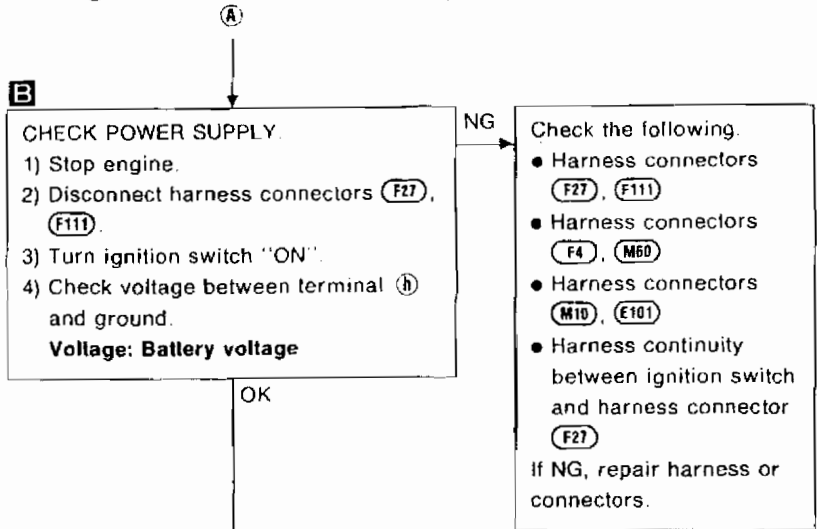
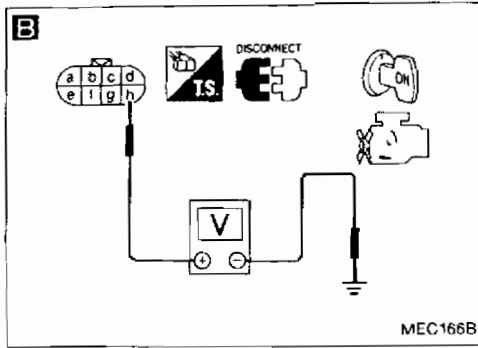


GI  
VA  
EM  
LC  
**EC**  
FE  
CL  
MT  
AT  
PD  
FA  
RA  
RR  
ST  
SC  
BT  
HA  
EL  
FX



# TROUBLE DIAGNOSES

## Diagnostic Procedure 35 (Cont'd)



Disconnect and reconnect harness connectors in the circuit. Then retest.

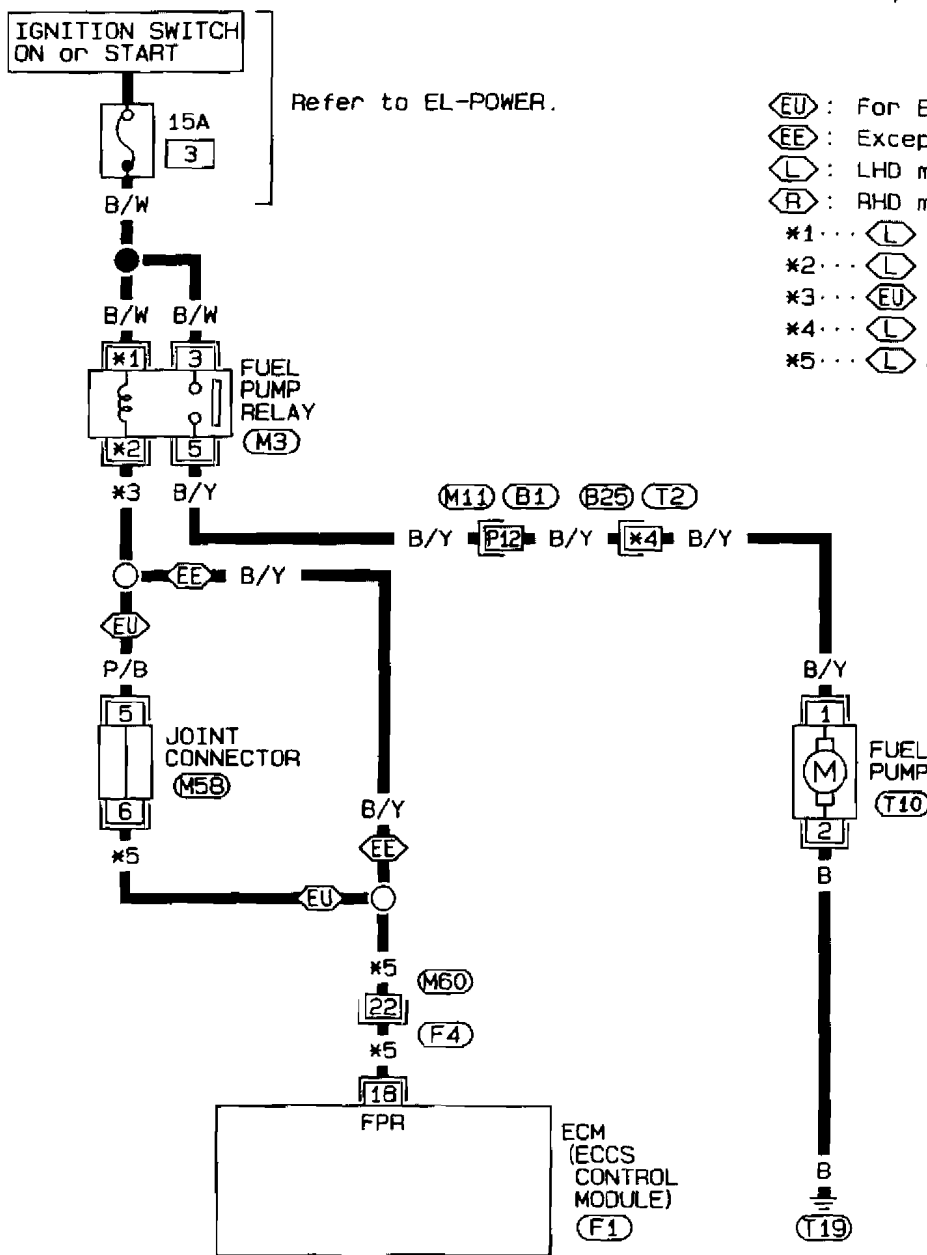
Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Diagnostic Procedure 36

FUEL PUMP (Not self-diagnostic item)

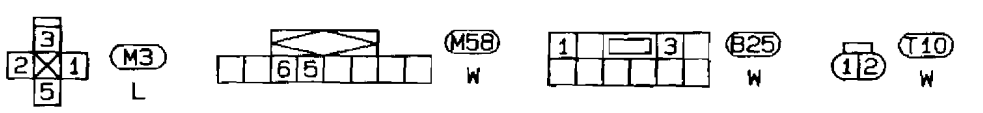
EC-F/PUMP-01



Refer to EL-POWER.

- Ⓔ EU : For Europe
- Ⓔ EE : Except for Europe
- Ⓔ L : LHD models
- Ⓔ R : RHD models
- \*1... Ⓔ L 1, Ⓔ R 2
- \*2... Ⓔ L 2, Ⓔ R 1
- \*3... Ⓔ EU P/B, Ⓔ EE B/Y
- \*4... Ⓔ L 1, Ⓔ R 3
- \*5... Ⓔ L B/P, Ⓔ R B/Y

EC



Refer to last page (Foldout page).

- Ⓔ M11, Ⓔ B1
- Ⓔ M60, Ⓔ F4

|     |     |     |     |     |     |     |     |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
|-----|-----|-----|-----|-----|-----|-----|-----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

Ⓔ F1  
L

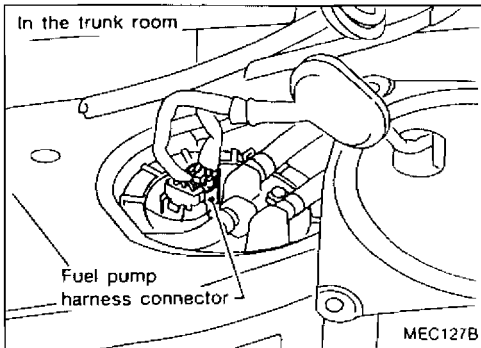
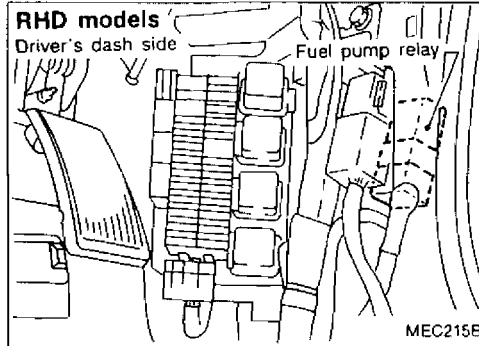
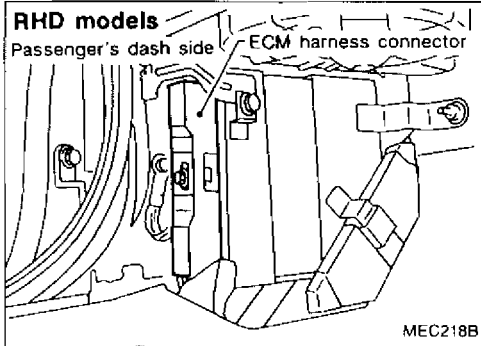
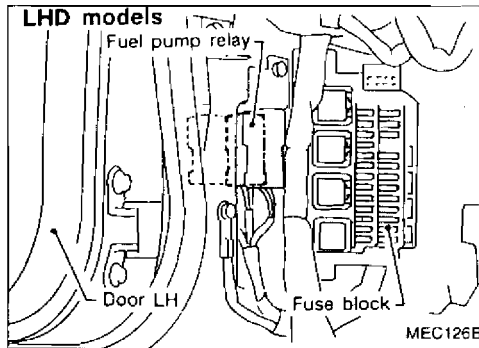
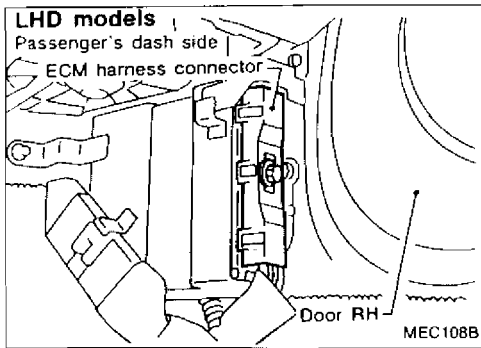


SEP845P

# TROUBLE DIAGNOSES

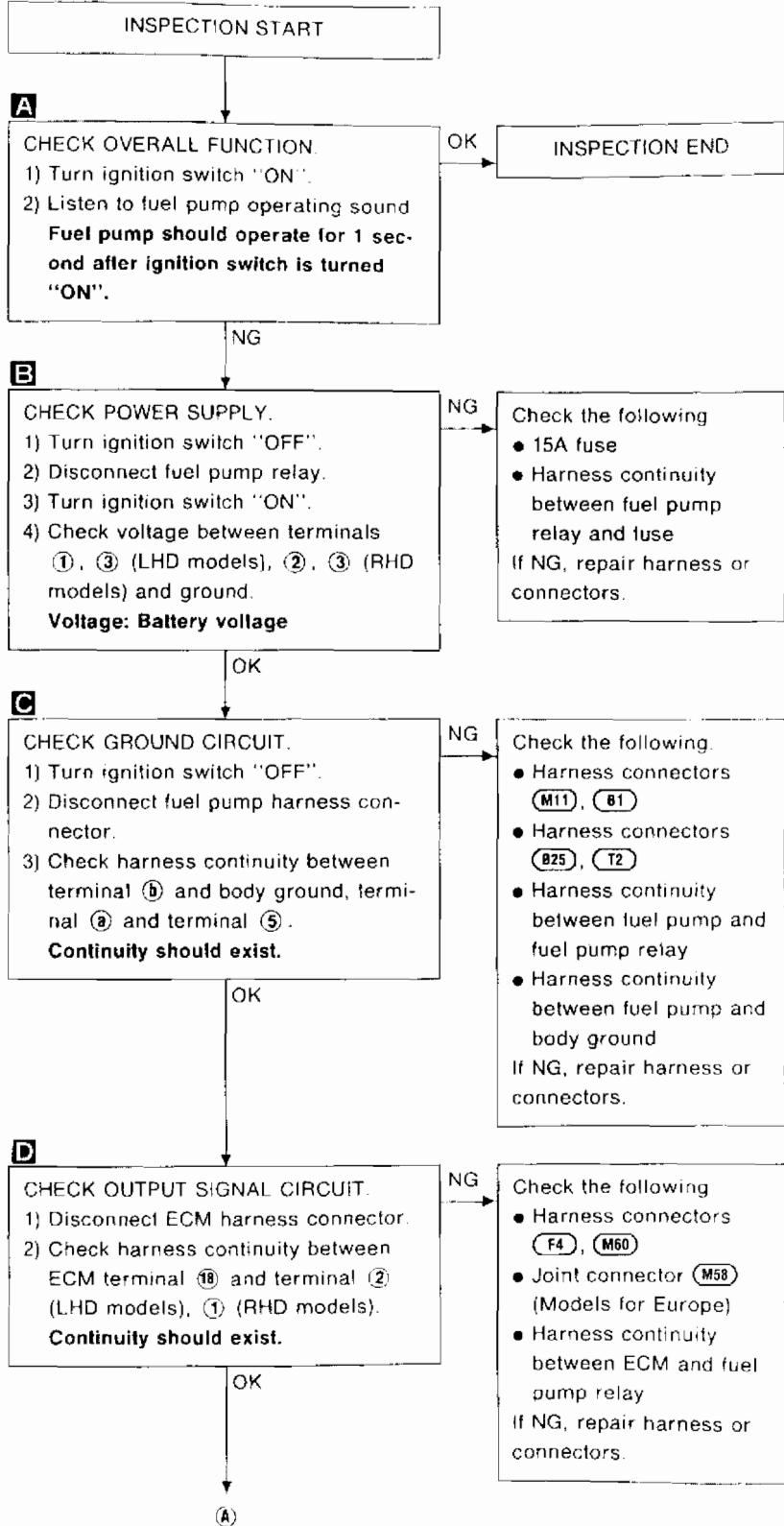
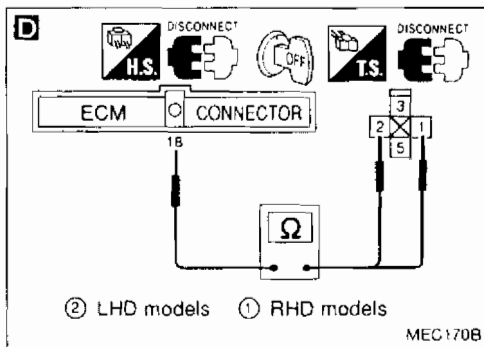
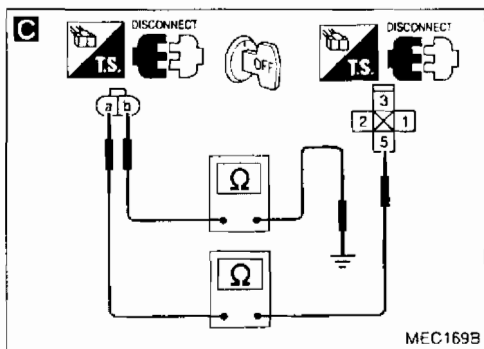
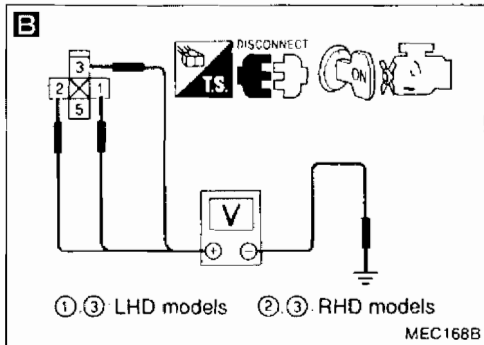
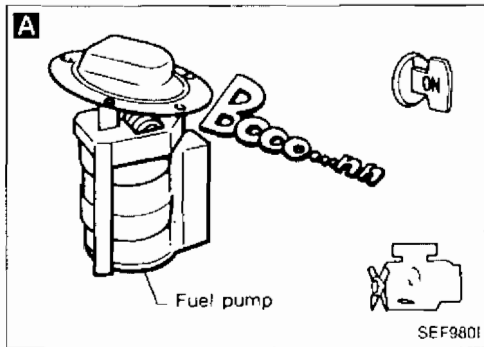
## Diagnostic Procedure 36 (Cont'd)

### Harness layout



# TROUBLE DIAGNOSES

## Diagnostic Procedure 36 (Cont'd)



# TROUBLE DIAGNOSES

## Diagnostic Procedure 36 (Cont'd)

**E**

FUEL PUMP CIRCUIT   
 PINCH FUEL FEED HOSE  
 WITH FINGERS. IS THERE  
 ANY PRESSURE  
 PULSATION ON THE FUEL  
 FEED HOSE?  
 OR  
 DOES THE FUEL PUMP  
 RELAY MAKE AN  
 OPERATING SOUND  
 EVERY 3 SECONDS?

SEF194L

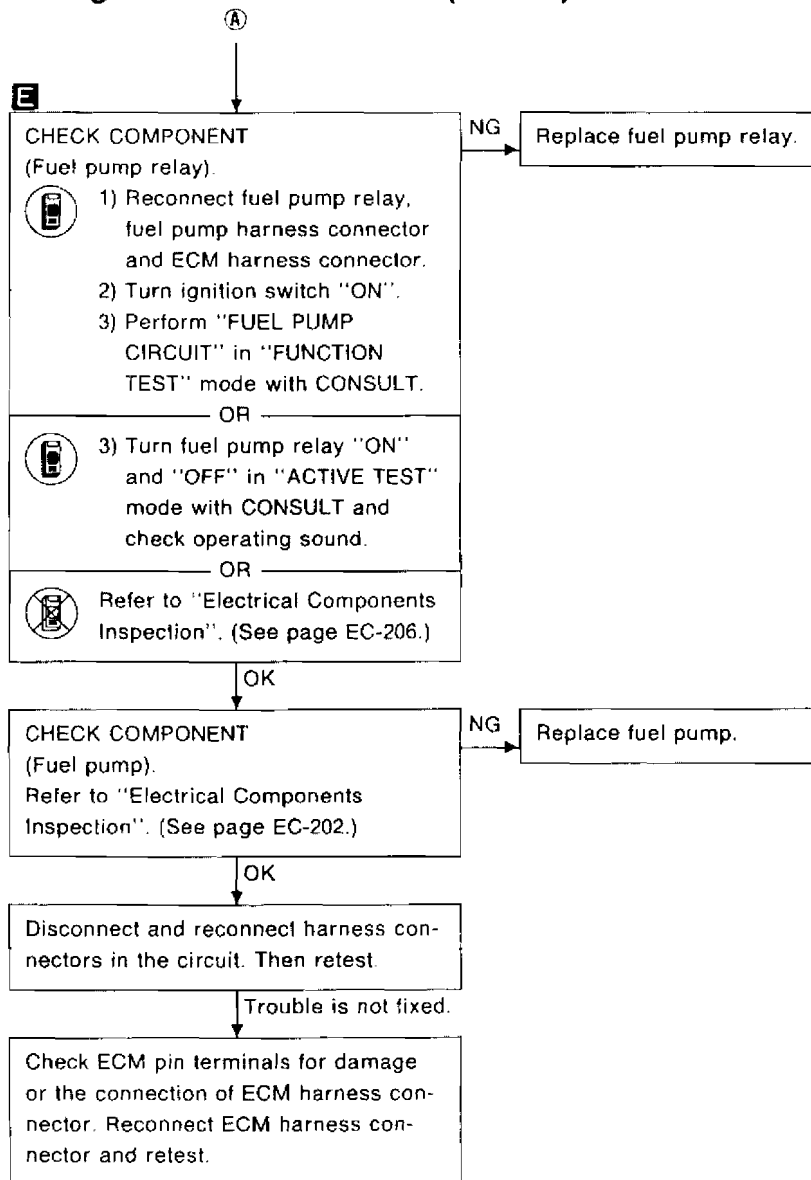
**E**

ACTIVE TEST

FUEL PUMP RELAY ON

== == MONITOR == == ==  
 CAS·RPM (REF) 0rpm

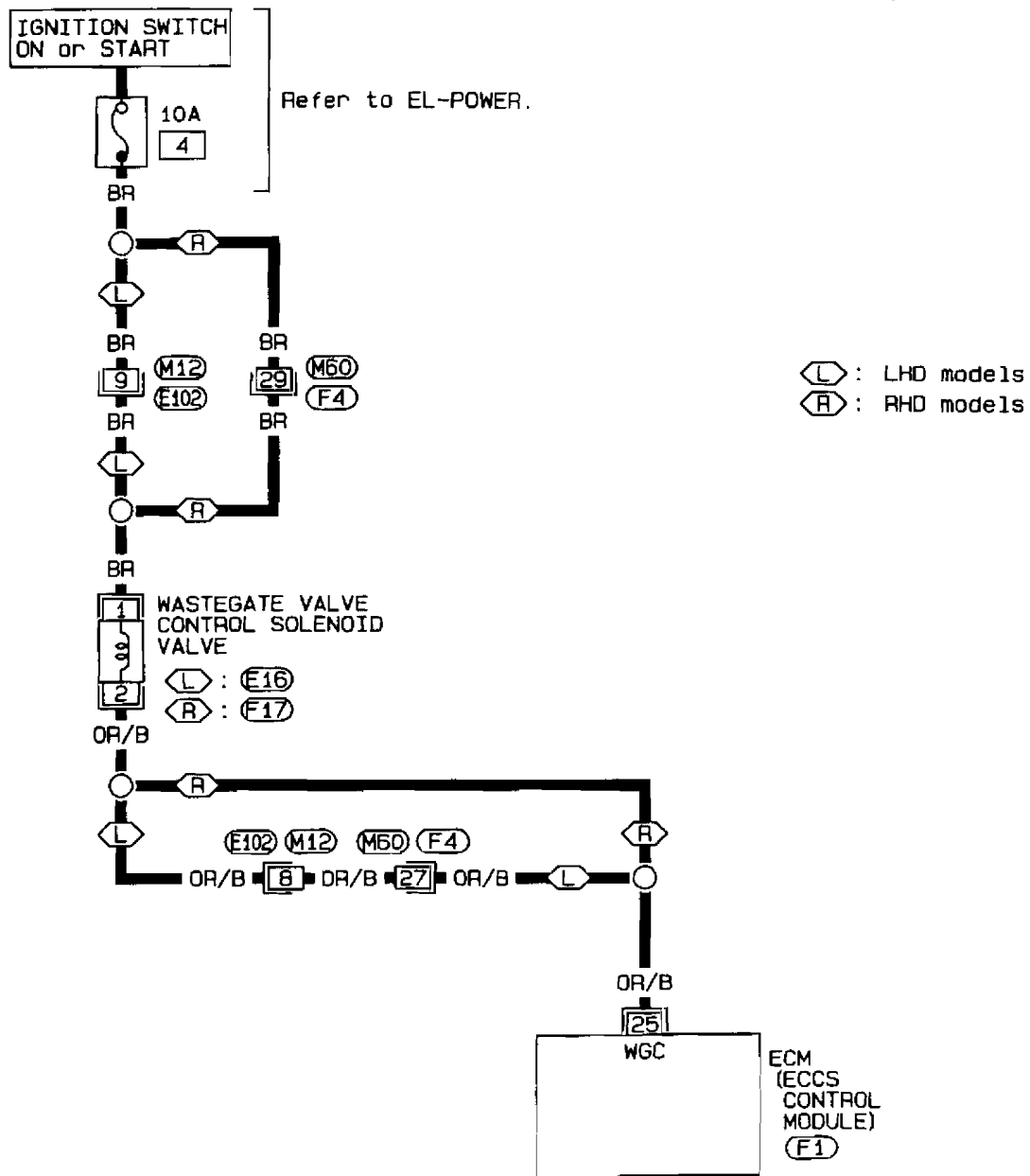
SEF498L



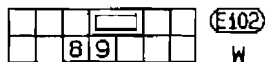
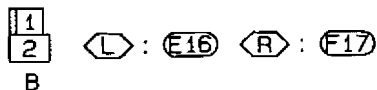
Diagnostic Procedure 37

WASTEGATE VALVE CONTROL (Not self-diagnostic item)

EC-WG/V-01



L : LHD models  
R : RHD models



Refer to last page (Foldout page).

M60, F4

|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

F1  
L



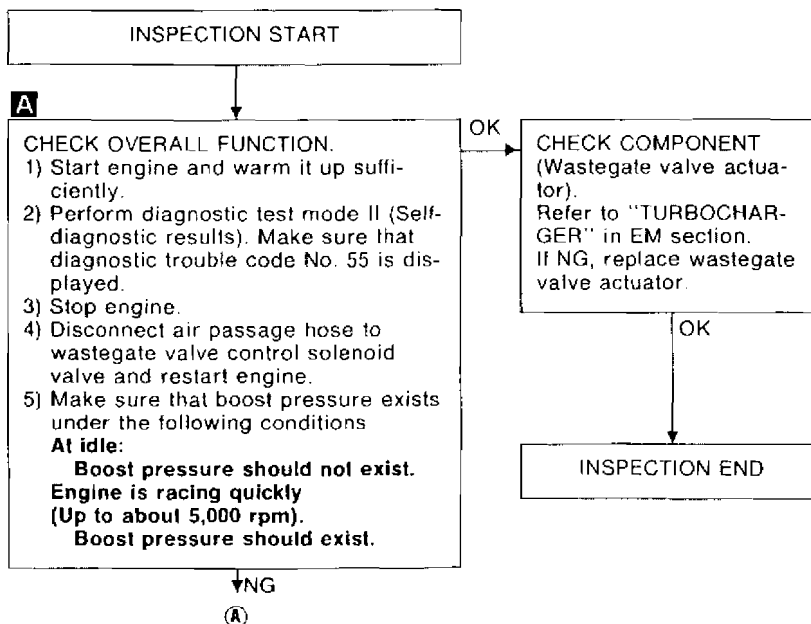
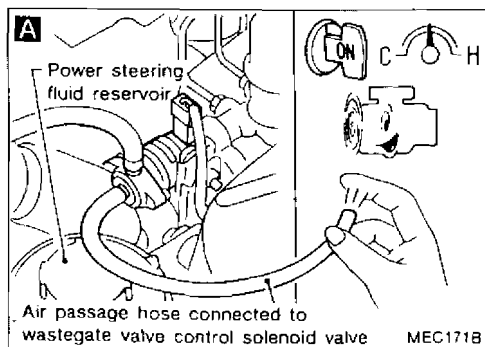
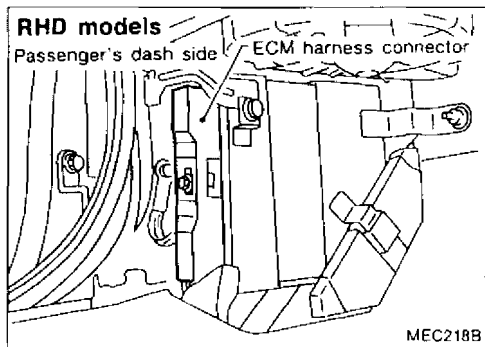
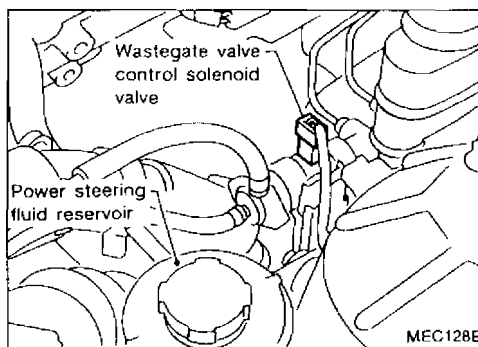
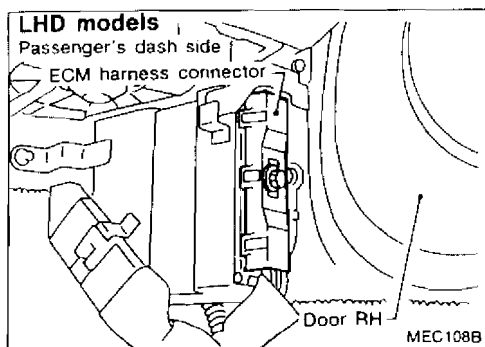
SF841P



# TROUBLE DIAGNOSES

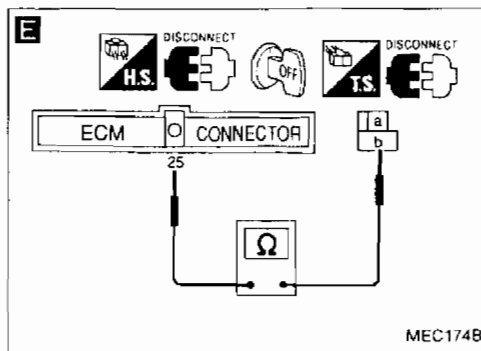
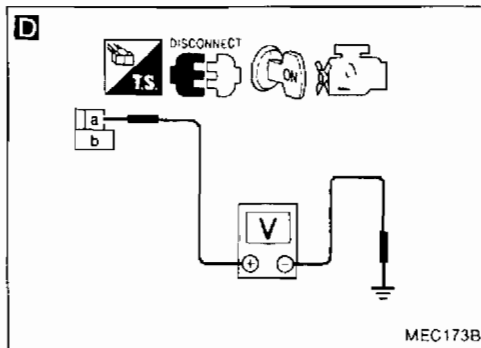
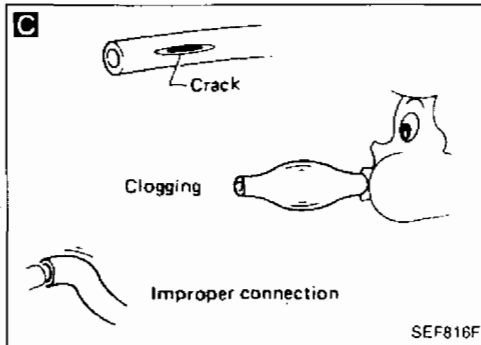
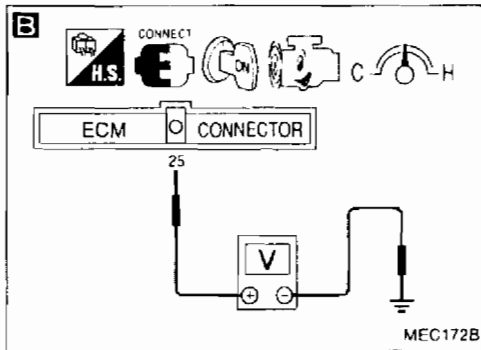
## Diagnostic Procedure 37 (Cont'd)

### Harness layout



# TROUBLE DIAGNOSES

## Diagnostic Procedure 37 (Cont'd)



**B**

**CHECK CONTROL FUNCTION.**  
1) Check voltage between ECM terminal 25 and ground under the following conditions.  
**Voltage:**  
At idle  
Battery voltage  
Engine is racing quickly (Up to about 5,000 rpm).  
Approximately 4 - 5V

OK →

**C**

Check air passage hose for clogging, cracks and proper connection.

NG ↓

**D**

**CHECK POWER SUPPLY.**  
1) Stop engine.  
2) Disconnect wastegate valve control solenoid valve harness connector.  
3) Turn ignition switch "ON".  
4) Check voltage between terminal a and ground.  
**Voltage: Battery voltage**

NG →

Check the following.

- Harness connectors (M12), (E102) (LHD models)
- Harness connectors (M60), (F4) (RHD models)
- 10A fuse
- Harness continuity between wastegate valve control solenoid valve and fuse.

If NG, repair harness or connectors.

OK ↓

**E**

**CHECK OUTPUT SIGNAL CIRCUIT.**  
1) Turn ignition switch "OFF".  
2) Disconnect ECM harness connector.  
3) Check harness continuity between ECM terminal 25 and terminal b.  
**Continuity should exist.**

NG →

Check the following.

- Harness connectors (E102), (M12) (LHD models)
- Harness connectors (M60), (F4) (LHD models)
- Harness continuity between ECM and wastegate valve control solenoid valve

If NG, repair harness or connectors.

OK ↓

**CHECK COMPONENT** (Wastegate valve control solenoid valve).  
Refer to "Electrical Components Inspection". (See page EC-205.)

NG →

Replace wastegate valve control solenoid valve.

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

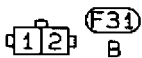
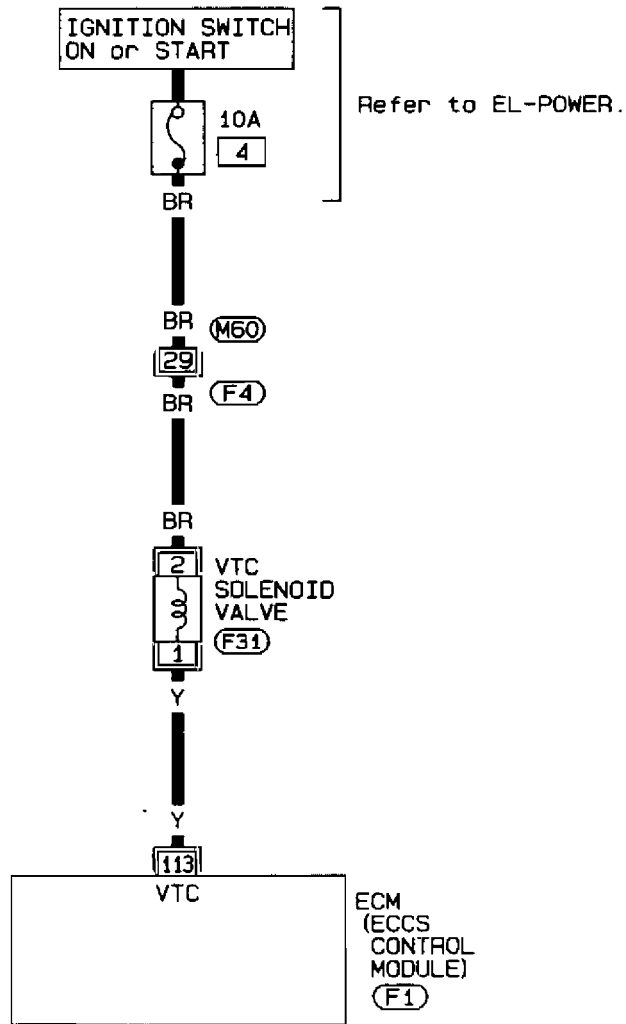
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

# TROUBLE DIAGNOSES

## Diagnostic Procedure 38

### VALVE TIMING CONTROL (Not self-diagnostic item)

EC-VTC-01



Refer to last page  
(Foldout page).

(M60), (F4)

|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | ○ | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |   | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

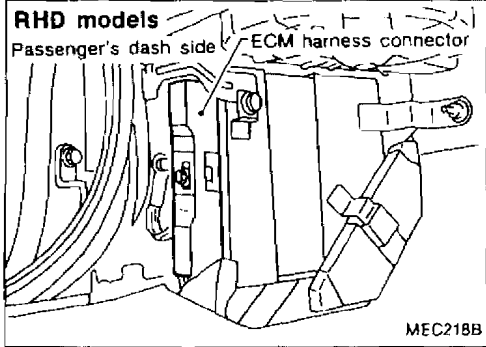
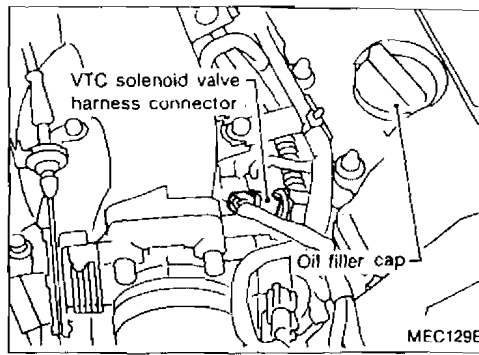
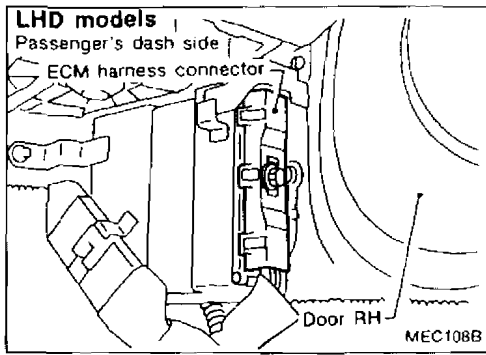
(F1)  
L



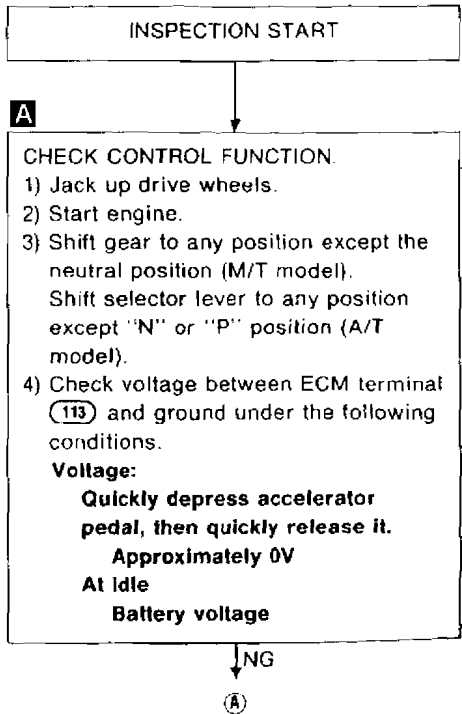
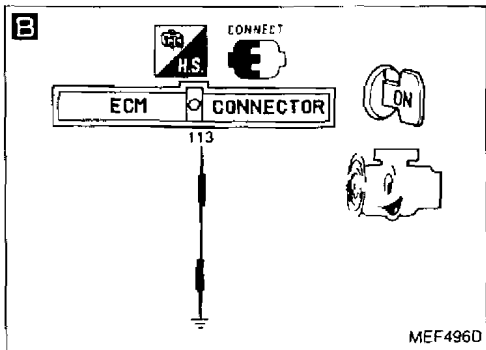
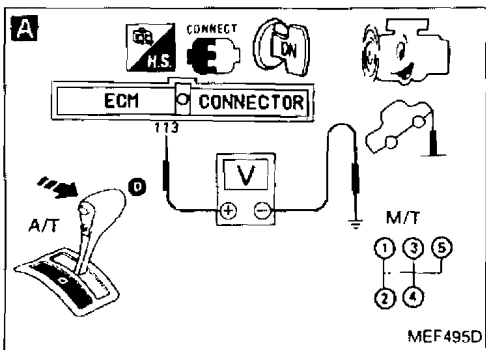
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Diagnostic Procedure 38 (Cont'd)

Harness layout

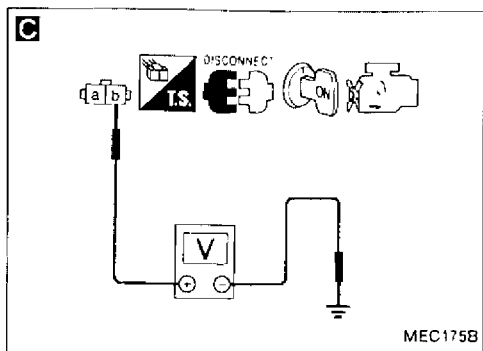


DI  
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# TROUBLE DIAGNOSES

## Diagnostic Procedure 38 (Cont'd)



**C**

**CHECK POWER SUPPLY.**

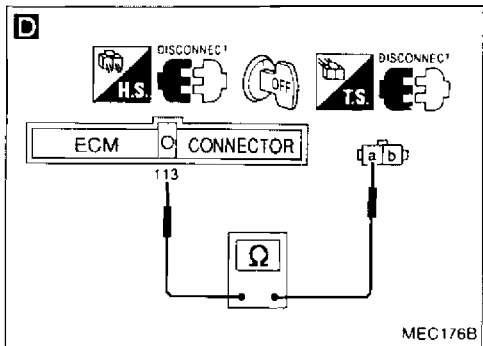
- 1) Stop engine.
- 2) Disconnect VTC solenoid valve harness connector.
- 3) Turn ignition switch "ON".
- 4) Check voltage between terminal (b) and ground.

**Voltage: Battery voltage.**

NG → Check the following.

- Harness connectors (M60, F4)
- 10A fuse
- Harness continuity between VTC solenoid valve and fuse

If NG, repair harness or connectors.



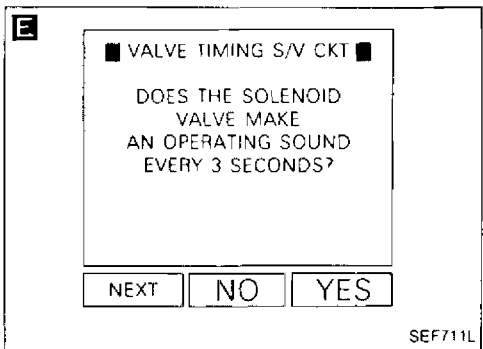
**D**

**CHECK INPUT SIGNAL CIRCUIT.**

- 1) Turn ignition switch "OFF".
- 2) Disconnect ECM harness connector.
- 3) Check harness continuity between terminal (a) and ECM terminal (f13).

**Continuity should exist.**

NG → Repair harness or connectors.



**E**

**CHECK COMPONENT (VTC solenoid valve).**

- 1) Reconnect ECM harness connector and VTC solenoid valve harness connector.
- 2) Turn ignition switch "ON".
- 3) Perform "VALVE TIMING S/V CKT" in "FUNCTION TEST" mode with CONSULT.

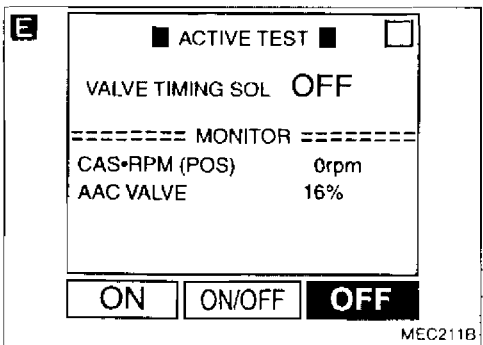
OR

- 3) Perform "VALVE TIMING SOL" in "ACTIVE TEST" mode with CONSULT.
- 4) Turn VTC solenoid valve "ON" and "OFF", and check operating sound.

OR

Refer to "Electrical Components Inspection". (See page EC-205.)

NG → Replace VTC solenoid valve.



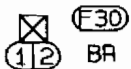
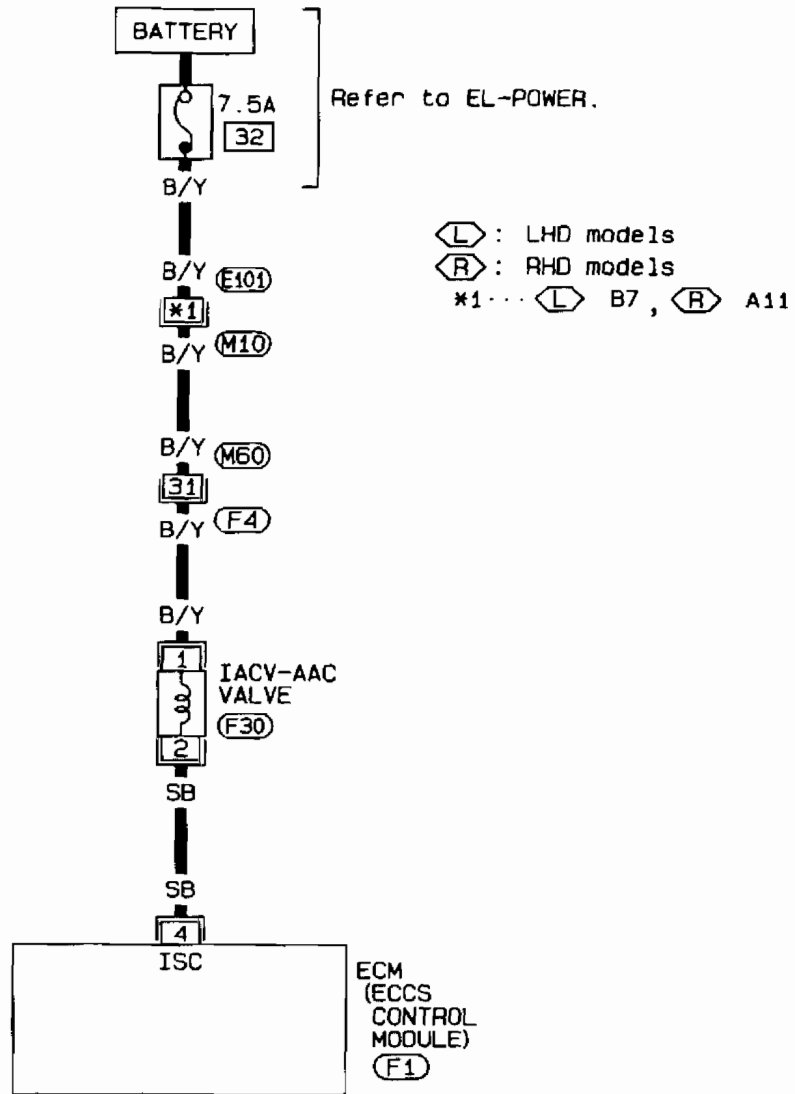
OK → Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed → Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

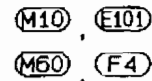
Diagnostic Procedure 39

IACV-AAC VALVE (Not self-diagnostic item)

EC-AAC/V-01



Refer to last page (Foldout page).



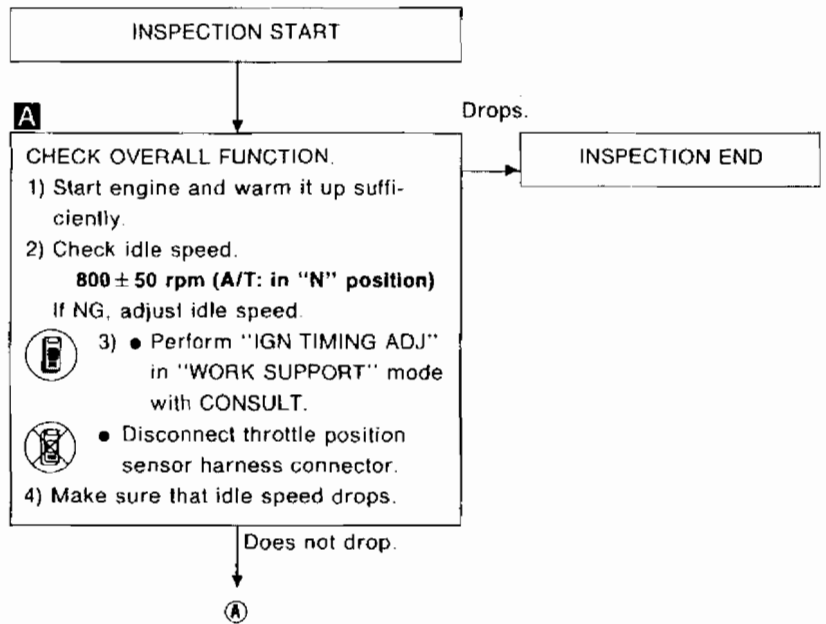
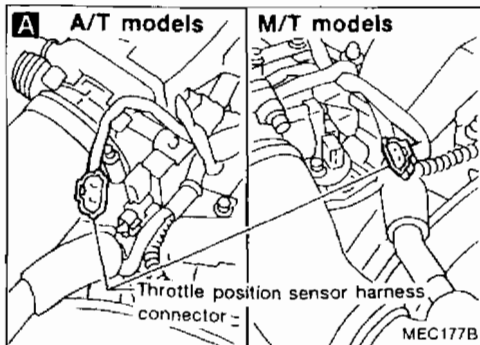
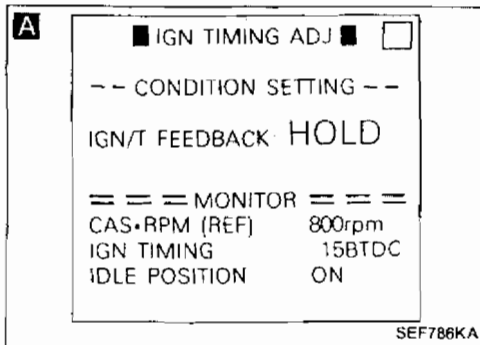
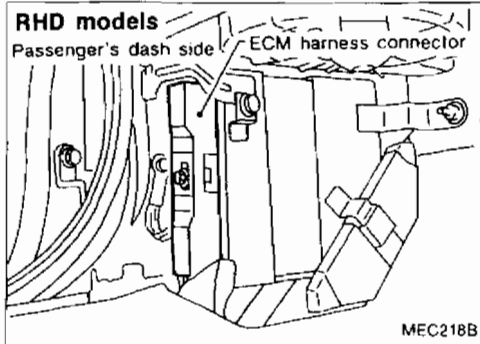
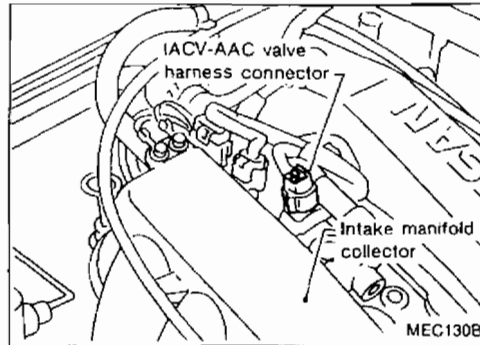
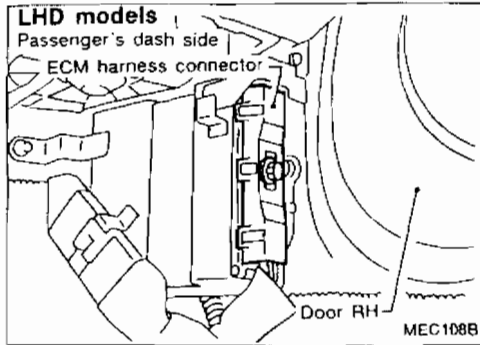
|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |



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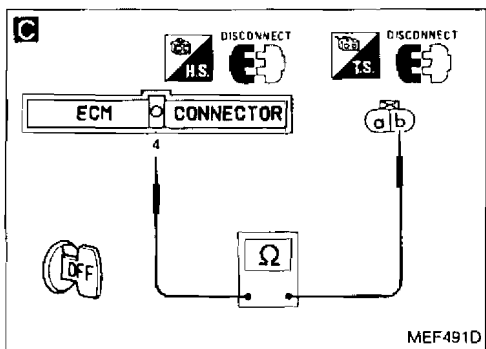
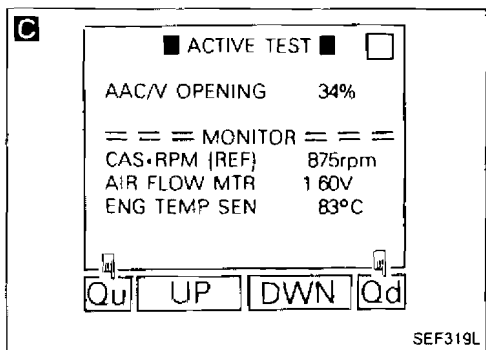
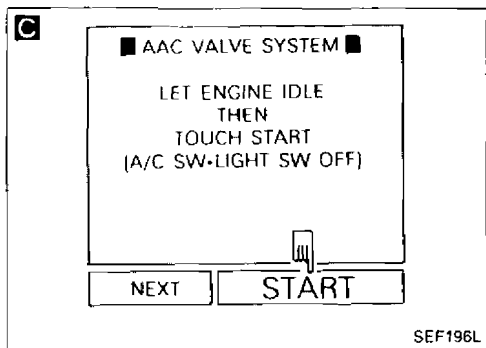
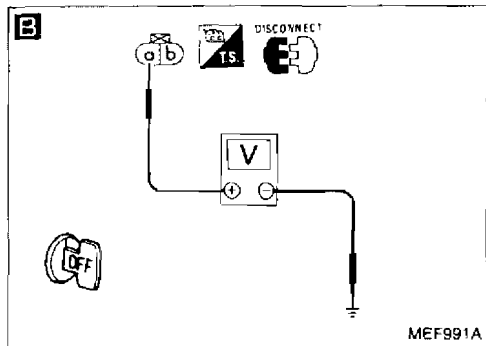
## Diagnostic Procedure 39 (Cont'd)

### Harness layout



# TROUBLE DIAGNOSES

## Diagnostic Procedure 39 (Cont'd)



**B**

**CHECK POWER SUPPLY.**

- 1) Stop engine.
- 2) Disconnect IACV-AAC valve harness connector.
- 3) Check voltage between terminal **(a)** and ground.

**Voltage: Battery voltage**

NG → Check the following.

- Harness connectors **(E101)**, **(M10)**
- Harness connectors **(M60)**, **(F4)**
- 7.5A fuse
- Harness continuity between IACV-AAC valve and fuse

If NG, repair harness or connectors.

OK ↓

**C**

**CHECK OUTPUT SIGNAL CIRCUIT.**

- 1) Reconnect IACV-AAC valve harness connector.
- 2) Perform "AAC VALVE SYSTEM" or "IACV-AAC/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.

OR

- 2) Perform "AAC VALVE OPENING TEST" or "IACV-AAC/V OPENING" in "ACTIVE TEST" mode with CONSULT.

OR

- 1) Disconnect ECM harness connector.
- 2) Check harness continuity between ECM terminal **(4)** and terminal **(b)**.

**Continuity should exist.**

NG → Repair harness or connectors.

OK ↓

**CHECK COMPONENT**  
(IACV-AAC valve).  
Refer to "Electrical Components Inspection". (See page EC-204.)

NG → Replace IACV-AAC valve.

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest

ST  
VA  
EM  
LC  
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FA  
RA  
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ST  
AS  
ST  
HA  
EL  
FOX

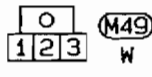
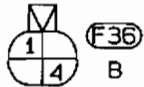
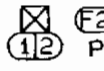
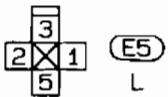
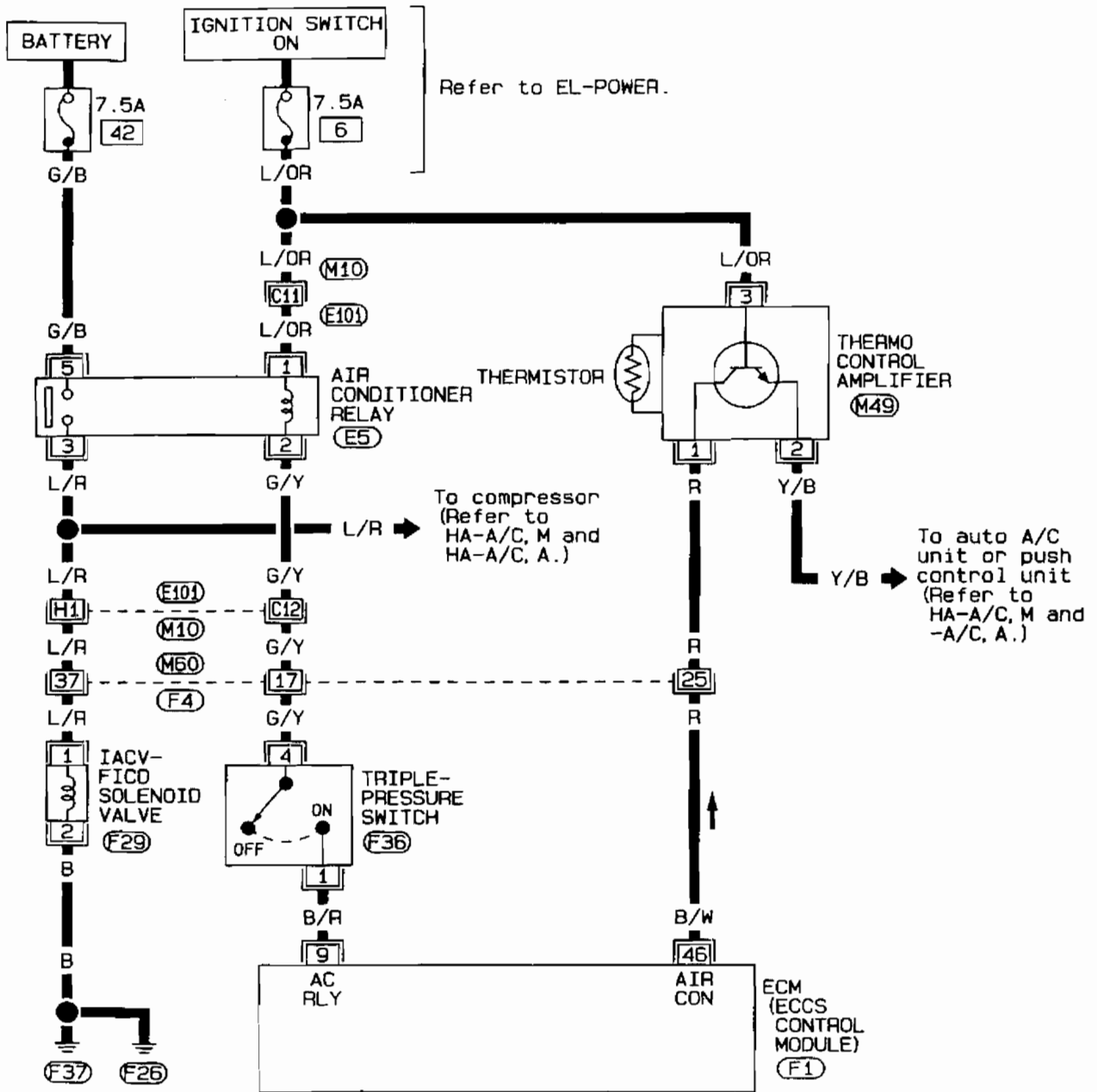


Diagnostic Procedure 40

IACV-FICD SOLENOID VALVE (Not self-diagnostic item)

LHD MODELS

EC-FICD-01



Refer to last page (Foldout page).

- (M10), (E101)
- (M60), (F4)

|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |



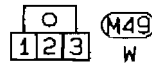
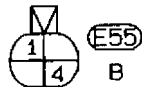
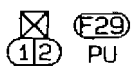
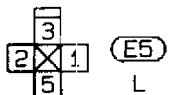
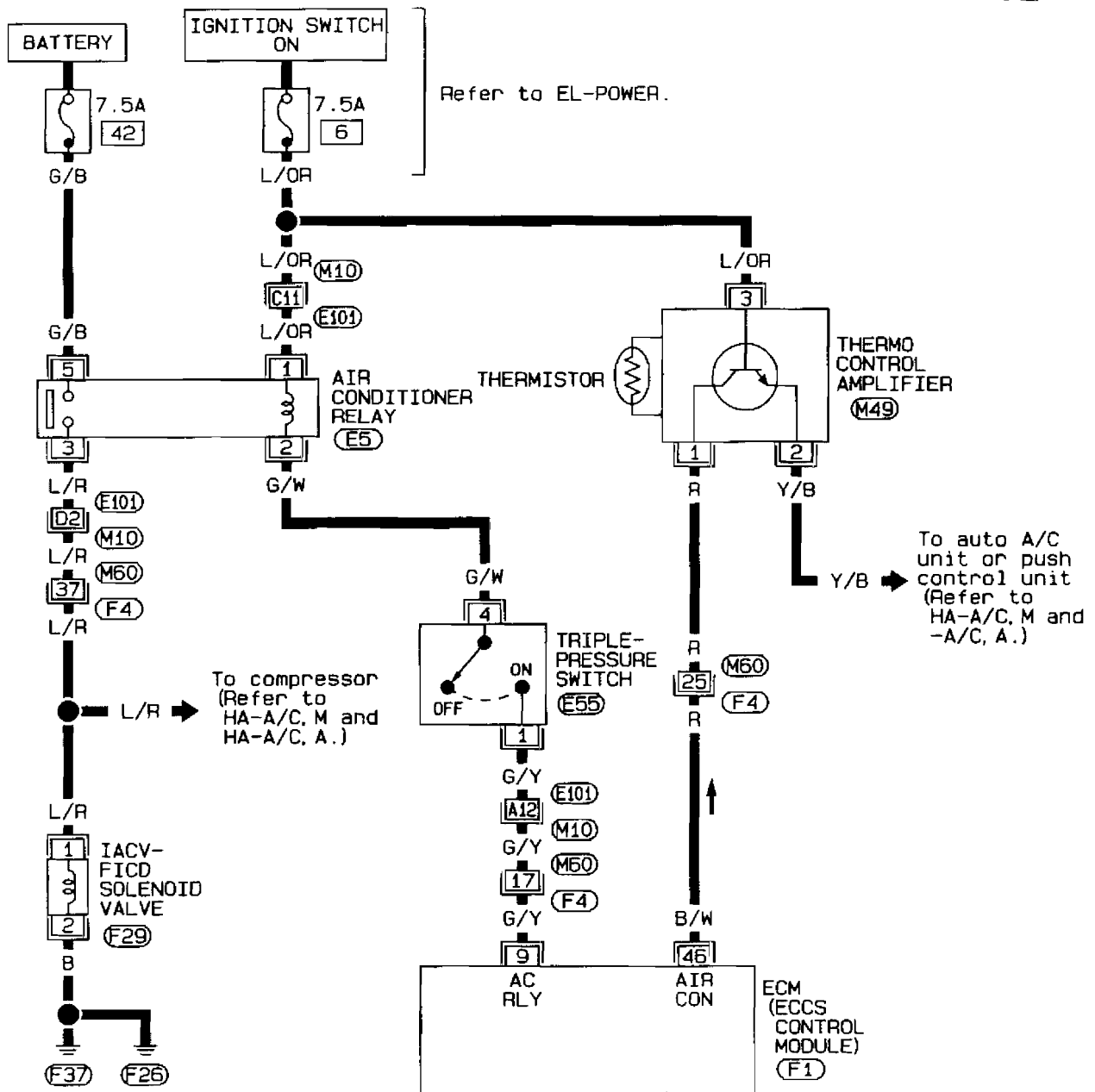
SEF846P

# TROUBLE DIAGNOSES

## Diagnostic Procedure 40 (Cont'd)

RHD MODELS

EC-FICD-02



Refer to last page (Foldout page).

(M10) (E101)  
(M60) (F4)

|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

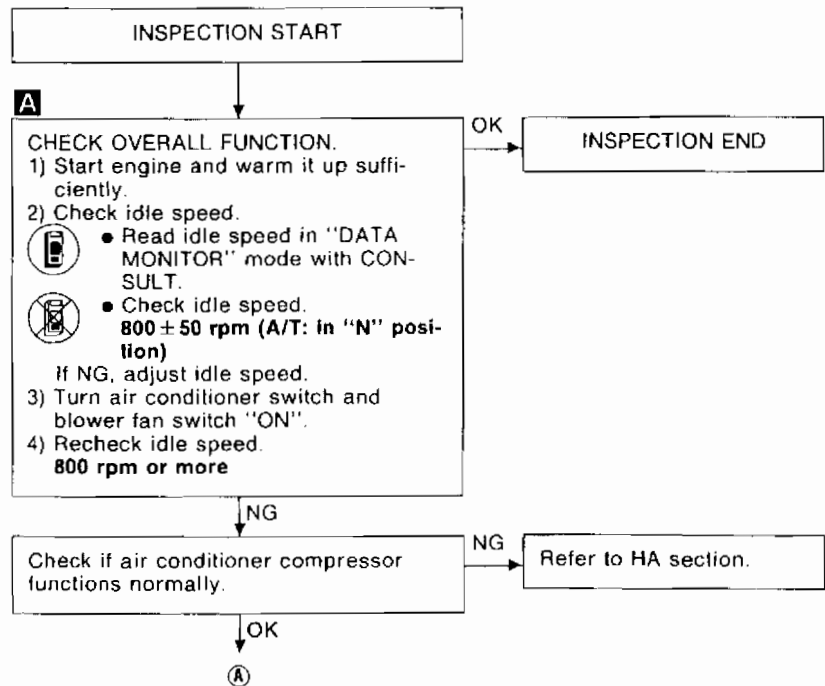
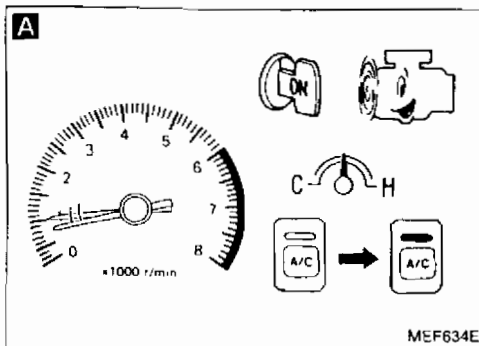
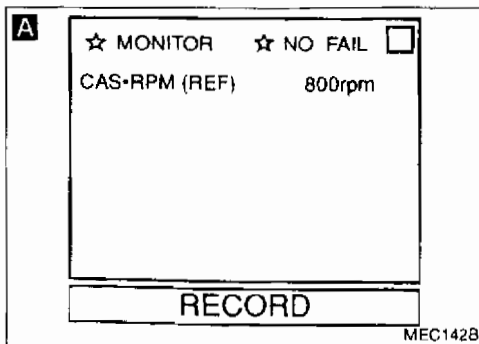
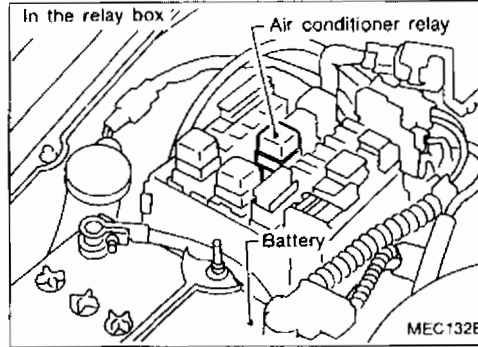
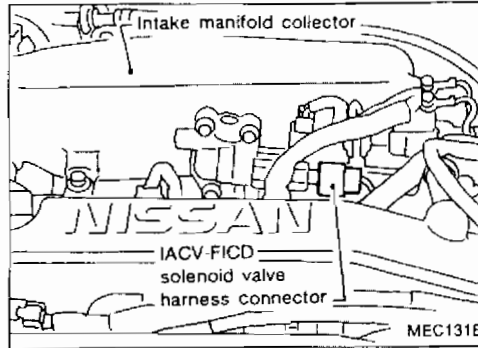
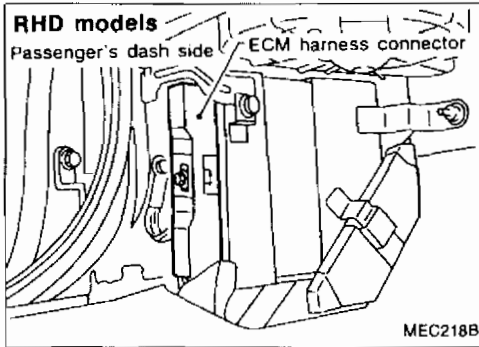
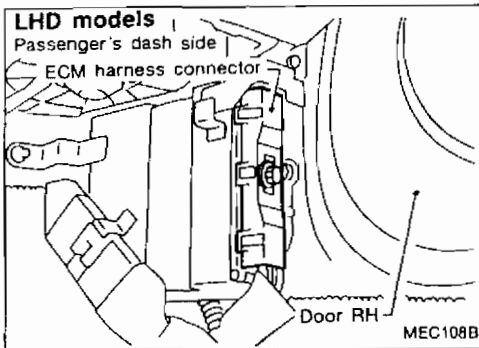
(F1)  
L



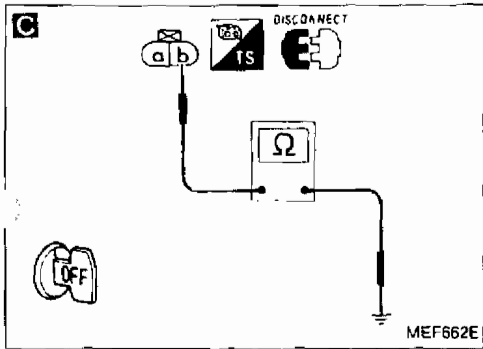
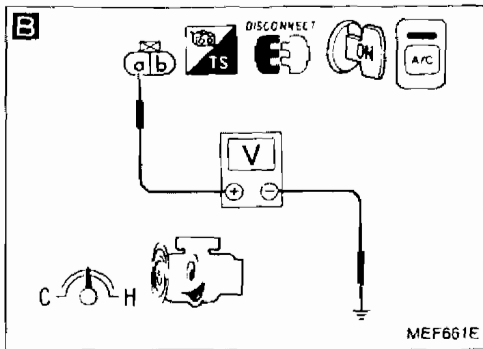
SEF847P

## Diagnostic Procedure 40 (Cont'd)

### Harness layout



**Diagnostic Procedure 40 (Cont'd)**



**B**

**CHECK POWER SUPPLY.**

- 1) Stop engine and turn air conditioner switch and blower fan switch "OFF".
- 2) Disconnect IACV-FICD solenoid valve harness connector.
- 3) Restart engine and turn air conditioner switch and blower fan switch "ON".
- 4) Check voltage between terminal **a** and ground.

**Voltage: Battery voltage**

NG

Check the following.

- Harness connectors **E101**, **M10**
- Harness connectors **M60**, **F4**
- Harness continuity between A/C relay and IACV-FICD solenoid valve

If NG, repair harness or connectors.

**C**

**CHECK GROUND CIRCUIT.**

- 1) Stop engine.
- 2) Check harness continuity between terminal **b** and engine ground.

**Continuity should exist.**

NG

Repair harness or connectors.

**CHECK COMPONENT**  
(IACV-FICD solenoid valve).  
Refer to "Electrical Components Inspection". (See page EC-205.)

NG

Replace IACV-FICD solenoid valve.

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

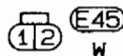
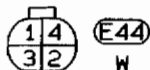
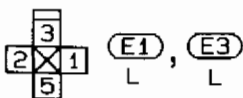
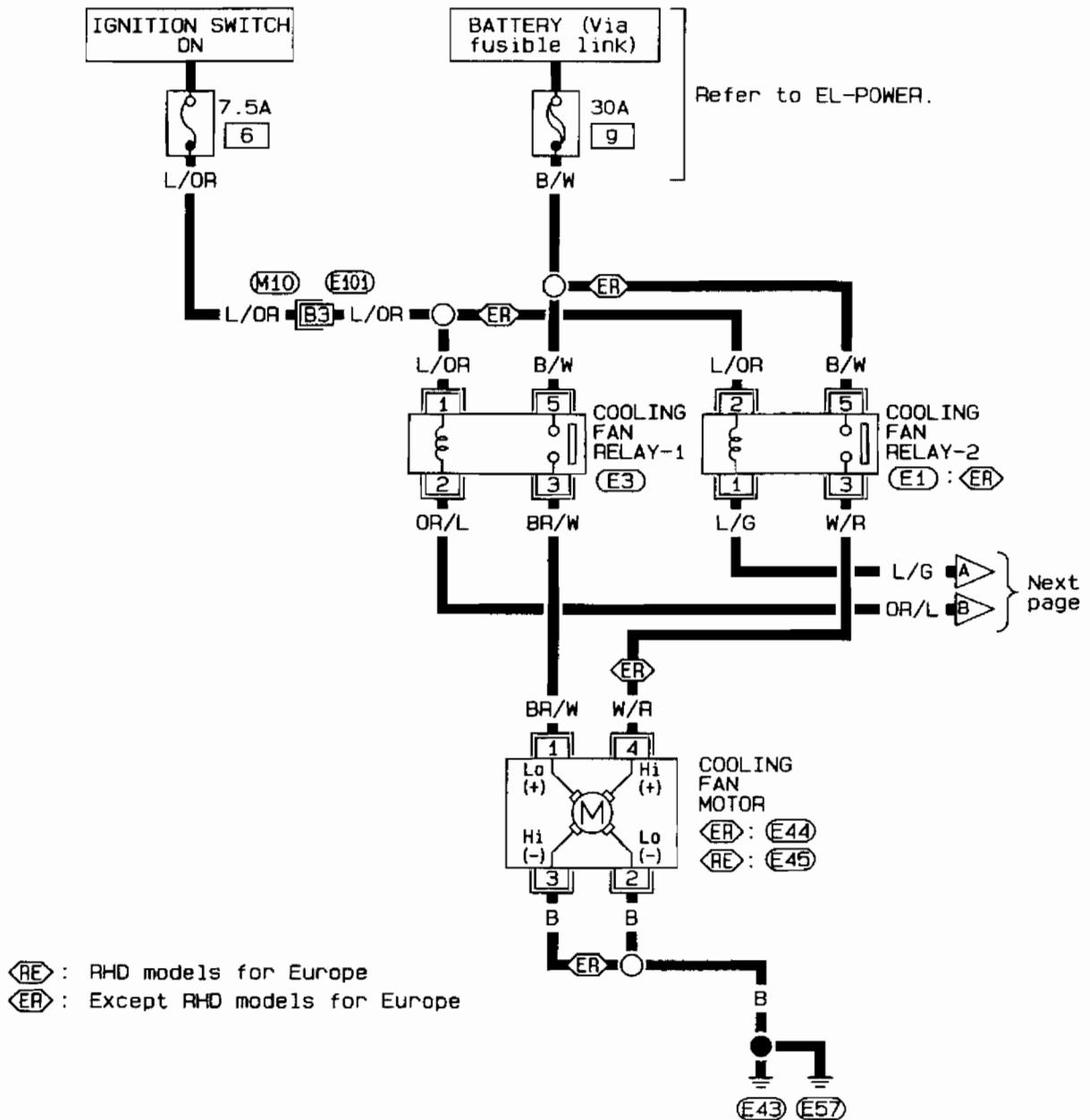
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

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ST  
RS  
BT  
HA  
EL  
DX

Diagnostic Procedure 41

COOLING FAN CONTROL (Not self-diagnostic item)

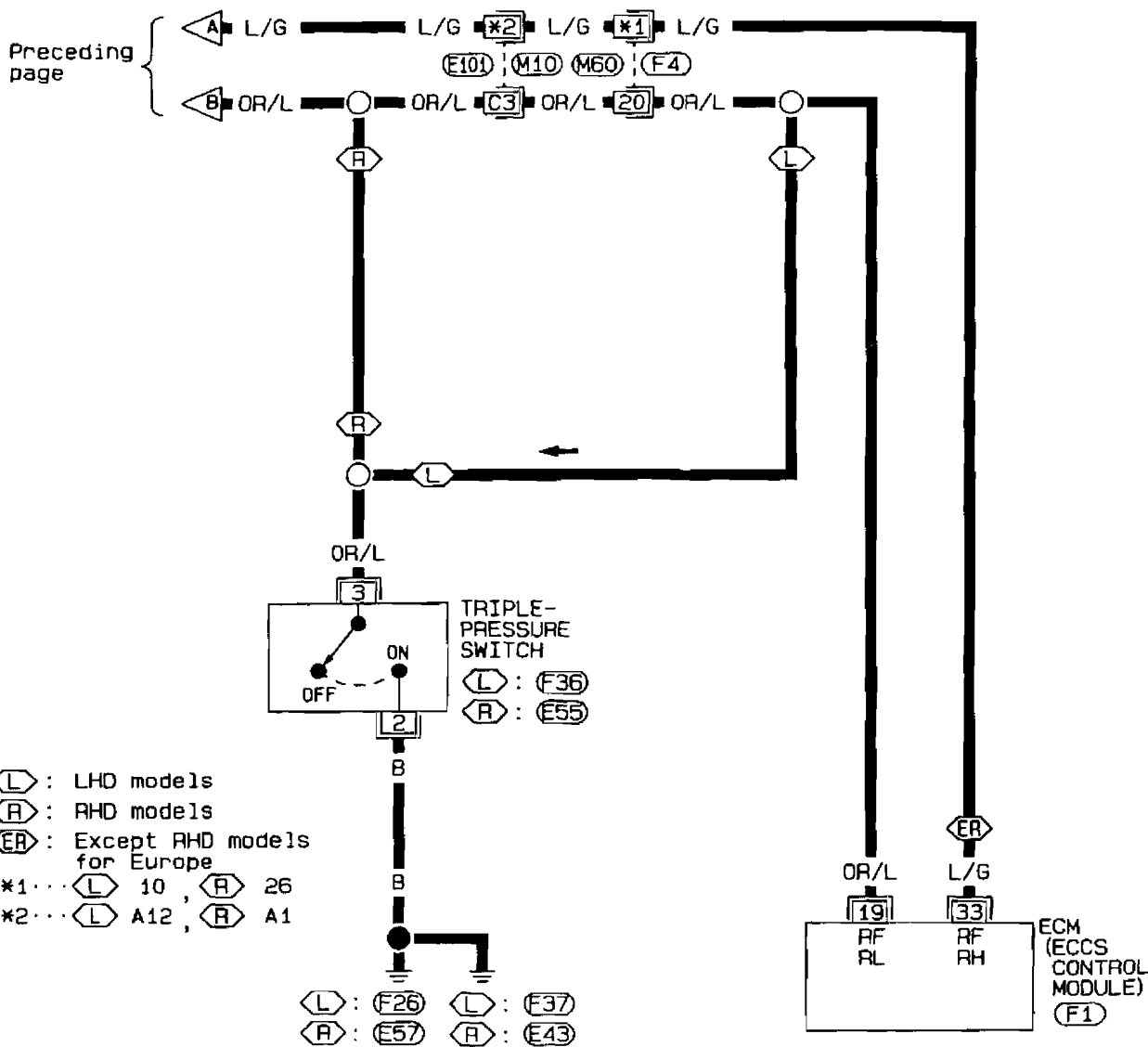
EC-COOL/F-01



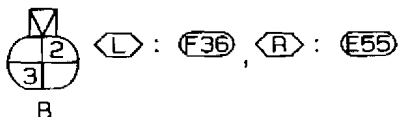
Refer to last page (Foldout page).

M10, E101

EC-COOL/F-02



EC



Refer to last page (Foldout page).

(M10) (E101)  
 (M60) (F4)

|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

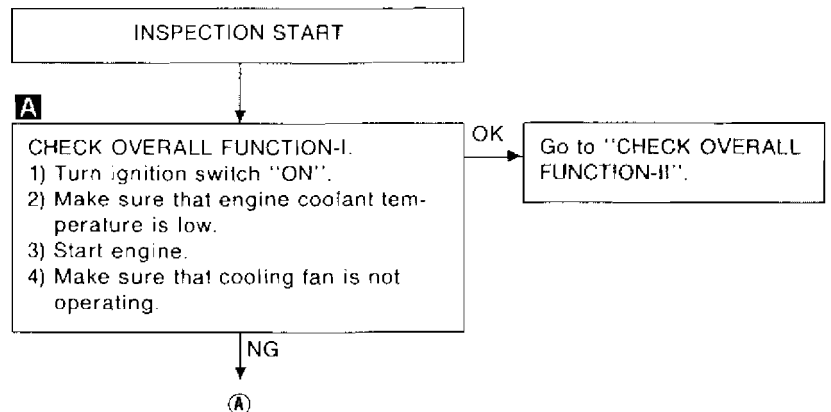
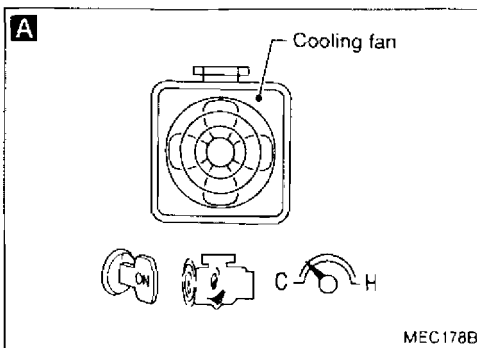
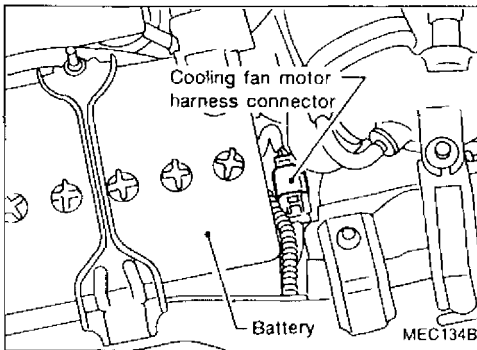
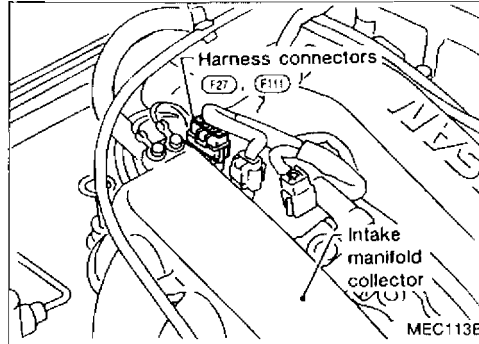
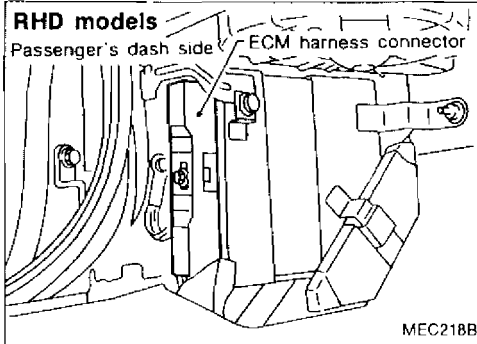
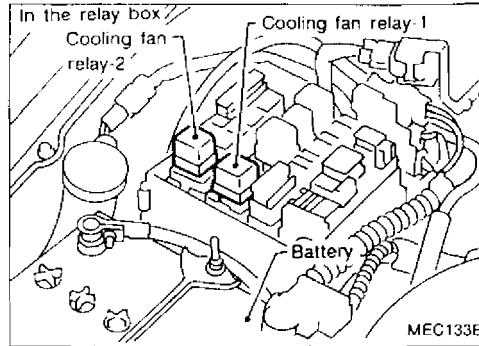
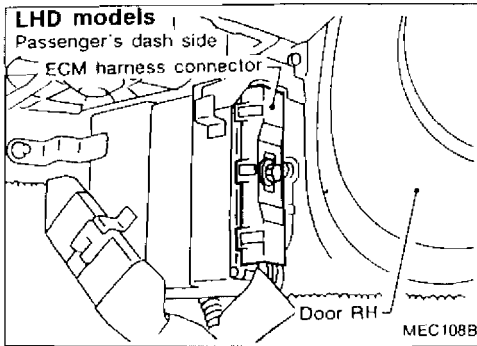
(F1)  
 L



# TROUBLE DIAGNOSES

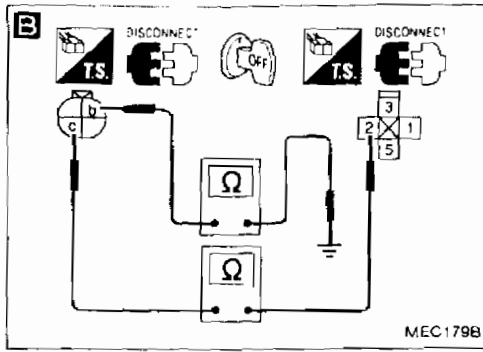
## Diagnostic Procedure 41 (Cont'd)

### Harness layout



# TROUBLE DIAGNOSES

## Diagnostic Procedure 41 (Cont'd)



**B**

CHECK HARNESS CONTINUITY BETWEEN COOLING FAN RELAY-1 AND GROUND.

- 1) Stop engine.
- 2) Disconnect cooling fan relay-1.
- 3) Disconnect triple-pressure switch harness connector.
- 4) Check harness continuity between terminal ② and terminal ⑥, terminal ④ and body ground. **Continuity should exist.**

NG

Check the following.

- Harness connectors (E101), (M10) (LHD models)
- Harness connectors (M60), (F4) (LHD models)
- Harness continuity between cooling fan relay-1 and triple-pressure switch
- Harness continuity between triple-pressure switch and body ground.

If NG, repair harness or connectors.

OK

CHECK COMPONENT (Triple-pressure switch). Refer to "HA section".

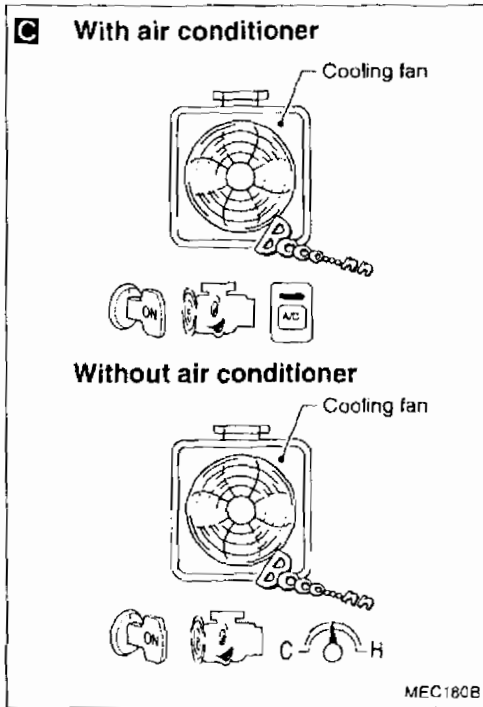
NG

Replace triple-pressure switch.

OK

Go to "CHECK OUTPUT SIGNAL CIRCUIT" in **PROCEDURE A**

CHECK OVERALL FUNCTION-II.



**C**

CHECK COOLING FAN LOW SPEED OPERATION.

**With air conditioner**

- 1) Start engine.
- 2) Set temperature lever at full cold position.
- 3) Turn air conditioner switch "ON".
- 4) Turn blower fan switch "ON".
- 5) Run engine at idle for a few minutes with air conditioner operating.
- 6) Make sure that cooling fan operates at low speed.

**Without air conditioner**

- 1) Start engine.
- 2) Keep engine speed at about 2,000 rpm until engine is warmed up sufficiently.
- 3) Make sure that cooling fan begins to operate at low speed during warm-up.

NG

Check cooling fan low speed control circuit (Go to **PROCEDURE A** .)

(RE): RHD models for Europe  
(ER): Except RHD models for Europe

OK

(RE)

INSPECTION END

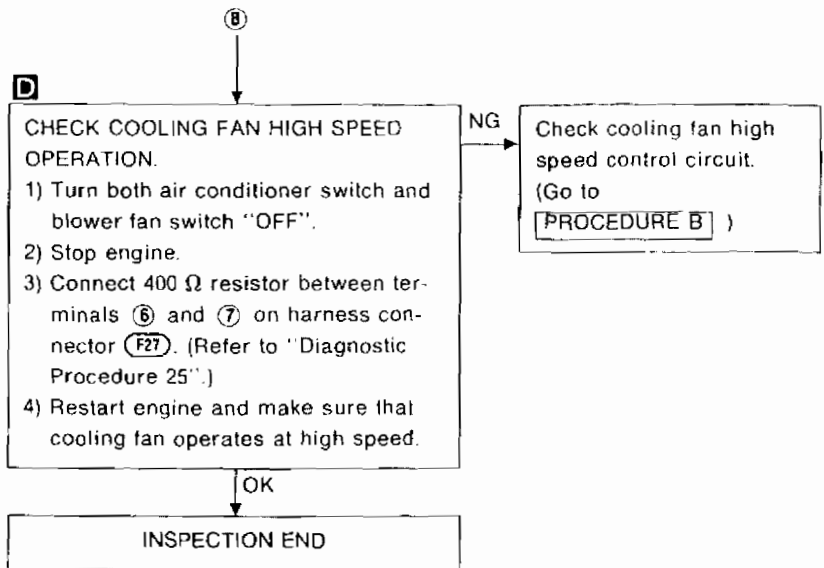
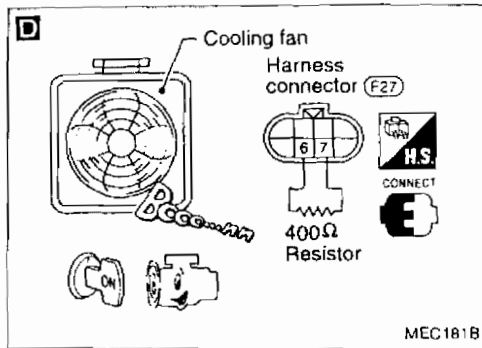
(ER)

(B)



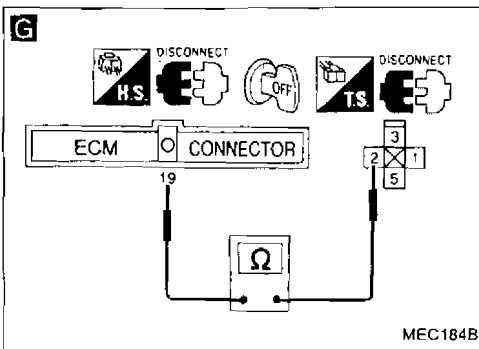
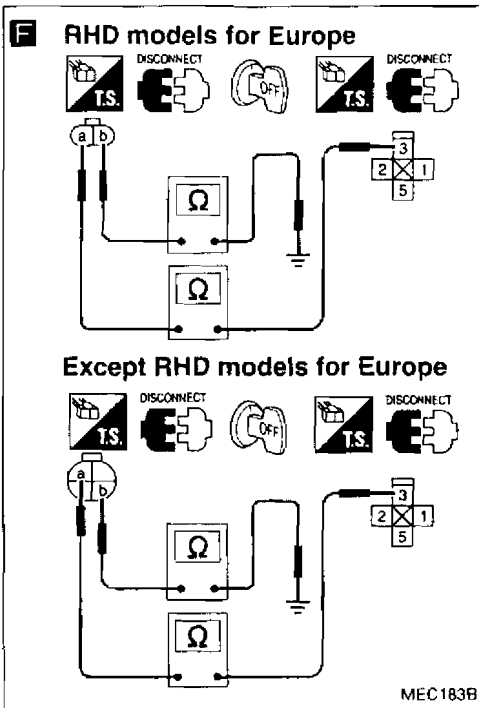
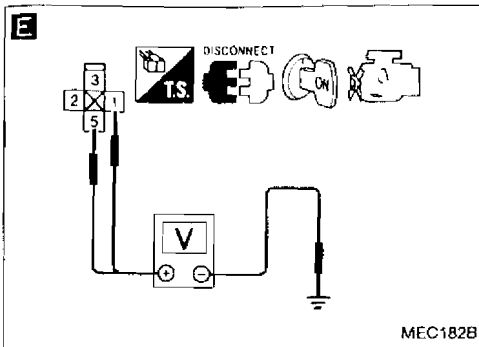
# TROUBLE DIAGNOSES

## Diagnostic Procedure 41 (Cont'd)



# TROUBLE DIAGNOSES

## Diagnostic Procedure 41 (Cont'd)



PROCEDURE A

INSPECTION START

**E**

CHECK POWER SUPPLY.

- 1) Stop engine.
- 2) Disconnect cooling fan relay-1.
- 3) Turn ignition switch "ON".
- 4) Check voltage between terminals ①, ⑤ and ground.

**Voltage: Battery voltage**

NG

Check the following.

- Harness connectors (M10), (E10)
- 7.5A fuse
- 30A fusible link
- Harness continuity between cooling fan relay-1 and fuse
- Harness continuity between cooling fan relay-1 and fusible link

If NG, repair harness or connectors.

OK

**F**

CHECK GROUND CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Disconnect cooling fan motor harness connector.
- 3) Check harness continuity between terminal ③ and terminal ④, terminal ⑤ and body ground.

**Continuity should exist.**

NG

Repair harness or connectors.

OK

**G**

CHECK OUTPUT SIGNAL CIRCUIT.

- 1) Disconnect ECM harness connector.
- 2) Check harness continuity between ECM terminal ⑱ and terminal ②.

**Continuity should exist.**

NG

Check the following.

- Harness connectors (E10), (M10)
- Harness connectors (M60), (F4)
- Harness continuity between ECM and cooling fan relay-1

If NG, repair harness or connectors.

OK

CHECK COMPONENT  
[Cooling fan relay-1].  
Refer to "Electrical Components Inspection". (See page EC-206.)

NG

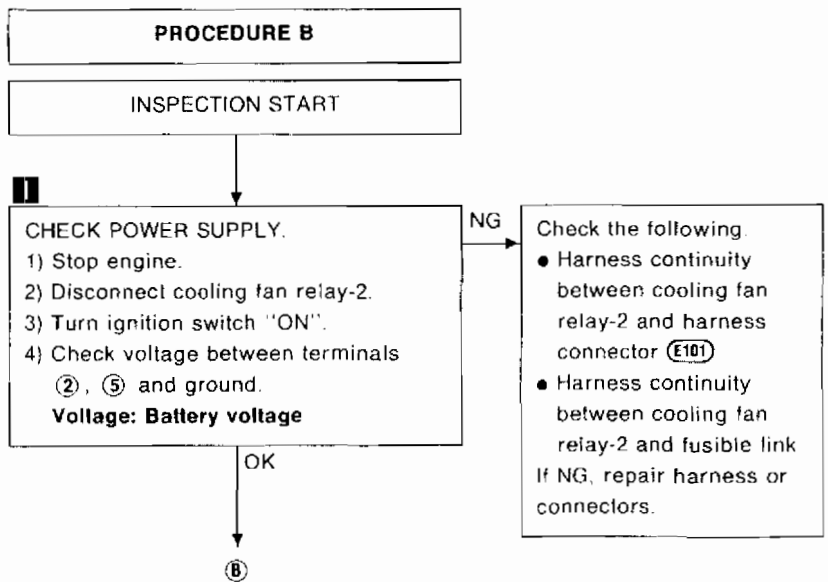
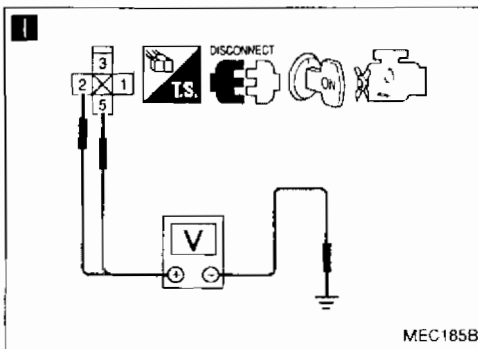
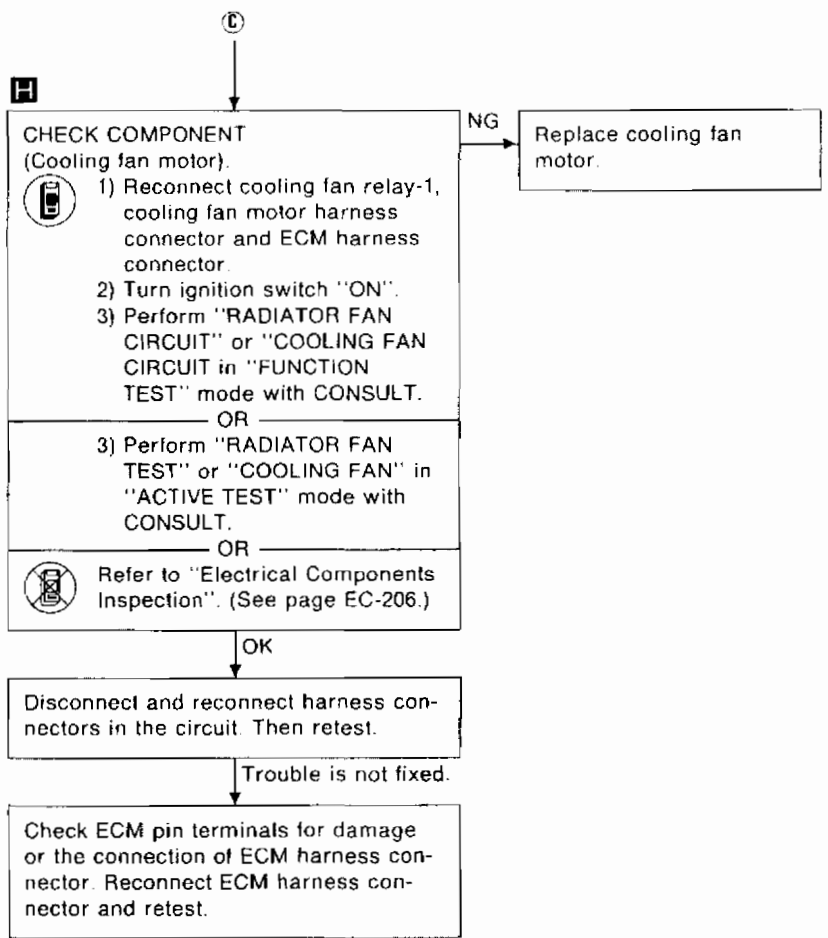
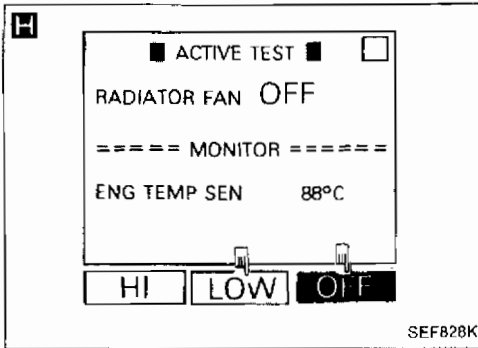
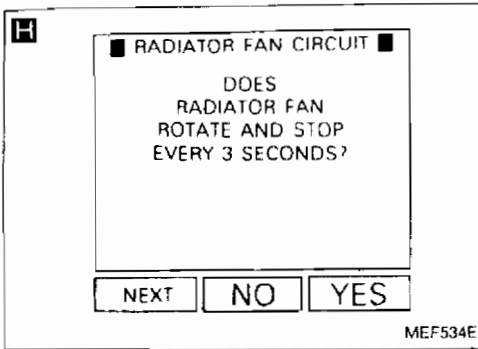
Replace cooling fan relay.

OK

③

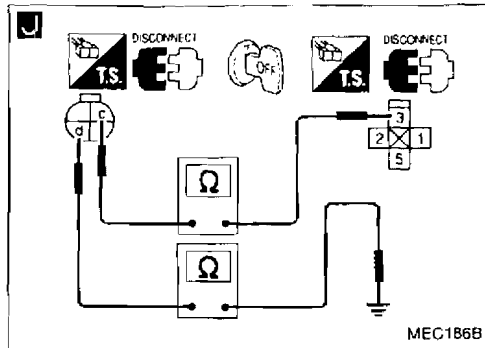
# TROUBLE DIAGNOSES

## Diagnostic Procedure 41 (Cont'd)



# TROUBLE DIAGNOSES

## Diagnostic Procedure 41 (Cont'd)

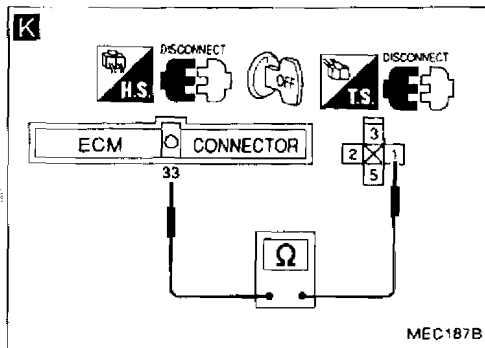


**J**

**CHECK GROUND CIRCUIT.**

- 1) Turn ignition switch "OFF".
- 2) Disconnect cooling fan motor harness connector.
- 3) Check harness continuity between terminal ③ and terminal ①, terminal ④ and body ground. **Continuity should exist.**

NG → Repair harness or connectors.



**K**

**CHECK OUTPUT SIGNAL CIRCUIT.**

- 1) Disconnect ECM harness connector.
- 2) Check harness continuity between ECM terminal ③③ and terminal ①. **Continuity should exist.**

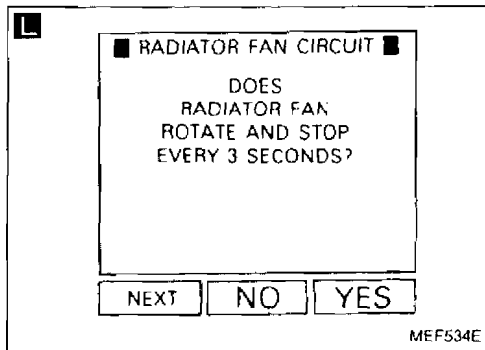
NG → Check the following.

- Harness connectors (E101), (M10)
- Harness connectors (M60), (F4)
- Harness continuity between ECM and cooling fan relay-2

If NG, repair harness or connectors.

**CHECK COMPONENT (Cooling fan relay-2).** Refer to "Electrical Components Inspection". (See page EC-206)

NG → Replace cooling fan relay.



**L**

**CHECK COMPONENT (Cooling fan motor).**

NG → Replace cooling fan motor.

1) Reconnect cooling fan relay-2, cooling fan motor harness connector and ECM harness connector.

2) Disconnect 400 Ω resistor from harness connector (F27).

3) Turn ignition switch "ON".

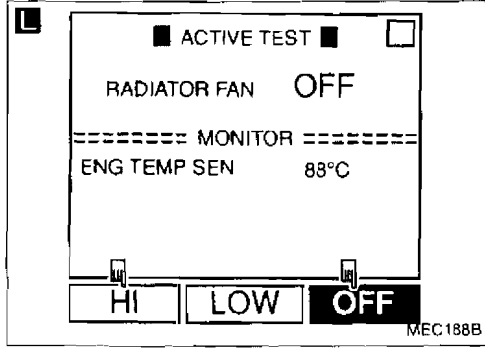
4) Perform "RADIATOR FAN CIRCUIT" or "COOLING FAN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

4) Perform "RADIATOR FAN TEST" or "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.

OR

Refer to "Electrical Components Inspection". (See page EC-206)



Disconnect and reconnect harness connectors in the circuit. Then retest

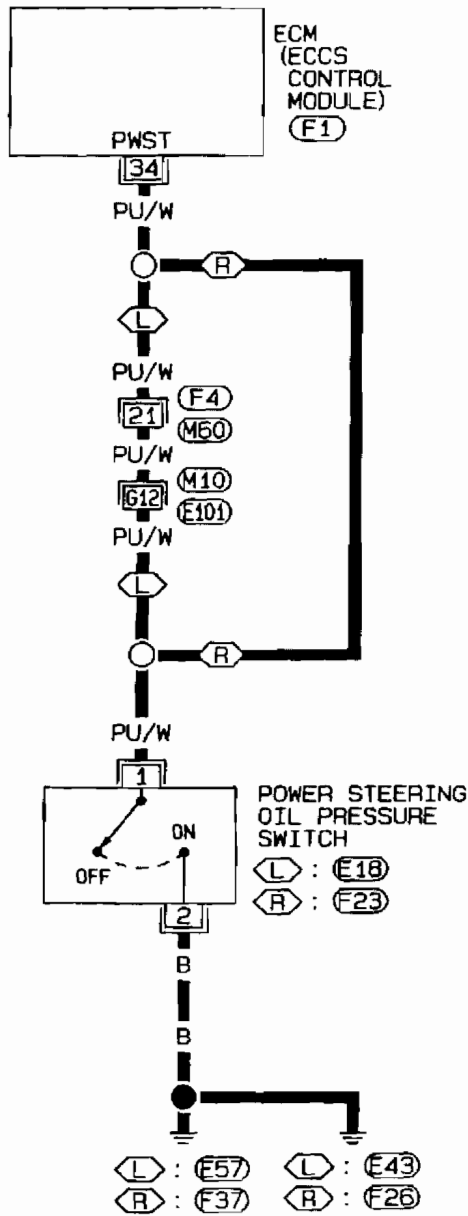
Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Diagnostic Procedure 42

POWER STEERING OIL PRESSURE SWITCH (Not self-diagnostic item)

EC-PST/SW-01



L : LHD models  
R : RHD models

12 W L : E18, R : F23

Refer to last page (Foldout page).

(M10) (E101)  
(M50) (F4)

|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

(F1)  
L



SEF848P



# TROUBLE DIAGNOSES

## Diagnostic Procedure 42 (Cont'd)

**A**

**■ PW/ST SIGNAL CIRCUIT ■**

HOLD STEERING WHEEL  
IN A FULL  
LOCKED POSITION  
THEN  
TOUCH START

NEXT    START

SEF200L

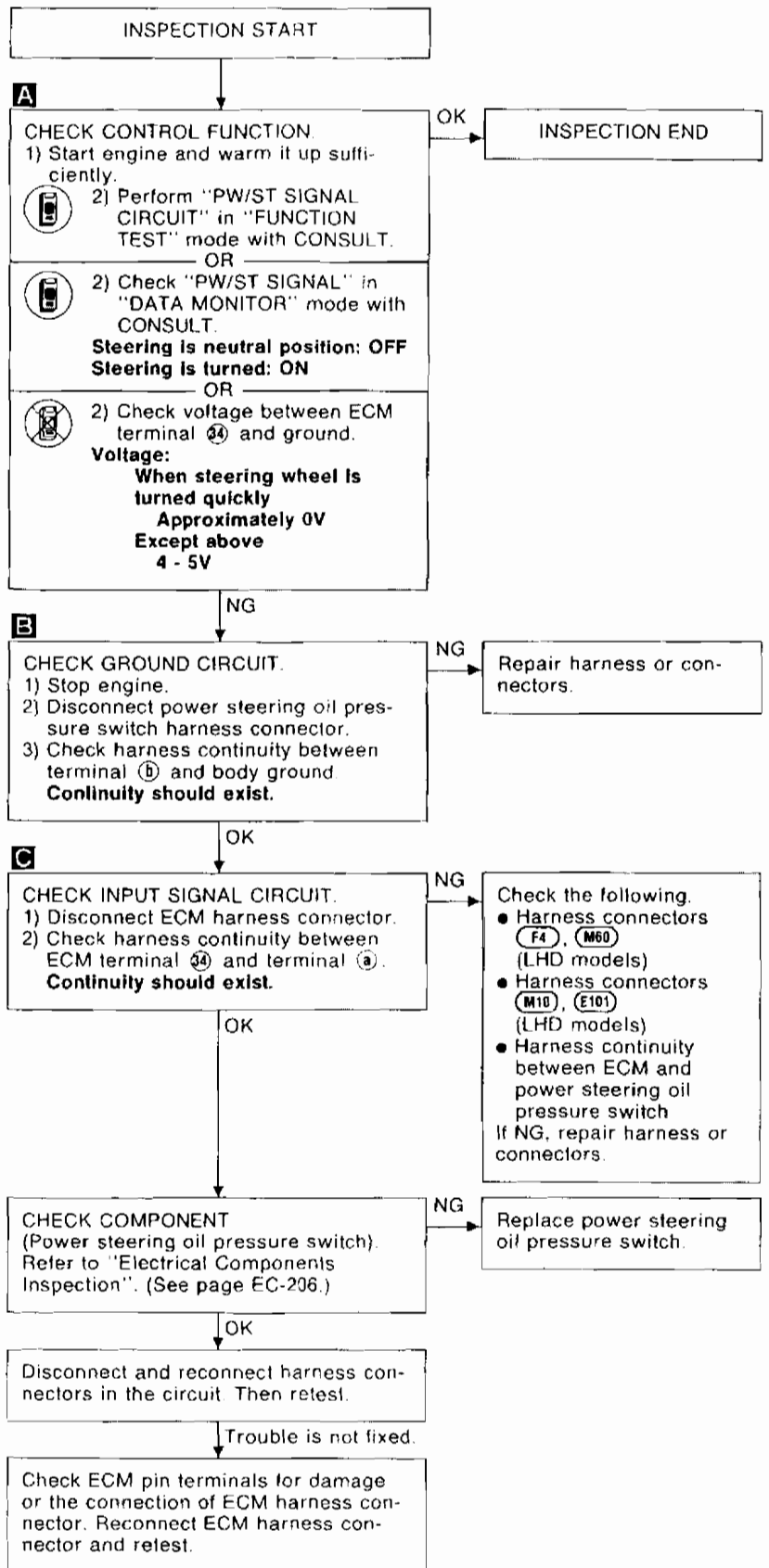
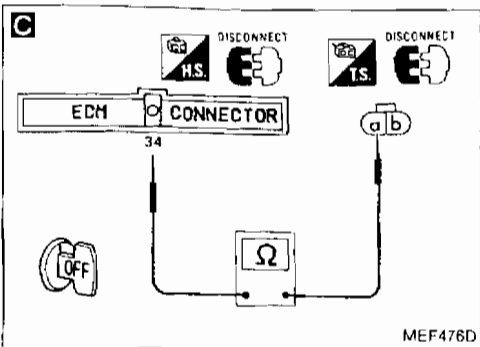
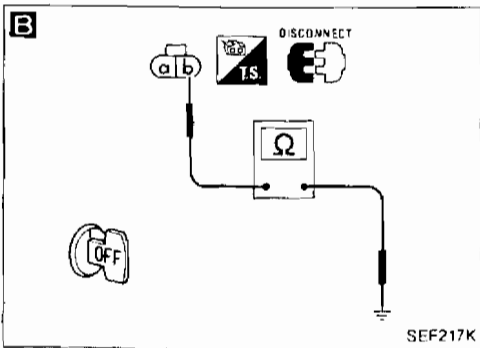
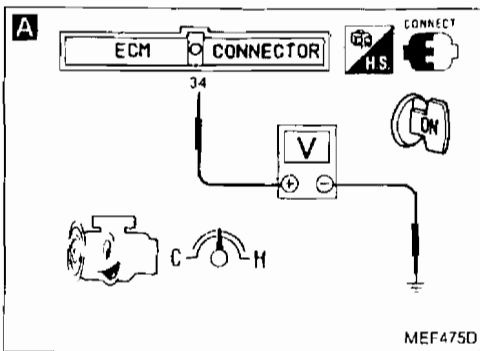
**A**

☆ MONITOR    ☆ NO FAIL   

PW/ST SIGNAL    OFF

RECORD

SEF831K

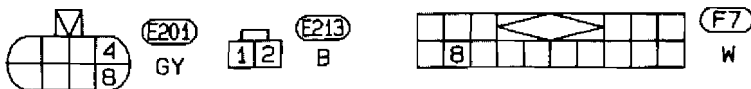
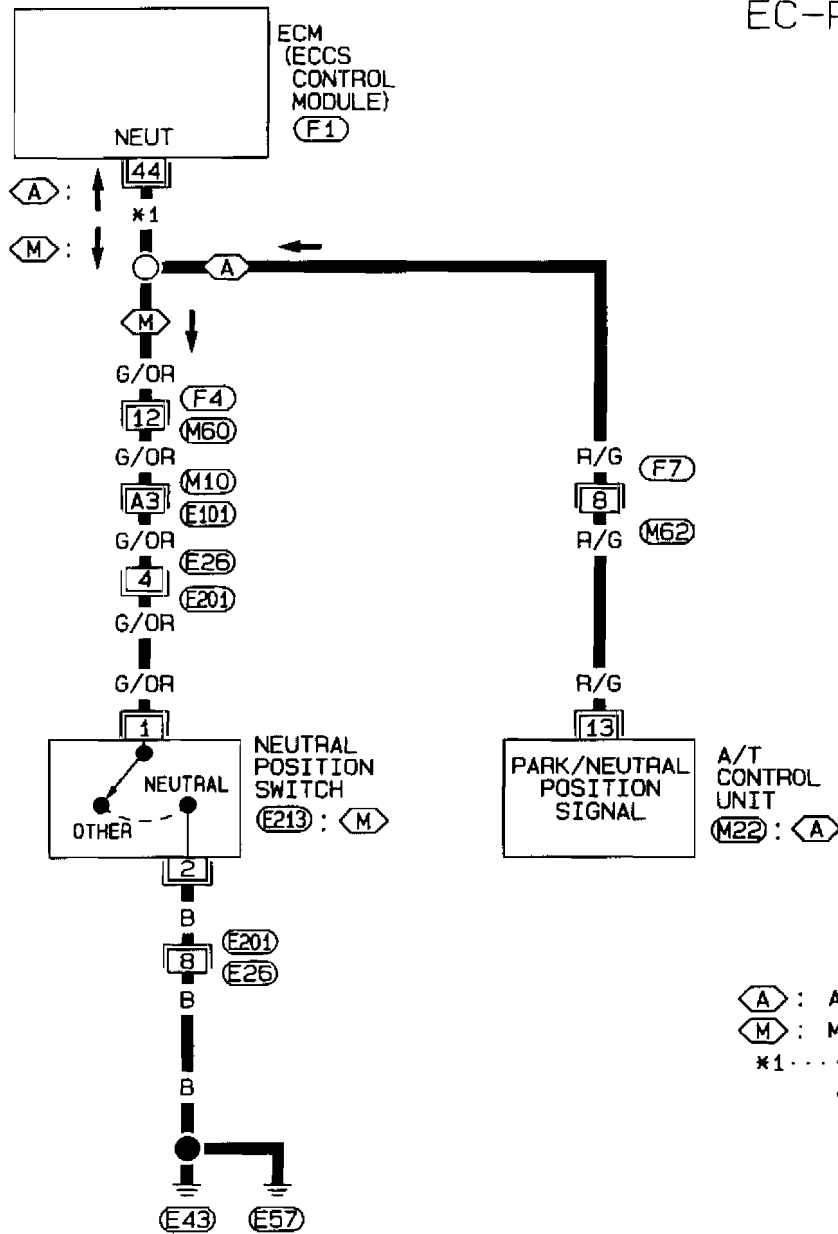


# TROUBLE DIAGNOSES

## Diagnostic Procedure 43

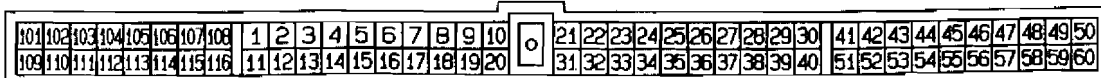
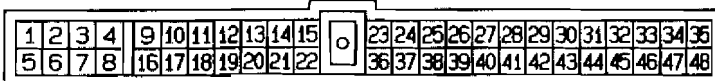
### NEUTRAL POSITION SWITCH & A/T CONTROL UNIT (PARK/NEUTRAL POSITION SIGNAL) (Not self-diagnostic item)

EC-PNP/SW-01



Refer to last page (Foldout page).

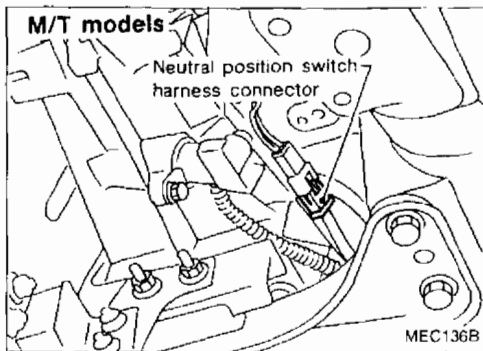
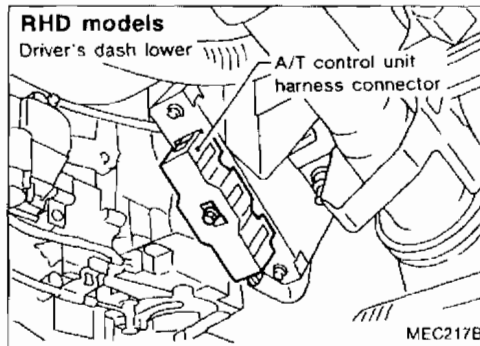
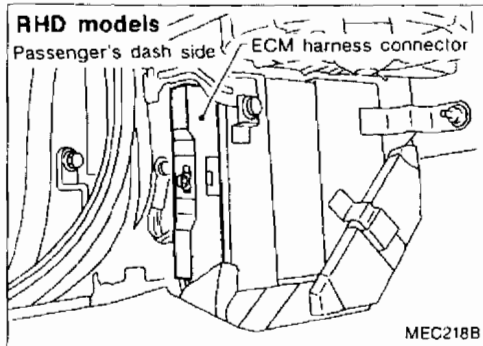
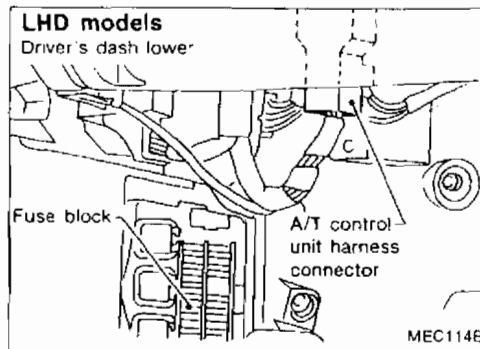
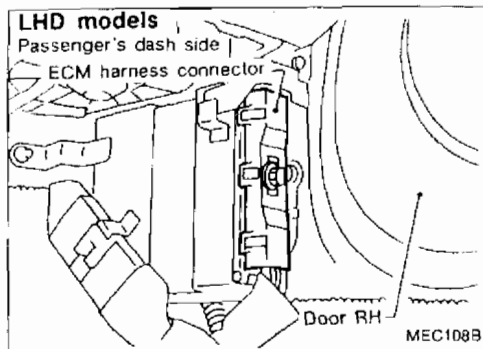
(M10) (E101)  
(M60) (F4)



SEF843P

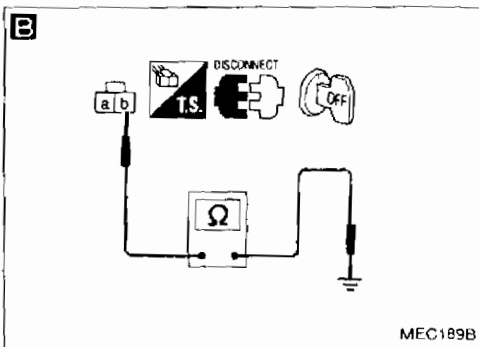
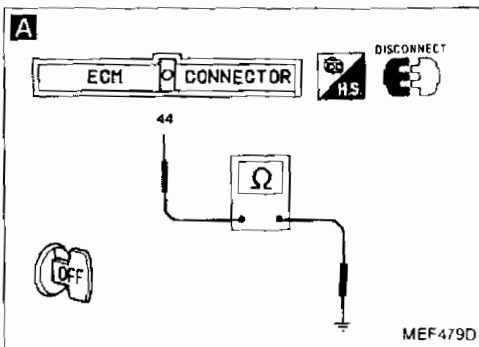
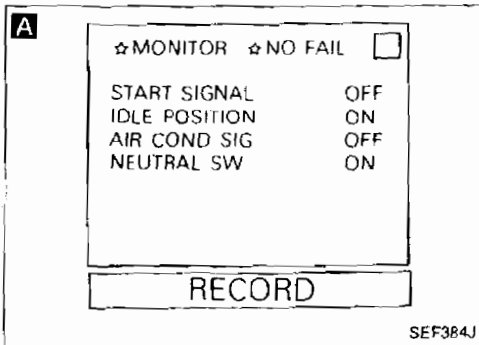
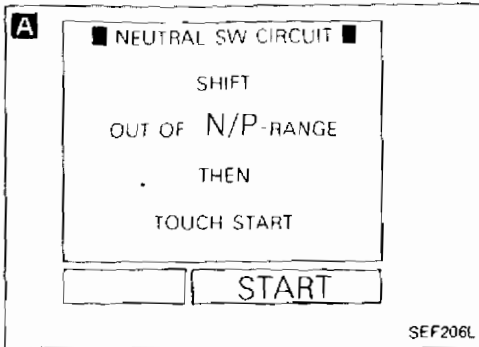


### Harness layout



# TROUBLE DIAGNOSES

## Diagnostic Procedure 43 (Cont'd)



### Neutral position switch

INSPECTION START

**A**

CHECK OVERALL FUNCTION.

1) Turn ignition switch "ON".

2) Perform "NEUTRAL SW CIRCUIT" or "NEUTRAL POSI SW CKT" in "FUNCTION TEST" mode with CONSULT

OR

OK → INSPECTION END

2) Check "NEUTRAL SW" or "NEUT POSI SW" signal in "DATA MONITOR" mode with CONSULT.

**Neutral position: ON**  
**Except above: OFF**

OR

1) Set shift lever to the neutral position.

2) Disconnect FCM harness connector.

3) Check harness continuity between ECM terminal ④④ and body ground.

**Continuity should exist.**

NG

Turn ignition switch "OFF".

**B**

CHECK GROUND CIRCUIT.

1) Disconnect neutral position switch harness connector.

2) Check harness continuity between terminal ① and body ground.

**Continuity should exist.**

NG →

Check the following.

- Harness connectors (E201), (E26)
- Harness continuity between neutral position switch and body ground

If NG, repair harness or connectors

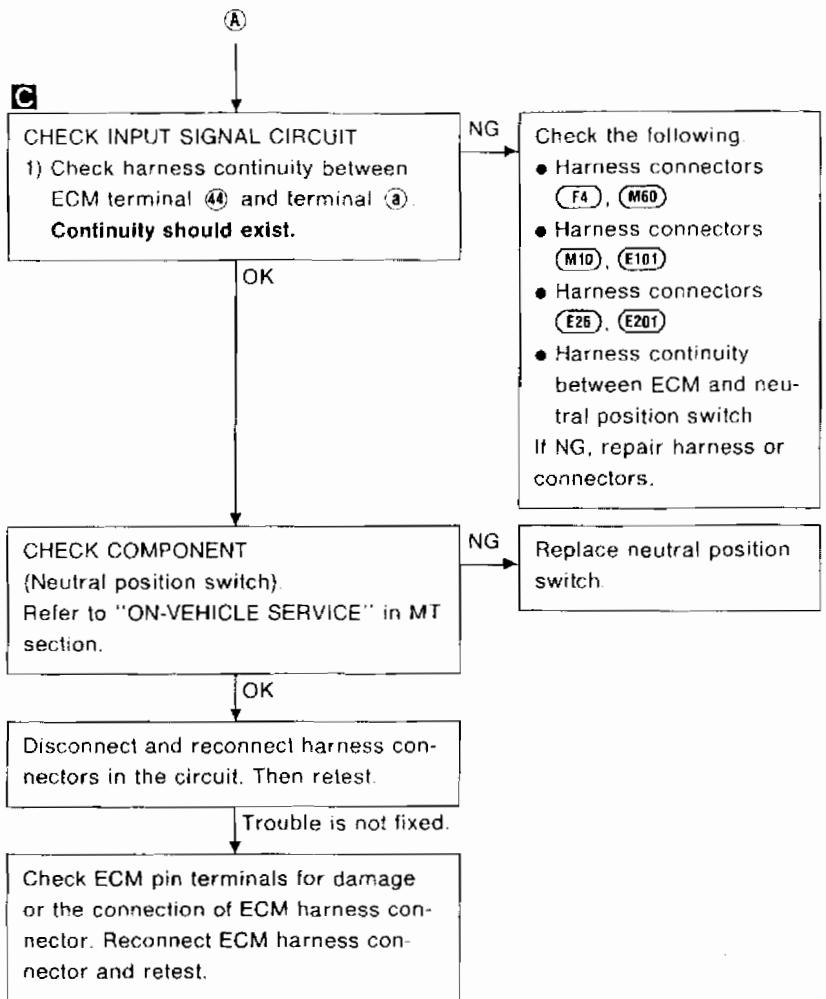
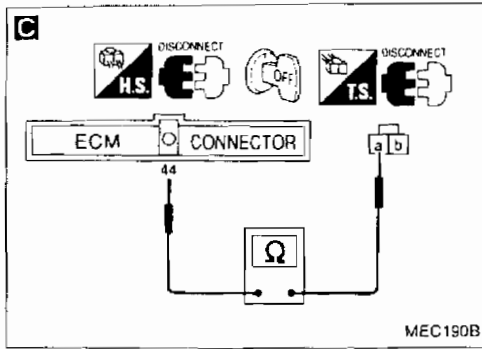
OK

Disconnect ECM harness connector

Ⓐ

# TROUBLE DIAGNOSES

## Diagnostic Procedure 43 (Cont'd)



# TROUBLE DIAGNOSES

## Diagnostic Procedure 43 (Cont'd)

**D**

■ NEUTRAL SW CIRCUIT ■

SHIFT  
OUT OF N/P-RANGE  
THEN  
TOUCH START

START

SEF206L

**D**

☆ MONITOR ☆ NO FAIL

|               |     |
|---------------|-----|
| START SIGNAL  | OFF |
| IDLE POSITION | ON  |
| AIR COND SIG  | OFF |
| NEUTRAL SW    | ON  |

RECORD

SEF384J

**D**

ECM CONNECTOR

CONNECT

H.S.

ECM

CONNECTOR

44

Ω

MEC191B

**E**

DISCONNECT

H.S.

C/UNIT CONNECTOR

ECM CONNECTOR

13

Ω

MEF242F

### A/T CONTROL UNIT (PARK/NEUTRAL POSITION SIGNAL) CIRCUIT

INSPECTION START

**D**

CHECK OVERALL FUNCTION.

- 1) Turn ignition switch "ON".
- 2) Perform "NEUTRAL SW CIRCUIT" or "NEUTRAL POSI SW CKT" in "FUNCTION TEST" mode with CONSULT.

OR

OK → INSPECTION END

**D**

- 2) Check "NEUTRAL SW" or "NEUT POSI SW" signal in "DATA MONITOR" mode with CONSULT.

"N" or "P": ON  
Except above: OFF

OR

**D**

- 2) Check voltage between ECM terminal 44 and ground under the following conditions.

**Voltage:**  
"N" or "P" Approximately 0V  
Except above Approximately 5V

NG

**E**

CHECK INPUT SIGNAL CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Disconnect ECM harness connector.
- 3) Disconnect A/T control unit harness connector.
- 4) Check harness continuity between ECM terminal 44 and terminal 13. Continuity should exist.

NG → Check the following.

- Harness connectors (F7, M62)
- Harness continuity between ECM and A/T control unit

If NG, repair harness or connectors.

OK

CHECK INHIBITOR SWITCH FUNCTION. Make sure that inhibitor switch functions properly. (Refer to AT section).

NG → Check inhibitor switch and circuit (Refer to AT section.)

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

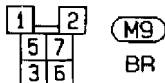
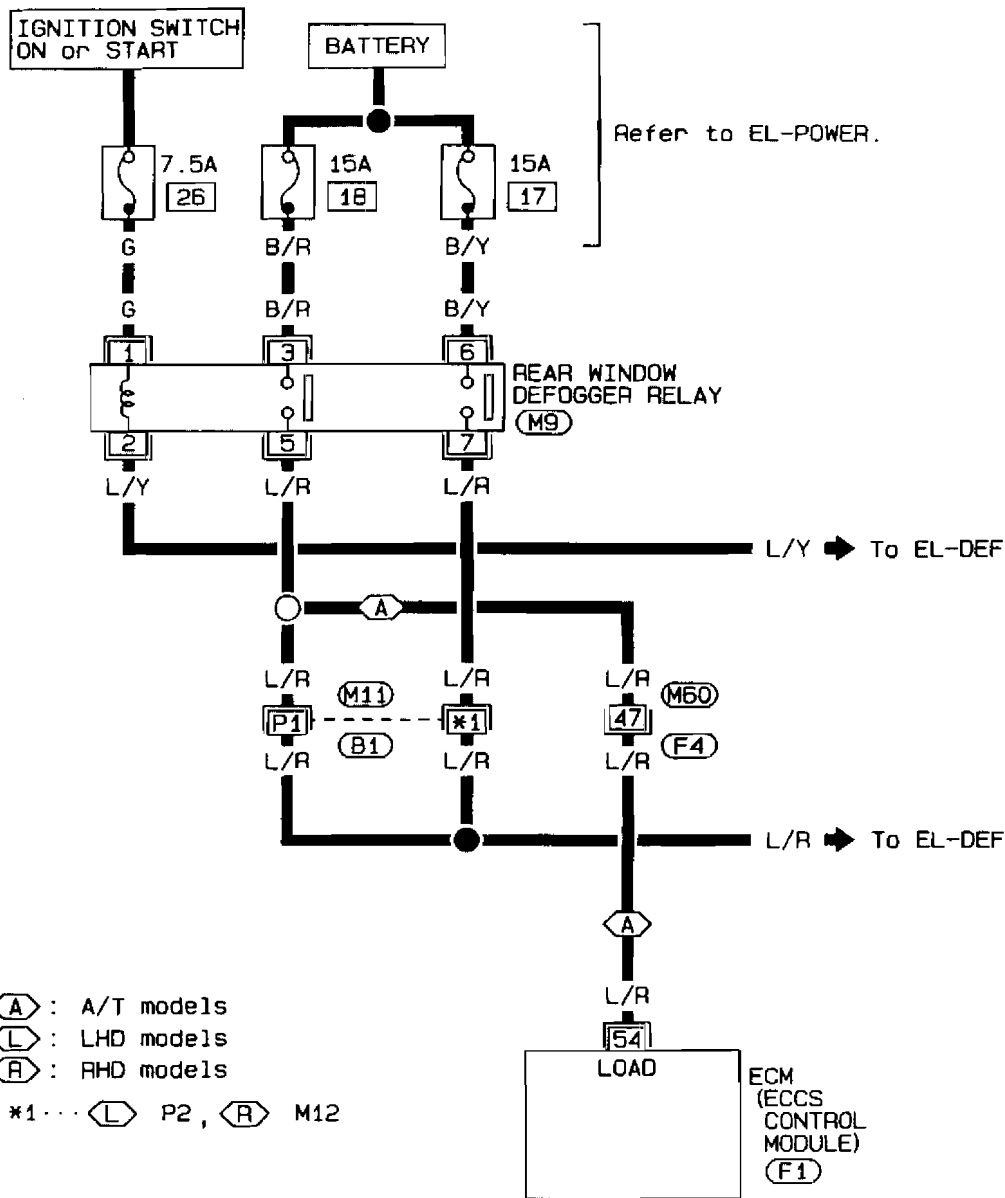
Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

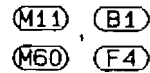
Diagnostic Procedure 44

REAR WINDOW DEFOGGER SWITCH (Not self-diagnostic item)

EC-DEF/S-01



Refer to last page (Foldout page).



|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

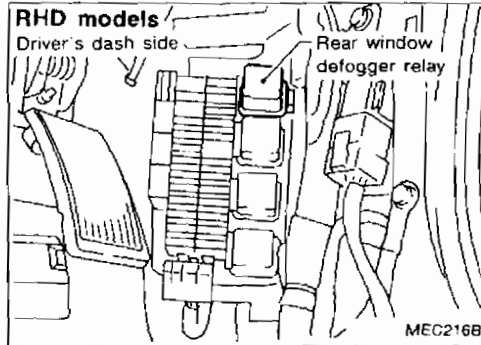
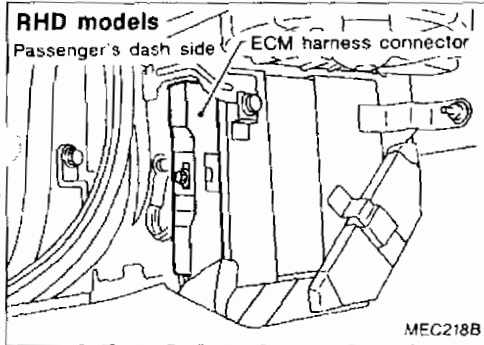
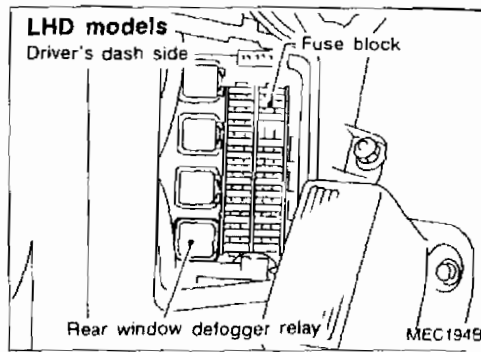
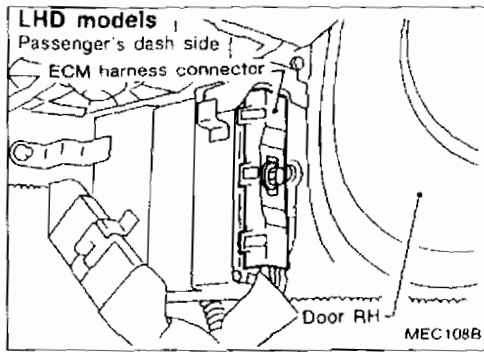


SEF849P

# TROUBLE DIAGNOSES

## Diagnostic Procedure 44 (Cont'd)

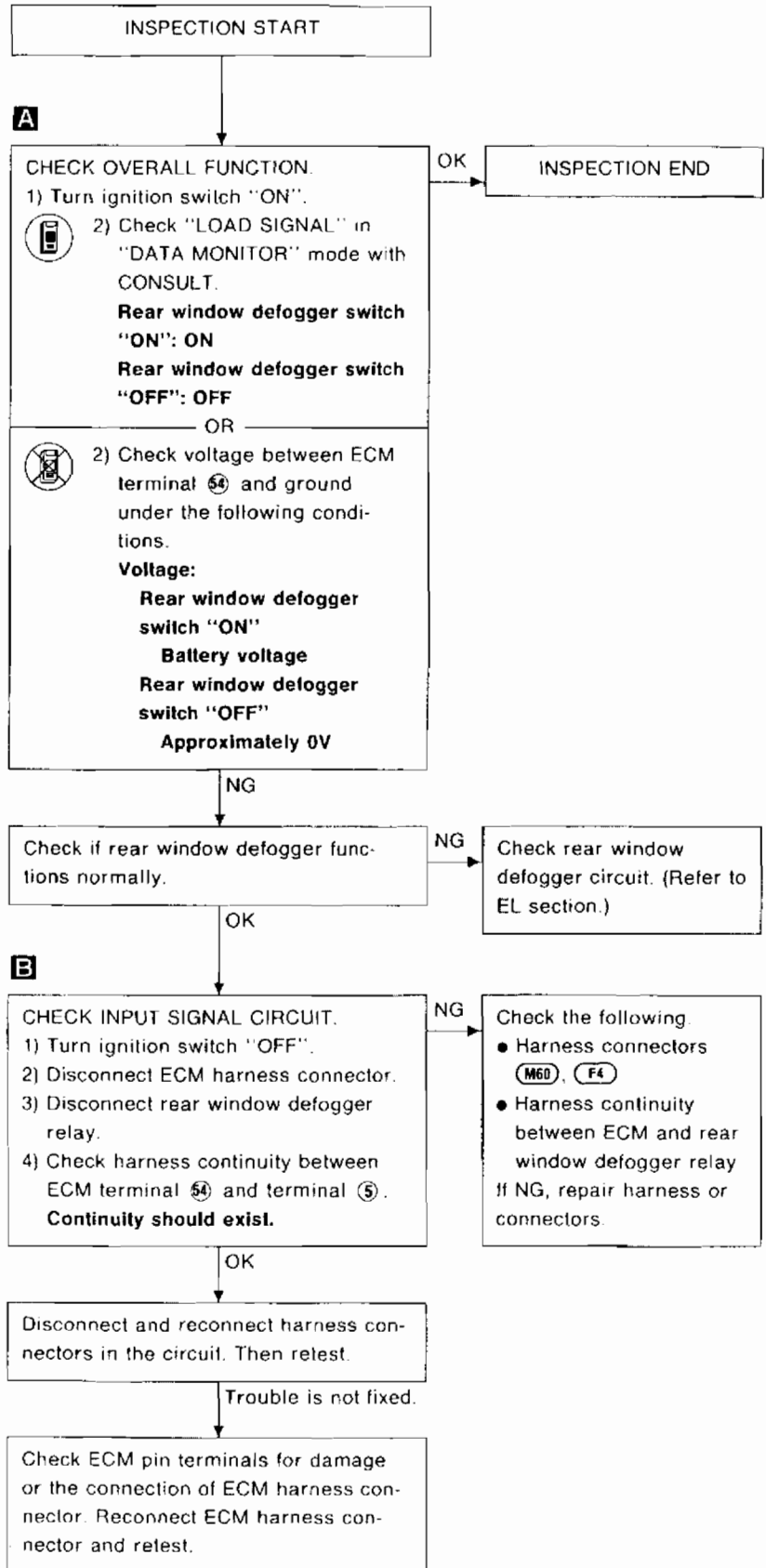
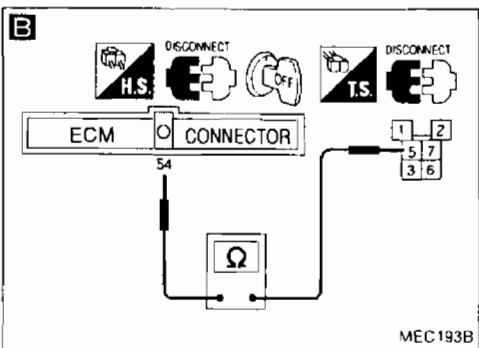
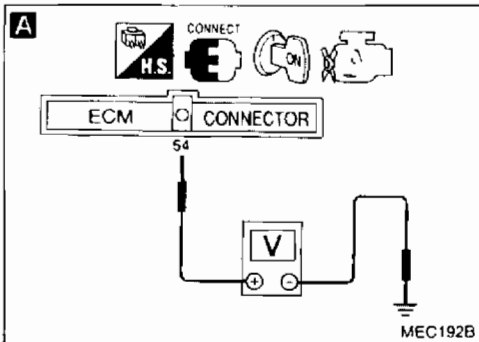
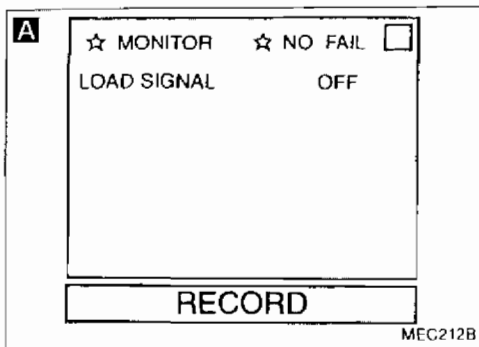
### Harness layout



SI  
MA  
EM  
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CL  
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AT  
PD  
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FA  
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FS  
ST  
FA  
EL  
DZ

# TROUBLE DIAGNOSES

## Diagnostic Procedure 44 (Cont'd)

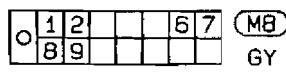
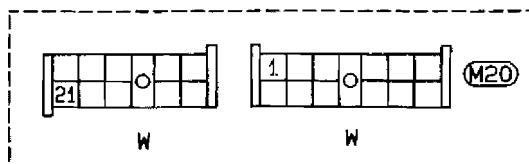
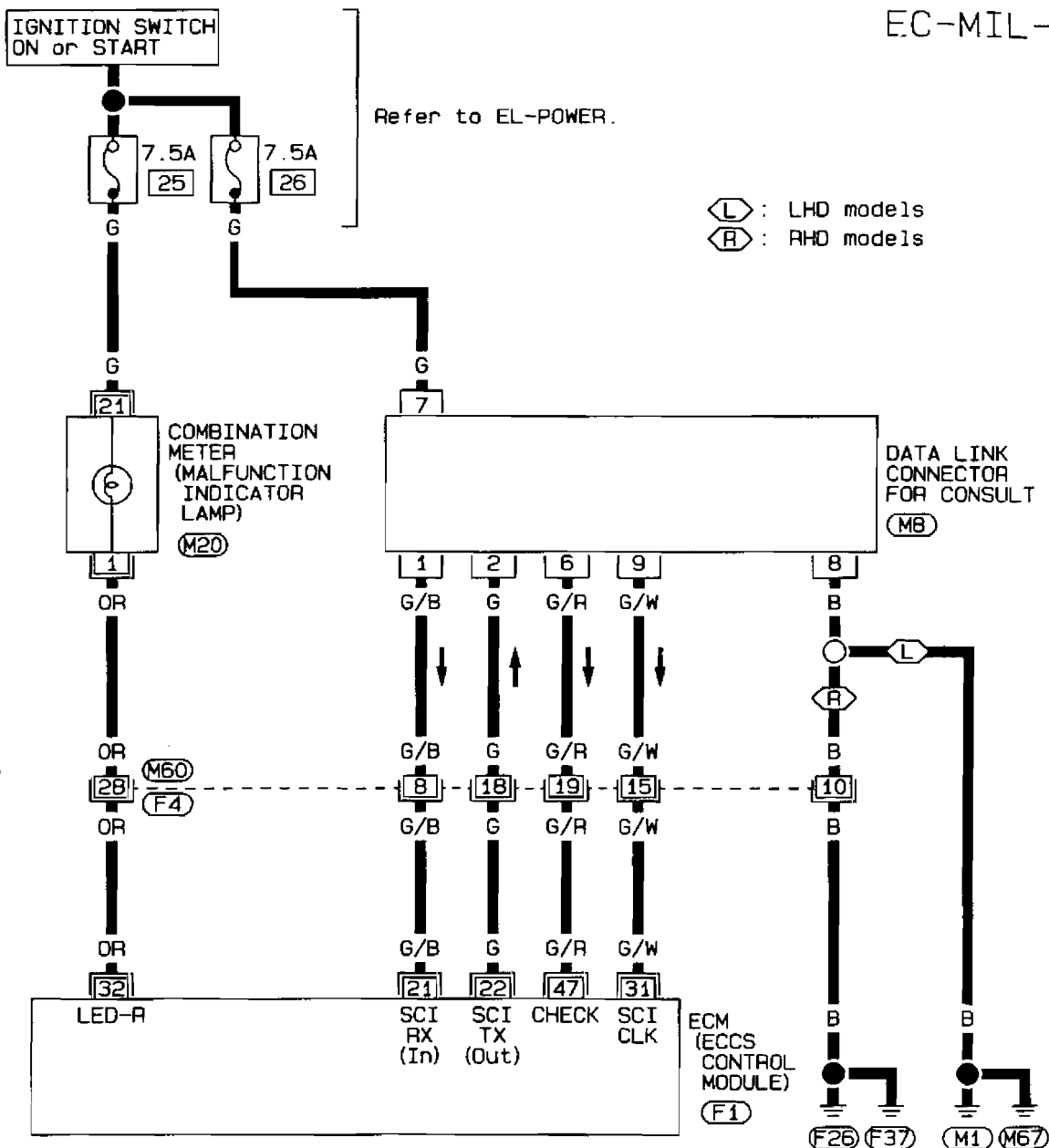


# TROUBLE DIAGNOSES

## Diagnostic Procedure 45

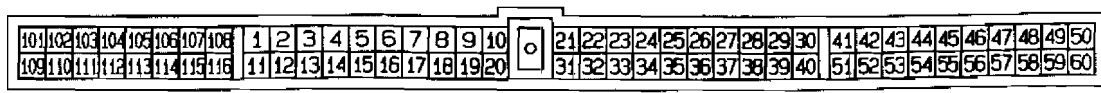
### MALFUNCTION INDICATOR LAMP & DATA LINK CONNECTOR FOR CONSULT (Not self-diagnostic item)

EC-MIL-01



Refer to last page (Foldout page).

(M60), (F4)



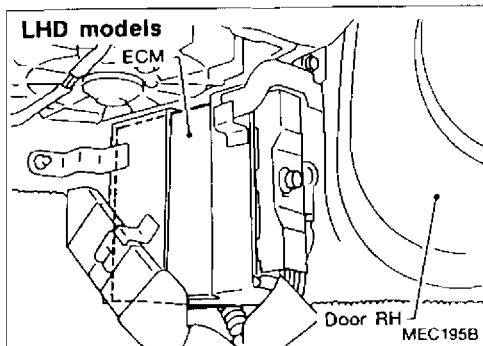
(F1)  
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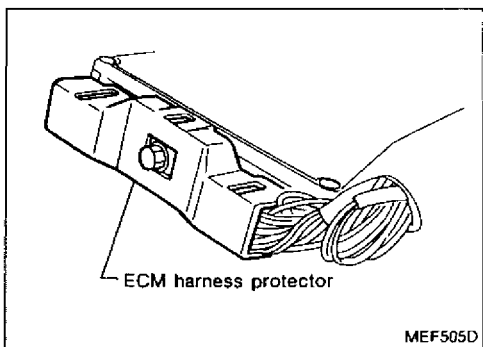
# TROUBLE DIAGNOSES



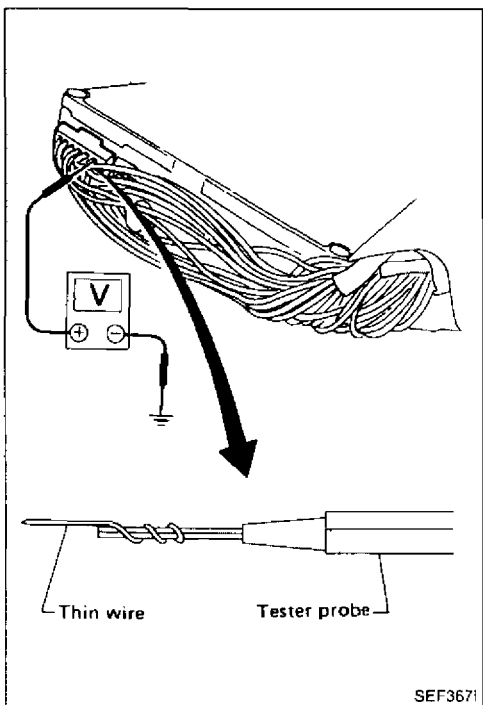
## Electrical Components Inspection

### ECM INPUT/OUTPUT SIGNAL INSPECTION

1. ECM is located at passenger's dash side. For this inspection, remove the passenger's dash side cover.



2. Remove ECM harness protector.



3. Perform all voltage measurements with the connectors connected.  
Extend tester probe as shown to perform tests easily.

### ECM HARNESS CONNECTOR TERMINAL LAYOUT

|     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 105 | 107 | 108 | 1  | 2  | 4  | 5  | 7  | 9  | 10 |    | 21 | 22 | 23 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 112 | 113 | 115 | 116 | 11 | 12 | 14 | 15 | 16 | 18 | 19 | 20 | 31 | 32 | 33 | 34 | 35 | 36 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 56 | 58 | 59 | 60 |    |    |



MEC196B

# TROUBLE DIAGNOSES

## Electrical Components Inspection (Cont'd)

\*Data are reference values.

| TER-MINAL NO. | ITEM                                   | CONDITION   | *DATA  |
|---------------|--|---|--|
| 19            | Cooling fan (Low speed)                | Engine is running.<br>└ Cooling fan is not operating.   | BATTERY VOLTAGE (11 - 14V)   |
|               |  | Engine is running.<br>└ Cooling fan is operating  | Approximately 0V   |
| 23            | Knock sensor                           | Engine is running.  | 2.0 - 3.0V   |
| 25            | Wastegate valve control solenoid valve | Engine is running.<br>└ Idle speed  | BATTERY VOLTAGE (11 - 14V)   |
|               |  | Engine is running.<br>└ Engine is racing up to 5,000 rpm.   | Approximately 5V   |
| 27            | Mass air flow sensor                   | Engine is running. (Warm-up condition)<br>└ Idle speed  | 0.8 - 1.5V   |
|               |  | Engine is running. (Warm-up condition)<br>└ Engine speed is 3,000 rpm                             | 1.4 - 2.0V   |
| 28            | Engine coolant temperature sensor      | Engine is running.  | 0 - 5.0V<br>Output voltage varies with engine coolant temperature. |
| 29            | Heated oxygen sensor                   | Engine is running.<br>└ After warming up sufficiently and engine speed is 2,000 rpm.              | 0 - 0.3V ↔ 0.6 - 0.9V  |
| 33            | Cooling fan (High speed)               | Engine is running.<br>└ Cooling fan is not operating.<br>└ Cooling fan is operating at low speed. | BATTERY VOLTAGE (11 - 14V)   |
|               |  | Engine is running.<br>└ Cooling fan is operating at high speed.                                   | Approximately 0V   |
| 34            | Power steering oil pressure switch     | Engine is running.<br>└ Steering wheel stays straight.  | 4.0 - 5.0V   |
|               |  | Engine is running.<br>└ Steering wheel is turned.   | Approximately 0V   |
| 35            | Boost pressure sensor                  | Engine is running.<br>└ Idle speed  | Approximately 2V   |
|               |  | Engine is running.<br>└ Engine is racing up to 4,000 rpm  | Approximately 2.2V   |

# TROUBLE DIAGNOSES

## Electrical Components Inspection (Cont'd)

\*Data are reference values.

| TER-MINAL NO. | ITEM  | CONDITION   | *DATA   |
|---------------|---|---|---|
| 38            | Throttle position sensor  | Ignition switch "ON"  | 0.35 - 4.0V<br>Output voltage varies with throttle valve opening angle. |
| 41<br>51      | Camshaft position sensor<br>(Reference signal)                        | Engine is running.<br>└ Do not run engine at high speed under no-load.  | 0.3 - 0.6V<br>Output voltage slightly varies with engine speed.         |
| 42<br>52      | Camshaft position sensor<br>(Position signal)                         | Engine is running.<br>└ Do not run engine at high speed under no-load.  | 2.0 - 3.0V<br>Output voltage slightly varies with engine speed.         |
| 43            | Start signal  | Ignition switch "ON"<br>Ignition switch "START"   | 0V<br>BATTERY VOLTAGE<br>(11 - 14V)                                     |
| 44            | Neutral position switch (M/T models)<br>A/T control unit (A/T models) | Ignition switch "ON"<br>└ Gear position is "Neutral position" (M/T models).<br>└ Gear position is "N" or "P" (A/T models).<br>Ignition switch "ON"<br>└ Except the above conditions | 0V<br>4.0 - 5.0V  |
| 45            | Ignition switch   | Ignition switch "ON"  | BATTERY VOLTAGE<br>(11 - 14V)   |
| 46            | Air conditioner switch  | Engine is running.<br>└ Air conditioner switch is "OFF".<br>Engine is running.<br>└ Both air conditioner switch and blower fan switch are "ON".                                     | BATTERY VOLTAGE<br>(11 - 14V)<br>Approximately 0V                       |
| 48            | Power source for sensors  | Ignition switch "ON"  | Approximately 5.0V  |
| 49<br>59      | Power source for ECM  | Ignition switch "ON"  | BATTERY VOLTAGE<br>(11 - 14V)   |
| 54            | Load signal   | Ignition switch "ON"<br>└ Rear window defogger switch is "ON".<br>Ignition switch "ON"<br>└ Rear window defogger switch is "OFF".   | BATTERY VOLTAGE<br>(11 - 14V)<br>Approximately 0V                       |
| 58            | Power supply (Back-up)  | Ignition switch "OFF"   | BATTERY VOLTAGE<br>(11 - 14V)   |

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EC

# TROUBLE DIAGNOSES

## Electrical Components Inspection (Cont'd)

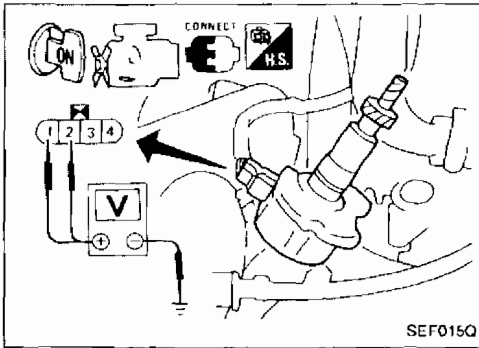
\*Data are reference values

| TER-MINAL NO.            | ITEM                                  | CONDITION   | *DATA                         |
|--------------------------|---------------------------------------|---|-------------------------------|
| 101<br>103<br>110<br>112 | Injectors                             | Engine is running.  | BATTERY VOLTAGE<br>(11 - 14V) |
| 102                      | EGR & canister control solenoid valve | Engine is running. (Warm-up condition)<br>└ Idle speed                        | Approximately 0V              |
|                          |                                       | Engine is running. (Warm-up condition)<br>└ Engine speed is 2,000 rpm.        | BATTERY VOLTAGE<br>(11 - 14V) |
| 113                      | VTC solenoid valve                    | Engine is running. (Jack-up condition)<br>└ Idle speed                        | BATTERY VOLTAGE<br>(11 - 14V) |
|                          |                                       | Engine is running. (Jack-up condition)<br>└ Engine is racing up to 2,000 rpm. | Approximately 0V              |
| 115                      | Heated oxygen sensor heater           | Engine is running.<br>└ Engine speed is between idle and 4,000 rpm.           | Approximately 0V              |
|                          |                                       | Engine is running.<br>└ Engine speed is above 4,000 rpm.                      | BATTERY VOLTAGE<br>(11 - 14V) |

# TROUBLE DIAGNOSES

## Electrical Components Inspection (Cont'd)

### CAMSHAFT POSITION SENSOR

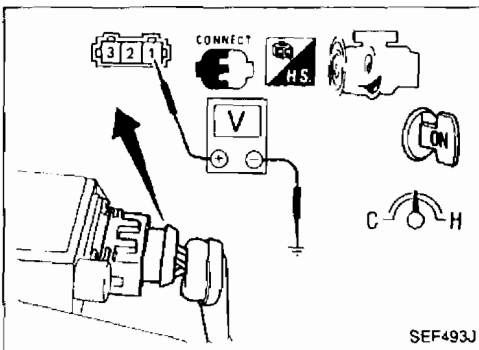


1. Remove camshaft position sensor from engine. (Camshaft position sensor harness connector should remain connected.)
2. Turn ignition switch "ON".
3. Rotate camshaft position sensor shaft slowly by hand and check voltage between terminals ①, ② and ground.

| Terminal        | Voltage                                |
|-----------------|--|
| ① (180° signal) | Voltage fluctuates between 5V and 0.1V |
| ② (1° signal)   |  |

If NG, replace camshaft position sensor.

After this inspection, diagnostic trouble code No. 11 might be displayed though the camshaft position sensor is functioning properly. In this case erase the stored memory.

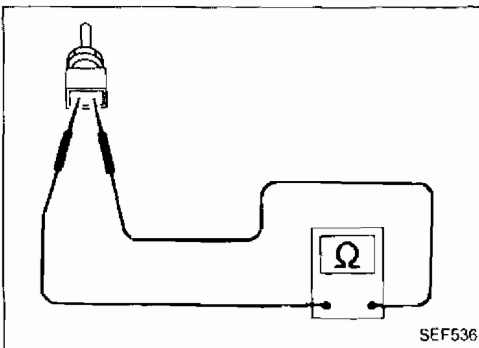


### MASS AIR FLOW SENSOR

1. Fold back mass air flow sensor harness connector rubber as shown in the figure if the harness connector is connected.
2. Turn ignition switch "ON".
3. Start engine and warm it up sufficiently.
4. Check voltage between terminal ① and ground.

| Conditions | Voltage V |
|------------|-----------|
| Idle speed | 0.8 - 1.5 |
| 3,000 rpm  | 1.4 - 2.0 |

5. If NG, remove mass air flow sensor from air duct. Check hot film for damage or dust.



### ENGINE COOLANT TEMPERATURE SENSOR

1. Disconnect engine coolant temperature sensor harness connector.
2. Check resistance as shown in the figure.

| Temperature °C (°F) | Resistance kΩ |
|---------------------|---------------|
| 20 (68)             | 2.1 - 2.9     |
| 50 (122)            | 0.68 - 1.00   |
| 80 (176)            | 0.30 - 0.33   |

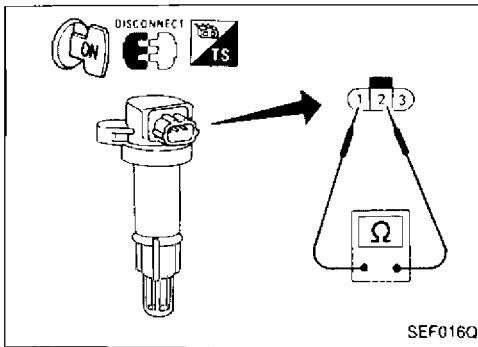
If NG, replace engine coolant temperature sensor.

## TROUBLE DIAGNOSES

### Electrical Components Inspection (Cont'd)

#### IGNITION COIL

1. Disconnect ignition coil harness connector.
2. Check resistance between terminals ① and ②.  
**Resistance: Approximately 1Ω**  
If NG, replace ignition coil.

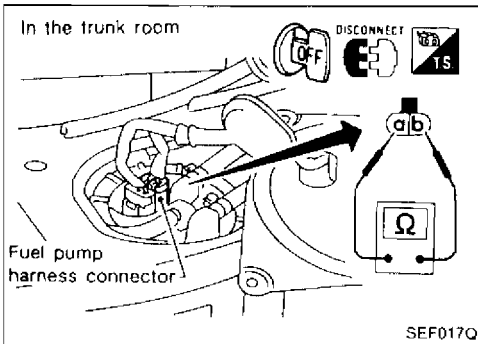


#### POWER TRANSISTOR

1. Disconnect power transistor harness connector.
2. Check power transistor continuity between terminals with analog tester as shown in the figure.

| Terminal combination |   |   |   | Tester polarity | Continuity | Tester polarity | Continuity |
|----------------------|---|---|---|-----------------|------------|-----------------|------------|
| e                    | e | e | e | ⊕               | No         | ⊖               | Yes        |
| 1                    | 2 | 3 | 4 | ⊖               |            | ⊕               | Yes        |
| e                    | e | e | e | ⊕               | Yes        | ⊖               | Yes        |
| a                    | b | c | d | ⊖               |            | ⊕               | Yes        |
| 1                    | 2 | 3 | 4 | ⊕               | Yes        | ⊖               | No         |
| a                    | b | c | d | ⊖               |            | ⊕               | No         |

If NG, replace power transistor.



#### FUEL PUMP

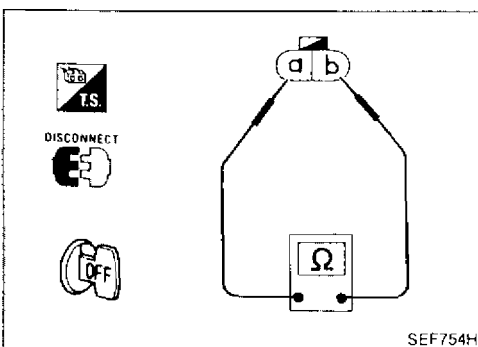
1. Disconnect fuel pump harness connector.
2. Check resistance between terminals ① and ②.  
**Resistance: Approximately 0.2 - 5.0Ω**  
If NG, replace fuel pump.

#### VEHICLE SPEED SENSOR

1. Jack up rear wheels. Use stands to support vehicle.
2. Disconnect vehicle speed sensor harness connector.
3. Check continuity between terminals ① and ② while rotating rear wheel by hand.

**Continuity should come and go.**

If NG replace vehicle speed sensor.

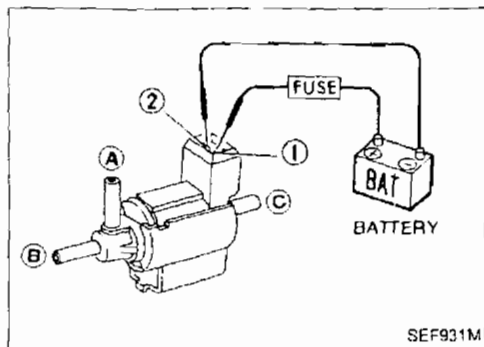


# TROUBLE DIAGNOSES

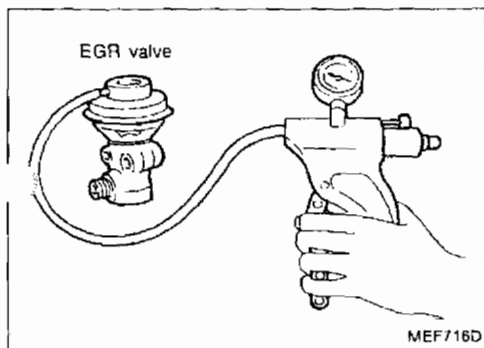
## Electrical Components Inspection (Cont'd)

### EGR AND CANISTER CONTROL SOLENOID VALVE

Check air passage continuity.



| Condition | Air passage continuity between (A) and (B)          | Air passage continuity between (A) and (C) |
|-----------|---|--|
|           | 12V direct current supply between terminals ① and ② | Yes  |
| No supply | No  | Yes  |

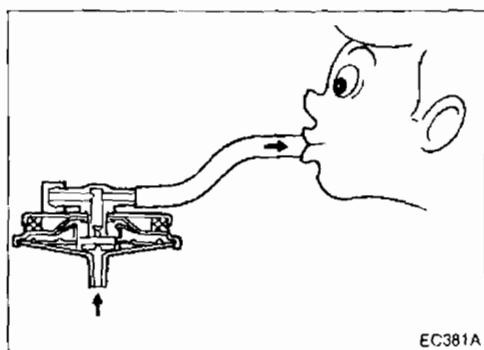


### EGR VALVE

Apply vacuum to EGR vacuum port with a hand vacuum pump.

**EGR valve spring should lift.**

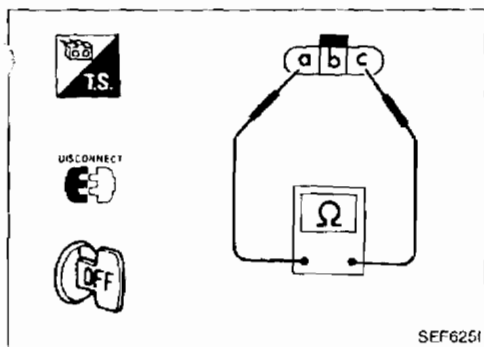
If NG, replace EGR valve.



### EGRC-BPT VALVE

Plug one of two ports of EGRC-BPT valve.

Apply a pressure above 0.490 kPa (4.90 mbar, 50 mmH<sub>2</sub>O, 1.97 inH<sub>2</sub>O) to check for leakage. If a leak is noted, replace valve.

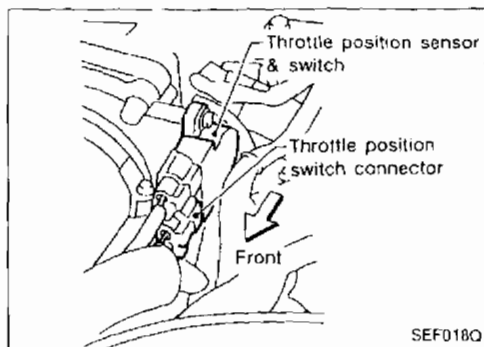


### HEATED OXYGEN SENSOR HEATER

Check resistance between terminals (a) and (b).

**Resistance: 3 - 1,000Ω**

If NG, replace heated oxygen sensor.



### THROTTLE POSITION SWITCH (A/T model only)

Refer to "TROUBLE DIAGNOSES" in AT section.

# TROUBLE DIAGNOSES

## Electrical Components Inspection (Cont'd)

### THROTTLE POSITION SENSOR



1. Disconnect throttle position sensor harness connector.
2. Make sure that resistance between terminals **(b)** and **(c)** changes when opening throttle valve manually.

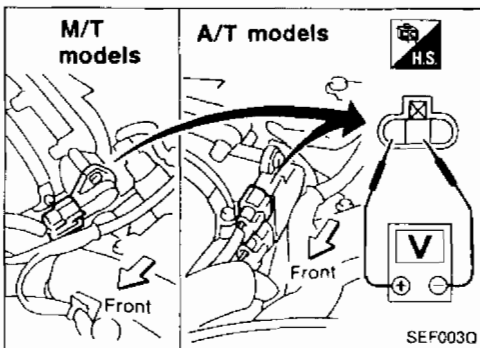
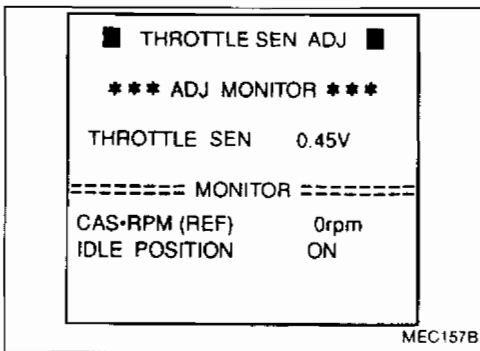
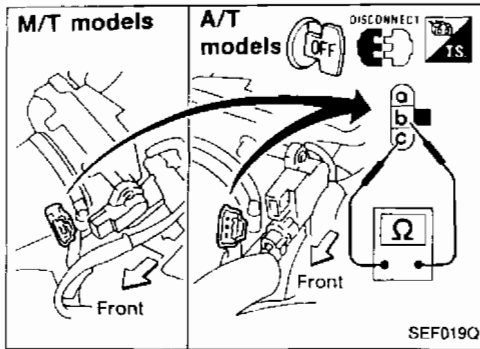
| Accelerator pedal condition | Resistance kΩ     |
|-----------------------------|-------------------|
| Completely released         | Approximately 0.7 |
| Partially released          | 0.7 - 5           |
| Completely depressed        | Approximately 5   |

If NG, replace throttle position sensor.

### Adjustment of throttle position sensor (idle position)

If throttle position sensor is replaced or removed, it is necessary to install it in the proper position, by following the procedure as shown below:

1. Install throttle position sensor body in throttle body. Do not tighten bolts. Leave bolts loose.
2. Connect throttle position sensor harness connector.
3. Start engine and warm it up sufficiently.
4.  Perform "THROTTLE SEN ADJ" or "THRTL POS SEN ADJ" in "WORK SUPPORT" mode.
5.  Measure output voltage of throttle position sensor using voltmeter.



5. Adjust by rotating throttle position sensor body so that output voltage is 0.35 to 0.65V.
6. Tighten mounting bolts.
7. Disconnect throttle position sensor harness connector for a few seconds and then reconnect it.

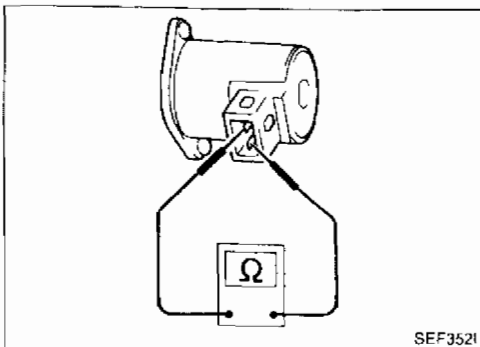
### IACV-AAC VALVE

- Check IACV-AAC valve resistance.

**Resistance:**

**Approximately 10Ω**

- Check plunger for seizing or sticking.
- Check for broken spring.



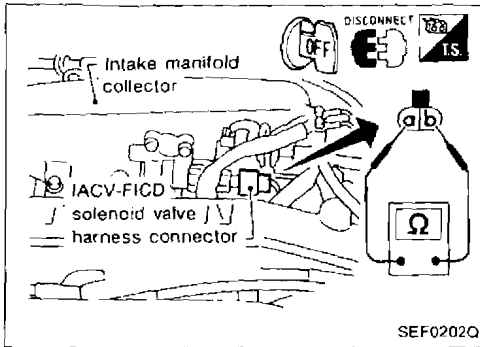


Electrical Components Inspection (Cont'd)

IACV-FICD SOLENOID VALVE

Disconnect IACV-FICD solenoid valve harness connector.

- Check for clicking sound when applying 12V direct current to terminals.
- Check plunger for seizing or sticking.
- Check for broken spring.



KNOCK SENSOR

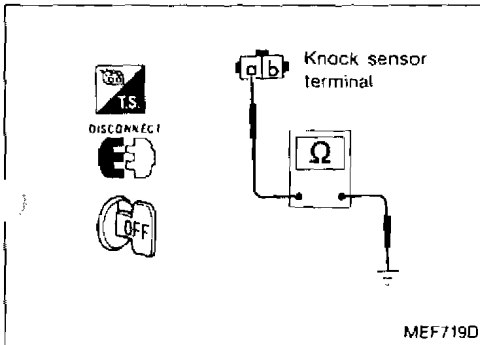
1. Disconnect knock sensor sub-harness connector.
2. Check continuity between terminal (a) and ground.

Continuity should exist.

- It is necessary to use an ohmmeter which can measure more than 10 MΩ.

CAUTION:

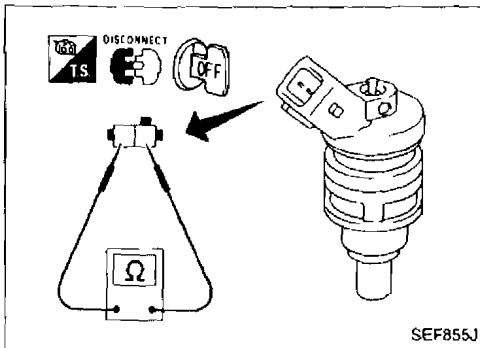
Discard any knock sensor which has been dropped or has undergone shocks; use a new one.



INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

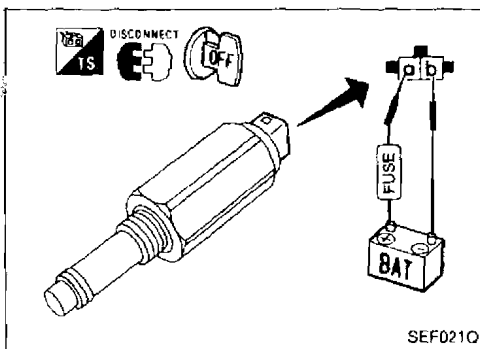
Resistance: 10 - 14Ω  
If NG, replace injector.



VALVE TIMING CONTROL (VTC) SOLENOID VALVE

Check valve timing control solenoid valve for normal operation by supplying it with battery voltage between terminals (a) and (b).

If NG, replace solenoid valve.

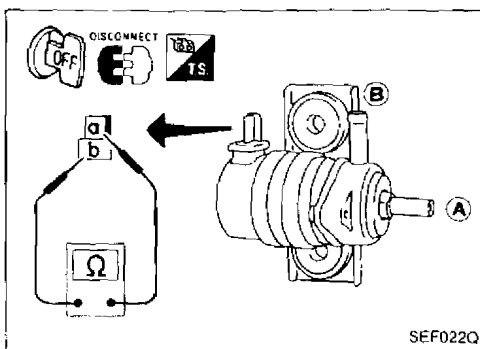


WASTEGATE VALVE CONTROL SOLENOID VALVE

Check air passage continuity.

| Condition   | Air passage continuity between (A) and (B) |
|---|--|
| 12V direct current supply between terminals (a) and (b) | Yes  |
| No supply   | No   |

If NG, replace solenoid valve.



EC

## TROUBLE DIAGNOSES

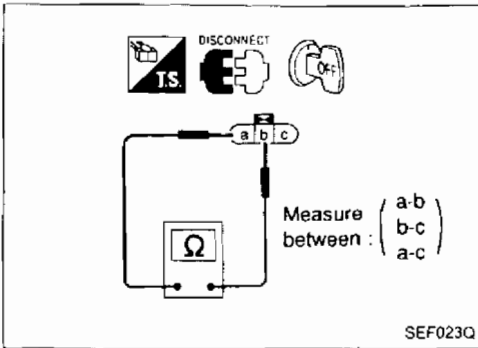
### Electrical Components Inspection (Cont'd)

#### BOOST PRESSURE SENSOR

Check resistance between terminals.

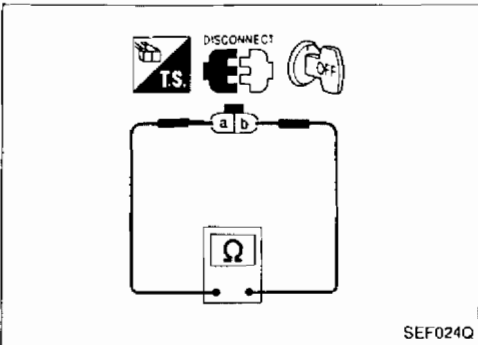
**Resistance:**

- Ⓐ and Ⓑ Approximately 1.1 kΩ
- Ⓑ and Ⓒ Approximately 0.5 kΩ
- Ⓐ and Ⓒ Approximately 0.3 kΩ



#### POWER STEERING OIL PRESSURE SWITCH

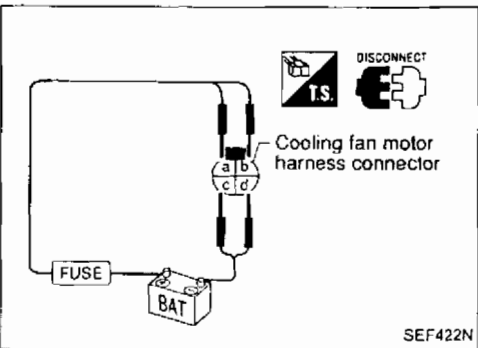
1. Disconnect power steering oil pressure switch harness connector.
2. Check continuity between terminals.



| Conditions                         | Continuity |
|------------------------------------|------------|
| Steering wheel is being turned     | Yes        |
| Steering wheel is not being turned | No         |

#### COOLING FAN MOTOR

1. Disconnect cooling fan motor harness connector.
2. Supply cooling fan motor terminals with battery voltage and check operation.



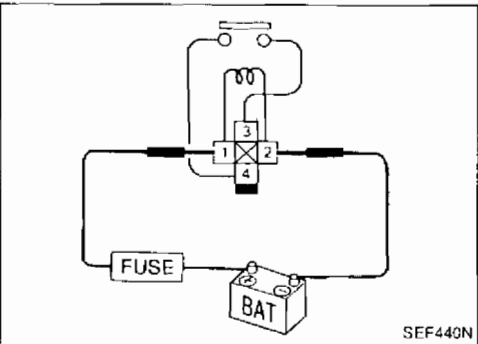
| Fan speed | Terminal |      |
|-----------|----------|------|
|           | ⊕        | ⊖    |
| Low       | Ⓐ        | Ⓓ    |
| High      | Ⓐ, Ⓑ     | Ⓒ, Ⓓ |

**Cooling fan motor should operate.**

If NG, replace cooling fan motor.

#### ECCS RELAY, FUEL PUMP RELAY, IGNITION COIL RELAY AND COOLING FAN RELAY 1-2

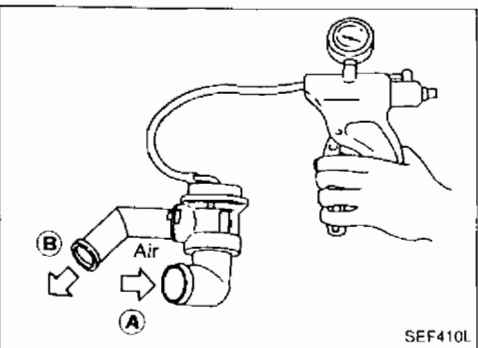
Check continuity between terminals ③ and ④.



| Conditions  | Continuity |
|---|------------|
| 12V direct current supply between terminals ① and ② | Yes        |
| No current supply                                   | No         |

#### RECIRCULATION VALVE

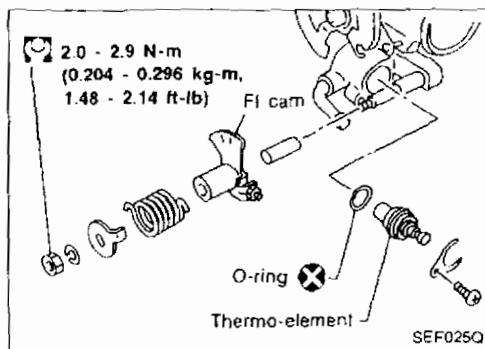
Check air passage continuity between Ⓐ and Ⓑ.



| Condition   | Continuity |
|---|------------|
| A vacuum of above -27.3 to -34.0 kPa (-273 to -340 mbar, -205 to -255 mmHg, -8.07 to -10.04 inHg) is applied to vacuum port | Yes        |
| No vacuum applied   | No         |

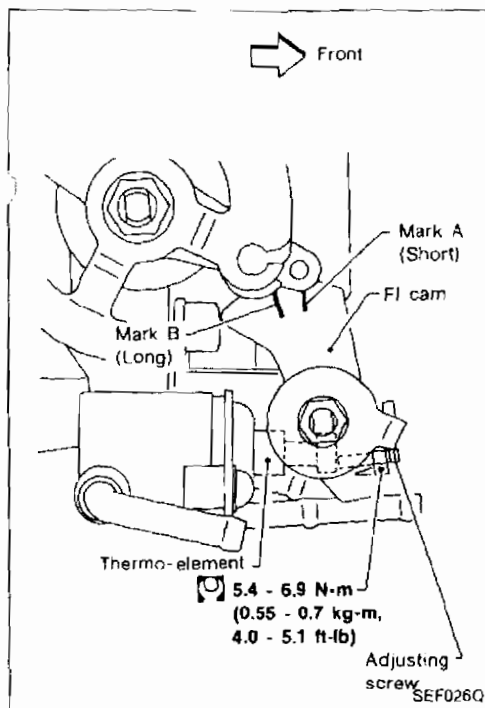
If NG, replace recirculation valve.

**Do not disassemble and adjust recirculation valve.**



## Fast Idle Cam (FIC) Inspection and Adjustment REMOVAL AND INSTALLATION

- Do not extract thermo-element by pulling center rod.
- Always replace O-ring with a new one.
- Lubricate O-ring with a smear of engine oil.
- After installation, check for water leakage.

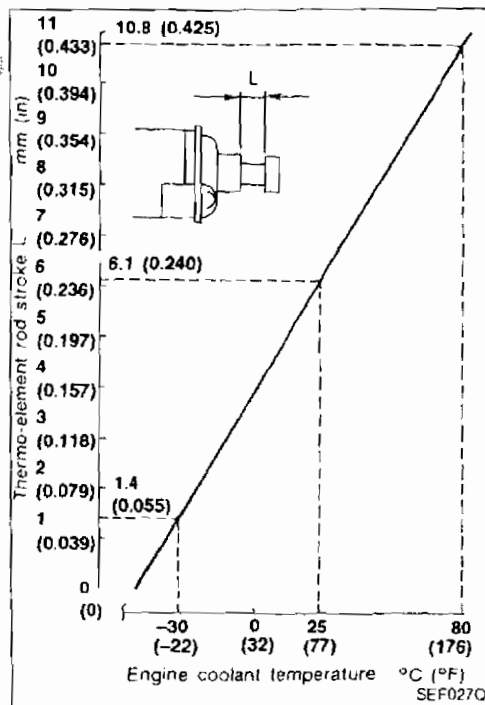


### INSPECTION

1. Start engine. Warm the engine coolant up to 80°C (176°F) and keep it there for 10 minutes.
2. Check that mark A (short line) on FI cam aligns with roller center.
  - a. If NG, measure thermo-element stroke (L) and engine coolant temperature. If stroke L is in the specification shown in the figure, adjust FI cam with adjusting screw.
  - b. If stroke (L) is out of the specification, replace thermo-element with a new one.

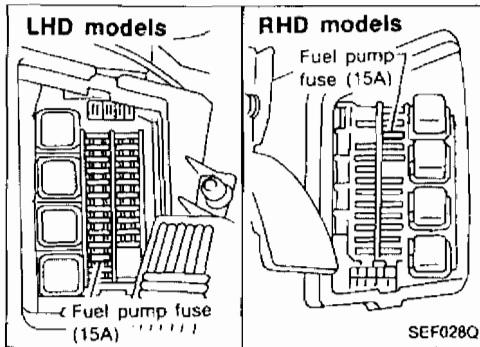
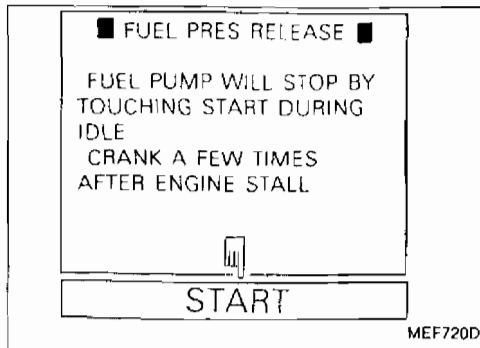
### ADJUSTMENT

1. Start engine. Warm the engine coolant up to 80°C (176°F) and keep it there for 10 minutes.
2. Loosen adjusting screw and align mark A (short line) on FI cam with roller center. Tighten lock nut to the specification.
3. Cool down the engine coolant to 25°C (77°F) and keep it there for 5 minutes.
4. Check that mark B (long line) on FI cam aligns with roller center.



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# MULTIPOINT FUEL INJECTION SYSTEM INSPECTION



## Releasing Fuel Pressure

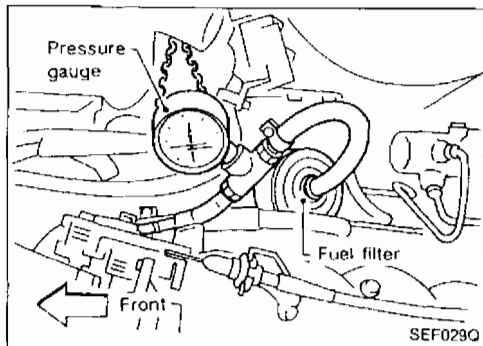
Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT.

1. Remove fuse for fuel pump.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch off and reconnect fuse for fuel pump.

## Fuel Pressure Check

- a. Make sure that clamp screw does not contact adjacent parts.
  - b. Use a torque driver to tighten clamps.
  - c. Use Pressure Gauge to check fuel pressure.
  - d. Do not perform fuel pressure check while fuel pressure regulator control system is operating; otherwise, fuel pressure gauge might indicate incorrect readings.
1. Release fuel pressure to zero.
  2. Disconnect fuel hose between fuel filter and fuel tube (engine side).
  3. Install pressure gauge between fuel filter and fuel tube.
  4. Start engine and check for fuel leakage.



5. Read the indication of fuel pressure gauge.

### At idling:

When fuel pressure regulator valve vacuum hose is connected.

Approximately 245 kPa (2.45 bar, 2.5 kg/cm<sup>2</sup>, 36 psi)

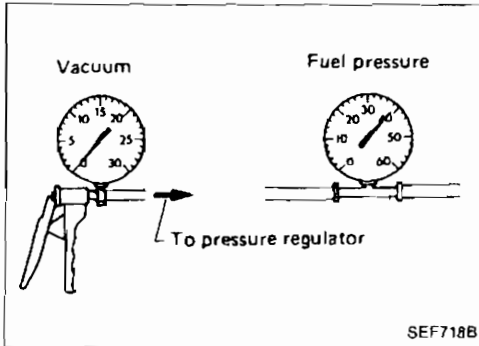
When fuel pressure regulator valve vacuum hose is disconnected.

Approximately 294.1 kPa (2.94 bar, 3.0 kg/cm<sup>2</sup>, 43 psi)

# MULTIPOINT FUEL INJECTION SYSTEM INSPECTION

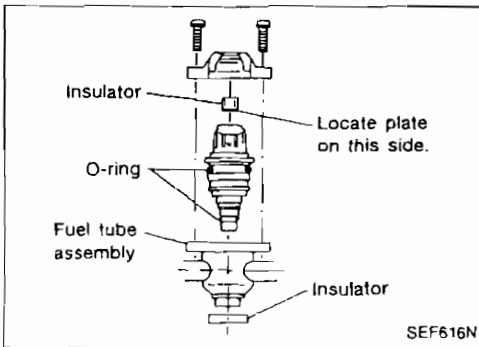
## Fuel Pressure Check (Cont'd)

6. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
7. Plug intake manifold with a rubber cap.
8. Connect variable vacuum source to fuel pressure regulator.



9. 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

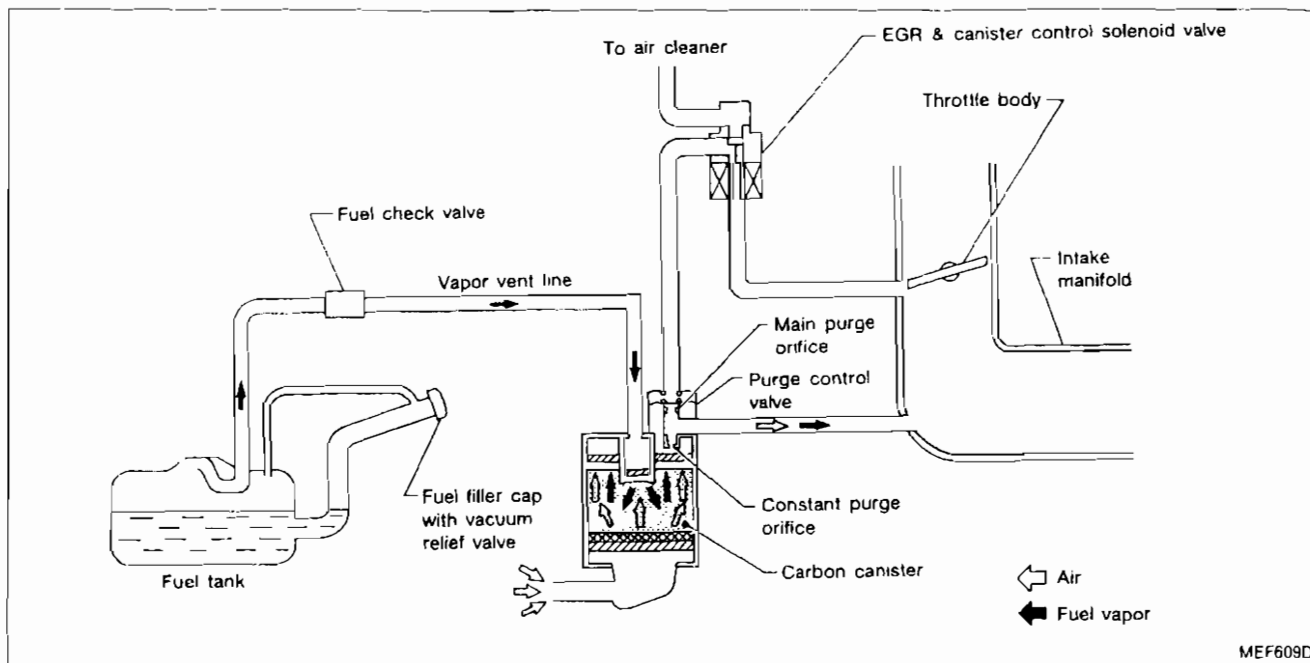
1. Remove injectors with fuel tube assembly. Refer to "INTAKE MANIFOLD" in EM section.
2. Push out any malfunctioning injector from fuel tube assembly.
  - Do not extract injector by pinching connector.
  - Always replace O-rings and insulators with new ones.
  - Lubricate O-ring with a smear of silicone oil.
3. Installation is in the reverse order of removal.

### CAUTION:

**After properly connecting injectors to fuel tube assembly, check connections for fuel leakage.**

# EVAPORATIVE EMISSION SYSTEM

## Description



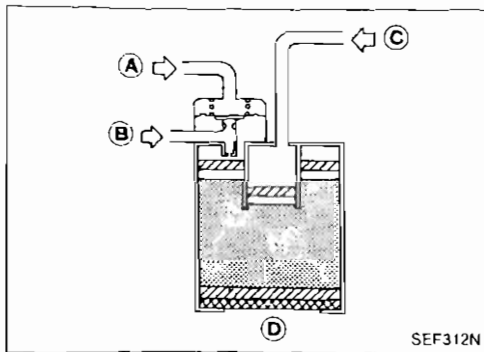
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the carbon canister.

The fuel vapor from sealed fuel tank is led into the canister when the engine is off. The fuel vapor is then stored in the canister. The canister retains the fuel vapor until the canister is purged by air.

When the engine is running, the air is drawn through the bottom of the canister. The fuel vapor will then be led to the intake manifold.

When the engine runs at idle, the purge control valve is closed. Only a small amount of vapor flows into the intake manifold through the constant purge orifice.

As the engine speed increases and the throttle vacuum rises, the purge control valve opens. The vapor is sucked through both main purge and constant purge orifices.



## Inspection

### ACTIVATED CARBON CANISTER

Check carbon canister as follows:

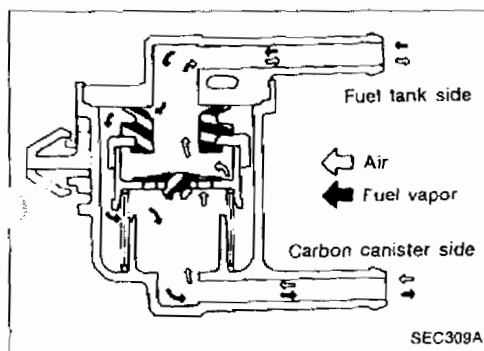
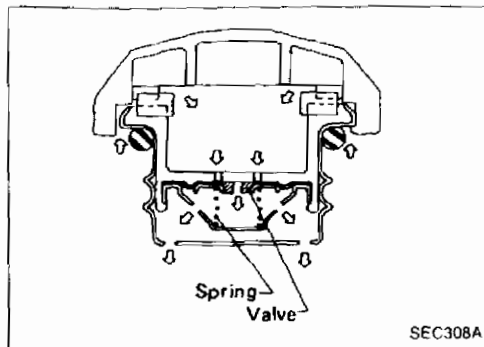
1. Blow air in port (A) and ensure that there is no leakage.
2.
  - Apply vacuum to port (A).
  - Cover port (D) with hand.
  - Blow air in port (C) and ensure free flow out of port (B).

# EVAPORATIVE EMISSION SYSTEM

## Inspection (Cont'd)

### FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Suck air through the cap. A slight resistance accompanied by valve clicks indicates that valve is in good mechanical condition. Note also that, by further sucking air, the resistance should disappear with valve clicks.
3. If valve is clogged or if no resistance is felt, replace cap as an assembly.



### FUEL CHECK VALVE

1. Blow air through connector on fuel tank side. A considerable resistance should be felt and a portion of air flow should be directed toward the canister.
2. Blow air through connector on canister side. Air flow should be smoothly directed toward fuel tank.
3. If fuel check valve is suspected of not properly functioning in steps 1 and 2 above, replace it.

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## Description

This system returns blow-by gas to the intake collector.

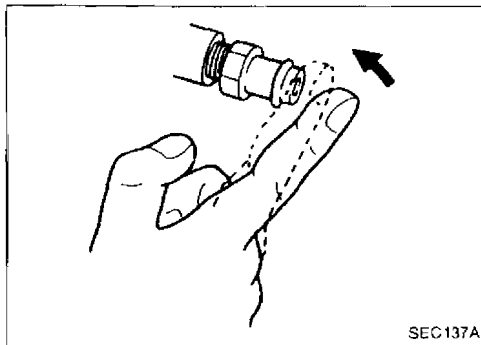
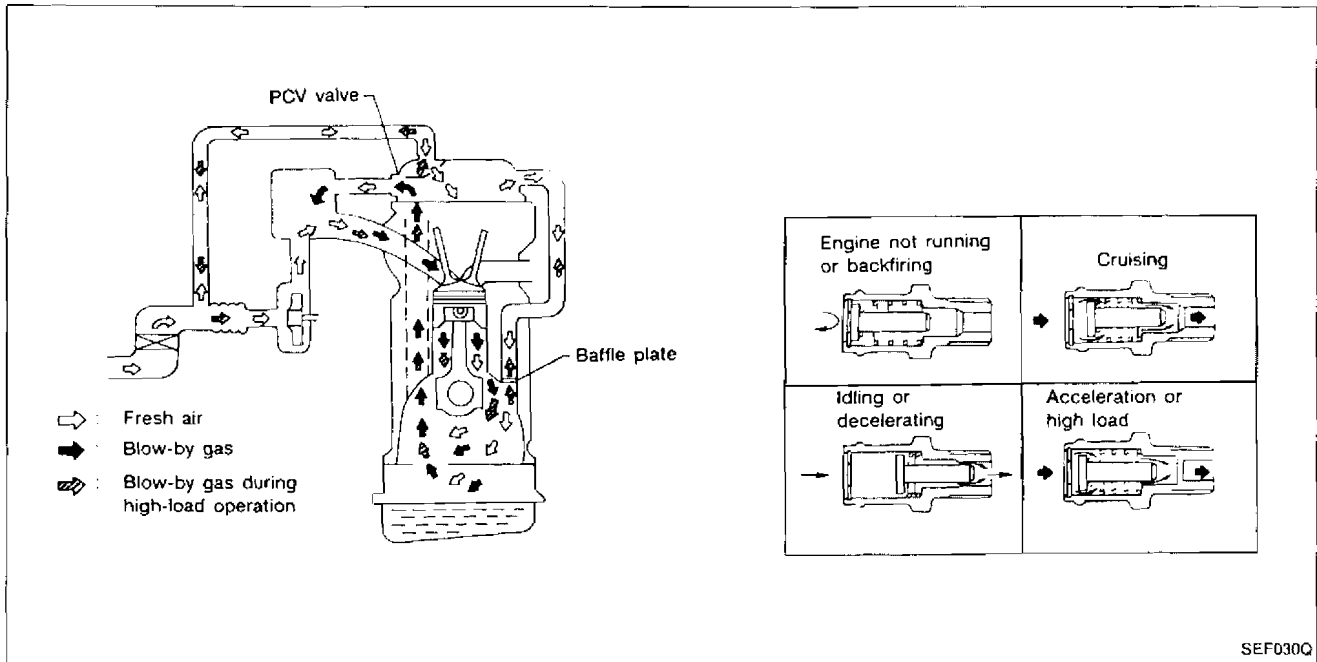
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

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 air inlet tubes into crankcase through a hose. The hose connects the air inlet tubes and the rocker cover. Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. Flow then goes through the hose connection in the reverse direction.

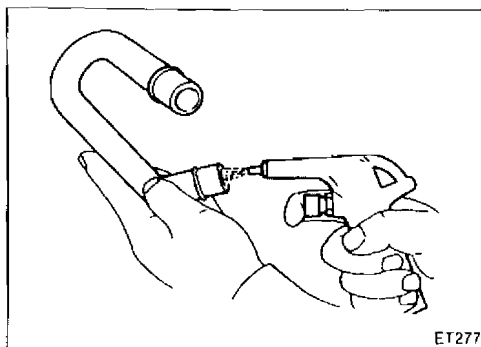
Under any condition, some of the flow goes through the hose connection to the air inlet tubes. This will occur on vehicles with an excessively high blow-by.



## Inspection

### PCV (Positive Crankcase Ventilation) VALVE

With engine running at idle, remove 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.



### VENTILATION HOSE

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.



**General Specifications**

|  |                                      |
|--|--------------------------------------|
| <b>PRESSURE REGULATOR</b>                                      |                                      |
| Fuel pressure at idling<br>kPa (bar, kg/cm <sup>2</sup> , psi) | Approximately<br>245 (2.45, 2.5, 36) |
| Vacuum hose is connected                                       | Approximately<br>294 (2.94, 3.0, 43) |
| Vacuum hose is disconnected                                    | Approximately<br>294 (2.94, 3.0, 43) |

**Inspection and Adjustment**

|  |     |               |
|--|-----|---------------|
| Idle speed*1                           | rpm |               |
| No-load*2                              |     |               |
| M/T & A/T (in "N" position)            |     | 800 ± 50      |
| Air conditioner: ON                    |     |               |
| M/T & A/T (in "N" position)            |     | 800 ± 50      |
| Ignition timing                        |     | 15° ± 2° BTDC |
| Throttle position sensor idle position | V   | 0.35 - 0.65   |

\*1: Feedback controlled and needs no adjustments

\*2: Under the following conditions:

- Air conditioner switch: OFF
- Steering wheel: Kept straight
- Electric load: OFF (Lights, heater, fan & rear defogger)
- Cooling fan: OFF

**IGNITION COIL**

|  |   |                 |
|--|---|-----------------|
| Primary voltage                        | V | 12              |
| Primary resistance<br>[at 20°C (68°F)] | Ω | Approximately 1 |

**ENGINE COOLANT TEMPERATURE SENSOR**

|                     |               |
|---------------------|---------------|
| Temperature °C (°F) | Resistance kΩ |
| 20 (68)             | 2.1 - 2.9     |
| 50 (122)            | 0.68 - 1.00   |
| 80 (176)            | 0.30 - 0.33   |

**FUEL PUMP**

|            |   |           |
|------------|---|-----------|
| Resistance | Ω | 0.2 - 5.0 |
|------------|---|-----------|

**HEATED OXYGEN SENSOR HEATER**

|            |   |           |
|------------|---|-----------|
| Resistance | Ω | 3 - 1,000 |
|------------|---|-----------|

**IACV-AAC VALVE**

|            |   |                  |
|------------|---|------------------|
| Resistance | Ω | Approximately 10 |
|------------|---|------------------|

**INJECTOR**

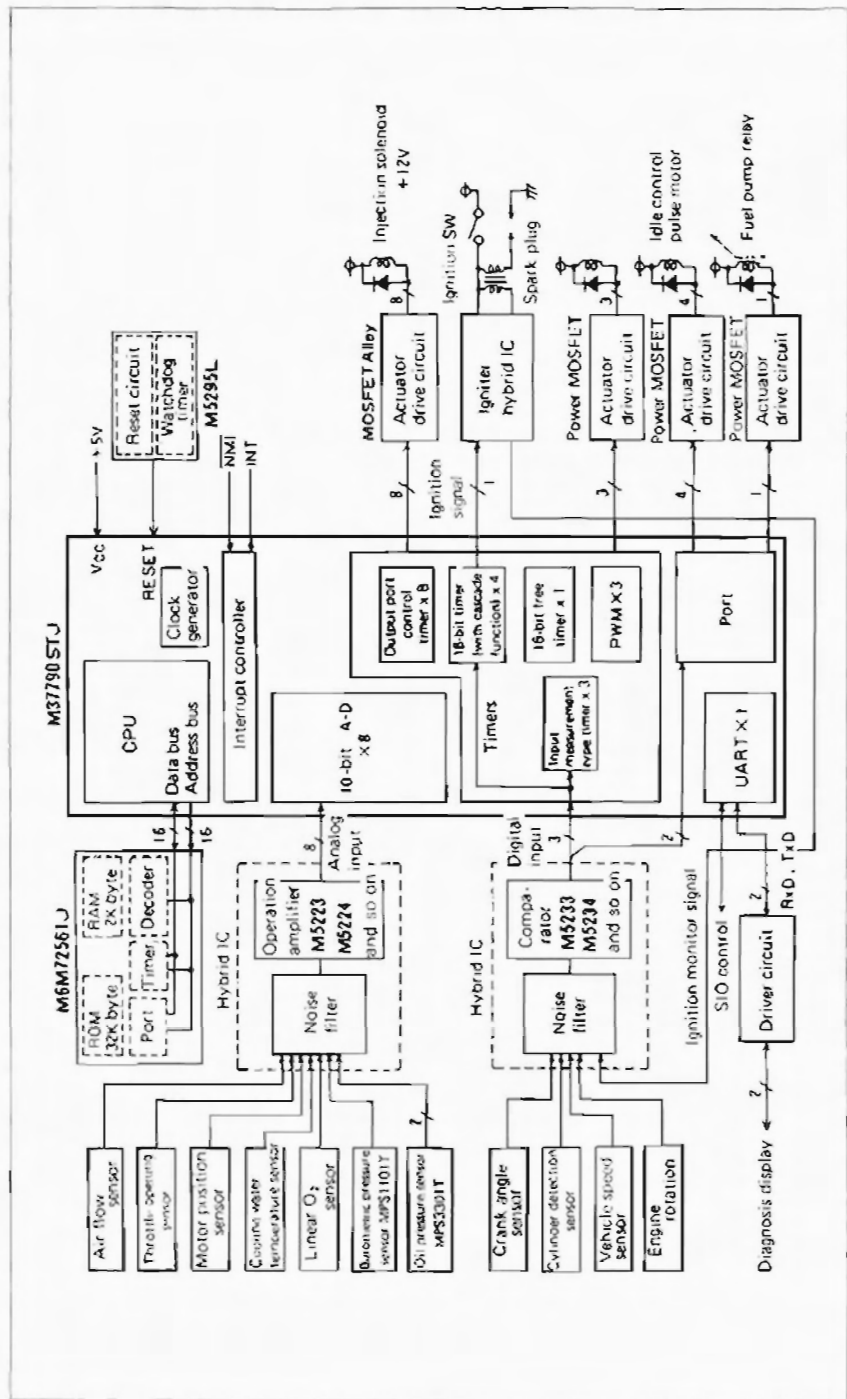
|            |   |         |
|------------|---|---------|
| Resistance | Ω | 10 - 14 |
|------------|---|---------|

**THROTTLE POSITION SENSOR**

|                              |                   |
|------------------------------|-------------------|
| Accelerator pedal conditions | Resistance kΩ     |
| Completely released          | Approximately 0.7 |
| Partially released           | 0.7 - 5           |
| Completely depressed         | Approximately 5   |

# Engine Control

System utilizing timers with enhanced real-time processing functions, high-precision A-D converter, and high-speed processing. Memory with large internal ROM and RAM (M6M72561J) is used.



# ACCELERATOR CONTROL, FUEL & EXHAUST SYSTEMS

## SECTION **FE**

### CONTENTS

#### PREPARATION/ACCELERATOR CONTROL SYSTEM


|                                 |   |
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| Accelerator Control System..... | 2 |
| Adjusting Accelerator Wire..... | 2 |

|                             |   |
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| Fuel Tank.....              | 3 |
| Fuel Pump and Gauge.....    | 5 |
| <b>EXHAUST SYSTEM</b> ..... | 7 |

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# PREPARATION/ACCELERATOR CONTROL SYSTEM

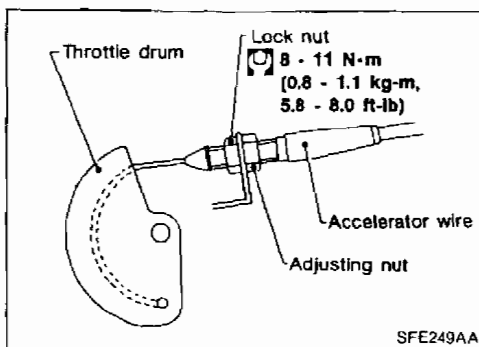
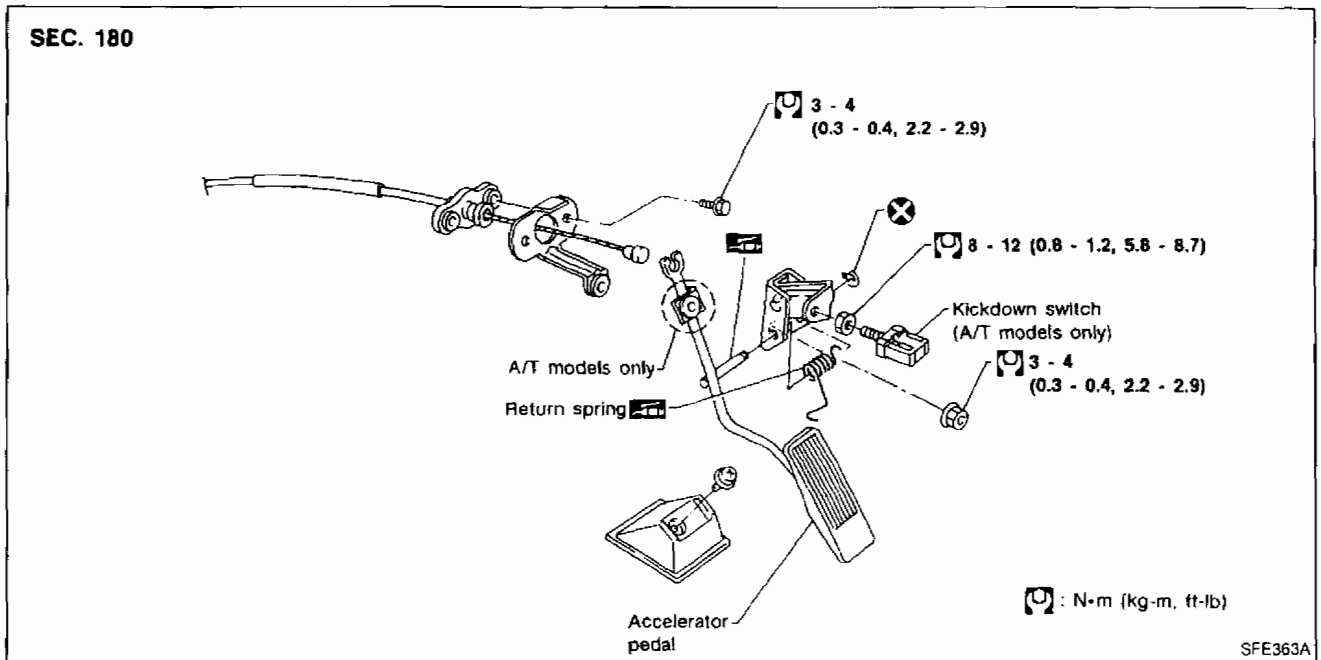
## Special Service Tool

| Tool number<br>Tool name                 | Description   |
|--|---|
| KV999G0010<br>Fuel tank lock ring socket | Removing and installing fuel tank lock ring                                       |
|  |  |
|  | NT057   |

## Accelerator Control System

### 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 wire.
- Refer to "AUTOMATIC SPEED CONTROL DEVICE" in EL section for ASCD wire adjustment.
- Refer to "ON-VEHICLE SERVICE" in AT section for Kickdown switch adjustment.



### Adjusting Accelerator Wire

1. Loosen lock nut, and tighten adjusting nut until throttle drum starts to move.
2. From that position turn back adjusting nut 1.5 to 2 turns, and secure lock nut.

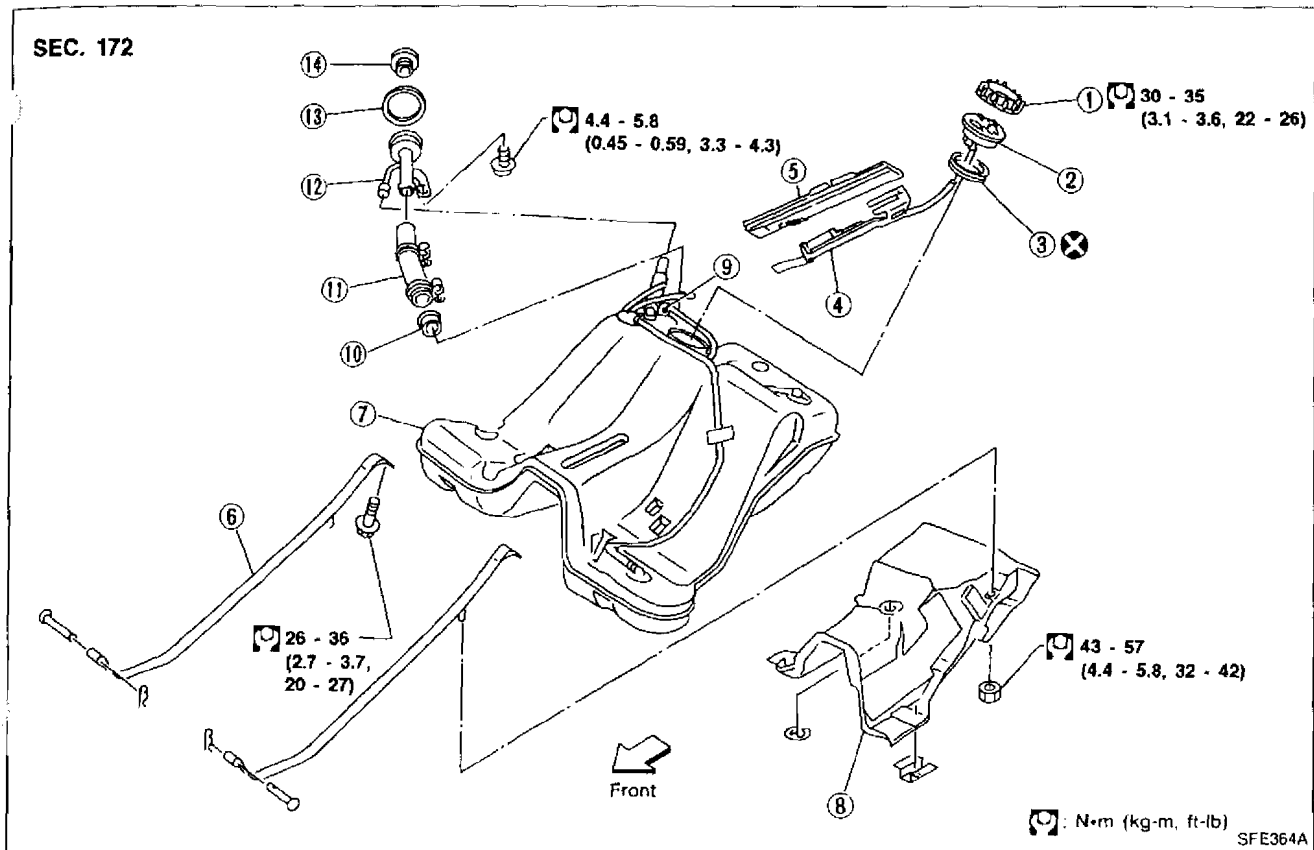
# FUEL SYSTEM

## WARNING:

- Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Be sure to furnish workshop with a CO<sub>2</sub> fire extinguisher.

## CAUTION:

- Before removing fuel line parts carry out the following procedures:
  - Put drained fuel in an explosion-proof container and put the lid on securely.
  - Release fuel pressure from fuel line. Refer to "Changing Fuel Filter" in MA section.
  - Disconnect battery ground cable.
- When installing fuel check valve, be careful of its designated direction. (Refer to EC section.)
- Always replace O-ring and clamps with new ones.
- Do not kink or twist tubes when they are being installed.
- Do not tighten hose clamps excessively to avoid damaging hoses.
- After installing tubes, run engine and check for fuel leaks at connections.



- |                |                       |               |
|----------------|-----------------------|---------------|
| ① Lock ring    | ⑥ Mounting band       | ⑪ Filler hose |
| ② Upper plate  | ⑦ Fuel tank           | ⑫ Filler tube |
| ③ Seal packing | ⑧ Fuel tank protector | ⑬ Grommet     |
| ④ Fuel pump    | ⑨ Fuel check valve    | ⑭ Filler cap  |
| ⑤ Fuel gauge   | ⑩ Filler collar       |               |

## Fuel Tank

### REMOVAL

#### CAUTION:

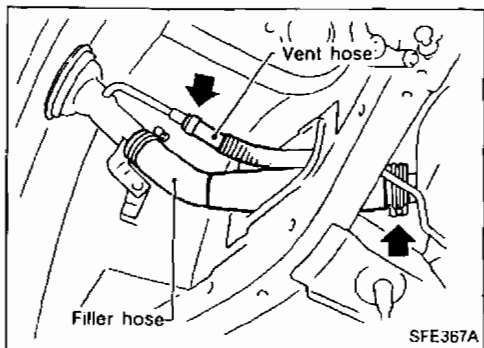
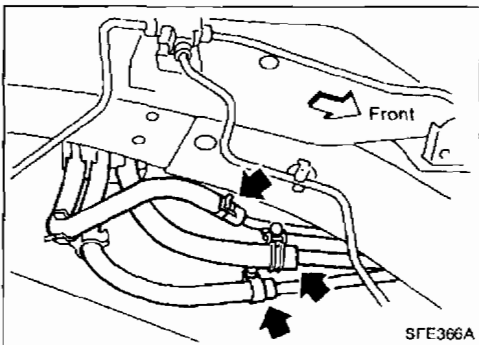
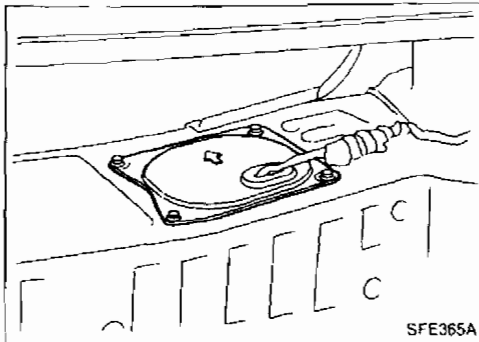
- Do not disconnect any fuel line unless absolutely necessary.
- Plug hose and pipe openings to prevent entry of dust or oil.

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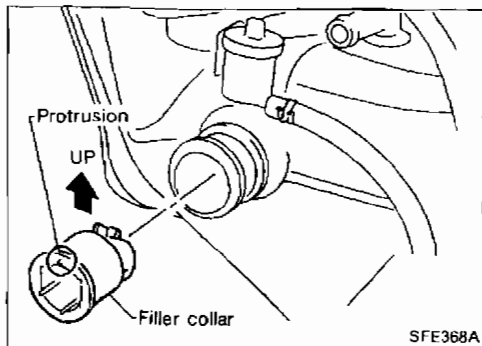
BOX

## FUEL SYSTEM

### Fuel Tank (Cont'd)



1. Release fuel pressure from fuel line.  
Refer to "Changing Fuel Filter" in MA section.
2. Remove inspection hole cover located behind the rear seat.
3. Disconnect harness connectors under inspection hole cover.
4. Disconnect fuel tubes located on the lower right-hand side of fuel tank.
  - Put mating marks on tubes for correct installation.
5. Remove exhaust center tube, propeller shaft, differential carrier, rear suspension member and drive shafts (Refer to RA section).
6. Disconnect filler hose at fuel tank side and vent hose at filler tube side.
7. Remove fuel tank protector.
8. Remove fuel tank band mounting bolts while supporting fuel tank.
9. Remove fuel tank.



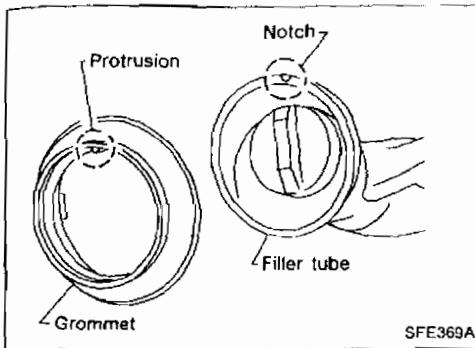
### INSTALLATION

Installation procedure is the reverse order of removal.

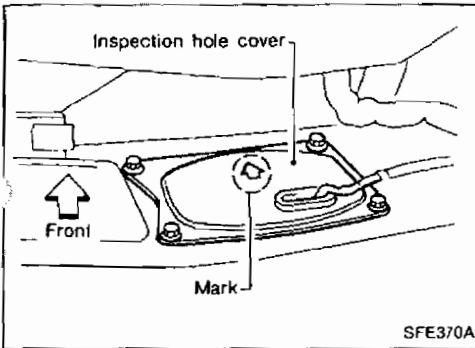
- When installing filler collar, place the protrusion of the collar flange upward.

## FUEL SYSTEM

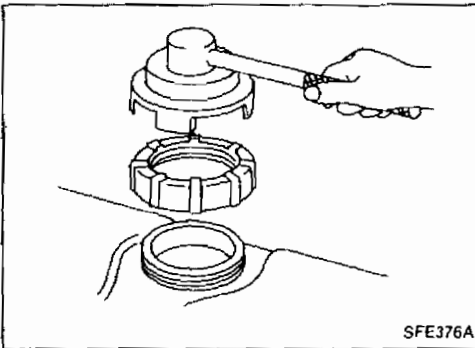
### Fuel Tank (Cont'd)



- When installing the grommet of the filler tube, align the protrusion on the grommet with the notch on the filler tube.



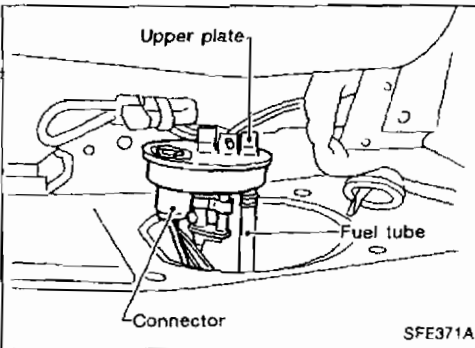
- When installing the inspection hole, put the arrow mark forward.



### Fuel Pump and Gauge

#### REMOVAL

1. Release fuel pressure from fuel line.  
Refer to "Changing Fuel Filter" in MA section.
2. Remove inspection hole cover located behind the rear seat.
3. Disconnect harness connectors and fuel tubes on upper plate.
- Put mating marks on tubes for correct installation.
4. Remove lock ring (Use Tool).
5. While lifting upper plate, disconnect fuel tube and harness connectors.



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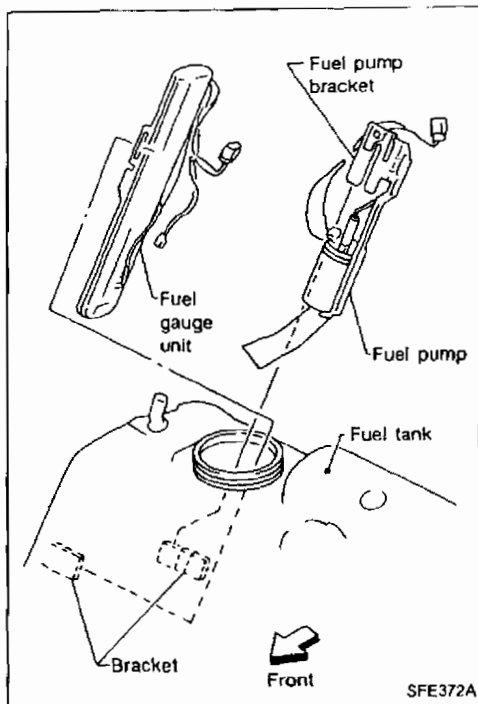
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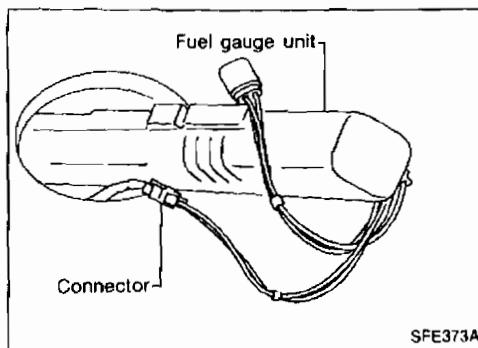
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## FUEL SYSTEM

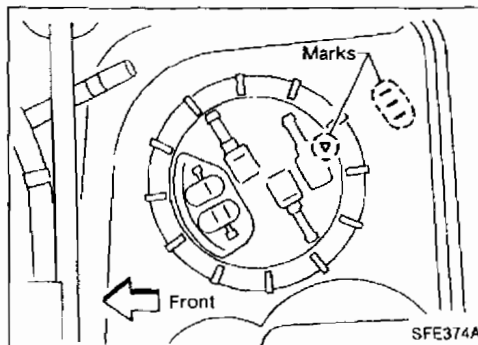
### Fuel Pump and Gauge (Cont'd)



6. Remove fuel pump pulling the top end of the fuel pump bracket upward.
7. Remove fuel gauge unit.
  - a. Pull fuel gauge unit horizontally to the left.



- b. Remove harness connector.
  - Carefully place the removed connector in the fuel tank so that it can be pulled out for the installation.



### INSTALLATION

Installation procedure is the reverse order of removal.

#### CAUTION:

- When installing upper plate, align the mark on it with the center of marks on fuel tank.



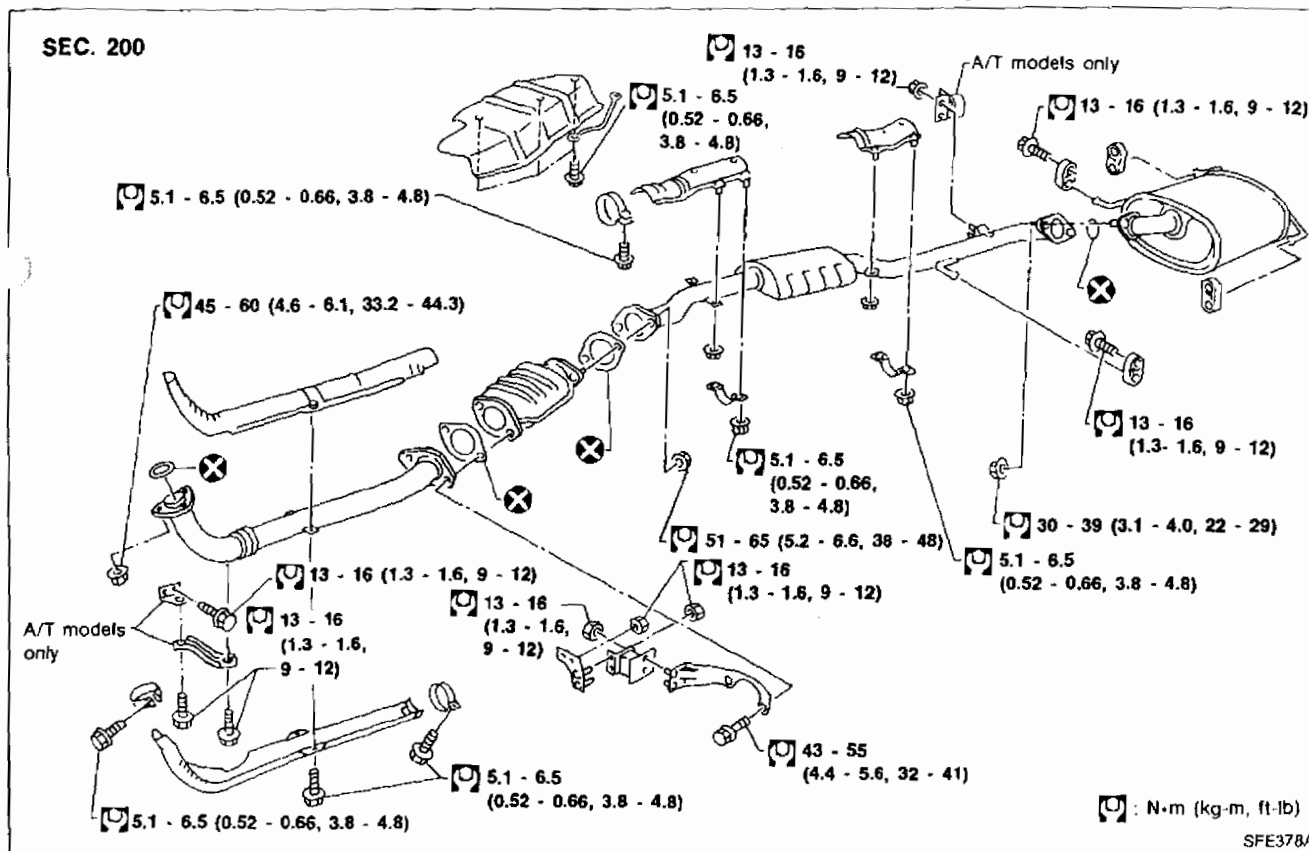
# EXHAUST SYSTEM

## 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.
- After installation, check to ensure that mounting brackets and mounting insulator are free from undue stress. If not installed properly, excessive noise or vibration may be transmitted to the vehicle body.

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# CLUTCH

## SECTION **CL**

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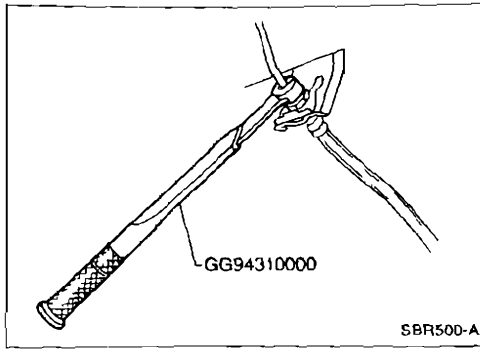
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# PRECAUTIONS AND PREPARATION



## Precautions

- 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

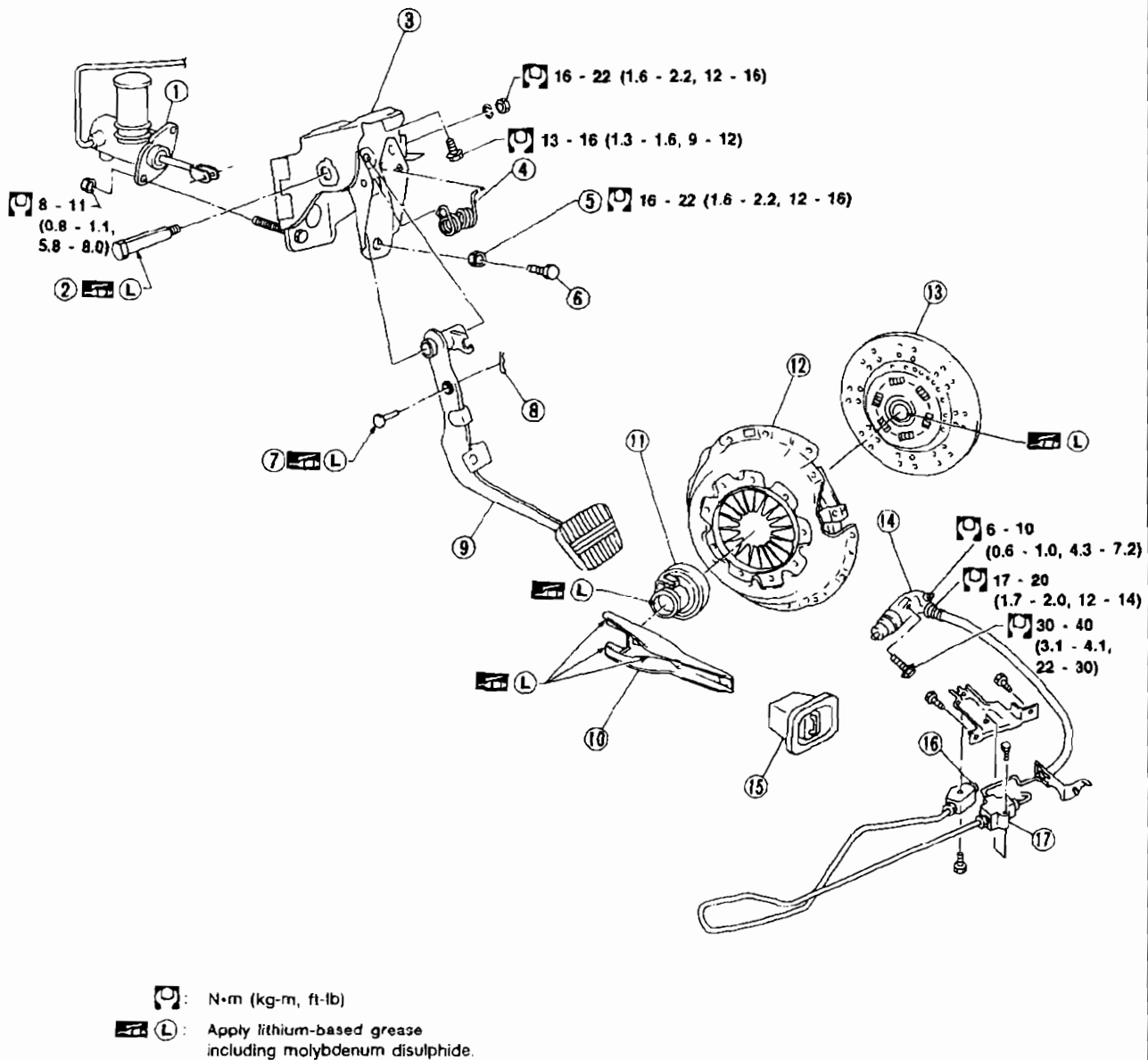
| Tool number<br>Tool name                        | Description  |
|---|--|
| GG94310000<br>Flare nut torque wrench           | <p>NT406</p> <p>a: 10 mm (0.39 in)</p>   |
| ST20600000<br>Clutch aligning bar               | <p>NT405</p> <p>a: 15.9 mm (0.626 in) dia.<br/>b: 22.8 mm (0.898 in) dia.<br/>c: 55 mm (2.17 in)</p> |
| ST20050240<br>Diaphragm spring adjusting wrench | <p>NT404</p> <p>a: 150 mm (5.91 in)<br/>b: 25 mm (0.98 in)</p>                                       |

## Commercial Service Tools

| Tool name      | Description   |
|----------------|---|
| Bearing puller | <p>NT077</p> <p>Removing release bearing</p>                                  |
| Bearing drift  | <p>NT063</p> <p>a: 50 mm (1.97 in) dia.</p> <p>Installing release bearing</p> |

# CLUTCH SYSTEM

SEC. 300-305-465



- ① Clutch master cylinder
- ② Fulcrum pin
- ③ Pedal bracket
- ④ Return spring
- ⑤ Lock nut
- ⑥ Lock nut

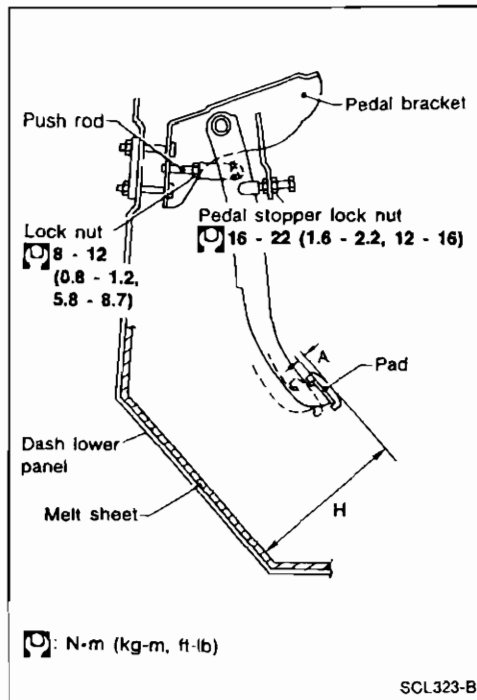
- ⑦ Clevis pin
- ⑧ Snap pin
- ⑨ Clutch pedal
- ⑩ Withdrawal lever
- ⑪ Release bearing
- ⑫ Clutch cover

- ⑬ Clutch disc
- ⑭ Operating cylinder
- ⑮ Dust cover
- ⑯ Bleeder screw
- ⑰ Clutch connector

SCL604

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# INSPECTION AND ADJUSTMENT



## Adjusting Clutch Pedal

1. Adjust pedal height with pedal stopper.

**Pedal height "H":**

**LHD 192 - 202 mm (7.56 - 7.95 in)**

**RHD 188 - 198 mm (7.40 - 7.80 in)**

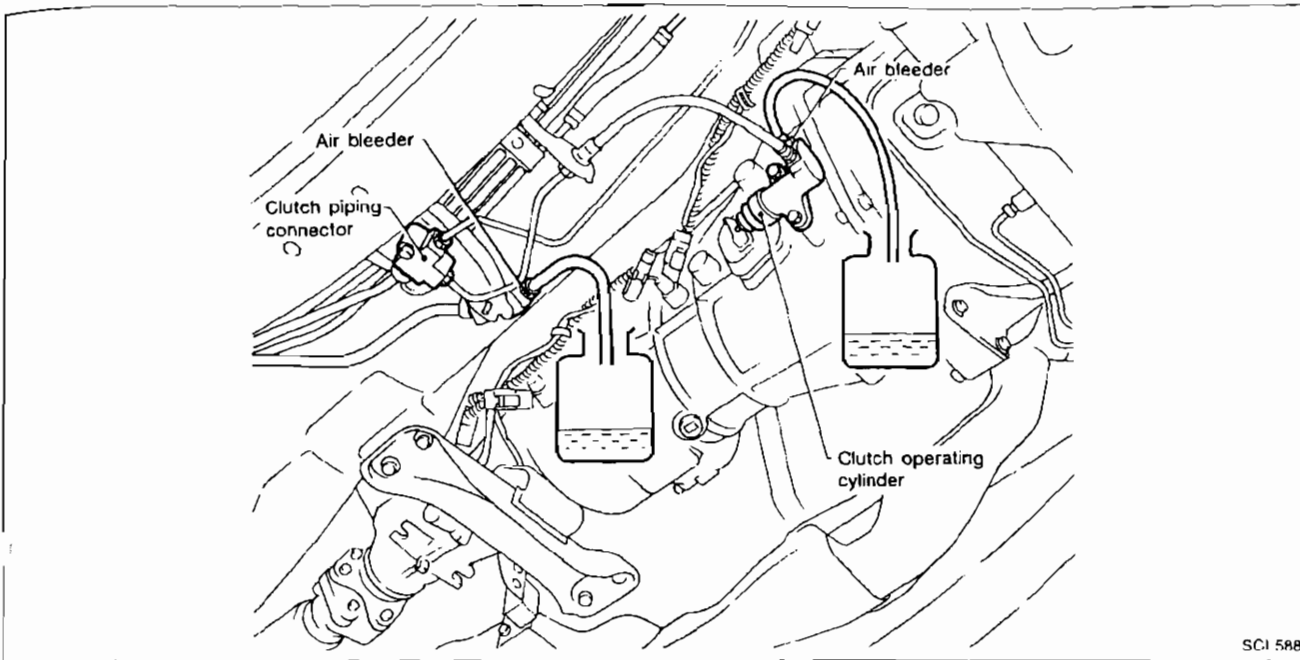
2. Adjust pedal free play with master cylinder push rod. Then tighten lock nut.

**Pedal free play "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 be rotated smoothly. If not, readjust pedal free play with master cylinder push rod.



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## Bleeding Procedure

1. Bleed air from clutch master cylinder (RHD model only) according to the following procedure.

**Carefully monitor fluid level at master cylinder during bleeding operation.**

- a. Top up reservoir with recommended brake fluid.
- b. Connect a transparent vinyl tube to air bleeder valve.
- c. Fully depress clutch pedal several times.
- d. With clutch pedal depressed, open bleeder valve to release air.
- e. Close bleeder valve.
- f. Repeat steps c through e above until brake fluid flows from air bleeder valve without air bubbles.

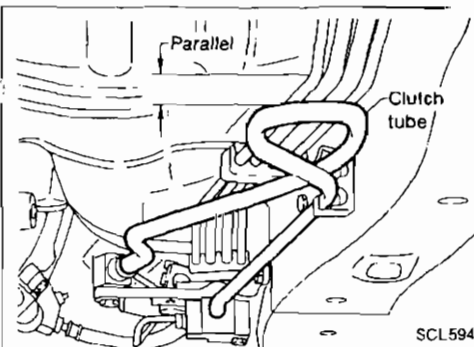
2. Bleed air from clutch operating cylinder according to the above same procedure.

3. Bleed air from clutch piping connector according to the above same procedure.

4. Repeat the above bleeding procedures 1 through 3 several times.

### Remarks

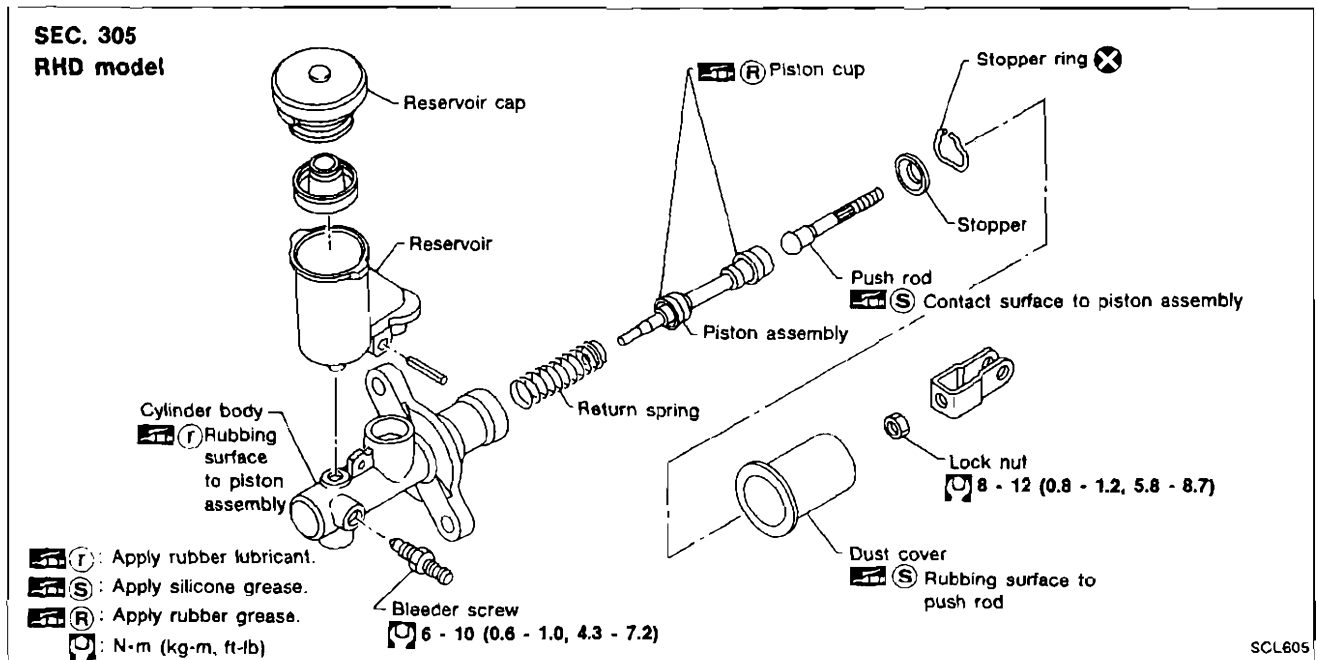
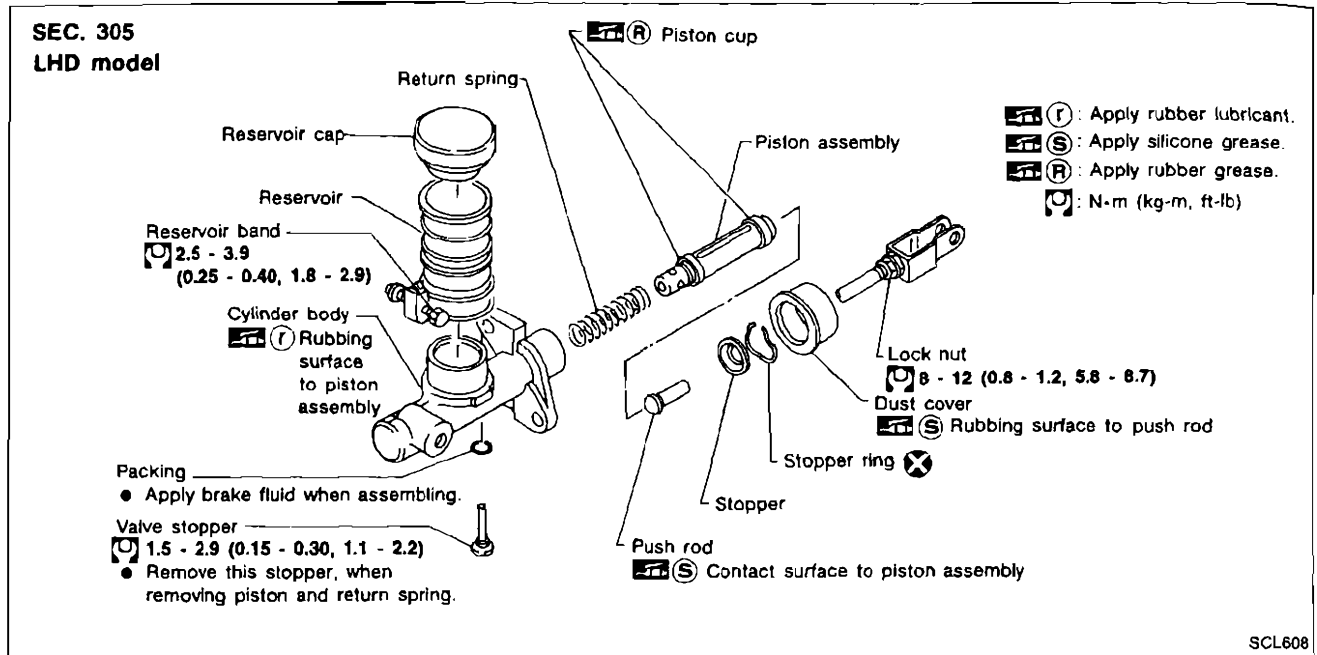
When replacing clutch tube, install new one parallel to body floor panel. If not, air bleeding might be difficult.



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# HYDRAULIC CLUTCH CONTROL

## Clutch Master Cylinder

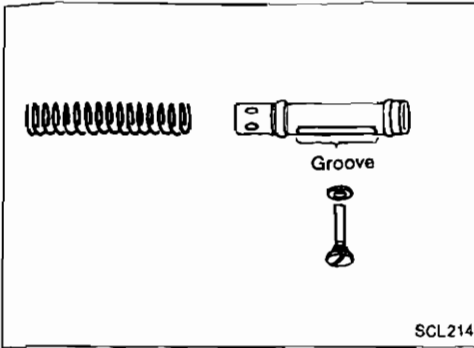


### DISASSEMBLY AND ASSEMBLY

- Push piston into cylinder body with screwdriver when removing and installing valve stopper.

# HYDRAULIC CLUTCH CONTROL

## Clutch Master Cylinder (Cont'd)



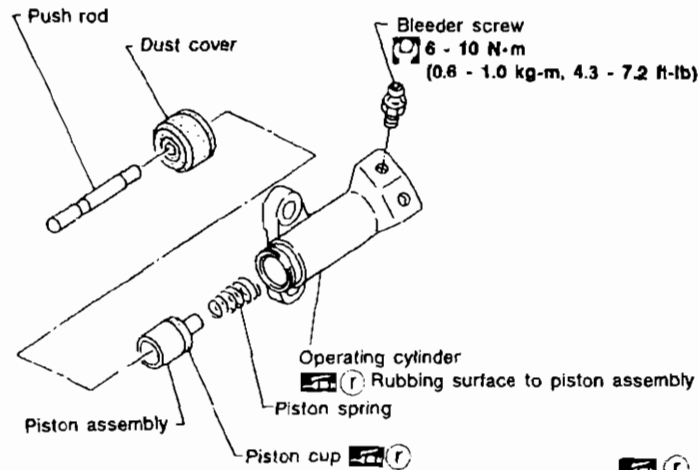
- Align groove of piston assembly and valve stopper when installing valve stopper.
- Check direction of piston cups.

## INSPECTION

- Check cylinder and piston rubbing surface for uneven wear, rust or damage. Replace if necessary.
- Check piston with piston cup for wear or damage. Replace if necessary.
- Check return spring for wear or damage. Replace if necessary.
- Check reservoir for deformation or damage. Replace if necessary.
- Check dust cover for cracks, deformation or damage. Replace if necessary.

## Operating Cylinder

SEC. 306



SCL590

## INSPECTION

- Check rubbing surface of cylinder for wear, rust or damage. Replace if necessary.
- Check piston with piston cup for wear or damage. Replace if necessary.
- Check piston spring for wear or damage. Replace if necessary.
- Check dust cover for cracks, deformation or damage. Replace if necessary.

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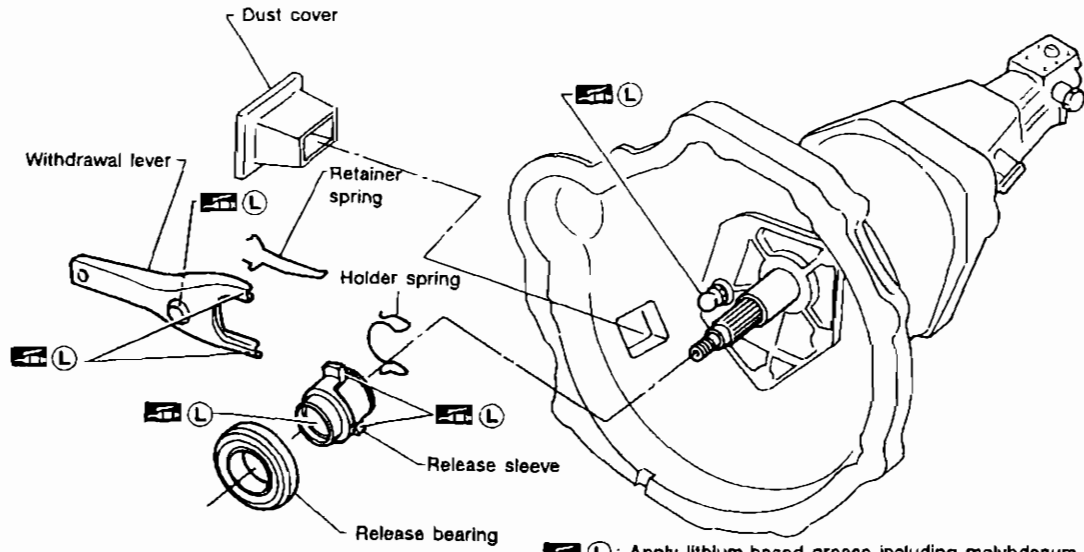
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# CLUTCH RELEASE MECHANISM

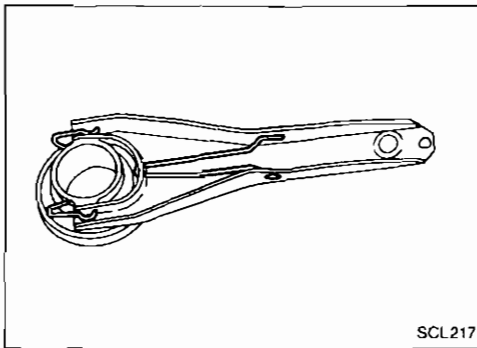
SEC. 321



SCL617

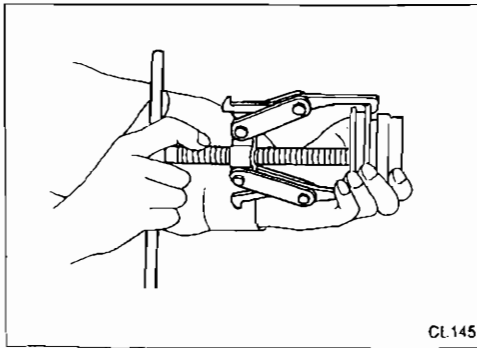
## REMOVAL AND INSTALLATION

- Install retainer spring and holder spring.



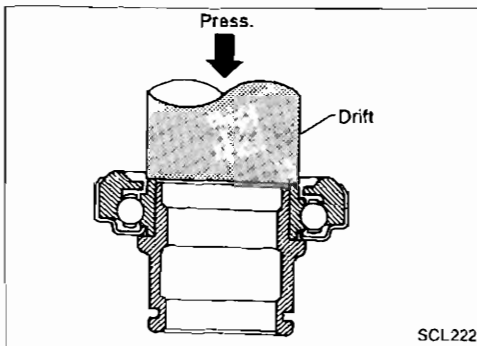
SCL217

- Remove release bearing



CL145

- Install release bearing with suitable drift.



SCL222

# CLUTCH RELEASE MECHANISM

## INSPECTION

- Check release bearing to see that it rolls freely and is free from noise, cracks, pitting or wear. Replace if necessary.
- Check release sleeve and withdrawal lever rubbing surface for wear, rust or damage. Replace if necessary.

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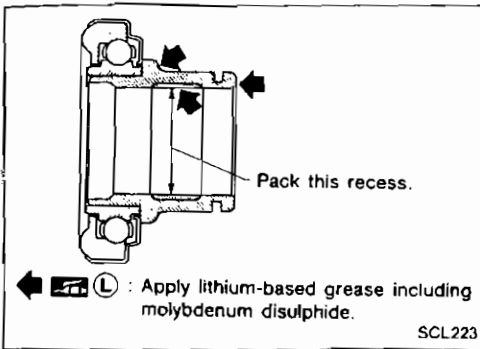
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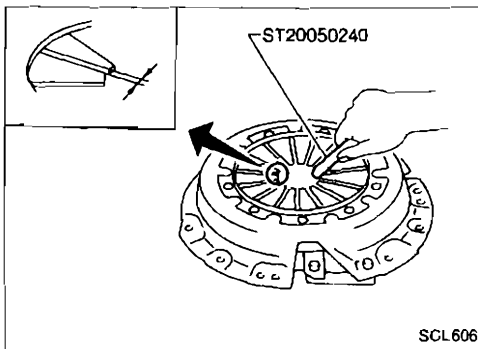
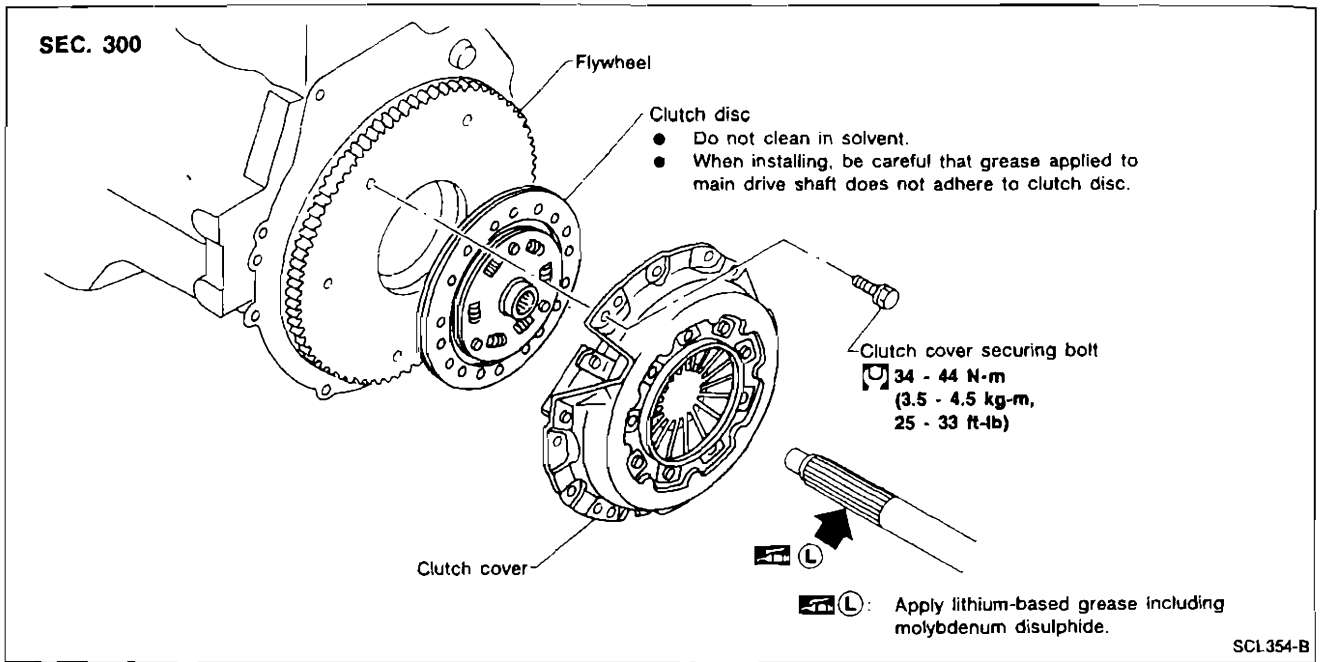


## LUBRICATION

- Apply recommended grease to contact surface and rubbing surface.

**Too much lubricant might damage clutch disc facing.**

# CLUTCH DISC AND CLUTCH COVER



## Clutch Cover and Flywheel

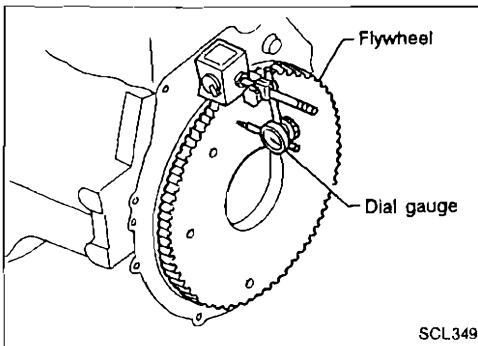
### INSPECTION AND ADJUSTMENT

- Check clutch cover installed on vehicle for unevenness of diaphragm spring toe height.

**Uneven limit:**

**0.5 mm (0.020 in)**

- If out of limit, adjust the height with Tool.

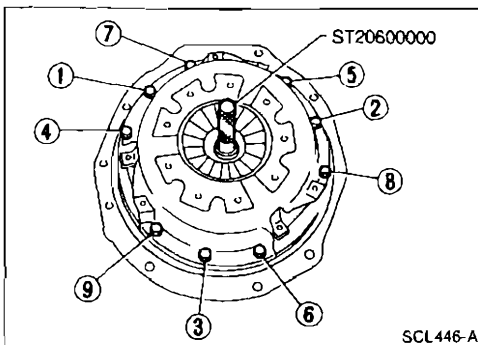


### FLYWHEEL INSPECTION

- Check contact surface of flywheel for slight burns or discoloration. Repair flywheel with emery paper.
- Check flywheel runout.

**Maximum allowable runout:**

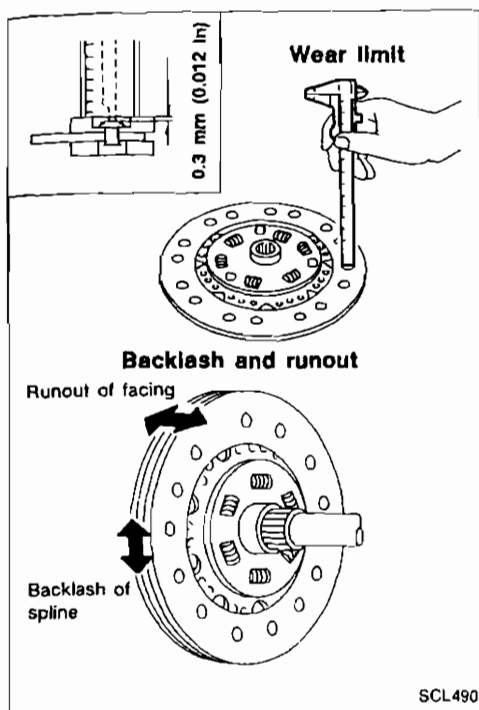
**Refer to EM section ("Inspection", "CYLINDER BLOCK").**



### INSTALLATION

- Insert Tool into clutch disc hub when installing clutch cover and disc.
- Tighten bolts in numerical order.
- **Be careful not to allow grease to contaminate clutch facing.**

# CLUTCH DISC AND CLUTCH COVER



## Clutch Disc

### INSPECTION

- Check clutch disc for wear of facing.  
**Wear limit of facing surface to rivet head:**  
0.3 mm (0.012 in)
- Check 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:**  
1.0 mm (0.039 in)  
**Distance of runout check point (from hub center):**  
115 mm (4.53 in)
- Check clutch disc for burns, discoloration or oil or grease leakage. Replace if necessary.

### INSTALLATION

- Apply recommended grease to contact surface of spring portion.  
**Too much lubricant might damage clutch disc facing.**

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# SERVICE DATA AND SPECIFICATIONS (SDS)

## General Specifications

### CLUTCH CONTROL SYSTEM

|                        |           |
|------------------------|-----------|
| Type of clutch control | Hydraulic |
|------------------------|-----------|

### CLUTCH MASTER CYLINDER

|                |         |             |
|----------------|---------|-------------|
| Inner diameter | mm (in) | 15.87 (5/8) |
|----------------|---------|-------------|

### CLUTCH OPERATING CYLINDER

|                |         |             |
|----------------|---------|-------------|
| Inner diameter | mm (in) | 19.05 (3/4) |
|----------------|---------|-------------|

### CLUTCH DISC

Unit: mm (in)

|   |   |
|---|---|
| Model   | 240   |
| Facing size<br>(Outer dia. x inner dia.<br>x thickness) | 240 x 160 x 3.5<br>(9.45 x 6.30 x 0.138)                        |
| Thickness of disc assembly<br>With load                 | 7.9 - 8.3 (0.311 - 0.327)<br>with 4,903 N<br>(500 kg, 1,103 lb) |

### CLUTCH COVER

|           |                               |
|-----------|-------------------------------|
| Model     | 240                           |
| Full load | N (kg, lb) 5,688 (580, 1,279) |

## Inspection and Adjustment

### CLUTCH PEDAL

Unit: mm (in)

| Model                                 | LHD                        | RHD                        |
|---------------------------------------|----------------------------|----------------------------|
| Pedal height "H"                      | 192 - 202<br>(7.56 - 7.95) | 188 - 198<br>(7.40 - 7.80) |
| Pedal free play "A"<br>(At pedal pad) | 9 - 16 (0.35 - 0.63)       |                            |

\*: Measured from surface of melt sheet to pedal pad

### CLUTCH COVER

Unit: mm (in)

|  |             |
|--|-------------|
| Model  | 240         |
| Uneven limit of diaphragm<br>spring toe height | 0.5 (0.020) |

### CLUTCH DISC

Unit: mm (in)

|   |             |
|---|-------------|
| Model   | 240         |
| Wear limit of facing surface to<br>rivet head           | 0.3 (0.012) |
| Runout limit of facing                                  | 1.0 (0.039) |
| Distance of runout check<br>point (from the hub center) | 115 (4.53)  |
| Maximum backlash of spline<br>(at outer edge of disc)   | 1.0 (0.039) |

# MANUAL TRANSMISSION

## SECTION **MT**

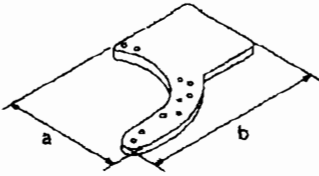
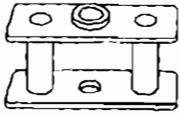
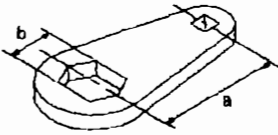

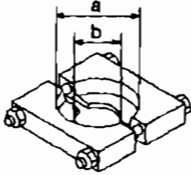
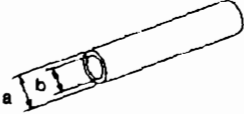
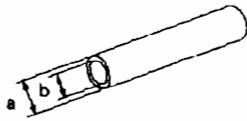
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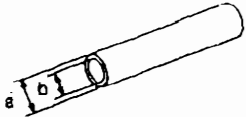
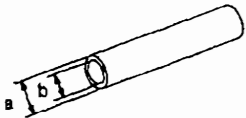
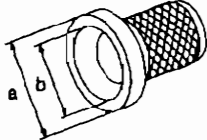
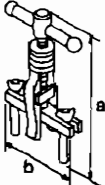
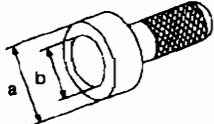
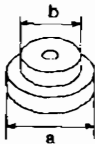
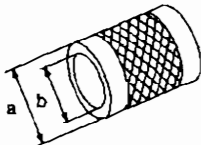
# PREPARATION

## Special Service Tools

| Tool number<br>Tool name               | Description  |
|--|--|
| ST23810001<br>Adapter setting plate    | <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="text-align: center;">  <p>NT407</p> </div> <div style="text-align: right;"> <p>Fixing adapter plate with gear assembly</p> <p><b>a: 166 mm (6.54 in)</b><br/><b>b: 270 mm (10.63 in)</b></p> </div> </div>  |
| KV31100401<br>Transmission press stand | <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="text-align: center;">  <p>NT068</p> </div> <div style="text-align: right;"> <p>Pressing counter gear and mainshaft</p> </div> </div>  |
| ST22520000<br>Wrench                   | <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="text-align: center;">  <p>NT409</p> </div> <div style="text-align: right;"> <p>Tightening mainshaft lock nut</p> <p><b>a: 100 mm (3.94 in)</b><br/><b>b: 41 mm (1.61 in)</b></p> </div> </div>  |
| ST23540000<br>Pin punch                | <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="text-align: center;">  <p>NT442</p> </div> <div style="text-align: right;"> <p>Removing and installing fork rod retaining pin</p> <p><b>a: 2.3 mm (0.091 in) dia.</b><br/><b>b: 4 mm (0.16 in) dia.</b></p> </div> </div>  |
| ST30031000<br>Puller                   | <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="text-align: center;">  <p>NT411</p> </div> <div style="text-align: right;"> <p>Removing and installing 1st gear bushing<br/>Removing main drive gear bearing<br/>Measuring wear of baulk rings</p> <p><b>a: 90 mm (3.54 in) dia.</b><br/><b>b: 50 mm (1.97 in) dia.</b></p> </div> </div> |
| ST23860000<br>Drift                    | <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="text-align: center;">  <p>NT065</p> </div> <div style="text-align: right;"> <p>Installing counter drive gear</p> <p><b>a: 38 mm (1.50 in) dia.</b><br/><b>b: 33 mm (1.30 in) dia.</b></p> </div> </div>   |
| ST22360002<br>Drift                    | <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="text-align: center;">  <p>NT065</p> </div> <div style="text-align: right;"> <p>Installing counter gear front and rear end bearings</p> <p><b>a: 29 mm (1.14 in) dia.</b><br/><b>b: 23 mm (0.91 in) dia.</b></p> </div> </div>   |

# PREPARATION

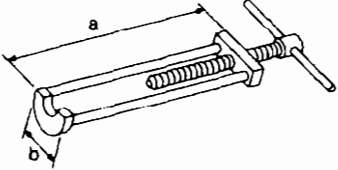
## Special Service Tools (Cont'd)

| Tool number<br>Tool name | Description  |                |
|--------------------------|--|----------------|
| ST22350000<br>Drift      |  <p style="text-align: center;">NT065</p> <p style="text-align: right;">Installing OD gear bushing</p> <p style="text-align: right;">a: 34 mm (1.34 in) dia.<br/>b: 28 mm (1.10 in) dia.</p>  | GI<br>VA<br>EM |
| ST23800000<br>Drift      |  <p style="text-align: center;">NT065</p> <p style="text-align: right;">Installing front cover oil seal</p> <p style="text-align: right;">a: 44 mm (1.73 in) dia.<br/>b: 31 mm (1.22 in) dia.</p>   | LC<br>EC       |
| ST33400001<br>Drift      |  <p style="text-align: center;">NT086</p> <p style="text-align: right;">Installing rear oil seal</p> <p style="text-align: right;">a: 60 mm (2.36 in) dia.<br/>b: 47 mm (1.85 in) dia.</p>  | FE<br>CL<br>MT |
| ST33290001<br>Puller     |  <p style="text-align: center;">NT414</p> <p style="text-align: right;">Removing rear oil seal</p> <p style="text-align: right;">a: 250 mm (9.84 in)<br/>b: 160 mm (6.30 in)</p>   | AT<br>PD       |
| ST30720000<br>Drift      |  <p style="text-align: center;">NT115</p> <p style="text-align: right;">Installing mainshaft ball bearing</p> <p style="text-align: right;">a: 77 mm (3.03 in) dia.<br/>b: 55.5 mm (2.185 in) dia.</p>  | FA<br>RA<br>BR |
| ST30613000<br>Drift      |  <p style="text-align: center;">NT073</p> <p style="text-align: right;">Installing main drive gear bearing</p> <p style="text-align: right;">a: 71.5 mm (2.815 in) dia.<br/>b: 47.5 mm (1.870 in) dia.</p>  | ST<br>RS<br>BT |
| ST33200000<br>Drift      |  <p style="text-align: center;">NT091</p> <p style="text-align: right;">Installing counter rear bearing<br/>Installing 3rd &amp; 4th synchronizer assembly</p> <p style="text-align: right;">a: 60 mm (2.36 in) dia.<br/>b: 44.5 mm (1.752 in) dia.</p> | HA<br>EL<br>DX |

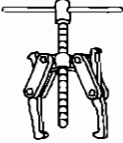


## PREPARATION

### Special Service Tools (Cont'd)

| Tool number<br>Tool name | Description   |
|--------------------------|---|
| KV32101330<br>Puller     |  <p>a: 447 mm (17.60 in)<br/>b: 100 mm (3.94 in)</p> |

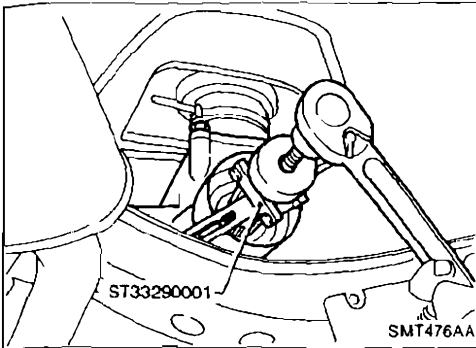
### Commercial Service Tool

| Tool name | Description  |
|-----------|--|
| Puller    |  <p>Removing counter bearings, counter drive and OD gears</p> |

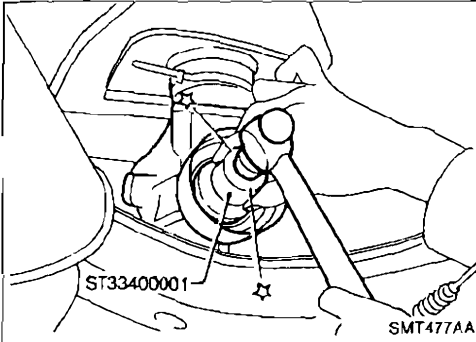
# ON-VEHICLE SERVICE

## Replacing Rear Oil Seal

### REMOVAL

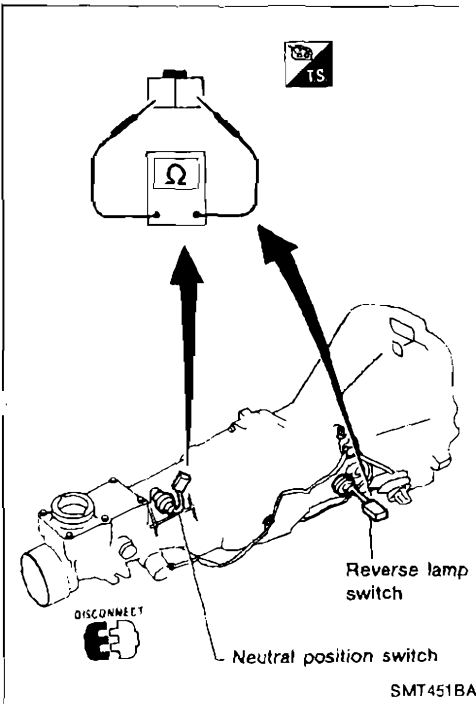


### INSTALLATION



## Check of Position Switches

| Switch                  | Gear position      | Continuity |
|-------------------------|--------------------|------------|
| Reverse lamp switch     | Reverse            | Yes        |
|                         | Other than reverse | No         |
| Neutral position switch | Neutral            | Yes        |
|                         | Other than neutral | No         |



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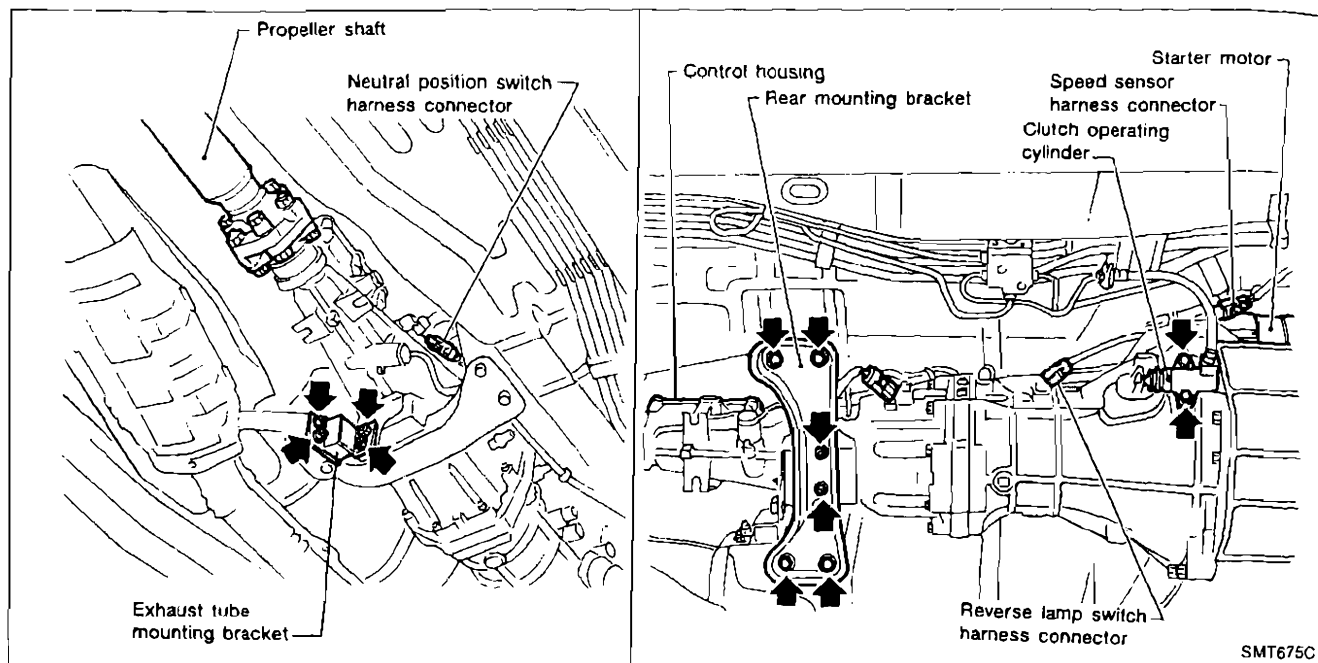
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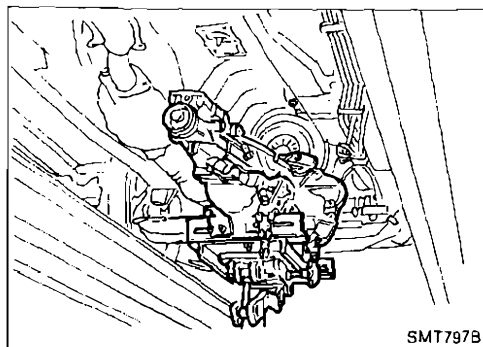
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# REMOVAL AND INSTALLATION

## Removal

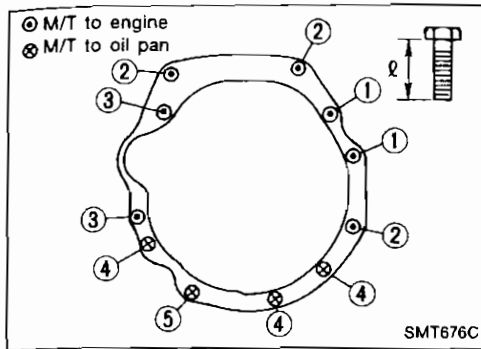


1. Remove battery negative terminal.
2. Remove shift lever with control housing from transmission.
3. Remove clutch operating cylinder from transmission.
4. Disconnect speed sensor, reverse lamp switch and neutral position switch harness connectors.
5. Remove starter motor from transmission.
6. Remove propeller shaft. — Refer to section PD.
- 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.
7. Remove exhaust tube mounting bracket from transmission.
8. Support manual transmission with a jack.
9. Remove rear mounting bracket.
10. Lower manual transmission as much as possible.



11. Remove transmission fixing bolts.
12. Remove transmission from engine.
- Support manual transmission while removing it.

# REMOVAL AND INSTALLATION



## Installation

- Tighten transmission fixing bolts.

| Bolt No. | Tightening torque<br>N·m (kg-m, ft-lb) | "L" mm (in) |
|----------|--|-------------|
| ①        | 70 - 79 (7.1 - 8.1, 51 - 59)           | 68 (2.68)   |
| ②        | 70 - 79 (7.1 - 8.1, 51 - 59)           | 63 (2.48)   |
| ③        | 70 - 79 (7.1 - 8.1, 51 - 59)           | 78 (3.07)   |
| ④        | 29 - 39 (3.0 - 4.0, 22 - 29)           | 60 (2.36)   |
| ⑤        | 29 - 39 (3.0 - 4.0, 22 - 29)           | 30 (1.18)   |

- Install any part removed.

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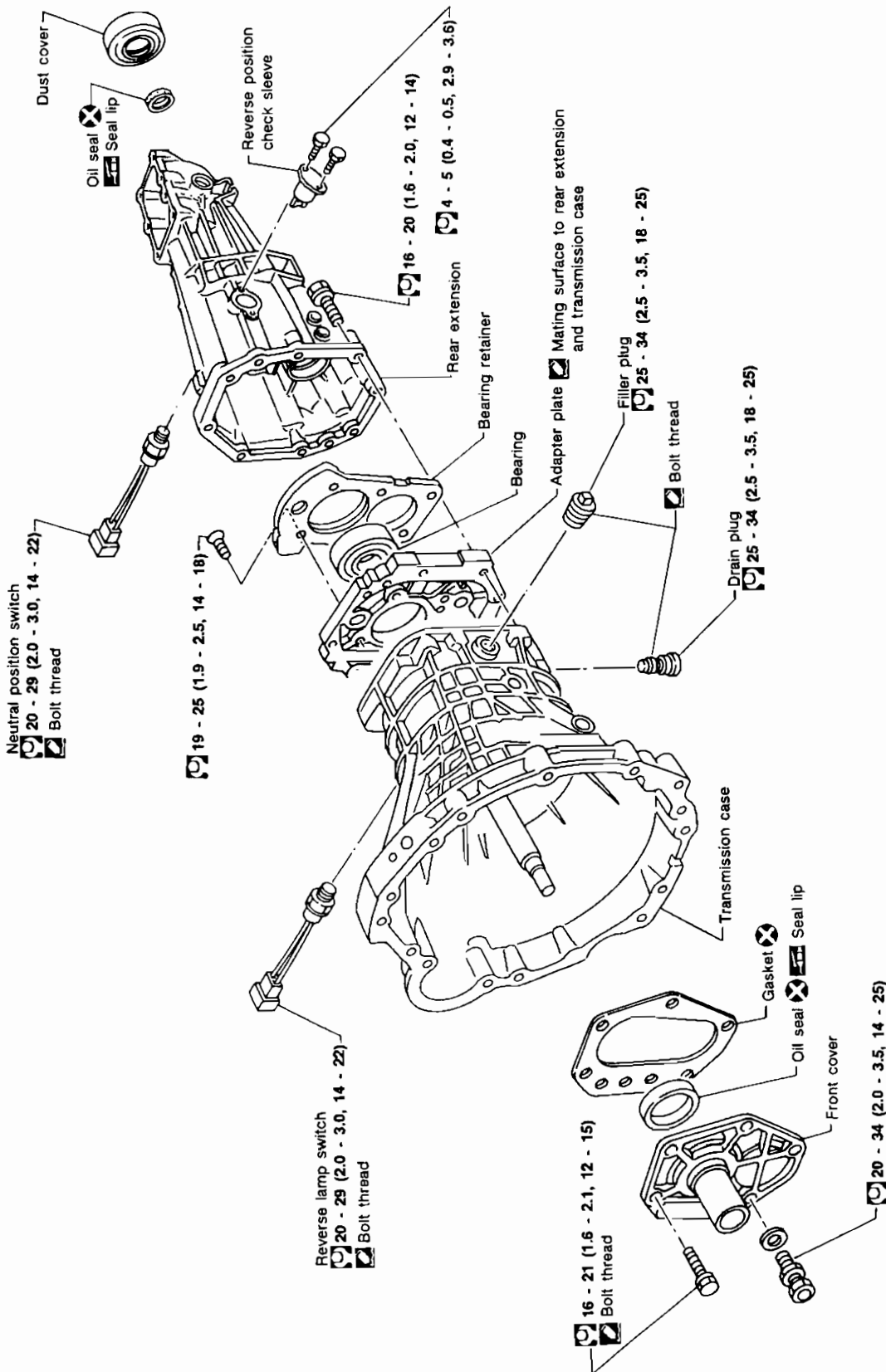
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# MAJOR OVERHAUL

## Case Components



⊗: N·m (kg-m, ft-lb)

⊠: Apply recommended sealant (Nissan genuine part: KP610-00250) or equivalent.

SEC. 320-321

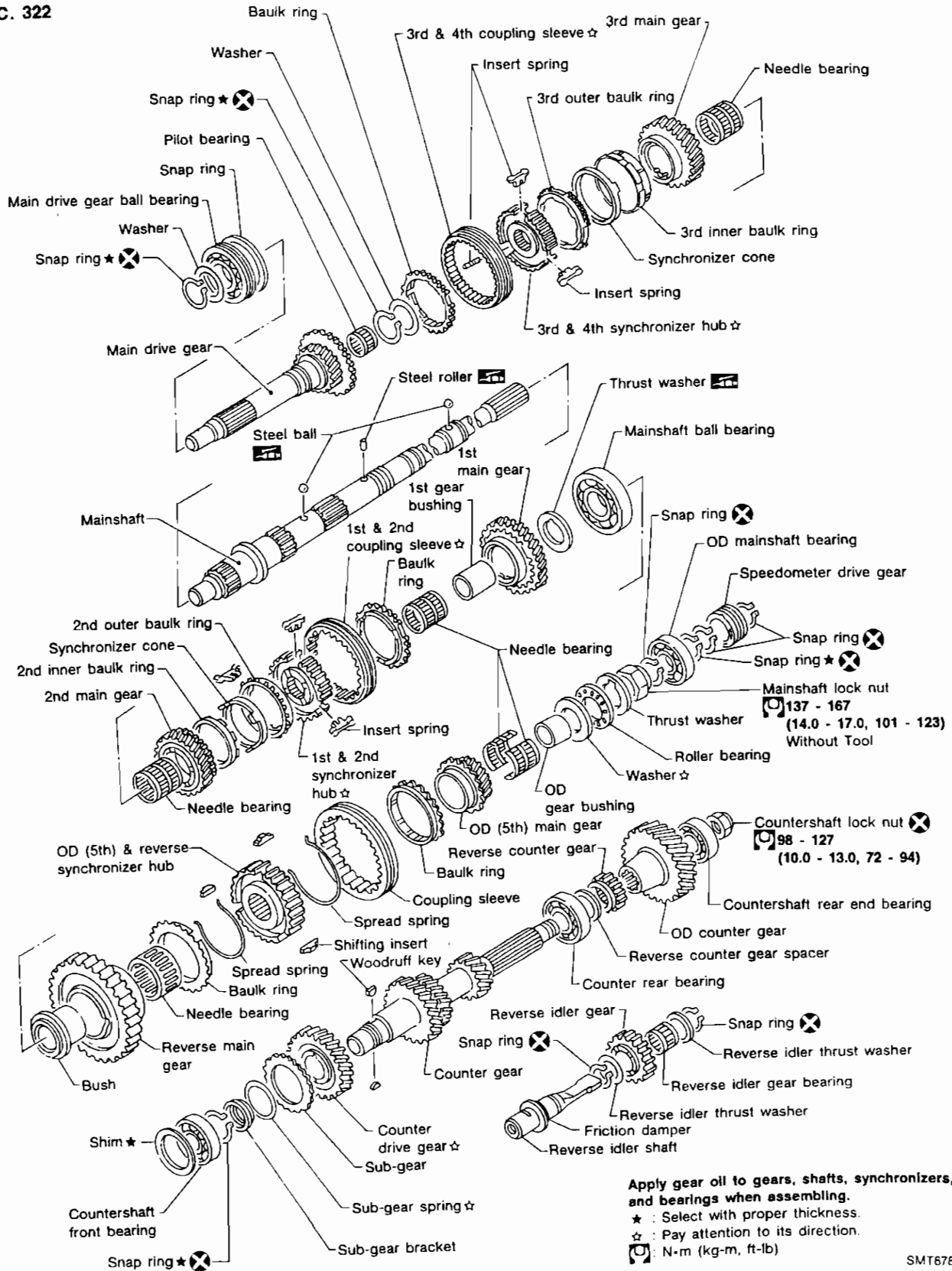
MT-8

SMT677C

# MAJOR OVERHAUL

## Gear Components

SEC. 322

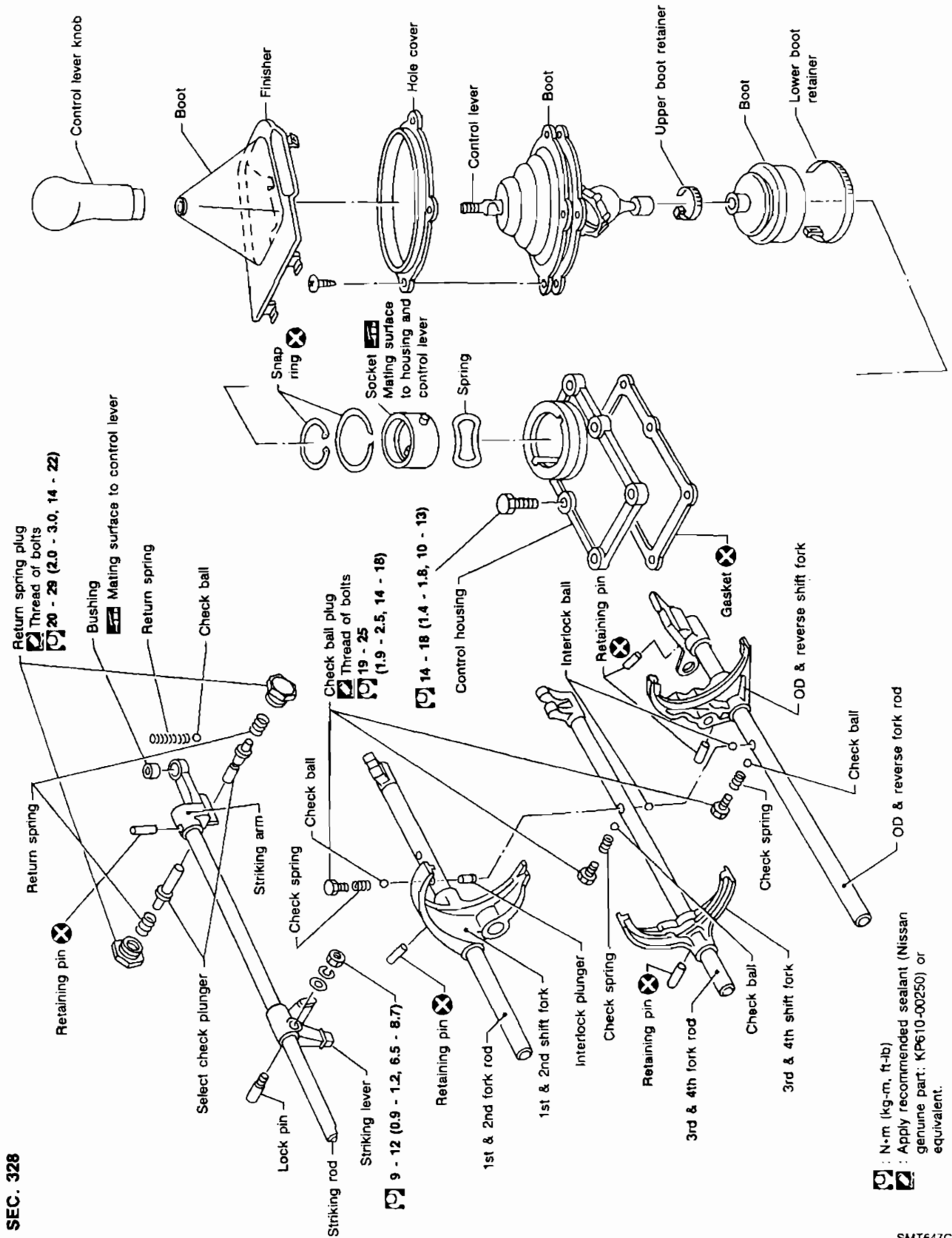


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# MAJOR OVERHAUL

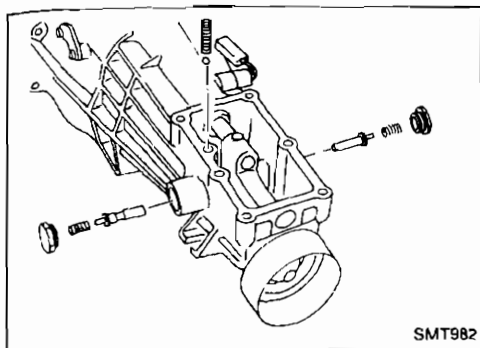
## Shift Control Components



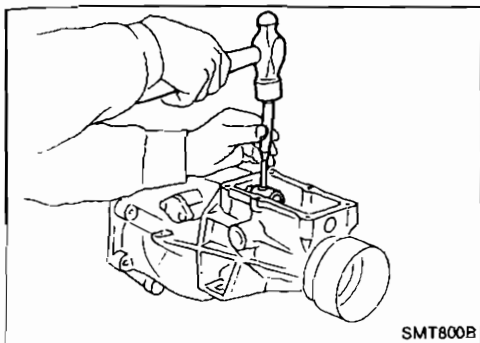
# DISASSEMBLY

## Case Components

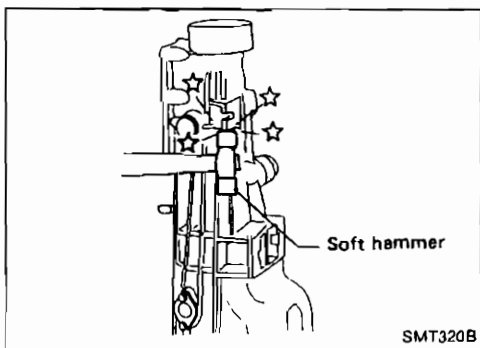
1. Remove rear extension.
  - a. Remove control housing, check ball, return spring plug, select check plunger and return springs.



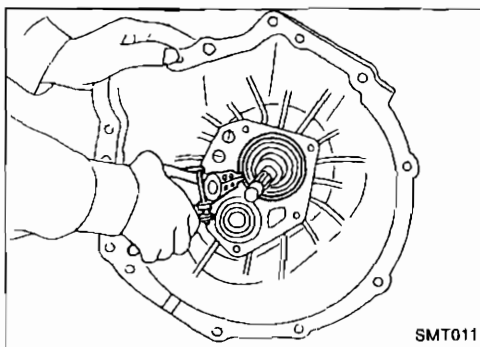
- b. Drive out striking arm retaining pin.
    - c. Remove striking arm from striking rod.



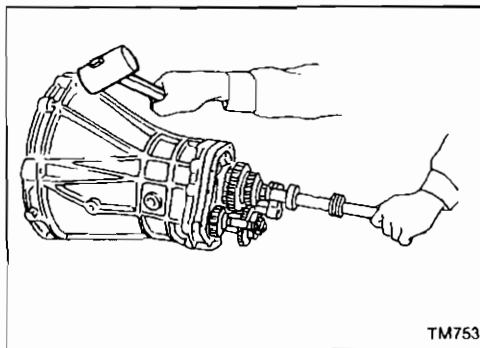
- d. Remove rear extension by lightly tapping it.



2. Remove front cover, gasket, shim of countershaft front bearing, and snap ring of main drive gear ball bearing.



3. Remove transmission case by tapping lightly.



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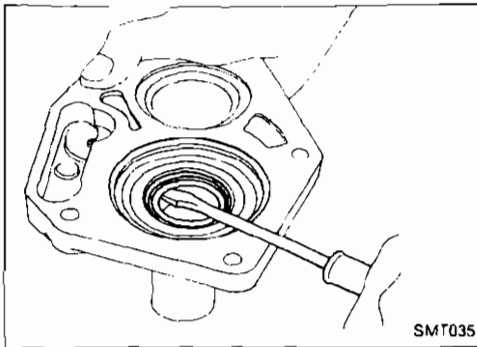
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## DISASSEMBLY

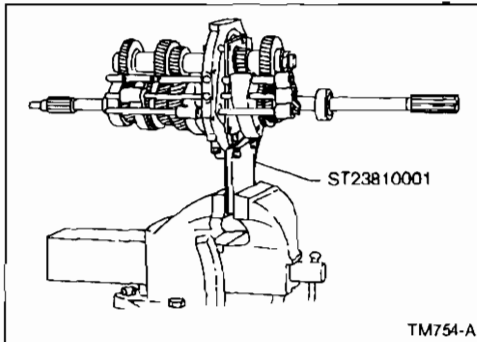
### Case Components (Cont'd)

4. Remove front cover oil seal.

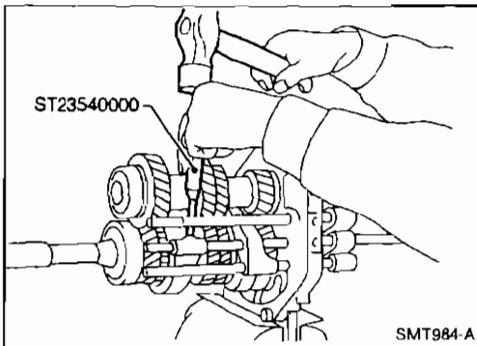


### Shift Control Components

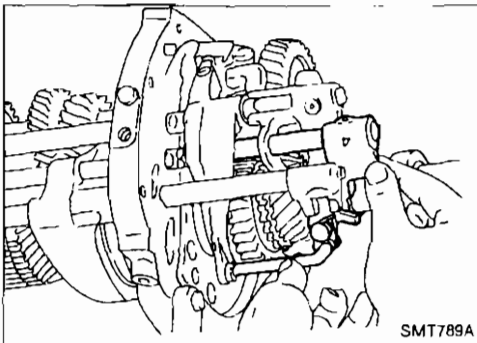
1. Set up Tool on adapter plate.
2. Remove striking rod from adapter plate.
3. Remove check ball plugs, check springs, and check balls.



4. Drive out retaining pins. Then drive out fork rods and remove interlock balls.



5. Draw out 3rd-4th and OD-reverse fork rods.

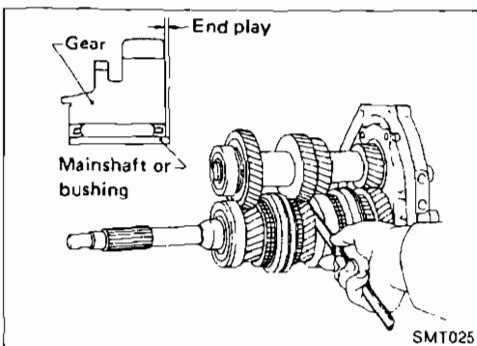


### Gear Components

1. Before removing gears and shafts, measure each gear end play.

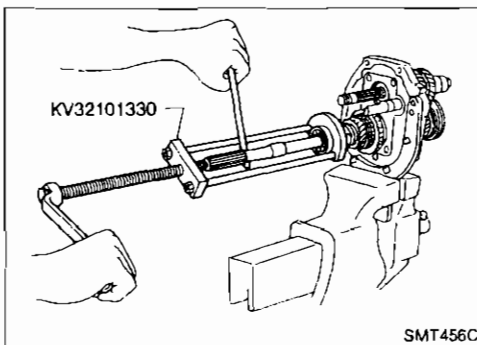
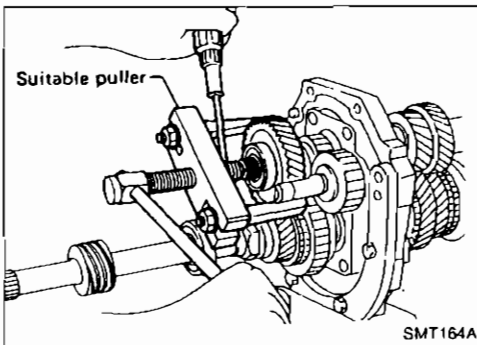
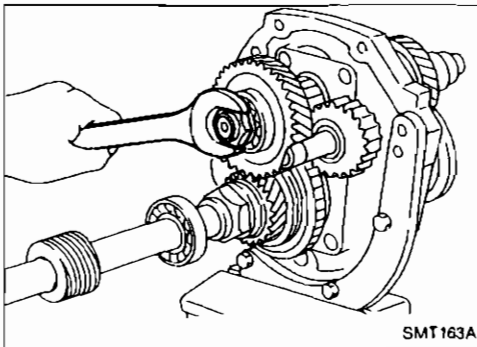
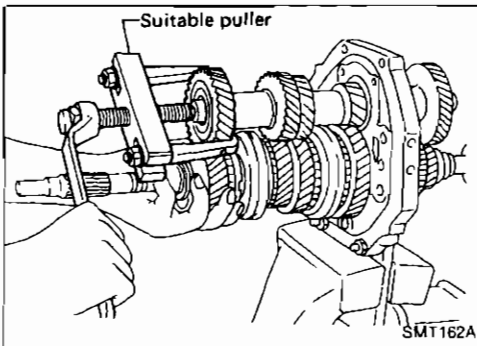
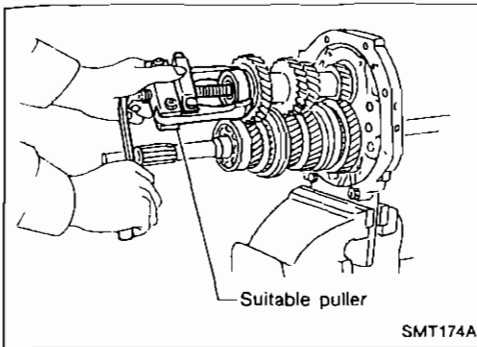
**Gear end play:** Refer to SDS, MT-28.

If not within specification, disassemble and check contact surface of gear to hub, washer, bushing, needle bearing and shaft.



## DISASSEMBLY

### Gear Components (Cont'd)



2. Mesh 2nd and reverse gear, then draw out counter front bearing with suitable puller.
3. Remove snap ring and then remove sub-gear bracket, sub-gear spring and sub-gear.

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4. Draw out counter drive gear with main drive gear assembly with suitable puller.

LC

- When drawing out main drive gear assembly, be careful not to drop pilot bearing and baulk ring.

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5. Remove rear side components on mainshaft and counter gear.

MT

- a. Release staking on countershaft nut and mainshaft nut and loosen these nuts.

AT

**Mainshaft nut: Left-hand thread**

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- b. Pull out OD counter gear with bearing with suitable puller.

- c. Draw out reverse counter gear and spacer.

- d. Remove snap rings from reverse idler shaft and draw out reverse idler gear, thrust washers and reverse idler gear bearing.

BR

- e. Remove speedometer drive gear and steel ball.

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- f. Remove snap ring and pull out OD mainshaft bearing, then remove snap ring.

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- g. Remove mainshaft nut.

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- h. Remove steel roller and washer.

- i. Remove roller bearing and washer.

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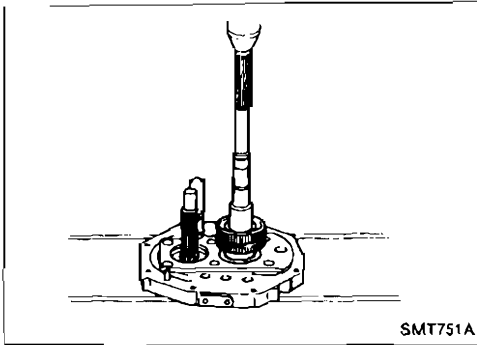
- j. Remove OD main gear, needle bearing and baulk ring (OD).

- k. Remove OD coupling sleeve and shifting inserts.

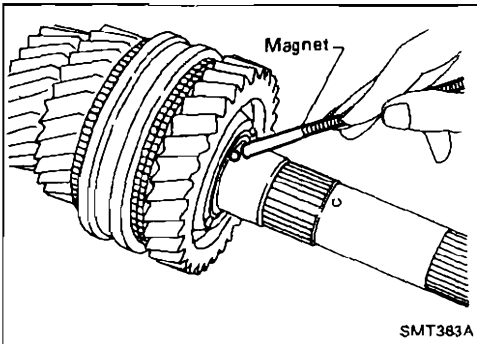
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## DISASSEMBLY

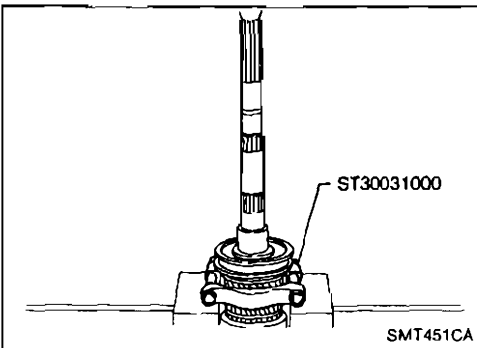
### Gear Components (Cont'd)



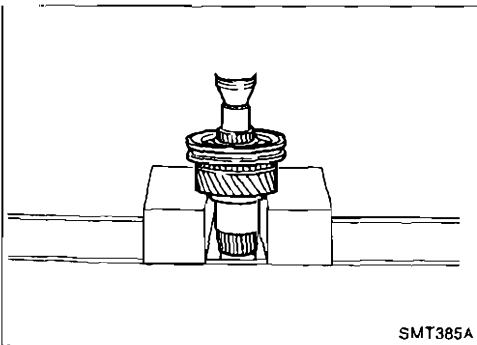
1. Press out mainshaft and counter gear alternately.
  - Press down mainshaft and counter gear alternately and carefully. Do not allow gears attached to mainshaft and counter gear underneath adapter plate to hit each other.



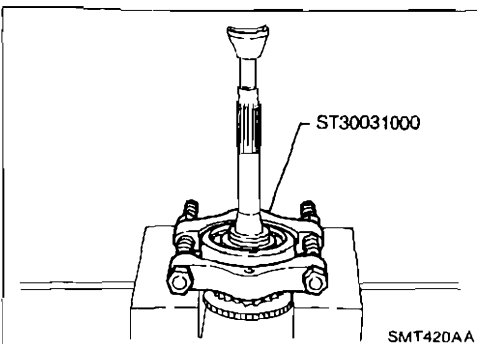
6. Remove front side components on mainshaft.
  - a. Remove 1st gear washer and steel ball.
  - b. Remove 1st main gear and 1st gear needle bearing.



- c. Press out 2nd main gear together with 1st gear bushing and 1st & 2nd synchronizer assembly.
  - d. Remove mainshaft front snap ring.



- e. Press out 3rd main gear together with 3rd & 4th synchronizer assembly and 3rd gear needle bearing.

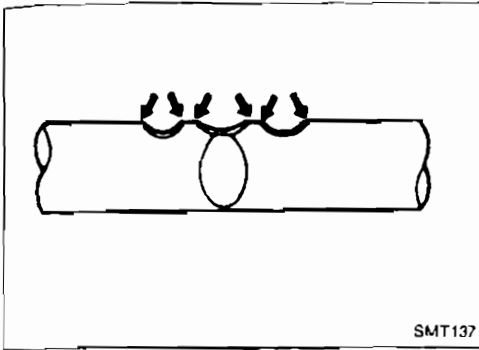


7. Remove main drive gear bearing.
  - a. Remove main drive gear snap ring and spacer.
  - b. Press out main drive gear bearing.

# INSPECTION

## Shift Control Components

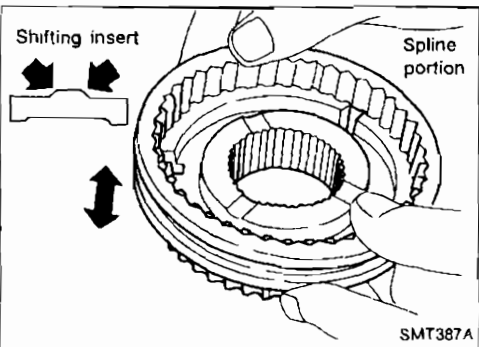
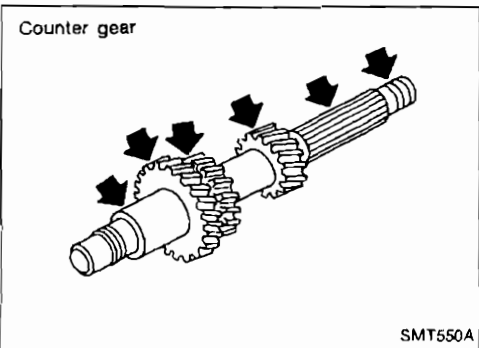
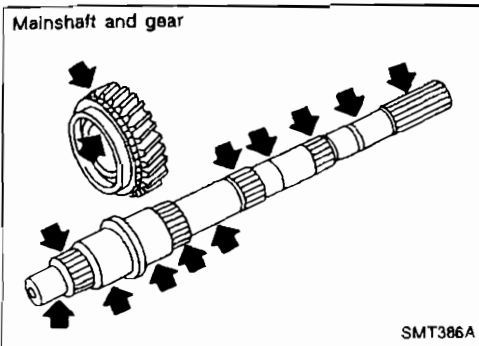
- Check contact surface and sliding surface for wear, scratches, projections or other damage.



## Gear Components

### GEAR AND SHAFT

- Check shafts for cracks, wear or bending.
- Check gears for excessive wear, chips or cracks.



### SYNCHRONIZERS

- 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 spread spring for deformation.

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## INSPECTION

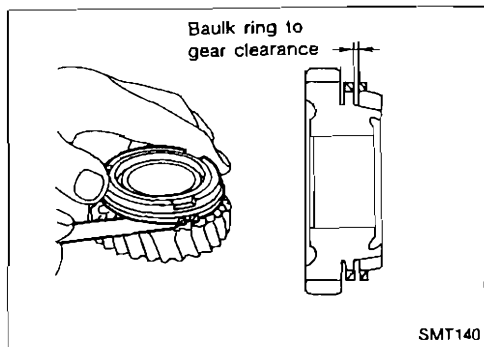
### Gear Components (Cont'd)

- Measure clearance between baulk ring and gear.

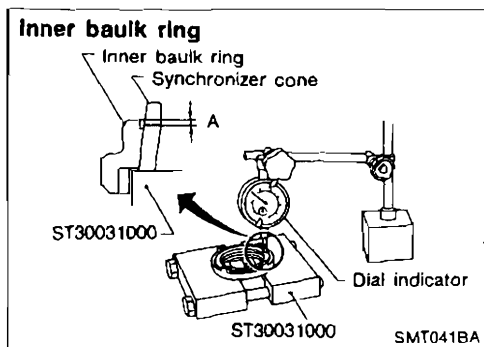
**Clearance between baulk ring and gear  
(1st, main drive, OD and reverse baulk ring):**

Unit: mm (in)

| Dimension  | Standard                         | Wear limit  |
|------------|----------------------------------|-------------|
| 1st        | 1.2 - 1.6<br>(0.047 - 0.063)     | 0.8 (0.031) |
| Main drive | 1.2 - 1.6<br>(0.047 - 0.063)     |             |
| OD         | 1.2 - 1.6<br>(0.047 - 0.063)     |             |
| Reverse    | 1.10 - 1.55<br>(0.0433 - 0.0610) | 0.7 (0.028) |



If the clearance is smaller than the wear limit, replace baulk ring.



- Measure wear of 2nd and 3rd baulk rings.
  - Place inner baulk ring in position on synchronizer cone.
  - Hold baulk ring evenly against synchronizer cone and measure distance "A".
  - Place outer baulk ring in position on synchronizer cone.
  - Hold baulk ring evenly against synchronizer cone and measure distance "B".

**Standard:**

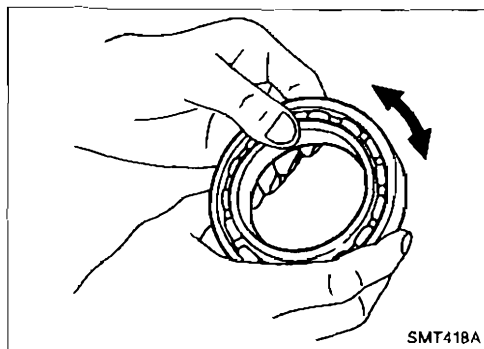
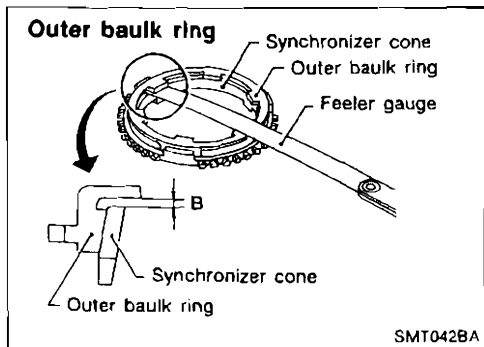
**Inner-A 0.6 - 1.1 mm (0.024 - 0.043 in)**

**Outer-B 0.7 - 0.9 mm (0.028 - 0.035 in)**

**Wear Limit:**

**0.2 mm (0.008 in)**

- If distance "A" or "B" is smaller than the wear limit, replace baulk ring.



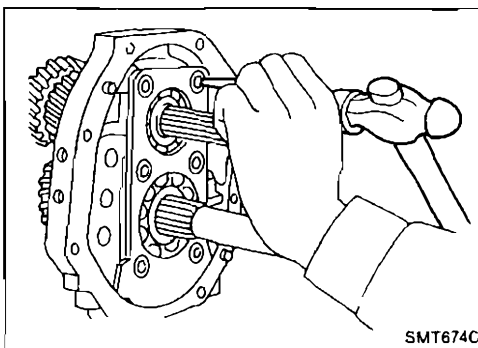
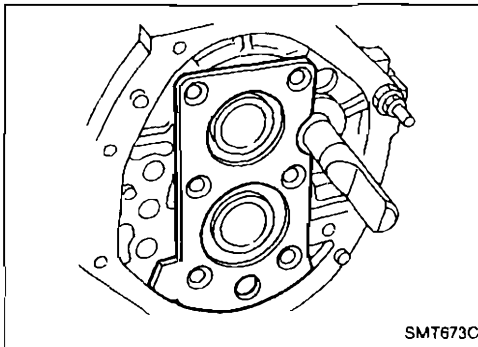
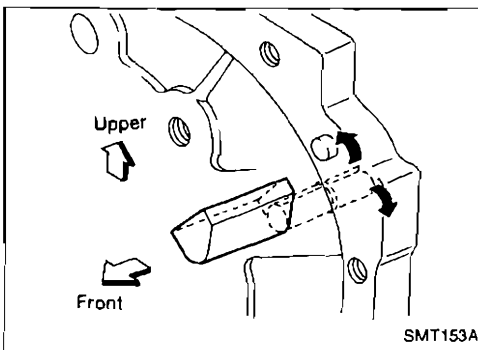
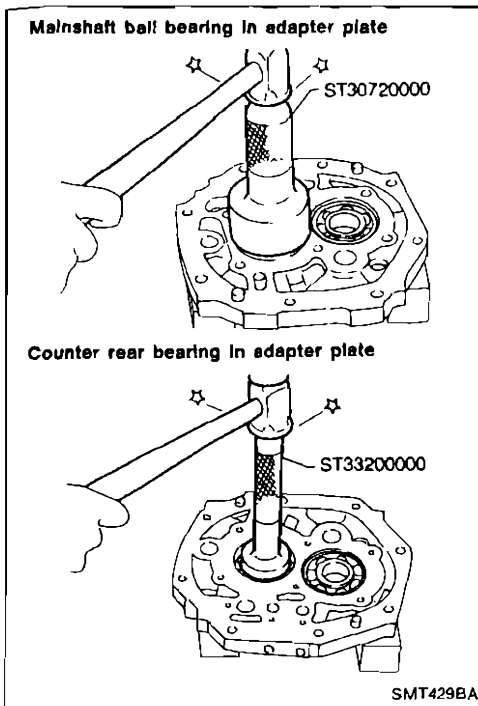
### BEARINGS

- Make sure bearings roll freely and are free from noise, crack, pitting or wear.

# ASSEMBLY

## Gear Components

1. Install bearings into case components.



2. Assemble adapter plate parts.

- Install oil gutter on adapter plate and expand on rear side.

- Install bearing retainer.

- a. Insert reverse shaft, then install bearing retainer.

- b. Tighten each screw, then stake each at two points.

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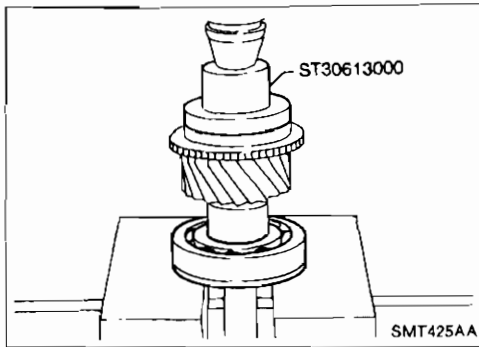
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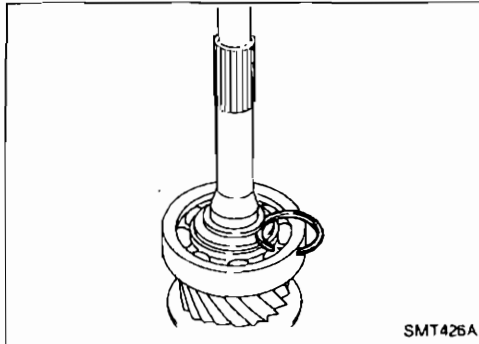
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# ASSEMBLY

## Gear Components (Cont'd)



3. Install main drive gear bearing.
  - a. Press main drive gear bearing.
  - b. Install main drive gear spacer.



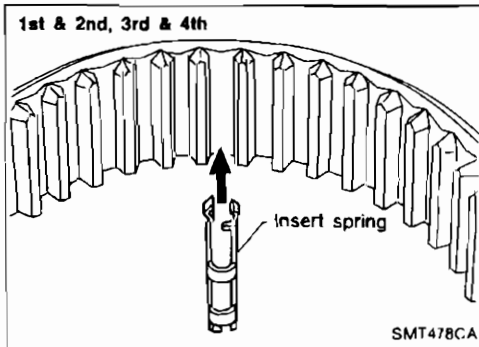
- c. Select proper main drive gear snap ring to minimize clearance of groove and install it.

**Allowable clearance of groove:**

**0 - 0.13 mm (0 - 0.0051 in)**

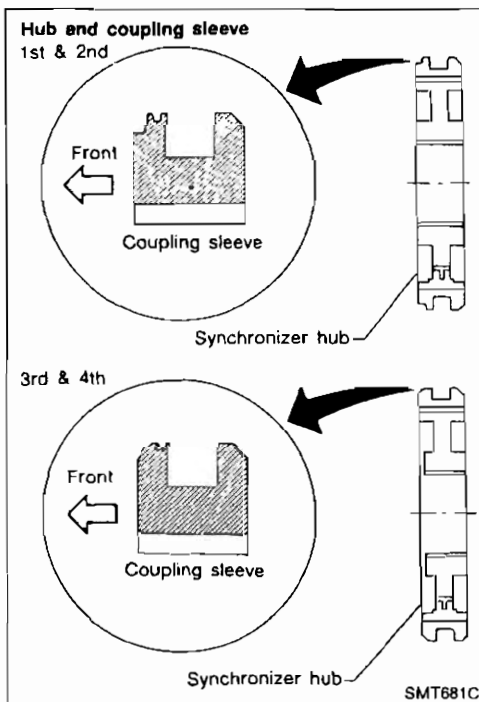
**Main drive gear snap ring:**

**Refer to SDS, MT-28.**



4. Assemble synchronizers.

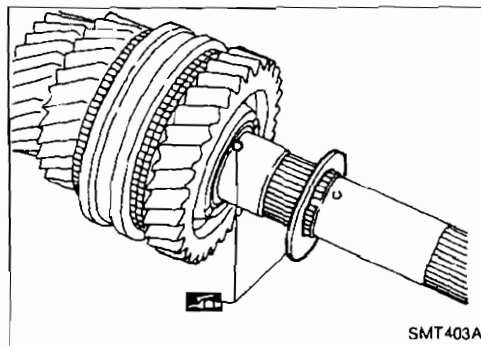
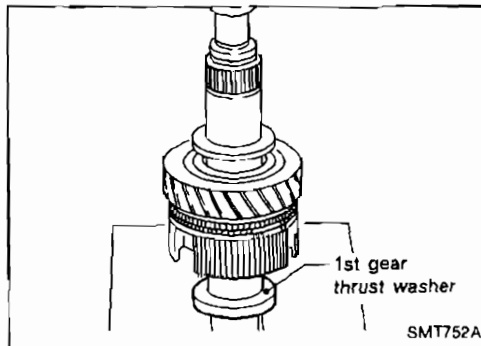
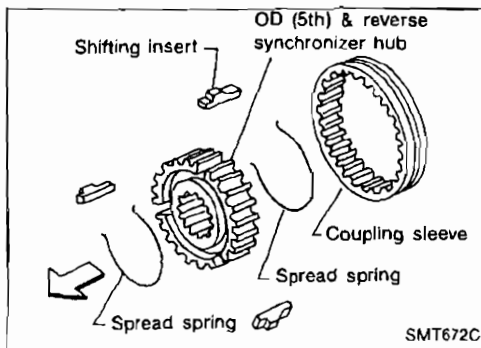
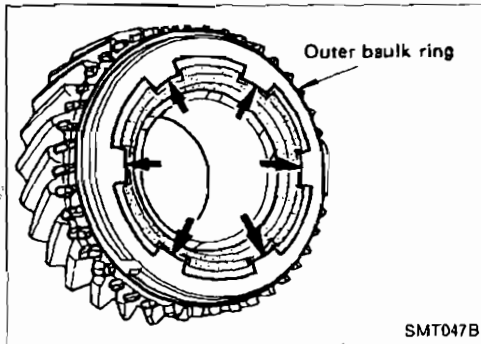
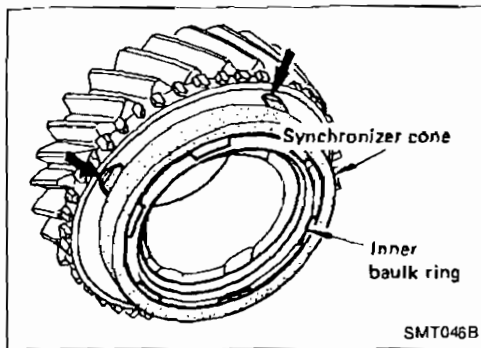
- 1st & 2nd, 3rd & 4th synchronizers



- Check coupling sleeve and synchronizer hub orientation.

# ASSEMBLY

## Gear Components (Cont'd)



● OD & reverse synchronizer

5. Install front side components on main shaft.
  - a. Assemble 2nd main gear, needle bearing and 1st & 2nd synchronizer assembly. Then press 1st gear bushing on mainshaft.
  - b. Install 1st main gear.

- c. Install steel ball and 1st gear washer.
    - Apply multi-purpose grease to steel ball and 1st gear washer before installing.

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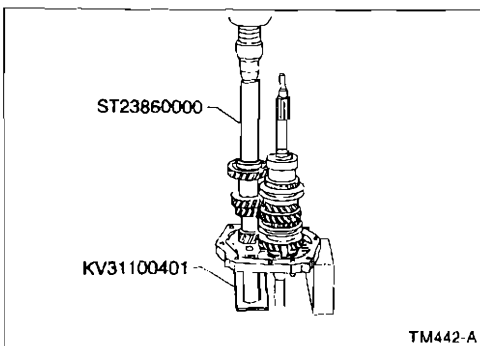
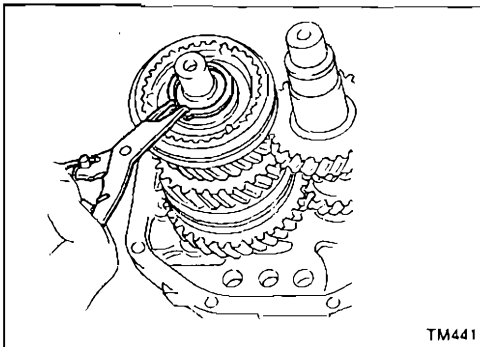
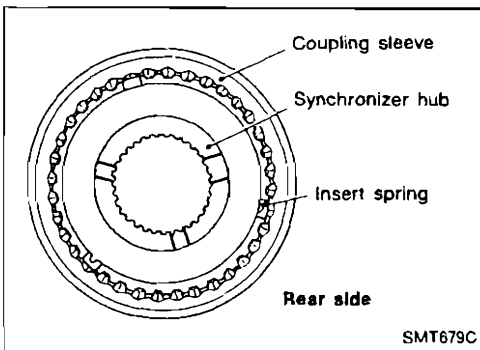
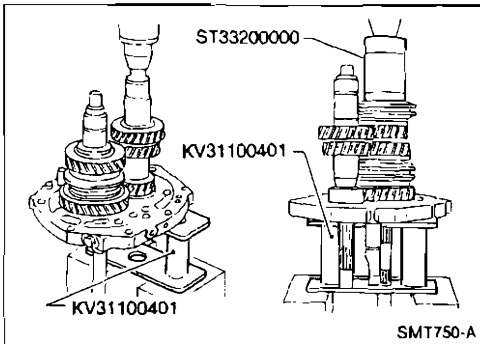
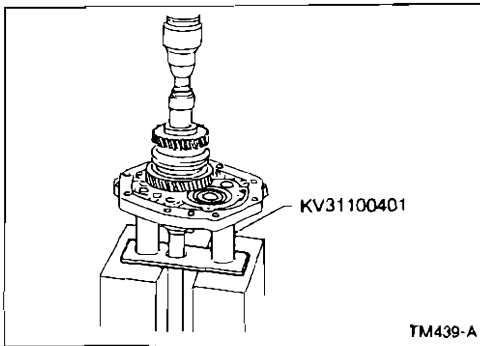
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## ASSEMBLY

### Gear Components (Cont'd)



6. Install mainshaft and counter gear on adapter plate and main drive gear on mainshaft.
- a. Press mainshaft assembly to adapter plate with Tool.

- b. Press counter gear into adapter plate with Tool.
- c. Install 3rd main gear and then press 3rd & 4th synchronizer assembly.

- Pay attention to direction of 3rd & 4th synchronizer.

- d. Install thrust washer on mainshaft and secure it with mainshaft front snap ring. Select proper snap ring to minimize clearance of groove in mainshaft.

**Allowable clearance of groove:**

**0 - 0.18 mm (0 - 0.0071 in)**

**Mainshaft front snap ring:**

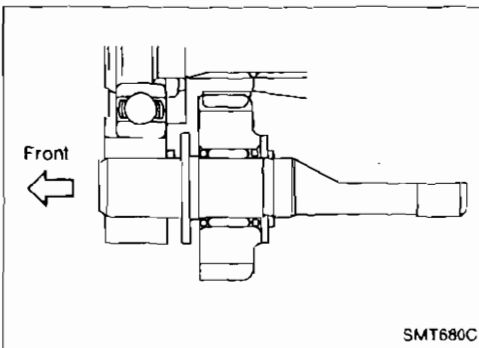
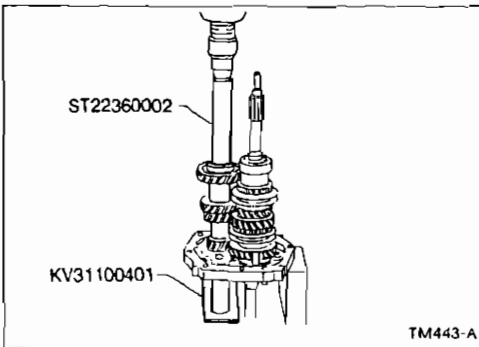
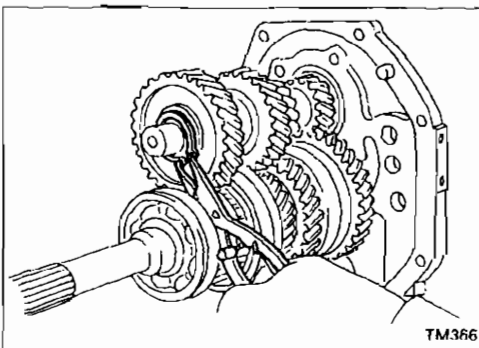
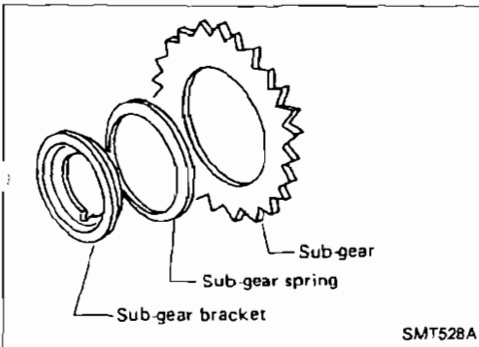
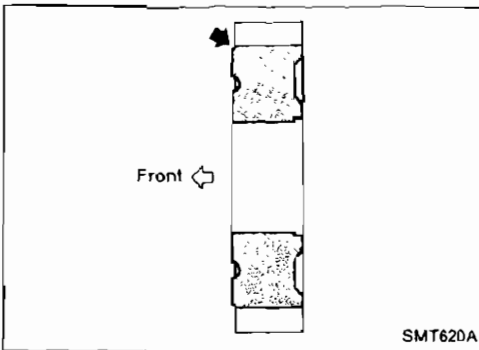
**Refer to SDS, MT-28.**

- e. Apply gear oil to mainshaft pilot bearing and install it on mainshaft.
- f. Press counter drive gear with main drive gear with Tool.

# ASSEMBLY

## Gear Components (Cont'd)

- Pay attention to direction of counter drive gear.



### g. Install sub-gear components.

- (1) Install sub-gear and sub-gear bracket on counter drive gear. Then select proper snap ring to minimize clearance of groove in counter gear.

**Allowable clearance of groove:**

**0 - 0.13 mm (0 - 0.0051 in)**

**Counter drive gear snap ring: Refer to SDS, MT-28.**

- (2) Remove snap ring, sub-gear bracket and sub-gear from counter gear.
- (3) Reinstall sub-gear, sub-gear spring and sub-gear bracket.

### h. Install selected counter drive gear snap ring.

### i. Press counter gear front bearing onto counter gear.

### 7. Install rear side components on mainshaft and counter gear.

- a. Install reverse idler gear to reverse idler shaft with spacers, snap rings and needle bearing.

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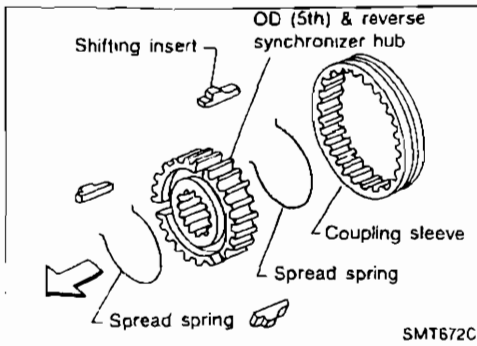
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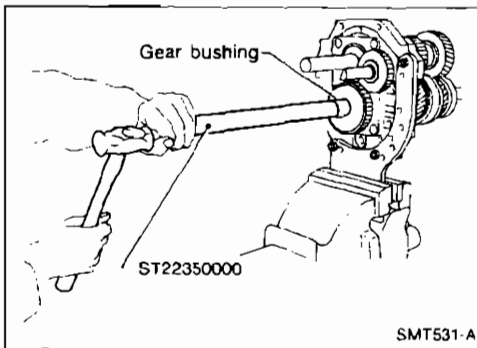
IDX

## ASSEMBLY

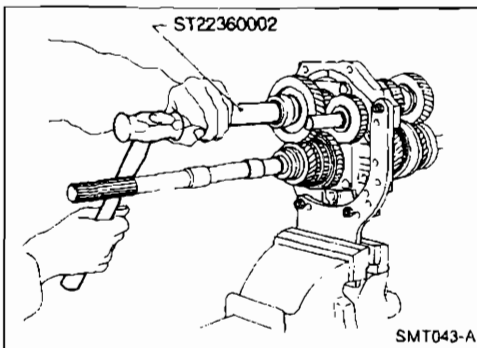
### Gear Components (Cont'd)



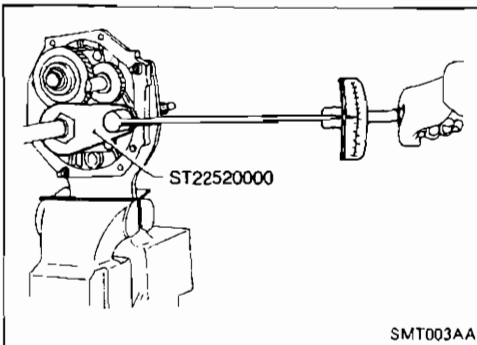
- b. Install insert retainer and OD & reverse synchronizer to mainshaft.  
● **Pay attention to direction of hub.**



- c. Install OD gear bushing with Tool.  
d. Install OD main gear and needle bearing.  
e. Install spacer, reverse counter gear and OD counter gear.  
● **OD main gear and OD counter gear should be handled as a matched set.**  
f. Install washer, roller bearing, steel roller and thrust washer.  
g. Tighten mainshaft lock nut temporarily.  
● **Always use new lock nut.**



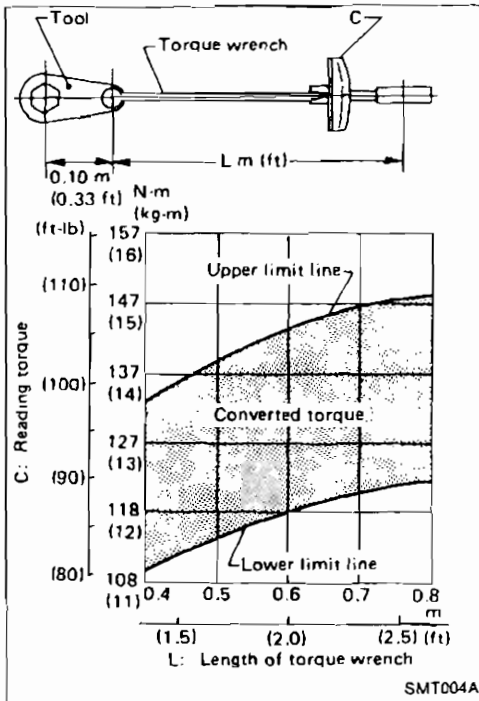
- h. Install countershaft rear end bearing with Tool.



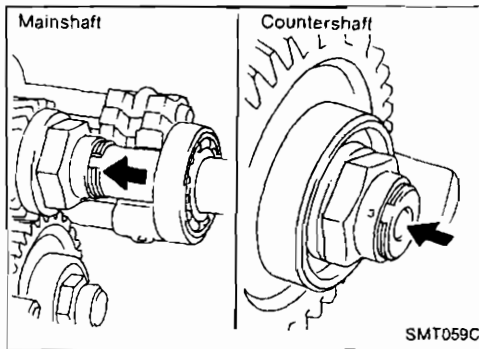
8. Mesh 2nd and reverse gears, then tighten mainshaft lock nut with Tool.

## ASSEMBLY

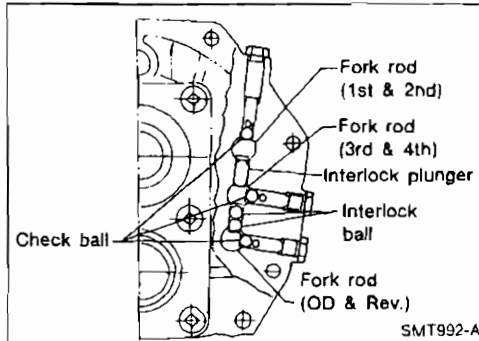
### Gear Components (Cont'd)



- Use the left chart when deciding the reading torque. (Length of torque wrench vs. setting or reading torque)
9. Tighten countershaft lock nut.
- Always use new lock nut.

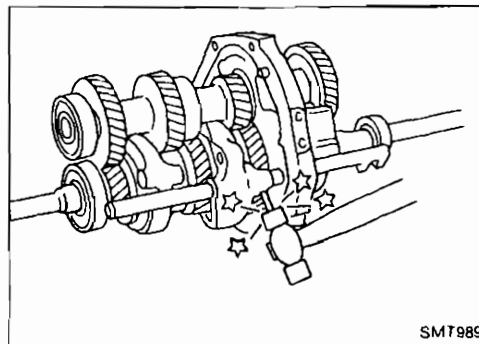


10. Stake mainshaft lock nut and countershaft lock nut with a punch.
11. Measure gear end play. For the description, refer to DIS-ASSEMBLY for Gear Components, MT-12.



### Shift Control Components

1. Install shift rods, interlock plunger, interlock balls and check balls.



- a. 1st-2nd shift fork

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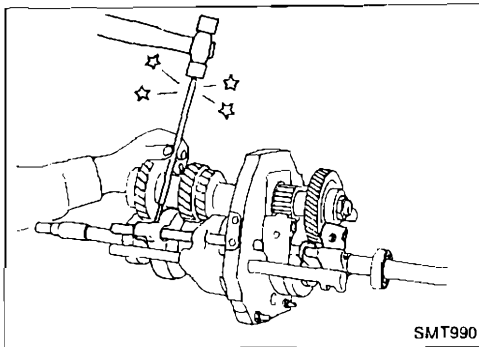
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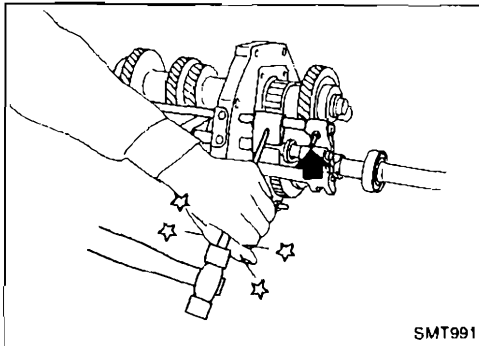
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## ASSEMBLY

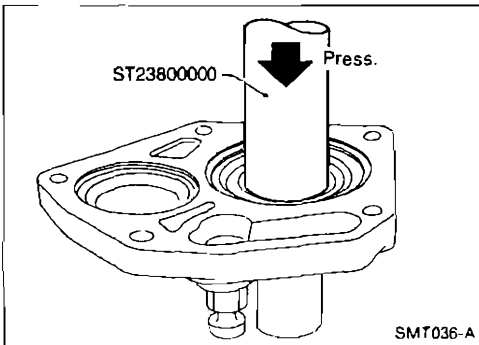
### Shift Control Components (Cont'd)



b. 3rd-4th shift fork

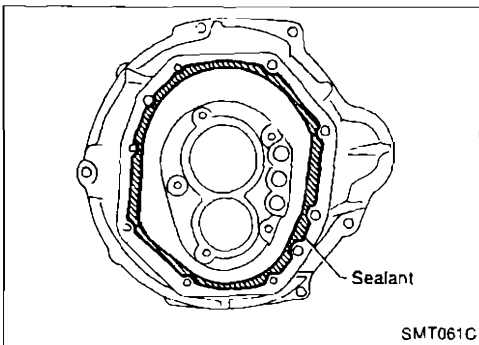


c. OD-reverse shift fork or reverse shift fork

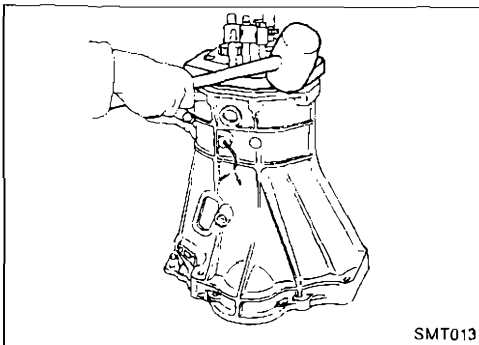


### Case Components

1. Install front cover oil seal.
  - Apply multi-purpose grease to seal lip of oil seal before installing.



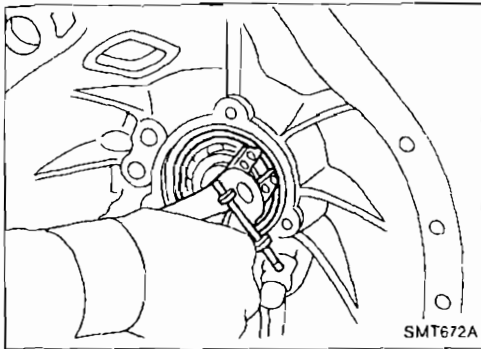
2. Apply sealant to mating surface of transmission case.



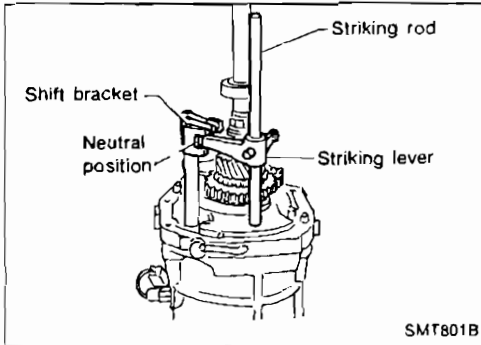
3. Install gear assembly onto transmission case.

# ASSEMBLY

## Case Components (Cont'd)

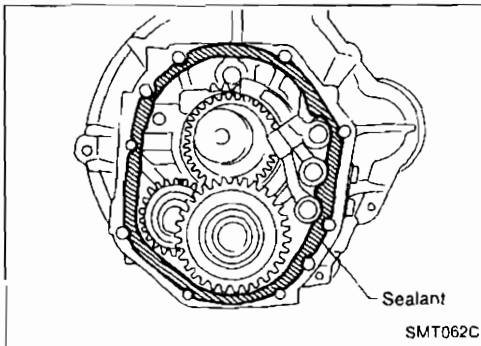


4. Install snap ring of main drive bearing.



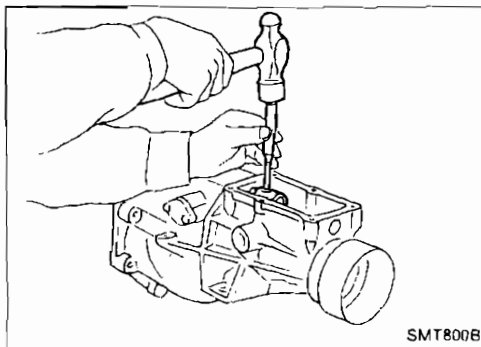
5. Set 1st & 2nd, 3rd & 4th and 5th & reverse shift forks in neutral position.

6. Install striking rod onto adapter plate while aligning striking lever with shift brackets.

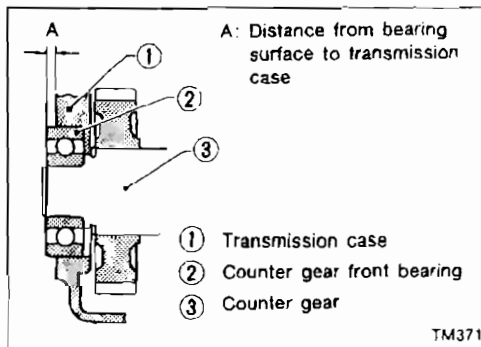


7. Apply sealant to mating surface of adapter plate.

8. Install rear extension while inserting striking arm into striking rod.



9. Install striking arm retaining pin.



10. Select counter front bearing shim.

**Counter front bearing shim: Refer to SDS, MT-29.**

11. Install gasket and front cover.

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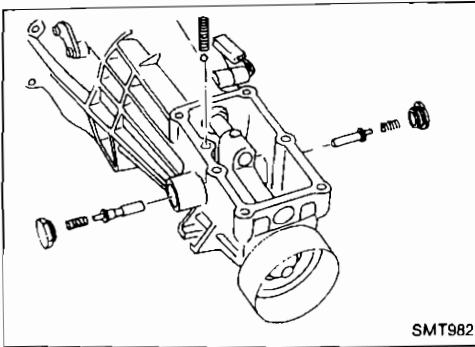
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## ASSEMBLY

### Case Components (Cont'd)

12. Install return spring plugs, check ball, return springs and select check plunger.
13. Install control housing and gasket.



# SERVICE DATA AND SPECIFICATIONS (SDS)

## General Specifications

|                    |                                     |                          |
|--------------------|-------------------------------------|--------------------------|
| Transmission model |                                     | FS5W71C                  |
| Number of speeds   |                                     | 5                        |
| Shift pattern      |                                     |                          |
| Synchronmesh type  |                                     | Warner                   |
| Gear ratio         | 1st                                 | 3.321                    |
|                    | 2nd                                 | 1.902                    |
|                    | 3rd                                 | 1.308                    |
|                    | 4th                                 | 1.000                    |
|                    | OD                                  | 0.838                    |
|                    | Reverse                             | 3.382                    |
| Number of teeth    |                                     |                          |
| Mainshaft          | Drive                               | 22                       |
|                    | 1st                                 | 33                       |
|                    | 2nd                                 | 27                       |
|                    | 3rd                                 | 26                       |
|                    | OD                                  | 22                       |
|                    | Reverse                             | 36                       |
| Countershaft       | Drive                               | 31                       |
|                    | 1st                                 | 14                       |
|                    | 2nd                                 | 20                       |
|                    | 3rd                                 | 28                       |
|                    | OD                                  | 37                       |
|                    | Reverse                             | 15                       |
| Reverse idler gear |                                     | 21                       |
| Oil capacity       | ℓ (Imp pt)                          | 2.5 (4-3/8)              |
| Remarks            | Sub-gear                            | ○                        |
|                    | Reverse synchronizer                | ○                        |
|                    | Double baulk ring type synchronizer | 2nd and 3rd synchronizer |

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# SERVICE DATA AND SPECIFICATIONS (SDS)

## Inspection and Adjustment

### GEAR END PLAY

| Gear     | End play mm (in)              |
|----------|-------------------------------|
| 1st gear | 0.31 - 0.41 (0.0122 - 0.0161) |
| 2nd gear | 0.11 - 0.21 (0.0043 - 0.0083) |
| 3rd gear | 0.11 - 0.21 (0.0043 - 0.0083) |
| OD gear  | 0.24 - 0.41 (0.0094 - 0.0161) |

### CLEARANCE BETWEEN BAULK RING AND GEAR

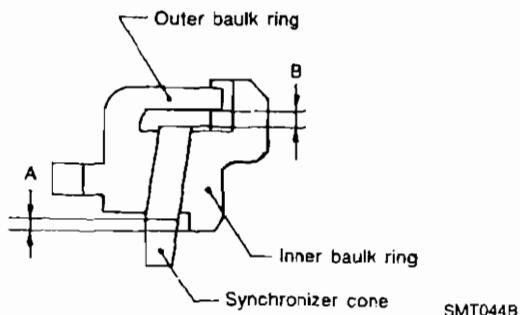
#### 1st, main drive, OD and reverse baulk ring

Unit: mm (in)

|            | Standard                         | Wear limit  |
|------------|----------------------------------|-------------|
| 1st        | 1.2 - 1.6<br>(0.047 - 0.063)     | 0.8 (0.031) |
| Main drive | 1.2 - 1.6<br>(0.047 - 0.063)     |             |
| OD         | 1.2 - 1.6<br>(0.047 - 0.063)     |             |
| Reverse    | 1.10 - 1.55<br>(0.0433 - 0.0610) | 0.7 (0.028) |

#### 2nd and 3rd baulk ring

Unit: mm (in)



| Dimension | Standard                     | Wear limit  |
|-----------|------------------------------|-------------|
| A         | 0.6 - 1.1<br>(0.024 - 0.043) | 0.2 (0.008) |
| B         | 0.7 - 0.9<br>(0.028 - 0.035) |             |

### AVAILABLE SNAP RINGS

#### Main drive gear bearing

| Allowable clearance |             | 0 - 0.13 mm (0 - 0.0051 in) |
|---------------------|-------------|-----------------------------|
| Thickness mm (in)   | Part number |                             |
| 1.73 (0.0681)       | 32204-78005 |                             |
| 1.80 (0.0709)       | 32204-78000 |                             |
| 1.87 (0.0736)       | 32204-78001 |                             |
| 1.94 (0.0764)       | 32204-78002 |                             |
| 2.01 (0.0791)       | 32204-78003 |                             |
| 2.08 (0.0819)       | 32204-78004 |                             |

#### Mainshaft front

| Allowable clearance |             | 0 - 0.18 mm (0 - 0.0071 in) |
|---------------------|-------------|-----------------------------|
| Thickness mm (in)   | Part number |                             |
| 2.4 (0.094)         | 32263-V5200 |                             |
| 2.5 (0.098)         | 32263-V5201 |                             |
| 2.6 (0.102)         | 32263-V5202 |                             |

#### OD mainshaft bearing

| Allowable clearance |             | 0 - 0.14 mm (0 - 0.0055 in) |
|---------------------|-------------|-----------------------------|
| Thickness mm (in)   | Part number |                             |
| 1.1 (0.043)         | 32228-20100 |                             |
| 1.2 (0.047)         | 32228-20101 |                             |
| 1.3 (0.051)         | 32228-20102 |                             |
| 1.4 (0.055)         | 32228-20103 |                             |

#### Counter drive gear

| Allowable clearance |             | 0 - 0.13 mm (0 - 0.0051 in) |
|---------------------|-------------|-----------------------------|
| Thickness mm (in)   | Part number |                             |
| 1.4 (0.055)         | 32215-E9000 |                             |
| 1.5 (0.059)         | 32215-E9001 |                             |
| 1.6 (0.063)         | 32215-E9002 |                             |

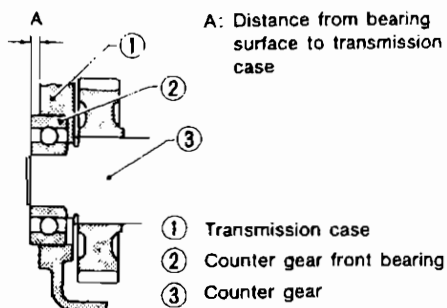
# SERVICE DATA AND SPECIFICATIONS (SDS)

## Inspection and Adjustment (Cont'd)

### AVAILABLE SHIMS

#### Counter front bearing

Unit: mm (in)



TM371

| Allowable clearance           | 0 - 0.16 (0 - 0.0063) |             |
|-------------------------------|-----------------------|-------------|
| "A"                           | Thickness of shim     | Part number |
| 4.52 - 4.71 (0.1780 - 0.1854) | Not necessary         |             |
| 4.42 - 4.51 (0.1740 - 0.1776) | 0.1 (0.004)           | 32218-V5000 |
| 4.32 - 4.41 (0.1701 - 0.1736) | 0.2 (0.008)           | 32218-V5001 |
| 4.22 - 4.31 (0.1661 - 0.1697) | 0.3 (0.012)           | 32218-V5002 |
| 4.12 - 4.21 (0.1622 - 0.1657) | 0.4 (0.016)           | 32218-V5003 |
| 4.02 - 4.11 (0.1583 - 0.1618) | 0.5 (0.020)           | 32218-V5004 |
| 3.92 - 4.01 (0.1543 - 0.1579) | 0.6 (0.024)           | 32218-V5005 |

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# PROPELLER SHAFT & DIFFERENTIAL CARRIER

## SECTION PD

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PROPELLER SHAFT

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PD

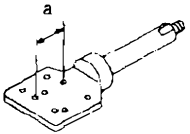
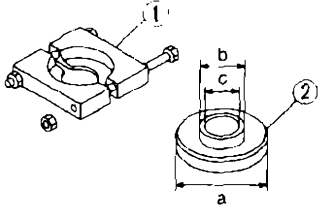
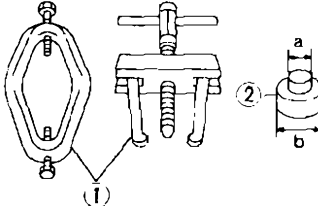
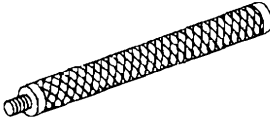
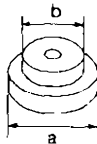
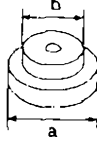
When you read wiring diagrams:

- Read GI section, "HOW TO READ WIRING DIAGRAMS".
- See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.

When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSIS" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".

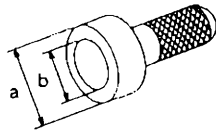
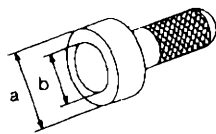
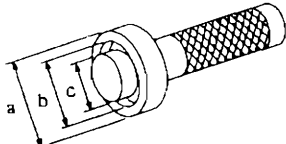
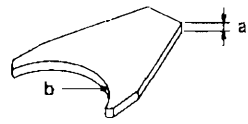
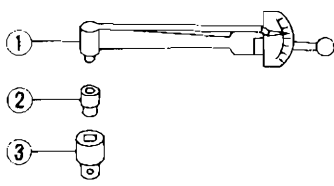
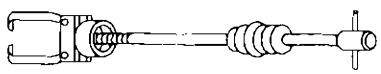
# PREPARATION

## Special Service Tools

| Tool number<br>Tool name  | Description  |  |
|---|--|--|
| KV38100800<br>Differential attachment   |  <p style="text-align: center;">a</p> | Mounting final drive<br>(To use, make a new hole )<br><br><b>a: 152 mm (5.98 in)</b>   |
| ST3090S000<br>Drive pinion rear inner race puller set<br>① ST30031000<br>Puller<br>② ST30901000<br>Base |                                       | Removing and installing drive pinion rear cone<br><br><b>a: 79 mm (3.11 in) dia.</b><br><b>b: 45 mm (1.77 in) dia.</b><br><b>c: 35 mm (1.38 in) dia.</b> |
| ST3306S001<br>Differential side bearing puller set<br>① ST3305S001<br>Body<br>② ST33061000<br>Adapter   |                                      | Removing and installing differential side bearing inner cone<br><br><b>a: 28.5 mm (1.122 in) dia.</b><br><b>b: 38 mm (1.50 in) dia.</b>                  |
| ST30611000<br>Drift   |                                     | Installing pinion rear bearing outer race<br><br>NT090   |
| ST30613000<br>Drift   |                                     | Installing pinion front bearing outer race<br><br><b>a: 72 mm (2.83 in) dia.</b><br><b>b: 48 mm (1.89 in) dia.</b><br>NT073                              |
| ST30621000<br>Drift   |                                     | Installing pinion rear bearing outer race<br><br><b>a: 79 mm (3.11 in) dia.</b><br><b>b: 59 mm (2.32 in) dia.</b><br>NT073                               |

## PREPARATION

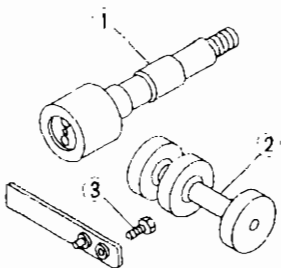
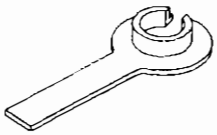
### Special Service Tools (Cont'd)

| Tool number<br>Tool name  | Description  |
|---|--|
| KV38100200<br>Gear carrier side oil seal drift  | <div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>NT115</p> </div> <div style="width: 50%; text-align: center;">  </div> <div style="width: 25%;"> <p>Installing side oil seal</p> <p>a: 65 mm (2.56 in) dia.<br/>b: 49 mm (1.93 in) dia.</p> </div> </div>                                       |
| KV38100500<br>Gear carrier front oil seal drift   | <div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>NT115</p> </div> <div style="width: 50%; text-align: center;">  </div> <div style="width: 25%;"> <p>Installing front oil seal</p> <p>a: 85 mm (3.35 in) dia.<br/>b: 60 mm (2.36 in) dia.</p> </div> </div>                                      |
| KV38100300<br>Differential side bearing inner cone  | <div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>NT085</p> </div> <div style="width: 50%; text-align: center;">  </div> <div style="width: 25%;"> <p>Installing side bearing inner cone</p> <p>a: 54 mm (2.13 in) dia.<br/>b: 46 mm (1.81 in) dia.<br/>c: 32 mm (1.26 in) dia.</p> </div> </div> |
| KV38100600<br>Side bearing spacer drift   | <div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>NT528</p> </div> <div style="width: 50%; text-align: center;">  </div> <div style="width: 25%;"> <p>Installing side bearing spacer</p> <p>a: 8 mm (0.31 in)<br/>b: R42.5 mm (1.673 in)</p> </div> </div>                                       |
| ST31275000<br>Preload gauge<br>① GG91030000 Torque wrench<br>② HT62940000 Socket adapter<br>③ HT62900000 Socket adapter | <div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>NT124</p> </div> <div style="width: 50%; text-align: center;">  </div> <div style="width: 25%;"> <p>Measuring pinion bearing preload and total preload</p> </div> </div>  |
| HT72400000<br>Slide hammer  | <div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>NT125</p> </div> <div style="width: 50%; text-align: center;">  </div> <div style="width: 25%;"> <p>Removing differential case assembly</p> </div> </div>   |

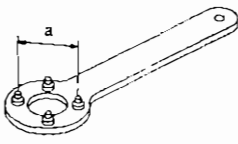
PD

## PREPARATION

### Special Service Tools (Cont'd)

| Tool number<br>Tool name   | Description   |
|--|---|
| KV381039S0<br>Drive pinion height<br>setting gauge<br>(1) KV38103910<br>Dummy shaft<br>(2) KV38100120<br>Height gauge<br>(3) KV38100140<br>Stopper |  <p style="text-align: right;">Selecting pinion height<br/>adjusting washer</p> <p style="text-align: left;">NT226</p> |
| KV38107900<br>Side oil seal protector  |  <p style="text-align: right;">Installing final drive side flange</p> <p style="text-align: left;">NT129</p>           |

### Commercial Service Tool

| Tool name                     | Description  |
|-------------------------------|--|
| Drive pinion flange<br>wrench |  <p style="text-align: right;">Removing and installing propeller shaft<br/>lock nut, and drive pinion lock nut.</p> <p style="text-align: left;">NT355</p> <p style="text-align: right;">a: 81.25 mm (3.1988 in)</p> |

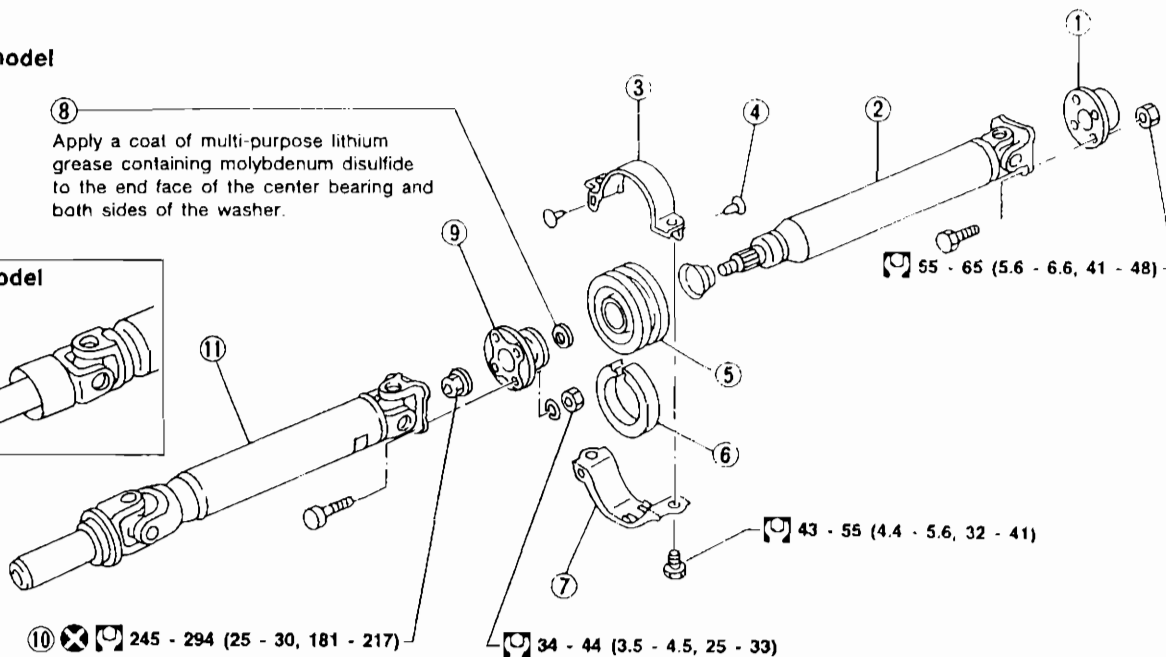
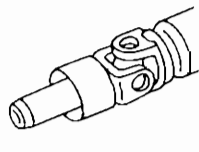
# PROPELLER SHAFT

SEC. 370  
3S71A

M/T model

⑧  
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.

A/T model



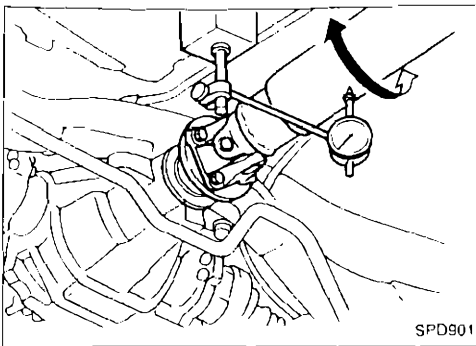
N·m (kg·m, ft·lb)

SFD 322A

- |   |   |                            |
|---|---|----------------------------|
| ① Final drive companion flange          | ⑤ Center bearing                        | ⑨ Companion flange         |
| ② Propeller shaft 2nd tube              | ⑥ Center bearing cushion                | ⑩ Lock nut                 |
| ③ Center bearing upper mounting bracket | ⑦ Center bearing lower mounting bracket | ⑪ Propeller shaft 1st tube |
| ④ Clip                                  | ⑧ Washer                                |                            |

PD

# PROPELLER SHAFT



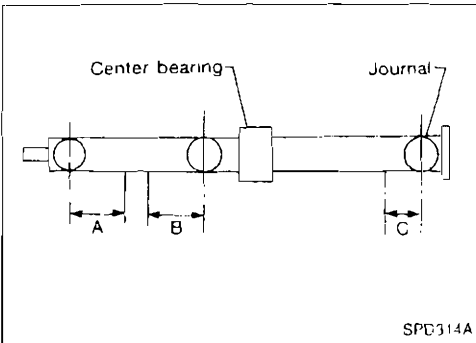
## On-vehicle Service

### PROPELLER SHAFT VIBRATION

If vibration is present at high speed, inspect propeller shaft runout first.

1. Raise rear wheels.
2. Measure propeller shaft runout at indicated points by rotating final drive companion flange with hands.

**Runout limit: 0.6 mm (0.024 in)**



### Propeller shaft runout measuring points:

**Distance:**

"A" 155 mm (6.10 in)

"B" 165 mm (6.50 in)

"C" 185 mm (7.28 in)

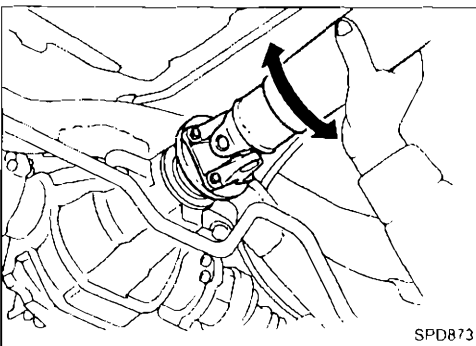
3. If runout exceeds specifications, disconnect propeller shaft at final drive companion flange. Then rotate companion flange 90, 180 or 270 degrees and reconnect propeller shaft.

**Runout limit: 0.6 mm (0.024 in)**

4. Check runout again. If runout still exceeds specifications, replace propeller shaft assembly.
5. Perform road test.

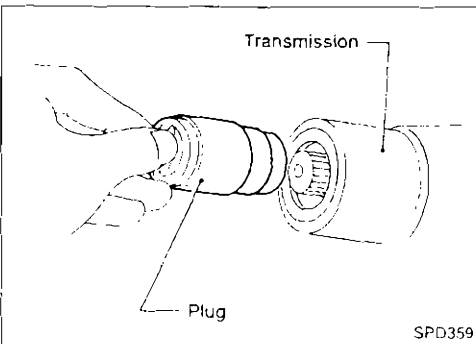
### APPEARANCE CHECKING

- Inspect propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly.
- If center bearing is noisy or damaged, replace it.



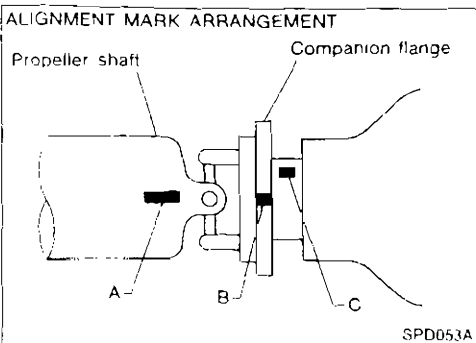
## Removal

- Draw out propeller shaft from transmission and plug up rear end of transmission rear extension housing.



## Installation

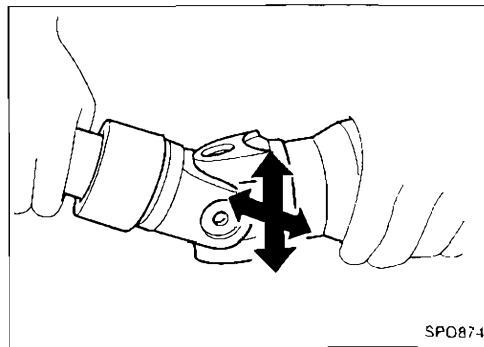
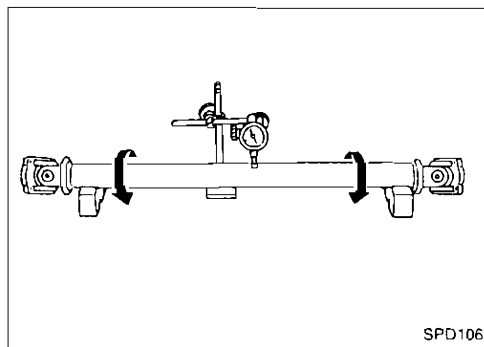
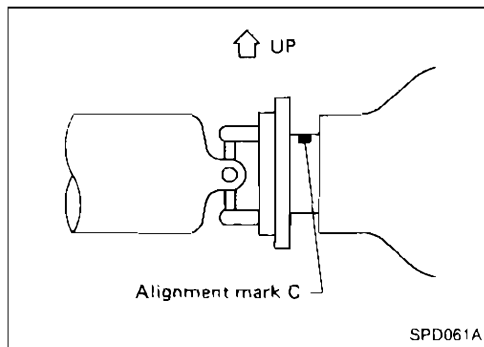
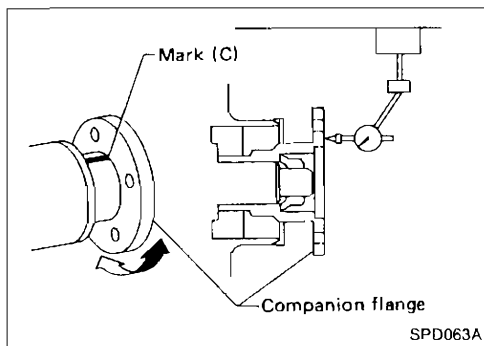
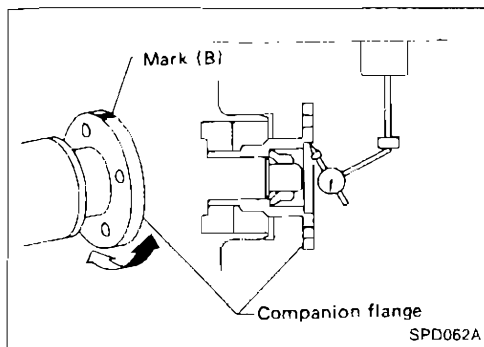
If companion flange has been removed, put new alignment marks B and C on it. Then reassemble using the following procedure. Perform step 4 when final drive and propeller shaft are separated from each other. Also perform step 4 when either of these parts is replaced with a new one.





# PROPELLER SHAFT

## Installation (Cont'd)



1. Erase original marks B and C from companion flange with suitable solvent.
2. Mark (B)
  - A. Measure companion flange vertical runout.
  - B. Determine the position where maximum runout is read on dial gauge. Put mark (shown by B in figure at left) on flange perimeter corresponding to maximum runout position.
3. Mark (C)
  - A. Measure companion flange surface runout.
  - B. Determine the position where maximum runout is read on dial gauge. Put mark (shown by C in figure at left) on flange perimeter corresponding to maximum runout position.
4. Position companion flange and propeller shaft using alignment marks A and B. Set the marks A and B as close to each other as possible. Temporarily attach bolts and nuts.
5. Press down propeller shaft with alignment mark C facing upward. Then tighten the lower nut to specified torque.
6. Tighten remaining nuts to specified torque.

PD

## Inspection

- Inspect propeller shaft runout. If runout exceeds specifications, replace propeller shaft assembly.  
**Runout limit: 0.6 mm (0.024 in)**

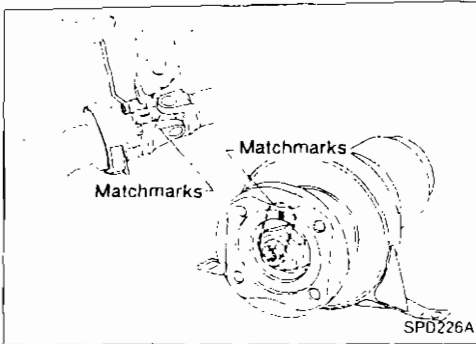
- Inspect journal axial play.  
If the play exceeds specifications, replace propeller shaft assembly.  
**Journal axial play:  
0 mm (0 in)**

# PROPELLER SHAFT

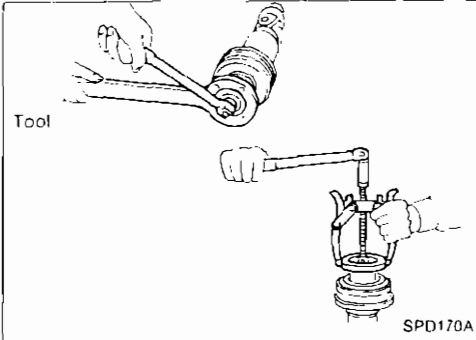
## Disassembly

### CENTER BEARING

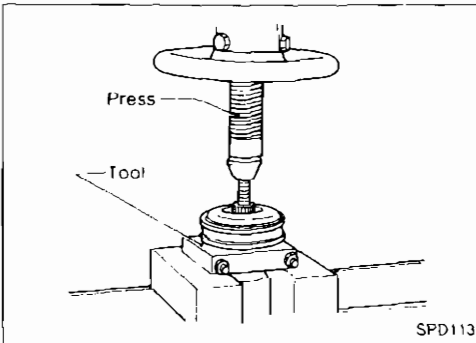
1. Put matchmarks on flanges, and separate 2nd tube from 1st tube
2. Put matchmarks on the flange and shaft.



3. Remove locking nut with suitable tool.
4. Remove companion flange with puller.



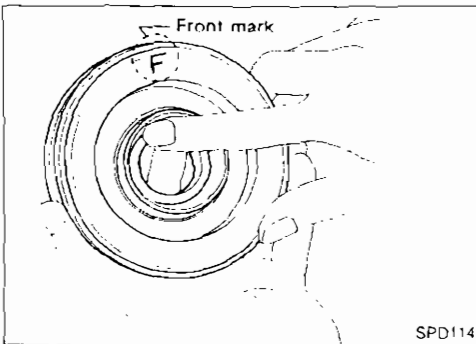
5. Remove center bearing with Tool and press.  
**Tool number: ST30031000**



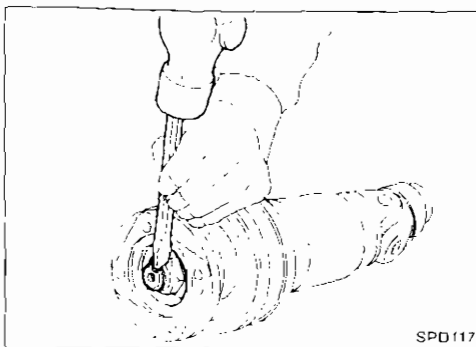
## Assembly

### CENTER BEARING

- When installing center bearing, position the "F" mark on center bearing toward rear of vehicle.
- Apply a coat of grease to the end face of center bearing and both sides of washer.  
Use multi-purpose lithium grease that contains molybdenum disulfide.

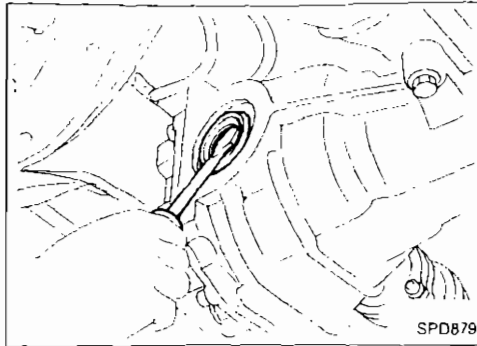


- Stake the nut. Always use new one.
- Align matchmarks when assembling tubes.

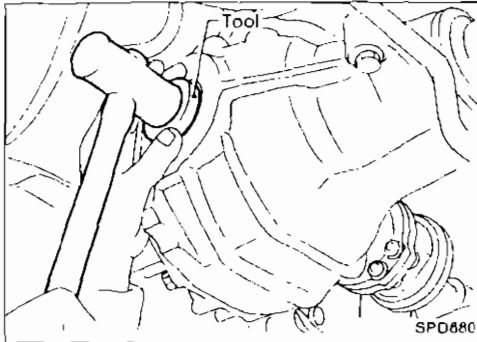


## ON-VEHICLE SERVICE/REMOVAL AND INSTALLATION

### Side Oil Seal Replacement (Cont'd)

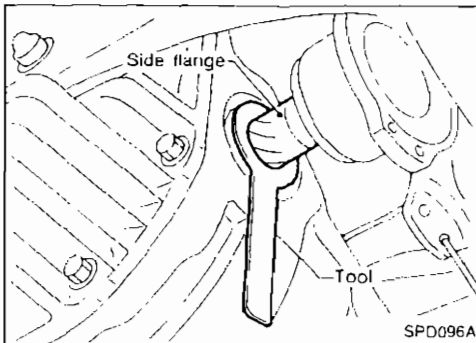


3. Remove oil seal.



4. Apply multi-purpose grease to sealing lips of oil seal. Press-fit oil seal into carrier with Tool.

**Tool number: KV38100200**

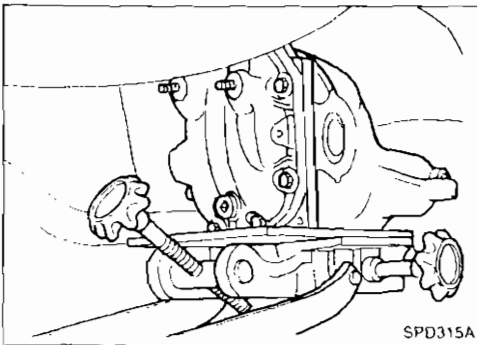


5. Install final drive side flange.

**Use Tool to prevent side oil seal from being damaged by spline portion of side flange.**

**Tool number: KV38107900**

6. Install drive shaft.



### Removal

#### CAUTION:

**Before removing the final drive assembly, disconnect the ABS sensor from the assembly. Then move it away from the final drive assembly. Failure to do so may result in damage to the sensor wires and the sensor becoming inoperative.**

- Remove propeller shaft.

**Plug up rear end of transmission rear extension housing.**

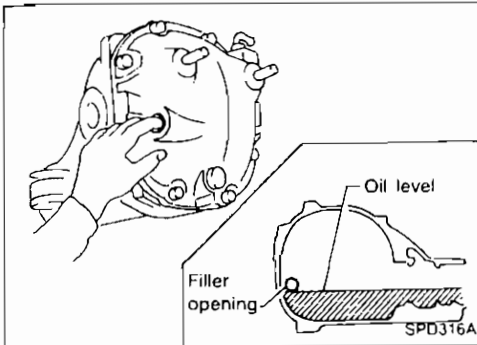
- Remove drive shafts.  
Refer to "Drive Shaft" of "REAR AXLE" in RA section.
- Remove nuts securing final drive rear cove to suspension member.
- Support weight of final drive using jack.
- Remove final drive mounting member from front of final drive.
- Move final drive forward together with jack. Remove rear cover stud bolts from suspension member.
- Lower final drive using jack. Remove jack from rear of vehicle.

## ON-VEHICLE SERVICE/REMOVAL AND INSTALLATION

### Removal (Cont'd)

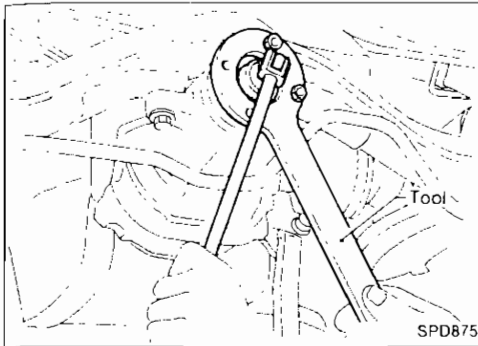
#### CAUTION:

- Be careful not to damage spline, sleeve yoke and front oil seal, when removing propeller shaft.
- After removal, support suspension member on a stand to prevent its insulators from being twisted or damaged.



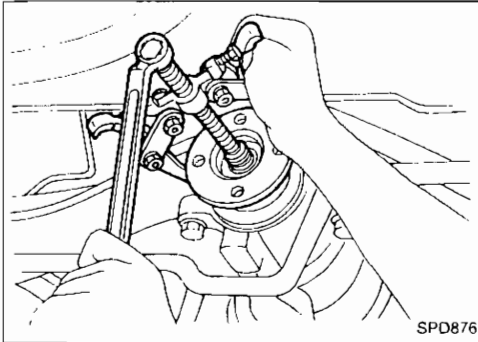
### Installation

- Fill final drive with recommended gear oil.
- **Models equipped with oil cooler system** —
- Check oil level and for oil leakage from hoses after oil cooler has been operated.

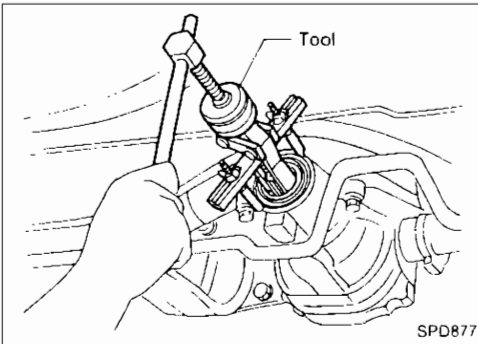


## Front Oil Seal Replacement

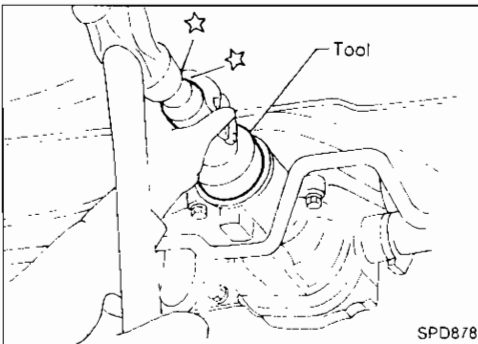
1. Remove propeller shaft.
2. Loosen drive pinion nut with suitable tool.



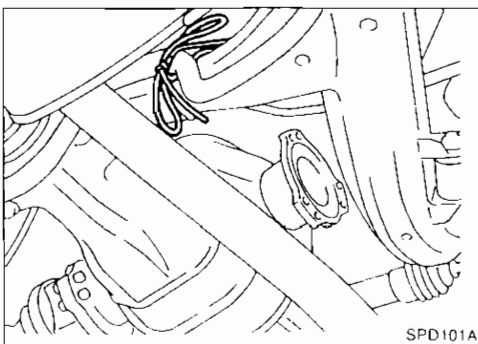
3. Remove companion flange.



4. Remove front oil seal.



5. Apply multi-purpose grease to sealing lips of oil seal. Press front oil seal into carrier.
6. Install companion flange and drive pinion nut.
7. Install propeller shaft.



## Side Oil Seal Replacement

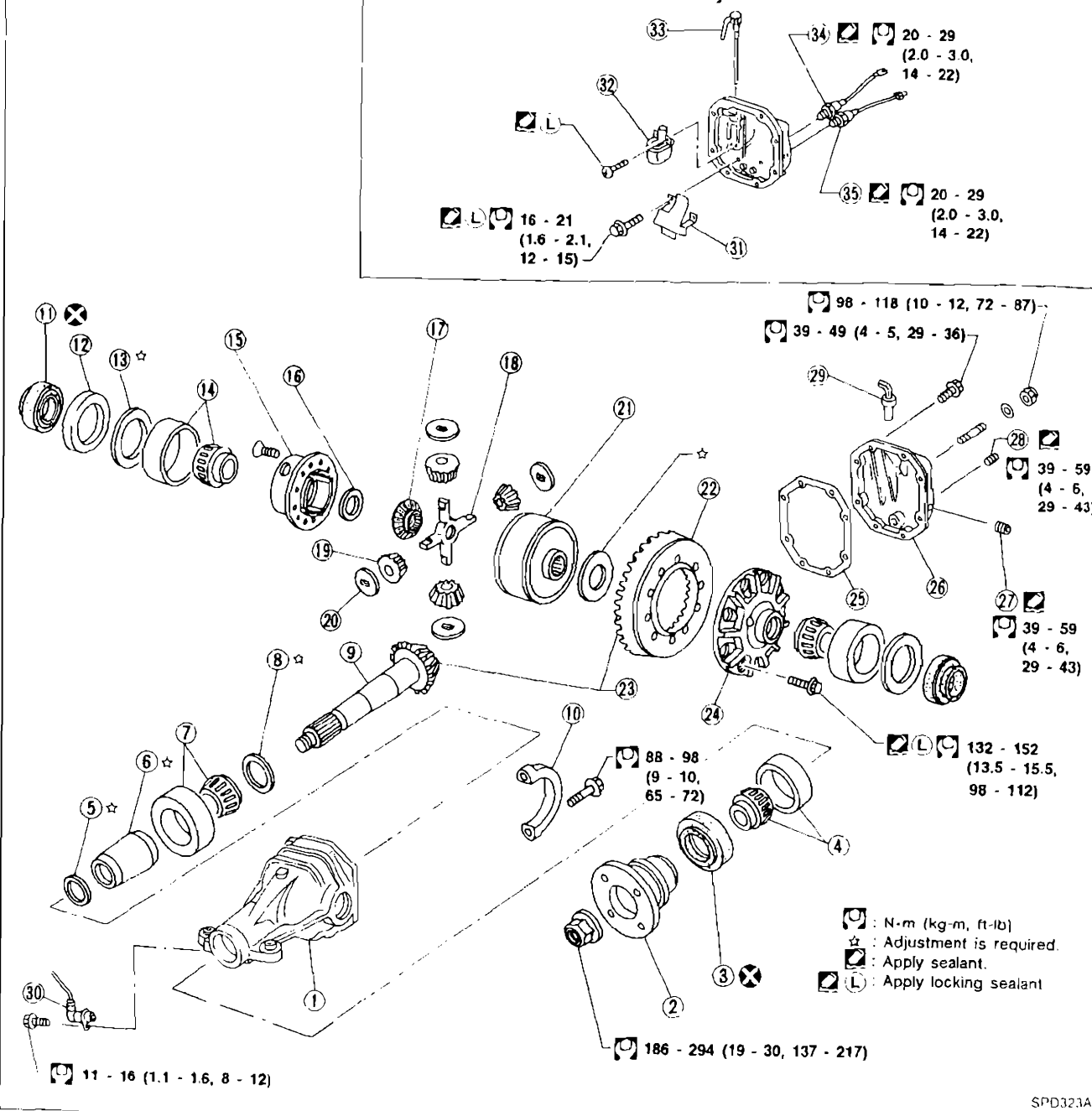
1. Disconnect final drive side flange and drive shaft flange and suspend drive shaft flange with wire.
2. Remove final drive side flange.

# FINAL DRIVE

R200V

SEC. 380

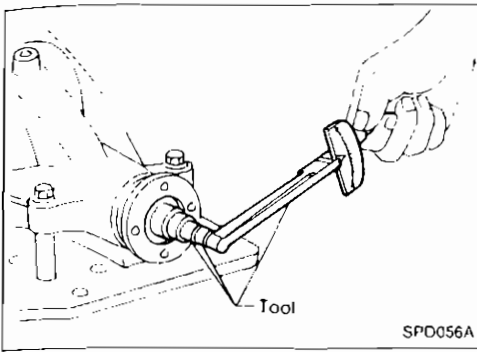
Models with differential oil cooler system



SPD323A

- |                                    |  |                            |
|------------------------------------|--|----------------------------|
| 1. Gear carrier                    | 13. Side bearing adjusting washer        | 25. Gasket                 |
| 2. Companion flange                | 14. Side bearing                         | 26. Rear cover             |
| 3. Front oil seal                  | 15. Differential case B                  | 27. Filler plug            |
| 4. Pinion front bearing            | 16. Side gear thrust washer              | 28. Drain plug             |
| 5. Pinion bearing adjusting washer | 17. Side gear (RH)                       | 29. Breather               |
| 6. Pinion bearing adjusting spacer | 18. Pinion mate shaft                    | 30. ABS sensor             |
| 7. Pinion rear bearing             | 19. Pinion mate gear                     | 31. Bracket                |
| 8. Pinion height adjusting washer  | 20. Pinion mate thrust washer            | 32. Oil filter             |
| 9. Drive pinion                    | 21. Side gear (LH) with viscous coupling | 33. Oil outlet             |
| 10. Bearing cap                    | 22. Ring gear                            | 34. Warning lamp switch    |
| 11. Side oil seal                  | 23. Hypoid gear set                      | 35. Oil temperature switch |
| 12. Side bearing spacer            | 24. Differential case A                  |                            |

# DISASSEMBLY



## Pre-inspection

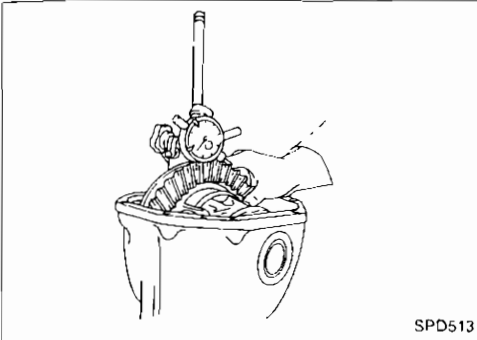
Before disassembling final drive, perform the following inspection.

- Total preload
  - 1) Turn drive pinion in both directions several times to set bearing rollers.
  - 2) Check total preload with Tool.

**Tool number: ST3127S000**

**Total preload:**

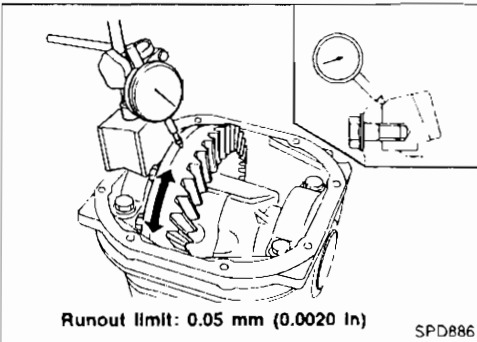
**1.4 - 3.1 N·m (14 - 32 kg-cm, 12 - 28 in-lb)**



- Ring gear to drive pinion backlash  
Check ring gear-to-drive pinion backlash with a dial indicator at several points.

**Ring gear-to-drive pinion backlash:**

**0.10 - 0.15 mm (0.0039 - 0.0059 in)**

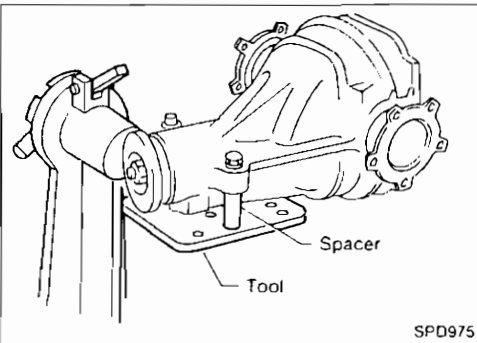


- Ring gear runout  
Check runout of ring gear with a dial indicator.

**Runout limit: 0.05 mm (0.0020 in)**

- Tooth contact  
Check tooth contact. Refer to Adjustment (PD-23).

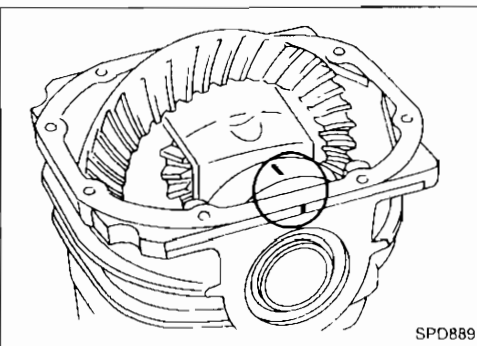
PD



## Differential Carrier

1. Using two 45 mm (1.77 in) spacers, mount carrier on Tool.

**Tool number: KV38100800**



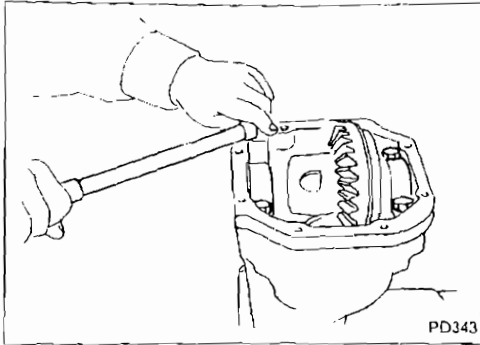
2. For proper reinstallation, paint or punch matchmarks on one side of the side bearing cap.

**Bearing caps are line-board during manufacture. Replace them in their proper positions.**

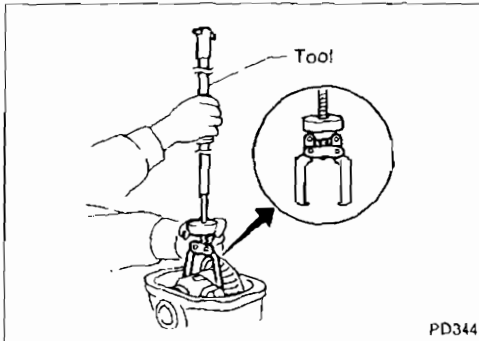
## DISASSEMBLY

### Differential Carrier (Cont'd)

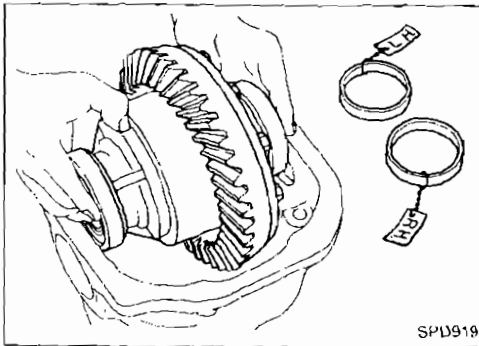
3. Remove side bearing caps.



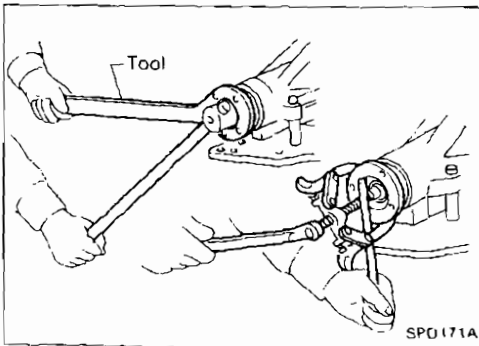
4. Lift differential case assembly out with Tool.  
Tool number: HT72400000



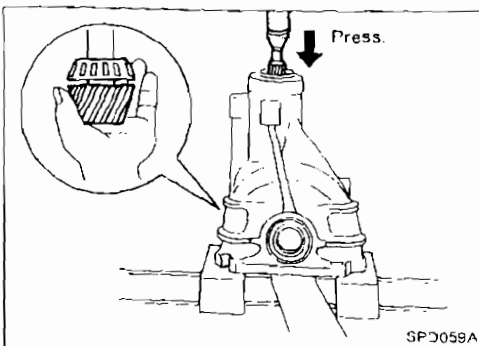
Keep the side bearing outer races together with inner cone — do not mix them up.  
Also, keep side bearing spacer and adjusting shims together with bearings.



5. Loosen drive pinion nut and pull off companion flange.



6. Take out drive pinion (together with rear bearing inner race, bearing spacer and adjusting washer).
7. Remove oil seal.
8. Remove front bearing inner race.
9. Remove side oil seal.

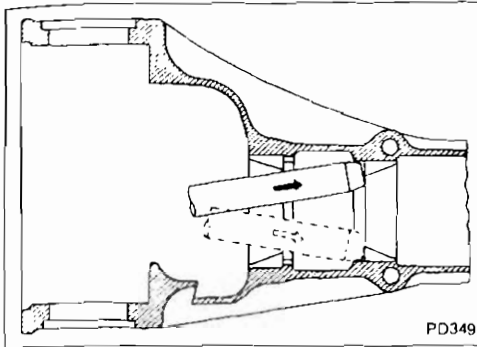




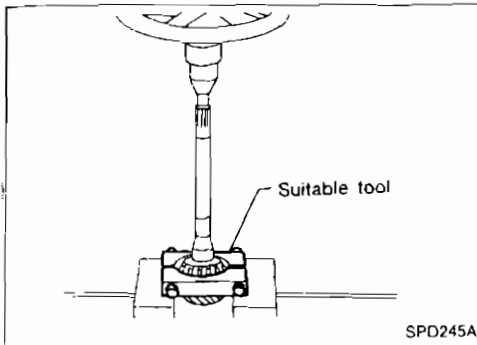
## DISASSEMBLY

### Differential Carrier (Cont'd)

10. Remove pinion bearing outer races with a brass drift.



11. Remove pinion rear bearing inner race and drive pinion height adjusting washer with suitable tool.



### Differential Case

1. Remove side bearing inner cones.

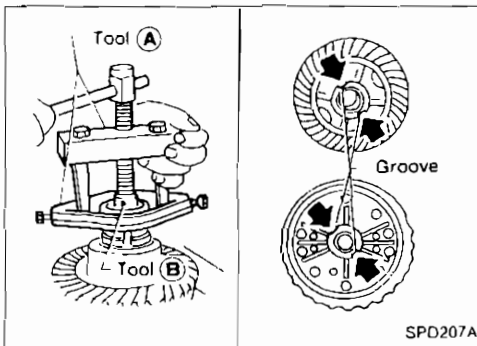
**To prevent damage to bearing, engage puller jaws in groove.**

Tool number:

Ⓐ ST3305S001

Ⓑ ST33061000

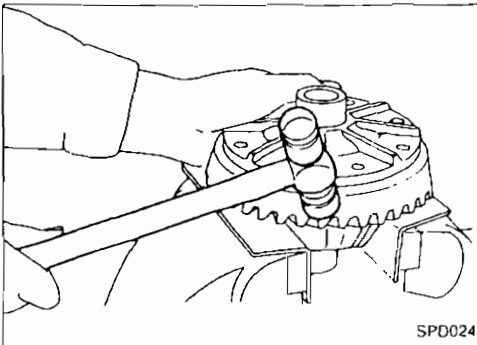
**Be careful not to confuse left- and right-hand parts. Keep bearing and bearing race for each side together.**



2. Loosen ring gear bolts in a criss-cross fashion.

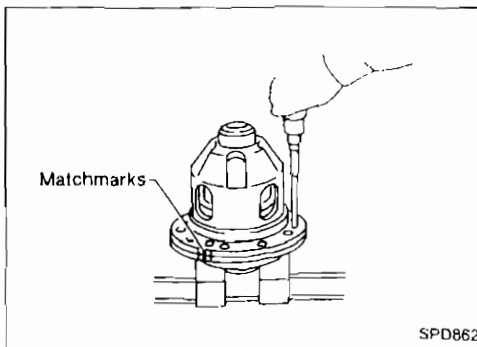
3. Tap ring gear off the differential case with a soft hammer.

**Tap evenly all around to keep ring gear from binding.**

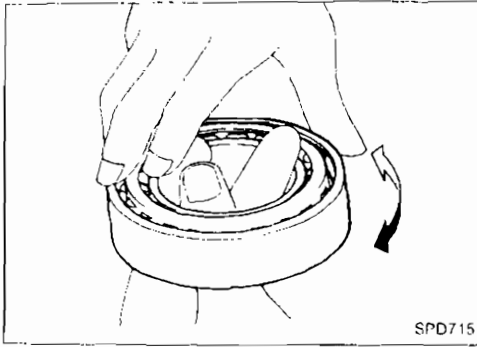


4. Loosen screws on differential cases A and B.

5. Separate differential cases A and B.



## INSPECTION



### Ring Gear and Drive Pinion

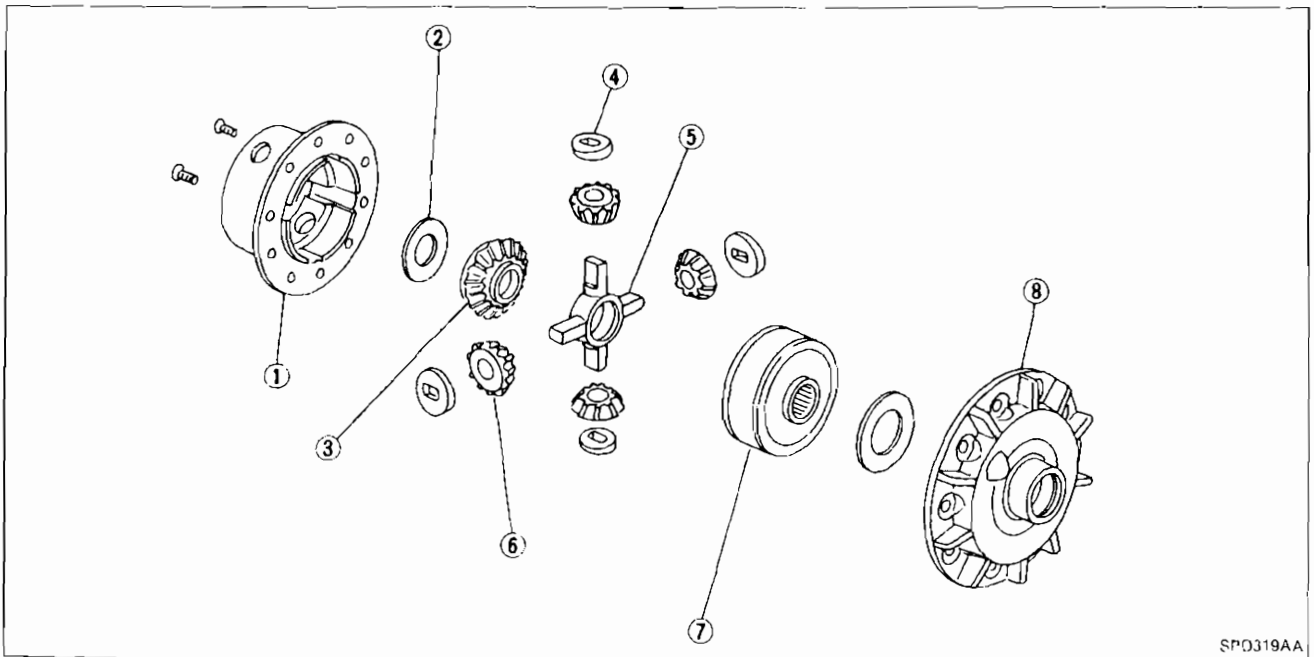
Check gear teeth for scoring, cracking or chipping. If any part is damaged, replace ring gear and drive pinion as a set (hypoid gear set).

### Bearing

- 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.

### Differential Case Assembly

- Check mating surfaces of differential case, side gears, pinion mate gears, pinion mate shaft and thrust washers.
- Check viscous coupling for oil leakage. If necessary, replace it with new one.



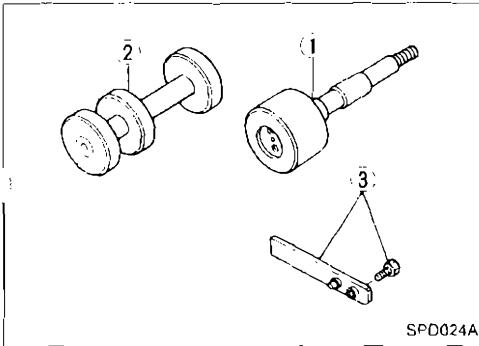
1. Differential case B
2. Side gear thrust washer
3. Side gear (RH)

4. Pinion mate thrust washer
5. Pinion mate shaft
6. Pinion mate gear

7. Side gear (LH) with viscous coupling
8. Differential case A

## ADJUSTMENT

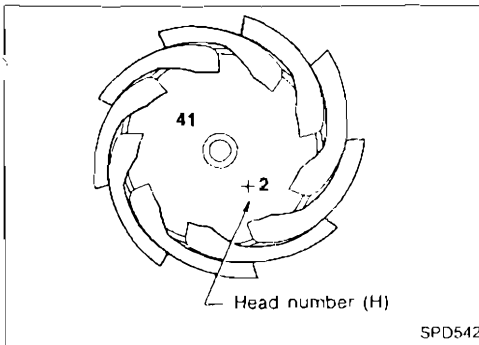
To avoid confusion while calculating bearing shims, it is absolutely necessary to stay with the metric system. If you measure anything in inches, **the results must be converted to the metric system.**



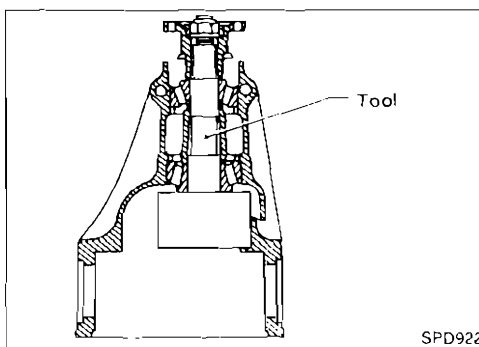
### Drive Pinion Height

1. First prepare Tools for pinion height adjustment.
  - ① Dummy shaft (KV38103910)
  - ② Height gauge (KV38100120)
  - ③ Stopper (KV38100140)
2. To simplify the job, make a chart, like the one below, to organize your calculations.

| LETTERS                | HUNDREDTHS OF A MILLIMETER |
|------------------------|----------------------------|
| H: Head number         |                            |
| N: Measuring clearance |                            |



3. Write the following numbers down the chart.  
H: Head number



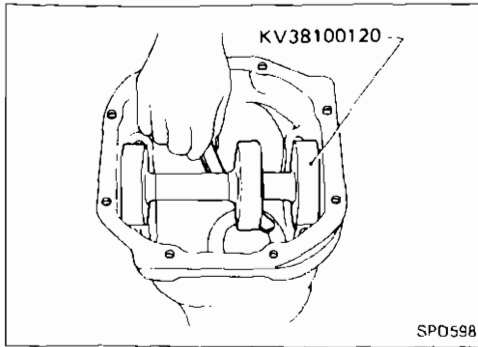
4. Set Tool (Dummy shaft) as shown below and tighten drive pinion nut carefully to correct preload of 1.0 to 1.3 N·m (10 to 13 kg-cm, 8.7 to 11.3 in-lb).

**Tool number: KV38103910**

PD

## ADJUSTMENT

### Drive Pinion Height (Cont'd)



5. Attach Tool (Height gauge) to gear carrier, and measure the clearance between the height gauge and the dummy shaft face.
6. Substitute these values into the equation to calculate the thickness of the washer.

**If value signifying H is not given, regard it as zero and calculate.**

$$T \text{ (Thickness of washer)} = N - (H \times 0.01) + 3.00$$

Example:

$$N = 0.23$$

$$H = 1$$

$$\begin{aligned} T &= N - (H \times 0.01) + 3.00 \\ &= 0.23 - (1 \times 0.01) + 3.00 \end{aligned}$$

|     |         |                  |
|-----|---------|------------------|
| (1) | H ..... | 1                |
|     |         | + 1              |
| (2) |         | + 1              |
|     |         | <u>x 0.01</u>    |
|     |         | + 0.01           |
| (3) | N ..... | 0.23             |
|     |         | <u>- (+0.01)</u> |
|     |         | 0.22             |
| (4) |         | 0.22             |
|     |         | <u>+ 3.00</u>    |
|     |         | 3.22             |
|     |         | ∴ T = 3.22       |

7. Select the proper pinion height washer.

**Drive pinion height adjusting washer:**

**Refer to SDS (PD-36).**

**If you cannot find the desired thickness of washer, use washer with thickness closest to the calculated value.**

Example:

Calculated value ... T = 3.22 mm

Used washer ... T = 3.21 mm

## ADJUSTMENT

### Drive Pinion Height (Cont'd)

#### — Washer selection when replacing hypoid gear set —

Drive pinions may be different in height due to the manufacturing process. Use a washer of proper thickness to adjust the height of new drive pinion. Select the washer as follows:

$$T = (t_1 - t_2) \times 0.01 + T_0$$

where T: thickness of the washer to select

$T_0$ : thickness of the washer used

$t_1$ : old drive pinion head number

$t_2$ : new drive pinion head number

Example:

$$T_0 = 3.21, t_1 = +2, t_2 = -1$$

$$T = \{2 - (-1)\} \times 0.01 + 3.21$$

$$= 3 \times 0.01 + 3.21$$

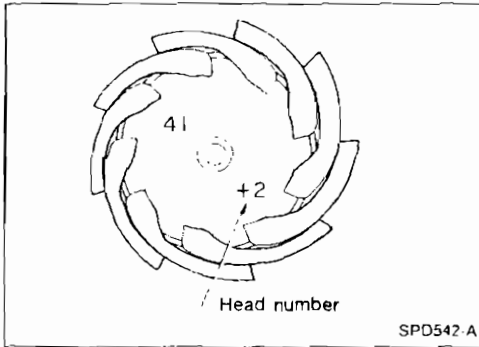
$$= 0.03 + 3.21$$

$$= 3.24$$

$$T = 3.24 \text{ mm}$$

Drive pinion height adjusting washer:

Refer to SDS (PD-36).



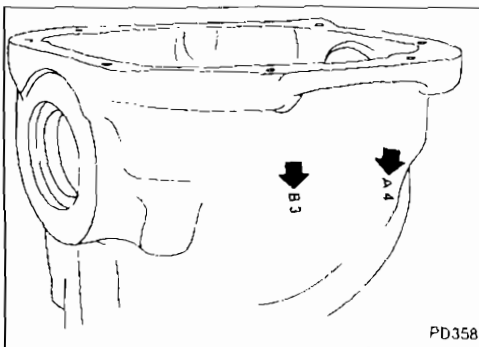
### Side Bearing Preload

- To simplify the job, make a chart like the one below to organize your calculations.

| LETTERS   | VALUE |
|---|-------|
| A: Left housing                                       |       |
| B: Right housing                                      |       |
| C: Differential case                                  |       |
| D: Differential case                                  |       |
| H: (+) or (-) ring gear                               |       |
| E: Left side bearing<br>(= 21 - Measured height)      |       |
| F: Right side bearing<br>(= 21 - Measured height)     |       |
| G: Side bearing spacer<br>(= 81 - Measured thickness) |       |
| X:  | 1 97  |
| Y:  | 2 07  |

- Write the following numbers down in the chart. If numbers for A, B, C, D and H are not given, regard them as zero.

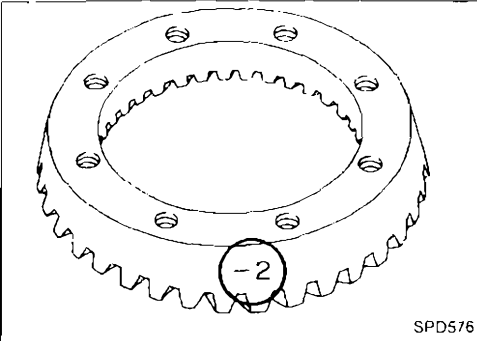
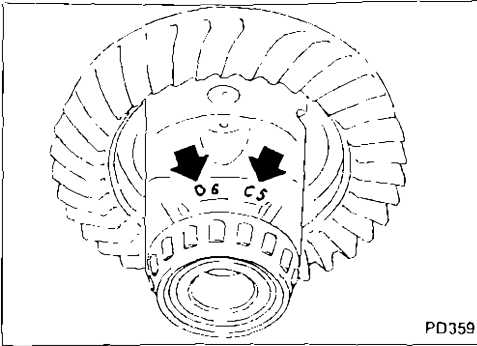
A & B: Figures marked on gear carrier



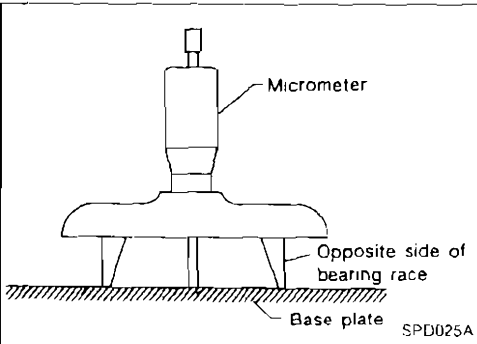
# ADJUSTMENT

## Side Bearing Preload (Cont'd)

C & D: Figures marked on differential case



H: Figure marked on ring gear  
Do not confuse negative and positive values.

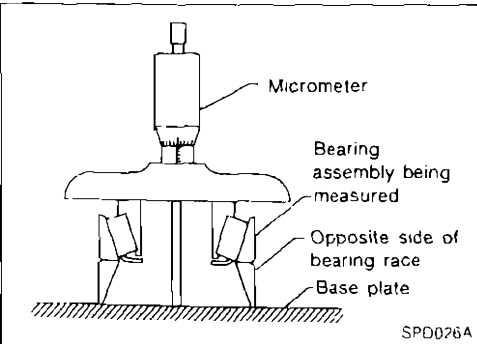


3. Calculate "E" and "F" as follows.

$E \& F = 21 \text{ mm (0.83 in)}$  - Measured bearing height

Bearing height can be measured as follows:

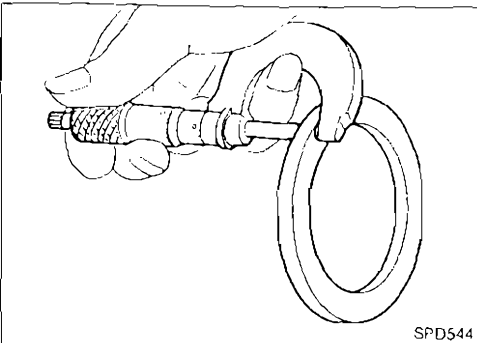
a. Measure height of bearing race which will be used as a base for the opposite side of a side bearing assembly.



b. Set bearing assembly to be measured on the base race and measure the total height.

**Lubricate bearing assembly and turn it several times to settle it on the base for accurate measurement.**

c. Subtract base race height from total height.



4. Calculate "G".

G: This is the difference in thickness of side spacer from standard width [8.10 mm (0.3189 in)].

$G = 8.10 \text{ mm (0.3189 in)}$  - Measured thickness

# ADJUSTMENT

## Side Bearing Preload (Cont'd)

| LETTERS  | VALUE |
|--|-------|
| A: Left housing  |       |
| B: Right housing                                       |       |
| C: Differential case                                   |       |
| D: Differential case                                   |       |
| H: (+) or (-): ring gear                               |       |
| E: Left side bearing<br>(= 21 - Measured height)       |       |
| F: Right side bearing<br>(= 21 - Measured height)      |       |
| G: Side bearing spacer<br>(= 8.1 - measured thickness) |       |
| X:   | 1.97  |
| Y:   | 2.07  |

### Calculations:

Side bearing spacer is used on the right

Left side washer thickness

$$T_1 = (A - C + D - H) \times 0.01 + E + Y$$

Right side washer thickness

$$T_2 = (B - D + H) \times 0.01 + F + G + X$$

Side bearing spacer is used on the left

Left side washer thickness

$$T_1 = (A - C + D - H) \times 0.01 + E + G + X$$

Right side washer thickness

$$T_2 = (B - D + H) \times 0.01 + F + Y$$

PD

## ADJUSTMENT

### Side Bearing Preload (Cont'd)

Example for R200V which has a side bearing spacer on the right

|        |          |
|--------|----------|
| A = 4  | E = 0.18 |
| B = 3  | F = 0.15 |
| C = 5  | G = 0.08 |
| D = 6  | X = 1.97 |
| H = -2 | Y = 2.07 |

**Left side washer thickness (without spacer)**

$$T_1 = (A - C + D - H) \times 0.01 + E + Y$$

|                                |        |  |
|--------------------------------|--------|--|
| 4                              | A      |  |
| - 5                            | - C    |  |
| = -1                           |        |  |
| + 6                            | + D    |  |
| = 5                            |        |  |
| - (-2)                         | - H    |  |
| = 7                            |        |  |
| x 0.01                         | x 0.01 |  |
| = 0.07                         |        |  |
| + 0.18                         | + E    |  |
| = 0.25                         |        |  |
| + 2.07                         | + Y    |  |
| = 2.32                         |        |  |
| <b>T<sub>1</sub> = 2.32 mm</b> |        |  |

**Right side washer thickness (with spacer)**

$$T_2 = (B - D + H) \times 0.01 + F + G + X$$

|                                |        |  |
|--------------------------------|--------|--|
| 3                              | B      |  |
| - 6                            | D      |  |
| = -3                           |        |  |
| + (-2)                         | + H    |  |
| = -5                           |        |  |
| x 0.01                         | x 0.01 |  |
| = -0.05                        |        |  |
| + 0.15                         | + F    |  |
| = 0.10                         |        |  |
| + 0.08                         | + G    |  |
| = 0.18                         |        |  |
| + 1.97                         | + X    |  |
| = 2.15                         |        |  |
| <b>T<sub>2</sub> = 2.15 mm</b> |        |  |

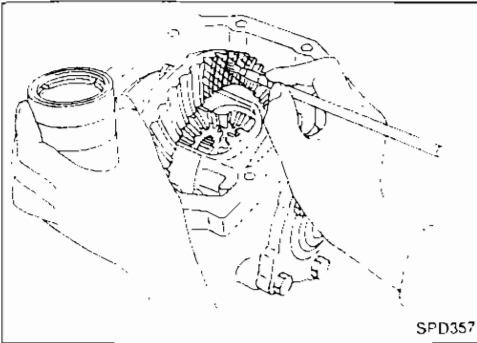
5. Select the proper shims. Refer to SDS (PD-36).  
**If you cannot find the desired thickness of shims, use shims with the total thickness closest to the calculated value.**



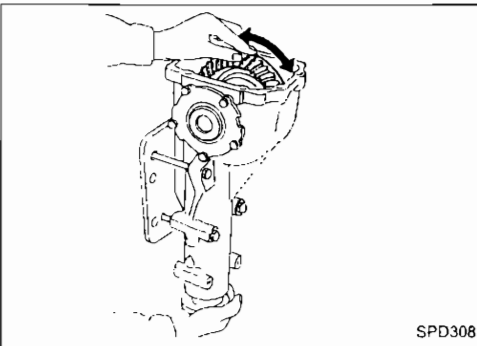
# ADJUSTMENT

## Tooth Contact

Checking gear tooth contact pattern is necessary to verify correct relationship between ring gear and drive pinion. Hypoid gears which are not positioned in proper arrangement may be noisy and/or have a short life. Check gear tooth contact pattern to obtain the best contact for low noise and long life.



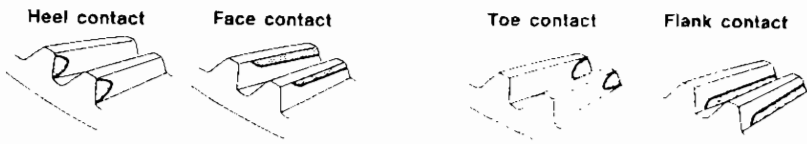
1. Thoroughly clean ring gear and drive pinion teeth
2. Lightly apply a mixture of powdered titanium oxide and oil or the equivalent. Apply it to 3 or 4 teeth of ring gear drive side.



3. Hold companion flange steady by hand and rotate the ring gear in both directions.

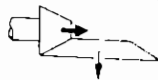
PD

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.



To correct, increase thickness of pinion height adjusting washer to bring drive pinion closer to ring gear

To correct, reduce thickness of pinion height adjusting washer to position drive pinion away from ring gear



Correct tooth contact



After adjustment, be sure to wipe off the ferric oxide and oil or their equivalent.

SPD007 A

## ASSEMBLY

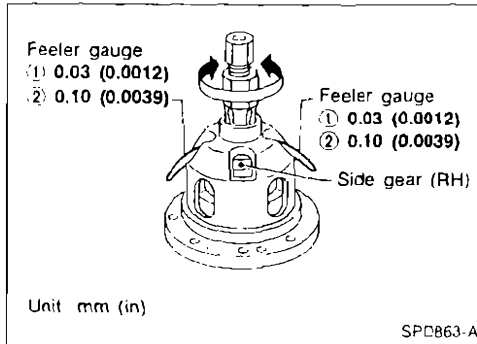
### Differential Case

Whenever side gears or pinion mate gears are replaced, selection of thrust washers should be carried out

Before selecting thrust washers, make sure all parts are clean and well lubricated with hypoid gear oil.

#### THRUST WASHER SELECTION

1. Install the previously removed thrust washer on right side gear. On left side gear, install a suitable thrust washer. Temporarily tighten differential cases using two screws.



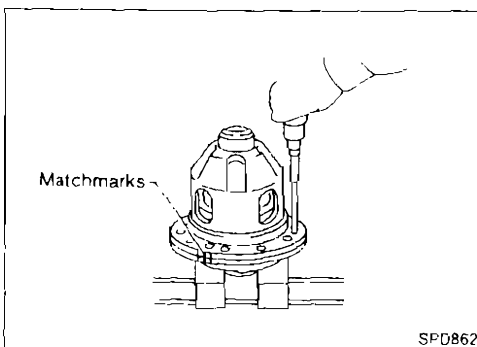
2. Position differential assembly so that right side gear is on the upper side. Place two feeler gauges of 0.03 mm (0.0012 in) thickness between right side gear and thrust washer as shown.

**Do not insert feeler gauge in oil groove portion of differential case.**

3. Rotate right side gear with a suitable tool attached to splines.

If hard to rotate, replace thrust washer on left side gear with a thinner one.

4. Replace both 0.03 mm (0.0012 in) feeler gauges with 0.10 mm (0.0039 in) gauges. At this point, make sure right side gear does not rotate. If it rotates, replace thrust washer on left side gear with a thicker one to prevent rotation

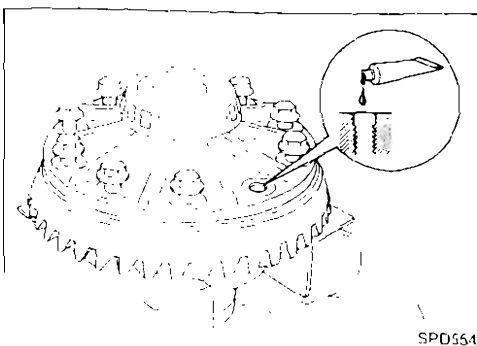


### ASSEMBLY

1. Install differential case A and B.

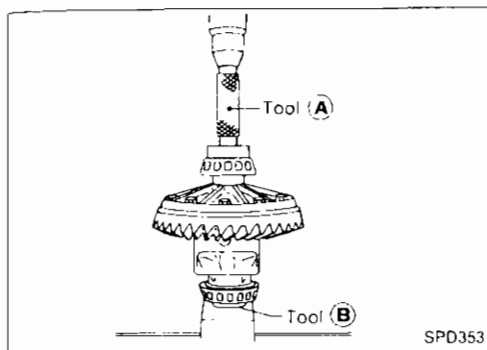
2. Place differential case on ring gear.

3. Apply locking sealant to ring gear bolts, and install them. **Tighten bolts in a criss-cross fashion, lightly tapping bolt head with a hammer.**



## ASSEMBLY

### Differential Case (Cont'd)

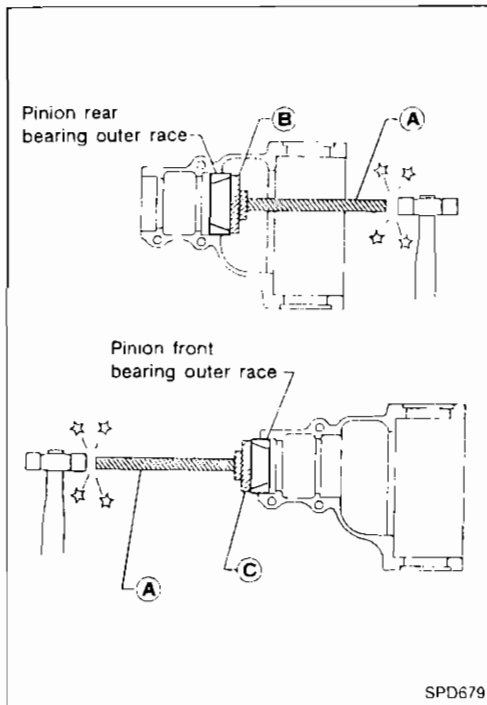


4. Press-fit side bearing inner cones on differential case with Tool.

Tool number:

- (A) KV38100300
- (B) ST33061000

### Differential Carrier

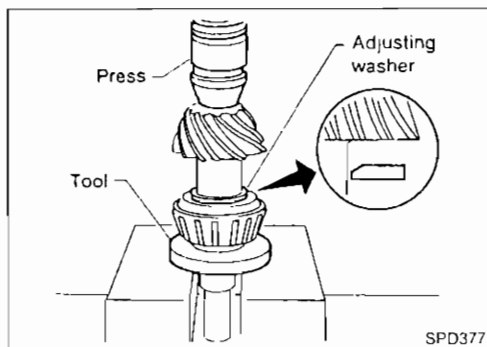


1. Press-fit front and rear bearing outer races with Tools

Tool number:

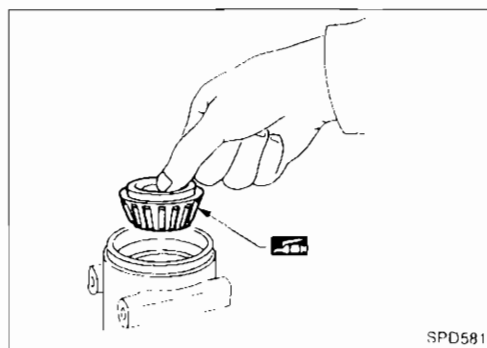
- (A) ST30611000
- (B) ST30621000
- (C) ST30613000

2. Select pinion bearing adjusting washer and drive pinion bearing spacer. Refer to ADJUSTMENT (PD-17).



3. Install selected drive pinion height adjusting washer in drive pinion. Using press and Tool, press-fit pinion rear bearing inner cone into it.

Tool number: ST30901000

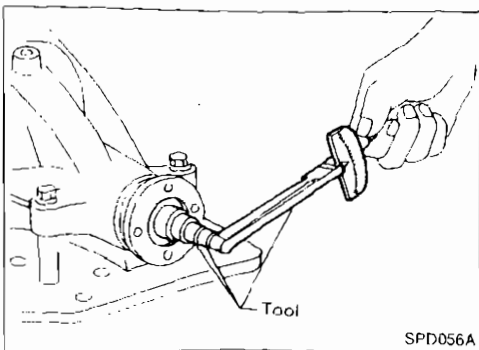
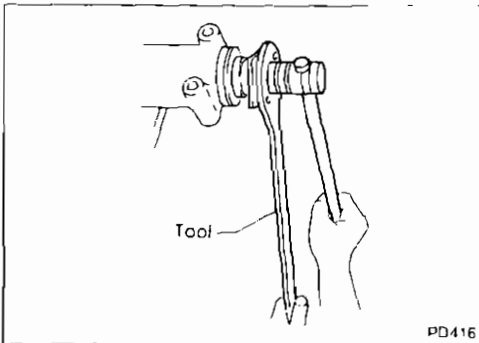
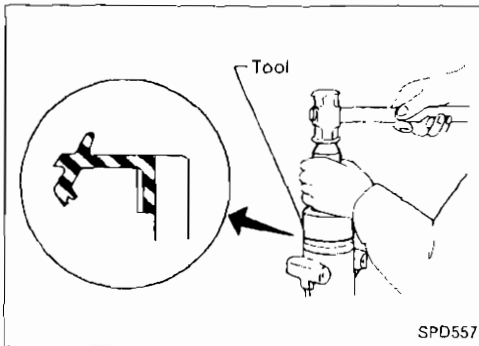
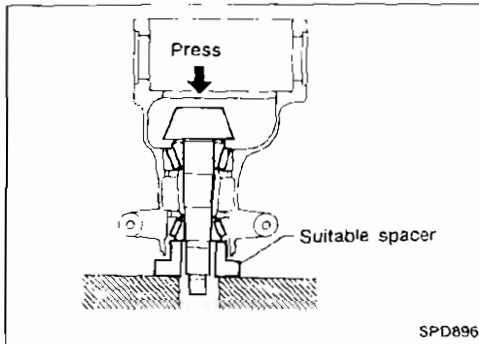
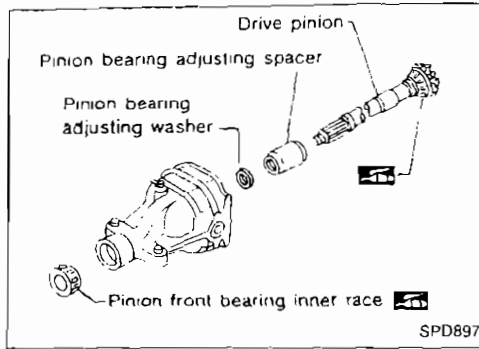


4. Place pinion front bearing inner cone in final drive housing.

PD

## ASSEMBLY

### Differential Carrier (Cont'd)



5. Set drive pinion assembly (as shown in figure at left) in differential carrier and install drive pinion with press and suitable tool.

**Stop when drive pinion touches bearing.**

**Apply multi-purpose grease to pinion rear bearing inner race, pinion front bearing inner race.**

6. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install front oil seal with Tool.

**Tool number: KV38100500**

7. Install companion flange, and tighten pinion nut to specified torque with suitable tool.

**Make sure that threaded portion of drive pinion and pinion nut are free from oil or grease.**

8. Turn drive pinion in both directions several times, and measure pinion bearing preload.

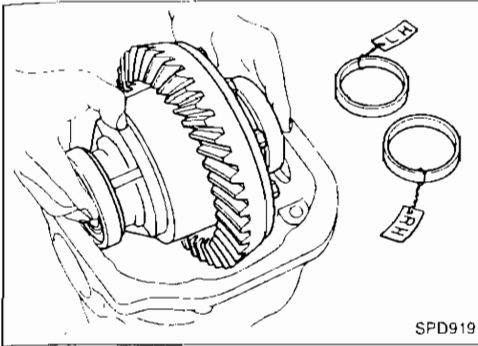
**Pinion bearing preload:**

**1.1 - 1.4 N·m (11 - 14 kg-cm, 9.5 - 12.2 in-lb)**

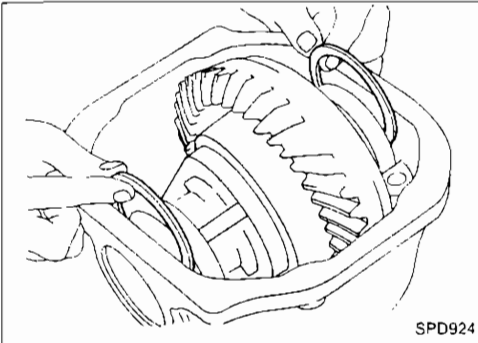
**When pinion bearing preload is outside specifications, replacement is required for pinion bearing adjusting washer and spacer. Replace with those of different thickness.**

## ASSEMBLY

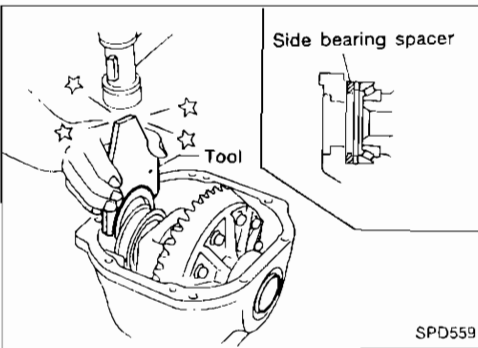
### Differential Carrier (Cont'd)



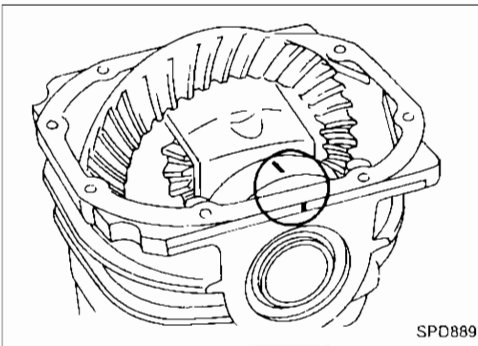
9. Select side bearing adjusting washer. Refer to ADJUSTMENT (PD-19).
10. Install differential case assembly with side bearing outer races into gear carrier.



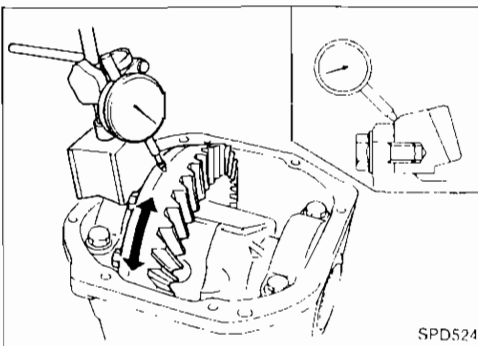
11. Insert left and right side bearing adjusting washers in place between side bearings and carrier.



12. Drive in side bearing spacer with Tool.  
**Tool number: KV38100600**  
**Spacer location: Right side**



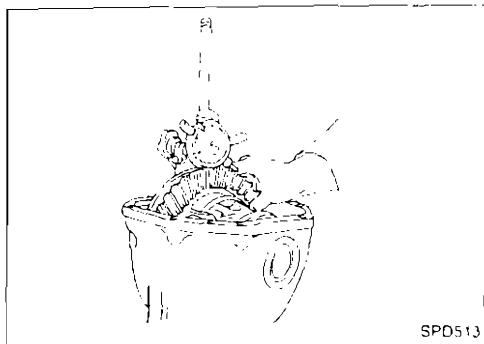
13. Align mark on bearing cap with that on gear carrier and install bearing cap on gear carrier.



14. Check runout of ring gear with a dial indicator.  
**Runout limit: 0.05 mm (0.0020 in)**

## ASSEMBLY

### Differential Carrier (Cont'd)



15. Measure ring gear to drive pinion backlash with a dial indicator.

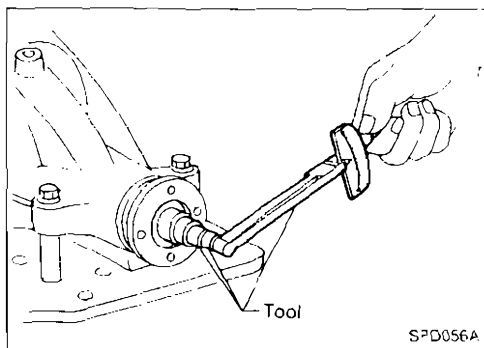
**Ring gear to drive pinion backlash:**

**0.10 - 0.15 mm (0.0039 - 0.0059 in)**

- If backlash is too small, adjustment of shim thickness is required. Decrease thickness of left shim and increase thickness of right 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.**



16. Check total preload with Tool.

**When checking preload, turn drive pinion in both directions several times to seat bearing rollers correctly.**

**Total preload:**

**1.4 - 3.1 N·m (14 - 32 kg-cm, 12 - 28 in-lb)**

- 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. Difference in number of shims will change ring gear to drive pinion backlash.**

17. Recheck ring gear to drive pinion backlash. Increase or decrease in thickness of shims will cause change to ring gear to pinion backlash.

- Check whether the backlash varies excessively in different places. Foreign matter may be caught between the ring gear and the differential case causing the trouble.
- The backlash can vary greatly even when the ring gear runout is within a specified range. In that case, replace the hypoid gear set or differential case.

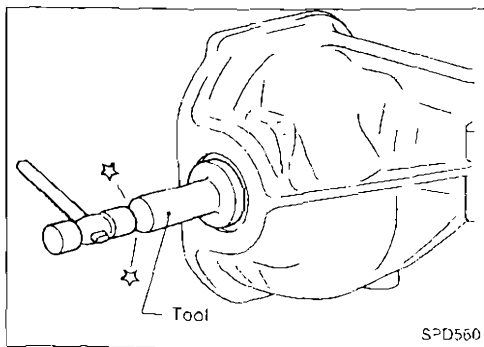
18. Check tooth contact.

Refer to ADJUSTMENT (PD-23).

19. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install side oil seal.

**Tool number: KV38100200**

20. Install rear cover and gasket.



# DIFFERENTIAL OIL COOLER SYSTEM

## Description

- The differential oil pumps automatically repeat ON-OFF operation according to the differential gear oil temperature.

OFF → ON 130°C (266°F)

ON → OFF 120°C (248°F)

However, the pumps will not operate when the vehicle speed is less than 120 km/h (75 MPH).

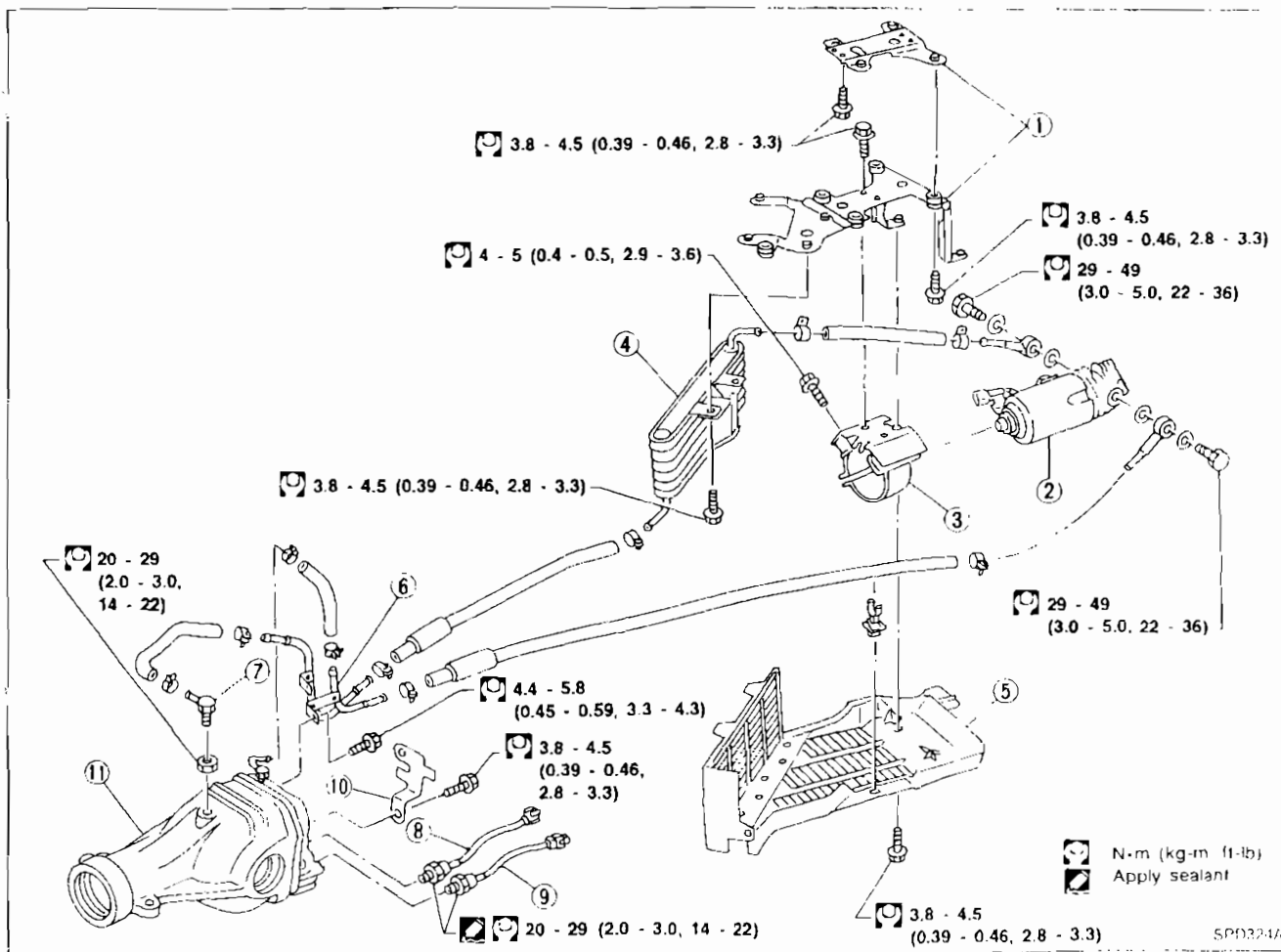
- When the oil temperature becomes excessively high, the warning lamp in the combination meter will illuminate.

Differential gear oil:

OFF → ON 180°C (356°F)

ON → OFF 150°C (302°F)

## Removal and Installation



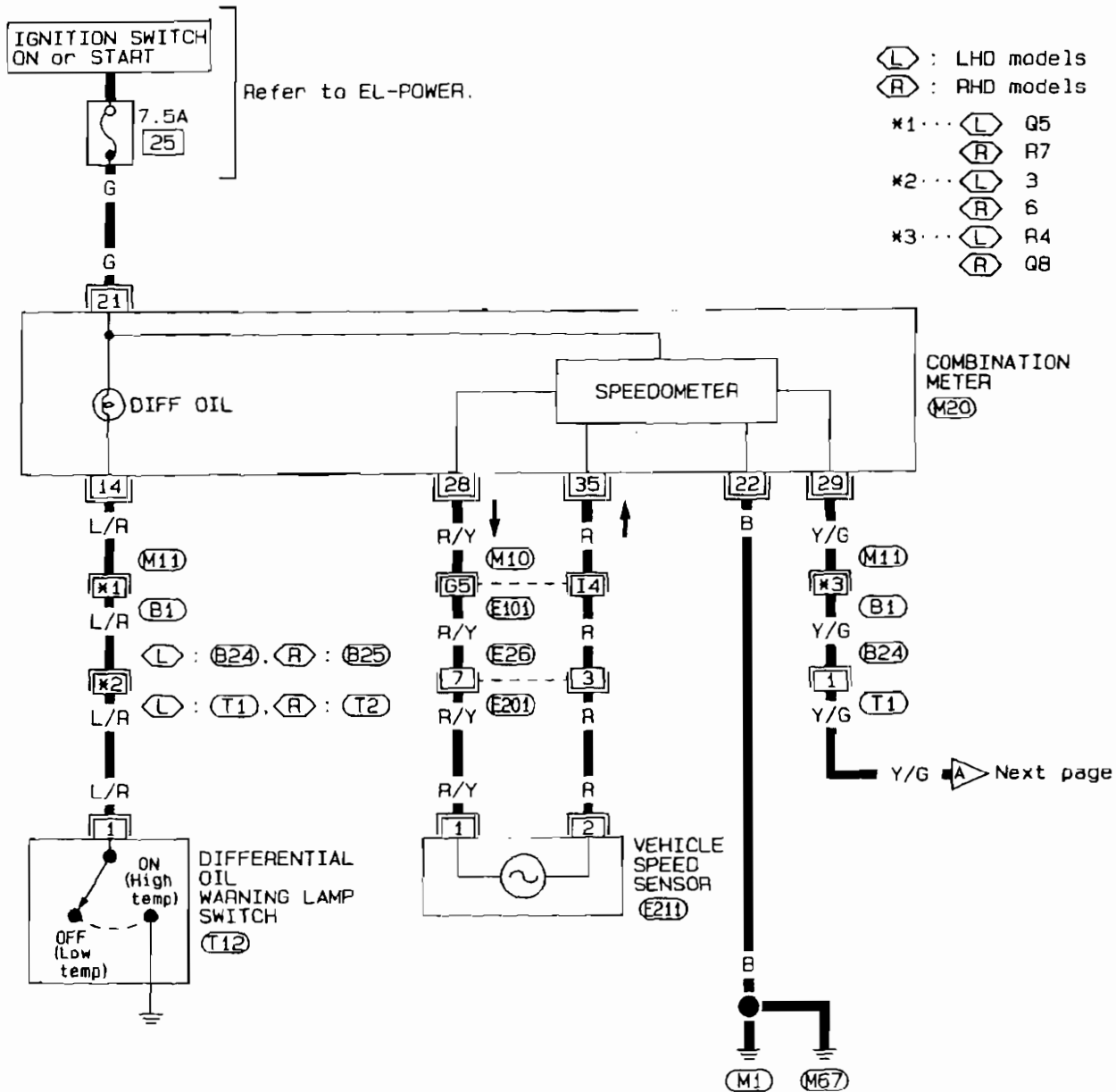
- |                             |                            |                          |
|-----------------------------|----------------------------|--------------------------|
| ① Oil pump mounting bracket | ⑤ Oil cooler protector     | ⑨ Oil temperature switch |
| ② Oil pump assembly         | ⑥ Oil cooler tube assembly | ⑩ Connector bracket      |
| ③ Oil pump bracket          | ⑦ Inlet connector          | ⑪ Final drive            |
| ④ Oil cooler assembly       | ⑧ Warning lamp switch      |                          |

PD

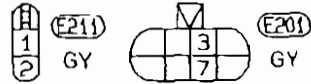
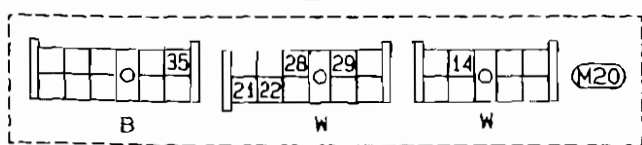
# DIFFERENTIAL OIL COOLER SYSTEM

## Wiring Diagram

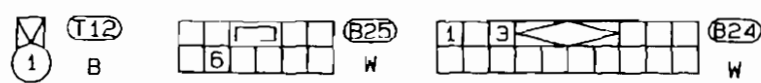
PD-DIFF-01



- ⬡ : LHD models
- ⬢ : RHD models
- \*1... ⬡ Q5
- ⬢ R7
- \*2... ⬡ 3
- ⬢ 6
- \*3... ⬡ R4
- ⬢ Q8



Refer to last page (Foldout page).



- ⬡ (M10), ⬢ (E101)
- ⬡ (M11), ⬢ (B1)

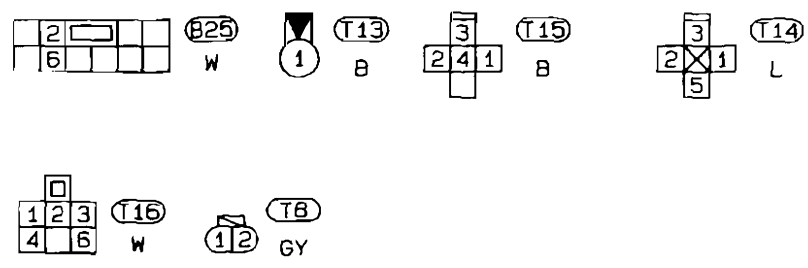
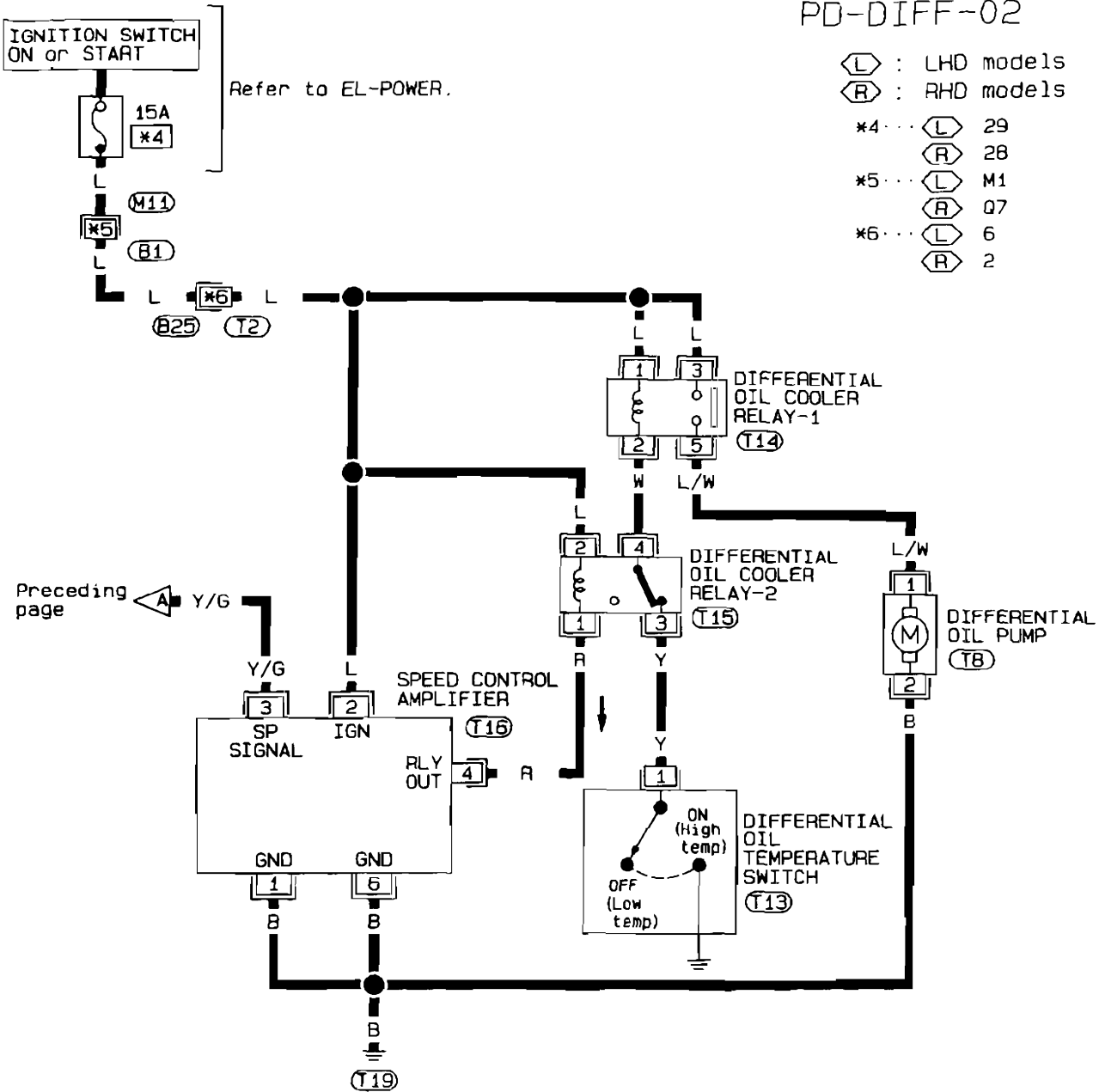


# DIFFERENTIAL OIL COOLER SYSTEM

## Wiring Diagram (Cont'd)

PD-DIFF-02

- (L) : LHD models
- (R) : RHD models
- \*4 ... (L) 29
- (R) 28
- \*5 ... (L) M1
- (R) Q7
- \*6 ... (L) 6
- (R) 2



Refer to last page (Foldout page).  
(M1), (B1)

PD

# DIFFERENTIAL OIL COOLER SYSTEM

## Inspection

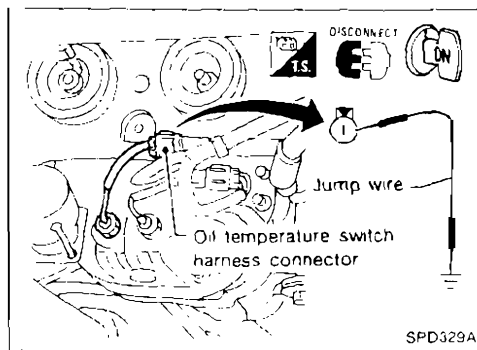
Thoroughly clean all parts in cleaning solvent and blow dry with compressed air, if available.

## OIL PUMP ASSEMBLY

Replace oil pump assembly when motor does not rotate because of motor seizure or other damage.

## OIL COOLER ASSEMBLY, OIL TUBE ASSEMBLY, OIL HOSE

If oil leakage is detected during removal, replace oil cooler assembly or oil tube.



## Trouble Diagnoses

### SYMPTOM:

Oil pump does not rotate.

### CHECK OIL PUMP OPERATION

1. Disconnect speed control amplifier harness connector.
2. Disconnect oil pump temperature switch harness connector.
3. Turn ignition switch "ON"
4. Connect jump wire between oil temperature switch harness connector terminal ① and ground.

### Oil pump rotates:

Refer to Procedure A.

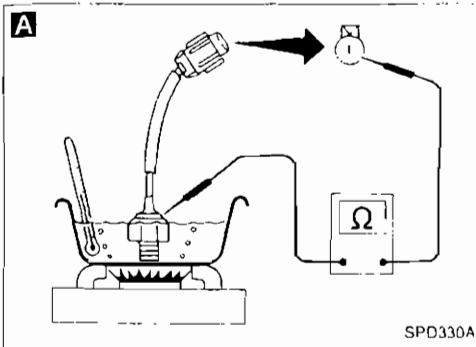
### Oil pump does not rotate:

Refer to Procedure B.

# DIFFERENTIAL OIL COOLER SYSTEM

## Trouble Diagnoses (Cont'd)

### Procedure A



**A**

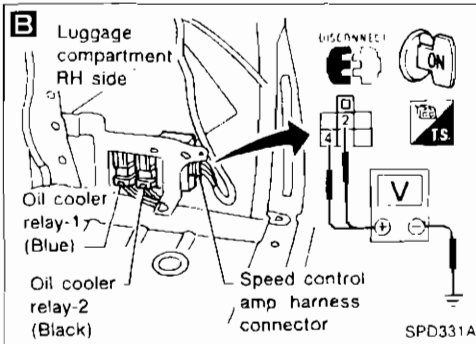
**CHECK OIL TEMPERATURE SWITCH**

- 1) Remove oil temperature switch
- 2) Check proper operation

**Operating temperature:**  
OFF → ON 130°C (266°F)

NG → Replace oil temperature switch

OK



**B**

**CHECK SPEED CONTROL AMPLIFIER POWER SUPPLY**

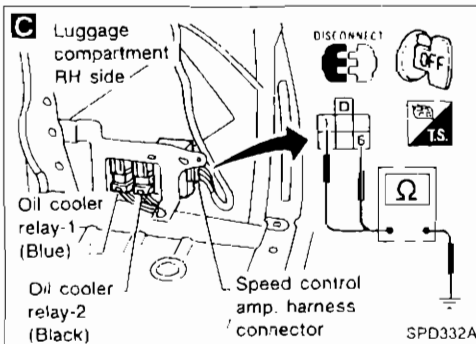
- 1) Disconnect speed control amplifier harness connector
- 2) Turn ignition switch "ON"
- 3) Check voltage between (2), (4) and ground.

**Battery voltage should exist.**

NG → Check and repair the following parts:

- Harness continuity between speed control amplifier harness connector terminal (2) and fuse
- Harness continuity between speed control amplifier harness connector terminal (4) and oil cooler relay-2 harness connector terminal (1)
- Harness continuity between oil cooler relay-2 harness connector terminal (2) and fuse
- Oil cooler relay-2

OK



**C**

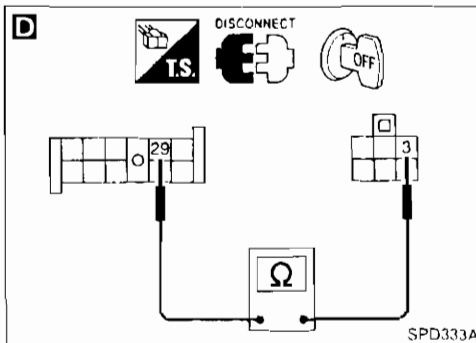
**CHECK SPEED CONTROL AMPLIFIER GROUND CIRCUIT.**

- 1) Turn ignition switch "OFF"
- 2) Disconnect speed control amplifier harness connector
- 3) Check harness continuity between (1), (6) and ground.

**Continuity should exist.**

NG → Repair or replace harness.

OK



**D**

**CHECK SPEED SIGNAL INPUT CIRCUIT.**

- 1) Disconnect speed control amplifier harness connector and combination meter harness connector.
- 2) Check harness continuity between speed control amplifier harness connector terminal (3) and combination meter harness connector terminal (29).

**Continuity should exist.**

NG → Repair or replace harness

OK

**CHECK VEHICLE SPEED SENSOR.**  
Refer to "METER AND GAUGES" in EL section.

NG → Replace vehicle speed sensor

OK

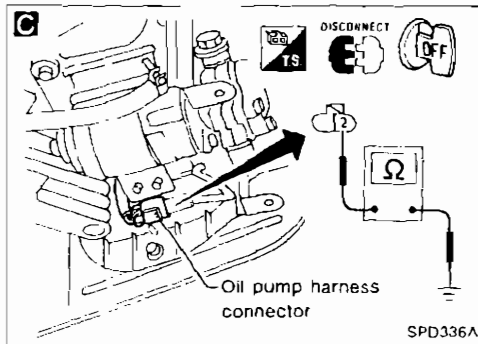
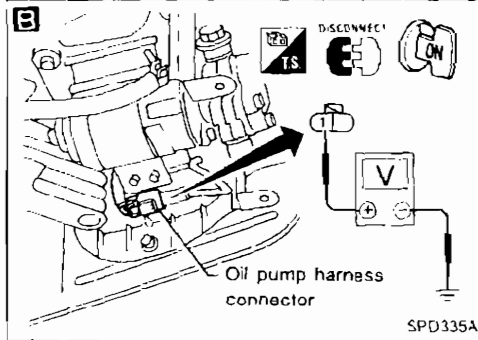
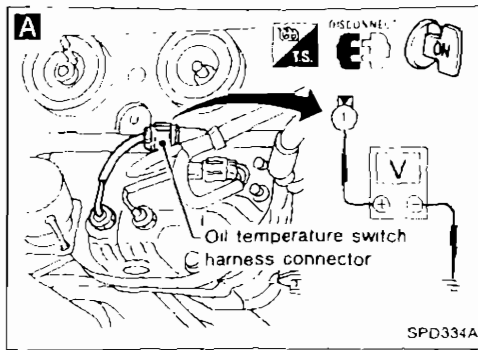
Replace speed control amplifier

PD

# DIFFERENTIAL OIL COOLER SYSTEM

## Trouble Diagnoses (Cont'd)

### Procedure B



**A**

**CHECK POWER SUPPLY**

- 1) Disconnect oil temperature switch harness connector and speed control amplifier harness connector
- 2) Turn ignition switch "ON"
- 3) Check voltage between oil temperature switch harness connector terminal ① and ground

**Battery voltage should exist.**

NG

Check and repair the following parts:

- Harness continuity between oil cooler relay-1 harness connector terminal ① and fuse
- Fuse
- Harness continuity between oil cooler relay-1 harness connector terminal ② and oil cooler relay-2 harness connector terminal ④
- Oil cooler relay-1
- Oil cooler relay-2
- Harness continuity between oil cooler relay-2 harness connector terminal ③ and oil temperature switch harness connector terminal ①

OK

**B**

- 1) Disconnect oil pump harness connector.
- 2) Turn ignition switch "ON"
- 3) Check voltage between oil pump harness connector terminal ① and ground.

**Battery voltage should exist.**

If NG, check and repair the following parts:

- Harness continuity between oil cooler relay-1 harness connector terminal ③ and fuse
- Fuse
- Harness continuity between oil cooler relay-1 harness connector terminal ⑤ and oil pump harness connector terminal ①
- Oil cooler relay-1

OK

**C**

**CHECK GROUND CIRCUIT.**

- 1) Turn ignition switch "OFF"
- 2) Disconnect oil pump harness connector.
- 3) Check harness continuity between oil pump harness connector terminal ② and ground.

**Continuity should exist.**

If NG, repair or replace harness

OK

Replace oil pump

# SERVICE DATA AND SPECIFICATIONS (SDS)

## Propeller Shaft

### GENERAL SPECIFICATIONS

| Unit: mm (in)                     |                                   |               |
|-----------------------------------|-----------------------------------|---------------|
| Applied model                     | M/T                               | A/T           |
| Propeller shaft model             | 3S71A                             |               |
| Number of joints                  | 3                                 |               |
| Coupling method with transmission | Sleeve type                       |               |
| Type of journal bearings          | Shell type (Non-disassembly type) |               |
| Distance between yokes            | 63.0 (2.480)                      |               |
| Shaft length (Spider to spider)   |                                   |               |
| 1st                               | 421.0 (16.57)                     | 441.0 (17.36) |
| 2nd                               |                                   |               |
| Without ABS                       | 650.0 (25.59)                     |               |
| With ABS                          | 636.0 (25.04)                     |               |
| Shaft outer diameter              |                                   |               |
| 1st                               | 75.0 (2.953)                      |               |
| 2nd                               | 75.0 (2.953)                      | 50.8 (2.000)  |

### SPECIFICATIONS AND ADJUSTMENT

| Unit: mm (in)                |             |
|------------------------------|-------------|
| Propeller shaft model        | 3S71A       |
| Propeller shaft runout limit | 0.6 (0.024) |
| Journal axial play           | 0 (0)       |

## Final Drive

### GENERAL SPECIFICATIONS

| Unit: mm (in)                               |                           |       |
|---|---------------------------|-------|
| Applied model                               | M/T                       | A/T   |
| Final drive model                           | R200V                     |       |
| Ring gear pitch diameter<br>mm (in)         | 205 (8.07)                |       |
| Gear ratio                                  | 3.692                     | 3.916 |
| Number of teeth<br>(Ring gear/drive pinion) | 48/13                     | 47/12 |
| Oil capacity { (Imp pt)                     | 1.2 - 1.4 (2-1/8 - 2-1/2) |       |
| Number of pinion gears                      | 4                         |       |
| Side gear bearing spacer location           | Right                     |       |

### INSPECTION AND ADJUSTMENT

#### Ring gear runout

|                                   |               |
|-----------------------------------|---------------|
| Ring gear runout limit<br>mm (in) | 0.05 (0.0020) |
|-----------------------------------|---------------|

#### Side gear adjustment

|  |                                  |
|--|----------------------------------|
| Clearance between side gear and differential case<br>mm (in) | 0.03 - 0.09<br>(0.0012 - 0.0035) |
|--|----------------------------------|

### Available side gear thrust washers

| Thickness | mm (in)  | Part number |
|-----------|----------|-------------|
| 0.80      | (0.0315) | 38424-40F60 |
| 0.83      | (0.0327) | 38424-40F61 |
| 0.86      | (0.0339) | 38424-40F62 |
| 0.89      | (0.0350) | 38424-40F63 |
| 0.92      | (0.0362) | 38424-40F64 |
| 0.95      | (0.0374) | 38424-40F65 |
| 0.98      | (0.0386) | 38424-40F66 |
| 1.01      | (0.0398) | 38424-40F67 |
| 1.04      | (0.0409) | 38424-40F68 |
| 1.07      | (0.0421) | 38424-40F69 |
| 1.10      | (0.0433) | 38424-40F70 |
| 1.13      | (0.0445) | 38424-40F71 |
| 1.16      | (0.0457) | 38424-40F72 |
| 1.19      | (0.0469) | 38424-40F73 |
| 1.22      | (0.0480) | 38424-40F74 |
| 1.25      | (0.0492) | 38424-40F75 |
| 1.28      | (0.0504) | 38424-40F76 |
| 1.31      | (0.0516) | 38424-40F77 |
| 1.34      | (0.0528) | 38424-40F78 |
| 1.37      | (0.0539) | 38424-40F79 |
| 1.40      | (0.0551) | 38424-40F80 |
| 1.43      | (0.0563) | 38424-40F81 |
| 1.46      | (0.0575) | 38424-40F82 |
| 1.49      | (0.0587) | 38424-40F83 |

PD

# SERVICE DATA AND SPECIFICATIONS (SDS)

## Final Drive (Cont'd)

### Drive pinion height adjustment

#### Available pinion height adjusting washers

| Thickness | mm (in)  | Part number |
|-----------|----------|-------------|
| 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 |

### Drive pinion preload adjustment

| Drive pinion bearing adjusting method    | Pinion bearing adjusting washer and spacer |
|--|--|
| Drive pinion preload with front oil seal | 1.1 - 1.4<br>(11 - 14, 9.5 - 12.2)         |

#### Available drive pinion bearing preload adjusting washers

| Thickness   | mm (in)           | Part number |
|-------------|-------------------|-------------|
| 3.80 - 3.82 | (0.1496 - 0.1504) | 38125-61001 |
| 3.82 - 3.84 | (0.1504 - 0.1512) | 38126-61001 |
| 3.84 - 3.86 | (0.1512 - 0.1520) | 38127-61001 |
| 3.86 - 3.88 | (0.1520 - 0.1528) | 38128-61001 |
| 3.88 - 3.90 | (0.1528 - 0.1535) | 38129-61001 |
| 3.90 - 3.92 | (0.1535 - 0.1543) | 38130-61001 |
| 3.92 - 3.94 | (0.1543 - 0.1551) | 38131-61001 |
| 3.94 - 3.96 | (0.1551 - 0.1559) | 38132-61001 |
| 3.96 - 3.98 | (0.1559 - 0.1567) | 38133-61001 |
| 3.98 - 4.00 | (0.1567 - 0.1575) | 38134-61001 |
| 4.00 - 4.02 | (0.1575 - 0.1583) | 38135-61001 |
| 4.02 - 4.04 | (0.1583 - 0.1591) | 38136-61001 |
| 4.04 - 4.06 | (0.1591 - 0.1598) | 38137-61001 |
| 4.06 - 4.08 | (0.1598 - 0.1606) | 38138-61001 |
| 4.08 - 4.10 | (0.1606 - 0.1614) | 38139-61001 |

#### Available drive pinion bearing preload adjusting spacers

| Length | mm (in)  | Part number |
|--------|----------|-------------|
| 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 |

### Total preload adjustment

|                                    |                    |                                  |
|------------------------------------|--------------------|----------------------------------|
| Drive pinion to ring gear backlash | mm (in)            | 0.10 - 0.15<br>(0.0039 - 0.0059) |
| Total preload                      | N·m (kg·cm, in·lb) | 1.4 - 3.1<br>(14 - 32, 12 - 28)  |
| Side bearing adjusting method      |                    | Adjusting washer                 |

#### 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 |
| 2.65      | (0.1043) | 38453-N3113 |

# FRONT AXLE & FRONT SUSPENSION

## SECTION **FA**

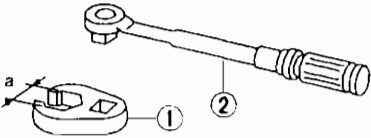
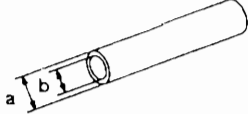
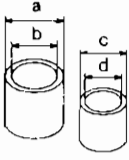
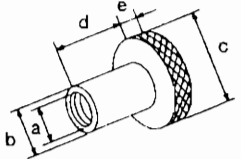
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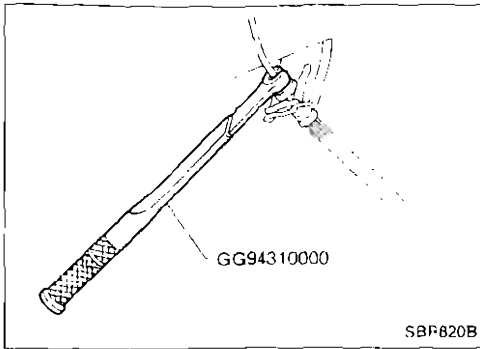
# PRECAUTIONS AND PREPARATION

## Commercial Service Tools

| Tool name   | Description  |   |
|---|--|---|
| Equivalent to GG94310000<br>① Flare nut crows foot<br>② Torque wrench |  <p>NT360</p> | Removing and installing each brake piping<br><br>a: 10 mm (0.39 in)   |
| Baffle plate drift  |  <p>NT065</p> | Installing baffle plate<br><br>a: 88 mm (3.46 in) dia.<br>b: 68 mm (2.68 in) dia.   |
| Tension rod bushing drift   |  <p>NT155</p> | Removing and installing tension rod bushing<br><br>a: 75 mm (2.95 in) dia.<br>b: 66 mm (2.60 in) dia.<br>c: 62 mm (2.44 in) dia.<br>d: 25 - 55 mm (0.98 - 2.17 in) dia. |
| Attachment<br>Wheel alignment   |  <p>NT148</p> | Measure wheel alignment<br><br>a: Screw M22 x 1.5<br>b: 35 (1.38) dia.<br>c: 65 (2.56) dia.<br>d: 56 (2.20)<br>e: 12 (0.47)<br>Unit: mm (in)                            |



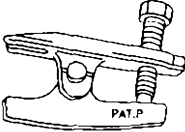
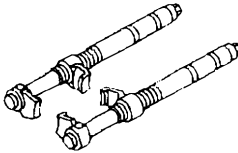
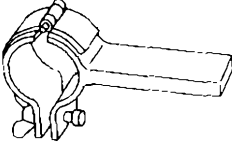
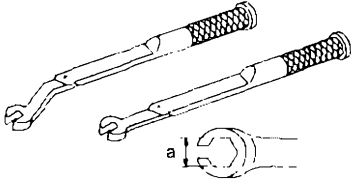
## PRECAUTIONS AND PREPARATION



### Precautions

- 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.
- After installing removed suspension parts, check wheel alignment and adjust if necessary.
- Use flare nut wrench when removing or installing brake tubes.
- Always torque brake lines when installing.

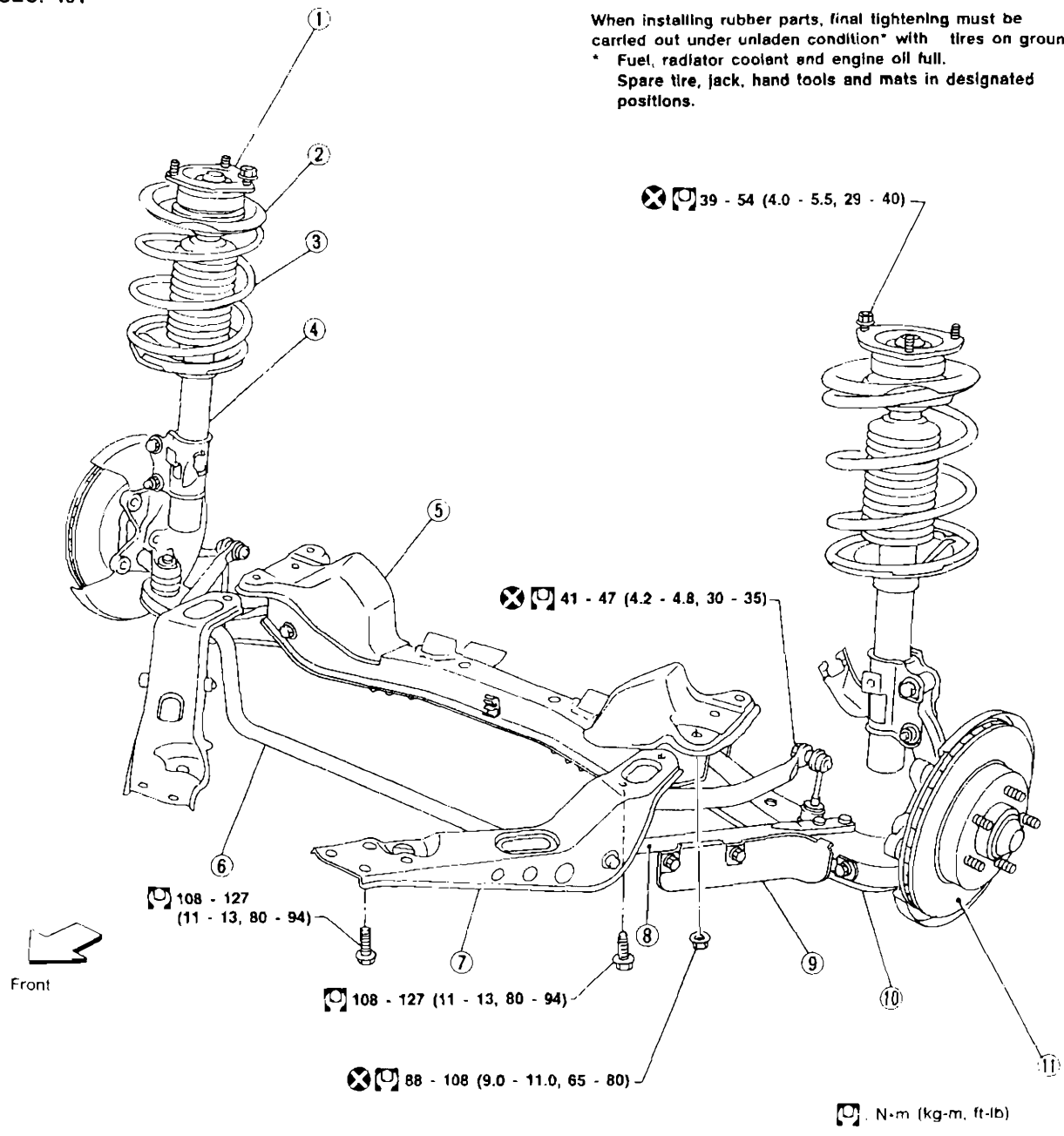
### Special Service Tools

| Tool number<br>Tool name              | Description  |  |
|---------------------------------------|--|--|
| HT72520000<br>Ball joint remover      | <br>NT146   | Removing tie-rod outer end and lower ball joint                |
| HT71780000<br>Spring compressor       | <br>NT144  | Removing and installing coil spring                            |
| ST35652000<br>Strut attachment        | <br>NT145 | Fixing strut assembly  |
| GG94310000<br>Flare nut torque wrench | <br>NT406 | Removing and installing brake piping<br><br>a: 10 mm (0.39 in) |

# FRONT SUSPENSION SYSTEM

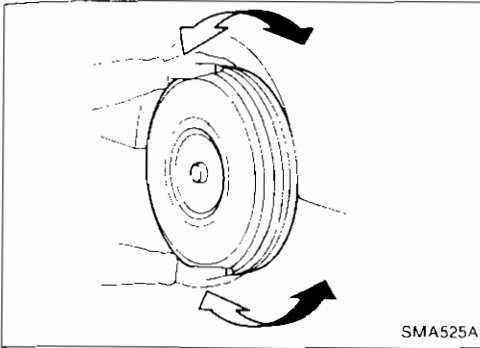
SEC. 401

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.



SFA615B

- |   |                          |   |                         |   |                                 |
|---|--------------------------|---|-------------------------|---|---------------------------------|
| ① | Strut mounting insulator | ⑤ | Front suspension member | ⑨ | Air guide                       |
| ② | Spring upper seat        | ⑥ | Front stabilizer        | ⑩ | Transverse link with ball joint |
| ③ | Coil spring              | ⑦ | Tension rod bracket     | ⑪ | Brake rotor                     |
| ④ | Strut assembly           | ⑧ | Tension rod             |   |                                 |



## Front Axle and Front Suspension Parts

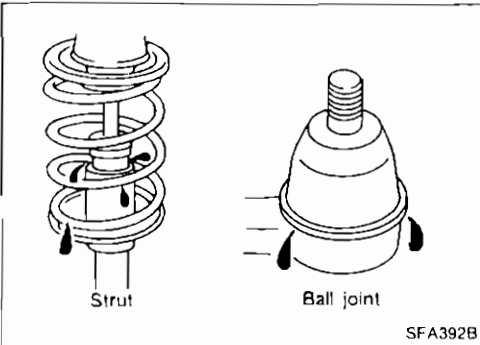
Check front axle and front suspension parts for looseness, cracks, wear or other damage

- Shake each front wheel to check for excessive play
- Retighten all axle and suspensions nuts and bolts to the specified torque.

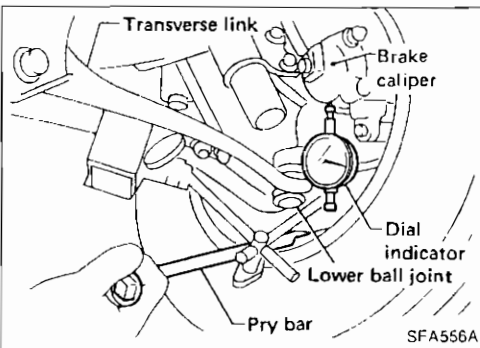
**Tightening torque:**

**Refer to FRONT SUSPENSION (FA-11).**

- Make sure that cotter pins are inserted



- Check strut (shock absorber) for oil leakage or other damage.
- Check suspension ball joint for grease leakage and ball joint dust cover for cracks or other damage. If ball joint dust cover is cracked or damaged, replace transverse link.

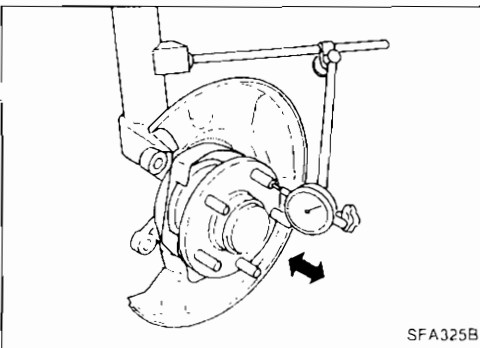


- Check suspension ball joint end play.
  - (1) Jack up front of vehicle and set the stands.
  - (2) Clamp dial indicator onto transverse link and place indicator tip on lower edge of brake caliper
  - (3) Make sure front wheels are straight and brake pedal is depressed.
  - (4) Place a pry bar between transverse link and inner rim of road wheel.
  - (5) While raising and releasing pry bar, observe maximum dial indicator value.

**Vertical end play:**

**0 mm (0 in)**

- (6) If ball joint movement is beyond specifications, remove and recheck it.



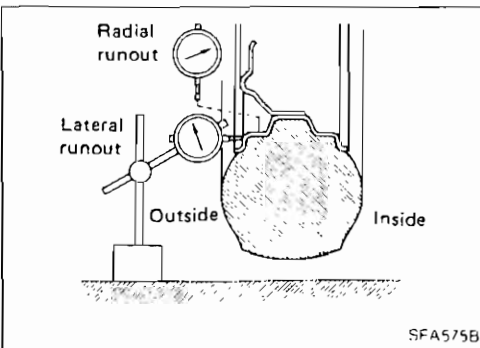
## Front Wheel Bearing

- Check that wheel bearings operate smoothly
- Check axial end play.

**Axial end play:**

**0.05 mm (0.0020 in) or less**

- If out of specification or wheel bearing does not turn smoothly, replace wheel bearing assembly. Refer to FRONT AXLE — Wheel Hub and Knuckle (FA-8)



## Front Wheel Alignment

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.

FA

## ON-VEHICLE SERVICE

### Front Wheel Alignment (Cont'd)

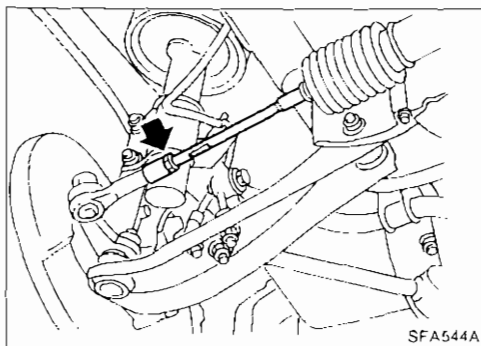
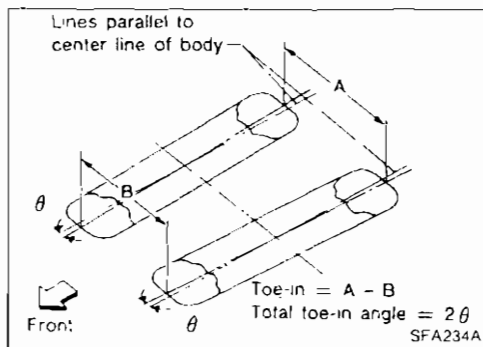
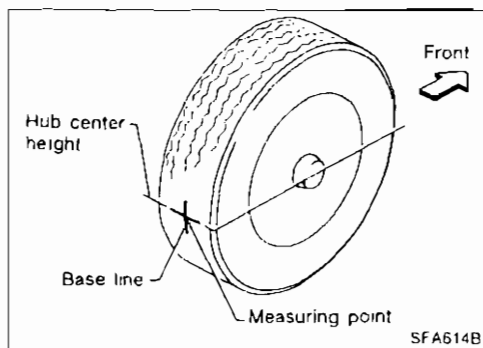
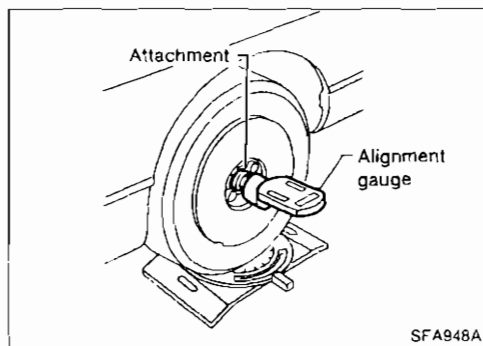
#### PRELIMINARY INSPECTION

1. Check tires for wear and improper inflation.
2. Check wheel runout.

#### Wheel runout:

Refer to SDS (FA-15).

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

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 (FA-15).

2. If camber, caster or kingpin inclination is not within specification, inspect front suspension parts. Replace damaged or worn out parts.

#### TOE-IN

Measure toe-in using following procedure. If out of specification, inspect and replace any damaged or worn front suspension parts.

#### WARNING:

- Perform following procedure always on a flat surface.
  - Make sure that no person is in front of the vehicle before pushing it.
1. Move rear of vehicle up and down to stabilize the posture.
  2. Push the vehicle straight ahead about 5 m (196.9 in).
  3. Put a mark on base line of the tread (rear side) at the same height of hub center to be a measuring point.
  4. Measure distance "A" (rear side).
  5. Push the vehicle slowly ahead to turn the wheels around 180 degrees.

If the wheels have passed 180 degrees, try the above procedure again from the beginning. Never push vehicle backward.

6. Measure distance "B" (front side).

#### Toe-in (A - B):

Refer to SDS (FA-15).

7. Adjust toe-in by varying length of steering tie-rods.
  - a. Loosen lock nuts.
  - b. Adjust toe-in by turning forward and reverse tie-rod.

## ON-VEHICLE SERVICE

### Front Wheel Alignment (Cont'd)

Make sure both tie-rods are the same length

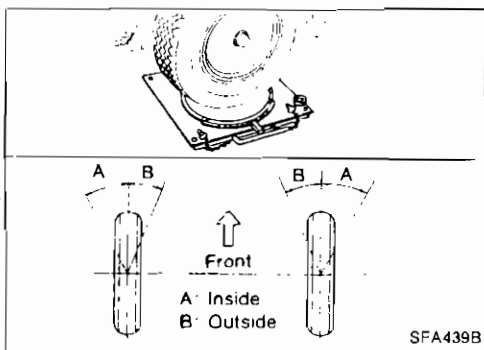
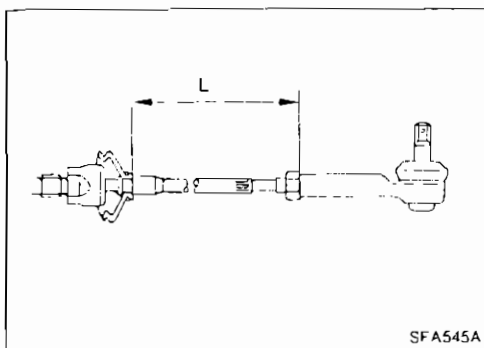
**Standard length "L":**

**Refer to SDS in ST section.**

- c. Tighten lock nuts to specified torque.

**Lock nut tightening torque:**

**Refer to ST section.**



### FRONT WHEEL TURNING ANGLE

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.**

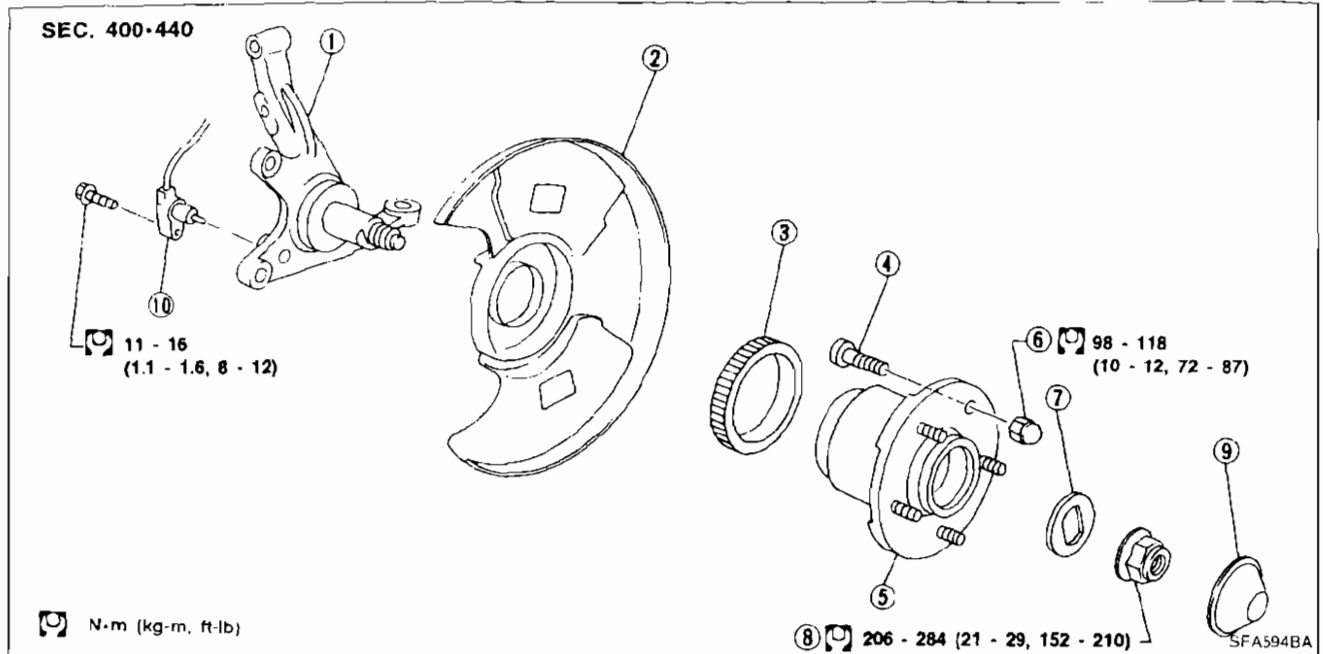
**Wheel turning angle (Full turn):**

**Refer to SDS (FA-15).**

FA

# FRONT AXLE

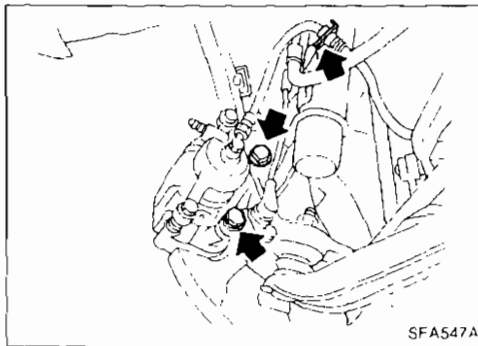
## Wheel Hub and Knuckle



- ① Knuckle spindle
- ② Baffle plate
- ③ ABS ring
- ④ Hub bolt

- ⑤ Wheel hub bearing
- ⑥ Wheel nut
- ⑦ Lock washer

- ⑧ Wheel bearing lock nut
- ⑨ Hub cap
- ⑩ ABS sensor



### REMOVAL

#### CAUTION:

Wheel hub bearing usually does not require maintenance. If any of the following symptoms are noted, replace wheel hub bearing assembly.

- Growling noise is emitted from wheel hub bearing during operation.
- Wheel hub bearing drags or turns roughly. This occurs when turning hub by hand after bearing lock nut is tightened to specified torque.
- If the wheel hub bearing assembly is removed, it must be renewed. The old assembly must not be re-used.

Remove brake caliper assembly and rotor.

Before removing the front axle assembly, disconnect the ABS wheel sensor from the assembly. Then move it away from the front axle assembly area.

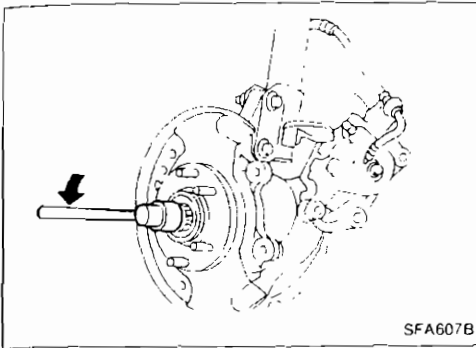
Failure to do so may result in sensor wires being damaged and the sensor becoming inoperative.

Suspend caliper assembly with wire so as not to stretch brake hose.

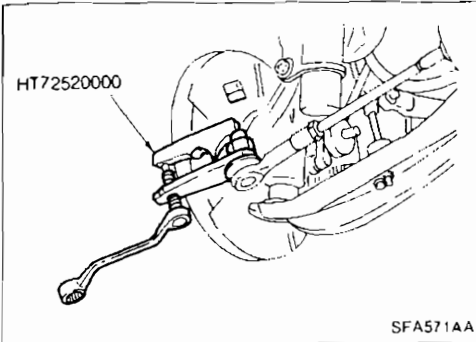
Be careful not to depress brake pedal, or piston will pop out.

## FRONT AXLE

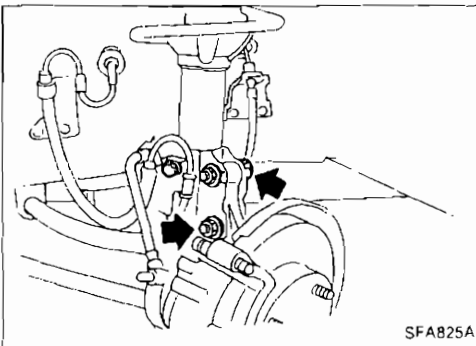
### Wheel Hub and Knuckle (Cont'd)



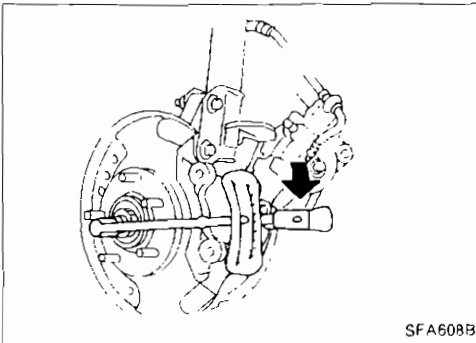
- Remove wheel bearing lock nut. Remove wheel hub from spindle.



- Remove tie-rod ball joint and lower ball joint.

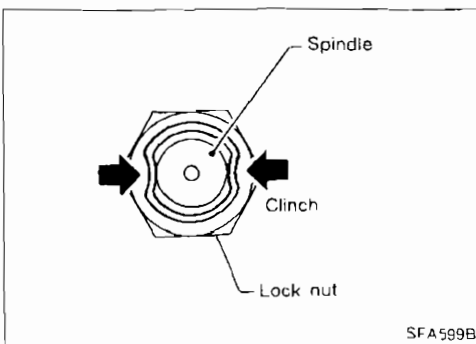


- Disconnect knuckle from strut.



### INSTALLATION

- Install wheel hub.
- Tighten wheel bearing lock nut.  
□: 206 - 284 N·m  
(21 - 29 kg-m, 152 - 210 ft-lb)



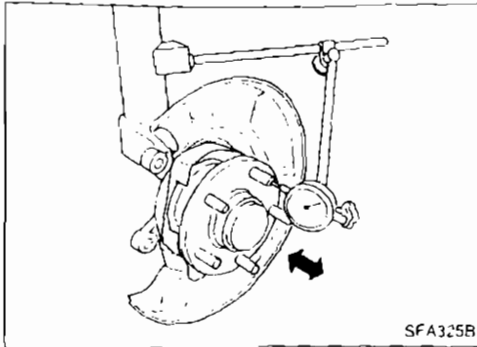
- Clinch two places of lock nut.

FA

## FRONT AXLE

### Wheel Hub and Knuckle (Cont'd)

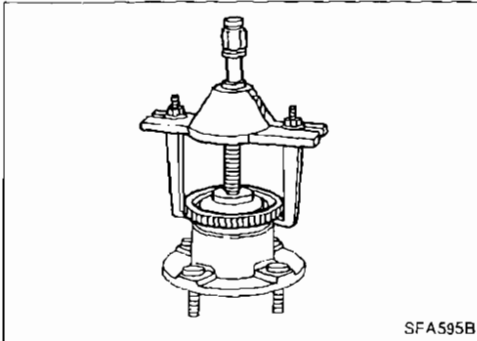
- Check wheel bearing axial end play.  
Axial end play: 0.05 mm (0.0020 in) or less



### ABS Sensor Rotor

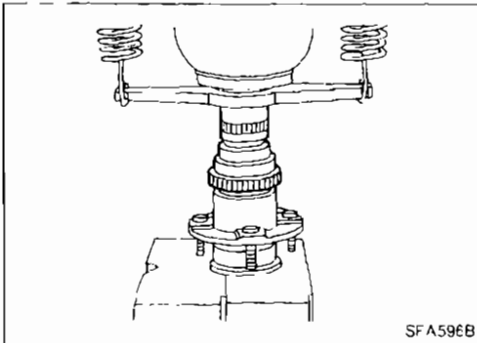
#### REMOVAL

Remove ABS sensor rotor (models equipped with ABS) or labyrinth plate (models without ABS) with suitable tool.



#### INSTALLATION

Press-fit ABS sensor rotor or labyrinth plate.

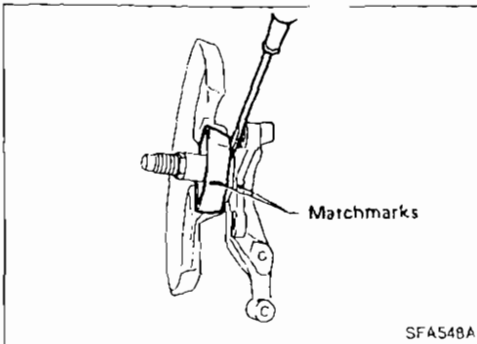


### Baffle Plate

#### REMOVAL

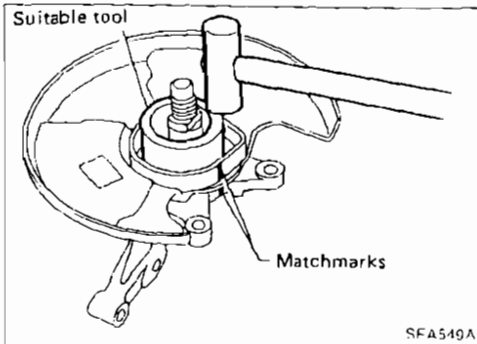
- Mark matchmarks on baffle plate before removing.
- If baffle plate replacement requires removal of knuckle spindle, separate it equally using a screwdriver.

**Be careful not to scratch knuckle spindle.**



#### INSTALLATION

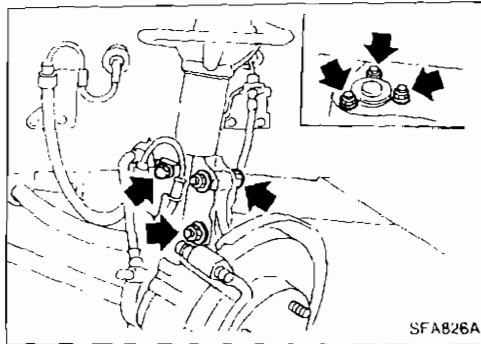
With matchmarks aligned, install baffle plate by tapping it with a copper hammer and a suitable tool.







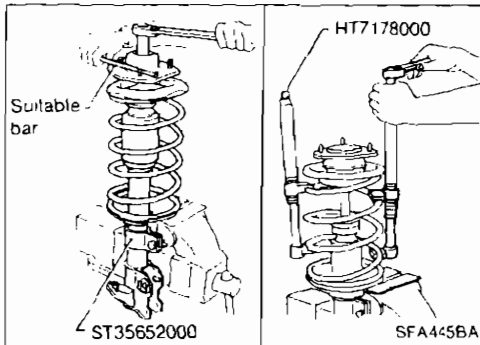
## FRONT SUSPENSION



### Coil Spring and Strut Assembly

#### REMOVAL

Remove strut assembly fixing bolts and nuts (to hoodledge).  
**Do not remove piston rod lock nut on vehicle.**

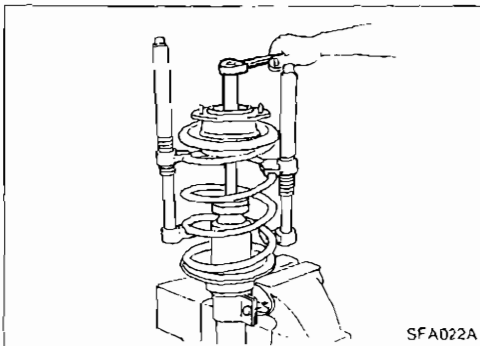


#### DISASSEMBLY

1. Set strut assembly on vise with Tool, then loosen piston rod lock nut.

**Do not remove piston rod lock nut.**

2. Compress spring with a Tool so that strut mounting insulator can be turned by hand.



3. Remove piston rod lock nut.

#### INSPECTION

##### Strut assembly

- Check for smooth operation through a full stroke, both compression and extension.
- Check for oil leakage on welded or gland packing portion.
- Check piston rod for cracks, deformation or other damage. Replace if necessary.

##### Strut mounting insulator

- Check cemented rubber-to-metal portion for separation or cracks. Check rubber parts for deterioration.

##### Lock washer

Check for cracks, deformation or other damage. Replace if necessary.

##### Coil spring

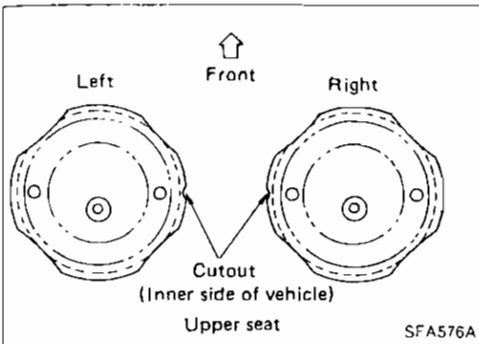
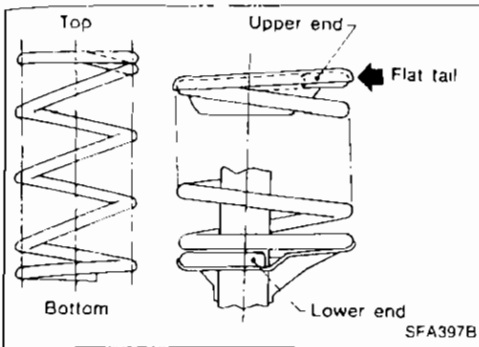
Check for cracks, deformation or other damage. Replace if necessary.

## FRONT SUSPENSION

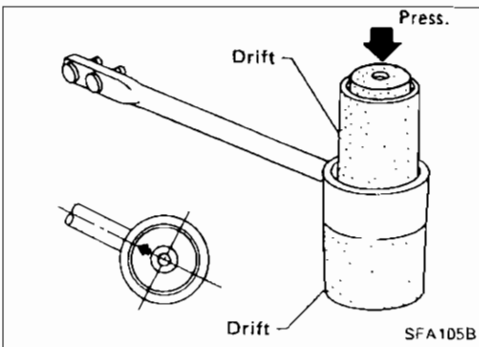
### Coil Spring and Strut Assembly (Cont'd)

#### ASSEMBLY

- When installing coil spring, be careful not to reverse top and bottom direction. (Top end is flat.)
- When installing coil spring on strut, it must be positioned as shown in figure at left.



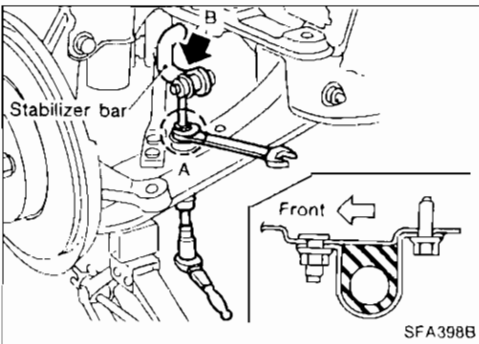
- Install upper spring seat with its cutout facing the inner side of vehicle.



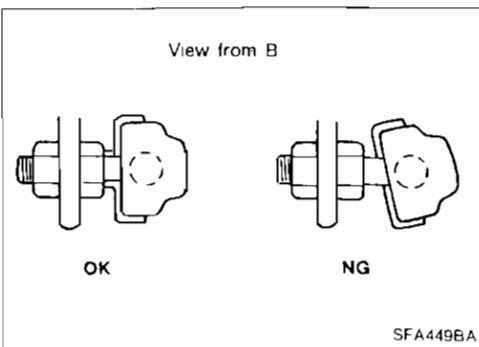
### Tension Rod and Stabilizer Bar

#### REMOVAL AND INSTALLATION

- Remove tension rod and stabilizer bar.
- Place one drift on lower side of tension rod bushing and another on upper side, as shown. Remove tension rod bushing by pressing it out.
- Place arrow mark on bushing facing tension rod before installing bushing.



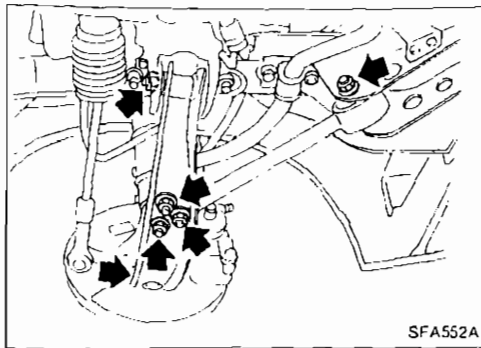
- Install stabilizer rear side bushings, then install front side bushings. When installing stabilizer bar clamp, make sure direction is correct (as shown at left).
- When removing and installing stabilizer bar, fix portion A.



- Install stabilizer bar with ball joint socket properly placed.

FA

## FRONT SUSPENSION



### Transverse Link and Lower Ball Joint

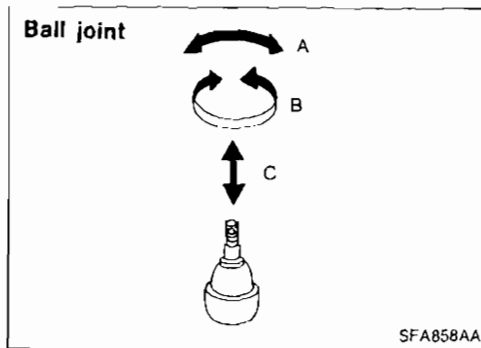
#### REMOVAL AND INSTALLATION

- Remove stabilizer, tension rod, ball joint and transverse link assembly.
- During installation, final tightening must be carried out at curb weight with tires on ground.
- After installation, check wheel alignment. Refer to "Front Wheel Alignment" of ON-VEHICLE SERVICE (FA-5).

#### INSPECTION

##### Transverse link

- Check transverse link for damage, cracks or deformation. Replace it if necessary.
- Check rubber bushing for damage, cracks and deformation. Replace transverse link if necessary.



##### Lower ball joint

- Check ball joint for play. Replace transverse link assembly in any of the following cases: Ball stud is worn, play in axial direction is excessive or joint is hard to swing. Before checking, turn ball joint at least 10 revolutions so that ball joint is properly broken in.
  - Swinging force "A": Refer to SDS (FA-15). (measuring point: cotter pin hole of ball stud)**
  - Turning torque "B": Refer to SDS (FA-15).**
  - Vertical end play "C": Refer to SDS (FA-15).**
- Check dust cover for damage. Replace it if necessary.

# SERVICE DATA AND SPECIFICATIONS (SDS)

## General Specifications

### COIL SPRING

|                      | Unit mm (in)            |
|----------------------|-------------------------|
| Applied model        | All                     |
| Wire diameter        | 13.1 (0.516)            |
| Coil outer diameter  | 183.2 (7.21)            |
| Free length          | 310 (12.20)             |
| Identification color | White x 1,<br>White x 2 |

### STRUT

|                     | Unit mm (in) |
|---------------------|--------------|
| Applied model       | All          |
| Piston rod diameter | 22 (0.87)    |

### FRONT STABILIZER BAR

|                      | Unit mm (in) |
|----------------------|--------------|
| Applied model        | All          |
| Stabilizer diameter  | 26.5 (1.043) |
| Identification color | Red          |

## Inspection and Adjustment

### WHEEL ALIGNMENT (Unladen\*1)

| Applied model                     | Europe               | Australia        | Except Europe and Australia |
|-----------------------------------|----------------------|------------------|-----------------------------|
| Camber degree                     | -1°35' to -0°05'     | -1°30' to 0°     |                             |
| Caster degree                     | 5°55' - 7°25'        | 6°00' - 7°30'    |                             |
| Toe-in                            |                      |                  |                             |
| A B                               | 1 - 3                | 1.5 - 3.5        |                             |
| mm (in)                           | (0.04 - 0.12)        | (0.059 - 0.138)  |                             |
| Total angle 2θ degree             | 5' - 16'             | 8' - 19'         |                             |
| Kingpin inclination degree        | 12°55' - 14°25'      |                  | 12°50' - 14°20'             |
| Front wheel turning angle         |                      |                  |                             |
| Full turn*2 inside/outside degree | 39° - 43°/<br>33°05' | 39° - 43°/33°10' |                             |

\*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 at idle

### WHEEL BEARING

|  |                                   |
|--|-----------------------------------|
| Wheel bearing axial end play mm (in)                       | 0.05 (0.0020) or less             |
| Wheel bearing lock nut Tightening torque N·m (kg·m, ft·lb) | 206 - 284<br>(21 - 29, 152 - 210) |

### LOWER BALL JOINT

|   |  |
|---|--|
| Swinging force "A" (Measuring point: cotter pin hole of ball stud) N (kg, lb) | 23.5 - 79.4<br>(2.4 - 8.1, 5.3 - 17.9) |
| Turning torque "B" N·m (kg·cm, in·lb)   | 1.5 - 4.9<br>(15 - 50, 13 - 43)        |
| Vertical end play "C" mm (in)   | 0 (0)                                  |

### WHEEL RUNOUT (Radial and lateral)

| Wheel type             | Radial runout       | Lateral runout      |
|------------------------|---------------------|---------------------|
| Aluminum wheel mm (in) | 0.3 (0.012) or less |                     |
| Steel wheel mm (in)    | 0.7 (0.028) or less | 1.0 (0.039) or less |

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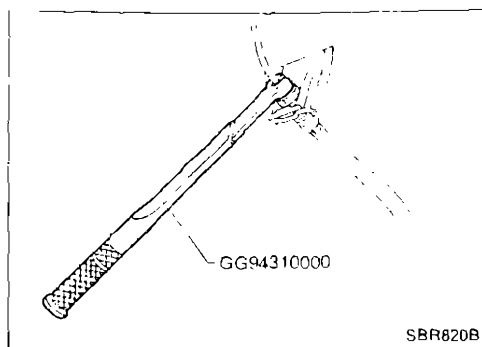
# REAR AXLE & REAR SUSPENSION

## SECTION **RA**

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## PRECAUTIONS AND PREPARATION



### Precautions

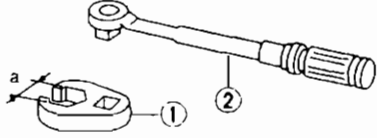
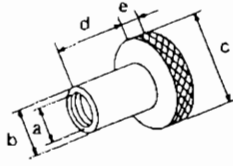
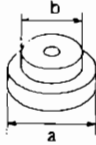
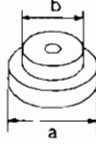
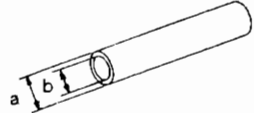
- When installing rubber parts, final tightening must be carried out under unladen condition\* with tires on ground.
- \*: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.
- Use flare nut wrench when removing or installing brake tubes.
- After installing removed suspension parts, check wheel alignment and adjust if necessary.
- Always torque brake lines when installing.
- Do not jack up at the lower arm.

### Special Service Tools

| Tool number<br>Tool name              | Description  |
|---------------------------------------|--|
| HT71780000<br>Spring compressor       | <div style="text-align: right;">Removing and installing coil spring</div> <div style="text-align: center;"> </div> <div style="text-align: left;">NT144</div>  |
| ST35652000<br>Strut attachment        | <div style="text-align: right;">Fixing strut assembly</div> <div style="text-align: center;"> </div> <div style="text-align: left;">NT145</div>  |
| ST30031000<br>Bearing puller          | <div style="text-align: right;">Removing inner race of wheel bearing</div> <div style="text-align: center;"> </div> <div style="text-align: left;">NT412</div> <div style="text-align: right;">a: 50 mm (1.97 in) dia.</div> |
| ST38280000<br>Arm bushing remover     | <div style="text-align: right;">Removing and installing bushing of rear axle housing</div> <div style="text-align: center;"> </div> <div style="text-align: left;">NT157</div>   |
| GG94310000<br>Flare nut torque wrench | <div style="text-align: right;">Removing and installing brake piping</div> <div style="text-align: center;"> </div> <div style="text-align: left;">NT406</div> <div style="text-align: right;">a: 10 mm (0.39 in) dia.</div> |

# PRECAUTIONS AND PREPARATION

## Commercial Service Tools

| Tool name   | Description  |
|---|--|
| Equivalent to GG94310000<br>① Flare nut crows foot<br>② Torque wrench | <div style="display: flex; justify-content: space-between;"> <div style="width: 25%;">  </div> <div style="width: 70%;"> <p>Removing and installing brake piping</p> <p>NT360</p> <p>a: 10 mm (0.39 in)</p> </div> </div>   |
| Attachment<br>Wheel alignment   | <div style="display: flex; justify-content: space-between;"> <div style="width: 25%;">  </div> <div style="width: 70%;"> <p>Measure rear wheel alignment</p> <p>NT148</p> <p>a: Screw M24 x 1.5<br/>                     b: 35 mm (1.38 in) dia.<br/>                     c: 65 mm (2.56 in) dia.<br/>                     d: 56 mm (2.20 in)<br/>                     e: 12 mm (0.47 in)</p> </div> </div> |
| Rear wheel hub drift  | <div style="display: flex; justify-content: space-between;"> <div style="width: 25%;">  </div> <div style="width: 70%;"> <p>Installing wheel bearing</p> <p>NT073</p> <p>a: 49 mm (1.93 in) dia.<br/>                     b: 41 mm (1.61 in) dia.</p> </div> </div>   |
| Wheel bearing drift   | <div style="display: flex; justify-content: space-between;"> <div style="width: 25%;">  </div> <div style="width: 70%;"> <p>Removing rear wheel hub</p> <p>NT073</p> <p>a: 40 mm (1.57 in) dia.<br/>                     b: 26 mm (1.02 in) dia.</p> </div> </div>   |
| Rear drive shaft plug seal drift                                      | <div style="display: flex; justify-content: space-between;"> <div style="width: 25%;">  </div> <div style="width: 70%;"> <p>Installing rear drive shaft plug seal</p> <p>NT065</p> <p>a: 85 mm (3.35 in) dia.<br/>                     b: 67 mm (2.64 in) dia.</p> </div> </div>  |

RA

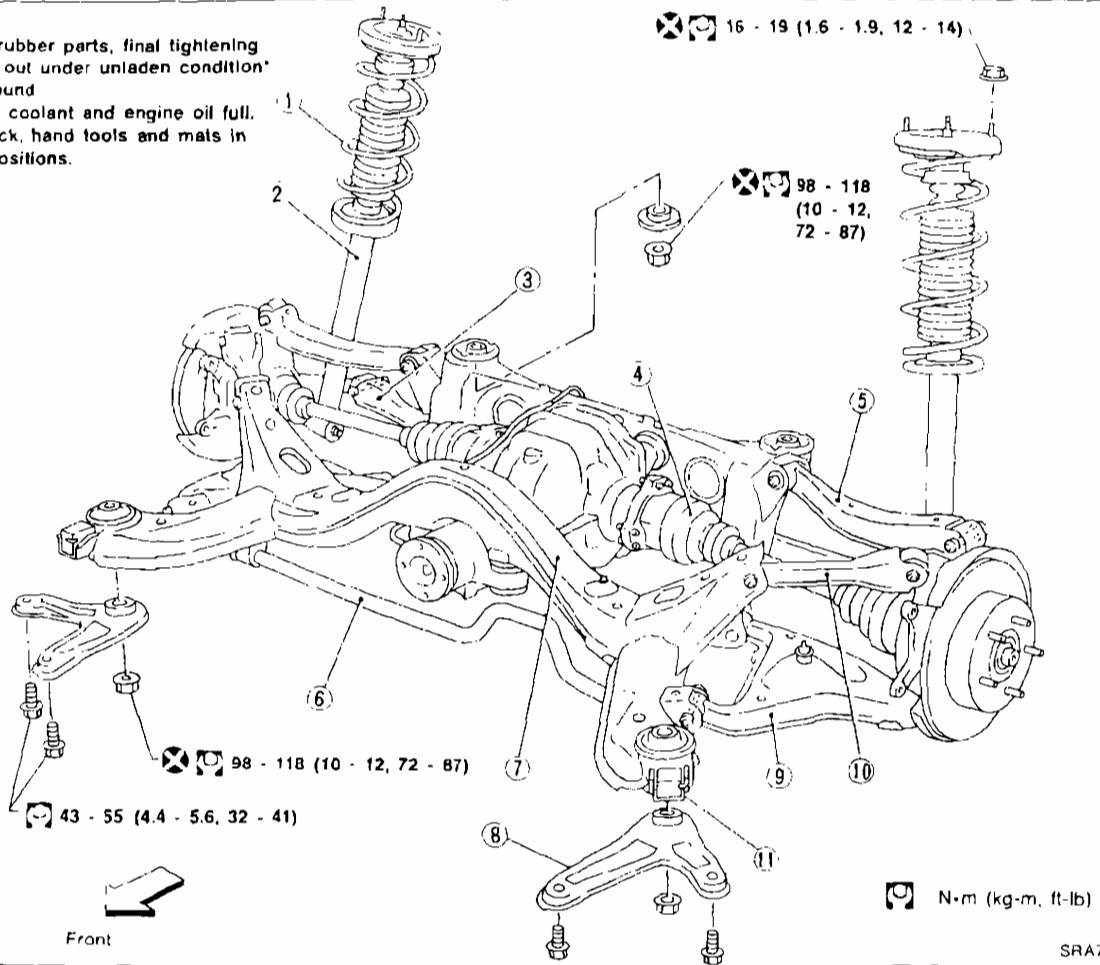


# REAR SUSPENSION SYSTEM

## SEC. 431

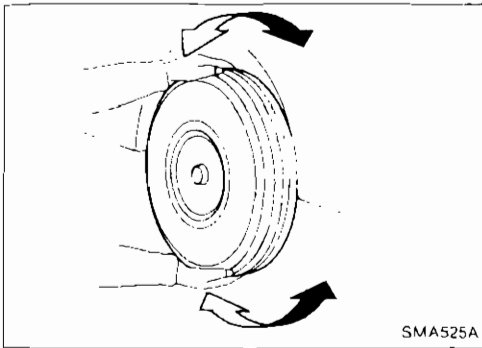
When installing rubber parts, final tightening must be carried out under unladen condition with tires on ground

- Fuel, radiator coolant and engine oil full.
- Spare tire, jack, hand tools and mats in designated positions.



- ① Coil spring
- ② Shock absorber
- ③ Lateral link
- ④ Drive shaft
- ⑤ Rear upper link
- ⑥ Stabilizer bar

- ⑦ Suspension member
- ⑧ Member stay
- ⑨ Lower arm
- ⑩ Front upper link
- ⑪ Dynamic damper assembly



## Rear Axle and Rear Suspension Parts

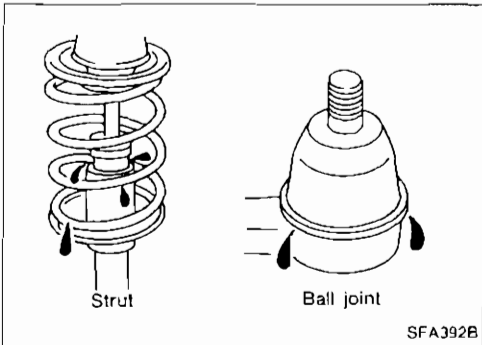
Check axle and suspension parts for looseness, wear or damage.

- Shake each rear wheel
- Retighten all axle and suspension nuts and bolts to the specified torque.

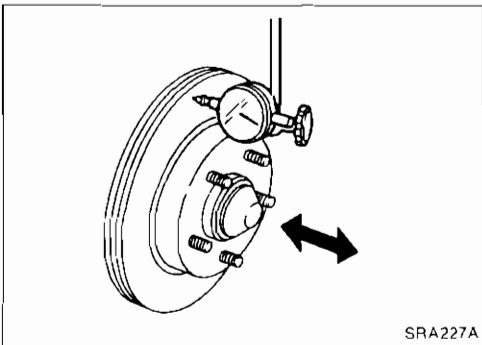
**Tightening torque:**

**Refer to REAR SUSPENSION (RA-17).**

- Make sure that cotter pins are inserted.



- Check shock absorber for oil leakage or other damage.
- Check suspension lower ball joint for excessive play
- Check suspension ball joint for grease leakage and ball joint dust cover for cracks or other damage.



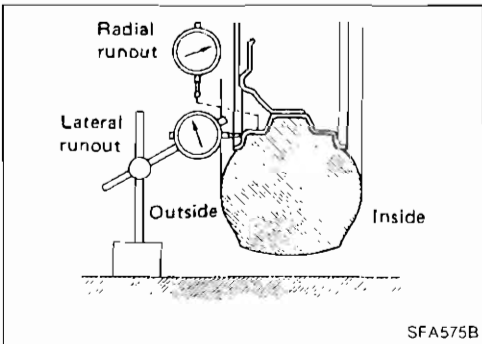
## Rear Wheel Bearing

- Check wheel bearings smooth operation.
- Check axial end play.

**Axial end play:**

**0.05 mm (0.0020 in) or less**

- If out of specification or wheel bearing does not turn smoothly, replace wheel bearing assembly.  
Refer to REAR AXLE — Wheel Hub and Axle Housing (RA-7).



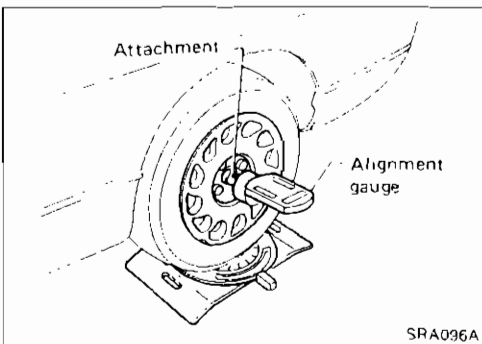
## Rear Wheel Alignment

Before checking rear wheel alignment, be sure to make a preliminary inspection.

### PRELIMINARY INSPECTION

Make following checks. Adjust, repair or replace if necessary.

- Check tires for wear and for improper inflation.
- Check rear wheel bearings for looseness.
- Check wheel runout.  
Refer to SDS in FA section.
- Check that rear shock absorber works properly
- Check rear axle and rear suspension parts for looseness
- Check vehicle posture (Unladen).  
("Unladen": Fuel tank, radiator and engine oil full. Spare tire, jack, hand tools and mats in designated positions.)



### CAMBER

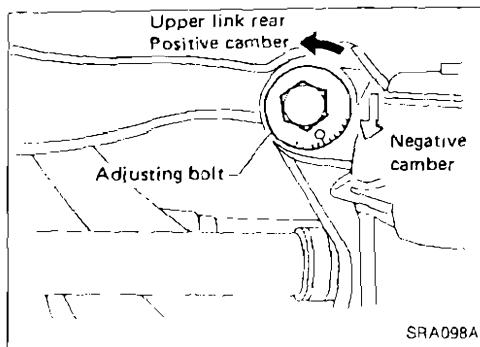
Measure camber of both right and left wheels with a suitable alignment gauge and adjust in accordance with the following procedures.

**Camber:**

**Refer to SDS (RA-23).**

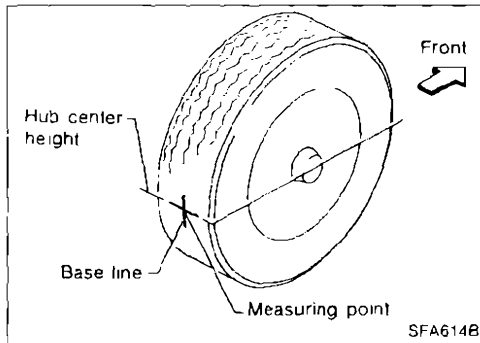
**RA**

## ON-VEHICLE SERVICE



### Rear Wheel Alignment (Cont'd)

- If camber is not within specification, adjust by turning the adjusting bolt.
1. Turn the adjusting bolt to adjust.  
**Camber changes about 4' with each graduation of the adjusting bolt.**
  2. Tighten to the specified torque.  
⚙️: 69 - 88 N·m  
 (7.0 - 9.0 kg-m, 51 - 65 ft-lb)



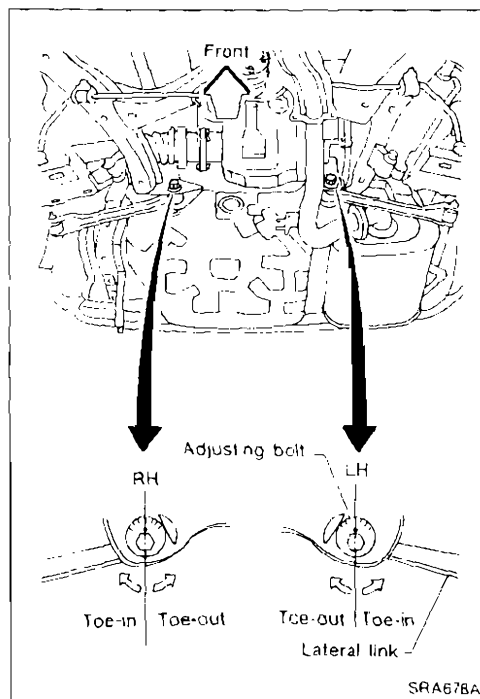
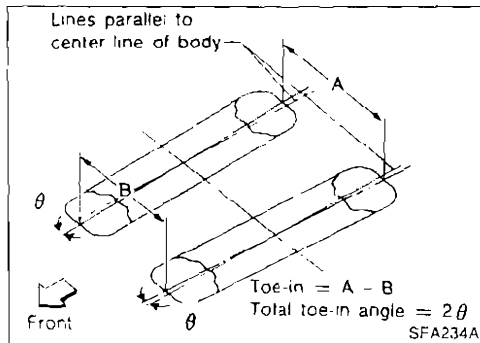
### TOE-IN

Measure toe-in using following procedure. If out of specification, inspect and replace any damaged or worn rear suspension parts.

#### WARNING:

- Perform following procedure always on a flat surface.
  - Make sure that no person is in front of the vehicle before pushing it.
1. Move rear of vehicle up and down to stabilize the posture.
  2. Push the vehicle straight ahead about 5 m (196.9 in).
  3. Put a mark on base line of the tread (rear side) at the same height of hub center to be a measuring point.
  4. Measure distance "A" (rear side).
  5. Push the vehicle slowly ahead to turn the wheels around 180 degrees.
- If the wheels have passed 180 degrees, try the above procedure again from the beginning. Never push vehicle backward.**
6. Measure distance "B" (front side).

**Toe-in (A - B):**  
**Refer to SDS (RA-23).**



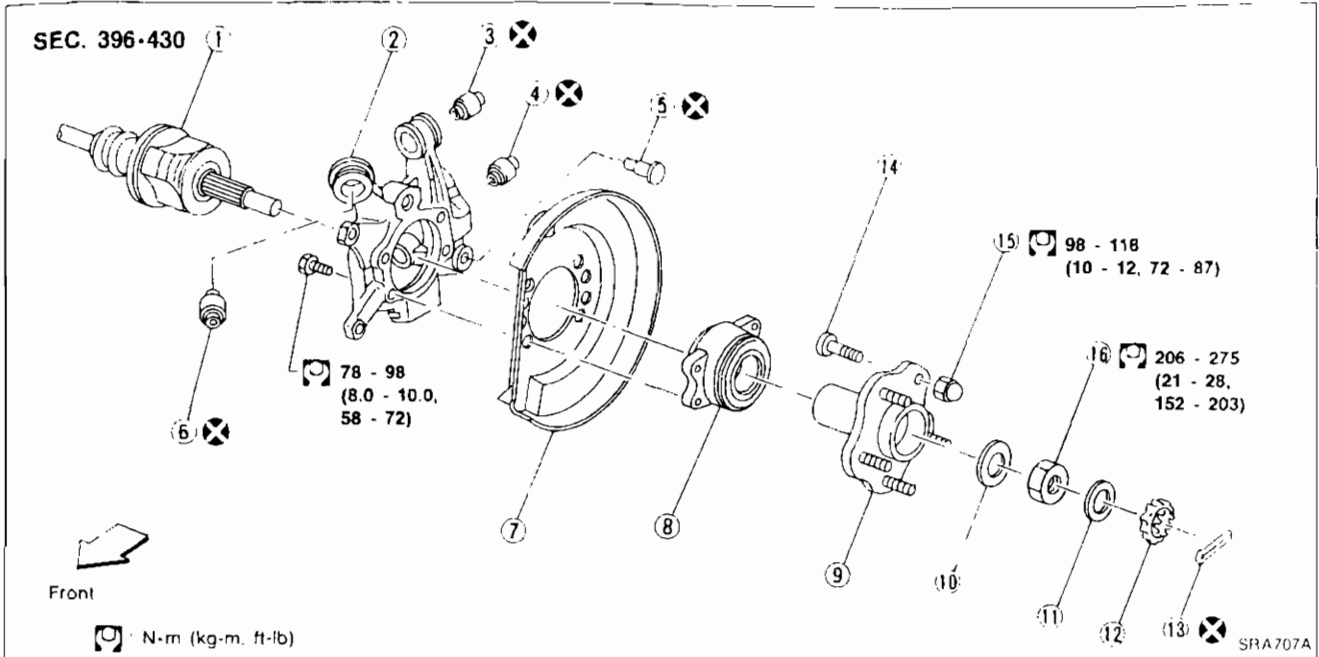
7. Adjust toe-in by turning adjusting bolts.  
**Toe changes about 1.3 mm (0.051 in) [One side] with each graduation of the adjusting bolt.**
8. Tighten to the specified torque.  
⚙️: 69 - 88 N·m  
 (7.0 - 9.0 kg-m, 51 - 65 ft-lb)

### Drive Shaft

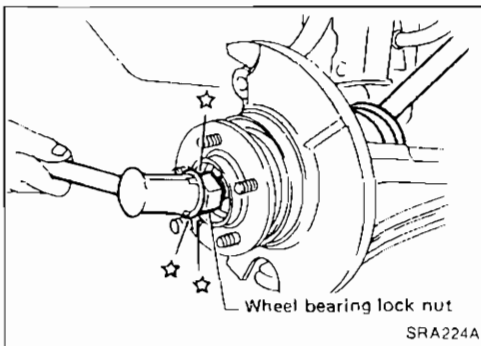
Check boot and drive shaft for cracks, wear, damage or grease leakage.

# REAR AXLE

## Wheel Hub and Axle Housing



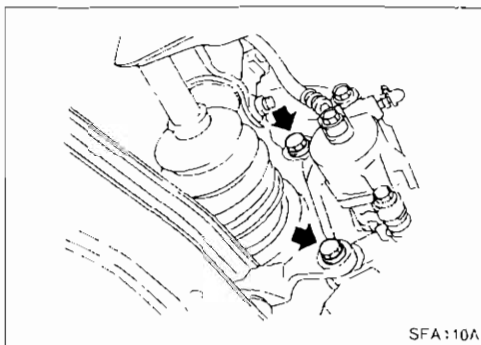
- |                      |                             |                          |
|----------------------|-----------------------------|--------------------------|
| ① Drive shaft        | ⑦ Baffle plate              | ⑫ Adjusting cap          |
| ② Axle housing       | ⑧ Wheel bearing with flange | ⑬ Cotter pin             |
| ③ Bushing            | ⑨ Wheel hub                 | ⑭ Hub bolt               |
| ④ Bushing            | ⑩ Plain washer              | ⑮ Wheel nut              |
| ⑤ Shock absorber pin | ⑪ Insulator                 | ⑯ Wheel bearing lock nut |
| ⑥ Bushing            |                             |                          |



### REMOVAL

1. Remove wheel bearing lock nut.
2. Separate drive shaft from axle housing by lightly tapping it. If it is hard to remove use puller.

**When removing drive shaft, cover boots with shop towel to prevent them from being damaged.**

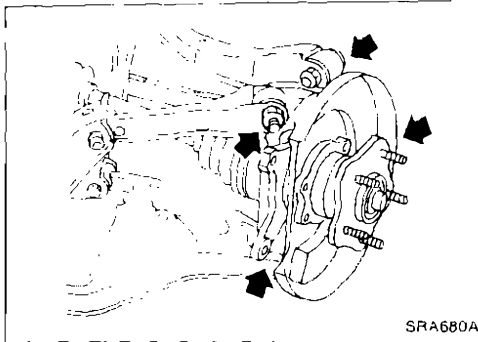


3. Remove brake caliper assembly and rotor.  
**Suspend caliper assembly with wire so as not to stretch brake hose.**  
**Be careful not to depress brake pedal or piston will pop out.**

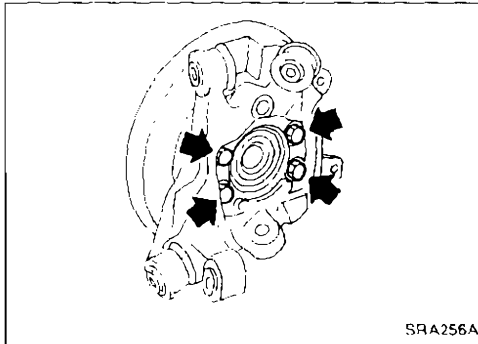
RA

## REAR AXLE

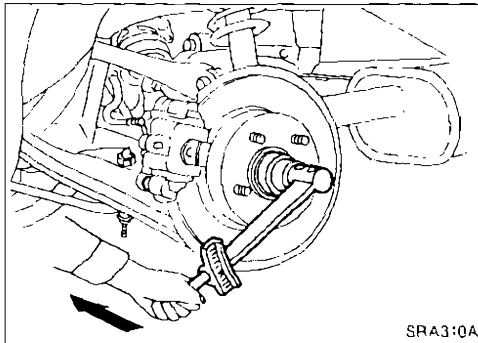
### Wheel Hub and Axle Housing (Cont'd)



4. Remove axle housing.

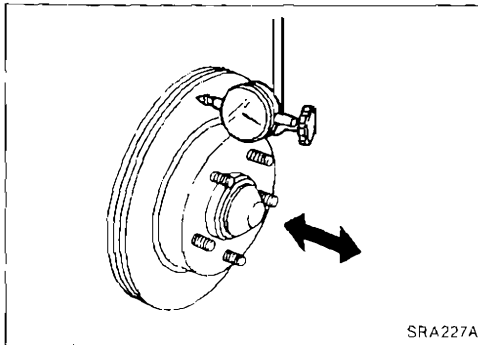


5. Remove wheel bearing with flange, and wheel hub from axle housing.



### INSTALLATION

1. Install axle housing with wheel hub.
2. Tighten wheel bearing lock nut.  
Before tightening, apply oil to threaded portion of rear spindle and both sides of plain washer.  
**⚙️: 206 - 275 N·m**  
**(21 - 28 kg·m, 152 - 203 ft·lb)**



3. Check wheel bearing axial end play.  
**Axial end play: 0.05 mm (0.0020 in) or less**  
Make sure that wheel bearings operate smoothly.
4. Check toe-in – Refer to ON-VEHICLE SERVICE (RA-6).

## REAR AXLE

### Wheel Hub and Axle Housing (Cont'd)

#### DISASSEMBLY

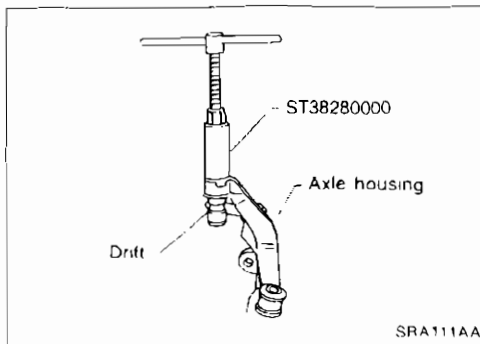
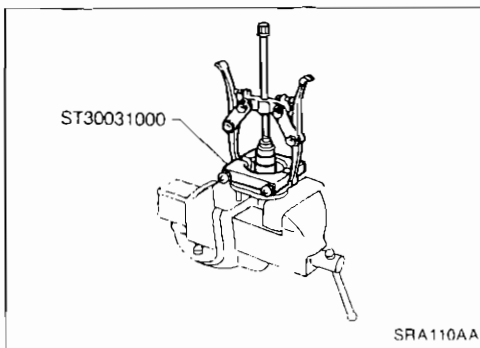
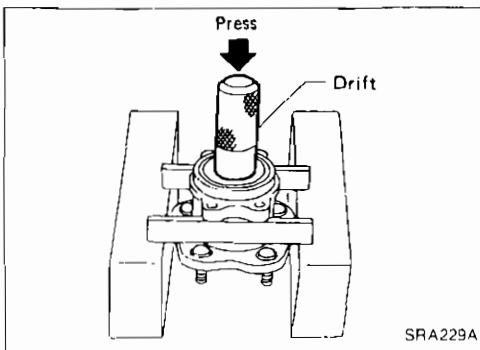
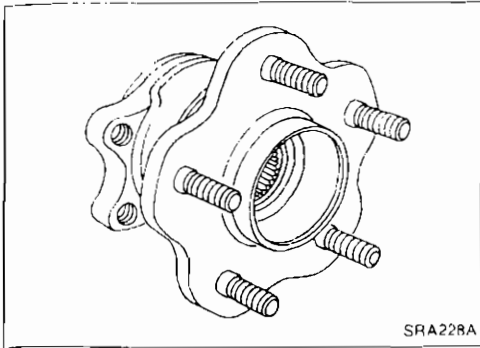
##### CAUTION:

Wheel bearing with flange usually does not require maintenance. If any of the following symptoms are noted, replace wheel bearing assembly (including flange, and inner and outer seals).

- Growling noise is emitted from wheel bearing during operation.
- Wheel hub bearing drags or turns roughly. This occurs when turning hub by hand after bearing lock nut is tightened to specified torque.
- After wheel bearing is removed from hub.

#### Wheel hub

Remove wheel bearing (with flange) and wheel hub as one unit from axle housing before disassembling.



#### Wheel bearing

1. Using a press and drift as shown in figure at left, press wheel bearing out.
2. Discard old wheel bearing assembly. Replace with a new one.

3. Remove inner race from hub using a bearing replacer/puller.

##### CAUTION:

- Do not reuse old inner race although it is of the same brand as the bearing assembly.
- Do not replace grease seals as single parts.

#### Axle housing

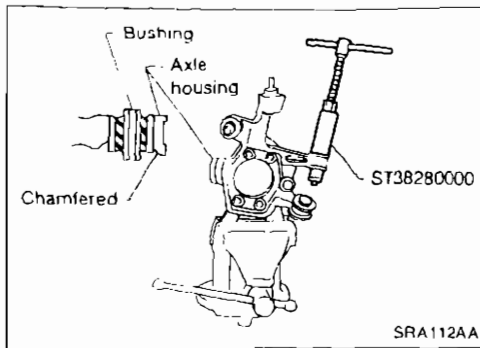
1. Attach a drift on outer shell of bushing as shown in figure at left. Remove bushing using arm bushing remover.

When placing axle housing in a vise, use wooden blocks or copper plates as pads.

RA

## REAR AXLE

### Wheel Hub and Axle Housing (Cont'd)



2. Ensure axle housing bore is free from scratches or deformities before pressing bushing into it.
3. Attach bushing to chamfered bore end of axle housing. Then press it until it is flush with end face of axle housing.

### INSPECTION

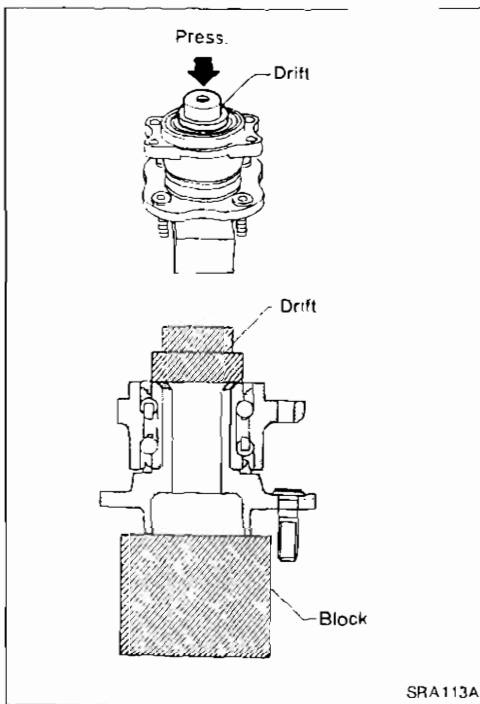
#### Wheel hub and axle housing

- Check wheel hub and axle housing for cracks by using a magnetic exploration or dyeing test.
- Check wheel bearing for damage, seizure, rust or rough operation.
- Check rubber bushing for wear or other damage. Replace if necessary.

### ASSEMBLY

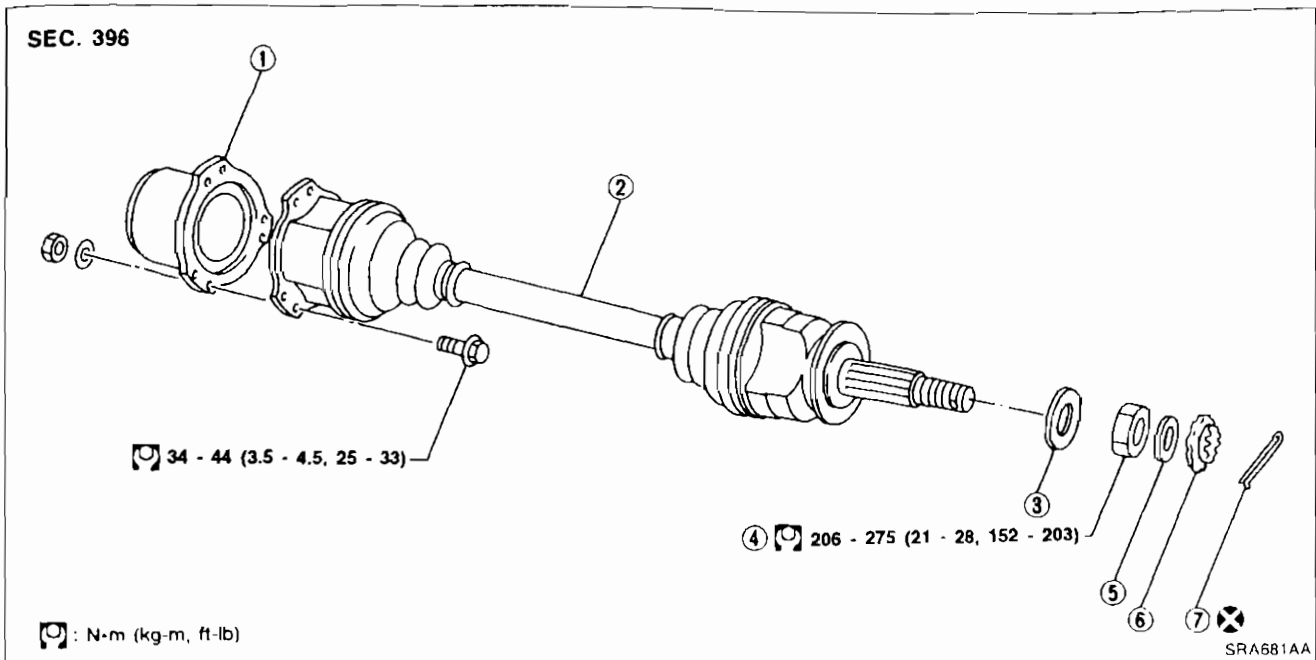
Place hub on a block. Attach a drift to inner race of wheel bearing and press it into hub as shown.

**Be careful not to damage grease seal.**



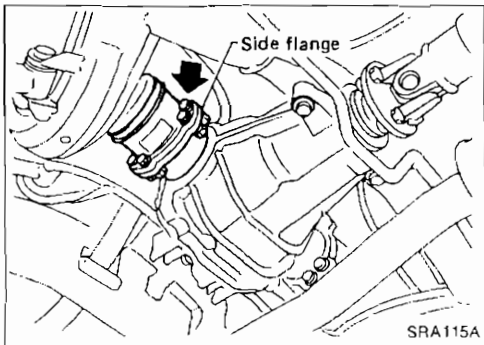
# REAR AXLE

## Drive Shaft



- ① Side flange
- ② Drive shaft
- ③ Plain washer
- ④ Wheel bearing lock nut

- ⑤ Insulator
- ⑥ Adjusting cap
- ⑦ Cotter pin

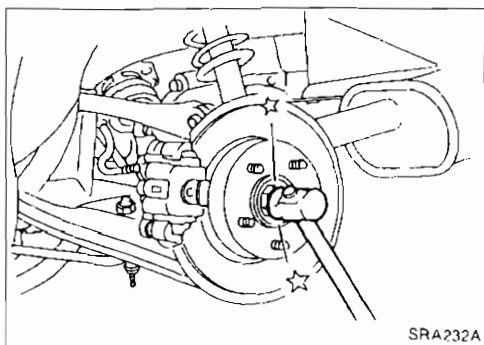


### REMOVAL

When removing drive shaft, cover boots with shop towel to prevent damage to them.

#### Final drive side

Remove side flange mounting bolt and separate shaft



#### Wheel side

Remove drive shaft by lightly tapping it with a copper hammer. If it is hard to remove, use puller.

To avoid damaging threads of drive shaft, install a nut while removing drive shaft.

### INSTALLATION

1. Insert drive shaft from wheel hub and temporarily tighten wheel bearing lock nut.
2. Tighten side flange mounting bolts to specified torque.
3. Tighten wheel bearing lock nut to specified torque.

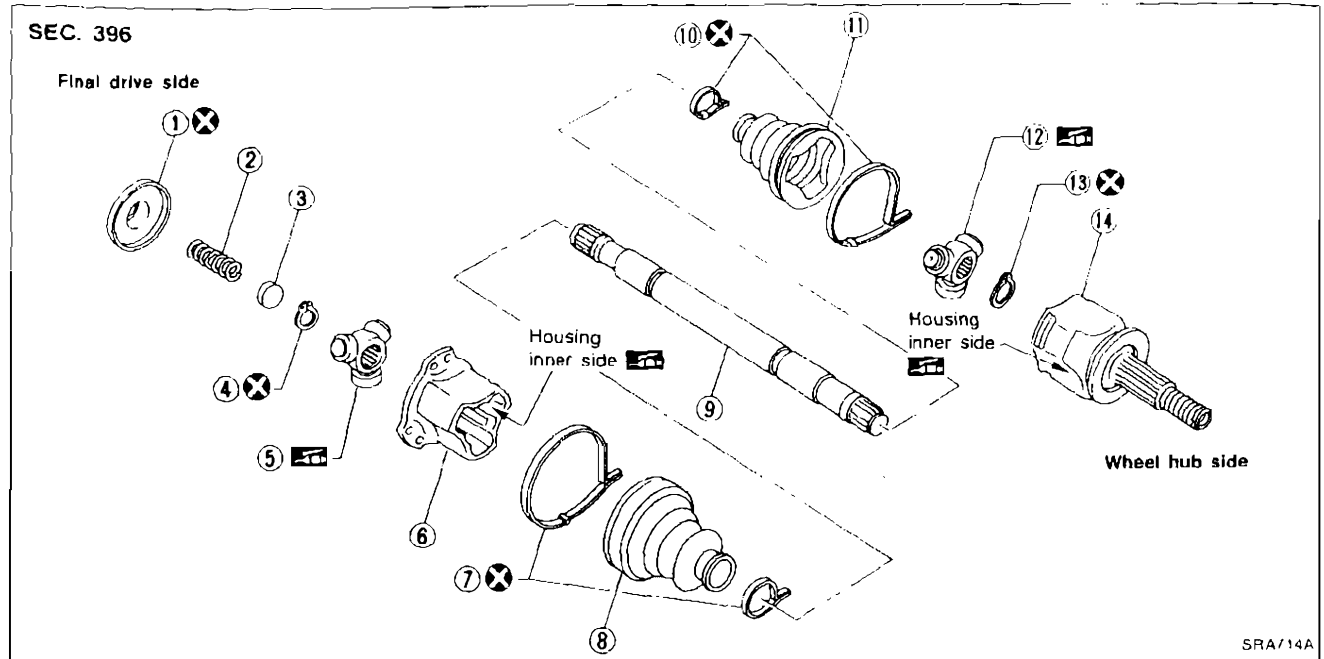
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# REAR AXLE

## Drive Shaft (Cont'd)

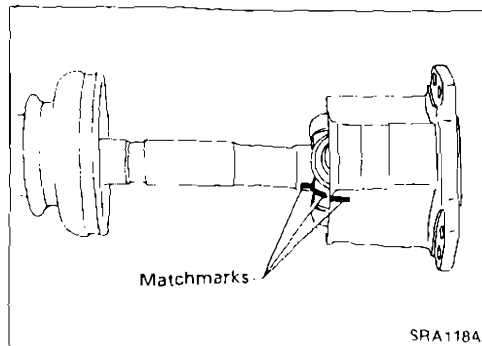
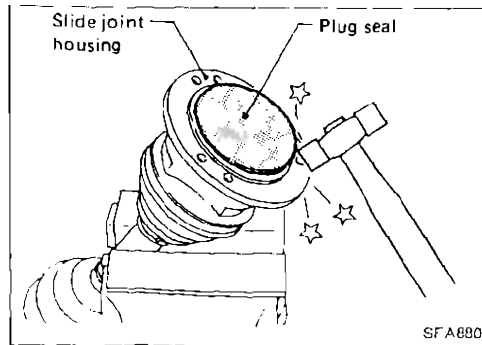
### COMPONENTS



- ① Plug seal
- ② Spring
- ③ Spring cap
- ④ Snap ring
- ⑤ Spider assembly

- ⑥ Slide joint housing
- ⑦ Boot band
- ⑧ Boot
- ⑨ Drive shaft
- ⑩ Boot band

- ⑪ Boot
- ⑫ Spider assembly
- ⑬ Snap ring
- ⑭ Housing with shaft



### DISASSEMBLY

#### Final drive side

1. Remove plug seal from slide joint housing by lightly tapping around slide joint housing.
2. Remove boot bands.
3. Put matchmarks on slide joint housing and drive shaft before separating joint assembly.
4. Put matchmarks on spider assembly and drive shaft.

## REAR AXLE

### Drive Shaft (Cont'd)

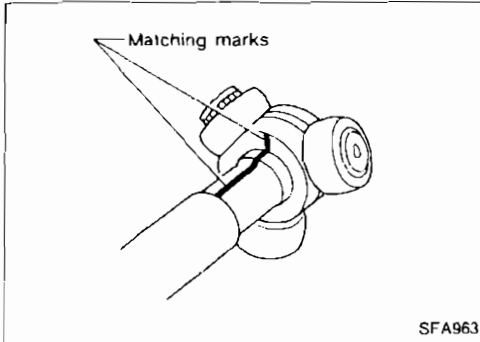
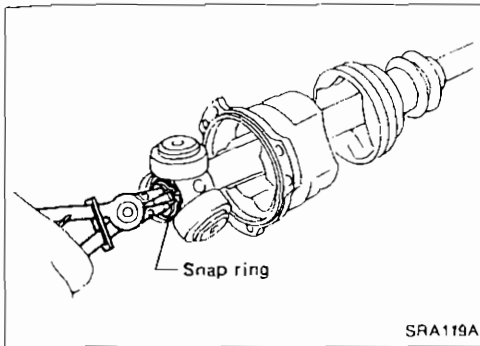
5. Pry off snap ring, then remove spider assembly.

**CAUTION:**

**Do not disassemble spider assembly.**

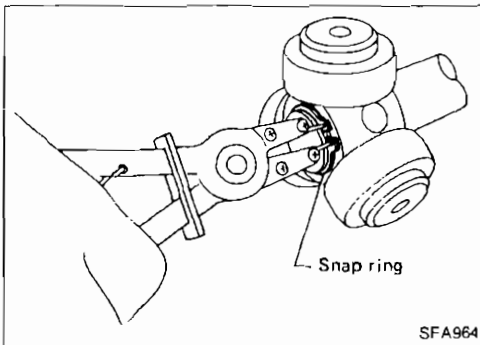
6. Draw out slide joint housing.
7. Draw out boot.

**Cover drive shaft serration with tape to prevent damage to the boot.**



### Wheel side

1. Remove boot bands
2. Put matchmarks on housing together with shaft and drive shaft before separating joint assembly.
3. Put matchmarks on spider assembly and drive shaft.



4. Pry off snap ring, then remove spider assembly

**CAUTION:**

**Do not disassemble spider assembly.**

5. Draw out boot.

**Cover drive shaft serration with tape to prevent damage to the boot.**

### INSPECTION

Thoroughly clean all parts in cleaning solvent, and dry with compressed air. Check parts for deformation or other damage

#### Drive shaft

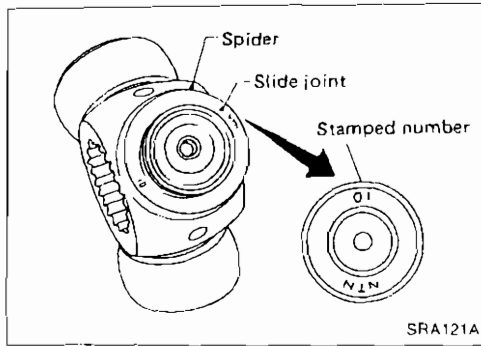
Replace drive shaft if it is twisted or cracked.

#### Boot

Check boot for fatigue, cracks, or wear. Replace boot with new boot bands.

## REAR AXLE

### Drive Shaft (Cont'd)



#### Joint assembly

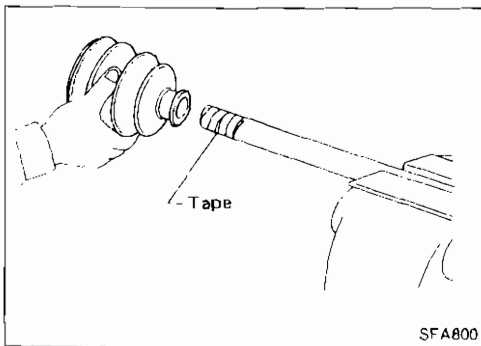
- Check spider assembly for bearing, roller and washer damage. Replace spider assembly if necessary.
- Check housing for any damage. Replace housing set and spider assembly, if necessary.
- When replacing only spider assembly, select a new spider assembly from among those listed in table below. Ensure the number stamped on sliding joint is the same as that stamped on new part.

**Housing alone cannot be replaced. It must be replaced together with spider assembly.**

| Stamped number | Part No.    |
|----------------|-------------|
| 00             | 39720 10V10 |
| 01             | 39720 10V11 |
| 02             | 39720 10V12 |

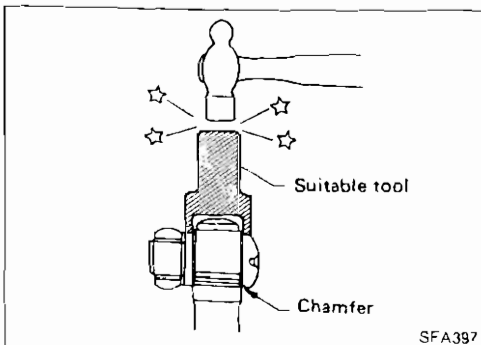
#### ASSEMBLY

- After drive shaft has been assembled, ensure it moves smoothly over its entire range without binding.
- Use **NISSAN GENUINE GREASE** or equivalent after every overhaul.



#### Wheel side

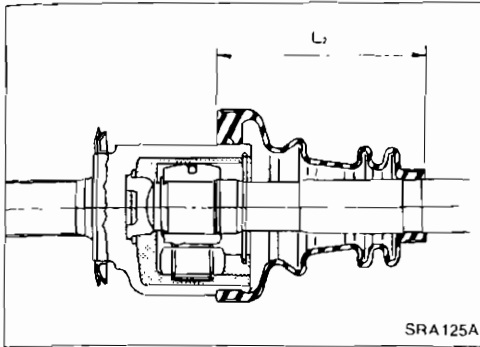
1. Install new small boot band and boot on drive shaft. **Cover drive shaft serration with tape to prevent damage to boot during installation.**



2. Install spider assembly securely, making sure marks are properly aligned. **Press-fit with spider assembly serration chamfer facing shaft.**
3. Install new snap ring.

## REAR AXLE

### Drive Shaft (Cont'd)



4. Pack drive shaft with specified amount of grease.

**Specified amount of grease:**

**135 - 145 g (4.76 - 5.11 oz)**

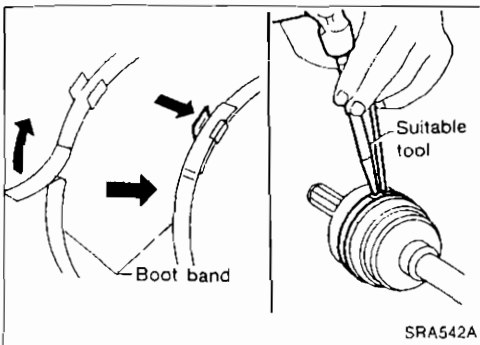
5. Install slide joint housing, then install new snap ring.

6. Set boot so that it does not swell and deform when its length is "L<sub>2</sub>".

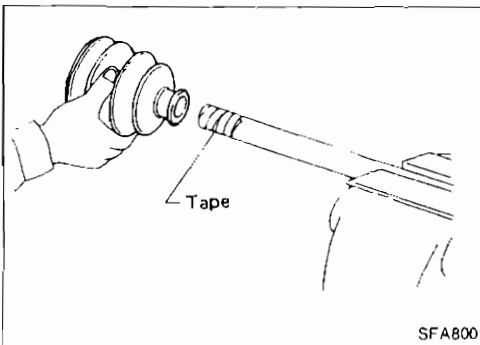
**Length "L<sub>2</sub>":**

**95 - 97 mm (3.74 - 3.82 in)**

**Make sure that boot is properly installed on the drive shaft groove.**



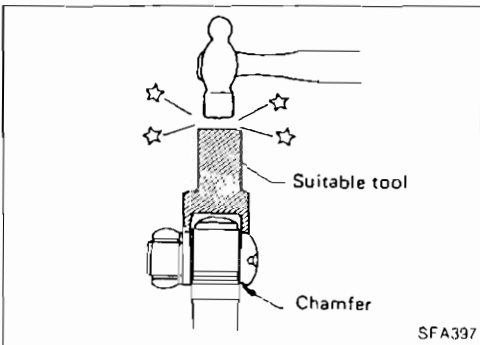
7. Lock new larger and smaller boot bands securely with a suitable tool.



### Final drive side

1. Install new small boot band, boot and slide joint housing to drive shaft.

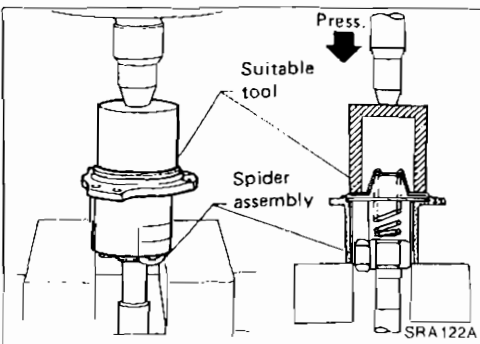
**Cover drive shaft serration with tape to prevent damage to boot during installation.**



2. Install spider assembly securely, making sure marks are properly aligned.

**Press-fit with spider assembly serration chamfer facing shaft.**

3. Install new snap ring.



4. Install coil spring, spring cap and new plug seal to slide joint housing. Press plug seal.

**Apply sealant to mating surface of plug seal.**

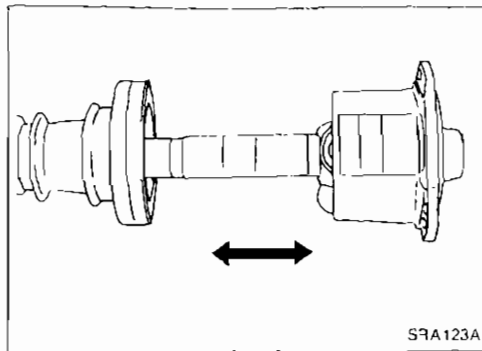
### CAUTION:

- a. When pressing plug seal into place, hold it horizontally. This prevents spring inside it from tilting or falling down.

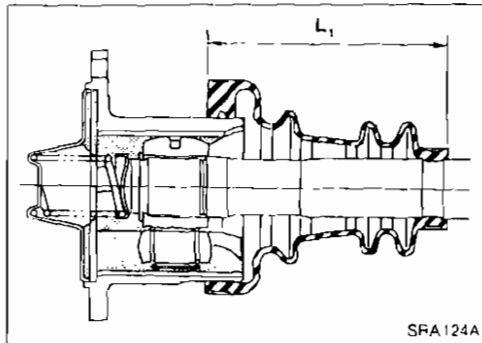
RA

## REAR AXLE

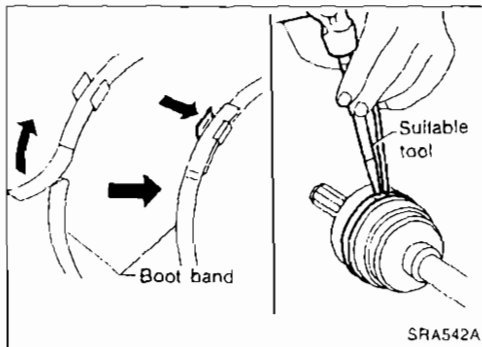
### Drive Shaft (Cont'd)



- b. Move shaft in axial direction to ensure that spring is installed properly. If shaft drags or if spring is not properly installed, replace plug seal with a new one.



5. Pack drive shaft with specified amount of grease.  
**Specified amount of grease:**  
155 - 165 g (5.47 - 5.82 oz)
6. 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)  
**Make sure that boot is properly installed on the drive shaft groove.**



7. Lock new larger boot band securely with a suitable tool, then lock new smaller boot band.

# REAR SUSPENSION

SEC. 380-396-431

**CAUTION:**

Do not jack up at lower link.  
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.

12 - 14  
(1.2 - 1.4, 9 - 10)

98 - 118  
(10 - 12, 72 - 87)

69 - 88  
(7.0 - 9.0, 51 - 65)

77 - 98  
(7.9 - 10.0, 57 - 72)

16 - 19  
(1.6 - 1.9, 12 - 14)

18 - 24  
(1.8 - 2.4, 13 - 17)

77 - 98  
(7.9 - 10.0, 57 - 72)

98 - 118  
(10 - 12, 72 - 87)

98 - 118  
(10 - 12, 72 - 87)

69 - 88  
(7.0 - 9.0, 51 - 65)

9 - 12  
(0.9 - 1.2, 6.5 - 8.7)

43 - 55  
(4.4 - 5.6, 32 - 41)

77 - 98  
(7.9 - 10.0, 57 - 72)

71 - 86  
(7.2 - 8.8, 52 - 64)

Front

98 - 118  
(10 - 12, 72 - 87)

98 - 118  
(10 - 12, 72 - 87)

34 - 44  
(3.5 - 4.5, 25 - 33)

9 - 12  
(0.9 - 1.2, 6.5 - 8.7)

206 - 275  
(21 - 28, 152 - 203)

⊗ : N·m (kg·m, ft·lb)

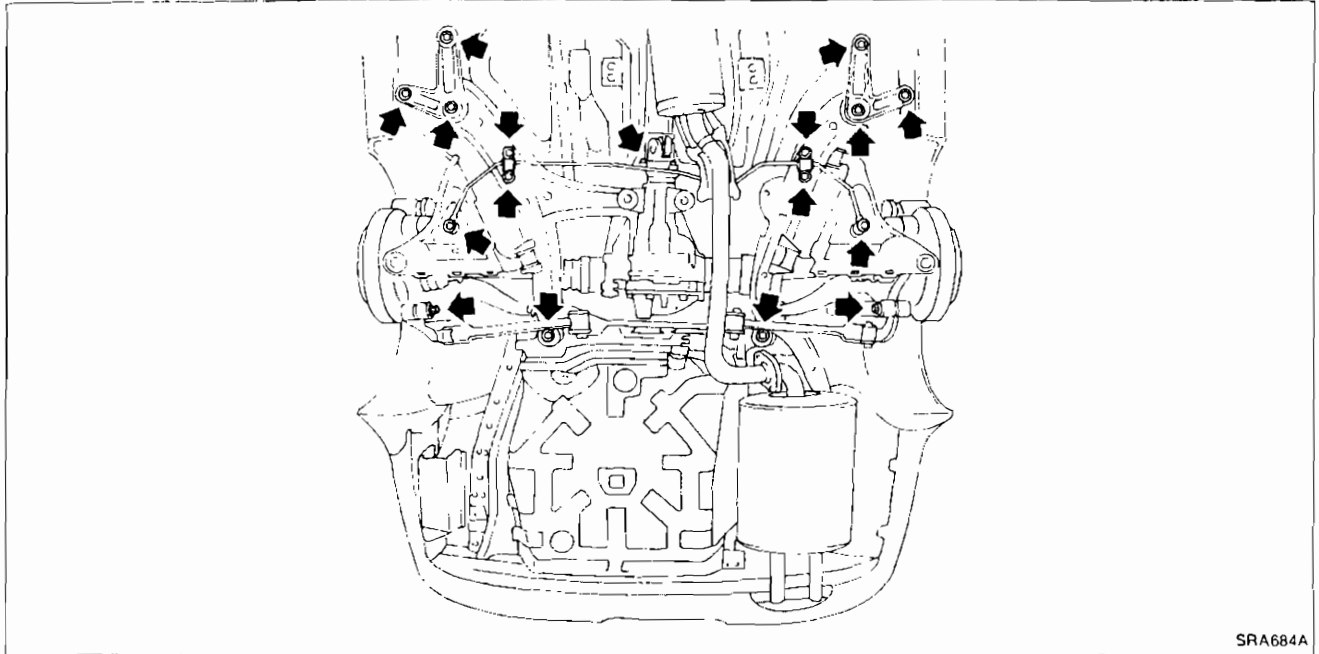
⊗ 43 - 55 (4.4 - 5.6, 32 - 41)

SRA708A

- |                                 |                     |                           |
|---------------------------------|---------------------|---------------------------|
| ① Cap                           | ⑩ Coil spring       | ⑲ Drive shaft             |
| ② Gasket                        | ⑪ Shock absorber    | ⑳ Connecting rod          |
| ③ Upper plate                   | ⑫ Suspension member | ㉑ Final drive             |
| ④ Bushing                       | ⑬ Rear upper link   | ㉒ Stabilizer bar          |
| ⑤ Upper spring seat             | ⑭ Front upper link  | ㉓ Bushing                 |
| ⑥ Upper rubber seal             | ⑮ Lateral link      | ㉔ Member stay             |
| ⑦ Bushing                       | ⑯ Lower arm         | ㉕ Insulator               |
| ⑧ Plate                         | ⑰ Protector         | ㉖ Adjusting cap           |
| ⑨ Bumper rubber with dust cover | ⑱ Axle housing      | ㉗ Dynamic damper assembly |

## REAR SUSPENSION

### Removal and Installation

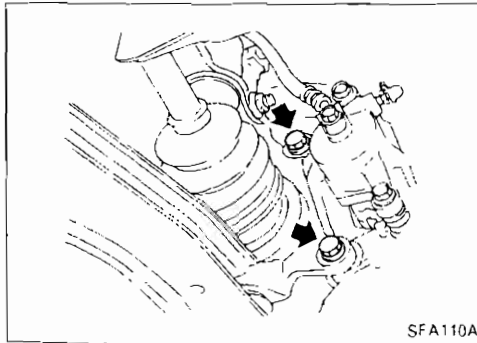


SRA684A

#### CAUTION:

Before removing the rear suspension assembly, disconnect the ABS sensor from the assembly. Then move it away from the rear suspension assembly. Failure to do so may result in damages to the sensor wires, making the sensor inoperative.

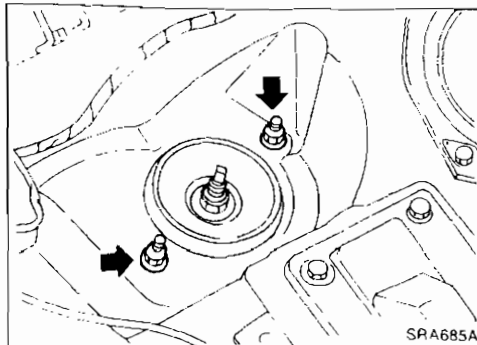
1. Remove exhaust tube.
2. Disconnect propeller shaft rear end.
3. Disconnect hand brake wire front end.



4. Remove brake caliper assembly.

Suspend caliper assembly with wire so as not to stretch brake hose.

Be careful not to depress brake pedal, or piston will pop out.



5. Remove rear parcel shelf. Refer to BT section.

6. Remove upper end nuts of shock absorber.

Do not remove piston rod lock nut.

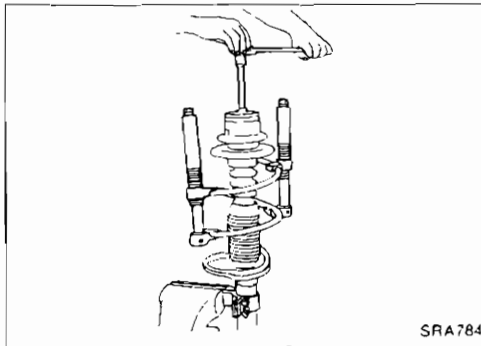
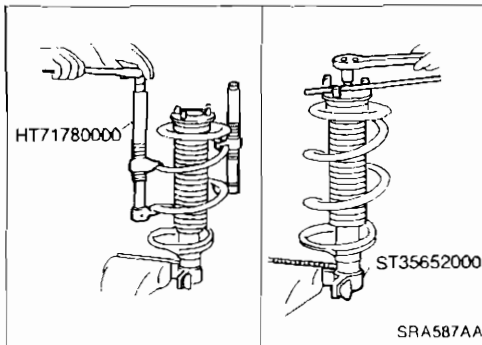
7. Remove suspension member fixing nuts. Then draw out rear axle and rear suspension assembly.

## REAR SUSPENSION

### Coil Spring and Shock Absorber

#### REMOVAL

Remove shock absorber upper and lower fixing nuts.  
**Do not remove piston rod lock nut on vehicle.**



#### DISASSEMBLY

1. Set shock absorber on vise with attachment, then loosen piston rod lock nut.

**Do not remove piston rod lock nut.**

2. Compress spring with Tool so that the strut upper spring seat can be turned by hand.

3. Remove piston rod lock nut.

#### INSPECTION

##### Shock absorber assembly

- Check for smooth operation through a full stroke, both compression and extension.
- Check for oil leakage on welded or gland packing portion.
- Check piston rod for cracks, deformation or other damage. Replace if necessary.

##### Upper rubber seat and bushing

Check rubber parts for deterioration or cracks. Replace if necessary.

##### Coil spring

Check for cracks, deformation or other damage. Replace if necessary.

RA

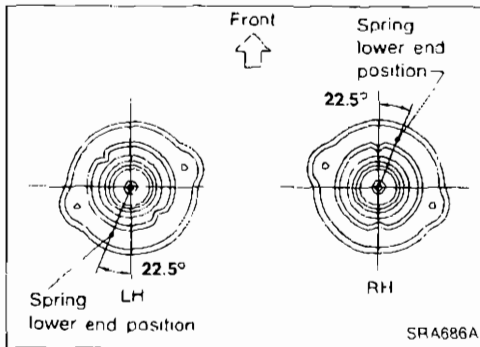
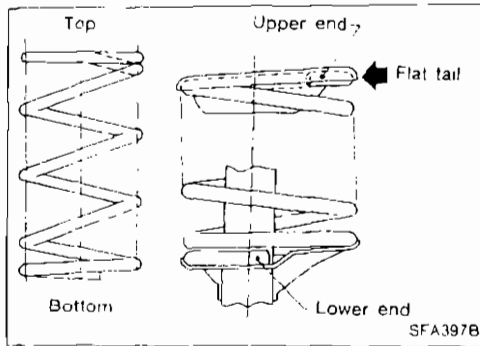


## REAR SUSPENSION

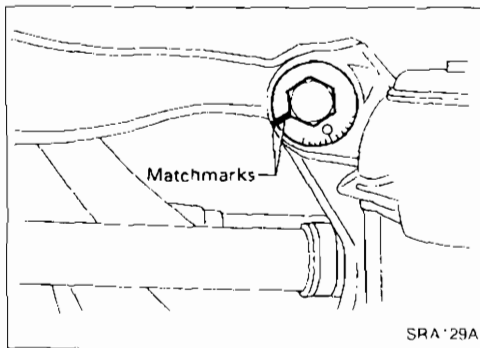
### Coil Spring and Shock Absorber (Cont'd)

#### ASSEMBLY

- When installing coil spring, be careful not to reverse top and bottom direction. (Top end is flat.)
- When installing coil spring on strut, it must be positioned as shown in figure at left.



- When installing upper spring seat, make sure that it is positioned as shown.



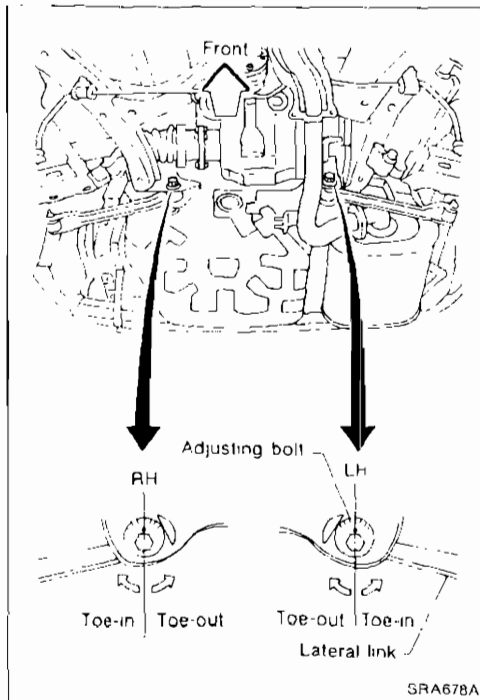
### Multi-link and Lower Ball Joint

#### REMOVAL AND INSTALLATION

- Refer to "Removal and Installation" of REAR SUSPENSION (RA-18).

**Before removing, put matchmarks on adjusting pin.**

- When installing, final tightening must be carried out at curb weight with tires on ground.
- After installation, check wheel alignment. Refer to "Rear Wheel Alignment" of ON-VEHICLE SERVICE (RA-5).



## REAR SUSPENSION

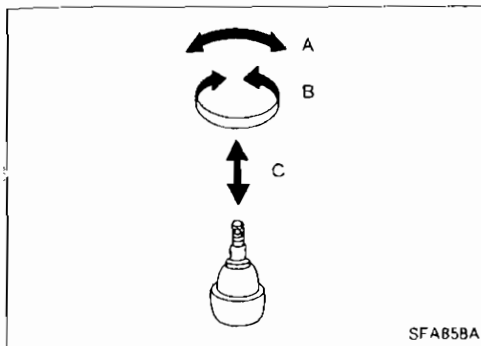
### Multi-link and Lower Ball Joint (Cont'd) INSPECTION

#### Rear suspension member

Replace suspension member assembly if cracked or deformed or if any part (insulator, for example) is damaged.

#### Upper and lower links

Replace upper or lower link as required if cracked or deformed or if bushing is damaged.



#### Lower ball joint

- Check ball joint for play. Replace transverse link assembly if any of the following cases occur. Ball stud is worn, play in axial direction is excessive or joint is hard to swing.

#### Swing force and turning torque

Before checking, turn ball joint at least 10 revolutions so that ball joint is properly broken in.

##### Swing force "A":

(measuring point: cotter pin hole of ball stud)

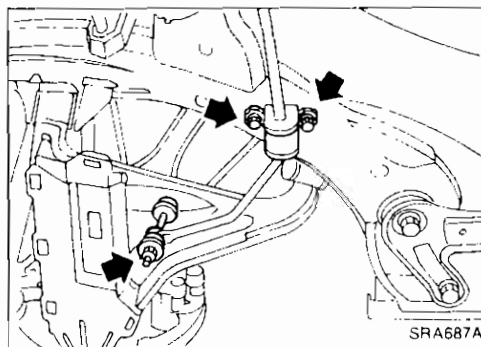
7.8 - 54.9 N (0.8 - 5.6 kg, 1.8 - 12.3 lb)

##### Turning torque "B":

0.5 - 3.4 N·m (5 - 35 kg-cm, 4.3 - 30.4 in-lb)

##### Vertical end play "C":

0 mm (0 in)



#### Stabilizer Bar

##### REMOVAL

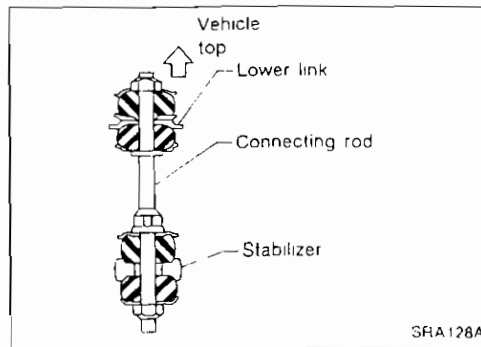
- Remove connecting rod and clamp.

##### INSPECTION

- Check stabilizer bar for deformation or cracks. Replace if necessary.
- Check rubber bushings for deterioration or cracks. Replace if necessary.

##### INSTALLATION

When installing connecting rod, make sure direction is correct (as shown at left).



RA

# SERVICE DATA AND SPECIFICATIONS (SDS)

## General Specifications

### COIL SPRING

|                      | Unit: mm (in)               |
|----------------------|-----------------------------|
| Applied model        | All                         |
| Wire diameter        | 11.5 (0.453)                |
| Coil outer diameter  |                             |
| Large diameter       | 123.5 - 126.5 (4.86 - 4.98) |
| Small diameter       | 112.3 - 115.3 (4.42 - 4.54) |
| Free length          | 350 (13.78)                 |
| Identification color | Red x 1                     |

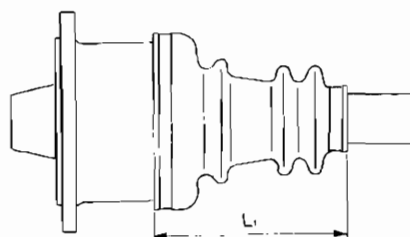
### SHOCK ABSORBER

| Applied model       | All          |
|---------------------|--------------|
| Piston rod diameter | mm (in)      |
|                     | 12.5 (0.492) |

### DRIVE SHAFT

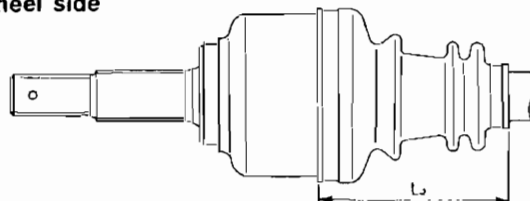
|                                    |         |                                     |
|------------------------------------|---------|-------------------------------------|
| Joint type                         |         |                                     |
| Final drive side                   |         | TS82F                               |
| Wheel side                         |         | TS82C                               |
| Grease name                        |         |                                     |
| Final drive side                   |         | Nissan genuine grease or equivalent |
| Wheel side                         |         | Nissan genuine grease or equivalent |
| Specified amount of grease         | g (oz)  |                                     |
| Final drive side                   |         | 155 - 165 (5.47 - 5.82)             |
| Wheel side                         |         | 135 - 145 (4.76 - 5.11)             |
| Boot length                        | mm (in) |                                     |
| Final drive side (L <sub>1</sub> ) |         | 95 - 97 (3.74 - 3.82)               |
| Wheel side (L <sub>2</sub> )       |         |                                     |

Final drive side



SRA133A

Wheel side



SRA543A

### REAR STABILIZER BAR

| Model                          | LHD          | RHD          |
|--------------------------------|--------------|--------------|
| Stabilizer diameter<br>mm (in) | 17.3 (0.681) | 18.0 (0.709) |
| Identification color           | Light green  | Orange       |

# SERVICE DATA AND SPECIFICATIONS (SDS)

## Inspection and Adjustment

### WHEEL ALIGNMENT (Unladen\*1)

| Applied model  |         | Australia           | Except Australia |
|----------------|---------|---------------------|------------------|
| Camber         | degree  | -1°40' to -0°40'    | -1°35' to -0°35' |
| Toe-in         |         |                     |                  |
| A - B          | mm (in) | 0 - 5.0 (0 - 0.197) |                  |
| Total angle 2θ | degree  | 0° - 28°            |                  |

\*1 Fuel, radiator coolant and engine oil full  
Spare tire, jack, hand tools and mats in designated positions

### LOWER BALL JOINT

|   |                    |                                       |
|---|--------------------|---------------------------------------|
| Swing force<br>(Measuring point: cotter pin<br>hole of ball stud) | N (kg, lb)         | 7.8 - 54.9<br>(0.8 - 5.6, 1.8 - 12.3) |
| Turning torque  | N·m (kg-cm, in-lb) | 0.5 - 3.4 (5 - 35, 4.3 - 30.4)        |
| Vertical end play   | mm (in)            | 0 (0)                                 |

### WHEEL BEARING

|                              |                   |                                   |
|------------------------------|-------------------|-----------------------------------|
| Wheel bearing axial end play | mm (in)           | 0.05 (0.0020) or less             |
| Wheel bearing lock nut       |                   |                                   |
| Tightening torque            | N·m (kg-m, ft-lb) | 206 - 275<br>(21 - 28, 152 - 203) |

### WHEEL RUNOUT (Radial and lateral)

| Wheel type     |         | Radial runout          | Lateral runout         |
|----------------|---------|------------------------|------------------------|
| Aluminum wheel | mm (in) | 0.3 (0.012) or less    |                        |
| Steel wheel    | mm (in) | 0.7 (0.028)<br>or less | 1.0 (0.039)<br>or less |

RA

# BRAKE SYSTEM

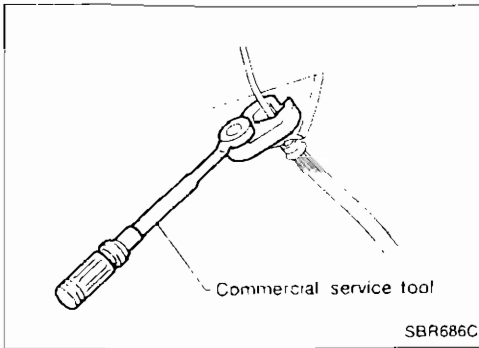
## SECTION **BR**

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BR

# PRECAUTIONS AND PREPARATION



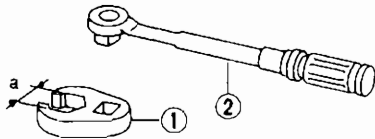
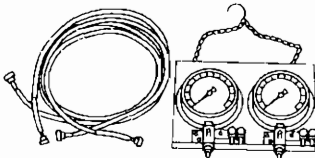
## Precautions

- Recommended brake fluid.  
For Europe: DOT3 or DOT4  
Except for Europe: DOT3  
For Europe, never mix different type brake fluids (DOT3 and DOT4).
- Never reuse drained brake fluid.
- Be careful not to splash brake fluid on painted areas.
- To clean or wash all parts of master cylinder, disc brake caliper and wheel cylinder, use clean brake fluid.
- Never use mineral oils such as gasoline or kerosene. They will ruin rubber parts of the hydraulic system.
- Use flare nut wrench when removing and installing brake tube.
- Always torque brake lines when installing.

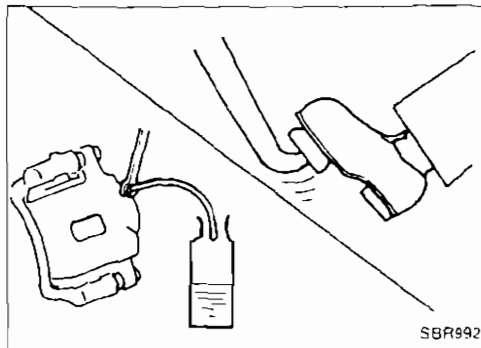
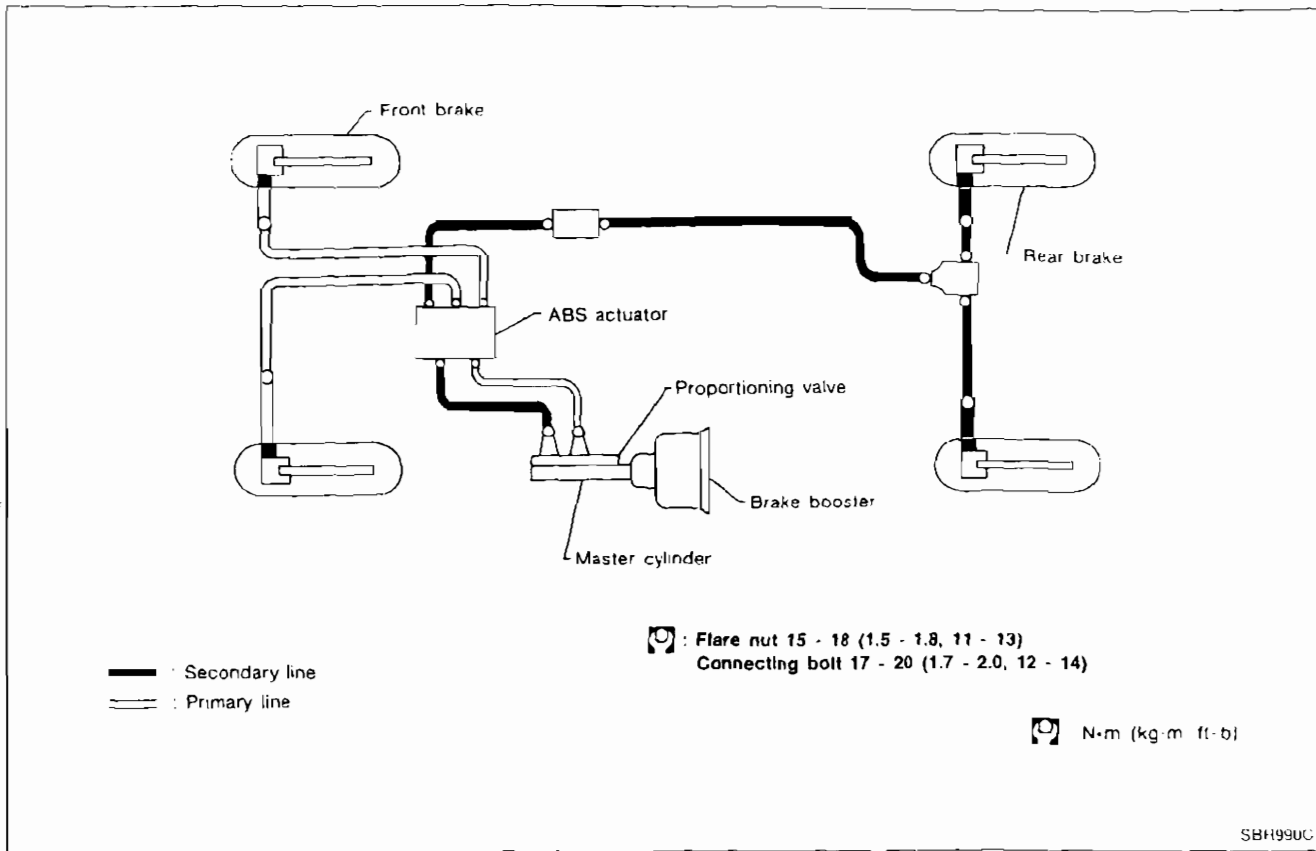
### WARNING:

- Clean brake pads and shoes with a waste cloth, then wipe with a dust collector.

## Commercial Service Tools

| Tool name   | Description  |
|---|--|
| <ul style="list-style-type: none"> <li>① Flare nut crows foot</li> <li>② Torque wrench</li> </ul> | <div style="text-align: right; margin-bottom: 10px;">Removing and installing each brake piping</div>  <p style="margin-top: 10px;">NT360</p> <p style="margin-top: 10px; text-align: right;">a: 10 mm (0.39 in)</p> |
| Brake fluid pressure gauge  |  <p style="margin-top: 10px;">NT151</p> <div style="text-align: right; margin-top: 10px;">Measuring brake fluid pressure</div>  |

## Brake Hydraulic Line



### REMOVAL

#### 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

Check brake lines (tubes and hoses) for cracks, deterioration or other damage. Replace any damaged parts.

# BRAKE HYDRAULIC LINE/CONTROL VALVE

## Brake Hydraulic Line (Cont'd)

### INSTALLATION

#### CAUTION:

- Refill with new brake fluid.  
For Europe: DOT3 or DOT4  
Except for Europe: DOT3  
For Europe, never mix different type brake fluids (DOT3 and DOT4).
  - Never reuse drained brake fluid.
1. Tighten all flare nuts and connecting bolts.

#### Specification:

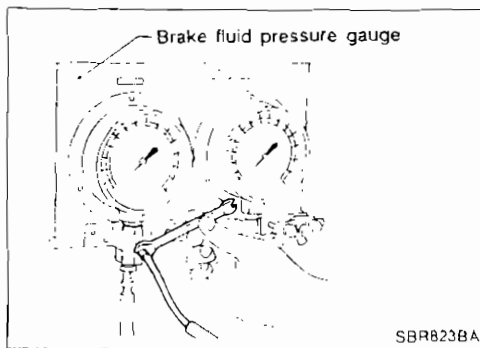
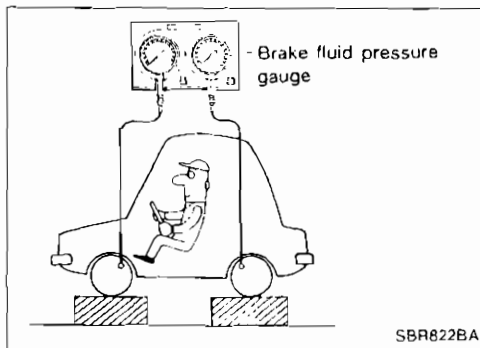
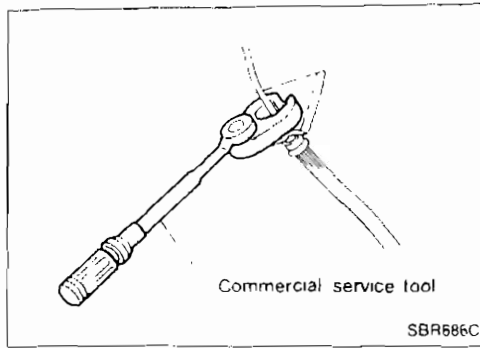
##### Flare nut

15 - 18 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)

##### Connecting bolt

17 - 20 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-5).



## Proportioning Valve

### INSPECTION

#### CAUTION:

- Carefully monitor brake fluid level at master cylinder.
  - Use new brake fluid.  
For Europe: DOT3 or DT4  
Except for Europe: DOT3  
For Europe, never mix different type brake fluids (DOT3 and DOT4).
  - 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.
1. Connect Tool to air bleeders of front and rear brakes on either LH and RH side.
  2. Bleed air from the Tool.
  3. Check fluid pressure by depressing brake pedal.

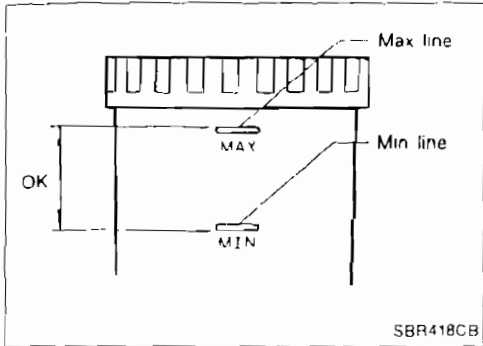
Unit: kPa (bar, kg/cm<sup>2</sup>, psi)

|                                |  |
|--------------------------------|--|
| Applied pressure (Front brake) | 7,355 (73.6, 75, 1,067)                            |
| Output pressure (Rear brake)   | 5,100 - 5,492<br>(51.0 - 54.9, 52 - 56, 739 - 796) |

4. Bleed air after disconnecting the Tool. Refer to "Bleeding Brake System" (BR-5).

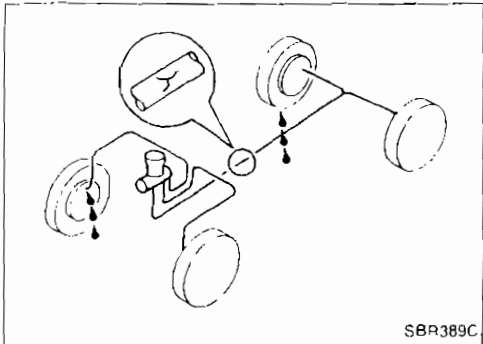


# CHECK AND ADJUSTMENT



## Checking Brake Fluid Level

- 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 for leaks.
- If brake warning lamp comes on, check brake fluid level switch and parking brake switch.

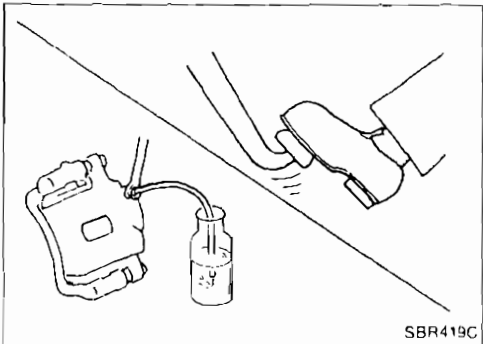


## Checking Brake Line

### CAUTION:

If leakage occurs around joints, retighten or, if necessary, replace damaged parts.

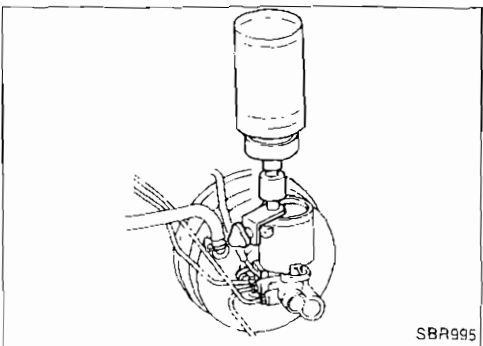
1. Check brake lines (tubes and hoses) for cracks, deterioration or other damage. Replace any damaged parts.
2. Check for oil leakage by fully depressing brake pedal while engine is running.



## Changing Brake Fluid

### CAUTION:

- Refill with new brake fluid.  
For Europe: DOT3 or DOT4/Except for Europe: DOT3  
For Europe, never mix different type brake fluids (DOT3 and DOT4).
  - 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-5).



## Bleeding Brake System

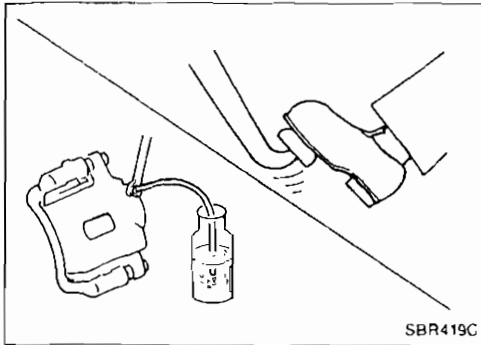
### CAUTION:

- Carefully monitor brake fluid level at master cylinder during bleeding operation.
- Fill reservoir with new brake fluid.  
For Europe: DOT3 or DOT4/Except for Europe: DOT3  
For Europe, never mix different type brake fluids (DOT3 and DOT4).  
Make sure it is full at all times while bleeding air out of system.

## CHECK AND ADJUSTMENT

### Bleeding Brake System (Cont'd)

- Place a container under master cylinder to avoid spillage of brake fluid.
- Turn ignition switch OFF and disconnect ABS actuator connectors or battery ground cable.

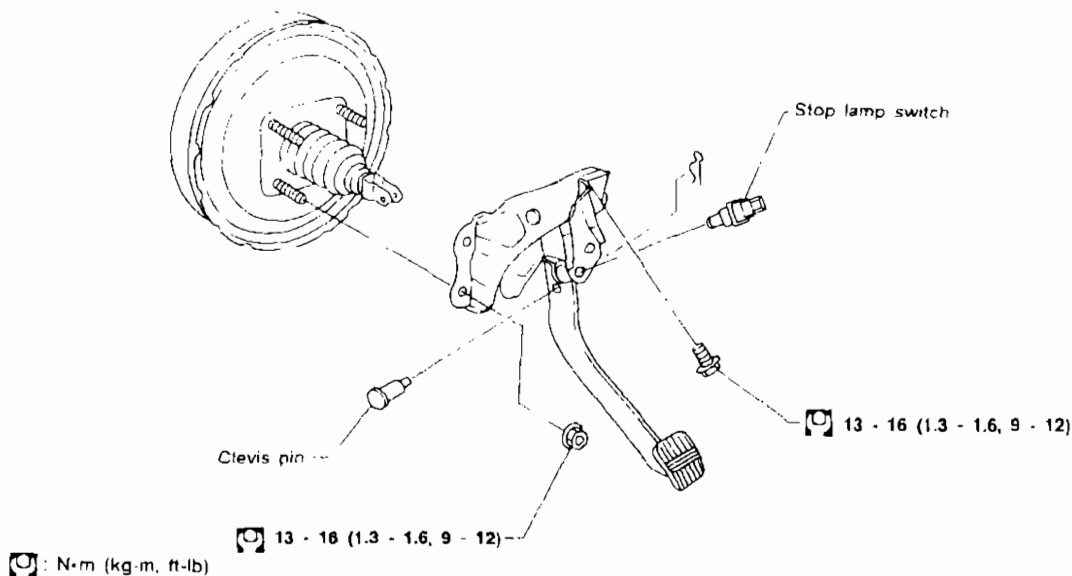


- Bleed air in the following order.  
Right rear brake → Left rear brake →  
Right front brake → Left front brake
1. Connect a transparent vinyl tube to air bleeder valve.
  2. Fully depress brake pedal several times.
  3. With brake pedal depressed, open air bleeder valve to release air.
  4. Close air bleeder valve.
  5. Release brake pedal slowly.
  6. Repeat steps 2. through 5. until clear brake fluid comes out of air bleeder valve.

# BRAKE PEDAL AND BRACKET

## Removal and Installation

SEC. 465



SBR565CC

### Inspection

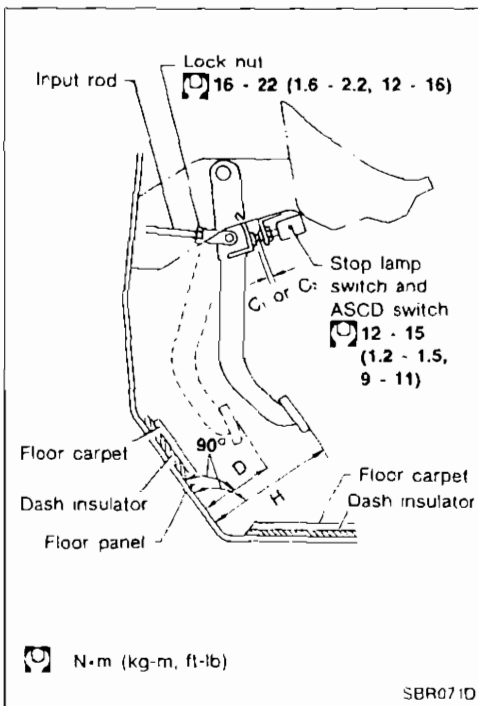
Check brake pedal for following items.

- Brake pedal bend
- Clevis pin deformation
- Crack of any welded portion

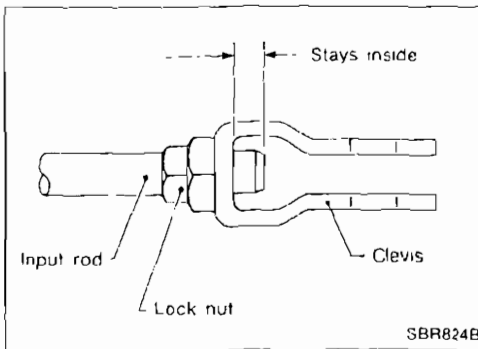
### Adjustment

Check brake pedal free height from dash reinforcement panel. Adjust if necessary.

- H:** Free height  
Refer to SDS (BR-66).
- D:** Depressed height  
Refer to SDS. (BR-66).  
Under force of 490 N (50 kg, 110 lb)  
with engine running
- C<sub>1</sub>, C<sub>2</sub>:** Clearance between pedal stopper and threaded end of stop lamp switch and ASCD switch  
0.3 - 1.0 mm (0.012 - 0.039 in)



SBR071D



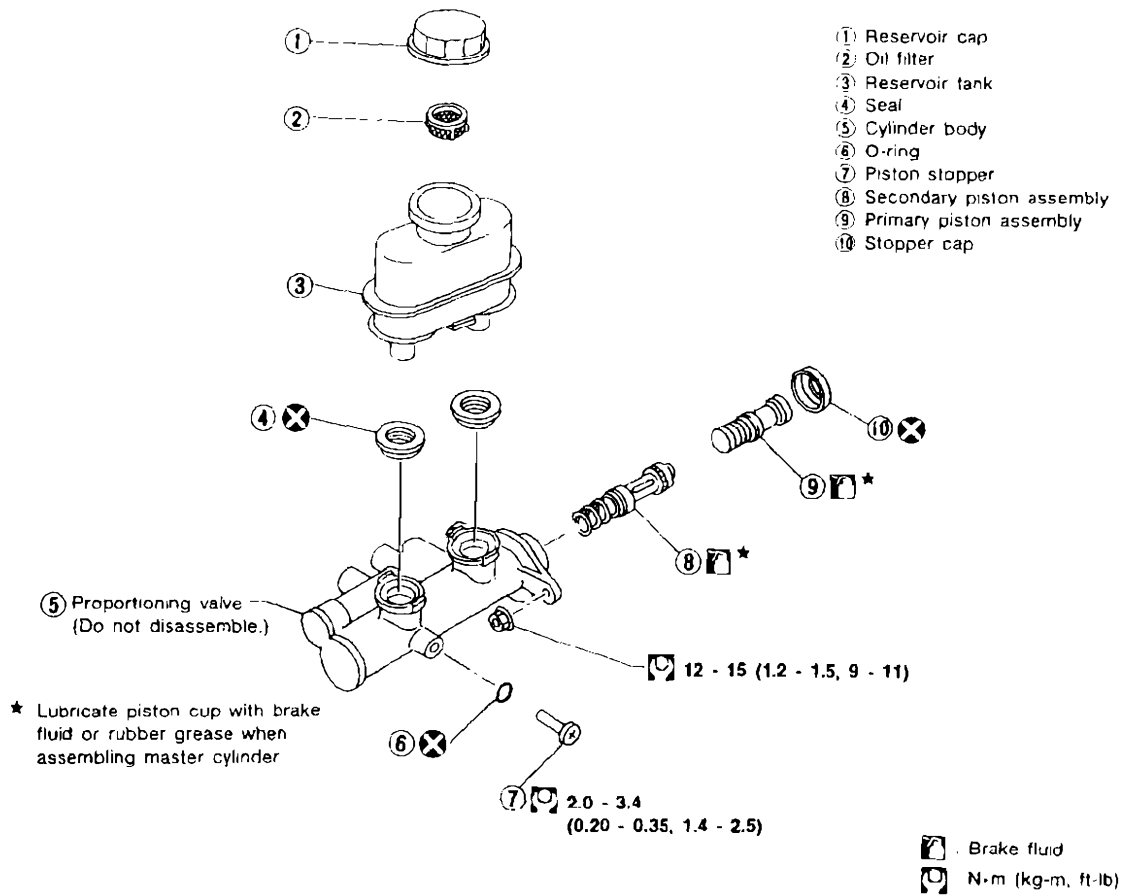
SBR824B

1. Loosen lock nut and adjust pedal free height by turning brake booster input rod. Then tighten lock nut.
2. Check pedal free play.  
**Make sure that stop lamps go off when pedal is released.**
3. Check brake pedal's depressed height while engine is running. If lower than specification, check for leaks, air in system, or damage to components (master cylinder, wheel cylinder, etc.). Then make necessary repair.

BR

# MASTER CYLINDER

SEC. 460



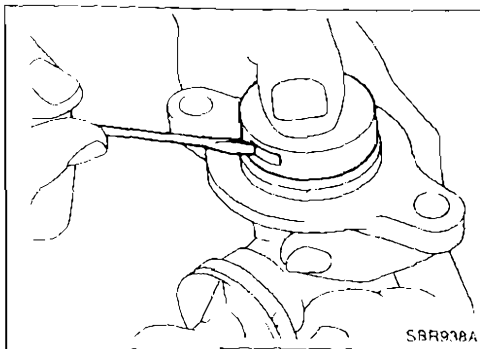
SBR851CA

## Removal

### 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.

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.



SBR938A

## Disassembly

1. Bend claws of stopper cap outward.

## MASTER CYLINDER

### Disassembly (Cont'd)

2. Remove valve 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

Check for the following items.

**Replace any part if damaged.**

**Master cylinder:**

- Pin holes or scratches on inner wall.

**Piston:**

- Deformation of or scratches on piston cups.

### Assembly

1. Insert secondary piston assembly. Then insert primary piston assembly.
  - **Pay attention to alignment of secondary piston slit with valve stopper mounting hole of cylinder body.**
2. Install stopper cap.  
**Before installing stopper cap, ensure that claws are bent inward.**
3. Push reservoir tank seals.
4. Push reservoir tank into master cylinder.

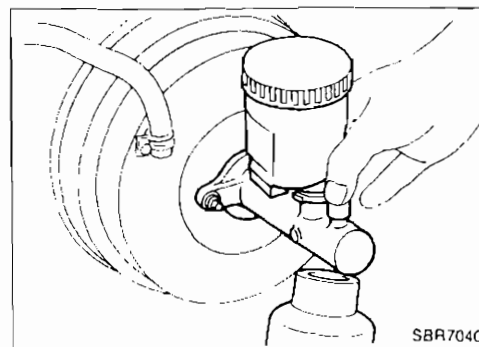
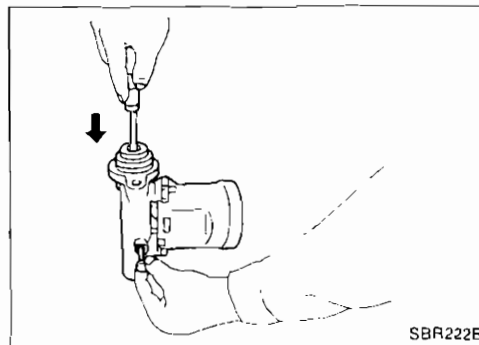
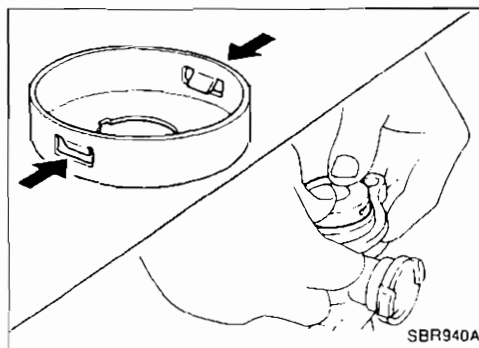
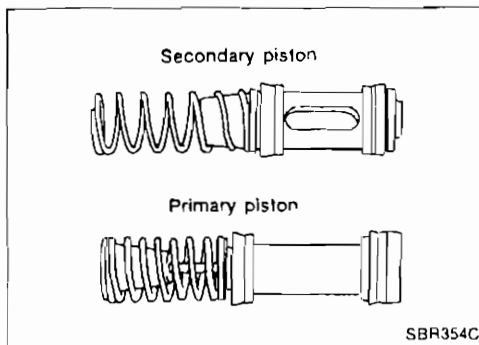
5. Install valve stopper while piston is pushed into cylinder.

### Installation

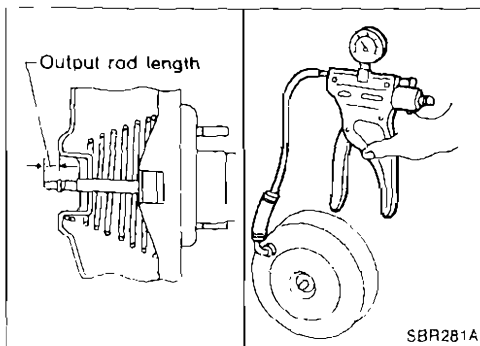
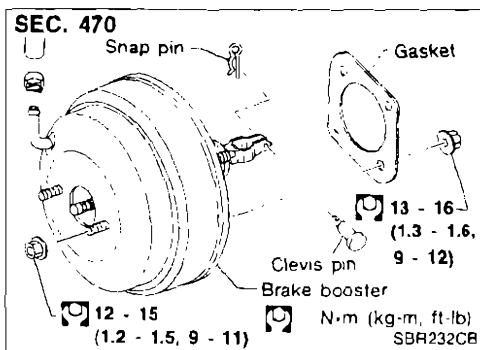
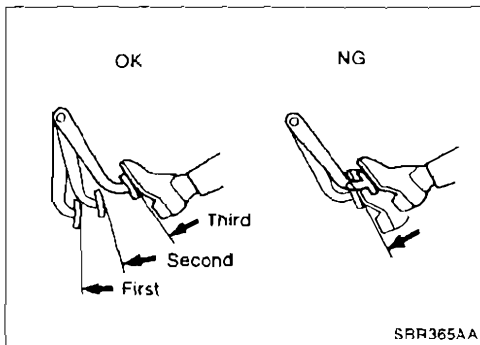
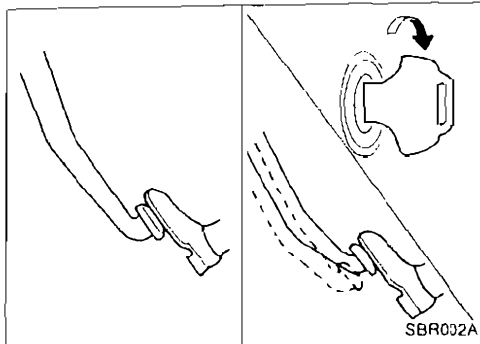
**CAUTION:**

- **Refill with new brake fluid.**  
**For Europe: DOT3 or DOT4/Except for Europe: DOT3**  
**For Europe, never mix different type brake fluids (DOT3 and DOT4).**
  - **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 - 18 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)**
  8. Bleed air from brake system. Refer to "Bleeding Brake System" (BR-5)

SBR231C



BR



## Brake Booster

### ON-VEHICLE SERVICE

#### Operating check

- Stop engine and depress brake pedal several times. Check that pedal stroke does not change.
- Depress brake pedal, then start engine. If pedal goes down slightly, operation is normal.

#### Airtight check

- Start engine, and stop it after one or two minutes. Depress brake pedal several times slowly. The pedal should go further down the first time, and then it should gradually rise thereafter.
- 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

### 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

### Output rod length check

1. Apply vacuum of  $-66.7 \text{ kPa}$  ( $-667 \text{ mbar}$ ,  $-500 \text{ mmHg}$ ,  $-19.69 \text{ inHg}$ ) to brake booster with a handy vacuum pump.
2. Check output rod length.

#### Specified length:

**10.4 mm (0.409 in)**

## INSTALLATION

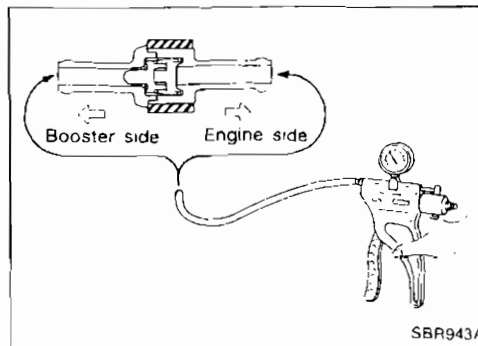
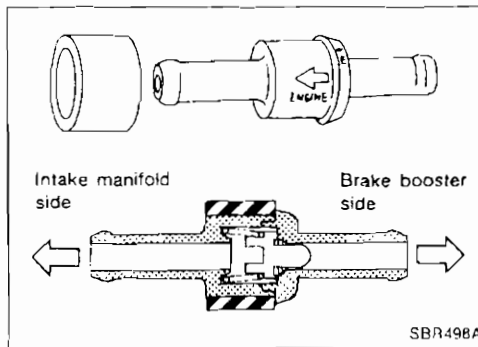
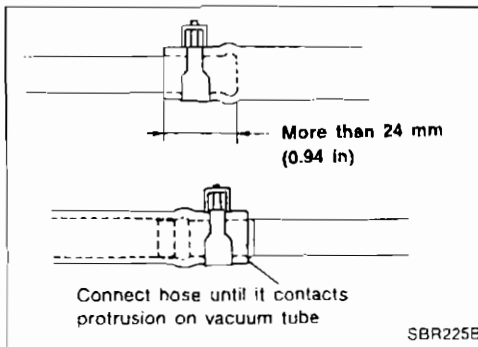
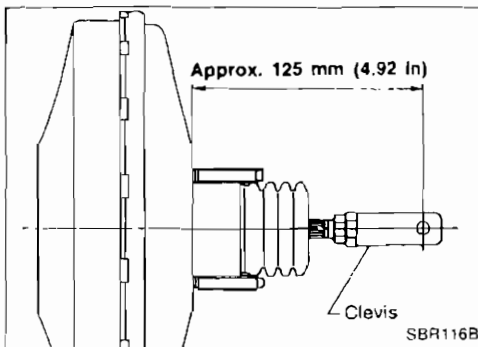
### CAUTION:

- Be careful not to deform or bend brake pipes, during installation of booster.
- Replace clevis pin if damaged.
- Refill with new brake fluid.  
For Europe: DOT3 or DOT4/Except for Europe: DOT3  
For Europe, never mix different type brake fluids (DOT3 and DOT4).
- Never reuse drained brake fluid.
- Take care not to damage brake booster mounting bolt

# BRAKE BOOSTER/VACUUM HOSE

## Brake Booster (Cont'd)

thread when installing. Due to the angle of installation, 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 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-9).
6. Bleed air. Refer to "Bleeding Brake System" (BR-5).

## Vacuum Hose

### REMOVAL AND INSTALLATION

#### 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.
- Install check valve, paying attention to its direction.

### INSPECTION

#### Hoses and connectors

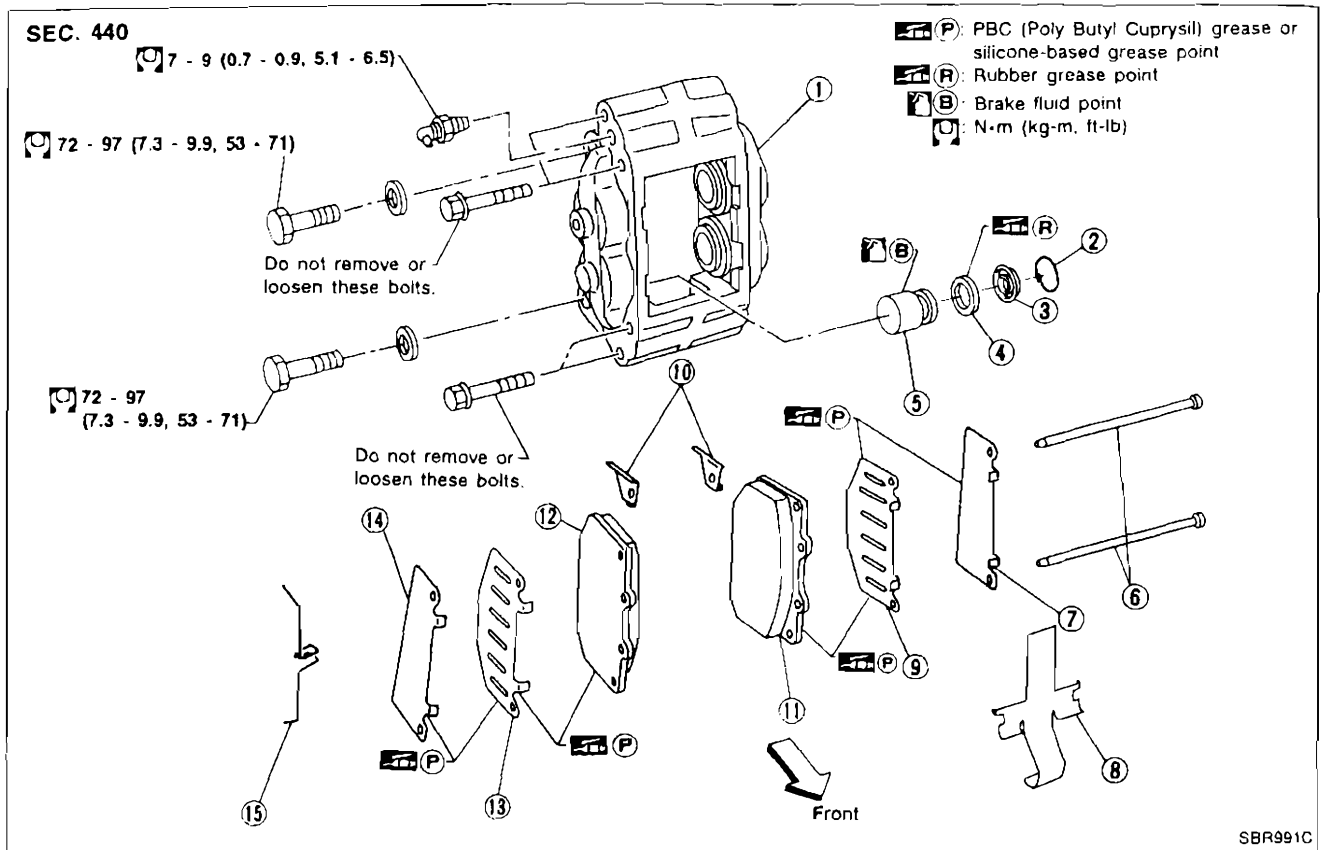
Check vacuum lines, connections and check valve for airtightness, improper attachment chafing and deterioration.

#### Check valve

Check vacuum with a vacuum pump.

|                         |                          |
|-------------------------|--------------------------|
| Connect to booster side | Vacuum should exist.     |
| Connect to engine side  | Vacuum should not exist. |

# FRONT DISC BRAKE (OPF25V)



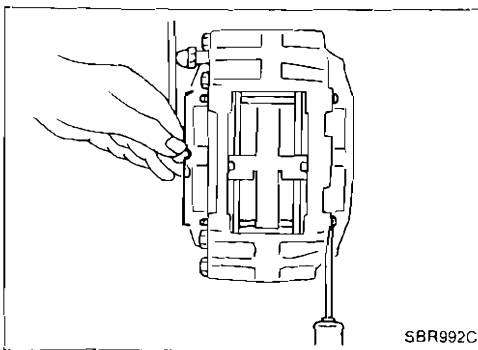
- |                  |                |                |
|------------------|----------------|----------------|
| ① Caliper        | ⑥ Pad pin      | ⑪ Outer pad    |
| ② Retaining ring | ⑦ Outer shim A | ⑫ Inner pad    |
| ③ Dust seal      | ⑧ Cross spring | ⑬ Inner shim B |
| ④ Piston seal    | ⑨ Outer shim B | ⑭ Inner shim A |
| ⑤ Piston         | ⑩ Pad retainer | ⑮ Clip         |

## Pad Replacement

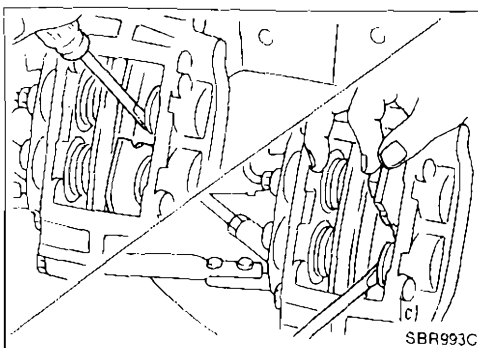
### CAUTION:

- When pads are removed, do not depress brake pedal because piston will pop out.
- Be careful not to damage dust seal or get oil on rotor. Always replace shims when replacing pads.

1. Remove clip from pad pin and then remove pad pin.
2. Remove cross spring.

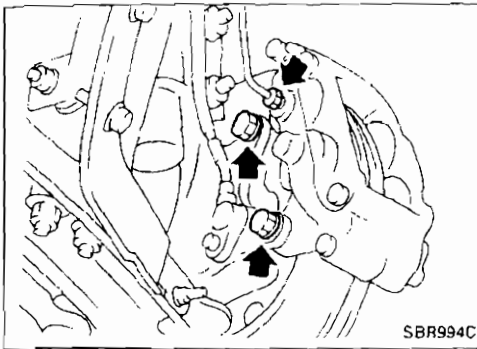


3. Pull out outer pad and insert it temporarily between lower piston and rotor as shown.
4. Push back upper piston with a suitable tool and insert new pad so it contacts upper piston as shown.
5. Pull out old pad.
6. Push back lower piston with a suitable tool.
7. Pull out new pad and reinstall it in the proper position.
8. Repeat step 3 to 7 for inner pad.
9. Install cross spring, pad pin and clip.



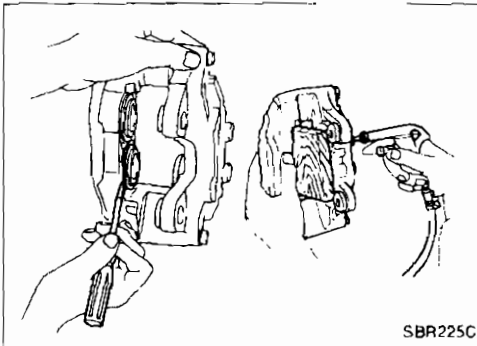


## FRONT DISC BRAKE (OPF25V)



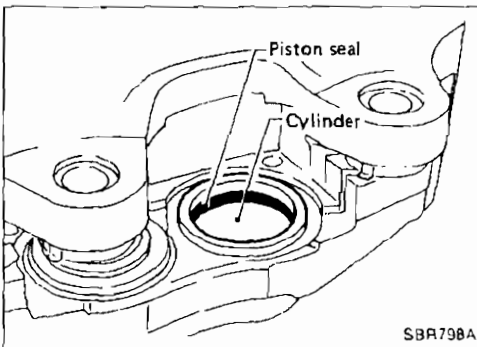
### Removal and Installation

1. Disconnect brake tube.
2. Remove brake pad.
3. Remove brake caliper mounting bolts.

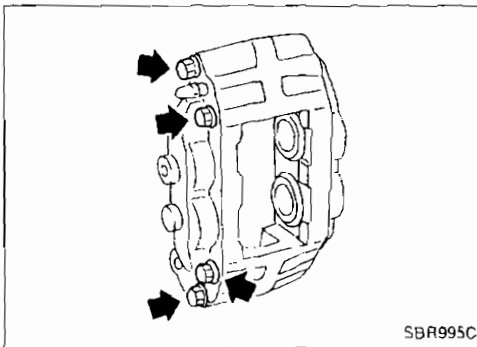


### Disassembly

1. Remove retaining ring.
2. Push out piston with dust seal using compressed air.



3. Remove piston seal.



### CAUTION:

Be careful not to loosen or remove bolts joining both sides of caliper.

If there is any fluid leakage, replace caliper assembly.

BR

# FRONT DISC BRAKE (OPF25V)

## Inspection

### CALIPER

- Check dust seals for damage.
- Check calipers for damage, rust or foreign materials.
- Check inside surface of cylinder for scoring, rust, wear, damage or foreign materials. Replace if any such condition exists.
- Eliminate minor damage from rust or foreign materials by polishing surface with fine emery paper.

### CAUTION:

Use brake fluid to clean.

### PISTON

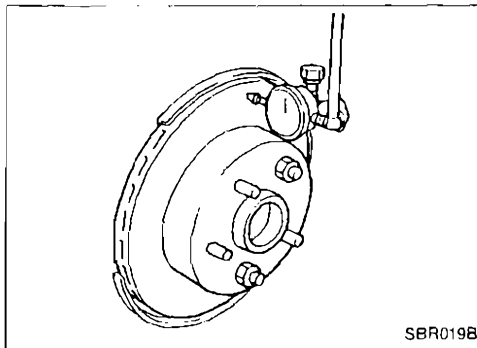
Check piston for scoring, rust, wear, damage or foreign materials. Replace if any condition exists.

### CAUTION:

**Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign materials are stuck to sliding surface.**

### PAD PIN AND CLIPS

Check for wear, cracks deformation, deterioration, rust or other damage. Replace if any such condition exists.



### RUNOUT

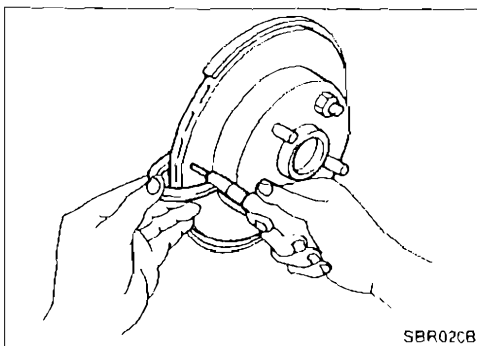
1. Secure rotor to wheel hub with at least two nuts (M12 x 1.25).
2. Check runout using a dial indicator.

**Make sure that wheel bearing axial end play is within the specifications before measuring. Refer to "Front Wheel Bearing" in FA section.**

#### Maximum runout:

**0.05 mm (0.0020 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).



### THICKNESS

#### Thickness variation (At least 8 positions):

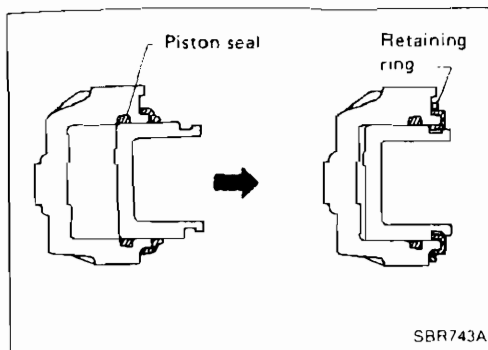
**Maximum 0.01 mm (0.0004 in)**

If thickness variation exceeds the specification, turn rotor with on-car brake lathe.

#### Rotor repair limit:

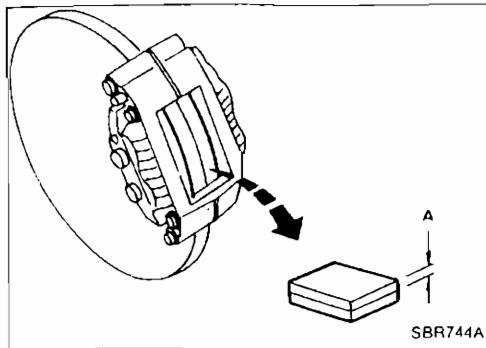
**28.0 mm (1.102 in)**

## FRONT DISC BRAKE (OPF25V)



### Assembly

1. Insert piston seal into groove on cylinder body
2. With dust seal fitted to piston, install piston into cylinder body.
3. Secure dust seal properly.
4. Install retaining ring.



### Inspection (On-vehicle)

#### DISC PAD

- Check pad shims for deformation or damage.
- Check disc pad for wear or damage.

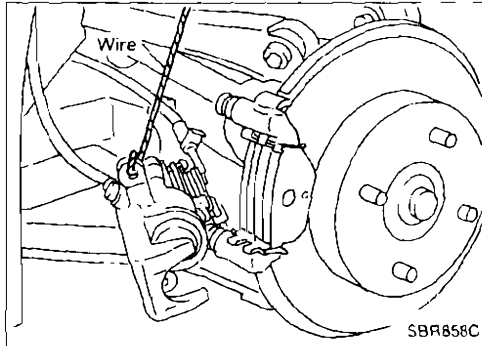
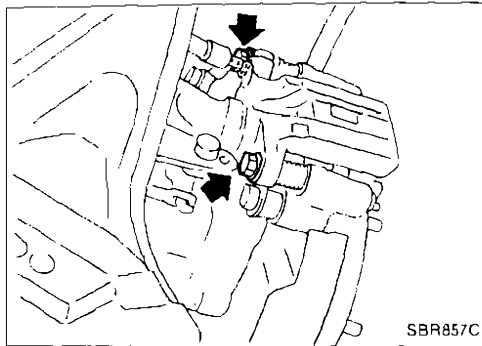
**Pad standard thickness (A):**

**10.0 mm (0.394 in)**

**Pad wear limit (A):**

**2.0 mm (0.079 in)**

## REAR DISC BRAKE



### Pad Replacement

#### WARNING:

Clean brake pads with a vacuum dust collector to minimize the hazard of airborne particles or other materials.

#### CAUTION:

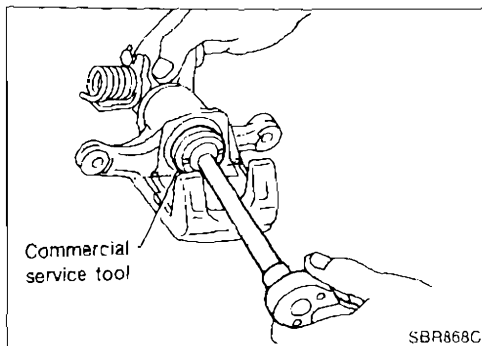
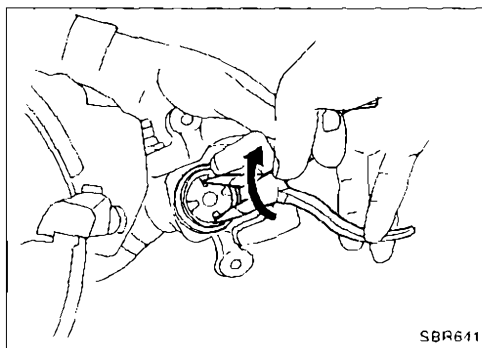
- When cylinder body is open, do not depress brake pedal because piston will pop out.
  - Be careful not to damage piston boot or get oil on rotor. Always replace shims in replacing pads.
  - If shims are rusted or show peeling of rubber coat, replace them with new shims.
  - It is not necessary to remove 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.
1. Remove master cylinder reservoir cap.
  2. Release parking brake.
  3. Remove brake cable mounting bolts from the rear suspension.
  4. Remove pin bolts.
  5. Remove cylinder body. Then remove pad retainers, and inner and outer shims.

#### Standard pad thickness:

9.5 mm (0.374 in)

#### Pad wear limit:

2.0 mm (0.079 in)

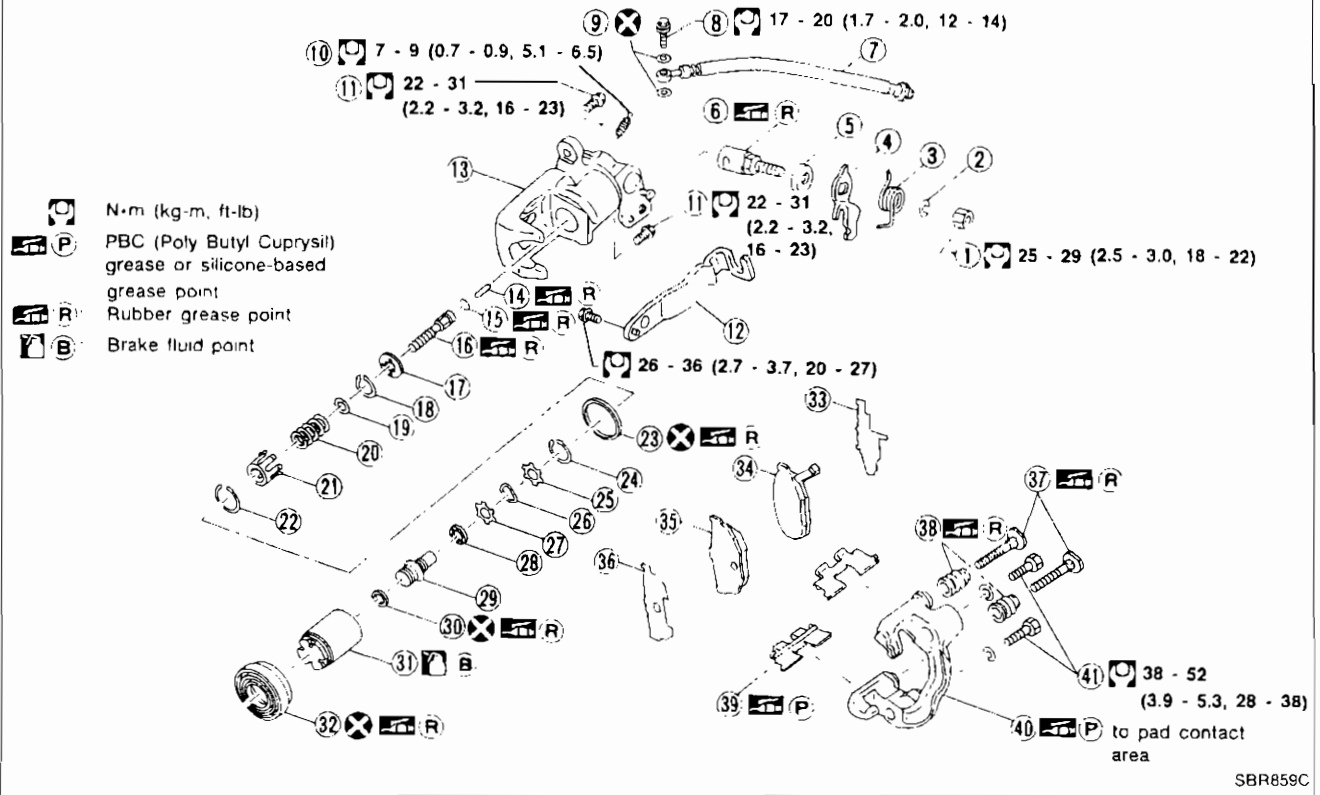


6. When installing new pads, push piston into cylinder body by gently turning piston clockwise, as shown.

**Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston.**

# REAR DISC BRAKE

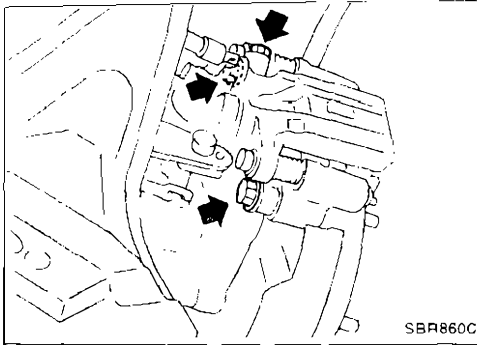
SEC. 441



SBR859C

- |                          |                |                             |
|--------------------------|----------------|-----------------------------|
| ① Nut                    | ⑮ O-ring       | ⑳ Adjusting nut             |
| ② Washer                 | ⑯ Push rod     | ㉑ Cup                       |
| ③ Return spring          | ⑰ Key plate    | ㉒ Piston                    |
| ④ Parking brake lever    | ⑱ Ring C       | ㉓ Dust seal                 |
| ⑤ Cam boot               | ⑲ Seat         | ㉔ Inner shim                |
| ⑥ Cam                    | ⑳ Spring       | ㉕ Inner pad                 |
| ⑦ Brake hose             | ㉑ Spring cover | ㉖ Outer pad                 |
| ⑧ Connecting bolt        | ㉒ Ring B       | ㉗ Outer shim                |
| ⑨ Copper washer          | ㉓ Piston seal  | ㉘ Pin                       |
| ⑩ Bleed screw            | ㉔ Ring A       | ㉙ Pin boot                  |
| ⑪ Pin bolt               | ㉕ Spacer       | ㉚ Pad retainer              |
| ⑫ Cable mounting bracket | ㉖ Wave washer  | ㉛ Torque member             |
| ⑬ Cylinder               | ㉗ Spacer       | ㉜ Torque member fixing bolt |
| ⑭ Strut                  | ㉘ Ball bearing |                             |

## REAR DISC BRAKE

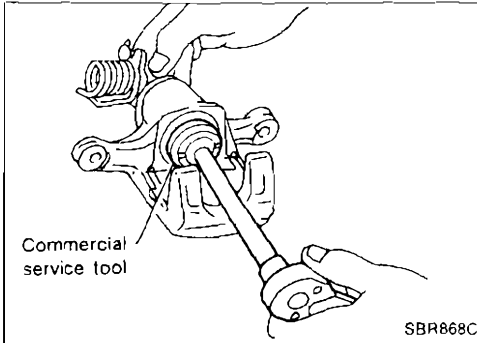


### Removal

#### WARNING:

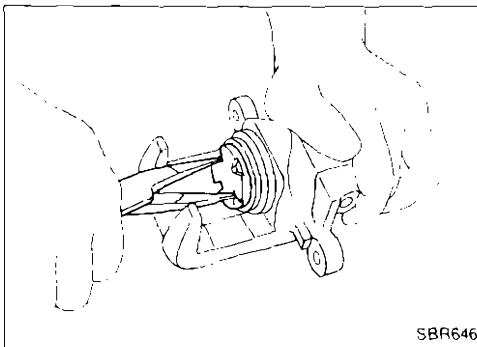
Clean brake pads with a vacuum dust collector to minimize the hazard of airborne particles or other materials.

- 1 Remove brake cable mounting bracket bolt and lock spring.
2. 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.

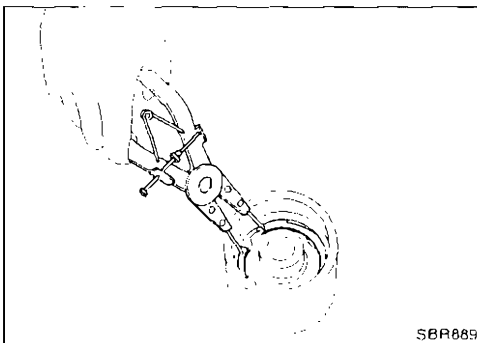


### Disassembly

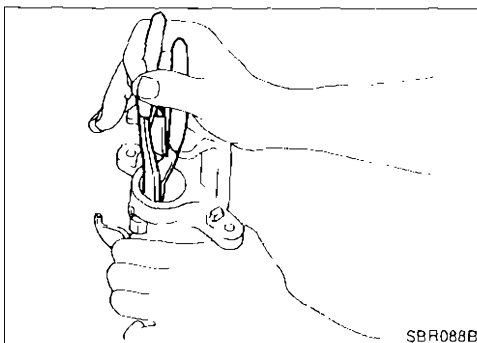
1. Remove piston by turning it counterclockwise with suitable commercial service tool or long nose pliers.



2. Pry off ring A from piston with suitable pliers and remove adjusting nut.



3. Disassemble cylinder body.
  - a. Pry off ring B with suitable pliers, then remove spring cover, spring and seat.
  - b. Pry off ring C, then remove key plate, push rod and strut.

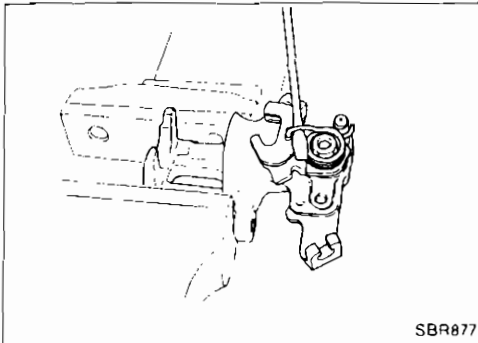
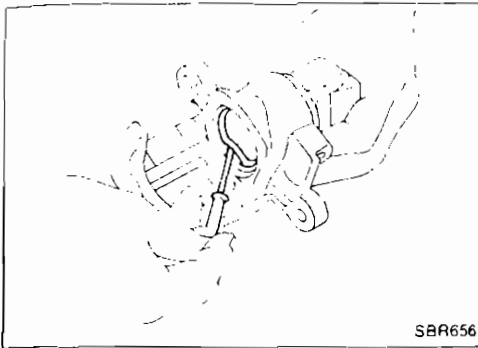


## REAR DISC BRAKE

### Disassembly (Cont'd)

c. Remove piston seal.

**Be careful not to damage cylinder body.**



4. Remove return spring, nut and parking brake lever

### Inspection — Caliper

#### CAUTION:

**Use brake fluid to clean cylinder. Never use mineral oil.**

#### CYLINDER BODY

- Check inside surface of cylinder for score, rust, wear, damage or presence of foreign materials. If any of the above conditions are observed, replace cylinder body.
- Minor damage from rust or foreign materials may be eliminated by polishing surface with a fine emery paper. Replace cylinder body if necessary.

#### TORQUE MEMBER

Check for wear, cracks or other damage. Replace if necessary.

#### PISTON

##### CAUTION:

**Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign matter is stuck to sliding surface.**

Check piston for score, rust, wear, damage or presence of foreign materials.

Replace if any of the above conditions are observed.

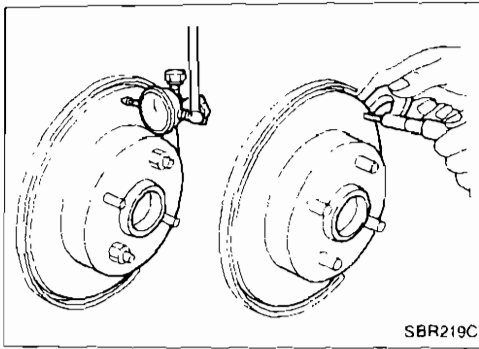
#### PIN AND PIN BOOT

Check for wear, cracks or other damage.

Replace if any of the above conditions are observed.

BR

## REAR DISC BRAKE



### Inspection — Rotor

#### RUBBING SURFACE

Check rotor for roughness, cracks or chips.

#### RUNOUT

1. Secure rotor to wheel hub with two nuts (M12 x 1.25).
2. Check runout using a dial indicator.

**Make sure that axial end play is within the specifications before measuring. Refer to "Rear Wheel Bearing" in RA section.**

3. Change relative positions of rotor and wheel hub so that runout is minimized.

**Maximum runout:**

**0.07 mm (0.0028 in)**

#### THICKNESS

**Rotor repair limit:**

**Standard thickness**

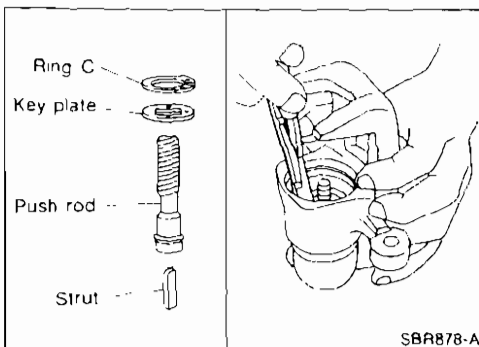
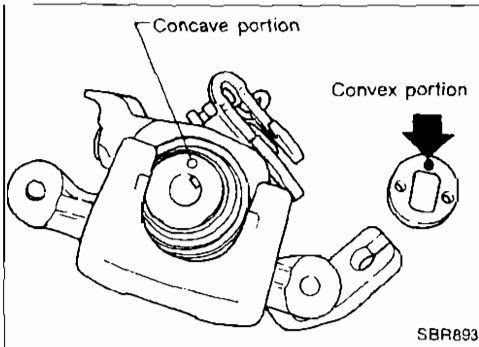
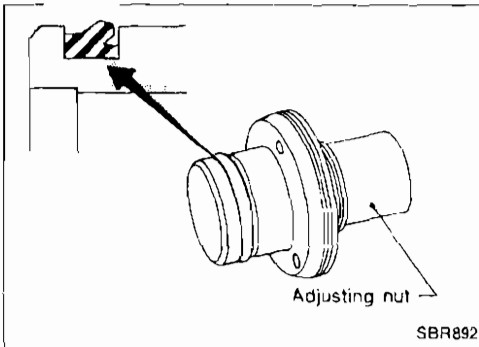
**9 mm (0.35 in)**

**Minimum thickness**

**8 mm (0.31 in)**

**Thickness variation (At least 8 portions)**

**Maximum 0.02 mm (0.0008 in)**



### Assembly

1. Install cup in the specified direction.

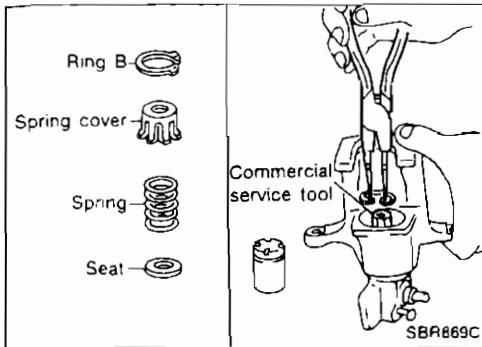
2. Fit push rod into square hole in key plate. Also match convex portion of key plate with concave portion of cylinder.

3. Install ring C with a suitable tool.

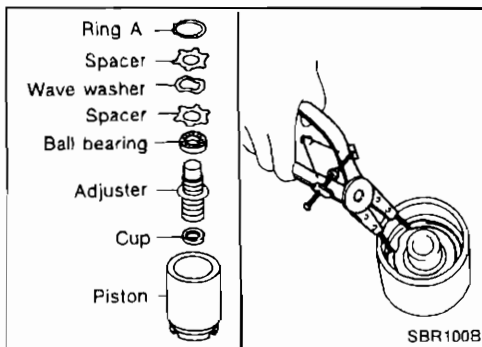
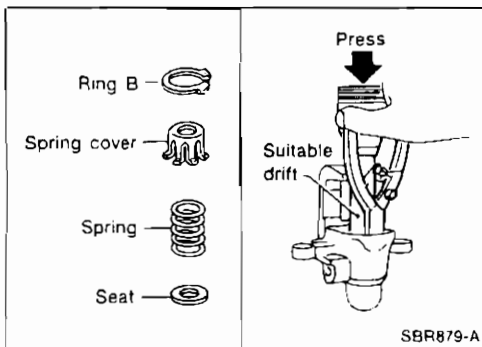


# REAR DISC BRAKE

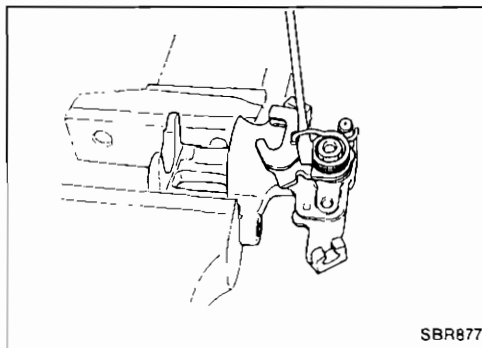
## Assembly (Cont'd)



4. Install seat, spring, spring cover and ring B while depressing with suitable commercial service tool or press and drift.



5. Install cup, adjuster, bearing, spacers, washers and ring A with a suitable tool.



6. Fit parking brake lever and tighten nut.  
7. Fit return spring in the order shown.

## Installation

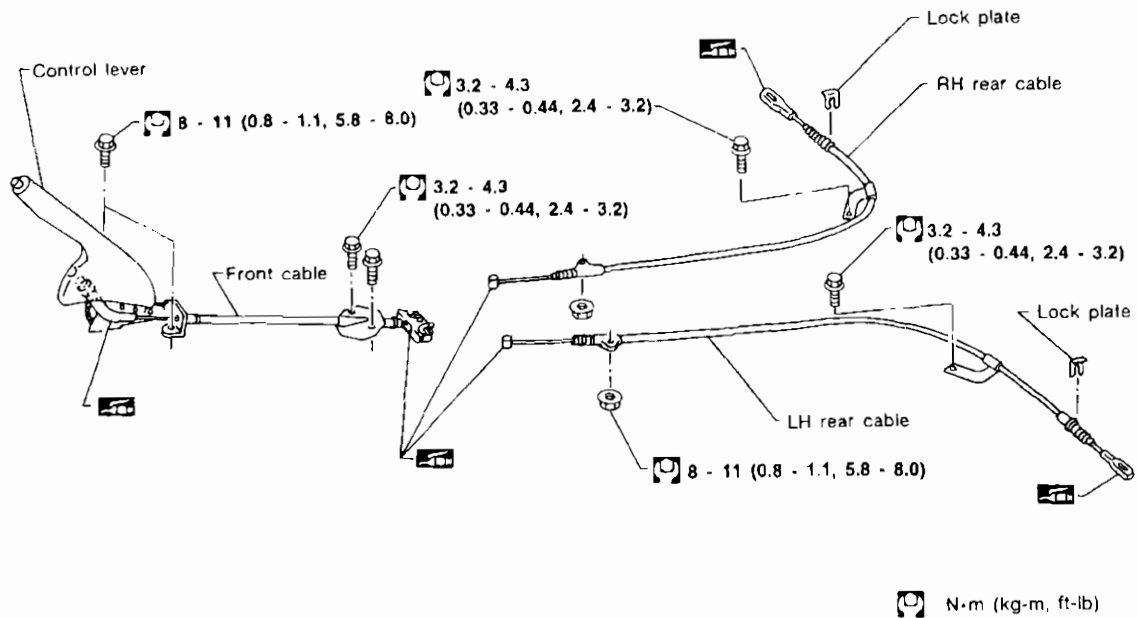
### CAUTION:

- Refill with new brake fluid "DOT 3" (Except for Europe) and "DOT3 or DOT4" (For Europe). For Europe, never mix different type brake fluids (DOT3 and DOT4).
  - Never reuse drained brake fluid.
1. Install brake hose to caliper securely.
  2. Install all parts and secure all bolts.
  3. Bleed air. Refer to "Bleeding Brake System" (BR-5).

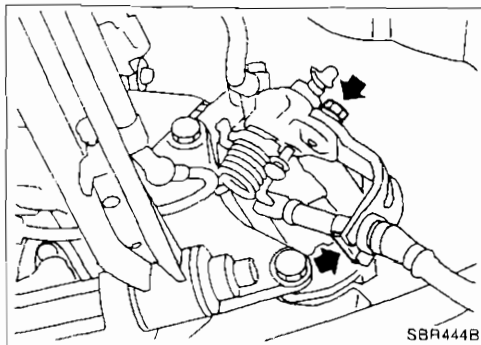
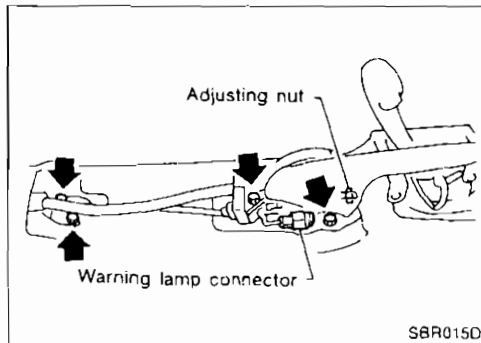
BR

# PARKING BRAKE CONTROL

SEC. 443



SBR996C



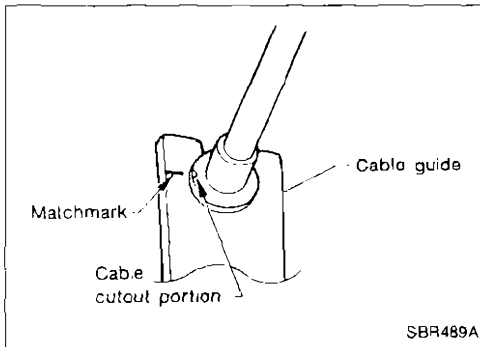
## Removal and Installation

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. Remove lock plate, then disconnect cable from caliper.

# PARKING BRAKE CONTROL

## Removal and Installation (Cont'd)

- When installing parking brake cable at rear caliper, make sure to align matchmark on cable guide.



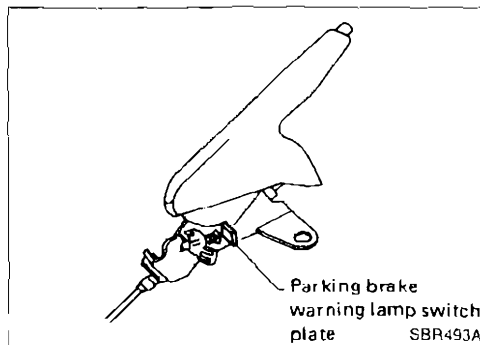
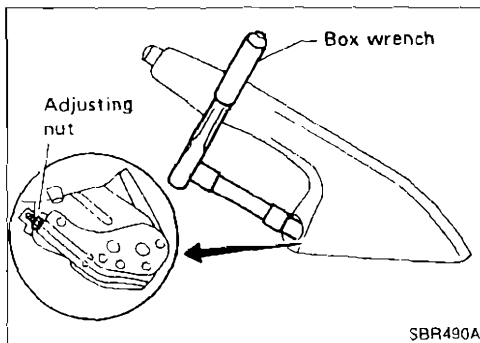
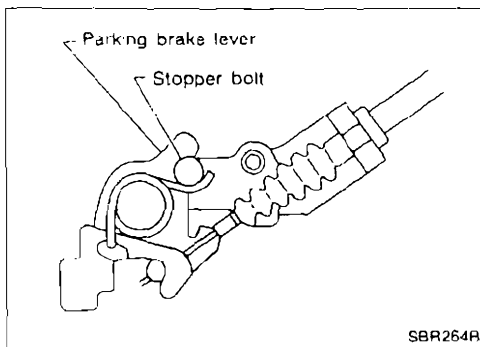
## Inspection

1. Check control lever for wear or other damage. Replace if necessary.
2. Check wires for discontinuity or deterioration. Replace if necessary.
3. Check warning lamp and switch. Replace if necessary.
4. Check parts at each connecting portion and, if found deformed or damaged, replace.

## Adjustment

Pay attention to the following points after adjustment.

- There is no drag when control lever is being released.
- Parking brake lever returns to stopper bolt when control lever for rear disc brake is released.



1. Pull control lever up by 4 or 5 notches.
2. Insert a box wrench into opening in control lever and loosen self-lock adjusting nut to slacken cables.
3. Completely push control lever down.
4. Forcefully depress brake pedal about five times (so that caliper is automatically set in position.).
5. Pull lever up by 4 or 5 notches.
6. Turn adjusting nut as shown in figure and adjust lever stroke to specified value.
7. Pull control lever with specified amount of force. Check lever stroke and ensure smooth operation.  
**Number of notches : 7 - 9 [196 N (20 kg, 44 lb)]**
8. Bend warning lamp switch plate to ensure the following.  
**Warning lamp comes on when lever is lifted "A" notches, and goes out when fully released.**  
**Number of "A" notches : 1**

## Purpose

The Anti-Lock Brake System (ABS) consists of electronic and hydraulic components. It allows for control of braking force so that locking of the wheels can be avoided.

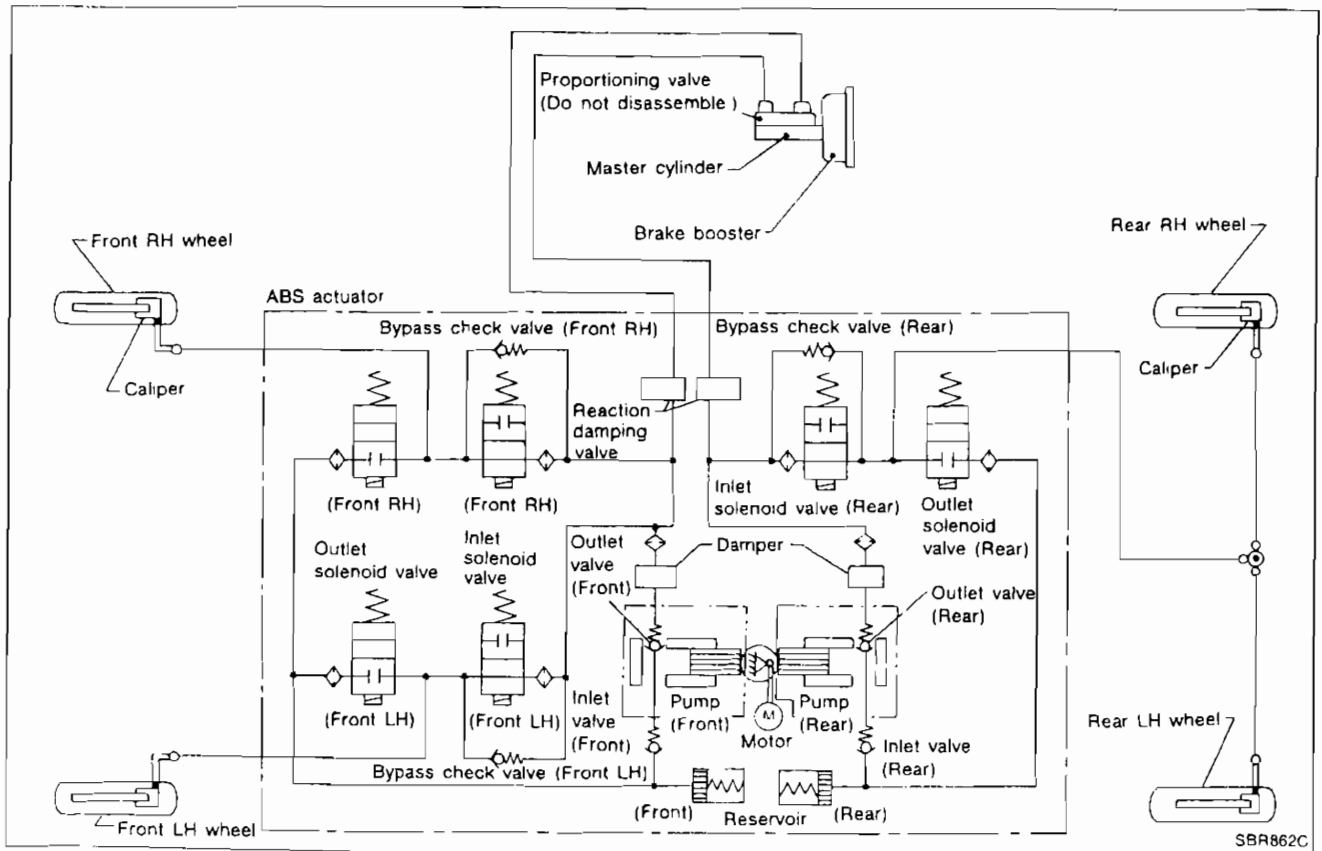
The ABS:

- 1) Improves proper tracking performance through steering wheel operation.
- 2) Eases obstacle avoidance through steering wheel operation.
- 3) Improves vehicle stability.

## Operation

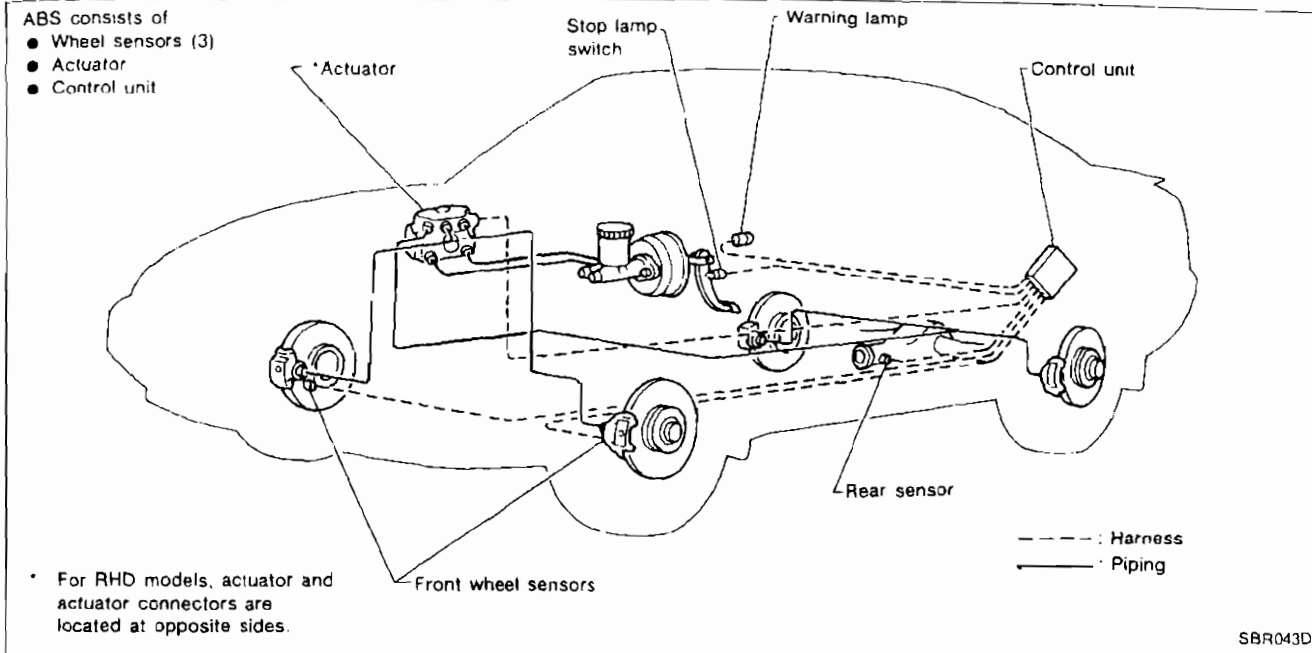
- The ABS will not operate at speeds below 5 to 10 km/h (3 to 6 MPH) to completely stop the vehicle. (The speeds will vary according to road conditions.)
- The ABS has self-test capabilities. A mechanical noise may be heard as the ABS performs a self-test the first time the vehicle reaches 10 km/h (6 MPH). This is a normal part of the self-test feature. If a malfunction is found during this check, the anti-lock warning lamp will come on.
- During ABS operation, a mechanical noise may be heard. This is a normal condition.

## ABS Hydraulic Circuit



# ANTI-LOCK BRAKE SYSTEM

## System Components



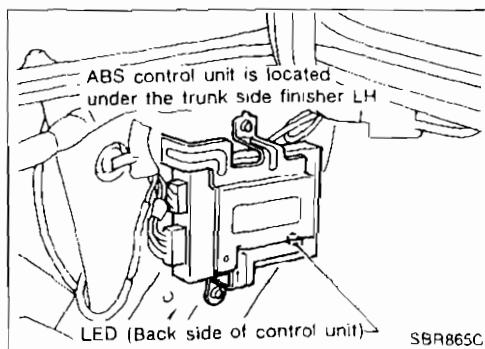
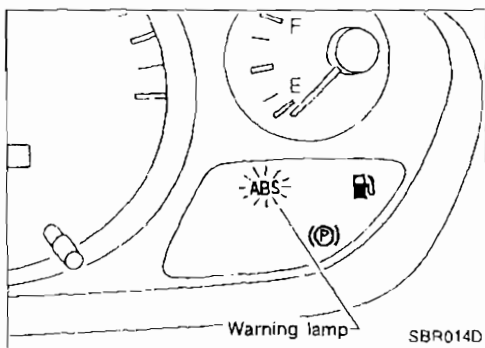
## System Description

### SENSOR

The sensor unit consists of a gear-shaped sensor rotor and a sensor element. The element contains a bar magnet wound with a coil. The sensor is installed on the back side of the brake rotor or the final drive. As the wheel rotates, the sensor generates a sine-wave pattern. The frequency and voltage increase(s) as the rotating speed increases.

### CONTROL UNIT

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 solenoid valve relay and motor relay. If any electrical malfunction should be detected in the system, the warning lamp is turned on. In this condition, the ABS will be deactivated, and the vehicle's brake system reverts to normal operation



# ANTI-LOCK BRAKE SYSTEM

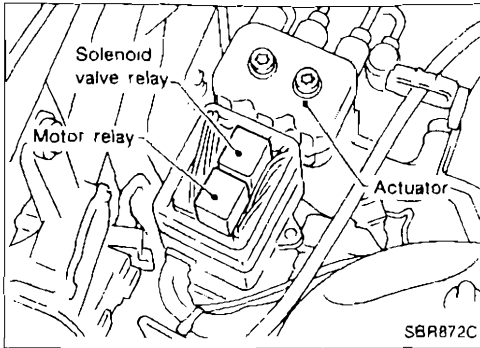
## System Description (Cont'd)

### ACTUATOR

The actuator contains:

- An electric motor and pump
- Two relays
- Six solenoid valves, each inlet and outlet for
  - LH front
  - RH front
  - LH and RH rear

These components control the hydraulic circuit. The ABS control unit directs the actuator to increase, hold or decrease hydraulic pressure to all or individual wheels.



### ABS actuator operation

|                        |                   | 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.  |

## Removal and Installation

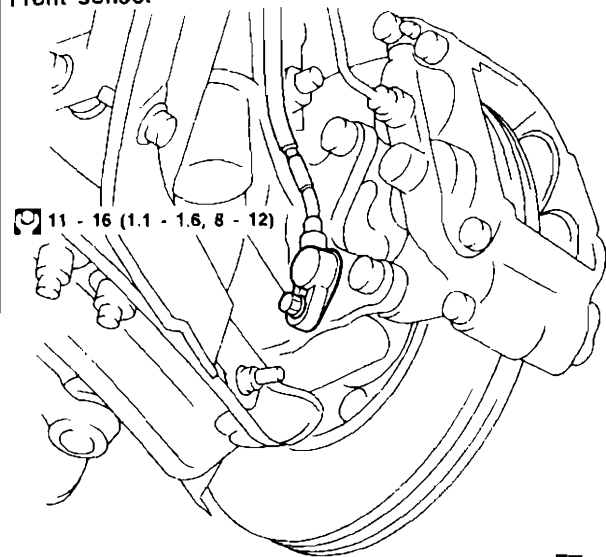
### CAUTION:

Be careful not to damage sensor edge and sensor rotor teeth. When removing the front wheel hub or final drive assemblies, first remove the ABS wheel sensor from the assembly. Failure to do so may result in damage to the sensor wires making the sensor inoperative.

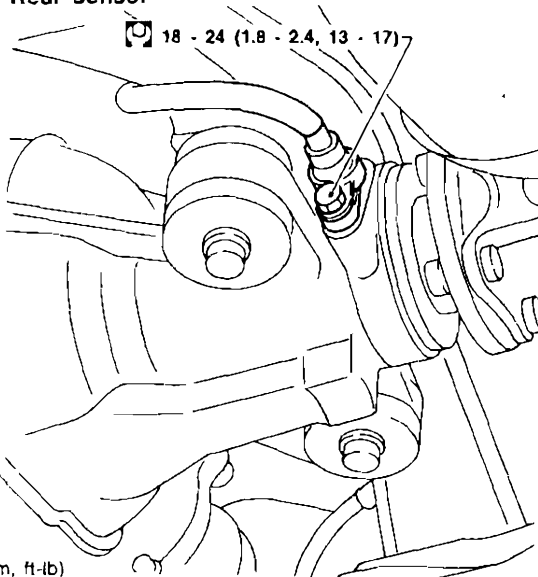
### WHEEL SENSORS

SEC. 476

Front sensor

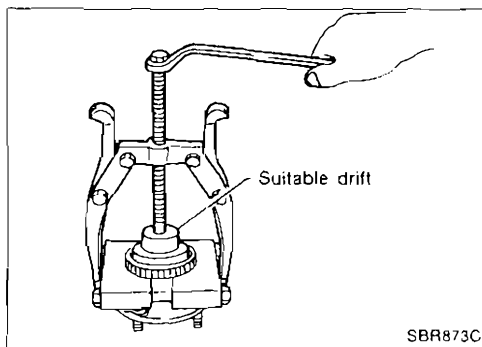


Rear sensor



: N·m (kg·m, ft·lb)

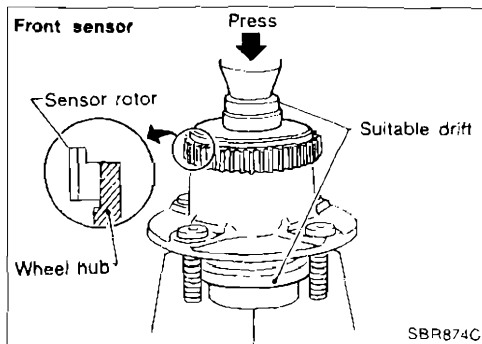
SBR997C



### SENSOR ROTOR

#### Removal

1. Remove the front wheel hub or final drive companion flange. Refer to FA and PD sections.
2. Remove the sensor rotor using suitable puller, drift and bearing replacer.



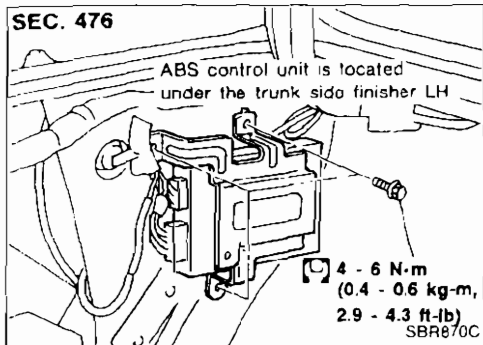
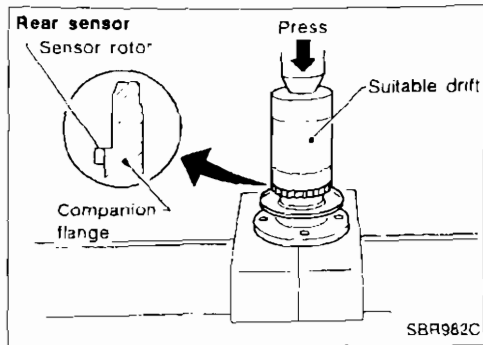
#### Installation

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 show in figure.

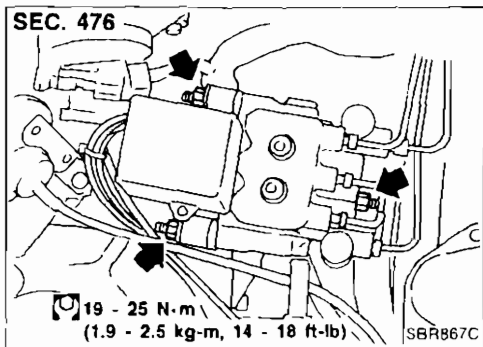
# ANTI-LOCK BRAKE SYSTEM

## Removal and Installation (Cont'd)



### CONTROL UNIT

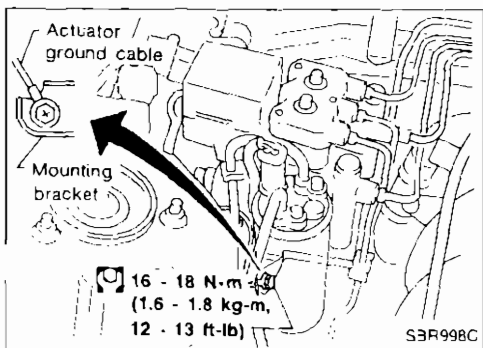
Location: Under trunk side finisher LH.



### ACTUATOR

#### Removal

1. Disconnect battery cable.
2. Drain brake fluid. Refer to "Changing Brake Fluid" (BR-5).
3. Apply different colored paint to each pipe connector and actuator to prevent incorrect connection.
4. Disconnect connector, brake pipes and remove fixing nuts and actuator ground cable.



#### Installation

#### CAUTION:

After installation, refill brake fluid. Then bleed air. Refer to "Bleeding Brake System" (BR-5).

1. Tighten actuator ground cable.  
**Place ground cable at a notch of mounting bracket.**
2. Connect brake pipes temporarily.
3. Tighten fixing nuts.
4. Tighten brake pipes.
5. Fix actuator harness clip on the mounting bracket.
6. Connect connector and battery cable.

### ACTUATOR RELAYS

1. Disconnect battery cable.
2. Remove actuator relay cover.
3. Pull out relays.

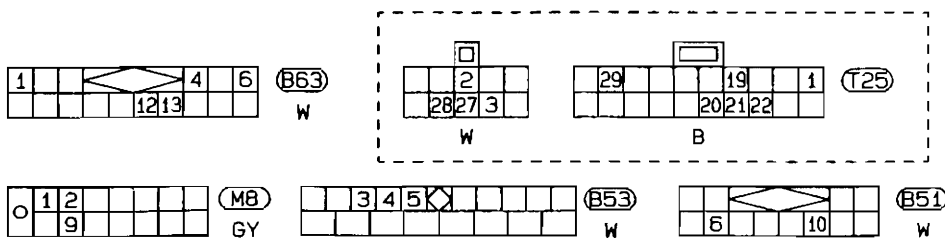
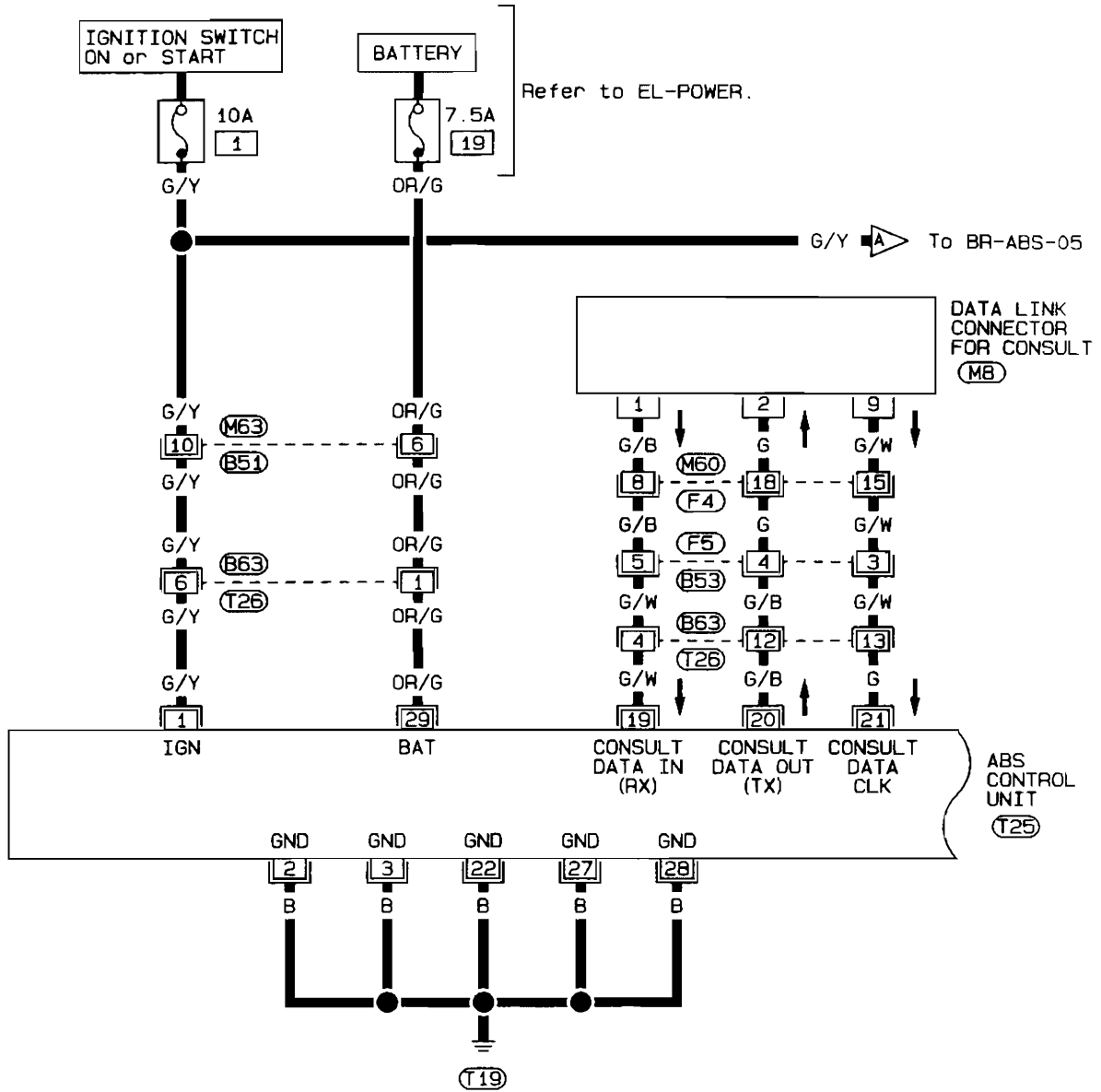


# ANTI-LOCK BRAKE SYSTEM

## Wiring Diagram — ABS —

LHD MODELS

BR-ABS-01



Refer to last page (Foldout page).

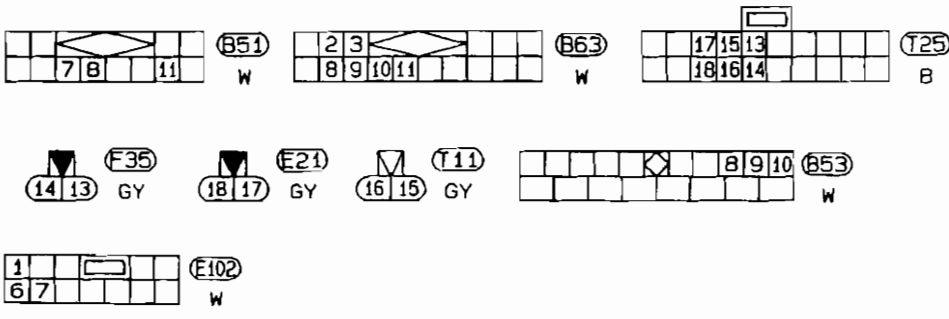
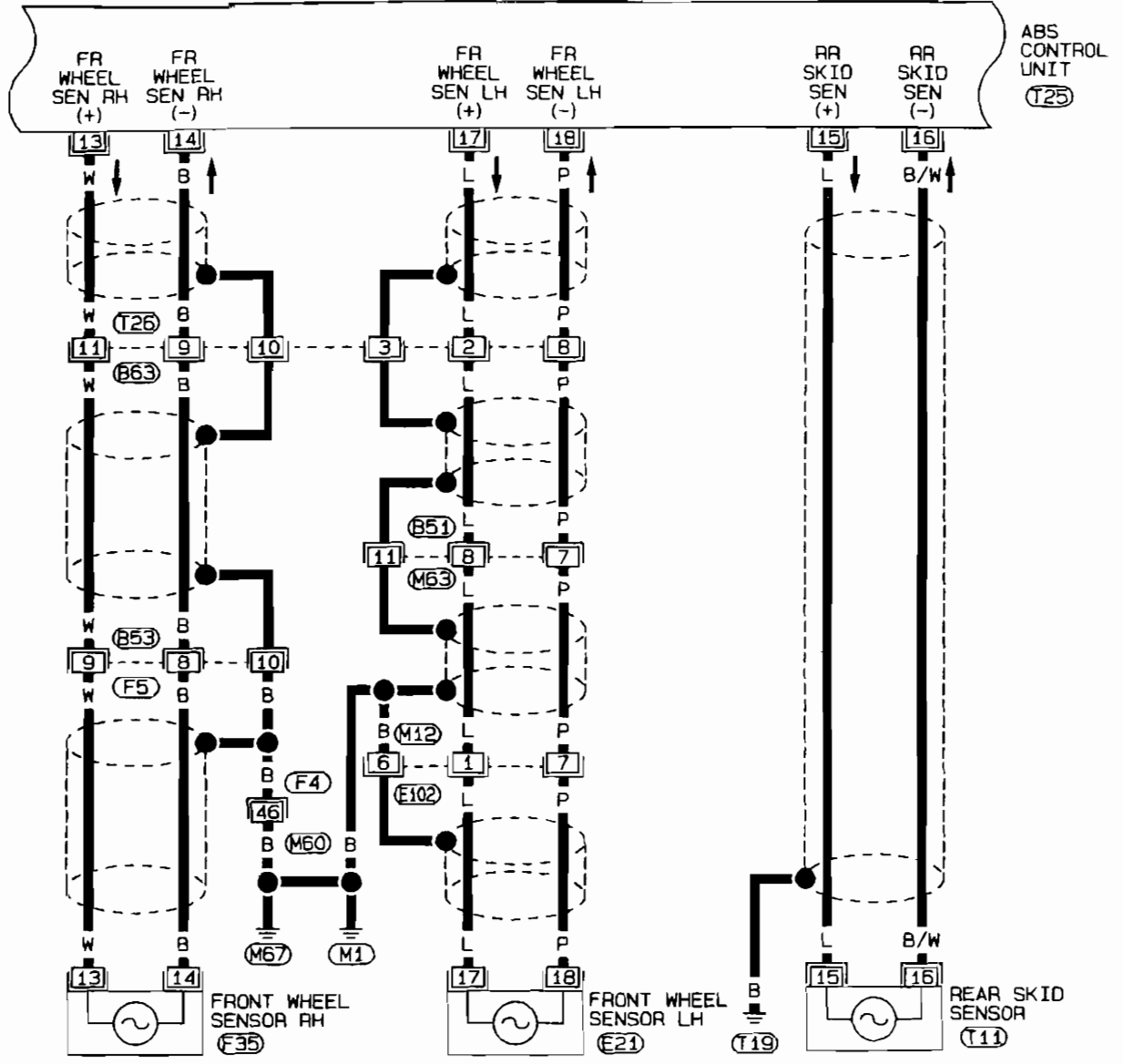
(M60) (F4)

BR

# ANTI-LOCK BRAKE SYSTEM

## Wiring Diagram — ABS — (Cont'd)

BR-ABS-02



Refer to last page (Foldout page).

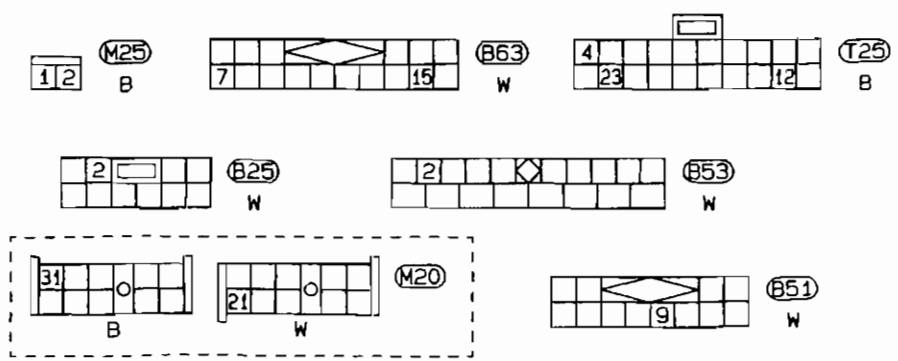
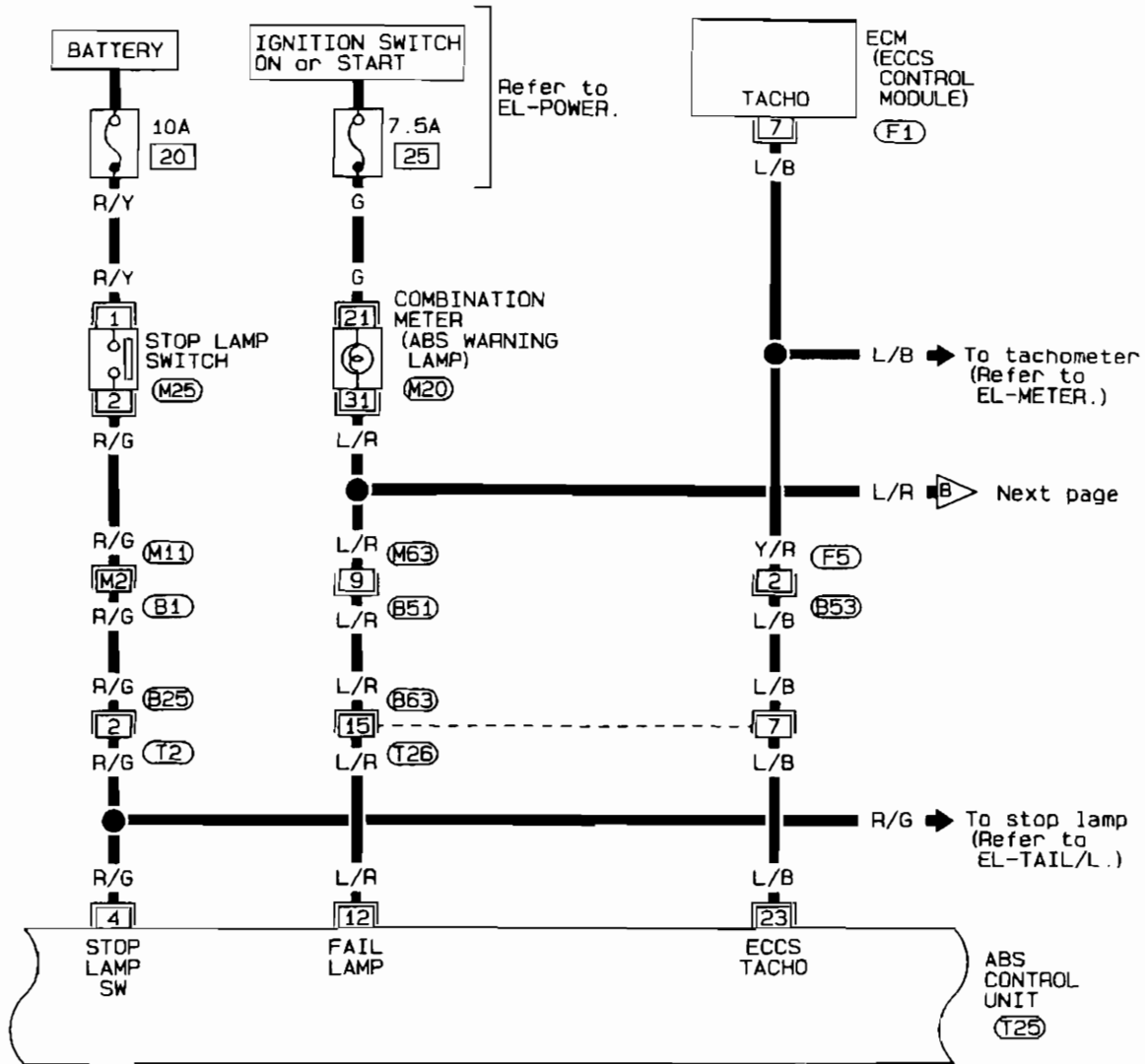
M60, F4

SBR002D

# ANTI-LOCK BRAKE SYSTEM

## Wiring Diagram — ABS — (Cont'd)

BR-ABS-03



Refer to last page (Foldout page).

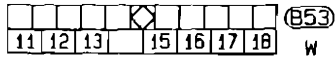
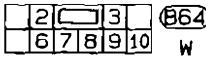
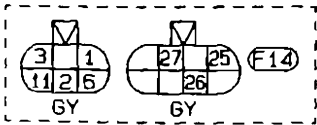
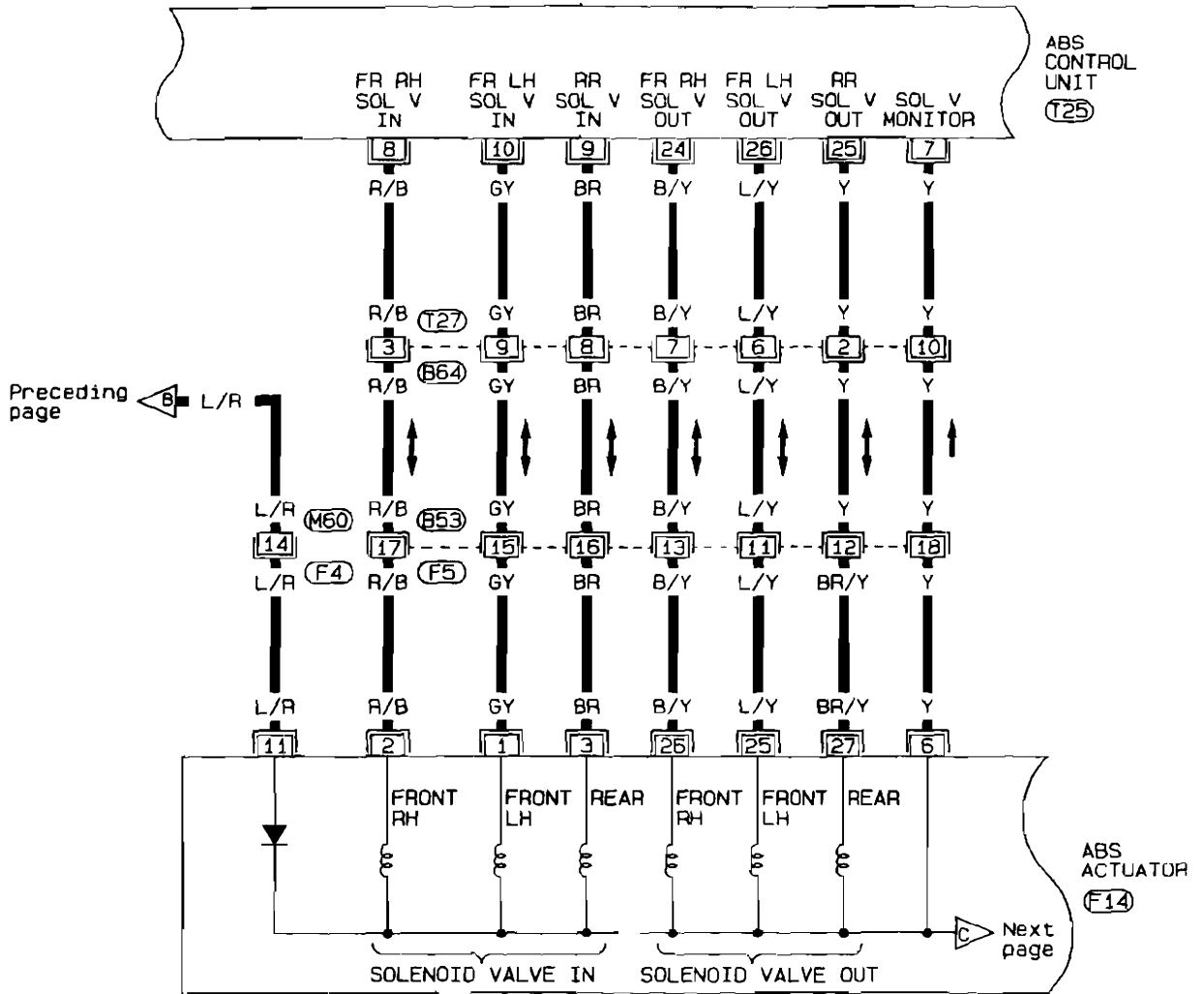
- (M11)
- (B1)
- (F1)

SBR003D

# ANTI-LOCK BRAKE SYSTEM

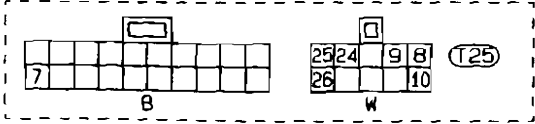
## Wiring Diagram — ABS — (Cont'd)

BR-ABS-04



Refer to last page (Foldout page).

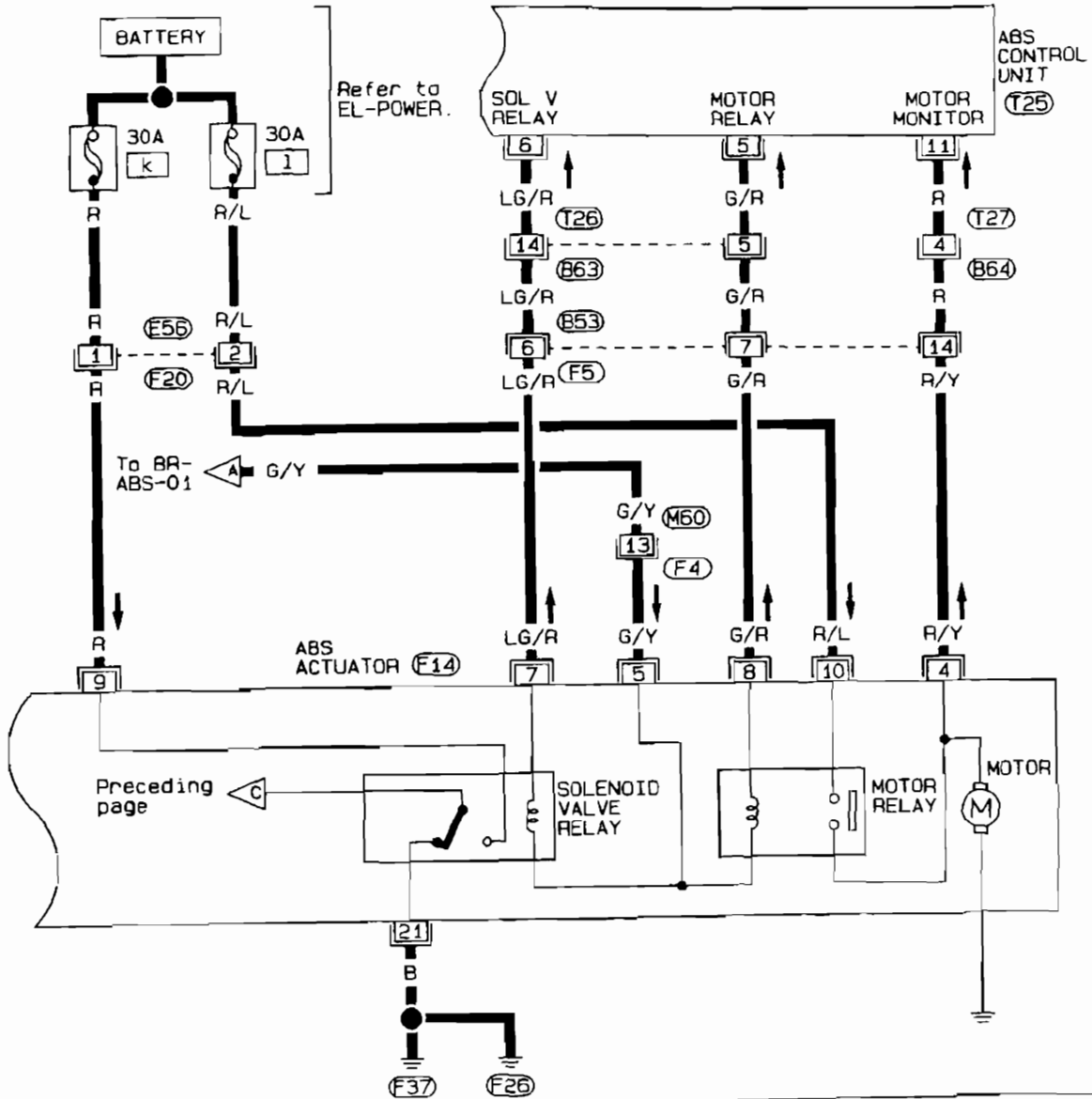
(M60), (F4)



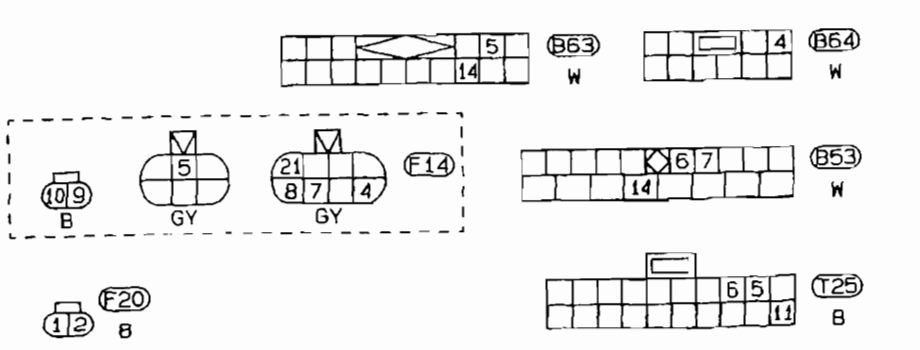
# ANTI-LOCK BRAKE SYSTEM

## Wiring Diagram — ABS — (Cont'd)

BR-ABS-05



BR



Refer to last page  
(Footnote page)  
(M60) (F4)

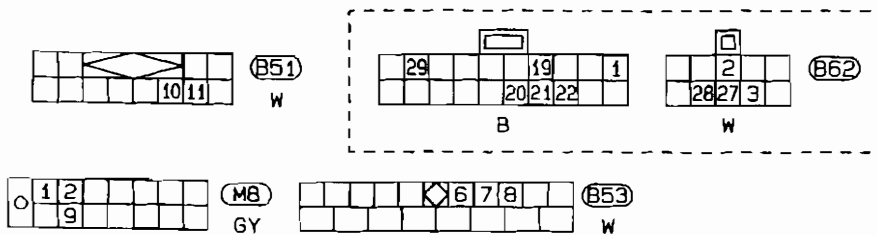
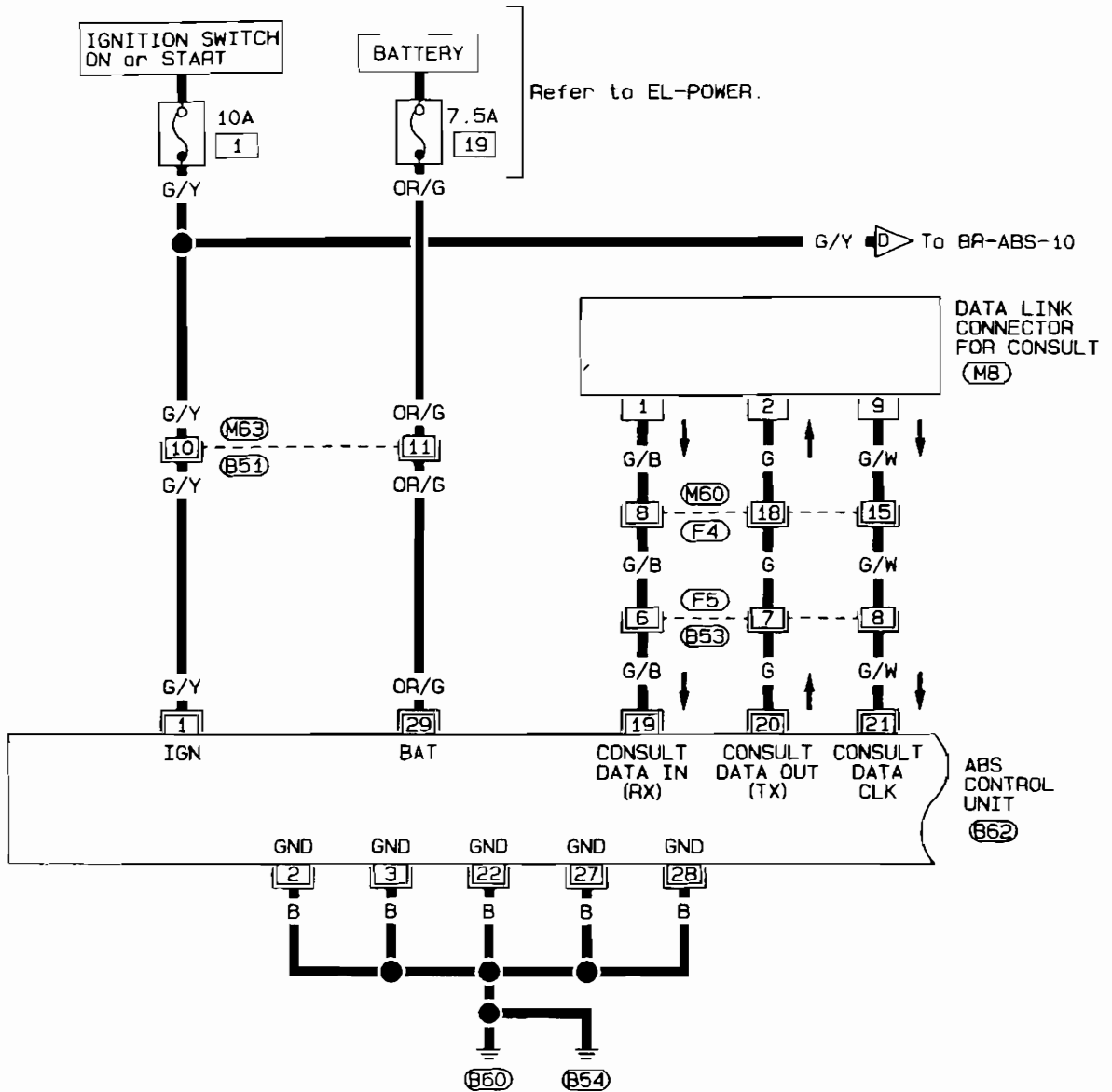
SBR005D

# ANTI-LOCK BRAKE SYSTEM

## Wiring Diagram — ABS — (Cont'd)

RHD MODELS

BR-ABS-06



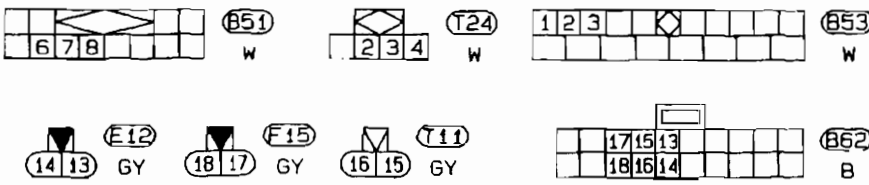
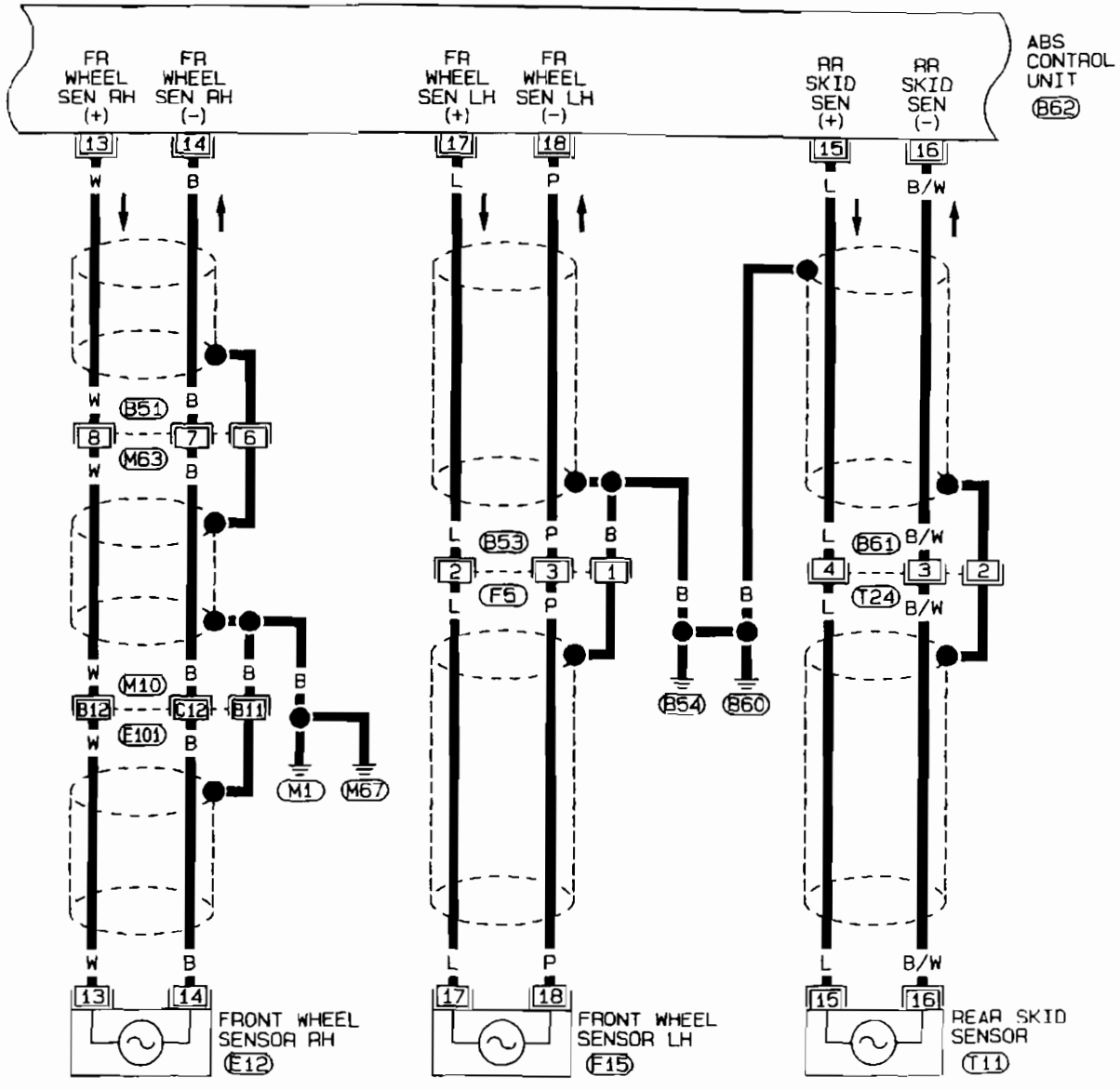
Refer to last page (Foldout page).

M60, F4

# ANTI-LOCK BRAKE SYSTEM

## Wiring Diagram — ABS — (Cont'd)

BR-ABS-07



Refer to last page (Foldout page).

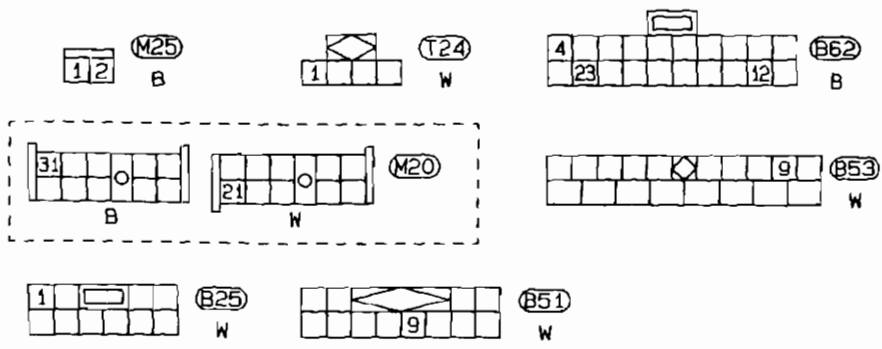
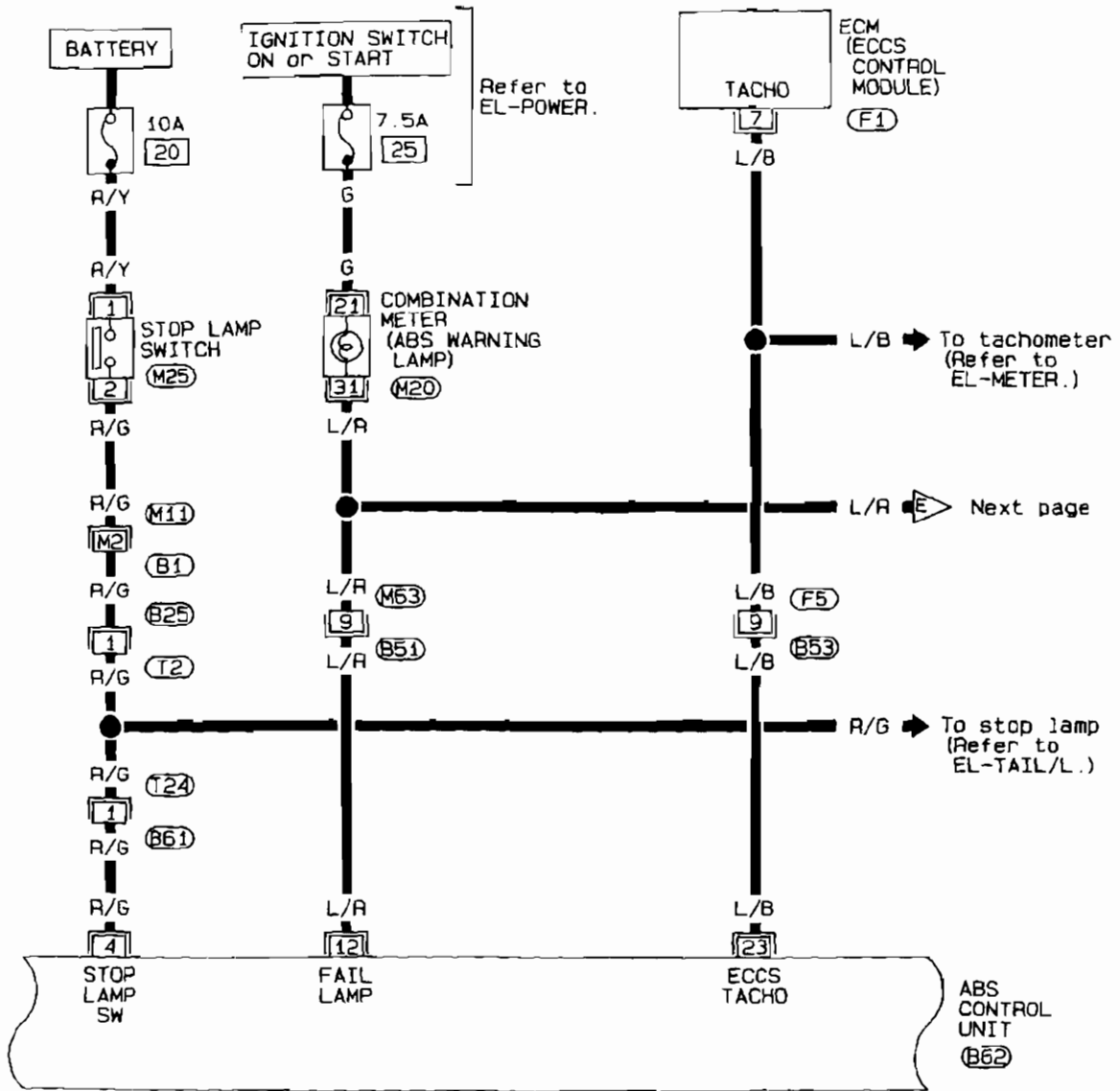
(M10), (E101)

SBR007D

# ANTI-LOCK BRAKE SYSTEM

## Wiring Diagram — ABS — (Cont'd)

BR-ABS-08



Refer to last page (Foldout page).

(M11) (B1)  
(F1)

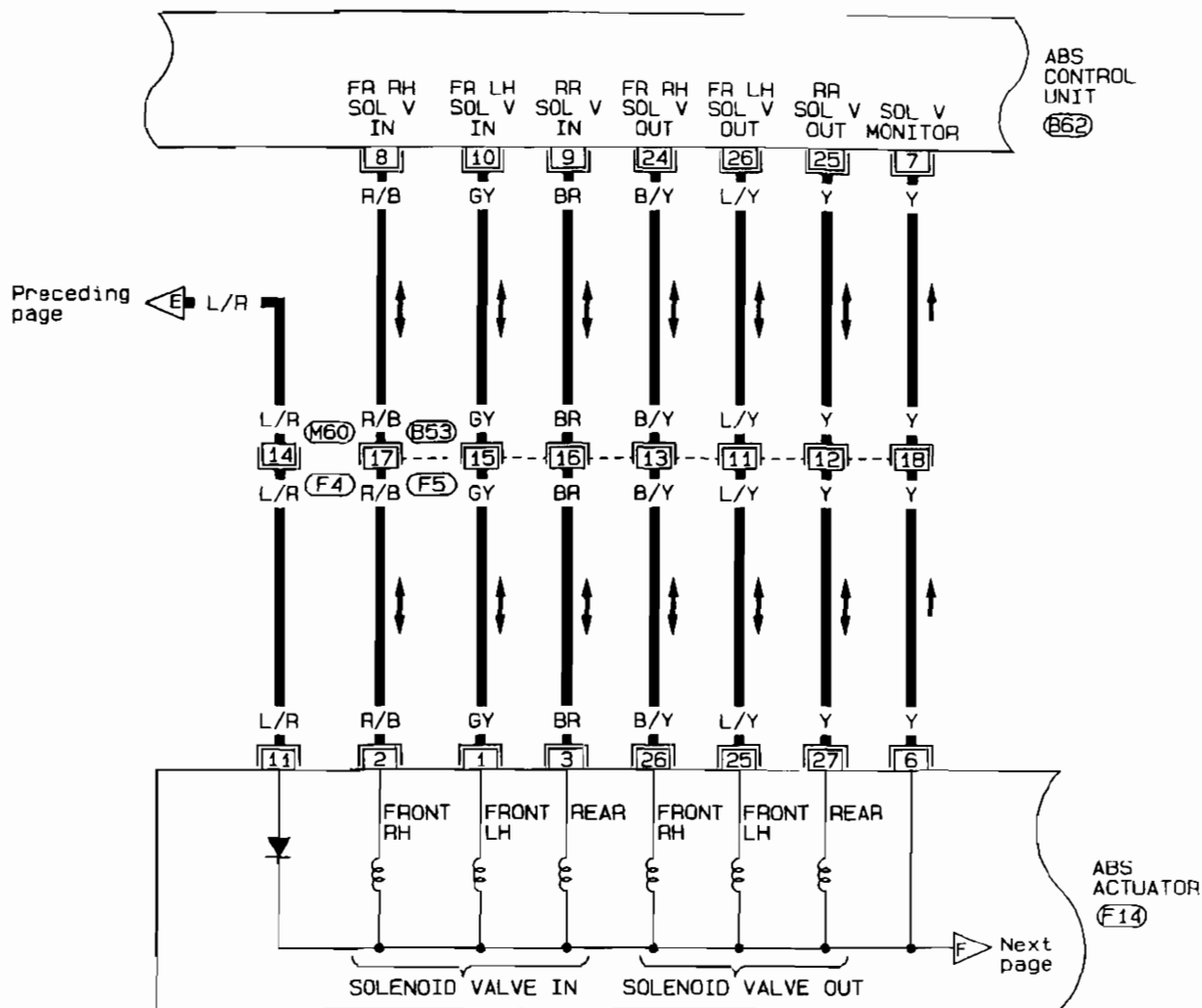
SBR0080



# ANTI-LOCK BRAKE SYSTEM

## Wiring Diagram — ABS — (Cont'd)

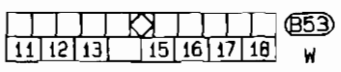
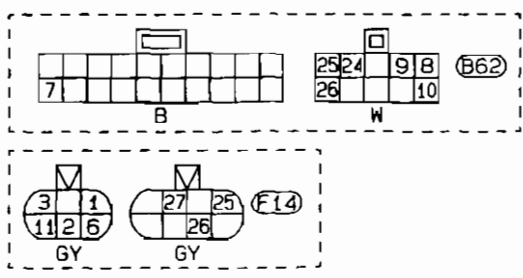
BR-ABS-09



Preceding page

ABS ACTUATOR (F14)

BR



Refer to last page (Foldout page).

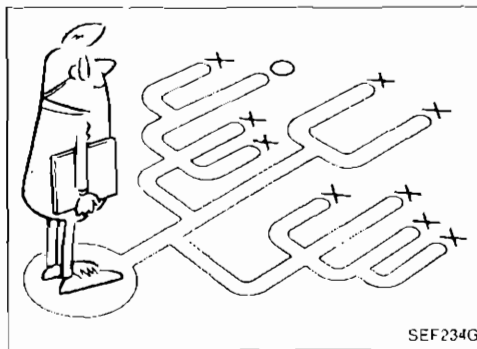
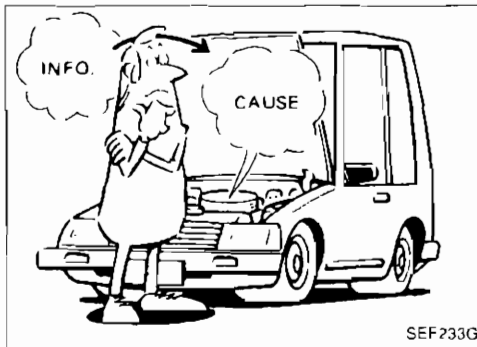
(M60), (F4)

SBR009D



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## How to Perform Trouble Diagnoses for Quick and Accurate Repair

### INTRODUCTION

The ABS system has an electronic control unit to control major functions. The control unit accepts input signals from sensors and instantly drives 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 the booster or 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 just a few minutes to talk with a customer who approaches with a ABS complaint. The customer is a very good source of information on such problems; especially intermittent ones. Through the talks with 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.

BR

# TROUBLE DIAGNOSES

## Self-diagnosis

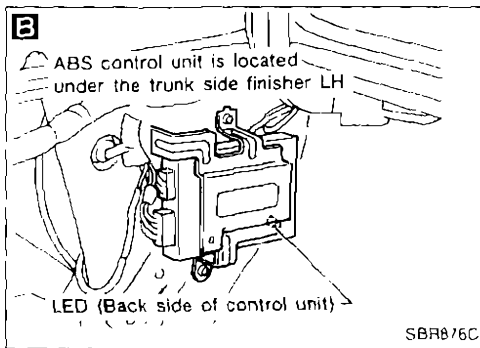
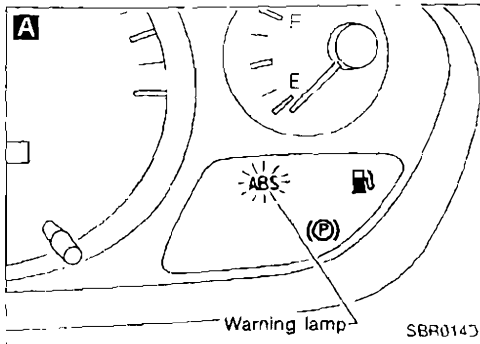
### FUNCTION

- When a problem occurs in the ABS, the warning lamp on the instrument panel comes on.
- A maximum of three malfunctions are stored in the memory of the ABS control unit.

**Erase the self-diagnosis results stored in the control unit after malfunctions are repaired (See next page).**

- The self-diagnosis results are identified by Consult or LED on the control unit

### SELF-DIAGNOSIS PROCEDURE



Start engine.  
Drive vehicle over 15 km/h (9 MPH) for at least one minute.

**A**  
Stop vehicle with engine running.  
**Make sure that the ABS warning lamp activates.**

**B**  
The LED on the ABS control unit flashes to indicate the malfunction code No

Verify the location of the malfunction with the malfunction code chart  
Then make necessary repairs following the diagnostic procedures

After the malfunctions are repaired, erase the self-diagnostic results stored in the control unit  
**Disconnect connectors for ABS control unit or the battery negative terminal for at least one minute.**

Check warning lamp for deactivation after driving vehicle over 15 km/h (9 MPH) for at least one minute

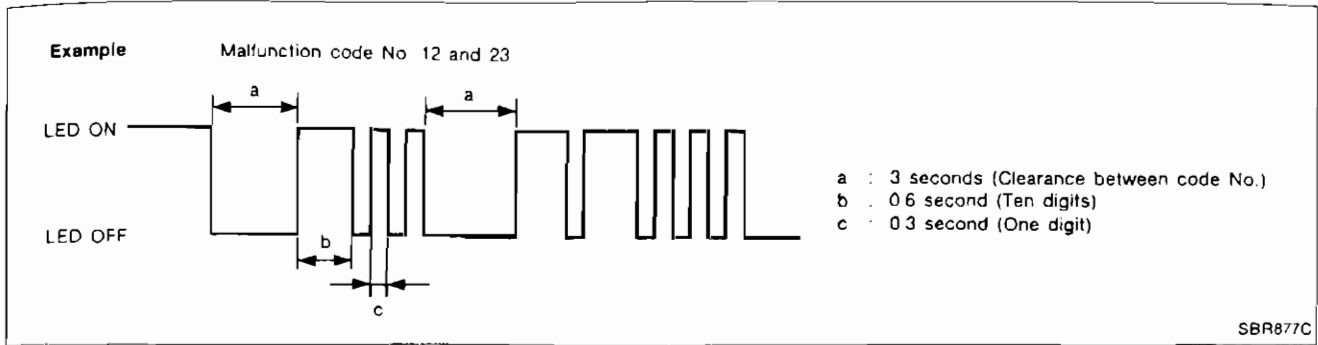
Test the ABS in a safe area to verify that it functions properly

# TROUBLE DIAGNOSES

## Self-diagnosis (Cont'd)

### HOW TO READ SELF-DIAGNOSTIC RESULTS (Malfunction codes)

- Determine the code No. by counting the number of times the LED flashes on and off
- The malfunction code chart is given on the next page.



### HOW TO ERASE SELF-DIAGNOSTIC RESULTS (Malfunction codes)

- Disconnect ABS control unit connectors or battery negative terminal for at least one minute.

SI  
ME  
FW  
LD  
EQ  
FE  
CL  
MT  
ET  
FD  
FL  
RA  
BR  
ST  
PS  
ST  
HL  
EL  
DX

## TROUBLE DIAGNOSES

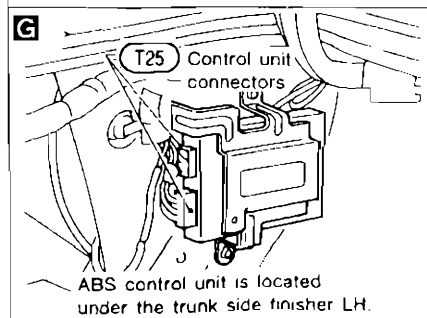
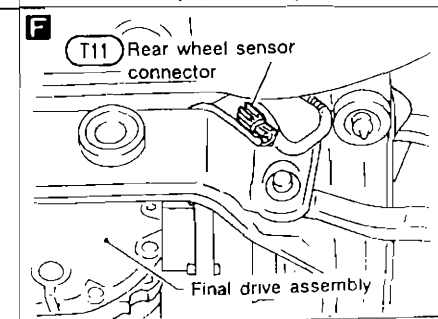
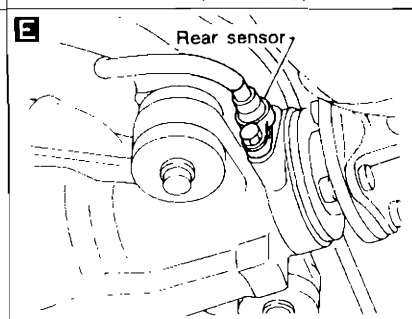
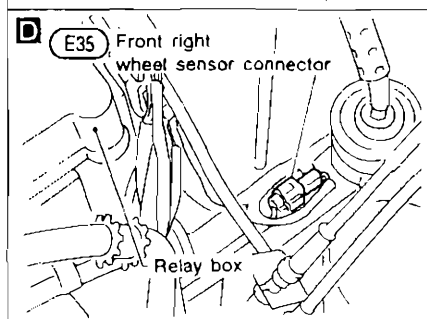
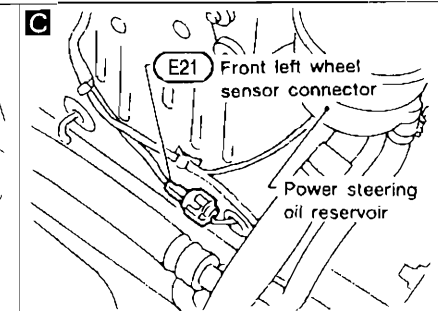
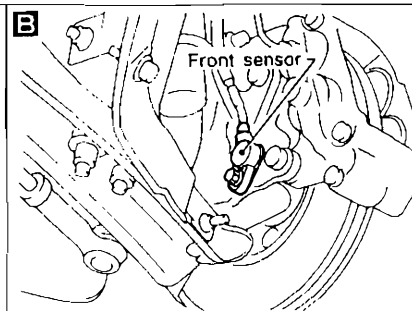
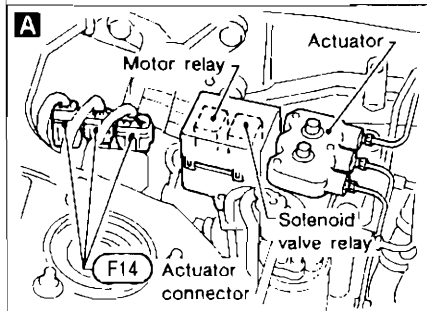
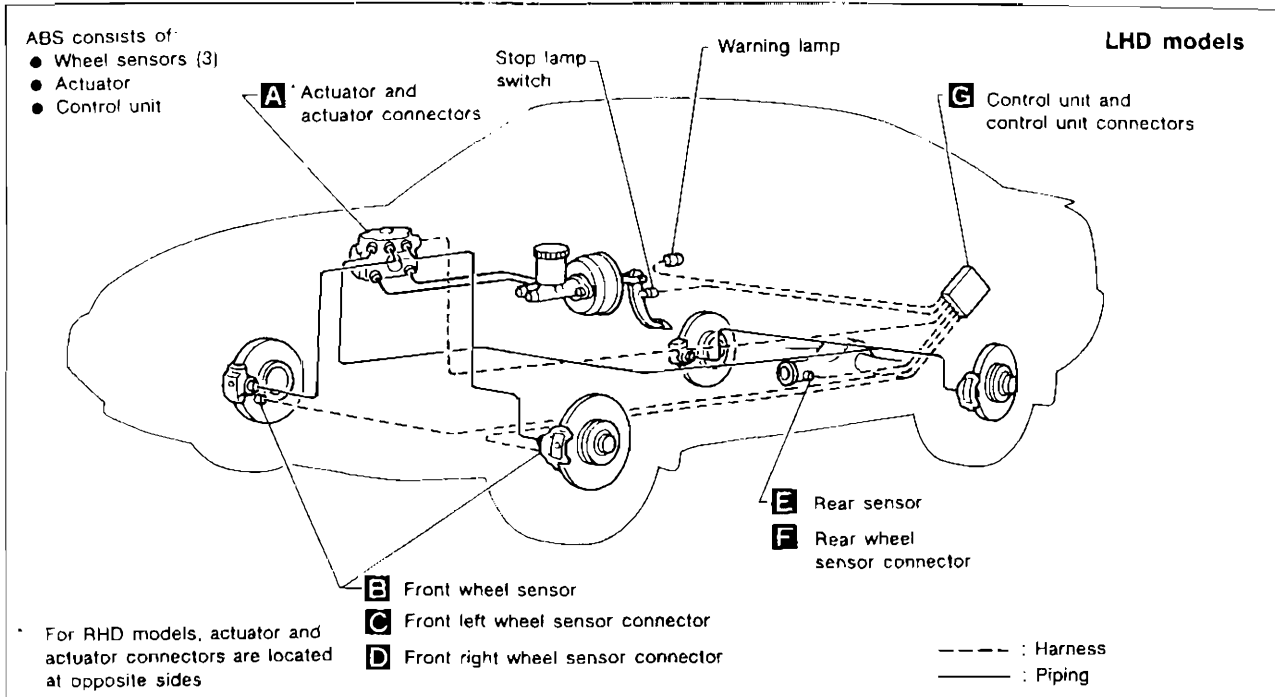
### Self-diagnosis (Cont'd)

#### MALFUNCTION CODE/SYMPTOM CHART

| Code No (No of LED flashes)                                      | Malfunctioning part and circuit  | Diagnostic procedure |
|--|--|----------------------|
| 01   | Front right sensor (open-circuit)  | 4                    |
| 02   | Front left sensor (open-circuit)   | 4                    |
| 03   | Rear sensor (open-circuit)   | 4                    |
| 05   | Front right sensor (short-circuit)   | 4                    |
| 06   | Front left sensor (short-circuit)  | 4                    |
| 07   | Rear sensor (short-circuit)  | 4                    |
| 11   | Actuator front right inlet solenoid valve (open-circuit)                             | 3                    |
| 12   | Actuator front left inlet solenoid valve (open-circuit)                              | 3                    |
| 13   | Actuator rear inlet solenoid valve (open-circuit)                                    | 3                    |
| 15   | Actuator front right outlet solenoid valve (open-circuit)                            | 3                    |
| 16   | Actuator front left outlet solenoid valve (open-circuit)                             | 3                    |
| 17   | Actuator rear outlet solenoid valve (open-circuit)                                   | 3                    |
| 21   | Actuator front right inlet solenoid valve (short-circuit)                            | 3                    |
| 22   | Actuator front left inlet solenoid valve (short-circuit)                             | 3                    |
| 23   | Actuator rear inlet solenoid valve (short-circuit)                                   | 3                    |
| 25   | Actuator front right outlet solenoid valve (short-circuit)                           | 3                    |
| 26   | Actuator front left outlet solenoid valve (short-circuit)                            | 3                    |
| 27   | Actuator rear outlet solenoid valve (short-circuit)                                  | 3                    |
| 41   | Solenoid valve relay circuit (unable to turn off)                                    | 6                    |
| 42   | Solenoid valve relay circuit (unable to turn on)                                     | 6                    |
| 43   | Actuator motor or motor relay (unable to turn off)                                   | 5                    |
| 44   | Actuator motor or motor relay (unable to turn on)                                    | 5                    |
| 47   | Power supply (High voltage)  | 7                    |
| 48   | Power supply (Low voltage)   | 7                    |
| 45, 46, 77<br>LED deactivation or continuous activation          | Control unit<br>Ground circuit   | 2                    |
| Warning lamp does not come on when ignition switch is turned on. | Fuse, warning lamp bulb or warning lamp circuit<br>Control unit power supply circuit | 1                    |
| Pedal vibration and noise  | —  | 9                    |
| Long stopping distance   | —  | 10                   |
| Unexpected pedal action  | —  | 11                   |
| ABS does not work  | —  | 12                   |
| ABS works frequently.  | —  | 13                   |

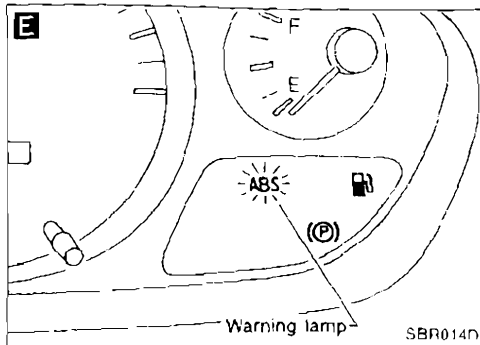
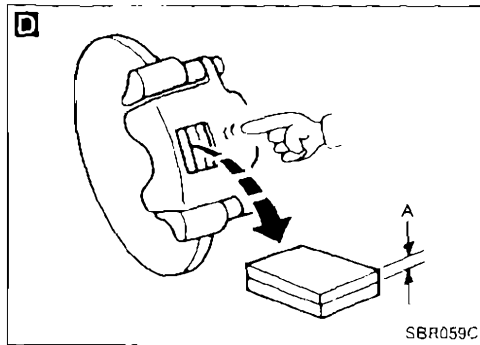
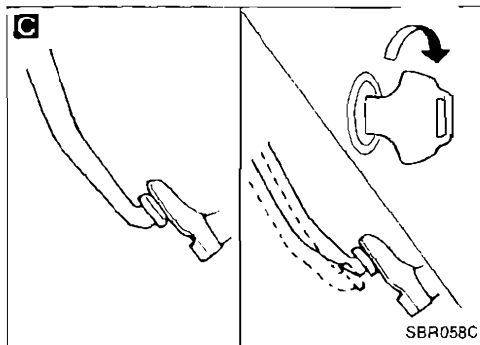
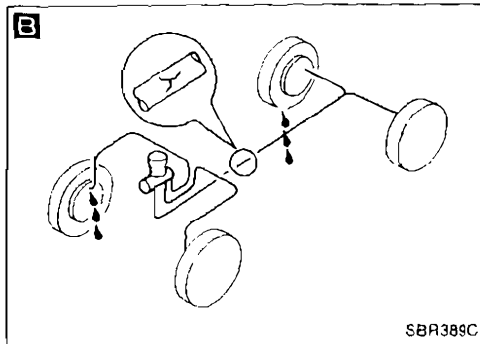
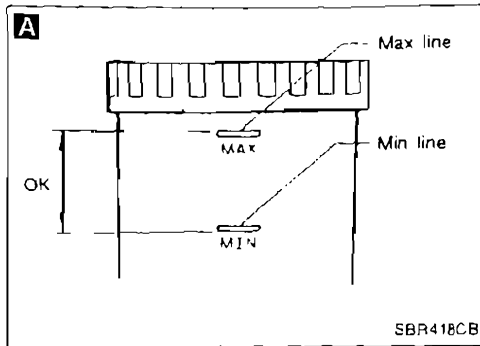
# TROUBLE DIAGNOSES

## Component Parts and Harness Connector Location

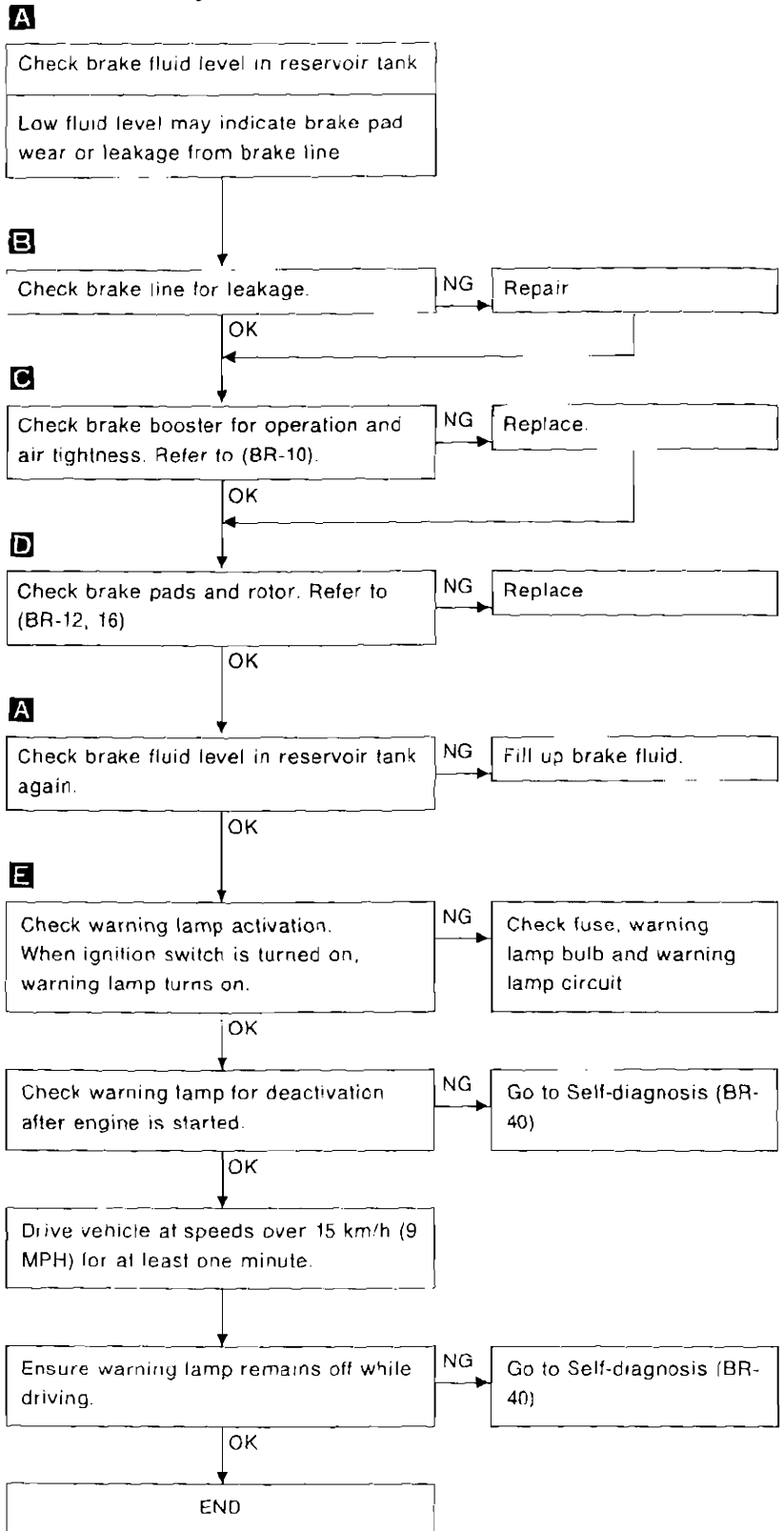


**BR**

# TROUBLE DIAGNOSES

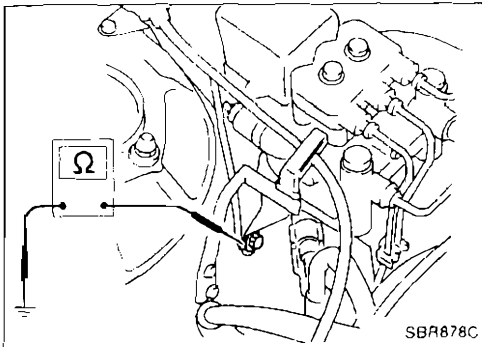


## Preliminary Check





# TROUBLE DIAGNOSES

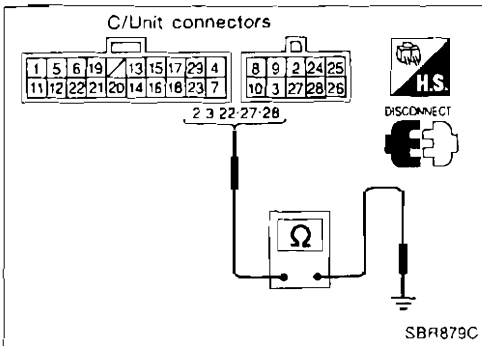


## Ground Circuit Check

### ACTUATOR MOTOR GROUND

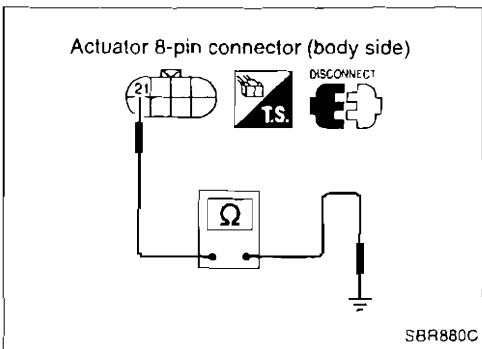
Actuator motor ground is secured with actuator mounting bracket bolt.

- Check resistance between actuator motor ground terminal and body ground.  
**Resistance: approximately 0Ω**



### CONTROL UNIT GROUND

- Check resistance between control unit connector terminals and ground.  
**Resistance: approximately 0Ω**

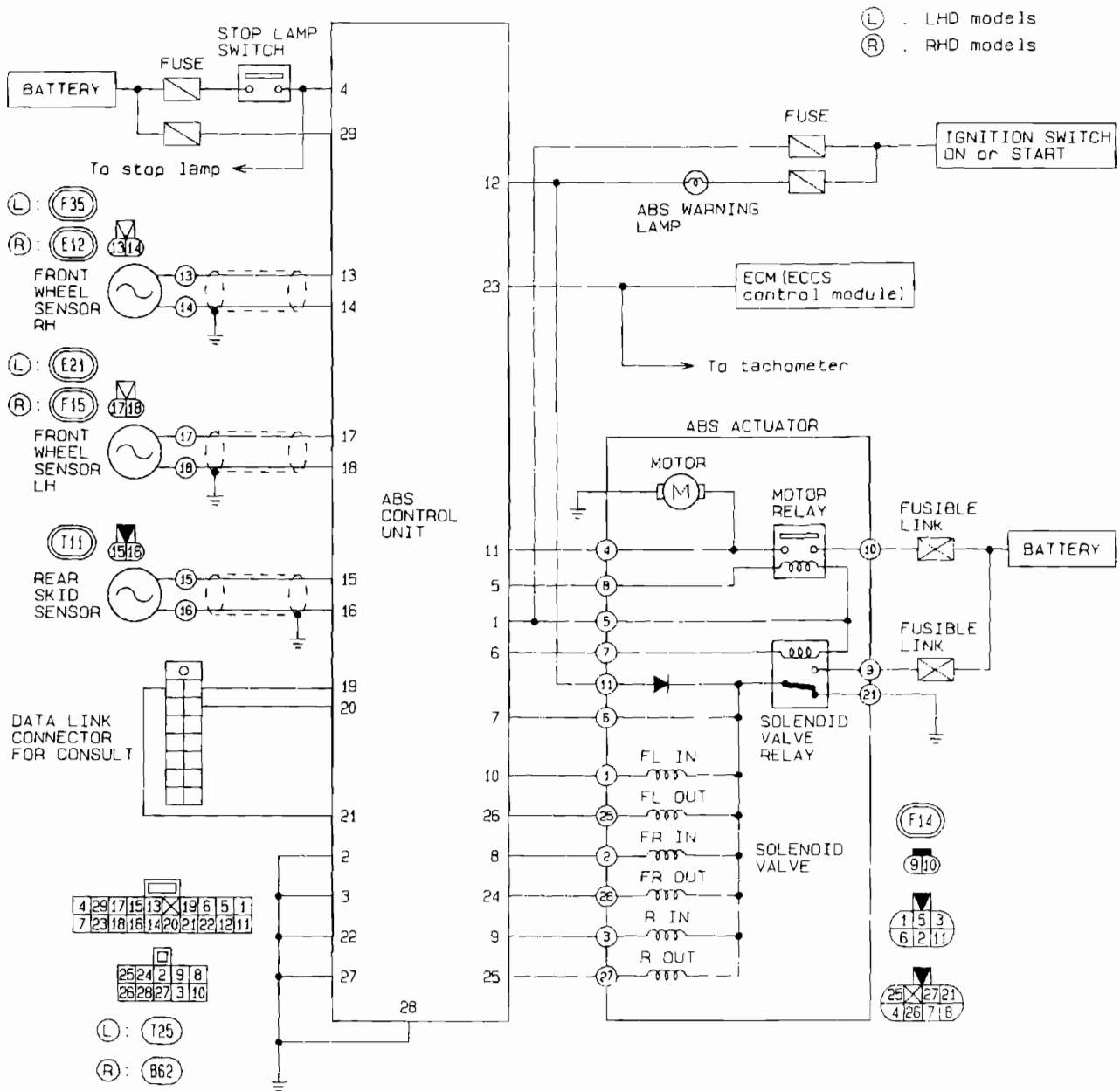


### ACTUATOR GROUND

- Check resistance between actuator harness 8-pin connector (body side) terminal ②1 and ground.  
**Resistance: approximately 0Ω**

# TROUBLE DIAGNOSES

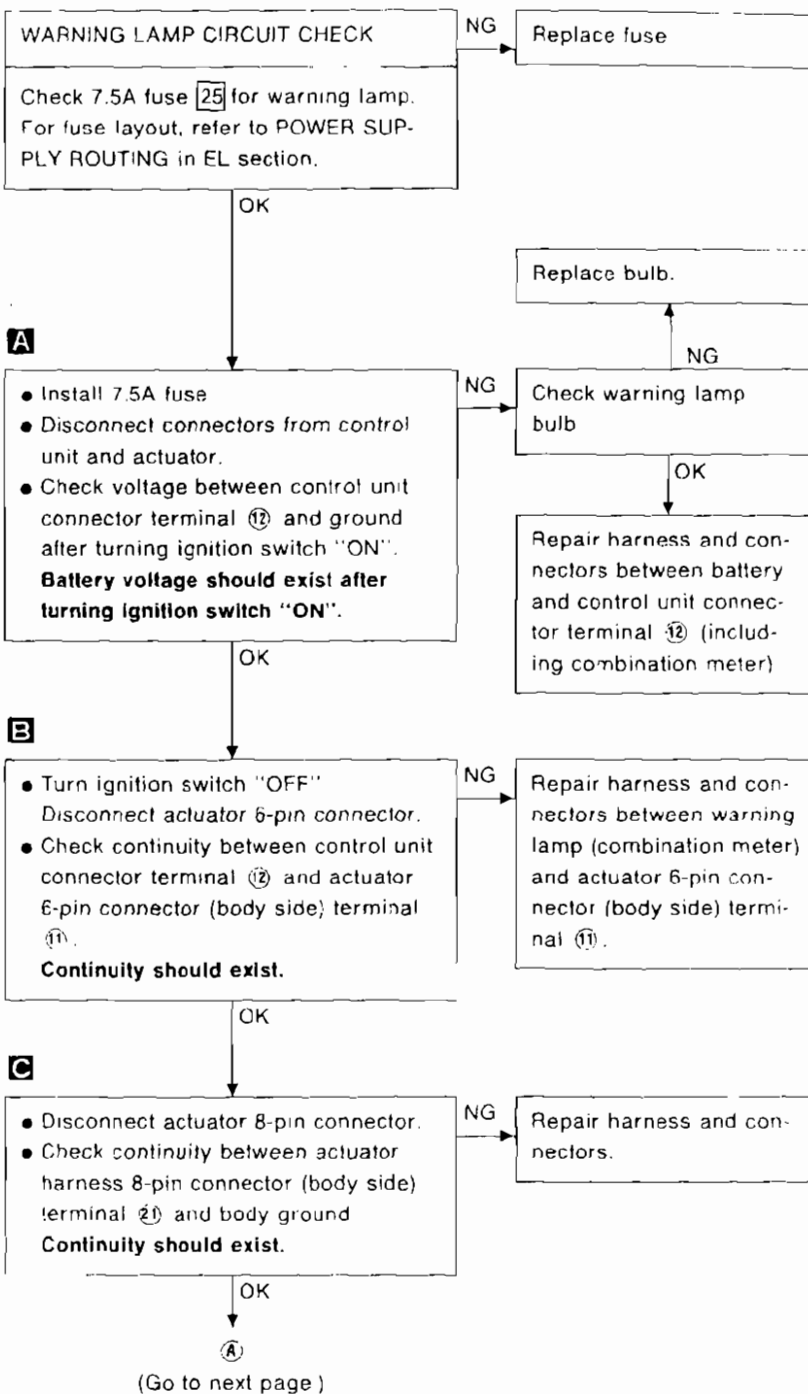
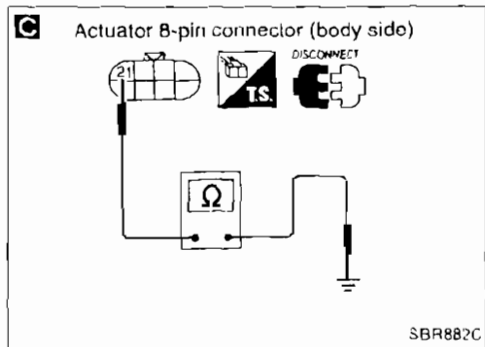
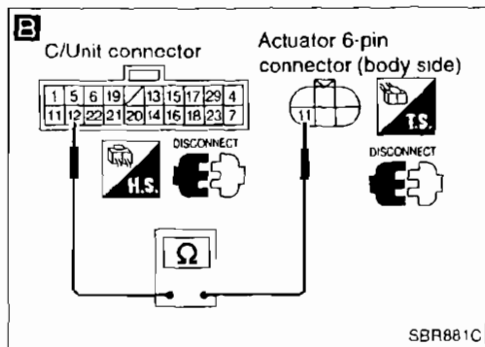
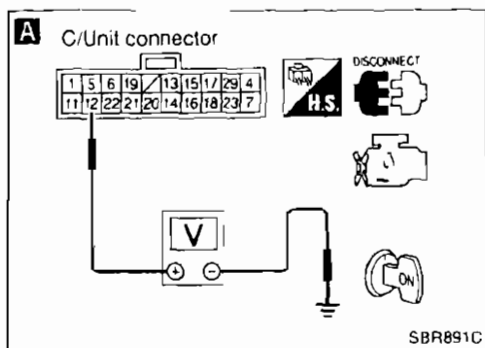
## Circuit Diagram for Quick Pinpoint Check



# TROUBLE DIAGNOSES

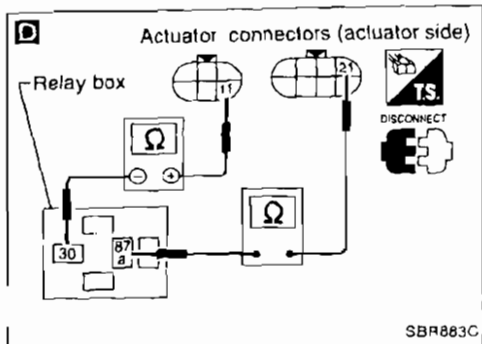
## Diagnostic Procedure 1 (Not self-diagnostic item)

Warning lamp does not work when ignition switch is turned ON.



# TROUBLE DIAGNOSES

## Diagnostic Procedure 1 (Not self-diagnostic item) (Cont'd)



**D**

- Disconnect solenoid valve relay
- Check continuity between actuator connector (actuator side) terminals and solenoid valve relay box terminals.

| Actuator | Relay box |
|----------|-----------|
| 11 ⊕     | 30 ⊖      |
| 21       | 87a       |

Continuity should exist.  
**Note: Pay attention to tester polarity\*.**

OK

CHECK SOLENOID VALVE RELAY.

Refer to SOLENOID VALVE RELAY in Electrical Components Inspection (BR-65).

OK

Go to **D** in Diagnostic Procedure 2.

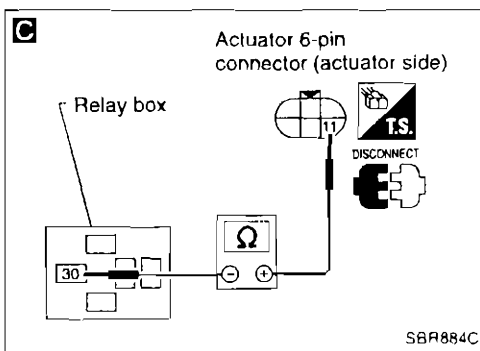
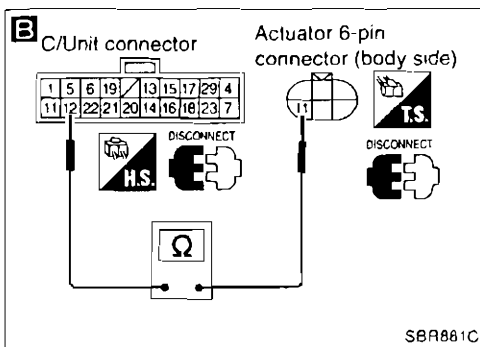
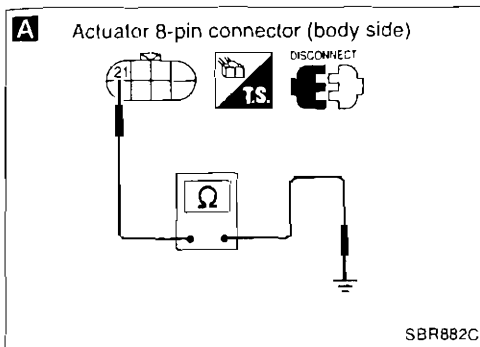
NG

Replace actuator assembly

NG

Replace solenoid valve relay.

\*: Specifications may vary depending on the type of tester.  
 Before performing this inspection, refer to the instruction manual of the tester.



## Diagnostic Procedure 2

### CONTROL UNIT OR GROUND CIRCUIT

(Malfunction code No. 45, 46, 77, LED deactivation or continuous activation)

• Disconnect connectors from control unit and actuator. Check terminals for damage or connection. Then reconnect connectors.

• Carry out self-diagnosis again

**Does warning lamp activate again?**

No → Inspection end

Yes

**SOLENOID VALVE RELAY CHECK**

NG → Replace solenoid valve relay

Refer to SOLENOID VALVE RELAY in Electrical Components Inspection (BR-65).

OK

**A** SOLENOID VALVE RELAY GROUND CIRCUIT

NG → Repair harness and connectors

- Disconnect actuator 8-pin connector.
- Check continuity between actuator 8-pin connector (body side) terminal ⑪ and body ground.

**Continuity should exist.**

OK

**B**

NG → Repair harness and connectors.

- Disconnect control unit connectors and actuator 6-pin connector.
- Check continuity between control unit connector terminal ⑫ and actuator 6-pin connector (body side) terminal ⑪.

**Continuity should exist.**

OK

**C**

NG → Replace actuator assembly.

- Check continuity between actuator 6-pin connector (actuator side) terminal ⑪ and solenoid valve relay box terminal ⑬.

| Actuator | Relay box | Continuity |
|----------|-----------|------------|
| 11 ⊕     | 30 ⊖      | Yes        |
| 11 ⊖     | 30 ⊕      | No         |

**Note: Pay attention to tester polarity\*.**

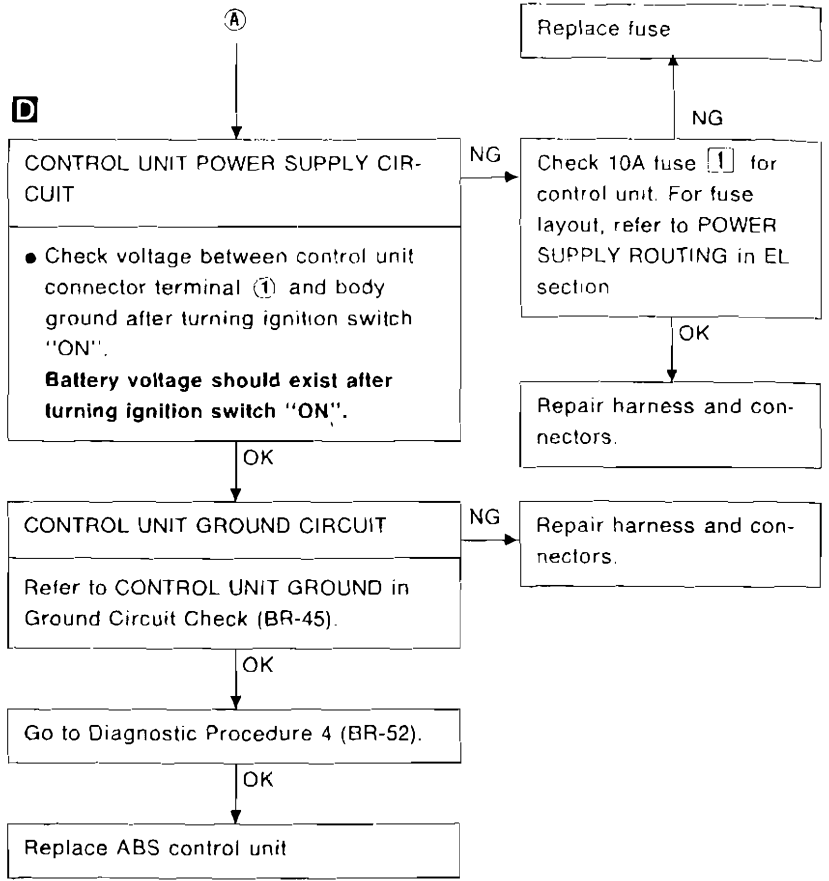
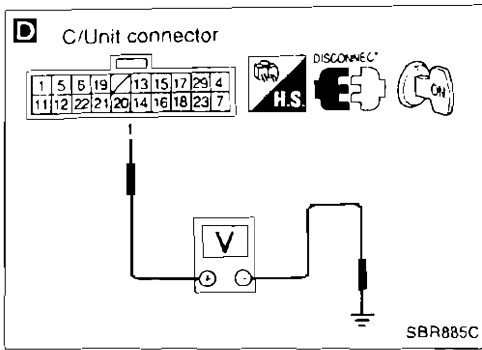
OK

(A)  
(Go to next page.)

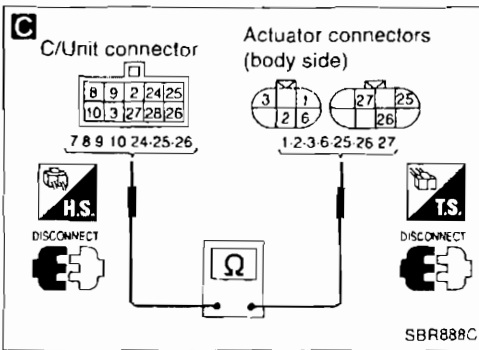
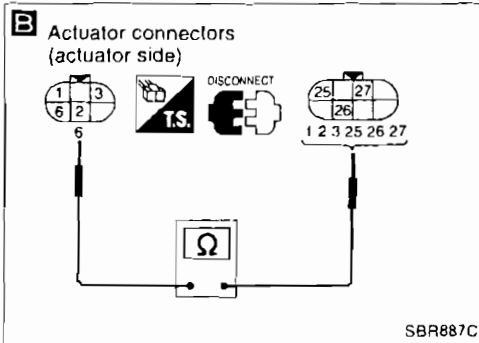
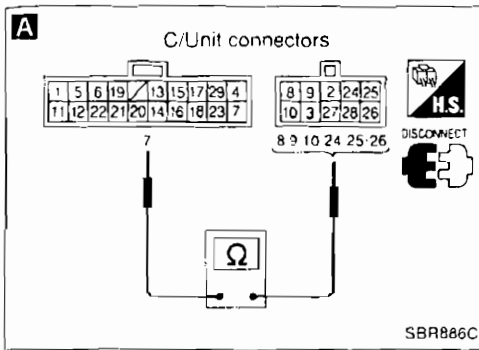
\*: Specifications may vary depending on the type of tester. Before performing this inspection, refer to the instruction manual of the tester.

# TROUBLE DIAGNOSES

## Diagnostic Procedure 2 (Cont'd)



# TROUBLE DIAGNOSES



## Diagnostic Procedure 3

### ACTUATOR SOLENOID VALVE

(Malfunction code No. 11 - 13, 15 - 17, 21 - 23, 25 - 27)

- Disconnect connectors from control unit and actuator. Check terminals for damage or loose connection. Then reconnect connectors.
- Carry out self-diagnosis again. **Does warning lamp activate again?**

No → Inspection end

Yes

**A** ACTUATOR SOLENOID VALVE CHECK

- Disconnect control unit connectors.
- Check resistance between control unit connector terminals.

| Code No. (LED flashes) | Terminals  |
|------------------------|------------|
| 11, 21                 | (7) - (8)  |
| 12, 22                 | (7) - (10) |
| 13, 23                 | (7) - (9)  |
| 15, 25                 | (7) - (24) |
| 16, 26                 | (7) - (26) |
| 17, 27                 | (7) - (25) |

Resistance: 3.7 - 8.0Ω

OK → Replace control unit

NG

**B**

- Disconnect actuator connectors.
- Check resistance between actuator connector (actuator side) terminals.

| Code No. (LED flashes) | Terminals  |
|------------------------|------------|
| 11, 21                 | (5) - (2)  |
| 12, 22                 | (6) - (1)  |
| 13, 23                 | (5) - (3)  |
| 15, 25                 | (6) - (25) |
| 16, 26                 | (6) - (26) |
| 17, 27                 | (6) - (27) |

Resistance: 3.7 - 8.0Ω

NG → Replace actuator

OK

**C**

- Check continuity between control unit connector terminals and actuator connector (body side) terminals

| Code No. (LED flashes) | Control unit | Actuator |
|------------------------|--------------|----------|
| 11, 21                 | (8)          | (2)      |
| 12, 22                 | (10)         | (1)      |
| 13, 23                 | (9)          | (3)      |
| 15, 25                 | (24)         | (25)     |
| 16, 26                 | (26)         | (26)     |
| 17, 27                 | (25)         | (27)     |
| 42                     | (7)          | (6)      |

Continuity should exist.

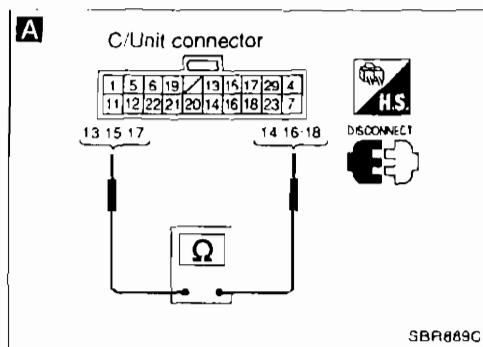
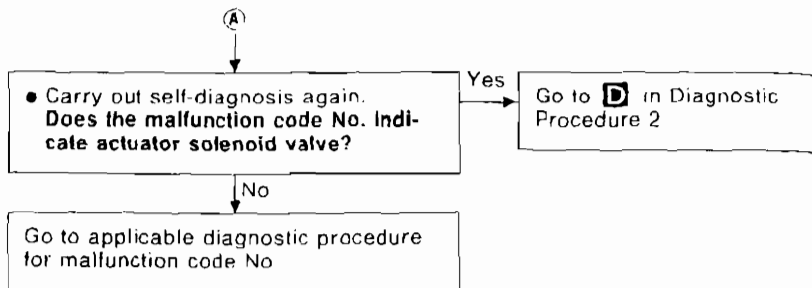
NG → Repair harness and connector

OK

(Go to next page)

# TROUBLE DIAGNOSES

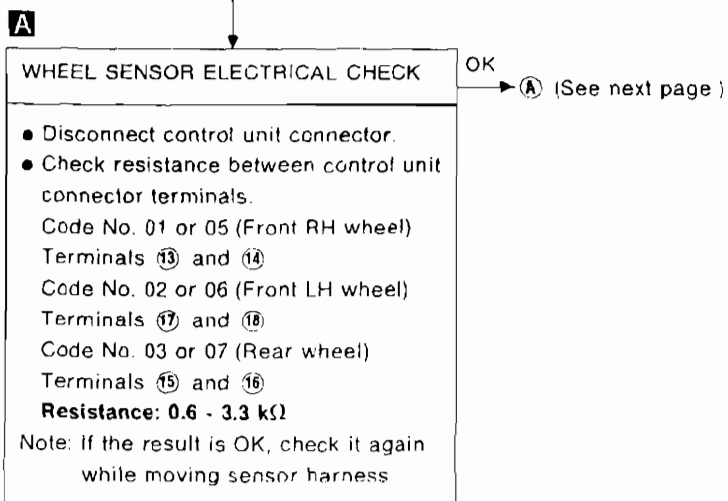
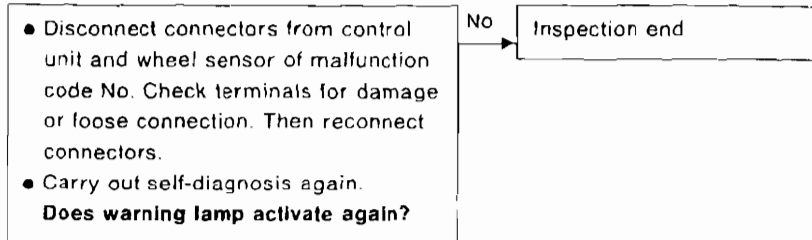
## Diagnostic Procedure 3 (Cont'd)



## Diagnostic Procedure 4

### WHEEL SENSOR OR ROTOR

(Malfunction code No. 01 - 03, 05 - 07)



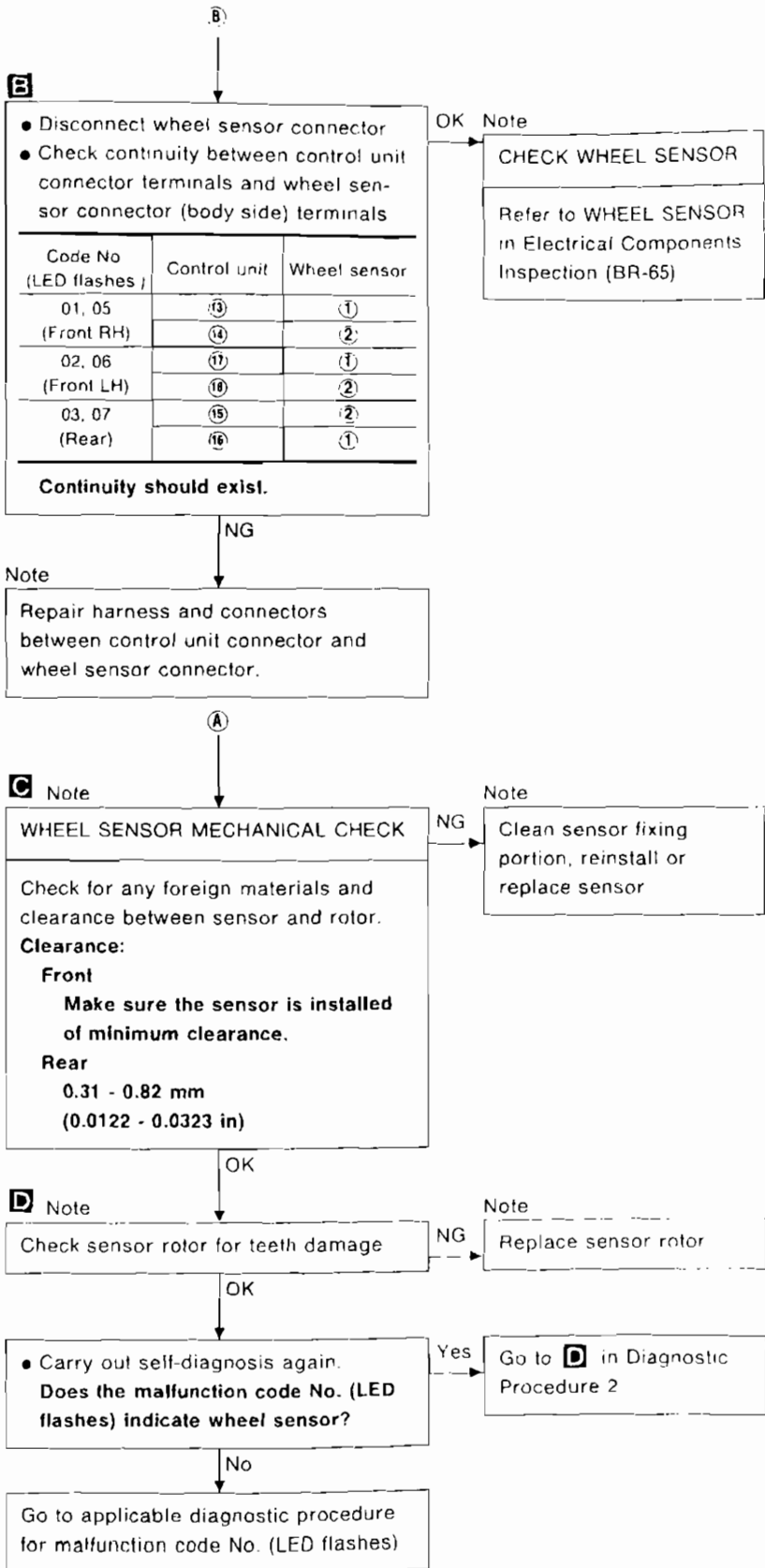
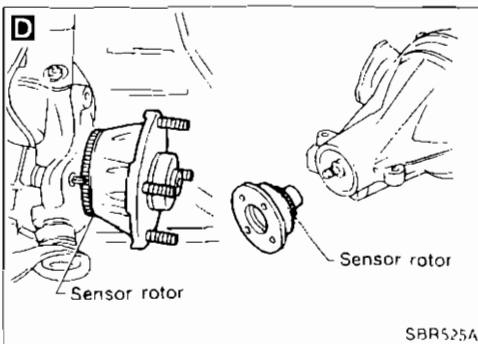
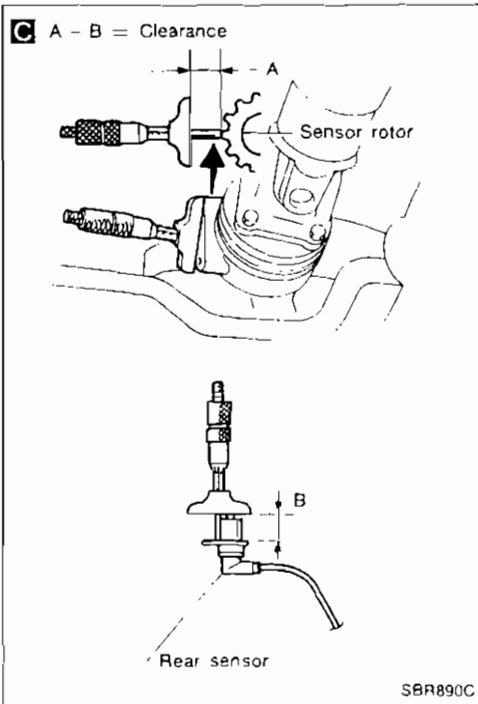
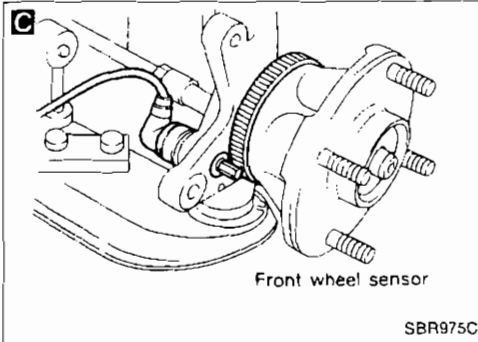
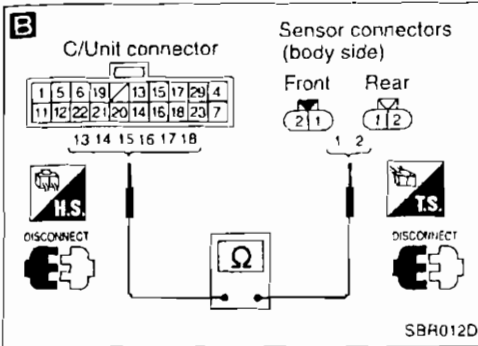
(B)  
(Go to next page.)

**Note:** Wheel position should be distinguished by code No. (LED flashes).



# TROUBLE DIAGNOSES

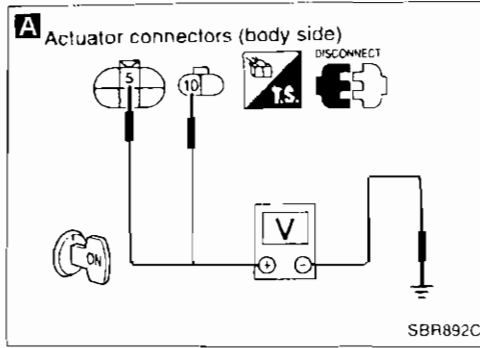
## Diagnostic Procedure 4 (Cont'd)



Note: Wheel position should be distinguished by code No. (LED flashes).

# TROUBLE DIAGNOSES

## Diagnostic Procedure 5 MOTOR RELAY OR MOTOR (Malfunction code No. 43, 44)

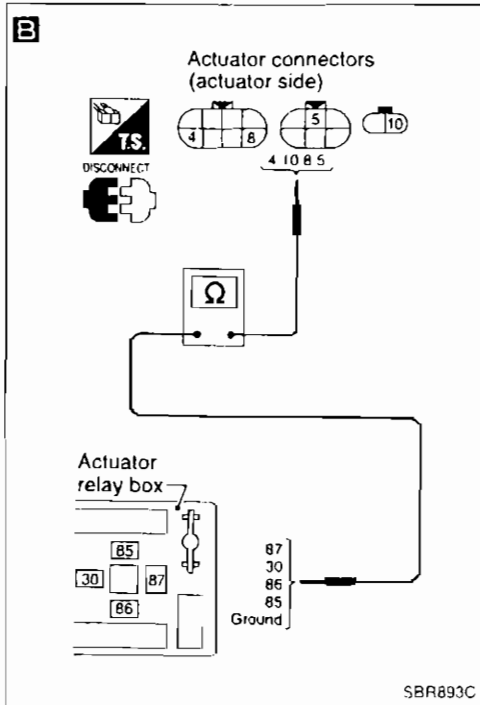


MOTOR POWER SUPPLY CIRCUIT

● Check 30A fusible link **L** and 10A fuse **I** for actuator. For fusible link and fuse layout, refer to POWER SUPPLY ROUTING in EL section.

NG → **B** (Skip page.)

OK

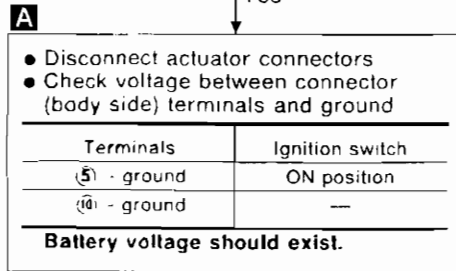


● Disconnect connectors from control unit and actuator. Check terminals for damage or loose connection. Then reconnect connectors.

● Carry out self-diagnosis again.  
**Does warning light activate again?**

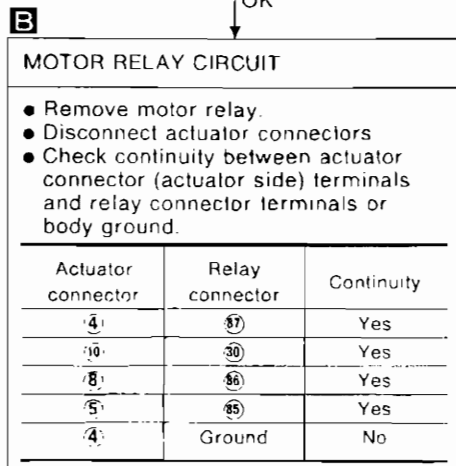
No → Inspection end

Yes



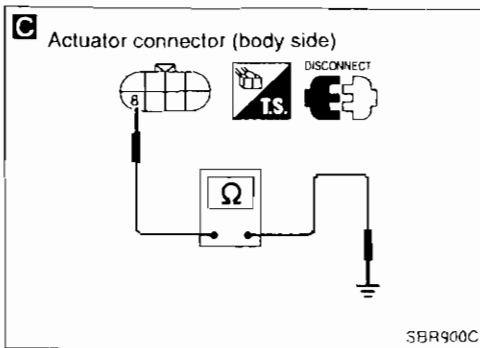
NG → Repair harness and connectors between battery and actuator connector (body side) terminals.

OK



NG → Replace actuator assembly

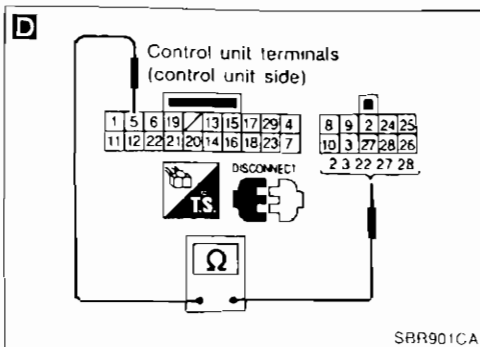
OK



● Check continuity between actuator connector (body side) terminal **8** and ground.  
**Continuity should not exist.**

OK → **(A)** (Go to next page)

NG



● Disconnect control unit connectors.

● Check continuity between control unit terminals (control unit side) **(5)** and **(2, 3, 22, 27, 28)**.  
**Continuity should not exist.**

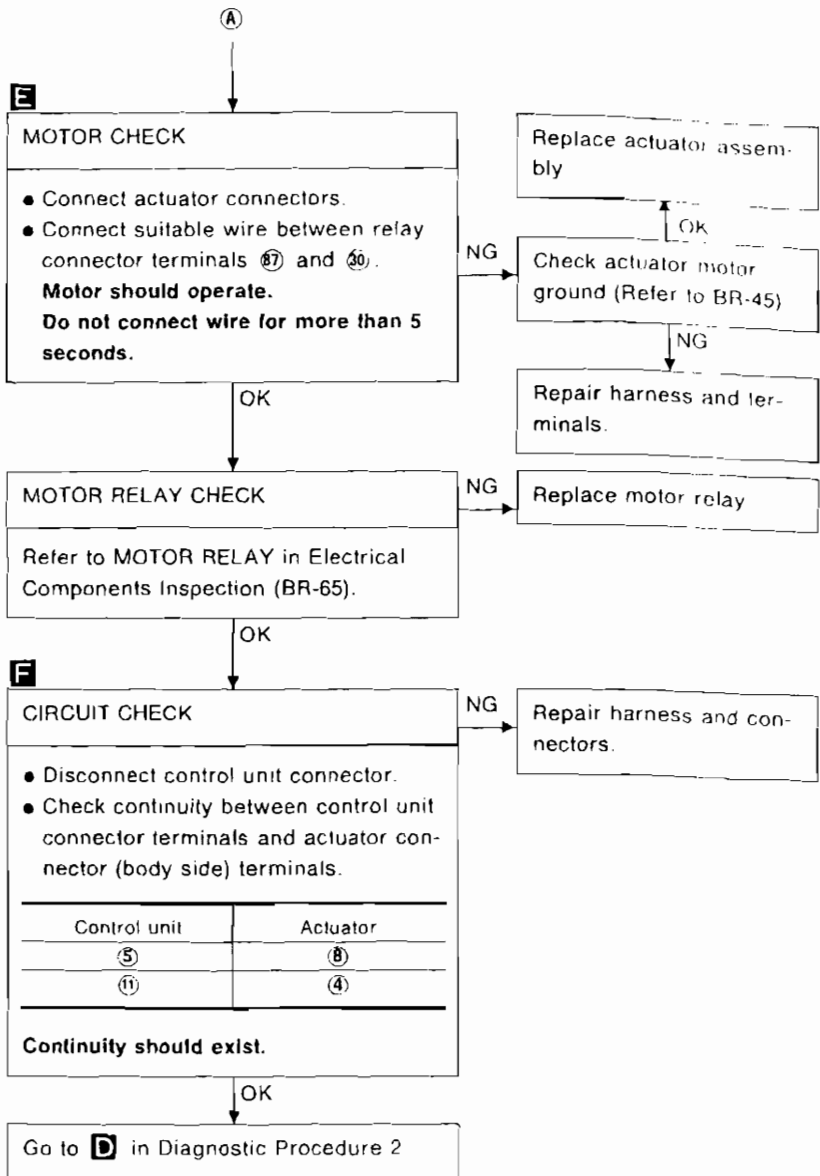
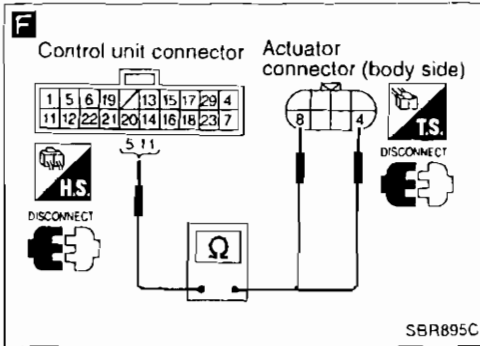
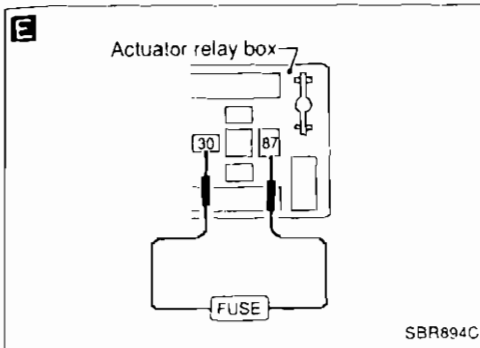
OK → Repair harness and connectors

NG

Replace control unit

# TROUBLE DIAGNOSES

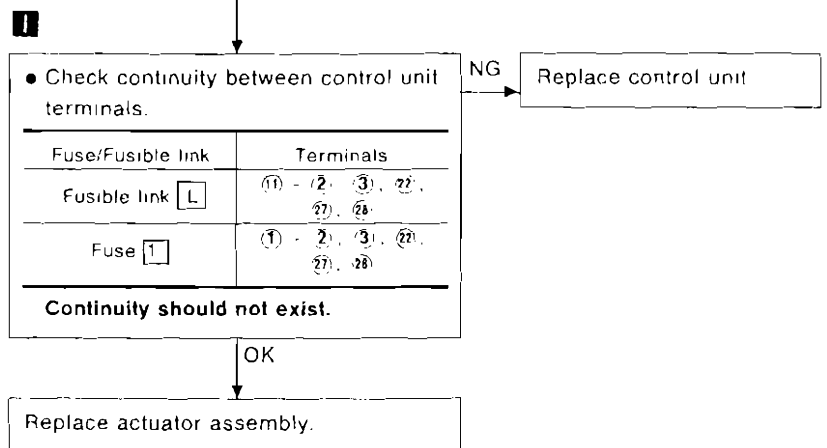
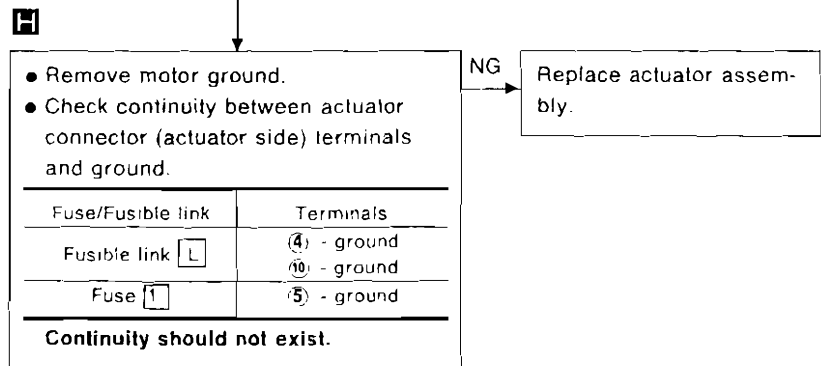
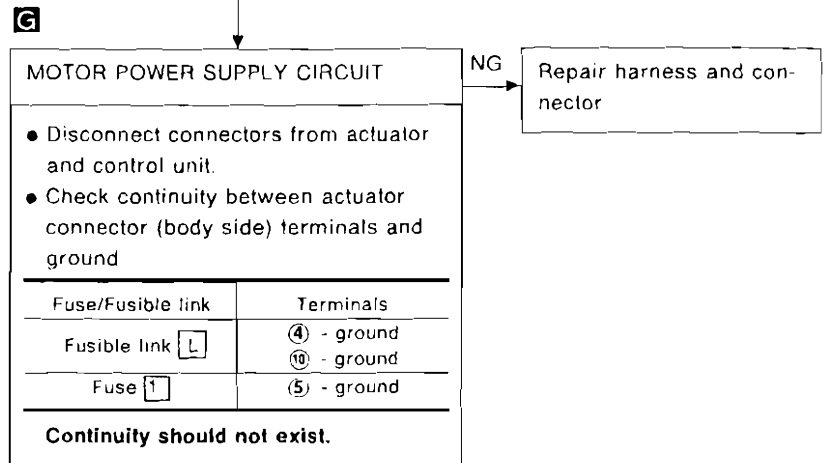
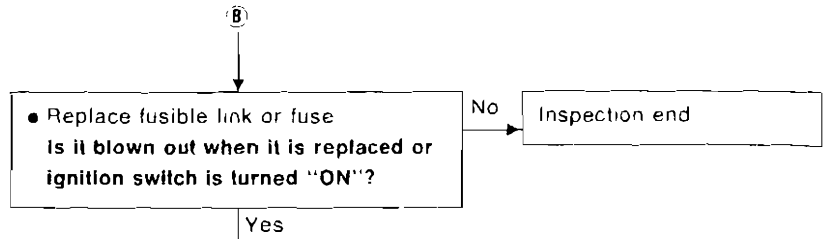
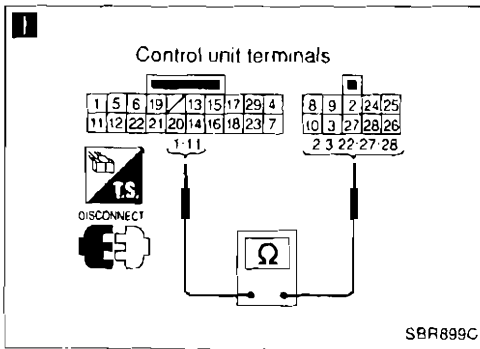
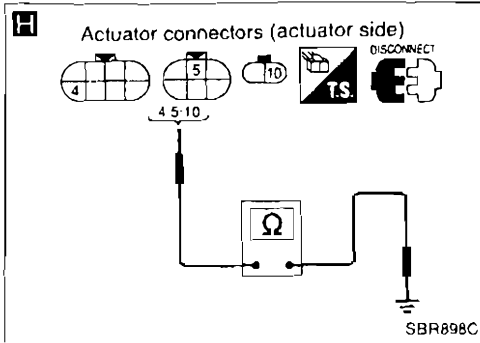
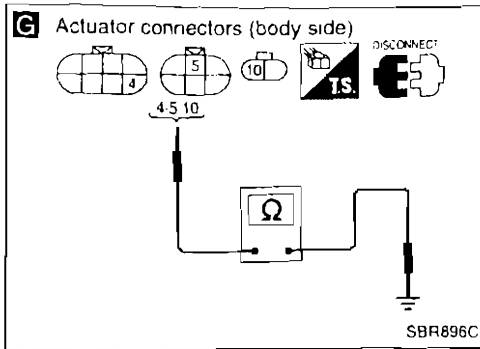
## Diagnostic Procedure 5 (Cont'd)



BR

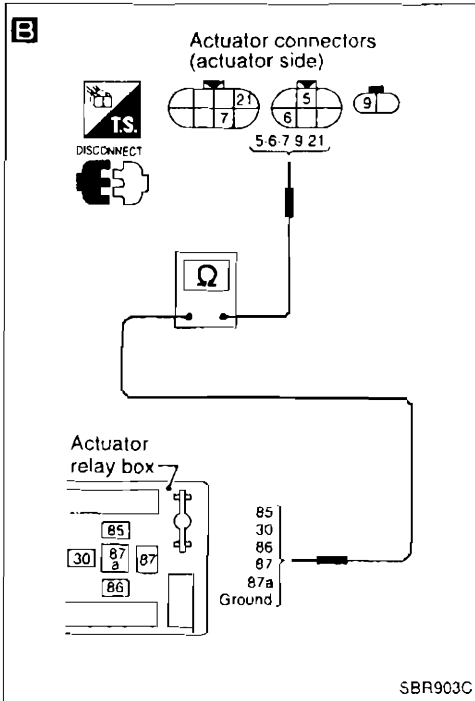
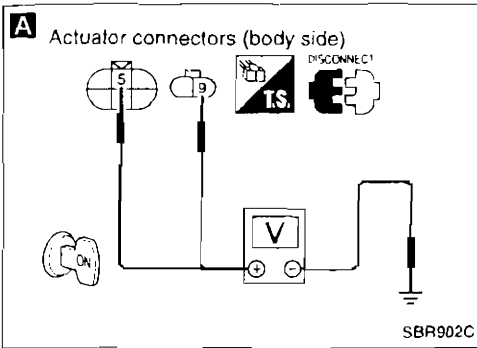
# TROUBLE DIAGNOSES

## Diagnostic Procedure 5 (Cont'd)



# TROUBLE DIAGNOSES

## Diagnostic Procedure 6 SOLENOID VALVE RELAY (Malfunction code No. 41, 42)



**SOLENOID VALVE POWER SUPPLY CHECK**

NG → **B** (See next page)

- Check 30A fusible link **K** and 10A fuse **1** for actuator. For fusible link and fuse layout, refer to POWER SUPPLY ROUTING in EL section.

OK

- Disconnect connectors from control unit and actuator. Check terminals for damage or loose connection. Then reconnect connectors
- Carry out self-diagnosis again.

**Does warning lamp activate again?**

No → Inspection end

Yes

**A** **SOLENOID VALVE POWER SUPPLY CHECK**

NG → Repair harness and connector.

- Disconnect connectors from actuator.
- Check voltage between actuator 2-pin connector (body side) terminals and ground.

| Terminals    | Ignition switch |
|--------------|-----------------|
| (5) - ground | ON position     |
| (9) - ground | —               |

**Battery voltage should exist.**

OK

**SOLENOID VALVE RELAY CHECK**

NG → Replace solenoid valve relay.

Refer to SOLENOID VALVE RELAY in Electrical Components Inspection (BR-65).

OK

**B** **SOLENOID VALVE RELAY CIRCUIT CHECK**

NG → Replace actuator.

Check continuity between relay terminals and actuator connector (actuator side) terminals

| Relay terminals | Connector terminals | Continuity |
|-----------------|---------------------|------------|
| (30)            | (6)                 | Yes        |
| (87)            | (9)                 | Yes        |
| (87a)           | (21)                | Yes        |
| (86)            | (7)                 | Yes        |
| (85)            | (5)                 | Yes        |
| Ground          | (?)                 | No         |

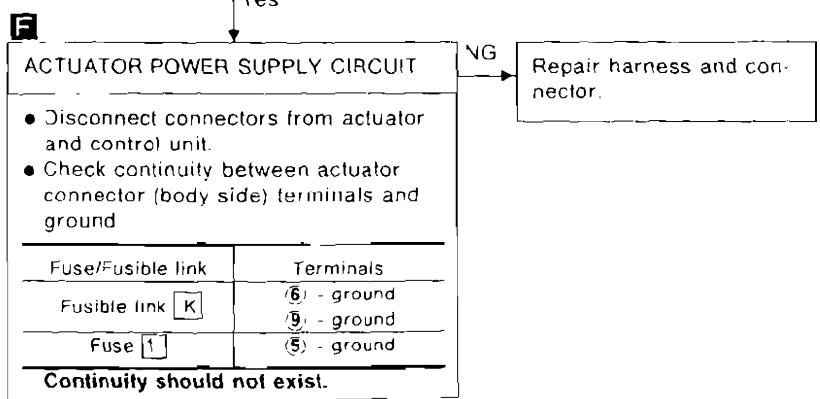
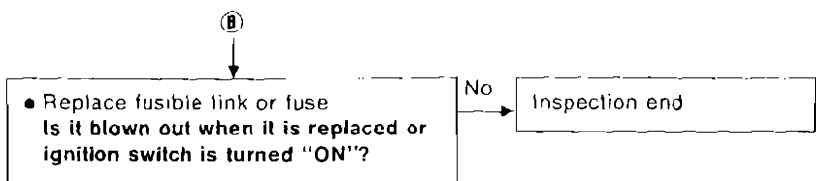
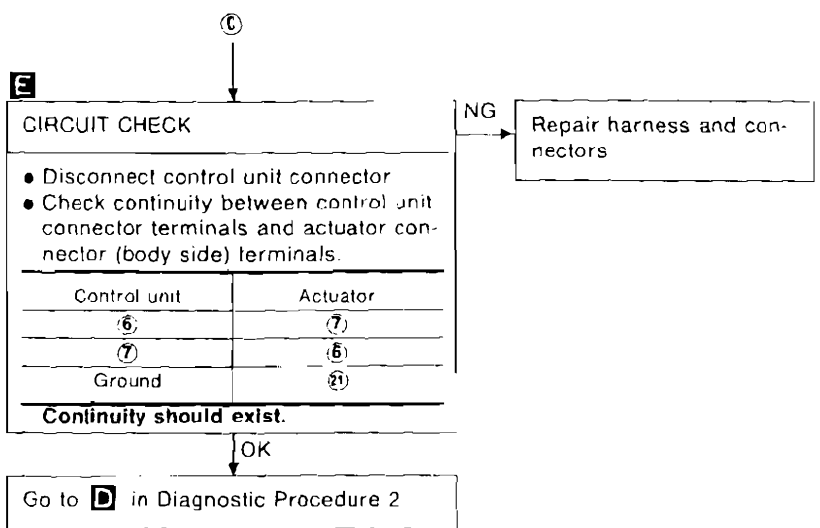
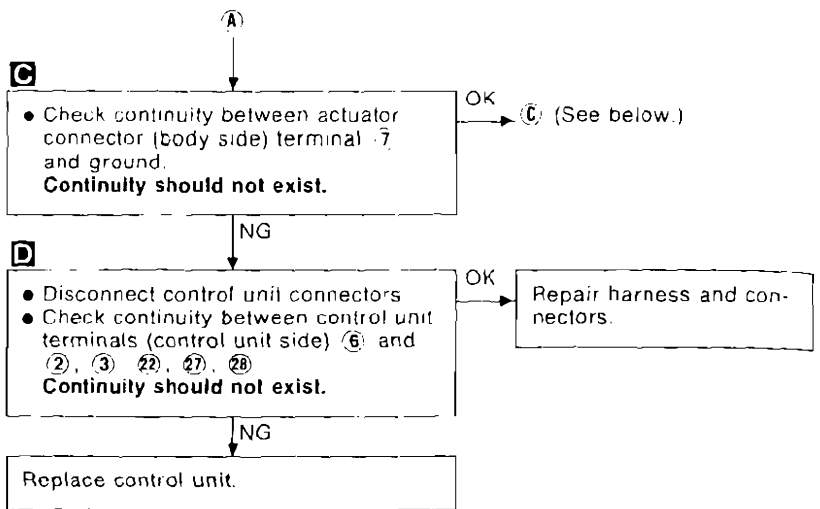
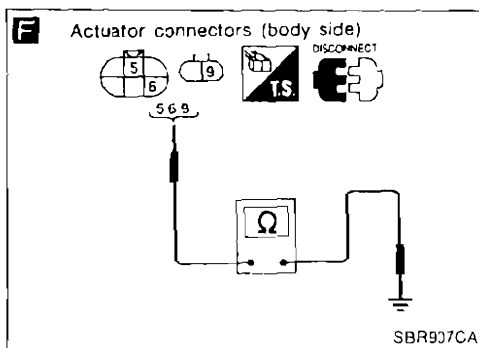
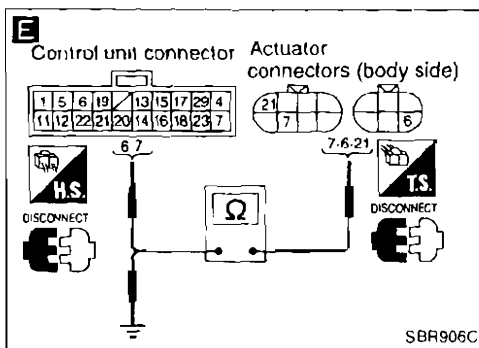
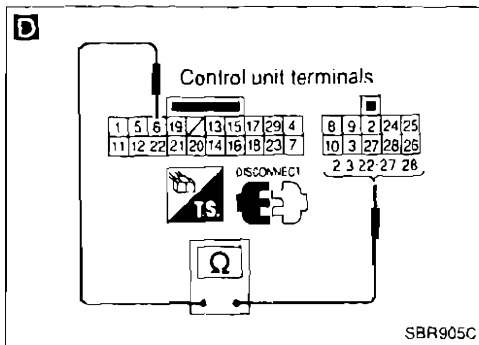
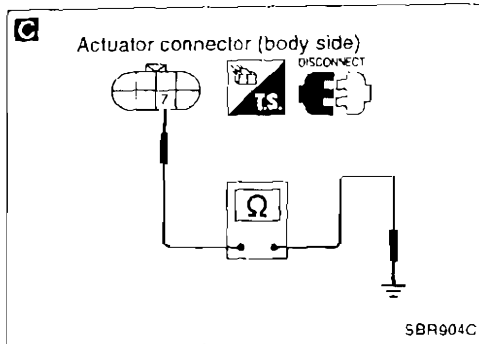
OK

**A**

(Go to next page)

# TROUBLE DIAGNOSES

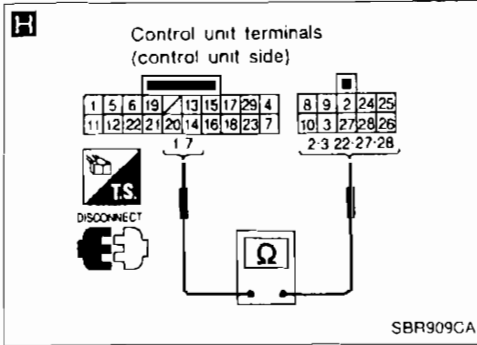
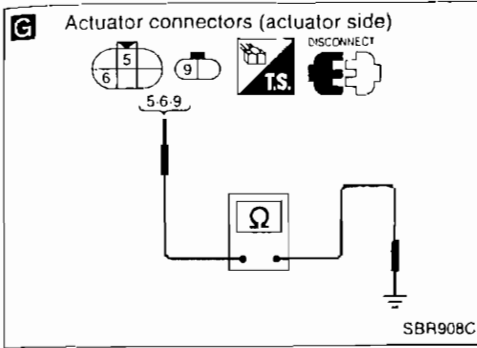
## Diagnostic Procedure 6 (Cont'd)



(Go to next page)

# TROUBLE DIAGNOSES

## Diagnostic Procedure 6 (Cont'd)



**G**

• Check continuity between actuator connector (actuator side) terminals and ground.

| Fuse/Fusible link     | Terminals                |
|-----------------------|--------------------------|
| Fusible link <b>K</b> | ⑥ - ground<br>⑨ - ground |
| Fuse <b>I</b>         | ⑤ - ground               |

**Continuity should not exist.**

NG → Replace actuator assembly.

**H**

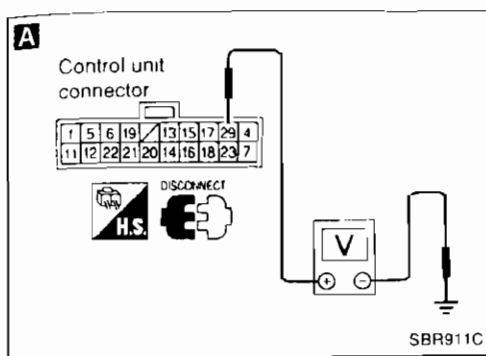
• Check continuity between control unit terminals (control unit side).

| Fuse/Fusible link     | Terminals            |
|-----------------------|----------------------|
| Fusible link <b>K</b> | ⑦ - ②, ③, ⑳,<br>⑳, ㉑ |
| Fuse <b>I</b>         | ① - ②, ③, ⑳,<br>㉑, ㉒ |

**Continuity should not exist.**

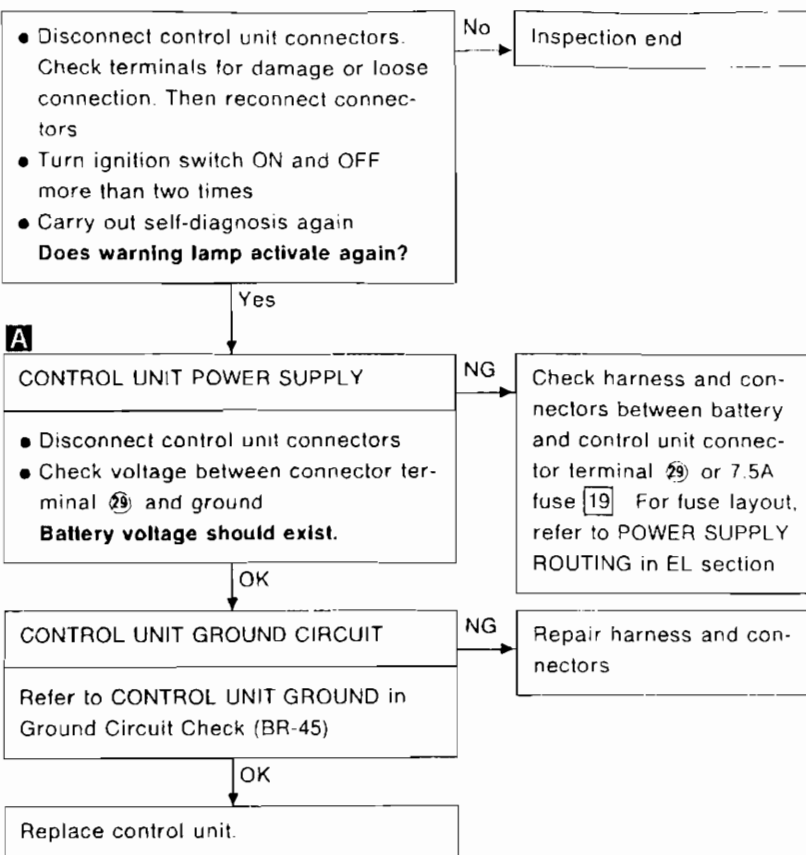
NG → Replace control unit.

OK → Replace actuator assembly



## Diagnostic Procedure 8

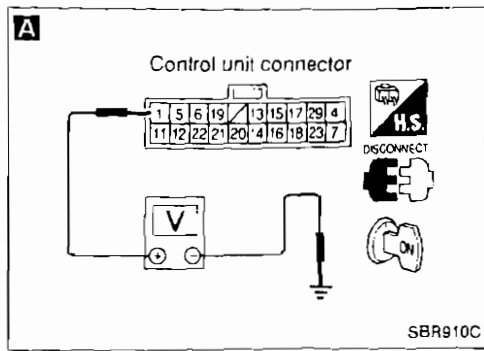
### MEMORY VOLT STOP



**Note:** MEMORY VOLT STOP is always indicated after disconnecting control unit connector.

BR

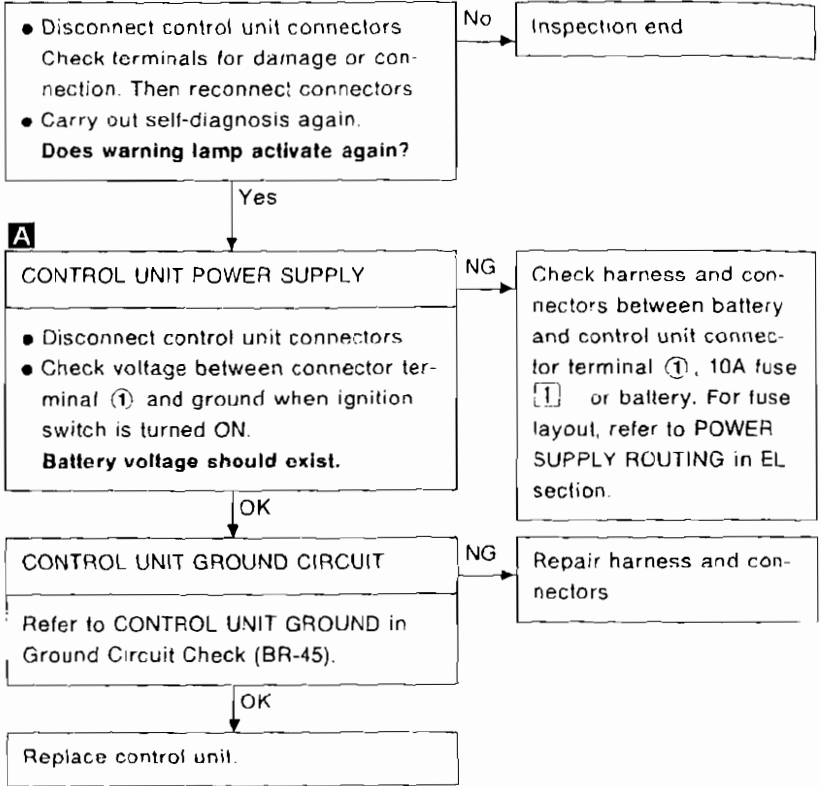


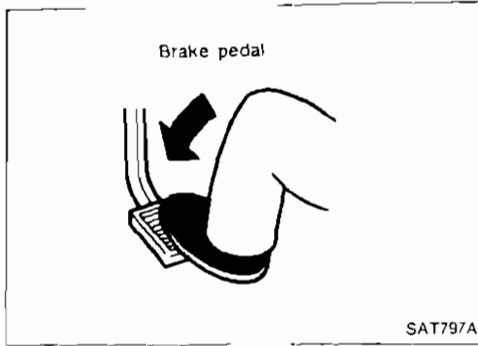


**Diagnostic Procedure 7**

**POWER SUPPLY**

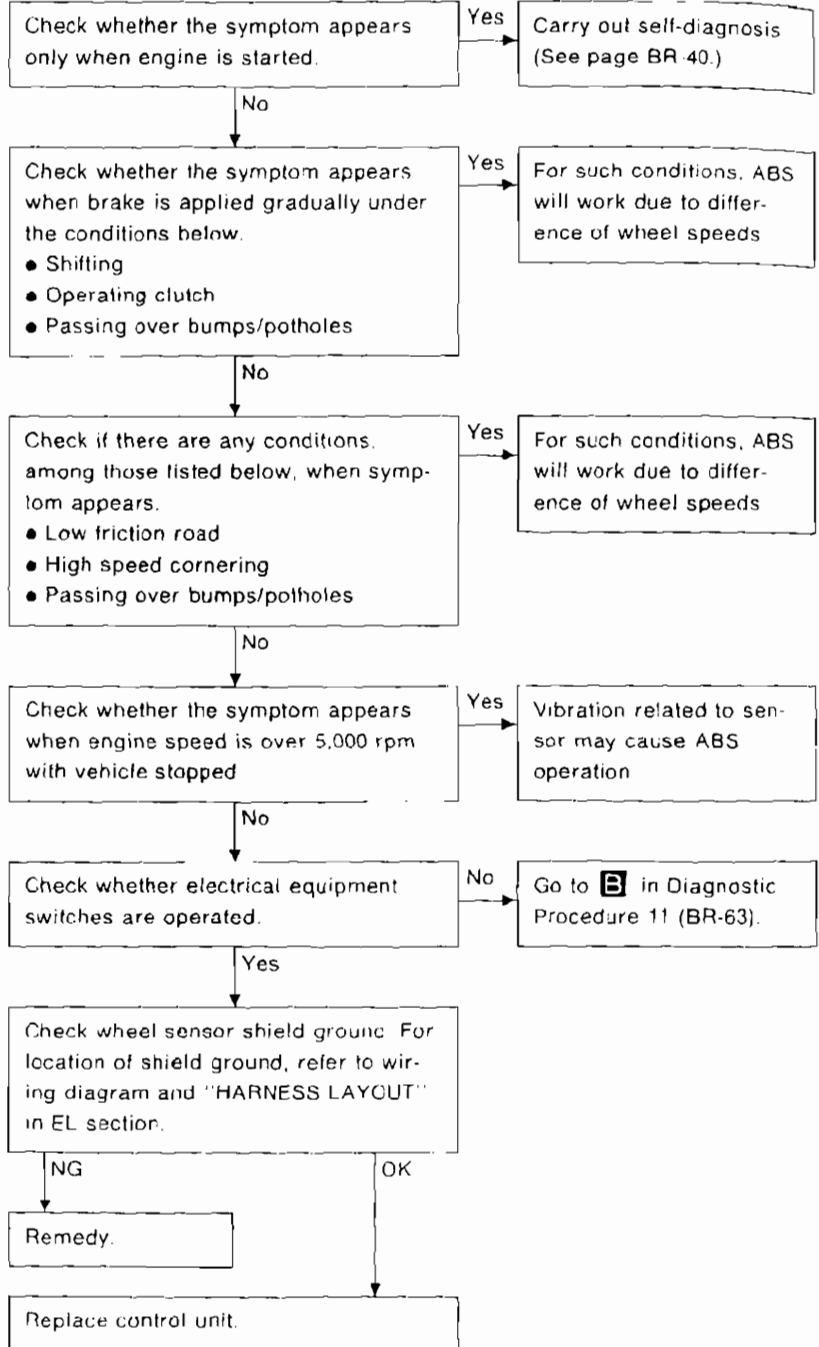
(Malfunction code No. 47, 48)





### Diagnostic Procedure 9

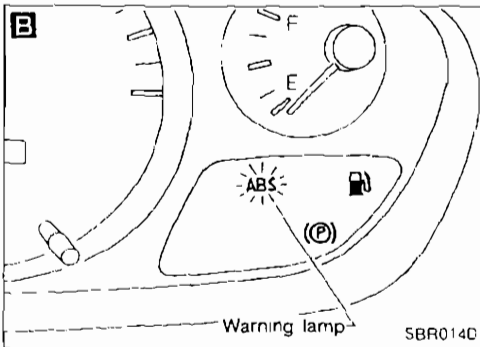
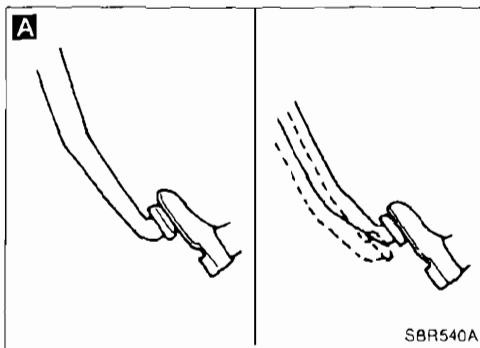
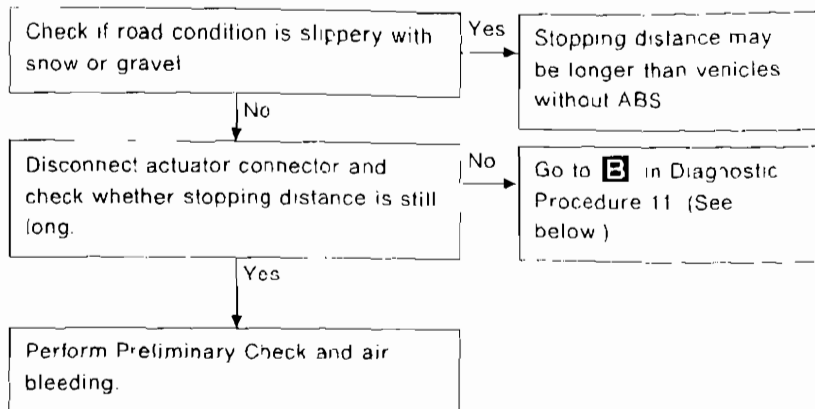
#### SYMPTOM: Pedal vibration and noise



# TROUBLE DIAGNOSES

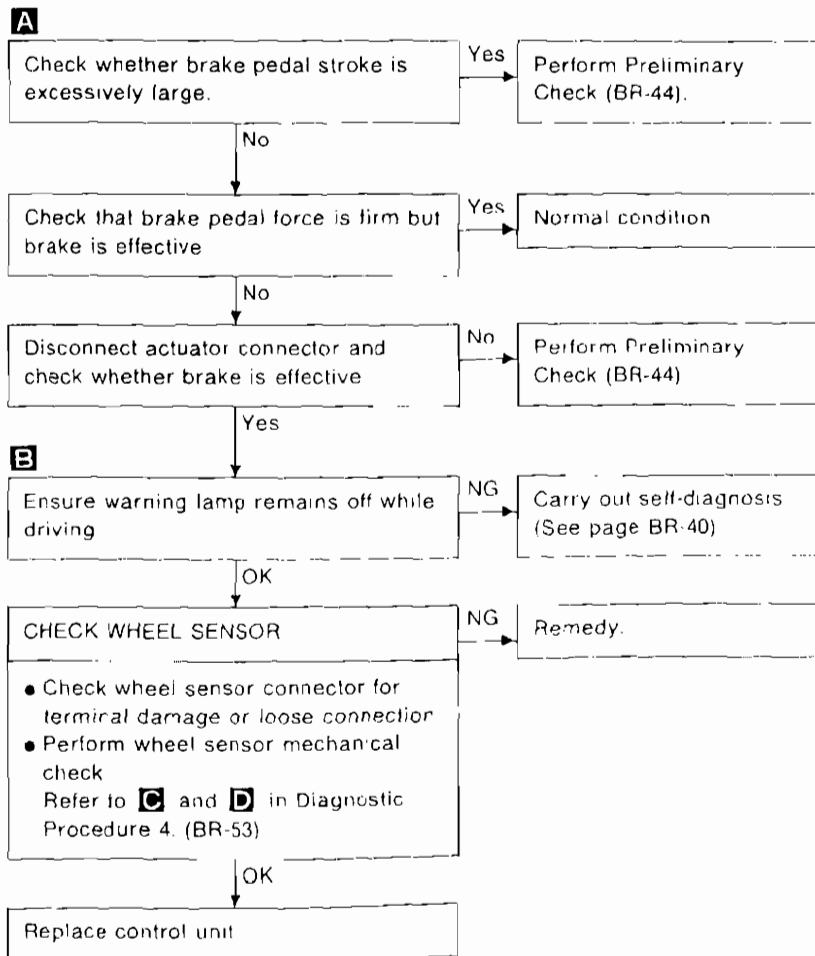
## Diagnostic Procedure 10

**SYMPTOM: Long stopping distance**



## Diagnostic Procedure 11

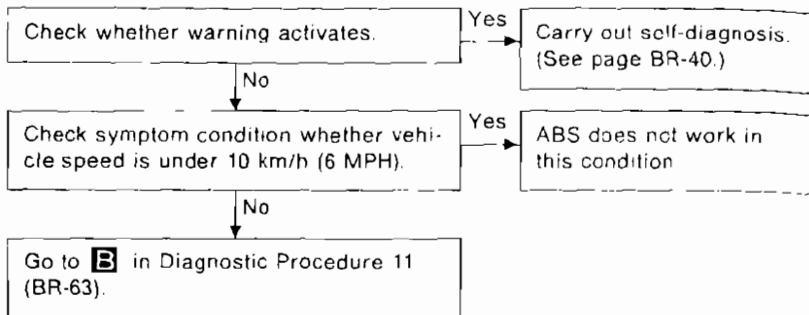
**SYMPTOM: Unexpected pedal action**



BR

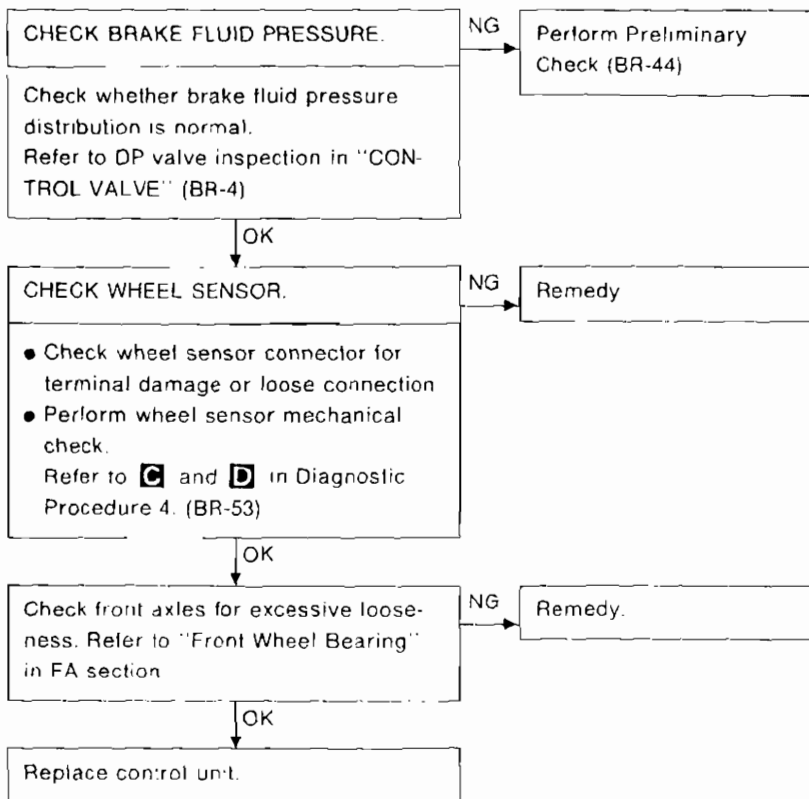
**Diagnostic Procedure 12**

**SYMPTOM: ABS does not work.**



**Diagnostic Procedure 13**

**SYMPTOM: ABS works frequently.**

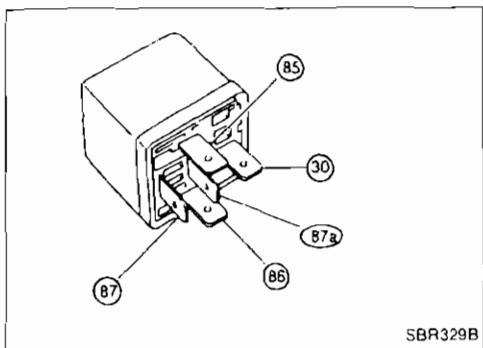
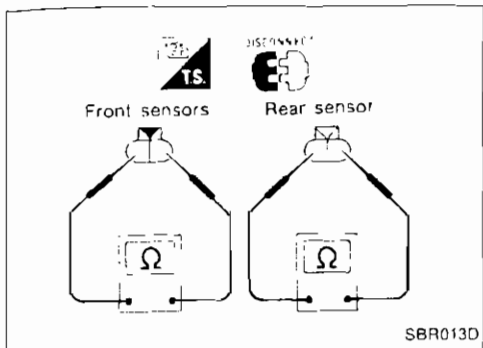


## Electrical Components Inspection

### WHEEL SENSOR

Check resistance for each sensor

Resistance: 0.6 - 3.3 k $\Omega$



### ACTUATOR MOTOR RELAY AND SOLENOID VALVE RELAY

|  | Solenoid valve relay                                    | Actuator motor relay<br>solenoid valve relay           |
|--|---|--|
| Condition  | Continuity existence<br>between terminals 30<br>and 87a | Continuity existence<br>between terminals 30<br>and 87 |
| Battery voltage not<br>applied between termi-<br>nals 85 and 86. | Yes   | No   |
| Battery voltage applied<br>between terminals 85<br>and 86        | No  | Yes  |

BR

# SERVICE DATA AND SPECIFICATIONS (SDS)

## General Specifications

|  |  |                         |
|--|--|-------------------------|
| Front brake                                    |  |                         |
| Brake model                                    |  | OPF25V disc brake       |
| Cylinder bore diameter<br>mm (in)              |  | 40.4 (1.59) x 2         |
| Pad<br>mm (in)                                 |  | 116.0 x 50.0 x 10.0     |
| Length x width x thickness                     |  | (4.57 x 1.969 x 0.394)  |
| Rotor outer diameter x thickness<br>mm (in)    |  | 280 x 30 (11.02 x 1.18) |
| Rear brake                                     |  |                         |
| Brake model                                    |  | CL11H disc brake        |
| Cylinder bore diameter<br>mm (in)              |  | 38.18 (1.5031)          |
| Pad<br>mm (in)                                 |  | 75.0 x 40.0 x 9.5       |
| Length x width x thickness                     |  | (2.953 x 1.575 x 0.374) |
| Rotor outer diameter<br>x thickness<br>mm (in) |  | 258 x 9 (10.16 x 0.35)  |

|  |   |  |
|--|---|--|
|  | Without ABS   | With ABS   |
| Master cylinder  |   |  |
| Cylinder bore diameter<br>mm (in)                                      | 23.81 (15/16)                                       | 25.40 (1)  |
| Control valve  | Proportioning valve<br>(built into master cylinder) |  |
| Valve model  |   |  |
| Split point<br>kPa (bar, kg/cm <sup>2</sup> , psi) x<br>reducing ratio | 3.923 (39.2, 40, 569) x 0.4                         |  |
| Brake booster  |   |  |
| Booster model  | M23 or G23  | M195T  |
| Diaphragm diameter<br>mm (in)  | 230 (9.06)  | Primary: 205<br>(8.07)<br>Secondary: 180<br>(7.09) |
| Recommended brake fluid  |   |  |
| For Europe*  | DOT3 or DOT4  |  |
| Except for Europe  | DOT 3   |  |

\*For Europe, never mix different type brake fluids (DOT3 and DOT4)

## Inspection and Adjustment

### DISC BRAKE

|                               |             |          |
|-------------------------------|-------------|----------|
| Brake model                   | OPF25V      | CL11H    |
| Pad wear limit<br>mm (in)     |             |          |
| Minimum thickness             | 2.0 (0.079) |          |
| Rotor repair limit<br>mm (in) |             |          |
| Minimum thickness             | 28 (1.10)   | 8 (0.31) |

### PARKING BRAKE

|   |              |
|---|--------------|
| Type  | Center lever |
| Number of notches<br>[under force of 196 N<br>(20 kg, 44 lb)] | 7 - 9        |
| Number of notches<br>when warning lamp switch<br>comes on     | 1            |

### BRAKE PEDAL

|   |                            |                            |
|---|----------------------------|----------------------------|
| Vehicle model   | LHD                        | RHD                        |
| Free height "H"<br>mm (in)  |                            |                            |
| M/T   | 181 - 191<br>(7.13 - 7.52) | 179 - 189<br>(7.05 - 7.44) |
| A/T   | 191 - 201<br>(7.52 - 7.91) | 183 - 199<br>(7.24 - 7.83) |
| Depressed height "D"<br>mm (in)   |                            |                            |
| [under force of 490 N (50 kg<br>110 lb) with engine running]  | 110 (4.33)                 |                            |
| Clearance "C" between pedal<br>stopper and threaded end of<br>stop lamp switch or ASCD<br>switch<br>mm (in) | 0.3 - 1.0 (0.012 - 0.039)  |                            |

# STEERING SYSTEM

## SECTION **ST**

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**ST**

# PRECAUTIONS AND PREPARATION

## Precautions

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

The Supplemental Restraint System "Air Bag" and "Seat belt pre-tensioner", used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioner, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **RS** section of this Service Manual.

#### WARNING:

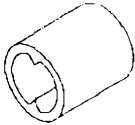
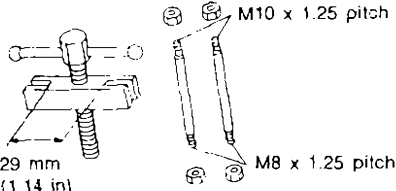
- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.
- All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS.

## STEERING SYSTEM

- 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 ATF\* 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.

\*: Automatic transmission fluid

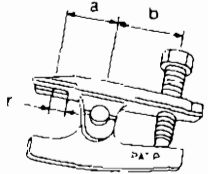
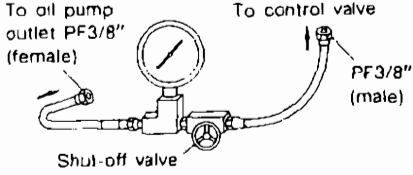
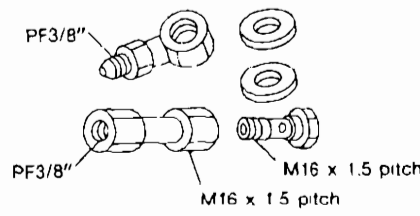
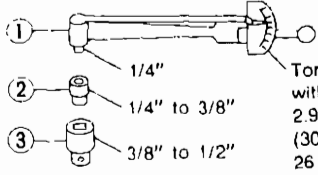
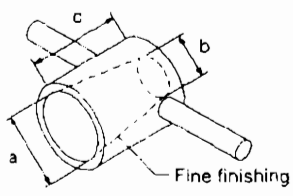
## Special Service Tools

| Tool number<br>Tool name            | Description  |
|-------------------------------------|--|
| KV48100700<br>Torque adapter        |  <p>Measuring pinion rotating torque</p> <p>NT159</p>   |
| ST27180001<br>Steering wheel puller |  <p>Removing and installing steering wheel</p> <p>NT544</p> <p>29 mm<br/>(1.14 in)</p> <p>M10 x 1.25 pitch</p> <p>M8 x 1.25 pitch</p> |

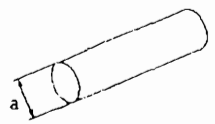


# PRECAUTIONS AND PREPARATION

## Special Service Tools (Cont'd)

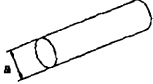
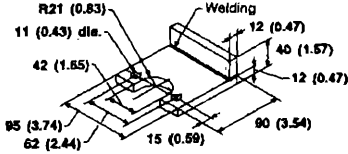
| Tool number<br>Tool name  | Description   |   |
|---|---|---|
| HT72520000<br>Ball joint remover  |    | Removing ball joint<br><br>a: 33 mm (1.30 in)<br>b: 50 mm (1.97 in)<br>r: R11.5 mm (0.453 in)           |
| ST27091000<br>Pressure gauge  |    | Measuring oil pressure  |
| KV48102500<br>Pressure gauge adapter  |    | Measuring oil pressure  |
| ST3127S000<br>① GG91C30000<br>Torque wrench<br>② HT62940000<br>Socket adapter<br>③ HT62900000<br>Socket adapter |   | Measuring turning torque<br><br>Torque wrench with range of 2.9 N·m (30 kg-cm, 26 in-lb)                |
| KV48104400<br>Rack seal ring reformer   |  | Reforming teilton ring<br><br>a: 50 mm (1.97 in) dia.<br>b: 36 mm (1.42 in) dia.<br>c: 100 mm (3.94 in) |

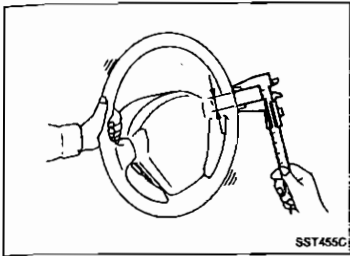
## Commercial Service Tools

| Tool name           | Description   |   |
|---------------------|---|---|
| Rear oil seal drift |  | Installing rear oil seal<br><br>a: 28 mm (1.10 in) dia. |

**PRECAUTIONS AND PREPARATIO**

**Commercial Service Tools (Cont'd)**

| Tool name             | Description   |                                       |
|-----------------------|---|---------------------------------------|
| Pinion oil seal drift |  | Installing pinion oil seal            |
| NT063                 | ø: 48 mm (1.57 in) dia.   |                                       |
| Oil pump attachment   |  | Disassembling and assembling oil pump |
| NT178                 | Unit: mm (in)   |                                       |



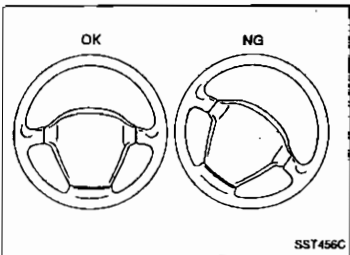
### Checking Steering Wheel Play

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



### Checking Neutral Position on Steering Wheel

#### Pre-checking

- Make sure that wheel alignment is correct.

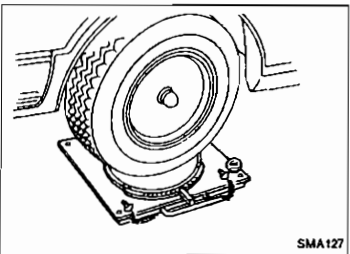
**Wheel alignment:**

Refer to SDS in FA section.

- Verify that the steering gear is centered before removing the steering wheel.

#### Checking

- Check that the steering wheel is in the neutral position when driving straight ahead.
- If it is not in the neutral position, remove the steering wheel and reinstall it correctly.
- 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.

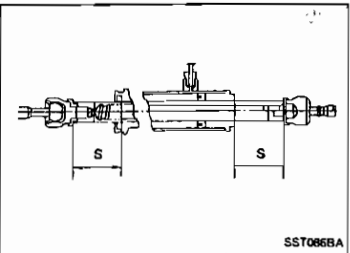


### Front Wheel Turning Angle

- Rotate steering wheel all the way right and left; measure turning angle.

**Turning angle of full turns:**

Refer to SDS in FA section.



- If it is not within specification, check rack stroke.

**Measured length "S":**

Refer to SDS (ST-27).

GI

MA

EM

LC

EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

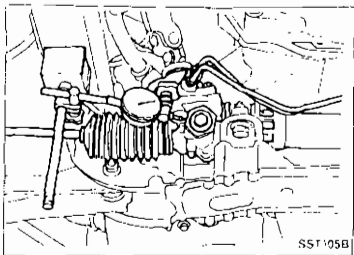
RS

BT

HA

EL

IDX



## Checking Gear Housing Movement

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:

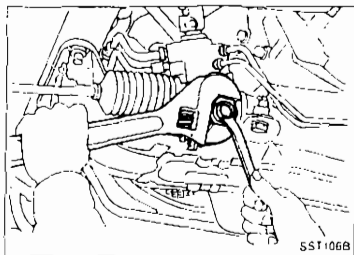
$\pm 2 \text{ mm}$  ( $\pm 0.08 \text{ in}$ ) or less

2. If movement exceeds the limit, replace mount insulator after confirming proper installation of gear housing clamps.

## Adjusting Rack Retainer

- Perform this driving test on a flat road

1. Check whether vehicle moves in a straight line when steering wheel is released.
2. Check whether steering wheel returns to neutral position when steering wheel is released from a slightly turned (approx.  $20^\circ$ ) position.
- If any abnormality is found, correct it by resetting adjusting screw.



## Checking and Adjusting Drive Belts (For power steering)

Refer to Drive Belt Inspection in MA section.

## Checking Fluid Level

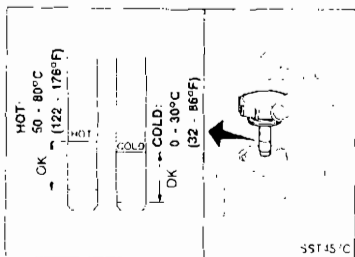
Check fluid level with dipstick on reservoir cap.

Use "HOT" range for fluid temperatures of 50 to 80°C (122 to 176°F).

Use "COLD" range for fluid temperatures of 0 to 30°C (32 to 86°F).

### CAUTION:

- Do not overfill.
- Recommended fluid is Automatic Transmission Fluid "DEXRON<sup>TM</sup>" type or equivalent.



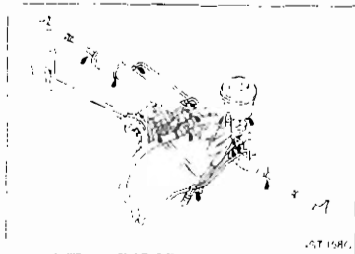
## Checking Fluid Leakage

Check the lines for improper attachment and for leaks, cracks, damage, loose connections, chafing or deterioration.

1. Run engine at idle speed or 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.



## ON-VEHICLE SERVICE

### Checking Fluid Leakage (Cont'd)

#### 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.

### Bleeding Hydraulic System

1. Raise front end of vehicle until wheels clear 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 the steering wheel slowly. This does not affect the performance or durability of the system

### Checking Steering Wheel Turning Force (For power steering)

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)]

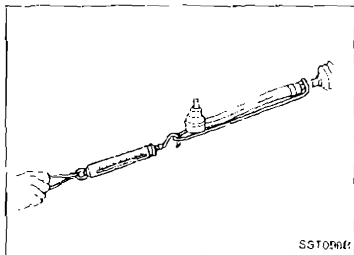
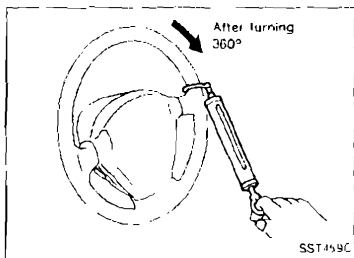
Tires need to be inflated to normal pressure.

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**

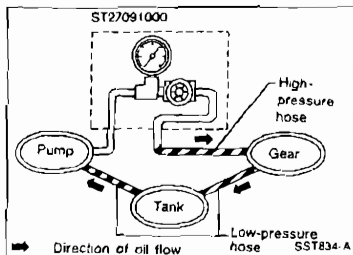
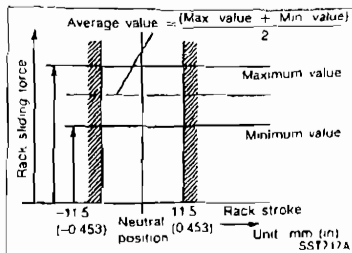
5. If steering wheel turning force is out of specification, check rack sliding force
  - a. Disconnect steering column lower joint and knuckle arms from the gear.
  - b. Start and run engine at idle to make sure steering fluid has reached normal operating temperature
  - c. Pull tie-rod slowly to move it from neutral position to  $\pm 11.5$  mm ( $\pm 0.453$  in) at speed of 3.5 mm (0.138 in)/s. Check that rack sliding force is within specification



## Checking Steering Wheel Turning Force (For power steering) (Cont'd)

**Average rack sliding force:**  
186 - 245 N (19 - 25 kg, 42 - 55 lb)  
**Maximum force deviation:**  
98 N (10 kg, 22 lb)

- If rack sliding force is not within specification, overhaul steering gear assembly



## Checking Hydraulic System

Before starting, check belt tension, driving pulley and tire pressure.

- Set Tool. Open shut-off valve. Then bleed air (See "Bleeding Hydraulic System", ST-7.)
- Run engine.

**Make sure temperature of fluid in 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 oil pump increases to maximum. This will raise oil temperature abnormally.**

- 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.**

### Oil pump maximum pressure:

8,630 - 9,219 kPa (86.3 - 92.2 bar, 88 - 94 kg/cm<sup>2</sup>,  
1,251 - 1,337 psi)

- If oil pressure is below the standard pressure, slowly close shut-off valve and check pressure
- When pressure reaches standard pressure, gear is damaged.
  - When pressure remains below standard pressure, pump is damaged.

### CAUTION:

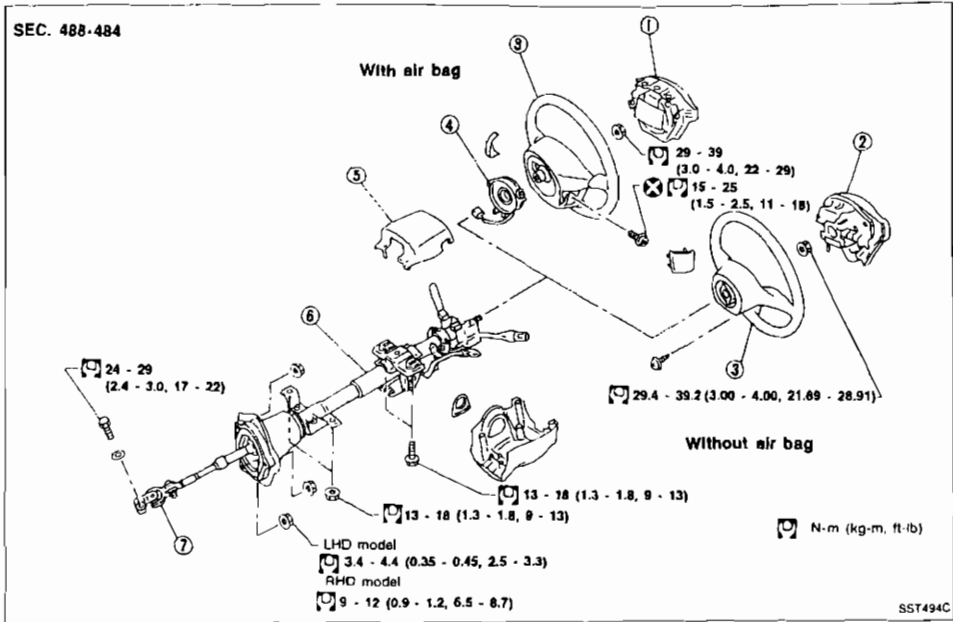
**Do not close shut-off valve for more than 15 seconds.**

- If oil pressure is higher than standard pressure, check oil pump flow control valve.
- After checking hydraulic system, remove Tool and add fluid as necessary. Then completely bleed air out of system

# STEERING WHEEL AND STEERING COLUMN

## Removal and Installation

SEC. 488-484



- ① Air bag module
- ② Horn pad
- ③ Steering wheel

- ④ Spiral cable
- ⑤ Column cover
- ⑥ Steering column assembly
- ⑦ Lower joint

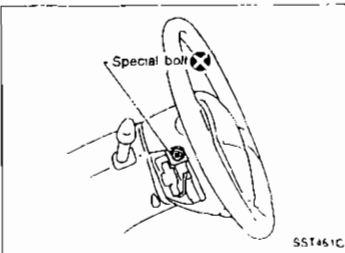
### CAUTION:

- 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.

### STEERING WHEEL


— With air bag type —

- Remove air bag module and spiral cable. Refer to "Removal — Air Bag Module and Spiral Cable", "SUPPLEMENTAL RESTRAINT SYSTEM" in RS section



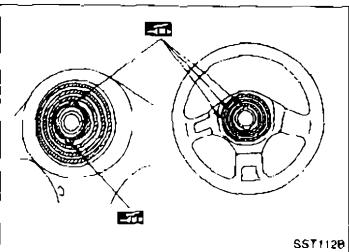
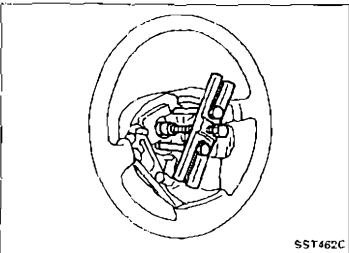
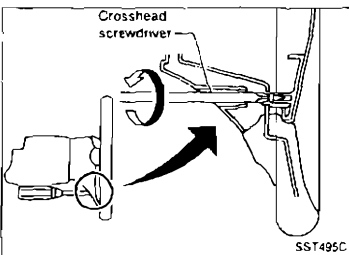
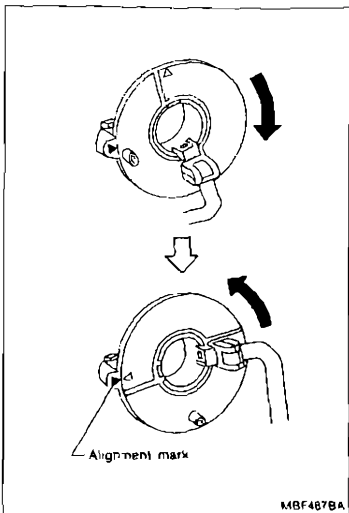
# STEERING WHEEL AND STEERING COLUMN

## Removal and Installation (Cont'd)

- 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 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 up to 2.5 turns from the neutral position to both the right and left.)



### — Without air bag type —

- Remove horn pad.

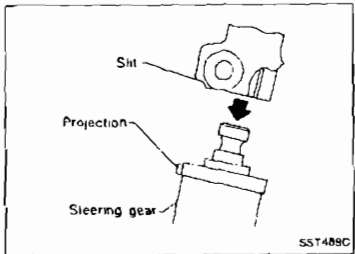
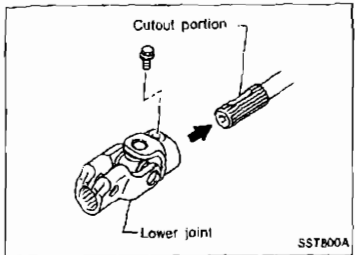
Insert a crosshead screwdriver into hole on lower side of spoke and remove screw. Lift horn pad off by hand
- Remove steering wheel with Tool
- When installing steering wheel, lubricate with multi-purpose grease. Apply grease to entire surface of turn signal cancel pins and horn contact slip rings.



## Removal and Installation (Cont'd)

### STEERING COLUMN

- 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.



- Align slit of lower joint with projection on dust cover. Insert joint until it stops.

#### CAUTION:

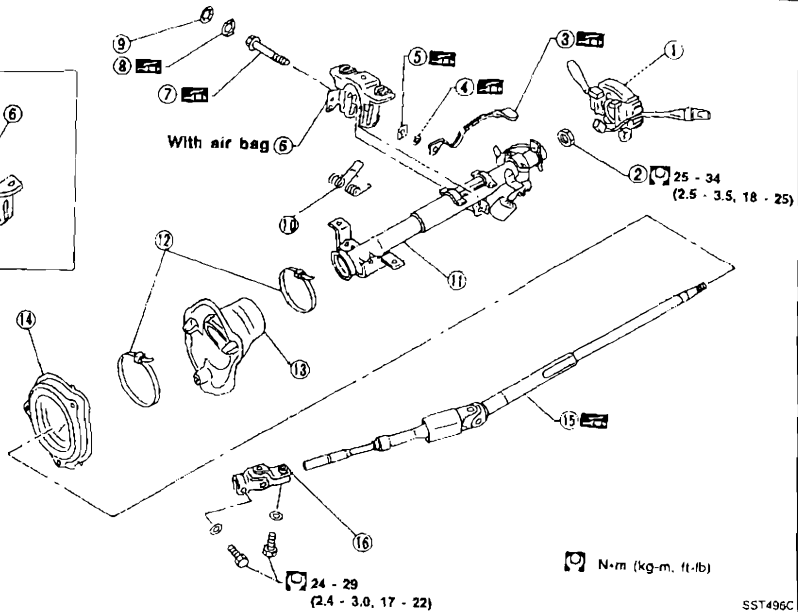
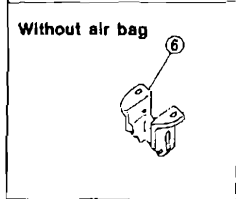
After installation, turn steering wheel to make sure it moves smoothly. Ensure the number of turns are the same from the straight forward position to left and right locks. Be sure that the steering wheel is in a neutral position when driving straight ahead.

ST

# STEERING WHEEL AND STEERING COLUMN

## Disassembly and Assembly

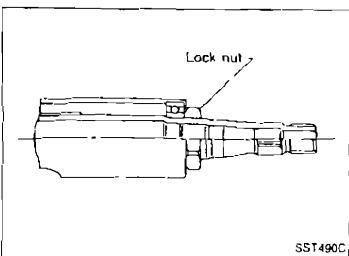
SEC. 488



- ① Combination switch
- ② Lock nut
- ③ Tilt lever
- ④ Washer
- ⑤ Tilt lever stopper

- ⑥ Steering column mounting bracket
- ⑦ Adjust bolt
- ⑧ Adjust bolt stopper
- ⑨ Push nut
- ⑩ Tilt spring (Air bag model)

- ⑪ Jacket lube assembly
- ⑫ Band
- ⑬ Jacket tube bracket insulator
- ⑭ Hole cover
- ⑮ Steering column shaft
- ⑯ Lower joint



- When disassembling and assembling, unlock steering lock with key
- Install lock nut on steering column shaft and tighten the nut to specification

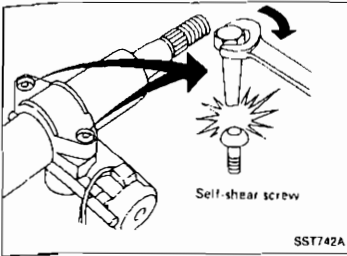
**□**: 25 - 34 N·m (2.5 - 3.5 kg-m, 18 - 25 ft·lb)

SST490C

# STEERING WHEEL AND STEERING COLUMN

## Disassembly and Assembly (Cont'd)

- 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.



## Inspection

- When steering wheel does not turn smoothly, check the steering column as follows and replace damaged parts.
  - a. Check column bearings for damage or unevenness. Lubricate with recommended multi-purpose grease or replace steering column as an assembly, if necessary.
  - b. Check steering column lower shaft for deformation or breakage. Replace if necessary.
- When the vehicle comes into a light collision, check length "L<sub>1</sub>" and "L<sub>2</sub>".

### Steering column length "L<sub>1</sub>":

LHD model 630.7 mm (24.83 in)

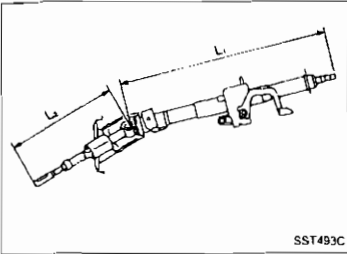
RHD model 610.0 mm (24.02 in)

### Steering column lower shaft length "L<sub>2</sub>":

LHD model 323.7 mm (12.74 in)

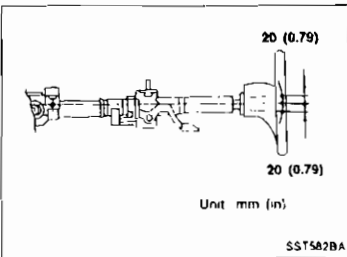
RHD model 341.0 mm (13.43 in)

If out of the specifications, replace steering column as an assembly

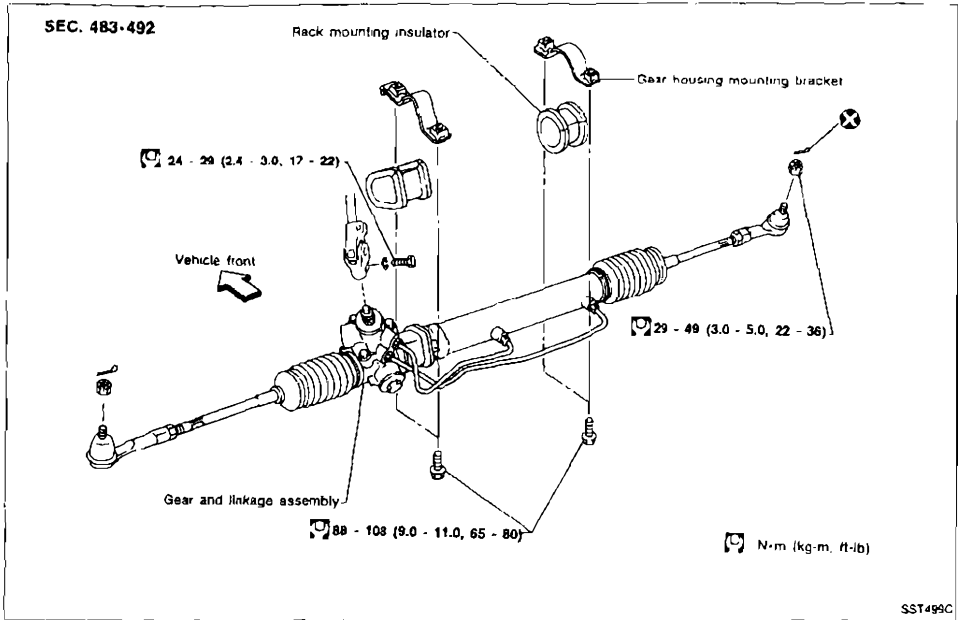


## ● Tilt mechanism

After installing steering column, check tilt mechanism operation.

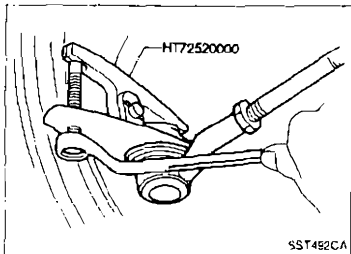


**Removal and Installation**



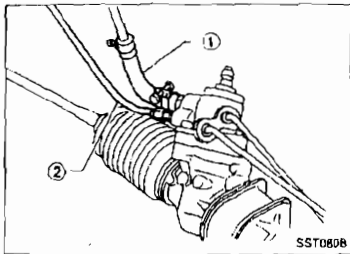
**CAUTION:**

- 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.



# POWER STEERING GEAR AND LINKAGE (Model PR24AC)

## Removal and Installation (Cont'd)



- Install pipe connector.
- Observe specified tightening torque when tightening high-pressure and low-pressure pipe connectors. Excessive tightening can damage threads or damaged connector O-ring.

### Connector tightening torque:

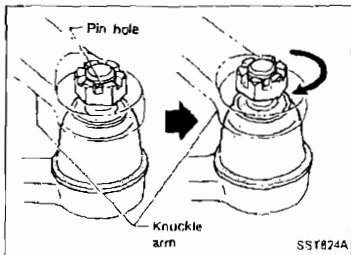
#### Low-pressure side "1"

27 - 39 N·m (2.8 - 4.0 kg-m, 20 - 29 ft-lb)

#### High-pressure side "2"

15 - 25 N·m (1.5 - 2.5 kg-m, 11 - 18 ft-lb)

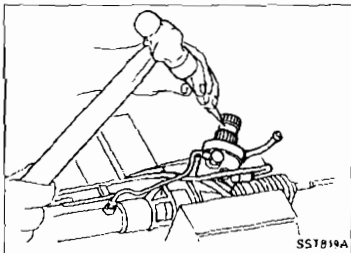
- The O-ring in low-pressure pipe connector is larger than that in high-pressure connector. Take care to install the proper O-ring.



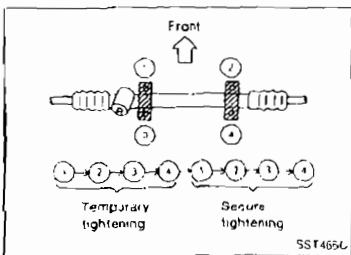
- Initially, tighten nut on tie-rod outer socket and knuckle arm to 29 to 39 N·m (3 to 4 kg-m, 22 to 29 ft-lb). Then tighten further to align nut groove with first pin hole so that cotter pin can be installed.

### CAUTION:

Tightening torque must not exceed 49 N·m (5 kg-m, 36 ft-lb).



- Before removing lower joint from gear, set gear in neutral (wheels in straight-ahead position). After removing 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 lower joint by aligning matching marks of pinion shaft and pinion housing.



- Tighten gear housing mounting bracket bolts in the order shown.

### Temporary tightening torque:

78 N·m (8.0 kg-m, 58 ft-lb)

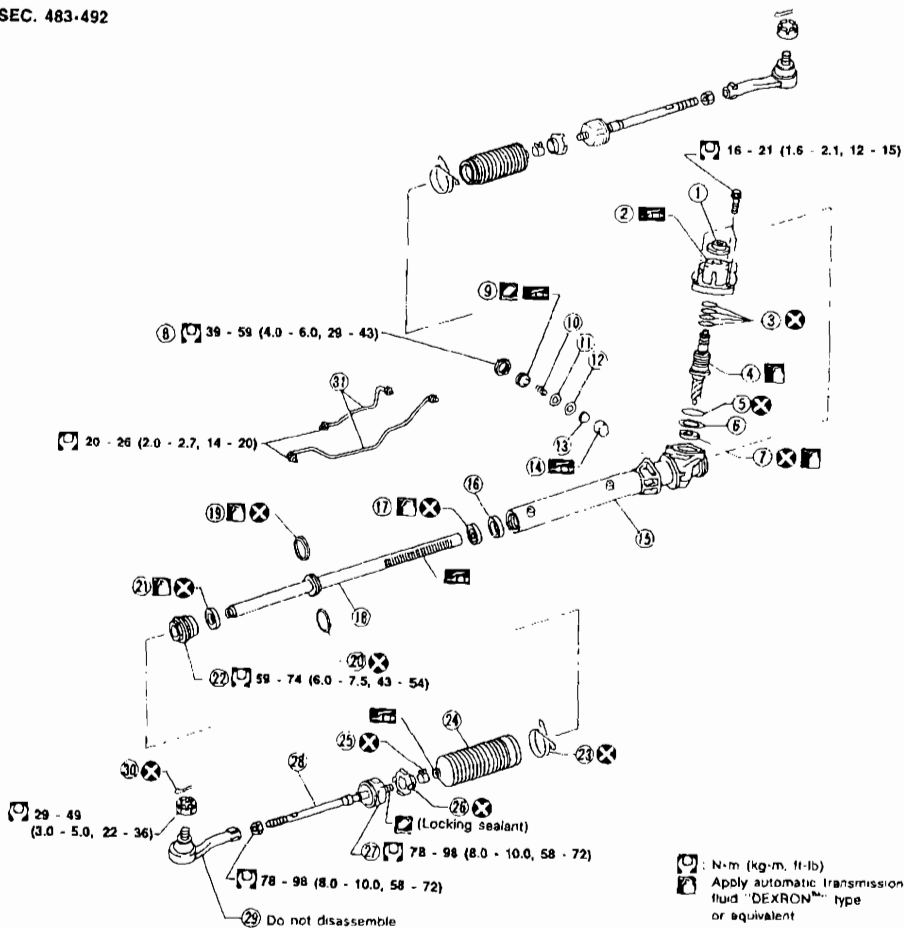
### Secure tightening torque:

88 - 108 N·m (9.0 - 11.0 kg-m, 65 - 80 ft-lb)

# POWER STEERING GEAR AND LINKAGE (Model PR24AC)

## Disassembly and Assembly

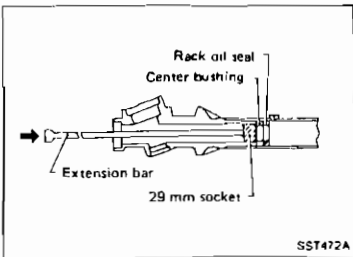
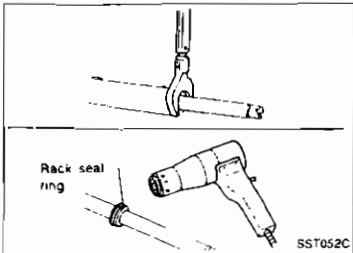
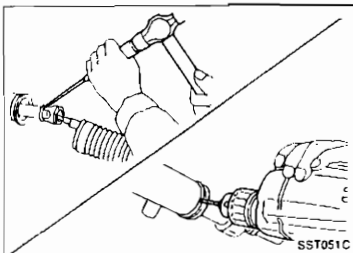
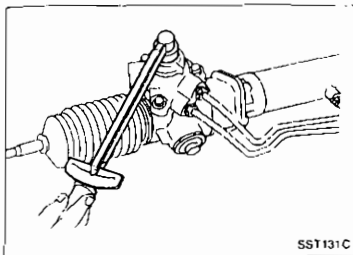
SEC. 483-492



SST900C

- |                         |                         |                        |
|-------------------------|-------------------------|------------------------|
| ① Rear housing cover    | ⑫ Washer                | ⑳ End cover assembly   |
| ② Rear housing assembly | ⑬ Spring seat           | ㉑ Boot clamp           |
| ③ Pinion seal ring      | ⑭ Retainer              | ㉒ Dust boot            |
| ④ Pinion assembly       | ⑮ Gear housing assembly | ㉓ Boot band            |
| ⑤ O-ring                | ⑯ Center bushing        | ㉔ Lock plate           |
| ⑥ Shim                  | ⑰ Rack oil seal         | ㉕ Tie-rod inner socket |
| ⑦ Pinion oil seal       | ⑱ Rack assembly         | ㉖ Tie-rod              |
| ⑧ Lock nut              | ㉒ Rack seal ring        | ㉗ Tie-rod outer socket |
| ⑨ Adjusting screw       | ㉓ O-ring                | ㉘ Cotter pin           |
| ⑩ Spring                | ㉔ Rack oil seal         | ㉙ Gear housing tube    |
| ⑪ Spring disc           |                         |                        |

# POWER STEERING GEAR AND LINKAGE (Model PR24AC)



## Disassembly

- 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 Tool.
9. Draw out rack assembly.
- 10 Remove rack seat 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 center bushing and rack oil seal using tape wrapped socket and extension bar.  
**Do not scratch inner surfaces of pinion housing.**

## Inspection

Thoroughly clean all parts in cleaning solvent or automatic transmission fluid "DEXRON™" type or equivalent. Blow dry with compressed air, if available.

### BOOT

Check condition of boot. If cracked excessively, replace it

### RACK

Thoroughly examine rack gear. If damaged, cracked or worn, replace it

## POWER STEERING GEAR AND LINKAGE (Model PR24AC)

### Inspection (Cont'd)

#### PINION ASSEMBLY

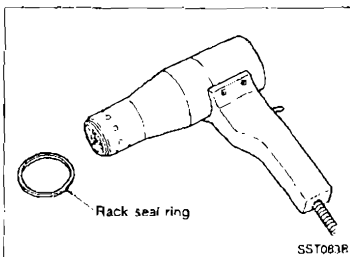
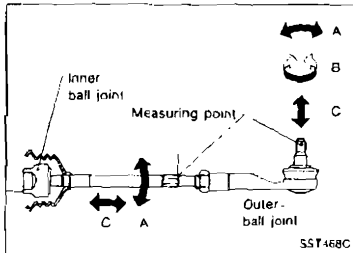
- Thoroughly examine pinion gear. If pinion gear is damaged, cracked or worn, replace it.
- Check that all bearings roll freely. Ensure that balls, rollers and races are not cracked, pitted or worn. Replace if necessary.

#### GEAR HOUSING CYLINDER

Check gear housing cylinder bore for scratches or other damage. Replace if necessary.

#### TIE-ROD OUTER AND INNER SOCKETS

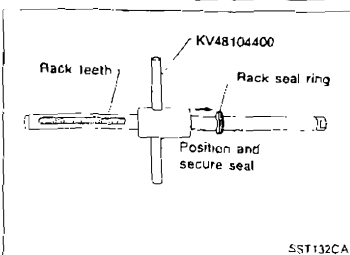
- Check ball joints for swinging force.  
**Tie-rod outer and inner ball joints swinging force "A":**  
Refer to SDS (ST-27).
- Check ball joint for rotating torque.  
**Tie-rod outer ball joint rotating torque "B":**  
Refer to SDS (ST-27).
- Check ball joints for axial end play.  
**Tie-rod outer and inner ball joints axial end play "C":**  
Refer to SDS (ST-27).
- Check condition of dust cover. If cracked excessively, replace outer tie-rod.



### Assembly

1. Using a heat gun, heat new teflon rack seal ring to approximately 40°C (104°F). Then place it onto rack.

2. Using Tool, compress rack seal ring securely onto rack. **Always insert the tool from the rack gear side.**



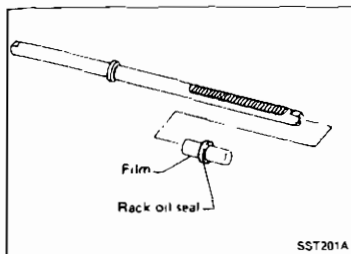


# POWER STEERING GEAR AND LINKAGE (Model PR24AC)

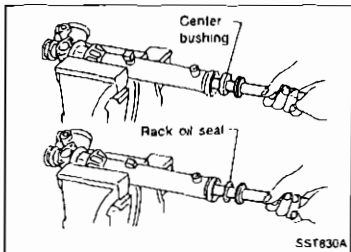
## Assembly (Cont'd)

3. Insert rack oil seal.

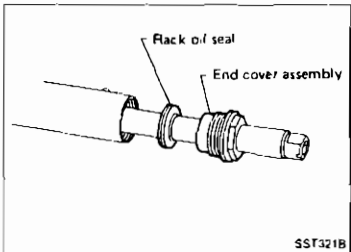
- Place plastic film into rack oil seal to prevent damage by rack teeth.
- Always remove plastic film after rack oil seal is positioned properly.
- Make sure lips of rack oil seal face each other.



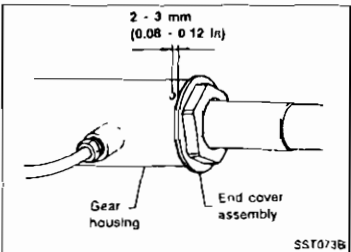
4. Install center bushing and rack oil seal with rack assembly.



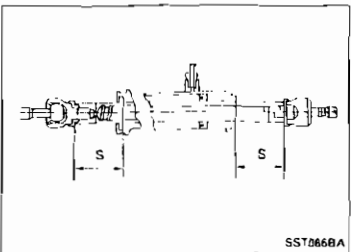
5. Insert rack oil seal and end cover assembly to rack. Then tighten end cover assembly.



6. Fasten cylinder end cover assembly to gear housing by staking.



7. Set rack gear in the neutral position.  
**Measured length "S":**  
Refer to SDS (ST-27).

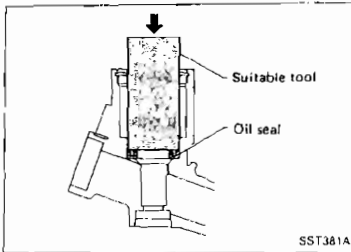


## POWER STEERING GEAR AND LINKAGE (Model PR24AC)

### Assembly (Cont'd)

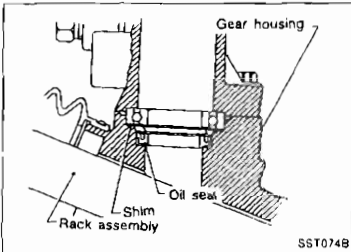
8. Coat seal lip of new pinion oil seal with multi-purpose grease. Install it into pinion housing of gear with a suitable tool.

**Make sure lip of oil seal faces up when installed.**



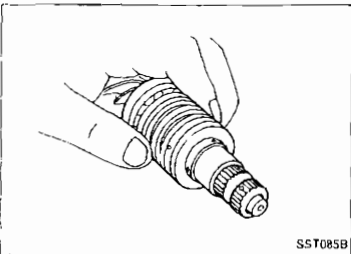
9. Install pinion bearing adjusting shim(s).

**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.**

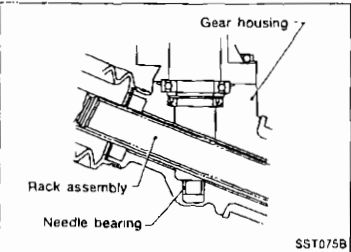


10. Install new pinion seal ring (made of Teflon) on pinion gear assembly.

- 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.

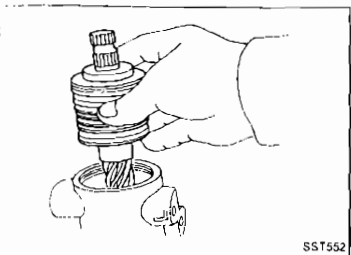


11. Apply a coat of multi-purpose grease to needle bearing roller and oil seal lip.



12. Install pinion assembly to rear housing

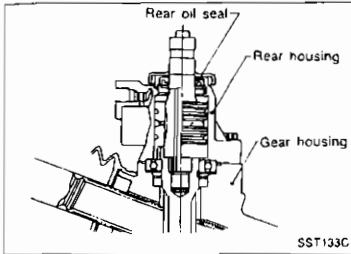
**Be careful not to damage pinion oil seal.**



# POWER STEERING GEAR AND LINKAGE (Model PR24AC)

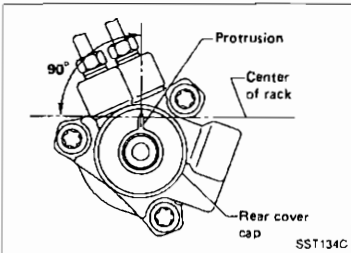
## Assembly (Cont'd)

13. Apply a coat of multi-purpose grease to rear oil seal tip before installing rear housing.



14. Ensure that the rack is centered. Install rear cover cap so that protrusion of rear housing cover is positioned as shown in figure.

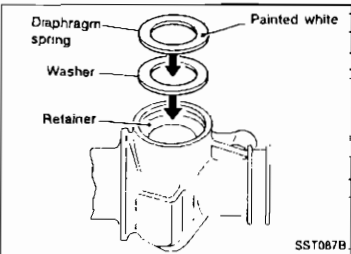
**Be careful not to damage worm ring and oil seal.**



15. Install diaphragm spring at retainer.

- Always install retainer, spring washer and diaphragm spring in that order
- Make sure convex end (painted white) of diaphragm spring faces outward when installing.

16. Install retainer spring and adjusting screw temporarily.

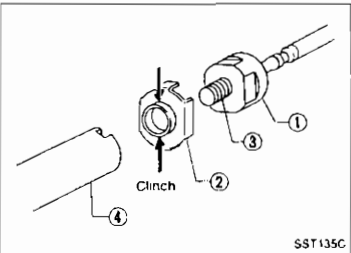


17. Install new lock plate.

- 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.



18. Tighten outer socket lock nut.

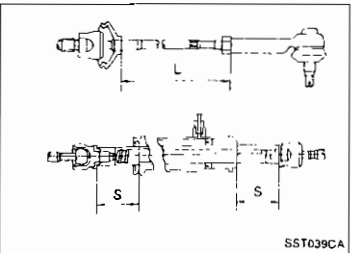
### Tie-rod length "L":

Refer to SDS (ST-27).

19. Measure rack stroke.

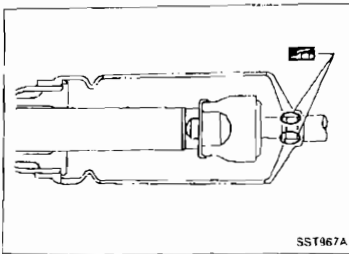
### Rack stroke "S":

Refer to SDS (ST-27).

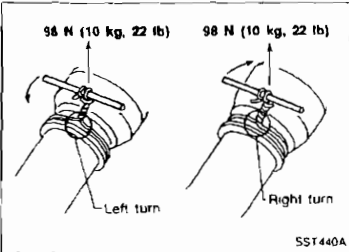


## POWER STEERING GEAR AND LINKAGE (Model PR24AC)

### Assembly (Cont'd)

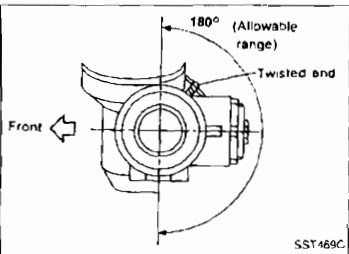


20. Before installing boot, coat the contact surfaces between boot and tie-rod with grease

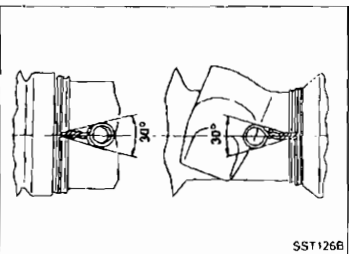


21. Install boot clamps.

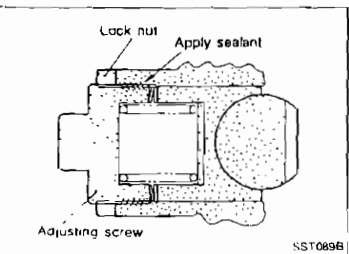
- To install, wrap boot clamp around boot groove twice. To tighten clamp, place a screwdriver through both rings. Twist rings 4 to 4-1/2 turns while pulling with a force of approx. 98 N (10 kg, 22 lb).
- Twist boot clamp in the direction shown in figure at left.



- Place twisted ends of boot clamp in the range shown (This will prevent interference with other parts.)



- After twisting boot clamp, bend twisted end diagonally so it does not contact boot.



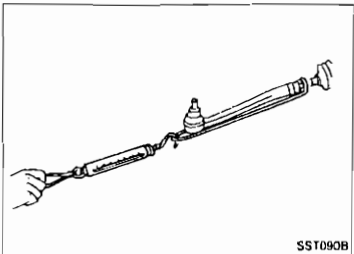
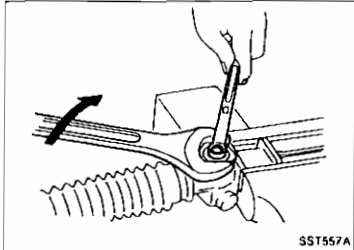
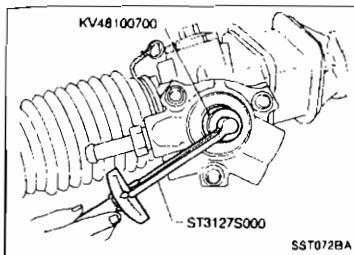
### Adjustment

Adjust pinion rotating torque as follows:

1. Set gears to Neutral 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

## POWER STEERING GEAR AND LINKAGE (Model PR24AC)

### Adjustment (Cont'd)



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 N·m (50 kg-cm, 43 in-lb).
9. Loosen adjusting screw by 70° to 110°.

10. Prevent adjusting screw from turning, and tighten lock nut to specified torque.

11. 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  $\pm 11.5$  mm ( $\pm 0.453$  in) at speed of 3.5 mm (0.138 in)/s. Check that rack sliding force is within specification.

**Average rack sliding force:**

**186 - 245 N (19 - 25 kg, 42 - 55 lb)**

**Maximum force deviation:**

**98 N (10 kg, 22 lb)**

- g. Check sliding force outside above range at rack speed of 40 mm (1.57 in)/s.

**Maximum rack sliding force:**

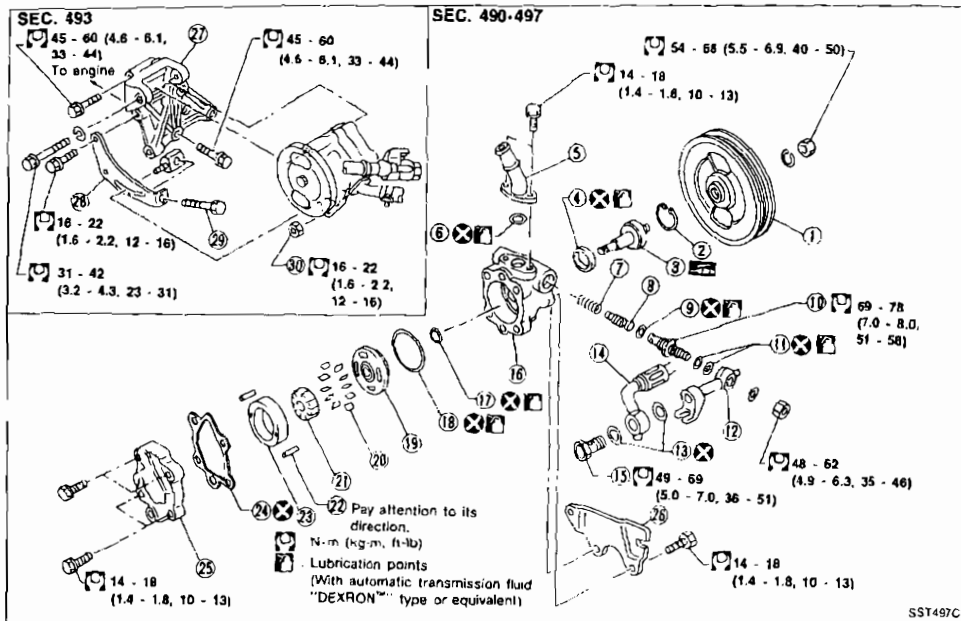
**294 N (30 kg, 66 lb)**

**Maximum force deviation:**

**147 N (15 kg, 33 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.

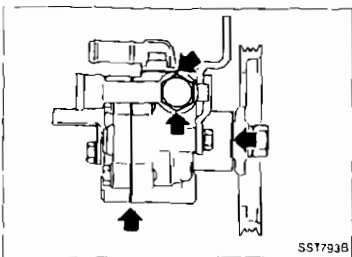
## Disassembly and Assembly



- ① Pulley
- ② Snap ring
- ③ Drive shaft assembly
- ④ Oil seal
- ⑤ Suction pipe
- ⑥ O-ring
- ⑦ Spring
- ⑧ Flow control valve
- ⑨ O-ring
- ⑩ Connector bolt

- ⑪ O-ring
- ⑫ Joint
- ⑬ Washer
- ⑭ Hose
- ⑮ Eye bolt
- ⑯ Casing
- ⑰ O-ring
- ⑱ O-ring
- ⑲ Front side plate
- ⑳ Vane

- ㉑ Rotor
- ㉒ Pin
- ㉓ Cam ring
- ㉔ Gasket
- ㉕ Rear cover
- ㉖ Front bracket
- ㉗ Power steering pump bracket
- ㉘ Adjusting bar
- ㉙ Adjusting bolt
- ㉚ Adjusting bolt lock nut



### Pre-disassembly Inspection

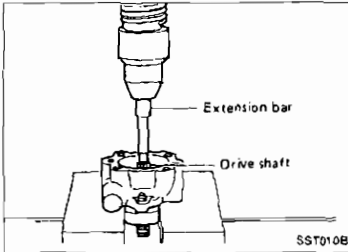
Disassemble the power steering oil pump only if the following items are found.

- Oil leak from any point shown in the figure.
- Deformed or damaged pulley
- Poor performance.

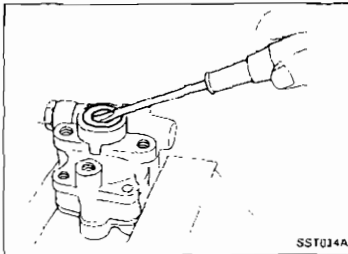
## Disassembly

### CAUTION:

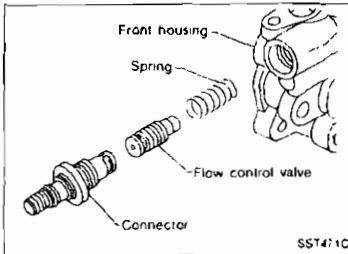
- Parts which can be disassembled are strictly limited. Never disassemble parts other than those specified.
- Disassemble in as clean a place as possible.
- Clean your hands before disassembly.
- Do not use rags; use nylon cloths or paper towels.
- Follow the procedures and cautions in the Service Manual.
- When disassembling and reassembling, do not let foreign matter enter or contact the parts.



- Remove snap ring, then draw pulley shaft out. Be careful not to drop pulley shaft.



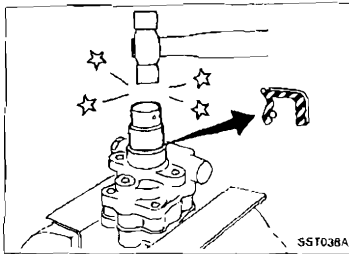
- Remove oil seal. Be careful not to damage front housing.



- Remove connector. Be careful not to drop flow control valve.

## Inspection

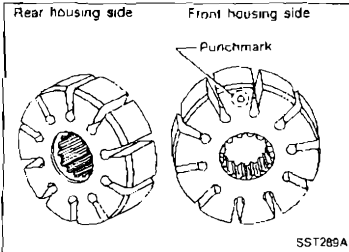
Inspect each component part for wear, deformation, scratches, and cracks. If damage is found, replace the part.



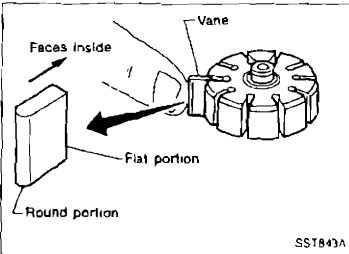
## Assembly

Assemble oil pump, noting the following instructions

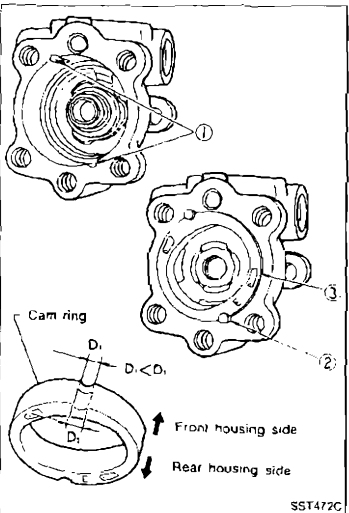
- Make sure O-rings and oil seal are properly installed.
- Always install new O-rings and oil seal
- Be careful of oil seal direction.
- Cam ring, rotor and vanes must be replaced as a set if necessary.
- Coat each part with ATF when assembling



- Pay attention to the direction of rotor



- When assembling vanes to rotor, rounded surfaces of vanes must face cam ring side.



- Insert pin (2) into pin groove (1) of front housing and front side plate. Then install cam ring (3) as shown at left.



# SERVICE DATA AND SPECIFICATIONS (SDS)

## General Specifications

|   |                   |
|---|-------------------|
| Applied model                             | All               |
| Steering model                            | Power steering    |
| Steering gear type                        | PR24AC            |
| Steering overall gear ratio               | 17.2              |
| Turns of steering wheel<br>(Lock to lock) | 3.1               |
| Steering column type                      | Collapsible, tilt |

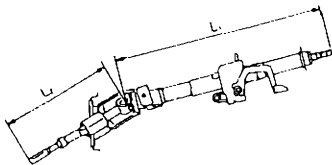
## Inspection and Adjustment

### GENERAL

|  |              |
|--|--------------|
| Steering wheel axial play<br>mm (in)             | 0 (0)        |
| Steering wheel play limit<br>mm (in)             | 35 (1.38)    |
| Allowable movement of gear<br>housing<br>mm (in) | ± 2 (± 0.08) |

### STEERING COLUMN

| Applied model  | LHD           | RHD           |
|--|---------------|---------------|
| Steering column length "L <sub>1</sub> "<br>mm (in)                | 630.7 (24.83) | 610.0 (24.02) |
| Steering column lower shaft<br>length "L <sub>2</sub> "<br>mm (in) | 323.7 (12.74) | 341.0 (13.43) |

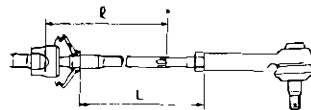


SST493C

### STEERING GEAR AND LINKAGE

|  |   |
|--|---|
| Steering gear type                                     | PR24AC                                  |
| Tie-rod outer ball joint                               |   |
| Swinging force at cotter<br>pin hole "A"<br>N (kg, lb) | 6.9 - 65.7<br>(0.7 - 6.7, 1.5 - 14.8)   |
| Rotating torque "B"<br>N m (kg-cm, in-lb)              | 0.29 - 2.94<br>(3.0 - 30.0, 2.6 - 26.0) |
| Axial end play "C" mm (in)                             | 0 (0)                                   |
| Tie-rod inner ball joint                               |   |
| Swinging force "A"<br>N (kg, lb)                       | 6.9 - 56.9<br>(0.7 - 5.8, 1.5 - 12.8)   |
| Axial end play "C" mm (in)                             | 0 (0)                                   |
| Tie-rod standard length "L"<br>mm (in)                 | 169 (6.65)                              |

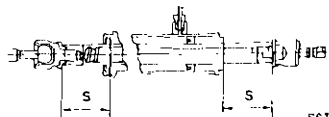
\* Measuring point [f: 137 mm (5.39 in)]



SST489C

|                         |              |
|-------------------------|--------------|
| Rack stroke "S" mm (in) | 68.5 (2.697) |
|-------------------------|--------------|

ST



SST086BA

# SERVICE DATA AND SPECIFICATIONS (SDS)

## Inspection and Adjustment (Cont'd)

### POWER STEERING

|   |  |
|---|--|
| Steering gear type  | PR24AC   |
| Rack sliding force  | N (kg, lb)   |
| Under normal operating oil pressure   |  |
| Range within $\pm 11.5$ mm ( $\pm 0.453$ in) from the neutral position at rack speed of 3.5 mm (0.138 in)/s |  |
| Average force   | 186 - 245<br>(19 - 25, 42 - 55)                      |
| Maximum force deviation   | 98 (10, 22)  |
| Except for the above range  |  |
| Maximum sliding force   | 294 (30, 66)   |
| Maximum force deviation   | 147 (15, 33)   |
| Retainer adjustment   |  |
| Adjusting screw   |  |
| Initial tightening torque   | 4.9 - 5.9<br>N m (kg-cm, in-lb)                      |
| Retightening torque after loosening   | 0.2 (2, 1.7)   |
| Tightening torque after gear has settled  | 4.9 (50, 43)   |
| Returning angle   | degree   |
|   | 70° - 110°   |
| Steering wheel turning force (Measured at one full turn from the neutral position)                          | N (kg, lb)   |
|   | 39 (4, 9) or less                                    |
| Fluid capacity (Approximate)  | l (Imp qt)   |
|   | 0.9 (3/4)  |
| Oil pump maximum pressure   | 8,630 - 9,219<br>kPa (bar, kg/cm <sup>2</sup> , psi) |
|   | (86.3 - 92.2, 88 - 94, 1,251 - 1,337)                |

# RESTRAINT SYSTEM

## SECTION **RS**

### CONTENTS

|  |   |   |    |
|--|---|---|----|
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When you read wiring diagrams:

- Read GI section, "HOW TO READ WIRING DIAGRAMS"
  - See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.
- When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

## PRECAUTION

### Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System "Air Bag" and "Seat Belt Pre-tensioner", used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.

#### 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.
- All SRS air bag electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS.

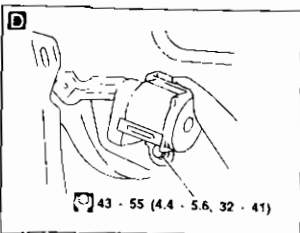
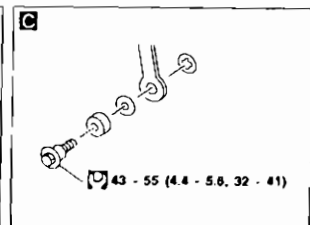
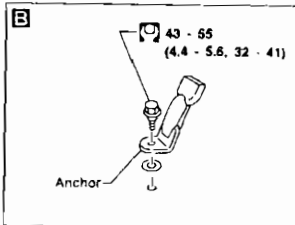
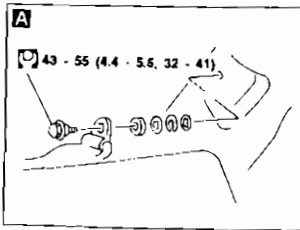
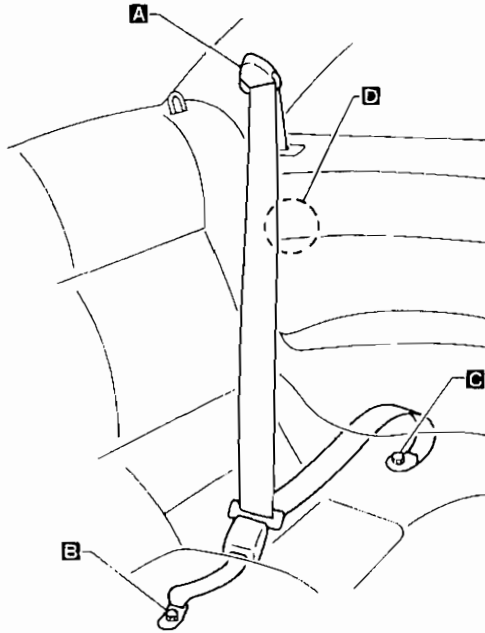


# SEAT BELTS

## Rear Seat Belt

1. Remove rear seat Refer to "SEAT" in BT section for details
2. Remove rear pillar lower garnish. Refer to "INTERIOR TRIM" in BT section for details.
3. Remove each anchor bolt
4. Remove the anchor bolt securing rear seat belt assembly.

SEC. 869



N·m (kg·m ft·lb)

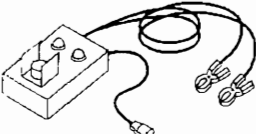
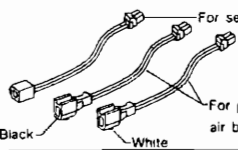
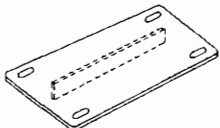
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## SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

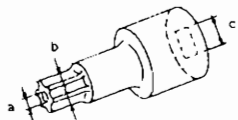
### Precautions for SRS "Air Bag" and "Seat Belt Pre-tensioner" Service

- Do not use a circuit tester to check SRS circuits.
- Before servicing the SRS, turn ignition switch "OFF", disconnect battery ground cable and wait for at least 10 minutes.  
For approximately ten 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 ten 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 it with the pad side facing upward.
- After removing any SRS parts, discard old bolts and replace with new ones. Conduct self-diagnosis to check entire SRS for proper function.
- After air bag inflates, the front instrument panel assembly should be replaced

### Special Service Tools

| Tool number<br>Tool name                  | Description   |
|---|---|
| KV99106400<br>Deployment tool             | Disposing of air bag module<br><br>NT357   |
| KV99106550<br>Deployment tool<br>adapters | <br>For seat belt pre-tensioner<br>For passenger air bag module<br>Black<br>White<br>NT353 |
| KV99105300<br>Passenger air bag bracket   | Anchor the passenger air bag module<br><br>NT354  |

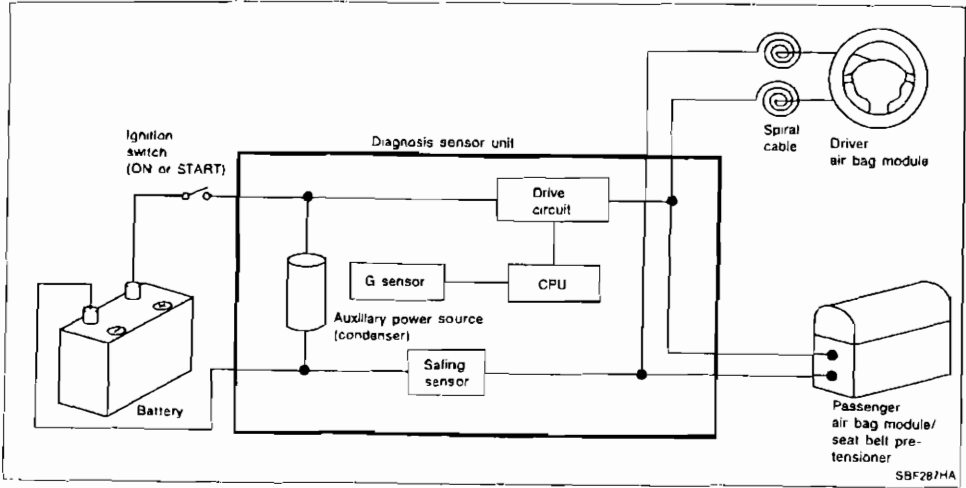
### Commercial Service Tool

| Tool name        | Description   |
|------------------|---|
| Special torx bit | Use for special bolts<br>[TAMPER RESISTANT TORX (Size T50)]<br><br>a: 3.5 (0.138) dia.<br>b: 8.5 - 8.6 (0.335 - 0.339) dia.<br>c: approx. 10 (0.39) sq.<br>Unit: mm (in) |

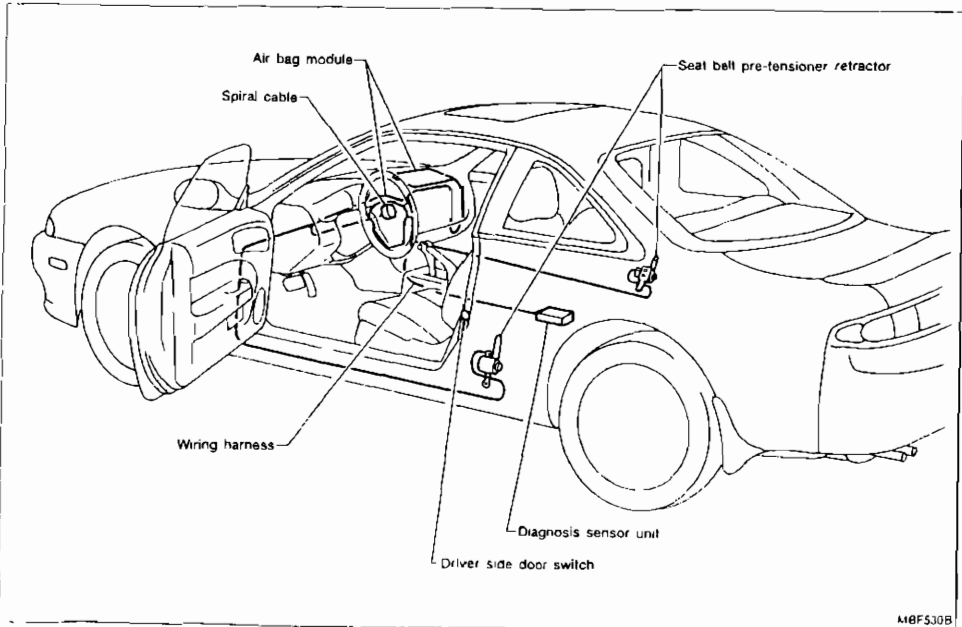
# SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

## Description

The air bag deploys if the diagnosis sensor unit activates while the ignition switch is in "ON" or "START" position.



## SRS Component Parts Location







**Maintenance Items**

1. Check "AIR BAG" warning lamp (Models equipped with air bags)

After turning ignition key to "ON" or "START" position, "AIR BAG" warning lamp illuminates for about 7 seconds. The "AIR BAG" warning lamp will go out after about 7 seconds, if no malfunction is detected.

When a warning lamp flashes, check and correct cause of the problem

2. Visually check SRS components

- (1) Diagnosis sensor unit — Airbag

- Check case and bracket for dents, cracks or deformities.
- Check connectors for damage, and terminals for deformities.

- (2) Main harness and air bag harness

- Check connectors for poor connections
- Check harnesses for binding, connectors for damage, and terminals for deformities.

- (3) Spiral cable

- Visually check lock (engagement) pins and combination switch for damage
- Check connectors, flat cable and protective tape for damage.
- Check steering wheel for noise, binding or difficult operation.

- (4) Air bag module and steering wheel

- Remove air bag module from steering wheel or instrument panel. Check harness cover and connectors for damage, terminals for deformities, and harness for binding.
- Install driver side air bag module to steering wheel to check fit or alignment with the wheel.
- Check steering wheel for excessive free play.
- Install passenger side air bag module to instrument panel to check fit or alignment with the instrument panel.

**CAUTION:**

**Replace previously used screws with new ones.**

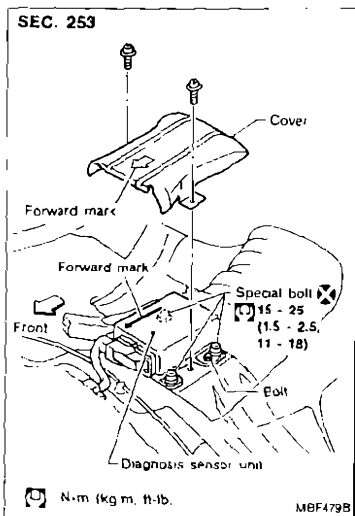
- (5) Seat belt pre-tensioner

- 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 circuit tester Refer to "Self-diagnosis" for details. (RS-21)

## Removal and Installation — Diagnosis Sensor Unit and Seat Belt Pre-tensioner

### CAUTION:

- Before servicing SRS, turn the ignition switch off, disconnect battery ground cable and wait for at least 10 minutes.
- The special bolts are coated with bonding agent. Discard old ones after removal; replace with new ones.
- Check diagnosis sensor unit for proper installation.
- Check diagnosis sensor unit to ensure they are 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.
- Do not attempt to disassemble seat belt pre-tensioner.
- Do not drop or impact seat belt pre-tensioner. If any portion is damaged, replace the seat belt pre-tensioner.
- Do not expose seat belt pre-tensioner to temperatures exceeding 80°C (176°F).
- Whenever seat belts (equipped with pre-tensioner) are moved, ensure that cylinder faces down. Do not hold cylinder.



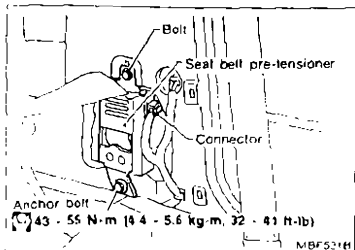
### REMOVAL OF DIAGNOSIS SENSOR UNIT

- 1 Disconnect driver and passenger air bag module connectors. Also, disconnect seat belt pre-tensioner connector.
- 2 Remove rear seat assembly. Refer to "Rear Seat" in BT section.
- 3 Remove cover.
- 4 Disconnect diagnosis sensor unit connector.
- 5 Remove 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.



### REMOVAL OF SEAT BELT PRE-TENSIONER

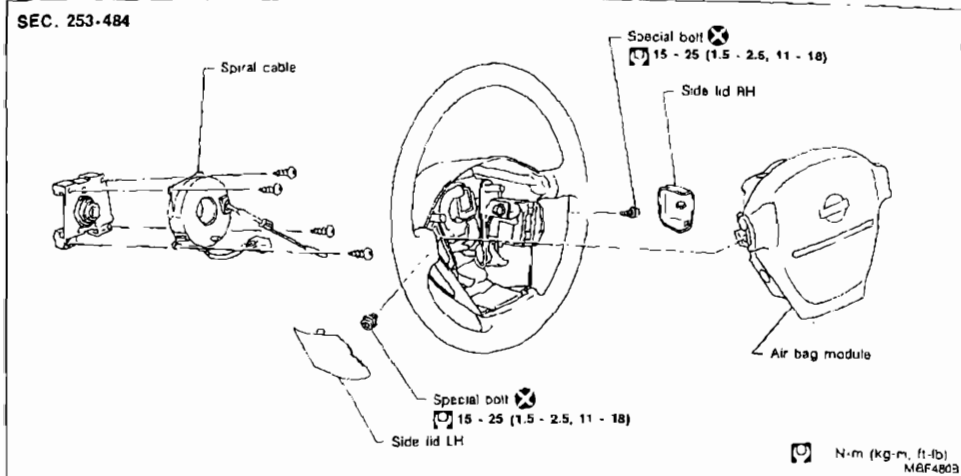
For removal of seat belt pre-tensioner, refer to "Front Seat Belt" for details. (RS-3)

#### NOTE:

- To install, reverse the removal procedure sequence.
- After replacement, perform self-diagnosis for seat belt pre-tensioner using circuit tester. Refer to "Self-diagnosis" for details. (RS-21)

Removal — Air Bag Module and Spiral Cable

SEC. 253-484



**CAUTION:**

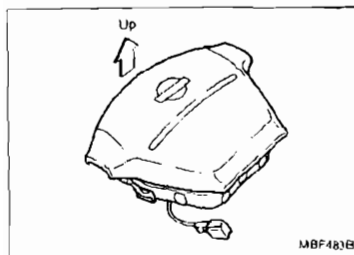
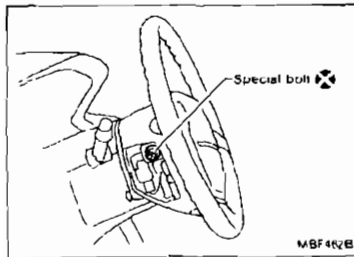
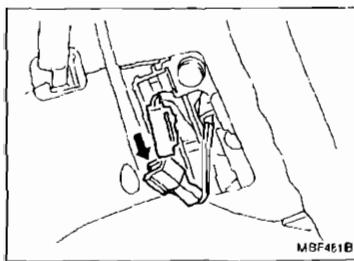
Before servicing SRS, turn the ignition switch off, disconnect battery ground cable and wait for at least 10 minutes.

1 Remove side lid LH from steering wheel, and disconnect air bag module connector.

2. Remove side lid. 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. Discard old ones after removal; replace with new ones.



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W100

RS

RS1

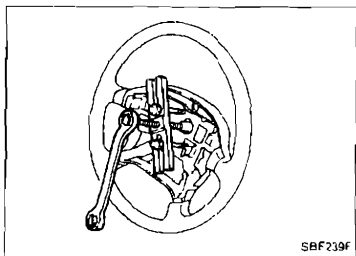
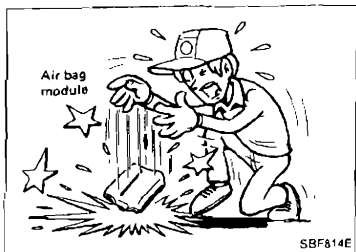
RS2

RS3

RS4

## SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

### Removal — Air Bag Module and Spiral Cable (Cont'd)



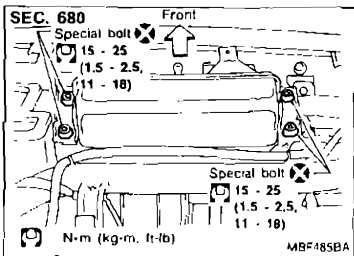
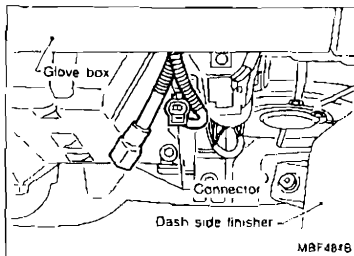
3. Set steering wheel in the neutral position.
4. Disconnect horn connector and remove nuts
5. Using steering wheel puller, remove steering wheel. Be careful not to over-tighten puller bolt on steering wheel.
6. Remove steering column cover.
7. Disconnect connector and remove the four screws. The spiral cable can then be removed.

### Removal — Front Passenger Air Bag Module

#### CAUTION:

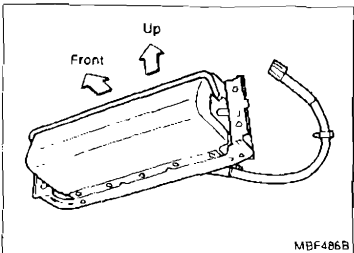
**Before servicing SRS, turn the ignition switch off, disconnect battery ground cable and wait for at least 10 minutes.**

1. Remove connector bracket from air bag module and disconnect air bag module connector.
  2. Remove instrument panel.
  3. Remove the special bolts from left and right sides of front passenger air bag module. Then remove the air bag module from the steering member.
- Air bag module is heavy and should be supported using both hands during removal.



#### CAUTION:

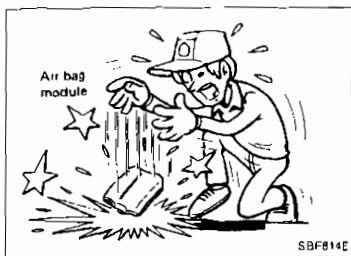
- Always place air bag module with pad side facing upward.
- Do not attempt to disassemble air bag module.
- The special bolts are coated with bonding agent. Discard old ones after removal; replace with new ones.



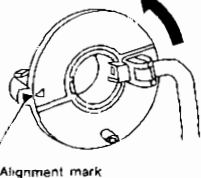
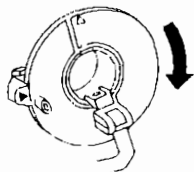
## SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

### Removal — Front Passenger Air Bag Module (Cont'd)

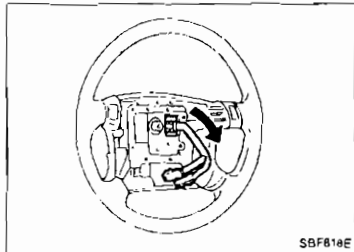
- Do not drop or impact air bag module. If any portion is deformed or cracked, replace the module.
- Do not expose the air bag module to temperatures exceeding 93°C (199°F).
- Do not allow oil, grease or water to come in contact with the air bag module.



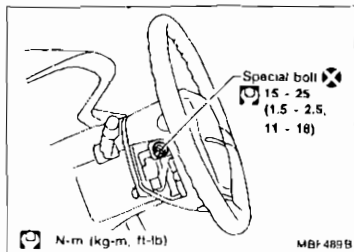
SEC. 253



MBF487B



SBF814E



### Installation — Air Bag Module and Spiral Cable

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 2.5 revolutions from the right end position. Align the two marks (X).

#### CAUTION:

The spiral cable may snap due to steering operation if the cable is installed in an improper position.

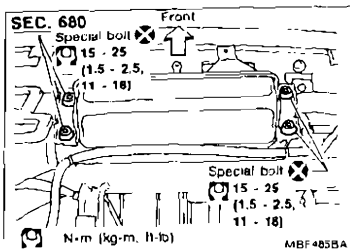
Also, with the steering linkage disconnected, the cable may snap by turning the steering wheel beyond the limited number of turns. (The spiral cable can be turned up to 2.5 turns from the neutral position to both the right and left.)

3. Connect spiral cable connector and tighten with screws. Install steering column cover.

4. Install steering wheel setting spiral cable pin guides, and pull spiral cable through
5. Connect horn connector and engage spiral cable with pawls in steering wheel.
6. Tighten nuts.

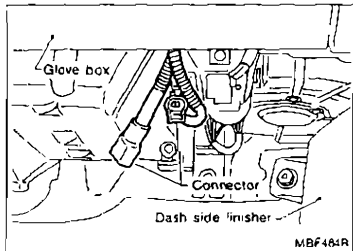
7. Position air bag module and tighten with new special bolts
8. Connect air bag module connector.
9. Install all lids.
10. Conduct self-diagnosis to ensure entire SRS operates properly. (Use CONSULT or warning lamp check)

## SUPPLEMENTAL RESTRAINT SYSTEM (SRS)



### Installation — Front Passenger Air Bag Module

1. Install front passenger air bag module on steering member.
  - Ensure harness is not caught between rear of air bag module and steering member.
2. Install instrument panel



3. Connect air bag module connector to body harness connector.
4. Install air bag module connector on connector bracket.
5. Install connector bracket on air bag module.

### Disposal of Air Bag Module and Seat Belt Pre-tensioner

- Make sure to deactivate air bag modules and seat belt pre-tensioners before disposing of them. Also, before disposing of a vehicle equipped with an SRS system, deactivate air bag modules and seat belt pre-tensioners. If such systems have already been deployed due to an accident, dispose of as indicated in "DISPOSING OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER".
- When deploying the air bag module and seat belt pre-tensioner, always use the Special Service Tool; Deployment tool KV99106400
- When deploying the air bag module and seat belt pre-tensioner, stand at least 5 m (16 ft) away from the deployment component
- Due to heat, do not touch air bag module for at least 30 minutes after deployment. Also do not touch seat belt pre-tensioner for at least 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 a deployed air bag module and seat belt pre-tensioner.
- Wash your hands clean after finishing work.

## SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

### Disposal of Air Bag Module and Seat Belt Pre-tensioner (Cont'd)

#### CHECKING DEPLOYMENT TOOL

##### Connecting to battery

- Place vehicle outdoors with at least 6 m (20 ft) of open space on all sides.
- Use a voltmeter to make sure the vehicle battery is fully charged.

##### 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 10 to 12 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.

##### CAUTION:

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.

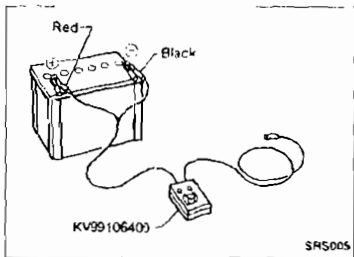
##### Deployment tool check

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.

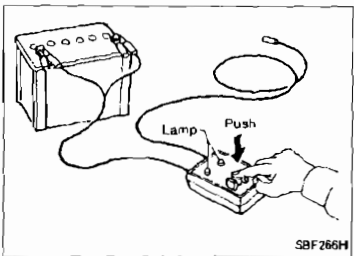
##### Air bag deployment tool lamp illumination chart (Battery connected)

| Switch operation | Left side lamp, green*<br>"AIR BAG CONNFC-<br>TOR VOLTAGE" | Right side lamp,<br>green*<br>"DEPLOYMENT TOOL<br>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.



SRS005



SBF266H

## SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

### Disposal of Air Bag Module and Seat Belt Pre-tensioner (Cont'd)

#### DEPLOYMENT PROCEDURES FOR AIR BAG MODULE AS A UNIT

Deploying air bag module while it is mounted in vehicle may damage vehicle. Deploy air bag module as a unit except when disposing of vehicle.

Anchor air bag module in a vise secured to a firm foundation during deployment.

#### Deployment of driver's air bag module as a unit

1. Prepare two sets of nuts and bolts (see figure at left). These bolts are required to secure driver's air bag module to the vise.
2. Install one set of nuts and bolts to each side of the air bag module.

#### CAUTION:

Make sure to install two bolts and nuts on each side.

3. Firmly place two nuts (secured to air bag module) in the vise.

#### CAUTION:

Ensure these two nuts are equally placed in the vise. Never finish the installation with just one nut.

4. Connect deployment tool (SST: KV99106400) 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:

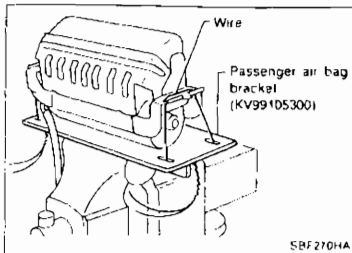
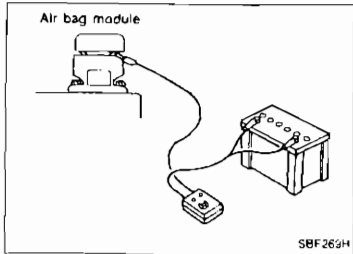
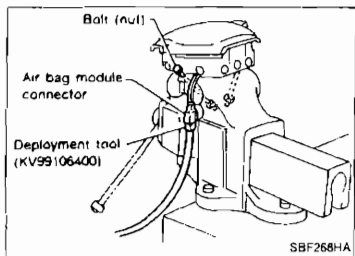
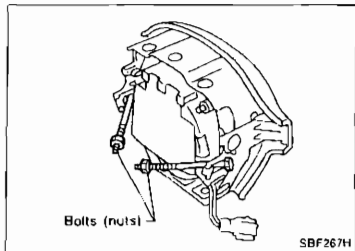
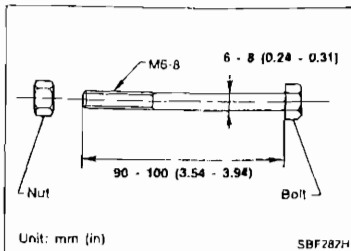
When deploying the air bag module, stand at least 5 m (16 ft) away from the air bag module.

#### Deployment of passenger air bag module as a unit

1. Using wire, secure air bag module to passenger air bag bracket (SST: KV99105300) at two places.

#### CAUTION:

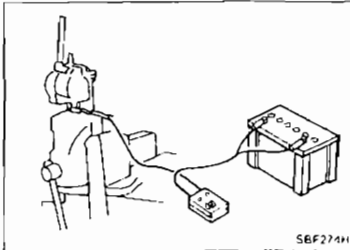
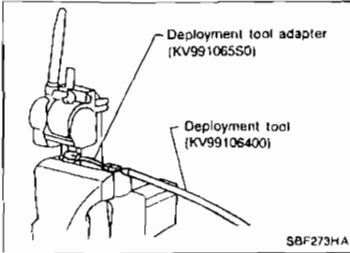
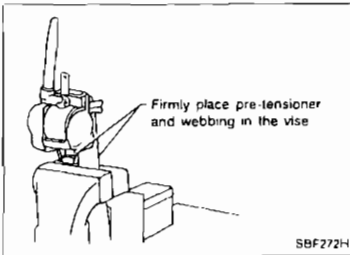
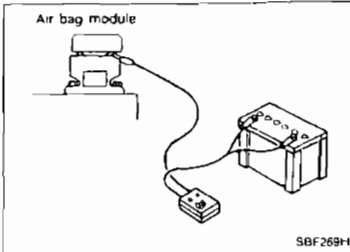
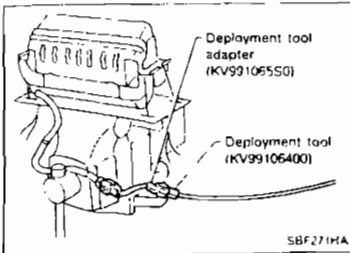
Use wire of at least 1 mm (0.04 in) in diameter.





## SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

### Disposal of Air Bag Module and Seat Belt Pre-tensioner (Cont'd)



2. Firmly anchor passenger air bag bracket in a vise.
3. Connect deployment tool adapter (SST: KV991065S0) to deployment tool (SST: KV99106400) connector and connector on either side of air bag module.

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.

#### CAUTION:

When deploying the air bag module, stand at least 5 m (16 ft) away from the air bag module.

#### CAUTION:

Always activate one inflator at a time.

### Deployment of seat belt pre-tensioner as a unit

1. Firmly anchor seat belt pre-tensioner in a vise

#### CAUTION:

Ensure bracket and webbing are placed in the vise.

2. Connect deployment tool adapter (SST: KV991065S0) to deployment tool (SST: KV99106400) connector and seat belt pre-tensioner connector.

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 "air bag 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.

## SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

### Disposal of Air Bag Module and Seat Belt Pre-tensioner (Cont'd)

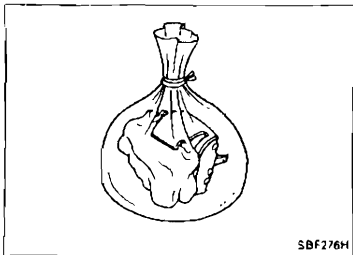
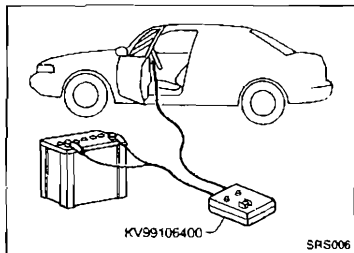
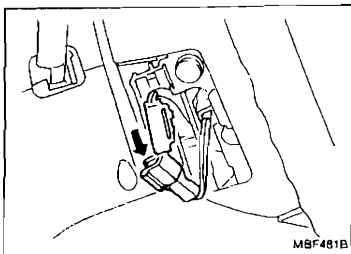
#### DEPLOYMENT OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER WHILE MOUNTED IN VEHICLE

When disposing of a vehicle, deploy air bag modules 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 battery ground cable and wait 10 minutes
2. Disconnect air bag modules and seat belt pre-tensioners connector.
3. Connect deployment tool connector (SST: KV99106400) to air bag module or seat belt pre-tensioner.  
For front passenger air bag module and seat belt pre-tensioner, attach deployment tool adapters (SST: KV991065S0) to the tool connector.
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 or seat belt pre-tensioner will deploy.
7. After deployment, remove them from vehicle and seal them up in plastic bags, then dispose of them.



#### DISPOSING OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER

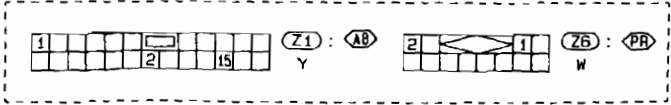
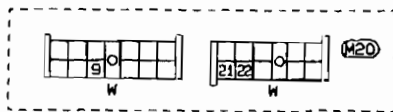
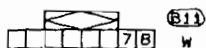
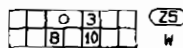
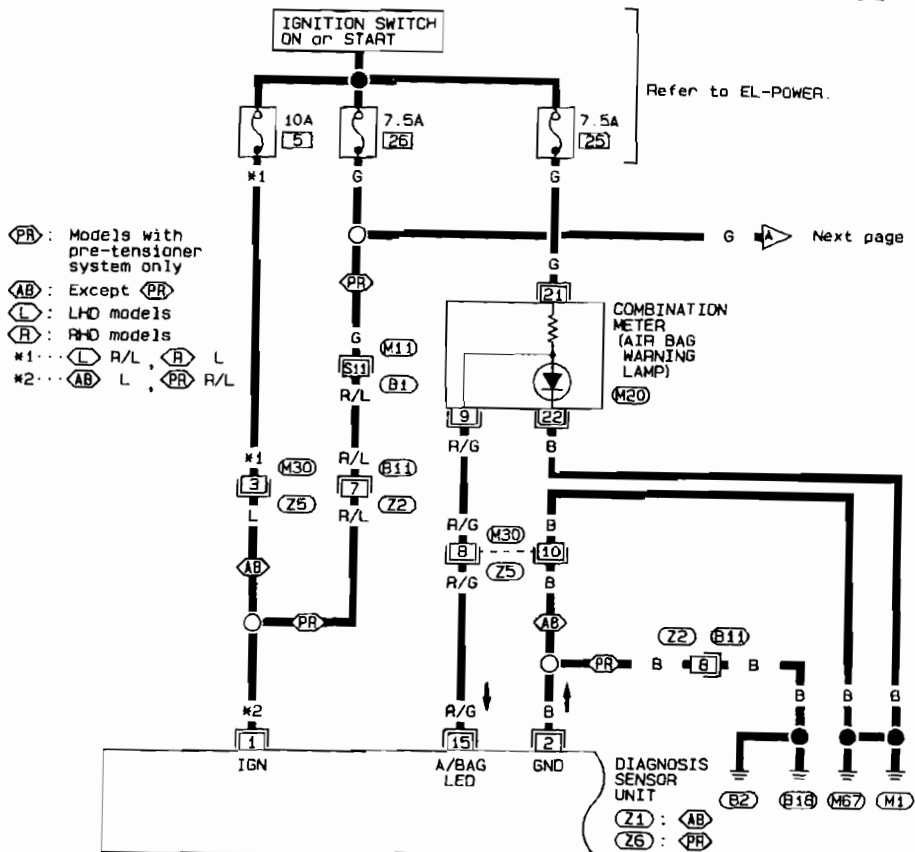
Deployed air bag modules and seat belt pre-tensioners are very hot. Before disposing of air bag module, and seat belt pre-tensioner, wait at least 30 minutes, and 10 minutes, respectively. Seal them in a plastic bag before disposal.

#### 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 can not be re-used.
- Wash your hands clean after finishing work.

Wiring Diagram — SRS —

RS-SRS-01



Refer to last page (Foldout page).

M11, B1

RS

# TROUBLE DIAGNOSES — Supplemental Restraint System (SRS)

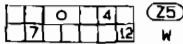
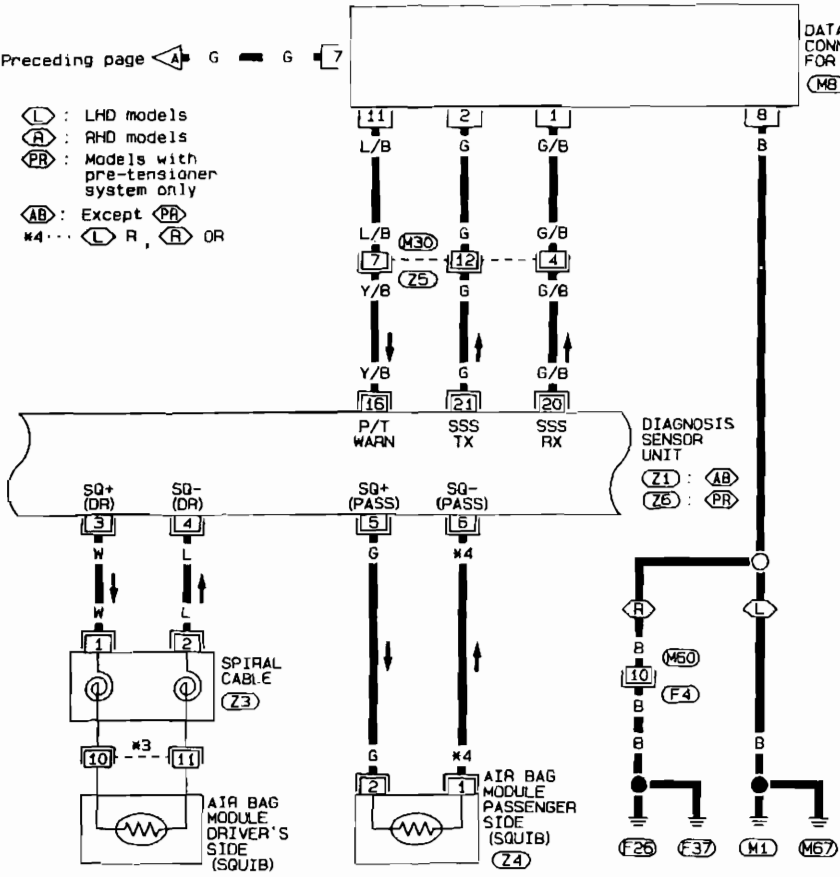
## Wiring Diagram — SRS — (Cont'd)

RS-SRS-02

Preceding page ◀ A G — G □ 7

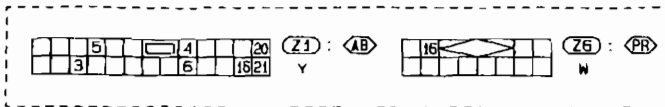
DATA LINK CONNECTOR FOR CONSULT  
(MB)

- (L) : LHD models
- (R) : RHD models
- (PR) : Models with pre-tensioner system only
- (AB) : Except (PR)
- \*4... (L) R, (R) OR



Refer to last page (Foldout page).

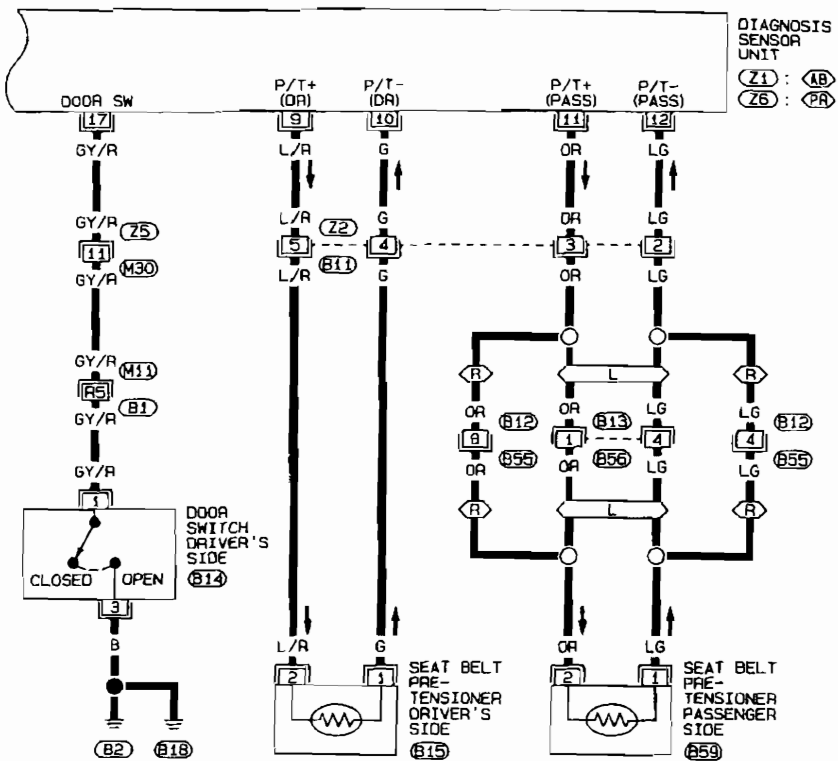
(M50), (F4)



# TROUBLE DIAGNOSES — Supplemental Restraint System (SRS)

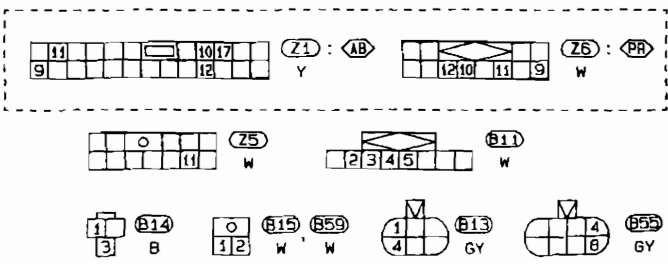
## Wiring Diagram — SRS — (Cont'd)

RS-SRS-03



8A  
8B  
8C  
8D  
8E  
8F  
8G  
8H  
8I  
8J  
8K  
8L  
8M  
8N  
8O  
8P  
8Q  
8R  
8S  
8T  
8U  
8V  
8W  
8X  
8Y  
8Z

RS



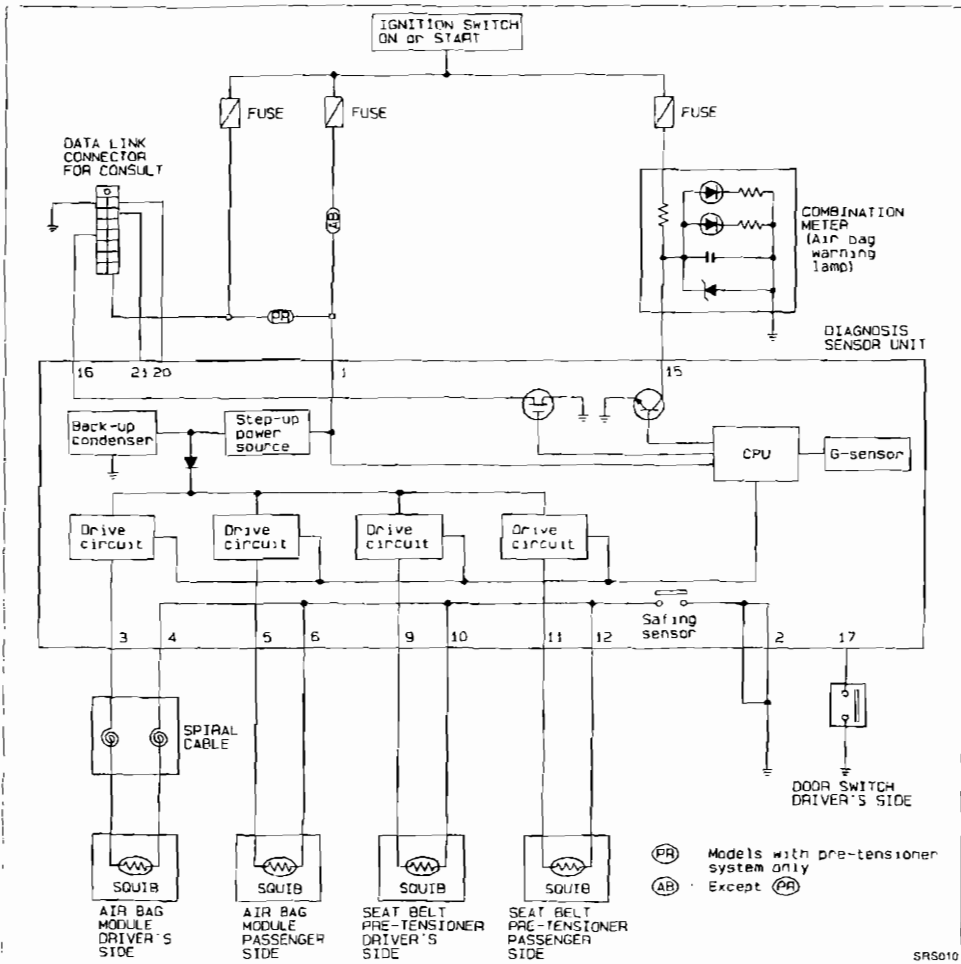
Refer to last page (Foldout page).

M11, B1

## Schematic

### CAUTION:

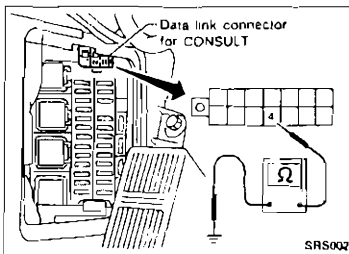
- Do not use a circuit tester to check SRS "Air Bag" harness connectors. The wiring harness and connectors have yellow outer insulation for easy identification.
- Do not attempt to repair, splice or modify the SRS "Air Bag" wiring harness. If the harness is damaged, replace it with a new one.
- Keep ground portion clean.



## Self-diagnosis

The air bag and seat belt pre-tensioner can be put under self-diagnosis by the following methods.

|                   |  | USING CIRCUIT TESTER | USING CONSULT | USING "AIR BAG" WARNING LAMP |
|-------------------|--|----------------------|---------------|------------------------------|
|                   |  | RS-21                | RS-22         | RS-24                        |
| For Europe        | Seat belt pre-tensioner (Standard equipment)       | ○                    |               |                              |
|                   | Equipped with driver air bag                       |                      |               | ○                            |
|                   | Equipped with driver air bag and passenger air bag |                      |               | ○                            |
| Except for Europe | Equipped with driver air bag                       |                      | ○             | ○                            |
|                   | Equipped with driver air bag and passenger air bag |                      |               | ○                            |
| For Australia     |  |                      | ○             | ○                            |



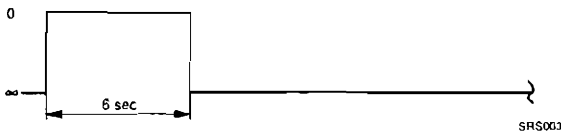
### USING CIRCUIT TESTER

Seat belt pre-tensioner self-diagnosis results can be read by using a circuit tester as follows:

1. Measure resistance between data link connector for CONSULT and body ground

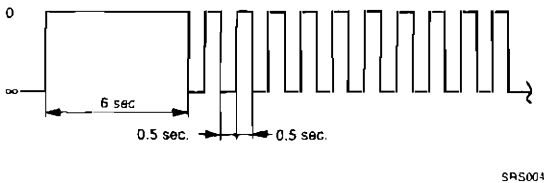
2. Visually check the oscillation of circuit tester needle.

① Normal

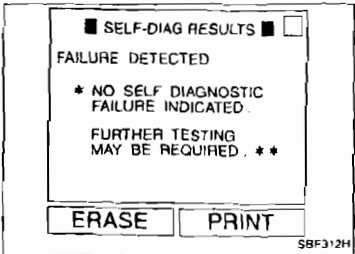
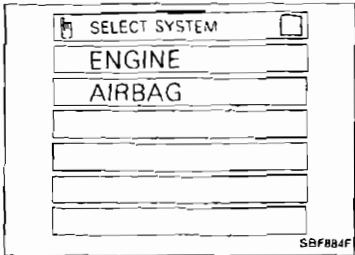
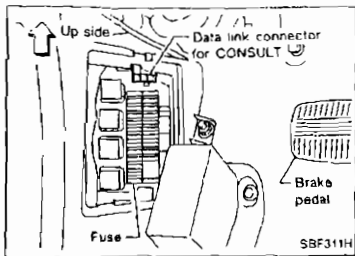


No problem  
The seat belt pre-tensioner is in good order

② Malfunction (including when seat belt pre-tensioner is deployed)



- Seat belt pre-tensioner circuit is open or shorted to some power supply circuit, or shorted to ground
- 1 Visually check wiring harness connections
  - 2 Replace seat belt assembly (Before disposing, it must be deactivated)
  - 3 Replace diagnosis sensor unit
  - 4 Replace air bag harness
  - 5 Replace main harness
- (Recheck seat belt pre-tensioner using circuit tester at each replacement.)



## Self-diagnosis (Cont'd)

### USING CONSULT

The self-diagnosis results can be read by CONSULT, as follows:

1. Connect "CONSULT" to data link connector for CONSULT. (Data link connector for CONSULT is located in left or right dash side panel)
2. Turn ignition switch to "ON" (When CONSULT is connected, the "AIR BAG" warning lamp will be turned to present diagnosis mode)
3. Touch "START" to operate "CONSULT"
4. Touch "AIR BAG" to choose air bag system.
5. Touch "SELF DIAG RESULTS" to read self-diagnosis results.
6. Problem codes are displayed on "SELF DIAG RESULTS".
7. When "PRINT" is pressed, information displayed on "SELF DIAG RESULTS" is printed out

### WARNING:

- While CONSULT is displaying this "SELF-DIAG RESULTS" information, do not disconnect CONSULT from data link connector.
- When finishing diagnosis, make sure to change CONSULT display to SELECT SYSTEM mode by using BACK KEY.

8. After repairing malfunctioning parts, press "ERASE" to clear self-diagnosis results.
- "ERASE" function requires selecting "ERASE", and completing step 9.
9. Push BACK KEY of CONSULT until SELECT SYSTEM mode appears to make "SELF-DIAGNOSIS" user mode.
- If malfunctioning parts are not completely repaired, "AIR BAG" warning lamp will blink every 0.5 seconds.
10. Push the power off switch
11. Turn off ignition switch, disconnect CONSULT.
12. Turn ignition switch to "ON"  
"AIR BAG" warning lamp should come on for about 7 seconds and then go off.



# TROUBLE DIAGNOSES — Supplemental Restraint System (SRS)

## Self-diagnosis (Cont'd)

### Self-diagnosis results

| Diagnostic item                      | Explanation/Possible causes  | Repair order<br>* Recheck SRS using CONSULT at each replacement   |
|--------------------------------------|--|---|
| NO SELF DIAGNOSTIC FAILURE INDICATED | ● Normal SRS system is in good order   | —   |
| AIRBAG MODULE [OPEN]                 | ● Driver's air bag module circuit is open (including the spiral cable)                                 | 1 Visually check wiring harness connections<br>2 Replace spiral cable   |
| AIRBAG MODULE [VB-SHORT]             | ● Driver's air bag module circuit is shorted to some power supply circuit (including the spiral cable) | 3 Replace driver's air bag module (Before disposing of it, it must be deployed)   |
| AIRBAG MODULE [GND-SHORT]            | ● Driver's air bag module circuit is shorted to ground (including the spiral cable).                   | 4 Replace diagnosis sensor unit<br>5 Replace air bag harness<br>6 Replace main harness  |
| AIRBAG MODULE [SHORT]                | ● Driver's air bag module circuits are shorted to each other   |   |
| ASSIST A/B MODULE*1 [OPEN]           | ● Front passenger air bag module circuit is open   | 1 Visually check wiring harness connections<br>2 Replace front passenger air bag module (Before disposal of it, it must be deployed)  |
| ASSIST A/B MODULE*1 [VB-SHORT]       | ● Front passenger air bag module circuit is shorted to some power supply circuit                       | 3 Replace diagnosis sensor unit<br>4 Replace air bag harness  |
| ASSIST A/B MODULE*1 [GND-SHORT]      | ● Front passenger air bag module circuit is shorted to ground.   | 5 Replace main harness  |
| ASSIST A/B MODULE*1 [SHORT]          | ● Front passenger air bag module circuits are shorted to each other                                    |   |
| CONTROL UNIT                         | ● Diagnosis sensor unit is out of order  | 1 Visually check wiring harness connections<br>2 Replace diagnosis sensor unit.<br>3 Replace air bag harness<br>4 Replace main harness  |
| INDEFINITE FAILURES (AIR BAG)        | ● A problem which cannot be specified occurs because more than two parts are out of order              | 1 Visually check wiring harness connections<br>2 Replace diagnosis sensor unit<br>3 Replace spiral cable and air bag modules<br>4 Replace air bag harness<br>5 Replace main harness |

\*1: For Australia model only

RS

# TROUBLE DIAGNOSES — Supplemental Restraint System (SRS)

## Self-diagnosis (Cont'd)

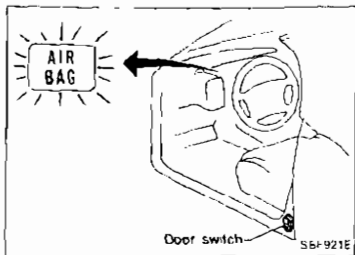
### USING "AIR BAG" WARNING LAMP

Air bag self-diagnosis results can be read by using the "AIR BAG" warning lamp.

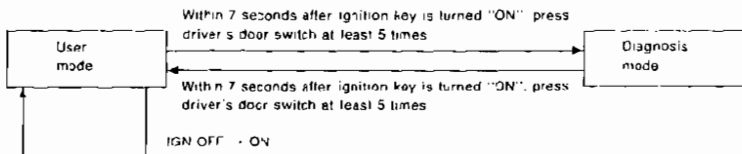
The "Air bag" warning lamp operates as shown below:

#### WARNING:

When the "AIR BAG" warning lamp is flashing, compare the flash time to the chart below.



### How to alternate self-diagnosis



Problem codes are displayed in diagnosis mode (self-diagnosis results).

### Warning lamp indication

- After repairing malfunctioning part, use driver's door switch to return the system to user mode. This will clear self-diagnosis results from memory.
- If a malfunctioning part is not completely repaired, self-diagnosis results will not be cleared.

#### User mode

|  |   |
|--|---|
| <p>① Normal (OFF)</p> <p>(IGN ON)</p> <p>Light check</p> <p>ON</p> <p>OFF</p> <p>7 sec.</p> <p>SBF298H</p>   | <p>No problem.</p>  |
| <p>② Malfunction (blinking)</p> <p>ON</p> <p>OFF</p> <p>0.5 sec.</p> <p>0.5 sec.</p> <p>SBF299HA</p>   | <p>The system has problem. Perform self-diagnosis with "Diagnosis mode"</p> |
| <p>③ Air bag is deployed or diagnosis sensor unit is malfunctioning and continuously sends an "ON" signal</p> <p>ON</p> <p>OFF</p> <p>SBF284HA</p> | <p>The system needs to be repaired (Refer to page RS-26)</p>                |

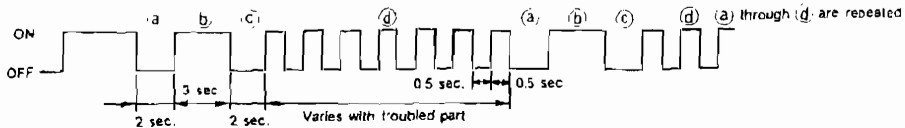
# TROUBLE DIAGNOSES — Supplemental Restraint System (SRS)

## Self-diagnosis (Cont'd)

Diagnosis mode (Self-diagnosis result)

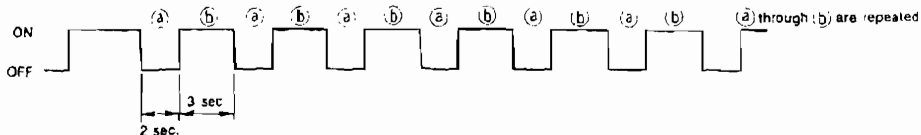
- Indicate malfunctioning part — The system needs to be repaired

(b): Start signal. Start signal identifies display modes



SBF300H

- No malfunctioning (or intermittent trouble/repair completion)



SBF265H

### WARNING:

- After the malfunctioning parts have been repaired, return the system to "User mode".

Self-diagnosis results in diagnosis mode can be identified by number of flashes (d). Refer to Table on next page for troubled parts

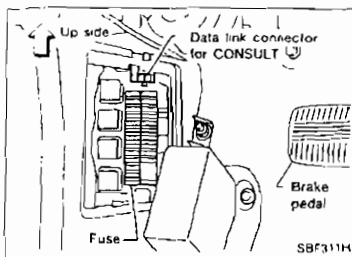
RS

# TROUBLE DIAGNOSES — Supplemental Restraint System (SRS)

## Self-diagnosis (Cont'd)

### Warning lamp flashing times and repair

| Warning lamp         | Flash code (4)<br>(# of flashes) | Explanation/Possible causes  | Repair order<br>* Recheck SRS at each replacement  |
|----------------------|----------------------------------|--|--|
| AIR BAG warning lamp | 0                                | <ul style="list-style-type: none"> <li>● Normal SRS "Air Bag" is in good order.</li> </ul>                 | —  |
|                      | 2                                | <ul style="list-style-type: none"> <li>● Driver's air bag module circuit is out of order.</li> </ul>       | <ol style="list-style-type: none"> <li>1. Visually check wiring harness connections</li> <li>2. Replace spiral cable</li> <li>3. Replace driver's air bag module (Before disposal of it, it must be deployed.)</li> <li>4. Replace diagnosis sensor unit</li> <li>5. Replace air bag harness</li> <li>6. Replace main harness</li> </ol> |
|                      | 7                                | <ul style="list-style-type: none"> <li>● Diagnosis sensor unit is out of order</li> </ul>                  | <ol style="list-style-type: none"> <li>1. Visually check wiring harness connections</li> <li>2. Replace diagnosis sensor unit</li> <li>3. Replace air bag harness</li> <li>4. Replace main harness</li> </ol>  |
|                      | 8                                | <ul style="list-style-type: none"> <li>● Front passenger air bag module circuit is out of order</li> </ul> | <ol style="list-style-type: none"> <li>1. Visually check wiring harness connections</li> <li>2. Replace front passenger air bag module (Before disposal, it must be deployed)</li> <li>3. Replace diagnosis sensor unit</li> <li>4. Replace air bag harness</li> <li>5. Replace main harness</li> </ol>                                  |
|                      | 9                                | <ul style="list-style-type: none"> <li>● More than two parts groups are out of order</li> </ul>            | <ol style="list-style-type: none"> <li>1. Visually check wiring harness connections</li> <li>2. Replace diagnosis sensor unit</li> <li>3. Replace all sensors, spiral cable and air bag module</li> <li>4. Replace air bag harness</li> <li>5. Replace main harness</li> </ol>   |



### Diagnostic Procedure 1

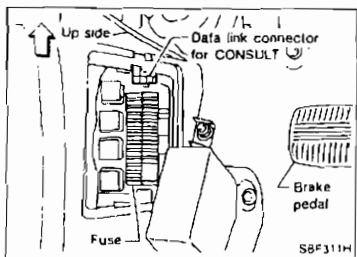
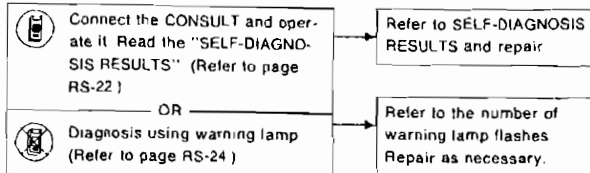
**SYMPTOM:** "AIR BAG" warning lamp flashes.

**WARNING:**

Determine if the flash rate is every 0.5 seconds, or 3 seconds "ON" and 2 seconds "OFF".

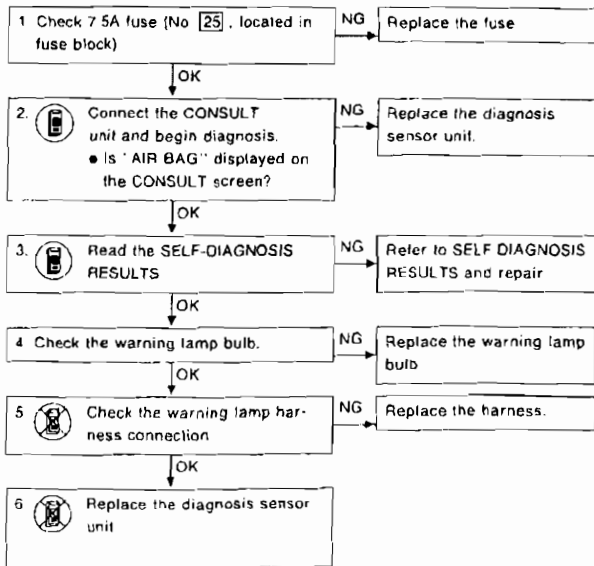
If every 0.5 seconds, perform self-diagnosis.

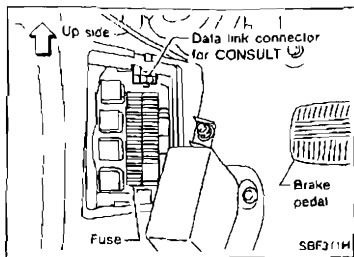
If 3 seconds "ON" and 2 seconds "OFF", the system is in Present diagnosis mode, refer to page RS-24 for instructions.



### Diagnostic Procedure 2

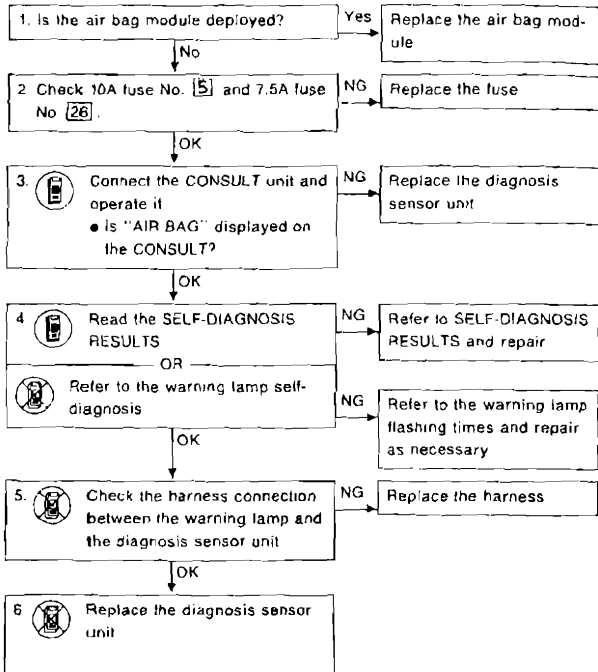
**SYMPTOM:** "AIR BAG" warning lamp does not come on.





**Diagnostic Procedure 3**

**SYMPTOM: Warning lamp does not go off.**



**Collision Diagnosis**

To repair the SRS, perform the following steps

**When air bag deploys in a collision:**

- ① Replace the diagnosis sensor unit
- ② Remove the air bag modules and seat belt pre-tensioners
- ③ Check the SRS components using the table shown below
  - Replace any SRS components showing visible signs of damage (dents, cracks, deformation).
- ④ Conduct self-diagnosis. Refer to "Self-diagnosis" for details (RS-21). Ensure the remainder of the SRS is operating properly.
- ⑤ Install new air bag modules.
- ⑥ Conduct self-diagnosis again.

**When air bag does not deploy in a collision:**

- ① Check the SRS components using the table shown below:
  - Replace any SRS components showing visible signs of damage (dents, cracks, deformation).
- ② Conduct self-diagnosis. Refer to "Self-diagnosis" for details (RS-21). Ensure entire SRS operates properly

**SRS inspection**

| Part  | Air bag deployed                   | Air bag did NOT deploy   |
|---|------------------------------------|--|
| Air bag module<br>(driver and passenger side) | REPLACE<br>Install with new bolts. | 1 Remove air bag module. Check harness cover and connectors for damage, terminals for deformities, and harness for binding<br>2-1 Install driver air bag module into the steering wheel to check fit and alignment with the wheel.<br>2-2 Install passenger air bag module into the instrument panel to check fit with the instrument panel.<br>3 No damage found, reinstall with new bolts<br>4 If damaged—REPLACE. Air bag must be deployed before discarding. |
| Instrument panel                              | REPLACE<br>Install with new bolts. | 1 Check instrument panel for bending, deformities, or cracks.<br>2 If no damage is found, reinstall with new bolts<br>3. If damaged—REPLACE  |
| Seat belt pre-tensioner assembly              | REPLACE<br>Install with new bolts  | 1 Remove seat belt pre-tensioners<br>Check harness cover and connectors for damage, terminals for deformities, and harness for binding<br>2 Check belts for damage and anchors for loose mounting.<br>3 Check retractor for smooth operation<br>4 If no damage is found, reinstall with new bolts<br>5 If damaged—REPLACE.   |
| Diagnosis sensor unit                         | REPLACE<br>Install with new bolts  | 1 Check case and bracket for dents, cracks or deformities.<br>2 Check connectors for damage, and terminals for deformities<br>3 If no damage is found, reinstall with new bolts.<br>4 If damaged—REPLACE.  |
| Steering wheel                                |                                    | 1 Check harness (built into steering wheel) and connectors for damage, and terminals for deformities<br>2 Install air bag module to check fit or alignment with steering wheel<br>3 Check steering wheel for excessive free play<br>4 If no damage is found, reinstall with new bolts<br>5 If damaged—REPLACE  |
| Spiral cable                                  |                                    | 1 Visually check lock (engagement) pins and combination switch for damage<br>2 Check connectors, flat cable and protective tape for damage<br>3 Check steering wheel for noise, binding or heavy operation<br>4 If no damage is found, reinstall with new bolts<br>5 If damaged—REPLACE  |
| Harness and Connectors                        |                                    | 1 Check connectors for poor connection, damage, and terminals for deformities.<br>2 Check harness for binding, chafing, cuts, or deformities<br>3 If no damage is found, reinstall<br>4 Damaged—REPLACE damaged section of harness. Do not attempt to repair, splice or modify any SRS harness   |

# BODY AND TRIM

## SECTION **BT**

### CONTENTS

|   |    |   |    |
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| <b>GENERAL SERVICING</b> .....  | 2  | <b>SEAT</b> .....                       | 27 |
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★ For seat belt, refer to MA and RS sections.

★ For body electrical systems, refer to EL section.



### Precautions

- When removing or installing various parts, place a cloth or padding onto the vehicle body to prevent scratches.
- Handle trim, molding, instruments, grille, etc. carefully during removing or installation. Be careful not to soil or damage them.
- Apply sealing compound where necessary when installing parts.
- When applying sealing compound, be careful that the sealing compound does not protrude from parts.
- When replacing any metal parts (for example body outer panel, members, etc.), be sure to take rust prevention measures.

### Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System "Air Bag" and "Seat Belt Pre-tensioner", used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **RS** section of this Service Manual.


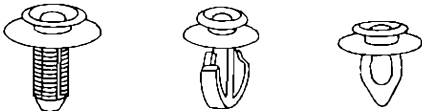


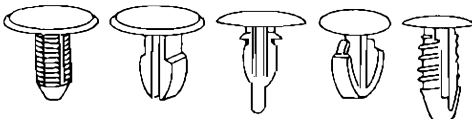
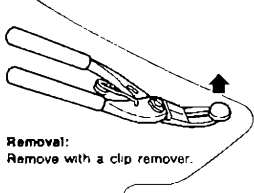

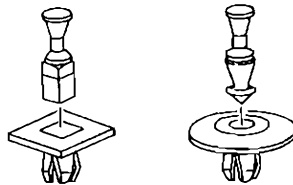
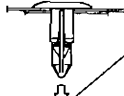
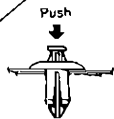

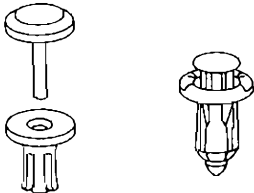
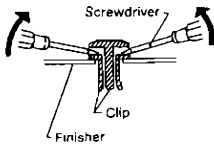
#### WARNING:

- 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.
- All SRS air bag electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS.

# GENERAL SERVICING

## Clip and Fastener

- 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



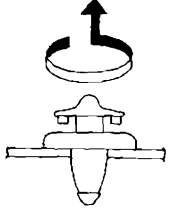

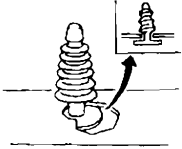
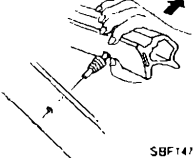

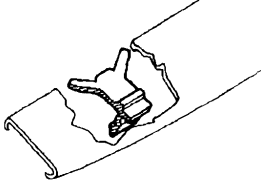
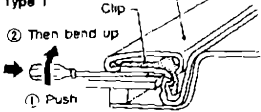
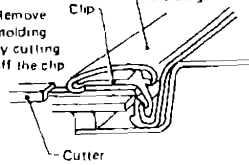

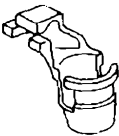
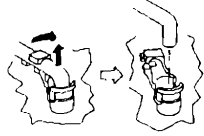
| Symbol No  | Shapes  | Removal & Installation   |
|--|---|--|
|    |    | <p><b>Removal:</b><br/>Remove by bending up with flat-bladed screwdrivers or clip remover</p>  <p>SBF302H <span style="float: right;">SBF367BA</span></p>   |
|    |    |  <p><b>Removal:</b><br/>Remove with a clip remover.</p> <p>SBF303H <span style="float: right;">SBF423H</span></p>   |
|    |    | <p>Push center pin to catching position.<br/>(Do not remove center pin by hitting it.)</p> <p><b>Push</b></p>  <p><b>Push</b></p>  <p><b>Installation:</b></p> <p>SBF256G <span style="float: right;">SBF708E</span></p> |
|  |  | <p><b>Removal:</b></p>  <p>Screwdriver<br/>Clip<br/>Finisher</p> <p>MBF518B <span style="float: right;">SBF636C</span></p>  |

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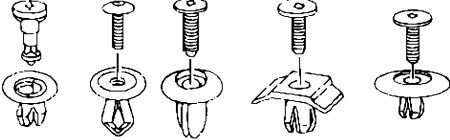

# GENERAL SERVICING

## Clip and Fastener (Cont'd)

| Symbol No.  | Shapes  | Removal & Installation   |
|---|---|--|
|  <p>C205</p>    |    |  <p style="text-align: center;">MBF519B <span style="float: right;">MBF520B</span></p>  |
|  <p>CE103</p>   |    | <p>Removal:</p>  <p style="text-align: center;">SBF104B <span style="float: right;">SBF147B</span></p>  |
|  <p>CE106</p>   |    | <p>Removal:</p> <p><b>Type 1</b></p>  <p>① Push<br/>② Then bend up</p> <p>Clip Molding</p> <p style="text-align: right;">SBF654B</p> <p><b>Type 2</b></p> <p>Remove molding by cutting off the clip</p>  <p>Clip Molding<br/>Cutter</p> <p style="text-align: center;">SBF653B <span style="float: right;">SBF914B</span></p> |
|  <p>CR103</p> |  | <p>Removal:</p> <p>Holder portion of clip must be spread out to remove rod</p>  <p style="text-align: center;">SBF766B <span style="float: right;">SBF770B</span></p>   |

# GENERAL SERVICING

## Clip and Fastener (Cont'd)

| Symbol No  | Shapes  | Removal & Installation  |
|--|---|---|
|  |  <p style="text-align: right;">SBF078B</p> | <p><b>Removal:</b></p> <ol style="list-style-type: none"> <li>1. Screw out with a Phillips screwdriver.</li> <li>2. Remove female portion with flat-bladed screwdriver</li> </ol>  <p style="text-align: right;">SBF992G</p> |

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BT

## BODY END

### Body Front End

- When removing or installing hood, place a cloth or other padding on hood. 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.

#### REMOVAL — Front bumper assembly

- ① Remove bolts securing bumper fascia to engine undercover.
- ② Remove screws and clips (C203) securing left and right sides of front fender protector. Then remove the front fender protector.
- ③ Remove clips (C3101) securing front grille, then remove the front grille.
- ④ Remove clip (C205) securing bumper fascia bracket to hood lock stay **A**.
- ⑤ Remove screws located at wheel opening.
- ⑥ Remove the screw securing each side of front clearance lamp assembly, then remove the front clearance lamp assembly.
- ⑦ Remove the screw securing each side of front turn signal lamp assembly. Then remove the front turn signal lamp assembly.
- ⑧ Remove bolts securing each side of front fender bracket.
- ⑨ Remove nuts securing left and right front fenders to bumper fascia bracket **B**.
- ⑩ Remove nuts and bolts securing bumper assembly to front side member.
- ⑪ Extract bumper assembly.
- ⑫ Remove bolts securing bumper fascia bracket to bumper fascia.
- ⑬ Disassemble bumper fascia and bumper fascia bracket.

# BODY END

## Body Front End (Cont'd)

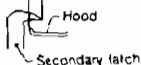
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### Hood lock adjustment

- Adjust hood so that hood primary lock meshes at a position 1 to 15 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 fit. Striker must be positioned at the center of hood primary lock
- After adjustment, ensure that hood primary and secondary lock operate properly

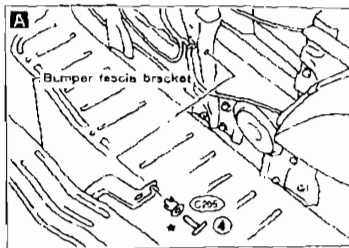
### Hood lock secondary latch hooking length

More than 5.0 mm (0.197 in)

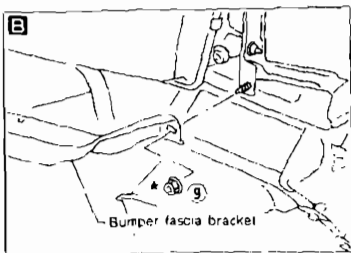
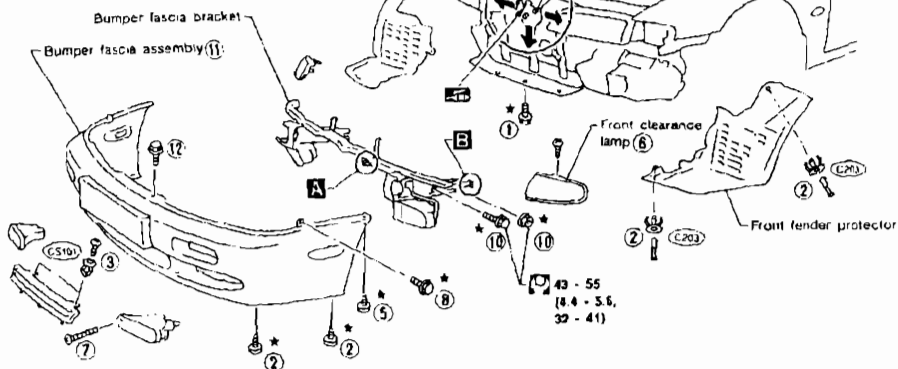
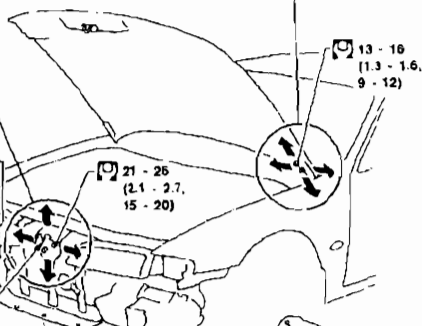


### Bumper rubber adjustment

- 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).)



### Hood adjustment



- \* Bumper assembly mounting bolts, nuts and clips
- ☐ N.m (kg-m (ft-lb))

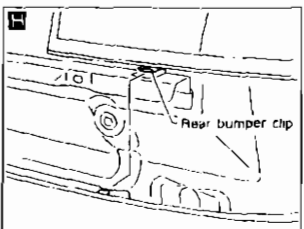
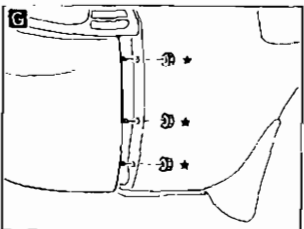
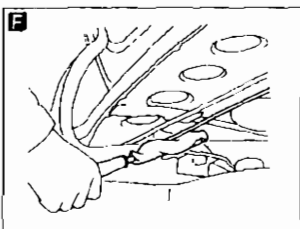
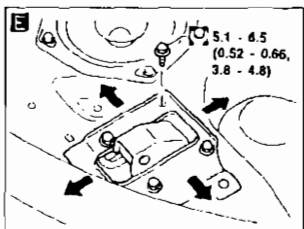
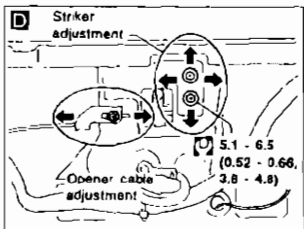
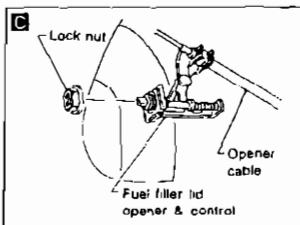
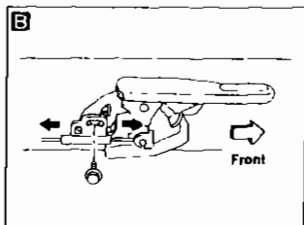
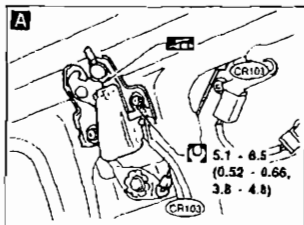
MBF527B

**Body Rear End and Opener**

- When removing or installing trunk lid, place a cloth or other padding on trunk lid. This prevents vehicle body from being scratched
- Trunk lid adjustment: Adjust at hinge-lid portion for proper trunk lid fit.
- Trunk lid lock system adjustment: Adjust striker so that it is in the center of the lock. After adjustment, check trunk lid lock operation.
- Opener cable: do not attempt to bend cable using excessive force
- After installation, make sure that trunk lid and fuel filler lid opener smoothly.

**REMOVAL — Rear bumper assembly**

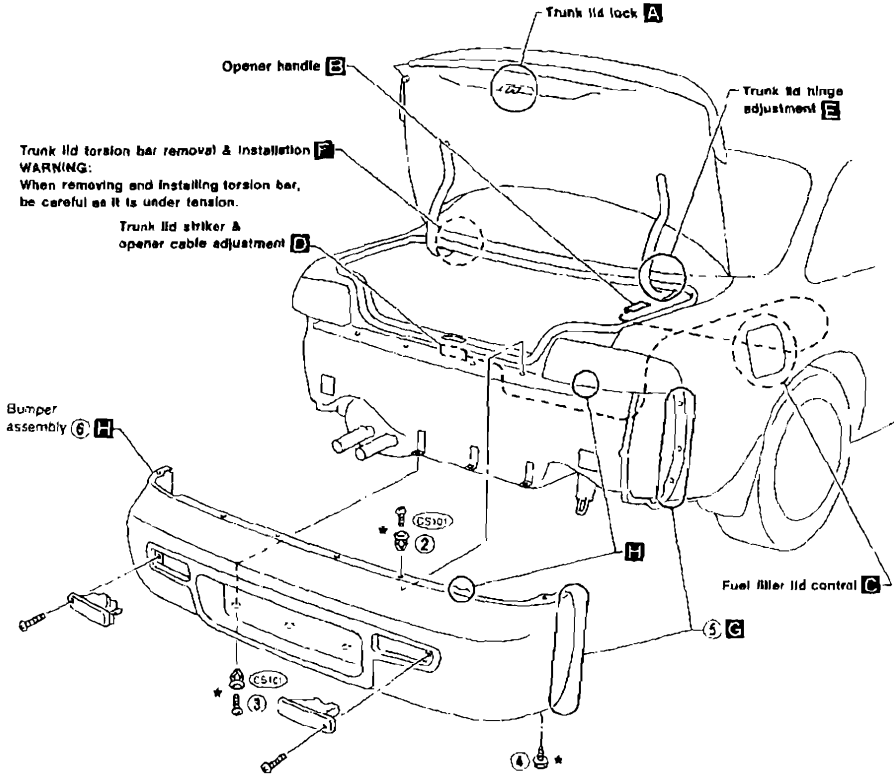
- ① Remove trunk trim. Refer to "TRUNK ROOM TRIM" in "INTERIOR TRIM" for details. (BT-21)
- ② Remove clips (CS10) securing rear panel upper to bumper fascia.
- ③ Remove clips (CS10) securing rear panel lower to bumper fascia.
- ④ Remove bolts from lower side of each side bumper
- ⑤ Working inside trunk, remove nuts securing left and right rear fenders to bumper fascia (C)
- ⑥ Extract bumper assembly (F).



# BODY END

## Body Rear End and Opener (Cont'd)

SEC. 843-850



\* Bumper assembly mounting  
bolts, nuts and clips

BT

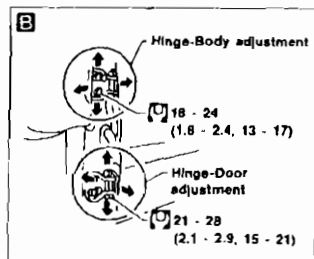
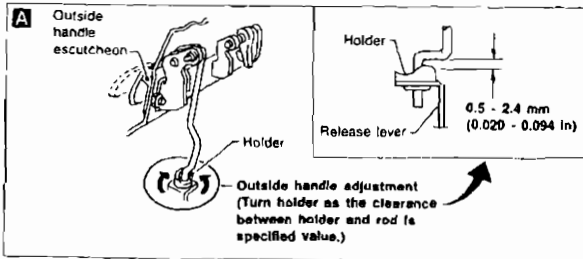
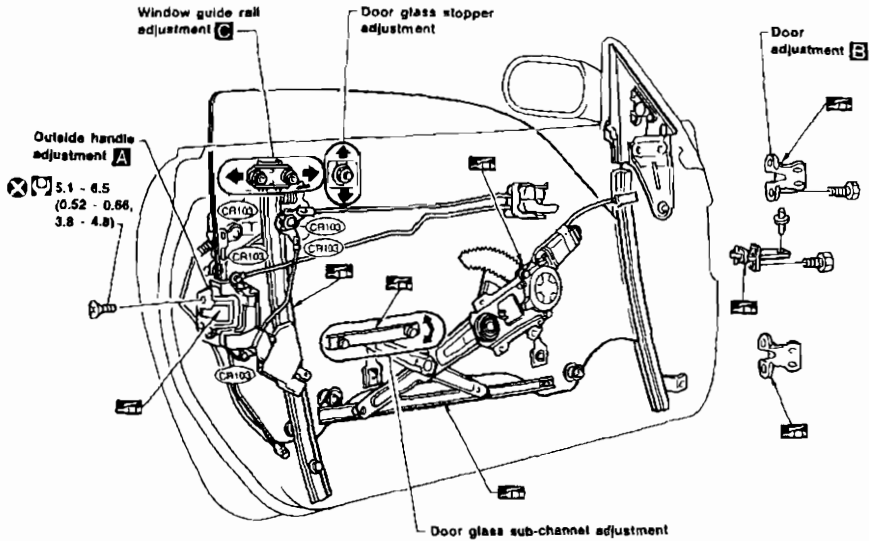
MRF538A



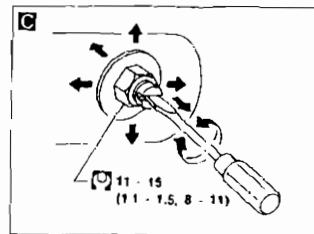
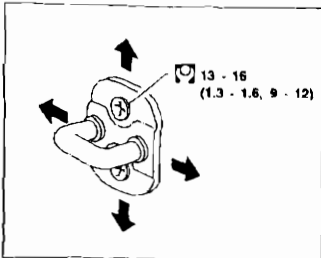
# DOOR

- For removal of door trim, refer to "DOOR TRIM" in "INTERIOR TRIM" for details (BT-19)
- After adjusting door or door lock, check door lock operation.

SEC. 800-803-805



## Striker adjustment



N·m (kg·m / ft·lb)

K/ST047A

# DOOR

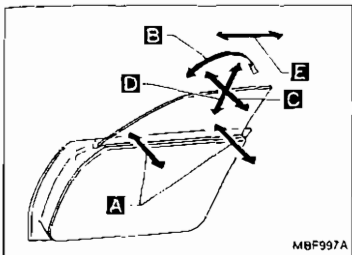
## Door Glass Fitting Adjustment

The door glass is properly adjusted using the following five methods:

- A** In-out adjustment (at the glass waist)
- B** Fore-aft tilt adjustment
- C** In-out tilt adjustment (at the glass upper stop)
- D** Up-stop adjustment
- E** Fore-aft adjustment

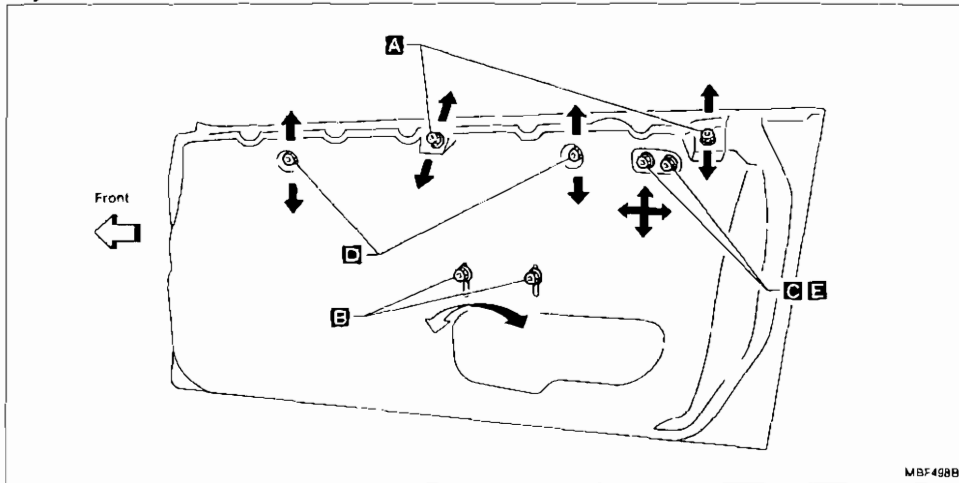
### NOTICE:

When adjusting the door glass, it is not necessary to remove the outside door molding.



MBF997A

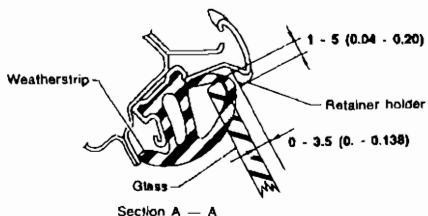
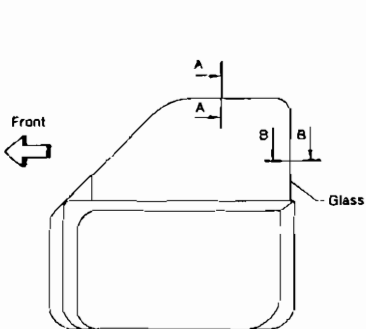
### Adjustment locations



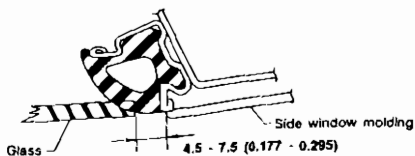
MBF498B

### Adjustment standard clearance

#### SEC. 803



Section A - A



Section B - B

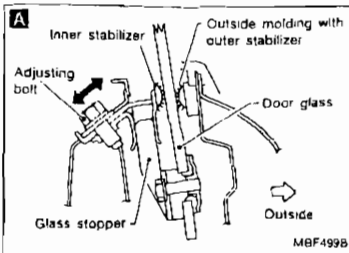
Unit: mm (in)

S6F394HA

BT

## DOOR

### Door Glass Fitting Adjustment (Cont'd)



#### A IN-OUT ADJUSTMENT (at the glass waist)

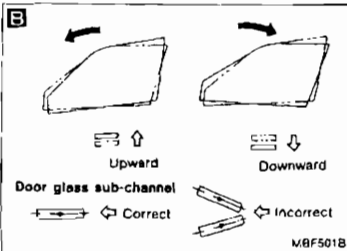
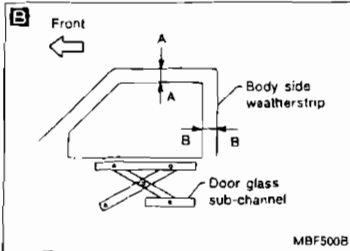
1. Raise door glass until glass stopper is in contact with inner stabilizer, just before the window stops.
2. Loosen adjusting bolts
3. Lightly press door glass upper end outward so that glass outer surface contacts outer stabilizer. With glass held in that position, press inner stabilizer to glass inner surface and tighten adjusting bolt.

#### CAUTION:

Make sure nap portions of stabilizers are clean and free from oil, grease, etc.

#### B FORE-AFT TILT ADJUSTMENT

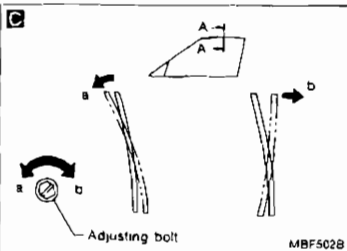
- Adjust door glass sub-channel so that the adjustment standard clearances A - A and B - B (Refer to BT-11) are obtained at the glass and retainer holder/body side weatherstrip locations.



- For sub-channel adjustment procedures, refer to figure at left as a guide

#### CAUTION:

- Make sure door glass sub-channel is horizontal.
- The fore-aft tilt adjustment must be made at the same time the fore-aft adjustment B is made.

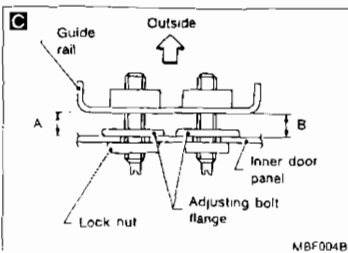


#### C IN-OUT TILT ADJUSTMENT (at glass upper stop)

1. Adjust door glass-to-holder clearance to 0 to 3.5 mm (0 to 0.138 in) (A) with the adjusting bolts.

#### CAUTION:

- Turn adjusting bolt clockwise to move door glass upper end outward.
- Turn adjusting bolt counterclockwise to move door glass upper end inward.



- For sub-channel adjustment procedures, refer to figure at left as a guide

#### CAUTION:

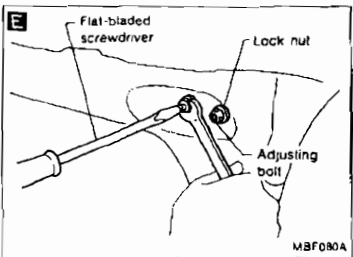
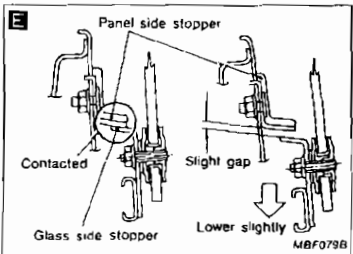
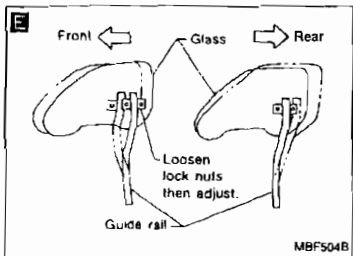
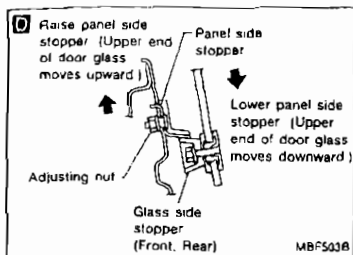
- Make sure door glass sub-channel is horizontal.
- The fore-aft tilt adjustment must be made at the same time the fore-aft adjustment B is made.

## DOOR

### Door Glass Fitting Adjustment (Cont'd)

#### D UP-STOP ADJUSTMENT

1. Adjust panel stopper height so that clearance at upper edge of door meets the adjustment standard clearance A - A (Refer to BT-11). Make sure front and rear glass stoppers lightly contact front and rear panel stoppers, then tighten adjusting nuts.
2. If stoppers do not contact each other, adjust sub-channel nut. Refer to "E Fore-aft tilt adjustment".
3. Open and close doors to make sure upper end of door glass does not contact holder.



#### E FORE-AFT ADJUSTMENT

1. Adjust guide rail in the fore-aft direction so that when door is closed or opened the clearance between upper edge of door glass and holder conforms to the adjustment standard clearance A - A (Refer to BT-11).
2. If outer perimeter of door glass interferes with holder when door is opened or closed, refer to "E Fore-aft tilt adjustment" for procedures.

#### CAUTION:

When loosening guide rail lock nut, prevent adjusting bolt from turning by holding it with a standard screwdriver.

3. Lower the glass slightly until the glass side stopper comes off the panel side stopper.

#### CAUTION:

Do not lower the glass excessively.

- After completing door glass adjustment, retighten all lock nuts.

#### CAUTION:

While tightening lock nuts, hold adjusting bolts using a standard screwdriver to prevent them from turning.

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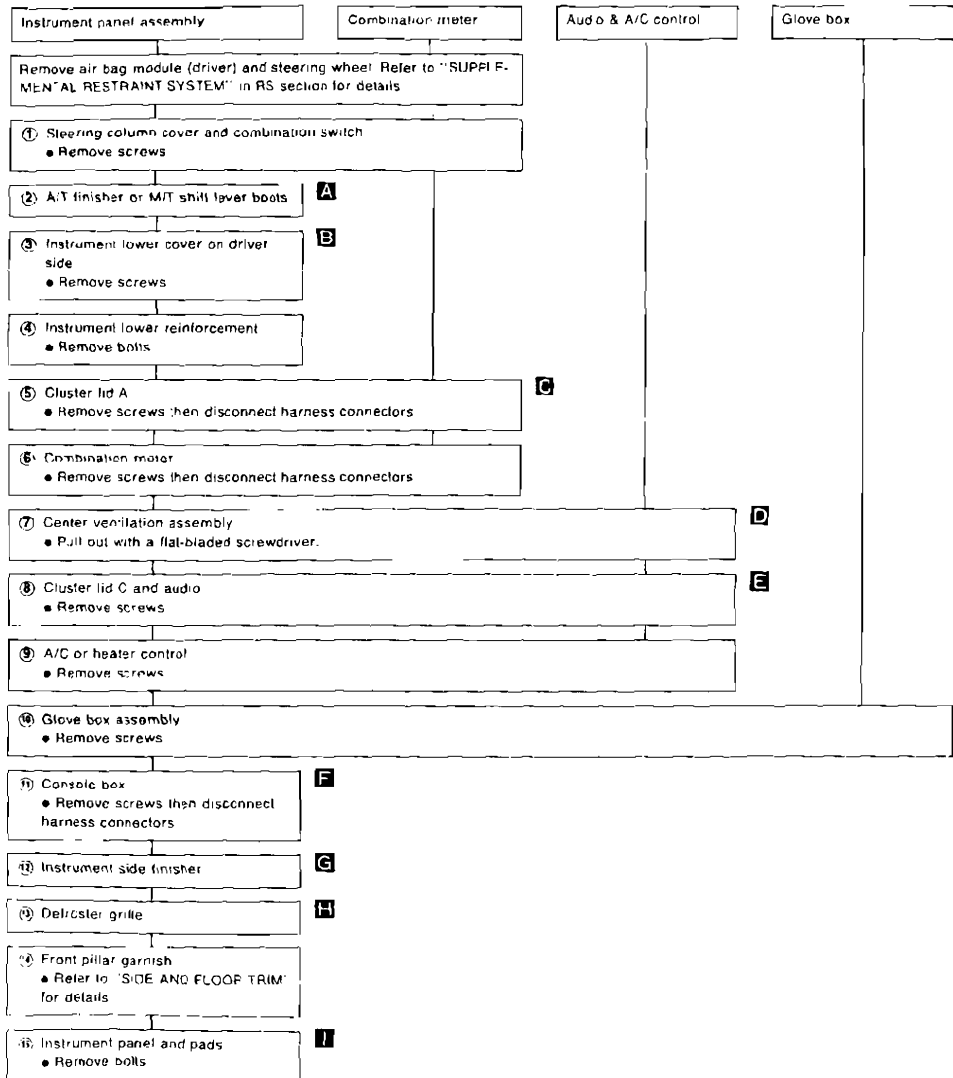
DX

# INSTRUMENT PANEL

## CAUTION:

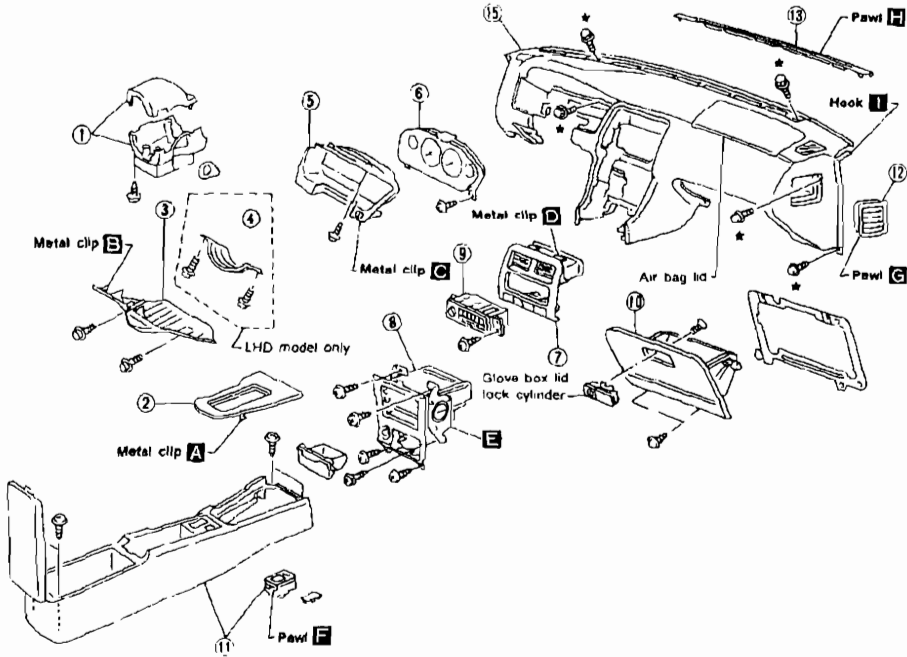
- Disconnect ground terminal from battery in advance.
- Disconnect air bag system line in advance.
- Never tamper with or force air bag lid open, as this may adversely affect air bag performance.
- Be careful not to scratch pad and other parts.

## REMOVAL — Instrument panel assembly

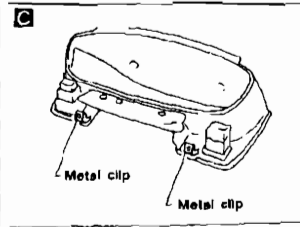
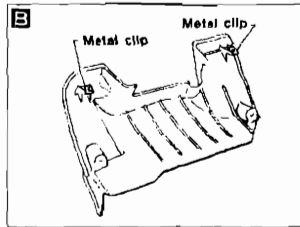
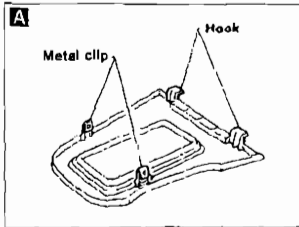


# INSTRUMENT PANEL

SEC. 248-487-680-685-969

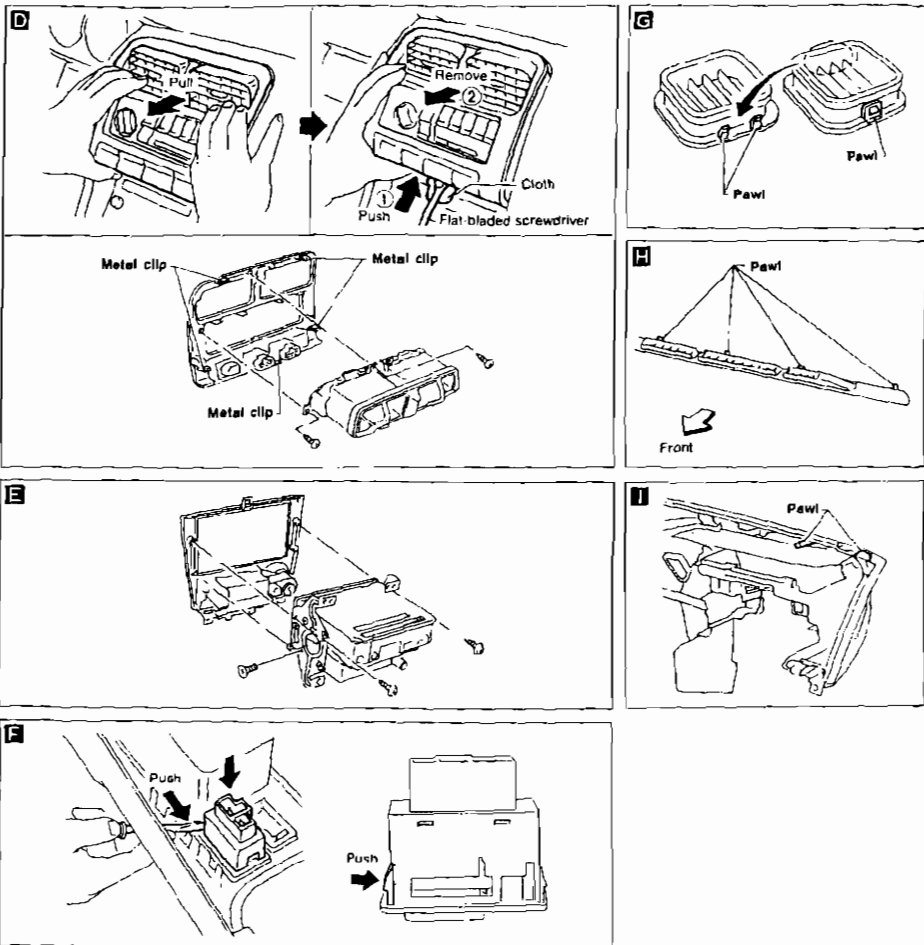


★ Instrument panel assembly mounting bolts and nuts



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# INSTRUMENT PANEL



MBF529B

## INTERIOR TRIM

### SIDE AND FLOOR TRIM

#### CAUTION:

Wrap the tip of flat-bladed screwdriver with a cloth when removing metal clips from garnishes.

#### REMOVAL — Body side trim

- ① Remove front and rear seat. Refer to "SEAT" for details (BT-27).
- ② Remove dash side finisher.
- ③ Remove kicking plate.
- ④ Remove front pillar garnish.
- ⑤ Remove rear side finisher.
- ⑥ Remove rear pillar finisher.
- ⑦ Remove rear parcel shelf.
- ⑧ Remove seat back finisher welt. Refer to "TRUNK ROOM TRIM" for details (BT-21).
- ⑨ Remove seat back finishers (Right, Center, Left).

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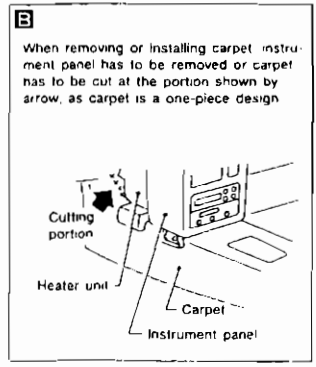
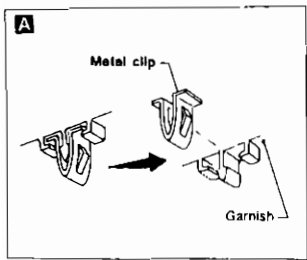
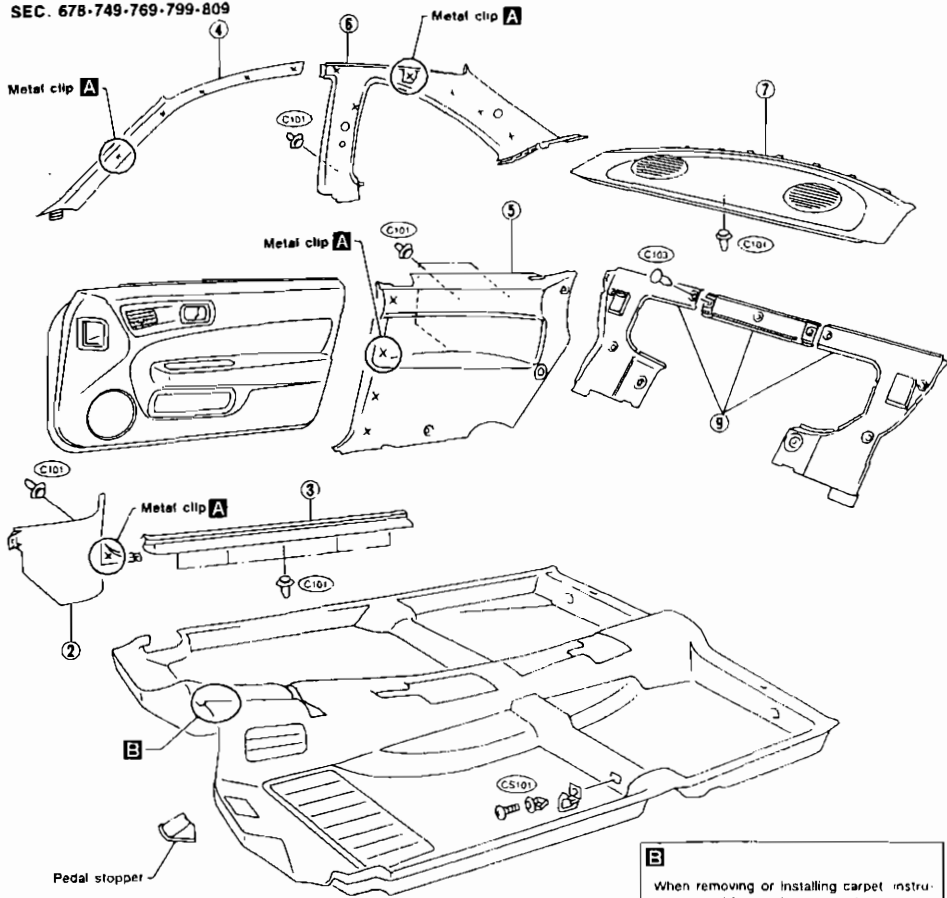
EL

EX



# INTERIOR TRIM

SEC. 678-749-769-799-809



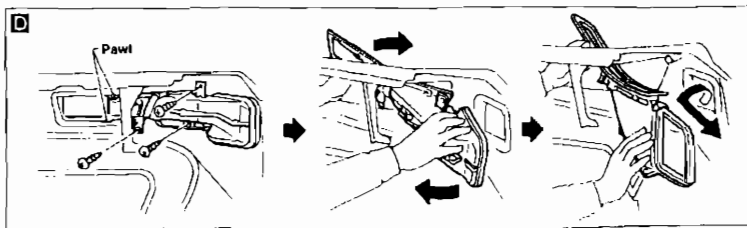
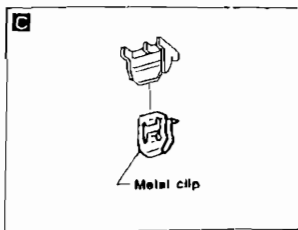
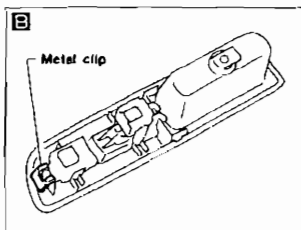
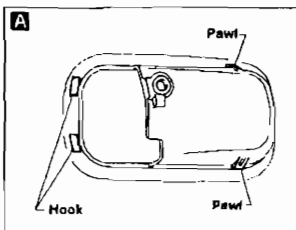
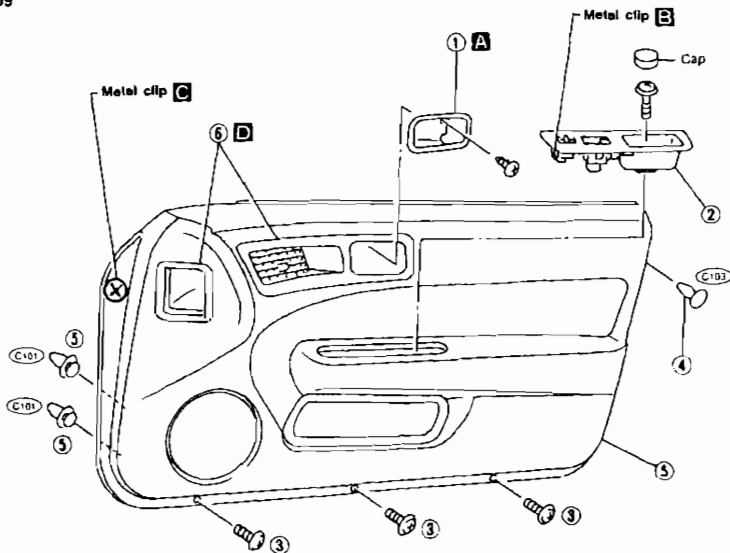
MBF445BA

## DOOR TRIM

### REMOVAL — Door trim

- ① Remove screws securing inside handle escutcheon, then remove the inside handle escutcheon **A**.
- ② Remove power window switch **B**.
- ③ Remove screws securing door finisher.
- ④ Remove clips **(C103)** securing door finisher.
- ⑤ Pull door finisher to remove clips **(C101)** and metal clips **C** from door panel and remove door finisher. Disconnect harness connectors.
- ⑥ Remove ventilator grille and ventilator duct assembly from door finisher **D**.

SEC. 809



MBF4479A

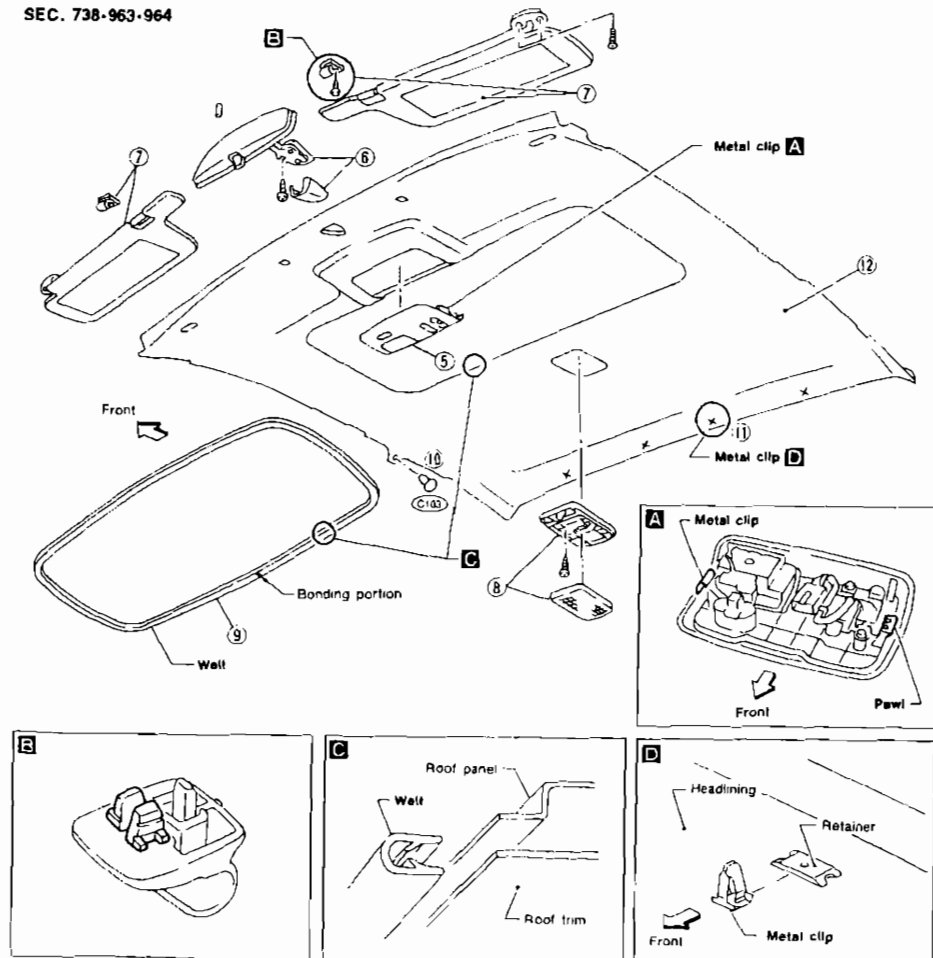
# INTERIOR TRIM

## ROOF TRIM

### REMOVAL — Headlining

- ① Remove rear seat. Refer to "Rear Seat" for details (BT-30).
- ② Remove seat belt adjuster cover over anchor bolt
- ③ Remove front and rear seat belts. Refer to "Seat Belt" in RS section for details.
- ④ Remove body side trim. Refer to "SIDE AND FLOOR TRIM" for details (BT-17).
- ⑤ Remove sunroof switch **A**.
- ⑥ Remove inside mirror assembly.
- ⑦ Remove sun visors **B**.
- ⑧ Remove interior lamp assembly.
- ⑨ Remove sunroof welt **C**.
- ⑩ Remove clips **C103** securing each side of headlining.
- ⑪ Remove metal clips securing headlining **D**.
- ⑫ Remove headlining.

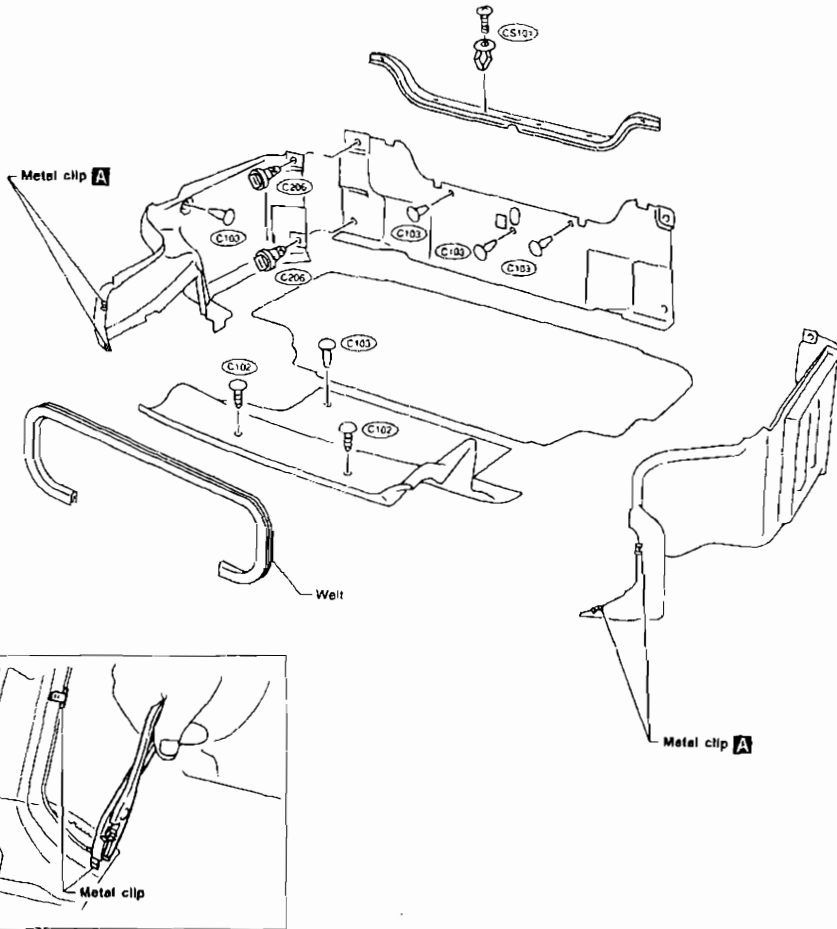
SEC. 738-963-964



# INTERIOR TRIM

## TRUNK ROOM TRIM

SEC 799-849

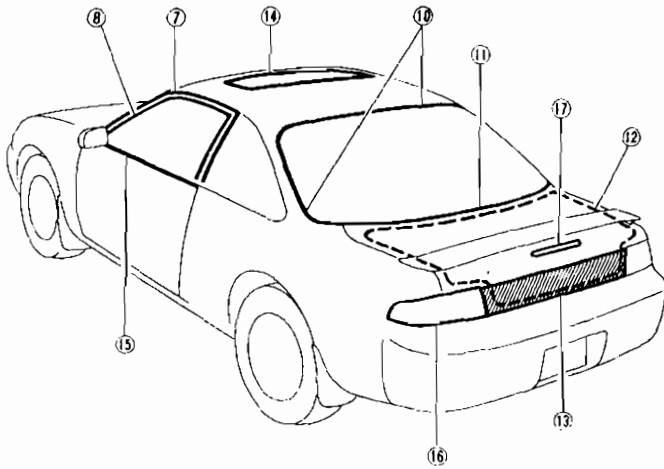
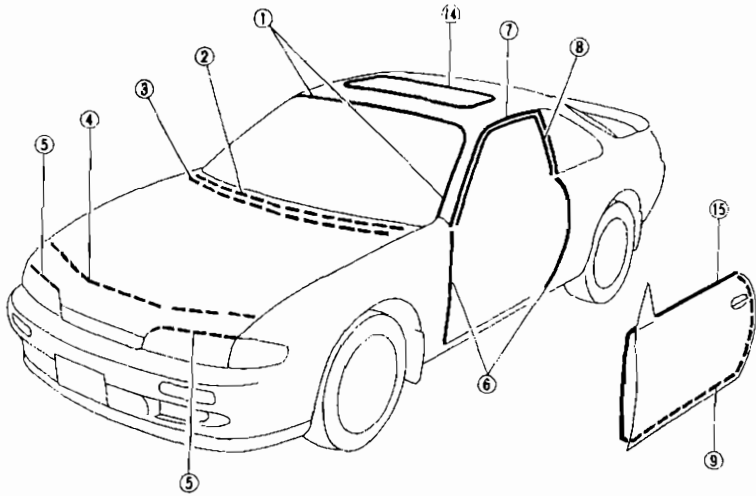


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**BT**

# EXTERIOR TRIM



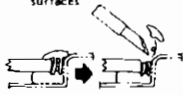
MBF449B

# EXTERIOR TRIM

## ① Windshield upper and side molding

### Method 1

Cut off top portion of molding and clean glass and panel surfaces



Apply sealant to top portion of molding



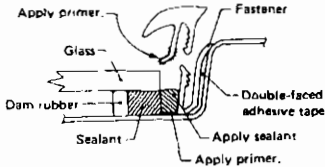
Cut off lower portion of new molding



Finish well to give it a good appearance

### Method 2

1. Cut off sealant at glass end.
2. Clean the side on which panel was mounted.
3. Set molding fastener and apply sealant to body panel, and apply primer to molding and body.

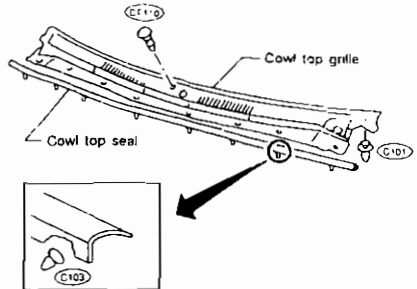


4. Install molding by aligning the molding mark located on center with vehicle center. Be sure to install tightly so that there is no gap around the corner.

SBF161F

## ②, ③ Cowl top grille and hood rear sealing rubber

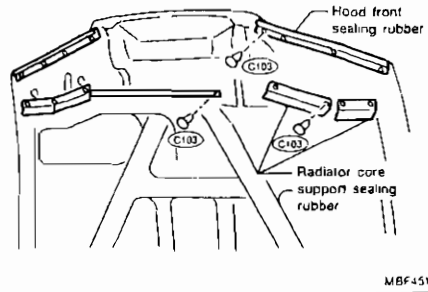
### SEC. 660



MBF450B

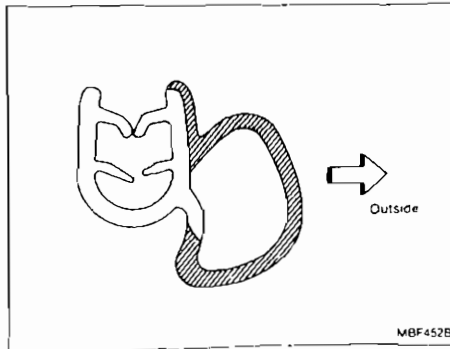
## ④, ⑤ Hood front sealing rubber

### SEC. 650



MBF451B

## ⑥ Body side welt

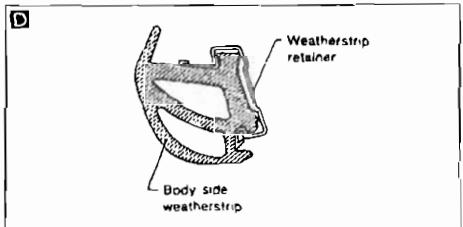
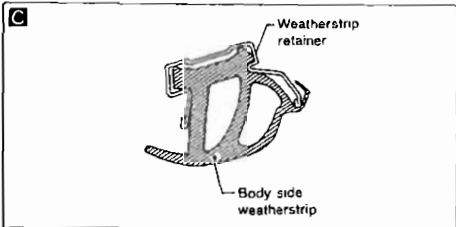
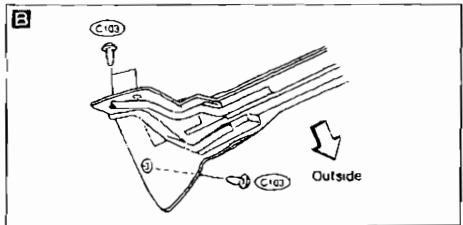
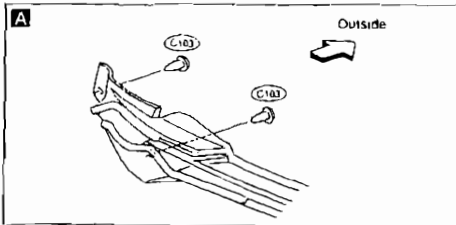
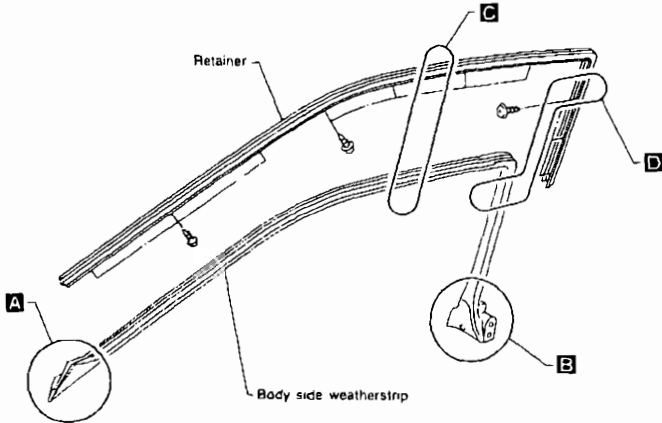


MBF452B

# EXTERIOR TRIM

## ⑦, ⑧ Body side weatherstrip and weatherstrip retainer

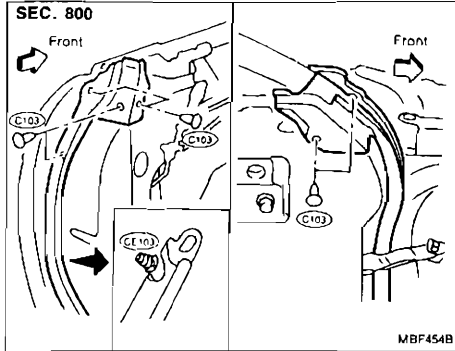
SEC. 766



MBF 453BA

## ⑨ Door weatherstrip

Before removing door weatherstrip, remove door trim. Refer to "DOOR TRIM" for details (BT-19).



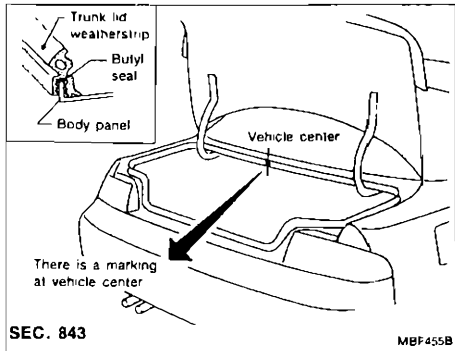
## ⑩ Back window upper and side molding (SEC. 797)

Basically the same as windshield upper and side molding

## ⑪ Back window lower molding (SEC. 797)

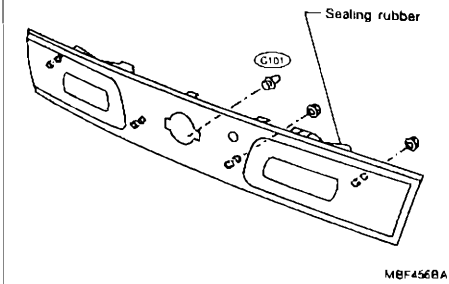
It is mounted with screws.

## ⑫ Trunk lid weatherstrip



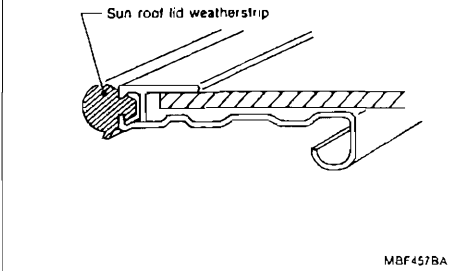
## ⑬ Rear panel finisher

### SEC. 265



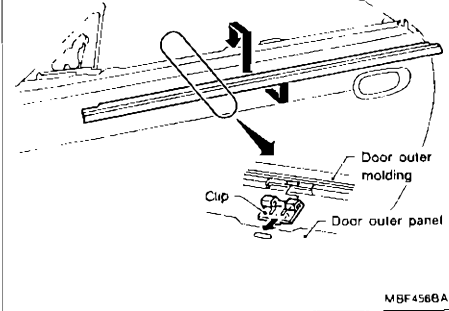
## ⑭ Sun roof lid weatherstrip

### SEC. 736



## ⑮ Door waist outside molding

### SEC. 800

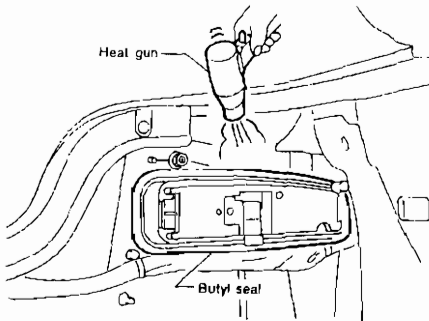


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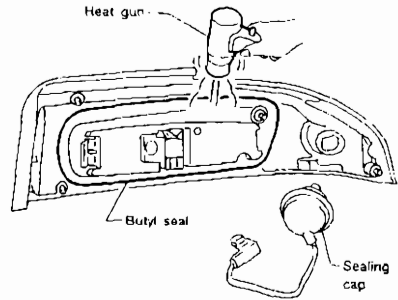


## 16 Rear combination lamp

SEC. 265



- Warm up lamp assembly area to a temperature a little below 60°C (140°F).

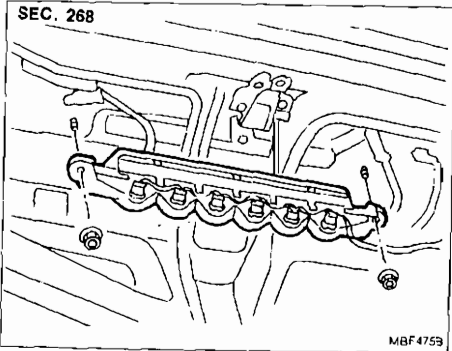


- Apply butyl seal evenly as it tends to become thin in the corners.
- Warm up lamp assembly area to a temperature a little below 60°C (140°F).

M6F459B

## 17 High-mounted stop lamp

SEC. 268

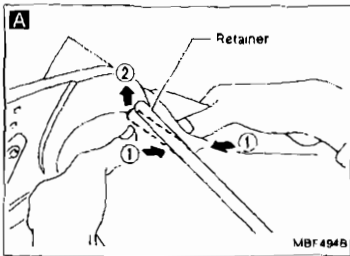




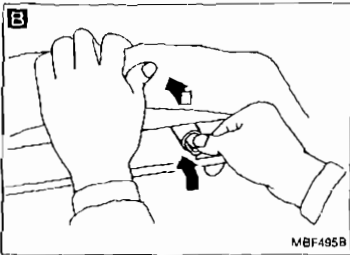
## SEAT

### Front Seat (Cont'd)

Remove retainer from lower side of seatback with fingers



Roll up seatback trim all the way to gain access to headrest holder pawls. Disengage and push headrest holder pawls to unlock holder. Lift off headrest holder.

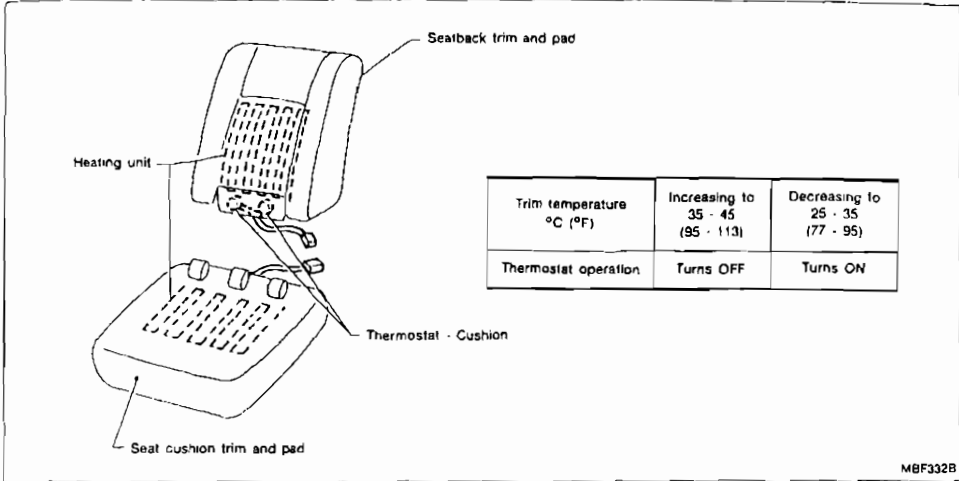


# SEAT

## Front Seat (Cont'd)

### HEATED SEAT

- 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.



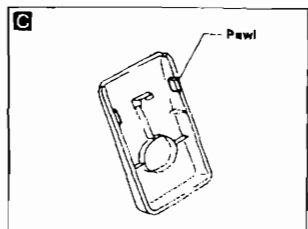
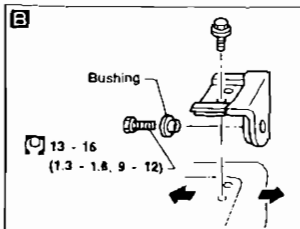
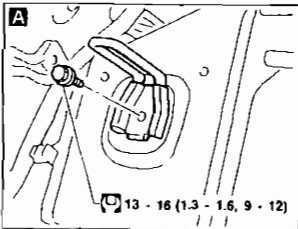
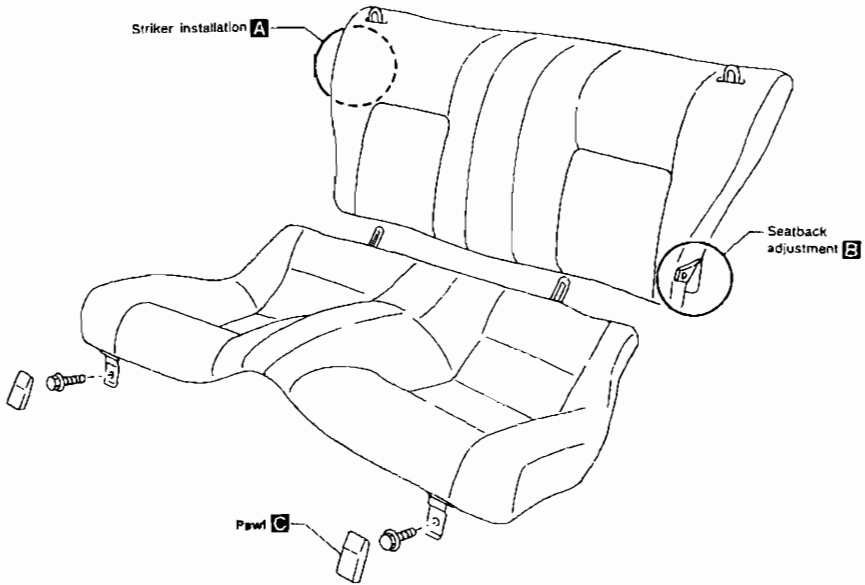
★ For Wiring Diagram, refer to "HEATED SEAT" in EL section.

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# SEAT

## Rear Seat

SEC. 880



N·m (kg·m, ft·lb)

MBF461BA

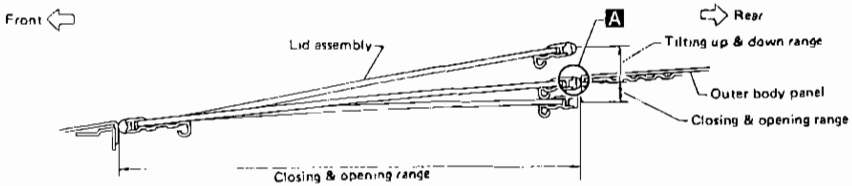
# SUN ROOF

★ For Wiring Diagram, refer to "ELECTRIC SUN ROOF" in EL section.

## ADJUSTMENT

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

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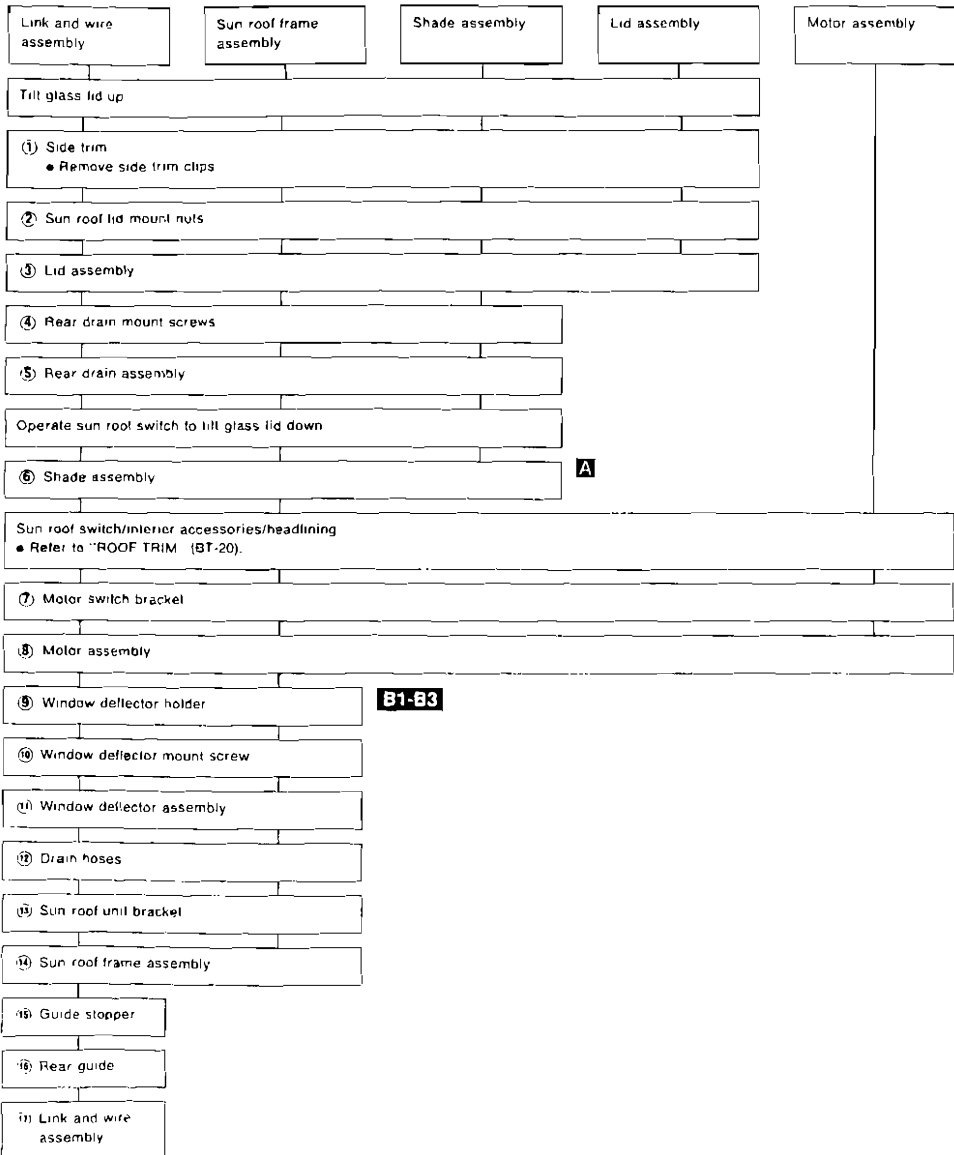
FOX

# SUN ROOF

- After any adjustment, check sun roof 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.

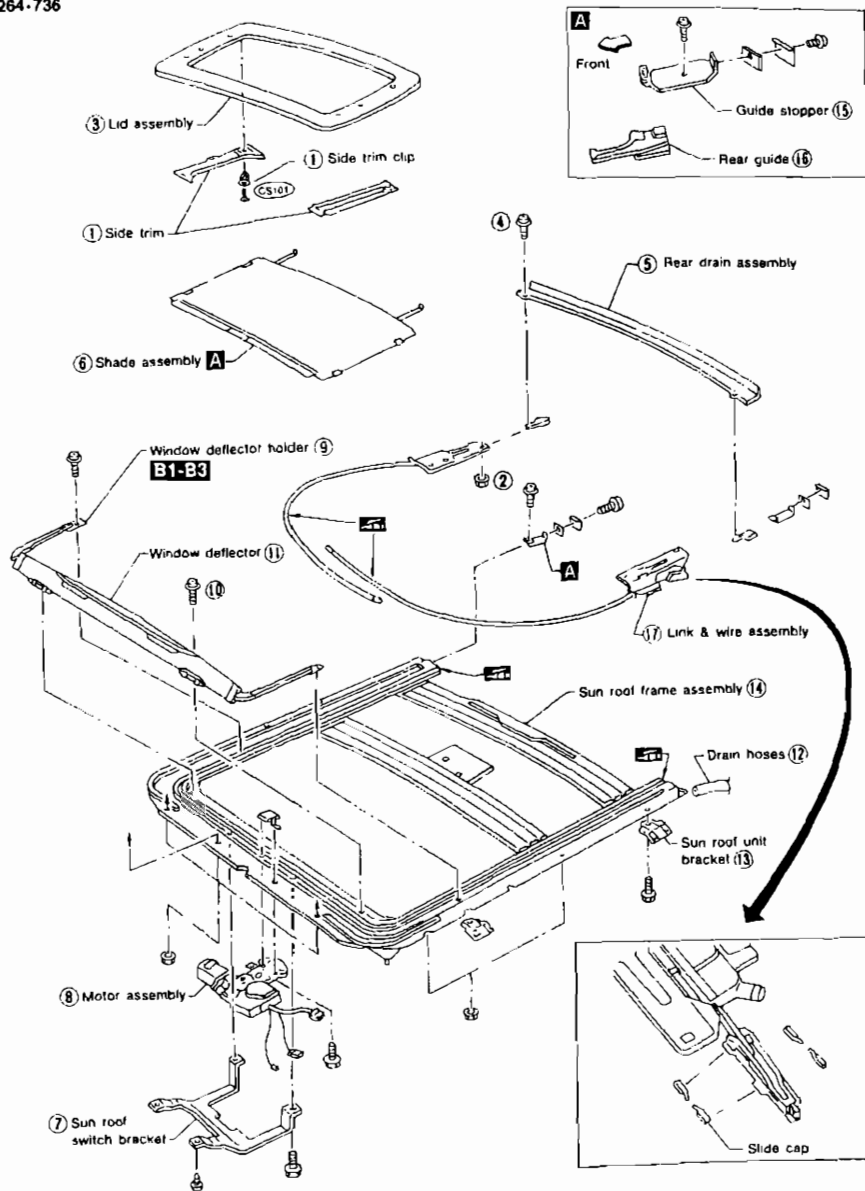
## CAUTION:

Always work with a helper.



# SUN ROOF

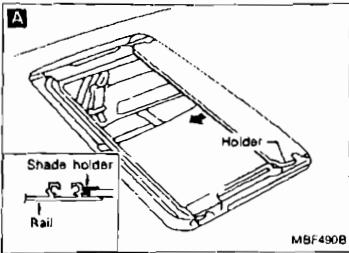
SEC. 264-736



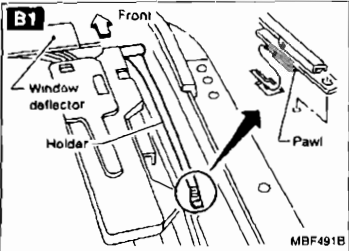
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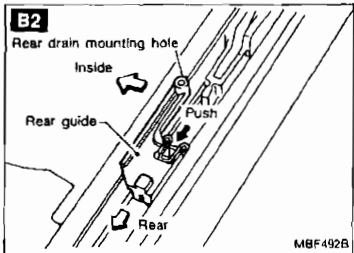
## SUN ROOF



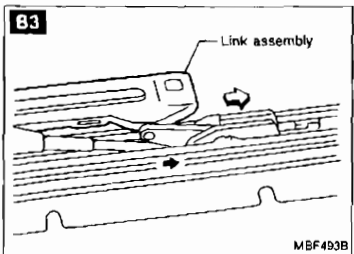
- A** Using flat-bladed screwdriver, pry shade assembly holder off rail. Then pull shade assembly forward to remove it from rail.



- B1** Disengage pawls from rail, then remove window deflector holder.

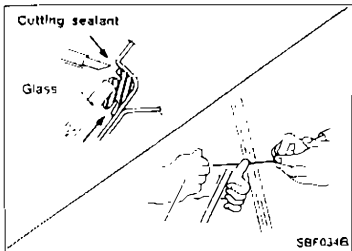


- B2** Using flat-bladed screwdriver, pry stopper spring off rail groove. Then slide rear guide backward to remove it from rail.



- B3** Remove wire and link assembly from rail while pushing link back with flat-bladed screwdriver.

# WINDSHIELD AND WINDOWS



## REMOVAL

After removing moldings, remove glass.

### CAUTION:

Be careful not to scratch glass when removing.

## INSTALLATION

- Use genuine Nissan Sealant kit or equivalent. Follow instructions furnished with it.
- After installation, the vehicle should remain stationary until the sealant hardens.

### WARNING:

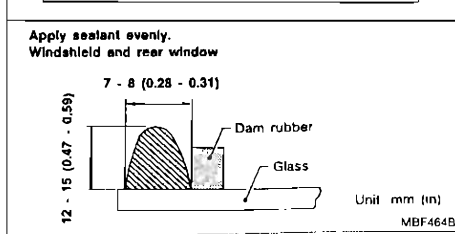
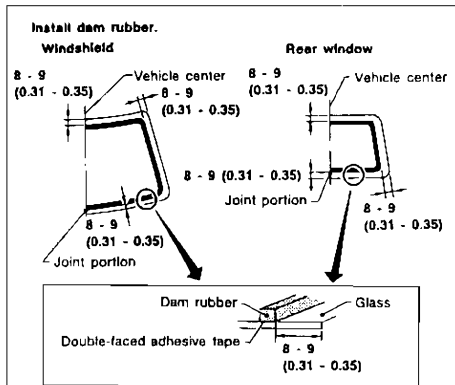
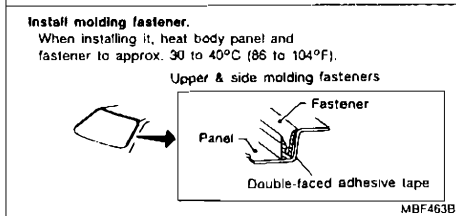
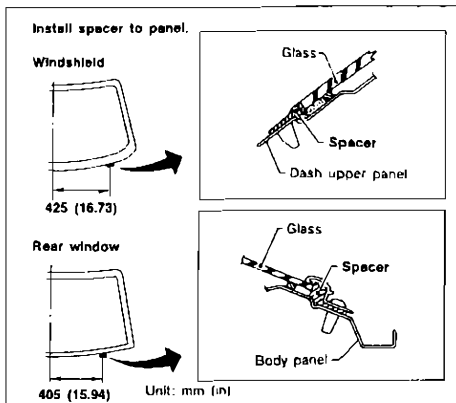
Keep heat and open flames away as primers are flammable.

### CAUTION:

Advise users not to drive the vehicle on rough roads until sealant has properly vulcanized.

- Do not use sealant which is past its usable term.
- Do not leave cartridge unattended with its cap open.
- Keep primers and sealant in a cool, dry place. Ideally, they should be stored in a refrigerator.
- Molding must be installed securely so that it is in position and leaves no gap.

## Windshield and Rear Window



## REPAIRING WATER LEAKS FOR WINDSHIELD AND WINDOWS

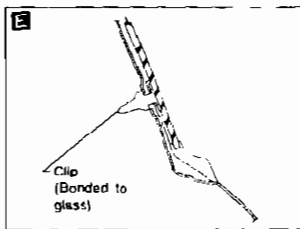
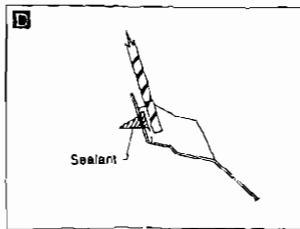
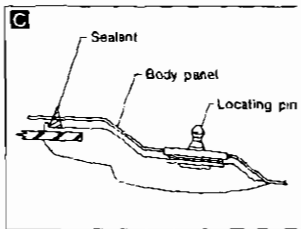
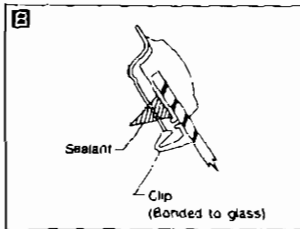
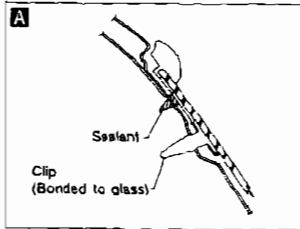
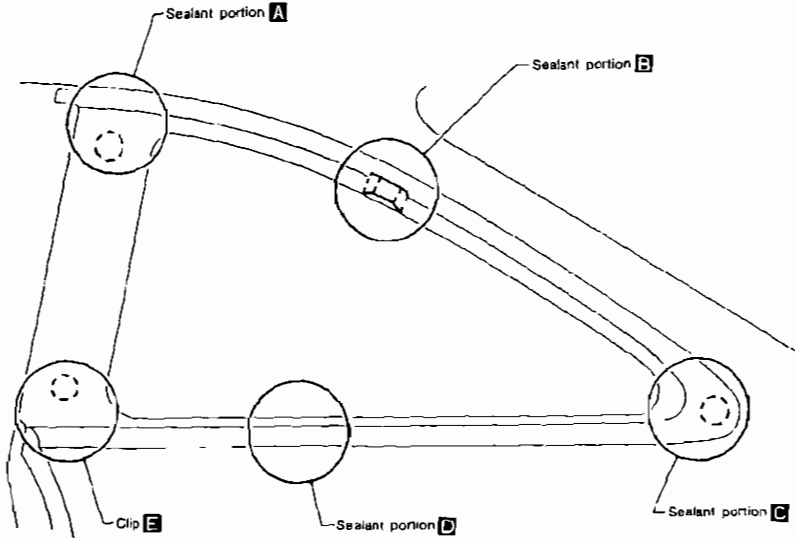
Leaks can be repaired without removing and reinstalling glass.

If water is leaking between caulking material and body or glass, determine the extent of leaking. This can be determined by applying water while pushing glass outward.

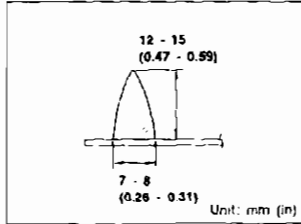
To stop the leak, apply primer and then sealant to the leak point.

Side Window

SEC. 830



Sealant quantity



MBF4658A

# DOOR MIRROR

★For Wiring Diagram, refer to "POWER DOOR MIRROR" in EL section.

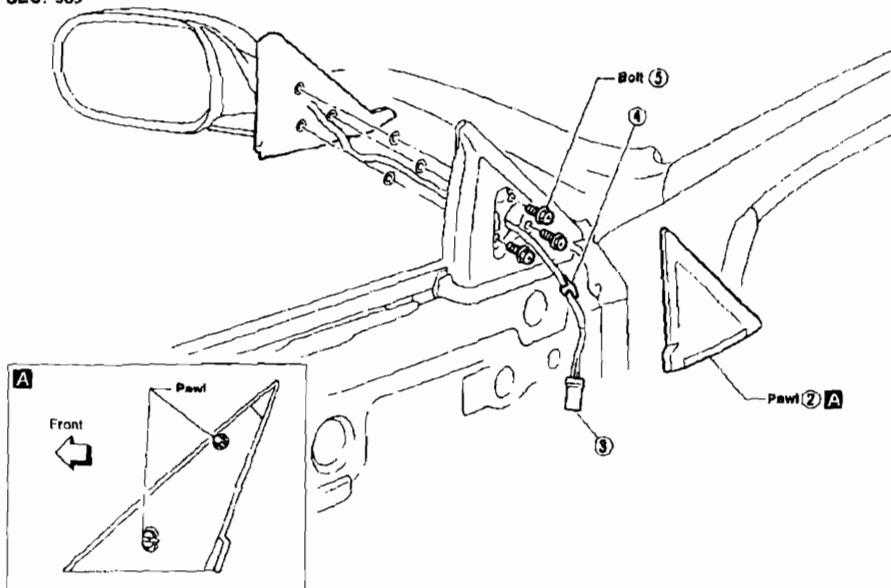
## CAUTION:

Be careful not to scratch door rearview mirror body.

## REMOVAL — Door mirror

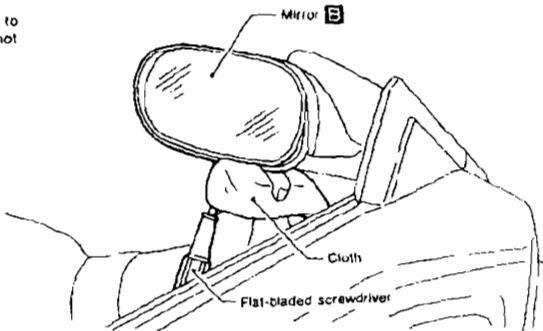
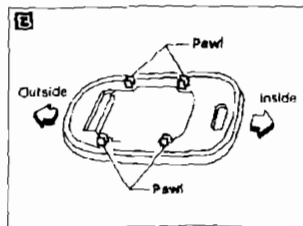
- ① Remove door trim. Refer to "DOOR TRIM" in "INTERIOR TRIM" for details (BT-19)
- ② Remove inner cover front corner of door **A**.
- ③ Disconnect door mirror harness connector.
- ④ Remove harness clips
- ⑤ Remove three bolts securing door mirror, then remove door mirror.

SEC. 963



## Removal

- Wrap flat-bladed screwdriver with a cloth to prevent scratching rear of door mirror. Do not insert screwdriver too far.

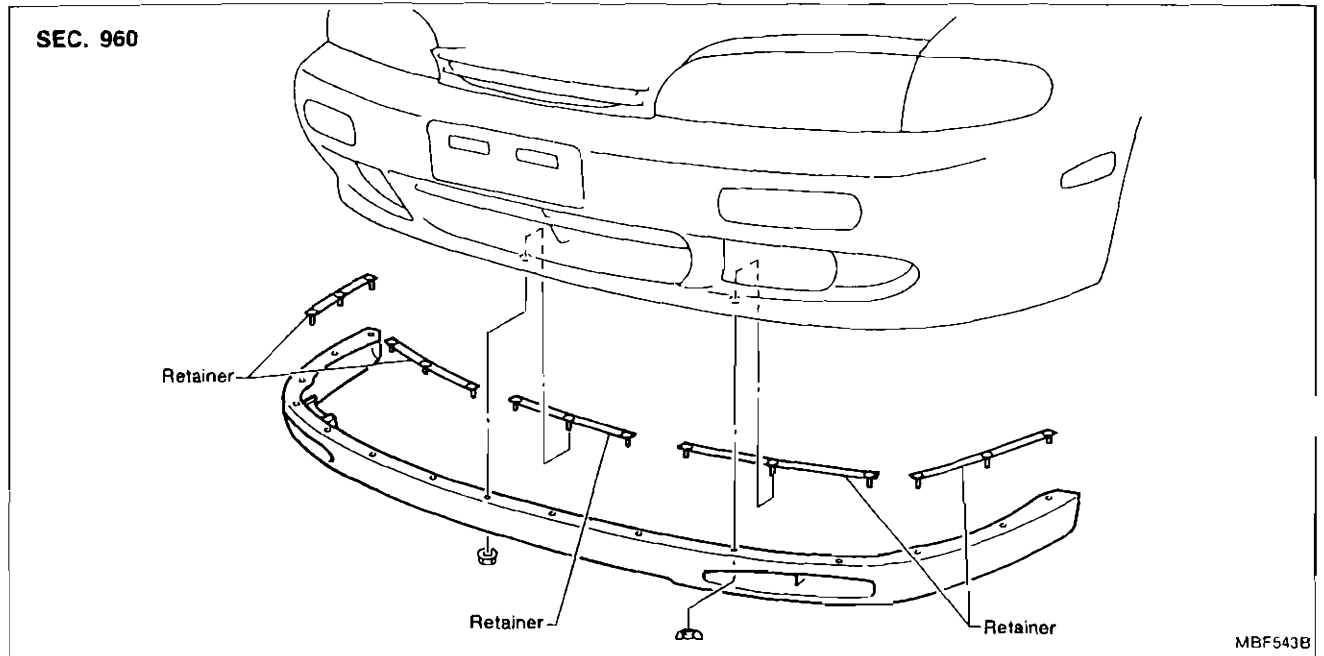


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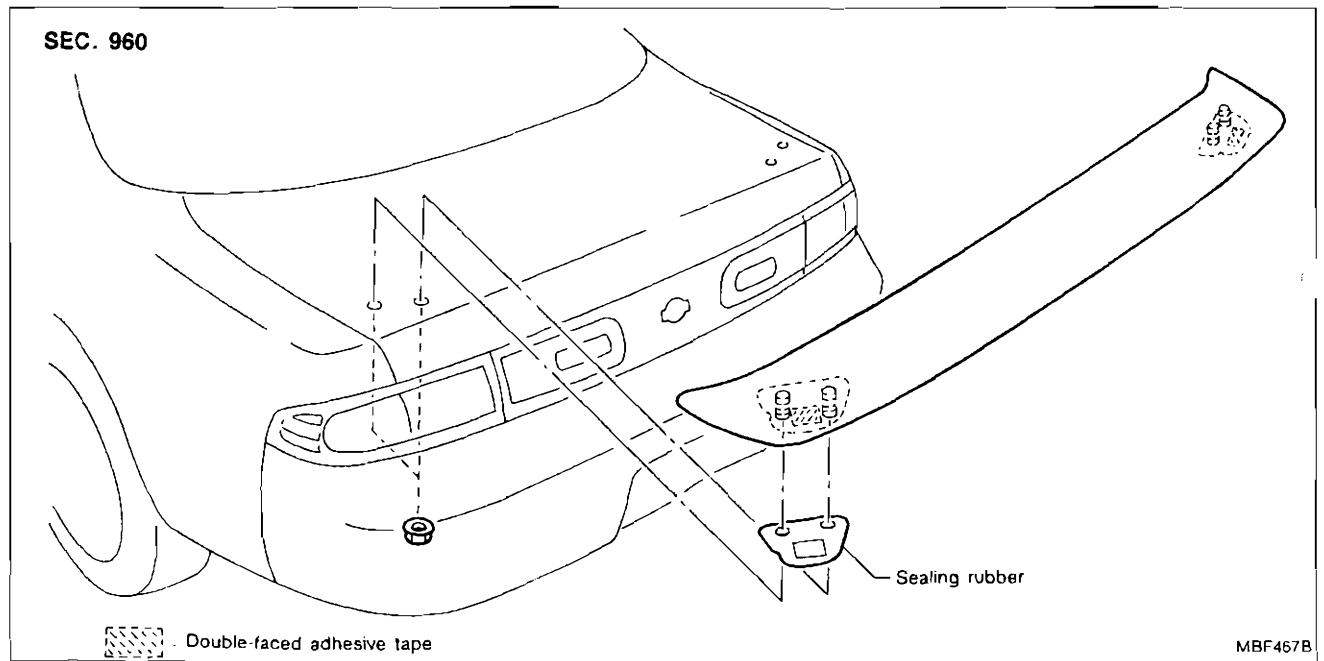
## FRONT AND REAR AIR SPOILER

- When installing, make sure that there are not gaps or waves at ends of air spoiler.
- Before installing spoiler, clean and remove oil from surface where spoiler will be mounted.

### Front Air Spoiler

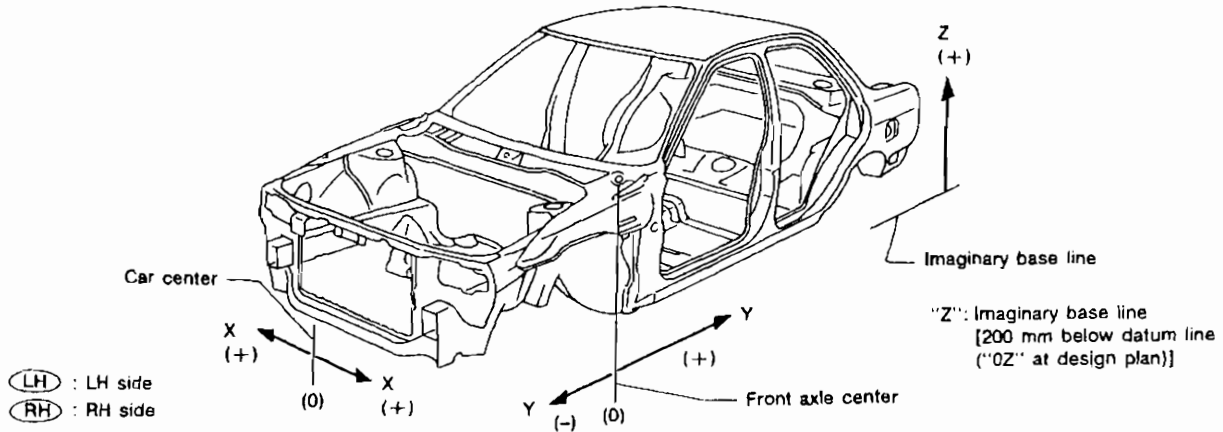


### Rear Air Spoiler



# BODY ALIGNMENT

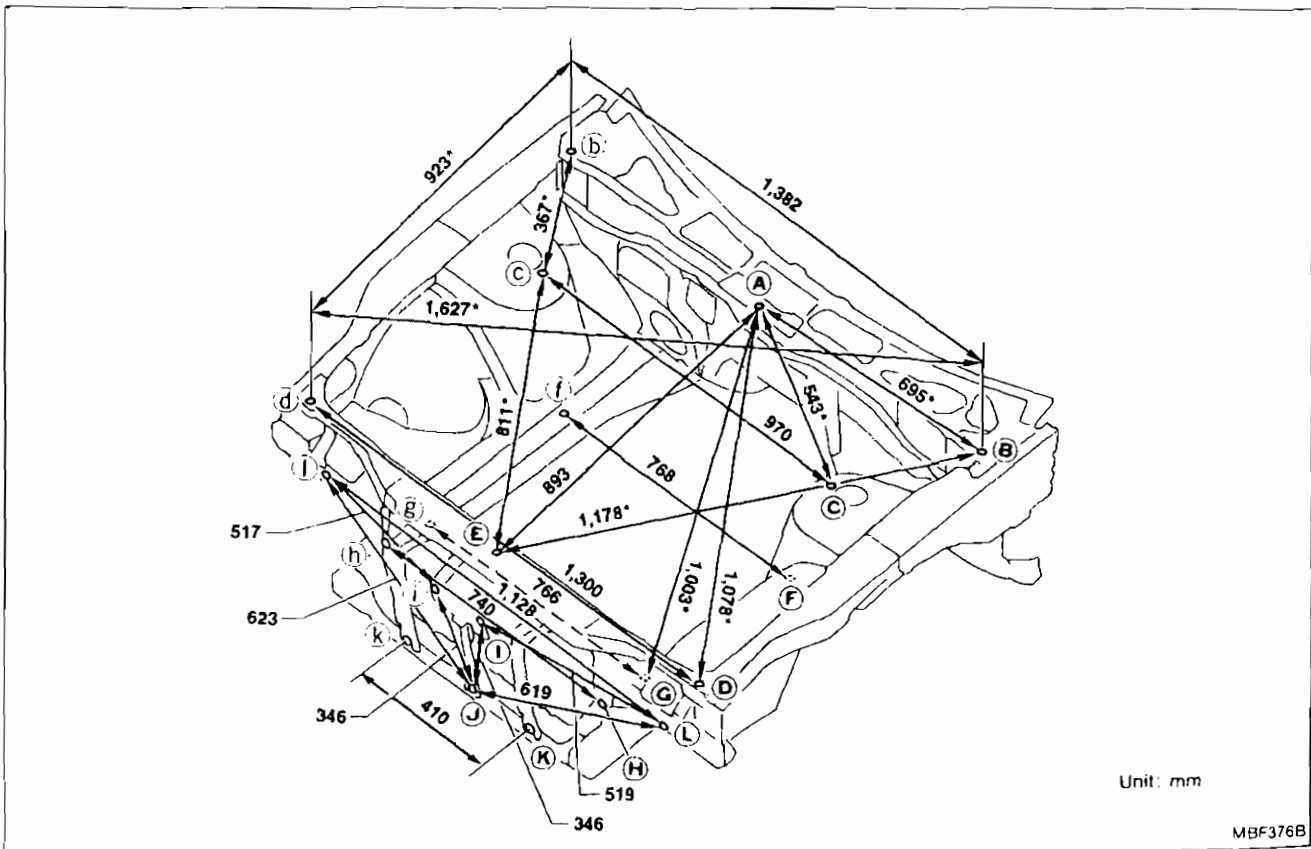
- All dimensions indicated in figures are actual ones.
- When using a tracking gauge, adjust both pointers to equal length. Check the pointers and gauge itself to make sure there is no free play.
- When a measuring tape is used, check to be sure there is no elongation, twisting or bending.
- Measurements 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".



## Engine Compartment

SBF874G

### MEASUREMENT



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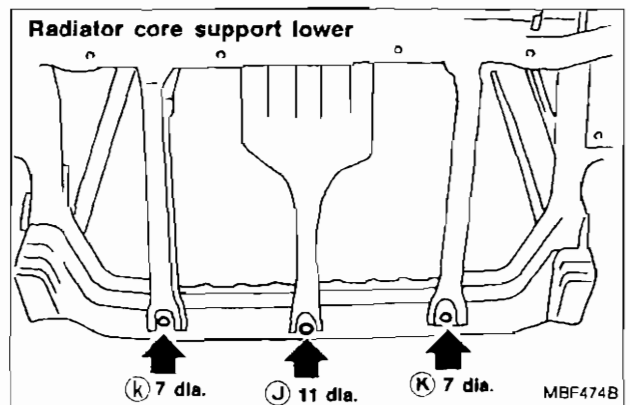
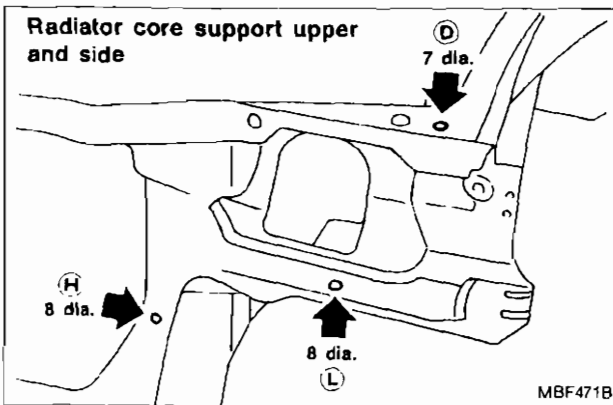
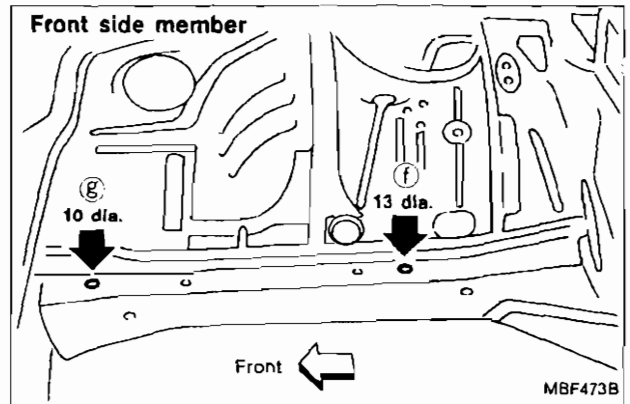
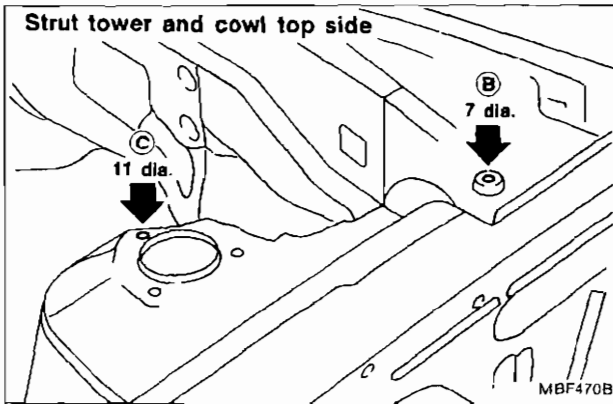
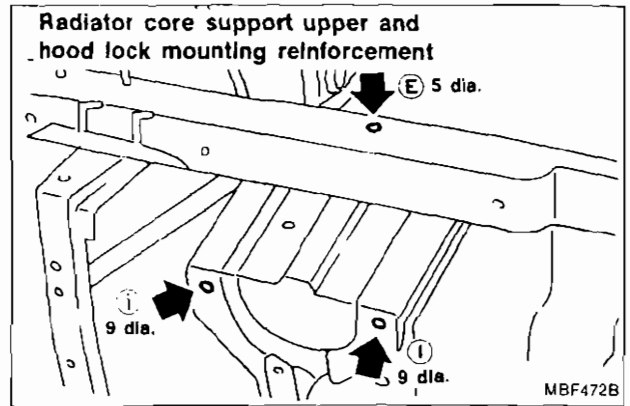
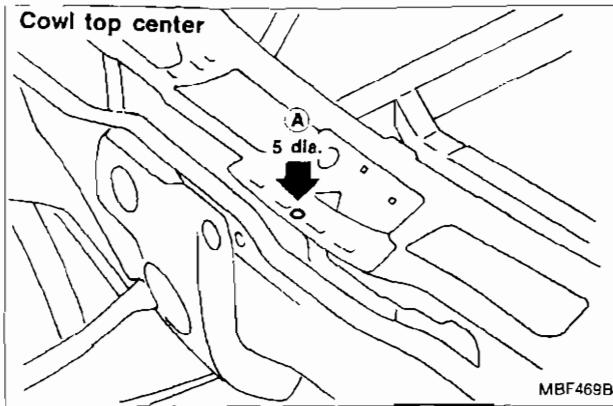
DA

# BODY ALIGNMENT

## Engine Compartment (Cont'd)

Unit: mm

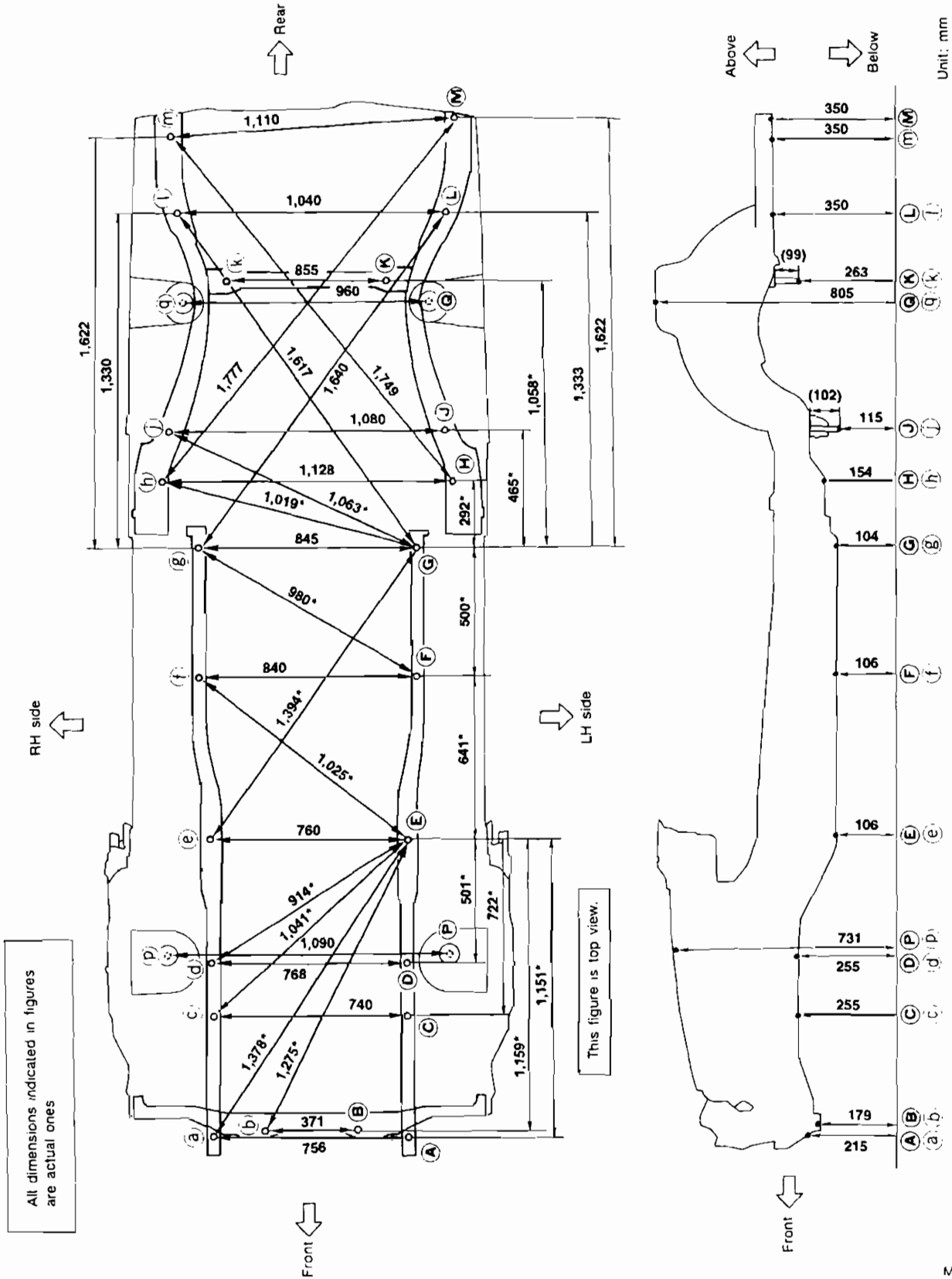
### MEASUREMENT POINTS



# BODY ALIGNMENT

## Underbody

### MEASUREMENT



BT

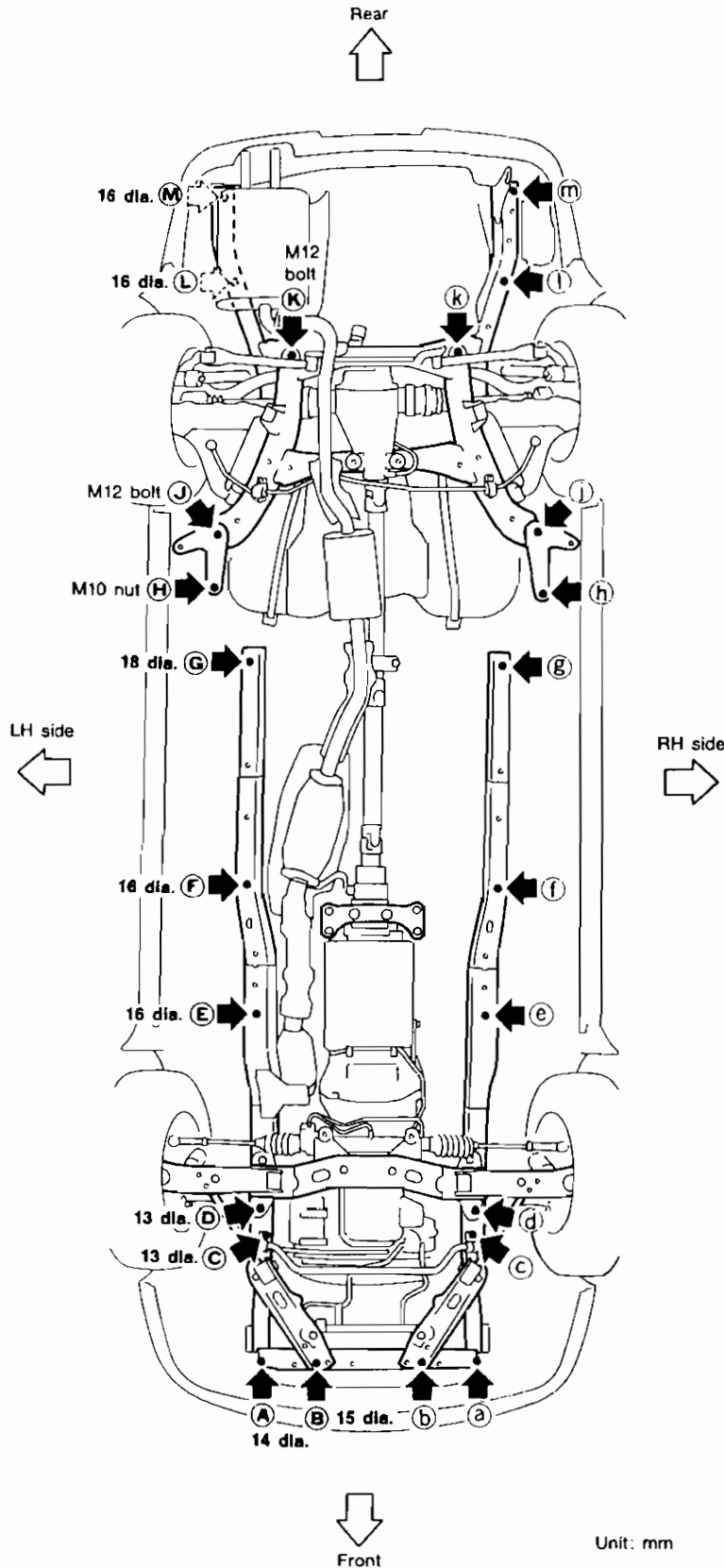
BT



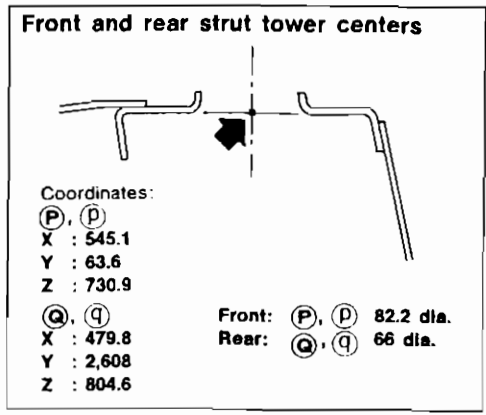
# BODY ALIGNMENT

## Underbody (Cont'd)

### MEASUREMENT POINTS



| Front coordinates:                                    | Rear coordinates:                                      |
|---|--|
| <b>(A), (a)</b><br>X : 378<br>Y : -635.5<br>Z : 214.5 | <b>(G), (g)</b><br>X : 422.5<br>Y : 1,650<br>Z : 103.9 |
| <b>(B), (b)</b><br>X : 185.3<br>Y : -630<br>Z : 179   | <b>(H), (h)</b><br>X : 564<br>Y : 1,900<br>Z : 154     |
| <b>(C), (c)</b><br>X : 370<br>Y : -196.5<br>Z : 254.9 | <b>(J), (j)</b><br>X : 540<br>Y : 2,100<br>Z : 115.2   |
| <b>(D), (d)</b><br>X : 384.2<br>Y : 32<br>Z : 254.9   | <b>(K), (k)</b><br>X : 308<br>Y : 2,690<br>Z : 262.8   |
| <b>(E), (e)</b><br>X : 380<br>Y : 510<br>Z : 106.2    | <b>(L)</b><br>X : 540<br>Y : 2,955<br>Z : 350          |
| <b>(F), (f)</b><br>X : 420<br>Y : 1,150<br>Z : 106.2  | <b>(I)</b><br>X : 500<br>Y : 2,955<br>Z : 350          |
|   | <b>(M)</b><br>X : 580<br>Y : 3,245<br>Z : 350          |
|   | <b>(m)</b><br>X : 530<br>Y : 3,250<br>Z : 350          |



Unit: mm

MBF477BA

# HEATER & AIR CONDITIONER

## SECTION HA

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#### MANUAL AND AUTO

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## CONTENTS (Cont'd.)

When you read wiring diagrams:

- Read G1 section, "HOW TO READ WIRING DIAGRAMS".
- See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.

When you perform trouble diagnoses, read G1 section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".

## Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System "Air Bag" and "Seat Belt Pre-tensioner", used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioner, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. 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.
- All SRS air bag electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS.

## Precautions for Working with HFC-134a (R-134a)

### WARNING:

- CFC-12 (R-12) refrigerant and HFC-134a (R-134a) refrigerant are not compatible. These refrigerants must never be mixed, even in the smallest amounts. If the refrigerants are mixed, compressor failure is likely to occur.
- 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. Use only approved recovery/recycling equipment to discharge HFC-134a (R-134a) refrigerant. If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.
- Do not allow lubricant (Nissan A/C System Oil Type S) to come in contact with styrofoam parts. Damage may result.

## General Refrigerant Precautions

### 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 introduce compressed air to any refrigerant container or refrigerant component.

### Precautions for Refrigerant Connection

**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:**

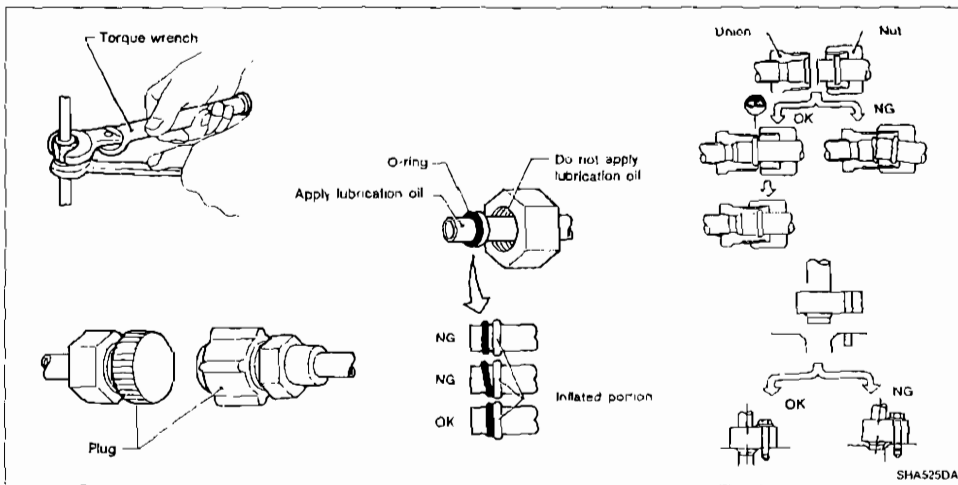
When replacing or cleaning refrigerant cycle components, observe the following.

- 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 portions shown in illustration. Be careful not to apply lubricant to threaded portion.

Lubricant name: Nissan A/C System Oil Type R

Part number: KLH00-PAGR0

- O-ring must be closely attached to inflated portion of tube.
- After inserting tube into union until O-ring is no longer visible, tighten nut to specified torque.
- 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.


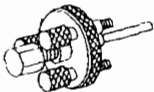



Precautions for Servicing Compressor

- 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 Lubricant — CHECKING AND ADJUSTING procedure exactly. Refer to HA-140.
- 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.

Special Service Tools

DKV-14C model

| Tool number<br>Tool name         | Description  |
|----------------------------------|--|
| KV99231152<br>Clutch disc wrench |  <p>Removing shaft nut and clutch disc</p> <p>NT255</p> |
| KV99232340<br>Clutch disc puller |  <p>Removing clutch disc</p> <p>NT206</p>               |
| KV99234330<br>Pulley installer   |  <p>Installing pulley</p> <p>NT207</p>                  |

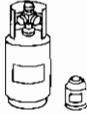


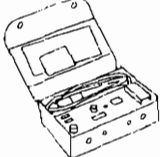

### HFC-134a (R-134a) Service Tools and Equipment

Never mix HFC-134a refrigerant and/or its specified lubricant with CFC-12 (R-12) refrigerant and/or its lubrication oil

Separate and non-interchangeable service equipment must be used for 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.


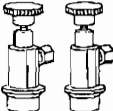

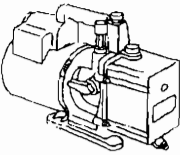
Adapters that convert one size fitting to another must never be used: refrigerant/lubricant contamination will occur and compressor failure will result.

| Tool name                                    | Description  | Note   |
|--|--|--|
| HFC-134a (R-134a) refrigerant                |  <p>NT196</p>     | <p>Container color: Light blue</p> <p>Container marking: HFC-134a (R-134a)</p> <p>Fitting size: Thread size</p> <ul style="list-style-type: none"> <li>● large container 1/2"-15 ACME</li> </ul> |
| Nissan A/C System Oil Type R                 |  <p>NT197</p>     | <p>Type: Poly alkylene glycol oil (PAG), type R</p> <p>Application: HFC-134a (R-134a) vane rotary compressors (Nissan only)</p> <p>Lubricity: 40 ml (1.4 imp fl oz)</p>  |
| Recovery/Recycling/Recharging equipment      |  <p>NT195</p>     | <p>Function: Refrigerant Recovery and Recycling and Recharging</p>   |
| Electrical leak detector                     |  <p>NT198</p>  | <p>Power supply:</p> <ul style="list-style-type: none"> <li>● DC 12 V (Cigarette lighter)</li> </ul>   |
| Manifold gauge set (with hoses and couplers) |  <p>NT199</p> | <p>Identification</p> <ul style="list-style-type: none"> <li>● The gauge face indicates R-134a.</li> <li>● Fitting size: Thread size</li> <li>● 1/2"-16 ACME</li> </ul>  |

# PRECAUTIONS AND PREPARATION

MANUAL AND AUTO

## HFC-134a (R-134a) Service Tools and Equipment (Cont'd)

| Tool name   | Description  | Note  |
|---|--|---|
| Service hoses <ul style="list-style-type: none"> <li>● High side hose</li> <li>● Low side hose</li> <li>● Utility hose</li> </ul> |  <p style="text-align: center;">NT201</p> | Hose color: <ul style="list-style-type: none"> <li>● Low hose: Blue with black stripe</li> <li>● High hose: Red with black stripe</li> <li>● Utility hose: Yellow with black stripe or green with black stripe</li> </ul> Hose fitting to gauge <ul style="list-style-type: none"> <li>● 1/2" -16 ACME</li> </ul> |
| Service couplers <ul style="list-style-type: none"> <li>● High side coupler</li> <li>● Low side coupler</li> </ul>                |  <p style="text-align: center;">NT202</p> | Hose fitting to service hose <ul style="list-style-type: none"> <li>● M14 x 1.5 fitting is optional or permanently attached</li> </ul>  |
| Refrigerant weight scale  |  <p style="text-align: center;">NT200</p> | For measuring of refrigerant<br>Fitting size: Thread size <ul style="list-style-type: none"> <li>● 1/2" -16 ACME</li> </ul>   |
| Vacuum pump<br>(Including the isolator valve)   |  <p style="text-align: center;">NT203</p> | Capacity: <ul style="list-style-type: none"> <li>● Air displacement: 4 CFM</li> <li>● Micron rating: 20 microns</li> <li>● Oil capacity: 482 g (17 oz)</li> </ul> Fitting size: Thread size <ul style="list-style-type: none"> <li>● 1/2" -16 ACME</li> </ul>   |

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## Precautions for Service Equipment

### RECOVERY/RECYCLING EQUIPMENT

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

Be certain to follow the manufactures instructions for tester operation and tester maintenance

### VACUUM PUMP

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.

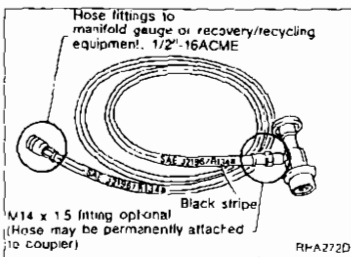
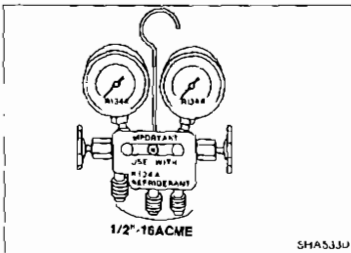
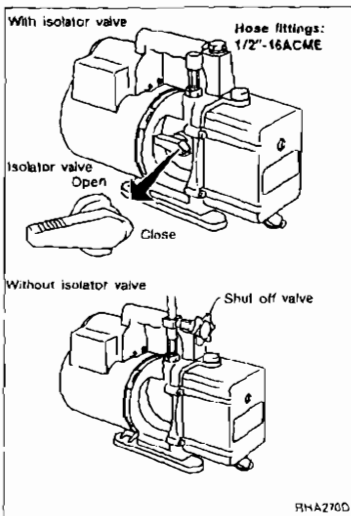
To prevent this migration, use a manual valve placed near the hose-to-pump connection, as follows.

- 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 lubricant 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.

### MANIFOLD GAUGE SET

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.



RH-A270D

SHA53JU

RH-A272D

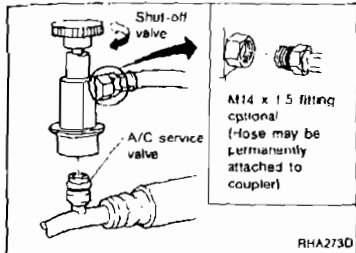
### SERVICE HOSES

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.

Precautions for Service Equipment (Cont'd)

**SERVICE COUPLERS**

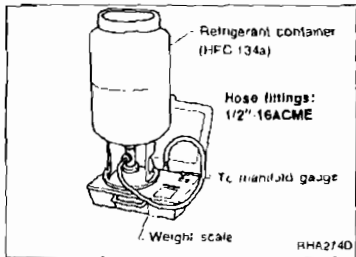
Never attempt to connect HFC-134a (R-134a) service couplers to an CFC-12 (R-12) A/C system. The HFC-134a (R-134a) couplers will not properly connect to the CFC-12 (R-12) system. However, if an improper connection is attempted, discharging and contamination may occur.



|                         |                   |
|-------------------------|-------------------|
| Shut off valve rotation | A/C service valve |
| Clockwise               | Open              |
| Counterclockwise        | Close             |

**REFRIGERANT WEIGHT SCALE**

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.



**CHARGING CYLINDER**

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.

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## Refrigeration Cycle

### REFRIGERANT FLOW

The refrigerant flow is in the standard pattern. Refrigerant flows through the compressor, condenser, liquid tank, 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

The compressor cycles on and off to maintain the evaporator temperature within a specified range. When the evaporator coil temperature falls below a specified point, the thermo control amplifier interrupts the compressor operation. When the evaporator coil temperature rises above the specification, the thermo control amplifier allows compressor operation.

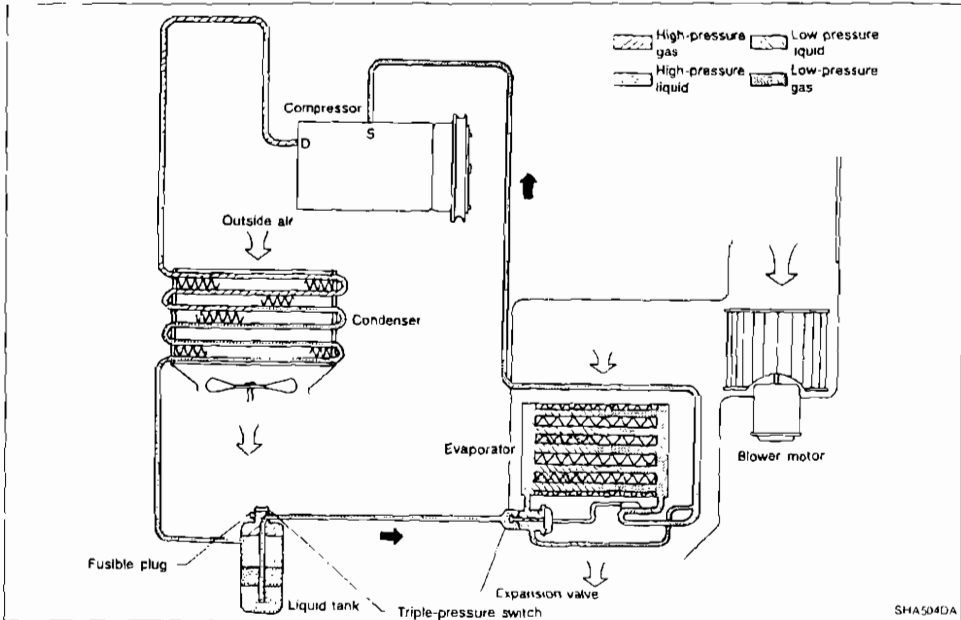
### REFRIGERANT SYSTEM PROTECTION

#### Triple-pressure switch

The triple pressure switch is located on the liquid tank. If the system pressure rises or falls out of specifications, the switch opens to interrupt compressor clutch operation. Triple-pressure switch closes to turn on the cooling fan and reduce system pressure.

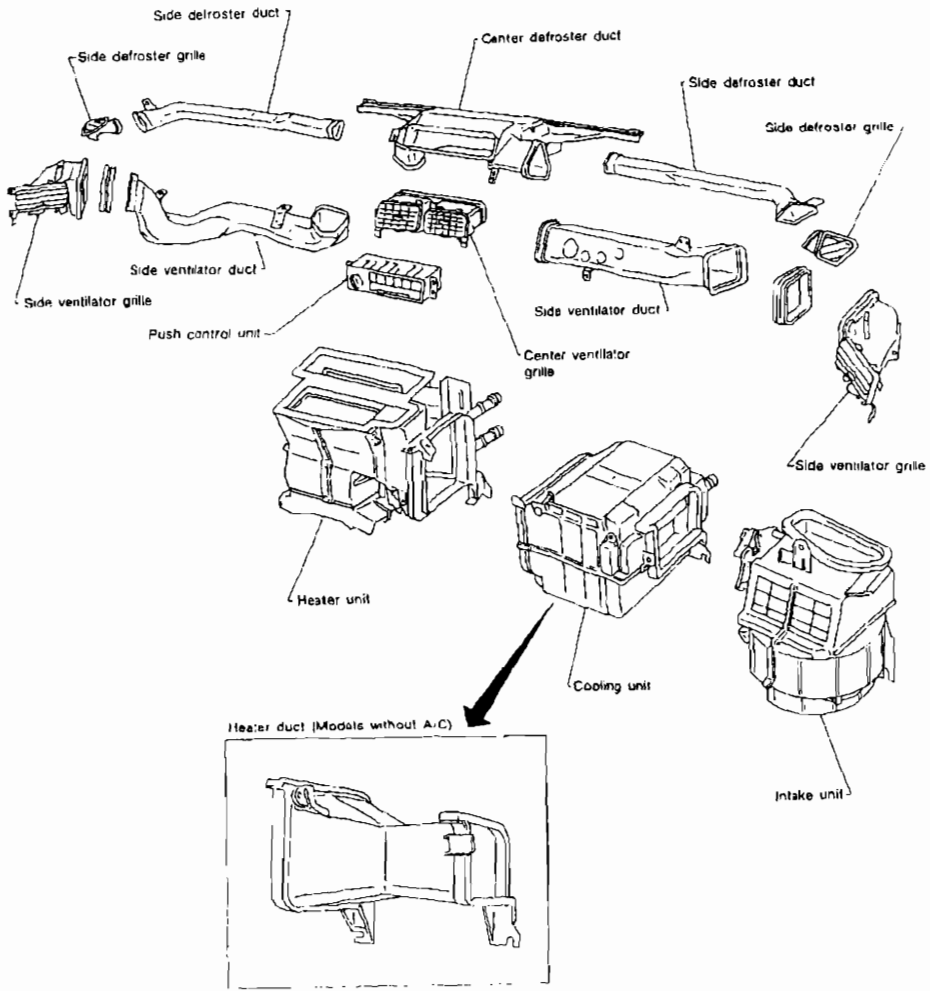
#### Fusible plug

Open at temperature above 105°C (221°F), thereby discharging refrigerant to the atmosphere. If this plug is melted and opened, check the refrigerant line and replace liquid tank.



Component Layout

SEC. 270-271-272-273-685



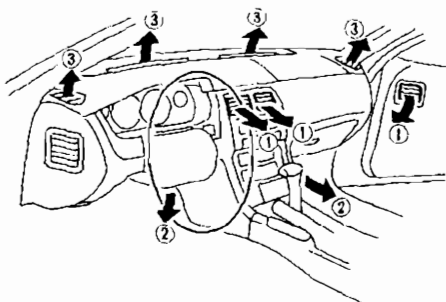
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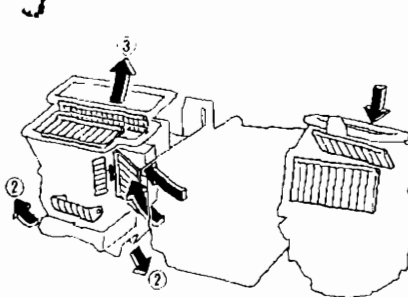
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Discharge Air Flow

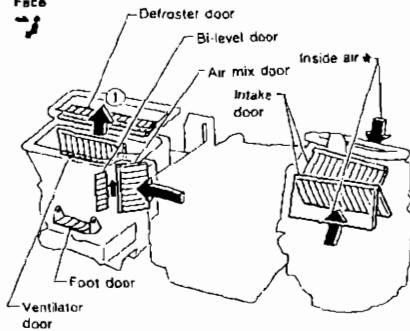
Air outlets



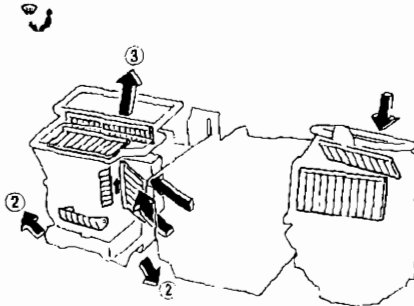
Foot



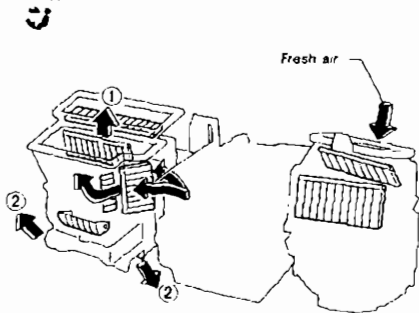
Face



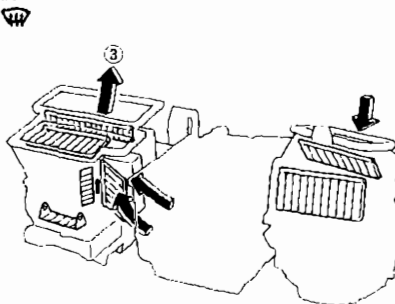
Foot and defroster



Bi-level



Defroster

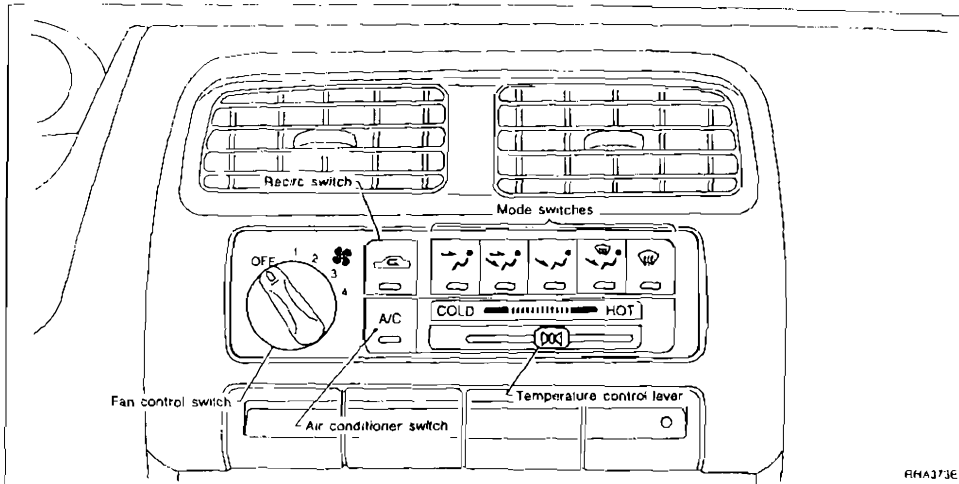


- (1) To face
- (2) To foot
- (3) To defroster

\* When RECIRC switch is ON

For air flow %, refer to "Operational Check", "TROUBLE DIAGNOSES".

## Control Operation

**FAN CONTROL SWITCH**

This switch turns the fan ON and OFF, and controls fan speed.

**MODE SWITCHES**

These switches control the outlet air flow.

In "DEF" or "F/D" mode, the intake door is set to "FRESH". The compressor turns on in the "DEF" mode.

**TEMPERATURE CONTROL LEVER**

This lever allows adjustment of the temperature of the outlet air.

**RECIRC SWITCH**

*OFF position:*

Outside air is drawn into the passenger compartment

*ON position:*

Interior air is recirculated inside the vehicle

RECIRC is canceled when DEF or F/D is selected, RECIRC resumes when another mode is chosen

**AIR CONDITIONER SWITCH**

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.

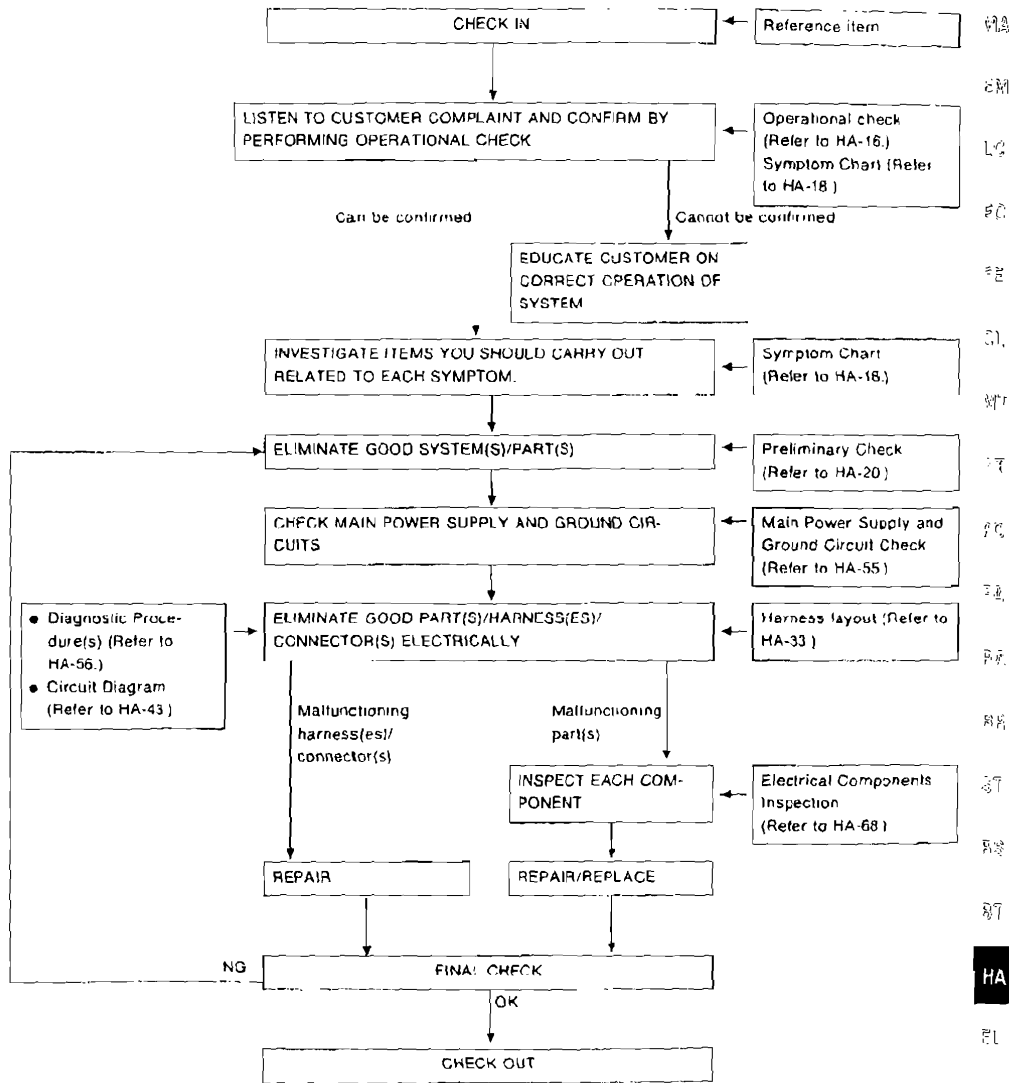
The air conditioner cooling function operates only when the engine is running.

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| Diagnostic Procedure 5<br>(SYMPTOM: Bi-level (B/L) door does not operate.) .....                               | HA-63 |
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How to Perform Trouble Diagnoses for Quick and Accurate Repair

WORK FLOW





## Operational Check

The purpose of the operational check is to confirm that the system is as it should be. The systems which will be checked are the blower, mode (discharge air), intake air, temperature decrease, temperature increase and A/C switch.

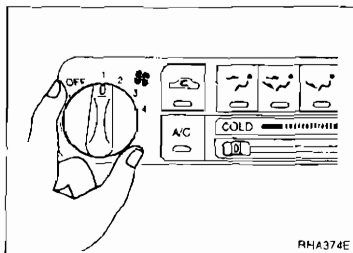
### CONDITIONS:

- Engine running and at normal operating temperature.

### PROCEDURE:

#### 1. Check blower

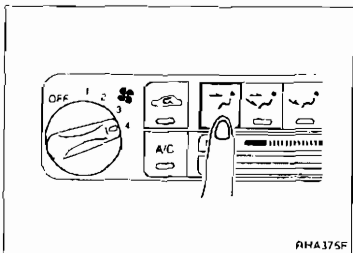
- 1) Turn fan switch to 1-speed  
Blower should operate on low speed
- 2) Then turn fan switch to 2-speed.
- 3) Continue checking blower speed until all speeds are checked
- 4) Leave blower on speed 4



RHA374E

#### 2. Check discharge air.

- 1) Press each mode switch.



RHA375F

- 2) Confirm that discharge air comes out according to the air distribution table at left.

Refer to "Discharge Air Flow", "DESCRIPTION" (HA-12)

### NOTE:

Confirm that the compressor clutch is engaged (visual inspection) and intake door position is at FRESH when the DEF button is pressed.

Confirm that the intake door position is at FRESH when the F/D button is pressed.


Intake door position is checked in the next step.

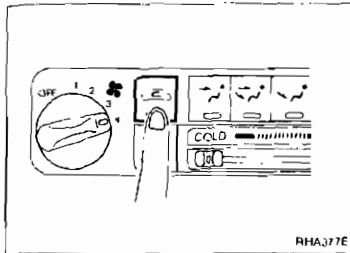
### Discharge air flow

| Switch mode/<br>indicator | Air outlet/distribution |      |           |
|---------------------------|-------------------------|------|-----------|
|                           | Face                    | Foot | Defroster |
|                           | 100%                    | -    | -         |
|                           | 60%                     | 40%  | -         |
|                           | -                       | 80%  | 20%       |
|                           | -                       | 60%  | 40%       |
|                           | -                       | -    | 100%      |

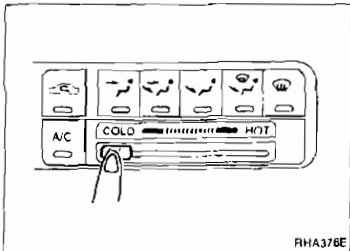
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**Operational Check (Cont'd)****3. Check recirc**

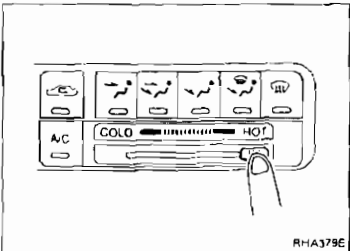
- 1) Press REC  switch  
Recirc indicator should illuminate.
- 2) Listen for intake door position change (you should hear blower sound change slightly)

**4. Check temperature decrease**

- 1) Slide temperature control lever to full cold
- 2) Check for cold air at discharge air outlets.

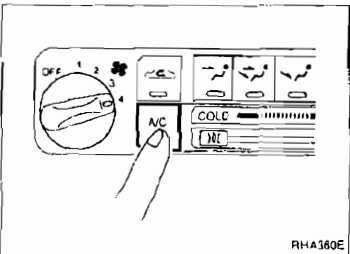
**5. Check temperature increase**

- 1) Slide temperature control lever to full hot.
- 2) Check for hot air at discharge air outlets.

**6. Check air conditioning switch**

Move the fan control switch to the desired (1 to 4 speed) position and push the A/C switch to turn ON the air conditioner.

The indicator lamp should come on when air conditioner is ON.



## Symptom Chart

## DIAGNOSTIC TABLE

| PROCEDURE   | Preliminary Check   |                     |                     |                     |                     |                     | Diagnostic Procedure   |                        |                        |                        |                        |                        | Main Power Supply and Ground Circuit Check |                       |                 |                   |
|---|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|--|-----------------------|-----------------|-------------------|
|   | HA-20               | HA-21               | HA-22               | HA-23               | HA-24               | HA-25               | HA-56                  | HA-58                  | HA-59                  | HA-61                  | HA-63                  | HA-64                  | HA-55                                      | HA-55                 | HA-55           |                   |
| REFERENCE PAGE  | HA-20               | HA-21               | HA-22               | HA-23               | HA-24               | HA-25               | HA-56                  | HA-58                  | HA-59                  | HA-61                  | HA-63                  | HA-64                  | HA-55                                      | HA-55                 | HA-55           |                   |
| SYMPTOM   | Preliminary check 1 | Preliminary check 2 | Preliminary check 3 | Preliminary check 4 | Preliminary check 5 | Preliminary check 6 | Diagnostic procedure 1 | Diagnostic procedure 2 | Diagnostic procedure 3 | Diagnostic procedure 4 | Diagnostic procedure 5 | Diagnostic procedure 6 | 15A Fuses (#7, #8)                         | 7.5A Fuse (#6 or #15) | 7.5A Fuse (#42) | Push control unit |
| A/C does not blow cold air  | ①                   |                     |                     |                     |                     |                     | ○                      |                        |                        | ○                      |                        |                        | ○  | ○                     |                 |                   |
| Insufficient heating  |                     |                     |                     |                     |                     | ①                   | ○                      |                        |                        | ○                      |                        |                        |  |                       |                 |                   |
| Blower motor does not rotate.                                       | ①                   |                     |                     |                     |                     |                     | ②                      |                        |                        |                        |                        |                        | ①  |                       |                 |                   |
| Air outlet does not change  |                     |                     |                     | ①                   |                     |                     | ②                      |                        |                        |                        |                        |                        |  | ○                     |                 | ○                 |
| Intake door does not change in VENT, B/L or FOOT mode.              |                     |                     |                     |                     |                     |                     |                        |                        | ①                      |                        |                        |                        |  |                       |                 | ○                 |
| Intake door is not set at "FRESH" in DEF or F/D mode                | ①                   |                     |                     |                     |                     |                     |                        |                        | ○                      |                        |                        |                        |  |                       |                 | ○                 |
| Air mix door does not change.                                       | ①                   |                     |                     |                     |                     |                     |                        |                        |                        | ②                      |                        |                        |  |                       |                 |                   |
| Bi-level door does not change.                                      |                     |                     |                     |                     |                     |                     |                        |                        |                        |                        | ①                      |                        |  |                       |                 |                   |
| Magnet clutch does not engage when A/C switch and fan switch are ON | ①                   |                     |                     |                     |                     |                     |                        |                        |                        |                        |                        | ②                      |  | ○                     | ○               |                   |
| Magnet clutch does not engage in DEF mode.                          | ①                   | ②                   |                     |                     |                     |                     |                        |                        |                        |                        |                        | ○                      |  | ○                     | ○               |                   |
| Noise   |                     |                     |                     |                     | ①                   |                     |                        |                        |                        |                        |                        |                        |  |                       |                 |                   |

① ② The number means checking order

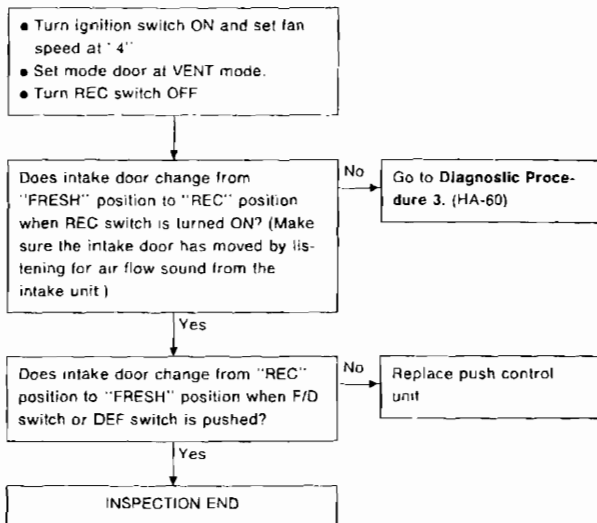
① ② Checking order depends on malfunction in each flow chart



## Preliminary Check

## PRELIMINARY CHECK 1

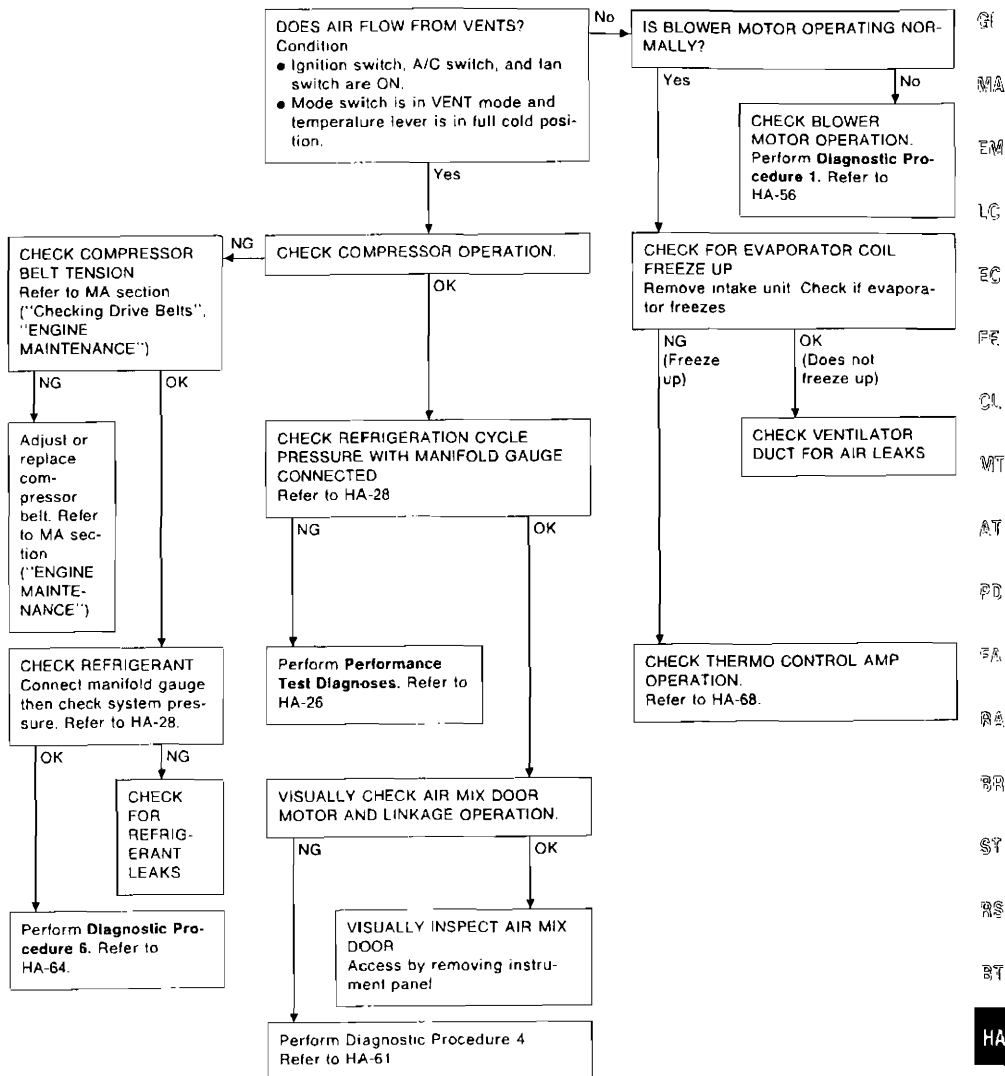
Intake door is not set at "FRESH" in DEF or F/D mode.



## Preliminary Check (Cont'd)

## PRELIMINARY CHECK 2

A/C does not blow cold air.

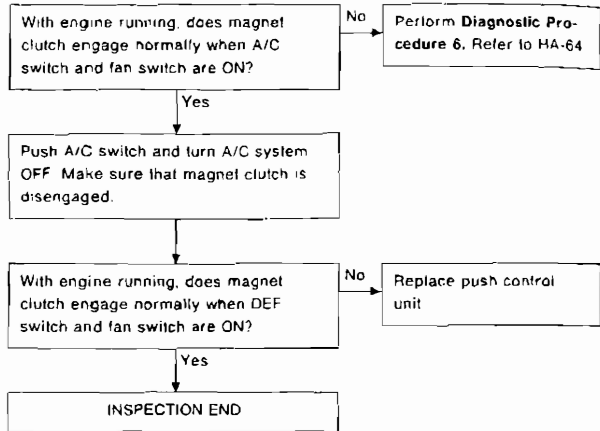


## Preliminary Check (Cont'd)

## PRELIMINARY CHECK 3

Magnet clutch does not engage in DEF mode.

- Perform PRELIMINARY CHECK 2 before referring to the following flow chart.



## Preliminary Check (Cont'd)






## PRELIMINARY CHECK 4

Air outlet does not change.

TURN IGNITION SWITCH ON DOES AIR COME OUT NORMALLY FROM EACH DUCT WHEN EACH MODE SWITCH IS PUSHED?

No

Perform Diagnostic Procedure 2. Refer to HA-58

| Switch mode/<br>Indicator   | Air outlet/distribution |      |           |
|---|-------------------------|------|-----------|
|   | Face                    | Foot | Defroster |
|  | 100%                    | —    | —         |
|  | 60%                     | 40%  | —         |
|  | —                       | 80%  | 20%       |
|  | —                       | 60%  | 40%       |
|  | —                       | —    | 100%      |

Yes

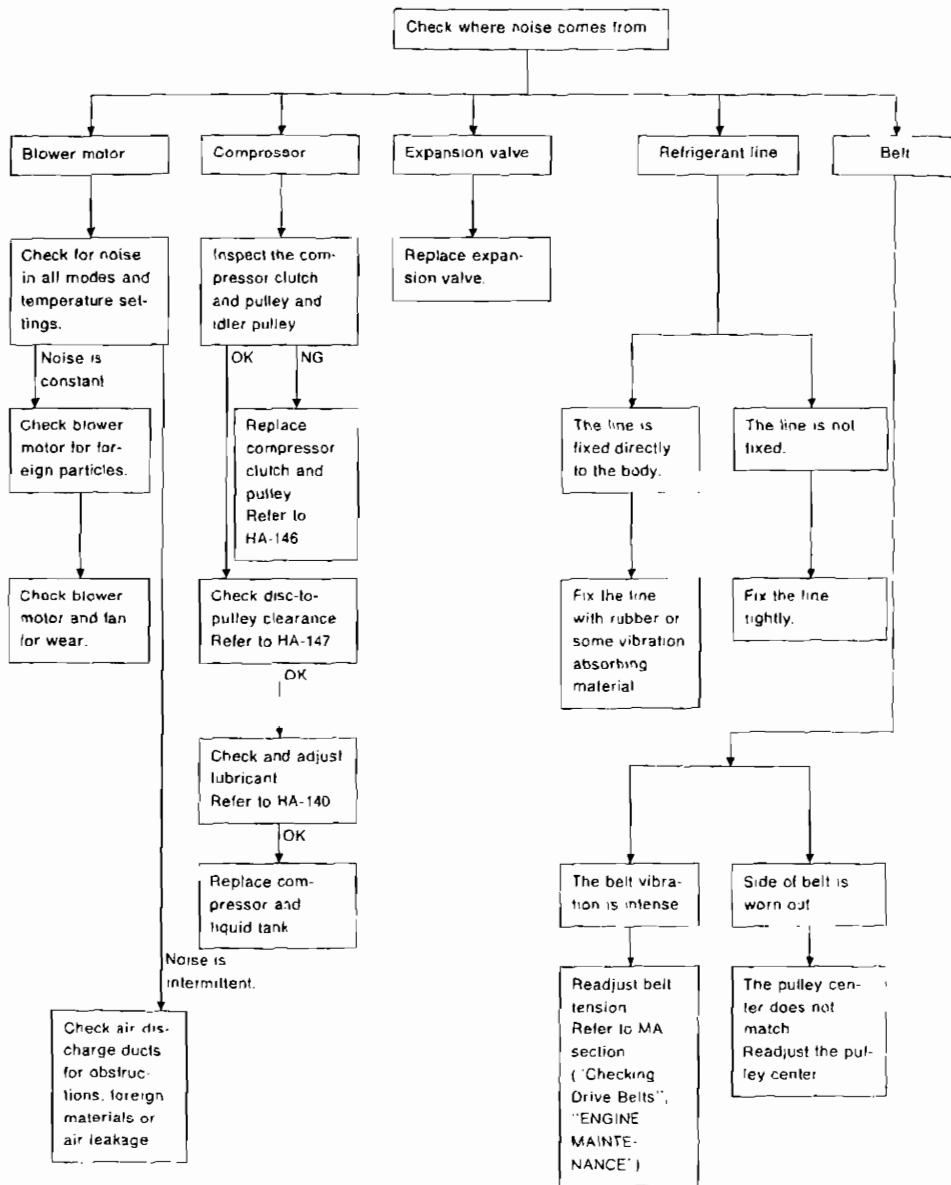
INSPECTION END



## Preliminary Check (Cont'd)

## PRELIMINARY CHECK 5

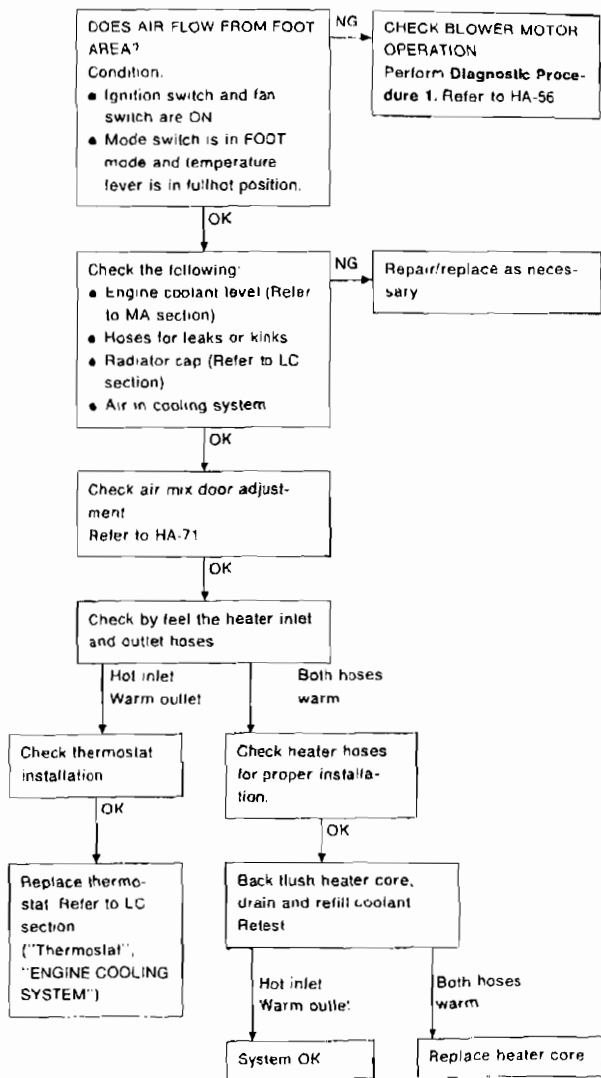
## Noise



## Preliminary Check (Cont'd)

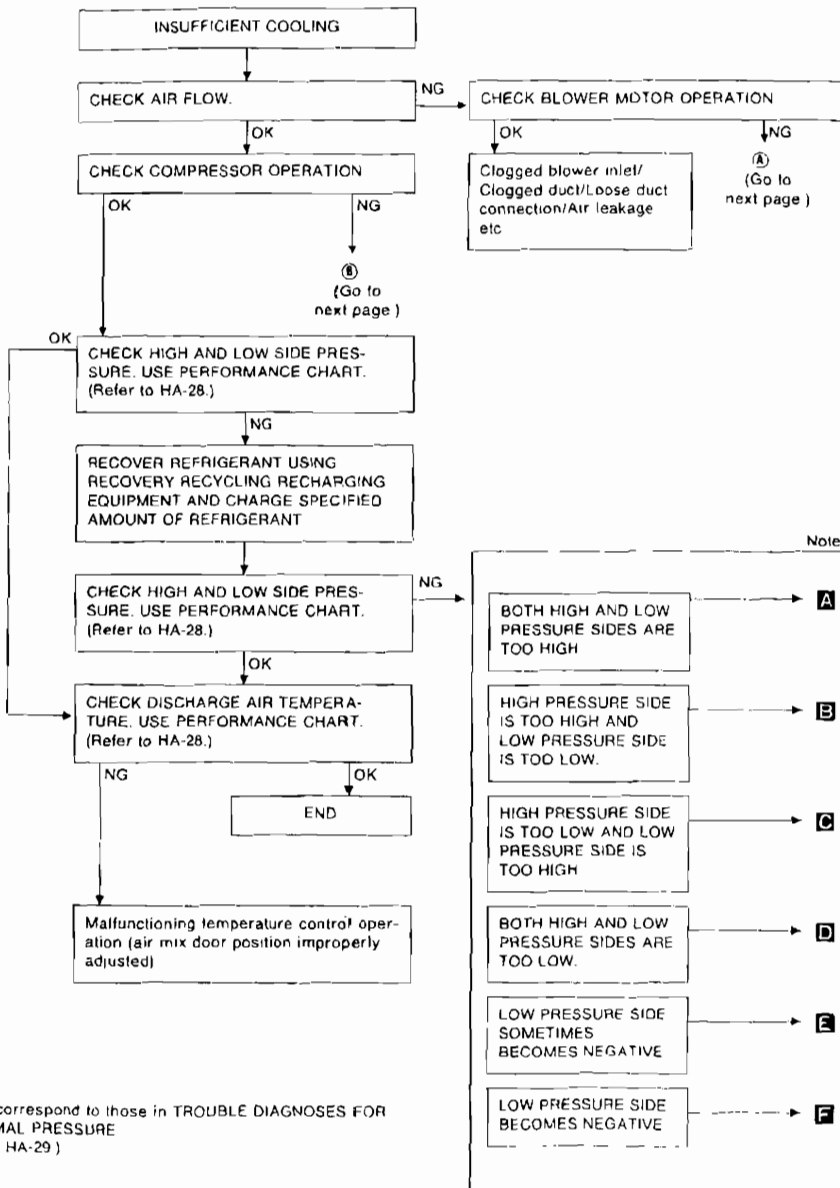
## PRELIMINARY CHECK 6

Insufficient heating



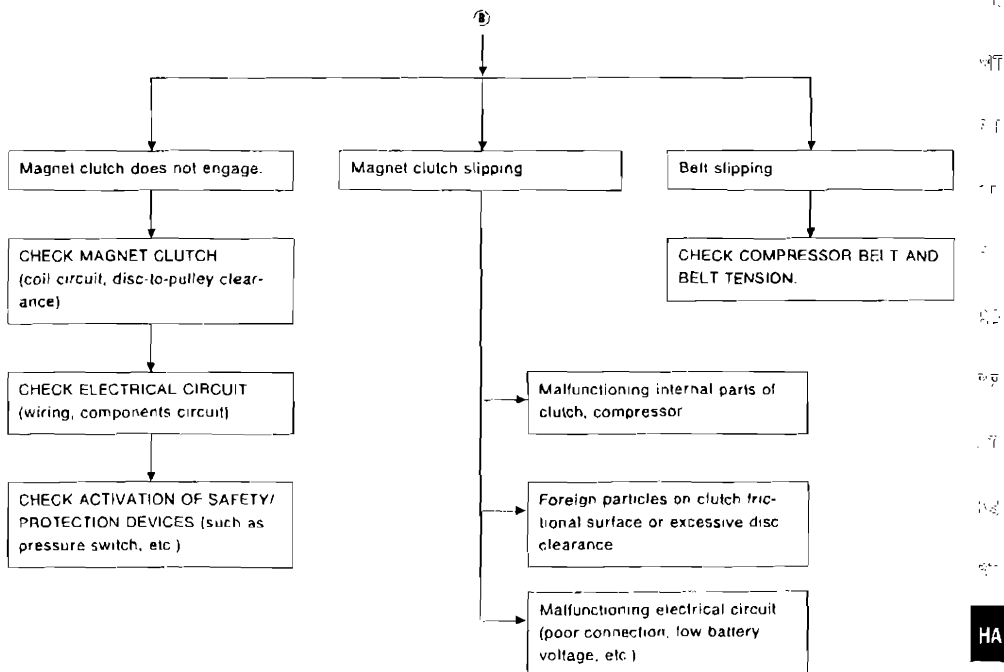
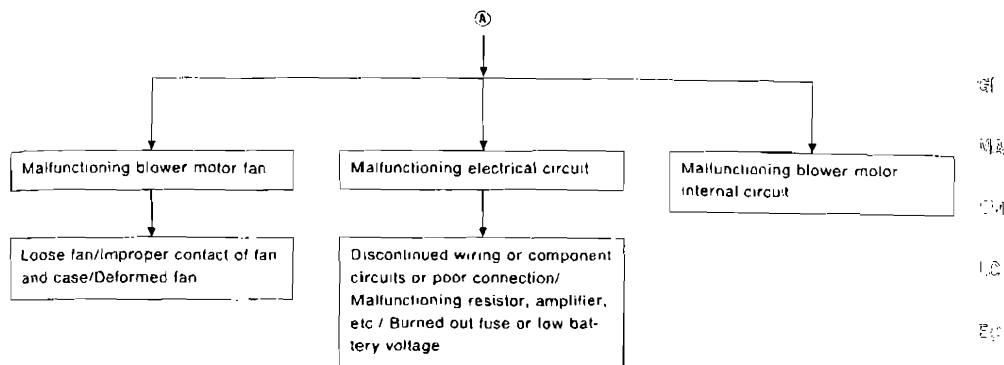
## Performance Test Diagnoses

### INSUFFICIENT COOLING



Note **A-F** correspond to those in TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE (Refer to HA-29)

## Performance Test Diagnoses (Cont'd)



## Performance Chart

## TEST CONDITION

Testing must be performed as follows:

Vehicle location: Indoors or in the shade (in a well ventilated place)

Doors: Closed

Door window: Open (Front driver side only)

Hood: Open

TEMP setting: Max COLD

Discharge Air: Face Vent

RECIRC switch: (Recirculation) ON

FAN speed: High speed

A/C switch: ON

Engine speed: Idle speed

Operate the air conditioning system for 10 minutes before taking measurements.

## TEST READING

## Recirculating-to-discharge air temperature table

| Inside air<br>at blower assembly inlet for RECIRC* |                            | Discharge air temperature at center ventilator<br>°C (°F) |
|--|----------------------------|---|
| Relative humidity<br>%                             | Air temperature<br>°C (°F) |   |
| 50 - 60  | 20 (68)                    | 6.2 - 8.8 (43 - 48)                                       |
|  | 25 (77)                    | 10.4 - 13.5 (51 - 56)                                     |
|  | 30 (86)                    | 14.6 - 18.2 (58 - 65)                                     |
|  | 35 (95)                    | 18.7 - 23.0 (66 - 73)                                     |
| 60 - 70  | 20 (68)                    | 8.8 - 11.6 (48 - 53)                                      |
|  | 25 (77)                    | 13.5 - 16.8 (56 - 62)                                     |
|  | 30 (86)                    | 18.2 - 22.0 (65 - 72)                                     |
|  | 35 (95)                    | 23.0 - 27.2 (73 - 81)                                     |

\* Thermometer should be placed at intake unit under RH side of instrument panel

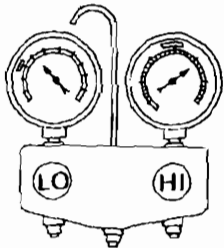
## Ambient air temperature-to-operating pressure table

| Ambient air            |                            | High-pressure (Discharge side)<br>kPa (bar, kg/cm <sup>2</sup> , psi) | Low-pressure (Suction side)<br>kPa (bar, kg/cm <sup>2</sup> , psi) |
|------------------------|----------------------------|---|--|
| Relative humidity<br>% | Air temperature<br>°C (°F) |   |  |
| 50 - 70                | 25 (77)                    | 814 - 991 (8.14 - 9.91,<br>8.3 - 10.1, 118 - 144)                     | 147 - 216 (1.47 - 2.16, 1.5 - 2.2, 21 - 31)                        |
|                        | 30 (86)                    | 941 - 1,177 (9.41 - 11.77,<br>9.6 - 12.0, 137 - 171)                  | 157 - 245 (1.57 - 2.45, 1.6 - 2.5, 23 - 36)                        |
|                        | 35 (95)                    | 1,108 - 1,402 (11.08 - 14.02,<br>11.3 - 14.3, 161 - 203)              | 177 - 284 (1.77 - 2.84, 1.8 - 2.9, 26 - 41)                        |
|                        | 40 (104)                   | 1,304 - 1,677 (13.04 - 16.77,<br>13.3 - 17.1, 189 - 243)              | 216 - 343 (2.16 - 3.43, 2.2 - 3.5, 31 - 50)                        |

If pressure is not within range, refer to HA-29, "Trouble Diagnoses for Abnormal Pressure".

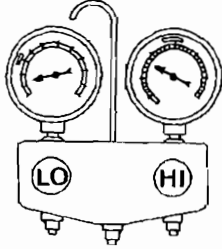
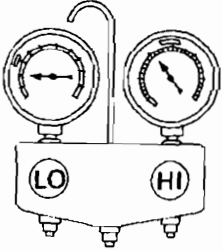
### Trouble Diagnoses for Abnormal Pressure

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-28 ("Ambient air temperature-to-compressor pressure table").

| Gauge indication   | Refrigerant cycle   | Probable cause   | Corrective action  |
|--|---|--|--|
| Both high and low-pressure sides are too high<br><b>A</b>                                      | <ul style="list-style-type: none"> <li>● Pressure is reduced soon after water is splashed on condenser</li> </ul>   | Excessive refrigerant charge in refrigeration cycle  | Reduce refrigerant until specified pressure is obtained  |
|  <p>AC359A</p> | <ul style="list-style-type: none"> <li>● Air suction by cooling fan is insufficient</li> </ul>  | Insufficient condenser cooling performance<br>↓<br>① Condenser fins are clogged<br>② Improper fan rotation of cooling fan  | <ul style="list-style-type: none"> <li>● Clean condenser.</li> <li>● Check and repair cooling fan as necessary.</li> </ul> |
|  | <ul style="list-style-type: none"> <li>● Low-pressure pipe is not cold</li> <li>● When compressor is stopped high-pressure value quickly drops by approximately 196 kPa (2.0 bar, 2 kg/cm<sup>2</sup>, 28 psi). It then decreases gradually thereafter</li> </ul> | Poor heat exchange in condenser<br>(After compressor operation stops, high pressure decreases too slowly)<br>↓<br>Air in refrigeration cycle   | Evacuate repeatedly and recharge system  |
|  | <ul style="list-style-type: none"> <li>● Engine tends to overheat</li> </ul>  | Engine cooling systems malfunction   | Check and repair each engine cooling system.   |
|  | <ul style="list-style-type: none"> <li>● An area of the low-pressure pipe is colder than areas near the evaporator outlet</li> <li>● Plates are sometimes covered with frost</li> </ul>   | <ul style="list-style-type: none"> <li>● Excessive liquid refrigerant on low-pressure side</li> <li>● Excessive refrigerant discharge flow</li> <li>● Expansion valve is open a little compared with the specification.</li> </ul> ↓<br>① Improper thermal valve installation<br>② Improper expansion valve adjustment | Replace expansion valve  |
|  |   |  |  |

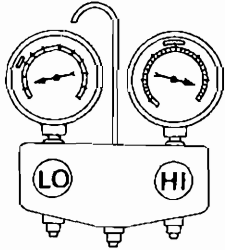


### Trouble Diagnoses for Abnormal Pressure (Cont'd)

| Gauge indication   | Refrigerant cycle  | Probable cause   | Corrective action   |
|--|--|--|---|
| <p>Both high- and low-pressure sides are too low.</p> <p><b>D</b></p>  <p>AC353A</p> | <p>There is a big temperature difference between expansion valve inlet and outlet while the valve itself is frosted</p> <p>An area of the low-pressure pipe is colder than areas near the evaporator outlet</p> <p>Air flow volume is not enough or is too low</p> | <p>Expansion valve closes a little compared with the specification</p> <p>↓</p> <ol style="list-style-type: none"> <li>① Improper expansion valve adjustment</li> <li>② Malfunctioning thermal valve</li> <li>③ Outlet and inlet may be clogged</li> </ol> <p>Low-pressure pipe is clogged or crushed</p> <p>Evaporator is frozen</p> <p>↓</p> <p>Compressor discharge capacity does not change. (Compressor stroke is set at maximum length.)</p> | <ul style="list-style-type: none"> <li>● Remove foreign particles by using compressed air</li> <li>● Check lubricant for contamination</li> </ul> <ul style="list-style-type: none"> <li>● Check and repair malfunctioning parts</li> <li>● Check lubricant for contamination.</li> </ul> <p>Replace compressor</p> |
| <p>Low-pressure side sometimes becomes negative</p> <p><b>E</b></p>  <p>AC354A</p>   | <ul style="list-style-type: none"> <li>● Air conditioning system does not function and does not cyclically cool the compartment air.</li> <li>● The system constantly functions for a certain period of time after compressor is stopped and restarted</li> </ul>  | <p>Refrigerant does not discharge cyclically</p> <p>↓</p> <p>Moisture is frozen at expansion valve outlet and inlet</p> <p>↓</p> <p>Water is mixed with refrigerant</p>  | <ul style="list-style-type: none"> <li>● Drain water from refrigerant or replace refrigerant</li> <li>● Replace liquid tank</li> </ul>  |

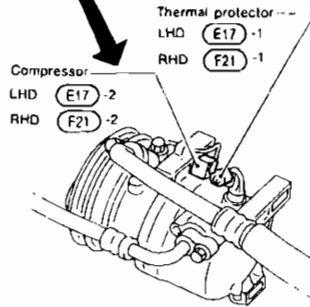
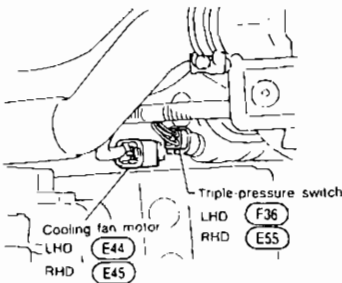
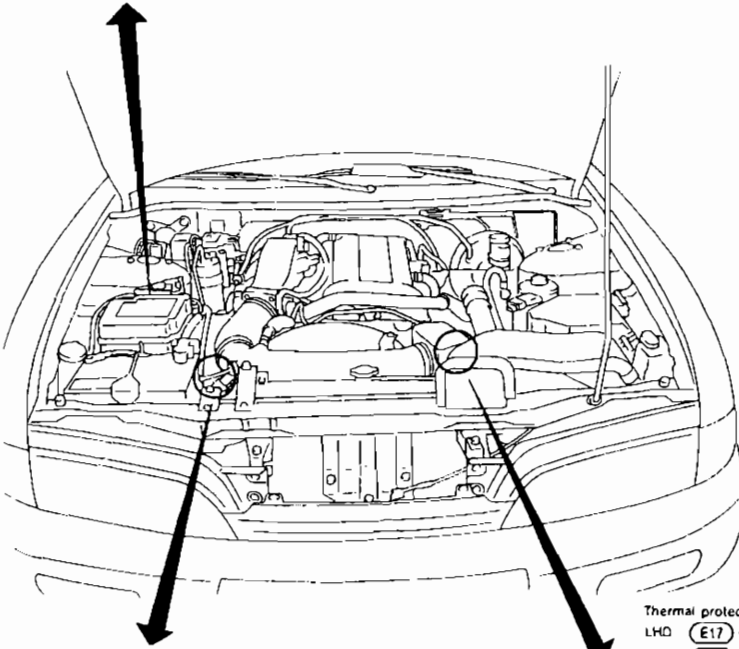
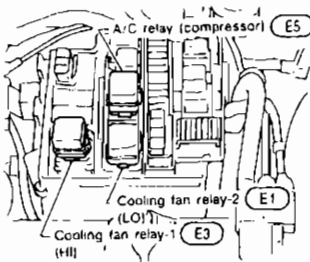


### Trouble Diagnoses for Abnormal Pressure (Cont'd)

| Gauge indication   | Refrigerant cycle  | Probable cause   | Corrective action  |
|--|--|--|--|
| Low-pressure side becomes negative.<br><b>F</b> <br>AC382A | 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<br>↓<br>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. <ul style="list-style-type: none"> <li>● If the problem is due to water, drain water from refrigerant or replace refrigerant</li> <li>● If due to foreign particles, remove expansion valve and remove the particles with dry and compressed air (not shop air)</li> <li>● If either of the above methods cannot correct the problem, replace expansion valve</li> <li>● Replace liquid tank</li> <li>● Check lubricant for contamination</li> </ul> |

Harness Layout

ENGINE COMPARTMENT



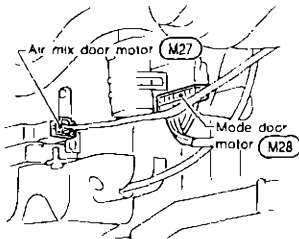
SHA506E

HA

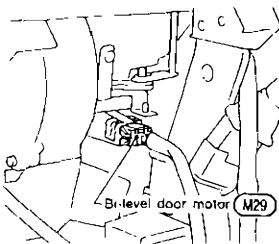
### PASSENGER COMPARTMENT

LHD model

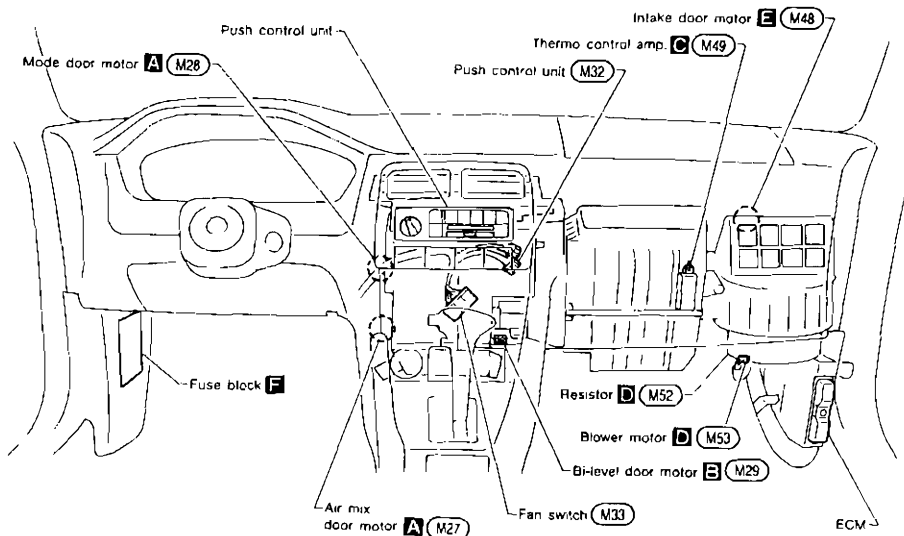
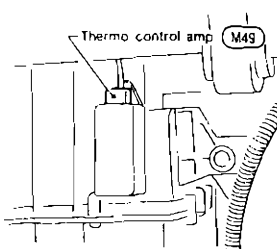
**A** Air mix door motor  
Mode door motor



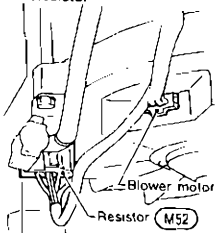
**B** Bi-level door motor



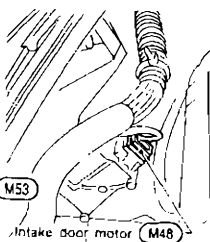
**C** Thermo control amp.



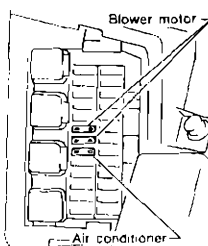
**D** Blower motor  
Resistor



**E** Intake door motor



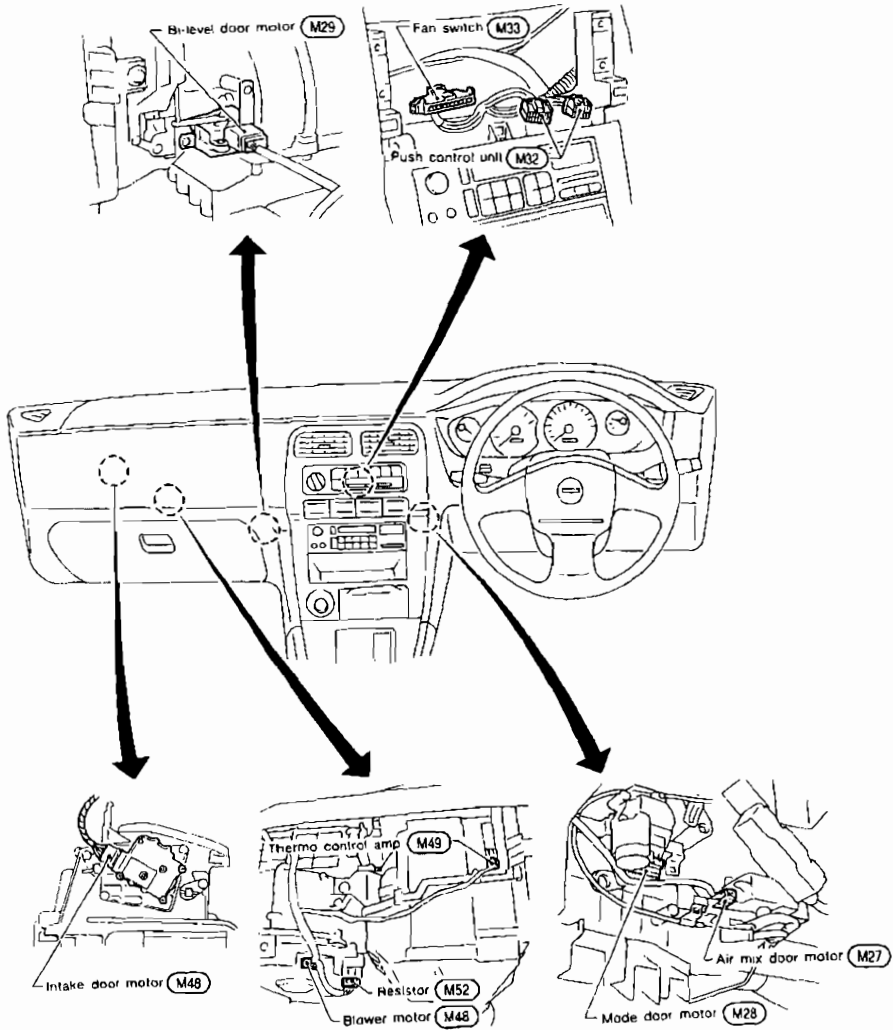
**F** Fuse block



# TROUBLE DIAGNOSES

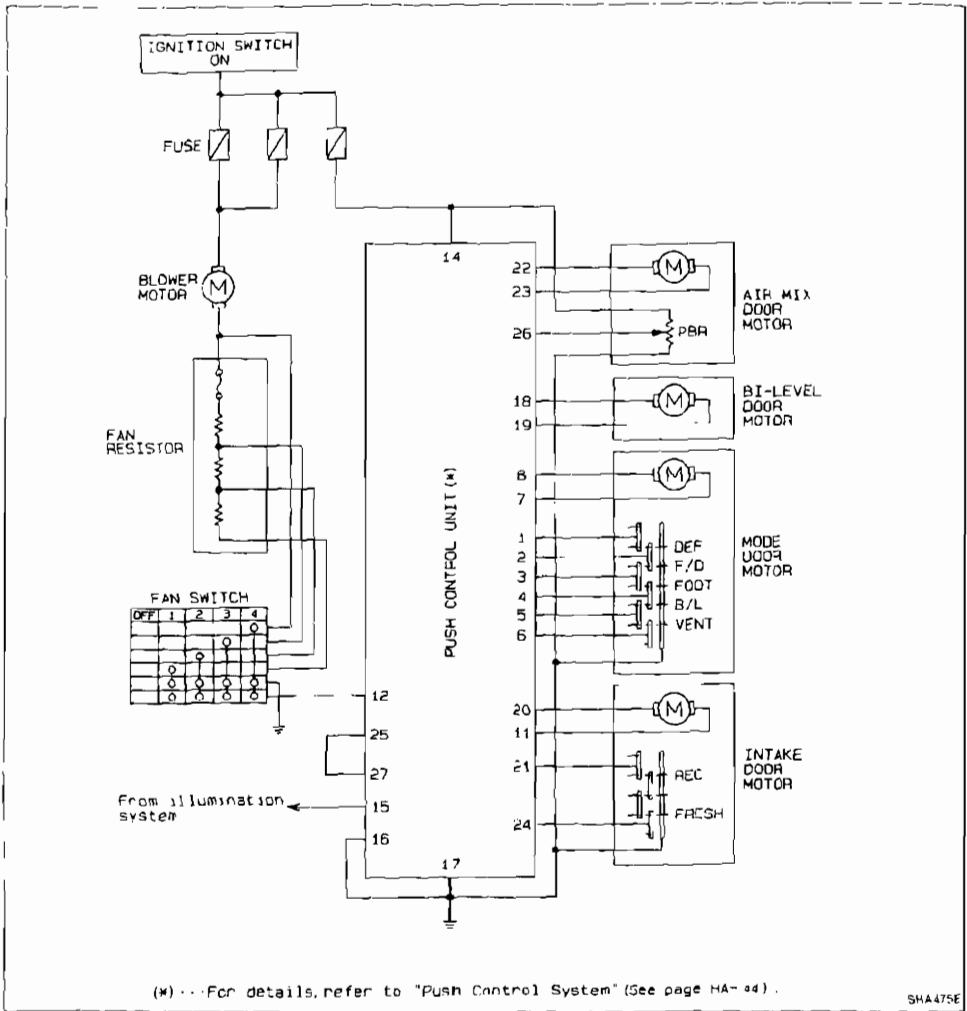
## Harness Layout (Cont'd)

RHD model



GI  
 MA  
 EM  
 LG  
 EC  
 FE  
 CL  
 WT  
 AT  
 PD  
 FA  
 PA  
 BR  
 ST  
 PS  
 ST  
 HA  
 EL  
 FOX

Circuit Diagram — Heater



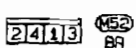
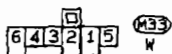
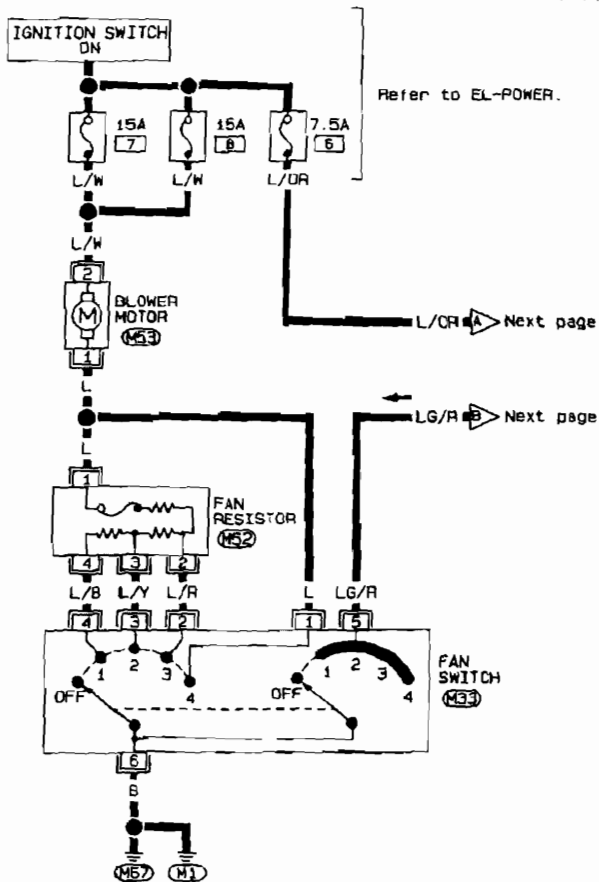
(\*) ... For details, refer to "Push Control System" (See page HA-44).

SHA475E

Wiring Diagram — HEAT —

LHD MODEL

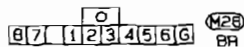
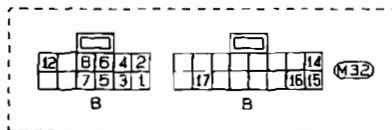
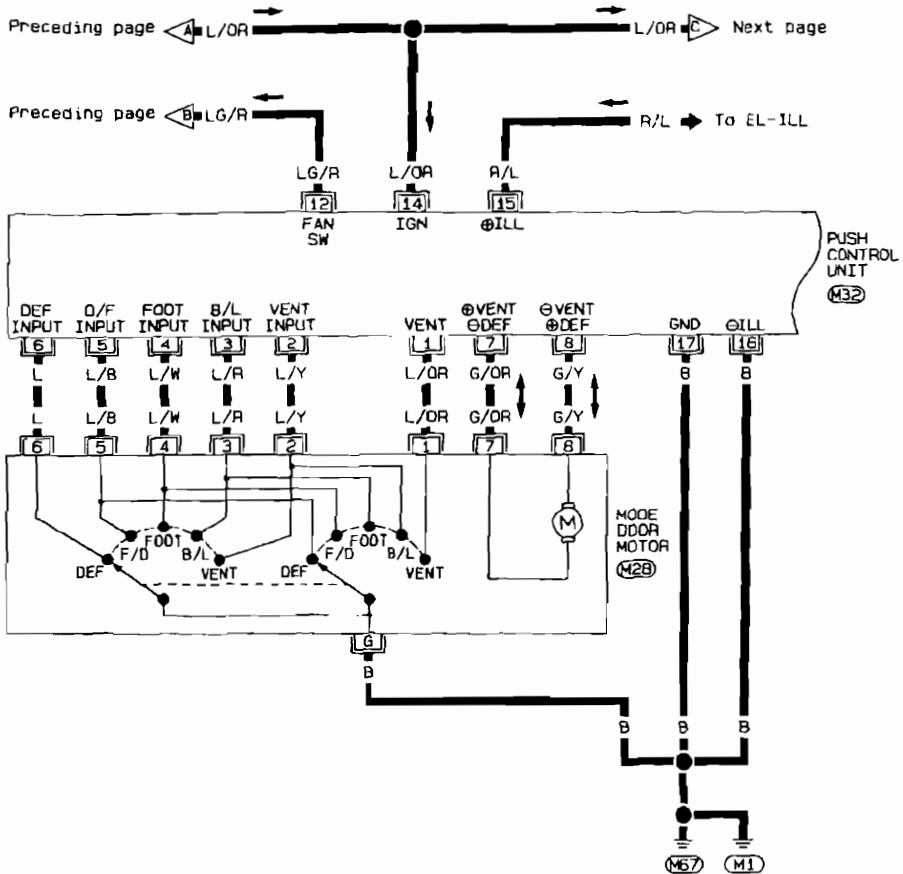
HA-HEAT-01



HA

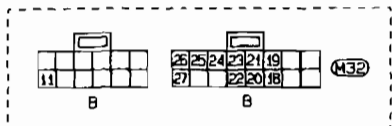
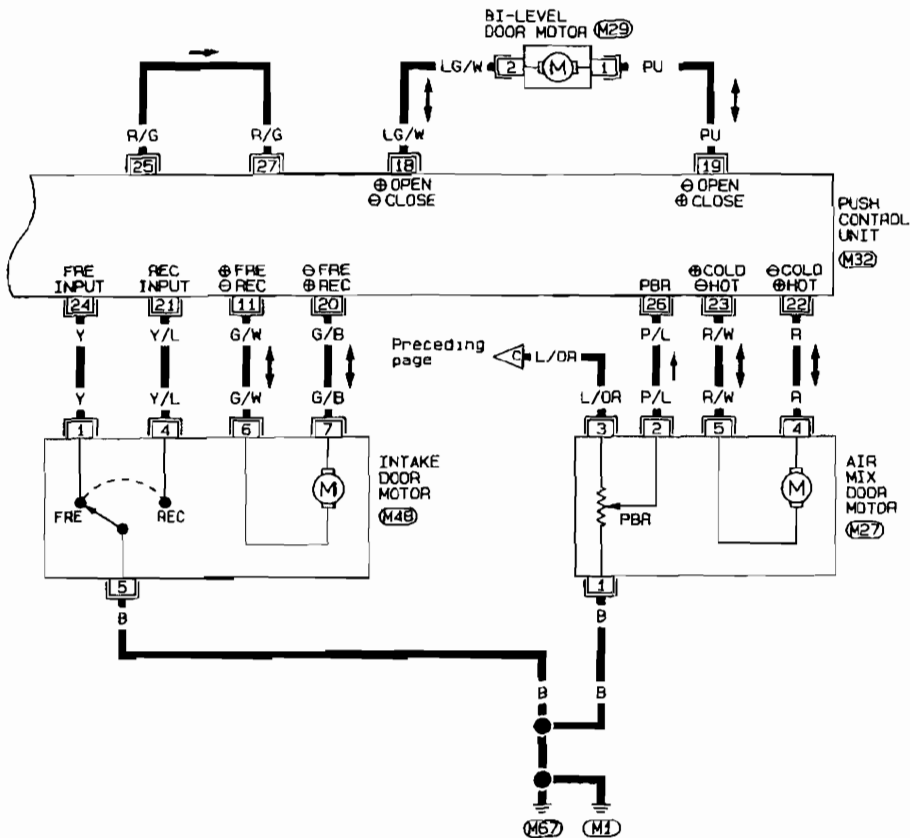
Wiring Diagram — HEAT — (Cont'd)

HA-HEAT-02



Wiring Diagram — HEAT — (Cont'd)

HA-HEAT-03



|   |   |   |     |
|---|---|---|-----|
| 7 | 5 | 0 | M48 |
| 5 | 4 | 1 | W   |

|   |   |   |     |
|---|---|---|-----|
| 4 | 0 | 5 | M27 |
| 1 | 2 | 3 | B   |

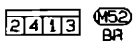
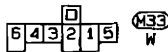
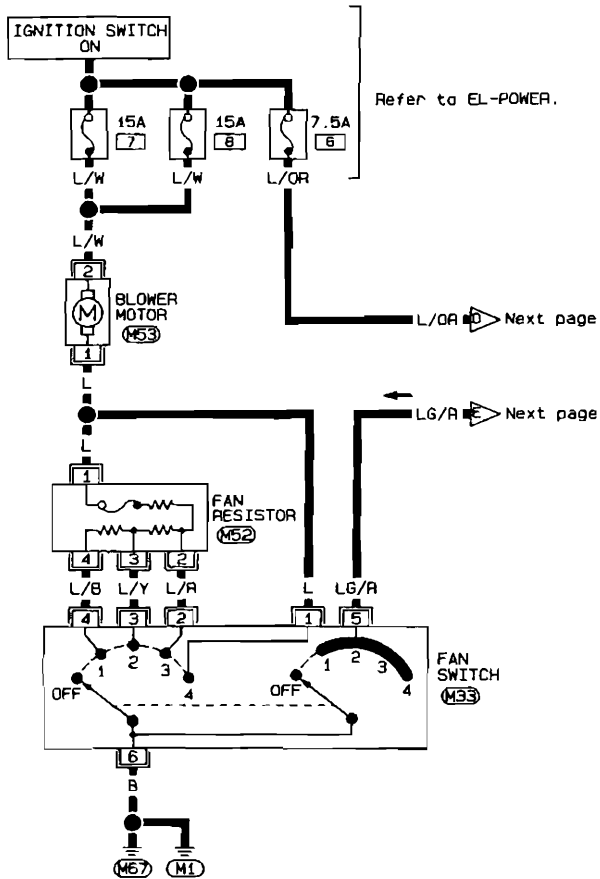
|   |   |     |
|---|---|-----|
| 1 | 0 | M29 |
| 2 | B |     |



Wiring Diagram — HEAT — (Cont'd)

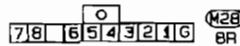
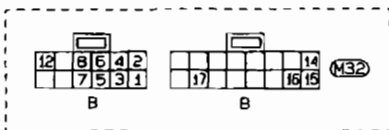
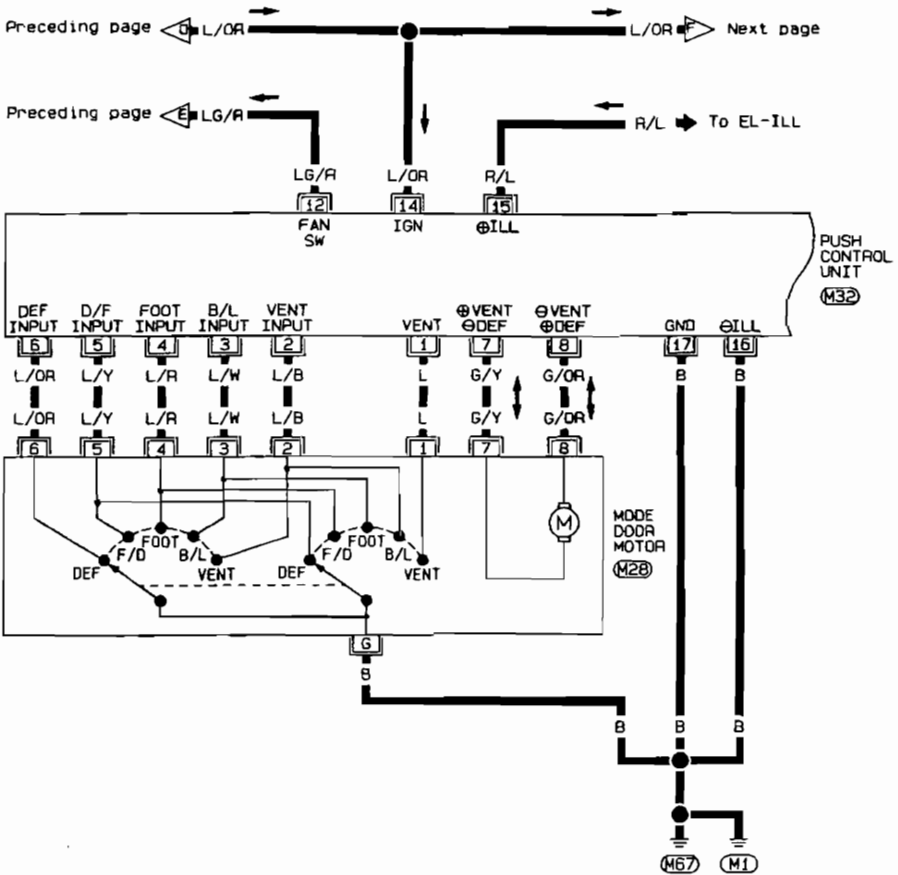
RHD MODEL

HA-HEAT-04



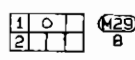
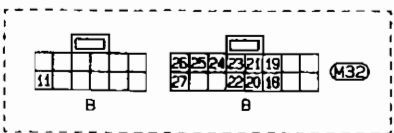
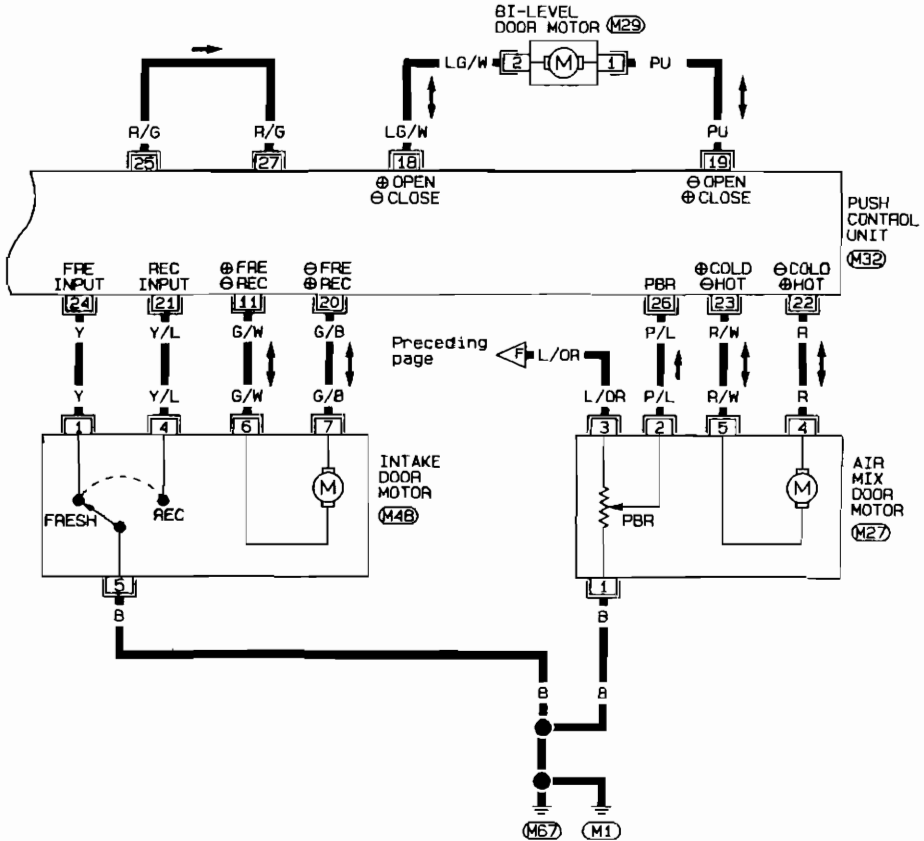
Wiring Diagram — HEAT — (Cont'd)

HA-HEAT-05



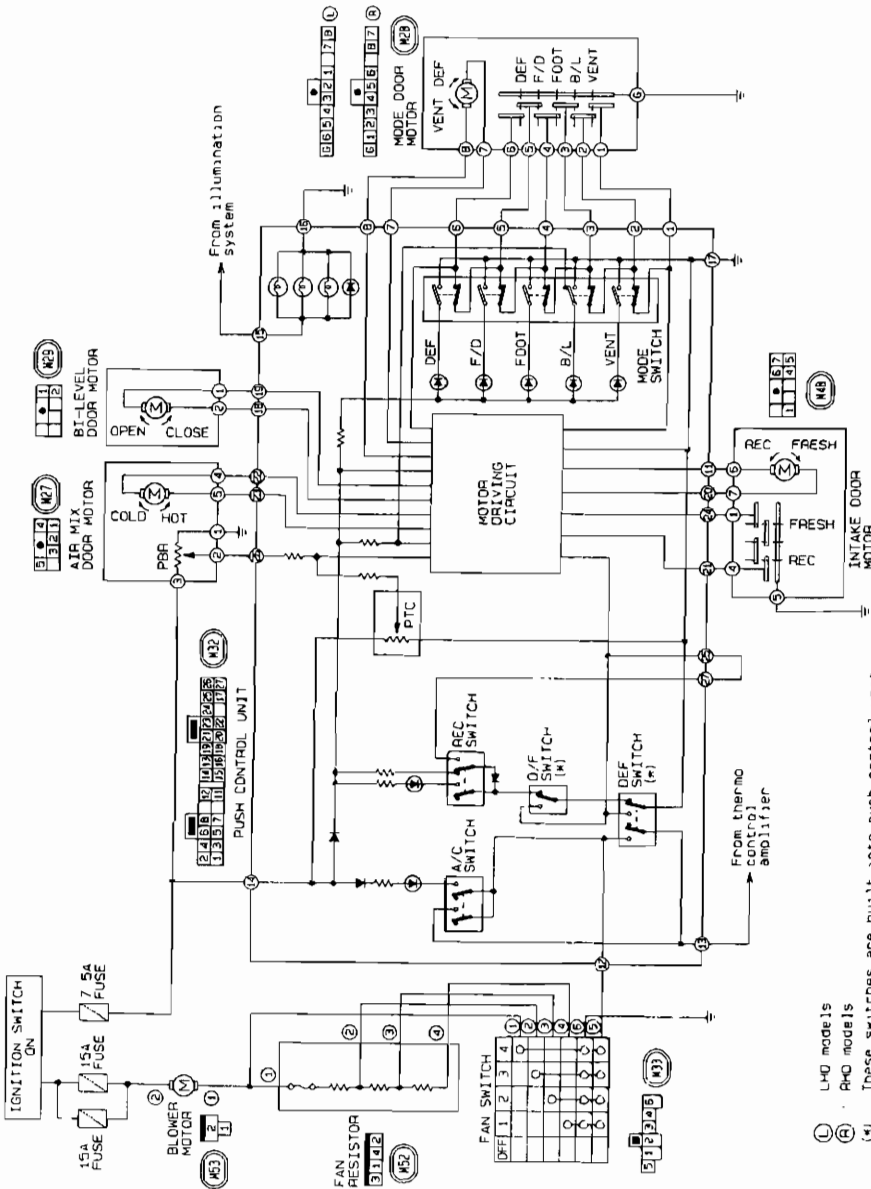
Wiring Diagram — HEAT — (Cont'd)

HA-HEAT-06





Circuit Diagram — Push Control Unit

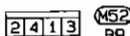
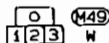
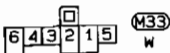
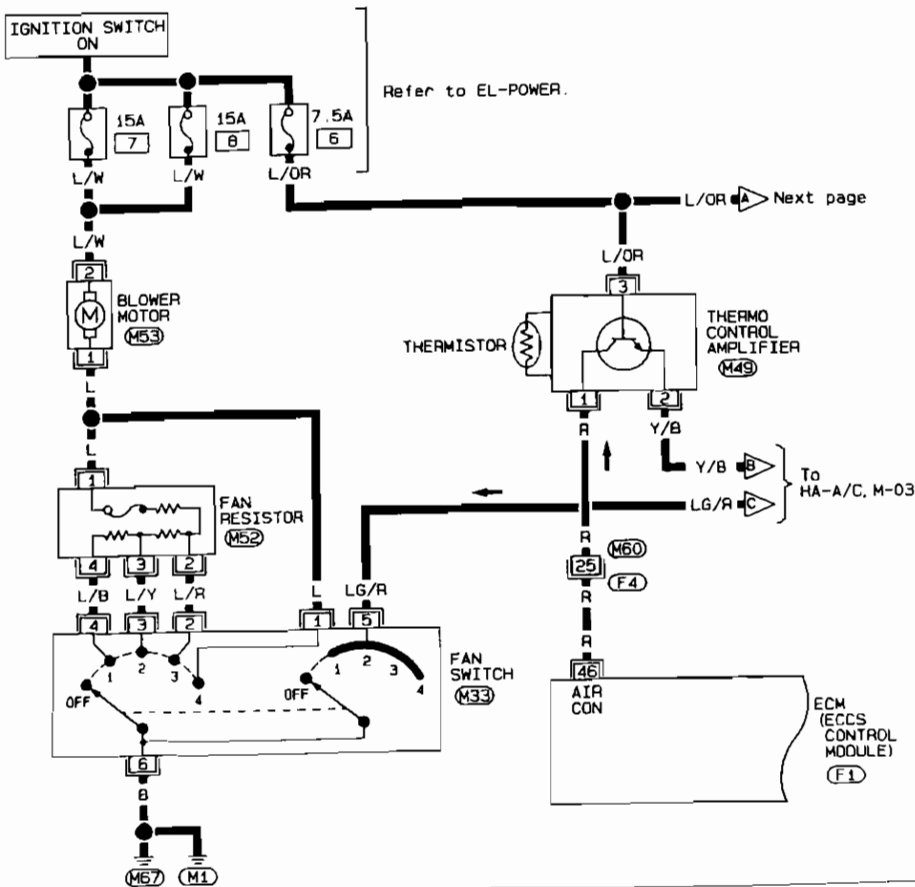


(L) LHO models  
 (R) AHO models  
 (\*) These switches are built into push control unit and mechanically linked to corresponding switches.

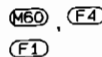
Wiring Diagram — A/C, M —

LHD MODEL

HA-A/C, M-01



Refer to last page (foldout page).



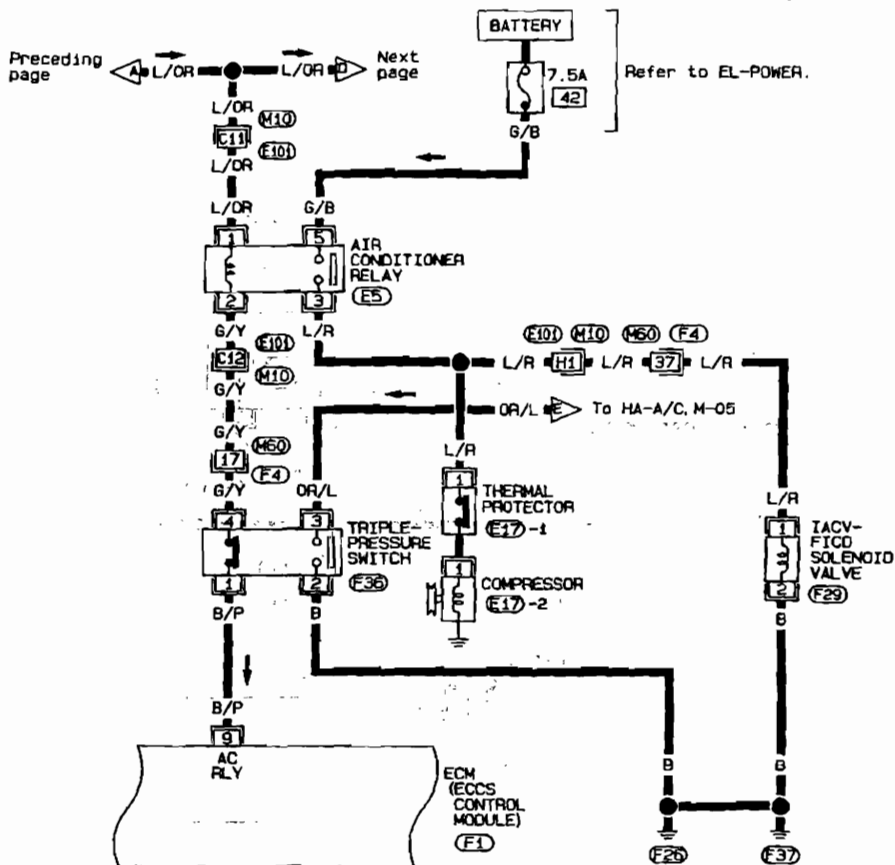
HA

81

100

## Wiring Diagram — A/C, M — (Cont'd)

HA-A/C, M-02

E5  
LE36  
BE29  
PUE17-1  
BE17-2  
WRefer to last page  
(Foldout page).

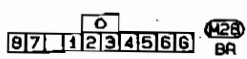
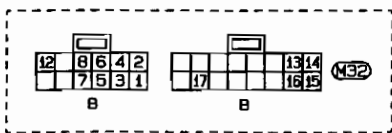
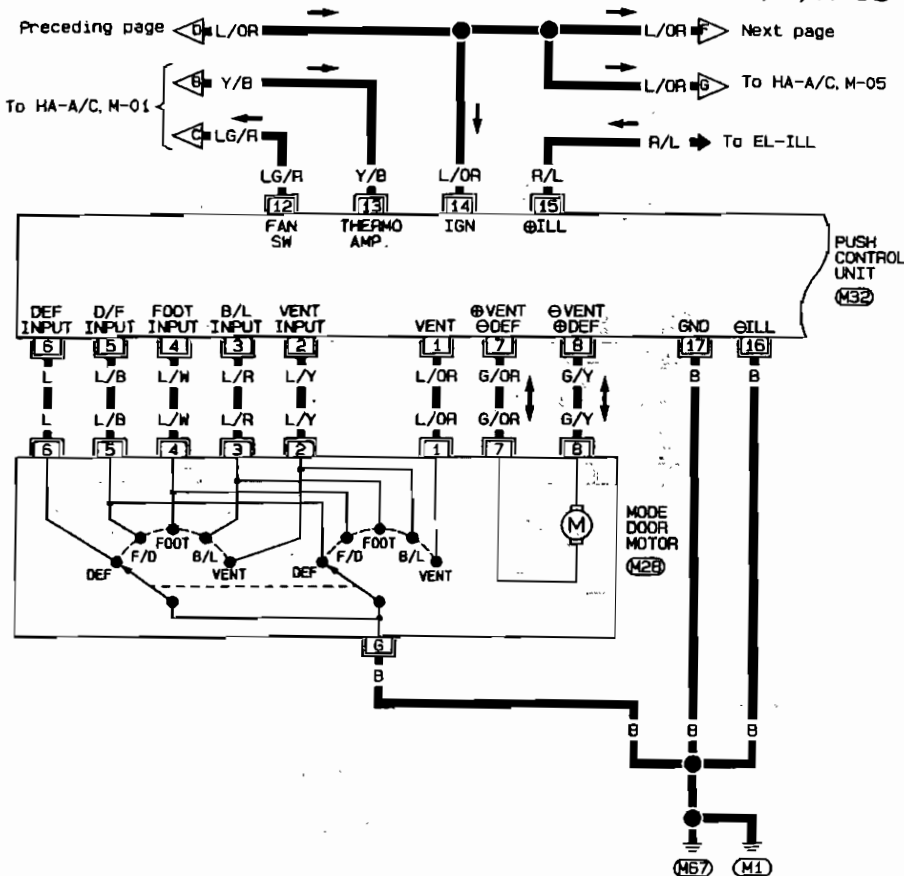
M10, E101

M60, F4

E1

Wiring Diagram — A/C, M — (Cont'd)

HA-A/C, M-03



GI  
MA  
EM  
LC  
EC  
FE  
CL  
MT  
AT  
PO  
FA  
RA  
BR  
ST  
RS  
BT  
HA  
EL  
FOX

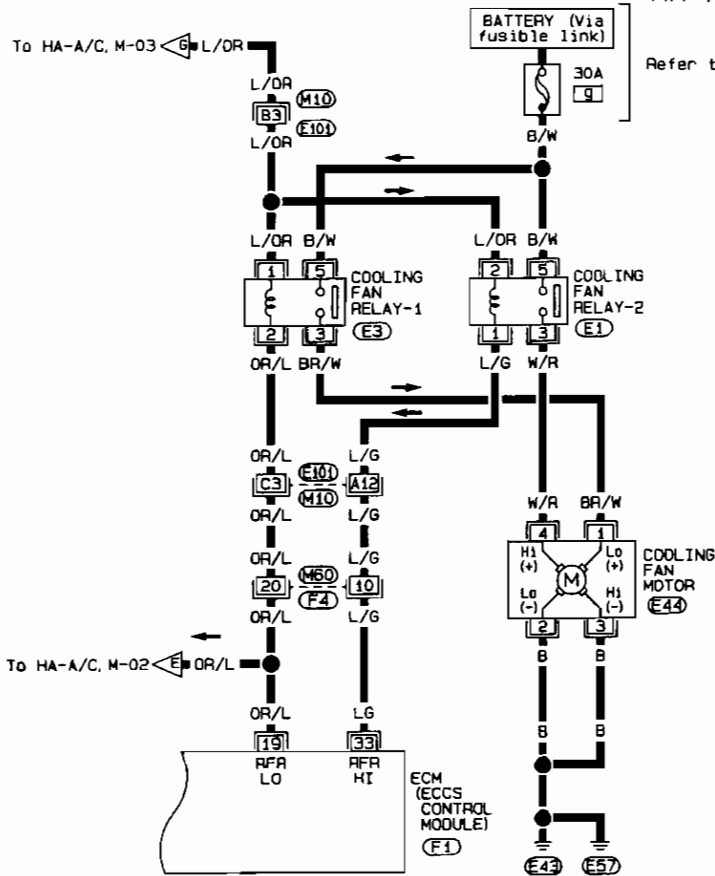




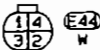
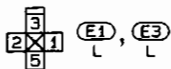
Wiring Diagram — A/C, M — (Cont'd)

HA-A/C, M-05

Refer to EL-POWER.



To HA-A/C, M-02



Refer to last page (Foldout page)

M10, E101

M60, F4

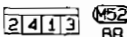
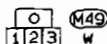
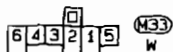
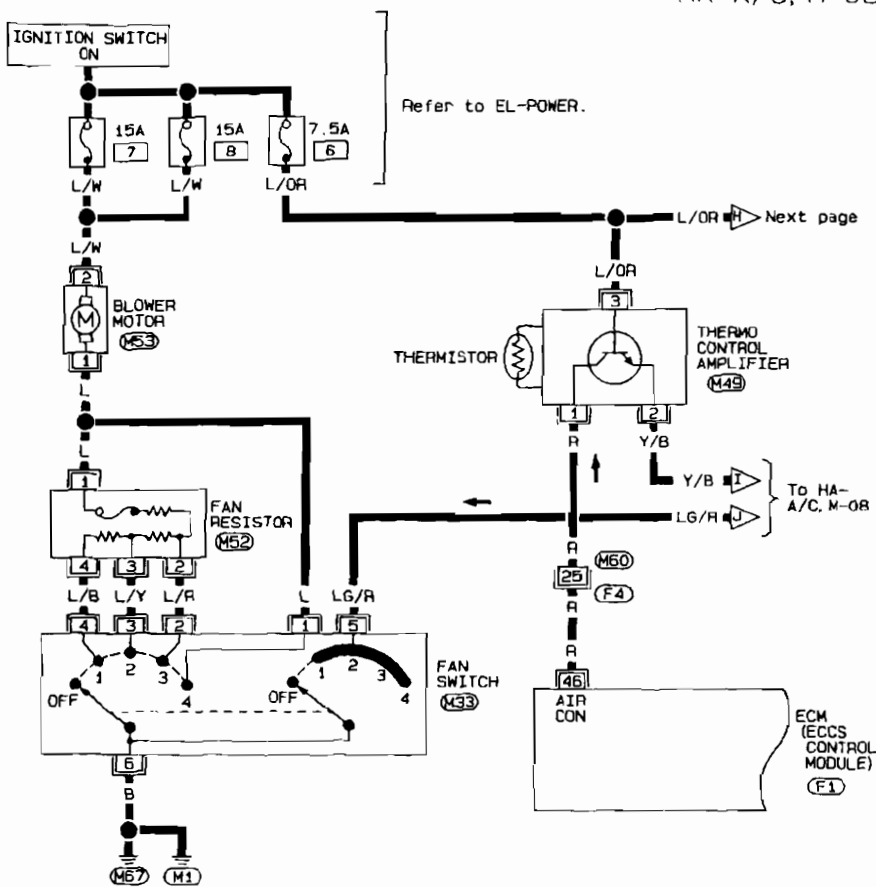
F1

HA

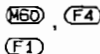
Wiring Diagram — A/C, M — (Cont'd)

RHD MODEL

HA-A/C, M-06

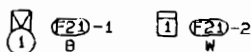
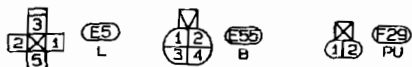
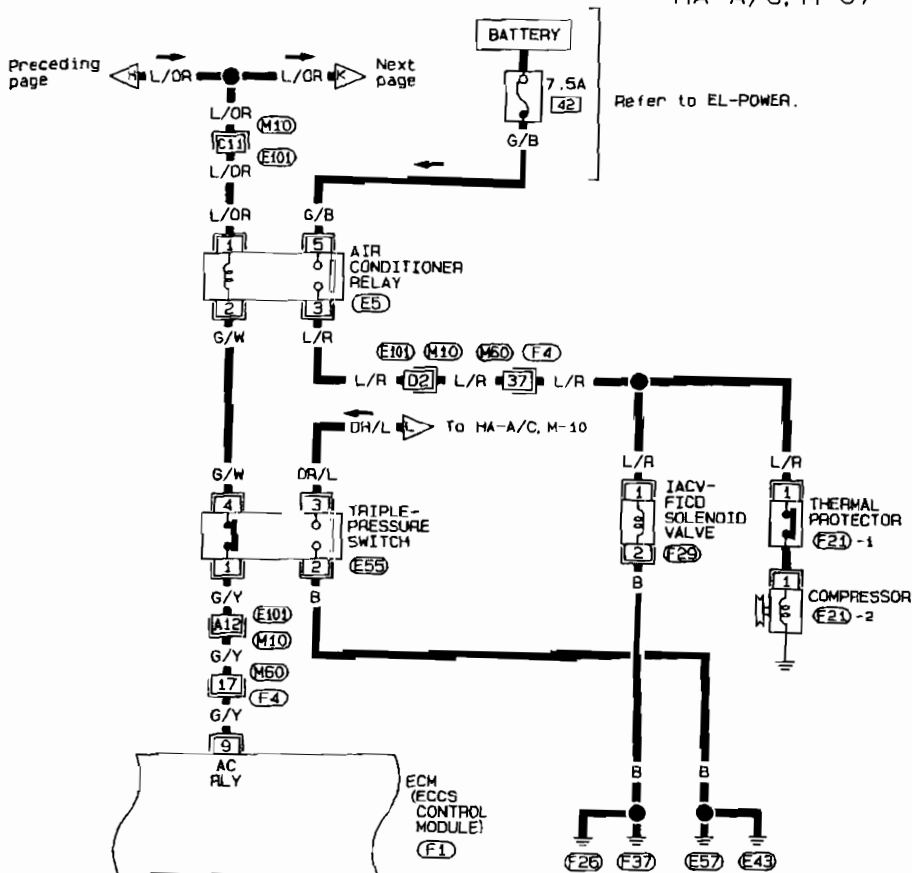


Refer to last page (Foldout page).



Wiring Diagram — A/C, M — (Cont'd)

HA-A/C, M-07



Refer to last page (Foldout page).

(M10, E101)

(M50, F4)

(F1)

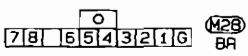
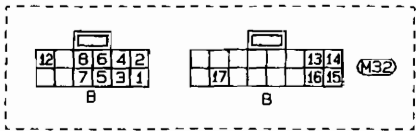
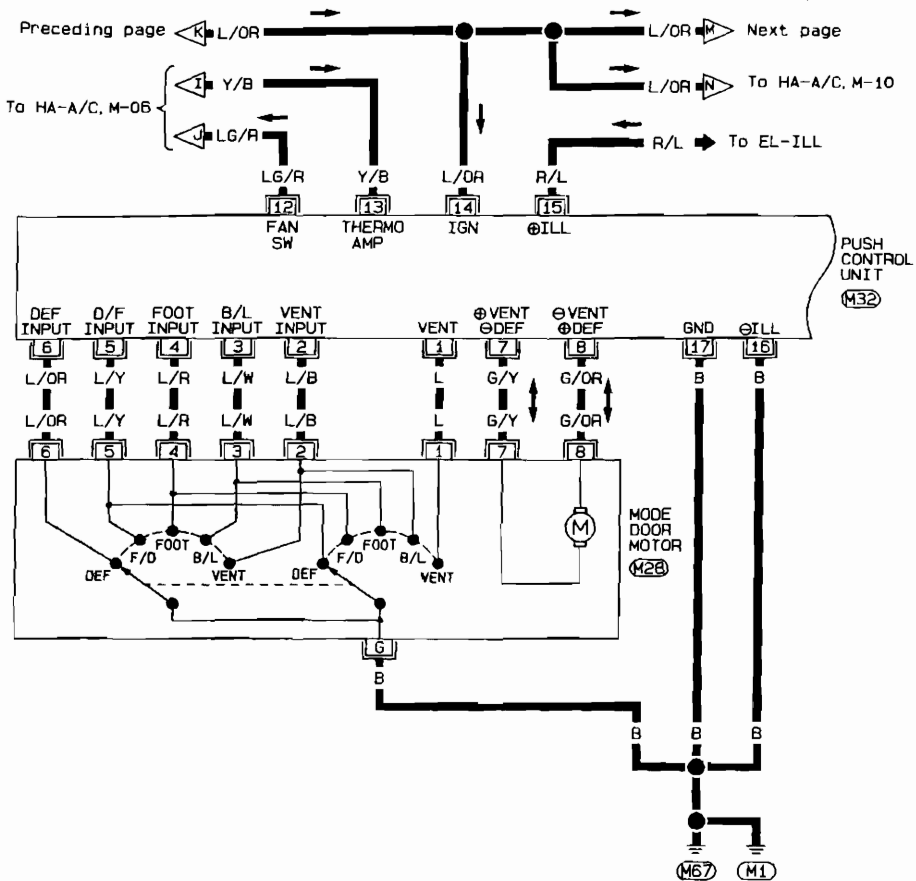
HA

E1

HA

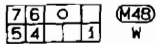
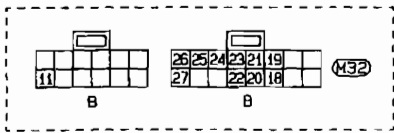
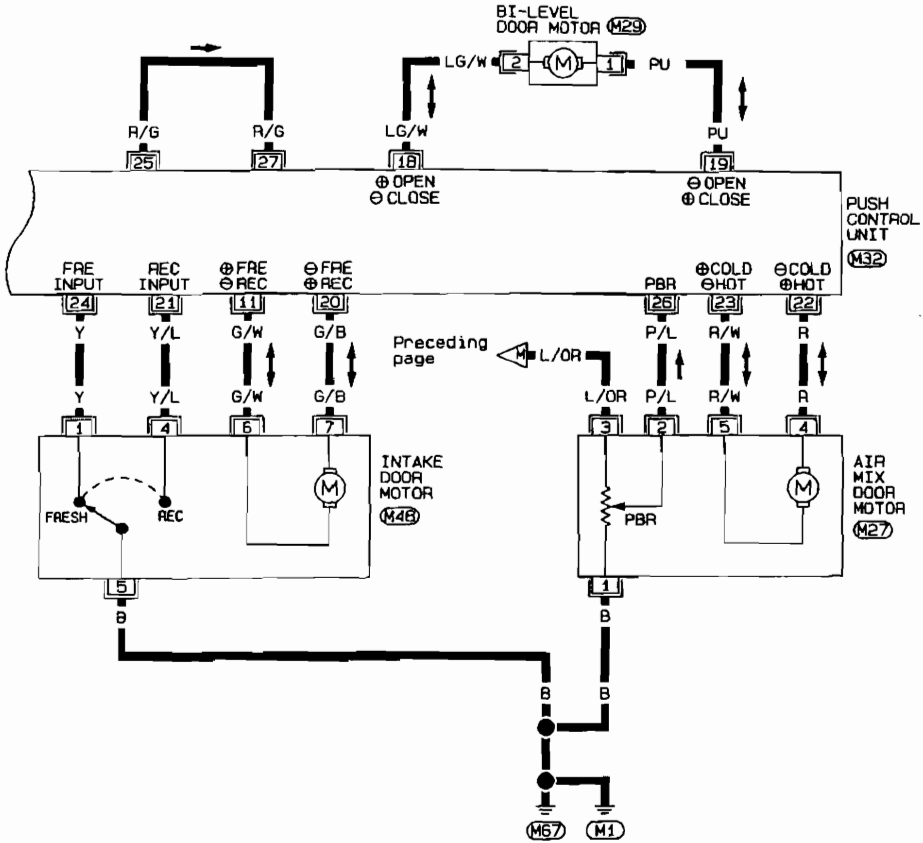
Wiring Diagram — A/C, M — (Cont'd)

HA-A/C, M-08



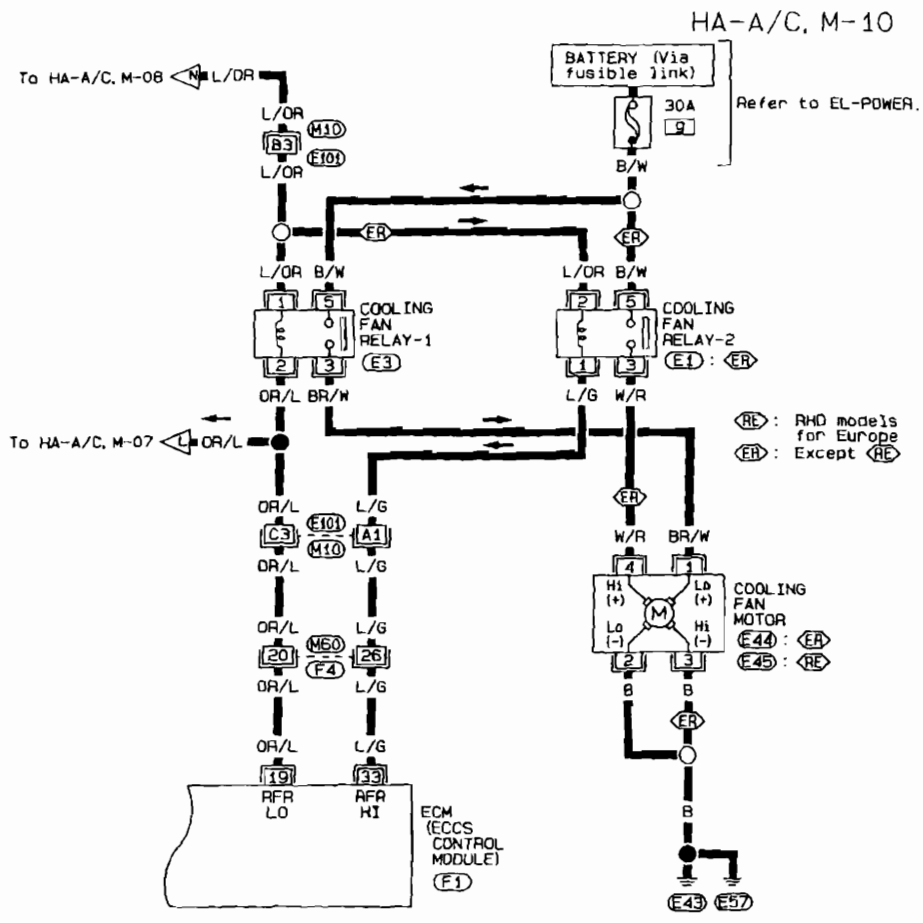
Wiring Diagram — A/C, M — (Cont'd)

HA-A/C, M-09

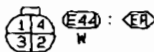


21  
 MA  
 FM  
 LC  
 EC  
 FE  
 CL  
 MT  
 AT  
 PD  
 FA  
 PA  
 BA  
 ST  
 AS  
 BT  
 HA  
 EL  
 FCX

## Wiring Diagram — A/C, M — (Cont'd)



(E1), (E3)  
L, L



(E44) : (ER)



(E45) : (RE)  
W

Refer to last page (Foldout page).

(M10), (E101)

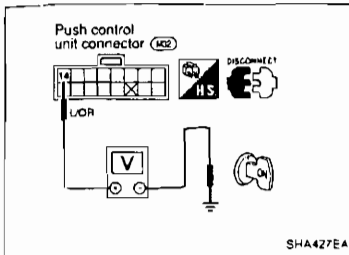
(M60), (F4)

(F1)

## Main Power Supply and Ground Circuit Check

## POWER SUPPLY CIRCUIT CHECK

Check power supply circuit for air conditioning system.  
Refer to EL section ("Wiring Diagram", "POWER SUPPLY ROUTING").



## PUSH CONTROL UNIT CHECK

Check power supply circuit for push control unit with ignition switch at ON.

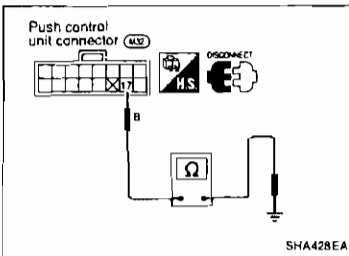
1. Disconnect push control unit harness connector.
2. Connect voltmeter from harness side.
3. Measure voltage across terminal No. ⑭ and body ground.

| Voltmeter terminal |             | Voltage    |
|--------------------|-------------|------------|
| ⊕                  | ⊖           |            |
| ⑭                  | Body ground | Approx 12V |

Check body ground circuit for push control unit.

1. Disconnect push control unit harness connector.
2. Connect ohmmeter from harness side
3. Check for continuity between terminal No ⑰ and body ground.

| Ohmmeter terminal |             | Continuity |
|-------------------|-------------|------------|
| ⊕                 | ⊖           |            |
| ⑰                 | Body ground | Yes        |



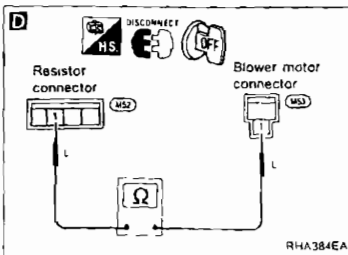
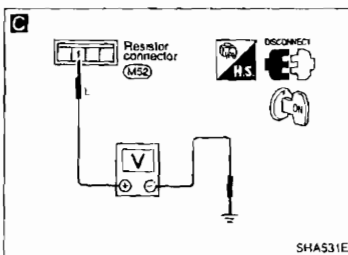
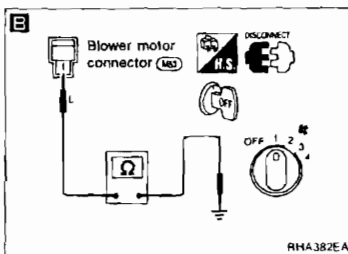
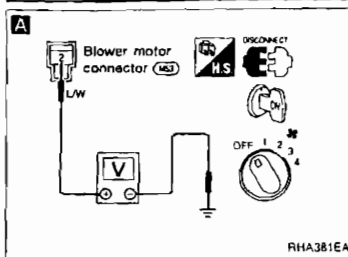


|   | INCIDENT                        | Flow chart No. |
|---|---------------------------------|----------------|
| 1 | Fan fails to rotate.            | ①              |
| 2 | Fan does not rotate at 1-speed. | ②              |
| 3 | Fan does not rotate at 2-speed. | ③              |
| 4 | Fan does not rotate at 3-speed. | ④              |
| 5 | Fan does not rotate at 4-speed. | ⑤              |

## Diagnostic Procedure 1

**SYMPTOM:** Blower motor does not rotate.

- Perform **PRELIMINARY CHECK 2** before referring to the following flow chart.



Check if blower motor rotates properly at each fan speed  
Conduct check as per flow chart at left

② ③ ④ ⑤  
(Go to next page)

**A**

①

**CHECK POWER SUPPLY FOR BLOWER MOTOR**  
Disconnect blower motor harness connector.  
Do approx. 12 volts exist between blower motor harness terminal No. ② and body ground?

No

Check 15A fuses at fuse block.  
Refer to EL section ("Wiring Diagram", "POWER SUPPLY ROUTING").

Yes

**B**

Check circuit continuity between blower motor harness terminal No. ① and body ground.

OK

**CHECK BLOWER MOTOR**  
(Refer to HA-58)

NG

Reconnect blower motor harness connector  
Disconnect resistor harness connector

Replace blower motor

**C**

**CHECK BLOWER MOTOR CIRCUIT BETWEEN BLOWER MOTOR AND RESISTOR**  
Do approx. 12 volts exist between resistor harness terminal No. ① and body ground?

No

Disconnect blower motor harness connectors

**D** Note

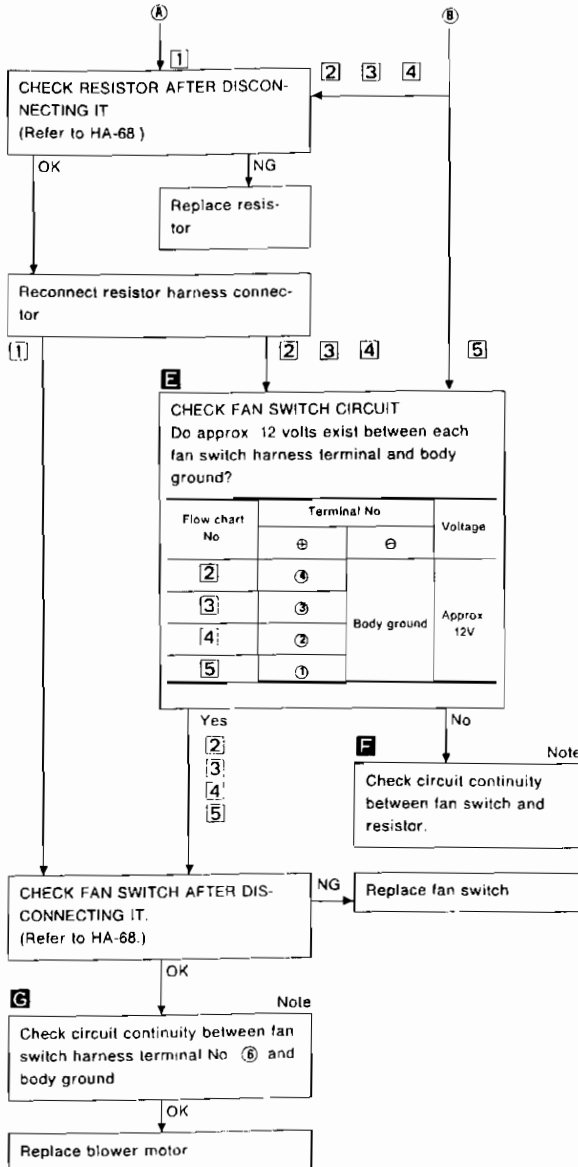
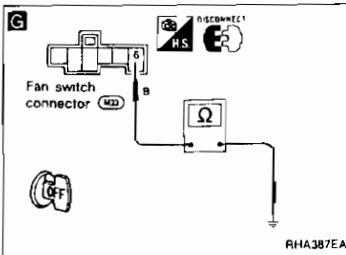
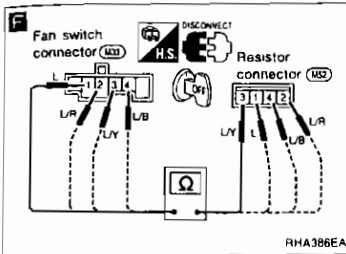
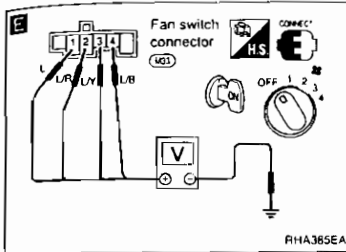
Check circuit continuity between blower motor harness terminal No. ① and resistor harness terminal No. ①.

Yes

④  
(Go to next page)

**Note:**  
If the result is NG after checking circuit continuity, repair harness or connector.

## Diagnostic Procedure 1 (Cont'd)



## Note:

If the result is NG after checking circuit continuity, repair harness or connector.



Diagnostic Procedure 2 (Cont'd)

A

Reconnect push control unit and mode door motor harness connectors

D

CHECK FOR OUTPUT OF PUSH CONTROL UNIT

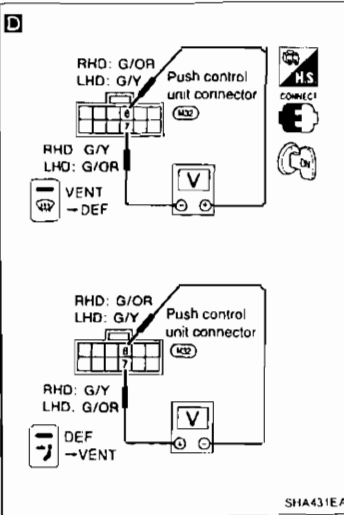
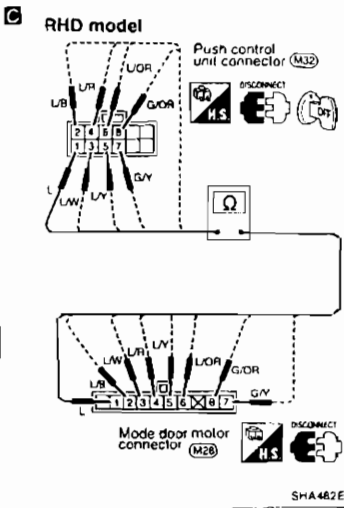
Change the mode from VENT to DEF, or from DEF to VENT. Do approx. 12 volts exist between push control unit harness terminals ⑦ and ⑧ in both cases?

No → Replace push control unit

| Terminal No | Mode switch operation | Voltage    |
|-------------|-----------------------|------------|
| ⑦ ⑧         | Each side             | Stop       |
| ④ ⑤         | VENT → DEF            | Approx 12V |
| ⑥ ⑥         | DEF → VENT            |            |

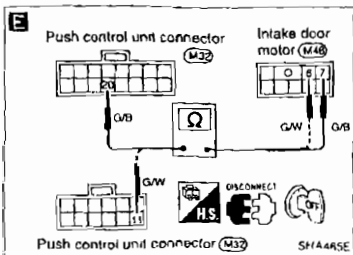
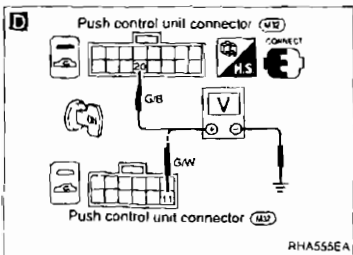
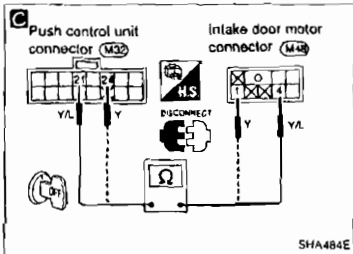
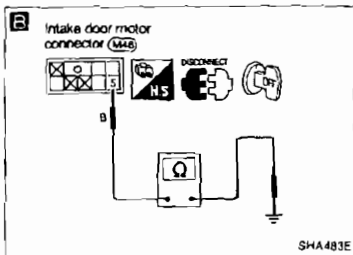
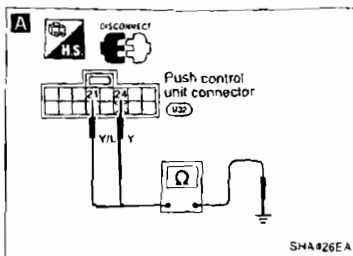
Yes

Replace mode door motor



97  
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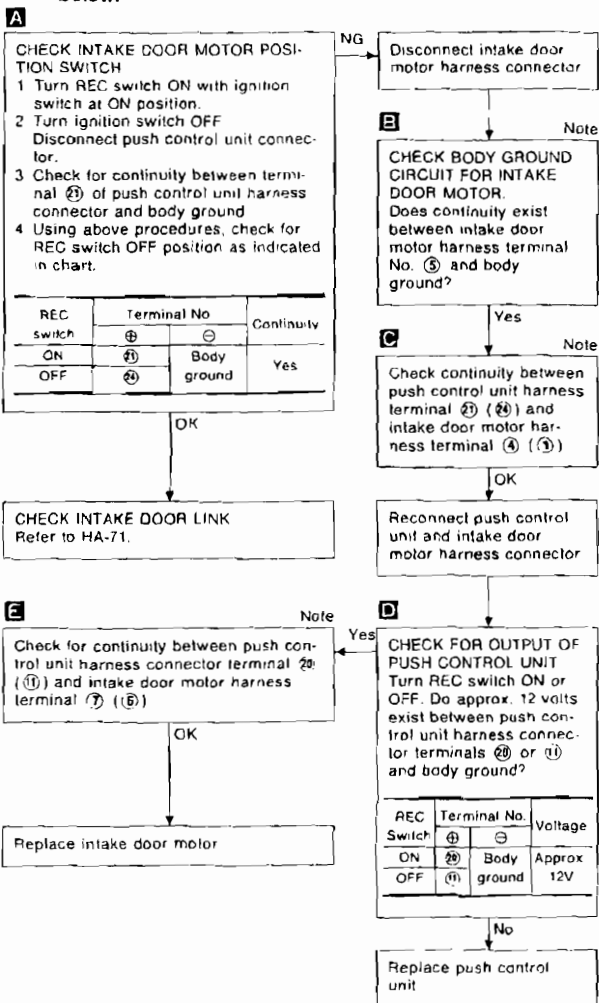
HA



## Diagnostic Procedure 3

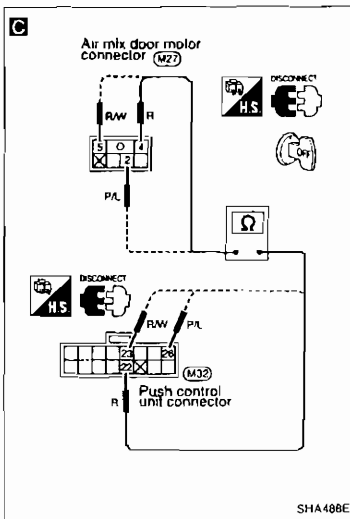
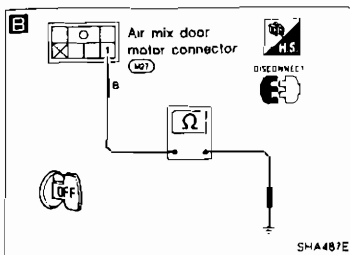
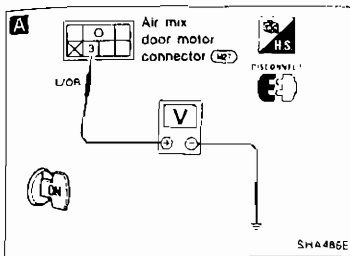
**SYMPTOM:** Intake door does not change in VENT, B/L or FOOT mode.

- Perform PRELIMINARY CHECK 1, then Main Power Supply and Ground Circuit Check before referring to the flow chart below.



## Note:

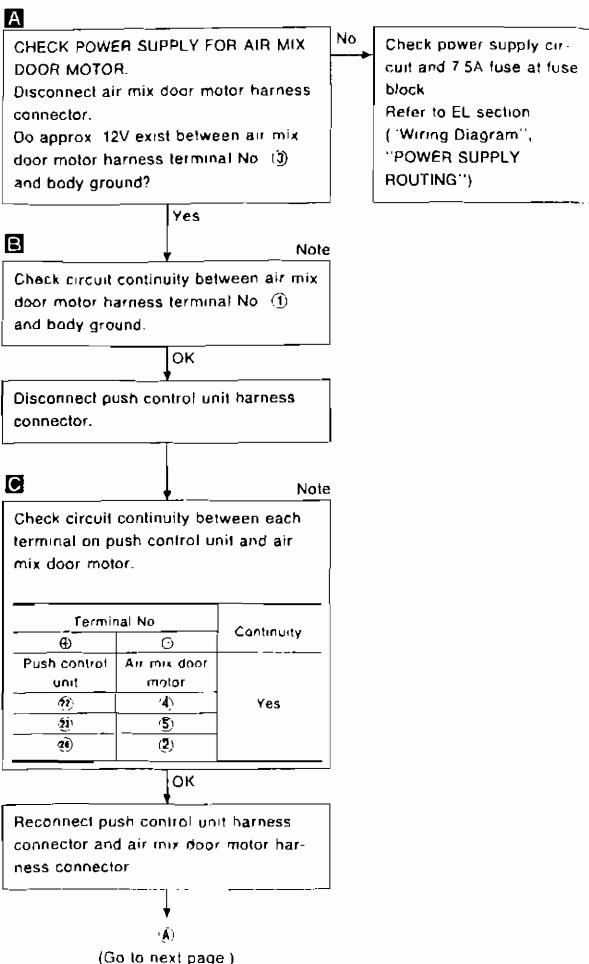
If the result is NG after checking circuit continuity, repair harness or connector.



## Diagnostic Procedure 4

**SYMPTOM:** Air mix door does not change.

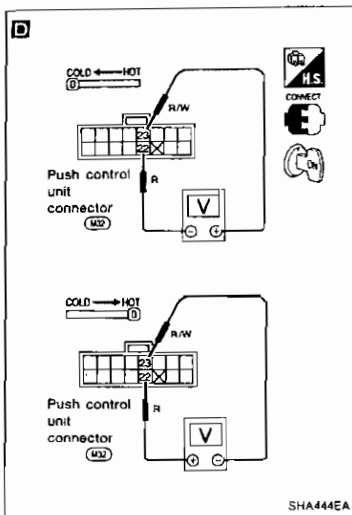
Perform **PRELIMINARY CHECK 2**, then **Main Power Supply and Ground Circuit Check** before referring to the flow chart below.



**Note:**

If the result is NG after checking circuit continuity, repair harness or connector.

## Diagnostic Procedure 4 (Cont'd)

**D**

## CHECK FOR PUSH CONTROL UNIT OUTPUT.

Slide the temperature control lever from HOT to COLD and COLD to HOT. Do approx. 12 volts exist between push control unit harness terminals ② and ② in both cases?

| Terminal No. |   | Temp control lever operation | Voltage    |
|--------------|---|------------------------------|------------|
| ②            | ② | HOT → COLD                   | Approx 12V |
| ⊖            | ⊕ | COLD → HOT                   |            |
| ①            | ⊖ |                              | Approx 0V  |
| Each side    |   | STOP                         | Approx 0V  |

No

Replace push control unit

Yes

CHECK FOR PBR RESISTANCE IN AIR MIX DOOR MOTOR  
Refer to HA-70

NG

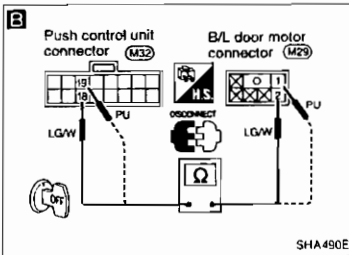
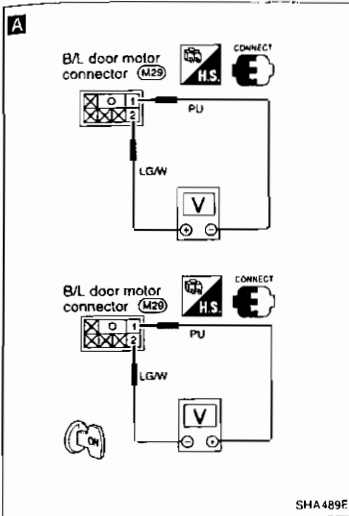
Replace air mix door motor.

OK

CHECK AIR MIX DOOR LINK.  
(Refer to HA-71)

## Diagnostic Procedure 5

SYMPTOM: BI-level (B/L) door does not operate.



**A**

CHECK POWER SUPPLY FOR B/L DOOR MOTOR

Turn B/L switch ON and OFF

Do approx. 12 volts exist between B/L door motor harness terminals ① and ② in both cases?

| Terminal No |   | B/L switch | B/L door operation | Voltage    |
|-------------|---|------------|--------------------|------------|
| ②           | ① |            |                    |            |
| ⊕           | ⊖ | ON         | Open               | Approx 12V |
| ⊖           | ⊕ | OFF        | Close              |            |

Yes

CHECK B/L DOOR LINK. Refer to HA-71.

Note:

If the result is NG after checking circuit continuity, repair harness or connector.

No

Disconnect push control unit connector

**B** Note

Check circuit continuity between B/L door motor harness terminal No ② (①) and push control unit harness terminal No 16 (16).

OK

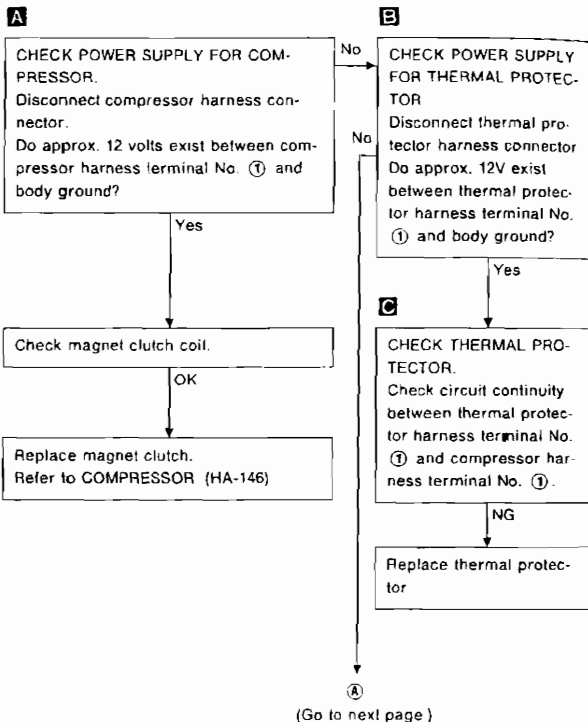
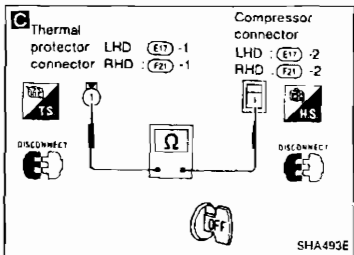
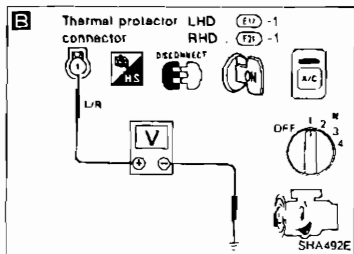
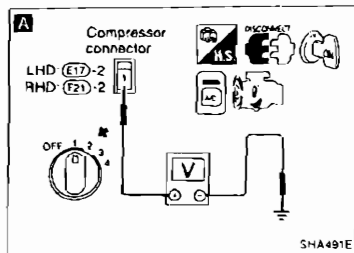
Replace push control unit.



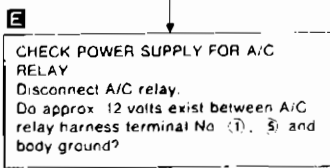
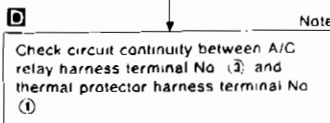
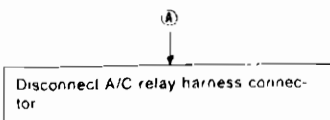
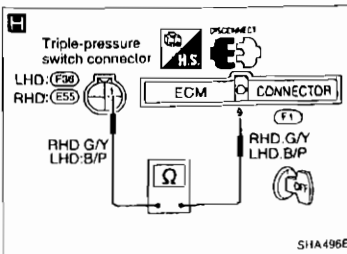
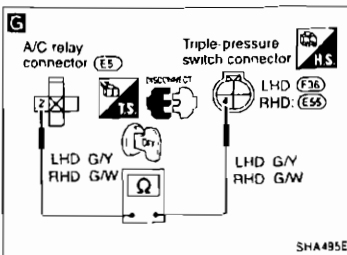
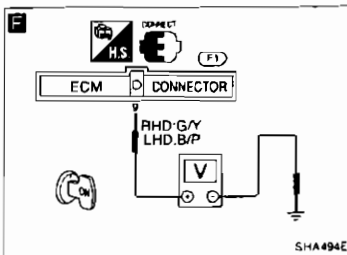
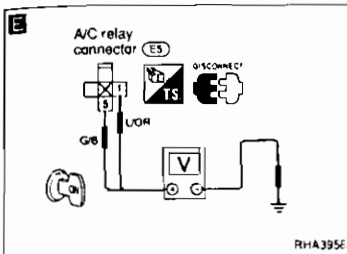
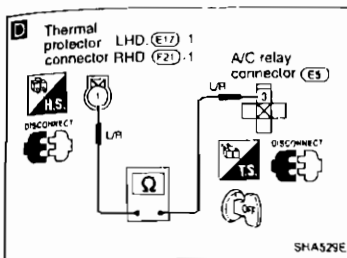
## Diagnostic Procedure 6

**SYMPTOM:** Magnet clutch does not operate when A/C switch and fan switch are ON.

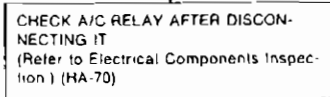
- Perform **PRELIMINARY CHECK 2** before referring to the following flow chart.



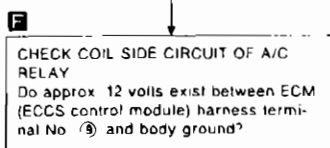
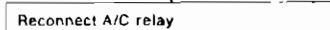
## Diagnostic Procedure 6 (Cont'd)



**CHECK POWER SUPPLY CIRCUIT AND 7.5A FUSES AT FUSE BLOCK** (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram)



Replace A/C relay



**Note**

Check circuit continuity between A/C relay harness terminal No. (2) and triple-pressure switch harness terminal No. (4)

OK

(Go to next page)

**Note**

Check circuit continuity between triple-pressure switch harness terminal No. (1) and ECM (ECCS control module) harness terminal No. (2).

[For terminal arrangement, refer to last page (Foldout page)]

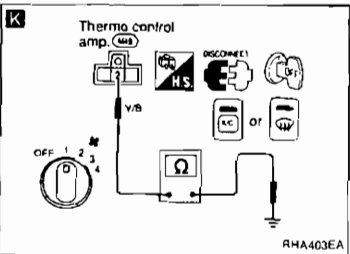
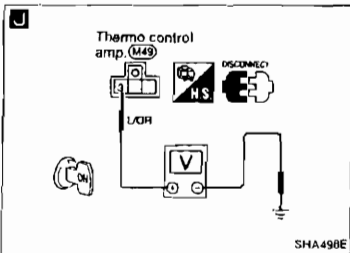
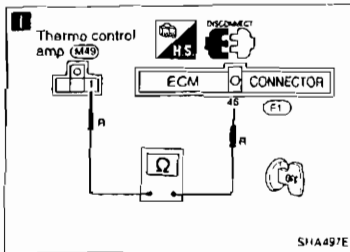
OK

**CHECK TRIPLE PRESSURE SWITCH**

Refer to HA-69

**Note:**  
If the result is NG after checking circuit continuity, repair harness or connector.

## Diagnostic Procedure 6 (Cont'd)



(8)  
Disconnect thermo control amp. harness connector

**I** Note  
Check circuit continuity between thermo control amp harness terminal No. (1) and ECM (ECCS control module) harness terminal No. (48)

OK  
**J** CHECK POWER SUPPLY FOR THERMO CONTROL AMP  
Disconnect thermo control amp harness connector  
Do approx. 12 volts exist between thermo control amp harness terminal No. (3) and body ground?

No  
Check 7.5A fuse at fuse block  
Refer to EL section ("Wiring Diagram", "POWER SUPPLY ROUTING")

Yes  
**K** CHECK BODY GROUND CIRCUIT FOR THERMO CONTROL AMP  
Turn A/C switch or DEF switch ON  
Check for continuity between thermo control amp harness terminal (2) and body ground

NG  
Disconnect push control unit harness connector.

(Go to next page)

OK  
CHECK THERMO CONTROL AMP.  
Refer to HA-68

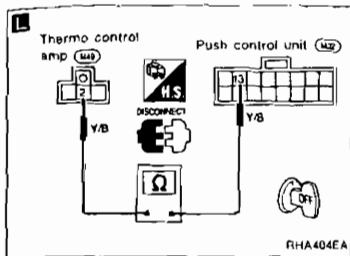
NG  
Replace thermo control amp

OK  
Check voltage between ECM (ECCS control module) harness terminals (9), (46) and body ground  
Refer to EC section ("ECM Terminals and Reference Valve", "TROUBLE DIAGNOSES - General Description")

**Note:**

If the result is NG after checking circuit continuity, repair harness or connector.

## Diagnostic Procedure 6 (Cont'd)



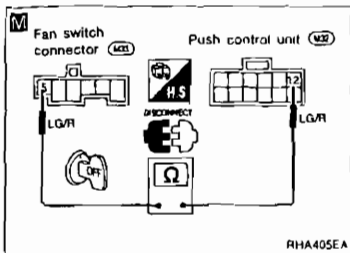
**L** Note

Check circuit continuity between thermo control amp harness terminal No. ② and push control unit harness terminal No. ⑩.

OK

Disconnect fan switch harness connector.

OK



**M** Note

Check circuit continuity between push control unit terminal No. ⑩ and fan switch harness terminal No. ②.

OK

**N** Note

CHECK BODY GROUND CIRCUIT FOR FAN SWITCH.  
Check for continuity between fan switch harness terminal ⑥ and body ground.

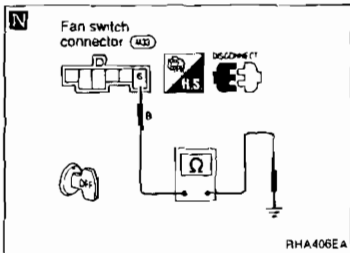
OK

CHECK FAN SWITCH.  
(Refer to HA-68.)

NG → Replace fan switch

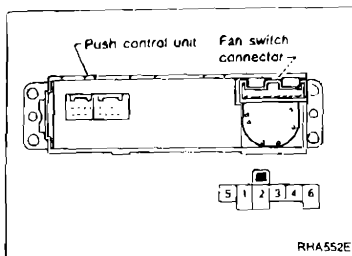
OK

Replace push control unit.

**Note:**

If the result is NG after checking circuit continuity, repair harness or connector.

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FD

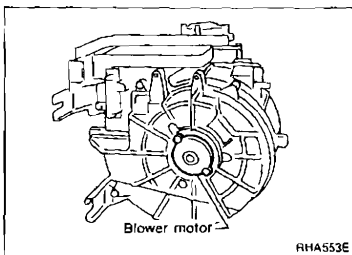


## Electrical Components Inspection

### FAN SWITCH

Check continuity between terminals at each position

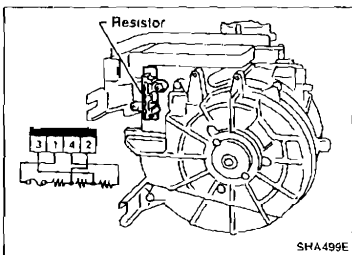
| POSITION | TERMINAL        |
|----------|-----------------|
| OFF      |                 |
| 1        | (4) - (5) - (6) |
| 2        | (3) - (5) - (6) |
| 3        | (2) - (5) - (6) |
| 4        | (1) - (5) - (6) |



### BLOWER MOTOR

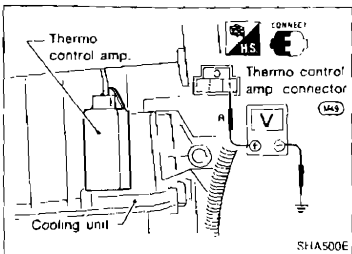
Check blower motor for smooth rotation.

- Ensure that there are no foreign particles inside the intake unit.



### BLOWER RESISTOR

Check continuity between terminals



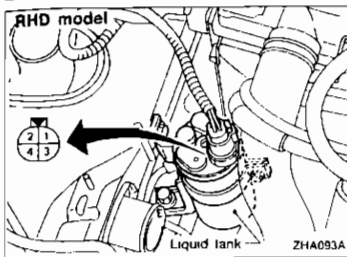
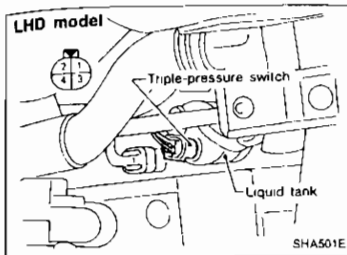
### THERMO CONTROL AMP.

1. Run engine, and operate A/C system.
2. Connect the voltmeter from harness side.
3. Check thermo control amp. operation shown in the table.

| Evaporator outlet air temperature<br>C (°F) | Thermo amp<br>operation | Tester     |
|---|-------------------------|------------|
| Decreasing to 2.5 - 3.5 (37 - 38)           | Turn OFF                | Approx 12V |
| Increasing to 1 - 2 (34 - 36)               | Turn ON                 | Approx 0V  |

## Electrical Components Inspection (Cont'd)

### TRIPLE-PRESSURE SWITCH



#### LHD model

|                       | Terminals | High-pressure side line pressure<br>kPa (bar, kg/cm <sup>2</sup> , psi)     | Operation | Continuity     |
|-----------------------|-----------|---|-----------|----------------|
| Low-pressure side     | ① - ④     | Increasing to<br>157 - 226 (1.57 - 2.26,<br>1.6 - 2.3, 23 - 33)             | ON        | Exist          |
|                       |           | Decreasing to<br>152.0 - 201.0 (1 520 - 2 010,<br>1.55 - 2.05, 22.0 - 29.2) | OFF       | Does not exist |
| Medium-pressure side* | ② - ③     | Increasing to<br>1,422 - 1,618 (14.22 - 16.18,<br>14.5 - 16.5, 206 - 235)   | ON        | Exist          |
|                       |           | Decreasing to<br>1,128 - 1,422 (11.28 - 14.22,<br>11.5 - 14.5, 164 - 206)   | OFF       | Does not exist |
| High-pressure side    | ① - ④     | Increasing to<br>1,687 - 2,059 (16.7 - 20.6,<br>17 - 21, 242 - 299)         | ON        | Exist          |
|                       |           | Decreasing to<br>2,452 - 2,844 (24.5 - 28.4,<br>25 - 29, 356 - 412)         | OFF       | Does not exist |

\* For cooling fan motor operation.

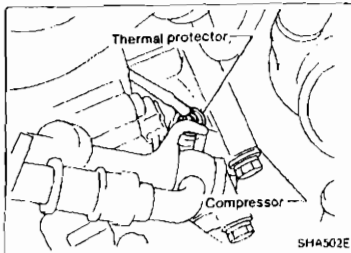
#### RHD model

|                       | Terminals | High-pressure side line pressure<br>kPa (bar, kg/cm <sup>2</sup> , psi)     | Operation | Continuity     |
|-----------------------|-----------|---|-----------|----------------|
| Low-pressure side     | ① - ④     | Increasing to<br>157 - 216 (1.57 - 2.16,<br>1.6 - 2.2, 23 - 31)             | ON        | Exists         |
|                       |           | Decreasing to<br>152.0 - 201.0 (1 520 - 2 010,<br>1.55 - 2.05, 22.0 - 29.2) | OFF       | Does not exist |
| Medium-pressure side* | ② - ③     | Increasing to<br>1,442 - 1,697 (14.42 - 16.97,<br>14.7 - 17.3, 209 - 246)   | ON        | Exists         |
|                       |           | Decreasing to<br>1,128 - 1,422 (11.28 - 14.22,<br>11.5 - 14.5, 164 - 206)   | OFF       | Does not exist |
| High-pressure side    | ① - ④     | Decreasing to<br>1,275 - 1,667 (12.7 - 16.7,<br>13 - 17, 185 - 242)         | ON        | Exists         |
|                       |           | Increasing to<br>2,452 - 2,844 (24.5 - 28.4,<br>25 - 29, 356 - 412)         | OFF       | Does not exist |

\* For cooling fan motor operation.

## Electrical Components Inspection (Cont'd)

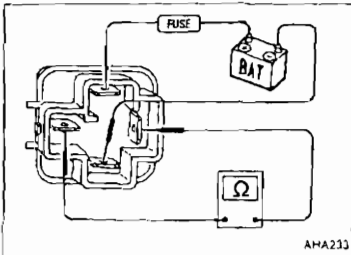
## THERMAL PROTECTOR



| Temperature of compressor<br>°C (°F)       | Operation |
|--|-----------|
| Increasing to approx 145 - 155 (293 - 311) | Turn OFF  |
| Decreasing to approx 130 - 140 (266 - 284) | Turn ON   |

## A/C RELAY

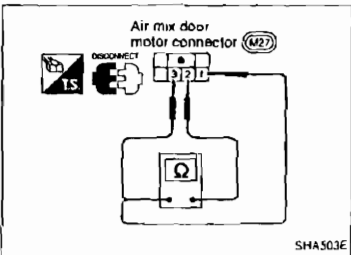
Check circuit continuity between terminals by supplying 12 volts to coil side terminals of the relay.



## AIR MIX DOOR MOTOR

Check for PBR resistance.

1. Turn ignition switch ON and temperature control lever to FULL HOT position.
2. Turn ignition switch OFF.
3. Disconnect air mix door motor connector
4. Check for resistance between air mix door motor harness terminal ③ and ②.
5. Using above procedures, check for each terminal as indicated in chart below

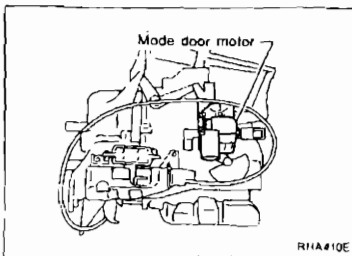


| Terminal No. | Temp control lever position | Resistance |              |
|--------------|-----------------------------|------------|--------------|
| ③            | ②                           | FULL HOT   | Approx. 0Ω   |
| ③            | ②                           | FULL COLD  | Approx. 3 kΩ |
| ①            | ②                           | FULL HOT   | Approx. 3 kΩ |
| ①            | ②                           | FULL COLD  | Approx. 0Ω   |

## Control Linkage Adjustment

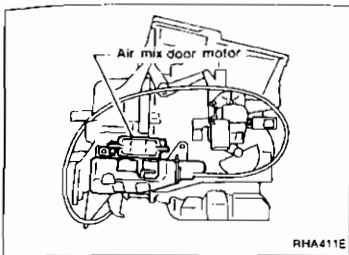
## MODE DOOR

1. Install mode door motor on heater unit and connect it to main harness.
2. Turn ignition switch to ON
3. Turn VENT switch ON.
4. Turn DEF switch ON. Check that side link operates at the fully-open position. Also turn DEF switch ON to check that side link operates at the fully-open position.



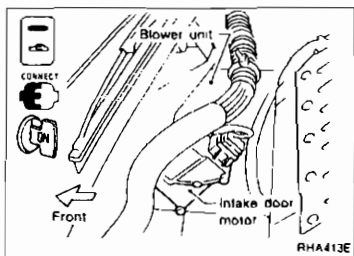
## Control Linkage Adjustment (Cont'd)

## AIR MIX DOOR



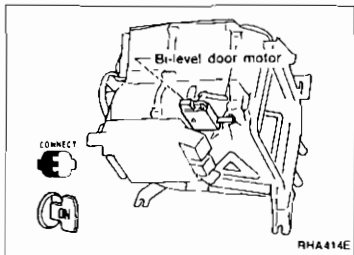
1. Move air mix door link by hand and hold air mix door in full cold position
2. Install air mix door motor on heater unit and connect sub-harness.
3. Turn ignition switch to ON.
4. Slide temperature control lever to full cold.
5. Attach air mix door motor rod to air mix door link rod holder.
6. Check that air mix door operates properly when temperature control lever is slid to full hot and full cold.
7. Slide temperature control lever to full cold.


## INTAKE DOOR



1. Connect intake door motor harness connector before installing intake door motor.
2. Turn ignition switch to ON.
3. Turn REC switch ON.
4. Install intake door motor on intake unit
5. Set intake door rod in REC position and fasten door rod to holder.
6. Check that intake door operates properly when REC switch is turned ON and OFF.

## BI-LEVEL (B/L) DOOR



1. Connect B/L door motor harness connector before installing B/L door motor
2. Turn ignition switch to ON.
3. Install B/L door motor on heater unit.
4. Check that B/L door operates properly when bi-level switch  is turned ON and OFF.

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## Introduction

The Automatic Temperature Control (ATC) system provides automatic regulation of the vehicle's interior temperature. The operator selects "set temperature", on which the regulation is based, regardless of the outside temperature changes. This is done by utilizing a microcomputer, also referred to as the automatic amplifier (auto amp.), which receives input signals from several sensors. The automatic amplifier uses these input signals (including the set temperature) to automatically control the ATC system's outlet air volume, air temperature, and air distribution.

## Features

### Air mix door control (Automatic temperature control)

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

Blower speed is automatically controlled based on temperature setting, ambient temperature, in-vehicle 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

The intake doors are automatically controlled by: The temperature setting, ambient temperature, in-vehicle temperature and amount of sunload.

### Mode door control

The mode doors (defroster door, ventilator door and foot door) are automatically controlled by: The temperature setting, ambient temperature, in-vehicle temperature and amount of sunload.

### Bi-level door control

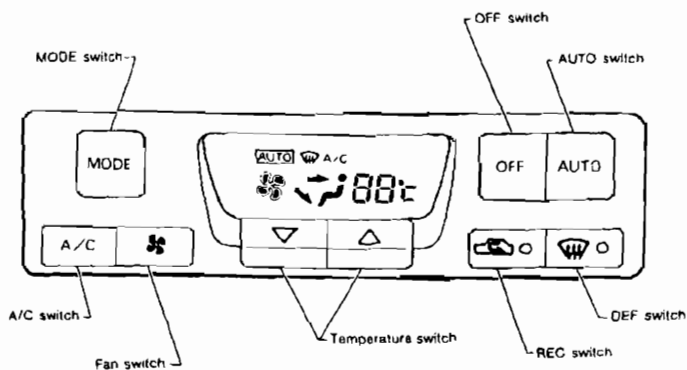
The bi-level door is opened to increase amount of air discharge when the air discharge outlet is set at bi-level position. The bi-level door is also opened when the fan speed is high and the set temperature is at 18°C.

Except during the above conditions, the bi-level door is closed.

### Self-diagnostic system

The self-diagnostic system is built into the automatic amplifier to quickly locate the cause of problems.

## Control Operation

**AUTO SWITCH**

The compressor, air intake doors, air mix door, mode doors, and blower speed are automatically controlled so that the in-vehicle temperature will reach, and be maintained at the set temperature. **The air conditioning cooling function operates only when the engine is running.**

**A/C SWITCH**

Manual control of the compressor operation. When the A/C mark appears on the display screen, compressor operation is being carried out.

**TEMPERATURE SWITCH**





Increases or decreases the set temperature.

**OFF SWITCH**

The compressor and blower are off, the air intake doors are set to the outside air position. Then, the mode doors are set to the foot (80% foot and 20% defrost) position. In the off position the A/C system uses the vehicle's "flow through" ventilation. It tries to maintain the interior temperature based on the last set temperature of the system.





**FAN SWITCH**

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 

**MODE SWITCH**

Manual control of the air discharge outlets. Four selections are available (as shown on the display screen):

face , bi-level , foot , defrost/foot 

**Control Operation (Cont'd)****REC SWITCH**

ON position: Interior air is recirculated inside the vehicle.

OFF position: Automatic control resumes.

RECIRC is canceled when DEF is selected. RECIRC resumes when another mode is chosen.

**DEF SWITCH**

Positions the mode doors to the defrost position. Also positions the air intake doors to the outside air position. With DEF switch ON, the compressor operates.

NOTE

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**Diagnostic Procedure 9**  
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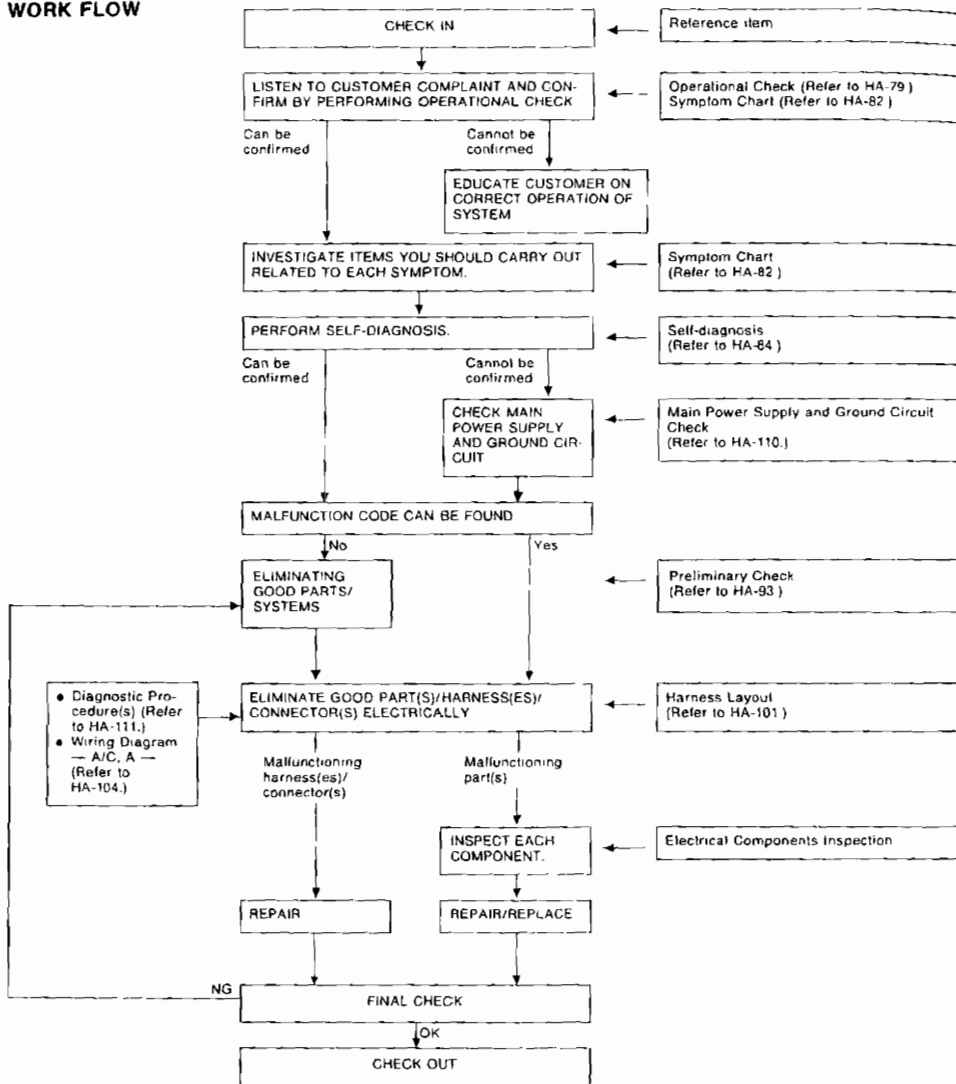
**Diagnostic Procedure 10**  
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## How to Perform Trouble Diagnoses for Quick and Accurate Repair

### WORK FLOW



## Operational Check



The purpose of the operational check is to confirm that the system is as it should be. The systems which will be checked are the blower, mode (discharge air), intake air, temperature decrease, temperature increase, A/C switch and the memory function.

### CONDITIONS:

- Engine running and at normal operating temperature.

### PROCEDURE:

#### 1. Check blower

- 1) Press fan switch one time.  
Blower should operate on low speed.  
The fan symbol should have one blade lit .
- 2) Press fan switch one more time.
- 3) Continue checking blower speed and fan symbol until all speeds are checked.
- 4) Leave blower on MAX speed .

#### 2. Check discharge air.

- 1) Press mode switch four times and DEF switch one time.  
When DEF switch is ON, DEF indicator should illuminate.

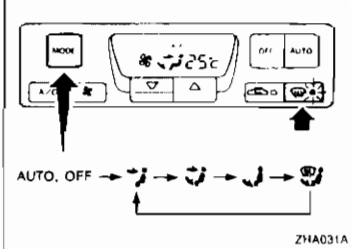
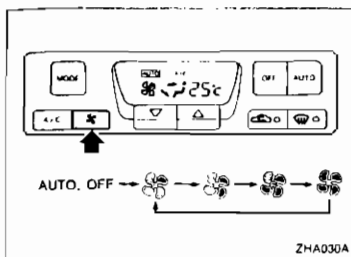
- 2) Confirm that discharge air comes out according to the air distribution table at left.

Refer to "Discharge Air Flow", "DESCRIPTION" (HA-12).






#### NOTE:

Confirm that the compressor clutch is engaged (visual inspection) and intake door position is at FRESH when the DEF switch is pressed.

Intake door position is checked in the next step.




#### Discharge air flow

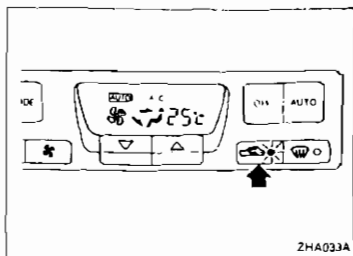
| Switch mode/<br>indicator  | Air outlet/distribution |      |           |
|--|-------------------------|------|-----------|
|  | Face                    | Foot | Defroster |
|  | 100%                    | —    | —         |
|  | 60%                     | 40%  | —         |
|  | —                       | 80%  | 20%       |
|  | —                       | 60%  | 40%       |
|  | —                       | —    | 100%      |

RHA429EA

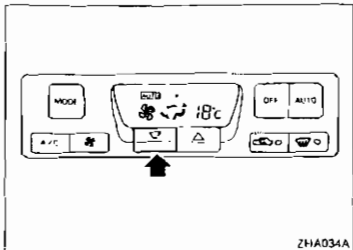


**Operational Check (Cont'd)****3. Check recirc**

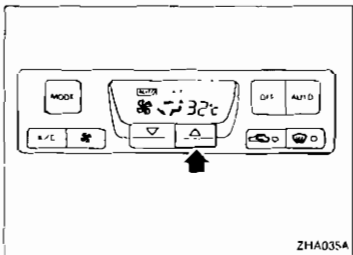
- 1) Press REC  switch  
Recirc indicator should illuminate.
- 2) Listen for intake door position change (you should hear blower sound change slightly).

**4. Check temperature decrease**

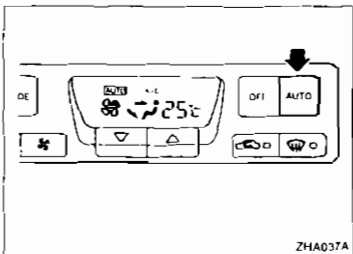
- 1) Press the temperature switch (COLD) until 18°C is displayed.
- 2) Check for cold air at discharge air outlets.

**5. Check temperature increase**

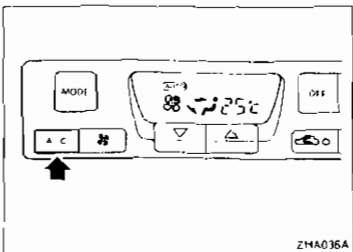
- 1) Press the temperature switch (HOT) until 32°C is displayed.
- 2) Check for hot air at discharge air outlets.

**6. Check AUTO mode**

- 1) Press AUTO switch.
- 2) Display should indicate AUTO and A/C.  
Confirm that the compressor clutch engages (audio or visual inspection).  
(Discharge air will depend on ambient, in-vehicle, and set temperatures)

**7. Check A/C mode**

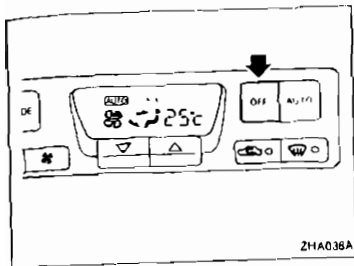
- 1) Press A/C switch
- 2) Display should indicate AUTO (A/C goes out).  
Confirm that the compressor clutch is not engaged (visual inspection).  
(Discharge air will depend on ambient, in-vehicle, and set temperatures)
- 3) Re-press A/C switch. Display should indicate A/C and the compressor clutch is engaged



## Operational Check (Cont'd)

## 8. Check memory function

- 1) Press OFF switch
- 2) Turn the ignition off.
- 3) Turn the ignition on.
- 4) Press the AUTO switch.
- 5) Confirm that the set temperature remains at previous temperature



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## Symptom Chart

## DIAGNOSTIC TABLE

| PROCEDURE  |   | Self diagnosis              |                    |                    |                    |                    | Preliminary Check           |                             |                             |                             |                             |                             | Diagnostic Procedure        |                             |                              |                                 |                                 |                                 |                                 |
|--|---|-----------------------------|--------------------|--------------------|--------------------|--------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| SYMPTOM  | DIAGNOSTIC ITEM AND REFERENCE PAGE      | STEP 1 (HA-85, 88)          | STEP 2 (HA-85, 88) | STEP 3 (HA-88, 89) | STEP 4 (HA-88, 90) | STEP 5 (HA-87, 90) | AUXILIARY MECHANISM (HA-92) | Preliminary Check 1 (HA-93) | Preliminary Check 2 (HA-94) | Preliminary Check 3 (HA-95) | Preliminary Check 4 (HA-96) | Preliminary Check 5 (HA-97) | Preliminary Check 6 (HA-98) | Preliminary Check 7 (HA-99) | Preliminary Check 8 (HA-100) | Diagnostic Procedure 1 (HA-111) | Diagnostic Procedure 2 (HA-112) | Diagnostic Procedure 3 (HA-113) | Diagnostic Procedure 4 (HA-114) |
|  |   | Air outlet does not change. |                    | 1                  | 2                  | 3                  | 4                           | 5                           |                             | 6                           |                             |                             |                             |                             |                              |                                 |                                 |                                 |                                 |
| Intake door does not change  |   | 1                           | 2                  |                    |                    |                    |                             | 3                           |                             |                             |                             |                             |                             |                             |                              |                                 |                                 |                                 |                                 |
| Insufficient cooling   |   | 1                           | 2                  | 3                  | 4                  | 5                  |                             |                             | 6                           |                             |                             |                             |                             |                             |                              |                                 |                                 |                                 |                                 |
| Insufficient heating   |   | 1                           | 2                  | 3                  | 4                  | 5                  |                             |                             | 6                           |                             |                             |                             |                             |                             |                              |                                 |                                 |                                 |                                 |
| Blower motor operation is malfunctioning   |   | 1                           | 2                  | 3                  | 4                  | 5                  |                             |                             |                             | 6                           |                             | 7                           |                             |                             |                              |                                 |                                 |                                 |                                 |
| Magnet clutch does not engage  |   | 1                           | 2                  |                    |                    |                    |                             |                             |                             |                             |                             | 3                           |                             |                             |                              |                                 |                                 |                                 |                                 |
| Discharged air temperature does not change                                       |   | 1                           | 2                  |                    |                    |                    |                             |                             |                             |                             |                             |                             | 3                           |                             |                              |                                 |                                 |                                 |                                 |
| Noise  |   |                             |                    |                    |                    |                    |                             |                             |                             |                             |                             |                             |                             | 1                           |                              |                                 |                                 |                                 |                                 |
| Result of self-diagnosis STEP 2  | 21 Ambient sensor circuit is open       | 1                           | 2                  |                    |                    | 3                  |                             |                             |                             |                             |                             |                             |                             |                             | 4                            |                                 |                                 |                                 |                                 |
|  | 22 In-vehicle sensor circuit is open    | 1                           | 2                  |                    |                    | 3                  |                             |                             |                             |                             |                             |                             |                             |                             |                              | 4                               |                                 |                                 |                                 |
|  | 25 Sunload sensor circuit is open       | 1                           | 2                  |                    |                    |                    |                             |                             |                             |                             |                             |                             |                             |                             |                              |                                 |                                 | 3                               |                                 |
|  | 26 PBR circuit is open                  | 1                           | 2                  |                    |                    |                    |                             |                             |                             |                             |                             |                             |                             |                             |                              |                                 |                                 |                                 | 3                               |
|  | 21 Ambient sensor circuit is shorted    | 1                           | 2                  |                    |                    | 3                  |                             |                             |                             |                             |                             |                             |                             |                             |                              | 4                               |                                 |                                 |                                 |
|  | 22 In-vehicle sensor circuit is shorted | 1                           | 2                  |                    |                    | 3                  |                             |                             |                             |                             |                             |                             |                             |                             |                              |                                 | 4                               |                                 |                                 |
|  | 25 Sunload sensor circuit is shorted    | 1                           | 2                  |                    |                    |                    |                             |                             |                             |                             |                             |                             |                             |                             |                              |                                 |                                 |                                 | 3                               |
|  | 26 PBR circuit is shorted               | 1                           | 2                  |                    |                    |                    |                             |                             |                             |                             |                             |                             |                             |                             |                              |                                 |                                 |                                 |                                 |
| Mode door motor does not operate normally  | 1                                       | 2                           | 3                  | 4                  |                    |                    |                             |                             |                             |                             |                             |                             |                             |                             |                              |                                 |                                 |                                 |                                 |
| Intake door motor does not operate normally                                      | 1                                       | 2                           |                    | 3                  | 4                  |                    |                             |                             |                             |                             |                             |                             |                             |                             |                              |                                 |                                 |                                 |                                 |
| Air mix door motor does not operate normally                                     | 1                                       | 2                           |                    | 3                  | 4                  |                    |                             |                             |                             |                             |                             |                             |                             |                             |                              |                                 |                                 |                                 |                                 |
| Bi-level door motor does not operate normally                                    | 1                                       | 2                           |                    | 3                  |                    |                    |                             |                             |                             |                             |                             |                             |                             |                             |                              |                                 |                                 |                                 |                                 |
| Blower motor operation is malfunctioning under out of Starting Fan Speed Control | 1                                       | 2                           |                    |                    |                    |                    |                             |                             |                             |                             | 3                           |                             |                             |                             |                              |                                 |                                 |                                 |                                 |
| Magnet clutch does not operate after performing Preliminary Check 6              | 1                                       | 2                           |                    |                    |                    |                    |                             |                             |                             |                             |                             | 3                           |                             |                             |                              |                                 |                                 |                                 |                                 |
| Self-diagnosis cannot be performed   |   |                             |                    |                    |                    |                    |                             |                             |                             |                             |                             |                             |                             |                             |                              |                                 |                                 |                                 |                                 |

1 2 The number means checking order

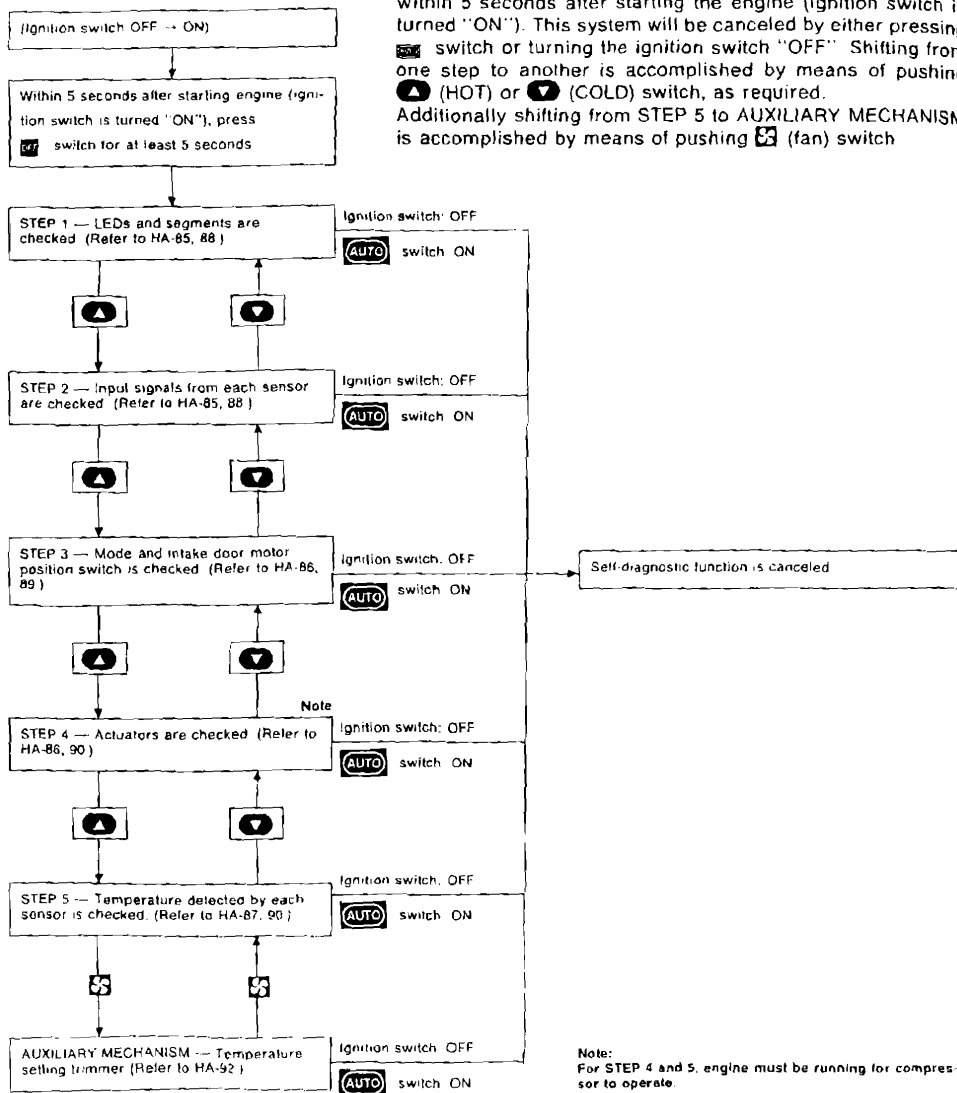
As for checking order, refer to each flow chart (It depends on malfunctioning portion)



## Self-diagnosis

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 done as follows. Start the engine (turn the ignition switch from "OFF" to "ON") And press "OFF" switch for at least 5 seconds. The "OFF" switch must be pressed within 5 seconds after starting the engine (ignition switch is turned "ON"). This system will be canceled by either pressing "OFF" 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 SS (fan) switch

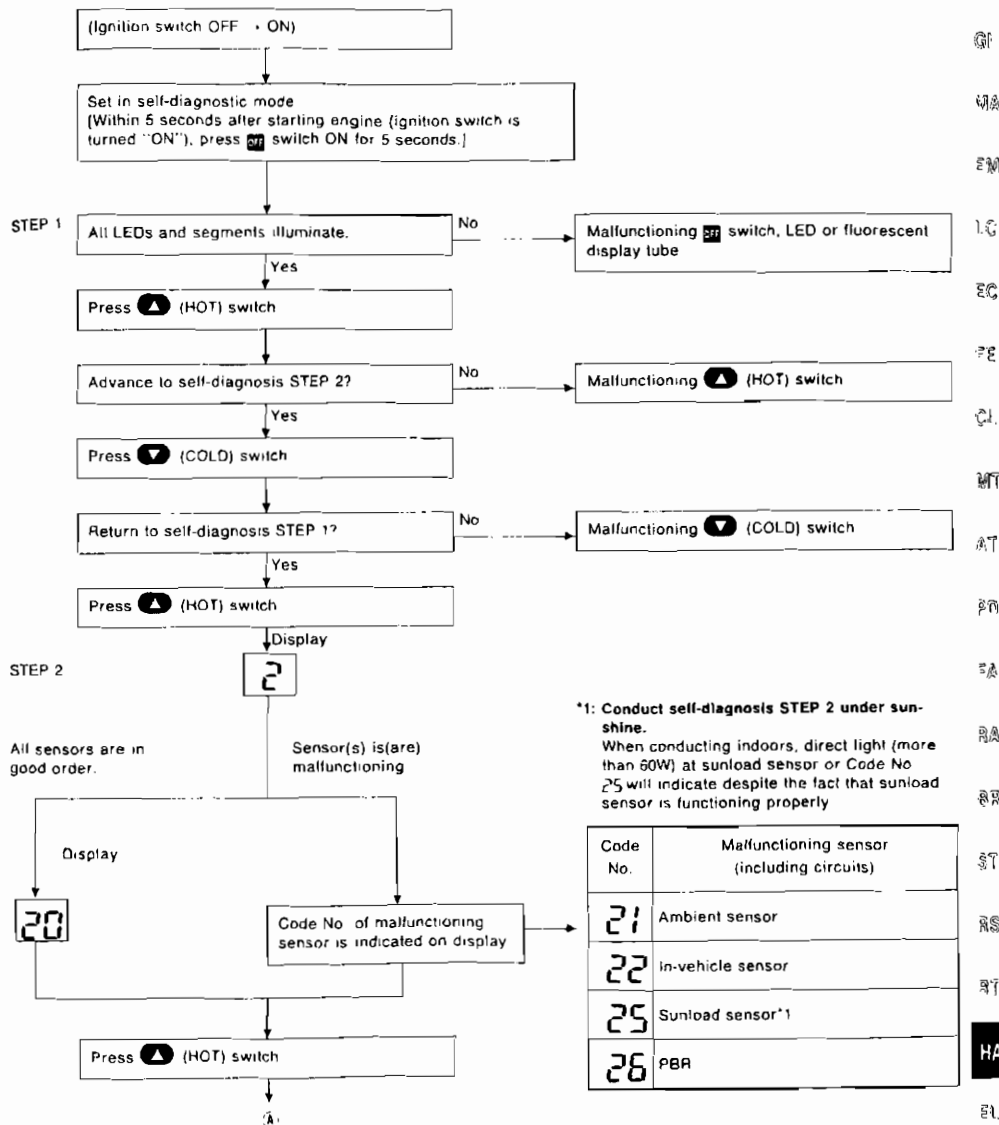


# TROUBLE DIAGNOSES

## Self-diagnosis (Cont'd)

AUTO

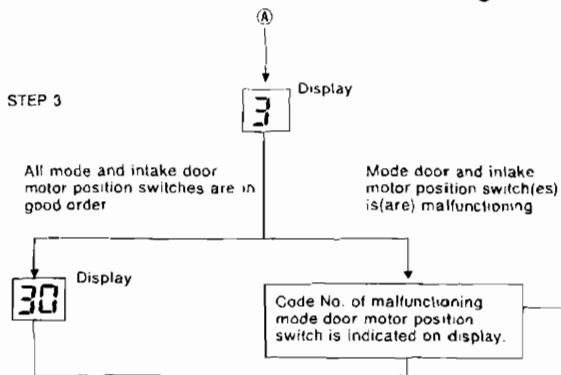
### CHECKING PROCEDURE



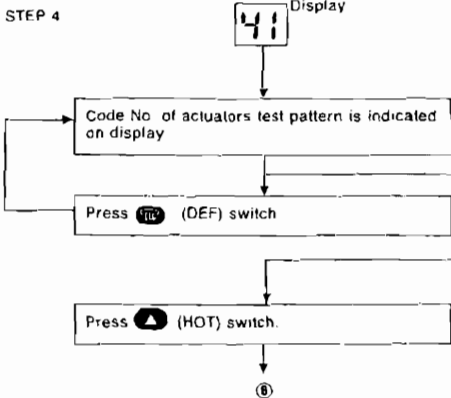
**Note:**

At any time, you can return to a previous step in the self-diagnosis by pressing the [COLD] switch.

## Self-diagnosis (Cont'd)



| Code No   | Malfunctioning part or circuit |                   |
|-----------|--------------------------------|-------------------|
|           | Position switch                |                   |
| <b>31</b> | VENT                           | Mode door motor   |
| <b>32</b> | B/L                            |                   |
| <b>33</b> | FOOT                           |                   |
| <b>34</b> | FOOT/DEF                       |                   |
| <b>35</b> | DEF                            |                   |
| <b>36</b> | FRE                            | Intake door motor |
| <b>38</b> | 20% FRE                        |                   |
| <b>39</b> | REC                            |                   |



| Code No.  | Actuators test pattern |             |              |               |              |            |
|-----------|------------------------|-------------|--------------|---------------|--------------|------------|
|           | Mode door              | Intake door | Air mix door | Bi-level door | Blower motor | Compressor |
| <b>41</b> | VENT                   | REC         | Full Cold    | OPEN          | 4 - 5V       | ON         |
| <b>42</b> | B/L                    | REC         | Full Cold    | OPEN          | 9 - 11V      | ON         |
| <b>43</b> | B/L                    | 20% FRE     | Full Hot     | CLOSE         | 7 - 9V       | ON         |
| <b>44</b> | FOOT                   | FRE         | Full Hot     | CLOSE         | 7 - 9V       | OFF        |
| <b>45</b> | F/O                    | FRE         | Full Hot     | CLOSE         | 7 - 9V       | OFF        |
| <b>46</b> | DEF                    | FRE         | Full Hot     | CLOSE         | 10 - 12V     | ON         |

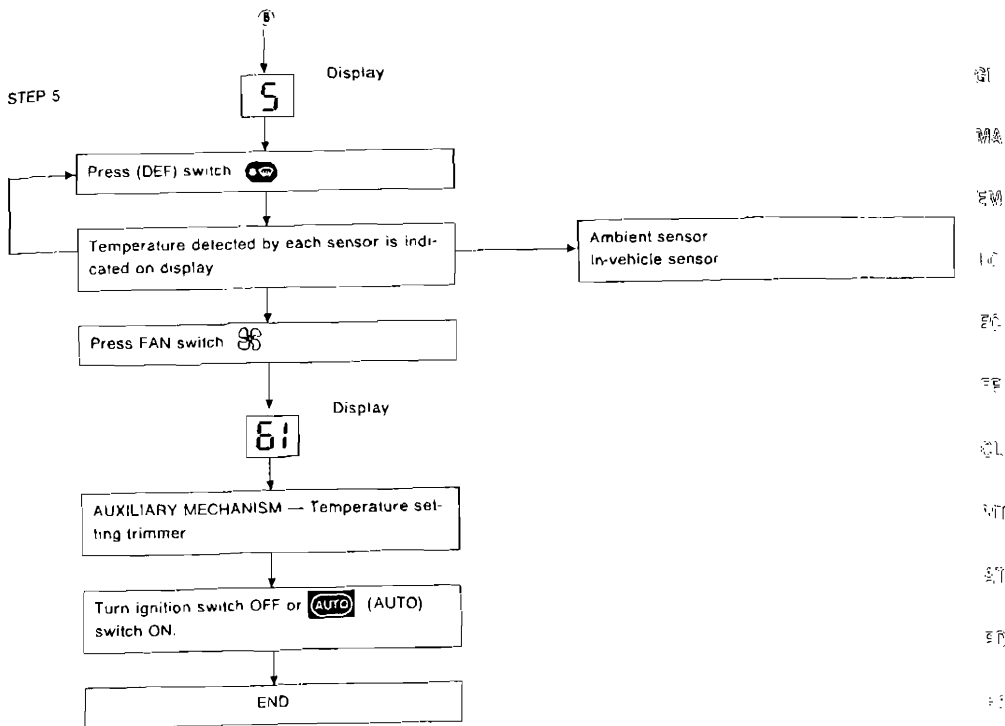
Note:

For STEP 4, engine must be running for compressor to operate.

# TROUBLE DIAGNOSES

## Self-diagnosis (Cont'd)

AUTO



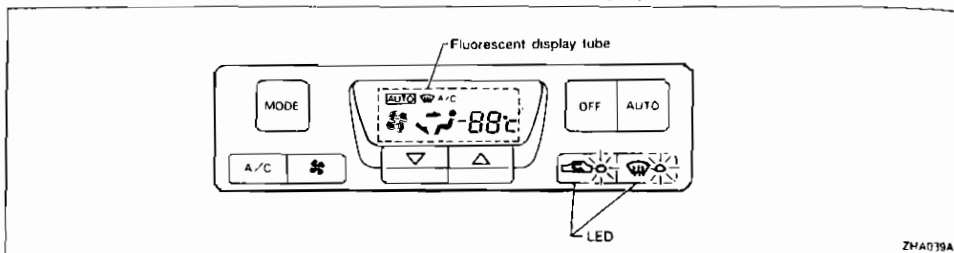


## Self-diagnosis (Cont'd)

## HOW TO INTERPRET THE RESULTS

## STEP 1: Checks LEDs and segments

When switch's LED and segments are in functioning properly in STEP 1, LED and display will come on.



ZHA039A

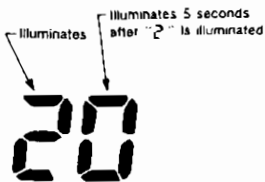
## Display malfunction



ZHA040A

If LEDs or segments malfunction, LED will not come on or display will show incomplete segment.

## Display (when all sensors are in good order)



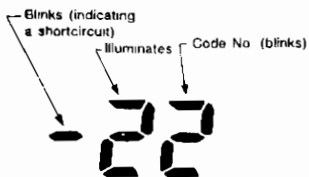
RHA499AA

## STEP 2: Checks each sensor circuit for open or short circuit

Display shows "2" in STEP 2 mode.

When all sensors are in good order, display shows "20". It takes approximately 5 seconds to check all sensors.

## Display (when sensor malfunctions)



ZHA042A

If a sensor is malfunctioning, the corresponding code No. blinks on display. A short circuit is identified by a blinking "-" mark preceding mode number

**Self-diagnosis (Cont'd)**

If two or more sensors malfunction, corresponding code Nos respectively blink two times



Each code No.  
blinks two times.

RHA501A

**Sensors and abnormalities**

If a circuit is opened or shorted, display shows its code No. when input corresponds with any of following conditions.

| Code No. | Sensor            | Open circuit                 | Short circuit                 |
|----------|-------------------|------------------------------|-------------------------------|
| 21       | Ambient sensor    | Less than<br>-41.9°C (-43°F) | Greater than<br>100°C (212°F) |
| 22       | In-vehicle sensor | Less than<br>-41.9°C (-43°F) | Greater than<br>100°C (212°F) |
| 25       | Sunload sensor*2  | Less than<br>4.5 mA          | Greater than<br>192 mA        |
| 26       | PBR*1             | Greater than 50%             | Less than 30%                 |

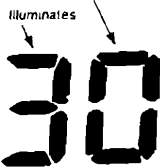
\*1: "50%" and "30%" refer to percentage with respect to full stroke of air mix door. (Full cold: 10%, Full hot: 90%)

\*2: Conduct self-diagnosis STEP 2 under sunshine.

When conducting indoors, direct light (more than 60W) at sunload sensor.

**Display (when all doors are in good order)**

Illuminates 20 seconds after "3" is shown on display



RHA383D

**STEP 3: Checks mode and intake door positions**

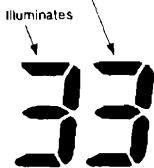
Display shows "3" in STEP 3 mode.

When all doors are in good order, display will then show "30"

It takes approximately 20 seconds to check all mode and intake doors.

**Display (when a door is out of order)**

Code No. (blinks)

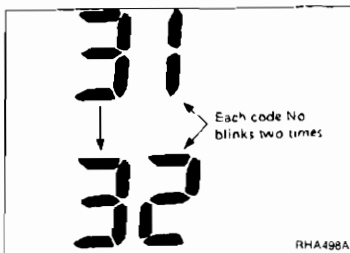


RHA49/A

When abnormalities are detected, display shows a code No. corresponding with malfunctioning part.

| Code No                  | 31   | 32  | 33   | 34           | 35  | 36  | 38         | 39  |
|--------------------------|------|-----|------|--------------|-----|-----|------------|-----|
| Malfunc-<br>tioning part | VENT | B/I | FOOT | FOOT/<br>DEF | DEF | FRE | 20%<br>FRE | REC |

HA

**Self-diagnosis (Cont'd)**

If two or more mode or intake doors are out of order, corresponding code numbers respectively blink two times.  
If mode door motor harness connector is disconnected, the following display pattern will appear.

31 → 32 → 33 → 34 → 35

If intake mode door harness connector is disconnected, the following display pattern will appear

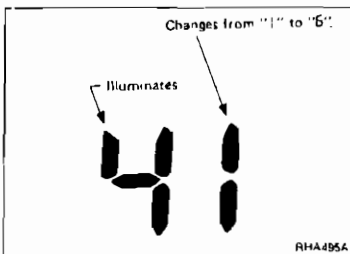
36 → 38 → 39

If any mode door motor position switch is malfunctioning, mode door motor will also malfunction.

**STEP 4: Checks operation of each actuator**

Display shows "41" in STEP 4 mode.

When DEF switch is pressed one time, display shows "42". Thereafter, each time the switch is pressed, display advances one number at a time, up to "46", then returns to "41".



During inspection in STEP 4, the auto amp. will forcefully transmit an output to the affected actuators. The corresponding code Nos. are shown on display as indicated in the table below.

**Checks must be made visually, by listening to any noise, or by touching air outlets with your hand, etc. for improper operation.**

**Discharge air flow**

| Switch mode/indicator | Air outlet/distribution |      |           |
|-----------------------|-------------------------|------|-----------|
|                       | Face                    | Foot | Defroster |
|                       | 100%                    | —    | —         |
|                       | 60%                     | 40%  | —         |
|                       | —                       | 80%  | 20%       |
|                       | —                       | 60%  | 40%       |
|                       | —                       | —    | 100%      |

RHA429EA

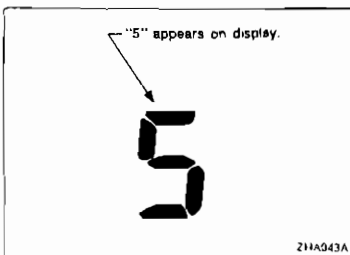
| Code No.      | 41         | 42          | 43         | 44         | 45         | 46           |
|---------------|------------|-------------|------------|------------|------------|--------------|
| Actuator      |            |             |            |            |            |              |
| Mode door     | VENT       | B/L         | B/L        | FOOT       | F/D        | DEF          |
| Intake door   | REC        | REC         | 20% FRE    | FRE        | FRE        | FRE          |
| Air mix door  | Full Cold  | Full Cold   | Full Hot   | Full Hot   | Full Hot   | Full Hot     |
| Blower motor  | 4 - 5<br>V | 9 - 11<br>V | 7 - 9<br>V | 7 - 9<br>V | 7 - 9<br>V | 10 - 12<br>V |
| Compressor    | ON         | ON          | ON         | OFF        | OFF        | ON           |
| Bi-level door | Open       | Open        | Shut       | Shut       | Shut       | Shut         |

Operating condition of each actuator cannot be checked by indicators.

**STEP 5: Checks temperature detected by sensors****Checks temperature detected by sensors**

Display shows "5" in STEP 5 mode

- When DEF switch is pressed one time, display shows temperature detected by ambient sensor
- When DEF switch is pressed second time, display shows temperature detected by in-vehicle sensor.
- When DEF switch is pressed third time, display returns to original presentation "5".

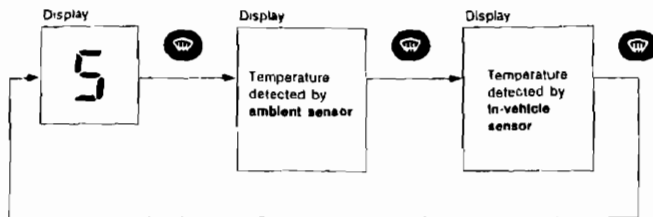


## Self-diagnosis (Cont'd)

Temperature detected by sensor  
corresponding with switch operation

23

RHA493A



ZHA044A




If temperature shown on display greatly differs from actual temperature, check sensor circuit at first. Then inspect sensor itself according to the procedures described in **Control System Input Component**. Refer to HA-128.

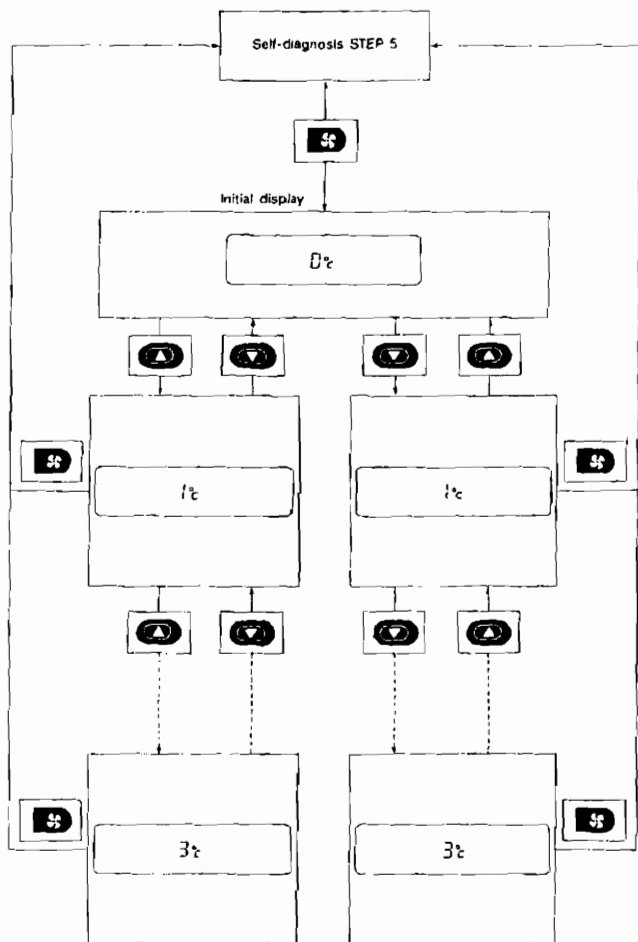
## Self-diagnosis (Cont'd)

**AUXILIARY MECHANISM: Temperature setting trimmer**

This trimmer compensates for differences between temperature setting (displayed digitally) and temperature felt by driver in a range of  $\pm 3^{\circ}\text{C}$ .

Operating procedures for this trimmer are as follows:

Starting with STEP 5 under "Self-diagnostic mode", press  (fan) switch to set air conditioning system in auxiliary mode. Then, press either  (HOT) or  (COLD) switch as desired. Temperature will change at a rate of  $1^{\circ}\text{C}$  each time a switch is pressed.



ZHA045A

When battery cable is disconnected, trimmer operation is canceled and temperature set becomes that of initial condition, i.e.  $0^{\circ}\text{C}$ .

## Preliminary Check

## PRELIMINARY CHECK 1

Air outlet does not change.

- Perform Self-diagnosis STEP 1 before referring to the flow chart.

CHECK SENSOR CIRCUIT  
Set up Self-diagnosis STEP 2  
Is each sensor circuit normal?  
Code No. 20 should be indicated on the display after approx. 5 seconds.

OK

NG

CHECK SENSOR CIRCUIT IN DETAIL ACCORDING TO THE DIAGNOSTIC PROCEDURE BELOW CORRESPONDING TO EACH CODE NO

| Code No | How to repair                 | Reference page |
|---------|-------------------------------|----------------|
| 21      | Go to Diagnostic Procedure 1  | HA-111         |
| 22      | Go to Diagnostic Procedure 2. | HA-112         |
| 25      | Go to Diagnostic Procedure 3. | HA-113         |
| 26      | Go to Diagnostic Procedure 4  | HA-114         |
| -21     | Go to Diagnostic Procedure 1  | HA-111         |
| -22     | Go to Diagnostic Procedure 2. | HA-112         |
| -25     | Go to Diagnostic Procedure 3  | HA-113         |
| -26     | Go to Diagnostic Procedure 4. | HA-114         |

Are sensor circuits for ambient sensor and in-vehicle sensor operating normally? If malfunction is suspected, check temperature detected by each sensor using Self-diagnosis STEP 5. Confirm the temperature is within normal range before performing Diagnostic Procedures

CHECK MODE DOOR MOTOR  
Set up Self-diagnosis STEP 3  
Is mode door motor operating normally?  
Code No. 30 should be indicated on the display after approx. 20 seconds.

OK

NG

Go to Diagnostic Procedure 5. (HA-115)

CHECK MODE DOOR OPERATION  
Set up Self-diagnosis STEP 4  
Does air outlet change according to each code No ?

|      |     |     |      |     |     |
|------|-----|-----|------|-----|-----|
| 41   | 42  | 43  | 44   | 45  | 46  |
| VENT | B/L | B/L | FOOT | F/D | DEF |

Refer to Discharge Air Flow. (HA-12)

OK

NG

CHECK SIDE LINK MECHANISM.  
Refer to CONTROL LINKAGE ADJUSTMENT. (HA-125)

Repair.

OK

Go to Diagnostic Procedure 5. (HA-115)

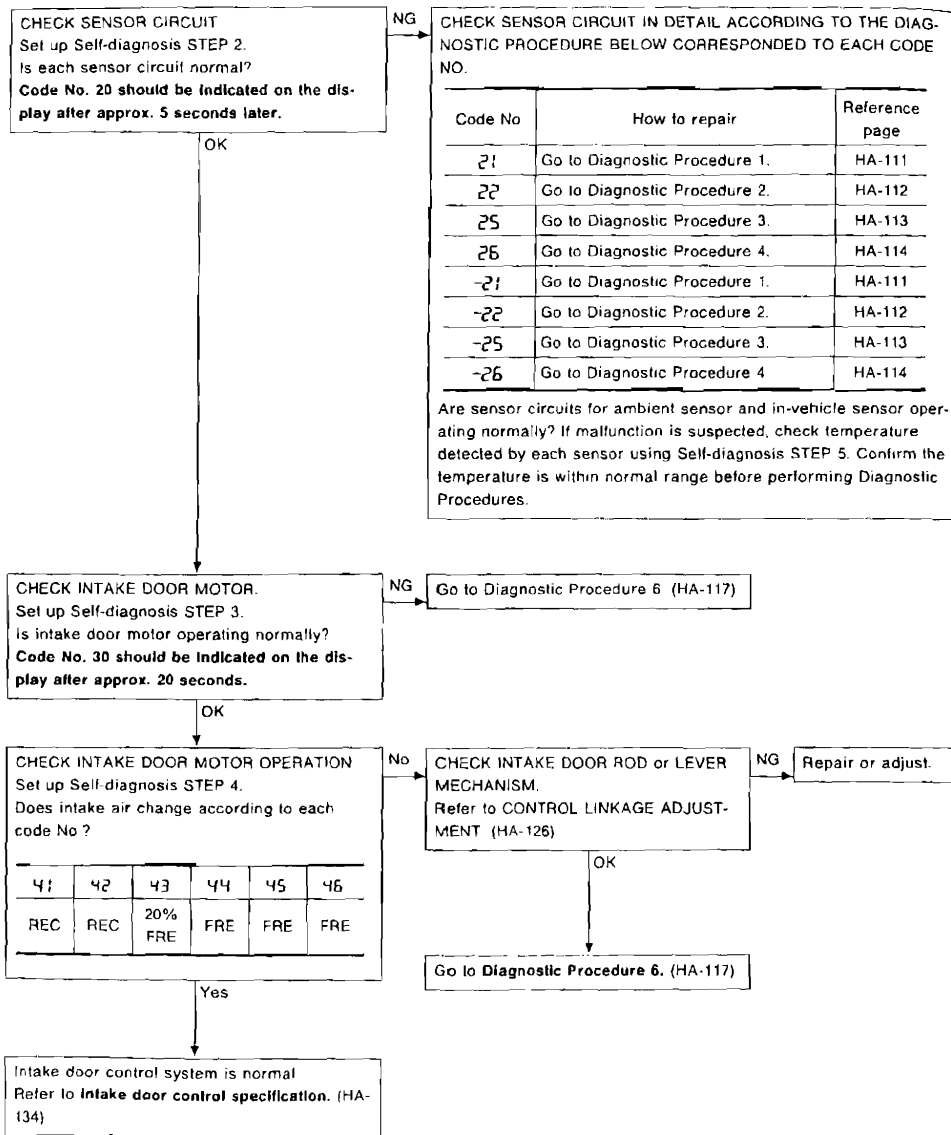
Air outlet control system is normal. Refer to Mode door control specification. (HA-133)

## Preliminary Check (Cont'd)

## PRELIMINARY CHECK 2

Intake door does not change.

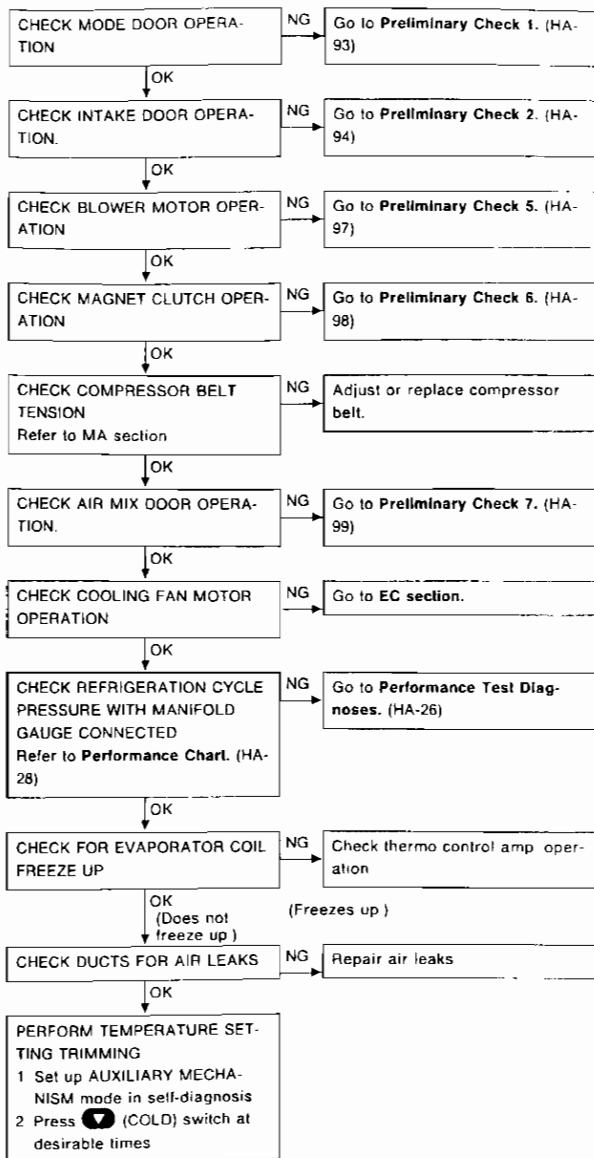
- Perform Self-diagnosis STEP 1 before referring to the following flow chart.



## PRELIMINARY CHECK 3

Insufficient cooling

## Preliminary Check (Cont'd)

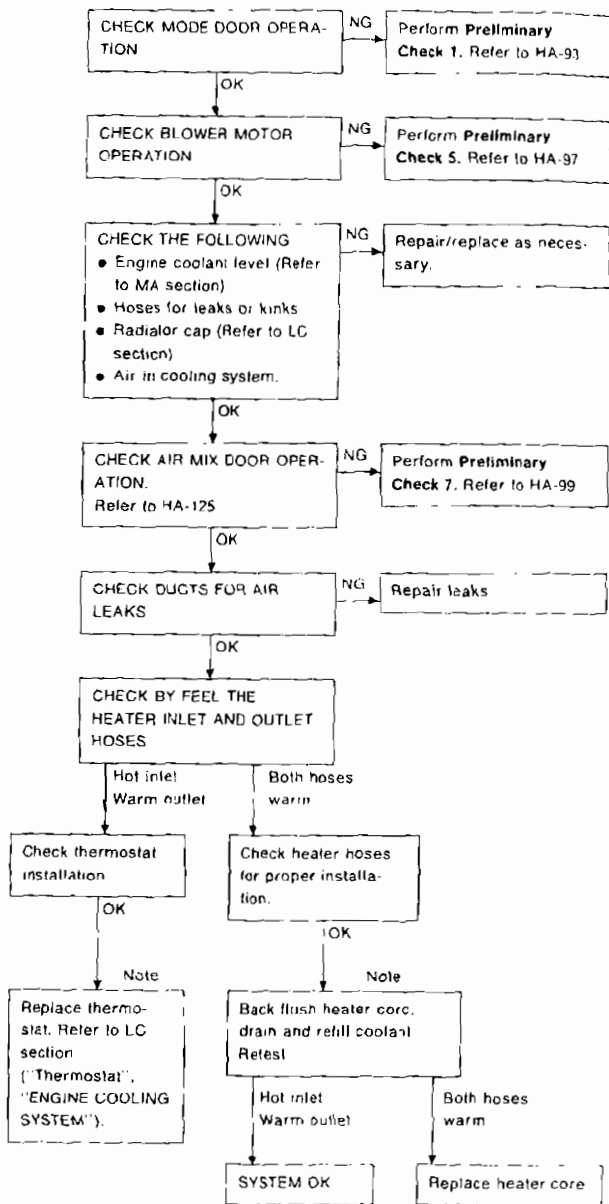




## Preliminary Check (Cont'd)

## PRELIMINARY CHECK 4

Insufficient heating



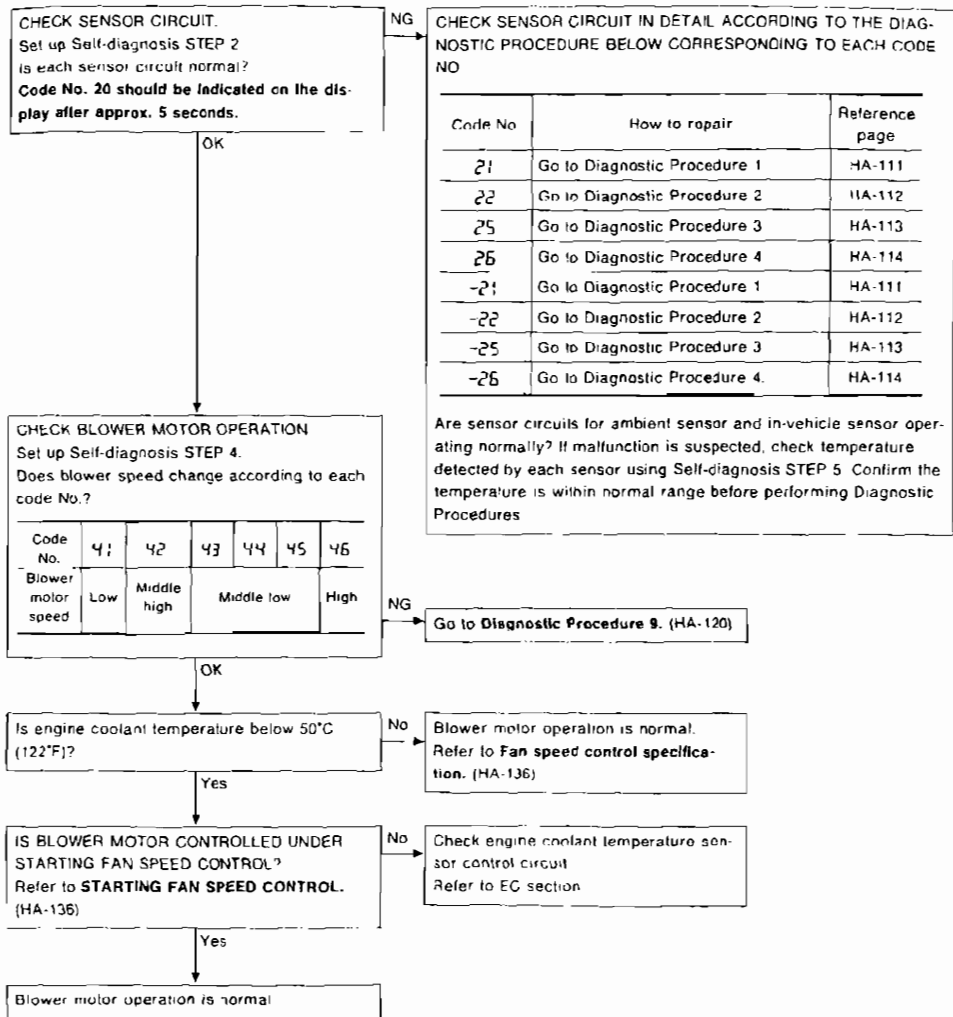
Note: To avoid unnecessary service of heating system, first perform TEMPERATURE SETTING TRIMMING. Refer to "AUXILIARY MECHANISM", "Self-diagnosis".

## Preliminary Check (Cont'd)

## PRELIMINARY CHECK 5

Blower motor operation is malfunctioning.

- Perform Self-diagnosis STEP 1 before referring to the following flow chart.

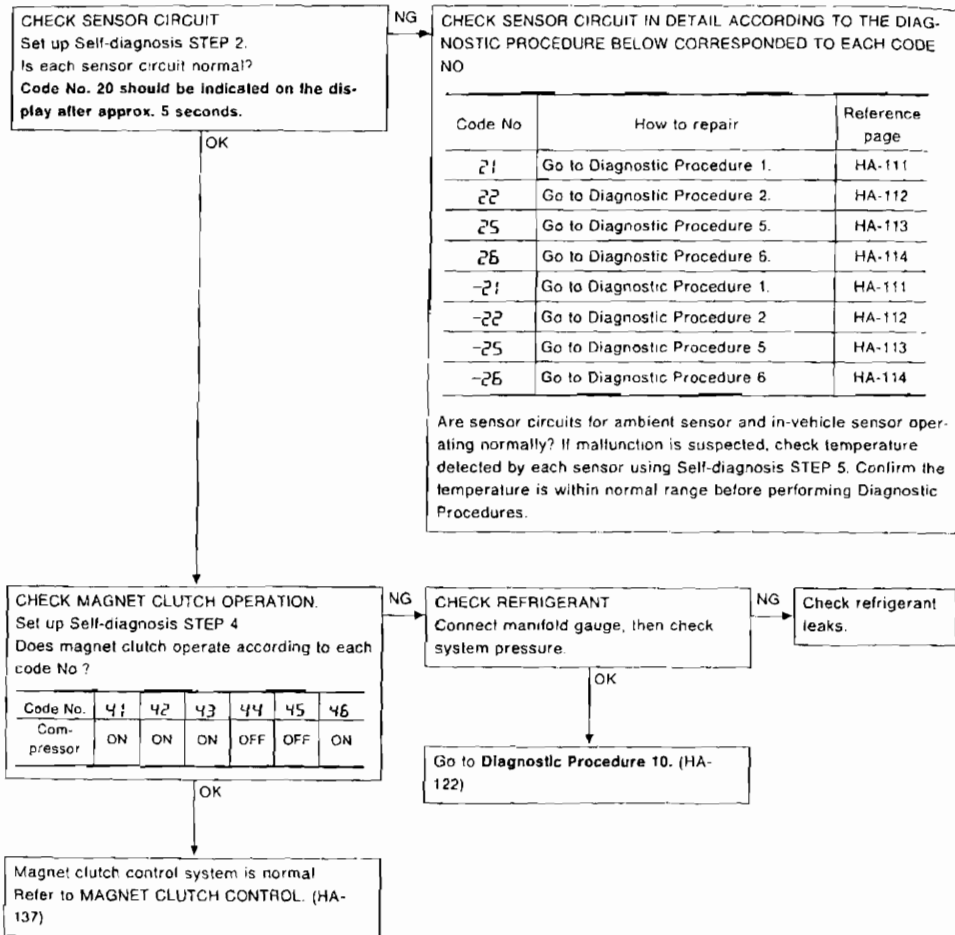


## Preliminary Check (Cont'd)

## PRELIMINARY CHECK 6

Magnet clutch does not engage.

Perform Self-diagnosis STEP 1 before referring to the following flow chart.

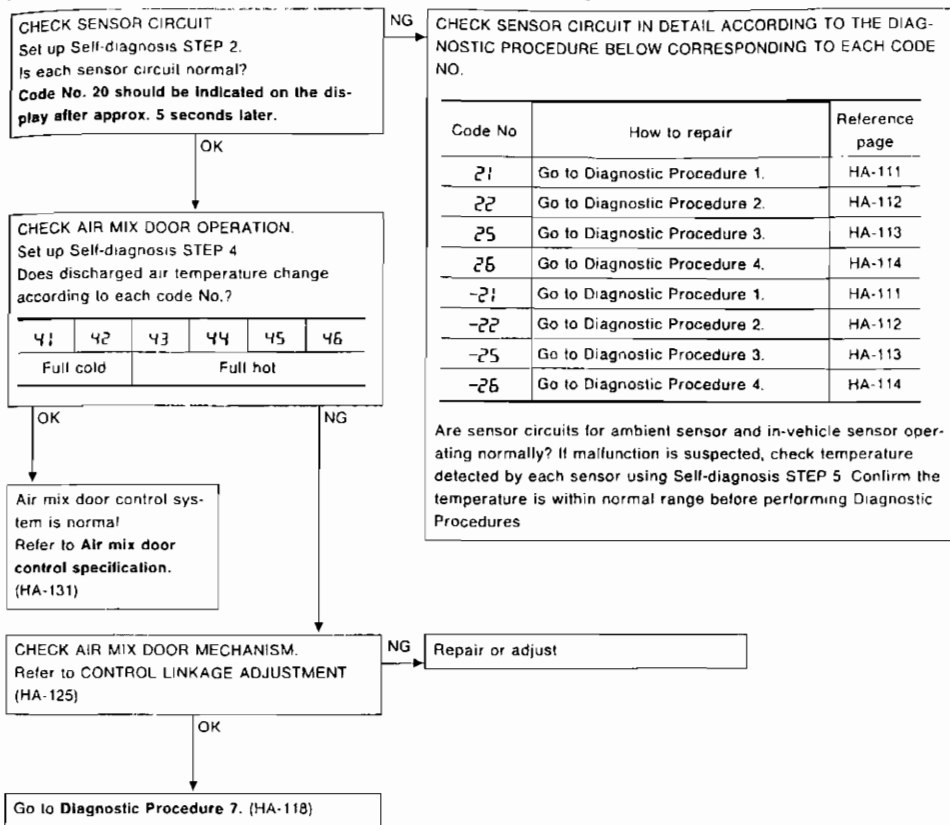


## Preliminary Check (Cont'd)

## PRELIMINARY CHECK 7

Discharged air temperature does not change.

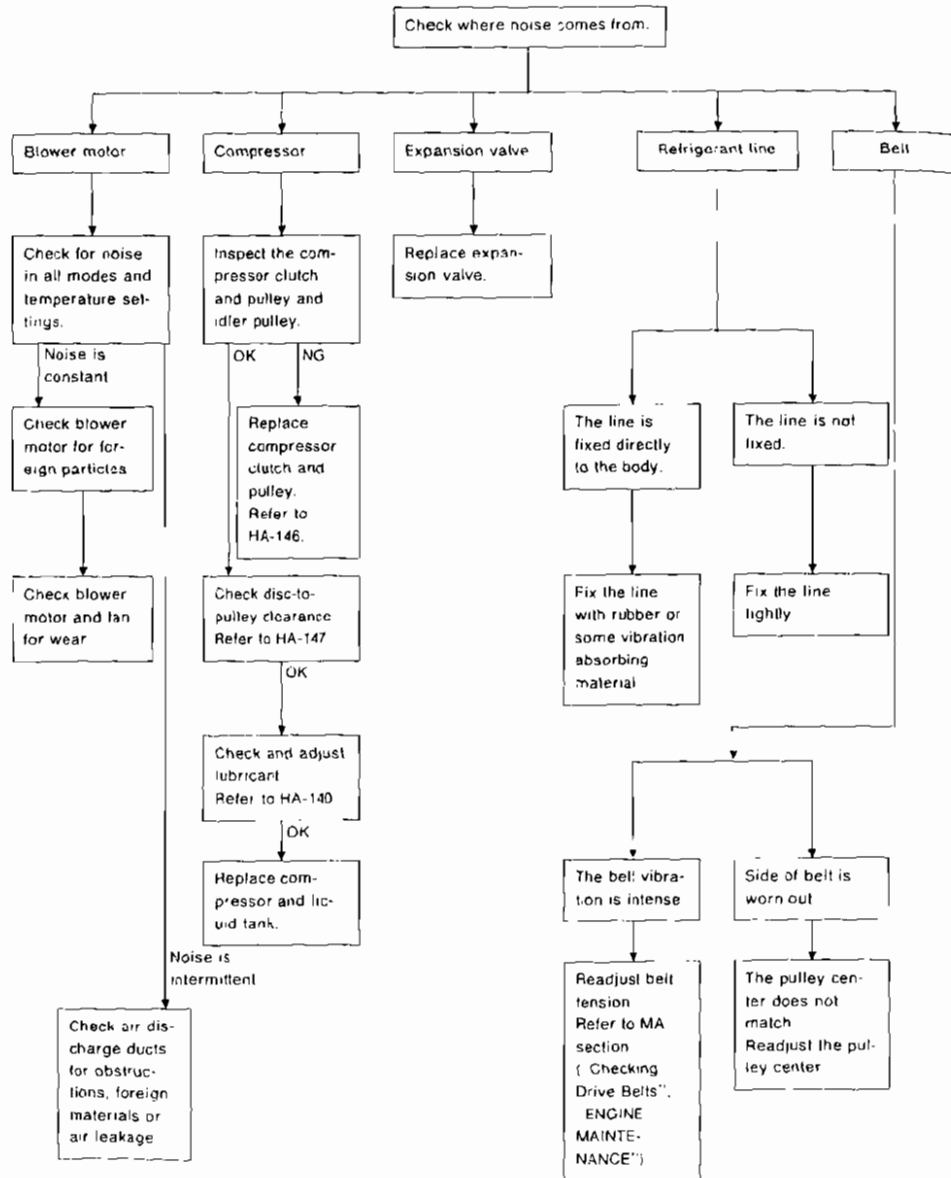
Perform Self-diagnosis STEP 1 before referring to the following flow chart.



## Preliminary Check (Cont'd)

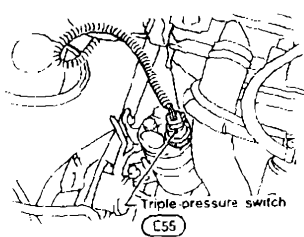
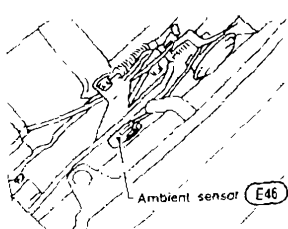
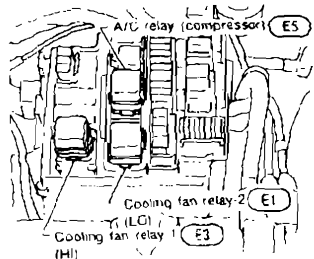
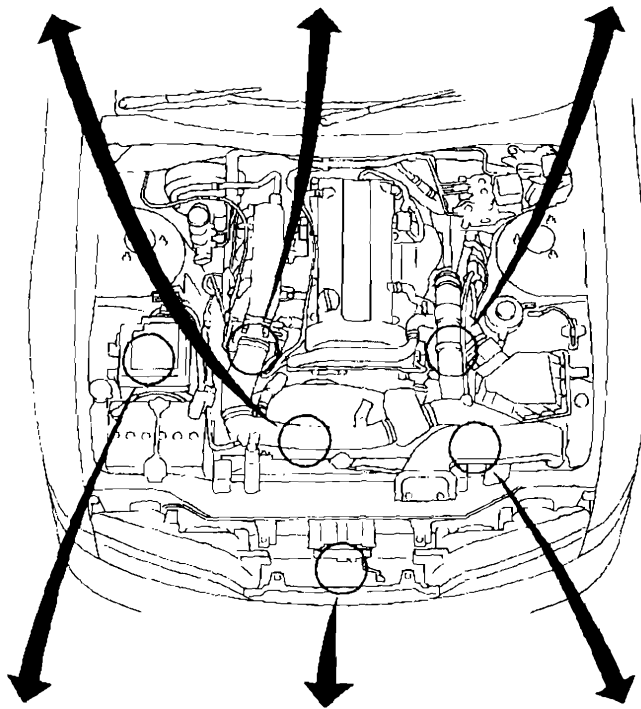
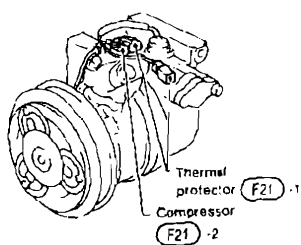
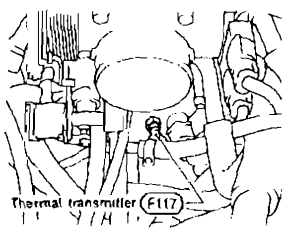
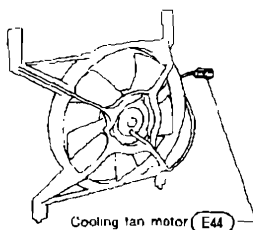
## PRELIMINARY CHECK 8

## Noise



### Harness Layout

#### Engine compartment



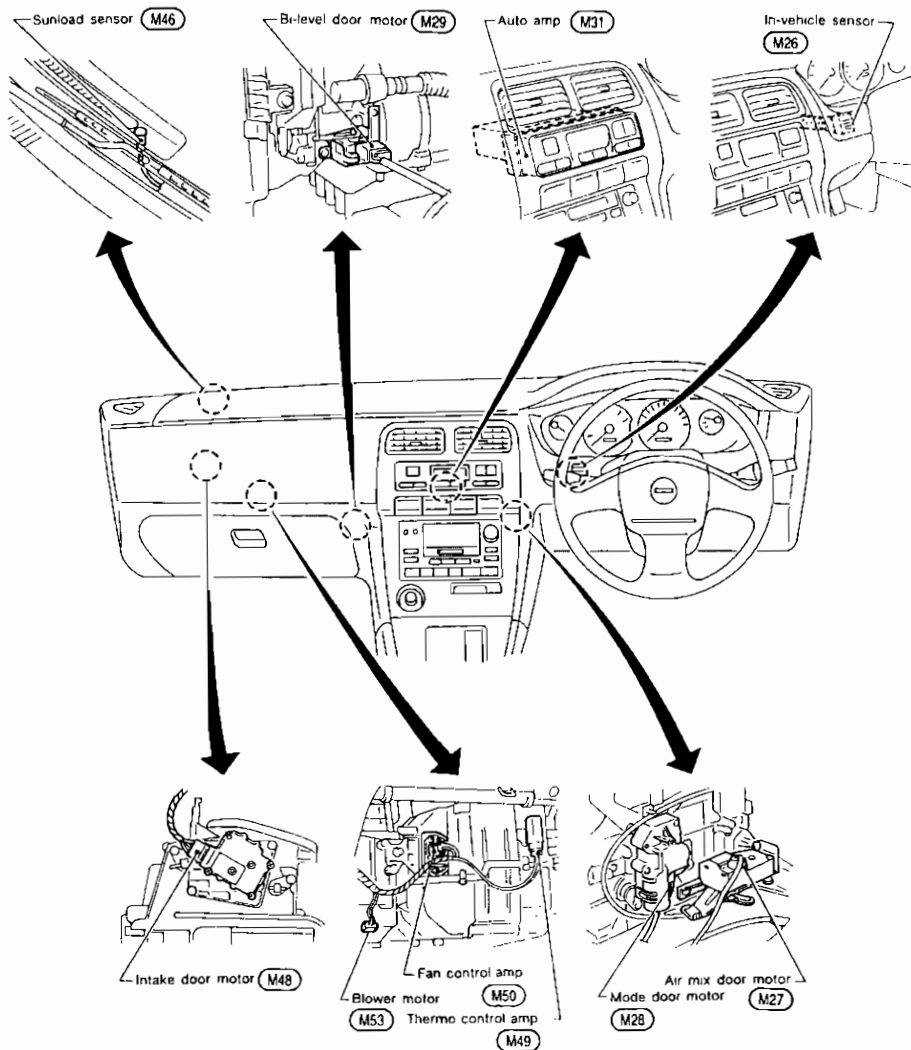
HA

# TRUBLE DIAGNOSES

## Harness Layout (Cont'd)

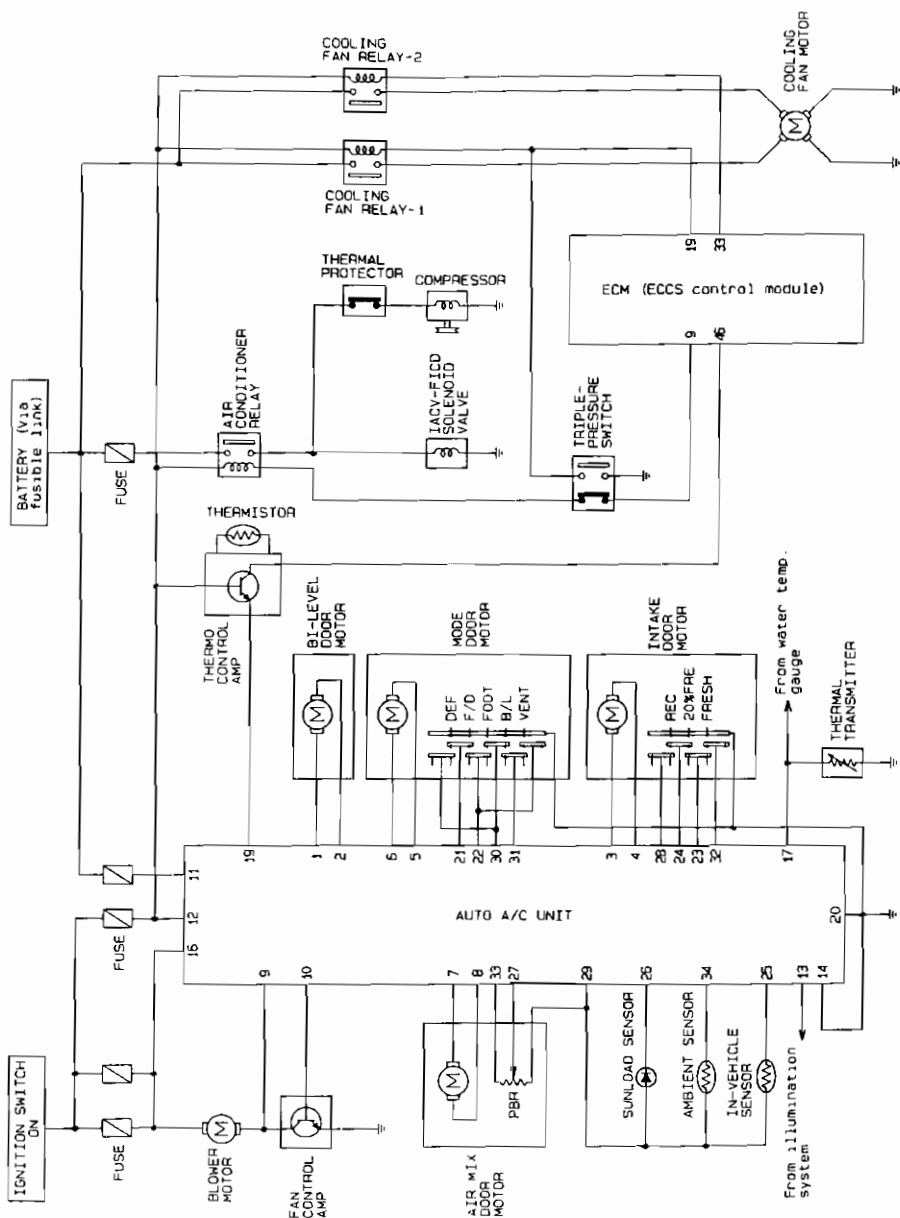
AUTO

### Passenger compartment



ZHA047A

## Circuit Diagram

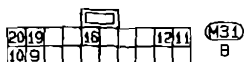
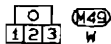
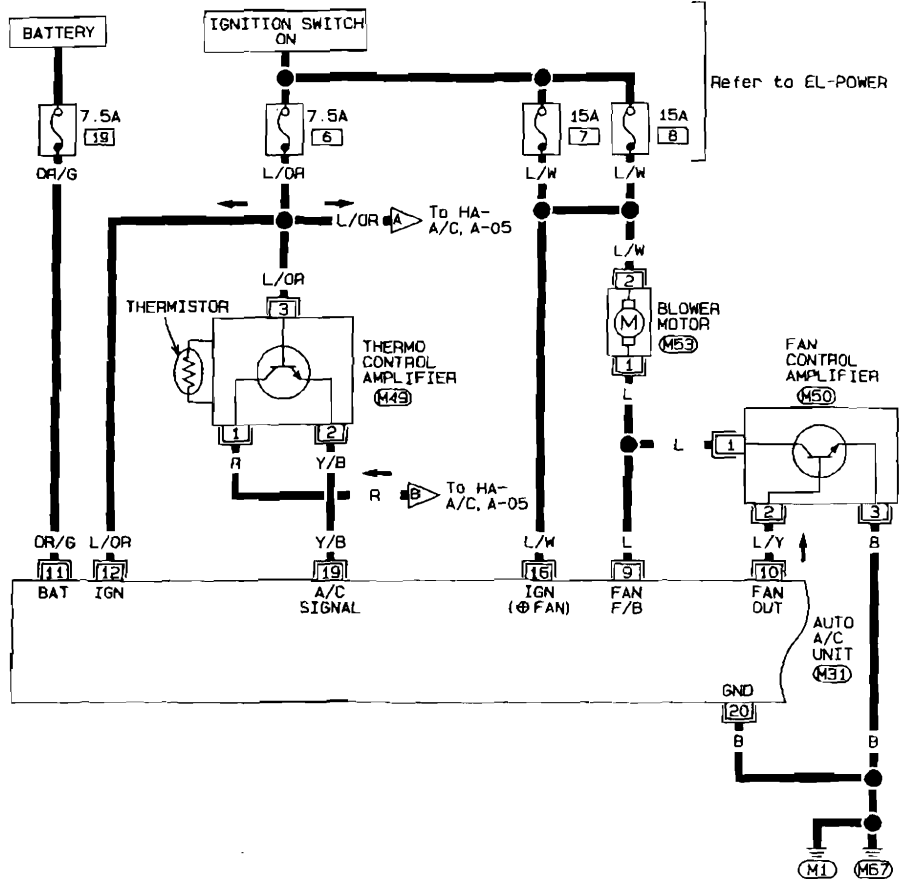


SHIA467E



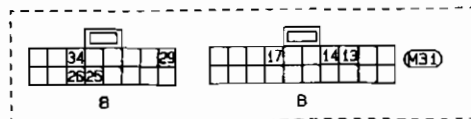
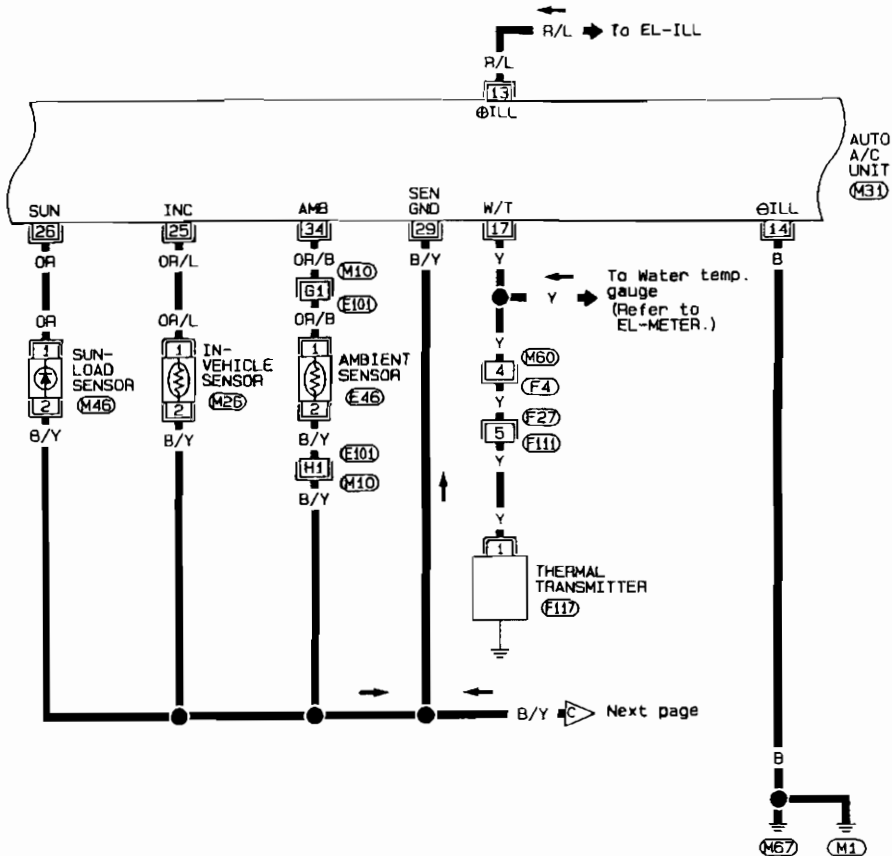
## Wiring Diagram — A/C, A —

HA-A/C, A-01



Wiring Diagram — A/C, A — (Cont'd)

HA-A/C, A-02



Refer to last page (Foldout page).

- M10, E101
- M60, F4

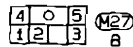
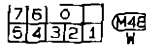
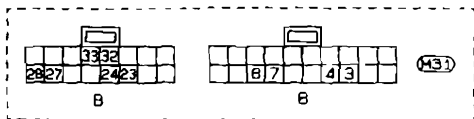
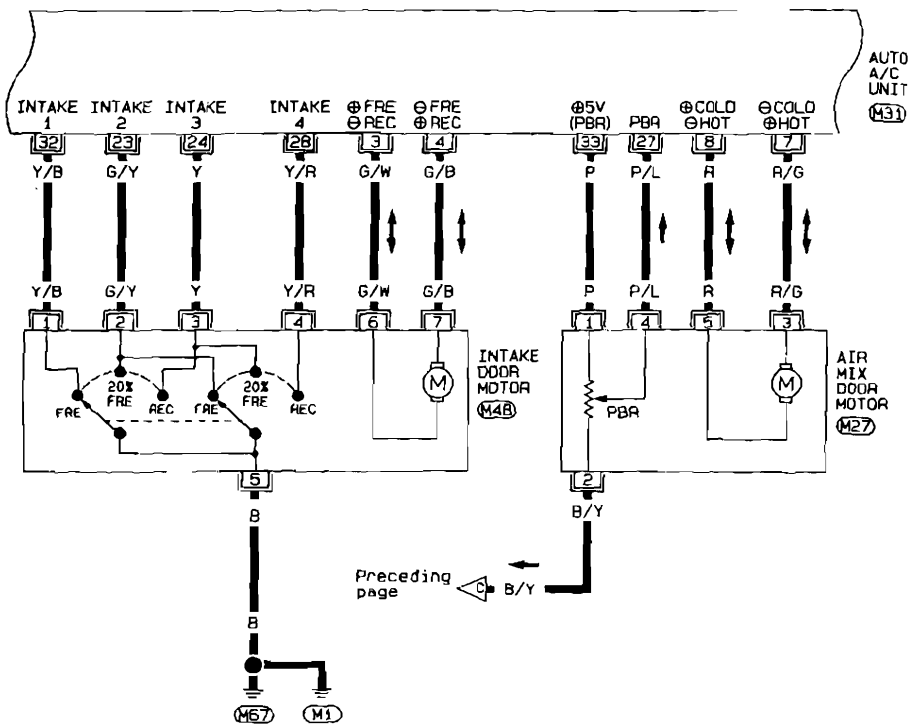


# TROUBLE DIAGNOSES

AUTO

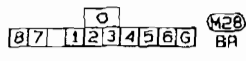
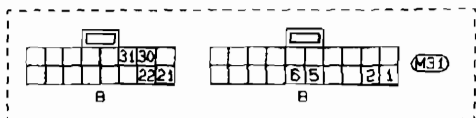
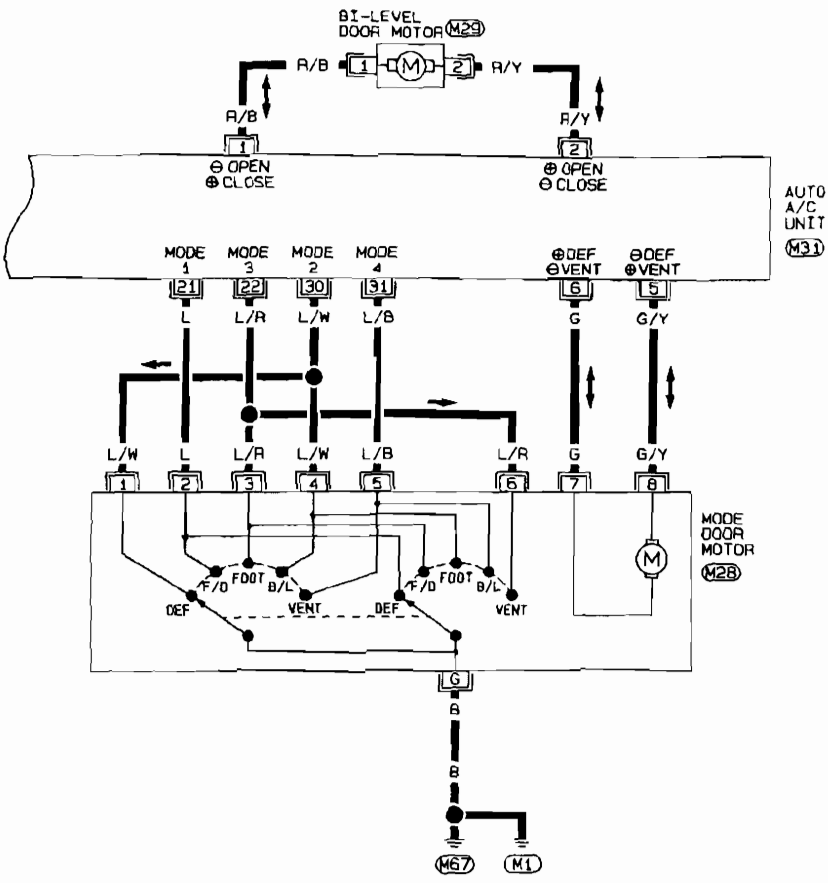
## Wiring Diagram — A/C, A — (Cont'd)

HA-A/C, A-03



Wiring Diagram — A/C, A — (Cont'd)

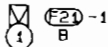
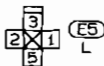
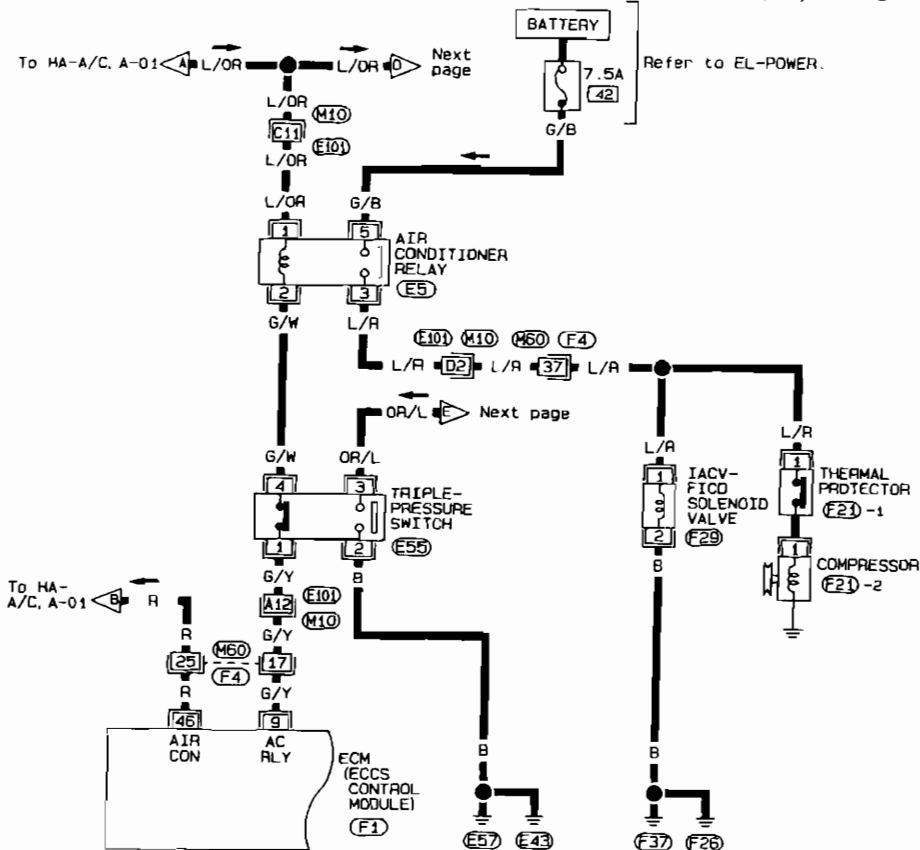
HA-A/C, A-04



HA

Wiring Diagram — A/C, A — (Cont'd)

HA-A/C, A-05



Refer to last page (Foldout page)

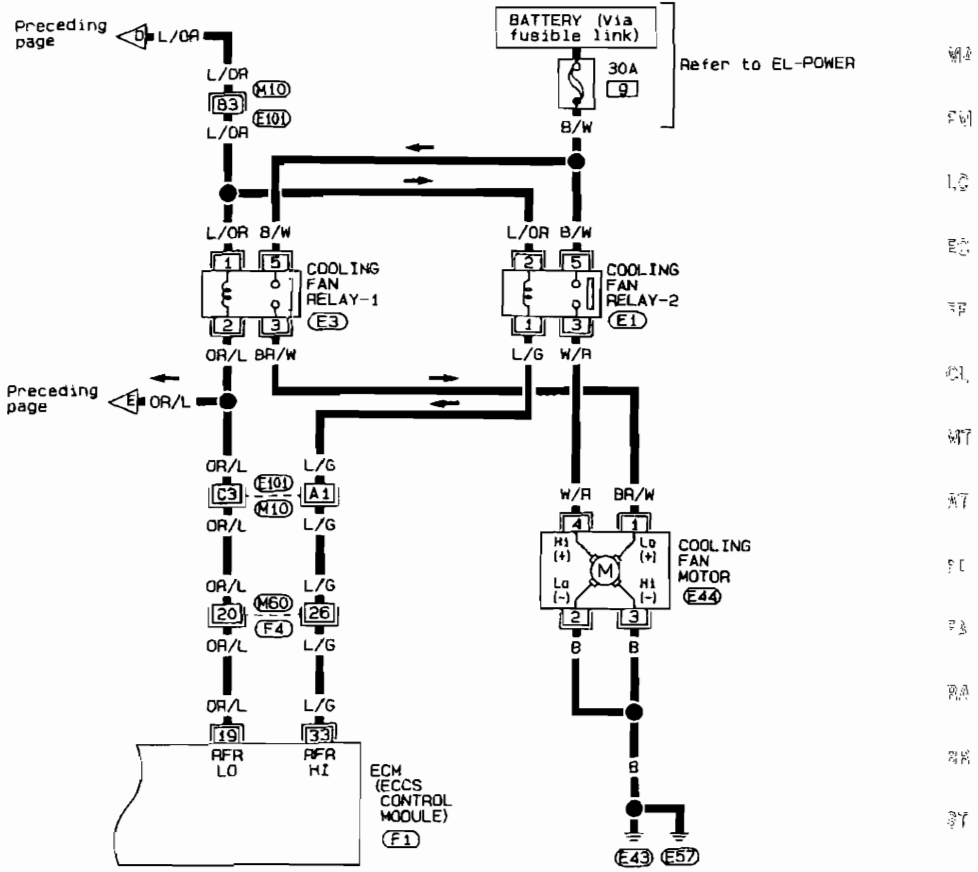
M10, E101

M50, F4

F1

Wiring Diagram — A/C, A — (Cont'd)

HA-A/C, A-06



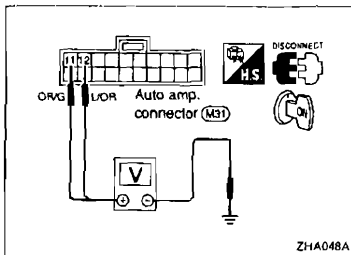
Refer to last page (foldout page).

- (M10, E101)
- (M50, F4)
- (F1)

HA

## Main Power Supply and Ground Circuit Check POWER SUPPLY CIRCUIT CHECK FOR AUTO A/C SYSTEM

Check power supply circuit for auto air conditioning system.  
Refer to "POWER SUPPLY ROUTING" in EL section and Wir-  
ing Diagram.

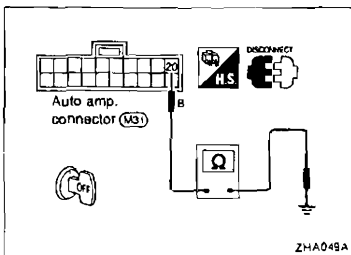


### AUTO AMP. CHECK

Check power supply circuit for auto amp. with ignition switch ON.

1. Disconnect auto amp. harness connector.
2. Connect voltmeter from harness side.
3. Measure voltage across terminal ⑪, ⑫ and body ground.

| Voltmeter terminal |             | Voltage     |
|--------------------|-------------|-------------|
| ⊕                  | ⊖           |             |
| ⑪, ⑫               | Body ground | Approx. 12V |



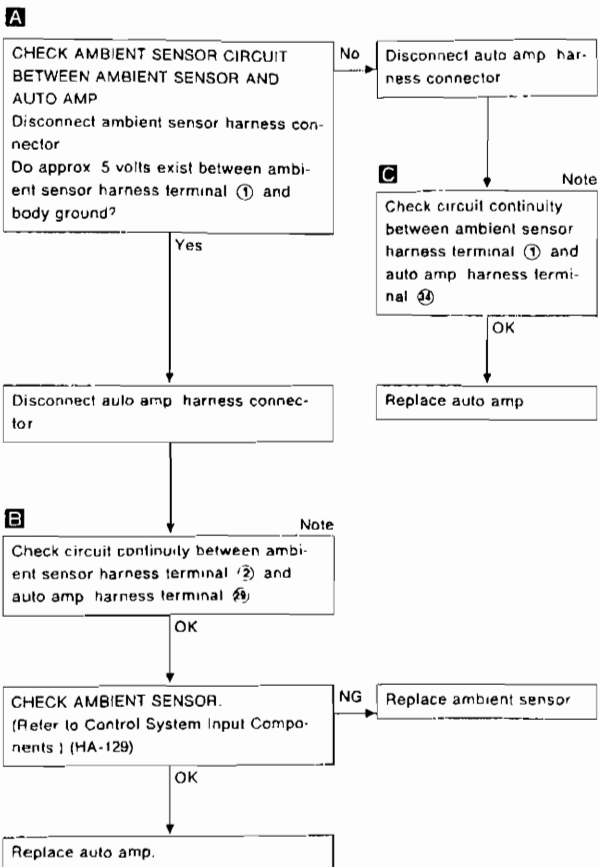
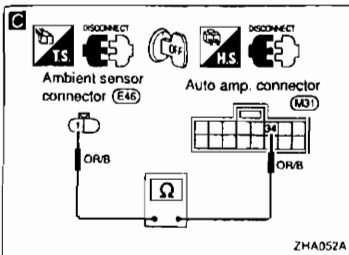
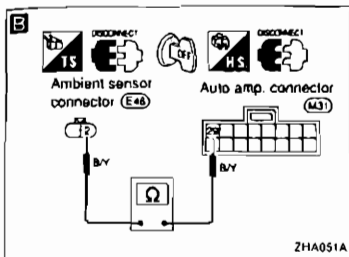
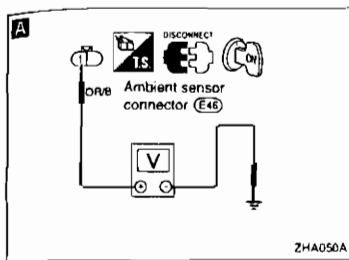
Check body ground circuit for auto amp. with ignition switch OFF

1. Disconnect push control unit harness connector
2. Connect ohmmeter from harness side.
3. Check for continuity between terminal ⑳ and body ground

| Ohmmeter terminal |             | Continuity |
|-------------------|-------------|------------|
| ⊕                 | ⊖           |            |
| ⑳                 | Body ground | Yes        |

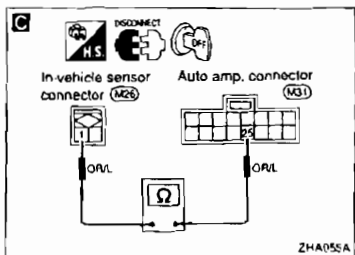
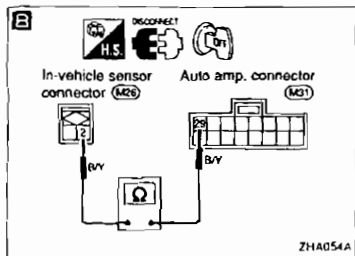
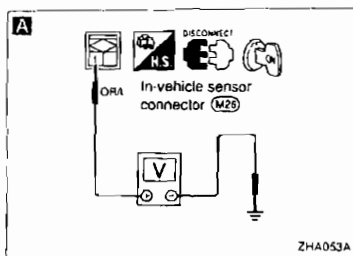
## Diagnostic Procedure 1

**SYMPTOM:** Ambient sensor circuit is open or shorted. (2) or -2) is indicated on display as a result of conducting Self-diagnosis STEP 2.)

**Note:**

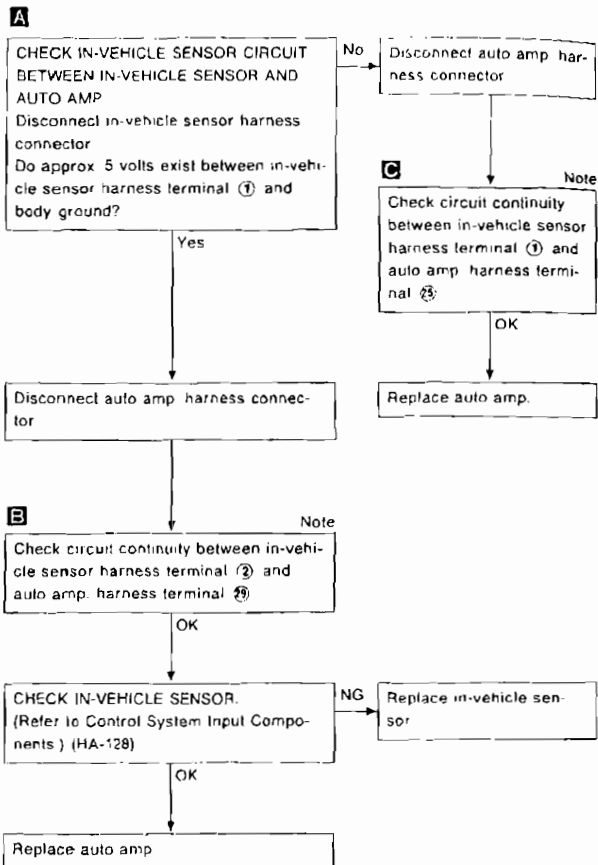
If the result is NG after checking circuit continuity, repair harness or connector.





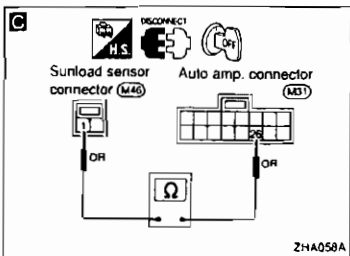
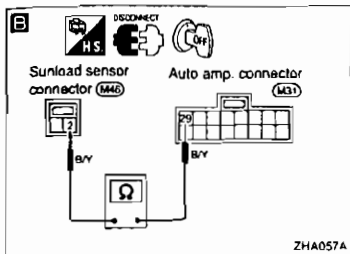
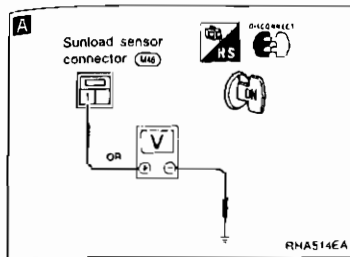
## Diagnostic Procedure 2

**SYMPTOM:** In-vehicle sensor circuit is open or shorted. (22 or -22 is indicated on display as a result of conducting Self-diagnosis STEP 2.)



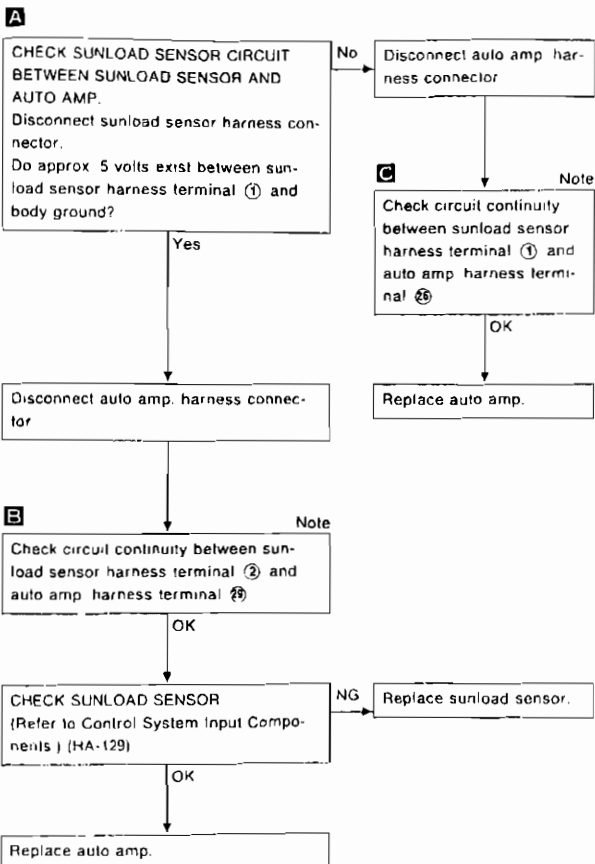
**Note:**

If the result is NG after checking circuit continuity, repair harness or connector.



## Diagnostic Procedure 3

**SYMPTOM:** Sunload sensor circuit is open or shorted. (25 or -25 is indicated on display as a result of conducting Self-diagnosis STEP 2.)

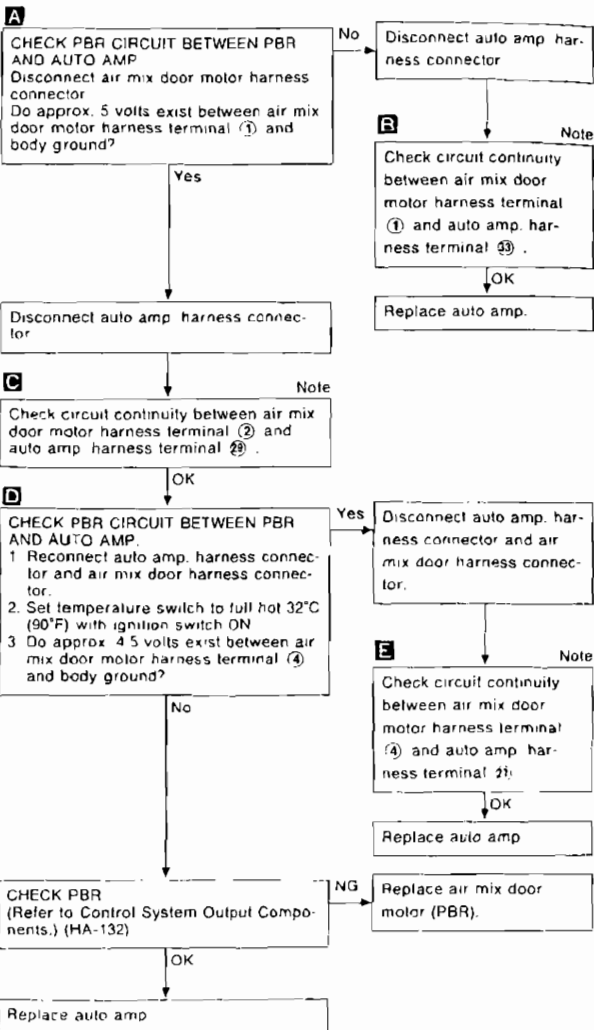
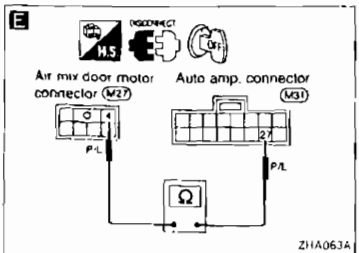
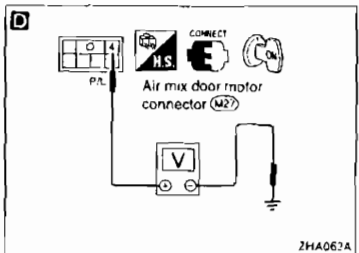
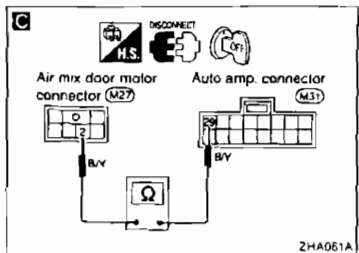
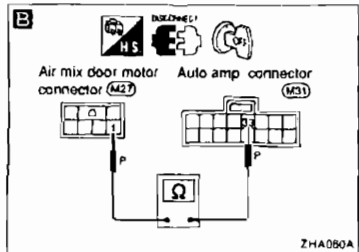
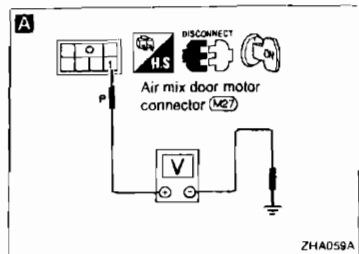


**Note:**

If the result is NG after checking circuit continuity, repair harness or connector.

## Diagnostic Procedure 4

**SYMPTOM:** PBR circuit is open or shorted. (26 or -26 is indicated on display as a result of conducting Self-diagnosis STEP 2.)



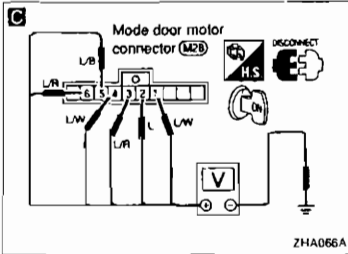
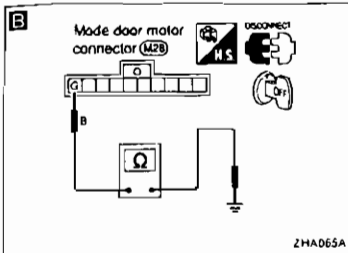
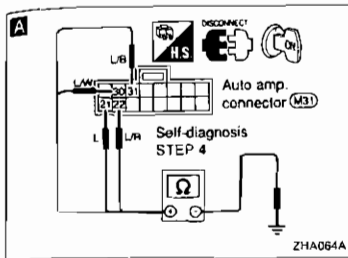
## Note

If the result is NG after checking circuit continuity, repair harness or connector.

## Diagnostic Procedure 5

SYMPTOM: Mode door motor does not operate normally.

- Perform Self-diagnosis STEPS 1 to 4 before referring to the following flow chart.

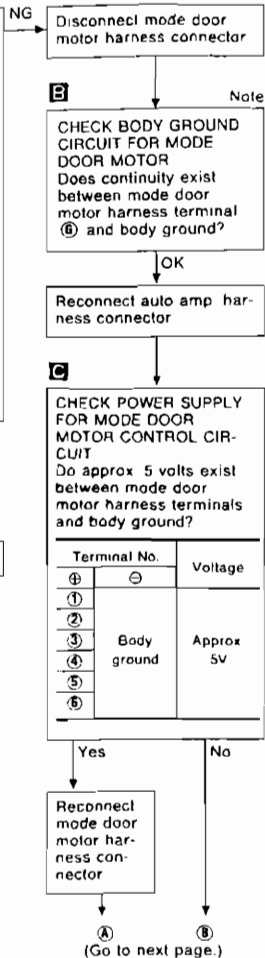
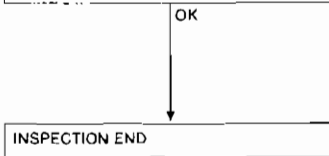


**A**

CHECK MODE DOOR MOTOR POSITION SWITCH.

- Set up code No. 4; in Self-diagnosis STEP 4.
- Disconnect auto amp harness connector after turning ignition switch OFF.
- Check if continuity exists between terminal ② or ① of auto amp harness connector and body ground.
- Using above procedure, check for continuity in any other mode, as indicated in chart.

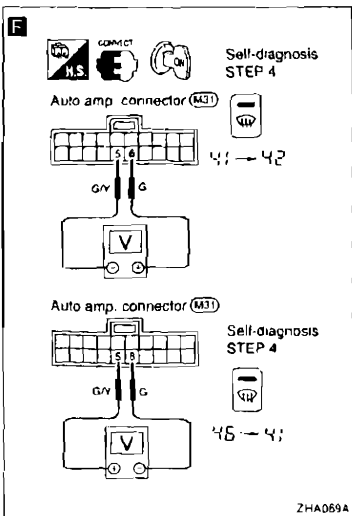
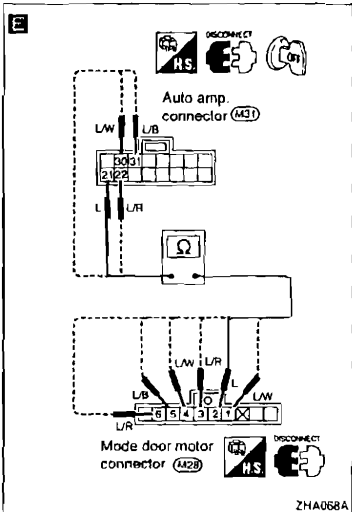
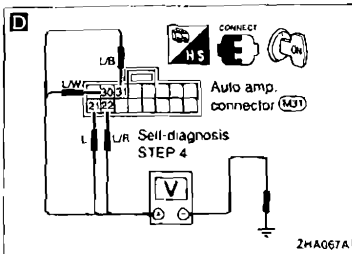
| Code No.   | Condition | Terminal No. |   | Continuity         |
|------------|-----------|--------------|---|--------------------|
|            |           | ⊕            | ⊖ |                    |
| 4; ;       | VENT      | ① or ②       | ⊖ | Body ground<br>Yes |
| 4; or 4; ; | B/L       | ③ or ④       | ⊖ |                    |
| 44         | FOOT      | ⑤ or ⑥       | ⊖ |                    |
| 45         | F/D       | ⑦ or ⑧       | ⊖ |                    |
| 46         | DEF       | ⑨ or ⑩       | ⊖ |                    |



Note:

If the result is NG after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 5 (Cont'd)



**D**

CHECK MODE DOOR MOTOR POSITION SWITCH

Set up Self-diagnosis STEP 4.

Measure voltage across auto amp harness terminals and body ground.

| Code No  | Con-<br>dition | Terminal No |    |    |    | Body<br>ground |
|----------|----------------|-------------|----|----|----|----------------|
|          |                | Ⓜ           | Ⓝ  | Ⓞ  | Ⓟ  |                |
| 41       | VENT           | 5V          | 0V | 5V | 0V | Yes            |
| 42 or 43 | B/L            | 5V          | 5V | 0V | 0V |                |
| 44       | FOOT           | 5V          | 0V | 0V | 5V |                |
| 45       | F/O            | 0V          | 0V | 5V | 5V |                |
| 46       | DEF            | 0V          | 5V | 0V | 5V |                |

0V Approx 0V  
5V Approx 5V

**E**

Note

Check circuit continuity between each terminal on auto amp and on mode door motor

| Terminal No |                   | Continuity |
|-------------|-------------------|------------|
| Ⓜ           | Ⓝ                 |            |
| Auto amp. Ⓜ | Mode door motor Ⓝ | Yes        |
| Ⓜ           | Ⓝ                 |            |
| Ⓜ           | Ⓞ or Ⓟ            |            |
| Ⓜ           | Ⓟ or Ⓠ            |            |
| Ⓜ           | Ⓠ                 |            |

OK →

NG → Replace mode door motor

OK →

Replace auto amp

**F**

CHECK FOR OUTPUT OF AUTO AMP

Do approx 10.5 volts exist between auto amp harness terminals Ⓜ and Ⓝ when code No. is switched from "41" to "42" or when code No. is switched from "46" to "41"?

No → Replace auto amp.

| Code No | Mode door motor operation | Terminal No |   | Voltage V   |
|---------|---------------------------|-------------|---|-------------|
|         |                           | Ⓜ           | Ⓝ |             |
| 41 → 42 | VENT → B/L                | Ⓜ           | Ⓝ | Approx 10.5 |
| 46 → 41 | DEF → VENT                | Ⓜ           | Ⓝ |             |
| -       | Stop                      | -           | - | 0           |

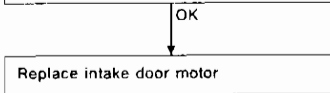
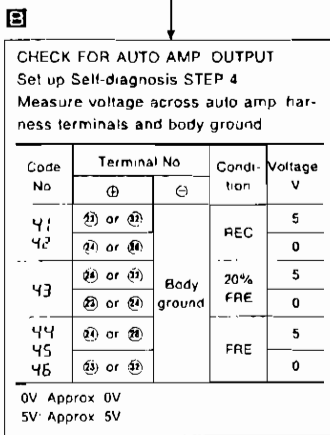
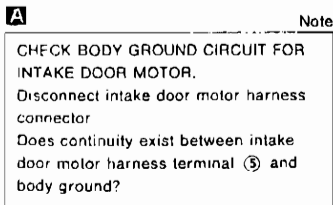
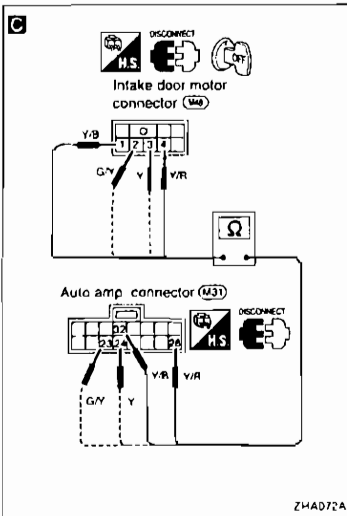
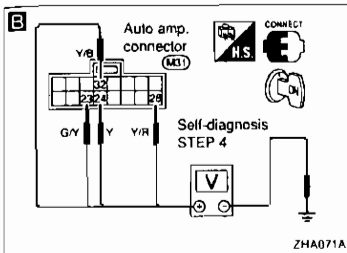
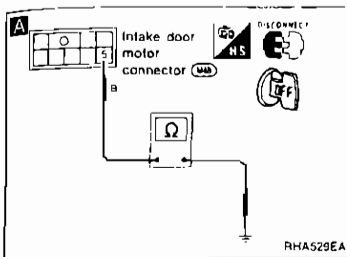
Yes → Replace mode door motor.

Note:  
If the result is NG after checking circuit continuity, repair harness or connector

## Diagnostic Procedure 6

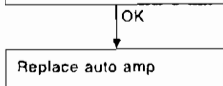
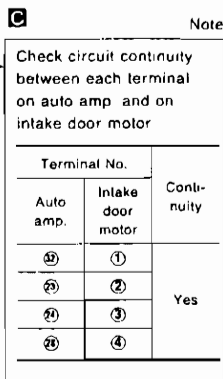
SYMPTOM: Intake door motor does not operate normally.

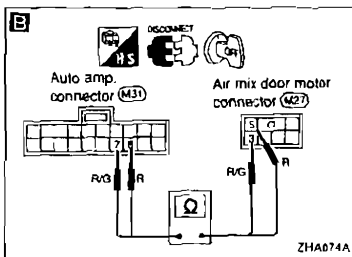
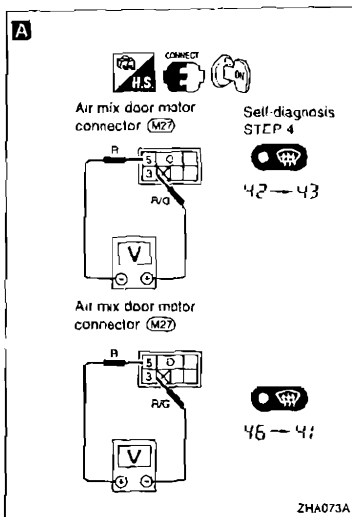
- Perform Self-diagnosis STEPS 1, 2 and 4 before referring to the flow chart.



Note:

If the result is NG after checking circuit continually, repair harness or connector.

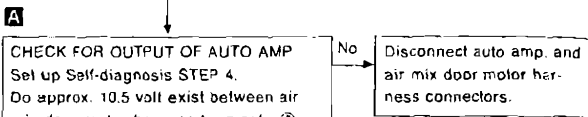
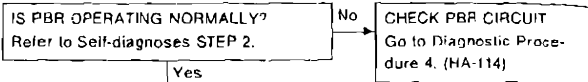




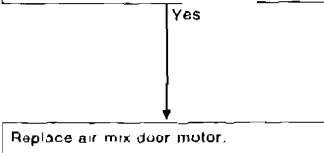
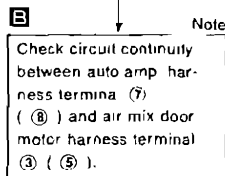
## Diagnostic Procedure 7

**SYMPTOM:** Air mix door motor does not operate normally.

- Perform Self-diagnosis STEPS 1, 2 and 4 before referring to the following flow chart.



| Code No. | Air mix door operation | Terminal No. |     | Voltage V   |
|----------|------------------------|--------------|-----|-------------|
|          |                        | (3)          | (5) |             |
| 42 →     | Cold                   | ⊕            | ⊖   | Approx 10.5 |
| 43 →     | Hot                    | ⊖            | ⊕   |             |
| 45 →     | Hot                    | ⊖            | ⊕   |             |
| 41 →     | Cold                   | ⊕            | ⊖   |             |
| -        | Stop                   | -            | -   | 0           |



Replace auto amp.

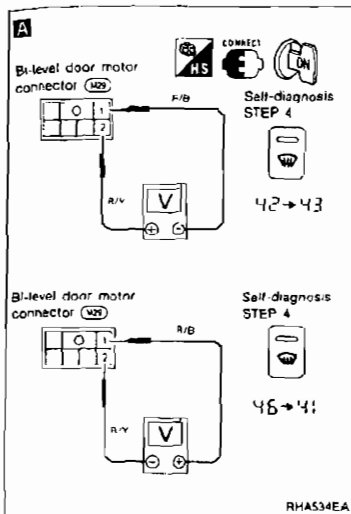
**Note:**

If the result is NG after checking circuit continuity, repair harness or connector.

## Diagnostic Procedure 8

**SYMPTOM:** Bi-level (B/L) door motor does not operate normally.

- Perform Self-diagnosis STEP 4 before referring to the following flow chart.

**A**

## CHECK FOR AUTO AMP. OUTPUT

Set up Self-diagnosis STEP 4

Do approx 12 volts exist between B/L door motor harness terminals ① and ② when code No is switched from "42" to "43" or when code No is switched from "46" to "41"?

| Code No    | B/L door condition | Terminal No |   | Voltage V    |
|------------|--------------------|-------------|---|--------------|
|            |                    | ①           | ② |              |
| 42<br>→ 43 | OPEN<br>→<br>CLOSE | ⊖           | ⊕ | Approx<br>12 |
| 46<br>→ 41 | CLOSE<br>→<br>OPEN | ⊕           | ⊖ |              |

Yes

Replace B/L door motor.

No

Disconnect auto amp harness connector

**B**

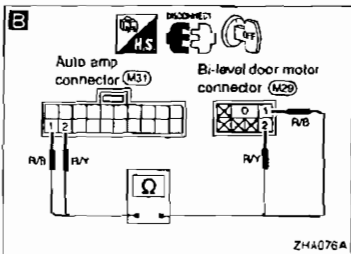
Note

Check circuit continuity between auto amp harness terminal ① (②) and bi-level door motor harness terminal ① (②).

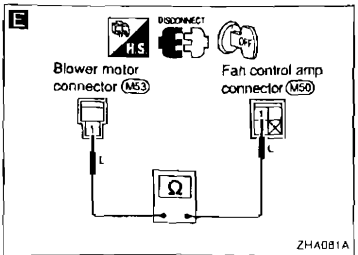
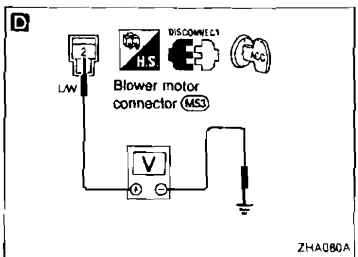
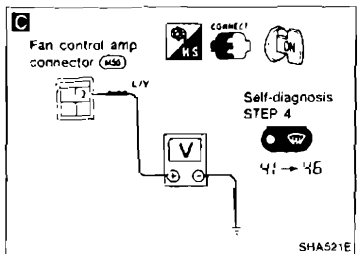
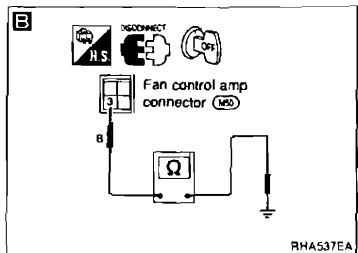
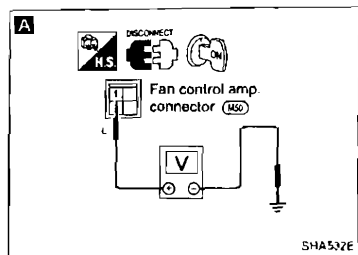
Replace auto amp.

**Note:**

If the result is NG after checking circuit continuity, repair harness or connector.



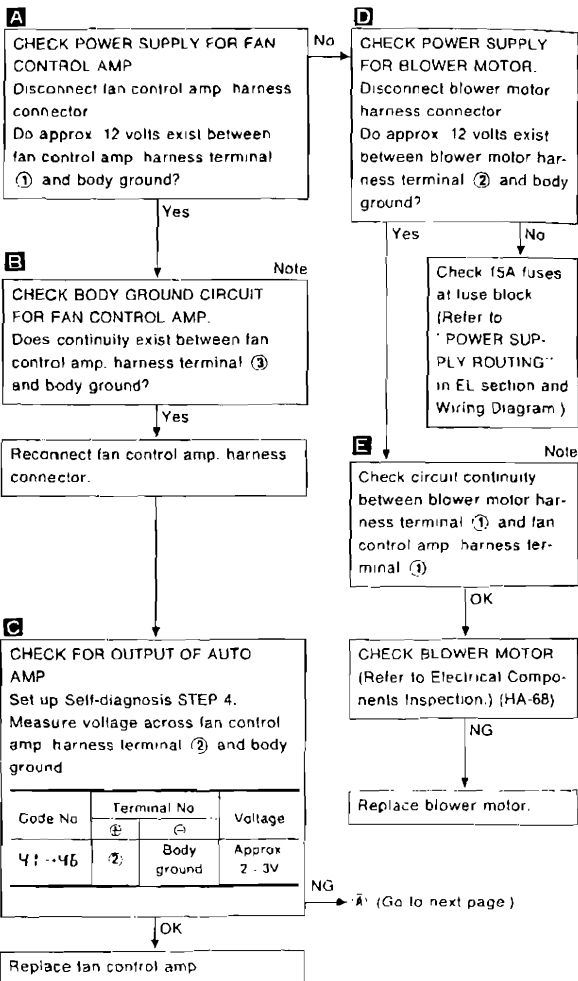




## Diagnostic Procedure 9

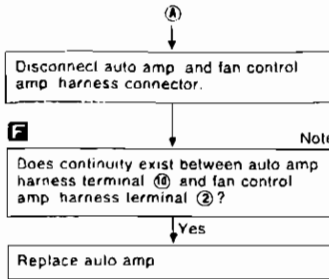
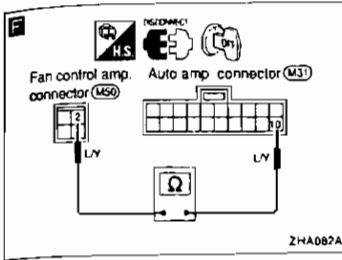
**SYMPTOM:** Blower motor operation is malfunctioning under out of Starting Fan Speed Control.

- Perform Preliminary Check 5 before referring to the following flow chart.

**Note:**

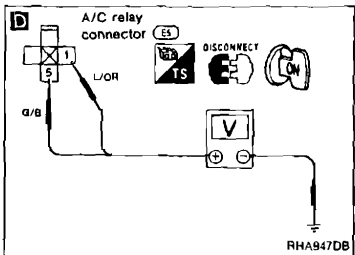
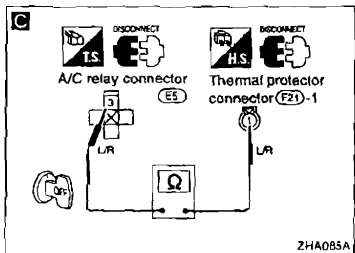
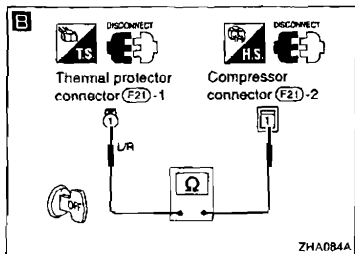
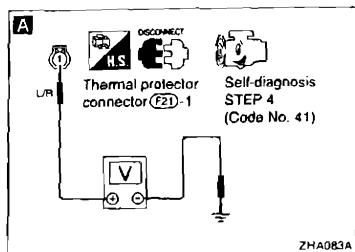
If the result is NG after checking circuit continuity, repair harness or connector.

## Diagnostic Procedure 9 (Cont'd)

**Note:**

If the result is NG after checking circuit continuity, repair harness or connector.

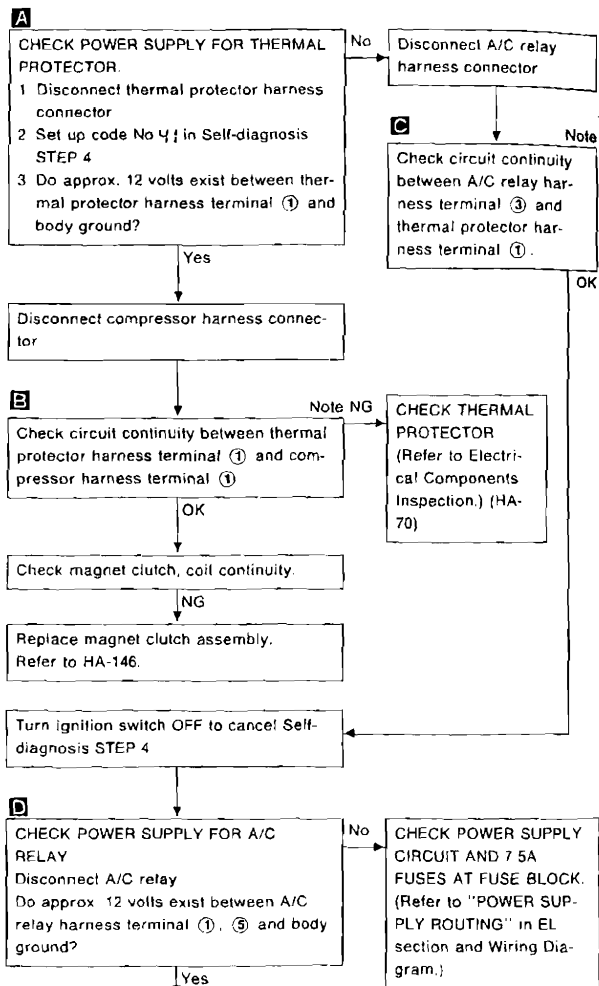
HA  
FI  
FI  
LC  
EC  
FF  
CI  
HT  
FT  
FD  
A  
FI  
FI  
HT  
RT  
RS  
RT  
HA  
FI  
FI



## Diagnostic Procedure 10

**SYMPTOM:** Magnet clutch does not engage after performing Preliminary Check 6.

- Perform Preliminary Check 6 before referring to the flow chart.

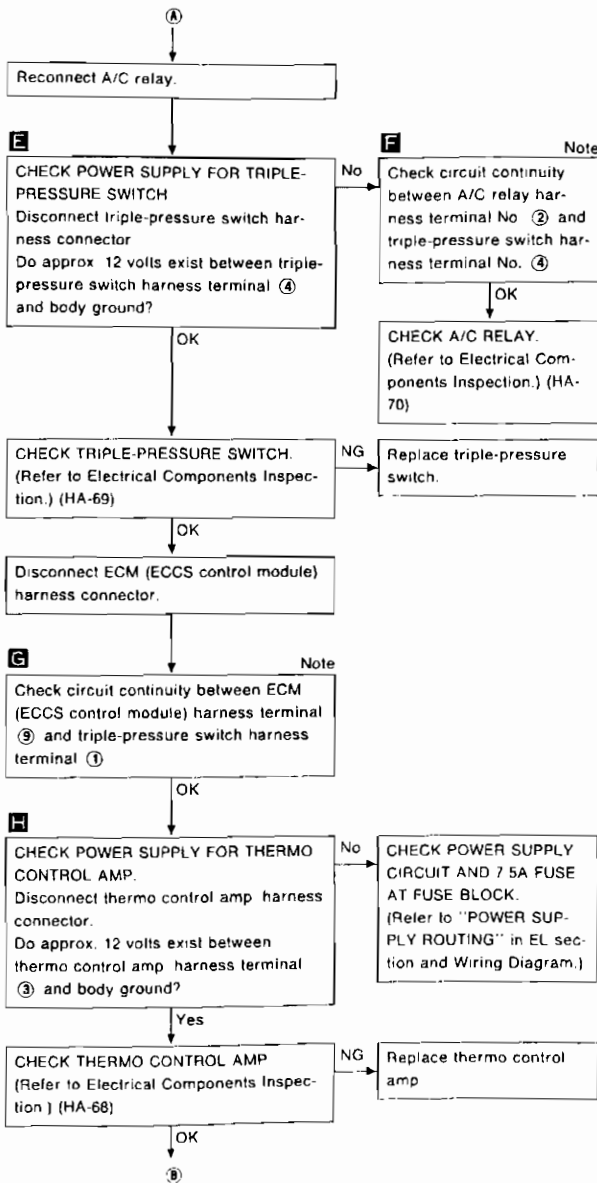
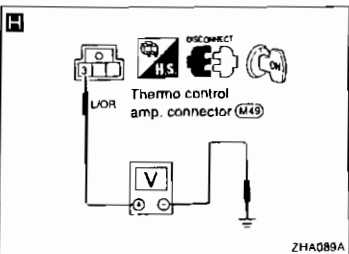
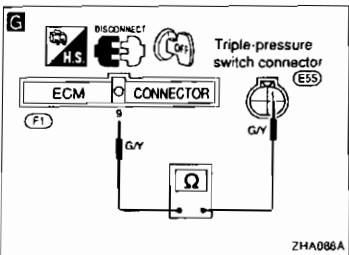
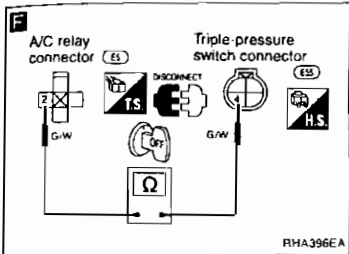
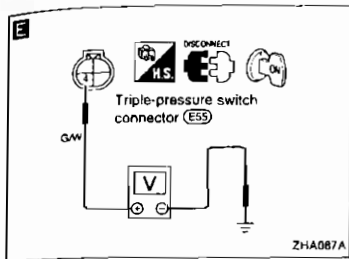


(Go to next page)

**Note:**

If the result is NG after checking circuit continuity, repair harness or connector.

## Diagnostic Procedure 10 (Cont'd)



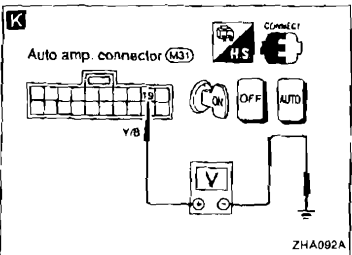
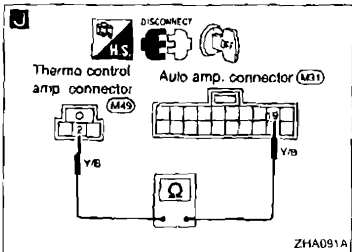
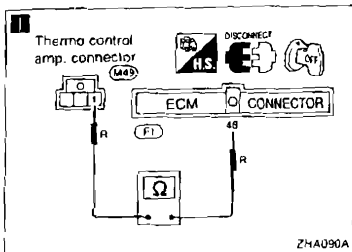
(Go to next page.)

Note:

If the result is NG after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES

Diagnostic Procedure 10 (Cont'd)



⑥

**I** Note

Check circuit continuity between ECM (ECCS control module) harness terminal ④ and thermo control amp harness terminal ①

Disconnect auto amp harness connector

**J** Note

Check circuit continuity between auto amp harness terminal ④ and thermo control amp harness terminal ②

Reconnect auto amp harness connector.

**K**

CHECK FOR AUTO AMP. OUTPUT

Measure voltage between auto amp harness terminal ⑱ and body ground

| Condition      | Terminal No |             | Voltage     |
|----------------|-------------|-------------|-------------|
|                | ⊕           | ⊖           |             |
| Auto switch ON | ⑱           | Body ground | Approx. 0V  |
| OFF            |             |             | Approx. 12V |
| switch ON      |             |             |             |

NG → Replace auto amp

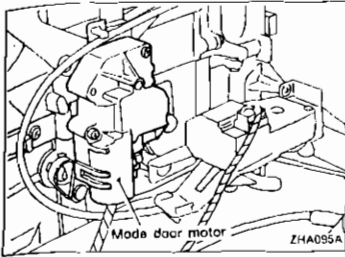
OK

CHECK ECM (ECCS CONTROL MODULE).

(Refer to EC section.)

Note:

If the result is NG after checking circuit continuity, repair harness or connector.

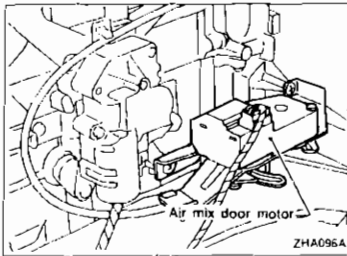


**Control Linkage Adjustment**

**MODE DOOR**

1. Install mode door motor on heater unit and connect it to main harness.
2. Set up code No. 45 in Self-diagnosis STEP 4
3. 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 | F/D | DEF |



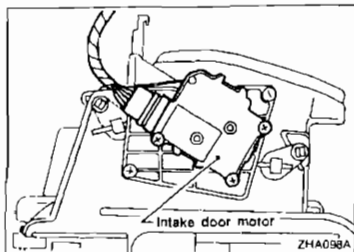
**AIR MIX DOOR**

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
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 |    |    |

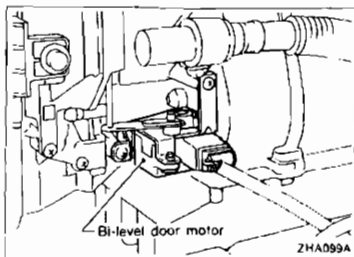
## Control Linkage Adjustment (Cont'd)

## INTAKE DOOR



1. Install intake door motor on intake unit and connect it to main harness.  
Make sure lever of intake door motor is fitted in the slit of intake door link.
2. Set up code No 41 in Self-diagnosis STEP 4.
3. 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 |    |



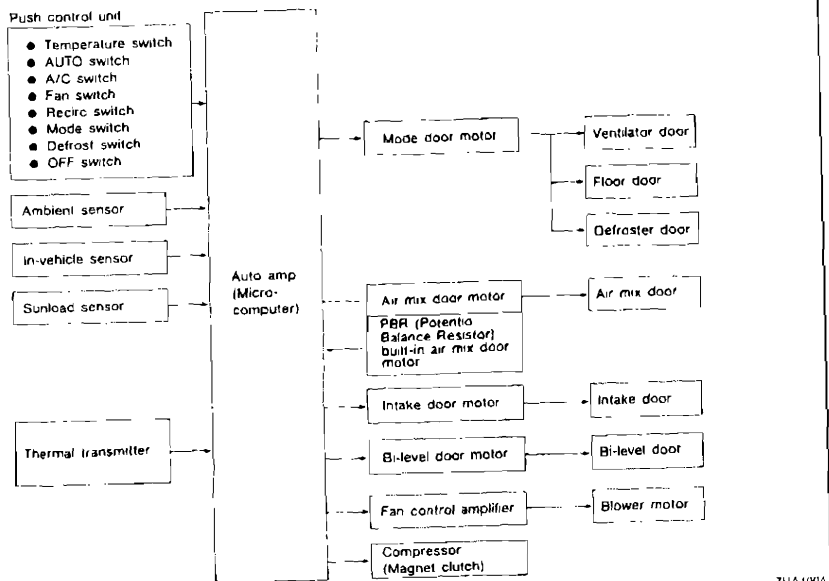
## BI-LEVEL DOOR

1. Install Bi-level door motor on cooling unit and connect it to main harness.  
Make sure lever of bi-level door motor is fitted in the slit of bi-level door link.
2. Set up code No 46 in self-diagnosis STEP 4.
3. Make sure Bi-level door operates properly when changing from code No. 41 to 46 by pushing DEF switch.

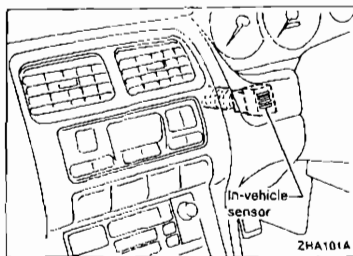
|      |    |    |       |    |    |
|------|----|----|-------|----|----|
| 41   | 42 | 43 | 44    | 45 | 46 |
| OPEN |    |    | CLOSE |    |    |

## Overview of Control System

The control system consists of a) input sensors and switches, b) the auto amp (microcomputer), and c) outputs. The relationship of these components is shown in the diagram below:







## Control System Input Components

### POTENTIO TEMPERATURE CONTROL (PTC)

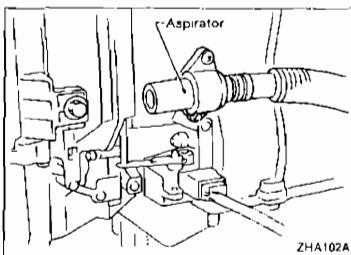
The PTC is built into the auto amp. It can be set at an interval of 1°C (2°F) through both **(H)** (HOT) and **(C)** (COLD) control switches. Setting temperature is digitally displayed.

### IN-VEHICLE SENSOR

The in-vehicle sensor is attached to cluster lid A. It converts variations in temperature of compartment air drawn from an aspirator into a resistance value. It is then input into the auto amp.

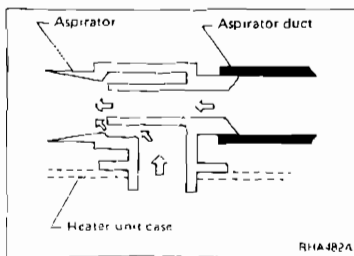
After disconnecting in-vehicle sensor harness connector, measure resistance between terminals **(1)** and **(2)** at sensor harness side, using the table below.

| 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          |



### ASPIRATOR

The aspirator is located on heater unit. It produces vacuum pressure due to air discharged from the heater unit, continuously taking compartment air in the aspirator.

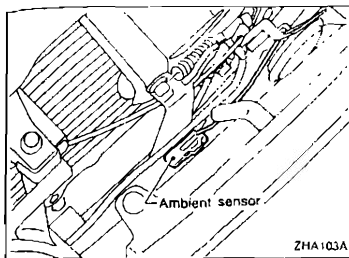


## Control System Input Components (Cont'd)

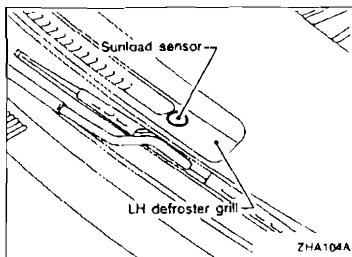
## AMBIENT SENSOR

The ambient sensor is attached to the hood rock stay. It detects ambient temperature and converts it into a resistance value which is then input to the auto amp.

After disconnecting ambient 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          |



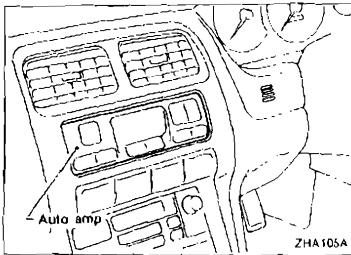
## SUNLOAD SENSOR

The sunload sensor is located on the LH defroster grille. It detects sunload entering through windshield by means of a photo diode and converts it into a current value which is then input to the auto amp.

Measure voltage between terminals ① and ② at vehicle harness side, using the table below.

| Input current<br>mA | Output voltage<br>V |
|---------------------|---------------------|
| 0                   | 5                   |
| 0.05                | 4.2                 |
| 0.1                 | 3.4                 |
| 0.15                | 2.6                 |
| 0.2                 | 1.8                 |
| 0.25                | 1.0                 |

- When checking sunload sensor, select a place where sun shines directly on it.



### Control System Automatic Amplifier (Auto amp.)

The auto amplifier has a built-in microcomputer which processes information sent from various sensors needed for air conditioning operation. The air mix door motor, mode door motor, intake door motor, bi-level door motor, blower motor, and compressor are then controlled.

The auto amp is unitized with control mechanisms. Signals from various switches are directly entered into auto amplifier. Self-diagnostic functions are also built into auto amp, to provide quick check of malfunctions in the auto air conditioning system.

### AMBIENT TEMPERATURE INPUT PROCESS

The auto amp. includes a "processing circuit" for the ambient sensor input. When the ambient temperature increases quickly, the processing circuit controls the input from the ambient sensor. It allows the auto amp. to recognize the increase of temperature only 0.2°C (0.4°F) per 60 seconds. As an example, consider stopping for a cup of coffee after high speed driving. Even though the ambient temperature has not changed, the ambient sensor will detect the increase of temperature. The heat radiated from the engine compartment can radiate to the front grille area. The ambient sensor is located there.

### SUNLOAD INPUT PROCESS

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. As a result, the effect the above mentioned 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.

## Control System Output Components

### AIR MIX DOOR CONTROL (Automatic temperature control)

#### Component parts

Air mix door control system components are:

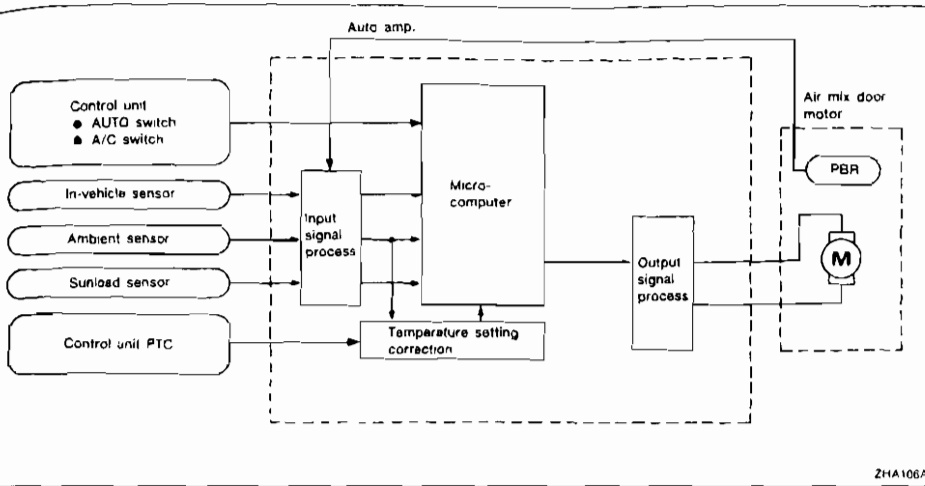
- 1) Auto amp.
- 2) Air mix door motor (PBR)
- 3) In-vehicle sensor
- 4) Ambient sensor
- 5) Sunload sensor

#### System operation

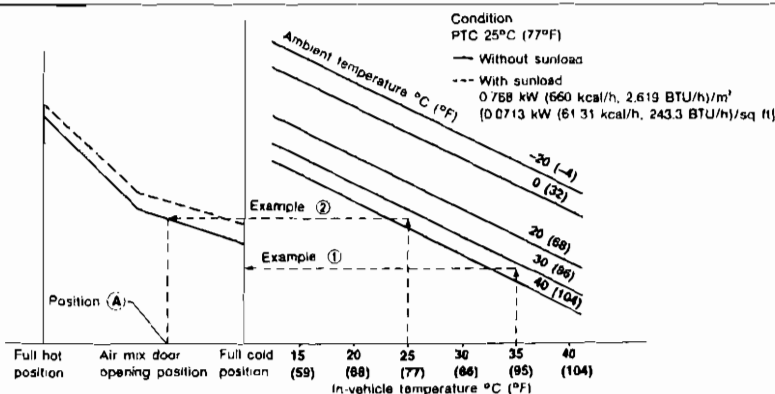
Temperature set by Potentio Temperature Control (PTC) is compensated through setting temperature correction circuit to determine target temperature.

Auto amp. will operate air mix door motor to set air conditioning system in HOT or COLD position, depending upon relationship between conditions (target temperature, sunload, in-vehicle temperature, and ambient temperature) and conditions (air mix door position and compressor operation).

Control System Output Components (Cont'd)



Air mix door control specification

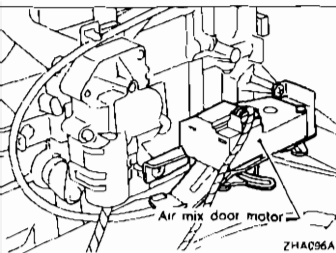


- Example:
- ① If temperature setting is set at 25°C (77°F) under no sunload condition when ambient and in-vehicle temperature are 35°C (95°F) air mix door is initially automatically set in full cold position
  - ② Within some period, in-vehicle temperature will lower towards the objective temperature, and the air mix door position will shift incrementally towards the hot side and finally stay in this position (A).  
 Air mix door opening position is always fed back to auto amplifier by PBR built-in air mix door motor

SHA523E

AIR MIX DOOR MOTOR

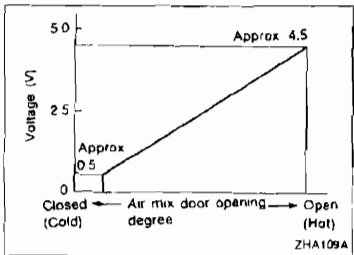
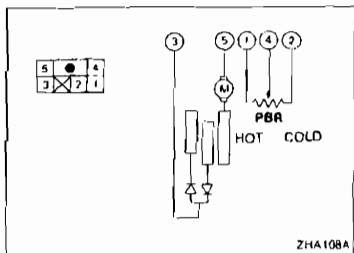
The air mix door motor is attached to the bottom of the heater unit. It rotates so that the air mix door is opened to a position set by the auto amp. Motor rotation is then conveyed through a shaft and air mix door position is then fed back to the auto amp. by PBR built-in air mix door motor.



Control System Output Components (Cont'd)

Air mix door operation

|   |   |                        |  |
|---|---|------------------------|--|
| 3 | 5 | Air mix door operation | Direction of lever movement                  |
| ⊕ | ⊖ | COLD · HOT             | Clockwise (Toward passenger compartment)     |
| — | — | STOP                   | STOP   |
| ⊖ | ⊕ | HOT · COLD             | Counterclockwise (Toward engine compartment) |



PBR characteristics

Measure voltage between terminals ④ and ② at vehicle harness side.

MODE DOOR CONTROL

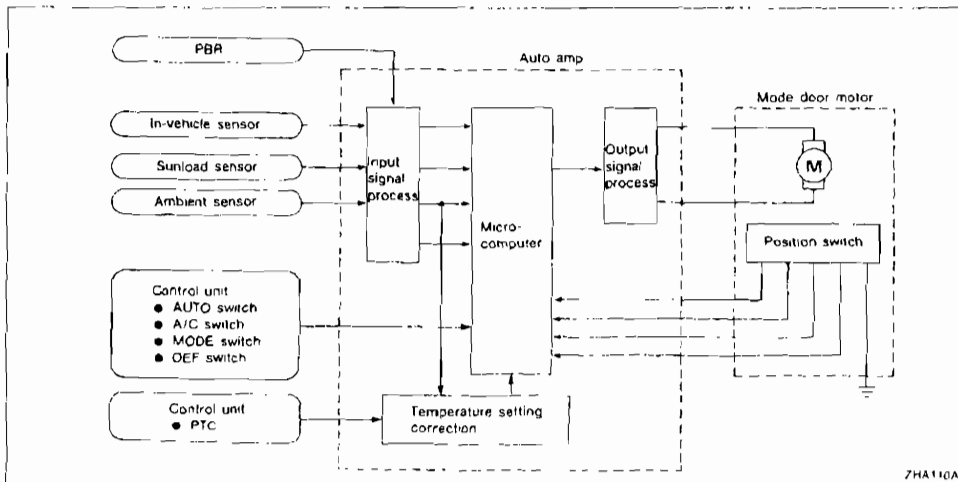
Component parts

Mode door control system components are:

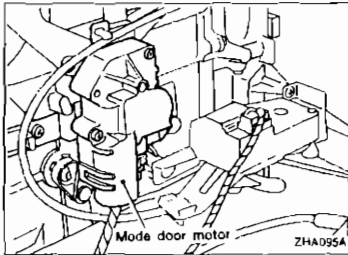
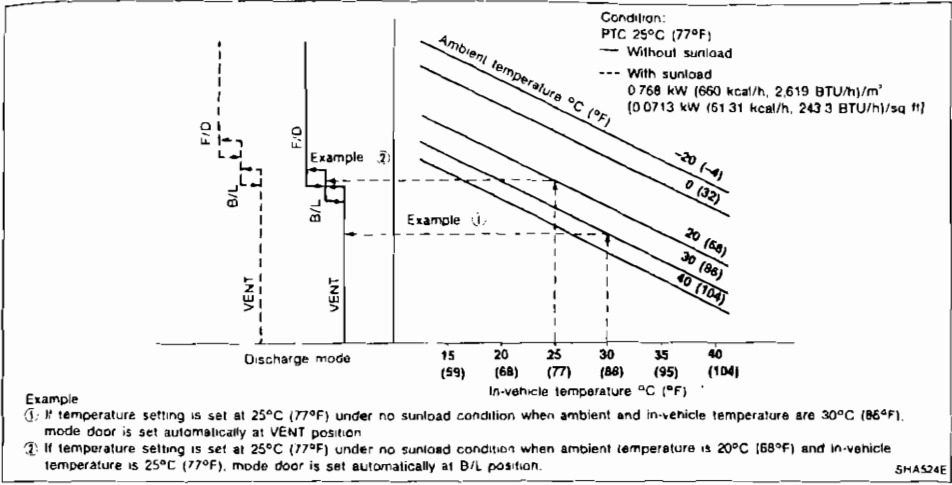
- 1) Auto amp.
- 2) Mode door motor
- 3) PBR
- 4) In-vehicle sensor
- 5) Ambient sensor
- 6) Sunload sensor

System operation

The auto amp. computes the air discharge conditions according to the ambient temperature and the in-vehicle temperature. The computed discharge conditions are then corrected for sunload. By this correction, it is determined through which outlets air will flow into the passenger compartment.



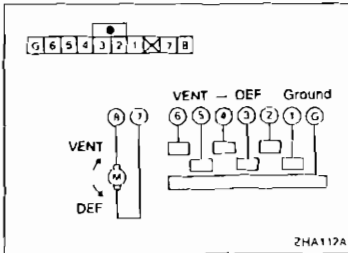
Control System Output Components (Cont'd)  
Mode door control specification



MODE DOOR MOTOR

The mode door motor is attached to the heater unit. It rotates so that air is discharged from the outlet set by the auto amp. Motor rotation is conveyed to a link which activates the mode door.

| 7 | 8 | Mode door operation | Direction of side link rotation |
|---|---|---------------------|---------------------------------|
| ⊕ | ⊖ | VENT → DEF          | Counterclockwise                |
| — | — | STOP                | STOP                            |
| ⊖ | ⊕ | DEF → VENT          | Clockwise                       |



## Control System Output Components (Cont'd)

### INTAKE DOOR CONTROL

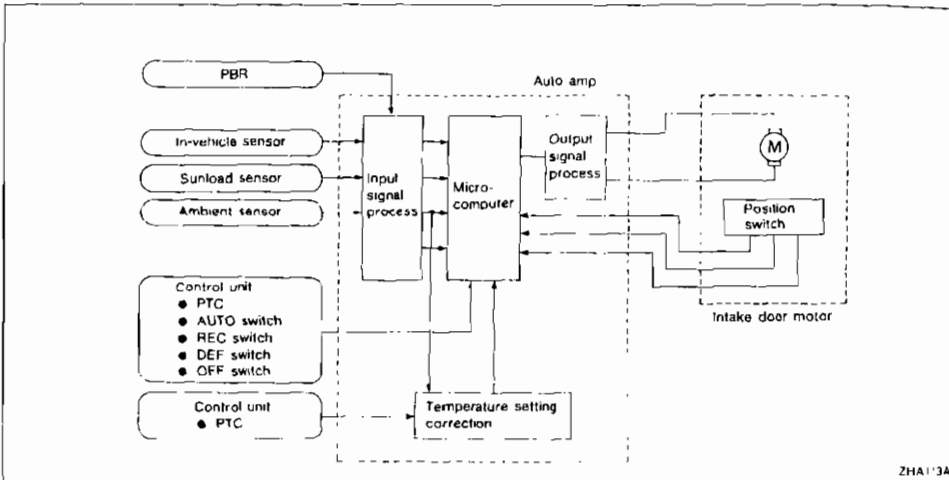
#### Components parts

Intake door control system components are.

- 1) Auto amp.
- 2) Intake door motor
- 3) PBR
- 4) In-vehicle sensor
- 5) Ambient sensor
- 6) Sunload sensor

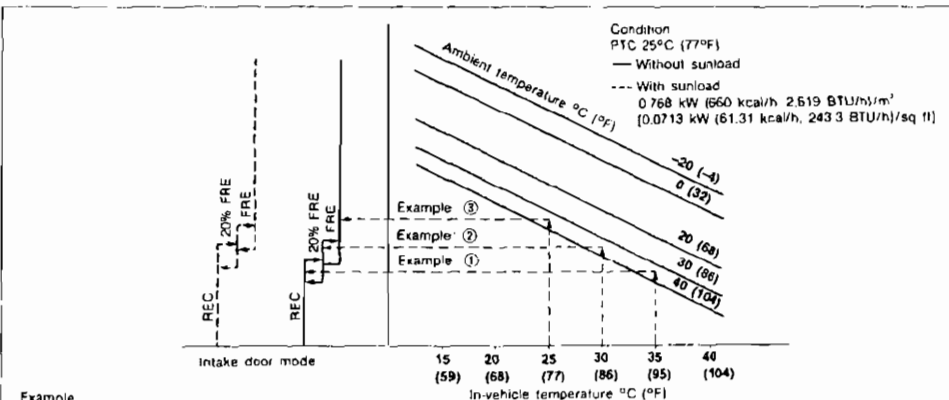
#### System operation

The intake door control determines intake door position based on the ambient temperature and the in-vehicle temperature. When the DEF button is pushed, the auto amp. sets the intake door at the "Fresh" position.



ZHA13A

### Intake door control specification



**Example**

1. If temperature setting is set at 25°C (77°F) under no sunload condition when ambient and in-vehicle temperature are 35°C (95°F) intake door is set automatically at REC position to make in-vehicle temperature cool down efficiently
2. In-vehicle temperature will lower and when 30°C (86°F) is reached, intake door will shift to 20% FRE position
3. In the state when in-vehicle temperature reaches the objective temperature 25°C (77°F) intake door is set at FRE position

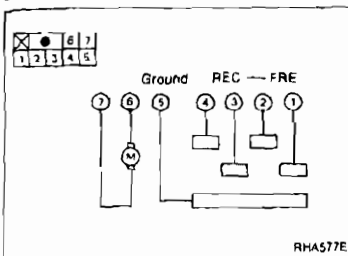
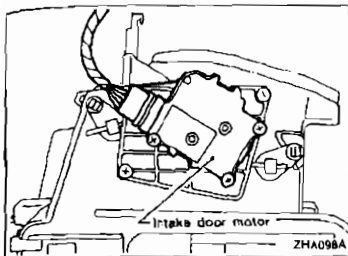
SH4525E

**Control System Output Components (Cont'd)**  
**INTAKE DOOR MOTOR**

The intake door motor is attached to the intake unit. It rotates so that air is drawn from inlets set by the auto amp. Motor rotation is conveyed to a lever which activates the intake door

**Intake door motor operation**

| 6 | 7 | Intake door operation | Movement of link rotation |
|---|---|-----------------------|---------------------------|
| ⊕ | ⊖ | REC → FRE             | Counterclockwise          |
| — | — | STOP                  | STCP                      |
| ⊖ | ⊕ | FRE → REC             | Clockwise                 |



**FAN SPEED CONTROL**

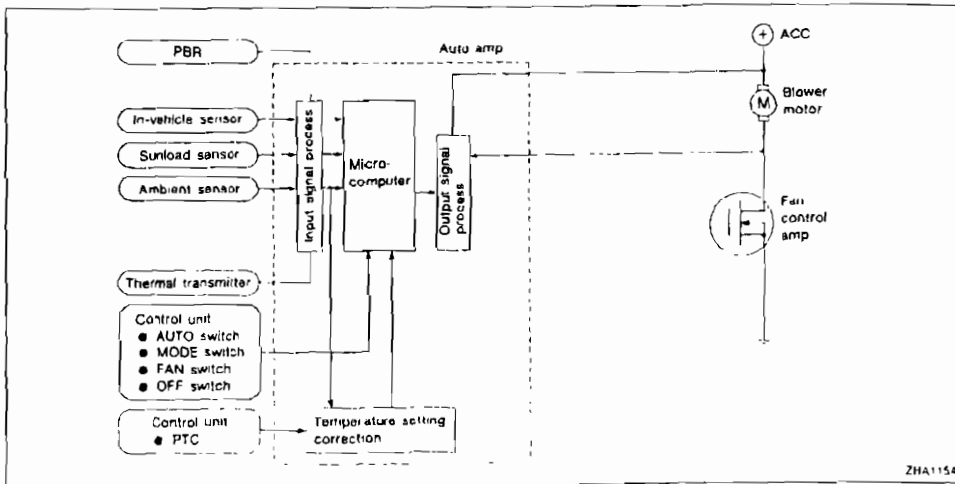
**Component parts**

Fan speed control system components are:

- 1) Auto amp.
- 2) Fan control amplifier
- 3) PBR

- 4) In-vehicle sensor
- 5) Ambient sensor
- 6) Sunload sensor
- 7) Thermal transmitter

**System operation**





Control System Output Components (Cont'd)

**AUTOMATIC MODE**

In the automatic mode, the blower motor speed is calculated by the auto amp. based on inputs from the PBR, in-vehicle sensor, sunload sensor, and ambient sensor. The blower motor applied voltage ranges from approximately 4 volts (lowest speed) to 12 volts (highest speed).

To control blower speed (in the range of 2V to 3V), the auto amp. supplies a signal to the fan control amplifier. Based on this signal, the fan control amplifier controls the current flow from the blower motor to ground

**STARTING FAN SPEED CONTROL**

**Start up from "COLD SOAK" condition (Automatic mode)**

In a cold start up condition where the engine coolant temperature is below 50°C (122°F) and mode door position is BI-LEVEL, F/D or FOOT, the blower will not operate for a short period of time (up to 150 seconds). The exact start delay time varies depending on the ambient and in-vehicle temperature.

In the most extreme case (very low ambient) the blower starting delay will be 150 seconds. After this delay, the blower will operate at low speed

until the engine coolant temperature rises above 50°C (122°F). Then the blower speed will increase to the objective speed

**Start up from normal or "HOT SOAK" condition (Automatic mode)**

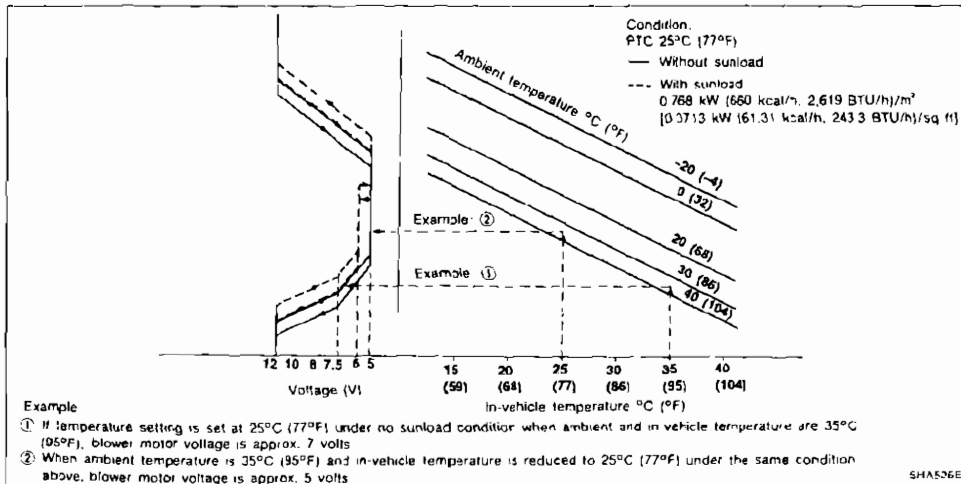
The blower will begin operation momentarily after the AUTO switch is pushed. The blower speed will gradually rise to the objective speed over a time period of 8 seconds or less (actual time depends on the objective blower speed). If the in-vehicle temperature is 35°C (95°F) or more, the blower will not operate for 3 seconds after AUTO switch is pushed

**BLOWER SPEED COMPENSATION**

**Sunload**

When the in-vehicle temperature and the set temperature are very close, the blower will operate at low speed. With the mode door in the VENT position, the low speed varies depending on the sunload. During conditions of high sunload, the blower low speed will rise (approx. 6.0V). During lesser sunload conditions, the low speed will drop to "normal" low speed (approx 5.0V).

Fan speed control specification



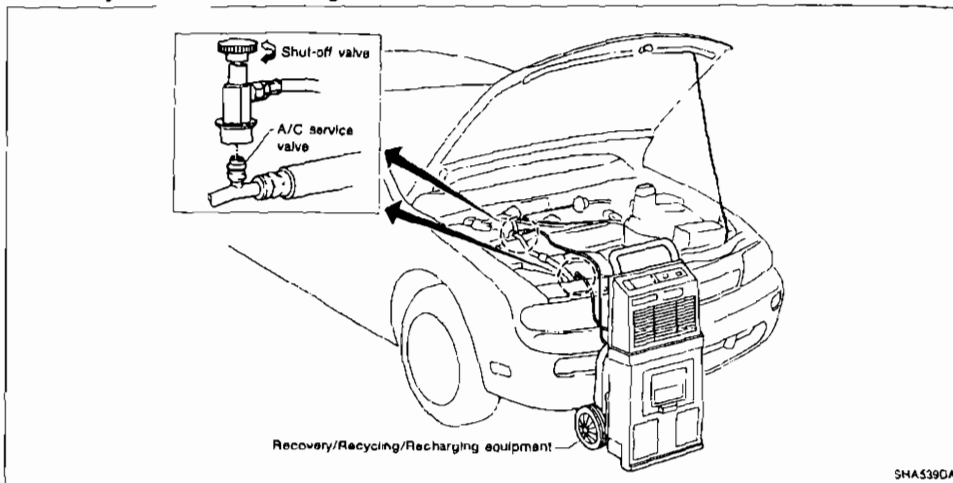


HFC-134a (R-134a) Service Procedure  
 SETTING OF SERVICE TOOLS AND EQUIPMENT

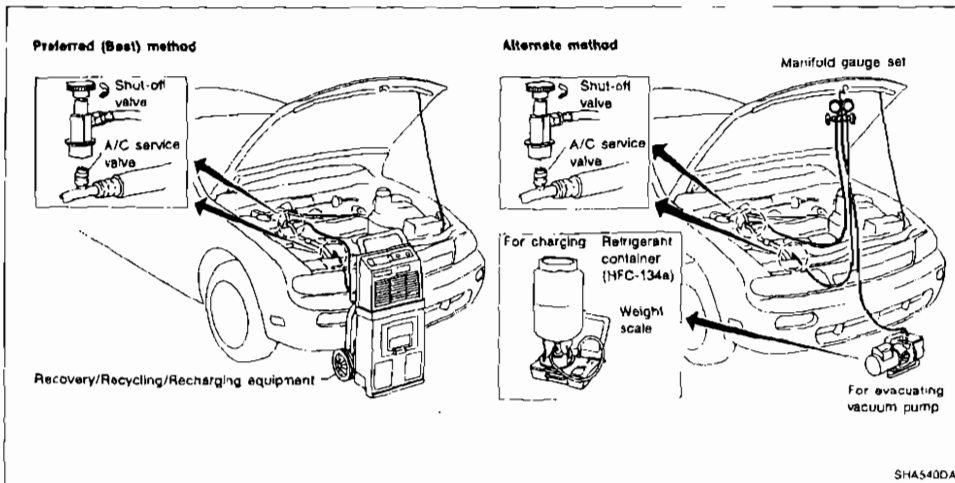
DISCHARGING REFRIGERANT

WARNING:

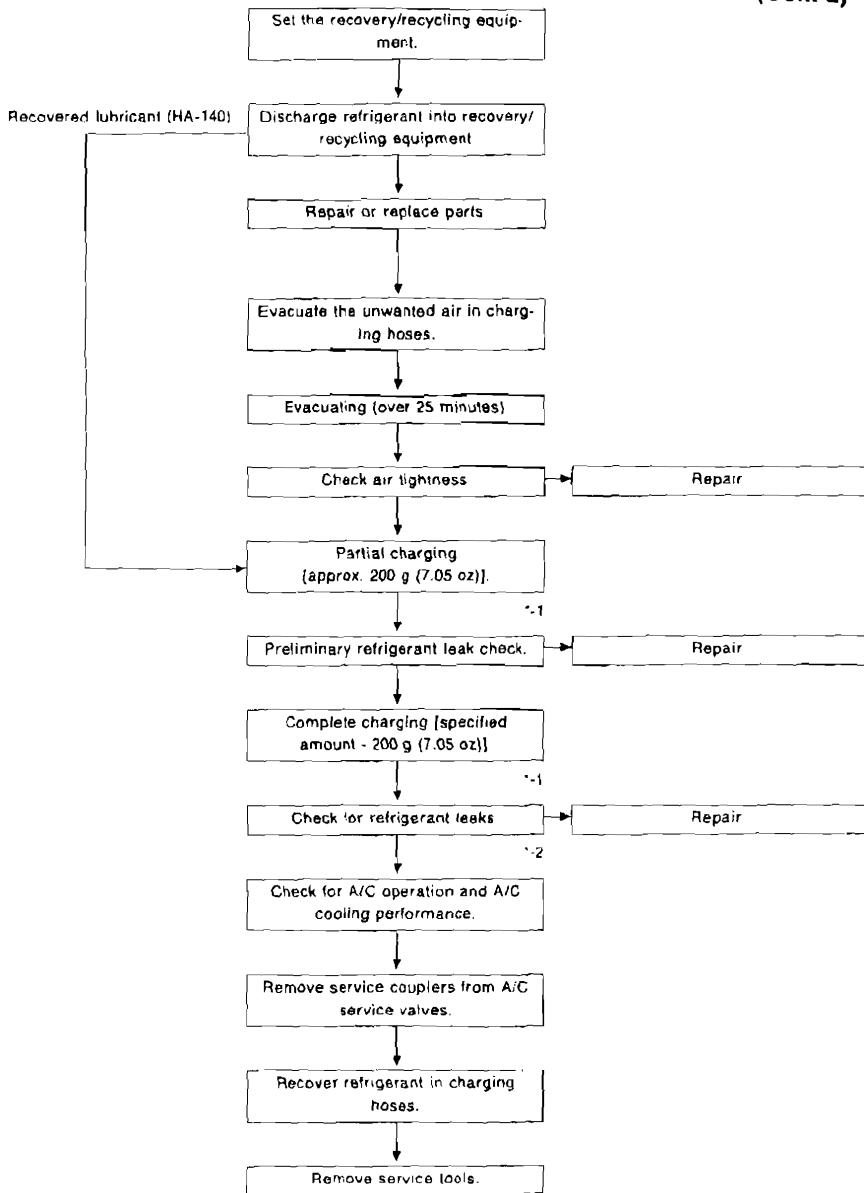
Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. Remove HFC-134a (R-134a) from A/C system using certified service equipment meeting requirements of HFC-134a (R-134a) recycling equipment or HFC-134a (R-134a) recovery equipment. If accidental system 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



HFC-134a (R-134a) Service Procedure (Cont'd)



Note \*-1 Before charging refrigerant, ensure engine is off

\*-2 Before checking for leaks, start engine to activate air conditioning system then turn it off  
Service valve caps must be attached to valves (to prevent leakage)

## Maintenance of Lubricant Quantity in Compressor

The lubricant used to lubricate 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)

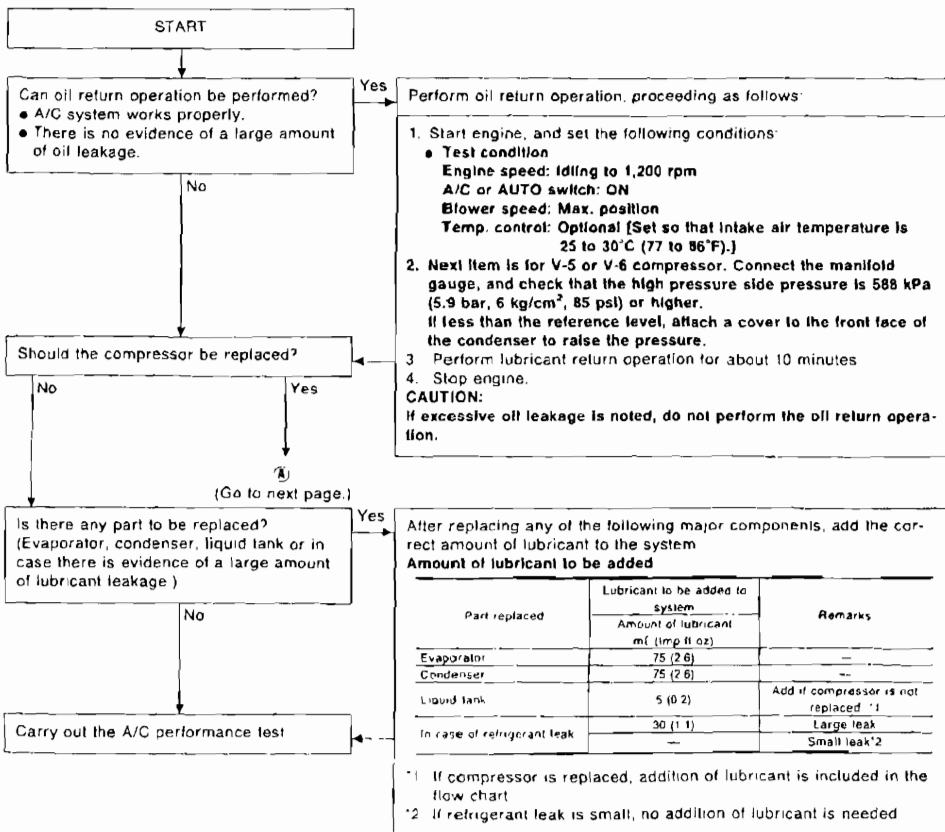
### LUBRICANT

**Name:** Nissan A/C System Oil Type R

**Part number:** KLH00-PAGR0

### CHECKING AND ADJUSTING

Adjust the lubricant quantity according to the flowchart shown below.

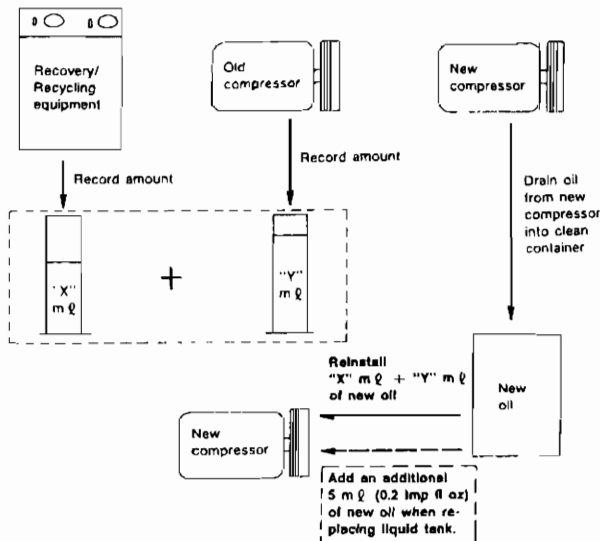


## Maintenance of Lubricant Quantity in Compressor (Cont'd)

(A)

1. Discharge refrigerant into the refrigerant recovery/recycling equipment. Measure oil discharged into the recovery/recycling equipment.
2. Remove the drain plug of the "old" (removed) compressor (applicable only to V-5, V-6 or DKS-16H compressor). Drain the oil into a graduated container and record the amount of drained oil.
3. Remove the drain plug and drain the oil from the "new" compressor into a separate, clean container.
4. Measure an amount of new oil installed equal to amount drained from "old" compressor. Add this oil to "new" compressor through the suction port opening.
5. Measure an amount of new oil equal to the amount recovered during discharging. Add this oil to "new" compressor through the suction port opening.
6. Torque the drain plug
  - V-5 or V-6 compressor: 18 - 19 N·m (1.8 - 1.9 kg·m, 13 - 14 ft·lb)
  - DKS-16H compressor: 14 - 16 N·m (1.4 - 1.6 kg·m, 10 - 12 ft·lb)
7. If the liquid tank also needs to be replaced, add an additional 5 mℓ (0.2 Imp fl oz) of oil at this time. Do not add this 5 mℓ (0.2 Imp fl oz) of oil if only replacing the compressor.

### Oil adjusting procedure for compressor replacement



R11A065DC

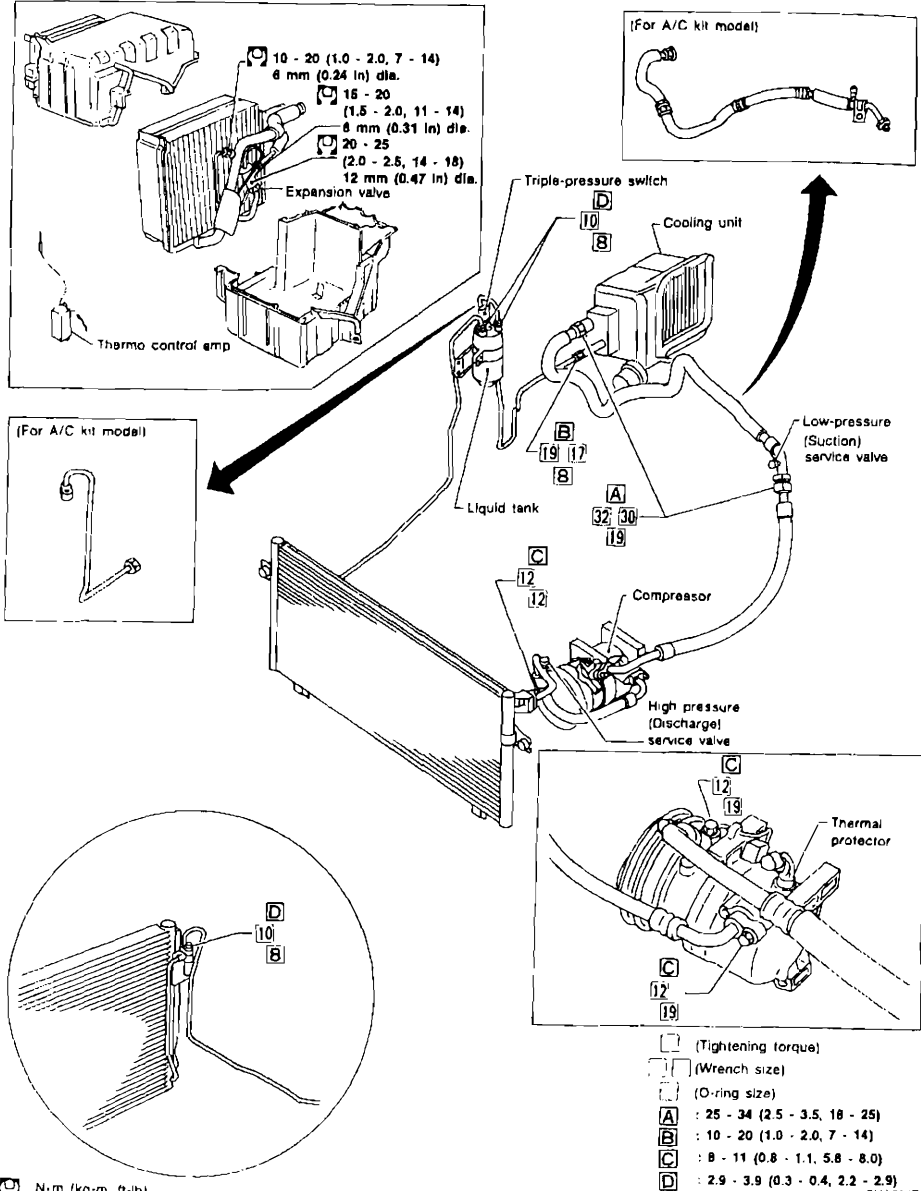
HA

Refrigerant Lines

• Refer to HA-4 regarding "Precautions for Refrigerant Connection".

LHD MODEL

SEC. 271-272-276



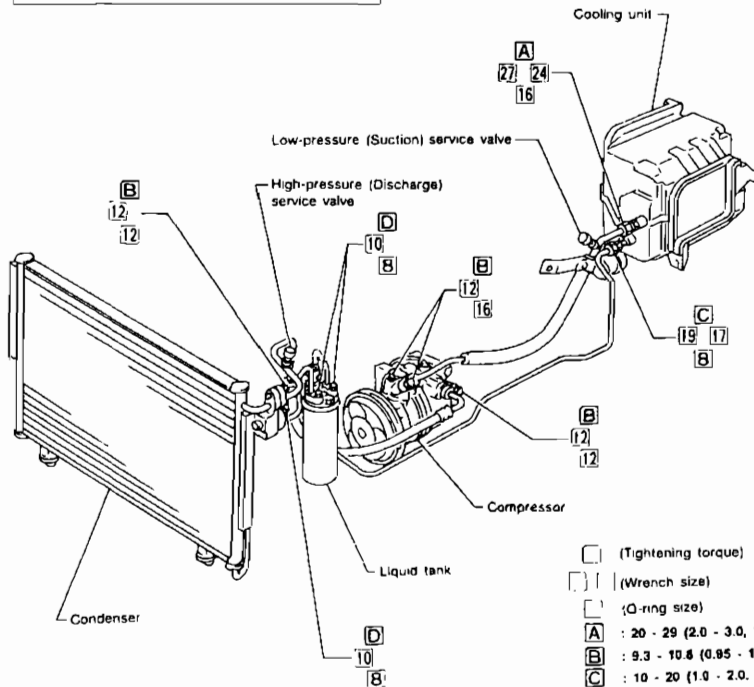
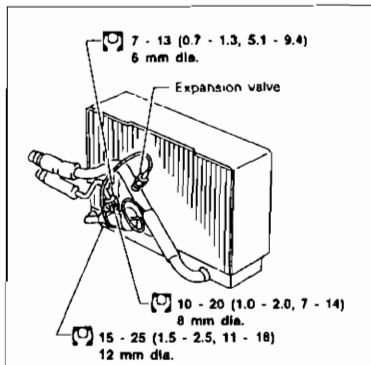
N·m (kg·m, ft·lb)

SHASOME

Refrigerant Lines (Cont'd)

RHD MODEL

SEC. 271-272-276



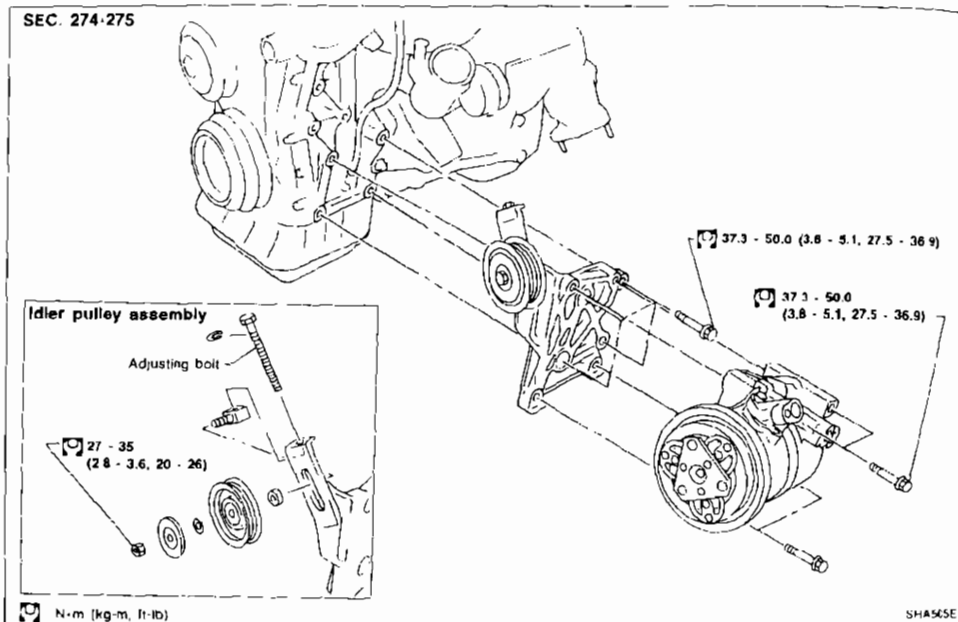
- (Tightening torque)
- (Wrench size)
- (O-ring size)
- A : 20 - 29 (2.0 - 3.0, 14 - 22)
- B : 9.3 - 10.8 (0.95 - 1.1, 6.9 - 8.0)
- C : 10 - 20 (1.0 - 2.0, 7 - 14)
- D : 3.8 - 4.5 (0.39 - 0.46, 2.8 - 3.3)
- N·m (kg·m, ft·lb)

HA



## Compressor Mounting

SEC. 274-275



## Belt Tension

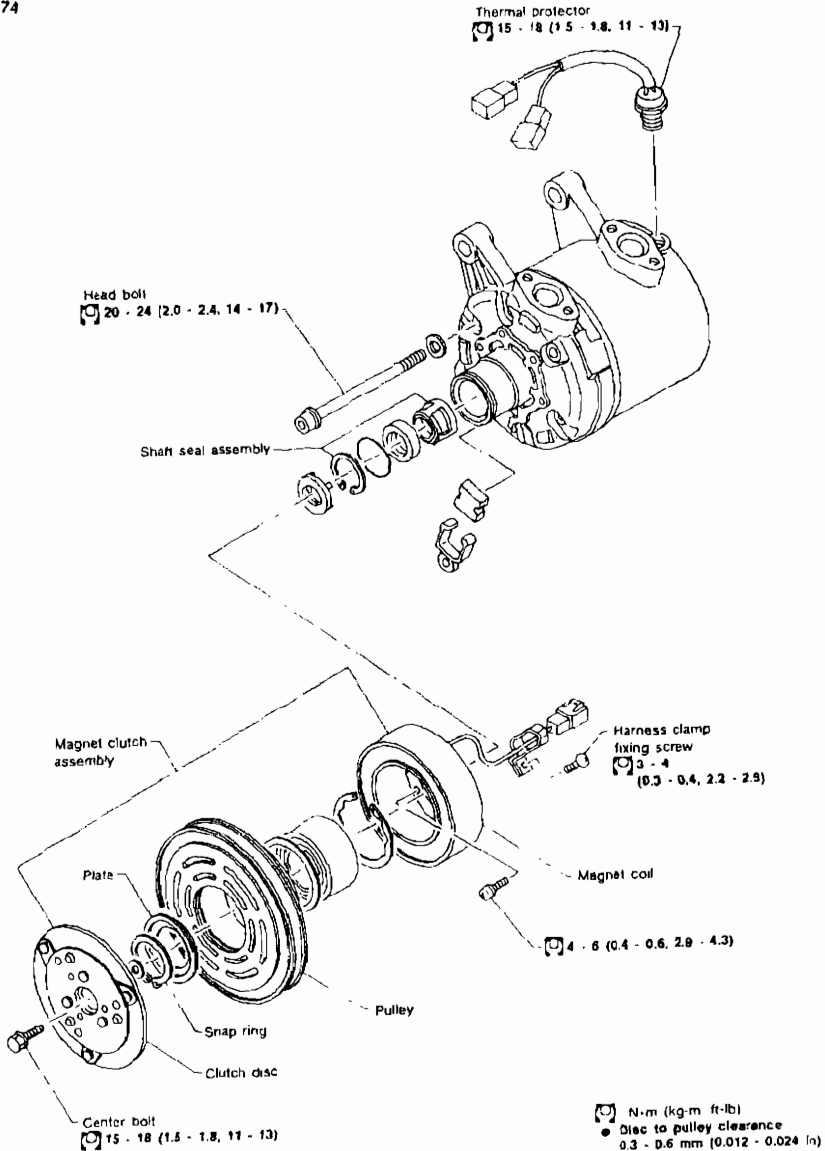
- Refer to MA section ("Checking Drive Belts", "ENGINE MAINTENANCE").

## Fast Idle Control Device (FICD)

- Refer to EC section ("IACV-FICD SOLENOID VALVE", "TROUBLE DIAGNOSES").

Compressor — Model DKV-14C (ZEXEL make)

SEC. 274



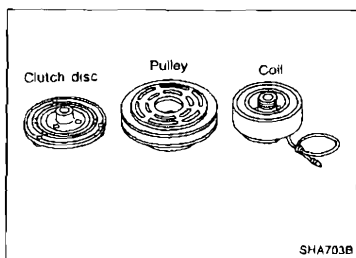
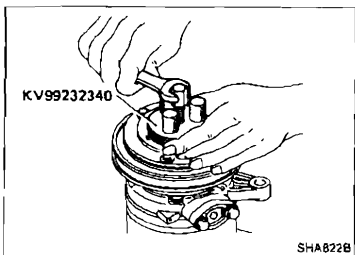
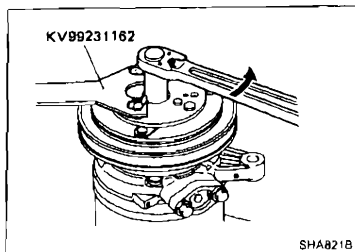
HA

## Compressor — Model DKV-14C (ZEXEL make) (Cont'd)

### COMPRESSOR CLUTCH

#### Removal

- When removing center bolt, hold clutch disc with clutch disc wrench.
- Using clutch disc puller clutch disc can be removed easily.



#### Inspection

##### Clutch disc

If the contact surface shows signs of damage due to excessive heat, the clutch disc and pulley should be replaced.

##### Pulley

Check the appearance of the pulley assembly. If the contact surface of the pulley shows signs of excessive grooving due to slippage, both the pulley and clutch disc should be replaced. The contact surfaces of the pulley assembly should be cleaned with a suitable solvent before reinstallation.

##### Coil

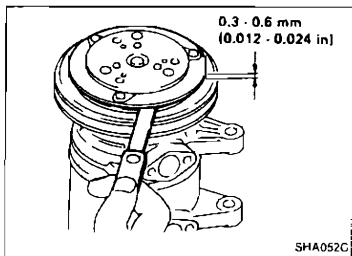
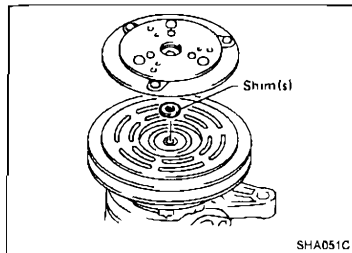
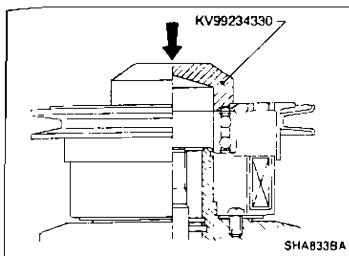
Check coil for loose connection or cracked insulation.

#### Installation

- Position coil assembly on compressor body. Be sure that the electrical terminals are reassembled in the original position. Install and tighten coil mounting screws evenly.

### Compressor — Model DKV-14C (ZEXEL make) (Cont'd)

- Press pulley assembly onto the neck of coil assembly using pulley installer.
- Wipe oil thoroughly off the clutch surface.



#### Adjustment

- Select adjusting shim(s) which give(s) the correct clearance between pulley and clutch disc.
- Using a plastic mallet, tape clutch disc in place on drive shaft.
- Do not use excessive force with a plastic mallet or in a press, or internal damages may result.
- Place spring washer and center bolt onto drive shaft. Tighten center bolt to drive clutch wheel onto drive shaft.

- 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

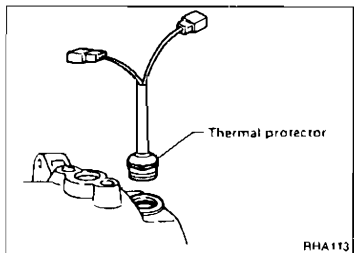
When replacing compressor clutch assembly, always conduct the break-in operation. This is done by engaging and disengaging the clutch about thirty times.

Break-in operation raises the level of transmitted torque.

#### THERMAL PROTECTOR

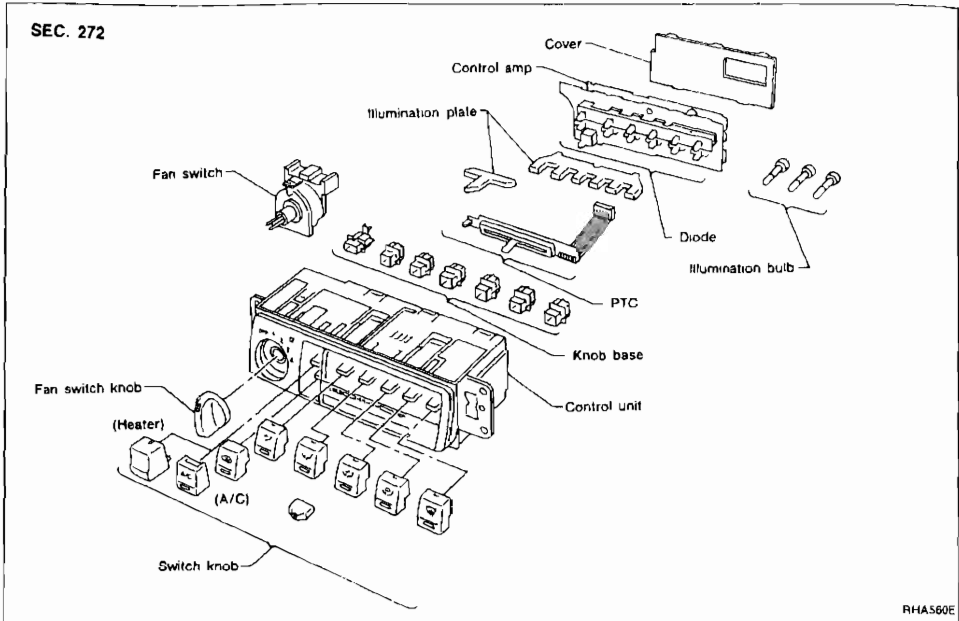
##### Inspection

- When servicing, do not allow foreign material to get into compressor.
- Check continuity between two terminals.



Overhaul — Push Control Unit Assembly

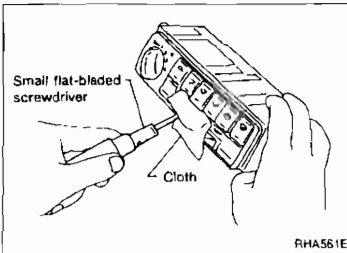
SEC. 272



RHA560E

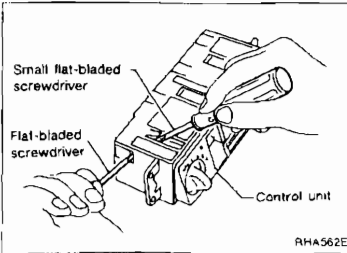
**Disassembly**

1. Remove switch knobs.  
Be careful not to scratch knobs during removal.



RHA561E

2. Remove fan switch knob.



RHA562E

## General Specifications

## COMPRESSOR

|  |                                   |
|--|-----------------------------------|
| Model                                    | DKV-14C                           |
| Type                                     | Vane rotary                       |
| Displacement cm <sup>3</sup> (cu in)/Rev | 140 (8.54)                        |
| Direction of rotation                    | Clockwise (Viewed from drive end) |
| Drive belt                               | Poly V type                       |

## LUBRICATION OIL

|   |                                 |
|---|---------------------------------|
| Model                                     | ZEXEL make<br>DKV-14C           |
| Name                                      | Nissan A/C System Oil<br>Type R |
| Part No                                   | KLH00-RAGR0                     |
| Capacity ml (Imp fl oz)                   |                                 |
| Total in system                           | 200 (7.0)                       |
| Compressor (Service part) charging amount | 200 (7.0)                       |

## REFRIGERANT

|                  |                           |
|------------------|---------------------------|
| Type             | HFC-134a (R-134a)         |
| Capacity kg (lb) |                           |
| LHD model        | 0.70 - 0.80 (1.54 - 1.76) |
| RHD model        | 0.60 - 0.70 (1.32 - 1.54) |

## Inspection and Adjustment

## ENGINE IDLING SPEED

## When A/C is ON

- Refer to EC section ("Inspection and Adjustments", "SERVICE DATA AND SPECIFICATIONS").

## BELT TENSION

- Refer to MA section ("Checking Drive Belts", "ENGINE MAINTENANCE").

## COMPRESSOR

|                                      |                              |
|--------------------------------------|------------------------------|
| Model                                | DKV-14C                      |
| Clutch disc-pulley clearance mm (in) | 0.3 - 0.6<br>(0.012 - 0.024) |

HA

EL

EX

# ELECTRICAL SYSTEM

# SECTION EL

When you read wiring diagrams:

• Read GI section, "HOW TO READ WIRING DIAGRAMS".

When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".

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## WIRING DIAGRAM REFERENCE CHART

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| ECCS.....                                | EC SECTION |
| A/T CONTROL.....                         | AT SECTION |
| ANTI-LOCK BRAKING SYSTEM.....            | BR SECTION |
| DIFFERENTIAL OIL COOLER.....             | PD SECTION |
| AIR BAG AND SEAT BELT PRE-TENSIONER..... | PS SECTION |
| HEATER AND AIR CONDITIONER.....          | HA SECTION |

## PRECAUTIONS



### Supplemental Restraint System "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System "Air Bag" and "Seat Belt Pre-tensioner", used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioners, a diagnostic sensor unit, warning lamp, wiring harness and spiral cable. 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.
- All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS SYSTEM.

# HARNES CONNECTOR

## Description

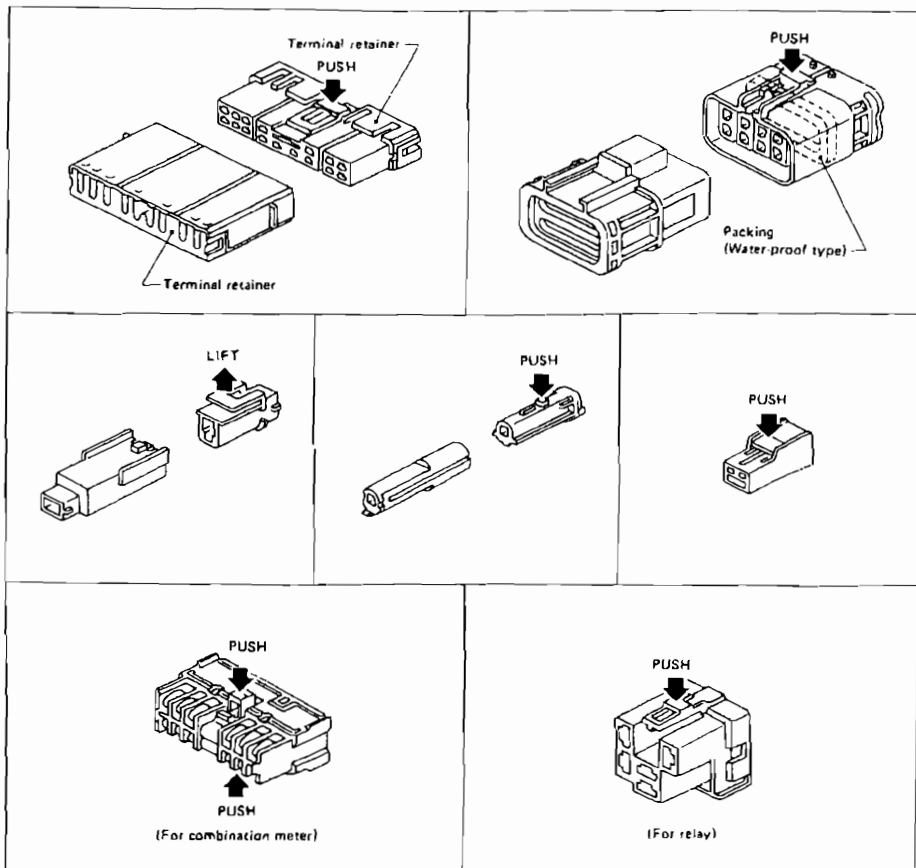
### HARNES CONNECTOR

- All harness connectors have been modified to prevent accidental looseness or disconnection.
- The connector can be disconnected by pushing or lifting the locking section.

#### CAUTION:

Do not pull the harness when disconnecting the connector.

(Example)



EL

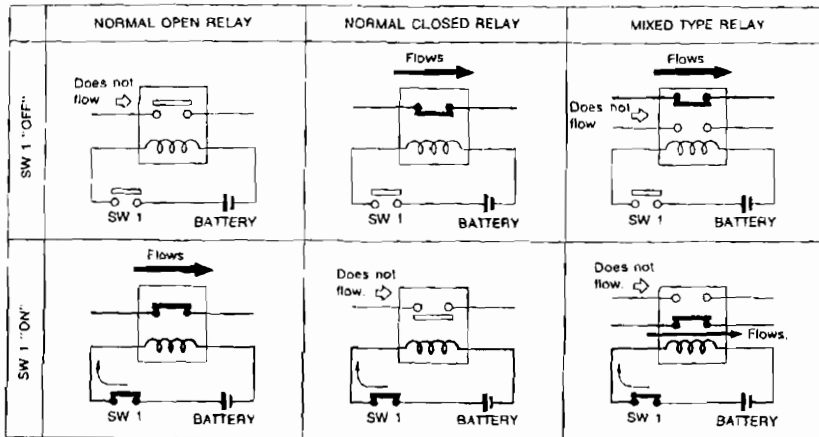
SFL 7670

# STANDARDIZED RELAY

## Description

### NORMAL OPEN, NORMAL CLOSED AND MIXED TYPE RELAYS

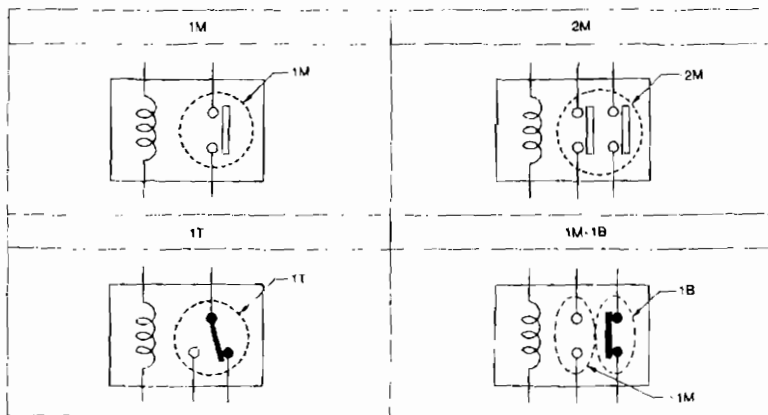
Relays can mainly be divided into three types: normal open, normal closed and mixed type relays



SEL081H

### TYPE OF STANDARDIZED RELAYS

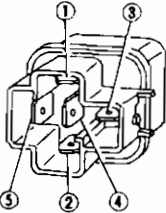
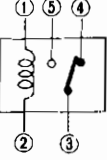
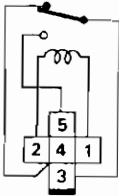
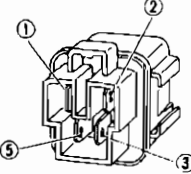
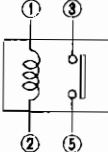
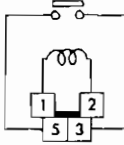
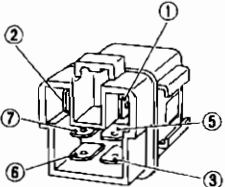
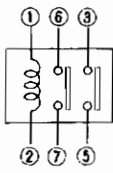
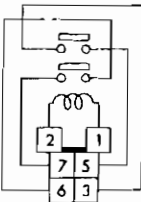
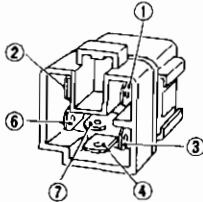
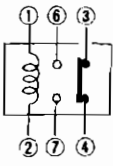
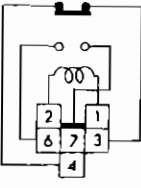
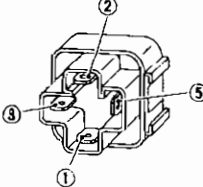
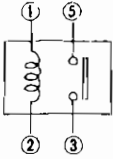
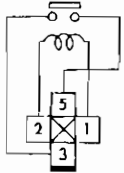
1M ..... 1 Make      2M ..... 2 Make  
 1T ..... 1 Transfer      1M-1B ..... 1 Make 1 Break



SEL082H

# STANDARDIZED RELAY

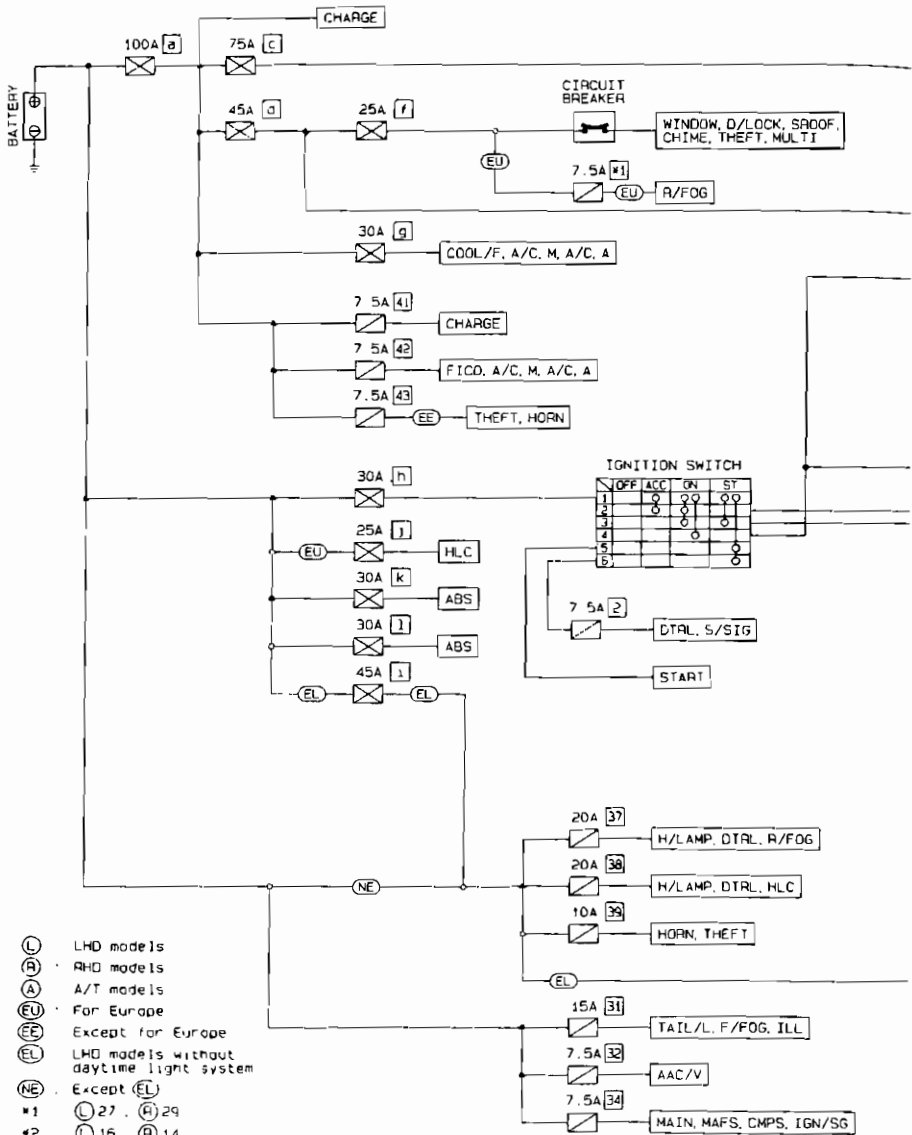
## Description (Cont'd)

| Type  | Outer view  | Circuit   | Connector symbol and connection   | Case color          |
|-------|---|---|---|---------------------|
| 1T    |    |    |    | BLACK               |
| 1M    |    |    |    | BLUE<br>or<br>GREEN |
| 2M    |    |    |    | BROWN               |
| 1M-1B |   |   |   | GRAY                |
| 1M    |  |  |  | BLUE                |

The arrangement of terminal numbers on the actual relays may differ from those shown above.

# POWER SUPPLY ROUTING

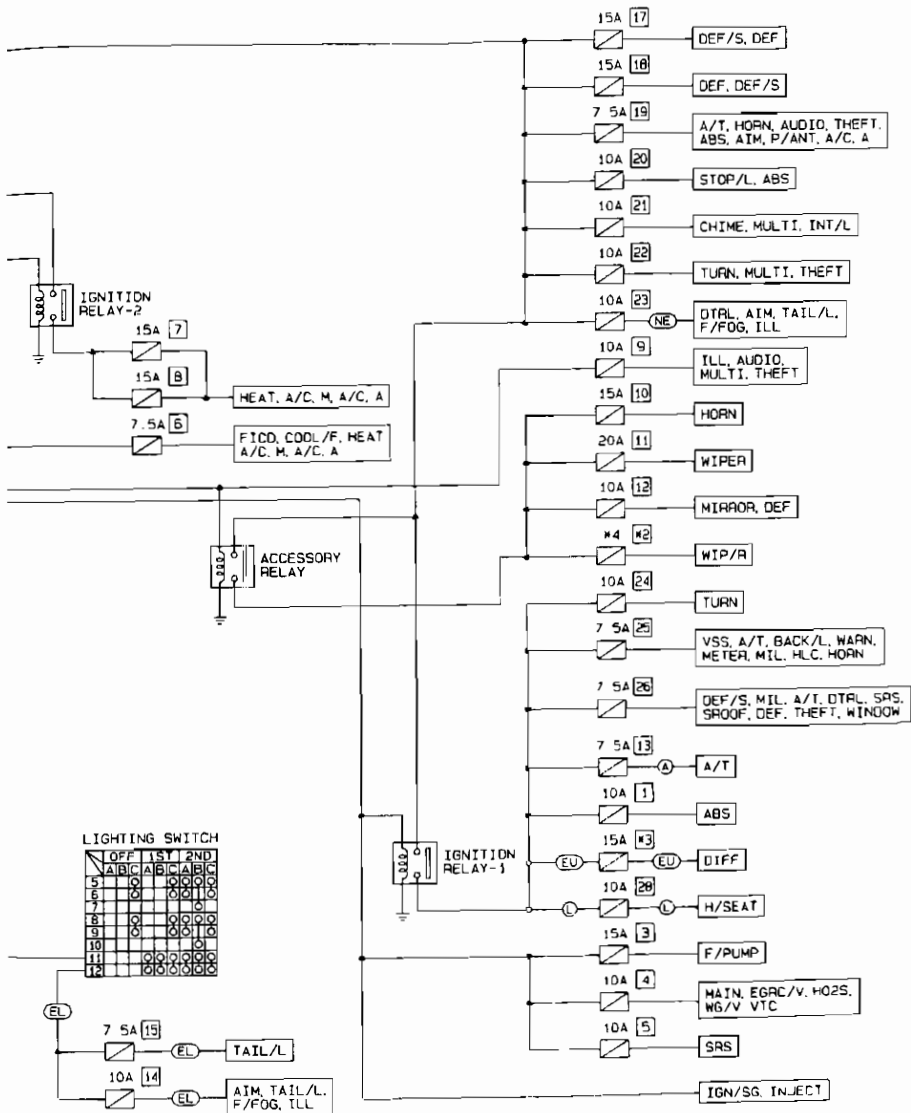
## Schematic



- (L) LHD models
- (R) RHD models
- (A) A/T models
- (EU) For Europe
- (EE) Except for Europe
- (EL) LHD models without daytime light system
- (NE) Except (EL)
- \*1 (L) 27, (R) 29
- \*2 (L) 16, (R) 14
- \*3 (L) 29, (R) 28
- \*4 (L) 10A, (R) 15A

# POWER SUPPLY UNIT

## Schematic (Cont'd)

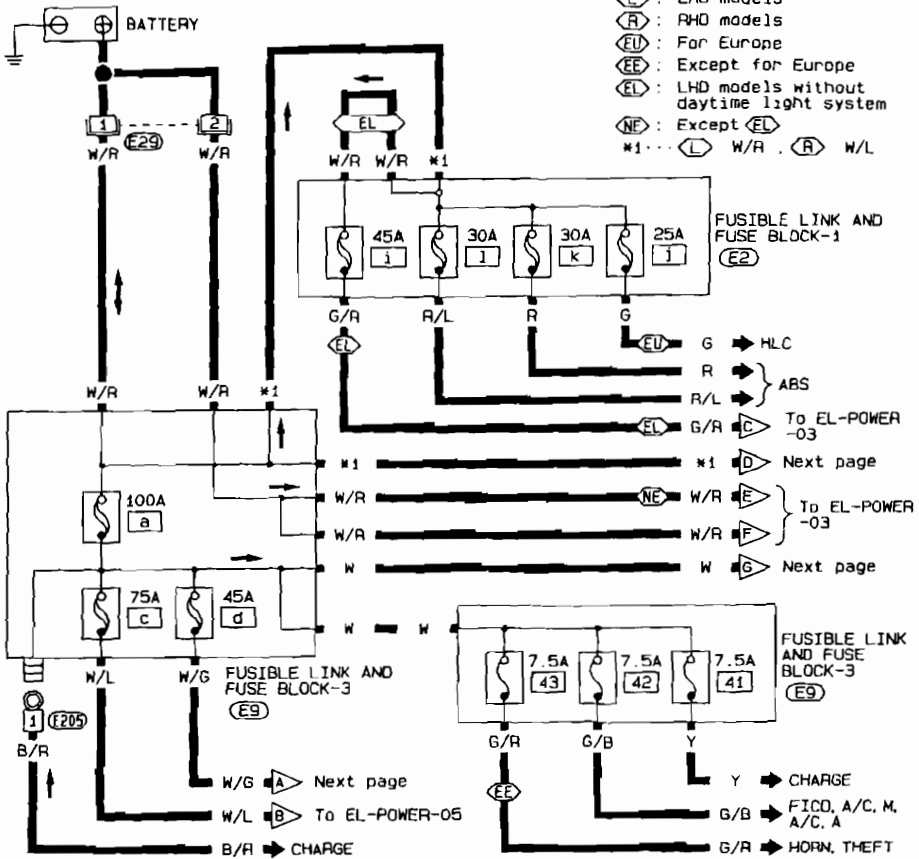


EL  
10X

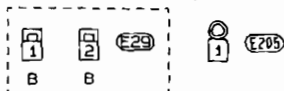
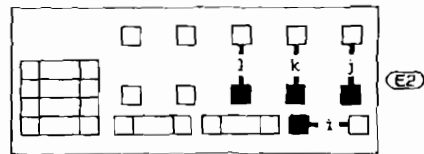
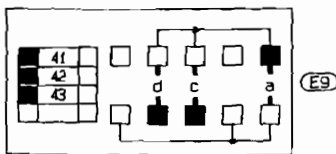
# POWER SUPPLY ROUTING

## Wiring Diagram — POWER —

EL-POWER-01



- (L) : LHD models
- (R) : RHD models
- (EU) : For Europe
- (EE) : Except for Europe
- (EL) : LHD models without daytime light system
- (NF) : Except (EL)
- \*1... (L) W/R . (R) W/L

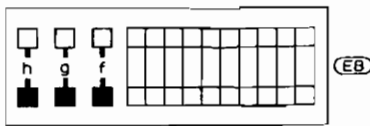
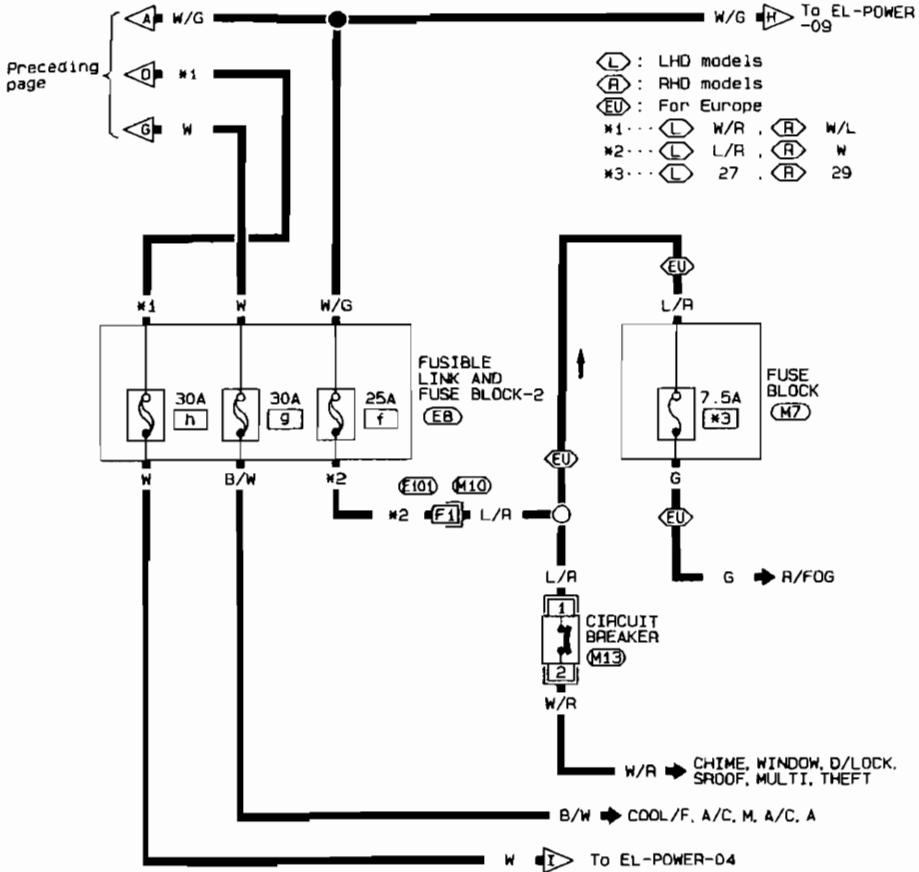




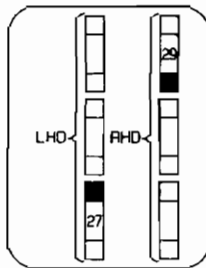
# POWER SUPPLY ROUTING

## Wiring Diagram — POWER — (Cont'd)

EL-POWER-02



FRONT ←



Refer to last page (Foldout page).

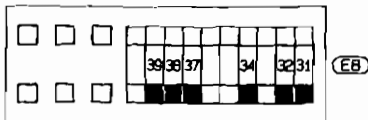
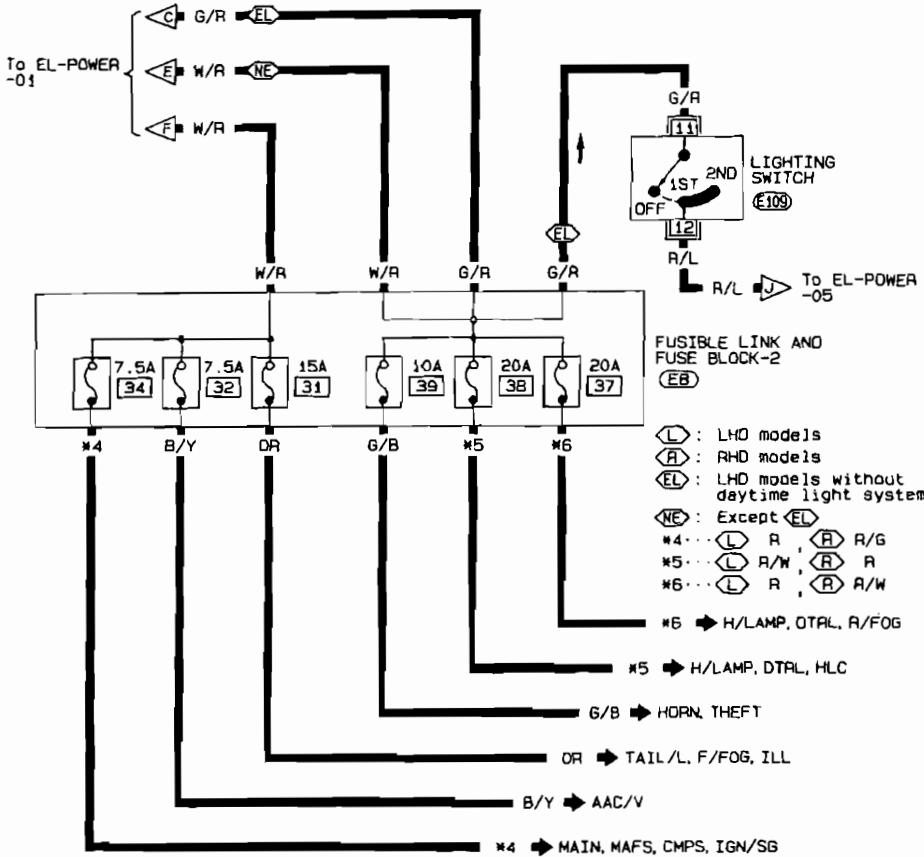
M10, E101

EL

# POWER SUPPLY ROUTING

## Wiring Diagram — POWER — (Cont'd)

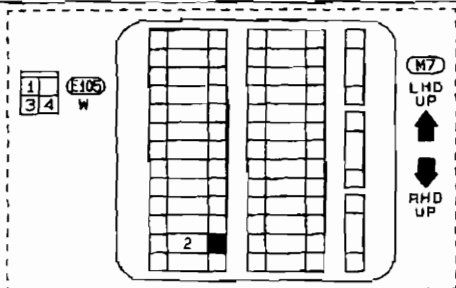
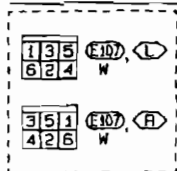
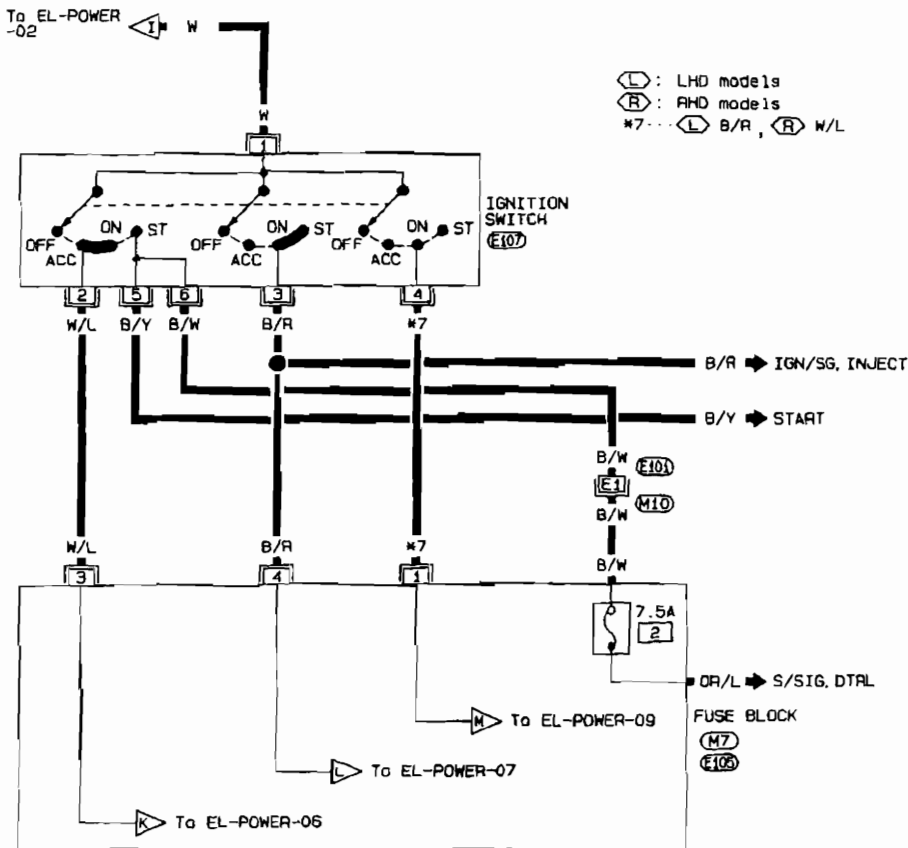
EL-POWER-03



# POWER SUPPLY ROUTING

## Wiring Diagram — POWER — (Cont'd)

EL-POWER-04



Refer to last page (Foldout page).

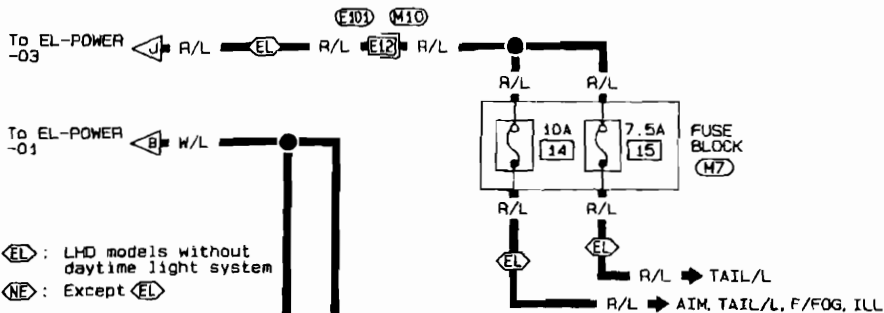
(M10), (E101)

EL

# POWER SUPPLY ROUTING

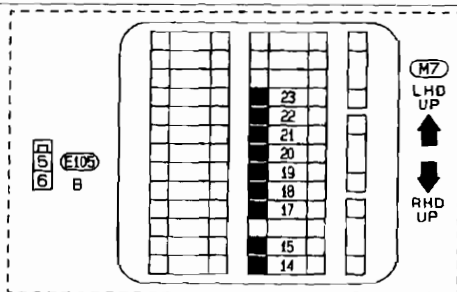
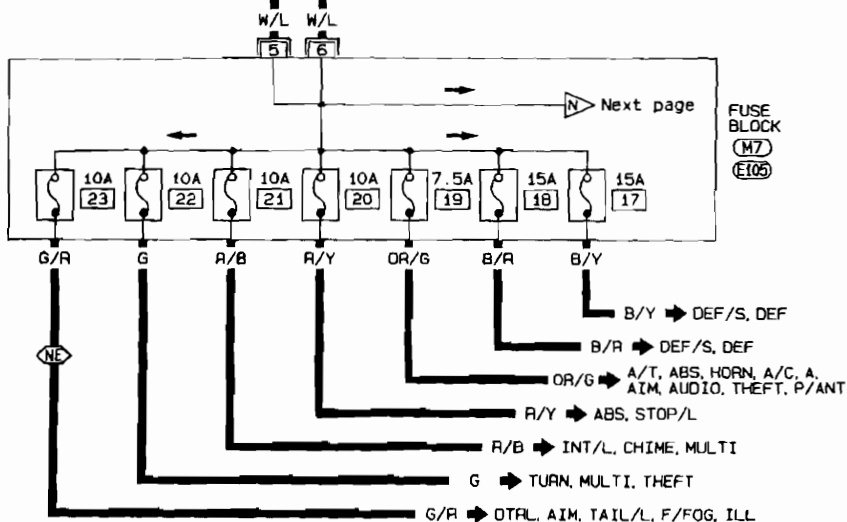
## Wiring Diagram — POWER — (Cont'd)

EL-POWER-05



$\text{E12}$ : LHD models without daytime light system

$\text{NE}$ : Except  $\text{E12}$



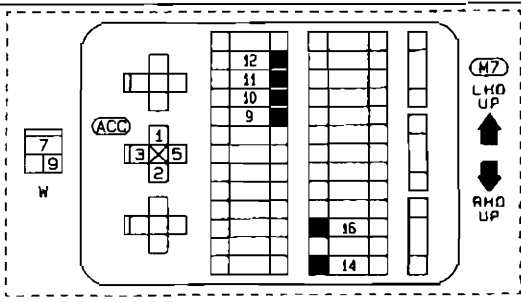
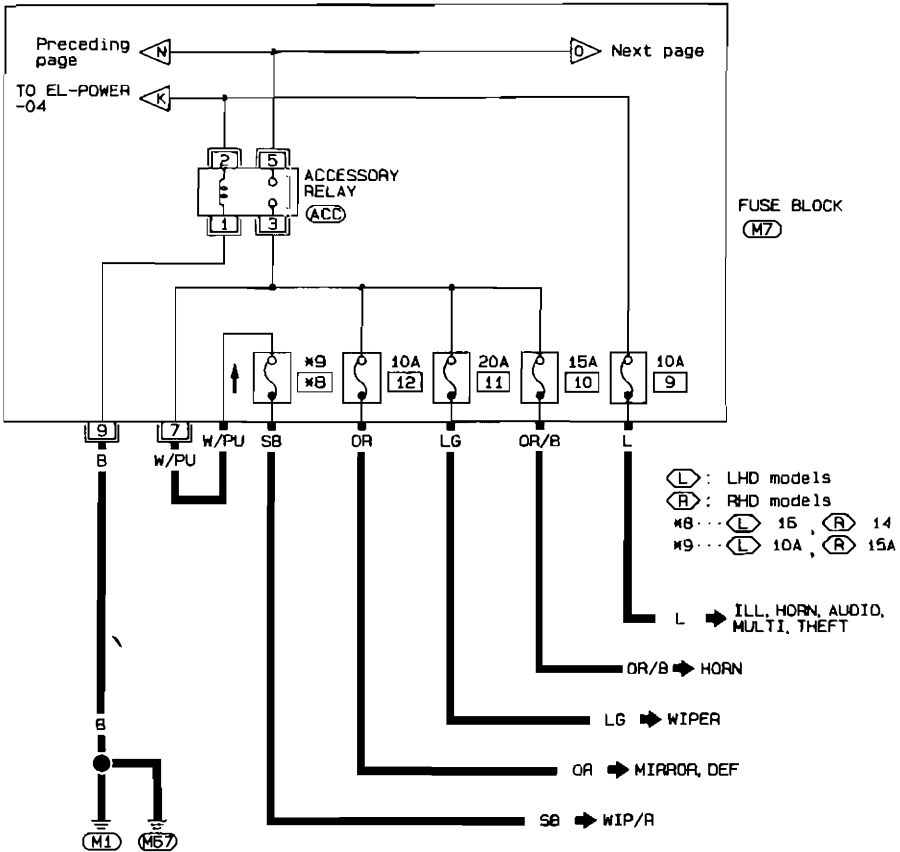
Refer to last page (Foldout page).

$\text{M10}$ ,  $\text{E101}$

# POWER SUPPLY ROUTING

## Wiring Diagram — POWER — (Cont'd)

EL-POWER-06

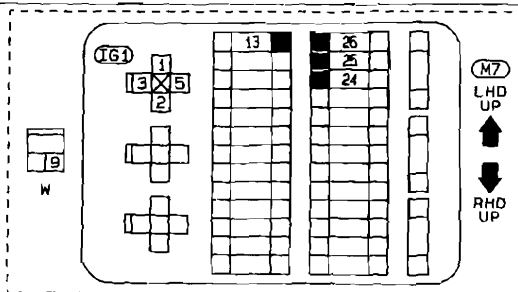
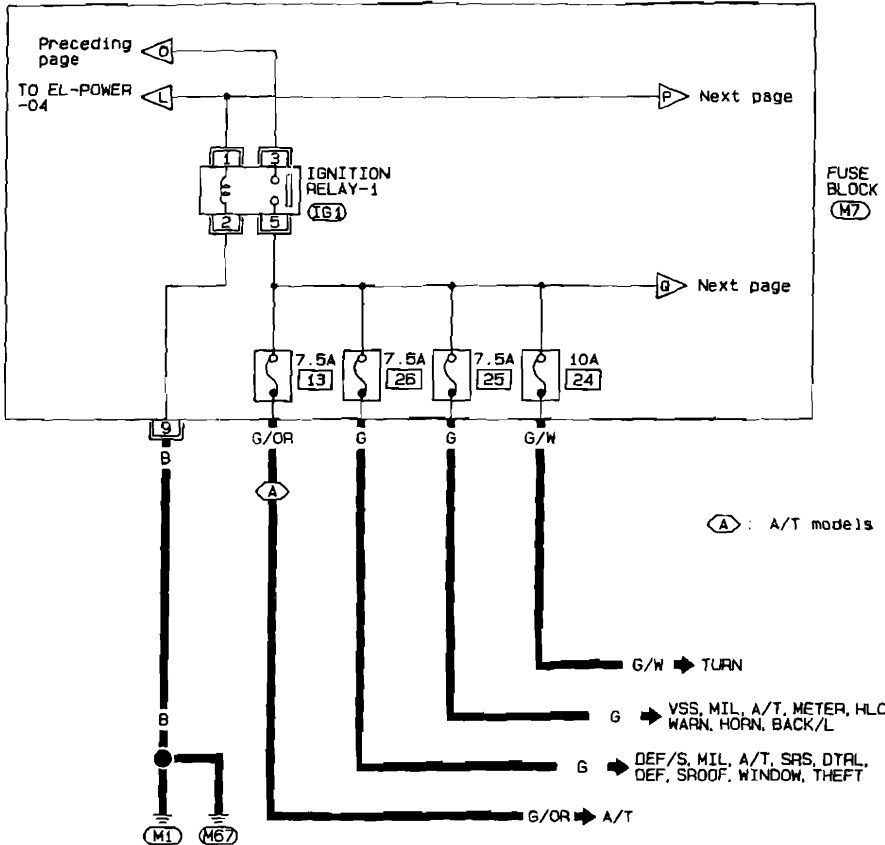


GI  
WA  
EM  
LC  
EC  
FE  
CL  
MT  
AT  
PD  
EA  
HA  
BP  
ST  
KS  
BT  
RA  
EL  
DX

POWER SUPPLY ROUTING

Wiring Diagram — POWER — (Cont'd)

EL-POWER-07

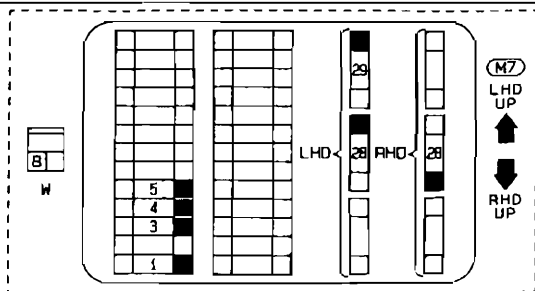
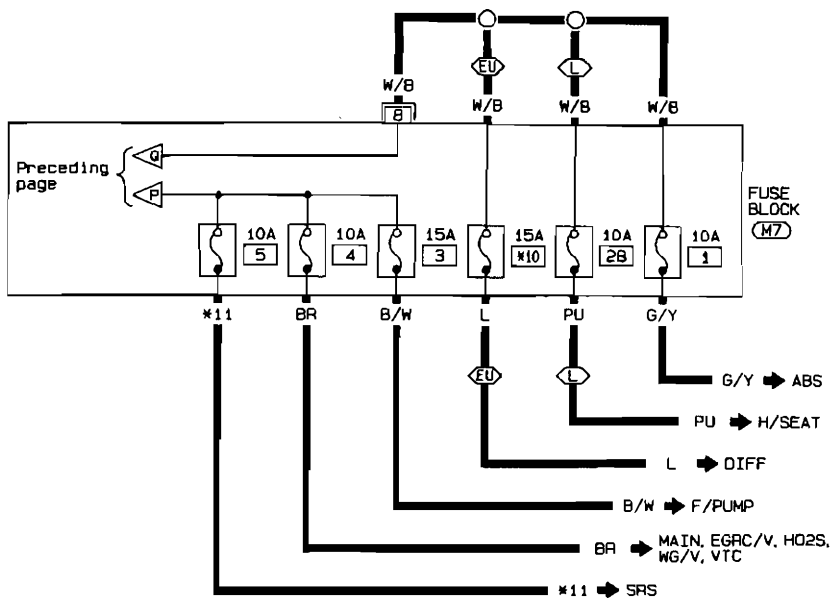


# POWER SUPPLY ROUTING

## Wiring Diagram — POWER — (Cont'd)

EL-POWER-08

- ◊L : LHD models
- ◊R : RHD models
- ◊EU : For Europe
- \*10... ◊L 29 . ◊B 2B
- \*11... ◊L A/L . ◊B L

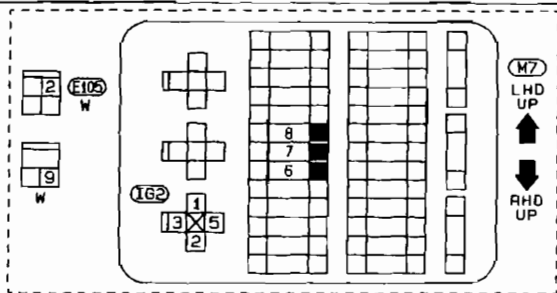
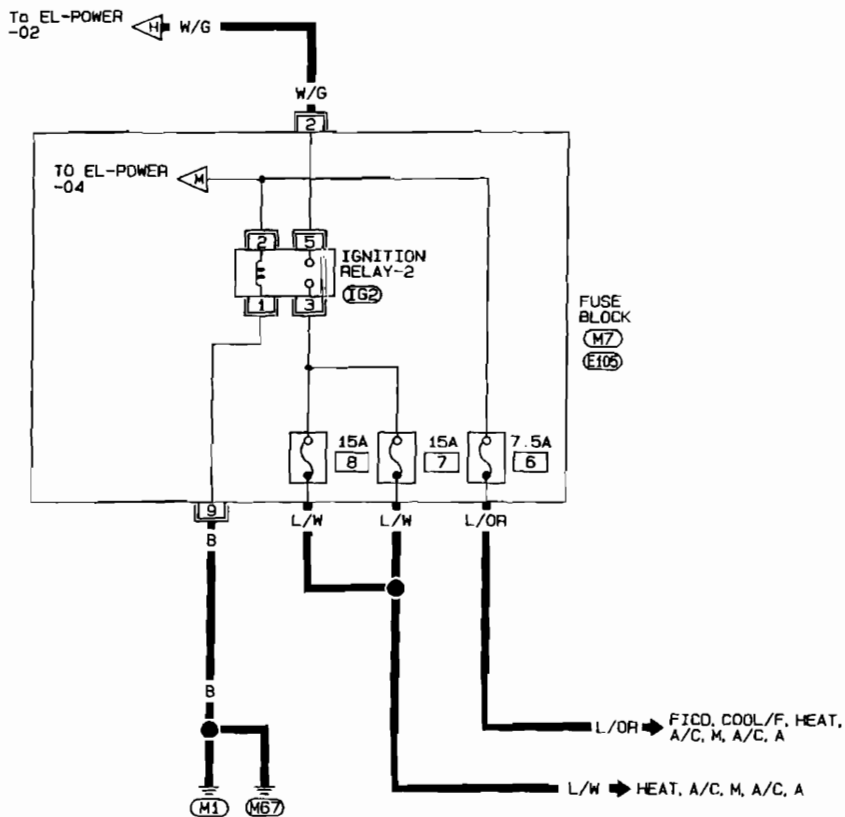


EL

# POWER SUPPLY ROUTING

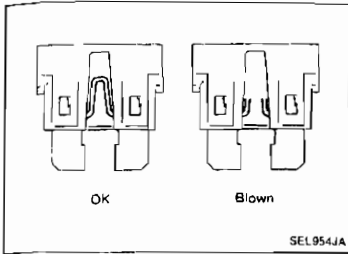
## Wiring Diagram — POWER — (Cont'd)

EL-POWER-09



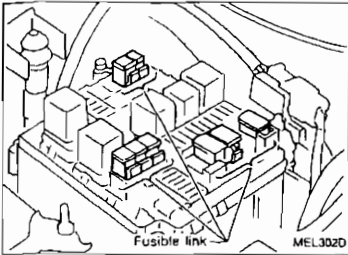


# POWER SUPPLY ROUTING



## Fuse

- 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 clock if vehicle is not used for a long period of time.

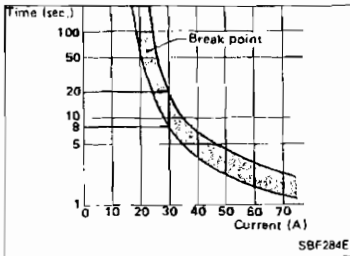


## Fusible Link

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

For example, when current is 30A, the circuit is broken within 8 to 20 seconds.

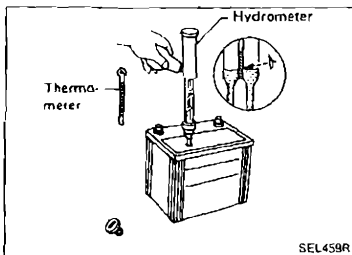
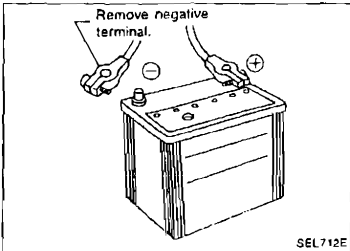
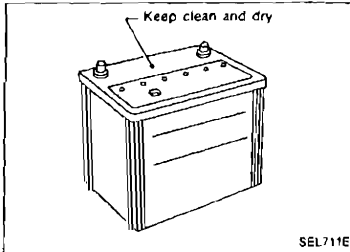
Circuit breakers are used in the following systems.

- Power window
- Power door lock
- Power sun roof
- Multi-remote control
- Theft warning
- Warning buzzer
- Rear window defogger and mirror defogger

# BATTERY

## 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 lightly clamped to battery terminals for good contact.
- Never add distilled water through the hole used to check specific gravity.



## How to Handle Battery

### METHODS OF PREVENTING OVER-DISCHARGE

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.
- 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.)

- 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

#### 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 the acid contacts the eyes, skin or clothing, immediately flush with water for 15 minutes and seek medical attention.



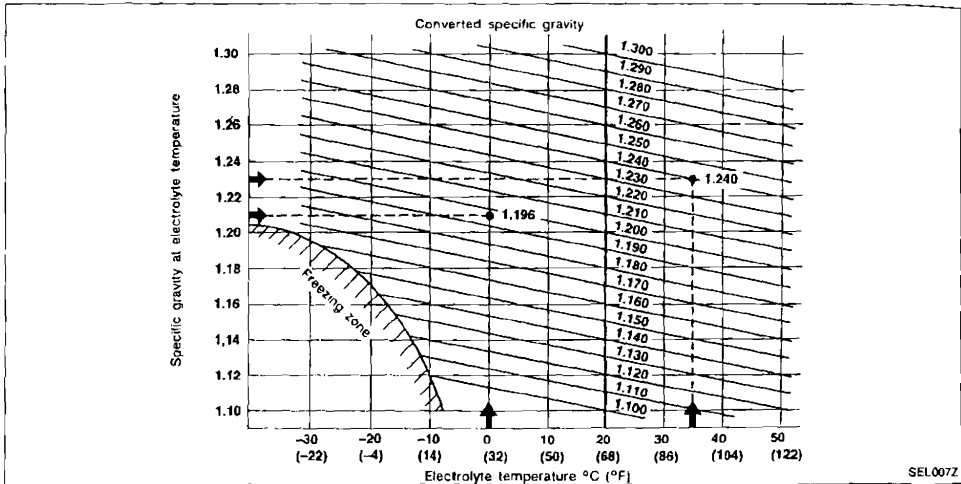
# BATTERY

## How to Handle Battery (Cont'd)

2. Convert into specific gravity at 20°C (68°F).

Example:

- When electrolyte temperature is 35°C (95°F) and specific gravity of electrolyte is 1.230, converted specific gravity at 20°C (68°F) is 1.240.
- When electrolyte temperature is 0°C (32°F) and specific gravity of electrolyte is 1.210, converted specific gravity at 20°C (68°F) is 1.196.



SEL007Z

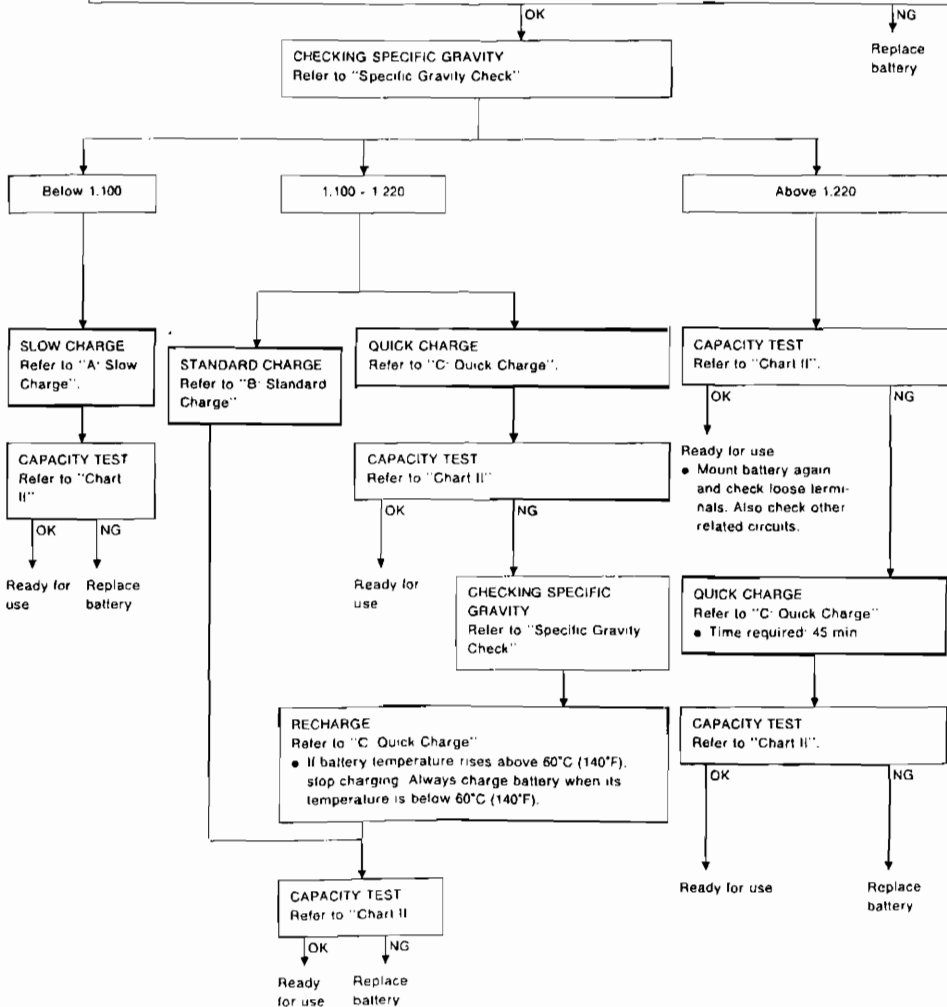
# BATTERY

## Battery Test and Charging Chart

Chart I

### VISUAL INSPECTION

- Check battery case for cracks or bends
- Check battery terminals for damage
- If the difference between the max. and min. electrolyte level in cells is within 10 mm (0.39 in.), it is OK



\* "STANDARD CHARGE" is recommended if the vehicle is in storage after charging.

EL

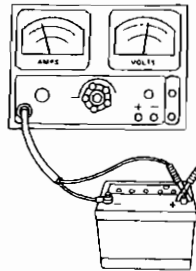
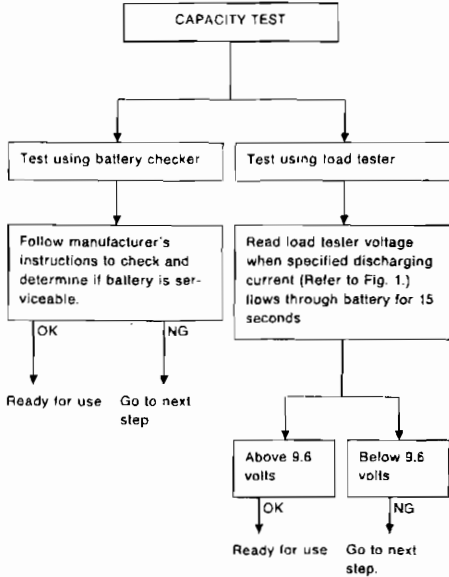
# BATTERY

## Battery Test and Charging Chart (Cont'd)

Chart II

- Check battery type and determine the specified current using the following table
- Fig 1 DISCHARGING CURRENT  
(Load Tester)

| Type       | Current (A) |
|------------|-------------|
| 28B19R(L)  | 90          |
| 34B19R(L)  | 99          |
| 46B24R(L)  | 135         |
| 55B24R(L)  | 135         |
| 50D23R(L)  | 150         |
| 55D23R(L)  | 180         |
| 65D26R(L)  | 195         |
| 80D26R(L)  | 195         |
| 75D31R(L)  | 210         |
| 95D31R(L)  | 240         |
| 115D31R(L) | 240         |
| 95E41R(L)  | 300         |
| 130E41R(L) | 330         |



SEL0082

# BATTERY

## Battery Test and Charging Chart (Cont'd)

### A. SLOW CHARGE

Determine initial charging current from specific gravity referring to Fig. 2.

- Charge battery
- Check charging voltage 30 minutes after starting the battery charge

12 to 15 volts

OK

Continue to charge for 12 hours.

CHECKING SPECIFIC GRAVITY  
Refer to "Specific Gravity Check".

Conduct additional charge as per Fig. 3, if necessary

Go to "CAPACITY TEST".

Below 12 volts or above 15 volts

NG

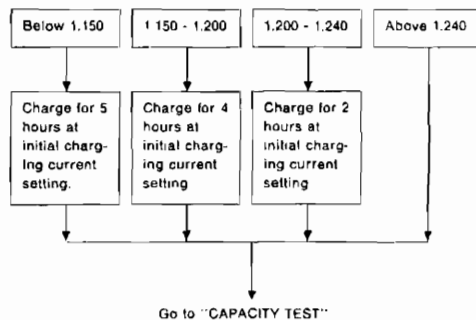
Replace battery.

Fig. 2 INITIAL CHARGING CURRENT SETTING (Slow charge)

| CON-<br>VERTED<br>SPECIFIC<br>GRAVITY | BATTERY TYPE |            |            |            |            |            |            |            |            |            |             |             |             |
|---------------------------------------|--------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|
|                                       | 28B19R(L)    | 34B19R(L)  | 46B24R(L)  | 55B24R(L)  | 50D23R(L)  | 55D23R(L)  | 65D28R(L)  | 80D28R(L)  | 75D31R(L)  | 95D31R(L)  | 115D31R(L)  | 95E41R(L)   | 130E41R(L)  |
| Below 1.100                           | 4.0<br>(A)   | 4.0<br>(A) | 5.0<br>(A) | 5.0<br>(A) | 7.0<br>(A) | 7.0<br>(A) | 8.0<br>(A) | 8.0<br>(A) | 9.0<br>(A) | 9.0<br>(A) | 10.0<br>(A) | 10.0<br>(A) | 14.0<br>(A) |

- Check battery type and determine the specified current using the table shown above.
- After starting charging, adjustment of charging current is not necessary.

Fig. 3 ADDITIONAL CHARGE (Slow charge)



### CAUTION:

- Set charging current to value specified in Fig. 2. If charger is not capable of producing specified current value, set its charging current as close to that value as possible.
- Keep battery away from open flame while it is being charged.
- When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.
- If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F).

# BATTERY

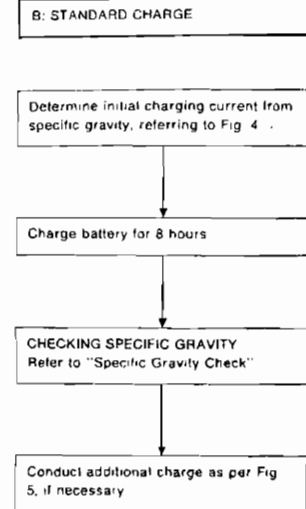
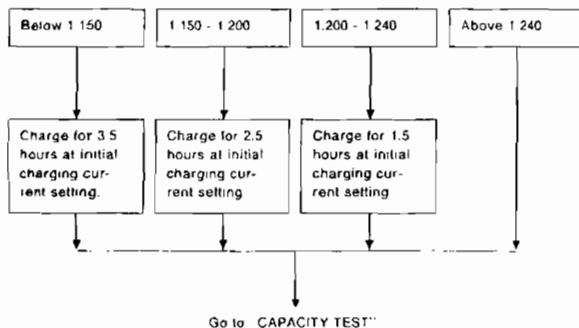
## Battery Test and Charging Chart (Cont'd)

Fig 4 INITIAL CHARGING CURRENT SETTING  
(Standard charge)

| CON-<br>VERTED<br>SPECIFIC<br>GRAVITY | BATTERY TYPE |           |           |           |           |           |           |           |           |           |            |           |            |
|---------------------------------------|--------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|-----------|------------|
|                                       | 28B19R(L)    | 34B19R(L) | 48B24R(L) | 55B24R(L) | 50D23R(L) | 55D23R(L) | 65D26R(L) | 80D26R(L) | 75D31R(L) | 95D31R(L) | 115D31R(L) | 98E41R(L) | 130E41R(L) |
| 1.100 - 1.130                         | 4.0 (A)      | 5.0 (A)   | 6.0 (A)   | 7.0 (A)   | 8.0 (A)   | 9.0 (A)   | 13.0 (A)  |           |           |           |            |           |            |
| 1.130 - 1.160                         | 3.0 (A)      | 4.0 (A)   | 5.0 (A)   | 6.0 (A)   | 7.0 (A)   | 8.0 (A)   | 11.0 (A)  |           |           |           |            |           |            |
| 1.160 - 1.190                         | 2.0 (A)      | 3.0 (A)   | 4.0 (A)   | 5.0 (A)   | 6.0 (A)   | 7.0 (A)   | 9.0 (A)   |           |           |           |            |           |            |
| 1.190 - 1.220                         | 2.0 (A)      | 2.0 (A)   | 3.0 (A)   | 4.0 (A)   | 5.0 (A)   | 5.0 (A)   | 7.0 (A)   |           |           |           |            |           |            |

- Check battery type and determine the specified current using the table shown above
- After starting charging, adjustment of charging current is not necessary

Fig 5 ADDITIONAL CHARGE (Standard charge)



### CAUTION:

- Do not use standard charge method on a battery whose specific gravity is less than 1.100.
- Set charging current to value specified in Fig. 4. If charger is not capable of producing specified current value, set its charging current as close to that value as possible.
- Keep battery away from open flame while it is being charged.
- When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.
- If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F).



# BATTERY

## Battery Test and Charging Chart (Cont'd)

### C QUICK CHARGE

Determine initial charging current setting and charging time from specific gravity referring to Fig. 6.

Charge battery.

Go to CAPACITY TEST

Fig. 6 INITIAL CHARGING CURRENT SETTING AND CHARGING TIME (Quick charge)

| BATTERY TYPE               |               | 28B19R(L)           | 34B19R(L) | 46B24R(L) | 55B24R(L) | 50D23R(L) | 55D23R(L) | 65D26R(L) | 80D26R(L) | 75D31R(L) | 95D31R(L) | 115D31R(L) | 95E41R(L) | 130E41R(L) |
|----------------------------|---------------|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|-----------|------------|
|                            |               | 10 (A)              | 15 (A)    | 20 (A)    | 30 (A)    | 40 (A)    |           |           |           |           |           |            |           |            |
| CONVERTED SPECIFIC GRAVITY | 1 100 - 1 130 | 2.5 hours           |           |           |           |           |           |           |           |           |           |            |           |            |
|                            | 1 130 - 1 160 | 2.0 hours           |           |           |           |           |           |           |           |           |           |            |           |            |
|                            | 1 160 - 1 190 | 1.5 hours           |           |           |           |           |           |           |           |           |           |            |           |            |
|                            | 1 190 - 1 220 | 1.0 hours           |           |           |           |           |           |           |           |           |           |            |           |            |
|                            | Above 1 220   | 0.75 hours (45 min) |           |           |           |           |           |           |           |           |           |            |           |            |

- Check battery type and determine the specified current using the table shown above.
- After starting charging, adjustment of charging current is not necessary

### CAUTION:

- Do not use quick charge method on a battery whose specific gravity is less than 1.100.
- Set initial charging current to value specified in Fig. 6. If charger is not capable of producing specified current value, set its charging current as close to that value as possible.
- Keep battery away from open flame while it is being charged.
- When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.
- Be careful of a rise in battery temperature because a large current flow is required during quick-charge operation.  
If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F).
- Do not exceed the charging time specified in Fig. 6, because charging battery over the charging time can cause deterioration of the battery.

### Service Data and Specifications (SDS)

| Applied model | For Europe | Except for Europe | Optional on LHD models for Europe |
|---------------|------------|-------------------|-----------------------------------|
| Type          | 55D23R     | 65D26R            | 80D26R                            |
| Capacity      | 12 - 60    | 12 - 65           | 12 - 65                           |

# STARTING SYSTEM

## System Description

### M/T MODELS

Power is supplied at all times

- to ignition switch terminal ①
- through 30A fusible link (letter [h] , located in the fusible link and fuse box).

#### For models with theft warning system

Power is supplied at all times

- through 7 5A fuse (No 26 , located in the fuse block)
- to theft warning relay terminal ①.

With the ignition switch in the START position, power is supplied

- from ignition switch terminal ⑤
- to theft warning relay terminal ③.

If the theft warning system is triggered, terminal ② of the theft warning relay is grounded and power to the starter motor is interrupted.

When the theft warning system is not operating, power is supplied

- through theft warning relay terminal ④
- to terminal ② of the starter motor windings.

#### For models without theft warning system

With the ignition switch in the START position, power is supplied

- from ignition switch terminal ⑤
- directly 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 engine block. With power and ground supplied, cranking occurs and the engine starts.

### A/T MODELS

Power is supplied at all times

- to ignition switch terminal ①
- through 30A fusible link (letter [h] , located in the fusible link and fuse box).

#### For models with theft warning system

Power is supplied at all times

- through 7 5A fuse (No 26 , located in the fuse block)
- to theft warning relay terminal ①.

With the ignition switch in the START position, power is supplied

- from ignition switch terminal ⑤
- to theft warning relay terminal ③.

If the theft warning system is triggered, terminal ② of the theft warning relay is grounded and power to the inhibitor switch is interrupted.

When the theft warning system is not operating, power is supplied

- through theft warning relay terminal ④
- to inhibitor switch terminal ②
- through inhibitor switch terminal ①, with the selector lever in the P or N position
- to terminal ② of the starter motor windings.

#### For models without theft warning system

With the ignition switch in the START position, power is supplied

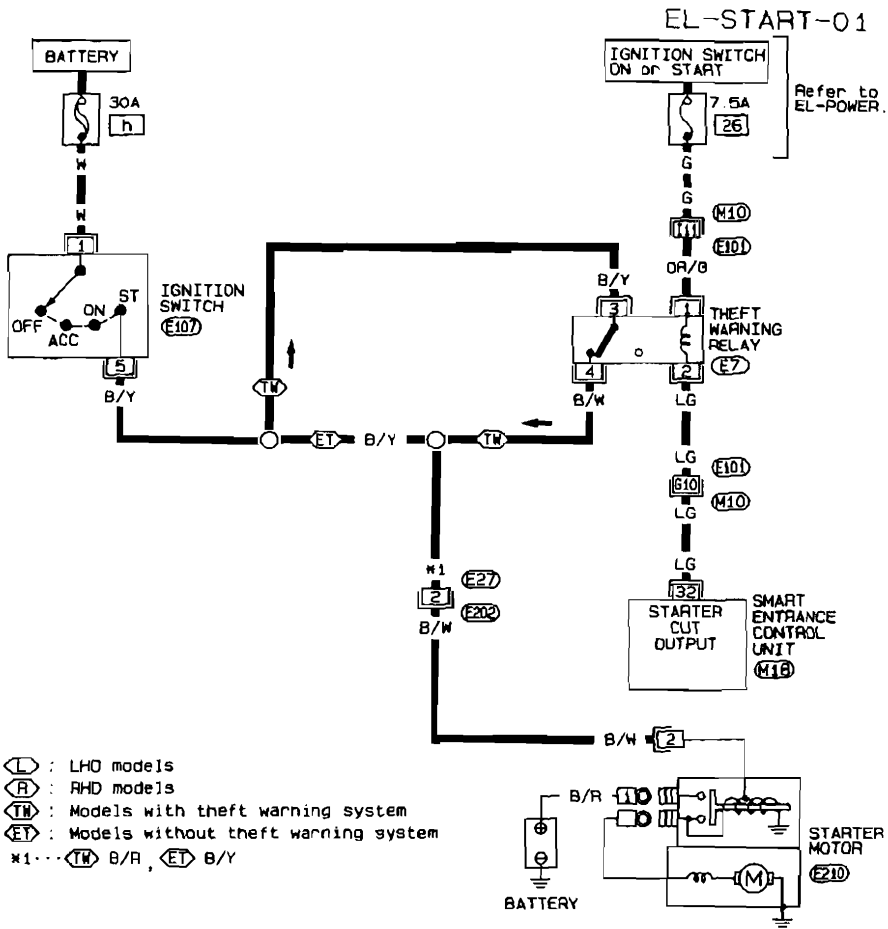
- from ignition switch terminal ⑤
- to inhibitor switch terminal ②
- through inhibitor switch terminal ①, with the selector lever in the P or N position
- to terminal ② of the starter motor windings

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.

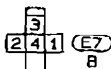
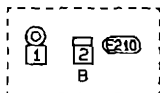
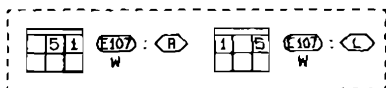
# STARTING SYSTEM

## Wiring Diagram — START —

M/T MODELS



- (L) : LHD models
- (R) : RHD models
- (TW) : Models with theft warning system
- (ET) : Models without theft warning system
- \*1... (TW) B/R, (ET) B/Y



Refer to last page (Foldout page).

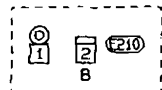
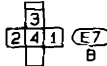
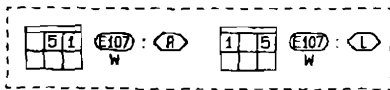
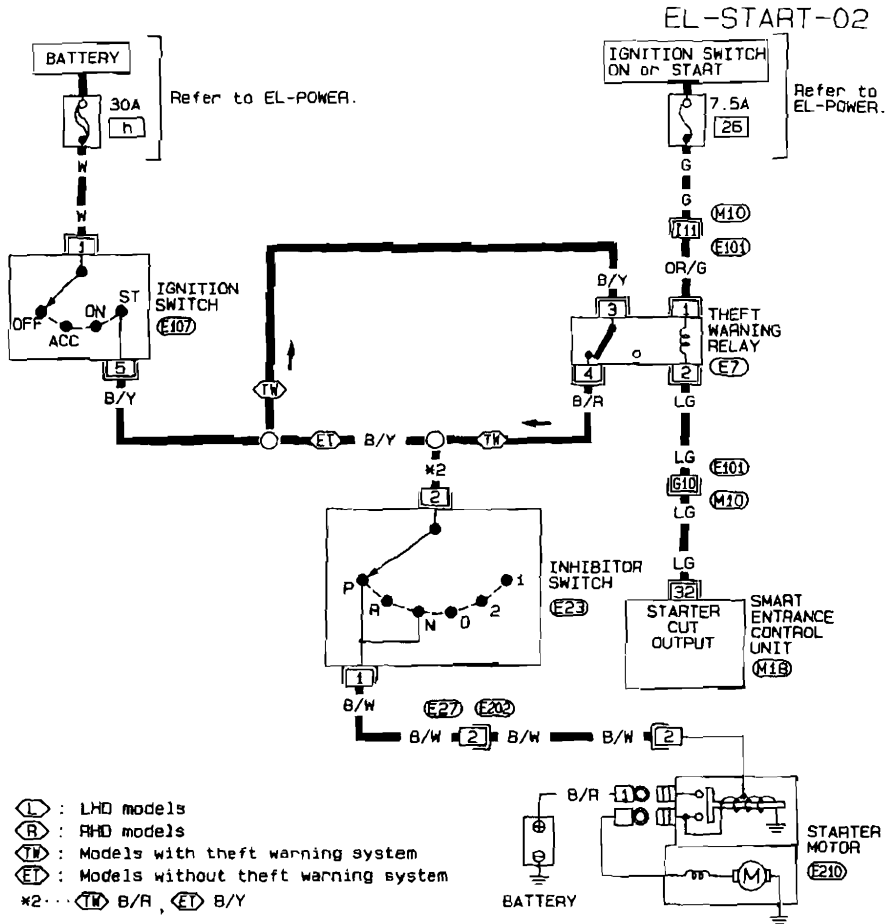
(M10), (E101)  
(M1B)

GE  
MA  
EM  
LC  
EG  
EE  
CL  
MT  
AT  
ED  
EA  
RA  
BR  
BT  
NS  
BT  
NA  
EL  
DX

# STARTING SYSTEM

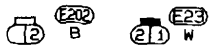
## Wiring Diagram — START — (Cont'd)

A/T MODELS



Refer to last page (Foldout page).

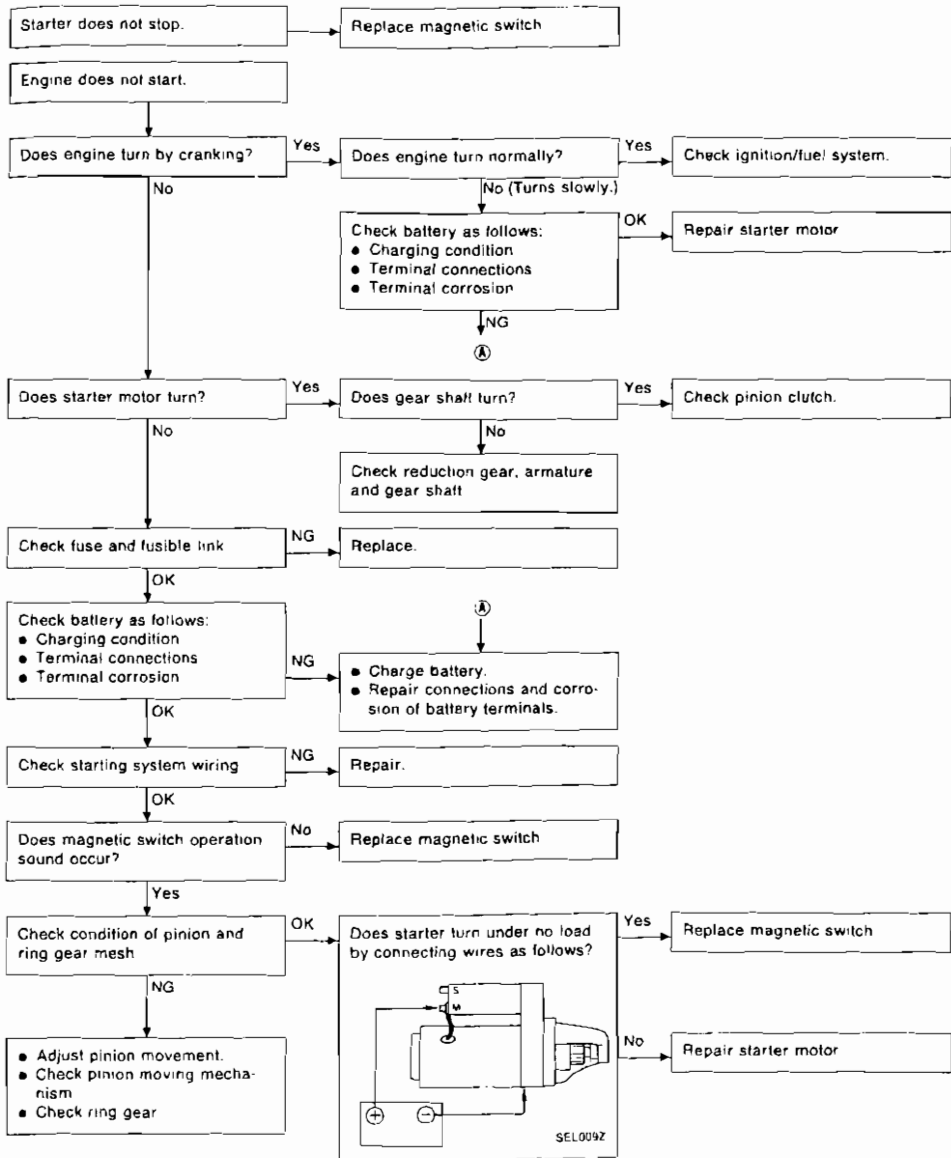
M10, E101  
M18



# STARTING SYSTEM

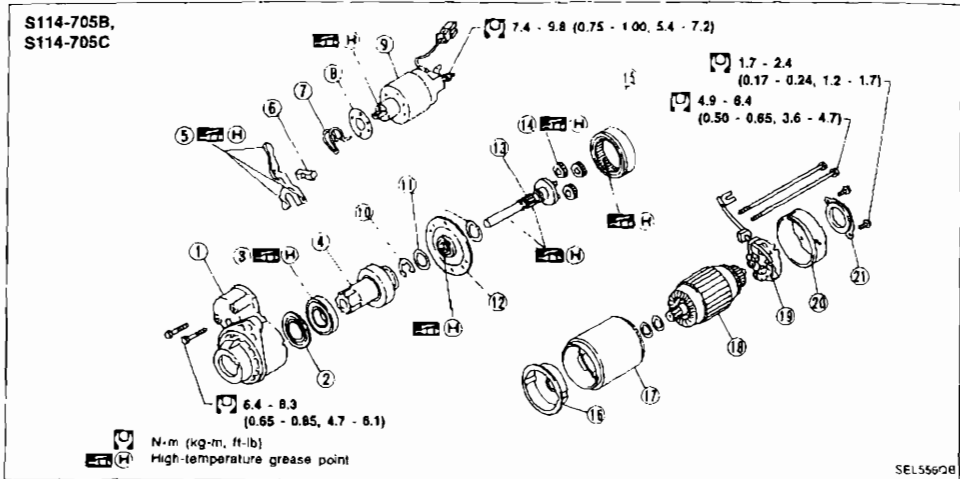
## Trouble-shooting

If any abnormality is found, immediately disconnect battery negative terminal.



# STARTING SYSTEM

## Construction



- |                   |                            |                         |
|-------------------|----------------------------|-------------------------|
| ① Gear case       | ⑧ Adjusting plate          | ⑮ Internal gear         |
| ② Bearing cover   | ⑨ Magnetic switch assembly | ⑯ Center bracket        |
| ③ Ball bearing    | ⑩ E-ring                   | ⑰ Yoke assembly         |
| ④ Pinion assembly | ⑪ Thrust washer            | ⑱ Armature              |
| ⑤ Shift lever     | ⑫ Center bracket           | ⑲ Brush holder assembly |
| ⑥ Dust cover      | ⑬ Pinion shaft             | ⑳ Rear cover            |
| ⑦ Torsion spring  | ⑭ Planetary gear           | ㉑ Dust cover            |

## Removal and Installation

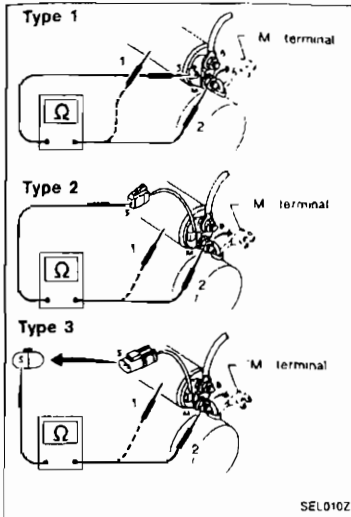
### REMOVAL

1. Remove battery negative cable from battery.
2. Remove transmission harness bracket
3. Remove battery cable from starter motor.
4. Disconnect harness connector from starter motor harness
5. Remove starter motor from under vehicle.

### INSTALLATION

Installation procedure is basically the reverse order of removal.

# STARTING SYSTEM

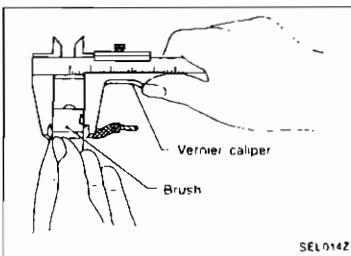
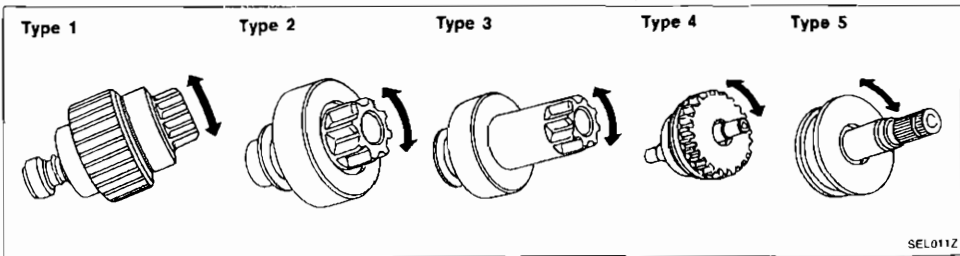


## Magnetic Switch Check

- Before starting to check, disconnect battery ground cable.
- Disconnect "M" terminal of starter motor.
- 1. Continuity test (between "S" terminal and switch body).
- No continuity ... Replace.
- 2. Continuity test (between "S" terminal and "M" terminal).
- No continuity ... Replace.

## Pinion/Clutch Check

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.



## Brush Check

### BRUSH

Check wear of brush.

**Wear limit length:**

**Refer to SDS. (EL-37)**

- Excessive wear .. Replace.

## STARTING SYSTEM

### Brush Check (Cont'd)

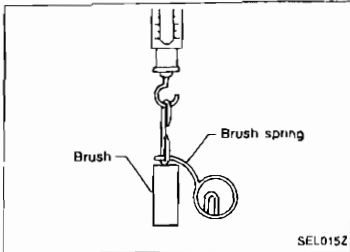
#### BRUSH SPRING PRESSURE

Check brush spring pressure with brush spring detached from brush.

**Spring pressure (with new brush):**

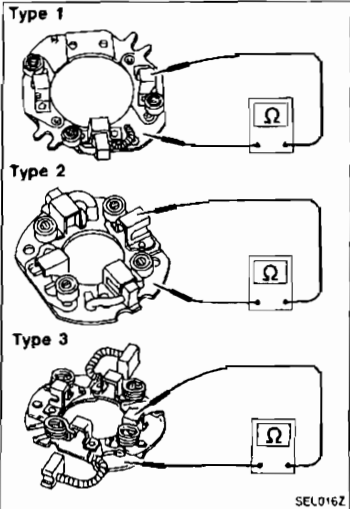
Refer to SDS. (EL-37)

- Not within the specified values ... Replace.



#### BRUSH HOLDER

1. Perform insulation test between brush holder (positive side) and its base (negative side).
- Continuity exists. ... Replace.
2. Check brush to see if it moves smoothly.
- If brush holder is bent, replace it; if sliding surface is dirty, clean.



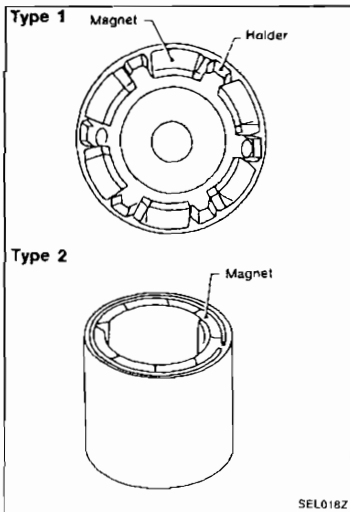
#### Yoke Check

Magnet is secured to yoke by bonding agent. Check magnet to see that it is secured to yoke and for any cracks. Replace malfunctioning parts as an assembly.

Holder may move slightly as it is only inserted and not bonded.

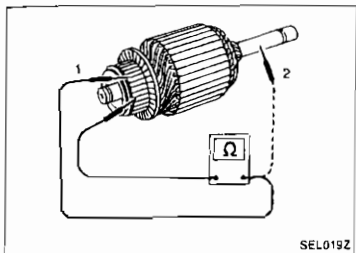
**CAUTION:**

Do not clamp yoke in a vice or strike it with a hammer.





## STARTING SYSTEM



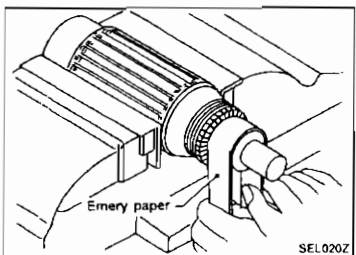
### Armature Check

1. Continuity test (between two segments side by side).
  - No continuity ... Replace.
2. Insulation test (between each commutator bar and shaft).
  - Continuity exists. ... Replace.

GI

MA

EM



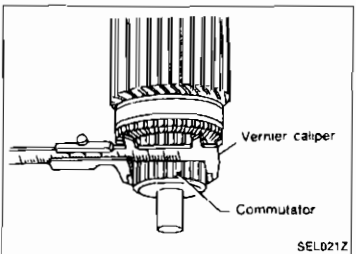
3. Check commutator surface.
  - Rough ... Sand lightly with No. 500 - 600 emery paper.

LC

EC

FE

CL



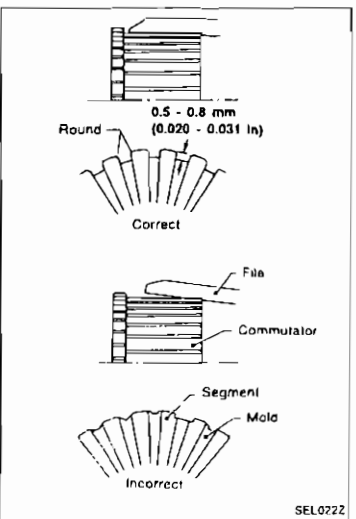
4. Check diameter of commutator.  
**Commutator minimum diameter:**  
**Refer to SDS. (EL-37)**
  - Less than specified value ... Replace.

MT

AT

PD

FA



5. Check depth of insulating mold from commutator surface.
  - Less than 0.2 mm (0.008 in) ... Undercut to 0.5 to 0.8 mm (0.020 to 0.031 in)

RA

BR

ST

RS

BY

HA

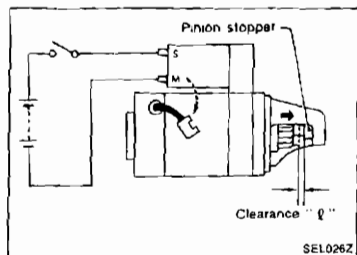
EL

IDX

## STARTING SYSTEM

### Assembly

Apply high-temperature grease to lubricate the bearing, gears and frictional surface when assembling the starter. Carefully observe the following instructions.



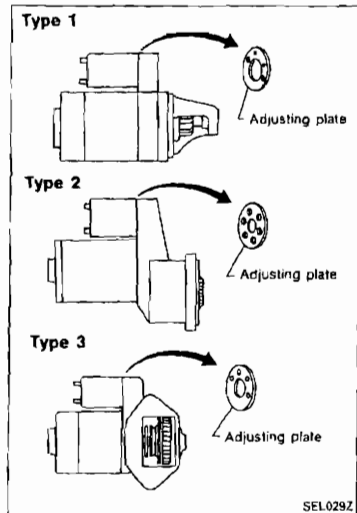
### PINION PROTRUSION LENGTH ADJUSTMENT

With pinion driven out by magnetic switch, push pinion back to remove slack and measure clearance "ℓ" between the front edge of the pinion and the pinion stopper.

Clearance "ℓ":

Refer to SDS. (EL-37)

- Not in the specified value ... Adjust by adjusting plate.



# STARTING SYSTEM

## Service Data and Specifications (SDS) STARTER

|   |                  |  |                 |
|---|------------------|--|-----------------|
| Type  | S114-705B        |  |                 |
|   | S114-705C        |  |                 |
|   | HITACHI make     |  |                 |
|   |                  | Reduction gear                         |                 |
| System voltage  | V                | 12                                     |                 |
| No-load   | Terminal voltage | V                                      | 11.0            |
|   | Current          | A                                      | Less than 90    |
|   | Revolution       | rpm                                    | More than 2,950 |
| Minimum length of brush                                   | mm (in)          | 11.0 (0.433)                           |                 |
| Brush spring tension<br>(With new brush)                  | N (kg, lb)       | 17.6 - 21.6 (1.80 - 2.20, 3.96 - 4.86) |                 |
| Minimum diameter of commutator                            | mm (in)          | 32.0 (1.260)                           |                 |
| Clearance between pinion front<br>edge and pinion stopper | mm (in)          | 0.3 - 1.5 (0.012 - 0.059)              |                 |
| Clearance between bearing metal and armature shaft        | mm (in)          | Less than 0.2 (0.008)                  |                 |

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EL

## CHARGING SYSTEM

### System Description

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

- 100A fusible link (letter (A), located in the fusible link and fuse box), and
- 7.5A fuse (No. (41), located in the fusible link and fuse 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 100A fusible link.

Terminal (E) of the alternator supplies ground through body ground (E204).

With the ignition switch in the ON or START position, power is supplied

- through 7.5A fuse (No. (25), located in the fuse block)
- to combination meter terminal (21) for the charge warning lamp.

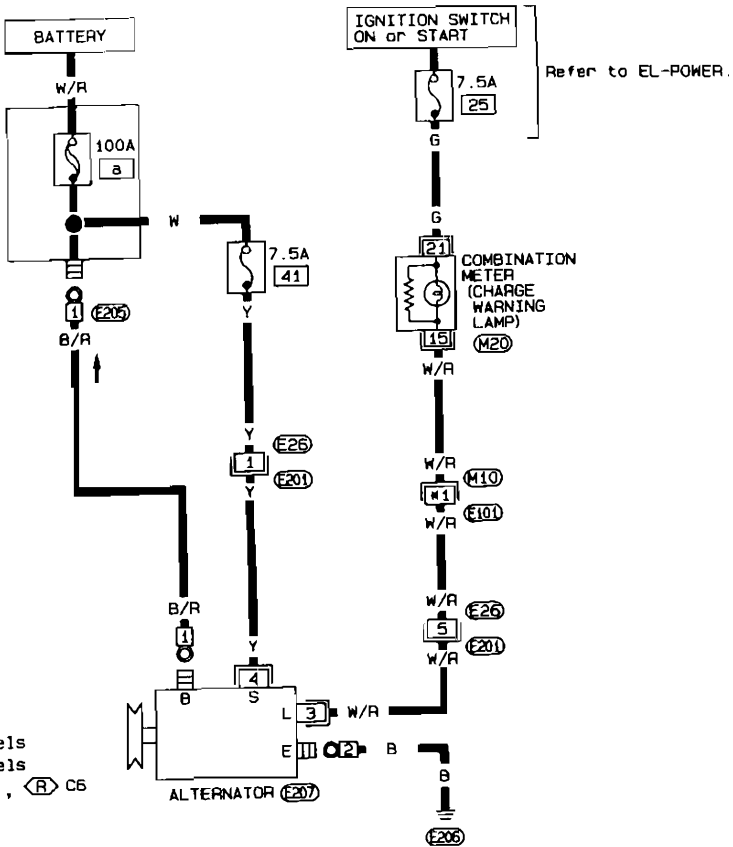
Ground is supplied to terminal (15) of the combination meter through terminal (L) of the alternator. With power and ground supplied, the charge warning lamp will illuminate. When the alternator is providing sufficient voltage with the engine running, the ground is opened and the charge warning lamp will go off.

If the charge warning lamp illuminates with the engine running, a fault is indicated.

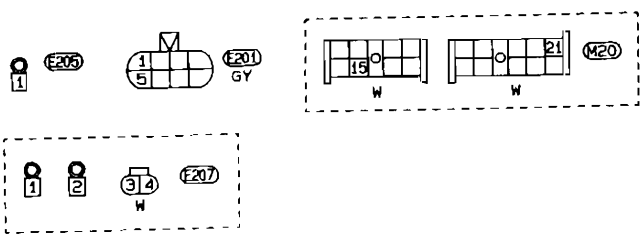
# CHARGING SYSTEM

## Wiring Diagram — CHARGE —

EL-CHARGE-01



Ⓛ : LHD models  
 Ⓡ : RHD models  
 \*1... Ⓛ H4, Ⓡ C6



Refer to last page  
 (Foldout page).  
 M10, E101

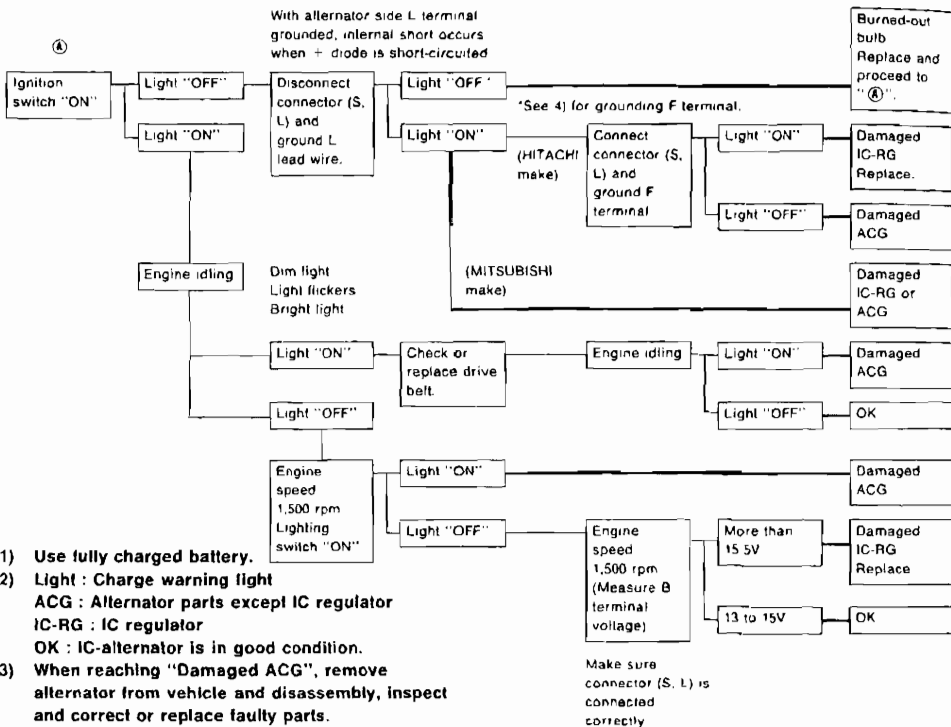
# CHARGING SYSTEM

## Trouble-shooting

Before conducting an alternator test, make sure that the battery is fully charged. A 30-volt voltmeter and suitable test probes are necessary for the test. The alternator can be checked easily by referring to the Inspection Table.

Before starting trouble-shooting, inspect the fusible link.

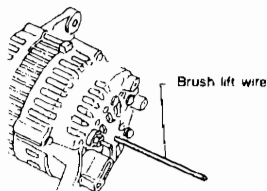
### WITH IC REGULATOR



- 1) Use fully charged battery.
- 2) Light : Charge warning light  
ACG : Alternator parts except IC regulator  
IC-RG : IC regulator  
OK : IC-alternator is in good condition.
- 3) When reaching "Damaged ACG", remove alternator from vehicle and disassembly, inspect and correct or replace faulty parts.
- 4) \*Method of grounding F terminal (HITACHI make only)

### Gasoline engine model

Contact tip of wire with brush and attach wire to alternator body.



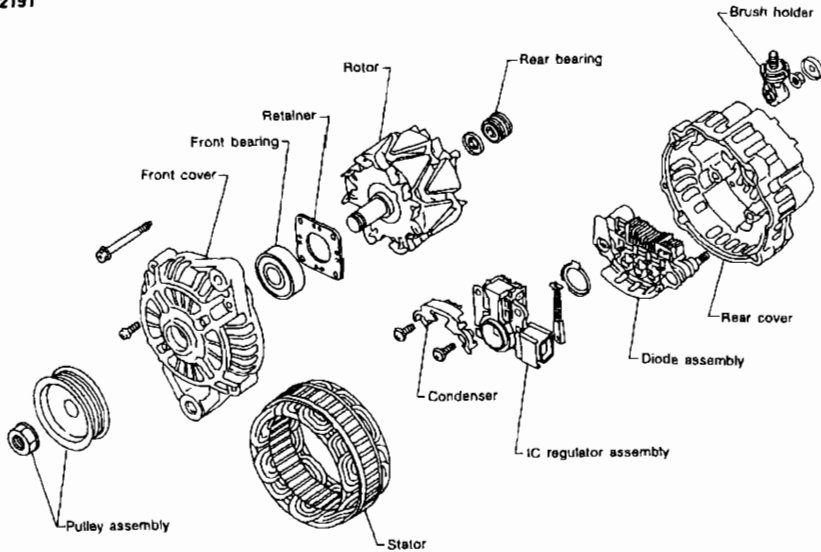
SEL0202

- 5) Terminals "S", "L", "B" and "E" are marked on rear cover of alternator.

# CHARGING SYSTEM

## Construction

SEC. 231  
A2T82191



SEL666T

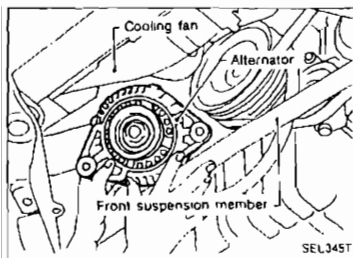
## Removal and Installation

### REMOVAL

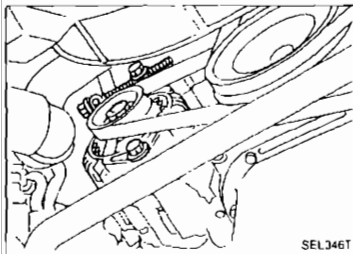
1. Remove engine undercover.
2. Remove stabilizer bracket
3. Remove power steering tube mounting bracket
4. Remove drive bell from alternator.
5. Disconnect harness connector.
6. Remove cooling fan lower shroud
7. Remove alternator

### INSTALLATION

To install, reverse the removal procedure.



SEL345T



SEL346T

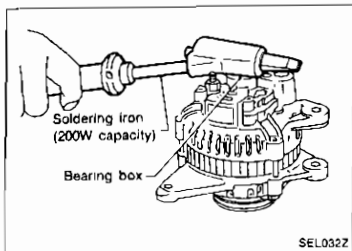
## Disassembly

### REAR COVER REMOVAL

#### CAUTION:

Rear cover may be hard to remove because a ring is used to lock outer race of rear bearing. To facilitate removal of rear cover, heat just bearing box section with a 200W soldering iron.

Do not use a heat gun, as it can damage diode assembly.



### REAR BEARING

#### CAUTION:

- Do not reuse rear bearing after removal. Replace with a new one.
- Do not lubricate rear bearing outer race.

### Rotor Check

#### 1. Resistance test

**Resistance: Refer to SDS. (EL-45)**

- Not within the specified values ... Replace rotor.

#### 2. Insulator test

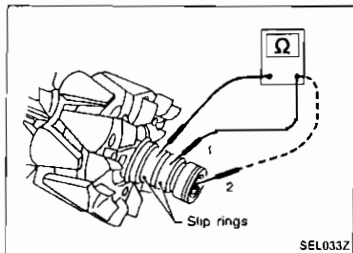
- Continuity exists ... Replace rotor.

#### 3. Check slip ring for wear.

**Slip ring minimum outer diameter:**

**Refer to SDS. (EL-45)**

- Not within the specified values ... Replace rotor.



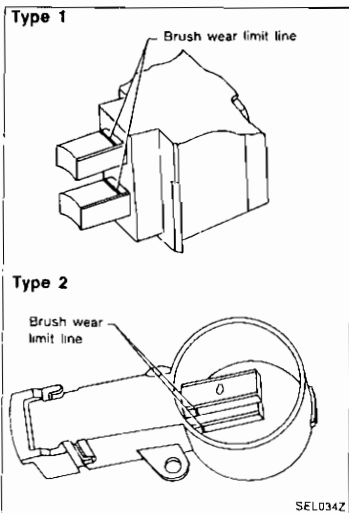
### Brush Check

#### 1. Check smooth movement of brush.

- Not smooth ... Check brush holder and clean.

#### 2. Check brush for wear.

- Replace brush if it is worn down to the limit line.



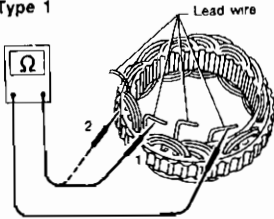


# CHARGING SYSTEM

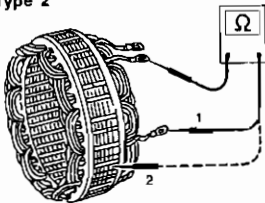
## Stator Check

1. Continuity test
  - No continuity ... Replace stator.
2. Ground test
  - Continuity exists ... Replace stator

Type 1



Type 2



SEL037Z

GF

WH

FW

LC

EC

FE

CL

VT

AT

FD

FR

RL

BF

ST

FS

RT

LA

EL

DM

# CHARGING SYSTEM

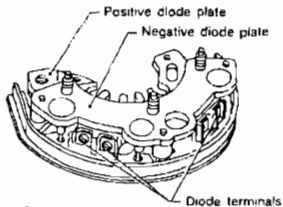
## Diode Check

### MAIN DIODES

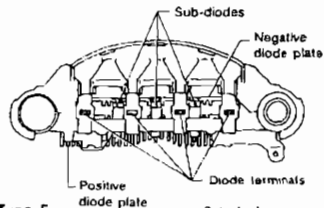
- Use an ohmmeter to check condition of diodes as indicated in chart below
- If any of the test results is not satisfactory, replace diode assembly.

|                              | Ohmmeter probes      |                      | Judgement                             |
|------------------------------|----------------------|----------------------|---------------------------------------|
|                              | Positive ⊕           | Negative ⊖           |                                       |
| Diodes check (Positive side) | Positive diode plate | Diode terminals      | Diode conducts in only one direction. |
|                              | Diode terminals      | Positive diode plate |                                       |
| Diodes check (Negative side) | Negative diode plate | Diode terminals      | Diode conducts in only one direction. |
|                              | Diode terminals      | Negative diode plate |                                       |

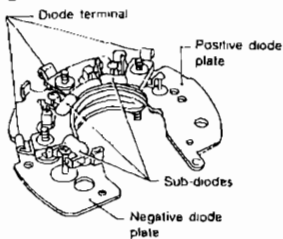
Type 1



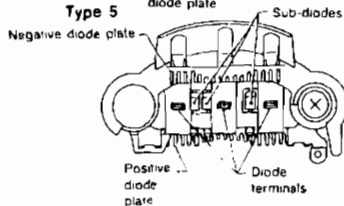
Type 4



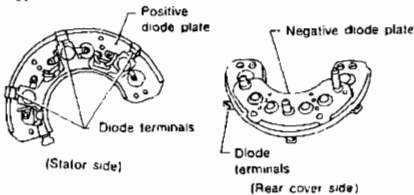
Type 2



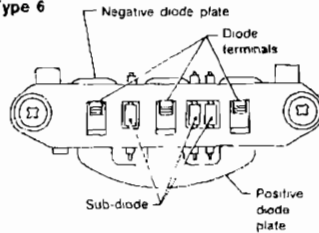
Type 5



Type 3

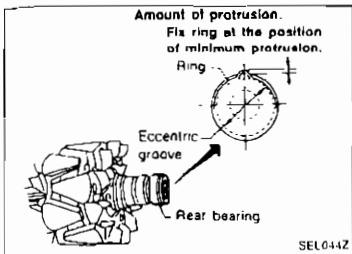


Type 6



SEL639Z

# CHARGING SYSTEM



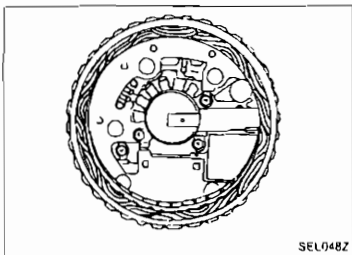
## Assembly

### RING FITTING IN REAR BEARING

- Fix ring into groove in rear bearing so that it is as close to the adjacent area as possible.

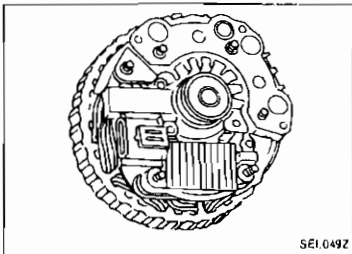
#### CAUTION:

Do not reuse rear bearing after removal.



### REAR COVER INSTALLATION

- (1) Fit brush assembly, diode assembly, regulator assembly and stator.
- (2) Push brushes up with fingers and install them to rotor. Take care not to damage slip ring sliding surface.



## Service Data and Specifications (SDS)

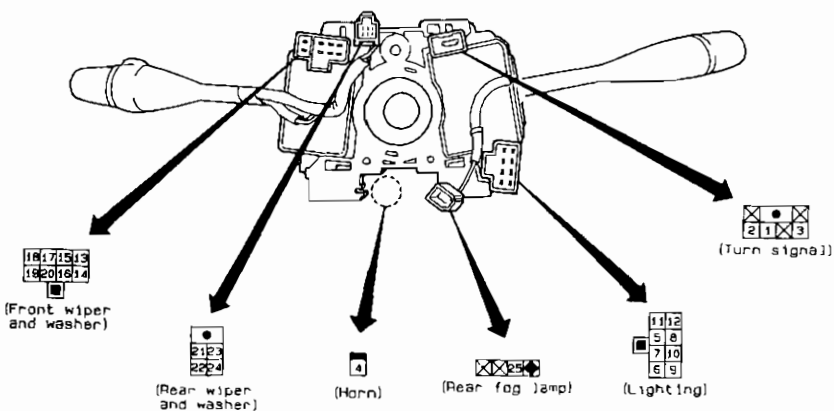
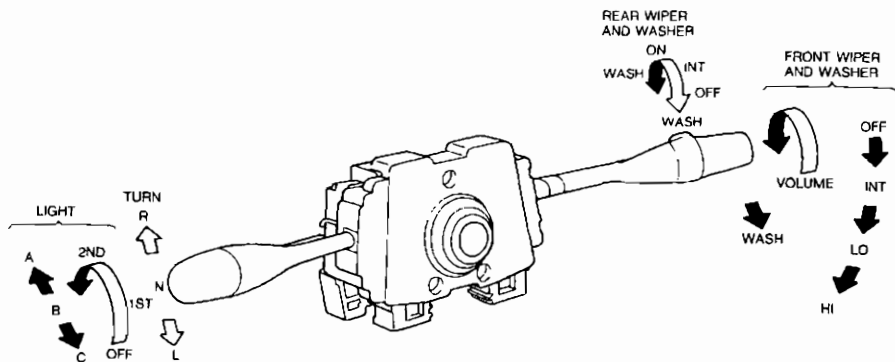
### ALTERNATOR

| Type   | A2182191        |  |
|--|-----------------|--|
|  | MITSUBISHI make |  |
| Nominal rating   | V-A             | 12-90  |
| Ground polarity  |                 | Negative   |
| Minimum revolution under no-load<br>(when 13.5 volts is applied) | rpm             | Less than 1,300  |
| Hot output current   | A/rpm           | More than 22/1,300<br>More than 67/2,500<br>More than 90/5,000 |
| Regulated output voltage   | V               | 14.1 - 14.7  |
| Minimum length of brush  | mm (in)         | More than 5 (0.20)   |
| Slip ring minimum outer diameter                                 | mm (in)         | More than 22.1 (0.870)   |
| Rotor (field coil) resistance                                    | Ω               | 2.5  |

# COMBINATION SWITCH

## Check

FOR EUROPE



**LIGHTING SWITCH**

|    | OFF | 1ST | 2ND |
|----|-----|-----|-----|
| 18 | A   | B   | C   |
| 19 | 0   | 0   | 0   |
| 20 | 0   | 0   | 0   |
| 21 | 0   | 0   | 0   |
| 22 | 0   | 0   | 0   |
| 23 | 0   | 0   | 0   |
| 24 | 0   | 0   | 0   |

**FRONT WIPER AND WASHER SWITCH**

|    | OFF | INT | LO | HI | WASH |
|----|-----|-----|----|----|------|
| 13 | 0   | 0   | 0  | 0  | 0    |
| 14 | 0   | 0   | 0  | 0  | 0    |
| 15 | 0   | 0   | 0  | 0  | 0    |
| 16 | 0   | 0   | 0  | 0  | 0    |
| 17 | 0   | 0   | 0  | 0  | 0    |
| 18 | 0   | 0   | 0  | 0  | 0    |

**REAR WIPER AND WASHER SWITCH**

|    | WASH | OFF | INT | ON | WASH |
|----|------|-----|-----|----|------|
| 21 | 0    | 0   | 0   | 0  | 0    |
| 22 | 0    | 0   | 0   | 0  | 0    |
| 23 | 0    | 0   | 0   | 0  | 0    |
| 24 | 0    | 0   | 0   | 0  | 0    |

**TURN SIGNAL SWITCH**

|   | R | N | L |
|---|---|---|---|
| 1 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 |

**INTERMITTENT WIPER VOLUME**



**HORN SWITCH**  
(Models without air bag system)

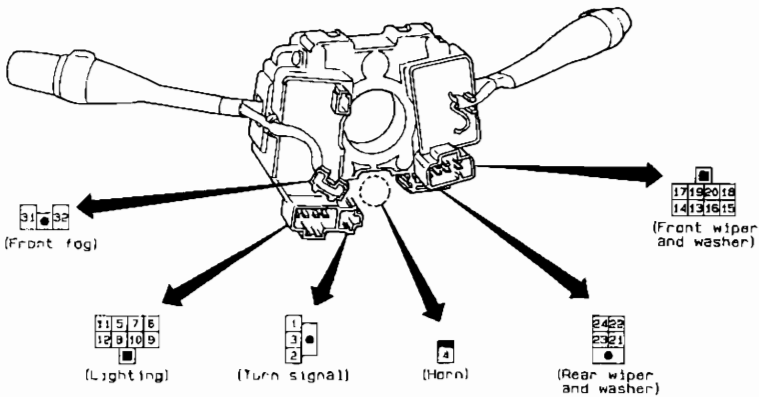
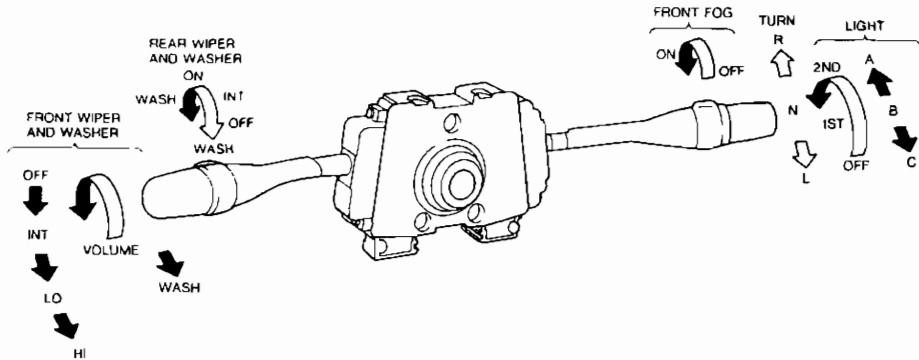


SEL671T

# COMBINATION SWITCH

## Check (Cont'd)

EXCEPT FOR EUROPE



LIGHTING SWITCH

|   | OFF | 1ST | 2ND |
|---|-----|-----|-----|
| A | 0   | 0   | 0   |
| B | 0   | 0   | 0   |
| C | 0   | 0   | 0   |
| D | 0   | 0   | 0   |
| E | 0   | 0   | 0   |
| F | 0   | 0   | 0   |
| G | 0   | 0   | 0   |
| H | 0   | 0   | 0   |
| I | 0   | 0   | 0   |
| J | 0   | 0   | 0   |
| K | 0   | 0   | 0   |
| L | 0   | 0   | 0   |

TURN SIGNAL SWITCH

|   | R | N | L |
|---|---|---|---|
| 1 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 |

FRONT WIPER AND WASHER SWITCH

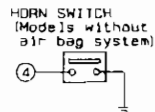
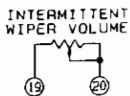
|    | OFF | INT | LO | HI | WASH |
|----|-----|-----|----|----|------|
| 13 | 0   | 0   |    |    |      |
| 14 | 0   | 0   |    |    |      |
| 15 | 0   | 0   |    |    |      |
| 16 | 0   | 0   |    |    |      |
| 17 | 0   | 0   |    |    |      |
| 18 | 0   | 0   |    |    |      |

REAR WIPER AND WASHER SWITCH

|    | WASH | OFF | INT | ON | WASH |
|----|------|-----|-----|----|------|
| 21 |      |     | 0   |    |      |
| 22 |      |     | 0   |    |      |
| 23 | 0    |     | 0   |    | 0    |
| 24 | 0    |     | 0   |    | 0    |

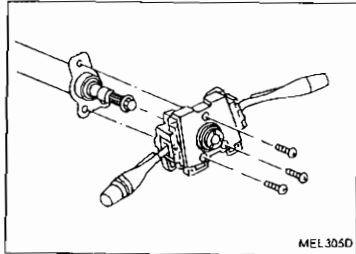
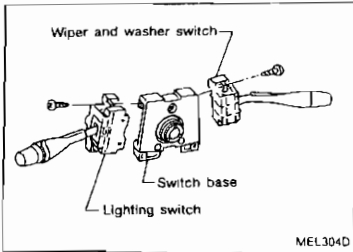
FRONT FOG LAMP SWITCH

|    | OFF | ON |
|----|-----|----|
| 31 | 0   | 0  |
| 32 | 0   | 0  |



EL  
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DA

## COMBINATION SWITCH



### Replacement

- Each switch can be replaced without removing combination switch base
- To remove combination switch base, remove base attaching screw.



## System Description

The headlamps are controlled by the lighting switch which is built into the combination switch

### MODELS FOR EUROPE

Power is supplied at all times

- to lighting switch terminal (5)
- through 20A fuse (No. [37] , located in the fusible link and fuse box), and
- to lighting switch terminal (8)
- through 20A fuse (No. [38] , located in the fusible link and fuse box).

#### 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 (10)
- to terminal (3) of the LH headlamp, and
- from lighting switch terminal (7)
- to terminal (3) of the RH headlamp.

Terminal (2) of each headlamp supplies ground through body ground (E43) or (E57).

With power and ground supplied, the low beam headlamps will illuminate.

#### High beam operation/flash-to-pass operation

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 terminals (1) (Outer) and (4) (Inner) of RH headlamp, and
- from lighting switch terminal (9)
- to terminals (1) (Outer) and (4) (Inner) of LH headlamp, and
- to combination meter terminal (17) for the high beam indicator.

Ground is supplied to terminal (16) of the combination meter through body ground (M1).

Terminals (2) (Outer) and (5) (Inner) of headlamp supply ground through body ground (E43) or (E57).

With power and ground supplied, the high beams and the high beam indicator will illuminate.

### MODELS EXCEPT FOR EUROPE

Power is supplied at all times

- to lighting switch terminal (5)
- through 20A fuse (No. [38] , located in the fusible link and fuse box), and
- to lighting switch terminal (8)
- through 20A fuse (No. [37] , located in the fusible link and fuse box).

#### 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 terminal (3) of the LH headlamp, and
- from lighting switch terminal (10)
- to terminal (3) of the RH headlamp.

Terminal (2) of each headlamp supplies ground through body ground (E43) or (E57).

With power and ground supplied, the low beam headlamps will illuminate.

#### High beam operation/flash-to-pass operation

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 (9)
- to terminals (1) (Outer) and (4) (Inner) of each RH headlamp, and
- from lighting switch terminal (6)
- to terminals (1) (Outer) and (4) (Inner) of each LH headlamp, and
- to combination meter terminal (17) for the high beam indicator.

Ground is supplied to terminal (16) of the combination meter through body ground (M1).

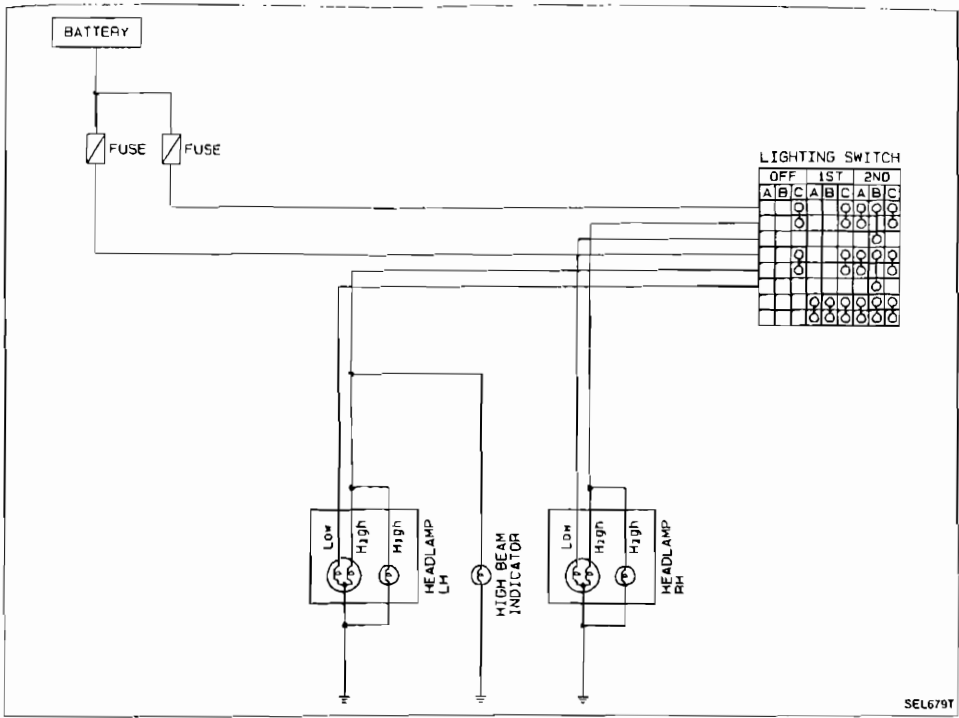
Terminals (2) (Outer) and (5) (Inner) of each headlamp supply ground through body ground (E43) or (E57).

With power and ground supplied, the high beams and the high beam indicator will illuminate



# HEADLAMP — Without Daytime Light System —

## Schematic



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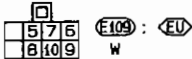
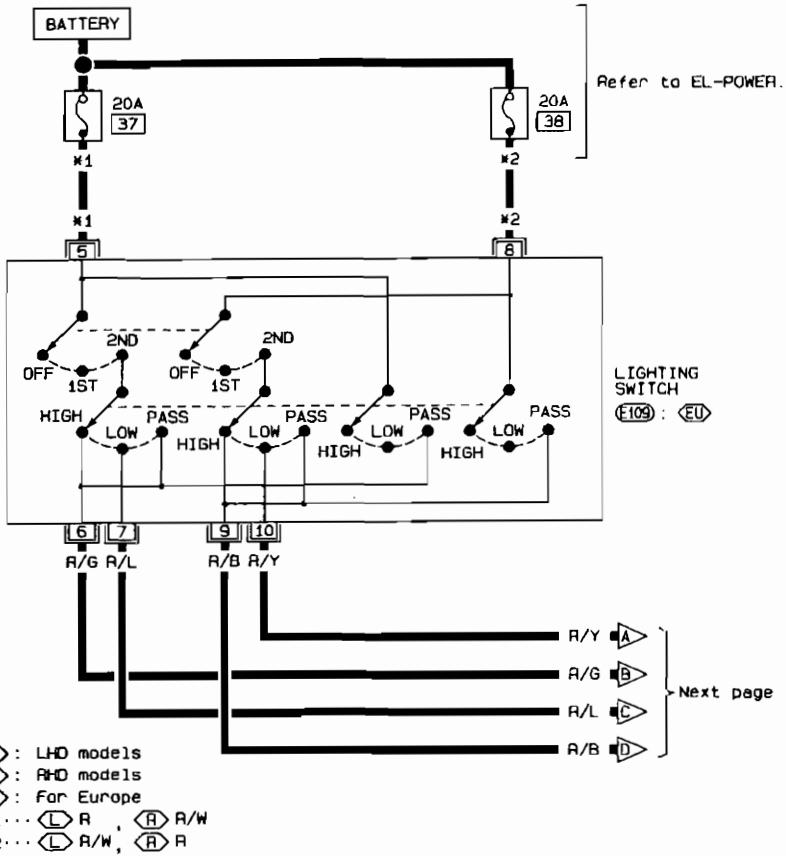
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# HEADLAMP — Without Daytime Light System —

## Wiring Diagram — H/LAMP —

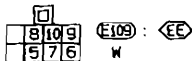
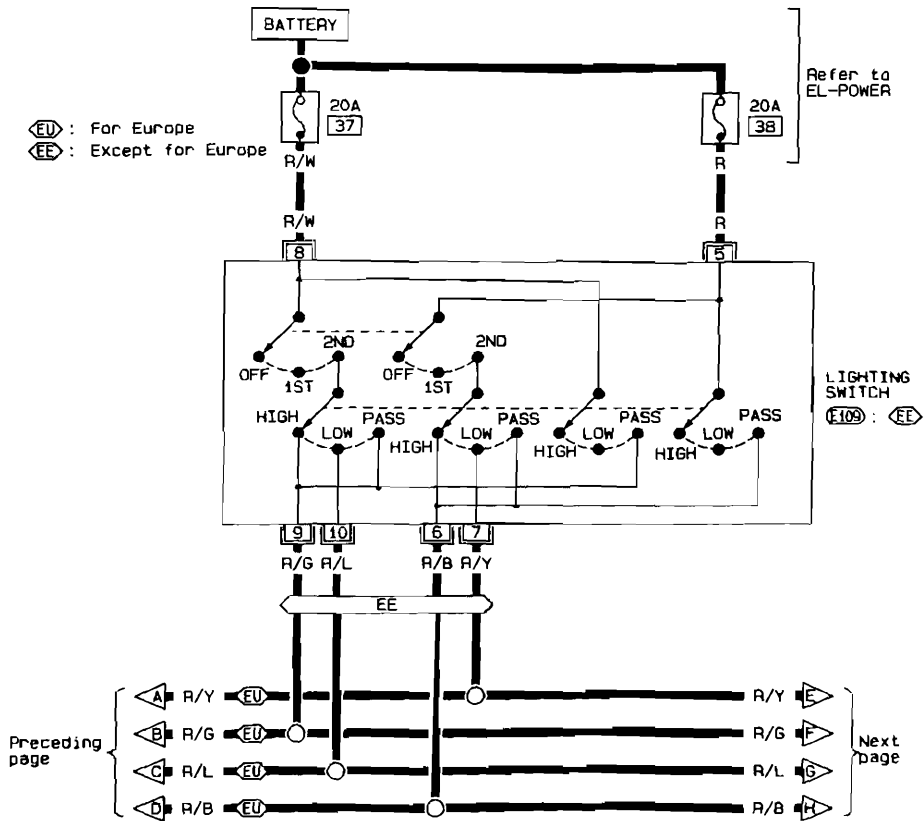
EL-H/LAMP-01



# HEADLAMP — Without Daytime Light System —

## Wiring Diagram — H/LAMP — (Cont'd)

EL-H/LAMP-02

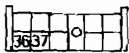
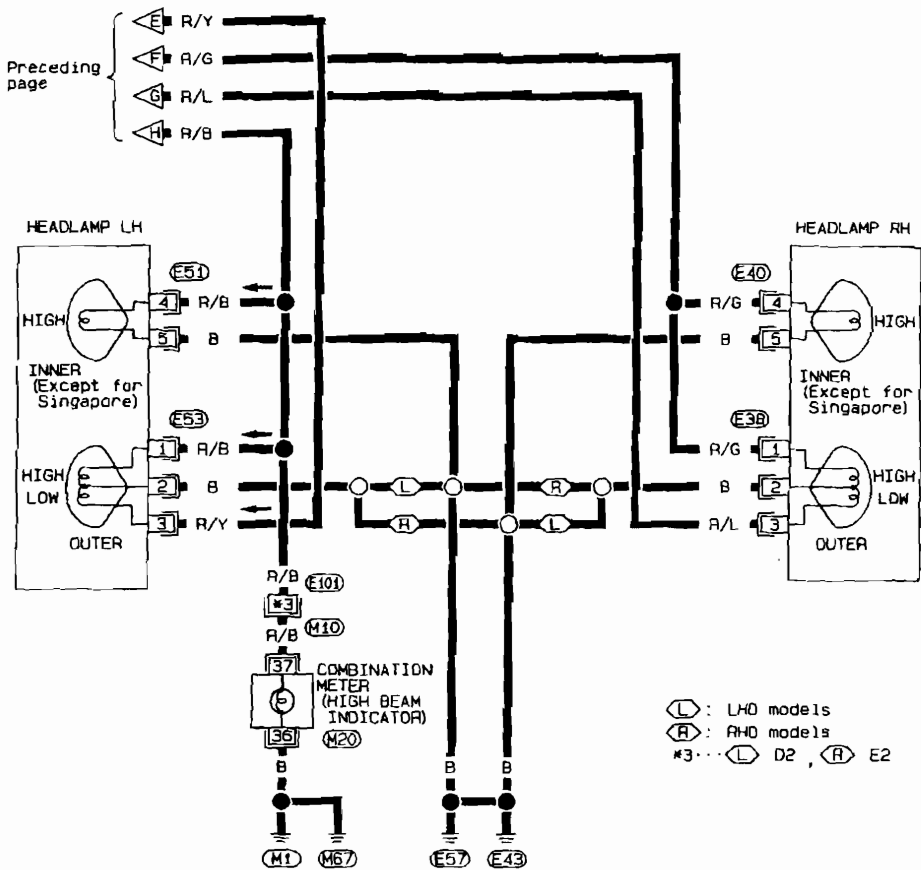


EL

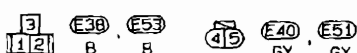
# HEADLAMP — Without Daytime Light System —

## Wiring Diagram — H/LAMP — (Cont'd)

EL-H/LAMP-03



M20  
B



Refer to last page (Foldout page).

M10, E101

# HEADLAMP — Without Daytime Light System —

## Trouble Diagnoses

| Symptom  | Possible cause   | Repair order   |
|--|--|--|
| LH headlamps do not operate                              | 1 Bulb<br>2 Ground (E43) or (E57)<br>3 20A fuse<br>4 Lighting switch | 1 Check bulb.<br>2 Check ground (E43) or (E57)<br>3 Check 20A fuse (No 38) . located in fusible link and fuse box). Verify battery positive voltage is present at terminal *1 of lighting switch.<br>4 Check lighting switch |
| RH headlamps do not operate                              | 1 Bulb<br>2 Ground (E43) or (E57)<br>3 20A fuse<br>4 Lighting switch | 1 Check bulb<br>2 Check ground (E43) or (E57)<br>3 Check 20A fuse (No 37) . located in fusible link and fuse box). Verify battery positive voltage is present at terminal *2 of lighting switch<br>4 Check lighting switch   |
| LH high beams do not operate, but LH low beam operates   | 1 Bulbs<br>2 Open in LH high beams circuit<br>3. Lighting switch     | 1 Check bulbs<br>2 Check R/B wire between lighting switch and LH headlamps for an open circuit<br>3 Check lighting switch  |
| LH low beam does not operate, but LH high beam operates. | 1 Bulb<br>2 Open in LH low beam circuit<br>3. Lighting switch        | 1 Check bulb<br>2 Check R/Y wire between lighting switch and LH headlamp for an open circuit.<br>3. Check lighting switch.   |
| RH high beams do not operate, but RH low beam operates.  | 1 Bulbs<br>2 Open in RH high beams circuit<br>3. Lighting switch     | 1 Check bulbs.<br>2 Check R/G wire between lighting switch and RH headlamps for an open circuit<br>3. Check lighting switch  |
| RH low beam does not operate, but RH high beam operates. | 1 Bulb<br>2 Open in RH low beam circuit<br>3 Lighting switch         | 1 Check bulb.<br>2 Check R/L wire between lighting switch and RH headlamp for an open circuit<br>3 Check lighting switch.  |
| High beam indicator does not work.                       | 1. Bulb<br>2. Ground (M1)<br>3 Open in high beam circuit             | 1. Check bulb in combination meter<br>2. Check ground (M1)<br>3 Check R/B wire between lighting switch and combination meter for an open circuit   |

\*1 (8) Models for Europe  
 (5) Models except for Europe

\*2 (5) Models for Europe  
 (8) Models except for Europe

## System Description

The headlamp system on vehicles for Norway and Sweden contains a daytime light unit. The unit activates the following whenever the engine is running with the lighting switch in the OFF position:

- Low beam headlamps
- Clearance, license, tail and illumination lamps

Power is supplied at all times

- through 20A fuse (No. 37), located in the fusible link and fuse box
- to daytime light unit terminal ③ and
- to lighting switch terminal ⑤.

Power is also supplied at all times

- through 20A fuse (No. 38), located in the fusible link and fuse box
- to daytime light unit terminal ② and
- to lighting switch terminal ⑥.

Power is also supplied at all times

- through 10A fuse (No. 2), located in the fuse block)
- to daytime light unit terminal ① and
- to lighting switch terminal ⑦.

With the ignition switch in the ON or START position, power is supplied

- through 7.5A fuse (No. 26), located in the fuse block)
- to daytime light unit terminal ⑦.

With the ignition switch in the START position, power is supplied

- through 7.5A fuse (No. 2), located in the fuse block)
- to daytime light unit terminal ⑥.

Ground is supplied to daytime light unit terminal ⑨ through body ground (E43).

## HEADLAMP OPERATION

### 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 or
- from daytime light unit terminal ④
- to RH headlamp terminal ③.

Ground is supplied to RH headlamp terminal ② through body ground (E43).

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 or
- from daytime light unit terminal ⑤.
- to LH headlamp terminal ③.

Ground is supplied to LH headlamp terminal ② through body ground (E37).

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 or PASS ("C") position, power is supplied

- from lighting switch terminal ⑥
- to terminals ① (Outer) and ④ (Inner) of RH headlamp, and
- from lighting switch terminal ⑨
- to terminals ① (Outer) and ④ (Inner) of LH headlamp, and
- to combination meter terminal ⑪ for the high beam indicator.

Ground is supplied to terminal ⑫ of the combination meter through body ground (M1).

Terminals ② (Outer) and ⑤ (Inner) of headlamp supply ground through body ground (E43) or (E37)

With power and ground supplied, the high beams and the high beam indicator will illuminate.

# HEADLAMP — Daytime Light System —

## System Description (Cont'd)

### DAYTIME LIGHT OPERATION

With the engine running and the lighting switch in the OFF position, power is supplied

- to daytime light unit terminal ②
- through daytime light unit terminal ⑤
- to terminal ③ of LH headlamp
- to daytime light unit terminal ③
- through daytime light unit terminal ④
- to terminal ③ of RH headlamp

Ground is supplied to terminal ② of each headlamp through body ground (E45) or (E57)

Ground is also supplied to terminal ⑨ of daytime light unit through body ground (E43).

### Operation (Daytime light system)

The headlamps' low beam and clearance, license, tail and illumination lamps automatically turn on after starting the engine with lighting switch in "OFF" position.

Lighting switch operations other than the above are the same as conventional light systems

| Engine                                   |   | With engine stopped |           |   |     |   |   |     |   |   | With engine running |   |   |     |   |   |     |   |   |
|--|---|---------------------|-----------|---|-----|---|---|-----|---|---|---------------------|---|---|-----|---|---|-----|---|---|
|  |   | OFF                 |           |   | 1ST |   |   | 2ND |   |   | OFF                 |   |   | 1ST |   |   | 2ND |   |   |
| Lighting switch                          |   | 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 | X | X   | O | X | X   | O | O |
| Low beam                                 | X |                     | X         | X | X   | X | X | X   | X | O | X                   | O | O | O   | X | X | X   | X | O |
| Clearance and tail lamp                  |   | X                   | X         | X | O   | O | O | O   | O | O | O                   | O | O | O   | O | O | O   | O | O |
| License and instrument illumination lamp |   | X                   | X         | X | O   | O | O | O   | O | O | O                   | O | O | O   | O | O | O   | O | O |

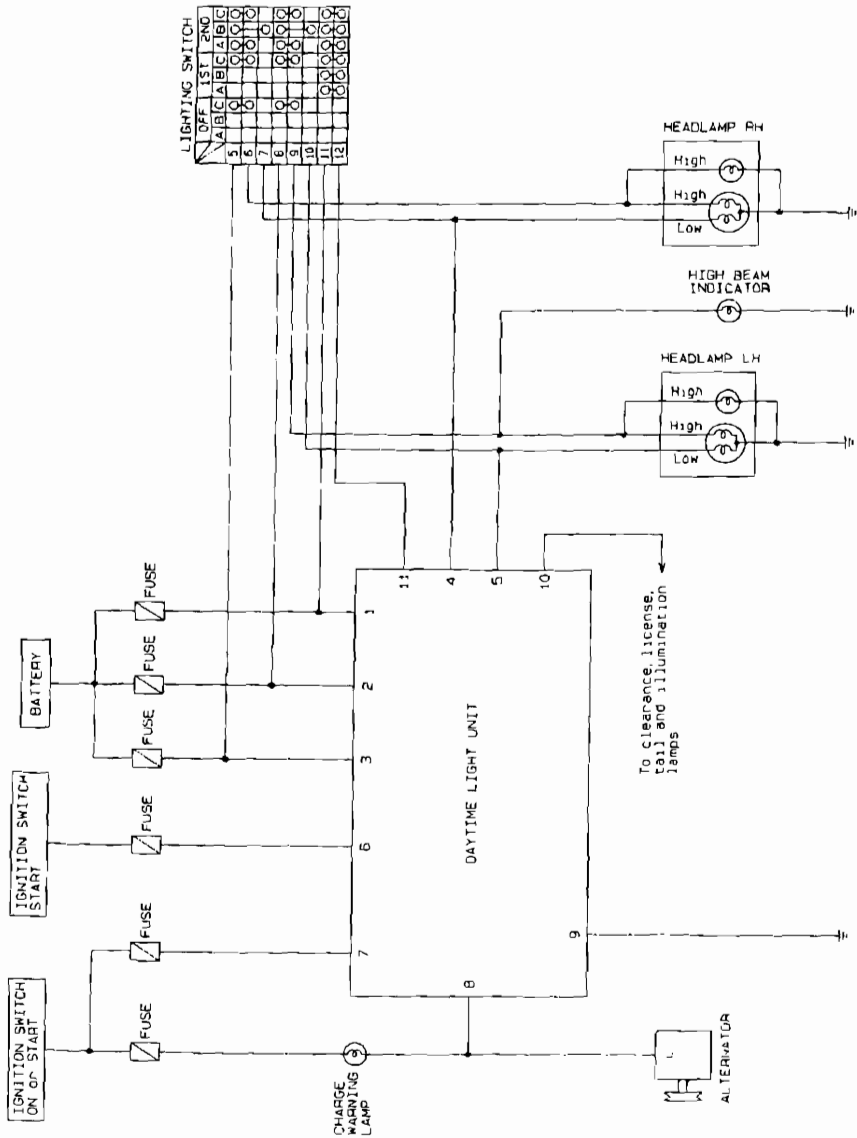
O: Lamp "ON"

X: Lamp "OFF"

□: Added functions

# HEADLAMP — Daytime Light System —

## Schematic

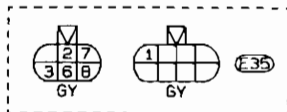
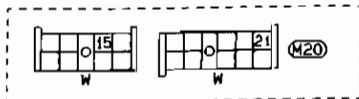
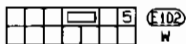
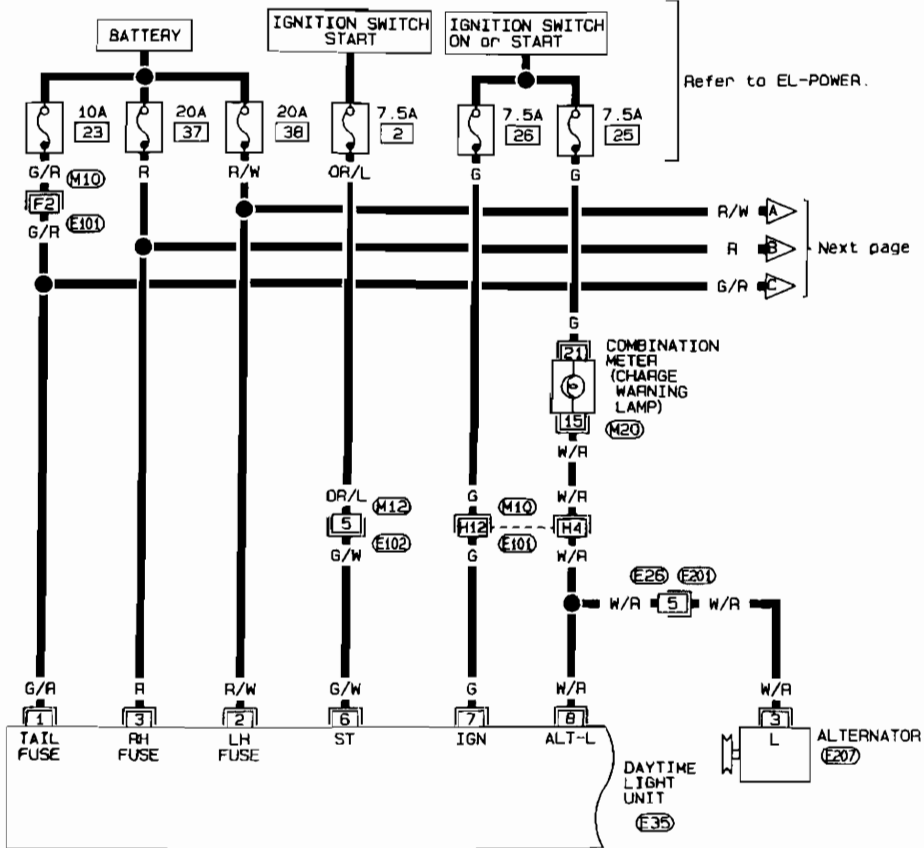




# HEADLAMP — Daytime Light System —

## Wiring Diagram — DTRL —

EL-DTRL-01



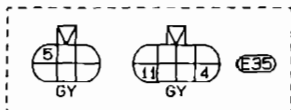
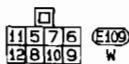
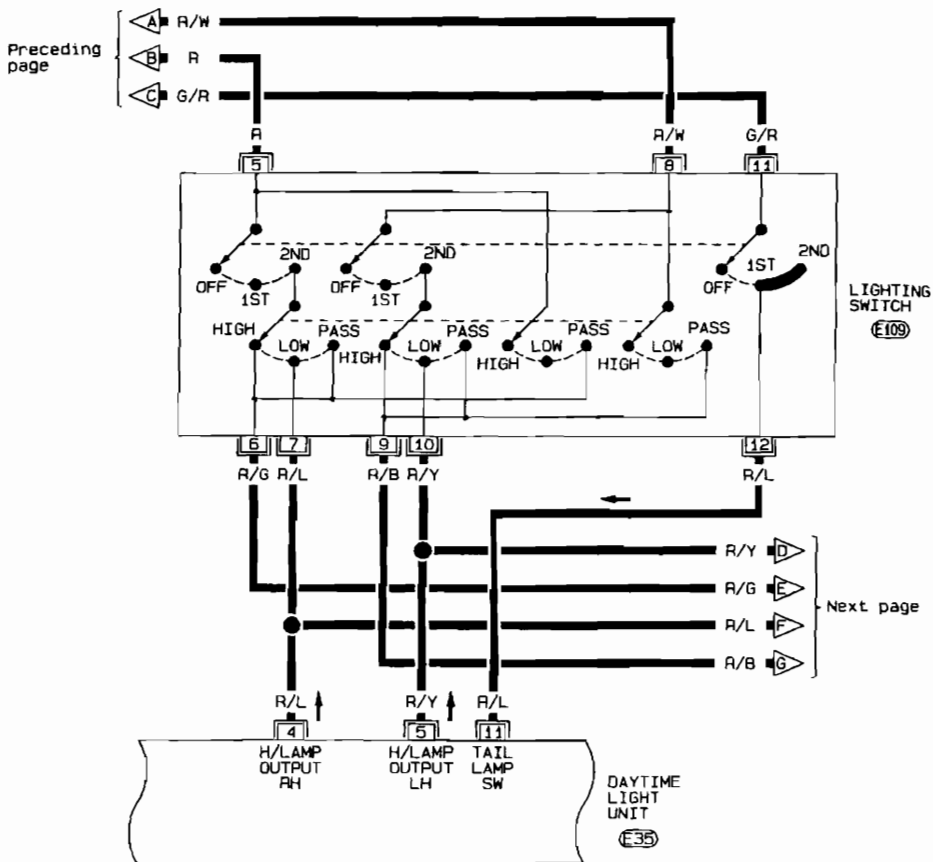
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M10 E101

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**HEADLAMP — Daytime Light System —**  
**Wiring Diagram — DTRL — (Cont'd)**

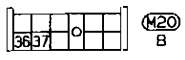
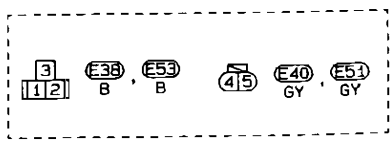
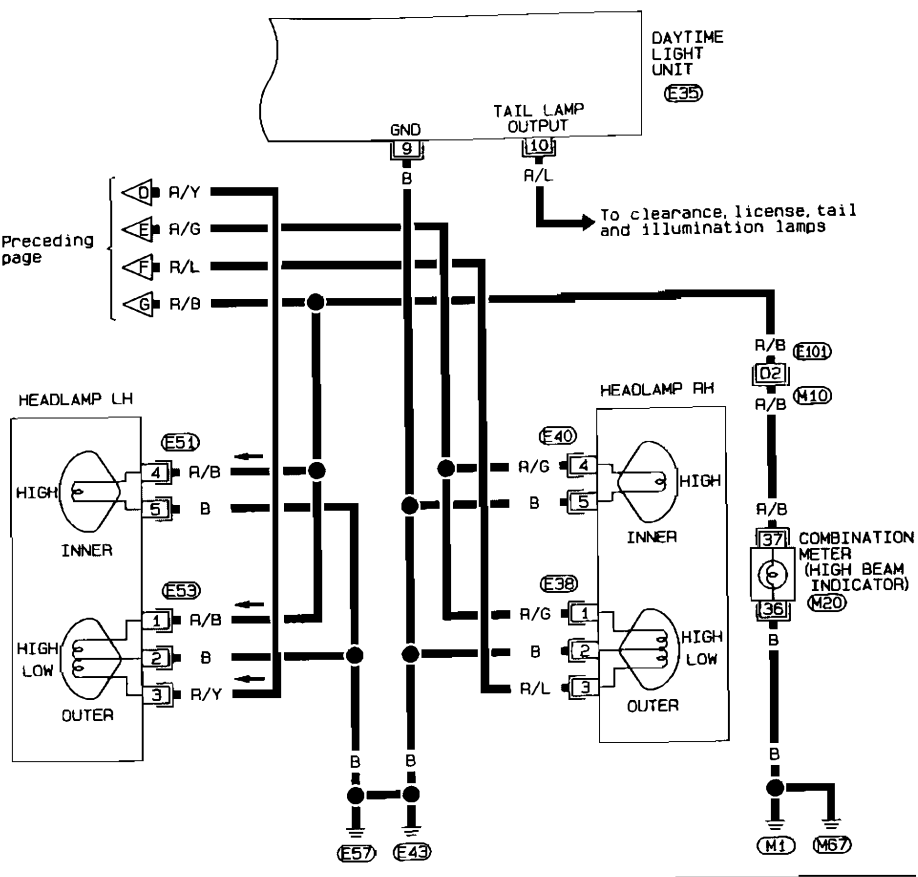
EL-DTRL-02



# HEADLAMP — Daytime Light System — Wiring Diagram — DTRL — (Cont'd)

EL-DTRL-03

GF  
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











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M10, E101

# HEADLAMP — Daytime Light System —

## Trouble Diagnoses

### DAYTIME LIGHT UNIT INSPECTION TABLE

(Data are reference values.)

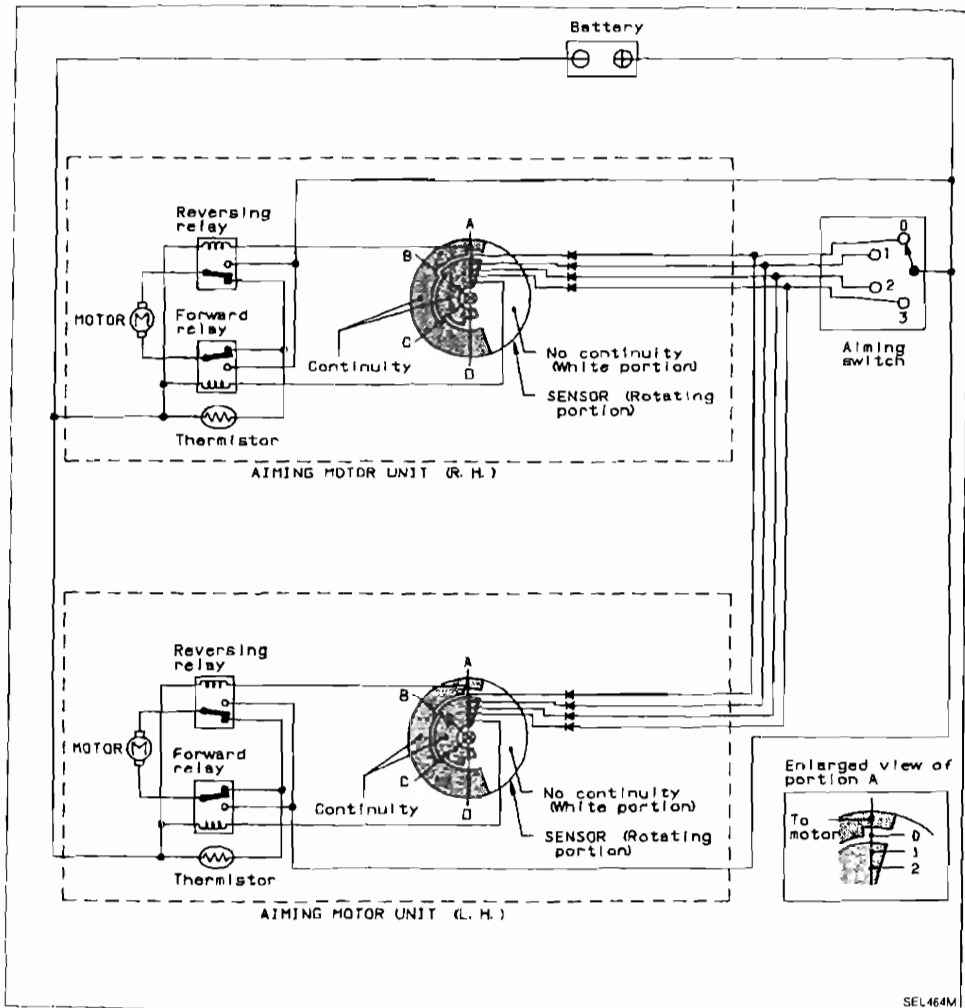
| Terminal No | Item                         | Condition   |   | Judgement standard       |
|-------------|------------------------------|---|---|--------------------------|
| 1           | Power source (BAT)           |    | When turning ignition switch to "ON"  | Battery positive voltage |
|             |                              |    | When turning ignition switch to "OFF"   | Battery positive voltage |
| 2           | Power source (BAT)           |    | When turning ignition switch to "ON"  | Battery positive voltage |
|             |                              |    | When turning ignition switch to "OFF"   | Battery positive voltage |
| 3           | Power source (BAT)           |    | When turning ignition switch to "ON"  | Battery positive voltage |
|             |                              |    | When turning ignition switch to "OFF"   | Battery positive voltage |
| 4           | RH to beam (Lighting switch) |    | When turning lighting switch to "HEAD" and 2ND positions                            | Battery positive voltage |
|             |                              |    | When turning lighting switch to "OFF" with engine running (daytime light operation) | Battery positive voltage |
| 5           | LH to beam (Lighting switch) |    | When turning lighting switch to "HEAD" and 2ND positions                            | Battery positive voltage |
|             |                              |    | When turning lighting switch to "OFF" with engine running (daytime light operation) | Battery positive voltage |
| 6           | Start signal                 |    | When turning ignition switch to "ST"  | Battery positive voltage |
|             |                              |    | When turning ignition switch to "ON" from "ST"                                      | 1V or less               |
|             |                              |   | When turning ignition switch to "OFF"   | 1V or less               |
| 7           | Power source (IGN)           |  | When turning ignition switch to "ON"  | Battery positive voltage |
|             |                              |  | When turning ignition switch to "ST"  | Battery positive voltage |
|             |                              |  | When turning ignition switch to "OFF"   | 1V or less               |
| 8           | Alternator                   |  | When turning ignition switch to "ON"  | More than 5V             |
|             |                              |  | When engine is running  | Battery positive voltage |
|             |                              |  | When turning ignition switch to "OFF"   | 1V or less               |



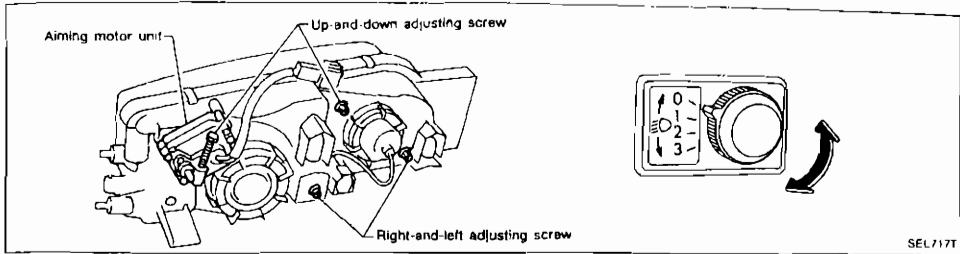
# HEADLAMP — Headlamp Aiming Control —

## Description

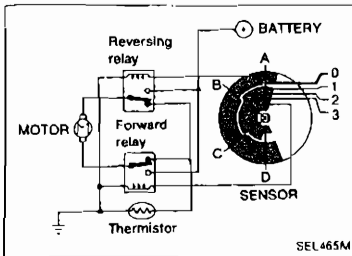
- The vertical direction of the headlamp beam can be adjusted from inside the vehicle. This prevents the headlamp beam axis from facing upward due to changes in number of occupants and vehicle load conditions



# HEADLAMP — Headlamp Aiming Control — Description (Cont'd)



SEL717T



## CIRCUIT OPERATION

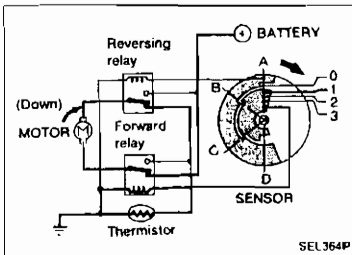
### [Example]

#### Aiming switch "0"

- When the aiming switch is set to "0", the motor will not start. This is because the power terminals are positioned at the nonconductive section of the sensor's rotary unit

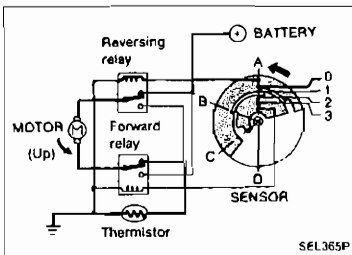
#### Aiming switch "0" → "1"

- When the aiming switch is moved from "0" to "1", the sensor's conductive section activates the relay. Power is supplied through the relay to the motor. The headlamps will then move in the "DOWN" direction.
- The motor continues to rotate while the rotary unit of the sensor moves from point A to point B.
- The power terminals will then be positioned at the nonconductive section, disconnecting the power to the motor. The motor will then stop.



#### Aiming switch "1" → "0"

- When the aiming switch is moved from "1" to "0", the sensor's conductive section activates the relay. Power is supplied through the relay to the motor. The motor will rotate to move the headlamps in the "UP" direction
- When the rotary unit of the sensor moves from point B to point A, the motor will stop.



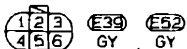
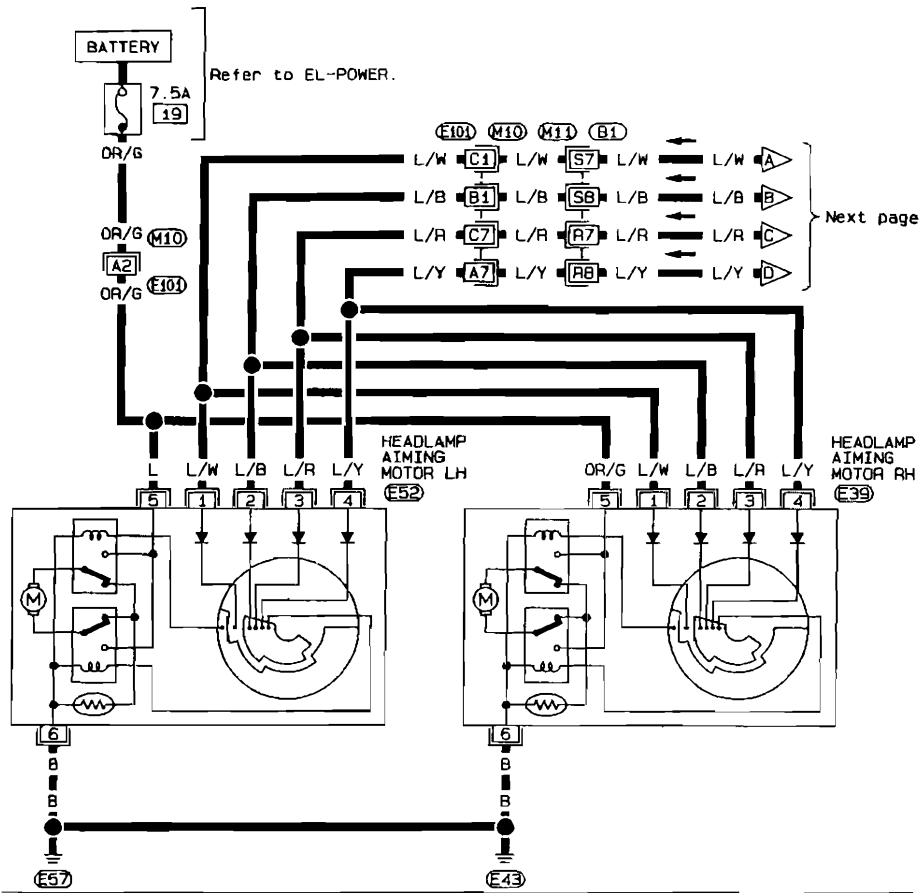
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DX

# HEADLAMP — Headlamp Aiming Control —

## Wiring Diagram — AIM —

LHD MODELS

EL-AIM-01



Refer to last page (Foldout page).

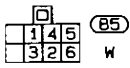
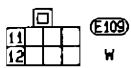
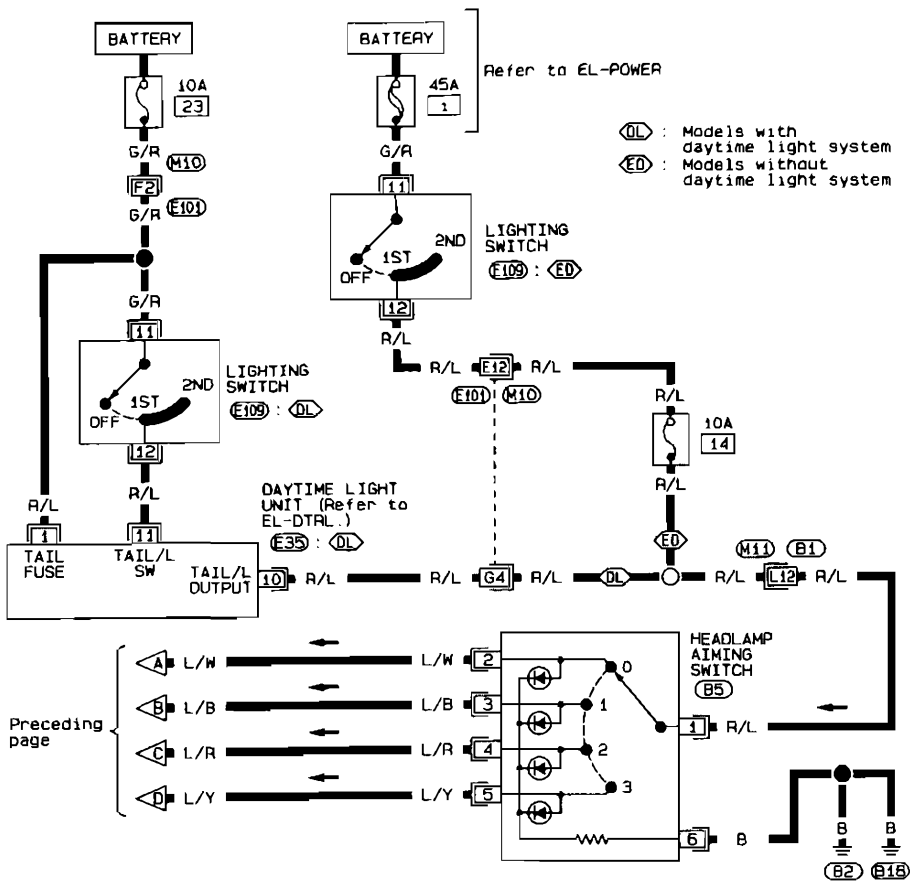
(M10), (E101)

(M11), (B1)



# HEADLAMP — Headlamp Aiming Control — Wiring Diagram — AIM — (Cont'd)

EL-AIM-02



Refer to last page (Foldout page)

(M10), (E101)  
(M11), (B1)

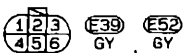
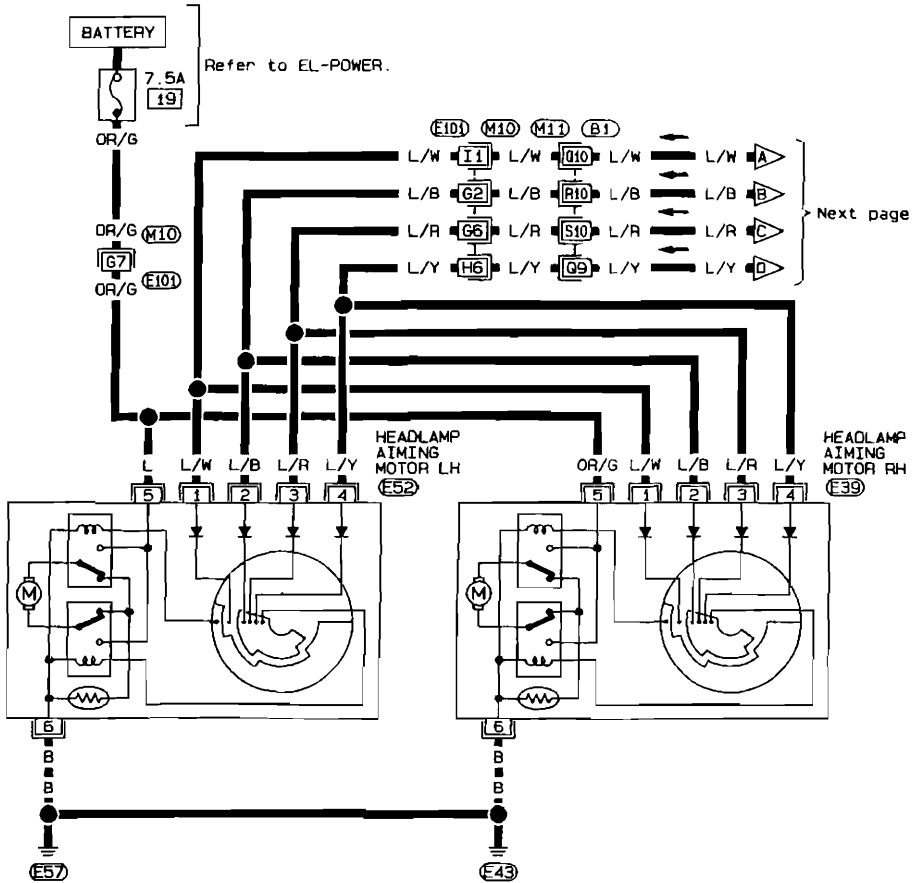
EL

# HEADLAMP — Headlamp Aiming Control —

## Wiring Diagram — AIM — (Cont'd)

RHD MODELS

EL-AIM-03



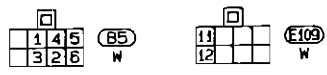
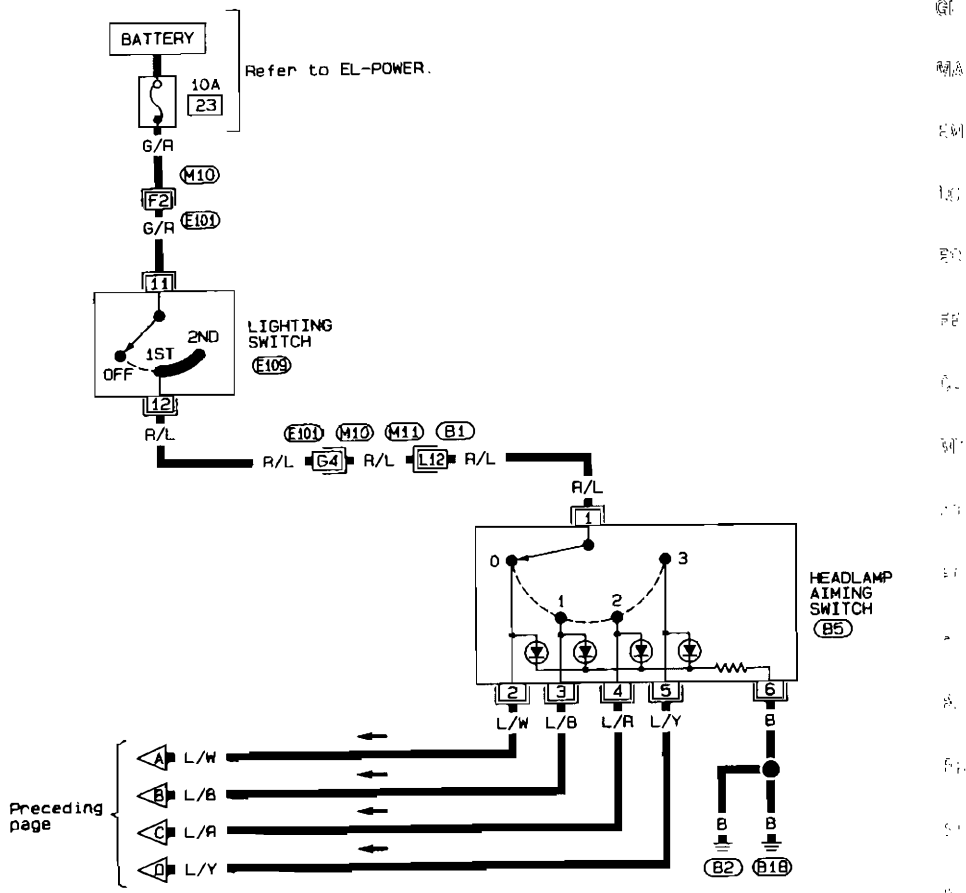
Refer to last page (Foldout page).

(M10) (E101)

(M11) (B1)

# HEADLAMP — Headlamp Aiming Control — Wiring Diagram — AIM — (Cont'd)

EL-AIM-04



Refer to last page (Foldout page).

- (M10) , (E101)
- (M11) , (B1)

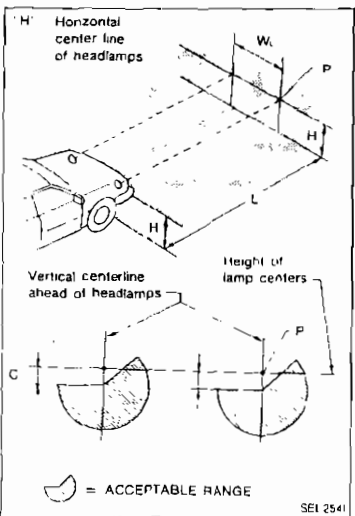
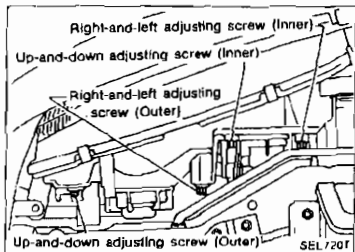
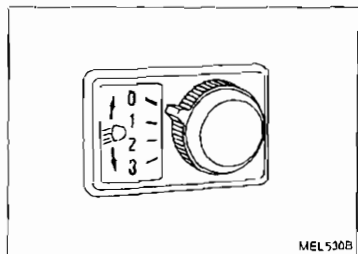
EL

## Aiming Adjustment

When performing headlamp aiming adjustment, use an aiming machine, aiming wall screen or headlamp tester. Aimers should be in good repair, calibrated and operated according to their operation manuals.

If any aimer is not available, aiming adjustment can be done as follows:

For details, refer to the regulations in your own country.



### CAUTION:

- Keep all tires inflated to correct pressures.
- Place vehicle and tester on one and same flat surface.
- 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).

### CAUTION:

Be sure aiming switch is set to "0" when performing aiming adjustment on vehicles equipped with headlamp aiming control.

### LOW BEAM

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.

- Adjust headlamps so that main axis of light is parallel to center line of body and is aligned with point P shown in illustration.

- Figure to the left shows headlamp aiming pattern for driving on right side of road; for driving on left side of road, aiming pattern is reversed.

- Dotted lines in illustration show center of headlamp.

"H": Horizontal center line of headlamps

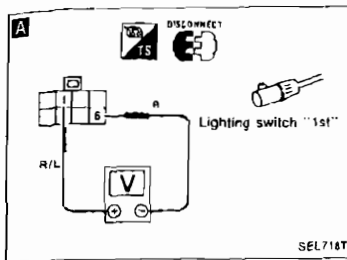
"W": Distance between each headlamp center

"L": 5,000 mm (196.85 in)

"C": 65 mm (2.56 in)

## Trouble Diagnoses

**SYMPTOM: Headlamp aiming does not operate.**



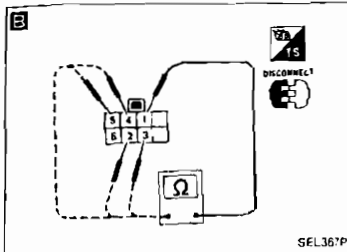
**A**

**POWER SUPPLY CIRCUIT CHECK (For aiming switch)**  
Check if 12 volts exist between terminals 1) and 6)

| Voltmeter terminals |     | Voltage [V] |
|---------------------|-----|-------------|
| (+)                 | (-) |             |
| ①                   | ⑥   | Approx 12   |

NG → Check 10A fuse at fuse block. (Refer to "POWER SUPPLY ROUTING")

OK



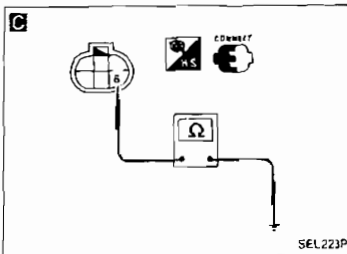
**B**

**AIMING SWITCH CHECK**  
Check continuity between terminals at each switch position

| Terminal          | ① | ② | ③ | ④ | ⑤ |
|-------------------|---|---|---|---|---|
| Switch position 0 | ○ | ○ | ○ | ○ | ○ |
| 1                 | ○ | ○ | ○ | ○ | ○ |
| 2                 | ○ | ○ | ○ | ○ | ○ |
| 3                 | ○ | ○ | ○ | ○ | ○ |

NG → Replace aiming switch.

OK

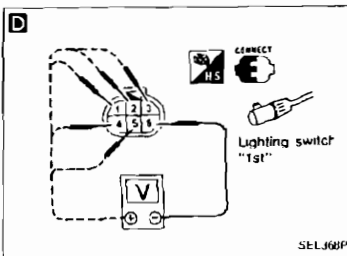


**C**

**GROUND CIRCUIT CHECK FOR AIMING MOTOR**  
Check continuity between terminals 6 and body ground.  
Continuity exists ... OK

NG → Repair harness between aiming motor and body ground

OK



**D**

**POWER SUPPLY CIRCUIT CHECK (For aiming motor unit)**  
Check if 12 volts exist between terminals 1), 2), 3), 4), 5) and 6).

| Voltmeter terminals |     | Voltage [V] | Aiming switch position |
|---------------------|-----|-------------|------------------------|
| (+)                 | (-) |             |                        |
| 1)                  | ⑥   | Approx 12   | "0"                    |
|                     |     | 0           | Except "0"             |
| 2)                  | ⑥   | Approx. 12  | "1"                    |
|                     |     | 0           | Except "1"             |
| 3)                  | ⑥   | Approx. 12  | "2"                    |
|                     |     | 0           | Except "2"             |
| 4)                  | ⑥   | Approx 12   | "3"                    |
|                     |     | 0           | Except "3"             |
| 5)                  | ⑥   | Approx 12   | --                     |
|                     |     | 0           | Except "--"            |

NG → Check harness between aiming switch and aiming motor unit

OK

Replace aiming motor unit

## EXTERIOR LAMP

### Clearance, License and Tail Lamps/System Description

#### LHD MODELS WITH DAYTIME LIGHT SYSTEM

The clearance, license and tail lamps on vehicles for Norway and Sweden contain a daytime light unit. The unit activates the small lamps whenever the engine and lighting switch are under the following conditions.

- Engine running
- Lighting switch in the OFF position

(For daytime light system, refer to "HEADLAMP — Daytime Light System —".)

#### Operation (when daytime light system is triggered.)

Power is supplied at all times

- through 10A fuse (No. 23, located in the fuse block)
- to daytime light unit terminal ①.

With the engine running and the lighting switch in the OFF position, power is supplied

- through daytime light unit terminal ⑩
- to terminal ① of each lamp.

Ground is supplied to terminal ② of clearance lamps through body ground (E43) or (E57).

Ground is also supplied to terminal ② of license lamp and to terminal ④ of tail lamps through body ground (T19).

With power and ground supplied, the clearance, license and tail lamps illuminate.

#### Operation (when daytime light system is not triggered.)

Power is supplied at all times

- through 10A fuse (No. 23, located in the fuse block)
- to lighting switch terminal ⑪.

With the lighting switch in the 1ST or 2ND position, power is supplied

- through lighting switch terminal ⑫
- to daytime light unit terminal ⑬
- through daytime light unit terminal ⑩
- to terminal ① of each lamp.

Ground is supplied to terminal ② of clearance lamps through body ground (E43) or (E57)

Ground is also supplied to terminal ② of license lamp and to terminal ④ of tail lamps through body ground (T19).

With power and ground supplied, the clearance, license and tail lamps illuminate.

#### LHD MODELS WITHOUT DAYTIME LIGHT SYSTEM

Power is supplied at all times

- through 45A fusible link (letter I, located in the fusible link and fuse box)
- to lighting switch terminal ⑬.

#### Operation

With the lighting switch in the 1ST or 2ND position, power is supplied

- from lighting switch terminal ⑭
- through 10A fuse (No. 14, located in the fuse block)
- to terminal ① of clearance, license and RH tail lamps.

With the lighting switch in the 1ST or 2ND position, power is also supplied

- from lighting switch terminal ⑭
- through 7.5A fuse (No. 15, located in the fuse block)
- to LH tail lamp terminal ①.

Ground is supplied to terminal ② of clearance lamps through body ground (E43) or (E57).

Ground is also supplied to terminal ② of license lamp and to terminal ④ of tail lamps through body ground (T19).

With power and ground supplied, the clearance, license and tail lamps illuminate

## EXTERIOR LAMP

### Clearance, License and Tail Lamps/System Description (Cont'd)

#### RHD MODELS FOR EUROPE

Power is supplied at all times

- through 10A fuse (No. 23), located in the fuse block)
- to lighting switch terminal 11

#### Operation

With the lighting switch in the 1ST or 2ND position, power is supplied

- through the lighting switch terminal 12
- to terminal 1 of each lamp.

Ground is supplied to terminal 2 of clearance lamps through body ground (E42) or (E57)

Ground is also supplied to terminal 2 of license lamp and to terminal 4 of tail lamps through body ground (T19)

With power and ground supplied, the clearance, license and tail lamps illuminate.

#### RHD MODELS EXCEPT FOR EUROPE

Power is supplied at all times

- through 10A fuse (No. 23), located in the fuse block)
- to lighting switch terminal 12, and
- to front fog lamp relay terminal 6.

#### Operation (when front fog lamp system is not triggered.)

With the lighting switch in the 1ST or 2ND position, power is supplied

- through lighting switch terminal 11
- to terminal 1 of each lamp.

Ground is supplied to terminal 2 of clearance lamps through body ground (E42) or (E57).

Ground is also supplied to terminal 2 of license lamp and to terminal 4 of tail lamps through body ground (T19).

#### Operation (when front fog lamp system is triggered.)

With the front fog lamp switch in the ON position.

- ground is supplied to front fog lamp relay terminal 2 through the front fog lamp switch and body ground (E42).

The front fog lamp relay is energized and power is supplied

- through front fog lamp relay terminal 7
- to terminal 1 of each lamp.

Ground is supplied to terminal 2 of clearance lamps through body ground (E42) or (E57).

Ground is also supplied to terminal 2 of license lamp and to terminal 4 of tail lamps through body ground (T19)

With power and ground supplied, the clearance, license and tail lamps illuminate.

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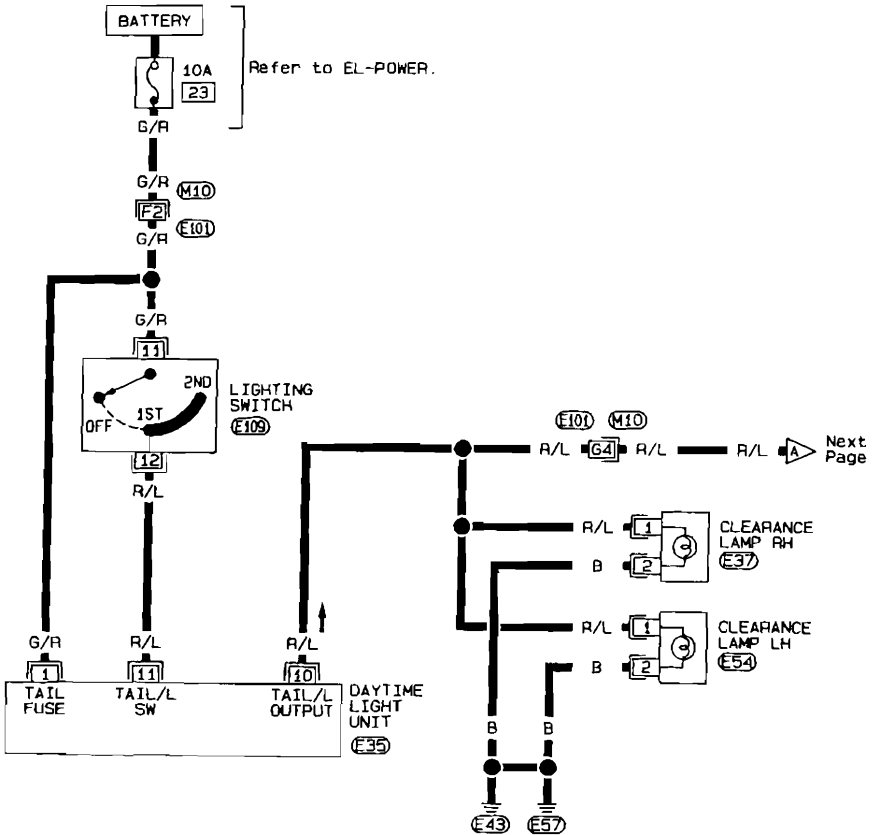
EL

# EXTERIOR LAMP

## Clearance, License and Tail Lamps/ Wiring Diagram — TAIL/L —

LHD MODELS WITH DAYTIME LIGHT SYSTEM

EL-TAIL/L-01



Refer to last page  
(Foldout page).

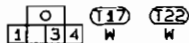
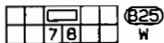
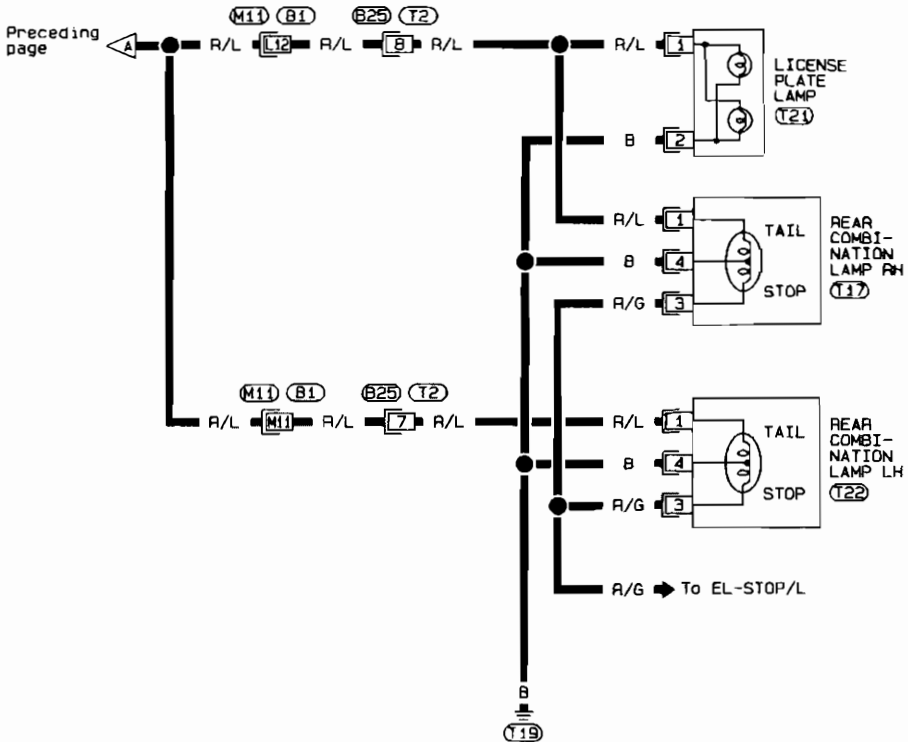
M10, E101



# EXTERIOR LAMP

## Clearance, License and Tail Lamps/ Wiring Diagram — TAIL/L — (Cont'd)

EL-TAIL/L-02



Refer to last page  
(Foldout page).

M11, B1

G1

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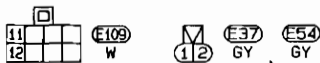
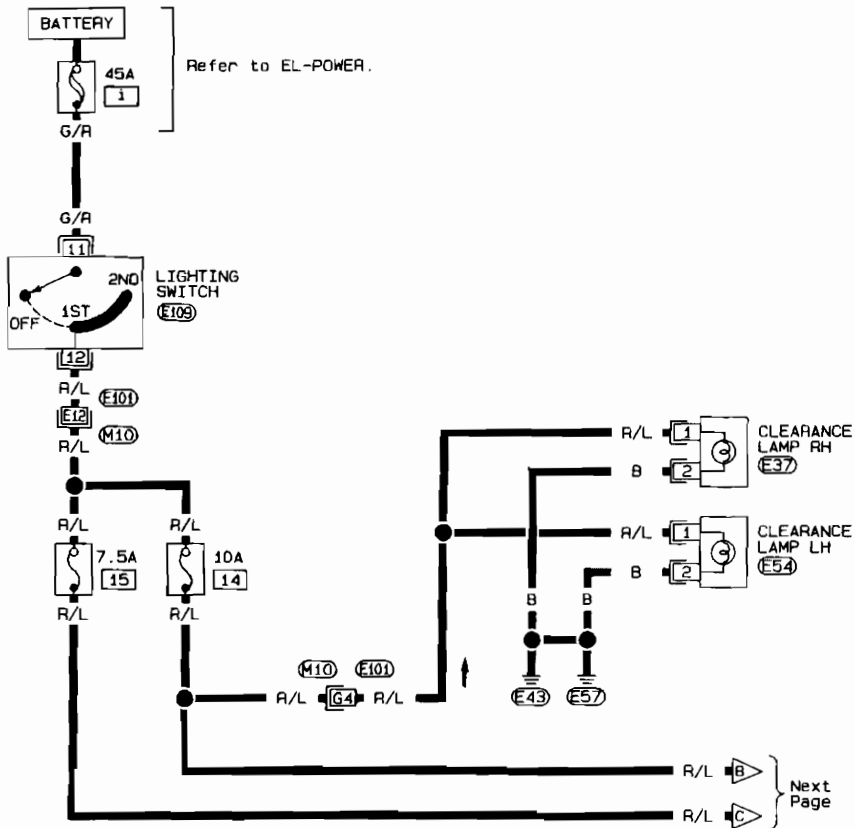
WT

# EXTERIOR LAMP

## Clearance, License and Tail Lamps/ Wiring Diagram — TAIL/L — (Cont'd)

LHD MODELS WITHOUT DAYTIME LIGHT SYSTEM

EL-TAIL/L-03



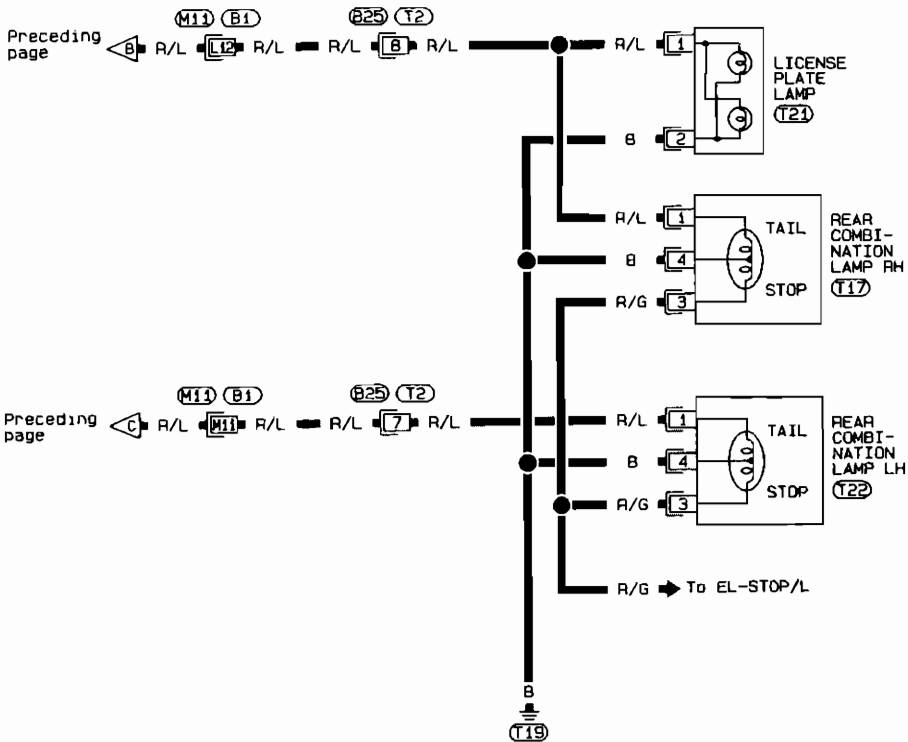
Refer to last page  
(Foldout page).

M10, E101

# EXTERIOR LAMP

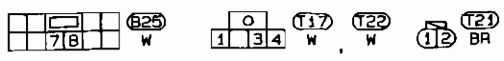
## Clearance, License and Tail Lamps/ Wiring Diagram — TAIL/L — (Cont'd)

EL-TAIL/L-04



Preceding page

Preceding page



Refer to last page (Foldout page).

M11, B1

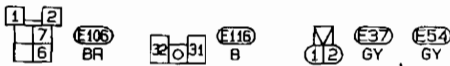
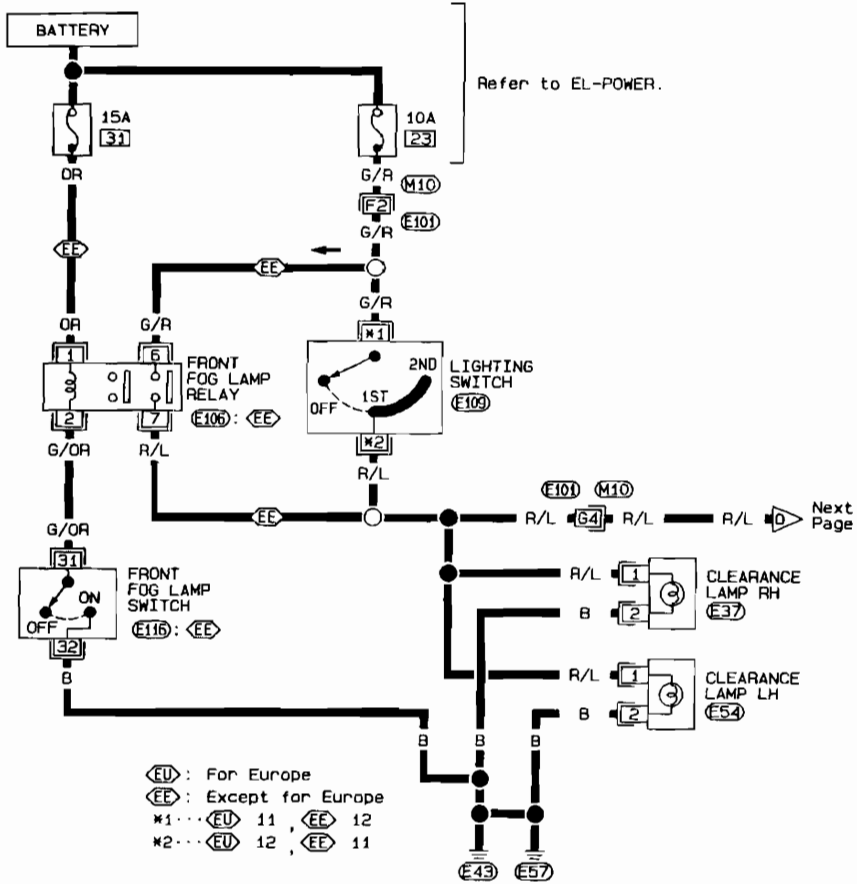
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# EXTERIOR LAMP

## Clearance, License and Tail Lamps/ Wiring Diagram — TAIL/L — (Cont'd)

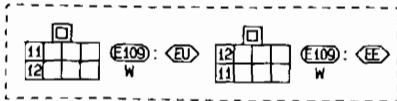
RHD MODELS

EL-TAIL/L-05



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(Foldout page).

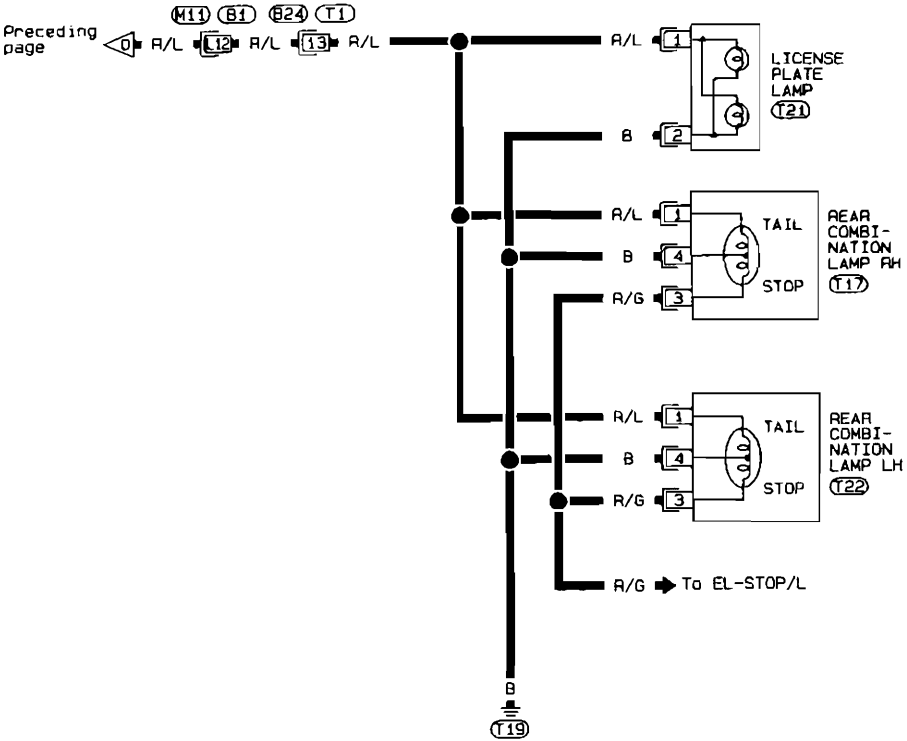
(M10), (E101)



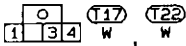
# EXTERIOR LAMP

## Clearance, License and Tail Lamps/ Wiring Diagram — TAIL/L — (Cont'd)

EL-TAIL/L-06



G24  
W



T17  
W, W



T21  
BR

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(Foldout page).

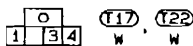
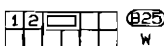
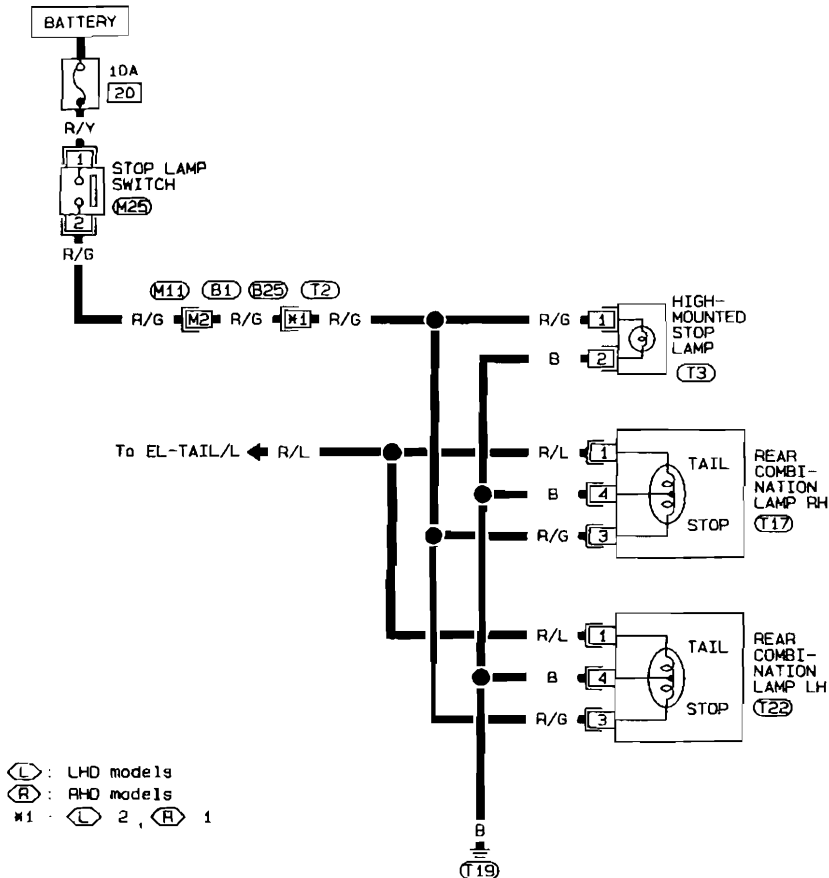
G11, G1

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RS  
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EL  
DX

# EXTERIOR LAMP

## Stop Lamp/Wiring Diagram — STOP/L —

EL-STOP/L-01



Refer to last page  
(Foldout page)

(M11), (B1)



## EXTERIOR LAMP

### Front Fog Lamps/System Description

#### LHD MODELS WITH DAYTIME LIGHT SYSTEM

Power is supplied at all times

- through 15A fuse (No. [31], located in the fusible link and fuse box)
- to front fog lamp relay terminal (3).

Power is also supplied at all times

- through 10A fuse (No. [23], located in the fuse block)
- to lighting switch terminal (1), and
- to daytime light unit terminal (1).

When the daytime light system is triggered, power is supplied

- through daytime light unit terminal (10)
- to front fog lamp relay terminal (1), or

With the lighting switch in the 1ST or 2ND position, power is supplied

- through lighting switch terminal (12)
- to daytime light unit terminal (1)
- through daytime light unit terminal (10)
- to front fog lamp relay terminal (1).

#### Front fog lamp operation

If the rear fog lamp system is triggered, terminal (2) of rear fog lamp relay is grounded and power to the front fog lamp switch is interrupted.

When the rear fog lamp system is not operating, ground is supplied

With the front fog lamp switch in the ON position:

- ground is supplied to front fog lamp relay terminal (2)
- from rear fog lamp relay terminal (4)
- to rear fog lamp relay terminal (3)
- through front fog lamp switch and body ground (B2) or (B18).

The front fog lamp relay is energized and power is supplied

- from front fog lamp relay terminal (5)
- to terminal (1) of each front fog lamp.

Ground is supplied to terminal (2) of each fog lamp through body ground (E43) or (E57).

With power and ground supplied, the front fog lamps illuminate.

#### LHD MODELS WITHOUT DAYTIME LIGHT SYSTEM

Power is supplied at all times

- through 15A fuse (No. [31], located in the fusible link and fuse box)
- to front fog lamp relay terminal (3).

With the lighting switch in the 1ST or 2ND position, power is supplied

- through 45A fusible link (letter [1], located in the fusible link and fuse box)
- to lighting switch terminal (1)
- from lighting switch terminal (12)
- through 10A fuse (No. [14], located in the fuse block)
- to front fog lamp relay terminal (1).

#### Front fog lamp operation

The lighting switch must be in the 1ST or 2ND position for front fog lamp operation.

With the front fog lamp switch in the ON position:

- ground is supplied to front fog lamp relay terminal (2) through the front fog lamp switch and body ground (B2) or (B18).

The front fog lamp relay is energized and power is supplied

- from front fog lamp relay terminal (5)
- to terminal (1) of each fog lamp.

Ground is supplied to terminal (2) of each fog lamp through body ground (E43) or (E57)

With power and ground supplied, the front fog lamps illuminate.



## EXTERIOR LAMP

### Front Fog Lamps/System Description (Cont'd)

#### RHD MODELS FOR EUROPE

Power is supplied at all times

- through 15A fuse (No. 31), located in the fusible link and fuse block)
- to front fog lamp relay terminal ③

With the lighting switch in the 1ST or 2ND position, power is supplied

- through 10A fuse (No. 23), located in the fuse block)
- to lighting switch terminal ①
- through terminal ⑫ of lighting switch
- to front fog lamp relay terminal ②.

#### Front fog lamp operation

The lighting switch must be in the 1ST or 2ND position for front fog lamp operation.

With the front fog lamp switch in the ON position:

- ground is supplied to front fog lamp relay terminal ① through the front fog lamp switch and body ground (B2) or (B19).

The front fog lamp relay is energized and power is supplied

- from front fog lamp relay terminal ⑤
- to terminal ① of each front fog lamp.

Ground is supplied to terminal ② of each front fog lamp through body ground (E43) or (E57)

With power and ground supplied, the front fog lamps illuminate.

#### RHD MODELS EXCEPT FOR EUROPE

Power is supplied at all times

- through 15A fuse (No. 31), located in the fusible link and fuse box)
- to front fog lamp relay terminals ① and ③.

#### Front fog lamp operation

The front fog lamp switch is built into the combination switch.

With the front fog lamp switch in the ON position:

- ground is supplied to front fog lamp relay terminal ② through front fog lamp switch and body ground (E44).

The front fog lamp relay is energized and power is supplied

- from front fog lamp relay terminal ⑤
- to terminal ① of each front fog lamp.

Ground is supplied to terminal ② of each front fog lamp through body ground (E43) or (E57)

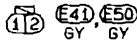
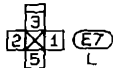
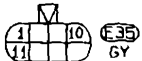
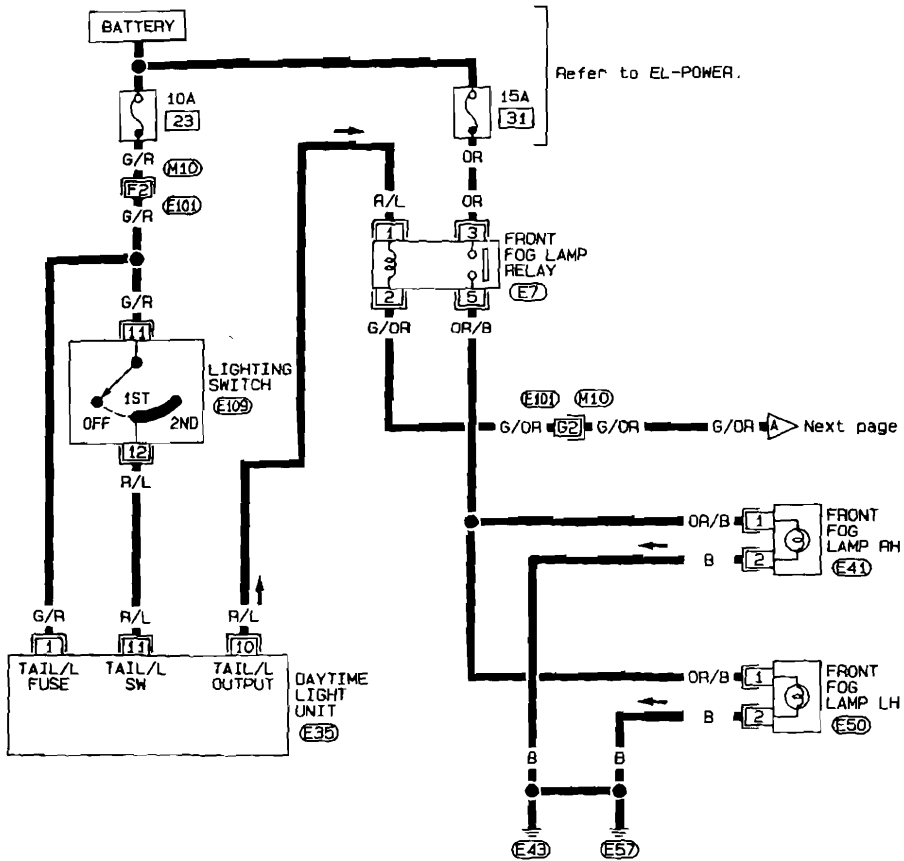
With power and ground supplied, the front fog lamps illuminate.

# EXTERIOR LAMP

## Front Fog Lamp/Wiring Diagram — F/FOG —

LHD MODELS WITH DAYTIME LIGHT SYSTEM

EL-F/FOG-01



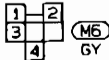
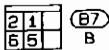
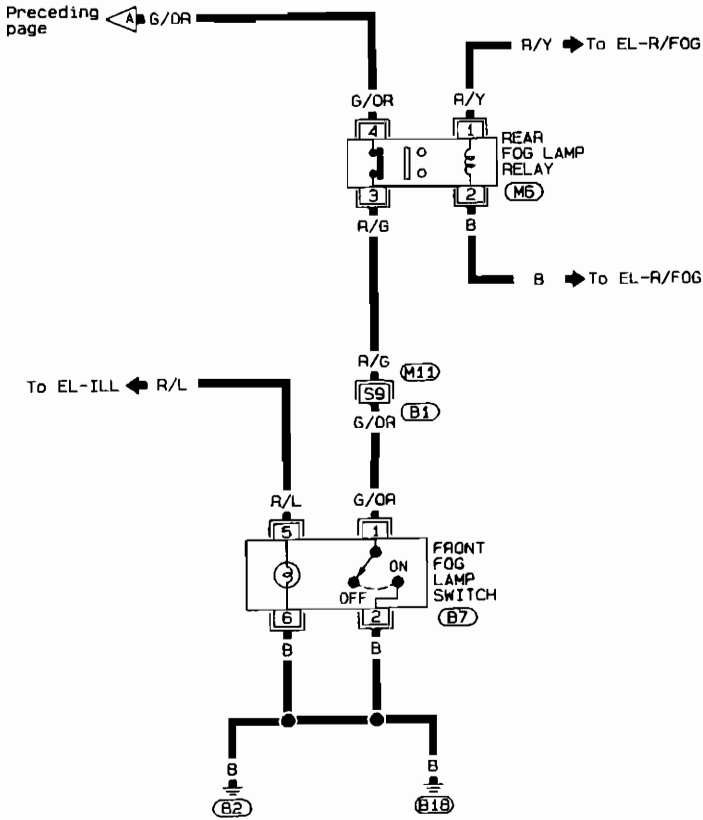
Refer to last page (Foldout page).

M10, E101

# EXTERIOR LAMP

## Front Fog Lamp/Wiring Diagram — F/FOG — (Cont'd)

EL-F/FOG-02



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(Foldout page).

(M11), (B1)

EL

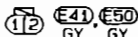
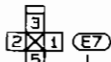
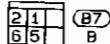
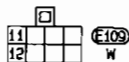
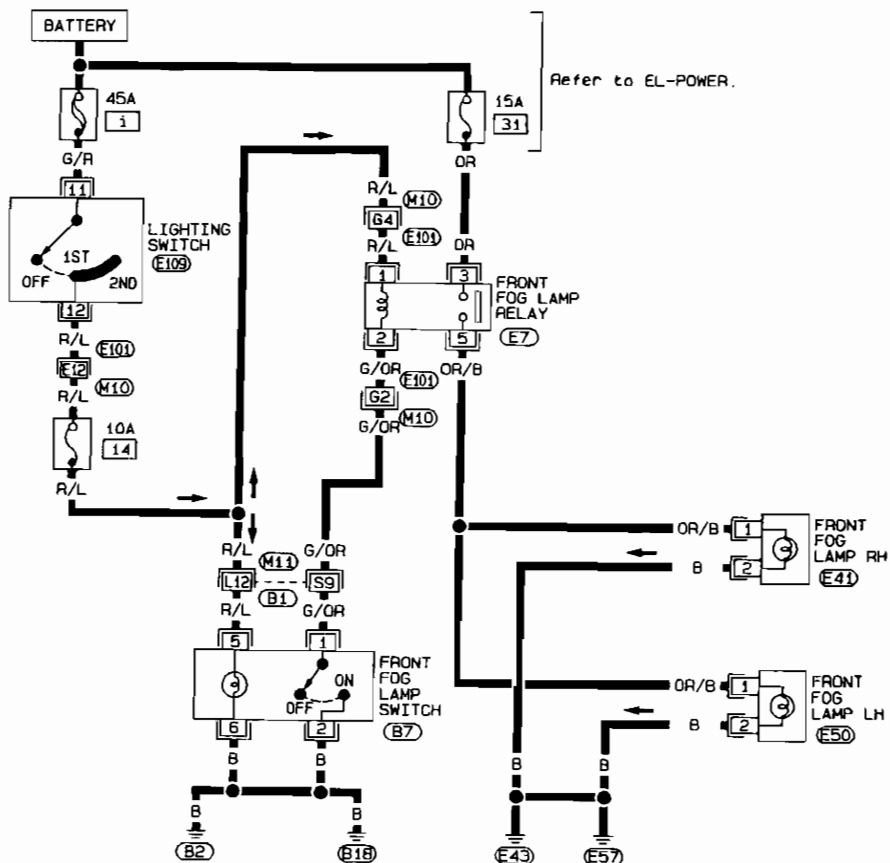
1/2X

# EXTERIOR LAMP

## Front Fog Lamp/Wiring Diagram — F/FOG — (Cont'd)

LHD MODELS WITHOUT DAYTIME LIGHT SYSTEM

EL-F/FOG-03



Refer to last page  
(Foldout page).

M10, E101

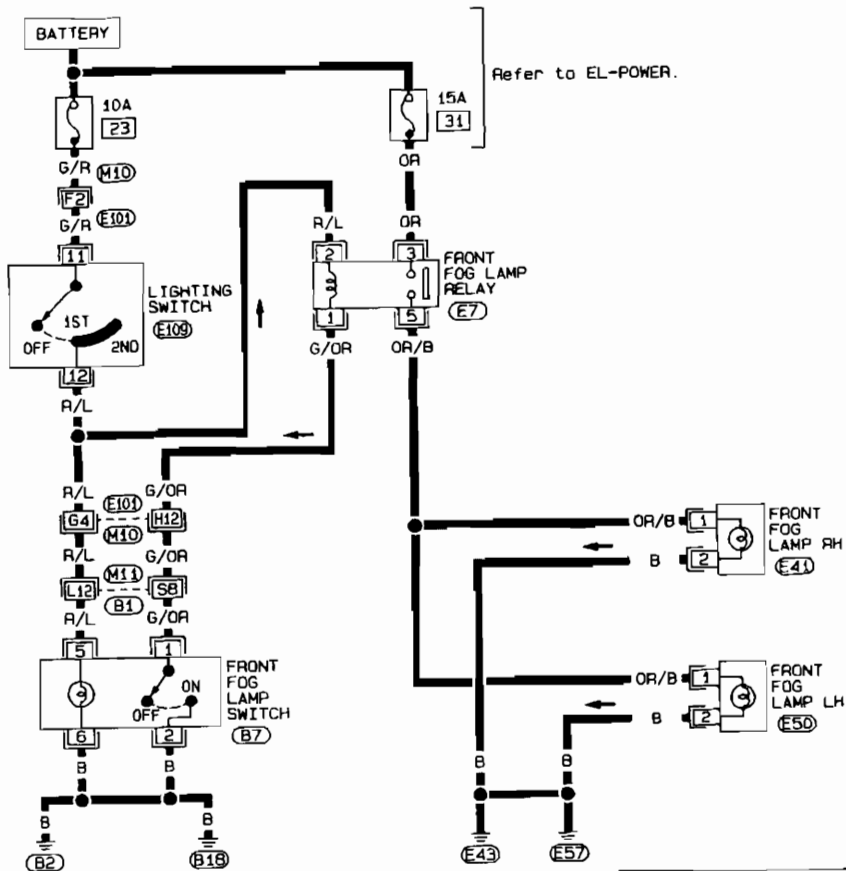
M11, B1

# EXTERIOR LAMP

## Front Fog Lamp/Wiring Diagram — F/FOG — (Cont'd)

RHD MODELS FOR EUROPE

EL-F/FOG-04



E109  
W



B7  
B



E7  
L



E41, E50  
GY, GY

Refer to last page  
(Foldout page).

M10, E101

M11, B1

EL



## EXTERIOR LAMP

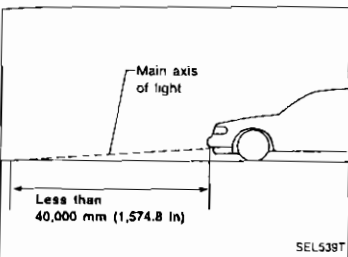
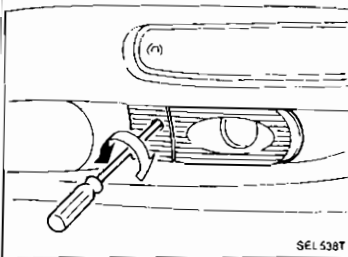
### Front Fog Lamp Aiming Adjustment

Before performing aiming adjustment, make sure of the following.

- a. Keep all tires inflated to correct pressure.
- b. Place vehicle on level ground.
- c. 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.

Check the distance between the vehicle and the ground point where the main axis of light of fog lamp reaches. Keep the distance within 40,000 mm (1,574.8 in)



## EXTERIOR LAMP

### Rear Fog Lamp/System Description

Power is supplied at all times

- through 7.5A fuse (No. 27 for LHD models, No. 29 for RHD models, located in the fuse block)
- to rear fog lamp relay terminal 7 (with daytime light system) or 3 (without daytime light system)

With the lighting switch in the 2ND position, power is supplied

- through 20A fuse (No. 37), located in the fusible link and fuse box)
- to lighting switch terminal 4
- through lighting switch terminal 5
- to rear fog lamp relay terminal 1.

#### Rear fog lamp operation

The lighting switch must be in the 2ND position for rear fog lamp operation.

Ground is supplied to rear fog lamp relay terminal 2 through body ground M1

With the lighting switch in the 2nd position, the rear fog lamp relay is energized and power is supplied

- through rear fog lamp relay terminal 6 (with daytime light system) or 5 (without daytime light system)
  - to rear fog lamp switch terminal 2
- With the rear fog lamp switch in the ON position, power is supplied
- through rear fog lamp switch terminal 1
  - to terminal 1 of rear fog lamp.

Ground is supplied to terminal 2 of rear fog lamp through body ground T19

With power and ground supplied, the rear fog lamp illuminates.

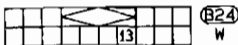
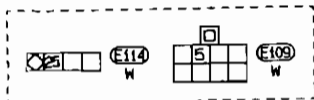
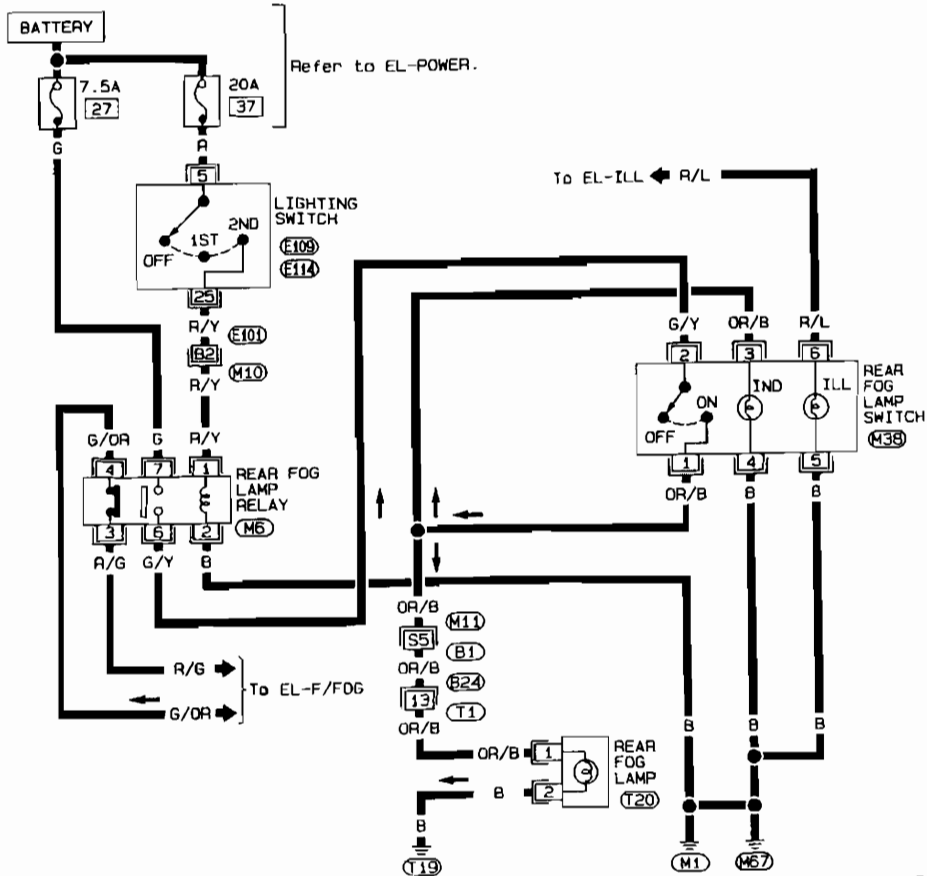


# EXTERIOR LAMP

## Rear Fog Lamp/Wiring Diagram — R/FOG —

WITH DAYTIME LIGHT SYSTEM

EL-R/FOG-01



Refer to last page (Foldout page).

M10, E101

M11, B1

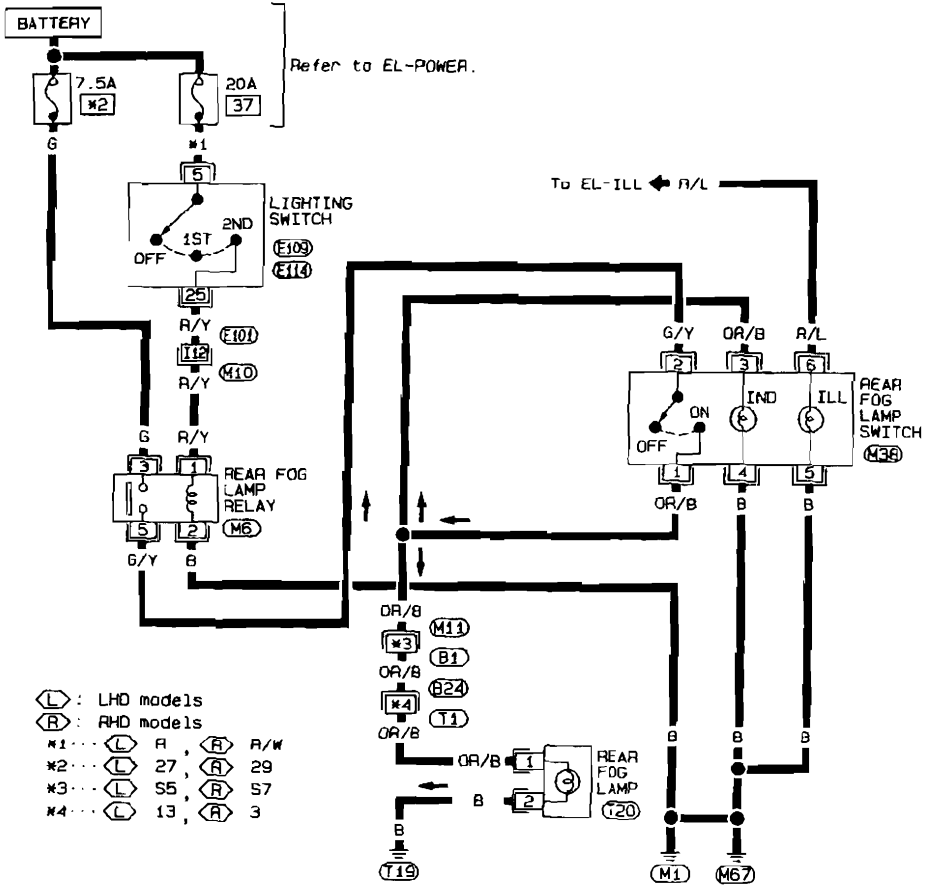
EL

# EXTERIOR LAMP

## Rear Fog Lamp/Wiring Diagram — R/FOG — (Cont'd)

WITHOUT DAYTIME LIGHT SYSTEM

EL-R/FOG-02



(L) : LHD models

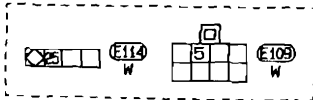
(R) : RHD models

#1 ... (L) R, (R) R/W

#2 ... (L) 27, (R) 29

#3 ... (L) S5, (R) S7

#4 ... (L) 13, (R) 3



Refer to last page  
(Foldout page).

(M10), (E101)

(M11), (B1)



## EXTERIOR LAMP

### Turn Signal and Hazard Warning Lamps/System Description

#### TURN SIGNAL OPERATION

With the hazard switch in the OFF position and the ignition switch in the ON or START position, power is supplied

- through 10A fuse (No. 24) . located in the fuse block
- to hazard switch terminal ②
- through terminal ① of the hazard switch
- to combination flasher unit terminal ②
- through terminal ③ of the combination flasher unit
- to turn signal switch terminal ①

Ground is supplied to combination flasher unit terminal ① through body ground (M1) or (M67).

#### LH turn

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 ①
- side turn signal lamp LH terminal ①
- rear combination lamp LH terminal ②
- combination meter terminal ⑩

Ground is supplied to the front turn signal lamp LH terminal ② through body ground (E67).

Ground is supplied to the side turn signal lamp LH terminal ② through body ground (E67) (LHD models) or (F37) (RHD models).

Ground is supplied to the rear combination lamp LH terminal ④ through body ground (T19).

Ground is supplied to combination meter terminal ⑩ through body ground (M1).

With power and ground supplied, the combination flasher unit controls the flashing of the LH turn signal lamps.

#### RH turn

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 ①
- side turn signal lamp RH terminal ①
- rear combination lamp RH terminal ②
- combination meter terminal ⑩

Ground is supplied to the front turn signal lamp RH terminal ② through body ground (E43).

Ground is supplied to the side turn signal lamp RH terminal ② through body ground (F26) (LHD models) or (E43) (RHD models)

Ground is supplied to the rear combination lamp RH terminal ④ through body ground (T19).

Ground is supplied to combination meter terminal ⑩ through body ground (M1).

With power and ground supplied, the combination flasher unit controls the flashing of the RH turn signal lamps

#### HAZARD LAMP OPERATION

Power is supplied at all times to hazard switch terminal ③ through:

- 10A fuse (No. 22) . located in the fuse block).

With the hazard switch in the ON position, power is supplied

- through terminal ① of the hazard switch
- to combination flasher unit terminal ②
- through terminal ③ of the combination flasher unit
- to hazard switch terminal ④

Ground is supplied to combination flasher unit terminal ① through body ground (M1) or (M67).

Power is supplied through terminal ⑤ of the hazard switch to

- front turn signal lamp LH terminal ①
- side turn signal lamp LH terminal ①
- rear combination lamp LH terminal ②
- combination meter terminal ⑩

Power is supplied through terminal ⑥ of the hazard switch to

## EXTERIOR LAMP

### Turn Signal and Hazard Warning Lamps/System Description (Cont'd)

- front turn signal lamp RH terminal ①
- side turn signal lamp RH terminal ①
- rear combination lamp RH terminal ②
- combination meter terminal ⑩

Ground is supplied to terminal ② of each front turn signal lamp through body ground (E43) or (E57).

Ground is supplied to terminal ② of driver's side turn signal lamp through body ground (E43) or (E57).

Ground is supplied to terminal ② of passenger side turn signal lamp through body ground (F26) or (F37).

Ground is supplied to terminal ④ of the rear combination lamps through body ground (T19).

Ground is supplied to combination meter terminal ⑩ through body ground (M1).

With power and ground supplied, the combination flasher unit controls the flashing of the hazard warning lamps.

### WITH MULTI-REMOTE CONTROL SYSTEM

Power is supplied at all times

- through 10A fuse (No. 22) located in the fuse block
- to multi-remote control relay-1 terminals ①, ⑥ and ③.

Ground is supplied to multi-remote control relay-1 terminal ②, when the multi-remote control system or theft warning system is triggered through the smart entrance control unit.

Refer to "MULTI-REMOTE CONTROL SYSTEM" or "THEFT WARNING SYSTEM".

The multi-remote control relay-1 is energized

Power is supplied through terminal ⑦ of the multi-remote control relay-1

- to front turn signal lamp LH terminal ①
- to side turn signal lamp LH terminal ①
- to rear combination lamp LH terminal ②
- to combination meter terminal ⑩

Power is supplied through terminal ⑤ of the multi-remote control relay-1

- to front turn signal lamp RH terminal ①
- to side turn signal lamp RH terminal ①
- to rear combination lamp RH terminal ②
- to combination meter terminal ⑩

Ground is supplied to terminal ② of each front turn signal lamp through body ground (E43) or (E57).

Ground is supplied to terminal ② of driver's side turn signal lamp through body ground (E43) or (E57).

Ground is supplied to terminal ② of passenger side turn signal lamp through body ground (F26) or (F37).

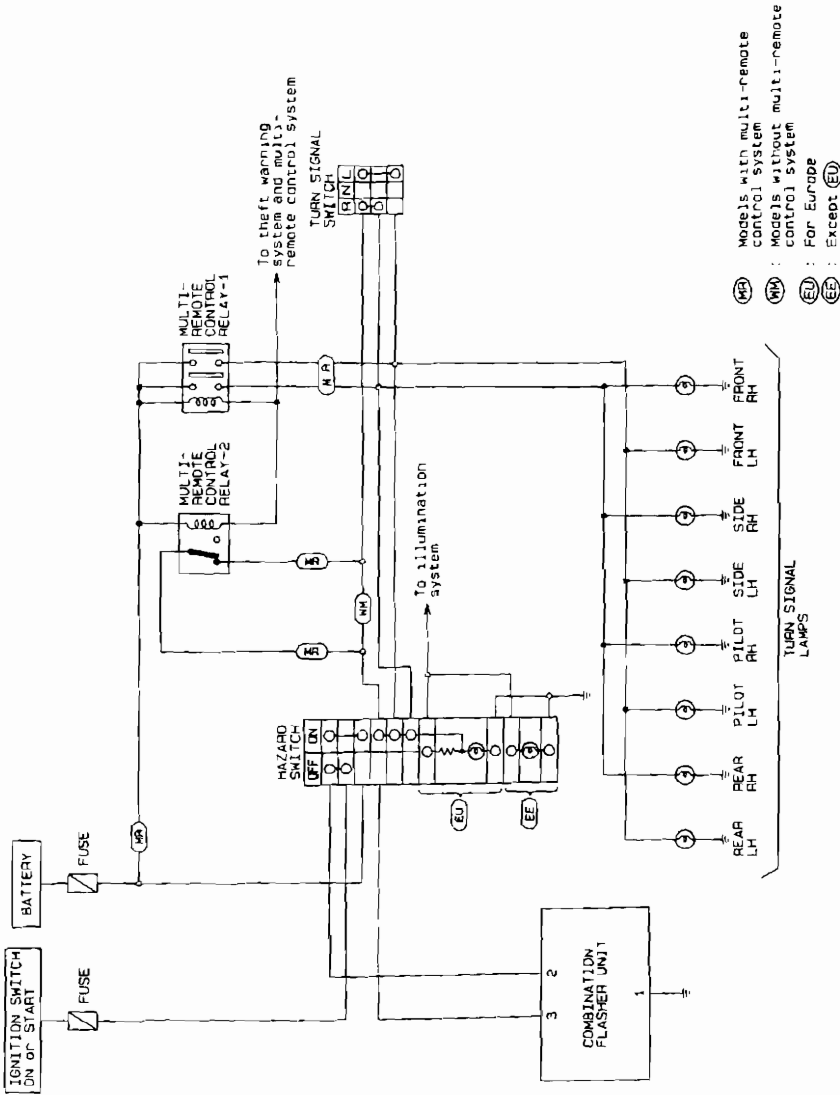
Ground is supplied to terminal ④ of the rear combination lamps through body ground (T19).

Ground is supplied to combination meter terminal ⑩ through body ground (M1).

With power and ground supplied, the smart entrance control unit controls the flashing of the hazard warning lamps

# EXTERIOR LAMP

## Turn Signal and Hazard Warning Lamps/Schematic



51  
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EL

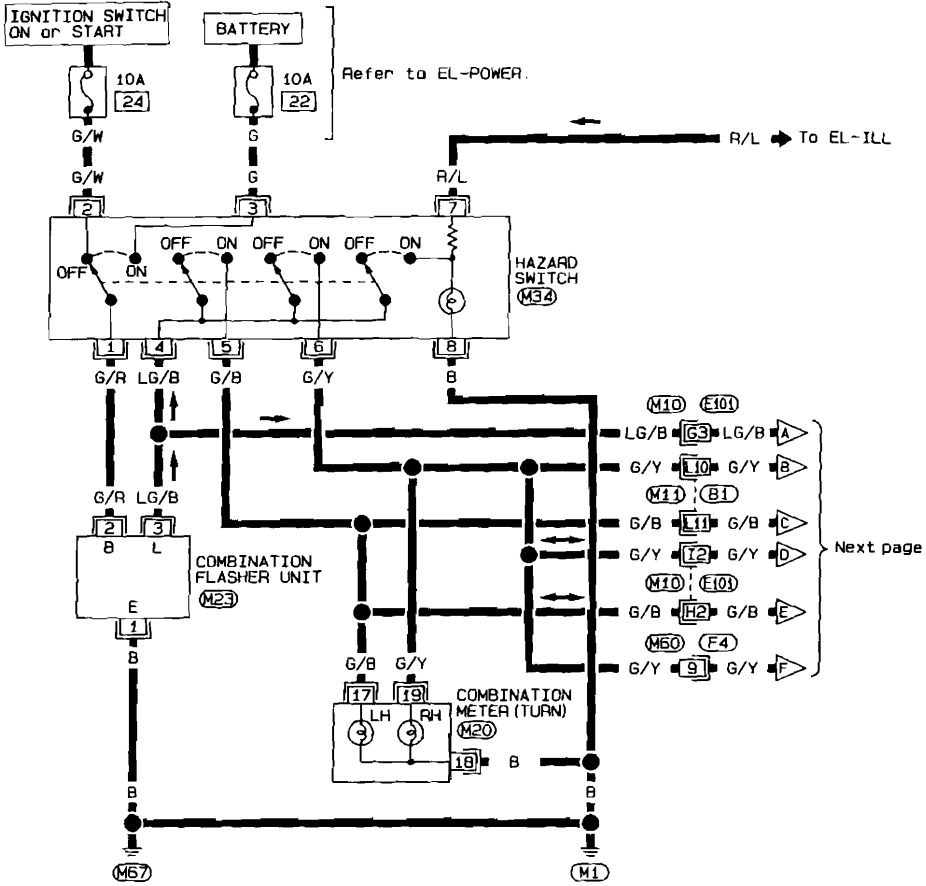
EX

# EXTERIOR LAMP

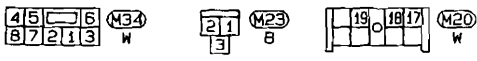
## Turn Signal and Hazard Warning Lamps/Wiring Diagram — TURN —

LHD MODELS

EL-TURN-01



Next page



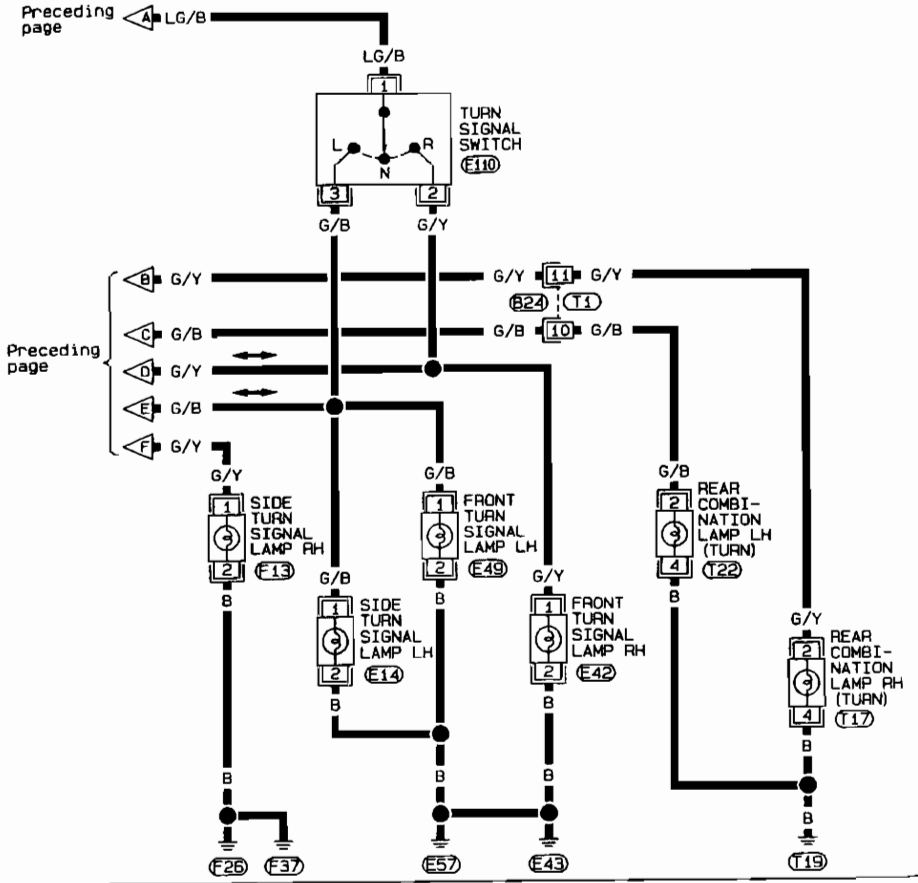
Refer to last page (Foldout page).

- M10 (E101)
- M11 (B1)
- M60 (F4)

# EXTERIOR LAMP

## Turn Signal and Hazard Warning Lamps/Wiring Diagram — TURN — (Cont'd)

EL-TURN-02



|   |   |   |      |
|---|---|---|------|
|   | 0 |   | E110 |
| 3 | 1 | 2 | W    |

|  |  |    |    |  |  |
|--|--|----|----|--|--|
|  |  |    |    |  |  |
|  |  | 10 | 11 |  |  |

|          |          |
|----------|----------|
| E42, E49 | E14, E13 |
| BR, BR   | GY, GY   |

|  |   |   |          |
|--|---|---|----------|
|  | 0 |   | T17, T22 |
|  | 2 | 4 | W, W     |

|  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

|     |
|-----|
| E24 |
| W   |

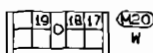
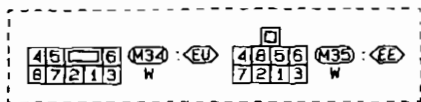
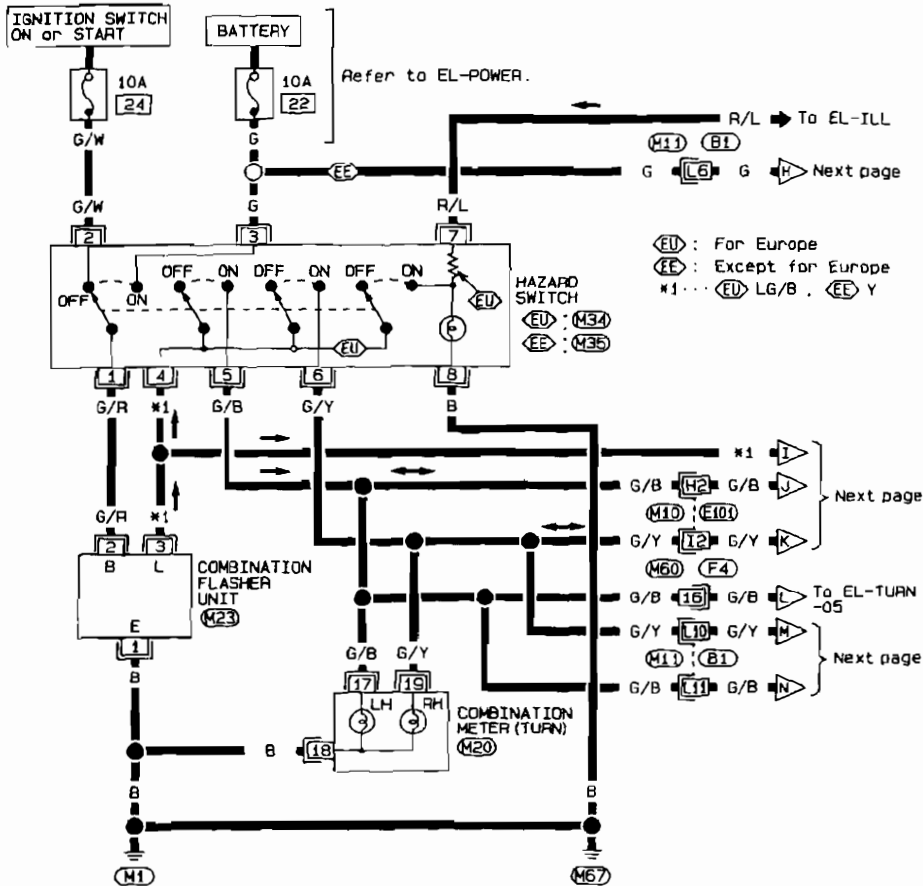
GA  
MA  
EM  
LG  
EC  
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CL  
VT  
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PO  
EA  
RA  
BR  
ST  
ES  
RT  
KA  
EL  
FDX

# EXTERIOR LAMP

## Turn Signal and Hazard Warning Lamps/Wiring Diagram — TURN — (Cont'd)

RHD MODELS

EL-TURN-03



Refer to last page (Foldout page).

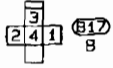
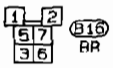
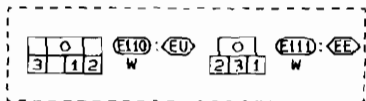
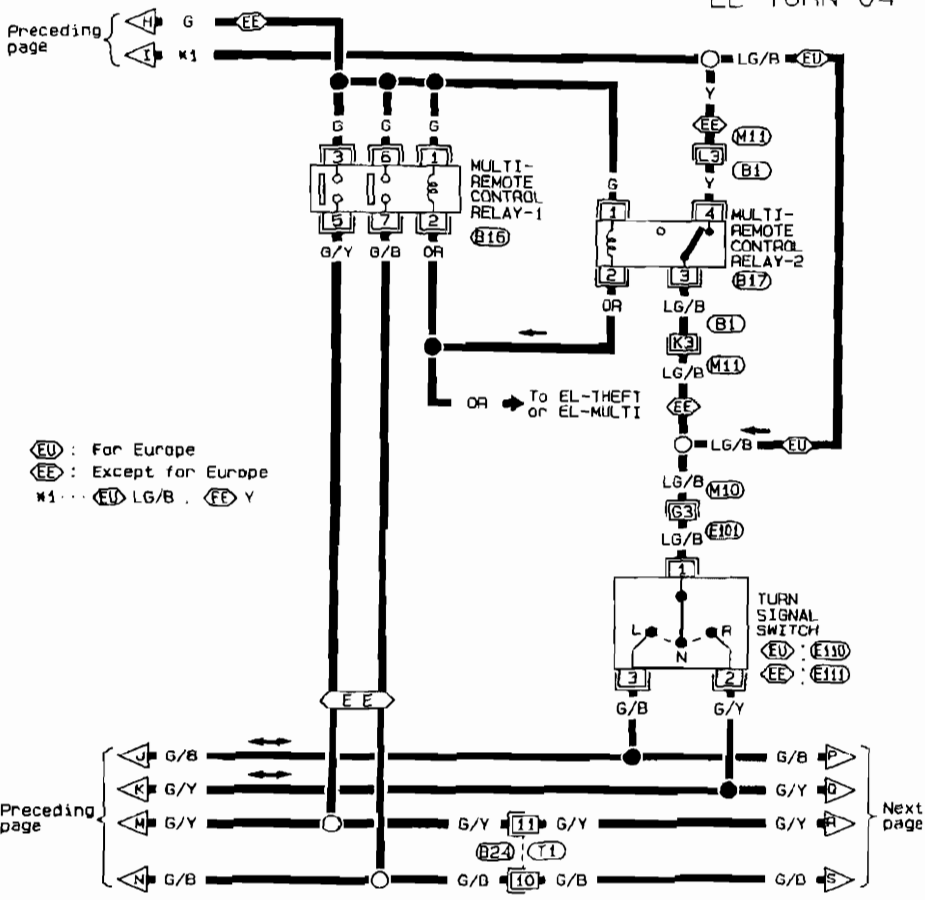
- M10, E101
- M11, G1
- M60, F4



# EXTERIOR LAMP

## Turn Signal and Hazard Warning Lamps/Wiring Diagram — TURN — (Cont'd)

EL-TURN-04



Refer to last page (Foldout page).

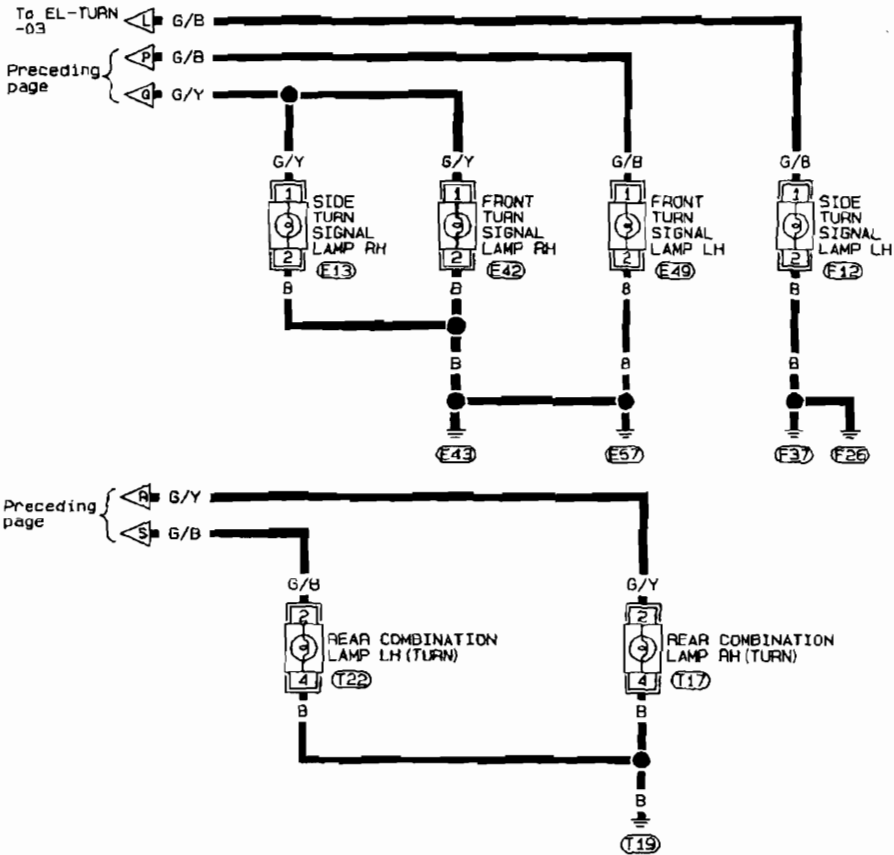
- M10**, **E10**
- M11**, **B1**



# EXTERIOR LAMP

## Turn Signal and Hazard Warning Lamps/Wiring Diagram — TURN — (Cont'd)

EL-TURN-05

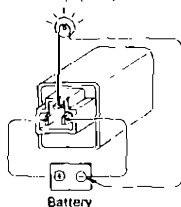


## EXTERIOR LAMP

### Turn Signal and Hazard Warning Lamps/Trouble Diagnoses

| Symptom  | Possible cause  | Repair order   |
|--|---|--|
| Turn signal and hazard warning lamps do not operate                | <ol style="list-style-type: none"> <li>1 Hazard switch</li> <li>2 Combination flasher unit</li> <li>3 Open in combination flasher unit circuit</li> </ol>         | <ol style="list-style-type: none"> <li>1 Check hazard switch</li> <li>2 Refer to combination flasher unit check (EL-101)</li> <li>3 Check wiring to combination flasher unit for open circuit</li> </ol>   |
| Turn signal lamps do not operate but hazard warning lamps operate  | <ol style="list-style-type: none"> <li>1 10A fuse</li> <li>2 Hazard switch</li> <li>3 Turn signal switch</li> <li>4 Open in turn signal switch circuit</li> </ol> | <ol style="list-style-type: none"> <li>1. Check 10A fuse (No. [24] , located in fuse block). Turn ignition switch ON and verify battery positive voltage is present at terminal ② of hazard switch.</li> <li>2 Check hazard switch</li> <li>3. Check turn signal switch</li> <li>4 Check wire between combination flasher unit and turn signal switch for open circuit.</li> </ol> |
| Hazard warning lamps do not operate but turn signal lamps operate. | <ol style="list-style-type: none"> <li>1. 10A fuse</li> <li>2 Hazard switch</li> <li>3 Open in hazard switch circuit</li> </ol>                                   | <ol style="list-style-type: none"> <li>1. Check 10A fuse (No. [22] , located in fuse block). Verify battery positive voltage is present at terminal ③ of hazard switch</li> <li>2 Check hazard switch</li> <li>3. Check wire between combination flasher unit and hazard switch for open circuit</li> </ol>  |
| Front turn signal lamp LH or RH does not operate.                  | <ol style="list-style-type: none"> <li>1 Bulb</li> <li>2 Ground (E44) or (E51)</li> </ol>   | <ol style="list-style-type: none"> <li>1 Check bulb.</li> <li>2 Check ground (E44) or (E51).</li> </ol>  |
| Side turn signal lamp on driver's side does not operate.           | <ol style="list-style-type: none"> <li>1 Bulb</li> <li>2 Ground (E43) or (E57)</li> </ol>   | <ol style="list-style-type: none"> <li>1 Check bulb.</li> <li>2 Check ground (E43) or (E57).</li> </ol>  |
| Side turn signal lamp on passenger side does not operate.          | <ol style="list-style-type: none"> <li>1 Bulb</li> <li>2 Ground (F28) or (F37)</li> </ol>   | <ol style="list-style-type: none"> <li>1 Check bulb.</li> <li>2 Check ground (F28) or (F37).</li> </ol>  |
| Rear turn signal lamp LH or RH does not operate                    | <ol style="list-style-type: none"> <li>1 Bulb</li> <li>2. Ground (T19)</li> </ol>   | <ol style="list-style-type: none"> <li>1 Check bulb</li> <li>2. Check ground (T19)</li> </ol>  |
| LH and RH turn indicators do not operate.                          | <ol style="list-style-type: none"> <li>1 Ground</li> </ol>  | <ol style="list-style-type: none"> <li>1 Check ground (M1)</li> </ol>  |
| LH or RH turn indicator does not operate                           | <ol style="list-style-type: none"> <li>1 Bulb</li> </ol>  | <ol style="list-style-type: none"> <li>1 Check bulb in combination meter.</li> </ol>   |

Test lamp (27W)



SEL122E

### Combination Flasher Unit Check

- 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.

## EXTERIOR LAMP

### Bulb Specifications

| Item                   | Wattage (W) |
|------------------------|-------------|
| Front fog lamp         | 55          |
| Front turn signal lamp | 21          |
| Clearance lamp         | 5           |
| Side turn signal lamp  | 5           |
| Rear combination lamp  |             |
| Turn signal lamp       | 21          |
| Stop/Tail lamp         | 21/5        |
| Back-up lamp           | 21          |
| License plate lamp     | 5           |
| Rear fog lamp          | 21          |
| High-mounted stop lamp | 5           |

## INTERIOR LAMP

### Illumination/System Description

Power supply routing for illumination lamps are the same as that of clearance, license and LH tail lamp. Refer to "Clearance, License and Tail Lamps"

On vehicles for Europe and Australia, illumination of combination meter and clock is controlled by illumination control switch

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.

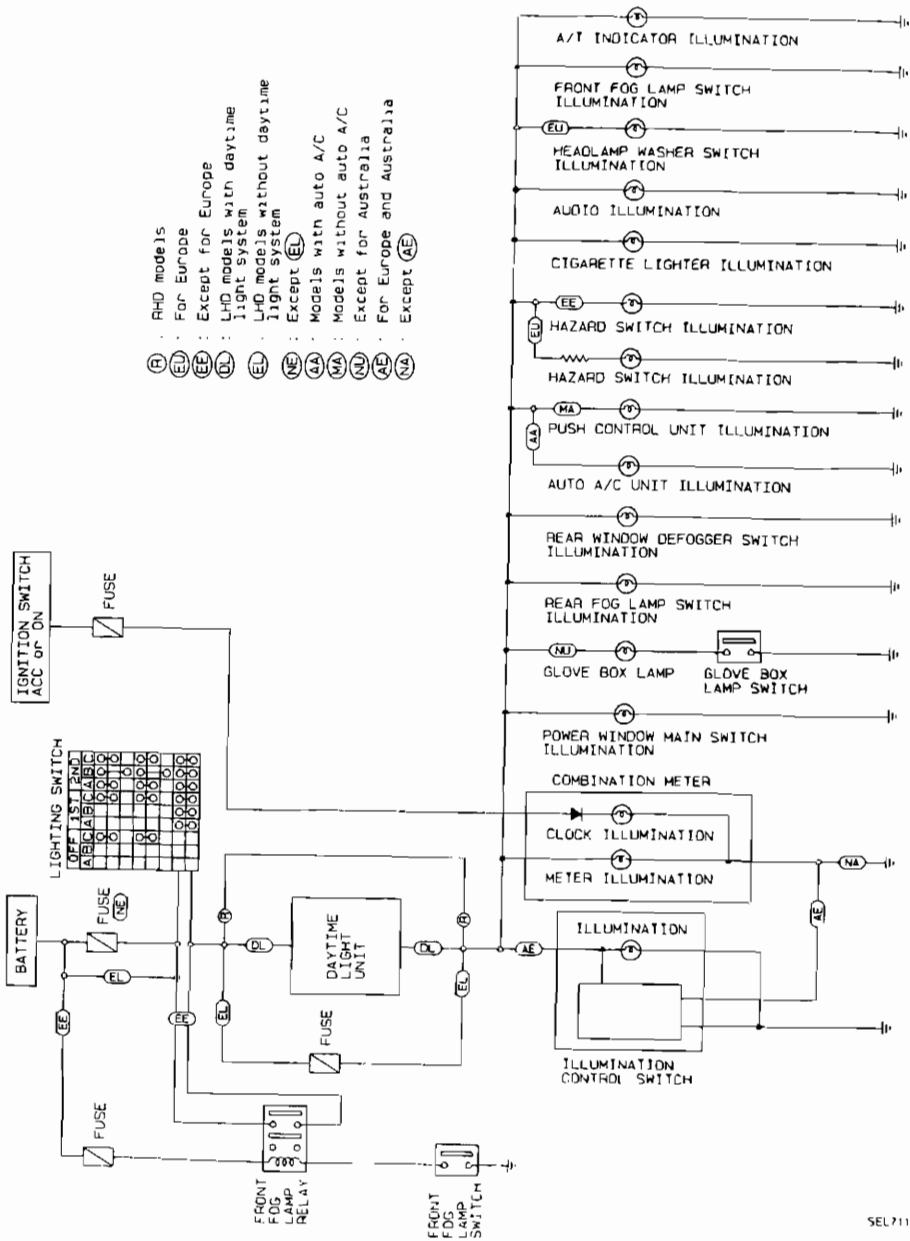
| Component                         | Connector No. | Power terminal | Ground terminal  | Ground        |
|-----------------------------------|---------------|----------------|------------------|---------------|
| Audio                             | M40           | 8              | -- (Unit ground) | --            |
| Push control unit                 | M32           | 15             | 16               | (M1) or (M67) |
| Auto A/C unit                     | M31           | 13             | 14               | (M1) or (M67) |
| A/T indicator                     | B8            | 7              | 6                | (B2) or (B18) |
| Power window main switch          | D9            | 15             | 16               | (M1) or (M67) |
| Cigarette lighter                 | M42           | 3              | 1                | (M1) or (M67) |
| Combination meter                 | M20           | 6              | 33               | (*)           |
| Clock                             | M20           | 8              | 33               | (*)           |
| Hazard switch (For Europe)        | M34           | 7              | 8                | (M1) or (M67) |
| Hazard switch (Except for Europe) | M35           | 7              | 8                | (M1) or (M67) |
| Glove box lamp (switch)           | M103          | 2              | 1                | (M1) or (M67) |
| Front fog lamp switch             | B7            | 5              | 6                | (B2) or (B18) |
| Rear fog lamp switch              | M38           | 6              | 5                | (M1) or (M67) |
| Headlamp washer switch            | M36           | 4              | 3                | (M1) or (M67) |
| Rear window defogger switch       | M37           | 5              | 6                | (M1) or (M67) |
| Illumination control switch       | M21           | 1              | 3                | (M1) or (M67) |

\*) For Europe and Australia models. Illumination control switch  
 Except for Europe and Australia models (M1) or (M67)

# INTERIOR LAMP

## Illumination/Schematic

- (R) : RHD models
- (E) : For Europe
- (EE) : Except for Europe
- (EL) : LHD models with daytime light system
- (EL) : LHD models without daytime light system
- (NE) : Except (EL)
- (AE) : Models with auto A/C
- (MA) : Models without auto A/C
- (NA) : Except for Australia
- (AE) : For Europe and Australia
- (NA) : Except (AE)

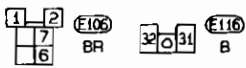
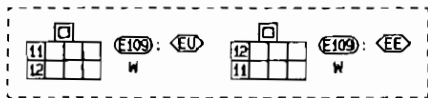
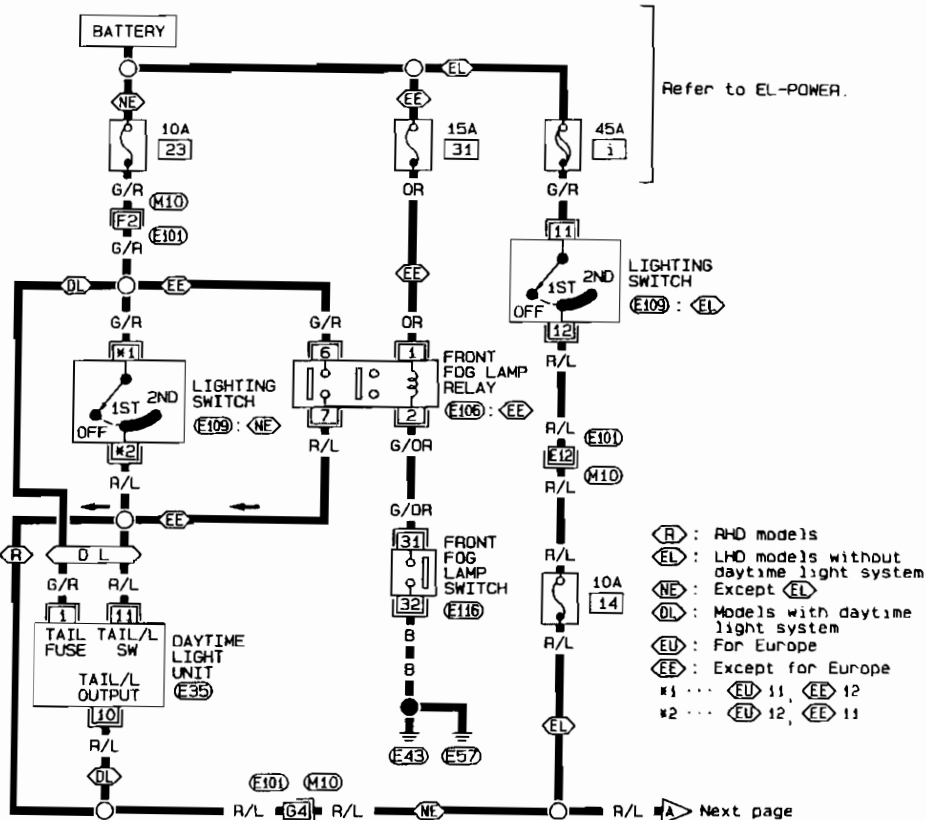


SEL711T

# INTERIOR LAMP

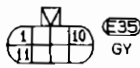
## Illumination/Wiring Diagram — ILL —

EL-ILL-01



Refer to last page (Foldout page).

(M10), (E101)

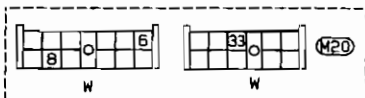
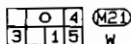
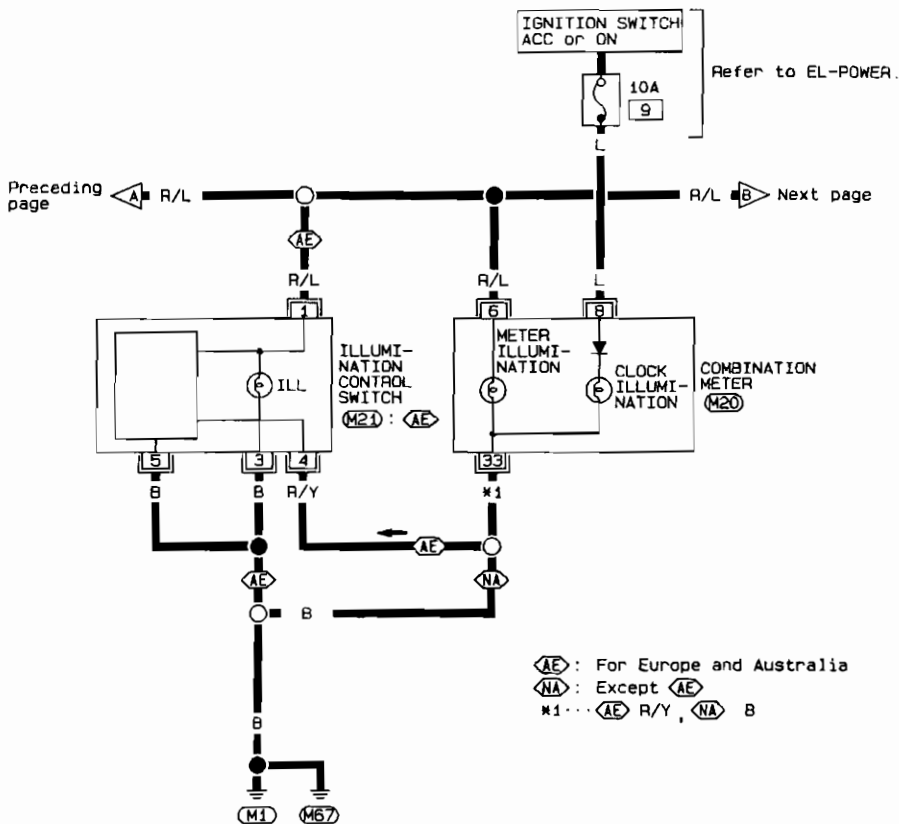


EL  
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RG

# INTERIOR LAMP

## Illumination/Wiring Diagram — ILL — (Cont'd)

EL-ILL-02





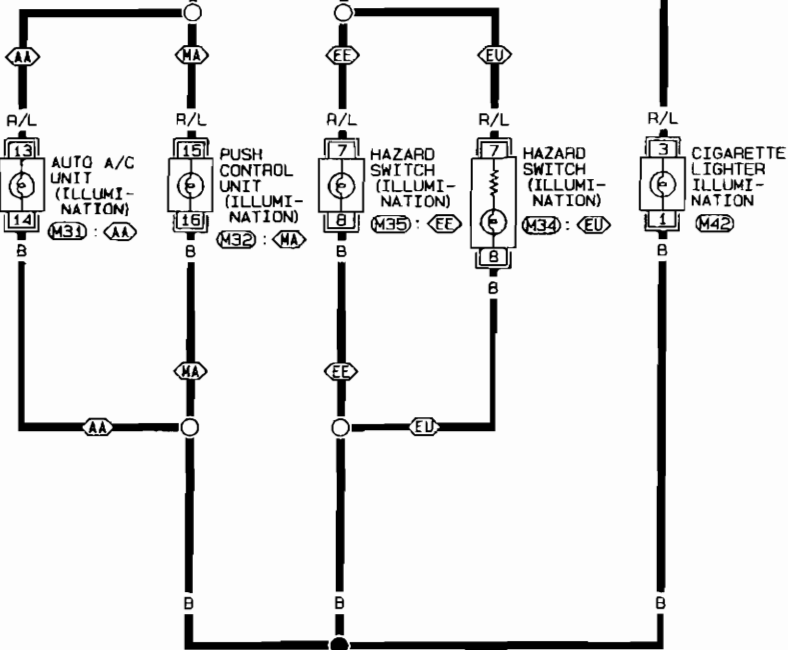


# INTERIOR LAMP

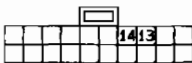
## Illumination/Wiring Diagram — ILL — (Cont'd)

EL-ILL-04

Preceding page R/L R/L Next page



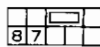
- : Models with auto A/C
- : Models without auto A/C
- : For Europe
- : Except for Europe



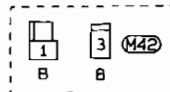
B



W



W



B



## INTERIOR LAMP

### Interior, Spot and Trunk Room Lamps/System Description

Power is supplied at all times

- through 10A fuse (No. 21) located in the fuse block)
- to interior lamp terminal ①.
- to spot lamp terminal ① and
- to trunk room lamp terminal ①.

### INTERIOR LAMP

#### Switch operation

With interior lamp switch in the ON position, ground is supplied to turn interior lamp on.

When a door switch is set to OPEN with interior lamp switch in the DOOR position, ground is supplied

- to interior lamp terminal ②
- through diode (M4) terminal ① (Except for Europe models)
- to diode (M4) terminal ② (Except for Europe models)
- through diode (M4) terminal ① (Except for Europe models)
- to diode (M4) terminal ② (Except for Europe models)
- through door switch passenger side terminal ① or
- through door switch driver's side terminal ②,
- through door switch unit ground.

#### Interior lamp control by multi-remote control system

When the smart entrance control unit receives a signal from multi-remote controller to unlock the door with interior lamp switch set in DOOR position, ground is supplied

- to interior lamp terminal ②
- through smart entrance control unit terminal ⑨,
- through smart entrance control unit terminal ⑩ and
- through body ground (M1).

With power and ground supplied, the interior lamp illuminates.

For smart entrance control unit, refer to "MULTI-REMOTE CONTROL SYSTEM".

### TRUNK ROOM LAMP

When the trunk room lamp switch is set to OPEN, ground is supplied

- to trunk room lamp terminal ②
- through trunk room switch terminal ①,
- through trunk room lamp switch terminal ② and
- through body ground (T19).

With power and ground supplied, the trunk room lamp illuminates.

### SPOT LAMP

With the spot lamp switch in the ON position, ground is supplied

- to spot lamp terminal ②
- through body ground (M1) or (M57).

With power and ground supplied, the spot lamp illuminates.

### Bulb Specifications

| Item            | Wattage (W) |
|-----------------|-------------|
| Interior lamp   | 10          |
| Spot lamp       | 10          |
| Trunk room lamp | 3.4         |





## METER AND GAUGES

### System Description

With the ignition switch in the ON or START position, power is supplied

- through 7.5A fuse (No. 25) located in the fuse block
- to combination meter terminal 21.

Ground is supplied

- to combination meter terminal 22
- through body ground (M1).

### WATER TEMPERATURE GAUGE

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 13 of the combination meter for the water temperature gauge. The needle on the gauge moves from "C" to "H".

### TACHOMETER

The tachometer indicates engine speed in revolutions per minute (rpm).

The tachometer is regulated by a signal

- from terminal 7 of the ECM (ECCS control module)
- to combination meter terminal 12 for the tachometer.

### FUEL GAUGE

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 20 for the fuel gauge
- from terminal 1 of the fuel tank gauge unit
- through terminal 3 of the fuel tank gauge unit and
- through body grounds (T19), (B2) and (B18).

### SPEEDOMETER

The vehicle speed sensor provides a voltage signal to the combination meter for the speedometer.

The voltage is supplied

- to combination meter terminals 28 and 45 for the speedometer
- from terminals 1 and 2 of the vehicle speed sensor.

The speedometer converts the voltage into the vehicle speed displayed.

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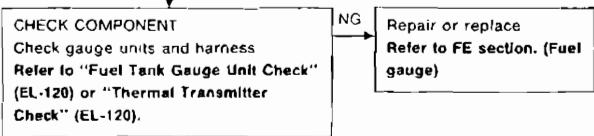
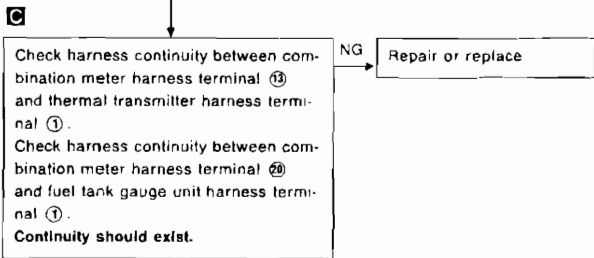
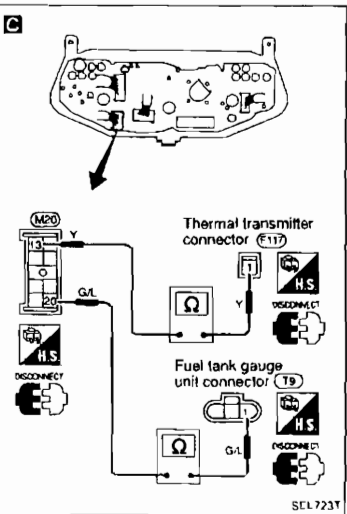
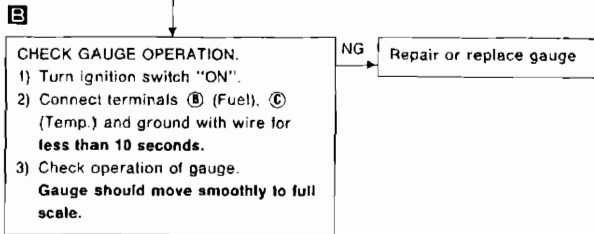
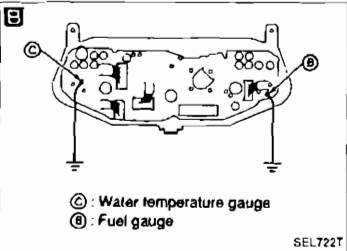
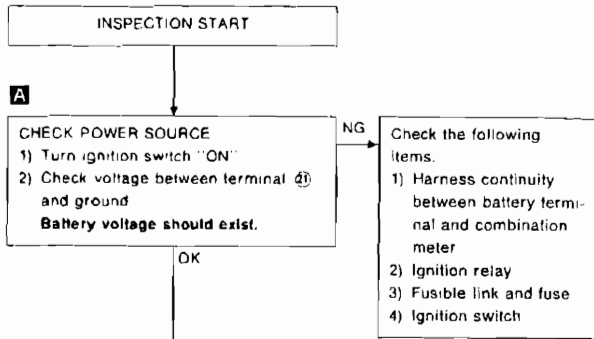
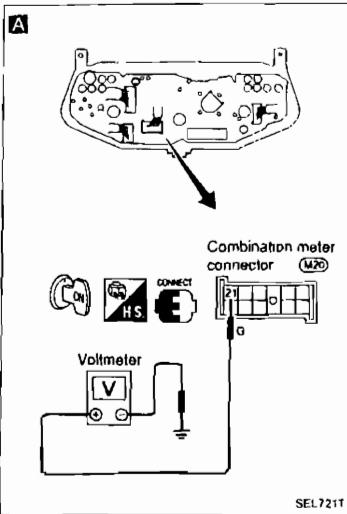
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## Inspection/Fuel Gauge and Water Temperature Gauge

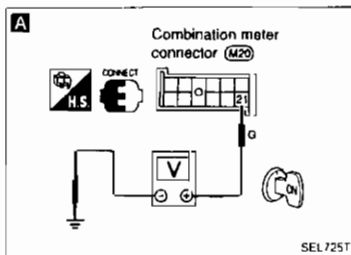
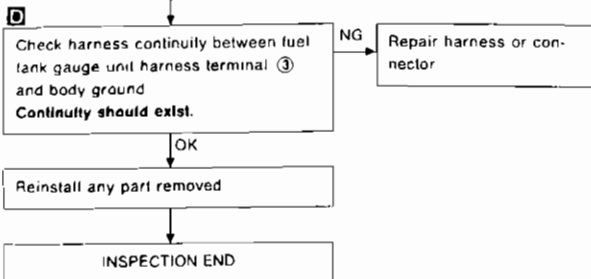
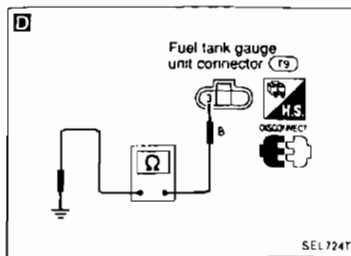


(Go to (A) on next page)

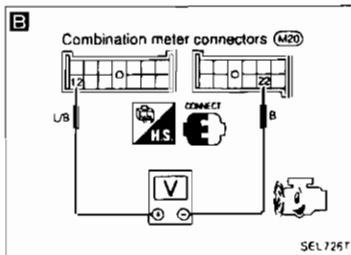
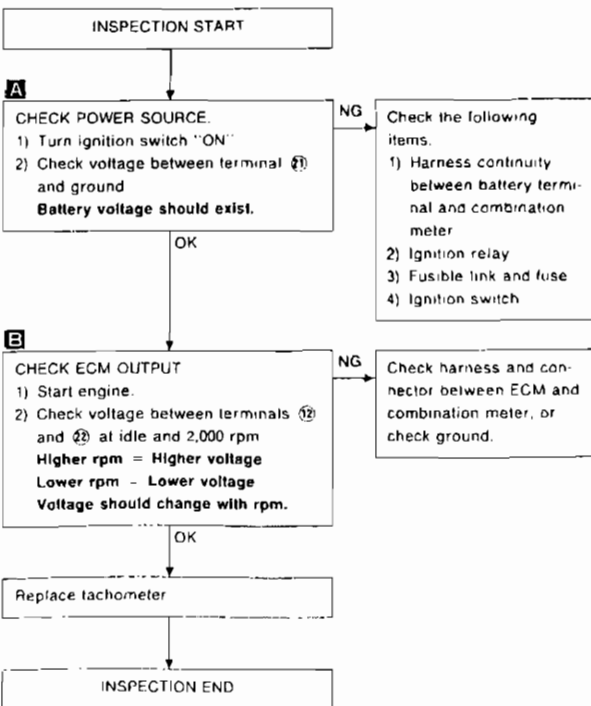


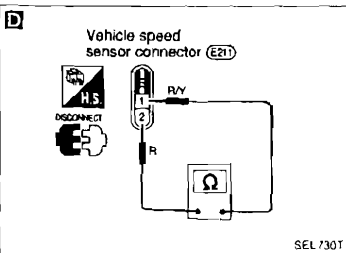
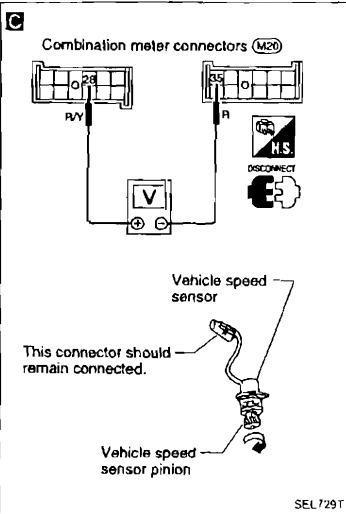
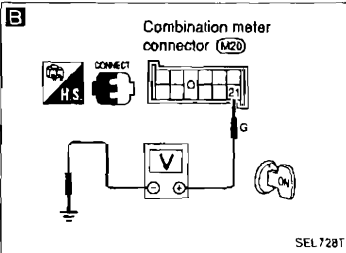
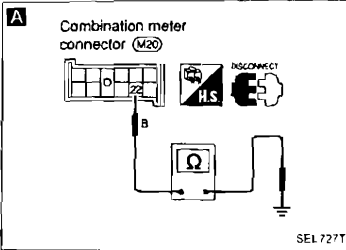
## METER AND GAUGES

### Inspection/Fuel Gauge and Water Temperature Gauge (Cont'd)



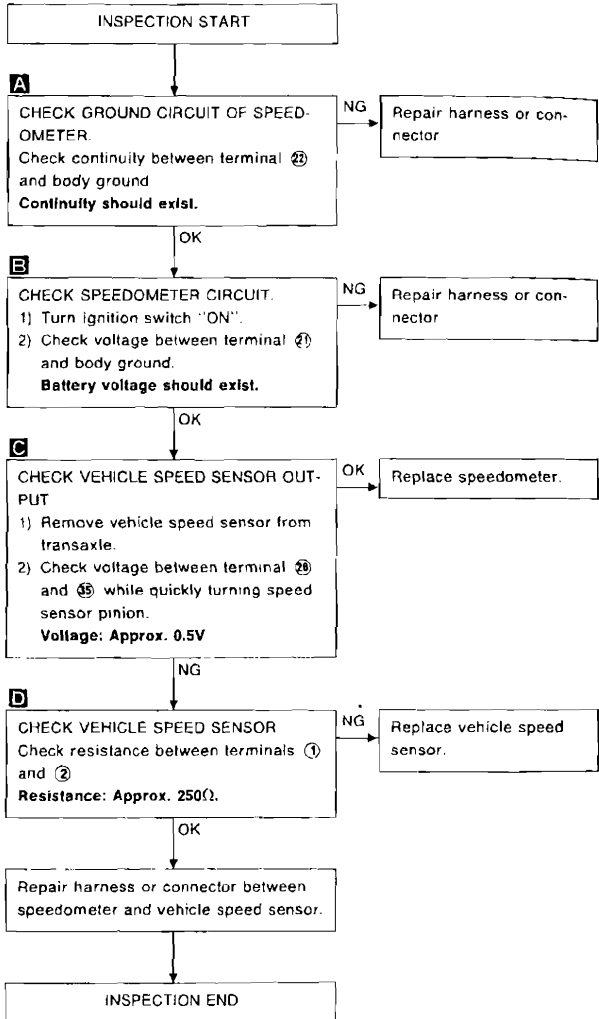
### Inspection/Tachometer





## Inspection/Speedometer and Vehicle Speed Sensor

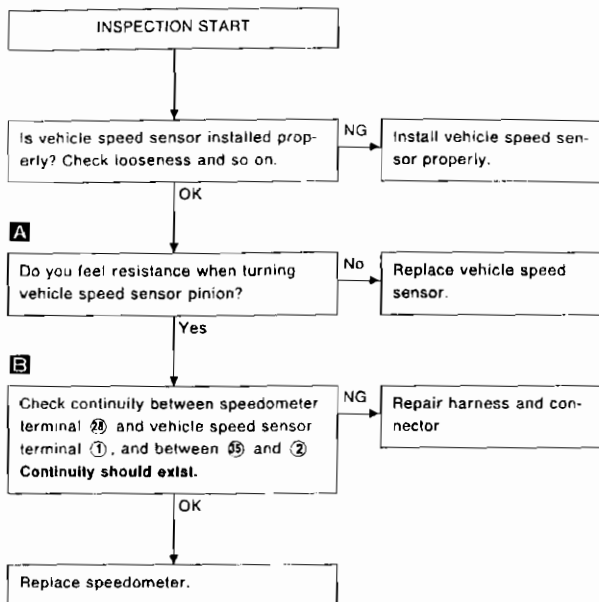
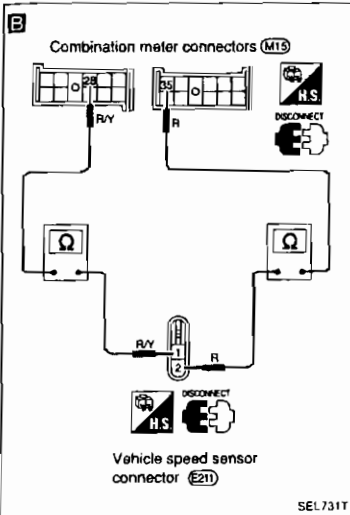
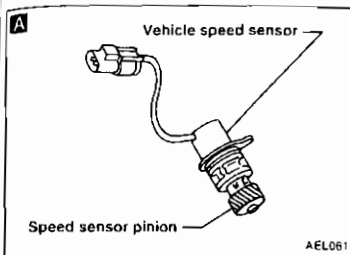
**SYMPTOM:** Speedometer stays at 0 km/h (0 MPH).



# METER AND GAUGES

## Inspection/Speedometer and Vehicle Speed Sensor (Cont'd)

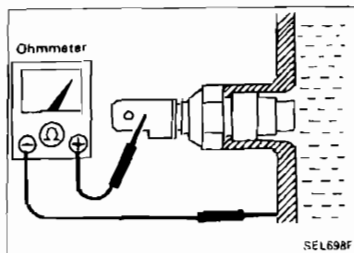
**SYMPTOM:** Speedometer indication flutters.



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EL

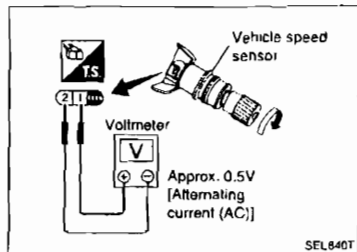
## METER AND GAUGES



### Thermal Transmitter Check

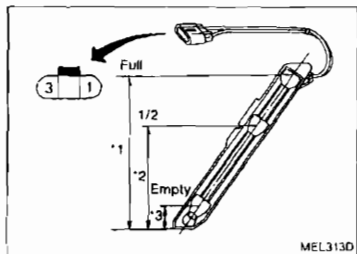
Check the resistance between the terminals of thermal transmitter and body ground

| Water temperature | Resistance       |
|-------------------|------------------|
| 60°C (140°F)      | Approx. 70 - 90Ω |
| 100°C (212°F)     | Approx. 21 - 24Ω |



### Vehicle Speed Sensor Signal Check

1. Remove vehicle speed sensor from transmission.
2. Turn vehicle speed sensor pinion quickly and measure voltage across ① and ②.



### Fuel Tank Gauge Unit Check

#### Sending unit

- For removal, refer to FE section.

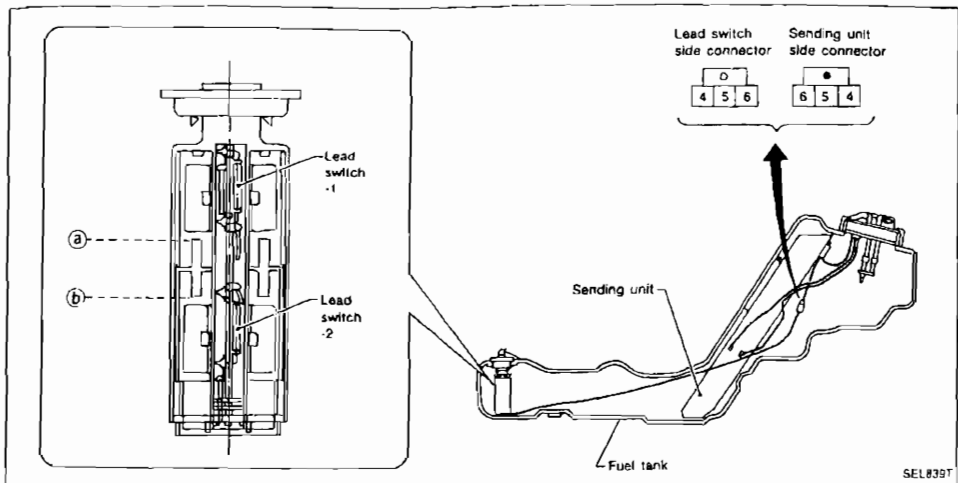
Check the resistance between terminals ① and ③.

| Ohmmeter |     | Float position |       | Resistance value (Ω) |
|----------|-----|----------------|-------|----------------------|
| (+)      | (-) | mm (in)        |       |                      |
| ①        | ③   | *1             | Full  | 358 (14.09)          |
|          |     | *2             | 1/2   | 245 (9.65)           |
|          |     | *3             | Empty | 42 (1.65)            |

\*1 and \*3: When float is in contact with stopper

# METER AND GAUGES

## Lead Switch



SEL839T

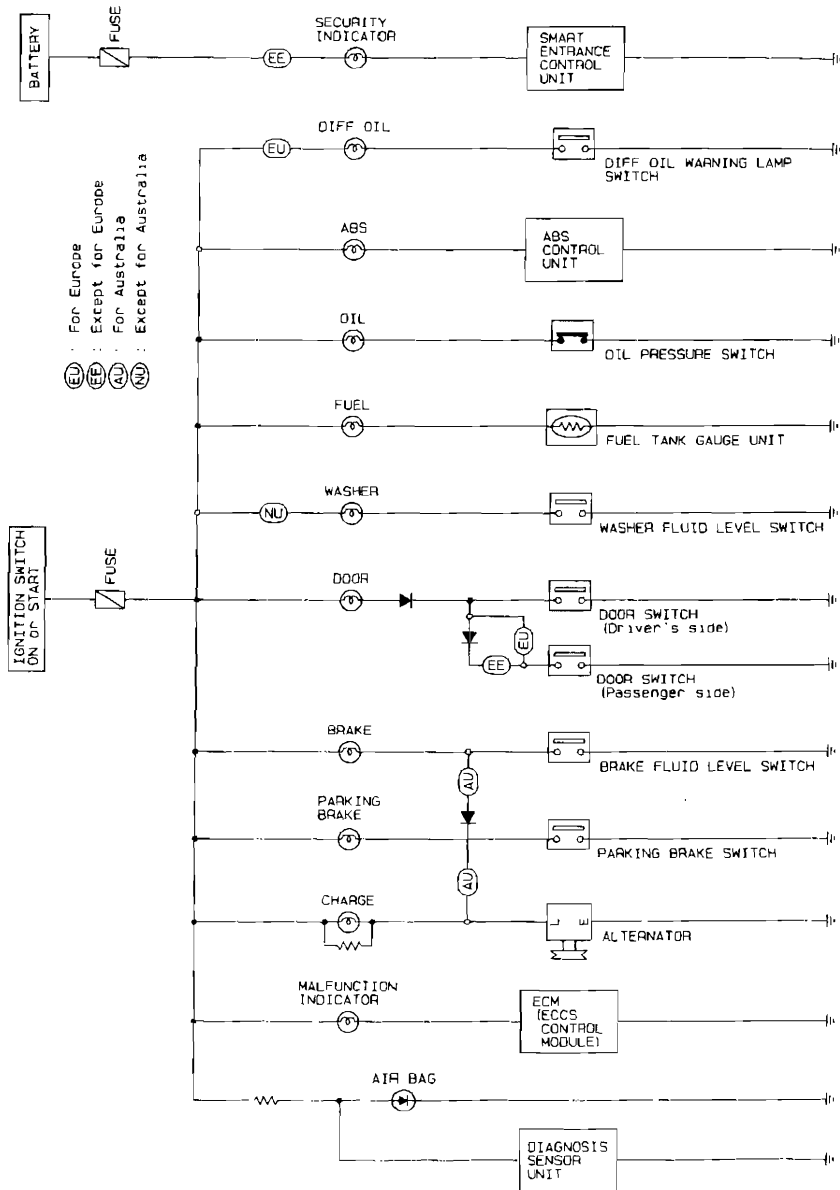
Lead switch is built into the fuel tank.  
Check the continuity between terminals ④ and ⑤ or ④ and ⑥

| Terminals |   |   | Lead switch condition |     | Fuel level line | Fuel capacity (Approximate values) ℓ (Imp qt) |
|-----------|---|---|-----------------------|-----|-----------------|---|
| ④         | ⑤ | ⑥ | SW1                   | SW2 |                 |   |
| ○         | ○ | ○ | ON                    | ON  | Above ①         | More than 6.8 (6)                             |
| ○         | ○ |   | OFF                   | ON  | ① - ②           | 2.5 - 6.8 (2-1/4 - 6)                         |
|           |   |   | OFF                   | OFF | Below ②         | Less than 2.5 (2-1/4)                         |

EL

# WARNING LAMPS AND BUZZER

## Warning Lamps/Schematic

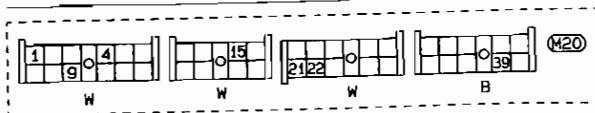
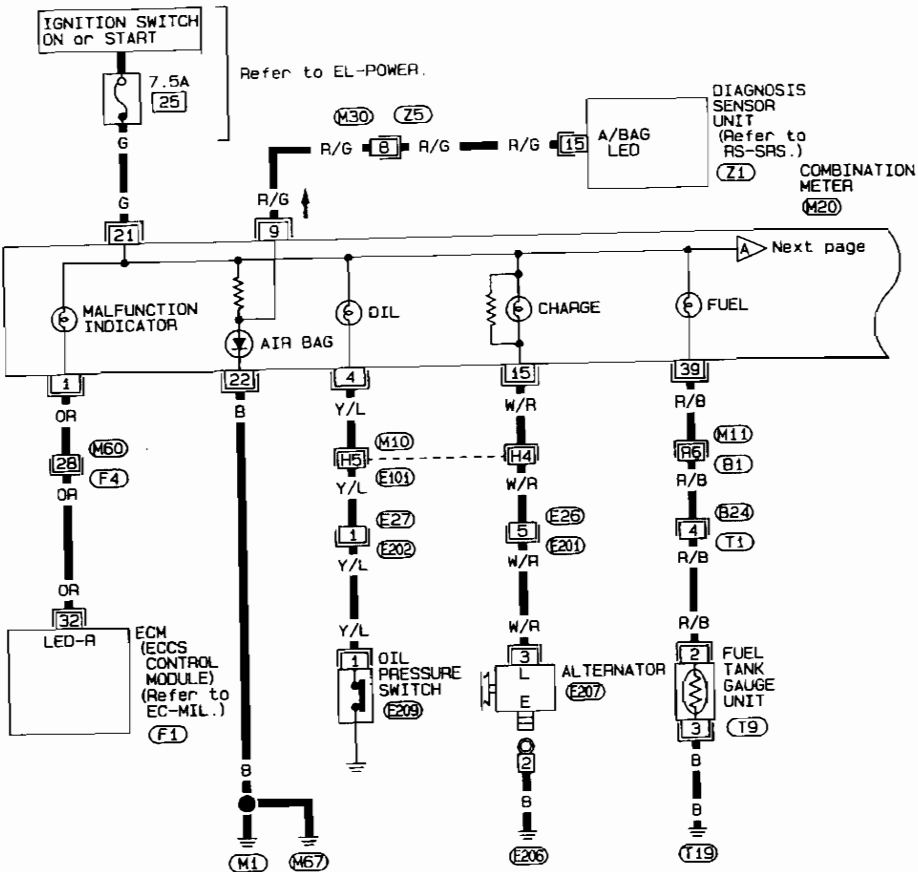


# WARNING LAMPS AND BUZZER

## Warning Lamps/Wiring Diagram — WARN —

LHD MODELS

EL-WARN-01



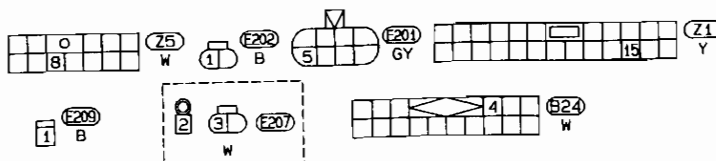
Refer to last page (Foldout page).

(M10, E101)

(M11, B1)

(M60, F4)

(F1)



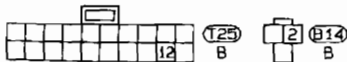
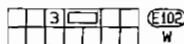
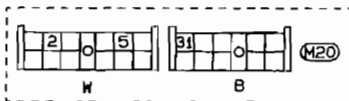
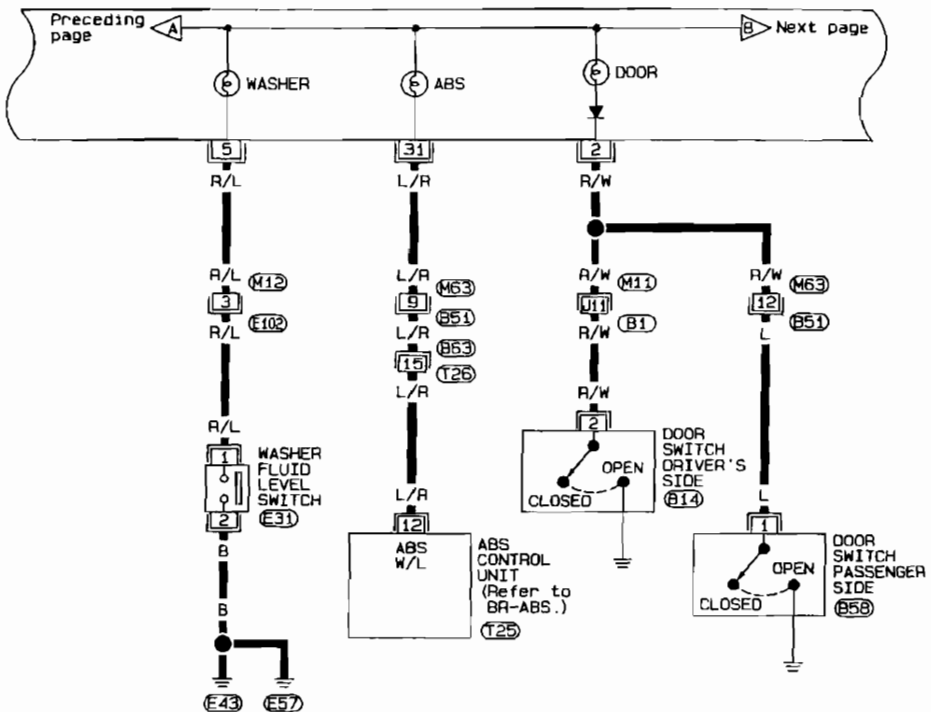
SEL/33T

# WARNING LAMPS AND BUZZER

## Warning Lamps/Wiring Diagram — WARN — (Cont'd)

EL-WARN-02

COMBINATION  
METER  
(M20)



Refer to last page  
(Foldout page).

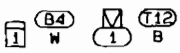
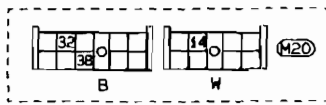
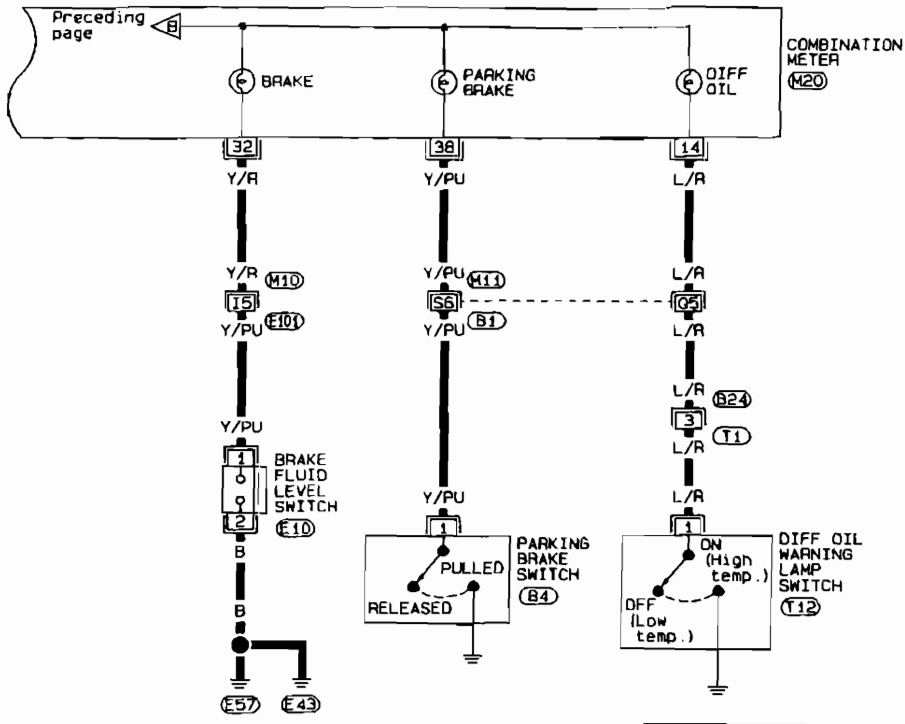
(M11), (B1)



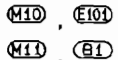
# WARNING LAMPS AND BUZZER

## Warning Lamps/Wiring Diagram — WARN — (Cont'd)

EL-WARN-03



Refer to last page  
(Foldout page).



Q1  
M1A  
EM  
LC  
EG  
SE  
E1  
M1  
AT  
FD  
FA  
M1A  
M1B  
ST  
M1S  
ST  
M1A  
FD

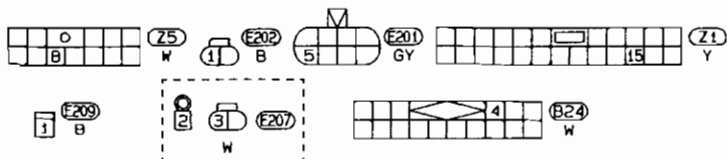
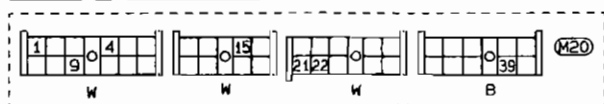
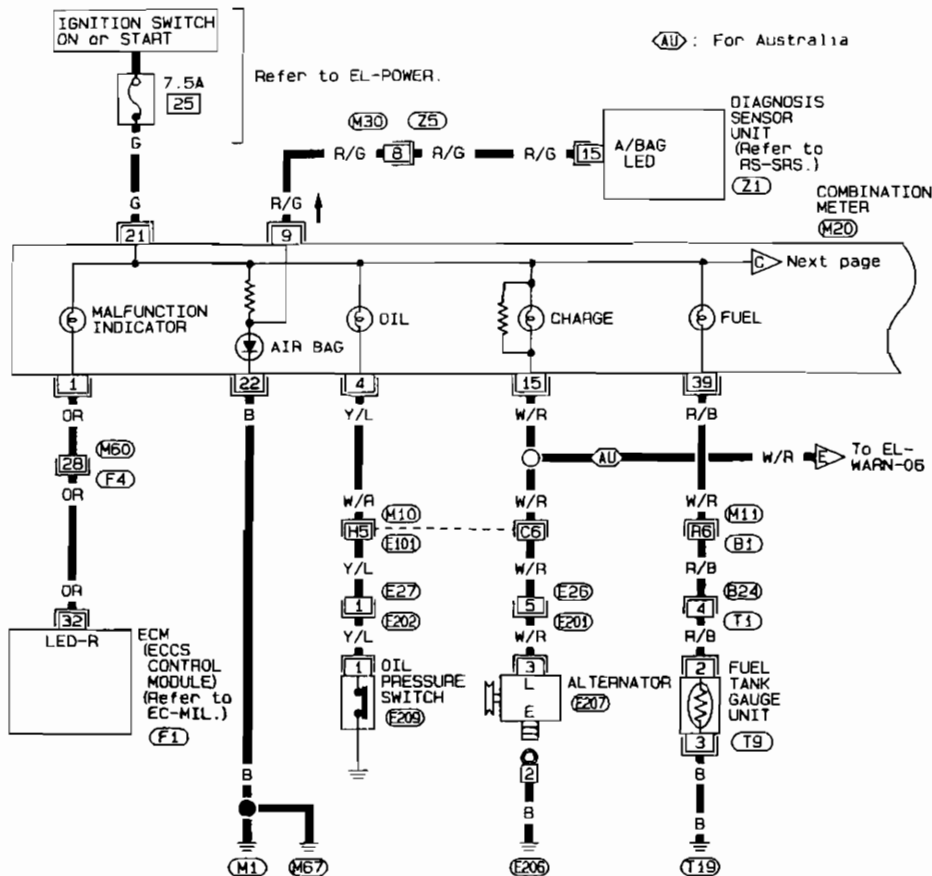
**EL**

# WARNING LAMPS AND BUZZER

## Warning Lamps/Wiring Diagram — WARN — (Cont'd)

RHD MODELS

EL-WARN-04



Refer to last page  
(Foldout page).

M10, E101

M11, B1

M60, F4

F1

# WARNING LAMPS AND BUZZER

## Warning Lamps/Wiring Diagram — WARN — (Cont'd)

EL-WARN-05

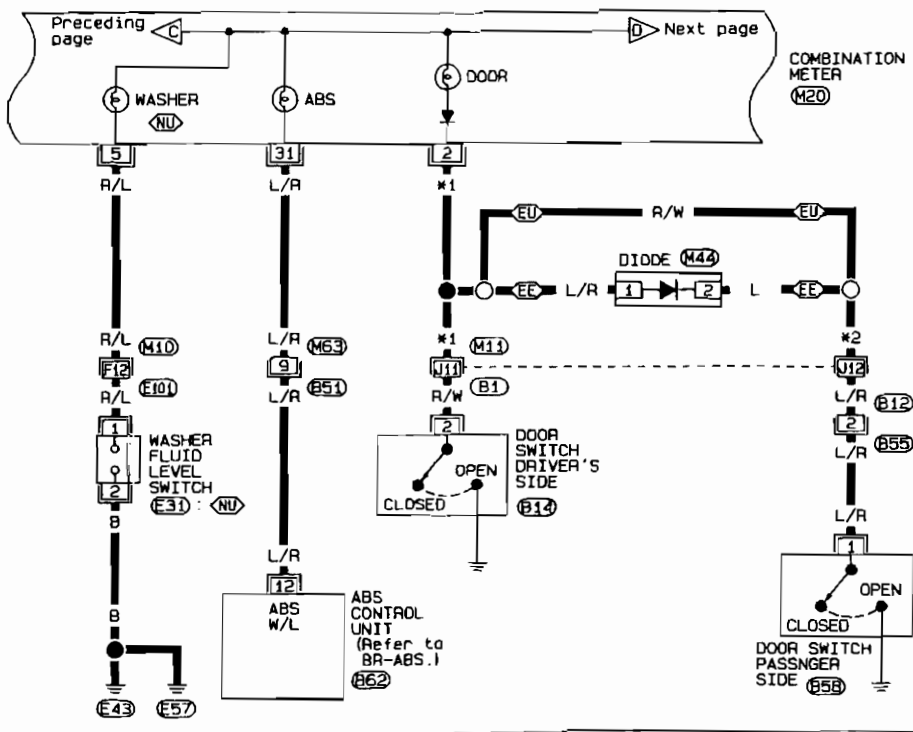
(NU) : Except for Australia

(EU) : For Europe

(EE) : Except for Europe

\*1 : (EU) R/W, (EE) L/R

\*2 : (EU) R/W, (EE) L



Refer to last page  
(Foldout page).

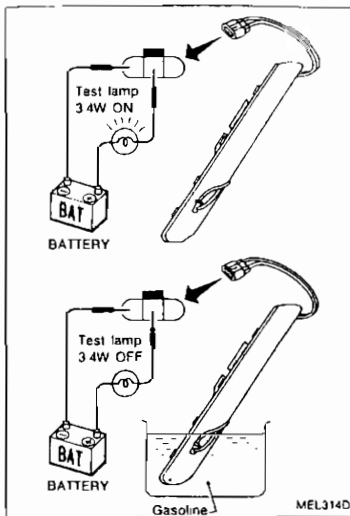
(M10), (E101)

(M11), (B1)

EL

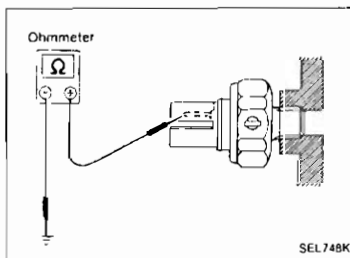
(B2)





## Fuel Warning Lamp Sensor Check

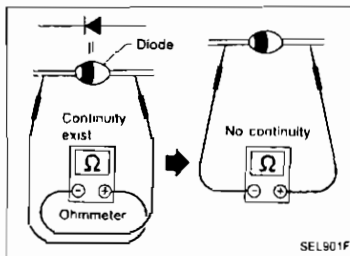
- It will take a short time for the bulb to light.



## Oil Pressure Switch Check

|              | Oil pressure<br>kPa (bar, kg/cm <sup>2</sup> , psi)  | Continuity |
|--------------|--|------------|
| Engine start | More than 10 - 20<br>(0.10 - 0.20, 0.1 - 0.2, 1 - 3) | NO         |
| Engine stop  | Less than 10 - 20<br>(0.10 - 0.20, 0.1 - 0.2, 1 - 3) | YES        |

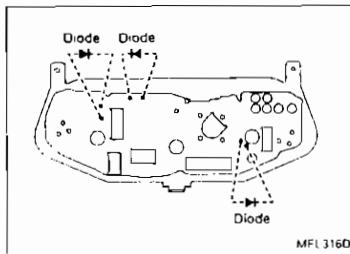
Check the continuity between the terminals of oil pressure switch and body ground.



## Diode Check

- Check continuity using an ohmmeter.
- Diode is functioning properly if test results are as shown in the figure at left.

**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.



- Diodes for warning lamps are built into the combination meter printed circuit.

## WARNING LAMPS AND BUZZER

### Warning Buzzer/System Description

The warning buzzer is controlled by the smart entrance control unit

Power is supplied at all times

- through 10A fuse (No. 21), located in the fuse block)
- to warning buzzer terminal ③
- to key switch terminal ①

Power is supplied at all times

(LHD models without daytime light system)

- through 45A fusible link (letter T), located in the fusible link and fuse box).
- to lighting switch terminal ⑪

(LHD models with daytime light system and RHD models)

- through 10A fuse (No. 23), located in the fuse block)
- to lighting switch terminal ⑪ (For Europe) or ⑫ (Except for Europe)

Power is supplied at all times

- through 25A fusible link (letter L), located in the fusible link and fuse box)
- to circuit breaker terminal ①
- through circuit breaker terminal ②
- to smart entrance control unit terminal ①

With the ignition switch in the ON or START position, power is supplied

- through 7.5A fuse (No. 26), located in the fuse block)
- to smart entrance control unit terminal ⑪

Ground is supplied to smart entrance control unit terminal ⑩ through body ground (M1).

When a signal, or combination of signals, is received by the smart entrance control unit, ground is supplied

- through smart entrance control unit terminal ⑫
- to warning buzzer terminal ①

With power and ground supplied, the warning buzzer will sound.

#### Ignition key warning buzzer (Except for Europe models)

With the key in the ignition switch in the OFF position, and the driver's door open, the warning buzzer will sound. A battery positive voltage is supplied

- from key switch terminal ②
- to smart entrance control unit terminal ⑭

Ground is supplied

- from driver side door switch terminal ①
- to smart entrance control unit terminal ⑮

Driver side door switch terminal ③ is grounded through body grounds (B2) and (B19).

#### Light warning buzzer

With ignition switch OFF, driver's door open, and lighting switch in 1ST or 2ND position, warning buzzer will sound. A battery positive voltage is supplied

(LHD models without daytime light system)

- from lighting switch terminal ⑫
- through 10A fuse (No. 14), located in the fuse block)
- to smart entrance control unit terminal ⑫

(LHD models with daytime light system)

- from lighting switch terminal ⑫
- to daytime light unit terminal ⑪
- through daytime light unit terminal ⑩
- to smart entrance control unit terminal ⑫

(RHD models)

- from lighting switch terminal ⑫ (For Europe) or ⑪ (Except for Europe)
- to smart entrance control unit terminal ⑫

Ground is supplied

- from driver side door switch terminal ①
- to smart entrance control unit terminal ⑮

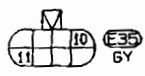
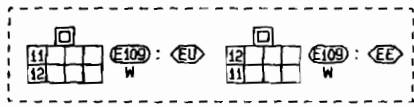
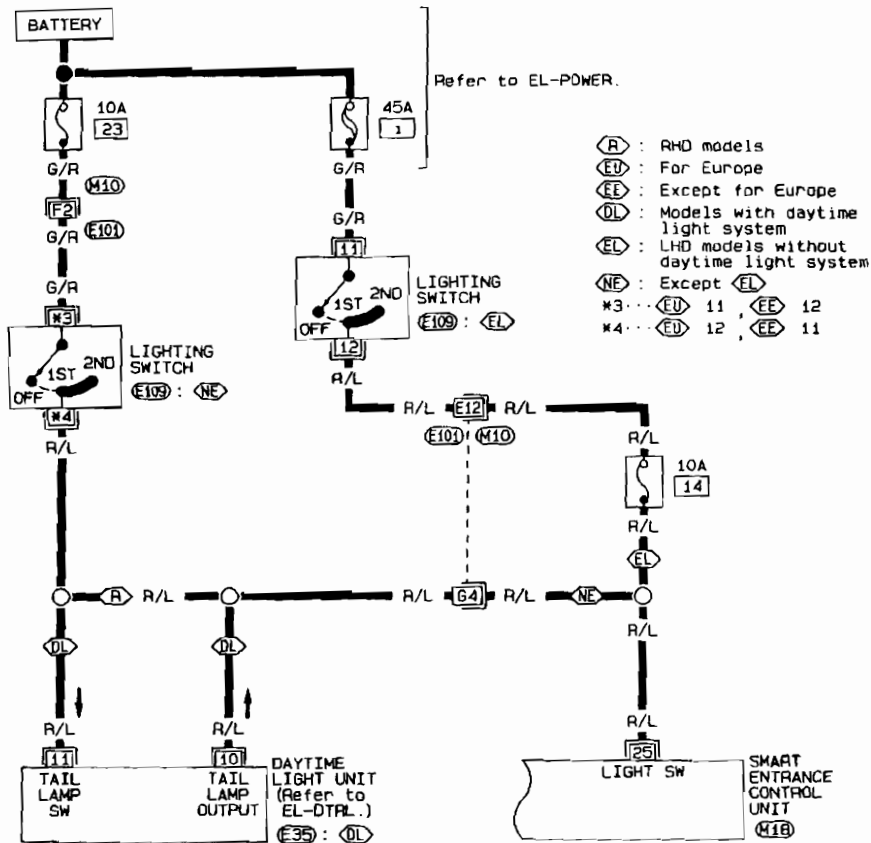
Driver side door switch terminal ③ is grounded through body grounds (B2) and (B19).



# WARNING LAMPS AND BUZZER

## Warning Buzzer/Wiring Diagram — CHIME — (Cont'd)

EL-CHIME-02



Refer to last page (Foldout page).

- ⓓⓐⓐ
- ⓔⓐⓐ
- ⓓⓐⓐ



# WARNING LAMPS AND BUZZER

## Trouble Diagnoses — Warning Buzzer

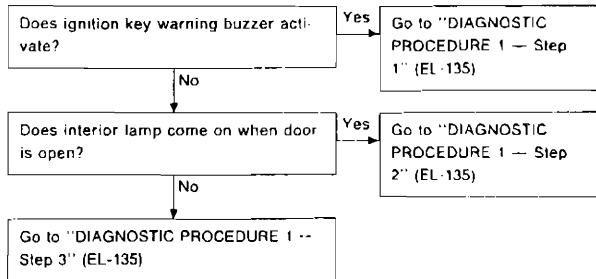
### SYMPTOM CHART

| PROCEDURE   | Preliminary Check   |                     | Main Power Supply and Ground Circuit Check | Diagnostic Procedure   |                        |
|---|---------------------|---------------------|--|------------------------|------------------------|
|   | EL-133              | EL-133              |  | EL-135                 | EL-136                 |
| SYMPTOM   | Preliminary check 1 | Preliminary check 2 | Main power supply and Ground circuit       | Diagnostic Procedure 1 | Diagnostic Procedure 2 |
| Light warning buzzer does not activate                                  |                     |                     |  |                        |                        |
| Ignition key warning buzzer does not activate (Except for Europe model) |                     |                     |  |                        |                        |

### PRELIMINARY CHECK

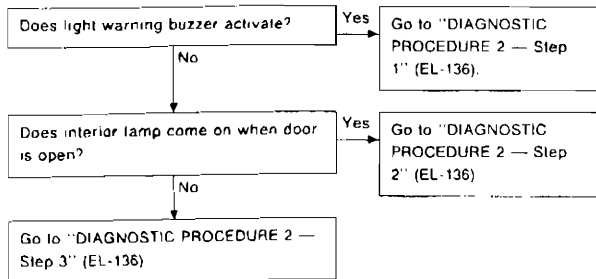
#### Preliminary check 1

- Light warning buzzer does not activate.



#### Preliminary check 2

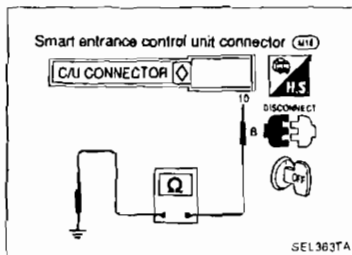
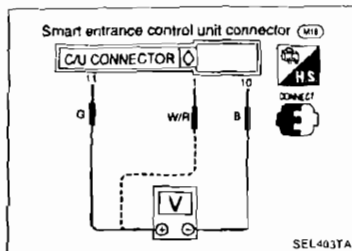
- Ignition key warning buzzer does not activate.



EL

## WARNING LAMPS AND BUZZER

### Trouble Diagnoses — Warning Buzzer (Cont'd) MAIN POWER SUPPLY AND GROUND CIRCUIT CHECK



#### Main power supply

| Terminals | Battery voltage existence condition |     |     |
|-----------|-------------------------------------|-----|-----|
|           | Ignition switch position            |     |     |
|           | OFF                                 | ACC | ON  |
| ⑪ - ⑩     | No                                  | No  | Yes |
| ① - ⑩     | Yes                                 | Yes | Yes |

#### Ground circuit

| Terminals  | Continuity |
|------------|------------|
| ⑩ - Ground | Yes        |

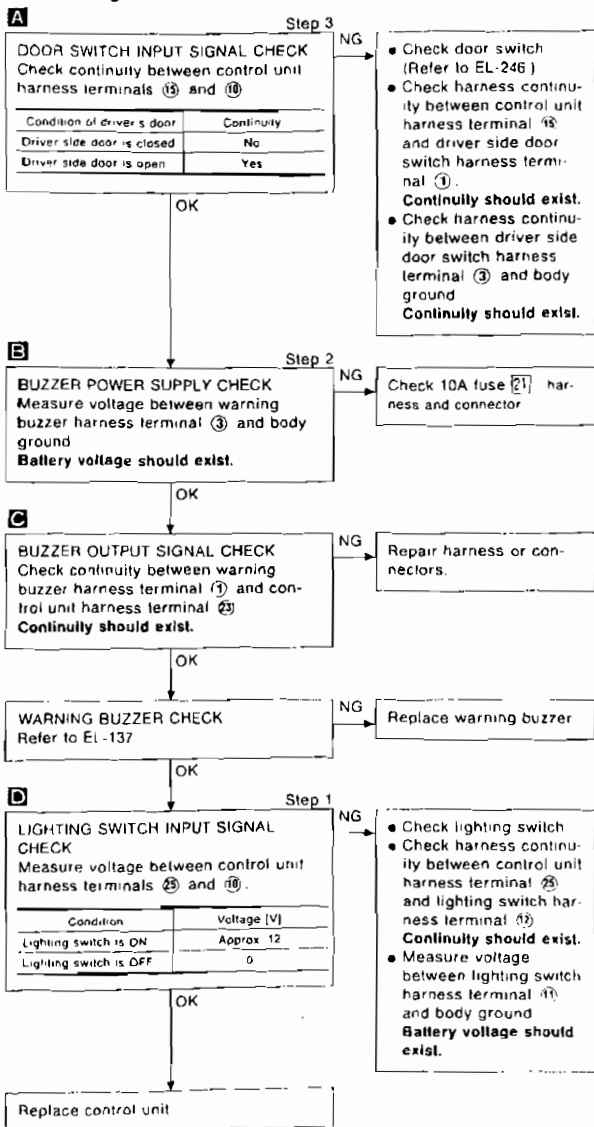
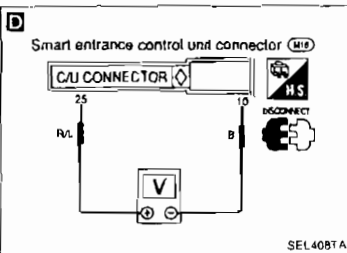
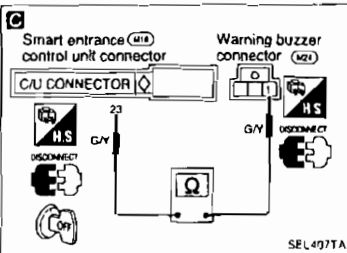
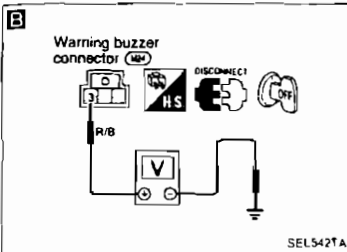
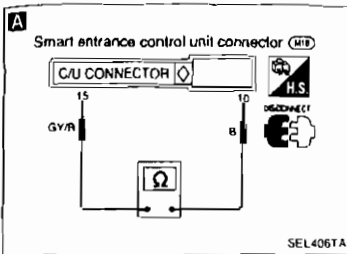
# WARNING LAMPS AND BUZZER

## Trouble Diagnoses — Warning Buzzer (Cont'd)

### DIAGNOSTIC PROCEDURE 1

**SYMPTOM:** Light warning buzzer does not activate.

- Perform "Preliminary check 1" before referring to the following flow chart.



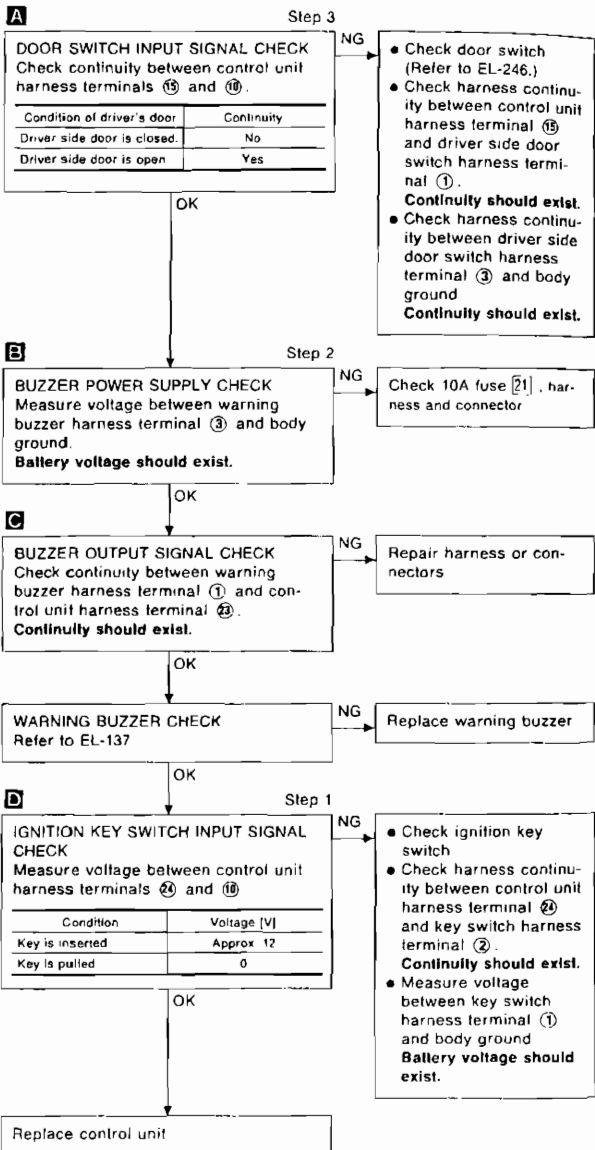
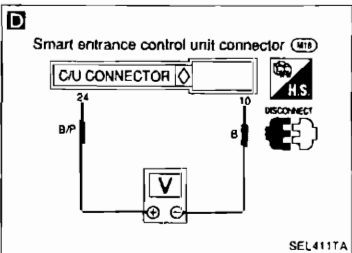
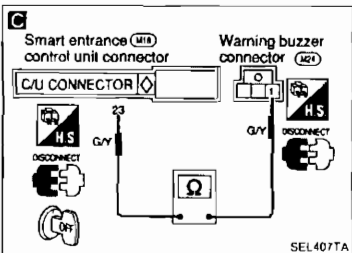
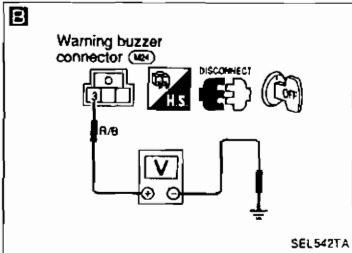
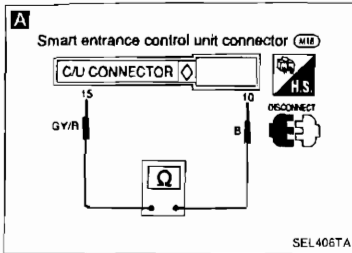
# WARNING LAMPS AND BUZZER

## Trouble Diagnoses — Warning Buzzer (Cont'd)

### DIAGNOSTIC PROCEDURE 2

**SYMPTOM:** Ignition key warning buzzer does not activate.  
(Except Europe model)

- Perform "Preliminary check 2" before referring to the following flow chart.





## WIPER AND WASHER

### Front Wiper and Washer/System Description

#### WIPER OPERATION

The 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. 111), located in the fuse block
- to front wiper motor terminal ②

#### Low and high speed wiper operation

Ground is supplied to wiper switch terminal ⑱ through body ground (E43) or (E57).

When the wiper switch is placed in the LO position, ground is supplied

- through terminal ⑭ of the wiper switch
- to wiper motor terminal ④.

With power and ground supplied, the wiper motor operates at low speed.

When the wiper switch is placed in the HI position, ground is supplied

- through terminal ⑯ of the wiper switch
- to wiper motor terminal ⑤.

With power and ground supplied, the wiper motor operates at high speed.

#### Auto stop operation

With wiper switch turned OFF, wiper motor will continue to operate until wiper arms reach windshield base.

When wiper arms are not located at base of windshield with wiper switch OFF, ground is provided

- from terminal ⑭ of the wiper switch
- to wiper motor terminal ④, in order to continue wiper motor operation at low speed.

Ground is also supplied

- through terminal ⑬ of the wiper switch
- to wiper amplifier terminal ②
- through terminal ⑦ of the wiper amplifier
- to wiper motor terminal ①
- through terminal ⑥ of the wiper motor, and
- through body ground (E37).

When wiper arms reach base of windshield, wiper motor terminals ① and ② are connected instead of terminals ① and ⑥. Wiper motor will then stop wiper arms at the PARK position.

#### Intermittent operation

The wiper motor operates the wiper arms one time at low speed at a set interval of approximately 3 to 13 seconds. This feature is controlled by the wiper amplifier.

When the wiper switch is placed in the INT position, ground is supplied

- to wiper amplifier terminal ①
- from wiper switch terminal ⑮
- through wiper switch terminal ⑱ and body ground (E43) or (E57).
- to wiper motor terminal ④
- through the wiper switch terminal ⑭
- to wiper switch terminal ⑰
- through wiper amplifier terminal ②
- to wiper amplifier terminal ③
- through body ground (F37)

The desired interval time is input

- to wiper amplifier terminal ⑧
- from wiper switch terminal ⑲

The wiper motor operates at low speed at the desired time interval.

## WIPER AND WASHER

### Front Wiper and Washer/System Description (Cont'd)

#### WASHER OPERATION

With the ignition switch in the ACC or ON position, power is supplied through 20A fuse (No. 11) located in the fuse block

- to washer motor terminal ①
- When the lever is pulled to the WASH position, ground is supplied
- to washer motor terminal ②, and
- to wiper amplifier terminal ⑥
- from terminal ⑩ of the wiper switch
- through terminal ⑪ of the wiper switch, and
- through body ground (E4) or (E7).

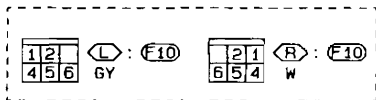
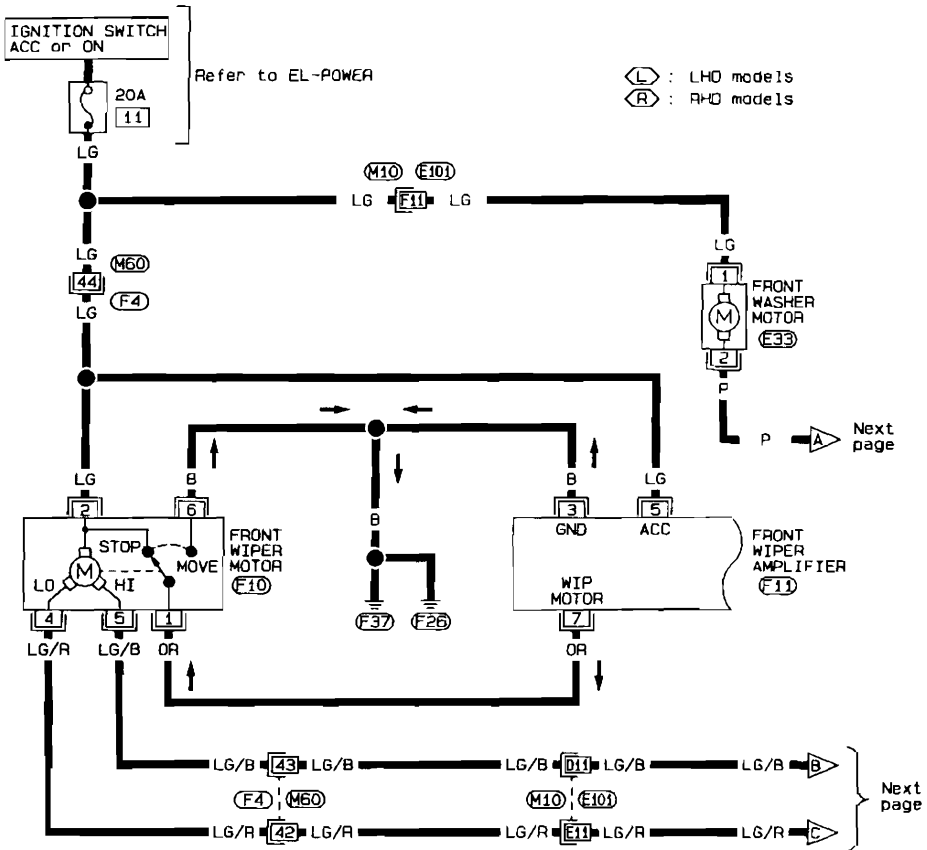
With power and ground supplied, the washer motor operates.

The wiper motor operates when the lever is pulled to the WASH position for one second or more and for approximately 3 seconds after the lever is released. This feature is controlled by the wiper amplifier in the same manner as the intermittent operation.

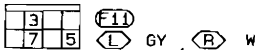
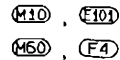
# WIPER AND WASHER

## Front Wiper and Washer/Wiring Diagram — WIPER —

EL-WIPER-01



Refer to last page  
(Foldout page).



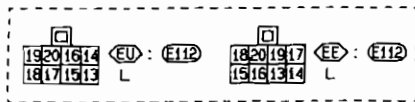
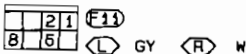
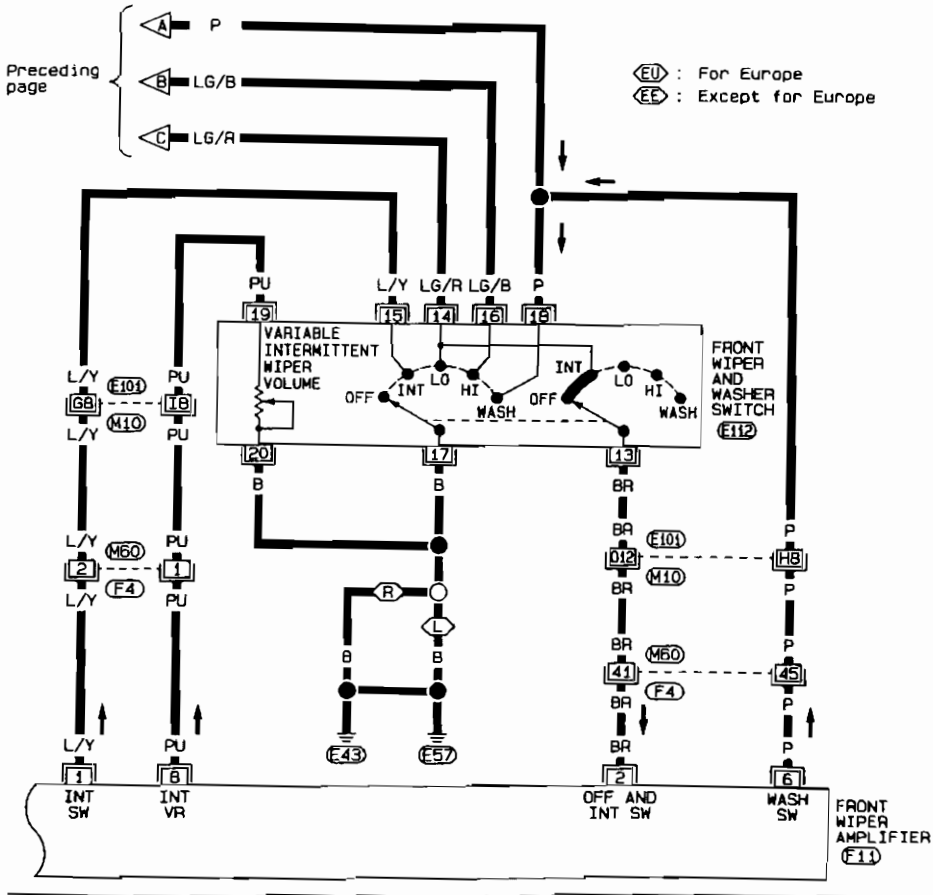


# WIPER AND WASHER

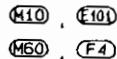
## Front Wiper and Washer/Wiring Diagram

### — WIPER — (Cont'd)

EL-WIPER-02



Refer to last page (Foldout page).

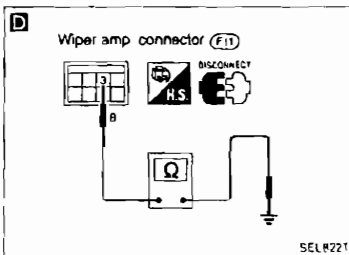
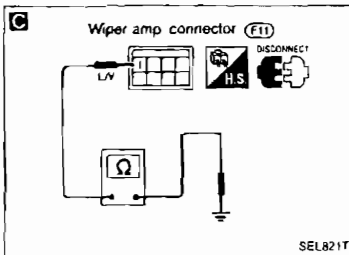
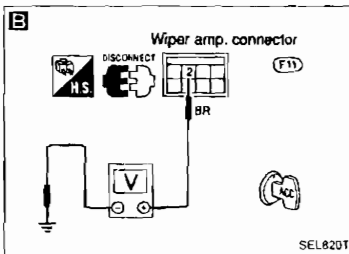
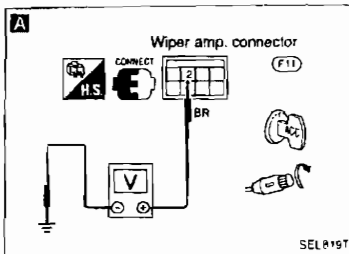


GI  
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LG  
EC  
PE  
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AT  
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BA  
BR  
ST  
RS  
BT  
FA  
EL  
DS

## Trouble Diagnoses

### DIAGNOSTIC PROCEDURE 1

**SYMPTOM: Intermittent wiper does not operate.**



**A**

**WIPER AMP OUTPUT SIGNAL CHECK**  
 1) Turn ignition switch to "ACC"  
 2) Turn wiper switch to "INT" or "OFF"  
 3) Measure voltage between wiper amp. harness terminal (2) and body ground

| Condition of wiper switch | Voltage (V)                                       |
|---------------------------|---|
| OFF                       | Approx. 12  |
| INT                       | Pointer swings from 0 to 12 every 3 to 13 seconds |

OK → Check wiper motor

**B**

Measure voltage between wiper amp harness terminal (2) and body ground  
**Battery voltage should exist.**

NG →

- Check wiper switch
- Check wiper motor
- Check harness continuity between wiper amp harness terminal (2) and wiper switch harness terminal (11). **Continuity should exist.**
- Check harness continuity between wiper switch harness terminal (11) and wiper motor harness terminal (3). **Continuity should exist.**

**C**

**INTERMITTENT SWITCH INPUT SIGNAL CHECK**  
 Check harness continuity between wiper amp. harness terminal (1) and body ground

| Condition of wiper switch | Continuity |
|---------------------------|------------|
| OFF                       | No         |
| INT                       | Yes        |

NG →

- Check wiper switch
- Check harness continuity between wiper amp harness terminal (1) and wiper switch harness terminal (11). **Continuity should exist.**
- Check harness continuity between wiper switch harness terminal (11) and body ground. **Continuity should exist.**

**D**

**WIPER AMP GROUND CIRCUIT CHECK**  
 Check harness continuity between wiper amp harness terminal (3) and body ground  
**Continuity should exist.**

NG → Repair harness or connector

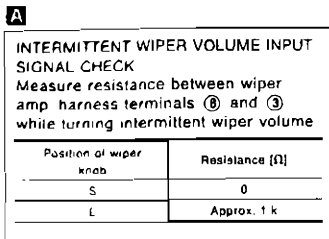
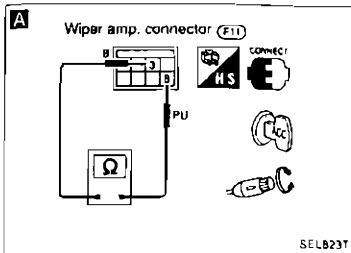
OK → Replace wiper amp

# WIPER AND WASHER

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 2

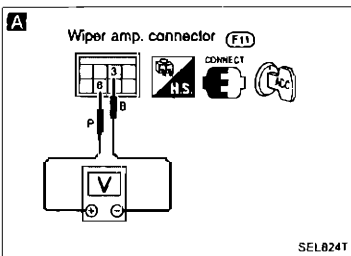
**SYMPTOM:** Intermittent time of wiper cannot be adjusted.



OK → Replace wiper amp.

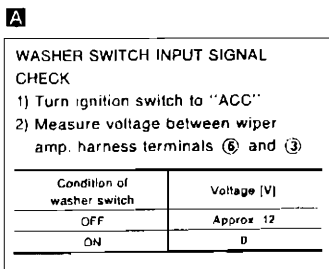
NG

Check intermittent wiper volume. Check harness continuity between wiper amp. harness terminal (2) and wiper switch harness terminal (10). Check harness continuity between wiper switch harness terminal (20) and body ground.



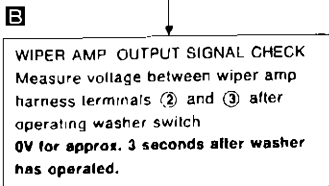
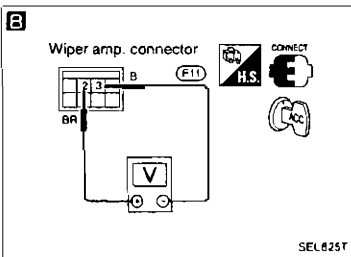
### DIAGNOSTIC PROCEDURE 3

**SYMPTOM:** Wiper and washer activate individually but not in combination.



NG → Check harness continuity between wiper amp harness terminal (6) and wiper switch harness terminal (10)

OK



NG → Check wiper switch.

OK

Replace wiper amp

GI

MA

EM

LC

EC

FE

GI

MT

AT

PD

FA

RA

RR

ST

RS

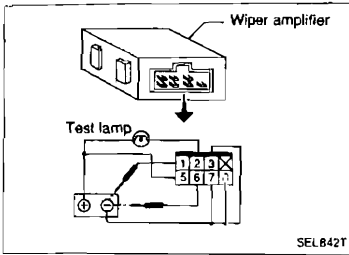
BT

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EL

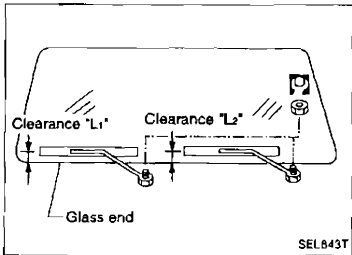
FDX

# WIPER AND WASHER



## Front Wiper Amplifier Check

1. Connect as shown in the figure at left.
2. If test lamp comes on when connected to terminal ① or ⑥ and battery ground, wiper amplifier is normal.



## Front Wiper Installation and Adjustment

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<sub>1</sub>" & "L<sub>2</sub>" 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<sub>1</sub>" & "L<sub>2</sub>".

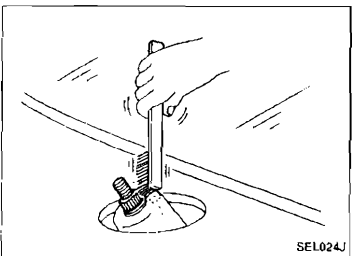
Clearance "L<sub>1</sub>": 18 - 33 mm (0.71 - 1.30 in)

Clearance "L<sub>2</sub>": 17 - 32 mm (0.67 - 1.26 in)

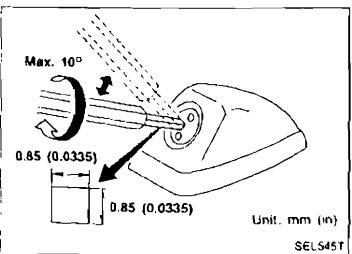
- Tighten wiper arm nuts to specified torque.

Front wiper:

16.7 - 22.6 N·m (1.70 - 2.31 kg·m, 12.32 - 16.67 ft·lb)



- Before reinstalling wiper arm, clean up the pivot area as illustrated. This will reduce possibility of wiper arm looseness.



## Front Washer Nozzle Adjustment

- Using a suitable tool, adjust windshield washer nozzle to correct its spray pattern.

Adjustable range:  $\pm 10^\circ$  (In any direction)

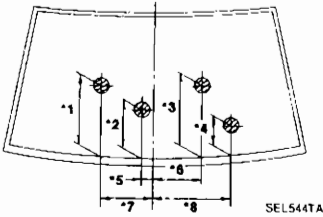
Before attempting to turn the nozzle, gently tap the end of the tool to free the nozzle.

This will prevent "rounding out" the small female square in the center of the nozzle.

# WIPER AND WASHER

## Front Washer Nozzle Adjustment (Cont'd)

### LHD models

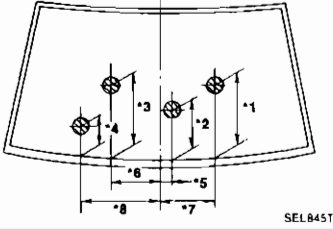


Unit: mm (in)

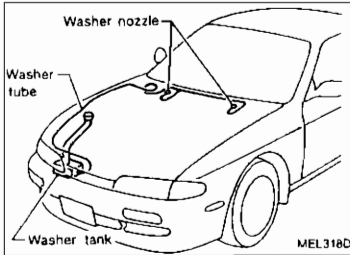
|    |             |    |             |
|----|-------------|----|-------------|
| *1 | 358 (14.09) | *5 | 70 (2.76)   |
| *2 | 245 (9.65)  | *6 | 245 (9.65)  |
| *3 | 300 (11.81) | *7 | 378 (14.88) |
| *4 | 203 (7.99)  | *8 | 503 (19.80) |

\* The diameters of these circles are less than 80 mm (3.15 in)

### RHD models

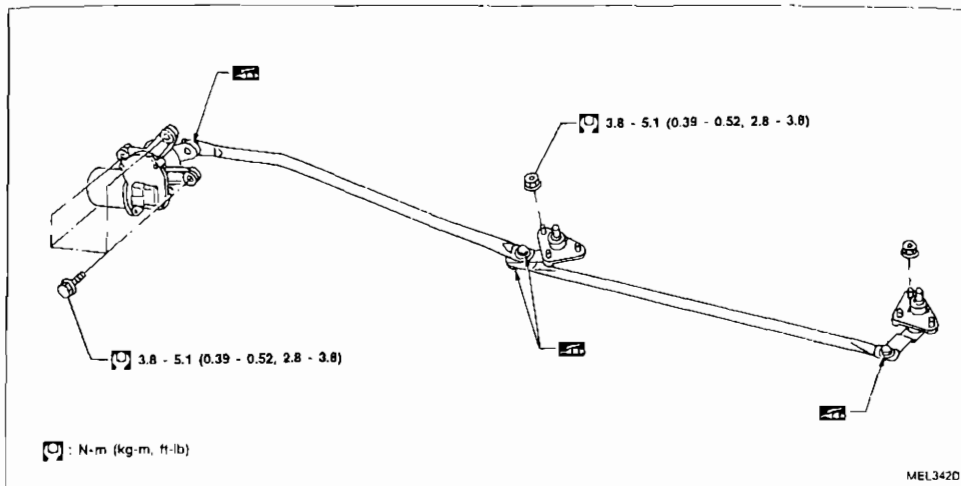


## Front Washer Tube Layout



## WIPER AND WASHER

### Front Wiper Linkage



This illustration is for LHD models. For RHD models, these units are installed on the opposite side.

#### REMOVAL

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

- Grease ball joint portion before installation.
1. Installation is the reverse order of removal.

## Rear Wiper and Washer/System Description

### WIPER OPERATION

The rear wiper switch is controlled by a ring built into the combination switch.

There are two wiper switch positions.

- ON (LO speed)
- INT (Intermittent)

With the ignition switch in the ACC or ON position, power is supplied

- through 10A (LHD models) or 15A (RHD models) fuse (No. 16 (LHD models) or 14 (RHD models), located in the fuse block)
- to rear wiper motor terminal ④, and
- to rear wiper relay terminal ①.

#### Low speed wiper operation

Ground is supplied to rear wiper switch terminal ② through body ground E42 or E57.

When the rear wiper is placed in the ON position, ground is supplied

- through rear wiper switch terminal ②
- to rear wiper relay terminal ②.

The rear wiper relay is energized and ground is supplied

- to rear wiper motor terminal ①
- through rear wiper relay terminal ③
- to rear wiper relay terminal ⑤
- through body ground T18.

#### Auto stop operation

With the rear wiper switch turned OFF, rear wiper motor will continue to operate until wiper arm reaches rear window base.

When wiper arm is not located at base of rear window with rear wiper switch OFF, rear wiper relay is not energized and ground is supplied

- to rear wiper motor terminal ①
- through rear wiper relay terminal ③
- to rear wiper relay terminal ④
- through rear wiper motor terminal ③, in order to continue rear wiper motor operation at low speed.

Ground is also supplied

- to rear wiper motor terminal ②
- through body ground B2 or B18.

When wiper arm reaches base of rear window, rear wiper motor terminals ① and ④ are connected instead of terminals ① and ③. Rear wiper motor will then stop wiper arm at the PARK position.

#### Intermittent operation

The rear wiper motor operates the wiper arm one time at low speed at an interval of approximately 7 seconds. This feature is controlled by rear wiper amplifier.

With the ignition switch in the ACC or ON position, power is supplied

- through 10A (LHD models) or 15A (RHD models) fuse (No. 16 (LHD models) or 14 (RHD models), located in the fuse block)
- to rear wiper relay terminal ①.

When the rear wiper switch is placed in the INT position, ground is supplied

- to rear wiper amplifier terminal ②
- from rear wiper switch terminal ①
- through body ground E43 or E57.

Ground is also supplied

- to rear wiper relay terminal ②
- through rear wiper amplifier terminal ⑥
- to rear wiper amplifier terminal ⑤;
- through body ground M1.

Then the rear wiper relay is energized and ground is supplied

- to rear wiper motor terminal ①
- through rear wiper relay terminal ③;
- to rear wiper relay terminal ⑤
- through body ground T18.

GI  
MA  
EM  
LC  
EC  
FE  
CL  
MT  
AT  
PD  
FA  
RA  
RI  
ST  
RS  
BT  
HA  
EL  
RX

## WIPER AND WASHER

### Rear Wiper and Washer/System Description (Cont'd)

With power and ground supplied, the rear wiper motor operates intermittently.

#### WASHER OPERATION

With the ignition switch in the ACC or ON position, power is supplied

- through 10A (LHD models) or 15A (RHD models) fuse (No 16 (LHD models) or 14 (RHD models), located in the fuse block)
- to rear washer motor terminal ①.

When the ring is turned WASH position, ground is supplied

- to rear washer motor terminal ②, and
- to rear wiper amplifier terminal ①
- from terminal ③ of rear wiper switch
- through terminal ④ of rear wiper switch, and
- through body ground (E43) or (E57)

With power and ground is supplied, the rear washer motor operates.

The rear wiper motor operates when the ring is turned to WASH position for one second or more and for approximately 3 seconds after the ring is released. This feature is controlled by the rear wiper amplifier in the same manner as the intermittent operation.



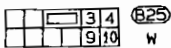
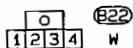
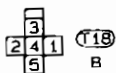
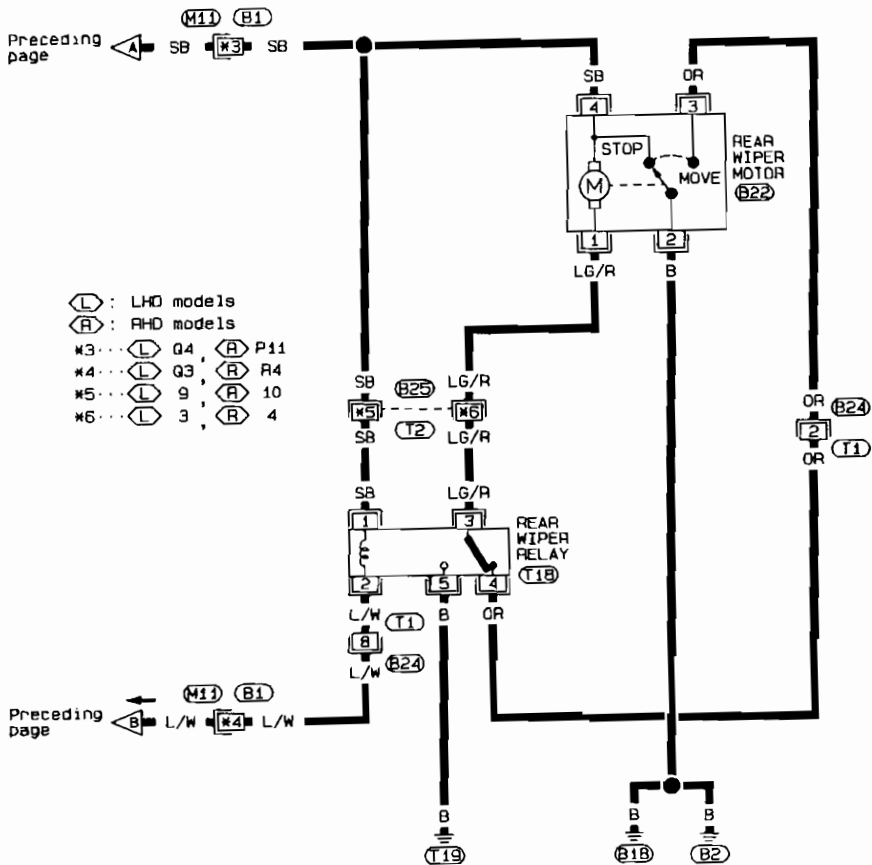


# WIPER AND WASHER

## Rear Wiper and Washer/Wiring Diagram

— WIP/R — (Cont'd)

EL-WIP/R-02



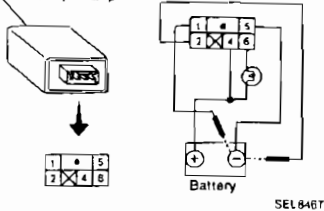
Refer to last page (Foldout page).

$\boxed{\text{M11}}$   $\boxed{\text{B1}}$

## Rear Wiper Amplifier Check

- 1 Connect as shown in the figure at left.
2. If test lamp comes on when connected to terminal ① or ② and battery ground, wiper amplifier is normal.

Rear wiper amplifier



SEL846T

## Rear Wiper Installation and Adjustment

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<sub>3</sub>" 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<sub>3</sub>".

Clearance "L<sub>3</sub>": 26 - 42 mm (1.02 - 1.65 in)

- Tighten wiper arm nuts to specified torque.

**Rear wiper:**

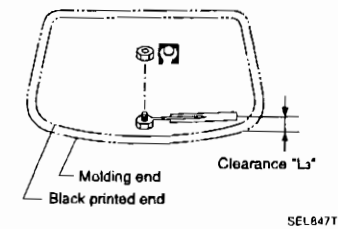
12.7 - 17.7 N·m (1.30 - 1.81 kg-m, 9.37 - 13.06 ft-lb)

- Before reinstalling wiper arm, clean up the pivot area as illustrated. This will reduce possibility of wiper arm looseness.

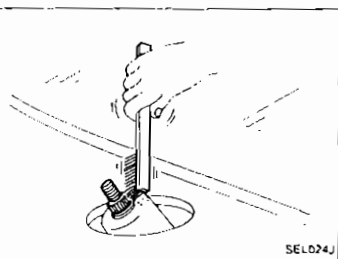
## Rear Washer Nozzle Adjustment

- Using a suitable tool, adjust rear window washer nozzle to correct its spray pattern.

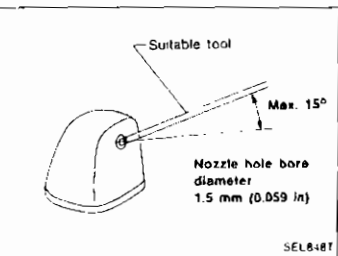
Adjustable range: ±15° (in any direction)



SEL847T



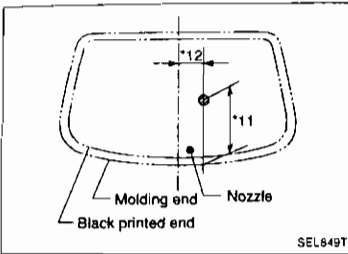
SEL024J



SEL848T

## WIPER AND WASHER

### Rear Washer Nozzle Adjustment (Cont'd)

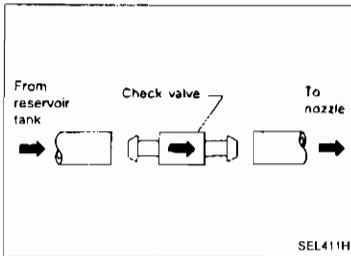
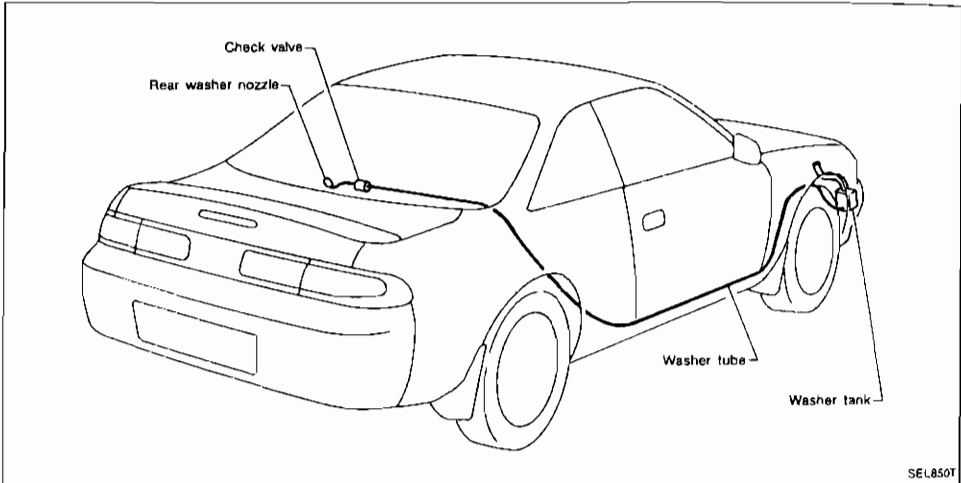


Unit, mm (in)

|     |            |     |           |
|-----|------------|-----|-----------|
| *11 | 219 (8.62) | *12 | 45 (1.77) |
|-----|------------|-----|-----------|

\* The diameters of these circles are less than 90 mm (3.54 in)

### Rear Washer Tube Layout



### Check Valve (For rear washer)

- A check valve is provided in the rear washer fluid line. Be careful not to connect check valve to washer tube in the wrong direction.

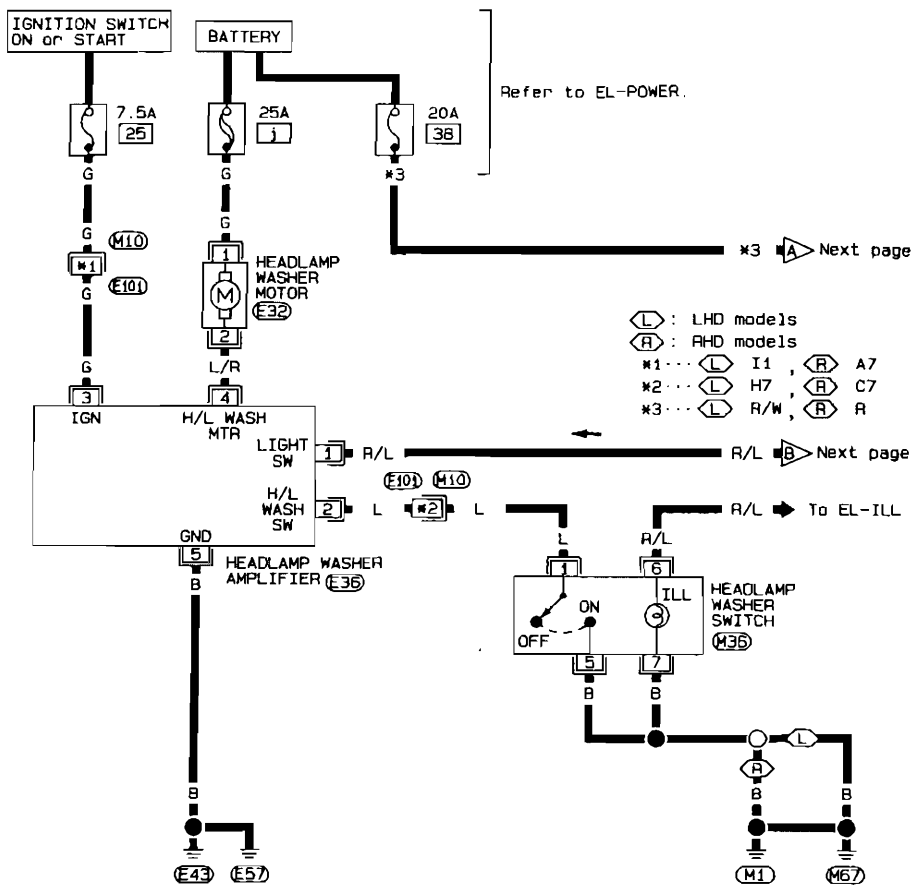
## Headlamp Washer/System Description

- Power is supplied at all times
  - through 25A fusible link (letter **11**), located in the fusible link and fuse box
  - to headlamp washer motor terminal **①** GI
- Power is also supplied at all times
  - through 20A fuse (No. **38**), located in the fusible link and fuse box
  - to lighting switch terminal **⑧**. MA
- Headlamp washer operation** EM
- The headlamp washer operates for approximately 1 second at one time. This feature is controlled by headlamp washer amplifier.
- For headlamp washer operation, the lighting switch must be in the 2ND position and ignition switch in the ON or START position. LG
- With the headlamp washer switch in the ON position, ground is supplied
  - to headlamp washer amplifier terminal **②** EG
  - through headlamp washer switch terminal **①**
  - to headlamp washer switch terminal **⑤**
  - through body ground (**M1**) or (**M37**). FE
- Ground is also supplied
  - to headlamp washer motor terminal **②**
  - through headlamp washer amplifier terminal **④** GI
  - to headlamp washer amplifier terminal **⑤**
  - through body ground (**E43**). WT
- With power and ground supplied, headlamp washer will operate. AT

EL

Headlamp Washer/Wiring Diagram — HLC —

EL-HLC-01



|   |   |     |
|---|---|-----|
| 4 | 3 | E35 |
| 5 | 2 | W   |

|   |     |
|---|-----|
| 1 | E32 |
| 2 | BR  |

|   |   |     |
|---|---|-----|
| 1 | 7 | M35 |
| 6 | 5 | BH  |

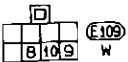
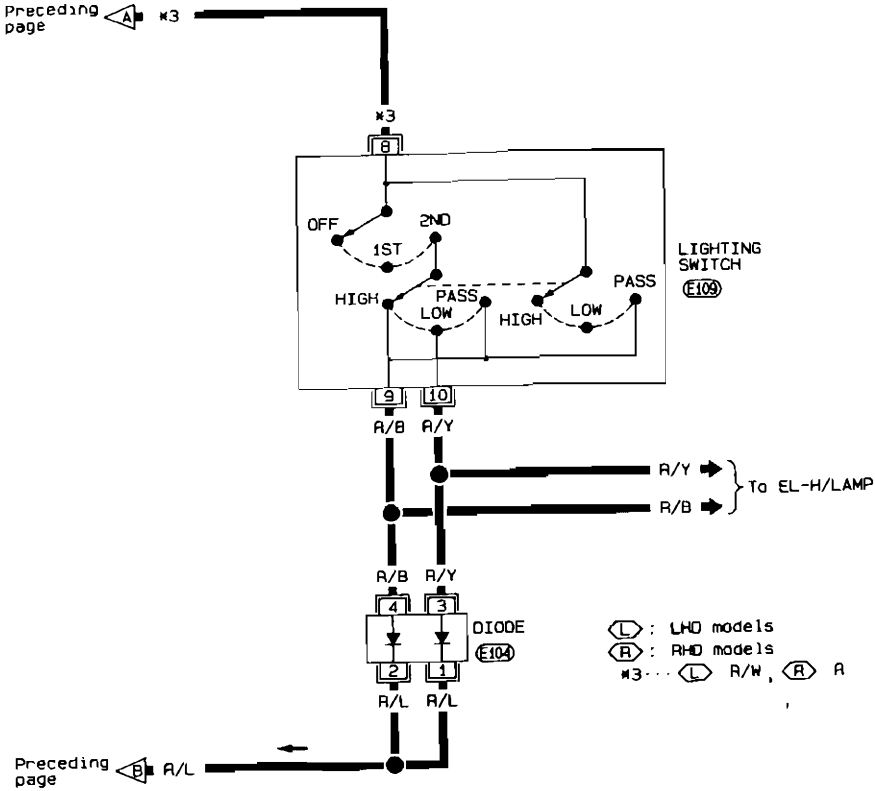
Refer to last page (Foldout page).

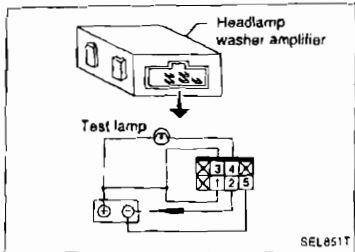
M10, E101

# WIPER AND WASHER

## Headlamp Washer/Wiring Diagram — HLC — (Cont'd)

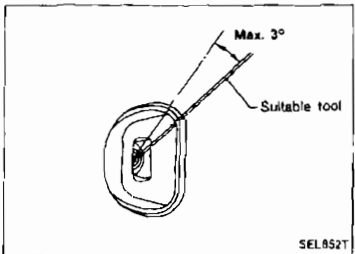
EL-HLC-02





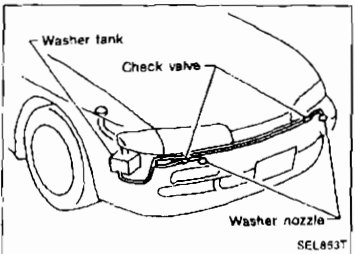
## Headlamp Washer Amplifier Check

- 1 Connect as shown in the figure at left.
- 2 If test lamp comes on when connected to the terminal (2) and battery ground, headlamp washer amplifier is normal.

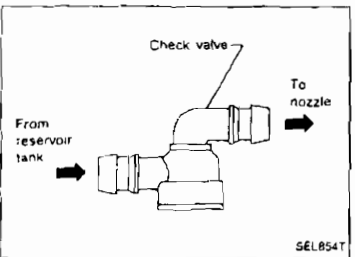


## Headlamp Washer Nozzle Adjustment

- Using a suitable tool, adjust headlamp washer nozzle to correct its spray pattern.  
Adjustable range:  $\pm 3^\circ$  (Up and down)



## Headlamp Washer Tube Layout



## Check Valve (For headlamp washer)



# POWER WINDOW

## System Description

Power is supplied at all times

- from 25A fusible link (Letter **T** located in the fuse and fusible link box)
- to circuit breaker terminal **(1)**
- through circuit breaker terminal **(2)**
- to power window relay terminal **(3)**

With ignition switch in ON or START position, power is supplied

- through 7.5A fuse (No. **26** located in the fuse block)
- to power window relay terminal **(1)**

Ground is supplied to power window relay terminal **(2)**

- through body ground **(MT)**.

The power window relay is energized and power is supplied

- through power window relay terminal **(5)**
- to power window main switch terminal **(5)**.
- to power window sub-switch terminal **(4)**.
- to power window amplifier terminal **(3)** and
- to power window amplifier terminal **(4)**.

## MANUAL OPERATION

### Driver side door

Ground is supplied

- to power window main switch terminal **(4)** and
- to power window amplifier terminal **(7)**
- through body ground **(MT)**.

### WINDOW UP

When the driver side switch in the power window main switch is pressed in the up position, ground signal is supplied

- to power window amplifier terminal **(1)**
- from power window main switch terminal **(3)**.

Power is supplied

- to driver side power window regulator terminal **(1)**
- through power window amplifier terminal **(5)**

Ground is supplied

- to driver side power window regulator terminal **(2)**
- through power window amplifier terminal **(6)**

Then, the motor raises the window until the switch is released.

### WINDOW DOWN

When the driver side switch in the power window main switch is pressed in the down position, ground signal is supplied

- to power window amplifier terminal **(2)**
- from power window main switch terminal **(2)**.

Power is supplied

- to driver side power window regulator terminal **(2)**
- through power window amplifier terminal **(6)**.

Ground is supplied

- to driver side power window regulator terminal **(1)**
- through power window amplifier terminal **(5)**

Then, the motor lowers the window until the switch is released.

### Passenger side door

Ground is supplied

- to power window main switch terminal **(4)**
- through body ground **(MT)**.

GI  
WA  
EM  
LC  
EC  
FE  
SL  
MT  
AT  
PD  
RA  
RA  
RH  
ST  
RS  
BT  
HA  
EL  
DX

## POWER WINDOW

### System Description (Cont'd)

#### NOTE:

Numbers in parentheses are terminal numbers, when power window switch is pressed in the UP and DOWN positions respectively

#### MAIN SWITCH OPERATION

Power is supplied

- through power window main switch (⑥, ⑦)
- to power window sub-switch (①, ⑤).

The subsequent operation is the same as the sub-switch operation.

#### SUB-SWITCH OPERATION

Power is supplied

- through power window sub-switch (②, ③)
- to passenger side power window regulator (①, ②).

Ground is supplied

- to passenger side power window regulator (②, ①)
- through power window sub-switch (③, ②)
- to power window sub-switch (⑤, ①)
- through power window main switch (⑦, ⑥)

Then, the motor raises or lowers the window until the switch is released.

#### AUTO OPERATION

The power window AUTO feature enables the driver to raise or lower the driver's window without holding the window switch.

The AUTO feature only operates on the driver's window.

When a power window main switch is pressed and released the AUTO position, ground signal is supplied

- to power window amplifier terminal ⑧
- from power window main switch terminal ①

The subsequent operation is the same as the manual operation of driver side door.

Then, the driver side door window will fully close or fully open.

#### POWER WINDOW LOCK

The power window lock is designed to lock-out window operation to passenger side door window.

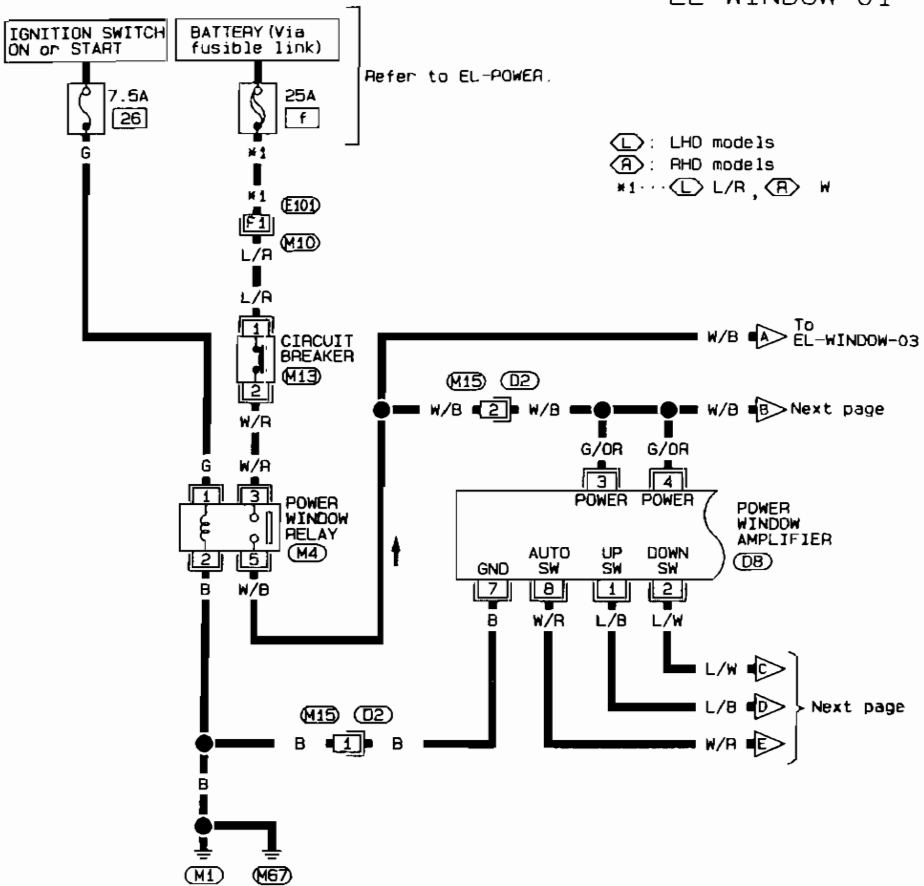
When the lock switch is pressed to lock position, ground of the passenger side switch in the power window main switch is disconnected. This prevents the power window motors from operating.



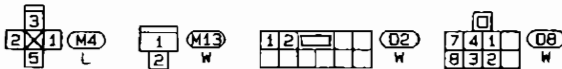
# POWER WINDOW

## Wiring Diagram — WINDOW —

EL-WINDOW-01



- (L) : LHD models
- (R) : RHD models
- \*1 : (L) L/R, (R) W



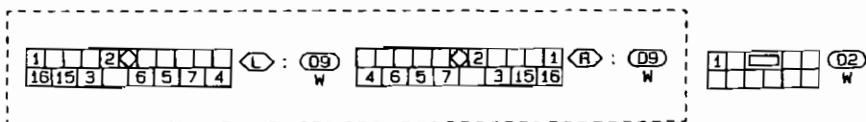
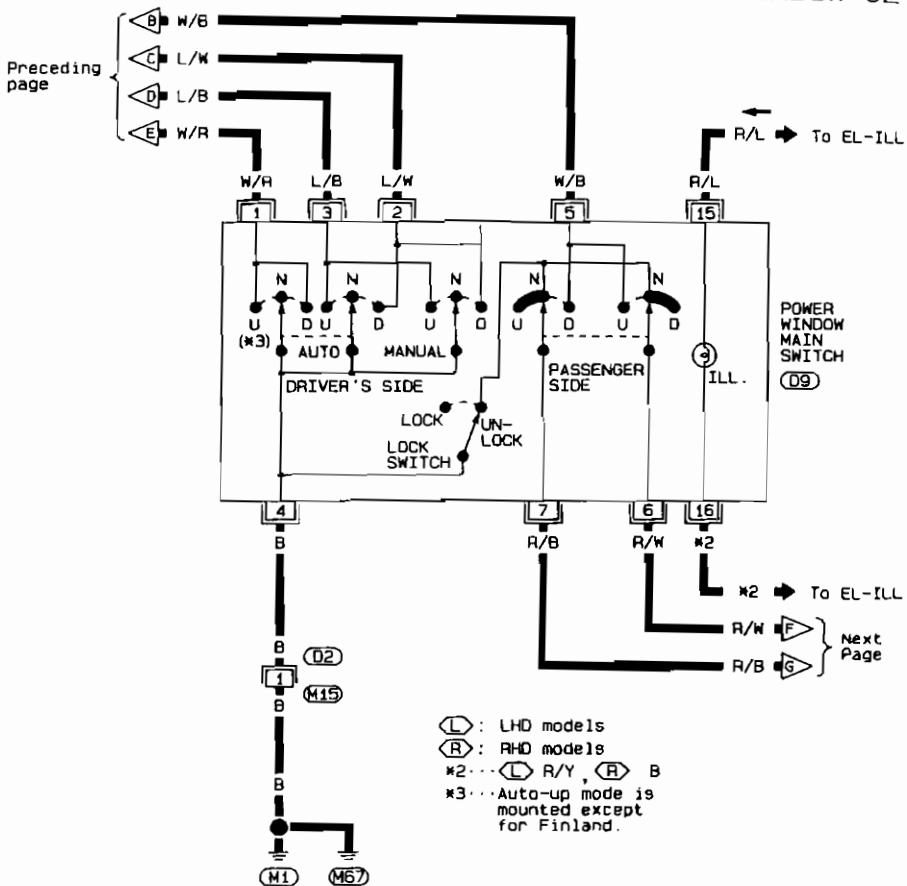
Refer to last page (Foldout page).

M10, E101

# POWER WINDOW

## Wiring Diagram — WINDOW — (Cont'd)

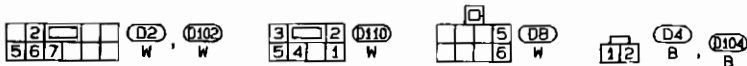
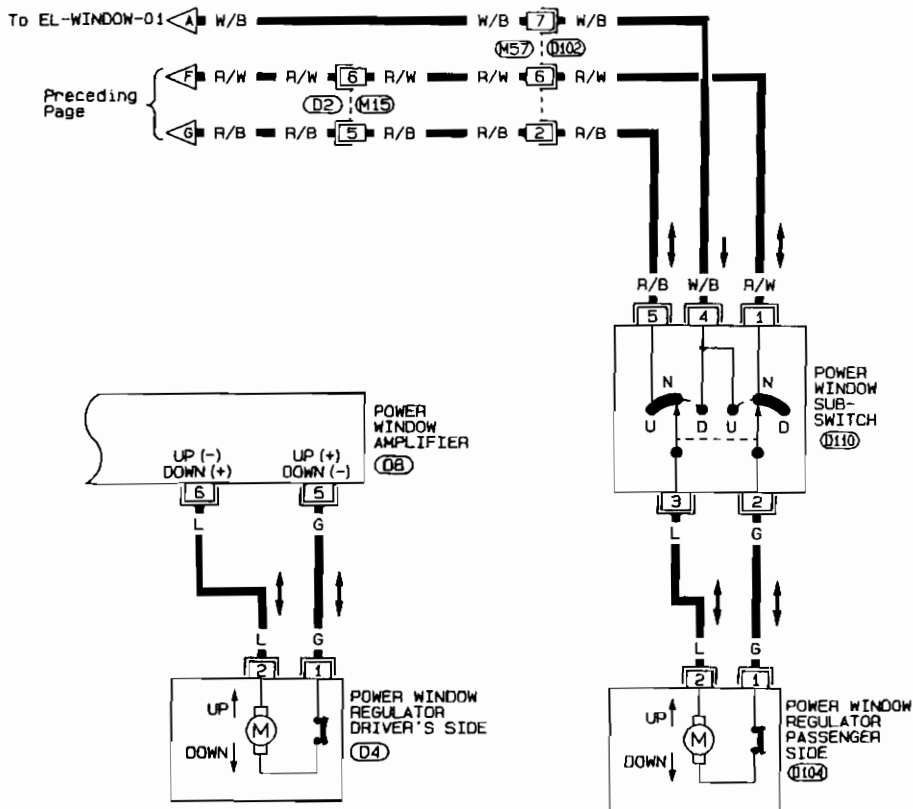
EL-WINDOW-02



# POWER WINDOW

## Wiring Diagram — WINDOW — (Cont'd)

EL-WINDOW-03

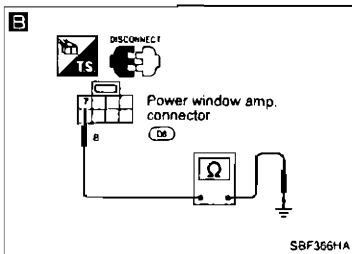
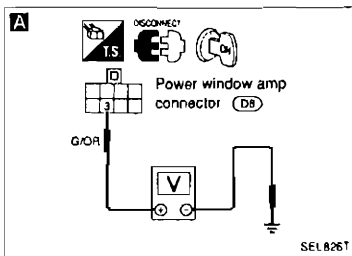


# POWER WINDOW

## Trouble Diagnosis

### DIAGNOSTIC PROCEDURE 1

**SYMPTOM: Driver and passenger power window cannot be operated.**



**A**

#### CHECK MAIN POWER SUPPLY AND GROUND CIRCUIT.

- 1) Disconnect power window amp connector.
- 2) Check voltage while ignition switch is "ON".

| Terminals | Voltage (V) |
|-----------|-------------|
| ③ - GND   | Approx. 12  |

NG

Check the following

- Fuse
- Power window relay
- Power supply harness

OK

**B**

Check continuity between power window amp terminal ⑦ and GND.  
Does continuity exist?

No

Repair harness.

Yes

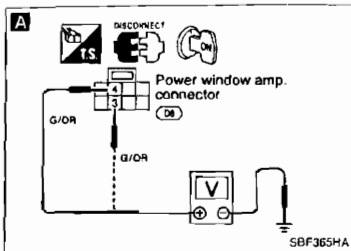
Go to DIAGNOSTIC PROCEDURE 2 and 3

# POWER WINDOW

## Trouble Diagnosis (Cont'd)

### DIAGNOSTIC PROCEDURE 2

**SYMPTOM:** Driver's power window cannot be operated but passenger power window can be operated.



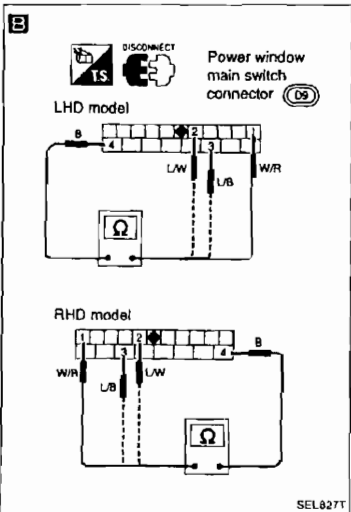
**A**

**CHECK POWER SUPPLY FOR POWER WINDOW AMP.**

- 1) Disconnect connector from power window amp.
- 2) Check voltage across power window amp terminal ③ and GND, ④ and GND while ignition switch is "ON".

| Terminals | Battery voltage existence |
|-----------|---------------------------|
| ③ - GND   | Yes                       |
| ④ - GND   |                           |

NG → Repair harness between power window relay and power window amp



**B**

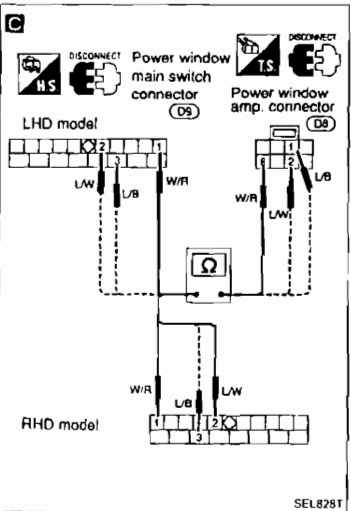
**CHECK POWER WINDOW MAIN SWITCH CIRCUIT.**

- 1) Disconnect connector from power window main switch.
- 2) Check continuity

| Power window main switch operation | Terminals |
|------------------------------------|-----------|
| Auto (Down)                        | ① - ④     |
| Up                                 | ③ - ④     |
| Down                               | ② - ④     |

Does continuity exist?

No → Replace power window main switch.



**C**

- 1) Disconnect connector from power window amp connector
- 2) Check continuity

| Power window main switch operation | Terminals |
|------------------------------------|-----------|
| Auto                               | ① - ⑧     |
| Up                                 | ③ - ①     |
| Down                               | ② - ②     |

Does continuity exist?

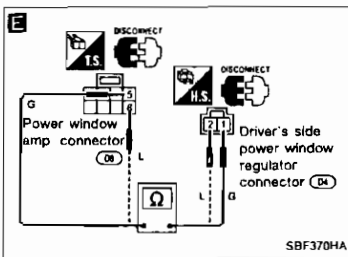
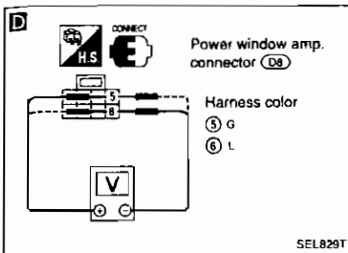
No → Repair harness

Yes → (Go to next page)



# POWER WINDOW

## Trouble Diagnosis (Cont'd)



**A**

**D**

**CHECK POWER WINDOW MOTOR CIRCUIT.**

- 1) Connect power window amp. connector.
- 2) Check voltage for power window motor.

| Terminals |   | Power window main switch operation |
|-----------|---|------------------------------------|
| ⊕         | ⊖ |                                    |
| ⑤         | ⑥ | Up                                 |
| ⑥         | ⑤ | Down                               |

**Does battery voltage exist?**

Yes

**E**

- 1) Disconnect driver side power window regulator connector.
- 2) Check continuity.

| Terminals |  |
|-----------|--|
| ⑤ - ①     |  |
| ⑥ - ②     |  |

**Does continuity exist?**

Yes

Check driver side power window motor  
 Refer to "ELECTRICAL COMPONENTS INSPECTION" (EL-168)

No

Replace power window amp.

No

Repair harness.

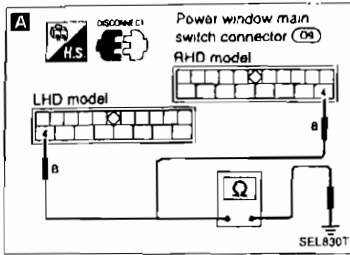
GI  
 MA  
 EM  
 LC  
 EC  
 FE  
 CL  
 MT  
 AT  
 PD  
 SA  
 PA  
 BP  
 ST  
 RS  
 RT  
 HA  
 EL  
 PX

# POWER WINDOW

## Trouble Diagnosis (Cont'd)

### DIAGNOSTIC PROCEDURE 3-1

**SYMPTOM:** Passenger power window (main switch and sub-switch) cannot be operated. But driver side power window can be operated.



**A**

#### CHECK GROUND CIRCUIT.

- 1) Disconnect power window main switch connector
- 2) Check continuity between power window main switch terminal (4) and GND.

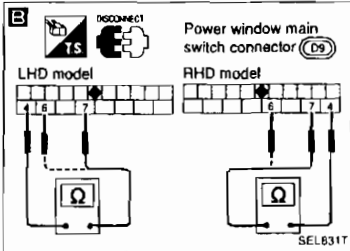
Does continuity exist?

No

Repair harness

Yes

**B**



#### CHECK POWER WINDOW MAIN SWITCH.

Check continuity when power window lock switch is in "UNLOCK" position.

Terminals

7 - 4

5 - 4

Does continuity exist?

No

Replace power window main switch

Yes

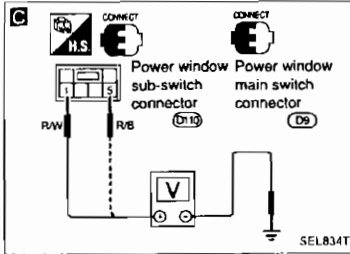
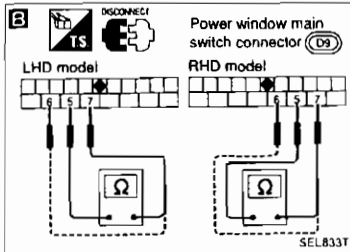
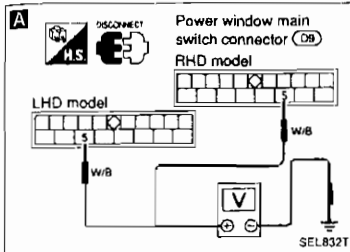
Check passenger side power window motor. Refer to "ELECTRICAL COMPONENTS INSPECTION" (EL-168)

# POWER WINDOW

## Trouble Diagnosis (Cont'd)

### DIAGNOSTIC PROCEDURE 3-2

**SYMPTOM:** Passenger power window cannot be operated using main switch. But driver side and passenger side (using sub-switch) can be operated.



**A**

**CHECK MAIN POWER SUPPLY.**

- 1) Disconnect power window main switch connector.
- 2) Check voltage across power window main switch terminal ⑤ and GND.

Does battery voltage exist?

No → Repair harness

Yes →

**B**

**CHECK POWER WINDOW MAIN SWITCH.**

Check continuity.

| Power window main switch operation | Terminals |
|------------------------------------|-----------|
| Up                                 | ⑥ - ⑤     |
| Down                               | ⑦ - ⑤     |

Does continuity exist?

No → Replace power window main switch

Yes →

**C**

- 1) Connect power window main switch connector
- 2) Check voltage

| Power window main switch operation | Terminals |
|------------------------------------|-----------|
| Up                                 | ① - GND   |
| Down                               | ③ - GND   |

Does battery voltage exist?

No → Repair harness

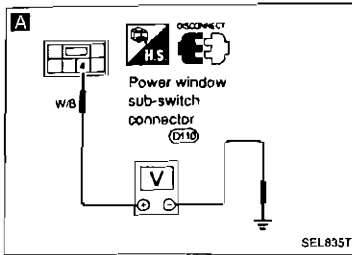
Yes → Replace power window sub-switch

## POWER WINDOW

### Trouble Diagnosis (Cont'd)

#### DIAGNOSTIC PROCEDURE 3-3

**SYMPTOM:** Passenger power window cannot be operated using sub-switch. But driver side and passenger side (using main switch) can be operated.



**A**

#### CHECK MAIN POWER SUPPLY.

- 1) Disconnect power window sub-switch connector
- 2) Check voltage across power window sub-switch terminal (4) and GND.

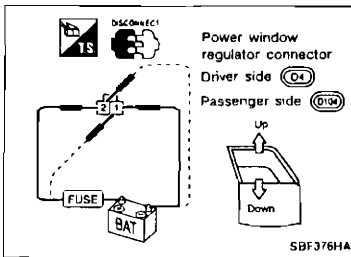
**Does battery voltage exist?**

No → Repair harness.

Yes

Replace power window sub-switch

**Note:** If passenger power window does not lock using lock button of main switch, replace main switch.



## ELECTRICAL COMPONENTS INSPECTION

### POWER WINDOW MOTOR

| Terminals |   | Operation |
|-----------|---|-----------|
| ⊕         | ⊖ |           |
| ①         | ② | Downward  |
| ②         | ① |           |

# POWER DOOR LOCK

## System Description

Power is supplied at all times

- through 25A fusible link (No. 17) located in the fuse and fusible link box
- to circuit breaker terminal ①
- through circuit breaker terminal ②
- to smart entrance control unit terminal ①.

Ground is supplied to smart entrance control unit terminal ⑩ through body ground (M1).

## POWER DOOR LOCK OPERATION

When one of the following input signals is supplied:

- driver side door is locked/unlocked using key or lock knob.
- passenger side door is locked/unlocked using key or lock knob (Only for models with multi-remote control system);

smart entrance control unit locks/unlocks driver side door (Only for models with multi-remote control system) and passenger side door.

For operation by the remote controller, refer to "MULTI-REMOTE CONTROL SYSTEM".

### Input (Unlock signal)

#### Models with multi-remote control system

When the driver side door is unlocked using key or lock knob, ground is supplied

- to smart entrance control unit terminal ⑫
- through driver side door lock actuator (door unlock sensor) terminal ④
- to driver side door lock actuator (door unlock sensor) terminal ②
- through body ground (M1).

When the passenger side door is unlocked using key or lock knob, ground is supplied

- to smart entrance control unit terminal ⑬
- through passenger side door lock actuator (door unlock sensor) terminal ④
- to passenger side door lock actuator (door unlock sensor) terminal ②
- through body ground (M1).

#### Models without multi-remote control system

When the driver side door is unlocked using key or lock knob, ground is supplied

- to smart entrance control unit terminal ⑫
- through lock knob switch terminal ②
- to lock knob switch terminal ①
- through body ground (M1).

### Input (Lock signal)

The smart entrance control unit terminal ⑫ or ⑬ receives lock signal when the unlock signal is shut off.

### Output (Unlock)

#### Driver side door (Models with multi-remote control system)

Power is supplied

- to driver side door lock actuator terminal ①
- through smart entrance control unit terminal ③.

Then, the door is unlocked.

Ground is supplied

- to driver side door lock actuator terminal ③
- through smart entrance control unit terminal ⑤.

#### Passenger side door

Power is supplied

- to passenger side door lock actuator terminal ①
- through smart entrance control unit terminal ②.

Ground is supplied

- to passenger side door lock actuator terminal ③
- through smart entrance control unit terminal ④

Then, the door is unlocked.

## POWER DOOR LOCK

### System Description (Cont'd)

#### Output (Lock)

##### Driver side door (Models with multi-remote control system)

Power is supplied

- to driver side door lock actuator terminal ③
- through smart entrance control unit terminal ⑤

Then, the door is locked.

Ground is supplied

- to driver side door lock actuator terminal ①
- through smart entrance control unit terminal ③

##### Passenger side door

Power is supplied

- to passenger side door lock actuator terminal ③
- through smart entrance control unit terminal ④

Ground is supplied

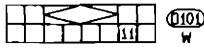
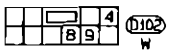
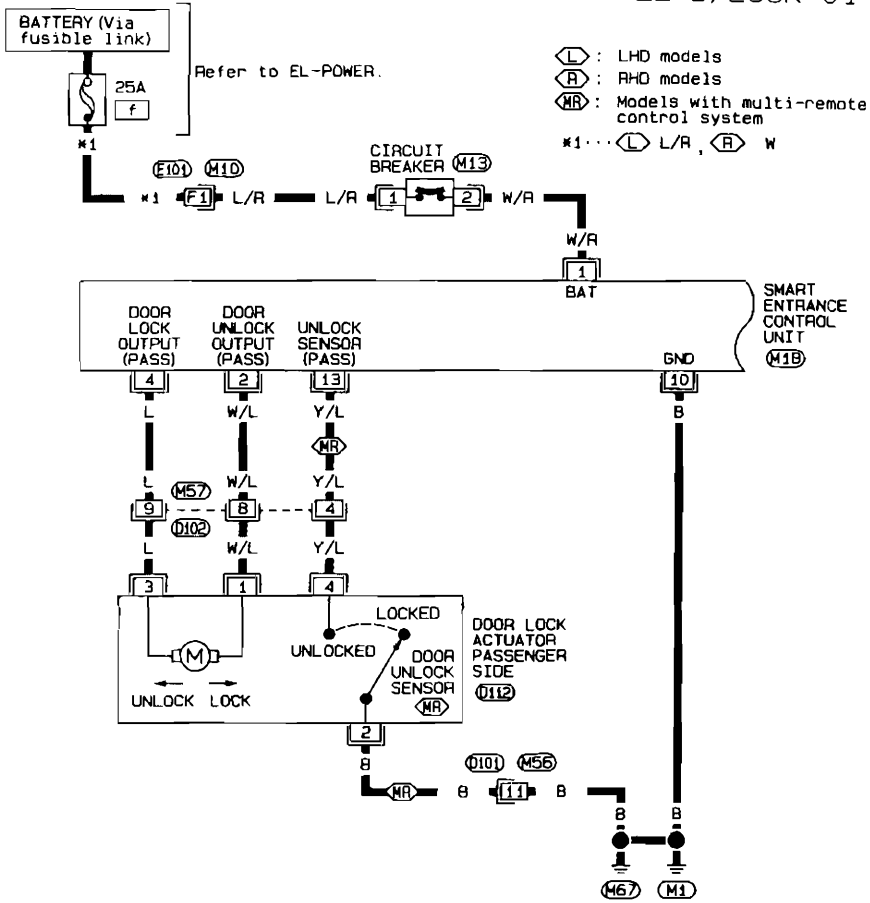
- to passenger side door lock actuator terminal ①
- through smart entrance control unit terminal ②

Then, the door is locked.

# POWER DOOR LOCK

## Wiring Diagram — D/LOCK —

EL-D/LOCK-01



Refer to last page (foldout page).

M10, E101

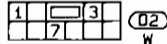
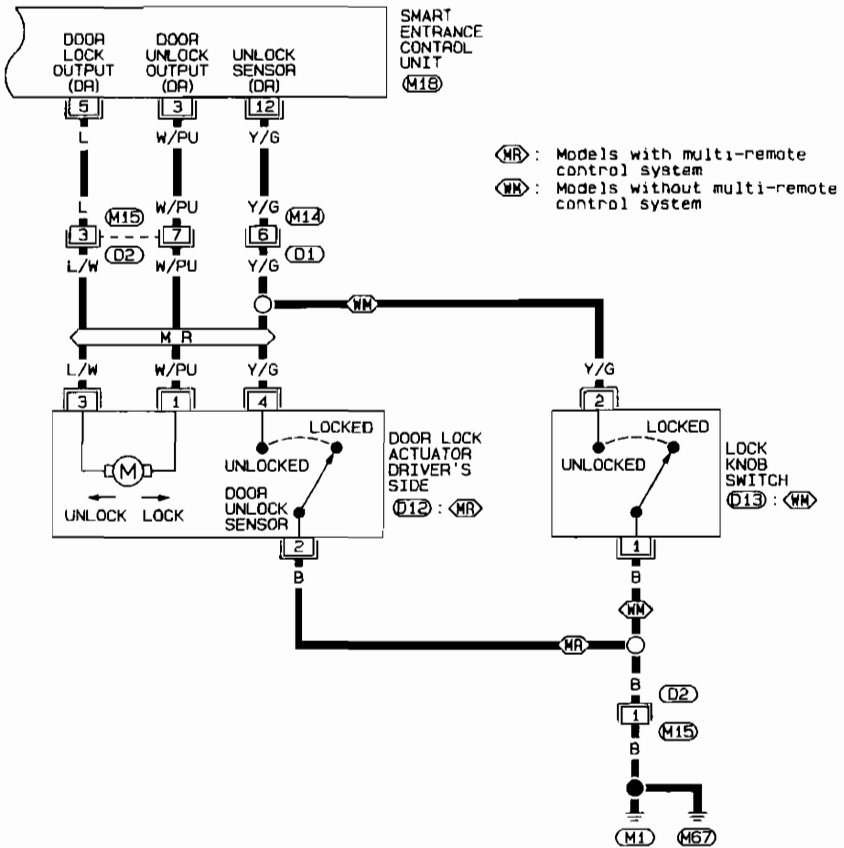
M1B

EL

# POWER DOOR LOCK

## Wiring Diagram — D/LOCK — (Cont'd)

EL-D/LOCK-02



Refer to last page (Foldout page).

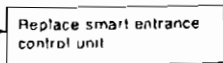
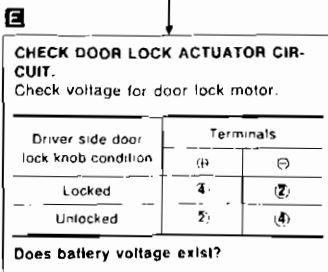
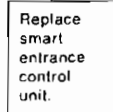
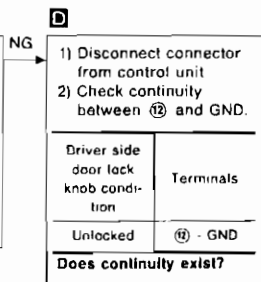
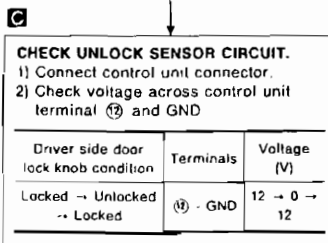
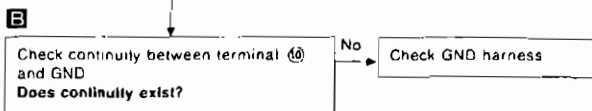
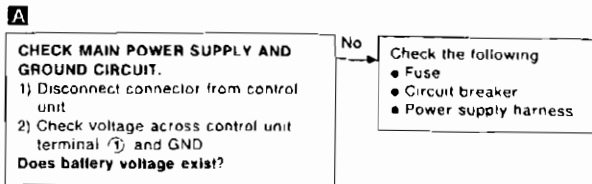
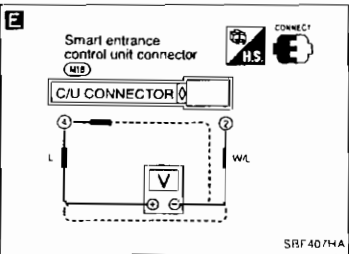
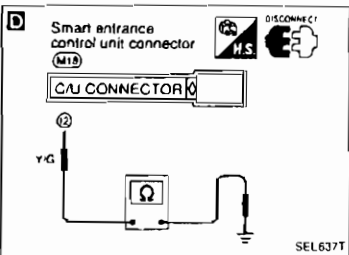
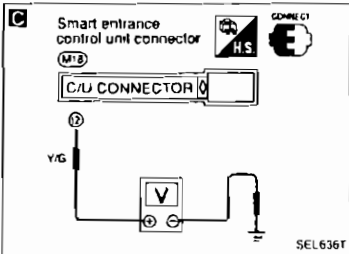
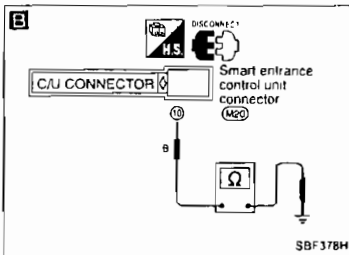
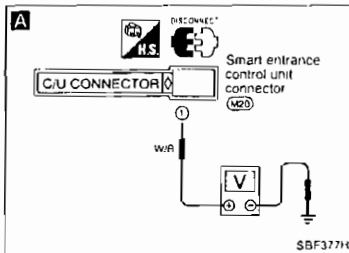
M18



## Trouble Diagnoses

### DIAGNOSTIC PROCEDURE

**SYMPTOM: Power door lock cannot be operated.**



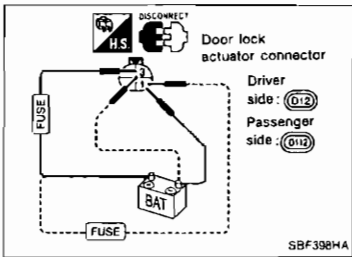
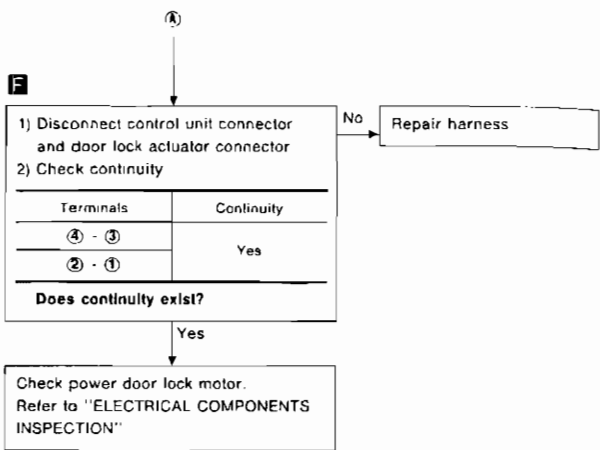
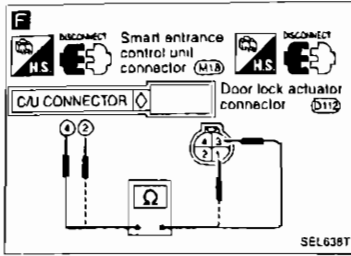
No

→

(Go to next page)

# POWER DOOR LOCK

## Trouble Diagnoses (Cont'd)



## ELECTRICAL COMPONENTS INSPECTION

### Power door lock motor

| Door lock condition | Terminals |   |
|---------------------|-----------|---|
|                     | ⊕         | ⊖ |
| Unlocked → Locked   | ③         | ① |
| Locked → Unlocked   | ①         | ③ |

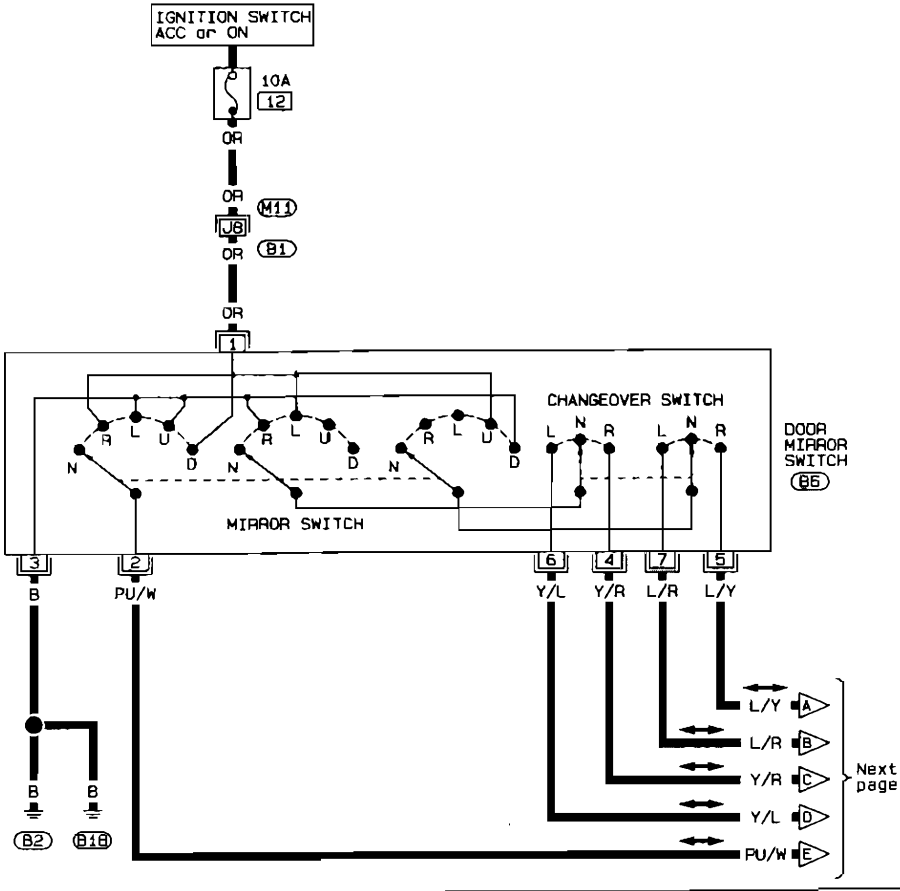
# POWER DOOR MIRROR

★ For removal of door mirror, refer to "DOOR MIRROR" in BT section.

## Wiring Diagram — MIRROR —

LHD MODELS

EL-MIRROR-01



|   |   |   |   |  |    |
|---|---|---|---|--|----|
|   |   |   |   |  | B6 |
| 2 | 3 | 1 |   |  |    |
| 5 | 7 | 4 | 6 |  | W  |

Refer to last page  
(Foldout page).

M11 B1

GI

MA

EM

LC

EC

FE

CL

MT

AT

PD

FA

RA

BR

SY

RS

BT

HA

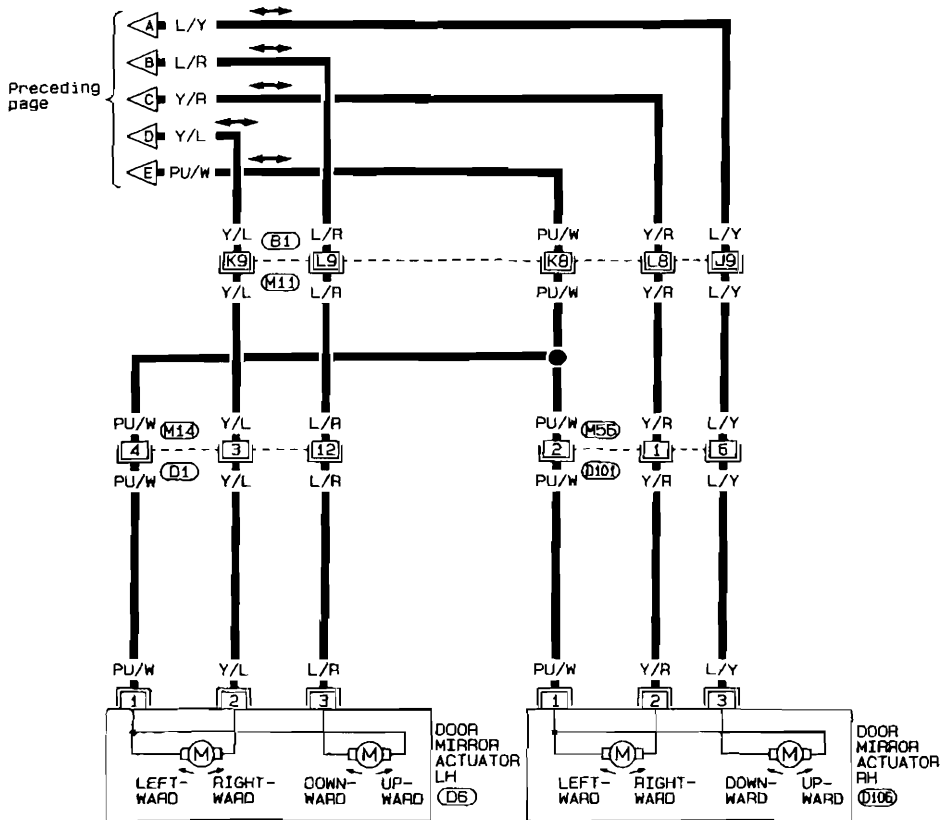
EL

DX

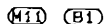
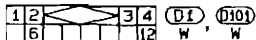
# POWER DOOR MIRROR

## Wiring Diagram — MIRROR — (Cont'd)

EL-MIRROR-02



Refer to last page  
(Foldout page).

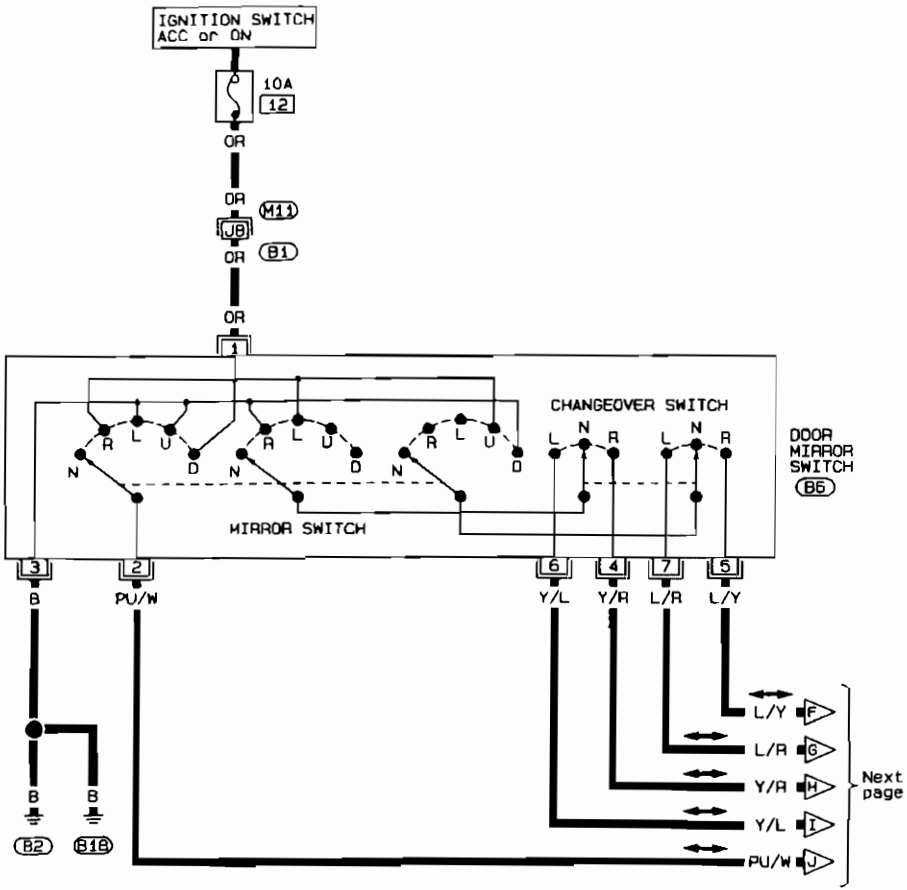


# POWER DOOR MIRROR

## Wiring Diagram — MIRROR — (Cont'd)

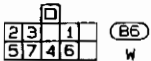
RHD MODELS

EL-MIRROR-03



Refer to last page  
(Foldout page).

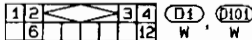
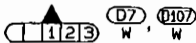
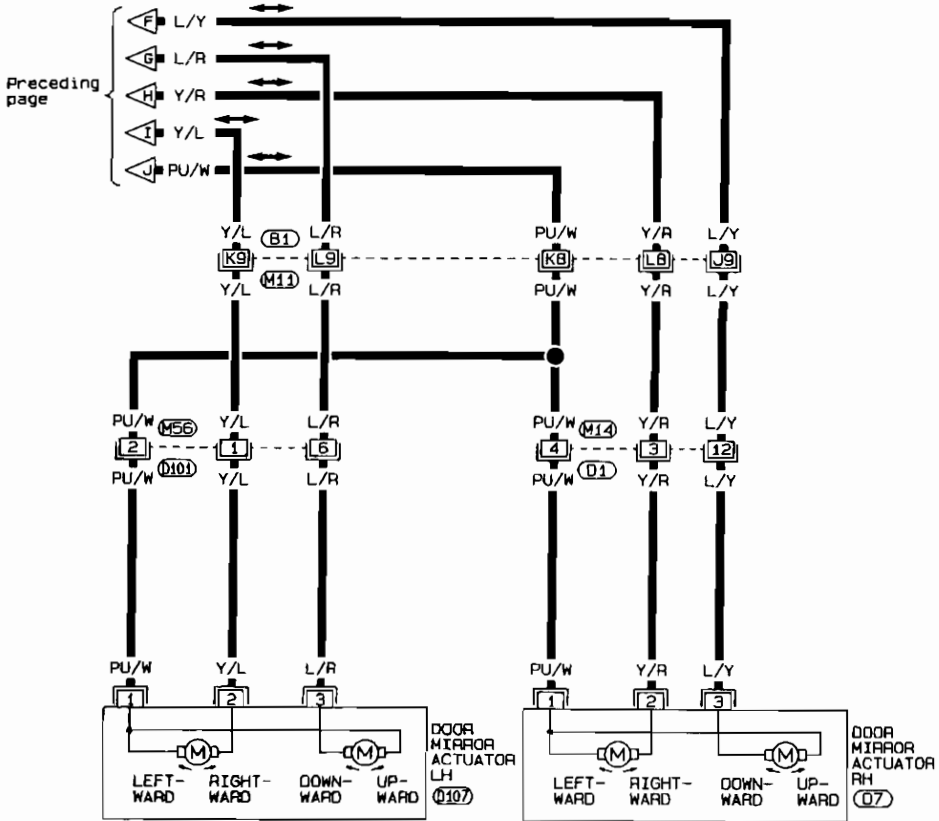
M11, B1



# POWER DOOR MIRROR

## Wiring Diagram — MIRROR — (Cont'd)

EL-MIRROR-04



Refer to last page (Foldout page).

(M11), (B1)

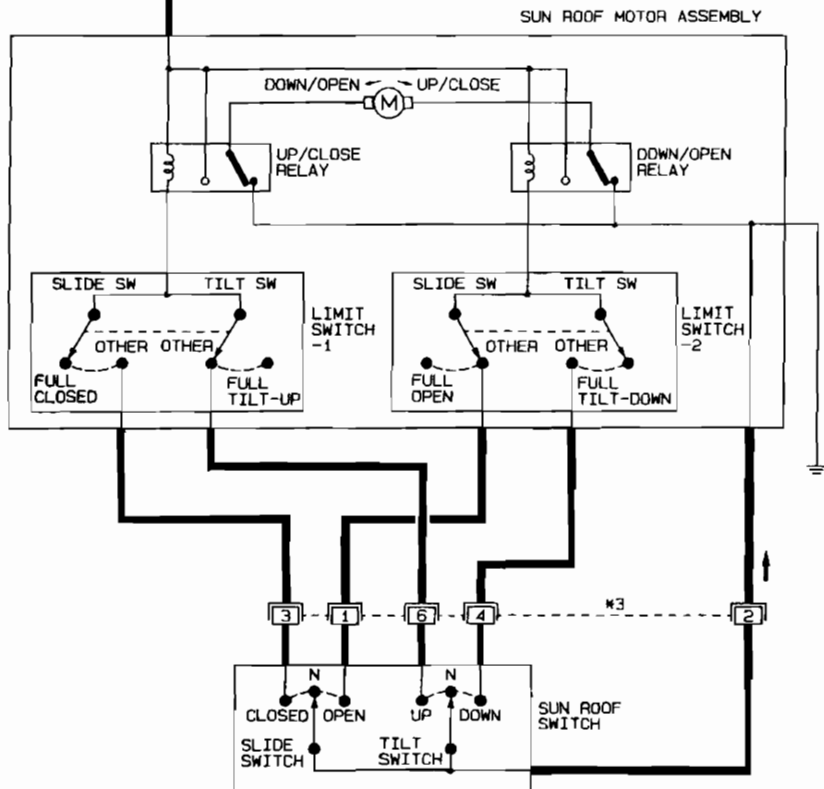


# ELECTRIC SUN ROOF

## Wiring Diagram — SROOF — (Cont'd)

EL-SROOF-02

Preceding page



|   |   |    |
|---|---|----|
| 4 | 1 | *3 |
| 2 | 3 |    |

BR

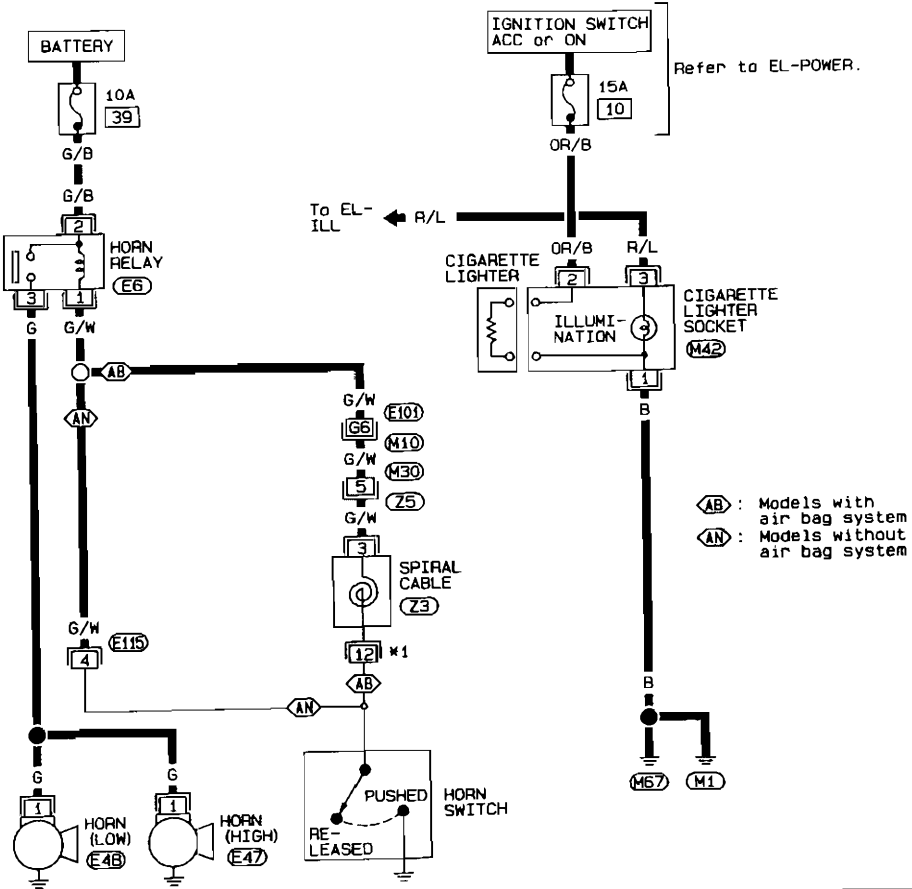


# HORN, CIGARETTE LIGHTER AND CLOCK

## Wiring Diagram — HORN —

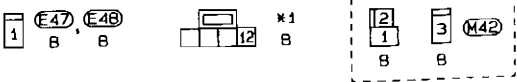
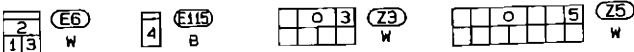
LHD MODELS

EL-HORN-01



Refer to EL-POWER.

◀ AB : Models with air bag system  
 ▶ AN : Models without air bag system

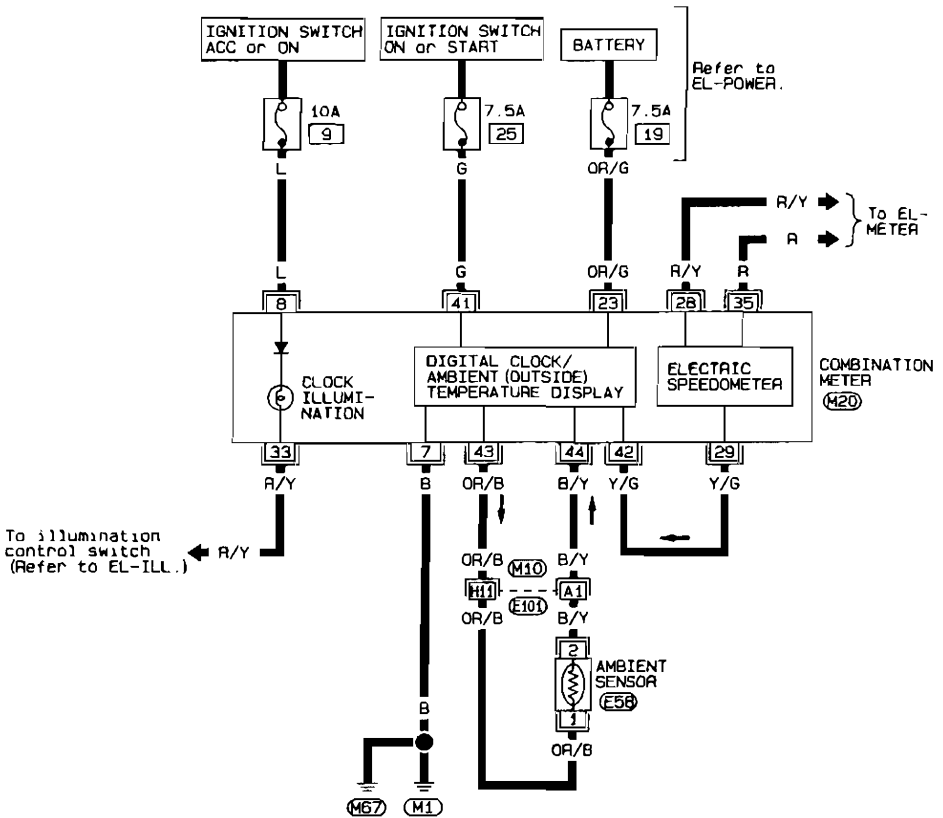


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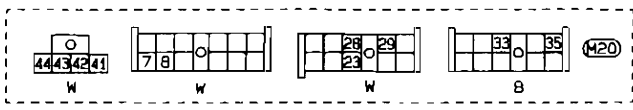
M10, E101



EL-HORN-02



To illumination control switch (Refer to EL-ILL.) ← R/Y



Refer to last page (Foldout page).

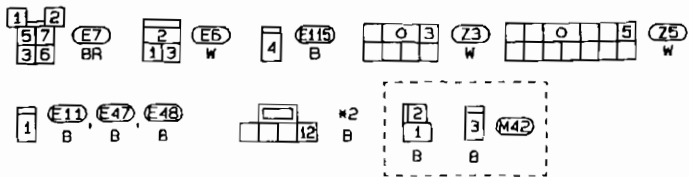
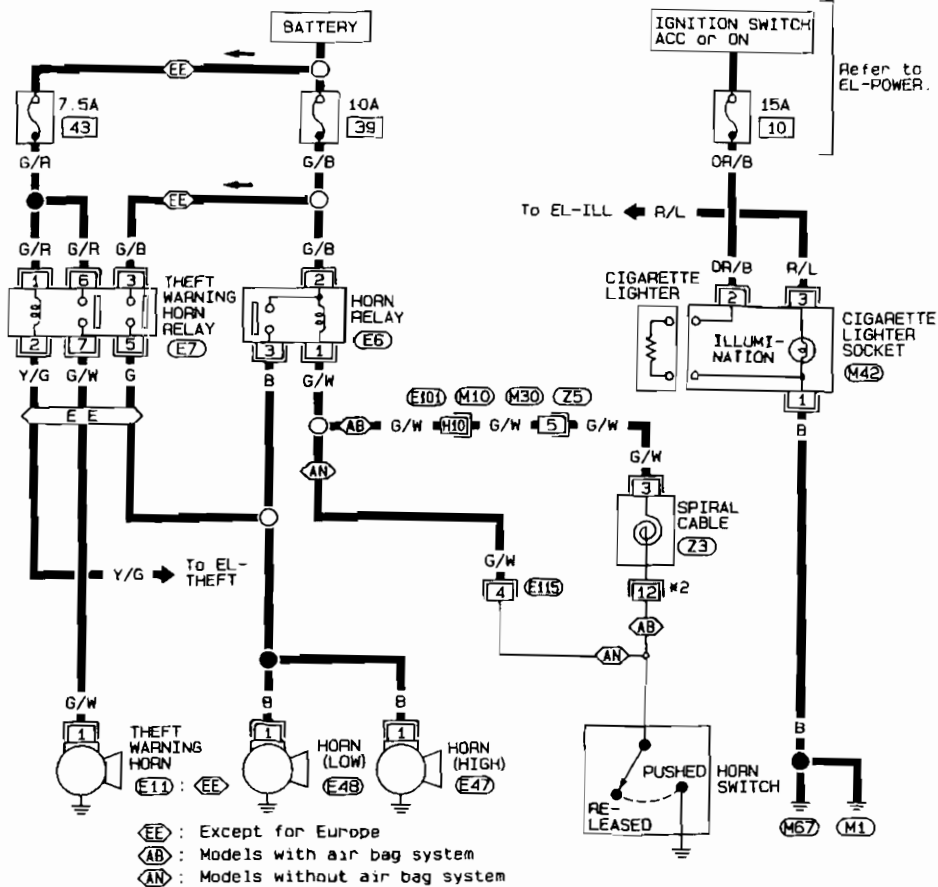
(M10), (E101)



Wiring Diagram — HORN — (Cont'd)

RHD MODELS

EL-HORN-03



Refer to last page (Foldout page).

(M10), (E10)





## System Description

The rear window and door mirror defogger system is controlled by the smart entrance control unit. Power is supplied at all times

- to rear window defogger relay terminal ③
- through 15A fuse (No. 181 located in the fuse block) and
- to rear window defogger relay terminal ⑥
- through 15A fuse (No. 117 located in the fuse block) and
- to mirror defogger relay terminal ③
- through 10A fuse (No. 121, located in the fuse block).

With the ignition switch in the ON or START position, power is supplied

- to each defogger relay terminal ① and
- to smart entrance control unit terminal 11

Ground is supplied

- to rear window defogger switch terminal ② and
- to smart entrance control unit terminal 10
- through body ground (M1) or (M67).

### Operation

The ignition switch must be in the ON or START position for defogger operation.

With the rear window defogger switch in the ON position and for approximately 15 minutes after the rear window defogger switch has turned to OFF from ON, ground is supplied

- through terminal ① of the rear window defogger switch
- to smart entrance control unit terminal 20.

Terminal ④ of the smart entrance control unit then supplies ground to each defogger relay terminal ②

With power and ground supplied, each defogger relay is energized

For rear window defogger system, power is supplied

- through terminals ⑤ and ⑦ of the rear window defogger relay
- to condenser terminal ①
- through terminal ② of the condenser
- to the rear window defogger terminal ①.

For mirror defogger system, power is supplied

- through mirror defogger relay terminal ⑤
- to each door mirror defogger terminal ①.

Ground is supplied

- to rear window defogger terminal ②
- through body ground (M104), and
- to each door mirror defogger terminal ③
- through body ground (M1) or (M67).

With power and ground supplied, each defogger filament heats and defogs the rear window and door mirror.

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 ⑤ of the rear window defogger relay

Terminal ④ of the rear window defogger switch is grounded through body ground (M1) or (M67)

GI

WA

RA

LI

RI

RI

LI

WT

RT

FD

RA

RA

RT

RI

RI

WT

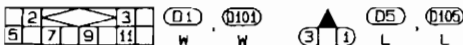
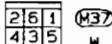
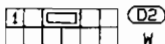
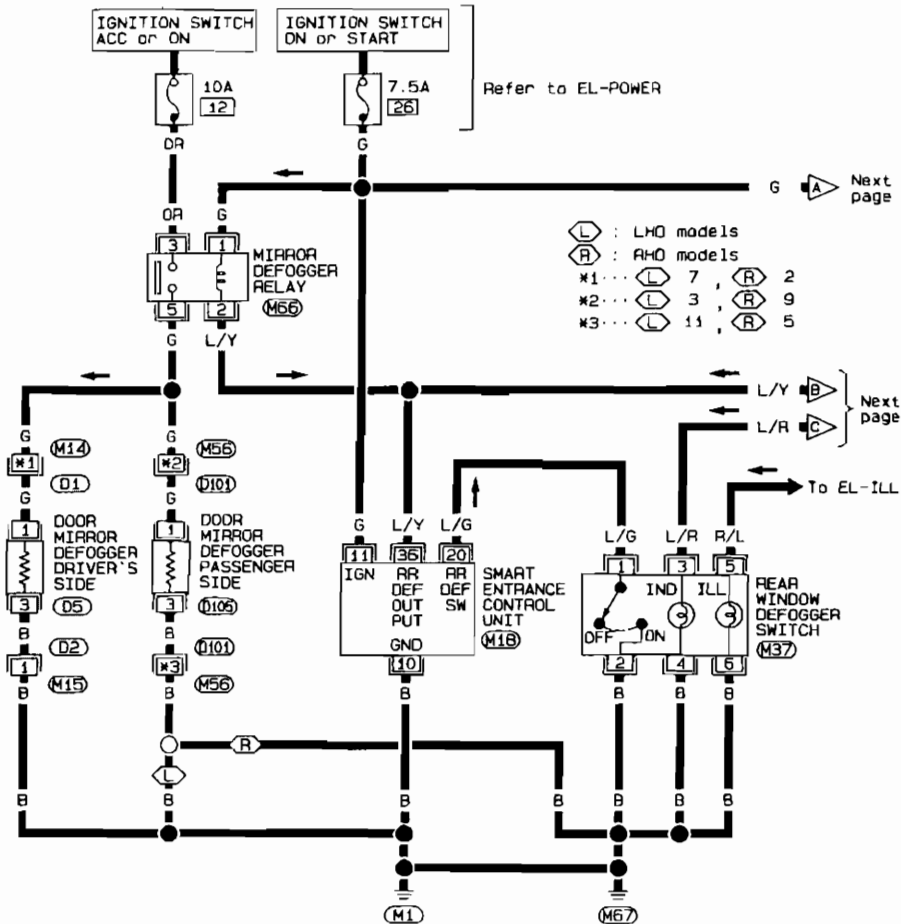
WA

EL

# REAR WINDOW DEFOGGER AND DOOR MIRROR DEFOGGER

## Wiring Diagram — DEF —

EL-DEF-01



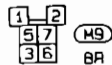
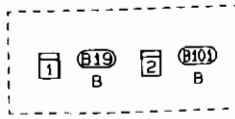
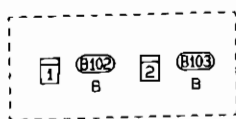
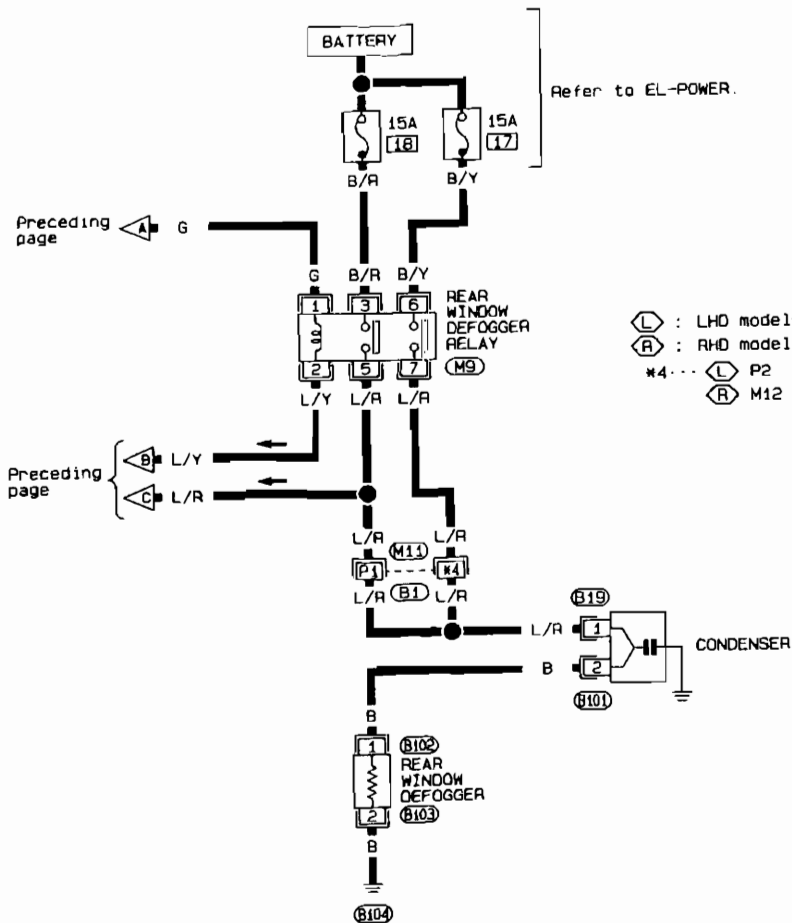
Refer to last page (Foldout page).

(M18)

# REAR WINDOW DEFOGGER AND DOOR DEFROSTER

## Wiring Diagram — DEF — (Cont'd)

EL-DEF-02



Refer to last page (Foldout page).

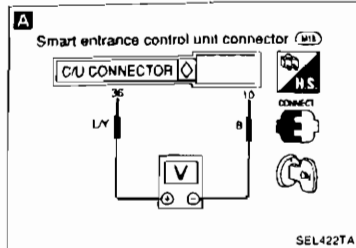


EL

## Trouble Diagnoses

### DIAGNOSTIC PROCEDURE 1

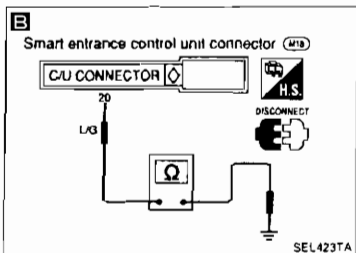
**SYMPTOM:** Rear defogger does not activate, or does not go off after activating.



**A** REAR WINDOW DEFOGGER OUTPUT SIGNAL CHECK  
Measure voltage between control unit harness terminals ③⑥ and ⑩.

| Condition                     | Voltage [V] |
|-------------------------------|-------------|
| Rear defogger switch is "OFF" | Approx 12   |
| Rear defogger switch is "ON"  | 0           |

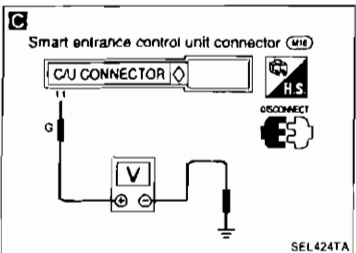
- OK
- Check rear window defogger relay (Refer to EL-189.)
  - Check rear window defogger circuit
  - Check rear window defogger filament. (Refer to EL-189.)



**B** REAR WINDOW DEFOGGER SWITCH INPUT SIGNAL CHECK  
Check continuity between control unit harness terminal ②① and body ground.

| Condition of defogger switch      | Continuity |
|-----------------------------------|------------|
| Rear defogger switch is pushed    | Yes        |
| Rear defogger switch is released. | No         |

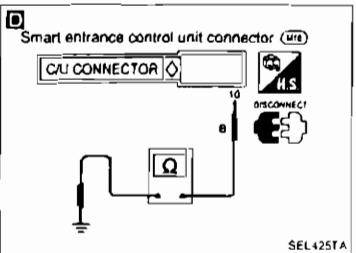
- NG
- Check rear window defogger switch. (Refer to EL-189.)
  - Check continuity between control unit harness terminal ②① and rear window defogger switch harness terminal ①.
  - **Continuity should exist.**
  - Check continuity between rear window defogger switch harness terminal ② and body ground.
  - **Continuity should exist.**



**C** IGNITION INPUT SIGNAL CHECK  
Check voltage between control unit harness terminal ⑩ and body ground.

| Condition                | Voltage [V] |
|--------------------------|-------------|
| Ignition switch is "ON"  | Approx 12   |
| Ignition switch is "OFF" | 0           |

- NG
- Repair harness or connectors



**D** CONTROL UNIT GROUND CIRCUIT CHECK  
Check continuity between control unit harness terminal ⑩ and body ground  
**Continuity should exist.**

- NG
- Repair harness or connectors.

OK

Replace control unit



# REAR WINDOW DEFOGGER AND DOOR MIRROR DEFOGGER

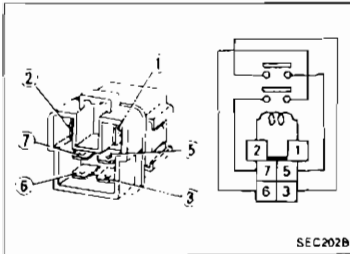
## Trouble Diagnoses (Cont'd)

### ELECTRICAL COMPONENTS INSPECTION

#### Rear window defogger relay

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         |

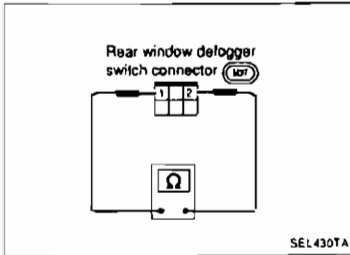


SEC202B

#### Rear window defogger switch

Check continuity between terminals when rear window defogger switch is pushed and released.

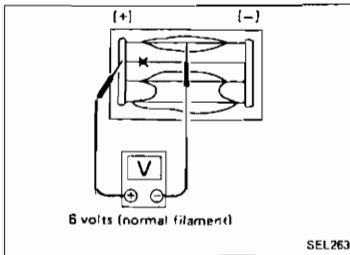
| Terminals | Condition                               | Continuity |
|-----------|---|------------|
| ① - ②     | Rear window defogger switch is pushed   | Yes        |
|           | Rear window defogger switch is released | No         |



SEL430TA

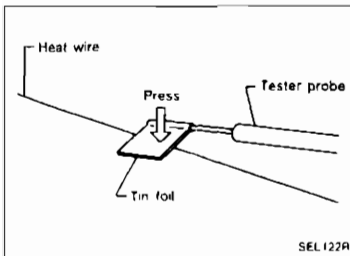
#### Filament Check

1. Attach probe circuit tester (in volt range) to middle portion of each filament.



SEL263

- When measuring voltage, wrap tin foil around the top of the negative probe. Then press the foil against the wire with your finger.



SEL122A

## AUDIO AND POWER ANTENNA

### Audio/System Description

Refer to Owner's Manual for audio system operating instructions

Power is supplied at all times

- through 7.5A fuse (No. 19), located in the fuse block)
- to radio terminal ⑥.

With the ignition switch in the ACC or ON position, power is supplied

- through 10A fuse (No. 9), located in the fuse block)
- to radio terminal ⑩.

Ground is supplied through the case of the radio.

When the radio power knob is pushed to the ON position, audio signals are supplied

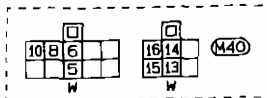
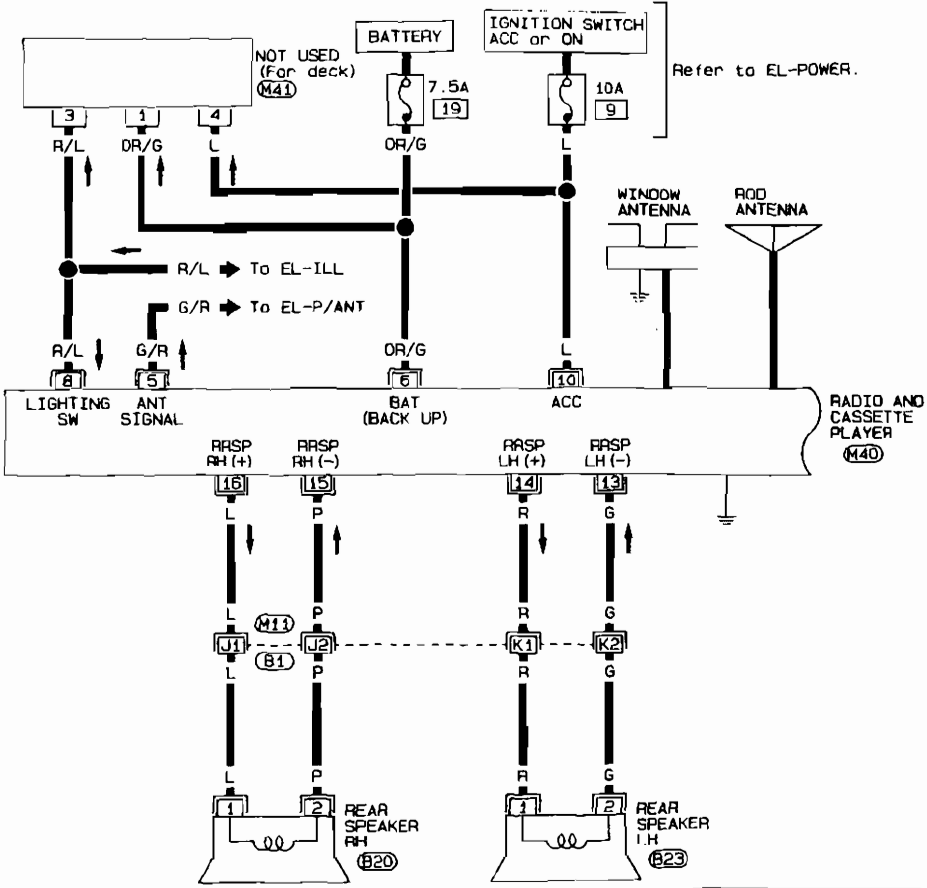
- through radio terminals 1, 2, 3, 4, 13, 14, 15 and 16
- to the door, pillar and rear speakers.

# AUDIO AND POWER ANTENNA

## Audio/Wiring Diagram — AUDIO —

EXCEPT CENTRAL AND SOUTH AMERICA

EL-AUDIO-01



Refer to last page (Foldout page).

(M1), (B1)

EL

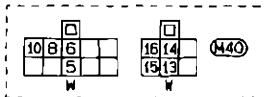
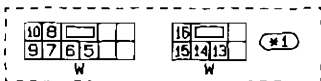
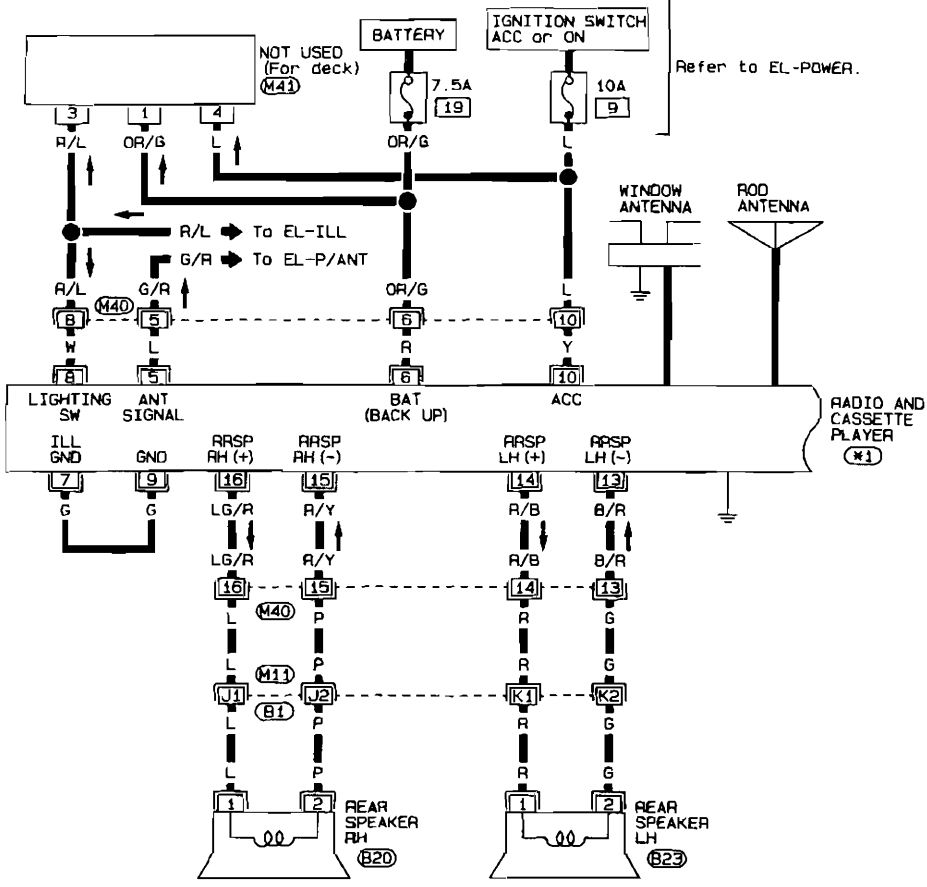


# AUDIO AND POWER ANTENNA

## Audio/Wiring Diagram — AUDIO — (Cont'd)

FOR CENTRAL AND SOUTH AMERICA

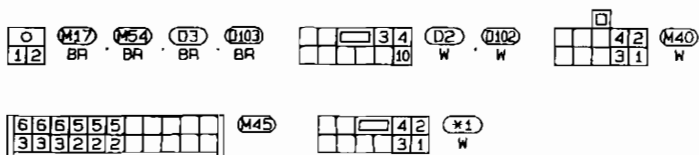
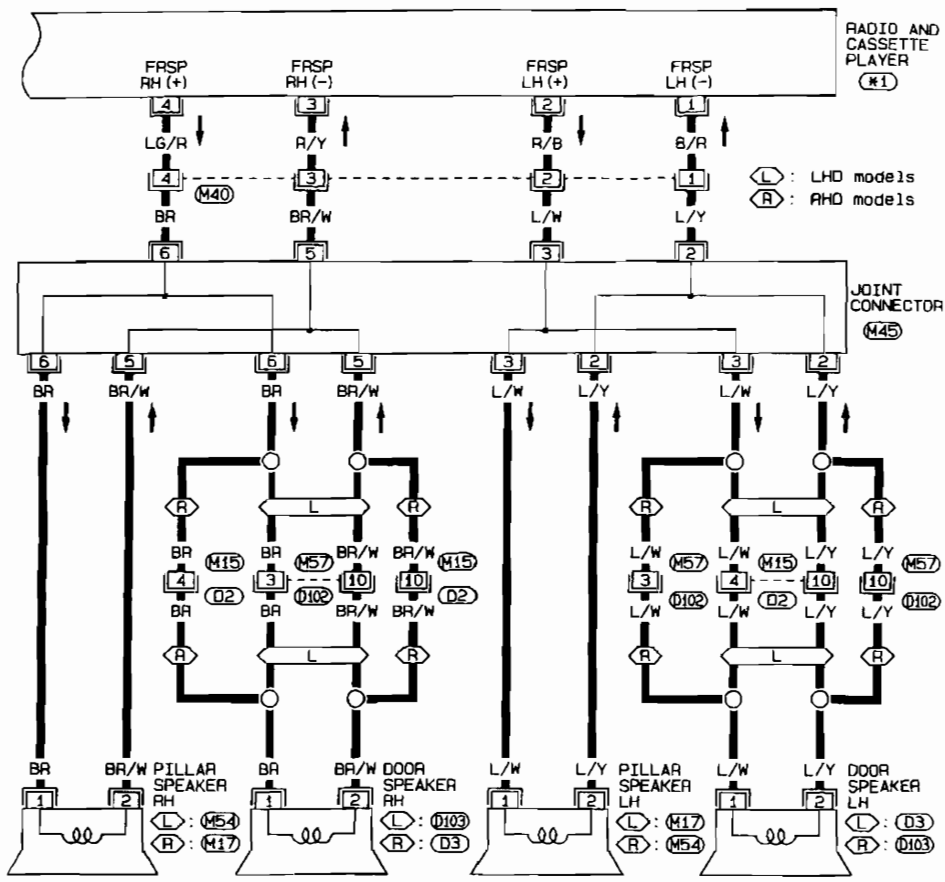
EL-AUDIO-03



# AUDIO AND POWER ANTENNA

## Audio/Wiring Diagram — AUDIO — (Cont'd)

EL-AUDIO-04



## Audio


### ANTI-THEFT SYSTEM

By using a personal 4-digit code known only to the vehicle owner, the possibility of the audio unit being stolen is effectively reduced, because without the code the unit can not be activated. When in normal use, the unit is unlocked and accessible in the usual way.

If however, someone attempts to remove the unit or the ground cable is disconnected from the battery, the Anti-theft system activates and the unit "locks". The only way it can be unlocked is by entering a personal code number known only by the owner

### UNLOCKING THE UNIT (How to enter a personal code number)

Use the following procedures to enter a personal code number into the radio

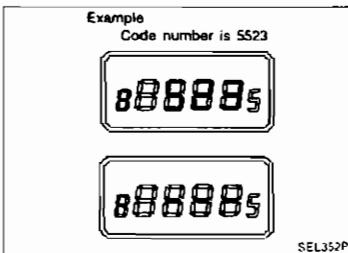
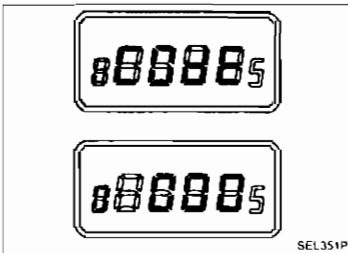
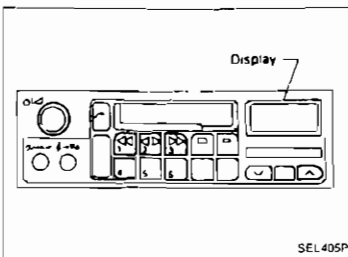
1. Turn ignition switch to "ACC" or "ON".
2. Turn SW VOL knob to "ON" and "0000" will appear on the display.
3. Press any button (except "eject") and "0000" will appear on the display.
4. Enter a personal code number by pressing station select buttons 1, 2, 3, 4 the required number of times to display the code.
5. Press  to enter the code.

Unit is unlocked and the radio/cassette will operate.

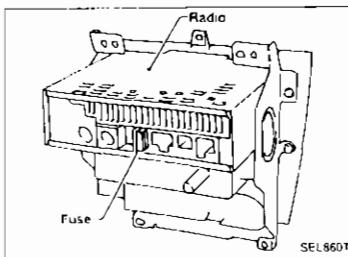
If the wrong code number is entered, the display shows "----" Wait ten seconds then enter the correct code

### CAUTION:

There is a theft prevention mechanism restricting the number of times a wrong code number can be entered into the radio unit. If a wrong code number is entered 1 to 2 times, you will have to wait for 10 seconds before the radio will receive further input. If a wrong code number is entered 3 to 20 times, you will have to wait a duration of 15 minutes. The radio unit will lock permanently if any further attempts are made.



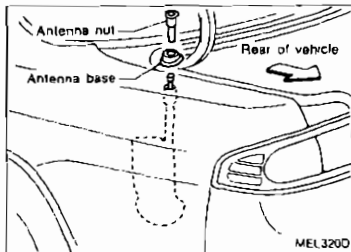
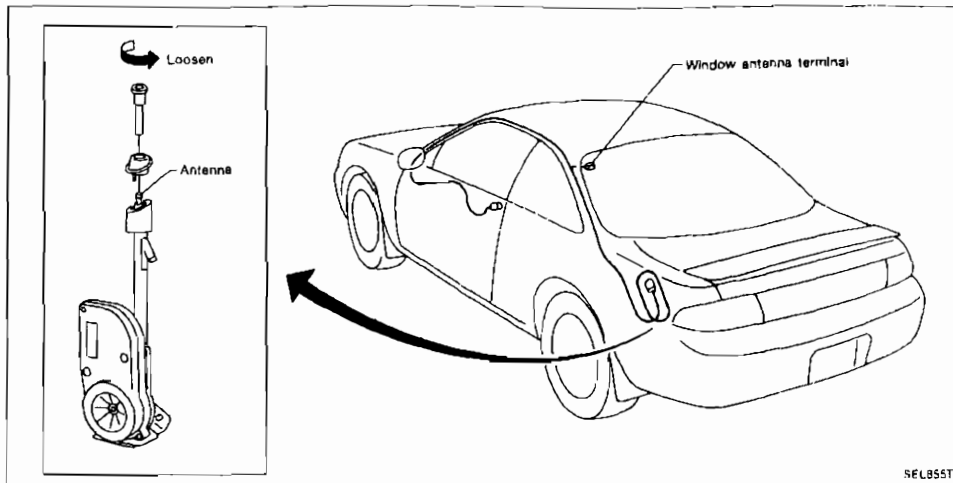
### Radio Fuse Check







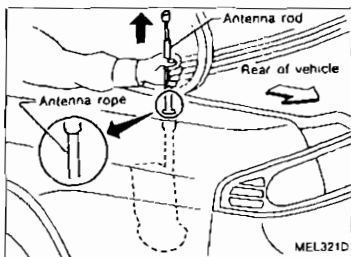
## Location of Antenna



## Antenna Rod Replacement

### REMOVAL

1. Remove antenna nut and antenna base.



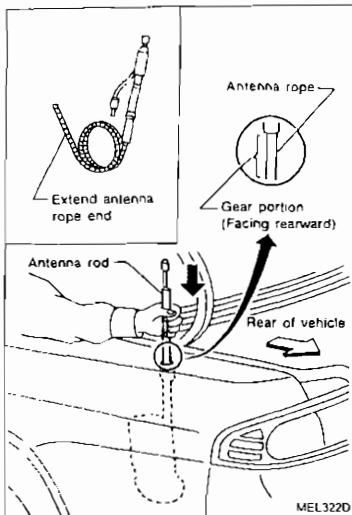
2. Withdraw antenna rod while raising it by operating antenna motor.

## AUDIO AND POWER ANTENNA

### Antenna Rod Replacement (Cont'd)

#### INSTALLATION

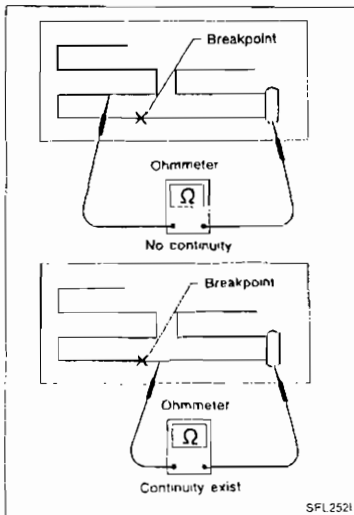
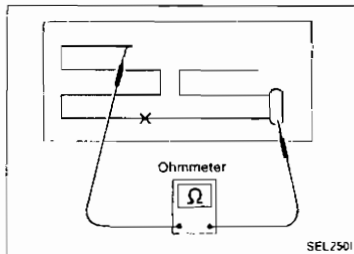
1. Lower antenna rod by operating antenna motor.
2. Insert gear section of antenna rope into place with it facing toward antenna motor
3. As soon as antenna rope is wound on antenna motor, stop antenna motor. Insert antenna rod lower end into antenna motor pipe
4. Retract antenna rod completely by operating antenna motor.
5. Install antenna nut and base



### Window Antenna Repair

#### ELEMENT CHECK

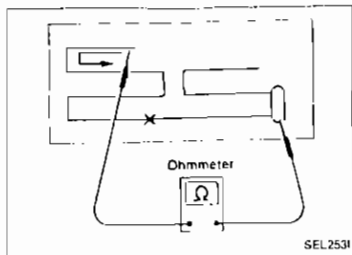
1. Attach probe circuit tester (in ohm range) to antenna terminal on each side.
2. If an element is broken, no continuity will exist



## AUDIO AND POWER ANTENNA

### Window Antenna Repair (Cont'd)

- To locate broken point, move probe to left and right along element. Tester needle will swing abruptly when probe passes the point.
- Refer to REAR WINDOW DEFOGGER "Filament Repair" for Element Repair.

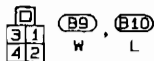
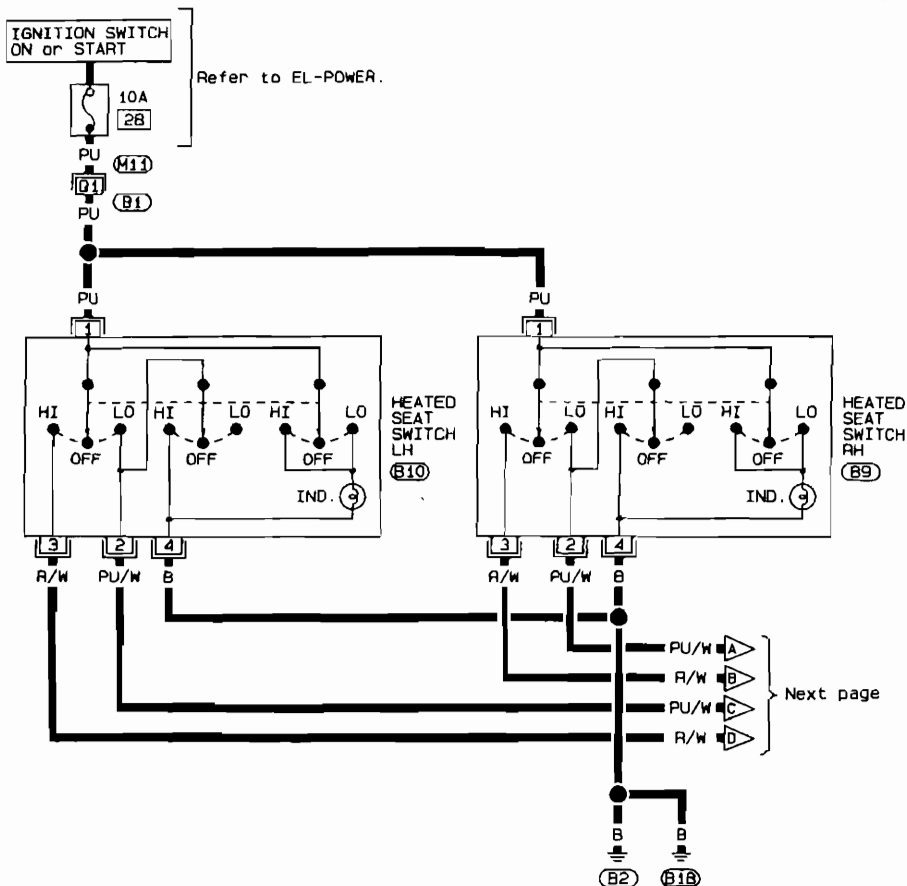


# HEATED SEAT

★ For location of heating unit, refer to "SEAT" in BT section.

## Wiring Diagram — H/SEAT —

EL-H/SEAT-01



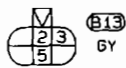
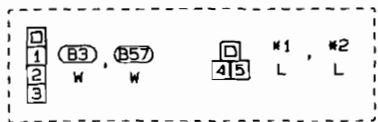
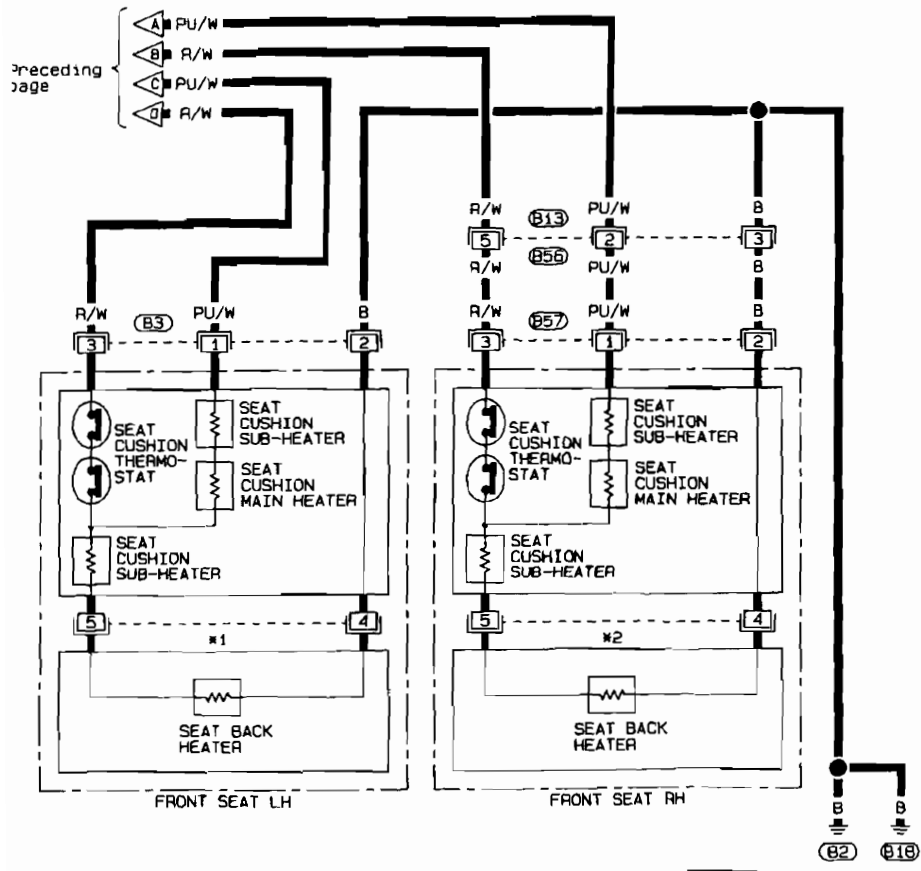
Refer to last page (Foldout page)

(M11), (B1)

# HEATED SEAT

## Wiring Diagram — H/SEAT — (Cont'd)

EL-H/SEAT-02



EL

## System Description

Power is supplied at all times

- through 25A fusible link (letter **1**), located in the fusible link and fuse box)
- to circuit breaker terminal **1**
- through circuit breaker terminal **2**
- to smart entrance control unit terminal **1**.

Power is supplied at all times

- to interior lamp terminal **1** and
- to key switch terminal **1**
- through 10A fuse (No. **21**), located in the fuse block).

Power is supplied at all times

- to multi-remote control relay-1 terminal **1**
- through 10A fuse (No. **22**), located in the fuse block).

Terminal **10** of the smart entrance control unit is grounded through body ground (**M1**).

## INPUTS

When the key switch is ON (ignition key is inserted in key cylinder), power is supplied

- through key switch terminal **2**
- to smart entrance control unit terminal **24**.

When the driver side door switch is OPEN, ground is supplied

- to smart entrance control unit terminal **15**
- through driver side door switch terminal **1**
- to driver side door switch terminal **3**
- through body ground (**B2**) or (**R12**).

When the passenger side door switch is OPEN, ground is supplied

- to smart entrance control unit terminal **16**
- through passenger side door switch body ground.

When the driver side door lock actuator (door unlock sensor) is UNLOCKED, ground is supplied

- to smart entrance control unit terminal **12**
- through driver side door lock actuator (door unlock sensor) terminal **4**
- to driver side door lock actuator (door unlock sensor) terminal **2**
- through body ground (**M1**).

When the passenger side door lock actuator (door unlock sensor) is UNLOCKED, ground is supplied

- to smart entrance control unit terminal **13**
- through passenger side door lock actuator (door unlock sensor) terminal **4**
- to passenger side door lock actuator (door unlock sensor) terminal **2**
- through body ground (**M67**).

Remote controller signal input

- through window antenna
- to smart entrance control unit terminal **17**.

The multi-remote control system controls operation of the

- power door lock
- interior lamp
- panic alarm
- hazard warning lamp
- ID code entry

## OPERATED PROCEDURE

### Power door lock operation

When the following input signals are both supplied:

- key switch OFF (when ignition key is not inserted in key cylinder);
- door switch CLOSED (when all the doors are closed);

smart entrance control unit locks all the doors with input of LOCK signal from remote controller.

When key switch is OFF (when ignition key is not inserted in key cylinder), smart entrance control unit unlocks the doors with input of UNLOCK signal from remote controller.

For details of current flow, refer to "POWER DOOR LOCK"

**System Description (Cont'd)****Interior lamp operation**

When the following input signals are both supplied.

- key switch OFF (when ignition key is not inserted in key cylinder);
- door switch CLOSED (when all the doors are closed);

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 and Trunk Room Lamps"

**Panic alarm operation**

When key switch is OFF (when ignition key is not inserted in key cylinder), multi-remote control system turns on and off horn and hazard warning lamp intermittently with input of PANIC ALARM signal from remote controller.

For detailed description, refer to "THEFT WARNING SYSTEM"

**Hazard warning lamp operation**

When the following input signals are all supplied

- key switch OFF (when ignition key is not inserted in key cylinder),
- door switch CLOSED (when all the doors are closed);
- door lock actuator (door unlock sensor) LOCKED (when all the doors are locked),

multi-remote control system outputs two times the following ground signals with input of LOCK signal from remote controller:

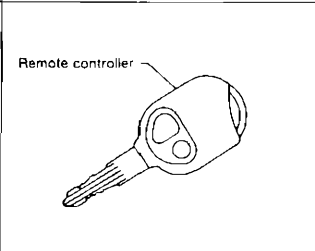
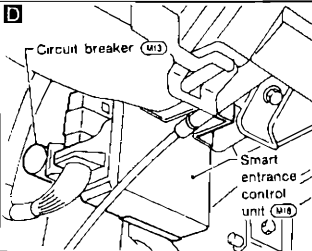
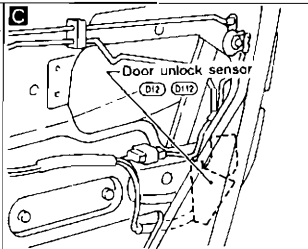
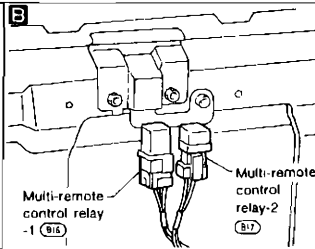
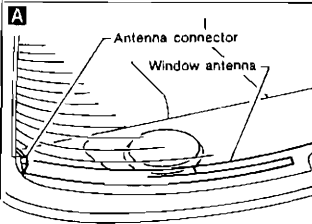
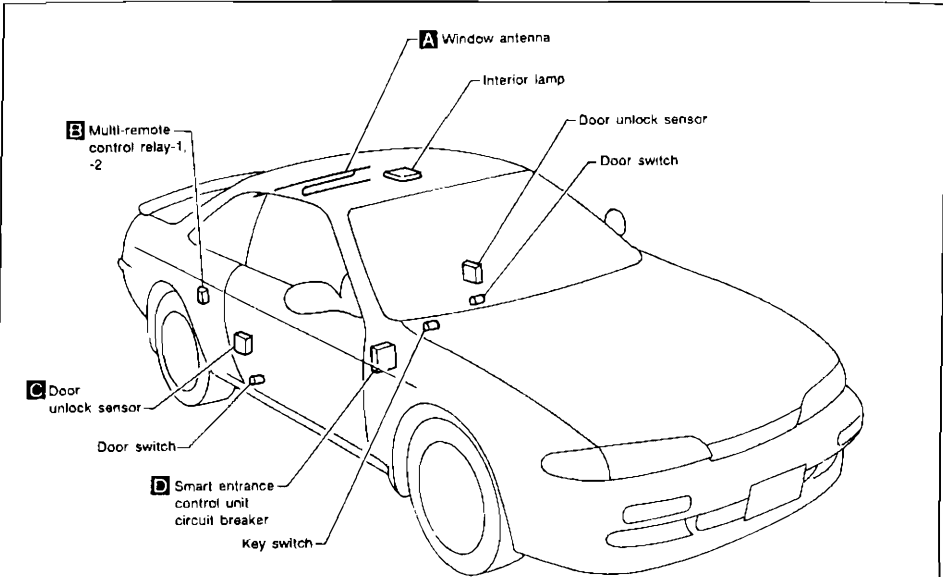
- to multi-remote control relay-1 terminal (2),
- through smart entrance control unit terminal (7)

As a result, multi-remote control relay-1 is energized, and hazard warning lamps flash on and off.

For detailed description, refer to "Turn Signal and Hazard Warning Lamps" and "THEFT WARNING SYSTEM"

# MULTI-REMOTE CONTROL SYSTEM

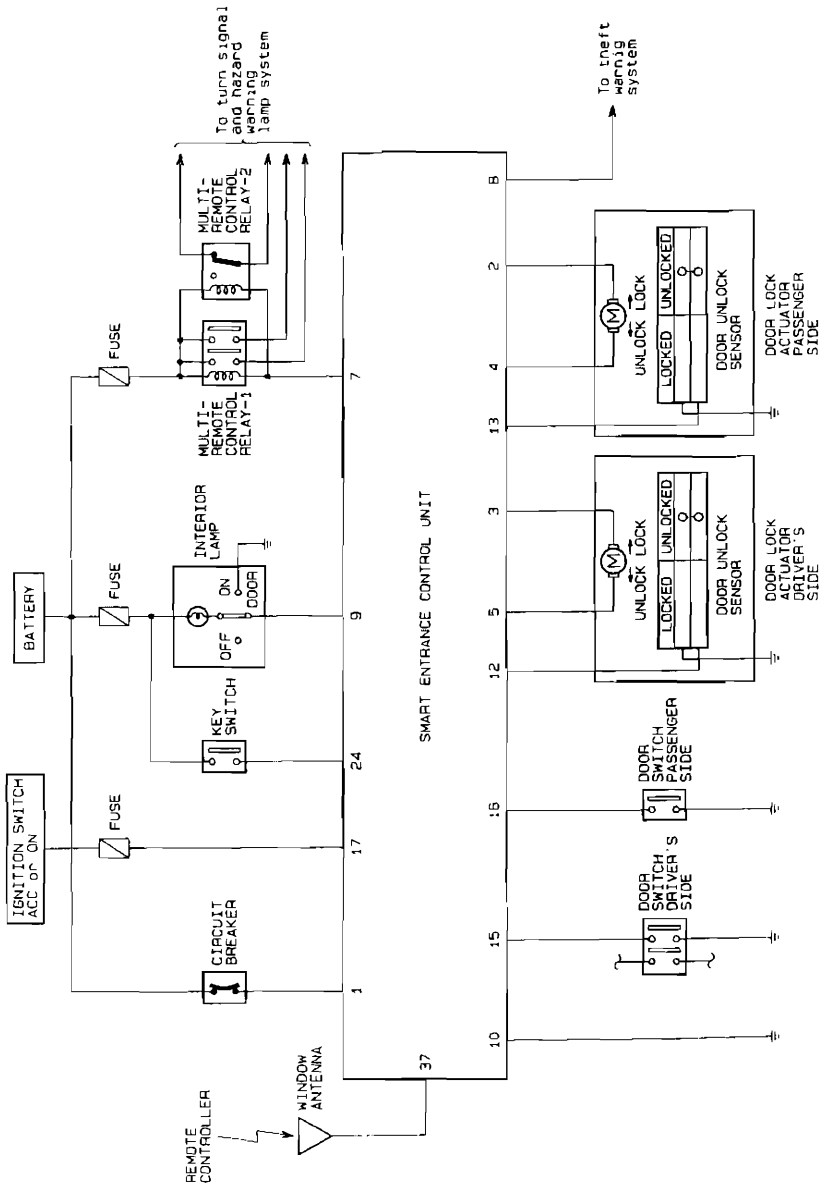
## Component Parts and Harness Connector Location





# MULTI-REMOTE CONTROL SYSTEM

## Schematic

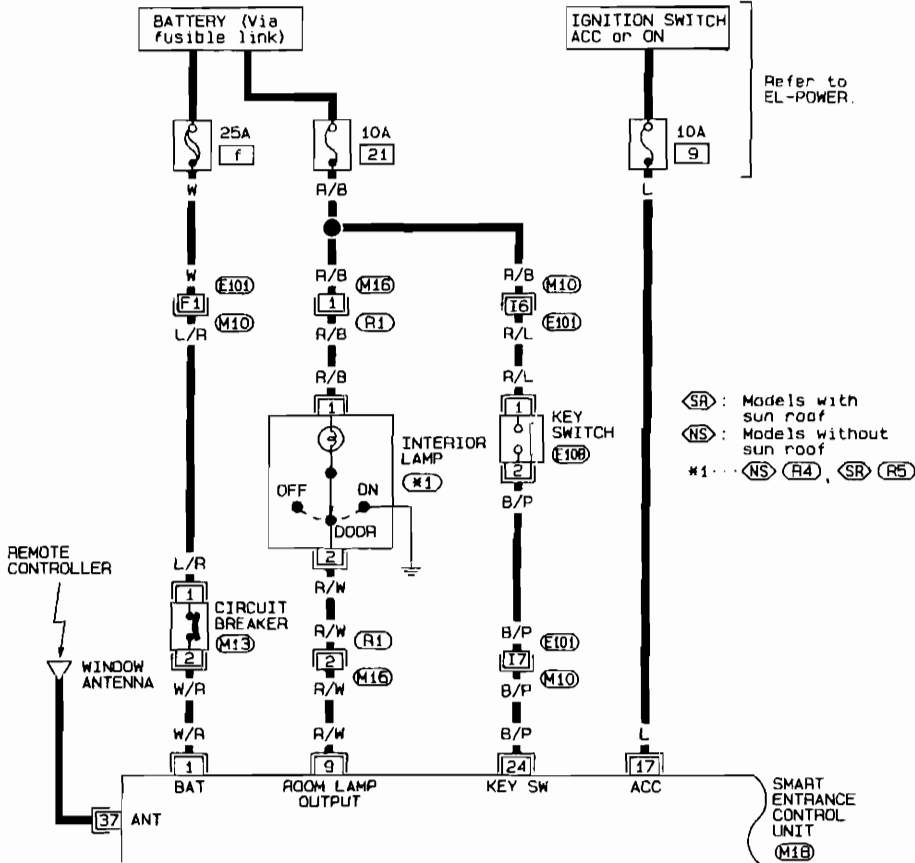


GI  
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EM  
LC  
FC  
FE  
CL  
MT  
AT  
PD  
FA  
ZA  
BR  
ST  
BS  
BT  
GA  
EL  
IOX

# MULTI-REMOTE CONTROL SYSTEM

## Wiring Diagram — MULTI —

EL-MULTI-01



Refer to last page (Foldout page).

(M10) (E100)

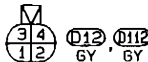
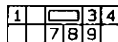
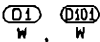
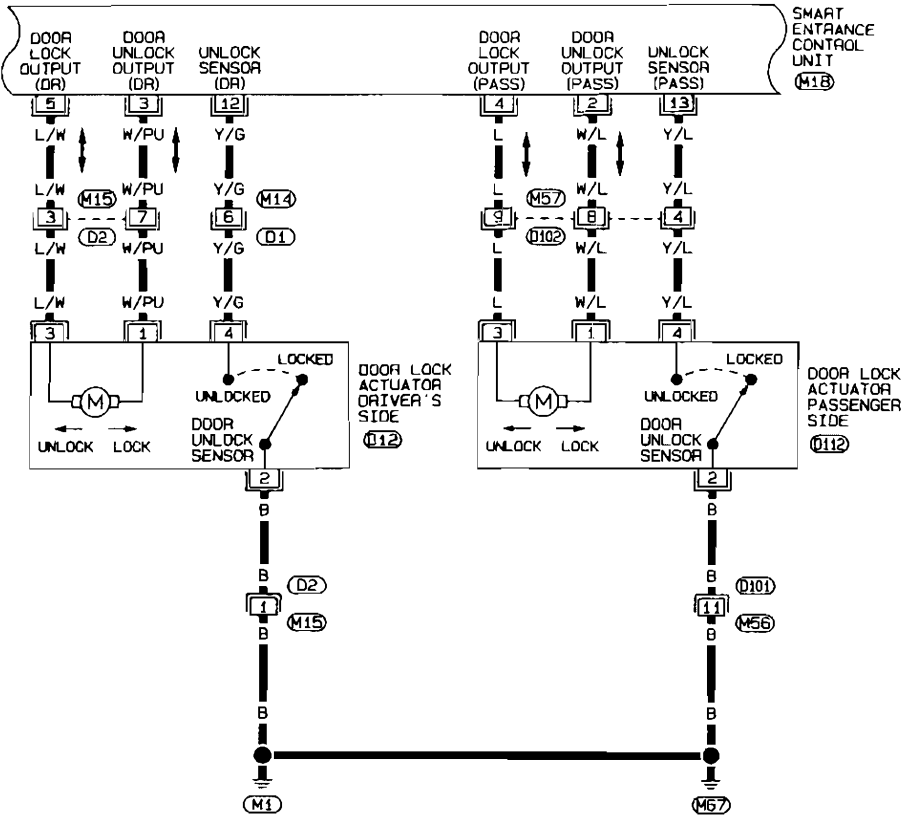
(M16)



# MULTI-REMOTE CONTROL SYSTEM

## Wiring Diagram — MULTI — (Cont'd)

EL-MULTI-03



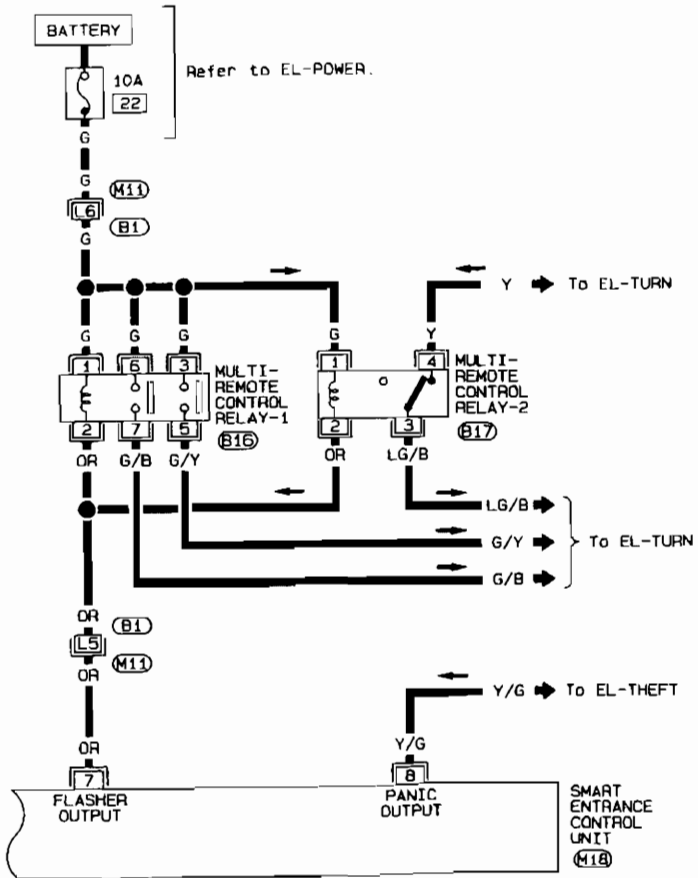
Refer to last page (Foldout page).

(M18)

# MULTI-REMOTE CONTROL SYSTEM

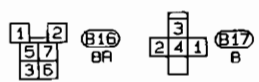
## Wiring Diagram — MULTI — (Cont'd)

EL-MULTI-04



Refer to EL-POWER.

Refer to last page (Foldout page).



(B11), (B1)  
(M1B)

EL

# MULTI-REMOTE CONTROL SYSTEM

## Input/Output Operation Signal

### SMART ENTRANCE CONTROL UNIT

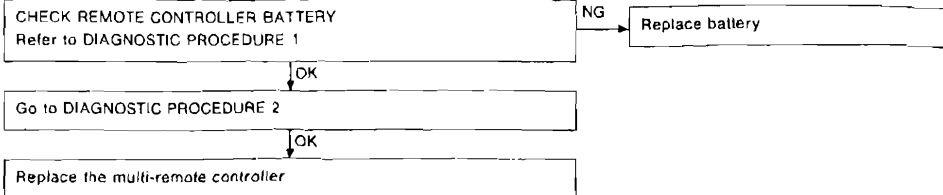
| Terminal No | Connections                  | Operated condition   |          | Voltage (V)<br>(Approximate values) |
|-------------|------------------------------|--|----------|-------------------------------------|
| 1           | Power source (C/B)           | —  |          | 12V                                 |
| 2           | Passenger door lock motor    | When door unlock signal is received from remote controller or unlock sensor                      | Unlocked | 12V                                 |
| 3           | Driver door lock motor       |  | Free     | 1V or less                          |
| 4           | Passenger door lock motor    | When door lock signal is received from remote controller or unlock sensor                        | Locked   | 12V                                 |
| 5           | Driver's door lock motor     |  | Free     | 1V or less                          |
| 7           | Multi-remote control relay 1 | When doors are locked using remote controller or panic alarm is operated using remote controller |          | 12V → 1V or less                    |
| 8           | Theft warning horn relay     | When panic alarm is operated using remote controller   |          | 12V → 1V or less                    |
| 9           | Interior lamp                | When doors are unlocked using remote controller. (Lamp switch in "DOOR" position)                |          | 12V → 1V or less                    |
| 10          | Ground                       | —  |          | —                                   |
| 11          | Ignition switch (ON)         | "ON" or "START" position   |          | 12V                                 |
| 12          | Driver door unlock sensor    | Driver door. Locked → Unlocked   |          | 12V → 4.5V or less                  |
| 13          | Passenger door unlock sensor | Passenger door. Locked → Unlocked  |          | 12V → 4.5V or less                  |
| 15          | Driver door switch           | OFF (Closed) → ON (Open)   |          | 12V → 4.5V or less                  |
| 16          | Passenger door switch        | OFF (Closed) → ON (Open)   |          | 12V → 1.5V or less                  |
| 17          | Ignition switch (ACC)        | "ACC" or "ON" position   |          | 12V                                 |
| 24          | Ignition key switch (Insert) | IGN key inserted → IGN key removed from IGN key cylinder   |          | 12V → 4.5V or less                  |
| 37          | Multi-remote antenna         | —  |          | —                                   |

# MULTI-REMOTE CONTROL SYSTEM

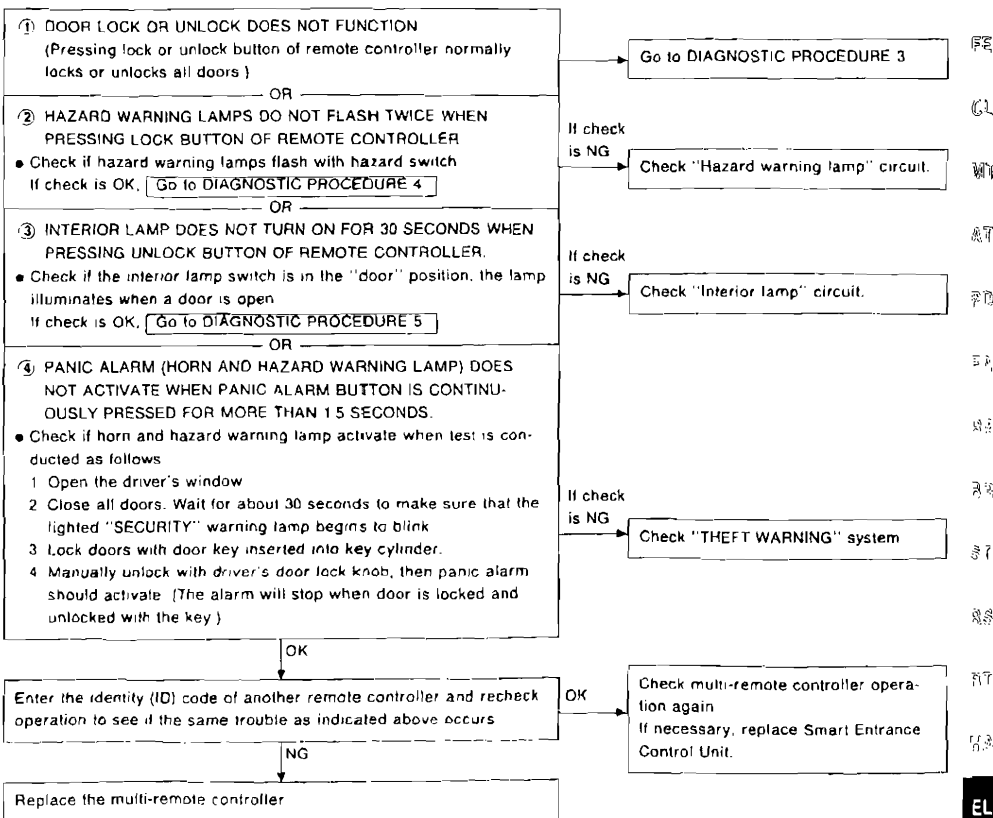
## Trouble Diagnoses

### TROUBLE SYMPTOM

- All functions of remote control system do not operate



- Some functions of multi-remote controller do not operate.



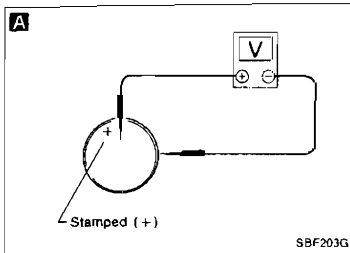
Note: The multi-remote control system does not activate with the ignition key inserted in the ignition key cylinder.

# MULTI-REMOTE CONTROL SYSTEM

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 1

Check remote controller battery.



**A**

#### CHECK REMOTE CONTROLLER BATTERY.

Remove battery and measure voltage across battery positive and negative terminals ⊕ and ⊖.

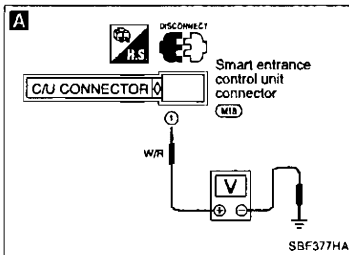
| Measuring terminal             |                                | Standard value |
|--------------------------------|--------------------------------|----------------|
| ⊕                              | ⊖                              |                |
| Battery positive terminal<br>⊕ | Battery negative terminal<br>⊖ | 3V or more     |

**Note:**

Remote controller does not function if battery is not set correctly.

### DIAGNOSTIC PROCEDURE 2

**SYMPTOM:** All remote controls do not function even if remote controller is operated properly.



**A**

#### CHECK MAIN POWER SUPPLY AND GROUND CIRCUIT.

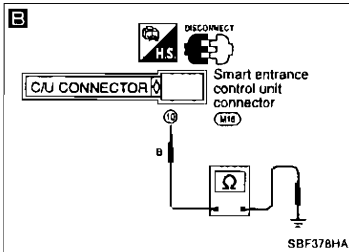
- 1) Remove key from ignition
- 2) Disconnect connector from control unit. Check voltage across control unit terminal ① and GND

Does battery voltage exist?

No

- Check the following.
- Fuse
  - Circuit breaker
  - Power supply harness

Yes



**B**

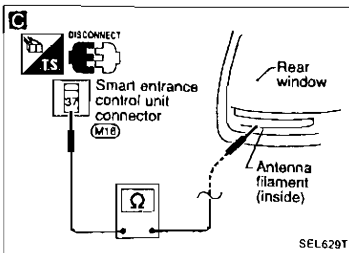
Check continuity between terminal ①B and GND

Does continuity exist?

No

Check GND harness

Yes



**C**

#### CHECK ANTENNA CIRCUIT.

Disconnect 1-pin connector from control unit

Check continuity between a terminal and filament on the rear window

Does continuity exist?

No

Check antenna circuit (Refer to REAR WINDOW DEFOGGER "Filament Repair" )

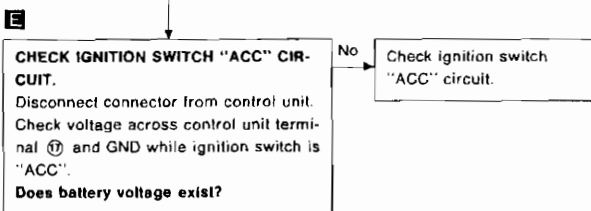
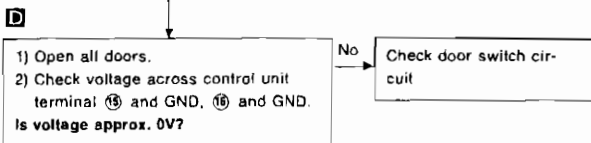
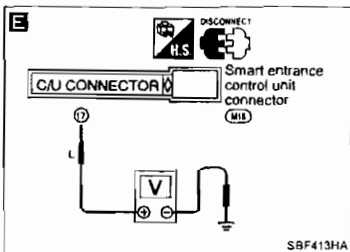
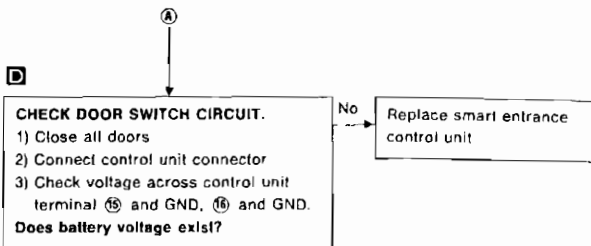
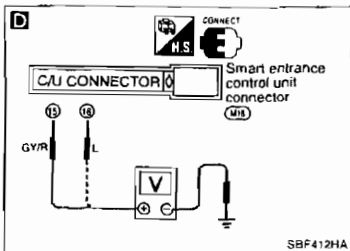
Yes

Ⓐ

(Go to next page )



## Trouble Diagnoses (Cont'd)

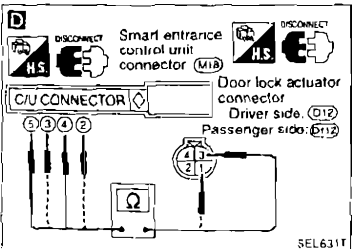
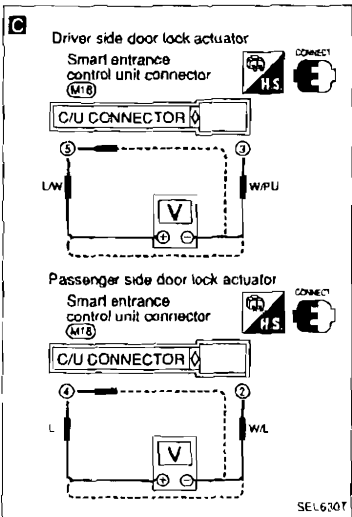
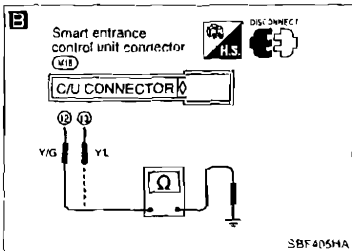
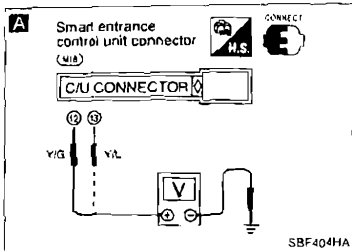


Check operation parts in multi-remote control system for function

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 3

**SYMPTOM:** Door lock or unlock on remote control does not function.



**A**

**CHECK UNLOCK SENSOR CIRCUIT**  
Check voltage across control unit terminal ② and GND, ③ and GND

| Door lock knob condition | Terminals | Voltage (V) |
|--------------------------|-----------|-------------|
| Locked →                 | ② - GND   | 12 - 0      |
| Unlocked →               | ③ - GND   | → 12        |

**C**

**CHECK DOOR LOCK ACTUATOR CIRCUIT.**  
Check voltage for door lock motor Door lock actuator driver side.

| Door lock knob condition | Terminals |   |
|--------------------------|-----------|---|
|                          | ⊕         | ⊖ |
| Locked                   | ⑤         | ③ |
| Unlocked                 | ③         | ⑤ |

Door lock actuator passenger side

| Door lock knob condition | Terminals |   |
|--------------------------|-----------|---|
|                          | ⊕         | ⊖ |
| Locked                   | ④         | ② |
| Unlocked                 | ②         | ④ |

**D**

1) Disconnect control unit connector and door lock actuator connector  
2) Check continuity

|                | Terminals      |
|----------------|----------------|
| Driver side    | ⑤ - ③<br>④ - ② |
| Passenger side | ④ - ②<br>② - ④ |

Does battery voltage exist?

Yes

Check power door lock motor. Refer to ELECTRICAL COMPONENTS INSPECTION in "POWER DOOR LOCK" (EL-174)

**B**

1) Disconnect connector from control unit  
2) Check continuity between ② and GND, ③ and GND

| Door lock knob condition | Terminals          |
|--------------------------|--------------------|
| Unlocked                 | ② - GND<br>③ - GND |

Does continuity exist?

No → Repair unlock sensor harness or replace door lock actuator

Yes → Replace smart entrance control unit

Repair unlock sensor harness or replace door lock actuator

Replace smart entrance control unit

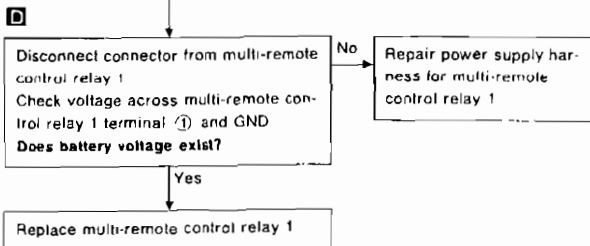
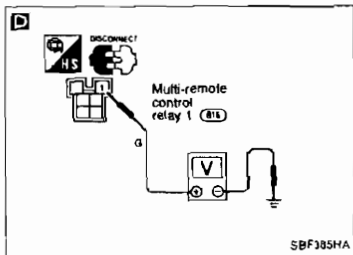
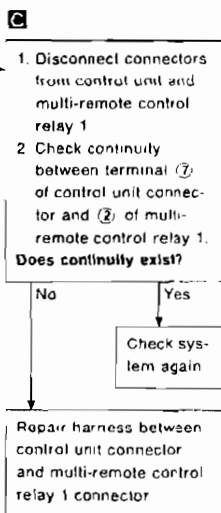
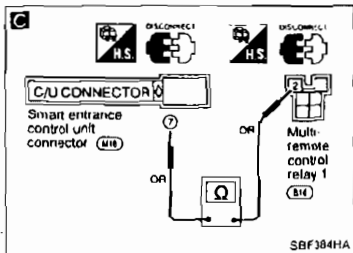
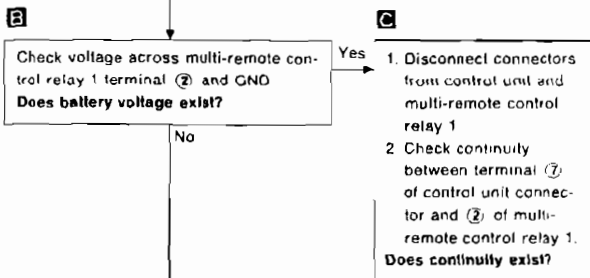
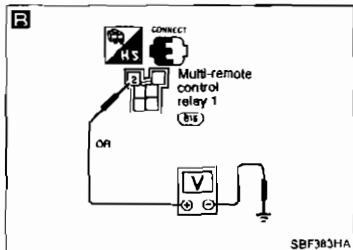
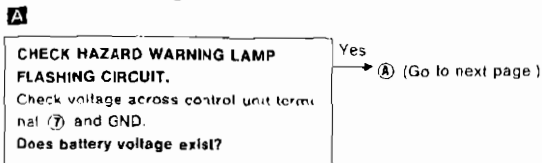
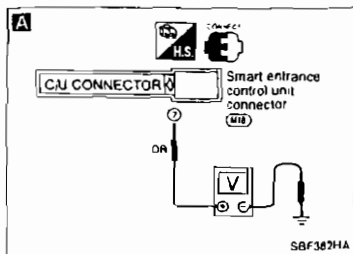
Repair harness

# MULTI-REMOTE CONTROL SYSTEM

## Trouble Diagnoses (Cont'd)

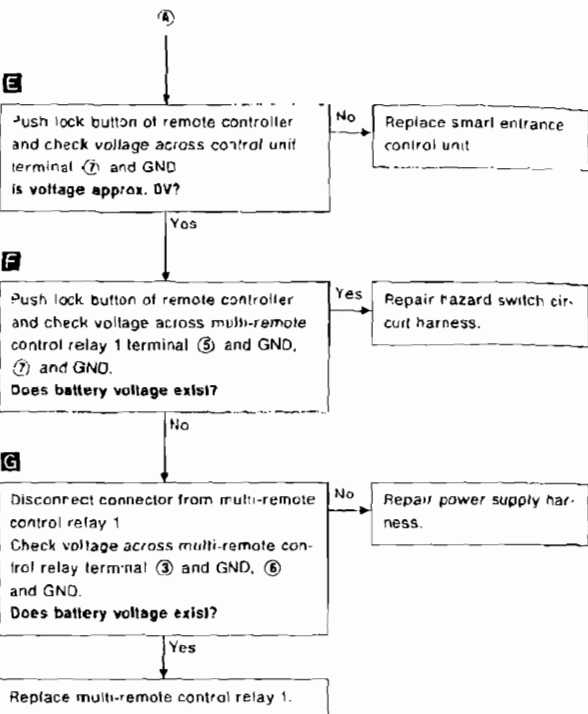
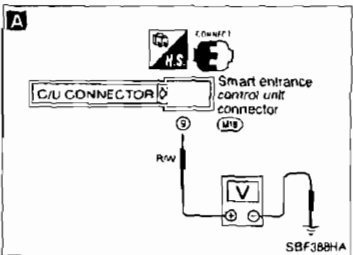
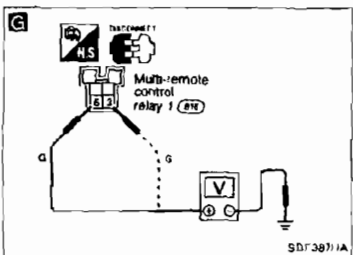
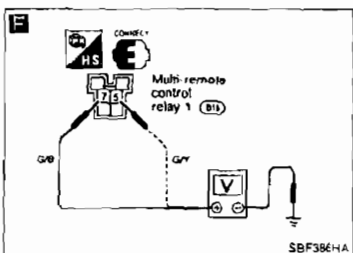
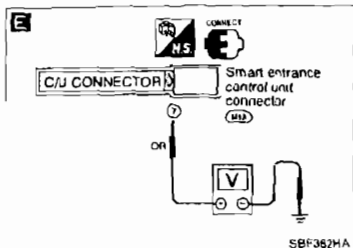
### DIAGNOSTIC PROCEDURE 4

**SYMPTOM:** Hazard warning lamps do not flash twice when pressing lock button of remote controller. Everything else functions.



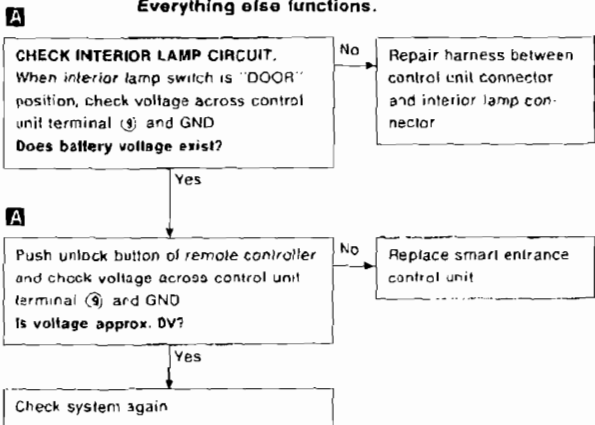
# MULTI-REMOTE CONTROL SYSTEM

## Trouble Diagnoses (Cont'd)



### DIAGNOSTIC PROCEDURE 5

**SYMPTOM:** Interior lamp does not turn on for 30 seconds when pressing unlock button of remote controller. Everything else functions.



### Replacing Remote Controller or Control Unit

If the remote controller or the control unit needs to be replaced or if an additional remote controller needs to be set, enter the identity (ID) code manually.

#### ID Code Entry Procedure

To enter the ID code, follow this procedure.

#### "Setting mode":

Three steps must be followed to establish the "setting mode".

- (1) Close and lock all doors.
- (2) Insert and remove the key from the ignition more than six times within 10 seconds. (The hazard warning lamp will then flash twice.)

● **At this time, the original ID codes are eliminated.**

#### ID code entry:

- (3) Turn ignition key to "ACC" position.
- (4) Push lock button on the new remote controller once (for example, if door is locked using the remote controller during this ID code entry enable state, a new ID code can be entered)

● **At this time, the new ID code is entered. (The hazard warning lamp will then flash twice.)**

- (5) If you need to enter additional remote controllers (including the original), release the driver's door lock, then lock again with door lock knob.

- (6) Push lock button on the new additional remote controller once.

- (7) This ID code entry enable state and setting mode remain until the driver's door is opened.

#### NOTE

- If the same ID code that existing in the memory is input, the entry is canceled, and no ID code will be entered.
- Entry of maximum four ID codes is allowed and any attempt to enter more will be ignored.
- Any ID codes entered after termination of the "setting" mode will not be accepted. Additionally remote control signals will be inhibited when an ID code has not been entered during the "setting" mode.

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# THEFT WARNING SYSTEM

## System Description

Refer to Owner's Manual for theft warning system operating instructions.

Power is supplied at all times

- through 30A fusible link (letter [h] ), located in the fusible link and fuse box)
- to ignition switch terminal (1).

With the ignition switch in the START position, power is supplied

- from terminal (5) of the ignition switch
- to theft warning relay terminal (3)

Power is supplied at all times

- through 7.5A fuse (No. [19] ), located in the fuse block)
- to security indicator lamp terminal (2).

Power is supplied at all times

- through 25A fusible link (letter [f] ), located in the fusible link and fuse box)
- to circuit breaker terminal (1)
- through circuit breaker terminal (2)

- to smart entrance control unit terminal (1)

With the ignition switch in the ACC or ON position, power is supplied

- through 10A fuse (No. [9] ), located in the fuse block)
- to smart entrance control unit terminal (17)

With the ignition switch in the ON or START position, power is supplied

- through 7.5A fuse (No. [26] ), located in the fuse block)
- to smart entrance control unit terminal (11) and
- to theft warning relay terminal (1).

Ground is supplied

- to smart entrance control unit terminal (10)
- through body ground (M1)

### THEFT WARNING SYSTEM ACTIVATION (Without key or remote controller used to lock doors)

The operation of the theft warning system is controlled by the doors, hood and trunk lid.

To activate the theft warning system, the ignition switch must be in the OFF position and the smart entrance control unit must receive signals indicating the doors, hood and trunk are closed and the doors are locked

When a door is open, smart entrance control unit terminal (15) or (16) receives a ground signal from driver side or passenger side door switch.

When a door is unlocked, smart entrance control unit terminal (12) or (13) receives a ground signal

- from terminal (4) of the driver side door unlock sensor
- from terminal (4) of the passenger side door unlock sensor
- through body grounds (M1) or (M67) for the doors.

When the hood is open, smart entrance control unit terminal (25) receives a ground signal

- from terminal (2) of the hood switch
- through body ground (E43).

When the trunk lid is open, smart entrance control unit terminal (26) receives a ground signal

- from terminal (1) of the trunk room lamp switch
- through body ground (T15).

If none of the described conditions exist, the theft warning system will activate automatically

### THEFT WARNING SYSTEM ACTIVATION (With key or remote controller used to lock doors)

If the key or remote controller is used to lock doors, terminal (40) receives a ground signal

- from terminal (2) of the driver side key cylinder switch and
- from terminal (1) of the passenger side door key cylinder switch
- through body grounds (M1) and (M67).

If this signal 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 (1) of the security indicator lamp

The security lamp will illuminate for approximately 30 seconds and then go on and off

**System Description (Cont'd)****THEFT WARNING SYSTEM OPERATION**

The theft warning system is triggered by

- opening a door or the trunk lid without using the key
- opening the hood
- tampering with the key cylinder in the door

Once the theft warning system has been activated, if the smart entrance control unit receives a ground signal at terminal (15), (16), (26) or (29) (as described under THEFT WARNING SYSTEM ACTIVATION), the theft warning system will be triggered. Also, when a door key tamper signal is received at the smart entrance control unit, the system will be triggered. The hazard warning lamps flash and the horns sound intermittently, and the starting system is interrupted.

When a door key cylinder switch has been tampered with, smart entrance control unit terminal (28) receives a ground signal

- from terminal (3) of each door's key cylinder switch
  - through body ground (M) or (M7)
- if the theft warning system is triggered, ground is supplied

- from terminal (12) of the smart entrance control unit
- to theft warning relay terminal (2).

With power and ground supplied, power to the inhibitor switch (A/T models) or starter motor (M/T models) is interrupted. The starter motor will not crank and the engine will not start.

Power is supplied at all times

- through 7.5A fuse (No. 43), located in the fusible link and fuse box)
- to theft warning horn relay terminals (1) and (6)

Power is supplied at all times

- through 10A fuse (No. 39), located in the fusible link and fuse box)
- to theft warning horn relay terminal (3)

Power is supplied at all times

- through 10A fuse (No. 22), located in the fuse block)
- to multi-remote control relay-1 terminals (1), (3) and (6)

When the theft warning system is triggered, ground is supplied intermittently

- from terminal (8) of the smart entrance control unit
- to theft warning horn relay terminal (2) and
- to multi-remote control relay-1 terminal (2).

The hazard warning lamps flash and the horns sound intermittently

The alarm automatically turns off after approximately 30 seconds but will reactivate if the vehicle is tampered with again.

**THEFT WARNING SYSTEM DEACTIVATION**

To deactivate the theft warning system, a door or the trunk lid must be unlocked with the key or remote controller.

When the key or remote controller is used to unlock a door, smart entrance control unit terminal (11) receives a ground signal

- from terminal (7) of the driver side door key cylinder switch
- from terminal (2) of the passenger side door key cylinder switch

When the key is used to unlock the trunk lid, smart entrance control unit terminal (27) receives a ground signal from terminal (1) of the trunk key cylinder switch.

When the smart entrance control unit receives either one of these signals, the theft warning system is deactivated

**PANIC ALARM OPERATION**

Multi-remote control system may or may not operate theft warning system (horns and hazard warning lamps) as required

When the multi-remote control system is triggered, ground is supplied intermittently.

- from smart entrance control unit terminal (8)
- to theft warning horn relay terminal (2) and
- from smart entrance control unit terminal (7)
- to multi-remote control relay-1 terminal (2)

## THEFT WARNING SYSTEM

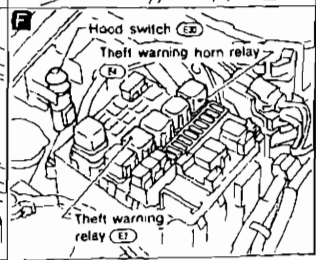
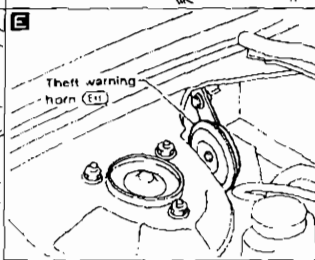
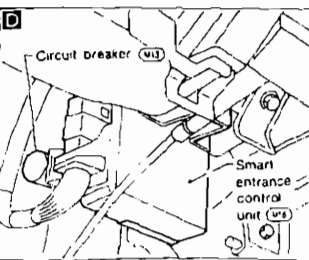
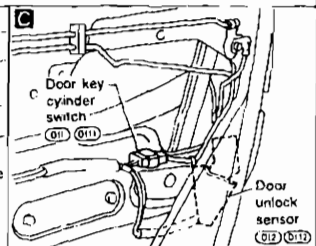
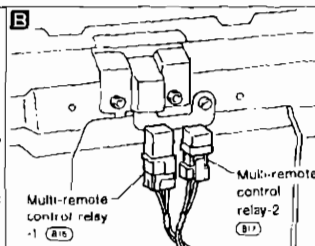
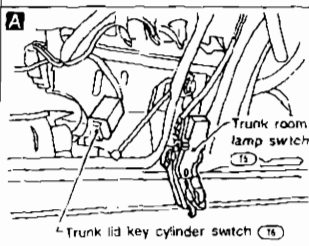
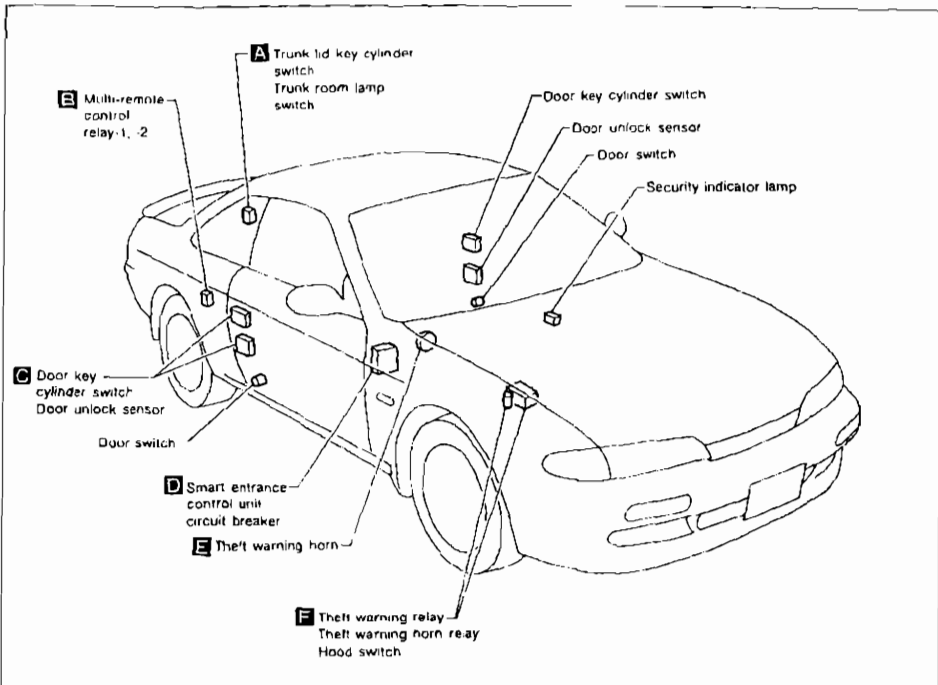
### System Description (Cont'd)

The hazard warning lamps flash and the horns sound intermittently. The alarm automatically turns off after 30 seconds or when smart entrance control unit receives any signal from multi-remote controller.



# THEFT WARNING SYSTEM

## Component Parts and Harness Connector Location

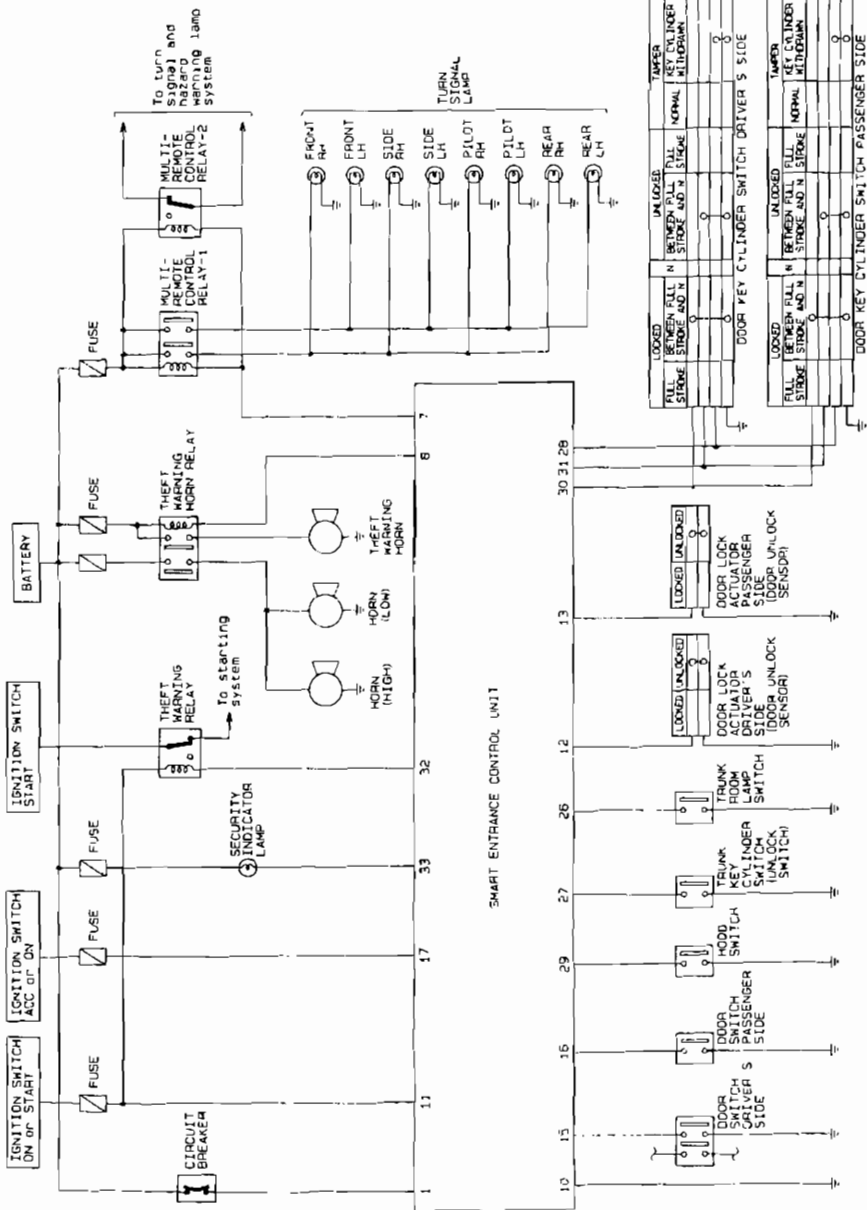


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SEL856T

# THEFT WARNING SYSTEM

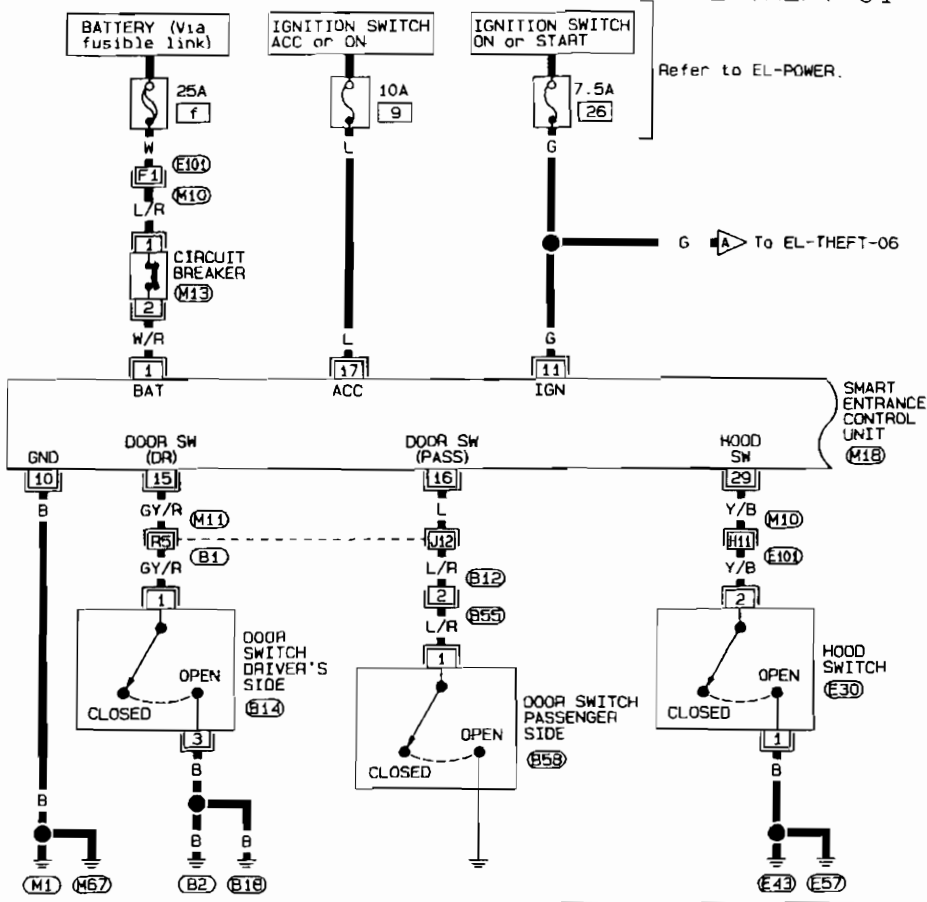
## Schematic



# THEFT WARNING SYSTEM

## Wiring Diagram — THEFT —

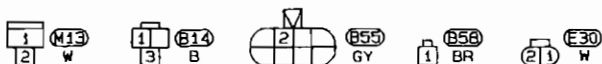
EL-THEFT-01



Refer to EL-POWER.

SMART  
ENTRANCE  
CONTROL  
UNIT  
(M18)

Refer to last page  
(Foldout page).



M10, E101

M11, B1

M18

EL

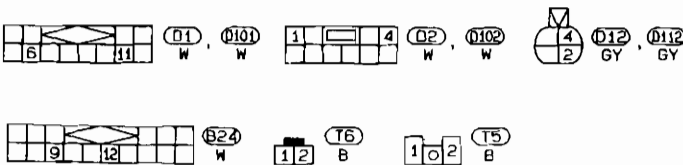
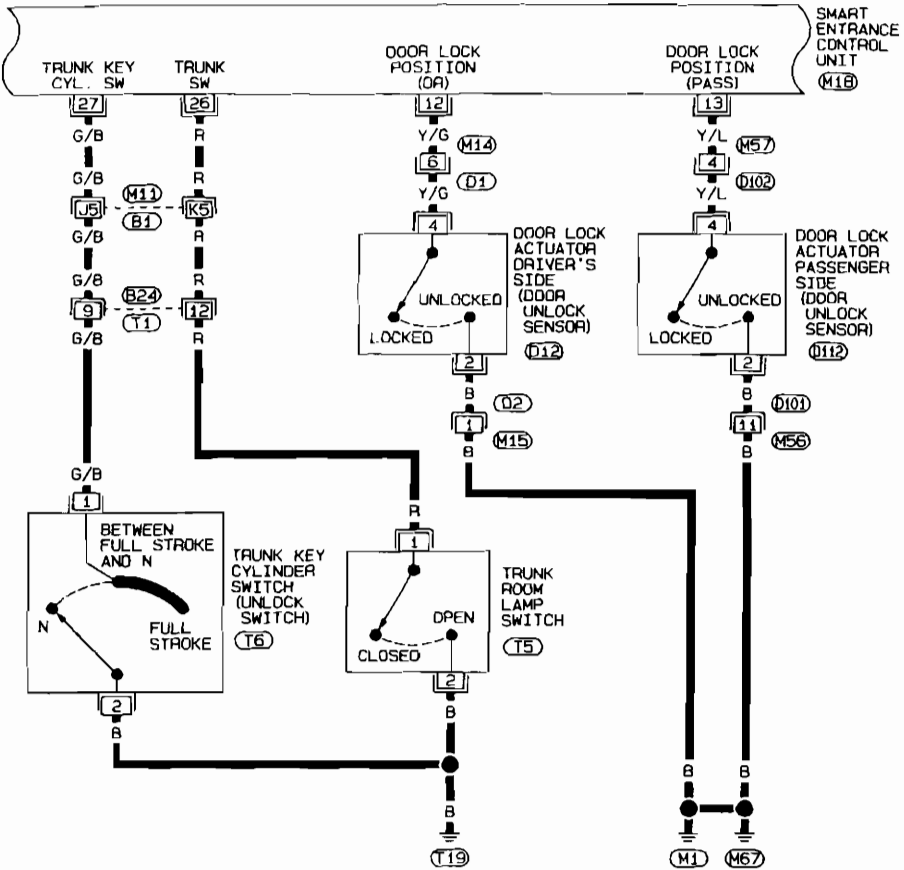
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SEL775T

# THEFT WARNING SYSTEM

## Wiring Diagram — THEFT — (Cont'd)

EL-THEFT-02



Refer to last page (Foldout page).

(M11), (B1)

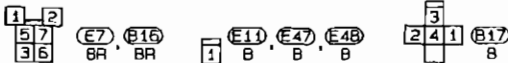
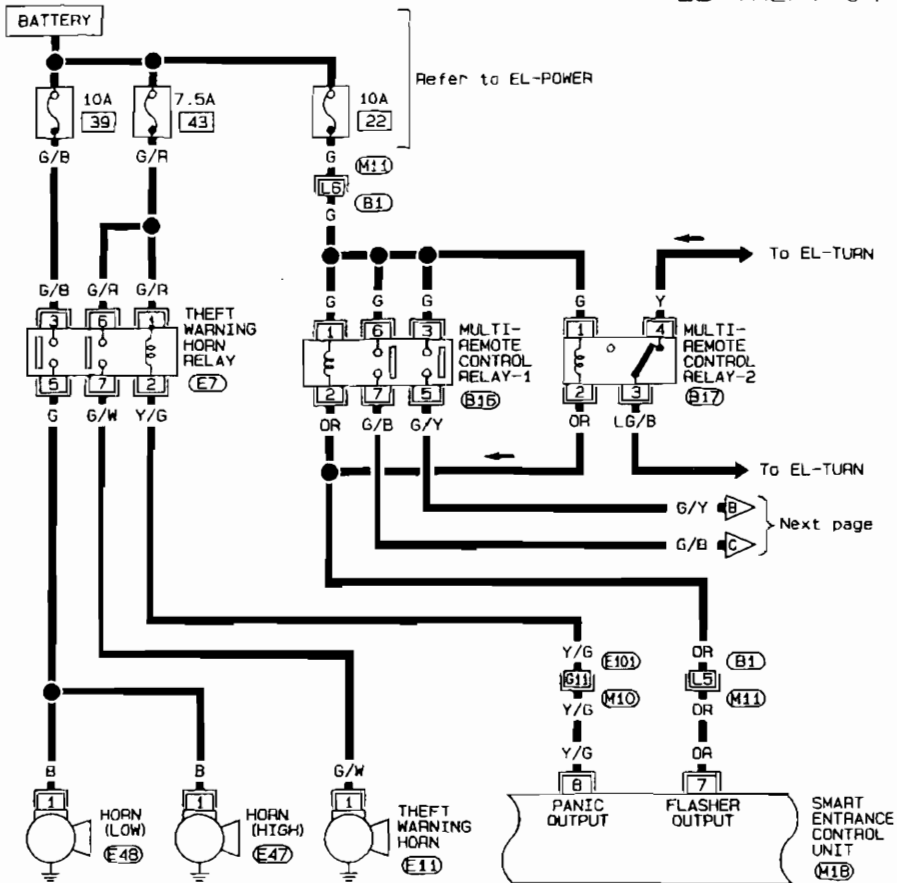
(M16)



# THEFT WARNING SYSTEM

## Wiring Diagram — THEFT — (Cont'd)

EL-THEFT-04



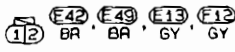
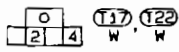
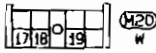
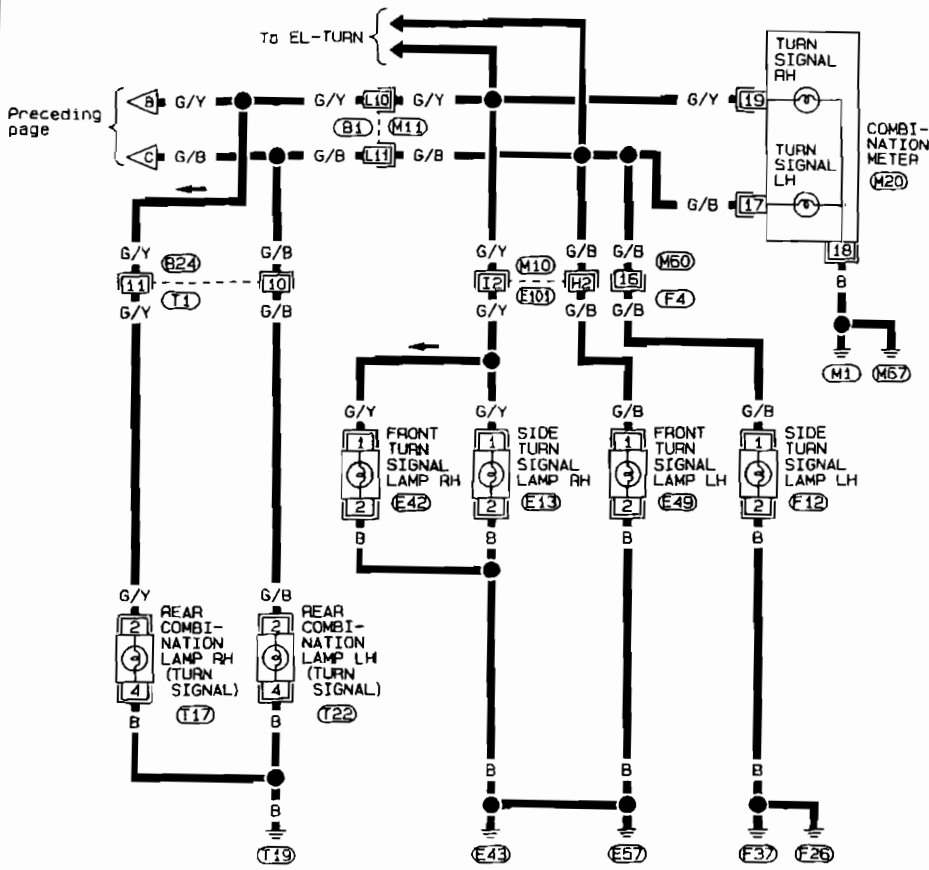
Refer to last page (Foldout page).

- (M10), (E10)
- (M11), (B1)
- (M1B)

# THEFT WARNING SYSTEM

## Wiring Diagram — THEFT — (Cont'd)

EL-THEFT-05



Refer to last page (Foldout page).

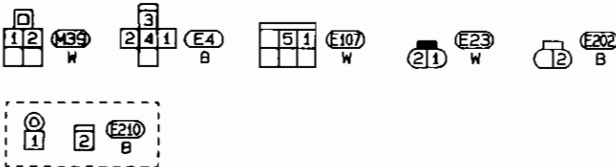
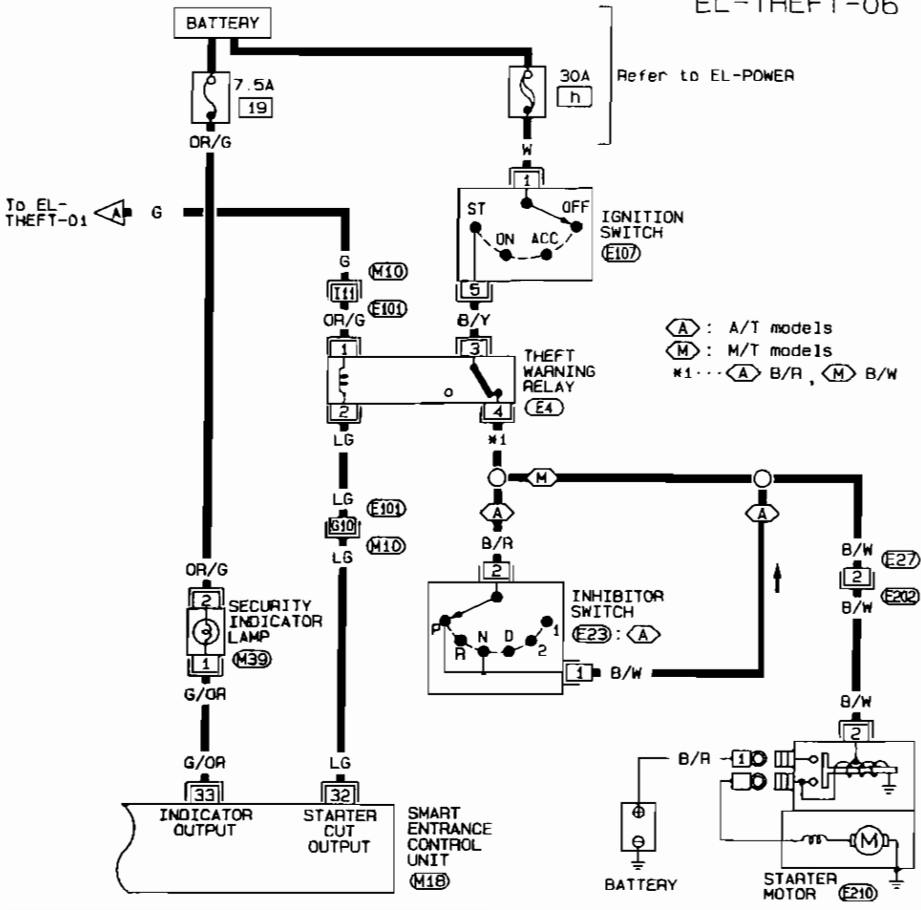
- (M10), (E101)
- (M11), (B1)
- (M60), (F4)

EL

# THEFT WARNING SYSTEM

## Wiring Diagram — THEFT — (Cont'd)

EL-THEFT-06



Refer to last page (Foldout page).

(M10, E101)

(M18)



# THEFT WARNING SYSTEM

## Input/Output Operation Signal

### SMART ENTRANCE CONTROL UNIT

| Terminal No | Connections                         | Operated condition                | Voltage (V)<br>(Approximate values) |
|-------------|-------------------------------------|-----------------------------------|-------------------------------------|
| 1           | Power source (C/B)                  | —                                 | 12V                                 |
| 7           | Multi-remote control relays 1 and 2 | When panic alarm is operated      | 12V · 1V or less                    |
| 8           | Theft warning horn relay            | When panic alarm is operated.     | 12V · 1V or less                    |
| 10          | Ground                              | —                                 | —                                   |
| 11          | Ignition switch (ON)                | "ON" or "START" position          | 12V                                 |
| 12          | Driver door unlock sensor           | Driver door: Locked → Unlocked    | 12V · 4.5V or less                  |
| 13          | Passenger door unlock sensor        | Passenger door: Locked → Unlocked | 12V · 4.5V or less                  |
| 15          | Driver door switch                  | OFF (Closed) → ON (Open)          | 12V · 4.5V or less                  |
| 16          | Passenger door switch               | OFF (Closed) → ON (Open)          | 12V · 1.5V or less                  |
| 17          | Ignition switch (ACC)               | "ACC" or "ON" position            | 12V                                 |
| 26          | Trunk room lamp switch              | ON (Open) → OFF (Closed)          | 0V · 12V                            |
| 27          | Trunk key cylinder switch           | OFF (Neutral) · ON (Unlocked)     | 4.5V or more<br>· 0V                |
| 28          | Door key cylinders tamper switch    | OFF → ON                          | 4.5V or more<br>· 0V                |
| 29          | Hood switch                         | ON (Open) · OFF (Closed)          | 0V · 4.5V or more                   |
| 30          | Door key cylinder lock switch       | OFF (Neutral) → ON (Locked)       | 4.5V or more<br>· 0V                |
| 31          | Door key cylinder unlock switch     | OFF (Neutral) → ON (Unlocked)     | 4.5V or more<br>· 0V                |
| 32          | Theft warning relay (Starter cut)   | OFF → ON                          | 12V · 0V                            |
| 33          | Security indicator                  | Goes off → Illuminates            | 12V · 0V                            |

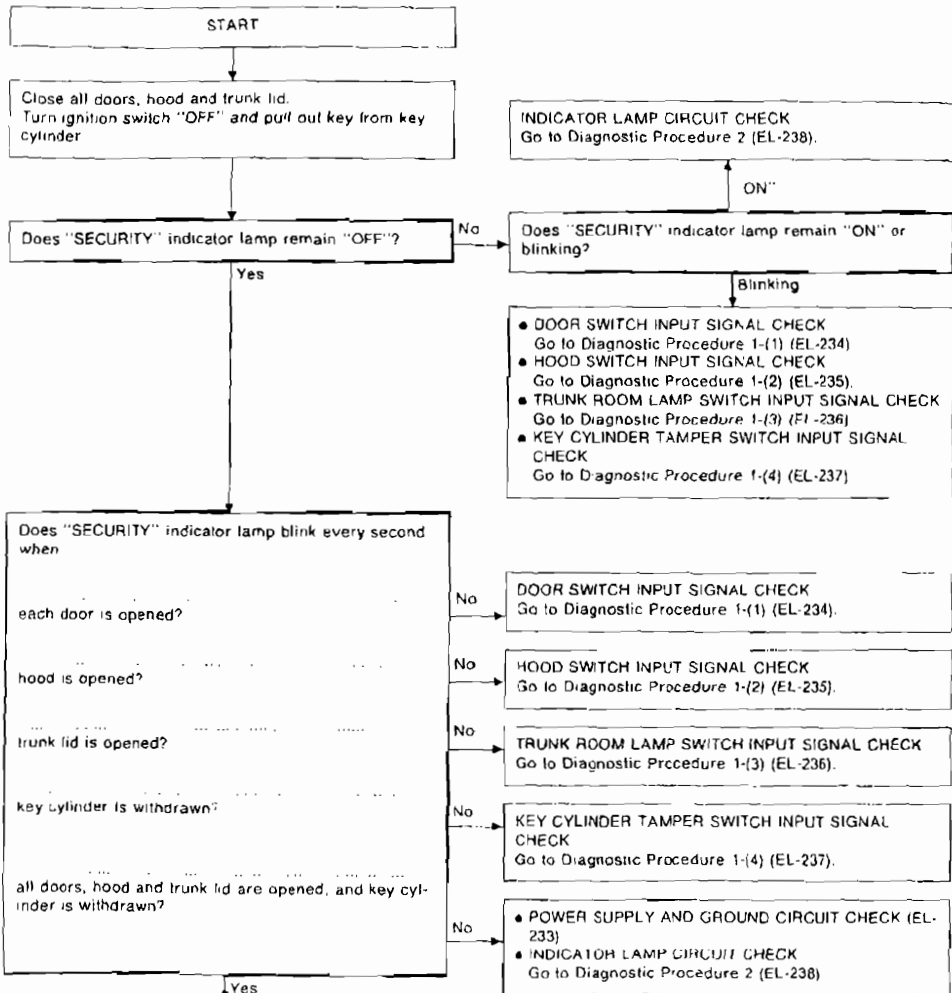
## Trouble Diagnoses

### SYSTEM OPERATION CHECK

The system operation is canceled by turning ignition switch to "ACC" at any step in the following:

- A step between START and ARMED, or
- In the ARMED phase

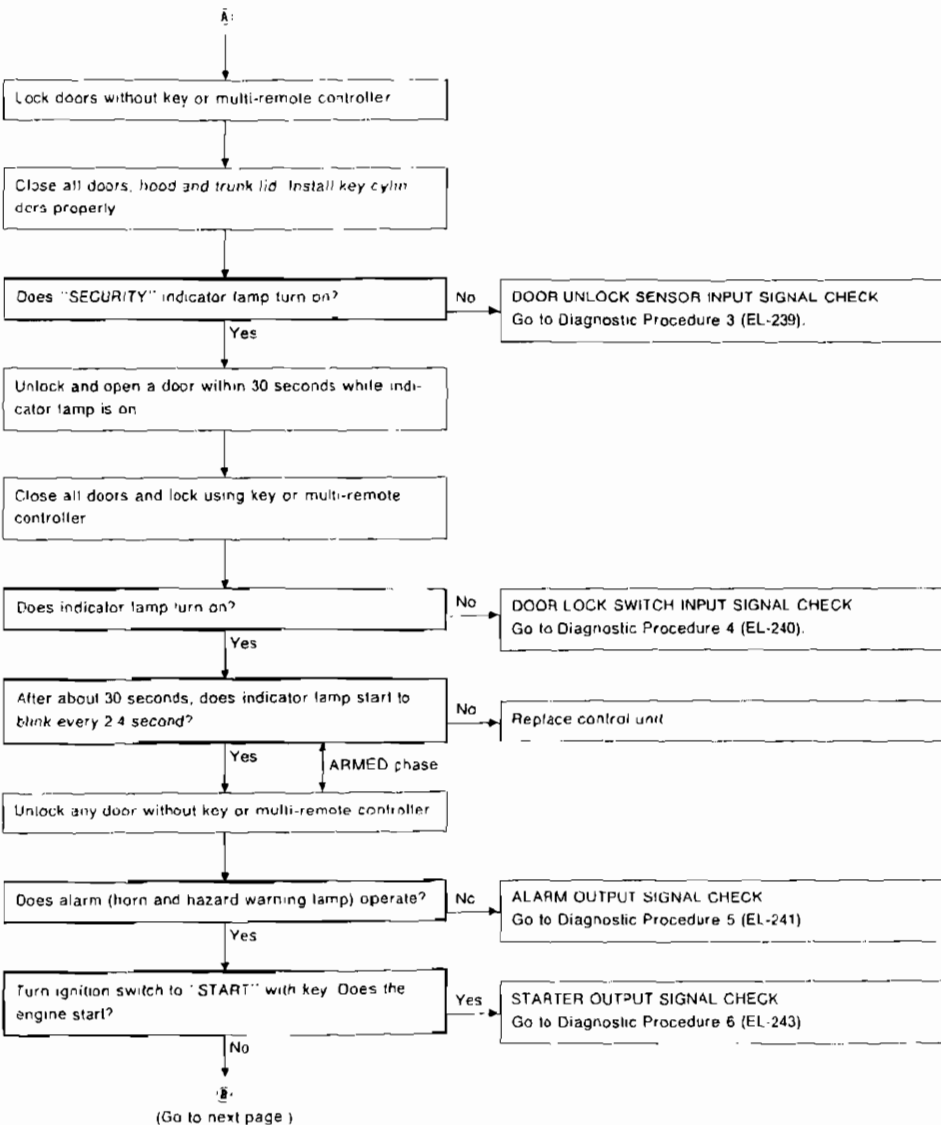
in the following flow chart.



(Go to next page)

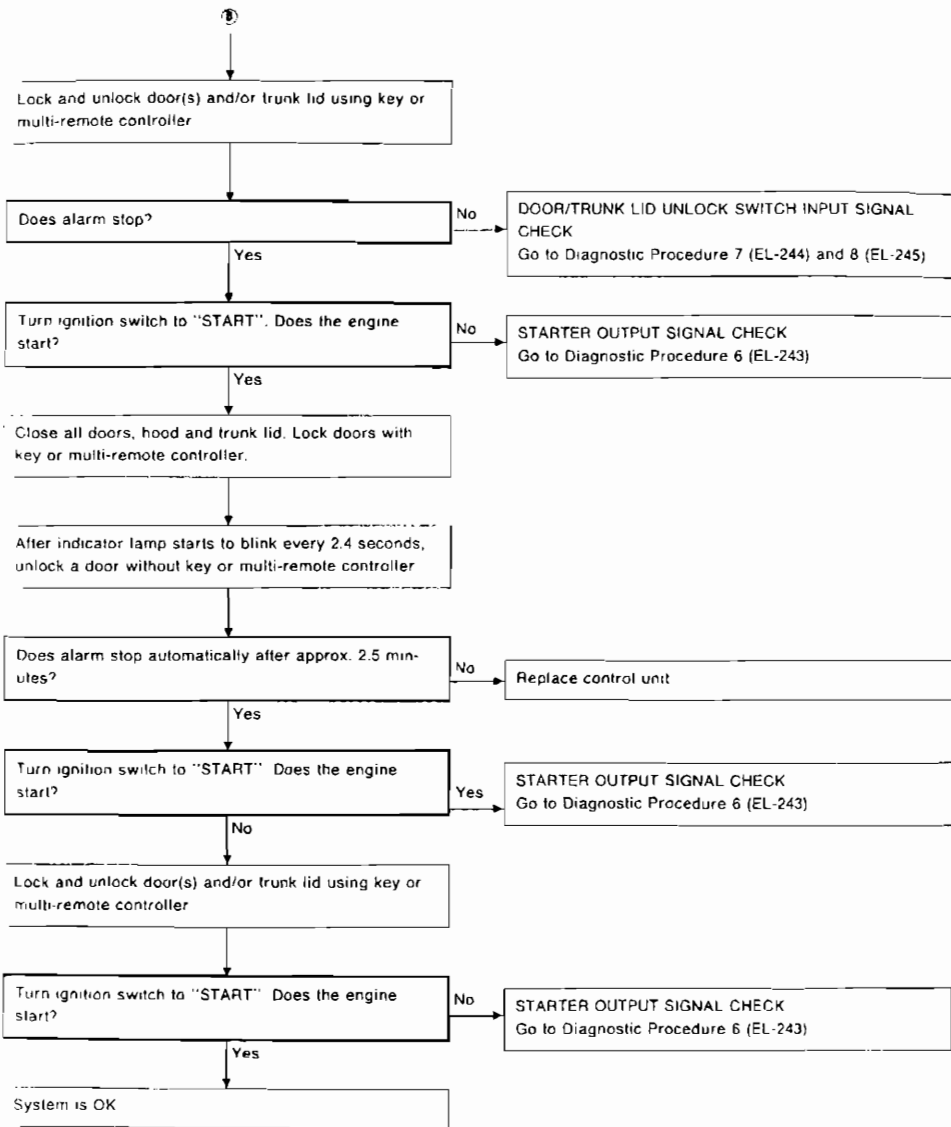
# THEFT WARNING SYSTEM

## Trouble Diagnoses (Cont'd)



# THEFT WARNING SYSTEM

## Trouble Diagnoses (Cont'd)



# THEFT WARNING SYSTEM

## Trouble Diagnoses (Cont'd)

### POWER SUPPLY AND GROUND CIRCUIT CHECK

#### Main power supply circuit check

| Terminals  | Ignition switch position |                 |                 |
|------------|--------------------------|-----------------|-----------------|
|            | OFF                      | ACC             | ON              |
| (1) - (10) | Battery voltage          | Battery voltage | Battery voltage |

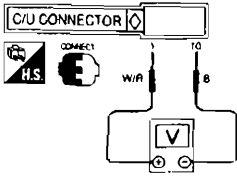
#### Power supply circuit check for system cancel

| Terminals  | Ignition switch position |                 |                 |
|------------|--------------------------|-----------------|-----------------|
|            | OFF                      | ACC             | ON              |
| (1) - (10) | 0V                       | Battery voltage | Battery voltage |

#### Ground circuit check

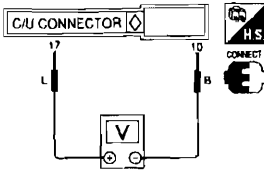
| Terminals     | Continuity |
|---------------|------------|
| (10) - Ground | Yes        |

Smart entrance control unit connector (M18)



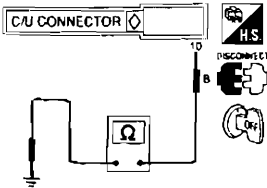
SEL361TA

Smart entrance control unit connector (M18)



SEL362TA

Smart entrance control unit connector (M18)



SEL363TA

# THEFT WARNING SYSTEM

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 1

- SYMPTOM:**
- Indicator lamp does not blink or
  - Indicator lamp remains blinking every second.
- Diagnostic procedure 1-(1)**

**A**

**DOOR SWITCH INPUT SIGNAL CHECK**  
Check continuity between control unit harness terminals (15) or (16) and (10)

| Condition                  | Continuity between (15) and (10) |
|----------------------------|----------------------------------|
| Driver side door is closed | No                               |
| Driver side door is opened | Yes                              |

| Condition                     | Continuity between (16) and (10) |
|-------------------------------|----------------------------------|
| Passenger side door is closed | No                               |
| Passenger side door is opened | Yes                              |

NG

**DOOR SWITCH CHECK**  
Refer to "Electrical Components Inspection" (EL-245)

NG

Replace door switch

OK

**B**

**DOOR SWITCH CIRCUIT CHECK**

- Check harness continuity between control unit harness terminal (15) or (16) and door switch harness terminal (3) and body ground.
  - Check harness continuity between driver side door switch harness terminal (3) and body ground.
- Continuity should exist.**

NG

Repair harness or connectors

OK

**C**

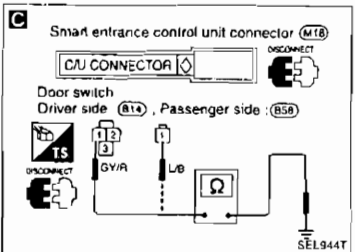
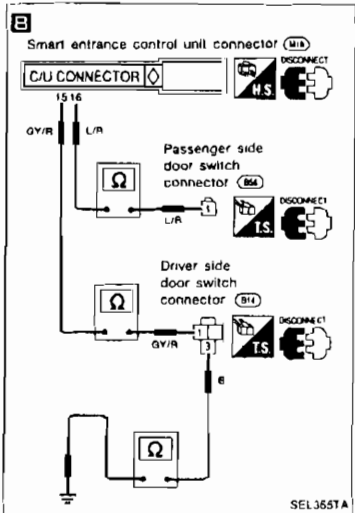
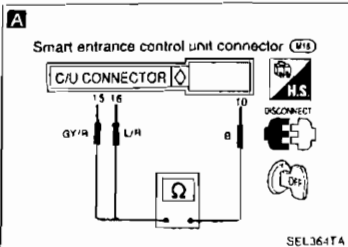
Check harness continuity between door switch harness terminal and body ground.  
(Before checking harness continuity, control unit harness connector should be disconnected.)  
**Continuity should not exist.**

NG

Repair harness  
(Short circuit exists between control unit harness terminal (15) or (16) and door switch harness terminals)

OK

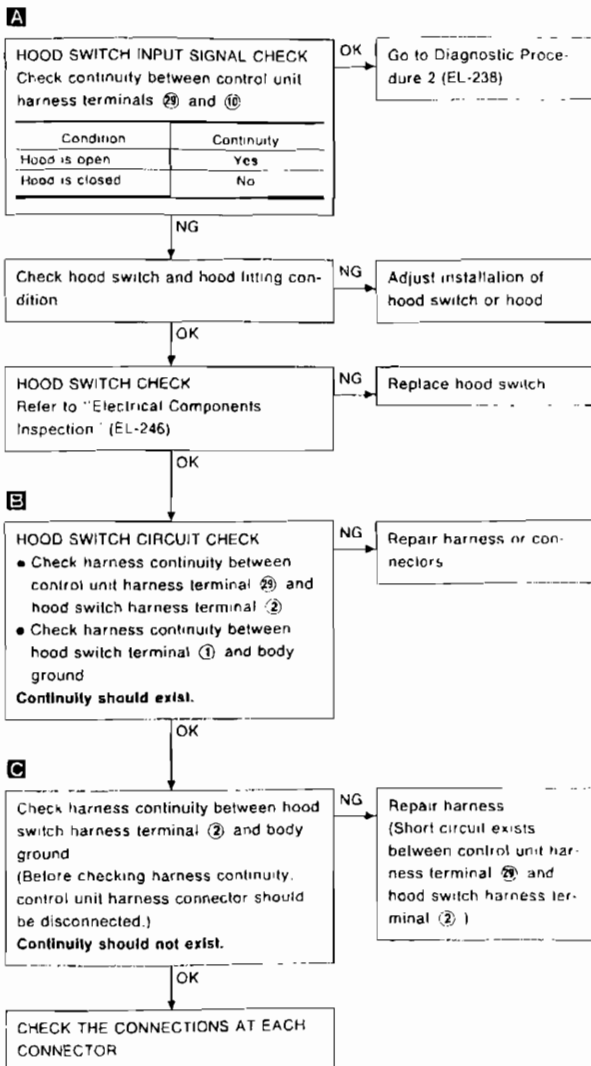
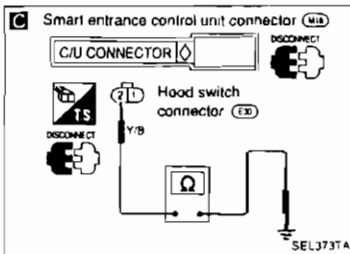
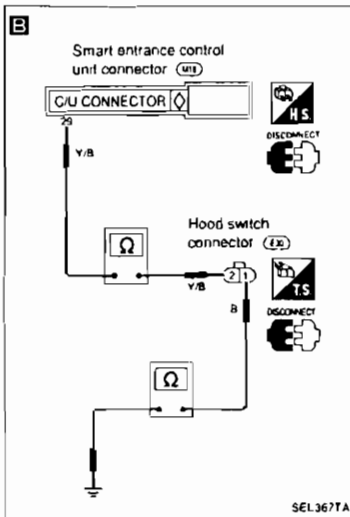
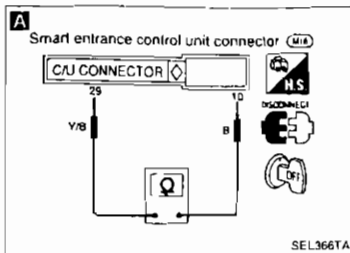
**CHECK THE CONNECTIONS AT EACH CONNECTOR**



# THEFT WARNING SYSTEM

## Trouble Diagnoses (Cont'd)

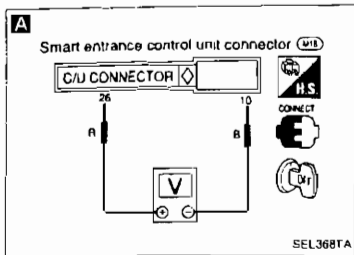
### Diagnostic procedure 1-(2)



# THEFT WARNING SYSTEM

## Trouble Diagnoses (Cont'd)

### Diagnostic procedure 1-(3)



**A**

#### TRUNK ROOM LAMP SWITCH INPUT SIGNAL CHECK

Check voltage between control unit harness terminals ②⑥ and ⑩.

| Condition            | Voltage    |
|----------------------|------------|
| Trunk lid is open.   | Approx 0V  |
| Trunk lid is closed. | Approx 12V |

OK

Go to Diagnostic Procedure 2 (EL-238)

NG

#### TRUNK ROOM LAMP SWITCH CHECK

Refer to "Electrical Components Inspection" (EL-246).

NG

Replace trunk room lamp switch.

OK

**B**

#### TRUNK ROOM LAMP SWITCH CIRCUIT CHECK

- Check harness continuity between control unit harness terminal ②⑥ and trunk room lamp switch harness terminal ①.
  - Check harness continuity between trunk room lamp switch harness terminal ② and body ground
- Continuity should exist.**

NG

Repair harness or connectors

OK

**C**

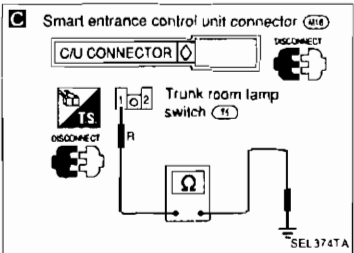
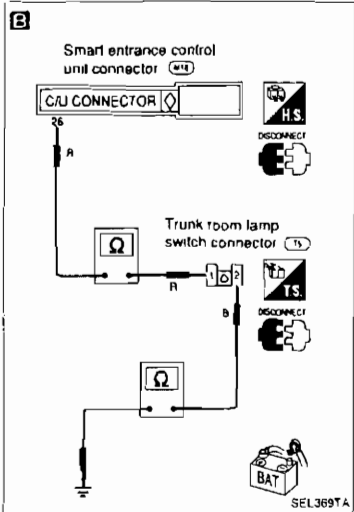
Check harness continuity between trunk room lamp switch harness terminal ① and body ground  
(Before checking harness continuity, control unit harness connector should be disconnected)  
**Continuity should not exist.**

NG

Repair harness  
(Short circuit exists between control unit harness terminal ②⑥ and trunk room lamp switch harness terminal ①)

OK

CHECK THE CONNECTIONS AT EACH CONNECTOR

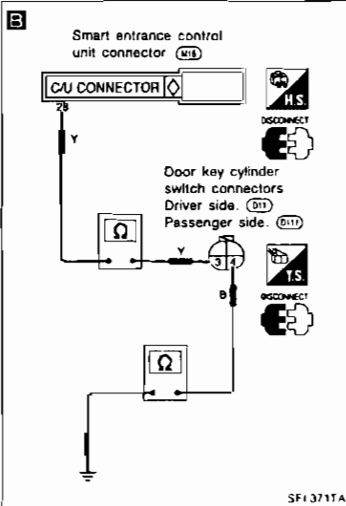
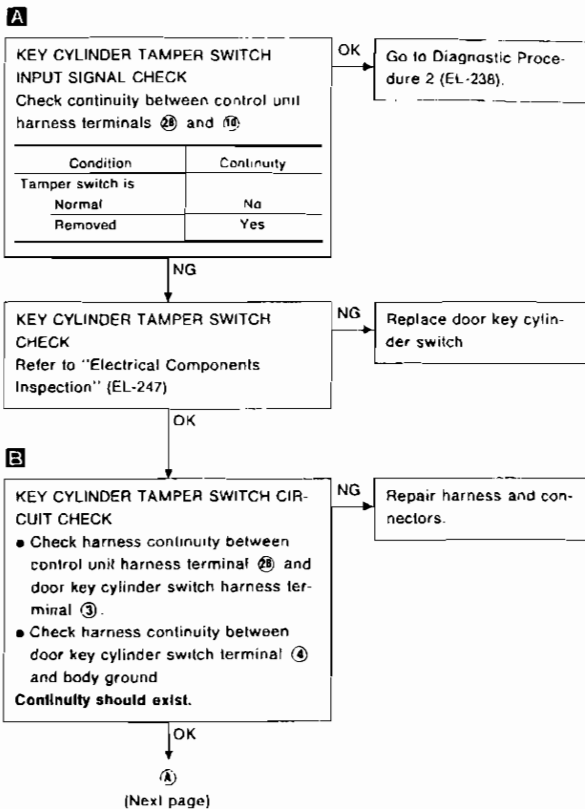
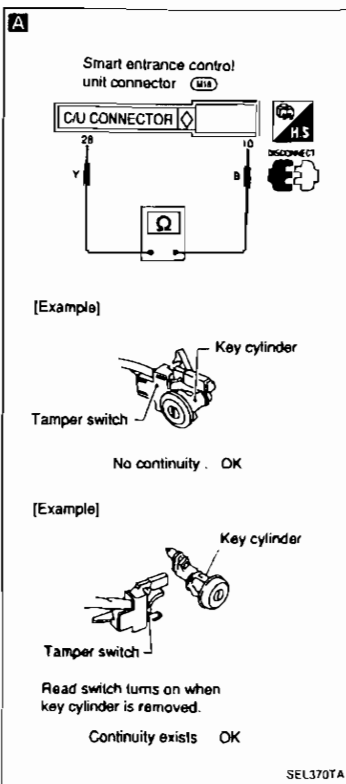




# THEFT WARNING SYSTEM

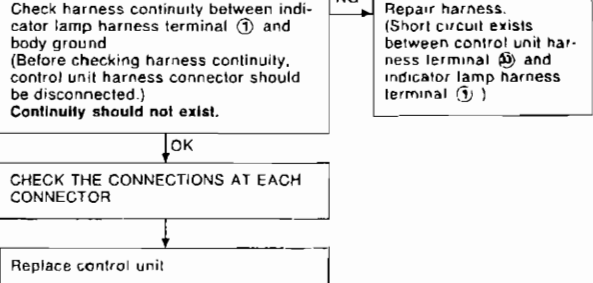
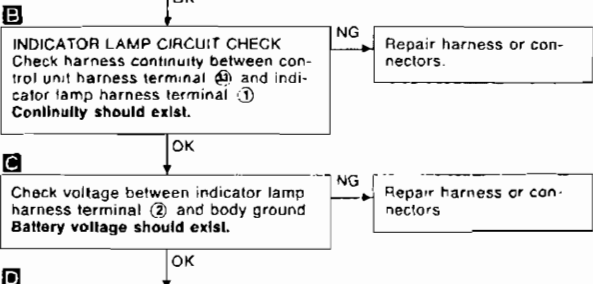
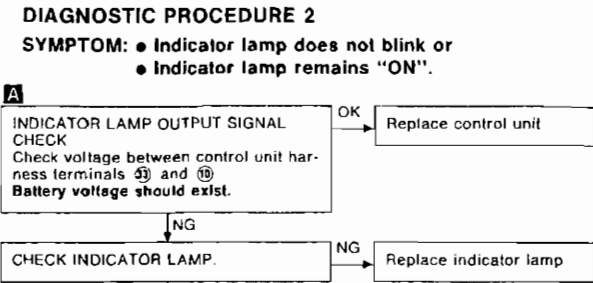
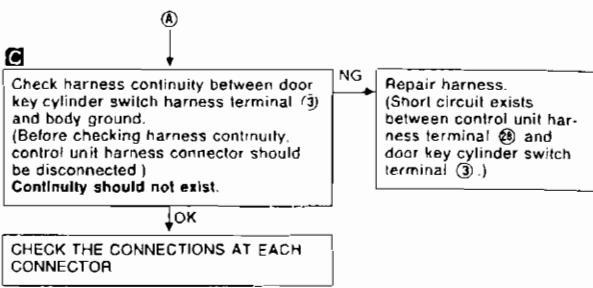
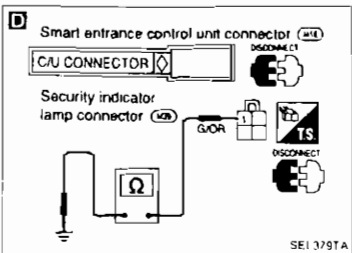
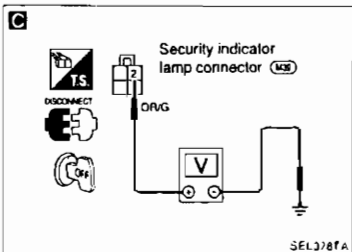
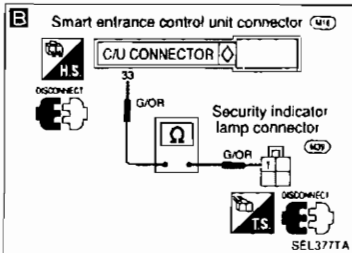
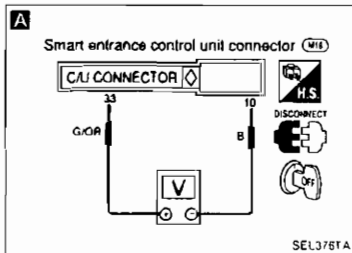
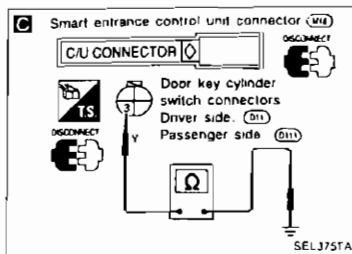
## Trouble Diagnoses (Cont'd)

### Diagnostic procedure 1-(4)



# THEFT WARNING SYSTEM

## Trouble Diagnoses (Cont'd)

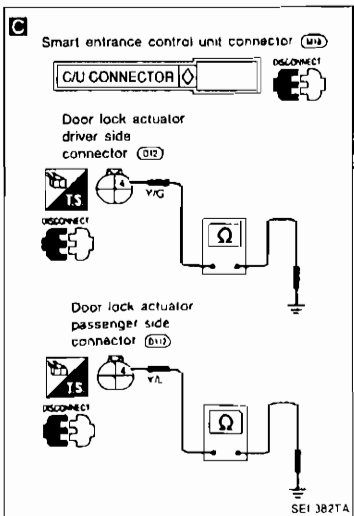
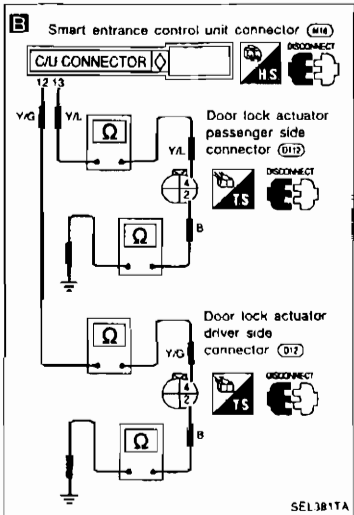
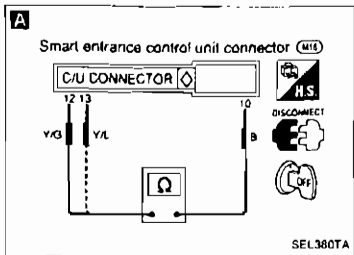


# THEFT WARNING SYSTEM

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 3

**SYMPTOM:** Indicator lamp does not come on.



**A**

#### DOOR UNLOCK SENSOR INPUT SIGNAL CHECK

Check continuity between control unit harness terminals (12) or (13) and (10).

| Condition                    | Continuity between (12) and (10) |
|------------------------------|----------------------------------|
| Driver side door is locked   | No                               |
| Driver side door is unlocked | Yes                              |

| Condition                        | Continuity between (13) and (10) |
|----------------------------------|----------------------------------|
| Passenger side door is locked.   | No                               |
| Passenger side door is unlocked. | Yes                              |

OK → Go to Diagnostic Procedure 2 (EL-238)

OK

Replace control unit

NG

**DOOR UNLOCK SENSOR CHECK**  
Refer to "Electrical Components Inspection" (EL-247).

NG → Replace door lock actuator.

OK

**B**

#### DOOR UNLOCK SENSOR CIRCUIT CHECK

- Check harness continuity between control unit harness terminal (12) or (13) and door actuator terminal (4)
  - Check harness continuity between door lock actuator harness terminal (2) and body ground.
- Continuity should exist.**

NG → Repair harness or connectors

OK

**C**

Check harness continuity between door lock actuator harness terminal (4) and body ground.  
(Before checking harness continuity, control unit harness connector should be disconnected)  
**Continuity should not exist.**

NG → Repair harness (Short circuit exists between control unit harness terminal (12) or (13) and door lock actuator harness terminal (4))

OK

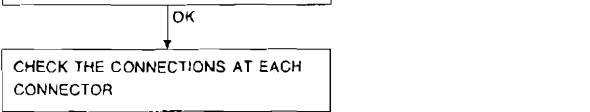
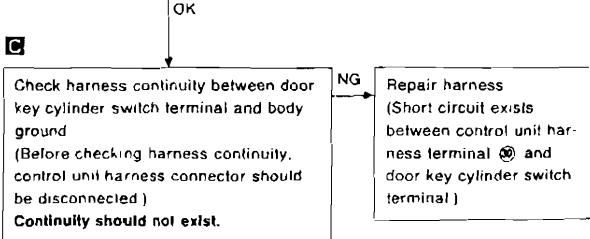
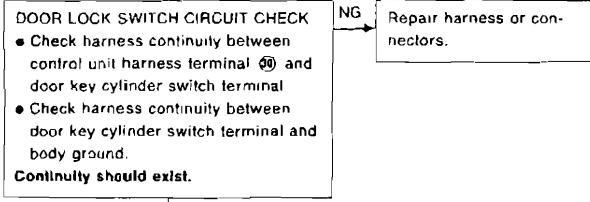
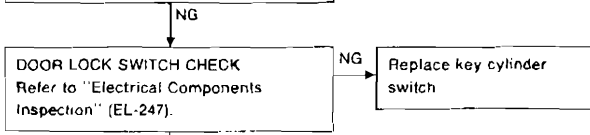
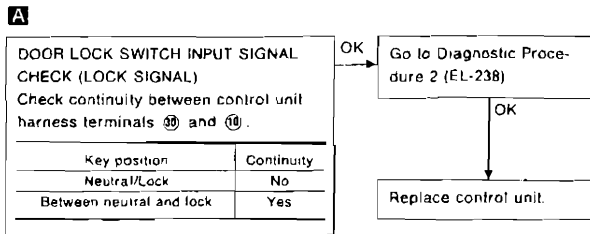
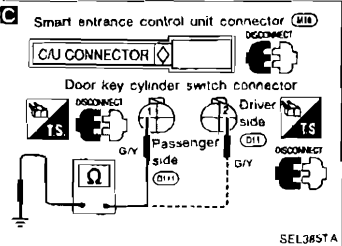
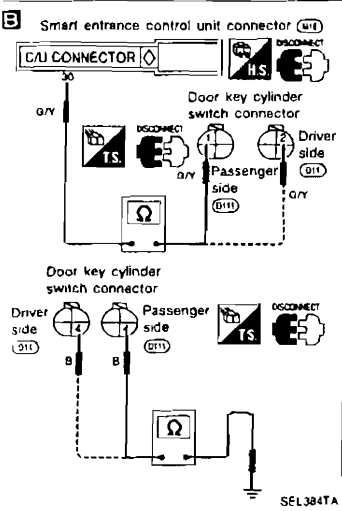
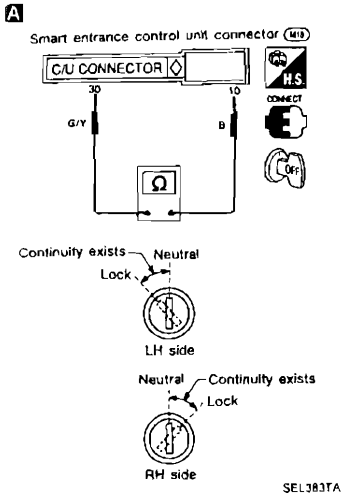
CHECK THE CONNECTIONS AT EACH CONNECTOR

# THEFT WARNING SYSTEM

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 4

**SYMPTOM: Indicator lamp does not come on.**



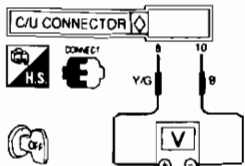
# THEFT WARNING SYSTEM

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 5

SYMPTOM: Alarm does not operate.

Smart entrance control unit connector (V13)



SEL386TA

**A**

#### ALARM SIGNAL OUTPUT CHECK

Check voltage between control unit harness terminals (8) and (10)

| Condition          | Voltage                               |
|--------------------|---------------------------------------|
| Except alarm phase | Approx 12V                            |
| Alarm phase        | Voltage fluctuates between 12V and 0V |

#### CHECK THE FOLLOWING

- Harness continuity between control unit harness terminal (8) and theft warning horn relay harness terminal (2)
- Harness continuity between fuse and theft warning horn relay harness terminal (1)
- Harness continuity between control unit harness terminal (8) and horn relay harness terminal (1)
- Harness continuity between fuse and horn relay harness terminal (2)
- Theft warning horn relay. Refer to "Electrical Components Inspection" (EL-248).

OK

**B**

#### HORN CIRCUIT CHECK

- Check voltage between theft warning horn relay harness terminal (3) and body ground, terminal (6) and body ground

**Battery voltage should exist.**

- Check harness continuity between theft warning horn relay harness terminals (3), (7) and horn harness terminals.

**Continuity should exist.**

#### ALARM SIGNAL INPUT CHECK

- Door switch circuit Refer to Diagnostic Procedure 1-(1) (EL-234)
- Hood switch circuit Refer to Diagnostic Procedure 1-(2) (EL-235).
- Trunk room lamp switch circuit Refer to Diagnostic Procedure 1-(3) (EL-236)
- Key cylinder tamper switch circuit Refer to Diagnostic Procedure 1-(4) (EL-237).
- Door unlock sensor circuit Refer to Diagnostic Procedure 3 (EL-239).

OK

OK

OK

NG

OK

NG

OK

NG

**HORN CHECK**  
Refer to "Electrical Components Inspection" (EL-247)

OK

NG

**THEFT WARNING HORN RELAY CHECK**  
Refer to "Electrical Components Inspection" (EL-248)

OK

NG

Repair harness or connectors

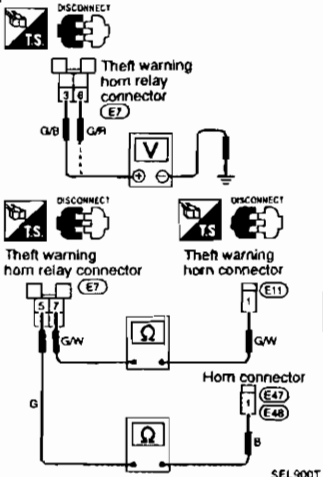
Replace horn

Replace relay

Replace control unit

(Next page)

**B**

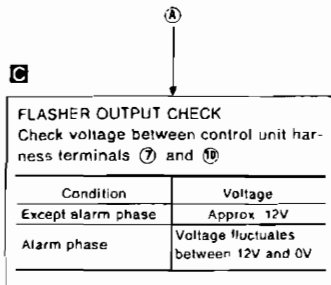
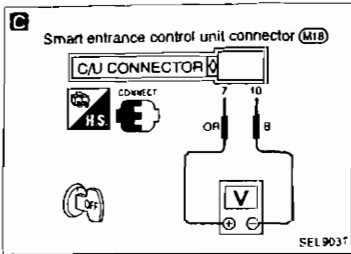


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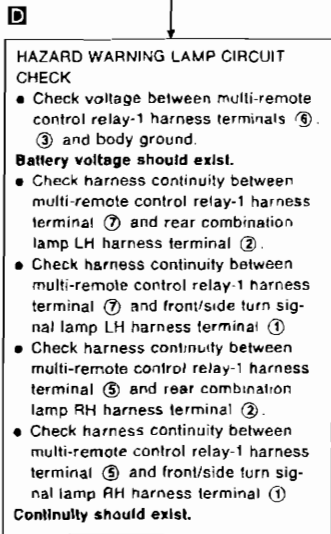
# THEFT WARNING SYSTEM

## Trouble Diagnoses (Cont'd)

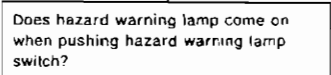


NG → CHECK THE FOLLOWING.

- Harness continuity between control unit harness terminal (7) and multi-remote control relay-1 harness terminal (2)
- Harness continuity between fuse and multi-remote control relay-1 harness terminal (1)
- Harness continuity between control unit harness terminal (7) and multi-remote control relay-1 harness terminal (1)
- Harness continuity between fuse and multi-remote control relay-1 harness terminal (2)
- Multi-remote control relay-1 Refer to "Electrical Components Inspection" (EL-248).

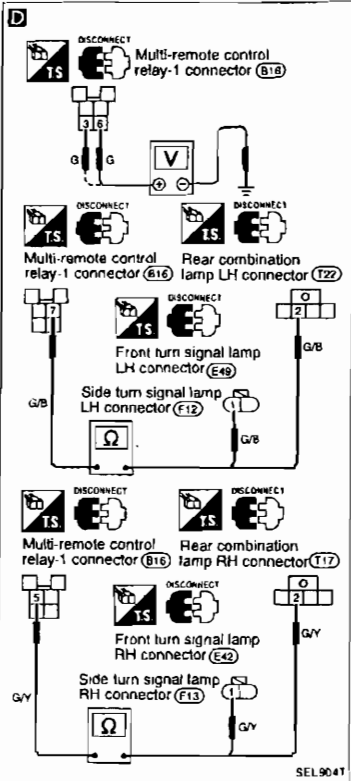


NG → Repair harness or connectors



No → Check turn signal lamp system Refer to "TURN SIGNAL LAMP" (EL-93)

Yes → CHECK THE CONNECTIONS AT EACH CONNECTOR.



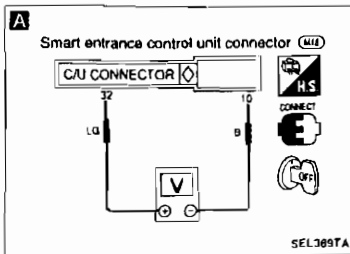
# THEFT WARNING SYSTEM

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 6

**SYMPTOM:**

- **STARTER MOTOR** can be operated. (Starter killed phase) or
- **STARTER MOTOR** cannot be operated after the theft warning system is deactivated.



**A**

#### STARTER MOTOR KILL OUTPUT SIGNAL CHECK

Check voltage between control unit harness terminals ⑫ and ⑩

| Condition                   | Voltage     |
|-----------------------------|-------------|
| Except starter killed phase | Approx. 12V |
| Starter killed phase        | 0V          |

NG

#### CHECK THE FOLLOWING.

- Harness continuity between control unit harness terminal ⑫ and theft warning relay harness terminal ②
- Harness continuity between theft warning relay harness terminal ① and fuse
- Theft warning relay  
Refer to "Electrical Components Inspection" (EL-248)

OK

OK

#### THEFT WARNING RELAY CHECK

Refer to "Electrical Components Inspection" (EL-248)

Replace control unit.

OK

NG

Replace relay

CHECK THE CONNECTIONS AT EACH CONNECTOR.

# THEFT WARNING SYSTEM

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 7

**SYMPTOM: Alarm does not stop even if stop signal is given.**

**A**

**DOOR UNLOCK SWITCH INPUT SIGNAL CHECK (UNLOCK SIGNAL)**

Check continuity between control unit harness terminals ⑪ and ⑫.

| Key position               | Continuity |
|----------------------------|------------|
| Neutral/Unlock             | No         |
| Between neutral and unlock | Yes        |

OK

**ALARM OUTPUT SIGNAL CHECK**  
Go to Diagnostic Procedure 5. (EL-241).

NG

**DOOR UNLOCK SWITCH CHECK**

Refer to "Electrical Components Inspection" (EL-247).

NG

Replace key cylinder switch.

OK

**B**

**DOOR UNLOCK SWITCH CIRCUIT CHECK**

- Check harness continuity between control unit harness terminal ⑪ and door key cylinder switch terminal.
- Check harness continuity between door key cylinder switch terminal and body ground.

**Continuity should exist.**

NG

Repair harness or connectors.

OK

**C**

Check harness continuity between door key cylinder switch terminal and body ground.

(Before checking harness continuity, control unit harness connector should be disconnected.)

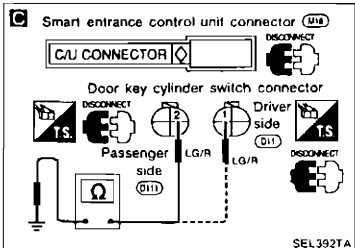
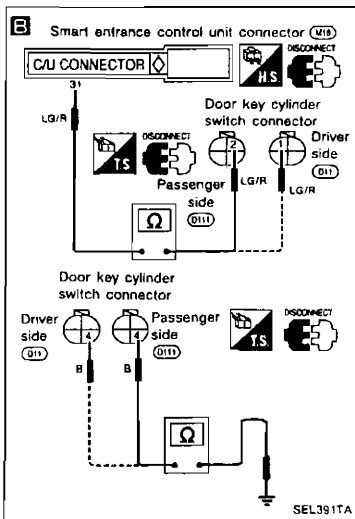
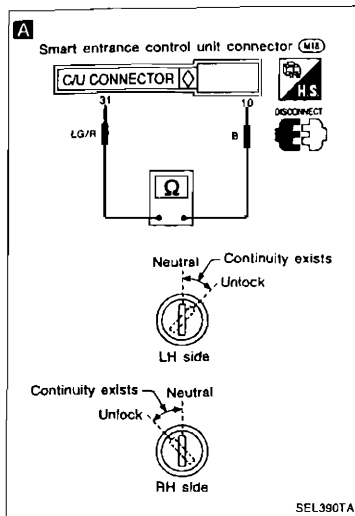
**Continuity should not exist.**

NG

Repair harness.  
(Short circuit exists between control unit harness terminal ⑪ and door key cylinder switch terminal.)

OK

**CHECK THE CONNECTIONS AT EACH CONNECTOR.**



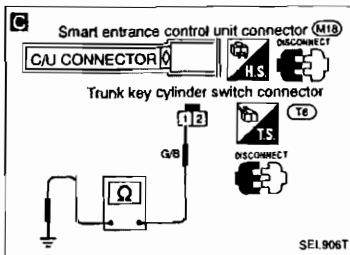
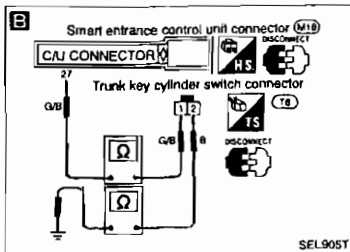
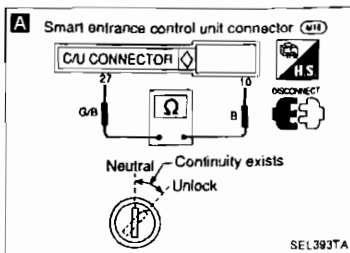


# THEFT WARNING SYSTEM

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 8

**SYMPTOM:** Alarm does not stop even if stop signal is given.



**A**

TRUNK KEY CYLINDER SWITCH INPUT SIGNAL CHECK (UNLOCK SIGNAL)  
Check continuity between control unit harness terminals ② and ⑩.

| Key position               | Continuity |
|----------------------------|------------|
| Neutral/Unlock             | No         |
| Between neutral and unlock | Yes        |

OK

ALARM OUTPUT SIGNAL CHECK  
Go to Diagnostic Procedure 5. (EL-241)

NG

TRUNK KEY CYLINDER SWITCH CHECK  
Refer to "Electrical Components Inspection" (EL-247).

NG

Replace trunk key cylinder switch.

OK

**B**

TRUNK KEY CYLINDER SWITCH CIRCUIT CHECK

- Check harness continuity between control unit harness terminal ② and trunk key cylinder switch terminal ①
- Check harness continuity between trunk key cylinder switch terminal ② and body ground.

NG

Repair harness or connectors.

OK

Check harness continuity between trunk key cylinder switch harness terminal ① and body ground.  
(Before checking harness continuity, control unit harness connector should be disconnected.)  
**Continuity should not exist.**

NG

Repair harness.  
(Short circuit exists between control unit harness terminal ② and trunk key cylinder switch harness terminal ①.)

OK

CHECK THE CONNECTIONS AT EACH CONNECTOR.

# THEFT WARNING SYSTEM

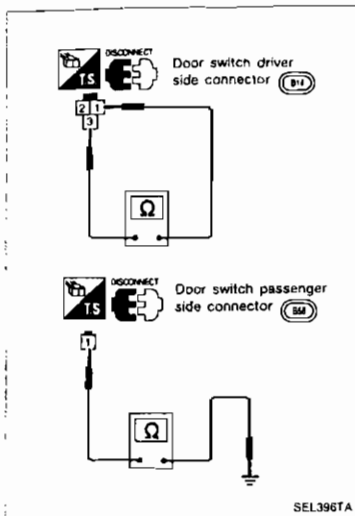
## Trouble Diagnoses (Cont'd)

### ELECTRICAL COMPONENTS INSPECTION

#### Door switches

Check continuity between terminals when door switch is pushed and released.

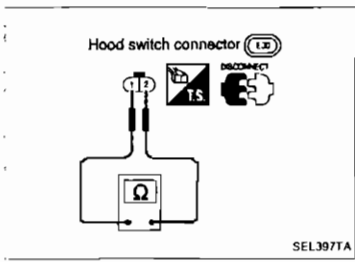
| Terminal No.                       | Condition                | Continuity |
|------------------------------------|--------------------------|------------|
| Driver side:<br>① - ③              | Door switch is pushed    | No         |
|                                    | Door switch is released. | Yes        |
| Passenger side:<br>① - body ground | Door switch is released. | Yes        |



#### Hood switch

Check continuity between terminals when hood switch is pushed and released.

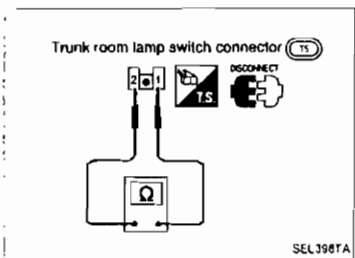
| Terminal No. | Condition               | Continuity |
|--------------|-------------------------|------------|
| ① - ②        | Hood switch is pushed   | No         |
|              | Hood switch is released | Yes        |



#### Trunk room lamp switch

Check continuity between terminals when trunk lid is closed and opened.

| Terminal No. | Condition            | Continuity |
|--------------|----------------------|------------|
| ① - ②        | Trunk lid is closed. | No         |
|              | Trunk lid is opened. | Yes        |



## Trouble Diagnoses (Cont'd)

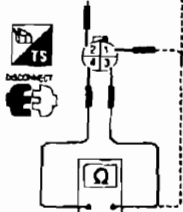
### Key cylinder tamper switch, door lock switch and door unlock switch

#### ● Door key cylinder switch

Door key cylinder switch connector

Driver side (G11)

Passenger side (G111)



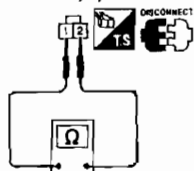
- ① Door lock switch terminal (Passenger side)
- ② Door unlock switch terminal (Driver side)
- ③ Door lock switch terminal (Passenger side)
- ④ Door lock switch terminal (Driver side)
- ⑤ Key cylinder tamper switch terminal
- ⑥ Ground terminal

SEL399TA

|                    | Terminal No.                                | Condition                                   | Continuity |
|--------------------|---|---|------------|
| Tamper switch      | ③ - ④                                       | Key cylinder is installed                   | No         |
|                    |   | Key cylinder is removed                     | Yes        |
| Door lock switch   | Driver side: ② - ④<br>Passenger side: ① - ④ | Key position is neutral or lock.            | No         |
|                    |   | Key position is between neutral and lock.   | Yes        |
| Door unlock switch | Driver side ① - ③<br>Passenger side ② - ④   | Key position is neutral or unlock           | No         |
|                    |   | Key position is between neutral and unlock. | Yes        |

#### ● Trunk key cylinder switch (unlock switch)

Trunk key cylinder switch (T8)



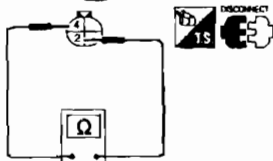
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| Terminal No. | Condition               | Continuity |
|--------------|-------------------------|------------|
| ① - ②        | Key position is neutral | No         |
|              | Key position is unlock  | Yes        |

#### ● Door lock actuator (Door unlock sensor)

Door lock actuator connectors

Driver side (D12), Passenger side (D112)



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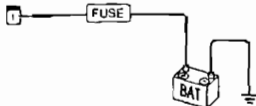
| Terminal No. | Condition         | Continuity |
|--------------|-------------------|------------|
| ④ - ②        | Door is locked    | No         |
|              | Door is unlocked. | Yes        |

#### Horns

Supply horn terminal with battery voltage and check horn operation.

Horn connectors

(E11), (E1), (E4)



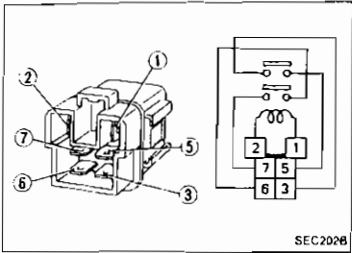
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## THEFT WARNING SYSTEM

### Trouble Diagnoses (Cont'd)

#### Theft warning horn relay and multi-remote control relay-1

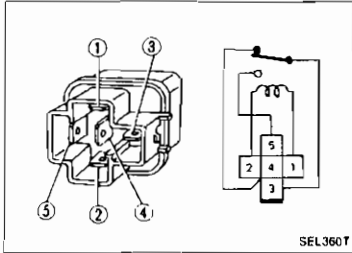
Check continuity between terminals ③ and ⑤, ⑥ and ⑦.



| Condition   | Continuity |
|---|------------|
| 12V direct current supply between terminals ① and ② | Yes        |
| No current supply                                   | No         |

#### Theft warning relay

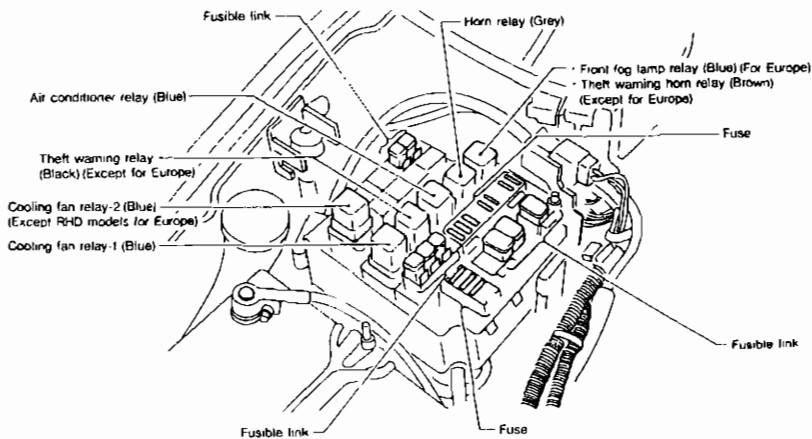
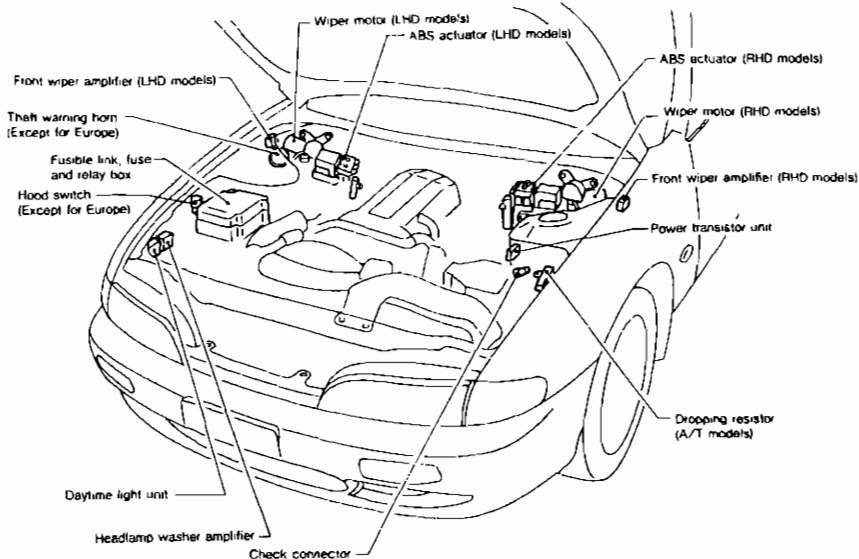
Check continuity between terminals ③ and ④



| Condition   | Continuity |
|---|------------|
| 12V direct current supply between terminals ① and ② | No         |
| No current supply                                   | Yes        |

# LOCATION OF ELECTRICAL UNIT

## Engine Compartment

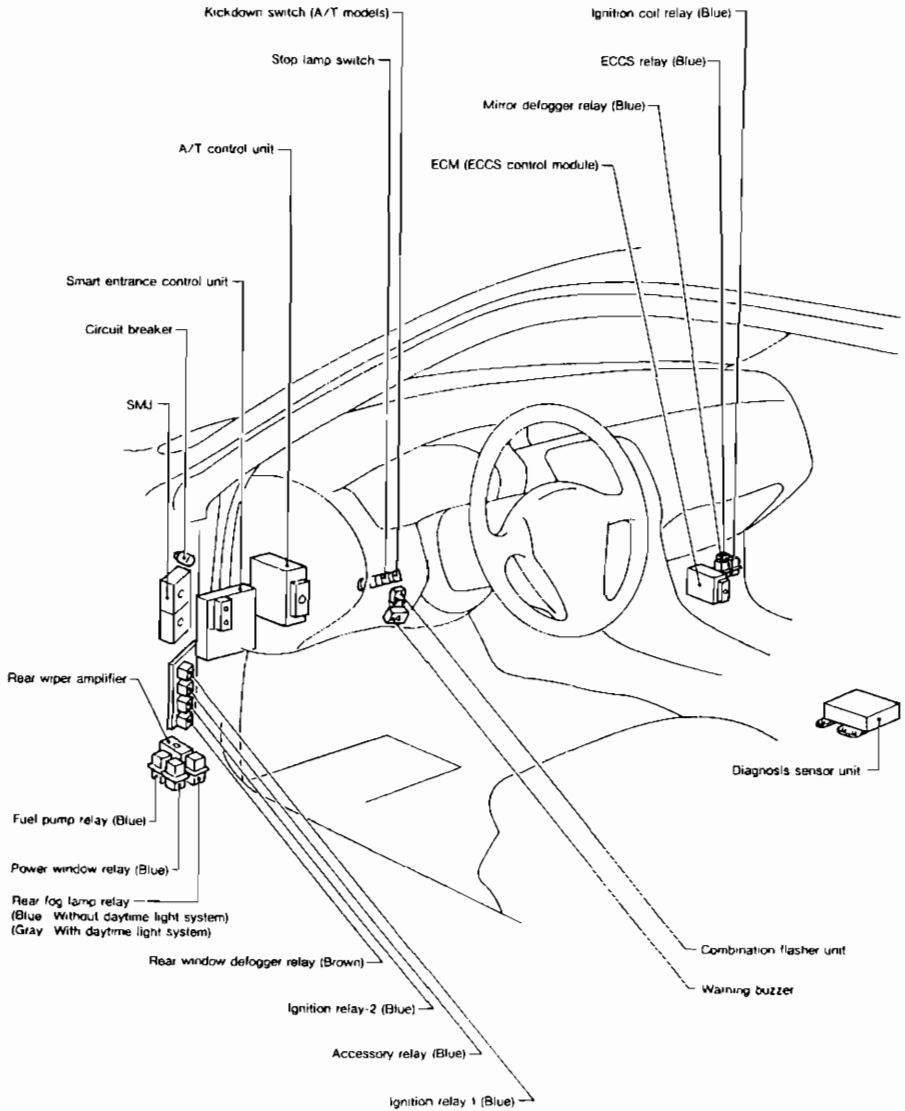


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# LOCATION OF ELECTRICAL UNIT

## Passenger Compartment

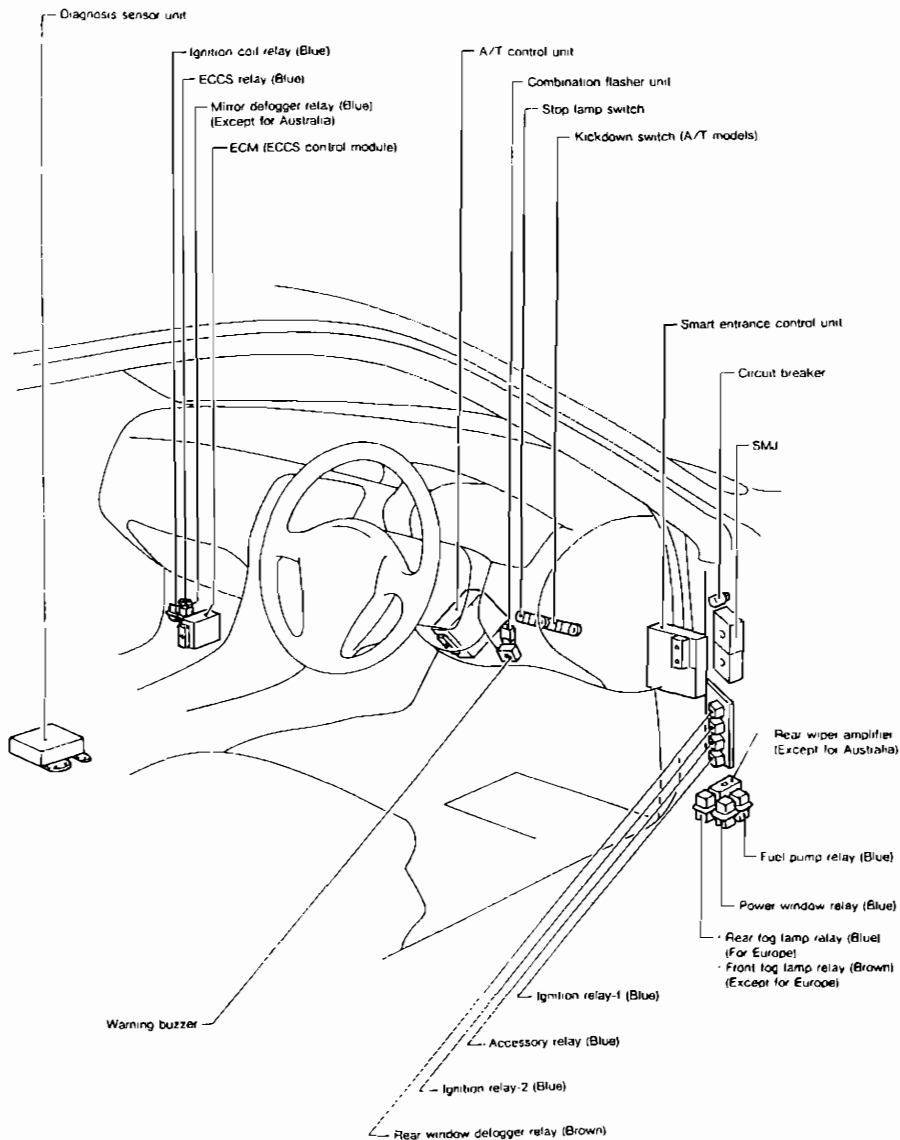
### LHD MODELS



# LOCATION OF ELECTRICAL UNIT

## Passenger Compartment (Cont'd)

RHD MODELS

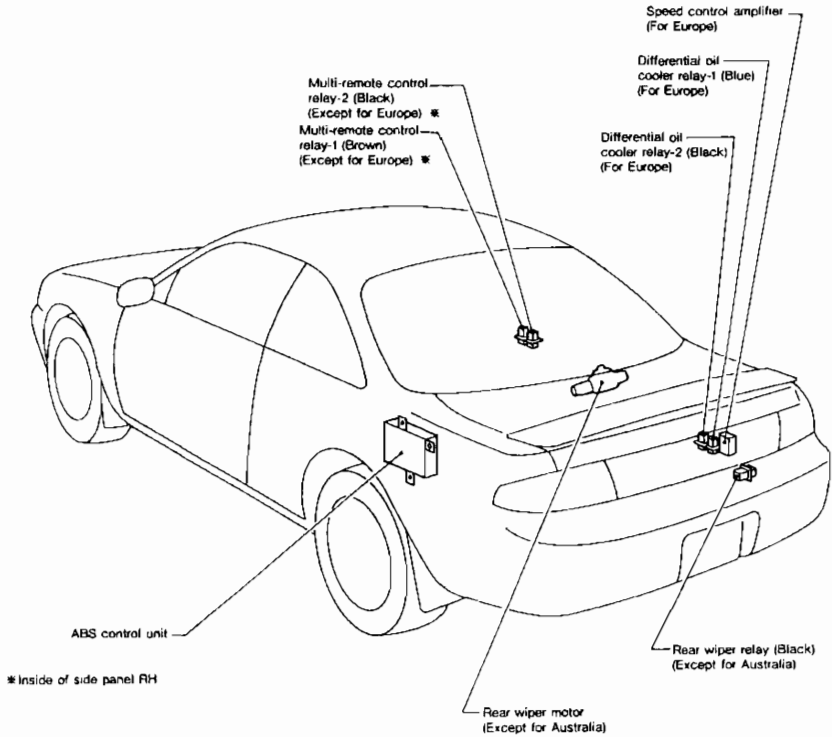


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SEL863T

# LOCATION OF ELECTRICAL UNIT

## Trunk Compartment

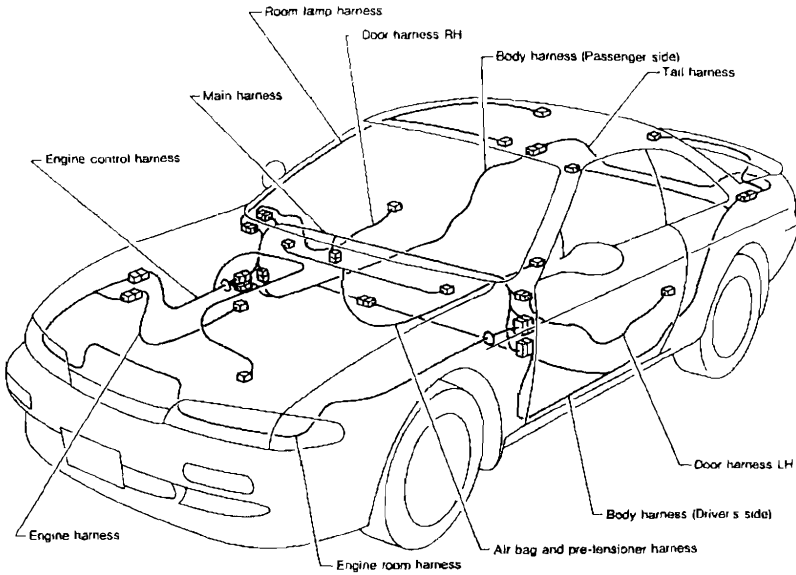




# HARNES LAYOUT

## LHD MODELS

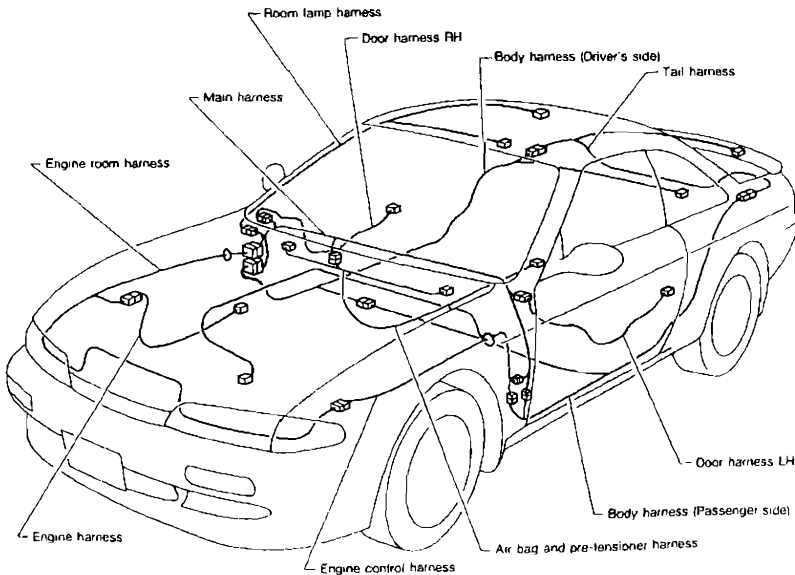
### Outline



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## RHD MODELS



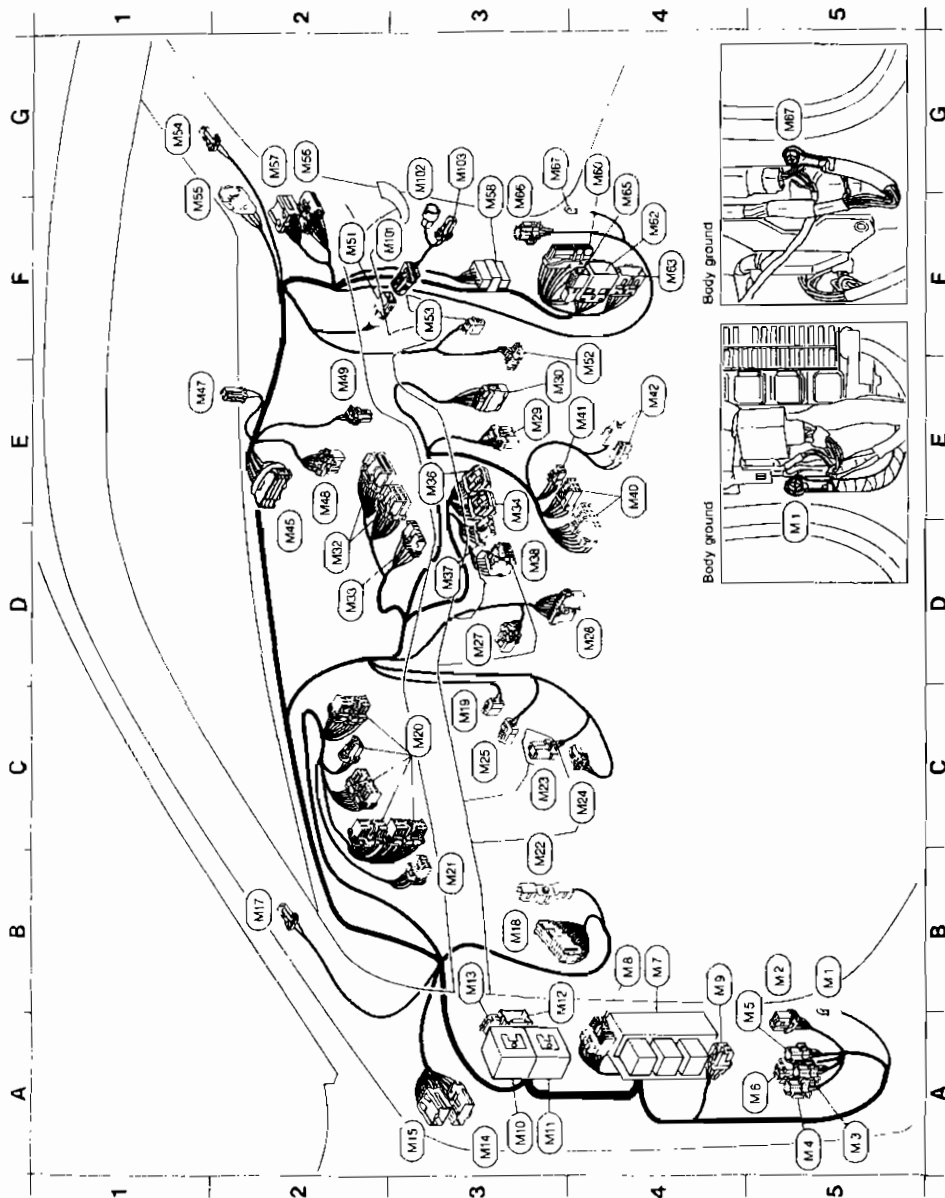
SEL866T

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# HARNESS LAYOUT

## Main Harness

LHD MODELS



# HARNESS LAYOUT

## Main Harness (Cont'd)

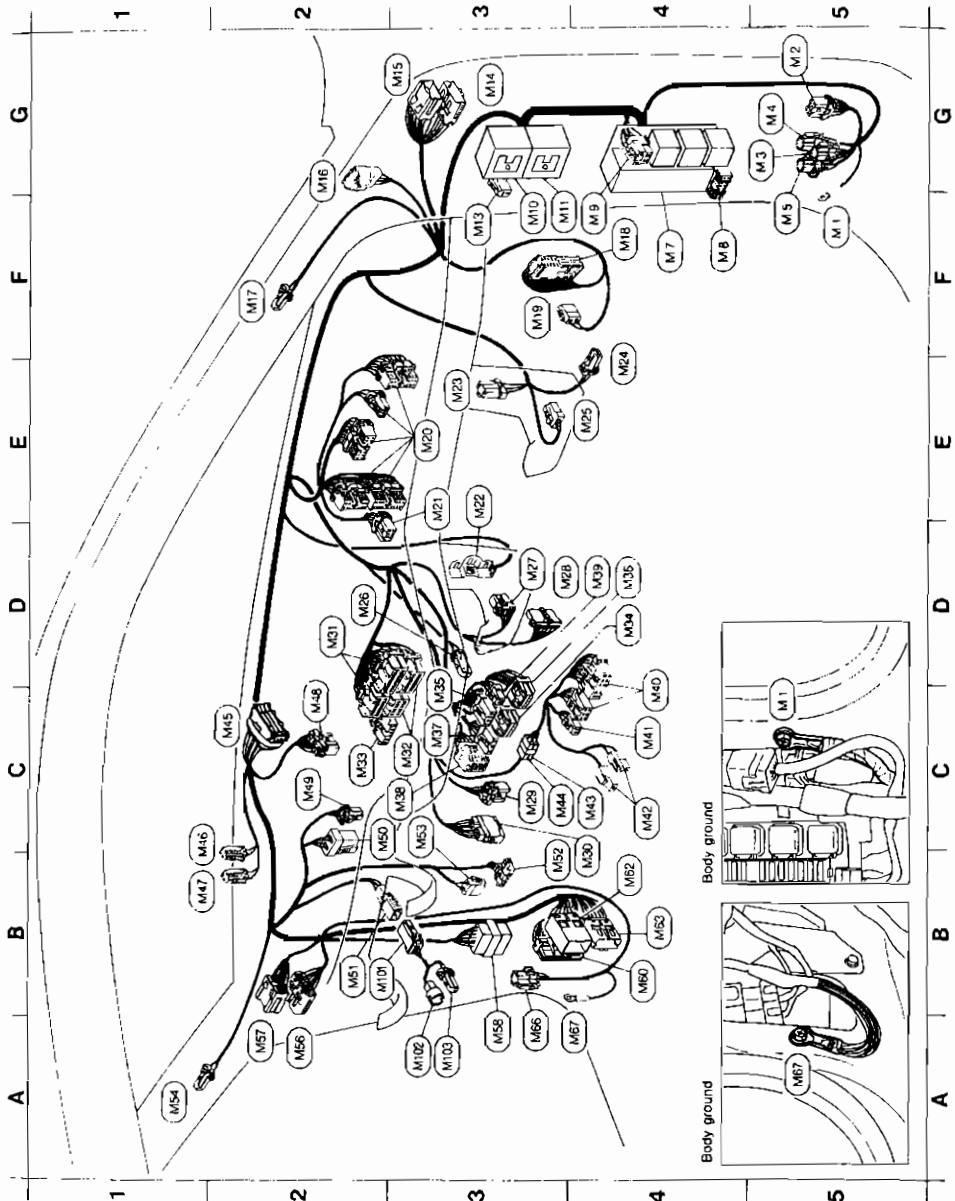
|    |       |   |    |        |                          |
|----|-------|---|----|--------|--------------------------|
| B5 | (M1)  | Body ground   | E2 | (M19)  | Thermo control amplifier |
| B5 | (M2)  | Rear wiper amplifier                                      | F2 | (M51)  | To (M10)                 |
| A5 | (M3)  | Fuel pump relay   | E4 | (M52)  | Fan resistor             |
| A5 | (M4)  | Power window relay  | F3 | (M13)  | Blower motor             |
| A5 | (M5)  | Rear fog lamp relay (Models without daytime light system) | G1 | (M54)  | Pillar speaker RH        |
| A5 | (M6)  | Rear fog lamp relay (Models with daytime light system)    | F1 | (M55)  | To (R1)                  |
| B4 | (M7)  | Fuse block  | G2 | (M56)  | To (D29)                 |
| B4 | (M8)  | Data link connector for CONSULT                           | G2 | (M57)  | To (D29)                 |
| B4 | (M9)  | Rear window defogger relay                                | F3 | (M68)  | Joint connector          |
| A3 | (M10) | To (E10) (SMJ)  | G4 | (M69)  | To (F4)                  |
| A3 | (M11) | To (E11) (SMJ)  | F4 | (M69)  | To (F7) (A/T models)     |
| B3 | (M12) | To (E12)  | F4 | (M63)  | To (E51)                 |
| B3 | (M13) | Circuit breaker   | F4 | (M65)  | To (E8) (M/T models)     |
| A3 | (M14) | To (D1)   | F3 | (M66)  | Mirror defogger relay    |
| A3 | (M15) | To (D2)   | G3 | (M67)  | Body ground              |
| B2 | (M17) | Pillar speaker LH   | F3 | (M109) | To (M51)                 |
| B3 | (M18) | Smart entrance control unit                               | G3 | (M109) | Glove box lamp           |
| C1 | (M19) | Kickdown switch (A/T models)                              | G3 | (M113) | Glove box lamp switch    |
| C1 | (M20) | Combination meter   |    |        |                          |
| B3 | (M21) | Illumination control switch                               |    |        |                          |
| B3 | (M22) | A/T control unit (A/T models)                             |    |        |                          |
| C3 | (M23) | Combination flasher unit                                  |    |        |                          |
| C4 | (M24) | Buzzer  |    |        |                          |
| C3 | (M25) | Stop lamp switch  |    |        |                          |
| D3 | (M27) | Air mix door motor  |    |        |                          |
| D4 | (M28) | Moose door motor  |    |        |                          |
| E3 | (M29) | Bi-level door motor                                       |    |        |                          |
| E3 | (M30) | To (E5)   |    |        |                          |
| D2 | (M32) | Push control unit   |    |        |                          |
| D2 | (M33) | Fan switch  |    |        |                          |
| E3 | (M34) | Hazard switch   |    |        |                          |
| E3 | (M36) | Headlamp washer switch                                    |    |        |                          |
| D3 | (M37) | Rear window defogger switch                               |    |        |                          |
| D3 | (M38) | Rear fog lamp switch                                      |    |        |                          |
| E4 | (M40) | Radio   |    |        |                          |
| E4 | (M41) | Not used  |    |        |                          |
| E4 | (M42) | Cigarette lighter   |    |        |                          |
| D2 | (M45) | Joint connector   |    |        |                          |
| E1 | (M47) | Not used  |    |        |                          |
| E2 | (M48) | Intake door motor   |    |        |                          |

EL

# HARNESS LAYOUT

## Main Harness (Cont'd)

RHD MODELS

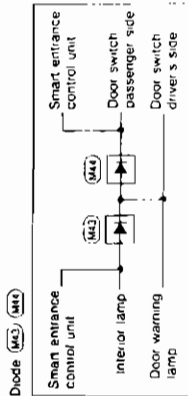


# HARNES LAYOUT

## Main Harness (Cont'd)

- F5 (M1) : Body ground
- G5 (M2) : Rear wiper amplifier (Except for Australia)
- G5 (M3) : Fuel pump relay
- G5 (M4) : Power window relay
- F5 (M5) : Rear fog lamp relay (For Europe)
- F4 (M7) : Fuse block
- F4 (M8) : Data link connector for CONSULT
- F4 (M9) : Rear window defogger relay
- F3 (M10) : To (E10) (SMU)
- F3 (E11) : To (B1) (SMU)
- F3 (M13) : Circuit breaker
- G3 (M14) : To (D1)
- G3 (M15) : To (D2)
- G2 (M18) : To (B1)
- F2 (M17) : Pillar speaker RH
- F4 (M18) : Smart entrance control unit
- F3 (M19) : Kickdown switch (A/T models)
- E3 (M20) : Combination meter
- E3 (M21) : Illumination control switch
- E3 (M22) : A/T control unit (A/T models)
- E3 (M23) : Combination flasher unit
- E4 (M24) : Buzzer
- E4 (M25) : Stop lamp switch
- D2 (M26) : In-vehicle sensor (Auto A/C)
- D3 (M27) : Air mix door motor
- D3 (M28) : Mode door motor
- C3 (M29) : Bi-level door motor
- B4 (M30) : To (Z3)
- D2 (M31) : Auto A/C unit (Auto A/C)
- C2 (M32) : Push control unit (Except auto A/C)
- C2 (M33) : Fan switch (Except auto A/C)
- D4 (M34) : Hazard switch (For Europe)
- C3 (M35) : Hazard switch (Except for Europe)
- D4 (M36) : Headlamp washer switch (For Europe)
- C3 (M37) : Rear window defogger switch
- C3 (M38) : Rear fog lamp switch (For Europe)
- D4 (M39) : Security indicator (Except for Europe)
- C4 (M40) : Radio
- C4 (M41) : Not used
- C4 (M42) : Cigarette lighter
- C4 (M43) : Diode (Except for Europe)
- C3 (M44) : Diode (Except for Europe)
- C2 (M45) : Joint connector
- B1 (M46) : Sunload sensor (Auto A/C)
- B1 (M47) : Not used (For Europe)
- C2 (M48) : Intake door motor
- C2 (M49) : Thermo control amplifier
- C2 (M50) : Fan control amplifier (Auto A/C)
- B2 (M51) : To (M18) (Except for Australia)
- B3 (M52) : Fan resistor (Except auto A/C)
- C3 (M53) : Blower motor
- A1 (M54) : Pillar speaker LH
- A2 (M55) : To (M18)
- A2 (M57) : To (D02)
- B4 (M58) : Joint connector (For Europe)
- B4 (M60) : To (E4)
- B4 (M62) : To (T1) (A/T models)
- B4 (M63) : To (E5) (Models with ABS)
- A3 (M65) : Mirror dip/ogger relay (Except for Australia)
- A4 (M67) : Body ground

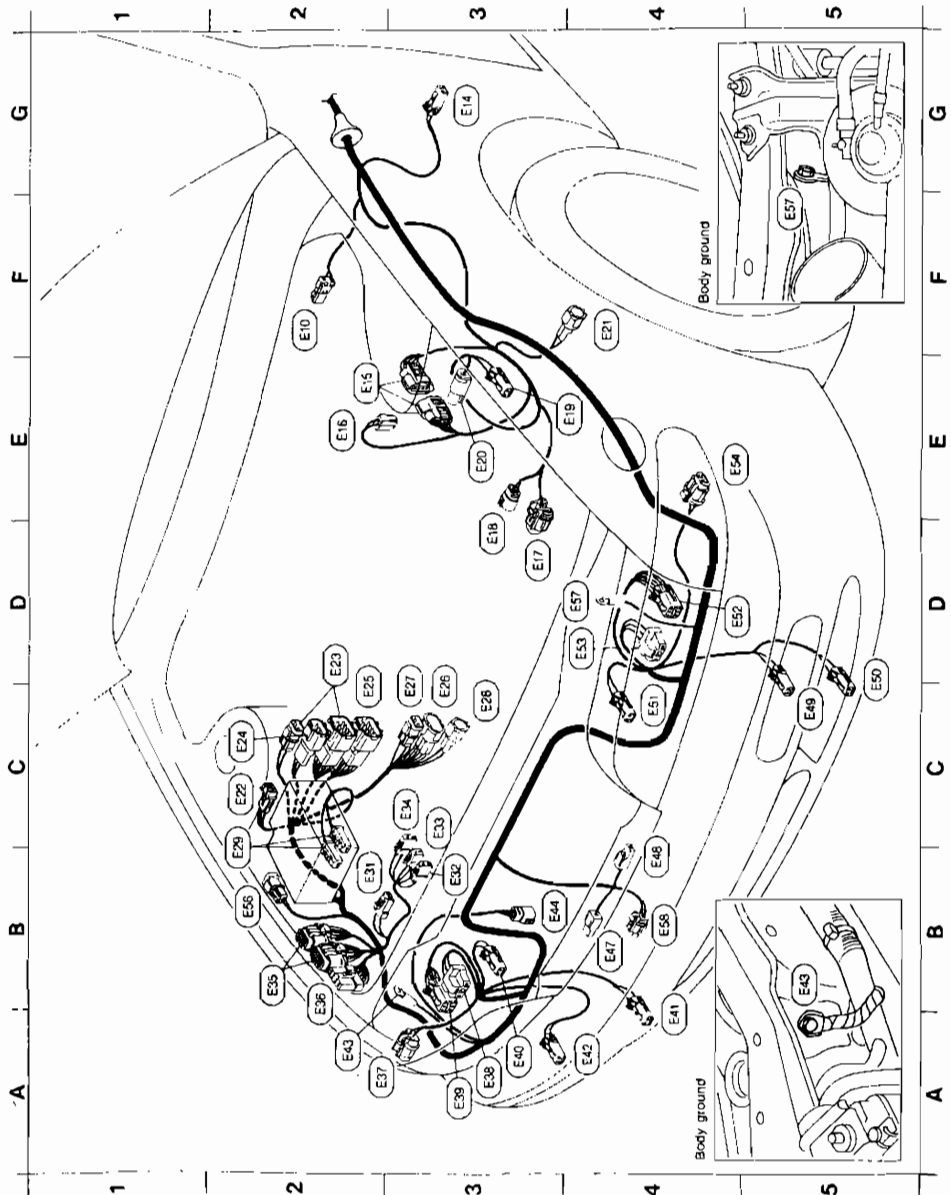
- B2 (M10) : To (M17)
- A3 (M12) : Glove box lamp
- A3 (M13) : Glove box lamp switch (Except for Australia)



# HARNES LAYOUT

## Engine Room Harness

ENGINE COMPARTMENT (LHD models)



# HARNESS LAYOUT

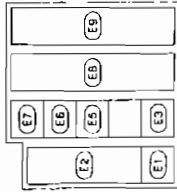
## Engine Room Harness (Cont'd)

- (E1) : Cooling fan relay-2
- (E2) : Fusible link and fuse block-1
- (E3) : Cooling fan relay-1
- (E4) : Air conditioner relay
- (E5) : Horn relay
- (E6) : Front fog lamp relay
- (E7) : Fusible link and fuse block-2
- (E8) : Fusible link and fuse block-3
- (E9) : Brake fluid level switch
- (E10) : Side turn signal lamp LH
- (E11) : Power transistor unit
- (E12) : Wastegate valve control solenoid valve
- (E13) : Compressor
- (E14) : Power steering oil pressure switch
- (E15) : Dropping resistor (A/T models)
- (E16) : Check connector
- (E17) : Front wheel sensor LH (For ABS)
- (E18) : Boost pressure sensor
- (E19) : Inhibitor switch (A/T models)
- (E20) : Revolution sensor (A/T models)
- (E21) : To terminal code assembly (A/T models)
- (E22) : To (E20)
- (E23) : To (E20)
- (E24) : Battery
- (E25) : Washer fluid level switch
- (E26) : Headlamp washer motor
- (E27) : Front washer motor
- (E28) : Rear washer motor
- (E29) : Daytime light unit
- (E30) : Headlamps washer amplifier
- (E31) : Clearance lamp RH
- (E32) : Headlamp RH outer
- (E33) : Headlamp aiming motor RH
- (E34) : Headlamps RH inner
- (E35) : Front fog lamp RH
- (E36) : Front turn signal lamp RH
- (E37) : Body ground
- (E38) : Cooling fan motor
- (E39) : Horn (High)

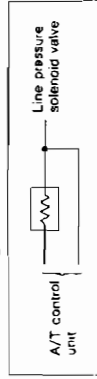
### Fusible link and fuse box

- (E40) : Horn (Low)
- (E41) : Front turn signal lamp LH
- (E42) : Front fog lamp LH
- (E43) : Headlamp LH inner
- (E44) : Headlamp aiming motor LH
- (E45) : Headlamp LH outer
- (E46) : Clearance lamp LH
- (E47) : To (E20)
- (E48) : Body ground
- (E49) : Ambient sensor (For outside temperature)

### Fusible link and fuse box



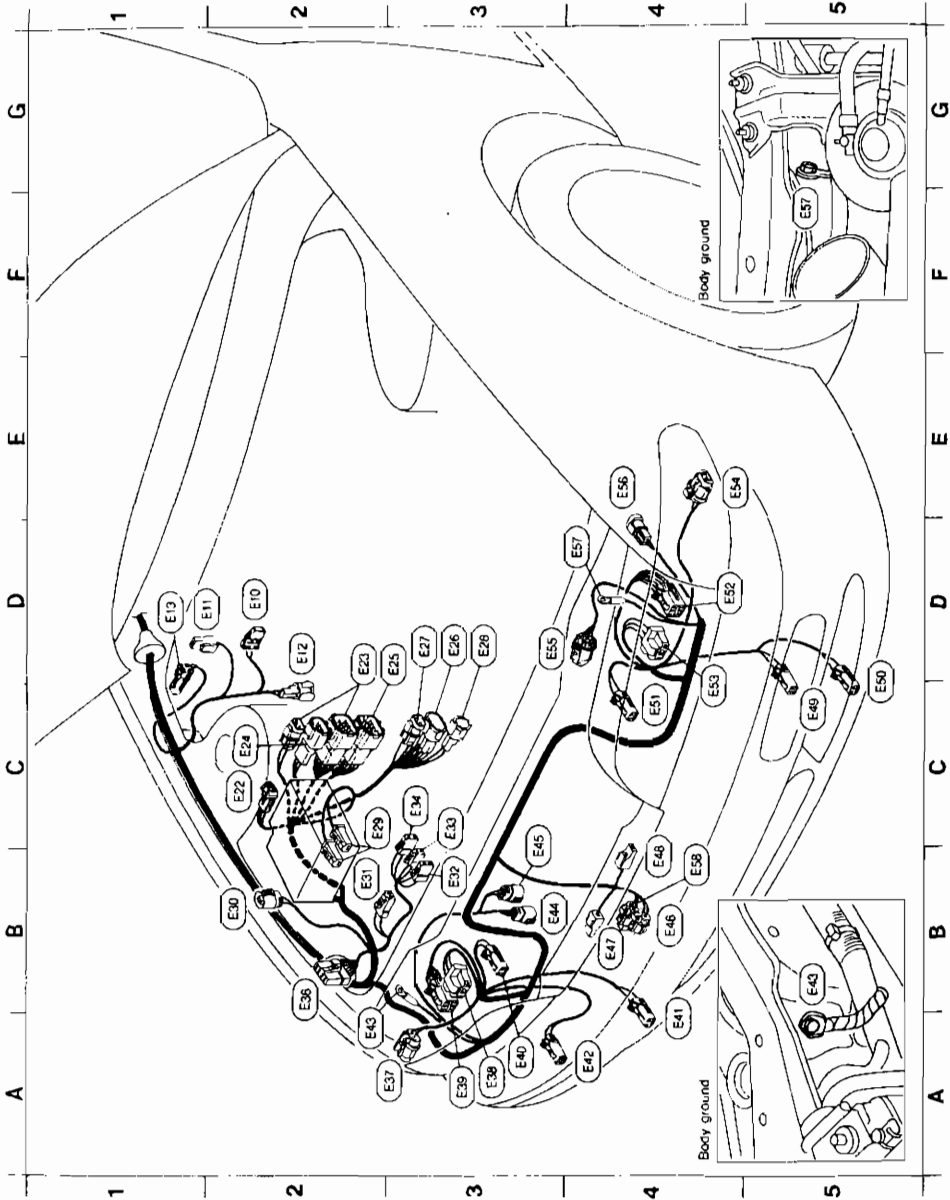
### Dropping resistor (E13)



# HARNESS LAYOUT

## Engine Room Harness (Cont'd)

ENGINE COMPARTMENT (RHD models)



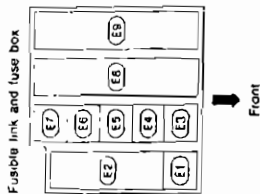


# HARNESS LAYOUT

## Engine Room Harness (Cont'd)

- C5 (E49) : Front turn signal lamp LH
- C5 (E50) : Front fog lamp LH
- C4 (E51) : Headlamp LH inner
- D4 (E52) : Headlamp aiming motor LH (For Europe)
- C4 (E53) : Headlamp LH outer
- E4 (E54) : Clearance lamp LH
- D3 (E55) : Triple-pressure switch
- D4 (E56) : To (E70)
- E4 (E57) : Body ground
- B4 (E58) : Ambient sensor (For outside temperature)

(Fuse link and fuse box)



- (E1) : Cooling fan relay-2 (Except for Europe)
- (E2) : Fuse link and fuse block-1
- (E3) : Cooling fan relay-1
- (E4) : Theft warning relay (Except for Europe)
- (E5) : Air conditioner relay
- (E6) : Horn relay
- (E7) : Theft warning horn relay (Except for Europe)
- Front fog lamp relay (For Europe)
- (E8) : Fuse link and fuse block-2
- (E9) : Fuse link and fuse block-3
- (E10) : Brake fluid level switch
- D1 (E11) : Theft warning horn (Except for Europe)
- D2 (E12) : Front wheel sensor RH (For ABS)
- D1 (E13) : Side turn signal lamp RH
- C2 (E22) : Boost pressure sensor
- D2 (E23) : Inhibitor switch (A/T models)
- C2 (E24) : Revolution sensor (A/T models)
- D3 (E25) : To terminal code assembly (A/T models)
- D3 (E26) : To (E27)
- D3 (E27) : To (E28)
- D3 (E28) : To (E29)
- C2 (E29) : Battery
- B2 (E30) : Hood switch (Except for Europe)
- B2 (E31) : Washer fluid level switch
- B3 (E32) : Headlamp washer motor (For Europe)
- C3 (E33) : Front washer motor
- C3 (E34) : Rear washer motor (Except for Australia)
- B2 (E35) : Headlamp washer amplifier (For Europe)
- A3 (E37) : Clearance lamp RH
- A3 (E38) : Headlamp RH outer
- A3 (E39) : Headlamp aiming motor RH (For Europe)
- A3 (E40) : Headlamp RH inner
- A4 (E41) : Front fog lamp RH
- A4 (E42) : Front turn signal lamp RH
- A2 (E43) : Body ground
- B3 (E44) : Cooling fan motor (Except for Europe)
- B3 (E45) : Cooling fan motor (For Europe)
- B4 (E46) : Ambient sensor (For auto A/C)
- B4 (E47) : Horn (High)
- B4 (E48) : Horn (Low)

EL

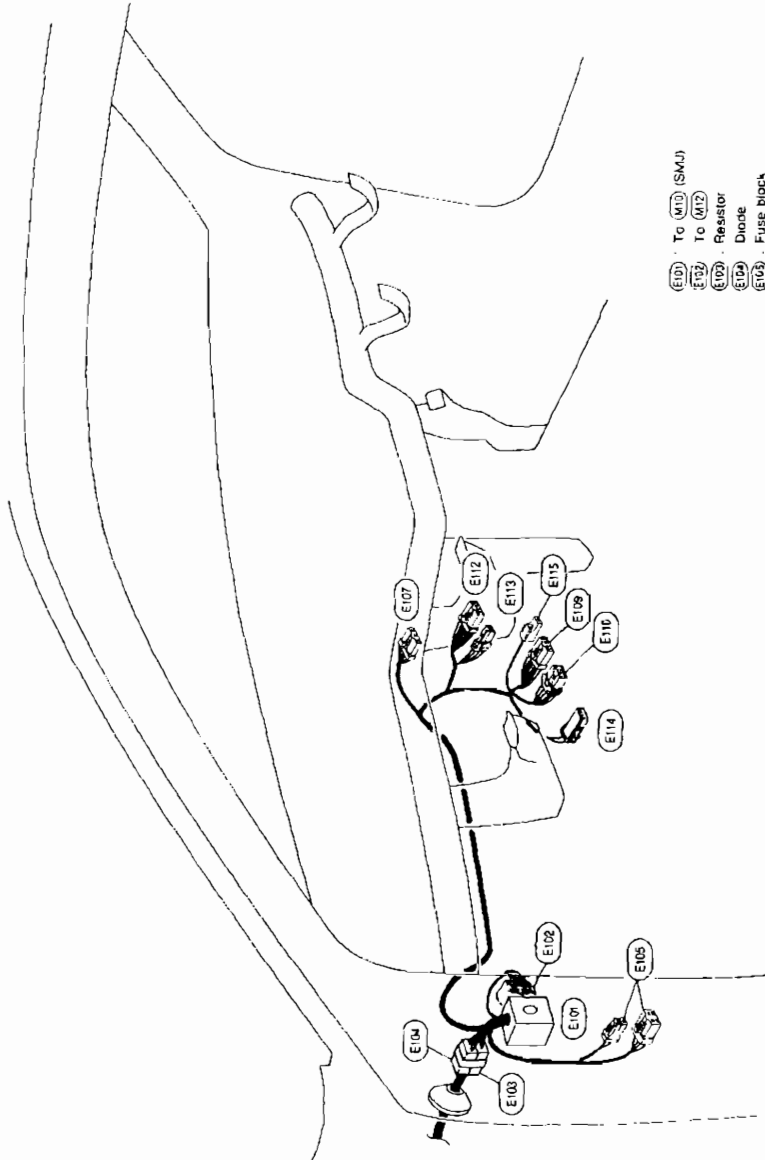
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# HARNESS LAYOUT

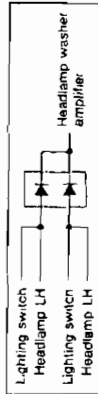
## Engine Room Harness (Cont'd)

### PASSENGER COMPARTMENT (LHD models)

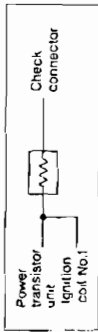


- (E104) : To (M11) (SMU)
- (E107) : To (M12)
- (E108) : Resistor
- (E109) : Diode
- (E110) : Fuse block
- (E107) : Ignition switch
- (E109) : Lighting switch
- (E110) : Turn signal switch
- (E112) : Front wiper and washer switch
- (E113) : Rear wiper and washer switch
- (E114) : Rear fog lamp switch
- (E115) : Horn switch

Diode (E108)



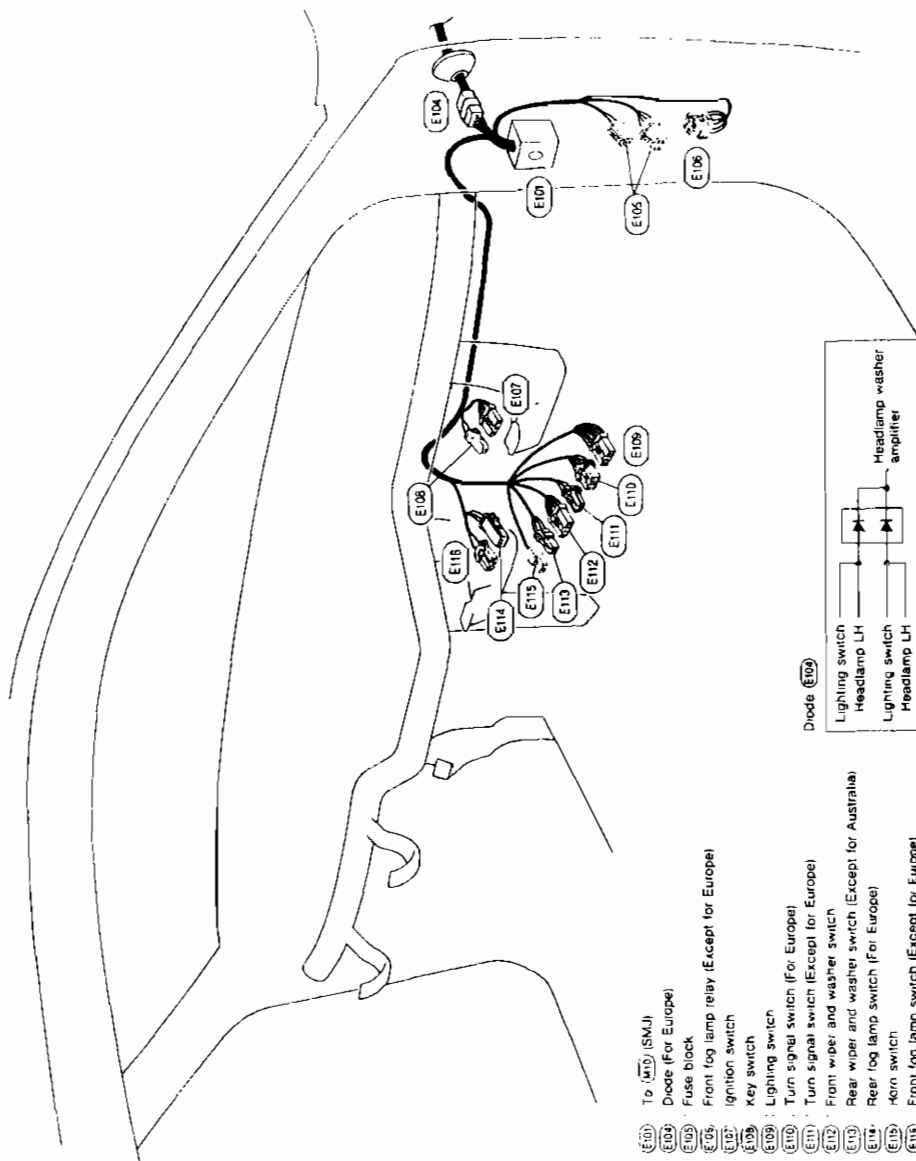
Resistor (E102)



# HARNESS LAYOUT

## Engine Room Harness (Cont'd)

PASSENGER COMPARTMENT (RHD models)

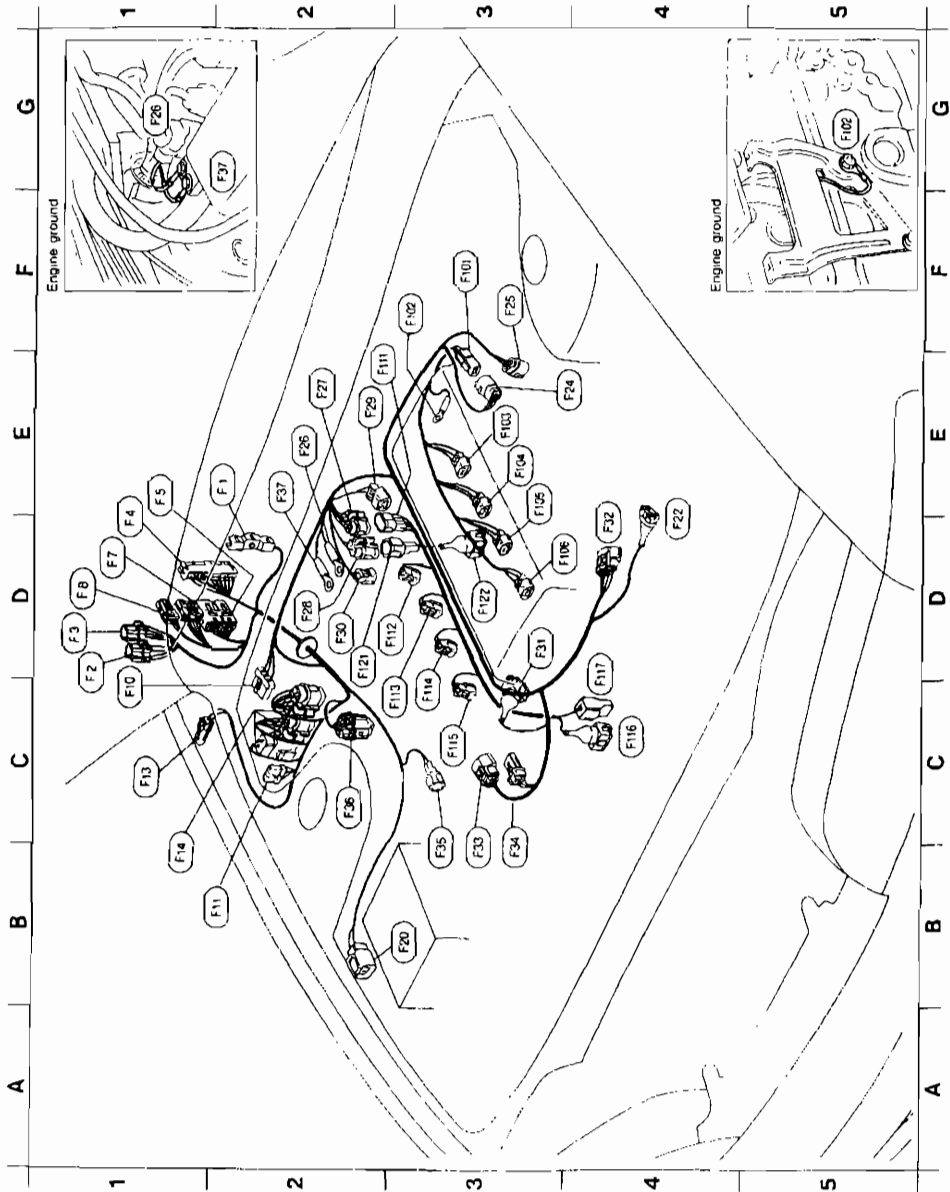


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# HARNESS LAYOUT

## Engine Control Harness

LHD MODELS



# HARNES LAYOUT

## Engine Control Harness (Cont'd)

E2 (E1) : ECM (ECSS control module)  
 D1 (E2) : ECSS relay  
 D1 (E3) : Ignition coil relay  
 D1 (E4) : To (M52)  
 E1 (E5) : To (B53)  
 D1 (E7) : To (M52) (A/T models)  
 D1 (E8) : To (M52) (M/T models)  
 C1 (E10) : Front wiper motor  
 B2 (E11) : Front wiper amplifier  
 C1 (E13) : Side turn signal lamp RH  
 B1 (E14) : ABS actuator  
 B3 (E20) : To (E36)  
 D4 (E22) : Mass air flow sensor  
 E3 (E24) : To (E10)  
 F3 (E25) : Heated oxygen sensor  
 E2 (E26) : Engine ground  
 E2 (E27) : To (E11)  
 D2 (E28) : To (E22)  
 E2 (E29) : IACV-FICD solenoid valve  
 D2 (E30) : IACV-AAC valve  
 D3 (E31) : VTC solenoid valve  
 D4 (E32) : Camshaft position sensor  
 B3 (E33) : Throttle position sensor (Brown)  
 B3 (E34) : Throttle position switch (Gray) (A/T models)  
 B3 (E35) : Front wheel sensor RH (For ABS)  
 C2 (E36) : Triple-pressure switch  
 E2 (E37) : Engine ground

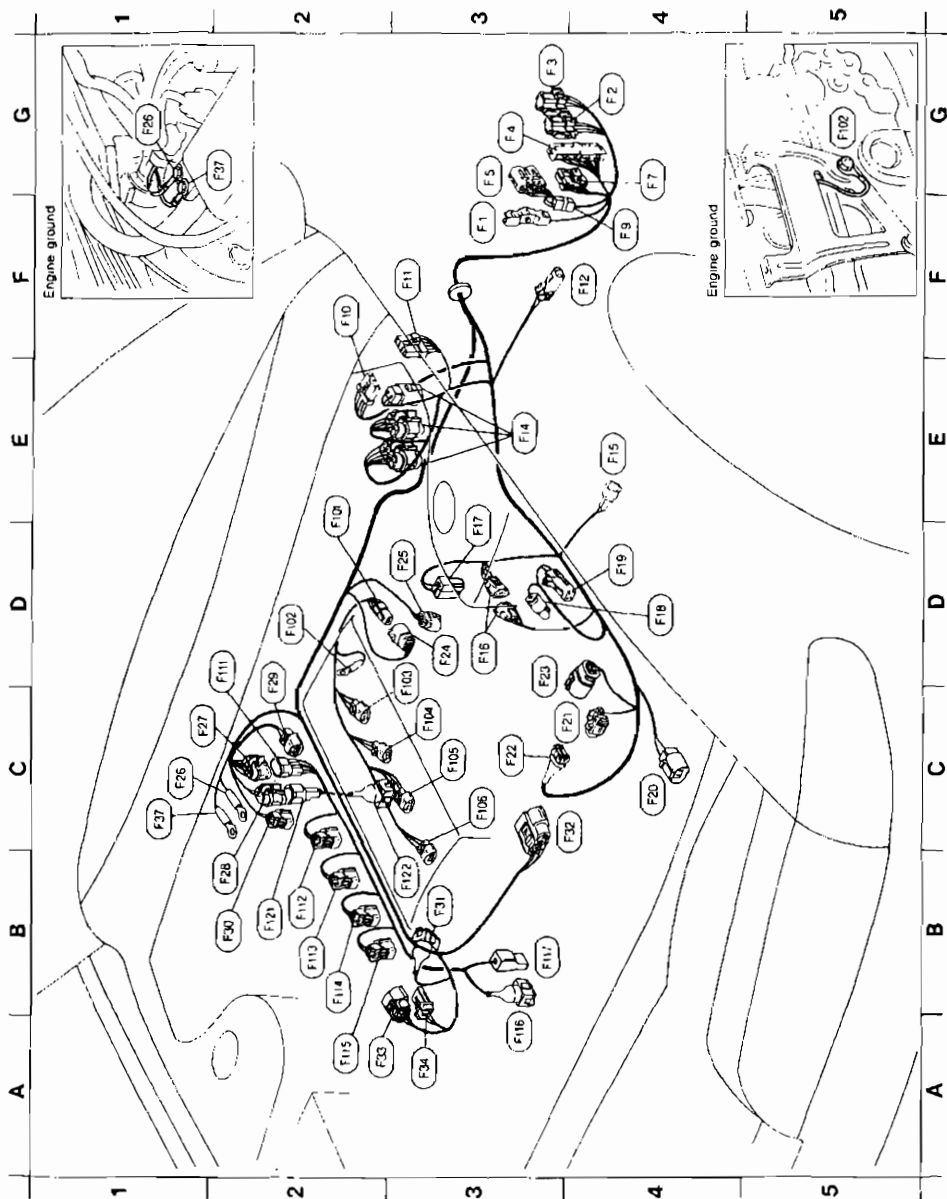
**Sub-harness**  
 F3 (F10) : To (F24)  
 F3 (F09) : Engine ground  
 E3 (F13) : Ignition coil No.4  
 E3 (F14) : Ignition coil No.3  
 E3 (F15) : Ignition coil No.2  
 D3 (F16) : Ignition coil No.1  
 E2 (F17) : To (E27)  
 D3 (F18) : Injector No.4  
 C3 (F19) : Injector No.3  
 C3 (F14) : Injector No.2  
 C3 (F15) : Injector No.1  
 C4 (F16) : Engine coolant temperature sensor  
 C4 (F17) : Thermal transmitter  
 D2 (F18) : To (F24)  
 D3 (F19) : Knock sensor

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# HARNESS LAYOUT

## Engine Control Harness (Cont'd)

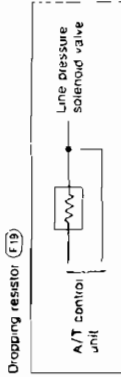
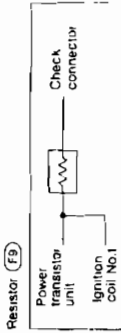
RHD MODELS



- F3 (E1) : ECM (ECSS control module)
- G4 (E2) : ECCS relay
- G3 (E3) : Ignition coil relay
- G3 (E4) : To (M6)
- G3 (E5) : To (E5) (Model with ABS)
- G4 (E7) : To (M2) (A/T models)
- F4 (E9) : Resistor
- F2 (E10) : Front wiper motor
- F3 (E11) : Front wiper amplifier
- F4 (E12) : Side turn signal lamp LH
- E3 (E14) : ABS actuator (For ABS)
- E4 (E15) : Front wheel sensor LH (For ABS)
- D3 (E16) : Power transistor unit
- D3 (E17) : Wastegate valve control solenoid valve
- D4 (E18) : Check connector
- D4 (E19) : Dropping resistor (A/T models)
- C4 (E20) : To (E56)
- C3 (E7) : Compressor
- C3 (E22) : Mass air flow sensor
- D3 (E23) : Power steering oil pressure switch
- D3 (E24) : To (E10)
- D3 (E25) : Heated oxygen sensor
- C1 (E27) : Engine ground
- C1 (E28) : To (E11)
- B2 (E29) : To (E28)
- B2 (E30) : IACV-FICD solenoid valve
- B2 (E32) : IACV-AAC valve
- B3 (E33) : VTC solenoid valve
- C4 (E34) : Camshaft position sensor
- A2 (E35) : Throttle position sensor (Brown)
- A3 (E36) : Throttle position switch (Gray) (A/T models)
- C1 (E37) : Engine ground

### Sub-harness

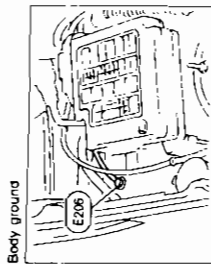
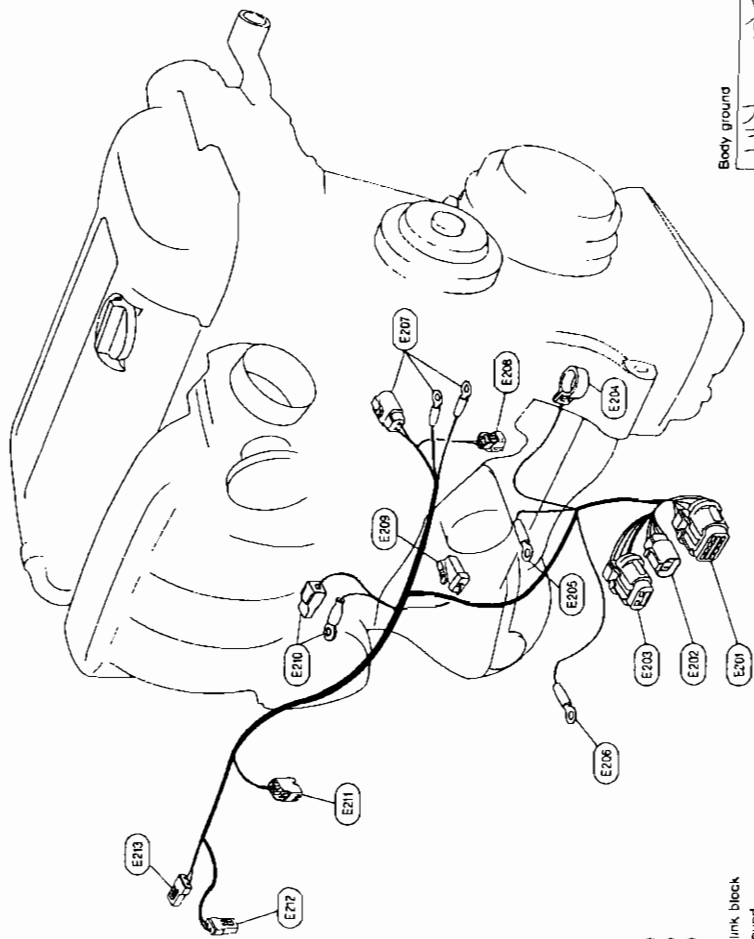
- D2 (E10) : To (E24)
- D2 (E102) : Engine ground
- C3 (E103) : Ignition coil No.4
- C3 (E104) : Ignition coil No.3
- C3 (E105) : Ignition coil No.2
- C3 (E106) : Ignition coil No.1
- D2 (E110) : To (E27)
- B2 (E112) : Injector No.4
- B2 (E113) : Injector No.3
- B2 (E114) : Injector No.2
- A2 (E115) : Injector No.1
- A3 (E116) : Engine coolant temperature sensor
- B3 (E117) : Thermal transmitter
- B2 (E120) : To (E28)
- B3 (E122) : Knock sensor



EL

# HARNES LAYOUT

## Engine Harness



Body ground

- E200 : To E26
- E202 : To E27
- E203 : To E28
- E204 : Battery
- E205 : Fusible link block
- E206 : Body ground
- E207 : Alternator
- E208 : EGR and canister control solenoid valve
- E209 : Oil pressure switch
- E210 : Starter motor
- E211 : Vehicle speed sensor
- E212 : Back-up lamp switch (M/T models)
- E213 : Neutral position switch (M/T models)



# HARNESS LAYOUT

NOTE

GF

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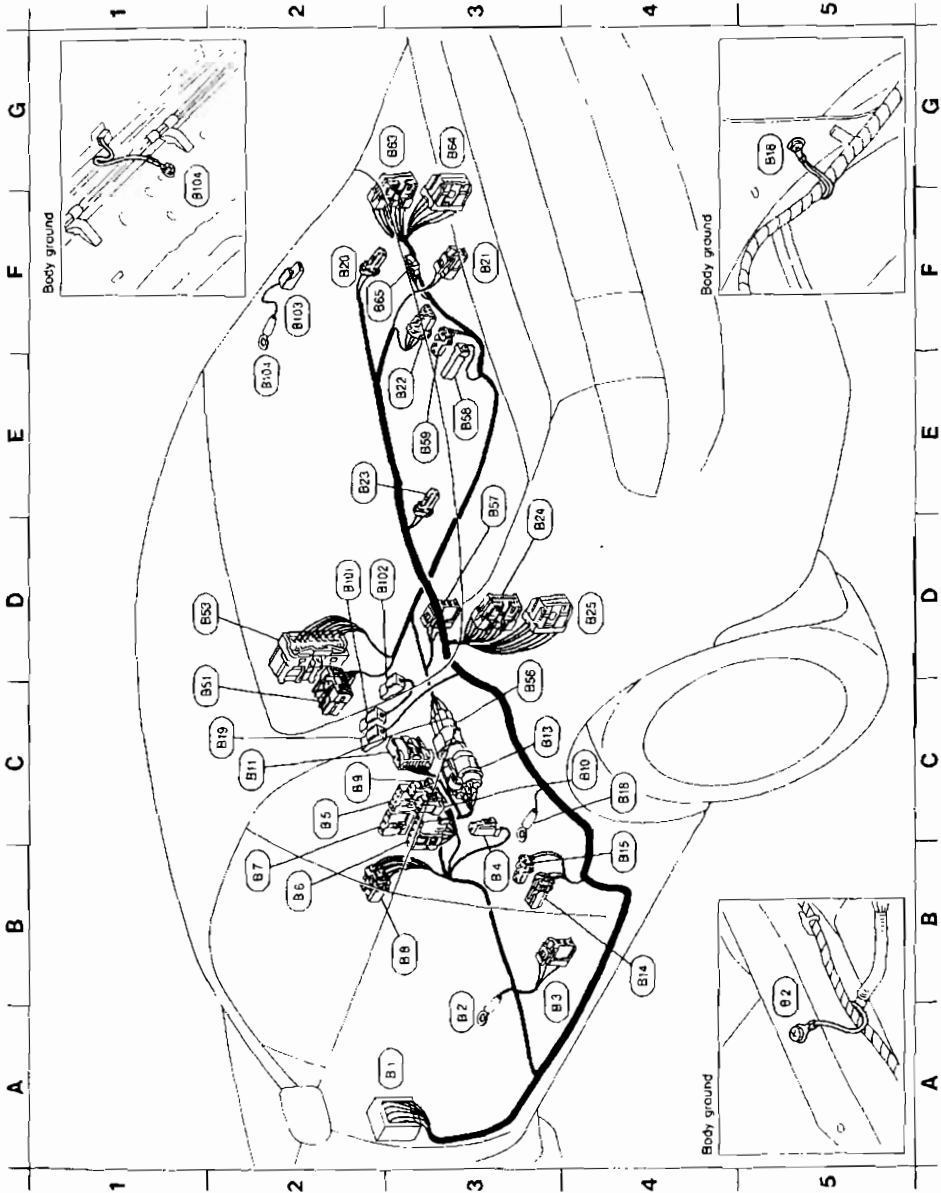
**EL**

ICX

# HARNESS LAYOUT

## Body Harness

LHD MODELS



# HARNES LAYOUT

## Body Harness (Cont'd)

|    |      |  |
|----|------|--|
| A3 | (81) | : To (411)                                 |
| A3 | (82) | : Body ground                              |
| B3 | (83) | : Heated seat LH                           |
| B3 | (84) | : Parking brake switch                     |
| C2 | (85) | : Headlamp aiming switch                   |
| B2 | (86) | : Door mirror control switch               |
| B2 | (87) | : Front fog lamp switch                    |
| B3 | (88) | : Overdrive switch - A/T illumination      |
| C2 | (89) | : Heated seat switch RH                    |
| C4 | (90) | : Heated seat switch LH                    |
| C3 | (91) | : To (22)                                  |
| C3 | (91) | : To (558)                                 |
| B4 | (91) | : Door switch (Driver's side)              |
| B4 | (92) | : Seat belt pre-tensioner (Driver's side)  |
| C4 | (91) | : Body ground                              |
| C2 | (91) | : Condenser (For rear window defogger)     |
| F2 | (90) | : Rear speaker RH                          |
| F3 | (91) | : Trunk room lamp                          |
| E3 | (92) | : Rear wiper motor                         |
| E2 | (93) | : Rear speaker LH                          |
| D3 | (94) | : To (71)                                  |
| D4 | (95) | : To (72)                                  |
| C2 | (95) | : To (463)                                 |
| D2 | (93) | : To (73)                                  |
| C3 | (96) | : To (81)                                  |
| E3 | (97) | : Heated seat RH                           |
| E3 | (98) | : Door switch (Passenger side)             |
| G3 | (99) | : Seat belt pre-tensioner (Passenger side) |
| G3 | (96) | : To (76)                                  |
| G3 | (94) | : To (77)                                  |
| F2 | (95) | : Not used                                 |

### Sub-harness

|    |      |  |
|----|------|--|
| D2 | (90) | : Condenser (For rear window defogger) |
| D2 | (90) | : Rear window defogger (+)             |
| F2 | (90) | : Rear window defogger (-)             |
| E2 | (90) | : Body ground                          |

EL



# HARNES LAYOUT

## Body Harness (Cont'd)

|    |       |  |  |
|----|-------|--|--|
| G3 | (81)  | To (M1)  |  |
| G3 | (82)  | Body ground  |  |
| F3 | (84)  | Parking brake switch                                 |  |
| F2 | (85)  | Headlamp aiming switch (For Europe)                  |  |
| F2 | (86)  | Door mirror control switch                           |  |
| F2 | (87)  | Front fog lamp switch (For Europe)                   |  |
| F3 | (88)  | Overdrive switch - A/T illumination                  |  |
| E4 | (81)  | To (T2)  |  |
| E4 | (82)  | To (835)   |  |
| F4 | (81)  | Door switch (Driver's side)                          |  |
| F3 | (815) | Seat belt pre-tensioner (Driver's side) (For Europe) |  |
| F3 | (816) | Multi-remote control relay-1 (Except for Europe)     |  |
| E4 | (817) | Multi-remote control relay-2 (Except for Europe)     |  |
| E3 | (818) | Body ground  |  |
| E2 | (819) | Condenser (For rear window defogger)                 |  |
| G2 | (820) | Rear speaker RH                                      |  |
| B3 | (821) | Trunk room lamp                                      |  |
| B3 | (822) | Rear wiper motor (Except for Australia)              |  |
| B2 | (823) | Rear speaker LH                                      |  |
| D3 | (824) | To (T1)  |  |
| D4 | (825) | To (T2)  |  |
| E2 | (817) | To (M83) (Models with ABS)                           |  |
| D2 | (855) | To (E5) (Models with ABS)                            |  |
| D3 | (854) | Body ground  |  |
| E3 | (855) | To (811)   |  |
| C3 | (838) | Door switch (Passenger side)                         |  |
| C3 | (835) | Door switch (Passenger side) (For Europe)            |  |
| B2 | (840) | Body ground (Models with ABS)                        |  |
| B3 | (851) | To (T2) (Models with ABS)                            |  |
| B3 | (852) | ABS control unit (For ABS)                           |  |
| B2 | (853) | Not used (For Europe)                                |  |

### Sub-harness

|    |       |                                      |
|----|-------|--------------------------------------|
| E2 | (810) | Condenser (For rear window defogger) |
| D2 | (813) | Rear window defogger (+)             |
| C2 | (810) | Rear window defogger (-)             |
| C2 | (813) | Body ground                          |

SM  
MA  
EM  
LC  
EC  
SE  
GL  
MT  
AT  
PD  
EA  
PA  
RE  
ST  
22  
ST  
GA  
EL  
MOX

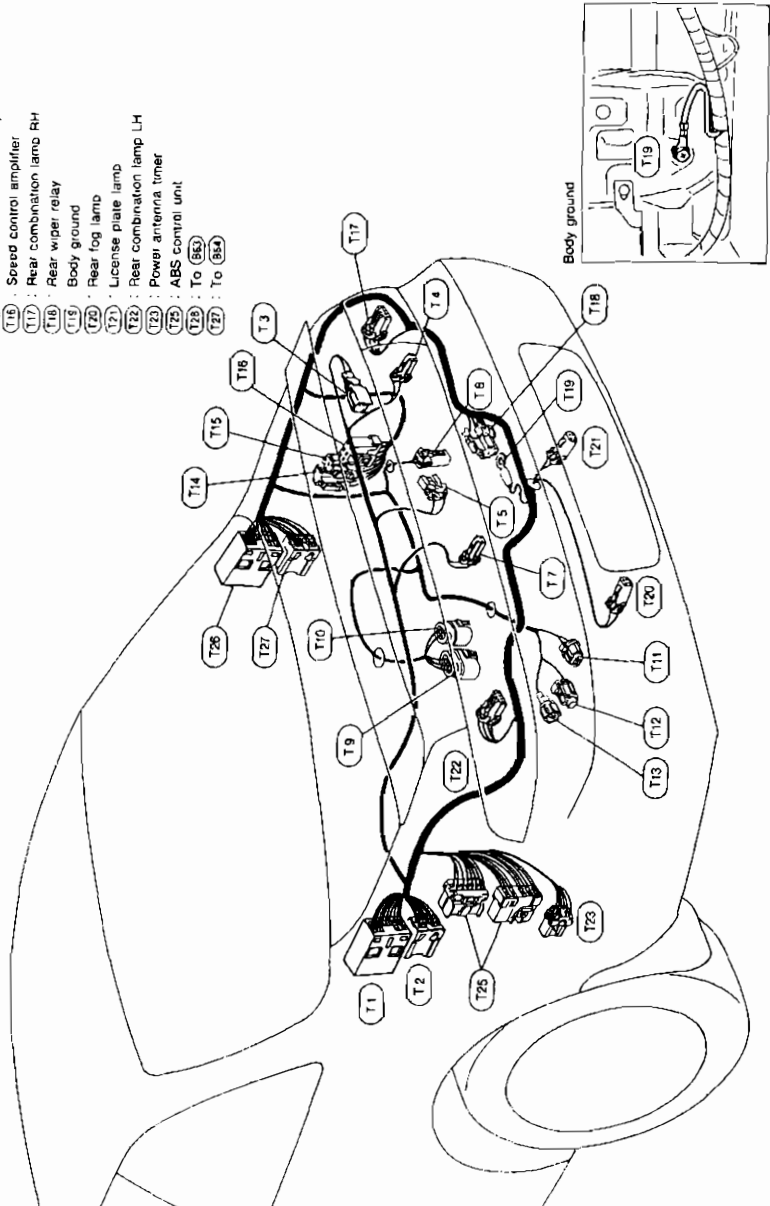
EL

# HARNES LAYOUT

## Tail Harness

### LHD MODELS

- (T1) : To (82A)
- (T2) : To (82Z)
- (T3) : High-mounted stop lamp
- (T4) : Back-up lamp RH
- (T5) : Trunk room lamp switch
- (T6) : Back-up lamp LH
- (T7) : Differential oil pump
- (T8) : Fuel tank gauge unit
- (T9) : Fuel pump
- (T10) : Rear skid sensor (for ABS)
- (T11) : Differential oil warning lamp switch
- (T12) : Differential oil temperature switch
- (T13) : Differential oil cooler relay-1
- (T14) : Differential oil cooler relay-2
- (T15) : Speed control amplifier
- (T16) : Rear combination lamp RH
- (T17) : Rear wiper relay
- (T18) : Body ground
- (T19) : Rear fog lamp
- (T20) : License plate lamp
- (T21) : Rear combination lamp LH
- (T22) : Power antenna timer
- (T23) : ABS control unit
- (T24) : To (82)
- (T25) : To (82A)

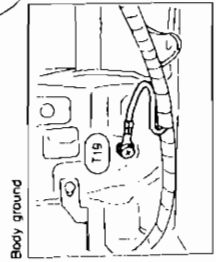
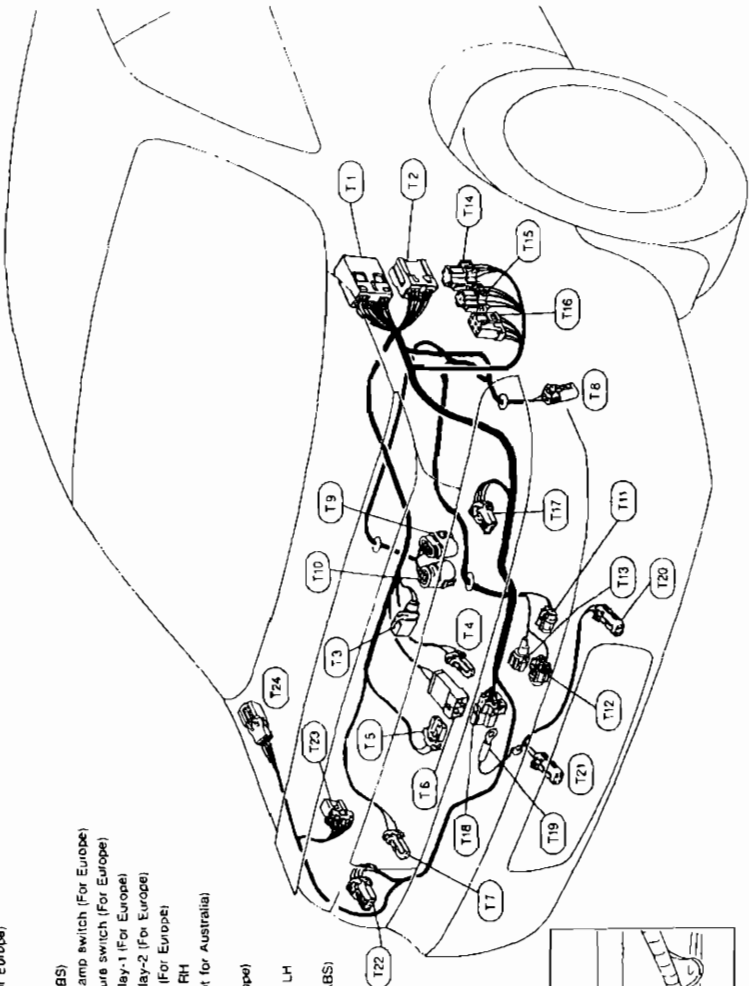


# HARNESS LAYOUT

## Tail Harness (Cont'd)

RHD MODELS

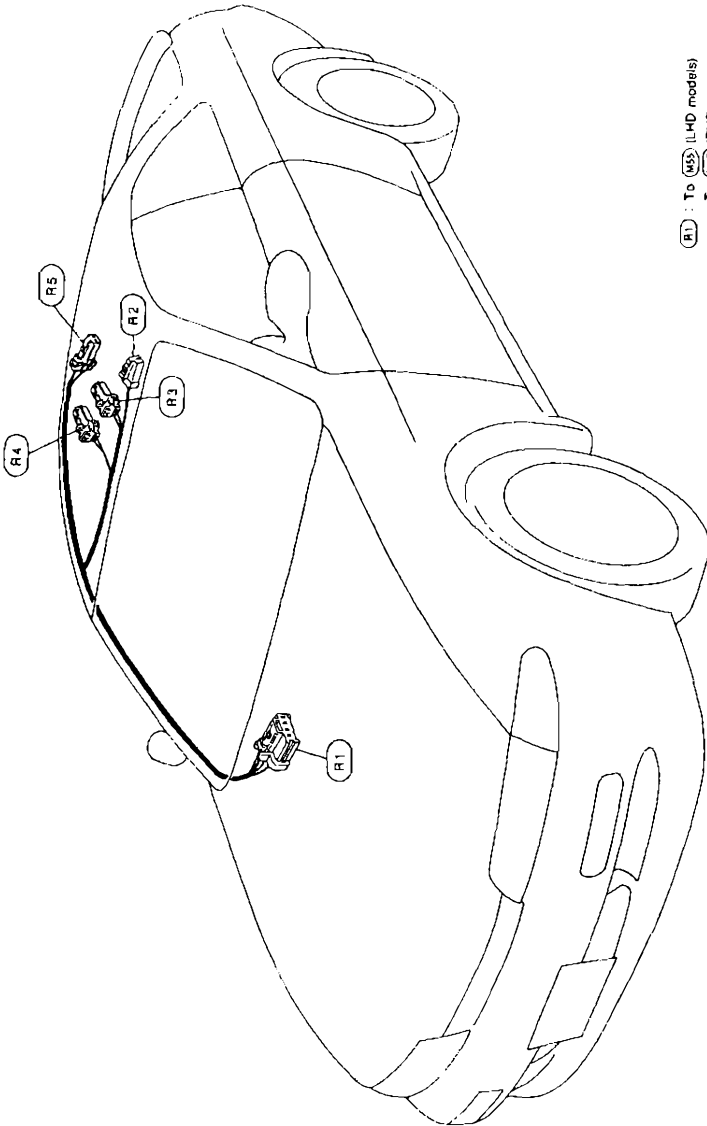
- (T1) : To (824)
- (T2) : To (825)
- (T3) : High-mounted stop lamp
- (T4) : Back-up lamp RH
- (T5) : Trunk room lamp switch
- (T6) : Trunk key cylinder switch (Except for Europe)
- (T7) : Back-up lamp LH
- (T8) : Differential oil pump (For Europe)
- (T9) : Fuel tank gauge unit
- (T10) : Fuel pump
- (T11) : Rear skid sensor (For ABS)
- (T12) : Differential oil warning lamp switch (For Europe)
- (T13) : Differential oil temperature switch (For Europe)
- (T14) : Differential oil cooler relay-1 (For Europe)
- (T15) : Differential oil cooler relay-2 (For Europe)
- (T16) : Speed control amplifier (For Europe)
- (T17) : Rear combination lamp RH
- (T18) : Rear wiper relay (Except for Australia)
- (T19) : Body ground
- (T20) : Rear fog lamp (For Europe)
- (T21) : License plate lamp
- (T22) : Rear combination lamp LH
- (T23) : Power antenna timer
- (T24) : To (861) (Models with ABS)



Body ground

# HARNES LAYOUT

## Room Lamp Harness



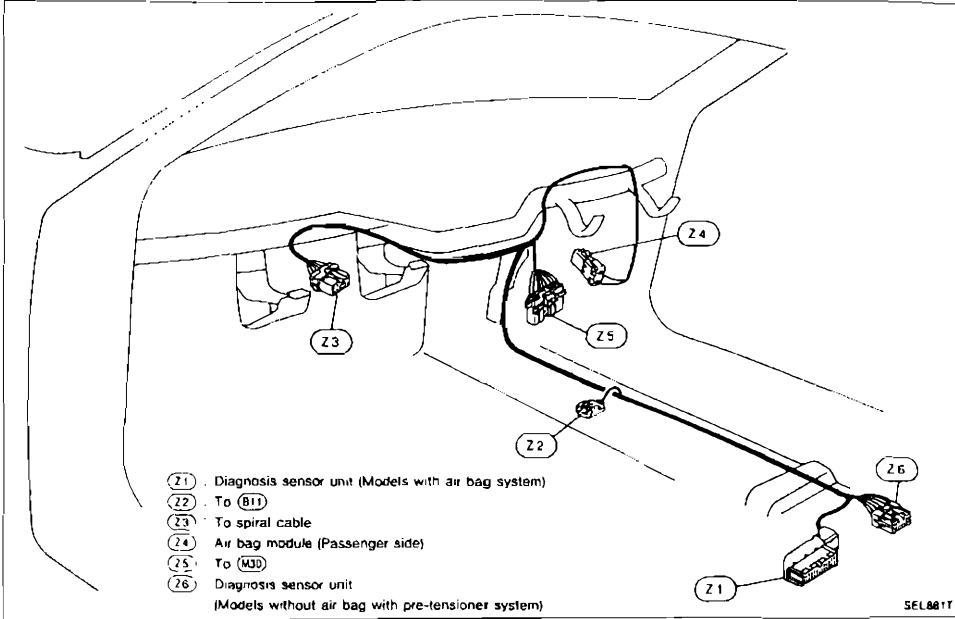
- (R1) : To (R5) (LHD models)  
To (R15) (RHD models)
- (R2) : To sun roof motor assembly
- (R3) : Spot lamp
- (R4) : Interior lamp (Without sun roof)
- (R5) : Interior lamp (With sun roof)



# HARNES LAYOUT

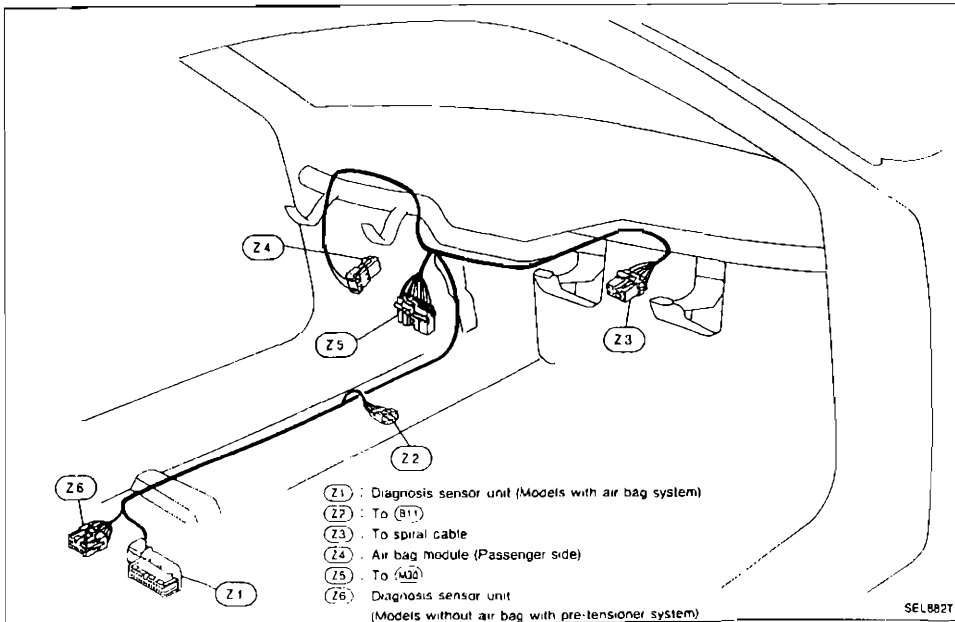
## LHD MODELS

### Air Bag and Seat Belt Pre-tensioner Harness



GN  
 MA  
 EM  
 LC  
 EC  
 FE  
 CL  
 MT  
 AT  
 PD  
 FA  
 HA  
 RA  
 ST  
 RS  
 BT  
 HA  
 EL  
 DX

## RHD MODELS

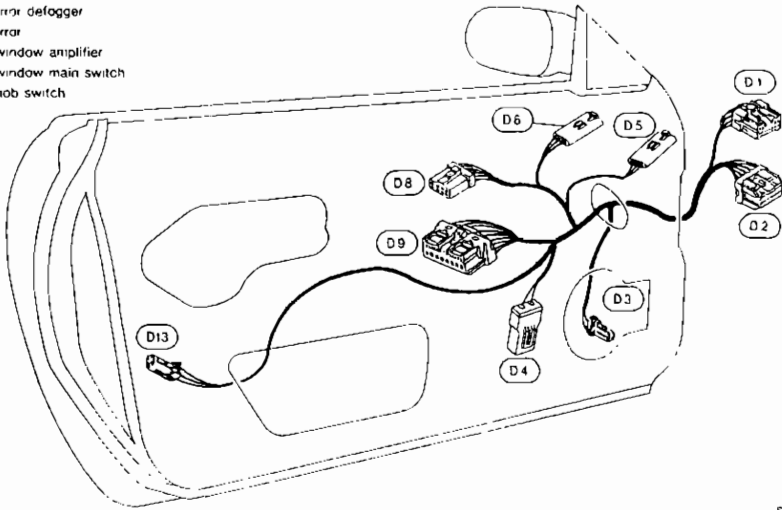


# HARNES LAYOUT

## Door Harness (LHD models)

### FRONT LH

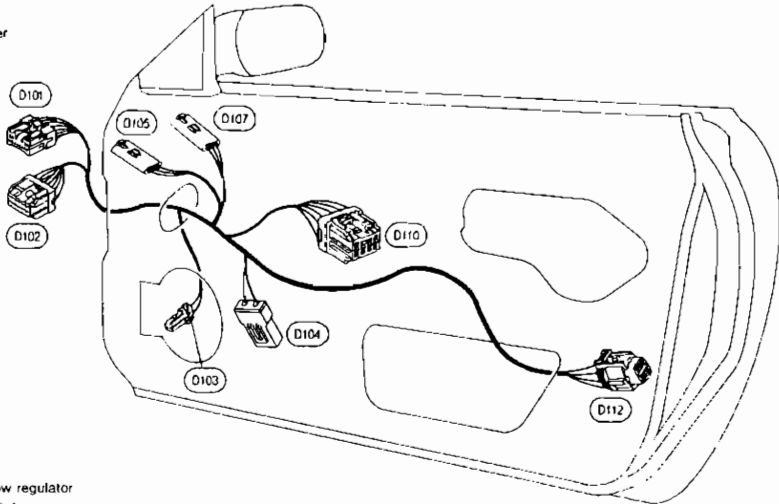
- (D1) To (M14)
- (D2) To (M15)
- (D3) Door speaker
- (D4) Power window regulator
- (D5) Door mirror defogger
- (D6) Door mirror
- (D8) Power window amplifier
- (D9) Power window main switch
- (D13) Lock knob switch



SEL883T

### FRONT RH

- (D101) : To (M56)
- (D102) : To (M57)
- (D103) : Door speaker



- (D104) Power window regulator
- (D105) Door mirror defogger
- (D106) Door mirror
- (D109) Power window sub-switch
- (D113) Door lock actuator

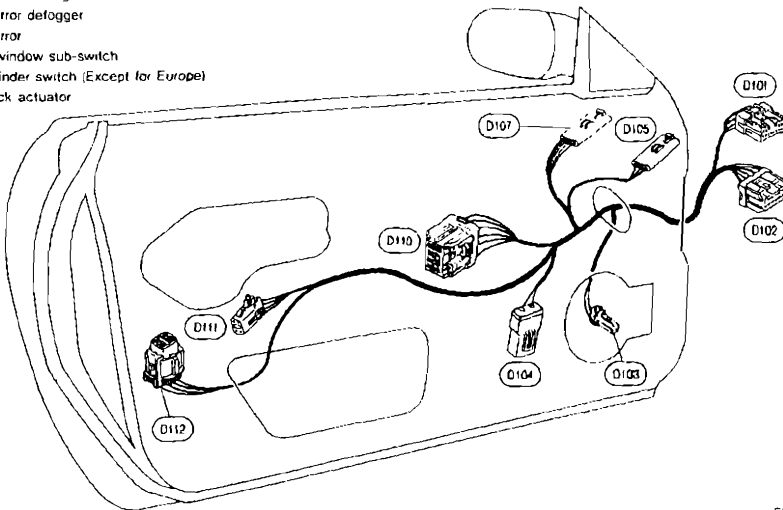
SE1084T

# HARNES LAYOUT

## FRONT LH

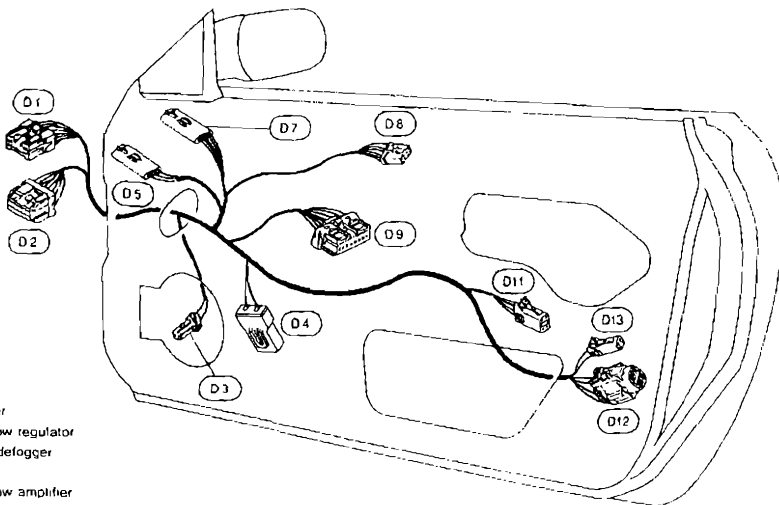
## Door Harness (RHD models)

- (D101) : To (M56)
- (D102) : To (M57)
- (D103) : Door speaker
- (D104) : Power window regulator
- (D105) : Door mirror defogger
- (D107) : Door mirror
- (D110) : Power window sub-switch
- (D111) : Key cylinder switch (Except for Europe)
- (D112) : Door lock actuator



SEL985T

## FRONT RH



- (D1) : To (M14)
- (D2) : To (M15)
- (D3) : Door speaker
- (D4) : Power window regulator
- (D5) : Door mirror defogger
- (D7) : Door mirror
- (D8) : Power window amplifier
- (D9) : Power window main switch
- (D11) : Key cylinder switch (Except for Europe)
- (D12) : Door lock actuator (Except for Europe)
- (D13) : Lock knob switch (For Europe)

SEL986T

## SUPER MULTIPLE JUNCTION (SMJ)

### Disconnecting and Connecting

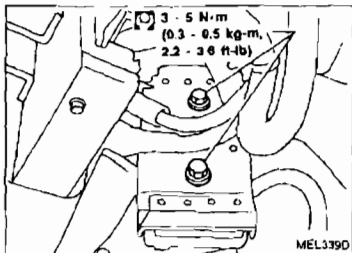
- SMJ is located on left side of dash.
- To disconnect SMJ, loosen fixing bolt.

- To install SMJ, tighten bolts until orange "full-tight" mark appears and then retighten to specified torque as required.

: 3 - 5 N·m  
(0.3 - 0.5 kg-m, 2.2 - 3.6 ft-lb)

#### CAUTION:

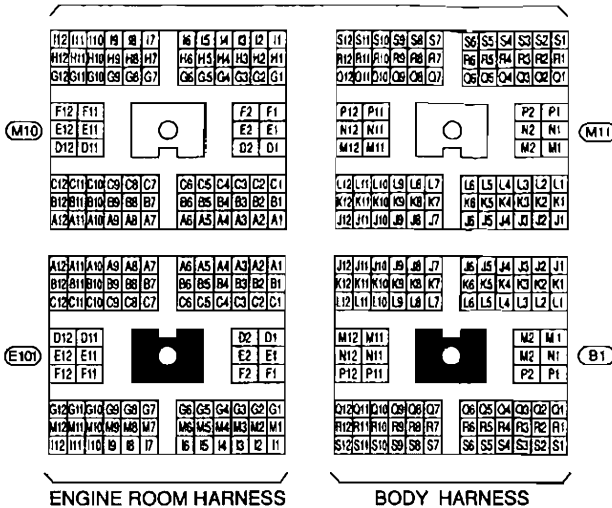
Do not overtighten bolts, otherwise, they may be damaged.



**Terminal Arrangement**

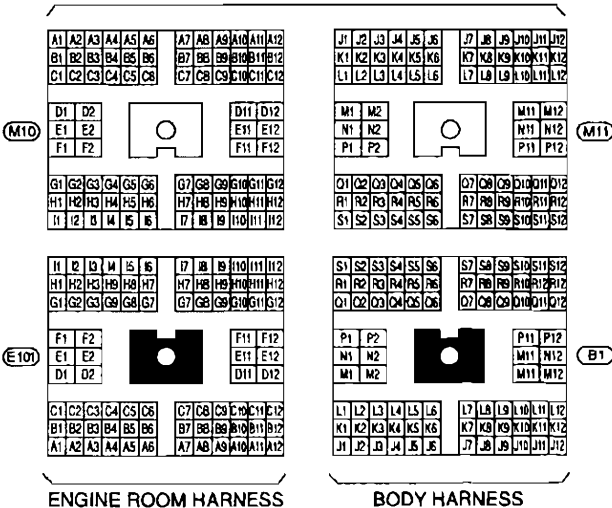
LHD MODELS

**MAIN HARNESS**



RHD MODELS

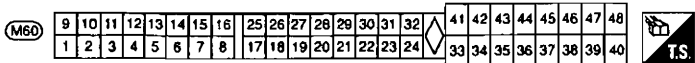
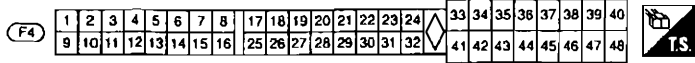
**MAIN HARNESS**



# SUPER MULTIPLE JUNCTION (SMJ)

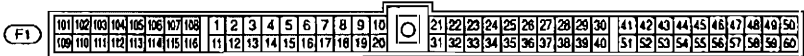
## Terminal Arrangement (Cont'd)

### ENGINE CONTROL HARNESS



### MAIN HARNESS

### ECM (ECCS CONTROL MODULE)



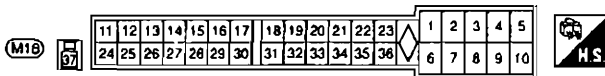
View from harness side

### A/T CONTROL UNIT



View from harness side

### SMART ENTRANCE CONTROL UNIT



View from harness side

SECTION **IDX**

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# NISSAN

## MODEL S14 SERIES

### FOREWORD

This supplement contains information concerning necessary service procedures and relevant data for the model S14 series face-lift.

All information, illustrations and specifications contained in this supplement are based on the latest product information available at the time of publication. If your NISSAN model differs from the specifications contained in this supplement, consult your NISSAN distributor for information.

The right is reserved to make changes in specifications and methods at any time without notice.

### QUICK REFERENCE INDEX

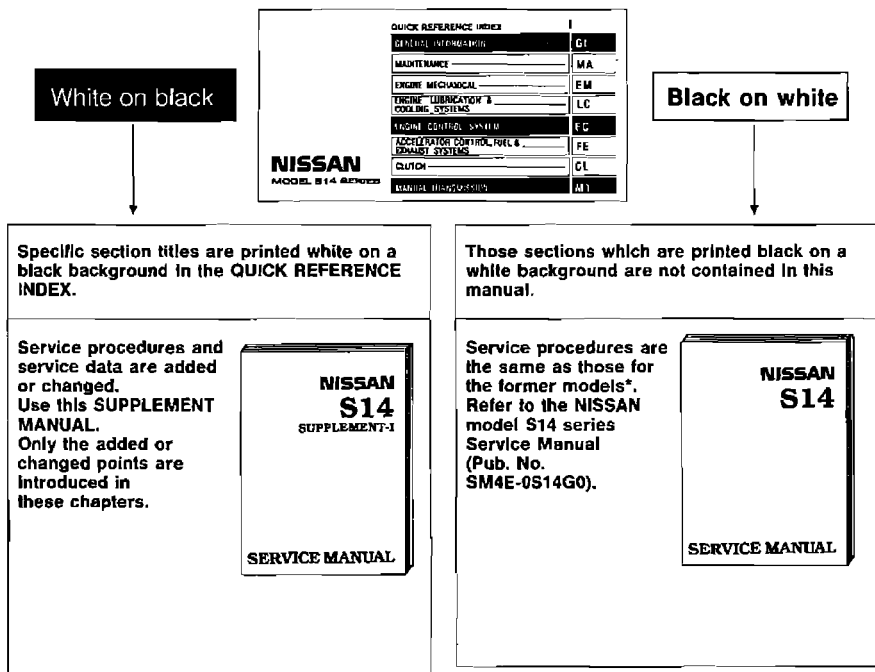
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NISSAN MOTOR CO., LTD.

# HOW TO USE THIS MANUAL

- ▶ This Service Manual contains the new service procedures, service data and specifications for the face-lifted model S14 series which has been in production since July, 1995.
- ▶ This Service Manual does not contain the service procedures, etc. which are the same as those for former models\*. Please use this manual in conjunction with the NISSAN model S14 series Service Manual (Pub. No. SM4E-0S14G0).
- ▶ Follow the instruction below when using this manual.



\* Former models: Models before the model S14 series introduced in July, 1995.

## 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 personal safety nor the vehicle's safety will be jeopardized by the service method selected.



# GENERAL INFORMATION

GI

## SECTION **GI**

**APPLIED FROM:** For Europe: ◆ JN1GBAS14U0010001 ◆  
For Australia: JN1GBAS14A0002001  
For New Zealand: JN1GBAS14A0700501  
Except for Europe, Australia and New Zealand: GBAS14-001001

### OUTLINE OF MODIFICATIONS:

#### Electrical system

- NATS V2.0 (Nissan Anti-theft System Ver. 2.0)\* has been adopted on models for Europe. (\*Immobiliser)
- A rear fog lamp warning buzzer has been adopted on models for Europe.
- A seat belt warning lamp/buzzer has been adopted on models for Australia.

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### Precautions for NATS V2.0 (For Europe)

#### NATS (Nissan Anti-Theft System)

NATS V2.0 will immobilize the engine if someone tries to start it without the registered key of NATS V2.0.

Both of the originally supplied ignition key IDs have been NATS registered.

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

- When NATS detects trouble, the malfunction indicator lamp (MIL) blinks.

This blinking indicates that the anti-theft is not functioning, so prompt service is required.

- When servicing NATS (trouble diagnoses, system initialisation and additional registration of other NATS ignition key IDs), CONSULT hardware and CONSULT NATS software is necessary.

Regarding the procedures of NATS initialisation and NATS ignition key ID registration, refer to CONSULT operation manual, NATS V2.0.

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

- When servicing NATS V2.0 (trouble diagnoses, system initialisation and additional registration of other NATS ignition key IDs), it may be necessary to re-register original key identification. Therefore, be sure to receive all keys from vehicle owner.

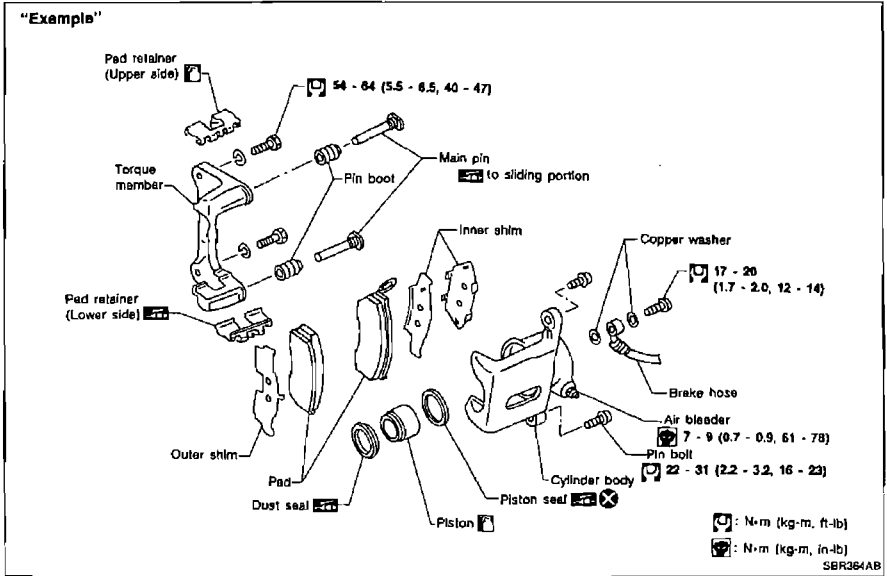
A maximum of four key IDs can be registered into NATS.

- When failing to start the engine first-time using the key of NATS V2.0, start as follows.
  - (1) Turn ignition key to "OFF".
  - (2) Wait approx. 5 seconds.
  - (3) Turn ignition key to "START" again while keeping the key apart from any others on key-chain.

# HOW TO USE THIS MANUAL

GI

- **THE LARGE ILLUSTRATIONS** are exploded views (See below.) and contain tightening torques, lubrication points 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**.



- The following **SYMBOLS AND ABBREVIATIONS** are used:

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

## HOW TO READ WIRING DIAGRAMS

### Wiring Diagram Codes (Cell Codes)

- Use the chart below to find out what each wiring diagram code stands for.
- Only the modified wiring diagrams are included in this service manual, as shown in the chart below.

| Code   | Section | Wiring Diagram Name                            |
|--------|---------|--|
| AAC/V  | EC      | IACV-AAC Valve                                 |
| ABS    | BR      | Anti-lock Brake System                         |
| A/C, A | HA      | Auto Air Conditioner                           |
| A/C, M | HA      | Manual Air Conditioner                         |
| A/T    | AT      | Automatic Transmission                         |
| AT/C   | EC      | A/T Control                                    |
| CHIME  | EL      | Warning Chime                                  |
| CMPS   | EC      | Camshaft Position Sensor                       |
| COOL/F | EC      | Cooling Fan Control                            |
| DEF/S  | EC      | Rear Window Defogger Signal                    |
| ECTS   | EC      | Engine Coolant Temperature Sensor              |
| EGRC/V | EC      | EGR and canister Control Solenoid Valve        |
| F/FOG  | EL      | Front Fog Lamp                                 |
| FICD   | EC      | IACV-FICD Solenoid Valve                       |
| F/PUMP | EC      | Fuel Pump                                      |
| HO2S   | EC      | Heated Oxygen Sensor                           |
| IGN/SG | EC      | Ignition Signal                                |
| ILL    | EL      | Illumination                                   |
| INJECT | EC      | Injector                                       |
| INT/L  | EL      | Interior, Spot and Trunk Room Lamps            |
| KS     | EG      | Knock Sensor                                   |
| MAFS   | EC      | Mass Air Flow Sensor                           |
| MAIN   | EG      | Main Power Supply and Ground Circuit           |
| METER  | EL      | Speedometer, Tachometer, Temp. and Fuel Gauges |
| MIL    | EC      | MIL, Data Link Connector For Consult           |
| MIRROR | EL      | Door Mirror                                    |
| MULTI  | EL      | Multi-remote Control System                    |
| NATS   | EL      | Nissan Anti-Theft System                       |
| PNP/SW | EC      | Park/Neutral Position Switch                   |
| POWER  | EL      | Power Supply Routing                           |
| PST/SW | EC      | Power Steering Oil Pressure Switch             |
| R/FOG  | EL      | Rear Fog Lamp                                  |

| Code   | Section | Wiring Diagram Name                    |
|--------|---------|--|
| SRS    | RS      | Supplemental Restraint System          |
| S/SIG  | EC      | Start Signal                           |
| THEFT  | EL      | Theft Warning System                   |
| TPS    | EC      | Throttle Position Sensor               |
| TURN   | EL      | Turn Signal and Hazard Warning Lamps   |
| VSS    | EC      | Vehicle Speed Sensor                   |
| VTC    | EC      | VTC Solenoid Valve                     |
| WARN   | EL      | Warning Lamps                          |
| WG/V   | EC      | Wastegate Valve Control Solenoid Valve |
| WINDOW | EL      | Power Window                           |

## Function and System Application

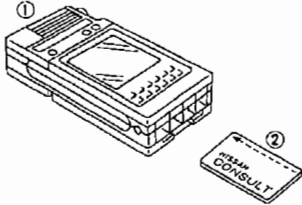
| Diagnostic test mode        | Function  | ECCS | A/T | Air bag | ABS | NATS*1 |
|-----------------------------|---|------|-----|---------|-----|--------|
| Work support                | This mode enables a technician to adjust some devices faster and more accurately by following the indications on CONSULT.             | x    | —   | —       | —   | —      |
| Self-diagnostic results     | Self-diagnostic results can be read and erased quickly.   | x    | x   | x       | x   | 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 ECM can be read.   | x    | x   | —       | x   | —      |
| Active test                 | Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range. | x    | —   | —       | x   | —      |
| ECM part number             | ECM part number can be read.  | x    | x   | —       | x   | —      |
| Function test               | Conducted by CONSULT instead of a technician to determine whether each system is "OK" or "NG".  | x    | —   | —       | —   | —      |
| Control unit initialisation | All registered ignition key IDs in NATS components can be initialised and new IDs can be registered.                                  | —    | —   | —       | —   | x      |
| Self-function check         | ECM checks its own NATS communication interface.  | —    | —   | —       | —   | x      |

x : Applicable

\*1: NATS, Nissan Anti-Theft System

## Checking Equipment

When ordering the below equipment, contact your NISSAN distributor.

| Tool name  | Description   |
|--|---|
| <b>NISSAN CONSULT</b><br>① CONSULT unit and accessories<br>② Program card<br>● AE950 for Australia<br>● EE940 except for Australia<br>● NATS-E940*1 for NATS | <br>NT004 |

\*1: An order for NATS program card must be placed only with NISSAN EUROPE N.V.

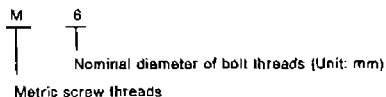
# TIGHTENING TORQUE OF STANDARD BOLTS

| 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   | 53.9  |
|       |           |                  | 1.25     | 13                                    | 1.3  | 9     | —     | 15                  | 1.5  | 11    | —     |
|       | M8        | 8.0              | 1.0      | 13                                    | 1.3  | 9     | —     | 16                  | 1.6  | 12    | —     |
|       |           |                  | 1.25     | 25                                    | 2.5  | 18    | —     | 29                  | 3.0  | 22    | —     |
|       | M10       | 10.0             | 1.25     | 25                                    | 2.6  | 19    | —     | 30                  | 3.1  | 22    | —     |
|       |           |                  | 1.75     | 42                                    | 4.3  | 31    | —     | 51                  | 5.2  | 38    | —     |
|       | M12       | 12.0             | 1.25     | 46                                    | 4.7  | 34    | —     | 56                  | 5.7  | 41    | —     |
| 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    |
|       |           |                  | 1.25     | 21                                    | 2.1  | 15    | —     | 25                  | 2.5  | 18    | —     |
|       | M8        | 8.0              | 1.0      | 22                                    | 2.2  | 16    | —     | 26                  | 2.7  | 20    | —     |
|       |           |                  | 1.5      | 41                                    | 4.2  | 30    | —     | 48                  | 4.9  | 35    | —     |
|       | M10       | 10.0             | 1.25     | 43                                    | 4.4  | 32    | —     | 51                  | 5.2  | 38    | —     |
|       |           |                  | 1.75     | 71                                    | 7.2  | 52    | —     | 84                  | 8.6  | 62    | —     |
|       | M12       | 12.0             | 1.25     | 77                                    | 7.8  | 57    | —     | 92                  | 9.4  | 68    | —     |
| 1.5   |           |                  | 127      | 13.0                                  | 94   | —     | 147   | 15.0                | 108  | —     |       |
| 9T    | M6        | 6.0              | 1.0      | 12                                    | 1.2  | 9     | —     | 15                  | 1.5  | 11    | —     |
|       |           |                  | 1.25     | 29                                    | 3.0  | 22    | —     | 35                  | 3.6  | 26    | —     |
|       | M8        | 8.0              | 1.0      | 31                                    | 3.2  | 23    | —     | 37                  | 3.8  | 27    | —     |
|       |           |                  | 1.5      | 59                                    | 6.0  | 43    | —     | 70                  | 7.1  | 51    | —     |
|       | M10       | 10.0             | 1.25     | 62                                    | 6.3  | 46    | —     | 74                  | 7.5  | 54    | —     |
|       |           |                  | 1.75     | 98                                    | 10.0 | 72    | —     | 118                 | 12.0 | 87    | —     |
|       | M12       | 12.0             | 1.25     | 108                                   | 11.0 | 80    | —     | 137                 | 14.0 | 101   | —     |
| 1.5   |           |                  | 177      | 18.0                                  | 130  | —     | 206   | 21.0                | 152  | —     |       |

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    |

\* : Nominal diameter



# ENGINE CONTROL SYSTEM

## SECTION **EC**

### MODIFICATION NOTICE:

- The mass air flow sensor harness connector has been changed.
- The boost pressure sensor has been eliminated.
- The ECM harness connector has been changed from 76-pin type to 64-pin type (Europe models only).

EC

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### ENGINE AND EMISSION CONTROL OVERALL

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### ENGINE AND EMISSION CONTROL SYSTEM

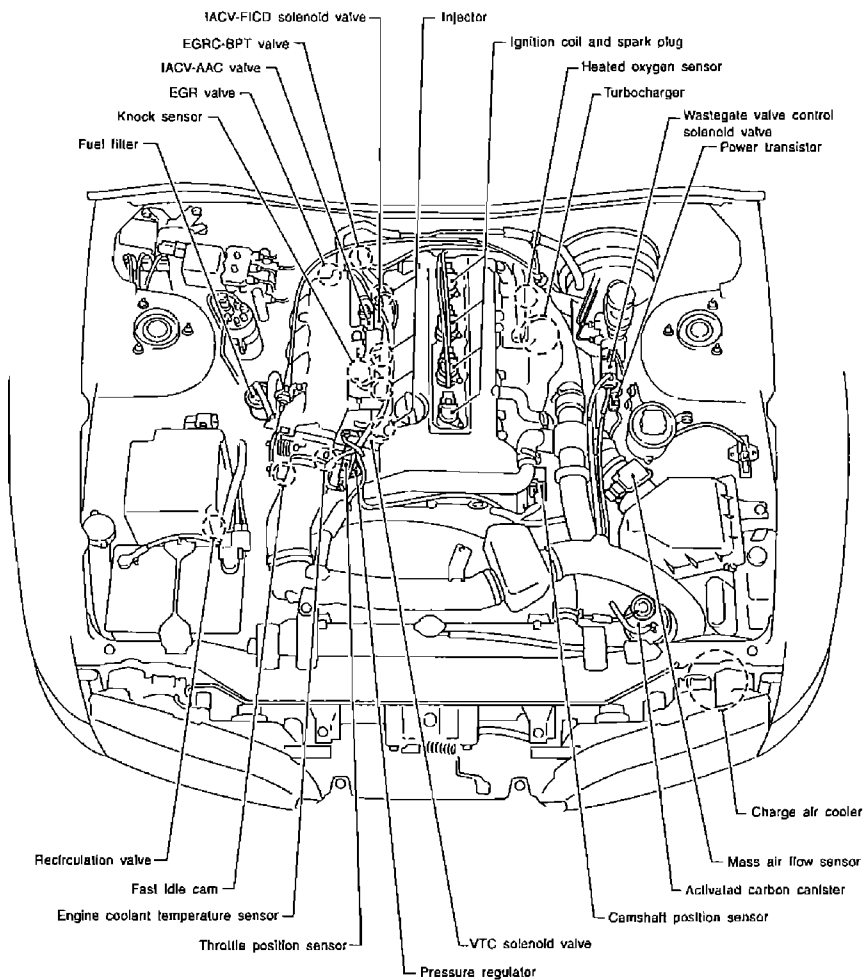
|  |           |
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#### When you read wiring diagrams:

- Read G1 section, "HOW TO READ WIRING DIAGRAMS".
- See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.

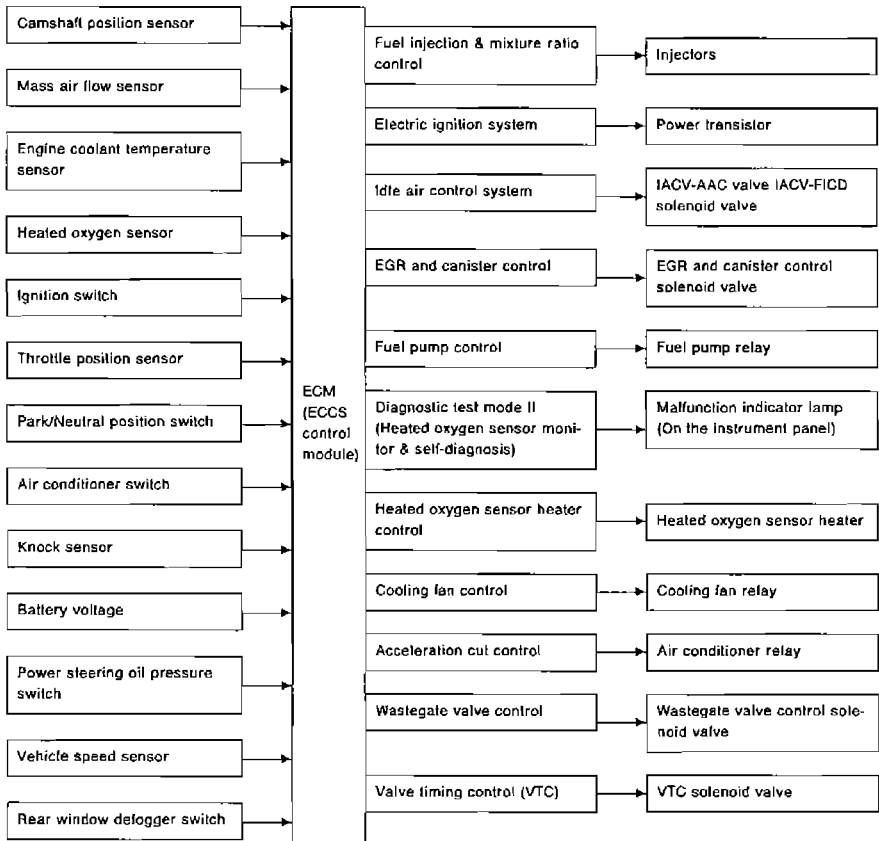
When you perform trouble diagnoses, read G1 section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".

## ECES Component Parts Location

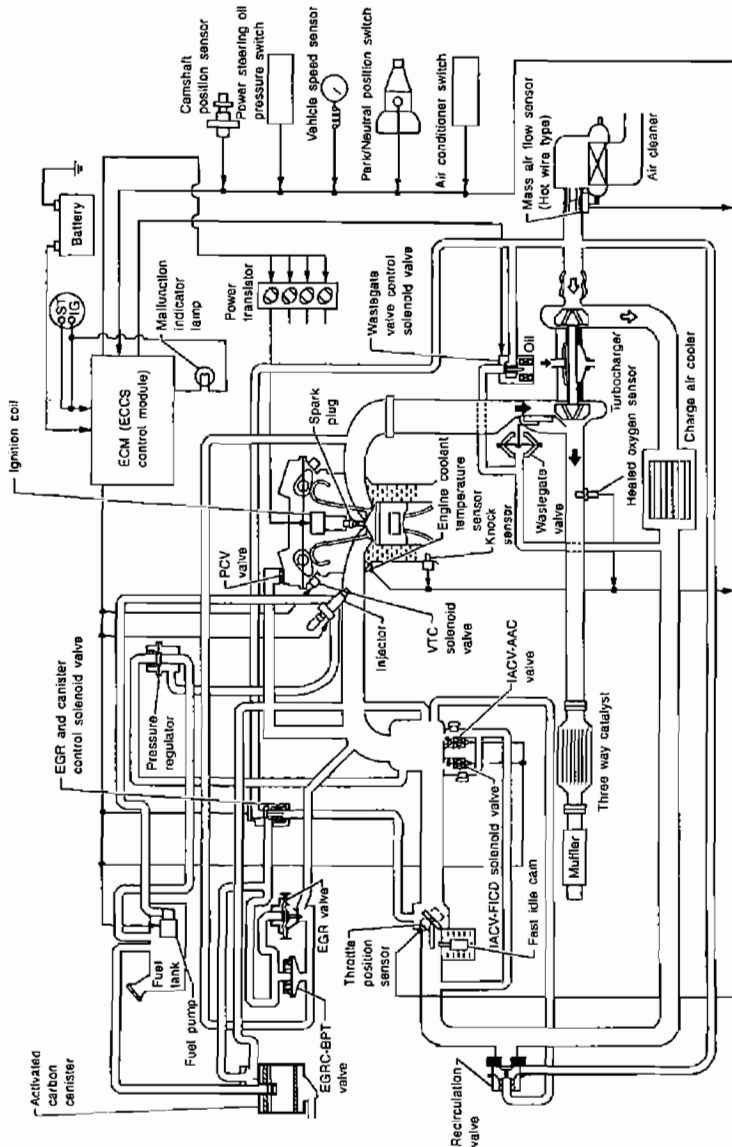




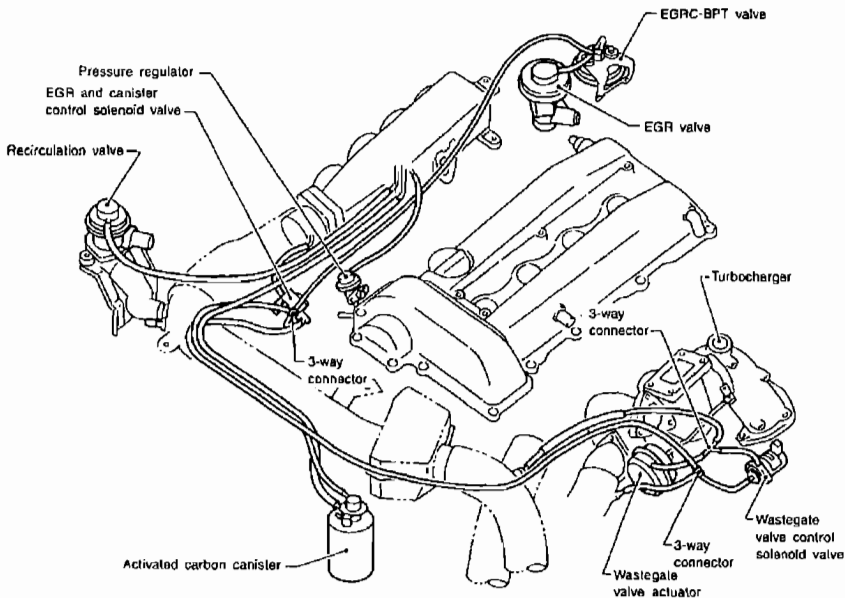
## System Chart



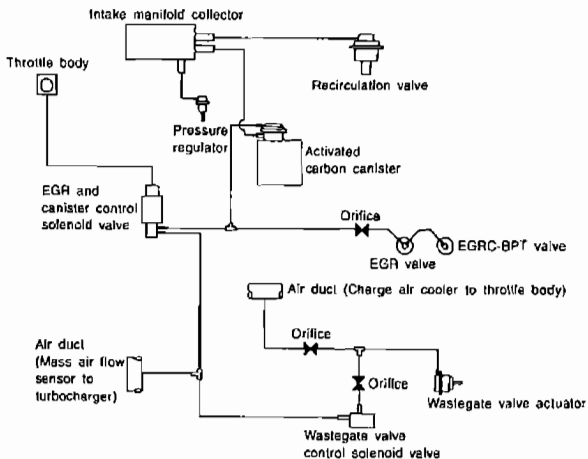
## System Diagram



Vacuum Hose Drawing



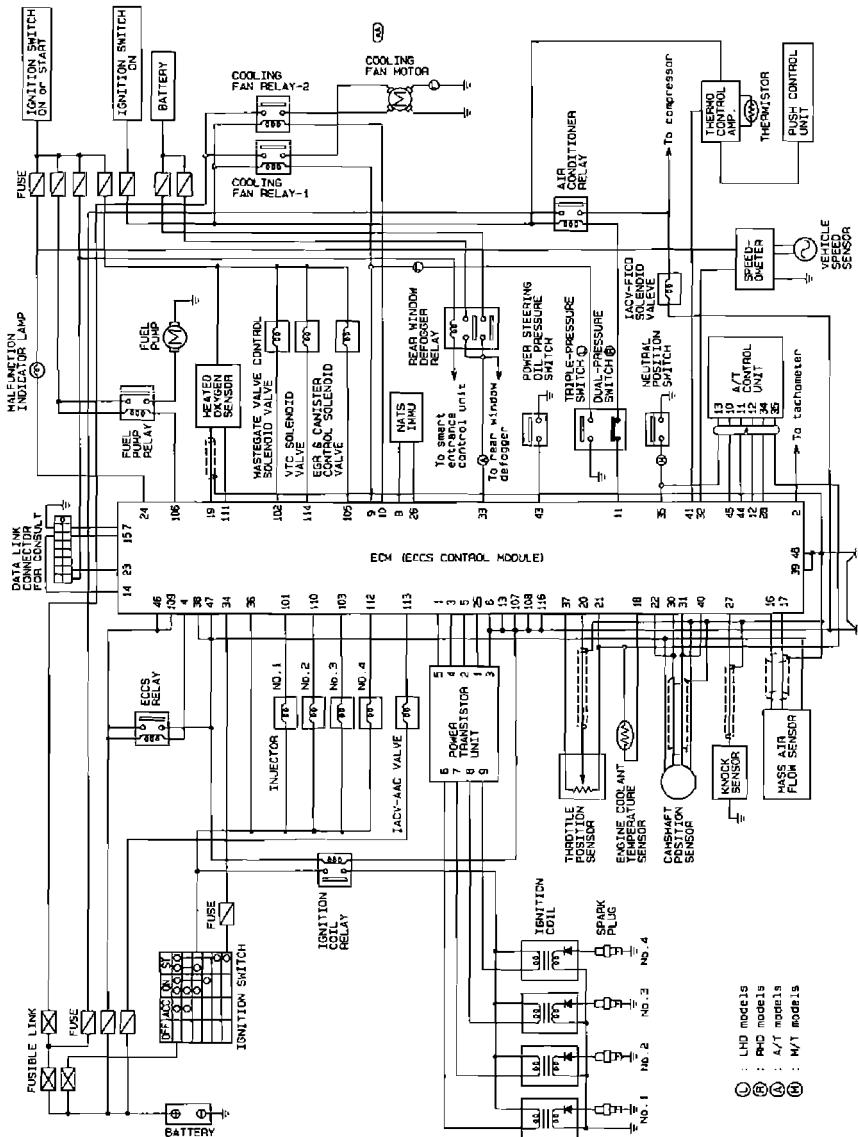
EC



# ENGINE AND EMISSION CONTROL OVERALL SYSTEM

## Circuit Diagram

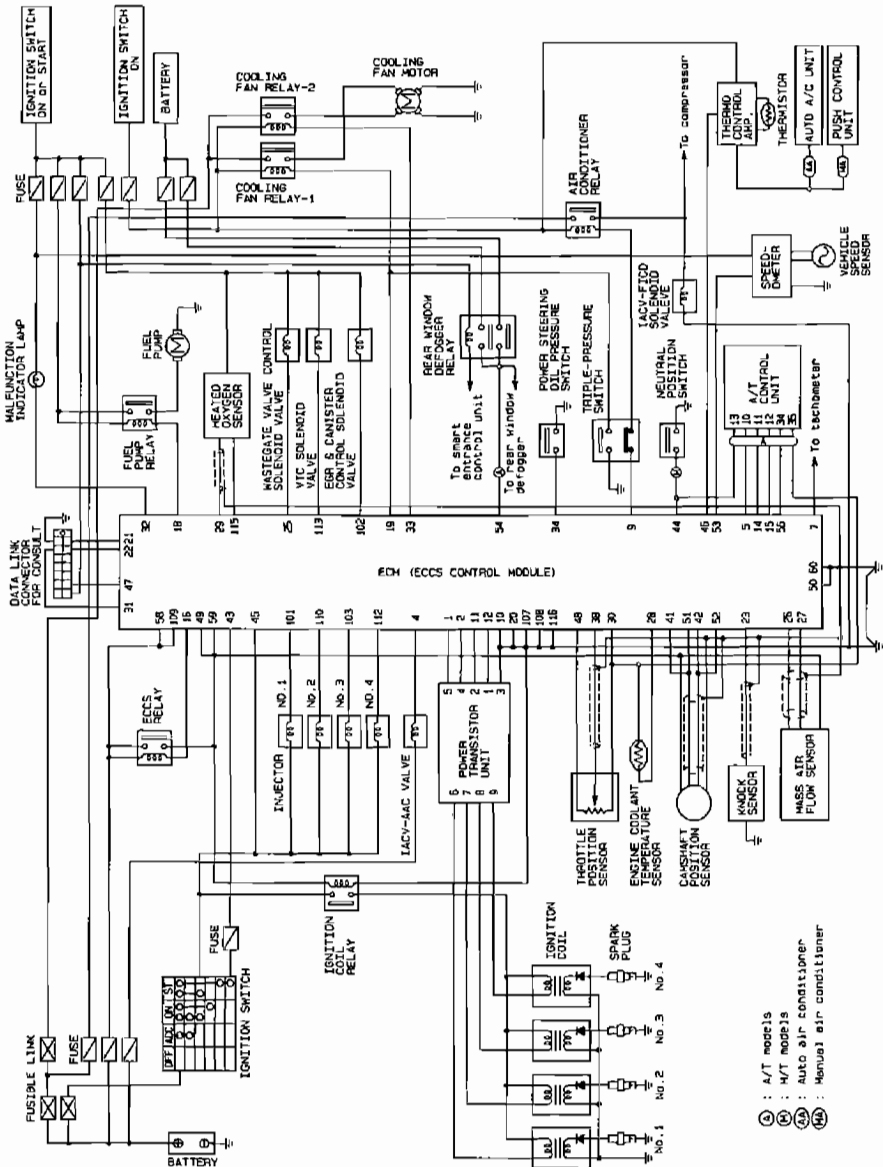
FOR EUROPE



# ENGINE AND EMISSION CONTROL OVERALL SYSTEM

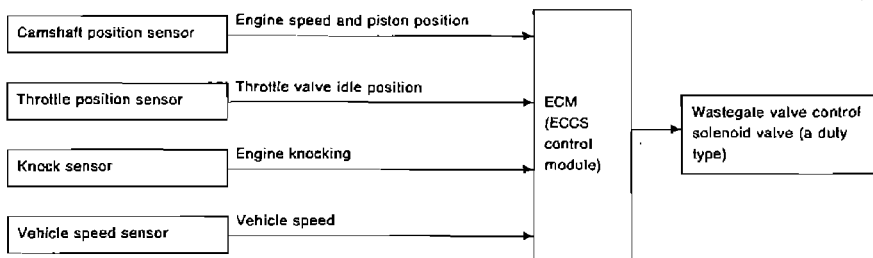
## Circuit Diagram (Cont'd)

EXCEPT FOR EUROPE



## Boost Pressure Control

### INPUT/OUTPUT SIGNAL LINE



### SYSTEM DESCRIPTION

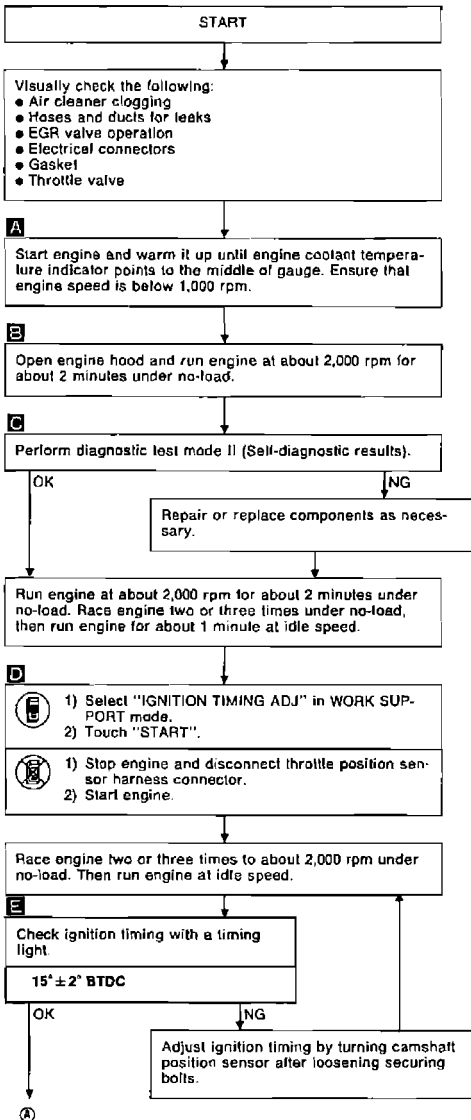
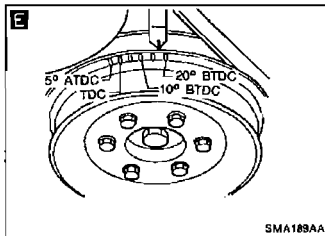
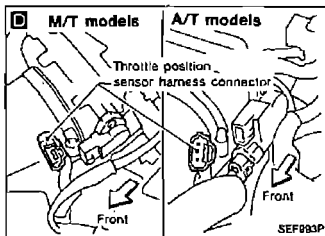
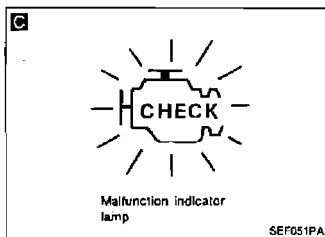
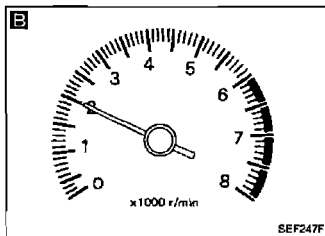
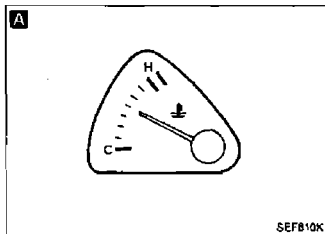
The output signal maps of the ECM are selected according to fuel octane rating, gear position (M/T model) and vehicle speed (A/T model). The wastegate valve control solenoid valve

changes the source vacuum which activates the actuator. This results in a proportional boost pressure to the acceleration. Knock signs are used to determine fuel octane rating.

### OPERATION

| Fuel octane rating   | Gear position or vehicle speed   | Boost pressure control map |
|----------------------|--|----------------------------|
| Premium              | <ul style="list-style-type: none"> <li>● 1, 2 and 3 speed gears (M/T model)</li> <li>● Less than 46 km/h (29 MPH) (A/T model)</li> </ul> | A slow response type       |
|                      | <ul style="list-style-type: none"> <li>● 4 and 5 speed gears (M/T model)</li> <li>● More than 46 km/h (29 MPH) (A/T model)</li> </ul>    | A quick response type      |
| Lower than the above | Any  | Fixed                      |

# IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION



EC

# IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION

**A**

■ IGN TIMING ADJ ■ □

— CONDITION SETTING —

IGN/T FEEDBACK HOLD

---

≡ ≡ MONITOR ≡ ≡

CAS-RPM (REF) 765rpm

IGN TIMING 15BTDC

IDLE POSITION ON

SEF854K

**B**

■ IGN TIMING ADJ ■ □

IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING START.

AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CRANK ANGLE SENSOR.

START

SEF816K

**C**

SEF996P

**D**

M/T models

A/T models

SEF997P

**D**

|      |          |           |       |   |
|------|----------|-----------|-------|---|
| ↑    |          |           |       |   |
| BACK | ←        | →         | ↑     | ↓ |
| MODE | LIGHT ON | LIGHT OFF | ↑     | ↓ |
|      |          |           | ENTER |   |

SEF912J

①

**A**

Check idle speed.

☎ Read idle speed in "IGN TIMING ADJ" in "WORK SUPPORT" mode.

OR

🔧 Check idle speed.

**800 ± 50 rpm (A/T in "N" position)**

OK ↓ NG → ②

**A**

☎ 1) Select "IGN TIMING ADJ" in "WORK SUPPORT" mode.

☎ 2) Touch "START".

OR

🔧 Turn off engine and disconnect throttle position sensor harness connector. Then start engine.

↓

Race engine two or three times to about 2,000 rpm under no-load. Then run engine at idle speed.

↓

**C**

Adjust idle speed by turning idle speed adjusting screw.

**750 ± 50 rpm (A/T in "N" position)**

↓

**D**

☎ Touch "Back".

🔧 1) Stop engine and disconnect throttle position sensor harness connector.

🔧 2) Start engine.

↓

Race engine two or three times to about 2,000 rpm under no-load. Then run engine at idle speed.

↓

Check idle speed.

☎ Read idle speed in "DATA MONITOR" mode with CONSULT.

OR

🔧 Check idle speed.

**800 ± 50 rpm (A/T in "N" position)**

OK ↓ NG → ③

Check AAC valve and replace if necessary.

↓

③ Check AAC valve harness and repair if necessary.

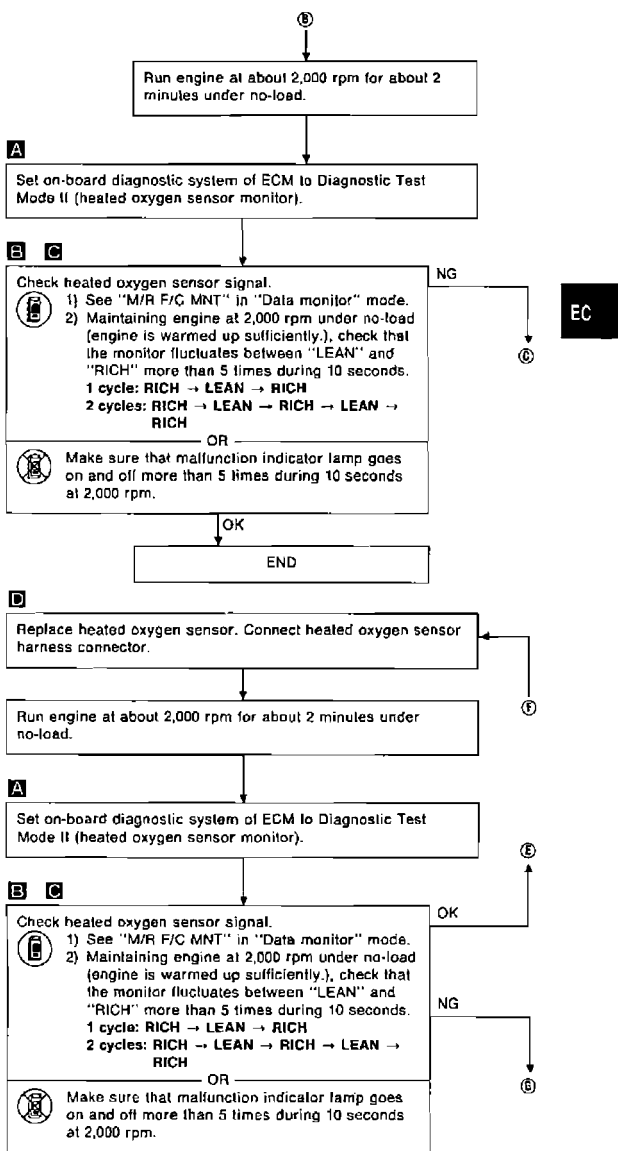
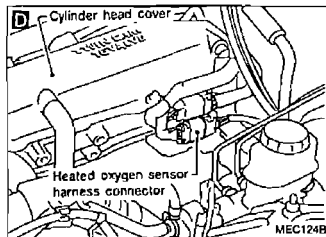
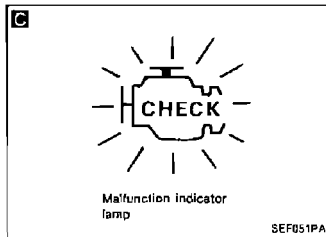
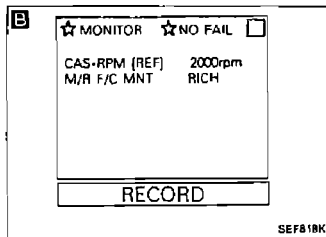
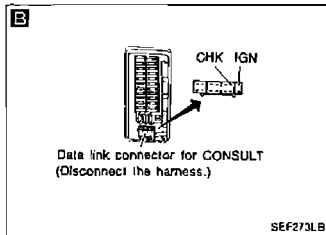
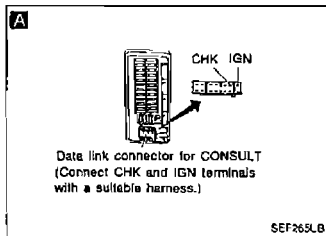
↓

Check ECM function\* by substituting another known good ECM.

\* ECM may be the cause of a problem, but this is rarely the case. ④

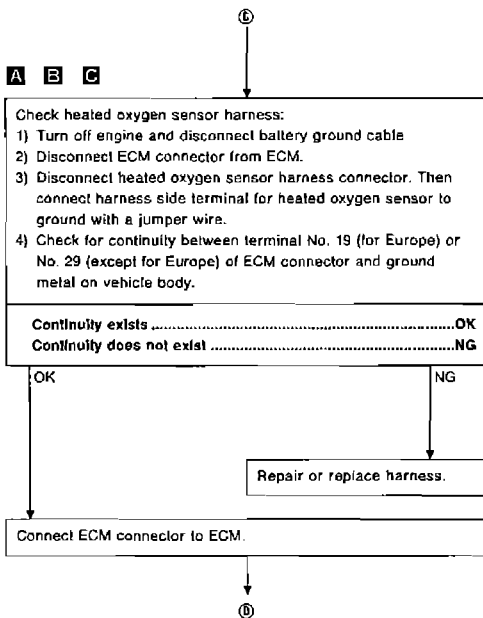
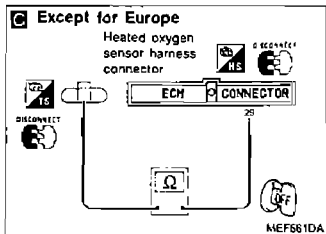
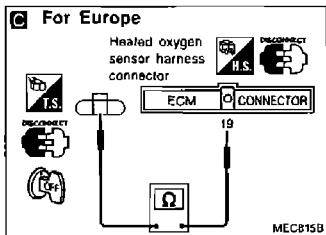
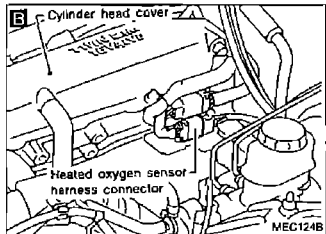
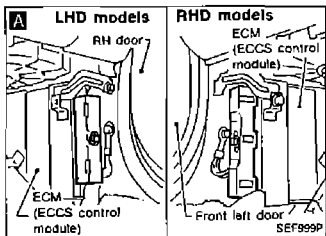


# IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION

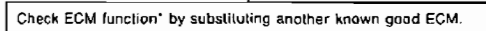
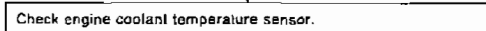
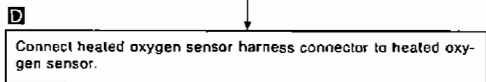
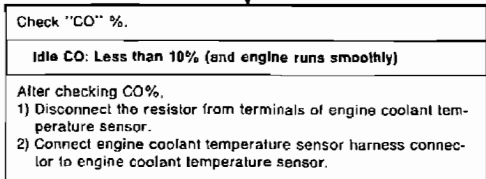
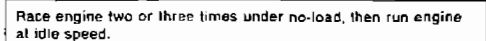
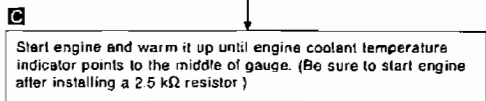
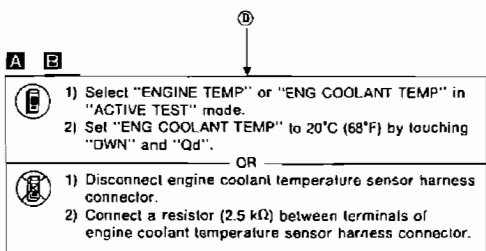
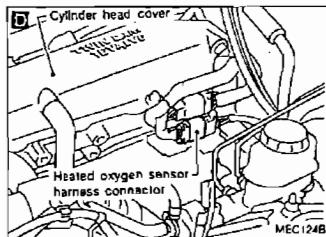
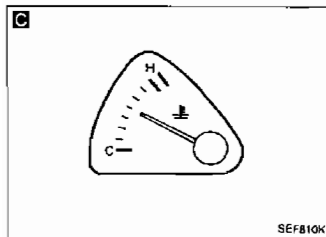
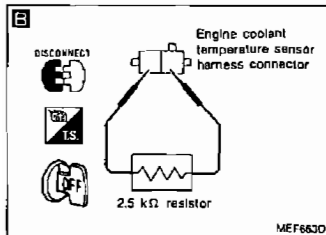
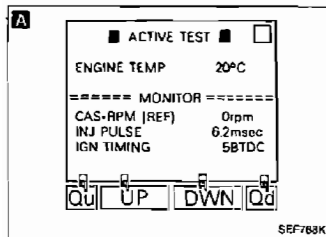


EC

# IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION



# IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION



\*: ECM may be the cause of a problem, but this is rarely the case.

EC

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### FOR ALL AREAS

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EC

## On-board Diagnostic System — Diagnostic Test Mode II (Self-diagnostic results)

### Display diagnostic trouble code table

| Diagnostic trouble code No. | Detected items                              |
|-----------------------------|---|
| 11*                         | Camshaft position sensor circuit            |
| 12                          | Mass air flow sensor circuit                |
| 13                          | Engine coolant temperature sensor circuit   |
| 21*                         | Ignition signal circuit                     |
| 34                          | Knock sensor circuit                        |
| 43                          | Throttle position sensor circuit            |
| 54                          | Signal circuit from A/T control unit to ECM |
| 55                          | No malfunction in the above circuits        |

\*: Check items causing a malfunction of camshaft position sensor circuit first, if both "CAMSHAFT POSITION SENSOR (No. 11)" and "IGN SIGNAL-PRIMARY (No. 21)" are displayed one after the other.

| Diagnostic trouble code No. | Detected items   | Malfunction is detected when ...   | Check item (remedy)  |
|-----------------------------|--|--|--|
| 11*                         | Camshaft position sensor circuit                       | <ul style="list-style-type: none"> <li>● Either 1° or 180° signal is not entered for the first few seconds during engine cranking.</li> <li>● Either 1° or 180° signal is not input often enough while the engine speed is higher than the specified rpm.</li> </ul> | <ul style="list-style-type: none"> <li>● Harness and connector (If harness and connector are normal, replace camshaft position sensor.)</li> </ul> |
| 12                          | Mass air flow sensor circuit                           | <ul style="list-style-type: none"> <li>● The mass air flow sensor circuit is open or shorted.<br/>(An abnormally high or low voltage is entered.)</li> </ul>   | <ul style="list-style-type: none"> <li>● Harness and connector (If harness and connector are normal, replace mass air flow sensor.)</li> </ul>     |
| 13                          | Engine coolant temperature sensor circuit              | <ul style="list-style-type: none"> <li>● The engine coolant temperature sensor circuit is open or shorted.<br/>(An abnormally high or low output voltage is entered.)</li> </ul>   | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Engine coolant temperature sensor</li> </ul>                             |
| 21*                         | Ignition signal circuit                                | <ul style="list-style-type: none"> <li>● The ignition signal in the primary circuit is not entered during engine cranking or running.</li> </ul>   | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Power transistor unit</li> </ul>   |
| 34                          | Knock sensor circuit                                   | <ul style="list-style-type: none"> <li>● The knock sensor circuit is open or shorted.<br/>(An abnormally high or low voltage is entered.)</li> </ul>   | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Knock sensor</li> </ul>  |
| 43                          | Throttle position sensor circuit                       | <ul style="list-style-type: none"> <li>● The throttle position sensor circuit is open or shorted.<br/>(An abnormally high or low voltage is entered.)</li> </ul>   | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Throttle position sensor</li> </ul>                                      |
| 54                          | Signal circuit from A/T control unit to ECM (A/T only) | <ul style="list-style-type: none"> <li>● The A/T communication line is open or shorted.</li> </ul>   | <ul style="list-style-type: none"> <li>● Harness and connector</li> </ul>  |

\*: Check items causing a malfunction of camshaft position sensor circuit first, if both "CAMSHAFT POSITION SENSOR (No. 11)" and "IGN SIGNAL-PRIMARY (No. 21)" are displayed one after the other.

### On-board Diagnostic System — Diagnostic Test Mode II (Self-diagnostic results) (Cont'd)

#### HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

The diagnostic trouble code is erased from the backup memory on the ECM when the diagnostic test mode is changed from Diagnostic Test Mode II to Diagnostic Test Mode I. (Refer to "HOW TO SWITCH DIAGNOSTIC TEST MODES".)

- If the battery terminal is disconnected, the diagnostic trouble code will be lost from the backup memory within 24 hours.
- Be careful not to erase the stored memory before starting trouble diagnoses.

EC



#### For Europe models

- If the MIL blinks or "NATS MALFUNCTION" is displayed on "SELF-DIAG RESULTS" screen, perform self-diagnostic results mode with CONSULT using NATS program card (NATS-E940). Refer to EL section.
- Confirm no self-diagnostic results of NATS is displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT.
- When replacing ECM, initialisation of NATS V2.0 system and registration of all NATS V2.0 Ignition key IDs must be carried out with CONSULT using NATS program card (NATS-E940).

Therefore, be sure to receive all keys from vehicle owner. Regarding the procedures of NATS initialisation and NATS Ignition key ID registration, refer to CONSULT operation manual, NATS V2.0.

# TROUBLE DIAGNOSES

## CONSULT

### ECCS COMPONENT PARTS APPLICATION

| ECCS COMPONENT PARTS                   |                                     | DIAGNOSTIC TEST MODE |                                |                   |             |                  |
|--|-------------------------------------|----------------------|--------------------------------|-------------------|-------------|------------------|
|  |                                     | WORK SUP-<br>PORT    | SELF-<br>DIAGNOSTIC<br>RESULTS | DATA MONI-<br>TOR | ACTIVE TEST | FUNCTION<br>TEST |
| INPUT                                  | Camshaft position sensor            |                      | X                              | X                 |             |                  |
|  | Mass air flow sensor                |                      | X                              | X                 |             |                  |
|  | Engine coolant temperature sensor   |                      | X                              | X                 | X           |                  |
|  | Heated oxygen sensors               |                      |                                | X                 |             | X                |
|  | Vehicle speed sensors               |                      |                                | X                 |             | X                |
|  | Throttle position sensor            | X                    | X                              | X                 |             | X                |
|  | Knock sensor                        |                      | X                              |                   |             |                  |
|  | Ignition switch (start signal)      |                      |                                | X                 |             | X                |
|  | Air conditioner switch              |                      |                                | X                 |             |                  |
|  | Park/Neutral position switch        |                      |                                | X                 |             | X                |
|  | Power steering oil pressure switch  |                      |                                | X                 |             | X                |
|  | Battery                             |                      |                                | X                 |             |                  |
| A/T signal                             |                                     | X                    |                                |                   |             |                  |
| OUTPUT                                 | Injectors                           |                      |                                | X                 | X           | X                |
|  | Power transistor (ignition timing)  | X                    | X (ignition<br>signal)         | X                 | X           | X                |
|  | IACV-AAC valve                      | X                    |                                | X                 | X           | X                |
|  | Valve timing control solenoid valve |                      |                                | X                 | X           | X                |
|  | EGRC-solenoid valve                 |                      |                                | X                 | X           | X                |
|  | Air conditioner relay               |                      |                                | X                 |             |                  |
|  | Fuel pump relay                     | X                    |                                | X                 | X           | X                |
|  | Cooling fan relay                   |                      |                                | X                 | X           | X                |
| Wastegate valve control solenoid valve |                                     |                      | X                              |                   |             |                  |

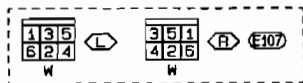
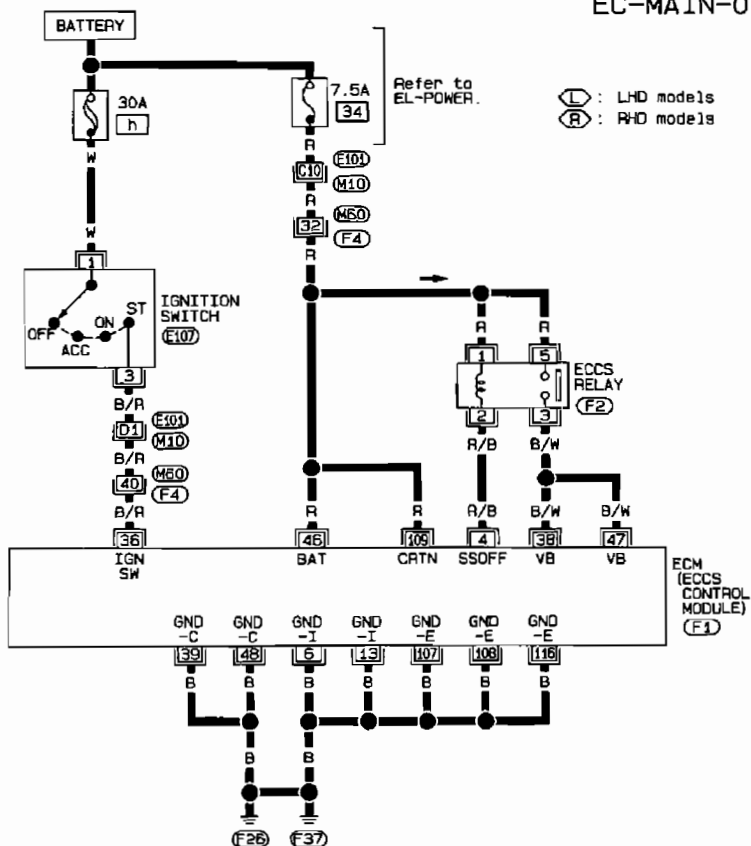
X: Applicable



## Diagnostic Procedure 22

## MAIN POWER SUPPLY AND GROUND CIRCUIT (Not self-diagnostic item)

EC-MAIN-01



Refer to last page (Foldout page).

Ⓐ (E101)  
Ⓑ (M10)  
Ⓐ (F4)  
Ⓑ (M60)

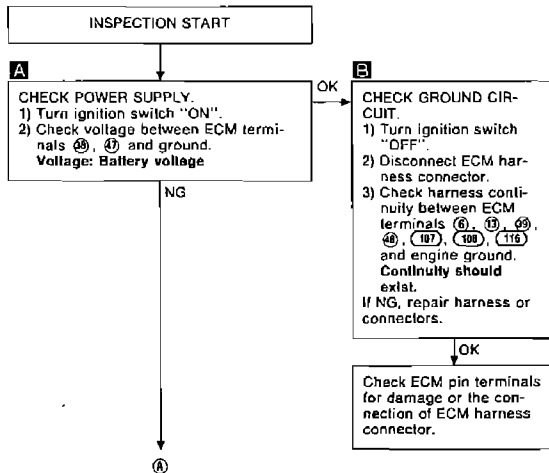
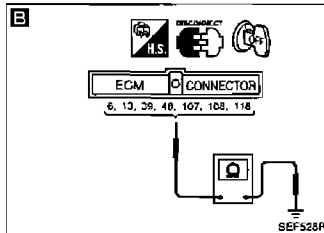
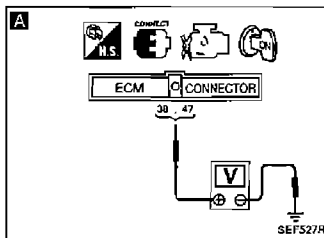
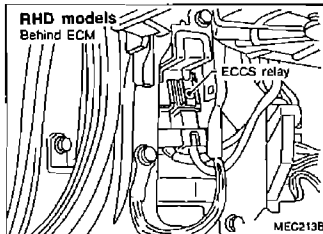
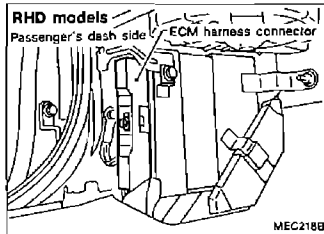
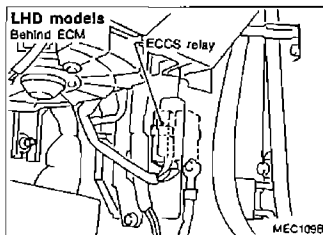
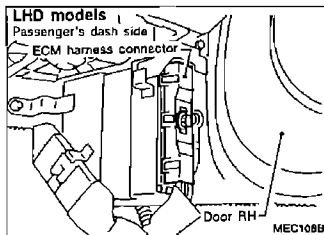
|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |

Ⓐ (F1)  
Ⓑ (L)

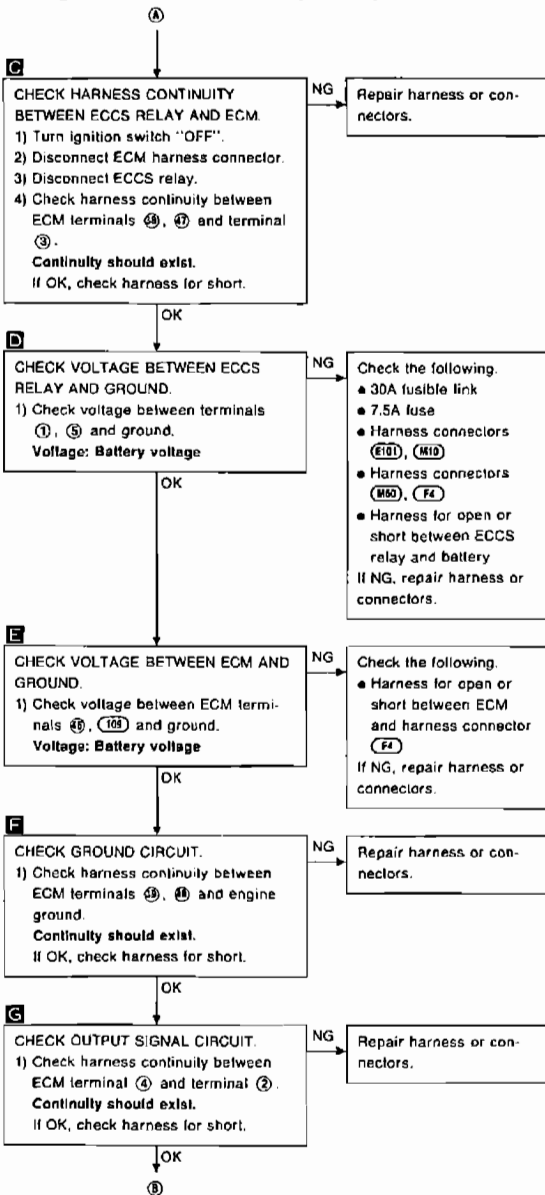
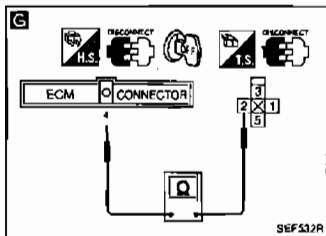
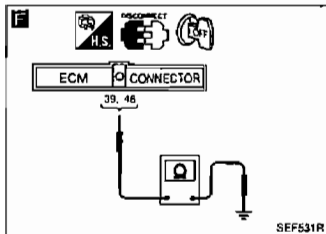
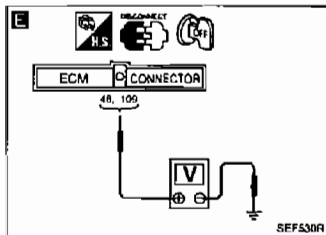
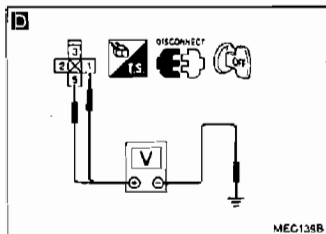
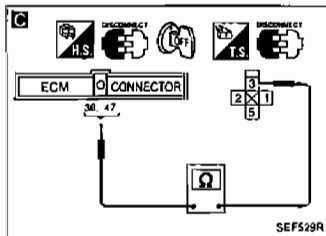


## Diagnostic Procedure 22 (Cont'd)

## Harness layout

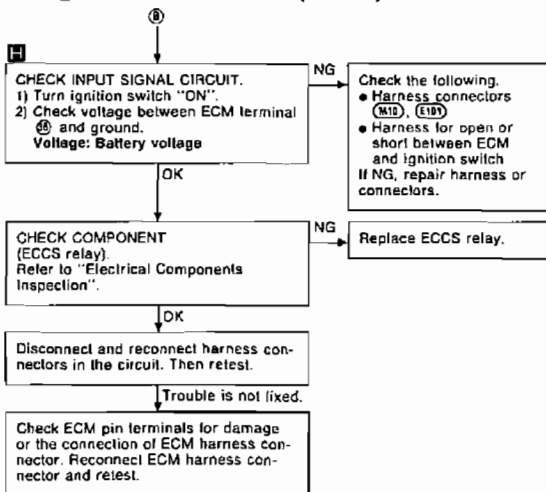
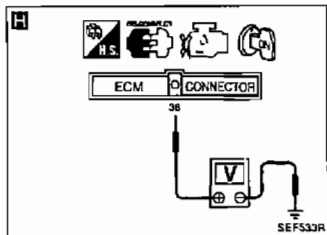


## Diagnostic Procedure 22 (Cont'd)



EC

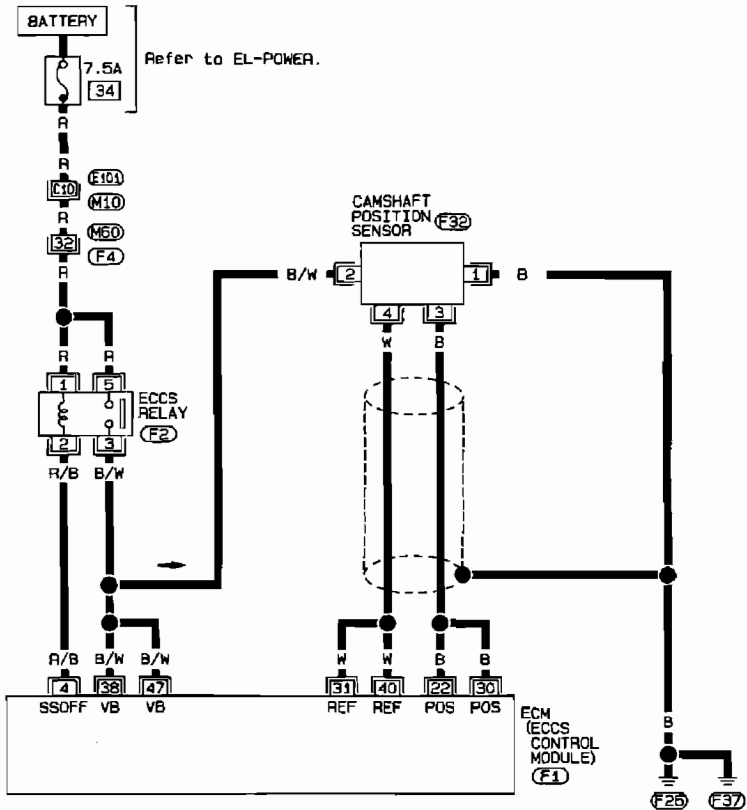
## Diagnostic Procedure 22 (Cont'd)



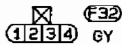
Diagnostic Procedure 23

CAMSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)

EC-CMPS-01



EC



Refer to last page (foldout page).

- (M10) (E101)
- (M60) (F4)

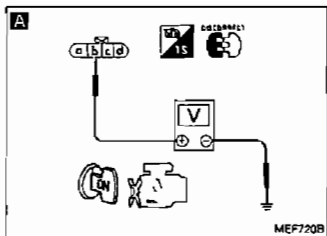
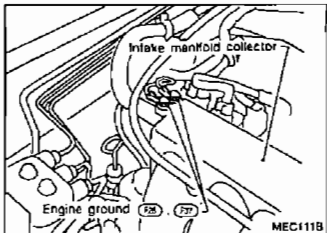
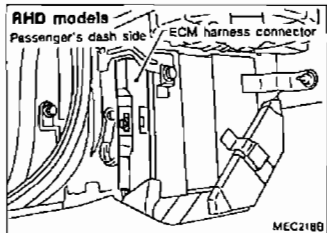
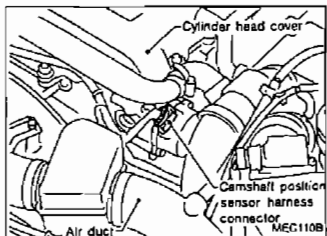
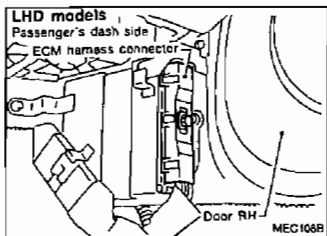
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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|
| 80  | WE  | 103 | 104 | 106 | 107 | 108 | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  | 34  | 35  | 36  | 37  | 38  | 39  | 40  | 41  | 42  | 43  | 44  | 45  | 46 | 47 | 48 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160 |    |    |    |

(F1)  
L

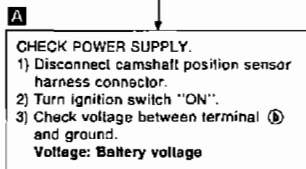


## Diagnostic Procedure 23 (Cont'd)

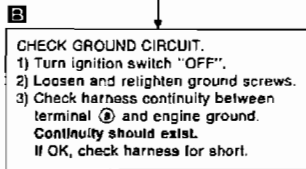
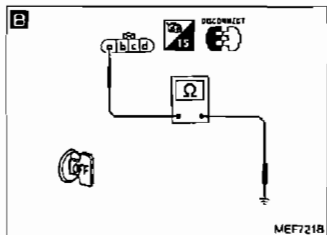
## Harness layout



INSPECTION START



Check the following.  
● Harness for open or short between camshaft position sensor and ECCS relay  
If NG, repair harness or connectors.

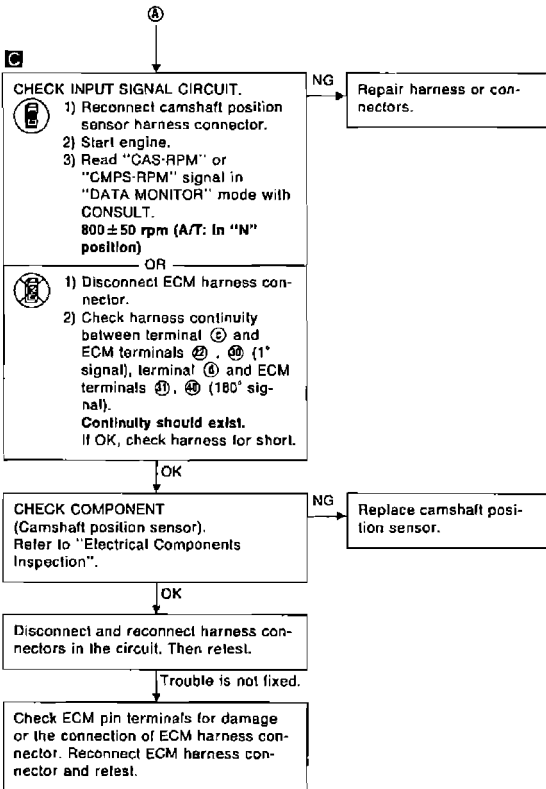
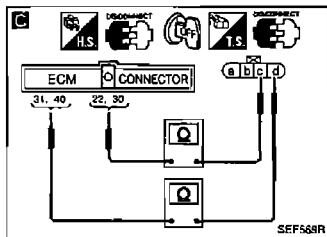
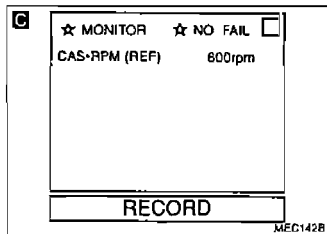


Repair harness or connectors.

OK

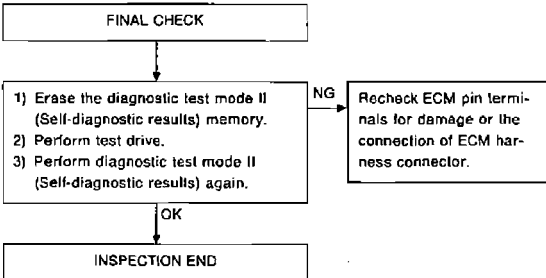
A

## Diagnostic Procedure 23 (Cont'd)



EC

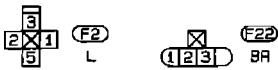
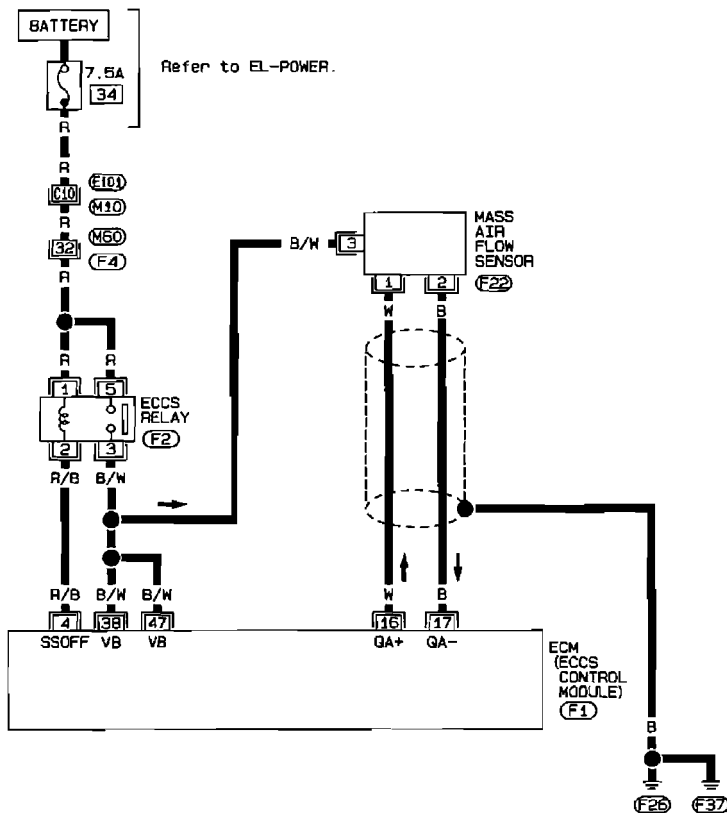
**Perform FINAL CHECK by the following procedure after repair is completed.**



Diagnostic Procedure 24

MASS AIR FLOW SENSOR (Diagnostic trouble code No. 12)

EC-MAFS-01



Refer to last page (Foldout page).

- (M10), (F10)
- (M60), (F4)

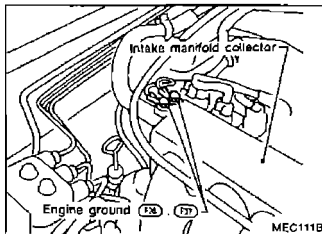
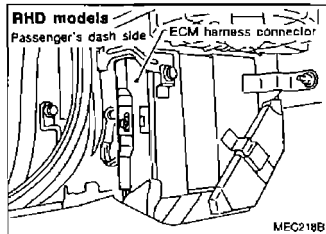
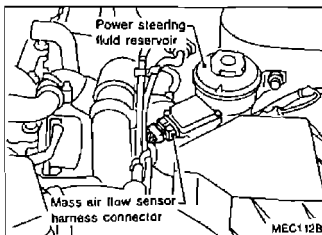
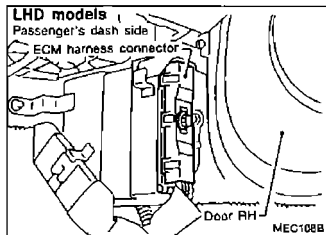
|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |    |    |    |    |    |    |    |    |    |
| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |



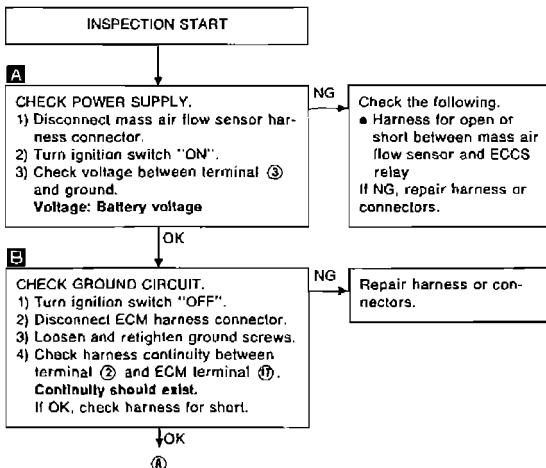
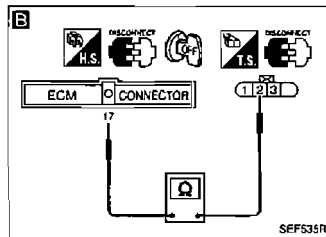
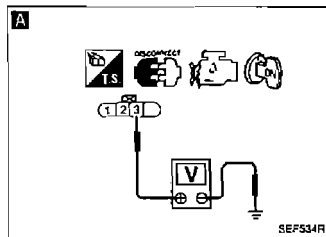


Diagnostic Procedure 24 (Cont'd)

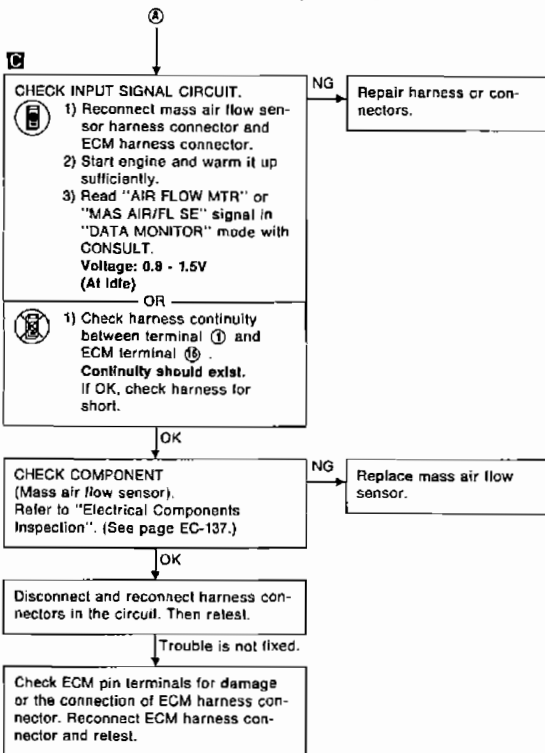
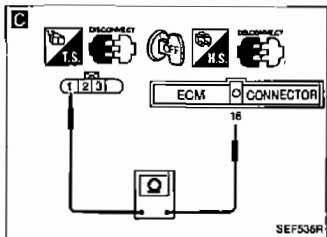
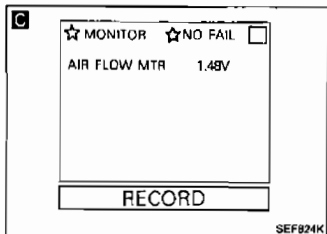
Harness layout



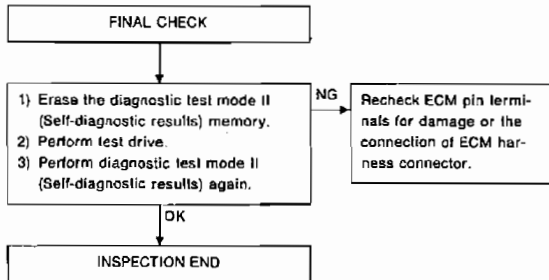
EC



## Diagnostic Procedure 24 (Cont'd)

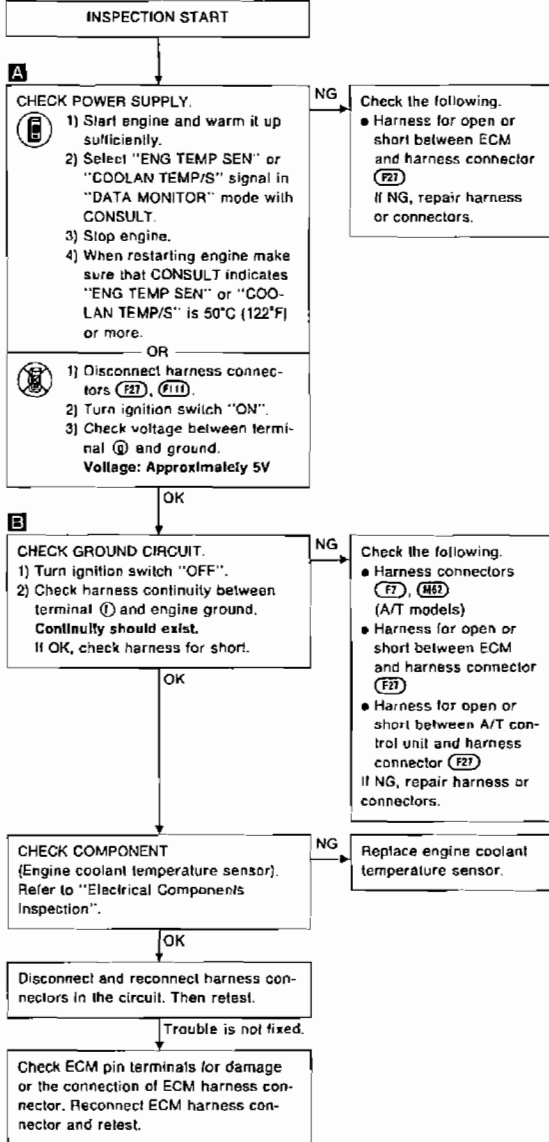
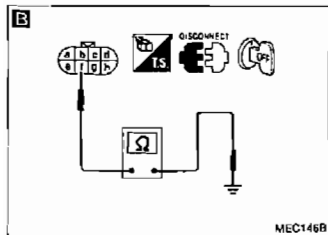
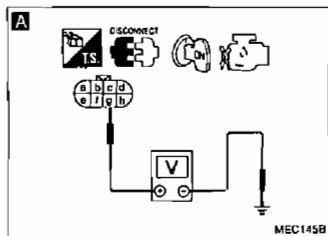
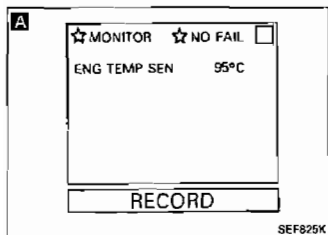


**Perform FINAL CHECK by the following procedure after repair is completed.**



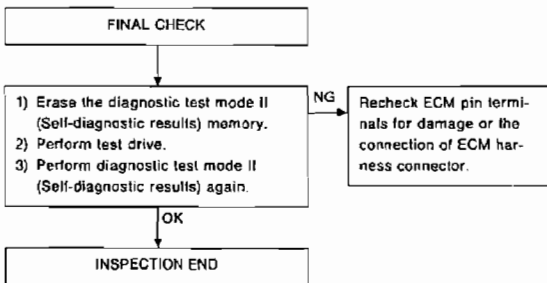


## Diagnostic Procedure 25 (Cont'd)



## Diagnostic Procedure 25 (Cont'd)

Perform FINAL CHECK by the following procedure after repair is completed.

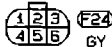
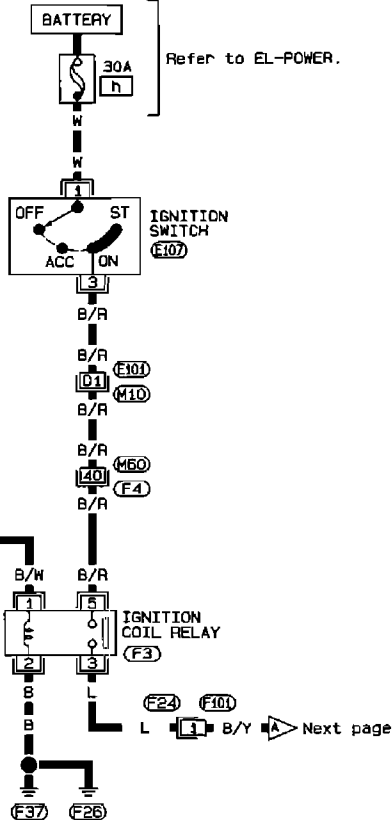
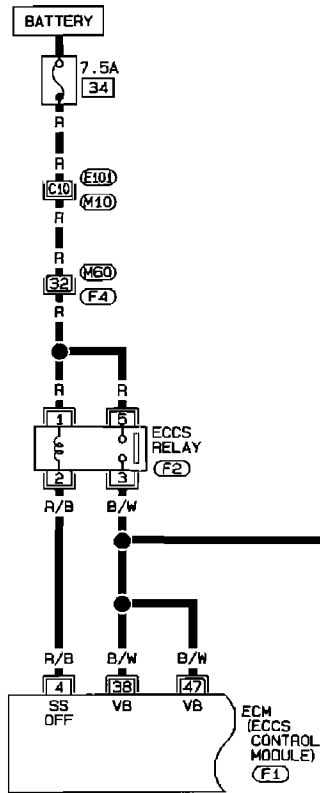


Diagnostic Procedure 26

IGNITION SIGNAL (Diagnostic trouble code No. 21)

LHD MODELS

EC-IGN/SG-01



Refer to last page (Foldout page).

M10, E101

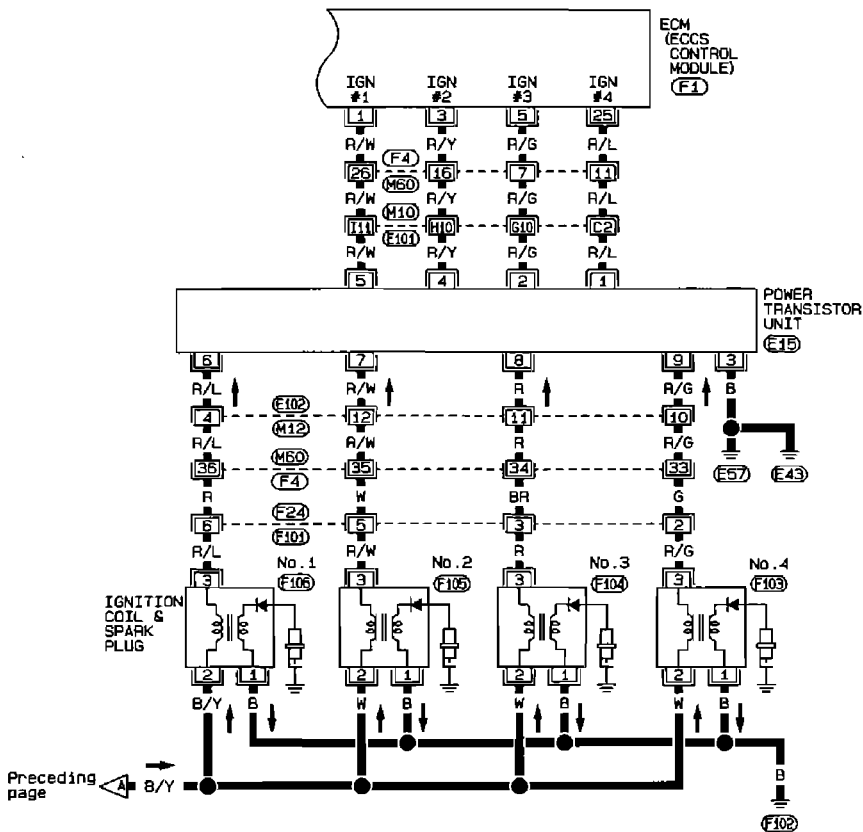
M60, F4

|     |     |     |     |     |     |     |     |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |
|-----|-----|-----|-----|-----|-----|-----|-----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|



Diagnostic Procedure 26 (Cont'd)

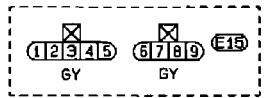
EC-IGN/SG-02



Preceding page

- F103, F104, F105, F106
- F24
- E102
- 1 2 3 GY
- 4 5 6 GY
- 1 2 3 4 9 W
- 6 7 8 9 10 11 12 W

Refer to last page (foldout page).



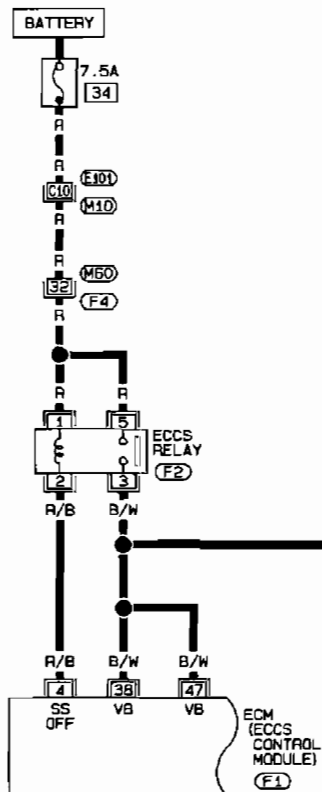
- M10, E101
- M50, F4

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |    |    |    |    |    |    |    |    |    |
| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |

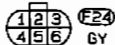
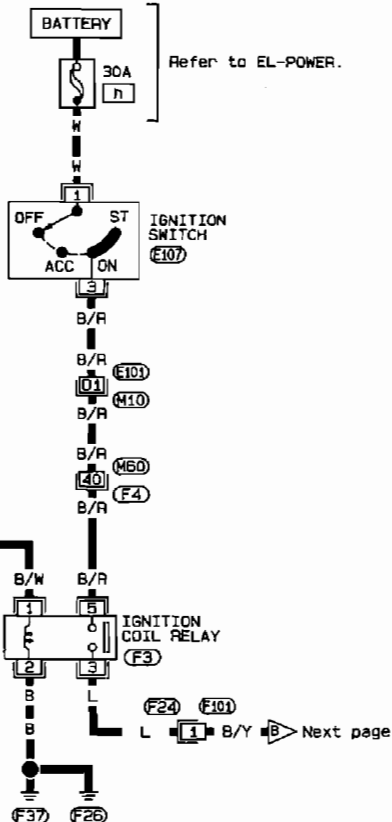
F1 L H.S.

## Diagnostic Procedure 26 (Cont'd)

## RHD MODELS



## EC-IGN/SG-03



Refer to last page (Foldout page).

M10, F101

M50, F4

|     |     |     |     |     |     |     |     |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1 | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 0 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | F1 |    |    |    |    |

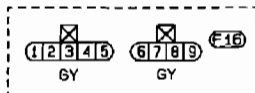
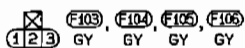
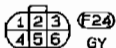
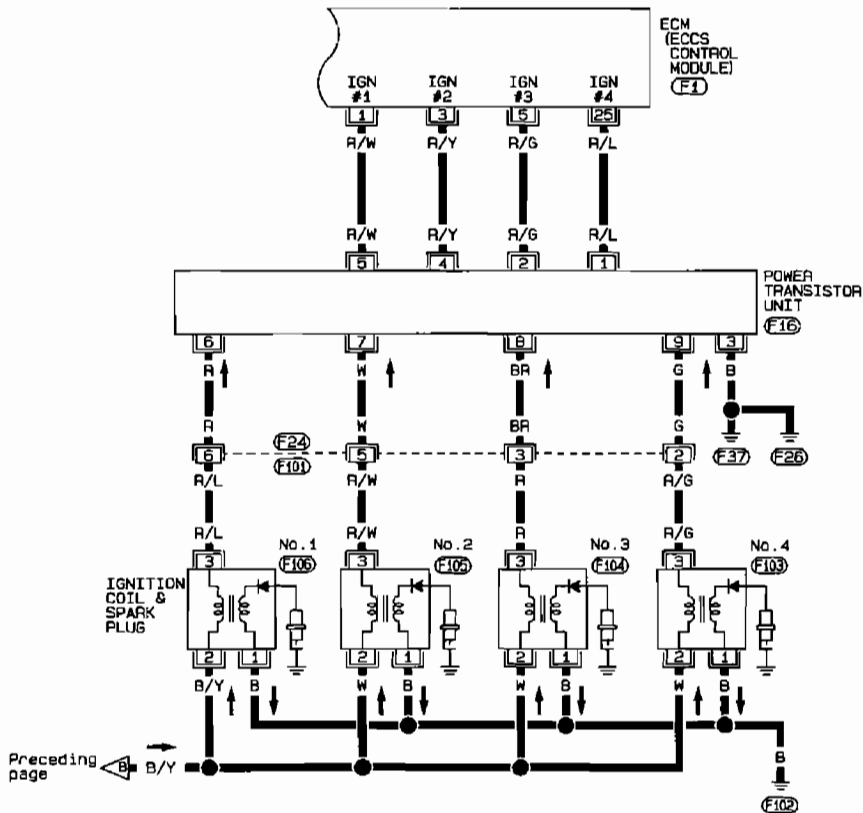
L





## Diagnostic Procedure 26 (Cont'd)

EC-IGN/SG-04



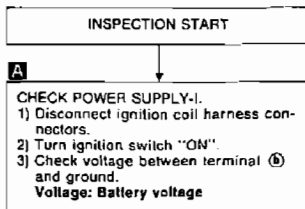
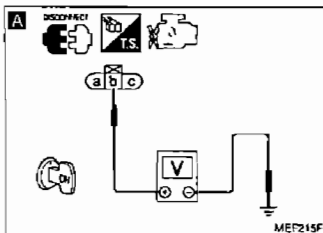
|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |

F1

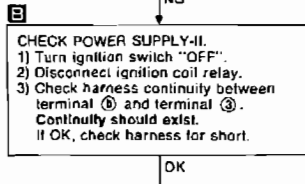
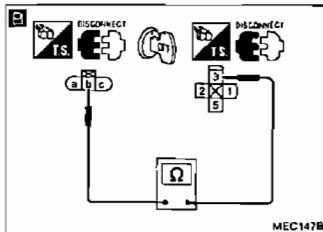
L



## Diagnostic Procedure 26 (Cont'd)



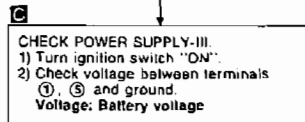
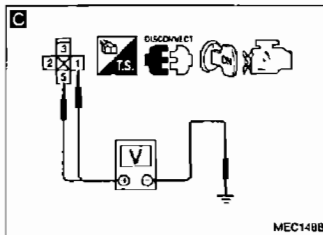
OK → Go to "CHECK GROUND CIRCUIT-II" on next page.



NG → Check the following.

- Harness connectors (F2A), (F10)
- Harness for open or short between ignition coil and ignition coil relay

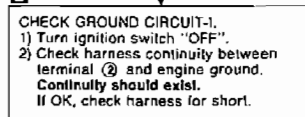
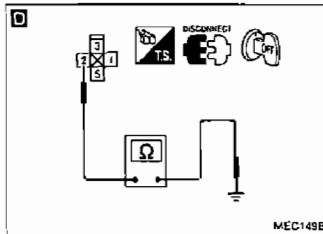
If NG, repair harness or connectors.



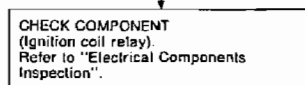
NG → Check the following.

- Harness connectors (E10), (M10)
- Harness connectors (M10), (F4)
- Harness for open or short between ignition coil relay and ignition switch
- Harness for open or short between ignition coil relay and ECSS relay

If NG, repair harness or connectors.



NG → Repair harness or connectors.



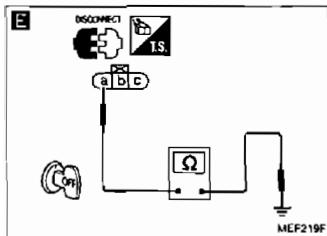
NG → Replace ignition coil relay.

OK → Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

## Diagnostic Procedure 26 (Cont'd)



## CHECK GROUND CIRCUIT-IL

1) Turn ignition switch "OFF"

**E** 2) Check harness continuity between terminal (a) and engine ground.  
Continuity should exist.

3) Disconnect power transistor unit harness connector.  
If OK, check harness for short.

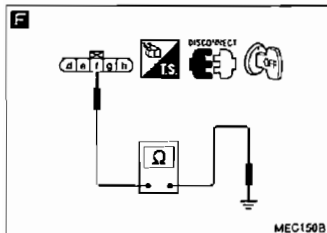
**F** 4) Check harness continuity between terminal (1) and engine ground.  
Continuity should exist.

If OK, check harness for short.

NG

Repair harness or connectors.

OK



## CHECK OUTPUT SIGNAL CIRCUIT.

**G** 1) Check harness continuity between terminals (1), (2), (3) and terminal (6).  
Continuity should exist.

If OK, check harness for short.

**H** 3) Check harness continuity between following terminals.

(1) - (2)    (3) - (6)

(3) - (2)    (6) - (6)

Continuity should exist.

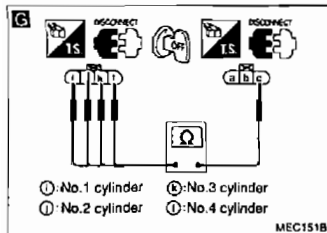
If OK, check harness for short.

NG

Check the following.

- Harness connectors (F2A, (F10))
  - Harness connectors (M5B, (F4) (LHD models))
  - Harness connectors (C10), (M12) (LHD models)
  - Harness connectors (W1D, (E10)) (LHD models)
  - Harness for open or short between ignition coil and power transistor unit
  - Harness for open or short between ECM and power transistor unit
- If NG, repair harness or connectors.

OK



## CHECK COMPONENTS

(Ignition coil and power transistor unit). Refer to "Electrical Components Inspection".

NG

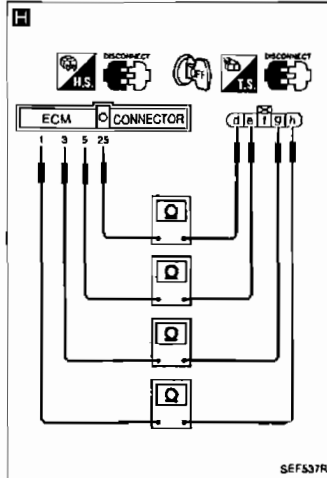
Replace malfunctioning component(s).

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

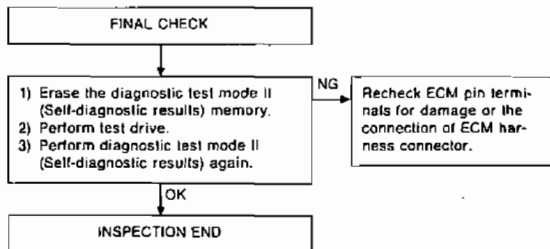
Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.



## Diagnostic Procedure 26 (Cont'd)

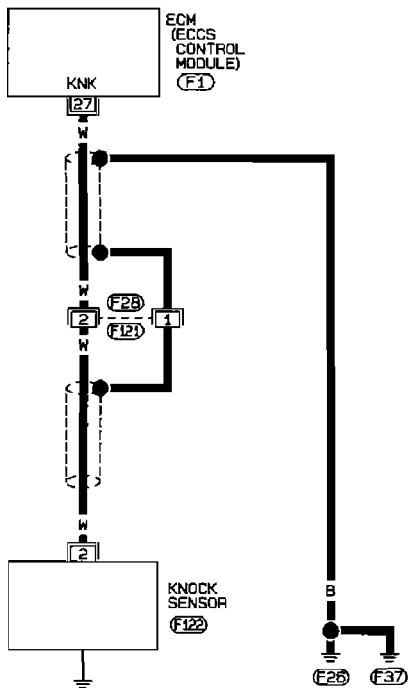
Perform **FINAL CHECK** by the following procedure after repair is completed.



## Diagnostic Procedure 28

KNOCK SENSOR (Diagnostic trouble code No. 34)

EC-KS-01



EC



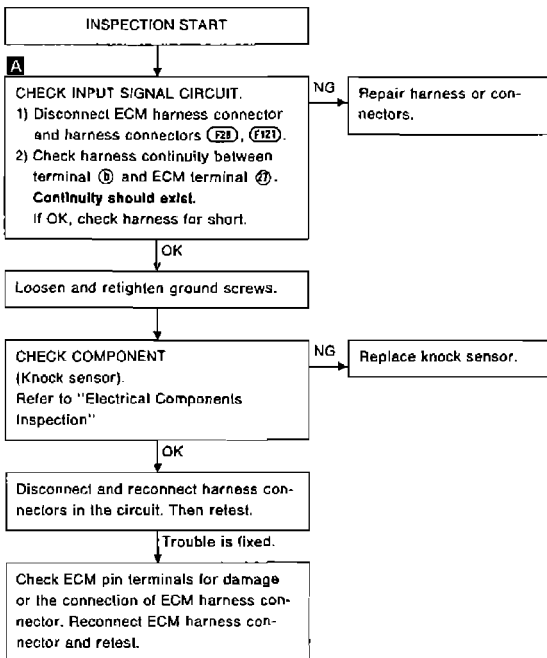
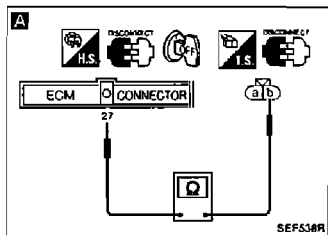
|     |     |     |     |     |     |     |     |   |   |    |    |    |    |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|---|---|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1 | 2 | 3  | 4  | 5  | 6  | 7  | 0 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |   | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |

(F1)

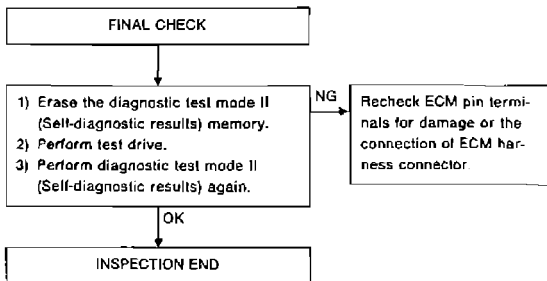
L



## Diagnostic Procedure 28 (Cont'd)



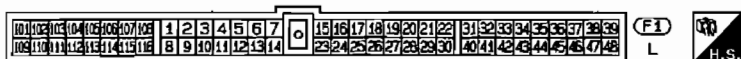
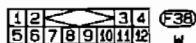
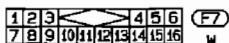
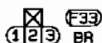
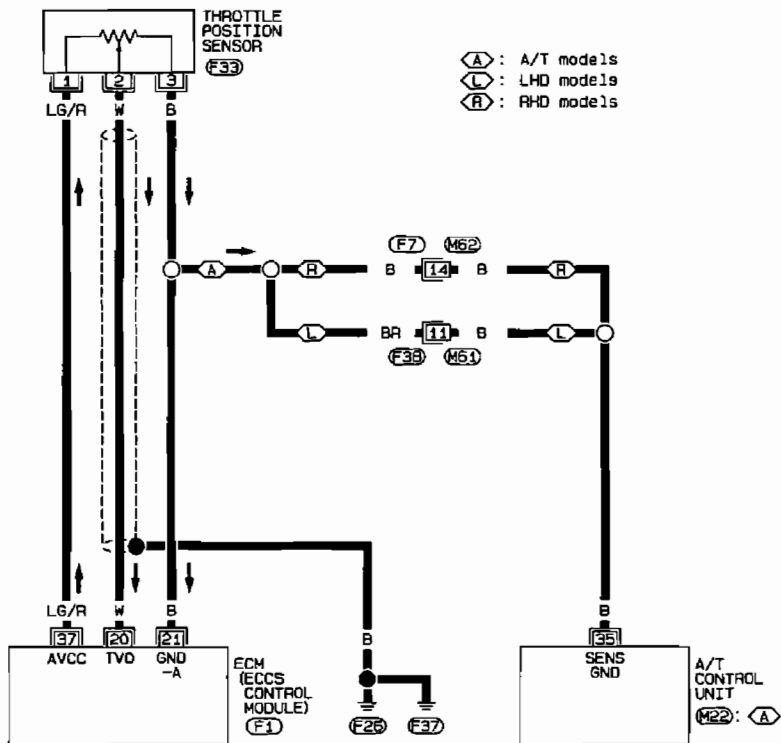
**Perform FINAL CHECK by the following procedure after repair is completed.**



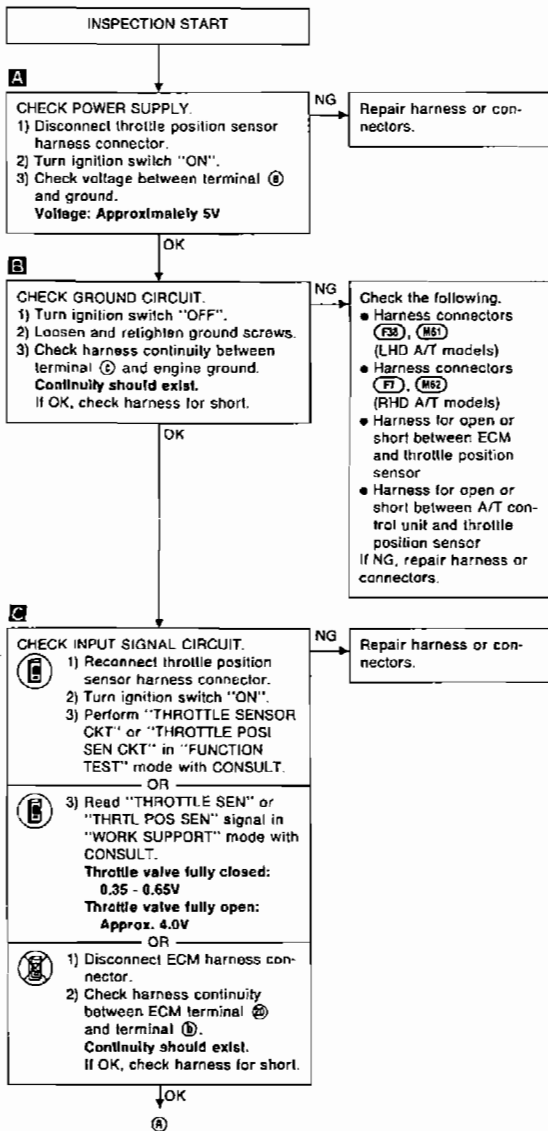
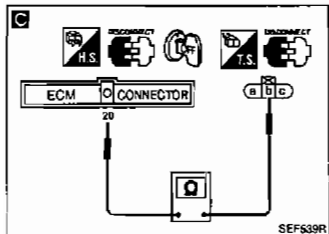
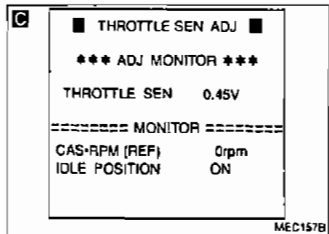
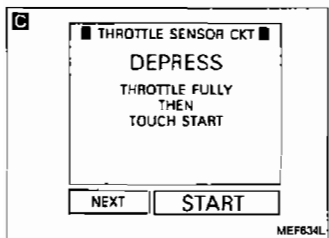
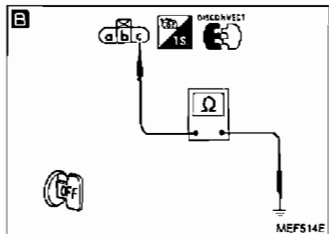
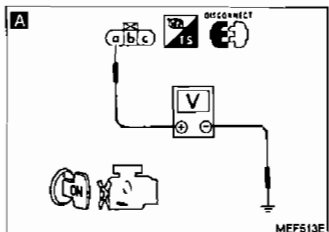
## Diagnostic Procedure 29

## THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43)

EC-TPS-01

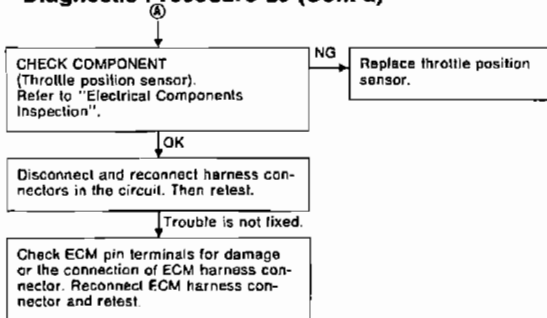


## Diagnostic Procedure 29 (Cont'd)



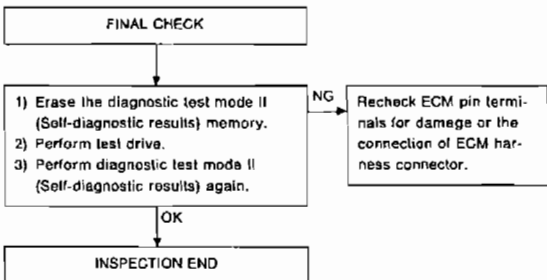


## Diagnostic Procedure 29 (Cont'd)



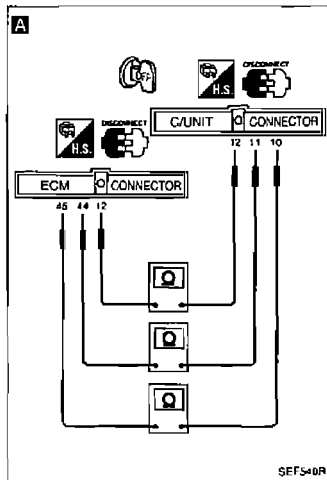
EC

Perform FINAL CHECK by the following procedure after repair is completed.





## Diagnostic Procedure 30 (Cont'd)



INSPECTION START

**A**

## CHECK INPUT SIGNAL CIRCUIT.

- 1) Disconnect ECM harness connector and A/T control unit harness connector.
- 2) Check harness continuity between ECM terminal ④⑤ and terminal ⑩, ECM terminal ④⑥ and terminal ⑪, ECM terminal ⑩ and terminal ⑫. Continuity should exist. If OK, check harness for short.

NG

Check the following.

- Harness connectors (F30), (M61) (LHD models)
  - Harness connectors (F7), (M62) (RHD models)
  - Harness for open or short between ECM and A/T control unit
- If NG, repair harness or connectors.

EC

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

**Perform FINAL CHECK by the following procedure after repair is completed.**

FINAL CHECK

- 1) Erase the diagnostic test mode II (Self-diagnostic results) memory.
- 2) Perform test drive.
- 3) Perform diagnostic test mode II (Self-diagnostic results) again.

NG

Recheck ECM pin terminals for damage or the connection of ECM harness connector.

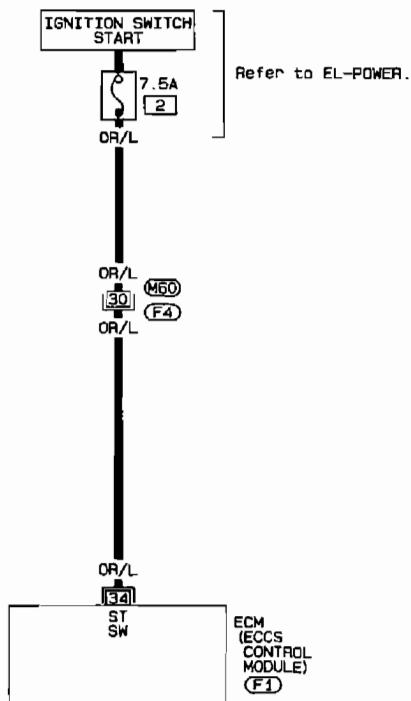
OK

INSPECTION END

## Diagnostic Procedure 31

START SIGNAL (Not self-diagnostic item)

EC-S/SIG-01

Refer to last page  
(Foldout page).

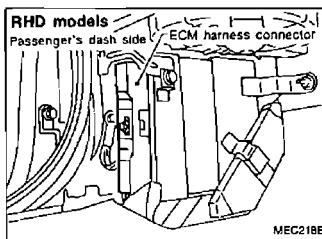
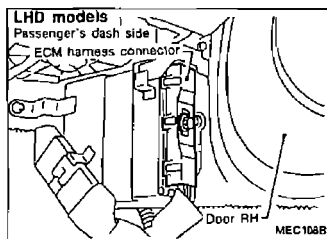
M50, F4

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |    |    |    |    |    |    |    |    |    |
| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |

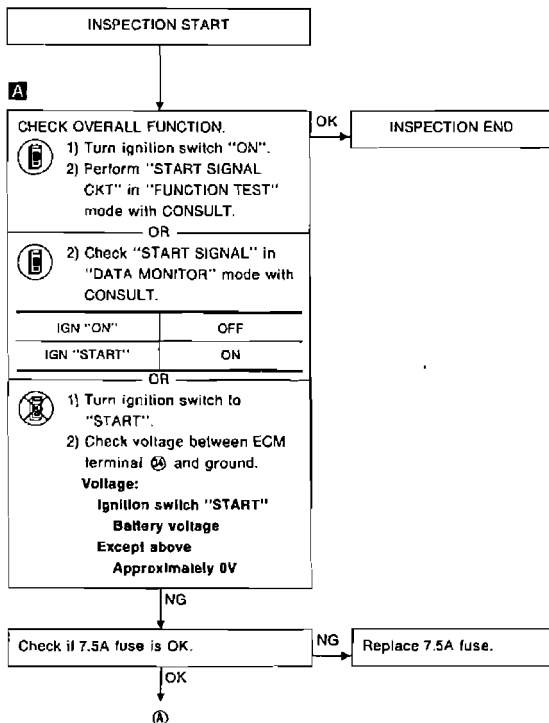
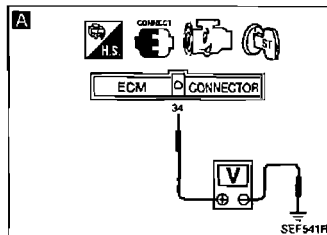
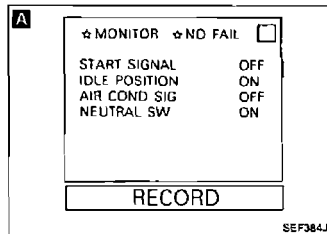
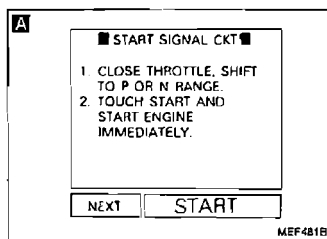
F1  
L

## Diagnostic Procedure 31 (Cont'd)

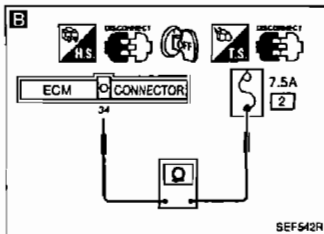
## Harness layout



EC



## Diagnostic Procedure 31 (Cont'd)



E

## CHECK INPUT SIGNAL CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Disconnect ECM harness connector and 7.5A fuse.
- 3) Check harness continuity between ECM terminal ④ and fuse block.  
**Continuity should exist.**  
If OK, check harness for short.

NG

Check the following.

- Harness connectors  
    ④, ⑤
  - Harness for open or short between ECM and fuse block
- If NG, repair harness or connectors.

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

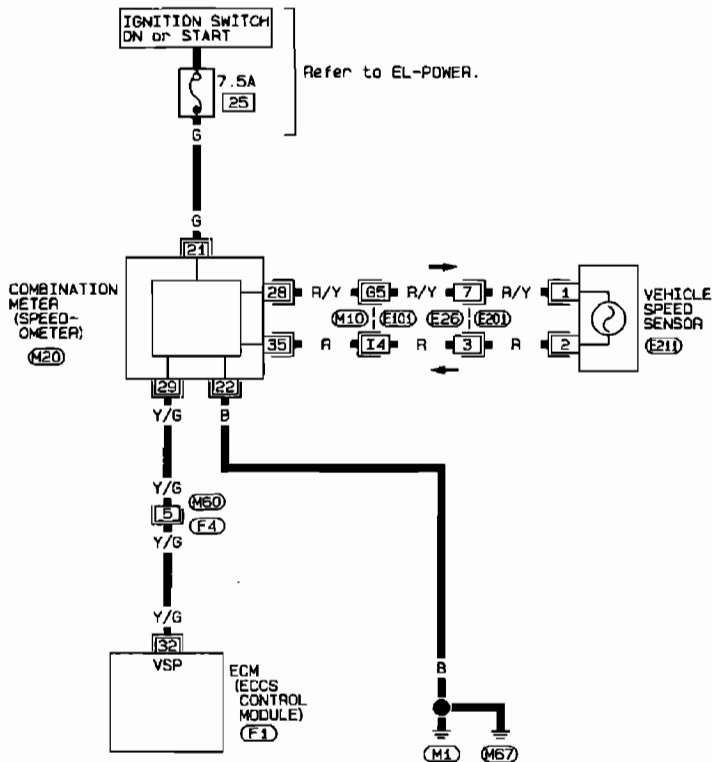
Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

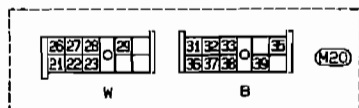
## Diagnostic Procedure 32

## VEHICLE SPEED SENSOR (Not self-diagnostic item)

EC-VSS-01



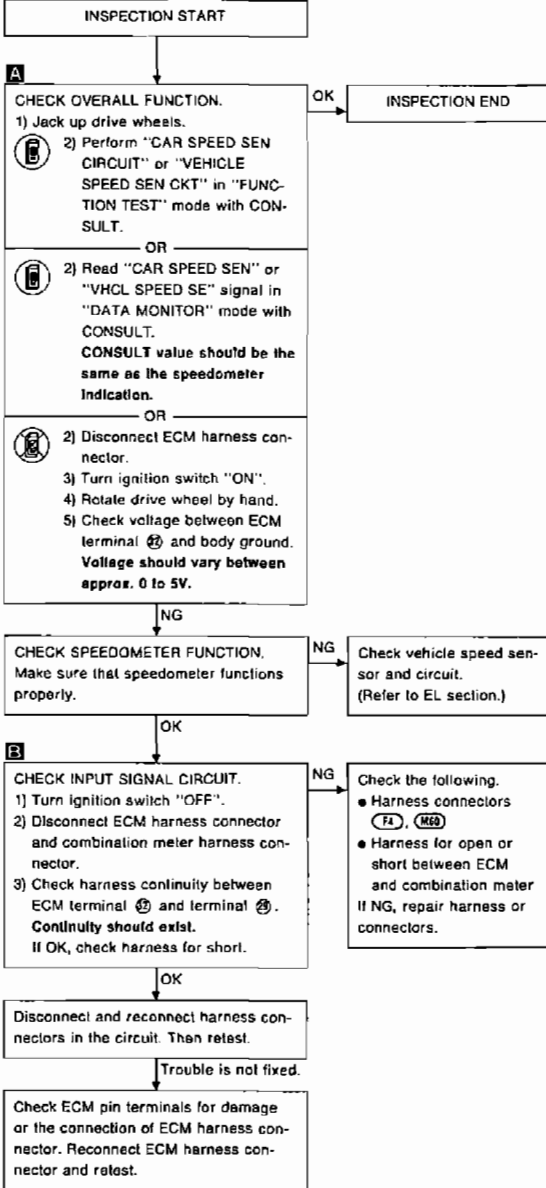
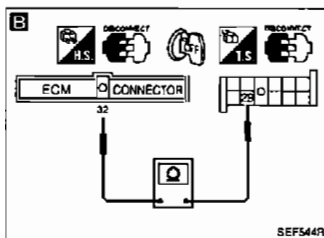
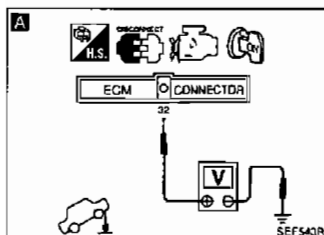
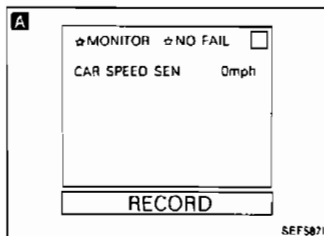
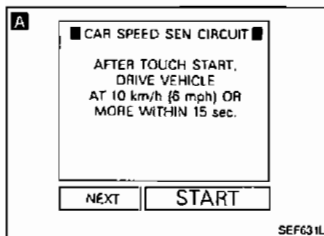
EC

Refer to last page  
(Foldout page).

M10 E10  
M50 F4



## Diagnostic Procedure 32 (Cont'd)

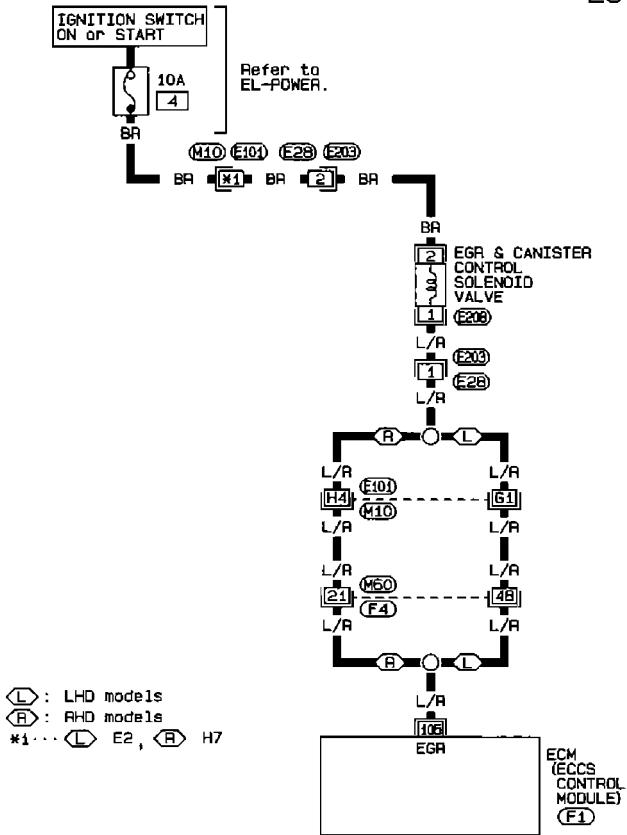




Diagnostic Procedure 33

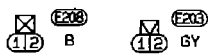
EGR AND CANISTER CONTROL (Not self-diagnostic item)

EC-EGRC/V-01

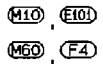


EC

◁ : LHD models  
 ▷ : RHD models  
 \*1... ◁ E2, ▷ H7



Refer to last page (Foldout page).



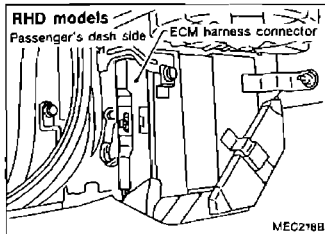
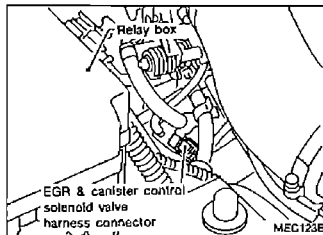
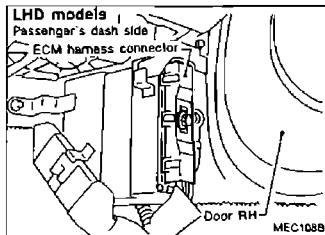
|     |     |     |     |     |     |     |     |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |
|-----|-----|-----|-----|-----|-----|-----|-----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

F1  
L



## Diagnostic Procedure 33 (Cont'd)

## Harness layout



INSPECTION START

A

## CHECK OVERALL FUNCTION.

- 1) Start engine and warm it up sufficiently.
- 2) Perform diagnostic test mode II (Self-diagnostic results).  
Make sure that diagnostic trouble code No. 12 is not displayed.
- 3) Make sure that EGR valve spring moves up and down (Use your finger) under the following conditions.

At Idle:

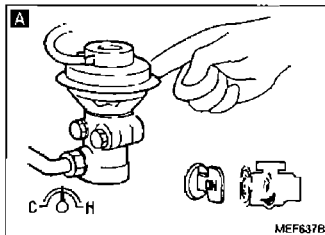
Spring does not move.

Racing engine from Idle to 3,000 rpm:

Spring moves up and down.

OK

INSPECTION END



NG

B

## CHECK VACUUM SOURCE TO EGR VALVE.

- 1) Disconnect vacuum hoses to EGR valve and activated carbon canister.
- 2) Make sure that vacuum exists under the following conditions.

At Idle:

Vacuum should not exist.

Racing engine from Idle to 3,000 rpm:

Vacuum should exist.

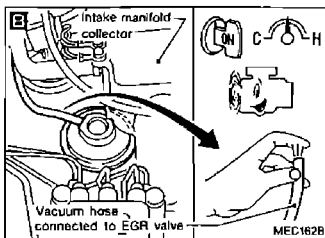
OK

CHECK COMPONENTS  
(EGR valve, EGRC-BPT valve and activated carbon canister).  
Refer to "Electrical Components Inspection".

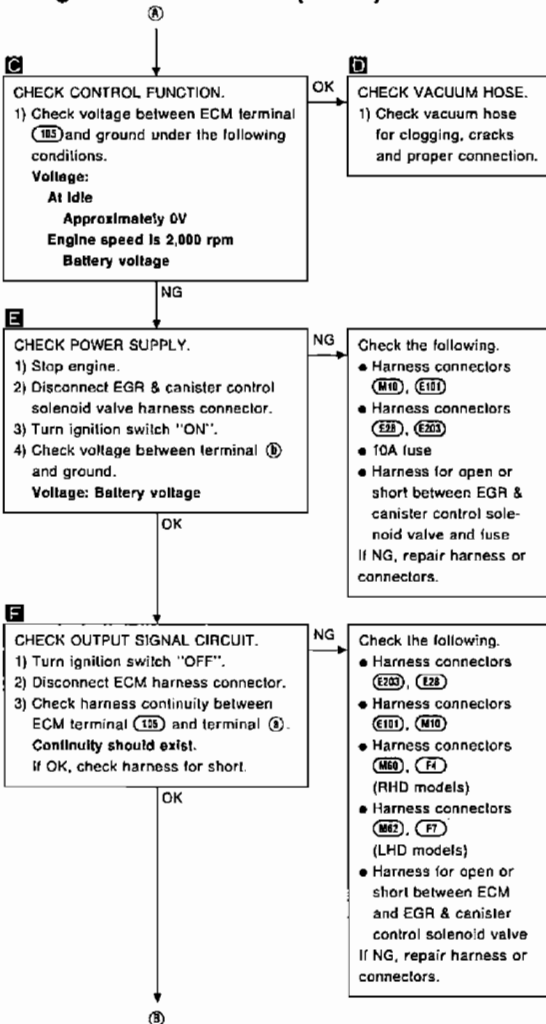
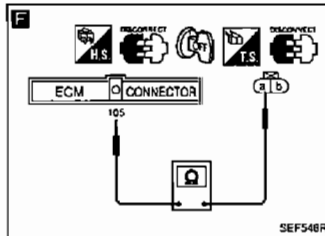
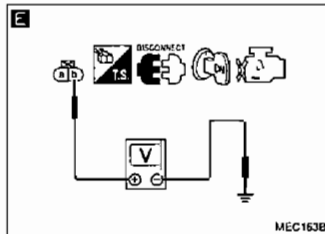
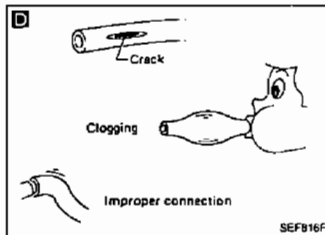
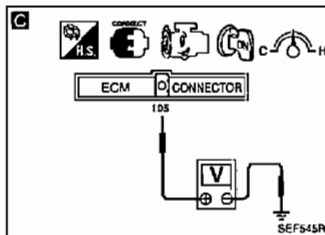
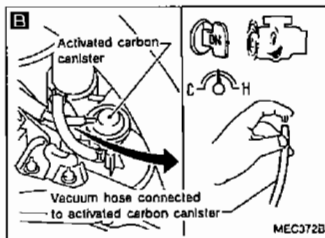
Replace malfunctioning component(s).

NG

A



## Diagnostic Procedure 33 (Cont'd)



EC

## Diagnostic Procedure 33 (Cont'd)

**C**

■ EGR CONT S/V CIRCUIT ■

DOES THE SOLENOID  
VALVE MAKE  
AN OPERATING SOUND  
EVERY 3 SECONDS?

NEXT NO YES

MEF569B

**C**

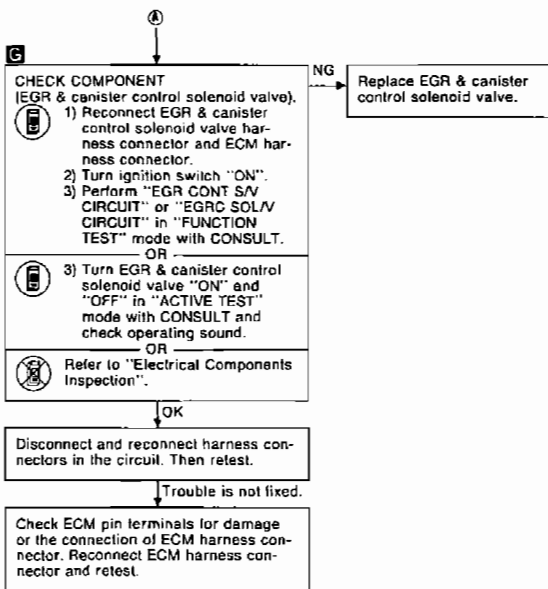
■ ACTIVE TEST ■

EGR CONT SOL/V OFF

== MONITOR ==  
CAS-RPM (REF) 0rpm

ON ON/OFF OFF

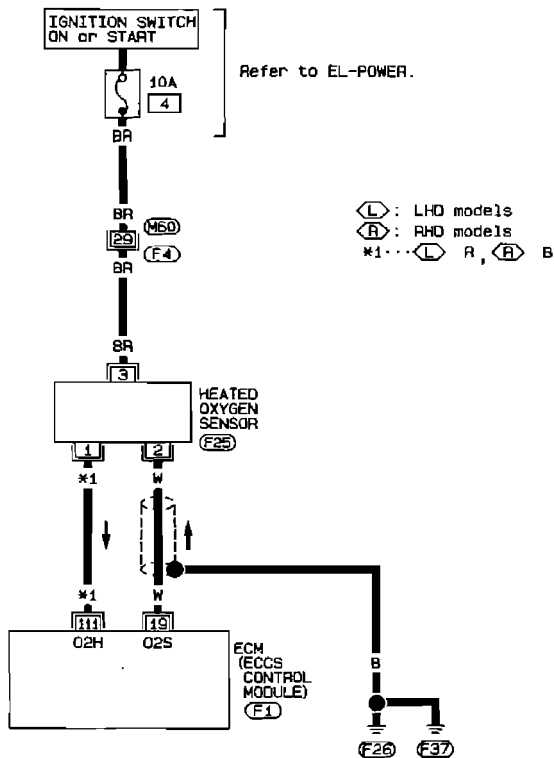
SEF222N



## Diagnostic Procedure 34

HEATED OXYGEN SENSOR (Not self-diagnostic item)

EC-HO2S-01



1 2 3 F25  
BY

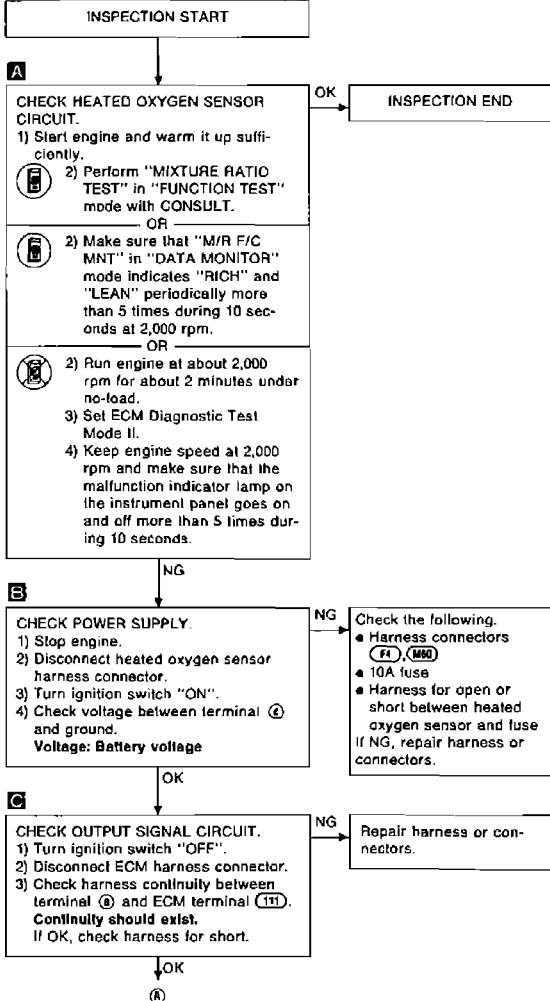
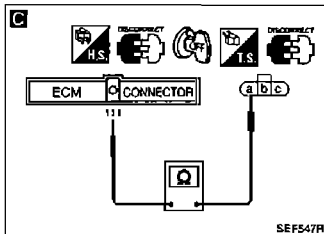
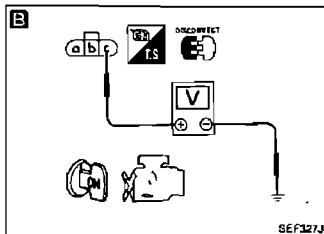
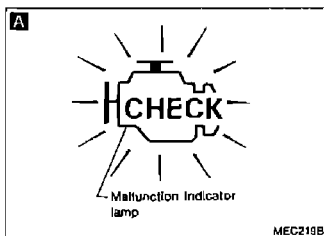
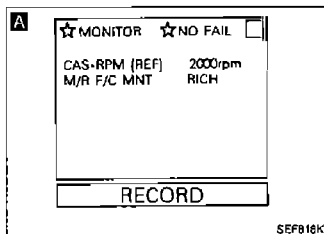
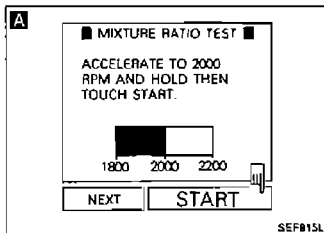
Refer to last page  
(Foldout page).

M6D F4

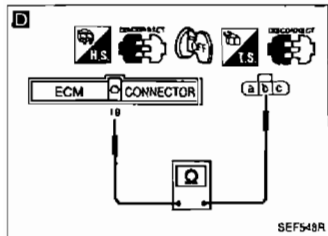
|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |

F1 L H.S.

## Diagnostic Procedure 34 (Cont'd)



## Diagnostic Procedure 34 (Cont'd)



D

**CHECK INPUT SIGNAL CIRCUIT.**  
 1) Loosen and retighten ground screws.  
 2) Check harness continuity between ECM terminal (a) and terminal (c). Continuity should exist.  
 If OK, check harness for short.

NG

Repair harness or connectors.

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Trouble is not fixed.

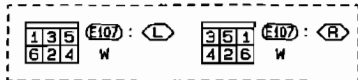
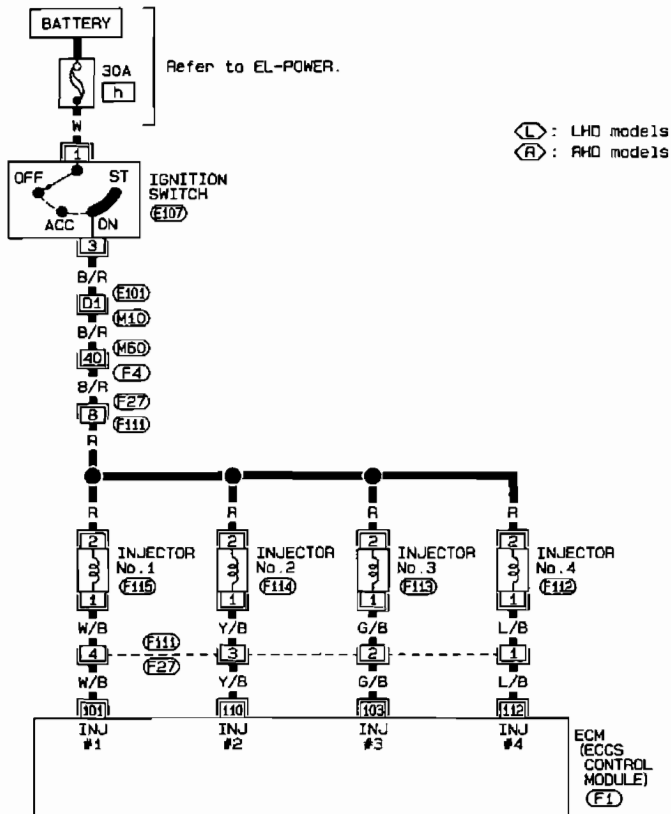
Replace heated oxygen sensor.

EC

## Diagnostic Procedure 35

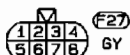
## INJECTOR CIRCUIT (Not self-diagnostic item)

EC-INJECT-01



Refer to last page (Foldout page).

(M10) (E101)  
(M60) (F4)



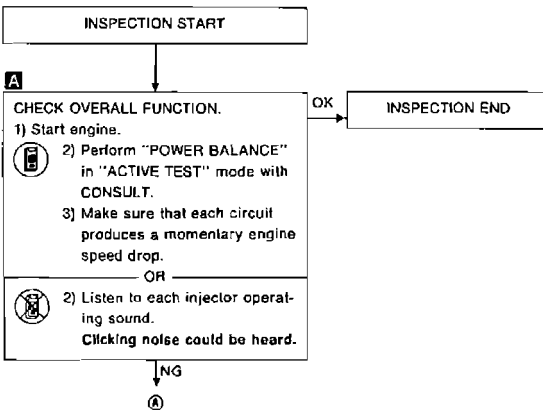
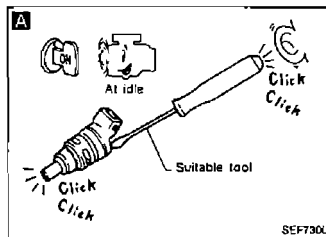
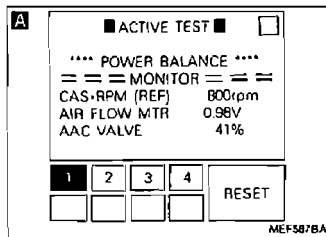
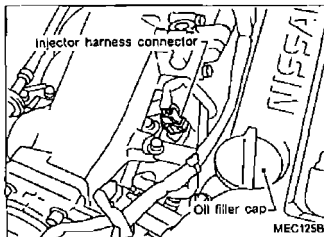
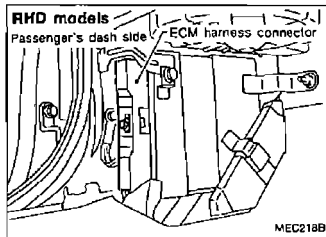
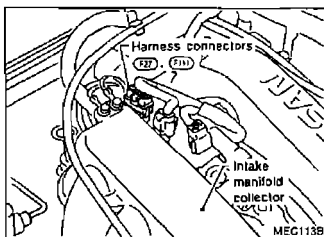
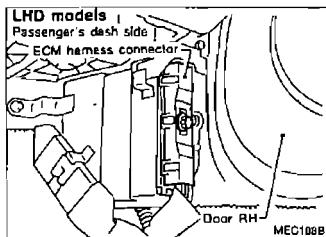
(F1)  
L



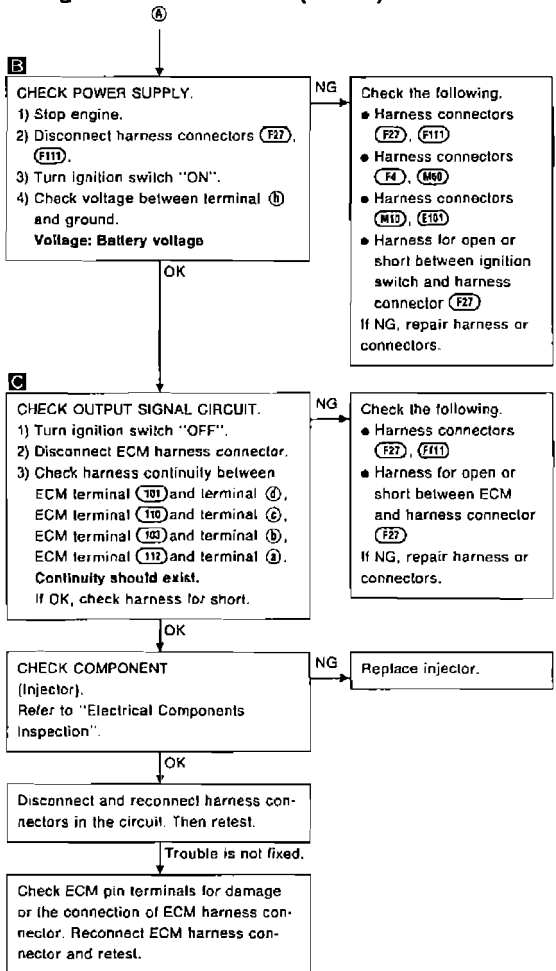
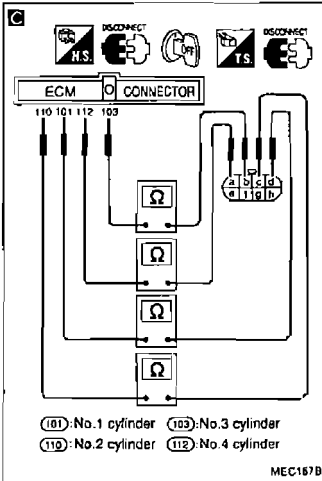
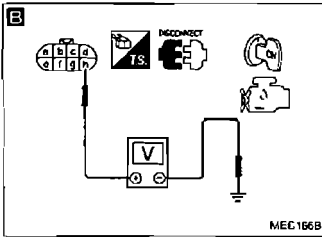


**Diagnostic Procedure 35 (Cont'd)**

**Harness layout**



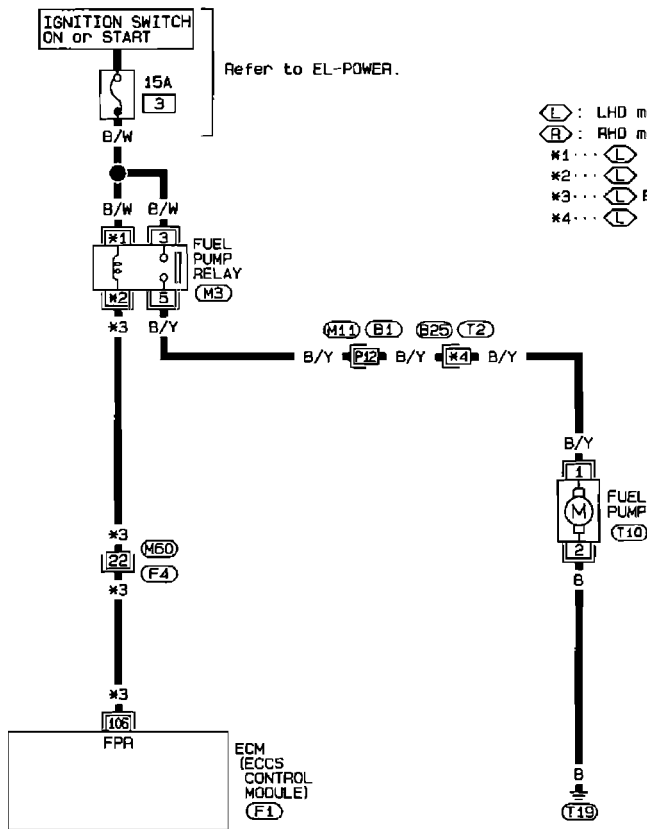
## Diagnostic Procedure 35 (Cont'd)



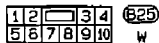
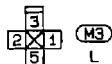
Diagnostic Procedure 36

FUEL PUMP (Not self-diagnostic item)

EC-F/PUMP-01



- Ⓛ : LHD models  
 Ⓡ : RHD models
- \*1... Ⓛ 1, Ⓡ 2  
 \*2... Ⓛ 2, Ⓡ 1  
 \*3... Ⓛ B/P, Ⓡ B/Y  
 \*4... Ⓛ 1, Ⓡ 3



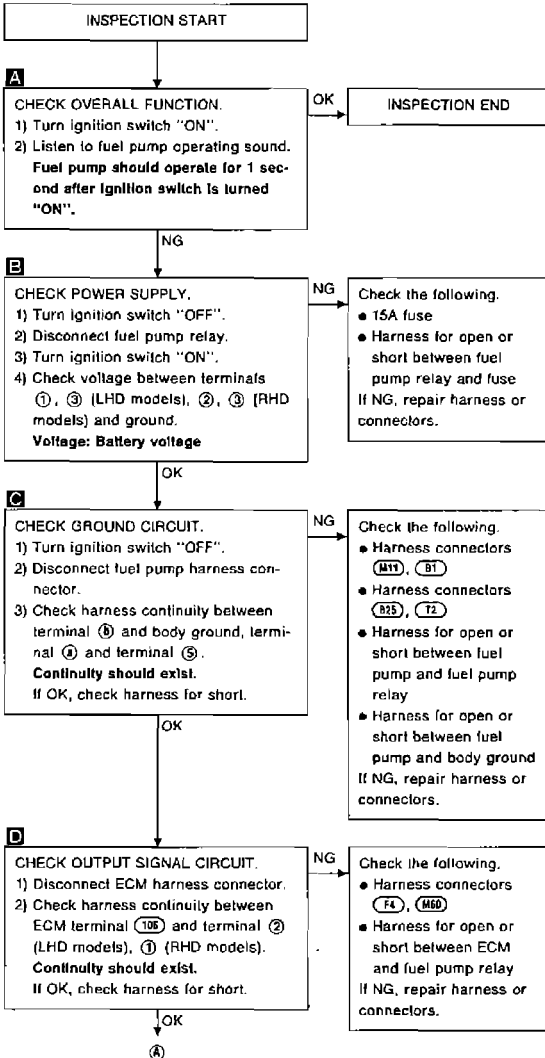
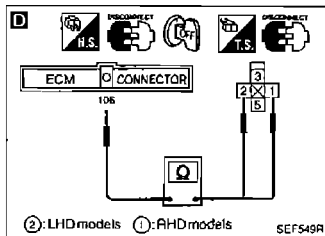
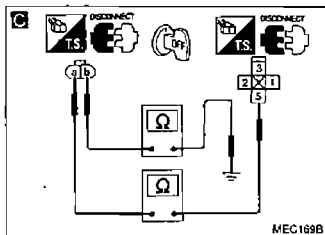
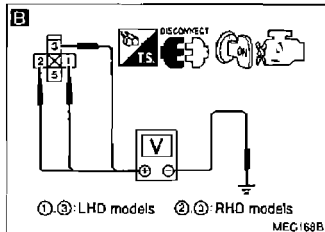
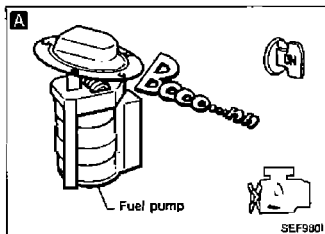
Refer to last page (Foldout page).

M11, B1

M60, F4



## Diagnostic Procedure 36 (Cont'd)



## Diagnostic Procedure 36 (Cont'd)

**E**

■ FUEL PUMP CIRCUIT ■  
PINCH FUEL FEED HOSE WITH FINGERS. IS THERE ANY PRESSURE PULSATION ON THE FUEL FEED HOSE?  
OR  
DOES THE FUEL PUMP RELAY MAKE AN OPERATING SOUND EVERY 3 SECONDS?

NEXT NO YES

SEF194L

**E**

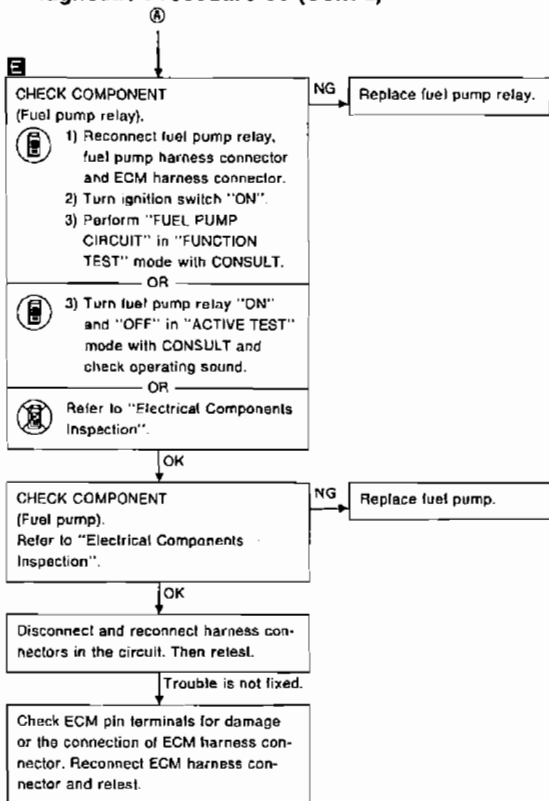
■ ACTIVE TEST ■

FUEL PUMP RELAY ON

== MONITOR ==  
CAS-RPM (REF) 0rpm

ON ON/OFF OFF

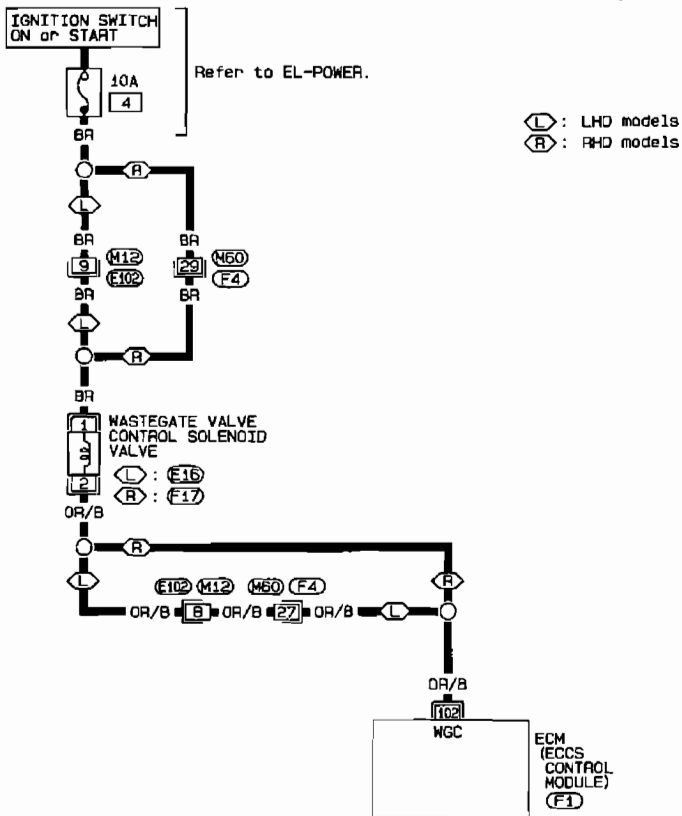
SEF496L



## Diagnostic Procedure 37

WASTEGATE VALVE CONTROL (Not self-diagnostic item)

EC-WG/V-01



L : LHD models  
R : RHD models

1  
2  
B  
L : E16 R : F17

1 2 3 4 5 E102  
6 7 8 9 10 11 12 W

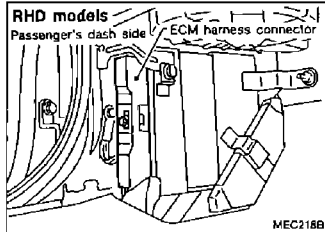
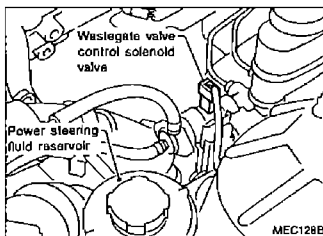
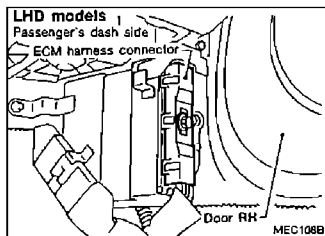
Refer to last page  
(foldout page).

M50, F4

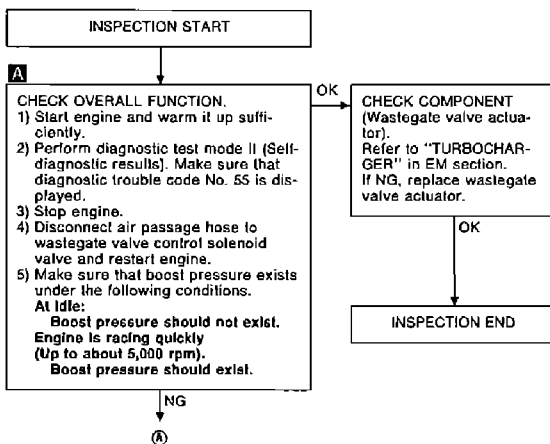
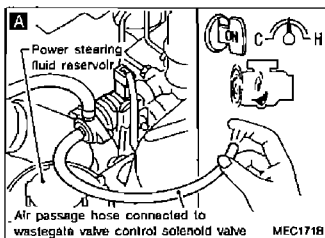


## Diagnostic Procedure 37 (Cont'd)

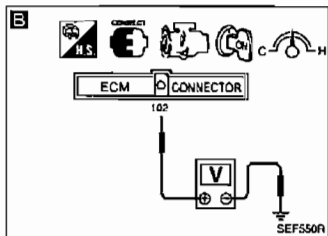
## Harness layout



EC



## Diagnostic Procedure 37 (Cont'd)



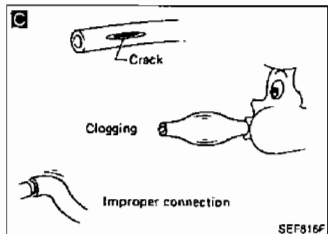
**C**

**CHECK CONTROL FUNCTION.**

- 1) Check voltage between ECM terminal (102) and ground under the following conditions.  
**Voltage:**  
**At Idle**  
**Battery voltage**  
**Engine is racing quickly**  
**(Up to about 5,000 rpm).**  
**Approximately 4 - 5V**

**C**

Check air passage hose for clogging, cracks and proper connection.



**D**

**CHECK POWER SUPPLY.**

- 1) Stop engine.
- 2) Disconnect wastegate valve control solenoid valve harness connector.
- 3) Turn ignition switch "ON".
- 4) Check voltage between terminal (10) and ground.

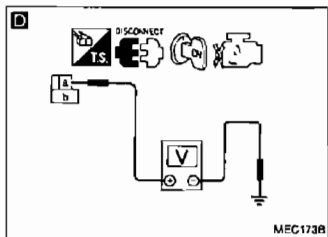
**Voltage: Battery voltage**

**D**

Check the following.

- Harness connectors (M12), (E102) (LHD models)
- Harness connectors (M86), (F4) (RHD models)
- 10A fuse
- Harness for open or short between wastegate valve control solenoid valve and fuse

If NG, repair harness or connectors.



**E**

**CHECK OUTPUT SIGNAL CIRCUIT.**

- 1) Turn ignition switch "OFF".
- 2) Disconnect ECM harness connector.
- 3) Check harness continuity between ECM terminal (102) and terminal (1).

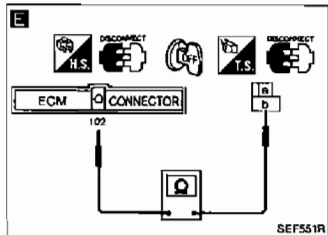
**Continuity should exist.**  
If OK, check harness for short.

**E**

Check the following.

- Harness connectors (E102), (M12) (LHD models)
- Harness connectors (M86), (F4) (LHD models)
- Harness for open or short between ECM and wastegate valve control solenoid valve

If NG, repair harness or connectors.



**CHECK COMPONENT**  
(Wastegate valve control solenoid valve).  
Refer to "Electrical Components Inspection".

**E**

Replace wastegate valve control solenoid valve.

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

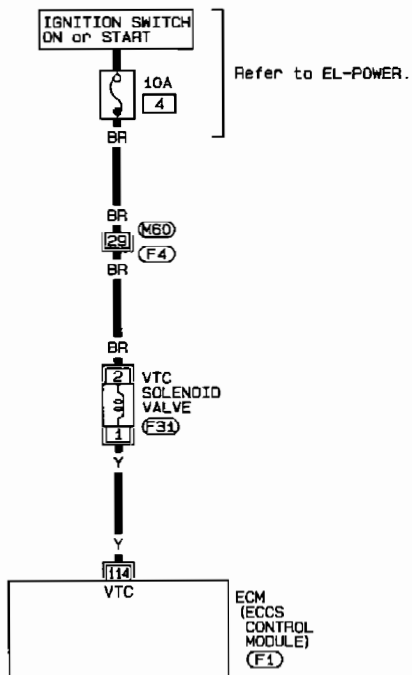
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.



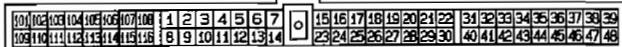
## Diagnostic Procedure 38

VALVE TIMING CONTROL (Not self-diagnostic item)

EC-VTC-01

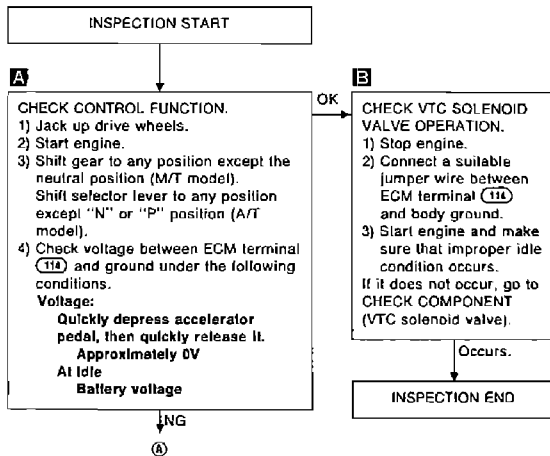
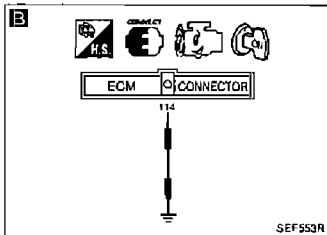
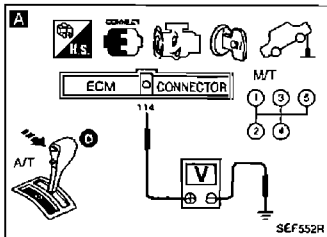
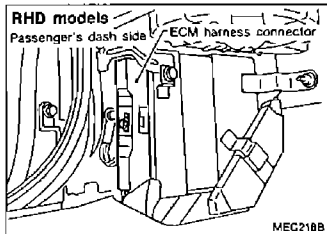
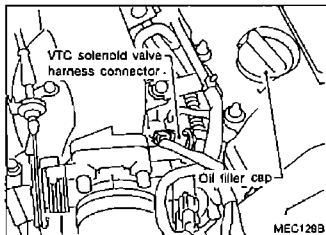
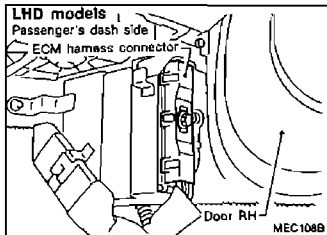


EC

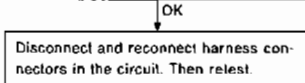
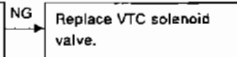
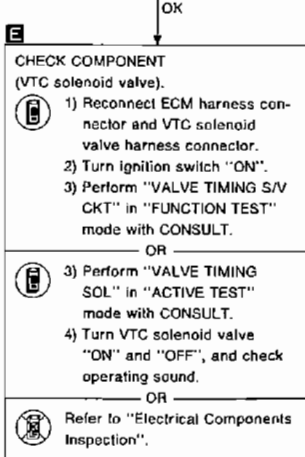
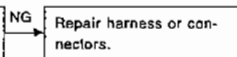
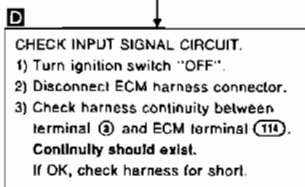
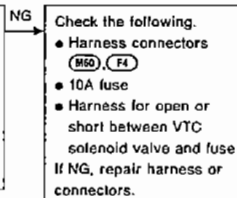
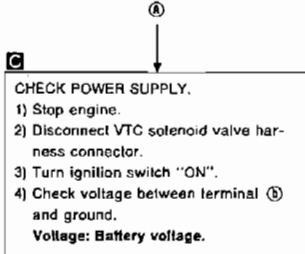
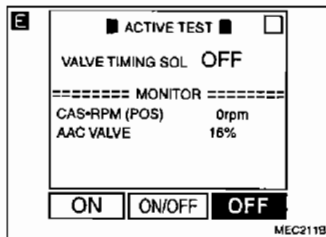
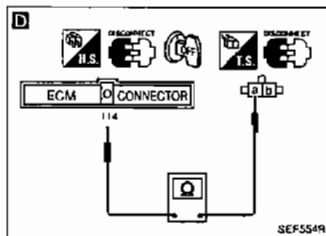
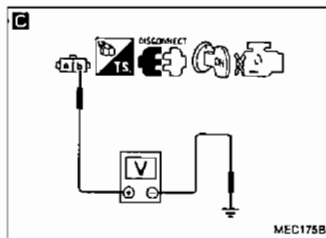
Refer to last page  
(Foldout page).

## Diagnostic Procedure 38 (Cont'd)

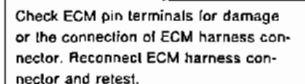
## Harness layout



## Diagnostic Procedure 38 (Cont'd)



Trouble is not fixed.

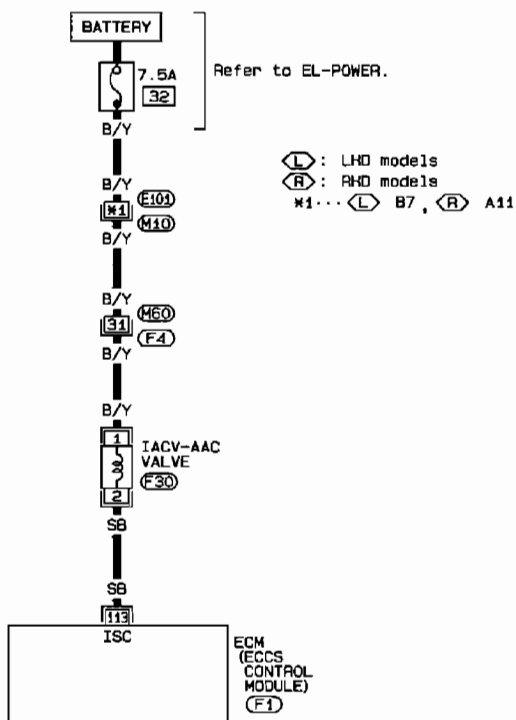


EC

## Diagnostic Procedure 39

IACV-AAC VALVE (Not self-diagnostic item)

EC-AAC/V-01

Refer to last page  
(foldout page).

M10, F10

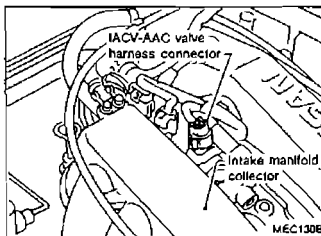
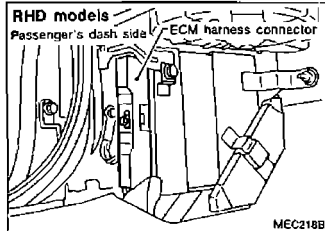
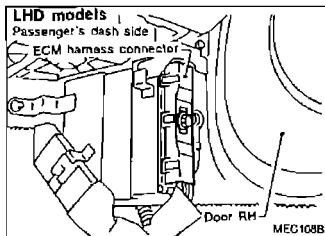
M60, F4

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |    |    |    |    |    |    |    |    |    |
| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |

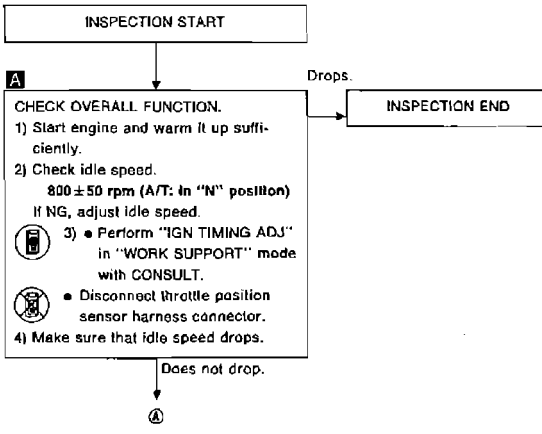
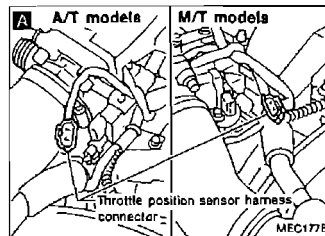
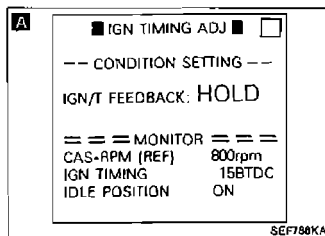
F1  
L

**Diagnostic Procedure 39 (Cont'd)**

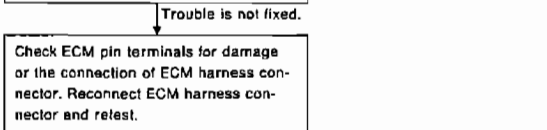
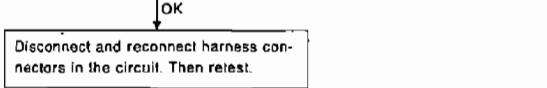
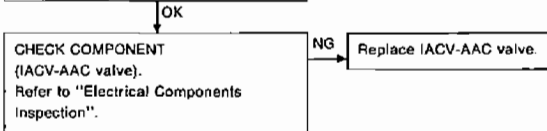
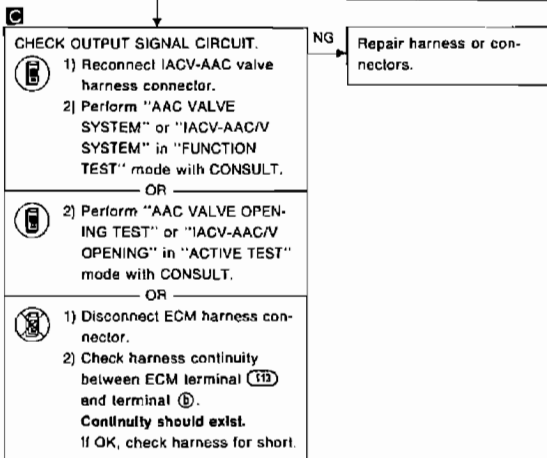
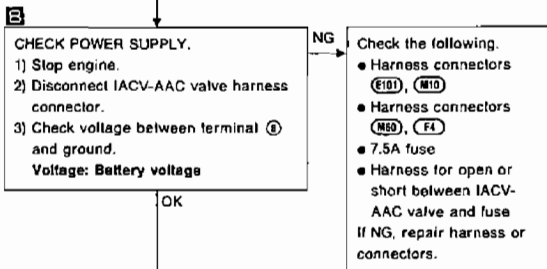
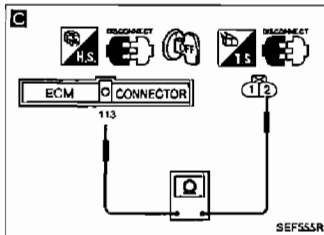
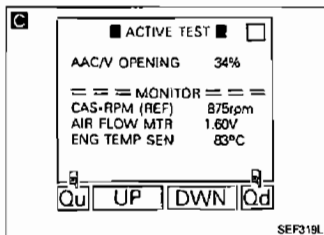
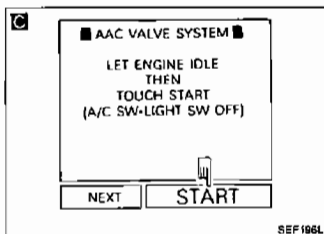
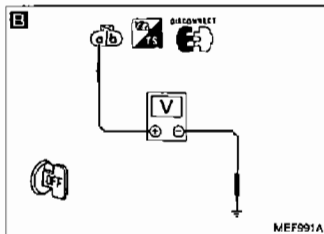
**Harness layout**



EC



## Diagnostic Procedure 39 (Cont'd)

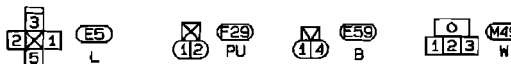
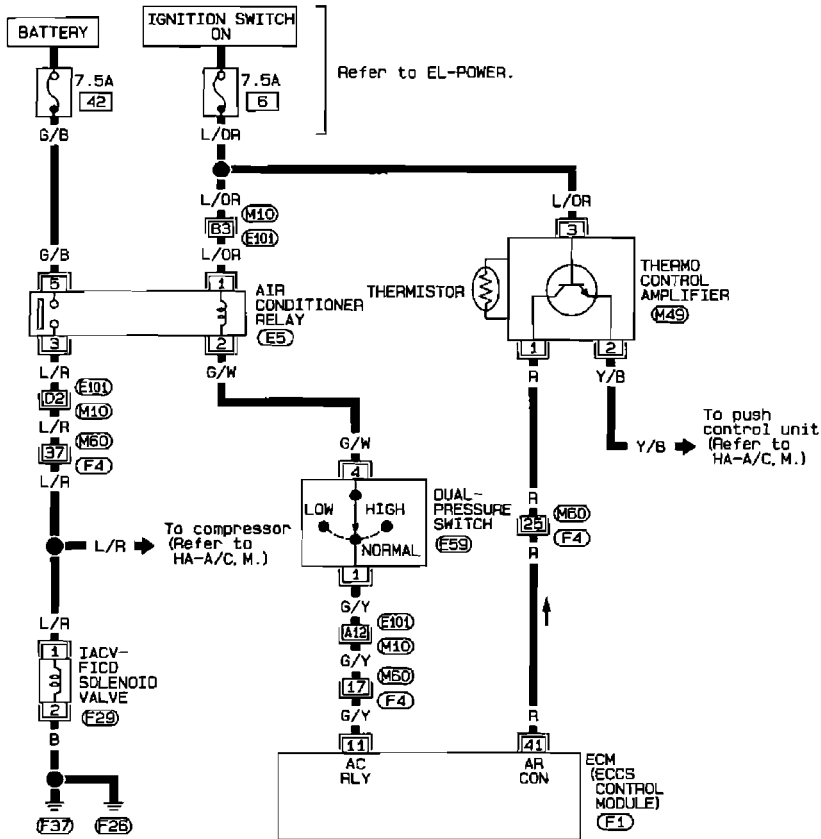




Diagnostic Procedure 40 (Cont'd)

RHD MODELS

EC-FICD-02



Refer to last page (Foldout page).

M10, E101  
M60, F4

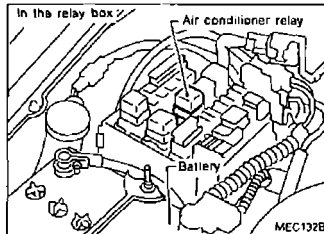
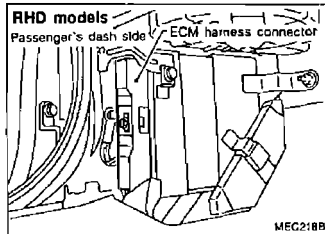
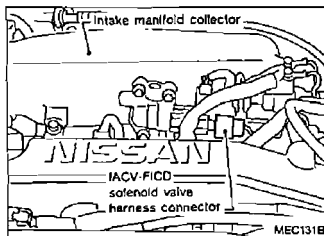
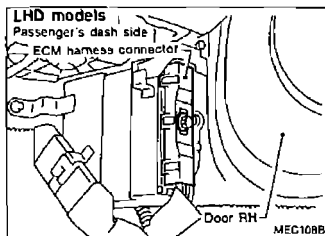
|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
| 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 |



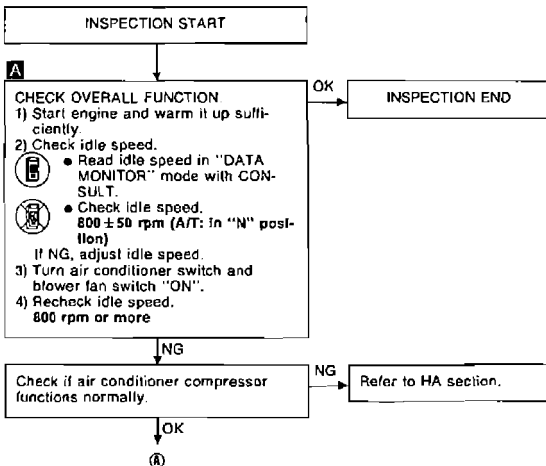
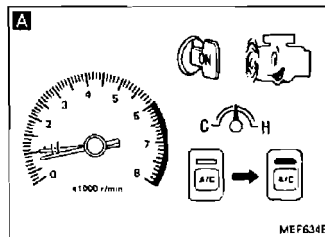
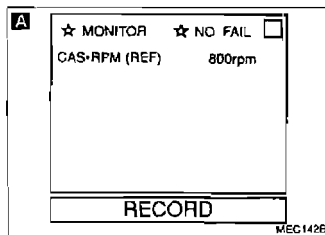


## Diagnostic Procedure 40 (Cont'd)

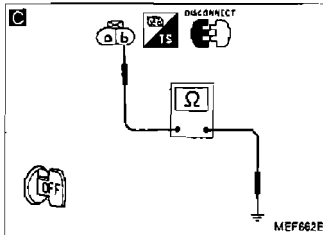
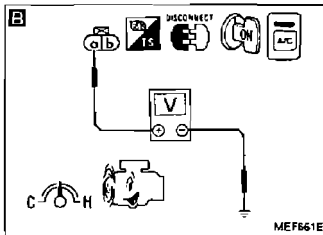
## Harness layout



EC



## Diagnostic Procedure 40 (Cont'd)



B

## CHECK POWER SUPPLY.

- 1) Stop engine and turn air conditioner switch and blower fan switch "OFF".
- 2) Disconnect IACV-FICD solenoid valve harness connector.
- 3) Restart engine and turn air conditioner switch and blower fan switch "ON".
- 4) Check voltage between terminal ② and ground.  
**Voltage: Battery voltage**

NG

## Check the following.

- Harness connectors
    - (E10), (M10)
    - Harness connectors (M10), (F1)
  - Harness for open or short between A/C relay and IACV-FICD solenoid valve
- If NG, repair harness or connectors.

OK

C

## CHECK GROUND CIRCUIT.

- 1) Stop engine.
- 2) Check harness continuity between terminal ② and engine ground.  
**Continuity should exist.**  
If OK, check harness for short.

NG

Repair harness or connectors.

OK

CHECK COMPONENT  
(IACV-FICD solenoid valve).  
Refer to "Electrical Components Inspection".

NG

Replace IACV-FICD solenoid valve.

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

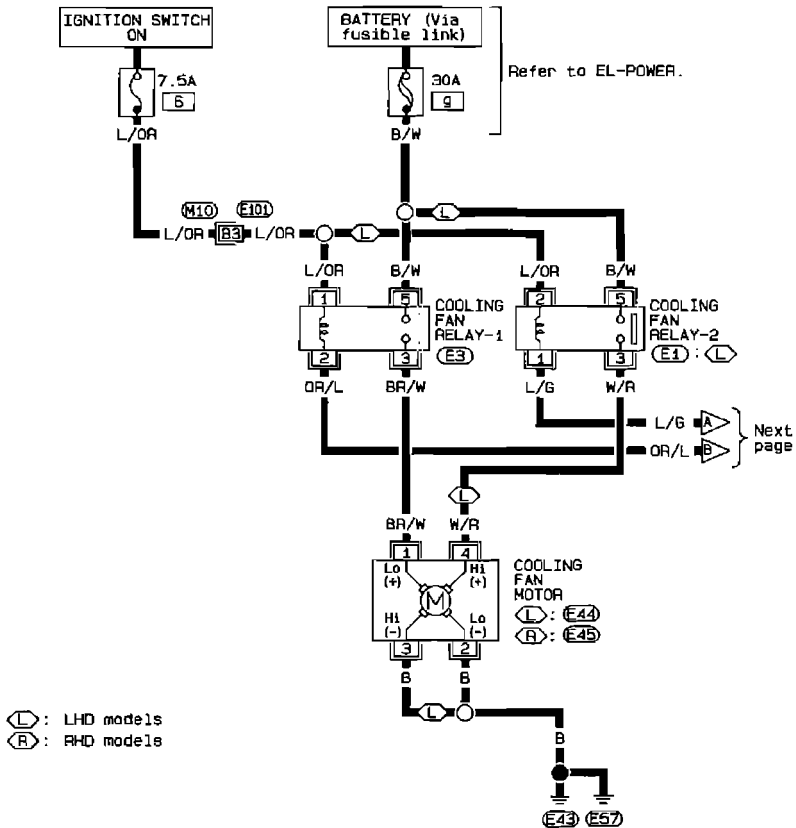
Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

## Diagnostic Procedure 41

COOLING FAN CONTROL (Not self-diagnostic item)

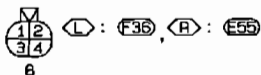
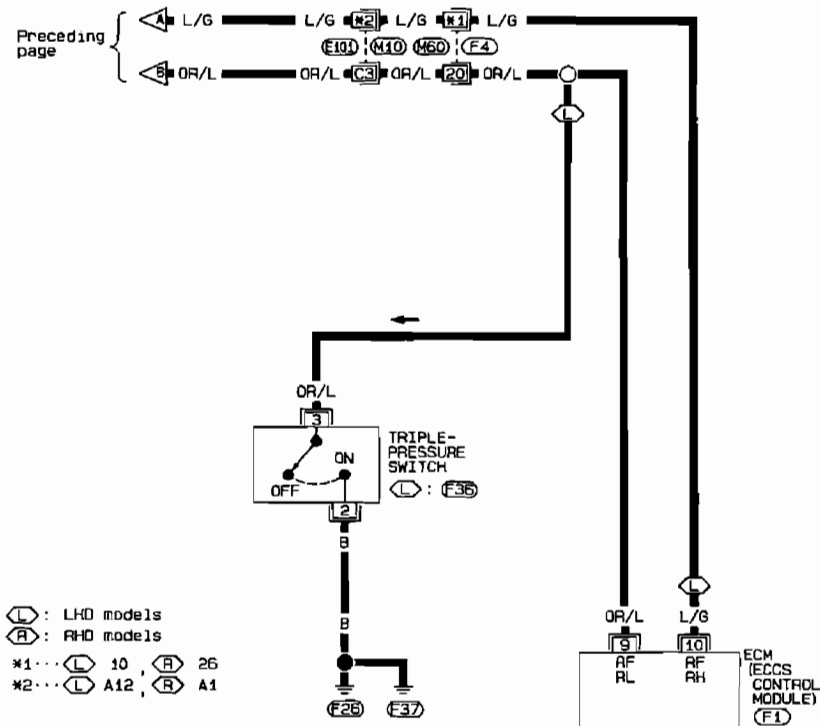
EC-COOL/F-01

Refer to last page  
(Foldout page).

(M10), (E10)

## Diagnostic Procedure 41 (Cont'd)

EC-COOL/F-02



Refer to last page (foldout page).

M10 E101  
 M60 F4

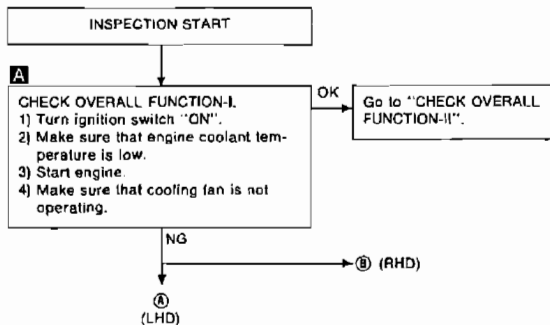
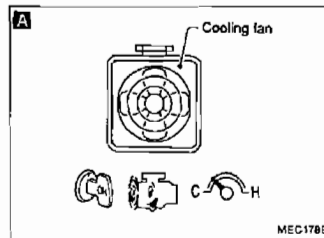
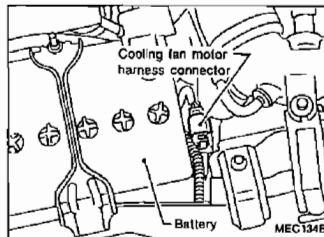
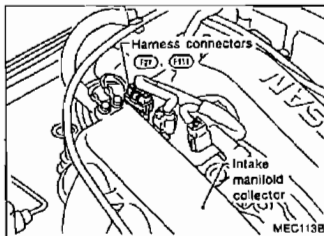
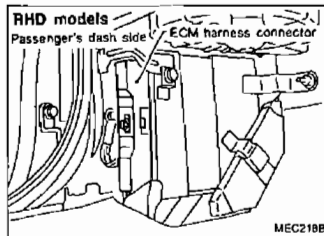
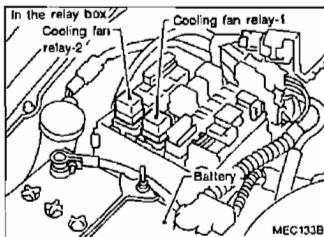
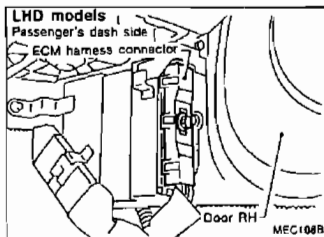
|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |
| 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |

F1 L

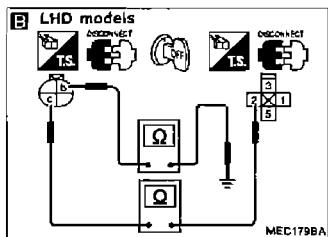


## Diagnostic Procedure 41 (Cont'd)

## Harness layout



## Diagnostic Procedure 41 (Cont'd)

**B** LHD models

**CHECK HARNESS CONTINUITY BETWEEN COOLING FAN RELAY-1 AND GROUND.**

- 1) Stop engine.
- 2) Disconnect cooling fan relay-1.
- 3) Disconnect triple-pressure switch harness connector.
- 4) Check harness continuity between terminal ② and terminal ③, terminal ④ and body ground.  
**Continuity should exist.**  
If OK, check harness for short.

NG

Check the following.

- Harness connectors (E10), (M10)
  - Harness connectors (M40), (FA)
  - Harness for open or short between cooling fan relay-1 and triple-pressure switch
  - Harness for open or short between triple-pressure switch and body ground.
- If NG, repair harness or connectors.

OK

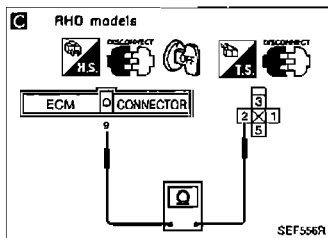
**CHECK COMPONENT (Triple-pressure switch).**  
Refer to "HA section".

NG

Replace triple-pressure switch.

OK

Go to "CHECK OUTPUT SIGNAL CIRCUIT" in **PROCEDURE A**

**C** RHD models

**CHECK HARNESS CONTINUITY BETWEEN COOLING FAN RELAY-1 AND ECM.**

- 1) Stop engine.
- 2) Disconnect cooling fan relay-1.
- 3) Disconnect ECM harness connector.
- 4) Check harness continuity between terminal ② and ECM terminal ③.  
**Continuity should exist.**  
If OK, check harness for short.

NG

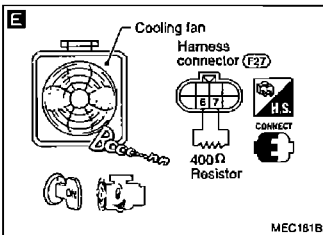
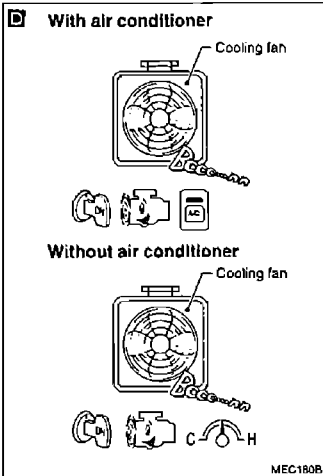
Check the following.

- Harness connectors (E10), (M10)
  - Harness connectors (M40), (FA)
  - Harness for open or short between cooling fan relay-1 and ECM
- If NG, repair harness or connectors.

OK

Go to "CHECK OUTPUT SIGNAL CIRCUIT" in **PROCEDURE A**

## Diagnostic Procedure 41 (Cont'd)



CHECK OVERALL FUNCTION-II.

**D**  
CHECK COOLING FAN LOW SPEED OPERATION

With air conditioner

- 1) Start engine.
- 2) Set temperature lever at full cold position.
- 3) Turn air conditioner switch "ON".
- 4) Turn blower fan switch "ON".
- 5) Run engine at idle for a few minutes with air conditioner operating.
- 6) Make sure that cooling fan operates at low speed.

Without air conditioner

- 1) Start engine.
- 2) Keep engine speed at about 2,000 rpm until engine is warmed up sufficiently.
- 3) Make sure that cooling fan begins to operate at low speed during warm-up.

NG  
Check cooling fan low speed control circuit. (Go to PROCEDURE A.)

(RH): RHD models  
(LH): LHD models

EC

OK

(LH)

(RH)

INSPECTION END

**E**  
CHECK COOLING FAN HIGH SPEED OPERATION.

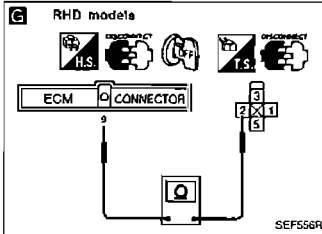
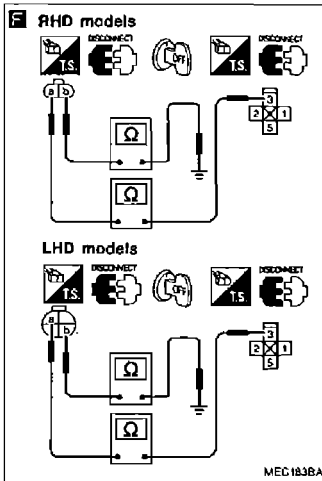
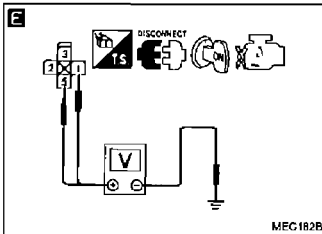
- 1) Turn both air conditioner switch and blower fan switch "OFF".
- 2) Stop engine.
- 3) Connect 400  $\Omega$  resistor between terminals (6) and (7) on harness connector (F27). (Refer to "Diagnostic Procedure 25".)
- 4) Restart engine and make sure that cooling fan operates at high speed.

NG  
Check cooling fan high speed control circuit. (Go to PROCEDURE B.)

OK

INSPECTION END

## Diagnostic Procedure 41 (Cont'd)



## PROCEDURE A

## INSPECTION START

**E**

## CHECK POWER SUPPLY.

- 1) Stop engine.
  - 2) Disconnect cooling fan relay-1.
  - 3) Turn ignition switch "ON".
  - 4) Check voltage between terminals ①, ③ and ground.
- Voltage: Battery voltage**

NG

## Check the following.

- Harness connectors (MID, E1B1)
  - 7.5A fuse
  - 30A fusible link
  - Harness for open or short between cooling fan relay-1 and fuse
  - Harness for open or short between cooling fan relay-1 and fusible link
- If NG, repair harness or connectors.

OK

**F**

## CHECK GROUND CIRCUIT.

- 1) Turn ignition switch "OFF".
  - 2) Disconnect cooling fan motor harness connector.
  - 3) Check harness continuity between terminal ③ and terminal ②, terminal ④ and body ground. Continuity should exist.
- If OK, check harness for short.

NG

Repair harness or connectors.

OK

**G**

## RHD models

## CHECK OUTPUT SIGNAL CIRCUIT.

- 1) Disconnect ECM harness connector.
  - 2) Check harness continuity between ECM terminal ③ and terminal ②. Continuity should exist.
- If OK, check harness for short.

NG

## Check the following.

- Harness connectors (E1B1, MID)
  - Harness connectors (MID, F4)
  - Harness for open or short between ECM and cooling fan relay-1
- If NG, repair harness or connectors.

OK

## CHECK COMPONENT

(Cooling fan relay-1).  
Refer to "Electrical Components Inspection".

NG

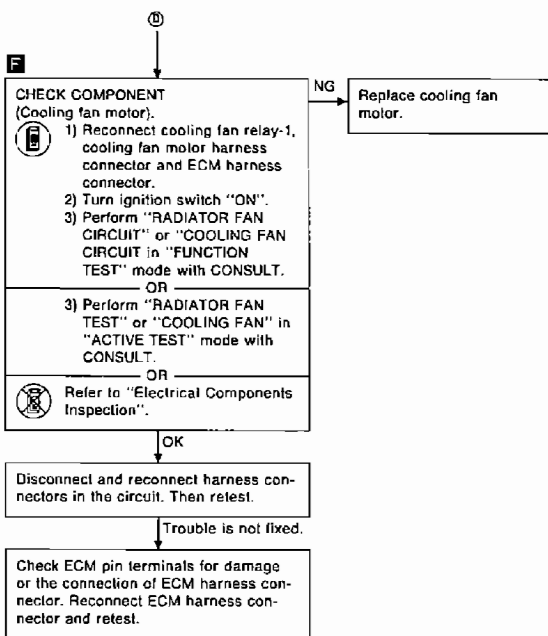
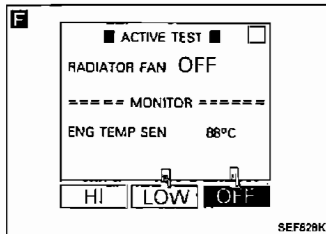
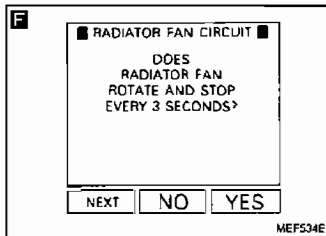
Replace cooling fan relay.

OK

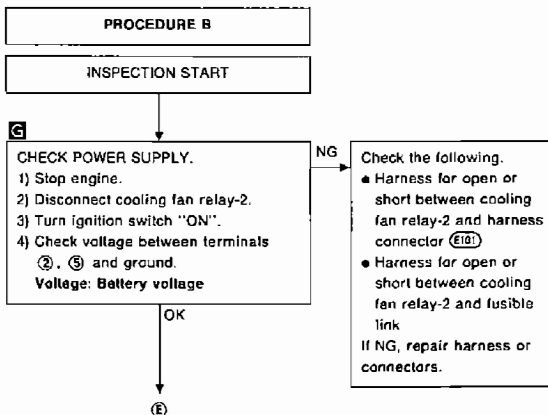
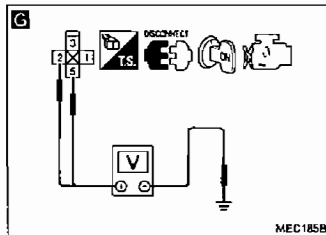
①



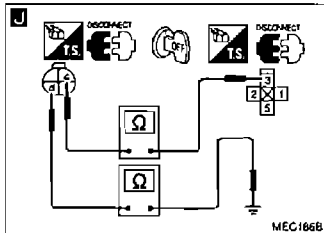
## Diagnostic Procedure 41 (Cont'd)



EC



## Diagnostic Procedure 41 (Cont'd)



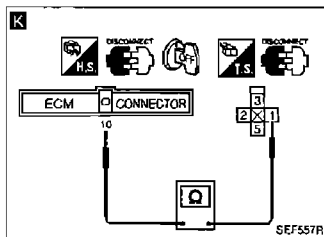
**J**

**CHECK GROUND CIRCUIT.**

- 1) Turn ignition switch "OFF".
- 2) Disconnect cooling fan motor harness connector.
- 3) Check harness continuity between terminal ③ and terminal ④, terminal ④ and body ground. Continuity should exist. If OK, check harness for short.

NG → Repair harness or connectors.

OK →



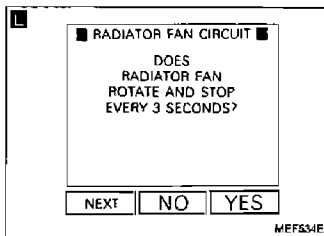
**K**

**CHECK OUTPUT SIGNAL CIRCUIT.**

- 1) Disconnect ECM harness connector.
- 2) Check harness continuity between ECM terminal ① and terminal ①. Continuity should exist. If OK, check harness for short.

NG → Check the following.  
 ● Harness connectors (E11), (M10)  
 ● Harness connectors (M50), (F4)  
 ● Harness for open or short between ECM and cooling fan relay-2  
 If NG, repair harness or connectors.

OK →



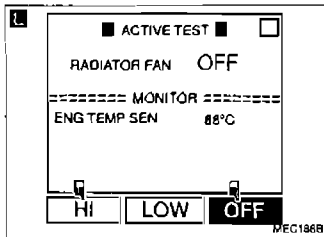
**L**

**CHECK COMPONENT (Cooling fan relay-2).**

Refer to "Electrical Components Inspection".

NG → Replace cooling fan relay.

OK →



**M**

**CHECK COMPONENT (Cooling fan motor).**

- 1) Reconnect cooling fan relay-2, cooling fan motor harness connector and ECM harness connector.
- 2) Disconnect 400  $\Omega$  resistor from harness connector (F27).
- 3) Turn ignition switch "ON".
- 4) Perform "RADIATOR FAN CIRCUIT" or "COOLING FAN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

- 4) Perform "RADIATOR FAN TEST" or "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.

OR

Refer to "Electrical Components Inspection".

NG → Replace cooling fan motor.

OK →

Disconnect and reconnect harness connectors in the circuit. Then retest.

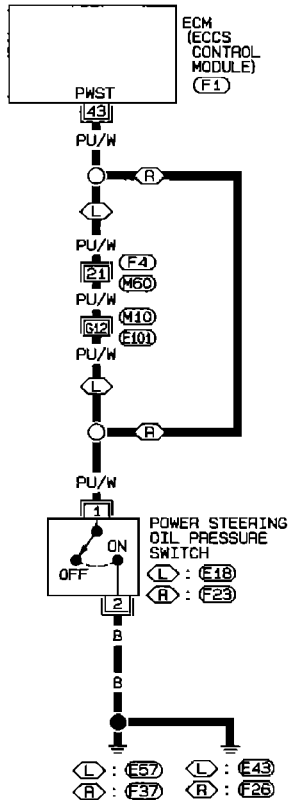
Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

## Diagnostic Procedure 42

## POWER STEERING OIL PRESSURE SWITCH (Not self-diagnostic item)

EC-PST/SW-01



L : LHD models  
R : RHD models

1 2

GY

L : E18, R : F23

Refer to last page  
(Foldout page).

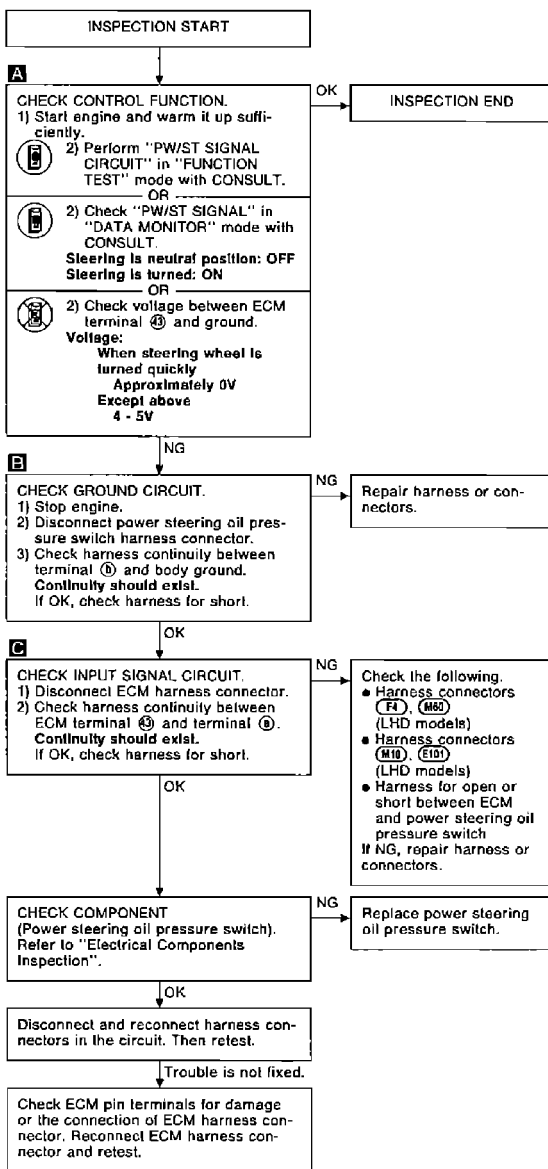
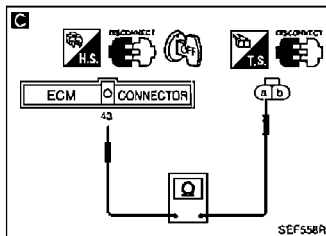
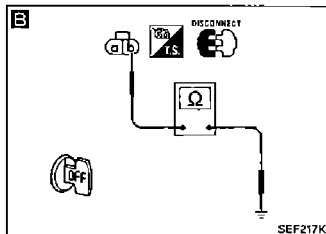
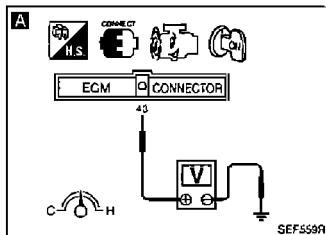
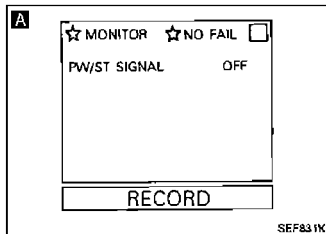
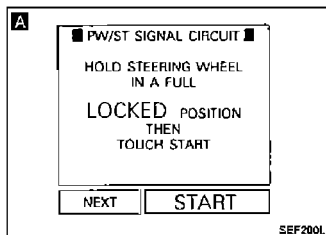
M10, E101  
M60, F4

|     |     |     |     |     |     |     |     |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1 | 2 | 3  | 4  | 5  | 6  | 7  | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |

F1  
L



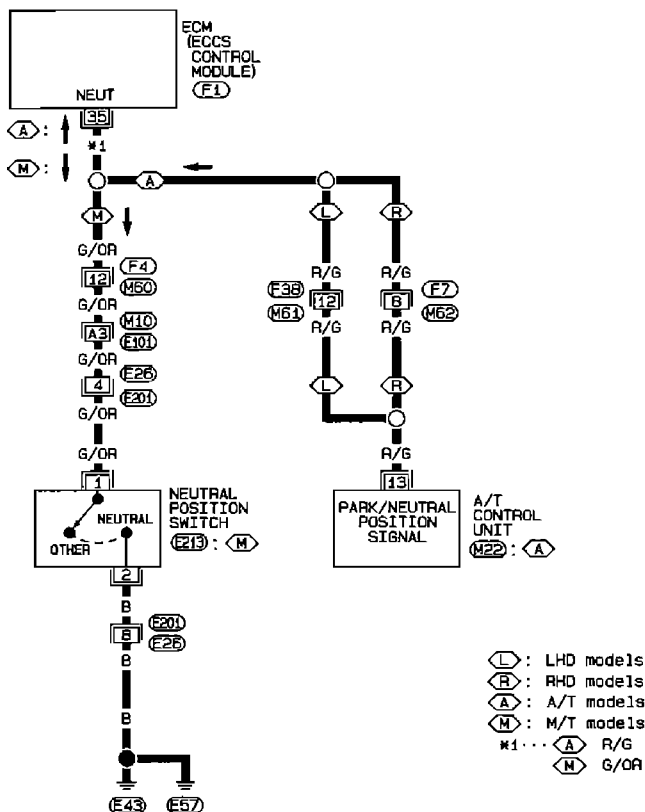
## Diagnostic Procedure 42 (Cont'd)



## Diagnostic Procedure 43

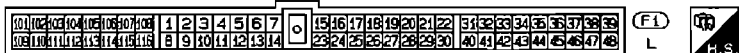
NEUTRAL POSITION SWITCH & A/T CONTROL UNIT (PARK/NEUTRAL POSITION SIGNAL)  
(Not self-diagnostic item)

EC-PNP/SW-01

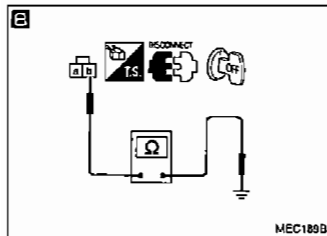
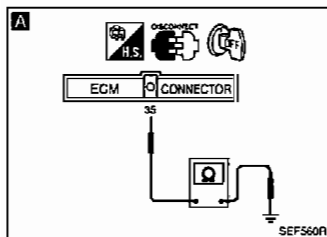
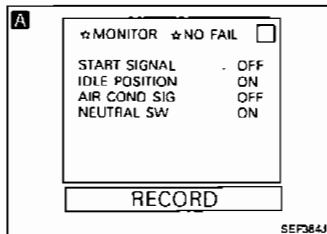
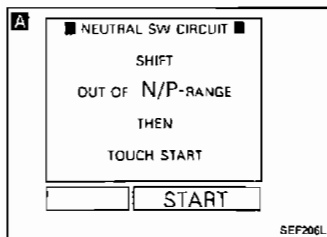


Refer to last page (Foldout page).

(M10) (E101)  
(M60) (F4)



## Diagnostic Procedure 43 (Cont'd)



## Neutral position switch

INSPECTION START

**A**

CHECK OVERALL FUNCTION.

- 1) Turn ignition switch "ON".
- 2) Perform "NEUTRAL SW CIRCUIT" or "NEUTRAL POSI SW CKT" in "FUNCTION TEST" mode with CONSULT.

OR

- 2) Check "NEUTRAL SW" or "NEUT POSI SW" signal in "DATA MONITOR" mode with CONSULT.

Neutral position: ON

Except above: OFF

OR

- 1) Set shift lever to the neutral position.
- 2) Disconnect ECM harness connector.
- 3) Check harness continuity between ECM terminal ⑤ and body ground. Continuity should exist. If OK, check harness for short.

OK

INSPECTION END

NG

- Turn ignition switch "OFF".

**B**

CHECK GROUND CIRCUIT.

- 1) Disconnect neutral position switch harness connector.
- 2) Check harness continuity between terminal ⑤ and body ground. Continuity should exist. If OK, check harness for short.

NG

Check the following.

- Harness connectors (E21), (E26)
- Harness for open or short between neutral position switch and body ground

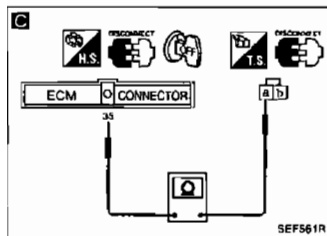
If OK, check harness for short.  
If NG, repair harness or connectors.

OK

- Disconnect ECM harness connector.

⑤

## Diagnostic Procedure 43 (Cont'd)

**C**

## CHECK INPUT SIGNAL CIRCUIT.

1) Check harness continuity between ECM terminal **35** and terminal **A**. Continuity should exist. If OK, check harness for short.

NG

Check the following.

- Harness connectors

- **F4**, **MED**

- Harness connectors

- **M1D**, **E1D1**

- Harness connectors

- **E25**, **E2D1**

- Harness for open or short between ECM and neutral position switch

If NG, repair harness or connectors.

OK

## CHECK COMPONENT

(Neutral position switch). Refer to "ON-VEHICLE SERVICE" in MT section.

NG

Replace neutral position switch.

OK

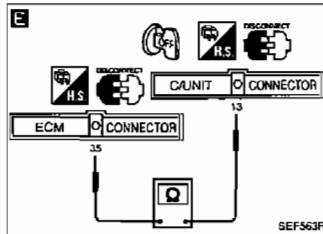
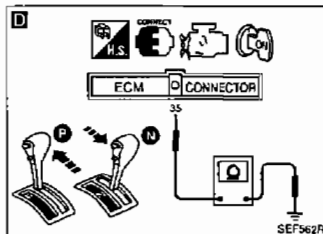
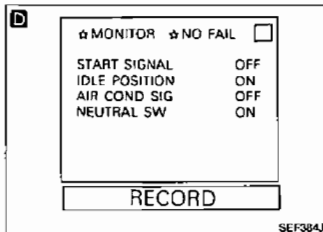
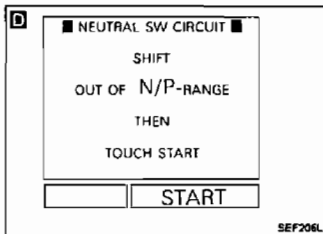
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

EC

## Diagnostic Procedure 43 (Cont'd)



A/T CONTROL UNIT (PARK/NEUTRAL POSITION SIGNAL) CIRCUIT

INSPECTION START

**D** CHECK OVERALL FUNCTION.

1) Turn ignition switch "ON".

2) Perform "NEUTRAL SW CIRCUIT" or "NEUTRAL POSI SW CKT" in "FUNCTION TEST" mode with CONSULT.

OR

2) Check "NEUTRAL SW" or "NEUT POSI SW" signal in "DATA MONITOR" mode with CONSULT.

"N" or "P": ON  
Except above: OFF

OR

2) Check voltage between ECM terminal ⑤ and ground under the following conditions.

Voltage:

"N" or "P"

Approximately 0V

Except above

Approximately 5V

OK

INSPECTION END

NG

**E** CHECK INPUT SIGNAL CIRCUIT.

1) Turn ignition switch "OFF".

2) Disconnect ECM harness connector.

3) Disconnect A/T control unit harness connector.

4) Check harness continuity between ECM terminal ⑤ and terminal ⑬. Continuity should exist.

If OK, check harness for short.

NG

Check the following.

- Harness connectors

- F38, M61 (LHD models)

- Harness connectors

- E7, M82 (RHD models)

- Harness for open or short between ECM and A/T control unit

If NG, repair harness or connectors.

OK

CHECK INHIBITOR SWITCH FUNCTION.

Make sure that inhibitor switch functions properly. (Refer to AT section).

NG

Check inhibitor switch and circuit

(Refer to AT section.)

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

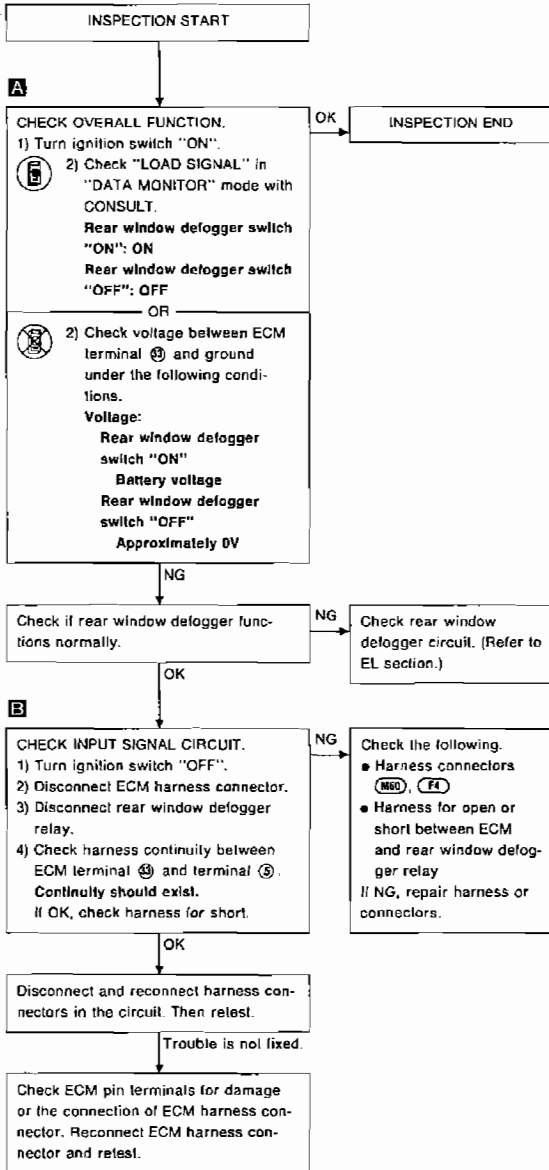
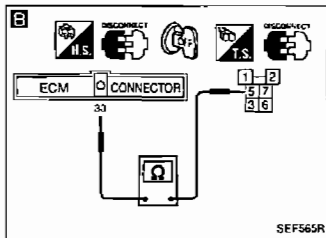
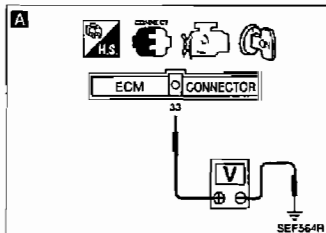
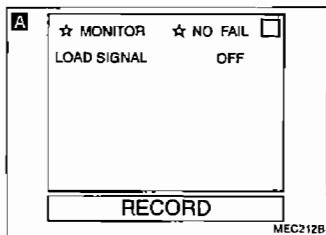
Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.





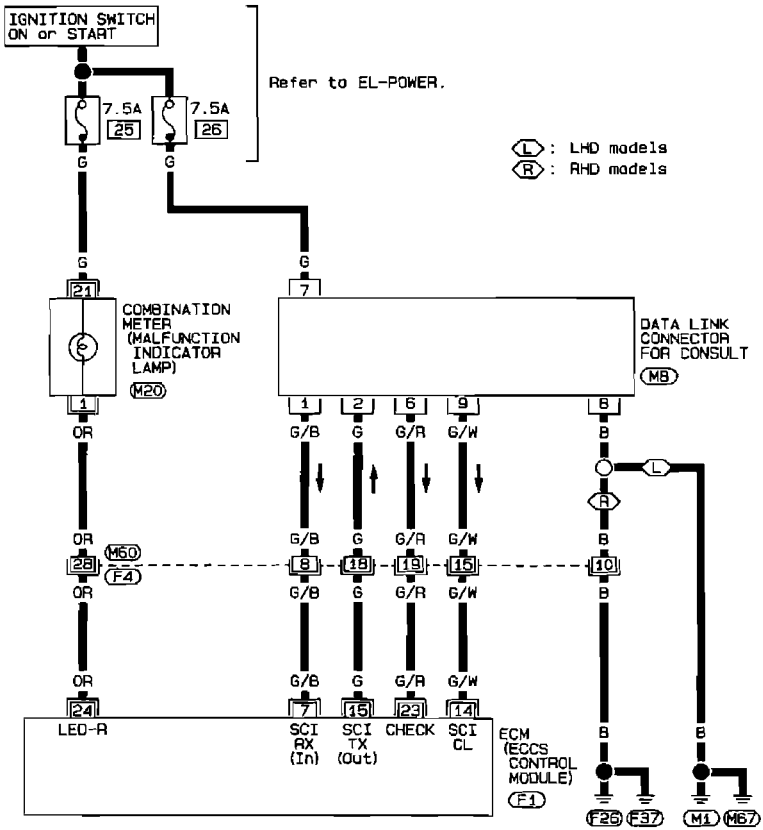
## Diagnostic Procedure 44 (Cont'd)



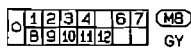
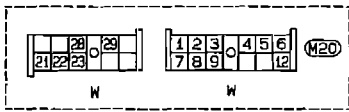
Diagnostic Procedure 45

MALFUNCTION INDICATOR LAMP & DATA LINK CONNECTOR FOR CONSULT (Not self-diagnostic item)

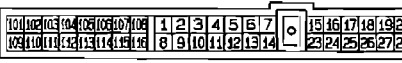
EC-MIL-01



EC



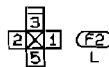
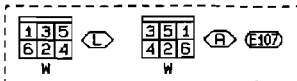
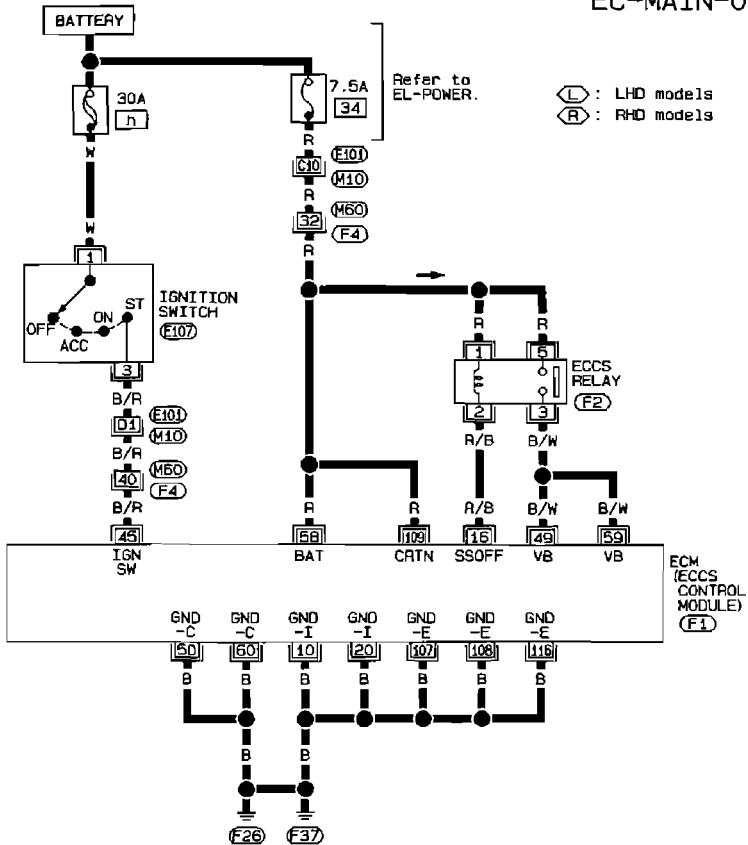
Refer to last page (Foldout page).  
 M60 F4



Diagnostic Procedure 22

MAIN POWER SUPPLY AND GROUND CIRCUIT (Not self-diagnostic item)

EC-MAIN-01



Refer to last page (Foldout page).

- Ⓜ10 (E10)
- Ⓜ60 (F4)

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |    |    |    |    |    |    |    |    |    |
| 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

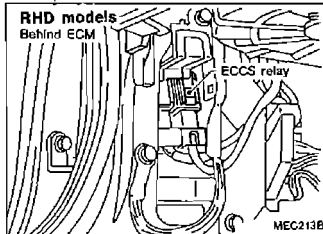
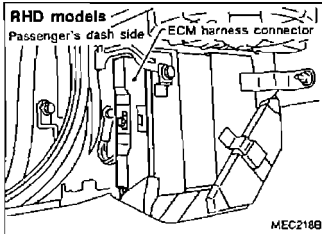
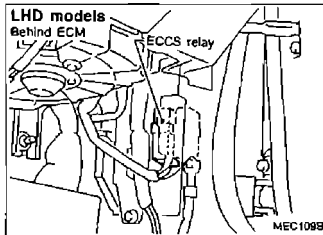
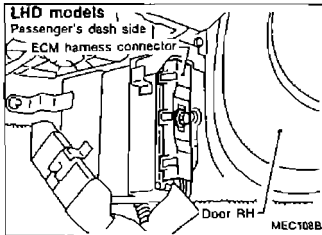
(F1)

L

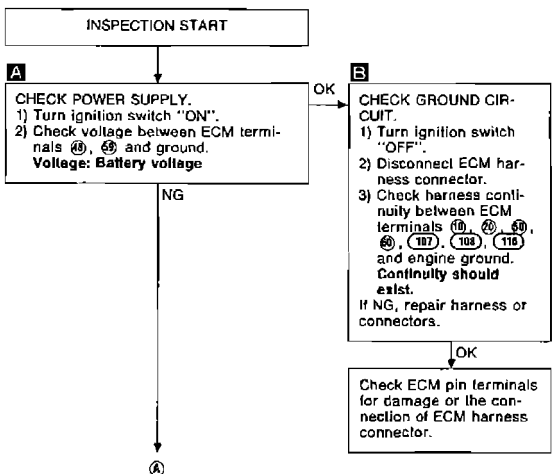
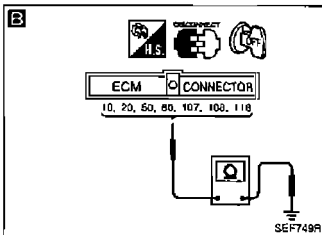
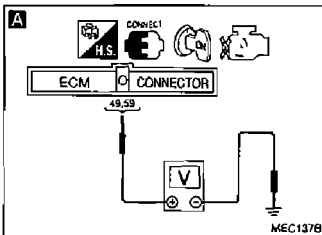


**Diagnostic Procedure 22 (Cont'd)**

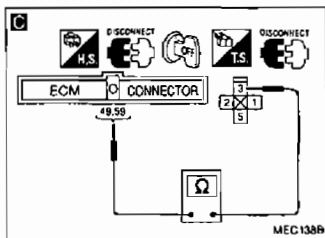
**Harness layout**



**EC**

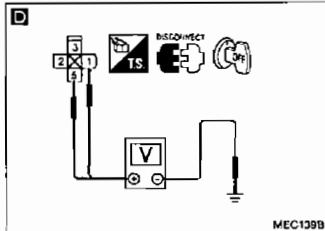


## Diagnostic Procedure 22 (Cont'd)



- C**
- CHECK HARNESS CONTINUITY BETWEEN ECSS RELAY AND ECM.**
- 1) Turn ignition switch "OFF".
  - 2) Disconnect ECM harness connector.
  - 3) Disconnect ECSS relay.
  - 4) Check harness continuity between ECM terminals ④, ⑤ and terminal ②.
- Continuity should exist.**  
If OK, check harness for short.

NG → Repair harness or connectors.

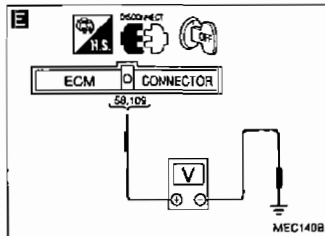


- D**
- CHECK VOLTAGE BETWEEN ECSS RELAY AND GROUND.**
- 1) Check voltage between terminals ①, ② and ground.
- Voltage: Battery voltage**

NG → Check the following.

- 7.5A fuse
- Harness connectors (E1D), (M1D)
- Harness connectors (M3D), (F4)
- Harness for open or short between ECSS relay and battery

If NG, repair harness or connectors.

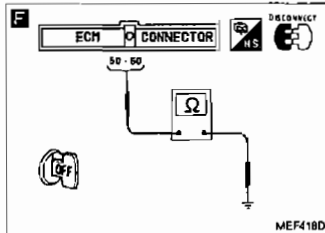


- E**
- CHECK VOLTAGE BETWEEN ECM AND GROUND.**
- 1) Check voltage between ECM terminals ④, ⑤ and ground.
- Voltage: Battery voltage**

NG → Check the following.

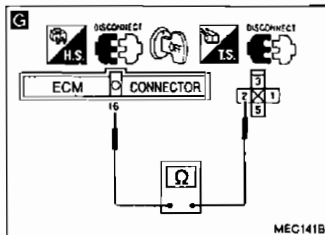
- Harness for open or short between ECM and harness connector (F4)

If NG, repair harness or connectors.



- F**
- CHECK GROUND CIRCUIT.**
- 1) Check harness continuity between ECM terminals ⑤, ⑥ and engine ground.
- Continuity should exist.**  
If OK, check harness for short.

NG → Repair harness or connectors.

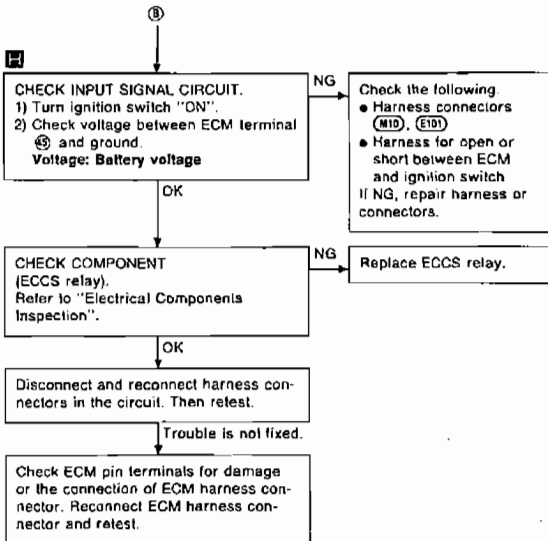
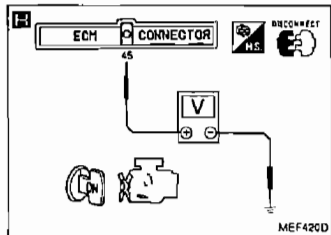


- G**
- CHECK OUTPUT SIGNAL CIRCUIT.**
- 1) Check harness continuity between ECM terminal ⑬ and terminal ②.
- Continuity should exist.**  
If OK, check harness for short.

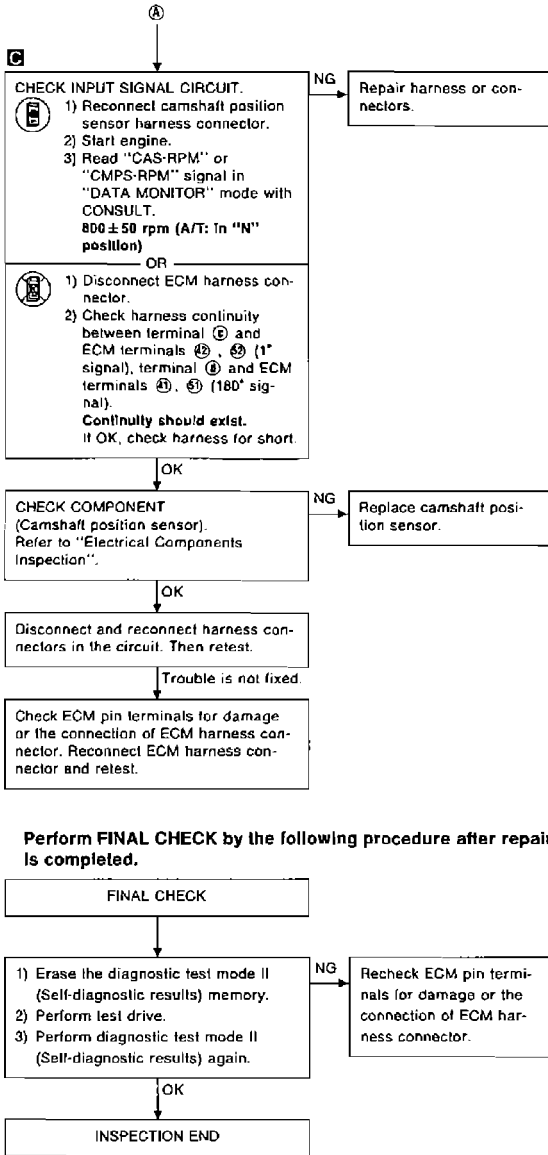
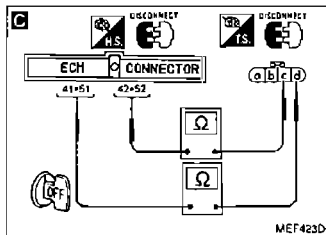
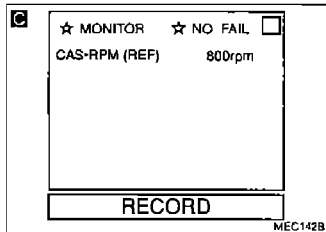
NG → Repair harness or connectors.

OK → ⑧

## Diagnostic Procedure 22 (Cont'd)



## Diagnostic Procedure 23 (Cont'd)

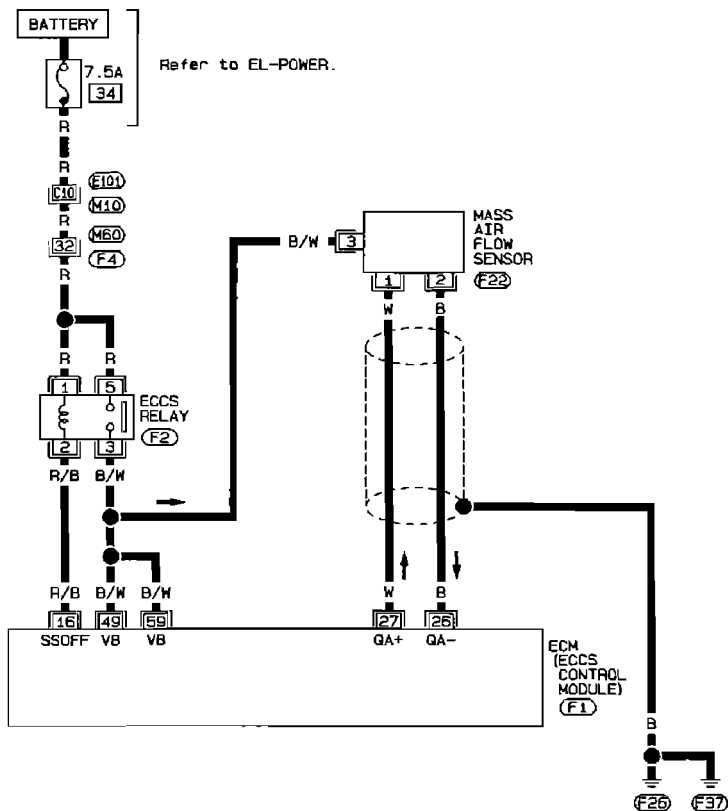




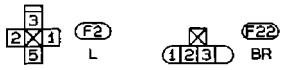
Diagnostic Procedure 24

MASS AIR FLOW SENSOR (Diagnostic trouble code No. 12)

EC-MAFS-01



EC



Refer to last page (foldout page).

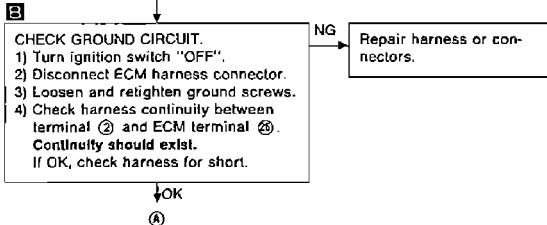
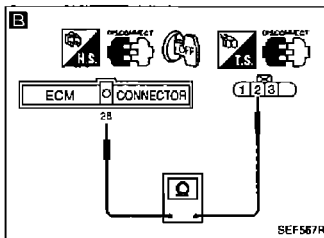
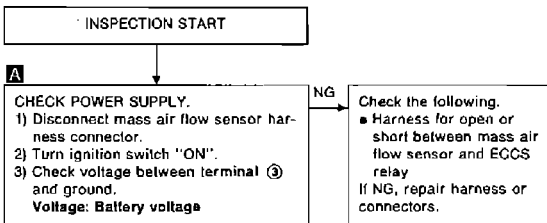
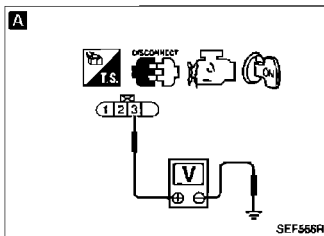
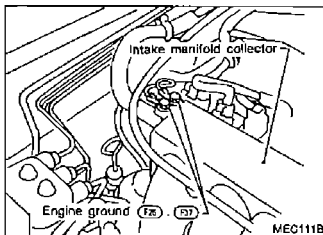
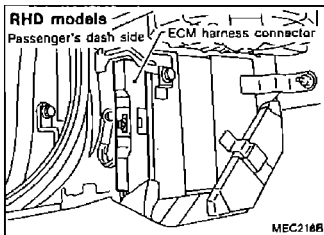
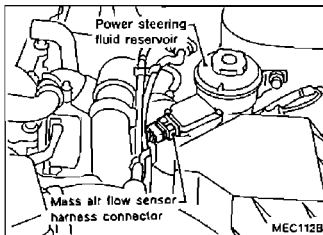
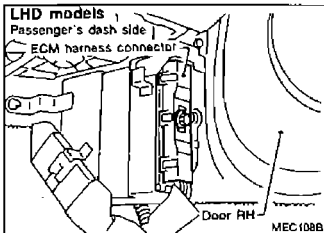
- M10, E101
- M60, F4

|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |    |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 0  | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

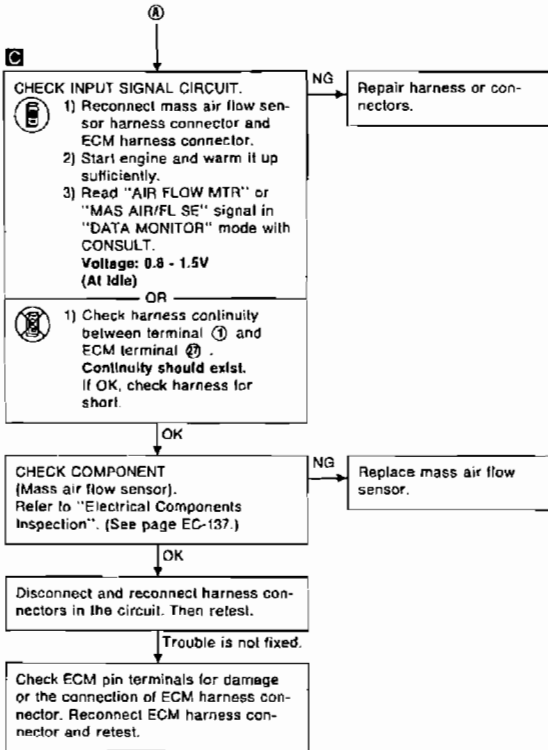
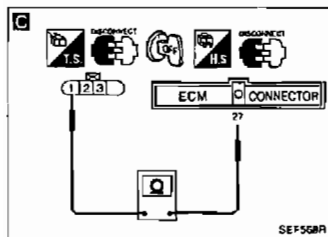
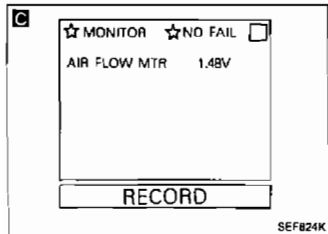
F1 L H.S.

Diagnostic Procedure 24 (Cont'd)

Harness layout

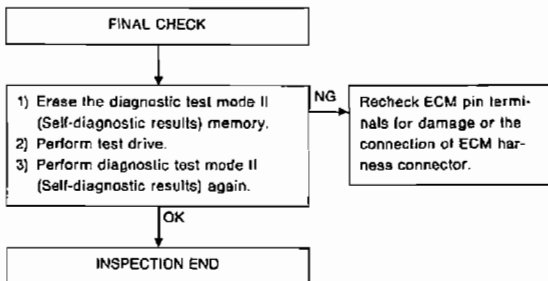


## Diagnostic Procedure 24 (Cont'd)



EC

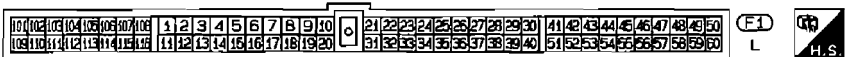
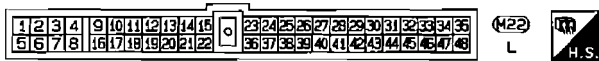
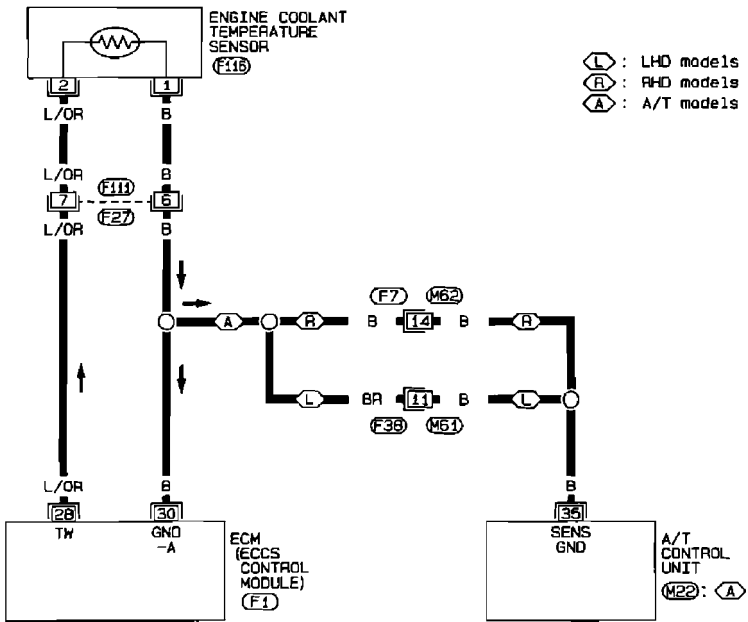
**Perform FINAL CHECK by the following procedure after repair is completed.**



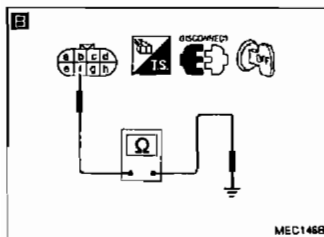
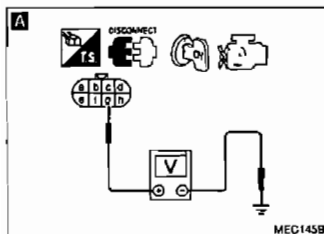
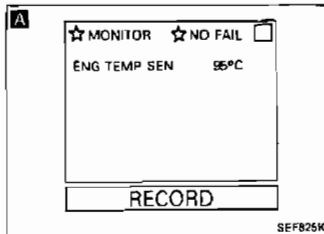
Diagnostic Procedure 25

ENGINE COOLANT TEMPERATURE SENSOR (Diagnostic trouble code No. 13)

EC-ECTS-01



## Diagnostic Procedure 25 (Cont'd)



INSPECTION START

**A**

## CHECK POWER SUPPLY.

- 1) Start engine and warm it up sufficiently.
- 2) Select "ENG TEMP SEN" or "COOLAN TEMP/S" signal in "DATA MONITOR" mode with CONSULT.
- 3) Stop engine.
- 4) When restarting engine make sure that CONSULT indicates "ENG TEMP SEN" or "COOLAN TEMP/S" is 50°C (122°F) or more.

OR



- 1) Disconnect harness connectors (F27), (F11).
- 2) Turn ignition switch "ON".
- 3) Check voltage between terminal ① and ground.  
**Voltage: Approximately 5V**

NG

Check the following.

- Harness for open or short between ECM and harness control (F27)
- If NG, repair harness or connectors.

OK

**B**

## CHECK GROUND CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Check harness continuity between terminal ① and engine ground.  
**Continuity should exist.**  
If OK, check harness for short.

NG

Check the following.

- Harness connectors (F38), (H65) (LHD A/T models)
  - Harness connectors (F7), (M52) (RHD A/T models)
  - Harness for open or short between ECM and harness connector (F27)
  - Harness for open or short between A/T control unit and harness connector (F27)
- If NG, repair harness or connectors.

OK

## CHECK COMPONENT

[Engine coolant temperature sensor].  
Refer to "Electrical Components Inspection".

NG

Replace engine coolant temperature sensor.

OK

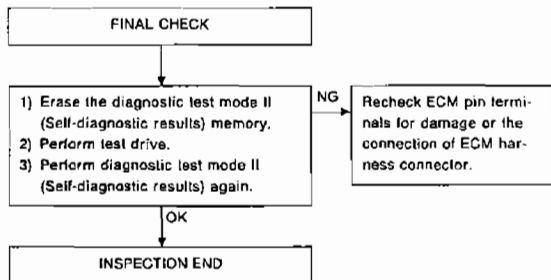
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

## Diagnostic Procedure 25 (Cont'd)

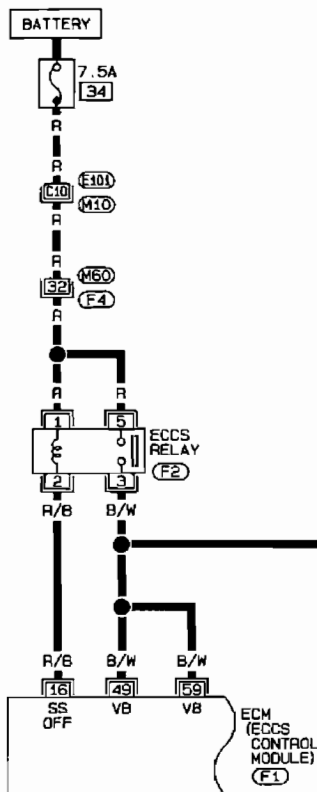
Perform FINAL CHECK by the following procedure after repair is completed.



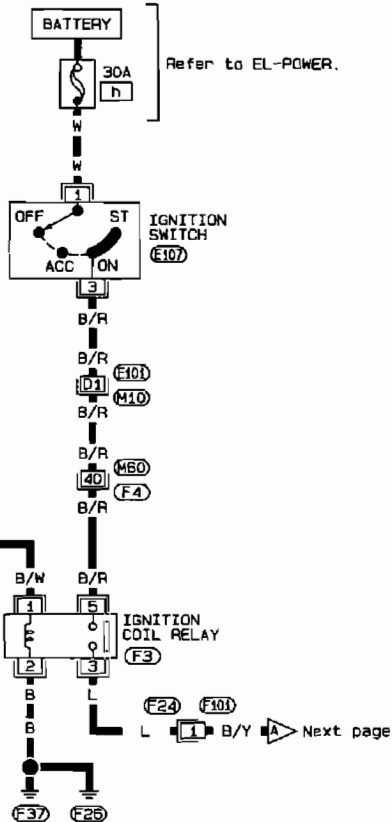
## Diagnostic Procedure 26

IGNITION SIGNAL (Diagnostic trouble code No. 21)

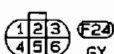
LHD MODELS



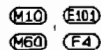
EC-IGN/SG-01



EC



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|     |     |     |     |     |     |     |     |     |     |     |     |   |   |   |   |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|---|---|---|---|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1   | 2   | 3   | 4   | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 |   |   |   |   |   |    |   | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

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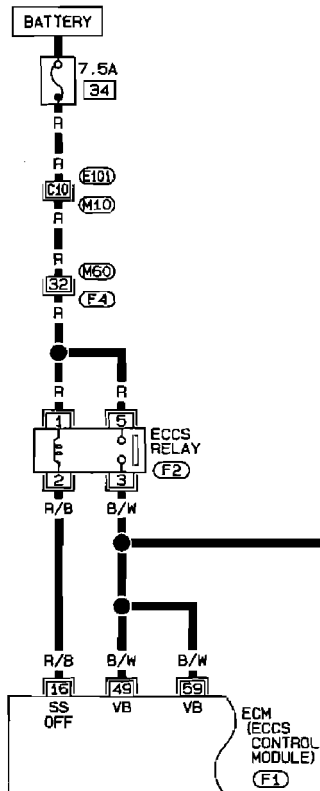
H.S.



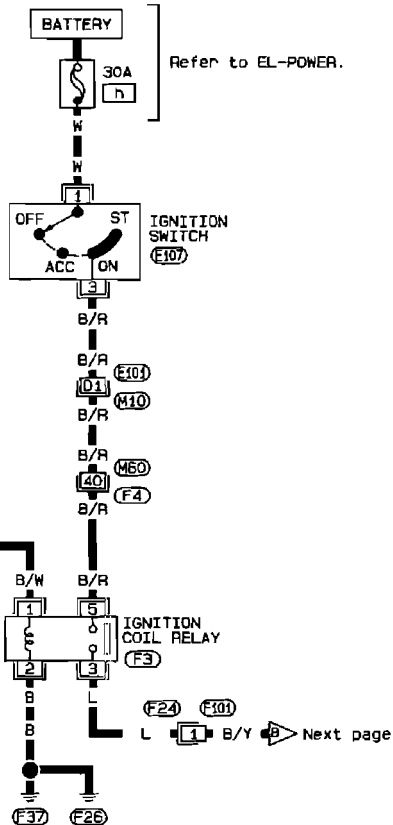


**Diagnostic Procedure 26 (Cont'd)**

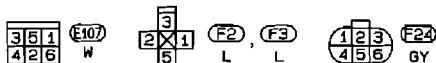
**RHD MODELS**



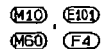
**EC-IGN/SG-03**



**EC**



Refer to last page (Foldout page).

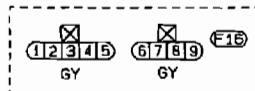
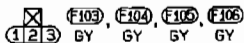
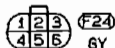
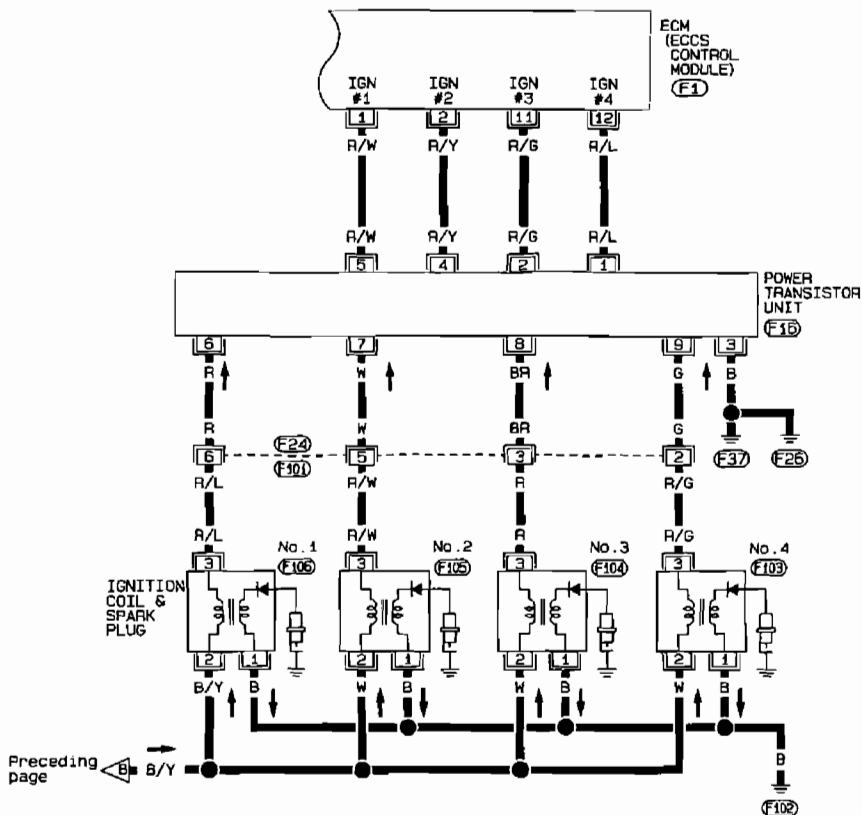


|     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   |
|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|---|---|---|---|---|---|---|---|---|
| 60  | 59  | 58  | 57  | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9  | 8  | 7  | 6  | 5  | 4  | 3  | 2  | 1  | 0  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   |
| 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |



## Diagnostic Procedure 26 (Cont'd)

## EC-IGN/SG-04

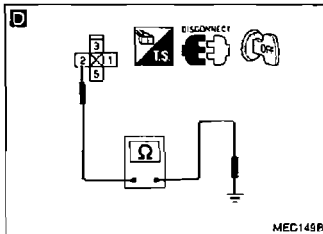
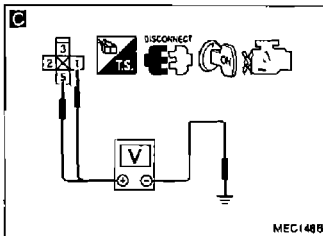
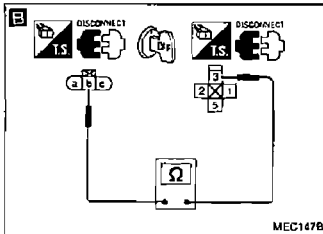
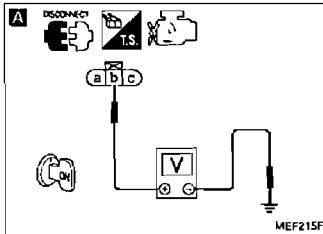


|     |     |     |     |     |     |     |     |   |   |   |   |   |   |   |   |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|---|---|---|---|---|---|---|---|---|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
|-----|-----|-----|-----|-----|-----|-----|-----|---|---|---|---|---|---|---|---|---|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

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## Diagnostic Procedure 26 (Cont'd)



INSPECTION START

**A**

## CHECK POWER SUPPLY-I.

- 1) Disconnect ignition coil harness connectors.
- 2) Turn ignition switch "ON".
- 3) Check voltage between terminal ① and ground.

Voltage: Battery voltage

OK

Go to "CHECK GROUND CIRCUIT-II" on next page.

**B**

## CHECK POWER SUPPLY-II.

- 1) Turn ignition switch "OFF".
- 2) Disconnect ignition coil relay.
- 3) Check harness continuity between terminal ① and terminal ③. Continuity should exist. If OK, check harness for short.

NG

Check the following.

- Harness connectors (F24), (F10)
  - Harness for open or short between ignition coil and ignition coil relay
- If NG, repair harness or connectors.

EC

**C**

## CHECK POWER SUPPLY-III.

- 1) Turn ignition switch "OFF".
- 2) Check voltage between terminals ①, ③ and ground.

Voltage: Battery voltage

NG

Check the following.

- Harness connectors (F10), (M10)
  - Harness connectors (M50), (F4)
  - Harness for open or short between ignition coil relay and ignition switch
  - Harness for open or short between ignition coil relay and ECOS relay
- If NG, repair harness or connectors.

OK

**D**

## CHECK GROUND CIRCUIT-I.

- 1) Turn ignition switch "OFF".
- 2) Check harness continuity between terminal ② and engine ground. Continuity should exist. If OK, check harness for short.

NG

Repair harness or connectors.

OK

## CHECK COMPONENT

(Ignition coil relay).

Refer to "Electrical Components Inspection".

NG

Replace ignition coil relay.

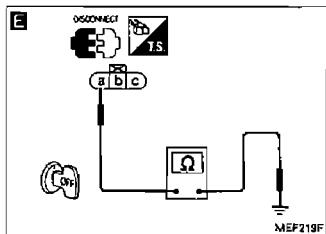
OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

## Diagnostic Procedure 26 (Cont'd)



## CHECK GROUND CIRCUIT-II.

1) Turn ignition switch "OFF".

**E** 2) Check harness continuity between terminal ① and engine ground.  
Continuity should exist.

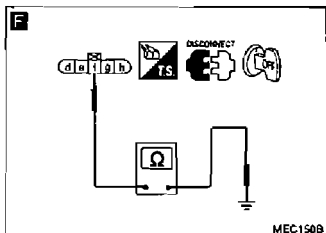
3) Disconnect power transistor unit harness connector.

**F** 4) Check harness continuity between terminal ① and engine ground.  
Continuity should exist.

If OK, check harness for short.

NG

Repair harness or connectors.



## CHECK OUTPUT SIGNAL CIRCUIT.

**G** 1) Check harness continuity between terminals ①, ①, ②, ① and terminal ③.  
Continuity should exist.

If OK, check harness for short.

2) Disconnect ECM harness connector.

**H** 3) Check harness continuity between following terminals.

① - ②    ③ - ④

② - ③    ④ - ①

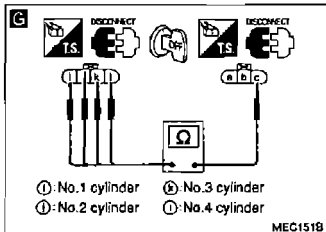
Continuity should exist.

If OK, check harness for short.

NG

Check the following.

- Harness connectors (F2), (F10)
  - Harness connectors (M20), (F4) (LHD models)
  - Harness connectors (E12), (M12) (LHD models)
  - Harness connectors (M10), (E10) (LHD models)
  - Harness for open or short between ignition coil and power transistor unit
  - Harness for open or short between ECM and power transistor unit
- If NG, repair harness or connectors.

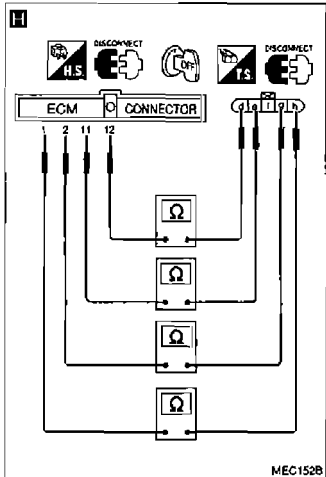


OK

CHECK COMPONENTS (ignition coil and power transistor unit). Refer to "Electrical Components Inspection".

NG

Replace malfunctioning component(s).



OK

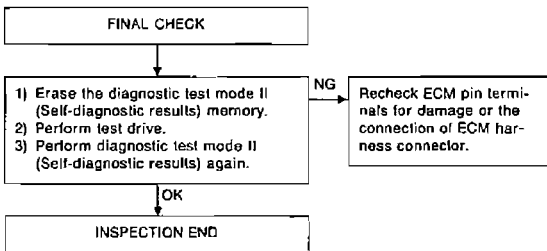
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

## Diagnostic Procedure 26 (Cont'd)

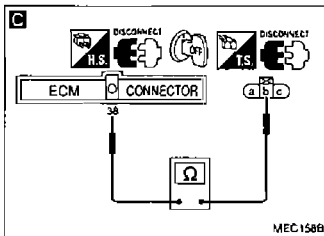
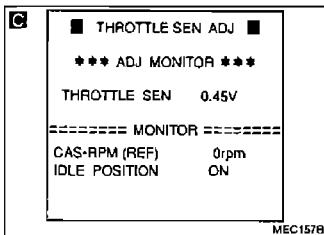
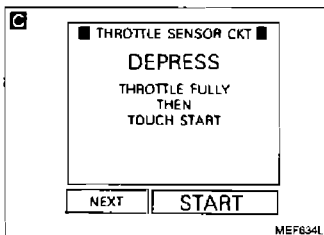
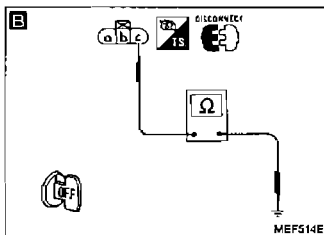
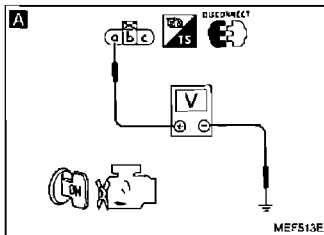
Perform **FINAL CHECK** by the following procedure after repair is completed.



EC



## Diagnostic Procedure 29 (Cont'd)



INSPECTION START

**A**

## CHECK POWER SUPPLY.

- 1) Disconnect throttle position sensor harness connector.
- 2) Turn ignition switch "ON".
- 3) Check voltage between terminal (a) and ground.

Voltage: Approximately 5V

NG

Repair harness or connectors.

OK

**B**

## CHECK GROUND CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Loosen and retighten ground screws.
- 3) Check harness continuity between terminal (a) and engine ground.

Continuity should exist.  
If OK, check harness for short.

NG

## Check the following.

- Harness connectors (F38), (M81) (LHD A/T models)
  - Harness connectors (F7), (M82) (RHD A/T models)
  - Harness for open or short between ECM and throttle position sensor
  - Harness for open or short between A/T control unit and throttle position sensor
- If NG, repair harness or connectors.

EC

OK

**C**

## CHECK INPUT SIGNAL CIRCUIT.

- 1) Reconnect throttle position sensor harness connector.
  - 2) Turn ignition switch "ON".
  - 3) Perform "THROTTLE SENSOR CKT" or "THROTTLE POS SEN CKT" in "FUNCTION TEST" mode with CONSULT.
- OR
- 3) Read "THROTTLE SEN" or "THRTL POS SEN" signal in "WORK SUPPORT" mode with CONSULT.
- Throttle valve fully closed:  
0.35 - 0.65V
- Throttle valve fully open:  
Approx. 4.0V

NG

Repair harness or connectors.



- 1) Disconnect ECM harness connector.

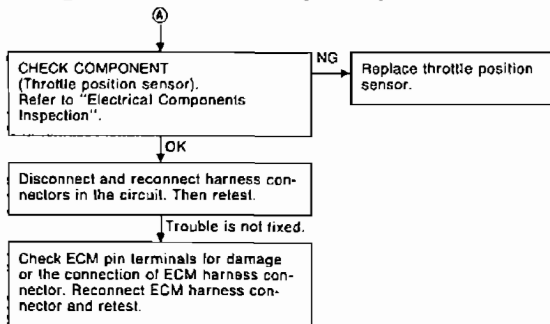
- 2) Check harness continuity between ECM terminal (a) and terminal (b).

Continuity should exist.  
If OK, check harness for short.

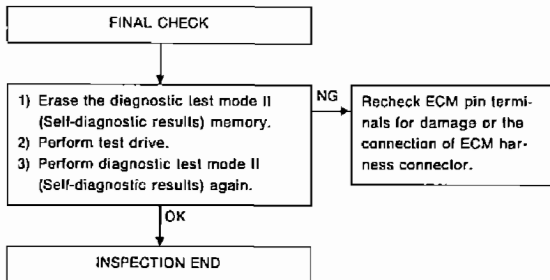
OK

(a)

## Diagnostic Procedure 29 (Cont'd)



**Perform FINAL CHECK by the following procedure after repair is completed.**

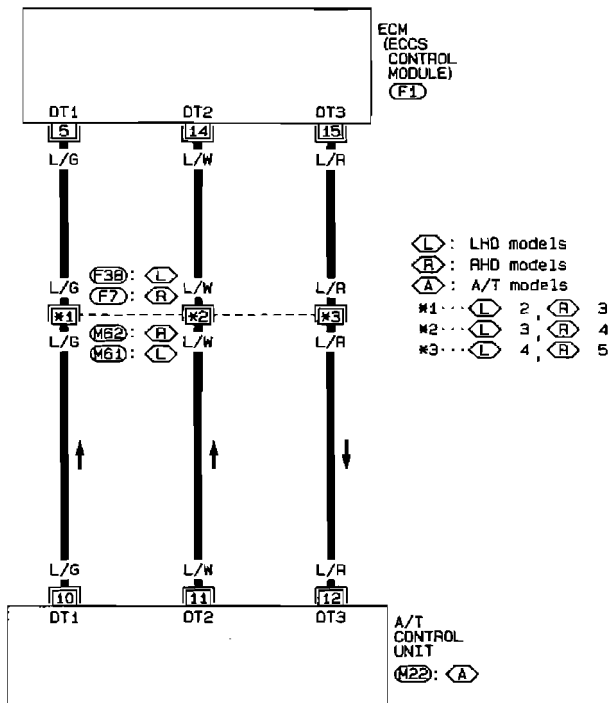




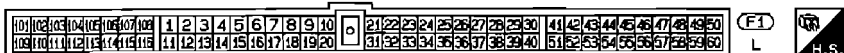
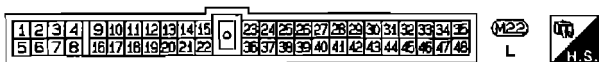
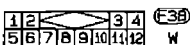
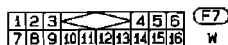
## Diagnostic Procedure 30

A/T CONTROL (Diagnostic trouble code No. 54)

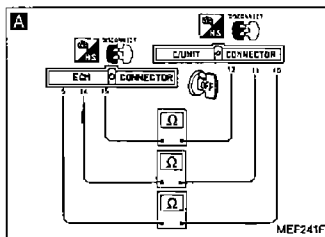
EC-AT/C-01



EC



## Diagnostic Procedure 30 (Cont'd)



INSPECTION START

A

## CHECK INPUT SIGNAL CIRCUIT.

- 1) Disconnect ECM harness connector and A/T control unit harness connector.
- 2) Check harness continuity between ECM terminal (5) and terminal (12), ECM terminal (14) and terminal (13), ECM terminal (15) and terminal (14). **Continuity should exist.**  
If OK, check harness for short.

NG

Check the following.

- Harness connectors (F3B), (ME1) (LHD models)
  - Harness connectors (F7), (ME2) (RHD models)
  - Harness for open or short between ECM and A/T control unit
- If NG, repair harness or connectors.

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

**Perform FINAL CHECK by the following procedure after repair is completed.**

FINAL CHECK

- 1) Erase the diagnostic test mode II (Self-diagnostic results) memory.
- 2) Perform test drive.
- 3) Perform diagnostic test mode II (Self-diagnostic results) again.

NG

Recheck ECM pin terminals for damage or the connection of ECM harness connector.

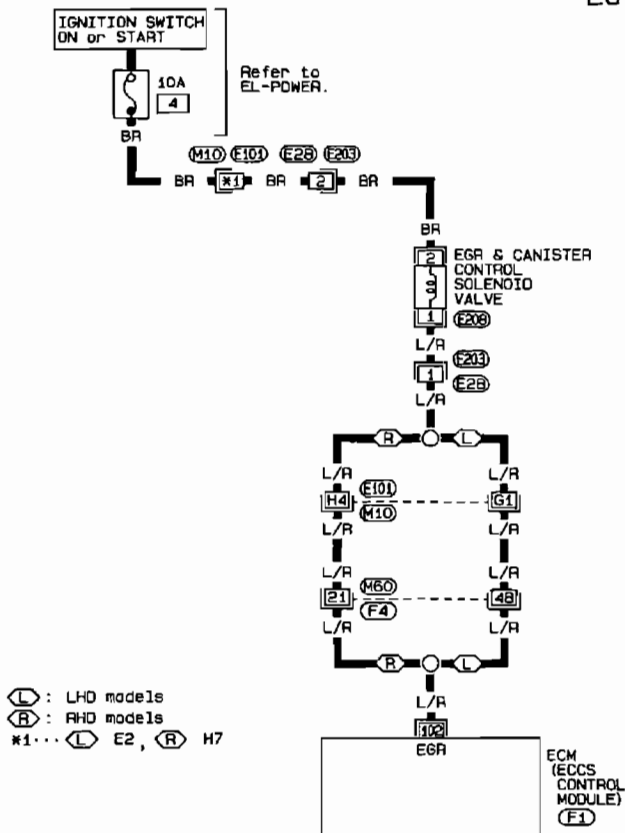
OK

INSPECTION END

## Diagnostic Procedure 33

EGR AND CANISTER CONTROL (Not self-diagnostic item)

EC-EGRC/V-01



EC

Refer to last page  
(Foldout page).

(M10) (E10)

(M60) (F4)

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 109 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  | 34  | 35  | 36  | 37  | 38  | 39  | 40  | 41  | 42  | 43  | 44  | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |

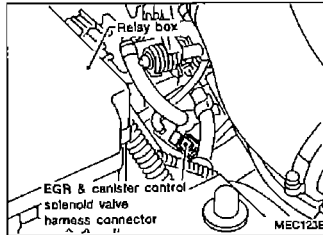
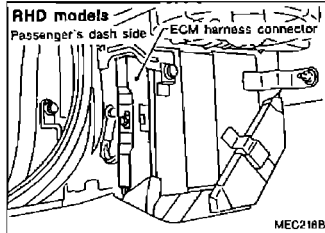
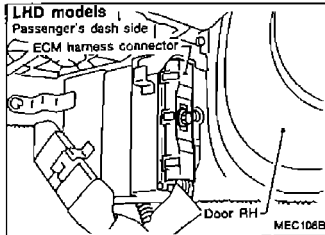
(F1)

L



## Diagnostic Procedure 33 (Cont'd)

## Harness layout



INSPECTION START

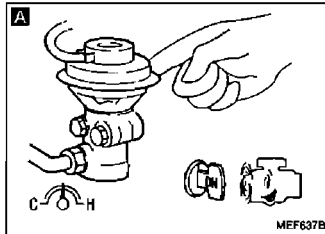
**A**

## CHECK OVERALL FUNCTION.

- Start engine and warm it up sufficiently.
- Perform diagnostic test mode II (Self-diagnostic results).  
Make sure that diagnostic trouble code No. 12 is not displayed.
- Make sure that EGR valve spring moves up and down (Use your finger) under the following conditions.  
**At Idle:**  
Spring does not move.  
**Racing engine from Idle to 3,000 rpm:**  
Spring moves up and down.

OK

INSPECTION END



NG

**B**

## CHECK VACUUM SOURCE TO EGR VALVE.

- Disconnect vacuum hoses to EGR valve and activated carbon canister.
- Make sure that vacuum exists under the following conditions.  
**At Idle:**  
Vacuum should not exist.  
**Racing engine from Idle to 3,000 rpm:**  
Vacuum should exist.

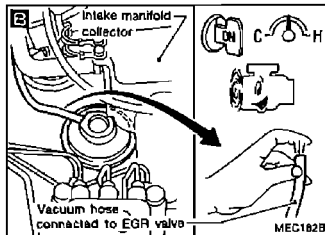
OK

CHECK COMPONENTS (EGR valve, EGRC-BPT valve and activated carbon canister).  
Refer to "Electrical Components Inspection".

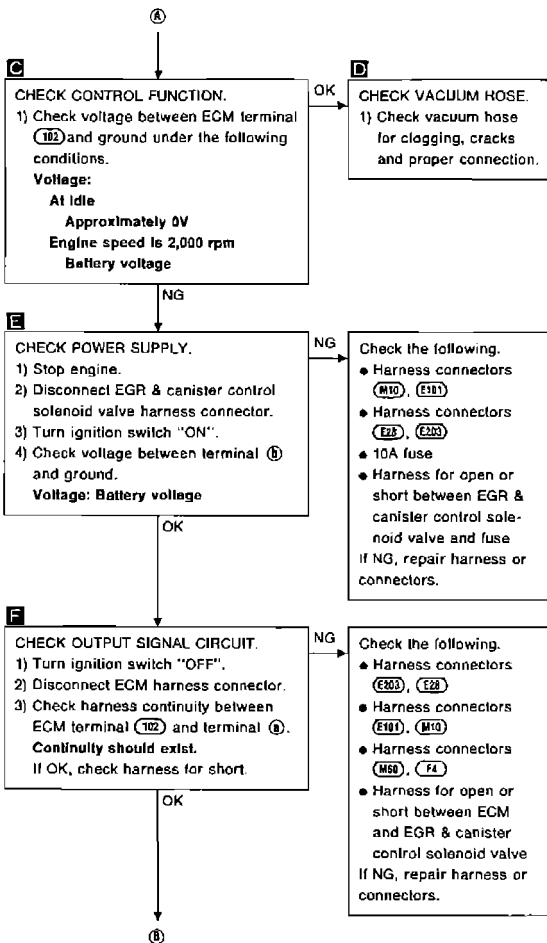
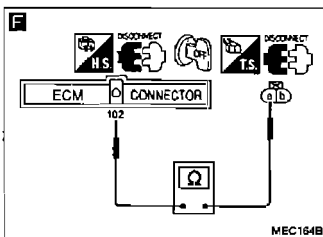
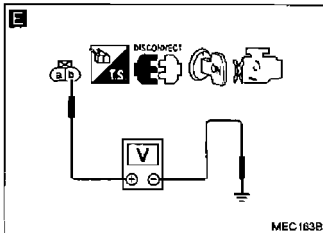
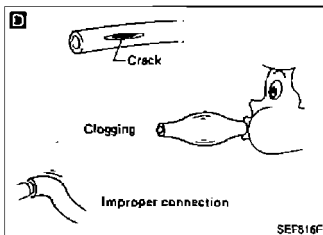
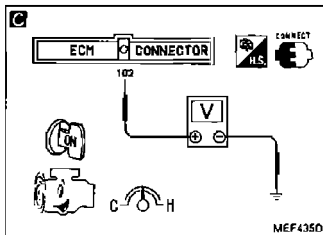
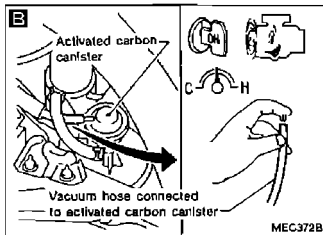
Replace malfunctioning component(s).

NG

Ⓐ

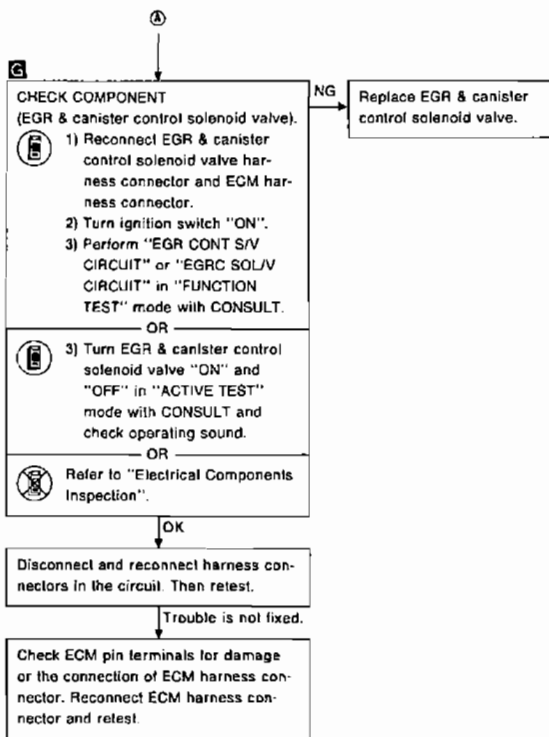
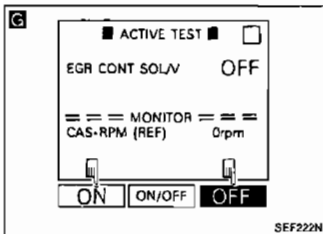
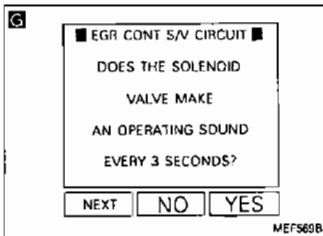


## Diagnostic Procedure 33 (Cont'd)



EC

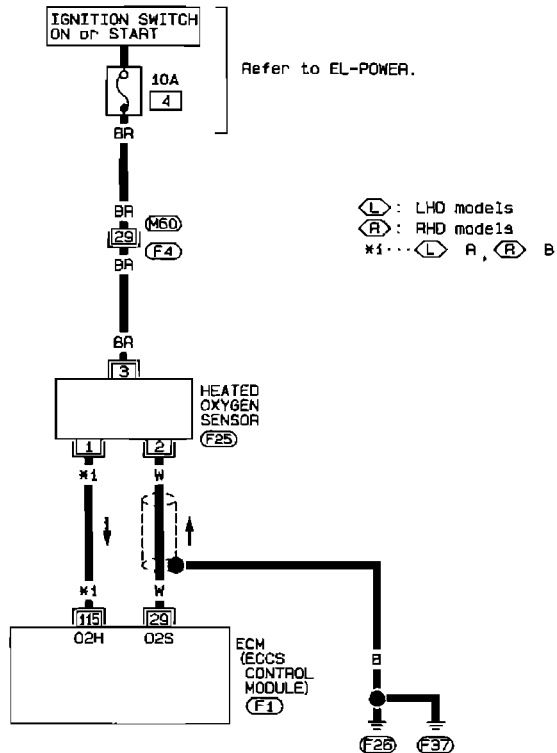
## Diagnostic Procedure 33 (Cont'd)



## Diagnostic Procedure 34

HEATED OXYGEN SENSOR (Not self-diagnostic item)

EC-HO2S-01



EC

123  
F25  
GY

Refer to last page  
(Foldout page).

M60, F4

|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

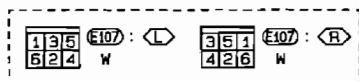
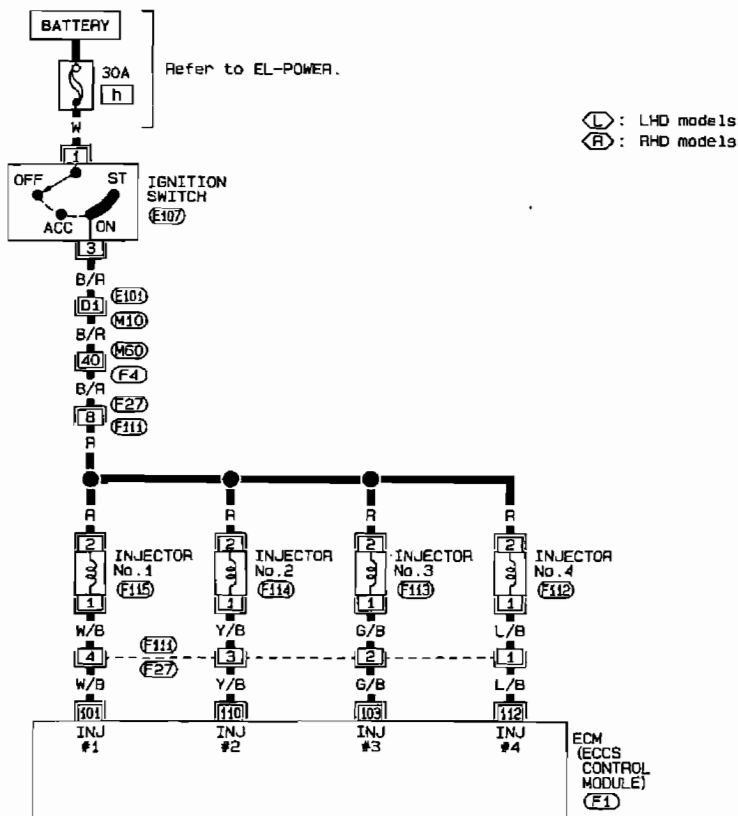
F1  
L



## Diagnostic Procedure 35

## INJECTOR CIRCUIT (Not self-diagnostic item)

## EC-INJECT-01



Refer to last page (Foldout page).

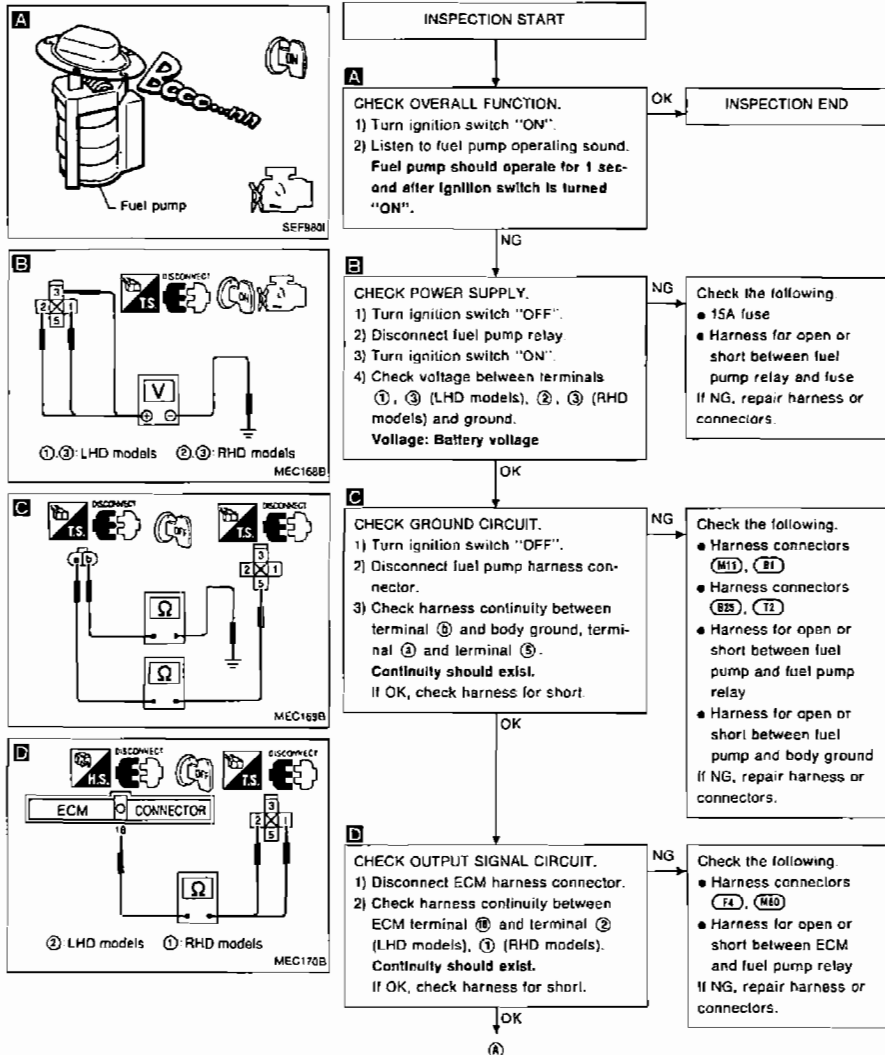
(M10) (E101)  
(M50) (F4)







## Diagnostic Procedure 36 (Cont'd)



## Diagnostic Procedure 36 (Cont'd)

**E**

■ FUEL PUMP CIRCUIT ■  
PINCH FUEL FEED HOSE WITH FINGERS. IS THERE ANY PRESSURE PULSATION ON THE FUEL FEED HOSE?  
OR  
DOES THE FUEL PUMP RELAY MAKE AN OPERATING SOUND EVERY 3 SECONDS?

NEXT NO YES

SEF194L

**E**

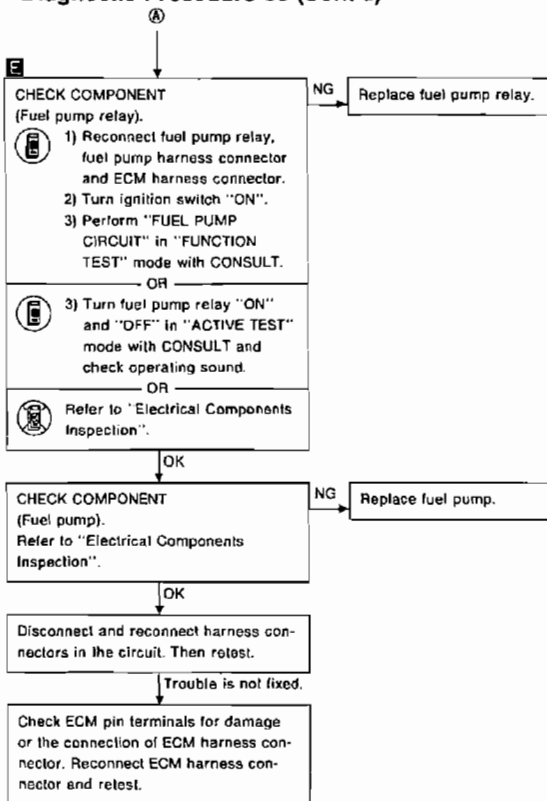
■ ACTIVE TEST ■

FUEL PUMP RELAY ON

== MONITOR ==  
CAS:RPM (REF) 0rpm

ON ON/OFF OFF

SEF498L

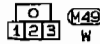
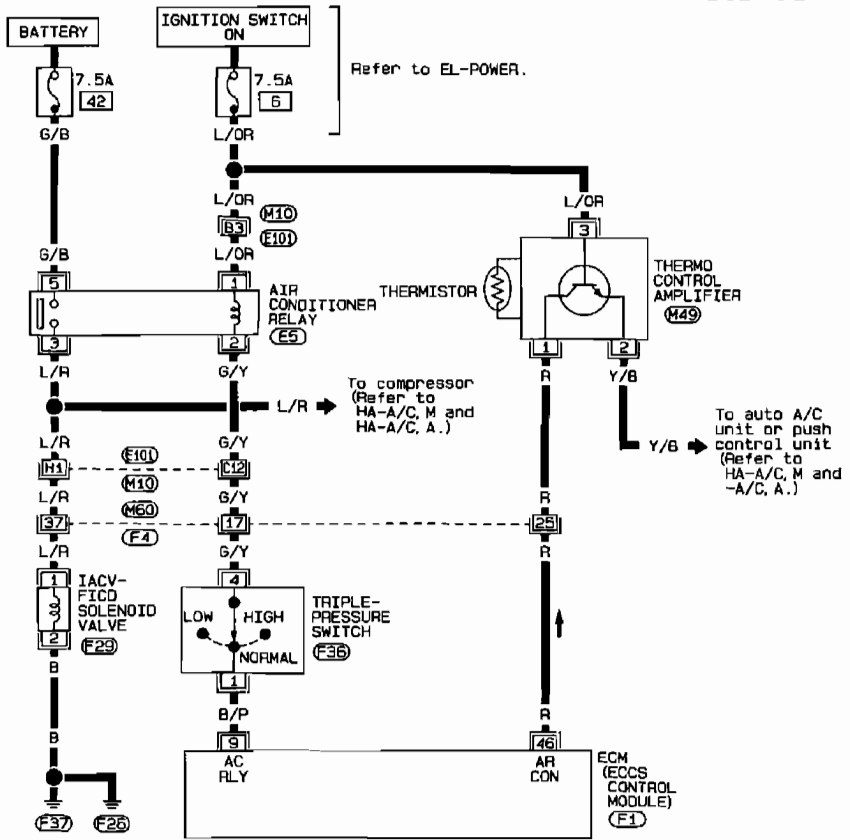


Diagnostic Procedure 40

IACV-FICD SOLENOID VALVE (Not self-diagnostic item)

EC-FICD-01

LHD MODELS



Refer to last page (foldout page).

M10, E101

M60, F4

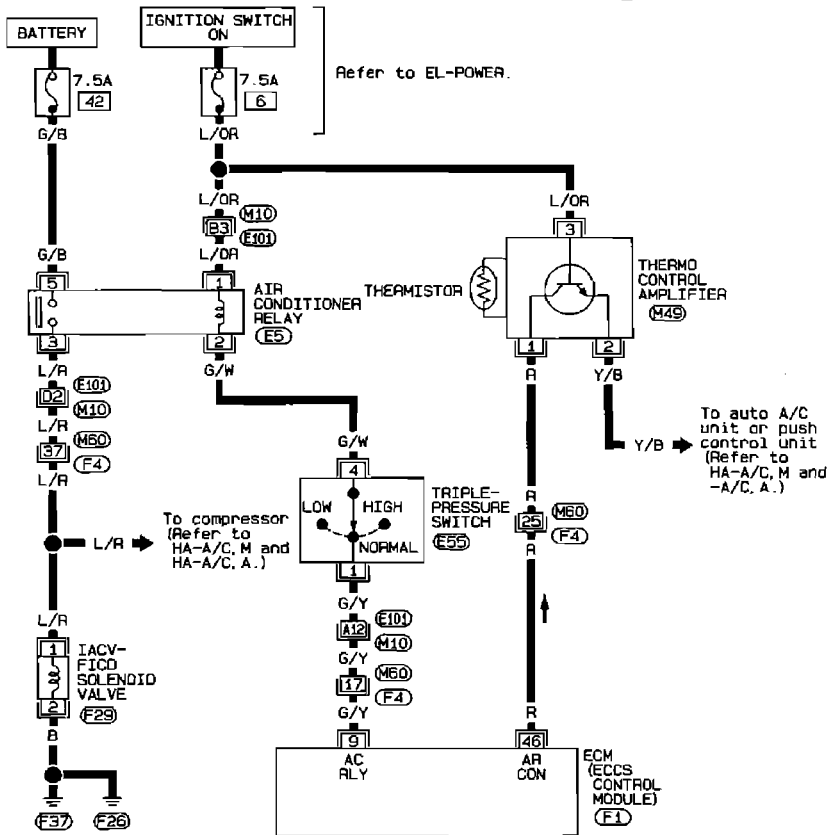
|     |     |     |     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 103 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 20 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |    |    |    |    |    |    |    |    |    |

F1 L

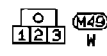


RHD MODELS

EC-FICD-02



EC



Refer to last page (Foldout page).

- (M10), (E10)
- (M60), (F4)

|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 0 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |   | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |

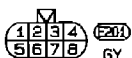
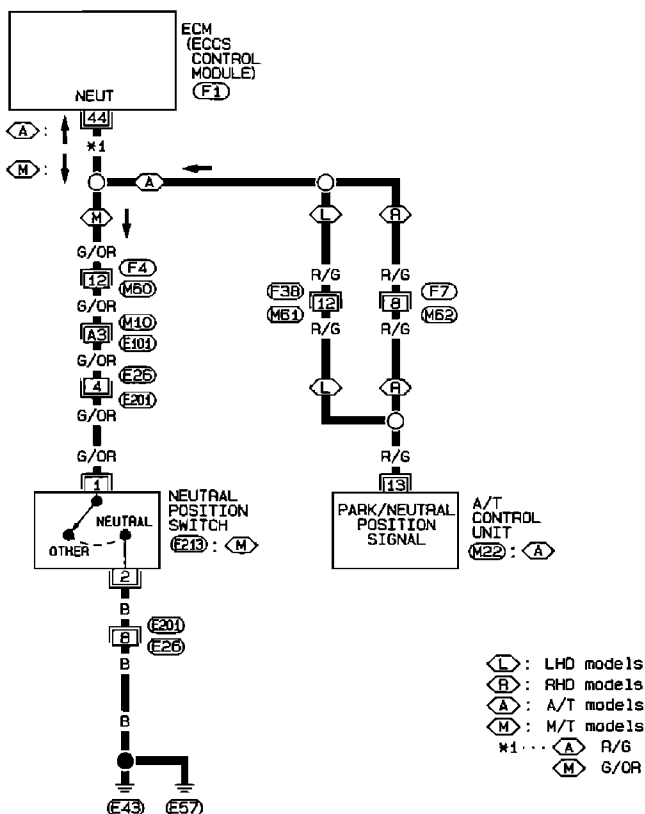
(F1)  
L



## Diagnostic Procedure 43

NEUTRAL POSITION SWITCH & A/T CONTROL UNIT (PARK/NEUTRAL POSITION SIGNAL)  
(Not self-diagnostic item)

EC-PNP/SW-01



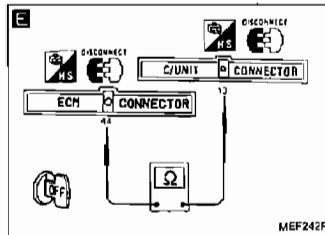
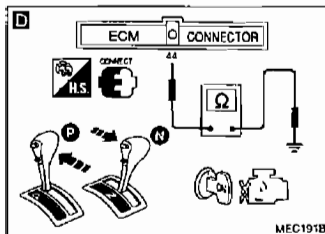
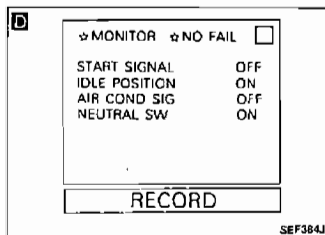
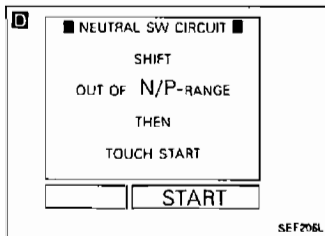
Refer to last page (Foldout page).



M10, E101  
M50, F4



## Diagnostic Procedure 43 (Cont'd)



## A/T CONTROL UNIT (PARK/NEUTRAL POSITION SIGNAL) CIRCUIT

INSPECTION START

**D**

CHECK OVERALL FUNCTION.

1) Turn ignition switch "ON".

2) Perform "NEUTRAL SW CIRCUIT" or "NEUTRAL POSI SW CKT" in "FUNCTION TEST" made with CONSULT.

OR



2) Check "NEUTRAL SW" or "NEUT POSI SW" signal in "DATA MONITOR" mode with CONSULT.

"N" or "P": ON

Except above: OFF

OR



2) Check voltage between ECM terminal ④ and ground under the following conditions.

Voltage:

"N" or "P":

Approximately 0V

Except above

Approximately 5V

OK

INSPECTION END

**E**

CHECK INPUT SIGNAL CIRCUIT.

1) Turn ignition switch "OFF".

2) Disconnect ECM harness connector.

3) Disconnect A/T control unit harness connector.

4) Check harness continuity between ECM terminal ④ and terminal ③. Continuity should exist. If OK, check harness for short.

NG

Check the following.

- Harness connectors (F34), (M61) (LHD models)
- Harness connectors (F7), (M62) (RHD models)
- Harness for open or short between ECM and A/T control unit if NG, repair harness or connectors.

OK

CHECK INHIBITOR SWITCH FUNCTION.

Make sure that inhibitor switch functions properly. (Refer to AT section).

NG

Check inhibitor switch and circuit (Refer to AT section.)

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

EC

# TROUBLE DIAGNOSES

## Electrical Components Inspection ECM HARNESS CONNECTOR TERMINAL LAYOUT

**For Europe**

|     |     |     |     |     |     |     |     |   |   |    |    |    |    |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|---|---|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | ×   | 105 | 106 | 107 | 108 | 1 | 2 | 3  | 4  | 5  | 6  | 7  | ○ | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
| 109 | 110 | 111 | 112 | 113 | 114 | ×   | 116 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |   | 23 | 24 | 25 | 26 | 27 | 28 | ×  | 30 | 40 | 41 | ×  | 43 | 44 | 45 | 46 | 47 | 48 |



SEF632R

**Except for Europe**

|     |     |     |     |     |   |     |     |    |    |   |    |    |    |   |    |    |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|---|-----|-----|----|----|---|----|----|----|---|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | ×   | 105 | × | 107 | 108 | 1  | 2  | × | 4  | 5  | ×  | 7 | ×  | 9  | 10 | ○ | 21 | 22 | 23 | ×  | 25 | 26 | 27 | 28 | 29 | 30 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 109 | 110 | ×   | 112 | 113 | × | 115 | 116 | 11 | 12 | × | 14 | 15 | 16 | × | 18 | 19 | 20 |   | 31 | 32 | 33 | 34 | ×  | 36 | ×  | 38 | ×  | ×  | 51 | 52 | 53 | 54 | ×  | 56 | ×  | 58 | 59 | 60 |



SEF633R



# TROUBLE DIAGNOSES

## Electrical Components Inspection (Cont'd)

### ECM INSPECTION TABLE (For Europe)

\*Data are reference values.

| TER-MINAL NO.     | ITEM                              | CONDITION  | *DATA  |
|-------------------|-----------------------------------|--|--|
| 1<br>3<br>5<br>25 | Ignition signal                   | Engine is running.<br>└ Idle speed   | 0 - 0.1V   |
|                   |                                   | Engine is running.<br>└ Engine speed is 2,000 rpm.   | Approximately 0.2V   |
| 2                 | Tachometer                        | Engine is running.<br>└ Idle speed   | Approximately 1V   |
| 4                 | ECCS relay (Self-shutoff)         | Engine is running.<br>Ignition switch "OFF"<br>└ For a few seconds after turning ignition switch "OFF" | Approximately 1V   |
|                   |                                   | Ignition switch "OFF"<br>└ A few seconds after turning ignition switch "OFF" and thereafter            | BATTERY VOLTAGE (11 - 14V)   |
| 9                 | Cooling fan relay (Low speed)     | Engine is running.<br>└ Cooling fan is not operating.  | BATTERY VOLTAGE (11 - 14V)   |
|                   |                                   | Engine is running.<br>└ Cooling fan is operating.  | Approximately 0.1V   |
| 10                | Cooling fan relay (High speed)    | Engine is running.<br>└ Cooling fan is not operating.<br>Cooling fan is operating at low speed.        | BATTERY VOLTAGE (11 - 14V)   |
|                   |                                   | Engine is running.<br>└ Cooling fan is operating at high speed.  | Approximately 0.1V   |
| 11                | Air conditioner relay             | Engine is running.<br>└ Both A/C switch and blower switch are "ON".                                    | Approximately 0.1V   |
|                   |                                   | Engine is running<br>└ A/C switch is "OFF".  | BATTERY VOLTAGE (11 - 14V)   |
| 16                | Mass air flow sensor              | Engine is running. (Warm-up condition)<br>└ Idle speed   | 0.8 - 1.5V   |
|                   |                                   | Engine is running. (Warm-up condition)<br>└ Engine speed is 3,000 rpm.                                 | 1.4 - 2.0V   |
| 18                | Engine coolant temperature sensor | Engine is running.   | 0 - 5.0V<br>Output voltage varies with engine coolant temperature. |

EC

## TROUBLE DIAGNOSES

### Electrical Components Inspection (Cont'd)

\*Data are reference values.

| TER-MINAL NO. | ITEM  | CONDITION   | *DATA                      |
|---------------|---|---|----------------------------|
| 19            | Heated oxygen sensor                        | <div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> <li>└ Engine speed is 2,000 rpm after warming up sufficiently.</li> </ul>             | 0 - 0.3V → 0.6 - 0.9V      |
| 20            | Throttle position sensor                    | <div style="border: 1px solid black; padding: 2px;">Ignition switch "ON"</div> <ul style="list-style-type: none"> <li>└ Accelerator pedal released</li> </ul>   | 0.35 - 0.85V               |
|               |   | <div style="border: 1px solid black; padding: 2px;">Ignition switch "ON"</div> <ul style="list-style-type: none"> <li>└ Accelerator pedal fully depressed</li> </ul>                                  | Approximately 3V           |
| 22<br>30      | Camshaft position sensor (Position signal)  | <div style="border: 1px solid black; padding: 2px;">Engine is running.</div>  | 2.0 - 3.0V                 |
| 27            | Knock sensor                                | <div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> <li>└ Idle speed</li> </ul>   | 2.0 - 3.0V                 |
| 31<br>40      | Camshaft position sensor (Reference signal) | <div style="border: 1px solid black; padding: 2px;">Engine is running.</div>  | Approximately 0.6V         |
| 33            | Load signal                                 | <div style="border: 1px solid black; padding: 2px;">Ignition switch "ON"</div> <ul style="list-style-type: none"> <li>└ Rear window defogger switch is "ON".</li> </ul>                               | BATTERY VOLTAGE (11 - 14V) |
| 34            | Start signal                                | <div style="border: 1px solid black; padding: 2px;">Ignition switch "ON"</div>  | Approximately 0V           |
|               |   | <div style="border: 1px solid black; padding: 2px;">Ignition switch "START"</div>   | BATTERY VOLTAGE (11 - 14V) |
| 35            | Neutral position/Inhibitor switch           | <div style="border: 1px solid black; padding: 2px;">Ignition switch "ON"</div> <ul style="list-style-type: none"> <li>└ Neutral position (M/T models)<br/>"N" or "P" position (A/T models)</li> </ul> | 0V                         |
|               |   | <div style="border: 1px solid black; padding: 2px;">Ignition switch "ON"</div> <ul style="list-style-type: none"> <li>└ Except the above gear position</li> </ul>                                     | Approximately 5V           |
| 36            | Ignition switch                             | <div style="border: 1px solid black; padding: 2px;">Ignition switch "OFF"</div>   | 0V                         |
|               |   | <div style="border: 1px solid black; padding: 2px;">Ignition switch "ON"</div>  | BATTERY VOLTAGE (11 - 14V) |
| 37            | Throttle position sensor power supply       | <div style="border: 1px solid black; padding: 2px;">Ignition switch "ON"</div>  | Approximately 5V           |
| 38<br>47      | Power supply for ECM                        | <div style="border: 1px solid black; padding: 2px;">Ignition switch "ON"</div>  | BATTERY VOLTAGE (11 - 14V) |
| 41            | Air conditioner switch                      | <div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> <li>└ Both air conditioner switch and blower switch are "ON".</li> </ul>              | Approximately 0V           |
|               |   | <div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> <li>└ Air conditioner switch is "OFF".</li> </ul>                                     | BATTERY VOLTAGE (11 - 14V) |

# TROUBLE DIAGNOSES

## Electrical Components Inspection (Cont'd)

\*Data are reference values.

| TER-MINAL NO. | ITEM  | CONDITION   | *DATA                      |
|---------------|---|---|----------------------------|
| 43            | Power steering oil pressure switch          | <div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> <li>└ Steering wheel is being turned.</li> </ul>  | Approximately 0V           |
|               |   | <div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> <li>└ Steering wheel is not being turned.</li> </ul>  | 4 - 5V                     |
| 46            | Power supply (Back-up)                      | <div style="border: 1px solid black; padding: 2px;">Ignition switch "OFF"</div>   | BATTERY VOLTAGE (11 - 14V) |
| 101           | Injector No. 1                              | <div style="border: 1px solid black; padding: 2px;">Engine is running.</div>  | BATTERY VOLTAGE (11 - 14V) |
| 103           | Injector No. 3                              |   |                            |
| 110           | Injector No. 2                              |   |                            |
| 112           | Injector No. 4                              |   |                            |
| 102           | Wastegate valve control solenoid valve      | <div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> <li>└ Idle speed</li> </ul>   | BATTERY VOLTAGE (11 - 14V) |
|               |   | <div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> <li>└ Revving engine up to 5,000 rpm.</li> </ul>  | Approximately 5V           |
| 105           | EGR valve & canister control solenoid valve | <div style="border: 1px solid black; padding: 2px;">Engine is running.</div> (Warm-up condition) <ul style="list-style-type: none"> <li>└ Idle speed</li> </ul>   | Approximately 0V           |
|               |   | <div style="border: 1px solid black; padding: 2px;">Engine is running.</div> (Warm-up condition) <ul style="list-style-type: none"> <li>└ Engine speed is 2,000 rpm</li> </ul>  | BATTERY VOLTAGE (11 - 14)  |
| 106           | Fuel pump relay                             | <div style="border: 1px solid black; padding: 2px;">Ignition switch "ON"</div> <ul style="list-style-type: none"> <li>└ For 5 seconds after turning Ignition switch "ON"</li> </ul>   | Approximately 0V           |
|               |   | <div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <div style="border: 1px solid black; padding: 2px;">Ignition switch "ON"</div> <ul style="list-style-type: none"> <li>└ 5 seconds after turning Ignition switch "ON" and thereafter</li> </ul> | BATTERY VOLTAGE (11 - 14V) |
| 111           | Heated oxygen sensor heater                 | <div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> <li>└ Engine speed is below 4,000 rpm.</li> </ul>   | Approximately 0V           |
|               |   | <div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> <li>└ Engine speed is above 4,000 rpm.</li> </ul>   | BATTERY VOLTAGE (11 - 14V) |
| 113           | IACV-AAC valve                              | <div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> <li>└ Idle speed</li> </ul>   | 9 - 14V                    |
|               |   | <div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> <li>└ Steering wheel is being turned.</li> <li>└ Air conditioner is operating.</li> <li>└ Rear defogger is "ON".</li> </ul>                                 | 5 - 9V                     |

EC

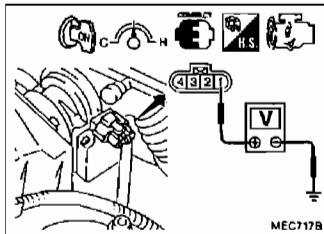
**TROUBLE DIAGNOSES****Electrical Components Inspection (Cont'd)**

\*Data are reference values.

| TER-MINAL NO. | ITEM               | CONDITION  | *DATA                      |
|---------------|--------------------|--|----------------------------|
| 114           | VTC solenoid valve | Engine is running. (Jacked-up condition)<br>└ Idle speed | BATTERY VOLTAGE (11 - 14V) |
|               |                    | Engine is running.<br>└ Engine speed is above 1,050 rpm  | Approximately 4V           |

## Electrical Components Inspection (Cont'd)

### MASS AIR FLOW SENSOR



1. Fold back mass air flow sensor harness connector rubber as shown in the figure if the harness connector is connected.
2. Turn ignition switch "ON".
3. Start engine and warm it up sufficiently.
4. Check voltage between terminal ① and ground.

| Conditions | Voltage V |
|------------|-----------|
| Idle speed | 0.8 - 1.5 |
| 3,000 rpm  | 1.4 - 2.0 |

5. If NG, remove mass air flow sensor from air duct. Check hot film for damage or dust.

EC

# MANUAL TRANSMISSION

## SECTION **MT**

### **MODIFICATION NOTICE:**

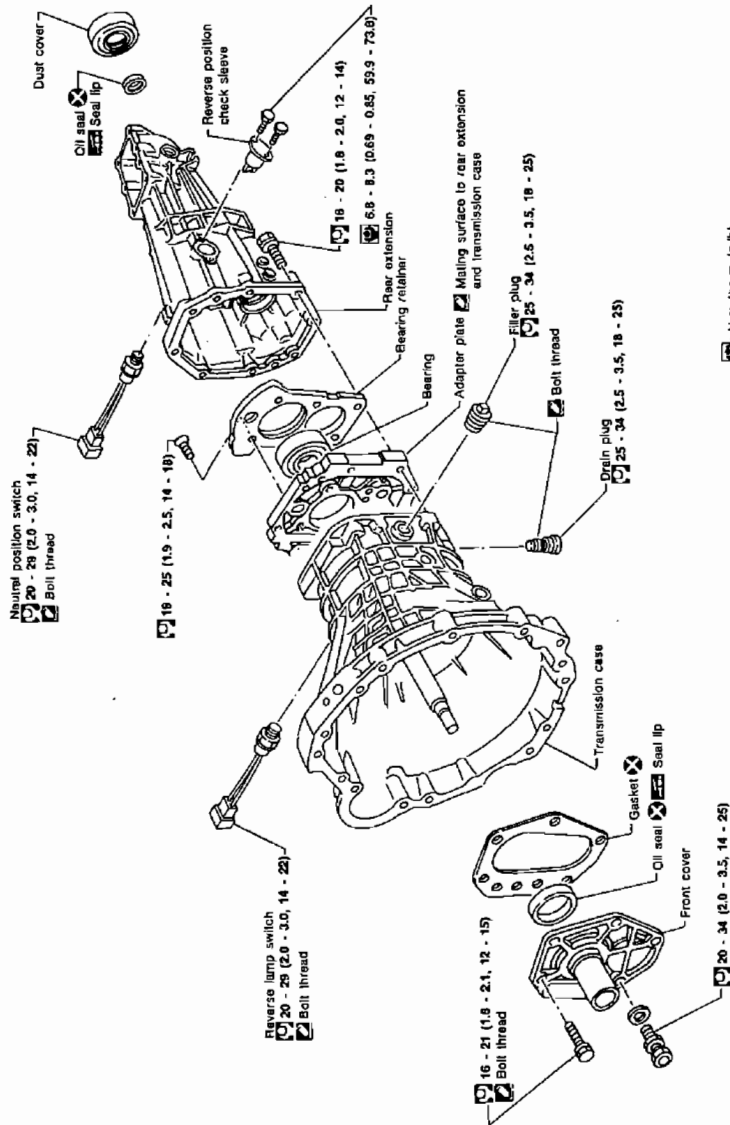
The service data and specifications (SDS), case and gear components have been changed.

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|                             |   |  |   |
|-----------------------------|---|--|---|
| <b>MAJOR OVERHAUL</b> ..... | 2 | <b>SERVICE DATA AND SPECIFICATIONS (SDS)</b> ..... | 4 |
| Case Components.....        | 2 | General Specifications.....                        | 4 |
| Gear Components.....        | 3 | Inspection and Adjustment.....                     | 5 |

MT

## Case Components



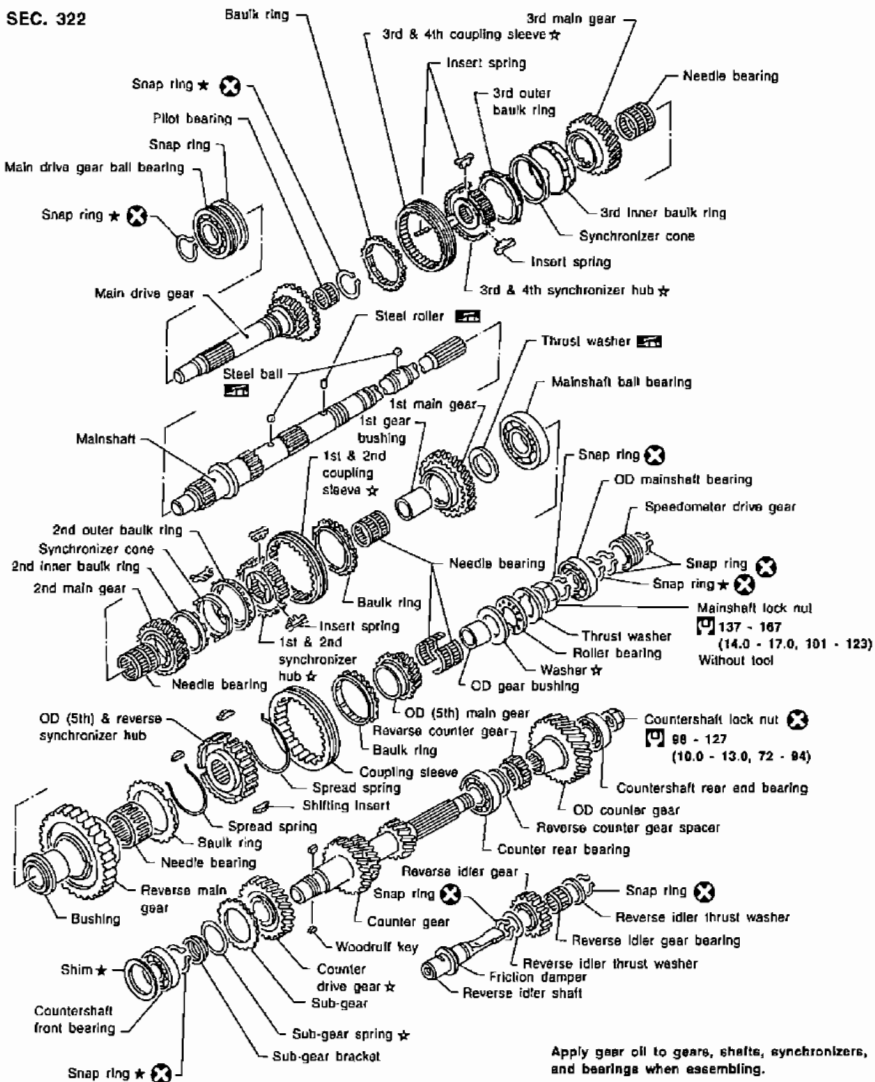
N·m (kg·m, in·lb)

N·m (kg·m, in·lb)

Apply recommended setting  
(Nissan genuine part: KP610-00250) or equivalent.

## Gear Components

SEC. 322



Apply gear oil to gears, shafts, synchronizers, and bearings when assembling.  
 ☆ : Select with proper thickness.  
 ☆ : Pay attention to its direction.  
 [N·m] : N·m (kg-m, ft-lb)

MT



# SERVICE DATA AND SPECIFICATIONS (SDS)

## General Specifications

|                       |                                     |                          |
|-----------------------|-------------------------------------|--------------------------|
| Transmission model    |                                     | F5W71C                   |
| Number of speeds      |                                     | 5                        |
| Shift pattern         |                                     |                          |
| Synchronesh type      |                                     | Warner                   |
| Gear ratio            | 1st                                 | 3.321                    |
|                       | 2nd                                 | 1.902                    |
|                       | 3rd                                 | 1.308                    |
|                       | 4th                                 | 1.000                    |
|                       | OD                                  | 0.838                    |
|                       | Reverse                             | 3.362                    |
| Number of teeth       |                                     |                          |
| Mainshaft             | Drive                               | 22                       |
|                       | 1st                                 | 33                       |
|                       | 2nd                                 | 27                       |
|                       | 3rd                                 | 26                       |
|                       | OD                                  | 22                       |
|                       | Reverse                             | 36                       |
| Countershaft          | Drive                               | 31                       |
|                       | 1st                                 | 14                       |
|                       | 2nd                                 | 20                       |
|                       | 3rd                                 | 28                       |
|                       | OD                                  | 37                       |
|                       | Reverse                             | 15                       |
| Reverse idler gear    |                                     | 21                       |
| Oil capacity (Imp pt) |                                     | 2.5 (4-3/8)              |
| Remarks               | Sub-gear                            | ○                        |
|                       | Reverse synchronizer                | ○                        |
|                       | Double baulk ring type synchronizer | 2nd and 3rd synchronizer |

## Inspection and Adjustment

### GEAR END PLAY

| Gear     | End play mm (in)              |
|----------|-------------------------------|
| 1st gear | 0.31 - 0.41 (0.0122 - 0.0161) |
| 2nd gear | 0.11 - 0.21 (0.0043 - 0.0083) |
| 3rd gear | 0.11 - 0.21 (0.0043 - 0.0083) |
| OD gear  | 0.24 - 0.41 (0.0094 - 0.0161) |

### CLEARANCE BETWEEN BAULK RING AND GEAR

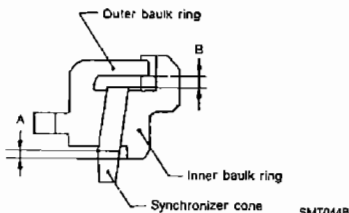
#### 1st, main drive, OD and reverse baulk ring

Unit: mm (in)

|            | Standard                         | Wear limit  |
|------------|----------------------------------|-------------|
| 1st        | 1.2 - 1.6<br>(0.047 - 0.063)     | 0.8 (0.031) |
| Main drive | 1.2 - 1.6<br>(0.047 - 0.063)     |             |
| OD         | 1.2 - 1.6<br>(0.047 - 0.063)     |             |
| Reverse    | 1.10 - 1.55<br>(0.0433 - 0.0610) | 0.7 (0.028) |

#### 2nd and 3rd baulk ring

Unit: mm (in)



| Dimension | Standard                     | Wear limit  |
|-----------|------------------------------|-------------|
| A         | 0.7 - 0.9<br>(0.028 - 0.035) | 0.2 (0.008) |
| B         | 0.6 - 1.1<br>(0.024 - 0.043) |             |

### AVAILABLE SNAP RINGS

#### Main drive gear bearing

| Allowable clearance | 0 - 0.13 mm (0 - 0.0051 in) |
|---------------------|-----------------------------|
| Thickness mm (in)   | Part number                 |
| 1.87 (0.0738)       | 32204-78001                 |
| 1.94 (0.0764)       | 32204-78002                 |
| 2.01 (0.0791)       | 32204-78003                 |

#### Mainshaft front

| Allowable clearance | 0 - 0.18 mm (0 - 0.0071 in) |
|---------------------|-----------------------------|
| Thickness mm (in)   | Part number                 |
| 2.4 (0.094)         | 32263-V5200                 |
| 2.5 (0.098)         | 32263-V5201                 |

#### OD mainshaft bearing

| Allowable clearance | 0 - 0.14 mm (0 - 0.0055 in) |
|---------------------|-----------------------------|
| Thickness mm (in)   | Part number                 |
| 1.1 (0.043)         | 32228-20100                 |
| 1.2 (0.047)         | 32228-20101                 |
| 1.3 (0.051)         | 32228-20102                 |
| 1.4 (0.055)         | 32228-20103                 |

#### Counter drive gear

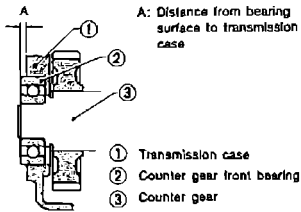
| Allowable clearance | 0 - 0.13 mm (0 - 0.0051 in) |
|---------------------|-----------------------------|
| Thickness mm (in)   | Part number                 |
| 1.4 (0.055)         | 32215-E9000                 |
| 1.5 (0.059)         | 32215-E9001                 |
| 1.6 (0.063)         | 32215-E9002                 |

MT

**AVAILABLE SHIMS**

**Counter front bearing**

Unit: mm (in)



TM371

| Allowable clearance           | 0 - 0.18 (0 - 0.0063) |             |
|-------------------------------|-----------------------|-------------|
| "A"                           | Thickness of shim     | Part number |
| 4.52 - 4.71 (0.1780 - 0.1854) | Not necessary         |             |
| 4.42 - 4.51 (0.1740 - 0.1776) | 0.1 (0.004)           | 32218-V5000 |
| 4.32 - 4.41 (0.1701 - 0.1736) | 0.2 (0.008)           | 32218-V5001 |
| 4.22 - 4.31 (0.1661 - 0.1697) | 0.3 (0.012)           | 32218-V5002 |
| 4.12 - 4.21 (0.1622 - 0.1657) | 0.4 (0.016)           | 32218-V5003 |
| 4.02 - 4.11 (0.1583 - 0.1618) | 0.5 (0.020)           | 32218-V5004 |
| 3.92 - 4.01 (0.1543 - 0.1579) | 0.6 (0.024)           | 32218-V5005 |

# AUTOMATIC TRANSMISSION

## SECTION **AT**

### MODIFICATION NOTICE:

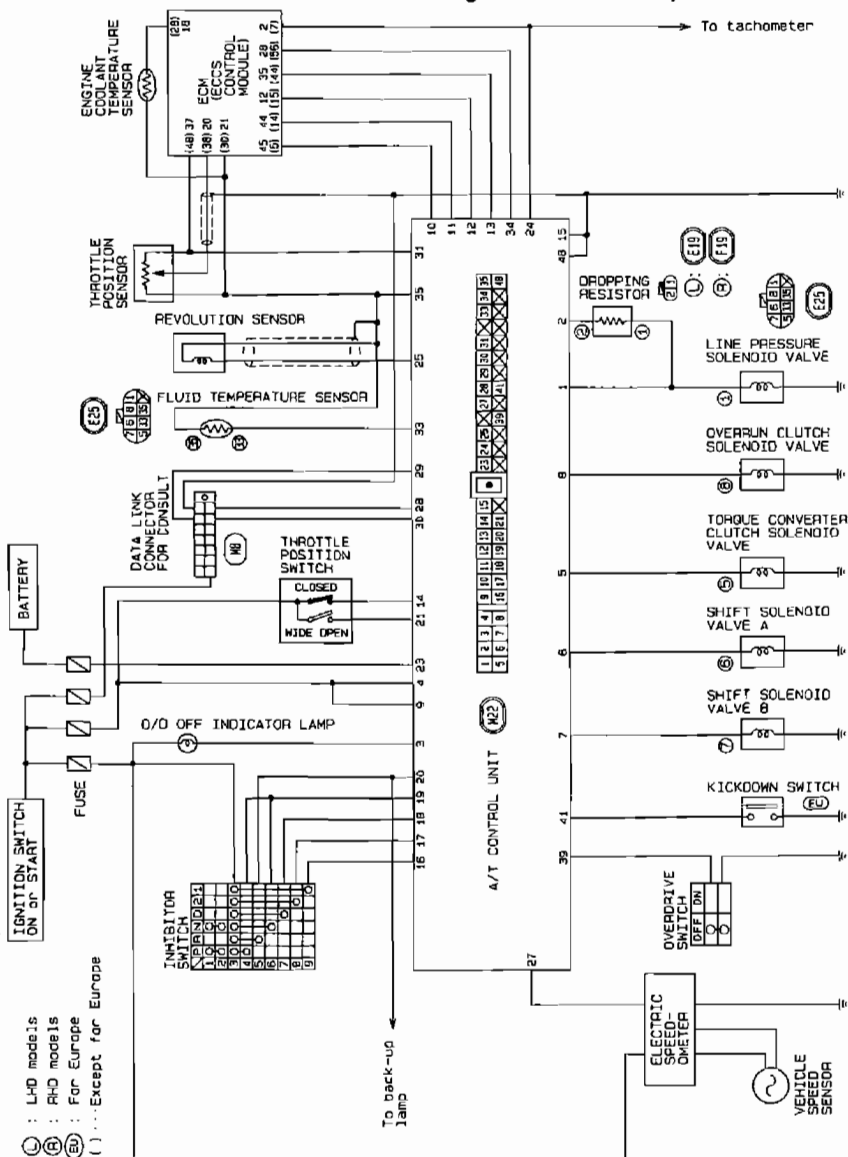
- The wiring diagrams and service data and specifications (SDS) have been changed.

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| Circuit Diagram for Quick Pinpoint Check..... | 2 | General Specifications.....                        | 15 |
| Wiring Diagram — AT — .....                   | 3 | Specifications and Adjustment.....                 | 15 |

AT

Circuit Diagram for Quick Pinpoint Check

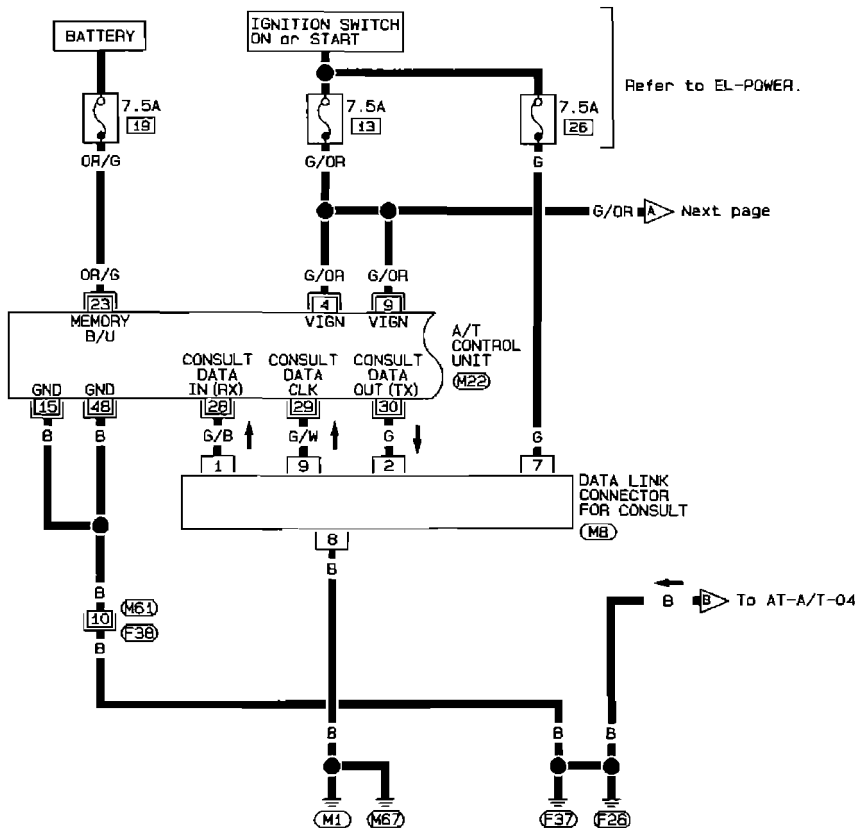


# TROUBLE DIAGNOSES

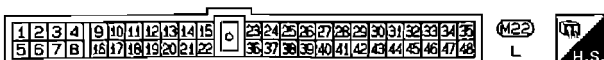
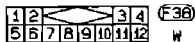
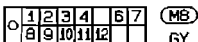
## Wiring Diagram — AT —

LHD MODELS

AT-A/T-01



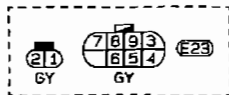
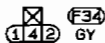
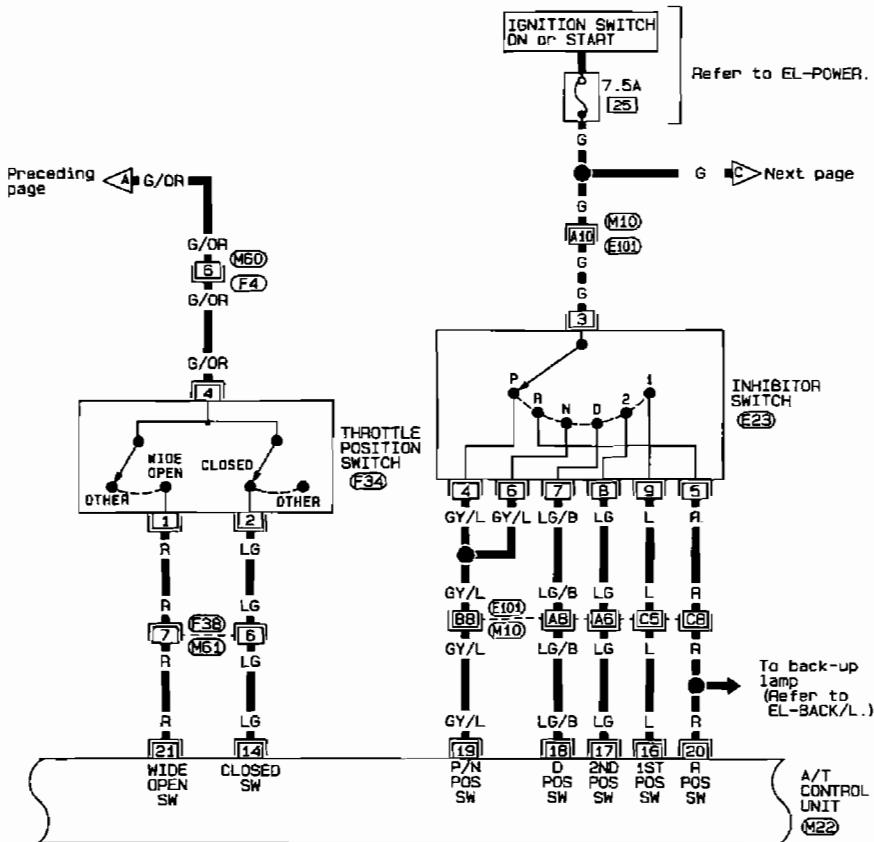
AT



# TROUBLE DIAGNOSES

## Wiring Diagram — AT — (Cont'd)

AT-A/T-02



Refer to last page (Foldout page).

M10 E101

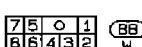
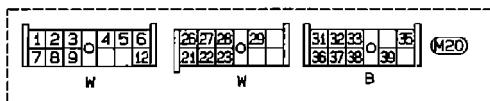
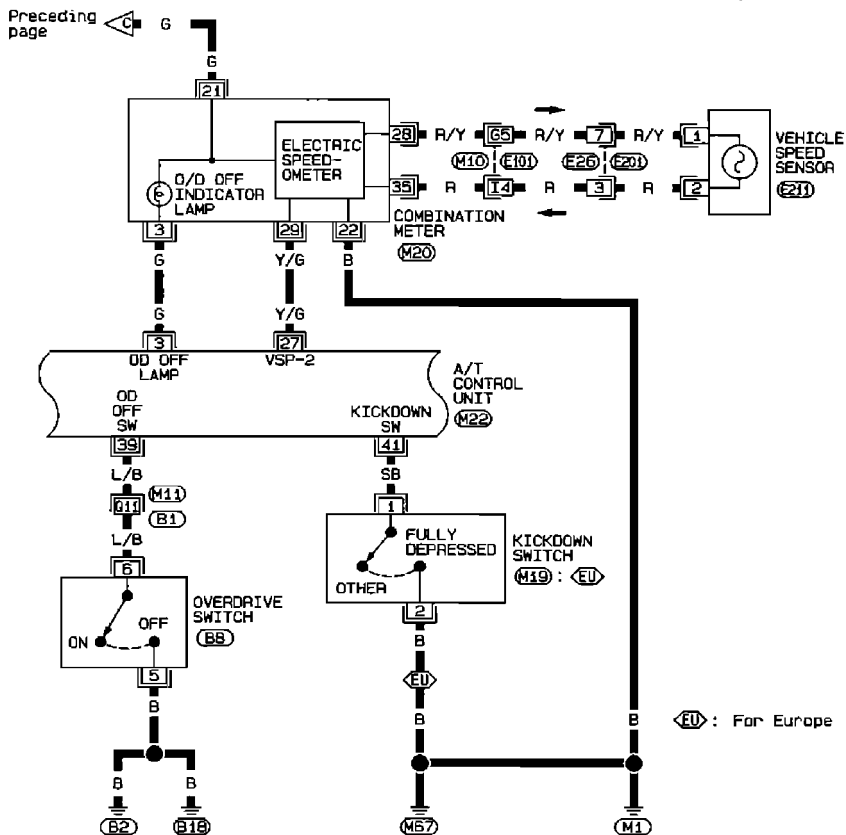
M60 F4



# TROUBLE DIAGNOSES

## Wiring Diagram — AT — (Cont'd)

AT-A/T-03



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M10, E10

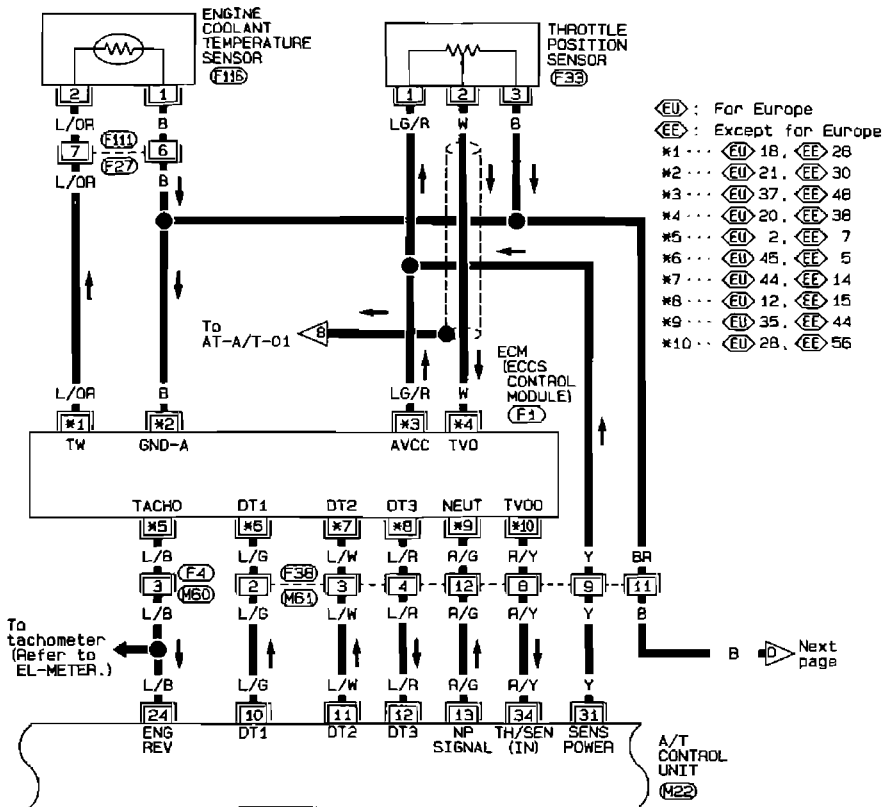
M11, B1



# TROUBLE DIAGNOSES

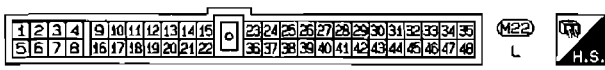
## Wiring Diagram — AT — (Cont'd)

AT-A/T-04



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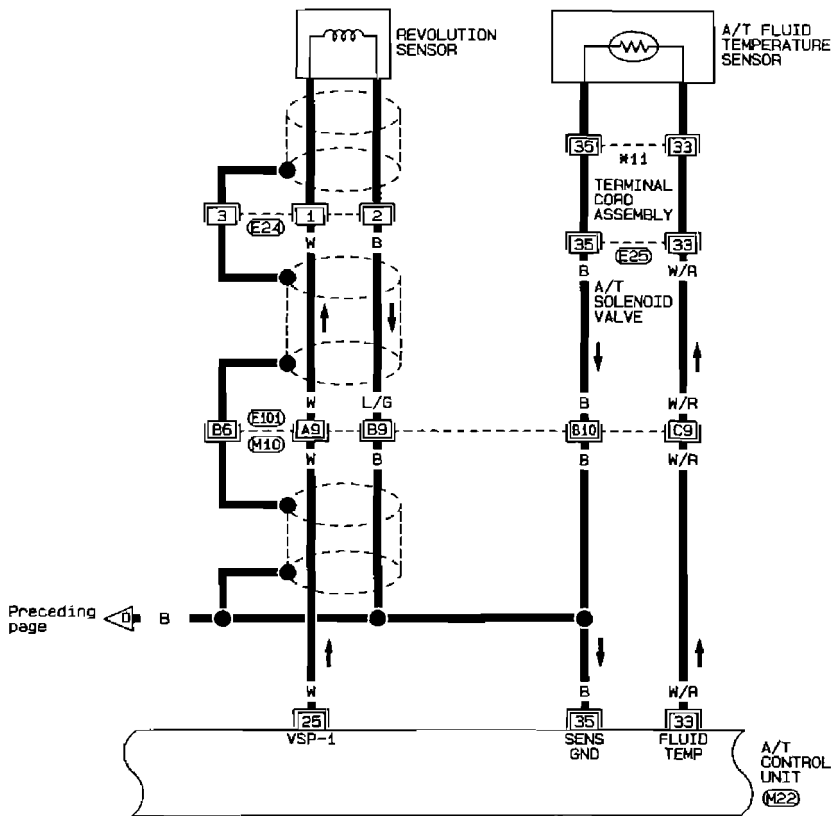
- (M50), (F4)
- (F1)



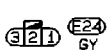
# TROUBLE DIAGNOSES

## Wiring Diagram — AT — (Cont'd)

AT-A/T-05



AT



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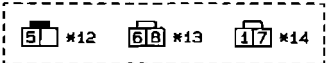
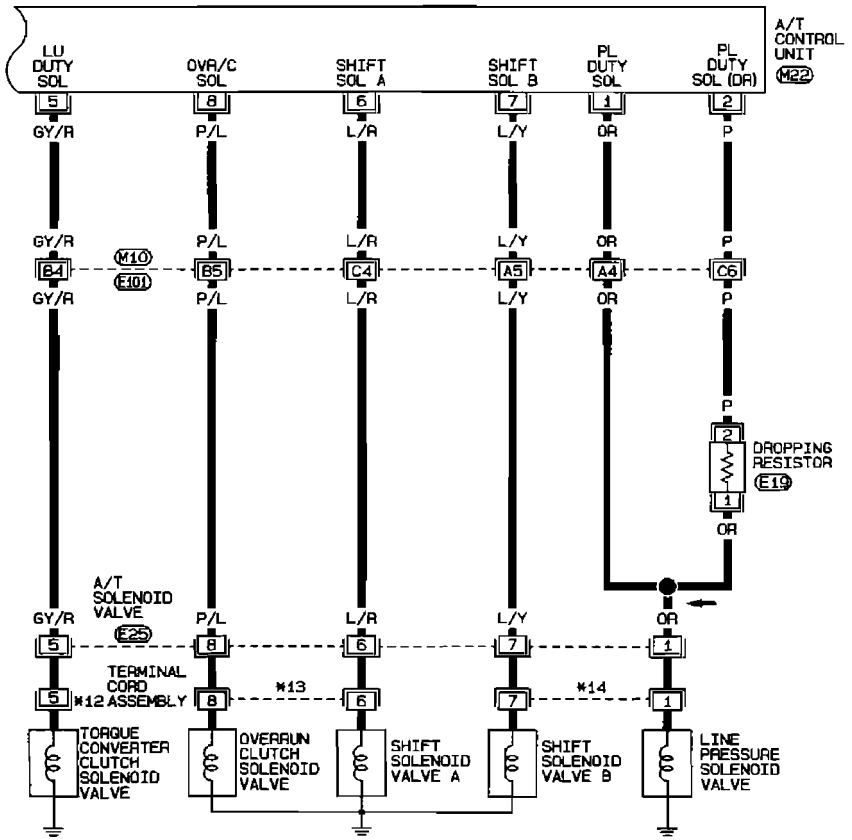
(M10), (E10)



# TROUBLE DIAGNOSES

## Wiring Diagram — AT — (Cont'd)

AT-A/T-06



Refer to last page (Foldout page).

(M10), (E101)

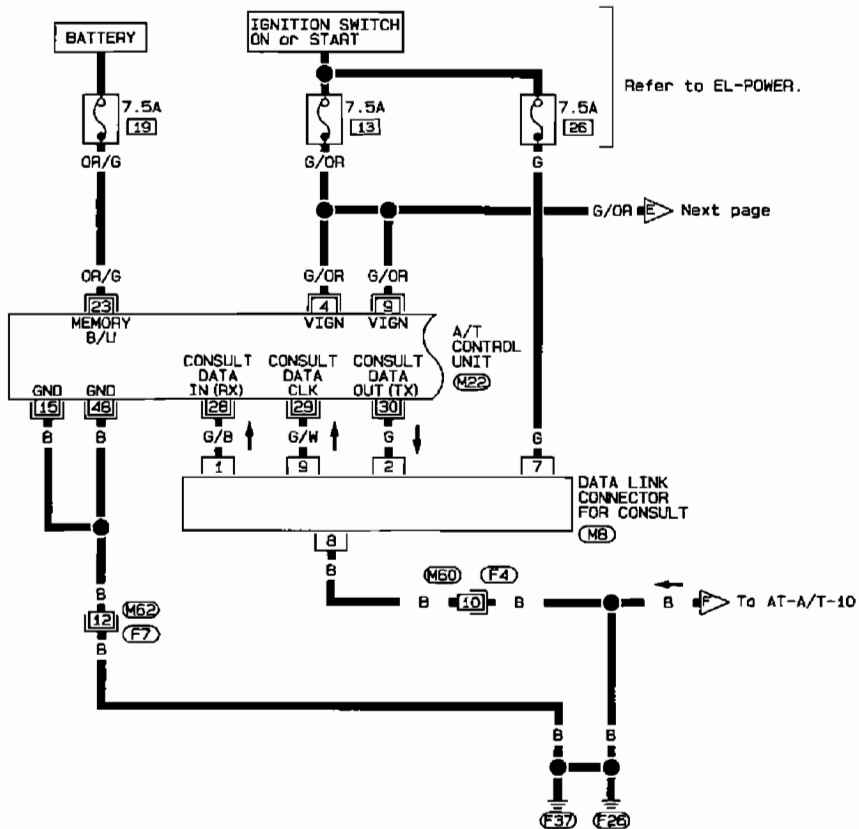


# TROUBLE DIAGNOSES

## Wiring Diagram — AT — (Cont'd)

RHD MODELS

AT-A/T-07



AT

|   |   |   |    |    |    |   |
|---|---|---|----|----|----|---|
| ○ | 1 | 2 | 3  | 4  | 6  | 7 |
| ○ | 8 | 9 | 10 | 11 | 12 |   |

(MB)  
GY

|    |    |    |    |    |    |
|----|----|----|----|----|----|
| 1  | 2  | 3  | 4  | 5  | 6  |
| 7  | 8  | 9  | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 |    |    |

(F7)  
W

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(foldout page).

(M60), (F4)

|   |   |   |   |    |    |    |    |    |    |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |
|---|---|---|---|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 9  | 10 | 11 | 12 | 13 | 14 | 15 | ○ | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 |
| 5 | 6 | 7 | 8 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |   | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |

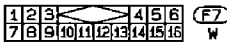
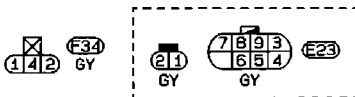
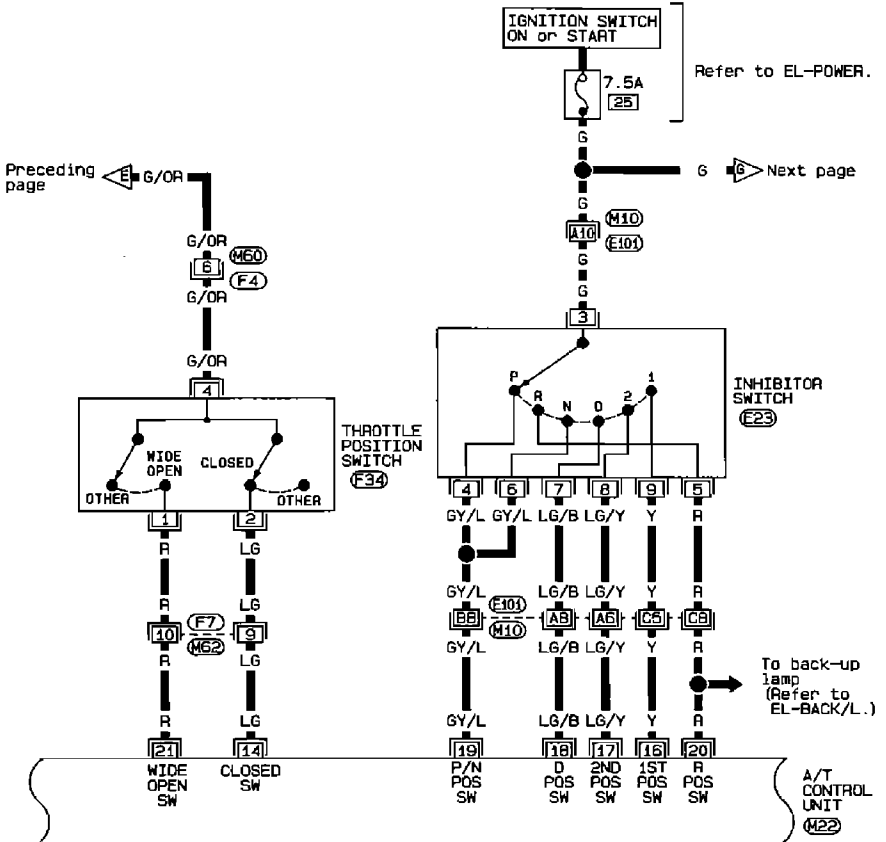
(M22)  
L



# TROUBLE DIAGNOSES

## Wiring Diagram — AT — (Cont'd)

AT-A/T-08



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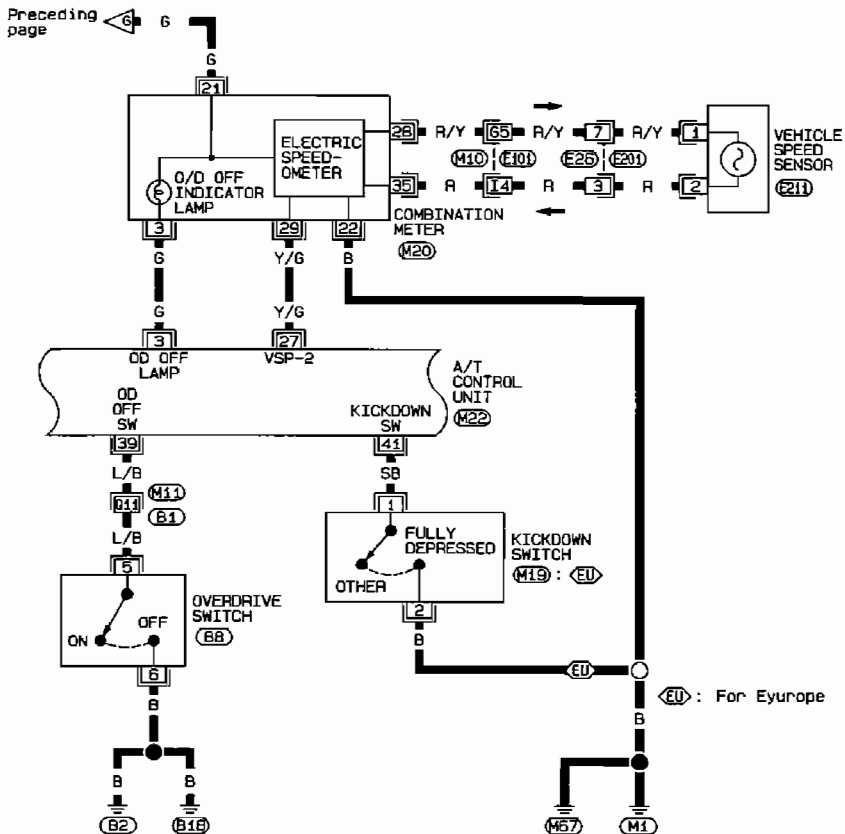
M10, E101  
M60, F4



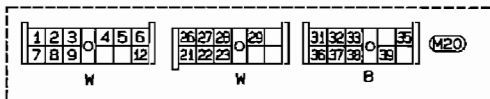
# TROUBLE DIAGNOSES

## Wiring Diagram — AT — (Cont'd)

AT-A/T-09



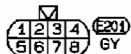
AT



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(M10), (E10)

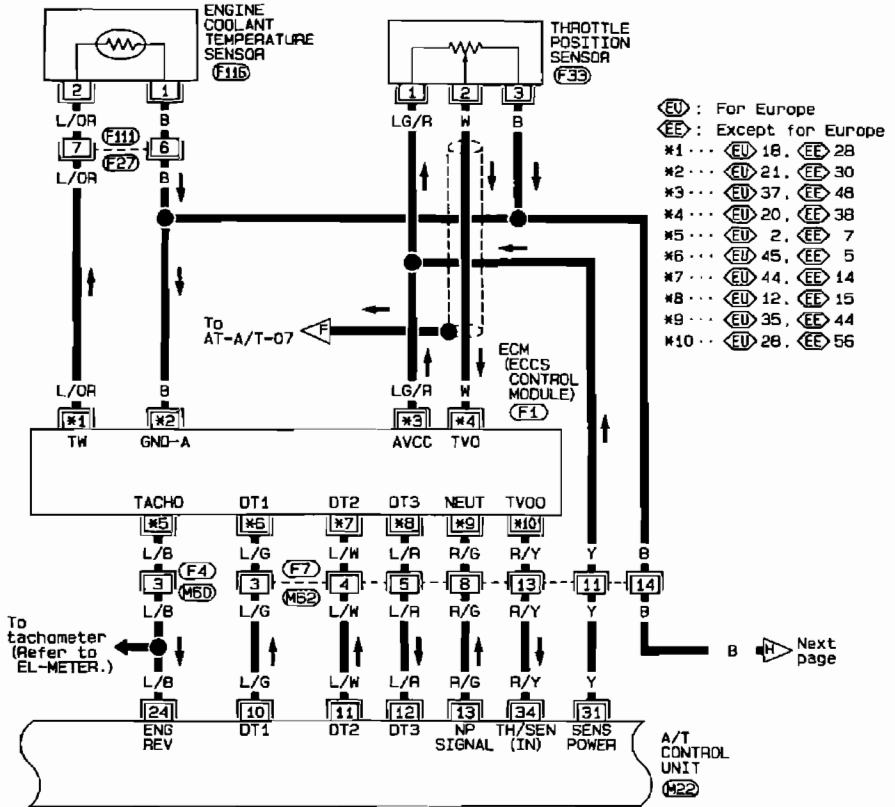
(M11), (B1)



# TROUBLE DIAGNOSES

## Wiring Diagram — AT — (Cont'd)

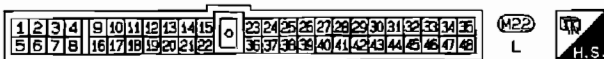
AT-A/T-10



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(M6D), (F4)

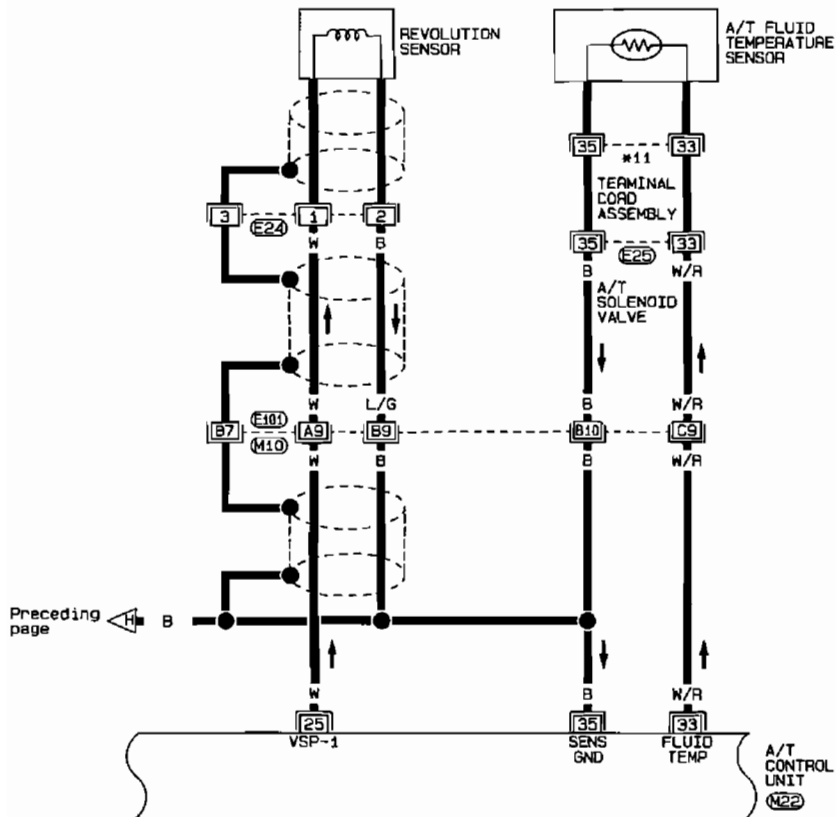
(F1)



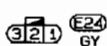
# TROUBLE DIAGNOSES

## Wiring Diagram — AT — (Cont'd)

AT-A/T-11



AT



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M10, E10



M22



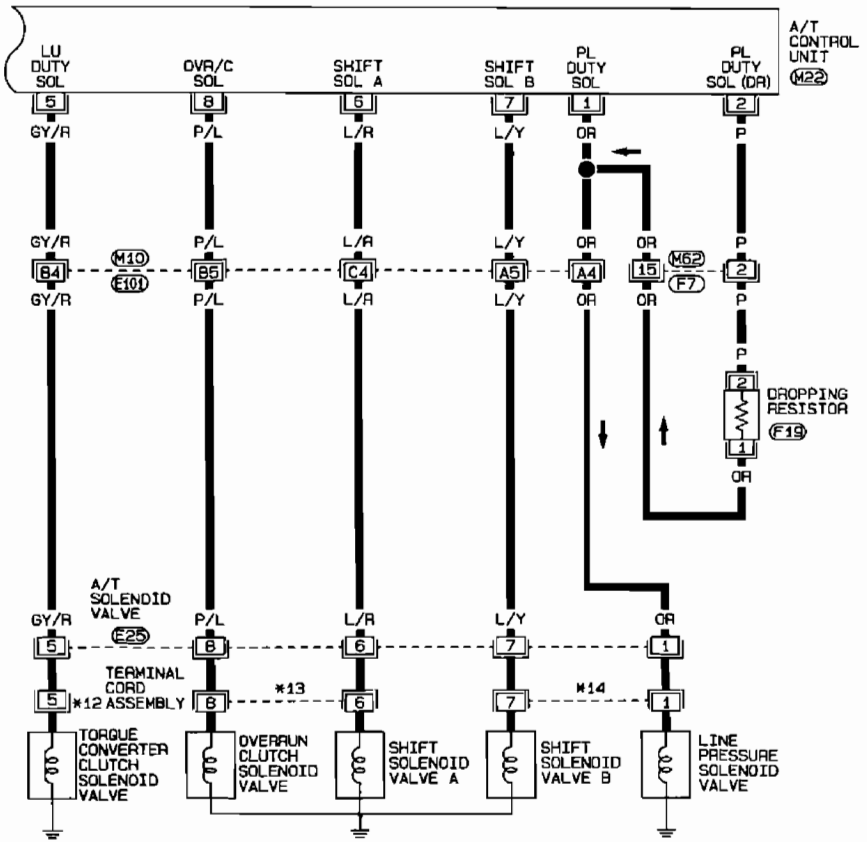
L



# TROUBLE DIAGNOSES

## Wiring Diagram — AT — (Cont'd)

AT-A/T-12



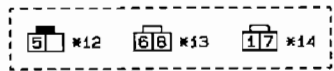
F25 BR



F7 W

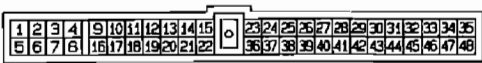


F19 GY



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M10, F101



M22 L



## General Specifications

|                                |                                  |
|--------------------------------|----------------------------------|
| Engine                         | SR20DET                          |
| Automatic transmission model   | RE4R01A                          |
| Transmission model code number | 42X65                            |
| Stall torque ratio             | 2.3 : 1                          |
| Transmission gear ratio        |                                  |
| 1st                            | 2.785                            |
| 2nd                            | 1.545                            |
| Top                            | 1.000                            |
| OD                             | 0.694                            |
| Reverse                        | 2.272                            |
| Recommended oil                | Genuine Nissan ATF or equivalent |
| Oil capacity (l (Imp qt))      | 7.9 (7)                          |

## Specifications and Adjustment

### VEHICLE SPEED WHEN SHIFTING GEARS

| Throttle position | Vehicle speed km/h (MPH)        |                                 |                                 |                                 |                                 |                                 |                                 |
|-------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
|                   | D <sub>1</sub> → D <sub>2</sub> | D <sub>2</sub> → D <sub>3</sub> | D <sub>3</sub> → D <sub>4</sub> | D <sub>4</sub> → D <sub>5</sub> | D <sub>5</sub> → D <sub>6</sub> | D <sub>6</sub> → D <sub>1</sub> | 1 <sub>2</sub> → 1 <sub>1</sub> |
| Full throttle     | 84 - 88<br>(40 - 42)            | 114 - 122<br>(71 - 76)          | 182 - 192<br>(113 - 119)        | 175 - 186<br>(109 - 116)        | 103 - 111<br>(64 - 69)          | 40 - 44<br>(25 - 27)            | 48 - 50<br>(28 - 31)            |
| Half throttle     | 51 - 55<br>(32 - 34)            | 93 - 99<br>(58 - 62)            | 146 - 154<br>(91 - 96)          | 87 - 95<br>(54 - 59)            | 39 - 45<br>(24 - 28)            | 10 - 14<br>(6 - 9)              | 46 - 50<br>(29 - 31)            |

### VEHICLE SPEED WHEN PERFORMING AND RELEASING LOCK-UP

| Throttle position | OD switch [Shift position] | Vehicle speed km/h (MPH) |                          |
|-------------------|----------------------------|--------------------------|--------------------------|
|                   |                            | Lock-up "ON"             | Lock-up "OFF"            |
| Full throttle     | ON [D <sub>4</sub> ]       | 183 - 191<br>(114 - 119) | 177 - 185<br>(110 - 115) |
|                   | OFF [D <sub>3</sub> ]      | 91 - 99<br>(57 - 62)     | 86 - 94<br>(53 - 58)     |
| Half throttle     | ON [D <sub>4</sub> ]       | 146 - 154<br>(91 - 96)   | 122 - 130<br>(76 - 81)   |
|                   | OFF [D <sub>3</sub> ]      | 92 - 100<br>(57 - 62)    | 86 - 94<br>(53 - 58)     |

### STALL REVOLUTION

|                      |
|----------------------|
| Stall revolution rpm |
| 2,725 - 2,975        |

### LINE PRESSURE

| Engine speed rpm | Line pressure kPa (bar, kg/cm <sup>2</sup> , psi)                |  |
|------------------|--|--|
|                  | D, 2 and 1 positions   | R position   |
| Idle             | 432 - 471<br>(4.320 - 4.710, 4.41 - 4.80, 62.6 - 68.3)           | 676.7 - 715.0<br>(6.767 - 7.150, 6.90 - 7.29, 98.1 - 103.7)      |
| Stall            | 1,039 - 1,118<br>(10.390 - 11.180, 10.60 - 11.40, 150.7 - 162.1) | 1,480 - 1,558<br>(14.800 - 15.580, 15.10 - 15.89, 214.6 - 225.9) |

AT

# SERVICE DATA AND SPECIFICATIONS (SDS)

## Specifications and Adjustment (Cont'd)

### RETURN SPRINGS

Unit: mm (in)

| Parts                              |                             | 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                          | 44.0 (1.732)   | 14.0 (0.551)  |
|                                    |                             | ③ Pressure modifier valve spring       | 31742-41X19                          | 31.95 (1.2579) | 6.8 (0.268)   |
|                                    |                             | ④ Shuttle shift valve D spring         | 31762-41X00                          | 26.5 (1.043)   | 6.0 (0.236)   |
|                                    |                             | 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 | 31742-41X20                          | 32.5 (1.280)   | 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)   | 9.1 (0.358)   |
|                                    |                             | ⑬ Lock-up 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)  |
|                                    | ② 1st reducing valve spring |  | 31756-41X05                          | 25.4 (1.000)   | 6.75 (0.2657) |
|                                    | 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                     | 16 pcs                      | 31505-41X02                            | 19.69 (0.7752)                       | 11.6 (0.457)   |               |
| High clutch                        | 16 pcs                      | 31505-21X03                            | 22.1 (0.870)                         | 11.6 (0.457)   |               |
| Forward clutch<br>(Overrun clutch) | 20 pcs                      | 31521-41X00<br>(Assembly)              | 35.77 (1.4083)                       | 9.7 (0.382)    |               |
| Low & reverse brake                | 18 pcs                      | 31505-41X05                            | 22.3 (0.878)                         | 11.6 (0.457)   |               |
| Band servo                         | Spring A                    | 31605-41X05                            | 45.6 (1.795)                         | 34.3 (1.350)   |               |
|                                    | Spring B                    | 31605-41X00                            | 53.8 (2.118)                         | 40.3 (1.587)   |               |
|                                    | Spring C                    | 31605-41X01                            | 29.7 (1.169)                         | 27.6 (1.087)   |               |
| Accumulator                        | Accumulator A               | 31605-41X02                            | 43.0 (1.693)                         | —              |               |
|                                    | Accumulator B               | 31605-41X10                            | 66.0 (2.598)                         | —              |               |
|                                    | Accumulator C               | 31605-41X09                            | 45.0 (1.772)                         | —              |               |
|                                    | Accumulator D               | 31605-41X08                            | 58.4 (2.299)                         | —              |               |

# SERVICE DATA AND SPECIFICATIONS (SDS)

## Specifications and Adjustment (Cont'd)

### ACCUMULATOR O-RING

| 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

| Reverse clutch                      |                           |             |  |
|-------------------------------------|---------------------------|-------------|--|
| Number of drive plates              | 2                         |             |  |
| Number of driven plates             | 2                         |             |  |
| Thickness of drive plate<br>mm (in) | Standard                  |             |  |
|                                     | 2.0 (0.079)               |             |  |
|                                     | Wear limit                |             |  |
| 1.8 (0.071)                         |                           |             |  |
| Clearance<br>mm (in)                | Standard                  |             |  |
|                                     | 0.5 - 0.8 (0.020 - 0.031) |             |  |
|                                     | Allowable limit           |             |  |
| 1.2 (0.047)                         |                           |             |  |
| Thickness of retaining plate        | Thickness<br>mm (in)      | Part number |  |
|                                     | 4.8 (0.189)               | 31537-42X02 |  |
|                                     | 5.0 (0.197)               | 31537-42X03 |  |
|                                     | 5.2 (0.205)               | 31537-42X04 |  |
|                                     | 5.4 (0.213)               | 31537-42X05 |  |
|                                     | 5.6 (0.220)               | 31537-42X06 |  |
| High clutch                         |                           |             |  |
| Number of drive plates              | 5                         |             |  |
| Number of driven plates             | 5                         |             |  |
| Thickness of drive plate<br>mm (in) | Standard                  |             |  |
|                                     | 1.6 (0.063)               |             |  |
|                                     | Wear limit                |             |  |
| 1.4 (0.055)                         |                           |             |  |
| Clearance<br>mm (in)                | Standard                  |             |  |
|                                     | 1.8 - 2.2 (0.071 - 0.087) |             |  |
|                                     | Allowable limit           |             |  |
| 3.0 (0.118)                         |                           |             |  |
| Thickness of retaining plate        | Thickness<br>mm (in)      | Part number |  |
|                                     | 3.4 (0.134)               | 31537-41X71 |  |
|                                     | 3.6 (0.142)               | 31537-41X61 |  |
|                                     | 3.8 (0.150)               | 31537-41X62 |  |
|                                     | 4.0 (0.157)               | 31537-41X63 |  |
|                                     | 4.2 (0.165)               | 31537-41X64 |  |
|                                     | 4.4 (0.173)               | 31537-41X65 |  |
|                                     | 4.6 (0.181)               | 31537-41X66 |  |
|                                     | 4.8 (0.189)               | 31537-41X67 |  |

| Forward clutch                      |                               |             |
|-------------------------------------|-------------------------------|-------------|
| Number of drive plates              | 7                             |             |
| Number of driven plates             | 7                             |             |
| Thickness of drive plate<br>mm (in) | Standard                      |             |
|                                     | 1.6 (0.063)                   |             |
|                                     | Wear limit                    |             |
| 1.4 (0.055)                         |                               |             |
| Clearance<br>mm (in)                | Standard                      |             |
|                                     | 0.45 - 0.85 (0.0177 - 0.0335) |             |
|                                     | Allowable limit               |             |
| 1.85 (0.0728)                       |                               |             |
| Thickness of retaining plate        | Thickness<br>mm (in)          | Part number |
|                                     | 4.6 (0.181)                   | 31537-42X13 |
|                                     | 4.8 (0.189)                   | 31537-42X14 |
|                                     | 5.0 (0.197)                   | 31537-42X15 |
|                                     | 5.2 (0.205)                   | 31537-42X16 |
|                                     | 5.4 (0.213)                   | 31537-42X17 |
|                                     | 5.6 (0.220)                   | 31537-42X18 |
| Overrun clutch                      |                               |             |
| Number of drive plates              | 3                             |             |
| Number of driven plates             | 5                             |             |
| Thickness of drive plate<br>mm (in) | Standard                      |             |
|                                     | 2.0 (0.079)                   |             |
|                                     | Wear limit                    |             |
| 1.8 (0.071)                         |                               |             |
| Clearance<br>mm (in)                | Standard                      |             |
|                                     | 1.0 - 1.4 (0.039 - 0.055)     |             |
|                                     | Allowable limit               |             |
| 2.0 (0.079)                         |                               |             |
| Thickness of retaining plate        | Thickness<br>mm (in)          | Part number |
|                                     | 4.2 (0.165)                   | 31537-41X80 |
|                                     | 4.4 (0.173)                   | 31537-41X81 |
|                                     | 4.6 (0.181)                   | 31537-41X82 |
|                                     | 4.8 (0.189)                   | 31537-41X83 |
|                                     | 5.0 (0.197)                   | 31537-41X84 |

AT

# SERVICE DATA AND SPECIFICATIONS (SDS)

## Specifications and Adjustment (Cont'd)

| Low & reverse brake                                    |                      |                               |  |
|--|----------------------|-------------------------------|--|
| Number of drive plates                                 |                      | 8                             |  |
| Number of driven plates                                |                      | 8                             |  |
| Thickness of drive plate<br>mm (in)                    |                      |                               |  |
| Standard   |                      | 2.0 (0.079)                   |  |
| Wear limit   |                      | 1.8 (0.071)                   |  |
| Clearance mm (in)                                      |                      |                               |  |
| Standard   |                      | 0.7 - 1.1 (0.028 - 0.043)     |  |
| Allowable limit  |                      | 2.3 (0.091)                   |  |
| Thickness of retaining plate                           | Thickness<br>mm (in) | Part number                   |  |
|  | 6.2 (0.244)          | 31667-41X15                   |  |
|  | 6.4 (0.252)          | 31667-41X16                   |  |
|  | 6.6 (0.260)          | 31667-41X17                   |  |
|  | 6.8 (0.268)          | 31667-41X11                   |  |
|  | 7.0 (0.276)          | 31667-41X12                   |  |
| 7.2 (0.283)  | 31667-41X13          |                               |  |
| Brake band   |                      |                               |  |
| Anchor end bolt tightening<br>torque N·m (kg-m, in-lb) |                      | 4 - 6<br>(0.4 - 0.6, 35 - 52) |  |
| Number of returning revolutions for anchor end bolt    |                      | 2.5                           |  |

### OIL PUMP AND LOW ONE-WAY CLUTCH

|  |  |                                |
|--|--|--------------------------------|
| Oil pump clearance mm (in)                         |  |                                |
| 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 mm (in)                        |  |                                |
| Standard   |  | 0.10 - 0.25 (0.0039 - 0.0096)  |
| Allowable limit                                    |  | 0.25 (0.0098)                  |

### TOTAL END PLAY

| Total end play "T <sub>1</sub> "         | 0.25 - 0.55 mm<br>(0.0098 - 0.0217 in) |             |
|--|--|-------------|
|  | Thickness<br>mm (in)                   | Part number |
| Thickness of oil pump cover bearing race | 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

| Reverse clutch drum end play "T <sub>2</sub> " | 0.55 - 0.90 mm<br>(0.0217 - 0.0354 in) |             |
|--|--|-------------|
|  | Thickness<br>mm (in)                   | Part number |
| Thickness of oil pump thrust washer            | 0.9 (0.035)                            | 31528-21X01 |
|  | 1.1 (0.043)                            | 31528-21X02 |
|  | 1.3 (0.051)                            | 31528-21X03 |
|  | 1.5 (0.059)                            | 31528-21X04 |
|  | 1.7 (0.067)                            | 31528-21X05 |
|  | 1.9 (0.075)                            | 31528-21X06 |

### REMOVAL AND INSTALLATION

|   |   |
|---|---|
| Manual control linkage                                      |   |
| Number of returning revolutions for lock nut                | 1   |
| Lock nut tightening torque                                  | 11 - 15 N·m<br>(1.1 - 1.5 kg-m, 8 - 11 ft-lb) |
| Distance between end of clutch housing and torque converter | 23.5 mm (0.925 in) or more                    |

# FRONT AXLE & FRONT SUSPENSION

## SECTION **FA**

### MODIFICATION NOTICE:

- The service data and specifications (SDS) have been changed.

## CONTENTS

|                        |   |   |   |
|------------------------|---|---|---|
| FRONT SUSPENSION ..... | 2 | SERVICE DATA AND SPECIFICATIONS (SDS) ..... | 3 |
|                        |   | Inspection and Adjustment .....             | 3 |

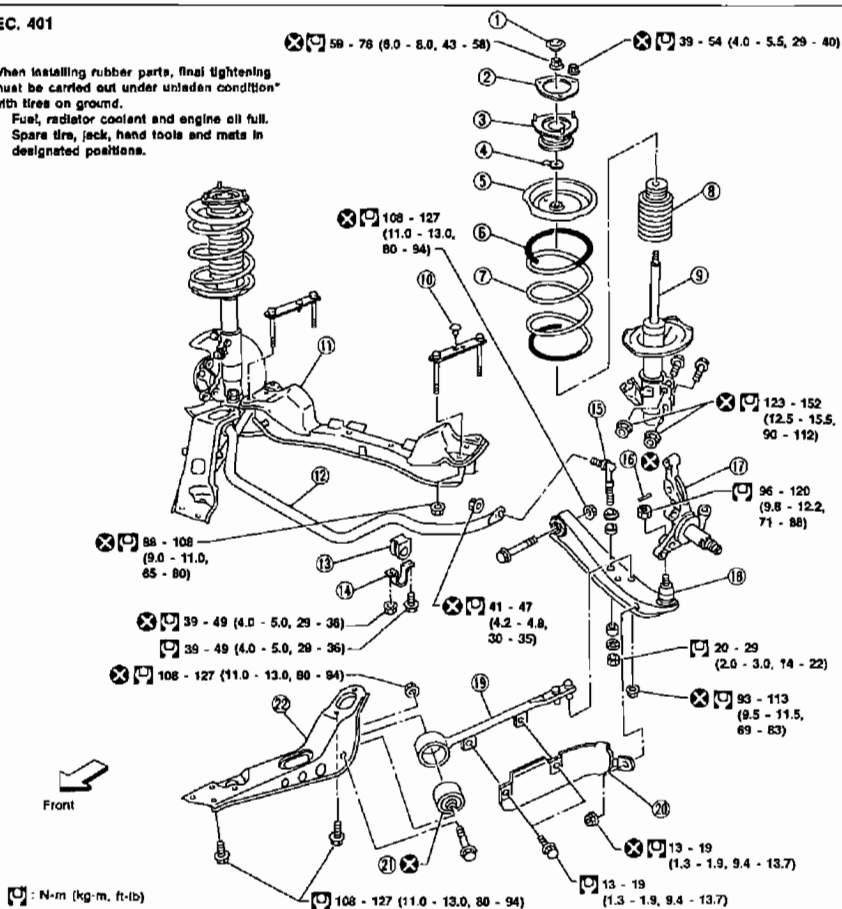
FA

# FRONT SUSPENSION

## SEC. 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.



SFA8168A

- |                            |                             |                                   |
|----------------------------|-----------------------------|-----------------------------------|
| ① Cap                      | ⑨ Strut assembly            | ⑱ Coller pin                      |
| ② Gasket                   | ⑩ Plastic clip              | ⑳ Knuckle spindle                 |
| ③ Strut mounting insulator | ⑪ Front suspension member   | ㉑ Transverse link with ball joint |
| ④ Lock washer              | ⑫ Stabilizer                | ㉒ Tension rod                     |
| ⑤ Upper seat               | ⑬ Bushing                   | ㉓ Tension rod                     |
| ⑥ (Polyurethane tube)      | ⑭ Clamp                     | ㉔ Air guide                       |
| ⑦ Coil spring              | ⑮ Stabilizer connecting rod | ㉕ Tension rod bushing             |
| ⑧ Bound bumper             |                             | ㉖ Tension rod bracket             |

**Inspection and Adjustment****LOWER BALL JOINT**

|  |                                       |
|--|---------------------------------------|
| Swinging force "A"<br>(Measuring point: center pin<br>hole of ball stud)<br>N (kg, lb) | 7.8 - 54.9<br>(0.8 - 5.6, 1.8 - 12.3) |
| Turning torque "B"<br>N·m (kg·cm, in·lb)   | 0.5 - 3.4<br>(5 - 35, 4.3 - 30.4)     |
| Vertical end play "C"<br>mm (in)   | 0 (0)                                 |



# REAR AXLE & REAR SUSPENSION

## SECTION **RA**

### MODIFICATION NOTICE:

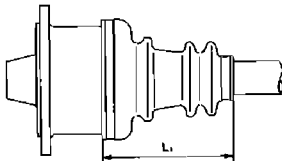
- The service data and specifications (SDS) have been changed.

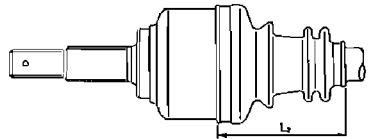
## CONTENTS

|  |   |
|--|---|
| <b>SERVICE DATA AND SPECIFICATIONS (SDS)</b> ..... | 2 |
| General Specifications.....                        | 2 |

**General Specifications**

**DRIVE SHAFT**

|                                    |                                     |                                    |   |                              |
|------------------------------------|-------------------------------------|------------------------------------|---|------------------------------|
| Joint type                         |                                     | Final drive side                   |  | SRA133A                      |
| Final drive side                   | TS82F                               |                                    |   |                              |
| Wheel side                         | TS82C                               |                                    |   |                              |
| Grease name                        |                                     | Final drive side                   | Nissan genuine grease or equivalent   |                              |
| Final drive side                   | Nissan genuine grease or equivalent |                                    |   |                              |
| Wheel side                         | Nissan genuine grease or equivalent |                                    |   |                              |
| Specified amount of grease         | g (oz)                              | Final drive side                   | 102 - 107 (3.60 - 3.77)   | Wheel side                   |
| Final drive side                   | 102 - 107 (3.60 - 3.77)             |                                    |   |                              |
| Wheel side                         | 115 - 125 (4.06 - 4.41)             |                                    |   |                              |
| Boot length                        | mm (in)                             | Final drive side (L <sub>1</sub> ) | 95 - 97 (3.74 - 3.82)   | Wheel side (L <sub>2</sub> ) |
| Final drive side (L <sub>1</sub> ) | 95 - 97 (3.74 - 3.82)               |                                    |   |                              |
| Wheel side (L <sub>2</sub> )       |                                     |                                    |   |                              |



SRA549A

# BRAKE SYSTEM

## SECTION **BR**

### MODIFICATION NOTICE:

- The anti-lock brake system wiring diagrams have been changed.
- The service data and specifications (SDS) have been changed.

## CONTENTS

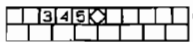
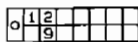
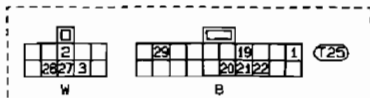
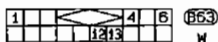
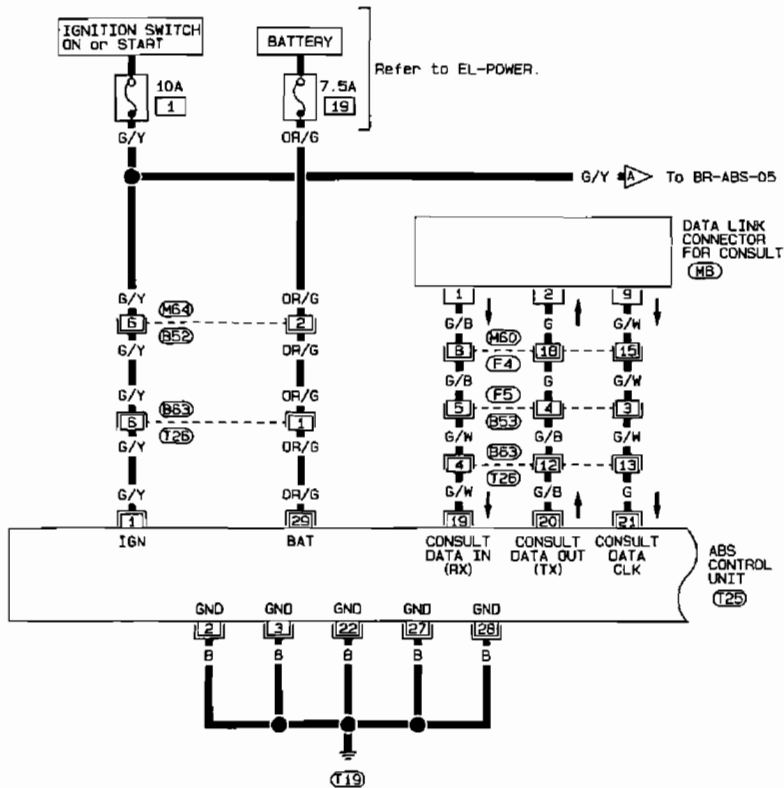
|                                     |   |  |    |
|-------------------------------------|---|--|----|
| <b>ANTI-LOCK BRAKE SYSTEM</b> ..... | 2 | <b>SERVICE DATA AND SPECIFICATIONS (SDS)</b> ..... | 12 |
| Wiring Diagram — ABS —.....         | 2 | General Specifications.....                        | 12 |
|                                     |   | Inspection and Adjustment.....                     | 12 |

# ANTI-LOCK BRAKE SYSTEM

## Wiring Diagram — ABS —

LHD MODELS

BR-ABS-01



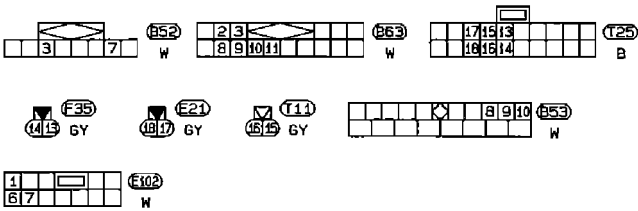
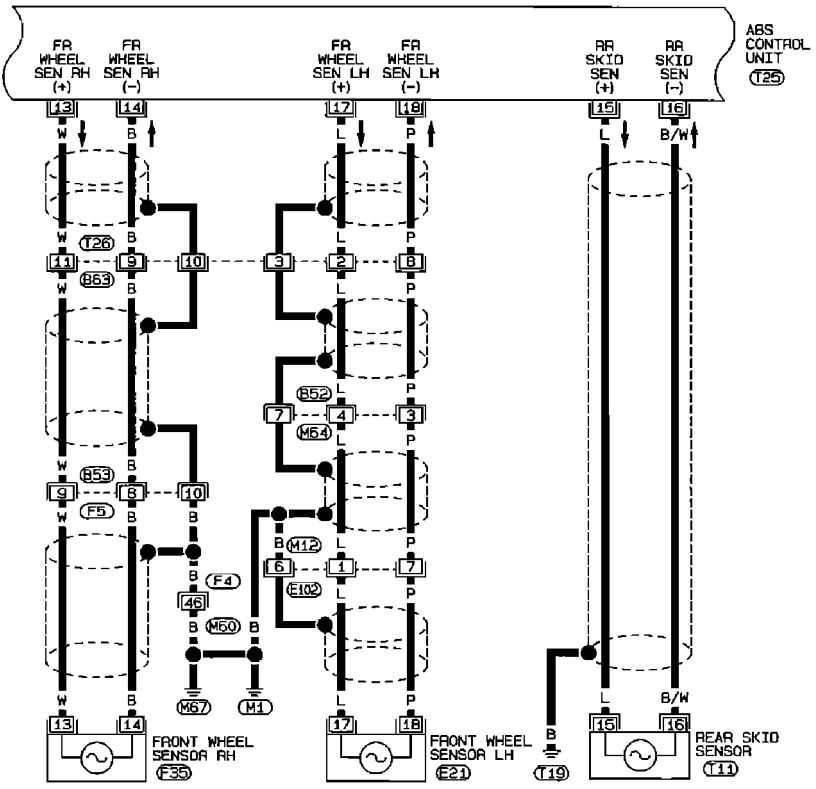
Refer to last page (Foldout page).

(M60) (F4)

# ANTI-LOCK BRAKE SYSTEM

## Wiring Diagram — ABS — (Cont'd)

BR-ABS-02



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 (M60, F4)

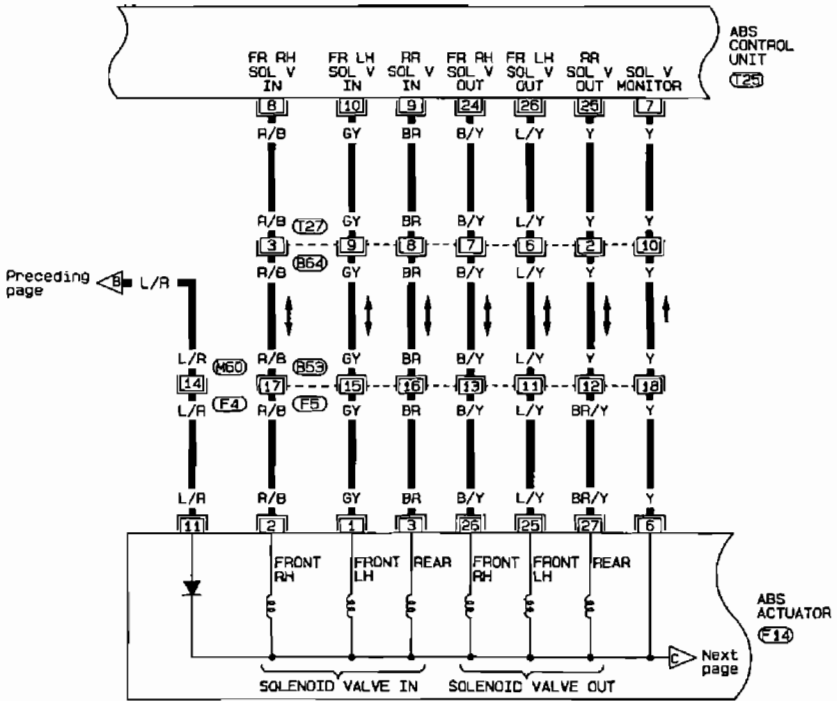
BR



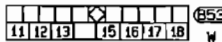
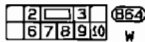
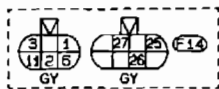
# ANTI-LOCK BRAKE SYSTEM

## Wiring Diagram — ABS — (Cont'd)

BR-ABS-04

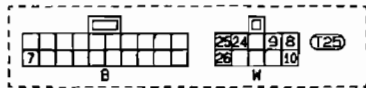


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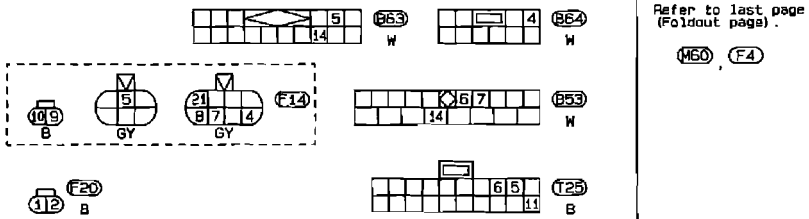
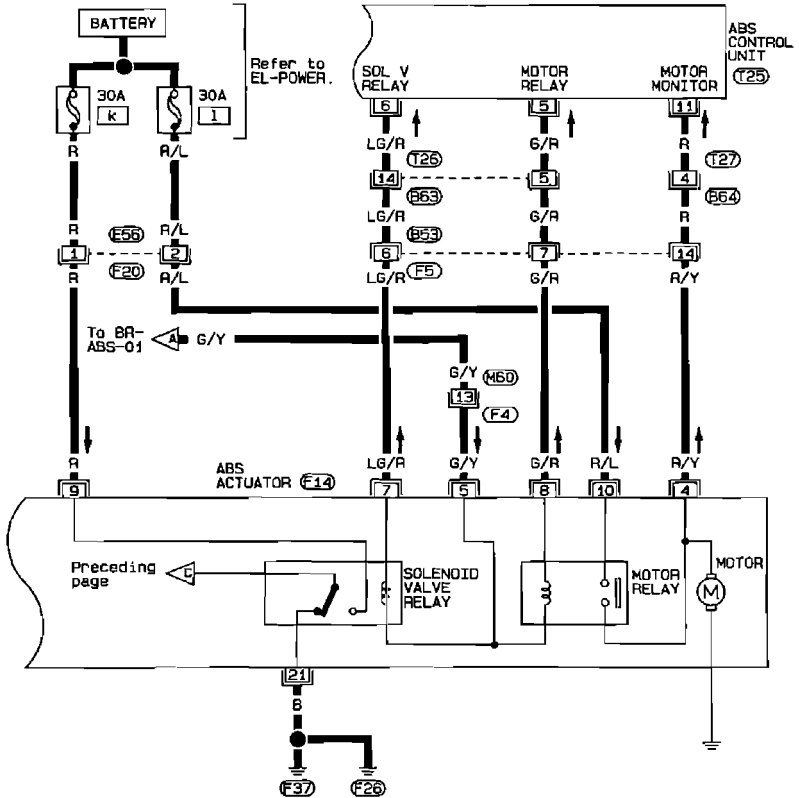
(M60) (F4)



# ANTI-LOCK BRAKE SYSTEM

## Wiring Diagram — ABS — (Cont'd)

BR-ABS-05



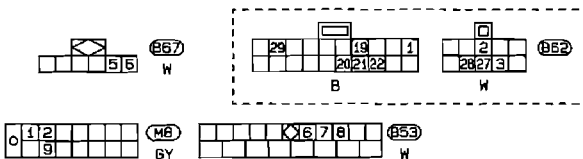
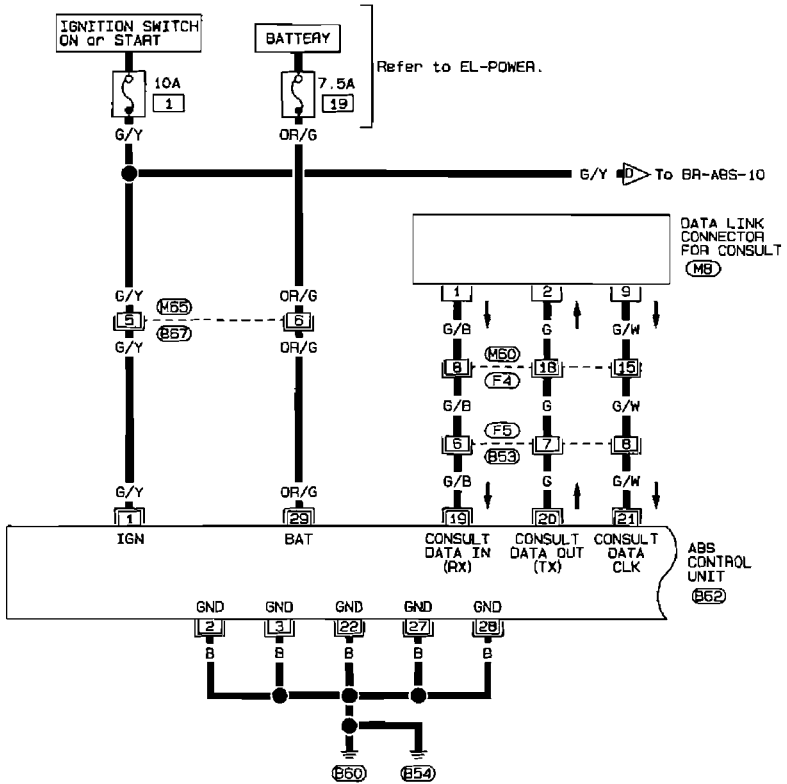


# ANTI-LOCK BRAKE SYSTEM

## Wiring Diagram — ABS — (Cont'd)

RHD MODELS

BR-ABS-06



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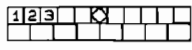
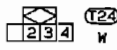
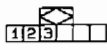
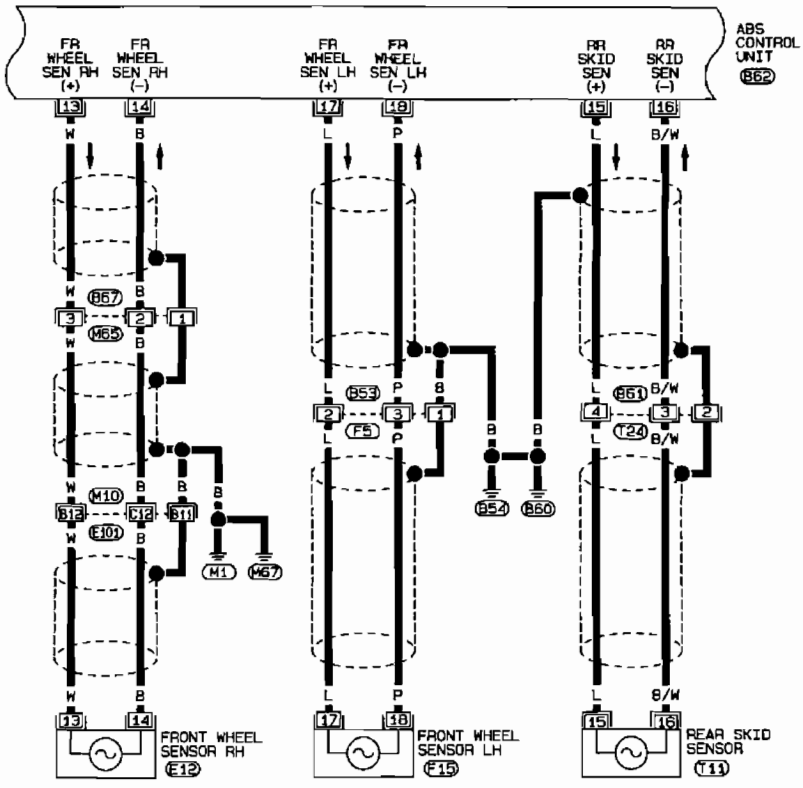
(B50) (F4)

BR

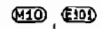
# ANTI-LOCK BRAKE SYSTEM

## Wiring Diagram — ABS — (Cont'd)

BR-ABS-07



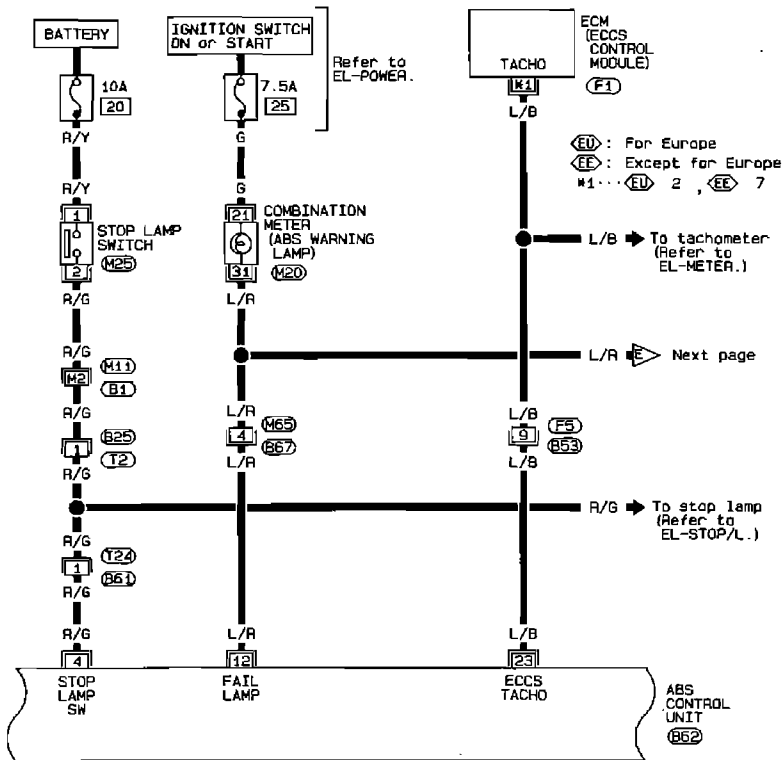
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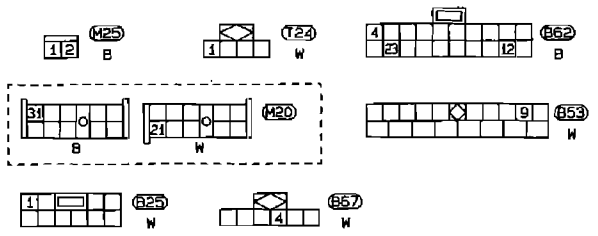
# ANTI-LOCK BRAKE SYSTEM

## Wiring Diagram — ABS — (Cont'd)

BR-ABS-08



BR



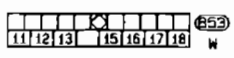
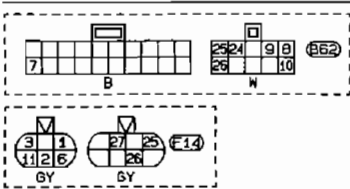
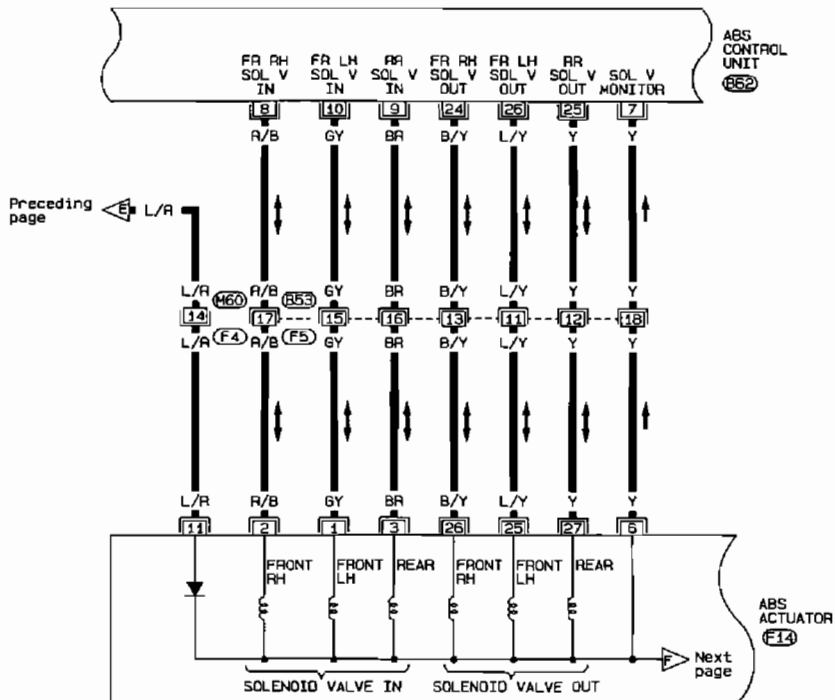
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(M11), (B1)  
(F1)

# ANTI-LOCK BRAKE SYSTEM

## Wiring Diagram — ABS — (Cont'd)

BR-ABS-09



Refer to last page (Foldout page).  
 (M60), (F4)



# SERVICE DATA AND SPECIFICATIONS (SDS)

## General Specifications

|  |   |
|--|---|
| Front brake                                    |   |
| Brake model                                    | OPF25VA disc brake                            |
| Cylinder bore diameter<br>mm (in)              | 40.4 (1.59) x 2                               |
| Pad<br>mm (in)                                 | 116.0 x 50.0 x 10.0<br>(4.57 x 1.969 x 0.394) |
| Length x width x thickness                     |   |
| Rotor outer diameter x thickness<br>mm (in)    | 280 x 30 (11.02 x 1.18)                       |
| Rear brake                                     |   |
| Brake model                                    | CL11H disc brake                              |
| Cylinder bore diameter<br>mm (in)              | 38.18 (1.5031)                                |
| Pad<br>mm (in)                                 | 75.0 x 40.0 x 9.5<br>(2.953 x 1.575 x 0.374)  |
| Length x width x thickness                     |   |
| Rotor outer diameter<br>x thickness<br>mm (in) | 258 x 8 (10.16 x 0.35)                        |

|  | Without ABS   | With ABS   |
|--|---|--|
| Master cylinder  |   |  |
| Cylinder bore diameter<br>mm (in)                                      | 23.81 (15/16)                                       | 25.40 (1)  |
| Control valve  |   |  |
| Valve model  | Proportioning valve<br>(built into master cylinder) |  |
| Split point<br>kPa (bar, kg/cm <sup>2</sup> , psi) x<br>reducing ratio | 3,923 (39.2, 40, 569) x 0.4                         |  |
| Brake booster  |   |  |
| Booster model  | M23 or G23  | M195T  |
| Diaphragm diameter<br>mm (in)  | 230 (9.06)  | Primary: 205<br>(8.07)<br>Secondary: 180<br>(7.09) |
| Recommended brake fluid  |   |  |
| For Europe*  | DOT3 or DOT4  |  |
| Except for Europe  | DOT 3   |  |

\*For Europe, never mix different type brake fluids (DOT3 and DOT4).

## Inspection and Adjustment

### DISC BRAKE

| Brake model                   | OPF25VA     | CL11H    |
|-------------------------------|-------------|----------|
| Pad wear limit<br>mm (in)     | 2.0 (0.079) |          |
| Minimum thickness             |             |          |
| Rotor repair limit<br>mm (in) | 28 (1.10)   | 8 (0.31) |
| Minimum thickness             |             |          |

### BRAKE PEDAL

| Vehicle model   | LHD                        | RHD                        |
|---|----------------------------|----------------------------|
| Free height "H"<br>mm (in)  |                            |                            |
| M/T   | 181 - 191<br>(7.13 - 7.52) | 179 - 189<br>(7.05 - 7.44) |
| A/T   | 191 - 201<br>(7.52 - 7.91) | 189 - 199<br>(7.44 - 7.83) |
| Depressed height "D"<br>mm (in)<br>(under force of 490 N (50 kg,<br>110 lb) with engine running)            |                            |                            |
| M/T   | 120 (4.72)<br>130 (5.12)*  |                            |
| A/T   | 130 (5.12)<br>135 (5.31)*  |                            |
| Clearance "C" between pedal<br>stopper and threaded end of<br>stop lamp switch or ASCD<br>switch<br>mm (in) | 0.3 - 1.0 (0.012 - 0.039)  |                            |

\*Without ABS for Australia

### PARKING BRAKE

| Type  | Center lever |
|---|--------------|
| Number of notches<br>[under force of 186 N<br>(20 kg, 44 lb)] | 7 - 9        |
| Number of notches<br>when warning lamp switch<br>comes on     | 1            |

# RESTRAINT SYSTEM

## SECTION **RS**

### MODIFICATION NOTICE:

Wiring diagrams have been changed.

## CONTENTS

|  |   |   |   |
|--|---|---|---|
| <b>PRECAUTION</b> .....                  | 2 | <b>TROUBLE DIAGNOSES — Supplemental</b> |   |
| Supplemental Restraint System (SRS) "AIR |   | <b>Restraint System (SRS)</b> .....     | 3 |
| BAG" and "SEAT BELT PRE-TENSIONER".....  | 2 | Wiring Diagram — SRS — .....            | 3 |

RS

## PRECAUTION

---

### **Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"**

The Supplemental Restraint System "Air Bag" and "Seat Belt Pre-tensioner", used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.

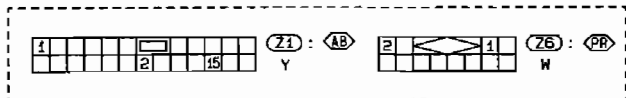
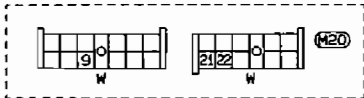
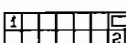
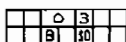
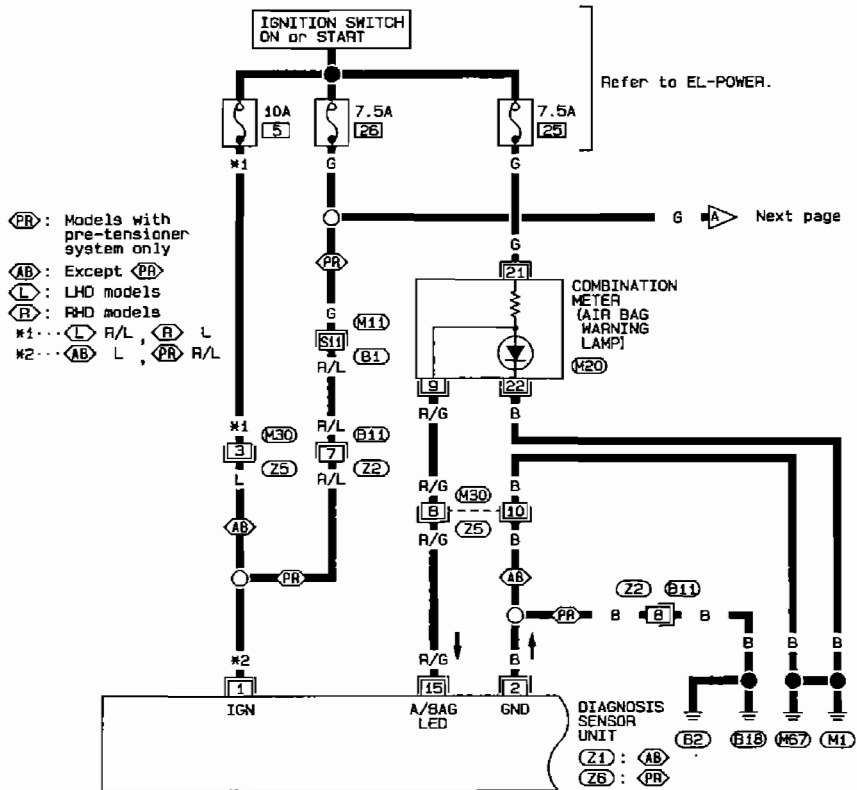
#### **WARNING:**

- 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.
- All SRS air bag electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS.



Wiring Diagram — SRS —

RS-SRS-01



Refer to last page (foldout page).

(M11), (B1)

RS

# TROUBLE DIAGNOSES — Supplemental Restraint System (SRS)

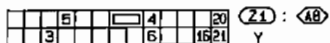
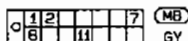
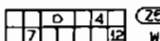
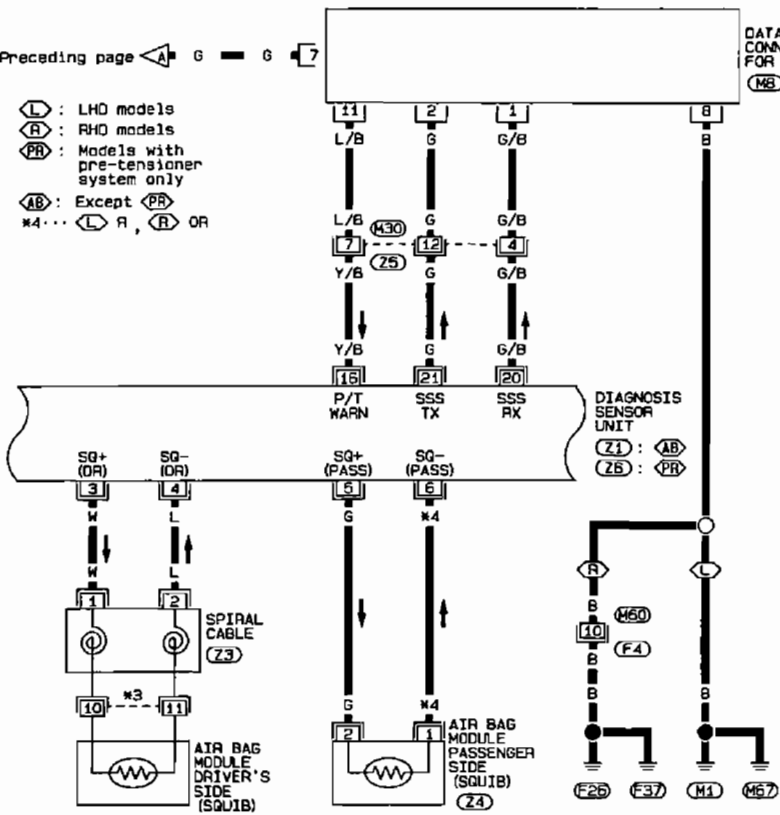
## Wiring Diagram — SRS — (Cont'd)

RS-SRS-02

Preceding page ◀ 6 — 6 ▶

DATA LINK  
CONNECTOR  
FOR CONSULT  
(M8)

- ◻ L : LHD models
- ◻ R : RHD models
- ◻ PR : Models with pre-tensioner system only
- ◻ AB : Except ◻ PR
- \*4... ◻ L, ◻ R OR



Refer to last page (Foldout page).

M50, F4



## SECTION **HA**

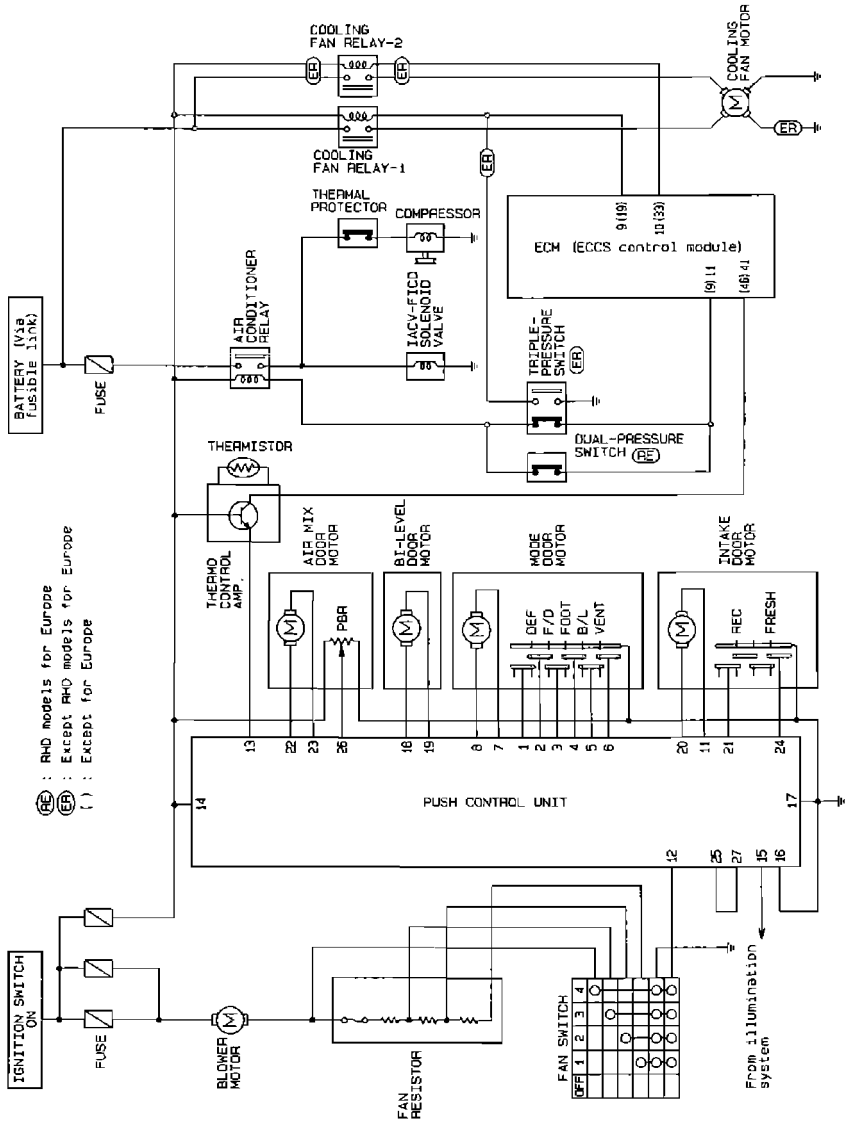
### MODIFICATION NOTICE:

- On RHD models for Europe, the triple-pressure switch has been replaced by a dual-pressure switch.
- Wiring diagrams have been changed.

## CONTENTS

| <input type="checkbox"/> MANUAL <input type="checkbox"/> | <input type="checkbox"/> MANUAL AND AUTO <input type="checkbox"/> |
|--|---|
| <b>TROUBLE DIAGNOSES</b> .....                           | <b>SERVICE PROCEDURES</b> .....                                   |
| Circuit Diagram — Manual Air Conditioner .....           | Refrigerant Lines .....   |
| Wiring Diagram — A/C, M — .....                          | <b>SERVICE DATA AND SPECIFICATIONS (SDS)</b> .....                |
| Diagnostic Procedure 6 .....                             | General Specifications .....                                      |
| Electrical Components Inspection .....                   | Inspection and Adjustment .....                                   |
| <br>   |   |
| <input type="checkbox"/> AUTO <input type="checkbox"/>   |   |
| <b>TROUBLE DIAGNOSES</b> .....                           |   |
| Wiring Diagram — A/C, A — .....                          |   |

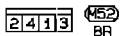
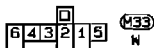
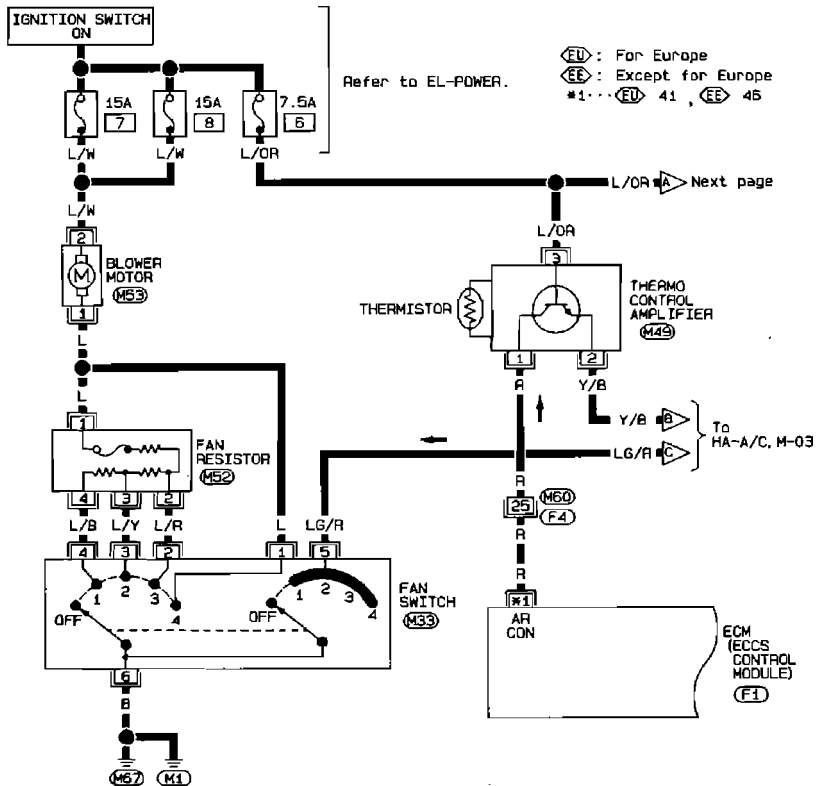
Circuit Diagram — Manual Air Conditioner



## Wiring Diagram — A/C, M —

LHD MODEL

HA-A/C, M-01



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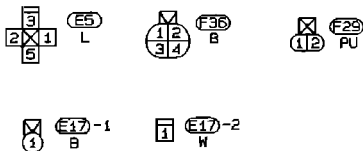
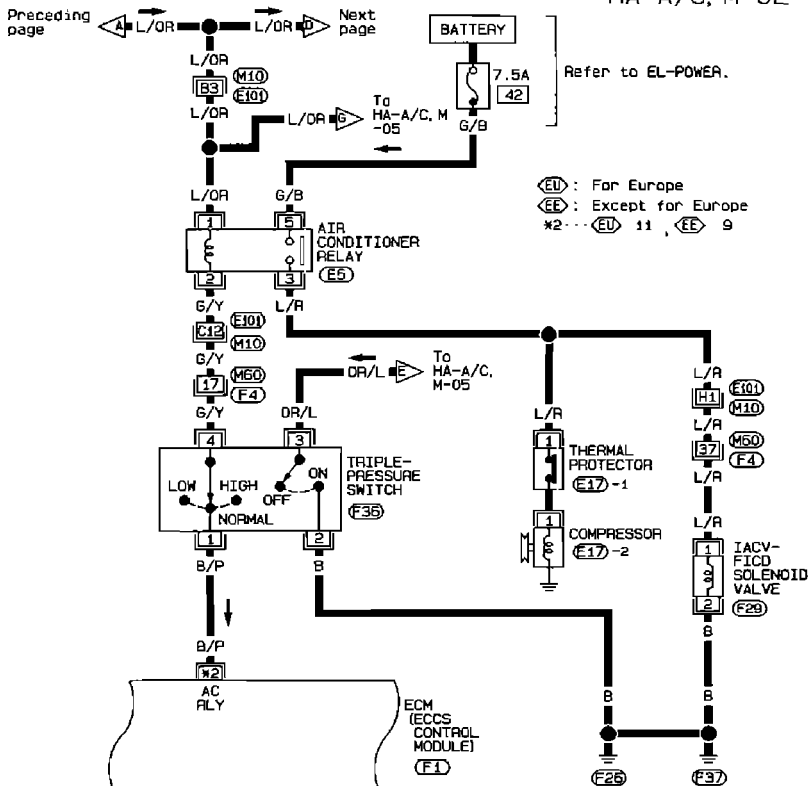
M50, F4

F1

HA

Wiring Diagram — A/C, M — (Cont'd)

HA-A/C, M-02

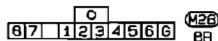
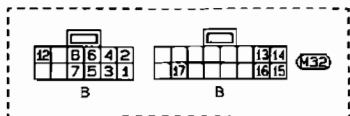
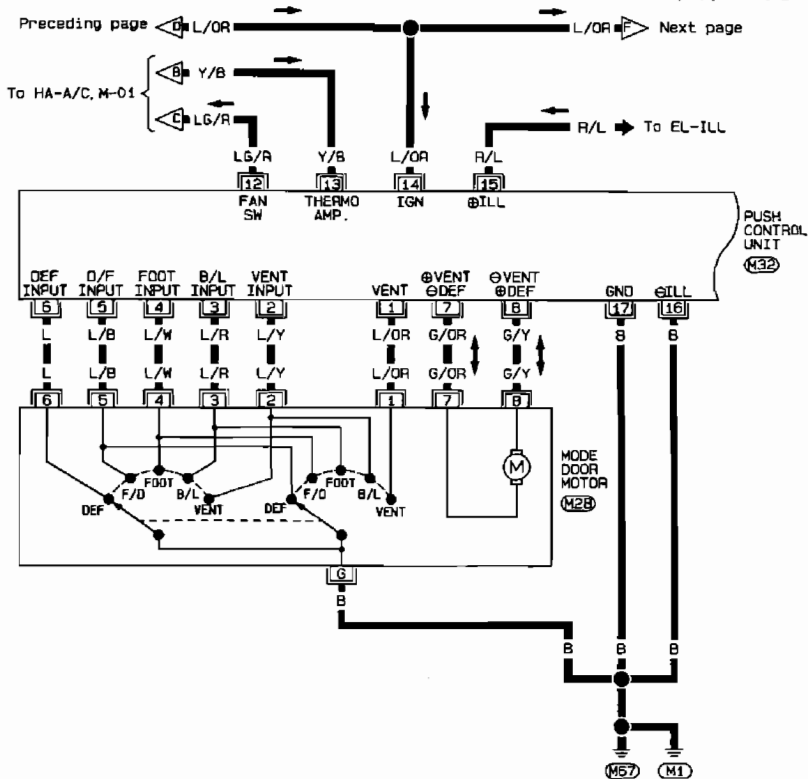


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- M10, E101
- M60, F4
- F1

Wiring Diagram — A/C, M — (Cont'd)

HA-A/C, M-03

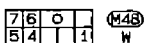
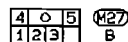
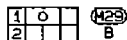
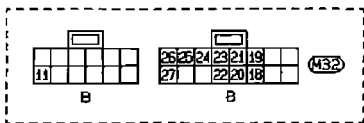
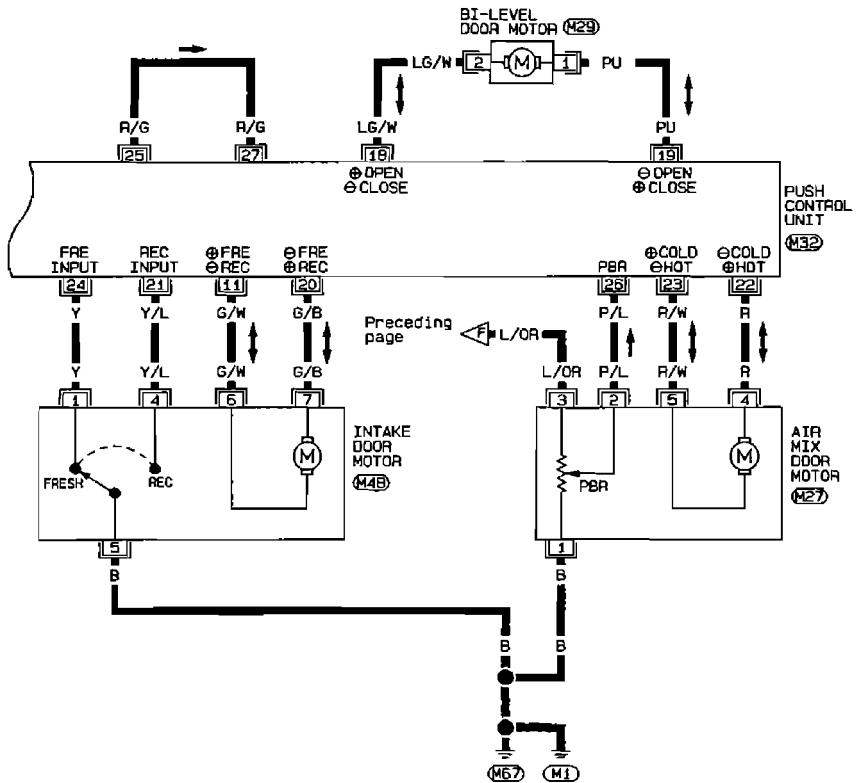


HA



Wiring Diagram — A/C, M — (Cont'd)

HA-A/C, M-04

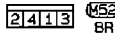
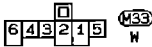
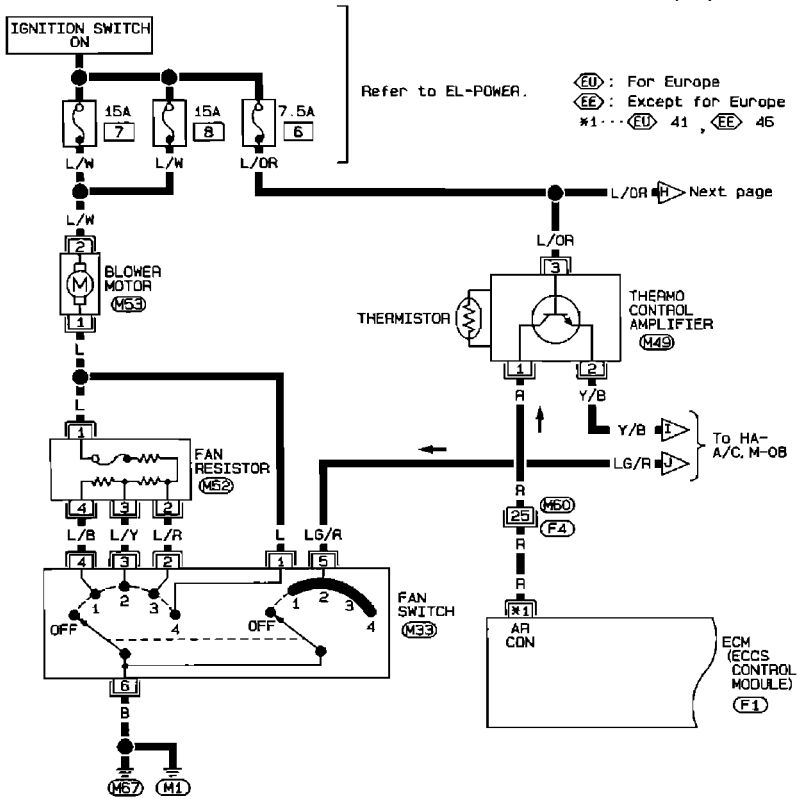




Wiring Diagram — A/C, M — (Cont'd)

RHD MODEL

HA-A/C, M-06

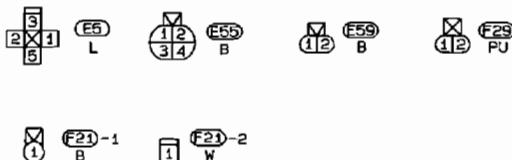
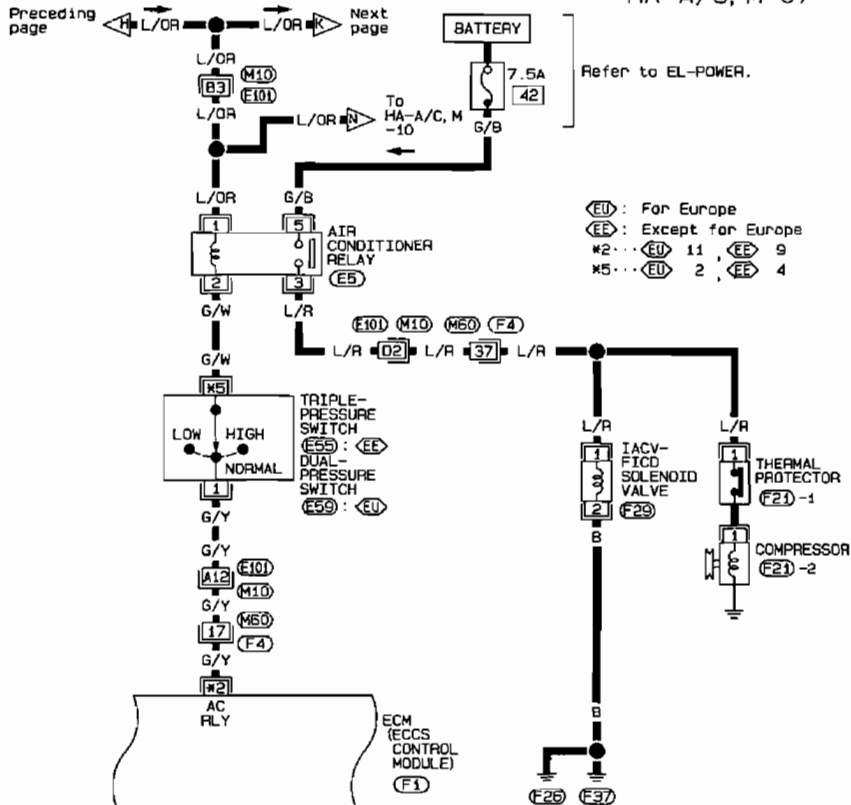


Refer to last page (Foldout page).



## Wiring Diagram — A/C, M — (Cont'd)

HA-A/C, M-07



Refer to last page (Foldout page).

ⒺM10, ⒺE101

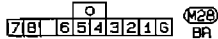
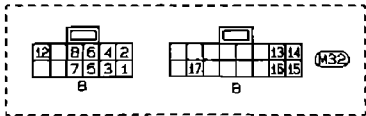
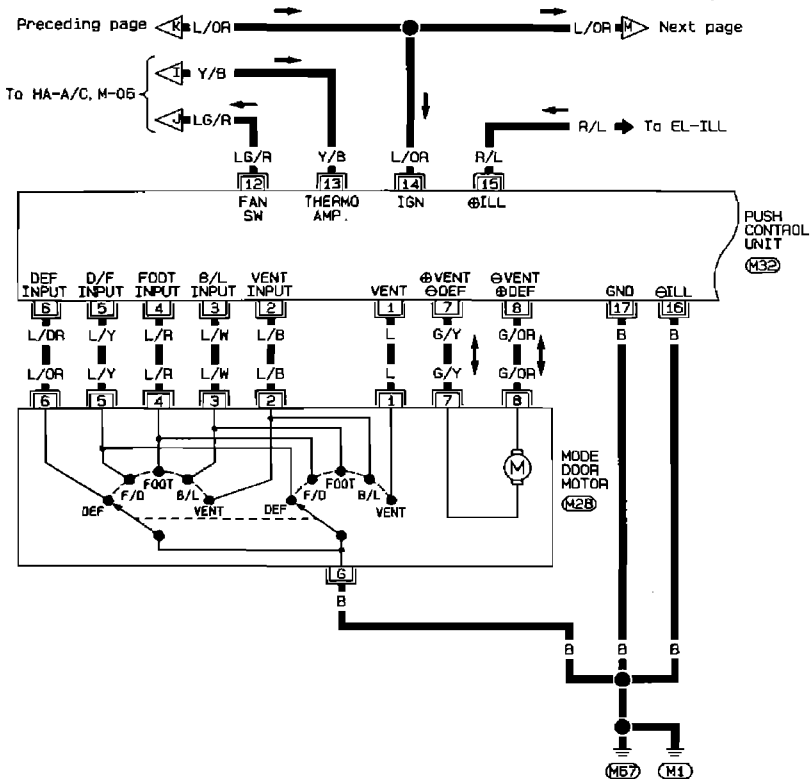
ⒺM50, ⒺF4

ⒺF1

HA

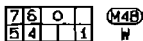
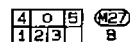
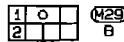
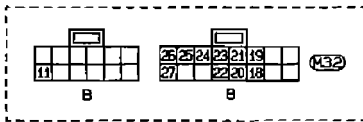
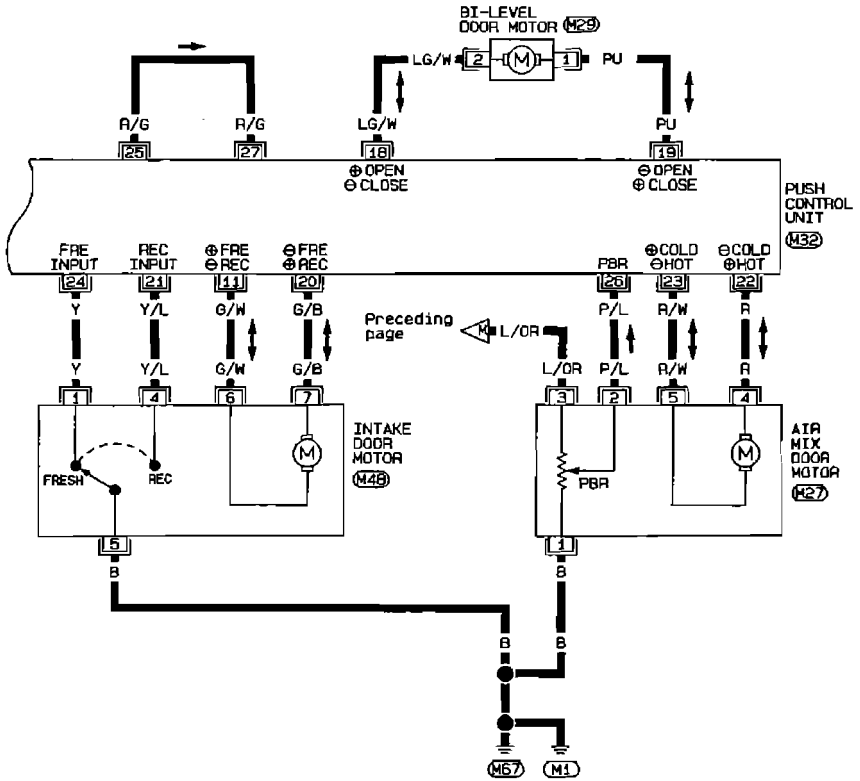
Wiring Diagram — A/C, M — (Cont'd)

HA-A/C, M-08



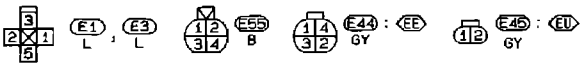
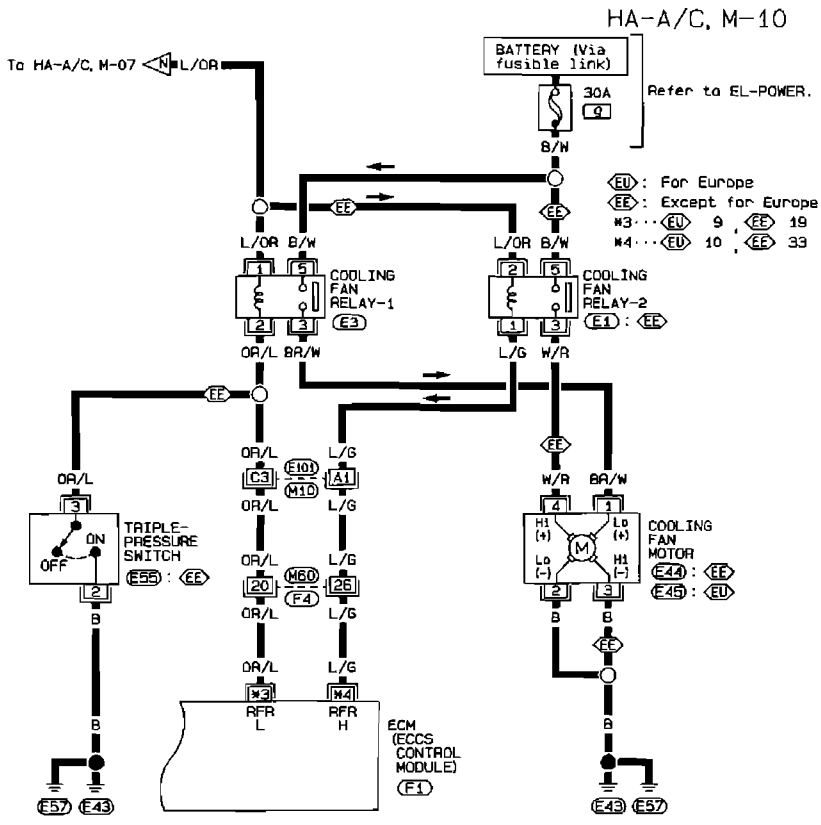
Wiring Diagram — A/C, M — (Cont'd)

HA-A/C, M-09



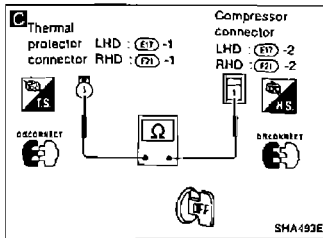
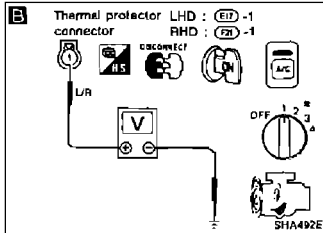
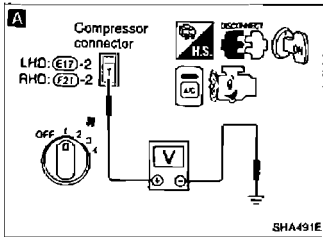
HA

Wiring Diagram — A/C, M — (Cont'd)



Refer to last page (Foldout page).

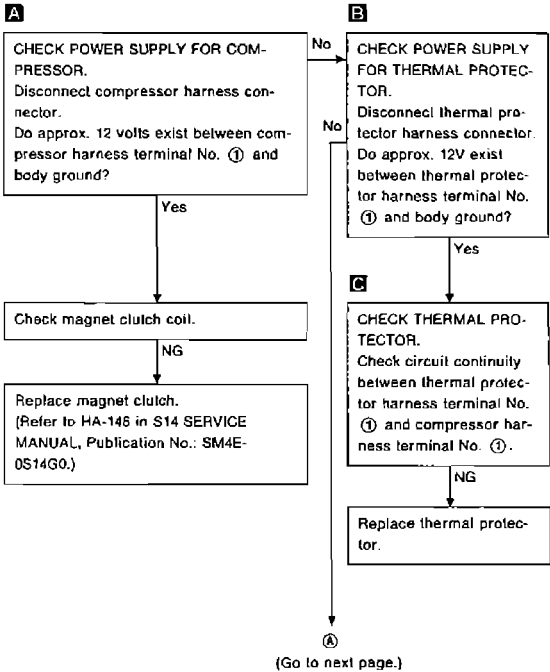
(M1D), (E101)  
 (M6D), (F4)  
 (F1)



## Diagnostic Procedure 6

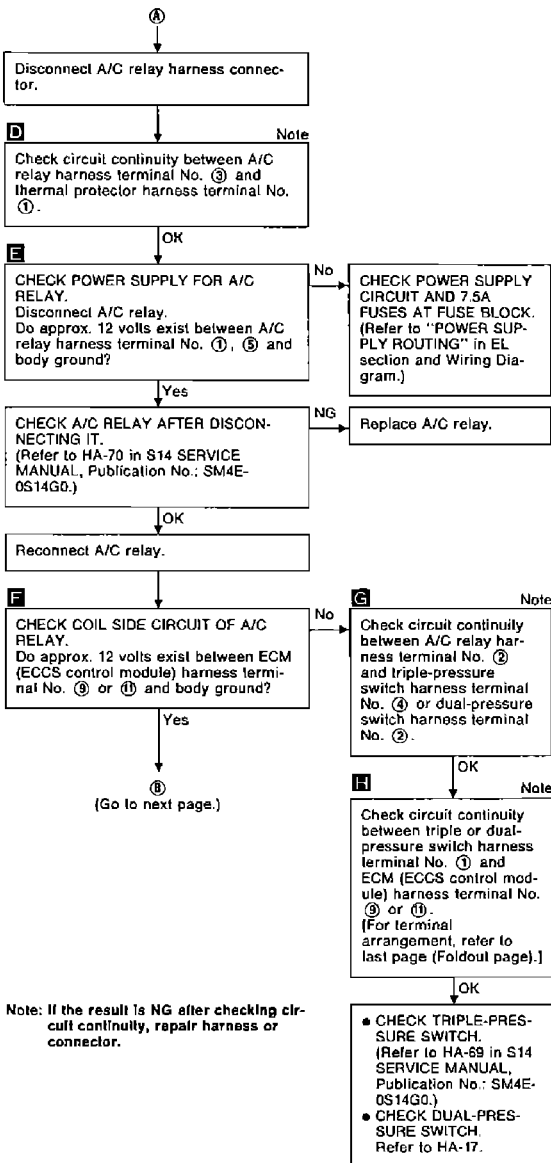
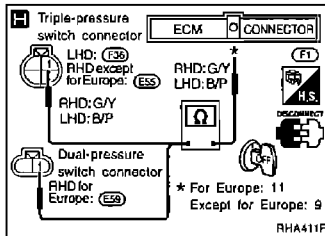
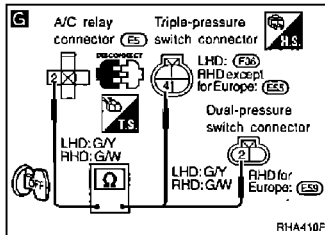
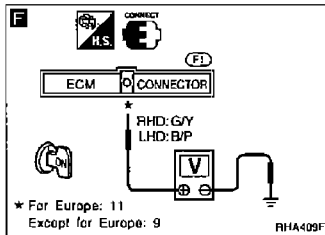
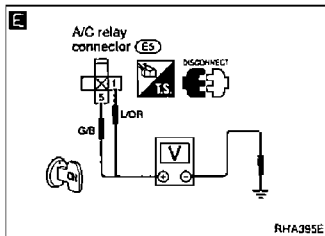
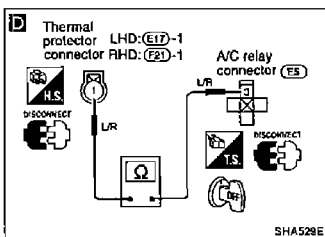
**SYMPTOM:** Magnet clutch does not operate when A/C switch and fan switch are ON.

- Perform PRELIMINARY CHECK 2 before referring to the following flow chart.

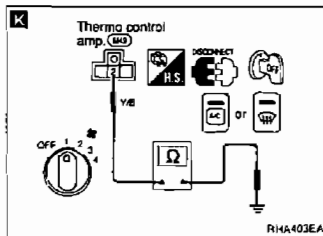
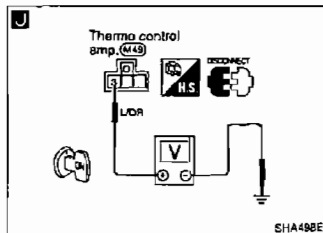
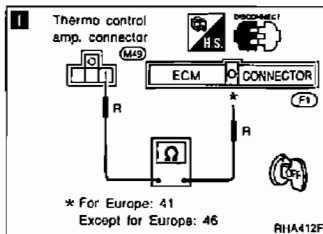




## Diagnostic Procedure 6 (Cont'd)



## Diagnostic Procedure 6 (Cont'd)



**I** Disconnect thermo control amp. harness connector.

**I** Note  
Check circuit continuity between thermo control amp. harness terminal No. ① and ECM (ECSS control module) harness terminal No. ④ or ⑤.

**U** CHECK POWER SUPPLY FOR THERMO CONTROL AMP.  
Disconnect thermo control amp. harness connector.  
Do approx. 12 volts exist between thermo control amp. harness terminal No. ③ and body ground?

No  
Check 7.5A fuse at fuse block.  
Refer to EL section ("Wiring Diagram", "POWER SUPPLY ROUTING").

**K** CHECK BODY GROUND CIRCUIT FOR THERMO CONTROL AMP.  
Turn A/C switch or DEF switch ON.  
Check for continuity between thermo control amp. harness terminal ② and body ground.

NG  
Disconnect push control unit harness connector.

Ⓞ  
(Go to next page.)

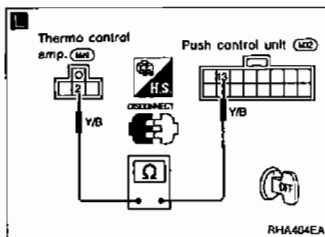
CHECK THERMO CONTROL AMP.  
(Refer to HA-68 in S14 SERVICE MANUAL, Publication No.: SM4E-OS14G0.)

NG  
Replace thermo control amp.

OK  
Check voltage between ECM (ECSS control module) harness terminals ⑥ and body ground.  
Refer to EC section ("ECM Terminals and Reference Value", "TROUBLE DIAGNOSES -- General Description") in S14 SERVICE MANUAL, Publication No.: SM4E-OS14G0.

Note:  
If the result is NG after checking circuit continually, repair harness or connector.

## Diagnostic Procedure 6 (Cont'd)



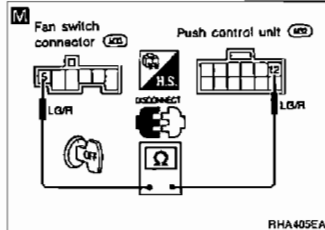
**L** Note

Check circuit continuity between thermo control amp. harness terminal No. ② and push control unit harness terminal No. ③.

OK

Disconnect fan switch harness connector.

OK



**M** Note

Check circuit continuity between push control unit terminal No. ④ and fan switch harness terminal No. ⑤.

OK

**N** Note

CHECK BODY GROUND CIRCUIT FOR FAN SWITCH.  
Check for continuity between fan switch harness terminal ⑥ and body ground.

OK

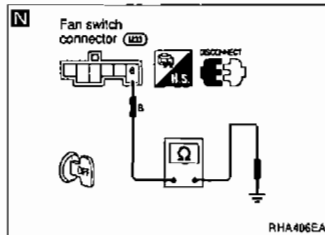
CHECK FAN SWITCH.  
(Refer to HA-68 in S14 SERVICE MANUAL, Publication No.: SM4E-0S14G0.)

NG

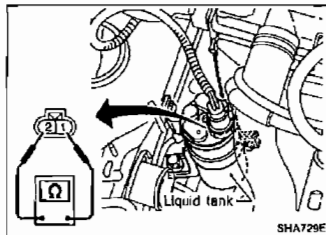
Replace fan switch.

OK

Replace push control unit.

**Note:**

If the result is NG after checking circuit continuity, repair harness or connector.



SHA729E

## Electrical Components Inspection

### DUAL-PRESSURE SWITCH

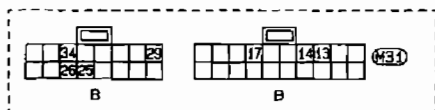
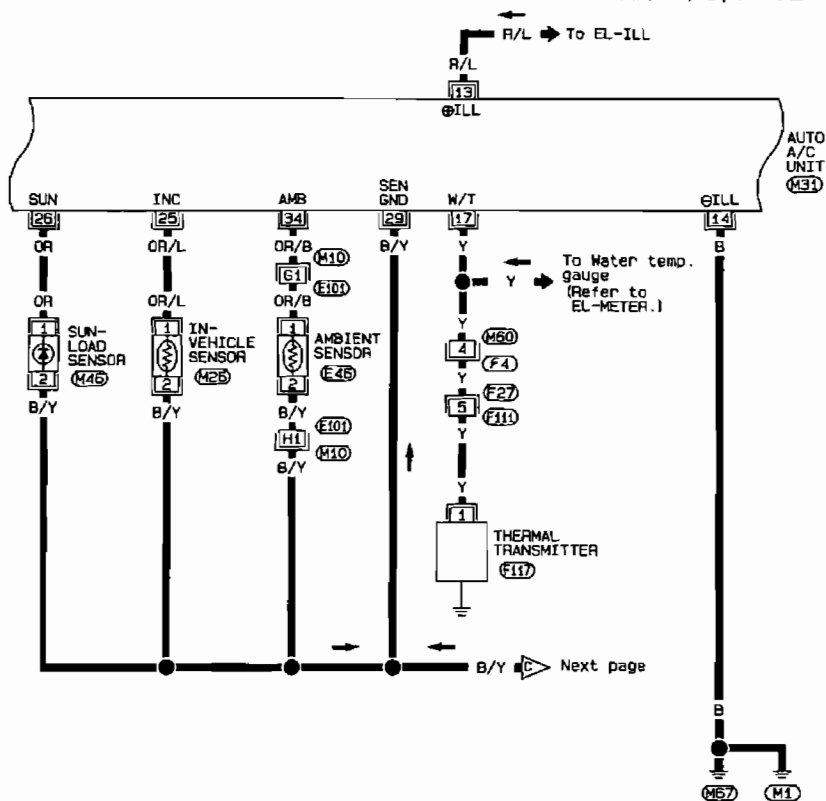
#### RHD models for Europe

|                    | ON<br>kPa (bar, kg/cm <sup>2</sup> , psi)                           | OFF<br>kPa (bar, kg/cm <sup>2</sup> , psi)                                  |
|--------------------|---|---|
| Low-pressure side  | Increasing to<br>157 - 216 (1.57 - 2.16,<br>1.6 - 2.2, 23 - 31)     | Decreasing to<br>152.0 - 201.0 (1.520 - 2.010,<br>1.55 - 2.05, 22.0 - 29.2) |
| High-pressure side | Decreasing to<br>1,275 - 1,667 (12.7 - 16.7,<br>13 - 17, 185 - 242) | Increasing to<br>2,452 - 2,844 (24.5 - 28.4,<br>25 - 29, 356 - 412)         |



## Wiring Diagram — A/C, A — (Cont'd)

HA-A/C, A-02



Refer to last page (Foldout page).

M10, E101  
M50, F4



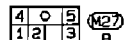
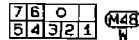
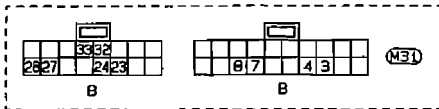
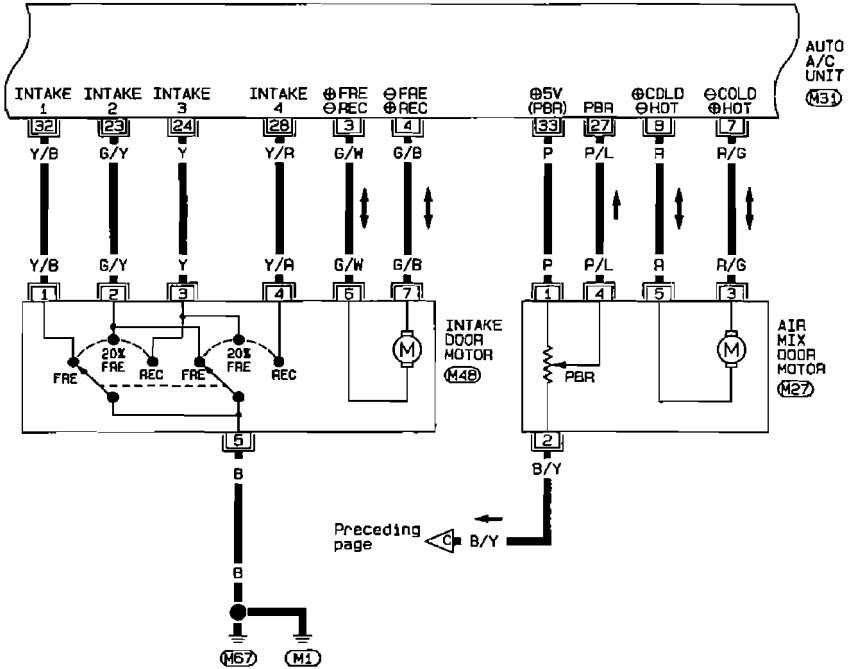
HA

# TROUBLE DIAGNOSES

AUTO

## Wiring Diagram — A/C, A — (Cont'd)

HA-A/C, A-03



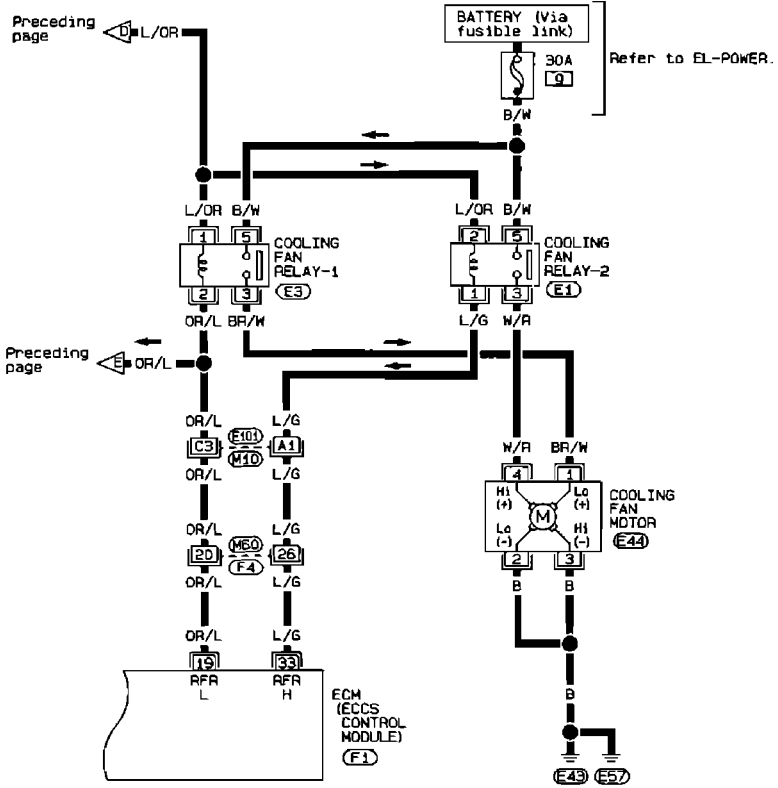






Wiring Diagram — A/C, A — (Cont'd)

HA-A/C, A-06



Refer to last page (Foldout page).

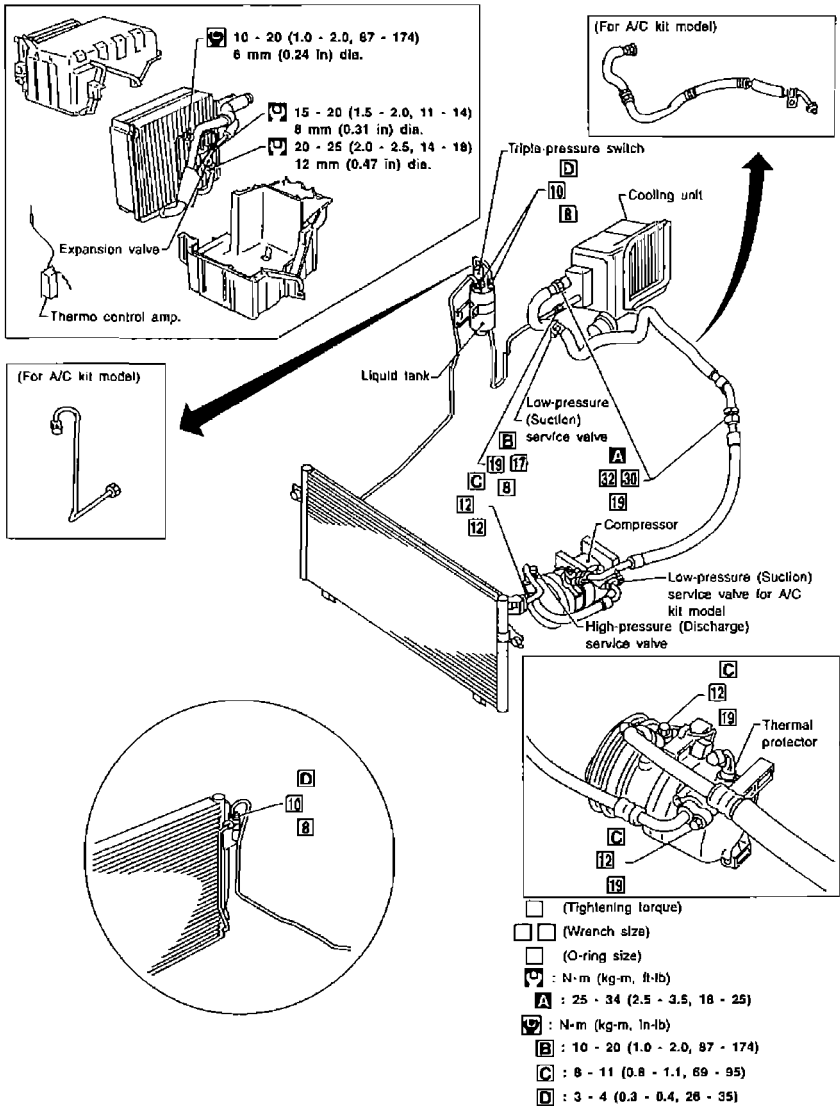
- (M10), (E10)
- (M60), (F4)
- (F1)

HA

LHD MODEL

Refrigerant Lines

SEC. 271•272•276



## General Specifications

## COMPRESSOR

|  |                                   |
|--|-----------------------------------|
| Model                                    | DKV-14C                           |
| Type                                     | Vane rotary                       |
| Displacement cm <sup>3</sup> (cu in)/Rev | 140 (8.54)                        |
| Direction of rotation                    | Clockwise (Viewed from drive end) |
| Drive belt                               | Poly V type                       |

## LUBRICANT

|   |                                 |
|---|---------------------------------|
| Model                                     | ZEXEL make<br>DKV-14C           |
| Name                                      | Nissan A/C System Oil<br>Type R |
| Part No.                                  | KLH00-RAGR0                     |
| Capacity mL (imp fl oz)                   |                                 |
| Total in system                           | 200 (7.0)                       |
| Compressor (Service part charging amount) | 200 (7.0)                       |

## REFRIGERANT

|                  |                           |
|------------------|---------------------------|
| Type             | HFC-134a (R-134a)         |
| Capacity kg (lb) | 0.60 - 0.70 (1.32 - 1.54) |

## Inspection and Adjustment

## ENGINE IDLING SPEED

When A/C is ON

- Refer to EC section ("Inspection and Adjustments", "SERVICE DATA AND SPECIFICATIONS").

## BELT TENSION

- Refer to MA section ("Checking Drive Belts", "ENGINE MAINTENANCE").

## COMPRESSOR

|                                      |                              |
|--------------------------------------|------------------------------|
| Model                                | DKV-14C                      |
| Clutch disc-pulley clearance mm (in) | 0.3 - 0.6<br>(0.012 - 0.024) |

# ELECTRICAL SYSTEM

## SECTION **EL**

When you read wiring diagrams:

- Read GI section, "HOW TO READ WIRING DIAGRAMS".

When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".

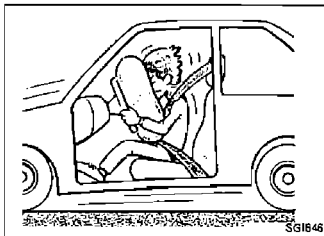
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### WIRING DIAGRAM REFERENCE CHART

|  |                   |
|--|-------------------|
| <b>ECCS</b> .....                                | <b>EC SECTION</b> |
| <b>A/T CONTROL</b> .....                         | <b>AT SECTION</b> |
| <b>ANTI-LOCK BRAKING SYSTEM</b> .....            | <b>BR SECTION</b> |
| <b>AIR BAG AND SEAT BELT PRE-TENSIONER</b> ..... | <b>RS SECTION</b> |
| <b>HEATER AND AIR CONDITIONER</b> .....          | <b>HA SECTION</b> |

EL



### Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System "Air Bag" and "Seat Belt Pre-tensioner", used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioners, a diagnostic sensor unit, warning lamp, wiring harness and spiral cable. 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.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses are covered with yellow insulation either just before the harness connectors or the complete harness, for easy identification.

## PRECAUTIONS

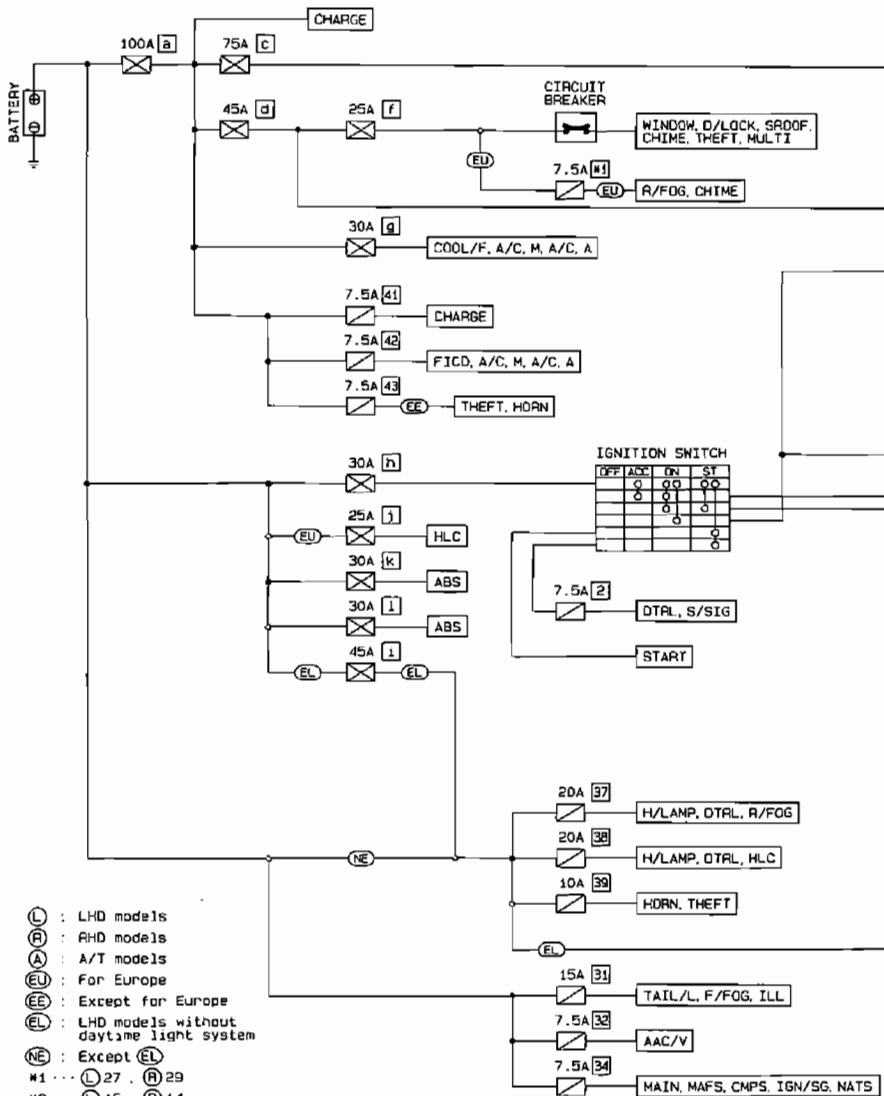
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NOTE

EL

# POWER SUPPLY ROUTING

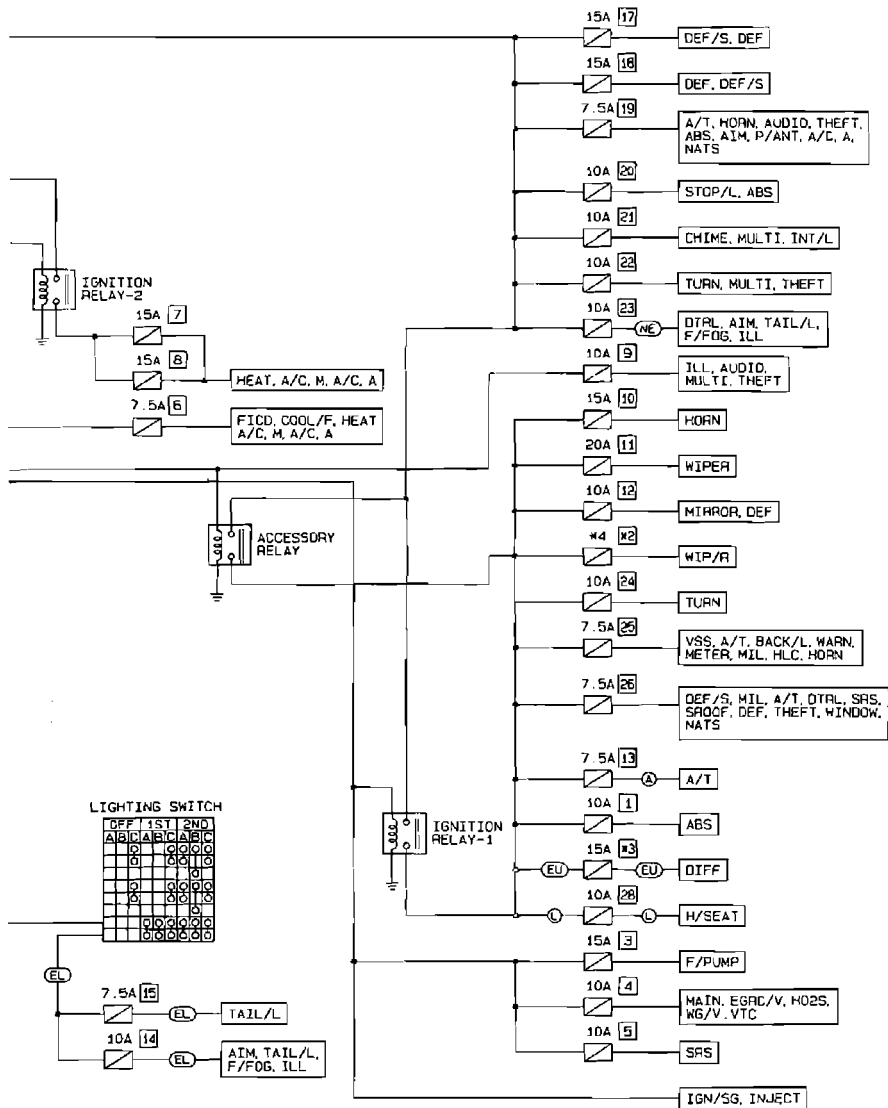
## Schematic



- (L) : LHD models
- (R) : RHD models
- (A) : A/T models
- (EU) : For Europe
- (EE) : Except for Europe
- (EL) : LHD models without daytime light system
- (NE) : Except (EL)
- #1 ... (L) 27, (R) 29
- #2 ... (L) 16, (R) 14
- #3 ... (L) 29, (R) 28
- #4 ... (L) 10A, (R) 15A



# POWER SUPPLY ROUTING Schematic (Cont'd)



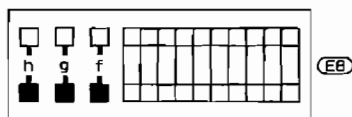
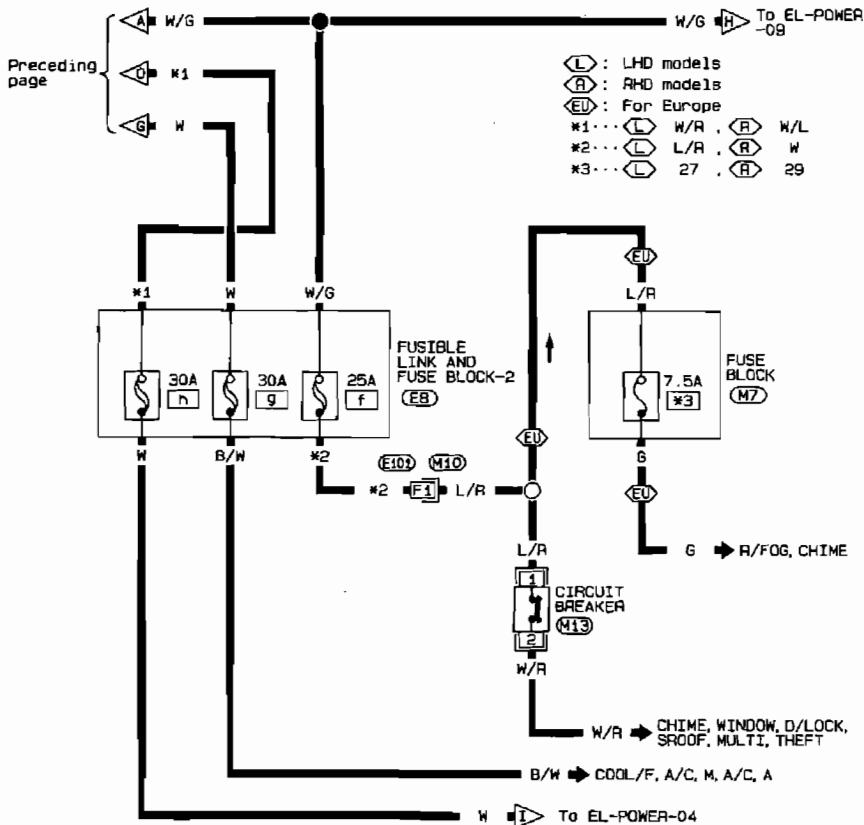
EL



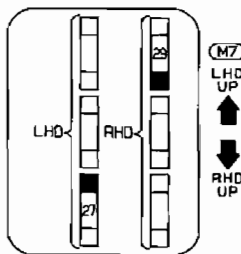
# POWER SUPPLY ROUTING

## Wiring Diagram — POWER — (Cont'd)

### EL-POWER-02



FRONT ←



Refer to last page (Foldout page).

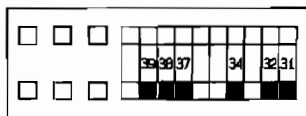
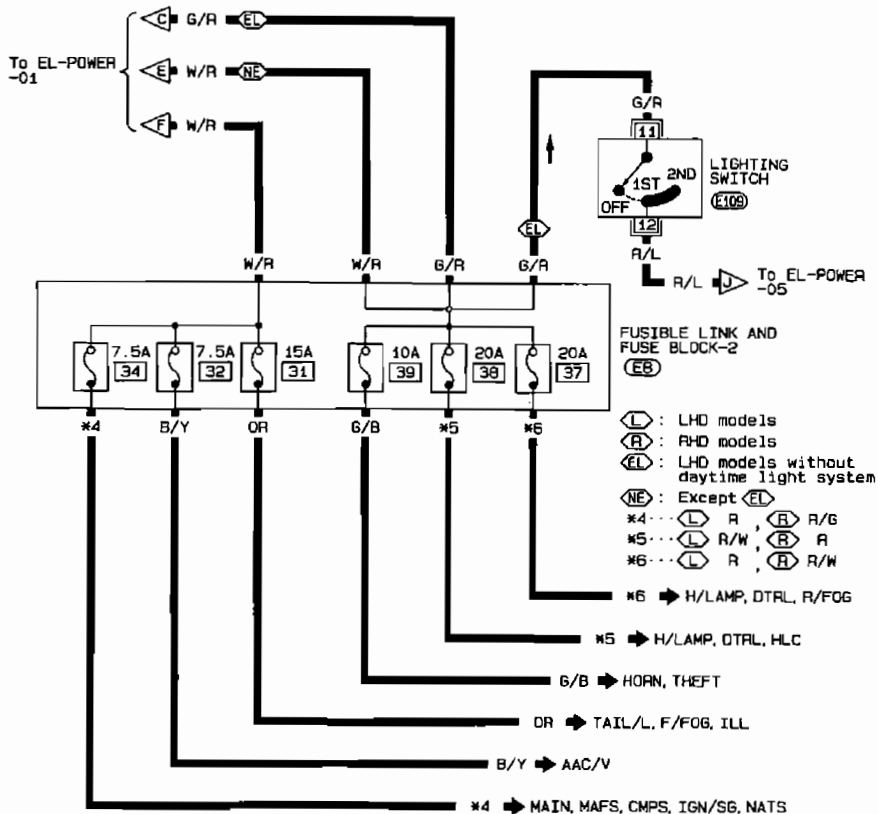
(M10), (E10)

EL

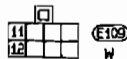
# POWER SUPPLY ROUTING

## Wiring Diagram — POWER — (Cont'd)

EL-POWER-03



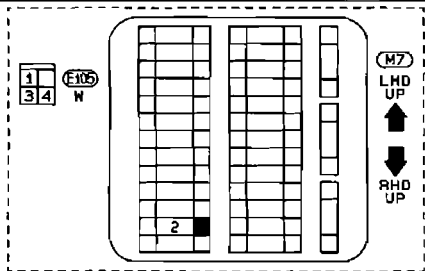
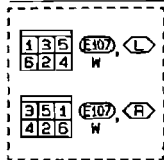
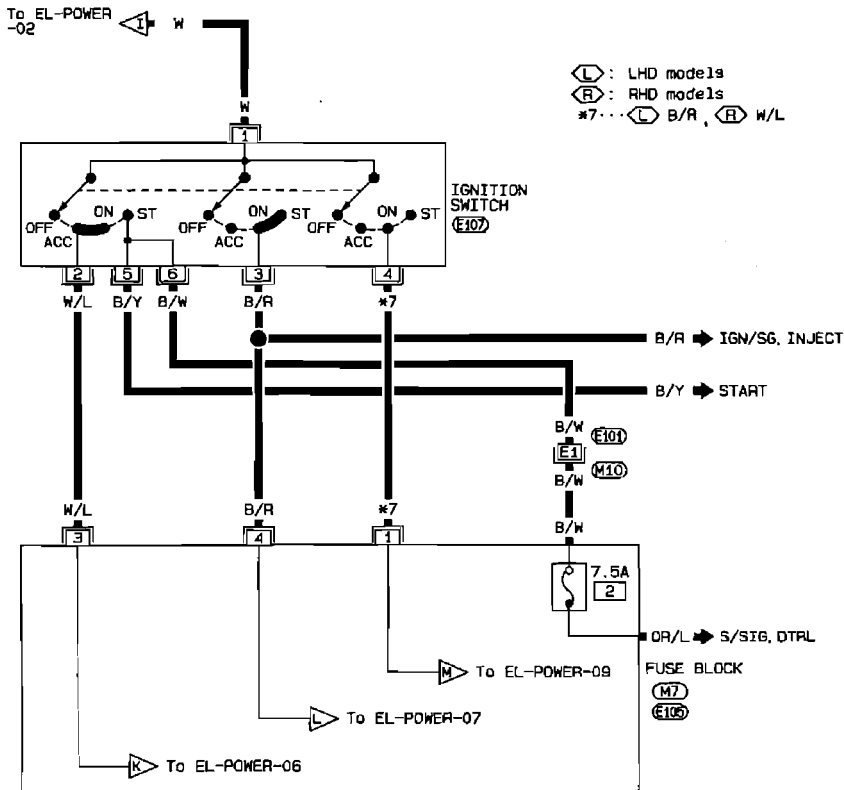
FRONT ←



# POWER SUPPLY ROUTING

## Wiring Diagram — POWER — (Cont'd)

EL-POWER-04



Refer to last page (foldout page).

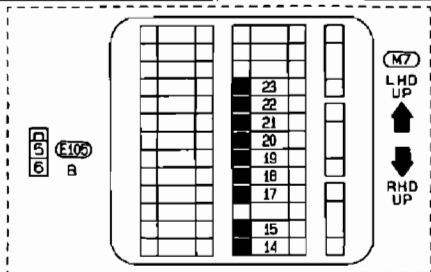
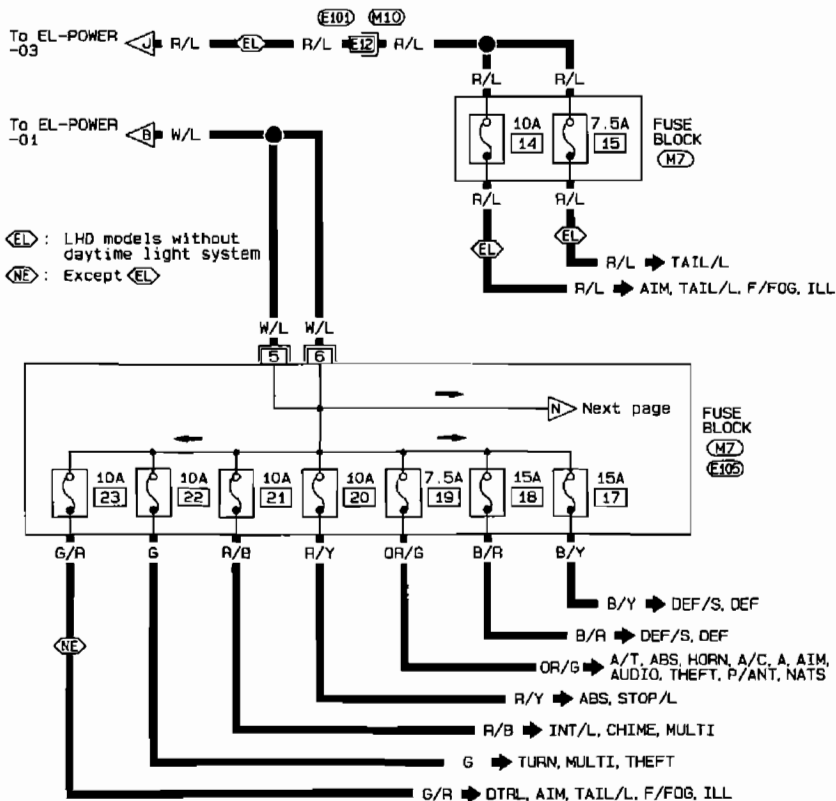
(M10), (E101)

EL

# POWER SUPPLY ROUTING

## Wiring Diagram — POWER — (Cont'd)

EL-POWER-05



Refer to last page (Foldout page).

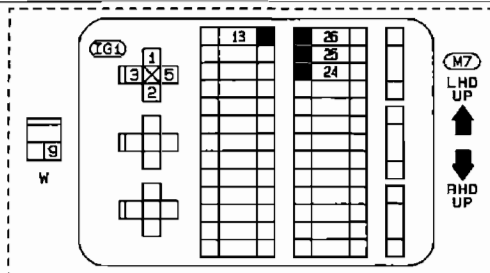
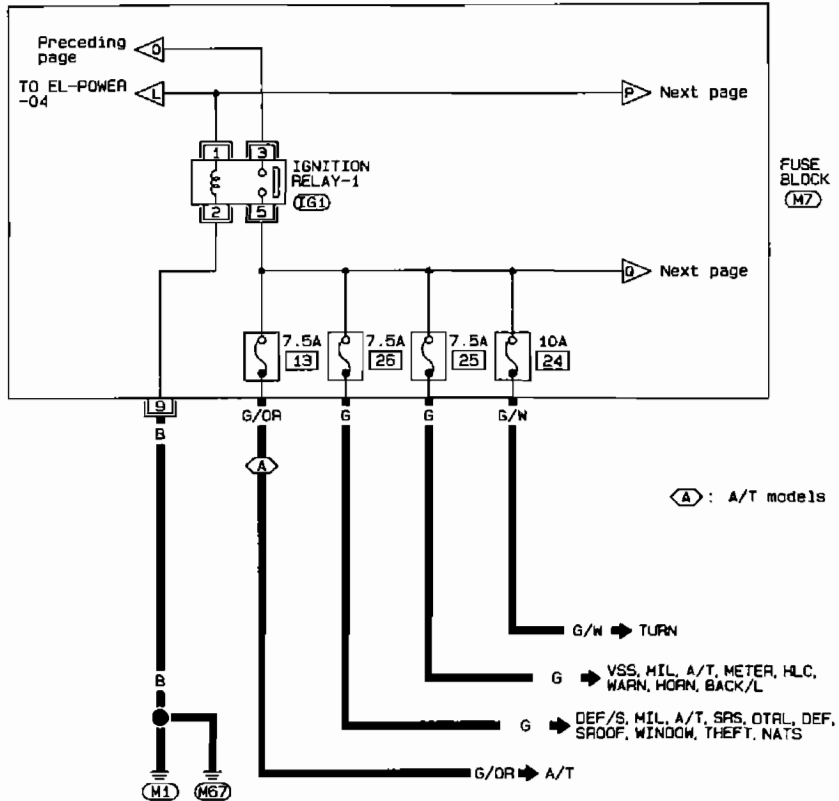
(M10), (E10)



# POWER SUPPLY ROUTING

## Wiring Diagram — POWER — (Cont'd)

EL-POWER-07



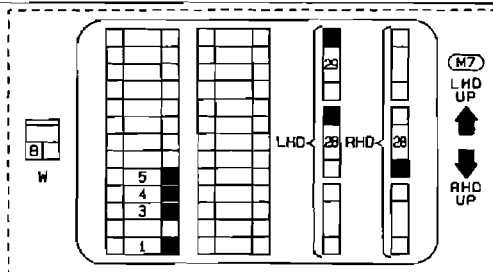
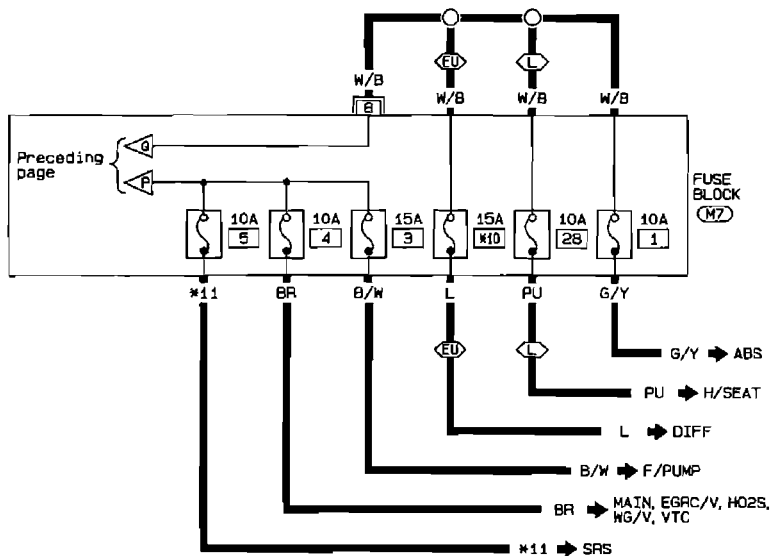


# POWER SUPPLY ROUTING

## Wiring Diagram — POWER — (Cont'd)

EL-POWER-08

- ⊖ L : LHD models
- ⊖ R : RHD models
- ⊖ EU : For Europe
- \*10 : ⊖ L 29 , ⊖ R 28
- \*11 : ⊖ L R/L , ⊖ R L

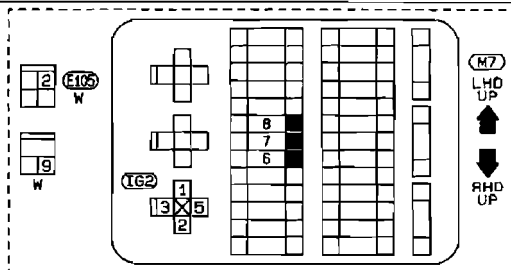
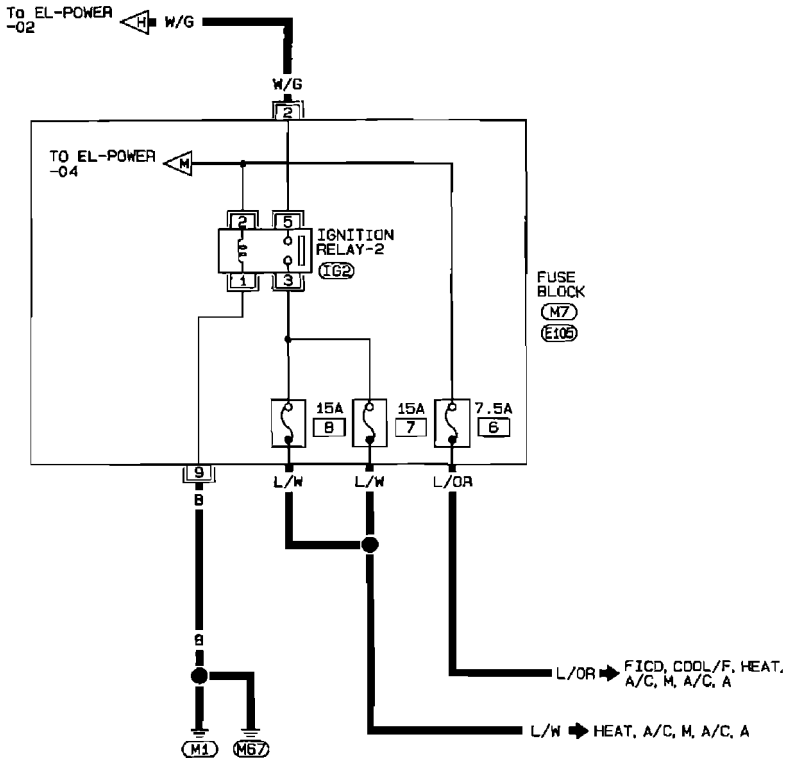


EL

# POWER SUPPLY ROUTING

## Wiring Diagram — POWER — (Cont'd)

EL-POWER-09



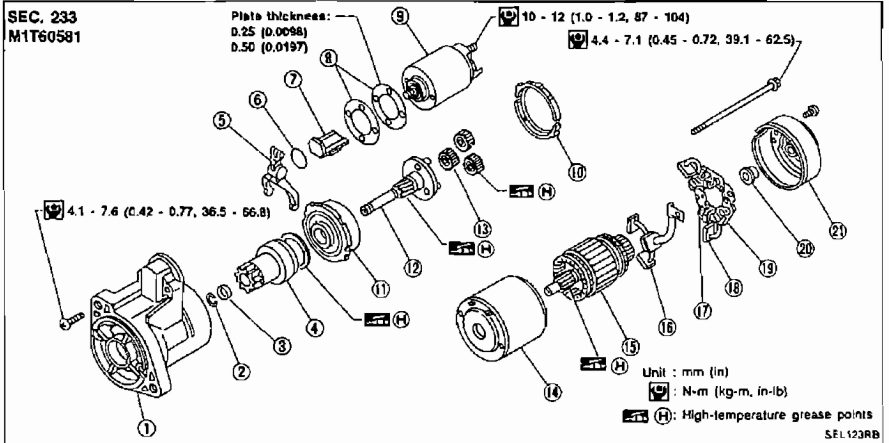
## BATTERY

### Service Data and Specifications (SDS)

| Applied model | For Europe and Australia | Excepi for Europe and Australia | Optional on LHD models for Europe |
|---------------|--------------------------|---------------------------------|-----------------------------------|
| Type          | 55D23R                   | 65D26R                          | 80D26R                            |
| Capacity V-AH | 12 - 60                  | 12 - 65                         | 12 - 65                           |

# STARTING SYSTEM

## Construction



- |                   |                            |                |
|-------------------|----------------------------|----------------|
| ① Gear case       | ⑧ Adjusting plate          | ⑮ Armature     |
| ② Stopper clip    | ⑨ Magnetic switch assembly | ⑯ Brush (+)    |
| ③ Pinion stopper  | ⑩ Packing                  | ⑰ Brush spring |
| ④ Pinion assembly | ⑪ Internal gear            | ⑱ Brush (-)    |
| ⑤ Shift lever     | ⑫ Shaft                    | ⑲ Brush holder |
| ⑥ Plate           | ⑬ Planetary gear           | ⑳ Rearing      |
| ⑦ Packing         | ⑭ Yoke                     | ㉑ Rear cover   |

## Service Data and Specifications (SDS)

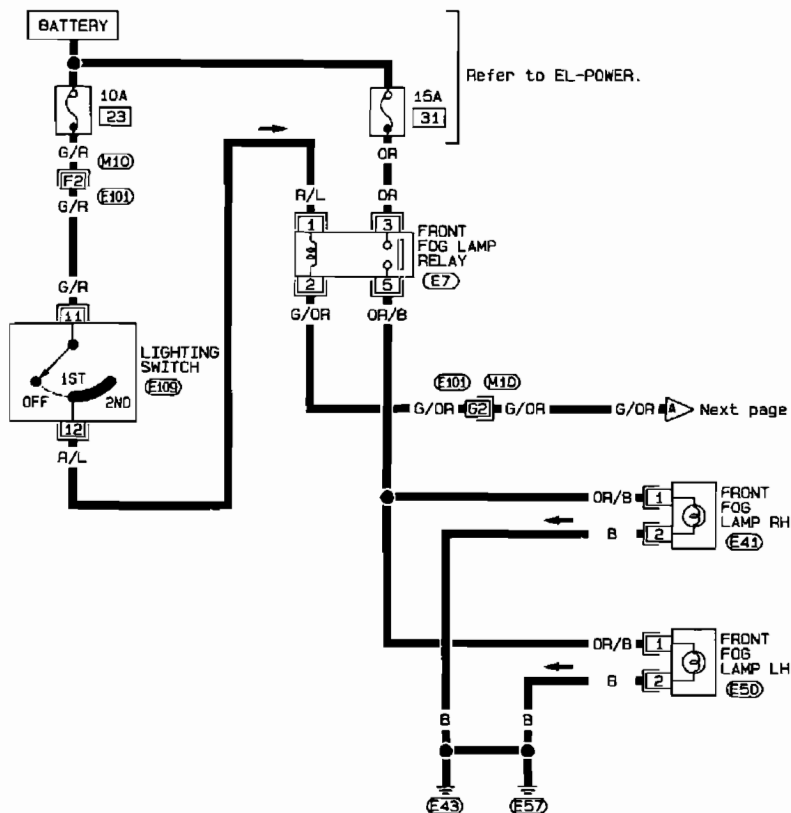
### STARTER MOTOR

| Type                                      | M1T60581            |                                       |
|---|---------------------|---------------------------------------|
|   | Reduction gear type |                                       |
|   | MITSUBISHI          |                                       |
| System voltage                            | V                   | 12                                    |
| No load                                   |                     |                                       |
| Terminal voltage                          | V                   | 11.0                                  |
| Current                                   | A                   | 50 - 75                               |
| Revolution                                | rpm                 | 3,000 - 4,000                         |
| Minimum diameter of commutator            | mm (in)             | 26.8 (1.134)                          |
| Minimum length of brush                   | mm (in)             | 12.0 (0.472)                          |
| Brush spring tension                      | N (kg, lb)          | 13.7 - 25.5<br>(1.4 - 2.6, 3.1 - 5.7) |
| Movement "E" in height of pinion assembly | mm (in)             | 0.5 - 2.0<br>(0.020 - 0.079)          |

Front Fog Lamp/Wiring Diagram — F/FOG —

LHD MODELS WITH DAYTIME LIGHT SYSTEM

EL-F/FOG-01



E109  
W



E7  
L



E41 E50  
GY GY

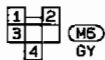
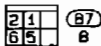
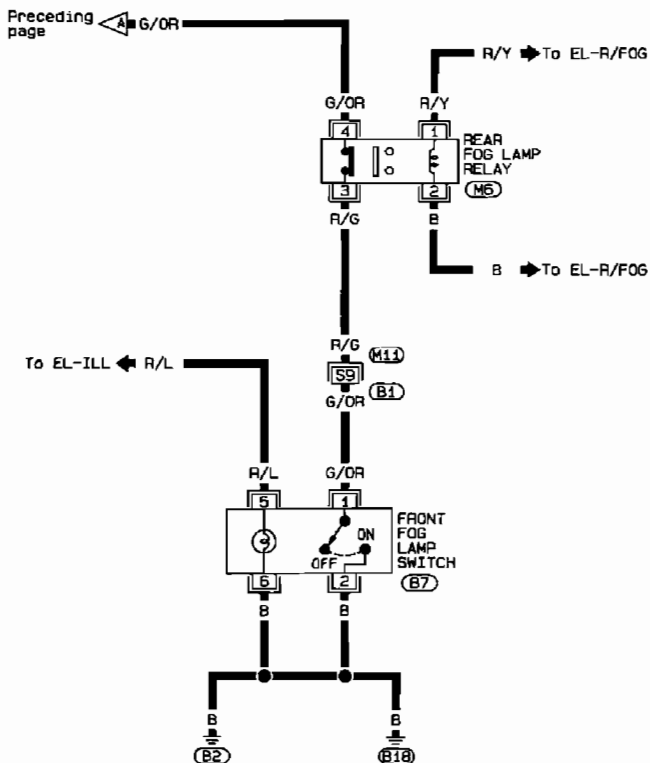
Refer to last page (Foldout page).

M10, E101

# EXTERIOR LAMP

## Front Fog Lamp/Wiring Diagram — F/FOG — (Cont'd)

EL-F/FOG-02



Refer to last page  
(Foldout page).

(M11), (B1)

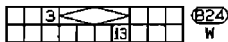
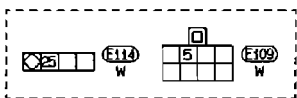
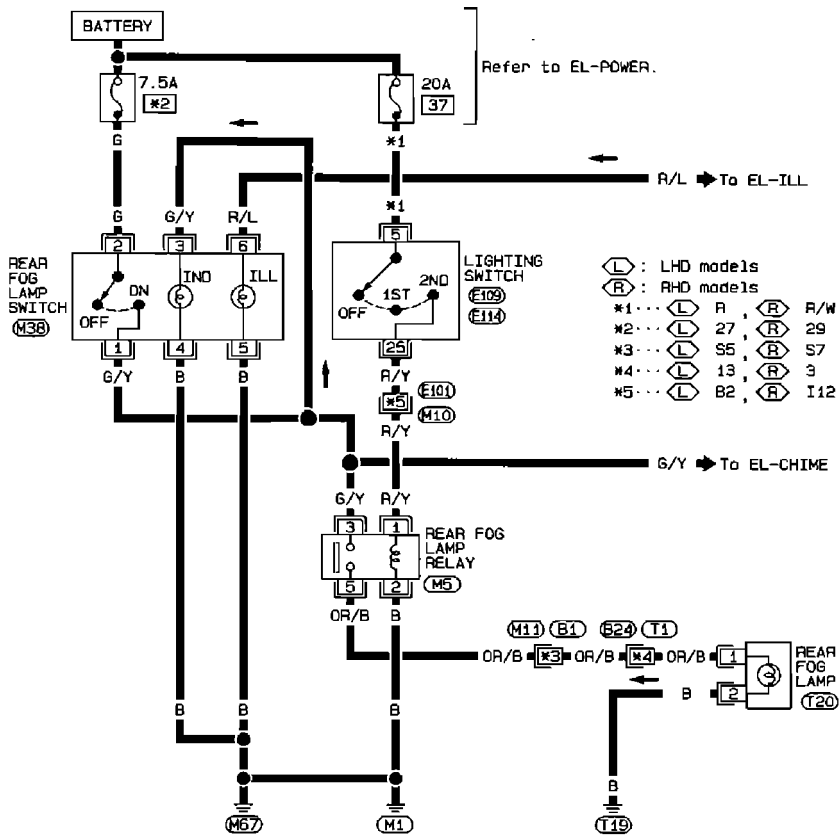


# EXTERIOR LAMP

## Rear Fog Lamp/Wiring Diagram — R/FOG — (Cont'd)

WITHOUT DAYTIME LIGHT SYSTEM

EL-R/FOG-02

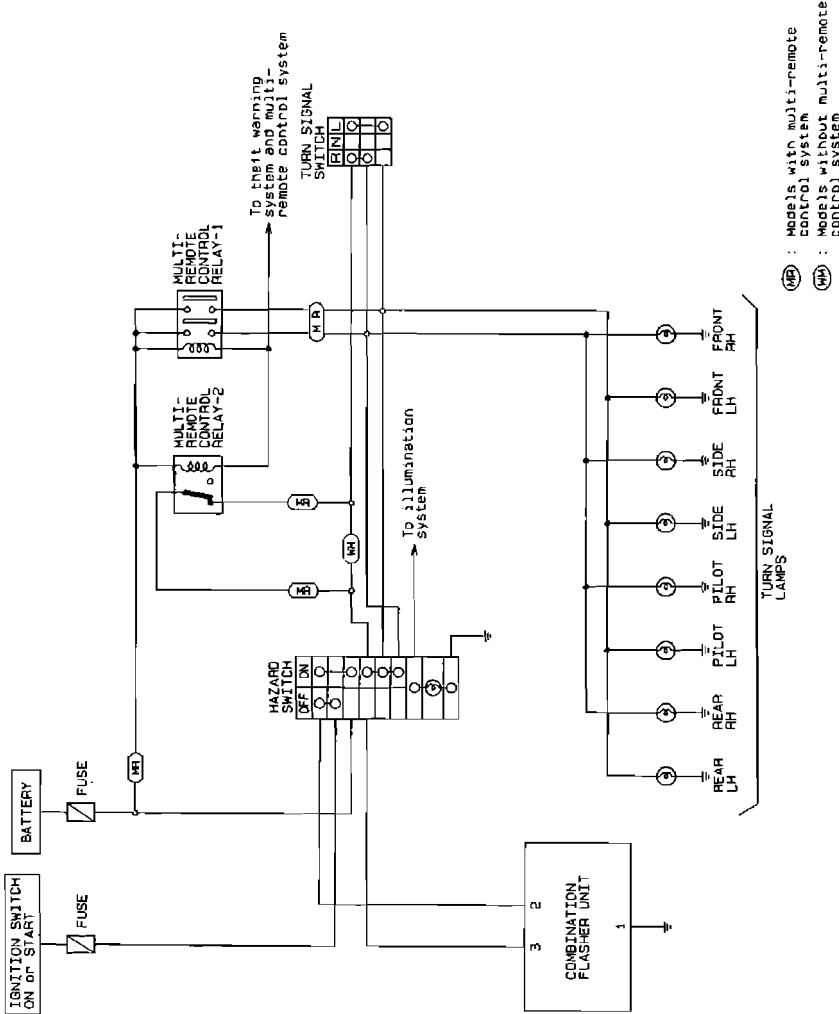


Refer to last page (foldout page).

M10, E101  
M11, B1



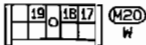
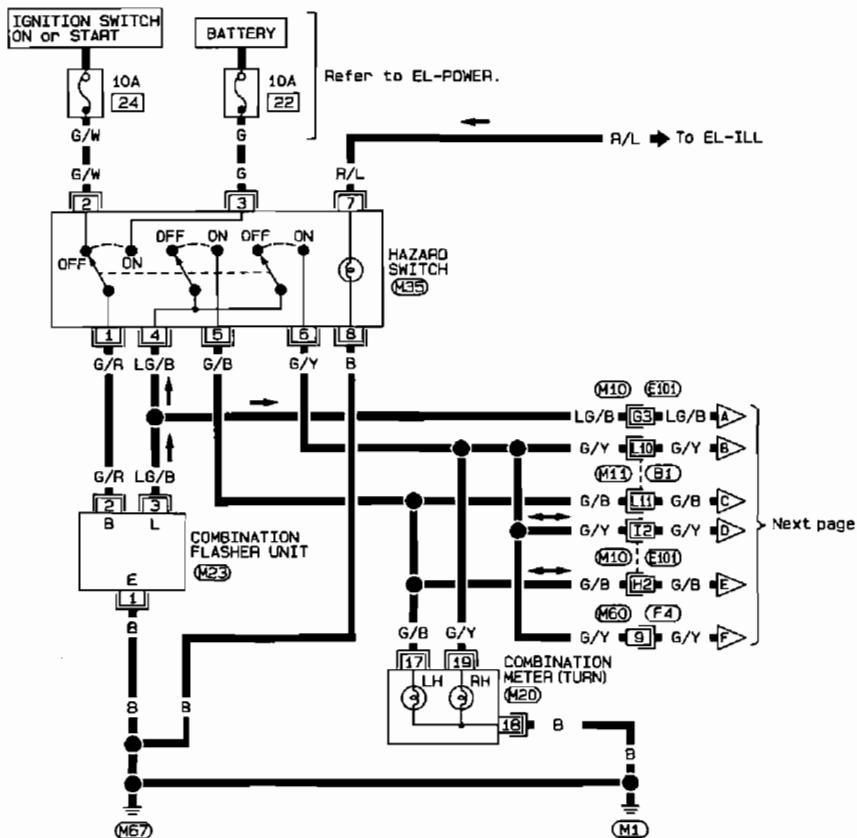
Turn Signal and Hazard Warning Lamps/  
Schematic



Turn Signal and Hazard Warning Lamps/Wiring  
Diagram — TURN —

LHD MODELS

EL-TURN-01

Refer to last page  
(foldout page):

M10, E101

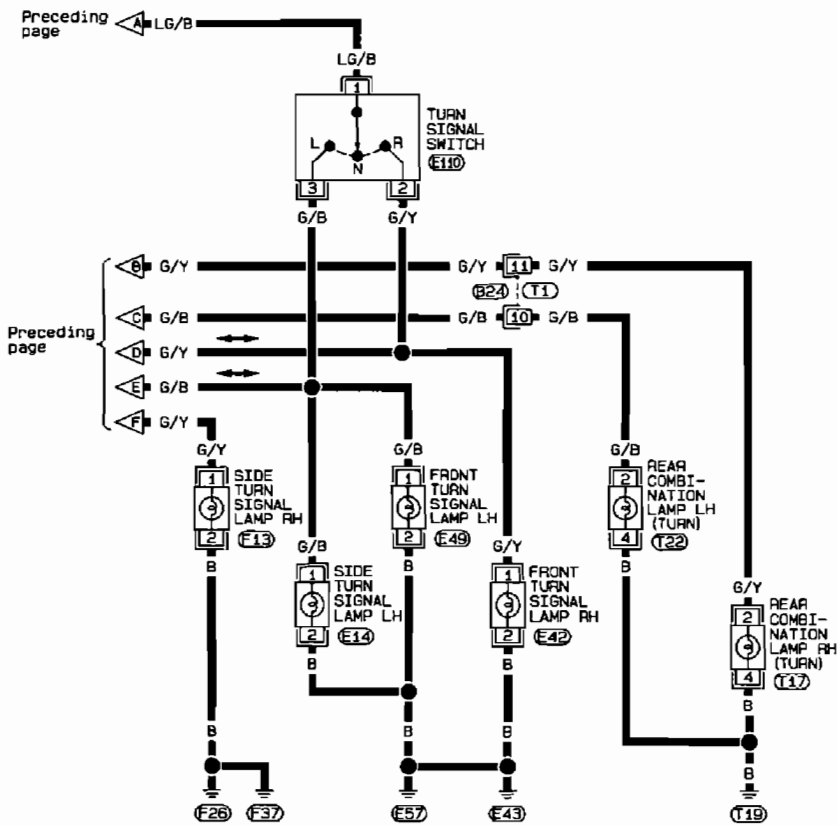
M11, B1

M20, F4

# EXTERIOR LAMP

## Turn Signal and Hazard Warning Lamps/Wiring Diagram — TURN — (Cont'd)

EL-TURN-02



|   |       |       |
|---|-------|-------|
| 0 |       | (E10) |
| 3 | 1 1 2 | W     |



|       |
|-------|
| (E42) |
| BR    |

|       |
|-------|
| (E49) |
| BR    |

|       |
|-------|
| (E14) |
| GY    |

|       |
|-------|
| (F13) |
| GY    |

|   |   |       |       |
|---|---|-------|-------|
| 0 |   | (T17) | (T22) |
| 2 | 4 | W     | W     |

|  |  |    |    |  |  |  |  |  |  |
|--|--|----|----|--|--|--|--|--|--|
|  |  |    |    |  |  |  |  |  |  |
|  |  | 10 | 11 |  |  |  |  |  |  |

|       |
|-------|
| (E24) |
| W     |

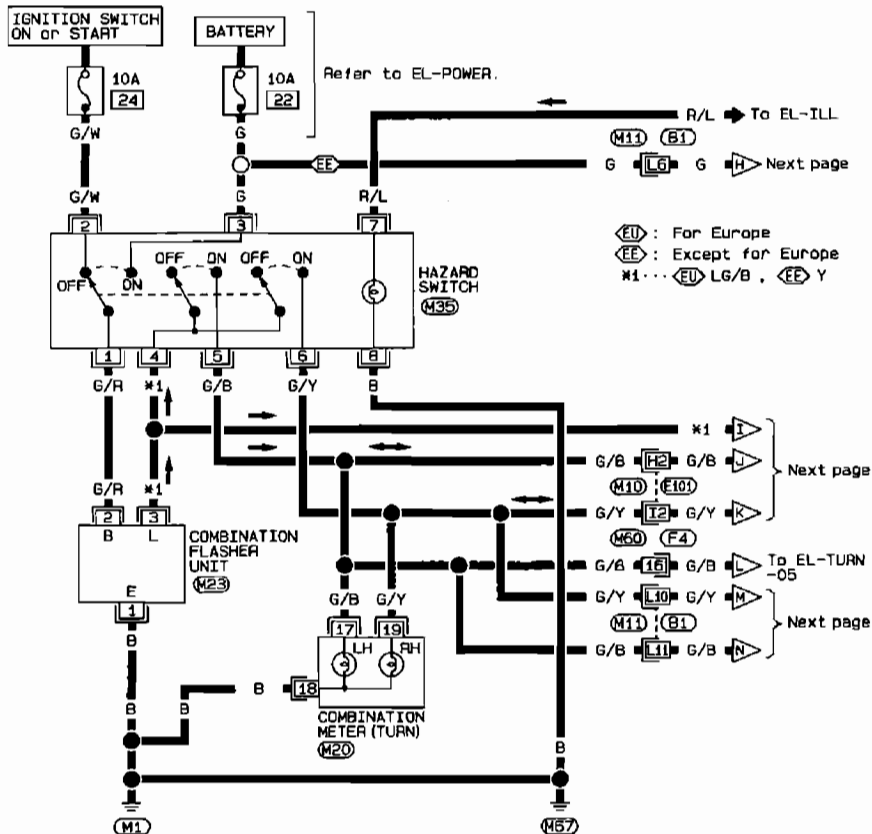
EL

# EXTERIOR LAMP

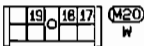
## Turn Signal and Hazard Warning Lamps/Wiring Diagram — TURN — (Cont'd)

RHD MODELS

EL-TURN-03



(EU) : For Europe  
 (EE) : Except for Europe  
 \*1... (EU) LG/B, (EE) Y



Refer to last page (foldout page).

(M10, E10)

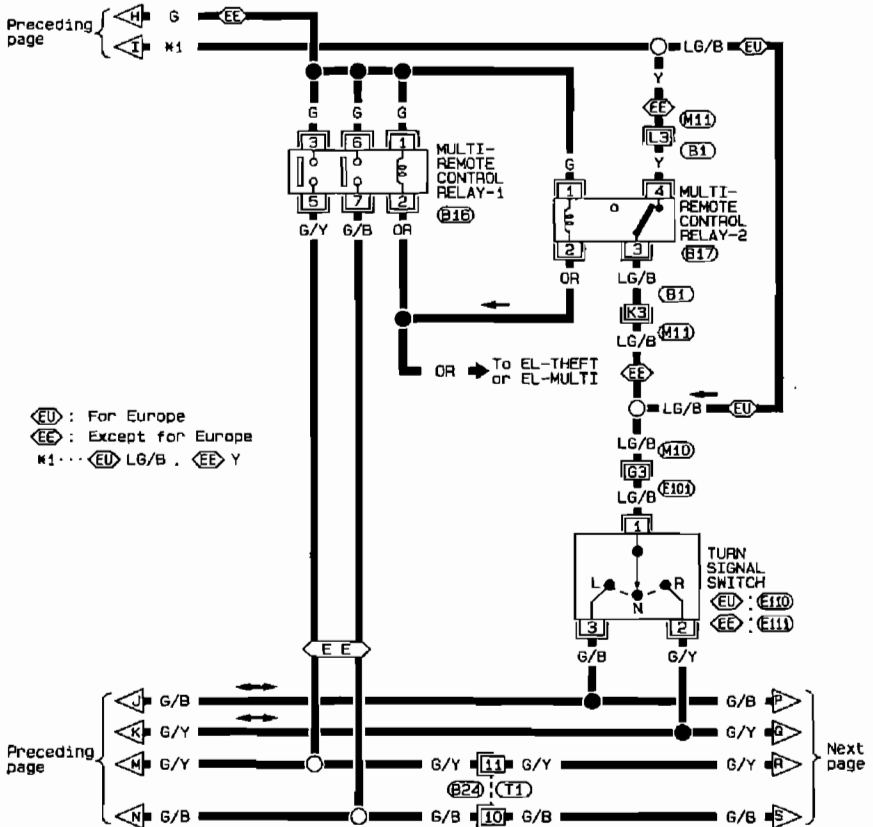
(M13, B1)

(M50, F4)

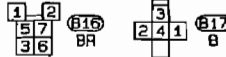
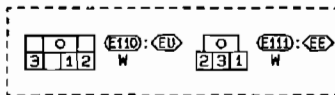
# EXTERIOR LAMP

## Turn Signal and Hazard Warning Lamps/Wiring Diagram — TURN — (Cont'd)

EL-TURN-04



(EU) : For Europe  
 (EE) : Except for Europe  
 M1... (EU) LG/B, (EE) Y



Refer to last page (foldout page).

(M10), (E10)  
 (M11), (B1)

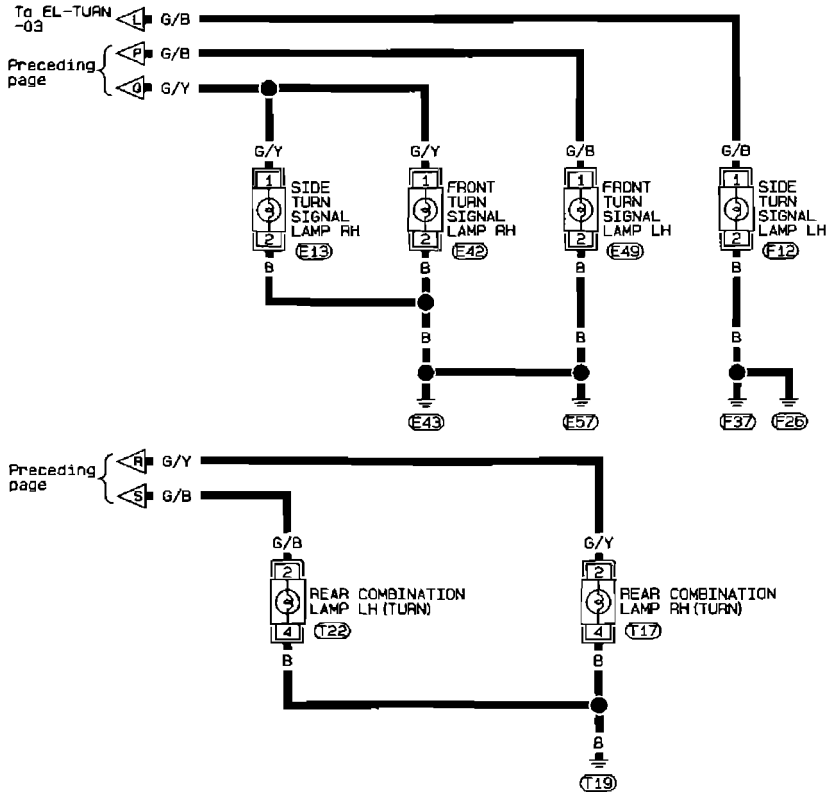


EL

# EXTERIOR LAMP

## Turn Signal and Hazard Warning Lamps/Wiring Diagram — TURN — (Cont'd)

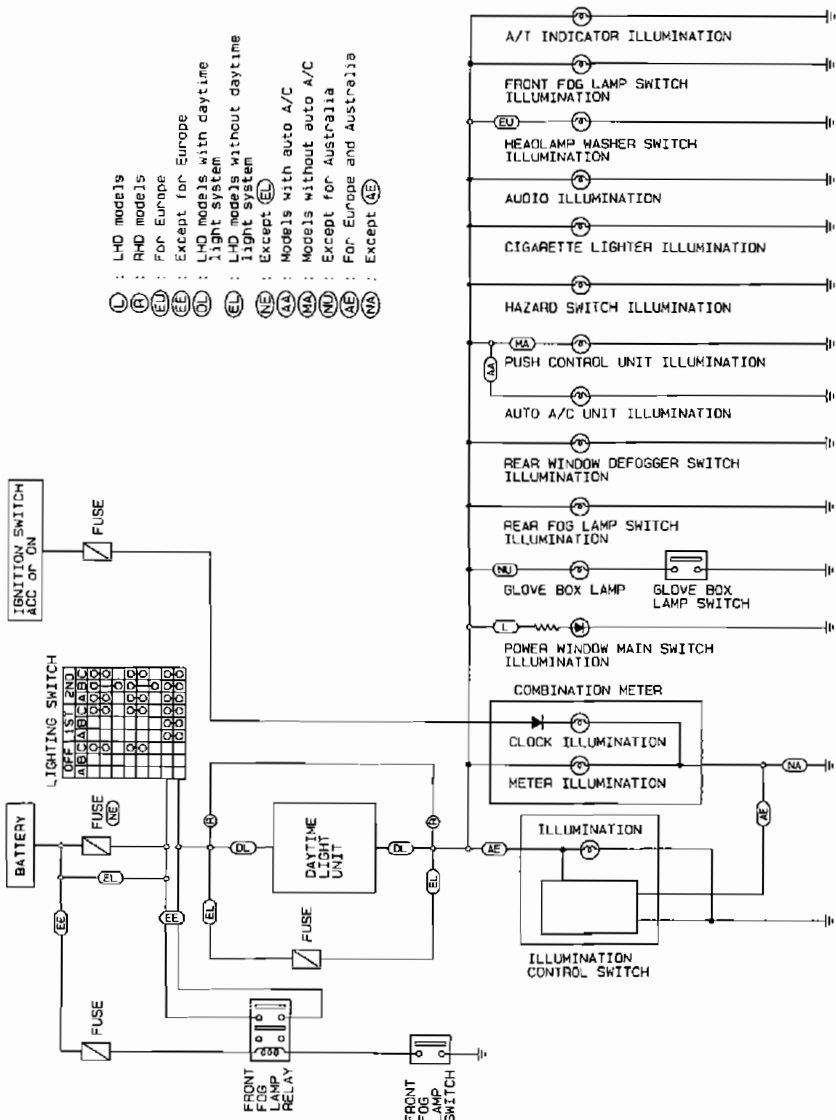
EL-TURN-05



(T12) E42, E49, E13, F12  
BR BR GY GY

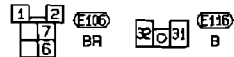
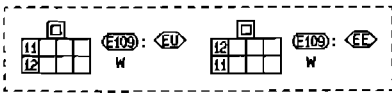
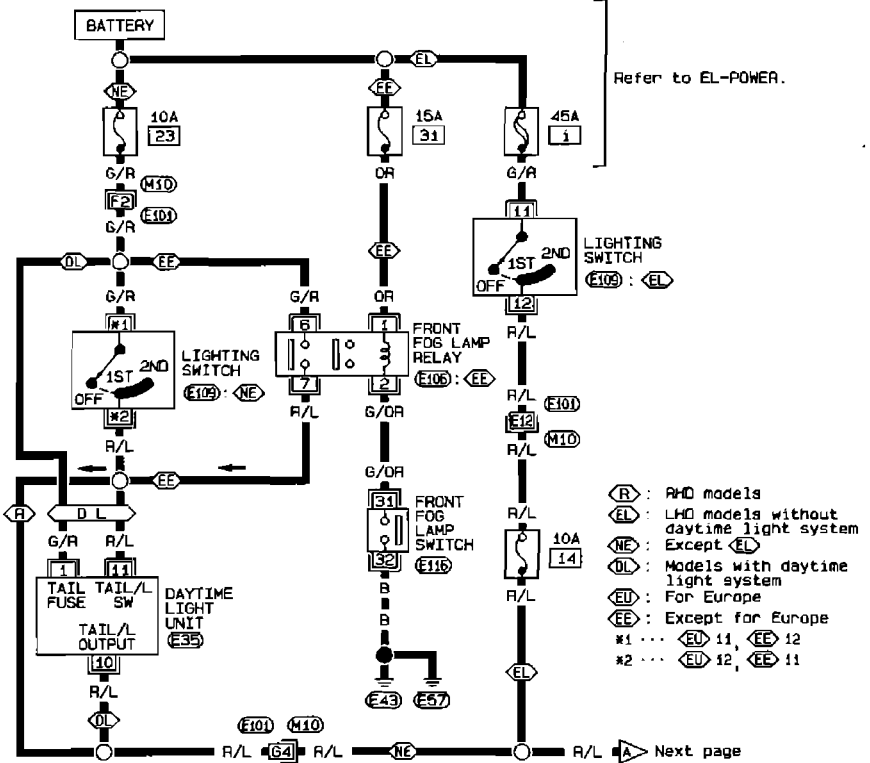
|   |              |
|---|--------------|
| 0 | (T17), (T22) |
| 2 | W W          |

## Illumination/Schematic



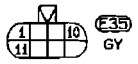
Illumination/Wiring Diagram — ILL —

EL-ILL-01



Refer to last page (Foldout page).

M10, E101



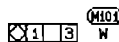
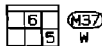
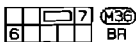
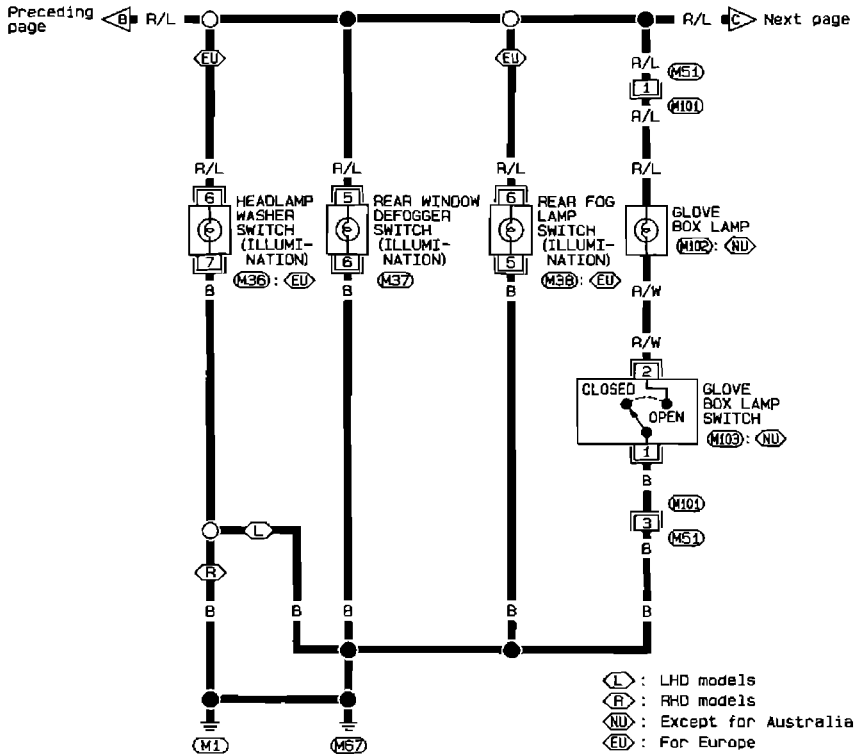




# INTERIOR LAMP

## Illumination/Wiring Diagram — ILL — (Cont'd)

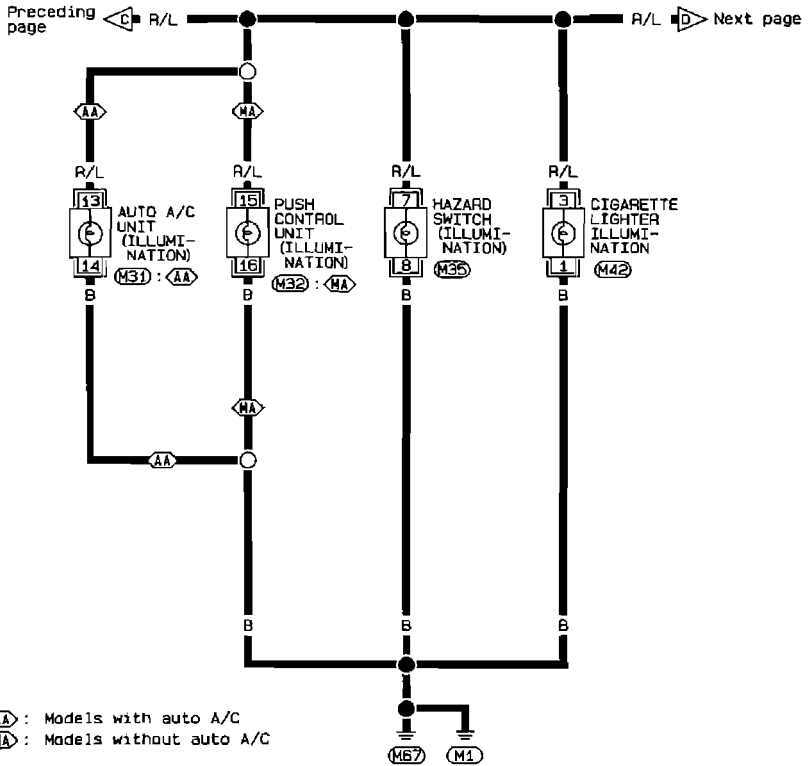
EL-ILL-03



# INTERIOR LAMP

## Illumination/Wiring Diagram — ILL — (Cont'd)

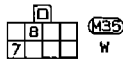
EL-ILL-04



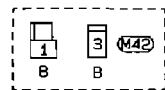
M31  
B



M32  
B



M35  
W



M42  
B

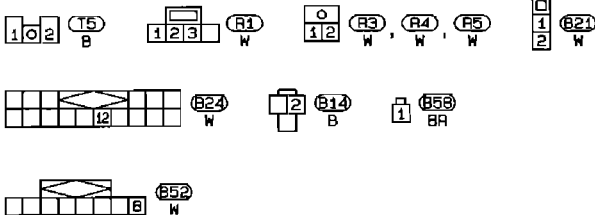
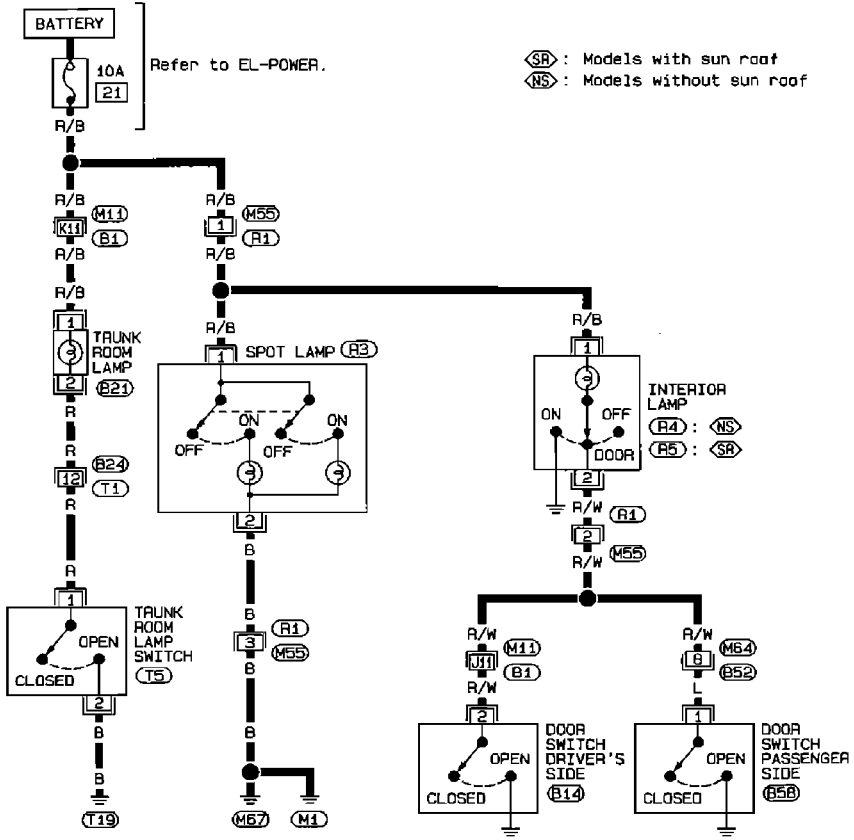
EL



Interior, Spot and Trunk Room Lamps/Wiring Diagram — INT/L —

LHD MODELS

EL-INT/L-01



Refer to last page (Foldout page).

(M11), (B1)

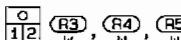
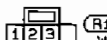
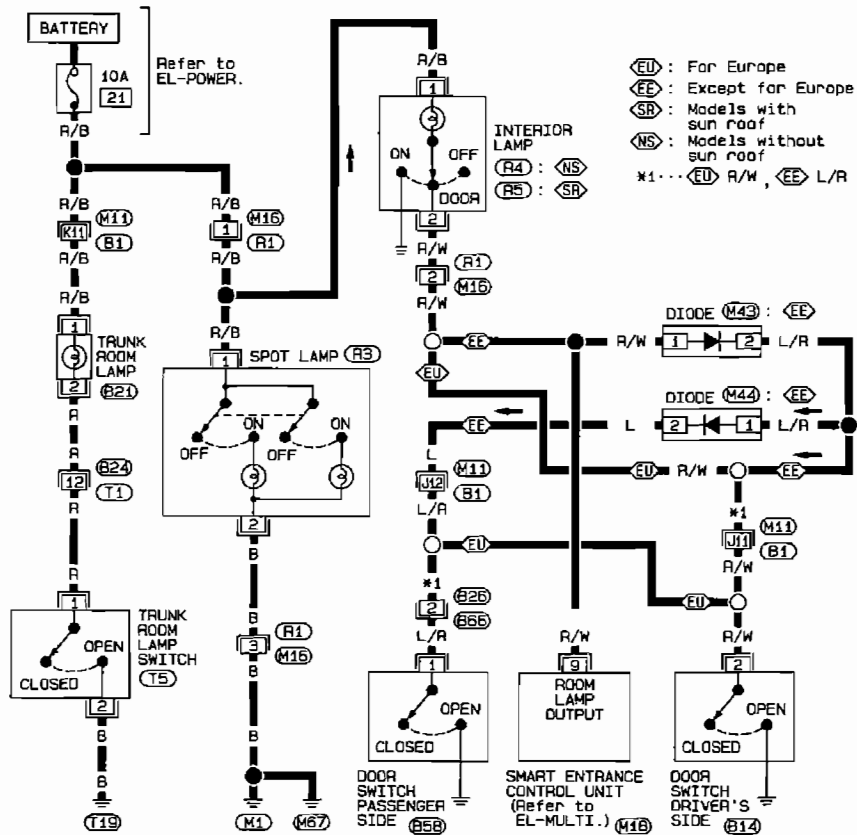
EL

# INTERIOR LAMP

## Interior, Spot and Trunk Room Lamps/Wiring Diagram — INT/L — (Cont'd)

RHD MODELS

EL-INT/L-02

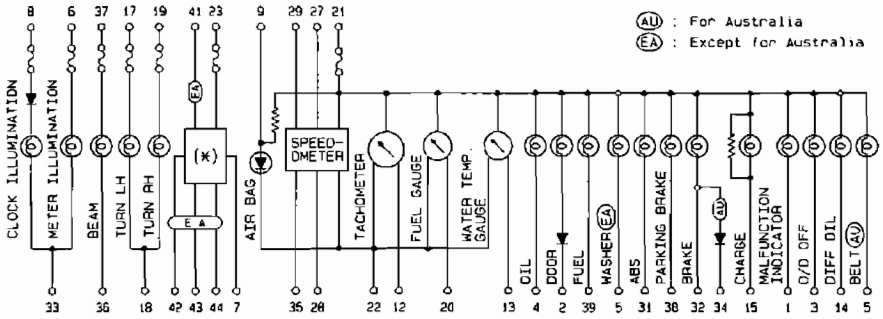
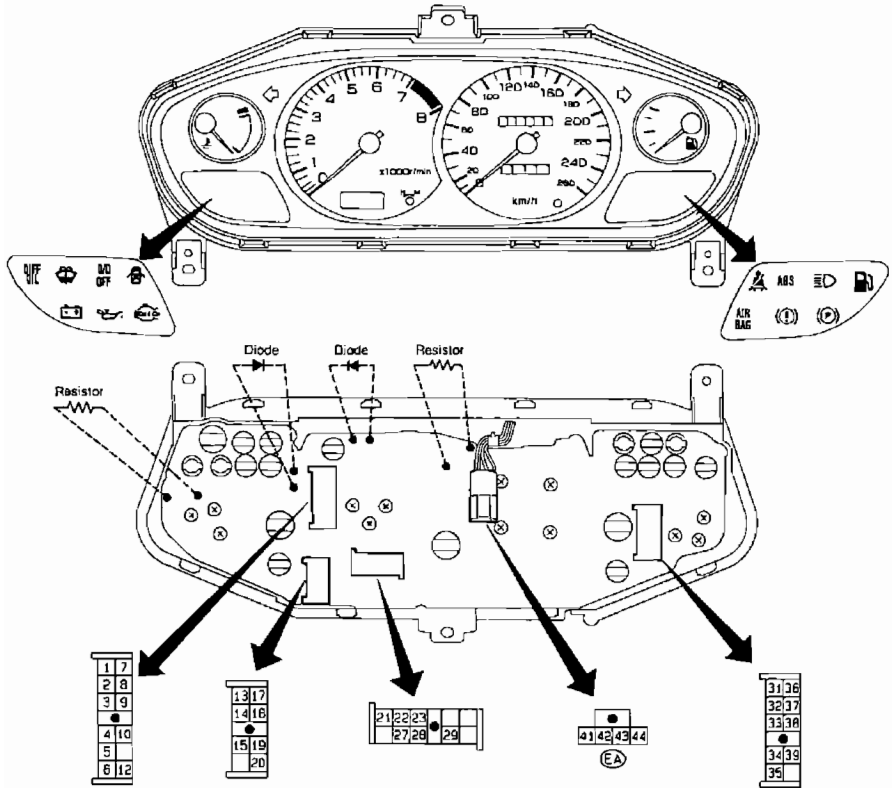


Refer to last page (foldout page).

M11, B1

M16

## Combination Meter



(AU) : For Australia  
 (EA) : Except for Australia

(\*) : Digital clock (AU)  
 Digital clock and Ambient (Outside) temperature display (EA)

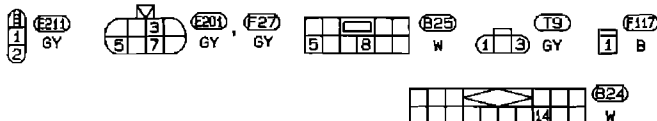
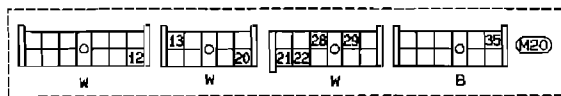
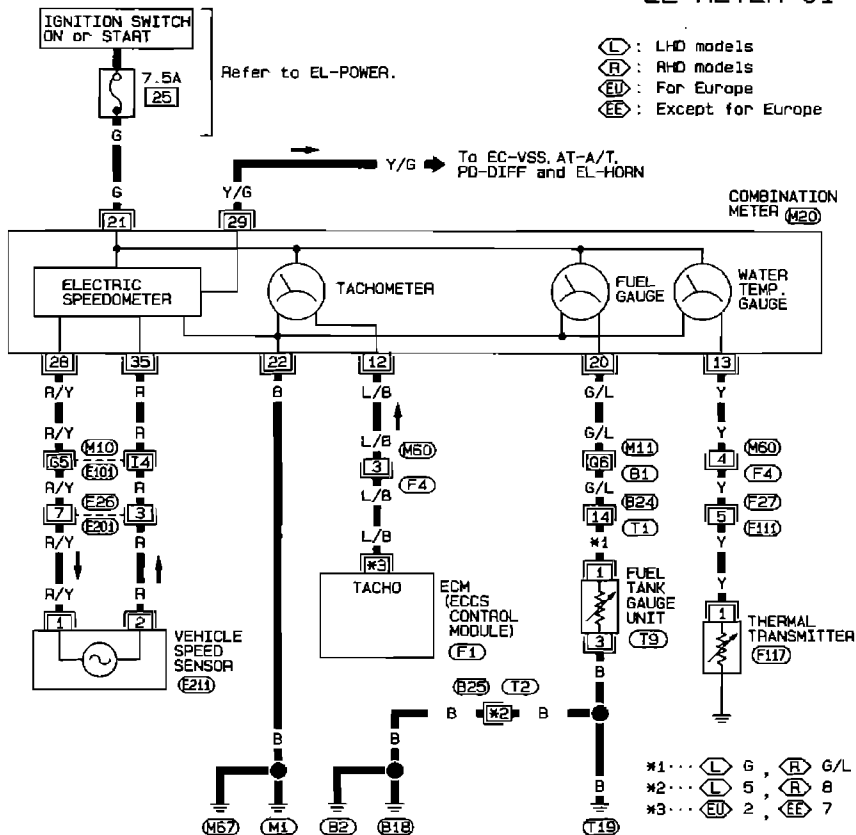
EL

TM

# METER AND GAUGES

## Speedometer, Tachometer, Temp. and Fuel Gauges/Wiring Diagram — METER —

EL-METER-01

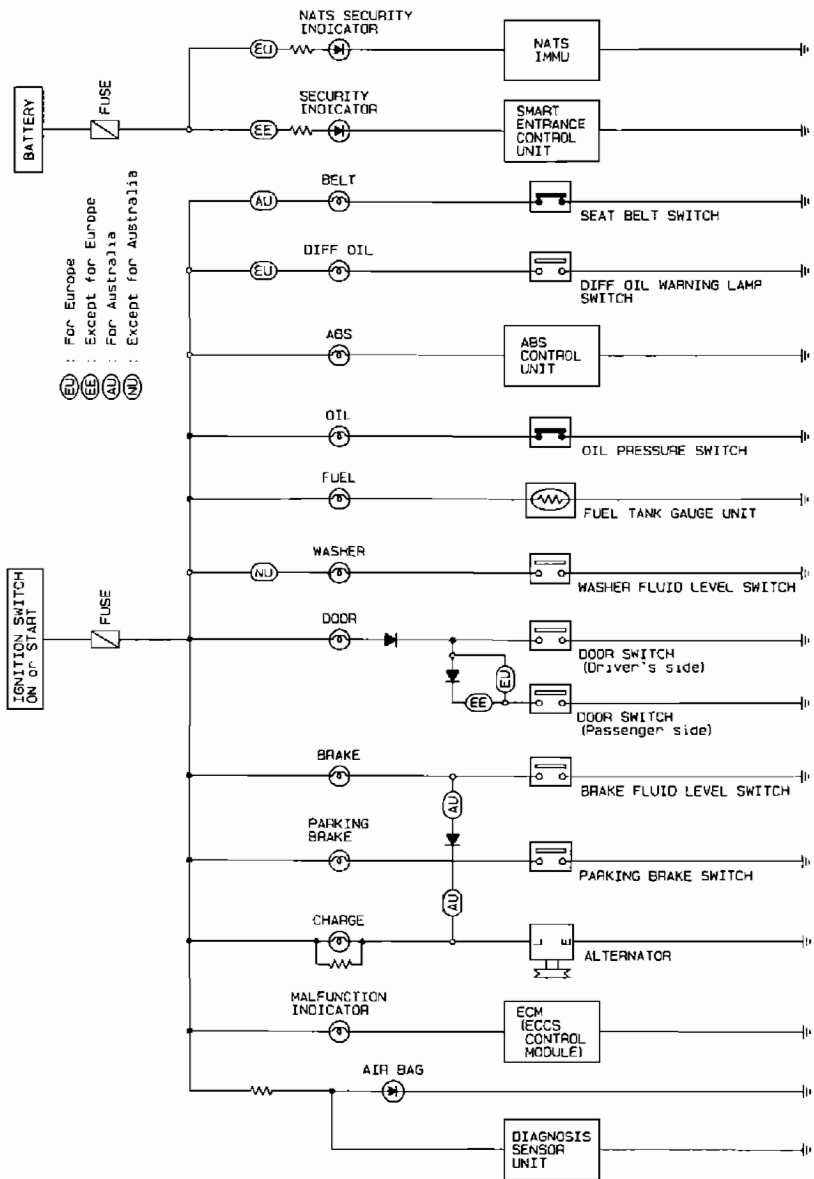


Refer to last page (foldout page).

(M10), (E101)  
(M11), (B1)  
(M50), (F4)  
(F1)



## Warning Lamps/Schematic

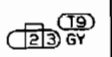
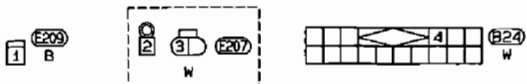
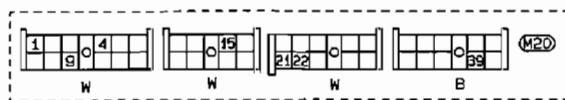
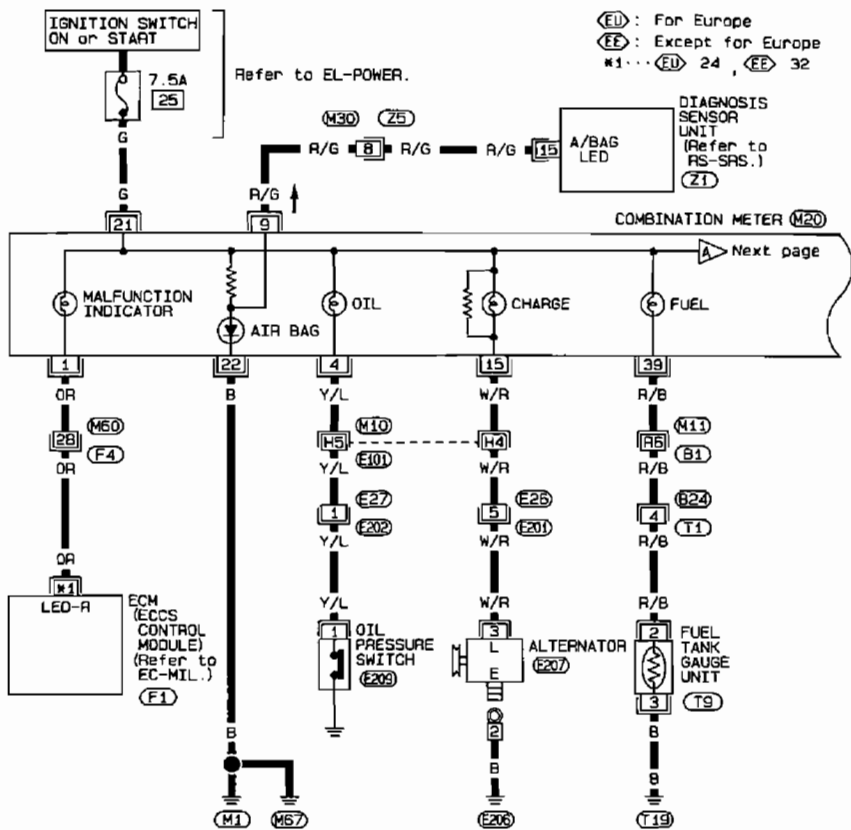


EL

## Warning Lamps/Wiring Diagram — WARN —

LHD MODELS

EL-WARN-01



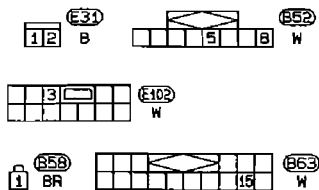
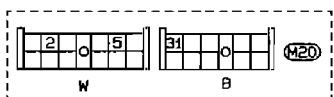
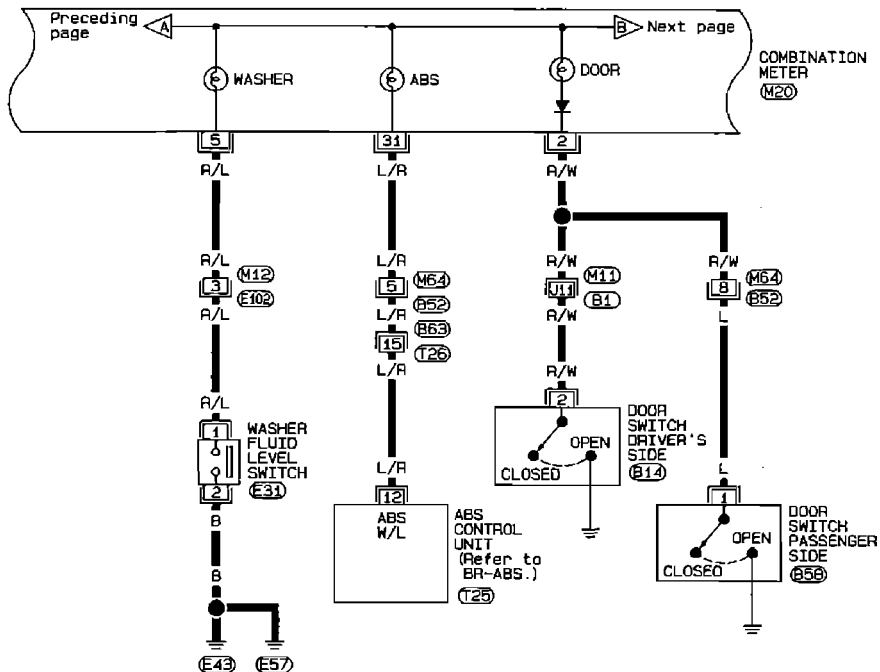
Refer to last page (Foldout page).

- M10, E101
- M11, B1
- M60, F4
- F1

# WARNING LAMPS AND BUZZER

## Warning Lamps/Wiring Diagram — WARN — (Cont'd)

EL-WARN-02



Refer to last page  
(Foldout page).

(M11), (E11)

EL

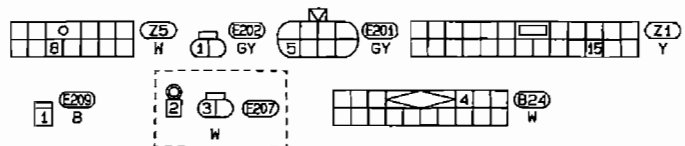
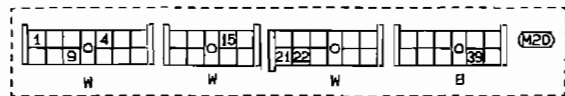
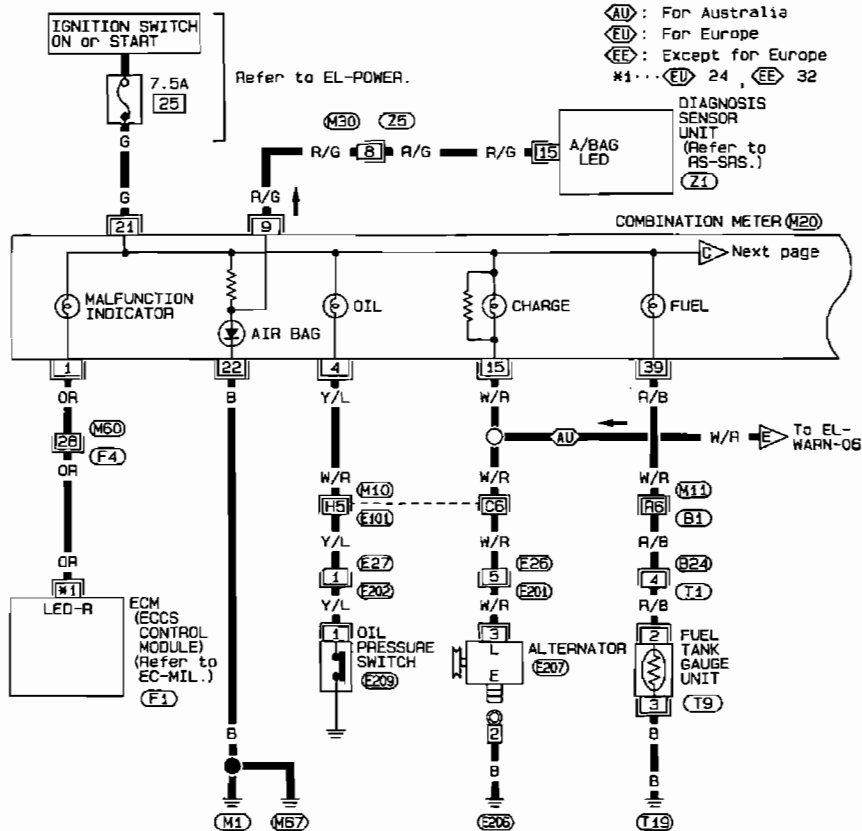


# WARNING LAMPS AND BUZZER

## Warning Lamps/Wiring Diagram — WARN — (Cont'd)

RHD MODELS

EL-WARN-04



Refer to last page (Foldout page).

M10 (E101)  
M11 (B1)  
M50 (F4)  
F1

EL

# WARNING LAMPS AND BUZZER

## Warning Lamps/Wiring Diagram — WARN — (Cont'd)

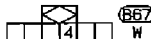
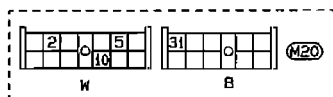
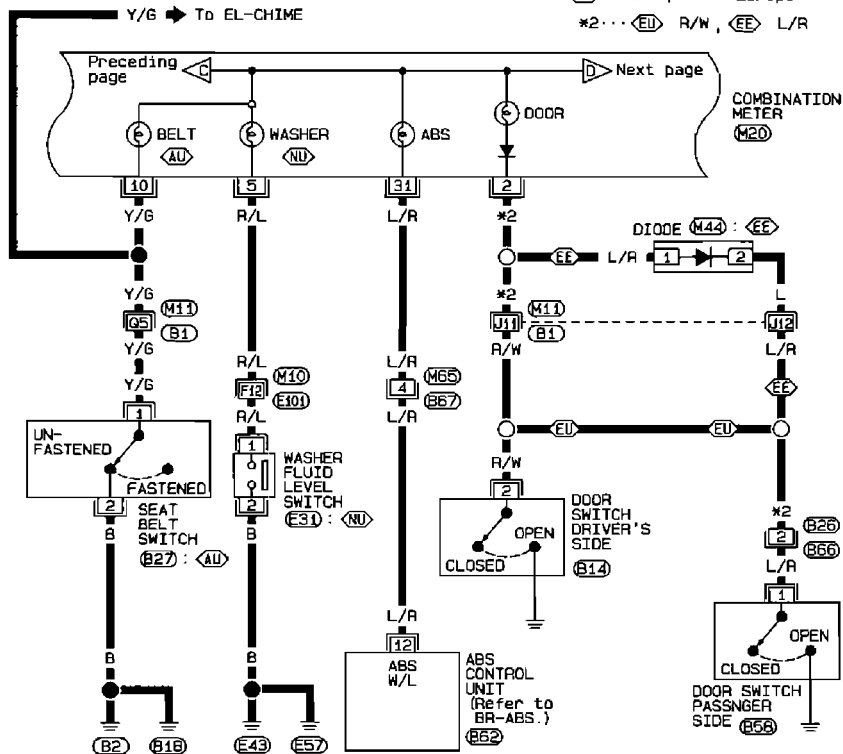
EL-WARN-05

(NU) : Except for Australia

(EU) : For Europe

(EE) : Except for Europe

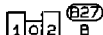
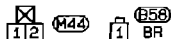
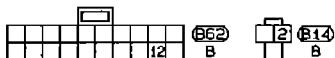
\*2... (EU) R/W, (EE) L/R



Refer to last page  
(Foldout page).

(M10), (E101)

(M11), (B1)

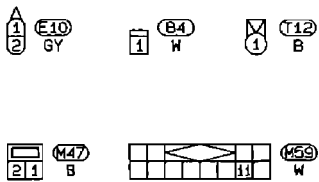
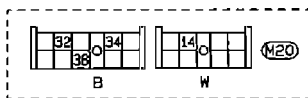
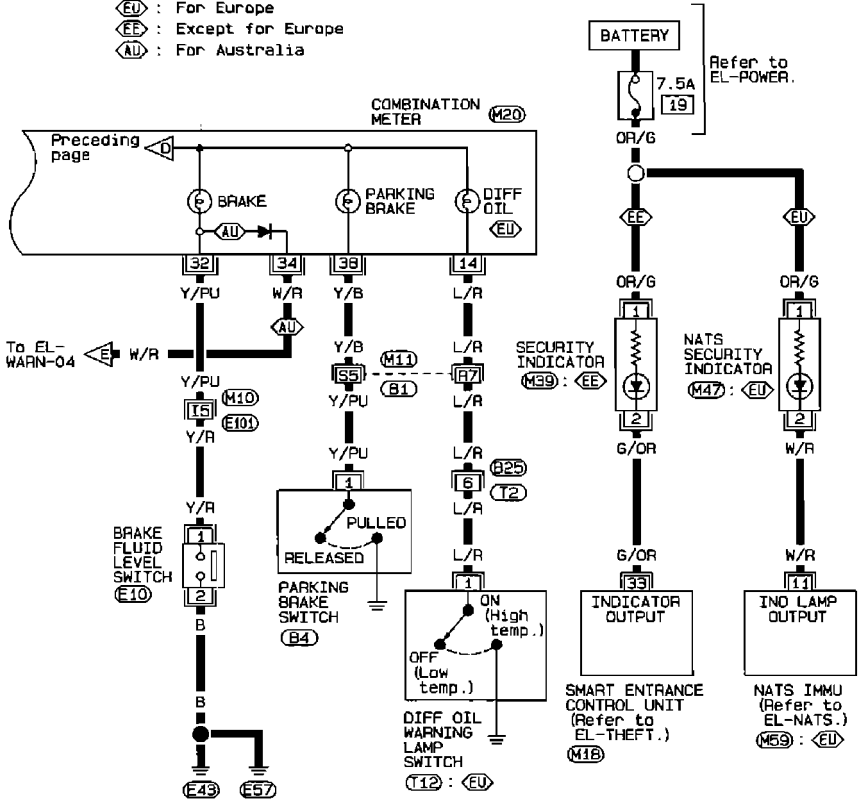


# WARNING LAMPS AND BUZZER

## Warning Lamps/Wiring Diagram — WARN — (Cont'd)

EL-WARN-06

- Ⓔ : For Europe
- Ⓕ : Except for Europe
- Ⓖ : For Australia



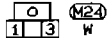
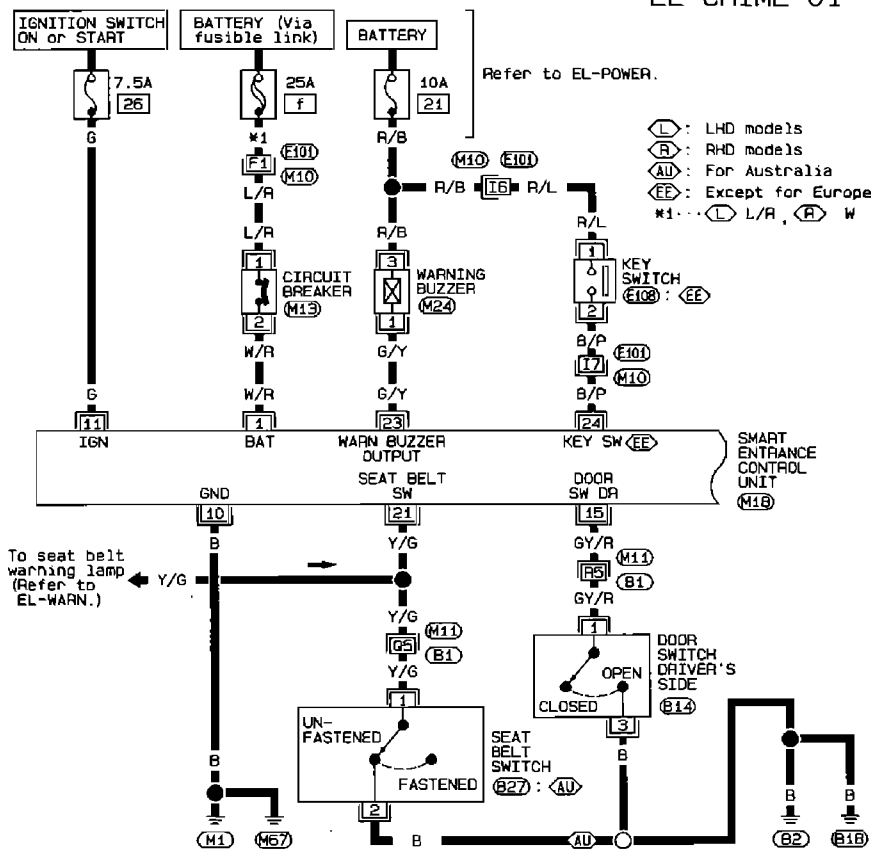
Refer to last page (foldout page).

- M10, E10
- M11, B1
- M18

EL

Warning Buzzer/Wiring Diagram — CHIME —

EL-CHIME-01



Refer to last page (foldout page).

(M10), (E101)

(M11), (B1)

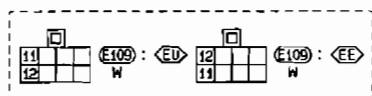
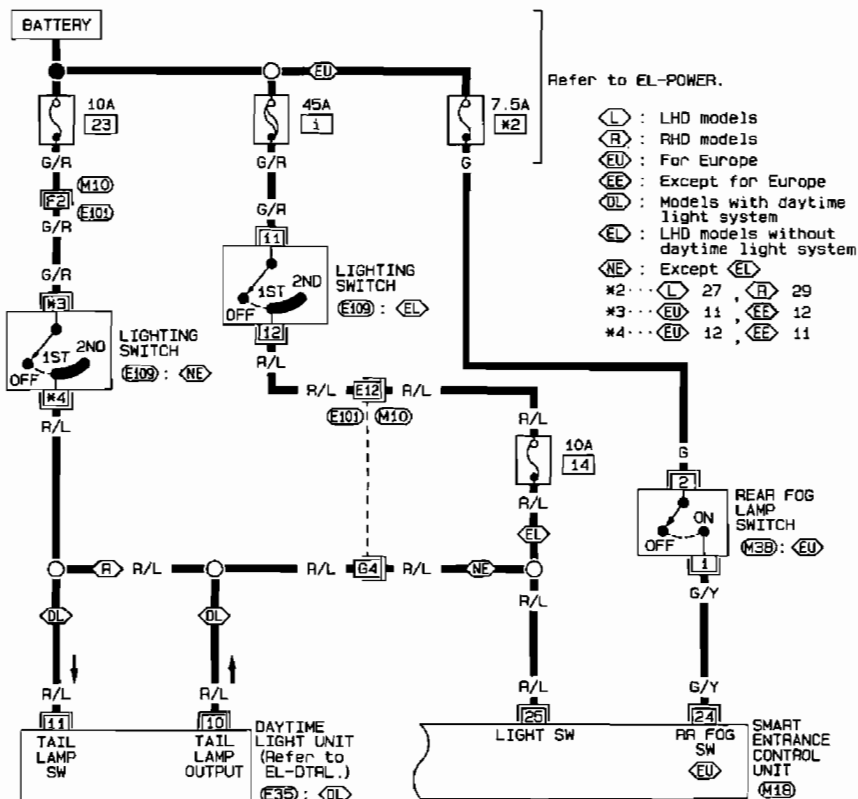
(M18)



# WARNING LAMPS AND BUZZER

## Warning Buzzer/Wiring Diagram — CHIME — (Cont'd)

EL-CHIME-02



Refer to last page  
(Foldout page).

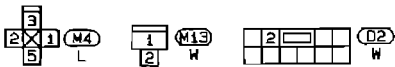
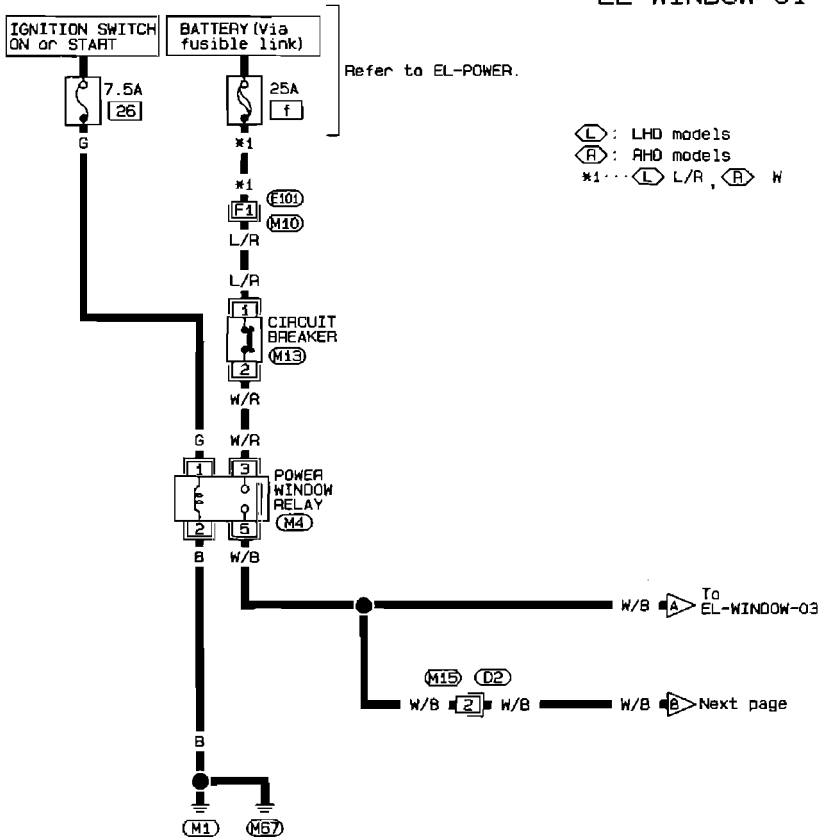
(M10), (E101)  
(M18)

EL



Wiring Diagram — WINDOW —

EL-WINDOW-01



Refer to last page (Foldout page).

(M10), (E101)

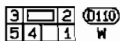
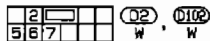
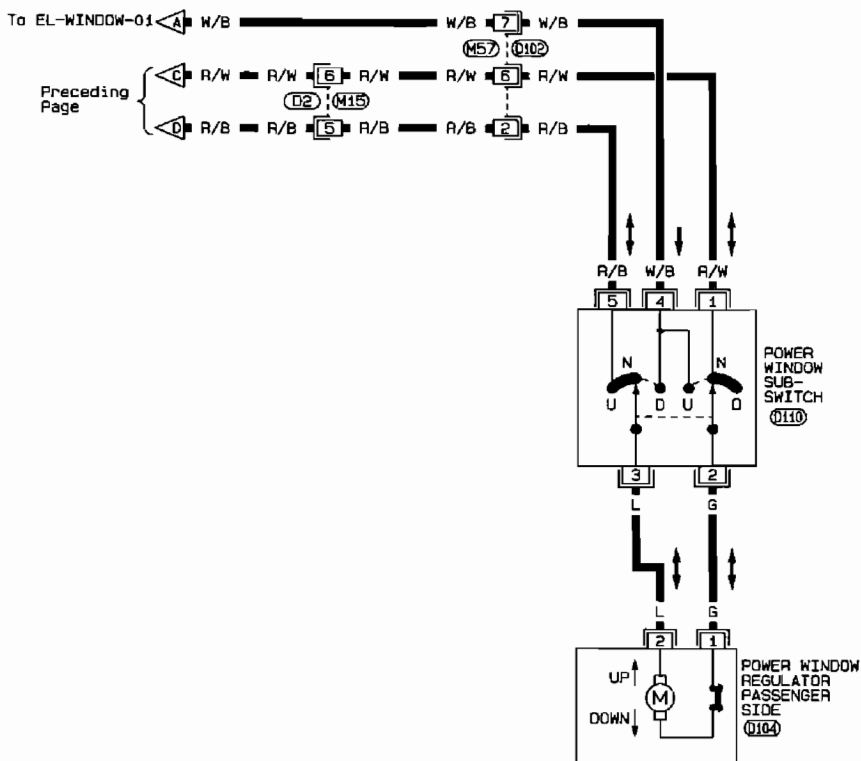
EL



**POWER WINDOW**

**Wiring Diagram — WINDOW — (Cont'd)**

EL-WINDOW-03



EL

# POWER WINDOW

## Trouble Diagnoses

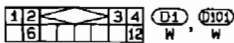
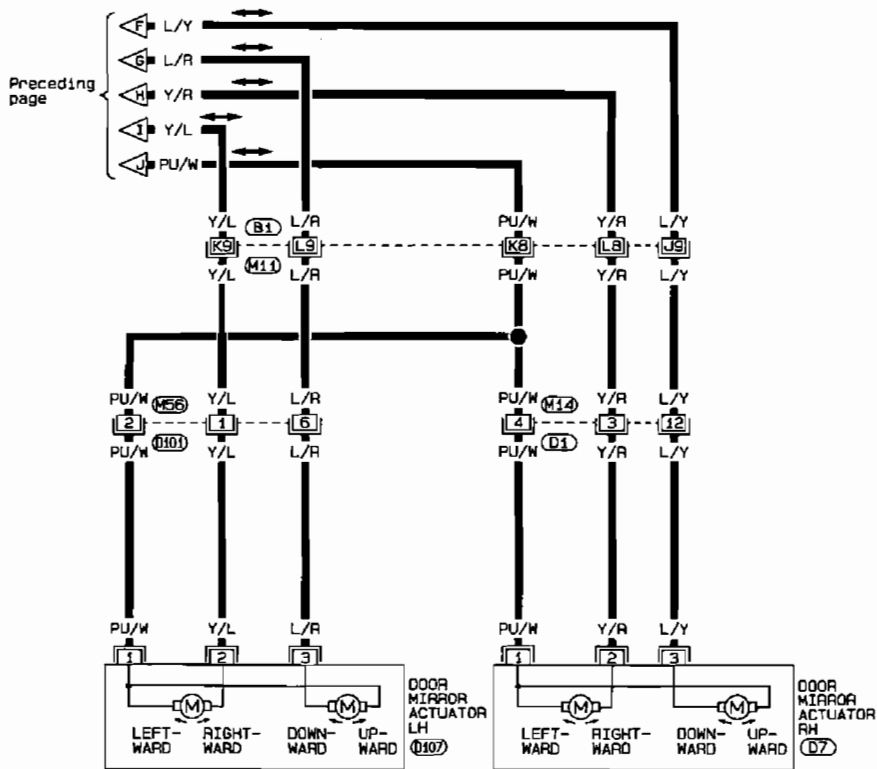
| Symptom  | Possible cause  | Repair order   |
|--|---|--|
| None of the power windows can be operated using any switch.  | <ol style="list-style-type: none"> <li>7.5A fuse, 25A fusible link and (M12) circuit breaker</li> <li>Grounds (M1) and (M67)</li> <li>Power window relay</li> <li>Open/short in power window main switch circuit</li> </ol> | <ol style="list-style-type: none"> <li>Check 7.5A fuse (No. 26), located in fuse block, 25A fusible link (letter 11), located in fuse and fusible link box) and (M12) circuit breaker. Turn ignition switch "ON" and verify battery positive voltage is present at terminal ① of power window main switch and terminal ④ of sub-switches.</li> <li>Check grounds (M1) and (M67).</li> <li>Check power window relay.</li> <li>Check W/B wire between power window relay and power window main switch for open/short circuit.</li> </ol> |
| Driver's side power window cannot be operated but passenger windows can be operated.                                     | <ol style="list-style-type: none"> <li>Driver's side power window regulator circuit</li> <li>Driver's side power window regulator</li> </ol>  | <ol style="list-style-type: none"> <li>Check driver's side power window regulator circuit</li> <li>Check driver's side power window regulator</li> </ol>   |
| Passenger power windows cannot be operated.  | <ol style="list-style-type: none"> <li>Power window sub-switch</li> <li>Passenger side power window regulators</li> <li>Power window main switch</li> <li>Power window circuit</li> </ol>                                   | <ol style="list-style-type: none"> <li>Check power window sub-switch</li> <li>Check passenger side power window regulator</li> <li>Check power window main switch</li> <li>4-1. Check harnesses between power window main switch and power window sub-switch for open/short circuit.</li> <li>4-2. Check harnesses between power window sub-switch and passenger side power window regulator for open/short circuit.</li> </ol>  |
| Passenger power window cannot be operated using power window main switch but can be operated by power window sub-switch. | <ol style="list-style-type: none"> <li>Power window main switch</li> </ol>  | <ol style="list-style-type: none"> <li>Check power window main switch.</li> </ol>  |
| Driver's side power window auto function cannot be operated using power window main switch.                              | <ol style="list-style-type: none"> <li>Power window main switch</li> </ol>  | <ol style="list-style-type: none"> <li>Check power window main switch.</li> </ol>  |



POWER DOOR MIRROR

Wiring Diagram — MIRROR — (Cont'd)

EL-MIRROR-04



Refer to last page  
(Foldout page).

(M11), (B1)

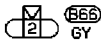
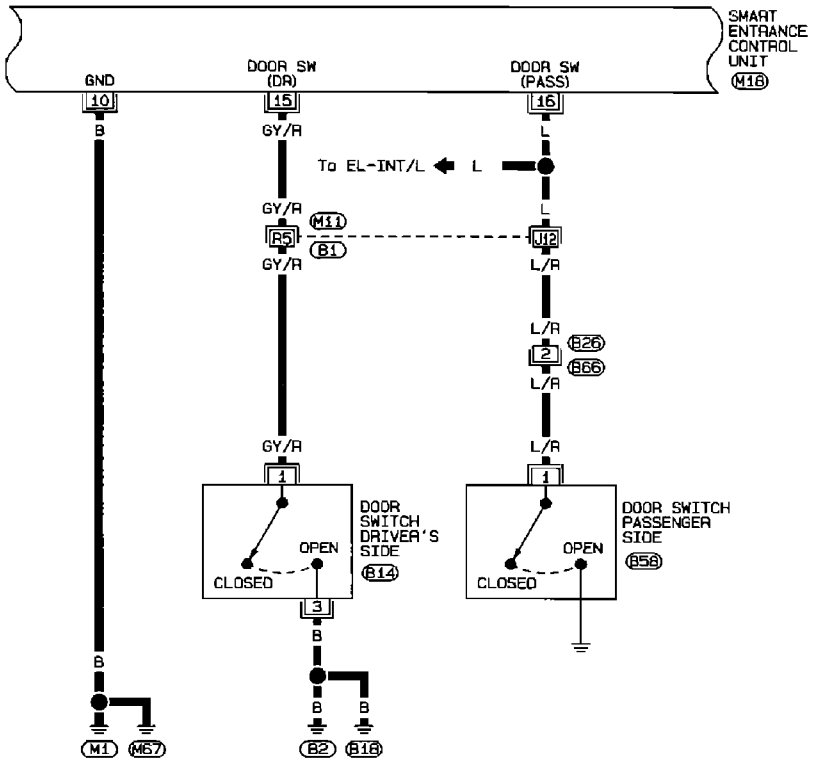




# MULTI-REMOTE CONTROL SYSTEM

## Wiring Diagram — MULTI — (Cont'd)

EL-MULTI-02



Refer to last page (foldout page).

(M11), (B1)

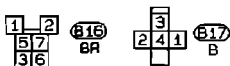
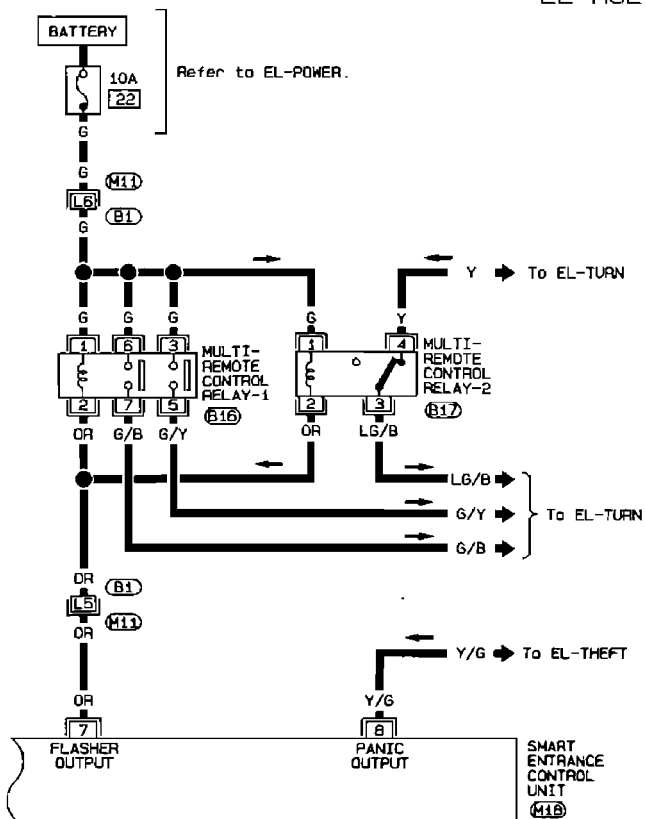
(M18)



# MULTI-REMOTE CONTROL SYSTEM

## Wiring Diagram — MULTI — (Cont'd)

EL-MULTI-04



Refer to last page (Foldout page).

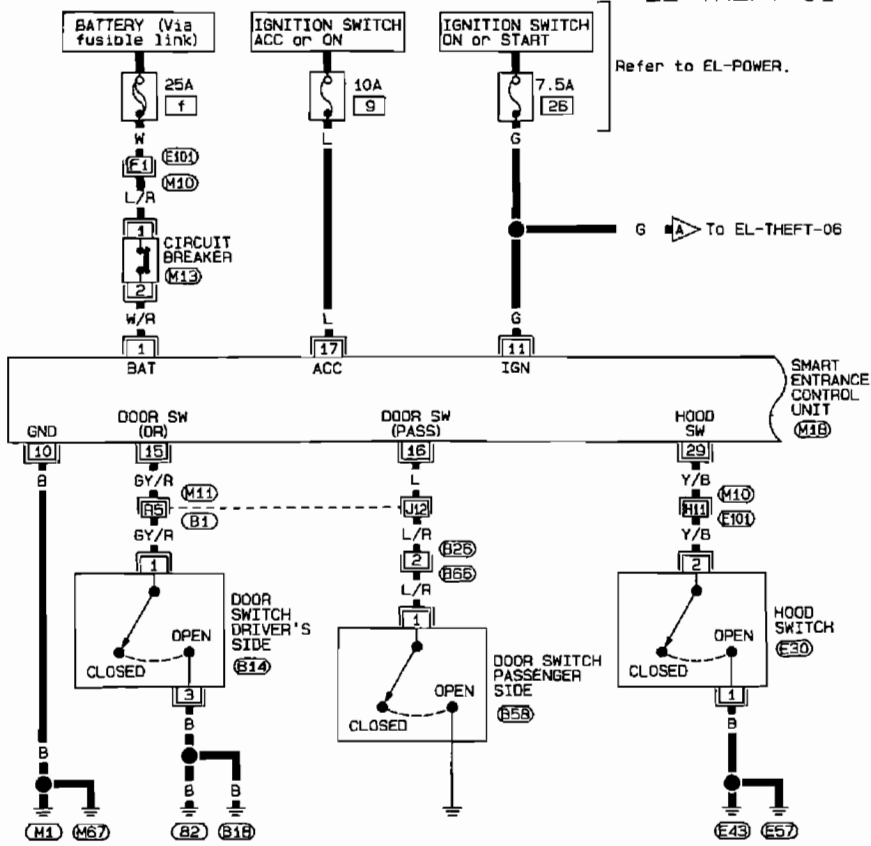
M11, B1

M18

# THEFT WARNING SYSTEM

## Wiring Diagram — THEFT —

EL-THEFT-01



Refer to EL-POWER.

To EL-THEFT-06

SMART ENTRANCE CONTROL UNIT (M18)

Refer to last page (Foldout page).



(M10), (E10)

(M11), (B1)

(M18)

EL

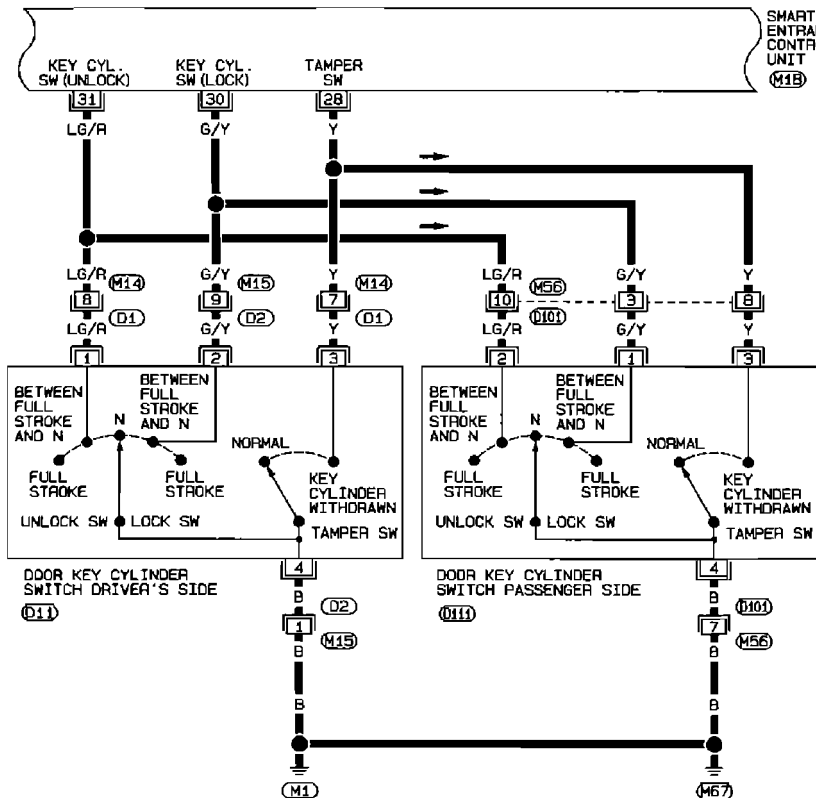


# THEFT WARNING SYSTEM

## Wiring Diagram — THEFT — (Cont'd)

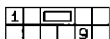
EL-THEFT-03

SMART  
ENTRANCE  
CONTROL  
UNIT  
(M18)



(D1)

(D101)



(D2)



(D11)

(D13)

(D111)

GY, GY

Refer to last page  
(Foldout page).

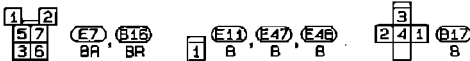
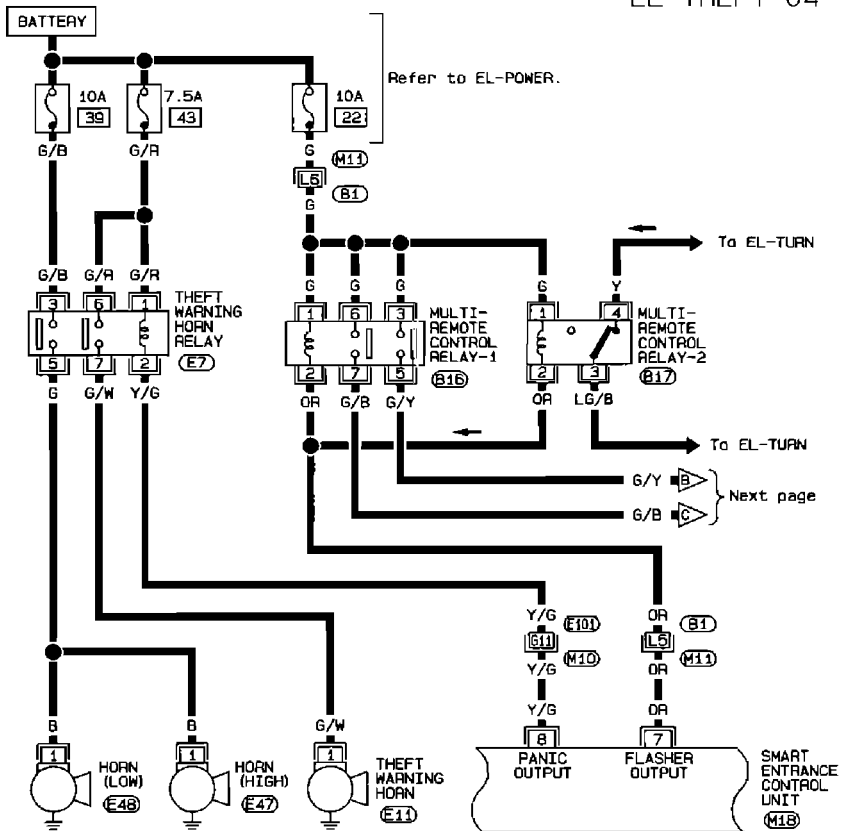
(M18)

EL

# THEFT WARNING SYSTEM

## Wiring Diagram — THEFT — (Cont'd)

EL-THEFT-04



Refer to last page (Foldout page).

- (M10), (E10)
- (M11), (B1)
- (M1B)

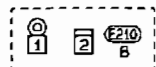
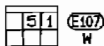
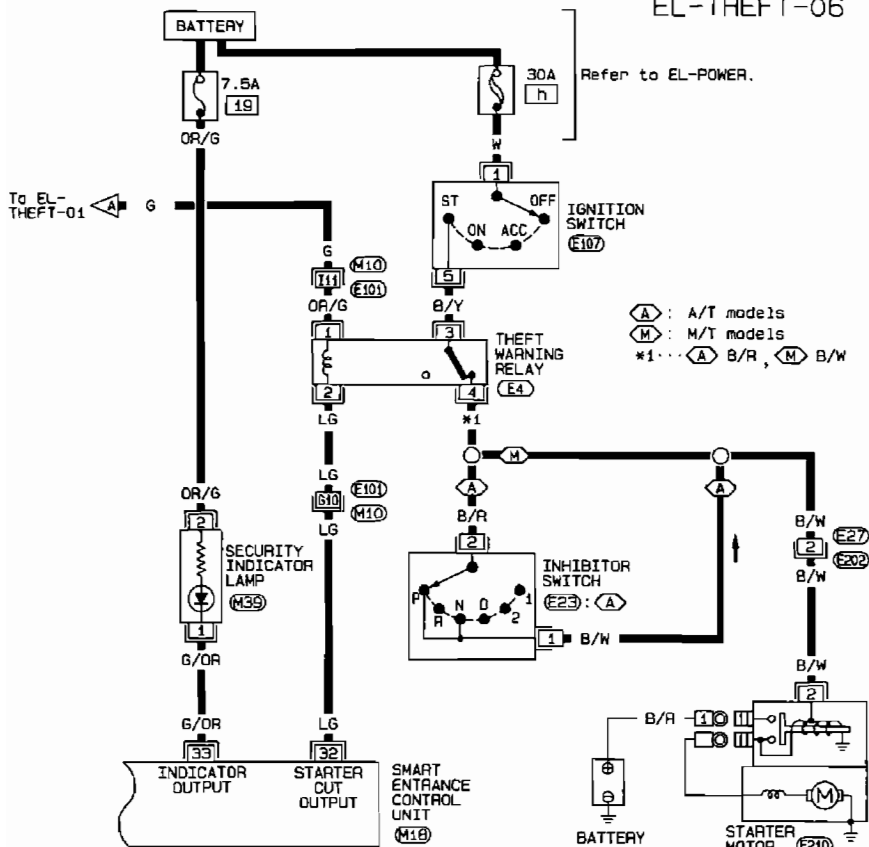




# THEFT WARNING SYSTEM

## Wiring Diagram — THEFT — (Cont'd)

EL-THEFT-06



Refer to last page (Foldout page).

(M10), (E101)

(M18)

## System Description

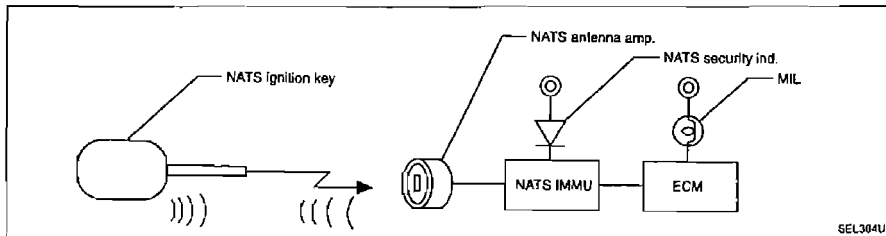
NATS V2.0 for the S14 model has the following immobiliser functions:

- Since only NATS ignition keys, whose ID nos. have been registered into the ECM and IMMU of NATS, allow the engine to run, operation of a stolen vehicle without a NATS registered key is prevented by NATS.  
That is to say, NATS V2.0 will immobilize the engine if someone tries to start it without the registered key of NATS V2.0.
- Both of the originally supplied ignition key IDs have been NATS registered.  
If requested by the vehicle owner, a maximum of four key IDs can be registered into the NATS components.
- The NATS security indicator (NATS security ind.) blinks when the ignition switch is in "OFF" or "ACC" position. Therefore, NATS warns outsiders that the vehicle is equipped with the anti-theft system.
- When NATS detects trouble, the malfunction indicator lamp (MIL) blinks.
- NATS trouble diagnoses, system initialisation and additional registration of other NATS ignition key IDs must be carried out using CONSULT hardware and CONSULT NATS software.  
When NATS initialisation has been completed, the ID of the inserted ignition key is automatically NATS registered. Then, if necessary, additional registration of other NATS ignition key IDs can be carried out.  
Regarding the procedures of NATS initialisation and NATS ignition key ID registration, refer to CONSULT operation manual, NATS V2.0.
- When diagnosing NATS V2.0 using CONSULT, adapter and adapter harness for NATS V1.0 are not necessary, although a direct DDL cable connection between CONSULT and DDL connector is required.
- When servicing a malfunction of the NATS V2.0 (indicated by flashing of Malfunction Indicator Lamp) or registering another NATS ignition key ID no., it may be necessary to re-register original key identification. Therefore, be sure to receive all keys from vehicle owner.

## System Composition

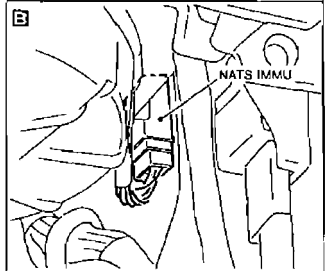
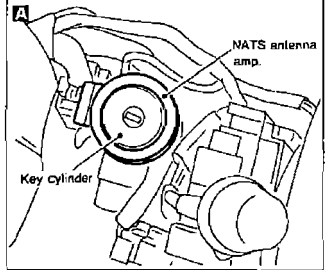
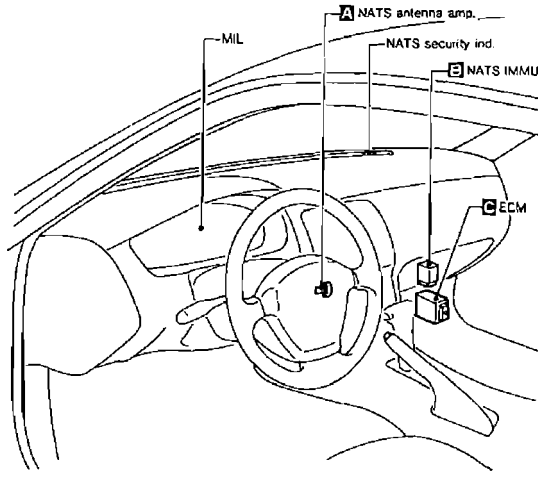
The immobiliser function of the NATS for the S14 model consists of the following:

- NATS ignition key
- NATS antenna amp. located in the ignition key cylinder
- NATS immobiliser control unit (NATS IMMU)
- Engine control module (ECM)
- NATS security indicator (NATS security ind.)
- Malfunction indicator lamp (MIL)

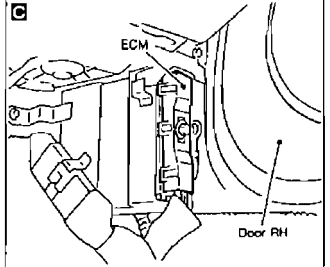
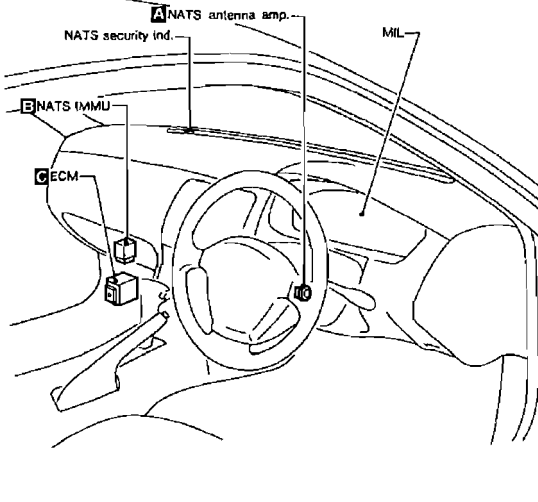


## Component Parts Location

LHD models



RHD models



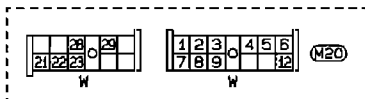
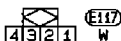
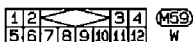
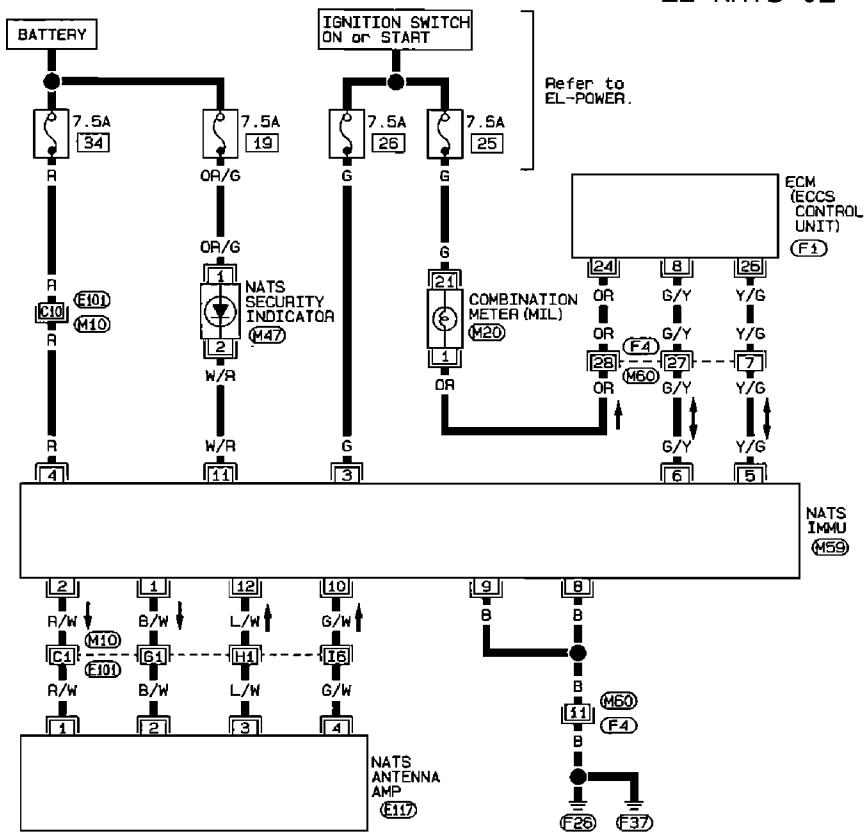


# NATS (Nissan Anti-Theft System)

## Wiring Diagram — NATS — (Cont'd)

RHD MODELS

EL-NATS-02

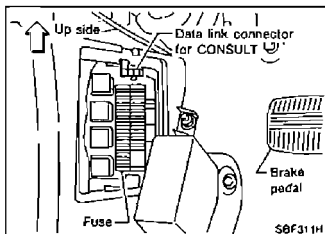


Refer to last page (Foldout page).

- (M10), (E10)
- (M50), (F4)
- (F1)



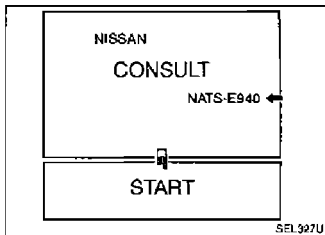
## NATS (Nissan Anti-Theft System)



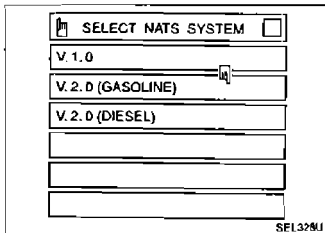
### Trouble Diagnoses (Cont'd)

#### CONSULT INSPECTION PROCEDURE

1. Turn off ignition switch.
2. Connect "CONSULT" to Data link connector for CONSULT. (Data link connector for CONSULT is located behind the fuse box cover.)
3. Insert NATS program card into CONSULT.  
◆ Program card  
NATS-E940
4. Turn on ignition switch.
5. Touch "START".

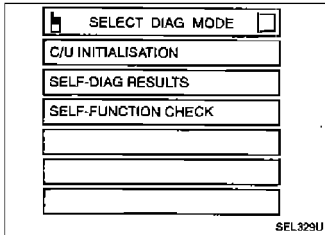


6. Touch "V.2.0 (GASOLINE)".



7. Perform each diagnostic test mode according to each service procedure.

**For further information, see the CONSULT Operation Manual, NATS V2.0.**





# NATS (Nissan Anti-Theft System)

## Trouble Diagnoses (Cont'd)

### CONSULT DIAGNOSTIC TEST MODE FUNCTION

| CONSULT DIAGNOSTIC TEST MODE | Description   |
|------------------------------|---|
| C/U INITIALIZATION           | When replacing any of following three components, C/U initialization is necessary. [NATS ignition key/IMMU/ECM] |
| SELF-FUNCTION CHECK          | ECM checks its own NATS communication interface by itself.  |
| SELF-DIAGNOSTIC RESULTS      | Detected items (screen terms) are as shown in the chart below.  |

### HOW TO READ SELF-DIAGNOSTIC RESULTS

**Result display screen (When no malfunction is detected)**

■ SELF-DIAG RESULTS ■ □

FAILURE DETECTED TIME  
\*NO SELF DIAGNOSTIC FAILURE INDICATED.

FURTHER TESTING MAY BE REQUIRED. \*\*

ERASE PRINT

**Result display screen (When malfunction is detected)**

■ SELF-DIAG RESULTS ■ □ ← Page mark

FAILURE DETECTED TIME  
IMMU 0 ← Time data\*  
DIFFERENCE OF KEY 1

ERASE PRINT

Detected items →

← Time data\*  
This indicates how many times the vehicle was driven after the last detection of a malfunction. If the malfunction is being detected currently, the time data will be "0".

When touched, the self-diagnostic results stored in the engine control module (ECM) are erased.

← When touched, the self-diagnostic results are printed out.

SEL332UC

\* If trip number is more than 1, MIL does not blink.

### SELF-DIAGNOSTIC RESULTS ITEM CHART

| Detected items (Screen terms)        | Description   | Reference page |
|--------------------------------------|---|----------------|
| IMMU                                 | ECM received the signal from IMMU that IMMU is malfunctioning.                                      | EL-72          |
| ECM                                  | ECM is malfunctioning.  | EL-72          |
| CHAIN OF ECM-IMMU                    | Communication impossible between ECM and IMMU.  | EL-73          |
| DIFFERENCE OF KEY                    | IMMU can receive the key ID signal but the result of ID verification between key ID and IMMU is NG. | EL-75          |
| CHAIN OF IMMU-KEY                    | IMMU cannot receive the key ID signal.  | EL-76          |
| ID DISCORD, IMM-ECM                  | The result of ID verification between IMMU and ECM is NG. System initialization is required.        | EL-78          |
| MINGLE NOISE                         | Noise (interference) mingled into NATS communication lines during communicating.                    | EL-79          |
| DON'T ERASE BEFORE CHECKING ENG DIAG | Engine trouble data and NATS trouble data have been detected in ECM.                                | EL-67          |

# NATS (Nissan Anti-Theft System)

## Trouble Diagnoses (Cont'd)

### SYMPTOM MATRIX CHART 1 (Self-diagnosis related item)

X: Possibility item, \*MIL: Malfunction Indicator Lamp

| SYSTEM<br>(Malfunctioning part or mode)   | REFERENCE PART NO. OF ILLUSTRATION ON NEXT PAGE | SYMPTOM                                     |  | Displayed "SELF-DIAG RESULTS" on CONSULT screen. | DIAGNOSTIC PROCEDURE (Reference page) |
|---|---|---|--|--|---------------------------------------|
|   |   | ● Blinking of MIL*.<br>● Engine will start. | ● Blinking of MIL*.<br>● Hard to start engine. |  |                                       |
| IMMU  | A   | X   |  | IMMU   | PROCEDURE 1 (EL-72)                   |
| ECM   | B   | X   |  | ECM  | PROCEDURE 2 (EL-72)                   |
| Open circuit in battery voltage line of IMMU circuit                                  | C1  |   | X  | CHAIN OF ECM-IMMU                                | PROCEDURE 3 (EL-73)                   |
| Open circuit in ignition line of IMMU circuit   | C2  |   | X  |  |                                       |
| Open circuit in ground line of IMMU circuit   | C3  |   | X  |  |                                       |
| Open circuit in communication line between IMMU and ECM                               | C4  |   | X  |  |                                       |
| Short circuit between IMMU and ECM communication line and battery voltage line        | C4  |   | X  |  |                                       |
| Short circuit between IMMU and ECM communication line and ground line                 | C4  |   | X  |  |                                       |
| Open circuit in power source line of ANT/AMP circuit                                  | E3  |   | X  |  |                                       |
| ECM   | B   |   | X  |  |                                       |
| IMMU  | A   |   | X  | DIFFERENCE OF KEY                                | PROCEDURE 4 (EL-75)                   |
| Unregistered key  | D   |   | X  |  |                                       |
| IMMU  | A   |   | X  | CHAIN OF IMMU-KEY                                | PROCEDURE 5 (EL-76)                   |
| Communication line between ANT/AMP and IMMU:  | E1  |   | X  |  |                                       |
| Open circuit or short circuit of battery voltage line or short circuit of ground line | E2  |   | X  |  |                                       |
| Open circuit in power source line of ANT/AMP circuit                                  | E3  |   | X  |  |                                       |
| Open circuit in ground line of ANT/AMP circuit  | E4  |   | X  |  |                                       |
| Malfunction of key ID chip  | E5  |   | X  |  |                                       |
| IMMU  | A   |   | X  |  |                                       |
| Antenna amp.  | E6  |   | X  |  |                                       |

# NATS (Nissan Anti-Theft System)

## Trouble Diagnoses (Cont'd)

X: Possibility item. \*MIL: Malfunction Indicator Lamp

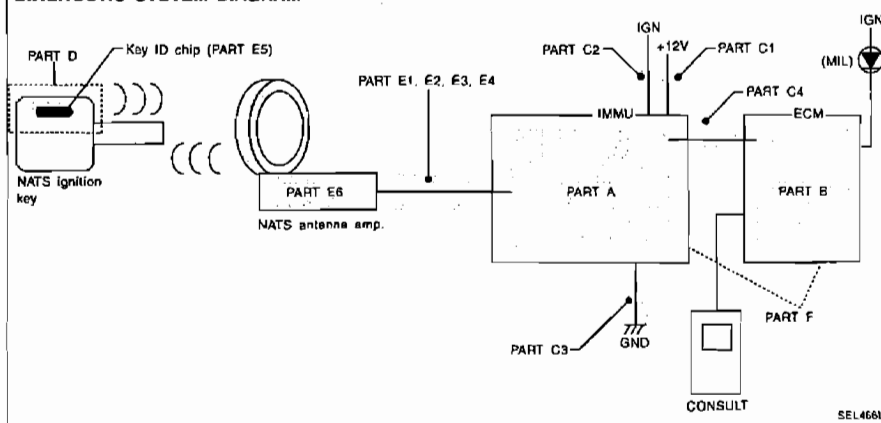
| SYSTEM<br>(Malfunctioning part or mode)                              | REFERENCE PART NO. OF ILLUSTRATION ON NEXT PAGE | SYMPTOM                                     |  | Displayed "SELF-DIAG RESULTS" on CONSULT screen. | DIAGNOSTIC PROCEDURE (Reference page) |
|--|---|---|--|--|---------------------------------------|
|  |   | ● Blinking of MIL*.<br>● Engine will start. | ● Blinking of MIL*.<br>● Hard to start engine. |  |                                       |
| System initialisation has not yet been completed.                    | F   |   | X  | ID DISCORD, IMM-ECM                              | PROCEDURE 6 (EL-78)                   |
| ECM  | F   |   | X  |  |                                       |
| Noise interference in communication line                             |   |   | X  | MINGLE NOISE                                     | PROCEDURE 7 (EL-79)                   |
| Engine trouble data and NATS trouble data have been detected in ECM. |   | X   | X  | DON'T ERASE BEFORE CHECKING ENG DIAG             | WORK FLOW (EL-67)                     |

## SYMPTOM MATRIX CHART 2 (Non self-diagnosis related item)

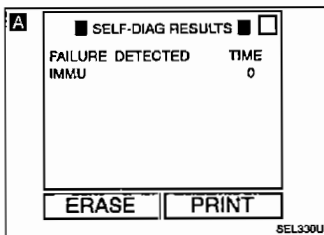
X: Possibility item

| SYSTEM<br>(Malfunctioning part or mode) | SYMPTOM                               | DIAGNOSTIC PROCEDURE (Reference page) |
|---|---------------------------------------|---------------------------------------|
|   | NATS security Ind. does not light up. |                                       |
| NATS security ind.                      |                                       |                                       |
| Open circuit between Fuse and NATS IMMU | X                                     | PROCEDURE 8 (EL-79)                   |
| Continuation of initialisation mode     |                                       |                                       |
| NATS IMMU                               |                                       |                                       |

## DIAGNOSTIC SYSTEM DIAGRAM



SEL466U

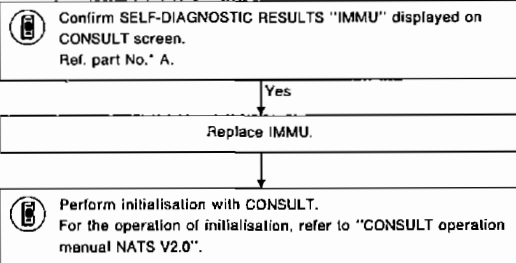


## Trouble Diagnoses (Cont'd)

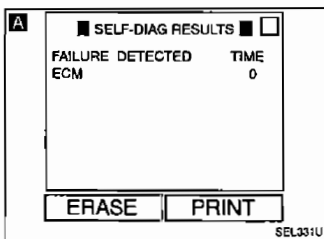
### DIAGNOSTIC PROCEDURE 1

Self-diagnostic results:  
"IMMU" displayed on CONSULT screen

A



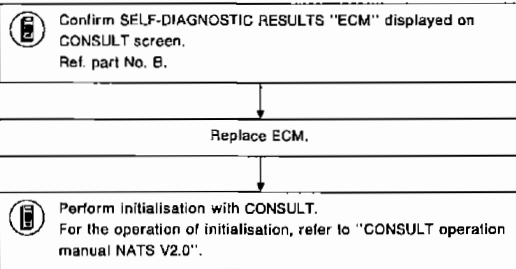
\* Ref. part No.: reference part No. of Diagnostic System Diagram on EL-71.



### DIAGNOSTIC PROCEDURE 2

Self-diagnostic results:  
"ECM" displayed on CONSULT screen

A

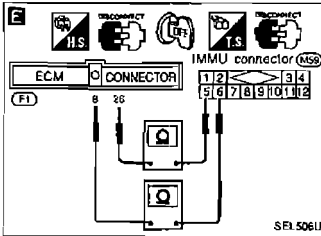
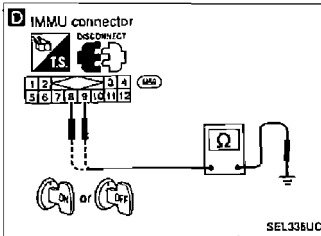
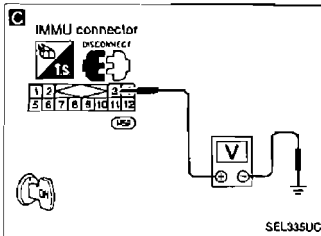
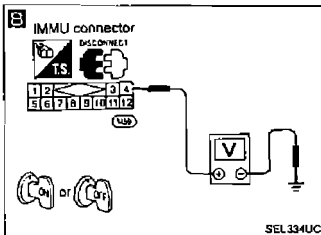
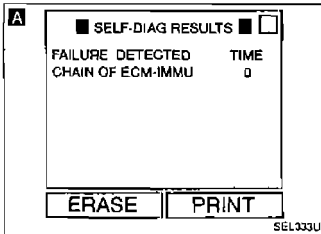


Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 3

Self-diagnostic results:

"CHAIN OF ECM-IMMU" displayed on CONSULT screen



**A** Confirm SELF-DIAGNOSTIC RESULTS "CHAIN OF ECM-IMMU" displayed on CONSULT screen.

OK

**B** Check voltage between terminal ④ of IMMU and ground with CONSULT or tester.  
Voltage: Battery voltage

NG

Check the following:

- 7.5A fuse
- Harness continuity between fuse and IMMU connector (MS9)

If NG, repair harness or connector.  
Ref. part No. C1

OK

**C** Check voltage between terminal ③ of IMMU and ground with CONSULT or tester.  
Voltage: Battery voltage

NG

Check the following:

- 7.5A fuse
- Harness continuity between fuse and IMMU connector (MS9), or between ignition switch and fuse.

If NG, repair harness or connectors.  
Ref. part No. C2

OK

**D** Check harness continuity between IMMU terminal ⑧ or ⑨ and ground. Continuity should exist.

NG

Repair harness or check the body ground screws. (F16) and (F37)  
Ref. part No. C3

OK

**E** Check harness continuity between the following ECM terminals and IMMU terminals.  
ECM ⑧ and IMMU ⑧  
ECM ⑫ and IMMU ⑨  
Continuity should exist.

NG

Check the following:

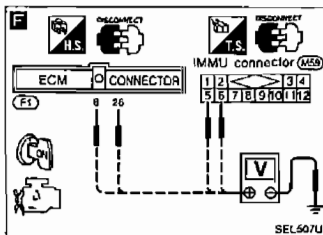
- Harness connection between (F4) and (MS9)
- Harness continuity between ECM and IMMU.

If NG, repair harness or connectors.  
Ref. part No. C4

OK

④

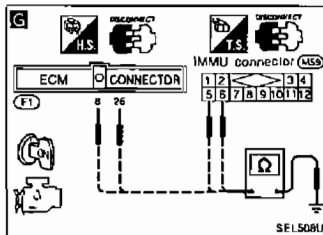
## Trouble Diagnoses (Cont'd)



**F** CHECK COMMUNICATION LINE CIRCUIT.

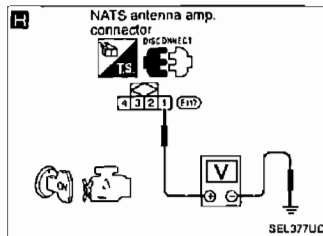
- 1) Disconnect ECM connector and IMMU connector.
- 2) Check voltage between the following terminals and ground.  
ECM ⑧, ECM ⑫, IMMU ⑤ and IMMU ⑥  
Voltage: 0V

NG → Communication line is short-circuited with battery voltage line or ignition switch ON line.  
Repair harness or connectors.  
Ref. part No. C4



**G** Check continuity between the following terminals and ground.  
ECM ⑧, ECM ⑫, IMMU ⑤ and IMMU ⑥  
Continuity should not exist.

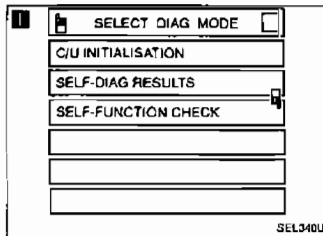
NG → Communication line is short-circuited with ground line.  
Repair harness or connectors.  
Ref. part No. C4



**H** CHECK NATS ANTENNA AMP. CIRCUIT.

- 1) Disconnect NATS antenna amp. connector.
- 2) Turn ignition switch "ON".
- 3) Check voltage between antenna amp. terminal ① and ground.  
Voltage: More than 4.7V

NG → NATS antenna amp. +5V line is short-circuited with battery voltage line or ground line.  
Repair harness or connectors.  
Ref. part No. E3



**I** SELF-FUNCTION CHECK

- 1) Connect ECM connector and disconnect IMMU connector.
- 2) Turn ignition switch "ON".
- 3) Touch "SELF-FUNCTION CHECK" on CONSULT "SELECT DIAG MODE" screen.

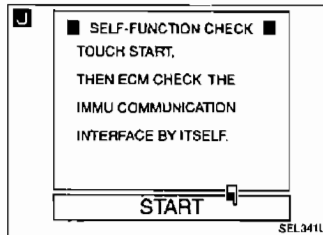
**J** Touch "START". ECM will then check its communication interface by itself.

NG → ECM is malfunctioning.  
Replace ECM.  
Ref. part No. B

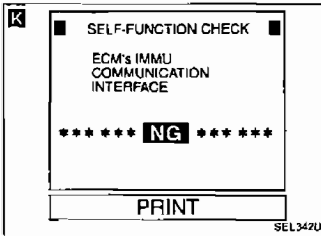
OK → **L** (See next page.)

IMMU is malfunctioning.  
Replace IMM U.  
Ref. part No. A

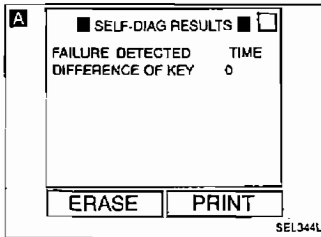
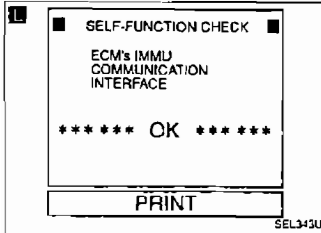
**E** Perform initialisation with CONSULT.  
For the operation of initialisation, refer to "CONSULT operation manual NATS V2.0".



Trouble Diagnoses (Cont'd)



ⓑ Perform initialisation with CONSULT.  
For the operation of initialisation, refer to "CONSULT operation manual NATS V2.0".



DIAGNOSTIC PROCEDURE 4

Self-diagnostic results:  
"DIFFERENCE OF KEY" displayed on CONSULT screen

Ⓐ Confirm SELF-DIAGNOSTIC RESULTS "DIFFERENCE OF KEY" displayed on CONSULT screen.

OK

ⓑ Perform initialisation with CONSULT.  
Re-register all NATS ignition key IDs.  
For the operation of initialisation, refer to "CONSULT operation manual NATS V2.0".

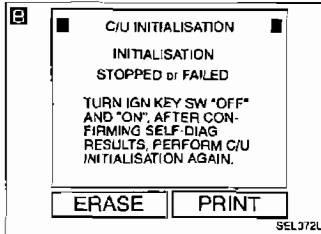
Initialisation completed

Start engine.

END  
(Ignition key ID was unregistered.)  
Ref. part No. D

Initialisation uncompleted or failed with CONSULT

Ⓒ IMMU is malfunctioning.  
Replace IMMU.  
Ref. part No. A



Ⓓ Perform initialisation with CONSULT.  
For the operation of initialisation, refer to "CONSULT operation manual NATS V2.0".

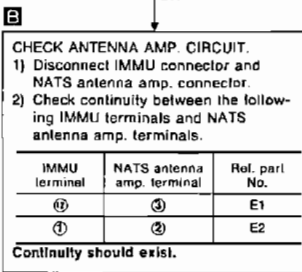
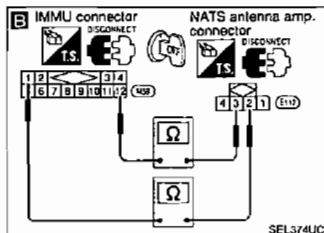
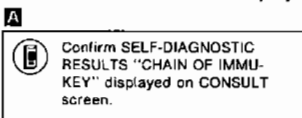
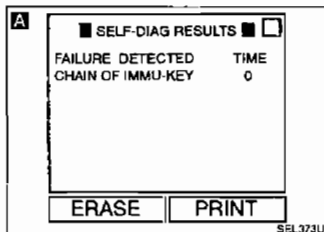
EL

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 5

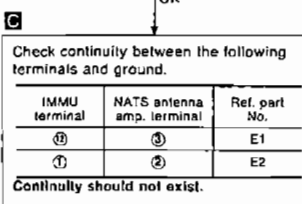
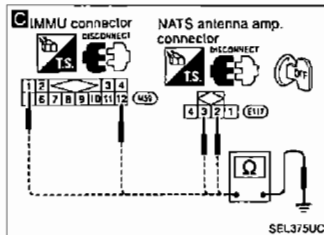
Self-diagnostic results:

"CHAIN OF IMMU-KEY" displayed on CONSULT screen



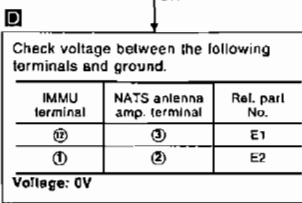
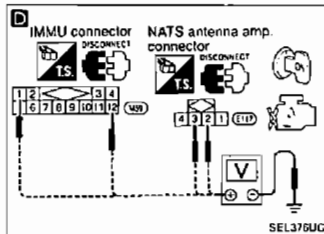
NG

Check harness and connectors.  
If NG, repair harness or connectors.



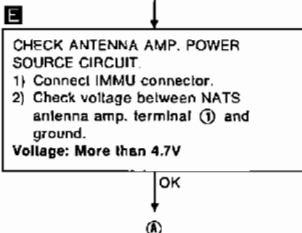
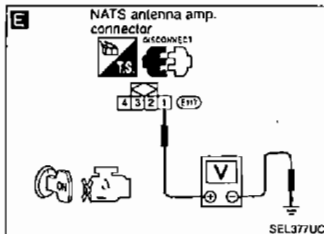
NG

Communication line is short-circuited with ground line.  
Repair harness or connectors.



NG

Communication line is short-circuited with battery voltage line or ignition switch "ON" line.  
Repair harness or connectors.

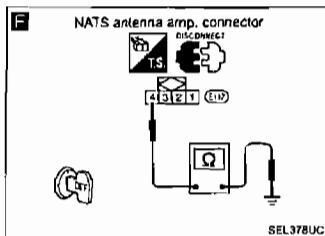


NG

Power source line is open circuit.  
Repair harness or connector.  
Ref. part No. E3



## Trouble Diagnoses (Cont'd)



**F** CHECK ANTENNA AMP. GROUND LINE CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Check continuity between NATS antenna amp. terminal ④ and ground.

Continuity should exist.

NG → NATS antenna amp. ground line is open circuit. Check harness continuity between IMMU terminal ⑩ and NATS antenna amp. terminal ④. If NG, repair harness or connectors. Ref. part No. E4

OK → CHECK NATS IGNITION KEY ID CHIP.

- 1) Connect NATS antenna amp. connector.
- 2) Pull the ignition key out.
- 3) Start engine with another registered NATS ignition key.

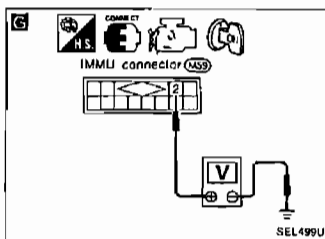
Start OK → Ignition key ID chip was malfunctioning. Replace the ignition key. Ref. part No. E5

Start NG → **G** CHECK IMMU OUTPUT VOLTAGE.

- 1) Turn the ignition switch "ON".
- 2) Check voltage between IMMU terminal ② and ground.

Voltage: More than 4.7V

NG → Perform initialisation with CONSULT. For the operation of initialisation, refer to "CONSULT operation manual NATS V2.0".



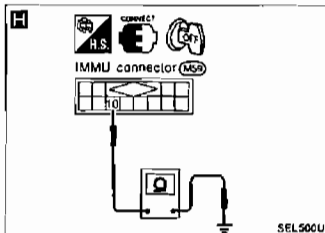
OK → Replace IMMU. Ref. part No. A

**H** CHECK IMMU GROUND CIRCUIT.

- 1) Turn the ignition switch "OFF".
- 2) Disconnect IMMU connector.
- 3) Check continuity between IMMU terminal ⑩ and ground.

Continuity should exist.

NG → Replace IMMU. Ref. part No. A



OK → **I** CHECK IMMU FUNCTION 1.

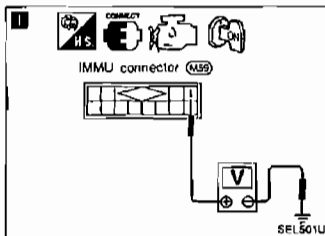
- 1) Connect connector and NATS antenna amp. connector.
- 2) Check voltage between IMMU terminal ① and ground.

NG → Perform initialisation with CONSULT. For the operation of initialisation, refer to "CONSULT operation manual NATS V2.0".

### Voltage

| Time (After turning ignition switch "ON") | Voltage         |
|---|-----------------|
| For approx. 0.5 sec.                      | Approx. 2.3 - 5 |
| After 1 sec.                              | 0               |

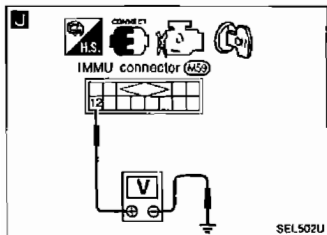
NG → Replace IMMU. Ref. part No. A



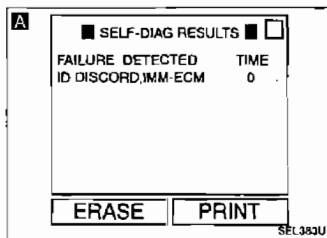
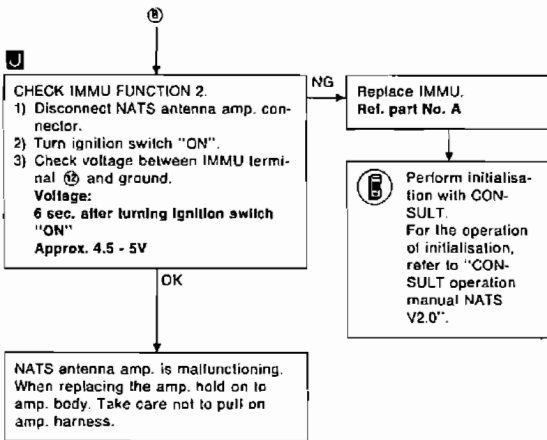
OK → ⑧

EL

## Trouble Diagnoses (Cont'd)



SEL502U

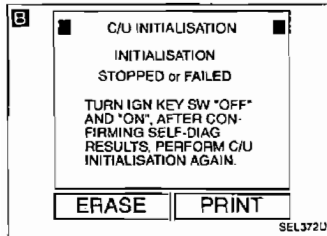


SEL383U

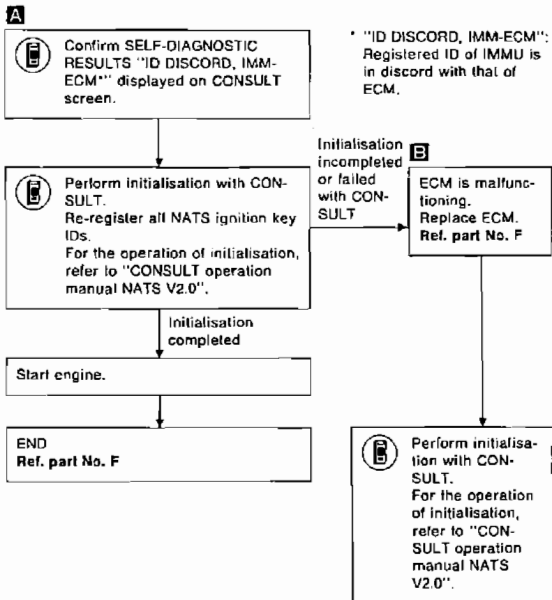
### DIAGNOSTIC PROCEDURE 6

#### Self-diagnostic results:

"ID DISCORD, IMM-ECM" displayed on CONSULT screen



SEL372U

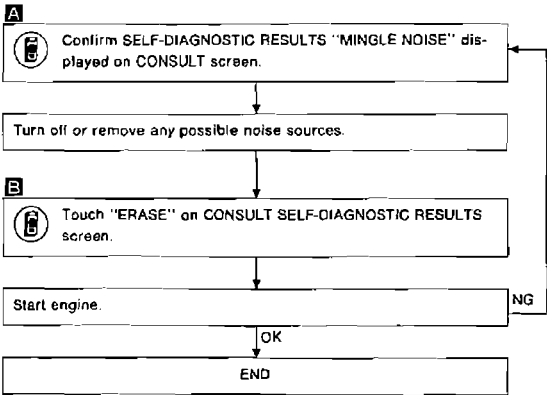
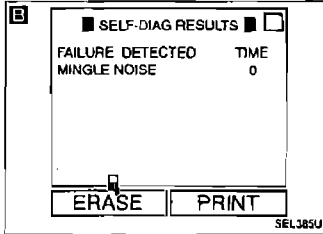
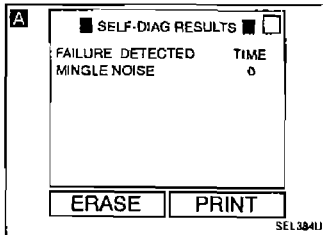


# NATS (Nissan Anti-Theft System)

## Trouble Diagnoses (Cont'd)

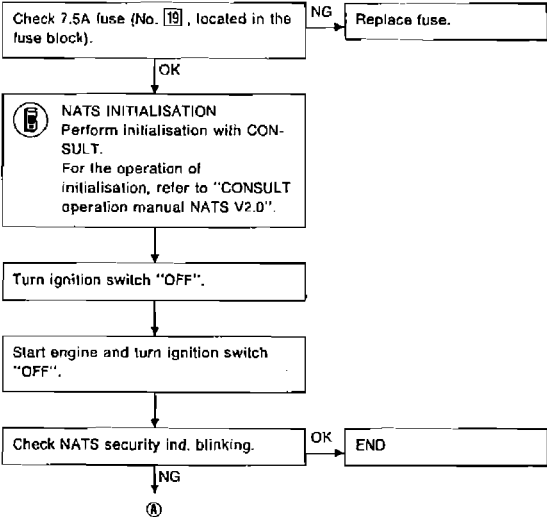
### DIAGNOSTIC PROCEDURE 7

Self-diagnostic results:  
"MINGLE NOISE" displayed on CONSULT screen



### DIAGNOSTIC PROCEDURE 8

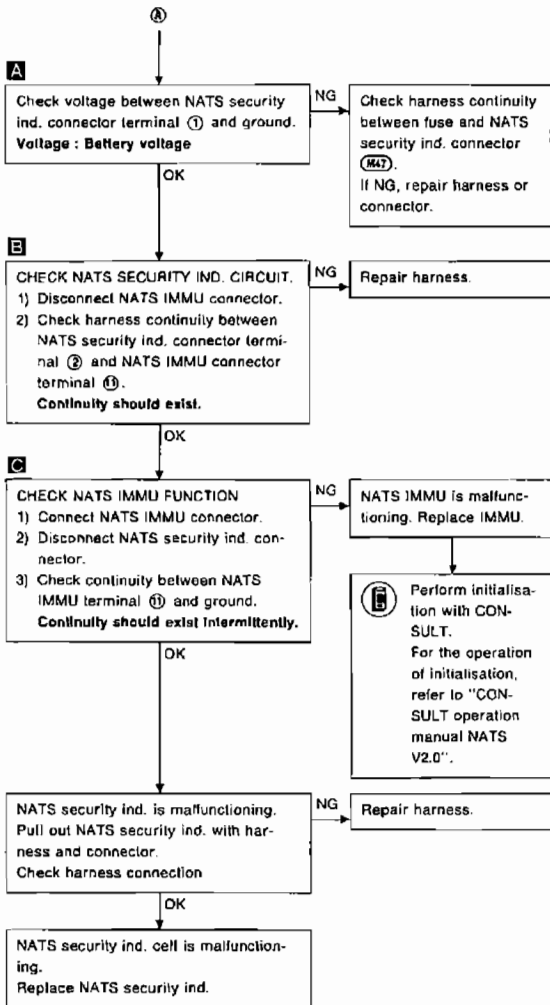
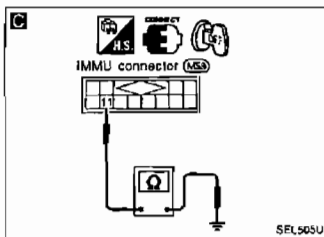
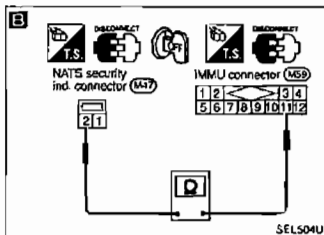
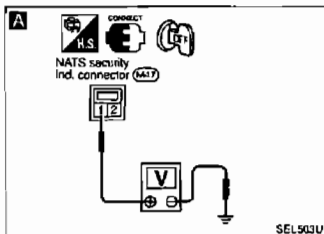
"NATS SECURITY IND. DOES NOT LIGHT UP"



EL

# NATS (Nissan Anti-Theft System)

## Trouble Diagnoses (Cont'd)



## NATS (Nissan Anti-Theft System)

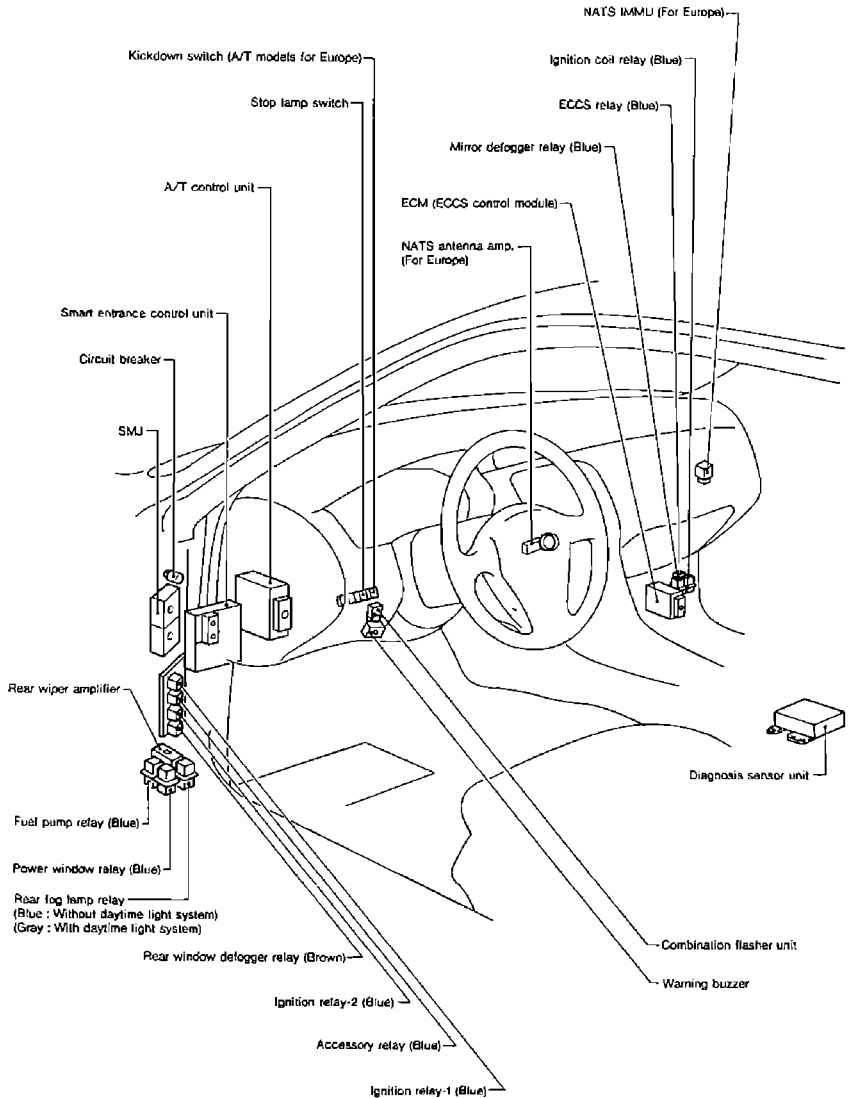
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NOTE

EL

## Passenger Compartment

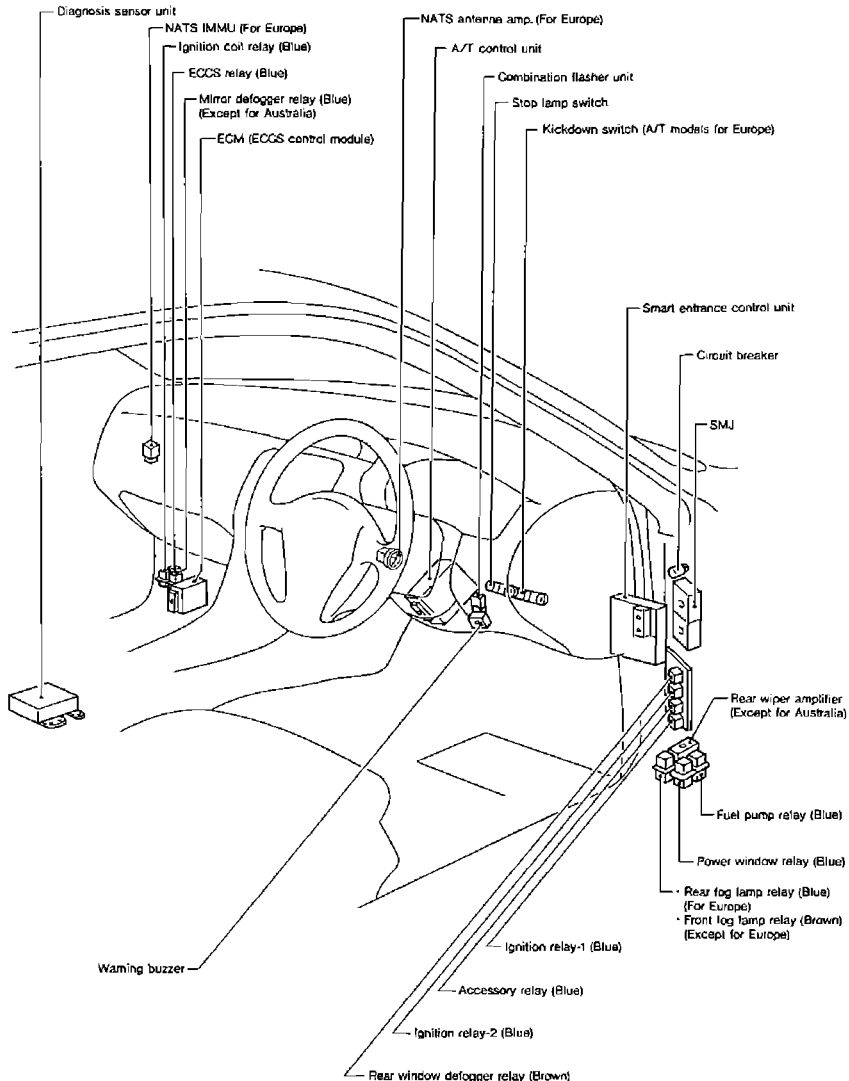
### LHD MODELS



# LOCATION OF ELECTRICAL UNIT

## Passenger Compartment (Cont'd)

### RHD MODELS

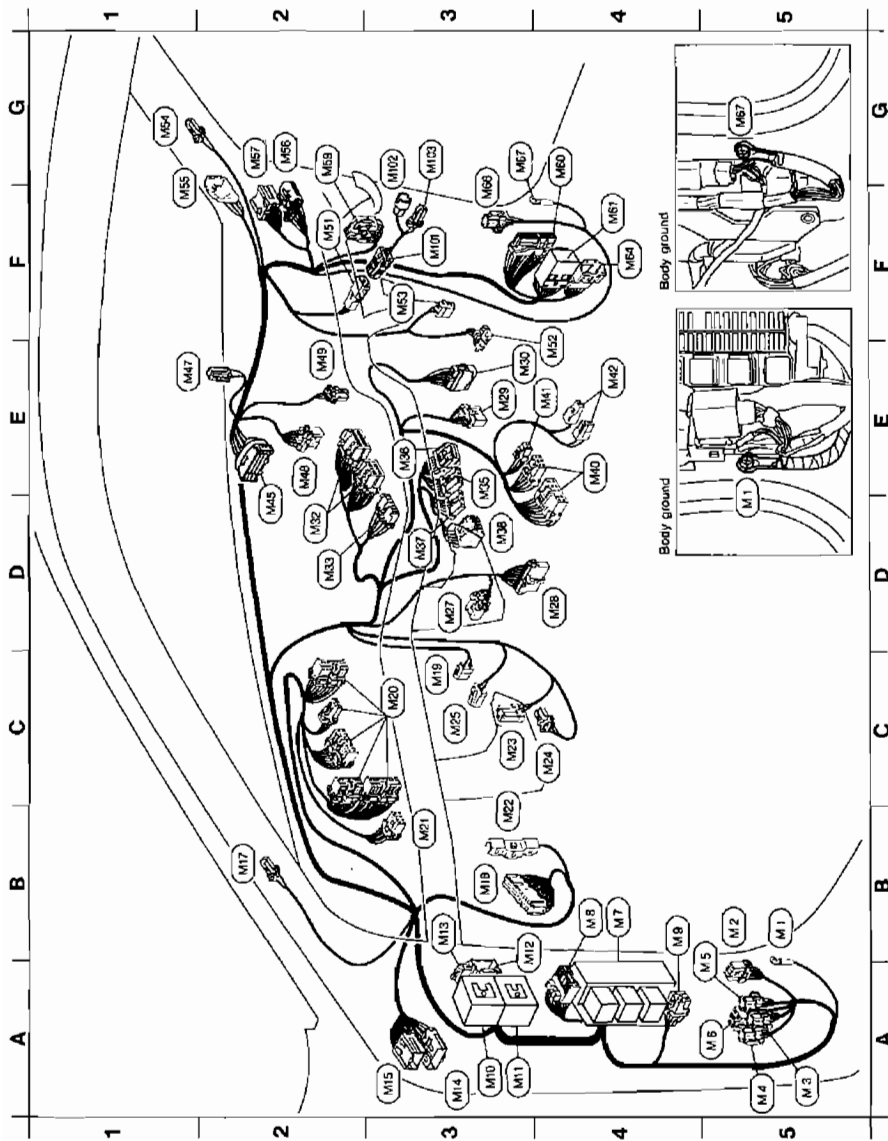


EL

# HARNESS LAYOUT

## Main Harness

LHD MODELS





# HARNESS LAYOUT

## Main Harness (Cont'd)

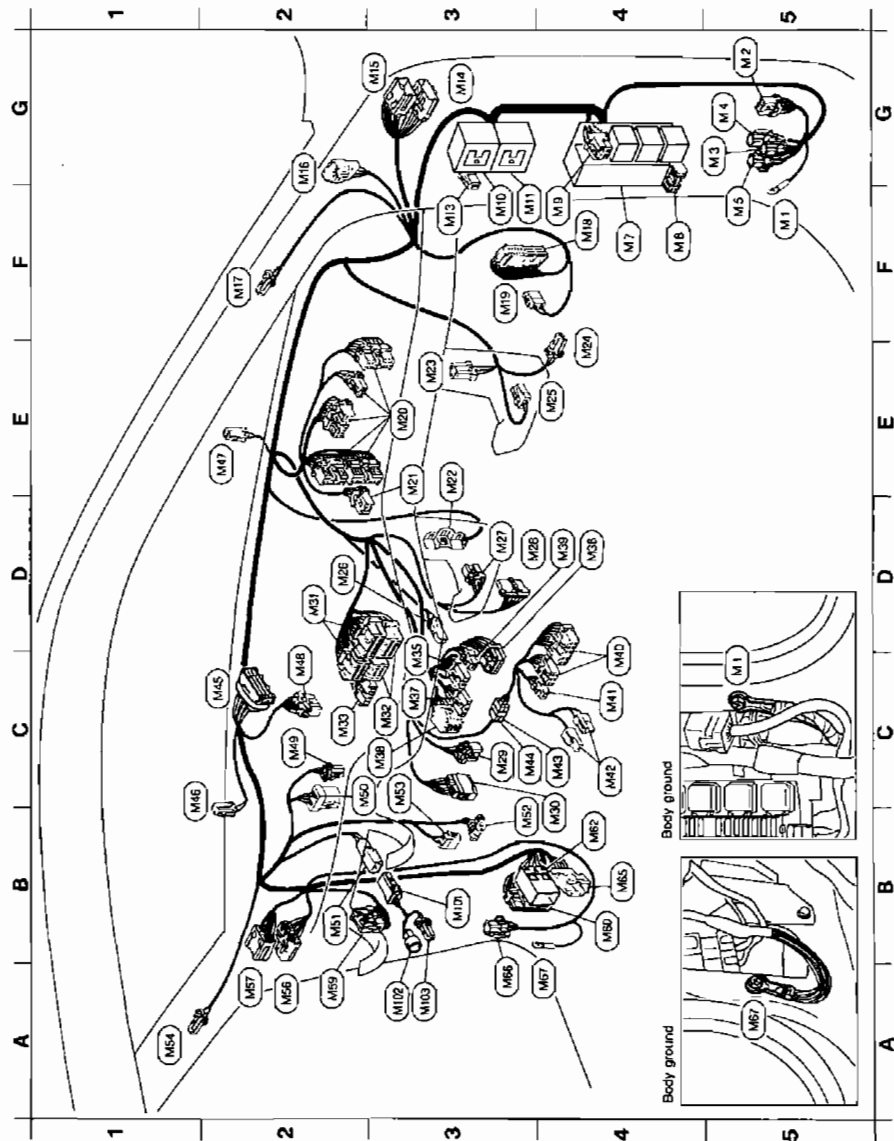
|    |       |   |    |       |                            |
|----|-------|---|----|-------|----------------------------|
| B5 | (M1)  | : Body ground   | E2 | (M8)  | : Thermo control amplifier |
| B5 | (M2)  | : Rear wiper amplifier                                      | F2 | (M9)  | : To (M10)                 |
| A5 | (M3)  | : Fuel pump relay   | E4 | (M9)  | : Fan resistor             |
| A5 | (M4)  | : Power window relay  | F3 | (M9)  | : Blower motor             |
| A5 | (M5)  | : Rear fog lamp relay (Models without daytime light system) | G1 | (M9)  | : Pillar speaker RH        |
| A5 | (M6)  | : Rear fog lamp relay (Models with daytime light system)    | F1 | (M9)  | : To (B1)                  |
| B4 | (M7)  | : Fuse block  | G2 | (M9)  | : To (M10)                 |
| B4 | (M8)  | : Data link connector for CONSULT                           | G2 | (M9)  | : To (M13)                 |
| B4 | (M9)  | : Rear window defogger relay                                | G2 | (M9)  | : NATS IMMUI (For Europe)  |
| A3 | (M10) | : To (E10) (SMJ)  | G4 | (M9)  | : To (F4)                  |
| A3 | (M11) | : To (E11) (SMJ)  | F4 | (M9)  | : To (E5) (A/T models)     |
| B3 | (M12) | : To (E12)  | F4 | (M9)  | : To (E5)                  |
| B3 | (M13) | : Circuit breaker   | F3 | (M9)  | : Mirror defogger relay    |
| A3 | (M14) | : To (D1)   | G3 | (M9)  | : Body ground              |
| A3 | (M15) | : To (D2)   |    |       |                            |
| B2 | (M17) | : Pillar speaker LH   |    |       |                            |
| B3 | (M18) | : Smart entrance control unit                               | F3 | (M10) | : To (M5)                  |
| C3 | (M19) | : Kickdown switch (A/T models)                              | G3 | (M10) | : Glove box lamp           |
| C3 | (M20) | : Combination meter   | G3 | (M10) | : Glove box lamp switch    |
| B8 | (M21) | : Illumination control switch                               |    |       |                            |
| B9 | (M22) | : A/T control unit (A/T models)                             |    |       |                            |
| C3 | (M23) | : Combination (washer unit)                                 |    |       |                            |
| C4 | (M24) | : Buzzer  |    |       |                            |
| C3 | (M25) | : Stop lamp switch  |    |       |                            |
| D3 | (M27) | : Air mix door motor  |    |       |                            |
| D4 | (M28) | : Mids door motor   |    |       |                            |
| E3 | (M28) | : BI-level door motor                                       |    |       |                            |
| E3 | (M29) | : To (E5)   |    |       |                            |
| D2 | (M30) | : Push control unit   |    |       |                            |
| D2 | (M30) | : Fan switch  |    |       |                            |
| E3 | (M30) | : Hazard switch   |    |       |                            |
| E3 | (M30) | : Headlamp washer switch                                    |    |       |                            |
| D3 | (M37) | : Rear window defogger switch                               |    |       |                            |
| D9 | (M38) | : Rear fog lamp switch                                      |    |       |                            |
| E4 | (M38) | : Radio   |    |       |                            |
| E4 | (M1)  | : Not used  |    |       |                            |
| E4 | (M2)  | : Cigarette lighter   |    |       |                            |
| D2 | (M3)  | : Joint connector   |    |       |                            |
| E1 | (M7)  | : NATS security indicator (For Europe)                      |    |       |                            |
| E2 | (M7)  | : Intake door motor   |    |       |                            |



# HARNESS LAYOUT

## Main Harness (Cont'd)

RHD MODELS



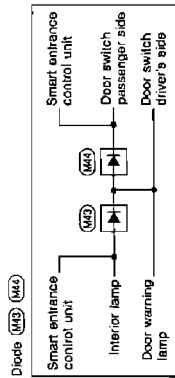
# HARNESS LAYOUT

## Main Harness (Cont'd)

- F5 (M1) : Body ground
- G5 (M2) : Rear wiper amplifier (Except for Australia)
- G5 (M3) : Fuel pump relay
- G5 (M4) : Power window relay
- F5 (M5) : Rear fog lamp relay (For Europe)
- F4 (M7) : Fuse block
- F4 (M8) : Data link connector for CONSULT
- F4 (M9) : Rear window distorger relay
- F3 (M10) : To (E20) (SMJ)
- F3 (E1) : To (E1) (ISMJ)
- F3 (M13) : Circuit breaker
- G3 (M14) : To (D1)
- G3 (M15) : To (D2)
- G2 (M16) : To (E1)
- F2 (M17) : Pillar speaker RH
- F4 (M18) : Smart entrance control unit
- F3 (M19) : Kickdown switch (A/T models)
- E3 (M20) : Combination meter
- E3 (M21) : Illumination control switch
- E3 (M22) : A/T control unit (A/T models)
- E4 (M23) : Combination flasher unit
- E4 (M24) : Buzzer
- E4 (M25) : Stop lamp switch
- D2 (M26) : In-vehicle sensor (Auto A/C)
- D3 (M27) : Air mix door motor
- D3 (M28) : Mode door motor
- D3 (M29) : Bi-level door motor
- B4 (M30) : To (Z5)
- D2 (M31) : Auto A/C unit (Auto A/C)
- C2 (M32) : Push control unit (Except auto A/C)
- C2 (M33) : Fan switch (Except auto A/C)
- C3 (M34) : Hazard switch
- D4 (M35) : Headlamp washer switch (For Europe)
- C3 (M36) : Rear window dirorger switch
- C3 (M37) : Rear fog lamp switch (For Europe)
- D4 (M38) : Security indicator (Except for Europe)
- C4 (M39) : Radio
- C4 (M40) : Not used
- C4 (M41) : Cigarette lighter

- C4 (M42) : Diode (Except for Europe)
- C3 (M43) : Diode (Except for Europe)
- C2 (M44) : Joint connector
- B1 (M45) : Sunload sensor (Auto A/C)
- E2 (M47) : NAT'S security indicator (For Europe)
- C2 (M48) : Intake door motor
- C2 (M49) : Thermo control amplifier
- C2 (M50) : Fan control amplifier (Auto A/C)
- B2 (M51) : To (M10) (Except for Australia)
- B3 (M52) : Fan resistor (Except auto A/C)
- C3 (M53) : Blower motor
- A1 (M54) : Pillar speaker LH
- A2 (M55) : To (D10)
- A2 (M57) : To (D19)
- A2 (M58) : NAT'S IMMJ (For Europe)
- B4 (M60) : To (Z4)
- B4 (M62) : To (Z7) (A/T models)
- B4 (M65) : To (S67) (Models with ABS)
- A3 (M66) : Mirror debugger relay (Except for Australia)
- A4 (M67) : Body ground

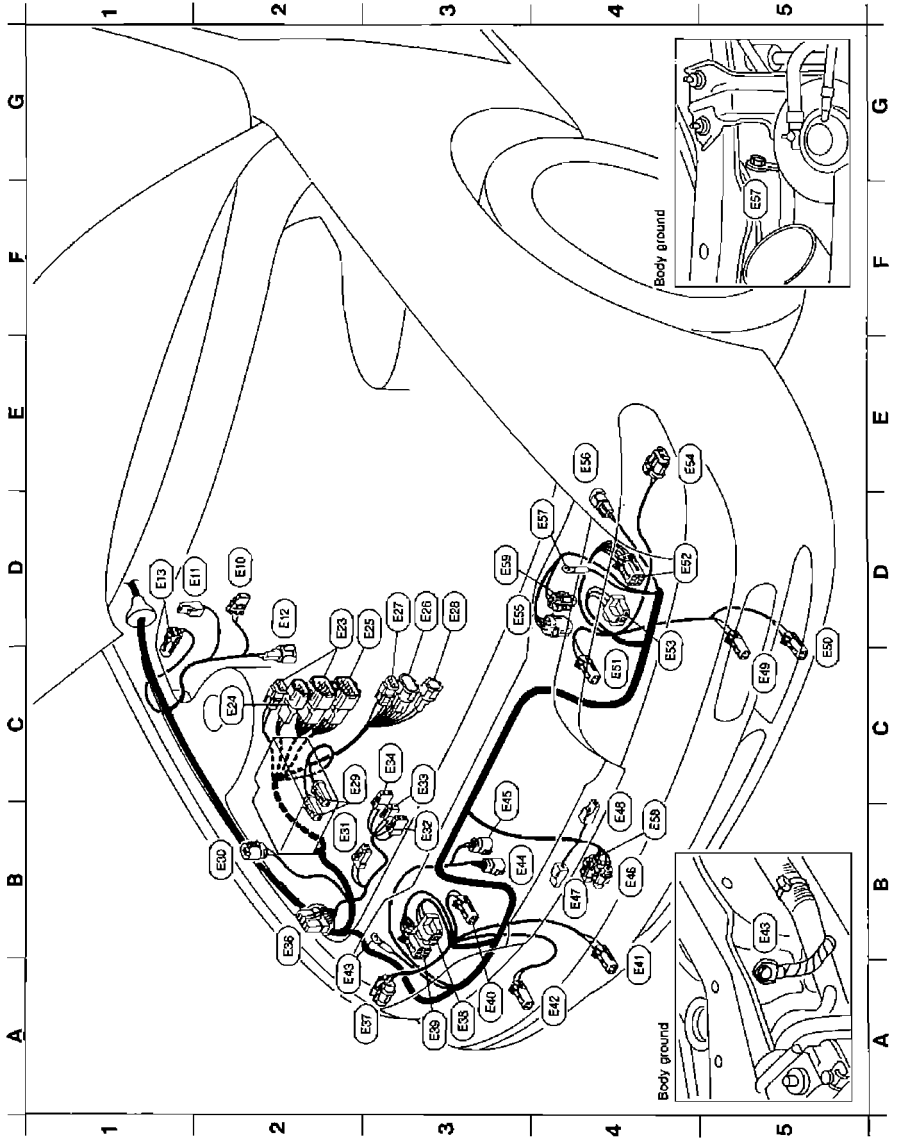
- B3 (M10) : To (M5)
  - A3 (M12) : Glove box lamp
  - A3 (M13) : Glove box lamp switch
- (Except for Australia)



# HARNESS LAYOUT

## Engine Room Harness

ENGINE COMPARTMENT (RHD models)

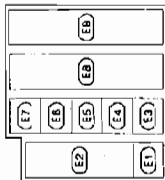


- C5 (E49) : Front turn signal lamp LH
- C5 (E50) : Front fog lamp LH
- C4 (E51) : Headlamp LH inner
- D4 (E52) : Headlamp aiming motor LH (For Europe)
- C4 (E53) : Headlamp LH outer
- E4 (E54) : Clearance lamp LH
- D3 (E55) : Triple-pressure switch (Except for Europe)
- E4 (E56) : To (E29)
- D4 (E57) : Body ground
- B4 (E58) : Ambient sensor (For outside temperature)
- D3 (E59) : Dual-pressure switch (For Europe)

(Fusible link and fuse box)

- (E1) : Cooling fan relay-2 (Except for Europe)
- (E2) : Fusible link and fuse block-1
- (E3) : Cooling fan relay-1
- (E4) : Theft warning relay (Except for Europe)
- (E5) : Air conditioner relay
- (E6) : Horn relay
- (E7) : Theft warning horn relay (Except for Europe)
- (E8) : Front fog lamp relay (For Europe)
- (E9) : Fusible link and fuse block-2
- (E10) : Brakes fluid level switch
- (E11) : Theft warning horn (Except for Europe)
- (E12) : Front wheel sensor RH (For ABS)
- D1 (E13) : Stee turn signal lamp RH
- D2 (E14) : Inhibitor switch (A/T models)
- C2 (E15) : Revolution sensor (A/T models)
- D3 (E16) : To terminal code assembly (A/T models)
- D3 (E17) : To (E29)
- D3 (E18) : To (E29)
- D3 (E19) : To (E29)
- C2 (E20) : Battery
- B2 (E21) : Hood switch (Except for Europe)
- B2 (E22) : Washer fluid level switch
- B3 (E23) : Headlamp washer motor (For Europe)
- C3 (E24) : Front washer motor
- C3 (E25) : Rear washer motor (Except for Australia)
- B2 (E26) : Headlamp washer amplifier (For Europe)
- A3 (E27) : Clearance lamp RH
- A3 (E28) : Headlamp RH outer
- A3 (E29) : Headlamp aiming motor RH (For Europe)
- A3 (E30) : Headlamp RH inner
- A4 (E31) : Front fog lamp RH
- A4 (E32) : Front turn signal lamp RH
- A2 (E33) : Body ground
- B3 (E34) : Cooling fan motor (Except for Europe)
- B3 (E35) : Cooling fan motor (For Europe)
- B4 (E36) : Ambient sensor (For auto A/C)
- B4 (E37) : Horn (High)
- B4 (E38) : Horn (Low)

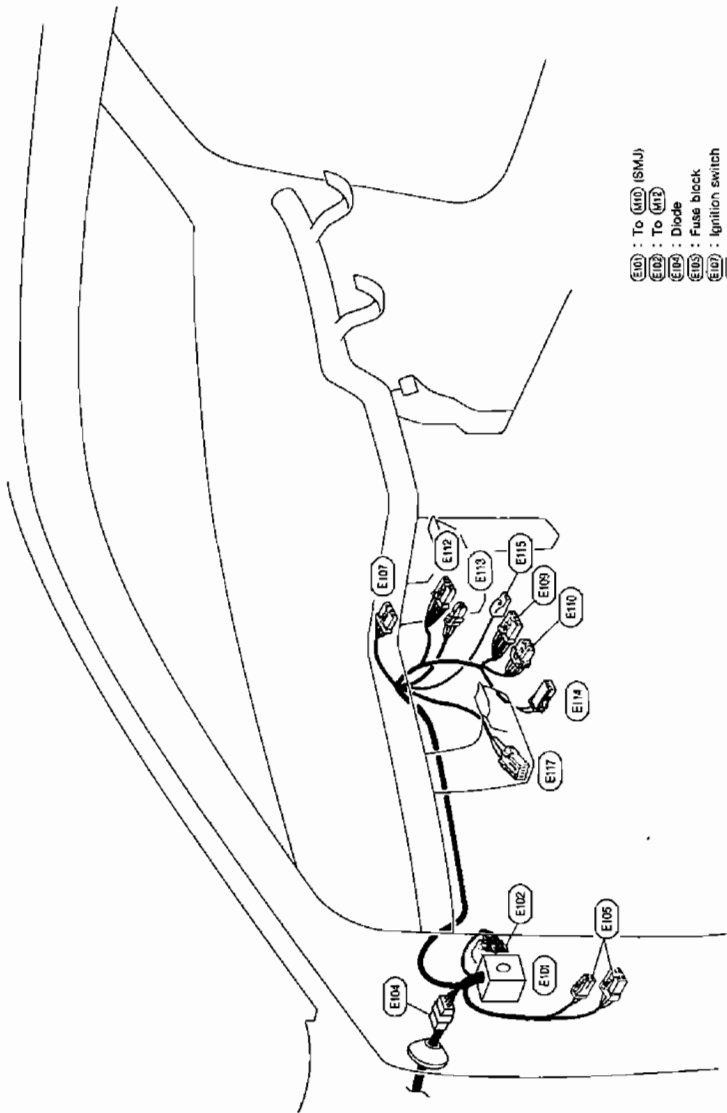
Fusible link and fuse box



# HARNES LAYOUT

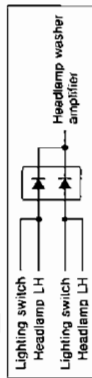
## Engine Room Harness (Cont'd)

### PASSENGER COMPARTMENT (LHD models)



- E100 : To (M01) (SMJ)
- E102 : To (M12)
- E104 : Diode
- E105 : Fuse block
- E107 : Ignition switch
- E109 : Lighting switch
- E110 : Turn signal switch
- E112 : Front wiper and washer switch
- E113 : Rear wiper and washer switch
- E114 : Rear fog lamp switch
- E115 : Horn switch
- E117 : NATS antenna amp. (For Europe)

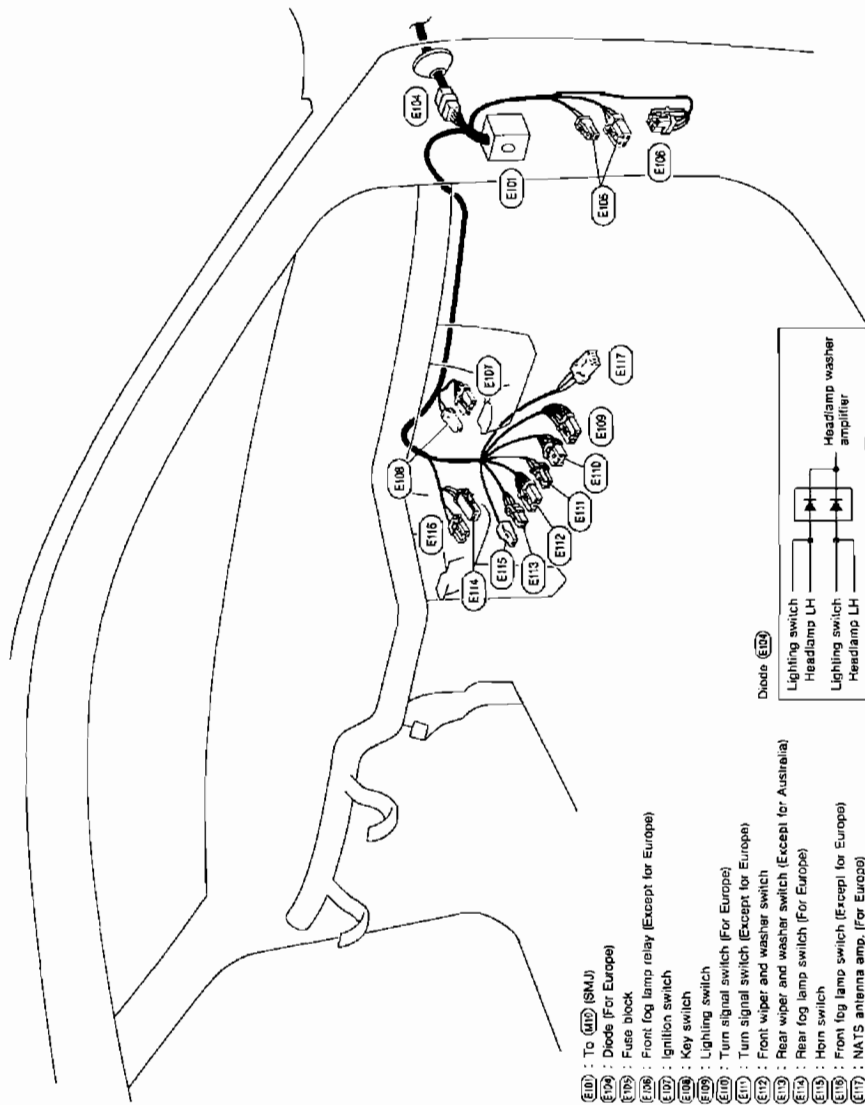
#### Diode (E104)



# HARNESS LAYOUT

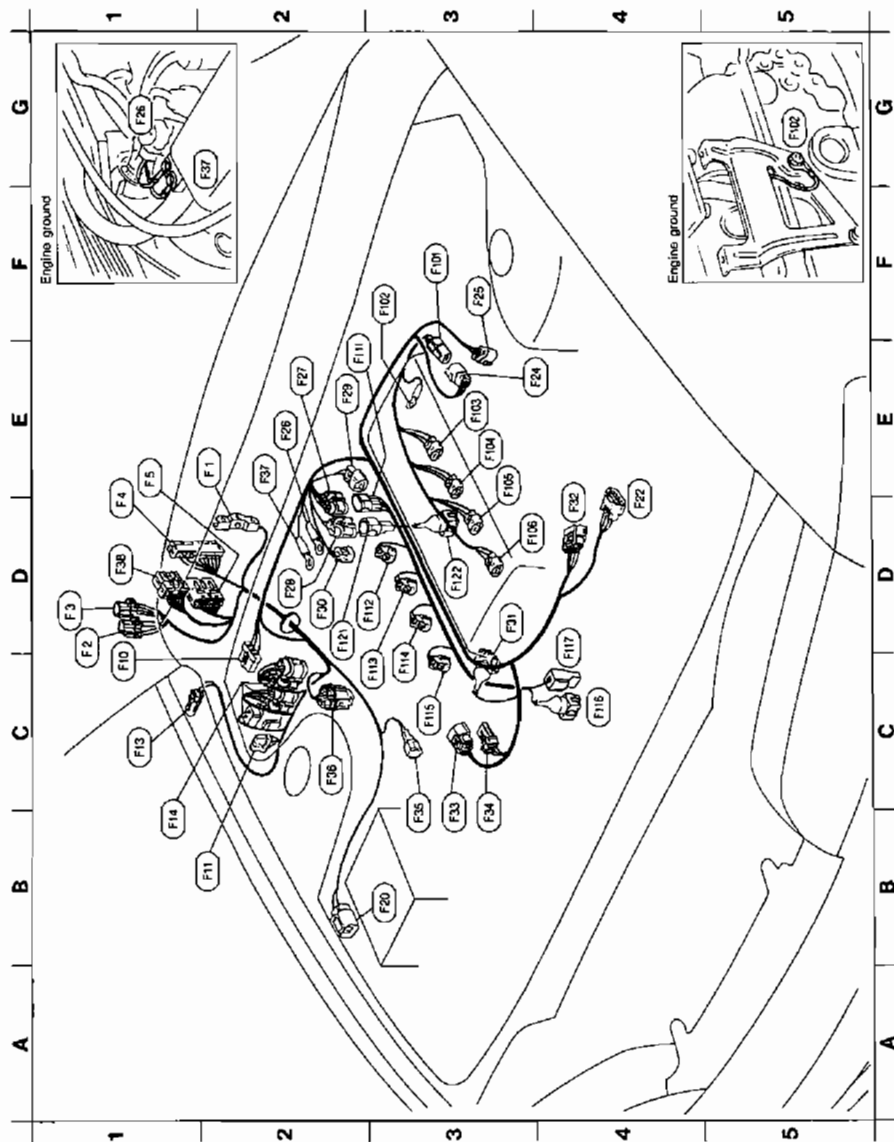
## Engine Room Harness (Cont'd)

### PASSENGER COMPARTMENT (RHD models)



## Engine Control Harness

LHD MODELS



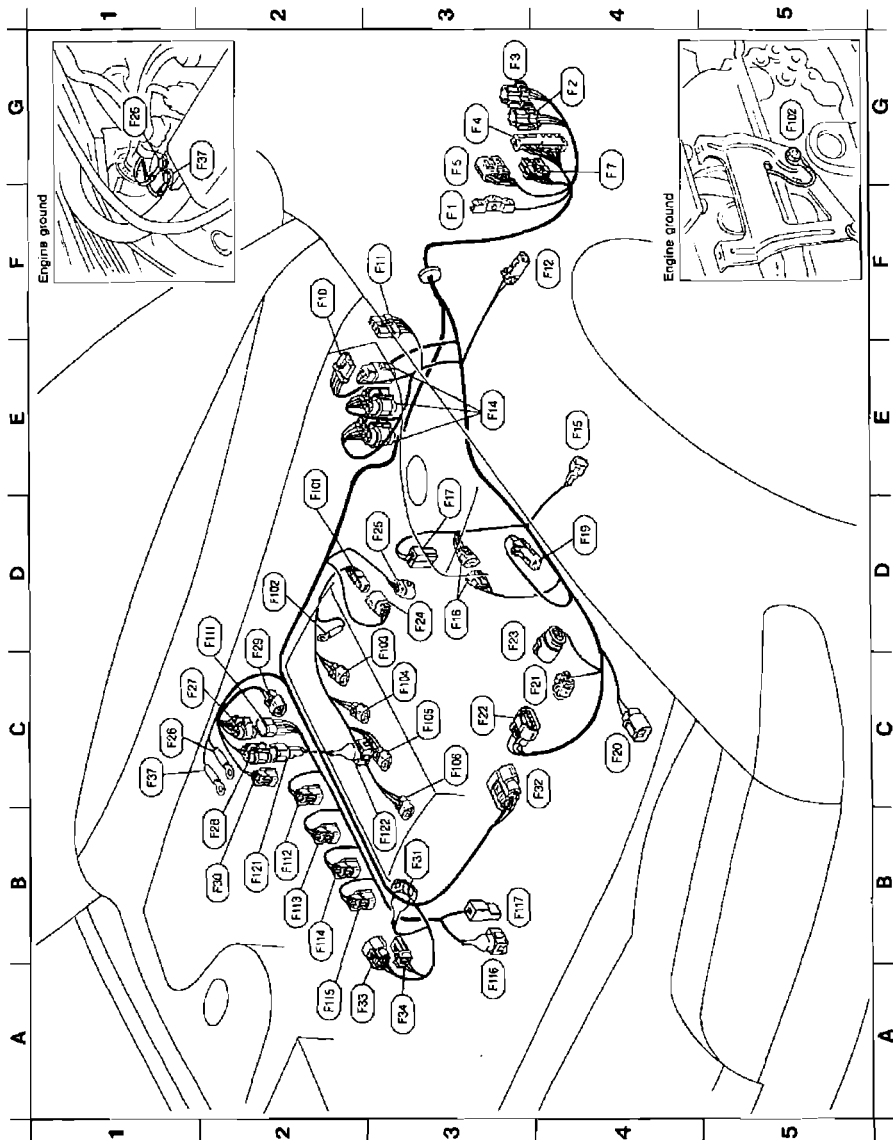




# HARNES LAYOUT

## Engine Control Harness (Cont'd)

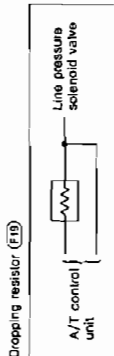
RHD MODELS



|    |       |  |
|----|-------|--|
| F3 | (F1)  | : ECM (ECCS control module)                    |
| G4 | (F2)  | : ECSS relay                                   |
| G3 | (F3)  | : Ignition coil relay                          |
| G3 | (F4)  | : To (W6)                                      |
| G3 | (F5)  | : To (S3) (Model with ABS)                     |
| B4 | (F7)  | : To (W2) (A/T models)                         |
| F2 | (F9)  | : Front wiper motor                            |
| F3 | (F1)  | : Front wiper amplifier                        |
| F4 | (F12) | : Side turn signal lamp LH                     |
| E3 | (F14) | : ABS actuator (For ABS)                       |
| E4 | (F19) | : Front wheel sensor LH (For ABS)              |
| D3 | (F18) | : Power transistor unit                        |
| D8 | (F17) | : Wastegate valve control solenoid valve       |
| D4 | (F19) | : Dropping resistor (A/T models)               |
| C4 | (F20) | : To (E5)                                      |
| C3 | (F21) | : Compressor                                   |
| C3 | (F22) | : Mass air flow sensor                         |
| D3 | (F23) | : Power steering oil pressure switch           |
| D3 | (F24) | : To (F10)                                     |
| D3 | (F16) | : Heated oxygen sensor                         |
| C1 | (F28) | : Engine ground                                |
| C1 | (F27) | : To (F11)                                     |
| B2 | (F38) | : To (S1)                                      |
| C2 | (F39) | : IACV-FICD solenoid valve                     |
| B2 | (F39) | : IACV-AAC valve                               |
| B3 | (F4)  | : YTC solenoid valve                           |
| C4 | (F32) | : Camshaft position sensor                     |
| A2 | (F33) | : Throttle position sensor (Brown)             |
| A3 | (F34) | : Throttle position switch (Grey) (A/T models) |
| C1 | (F27) | : Engine ground                                |

### Sub-harness

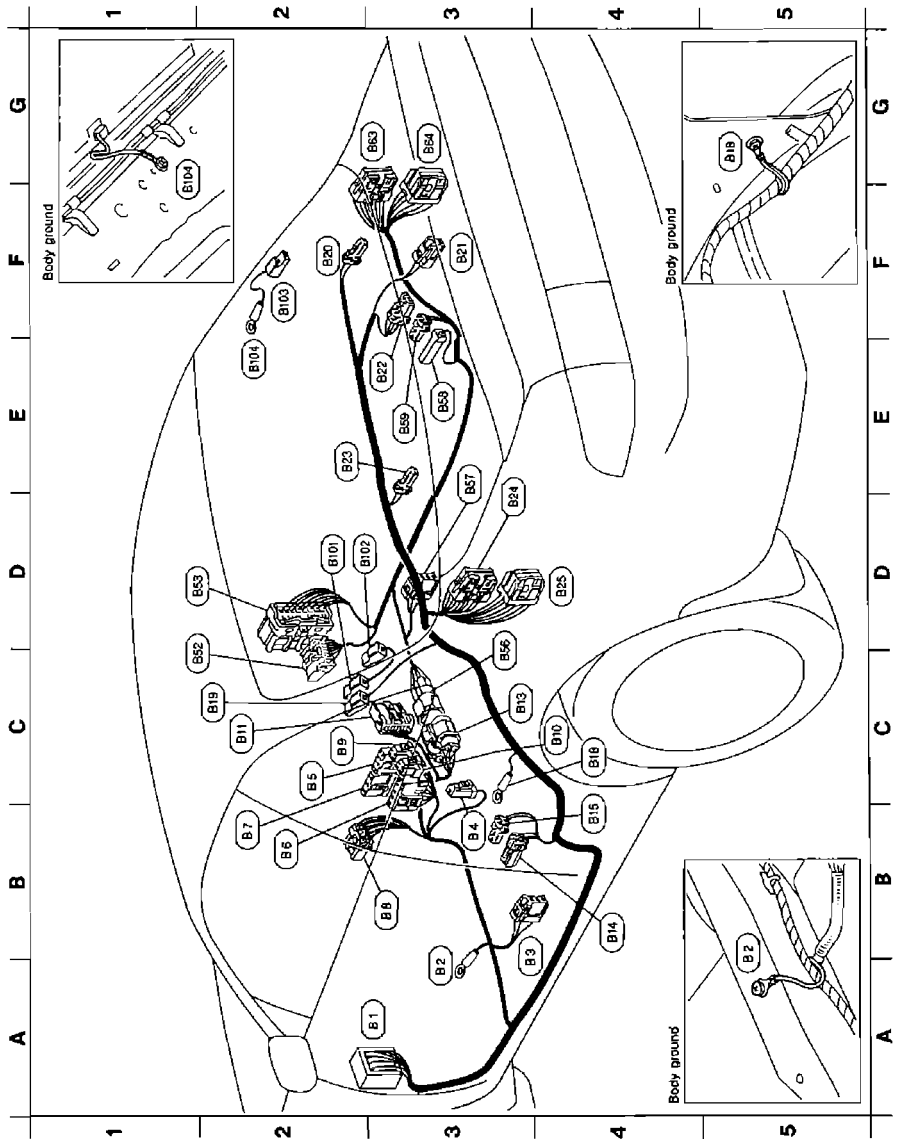
|    |       |                                     |
|----|-------|-------------------------------------|
| D2 | (F10) | : To (F2)                           |
| D2 | (F9)  | : Engine ground                     |
| C3 | (F9)  | : Ignition coil No.4                |
| C3 | (F10) | : Ignition coil No.3                |
| C3 | (F10) | : Ignition coil No.2                |
| C3 | (F10) | : Ignition coil No.1                |
| D2 | (F11) | : To (F2)                           |
| B2 | (F12) | : Injector No.4                     |
| B2 | (F13) | : Injector No.3                     |
| B2 | (F14) | : Injector No.2                     |
| A2 | (F15) | : Injector No.1                     |
| A3 | (F16) | : Engine coolant temperature sensor |
| B3 | (F17) | : Thermal transmitter               |
| B2 | (F20) | : To (F3)                           |
| B3 | (F22) | : Knock sensor                      |



# HARNES LAYOUT

## Body Harness

LHD MODELS



# HARNES LAYOUT

## Body Harness (Cont'd)

|    |       |  |
|----|-------|--|
| A3 | (81)  | To (W11)                                   |
| A3 | (82)  | : Body ground                              |
| B3 | (83)  | : Heated seat LH                           |
| B3 | (84)  | : Parking brake switch                     |
| C2 | (85)  | : Headlamp aiming switch                   |
| B2 | (86)  | : Door mirror control switch               |
| B2 | (87)  | : Front fog lamp switch                    |
| B3 | (88)  | : Overdrive switch - A/T illumination      |
| C2 | (89)  | : Heated seat switch RH                    |
| C4 | (90)  | : Heated seat switch LH                    |
| C2 | (91)  | : To (Z2)                                  |
| C3 | (92)  | : To (B5)                                  |
| B4 | (93)  | : Door switch (Driver's side)              |
| B4 | (94)  | : Seat belt pre-tensioner (Driver's side)  |
| C4 | (95)  | : Body ground                              |
| C2 | (96)  | : Condenser (For rear window defogger)     |
| F2 | (97)  | : Rear speaker RH                          |
| F3 | (98)  | : Trunk room lamp                          |
| E3 | (99)  | : Rear wiper motor                         |
| E2 | (99)  | : Rear speaker LH                          |
| D3 | (100) | : To (T1)                                  |
| D4 | (101) | : To (T2)                                  |
| C2 | (102) | : To (48)                                  |
| D2 | (99)  | : To (F5)                                  |
| C3 | (99)  | : To (B13)                                 |
| E3 | (97)  | : Heated seat RH                           |
| E3 | (98)  | : Door switch (Passenger side)             |
| E3 | (99)  | : Seat belt pre-tensioner (Passenger side) |
| G3 | (96)  | : To (78)                                  |
| G3 | (94)  | : To (77)                                  |

### Sub-harness

|    |      |  |
|----|------|--|
| D2 | (90) | : Condenser (For rear window defogger) |
| D2 | (99) | : Rear window defogger (+)             |
| F2 | (99) | : Rear window defogger (-)             |
| E2 | (94) | : Body ground                          |



# HARNES LAYOUT

## Body Harness (Cont'd)

|    |       |   |  |
|----|-------|---|--|
| G9 | (61)  | : To (41)   |  |
| G3 | (62)  | : Body ground   |  |
| F3 | (64)  | : Parking brake switch                                  |  |
| F2 | (35)  | : Headlamp aiming switch (For Europe)                   |  |
| F2 | (66)  | : Door mirror control switch                            |  |
| F2 | (67)  | : Front fog lamp switch (For Europe)                    |  |
| F3 | (68)  | : Overdrive switch - A/T illumination                   |  |
| E2 | (61)  | : To (22)   |  |
| F4 | (614) | : Door switch (Driver's side)                           |  |
| F3 | (615) | : Seat belt pre-tensioner (Driver's side) (For Europe)  |  |
| F3 | (616) | : Multi-remote control relay-1 (Except for Europe)      |  |
| E4 | (617) | : Multi-remote control relay-2 (Except for Europe)      |  |
| E3 | (618) | : Body ground   |  |
| E2 | (619) | : Condenser (For rear window defogger)                  |  |
| C2 | (620) | : Rear speaker RH                                       |  |
| B3 | (62)  | : Trunk room lamp                                       |  |
| B3 | (622) | : Rear wiper motor (Except for Australia)               |  |
| B2 | (623) | : Rear speaker LH                                       |  |
| D9 | (624) | : To (11)   |  |
| D4 | (625) | : To (12)   |  |
| E4 | (626) | : To (655)  |  |
| G3 | (627) | : Seat belt switch (For Australia)                      |  |
| D2 | (633) | : To (15) (Models with ABS)                             |  |
| D3 | (634) | : Body ground   |  |
| C3 | (635) | : Door switch (Passenger side)                          |  |
| C3 | (636) | : Seat belt pre-tensioner (Passenger side) (For Europe) |  |
| B2 | (636) | : Body ground (Models with ABS)                         |  |
| B3 | (637) | : To (174) (Models with ABS)                            |  |
| B3 | (637) | : ABS control unit (For ABS)                            |  |
| E3 | (638) | : To (628)  |  |
| E2 | (638) | : To (665) (Models with ABS)                            |  |

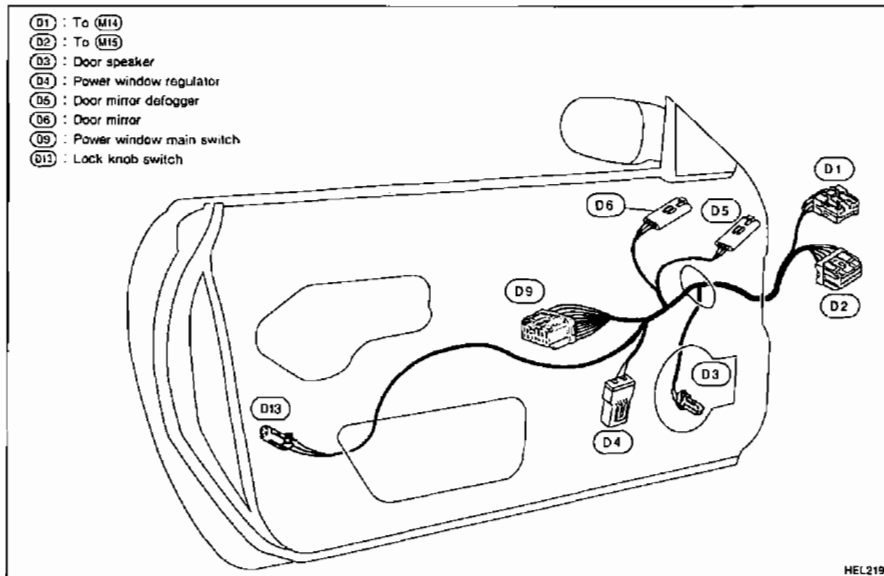
### Sub-harness

|    |       |  |
|----|-------|--|
| E2 | (602) | : Condenser (For rear window defogger) |
| D2 | (602) | : Rear window defogger (+)             |
| C2 | (602) | : Rear window defogger (-)             |
| C2 | (602) | : Body ground                          |

# HARNESS LAYOUT

## Door Harness (LHD models)

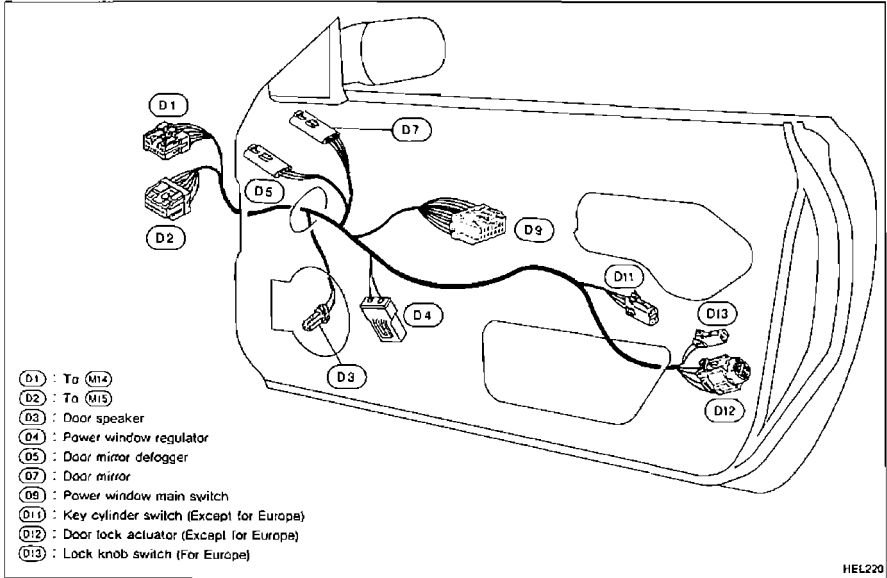
### FRONT LH





## Door Harness (RHD models)

FRONT RH



**ALPHABETICAL INDEX**

**SECTION** **IDX**

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