

I N F I N I T I ®

J30

MODEL Y32 SERIES

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FOREWORD

This manual contains maintenance and repair procedures for the 1993 INFINITI J30.

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

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

IMPORTANT SAFETY NOTICE

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

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

GENERAL INFORMATION

GI

SECTION GI

CONTENTS

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

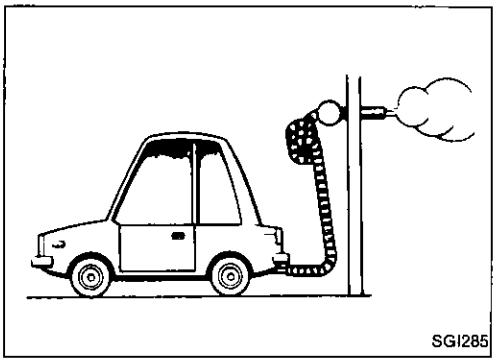

SGI646

Precautions for Supplemental Restraint System "AIR BAG"

This model has a Supplemental Restraint System "Air Bag". It helps to reduce the risk or severity of injury to the driver and the front passenger in certain types of frontal collision. The Supplemental Restraint System consists of air bags (located in the center of the steering wheel and on the instrument panel on the passenger side), sensors, a ECM, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **BF section** of this Service Manual.

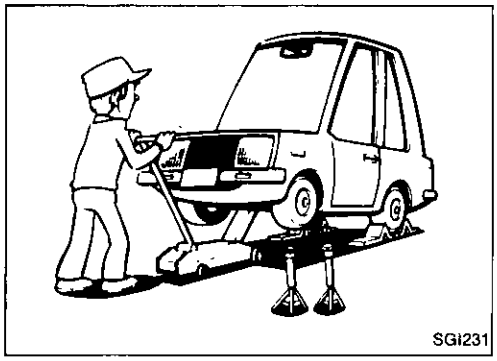
WARNING:

- **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized INFINITI 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 "Air Bag".**


SGI285

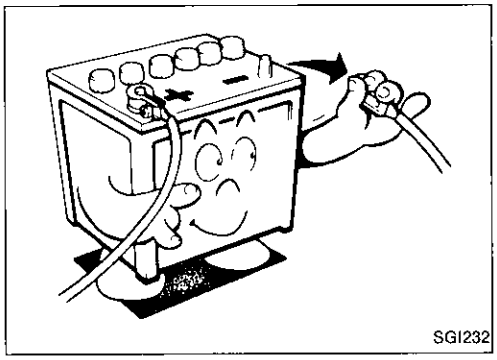
General Precautions

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

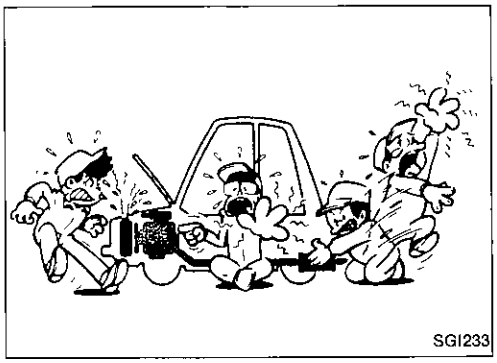

SGI231

2. 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 and towing before working on the vehicle.
   These operations should be done on a level surface.
3. 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.

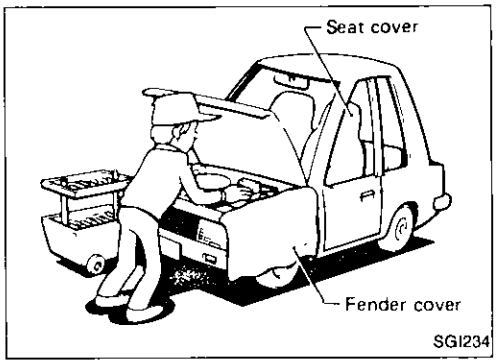
General Precautions (Cont'd)


SGI232

4. 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.


SGI233

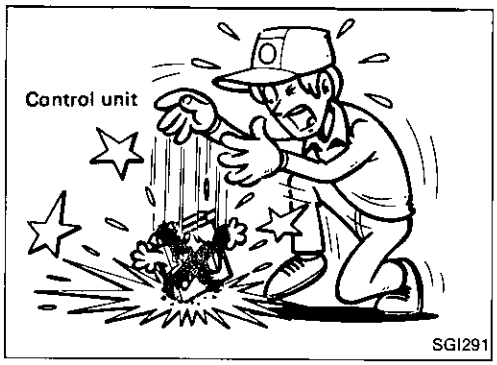
5. To prevent serious burns, avoid contact with hot metal parts such as the radiator, exhaust manifold, tail pipe and muffler. Do not remove the radiator cap when the engine is hot.



SGI234

6. 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.

7. Clean all disassembled parts in the designated liquid or solvent prior to inspection or assembly.
8. Replace oil seals, gaskets, packings, O-rings, locking washers, cotter pins, self-locking nuts, etc. with new ones.
9. Replace inner and outer races of tapered roller bearings and needle bearings as a set.
10. Arrange the disassembled parts in accordance with their assembled locations and sequence.
11. Do not touch the terminals of electrical components which use microcomputers (such as electronic control module). Static electricity may damage internal electronic components.
12. After disconnecting vacuum or air hoses, attach a tag to indicate the proper connection.
13. Use only the lubricants specified in MA section.
14. Use approved bonding agent, sealants or their equivalents when required.
15. Use tools and recommended special tools where specified for safe and efficient service repairs.
16. When repairing the fuel, oil, water, vacuum or exhaust systems, check all affected lines for leaks.
17. Dispose of drained oil or the solvent used for cleaning parts in an appropriate manner.



Precautions for Multiport Fuel Injection System or E.C.C.S. Engine

1. Before connecting or disconnecting multiport fuel injection system or E.C.C.S. harness connector to or from any multiport fuel injection system or ECM (ECCS control module), be sure to turn the ignition switch to the "OFF" position and disconnect the negative battery terminal.
   Otherwise, there may be damage to ECM.
2. Before disconnecting pressurized fuel line from fuel pump to injectors, be sure to release fuel pressure to eliminate danger.
3. 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 catalytic converter.
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.
4. Do not place the vehicle on inflammable material. Keep inflammable material off the exhaust pipe.

Precautions for Fuel

To maintain engine and exhaust system durability and performance, UNLEADED PREMIUM gasoline with an octane rating of at least 91 AKI (Research octane number 96) must be used.

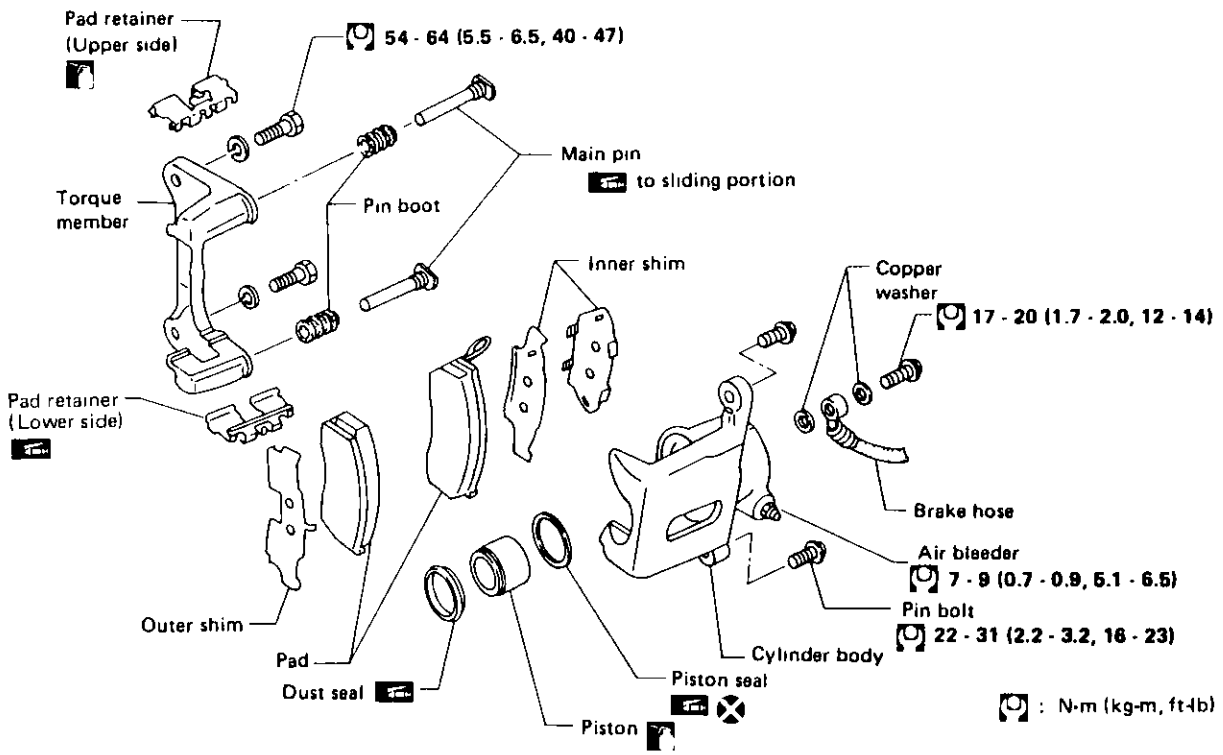
If premium unleaded gasoline is not available, REGULAR UNLEADED gasoline with an octane rating of 87 AKI (Research octane number 91) may be used temporarily, but only under the following conditions:

- The fuel tank should be filled only partially with unleaded regular gasoline, and filled up with premium unleaded gasoline as soon as possible.
- Full throttle driving and abrupt acceleration should be avoided.

Use UNLEADED fuel only. Under no circumstances should leaded gasoline be used. Lead gasoline will damage the catalytic converter and increase dangerous emissions from the vehicle exhaust.

1. **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.
2. **THE CONTENTS** are listed on the first page of each section.
3. **THE TITLE** is indicated on the upper portion of each page and shows the part or system.
4. **THE PAGE NUMBER** of each section consists of two letters which designate the particular section and a number (e.g. "BR-5").
5. **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**.

"Example"



6. **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 complicated units such as the automatic transaxle or transmission, etc. are presented in a step-by-step format where necessary.

7. The following **SYMBOLS AND ABBREVIATIONS** are used:

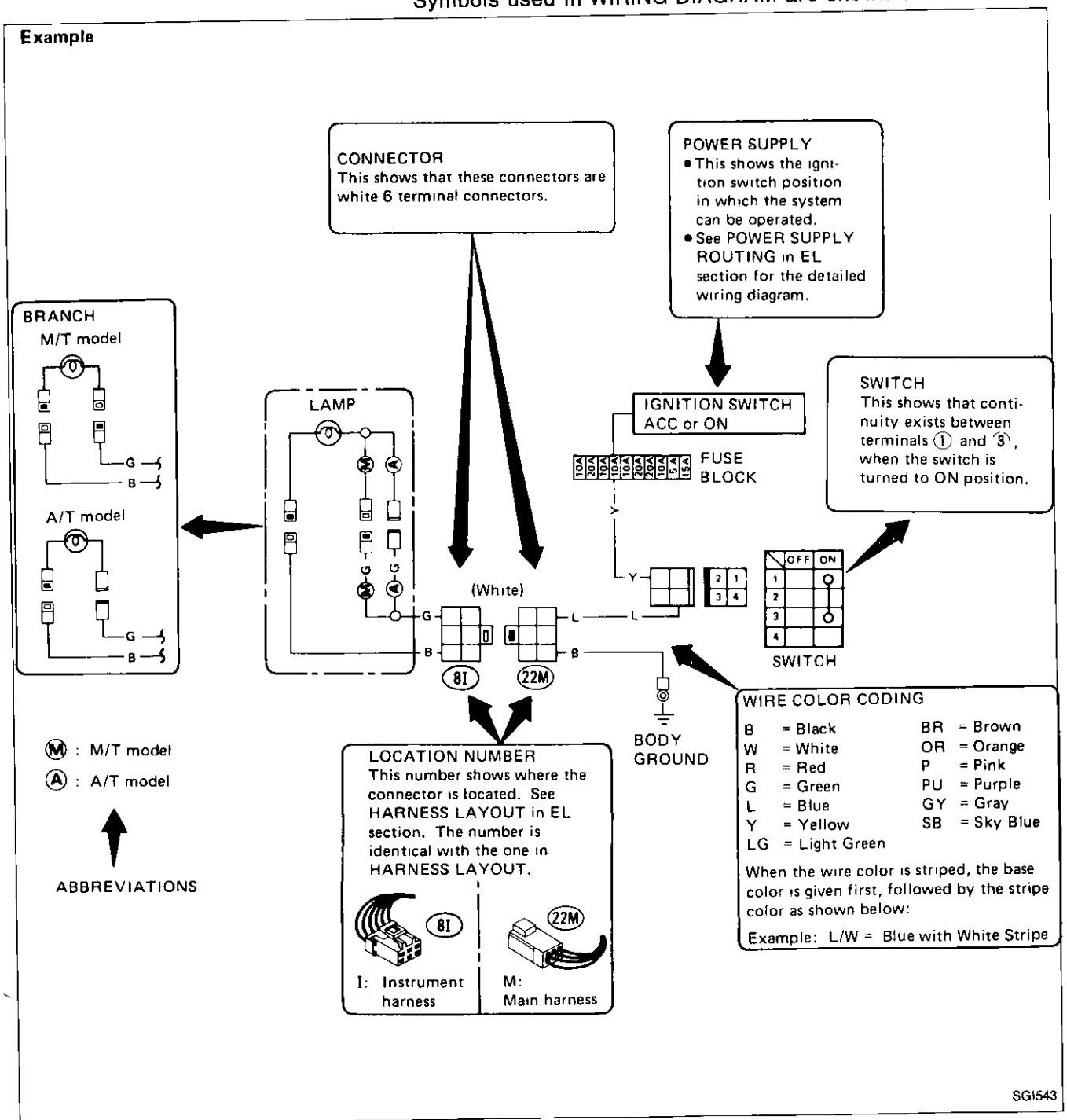
: Tightening torque
: Should be lubricated with grease. Unless otherwise indicated, use recommended multi-purpose grease.
: Should be lubricated with oil.
: Sealing point
: Checking point
: Always replace after every disassembly.
Ⓟ : Apply petroleum jelly.
ATF : Apply A.T.F.
★ : Select with proper thickness.
☆ : Adjustment is required.
S.D.S. : Service Data and Specifications
L.H., R.H. : Left-Hand, Right-Hand
FR, RR : Front, Rear
A/T : Automatic Transaxle/Transmission
A/C : Air Conditioner
P/S : Power Steering
SAE : Society of Automotive Engineers, Inc.
Tool : Special Service Tools
A.T.F. : Automatic Transmission Fluid
D_1 : Drive range 1st gear
D_2 : Drive range 2nd gear
D_3 : Drive range 3rd gear
D_4 : Drive range 4th gear
O.D. : Overdrive
2_2 : 2nd range 2nd gear
2_1 : 2nd range 1st gear
1_2 : 1st range 2nd gear
1_1 : 1st range 1st gear
3_3 : 3rd range 3rd gear
3_2 : 3rd range 2nd gear
3_1 : 3rd range 1st gear

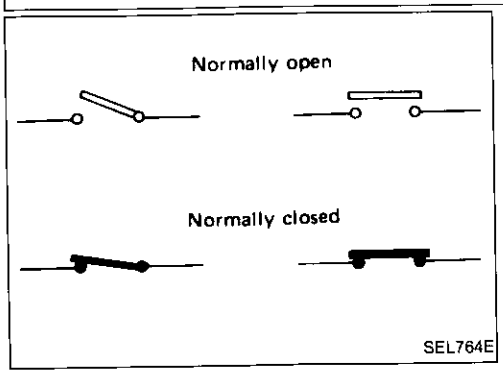
8. The **UNITS** given in this manual are primarily expressed as SI UNITS (International System of Unit), and alternately expressed in the metric system and in the yard/pound system.
   "Example"
   Tightening torque:
   59 - 78 N·m (6.0 - 8.0 kg-m, 43 - 58 ft-lb)
9. **TROUBLE DIAGNOSES** are included in sections dealing with complicated components.
10. **SERVICE DATA AND SPECIFICATIONS** are contained at the end of each section for quick reference of data.
11. 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.

WIRING DIAGRAM

Symbols used in WIRING DIAGRAM are shown below:



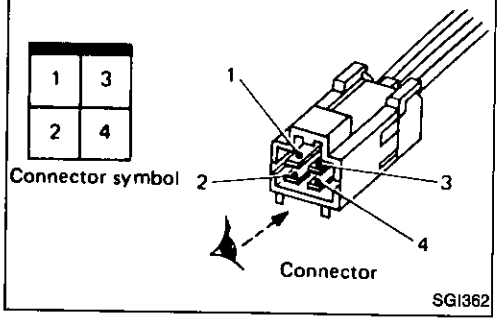


SWITCH POSITIONS

Wiring diagram switches are shown with the vehicle in the following condition.

- Ignition switch "OFF".
- Doors, hood and trunk lid/back door closed.
- Pedals are not depressed and parking brake is released.

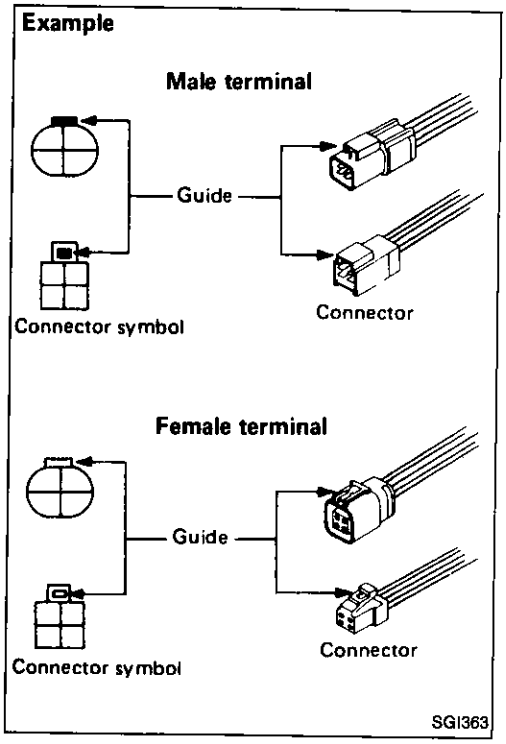
Example



CONNECTOR SYMBOLS

- All connector symbols in wiring diagrams are shown from the terminal side.

Example

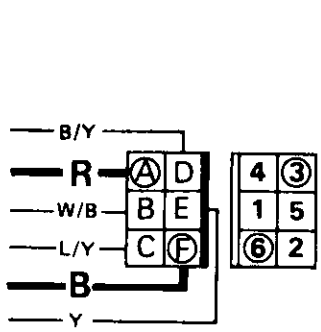


- Male and female terminals
  Connector guides for male terminals are shown in black and female terminals in white in wiring diagrams.

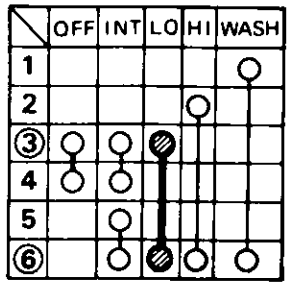
MULTIPLE SWITCH

The continuity of the multiple switch is identified in the switch chart in wiring diagrams.

Example



WIPER SWITCH



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

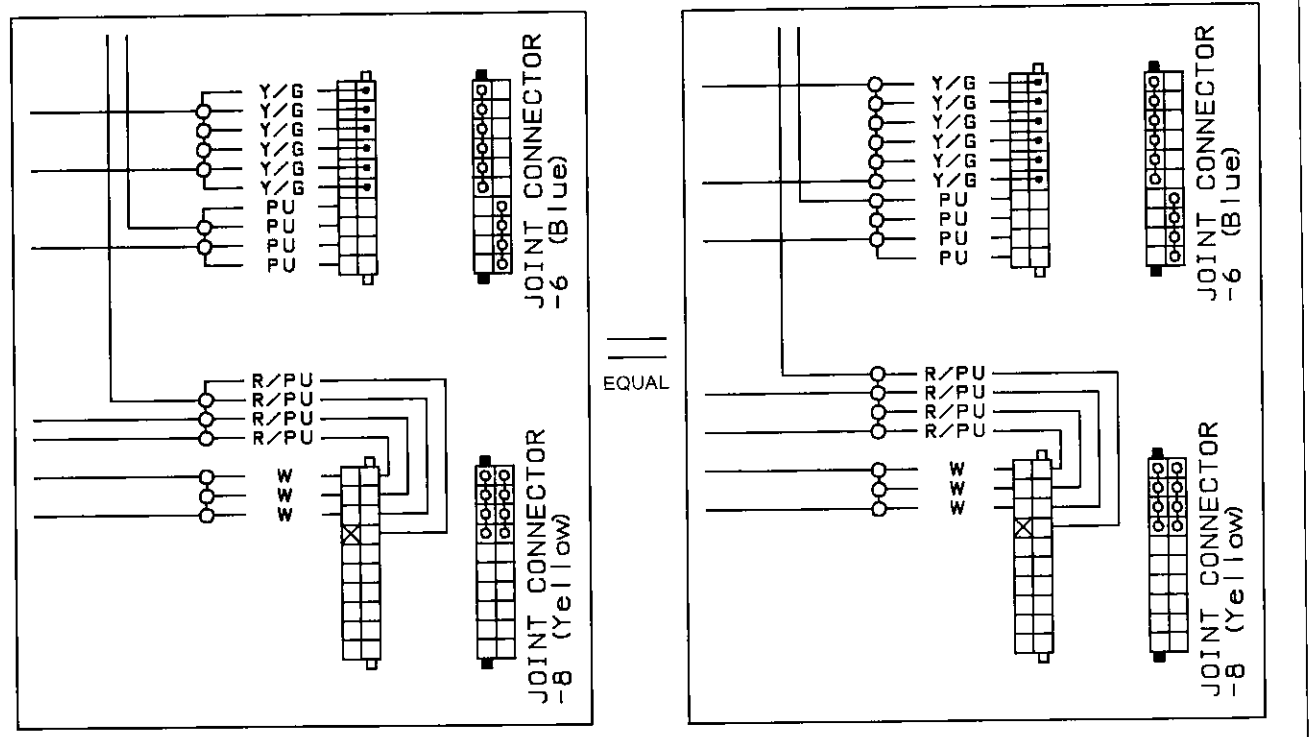
Example: Wiper switch in LO position
Continuity circuit: Red wire – Ⓐ terminal – ③ terminal – Wiper switch (● – ●: LO) – ⑥ terminal – Ⓕ terminal – Black wire

SGI365

JOINT CONNECTORS

Wires of the same color are grouped at random in the connector. They are grouped together and connected to the pins of similar groups in no set order. (In other words, the location of each particular connection is random.) Therefore, the locations of connections shown in the circuit diagram in the manual should be served only as a reference. The actual locations of the connections in the vehicle may be different. The manual does show the actual circuit logic.

Example

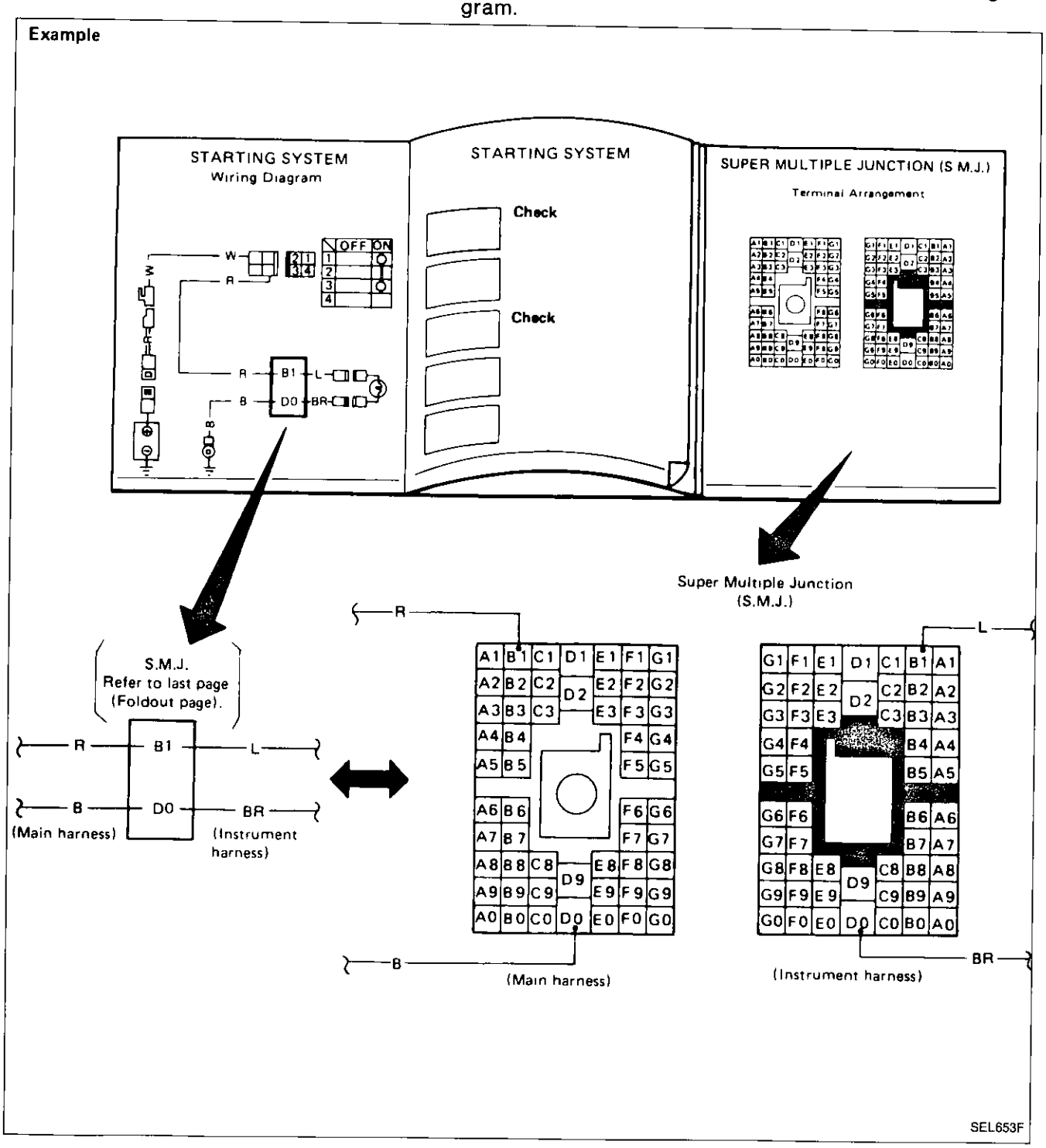


The above two wiring diagrams have the same circuit logic.

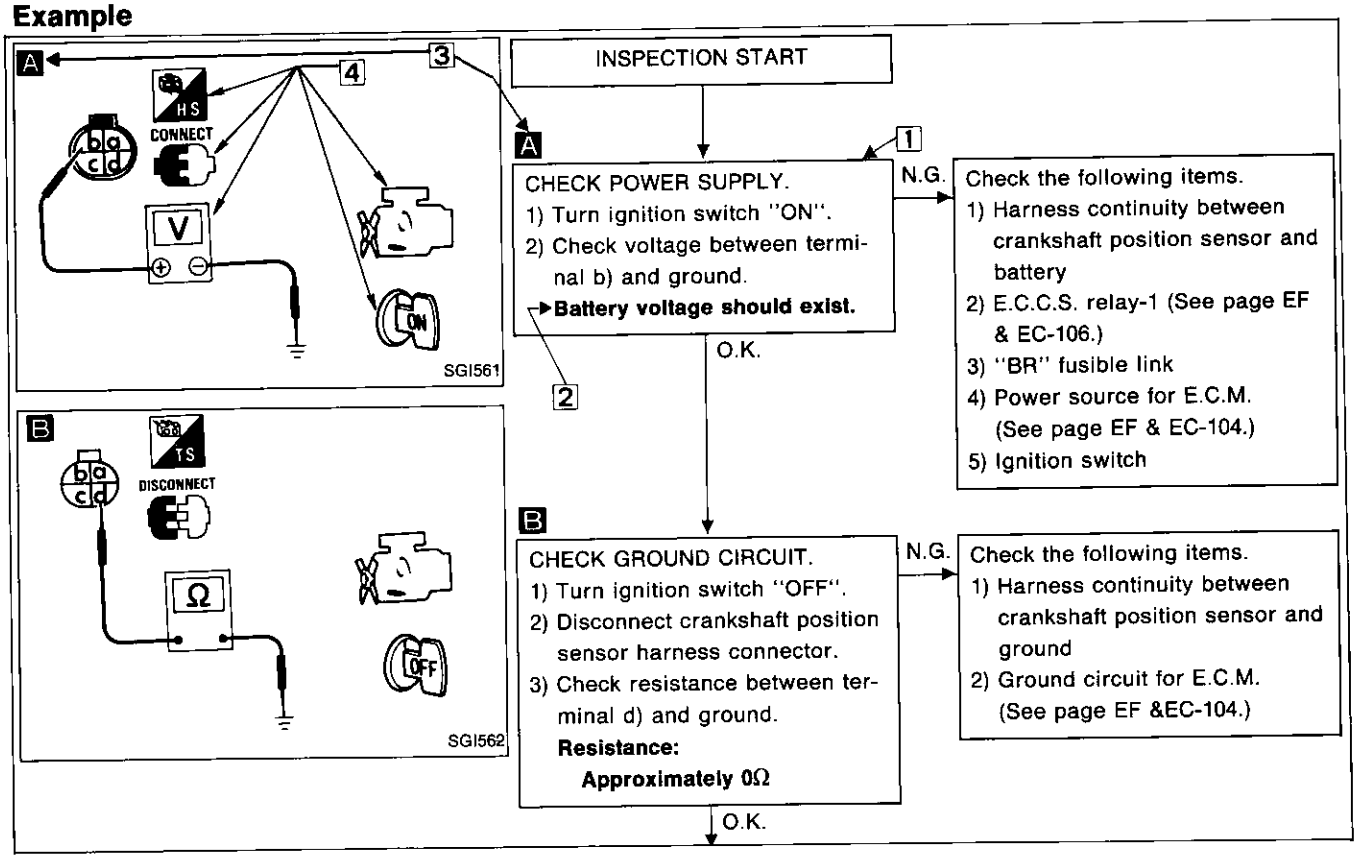
SGI755

SUPER MULTIPLE JUNCTION (S.M.J.)

- The "S.M.J." indicated in wiring diagrams is shown in a simplified form. The terminal arrangement should therefore be referred to in the foldout at the end of the Service Manual.
- The foldout should be spread to read the entire wiring diagram.



Example



NOTICE

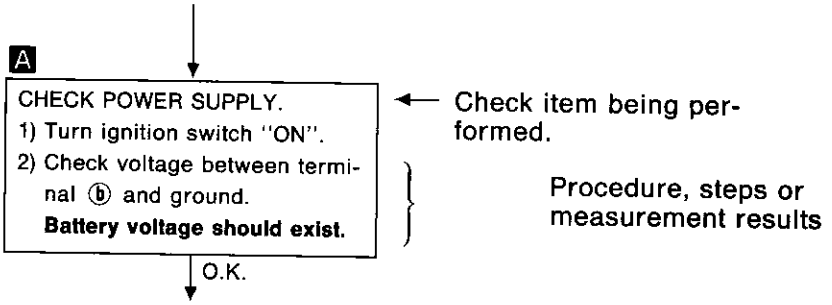
The flow chart indicates work procedures required to diagnose problems effectively. Observe the following instructions before diagnosing.

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 Location and Harness Layout 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 and Harness Layout in EL section for identification of harness connectors.**
5) **When checking circuit continuity, ignition switch should be "OFF".**
6) **Before checking voltage at connectors, check battery voltage.**
7) **After accomplishing the Diagnostic Procedures and Electrical Components Inspection, make sure that all harness connectors are reconnected as they were.**

HOW TO FOLLOW 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.



2 Measurement results

Required results are indicated in bold type in the corresponding block, as shown below:
These have the following meanings:

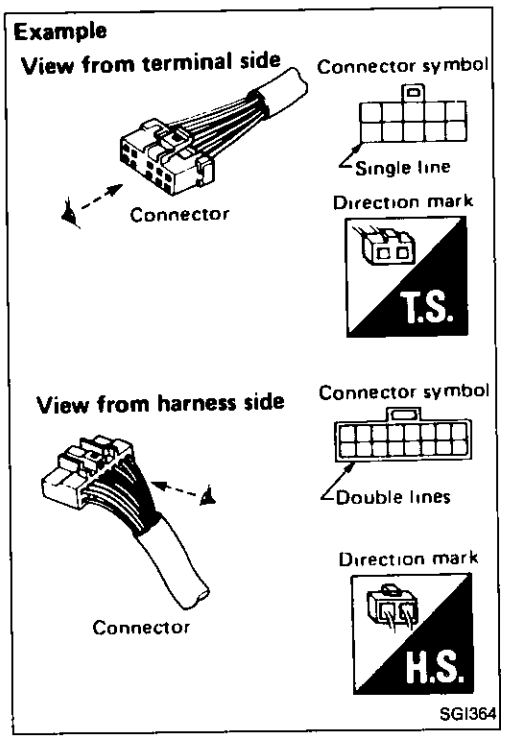
Battery voltage → 11 - 14V or approximately 12V
Voltage: Approximately 0V → Less than 1V

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

A direction mark is shown to clarify the side of connector (terminal side or harness side).
Direction marks are mainly used in the illustrations indicating terminal inspection.



: **View from terminal side ... T.S.**

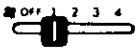
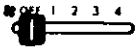
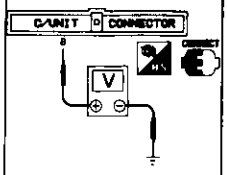
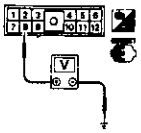
- **All connector symbols shown from the terminal side are enclosed by a single line.**



: **View from harness side ... H.S.**

- **All connector symbols shown from the harness side are enclosed by a double line.**

Key to symbols signifying measurements or procedures

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

System Application and Function

Diagnostic test mode	Function	E.C.C.S.	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	—	—
E.C.M. part number	E.C.M. part number can be read.	X	X	—
Function test	E.C.C.S. faults can be isolated to a general area, semi- automatically and in a short time, by following the directions on the screen.	X	—	—

X: Applicable

Lithium Battery Replacement

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

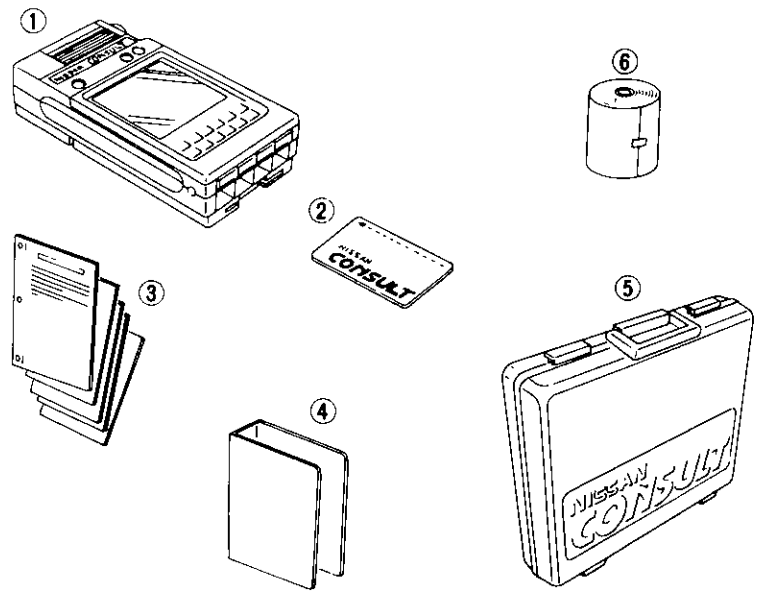
WARNING:

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 of dispose of in fire.

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

Checking Equipment

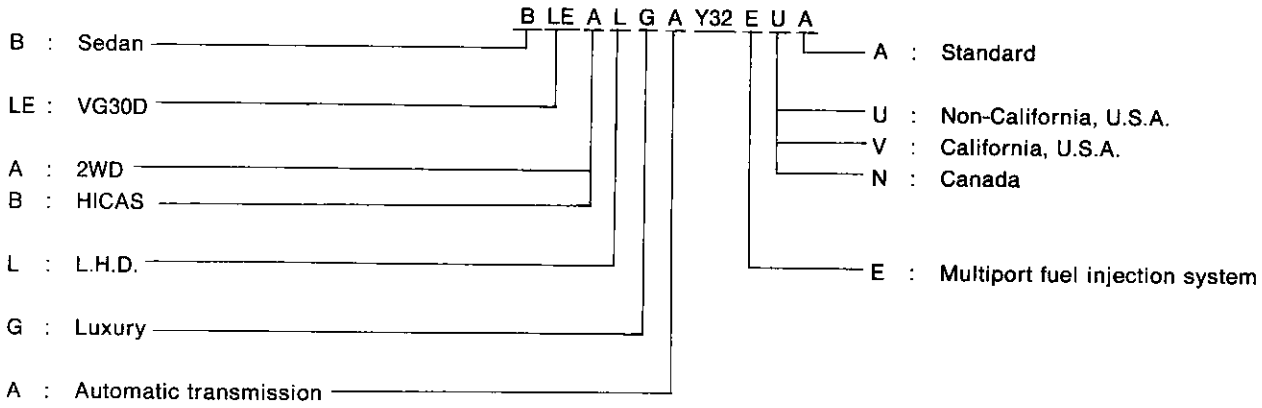
When ordering the below equipment, contact your INFINITI distributor.

Tool name	Description
NISSAN CONSULT kit ① CONSULT unit and accessories ② Program card (UE 920) ③ Operation manuals ④ Binder ⑤ Carrying case ⑥ Thermal paper (Rolls)	

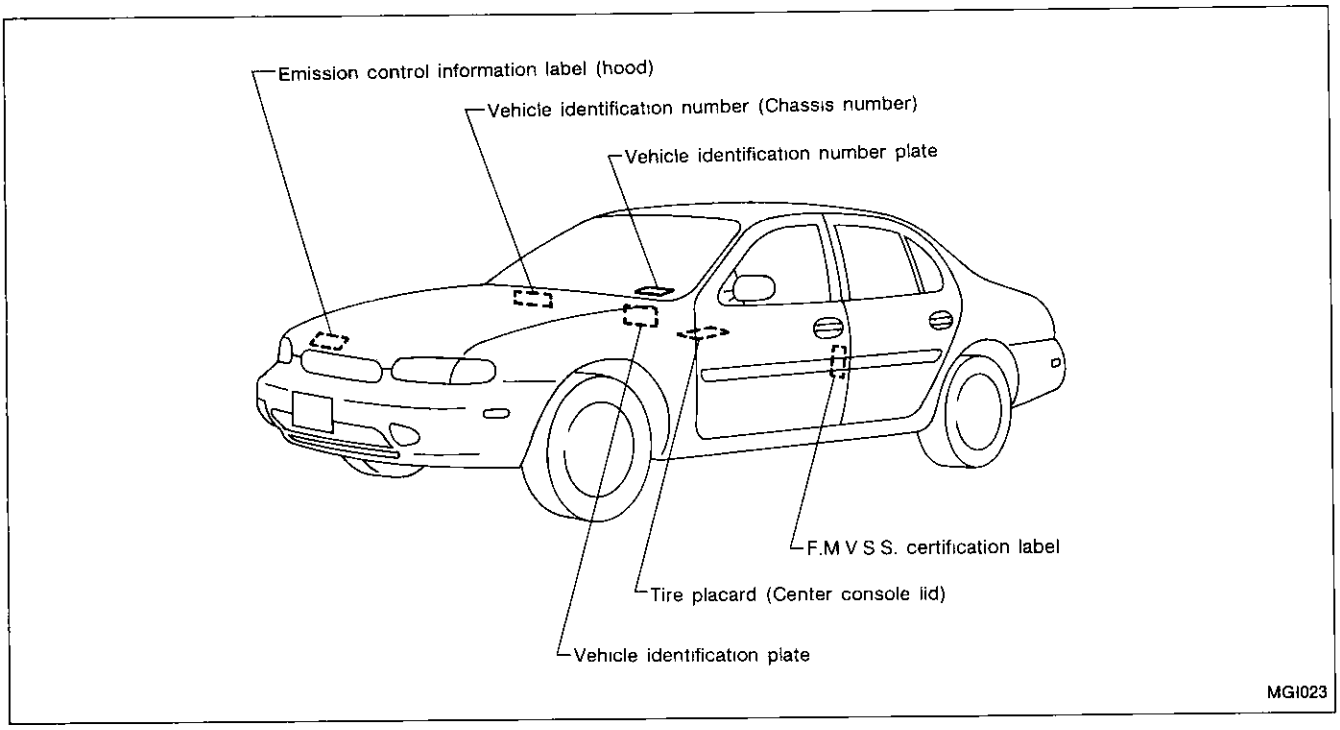
Model Variation

Body	Destination	Grade	Model	Engine	Transmission	Differential carrier
Sedan	Non-California	Luxury	BLEALGA-EUA	VG30DE	RE4R01A	R200V
			BLEBLGA-EUA			
	California		BLEALGA-EVA			
			BLEBLGA-EVA			
	Canada		BLEALGA-ENA			
			BLEBLGA-ENA			

Prefix and suffix designations:



Identification Number



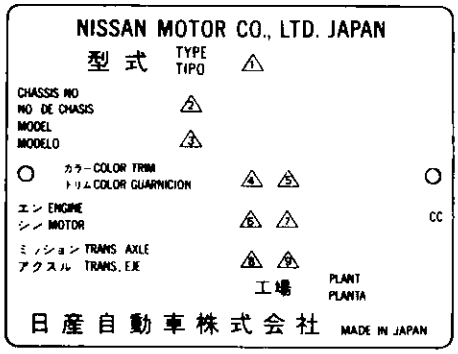
VEHICLE IDENTIFICATION NUMBER ARRANGEMENT

JNK A Y 2 1 D 1 P M 000001

- Manufacturer
  - JNK : Nissan, Passenger vehicle
- Engine type
  - A : VG30D
- Vehicle line
  - Y : INFINITI J30
- Model change
- Body type
  - 1 : 4-door Sedan
- Restraint system
  - D : Driver & front passenger air bag system
- Check digit (0 to 9 or X)
  - The code for the check digit is determined by mathematical computation.
- Model year
  - P : 1993 year model
- Manufacturing plant
  - M : Tochigi
- Vehicle serial number (Chassis number)

Identification Number (Cont'd)

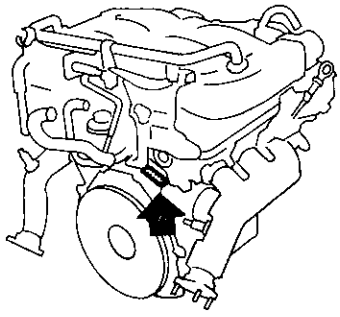
IDENTIFICATION PLATE



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

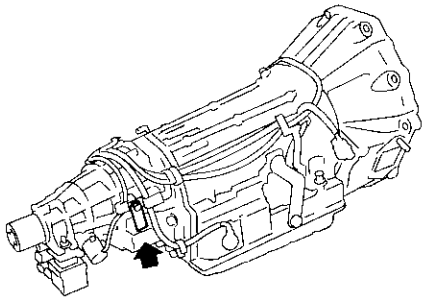
SGI315

ENGINE SERIAL NUMBER



MGI024

AUTOMATIC TRANSMISSION NUMBER



MGI025

Dimensions

Unit: mm (in)

Item \ Model		Sedan
Overall length		4,859 (191.3)
Overall width		1,770 (69.7)
Overall height		1,389 (54.7)
Wheel base		2,761 (108.7)
Tread	Front	1,500 (59.1)
	Rear	1,495 (58.9)

Wheels and Tires

Road wheel	Aluminum	15 x 6-1/2 JJ
	Spare	16 x 4T*
	Offset mm (in)	40 (1.57)
Tire size	Conventional	P215/60R15 93H
	Spare	T125/90D16*

*: T-type spare tire

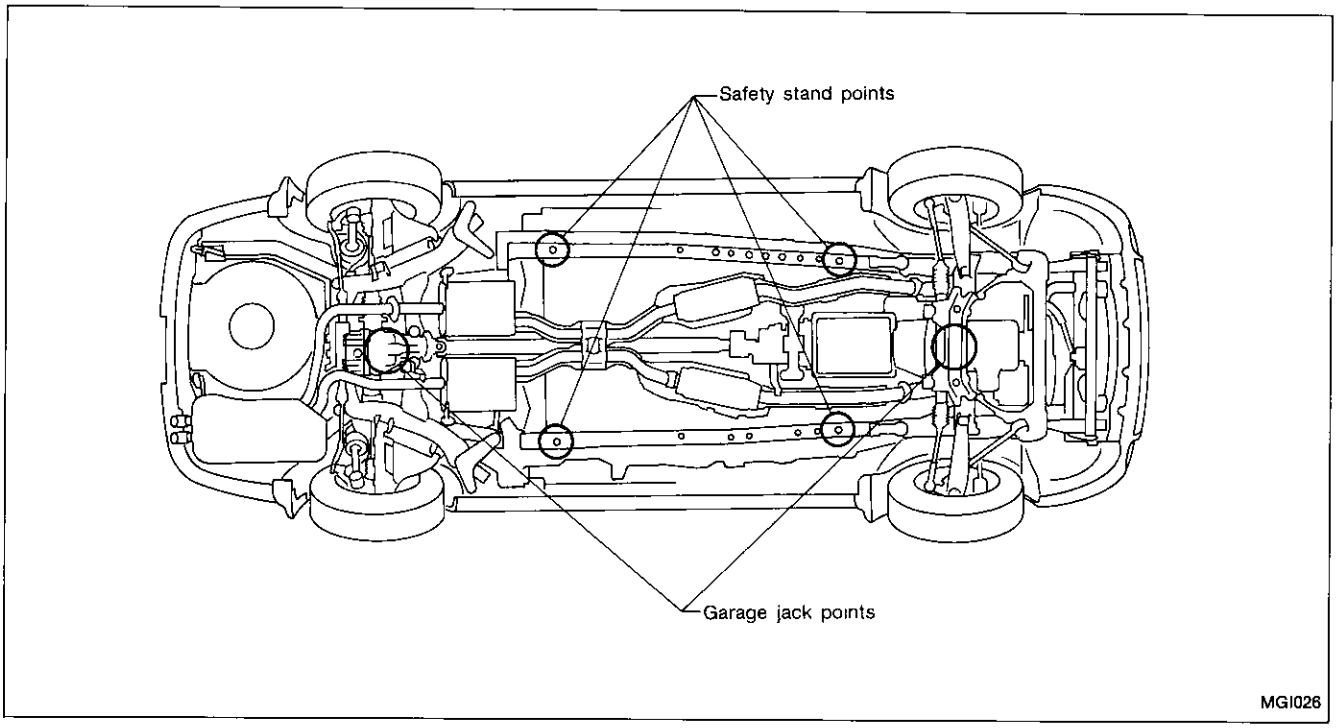
Garage Jack and Safety Stand

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 both front and back of the wheels on the ground.**

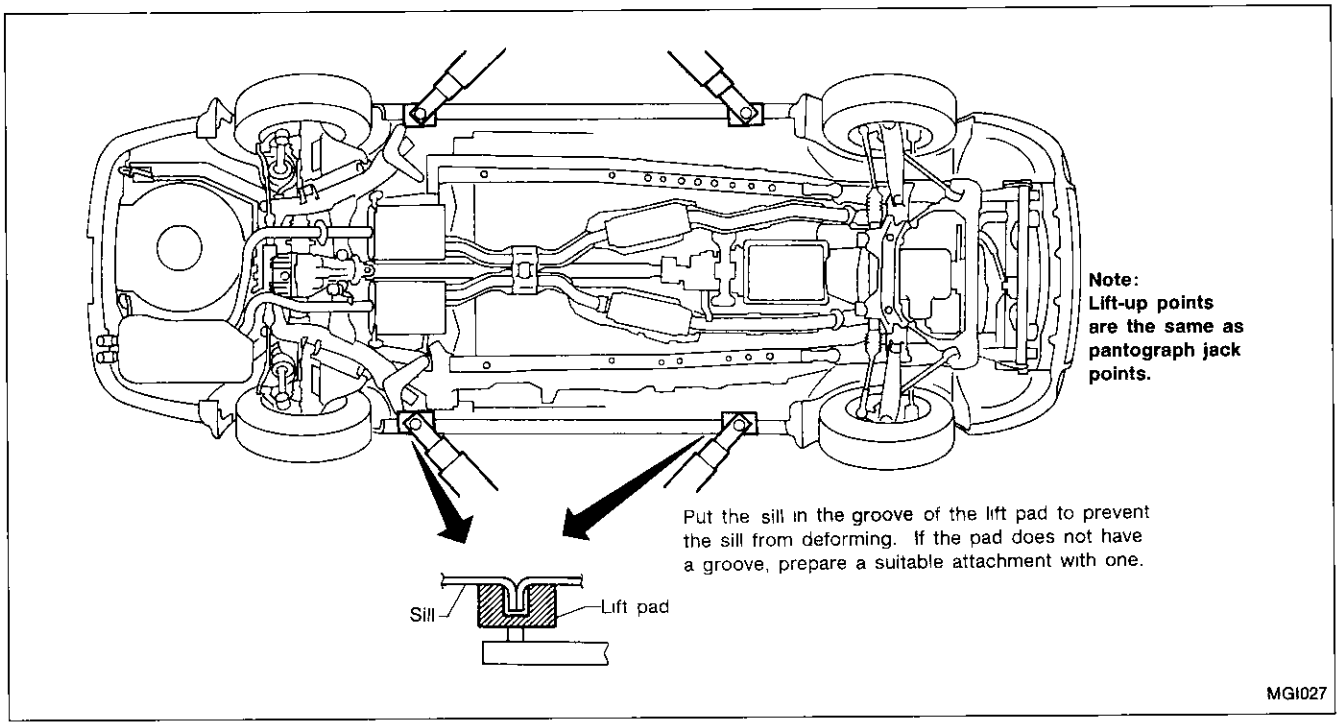
CAUTION:

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



2-pole Lift

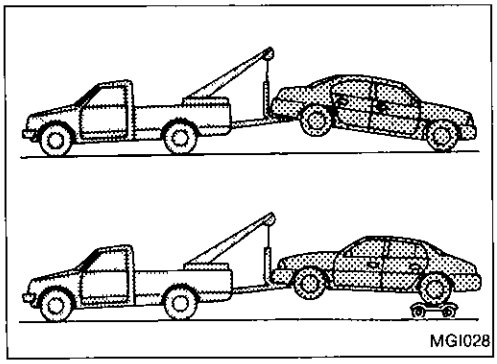
WARNING:
When lifting the vehicle, open the lift arms as wide as possible and ensure that the front and rear of the vehicle are well balanced.
When setting the lift arm, do not allow the arm to contact the brake tubes and fuel lines.



Tow Truck Towing

CAUTION:

- **All applicable state or Provincial (in Canada) laws and local laws regarding the towing operation must be obeyed.**
- **It is necessary to use proper towing equipment to avoid possible damage to the vehicle during towing operation. Towing is in accordance with Towing Procedure Manual at dealer.**
- **When towing with the rear wheels on the ground, release the parking brake and move the shift lever to neutral ("N" position).**
- **Never tow the vehicle from the rear (i.e., backward) with four wheels on the ground as this may cause serious and expensive damage to the transmission.**



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

Tow Truck Towing (Cont'd)

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.

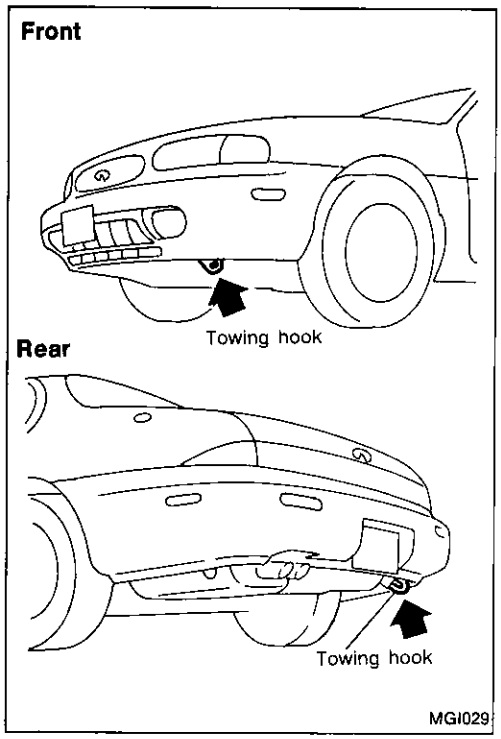
Speed:

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

- **Never tow the vehicle using only the towing hooks. Use proper towing equipment when towing. Otherwise, the vehicle body will be damaged.**
- **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* mm	Pitch 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
	M12	12.0	1.75	42	4.3	31	51	5.2	38
			1.25	46	4.7	34	56	5.7	41
	M14	14.0	1.5	74	7.5	54	88	9.0	65
7T	M6	6.0	1.0	8.4	0.86	6.2	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
	M12	12.0	1.75	71	7.2	52	84	8.6	62
			1.25	77	7.9	57	92	9.4	68
	M14	14.0	1.5	127	13.0	94	147	15.0	108
9T	M6	6.0	1.0	12	1.2	9	15	1.5	11
	M8	8.0	1.25	29	3.0	22	35	3.6	26
			1.0	31	3.2	23	37	3.8	27
	M10	10.0	1.5	59	6.0	43	70	7.1	51
			1.25	62	6.3	46	74	7.5	54
	M12	12.0	1.75	98	10.0	72	118	12.0	87
			1.25	108	11.0	80	137	14.0	101
	M14	14.0	1.5	177	18.0	130	206	21.0	152

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

M 6
- 6 — Nominal diameter of bolt threads (Unit: mm)
- M — Metric screw threads

MAINTENANCE

SECTION MA

MA

CONTENTS

GENERAL MAINTENANCE ..... MA- 2
PERIODIC MAINTENANCE ..... MA- 4
RECOMMENDED FLUIDS AND LUBRICANTS ..... MA- 7
ENGINE MAINTENANCE ..... MA- 8
CHASSIS AND BODY MAINTENANCE MA-14
SERVICE DATA AND SPECIFICATIONS (S.D.S.) MA-19

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 INFINITI dealers do them.

Item	Reference page
OUTSIDE THE VEHICLE The maintenance items listed here should be performed from time to time, unless otherwise specified.	
Tires Check the pressure with a gauge periodically when at a service station, including the spare, and adjust to the specified pressure if necessary. Check carefully for damage, cuts or excessive wear.	—
Wheel nuts When checking the tires, make sure no nuts are missing, and check for any loose nuts. Tighten if necessary.	—
Tire rotation Tires should be rotated every 12,000 km (7,500 miles).	MA-16
Wheel alignment and balance If the vehicle should pull to either side while driving on a straight and level road, or if you detect uneven or abnormal tire wear, there may be a need for wheel alignment. If the steering wheel or seat vibrates at normal highway speeds, wheel balancing may be needed.	MA-16 FA-7
Windshield wiper blades Check for cracks or wear if they do not wipe properly.	—
Doors and engine hood Check that all doors and the engine hood operate smoothly as well as the trunk lid. Also ensure, that all latches lock securely. Lubricate hinges and latches if necessary. Make sure that the secondary latch keeps the hood from opening when the primary latch is released. When driving in areas using road salt or other corrosive materials, check lubrication frequently.	MA-18
INSIDE THE VEHICLE The maintenance items listed here should be checked on a regular basis, such as when performing periodic maintenance, cleaning the vehicle, etc.	
Lights 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.	—
Warning lights and buzzers/chimes Make sure that all warning lights and buzzers/chimes are operating properly.	—
Windshield wiper and washer Check that the wipers and washer operate properly and that the wipers do not streak.	—
Windshield defroster Check that the air comes out of the defroster outlets properly and in sufficient quantity when operating the heater or air conditioner.	—
Steering wheel Check that it has the specified free play. Be sure to check for changes in the steering condition, such as excessive free play, hard steering or strange noises. **Free play: Less than 35 mm (1.38 in)**	—
Seats Check seat position controls such as seat adjuster, seatback recliner, etc. to ensure they operate smoothly and that all latches lock securely in every position. Check that the head restraints move up and down smoothly and that the locks (if so equipped) hold securely in all latched positions. Check that the latches lock securely for folding-down rear seatbacks.	—
Seat belts Check that all parts of the seat belt system (e.g. buckles, anchors, adjusters and retractors) operate properly and smoothly, and are installed securely. Check the belt webbing for cuts, fraying, wear or damage.	MA-18
Brakes Check that the brake does not pull the vehicle to one side when applied.	—
Brake pedal and booster Check the pedal for smooth operation and make sure it has the proper distance under it when depressed fully. Check the brake booster function. Be certain to keep floor mats away from the pedal.	BR-7 BR-12

Item	Reference page
Parking brake Check that the lever has the proper travel and confirm that your vehicle is held securely on a fairly steep hill with only the parking brake applied.	BR-28
Automatic transmission "Park position" mechanism Check that the lock release button on the selector lever operates properly and smoothly. On a fairly steep hill check that your vehicle is held securely with the selector lever in the "P" position without applying any brakes.	—
UNDER THE HOOD AND VEHICLE The maintenance items listed here should be checked periodically (e.g. each time you check the engine oil or refuel).	
Windshield washer fluid Check that there is adequate fluid in the tank.	—
Engine coolant level Check the coolant level when the engine is cold.	MA-11
Radiator and hoses Check the front of the radiator and clean off any dirt, insects, leaves, etc., that may have accumulated. Make sure the hoses have no cracks, deformation, rot or loose connections.	—
Brake fluid level Make sure that the brake fluid level is between the "MAX" and "MIN" lines on the reservoir.	MA-15
Battery Check the fluid level in each cell. It should be between the "MAX" and "MIN" lines.	—
Engine drive belts Make sure that no belts is frayed, worn, cracked or oily.	MA-8
Engine oil level Check the level on the dipstick after parking the vehicle on a level spot and turning off the engine.	MA-12
Power steering fluid level and lines Check the level when the fluid is cold and the engine is turned off. Check the lines for proper attachment, leaks, cracks etc.	MA-17
Automatic transmission fluid level Check the level on the dipstick after putting the selector lever in "P" with the engine idling.	MA-14
Exhaust system Make sure there are no loose supports, cracks or holes. If the sound of the exhaust seems unusual or there is a small of exhaust fumes, immediately locate the trouble and correct it.	MA-17
Underbody The underbody is frequently exposed to corrosive substances such as those used on icy roads or to control dust. It is very important to remove these substances, otherwise rust will form on the floor pan, frame, fuel lines and around the exhaust system. At the end of winter, the underbody should be thoroughly flushed with plain water, being careful to clean those areas where mud and dirt can easily accumulate.	—
Fluid leaks Check under the vehicle for fuel, oil water or other fluid leaks after the vehicle has been parked for a while. Water dripping from the air conditioner after use is normal. If you should notice any leaks or gasoline fumes are evident, check for the cause and correct it immediately.	—

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

SCHEDULE 1

Follow Periodic Maintenance Schedule 1 if your driving habits frequently includes one or more of the following driving conditions:

- Repeated short trips of less than 5 miles (8 km).
- Repeated short trips of less than 10 miles (16 km) with outside temperatures remaining below freezing.
- Operating in hot weather in stop-and-go "rush hour" traffic.
- Extensive idling and/or low speed driving for long distances, such as police, taxi or door-to-door delivery use.
- Driving in dusty conditions.
- Driving on rough, muddy, or salt spread roads.
- Towing a trailer, using a camper or a car-top carrier.

SCHEDULE 2

Follow Periodic Maintenance Schedule 2 if none of the driving conditions shown in Schedule 1 apply to your driving habits.

Abbreviations: R = Replace I = Inspect. Correct or replace as necessary. [ ]: Perform service at the mileage intervals only

MAINTENANCE OPERATION		MAINTENANCE INTERVAL																
Perform at number of miles, kilometers or months, whichever comes first.	Miles x 1,000	3.75	7.5	11.25	15	18.75	22.5	26.25	30	33.75	37.5	41.25	45	48.75	52.5	56 25	60	Reference page
	(km x 1,000)	(6)	(12)	(18)	(24)	(30)	(36)	(42)	(48)	(54)	(60)	(66)	(72)	(78)	(84)	(90)	(96)	
	Months	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	
EMISSION CONTROL SYSTEM MAINTENANCE																		
Service "A"																		
Engine oil		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	MA-11
Engine oil filter (Use Nissan Part No. 15208-60U00 or equivalent)		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	MA-12
Service "E"																		
Air cleaner filter	See NOTE (1)								[R]								[R]	MA-11
Service "F"																		
Vapor lines									I*								I*	MA-13
Fuel lines									I*								I*	MA-10
Fuel filter	See NOTE (2)*																	MA-11
Service "G"																		
Drive belts	See NOTE (3)																I*	MA-8
Service "J"																		
Engine coolant	See NOTE (4)																R*	MA-9
Service "H"																		
Spark plugs (PLATINUM-TIPPED type)																	[R]	MA-13
Timing belt																	[R]	EM-14
CHASSIS AND BODY MAINTENANCE																		
Service "B"																		
Brake pads & discs			I		I		I		I		I		I		I		I	MA-15
Steering gear & linkage, axle & suspension parts			I		I		I		I		I		I		I		I	MA-19, FA-5, RA-5
Steering linkage ball joints & front suspension ball joints			I		I		I		I		I		I		I		I	MA-16, FA-6
SUPER HICAS linkage			I		I		I		I		I		I		I		I	MA-17
Exhaust system			I		I		I		I		I		I		I		I	MA-17
Service "D"																		
Brake lines & cables					I				I				I				I	MA-15
Automatic transmission oil & differential gear oil	See NOTE (5)				I				I				I				I	MA-14
Air bag system	See NOTE (6)																	BF-70

NOTE:
(1) If operating mainly in dusty conditions, more frequent maintenance may be required.
(2) If vehicle is operated under extremely adverse weather conditions or in areas where ambient temperatures are either extremely low or extremely high, the filters might become clogged. In such an event, replace them immediately.
(3) After 60,000 miles (96,000 km) or 48 months, inspect every 15,000 miles (24,000 km) or 12 months.
(4) After 60,000 miles (96,000 km) or 48 months, replace every 30,000 miles (48,000 km) or 24 months.
(5) If towing a trailer, using a camper or a car-top carrier, or driving on rough or muddy roads, change (not just inspect) oil at every 30,000 miles (48,000 km) or 24 months.
(6) Inspect the air bag system 10 years after the date of manufacture as noted on the F.M.V.S.S. certification label.
(7) Maintenance items and intervals with "*" are recommended by INFINITI for reliable vehicle operation. The owner need not perform such maintenance in order to maintain the emission warranty or manufacturer recall liability. Other maintenance items and intervals are required.

Abbreviations: R = Replace I = Inspect. Correct or replace as necessary. [ ]: Perform service at the mileage intervals only

MAINTENANCE OPERATION		MAINTENANCE INTERVAL								
Perform at number of miles, kilometers or months, whichever comes first.	Miles x 1,000 (km x 1,000) Months	7.5 (12) 6	15 (24) 12	22.5 (36) 18	30 (48) 24	37.5 (60) 30	45 (72) 36	52.5 (84) 42	60 (96) 48	Reference page
EMISSION CONTROL SYSTEM MAINTENANCE										
Service "A"										
Engine oil		R	R	R	R	R	R	R	R	MA-11
Service "D"										
Engine oil filter (Use Nissan Part No. 15208-60U00 or equivalent)			R		R		R		R	MA-12
Service "E"										
Air cleaner filter					[R]				[R]	MA-11
Service "F"										
Vapor lines					I*				I*	MA-13
Fuel lines					I*				I*	MA-10
Fuel filter	See NOTE (1)*									MA-11
Service "G"										
Drive belts	See NOTE (2)								I*	MA-8
Service "J"										
Engine coolant	See NOTE (3)								R*	MA-9
Service "H"										
Spark plugs (PLATINUM-TIPPED Type)									[R]	MA-13
Timing belt									[R]	EM-14
CHASSIS AND BODY MAINTENANCE										
Service "D"										
Brake lines & cables			I		I		I		I	MA-15
Brake pads & discs			I		I		I		I	MA-15
Automatic transmission oil & differential gear oil			I		I		I		I	MA-14
Service "F"										
Steering gear linkage axle & suspension parts					I				I	MA-16, FA-5, RA-5
SUPER HICAS linkage					I				I	MA-17
Exhaust system					I				I	MA-17
Air bag system	See NOTE (4)									BF-70

NOTE: (1) If vehicle is operated under extremely adverse weather conditions or in areas where ambient temperatures are either extremely low or extremely high, the filters might become clogged. In such an event, replace them immediately.

(2) After 60,000 miles (96,000 km) or 48 months, inspect every 15,000 miles (24,000 km) or 12 months.

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

(4) Inspect the air bag system 10 years after the date of manufacture as noted on the F.M.V.S.S. certification label.

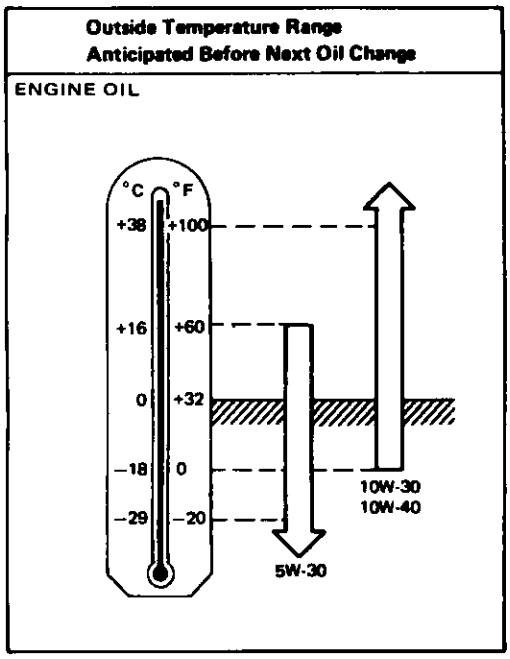
(5) Maintenance items and intervals with "*" are recommended by INFINITI for reliable vehicle operation. The owner need not perform such maintenance in order to maintain the emission warranty or manufacturer recall liability. Other maintenance items and intervals are required.

Fluids and Lubricants

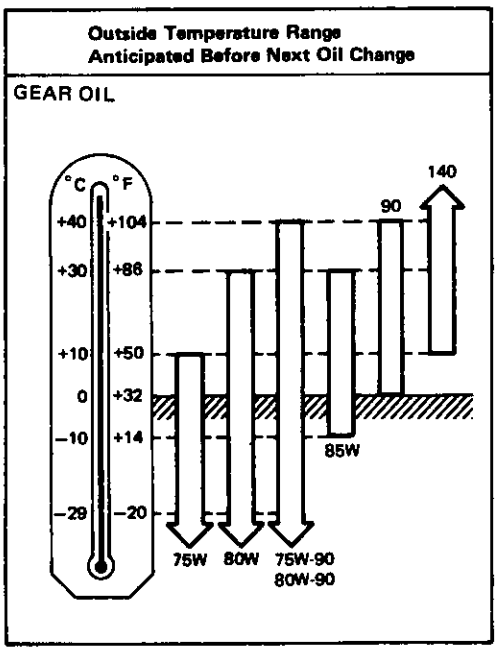
	Capacity (Approximate)			Recommended fluids and lubricants
	US measure	Imp measure	Liter	
Engine oil (Refill)				
With oil filter	4-1/2 qt	3-3/4 qt	4.3	Energy Conserving Oils of API SG*2, *3
Without oil filter	4-1/8 qt	3-3/8 qt	3.9	
Cooling system (With reservoir)	9-3/4 qt	8-1/8 qt	9.2	Anti-freeze coolant (Ethylene glycol base)
Differential gear oil	3-1/8 pt	2-5/8 pt	1.5	API GL-5*2
Automatic transmission fluid	8-3/4 qt	7-1/4 qt	8.3	Genuine ATF*1 or equivalent Type DEXRON™
Power steering fluid	—	—	—	Type DEXRON™
Brake fluid	—	—	—	Genuine Brake Fluid*1 or equivalent DOT 3 (US FMVSS No. 116)
Multi-purpose grease	—	—	—	NLGI No. 2 (Lithium soap base)
Air conditioning system refrigerant	—	—	—	R-134a
Air conditioning lubricants	—	—	—	Nissan A/C System Oil Type R or equivalent

*1: Available in mainland U.S.A. through your INFINITI dealer.
*2: For further details, see "Recommended SAE viscosity number".
*3: Energy conserving oils
These oils can be identified by such labels as EC-I, EC-II, energy conserving, energy saving, improved fuel economy, etc.

SAE Viscosity Number



TI0002

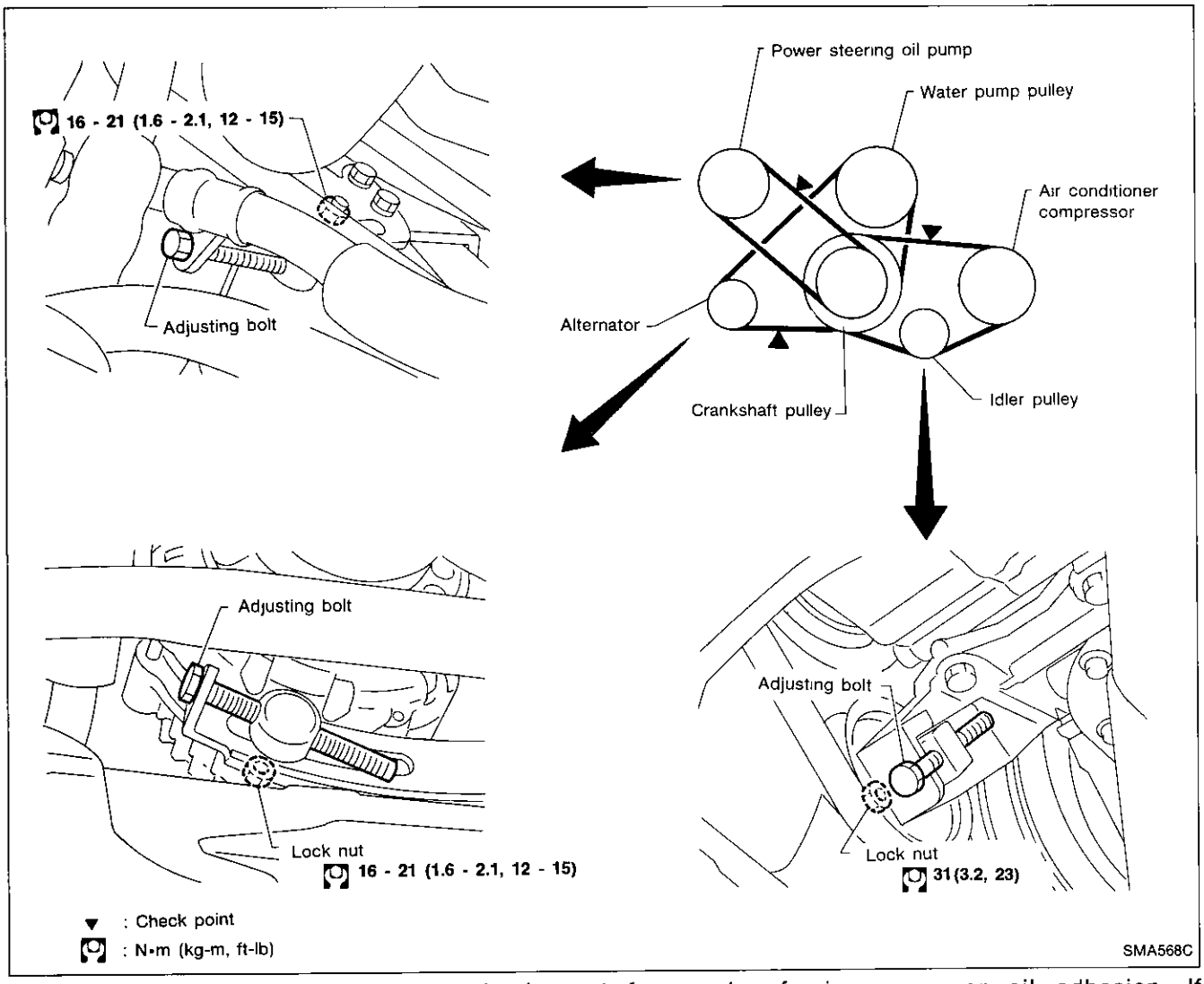


TI0003

10W-30 is preferable for ambient temperatures above −18°C (0°C). 20W-40 and 20W-50 are usable for ambient temperatures above 10°C (50°F) for all seasons.

80W-90 for differential gear is preferable 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 deflection by pushing on the belt midway between pulleys.

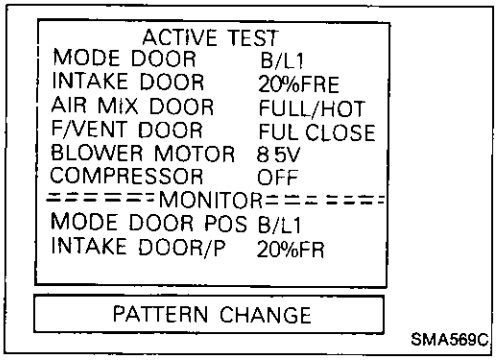
Adjust if belt deflection exceed the limit.

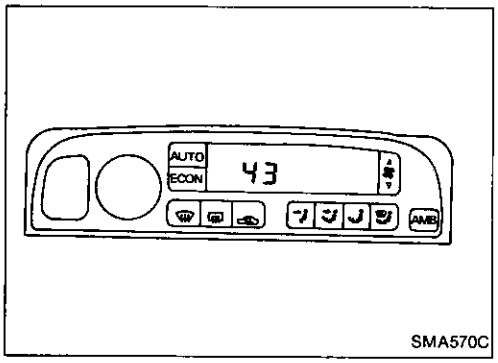
Belt deflection:

Unit: mm (in)

	Used belt deflection		Deflection of new belt
	Limit	Deflection after adjustment	
Alternator	10 (0.39)	6.5 - 7.5 (0.256 - 0.295)	5.5 - 6.5 (0.217 - 0.256)
Air conditioner compressor	14 (0.55)	8.5 - 9.5 (0.335 - 0.374)	7.5 - 8.5 (0.295 - 0.335)
Power steering oil pump	20 (0.79)	13 - 15 (0.51 - 0.59)	11 - 13 (0.43 - 0.51)
Applied pushing force	98 N (10 kg, 22 lb)		

Inspect drive belt deflection when engine is cold.





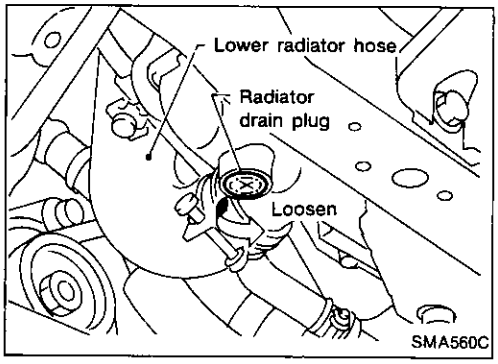
Changing Engine Coolant

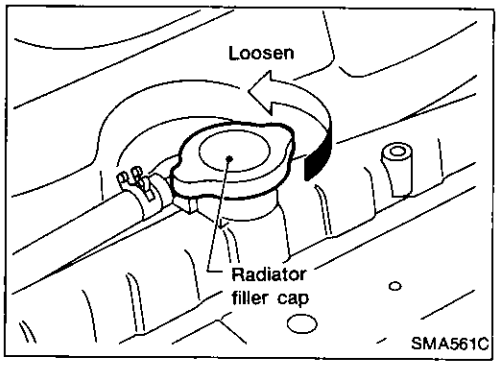
WARNING:

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

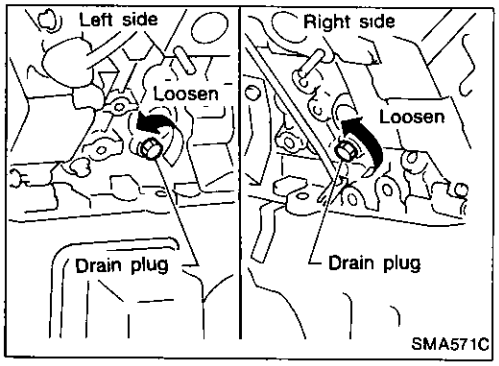
1. Perform "COMPLEX PATTERNS" test in "ACTIVE TEST" mode of "AUTO A/C" (Automatic Air Conditioner) system.
   Set "AIR MIX DOORS" at (full) HOT and wait 10 seconds before turning ignition switch off.

1. Perform self-diagnosis step 2 of Automatic Air Conditioner system, referring to the following notes:
   1) Turn ignition switch from "OFF" to "ON".
   2) Press "TEMP" knob for at least 5 seconds.
   3) Turn "TEMP" knob in Hot or Cool direction until CODE "41" is indicated.
   4) Press (DEF) switch 2 times.
   5) Confirm indication of the A/C display shown at left.
   6) Wait 10 seconds before turning ignition switch off.





2. Open drain plug at the bottom of radiator, and remove radiator cap.



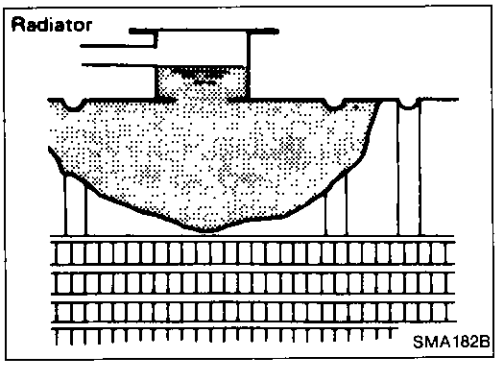
3. Open drain plugs on both sides of cylinder block.

- **Left side drain plug is located beside the left side engine mounting.**

Changing Engine Coolant (Cont'd)

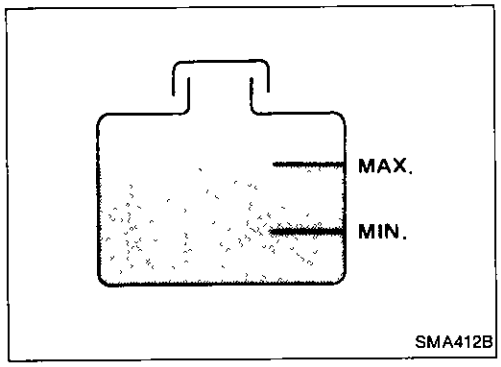
4. Flush cooling system by running fresh water through radiator.
5. Close drain plug and tighten drain plugs securely.

- **Apply sealant to the drain plug thread.**
  : 34 - 44 N·m (3.5 - 4.5 kg-m, 25 - 33 ft-lb)



6. Fill radiator slowly with proper mixture of coolant and water. Fill reservoir tank up to the "H" level. Then install radiator cap and close air release plug.
   Coolant capacity (With reservoir tank):
   9.2ℓ (9-3/4 US qt, 8-1/8 Imp qt)
   Reservoir tank:
   1.0ℓ (1-1/8 US qt, 7/8 Imp qt)

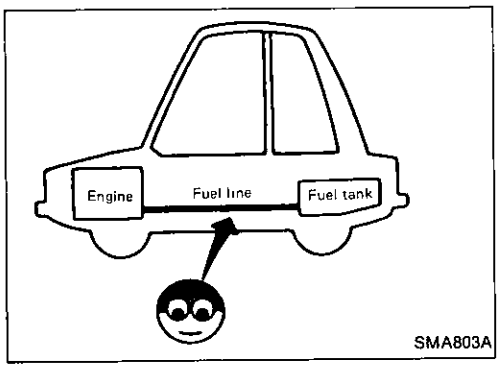
Pour coolant through coolant filler neck slowly to allow air in system to escape.

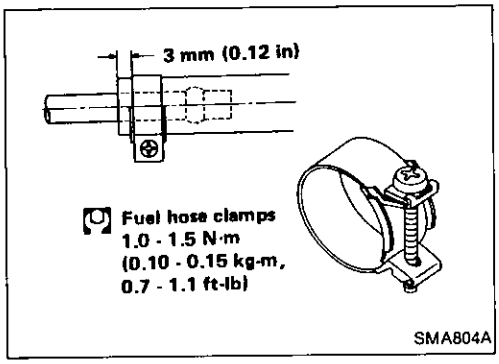


7. Start engine and warm it up until it reaches normal operating temperature. Then race engine 2 or 3 times under no-load. Watch coolant temperature gauge for signs of overheating.
8. Stop engine. After it completely cools down, refill radiator up to filler opening. Fill reservoir tank up to the "H" level.
9. Check drain cock and drain plug for any sign of leakage.

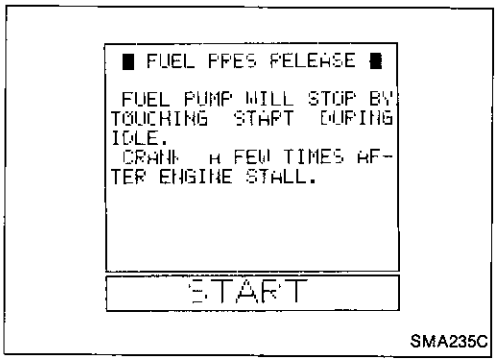
Checking Fuel Lines

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.

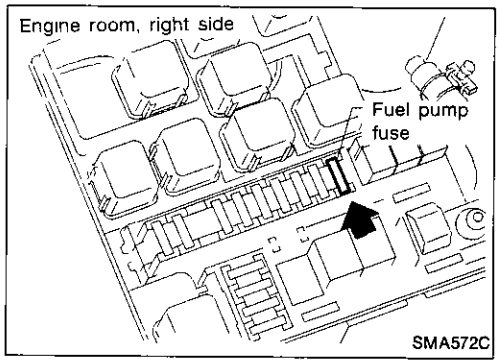


Changing Fuel Filter

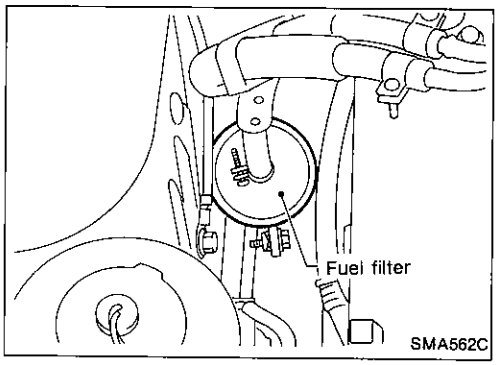
WARNING:

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

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode and release fuel pressure to zero.
2. Turn ignition switch off.

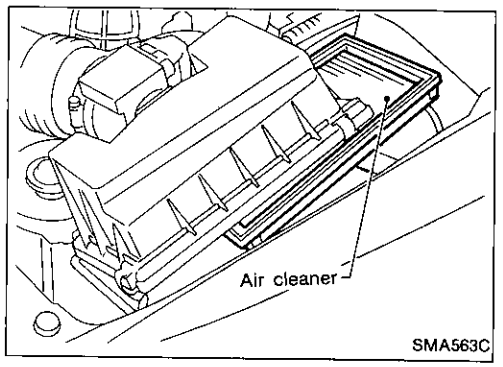


1. Remove fuel pump fuse and start engine.
2. After engine stalls, crank engine two or three times to make sure that fuel pressure is released. Then turn ignition switch off and reconnect fuel pump relay.



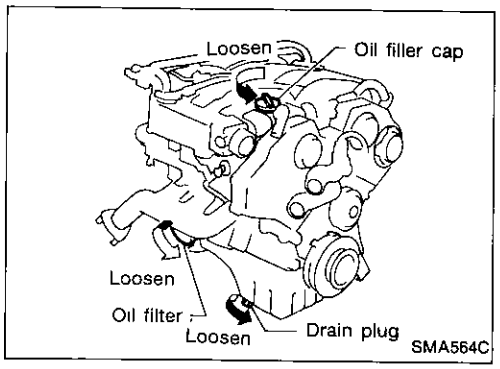
3. Loosen fuel hose clamps.
4. Replace fuel filter.

- **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

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.

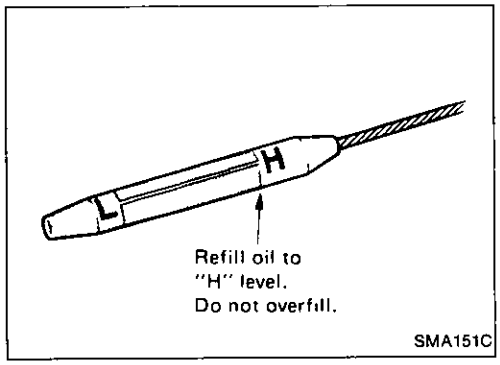
1. Warm up engine, and check for oil leakage from engine components.
2. Remove drain plug and oil filler cap.

Changing Engine Oil (Cont'd)

3. Drain oil and refill with new engine oil.
   Oil grade: API SG
   Viscosity:
   See "RECOMMENDED FLUIDS AND LUBRICANTS" in MA section.
   Refill oil capacity (Approximately): ℓ (US qt, Imp qt)
   With oil filter
   4.3 (4-1/2, 3-3/4)
   Without oil filter
   3.9 (4-1/8, 3-3/8)

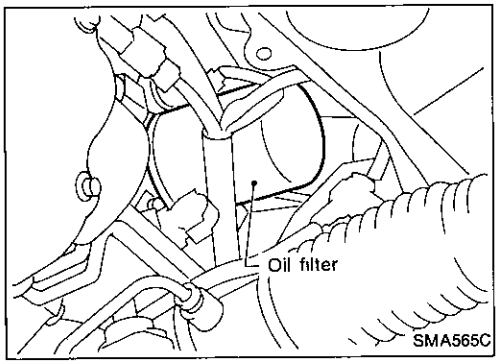
CAUTION:

- **Be sure to clean drain plug and install with new washer.**
  Oil pan drain plug:
  : 29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)
- **Since the refill capacity changes depending on the oil temperature and drain time, use these values as a reference and be certain to check with the dipstick when changing the oil.**



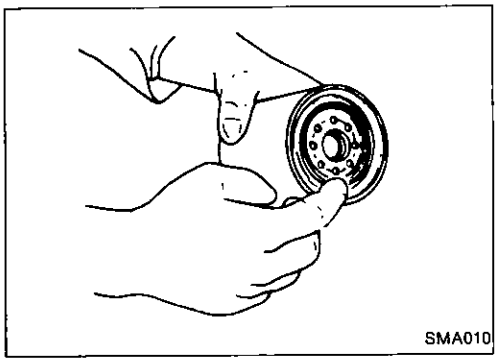
4. Check oil level.
5. Start engine and check area around drain plug and oil filter for oil leakage.
6. Run engine for a few minutes, then turn it off. After several minutes, check oil level.

Changing Oil Filter



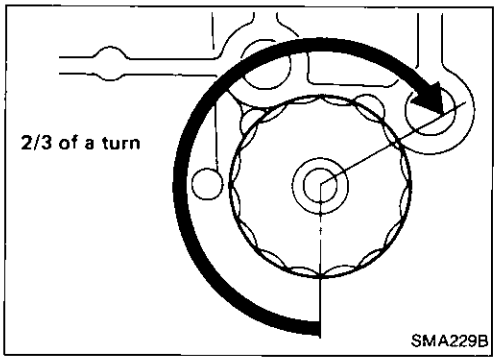
1. Remove oil filter with a suitable tool.

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



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

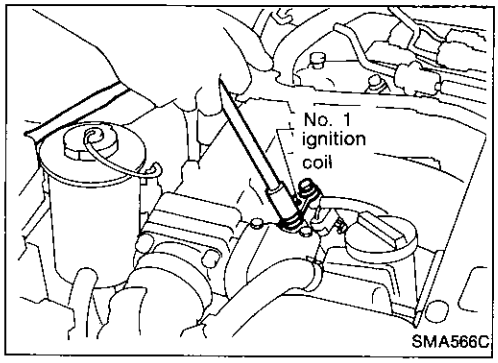
Changing Oil Filter (Cont'd)



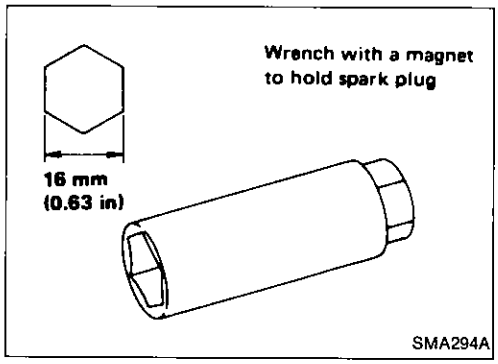
3. Screw in the oil filter until a slight resistance is felt, then tighten additionally more than 2/3 turn.
4. Add engine oil.

Refer to Changing Engine Oil.

Changing Spark Plugs



1. Disconnect ignition coil harness connector.
2. Loosen ignition coil fixing bolts and pull out coil from intake manifold collector.

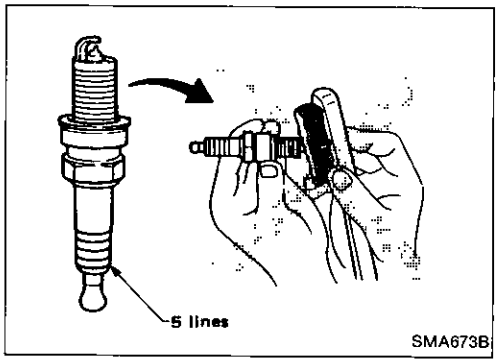


3. Remove spark plugs with suitable spark plug wrench.

Spark plug (Platinum-tipped type):

Standard type	**PFR5G-11**
Cold type	**PFR6B-11**
	PFR7B-11

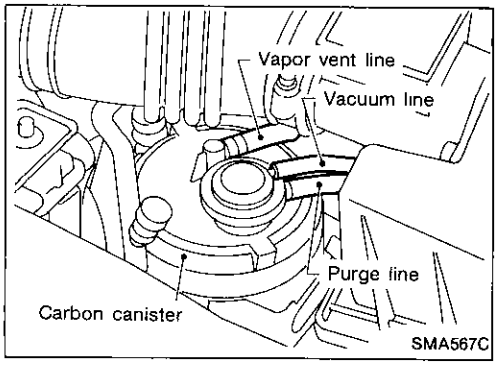
: 20 - 29 N·m (2 - 3 kg-m, 14 - 22 ft-lb)



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

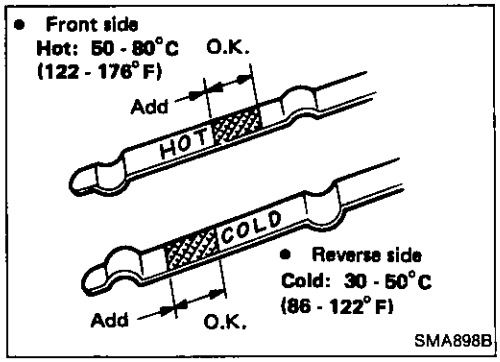
Cleaner air pressure:
Less than 588 kPa (6 kg/cm^2, 85 psi)
Cleaning time:
Less than 20 seconds

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 EF & EC section.

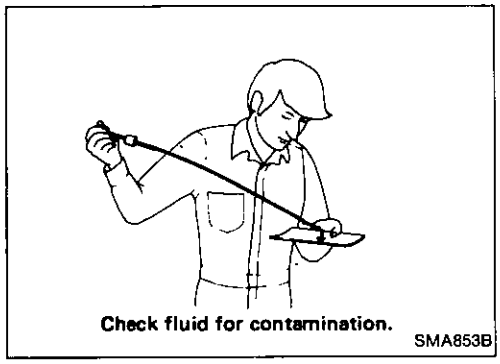


Checking A/T Fluid

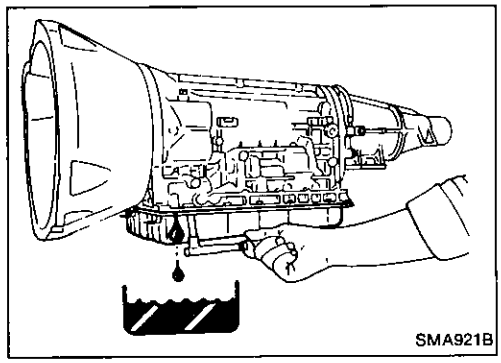
1. Check for fluid leakage.
2. If leakage is found, check fluid level. Fluid level should be checked using "HOT" range on dipstick at fluid temperatures of 50 to 80°C (122 to 176°F) after vehicle has been driven approximately 5 minutes in urban areas after engine is warmed up. But it can be checked at fluid temperatures of 30 to 50°C (86 to 122°F) using "COLD" range on dipstick for reference after engine is warmed up and before driving. However, fluid level must be rechecked using "HOT" range.

1) Park vehicle on level surface and set parking brake.
2) Start engine and then move selector lever through each gear range, ending in "P".
3) Check fluid level with engine idling.
4) Remove dipstick and wipe it clean with lint-free paper.
5) Reinsert dipstick into charging pipe as far as it will go.
6) Remove dipstick and note reading. If level is at low side of either range, add fluid to the charging pipe.

Do not overfill.



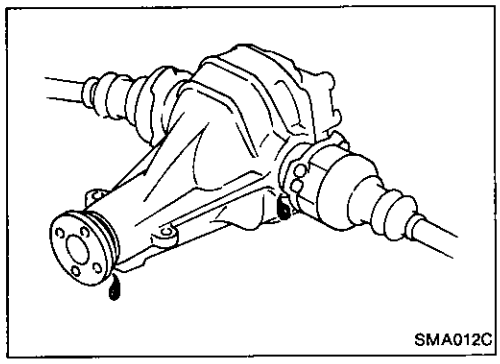
3. Check fluid condition.
   Check fluid for contamination. If fluid is very dark or smells burned, or contains frictional material (clutches, band, etc.), check operation of A/T.
   Refer to section AT for checking operation of A/T.



Changing A/T Fluid

1. Drain fluid by removing oil pan.
2. Replace gasket with new one.
3. Refill with fluid and then check fluid level.

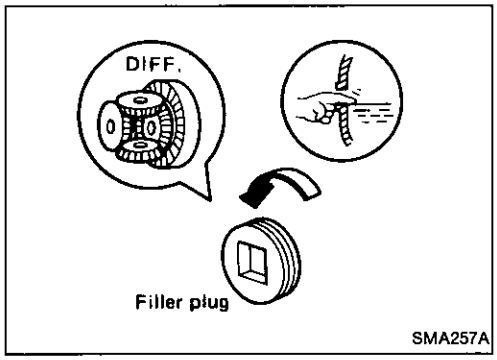
Oil grade:
ATF "DEXRON™"
Oil capacity (With torque converter):
8.3 ℓ (8-3/4 US qt, 7-1/4 Imp qt)



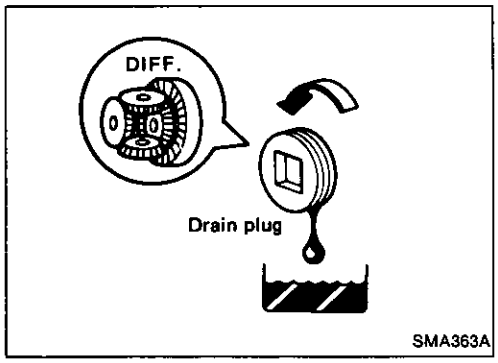
Checking Differential Gear Oil

1. Check differential carrier for oil leakage.

Checking Differential Gear Oil (Cont'd)

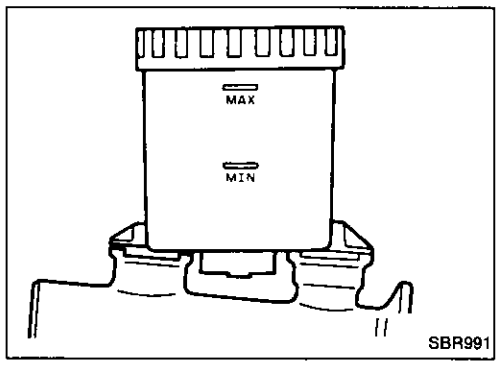


2. If leakage is found, check oil level.
   Filler plug:
   [O]: 39 - 59 N·m (4 - 6 kg-m, 29 - 43 ft-lb)



Changing Differential Gear Oil

1. Drain oil and refill with new gear oil.
2. Check oil level.
   Oil grade:
   API GL-5
   Viscosity:
   See "RECOMMENDED FLUIDS AND LUBRICANTS" in MA section.
   Oil capacity:
   1.5 ℓ (3-1/8 US pt, 2-5/8 Imp pt)
   Drain plug:
   [O]: 39 - 59 N·m (4 - 6 kg-m, 29 - 43 ft-lb)

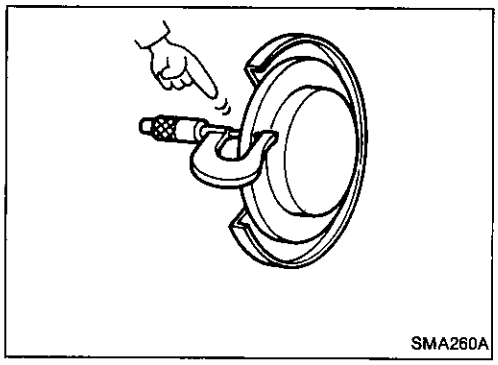


Checking Brake Fluid Level and Leaks

- 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 and for leaks, chafing, abrasions, deterioration, etc.


SMA260A

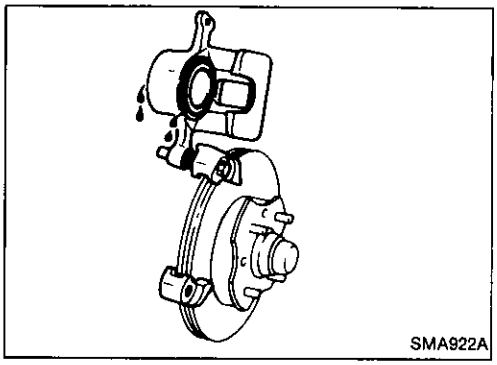
Checking Disc Brake

ROTOR

- Check condition and thickness.

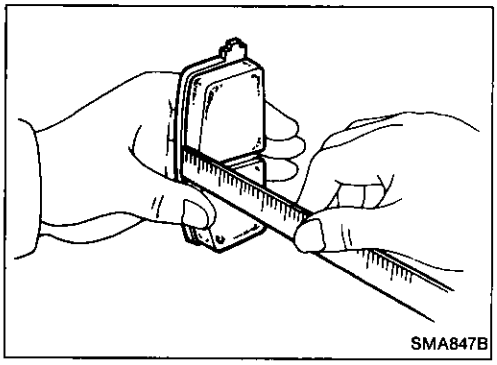
Unit: mm (in)

	Front	Rear
Standard thickness	28 (1.10)	16 (0.63)
Minimum thickness	26.0 (1.024)	14.0 (0.551)


SMA922A

CALIPER

- Check operation and for leakage.


SMA847B

PAD

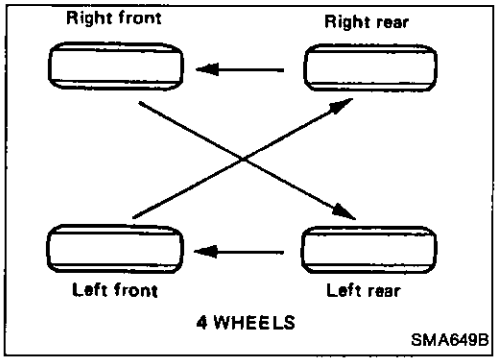
- Check for wear or damage.

Unit: mm (in)

	Front	Rear
Standard thickness	9.5 (0.374)	10 (0.39)
Minimum thickness	2.0 (0.079)	

Balancing Wheels

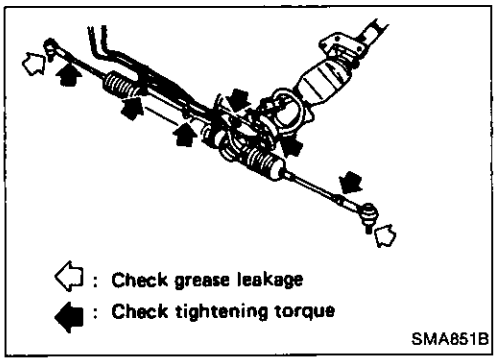
- Adjust wheel balance using road wheel center.
  Wheel balance (Maximum allowable unbalance):
  Refer to S.D.S.



SMA649B

Tire Rotation

- **Do not include the T-type spare tire when rotating the tires.**
  Wheel nuts:
  [O]: 98 - 118 N·m (10 - 12 kg-m, 72 - 87 ft-lb)



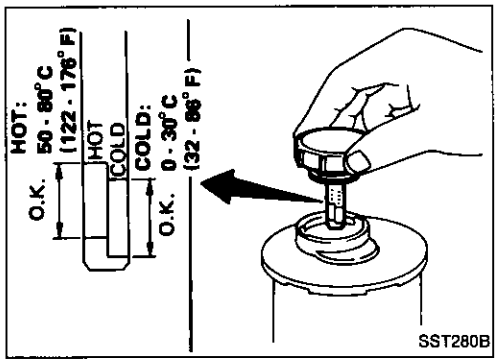
Checking Steering Gear and Linkage

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.

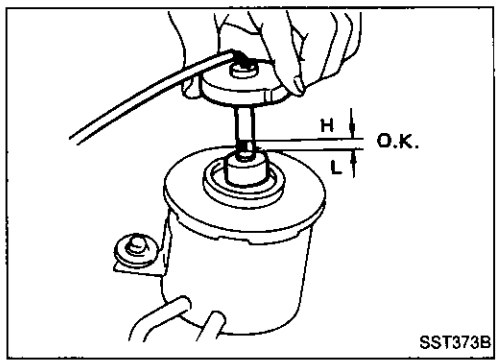


Checking Power Steering Fluid and Lines

CHECKING FLUID LEVEL (WITHOUT SUPER HICAS SYSTEM)

Fluid level should be checked using "HOT" range on dipstick at fluid temperatures of 50 to 80°C (122 to 176°F) or using "COLD" range on dipstick at fluid temperatures of 0 to 30°C (32 to 86°F).

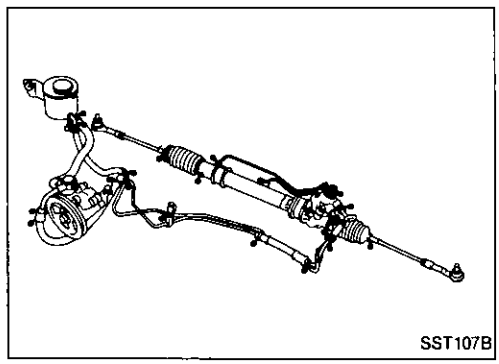
CAUTION:
Do not overfill.



CHECKING FLUID LEVEL (WITH SUPER HICAS SYSTEM)

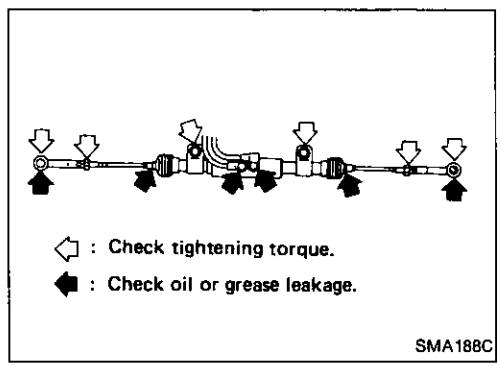
Maintain the fluid level so that the lower surface of the float is maintained between the "L" and "H" marks on the gauge rod. The fluid level should be checked when the engine is stopped and the fluid temperature is normal.

CAUTION:
Do not overfill.



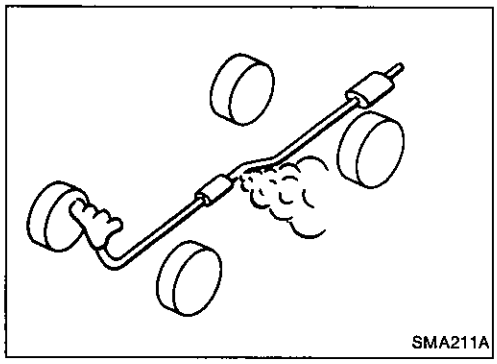
CHECKING LINES

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



Checking SUPER HICAS Linkage (With SUPER HICAS system)

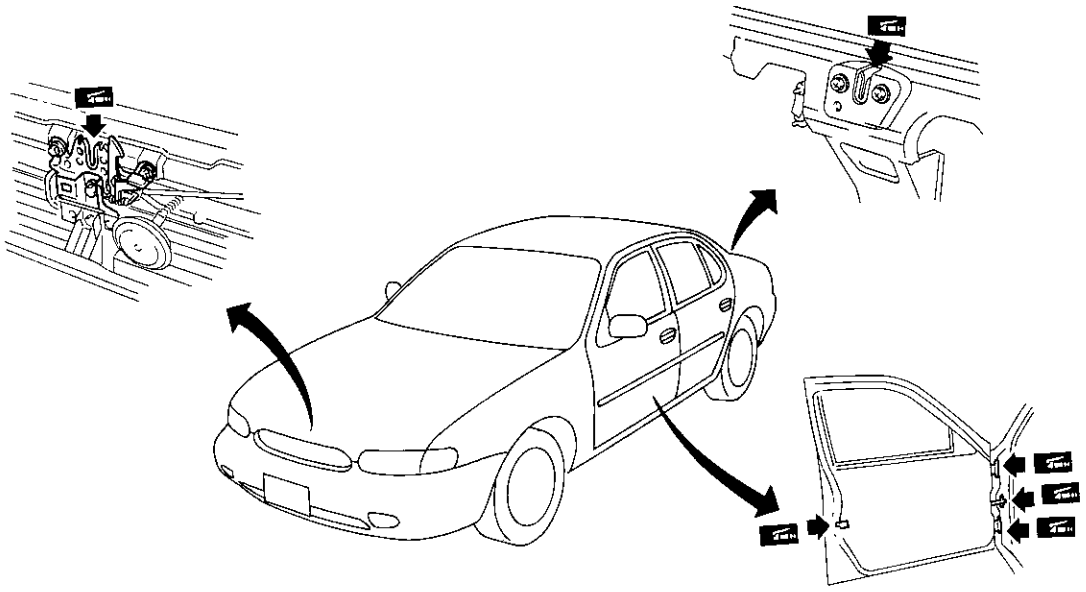
- Check power cylinder and linkage for damage, looseness and leakage of oil or grease.



Checking Exhaust System

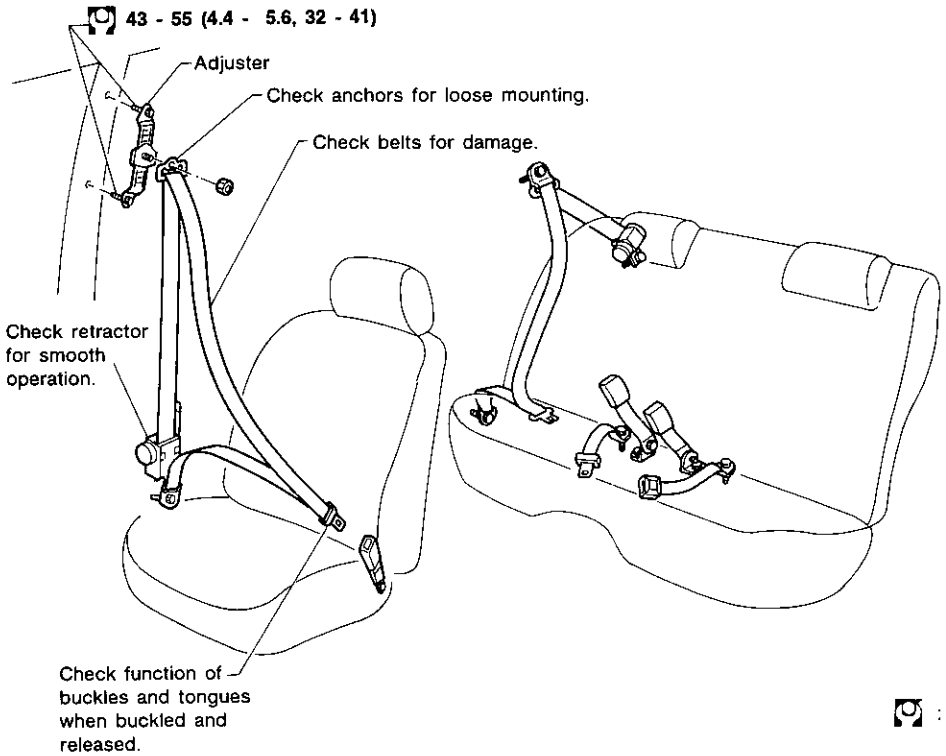
- Check exhaust pipes, muffler and mounting for improper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.

Lubricating Locks, Hinges and Hood Latches



MMA047A

Checking Seat Belts, Buckles, Retractors, Anchors and Adjusters



CAUTION:

1. **All seat belt assemblies, including retractors and attaching hardwares such as guide rail set, etc., should be inspected after any collision. Nissan recommends that all seat belt assemblies in use during a collision be replaced unless the collision was minor and the belts show no damage and continue to operate properly. Seat belt assemblies not in use during a collision should also be inspected and replaced if either damage or improper operation is noted.**
2. **If the condition of any component of seat belt assembly is questionable, do not have it repaired, but replaced as seat belt assembly.**
3. **If webbing is cut, frayed, or damaged, replace belt assembly.**
4. **Do not spill drinks, oil, etc. on inner lap belt buckle. Never oil tongue and buckle.**
5. **Use a genuine seat belt assembly.**

Anchor bolt
43 - 55 (4.4 - 5.6, 32 - 41)

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

: N•m (kg-m, ft-lb)

MMA048A

Engine Maintenance

INSPECTION AND ADJUSTMENT

Drive belt deflection

Unit: mm (in)

	Used belt deflection		Deflection of new belt
	Limit	Deflection after adjustment	
Alternator	10 (0.39)	6.5 - 7.5 (0.256 - 0.295)	5.5 - 6.5 (0.217 - 0.256)
Air conditioner compressor	14 (0.55)	8.5 - 9.5 (0.335 - 0.374)	7.5 - 8.5 (0.295 - 0.335)
Power steering oil pump	20 (0.79)	13 - 15 (0.51 - 0.59)	11 - 13 (0.43 - 0.51)
Applied pushing force	98 N (10 kg, 22 lb)		

Oil capacity (Refill)

Unit: ℓ (US qt, Imp qt)

With oil filter	4.3 (4-1/2, 3-3/4)
Without oil filter	3.9 (4-1/8, 3-3/8)

Coolant capacity

Unit: ℓ (US qt, Imp qt)

With reservoir tank	9.2 (9-3/4, 8-1/8)
Reservoir tank	1.0 (1-1/8, 7/8)

Spark plug

Standard type	PFR5G-11
Cold type	PFR6B-11
	PFR7B-11

Chassis and Body Maintenance

INSPECTION AND ADJUSTMENT

Front axle and front suspension (Unladen)*

Camber	degree	–1°30′ to 0°
Caster	degree	5°50′ - 7°20′
Kingpin inclination	degree	12°40′ - 14°10′
Toe-in		
A – B	mm (in)	0 - 2 (0 - 0.08)
Total angle 2θ	degree	0′ - 10′
Front wheel turning angle		
Full turn Inside/outside	degree	35°20′ - 39°20′/31°50′

*: Fuel, radiator coolant and engine oil full.
Spare tire, jack, hand tools and mats in designated positions.

Rear axle and rear suspension (Unladen)*

Camber	degree	–1°30′ to –0°30′
Toe-in		
A – B	mm (in)	0 - 4 (0 - 0.16)
Total angle 2θ	degree	0′ - 28′

*: Fuel, radiator coolant and engine oil full.
Spare tire, jack, hand tools and mats in designated positions.

Wheel bearing

	Front	Rear
Wheel bearing axle end play mm (in)	0 (0)	0.05 (0.0020) or less
Wheel bearing lock nut Tightening torque N·m (kg-m, ft-lb)	206 - 284 (21 - 29, 152 - 210)	206 - 275 (21 - 28, 152 - 203)

Wheel balance

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

Brake

Unit: mm (in)

Disc brake	
Pad	
Standard thickness	
Front	9.5 (0.374)
Rear	10 (0.39)
Minimum thickness	
All	2.0 (0.079)
Rotor	
Standard thickness	
Front	28 (1.10)
Rear	16 (0.63)
Minimum thickness	
Front	26.0 (1.024)
Rear	14.0 (0.551)

TIGHTENING TORQUE

Unit	N·m	kg-m	ft-lb
Final drive			
Drain plug	25 - 34	2.5 - 3.5	18 - 25
Filler plug	39 - 59	4 - 6	29 - 43
Front axle and front suspension			
Tie-rod lock nut	78 - 98	8.0 - 10.0	58 - 72
Rear axle and rear suspension			
Toe adjusting bolt	69 - 88	7.0 - 9.0	51 - 65
Camber adjusting bolt (Models without super HICAS)	69 - 88	7.0 - 9.0	51 - 65
Lower link lock nut (Models with super HICAS)	37 - 46	3.8 - 4.7	27 - 34
Brake system			
Air bleed valve	7 - 9	0.7 - 0.9	5.1 - 6.5
Wheel and tire			
Wheel nut	98 - 118	10 - 12	72 - 87

ENGINE MECHANICAL

SECTION EM

EM

CONTENTS

PRECAUTIONS ..... EM- 2
PREPARATION ..... EM- 4
OUTER COMPONENT PARTS ..... EM- 7
COMPRESSION PRESSURE ..... EM- 9
OIL PAN EM-10
TIMING BELT EM-14
OIL SEAL REPLACEMENT EM-22
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CYLINDER HEAD EM-26
ENGINE REMOVAL EM-37
CYLINDER BLOCK EM-39
SERVICE DATA AND SPECIFICATIONS (S.D.S.) EM-52

Supplemental Restraint System "AIR BAG"

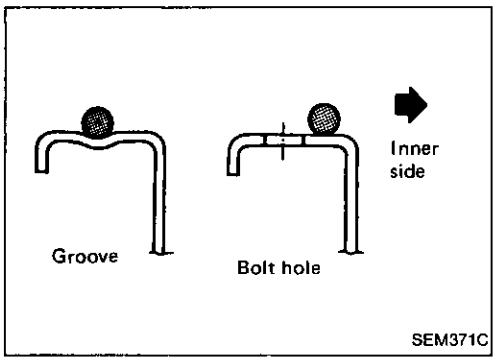
The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury in a frontal collision. The Supplemental Restraint System consists of air bags, sensors, a ECM, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **BF section** of this Service Manual.

WARNING:

a. **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized INFINITI dealer.**
b. **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
c. **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 "Air Bag".**

Parts Requiring Angular Tightening

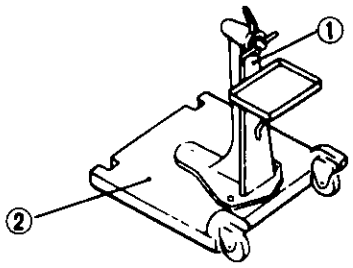
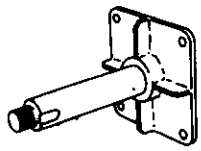
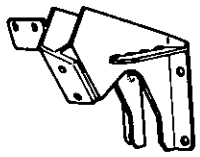
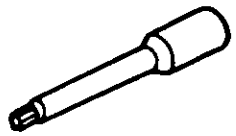
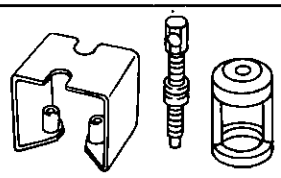
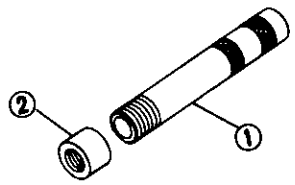
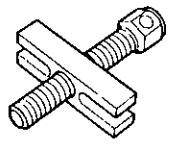
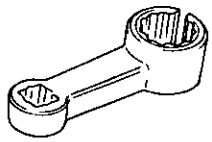
- Some important engine parts are tightened using an angular-tightening method rather than a torque setting method.
- If these parts are tightened using a torque setting method, dispersal of the tightening force (axial bolt force) will be two or three times that of the dispersal produced by using the correct angular-tightening method.
- Although the torque setting values (described in this manual) are equivalent to those used when bolts and nuts are tightened with an angular-tightening method, they should be used for reference only.
- To assure the satisfactory maintenance of the engine, bolts and nuts must be tightened using an angular-tightening method.
- Before tightening the bolts and nuts, ensure that the thread and seating surfaces are clean and then coated with engine oil.
- The bolts and nuts which require the angular-tightening method are as follows:
  (1) Cylinder head bolts
  (2) Connecting rod cap nuts

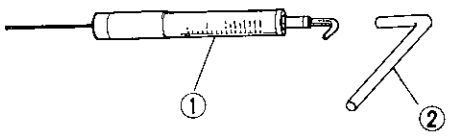
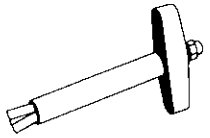
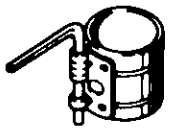
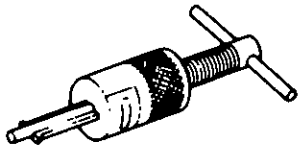
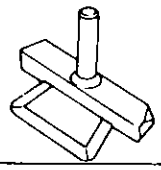
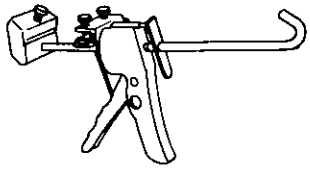
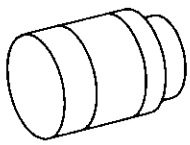
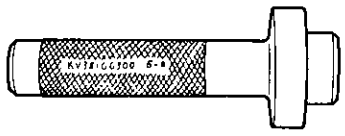
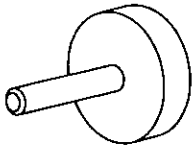


Liquid Gasket Application Procedure

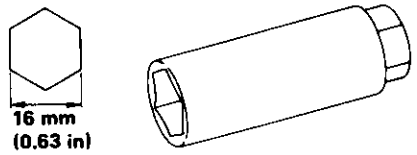
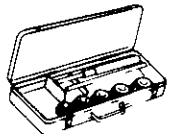
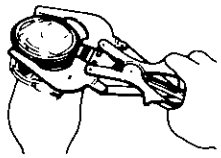
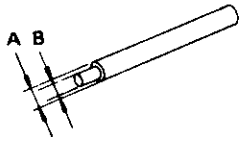
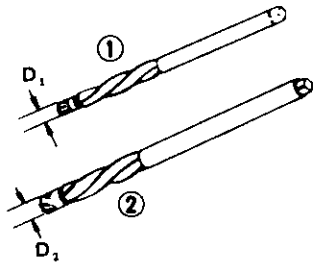
a. Before applying liquid gasket, use a scraper to remove all traces of old liquid gasket from mating surfaces and grooves, and then completely clean any oil stains from these portions.
b. Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine Liquid Gasket or equivalent.)
   - Be sure liquid gasket is 3.5 to 4.5 mm (0.138 to 0.177 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.

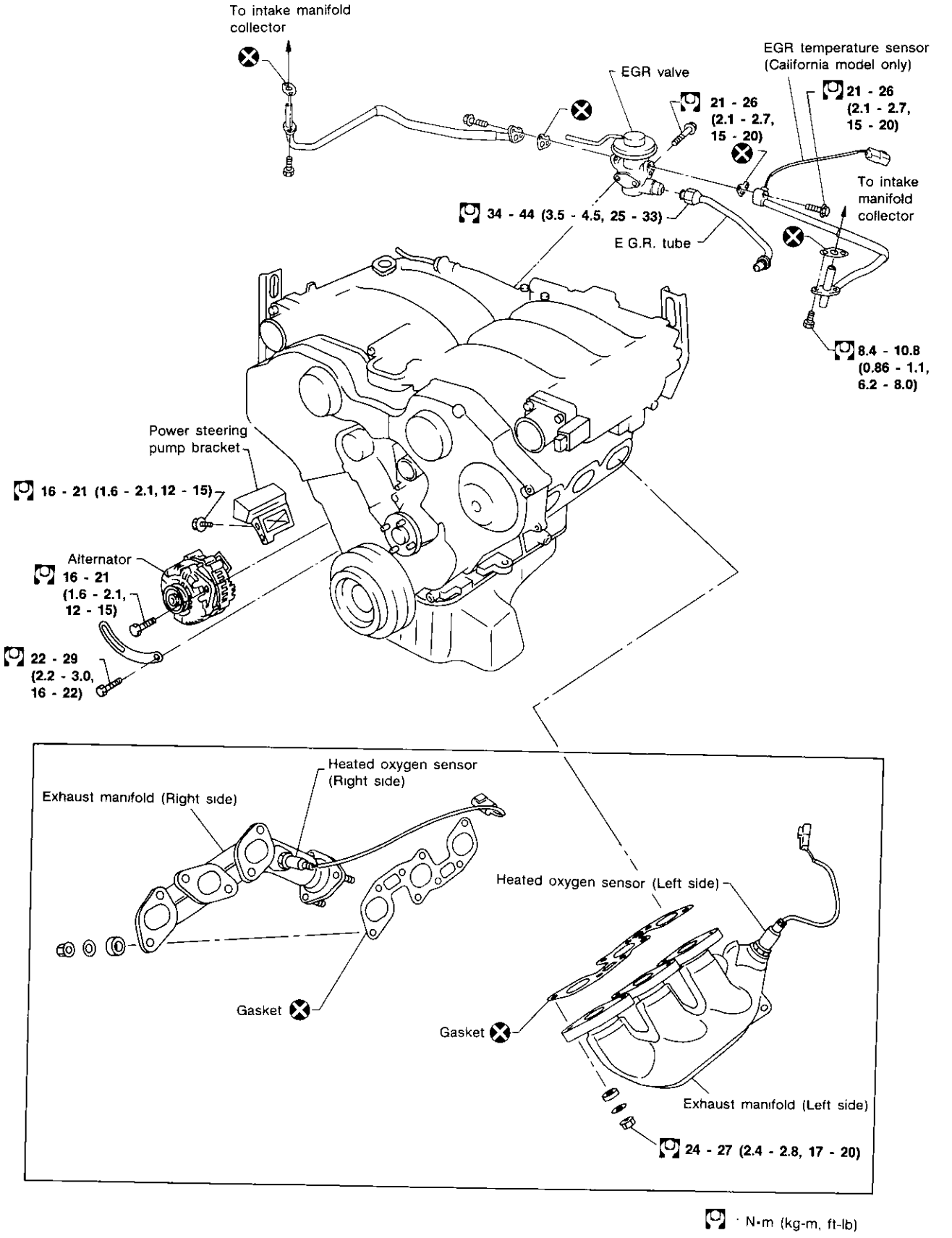
SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description
ST0501S000 (—) Engine stand assembly ① ST05011000 (—) Engine stand ② ST05012000 (—) Base	Disassembling and assembling 
KV10106500 (—) Engine stand shaft	
KV10110001 (—) Engine sub-attachment	
ST10120000 (J24239-01) Cylinder head bolt wrench	Loosening and tightening cylinder head bolt 
KV10111300 (—) Valve spring compressor	Disassembling and assembling valve components 
① KV10107501 (—) Valve oil seal drift ② KV10111400 (—) Attachment	Installing valve oil seal 
ST27180001 (J25726-A) Steering wheel puller	Removing crankshaft pulley 
KV10114400 (J-38365) Heated oxygen sensor wrench	Loosening or tightening heated oxygen sensor 

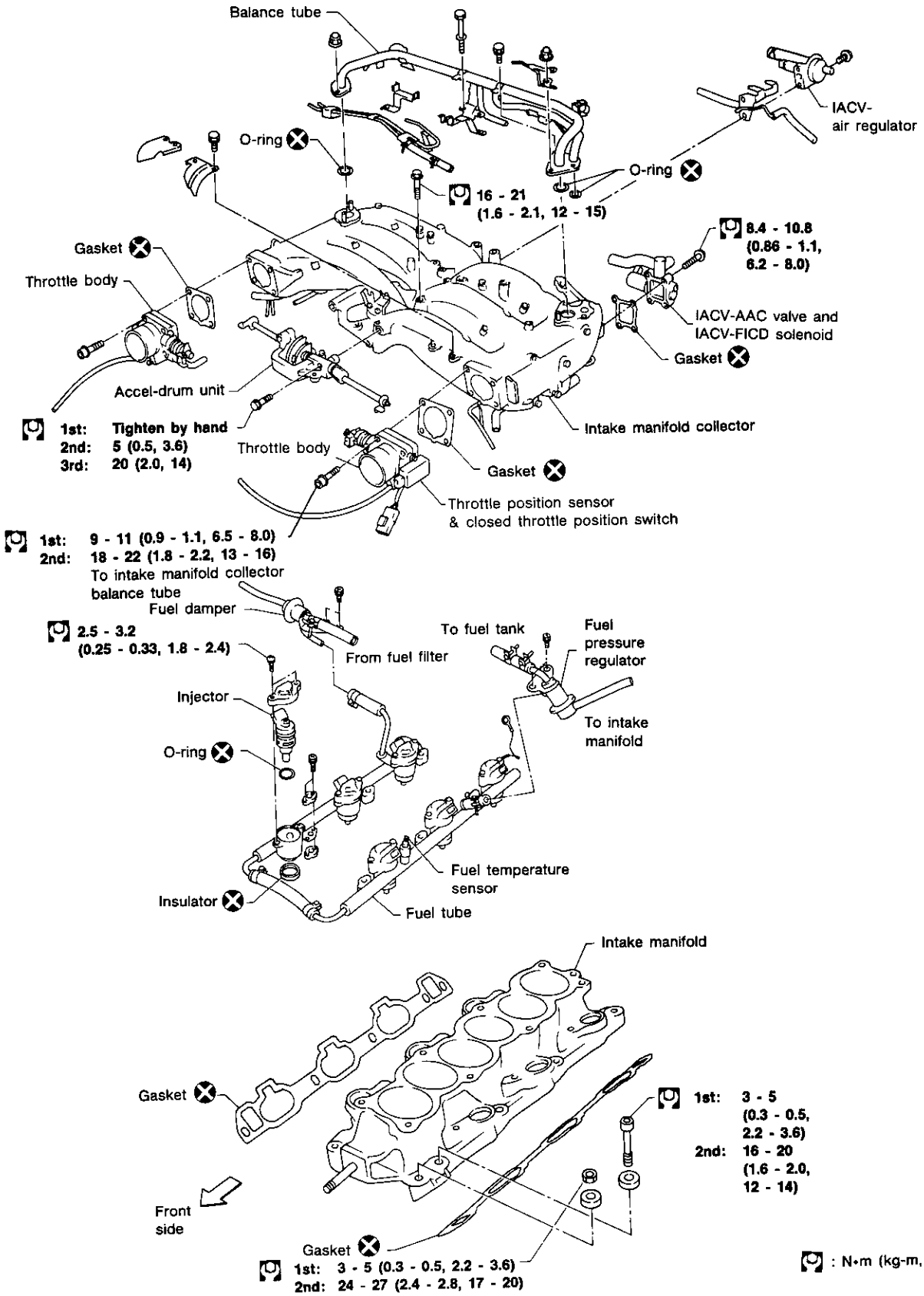
Tool number (Kent-Moore No.) Tool name	Description
① EG14860000 (J-38387) Push-pull gauge ② KV10112000 (—) Hook	Adjusting timing belt tension 
(J36467) Valve oil seal remover	Removing valve oil seals 
EM03470000 (J8037) Piston ring compressor	Installing piston assembly into cylinder bore 
ST16610001 (J23907) Pilot bushing puller	Removing crankshaft pilot bushing 
KV10111100 (J37228) Seal cutter	Removing oil pan 
WS39930000 (—) Tube presser	Pressing the tube of liquid gasket 
ST33200000 (J26082) Drift	Installing camshaft oil seal 
KV38100300 (J22888) Drift	Installing front oil seal 
ST15310000 (J25640-B) Drift	Installing rear oil seal 

COMMERCIAL SERVICE TOOLS

Tool name	Description
Spark plug wrench	Removing and installing spark plug 
Pulley holder	Holding camshaft pulley while tightening or loosening camshaft bolt 
Valve seat cutter set	Finishing valve seat dimensions 
Piston ring expander	Removing and installing piston ring 
Valve guide drift	Removing and installing valve guide **Intake & Exhaust:** **A = 9.5 mm (0.374 in) dia.** **B = 5.5 mm (0.217 in) dia.** 
Valve guide reamer	Reaming valve guide ① or hole for oversize valve guide ② **D_1 = 6.0 mm (0.236 in) dia.** **D_2 = 10.2 mm (0.402 in) dia.** 


To intake manifold collector
EGR temperature sensor (California model only)
EGR valve
21 - 26 (2.1 - 2.7, 15 - 20)
21 - 26 (2.1 - 2.7, 15 - 20)
To intake manifold collector
34 - 44 (3.5 - 4.5, 25 - 33)
E.G.R. tube
8.4 - 10.8 (0.86 - 1.1, 6.2 - 8.0)
Power steering pump bracket
16 - 21 (1.6 - 2.1, 12 - 15)
Alternator
16 - 21 (1.6 - 2.1, 12 - 15)
22 - 29 (2.2 - 3.0, 16 - 22)
Heated oxygen sensor (Right side)
Exhaust manifold (Right side)
Heated oxygen sensor (Left side)
Gasket
Gasket
Exhaust manifold (Left side)
24 - 27 (2.4 - 2.8, 17 - 20)
N·m (kg-m, ft-lb)

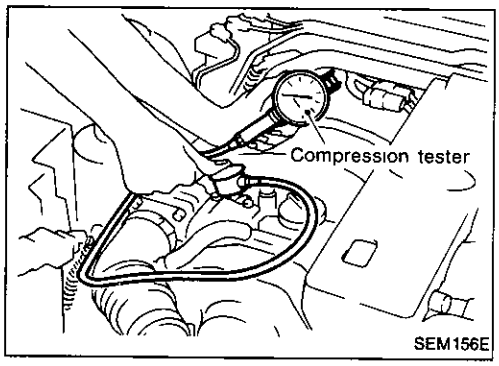
SEM155E


Balance tube
O-ring
16 - 21 (1.6 - 2.1, 12 - 15)
IACV-air regulator
O-ring
8.4 - 10.8 (0.86 - 1.1, 6.2 - 8.0)
Gasket
Throttle body
IACV-AAC valve and IACV-FICD solenoid
Gasket
Accel-drum unit
1st: Tighten by hand
2nd: 5 (0.5, 3.6)
3rd: 20 (2.0, 14)
Intake manifold collector
Throttle body
Gasket
Throttle position sensor & closed throttle position switch
1st: 9 - 11 (0.9 - 1.1, 6.5 - 8.0)
2nd: 18 - 22 (1.8 - 2.2, 13 - 16)
To intake manifold collector balance tube
Fuel damper
2.5 - 3.2 (0.25 - 0.33, 1.8 - 2.4)
From fuel filter
To fuel tank
Fuel pressure regulator
Injector
To intake manifold
O-ring
Fuel temperature sensor
Insulator
Fuel tube
Intake manifold
Gasket
1st: 3 - 5 (0.3 - 0.5, 2.2 - 3.6)
2nd: 16 - 20 (1.6 - 2.0, 12 - 14)
Front side
Gasket
1st: 3 - 5 (0.3 - 0.5, 2.2 - 3.6)
2nd: 24 - 27 (2.4 - 2.8, 17 - 20)
: N•m (kg-m, ft-lb)

SEM098E

Measurement of Compression Pressure

1. Warm up engine.
2. Turn ignition switch off.
3. Release fuel pressure.
   Refer to "Releasing Fuel Pressure" in section EF & EC.
4. Remove all spark plugs.
5. Disconnect crankshaft position sensor harness connector.



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.

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

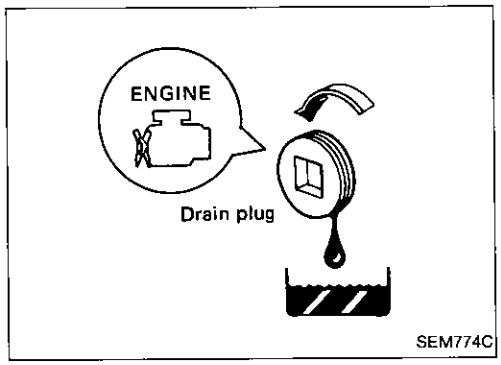
Compression pressure:

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

Standard	1,285 (13.1, 186)
Minimum	981 (10.0, 142)
Differential limit between cylinders	98 (1.0, 14)

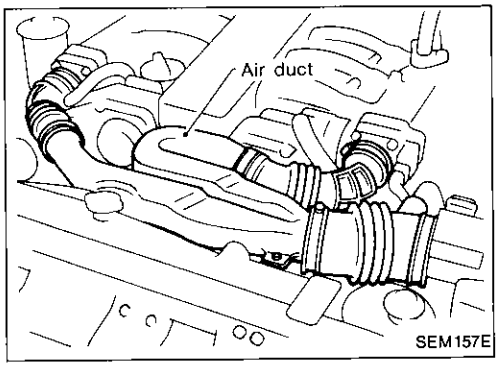
10. If cylinder compression in one or more cylinders is low, pour a small amount of engine oil into cylinders through the spark plug holes and retest compression.

- **If adding oil helps compression, piston rings may be worn or damaged. If so, replace piston rings after checking piston.**
- **If pressure stays low, a valve may be sticking or seating improperly. Inspect and repair valves and valve seats. (Refer to S.D.S.) If valves or valve seats are damaged excessively, replace them.**
- **If compression in any two adjacent cylinders is low and if adding oil does not help compression, there may be leakage past gasket surface. If so, replace cylinder head gasket.**

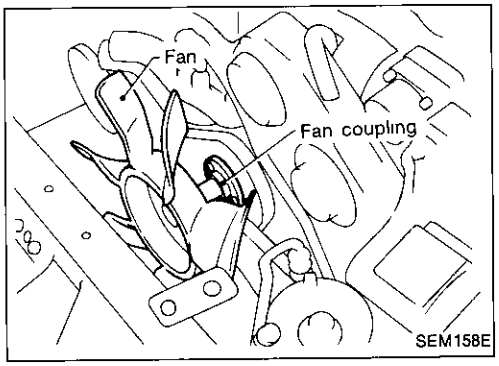


Removal

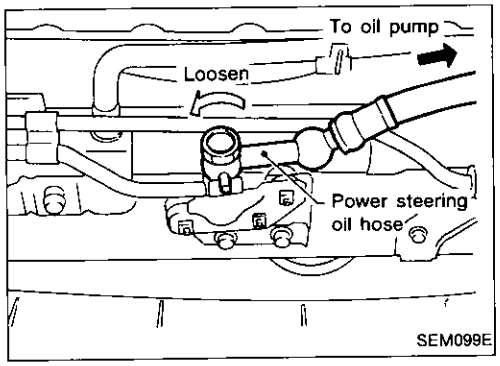
1. Drain engine oil.
2. Drain coolant from radiator drain cock.
3. Remove engine under cover.



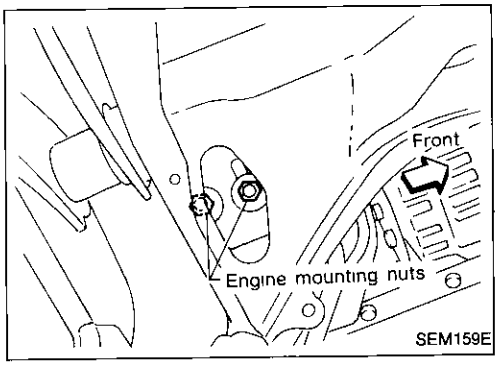
4. Remove air ducts.
5. Remove lower and upper radiator shrouds.



6. Remove fan coupling.

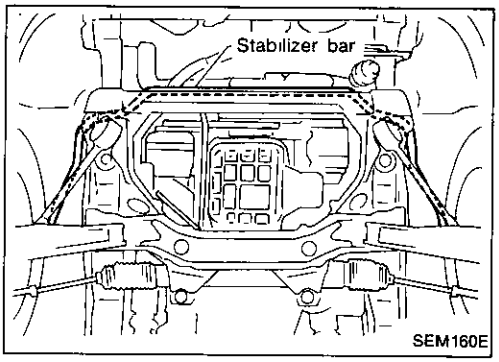


7. Disconnect power steering oil hoses.
8. Remove power steering oil pump.

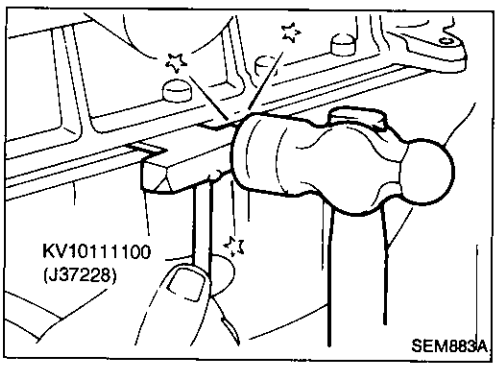


9. Remove engine mounting insulator lower fixing nuts from both sides.

Removal (Cont'd)

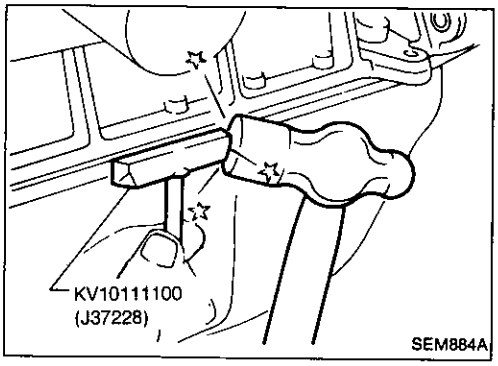


10. Remove stabilizer bar.
11. Hoist engine with engine slingers.
12. Remove oil pan bolts.

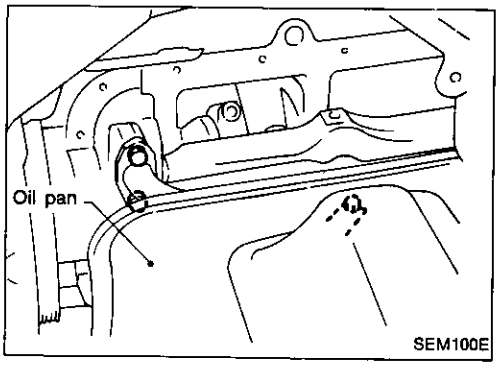


13. Remove oil pan.
(1) Insert Tool between cylinder block and oil pan.

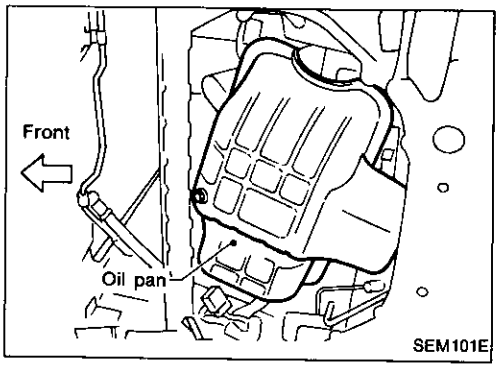
- **Do not drive seal cutter into oil pump or rear oil seal retainer, as aluminum mating surfaces may be damaged.**
- **Do not insert screwdriver, or oil pan flange may be deformed.**



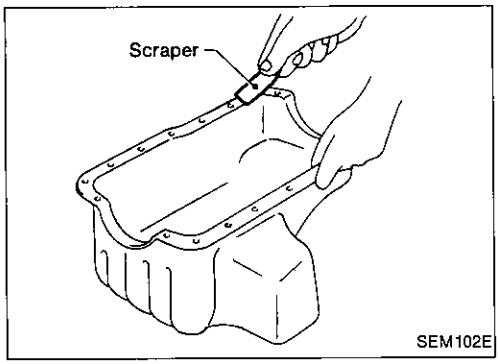
(2) Slide Tool by tapping its side with a hammer, and remove oil pan.



(3) Remove oil strainer.

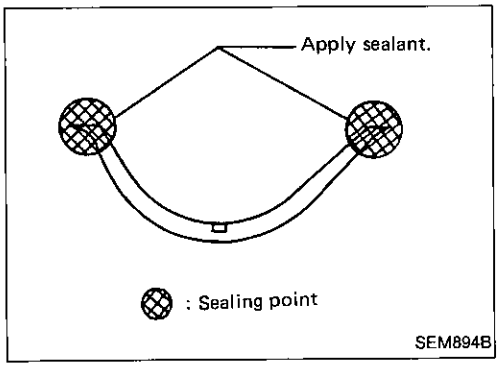


(4) Take out oil pan.

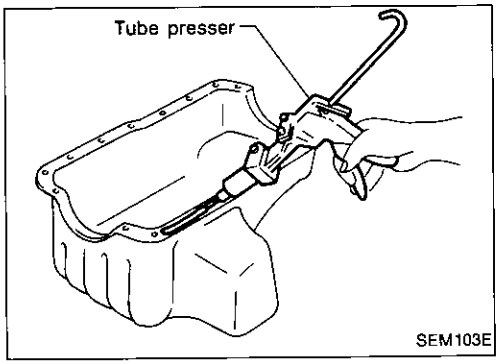


Installation

1. Before installing oil pan, remove all traces of liquid gasket from mating surface using a scraper.
- Also remove traces of liquid gasket from cylinder block mating surface.

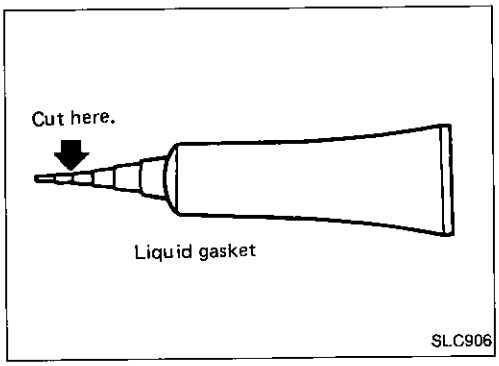


2. Apply sealant to oil pump gasket and rear oil seal retainer gasket.

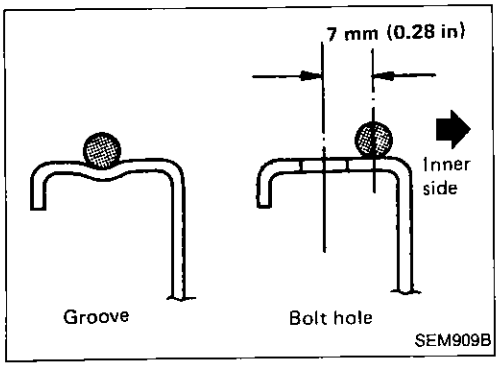


3. Apply a continuous bead of liquid gasket to oil pan mating surface.

Use Genuine Liquid Gasket or equivalent.

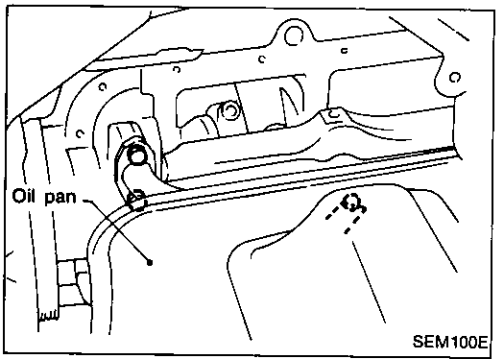


- Be sure liquid gasket is 3.5 to 4.5 mm (0.138 to 0.177 in) wide.

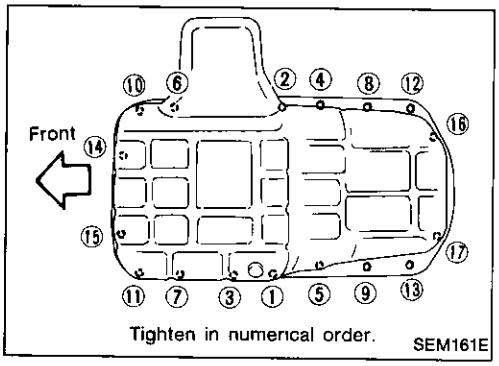


4. Apply liquid gasket to inner sealing surface as shown in figure.
- Attaching should be done within 5 minutes after coating.

Installation (Cont'd)



5. Put oil pan under the engine.
6. Install oil strainer.

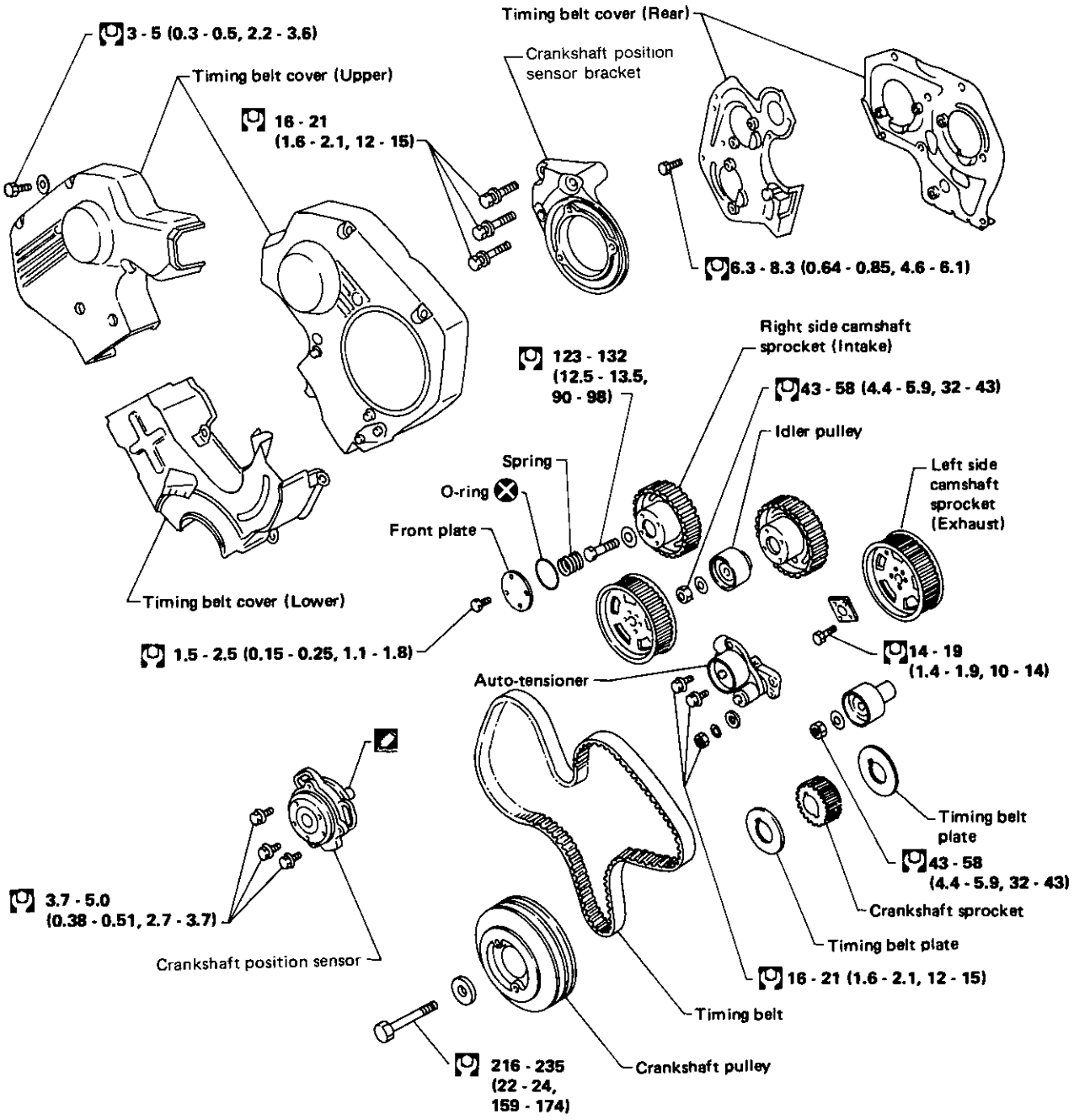


7. Install oil pan.

- **Install bolts in the reverse order of removal.**
- **Wait at least 30 minutes before refilling engine oil.**

CAUTION:

a. **Do not bend or twist timing belt.**
b. **After removing timing belt, do not turn crankshaft and camshaft separately because valves will strike piston heads.**
c. **Make sure that timing belt, camshaft sprocket, crankshaft sprocket, idler pulley and auto-tensioner are clean and free of oil and water.**
d. **Timing belt installation should be carried out when engine is cold.**

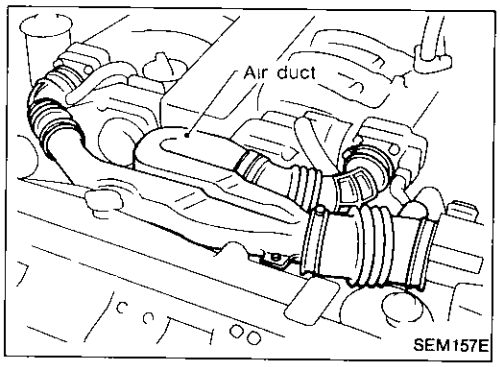


: N·m (kg-m, ft-lb)

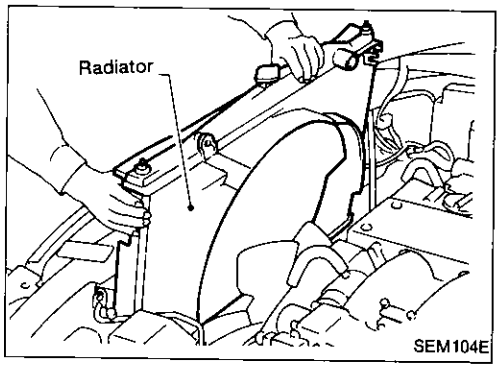
SEM619C

Removal

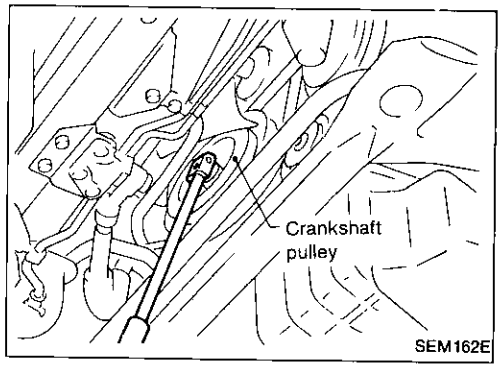
1. Remove engine under cover.
2. Drain coolant from both cylinder block drain plugs, and radiator drain cock.



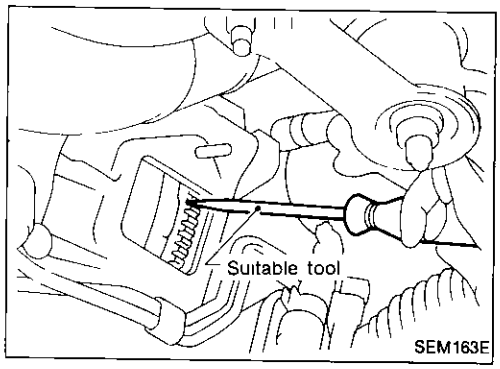
3. Remove air ducts.



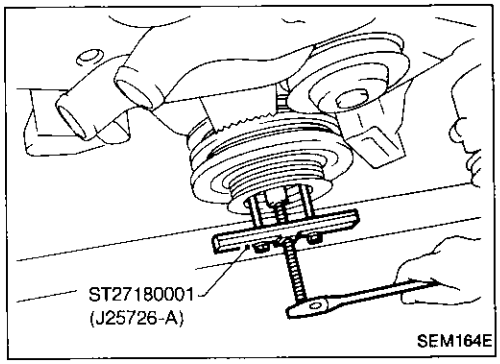
4. Remove radiator.
5. Remove drive belts, cooling fan and coupling.



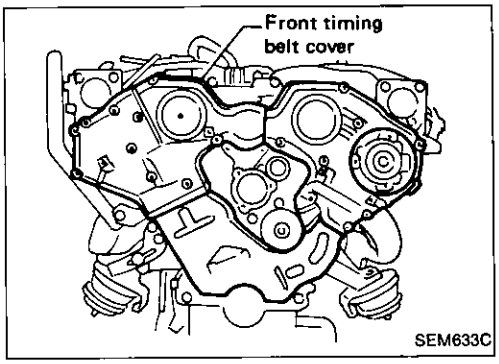
6. Remove crankshaft pulley bolt.
   (At this time, remove starter motor and set a suitable tool to ring gear so that crankshaft cannot rotate.)



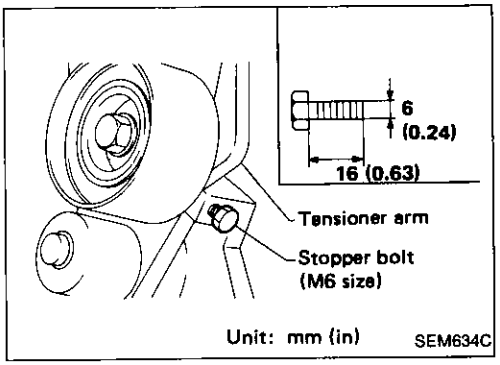
Removal (Cont'd)



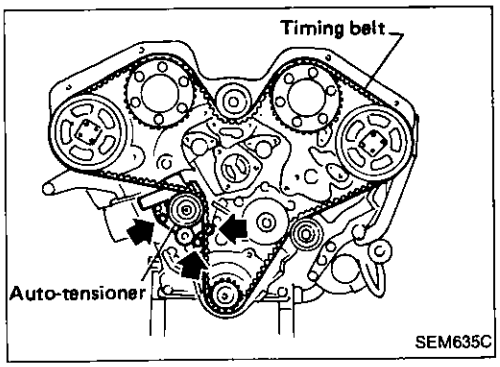
7. Remove crankshaft pulley using Tool.



8. Remove water inlet and outlet.
9. Remove front timing belt covers.



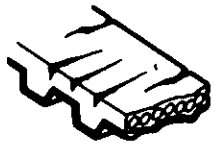
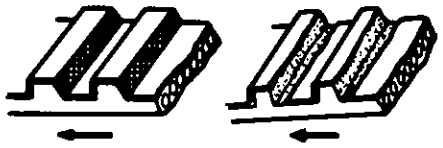
10. Install a suitable stopper bolt (M6) into tensioner arm of auto-tensioner so that auto-tensioner pusher does not spread out.



11. Set No. 1 cylinder at T.D.C. on its compression stroke.
12. Remove auto-tensioner and timing belt.

Inspection

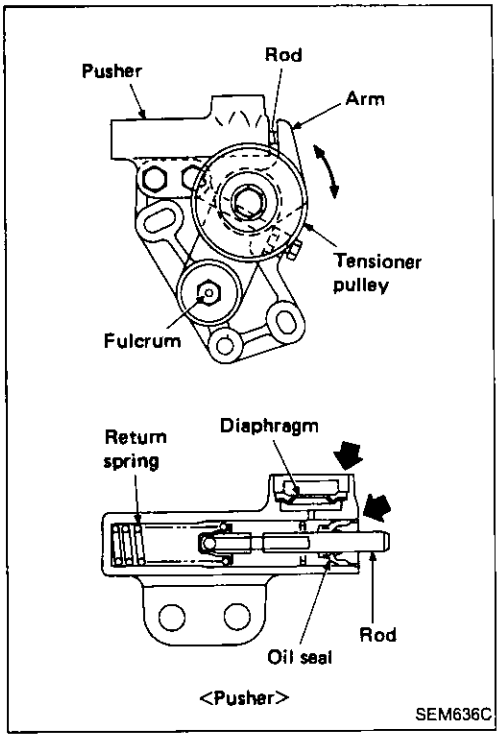
Visually check the condition of timing belt. Replace if any abnormality is found.

Item to check	Problem	Cause
Tooth is broken/tooth root is cracked.	 SEM394A	• Camshaft jamming • Distributor jamming • Damaged camshaft/crankshaft oil seal
Back surface is cracked/worn.	 SEM395A	• Tensioner jamming • Overheated engine • Interference with belt cover
Side surface is worn.	 • Belt corners are worn and round. • Wicks are frayed and coming out. SEM396A	• Improper installation of belt • Malfunctioning crankshaft pulley plate/timing belt plate
Teeth are worn.	 Rotating direction • Canvas on tooth face is worn down. • Canvas on tooth is fluffy, rubber layer is worn down and faded white, or weft is worn down and invisible. SEM397A	• Poor belt cover sealing • Coolant leakage at water pump • Camshaft not functioning properly • Distributor not functioning properly • Excessive belt tension
Oil/Coolant or water is stuck to belt.		• Poor oil sealing • Coolant leakage at water pump • Poor belt cover sealing

Inspection (Cont'd)

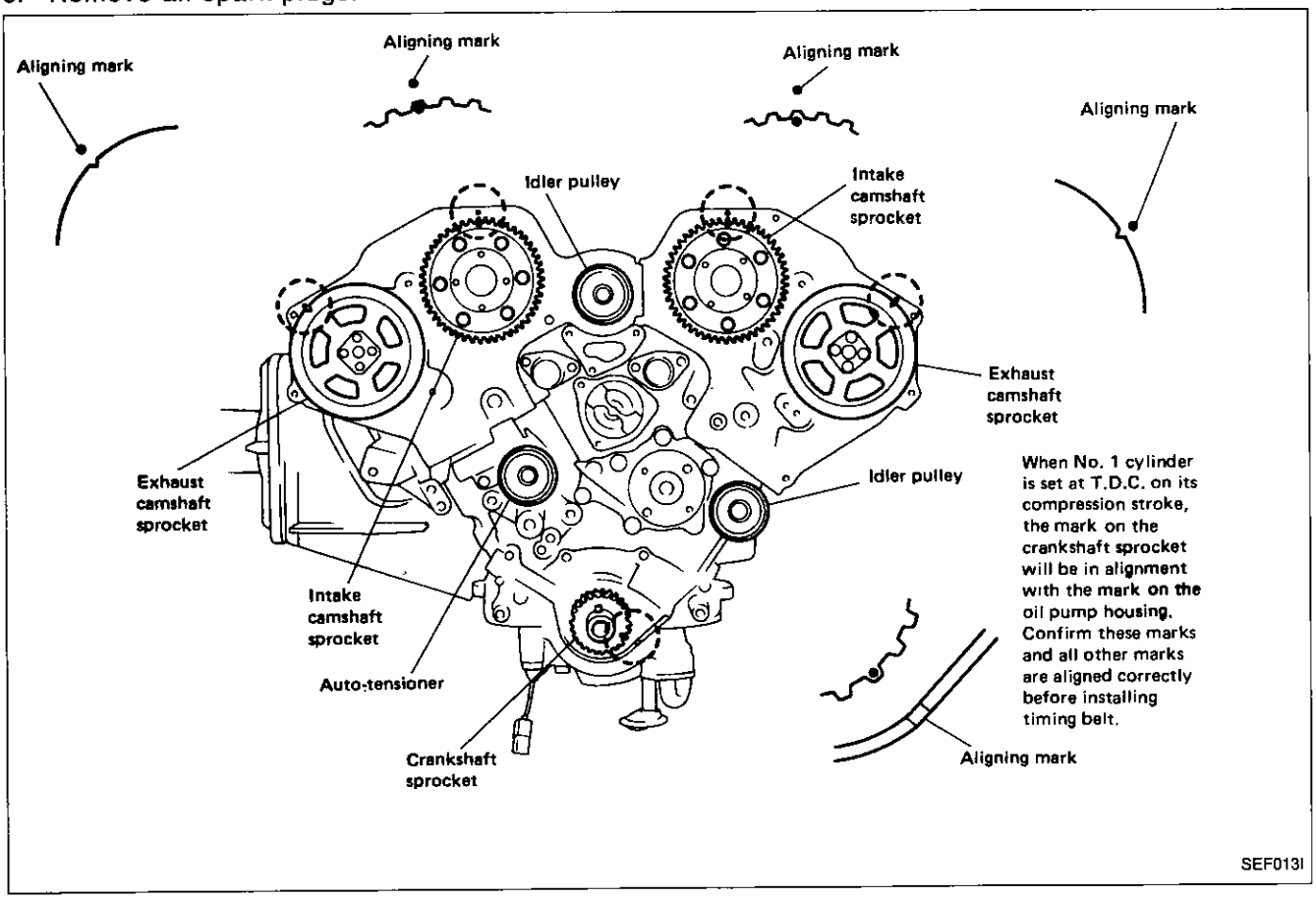
AUTO-TENSIONER

Check for oil leaks from pusher rod and diaphragm.



Installation

1. Confirm that No. 1 cylinder is set at T.D.C. on its compression stroke.
2. Align matching marks on camshaft and crankshaft sprockets with aligning marks on rear belt cover and oil pump housing.
3. Remove all spark plugs.



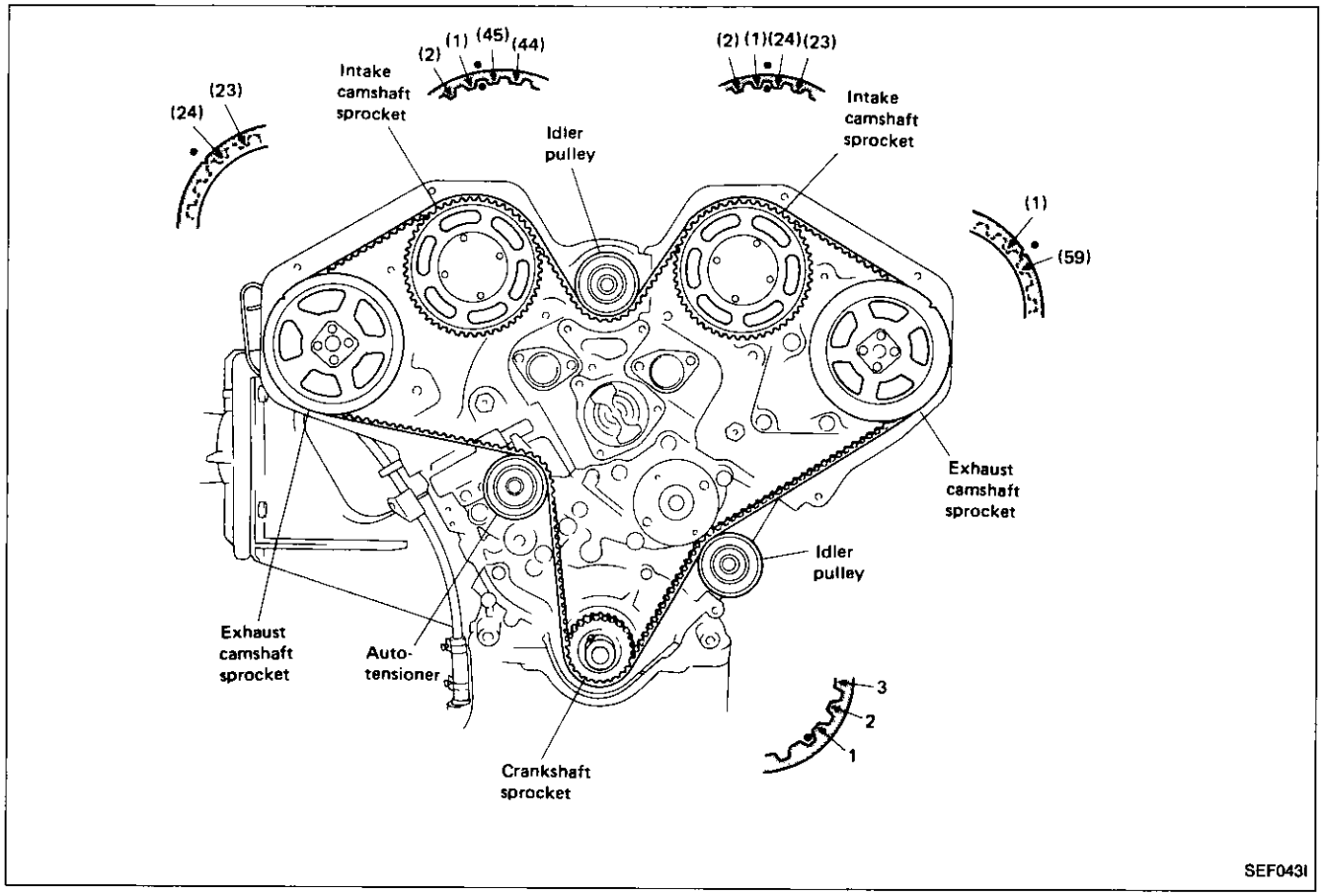
Installation (Cont'd)

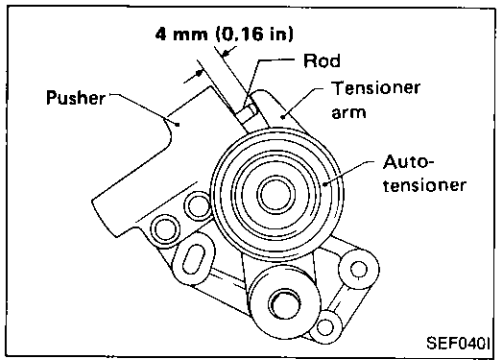
4. Set timing belt.

a. Ensure timing belt and sprockets are clean and free from oil or water. Do not bend or twist timing belt.

b. Align white lines on timing belt with matching mark on camshaft sprocket and crankshaft sprocket.

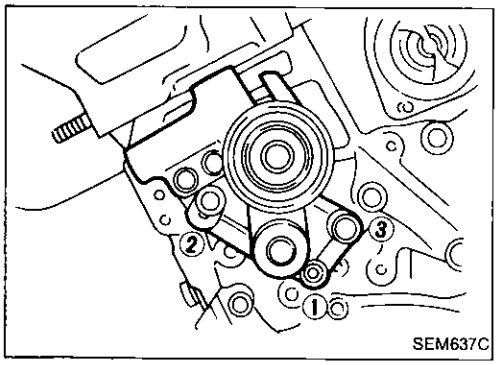
c. Point arrow on timing belt towards the front.





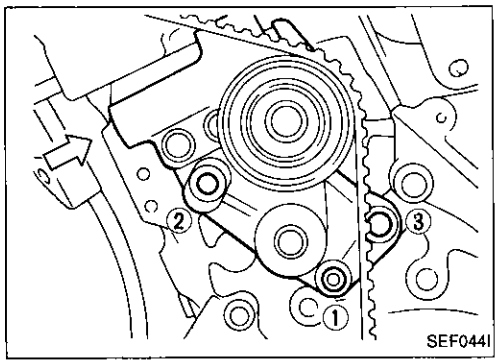
5. Adjust tensioner arm to give 4 mm (0.16 in) clearance with pusher of auto-tensioner using a suitable vise, and then insert stopper bolt into tensioner arm in order that clearance does not change.

When adjusting clearance, do not push tensioner arm with stopper bolt fitted because it will damage thread portion of stopper bolt.



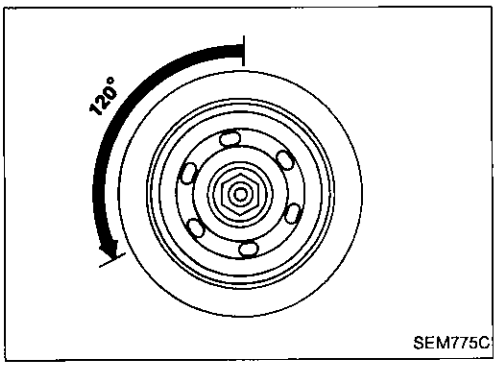
6. Install auto-tensioner and tighten nut (①) and bolts (②, ③) slightly by hand.

Installation (Cont'd)

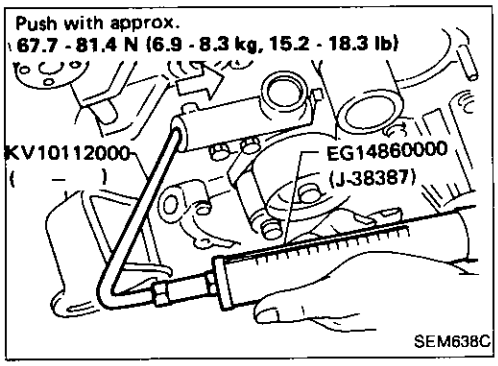


7. Push auto-tensioner slightly towards timing belt to prevent belt from slipping.
   Set tensioner slightly by pushing timing belt. Then, turn crankshaft 10 degrees clockwise and tighten nut (①) and bolts (②, ③) to 16 to 21 N·m (1.6 to 2.1 kg-m, 12 to 15 ft-lb).

At this time, do not push auto-tensioner hard or belt will be adjusted too tightly.

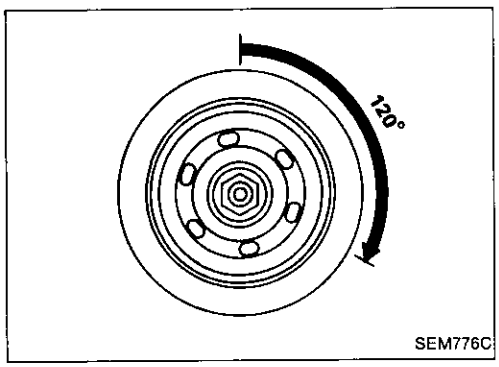


8. Turn crankshaft 120 degrees counterclockwise.
9. Loosen nut (①) and bolts (②, ③) 1/2 turn to set tensioner body as for back as it will go.
10. Turn crankshaft clockwise and set No. 1 cylinder at T.D.C. on its compression stroke.

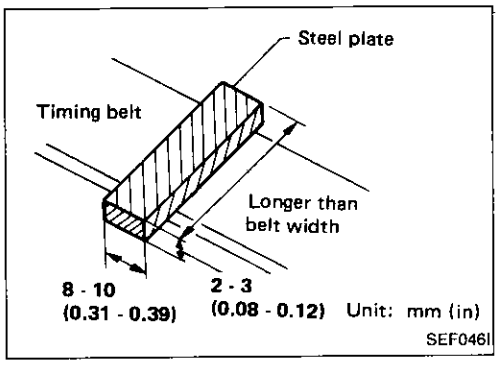


11. Push the end of pusher with approx. 58.8 N (6.0 kg, 13.2 lb) force using Tool (push-pull gauge) and tighten nut (①) and bolts (②, ③) to 16 to 21 N·m (1.6 to 2.1 kg-m, 12 to 15 ft-lb).

If deflection of timing belt exceeds specification in procedure 15., change applied pushing force.

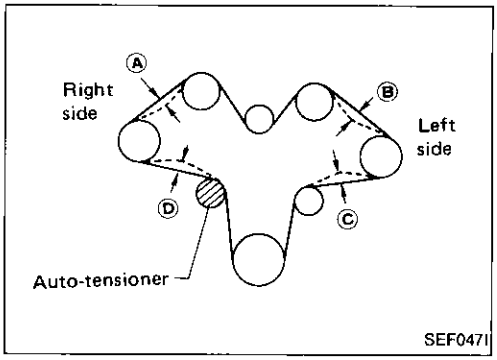


12. Turn crankshaft 120 degrees clockwise.
13. Turn crankshaft 120 degrees counterclockwise and set No. 1 cylinder at T.D.C. on its compression stroke.



14. Prepare a suitable steel plate to measure belt deflection as shown.

Installation (Cont'd)



15.
(1) Set plate and push it with 49 N (5 kg, 11 lb) force using Tool (push-pull gauge) at each position of timing belt mid-way between pulleys as shown.
(2) Measure each deflection.

Deflection:

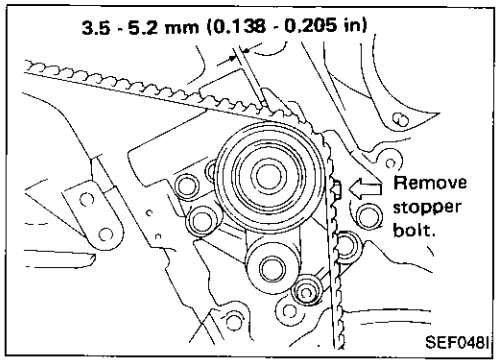
6 - 7 mm (0.24 - 0.28 in) or the average of each portion

$$\frac{Ⓐ + Ⓑ + Ⓒ + Ⓓ}{4}$$

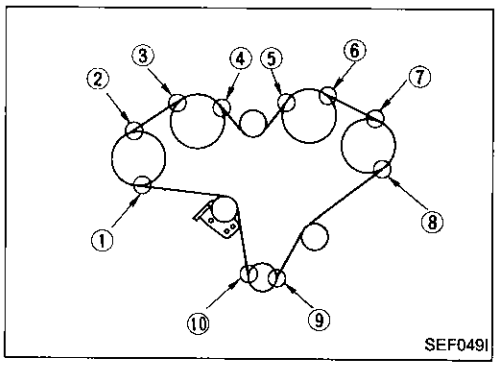
is 6 - 7 mm (0.24 - 0.28 in)

If not within specification, repeat procedure from step 7 through step 15.

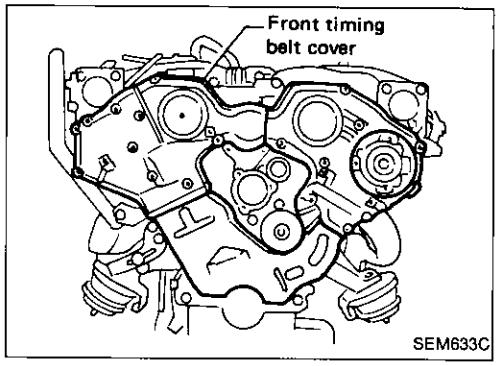
16. Confirm auto tensioner fixing nuts and bolts are tightened to 16 to 21 N·m (1.6 to 2.1 kg-m, 12 to 15 ft-lb).



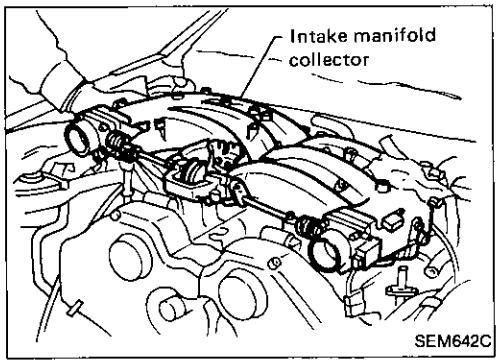
17.
- Remove the auto-tensioner stopper bolt.
- After 5 minutes check the projection of the rod (clearance between tensioner arm and pusher) stays at 3.5 - 5.2 mm (0.138 - 0.205 in).



18. Check the proper installation (no slip or misplacement) of timing belt at each position as shown.

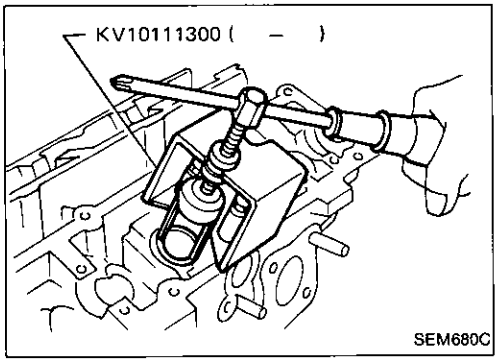


19. Install timing belt covers.

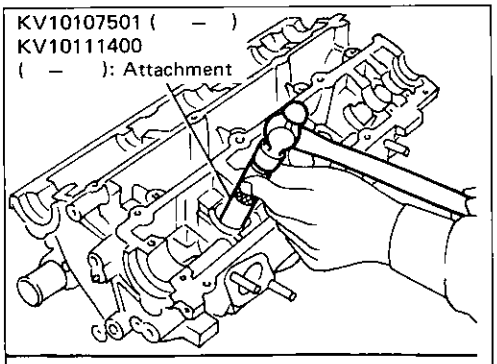


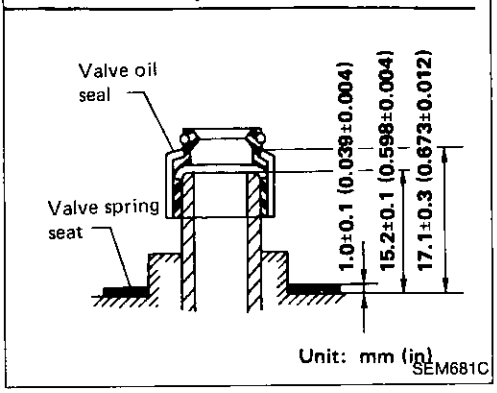
VALVE OIL SEAL

1. Remove intake manifold collector and valve cover.
2. Remove timing belt, camshaft sprocket and rear belt cover.
3. Remove camshaft brackets, camshaft and valve lifter.



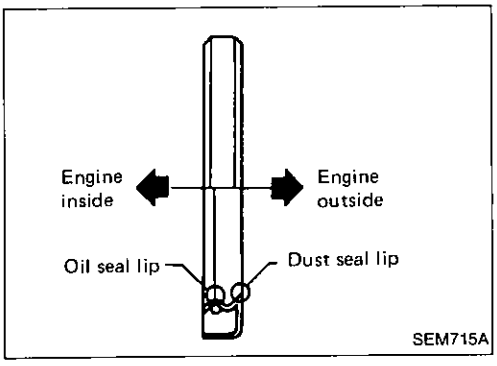
4. Remove valve spring using Tool or a suitable tool.
   - Piston concerned should be set at T.D.C. to prevent valve from falling.
5. Pry out valve oil seal.

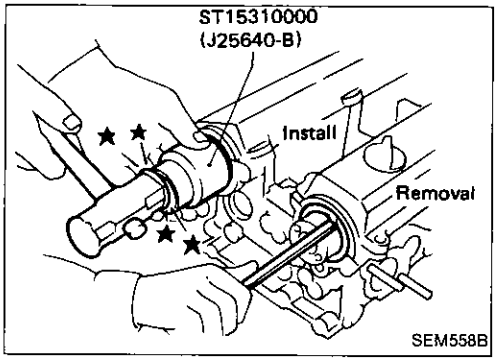




6. Apply engine oil to new valve oil seal and install it.
   - Before installing valve oil seal, install inner valve spring seat.

OIL SEAL INSTALLATION DIRECTION



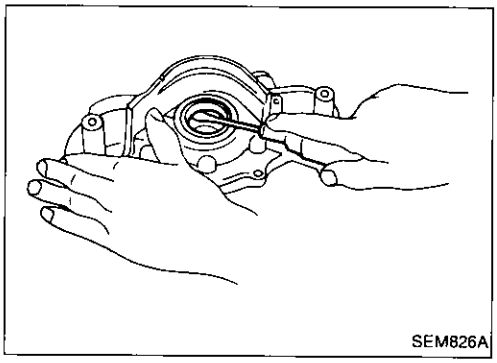


CAMSHAFT OIL SEAL

1. Remove timing belt and camshaft sprocket.
2. Remove rear belt cover and camshaft oil seal.

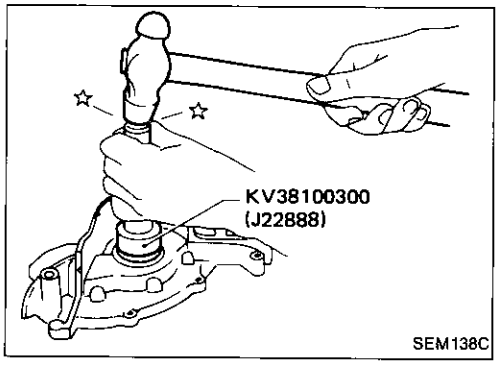
Be careful not to scratch camshaft.

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

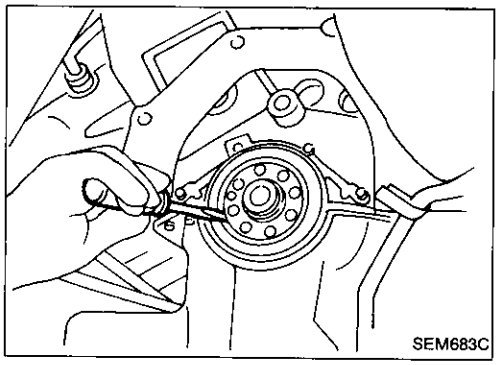


FRONT OIL SEAL

1. Remove timing belt and crankshaft sprocket.
2. Remove oil pan and oil pump assembly.
3. Remove front oil seal from oil pump body.



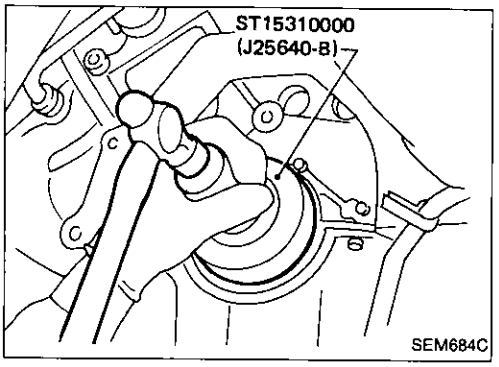
4. Apply engine oil to new oil seal and install it using Tool or a suitable tool.



REAR OIL SEAL

1. Remove flywheel or drive plate.
2. Remove rear oil seal from retainer.

Be careful not to scratch crankshaft.



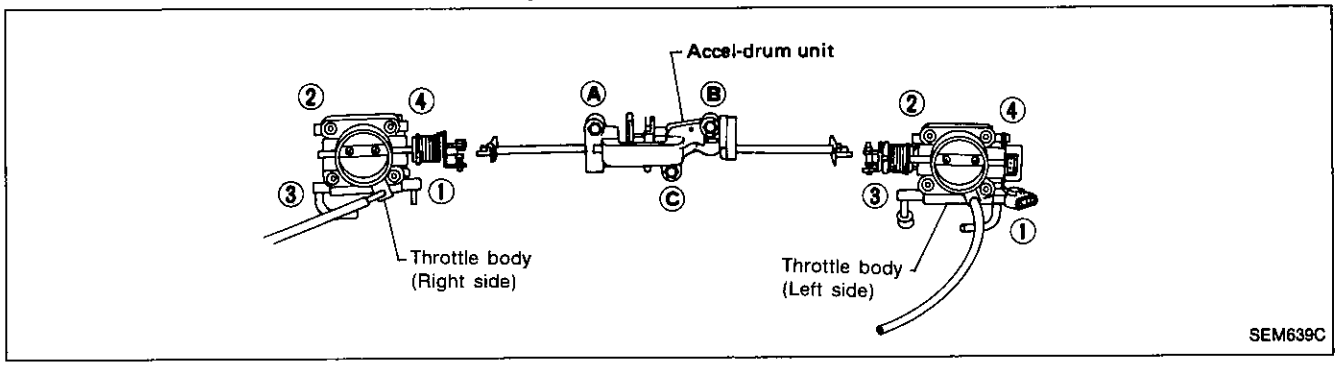
3. Apply engine oil to new oil seal and install it using Tool or a suitable tool.

Precaution

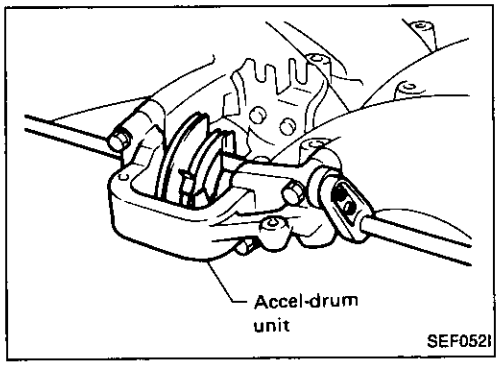
A letter, "U" or "L", is stamped on the throttle bodys. When changing a throttle body, replace it with a new one that has the same mark.

Installation

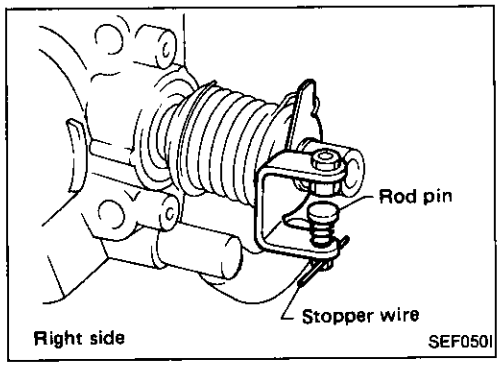
The intention of this installation and adjustment procedure is to assure accurate synchronization of the throttle body opening points.



1. Install accel-drum unit and throttle bodys (right side and left side).



- **When tightening bolts, free accel-drum unit so that drum unit is left under its own weight. Do not apply external force to accel-drum unit.**
- **When replacing throttle bodys only, you need not perform procedures (3), (4) and (5).**



- **Before installing each throttle body, confirm that stopper wire is installed in hole of rod pin. If not, install suitable wire.**

Tightening order:

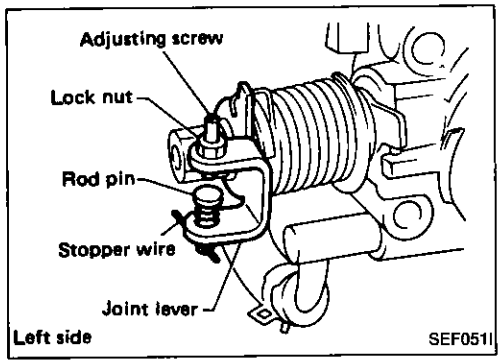
(1) ① → ② → ③ → ④:
9 - 11 N·m (0.9 - 1.1 kg-m, 6.5 - 8.0 ft-lb)

(2) ① → ② → ③ → ④:
18 - 22 N·m (1.8 - 2.2 kg-m, 13 - 16 ft-lb)

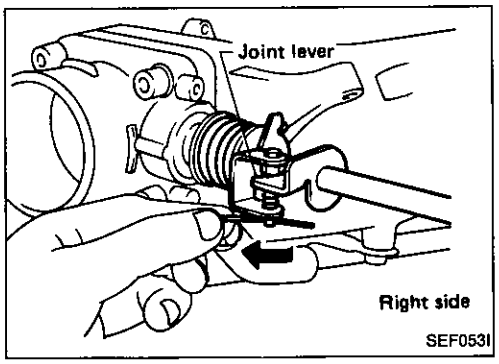
(3) Ⓐ → Ⓑ → Ⓒ: Tighten by hand

(4) Ⓐ → Ⓑ → Ⓒ:
5 N·m (0.5 kg-m, 3.6 ft-lb)

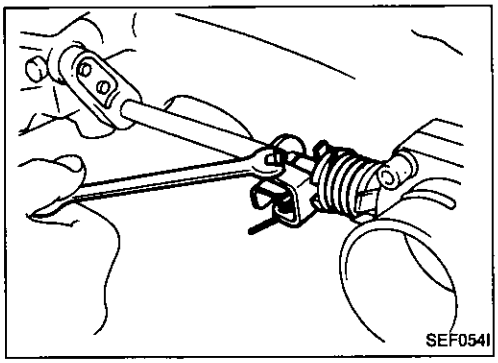
(5) Ⓐ → Ⓑ → Ⓒ:
20 N·m (2.0 kg-m, 14 ft-lb)



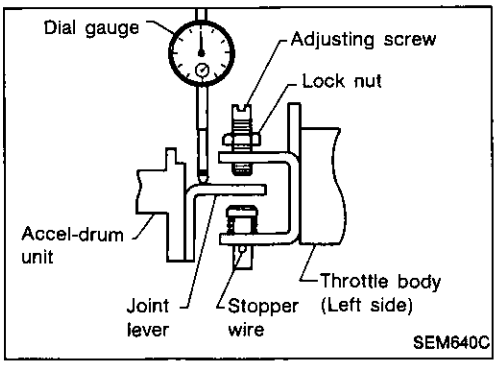
Installation (Cont'd)



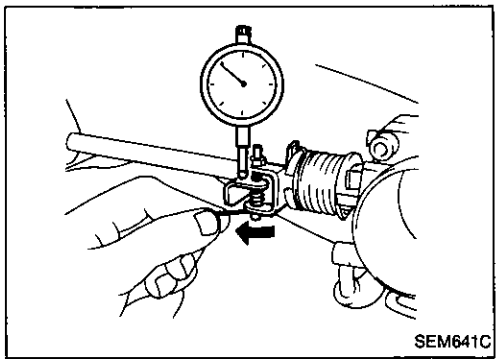
2. Pull out stopper wire of right side throttle body in order to secure right side joint lever.



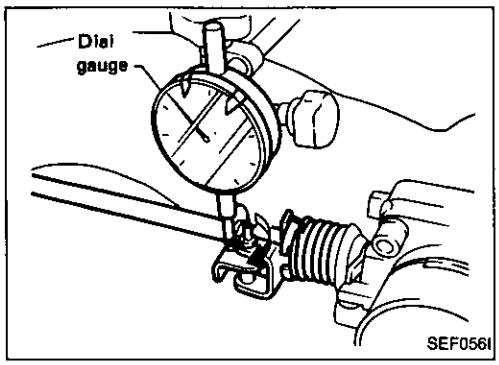
3. Loosen left side throttle body lock nut and back-out adjusting screw until there is clearance between the screw and joint lever.



4. Set dial gauge on joint lever and set indicator to zero. Confirm that bottom end of adjusting screw is not in contact with joint lever of accelerator drum unit.



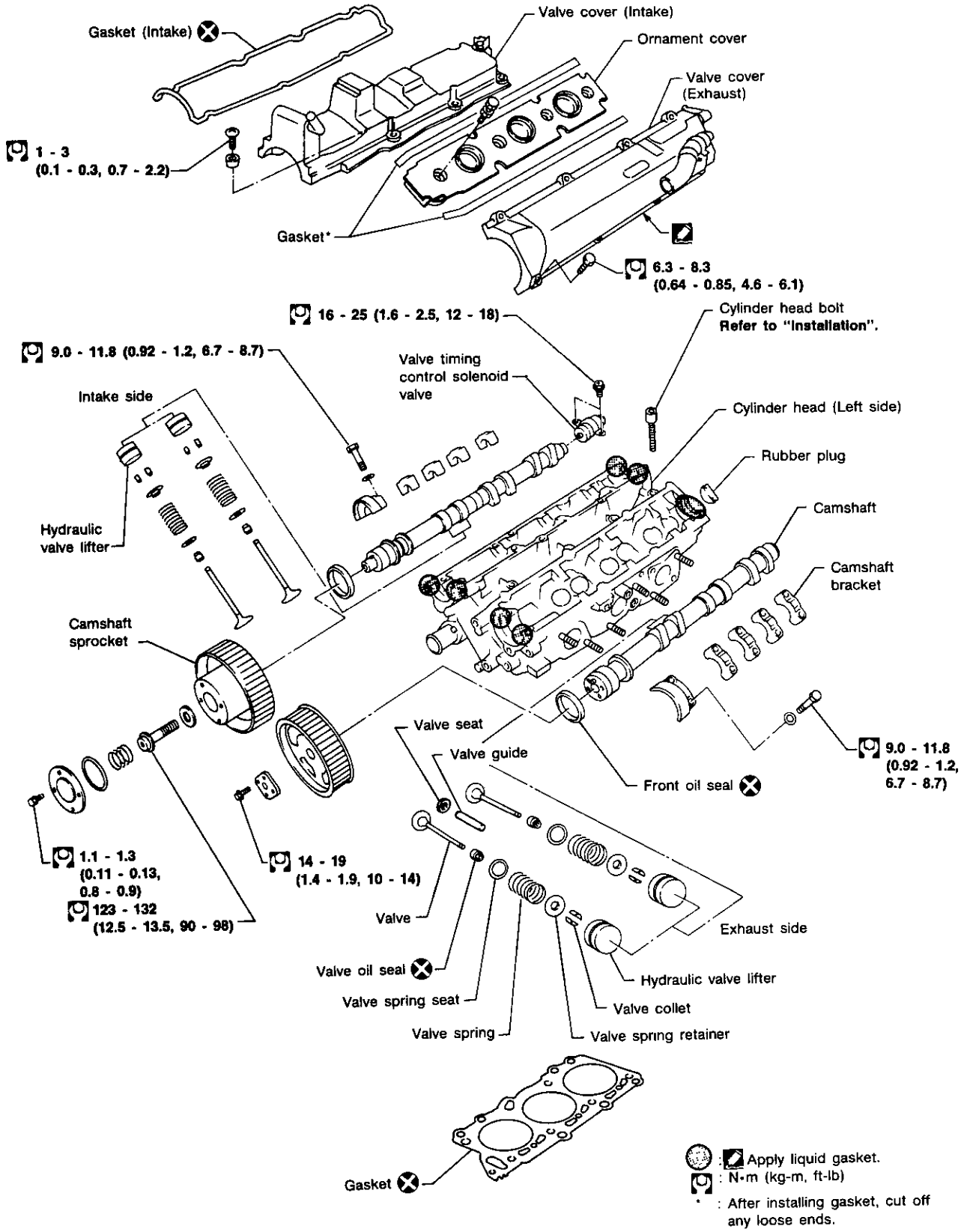
5. Pull out left side throttle body stopper wire from rod pin.



6. Turn adjusting screw until dial gauge indicator is within the following range.
   Range: 0.07 - 0.13 mm (0.0028 - 0.0051 in)

Then tighten lock nut.

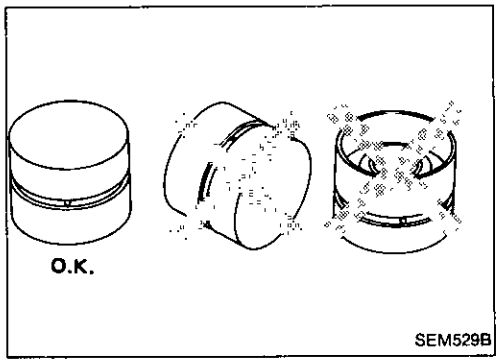
7. Confirm that the dial gauge indicator is still within the above range.


Gasket (Intake)
Valve cover (Intake)
Ornament cover
Valve cover (Exhaust)
1 - 3 (0.1 - 0.3, 0.7 - 2.2)
Gasket*
6.3 - 8.3 (0.64 - 0.85, 4.6 - 6.1)
16 - 25 (1.6 - 2.5, 12 - 18)
Cylinder head bolt
Refer to "Installation".
9.0 - 11.8 (0.92 - 1.2, 6.7 - 8.7)
Valve timing control solenoid valve
Intake side
Cylinder head (Left side)
Rubber plug
Camshaft
Hydraulic valve lifter
Camshaft bracket
Camshaft sprocket
Valve seat
Valve guide
Front oil seal
9.0 - 11.8 (0.92 - 1.2, 6.7 - 8.7)
1.1 - 1.3 (0.11 - 0.13, 0.8 - 0.9)
123 - 132 (12.5 - 13.5, 90 - 98)
14 - 19 (1.4 - 1.9, 10 - 14)
Valve
Exhaust side
Valve oil seal
Hydraulic valve lifter
Valve spring seat
Valve collet
Valve spring
Valve spring retainer
Gasket
: Apply liquid gasket.
: N·m (kg-m, ft-lb)
* : After installing gasket, cut off any loose ends.

SEM105E

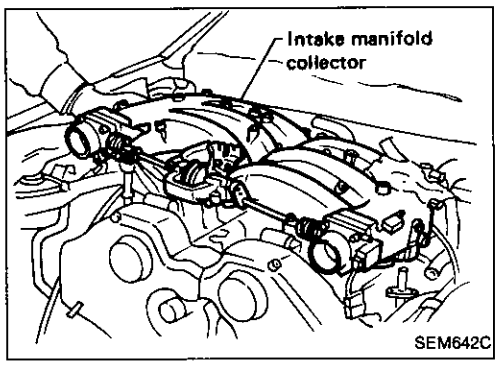
CAUTION:

- **When installing sliding parts such as camshaft, camshaft bracket and oil seal, be sure to apply new engine oil on their sliding surfaces.**
- **When tightening cylinder head bolts, intake camshaft sprocket bolts and camshaft bracket bolts, apply new engine oil to thread portions and seat surfaces of bolts.**

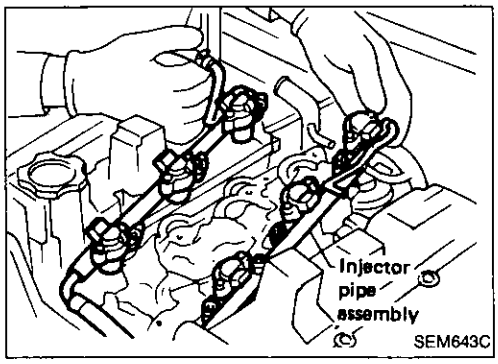


- **Do not put hydraulic valve lifters upside down, otherwise air will enter valve lifter, causing it to make a noise.**
- **Do not disassemble hydraulic valve lifter.**
- **Attach tags to valve lifters so as not to mix them up.**
- **Valve lifters should be immersed in engine oil.**

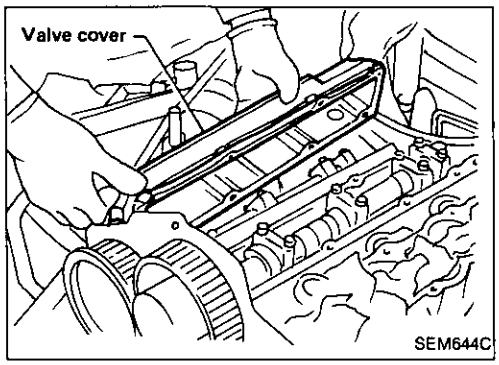
Removal



1. Remove intake manifold collector.

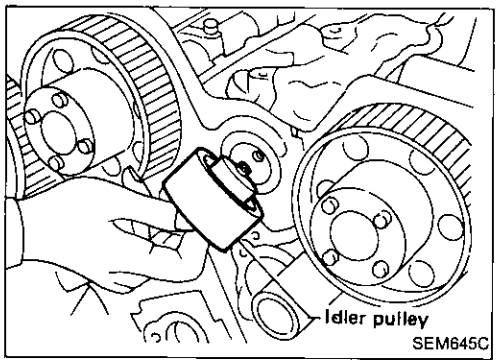


2. Remove injector pipe assembly.



3. Remove valve covers.

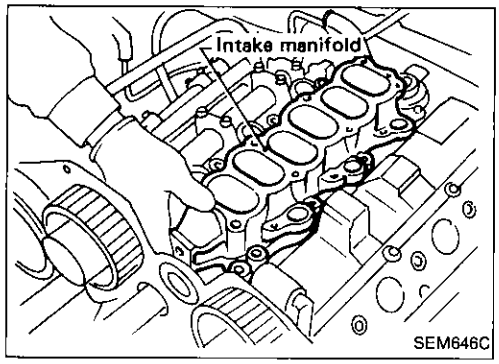
Removal (Cont'd)



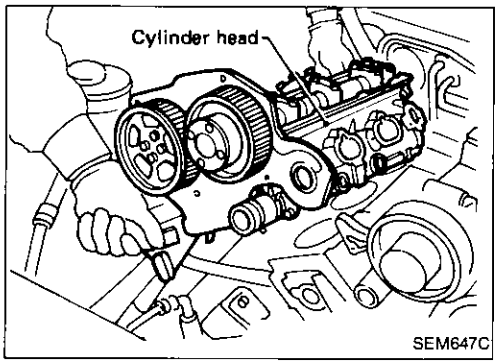
4. Remove timing belt.

Refer to "Removal" of TIMING BELT.

5. Remove idler pulley and its stud bolt.



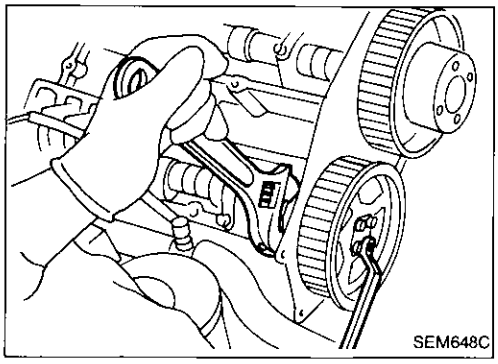
6. Remove intake manifold.



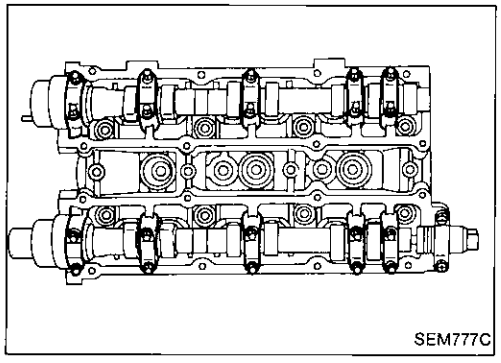
7. Disconnect front exhaust tube from exhaust manifold.
8. Remove cylinder head with exhaust manifold.

Cylinder head bolts should be loosened in two or three steps.

Disassembly



1. Remove exhaust manifold from cylinder head.
2. Remove camshaft sprockets.
3. Remove timing belt rear cover.

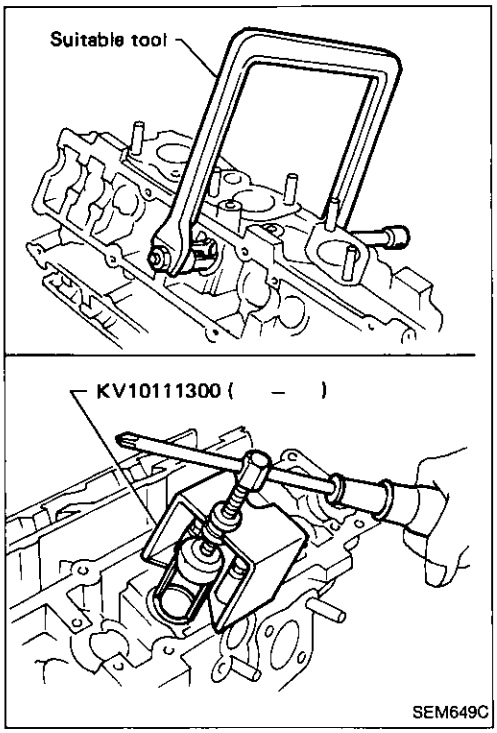


4. Remove VTC solenoid valve.
5. Remove camshaft brackets.

Bolts should be loosened in two or three steps.
Before removing camshaft, measure camshaft end play.

6. Remove oil seals, camshafts and hydraulic valve lifters.

Disassembly (Cont'd)



7. Remove valve springs with Tool or a suitable tool.
8. Pull out valve oil seals.

Inspection

CYLINDER HEAD DISTORTION

Head surface flatness:

Less than 0.1 mm (0.004 in)

If beyond the specified limit, replace it or resurface it.

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".

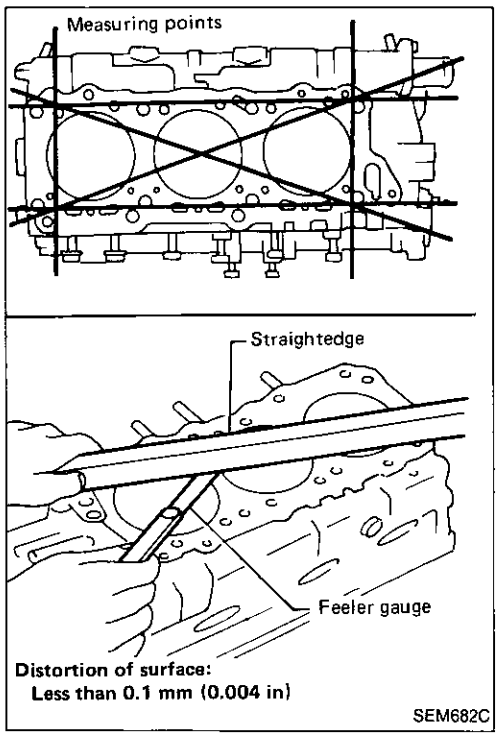
The maximum limit is as follows:

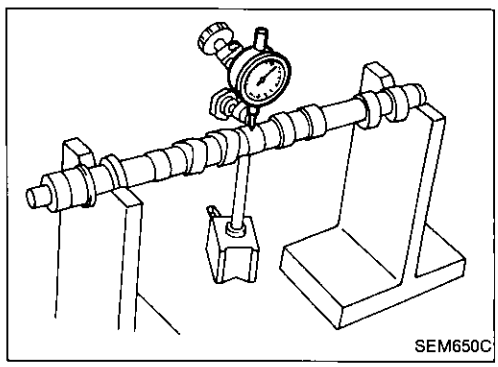
A + B = 0.2 mm (0.008 in)

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

Nominal cylinder head height from camshaft center:

Refer to S.D.S.





CAMSHAFT VISUAL CHECK

Check camshaft for scratches, seizure and wear.

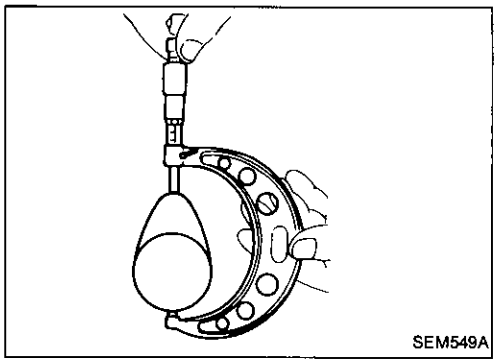
CAMSHAFT RUNOUT

1. Measure camshaft runout at the center journal.

   Runout (Total indicator reading):

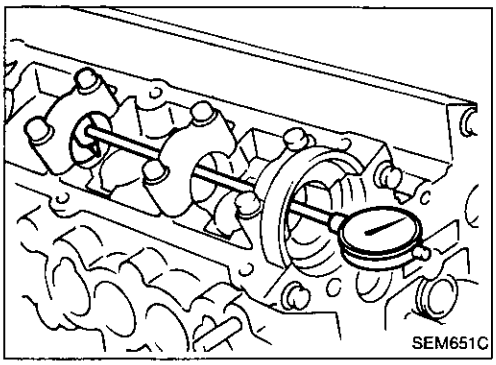
   Limit 0.1 mm (0.004 in)
2. If it exceeds the limit, replace camshaft.

Inspection (Cont'd)


SEM549A

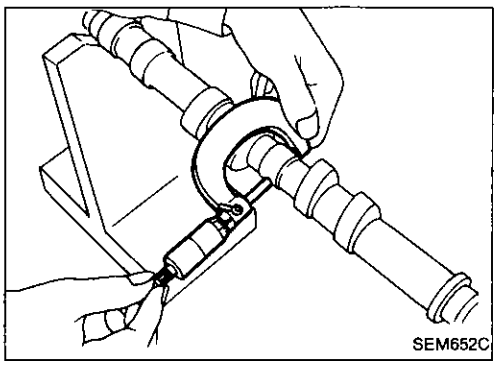
CAMSHAFT CAM HEIGHT

1. Measure camshaft cam height.
   Standard cam height:
   40.405 - 40.595 mm (1.5907 - 1.5982 in)
   Cam wear limit:
   0.15 mm (0.0059 in)
2. If wear is beyond the limit, replace camshaft.

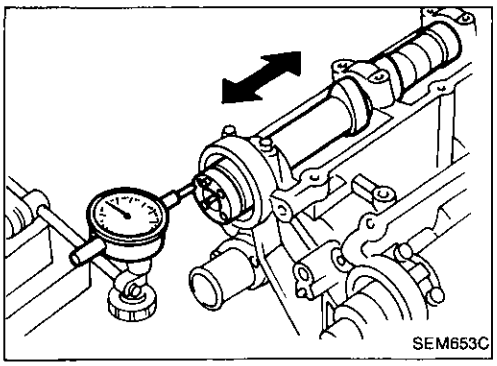

SEM651C

CAMSHAFT JOURNAL CLEARANCE

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)

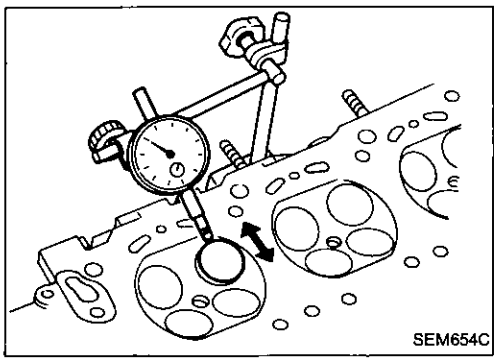

SEM652C

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 limit:
   0.15 mm (0.0059 in)


SEM653C

CAMSHAFT END PLAY

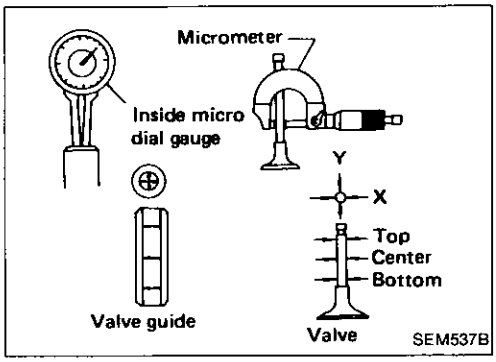
1. Install camshaft in cylinder head.
2. Measure camshaft end play.
   Camshaft end play:
   Standard
   0.03 - 0.08 mm (0.0012 - 0.0031 in)


SEM654C

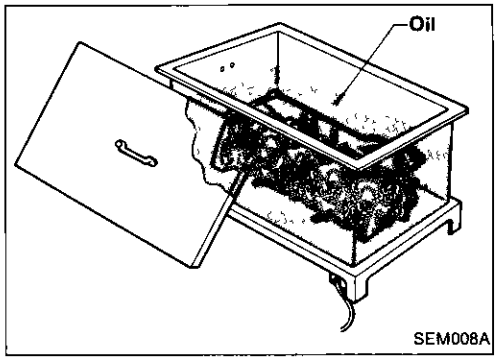
VALVE GUIDE CLEARANCE

1. Push valve stem out so that its end is even with valve guide height. Measure valve runout by moving valve.
   Valve deflection limit (Dial gauge reading):
   0.2 mm (0.008 in)

Inspection (Cont'd)

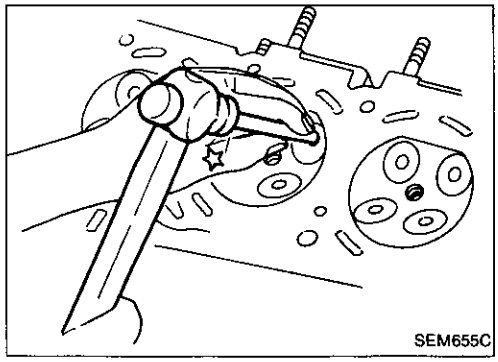


2. If it exceeds the limit, check valve to valve guide clearance.
a. Measure valve stem diameter and valve guide inner diameter.
b. Check that clearance is within specification.
Valve to valve guide clearance limit:
0.10 mm (0.0039 in)
c. If it exceeds the limit, replace valve or valve guide.

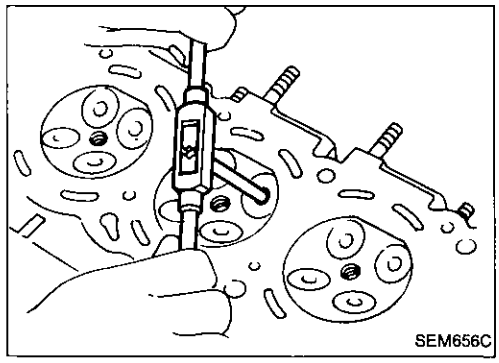


VALVE GUIDE REPLACEMENT

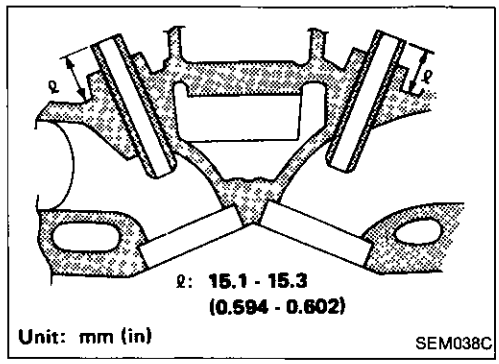
1. To remove valve guide, heat cylinder head to 150 to 160°C (302 to 320°F).



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

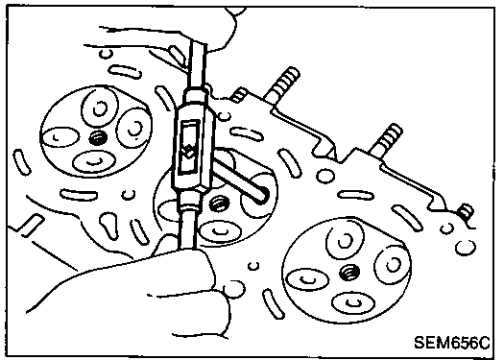


3. Ream cylinder head valve guide hole.
Valve guide hole diameter
(for service parts):
Intake and Exhaust
10.175 - 10.196 mm (0.4006 - 0.4014 in)



4. Heat cylinder head to 150 to 160°C (302 to 320°F) and press service valve guide onto cylinder head.
Projection "ℓ":
15.1 - 15.3 mm (0.594 - 0.602 in)

Inspection (Cont'd)

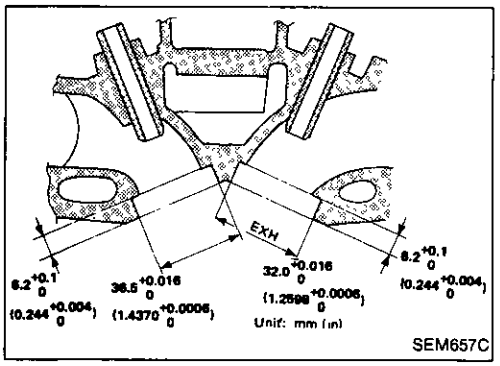

SEM656C

5. Ream valve guide.
   Finished size:
   Intake and Exhaust
   6.000 - 6.018 mm (0.2362 - 0.2369 in)

VALVE SEATS

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

- **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 assure a uniform surface.**

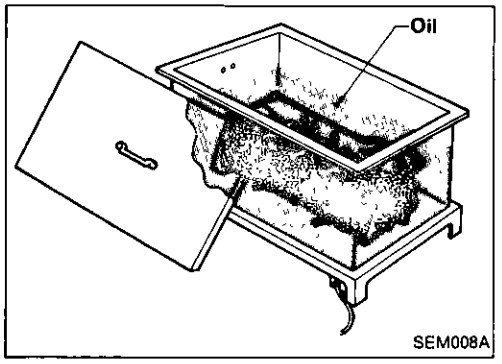


SEM657C

REPLACING VALVE SEAT FOR SERVICE PARTS

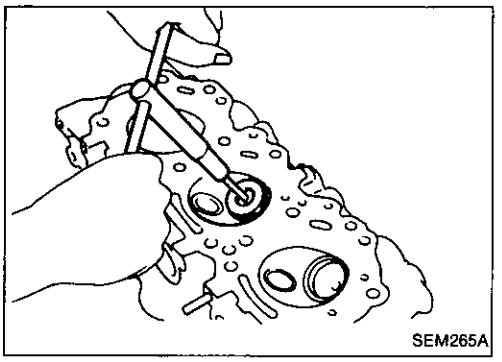
1. Bore out old seat until it collapses. The machine depth stop should be set so that boring cannot continue beyond the bottom face of the seat recess in cylinder head.
2. Ream cylinder head recess.
   Reaming bore for service valve seat
   Oversize [0.5 mm (0.020 in)]:
   Intake 36.500 - 36.516 mm (1.4370 - 1.4376 in)
   Exhaust 32.000 - 32.016 mm (1.2598 - 1.2605 in)

Reaming should be done to the concentric circles to valve guide center so that valve seat will have the correct fit.



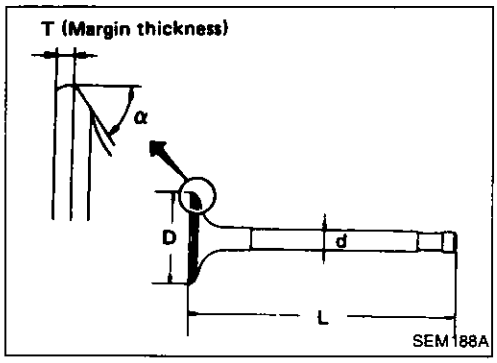
SEM008A

3. Heat cylinder head to 150 to 160°C (302 to 320°F).
4. Press fit valve seat until it seats on the bottom.


SEM265A

5. Cut or grind valve seat using suitable tool at the specified dimensions as shown in S.D.S.
6. After cutting, lap valve seat with abrasive compound.
7. Check valve seat contact condition.

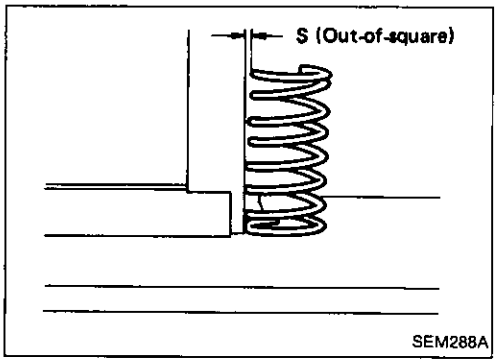
Inspection (Cont'd)



VALVE DIMENSIONS

Check dimensions in each valve. For dimensions, refer to S.D.S. When valve head has been worn down to 0.5 mm (0.020 in) in margin thickness, replace valve.

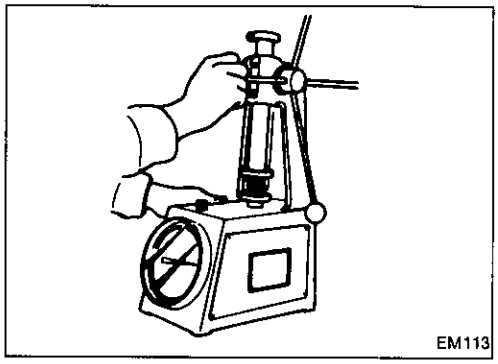
Grinding allowance for valve stem tip is 0.2 mm (0.008 in) or less.



VALVE SPRING

Squareness

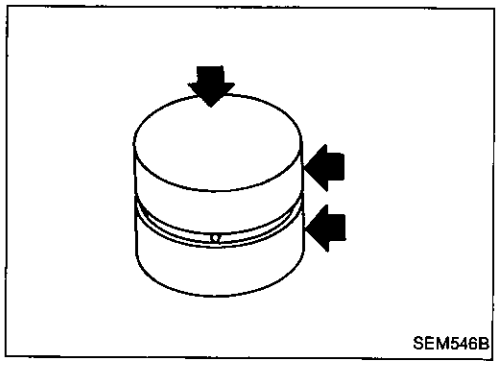
1. Measure "S" dimension.
   Out-of-square:
   Less than 1.8 mm (0.071 in)
2. If it exceeds the limit, replace spring.



Pressure

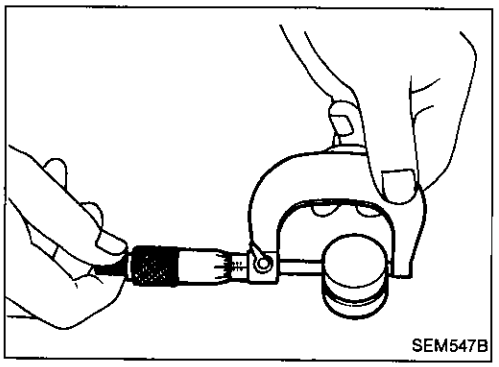
Check valve spring pressure.

Pressure: N (kg, lb) at height mm (in)
Standard
536.4 (54.7, 120.6) at 26.5 (1.043)
Limit
More than 452.79 (46.17, 101.80) at 26.5 (1.043)
If it exceeds the limit, replace spring.



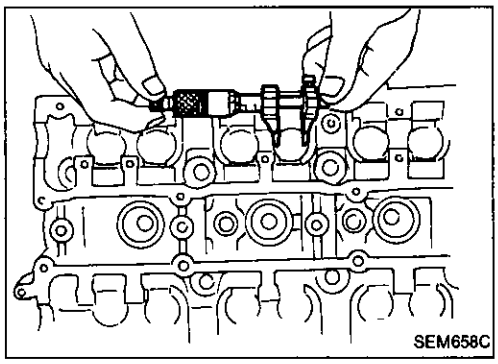
HYDRAULIC VALVE LIFTER

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



2. Check diameter of valve lifter.
   Outer diameter:
   30.955 - 30.965 mm (1.2187 - 1.2191 in)

Inspection (Cont'd)

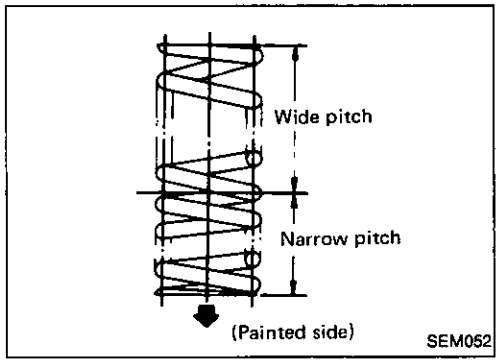

SEM658C

3. Check valve lifter guide inner diameter.
   Inner diameter:
   31.000 - 31.020 mm (1.2205 - 1.2213 in)
   Standard clearance between valve lifter and lifter guide:
   0.035 - 0.065 mm (0.0014 - 0.0026 in)

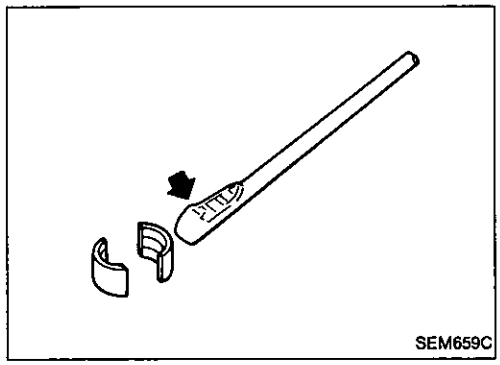
Assembly

1. Install valve component parts.

- **Always use new valve oil seal. (Refer to OIL SEAL REPLACEMENT.)**
- **Install valve spring (uneven pitch type) with its narrow pitch side (painted side) toward cylinder head side.**

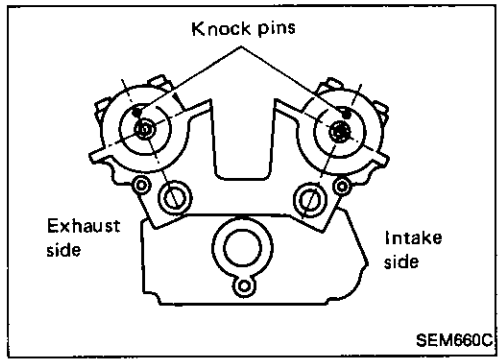


SEM052

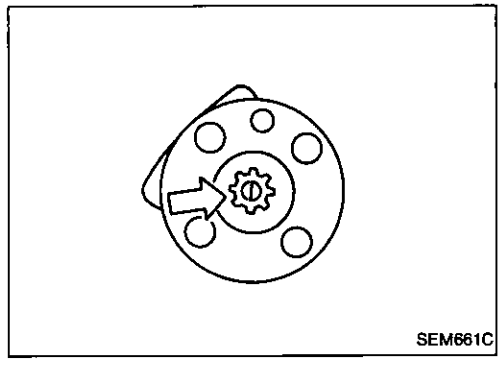

SEM659C

- To facilitate installation of collet, apply a small amount of grease to a piece of wire or a pencil and attach collet to wire or pencil, as shown.

2. Install camshafts as shown.

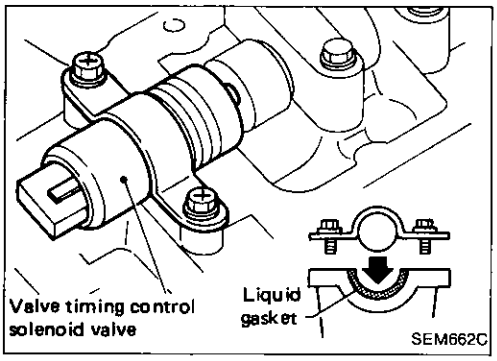


SEM660C

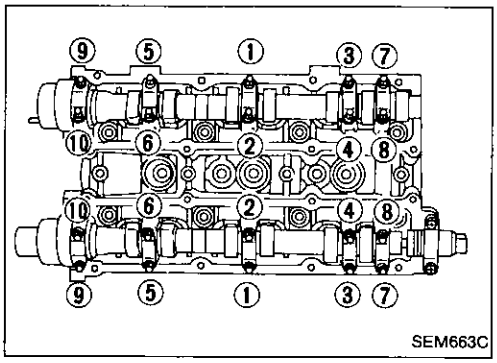

SEM661C

- Exhaust camshaft (left side) has spline for crankshaft position sensor.

Assembly (Cont'd)

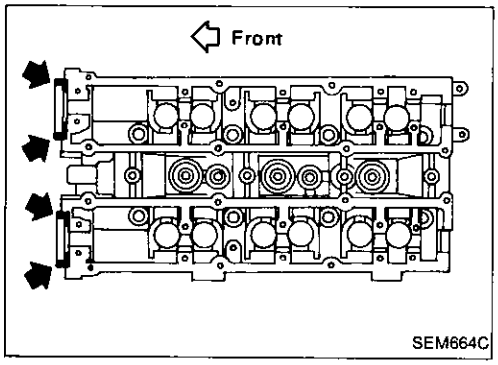


- When installing valve timing control solenoid valves, apply liquid gasket to solenoid valve surfaces.



3. Install camshaft brackets.

Tighten camshaft bracket bolts gradually in two or three stages.



When installing front side camshaft brackets, apply liquid gasket as shown.

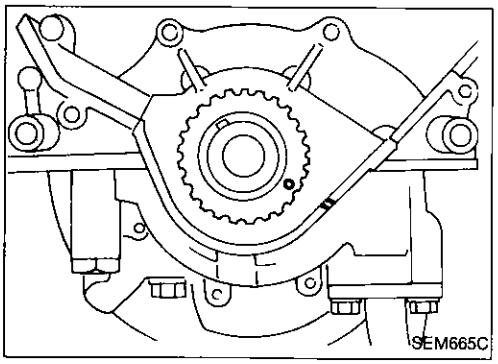
4. Apply engine oil to camshaft oil seal lip and install it in place.

Always use new camshaft oil seal.

5. Install rear timing belt cover.
6. Install camshaft sprockets.

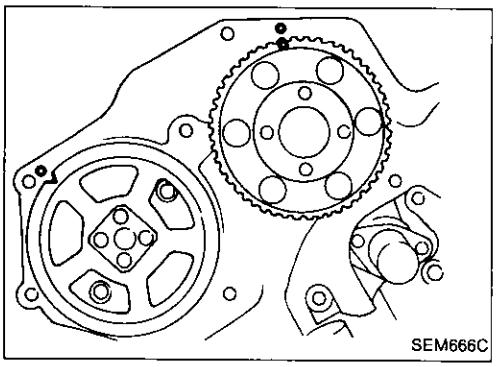
When tightening bolts, fix camshaft to prevent it from rotating.

Installation



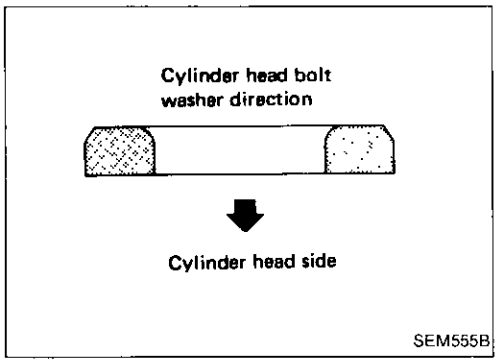
1. Set No. 1 piston at T.D.C. on its compression stroke as follows:

(1) Align crankshaft sprocket aligning mark with mark on oil pump body.



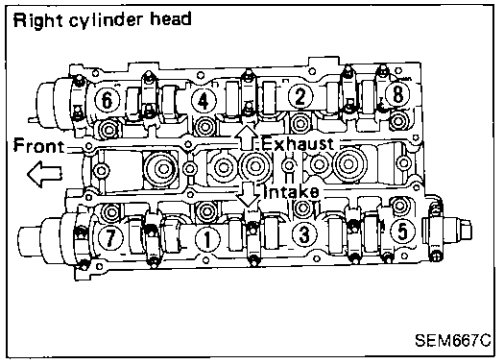
(2) Align camshaft sprocket aligning mark with mark on timing belt rear cover.

Installation (Cont'd)



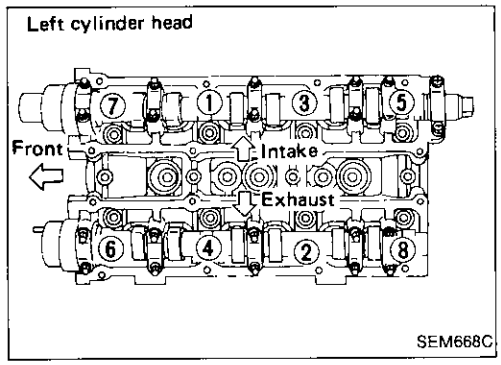
2. Install cylinder head with new gasket.
- **Be sure to install washers between bolts and cylinder head.**
- **Do not rotate crankshaft and camshaft separately, or valves will hit piston heads.**

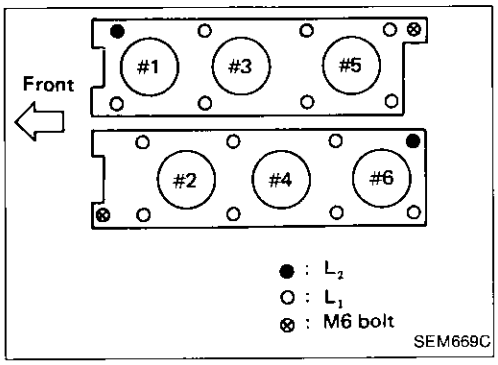
3. Install cylinder head bolts.
- **Install short bolts (L_2) into the correct holes of cylinders #1 and #6 as shown in figure of step (6).**



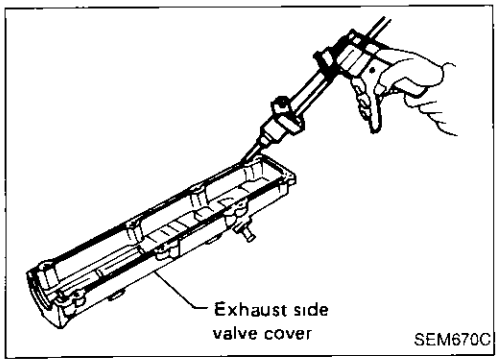
4. Tighten cylinder head bolts in numerical order.
- **Tightening procedure**

(1) Tighten all bolts to 39 N·m (4.0 kg-m, 29 ft-lb).
(2) Tighten all bolts to 123 N·m (12.5 kg-m, 90 ft-lb).
(3) Loosen all bolts completely.
(4) Tighten all bolts to 34 to 44 N·m (3.5 to 4.5 kg-m, 25 to 33 ft-lb).
(5) Tighten all bolts to 123 N·m (12.5 kg-m, 90 ft-lb) or if an angle wrench is available, tighten bolts 70 to 75 degrees (L_1), 65 to 70 degrees (L_2) clockwise.

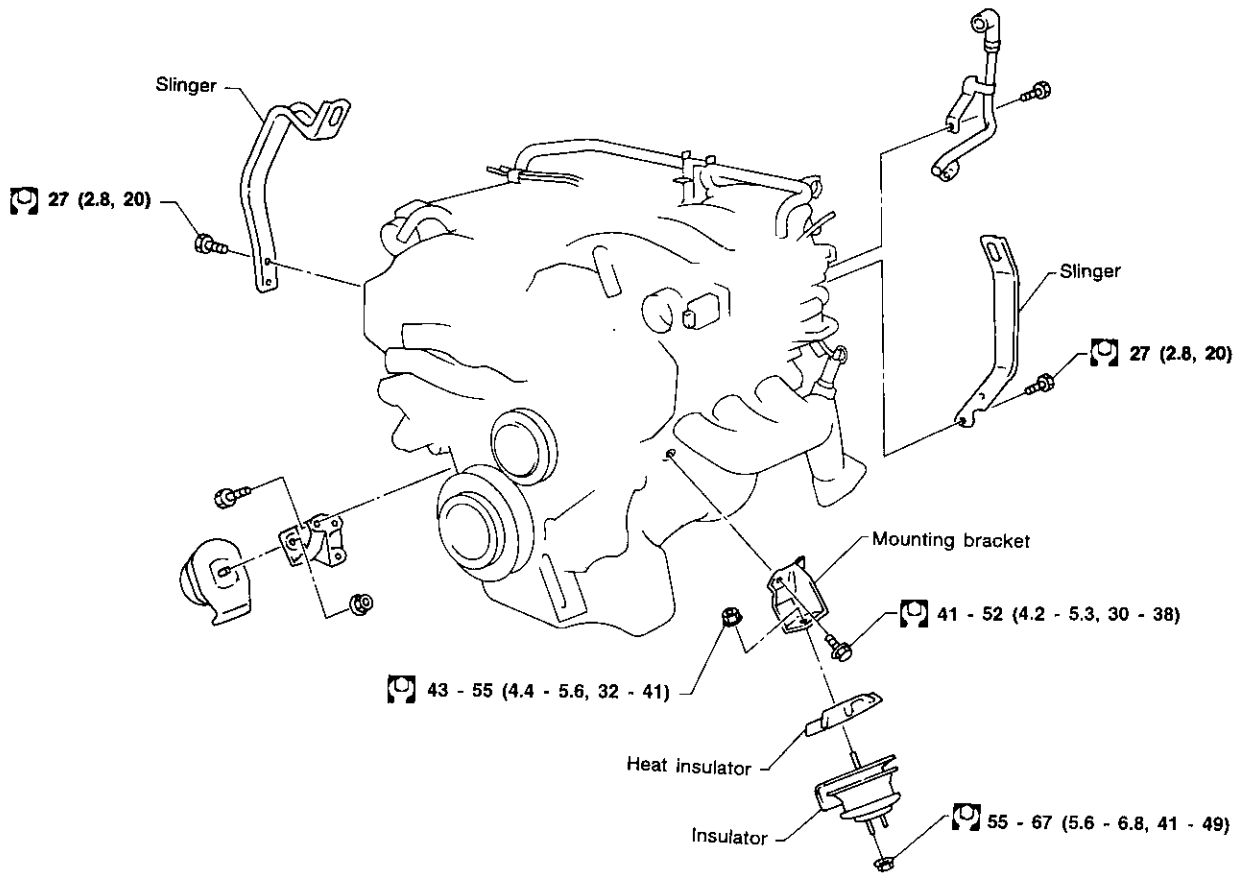


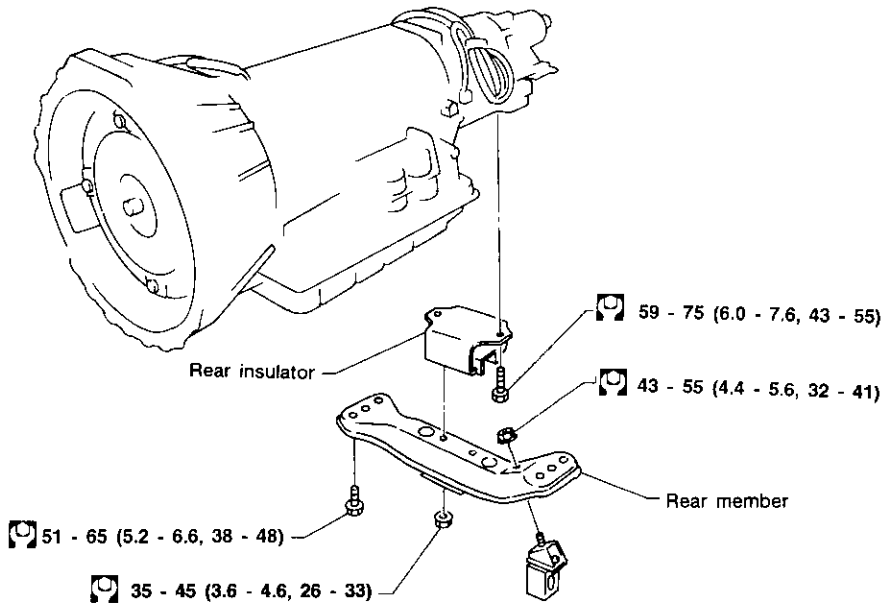


(6) Tighten bolts (ⓧ) as shown to 10 to 12 N·m (1.0 to 1.2 kg-m, 7 to 9 ft-lb).



5. Install valve covers.
When installing exhaust side valve covers, apply liquid gasket as shown.
6. Install remaining parts.





: N·m (kg-m, ft-lb)

SEM106E

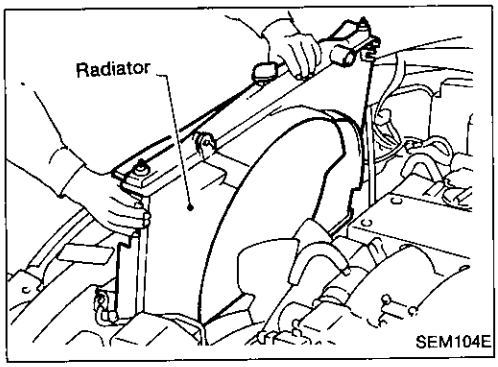
WARNING:

a. **Situate vehicle on a flat and solid surface.**
b. **Place chocks at front and back of rear wheels.**
c. **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.**
d. **For safety during subsequent steps, the tension of wires should be slackened against the engine.**
e. **Before disconnecting fuel hose, release fuel pressure from fuel line.**
   Refer to "Releasing Fuel Pressure" in section EF & EC.
f. **Be sure to hoist engine and transmission in a safe manner.**
g. **For engines not equipped with engine slingers, attach proper slingers and bolts described in PARTS CATALOG.**

CAUTION:

- **When lifting engine, be careful not to strike adjacent parts, especially accelerator wire casing, brake lines, and brake master cylinder.**
- **In hoisting the engine, always use engine slingers in a safe manner.**

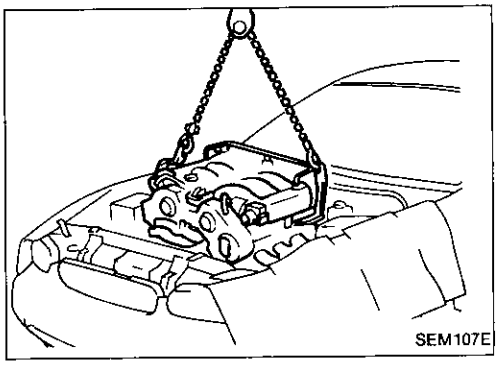
1. Remove engine under cover and hood.
2. Drain coolant from both cylinder block drain plugs, and radiator drain cock.
3. Drain engine oil from drain plug of oil pan.
4. Remove vacuum hoses, fuel tubes, wires, harnesses and connectors and so on.
5. Remove front exhaust tubes and propeller shaft.



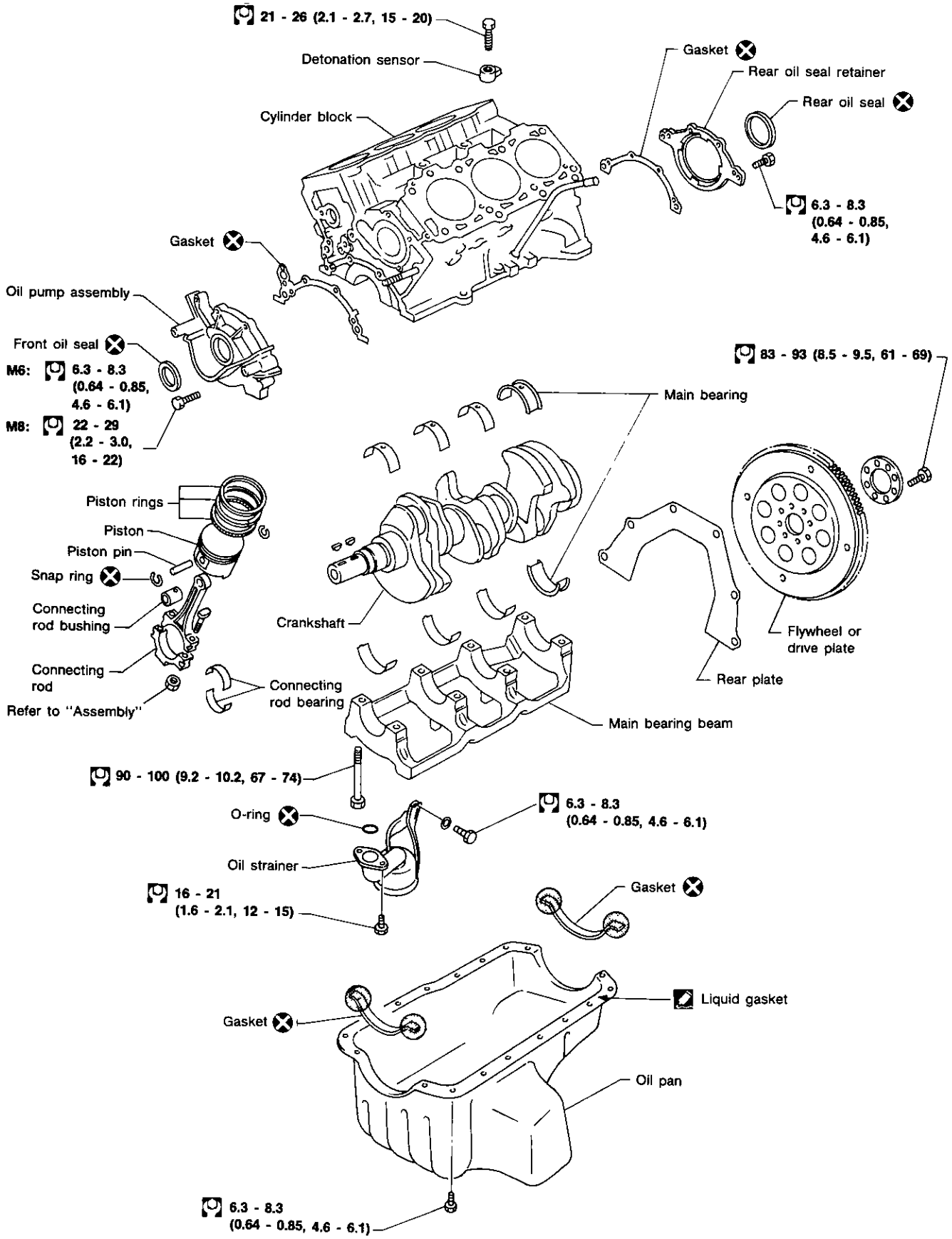
6. Remove radiator.
7. Remove drive belts, cooling fan and coupling.
8. Remove P/S oil pump, alternator, A/C pump from engine, and starter motor.
9. Remove transmission from vehicle.

Refer to AT section.

10. Hoist engine with engine slingers and remove engine mounting bolts from both sides.



11. Lift engine out of vehicle as shown

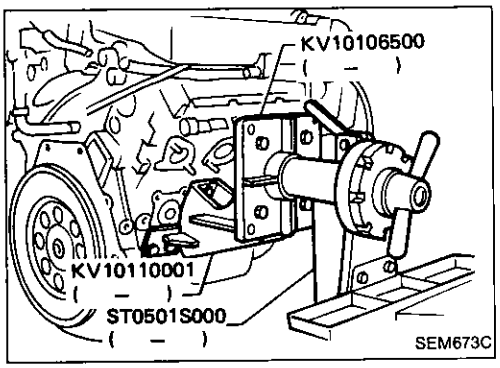


: Apply liquid gasket.
: N·m (kg-m, ft-lb)

SEM108E

CAUTION:

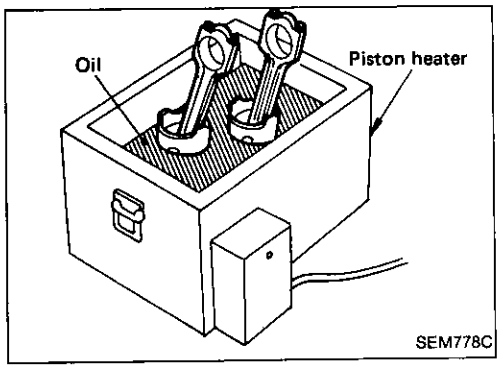
- **When installing sliding parts such as bearings and pistons, be sure to apply engine oil on the sliding surfaces.**
- **Place removed parts such as bearings and bearing caps in their proper order and direction.**
- **When tightening connecting rod bolts and main bearing cap bolts, apply engine oil to thread portion of bolts and seating surface of nuts.**



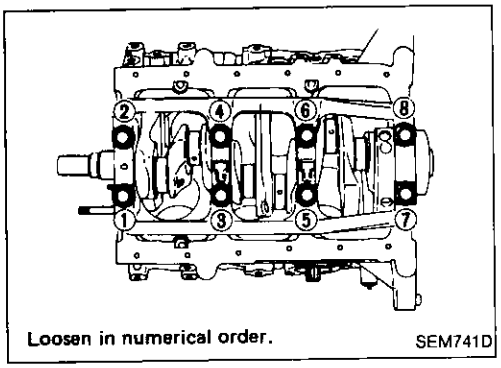
Disassembly

PISTON AND CRANKSHAFT

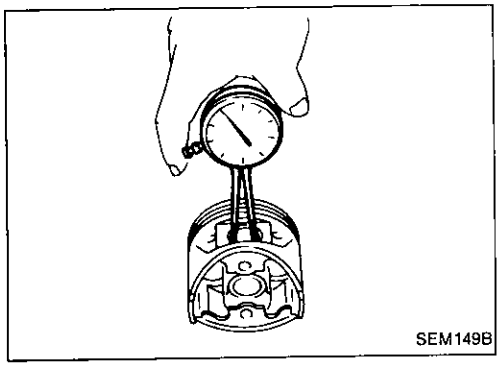
1. Place engine on a work stand.
2. Remove timing belt.
3. Drain coolant and remove water pump.
4. Drain oil.
5. Remove oil pan, oil pump and rear oil seal retainer.
6. Remove intake manifold collector, intake manifold and cylinder head.



7. Remove pistons.
- 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.



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



Inspection

PISTON AND PISTON PIN CLEARANCE

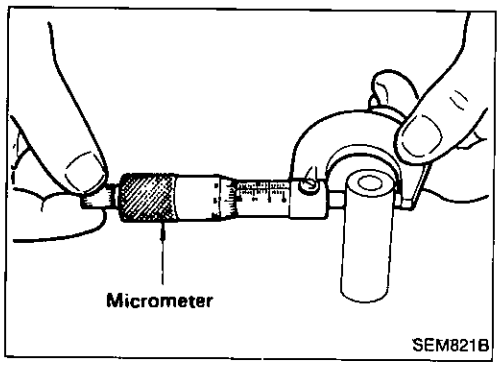
- Confirm the fitting of piston pin into piston pin hole by checking if it can be pressed in smoothly by finger pressure at room temperature.

1. Measure inner diameter of piston pin hole "dp"

Standard diameter "dp":

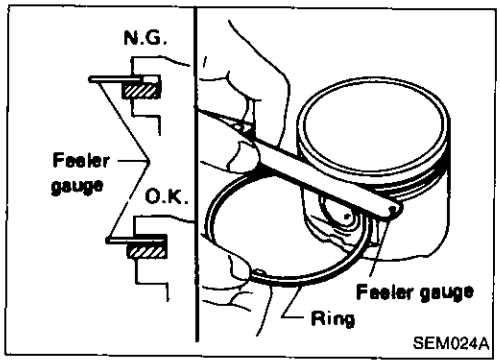
21.987 - 21.999 mm (0.8656 - 0.8661 in)

Inspection (Cont'd)



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 to 0 mm (–0.0002 to 0 in)

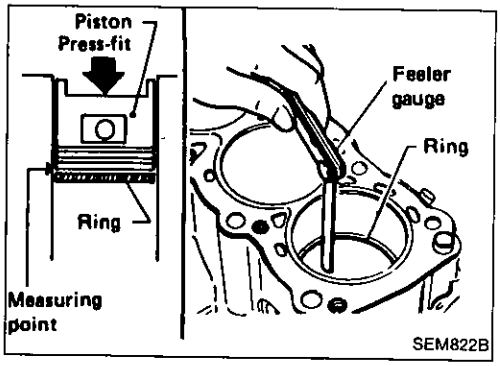
If it exceeds the above value, replace piston assembly with pin.



PISTON RING SIDE CLEARANCE

Side clearance:
Top ring
0.040 - 0.073 mm (0.0016 - 0.0029 in)
2nd ring
0.030 - 0.063 mm (0.0012 - 0.0025 in)
Max. limit of side clearance:
0.1 mm (0.004 in)
O-ring:
0.015 - 0.185 mm (0.0006 - 0.0073 in)

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



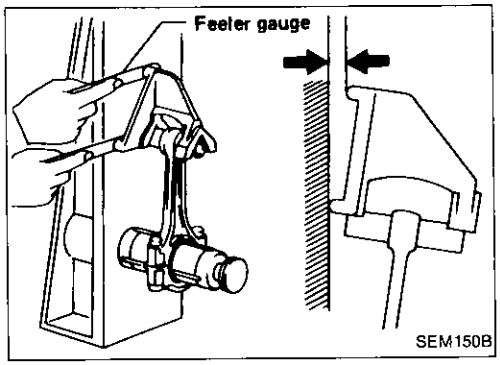
PISTON RING END GAP

End gap:
Top ring
0.21 - 0.40 mm (0.0083 - 0.0157 in)
2nd ring
0.50 - 0.76 mm (0.0197 - 0.0299 in)
Oil ring
0.20 - 0.76 mm (0.0079 - 0.0299 in)
Max. limit of end gap:
1.0 mm (0.039 in)

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

Refer to S.D.S.

Inspection (Cont'd)



CONNECTING ROD BEND AND TORSION

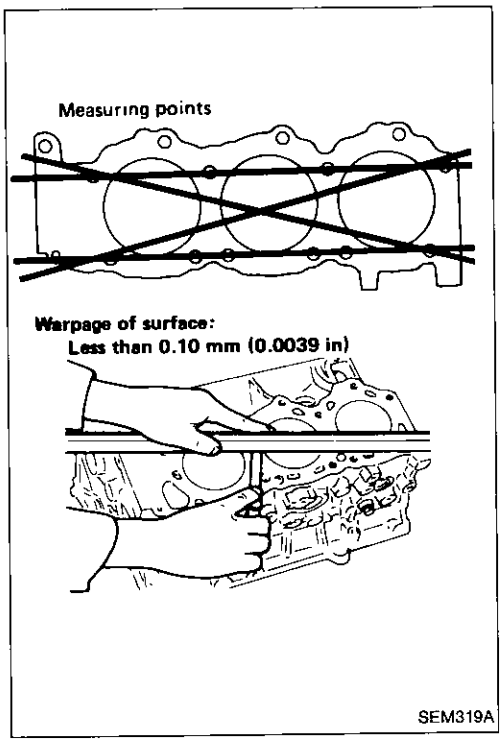
Bend:

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

Torsion:

Limit 0.3 mm (0.012 in) per 100 mm (3.94 in) length

If it exceeds the limit, replace connecting rod assembly.



CYLINDER BLOCK DISTORTION AND WEAR

1. Clean upper face of cylinder block and measure the distortion.

   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.

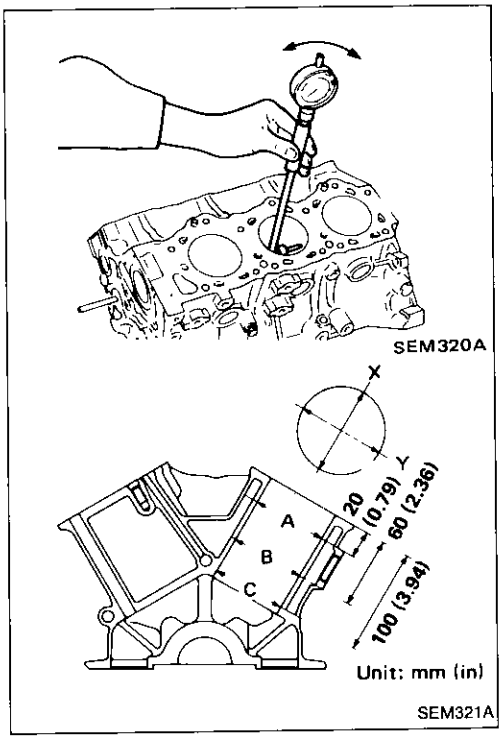
Amount of cylinder head resurfacing is "A".

Amount of cylinder block resurfacing is "B".

The maximum limit is as follows:

A + B = 0.2 mm (0.008 in)

3. If necessary, replace cylinder block.



PISTON-TO-BORE CLEARANCE

Method A (Using bore gauge and micrometer)

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

   Standard inner diameter:

   87.000 - 87.030 mm (3.4252 - 3.4264 in)

   Wear limit:

   0.20 mm (0.0079 in)

   Out-of-round (X – Y) limit:

   0.015 mm (0.0006 in)

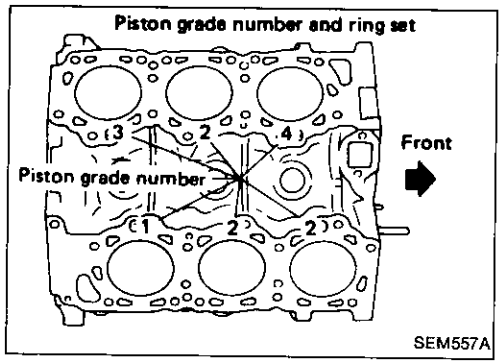
   Taper (A – B – C) limit:

   0.015 mm (0.0006 in)

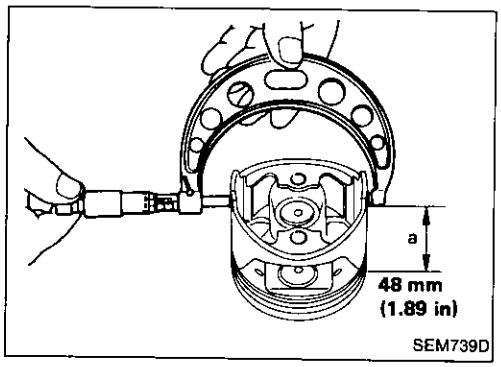
   If it exceeds the limit, rebore all cylinders. Replace cylinder block if necessary.

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

Inspection (Cont'd)



- **If both cylinder block and piston are replaced with new ones, select piston of the same grade number punched on cylinder block upper surface.**



3. Measure piston skirt diameter.
   Piston diameter "A":
   Refer to S.D.S.
   Measuring point "a" (Distance from the top):
   48.0 mm (1.890 in)
4. Check that piston-to-bore clearance is within specification.
   Piston-to-bore clearance "B":
   Non-turbo
   0.015 - 0.035 mm (0.0006 - 0.0014 in)
   Turbo
   0.025 - 0.045 mm (0.0010 - 0.0018 in)
5. Determine piston oversize according to amount of cylinder wear.

Oversize pistons are available for service. Refer to S.D.S.

6. Cylinder bore size is determined by adding piston-to-bore clearance to piston diameter "A".
   Rebored size calculation:
   D = A + B – C
   where,
   D: Bored diameter
   A: Piston diameter as measured
   B: Piston-to-bore clearance
   C: Honing allowance 0.02 mm (0.0008 in)
7. Install main bearing caps, and tighten to the specified torque to prevent distortion of cylinder bores in final assembly.
8. Cut cylinder bores.

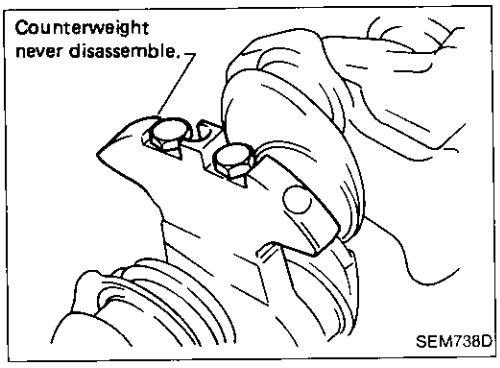
- **When any cylinder needs boring, all other cylinders must also be bored.**
- **Do not cut too much out of cylinder bore at a time. Do not cut more than 0.05 mm (0.0020 in) in diameter at a time.**

9. Hone cylinders to obtain specified piston-to-bore clearance.
10. Measure finished cylinder bore for out-of-round and taper.

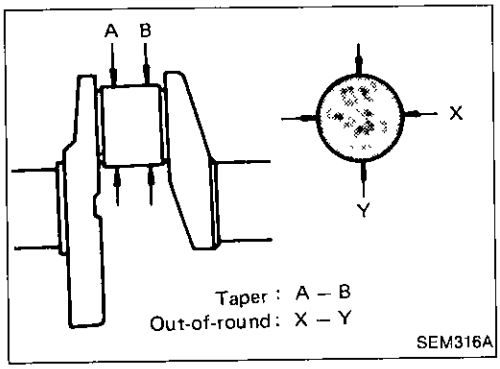
- **Measurement should be done after cylinder bore cools down.**

Inspection (Cont'd)

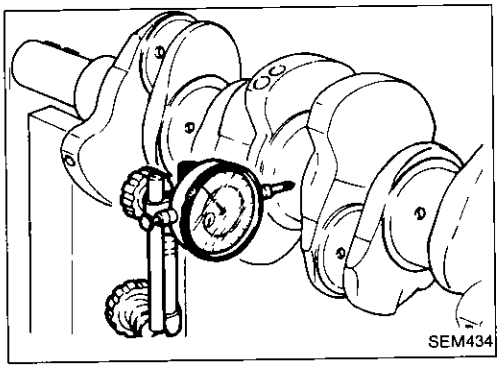
CRANKSHAFT



CAUTION:
Never attempt to disassemble crankshaft counter weight.



1. Check crankshaft main and pin journals for score, wear or cracks.
2. With a micrometer, measure journals for taper and out-of-round.
   Out-of-round (X – Y):
   Less than 0.005 mm (0.0002 in)
   Taper (A – B):
   Less than 0.005 mm (0.0002 in)
   Limit:
   0.02 mm (0.0008 in)



3. Measure crankshaft runout.
   Runout (Total indicator reading):
   Less than 0.10 mm (0.0039 in)

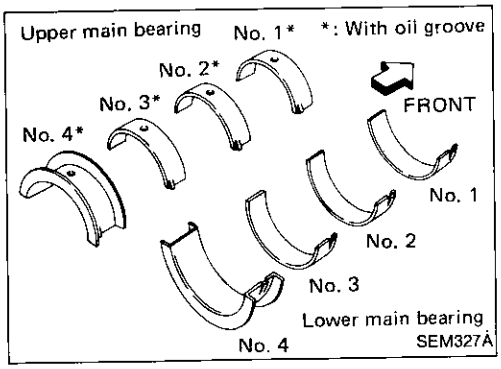
BEARING CLEARANCE

- Either of the following two methods may be used; however, method "A" gives more reliable results and is preferable.

Method A (Using bore gauge & micrometer)

Main bearing

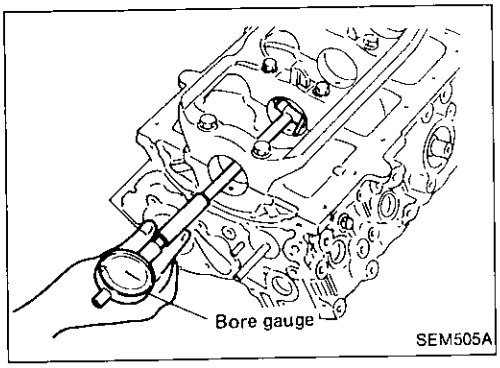
1. Set main bearings in their proper positions on cylinder block and main bearing cap.



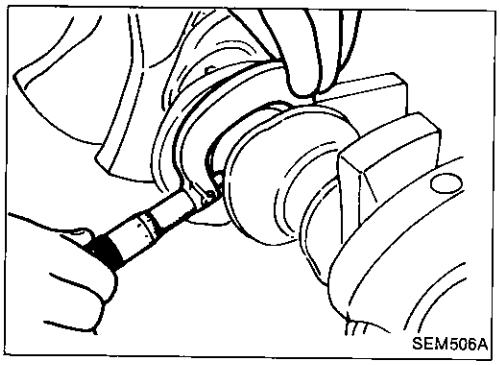
2. Install main bearing cap to cylinder block.

Tighten all bolts in correct order in two or three stages.

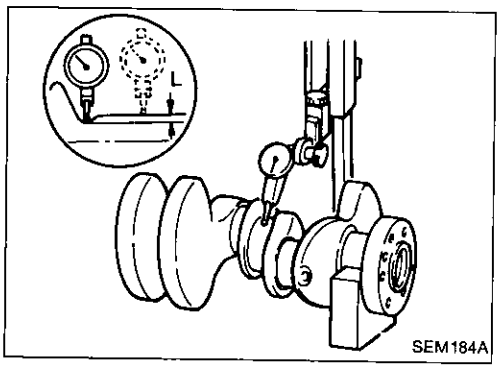
3. Measure inner diameter "A" of each main bearing.



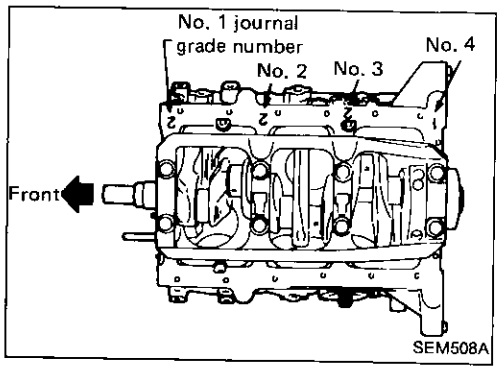
Inspection (Cont'd)



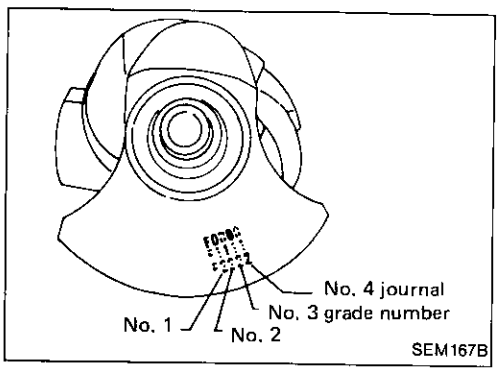
4. Measure outer diameter "Dm" of each crankshaft main journal.
5. Calculate main bearing clearance.
   Main bearing clearance (A – Dm):
   Standard
   0.028 - 0.055 mm (0.0011 - 0.0022 in)
   Limit
   0.090 mm (0.0035 in)
6. If it exceeds the limit, replace bearing.
7. If clearance cannot be adjusted 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 S.D.S. for grinding crankshaft and available service parts.



8. If crankshaft, cylinder block or main bearing is reused again, measure main bearing clearance.
   If crankshaft, cylinder block and main bearings are replaced with new ones, it is necessary to select thickness of main bearings as follows:
a. Grade number of each cylinder block main journal is punched on the respective cylinder block.



b. Grade number of each crankshaft main journal is punched on the No. 1 counter weight of crankshaft.

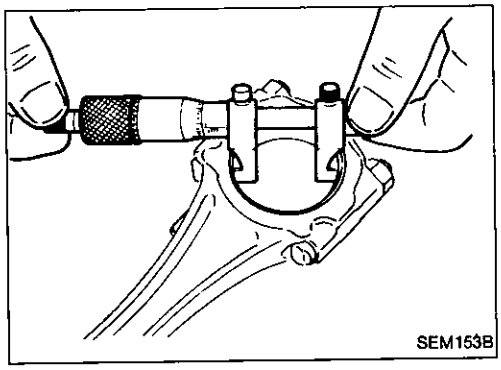
Inspection (Cont'd)

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

Main bearing grade number:

Crankshaft journal grade number \ Main journal grade number	0	1	2
0	0	1	2
1	1	2	3
2	2	3	4

For example:
Main journal grade number: 1
Crankshaft journal grade number: 2
Main bearing grade number = 1 + 2
= 3

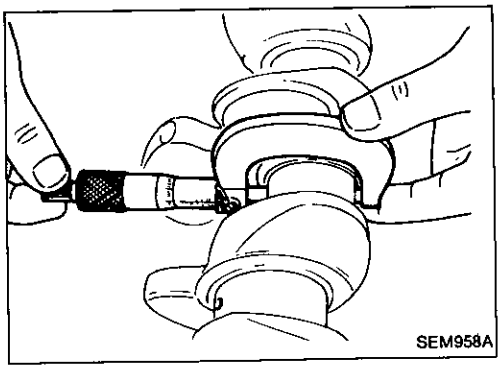

SEM153B

Connecting rod bearing (Big end)

1. Install connecting rod bearing to connecting rod and cap.
2. Install connecting rod cap to connecting rod.

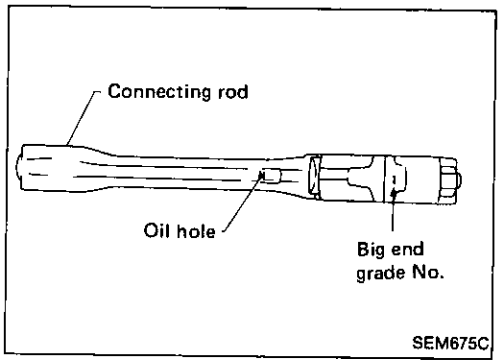
Tighten bolts to the specified torque.

3. Measure inner diameter "C" of each bearing.


SEM958A

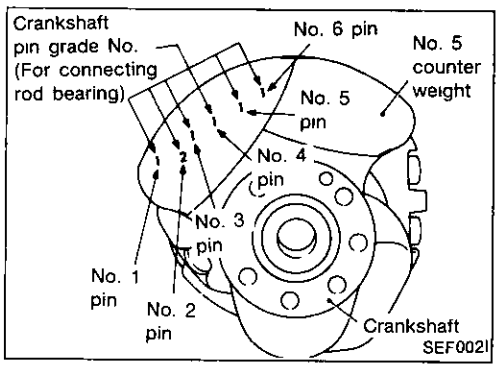
4. Measure outer diameter "Dp" of each crankshaft pin journal.
5. Calculate connecting rod bearing clearance.
   Connecting rod bearing clearance (C – Dp):
   Standard
   0.028 - 0.048 mm (0.0011 - 0.0019 in)
   Limit
   0.090 mm (0.0035 in)
6. If it exceeds the limit, replace bearing.
7. If clearance 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".

Inspection (Cont'd)



8. If crankshaft, connecting rods or bearings are replaced with new ones, it is necessary to select thickness of connecting rod bearings as follows:

a. Grade number of each connecting rod big end is punched on the respective connecting rod.



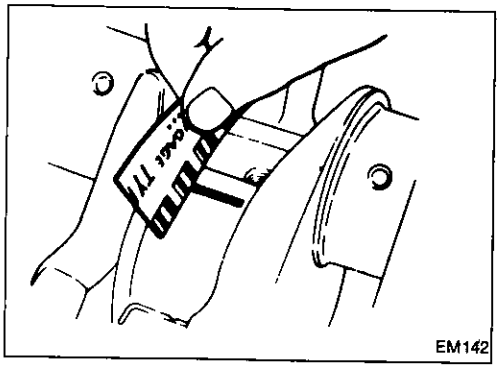
b. Grade number of each crankshaft pin journal is punched on the No. 5 counter weight of crankshaft.

c. Select connecting rod bearing with suitable thickness according to the following table.

Connecting rod bearing grade number:

Connecting rod big end grade number / Crankshaft pin grade number	0	1 (I)
0	0	1
1 (I)	1	2
2 (II)	2	3

For example:
Connecting rod big end grade number: 1
Crankshaft pin grade number: 2
Connecting rod bearing grade number = 1 + 2
= 3



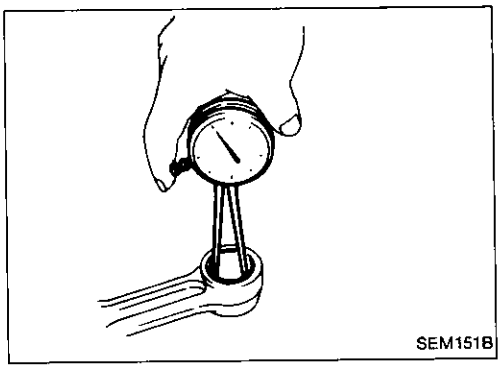
Method B (Using "plastigage")

CAUTION:

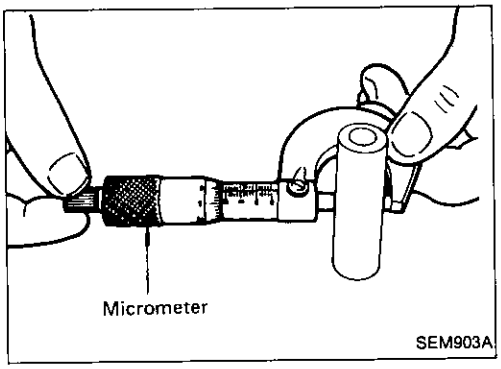
- **Do not turn crankshaft or connecting rod while plastigage is being inserted.**
- **When bearing clearance exceeds the specified limit, ensure that the proper bearing has been installed. Then if excessive bearing clearance exists, use a thicker main bearing or undersized bearing so that the specified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

Inspection (Cont'd)

CONNECTING ROD BUSHING CLEARANCE (Small end)


SEM151B

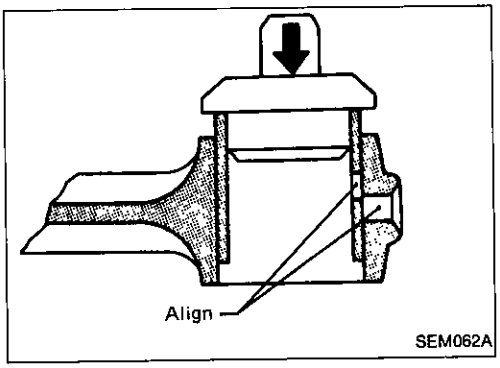
1. Measure inner diameter "C" of bushing.



SEM903A

2. Measure outer diameter "Dp" of piston pin.
3. Calculate connecting rod bushing clearance.
   C – Dp = 0.005 - 0.017 mm (0.0002 - 0.0007 in)
   Limit: 0.023 mm (0.0009 in)
   If it exceeds the specified value, replace connecting rod bushing and/or piston set with pin.

REPLACEMENT OF CONNECTING ROD BUSHING (Small end)



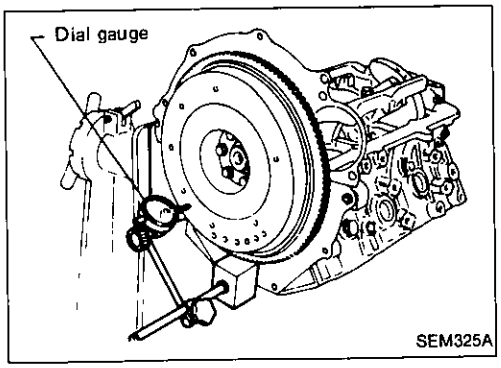
SEM062A

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

Be sure to align the oil holes.

2. After driving in small end bushing, ream the bushing.
   Small end bushing inside diameter:
   Finished size
   22.000 - 22.012 mm (0.8661 - 0.8666 in)

DRIVE PLATE RUNOUT

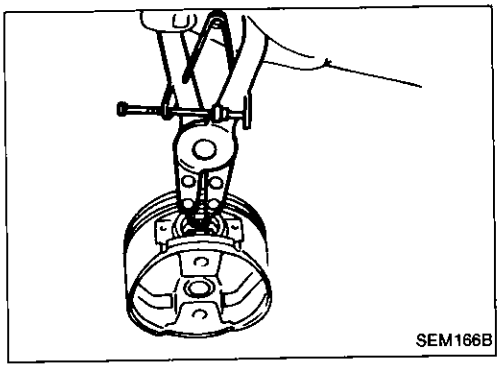


SEM325A

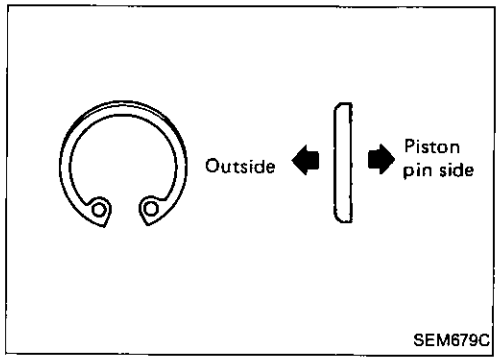
Runout (Total indicator reading):
Less than 0.15 mm (0.0059 in)

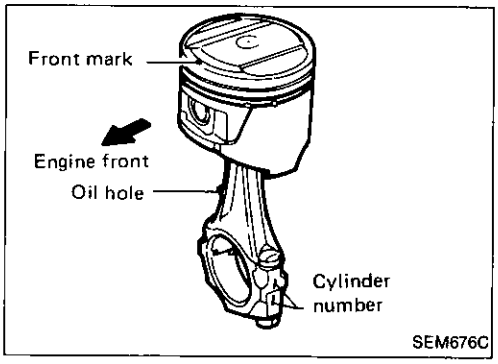
Assembly

PISTON

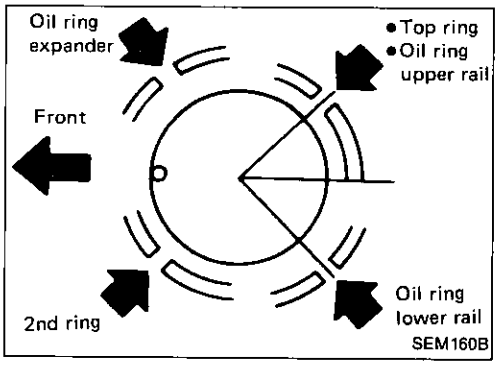

SEM166B

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

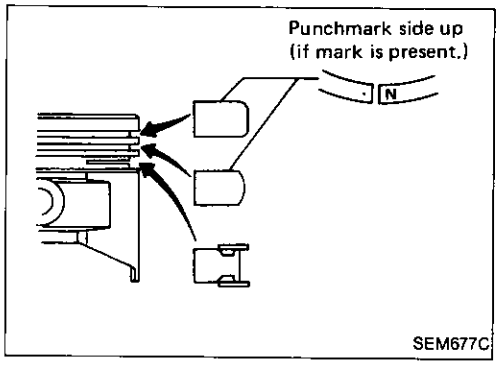


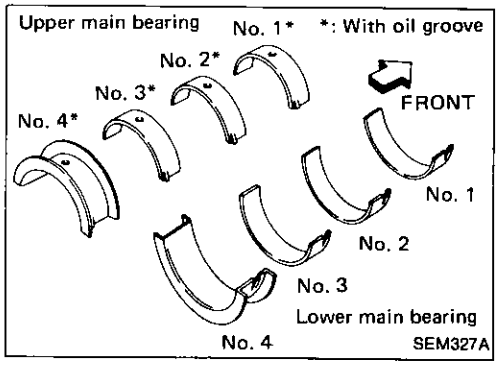


2. Heat piston to 60 to 70°C (140 to 158°F) and assemble piston, piston pin, connecting rod and new snap ring.
- **Align the direction of piston and connecting rod.**
- **Numbers stamped on connecting rod and cap correspond to each cylinder.**
- **After assembly, make sure connecting rod swings smoothly.**



3. Set piston rings as shown.



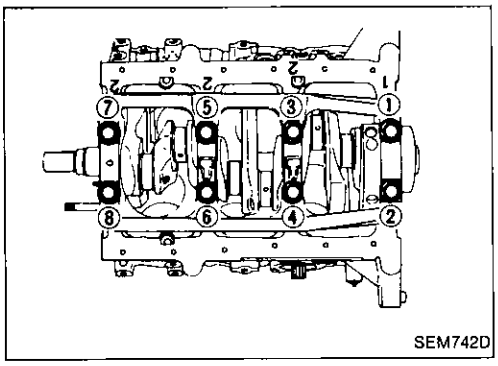


CRANKSHAFT

1. Set main bearings in their proper positions on cylinder block and main bearing cap.
- **Confirm that correct main bearings are used.**

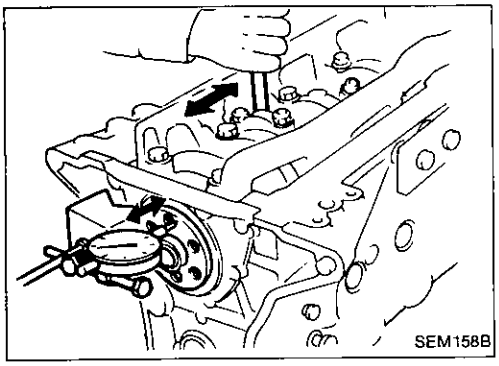
Refer to "Inspection".

Assembly (Cont'd)



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

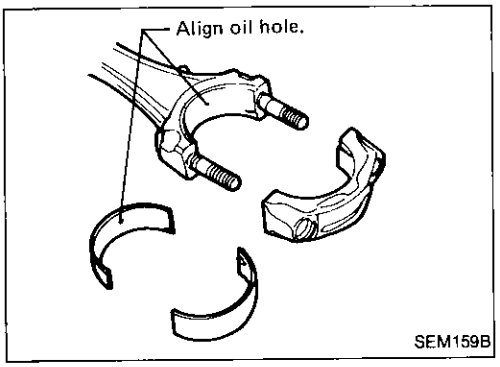
- **Prior to tightening bearing cap bolts, place bearing cap in its proper position by shifting crankshaft in the axial direction.**
- **Tighten bearing cap bolts gradually in two or three stages. Start with center bearing and move outward sequentially.**
- **After securing bearing cap bolts, make sure crankshaft turns smoothly by hand.**



3. Measure crankshaft end play.

Crankshaft end play:
Standard
0.05 - 0.18 mm (0.0020 - 0.0071 in)
Limit
0.30 mm (0.0118 in)

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

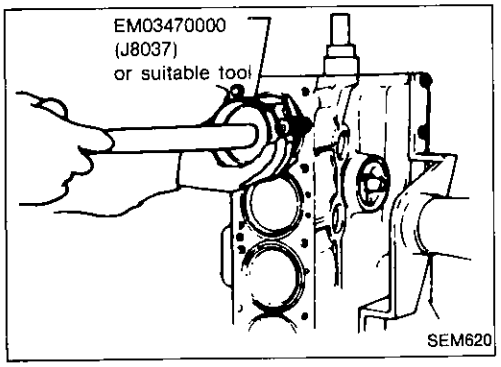


4. Install connecting rod bearings in connecting rods and connecting rod caps.

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

Refer to "Inspection".

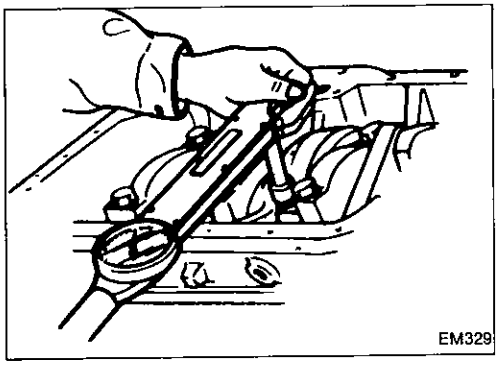
- Install bearings so that oil hole in connecting rod aligns with oil hole of bearing.



5. Install pistons with connecting rods.

a. Install them into corresponding cylinders with Tool.

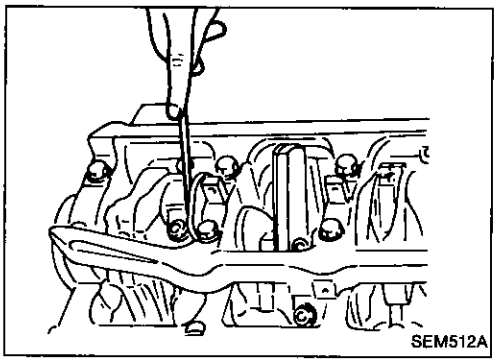
- **Be careful not to scratch cylinder wall by connecting rod.**
- **Arrange so that front mark on piston head faces toward front of engine.**



b. Install connecting rod bearing caps.
Tighten connecting rod bearing cap nuts to the specified torque.

: Connecting rod bearing nut
(1) Tighten to 14 to 16 N·m
(1.4 to 1.6 kg-m, 10 to 12 ft-lb).
(2) Tighten to 59 to 65 N·m
(6.0 to 6.6 kg-m, 43 to 48 ft-lb)
or if you have an angle wrench, tighten bolts 60 to 65 degrees clockwise.

Assembly (Cont'd)


SEM512A

6. Measure connecting rod side clearance.

Connecting rod side clearance:

Standard

0.20 - 0.35 mm (0.0079 - 0.0138 in)

Limit

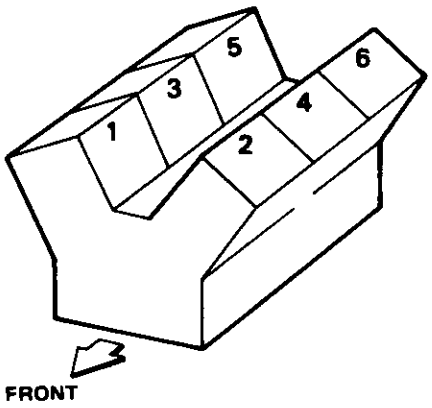
0.40 mm (0.0157 in)

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

General Specifications

Cylinder arrangement		V-6
Displacement	cm^3 (cu in)	2,960 (180.62)
Bore and stroke	mm (in)	87 × 83 (3.43 × 3.27)
Valve arrangement		D.O.H.C.
Firing order		1-2-3-4-5-6
Number of piston rings		
Compression		2
Oil		1
Number of main bearings		4
Compression ratio		10.5

Cylinder number



SEM713A

COMPRESSION PRESSURE

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

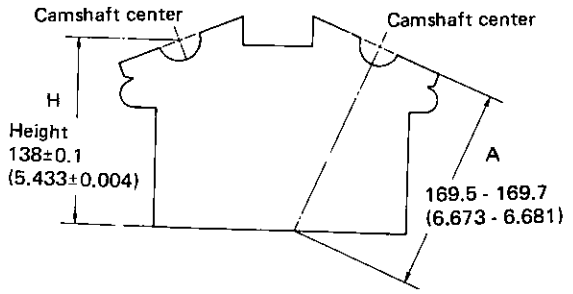
Compression pressure	
Standard	1,285 (13.1, 186)
Minimum	981 (10.0, 142)
Differential limit between cylinders	98 (1.0, 14)

Inspection and Adjustment

CYLINDER HEAD

Unit: mm (in)

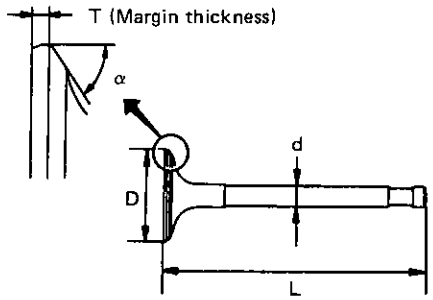
	Standard	Limit
Head surface distortion	Less than 0.05 (0.0020)	0.1 (0.004)



SEM889D

VALVE

Unit: mm (in)



SEM188

Valve head diameter "D"	
Intake	34.0 - 34.2 (1.339 - 1.346)
Exhaust	29.5 - 29.7 (1.161 - 1.169)
Valve length "L"	
Intake	103.1 - 103.3 (4.059 - 4.067)
Exhaust	103.6 - 103.8 (4.079 - 4.087)
Valve stem diameter "d"	
Intake	5.965 - 5.980 (0.2348 - 0.2354)
Exhaust	5.945 - 5.960 (0.2341 - 0.2346)
Valve seat angle "α"	
Intake	45°15' - 45°45'
Exhaust	
Valve margin "T"	
Intake	1.15 - 1.45 (0.0453 - 0.0571)
Exhaust	1.35 - 1.65 (0.0531 - 0.0650)
Valve margin "T" limit	More than 0.5 (0.020)
Valve stem end surface grinding limit	Less than 0.2 (0.008)
Valve clearance	
Intake	0 (0)
Exhaust	0 (0)

Valve spring

Free height	mm (in)		43.1 (1.697)
Pressure N (kg, lb) at height mm (in)		Standard	536.4 (54.7, 120.6) at 26.5 (1.043)
		Limit	452.79 (46.17, 101.80) at 26.5 (1.043)
Out-of-square	mm (in)		Less than 1.8 (0.071)

Hydraulic valve lifter

Unit: mm (in)

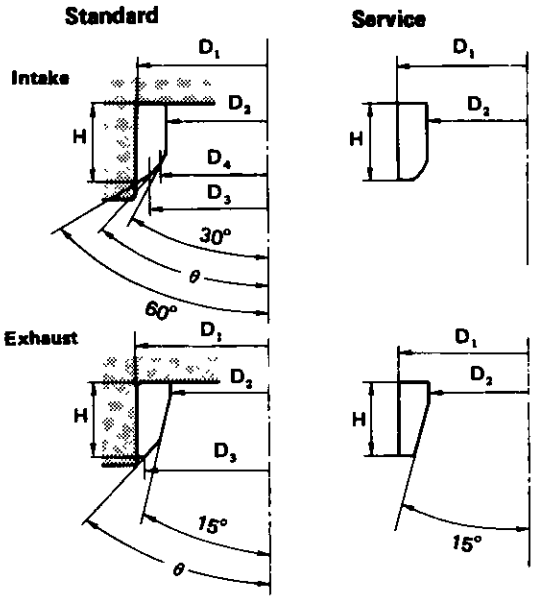
Lifter outer diameter	30.955 - 30.965 (1.2187 - 1.2191)
Lifter guide inner diameter	31.000 - 31.020 (1.2205 - 1.2213)
Clearance between lifter and lifter guide	0.035 - 0.065 (0.0014 - 0.0026)

Valve guide

Unit: mm (in)

		Standard	Service
Valve guide Outer diameter		10.023 - 10.034 (0.3946 - 0.3950)	10.223 - 10.234 (0.4025 - 0.4029)
Valve guide Inner diameter (Finished size)		6.000 - 6.018 (0.2362 - 0.2369)	
Cylinder head valve guide hole diameter		9.975 - 9.996 (0.3927 - 0.3935)	10.175 - 10.196 (0.4006 - 0.4014)
Interference fit of valve guide		0.027 - 0.059 (0.0011 - 0.0023)	
		Standard	Max. tolerance
Stem to guide clearance	Intake	0.020 - 0.053 (0.0008 - 0.0021)	0.10 (0.0039)
	Exhaust	0.040 - 0.073 (0.0016 - 0.0029)	
Valve deflection limit		—	0.20 (0.0079)

VALVE SEAT
Inspection and Adjustment (Cont'd)



SEM529C

Unit: mm (in)

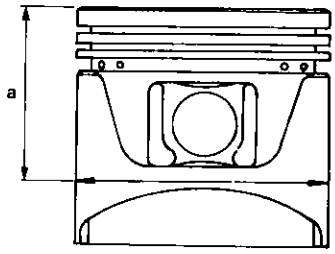
		Standard	Service*
Cylinder head seat recess diameter (D_1)	In.	36.000 - 36.016 (1.4173 - 1.4179)	36.500 - 36.516 (1.4370 - 1.4376)
	Ex.	31.500 - 31.516 (1.2402 - 1.2408)	32.000 - 32.016 (1.2598 - 1.2605)
Valve seat interference fit	In.	0.081 - 0.113 (0.0032 - 0.0044)	
	Ex.	0.064 - 0.096 (0.0025 - 0.0038)	
Valve seat outer diameter (D_1)	In.	36.097 - 36.113 (1.4211 - 1.4218)	36.597 - 36.613 (1.4408 - 1.4415)
	Ex.	31.580 - 31.596 (1.2433 - 1.2439)	32.080 - 32.096 (1.2630 - 1.2636)
Valve seat inner diameter (D_2)	In.	29.85 - 30.15 (1.1752 - 1.1870)	
	Ex.	24.35 - 24.65 (0.9587 - 0.9705)	
Height (H)	In.	5.9 - 6.0 (0.232 - 0.236)	5.35 - 5.45 (0.2106 - 0.2146)
	Ex.	5.9 - 6.0 (0.232 - 0.236)	5.9 - 6.0 (0.232 - 0.236)
Face angle (θ)	In.	45°	
	Ex.	45°	
Face inner diameter (D_4)	In.	31.5 (1.240)	*: Valve seat surface must be corrected to specified alue.
Face diameter (D_3)	In.	33.6 - 33.8 (1.323 - 1.331)	
	Ex.	28.9 - 29.1 (1.138 - 1.146)	

Inspection and Adjustment (Cont'd)

PISTON, PISTON RING AND PISTON PIN

Available piston

Unit: mm (in)



SEM740D

Piston skirt diameter "A"	
Standard	
Grade No. 1	86.975 - 86.985 (3.4242 - 3.4246)
Grade No. 2	86.985 - 86.995 (3.4246 - 3.4250)
Grade No. 3	86.995 - 87.005 (3.4250 - 3.4254)
0.25 (0.0098) oversize (Service)	87.225 - 87.275 (3.4340 - 3.4360)
0.50 (0.0197) oversize (Service)	87.475 - 87.525 (3.4439 - 3.4459)
"a" dimension	48.0 (1.890)
Piston pin hole diameter	21.987 - 21.999 (0.8656 - 0.8661)
Piston clearance to cylinder block	
Non-turbo	0.015 - 0.035 (0.0006 - 0.0014)
Turbo	0.025 - 0.045 (0.0010 - 0.0018)

Piston ring

Unit: mm (in)

	Standard	Limit
Side clearance		
Top	0.040 - 0.073 (0.0016 - 0.0029)	0.1 (0.004)
2nd	0.030 - 0.063 (0.0012 - 0.0025)	
Oil	0.015 - 0.185 (0.0006 - 0.0073)	0.2 (0.008)
End gap		
Top	0.21 - 0.40 (0.0083 - 0.0157)	1.0 (0.039)
2nd	0.50 - 0.76 (0.0197 - 0.0299)	
Oil (rail ring)	0.20 - 0.76 (0.0079 - 0.0299)	

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)
Piston pin to connecting rod bushing clearance	0.005 - 0.017 (0.0002 - 0.0007)

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

CONNECTING ROD

Unit: mm (in)

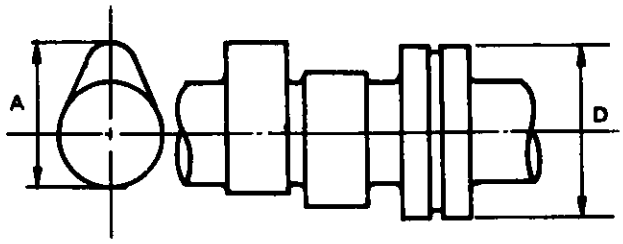
Center distance	154.1 - 154.2 (6.067 - 6.071)
Bend [per 100 (3.94)]	
Limit	0.15 (0.0059)
Torsion [per 100 (3.94)]	
Limit	0.3 (0.012)
Piston pin bushing inner diameter*	22.000 - 22.012 (0.8661 - 0.8666)
Connecting rod big end inner diameter	53.000 - 53.013 (2.0866 - 2.0871)
Side clearance	
Standard	0.20 - 0.35 (0.0079 - 0.0138)
Limit	0.40 (0.0157)

*: After installing in connecting rod

Inspection and Adjustment (Cont'd)

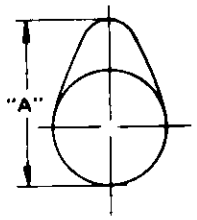
CAMSHAFT AND CAMSHAFT BEARING

Unit: mm (in)



SEM568A

	Standard	Max. tolerance
Camshaft journal to bearing clearance	0.045 - 0.086 (0.0018 - 0.0034)	0.15 (0.0059)
Inner diameter of camshaft bearing	28.000 - 28.021 (1.1024 - 1.1032)	—
Outer diameter of camshaft journal	27.935 - 27.955 (1.0998 - 1.1006)	—
Camshaft runout [T.I.R.*]	Less than 0.04 (0.0016)	0.1 (0.004)
Camshaft end play	0.03 - 0.08 (0.0012 - 0.0031)	—

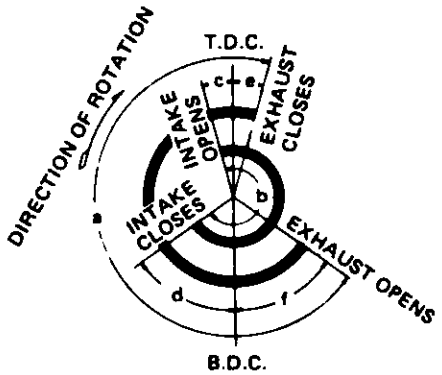


EM671

Cam height "A"	
Intake	40.405 - 40.595 (1.5907 - 1.5982)
Exhaust	
Wear limit of cam height	0.15 (0.0059)

*Total indicator reading

Valve timing



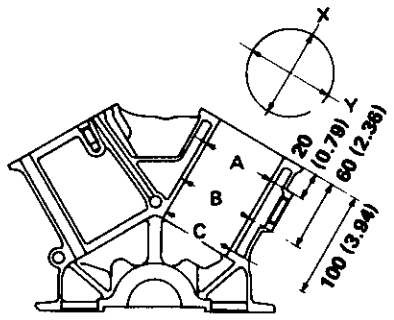
Unit : degree

EM120

a	b	c	d	e	f
248	248	–1	69	9	59

CYLINDER BLOCK

Unit: mm (in)



SEM321A

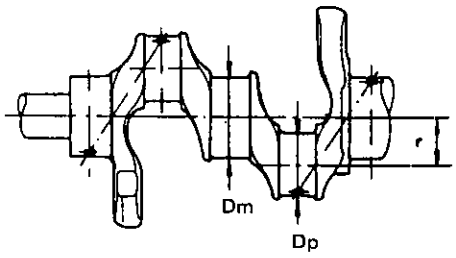
Surface flatness	
Standard	Less than 0.03 (0.0012)
Limit	0.10 (0.0039)
Cylinder bore	
Inner diameter	
Standard	
Grade No. 1	87.000 - 87.010 (3.4252 - 3.4256)
Grade No. 2	87.010 - 87.020 (3.4256 - 3.4260)
Grade No. 3	87.020 - 87.030 (3.4260 - 3.4264)
Wear limit	0.20 (0.0079)
Out-of-round (X – Y)	Less than 0.015 (0.0006)
Taper (A – B – C)	Less than 0.015 (0.0006)
Main journal inner diameter	
Grade No. 0	66.645 - 66.654 (2.6238 - 2.6242)
Grade No. 1	66.654 - 66.663 (2.6242 - 2.6245)
Grade No. 2	66.663 - 66.672 (2.6245 - 2.6249)
Difference in inner diameter between cylinders	
Standard	Less than 0.05 (0.0020)

Inspection and Adjustment (Cont'd)

CRANKSHAFT

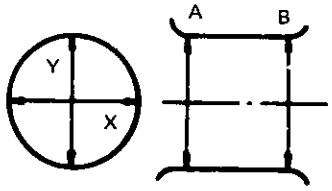
Unit: mm (in)

Main journal dia. "Dm"	
Grade No. 0	62.967 - 62.975 (2.4790 - 2.4793)
Grade No. 1	62.959 - 62.967 (2.4787 - 2.4790)
Grade No. 2	62.951 - 62.959 (2.4784 - 2.4787)
Pin journal dia. "Dp"	
Grade No. 0	49.968 - 49.974 (1.9672 - 1.9675)
Grade No. 1	49.962 - 49.968 (1.9670 - 1.9672)
Grade No. 2	49.955 - 49.962 (1.9667 - 1.9670)
Center distance "r"	41.47 - 41.53 (1.6327 - 1.6350)
Out-of-round (X – Y)	
Standard	Less than 0.005 (0.0002)
Limit	0.02 (0.0008)
Taper (A – B)	
Standard	Less than 0.005 (0.0002)
Limit	0.02 (0.0008)
Runout [T.I.R.]	
Standard	Less than 0.10 (0.0039)
Free end play	
Standard	0.05 - 0.18 (0.0020 - 0.0071)
Limit	0.30 (0.0118)



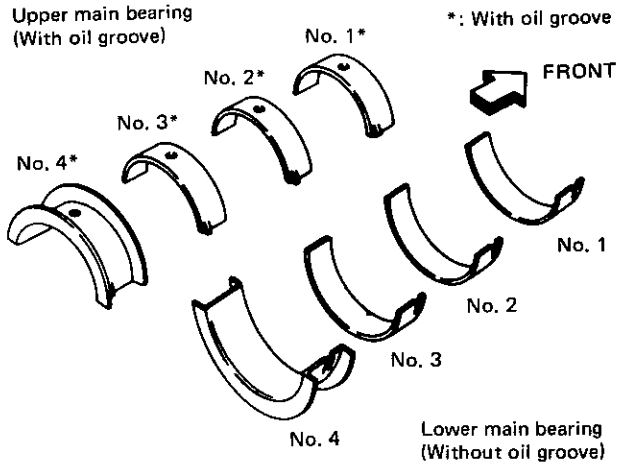
SEM645

Out-of-round X – Y
Taper A – B



EM715

AVAILABLE MAIN BEARING



SEM327A

No. 1 main bearing

Grade number	Thickness "T" mm (in)	Width "W" mm (in)	Identification color
0	1.817 - 1.821 (0.0715 - 0.0717)		Black
1	1.821 - 1.825 (0.0717 - 0.0719)		Brown
2	1.825 - 1.829 (0.0719 - 0.0720)	22.4 - 22.6 (0.882 - 0.890)	Green
3	1.829 - 1.833 (0.0720 - 0.0722)		Yellow
4	1.833 - 1.837 (0.0722 - 0.0723)		Blue

No. 2 and 3 main bearing

Grade number	Thickness "T" mm (in)	Width "W" mm (in)	Identification color
0	1.817 - 1.821 (0.0715 - 0.0717)		Black
1	1.821 - 1.825 (0.0717 - 0.0719)		Brown
2	1.825 - 1.829 (0.0719 - 0.0720)	18.9 - 19.1 (0.744 - 0.752)	Green
3	1.829 - 1.833 (0.0720 - 0.0722)		Yellow
4	1.833 - 1.837 (0.0722 - 0.0723)		Blue

Inspection and Adjustment (Cont'd)

No. 4 main bearing

Grade number	Thickness "T" mm (in)	Identification color
0	1.817 - 1.821 (0.0715 - 0.0717)	Black
1	1.821 - 1.825 (0.0717 - 0.0719)	Brown
2	1.825 - 1.829 (0.0719 - 0.0720)	Green
3	1.829 - 1.833 (0.0720 - 0.0722)	Yellow
4	1.833 - 1.837 (0.0722 - 0.0723)	Blue

Undersize

Unit: mm (in)

	Thickness	Main journal diameter "Dm"
0.25 (0.0098)	1.948 - 1.956 (0.0767 - 0.0770)	Grind so that bearing clearance is the specified value.

AVAILABLE CONNECTING ROD BEARING

Connecting rod bearing

Grade number	Thickness "T" mm (in)	Identification color
0	1.496 - 1.499 (0.0589 - 0.0590)	No paint
1	1.499 - 1.502 (0.0590 - 0.0591)	Brown
2	1.502 - 1.505 (0.0591 - 0.0593)	Green
3	1.505 - 1.508 (0.0593 - 0.0594)	Yellow

Undersize

Unit: mm (in)

	Thickness	Crank pin journal diameter "Dp"
0.08 (0.0031)	1.540 - 1.548 (0.0606 - 0.0609)	Grind so that bearing clearance is the specified value.
0.12 (0.0047)	1.560 - 1.568 (0.0614 - 0.0617)	
0.25 (0.0098)	1.625 - 1.633 (0.0640 - 0.0643)	

MISCELLANEOUS COMPONENTS

Unit: mm (in)

Flywheel	
Runout [T.I.R.]*	Less than 0.15 (0.0059)

*Total indicator reading

Bearing clearance

Unit: mm (in)

Main bearing clearance	
Standard	0.028 - 0.055 (0.0011 - 0.0022)
Limit	0.090 (0.0035)
Connecting rod bearing clearance	
Standard	0.028 - 0.048 (0.0011 - 0.0019)
Limit	0.090 (0.0035)

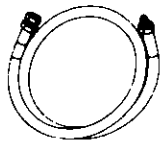
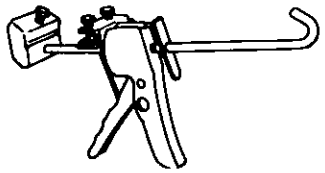
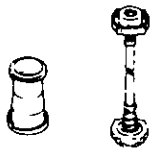
ENGINE LUBRICATION & COOLING SYSTEMS

SECTION LC

CONTENTS

PREPARATION ..... LC- 2
PRECAUTIONS ..... LC- 3
ENGINE LUBRICATION SYSTEM ..... LC- 4
ENGINE COOLING SYSTEM ..... LC- 8
SERVICE DATA AND SPECIFICATIONS (S.D.S.) LC-14

SPECIAL SERVICE TOOLS

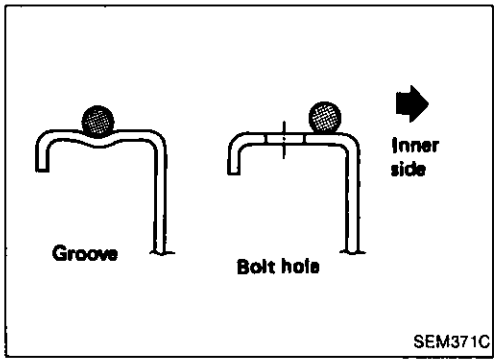
Tool number (Kent-Moore No.) Tool name	Description
ST25051001 (J25695-1) Oil pressure gauge	
ST25052000 (J25695-2) Hose	Adapting oil pressure gauge to cylinder block 
WS39930000 (—) Tube presser	Pressing the tube of liquid gasket 
EG17650301 (J33984-A) Radiator cap tester adapter	Adapting radiator cap tester to radiator filler neck 

The Supplemental Restraint System "AIR BAG"

The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury in a frontal collision. The Supplemental Restraint System consists of air bags, sensors, a control unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in **section BF** of this Service Manual.

WARNING:

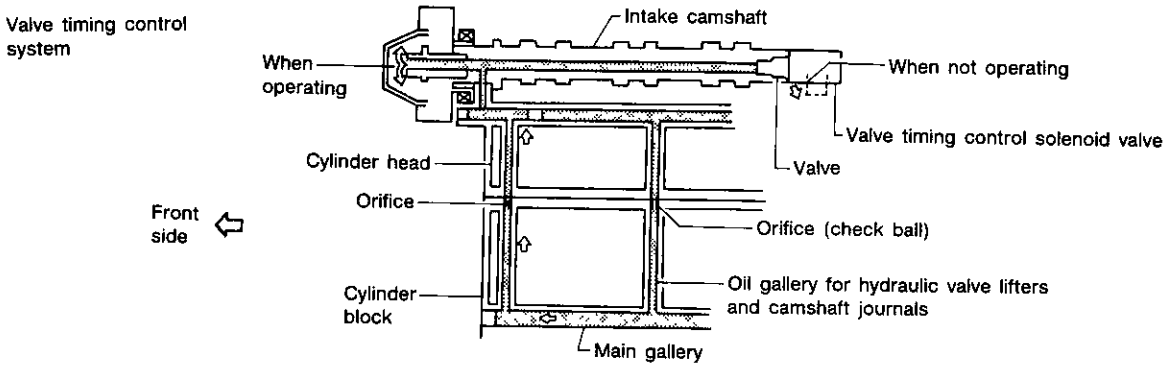
a. **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized INFINITI dealer.**
b. **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
c. **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 "Air Bag".**

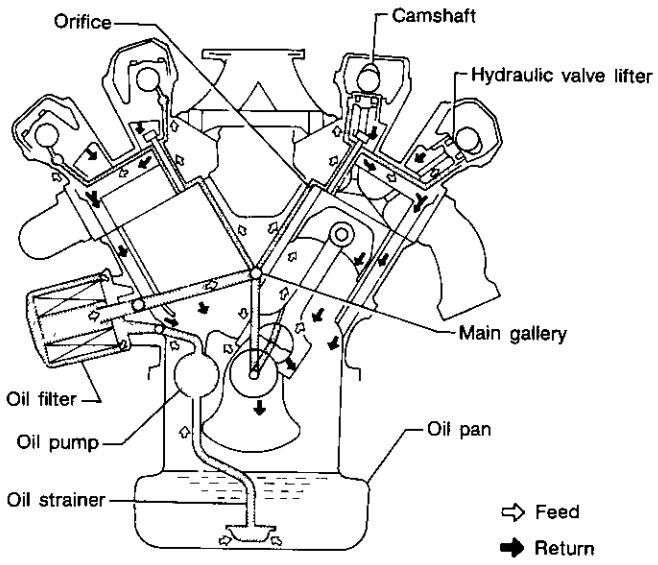


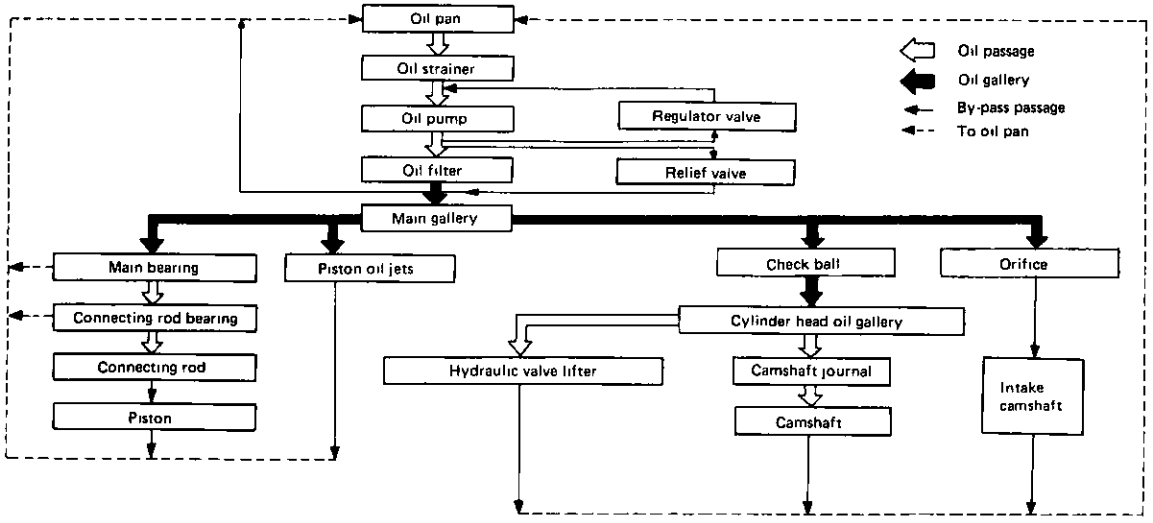
Liquid Gasket Application Procedure

a. Before applying liquid gasket, use a scraper to remove all traces of old liquid gasket from mating surfaces and grooves, and then completely clean any oil stains from these portions.
b. Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine Liquid Gasket or equivalent.)
   - Be sure liquid gasket is 3.5 to 4.5 mm (0.138 to 0.177 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.

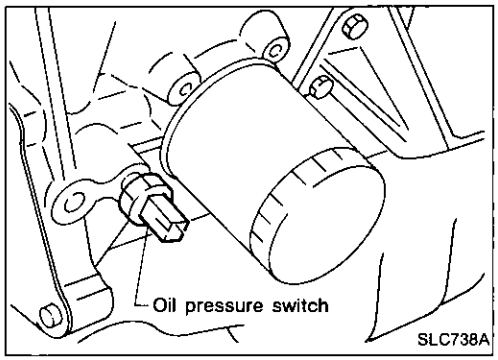
Lubrication Circuit







SLC737A

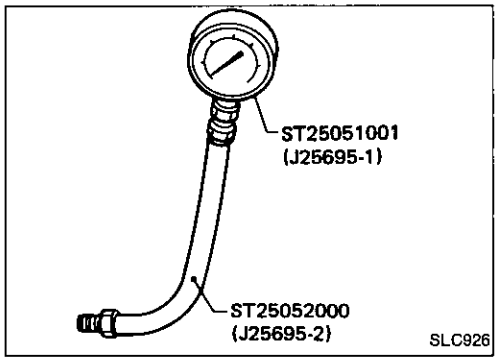


Oil Pressure Check

WARNING:

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

1. Check oil level.
2. Remove oil pressure switch.

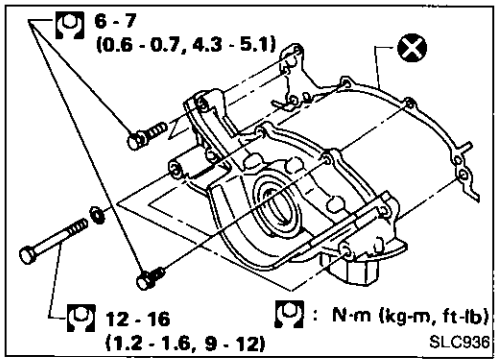


3. Install pressure gauge.
4. Start engine and warm it up to normal operating temperature.
5. Check oil pressure with engine running under no-load.

Engine speed	Approximate discharge pressure kPa (kg/cm^2, psi)
Idle speed	More than 78 (0.8, 11)
3,000	353 - 451 (3.6 - 4.6, 51 - 65)

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

6. Install oil pressure switch with sealant.



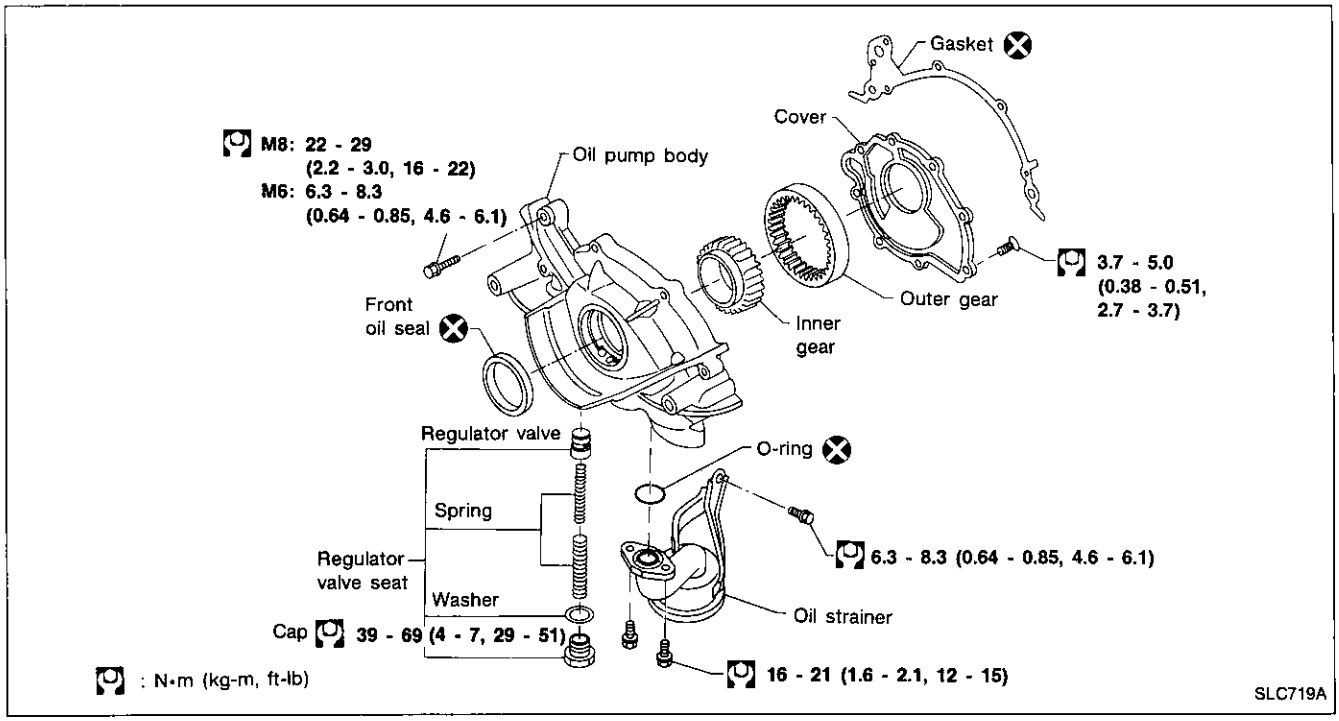
Oil Pump

REMOVAL

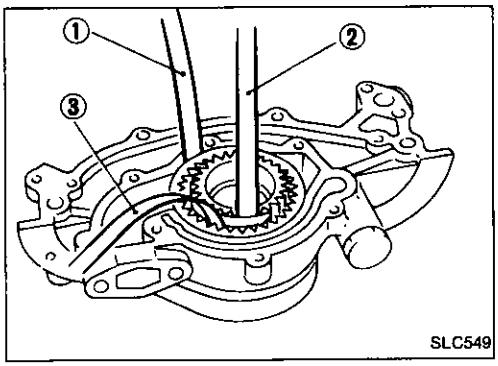
1. Drain oil.
2. Remove oil pan. (Refer to "OIL PAN — Removal" in EM section.)
3. Remove oil pump assembly.

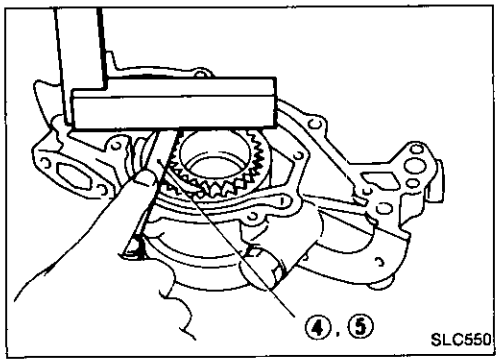
Oil Pump (Cont'd)

DISASSEMBLY AND ASSEMBLY



- **Always replace with new oil seal and gasket.**
- **When installing oil pump, apply engine oil to inner and outer gears.**
- **Be sure that O-ring is properly installed.**





INSPECTION

Using a feeler gauge, check the following clearances:

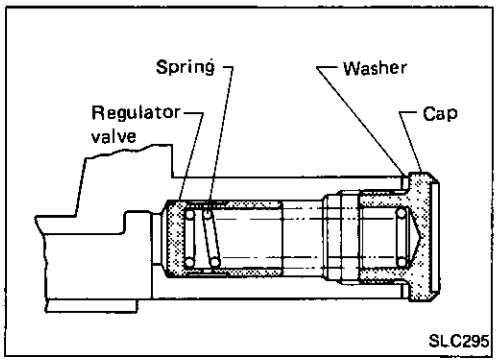
Standard clearance:

Unit: mm (in)

Body to outer gear clearance ①	0.110 - 0.200 (0.0043 - 0.0079)
Inner gear to crescent clearance ②	0.223 - 0.333 (0.0088 - 0.0131)
Outer gear to crescent clearance ③	0.210 - 0.320 (0.0083 - 0.0126)
Housing to inner gear clearance ④	0.050 - 0.090 (0.0020 - 0.0035)
Housing to outer gear clearance ⑤	0.050 - 0.110 (0.0020 - 0.0043)

If any clearance exceeds the limit, replace gear set or entire oil pump assembly.

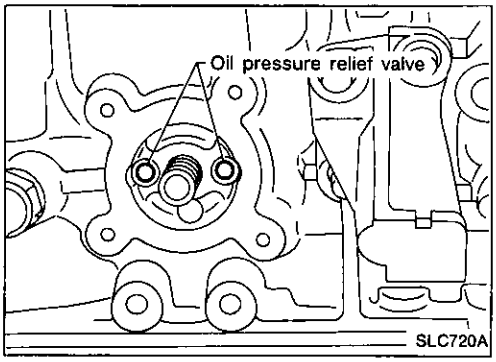
Oil Pump (Cont'd)



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 and check to make sure that it falls smoothly into the valve hole by its own weight.

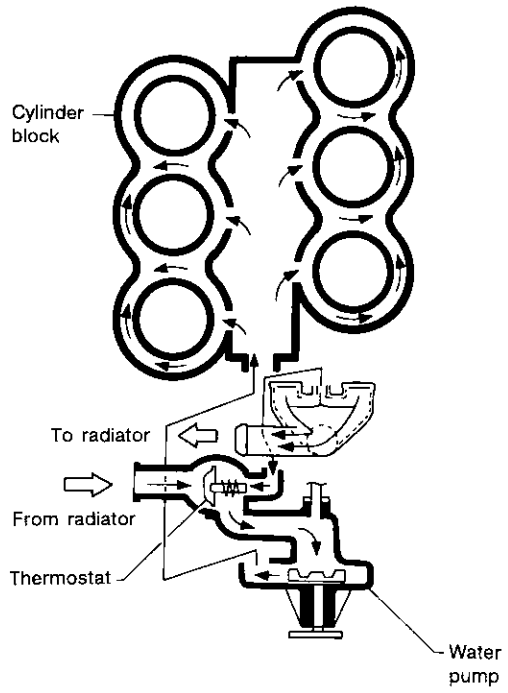
If damaged, replace regulator valve set or oil pump assembly.

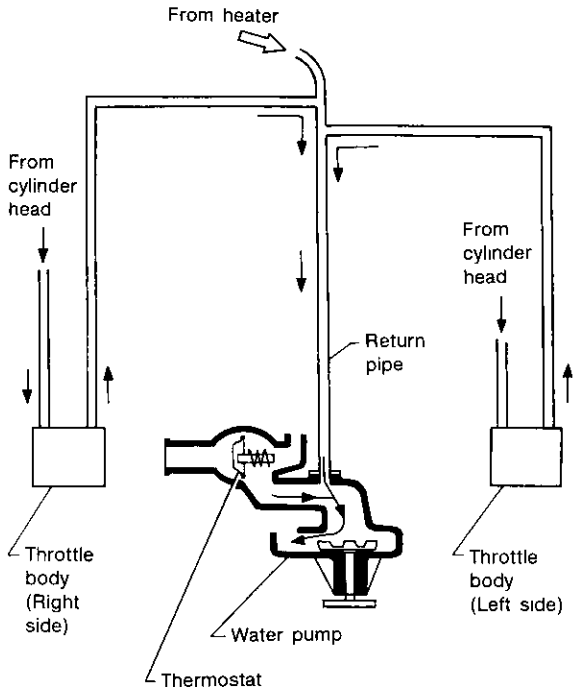


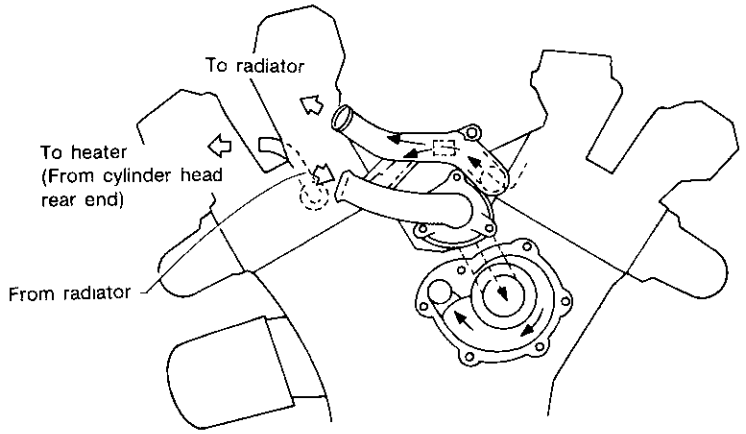
OIL PRESSURE RELIEF VALVE INSPECTION

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 by tapping it in place.

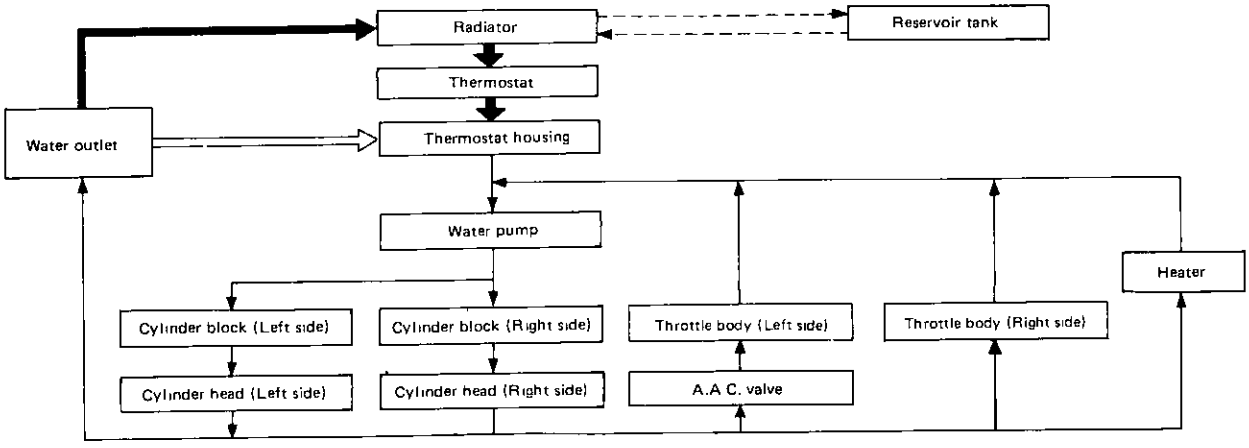
Cooling Circuit







: Thermostat open
: Thermostat closed



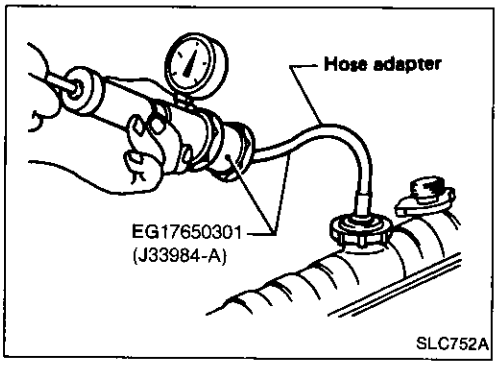
SLC723A

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 the cap and carefully remove by turning it a quarter turn to allow built-up pressure to escape. Then continue to turn the cap until it can be removed safely.

CHECKING COOLING SYSTEM HOSES

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

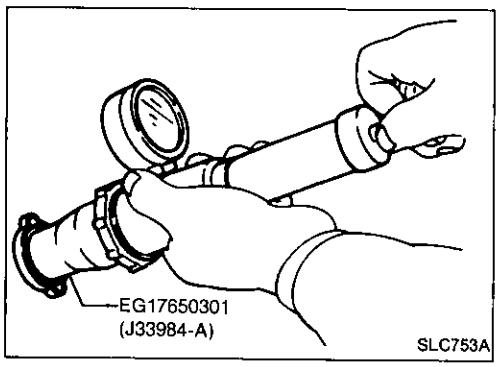


CHECKING COOLING SYSTEM FOR LEAKS

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

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

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



CHECKING RADIATOR CAP

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

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

Water Pump

REMOVAL AND INSTALLATION

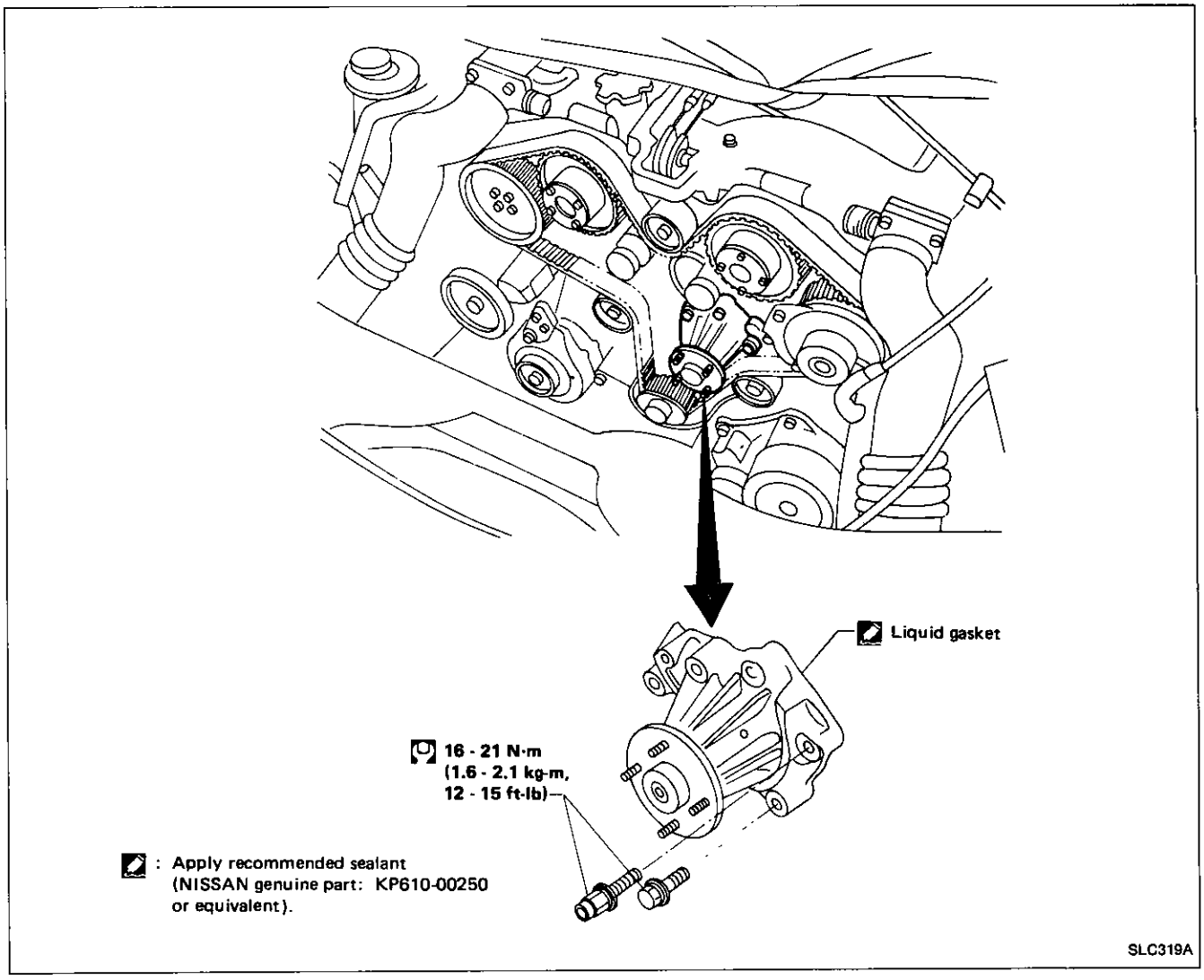
1. Drain coolant from drain cocks on both sides of cylinder block and radiator.
2. Remove the following parts:

- Under cover
- Radiator
- Drive belts
- Cooling fan and coupling
- Water inlet and outlet

Water Pump (Cont'd)

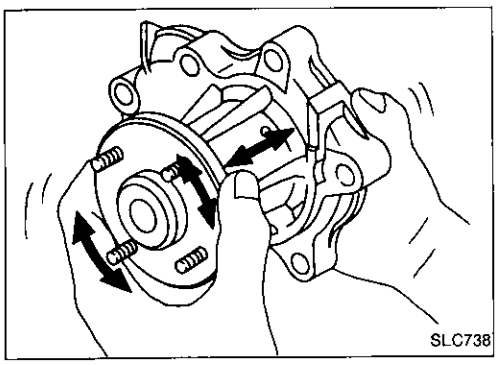
- Crank shift pulley
- Timing belt cover

3. Remove water pump
4. After repairing or replacing water pump, install any parts removed in reverse order of removal.



CAUTION:

- **When removing water pump assembly, be careful not to get coolant on timing 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.**



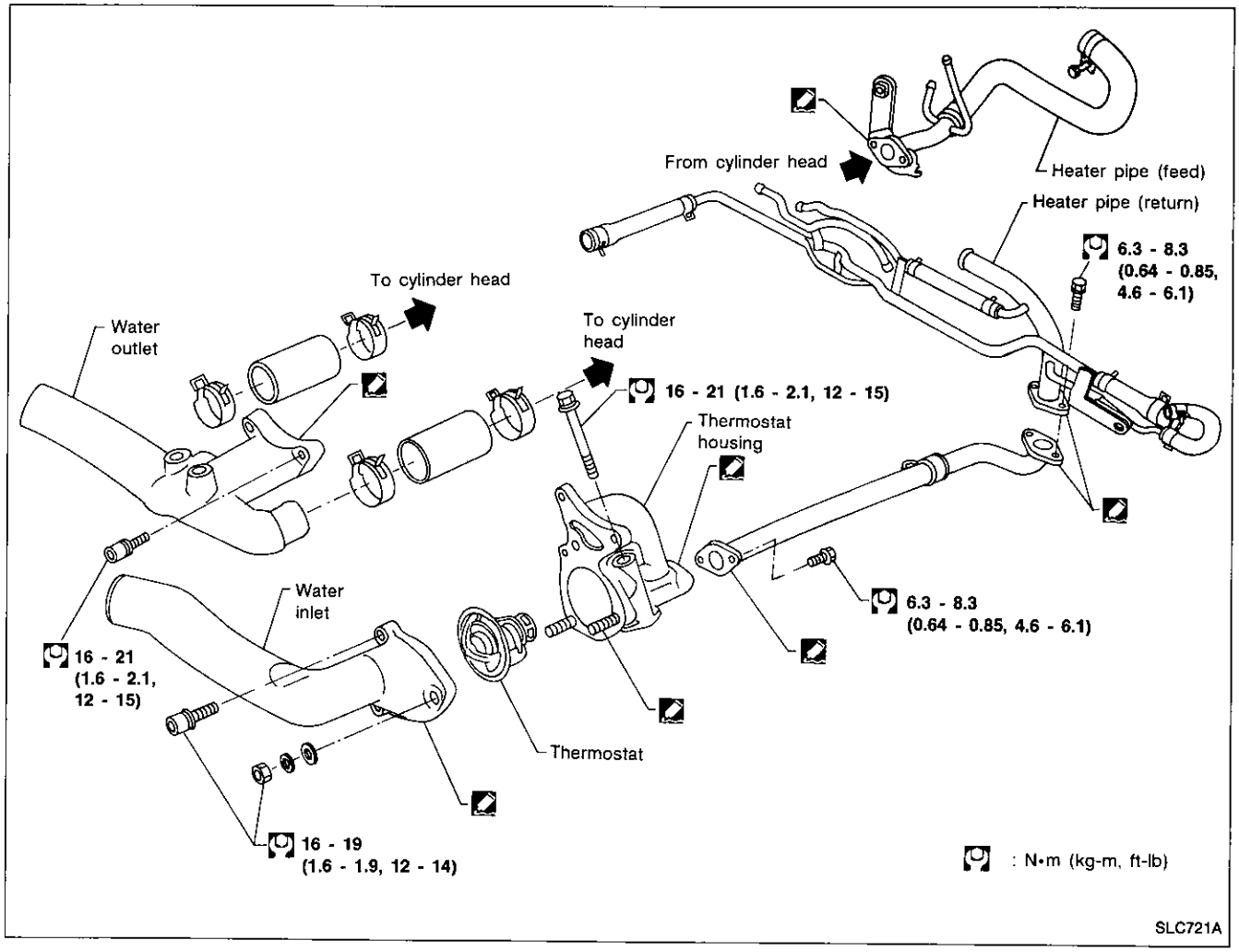
INSPECTION

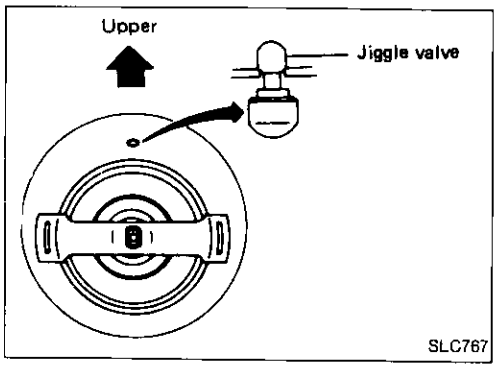
1. Check for badly rusted or corroded vanes and body assembly.
2. Check for rough operation due to excessive end play.

Thermostat

REMOVAL AND INSTALLATION

1. Drain coolant from drain cocks on both sides of cylinder block and radiator.
2. Remove the following parts:
- Under cover
- Radiator upper hose
- Radiator shroud
- Fan belt
- Cooling fan and coupling
- Water inlet
3. Remove thermostat.



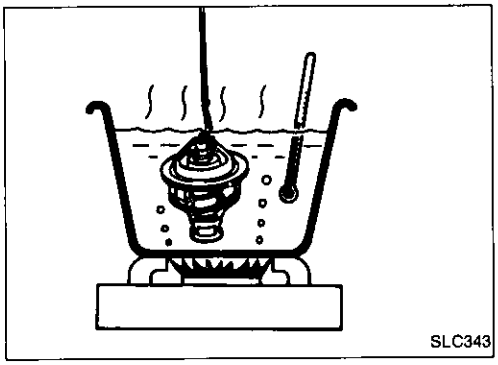


4. After repairing or replacing thermostat, install thermostat with jiggle valve facing upward.

Thermostat (Cont'd)

INSPECTION

1. Check valve seating condition at ordinary room temperatures. It should seat tightly.

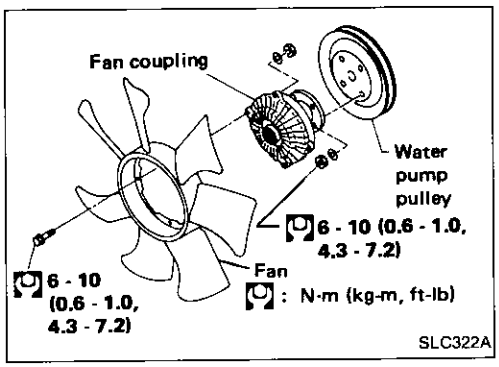

SLC343

2. Check valve opening temperature and maximum valve lift.

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

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

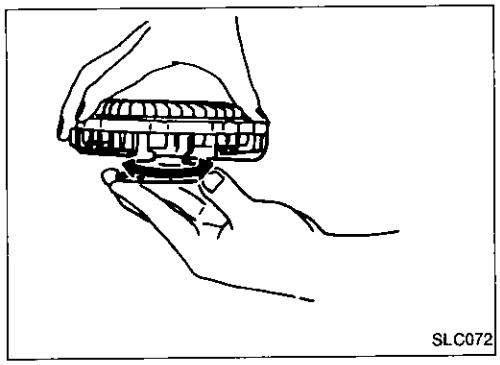
- **After installation, run engine for a few minutes, and check for leaks.**
- **Be careful not to spill coolant over engine compartment. Use a rag to absorb coolant.**



SLC322A

Cooling Fan

DISASSEMBLY AND ASSEMBLY


SLC072

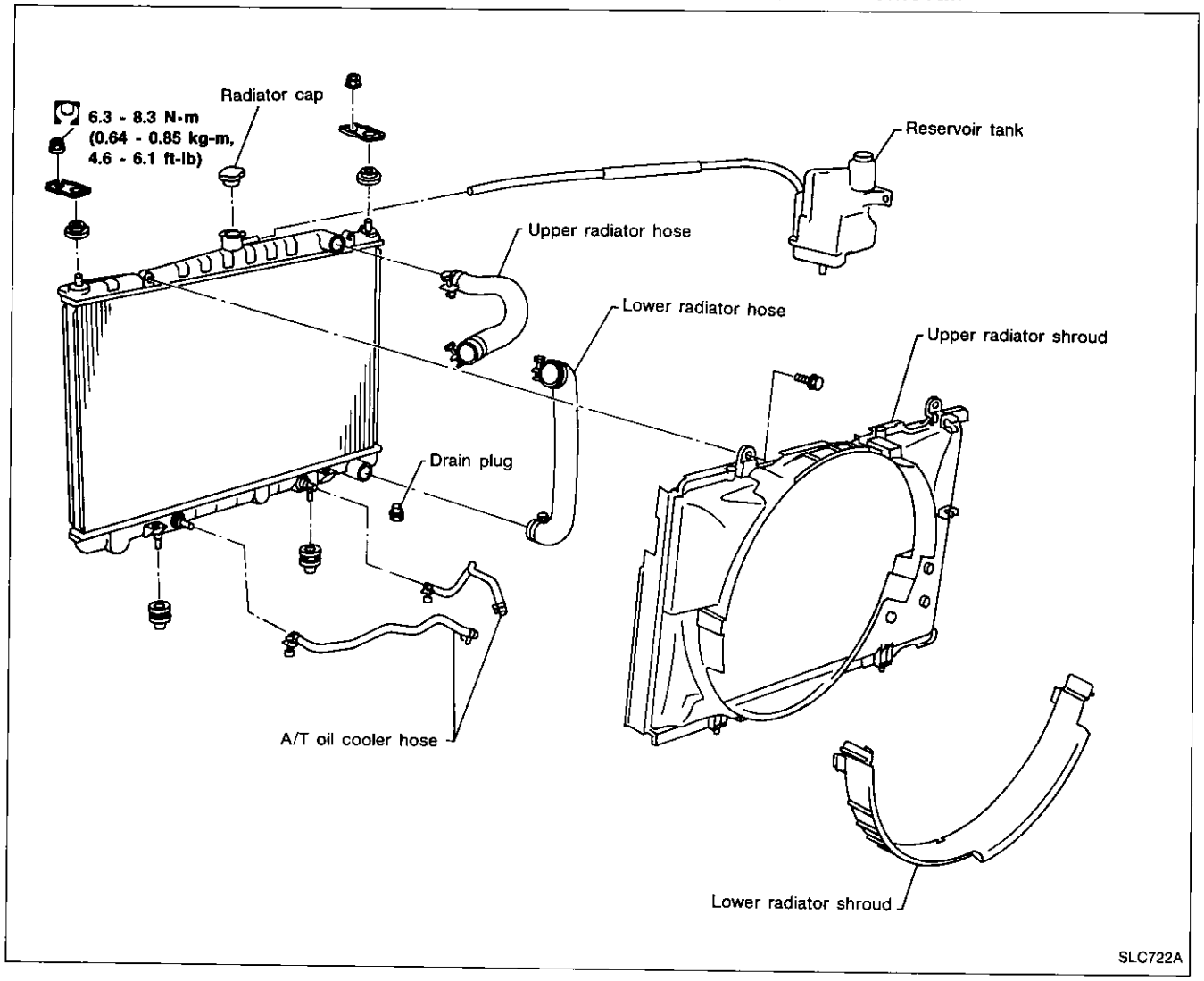
INSPECTION

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

Radiator

REMOVAL AND INSTALLATION

1. Drain coolant from radiator drain cock.
2. Remove under cover.
3. Disconnect radiator upper and lower hoses.
4. Remove A/T oil cooler hoses. (A/T model only)
5. Remove radiator lower shroud.
6. Remove radiator.
7. After repairing or replacing radiator, install any part removed in reverse order of removal.



Electric Cooling Fan Control System

Radiator (Condenser) fan is controlled by ECM (ECCS control module). For details, refer to EF & EC section.

Engine Lubrication System

Oil pressure check

Engine speed	Approximate discharge pressure kPa (kg/cm^2, psi)
Idle speed	More than 78 (0.8, 11)
3,000	353 - 451 (3.6 - 4.6, 51 - 65)

Oil pump

Unit: mm (in)

Body to outer gear clearance ①	0.110 - 0.200 (0.0043 - 0.0079)
Inner gear to crescent clearance ②	0.223 - 0.333 (0.0088 - 0.0131)
Outer gear to crescent clearance ③	0.210 - 0.320 (0.0083 - 0.0126)
Housing to inner gear clearance ④	0.050 - 0.090 (0.0020 - 0.0035)
Housing to outer gear clearance ⑤	0.050 - 0.110 (0.0020 - 0.0043)

Engine Cooling System

Thermostat

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

ENGINE FUEL & EMISSION CONTROL SYSTEM

SECTION EF & EC

CONTENTS

PRECAUTIONS ..... EF & EC- 2
PREPARATION ..... EF & EC- 4
ENGINE AND EMISSION CONTROL OVERALL SYSTEM ..... EF & EC- 5
ENGINE AND EMISSION CONTROL PARTS DESCRIPTION ..... EF & EC- 11
ENGINE AND EMISSION CONTROL SYSTEM DESCRIPTION ..... EF & EC- 18
IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION ..... EF & EC- 32
TROUBLE DIAGNOSES ..... EF & EC- 39
MULTIPORT FUEL INJECTION SYSTEM INSPECTION ..... EF & EC-229
EVAPORATIVE EMISSION SYSTEM ..... EF & EC-231
CRANKCASE EMISSION CONTROL SYSTEM ..... EF & EC-233
SERVICE DATA AND SPECIFICATIONS (S.D.S.) ..... EF & EC-234

Note: Refer to Foldout page for "E.C.C.S. WIRING DIAGRAM".

For assistance with 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".

Supplemental Restraint System "AIR BAG"

The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury in a frontal collision. The Supplemental Restraint System consists of air bags, sensors, a ECM, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in **section BF** of this Service Manual.

WARNING:

a. **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized INFINITI dealer.**
b. **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
c. **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 "Air Bag".**

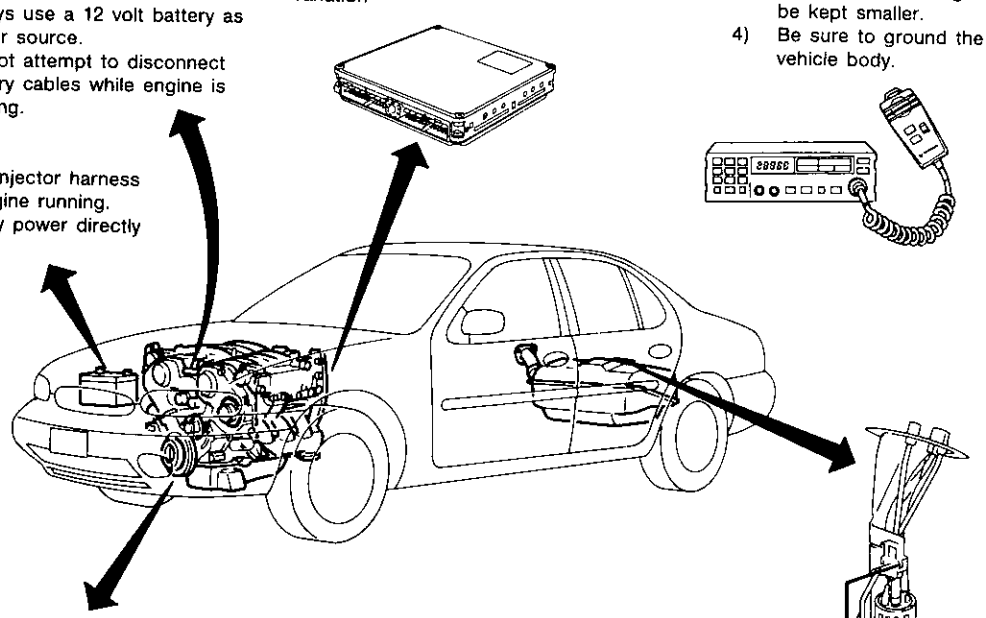
Engine Fuel & Emission Control System

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

ECM
- Do not disassemble ECM (ECCS control module)
- Do not turn diagnostic test 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

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 electronic control units
2) Keep the antenna feeder line more the 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.

INJECTOR
- Do not disconnect injector harness connectors with engine running.
- Do not apply battery power directly to injectors.



E.C.C.S. 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 crankshaft position sensor.



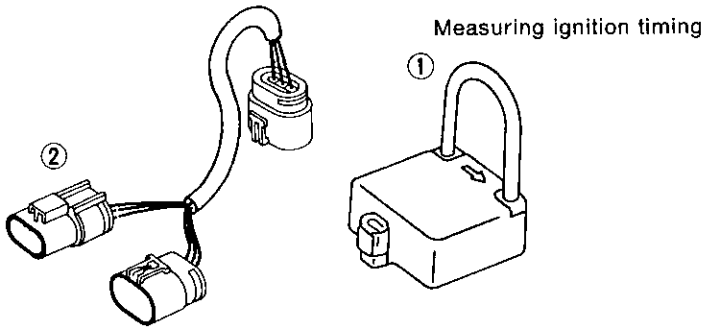
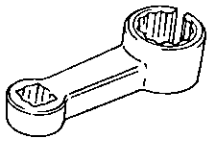
WHEN STARTING
- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown

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

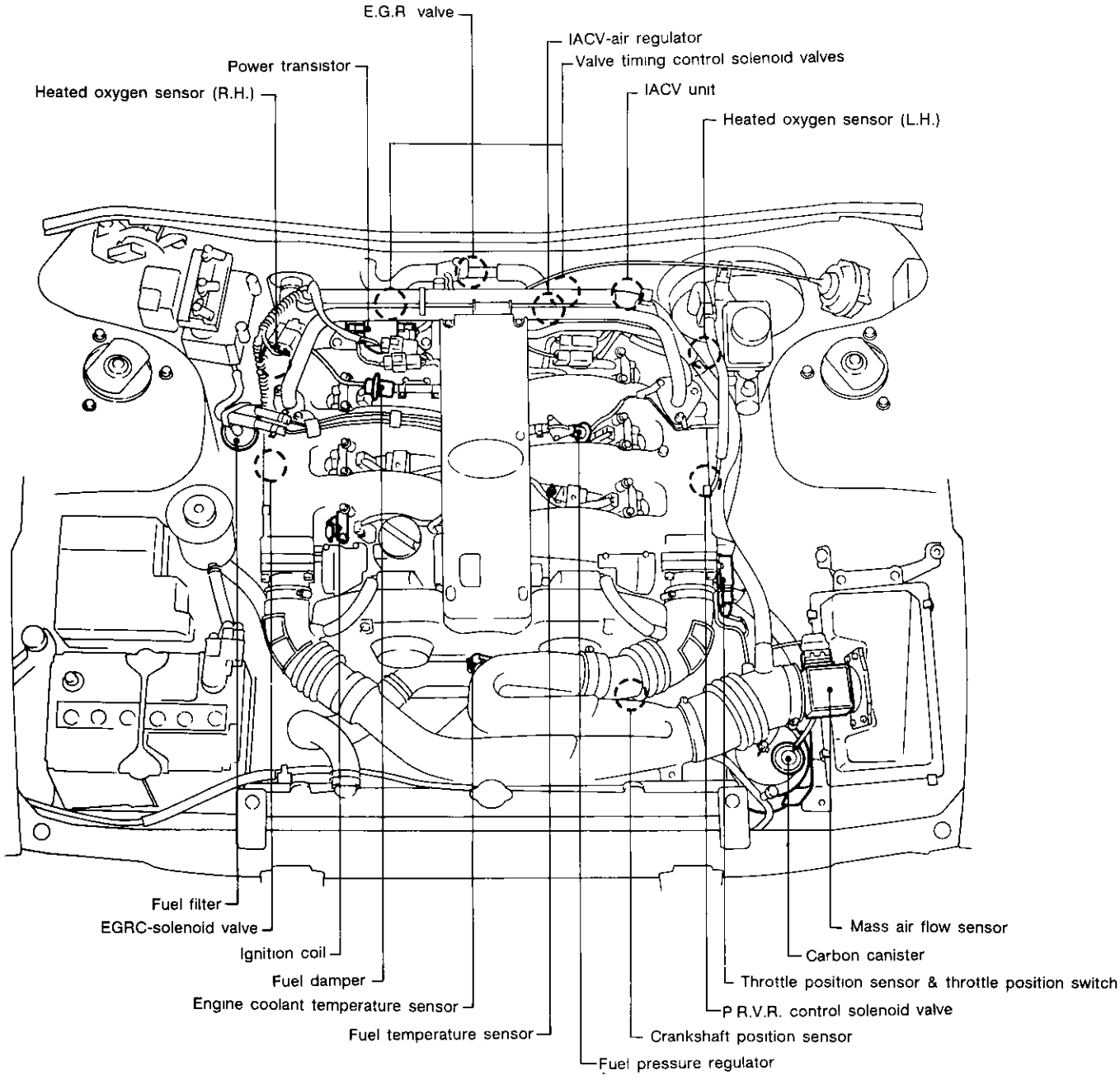
ECM HARNESS HANDLING
- Securely connect ECM harness connectors.
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in) away from adjacent harnesses, to prevent an ECM system malfunction 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.

SEF116M

SPECIAL SERVICE TOOLS

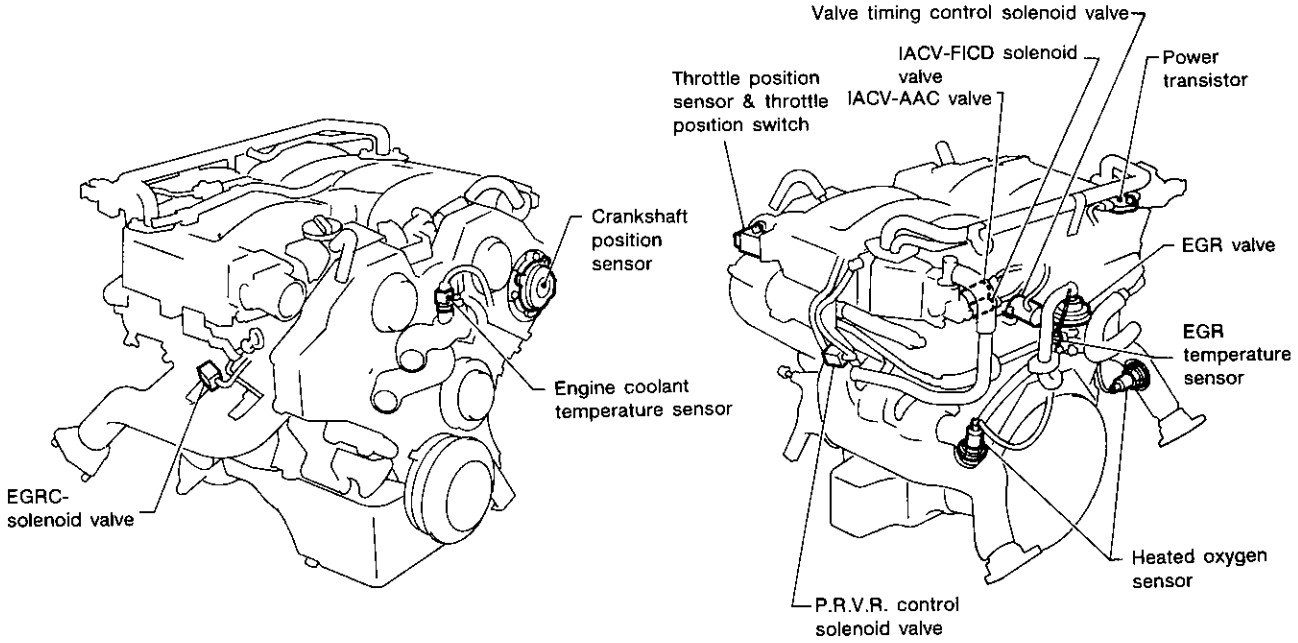
Tool number (Kent-Moore No.) Tool name	Description
① KV109D0010 (J-36777-1) Ignition timing adapter coil ② KV10114200 (J-38386) Adapter harness	
(J-38365) Oxygen sensor wrench	

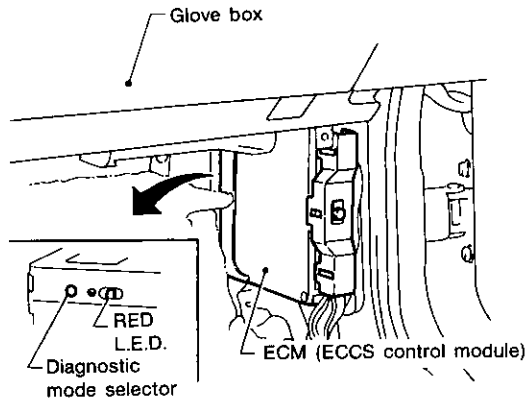
E.C.C.S. Component Parts Location

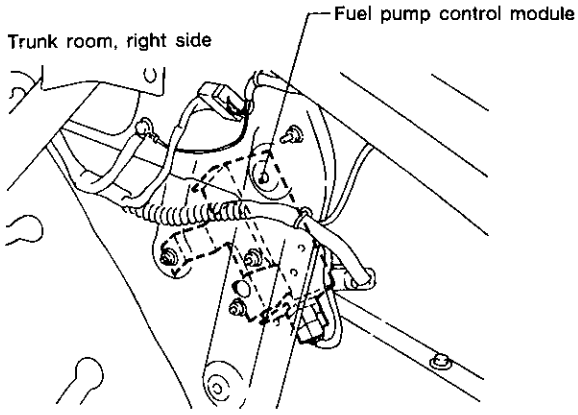


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E.C.C.S. Component Parts Location (Cont'd)

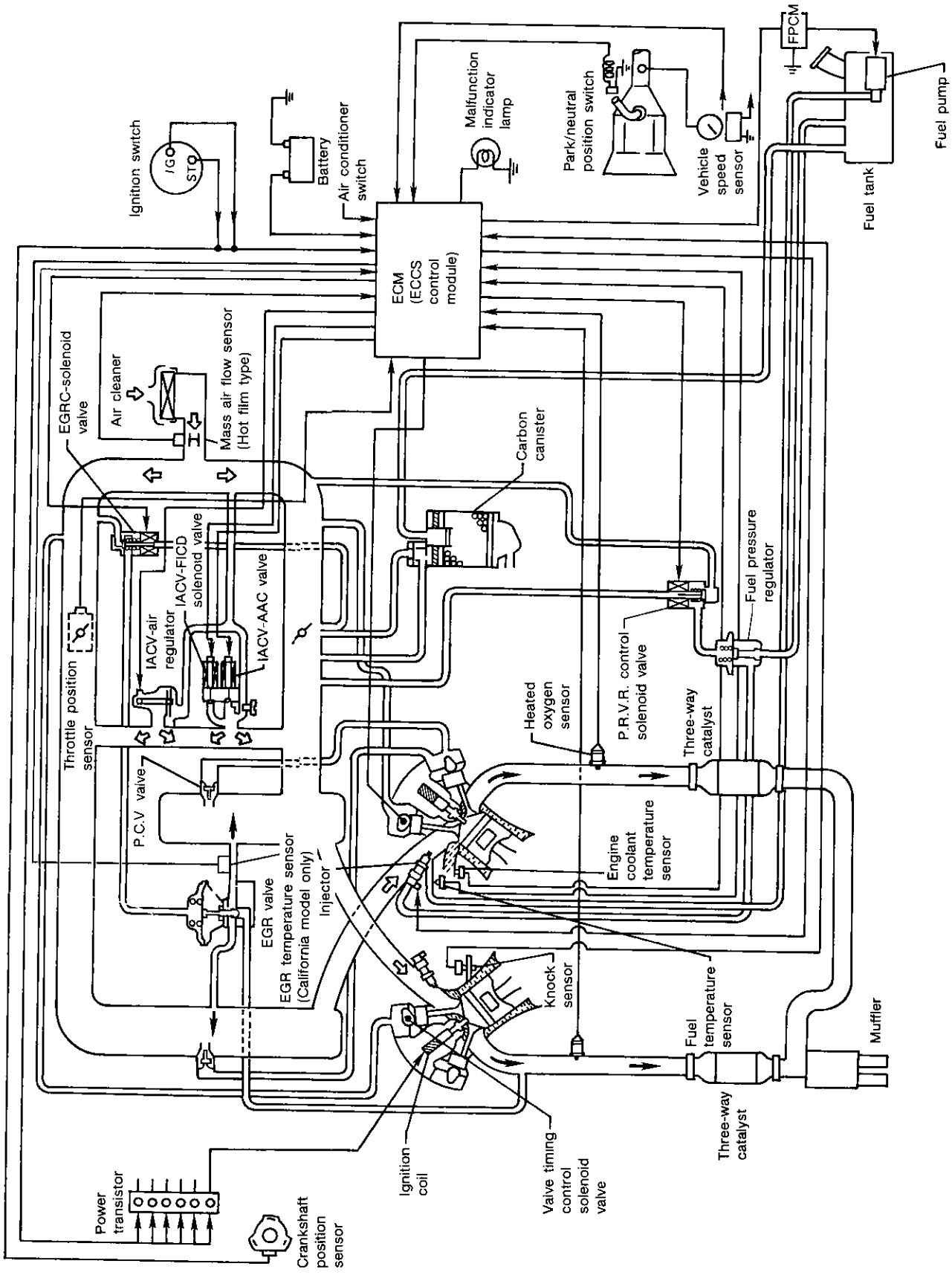






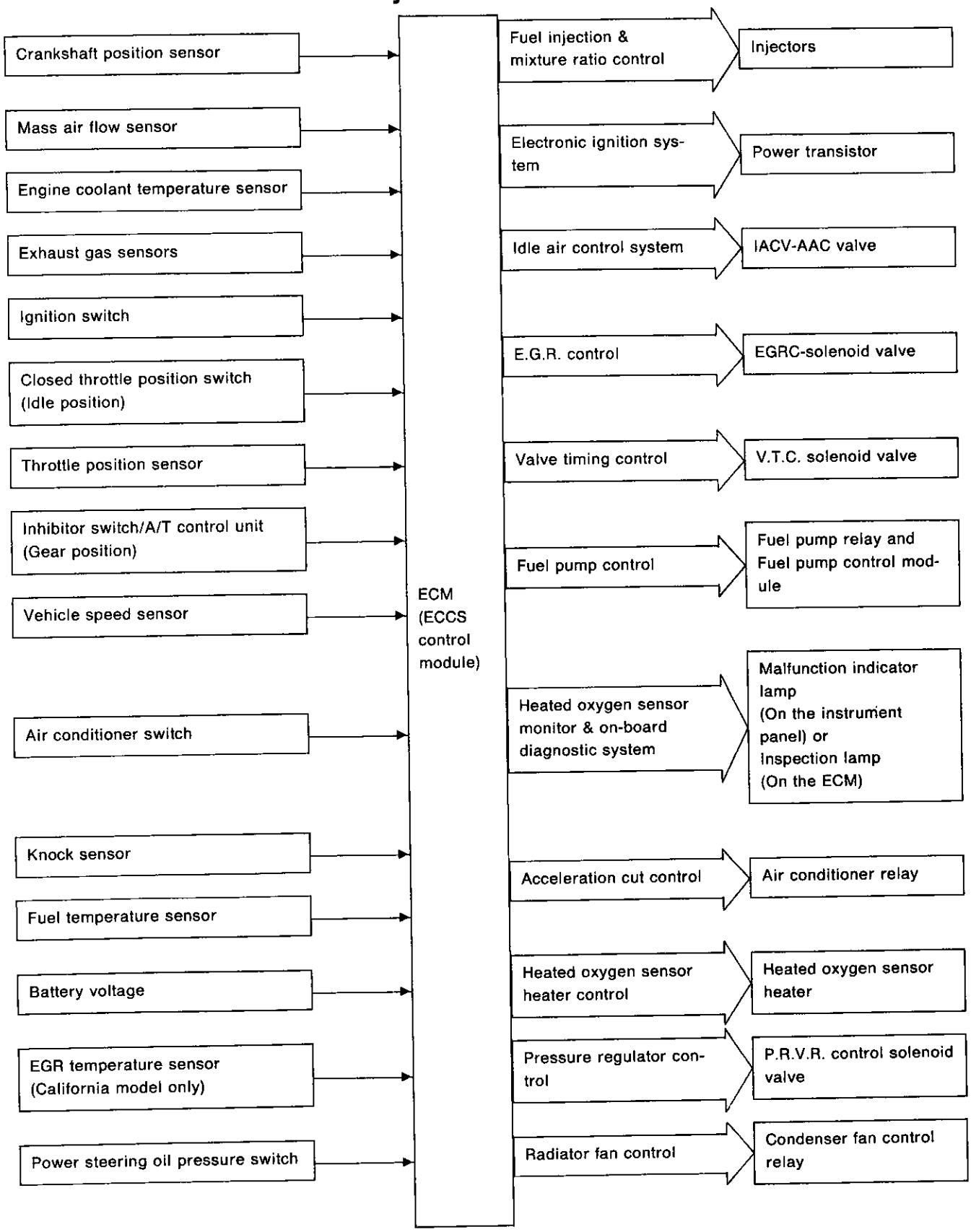
SEF071M

System Diagram

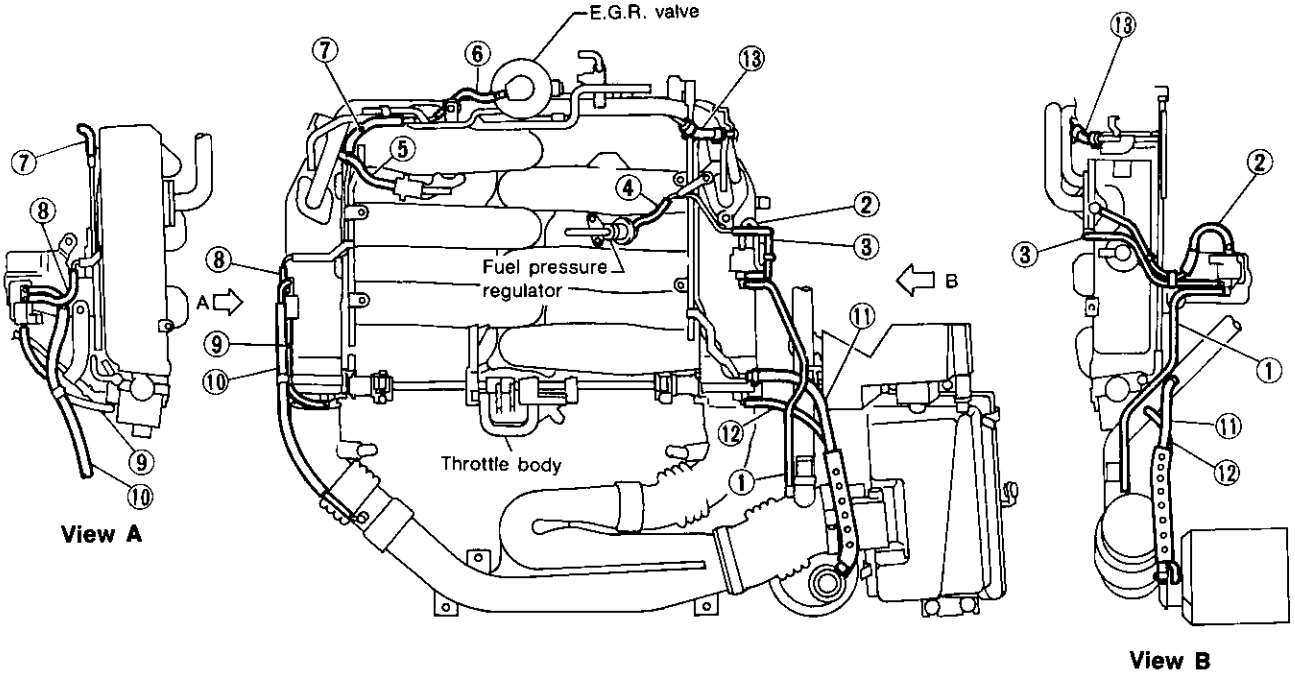


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System Chart



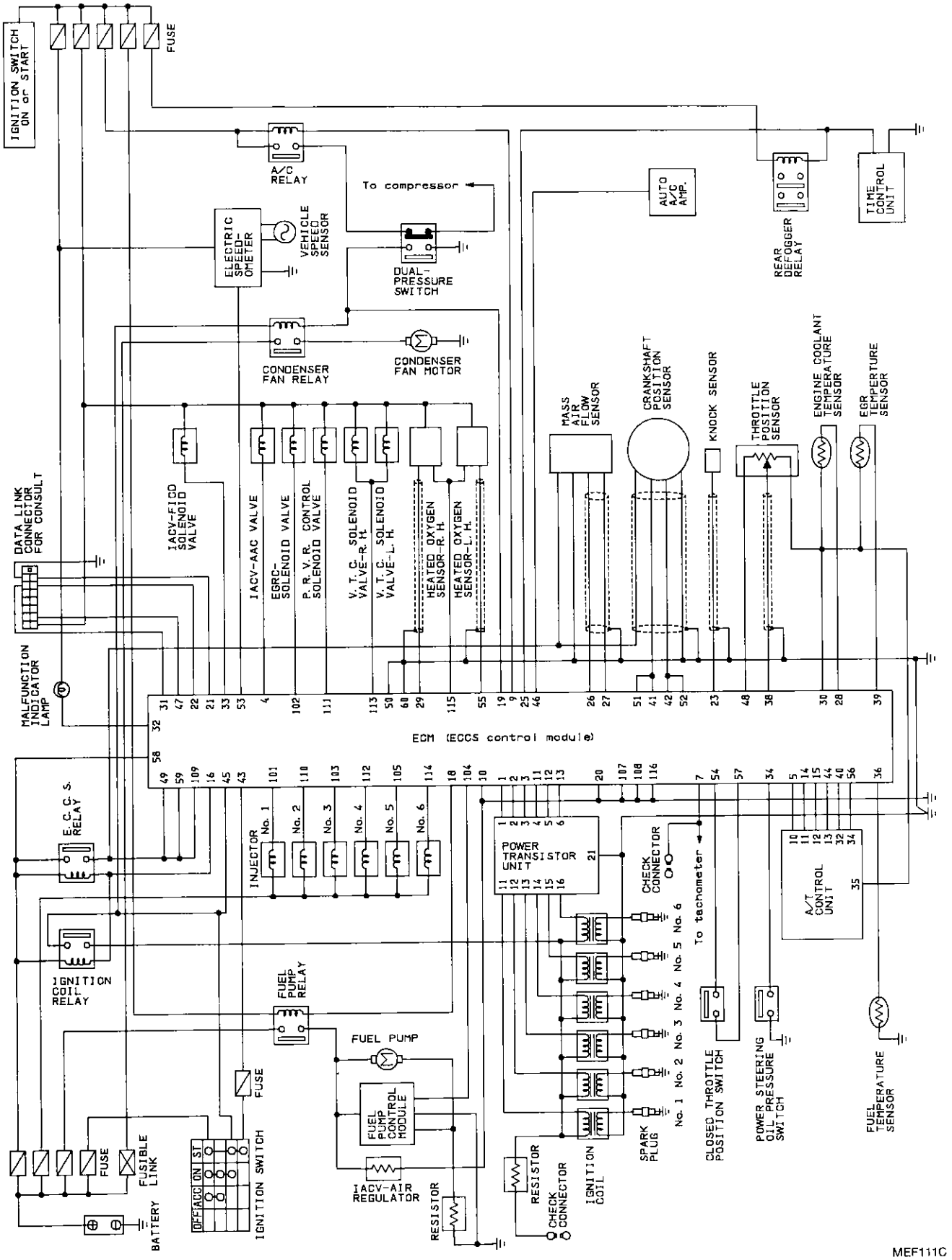
Vacuum Hose Drawing

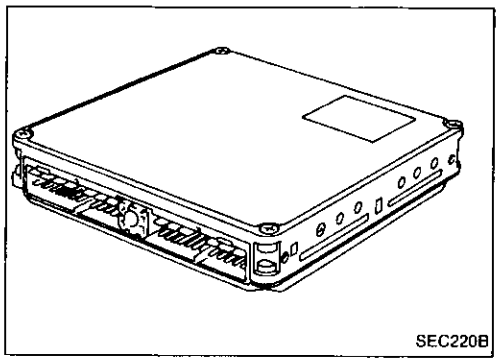


SEF072M

① P.R.V.R. control solenoid valve to Air duct
② P.R.V.R. control solenoid valve to Intake manifold collector
③ P.R.V.R. control solenoid valve to Vacuum gallery
④ Fuel pressure regulator to Vacuum gallery
⑤ Fuel damper to Balance tube
⑥ E.G.R. valve to Rear side vacuum gallery
⑦ Rear side vacuum gallery to Right side vacuum gallery
⑧ E.G.R.C. solenoid valve to Right side vacuum gallery
⑨ Throttle body to E.G.R.C. solenoid valve
⑩ Air gallery to E.G.R.C. solenoid valve
⑪ Activated carbon canister (purge port) to Purge tube
⑫ Activated carbon canister (vacuum port) to Throttle body
⑬ Left side vacuum gallery to Balance tube

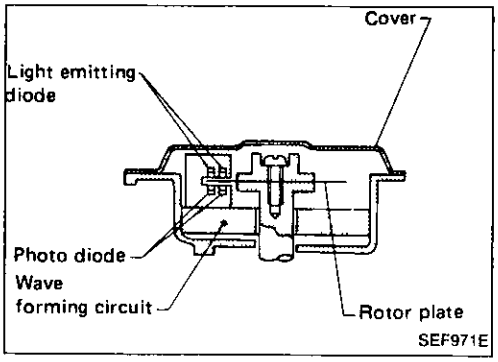
Circuit Diagram




SEC220B

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.



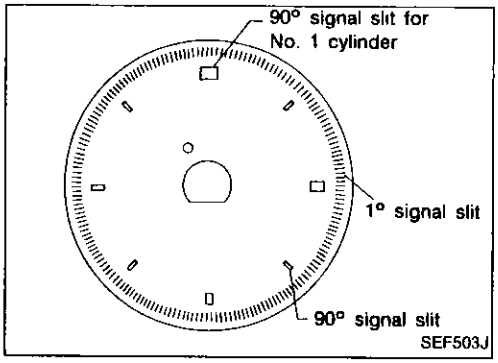
SEF971E

Crankshaft Position Sensor (CKPS)

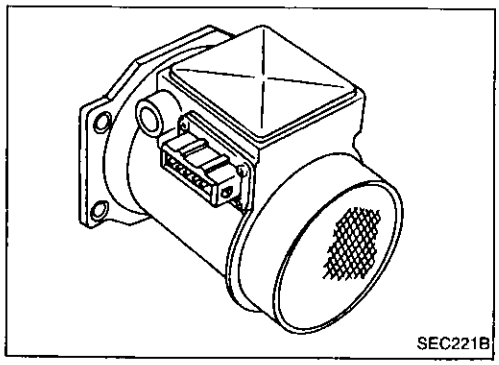
The crankshaft position sensor is a basic component of the E.C.C.S. It monitors engine speed and piston position, and sends signals to the ECM to control fuel injection, ignition timing and other functions.

The crankshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for 1° signal and 8 slits for 90° signal. Light Emitting Diodes (L.E.D.) and photo diodes are built in the wave-forming circuit.

When the rotor plate passes between the L.E.D. and the photo diode, the slits in the rotor plate continually cut the light being transmitted to the photo diode from the L.E.D. This generates rough-shaped pulses which are converted into on-off pulses by the wave-forming circuit, which are sent to the ECM.



SEF503J

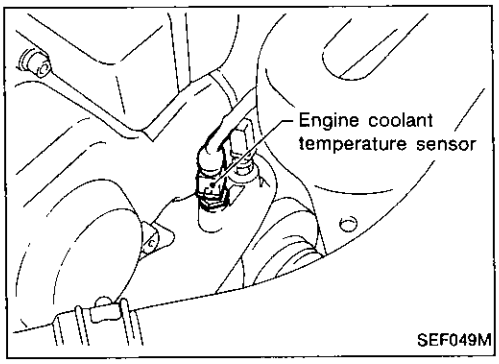

SEC221B

Mass Air Flow Sensor (MAFS)

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.

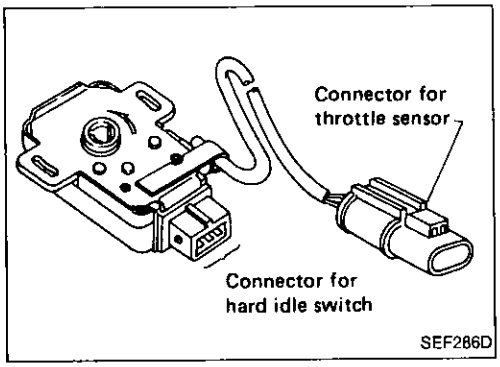
Therefore, it is necessary to supply the hot film with more electric current in order to maintain the temperature of the hot film. The ECM detects the air flow by means of this current change.



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

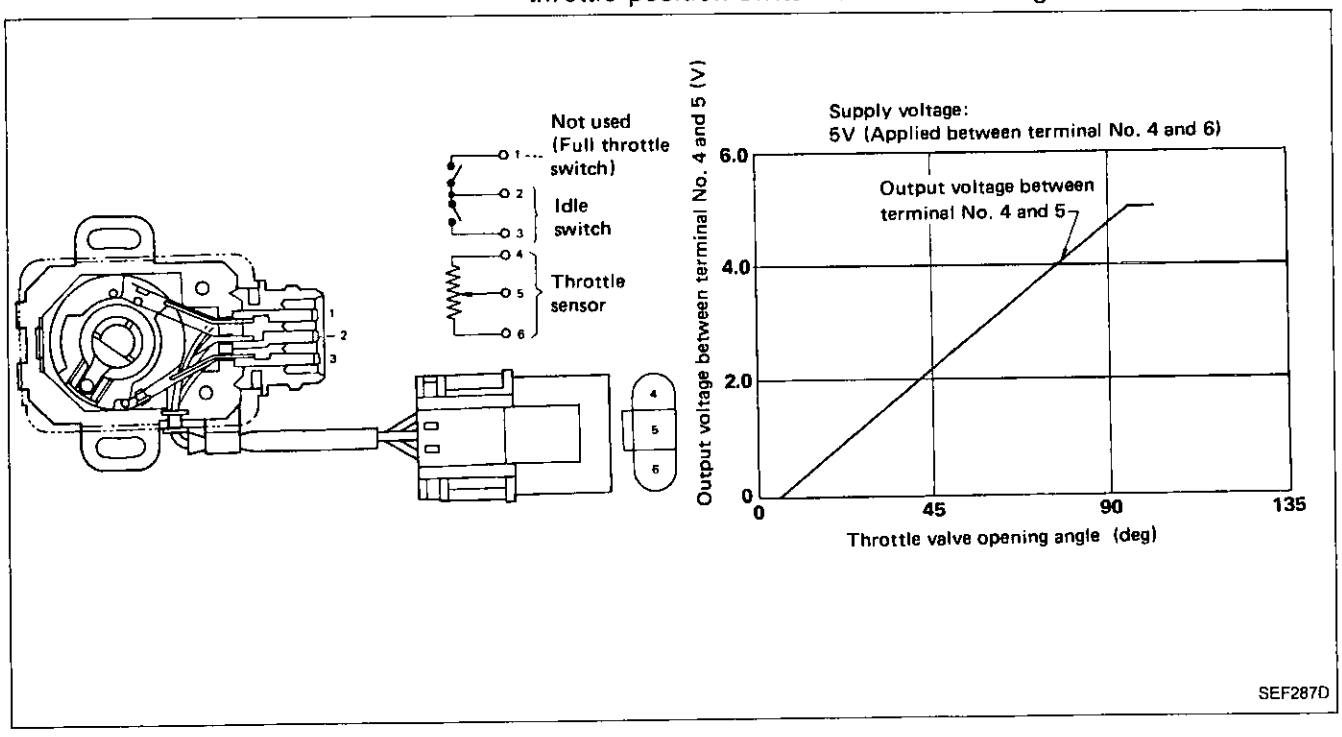
The temperature sensing unit employs a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

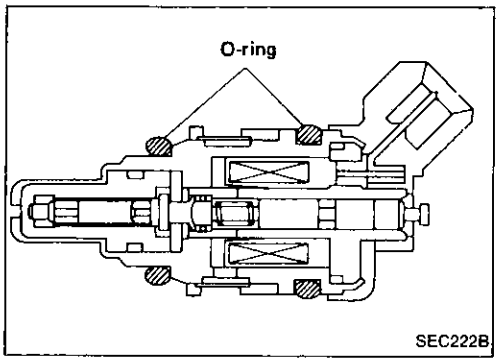


Throttle Position Sensor (TP) & Soft/Hard Closed Throttle Position (CTP) Switch

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.

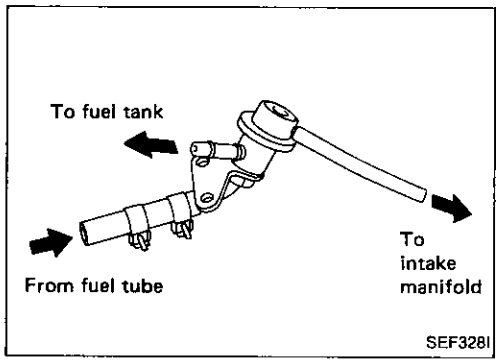
Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This system is called "soft closed throttle position switch". It controls engine operation such as fuel cut. On the other hand, "hard closed throttle position switch", which is built in the throttle position sensor unit, is used for engine control when soft closed throttle position switch is malfunctioning.





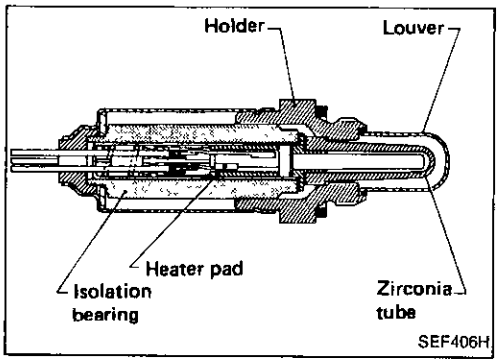
Fuel Injector

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.



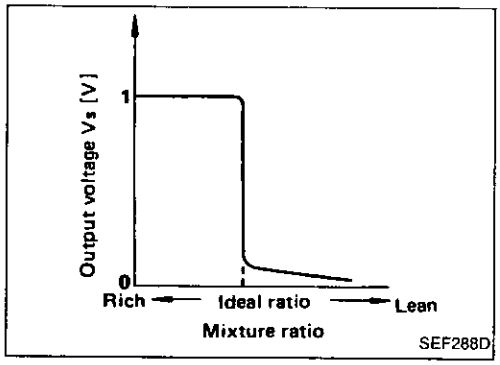
Fuel Pressure Regulator

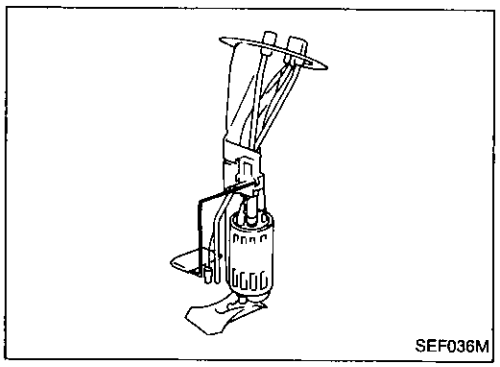
The pressure regulator maintains the fuel pressure at 299.1 kPa (3.05 kg/cm^2, 43.4 psi). Since the injected fuel amount depends on injection pulse duration, it is necessary to maintain the pressure at the above value.



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.

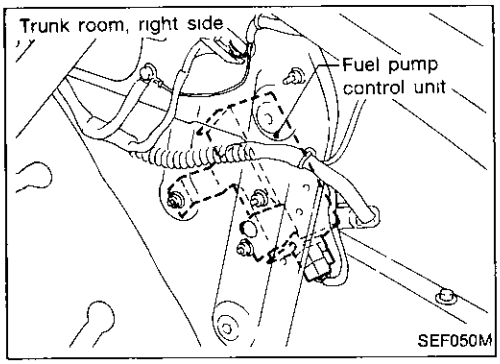




Fuel Pump

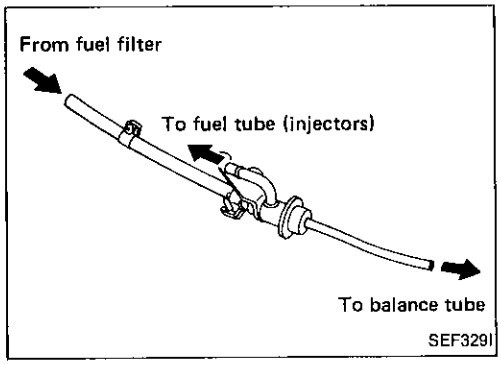
The fuel pump is an in-tank type with a fuel damper. Both the pump and damper are located in the fuel tank.

Fuel Pump (Cont'd)



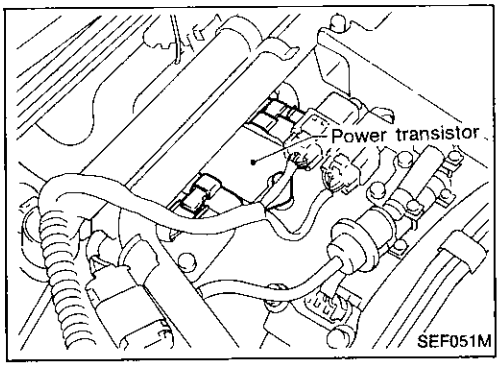
FUEL PUMP CONTROL MODULE

The fuel pump control module adjusts the voltage supplied to the fuel pump to control the fuel quantity.



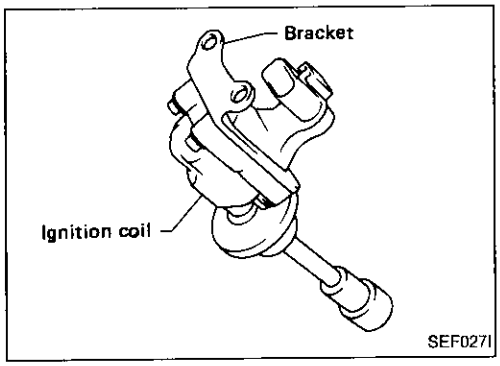
Fuel Damper

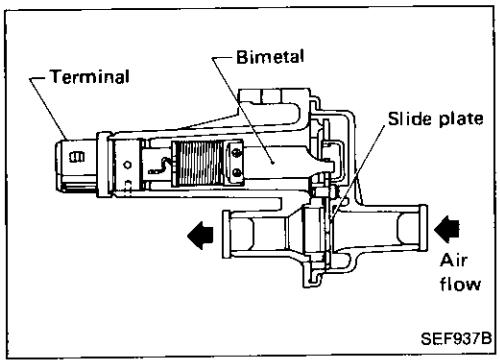
The fuel damper, which consists of a diagram, reduces fuel pressure pulsation in the fuel feed line between the fuel filter and injectors.



Power Transistor Unit & Ignition Coil

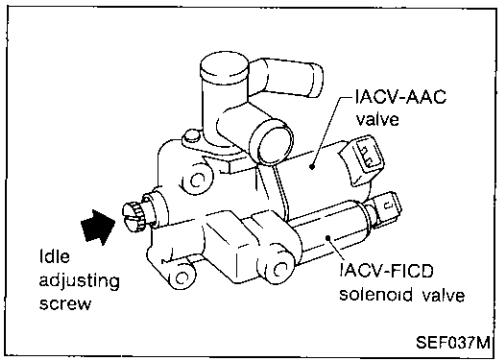
The ignition signal from the ECM is amplified by the two power transistors, which turn the ignition coil primary circuit on and off, inducing the proper high voltage in the secondary circuit. The ignition coil is a small, molded type.





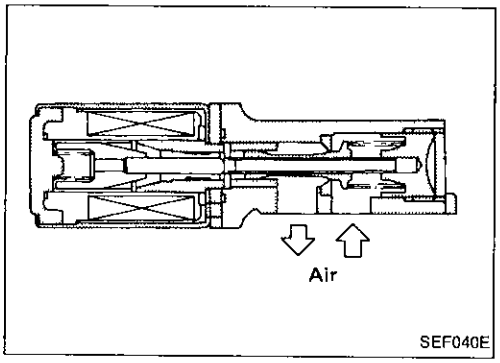
Idle Air Control Valve (IACV)-Air Regulator

The IACV-air regulator provides an air by-pass when the engine is cold for a fast idle during warm-up.
A bimetal, heater and rotary shutter are built into the IACV-air regulator. When the bimetal temperature is low, the air by-pass port opens. As the engine starts and electric current flows through a heater, the bimetal begins to turn the shutter to close the by-pass port. The air passage remains closed until the engine stops and the bimetal temperature drops.



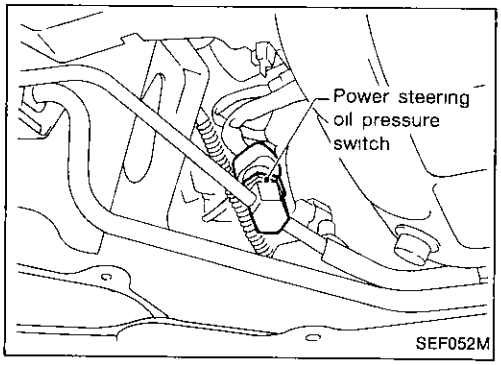
Idle Air Control Valve (IACV) Unit

The IACV unit is made up of the IACV-AAC valve, IACV-FICD solenoid valve and idle adjust screw. It receives the signal from the ECM and controls the idle speed at the preset value.
The IACV-FICD solenoid valve compensates for changes in idle speed caused by the operation of the air compressor.



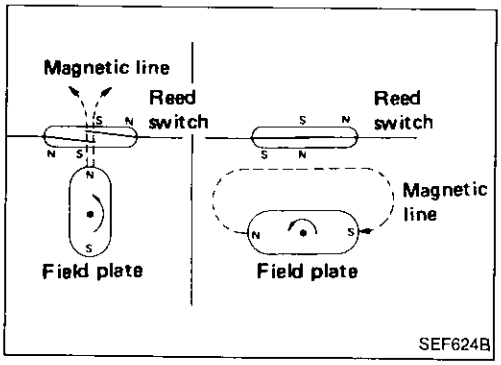
Idle Air Control Valve (IACV)-Auxiliary Air Control (AAC) Valve

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.



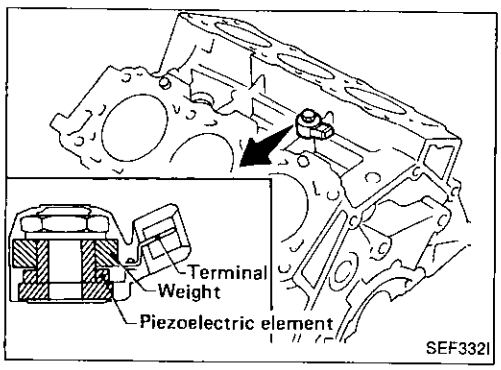
Power Steering Oil Pressure Switch

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.



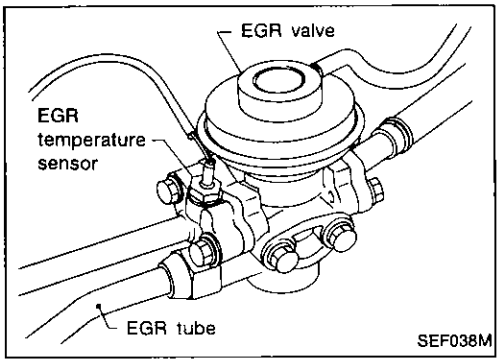
Vehicle Speed Sensor (VSS)

The vehicle speed sensor provides a vehicle speed signal to the ECM.
The speed sensor consists of a reed switch, which is installed in the speedometer unit and transforms vehicle speed into a pulse signal.



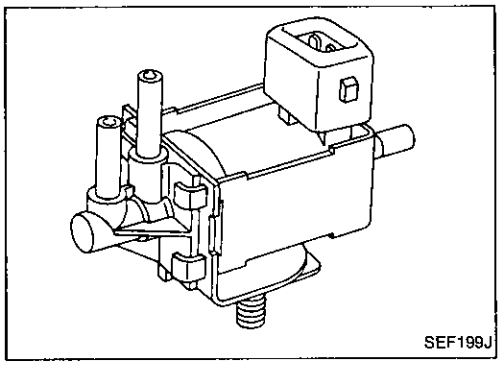
Knock Sensor (KS)

The two knock sensors are attached to the cylinder block and sense 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.



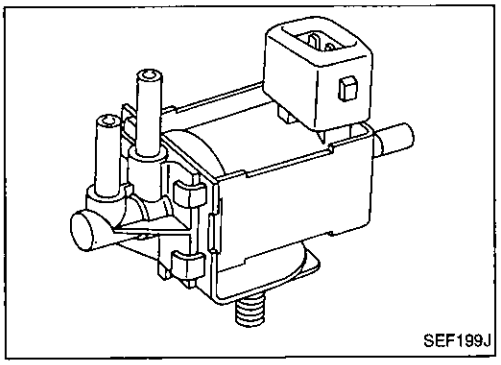
Exhaust Gas Recirculation (EGR) Valve

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.



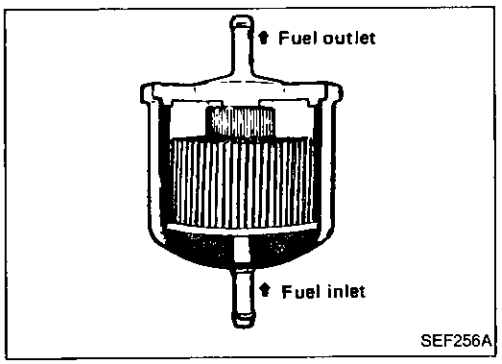
EGR Control (EGRC)-Solenoid Valve

The solenoid valve responds to the ON/OFF signal from the ECM. When it is off, a vacuum signal from the throttle body is fed into the EGR valve. When the ECM sends an ON signal, the coil pulls the plunger downward and cuts the vacuum signal.



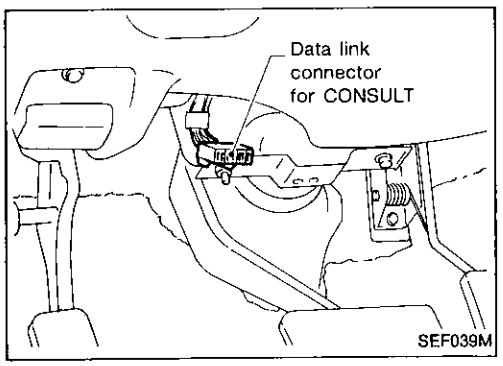
Pressure Regulator Vacuum Relief (P.R.V.R.) Control Solenoid Valve

The solenoid valve responds to the ON/OFF signal from the ECM When it is off, a vacuum signal from the intake manifold is fed into the pressure regulator. When the ECM sends an ON signal, the coil pulls the plunger downward and cuts the vacuum signal.



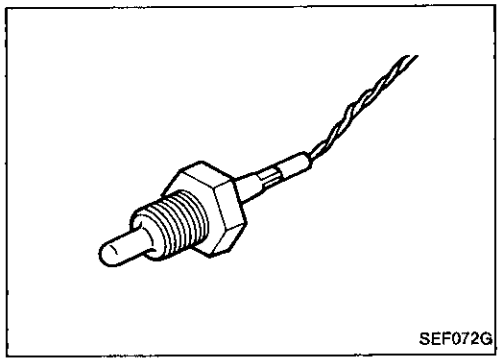
Fuel Filter

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



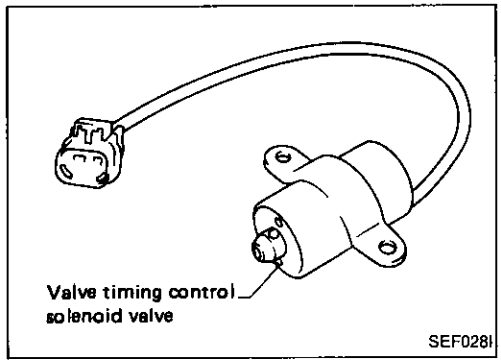
Data Link Connector For CONSULT

The data link connector for CONSULT is located behind the fuse lid.



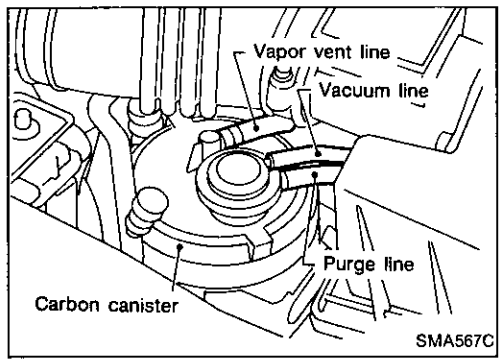
EGR Temperature Sensor (California models only)

The EGR temperature sensor monitors the exhaust gas temperature and transmits a signal to the ECM. The temperature sensing unit employs a thermistor which is sensitive to the change in temperature. Electric resistance of the thermistor decreases in response to the temperature rise.



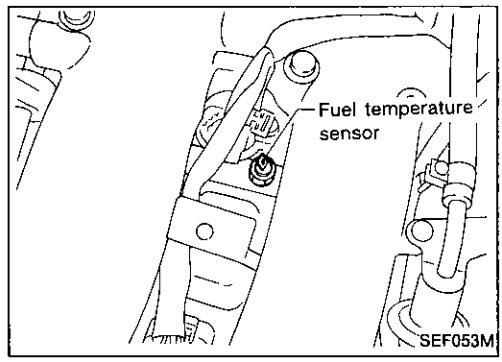
Valve Timing Control Solenoid Valve

The valve timing control solenoids are installed at the front of the intake camshafts, and control oil pressure which regulates the position of the intake camshafts.



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.

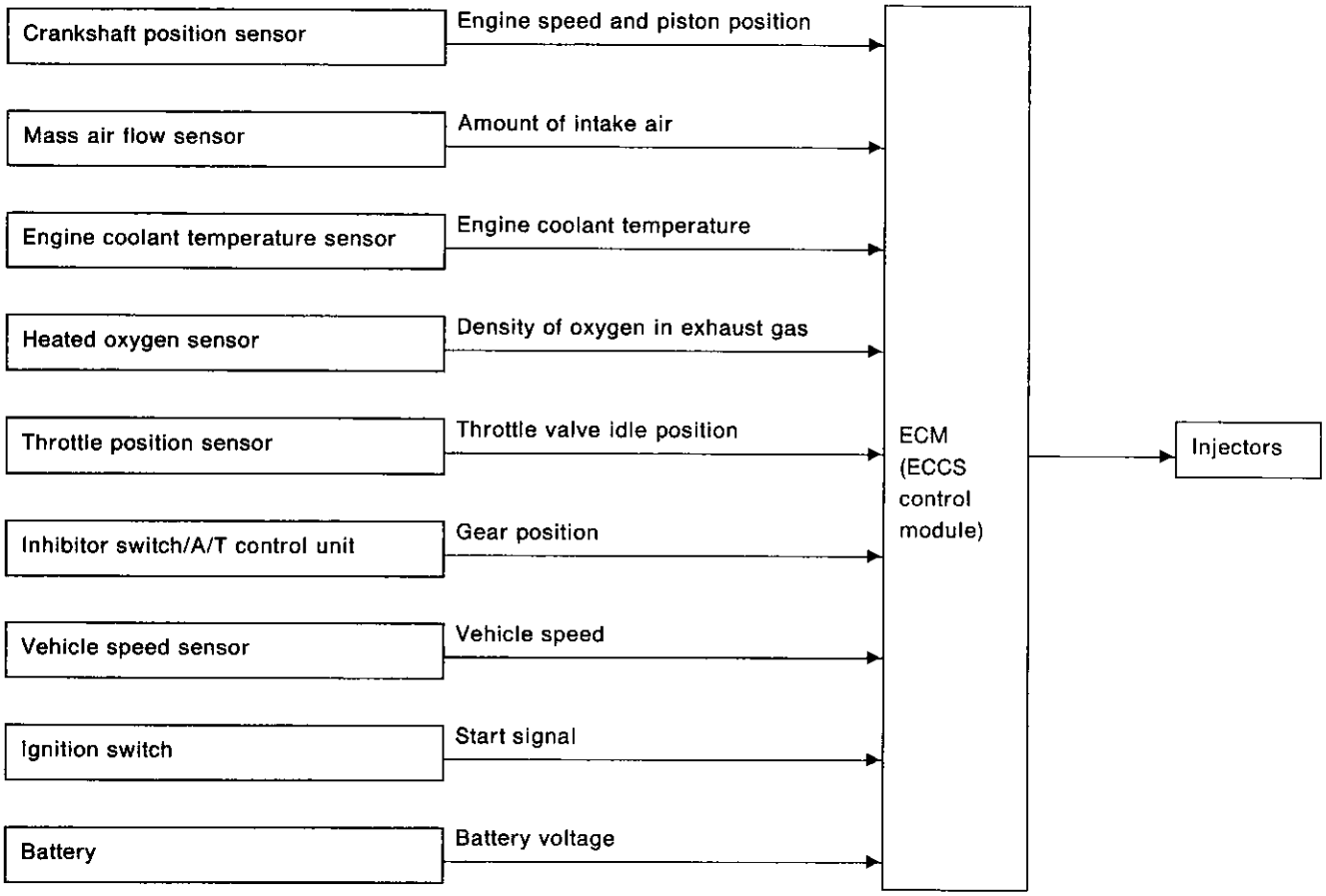


Fuel Temperature Sensor

The fuel temperature sensor, built into the fuel tube, senses fuel temperature. When the fuel temperature is higher than specified, the ECM (ECCS control module) turns the P.R.V.R. control solenoid valve ON and raises fuel pressure.

Multiport Fuel Injection (MFI) System

INPUT/OUTPUT SIGNAL LINE



BASIC MULTIPORT 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 basic 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 crankshaft position sensor and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injection is compensated for to improve engine performance under various operating conditions as listed below.

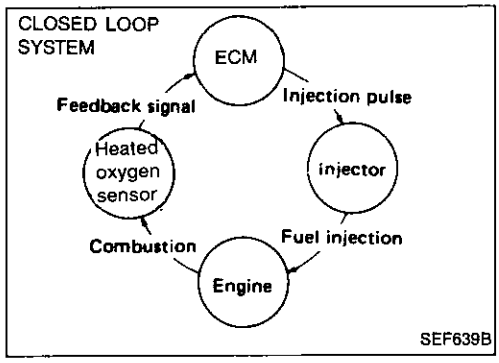
<Fuel increase>

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 three way catalyst can reduce CO, HC and NOx emissions. This system uses an 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.

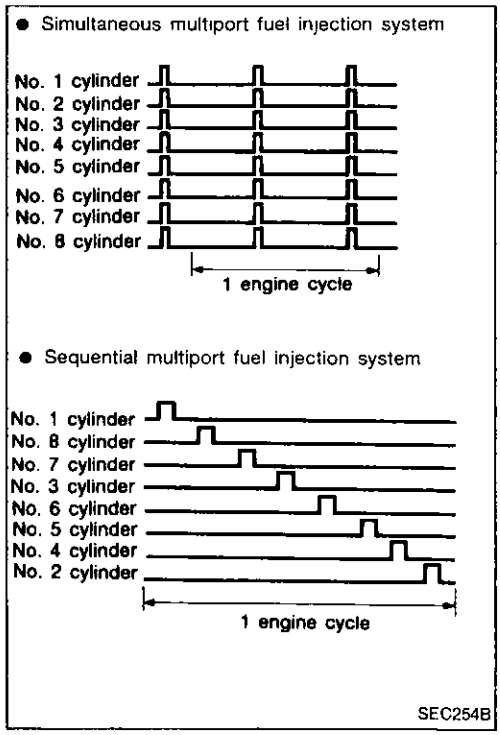
This stage refers to the closed loop control condition. The open-loop control condition refers to that under which the ECM detects any of the following conditions and feedback control stops in order to maintain stabilized fuel combustion.

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
7) Heated oxygen sensor high output voltage

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. This is due to manufacturing errors (e.g., mass air flow sensor hot wire) and changes during operation (injector clogging, etc.) of E.C.C.S. parts which directly affect the mixture ratio.

Accordingly, a difference between the basic and theoretical mixture ratios is monitored in this system. It is then computed in terms of "fuel injection duration" to automatically compensate for the difference between the two ratios.



FUEL INJECTION TIMING

Two types of fuel injection systems are used — simultaneous multiport fuel injection system and sequential multiport fuel injection system. In the former, fuel is injected into all six cylinders simultaneously twice each engine cycle.

In other words, pulse signals of the same width are simultaneously transmitted from the ECM to the six injectors two times for each engine cycle.

In the sequential multiport fuel injection system, fuel is injected into each cylinder during each engine cycle according to the firing order.

When engine is starting, fuel is injected into all six cylinders simultaneously twice per cycle.

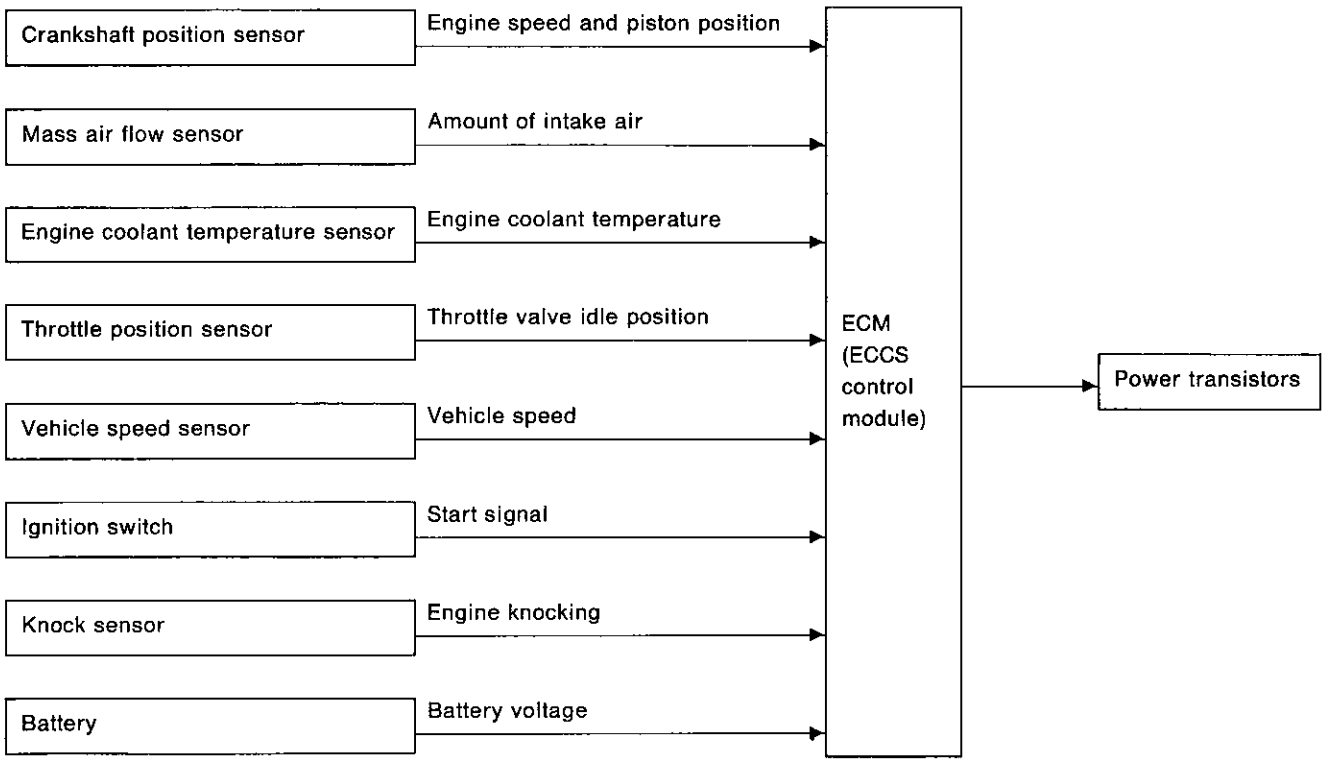
Multiport Fuel Injection (MFI) System (Cont'd)

FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration or high-speed operation.

Electronic Ignition System (EI)

INPUT/OUTPUT SIGNAL LINE



Electronic Ignition System (EI) (Cont'd)

SYSTEM DESCRIPTION

The ignition timing is controlled by the ECM in order to maintain the best air-fuel ratio in response to every running condition of the engine.

The ignition timing data is stored in the ECM located in the ECM. This data forms the map shown below.

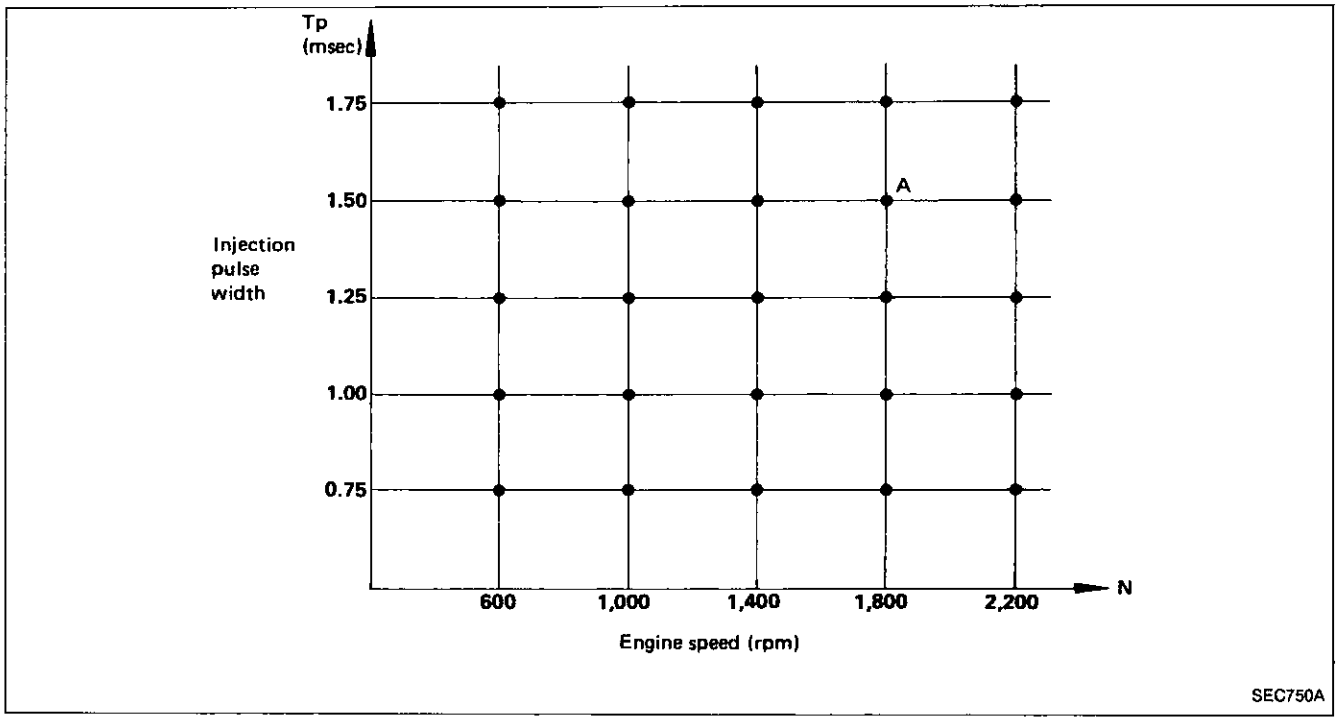
The ECM detects information such as the injection pulse width and crankshaft position sensor signal which varies every moment. Then responding to this information, ignition signals are transmitted to the power transistor.

e.g. N: 1,800 rpm, Tp: 1.50 msec
A °B.T.D.C.

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.

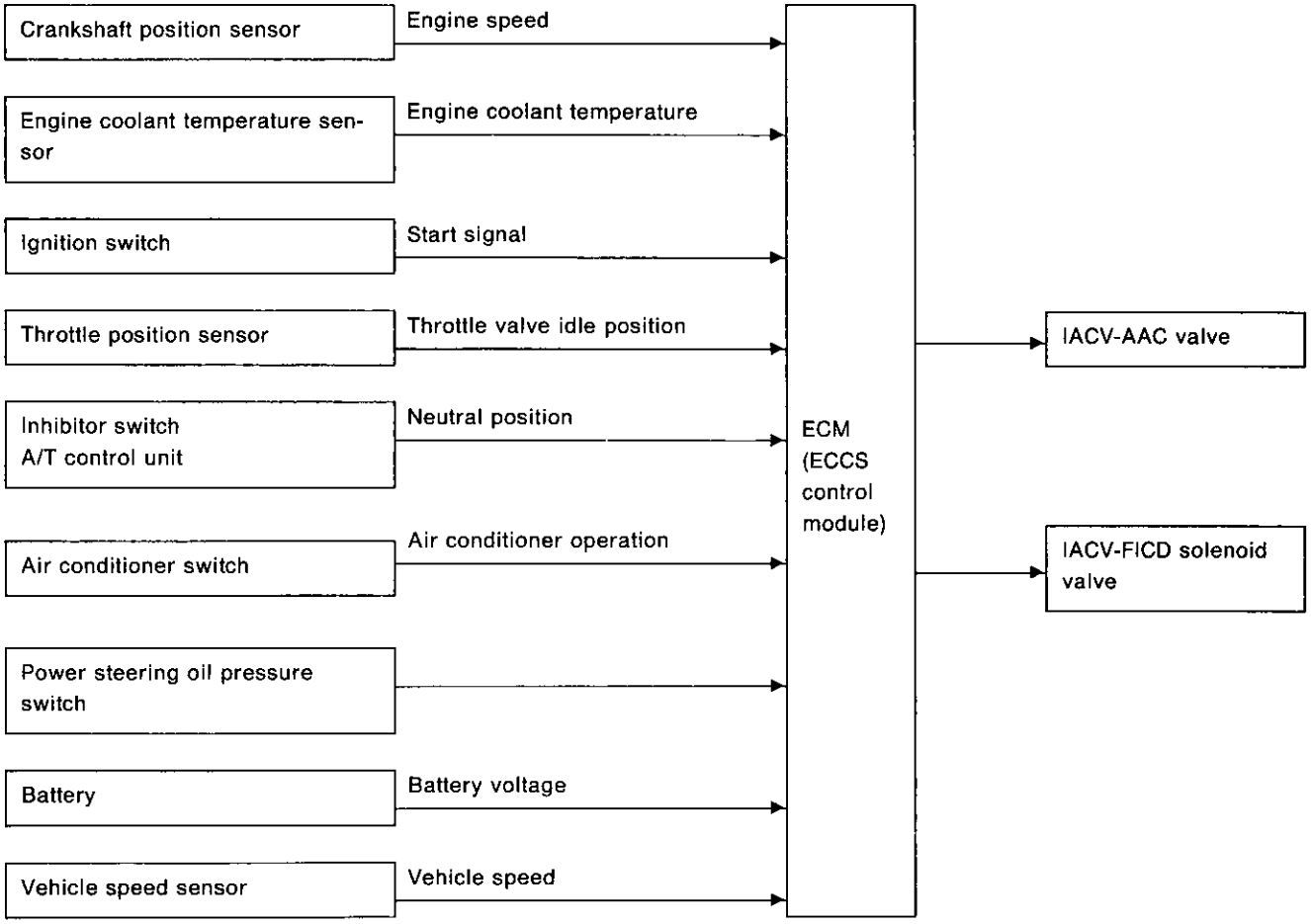


The retard system, actuated by the knock sensor, is designed only for emergencies. The basic ignition timing is pre-programmed within the anti-knocking zone, even if recommended fuel is used under dry conditions. Consequently, the retard system does not operate under normal driving conditions.

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.

Idle Air Control (IACV) System

INPUT/OUTPUT SIGNAL LINE



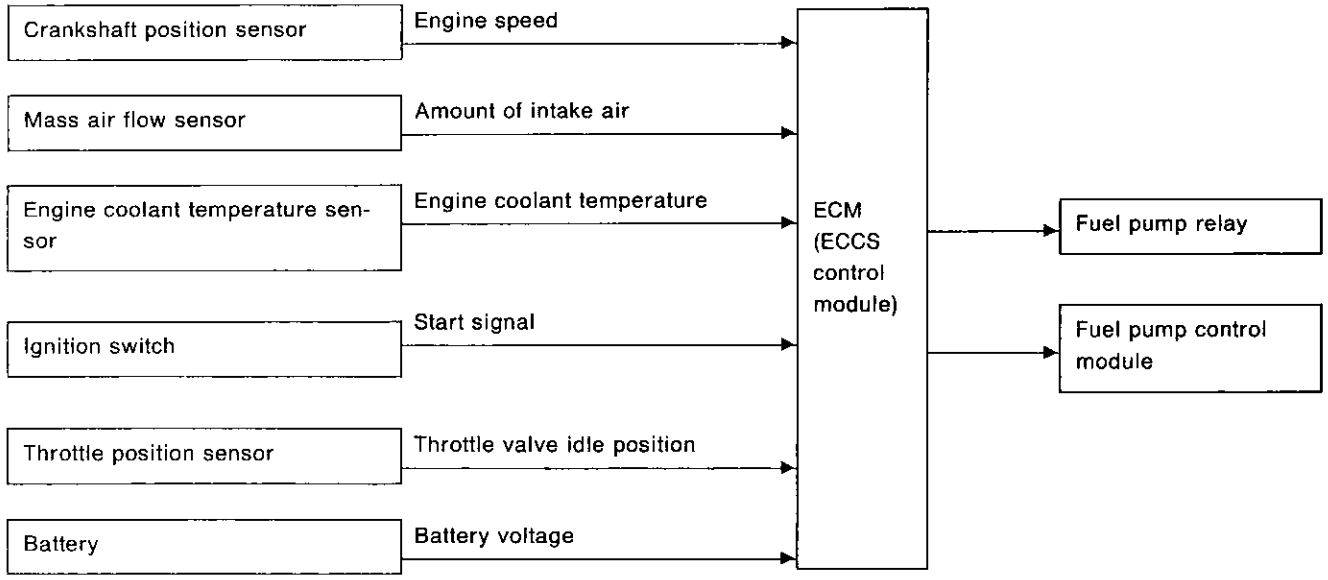
SYSTEM DESCRIPTION

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 IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The crankshaft 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 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 and IACV-air regulator 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 crankshaft 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 battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1.5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1.5 seconds
Except as shown above	Stops

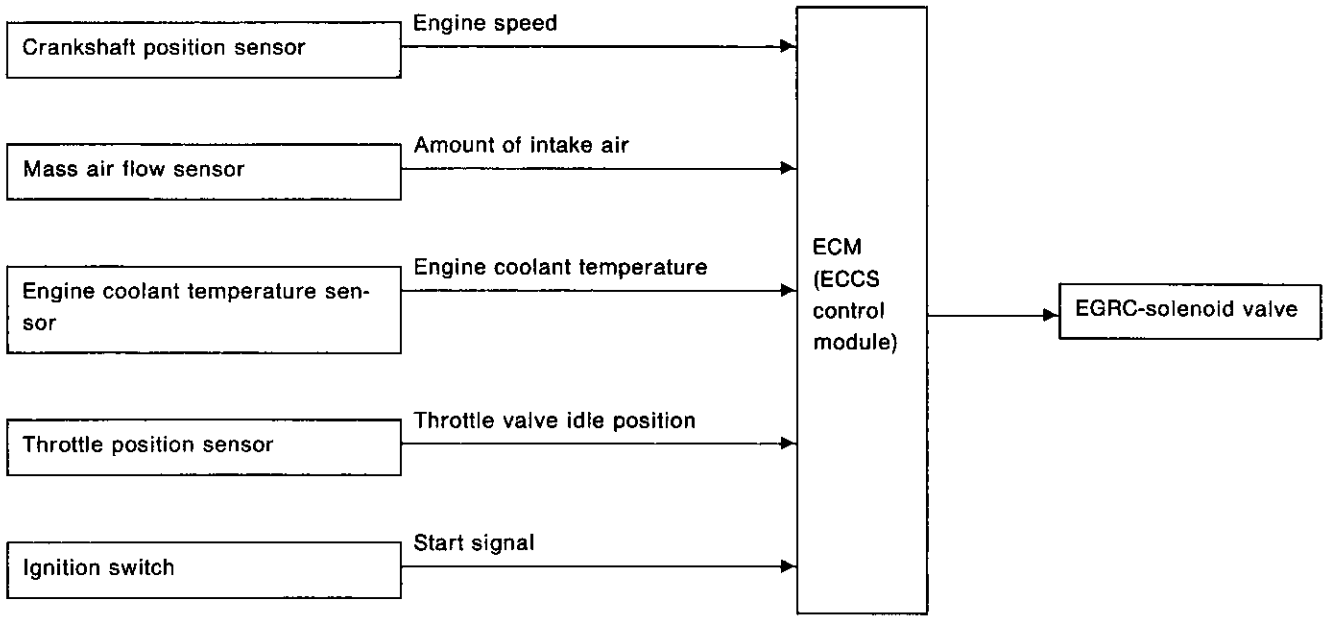
Fuel pump voltage control

The fuel pump is controlled by the fuel pump control module adjusting the voltage supplied to the fuel pump.

Conditions	Supplied voltage
• 1 second after ignition switch is turned ON • Engine cranking • 30 (*NA)/5 (**TC) seconds after engine start [above 50°C (122°F)] • Engine coolant temperature below 10°C (50°F) • Engine is running under heavy load conditions • Engine is running under middle load conditions	Battery voltage
• Except the above	Approx. 8V

Exhaust Gas Recirculation (EGR) System

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

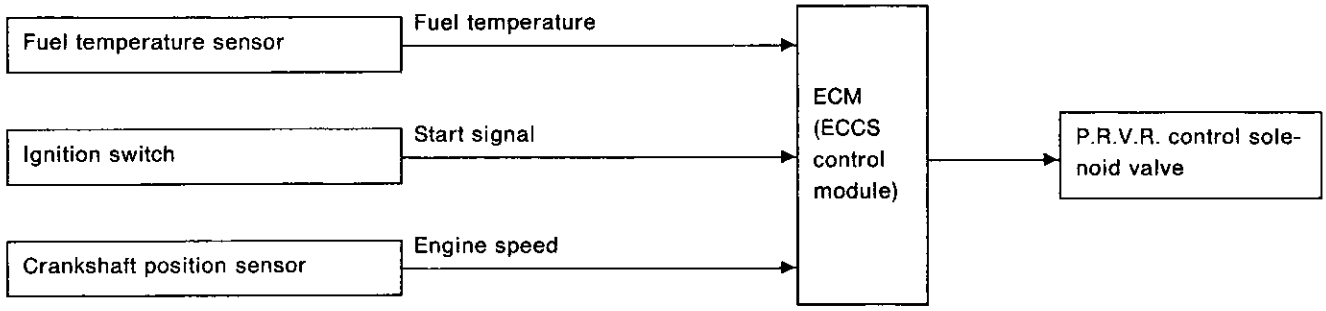
In addition, a system is provided which precisely cuts and controls port vacuum applied to the EGR valve to suit engine operating conditions.
This cut-and-control operation is accomplished through the ECM. When the ECM detects any of the following conditions, current flows through the solenoid valve in the E.G.R. control vacuum line.

This causes the port vacuum to be discharged into the atmosphere so that the EGR valve remains closed.

1) Low engine coolant temperature
2) Engine starting
3) High-speed engine operation
4) Engine idling
5) Excessively high engine coolant temperature

Fuel Pressure Regulator Control

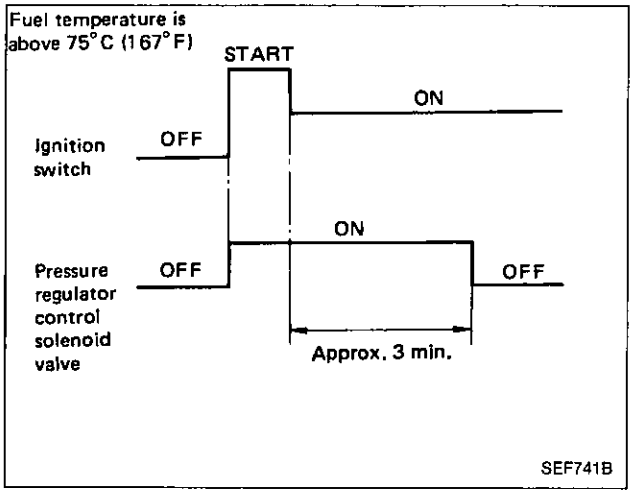
INPUT/OUTPUT SIGNAL LINE



Fuel Pressure Regulator Control (Cont'd)

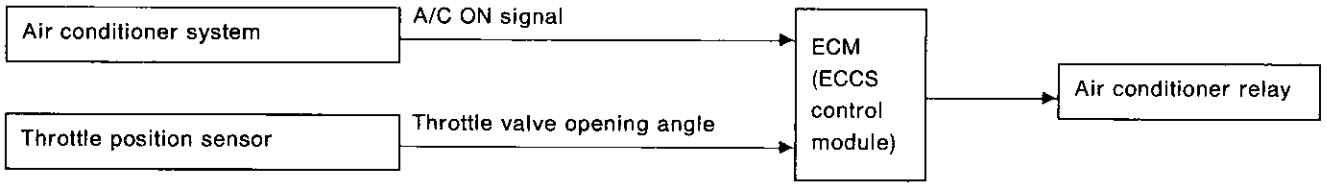
SYSTEM DESCRIPTION

The fuel "pressure-up" control system briefly increases fuel pressure for improved starting performance of a hot engine. Under normal operating conditions, manifold vacuum is applied to the fuel pressure regulator. When starting the engine, however, the ECM allows current to flow through the ON/OFF solenoid valve in the control vacuum line, opening this line to the atmosphere. As a result, atmospheric pressure is applied, restricting the fuel return line so as to increase fuel pressure.



Acceleration Cut Control

INPUT/OUTPUT SIGNAL LINE



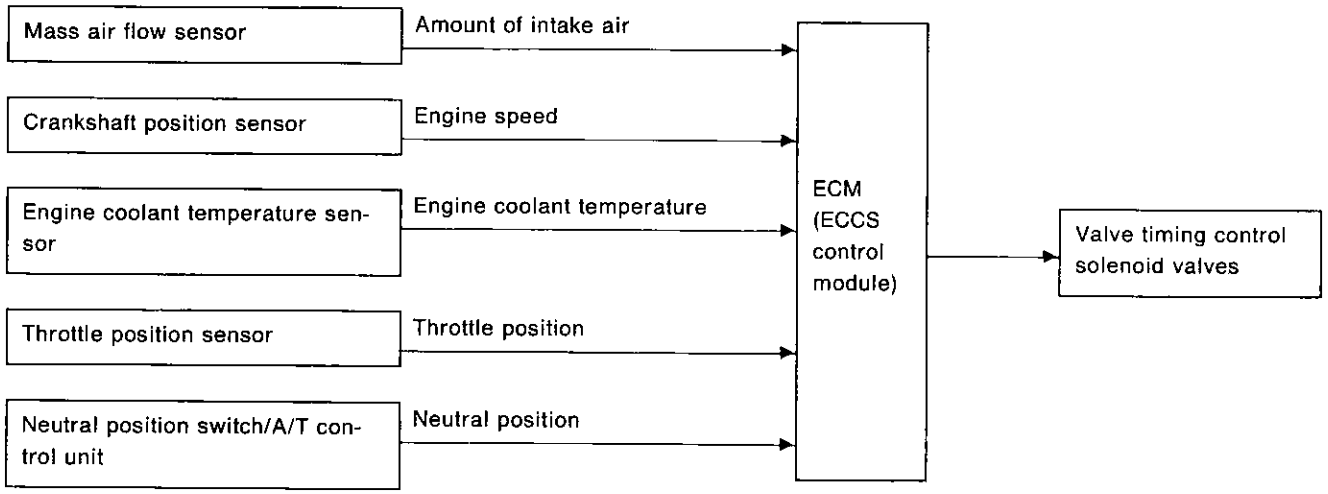
SYSTEM DESCRIPTION

When the accelerator pedal is fully depressed, the air conditioner is turned off for a few seconds.

This system improves acceleration when the air conditioner is used.

Valve Timing Control

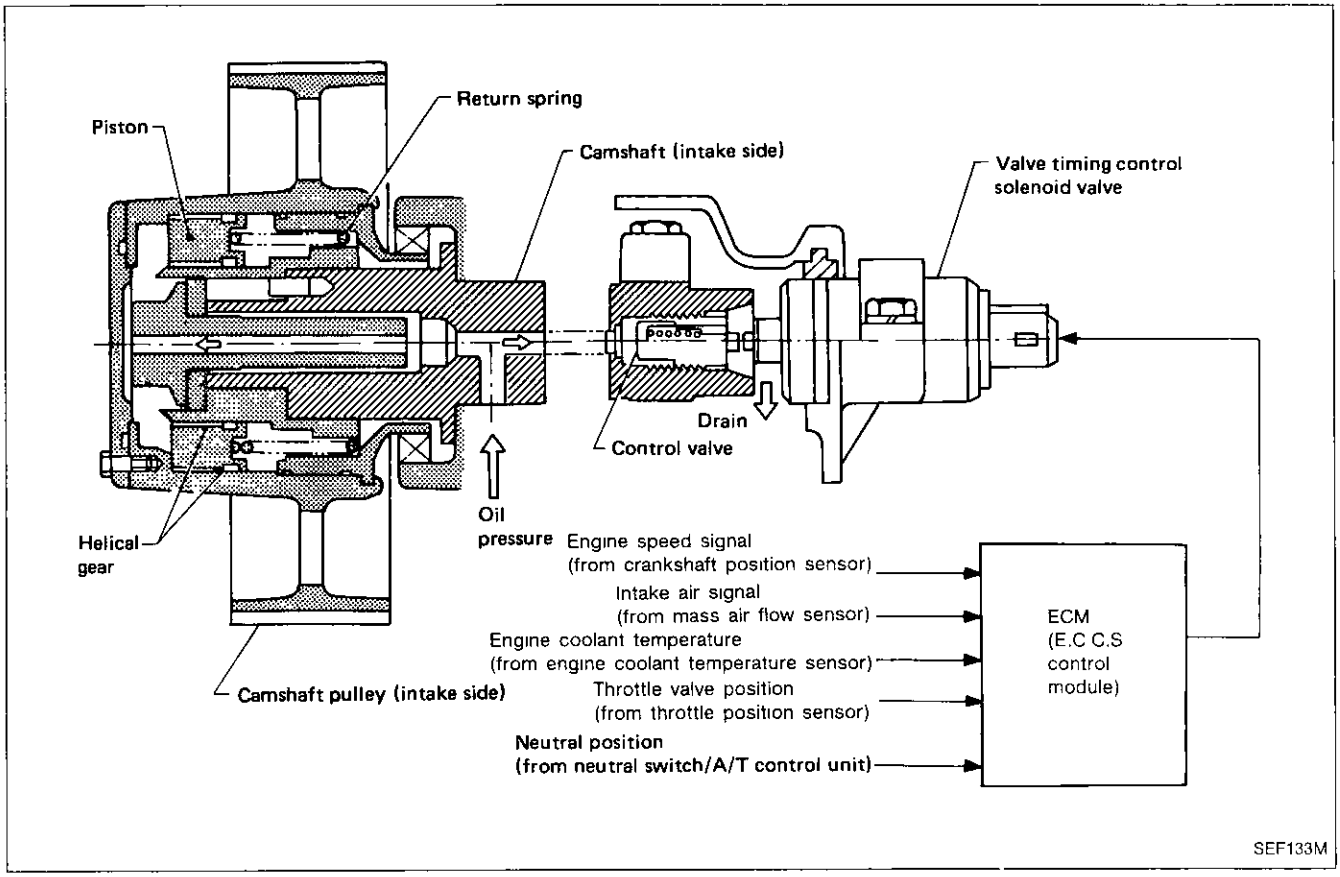
INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

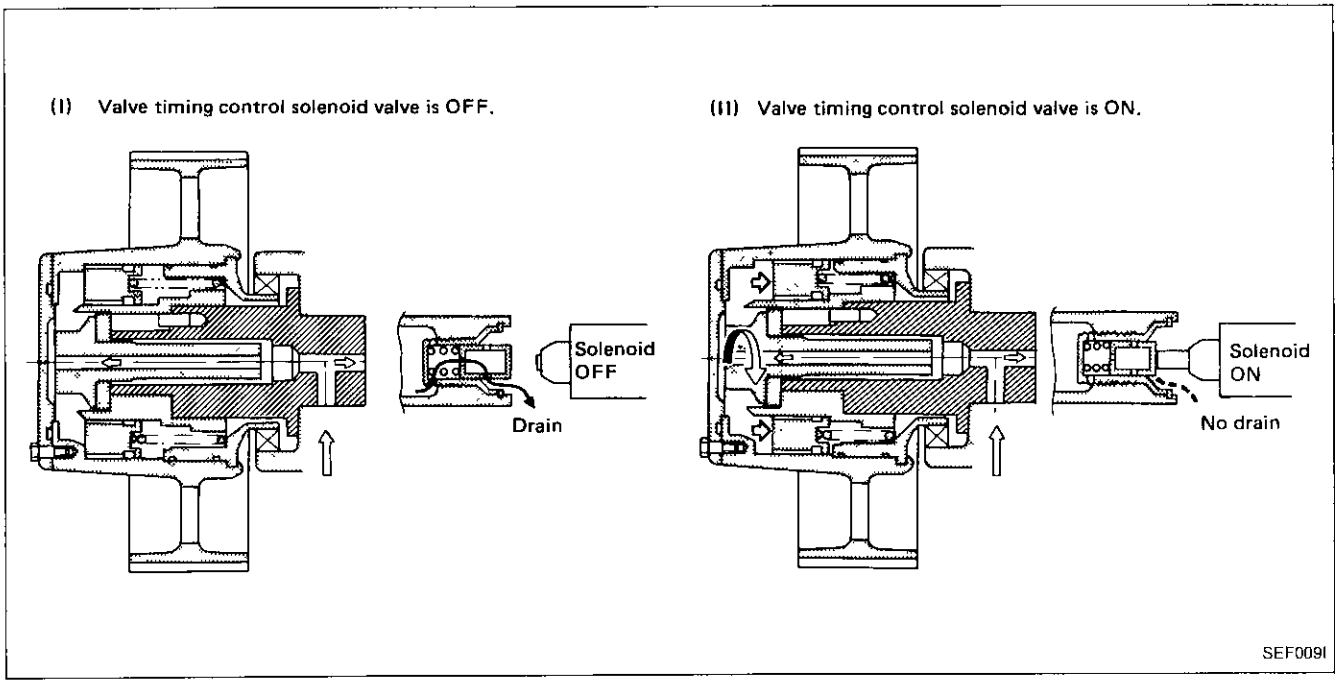
The valve timing control system is utilized to increase engine performance. Intake valve opening and closing time is controlled, according to the engine operating conditions, by the ECM.
Engine coolant temperature signals, engine speed, amount of intake air, throttle position and gear position are used 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.

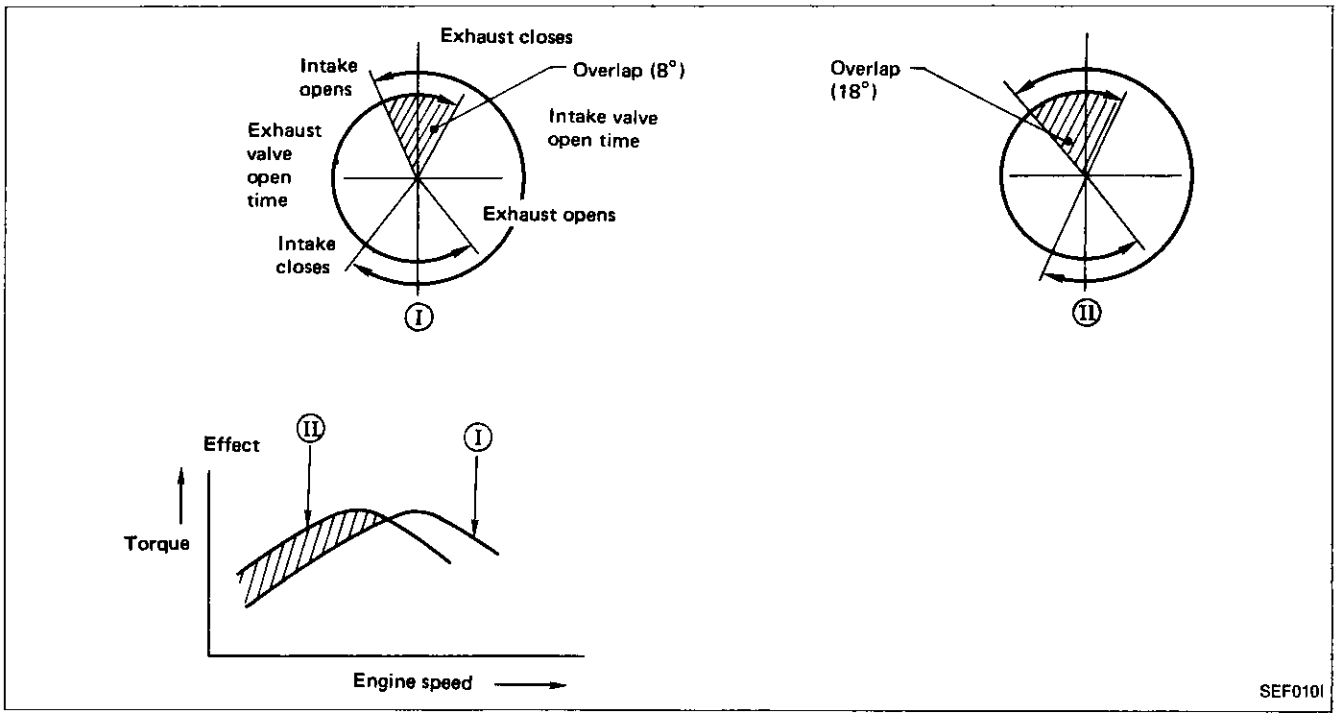
Valve Timing Control (Cont'd)



OPERATION

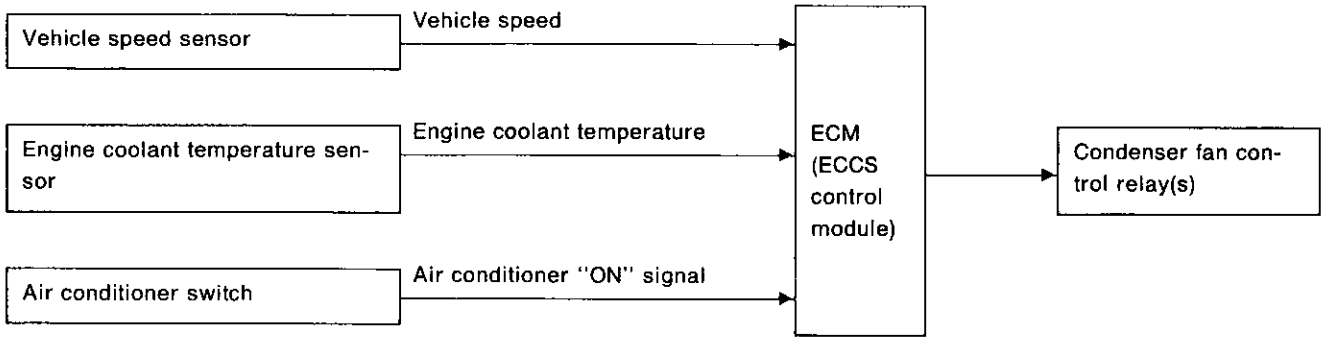
Engine operating condition	Valve timing control solenoid valve	Intake valve opening and closing time	Valve overlap	Engine torque curve
Idling, high speed	OFF	Retard	Decreased	Ⅰ
Low to medium speed	ON	Advance	Increased	Ⅱ





Condenser Fan Control

INPUT/OUTPUT SIGNAL LINE



The ECM controls the condenser fan corresponding to the vehicle speed, engine coolant temperature, and air conditioner ON signal. The non-turbo model has 2-step control [ON (HIGH)/OFF], and the turbo model 3-step control [HIGH/LOW/OFF].

OPERATION

Air conditioner switch is "OFF"

Engine coolant temperature °C (°F)	Condenser fan
Below 104 (219)	OFF
Above 105 (221)	ON

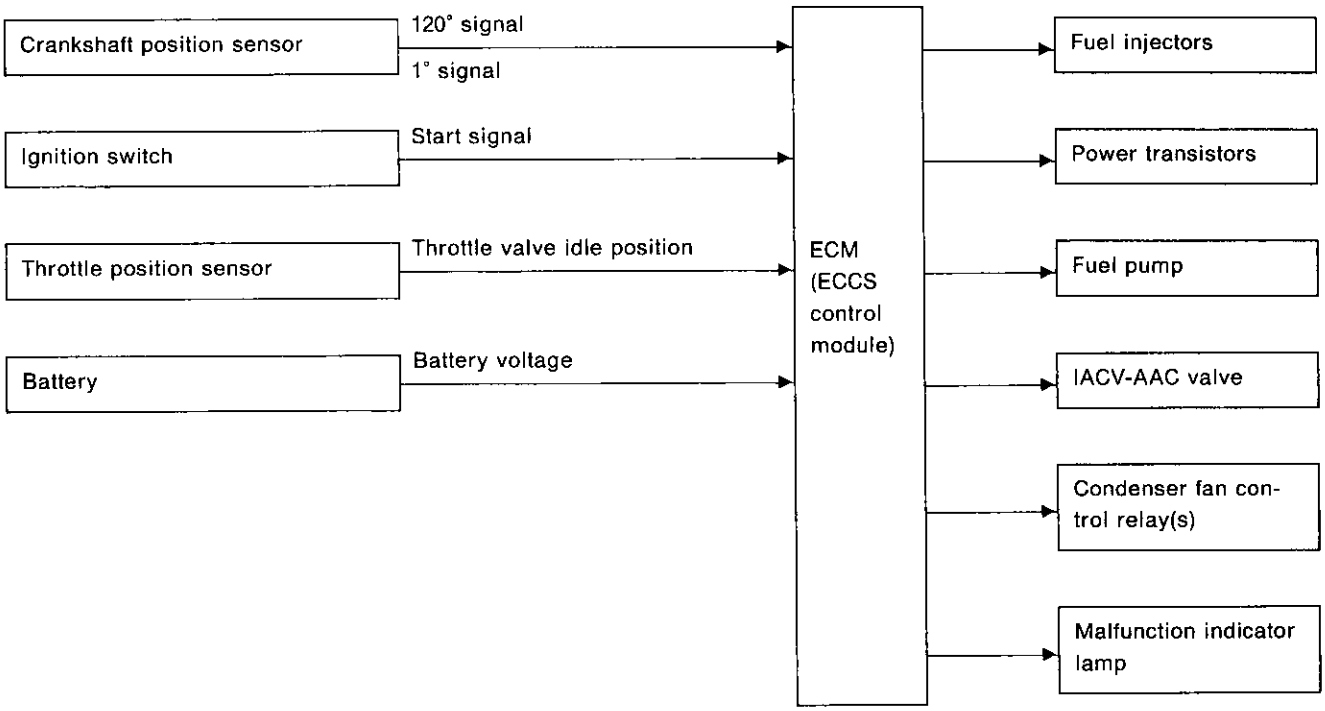
Air conditioner switch is "ON"

Vehicle speed km/h (MPH)	Engine coolant temperature °C (°F)	Condenser fan
Below 39 (24)	Below 94 (201)	OFF
	Above 95 (203)	ON
Above 40 (25)	Below 104 (219)	OFF
	Above 105 (221)	ON

Fail-safe System

C.P.U. MALFUNCTION OF ECM

Input/output signal line



Outline

The fail-safe system makes engine starting possible if there is something malfunctioning in the ECM's C.P.U. circuit.
In general, 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 operation starts 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 C.P.U. 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, E.G.R. operation, and so on are controlled under certain limitations.

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 above or below the specified value, the ECM senses an mass air flow sensor malfunction. In 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.

Fail-safe System (Cont'd)

Operation

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.

ENGINE COOLANT TEMPERATURE SENSOR MALFUNCTION

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

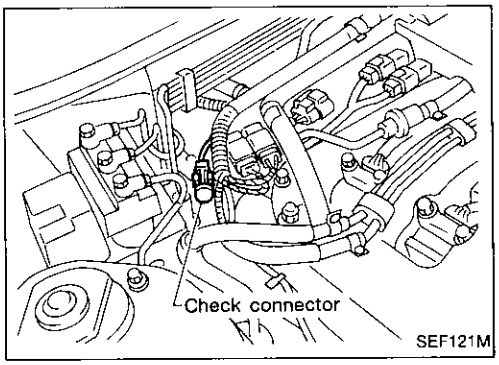
Engine condition	Engine coolant temperature preset value °C (°F)
Start	40 (104)
Running	80 (176)

KNOCK SENSOR MALFUNCTION

When the output signal of the knock sensor is abnormal, the ECM judges it to be malfunctioning. When knock sensor is malfunctioning, ignition timing will retard or advance according to operating conditions.

THROTTLE POSITION SENSOR MALFUNCTION

When the output signal of throttle position sensor is abnormal, the ECM judges it as a malfunctioning of throttle position sensor. The ECM does not use the throttle position sensor signal but uses a closed throttle position switch signal.

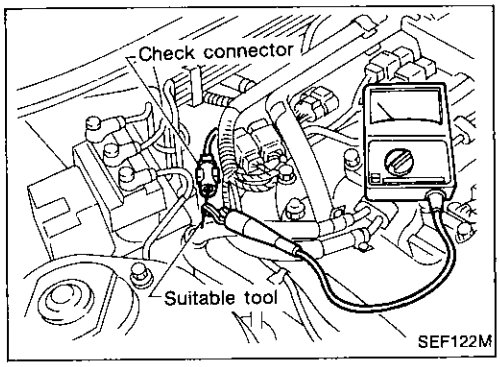


Direct Ignition System

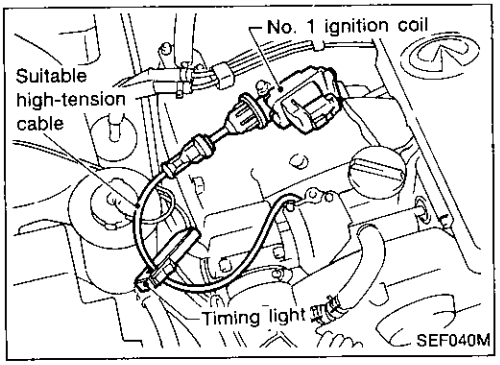
CHECKING IDLE SPEED AND IGNITION TIMING

Idle speed

1. Disconnect check connector for voltage type tachometer.



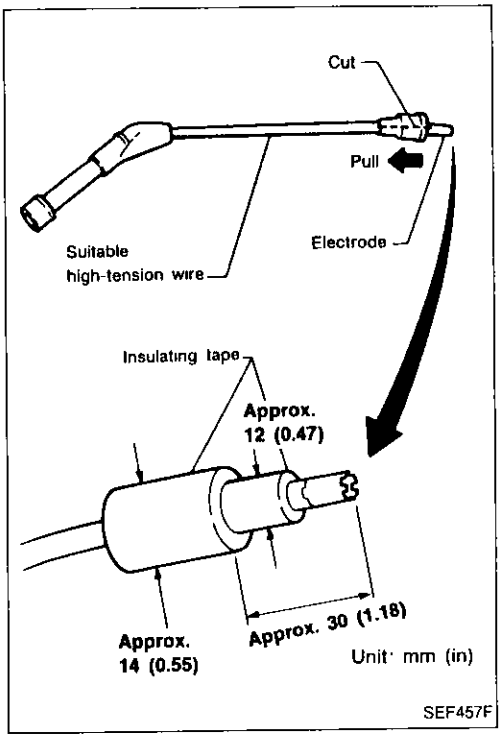
2. Connect tachometer using a suitable tool.



Ignition timing

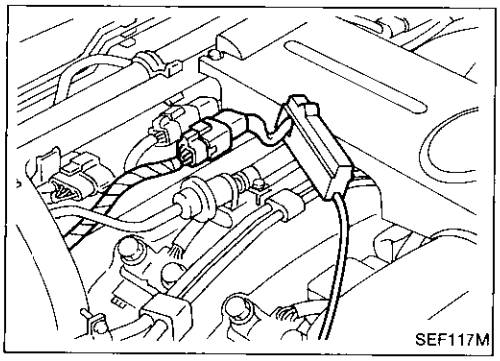
- **Method A (Without S.S.T.)**

1. Remove No. 1 or No. 6 ignition coil.
2. Connect No. 1 or No. 6 ignition coil and No. 1 or No. 6 spark plug with a suitable high-tension wire as shown, and attach timing light the above procedures, enlarge the end of a suitable high-tension wire with insulating tape as shown.
3. Check ignition timing.



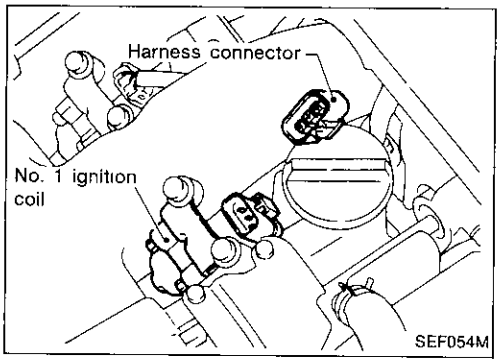
4. For the above procedures, enlarge the end of a suitable high-tension wire with insulating tape as shown.

Direct Ignition System (Cont'd)



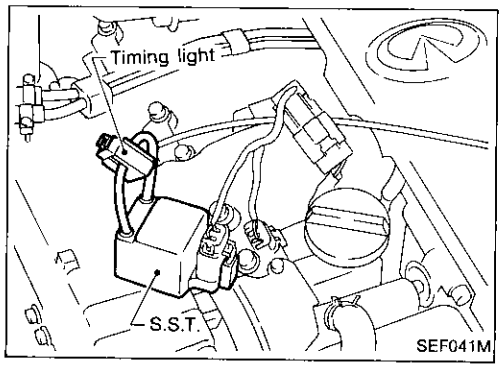
- **Method B (Without S.S.T.)**

Clamp wire as shown.
This connector is installed at the lower end of the left bank power transistor on some models, and the right bank power transistor on other models.

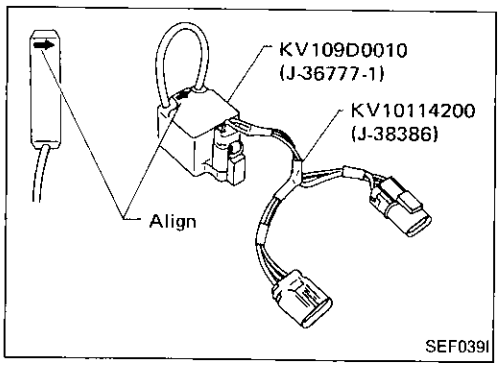


- **Method C (With S.S.T.)**

1. Disconnect No. 1 ignition coil connector.



2. Connect S.S.T. and clamp wire with timing light as shown.
3. Check ignition timing.



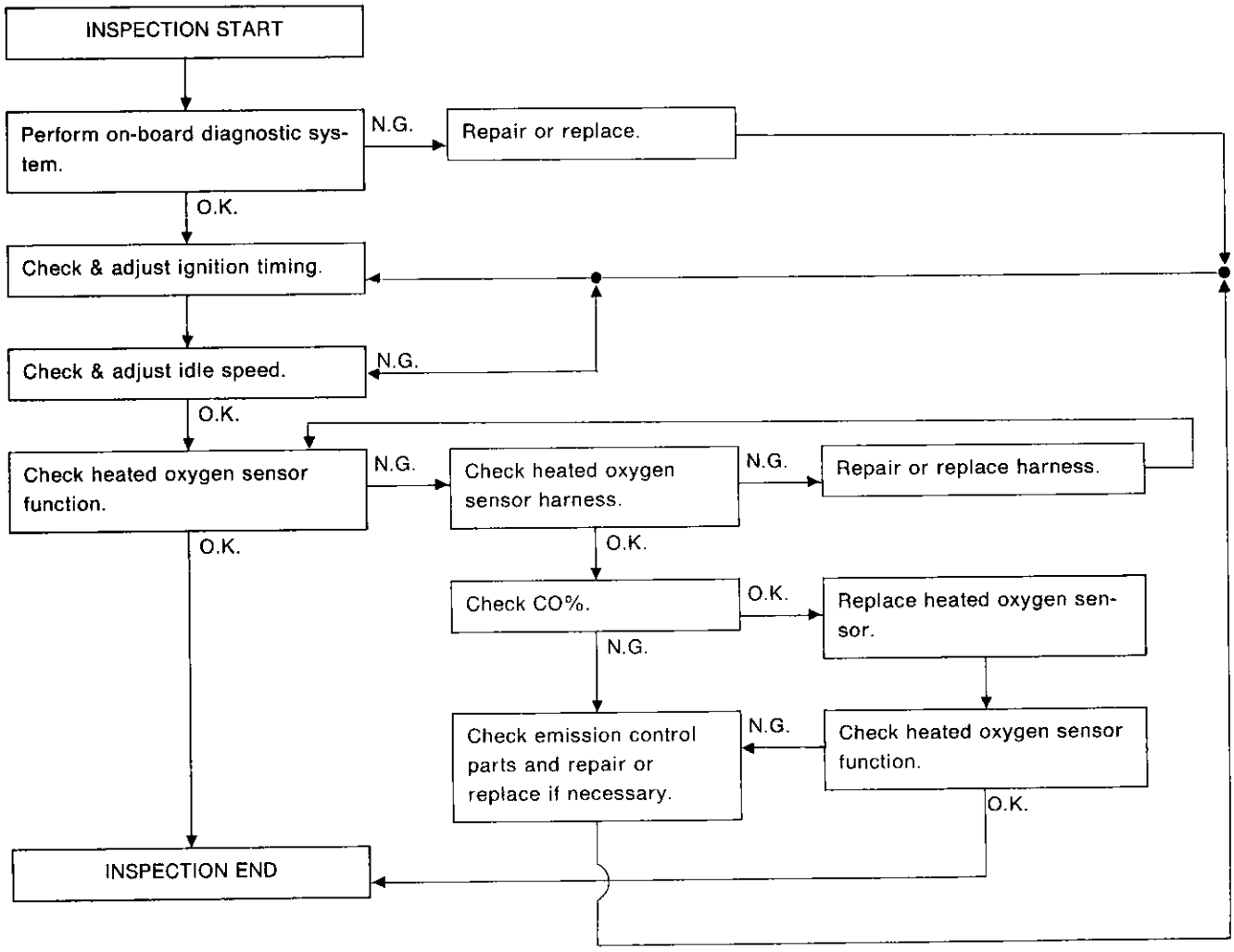
Align direction marks on S.S.T. and timing light clamp if aligning mark is punched.

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
- E.G.R. valve operation
- Throttle valve

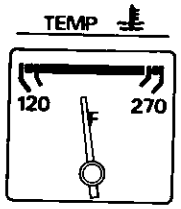
2. On air conditioner equipped models, checks should be carried out while the air conditioner is "OFF".
3. On automatic transmission equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in "N" position.
4. When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
5. Turn off headlamps, heater blower, rear defogger.
6. Keep front wheels pointed straight ahead.
7. Make the check after the radiator fan has stopped.

Overall inspection sequence



START

Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- EGR valve operation
- Electrical connectors
- Gasket
- Throttle valve



SEF246F

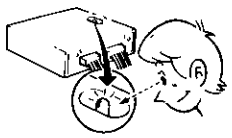
Start engine and warm it up until water temperature indicator points to the middle of gauge.



SEF247F

Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.

Perform E.C.C.S on-board diagnostic system.


SEF362I

O.K.

N.G.

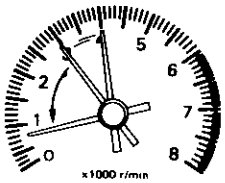
Repair or replace components as necessary.

Does engine run smoothly?

O.K.

N.G.

Clean injectors.



SEF248F

Race engine two or three times under no-load, then run engine at idle speed.

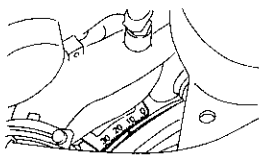
Check ignition timing with a timing light.

15° ± 2° B.T.D.C.

O.K.

N.G.

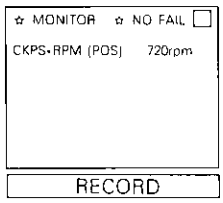
Adjust ignition timing by turning crankshaft position sensor after loosening securing bolts.


SEF042M

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Ⓗ



SEF225L

Check idle speed.

Read idle speed in "DATA MONITOR" mode with CONSULT.

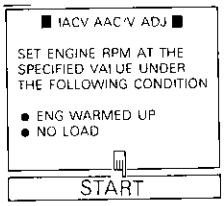
OR

Check idle speed.

A/T: 720 ± 50 rpm (in "N" position)

O.K.

N.G.

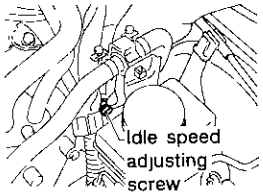


SEF372I

1) Select "IACV-AAC/V ADJ" in "WORK SUPPORT" mode.
2) Touch "START".

OR

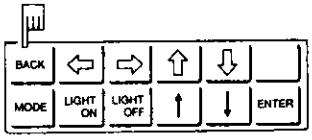
Disconnect IACV-AAC valve harness connector.



SEF043M

Adjust idle speed by turning idle speed adjusting screw.

A/T: 670 ± 25 rpm (in "N" position)



SEF913J

1) Touch "BACK".

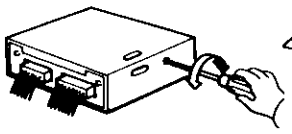
1) Connect IACV-AAC valve harness connector.



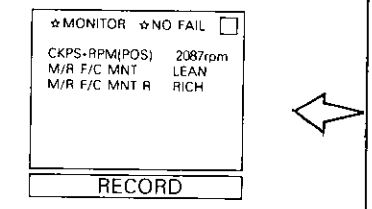
SEF247F

Run engine at about 2,000 rpm for about 2 minutes under no-load.

Set the diagnosis mode of ECM to Diagnostic Test Mode II.



SEF957D



SEF160I

Ⓓ

Check left bank heated oxygen sensor signal.

1) See "M/R F/C MNT (right and left sides)" in "Data monitor" mode.
2) 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.

RICH → LEAN → RICH → (1 time / 2 times)
LEAN → RICH .....

OR

Make sure that malfunction indicator lamp and red L.E.D. go on and off more than 5 times during 10 seconds at 2,000 rpm.

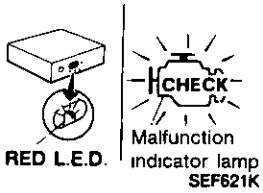
Monitor does not fluctuate.
Inspection lamp does not blink.

O.K.

Less than 5 times

Replace left bank heated oxygen sensor.

Ⓙ



SEF621K

O.K.

Check left bank heated oxygen sensor signal.

1) See "M/R F/C MNT (right and left sides)" in "Data monitor" mode.
2) 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.

RICH → LEAN → RICH → (1 time / 2 times)
LEAN → RICH .....

OR

Make sure that inspection lamp goes on and off more than 5 times during 10 seconds at 2,000 rpm.

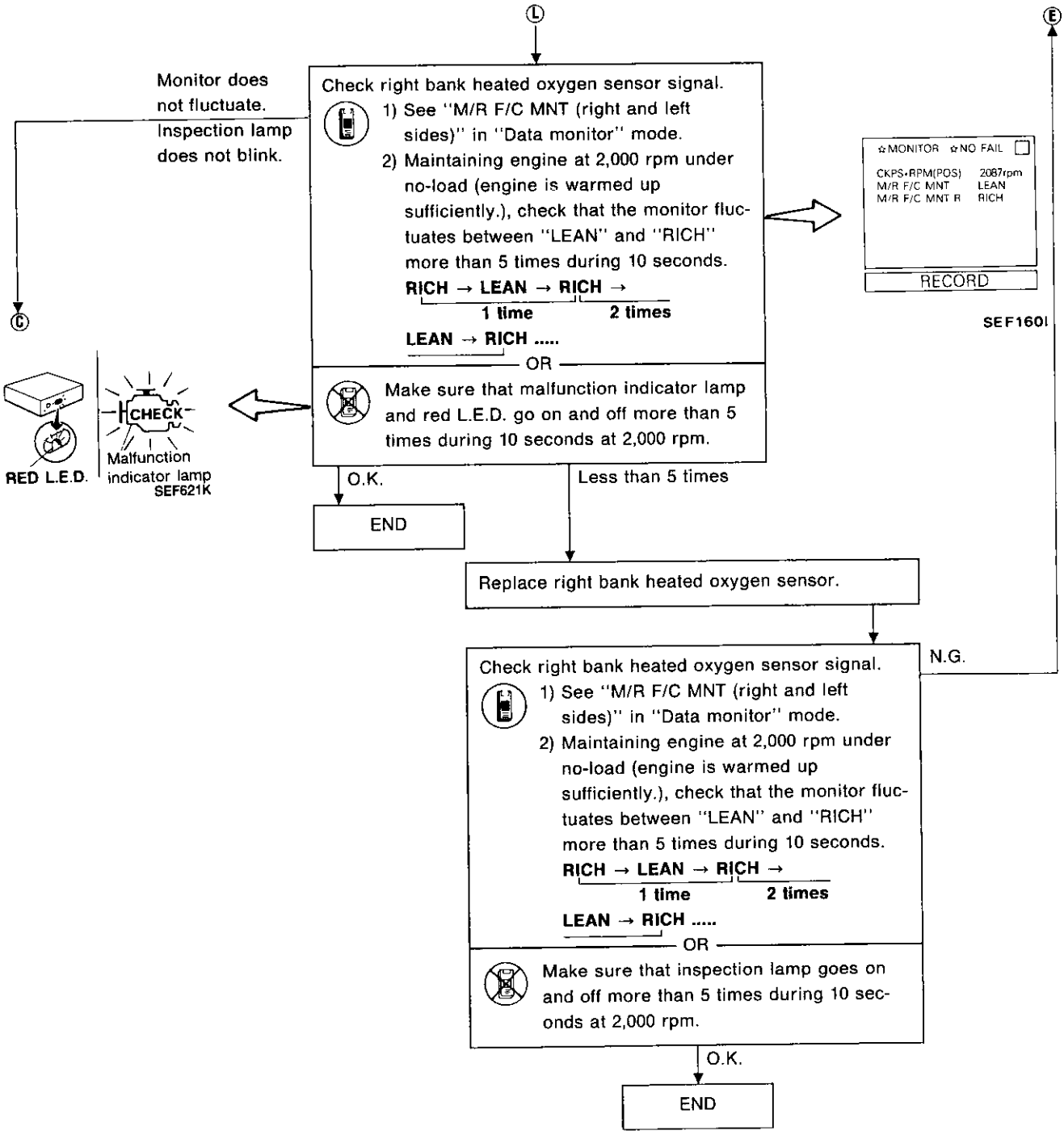
N.G.

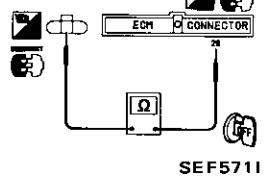
Ⓚ

Ⓛ

Ⓔ

Ⓕ


Ⓛ
Ⓔ
Monitor does not fluctuate.
Inspection lamp does not blink.
Check right bank heated oxygen sensor signal.
1) See "M/R F/C MNT (right and left sides)" in "Data monitor" mode.
2) 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.
RICH → LEAN → RICH →
1 time
2 times
LEAN → RICH .....
OR
Make sure that malfunction indicator lamp and red L.E.D. go on and off more than 5 times during 10 seconds at 2,000 rpm.
☆MONITOR ☆NO FAIL
CKPS•RPM(POS) 2087rpm
M/R F/C MNT LEAN
M/R F/C MNT R RICH
RECORD
SEF160I
Ⓒ
CHECK
Malfunction indicator lamp
RED L.E.D.
SEF621K
O.K.
Less than 5 times
END
Replace right bank heated oxygen sensor.
Check right bank heated oxygen sensor signal.
1) See "M/R F/C MNT (right and left sides)" in "Data monitor" mode.
2) 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.
RICH → LEAN → RICH →
1 time
2 times
LEAN → RICH .....
OR
Make sure that inspection lamp goes on and off more than 5 times during 10 seconds at 2,000 rpm.
N.G.
O.K.
END



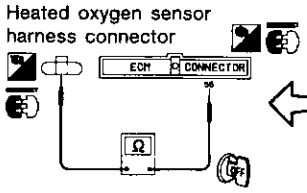
Check right bank heated oxygen sensor harness:
1) Turn off engine and disconnect battery ground cable.
2) Disconnect 76-pin connector from ECM.
3) Disconnect right bank heated oxygen sensor harness connector.
4) Check for continuity between terminal No. 29 of 76-pin connector and harness connector for heated oxygen sensor.

Continuity exists ..... **OAA.**
Continuity does not exist ..... **N.G.**

O.K. | N.G.

Repair or replace harness. → Ⓘ

Connect 76-pin connector to ECM.



Check left bank heated oxygen sensor harness:
1) Turn off engine and disconnect battery ground cable.
2) Disconnect 76-pin connector from ECM.
3) Disconnect left bank heated oxygen sensor harness connector.
4) Check for continuity between terminal No. 55 of 76-pin connector and harness connector for heated oxygen sensor.

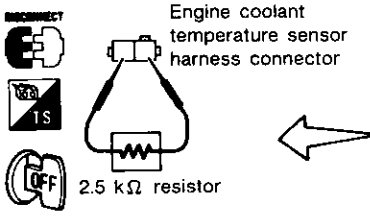
Continuity exists ..... **O.K.**
Continuity does not exist ..... **N.G.**

O.K. | N.G.

Repair or replace harness. → Ⓘ

Connect 76-pin connector to ECM.

→ Ⓖ



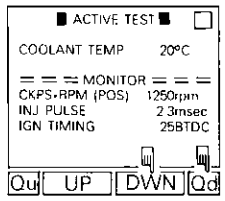
SEC242B

Ⓖ

1) Select "ENGINE TEMP" in "ACTIVE TEST" mode.
2) Set "ENGINE TEMP" to 20°C (68°F) by touching "DWN" and "Od".

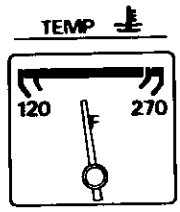
OR

1) Disconnect engine coolant temperature sensor harness connector.
2) Connect a resistor (2.5 kΩ) between terminals of engine coolant temperature sensor harness connector.



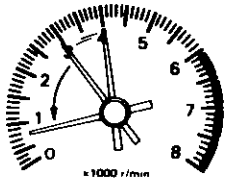
SEF878J

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



SEF246F

Race engine two or three times under no-load, then run engine at idle speed.



SEF248F

Check "CO" %.

Idle CO: 0.2 - 8%

After checking CO%,
1) Disconnect the resistor from terminals of engine coolant temperature sensor.
2) Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.

O.K. → Ⓙ

N.G.

Connect heated oxygen sensor harness connector to heated oxygen sensor.

Check fuel pressure regulator. ← Ⓚ

Check mass air flow sensor.

Check injector.
Clean or replace if necessary.

Check engine coolant temperature sensor.

Check ECM function* by substituting another known good ECM. → Ⓗ

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

Contents

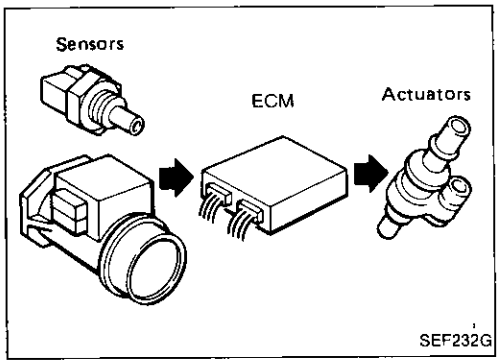
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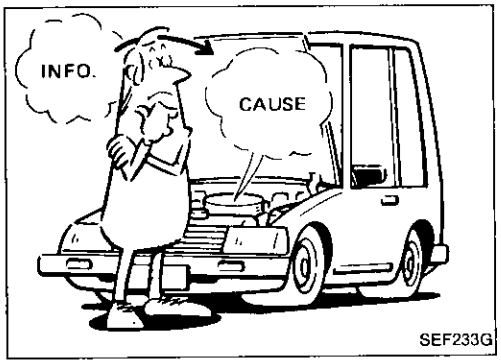
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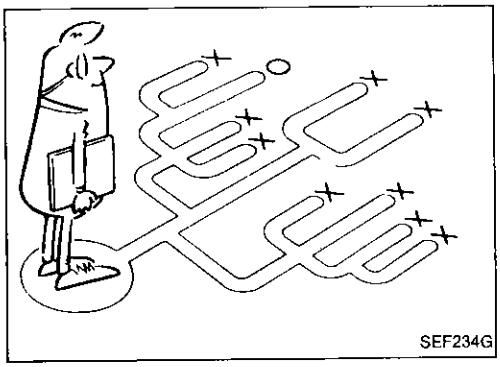
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How to Perform Trouble Diagnoses for Quick and Accurate Repair

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.

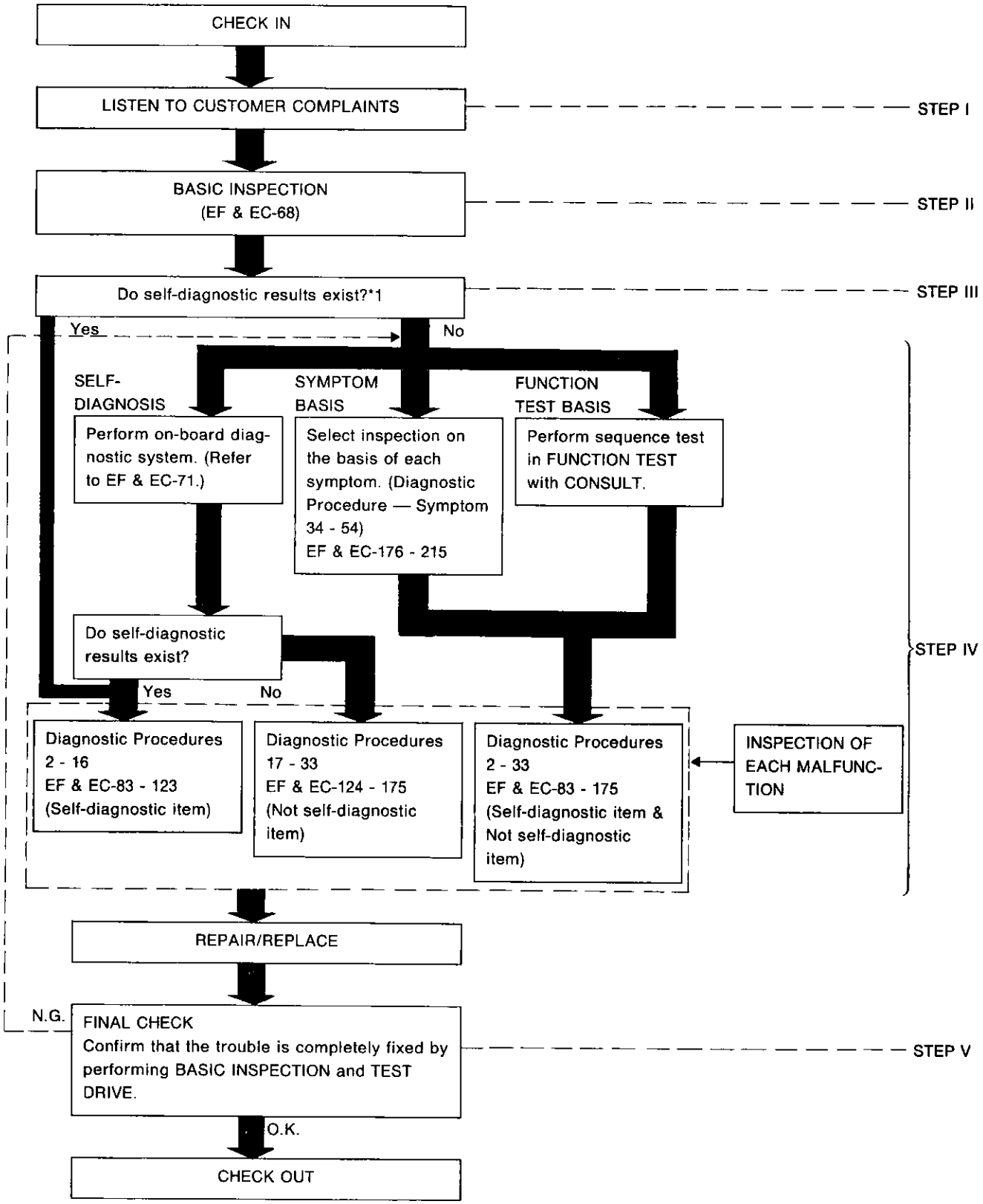
A visual check only may not find the cause of the problems, so a road test with a circuit tester connected to a suspected circuit should be performed.

Before undertaking actual checks, take just a few minutes to talk with a customer who approaches with a driveability 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 driveability problems on an electronically controlled engine vehicle.

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 1)**

***2: If the trouble is not duplicated, see INTERMITTENT PROBLEM SIMULATION (EF & EC-46).**

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	Perform inspection often selecting from the following three tests according to the trouble observed. 1. ON-BOARD DIAGNOSTIC SYSTEM 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. 2. SYMPTOM BASIS 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 34 - 54. 3. FUNCTION TEST BASIS (Sequence test) 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 2 - 33. 4. Diagnostic Procedure • This inspection program is prepared using the data obtained when disconnection of harness or connectors has occurred in the respective circuit. • Inspection of the "Not self-diagnostic item" does not actually start with the execution of on-board diagnostic system. However, inspection is started by assuming that the on-board diagnostic system has already been performed. • When a system having the on-board diagnostic system function contains any circuit placed outside the range of this on-board diagnostic system function, it is arranged that the "Not on-board diagnostic system item" of such a system will be performed when the self-diagnostic result is OK. Example: CRANKSHAFT POSITION SENSOR
STEP V	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. 2. If the same trouble phenomenon is observed again in the final check: Go back to STEP IV, and perform the inspection using a method which is different from the previous method. 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.

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

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE ..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

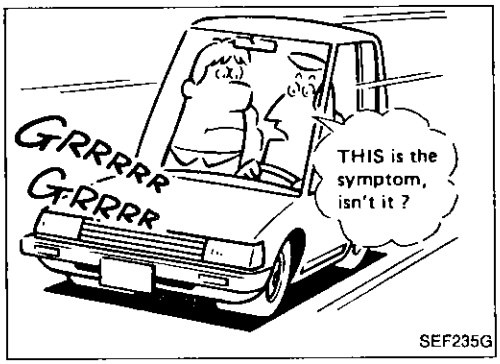
SEF907L

DIAGNOSTIC WORKSHEET

There are many kinds of operating conditions that lead to malfunctions on engine components.
A good grasp of such conditions can make trouble-shooting faster and more accurate.
In general, feelings for a problem depend on each customer. It is important to fully understand the symptoms or under what conditions a customer complains.
Make good use of a diagnostic worksheet such as the one shown below in order to utilize all the complaints for trouble-shooting.

Worksheet sample

Customer name MR/MS	Model & Year	VIN
Engine #	Trans.	Mileage
Incident Date	Manuf. Date	In Service Date
Symptoms — ☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence	☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency	☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions	☐ Not affected	
Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions	☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions	☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions	☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp	☐ Turned on ☐ Not turned on	

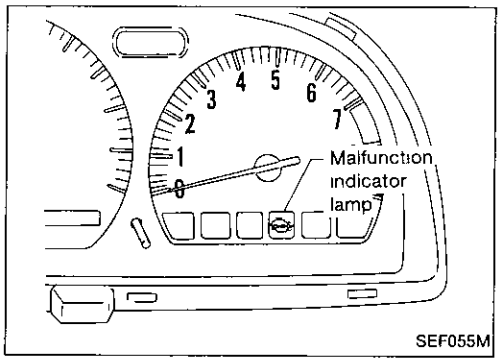


How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont'd)

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.

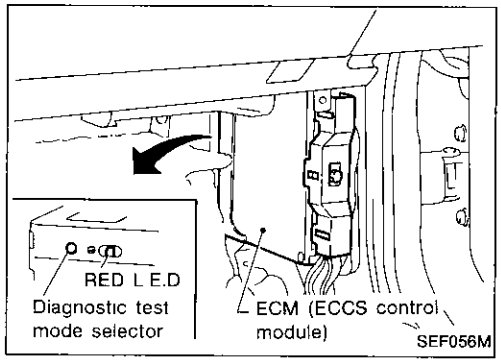
	Variable factor	Influential part	Target condition	Service procedure
1	Mixture ratio	Pressure regulator	Made lean	Remove vacuum hose and apply vacuum.
			Made rich	Remove vacuum hose and apply pressure.
2	Ignition timing	Crankshaft position sensor	Advanced	Rotate distributor counter clockwise.
			Retarded	Rotate distributor clockwise.
3	Mixture ratio feedback control	Heated oxygen sensor	Suspended	Disconnect heated oxygen sensor harness connector.
		ECM	Operation check	Perform on-board diagnostic system (Diagnostic Test Mode II) 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.
				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. **[WARNING: Do not overheat the unit.]**
7	Moisture	Electric parts	Damp	Wet. **[WARNING: Do not directly pour water on components. Use a mist sprayer.]**
8	Electric loads	Load switches	Loaded	Turn on headlamps, air conditioner, rear defogger, etc.
9	Closed throttle position switch condition	ECM	ON-OFF switching	Rotate throttle position sensor body.
10	Ignition spark position	Timing light	Spark power check	Try to flash timing light for each cylinder using ignition coil adapter (S.S.T.).



On-board diagnostic system

MALFUNCTION INDICATOR LAMP (MIL)

A malfunction indicator lamp has been adopted on all models. This light blinks simultaneously with the RED L.E.D. on the ECM.



ECM L.E.D.

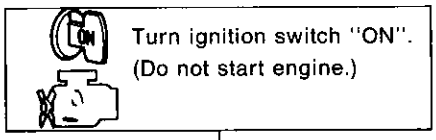
The ECM has only one RED L.E.D.

SELF-DIAGNOSTIC FUNCTION

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

On-board diagnostic system (Cont'd)

HOW TO SWITCH MODES



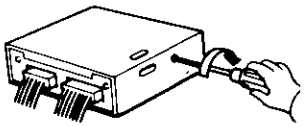
Turn ignition switch "ON".
(Do not start engine.)

Diagnostic Test Mode I — BULB CHECK



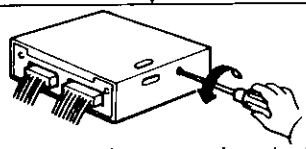
Start engine.

Diagnostic Test Mode I — MALFUNCTION WARNING



(Turn diagnostic test mode selector on ECM fully clockwise)

Wait at least 2 seconds.



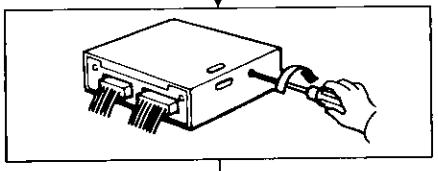
(Turn diagnostic test mode selector fully counterclockwise)

Diagnostic Test Mode II — SELF-DIAGNOSTIC RESULTS

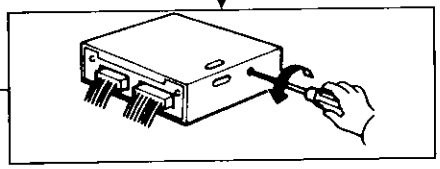


Start engine.

Diagnostic Test Mode II — HEATED OXYGEN SENSOR MONITOR



Wait at least 2 seconds.



- **Turn back diagnostic test mode selector to the fully counterclockwise position whenever vehicle is in use.**
- **Switching the modes is not possible when the engine is running.**
- **When the ignition switch is turned off during diagnosis in each mode, and then turned back on again after power to the ECM has dropped off completely, the diagnosis will automatically return to Diagnostic Test Mode I.**

On-board diagnostic system — Diagnostic Test Mode I

DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the RED L.E.D. in the ECM and the MALFUNCTION INDICATOR LAMP in the instrument panel stay "ON".
If either remain "OFF", check the bulb in the MALFUNCTION INDICATOR LAMP or the RED L.E.D.

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

For California model

MALFUNCTION INDICATOR LAMP and RED L.E.D.	Condition
ON	When the following malfunction (malfunction indicator lamp item) is detected or the ECM's C.P.U. or crankshaft position sensor is malfunctioning.
OFF	O.K.

Diagnostic trouble code No.	Malfunction
12	Mass air flow sensor circuit
13	Engine coolant temperature sensor circuit
14	Vehicle speed sensor circuit
31	ECM (ECCS control module)
32	E.G.R. function
33	Heated oxygen sensor circuit (Left bank)
35	EGR temperature sensor circuit
43	Throttle position sensor circuit
45	Injector leak
51	Injector circuit
53	Heated oxygen sensor circuit (Right bank)

- **These Diagnostic trouble code Numbers are clarified in Diagnostic Test Mode II — SELF- DIAGNOSTIC RESULTS.**
- **The RED L.E.D. and the MALFUNCTION INDICATOR LAMP will turn off when the normal condition is detected. At this time, the Diagnostic Test Mode II — SELF-DIAGNOSTIC RESULTS memory must be cleared as the contents remain stored.**

For non-California model

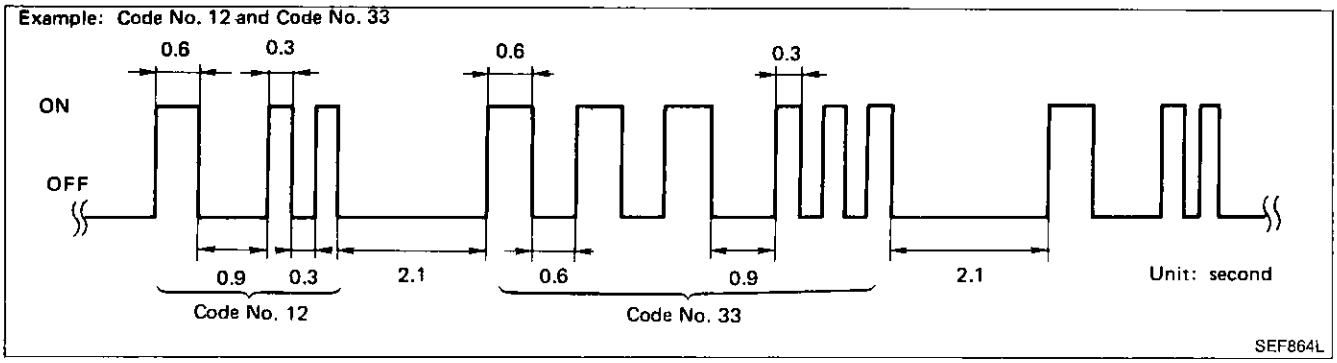
MALFUNCTION INDICATOR LAMP and RED L.E.D.	Condition
ON	When the ECM's C.P.U. or crankshaft position sensor is malfunctioning.
OFF	O.K.

On-board diagnostic system — Diagnostic test mode II (Self-diagnostic results)

CAUTION:
The mode selector on the ECM must be returned to the fully counterclockwise position, except when switching the modes.

DESCRIPTION

In this mode, a diagnostic trouble code is indicated by the number of flashes from the RED L.E.D. or the MALFUNCTION INDICATOR LAMP 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 red L.E.D. 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.

Display diagnostic trouble code table

Diagnostic trouble code No.	Detected items	California model	Non-California model
11*1)	Crankshaft position sensor circuit	X	X
12	Mass air flow sensor circuit	X	X
13	Engine coolant temperature sensor circuit	X	X
14	Vehicle speed sensor circuit	X	X
21*1)	Ignition signal circuit	X	X
31	ECM	X	X
32	E.G.R. function	X	—
33	Heated oxygen sensor circuit (Left bank)	X	X
34	Knock sensor circuit	X	X
35	EGR temperature sensor circuit	X	—
42	Fuel temperature sensor circuit	X	X
43	Throttle position sensor circuit	X	X
45	Injector leak	X	—
51	Injector circuit	X	—
53	Heated oxygen sensor circuit (Right bank)	X	X
54	Signal circuit from A/T control unit to ECM	X	X
55	No malfunction in the above circuits	X	X

X: Available
—: Not available
: Malfunction indicator lamp item.
*1): Check items causing a malfunction of crankshaft position sensor circuit first, if both "CRANKSHAFT 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)

Diagnostic trouble code No.	Detected items	Malfunction is detected when ...	Check item (remedy)
11*1)	Crankshaft position sensor circuit	• Either 1° or 90° signal is not entered for the first few seconds during engine cranking. • Either 1° or 90° signal is not input often enough while the engine speed is higher than the specified rpm.	• Harness and connector (If harness and connector are normal, replace crankshaft position sensor.)
12	Mass air flow sensor circuit	• The mass air flow sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector (If harness and connector are normal, replace mass air flow sensor.)
13	Engine coolant temperature sensor circuit	• The engine coolant temperature sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Engine coolant temperature sensor
14	Vehicle speed sensor circuit	• The vehicle speed sensor circuit is open or shorted.	• Harness and connector • Vehicle speed sensor (reed switch)
21*1)	Ignition signal circuit	• The ignition signal in the primary circuit is not entered during engine cranking or running.	• Harness and connector • Power transistor unit
31	ECM	• ECM calculation function is malfunctioning.	[Replace ECM (ECCS control module).]
32	E.G.R. function	• EGR valve does not operate. (EGR valve spring does not lift.)	• EGR valve • EGRC-solenoid valve
33	Heated oxygen sensor circuit (Left bank)	• The heated oxygen sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Heated oxygen sensor • Fuel pressure • Injectors • Intake air leaks
53	Heated oxygen sensor circuit (Right bank)		
34	Knock sensor circuit	• The knock sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Knock sensor
35	EGR temperature sensor circuit	• The EGR temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • EGR temperature sensor
42	Fuel temperature sensor circuit	• The fuel temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • EGR temperature sensor
43	Throttle position sensor circuit	• The throttle position sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Throttle position sensor
45	Injector leak	• Fuel leaks from injector.	• Injector
51	Injector circuit	• The injector circuit is open or shorted.	• Injector
54	Signal circuit from A/T control unit to ECM (A/T only)	• The A/T communication line is open or shorted.	• Harness and connector

*1): Check items causing a malfunction of crankshaft position sensor circuit first, if both "CRANKSHAFT 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 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 self-diagnosis.**

On-board diagnostic system — Diagnostic test mode II (Heated oxygen sensor monitor)

DESCRIPTION

In this mode, the MALFUNCTION INDICATOR LAMP and RED L.E.D. display the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor.

MALFUNCTION INDICATOR LAMP and RED L.E.D.	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.

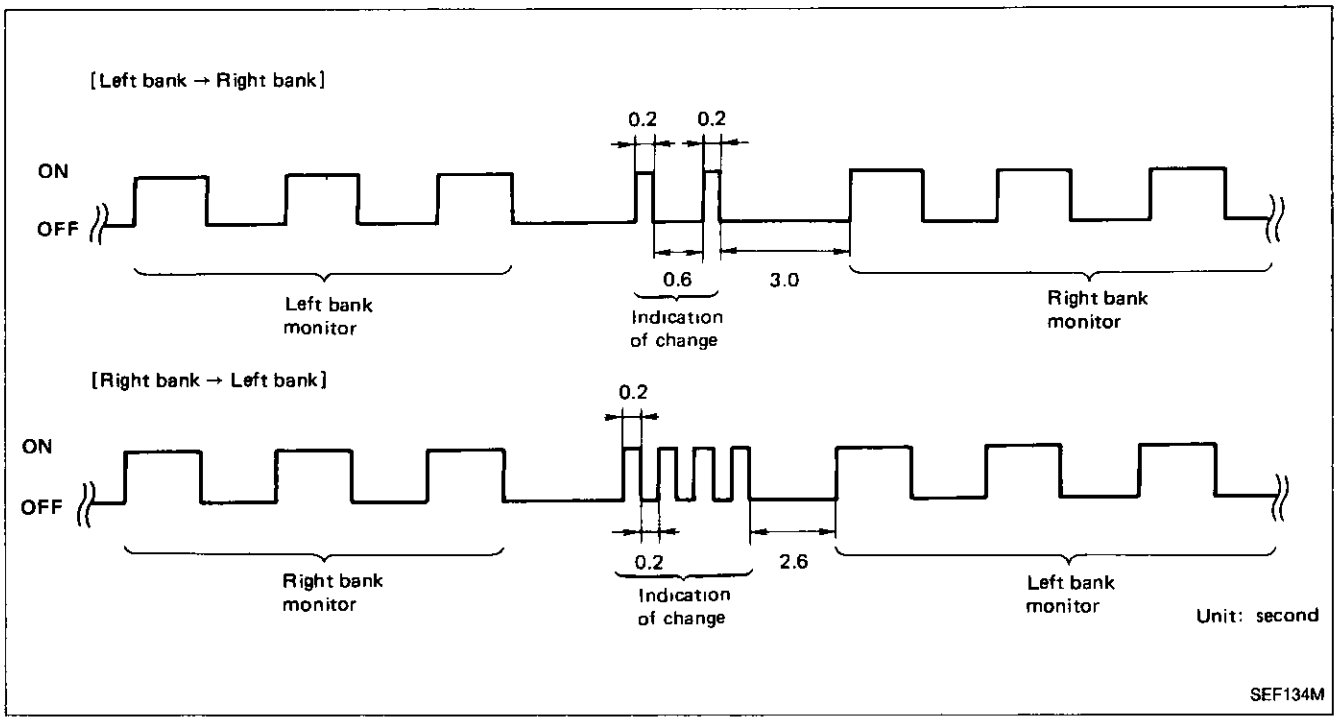
If two heated oxygen sensors (right bank and left bank) are fitted on the engine, the left bank heated oxygen sensor monitor operates first, when selecting this mode.

HOW TO CHANGE MONITOR FROM LEFT BANK (Right bank) TO RIGHT BANK (Left bank)

1. Turn diagnostic test mode selector on ECM fully clockwise.
2. Wait at least 2 seconds.
3. Turn diagnostic test mode selector on ECM fully counterclockwise.

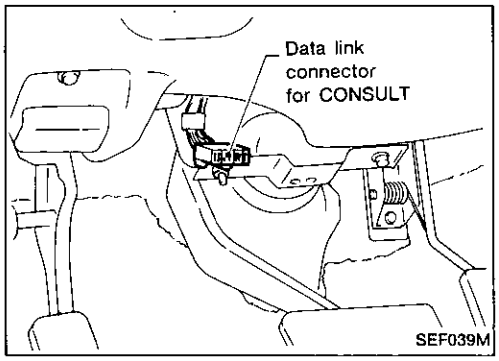
- These procedures should be carried out when the engine is running.

On-board diagnostic system — Diagnostic test mode II (Heated oxygen sensor monitor) (Cont'd)



HOW TO CHECK HEATED OXYGEN SENSOR

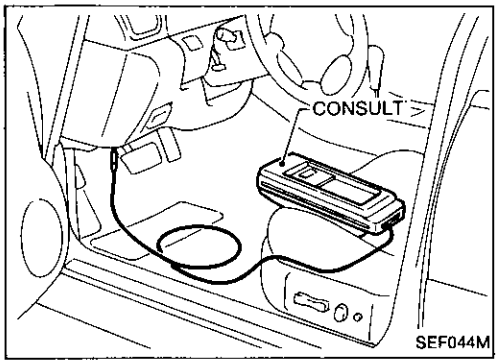
1. Set Diagnostic Test Mode II. (Refer to "HOW TO SWITCH DIAGNOSTIC TEST MODES".)
2. Start engine and warm it up until engine coolant temperature indicator points to the middle of the gauge.
3. Run engine at about 2,000 rpm for about 2 minutes under no-load conditions.
4. Make sure RED L.E.D. or MALFUNCTION INDICATOR LAMP goes ON and OFF more than 5 times every 10 seconds; measured at 2,000 rpm under no-load.



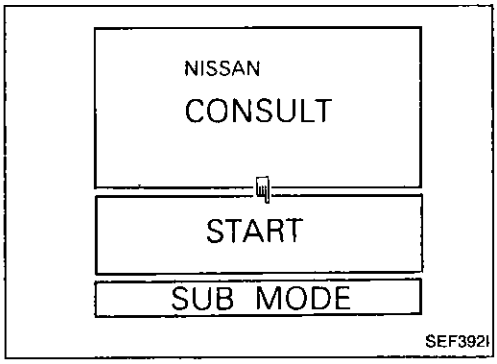
Consult

CONSULT INSPECTION PROCEDURE

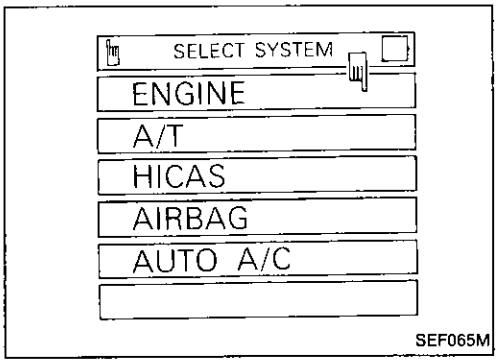
1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector for CONSULT. (Data link connector for CONSULT is located in left dash side panel.)



3. Turn on ignition switch.
4. Touch "START".

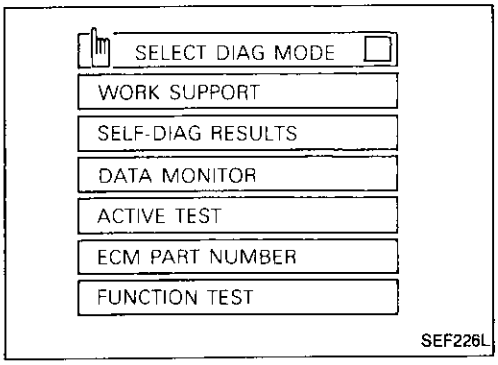


5. Touch "ENGINE".



6. Perform each diagnostic test mode according to the inspection sheet as follows:

For further information, read the CONSULT Operation Manual.



Consult (Cont'd)

E.C.C.S. COMPONENT PARTS APPLICATION

	DIAGNOSTIC TEST MODE / E.C.C.S. COMPONENT PARTS	WORK SUPPORT	SELF-DIAGNOSTIC RESULTS	DATA MONITOR	ACTIVE TEST	FUNCTION TEST
INPUT	Crankshaft position sensor		X	X		
	Mass air flow sensor		X	X		
	Engine coolant temperature sensor		X	X	X	
	Heated oxygen sensors		X	X		X
	Vehicle speed sensor		X	X		X
	Throttle position sensor	X	X	X		X
	Fuel temperature sensor		X	X		
	EGR temperature sensor*		X	X		
	Knock sensor		X			
	Ignition switch (start signal)			X		X
	Air conditioner switch			X		
	Neutral position switch			X		
	Power steering oil pressure switch			X		X
	Battery			X		
	A/T signal		X			
OUTPUT	Injectors		X	X	X	X
	Power transistors (ignition timing)		X (Ignition signal)	X	X	X
	IACV-AAC valve	X		X	X	X
	IACV-FICD solenoid valve			X	X	X
	Valve timing control solenoid valve			X	X	X
	P.R.V.R. control solenoid valve			X	X	X
	EGRC-solenoid valve			X	X	X
	Air conditioner relay			X		
	Fuel pump relay	X		X	X	X
	Condenser fan			X	X	X

* The E.C C.S. component part marked * is applicable to vehicles for California only.
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".

WORK SUPPORT DIAGNOSTIC TEST MODE

WORK ITEM	CONDITION	USAGE
THROTTLE POSITION SENSOR ADJUSTMENT	CHECK THE THROTTLE POSITION SENSOR SIGNAL. ADJUST IT TO THE SPECIFIED VALUE BY ROTATING THE SENSOR BODY UNDER THE FOLLOWING CONDITIONS. • IGN SW "ON" • ENG NOT RUNNING • ACC PEDAL NOT PRESSED	When adjusting throttle position sensor initial position,
IGNITION TIMING ADJUSTMENT*	• IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING "START" AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CRANKSHAFT POSITION SENSOR.	When adjusting initial ignition timing,
IACV-AAC VALVE ADJUSTMENT	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. • ENGINE WARMED UP • NO-LOAD	When adjusting idle speed,
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line,

*: The ignition timing feedback control is not adopted on model 300ZX, so it is not necessary to perform IGNITION TIMING ADJUSTMENT.

Consult (Cont'd)

SELF-DIAGNOSTIC RESULTS DIAGNOSTIC TEST MODE

DIAGNOSTIC ITEM	DIAGNOSTIC ITEM IS DETECTED WHEN ...	CHECK ITEM (REMEDY)
CRANKSHAFT POSITION SENSOR*	• Either 1° or 120° signal is not entered for the first few seconds during engine cranking. • Either 1° or 120° signal is not input often enough while the engine speed is higher than the specified rpm.	• Harness and connector (If harness and connector are normal, replace crankshaft position sensor.)
MASS AIR FLOW SENSOR	• The mass air flow sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector (If harness and connector are normal, replace mass air flow sensor.)
ENGINE COOLANT TEMPERATURE SENSOR	• The engine coolant temperature sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Engine coolant temperature sensor
VEHICLE SPEED SENSOR	• The vehicle speed sensor circuit is open or shorted.	• Harness and connector • Vehicle speed sensor (reed switch)
IGN SIGNAL—PRIMARY*	• The ignition signal in primary circuit is not entered during engine cranking or running.	• Harness and connector • Power transistor unit
ECM	• ECM calculation function is malfunctioning.	[Replace ECM (ECCS control module).]
EGR SYSTEM**	• EGR valve does not operate. (EGR valve spring does not lift.)	• EGR valve • EGRC-solenoid valve
HEATED OXYGEN SENSOR HEATED OXYGEN SENSOR-R	• The heated oxygen sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Heated oxygen sensor • Fuel pressure • Injectors • Intake air leaks
KNOCK SENSOR	• The knock sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Knock sensor
EGR TEMP SENSOR**	• The EGR temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • EGR temperature sensor
FUEL TEMP SENSOR	• The fuel temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Fuel temperature sensor
THROTTLE POSITION SENSOR	• The throttle position sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Throttle position sensor

*: Check items causing a malfunction of crankshaft position sensor circuit first, if both "CRANKSHAFT POSITION SENSOR" and "IGN SIGNAL—PRIMARY" are displayed at the same time.

Consult (Cont'd)

DIAGNOSTIC ITEM	DIAGNOSTIC ITEM IS DETECTED WHEN ...	CHECK ITEM (REMEDY)
INJECTION FUEL LEAK**	• Fuel leaks from injector.	• Injector
INJECTOR OPEN**	• The injector circuit is open.	• Injector
A/T COMM LINE	• The A/T communication line is open or shorted.	• Harness and connector

**: The diagnostic item marked ** is applicable to vehicles for California only.

Consult (Cont'd)

DATA MONITOR DIAGNOSTIC TEST 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 crankshaft position sensor and other ignition timing related sensors.
- If the real-time diagnosis results are NG and the on-board diagnostic system results are OK when diagnosing the mass air flow sensor, first check to see if the fuel pump control circuit is normal.
- The monitor item marked "* *" is applicable to vehicles for California only.

MONITOR ITEM	CONDITION		SPECIFICATION	CHECK ITEM WHEN OUTSIDE SPEC.
CKPS·RPM (POS) CKPS·RPM (REF)	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT value.		Almost the same speed as the CONSULT value.	• Harness and connector • Crankshaft position sensor
MAS AIR/FL SE	• Engine: After warming up, idle the engine • A/C switch "OFF" • Shift lever "N" • No-load	Idle	1.0 - 1.4V	• Harness and connector • Mass air flow sensor
		2,000 rpm	1.4 - 1.9V	
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)	• Harness and connector • Engine coolant temperature sensor
O2 SEN O2 SEN-R M/R F/C MNT M/R F/C MNT-R	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V → 0.6 - 1.0V LEAN → RICH Changes more than 5 times during 10 seconds.	• Harness and connector • Heated oxygen sensor • Intake air leaks • Injectors
VHCL SPEED SE	• Turn drive wheels and compare speedometer indication with the CONSULT value		Almost the same speed as the CONSULT value	• Harness and connector • Vehicle speed sensor
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V	• Battery • ECM power supply circuit
THRTL POS SEN	• Ignition switch: ON (Engine stopped)	Throttle valve fully closed (Engine: After warming up)	0.4 - 0.5V	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment
		Throttle valve fully open	Approx. 4.0V	
FUEL TEMP SEN	• Engine: After warming up		20 - 60°C (68 - 140°F)	• Harness and connector • Fuel temperature sensor
EGR TEMP SEN**	• Engine: After warming up		Less than 4.5V	• Harness and connector • EGR temperature sensor
START SIGNAL	• Ignition switch: ON → START		OFF → ON	• Harness and connector • Starter switch

Consult (Cont'd)

MONITOR ITEM	CONDITION		SPECIFICATION	CHECK ITEM WHEN OUTSIDE SPEC.
CLOSED TH/POS	• Ignition switch: ON (Engine stopped)	Throttle valve: Idle position (Engine: After warming up)	ON	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment • Closed throttle position switch
		Throttle valve: Slightly open	OFF	
AIR COND SIG	• Engine: After warming up, idle the engine	A/C switch "OFF"	OFF	• Harness and connector • Air conditioner switch
		A/C switch "ON"	ON	
NEUTRAL POSITION SW	• Ignition switch: ON	Shift lever "P" or "N"	ON	• Harness and connector • Neutral position switch
		Except above	OFF	
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF	• Harness and connector • Power steering oil pressure switch
		The steering wheel is turned	ON	
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger is operating.	ON	• Harness and connector • Rear window defogger system (Refer to section EL.)
		Rear window defogger is not operating.	OFF	
INJ PULSE INJ PULSE-R	• Engine: After warming up • A/C switch "OFF" • Shift lever "N" • No-load	Idle	1.8 - 2.5 msec.	• Harness and connector • Injector • Mass air flow sensor • Intake air system
		2,000 rpm	1.7 - 2.4 msec.	
IGN TIMING	ditto	Idle	15° B.T.D.C.	• Harness and connector • Crankshaft position sensor
		2,000 rpm	More than 25° B.T.D.C.	
IACV-AAC/V	ditto	Idle	15 - 40%	• Harness and connector • IACV-AAC valve
		2,000 rpm	—	
A/F ALPHA A/F ALPHA-R	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	75 - 125%	• Harness and connector • Injectors • Mass air flow sensor • Heated oxygen sensor • Canister purge line • Intake air system
AIR COND RLY	Engine: After warming up, idle the engine Air conditioner switch OFF → ON		OFF → ON	• Harness and connector • Air conditioner switch • Air conditioner relay
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking • When engine is stopped (stops in 1.5 seconds)		ON	• Harness and connector • Fuel pump relay
	Except as shown above		OFF	

Consult (Cont'd)

MONITOR ITEM	CONDITION		SPECIFICATION	CHECK ITEM WHEN OUTSIDE SPEC.
VALVE T/M SOL	• Jack up rear wheel • Engine: After warming up	• Idle	OFF	• Harness and connector • Valve timing solenoid valve
		• Shift select lever to any range except "N" or "P" range • Quickly depress accelerator pedal, then quickly release it	OFF → ON → OFF	
RADIATOR FAN	• After warming up engine, idle the engine. • A/C switch "OFF"	Engine coolant temperature is 94°C (201°F) or less	OFF	• Harness and connector • Condenser fan relay • Condenser fan
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F)	LOW	
		Engine coolant temperature is 105°C (221°F) or more	HIGH	
PRVR CONT SOL VALVE	• Fuel temperature is above 75°C (167°F)	For 3 minutes after starting engine	ON	• Harness and connector • Pressure regulator control solenoid valve • Fuel temperature sensor
		3 minutes after starting engine	OFF	
FICD S/V	• Engine: After warming up, idle the engine	Air conditioner switch and fan switch "ON"	ON	• Harness and connector • IACV-FICD solenoid valve
		Air conditioner switch and fan switch "OFF"	OFF	
EGRC SOL/V	• Engine: After warming up • A/C switch "OFF" • Shift lever "N" • No-load	Idle	ON	• Harness and connector • EGRC-solenoid valve
		2,000 rpm	OFF	

Consult (Cont'd)

ACTIVE TEST DIAGNOSTIC TEST MODE

TEST ITEM	CONDITION		JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION TEST	• Engine: Return to the original trouble condition • Change the amount of fuel injection with the CONSULT.		If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Fuel injectors • Heated oxygen sensors
IACV-AAC/V OPENING TEST	• Engine: After warming up, idle the engine. • Change the IACV-AAC valve opening percent with the CONSULT.		Engine speed changes according to the opening percent.	• Harness and connector • IACV-AAC valve
ENG COOLANT TEMP TEST	• Engine: Return to the original trouble condition • Change the engine coolant temperature with the CONSULT.		If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Engine coolant temperature sensor • Fuel injectors
IGN TIMING TEST	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing with the CONSULT.		If trouble symptom disappears, see CHECK ITEM.	• Adjust initial ignition timing
POWER BALANCE TEST	• Engine: After warming up, idle the engine. • A/C switch "OFF" • Shift lever "N" • Cut off each injector signal one at a time with the CONSULT.		Engine runs rough or dies.	• Harness and connector • Compression • Injectors • Power transistor • Spark plugs • Ignition coils
RADIATOR FAN TEST	• Ignition switch: ON • Turn the radiator fan "ON" and "OFF" using CONSULT.		Condenser fan moves and stops.	• Harness and connector • Condenser fan motor
FICD SOL/V TEST	• Engine: After warming up, idle the engine. • A/C switch "OFF" • Shift lever "N" • Turn the IACV-FICD solenoid valve "ON" with the CONSULT.		Engine speed will increase momentarily by approx. 200 rpm.	• Harness and connector • IACV-FICD solenoid valve
FUEL PUMP RLY TEST	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay "ON" and "OFF" with the CONSULT and listen to operating sound.		Fuel pump relay makes the operating sound.	• Harness and connector • Fuel pump relay
EGRC SOLENOID VALVE TEST PRVR CONT SOL/V TEST VALVE TIM SOL TEST	• Ignition switch: ON • Turn solenoid valve "ON" and "OFF" with the CONSULT and listen to operating sound.		Each solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
SELF-LEARN CONT TEST	• In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen.			
PRVR CONT SOL VALVE	• Fuel temperature is above 75°C (167°F)	For 3 minutes after starting engine	ON	• Harness and connector • Pressure regulator control solenoid valve • Fuel temperature sensor
		3 minutes after starting engine	OFF	
FICD S/V	• Engine: After warming up, idle the engine.	Air conditioner switch and fan switch "ON"	ON	• Harness and connector • IACV-FICD solenoid valve
		Air conditioner switch and fan switch "OFF"	OFF	

Consult (Cont'd)

FUNCTION TEST DIAGNOSTIC TEST MODE

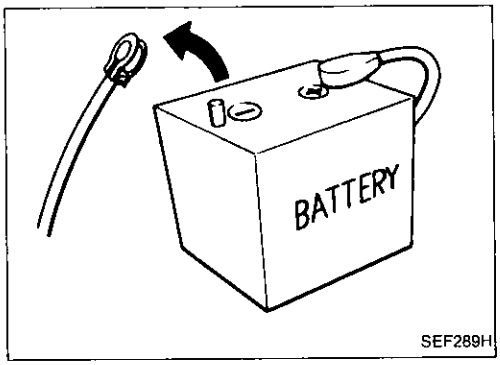
FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
SELF-DIAG RESULTS	• Ignition switch: ON (Engine stopped) • Displays the results of on-board diagnostic system.	—		Objective system
CLOSED THROTTLE POSI (CLOSED THROTTLE POSITION SWITCH CIRCUIT)	• Ignition switch: ON (Engine stopped) • Closed throttle position switch circuit is tested when throttle is opened and closed fully. ("IDLE POSITION" is the test item name for the vehicles in which idle is selected by throttle position sensor.)	Throttle valve: opened	OFF	• Harness and connector • Throttle position sensor (Closed throttle position switch) • Throttle position sensor (Closed throttle position switch) adjustment • Throttle linkage • Verify operation in DATA MONITOR mode.
		Throttle valve: closed	ON	
THROTTLE POSI SEN CKT	• Ignition switch: ON (Engine stopped) • Throttle position sensor circuit is tested when throttle is opened and closed fully.	Range (Throttle valve fully opened — Throttle valve fully closed)	More than 3.0V	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment • Throttle linkage • Verify operation in DATA MONITOR mode.
NEUTRAL POSI SW CKT	• Ignition switch: ON (Engine stopped) • Neutral position switch circuit is tested when shift lever is manipulated.	OUT OF N/P-RANGE	OFF	• Harness and connector • Neutral position switch/ Inhibitor switch • Linkage + Inhibitor switch adjustment
		IN N-RANGE	ON	
FUEL PUMP CIRCUIT	• Ignition switch: ON (Engine stopped) • Fuel pump circuit is tested by checking the pulsation in fuel pressure when fuel tube is pinched.	There is pressure pulsation on the fuel feed hose.		• Harness and connector • Fuel pump • Fuel pump relay • Fuel filter clogging • Fuel level
EGRC SOL/V CIRCUIT	• Ignition switch: ON (Engine stopped) • EGR control S/V circuit is tested by checking solenoid valve operating noise.	The solenoid valve makes an operating sound every 3 seconds.		• Harness and connector • EGRC-solenoid valve
PRVR CONT S/V CIRCUIT	• Ignition switch: ON (Engine stopped) • PRVR CONT S/V circuit is tested by checking solenoid valve operating noise.	The solenoid valve makes an operating sound every 3 seconds.		• Harness and connector • PRVR control solenoid valve

Consult (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
VALVE TIMING S/V CKT	• Ignition switch: ON (Engine stopped) • Valve timing S/V circuit is tested by checking solenoid valve operating noise.	The solenoid valve makes an operating sound every 3 seconds.		• Harness and connector • Valve timing solenoid valve
RADIATOR FAN CIRCUIT	• Ignition switch: ON (Engine stopped) • Condenser fan circuit is tested by checking radiator fan operation	• The condenser fan rotates and stops every 3 seconds.		• Harness and connector • Condenser fan motor • Condenser fan relay
START SIGNAL CIRCUIT	• Ignition switch: ON → START • 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.	Start signal: OFF → ON		• Harness and connector • Ignition switch
PW/ST SIGNAL CIRCUIT	• Ignition switch: ON (Engine running) • Power steering circuit is tested when steering wheel is rotated fully and then set to a straight line running position.	Locked position	ON	• Harness and connector • Power steering oil pressure switch • Power steering oil pump
		Neutral position	OFF	
VEHICLE SPEED SEN CKT	• Vehicle speed sensor circuit is tested when vehicle is running at a speed of 10 km/h (6 mph) or higher.	Vehicle speed sensor input signal is greater than 4 km/h (2 MPH)		• Harness and connector • Vehicle speed sensor • Electric speedometer
IGN TIMING ADJ	• After warming up, idle the engine. • Ignition timing adjustment is checked by reading ignition timing with a timing light and checking whether it agrees with specifications.	The timing light indicates the same value on the screen.		• Adjust ignition timing (by moving crankshaft position sensor or distributor) • Crankshaft position sensor drive mechanism

Consult (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
MIXTURE RATIO TEST	• Air-fuel ratio feedback circuit (injection system, ignition system, vacuum system, etc.) is tested by examining the O_2 sensor output at 2,000 rpm under non-loaded state.	• O_2 SEN COUNT: More than 5 times during 10 seconds (O_2 SEN-R COUNT: More than 5 times during 10 seconds)	• INJECTION SYS (Injector, fuel pressure regulator, harness or connector) • IGNITION SYS (Spark plug, power transistor, ignition coil, harness or connector) • VACUUM SYS (Intake air leaks) • O_2 sensor circuit • O_2 sensor operation • Fuel pressure high or low • Mass air flow sensor
POWER BALANCE	• After warming up, idle the engine. • 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 multiport fuel injection system system is used.)	Difference in engine speed is greater than 25 rpm before and after cutting off the injector of each cylinder.	• Injector circuit (Injector, harness or connector) • Ignition circuit (Spark plug, power transistor, ignition coil, harness or connector) • Compression • Valve timing
IACV-AAC/V SYSTEM	• After warming up, idle the engine. • IACV-AAC valve system is tested by detecting change in engine speed when IACV-AAC valve opening is changed to 0%, 20% and 80%.	Difference in engine speed is greater than 150 rpm between when valve opening is at 80% (102 steps) and at 20% (25 steps).	• Harness and connector • IACV-AAC valve • Air passage restriction between air inlet and IACV-AAC valve • IAS (Idle adjusting screw) adjustment
FICD SYSTEM	• After warming up, idle the engine. A/C switch: OFF Light switch: OFF • FICD system is tested by detecting change in engine speed when IACV-FICD solenoid valve is ON and OFF.	Difference in engine speed is greater than 50 rpm between IACV-FICD solenoid valve "ON" and "OFF"	• Harness and connector • IACV-FICD solenoid valve • Air passage

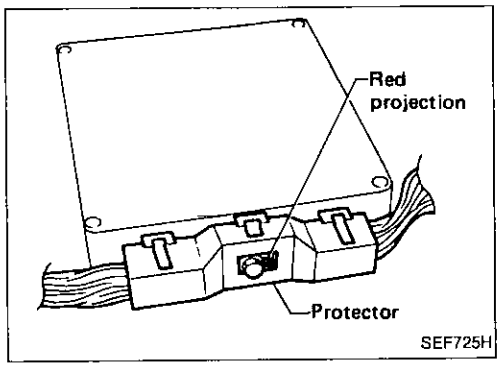


SEF289H

Diagnostic Procedure

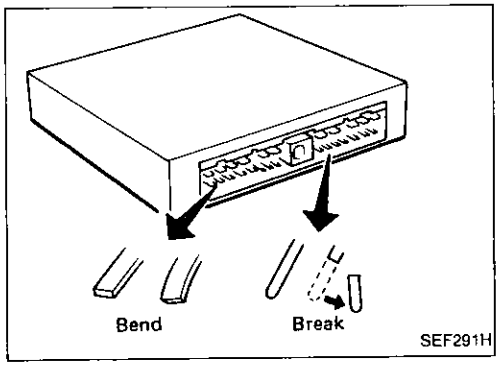
CAUTION:

1. **Before connecting or disconnecting the ECM harness connector to or from any ECM, be sure to turn the ignition switch to the "OFF" position and disconnect the negative battery terminal in order not to damage ECM as battery voltage is applied to ECM even if ignition switch is turned off. Failure to do so may damage the ECM.**



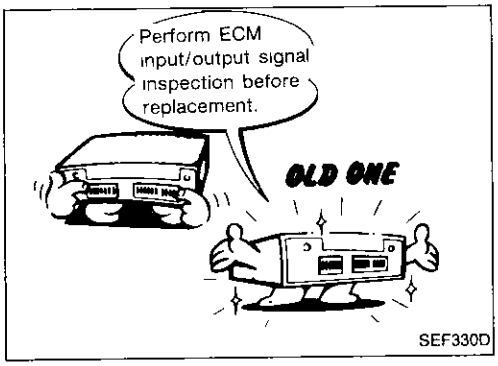
SEF725H

2. **When connecting ECM harness connector, tighten securing bolt until red projection is in line with connector face.**



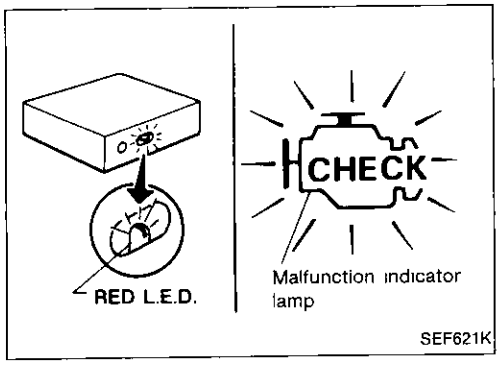
SEF291H

3. **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
4. **Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.**



SEF330D

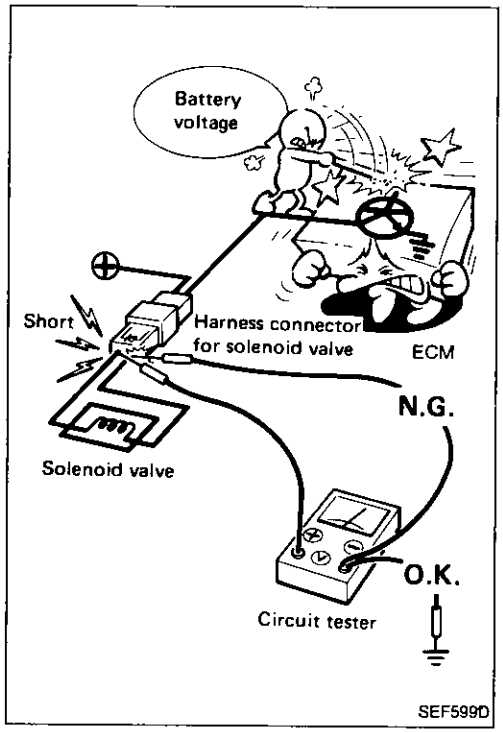
5. **Before replacing ECM, perform ECM input/output signal inspection and make sure whether ECM functions properly or not. (See page EF & EC-216.)**



SEF621K

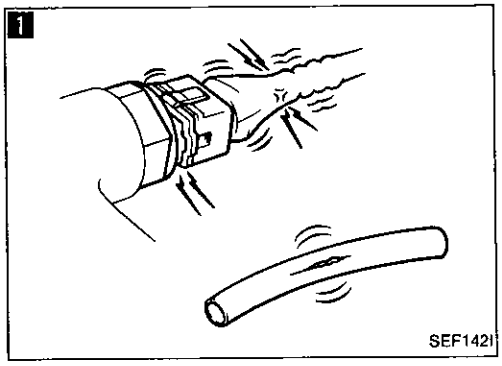
6. **After performing this "Diagnostic Procedure", perform E.C.C.S. on-board diagnostic system and driving test.**

Diagnostic Procedure (Cont'd)



7. **When measuring ECM controlled components supply voltage with a circuit tester, separate one tester probe from the other.**
   If the two tester probes accidentally make contact with each other during measurement, the circuit will be shorted, resulting in damage to the ECM power transistor.

Basic Inspection



1

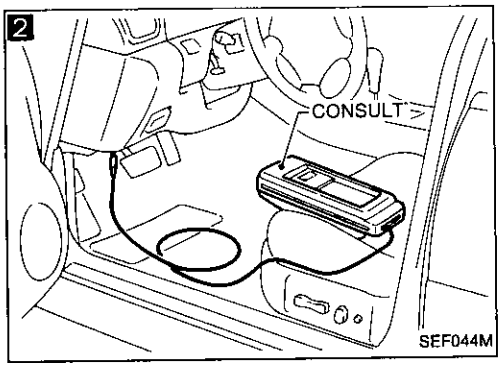
BEFORE STARTING

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 EF & EC-54.)



3

DOES ENGINE START? — No → GO TO **6**.

Yes

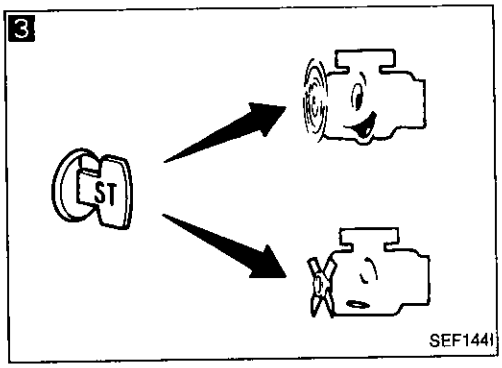
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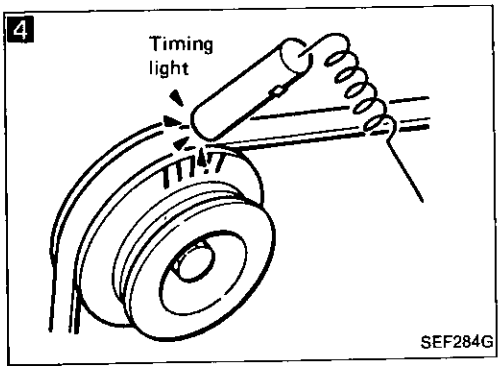
CHECK IGNITION TIMING.
Warm up engine sufficiently and check ignition timing at idle using timing light. (Refer to page EF & EC-32.)
Ignition timing: 15° ± 2° B.T.D.C.

N.G. → Adjust ignition timing by turning crankshaft position sensor.

O.K.

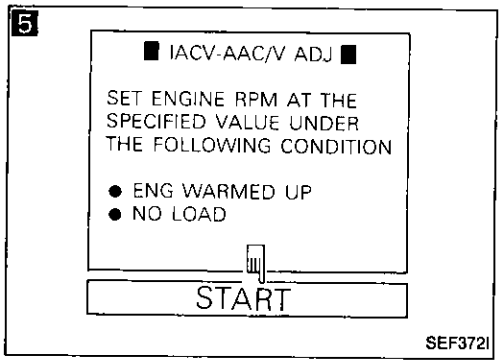
(Go to Ⓐ on next page.)



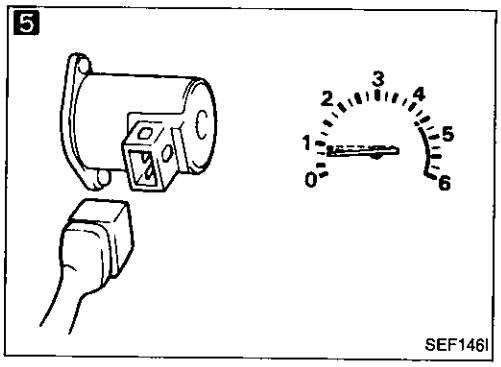


Basic Inspection (Cont'd)

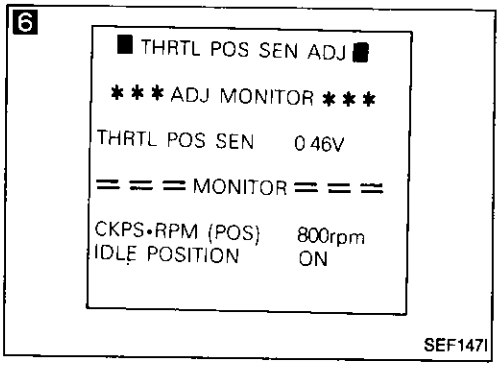
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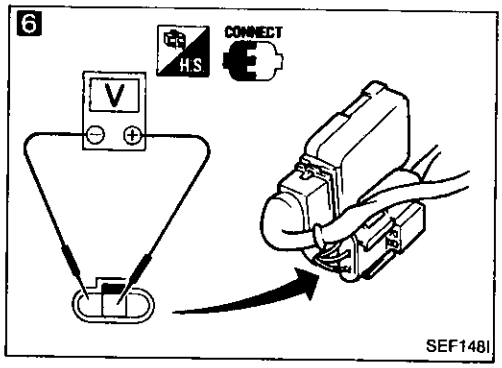
5



6



6



Ⓐ

5

CHECK IDLE ADJ. SCREW INITIAL SET RPM.

1. Select "IACV-AAC/V ADJ" in "WORK SUPPORT" mode.
2. When touching "START", does engine speed fall to 600±25 rpm (A/T in "N" position)?

N.G. → Adjust engine speed by turning idle adjusting screw.

OR

When disconnecting IACV-AAC valve harness connector, does engine speed fall to 600±25 rpm (A/T in "N" position)?

O.K.

6

CHECK THROTTLE POSITION SENSOR IDLE POSITION.

1. Perform "THRTL POS SEN. ADJ." in "WORK SUPPORT" mode.
2. Check that output voltage of throttle position sensor is approx. 0.4 to 0.5V. (Throttle valve fully closes.) and "IDLE POSITION" stays "ON".

N.G. →
1. Adjust output voltage by rotating throttle position sensor body.
2. Disconnect throttle position sensor harness connector for a few seconds and then reconnect it.
3. Confirm that "IDLE POSITION" stays "ON".

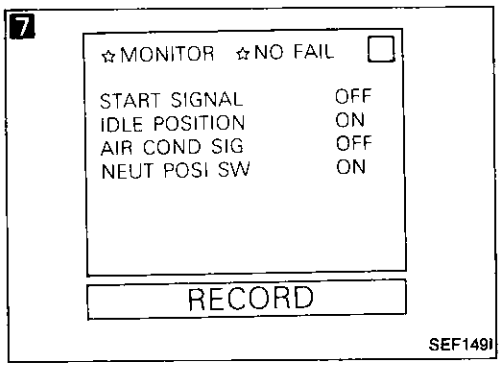
OR

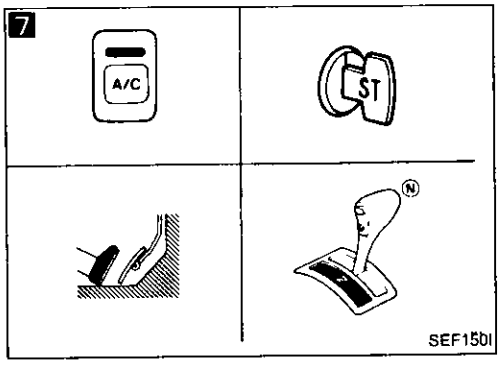
Measure output voltage of throttle position sensor using voltmeter, and check that it is approx. 0.4 to 0.5V. (Throttle valve fully closed.)

O.K.

(Go to Ⓑ on next page.)

Basic Inspection (Cont'd)





Ⓑ

CHECK SWITCH INPUT SIGNAL.

Select the following switches in "DATA MONITOR" mode,
a) Start signal,
b) Idle position,
c) Air conditioner signal,
d) Neutral position (Parking) switch, and check the switches' ON-OFF operation.

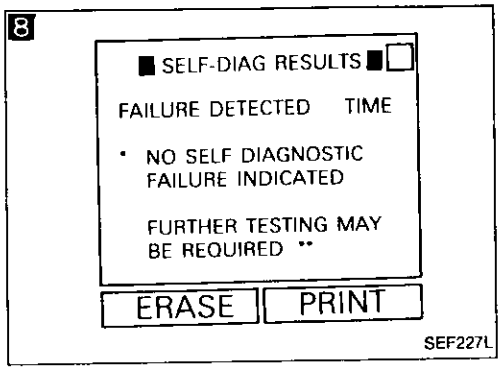
N.G. → Repair or replace the malfunctioning switch or its circuit.

— OR —

Remove ECM from front floor panel and check the above switches' ON-OFF operation using voltmeter at each ECM terminal.

Switch	Condition	Voltage (V)
Start signal	IGN ON → IGN START	0 → Battery voltage
Idle position	Engine warmed up sufficiently Idle position → Depress the accelerator pedal.	Battery voltage → 0V
A/C signal	A/C OFF → A/C ON (Engine running)	7.0 - 10.0 → 0.5 - 0.7
Neutral position (Parking) switch	Shift lever is "N" or "P" position → Except "N" and "P"	0 → 8.0 - 10.0

O.K.



READ SELF-DIAGNOSTIC RESULTS.

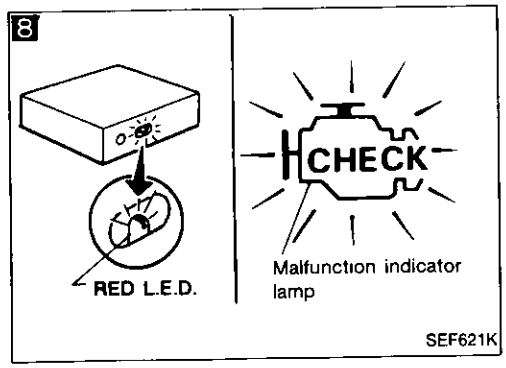
1. Perform "SELF-DIAG RESULTS" mode.
2. Read out self-diagnostic results.
3. Is a failure detected?

Yes → Go to the relevant inspection procedure.

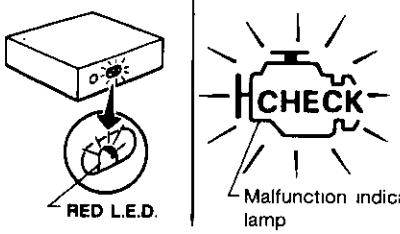
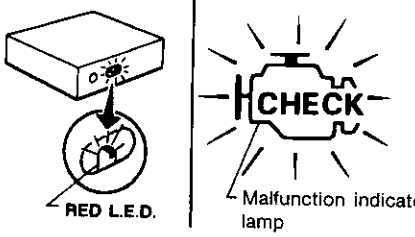
— OR —

1. Set "Self-diagnostic results mode" in Diagnostic Test Mode II. (Refer to page EF & EC-50.)
2. Count the number of malfunction indicator lamp and RED L.E.D. flashes and read out the diagnostic trouble codes.
3. Are the diagnostic trouble codes being output?

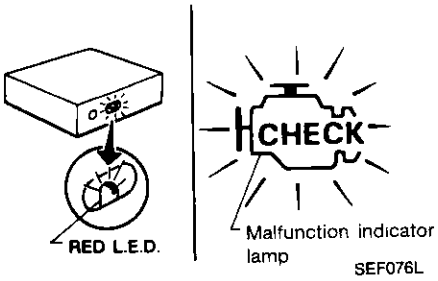
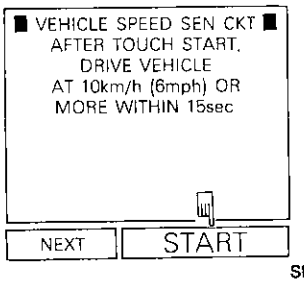
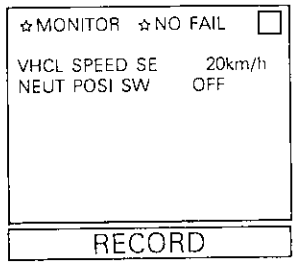
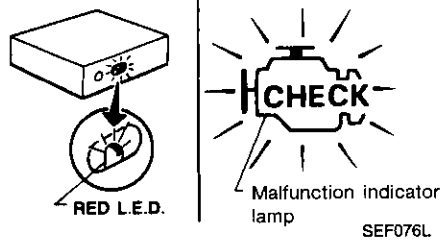
No → INSPECTION END



How to Execute On-board Diagnostic System in Diagnostic Test Mode II

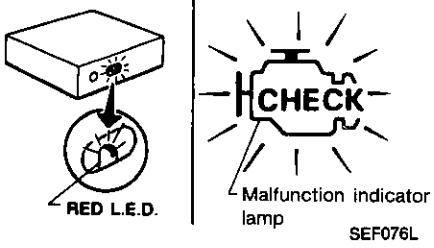
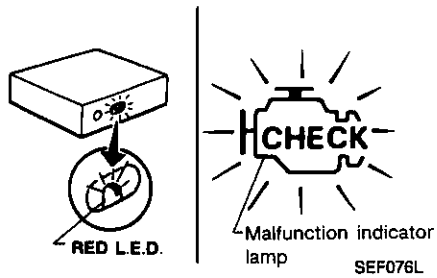
Detected items	Display Diagnostic trouble code No.	How to perform on-board diagnostic system judgement	
		Illustration	Method
Crankshaft position	11	☆MONITOR ☆NO FAIL CKPS•RPM(POS) 720rpm CKPS•RPM(REF) 720rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O_2 SEN 0.06V O_2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF075L  SEF076L	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Start engine. 2) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** OR 2) Turn ignition switch "OFF" and then "ON". 3) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**
Mass air flow sensor circuit	12	☆MONITOR ☆NO FAIL CKPS•RPM(POS) 720rpm CKPS•RPM(REF) 720rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O_2 SEN 0.06V O_2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF075L  SEF076L	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON" wait for at least 5 seconds and then start engine. 2) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** OR 2) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**

How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

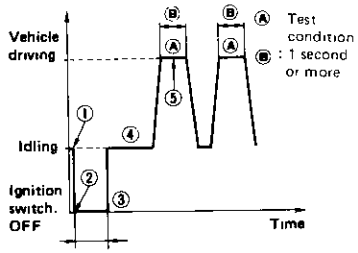
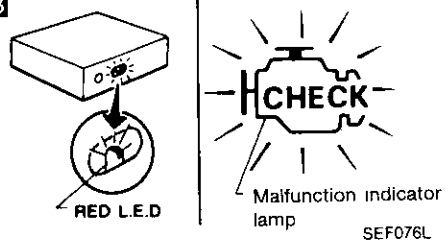
Detected items	Display Diagnostic trouble code No.	How to perform on-board diagnostic system judgement	
		Illustration	Method
Engine coolant temperature sensor circuit	13	 SEF076L	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON" or start engine. 2) Select "SELF-DIAG RESULTS" mode with CONSULT. ☆ **NO FAIL** OR 2) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**
Vehicle speed sensor circuit*	14	 SEF090L  SEF091L  SEF076L	**CHECK OVERALL FUNCTION.** 1) Jack up drive wheels. 2) Start engine. 3) Perform "VEHICCLE SPEED SEN CKT" in "FUNCTION TEST" mode with CONSULT. OR 2) Start engine. 3) Read vehicle speed sensor signal in "DATA MONITOR" mode with CONSULT. **CONSULT value should be the same as the speedometer indication.** OR 1) Start engine and warm it up sufficiently. 2) Shift to a suitable gear position and maintain the following test drive conditions for at least 5 seconds. Driving conditions (1) Engine speed: 2,200 ± 350 rpm (2) Intake manifold vacuum: −45.3 ± 4.0 kPa (−340 ± 30 mmHg, 13.39 ± 1.18 inHg) (3) Vehicle speed 5 km/h (3 MPH) or more 3) If malfunction indicator lamp comes on during test drive, perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**

*: On-board diagnostic system is not performed but this method provides results which are equal to the self-diagnostic results.

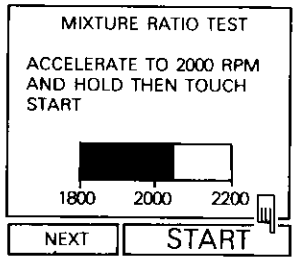
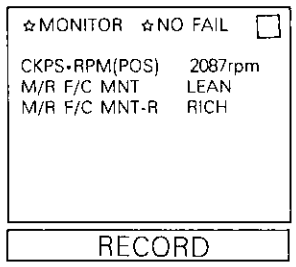
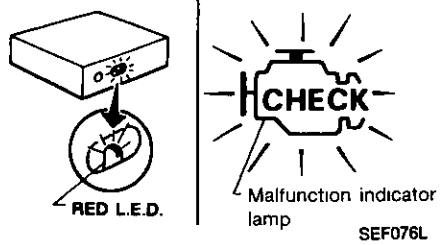
How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

Detected items	Display Diagnostic trouble code No.	How to perform on-board diagnostic system judgement	
		Illustration	Method
Ignition signal circuit	21	☆MONITOR ☆NO FAIL CKPS•RPM(POS) 720rpm CKPS•RPM(REF) 720rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O_2 SEN 0.06V O_2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF238L  SEF076L	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Start engine. 2) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** OR 2) Turn ignition switch "OFF" and then "ON". 3) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**
ECM	31	 SEF076L	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON". 2) Select "SELF-DIAG RESULTS" mode with CONSULT. ☆ **NO FAIL** OR 2) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**

How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

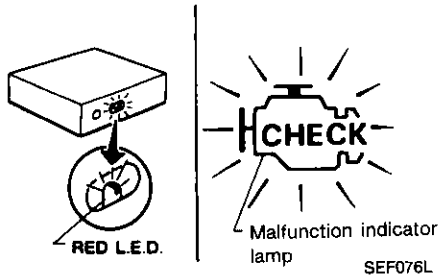
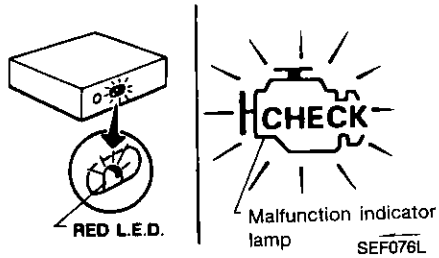
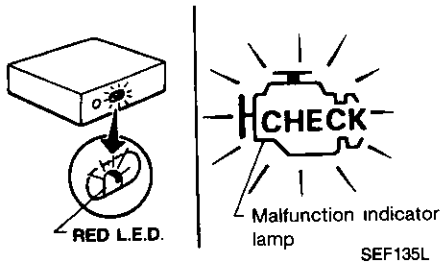
Detected items	Display Diagnostic trouble code No.	How to perform on-board diagnostic system judgement	
		Illustration	Method
EGR function	32	**A** **ROAD TEST** **Test condition** **Drive vehicle under the following conditions with a suitable shift position.** (1) Engine speed: 2,550±150 rpm (2) Intake manifold vacuum −39.3±1.3 kPa (−295±10 mmHg, −11.61±0.39 inHg) **Driving mode**  Until red L.E.D. goes off. ① **Start engine and warm it up sufficiently.** ② **Turn off ignition switch and keep it off until red L.E.D. goes off.** ③ **Start engine and make sure that air conditioner switch and rear defogger are turned "OFF" during test drive.** ④ Keep engine running for at least 120 seconds ⑤ Shift to suitable gear position and drive in 'Test condition' for at least 1 second ⑥ Repeat step ⑤ at least 11 times **B**  SEF076L	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON". 2) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. Make sure that diagnostic trouble code No 11 or 12 is not displayed. 3) Perform test drive under the following conditions. (1) Warm up engine sufficiently. (2) Use test driving modes indicated in figure **A** 4) If malfunction indicator lamp comes on during test drive, perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **B** **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**

How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

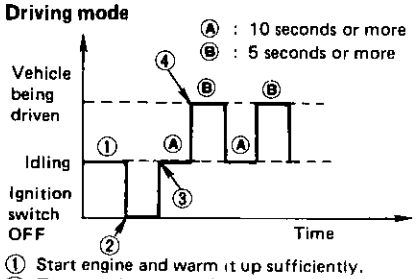
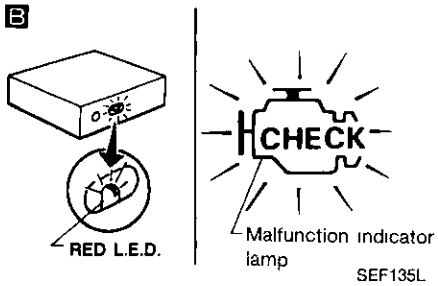
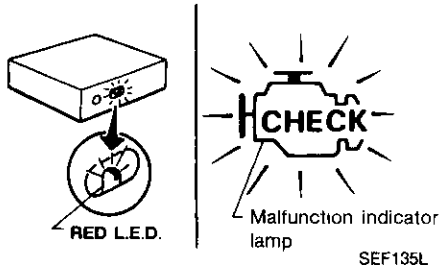
Detected items	Display Diagnostic trouble code No.	How to perform on-board diagnostic system judgement	
		Illustration	Method
Heated oxygen sensor circuit (Left bank)*	33	 SEF115L  SEF116L	**CHECK OVERALL FUNCTION.** 1) Start engine and warm it up sufficiently. 2) Perform "MIXTURE RATIO TEST" in "FUNCTION TEST" mode with CONSULT. —OR— 2) Make sure that "M/R F/C MNT(R)" in "DATA MONITOR" mode indicates "RICH" and "LEAN" periodically more than 5 times during 10 seconds at 2,000 rpm —OR— 2) Make sure that malfunction indicator lamp and red L.E.D. on ECM go on and off periodically more than 5 times during 10 seconds at 2,000 rpm in on-board diagnostic system Diagnostic Test Mode II.
Heated oxygen sensor circuit (Right bank)*	53		
Knock sensor circuit	34	 SEF076L	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Start engine. 2) Select "SELF-DIAG RESULTS" mode with CONSULT. ☆ **NO FAIL** —OR— 2) Turn ignition switch "OFF" and then "ON". 3) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**

*: On-board diagnostic system is not performed but this method provides results which are equal to the self-diagnostic results.

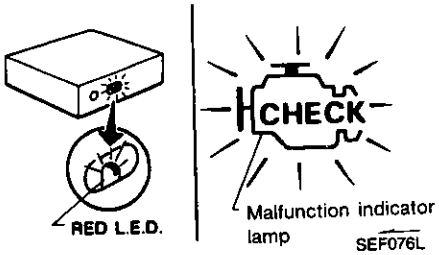
How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

Detected items	Display Diagnostic trouble code No.	How to perform on-board diagnostic system judgement	
		Illustration	Method
EGR temperature sensor circuit	35	 SEF076L	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Start engine and warm it up sufficiently. 2) Select "SELF-DIAG RESULTS" mode with CONSULT. ☆ **NO FAIL** OR 2) Turn ignition switch "OFF" and then "ON". 3) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**
Fuel temperature sensor circuit	42	 SEF076L	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON". 2) Select "SELF-DIAG RESULTS" mode with CONSULT. ☆ **NO FAIL** OR 1) Turn ignition switch "ON". 2) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**
Throttle position sensor circuit	43	 SEF135L	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Jack up drive wheels 2) Start engine. 3) Shift to a suitable gear position (Except "P" or "N"), and run engine at vehicle speed of 5 km/h (3 MPH) or higher for at least 10 seconds. 4) Select "SELF-DIAG RESULTS" mode with CONSULT. ☆ **NO FAIL** OR 4) Turn ignition switch "OFF" and then "ON". 5) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**

How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

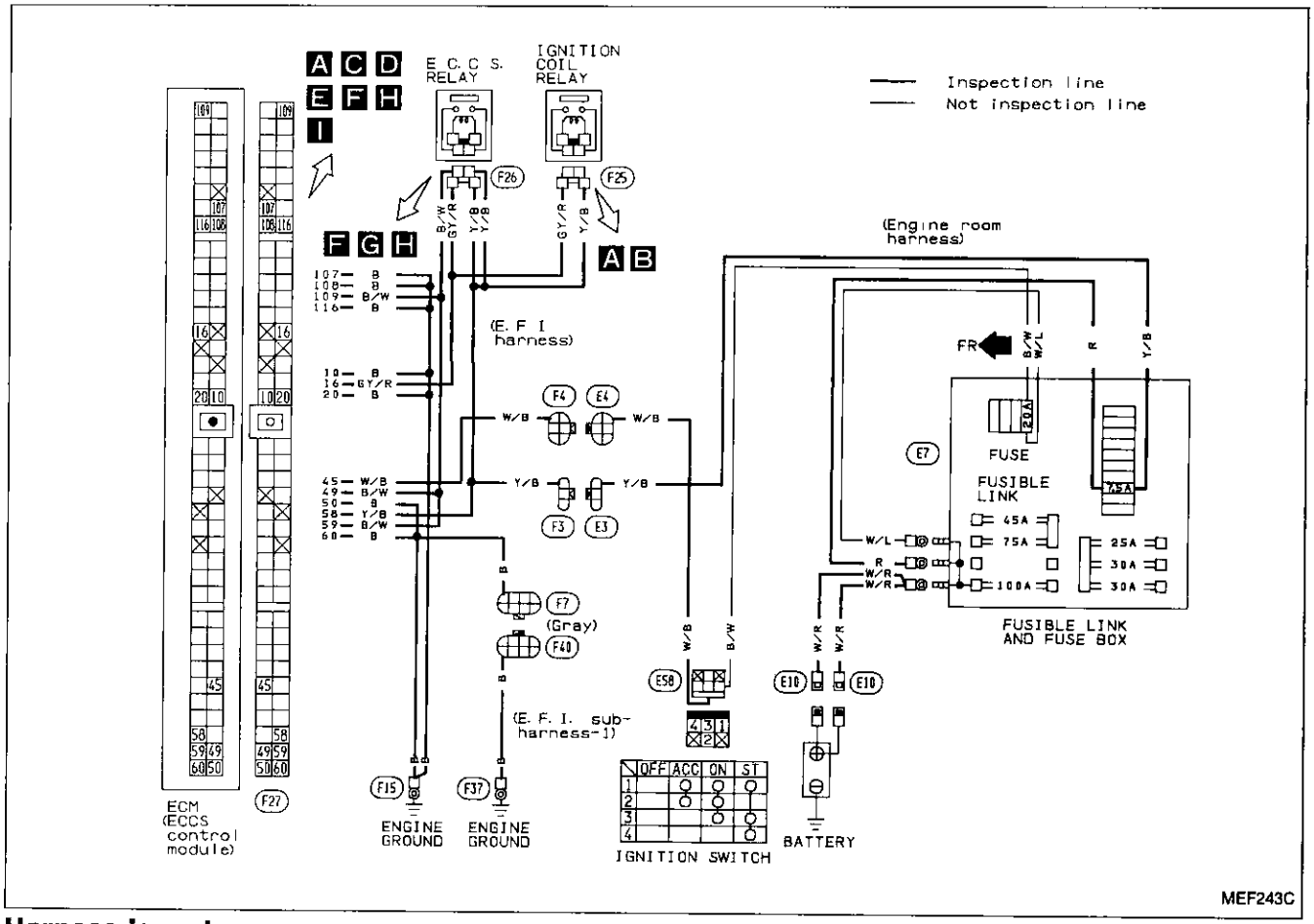
Detected items	Display Diagnostic trouble code No.	How to perform on-board diagnostic system judgement	
		Illustration	Method
Injector leak	45	**A ROAD TEST** **Test condition** **Drive vehicle under the following conditions with a suitable shift position.** **(1) Engine speed: 2,250±400 rpm** **(2) Intake manifold vacuum:** **–46.7±13.3 kPa** **(–350±100 mmHg, –13.78±3.94 inHg)** **Driving mode**  ① Start engine and warm it up sufficiently. ② Turn ignition switch OFF and wait for at least 10 seconds. ③ Start engine and keep it at idle speed for at least 10 seconds. ④ Shift to a suitable gear position and drive in "Test condition" for at least 5 seconds. ⑤ Repeat steps ③ through ④ at least 1 more times. **B**  SEF135L	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Perform test drive as indicated in figure **A** . 2) If malfunction indicator lamp comes on during test drive, perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **B Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**
Injector circuit	51	 SEF135L	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Start engine. 2) Select "SELF-DIAG RESULTS" mode with CONSULT. ☆ **NO FAIL** OR 2) Turn ignition switch "OFF" and then "ON". 3) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**

How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

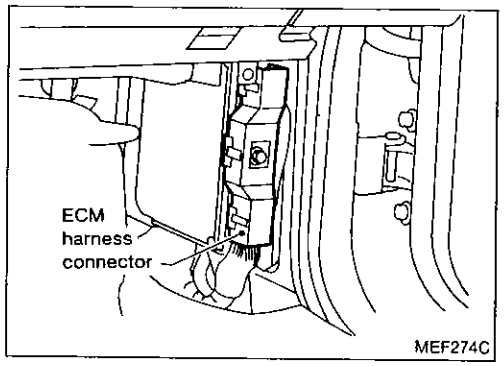
Detected items	Display Diagnostic trouble code No.	How to perform on-board diagnostic system judgement	
		Illustration	Method
Signal circuit from A/T control unit to ECM	54		**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Start engine. 2) Select "SELF-DIAG RESULTS" mode with CONSULT. ☆ **NO FAIL** OR 2) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**

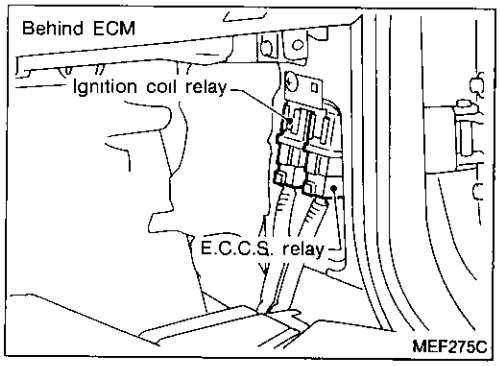
Diagnostic Procedure 1

MAIN POWER SUPPLY AND GROUND CIRCUIT (Not self-diagnostic item)



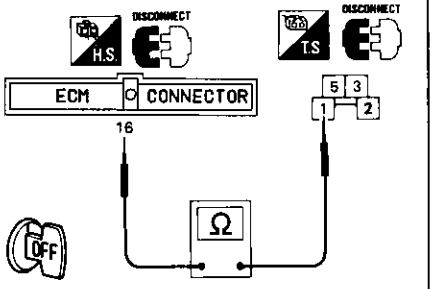
Harness layout





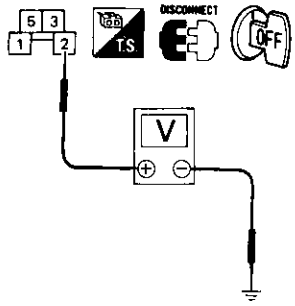
MAIN POWER SUPPLY AND GROUND CIRCUIT (Not self-diagnostic item)

A



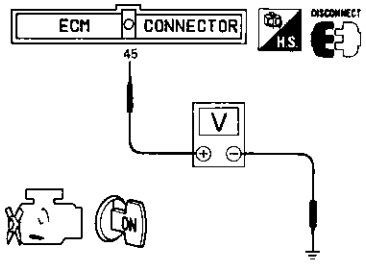
MEF308C

B



MEF309C

C



MEF310C

INSPECTION START

Start engine.
Is engine running?

Yes → Ⓐ

No

CHECK IGNITION COIL RELAY CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ignition coil relay and ECM harness connector.
A 3) Check harness continuity between ECM terminal ⑯ and terminal ①.
Continuity should exist.
B 4) Check voltage between terminal ② and ground with CONSULT or tester.
Voltage: Battery voltage

N.G. →
Check the following.
- Harness connectors (F3), (E4)
- 7.5A fuse
- Harness continuity between ignition coil relay and battery
- Harness continuity between ignition coil relay and ECM

If N.G., repair harness or connectors.

O.K.

C

CHECK POWER SUPPLY-I.
1) Turn ignition switch "ON".
2) Check voltage between ECM terminal ㊺ and ground with CONSULT or tester.
Voltage: Battery voltage

N.G. →
Check the following.
- Harness connectors (F4), (E4)
- Harness continuity between ECM and ignition switch

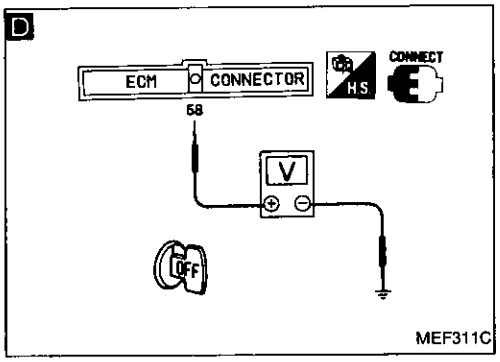
If N.G., repair harness or connectors.

O.K.

Go to "CHECK GROUND CIRCUIT".

MAIN POWER SUPPLY AND GROUND CIRCUIT (Not self-diagnostic item)

D



MEF311C

Ⓐ

D

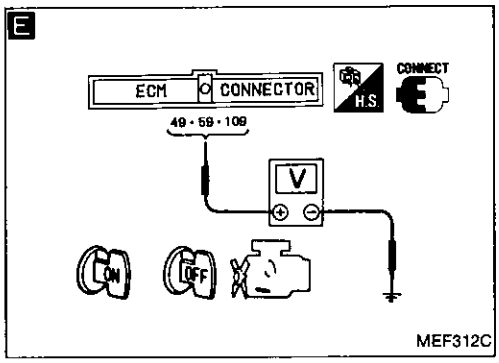
CHECK POWER SUPPLY-II.
1) Stop engine.
2) Check voltage between ECM terminal ⑱ and ground with CONSULT or tester.
Voltage: Battery voltage

N.G. → Check the following.
- Harness continuity between ECM and E.F.I. harness connector (F3)

If N.G., repair harness or connectors.

O.K. ↓

E



MEF312C

E

CHECK POWER SUPPLY-III.
1) Turn ignition switch "ON" and then "OFF".
2) Check voltage between ECM terminals ㊾, ㊾, ⑩⑨ and ground with CONSULT or tester.
Voltage:
Ignition switch "ON" and for a few seconds after turning ignition switch "OFF"
Battery voltage
A few seconds after turning ignition switch "OFF"
Approximately 0V

O.K. → Go to "CHECK GROUND CIRCUIT".

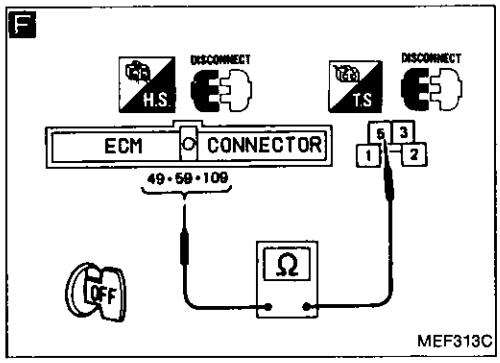
Case-1: Battery voltage does not exist for a few seconds.
Case-2: Battery voltage exists for more than a few seconds.

N.G. ↓

Case-2 → Go to "Check COMPONENT" (E.C.C.S. relay).

Case-1 ↓

F



MEF313C

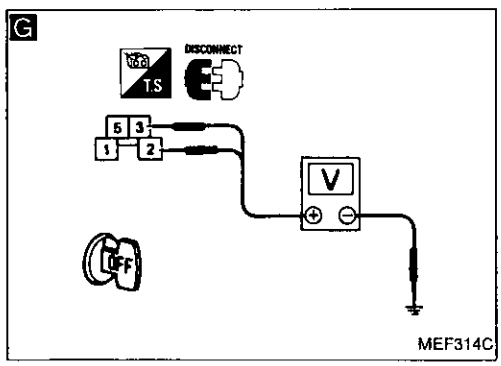
F

CHECK HARNESS CONTINUITY BETWEEN E.C.C.S. RELAY AND ECM
1) Disconnect ECM harness connector.
2) Disconnect E.C.C.S. relay.
3) Check harness continuity between ECM terminals ㊾, ㊾, ⑩⑨ and terminal ⑤.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

G



MEF314C

G

CHECK VOLTAGE BETWEEN E.C.C.S. RELAY AND GROUND.
1) Check voltage between terminals ②, ③ and ground with CONSULT or tester.
Voltage: Battery voltage

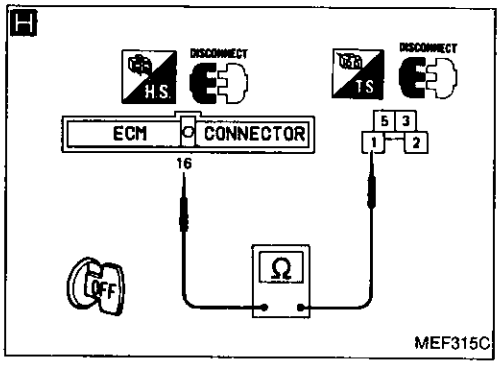
N.G. → Check the following.
- Harness continuity between E.C.C.S. relay and E.F.I. harness connector (F3)

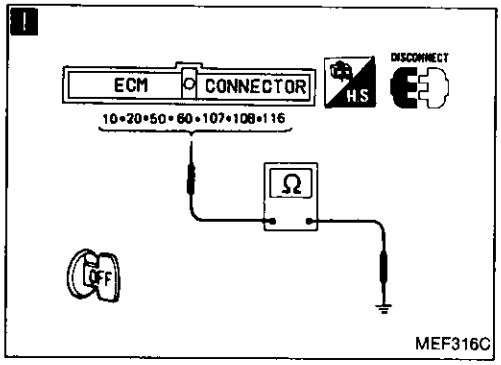
If N.G., repair harness or connectors.

O.K. ↓

Ⓑ

MAIN POWER SUPPLY AND GROUND CIRCUIT (Not self-diagnostic item)





Ⓑ

H

CHECK OUTPUT SIGNAL CIRCUIT.
1) Check harness continuity between ECM terminal ⑯ and terminal ①.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT
(E.C.C.S. relay).
Refer to "Electrical Components Inspection".
(See page EF & EC-227.)

N.G. → Replace E.C.C.S. relay.

O.K.

I

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminals ⑩, ⑳, ㊿, ㊿, ⑩⑦, ⑩⑧, ⑪⑥ and engine ground.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F7), (F40)
- Harness continuity between ECM and engine ground.

If N.G., repair harness or connectors.

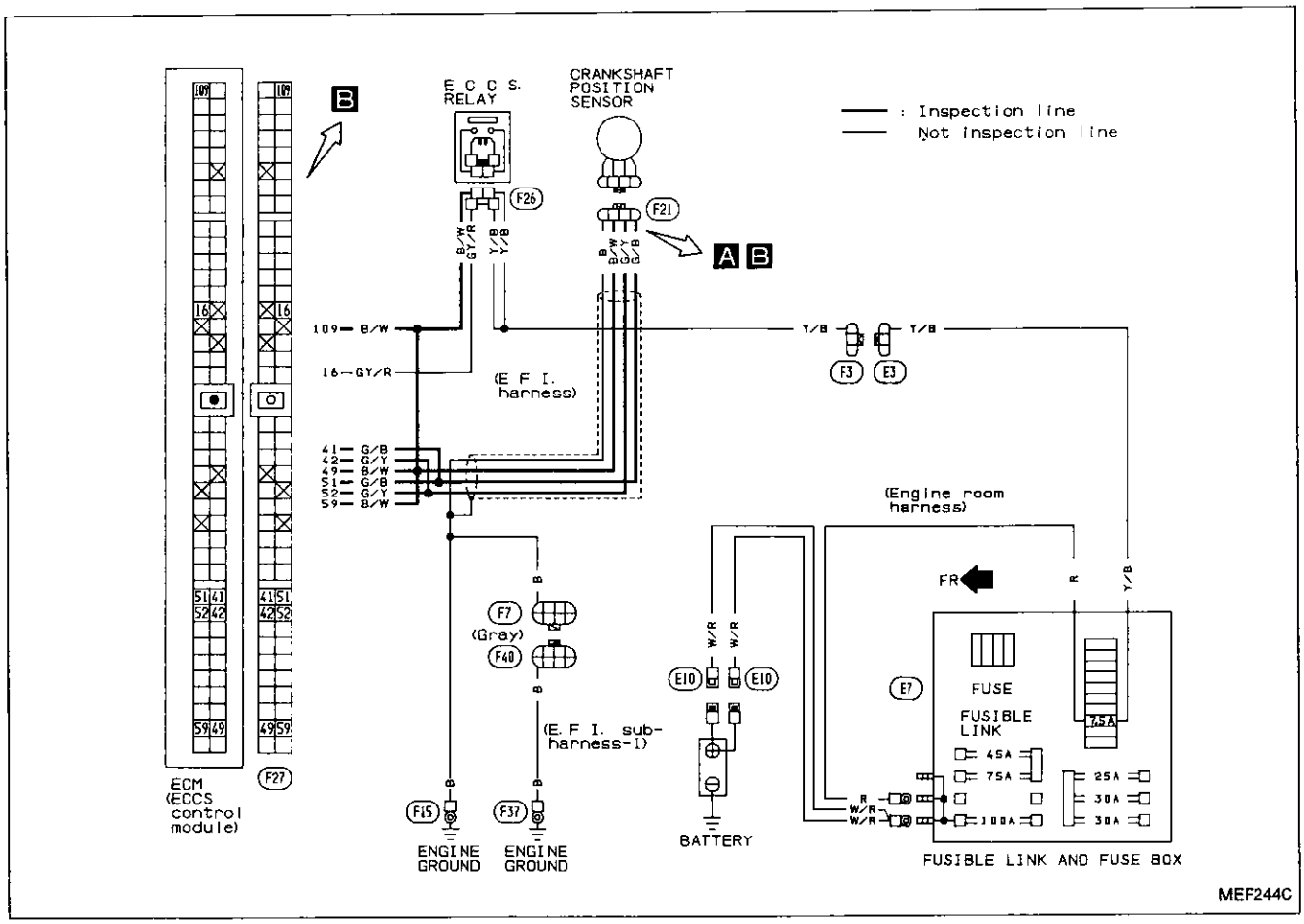
O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector.

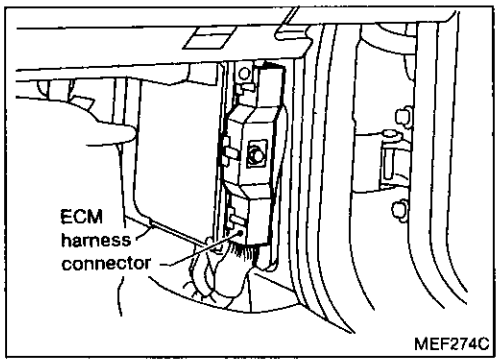
INSPECTION END

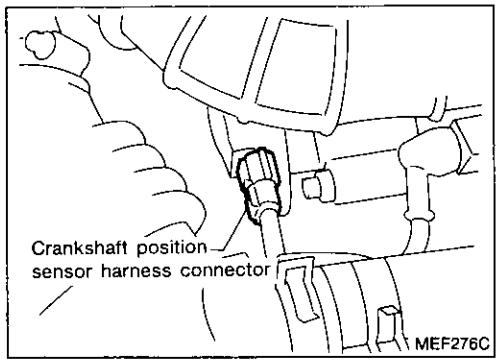
Diagnostic Procedure 2

CRANKSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)

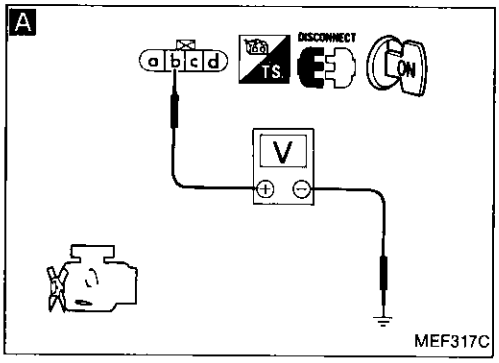


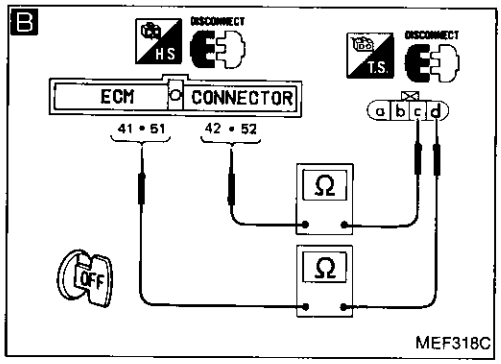
Harness layout





CRANKSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)





INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-71.

O.K. → Go to "CRANKSHAFT POSITION SENSOR (Not self-diagnostic item)".

N.G.

A

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect crankshaft position sensor harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓑ and ground with CONSULT or tester.
Voltage: Battery voltage

N.G. → Check the following.
- Harness continuity between crankshaft position sensor and E.C.C.S. relay
- Harness continuity between crankshaft position sensor and ECM

If N.G., repair harness or connectors.

O.K.

B

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between terminal ⓓ and ECM terminals ㊶, ㊺ (120° signal), terminal ⓒ and ECM terminals ㊷, ㊻ (1° signal).
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT (Crankshaft position sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-221.)

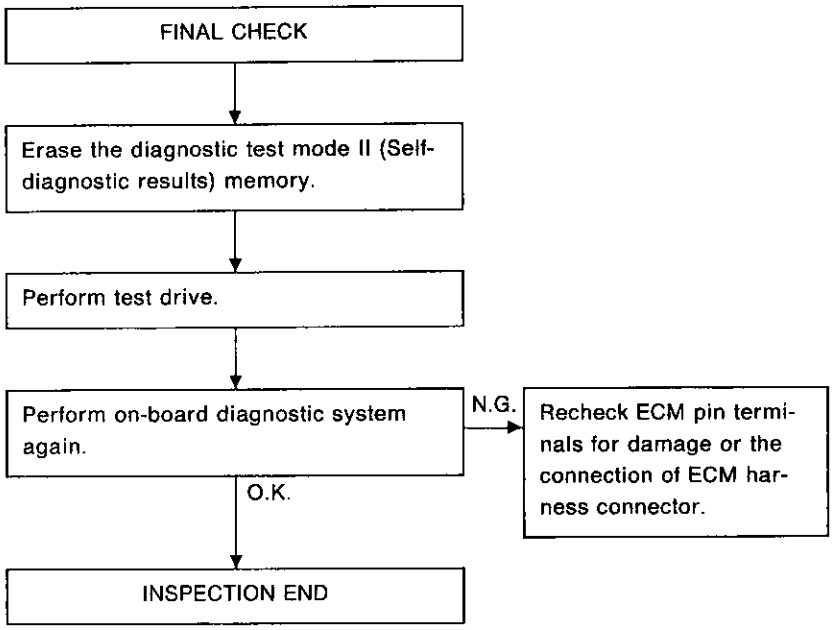
N.G. → Replace crankshaft position sensor.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector.

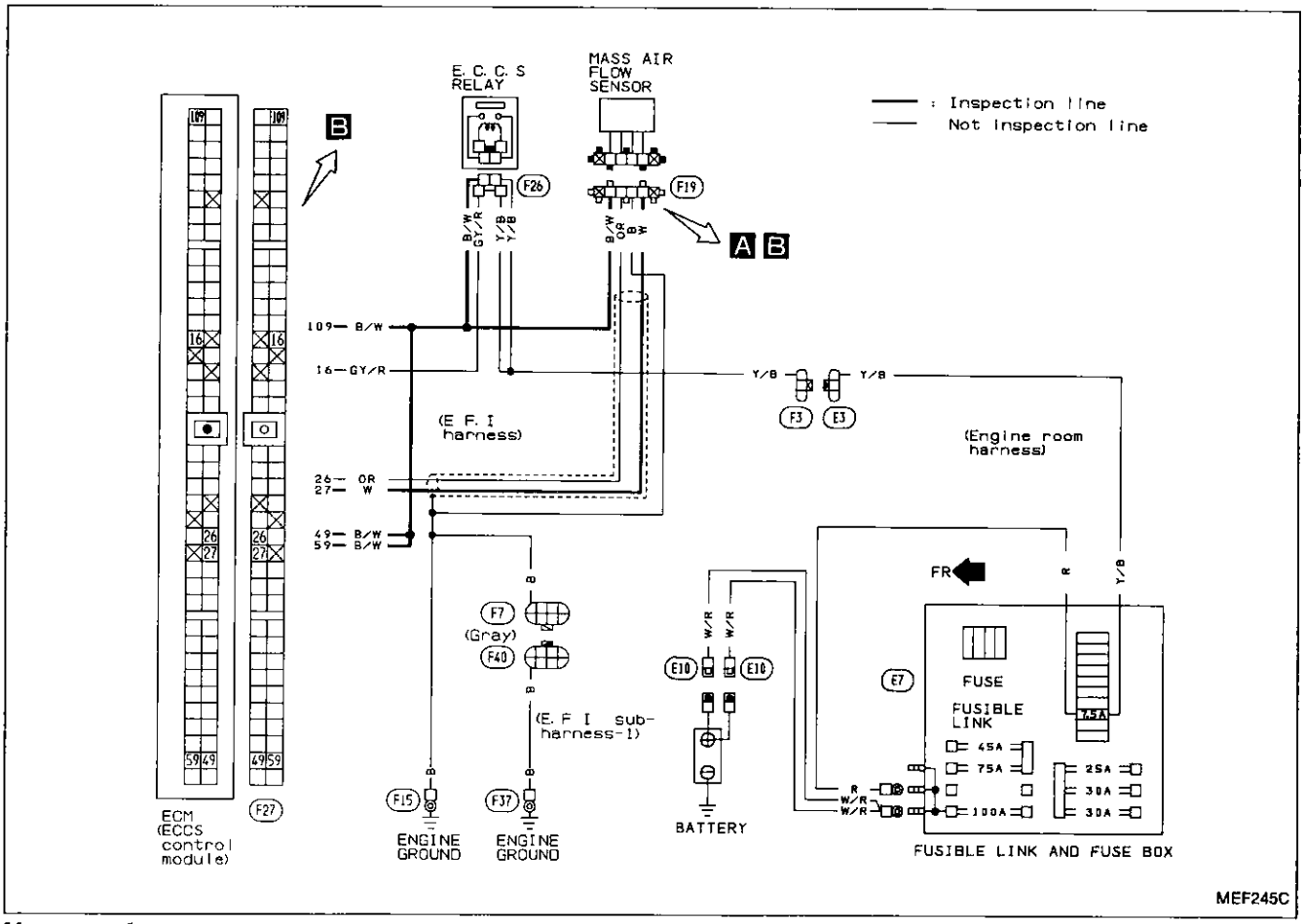
CRANKSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)

Perform FINAL CHECK by the following procedure after repair is completed.

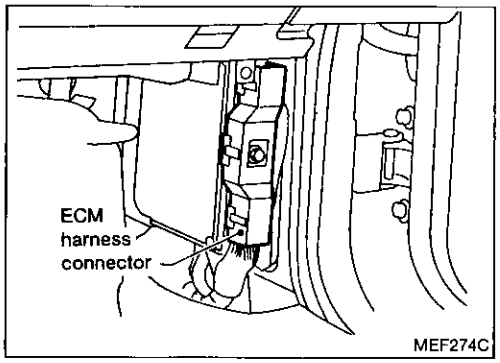


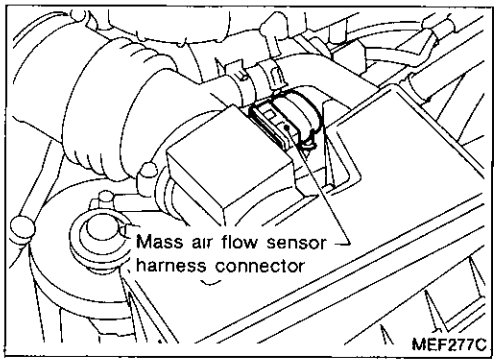
Diagnostic Procedure 3

MASS AIR FLOW SENSOR (Diagnostic trouble code No. 12) (Malfunction indicator lamp item)

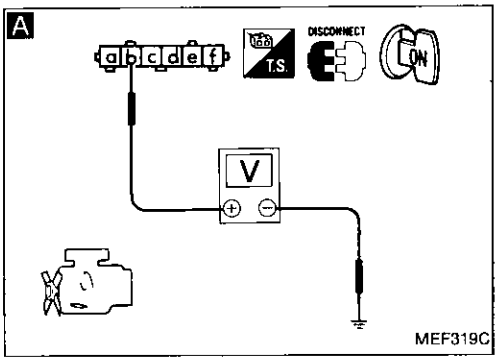


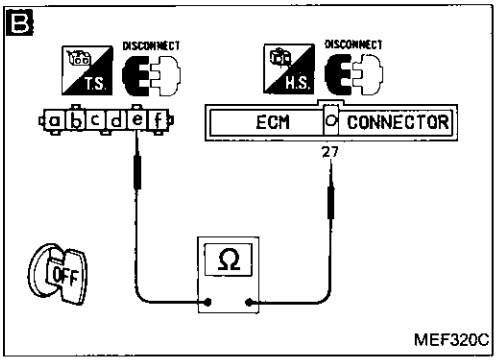
Harness layout





MASS AIR FLOW SENSOR (Diagnostic trouble code No. 12) (Malfunction indicator lamp item)





INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
See page EF & EC-71.

O.K. → Go to "MASS AIR FLOW SENSOR (Not self-diagnostic item)".

N.G.

A

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect mass air flow sensor harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓑ and ground with CONSULT or tester.
Voltage: Battery voltage

N.G. → Check the following.
- Harness continuity between mass air flow sensor and E.C.C.S. relay
- Harness continuity between mass air flow sensor and ECM

If N.G., repair harness or connectors.

O.K.

B

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between terminal ⑧ and ECM terminal ㉗.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT
(Mass air flow sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-221.)

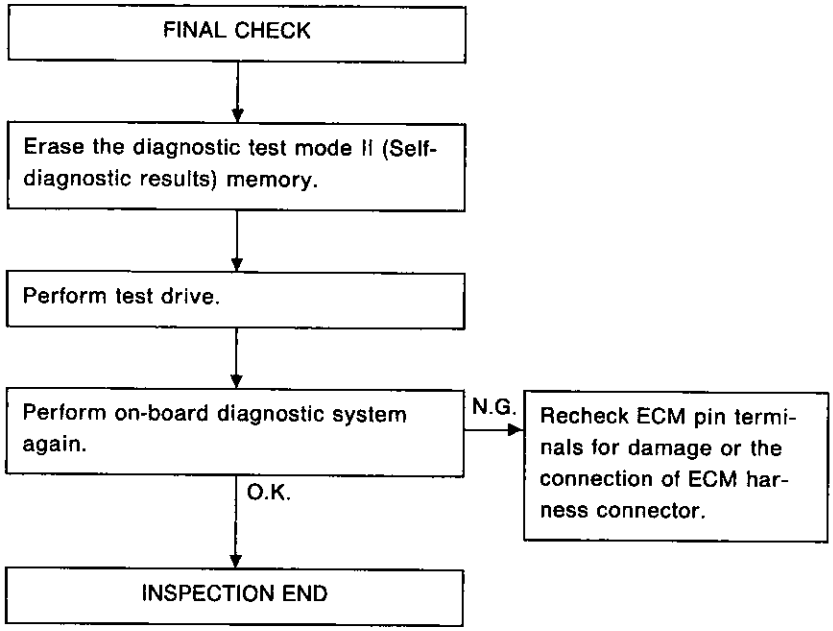
N.G. → Replace mass air flow sensor.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector.

MASS AIR FLOW SENSOR (Diagnostic trouble code No. 12) (Malfunction indicator lamp item)

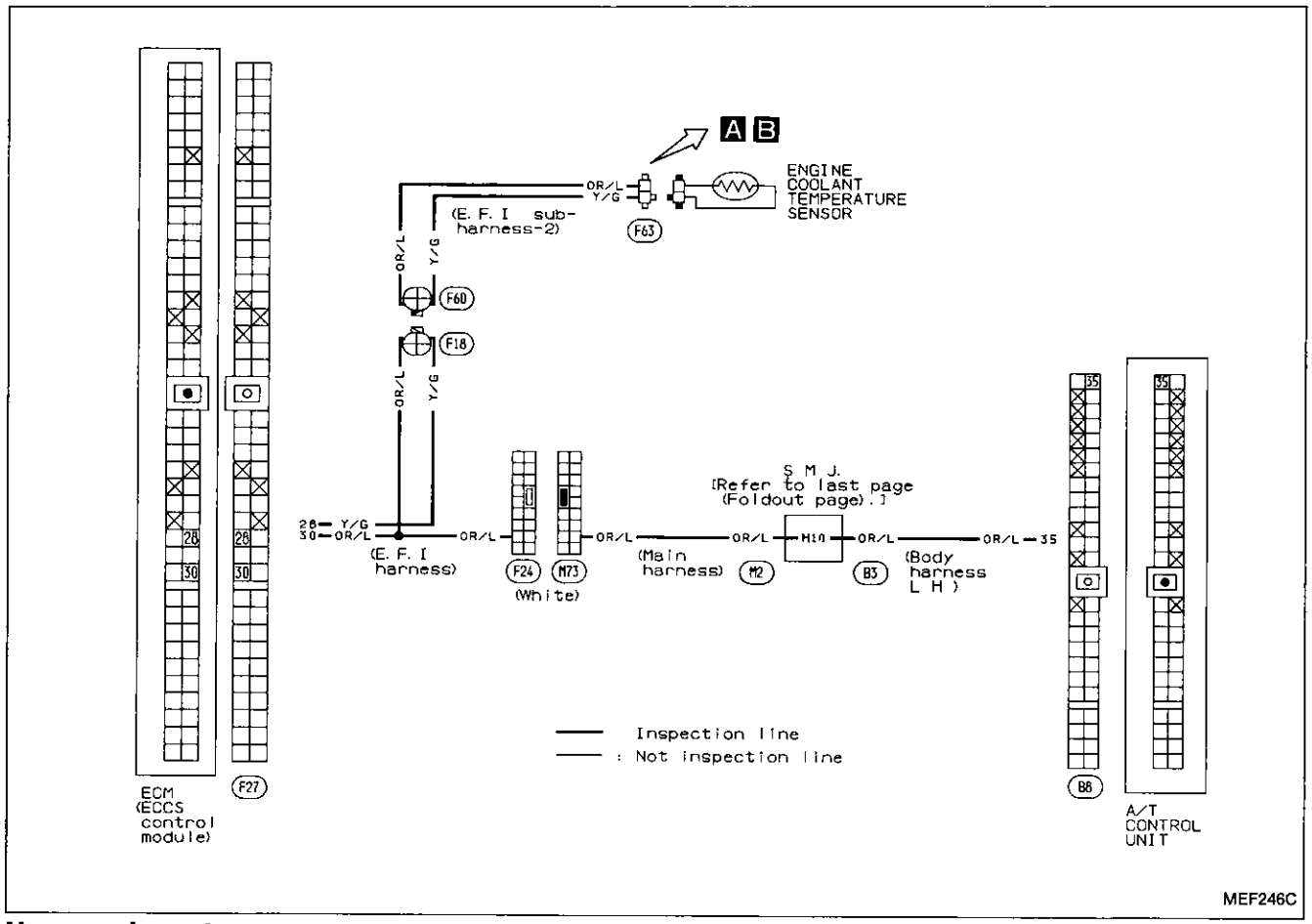
Perform FINAL CHECK by the following procedure after repair is completed.



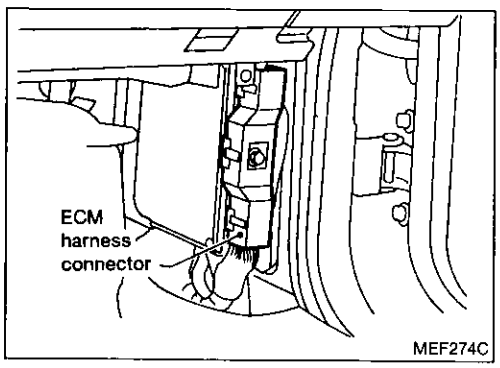
Diagnostic Procedure 4

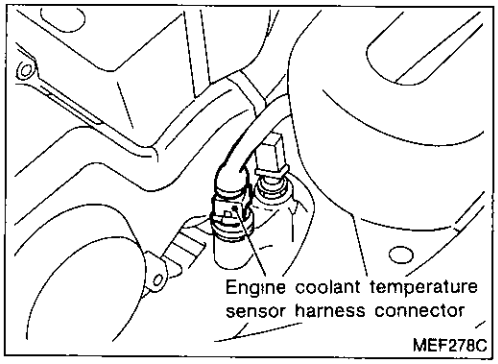
ENGINE COOLANT TEMPERATURE SENSOR (Diagnostic trouble code No. 13)

(Malfunction indicator lamp item)



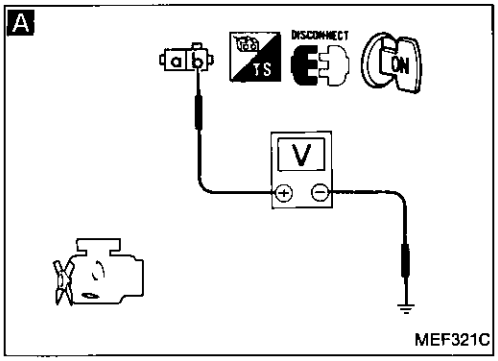
Harness layout



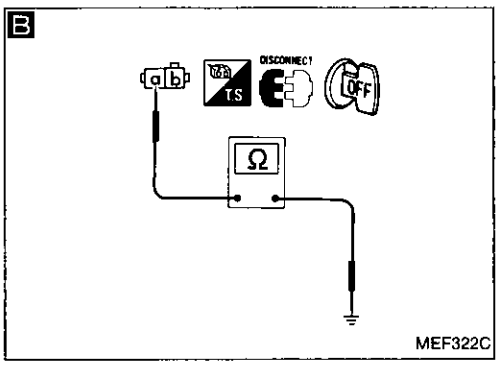


ENGINE COOLANT TEMPERATURE SENSOR (Diagnostic trouble code No. 13)
(Malfunction indicator lamp item)

A



B



INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
See page EF & EC-72.

O.K. → INSPECTION END

N.G.

A

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect engine coolant temperature sensor harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓑ and ground with CONSULT or tester.
Voltage: Approximately 5V

N.G. → Check the following.
- Harness connectors (F18), (F60)
- Harness continuity between ECM and engine coolant temperature sensor

If N.G., repair harness or connectors.

O.K.

B

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal ⓐ and engine ground.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F18), (F60)
- Harness connectors (F24), (M73)
- Harness connectors (M2), (B3)
- Harness continuity between ECM and engine coolant temperature sensor
- Harness continuity between A/T control unit and engine coolant temperature sensor

If N.G., repair harness or connectors.

O.K.

CHECK COMPONENT
(Engine coolant temperature sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-222.)

N.G. → Replace engine coolant temperature sensor.

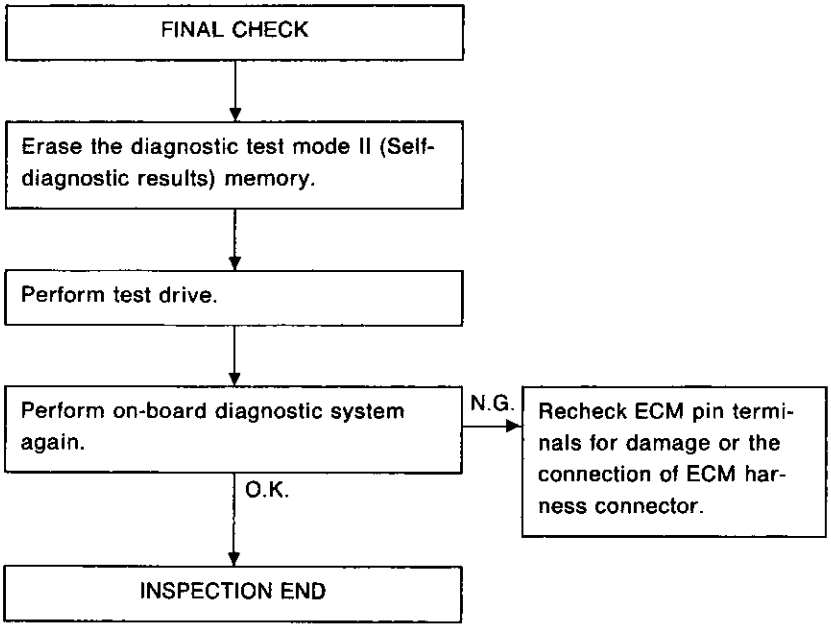
O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector.

ENGINE COOLANT TEMPERATURE SENSOR (Diagnostic trouble code No. 13)

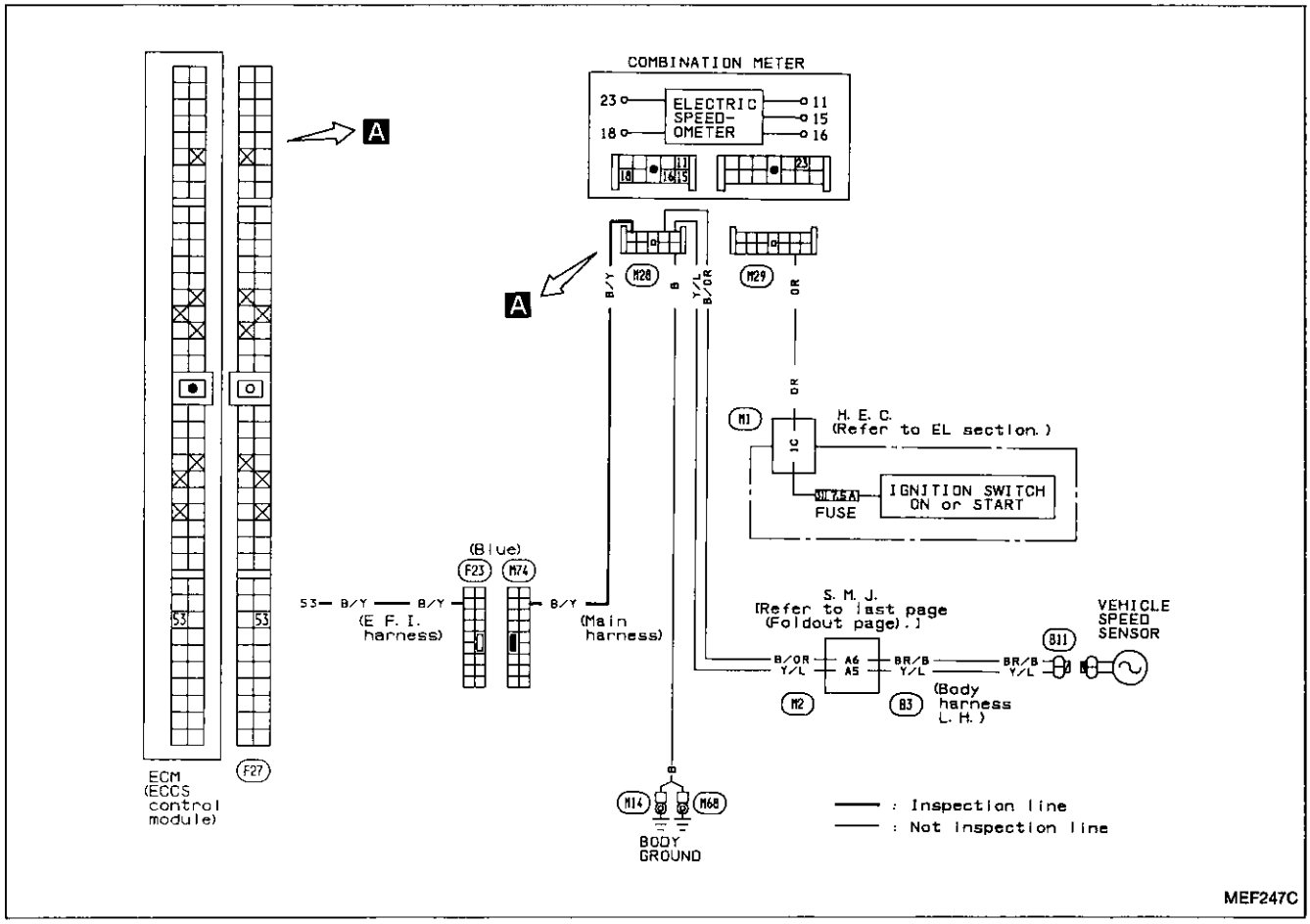
(Malfunction indicator lamp item)

Perform FINAL CHECK by the following procedure after repair is completed.

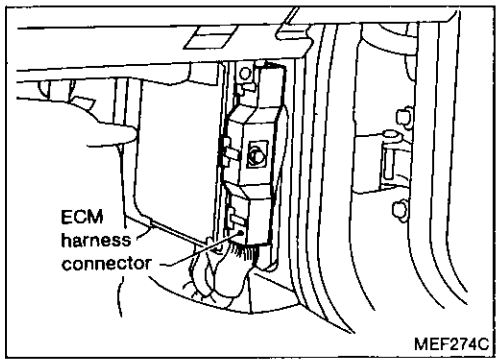


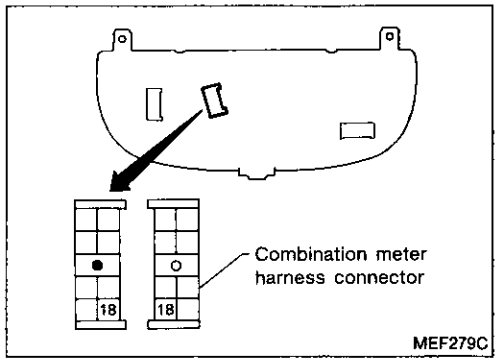
Diagnostic Procedure 5

VEHICLE SPEED SENSOR (Diagnostic trouble code No. 14) (Malfunction indicator lamp item)

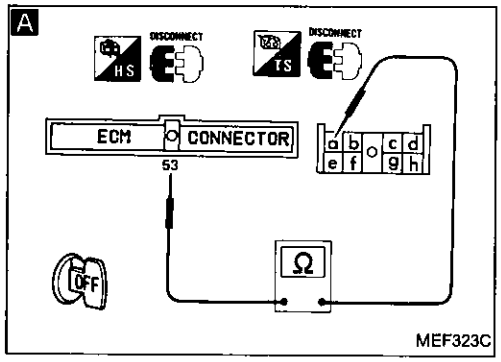


Harness layout





VEHICLE SPEED SENSOR (Diagnostic trouble code No. 14) (Malfunction indicator lamp item)



INSPECTION START

CHECK OVERALL FUNCTION.
See page EF & EC-72.
O.K. → INSPECTION END

N.G.

CHECK SPEEDOMETER FUNCTION.
Make sure that speedometer functions properly.
N.G. → Check vehicle speed sensor and its circuit. (Refer to EL section.)

O.K.

A

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 ㊸ and terminal ⓖ.
Continuity should exist.
N.G. → Check the following.
- Harness connectors (F23), (M74)
- Harness continuity between ECM and combination meter

If N.G., repair harness or connectors.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector.

Perform FINAL CHECK by the following procedure after repair is completed.

FINAL CHECK

Erase the diagnostic test mode II (Self-diagnostic results) memory.

Perform test drive.

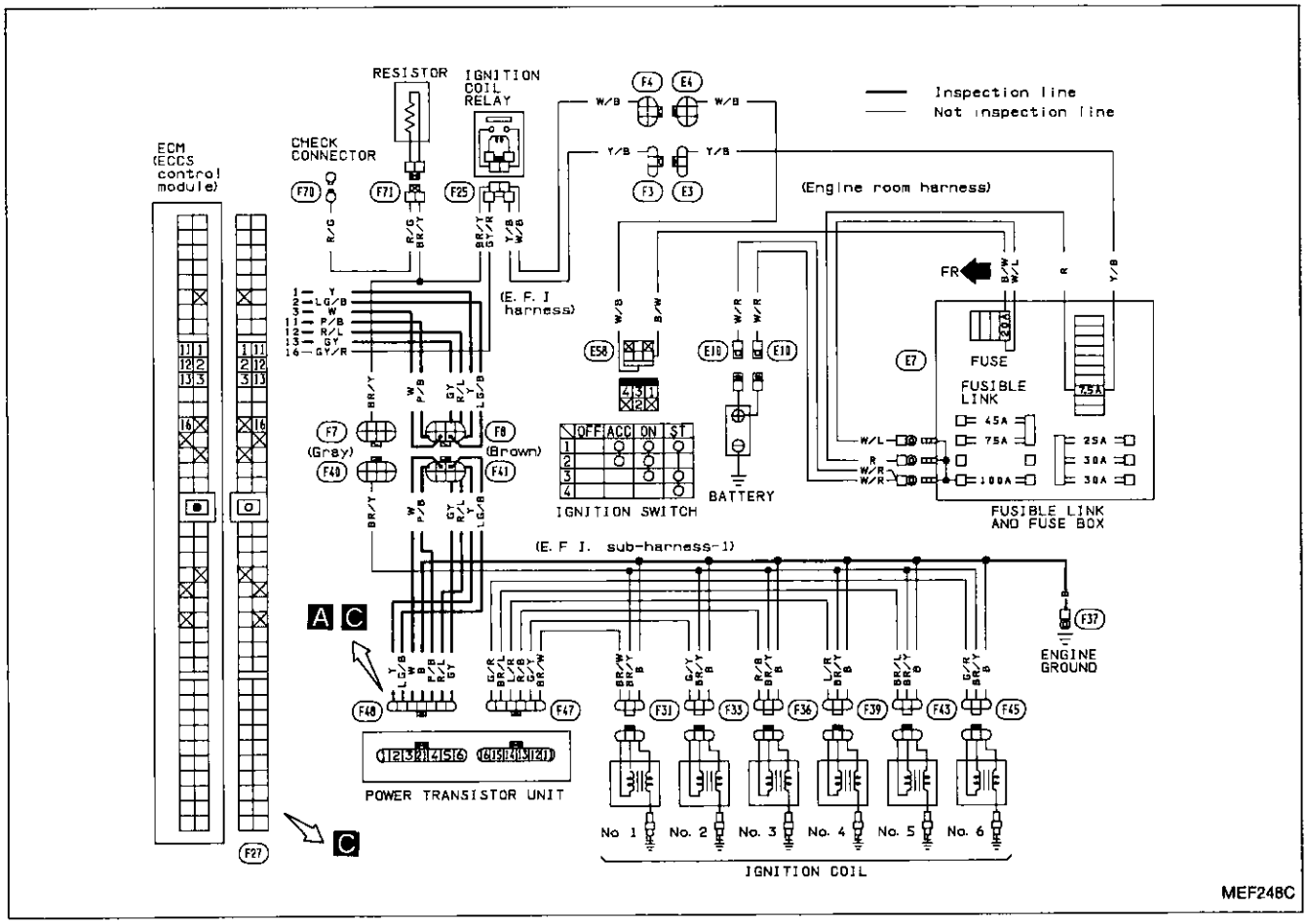
Check overall function again.
N.G. → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

O.K.

INSPECTION END

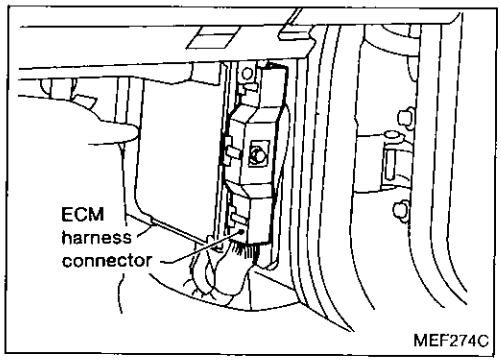
Diagnostic Procedure 6

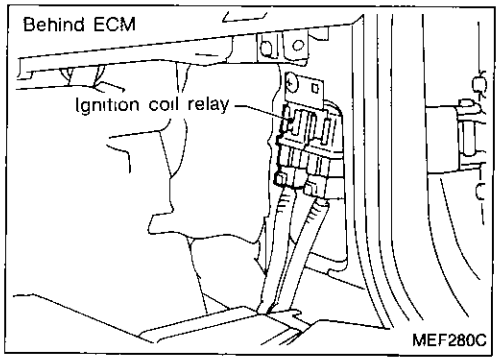
IGNITION SIGNAL (Diagnostic trouble code No. 21)

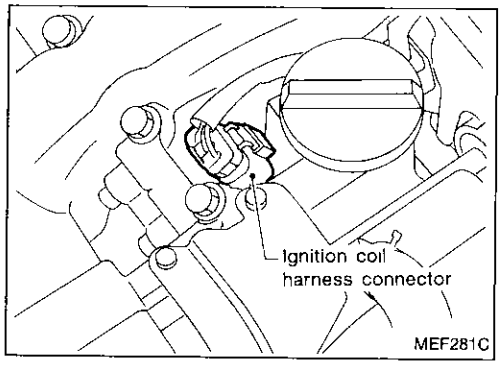


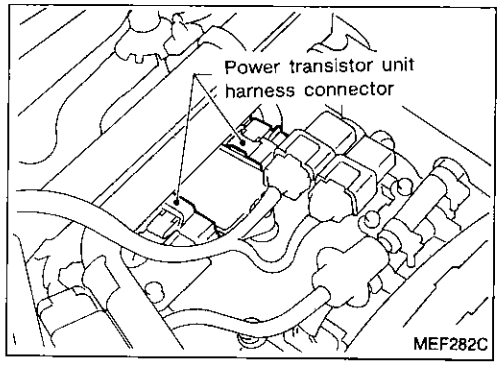
IGNITION SIGNAL (Diagnostic trouble code No. 21)

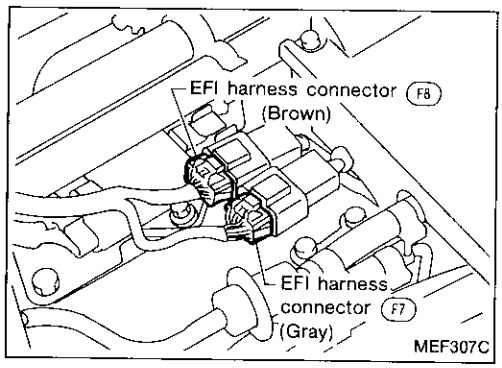
Harness layout





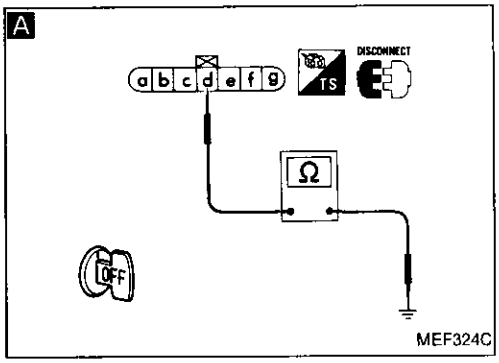






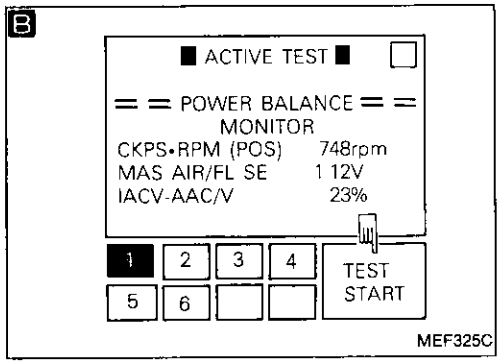
IGNITION SIGNAL (Diagnostic trouble code No. 21)

A



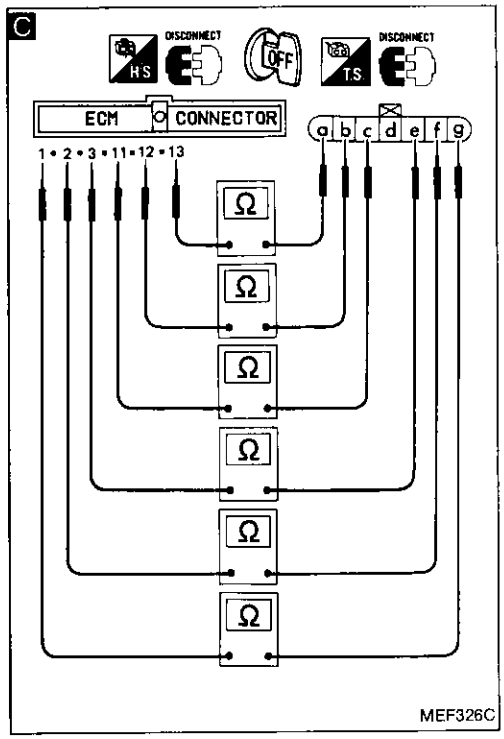
MEF324C

B



MEF325C

C



MEF326C

INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-73.

O.K. → Go to "IGNITION SIGNAL (Not self-diagnostic item)".

N.G.

Turn ignition switch "START". **Is any cylinder ignited?**

No → A

Yes

B

SEARCH FOR MALFUNCTIONING CIRCUIT.
1) Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
2) Search for circuit which does not produce a momentary engine speed drop.

A

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect power transistor unit harness connector.
3) Check harness continuity between terminal ⓓ and engine ground. **Continuity should exist.**

If N.G., repair harness or connectors.

O.K.

C

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector and power transistor unit harness connector.
3) Check harness continuity between
ECM terminal ① and terminal ⓖ,
ECM terminal ② and terminal ⓕ,
ECM terminal ③ and terminal ⓔ,
ECM terminal ⑪ and terminal ⓒ,
ECM terminal ⑫ and terminal ⓑ,
ECM terminal ⑬ and terminal ⓐ.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F8), (F41)
- Harness continuity between ECM and power transistor unit

If N.G., repair harness or connectors.

O.K.

CHECK COMPONENT (Power transistor unit). Refer to "Electrical Components Inspection". (See pages EF & EC-222.)

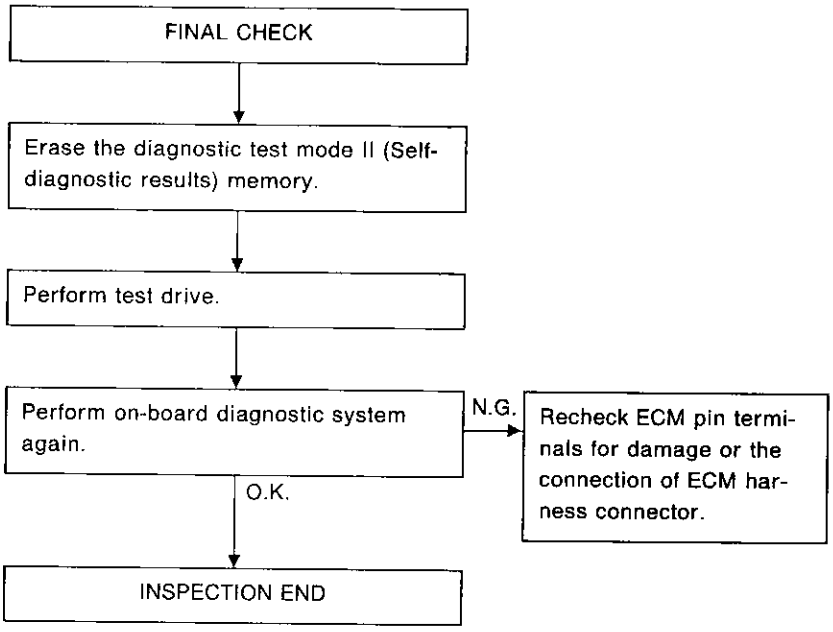
N.G. → Replace power transistor unit.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector.

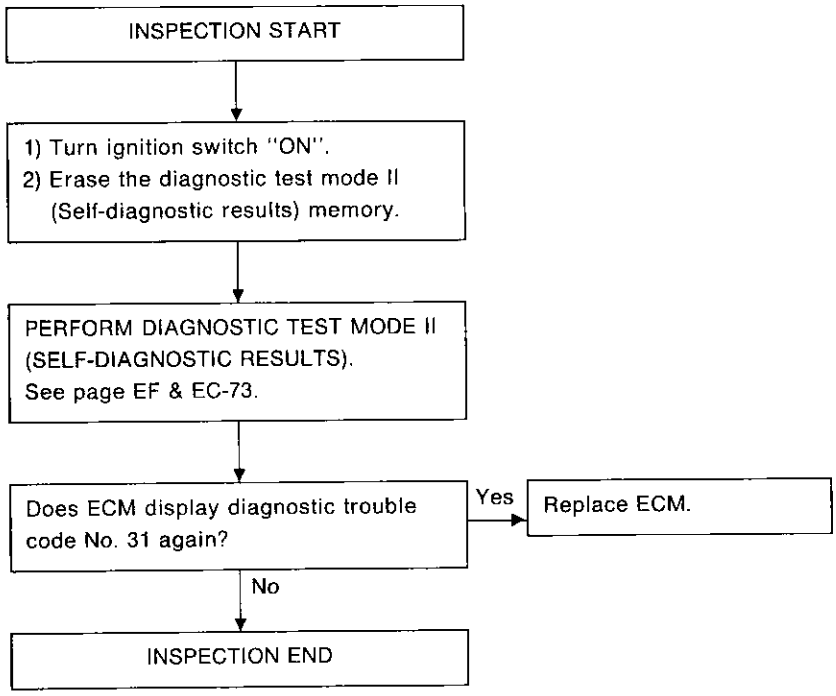
IGNITION SIGNAL (Diagnostic trouble code No. 21)

Perform FINAL CHECK by the following procedure after repair is completed.



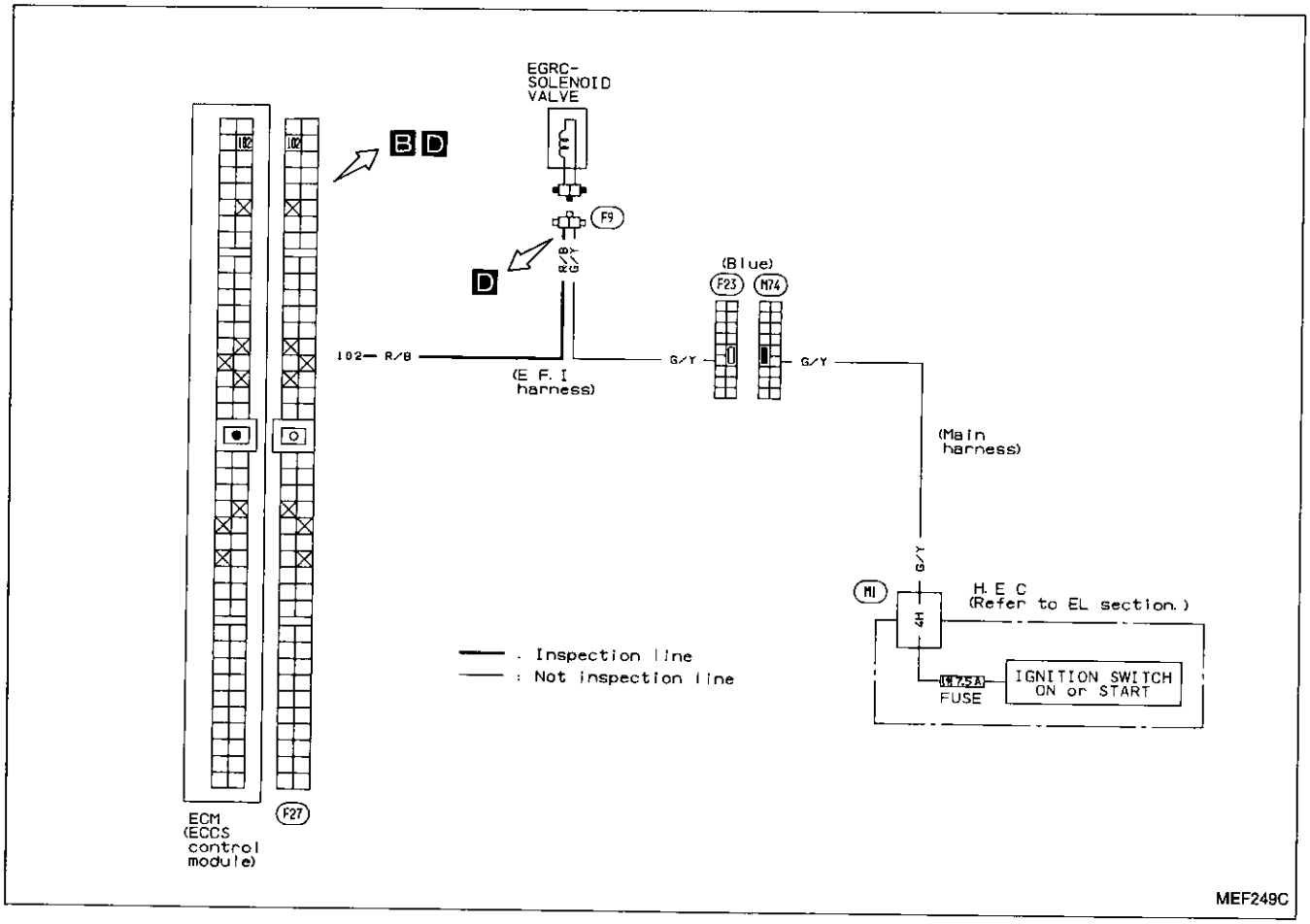
Diagnostic Procedure 7

ECM (ECCS CONTROL MODULE) (Diagnostic trouble code No. 31)
(Malfunction indicator lamp item)

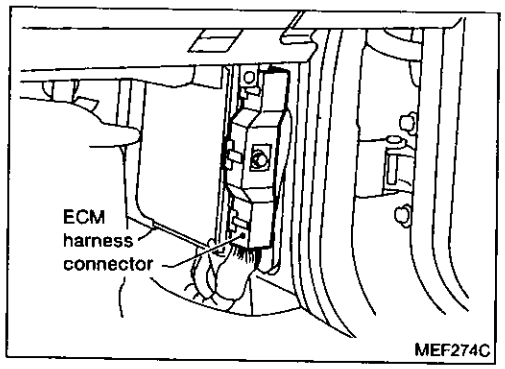


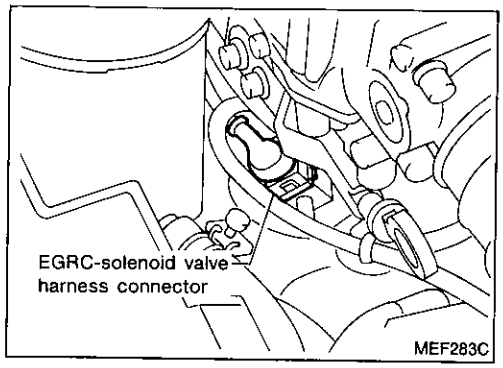
Diagnostic Procedure 8

E.G.R. FUNCTION (Diagnostic trouble code No. 32) (Malfunction indicator lamp item) : California models

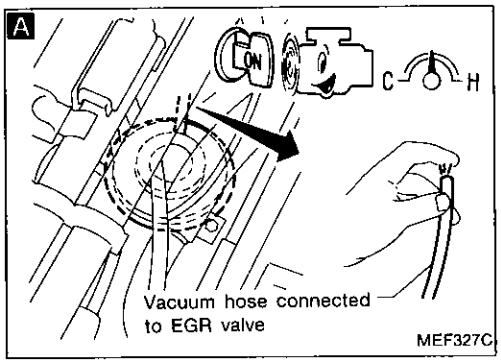


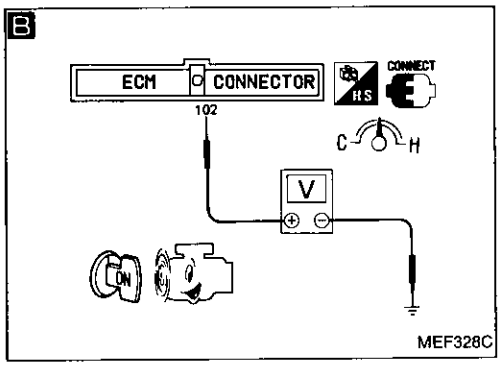
Harness layout

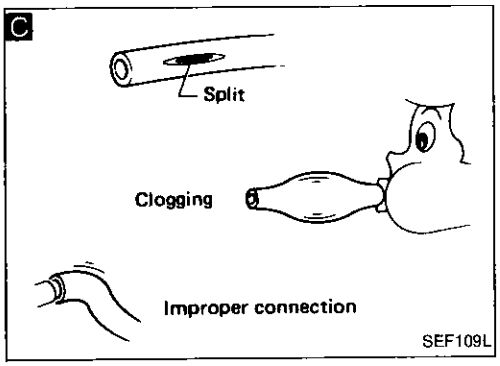


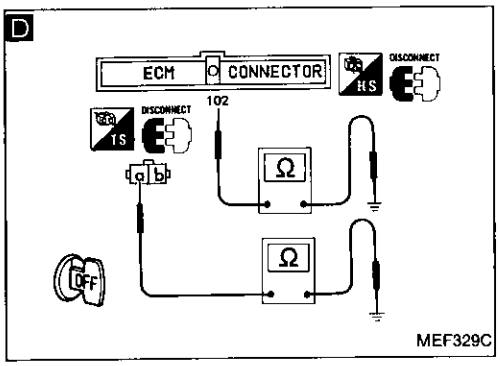


E.G.R. FUNCTION (Diagnostic trouble code No. 32) (Malfunction indicator lamp item): (California models)









INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-74.

O.K. → Go to E.G.R. CONTROL (Not self-diagnostic item).

N.G.

A

CHECK VACUUM SOURCE TO EGR VALVE.
1) Start engine and warm it up sufficiently.
2) Keep engine speed at about 2,000 rpm.
3) Disconnect vacuum hose to EGR valve.
4) Make sure that vacuum exists.
Vacuum should exist.

O.K. → CHECK COMPONENT (EGR valve). Refer to "Electrical Components Inspection". (See page EF & EC-223.)

N.G. → Replace EGR valve.

N.G.

B

CHECK CONTROL FUNCTION.
1) Check voltage between ECM terminal (102) and ground under the following conditions with CONSULT or tester.
Voltage:
At idle
Approximately 0V
Engine speed is 2,000 rpm.
Battery voltage

O.K. → C

C

CHECK VACUUM HOSE. Check vacuum hose for clogging, cracks and proper connection.

N.G.

D

CHECK OUTPUT SIGNAL CIRCUIT.
1) Stop engine.
2) Disconnect ECM harness connector.
3) Disconnect EGRC-solenoid valve harness connector.
4) Check harness continuity between ECM terminal (102) and ground, terminal ⓐ and ground.
Continuity should not exist.

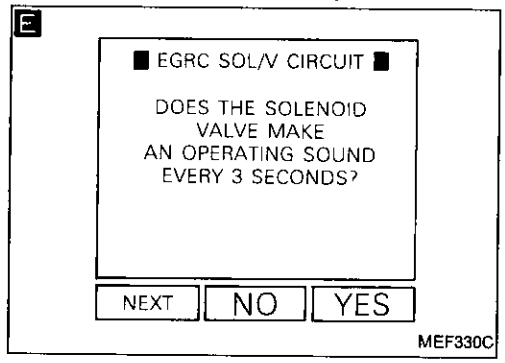
N.G. → Repair harness or connectors between ECM and EGRC-solenoid valve.

O.K.

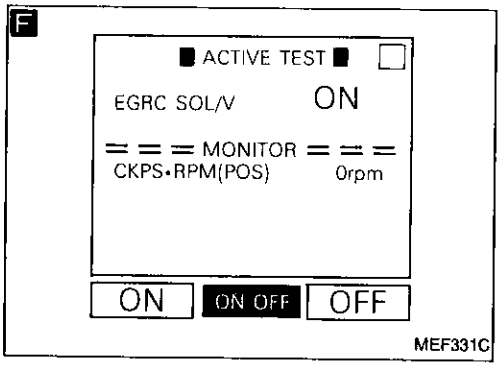
Ⓐ

E.G.R. FUNCTION (Diagnostic trouble code No. 32) (Malfunction indicator lamp item): (California models)

E



F



Ⓐ

E

CHECK COMPONENT (EGRC-solenoid valve).

1) Reconnect ECM harness connector and EGRC-solenoid valve harness connector.
2) Turn ignition switch "ON".
3) Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

N.G. → Replace EGRC-solenoid valve.

— OR —

1) Reconnect ECM harness connector and EGRC-solenoid valve harness connector.
2) Turn ignition switch "ON".
3) Turn EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

— OR —

Refer to "Electrical Components Inspection".
(See page EF & EC-223.)

O.K. ↓

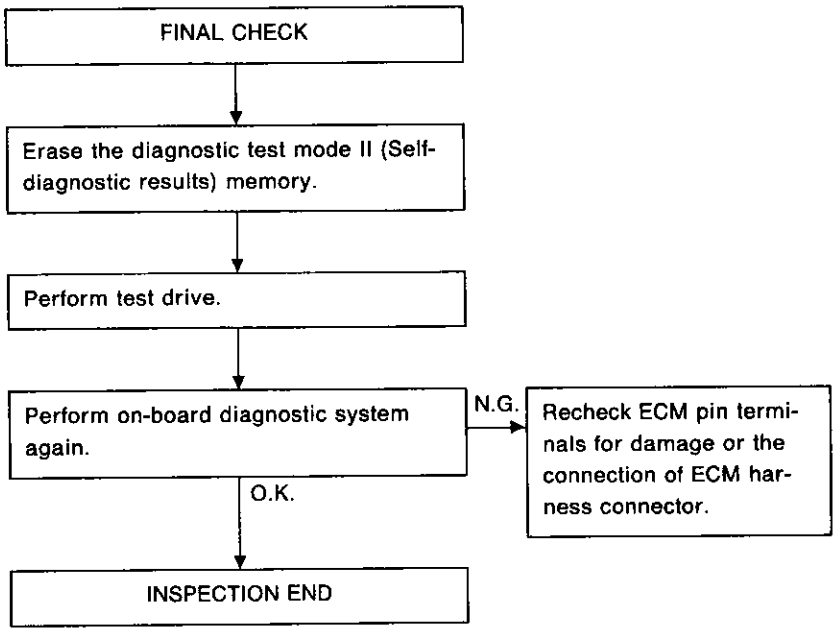
Check ECM pin terminals for damage or the connection of ECM harness connector.

↓

Check resistance of EGR temperature sensor.
(See page EF & EC-224.)

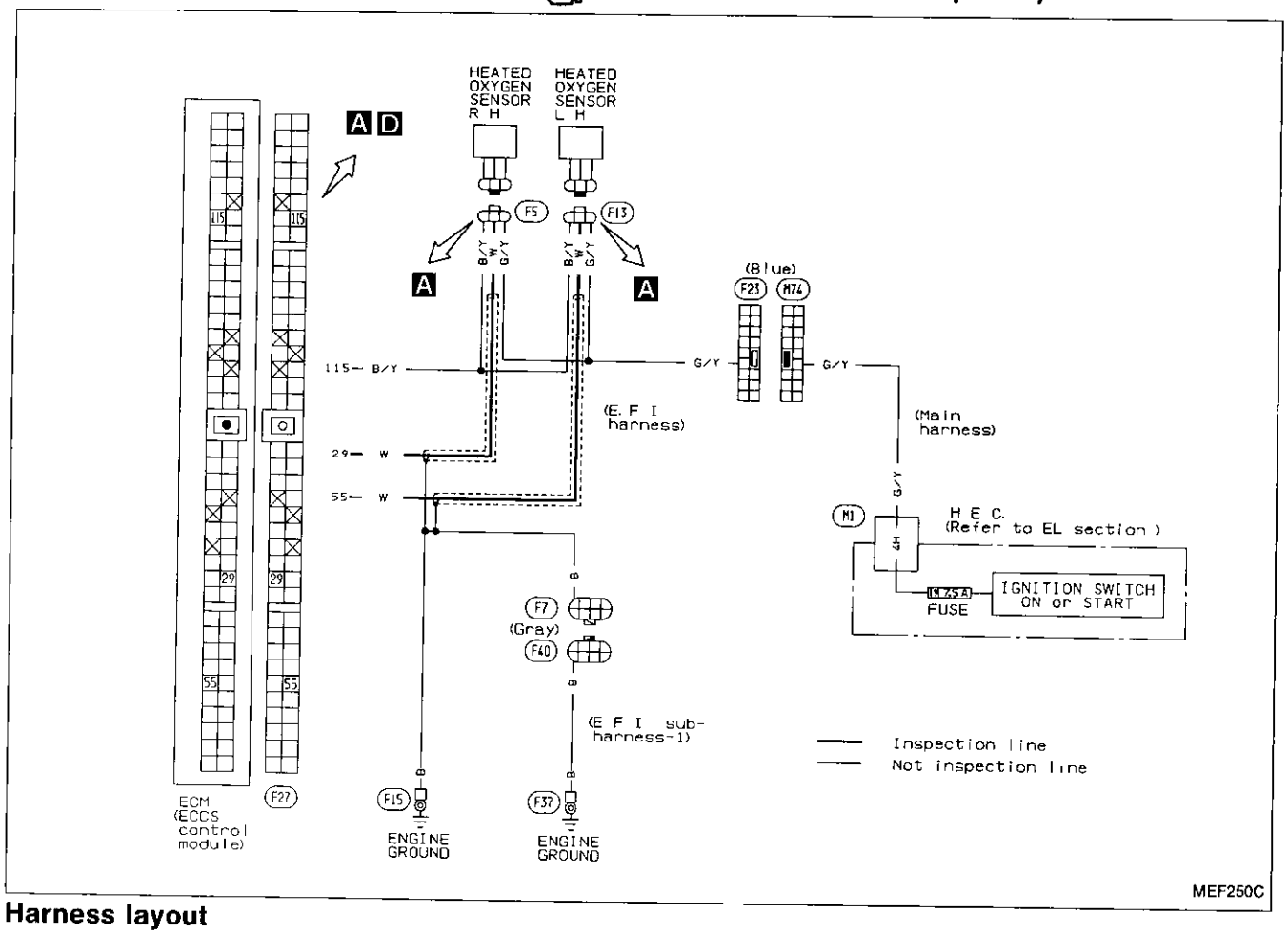
E.G.R. FUNCTION (Diagnostic trouble code No. 32) (Malfunction indicator lamp item): California models

Perform FINAL CHECK by the following procedure after repair is completed.

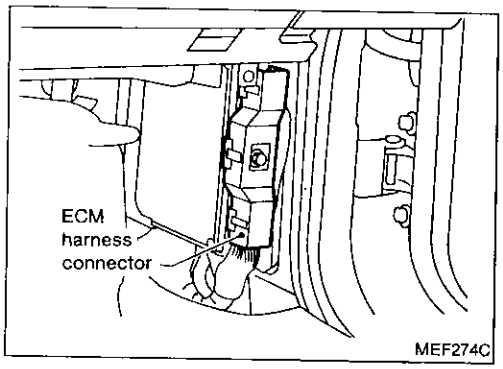


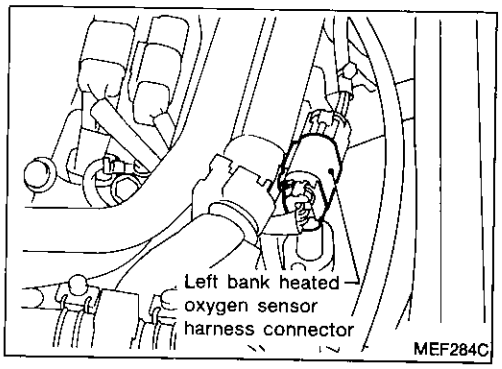
Diagnostic Procedure 9

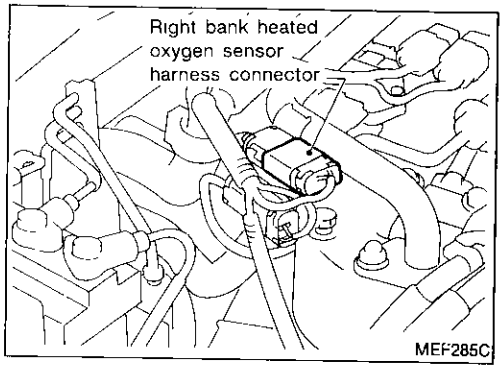
HEATED OXYGEN SENSOR L.H. (Diagnostic trouble code No. 33) HEATED OXYGEN SENSOR R.H. (Diagnostic trouble code No. 53) (Malfunction indicator lamp item)



Harness layout

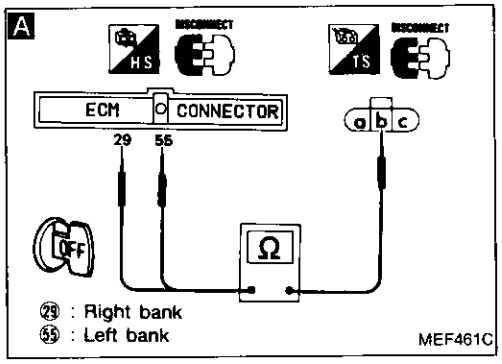




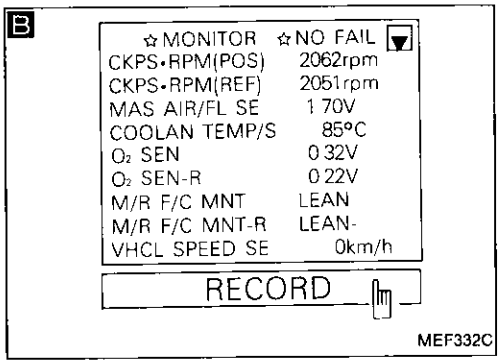


HEATED OXYGEN SENSOR L.H. (Diagnostic trouble code No. 33) HEATED OXYGEN SENSOR R.H. (Diagnostic trouble code No. 53) (Malfunction indicator lamp item)

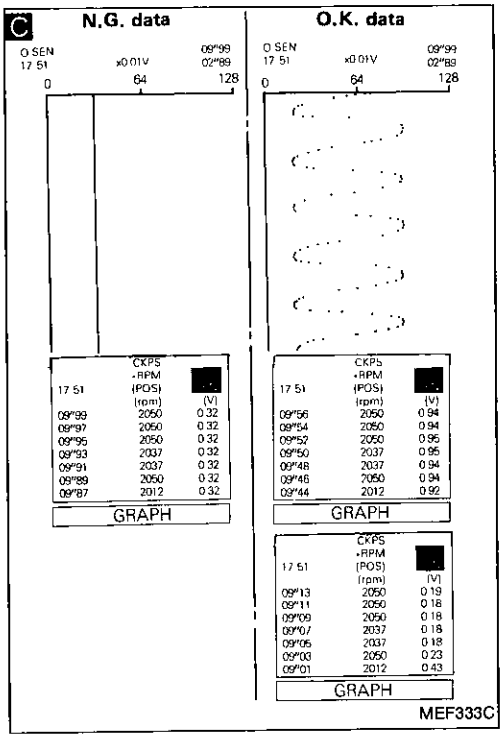
A



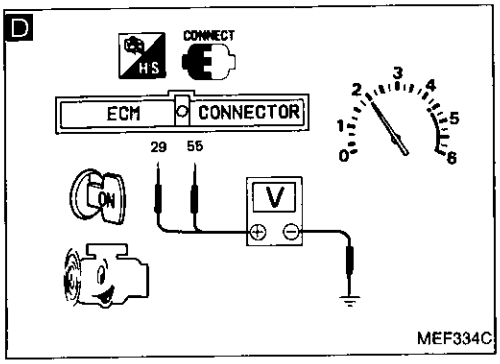
B



C



D



INSPECTION START

CHECK OVERALL FUNCTION.
See page EF & EC-75.

O.K. → INSPECTION END

N.G.

A

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect heated oxygen sensor harness connector and ECM harness connector.
3) Check harness continuity between ECM terminals ㉙, ㊺ and terminal ⓑ.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK VOLTAGE.
1) Reconnect heated oxygen sensor harness connector and ECM harness connector.
2) Start engine and warm it up sufficiently.
B 3) Select "DATA MONITOR" mode with CONSULT.
4) Touch "RECORD" on CONSULT with engine speed held at approximately 2,000 rpm.
C 5) Check "O_2 SEN (–R)" voltage.
① **Approx. 0.3 volts (No voltage fluctuations) ... N.G.**
② **Other than ① above ... O.K.**

N.G. → Replace heated oxygen sensor.

OR

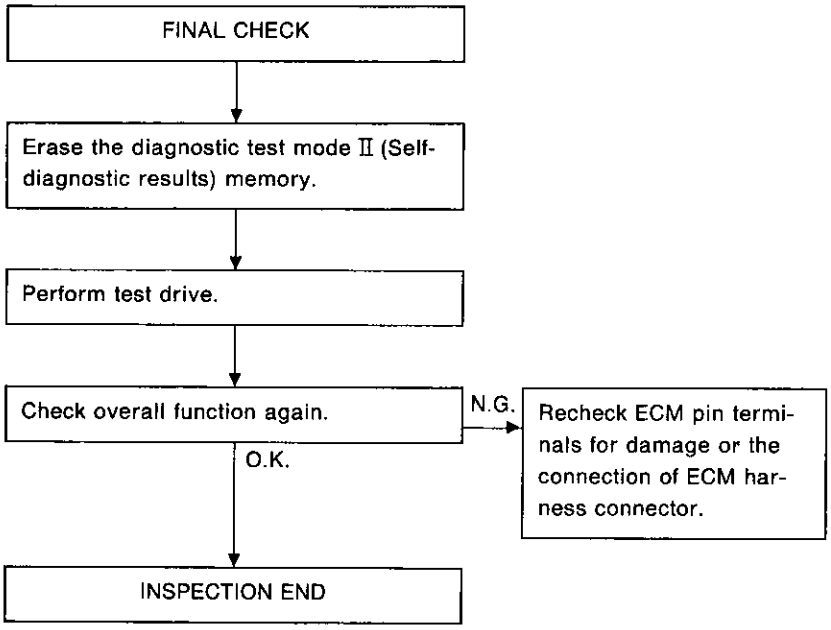
D 3) Check voltage between ECM terminals ㉙, ㊺ and ground, with engine speed held at approximately 2,000 rpm.
① **Approx. 0.3 volts (No voltage fluctuations) ... N.G.**
② **Other than ① above ... O.K.**

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector.

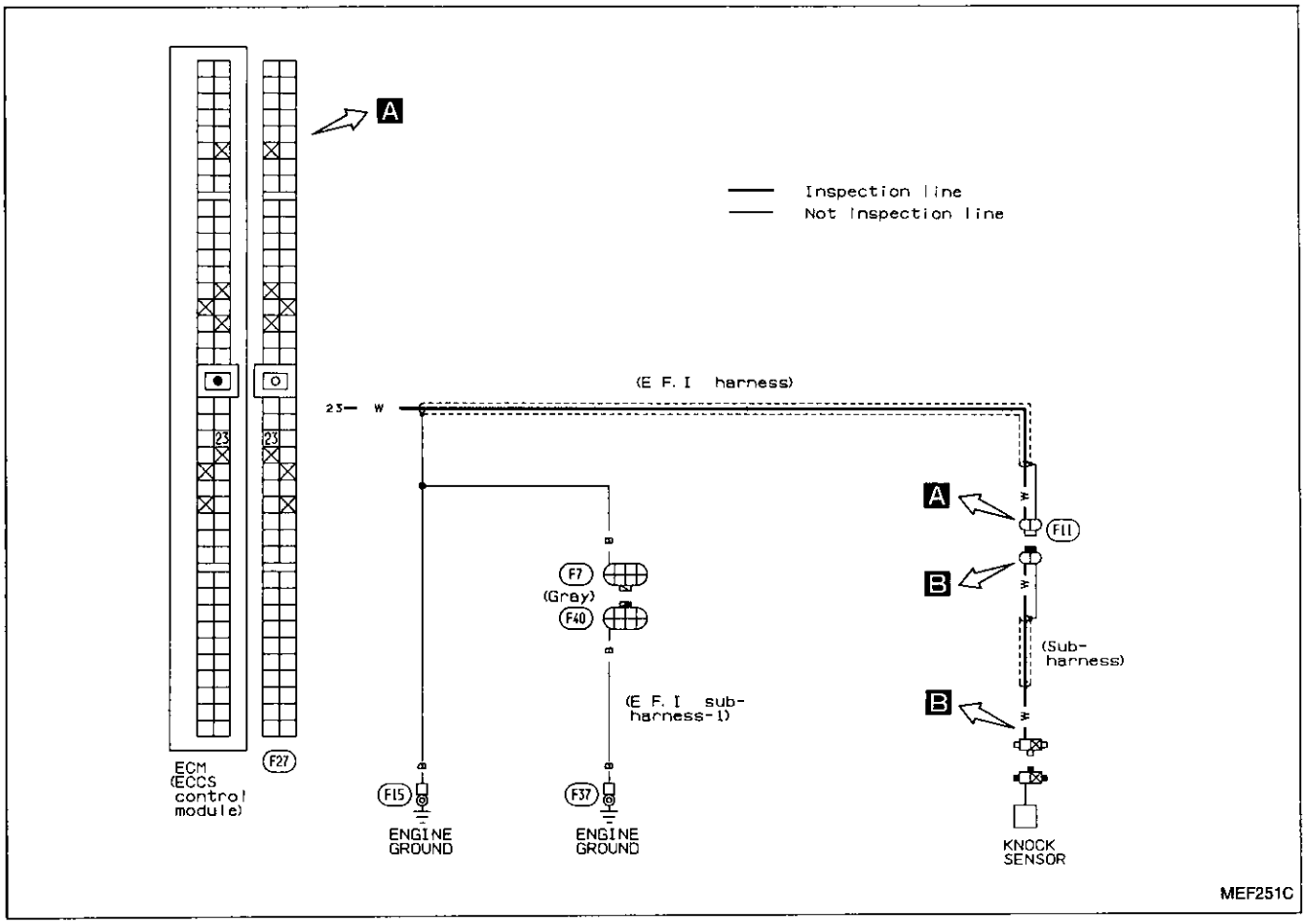
HEATED OXYGEN SENSOR L.H. (Diagnostic trouble code No. 33) HEATED OXYGEN SENSOR R.H. (Diagnostic trouble code No. 53) (Malfunction indicator lamp item)

Perform FINAL CHECK by the following procedure after repair is completed.

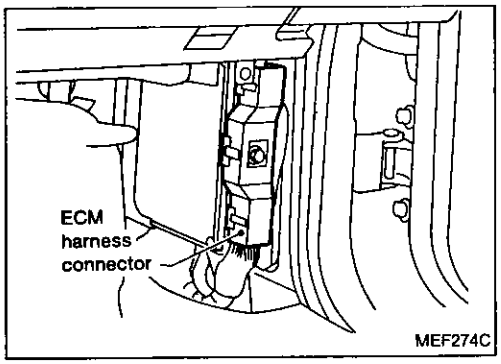


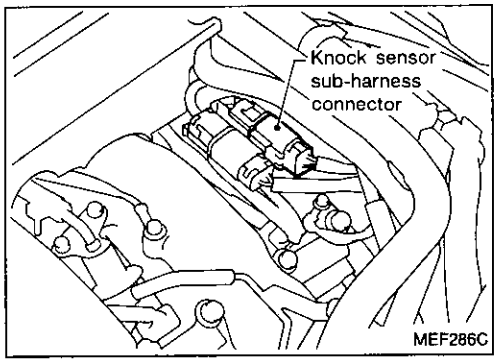
Diagnostic Procedure 10

KNOCK SENSOR (Diagnostic trouble code No. 34)

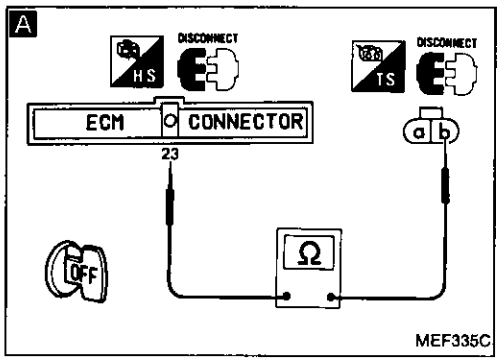


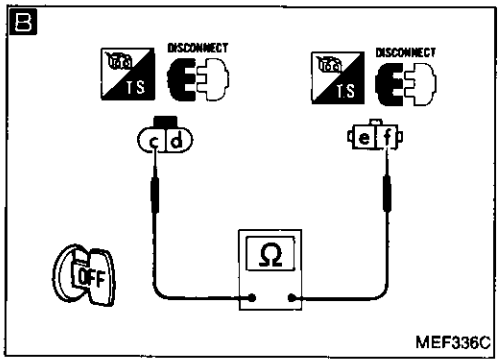
Harness layout





KNOCK SENSOR (Diagnostic trouble code No. 34)





INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
See page EF & EC-75.

O.K. → INSPECTION END

N.G.

A

CHECK INPUT SIGNAL CIRCUIT-I.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector and knock sensor sub-harness connector.
3) Check harness continuity between terminal ⓑ and ECM terminal ㉓.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

B

CHECK INPUT SIGNAL CIRCUIT-II.
1) Disconnect knock sensor harness connector.
2) Check harness continuity between terminals ⓒ and ⓕ.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT (Knock sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-226.)

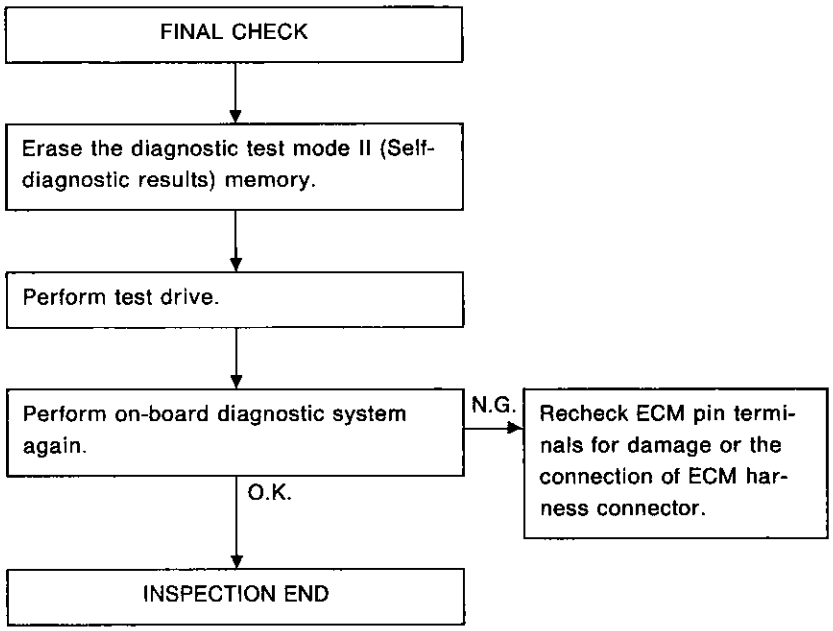
N.G. → Replace knock sensor.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector.

KNOCK SENSOR (Diagnostic trouble code No. 34)

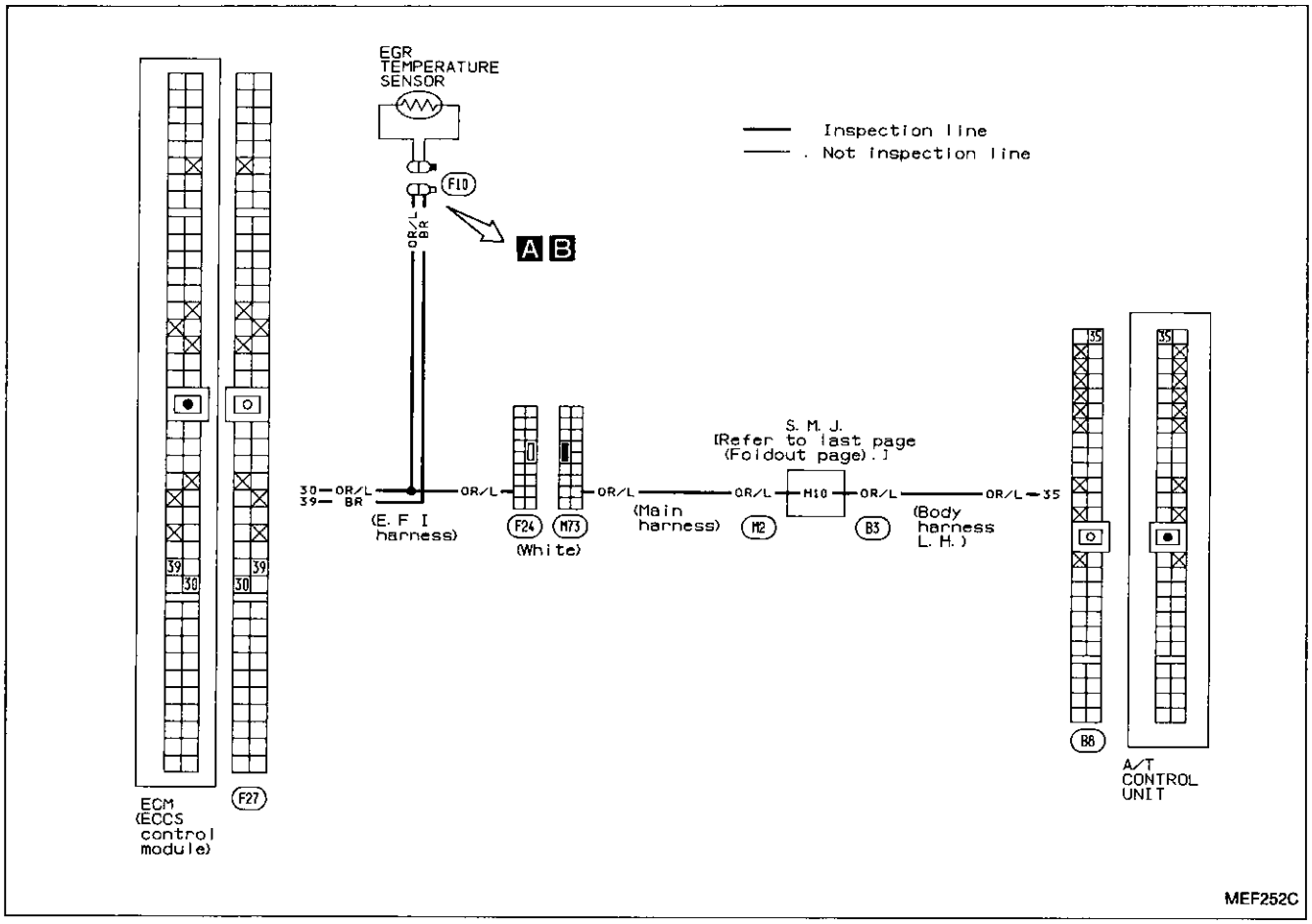
Perform FINAL CHECK by the following procedure after repair is completed.



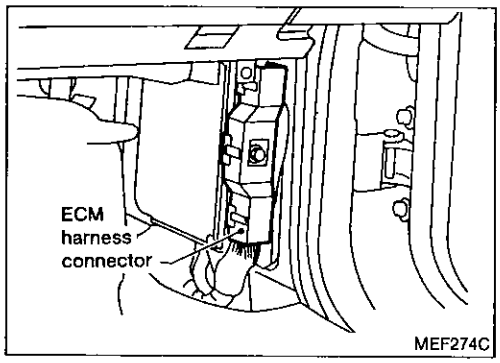
Diagnostic Procedure 11

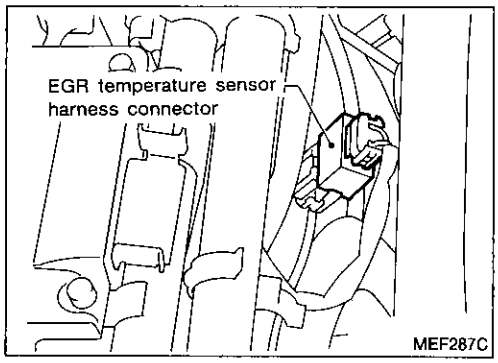
EGR TEMPERATURE SENSOR (Diagnostic trouble code No. 35) (Malfunction indicator lamp item):

California models only



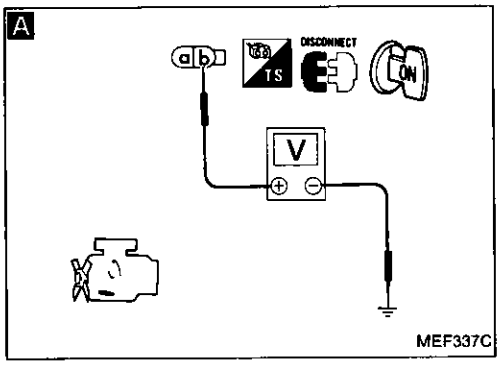
Harness layout





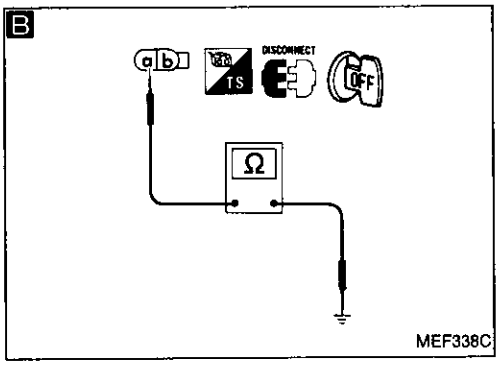
EGR TEMPERATURE SENSOR (Diagnostic trouble code No. 35) (Malfunction indicator lamp item):

A



MEF337C

B



MEF338C

INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-76.

O.K. → INSPECTION END

N.G.

A

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect EGR temperature sensor harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓑ and ground with CONSULT or tester.
Voltage: Approximately 5V

N.G. → Repair harness or connectors.

O.K.

B

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal ⓐ and engine ground.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F24), (M73)
- Harness connectors (M2), (B3)
- Harness continuity between EGR temperature sensor and control unit
- Harness continuity between EGR temperature sensor and A/T control unit

If N.G., repair harness or connectors.

O.K.

CHECK COMPONENT (EGR temperature sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-224.)

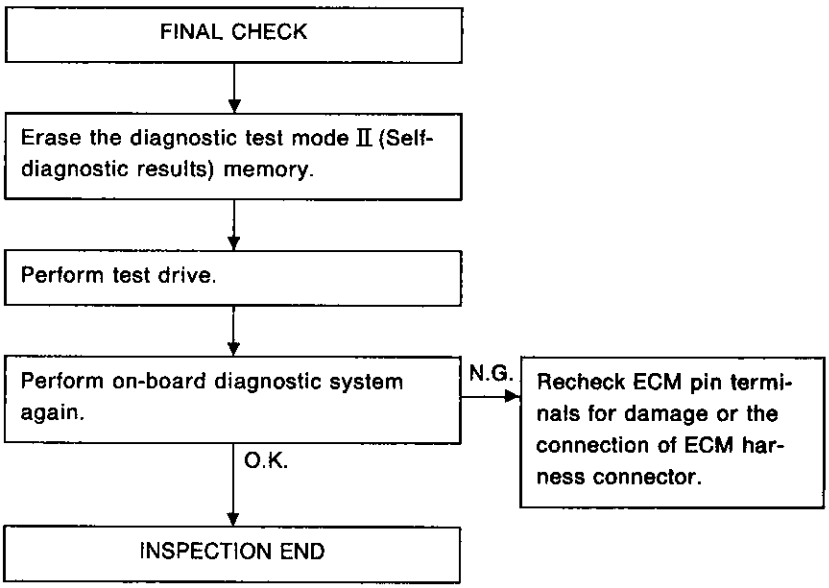
N.G. → Replace EGR temperature sensor.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector.

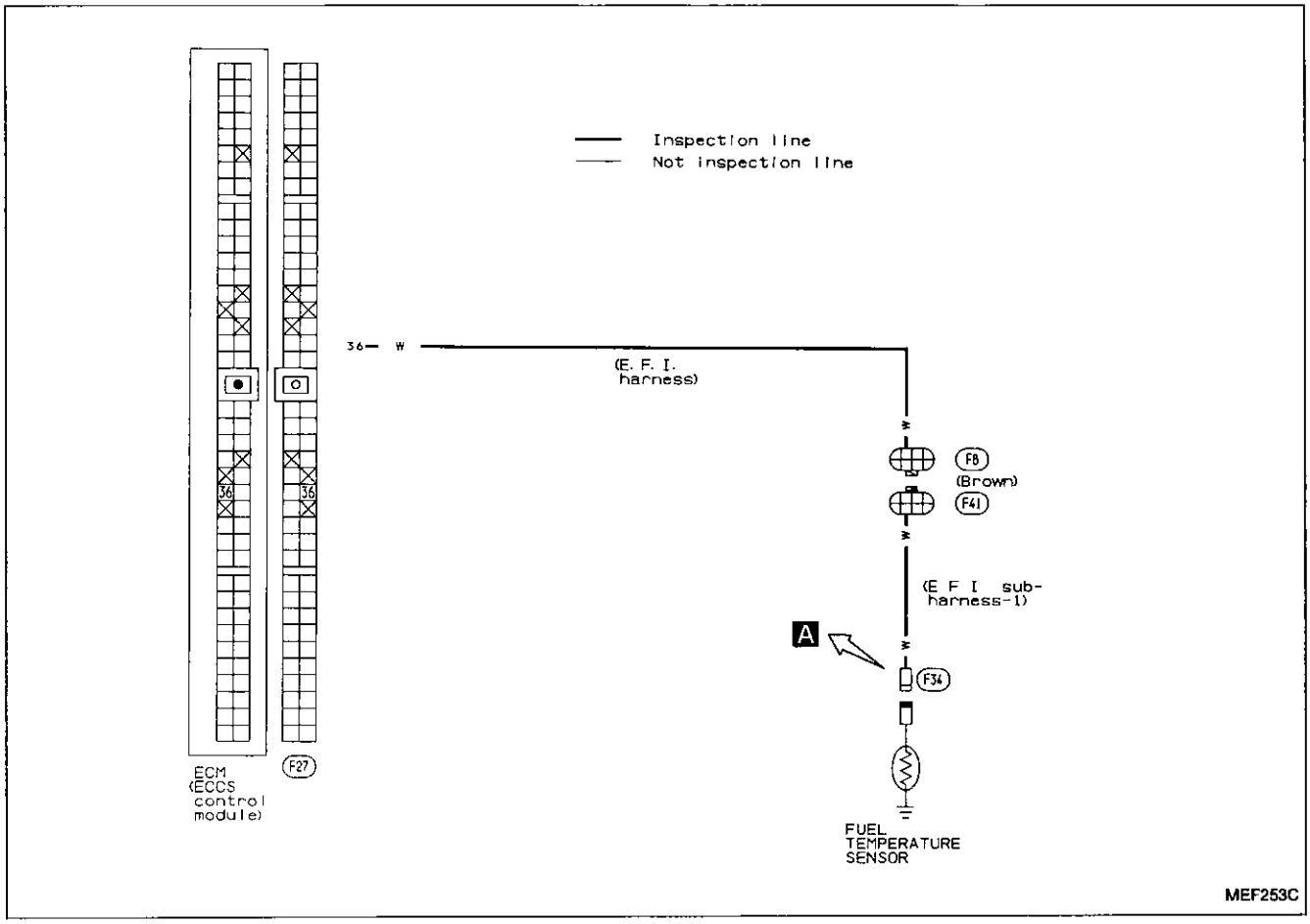
EGR TEMPERATURE SENSOR (Diagnostic trouble code No. 35) (Malfunction indicator lamp item):

Perform FINAL CHECK by the following procedure after repair is completed.

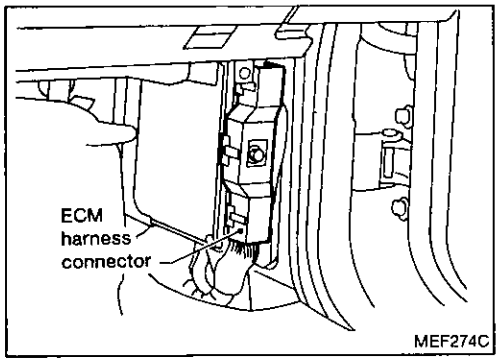


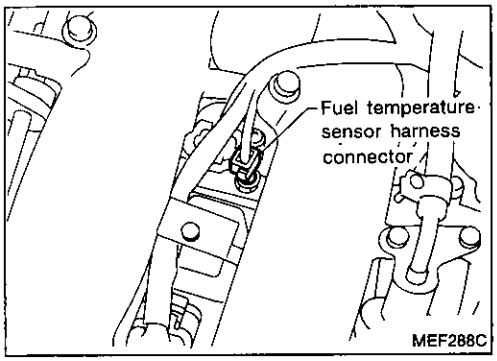
Diagnostic Procedure 12

FUEL TEMPERATURE SENSOR (Diagnostic trouble code No. 42) (Malfunction indicator lamp item)

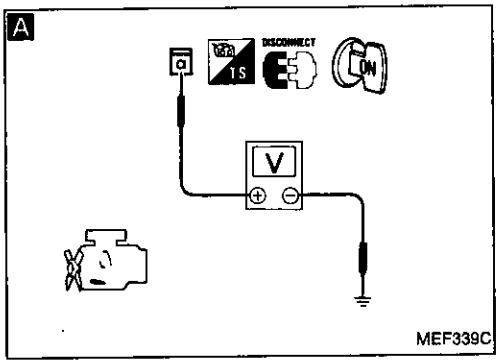


Harness layout





FUEL TEMPERATURE SENSOR (Diagnostic trouble code No. 42)
(Malfunction indicator lamp item)



INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-76.
- O.K. → INSPECTION END
- N.G. ↓

A

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect fuel temperature sensor harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⑨ and ground with CONSULT or tester.
Voltage: Approximately 5V

- N.G. → Check the following.
  - Harness connectors (F8), (F41)
  - Harness continuity between ECM and fuel temperature sensor

  If N.G., repair harness or connectors.
- O.K. ↓

CHECK COMPONENT (Fuel temperature sensor). Refer to "Electrical Components Inspection". (See page EF & EC-227.)
- N.G. → Replace fuel temperature sensor.
- O.K. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector.

Perform FINAL CHECK by the following procedure after repair is completed.

FINAL CHECK

↓

Erase the diagnostic test mode II (Self-diagnostic results) memory.

↓

Perform test drive.

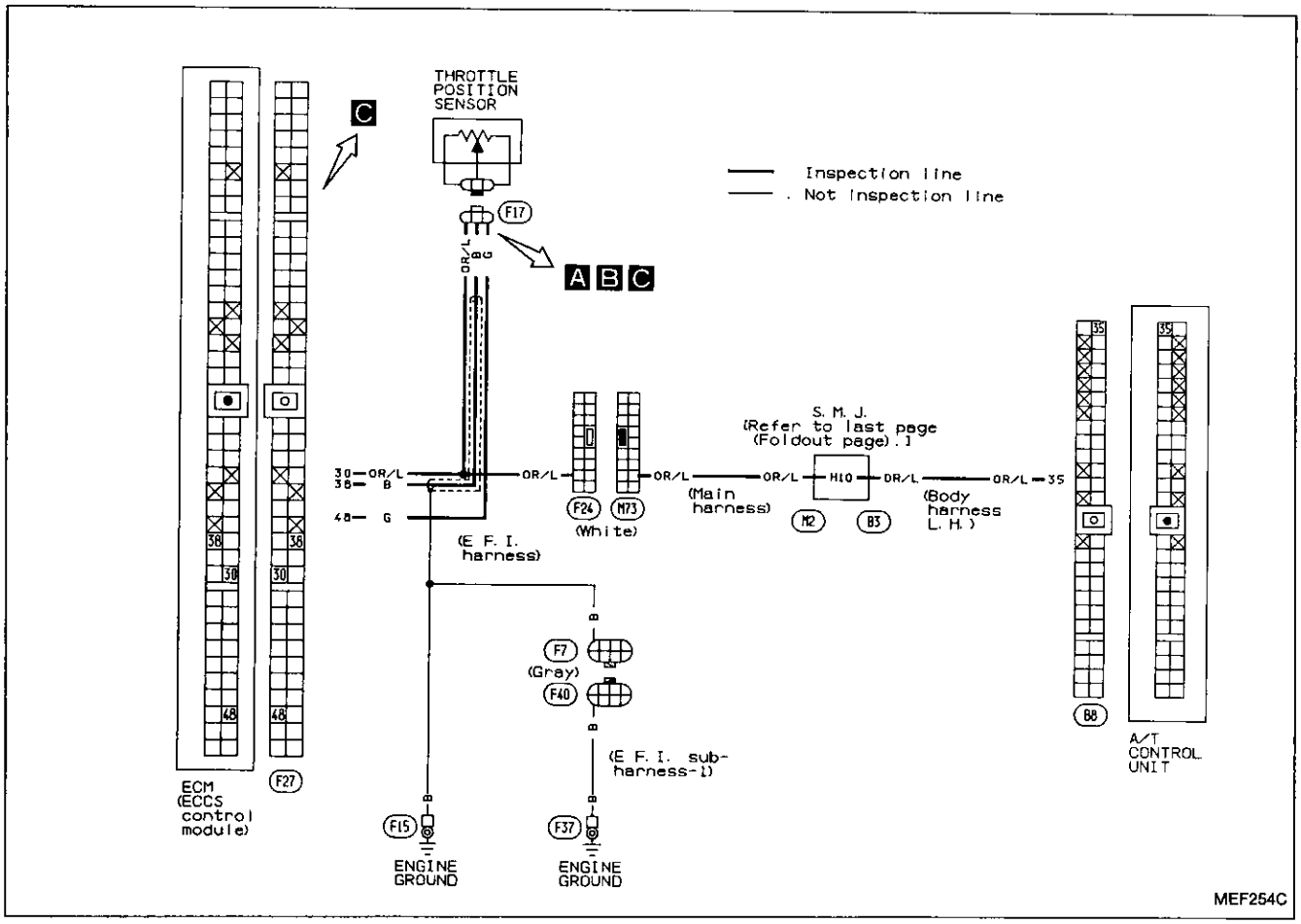
↓

Perform on-board diagnostic system again.
- N.G. → Recheck ECM pin terminals for damage or the connection of ECM harness connector.
- O.K. ↓

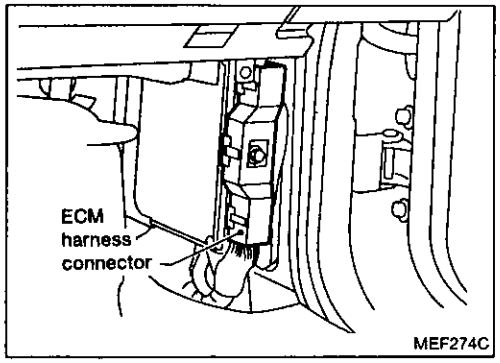
INSPECTION END

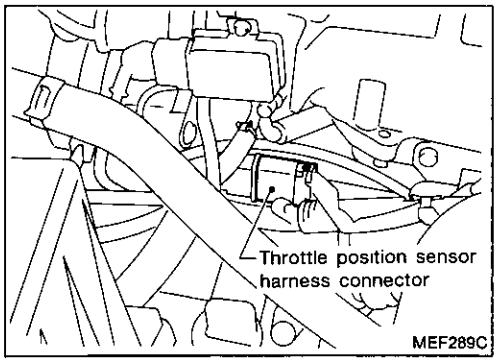
Diagnostic Procedure 13

THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43) (Malfunction indicator lamp item)

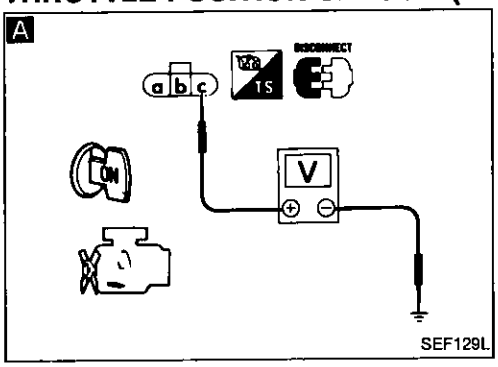


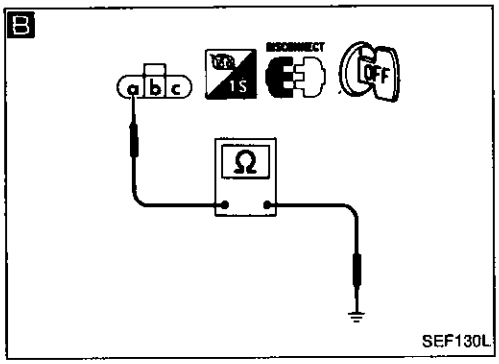
Harness layout

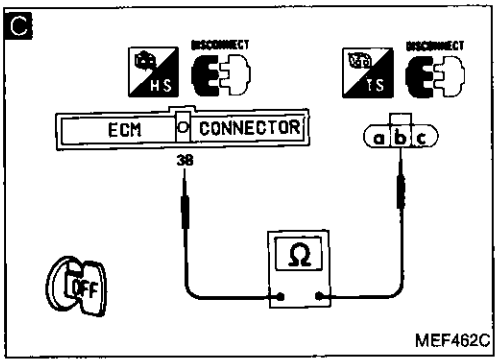




THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43)
(Malfunction indicator lamp item)







INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
See page EF & EC-76.

O.K. → INSPECTION END

N.G.

A

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect throttle position sensor harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓒ and ground with CONSULT or tester.
Voltage: Approximately 5V

N.G. → Repair harness or connectors.

O.K.

B

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal ⓐ and engine ground.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F24), (M73)
- Harness connectors (M2), (B3)
- Harness continuity between control unit and throttle position sensor
- Harness continuity between A/T Control unit and throttle position sensor

If N.G., repair harness or connectors.

O.K.

C

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ㊳ and terminal ⓑ.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT (Throttle position sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-224.)

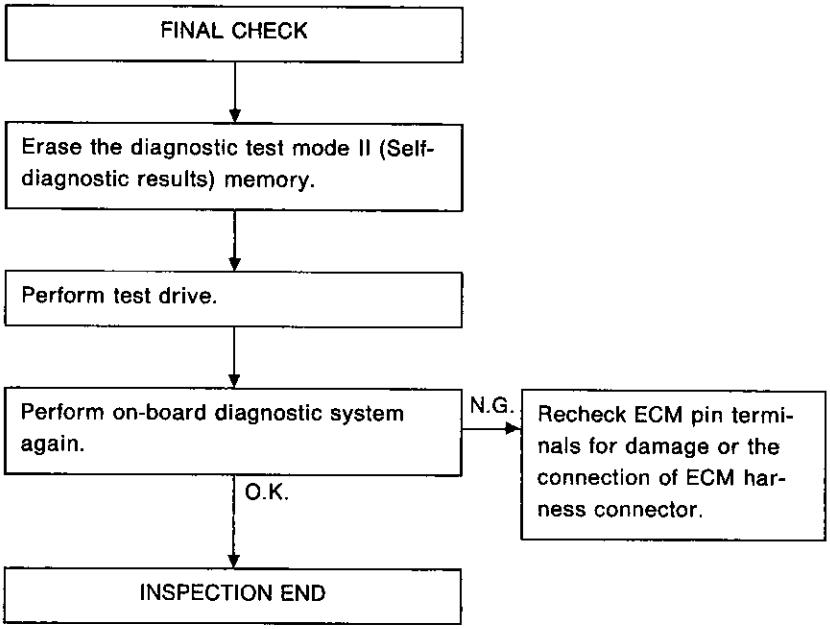
N.G. → Replace throttle position sensor.

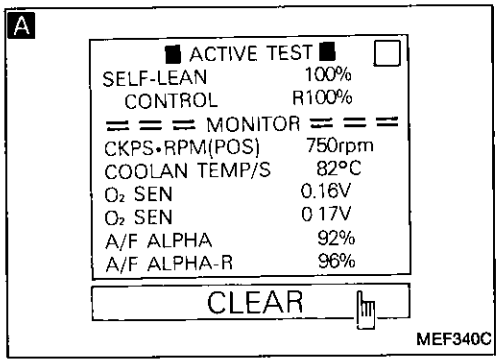
O.K.

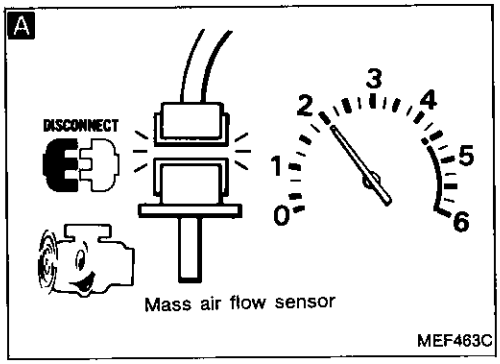
Check ECM pin terminals for damage or the connection of ECM harness connector.

THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43) (Malfunction indicator lamp item)

Perform FINAL CHECK by the following procedure after repair is completed.







Diagnostic Procedure 14

INJECTOR LEAK (Diagnostic trouble code No. 45)

(Malfunction indicator lamp item): California models only

INSPECTION START

A

Clear the self-learning data
1) Start engine and warm it up sufficiently.
2) Select "SELF- LEARNING CONT" in "ACTIVE TEST" mode with CONSULT.
3) Clear the self-learning control coefficient by touching "CLEAR".

OR

2) Disconnect mass air flow sensor connector, and restart and run engine for at least 30 seconds at 2,000 rpm.
3) Stop engine and reconnect mass air flow sensor connector.
4) Make sure diagnostic trouble code No. 12 is displayed in Diagnostic Test Mode II.
5) Erase the diagnostic test mode II (Self- diagnostic results) memory. Make sure diagnostic trouble code No. 55 is displayed in Diagnostic Test Mode II.

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
See page EF & EC-77.

O.K. → INSPECTION END

N.G.

Remove injector assembly.
(See page EF & EC-230.)
Keep fuel hose and all injectors connected to injector gallery.

Turn ignition switch "ON".
Make sure fuel does not drip from injector.

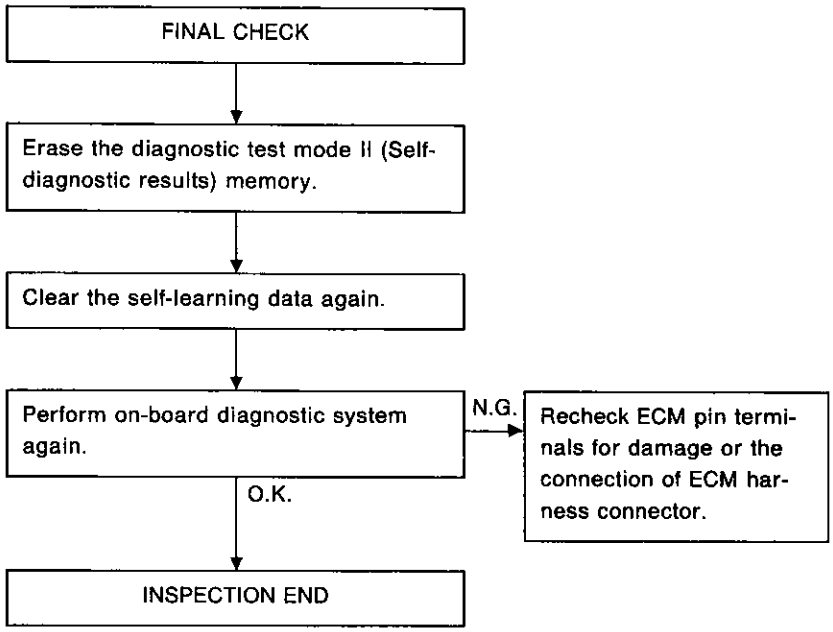
Drips → Replace the injectors from which fuel is dripping.

Does not drip

Check ECM pin terminals for damage or the connection of ECM harness connector.

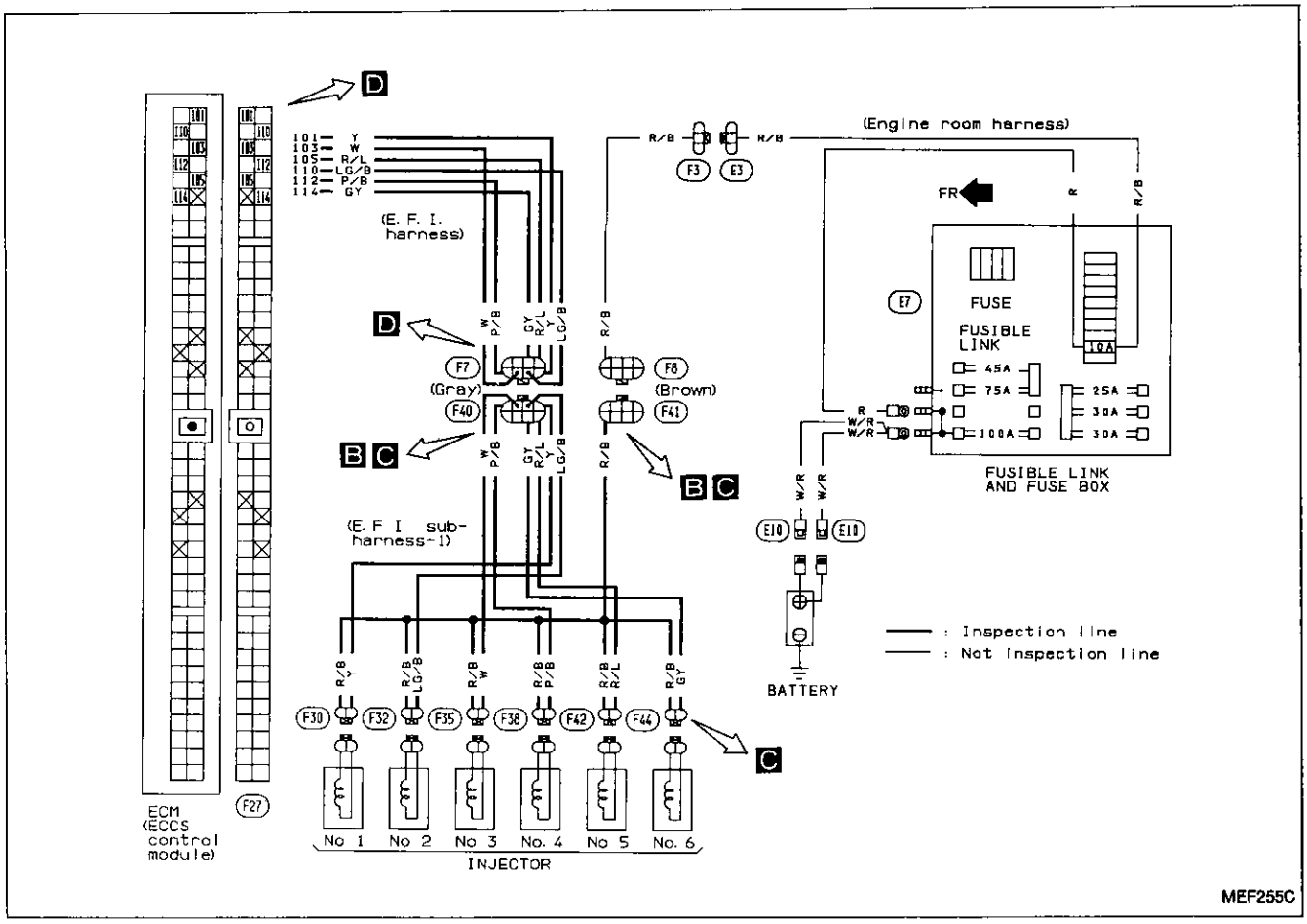
INJECTOR LEAK (Diagnostic trouble code No. 45)
(Malfunction indicator lamp item): California models only

Perform FINAL CHECK by the following procedure after repair is completed.

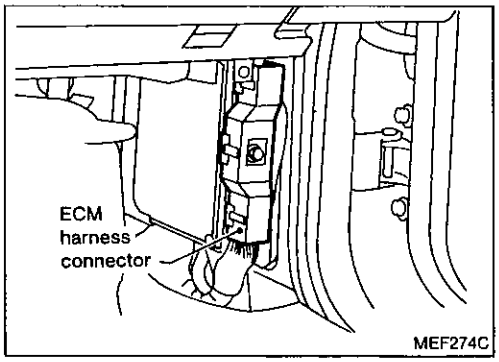


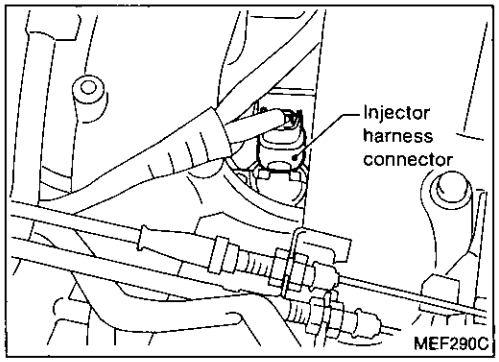
Diagnostic Procedure 15

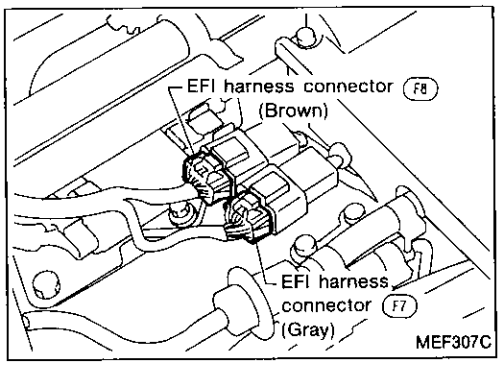
INJECTOR (Diagnostic trouble code No. 51) (Malfunction indicator lamp item): California models



Harness layout

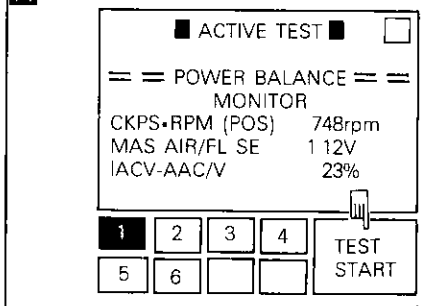






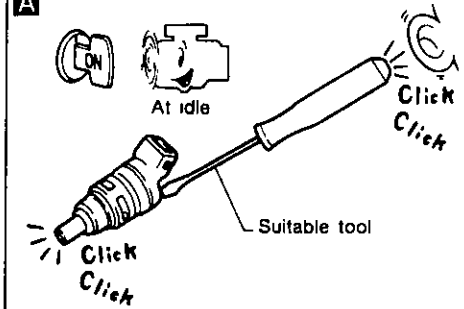
INJECTOR (Diagnostic trouble code No. 51) (Malfunction indicator lamp item): California models

A



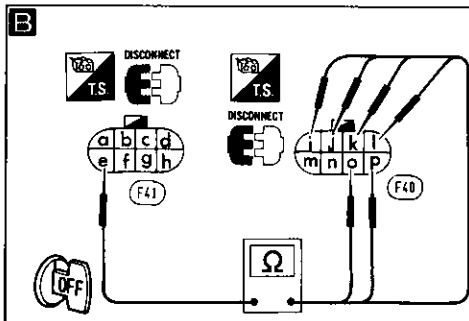
MEF341C

A



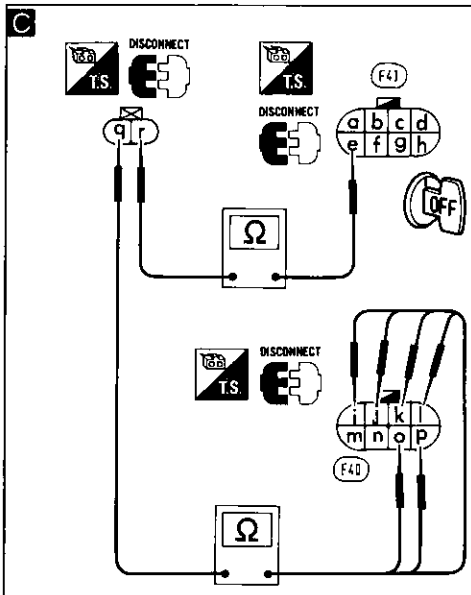
SEF730L

B



MEF342C

C



ⓘ : No. 1 cylinder
ⓚ : No. 2 cylinder
ⓙ : No. 3 cylinder
ⓘ : No. 4 cylinder
ⓟ : No. 5 cylinder
ⓞ : No. 6 cylinder

MEF343C

INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
See page EF & EC-77.

O.K. → INSPECTION END

If engine speed does not exceed the idle speed or engine idle is unstable.

Go to "INJECTOR (Not self-diagnostic item)"

N.G.

A

SEARCH FOR MALFUNCTIONING CIRCUIT.

1) Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
2) Search for circuit which does not produce a momentary engine speed drop.

OR

1) Search for circuit which does not produce injector operating sound at idle.

B

CHECK CIRCUIT CONTINUITY-I.

1) Turn ignition switch "OFF".
2) Disconnect E.F.I. sub-harness-I connectors (F40), (F41)
3) Check harness continuity between terminal ⓔ and terminals ⓘ, ⓙ, ⓚ, ⓛ, ⓞ, ⓟ.

Continuity should exist.

N.G. → C

C

CHECK CIRCUIT CONTINUITY-II.

1) Disconnect injector harness connectors.
2) Check harness continuity between terminal ⓔ and terminal ⓡ, terminal ⓠ and terminals ⓘ, ⓙ, ⓚ, ⓛ, ⓞ, ⓟ.

Continuity should exist.

If N.G., repair harness or connectors.

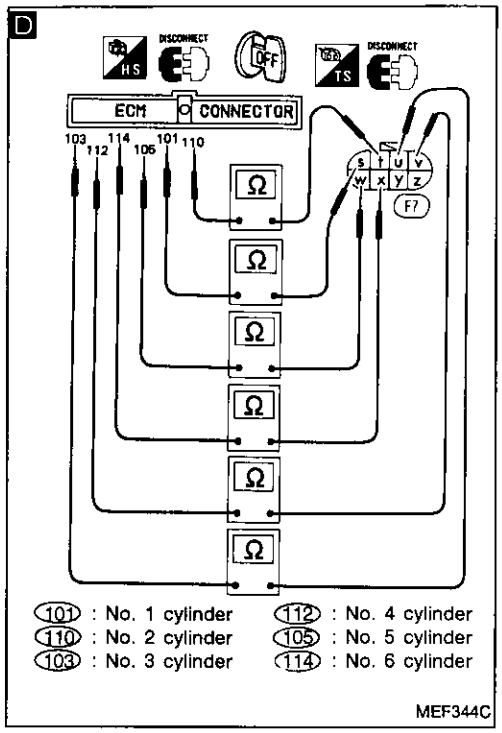
O.K.

CHECK COMPONENT (Injector).
Refer to "Electrical Components Inspection".
(See page EF & EC-226.)
If N.G., replace injector.

O.K.

Ⓐ

INJECTOR (Diagnostic trouble code No. 51) (Malfunction indicator lamp item): California models



Ⓐ

D

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between
ECM terminal (101) and terminal (s),
ECM terminal (103) and terminal (u),
ECM terminal (105) and terminal (w),
ECM terminal (110) and terminal (t),
ECM terminal (112) and terminal (v),
ECM terminal (114) and terminal (x).
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector.

Perform FINAL CHECK by the following procedure after repair is completed.

FINAL CHECK ↓

Erase the diagnostic test mode II (Self-diagnostic results) memory. ↓

Perform test drive. ↓

Perform on-board diagnostic system again.

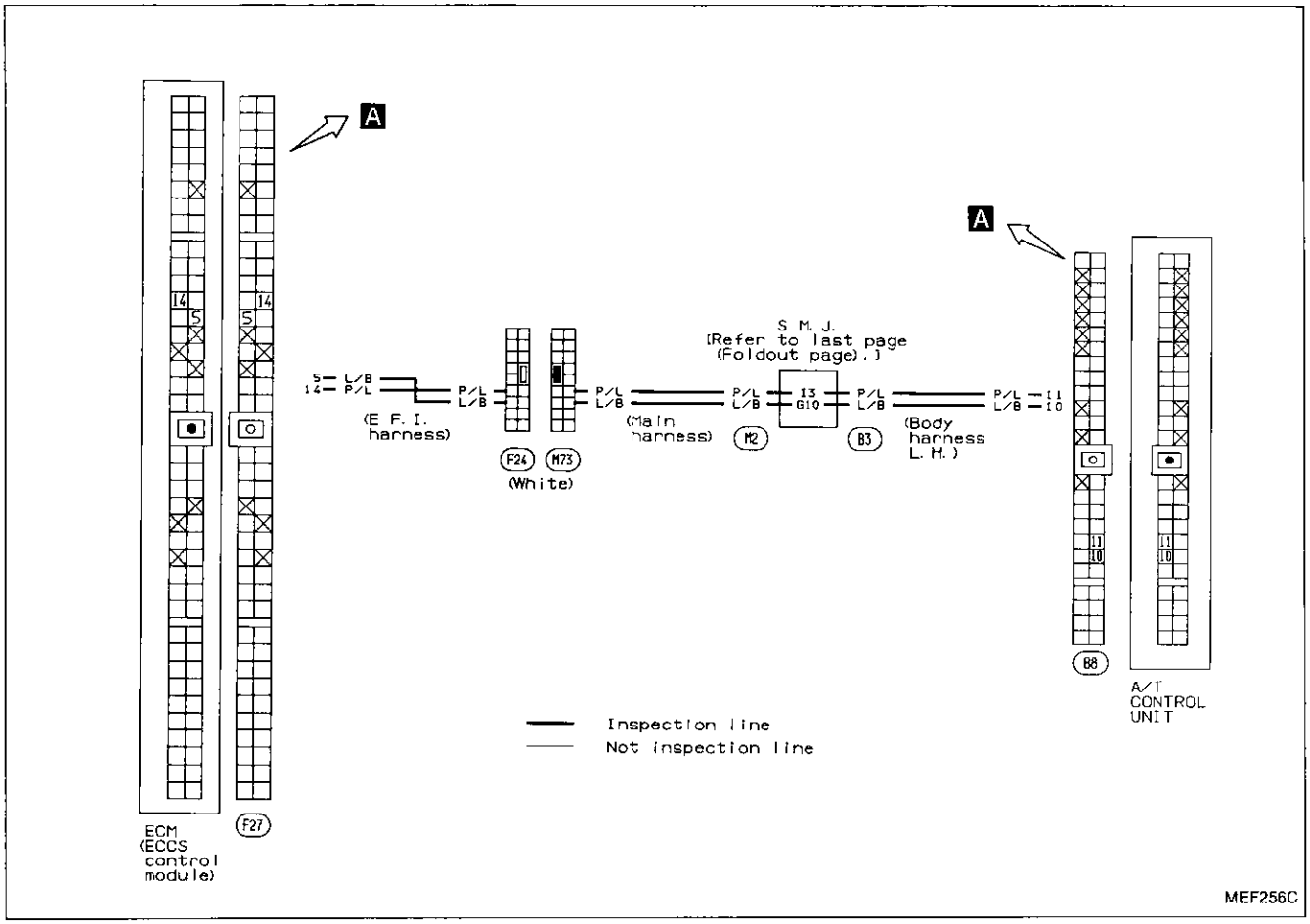
N.G. → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

O.K. ↓

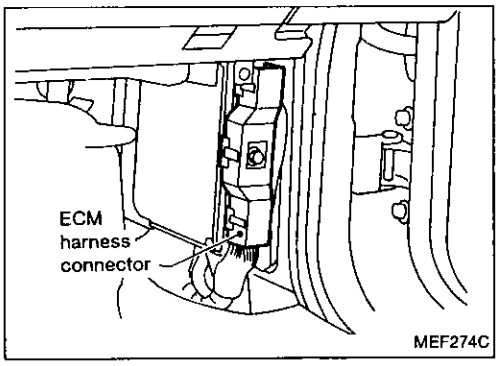
INSPECTION END

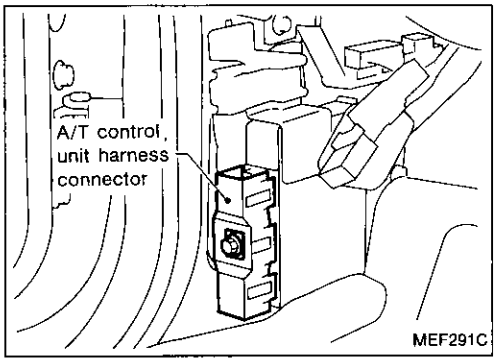
Diagnostic Procedure 16

A/T CONTROL (Diagnostic trouble code No. 54)

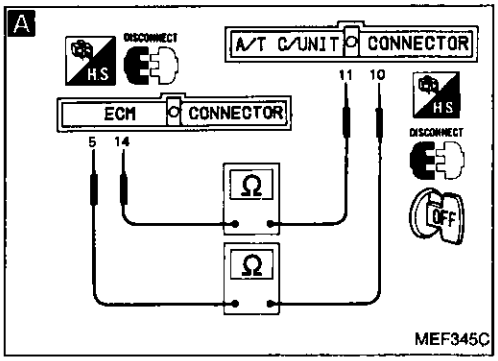


Harness layout





A/T CONTROL (Diagnostic trouble code No. 54)



INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
See page EF & EC-78.

O.K. → INSPECTION END

N.G.

A

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect control unit harness connector and A/T control unit harness connector.
3) Check harness continuity between ECM terminal ⑤ and terminal ⑩, ECM terminal ⑭ and terminal ⑪.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F24), (M73)
- Harness connectors (M2), (B3)
- Harness continuity between ECM and A/T control unit

If N.G., repair harness or connectors.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector.

Perform FINAL CHECK by the following procedure after repair is completed.

FINAL CHECK

Erase the diagnostic test mode II (Self-diagnostic results) memory.

Perform test drive.

Perform on-board diagnostic system again.

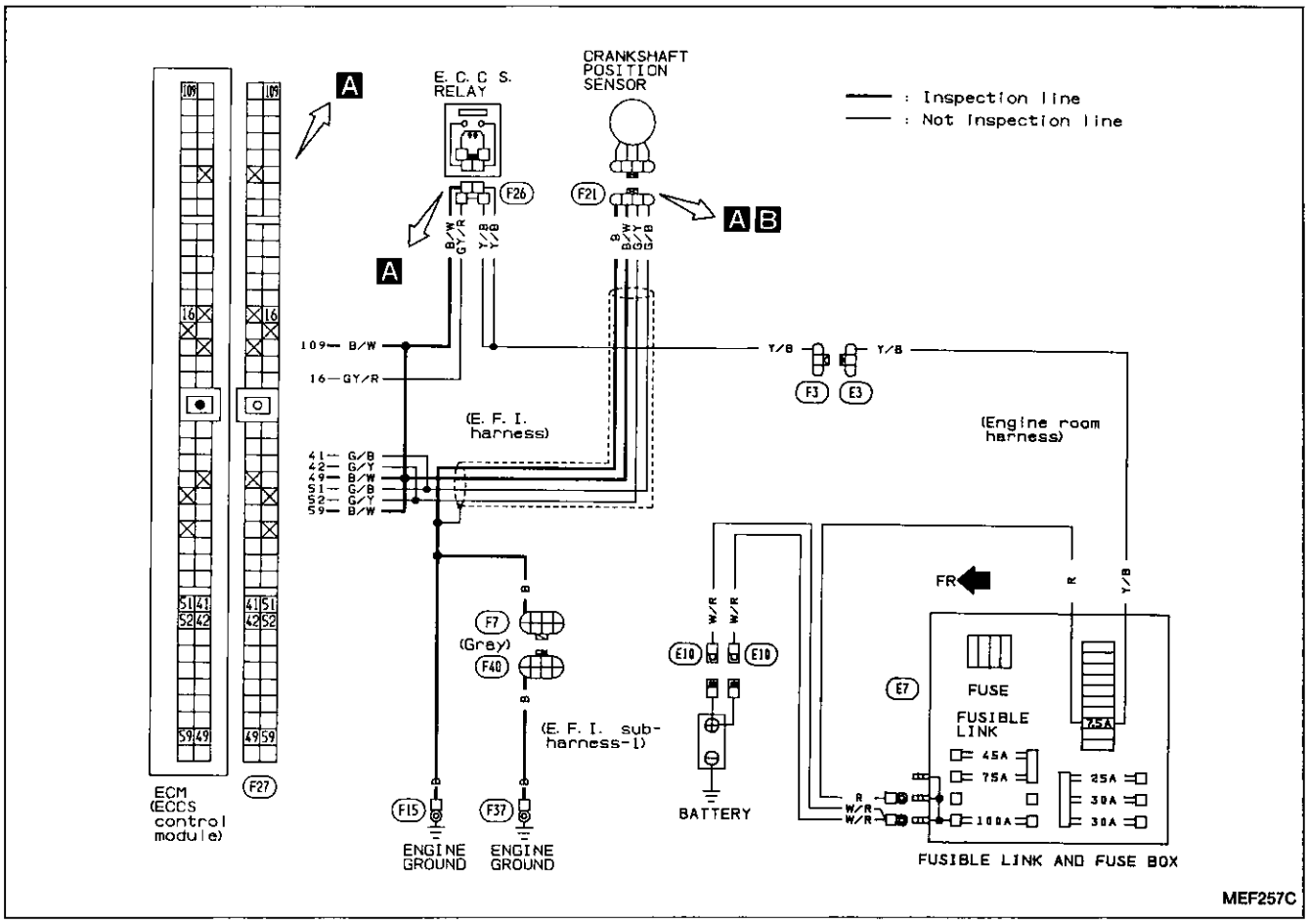
N.G. → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

O.K.

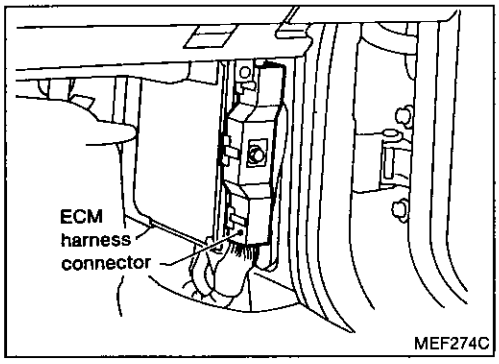
INSPECTION END

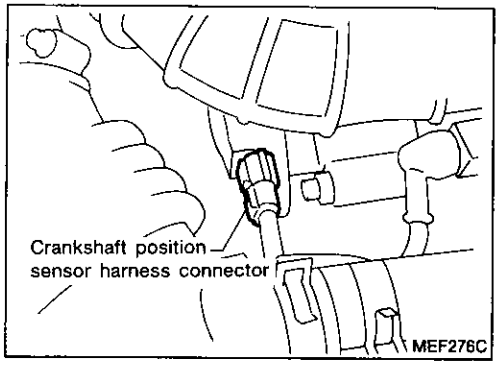
Diagnostic Procedure 17

CRANKSHAFT POSITION SENSOR (Not self-diagnostic item)

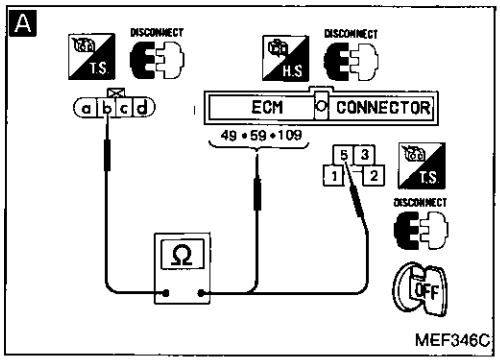


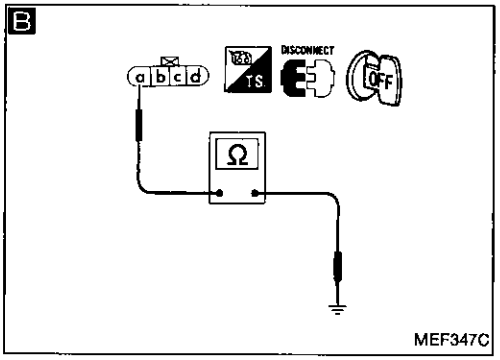
Harness layout





CRANKSHAFT POSITION SENSOR (Not self-diagnostic item)





INSPECTION START

A

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect crankshaft position sensor harness connector.
3) Disconnect ECM harness connector and E.C.C.S. relay.
4) Check harness continuity between terminal ⓑ and terminal ⑤, ECM terminals ㊾, ㊾, ⑩⑨.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

B

CHECK GROUND CIRCUIT.
1) Check harness continuity between terminal ⓐ and engine ground.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F7), (F40)
- Harness continuity between crankshaft position sensor and engine ground

If N.G., repair harness or connectors.

O.K.

CHECK COMPONENT
(Crankshaft position sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-221.)

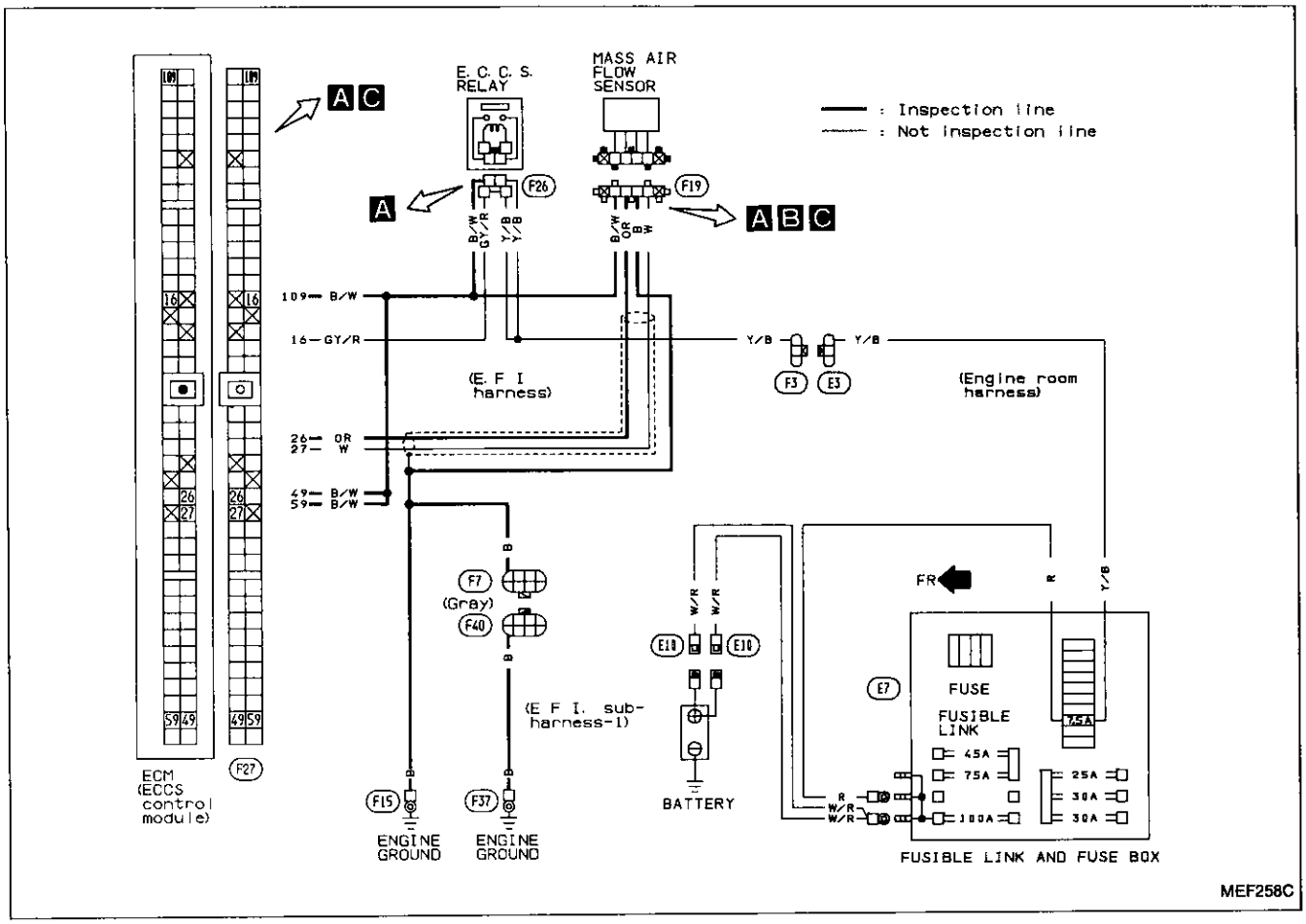
N.G. → Replace crankshaft position sensor.

O.K.

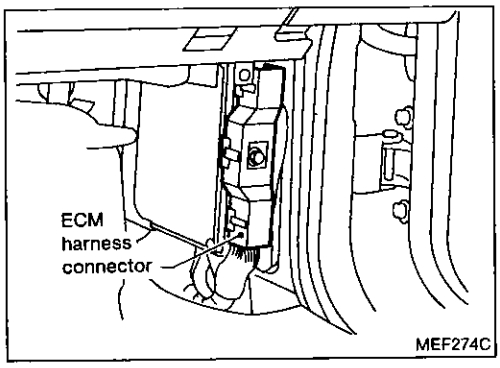
INSPECTION END

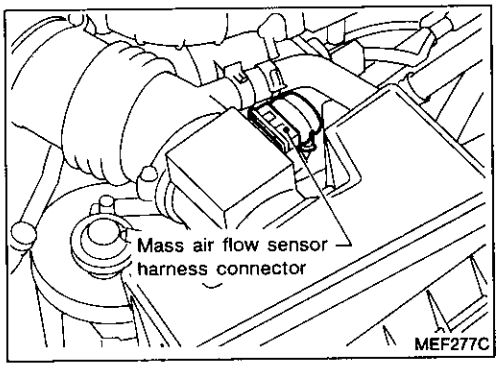
Diagnostic Procedure 18

MASS AIR FLOW SENSOR (Not self-diagnostic item)

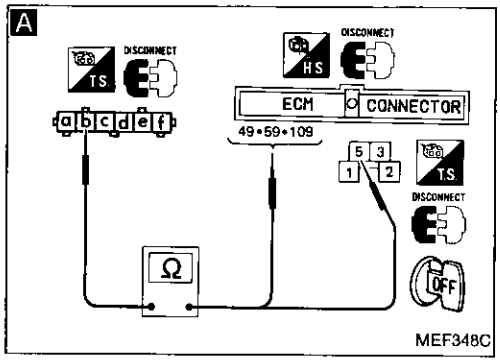


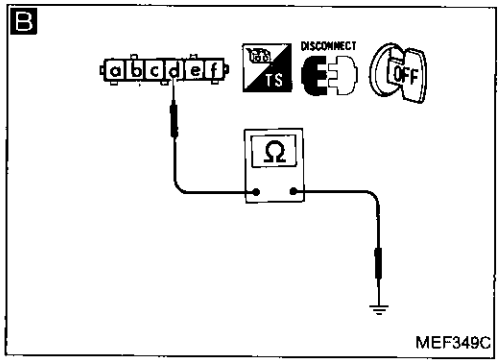
Harness layout

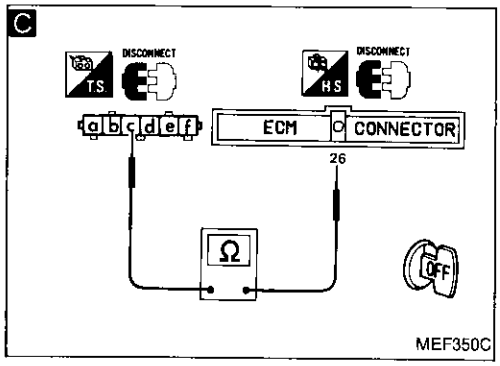




MASS AIR FLOW SENSOR (Not self-diagnostic item)







INSPECTION START

A

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect mass air flow sensor harness connector.
3) Disconnect ECM harness connector and E.C.C.S. relay.
4) Check harness continuity between terminal ⓑ and terminal ⑤, ECM terminals ㊾, ㊾, ⑩⑨.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

B

CHECK GROUND CIRCUIT.
1) Check harness continuity between terminal ⓓ and engine ground.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F7), (F40)
- Harness continuity between mass air flow sensor and engine ground

If N.G., repair harness or connectors.

O.K.

C

CHECK INPUT SIGNAL CIRCUIT.
1) Check harness continuity between terminal ⓒ and ECM terminal ㉖.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT
(Mass air flow sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-221.)

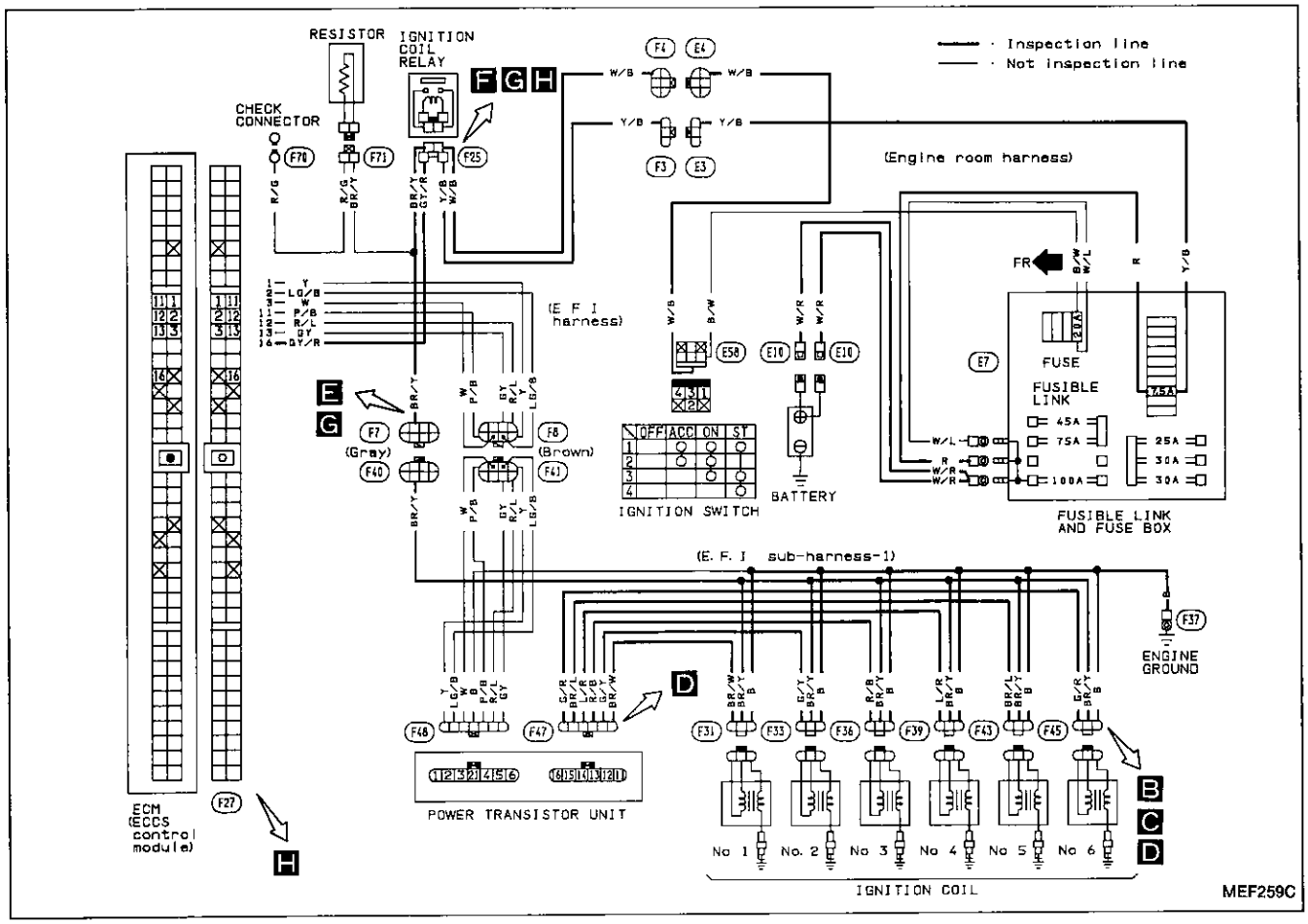
N.G. → Replace mass air flow sensor.

O.K.

INSPECTION END

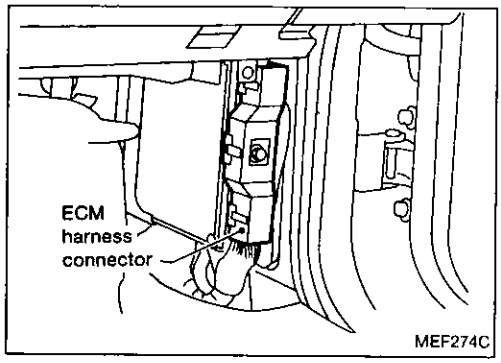
Diagnostic Procedure 19

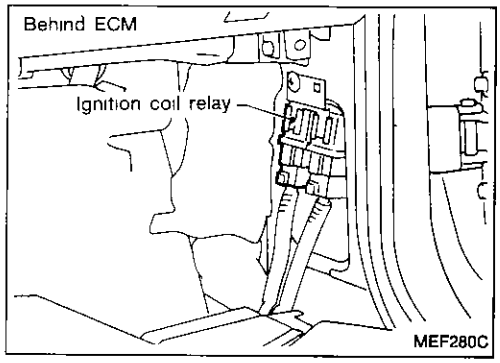
IGNITION SIGNAL (Not self-diagnostic item)

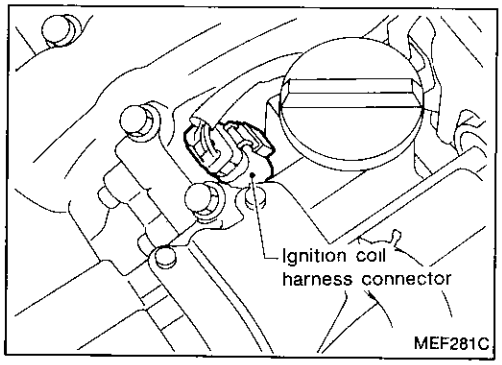


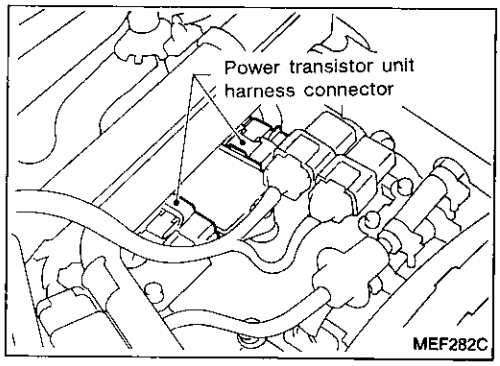
IGNITION SIGNAL (Not self-diagnostic item)

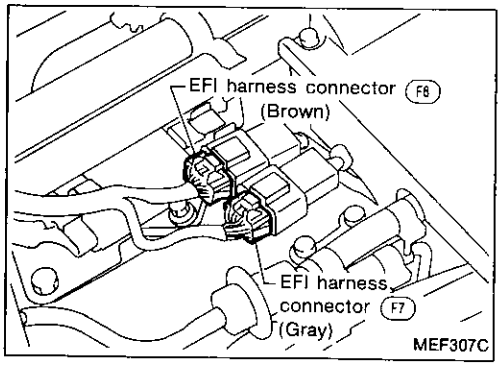
Harness layout



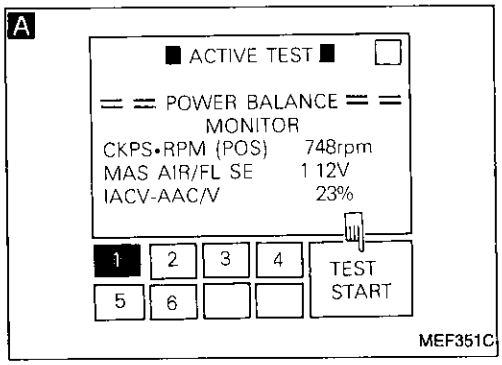


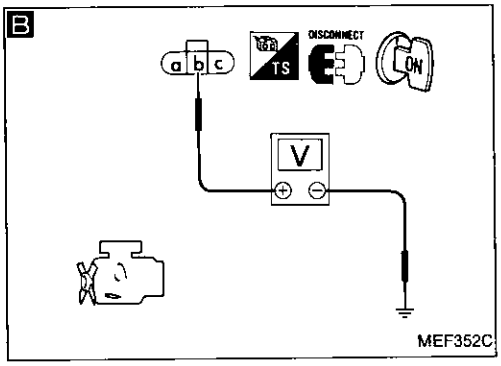


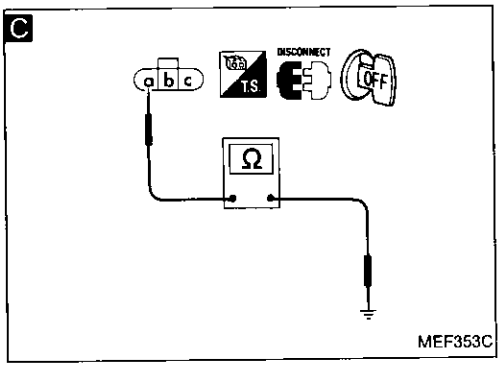


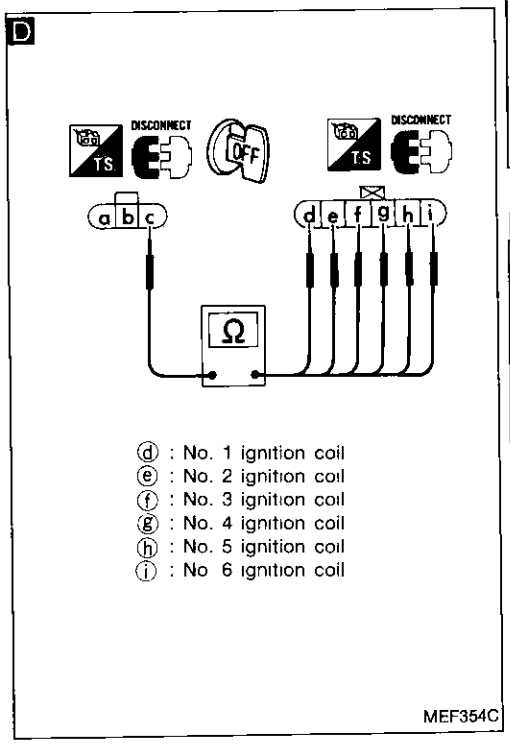


IGNITION SIGNAL (Not self-diagnostic item-I)









INSPECTION START

CHECK OVERALL FUNCTION.
1) Turn ignition switch "START".
Is any cylinder ignited?

No → Go to "IGNITION SIGNAL (Not self-diagnostic item-II)".

Yes

A

SEARCH FOR MALFUNCTIONING CIRCUIT.
1) Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
2) Search for circuit which does not produce a momentary engine speed drop.

B

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect ignition coil harness connectors.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓑ and ground with CONSULT or tester.
Voltage: Battery voltage

N.G. → Check the following.
- Harness continuity between ignition coil and E.F.I. sub-harness-1 connector (F40).

If N.G., repair harness or connectors.

O.K.

C

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal ⓐ and engine ground.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

D

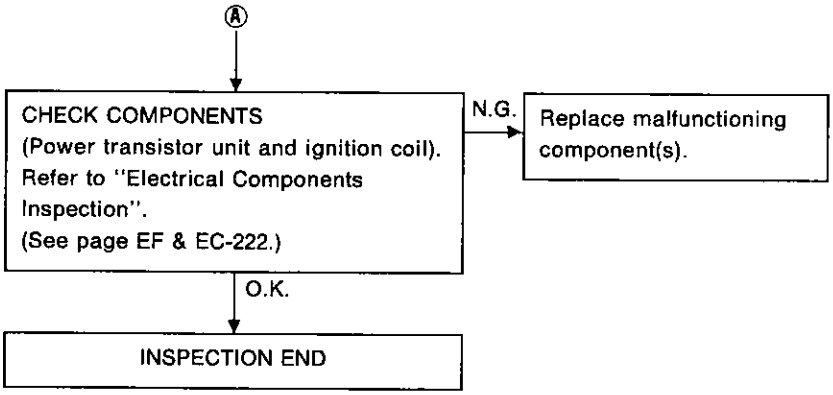
CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect power transistor unit harness connector.
2) Check harness continuity between terminal ⓒ and terminals ⓓ, ⓔ, ⓕ, ⓖ, ⓗ, ⓘ.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

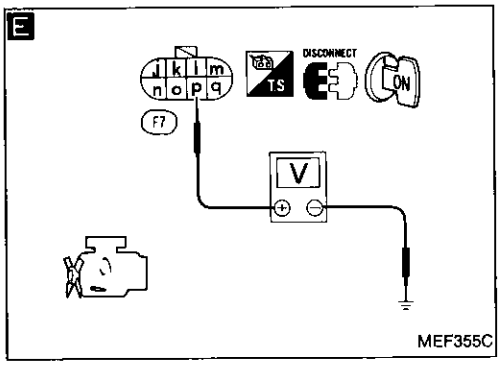
Ⓐ

IGNITION SIGNAL (Not self-diagnostic item-I)



IGNITION SIGNAL (Not self-diagnostic item-II)

E



MEF355C

From "IGNITION SIGNAL (Not self-diagnostic item-I)".

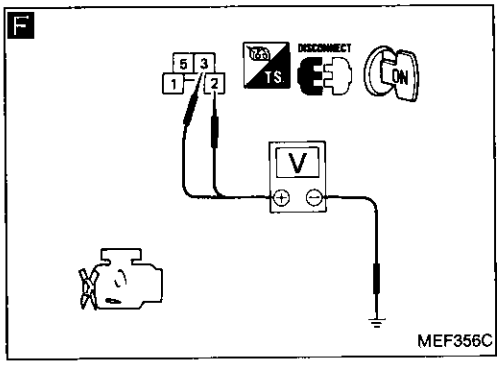
E

CHECK OVERALL FUNCTION.
1) Turn ignition switch "OFF".
2) Disconnect E.F.I. harness connector (F7).
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓟ and ground with CONSULT or tester.
Voltage: Battery voltage

O.K. → Go to "CHECK POWER SUPPLY" in "IGNITION SIGNAL (Not self-diagnostic item-I)".

N.G.

F



MEF356C

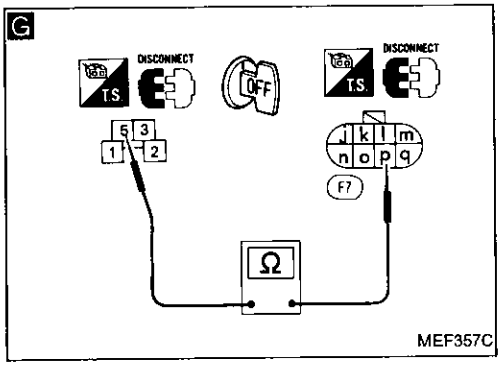
CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect ignition coil relay.
3) Turn ignition switch "ON".
4) Check voltage between terminals ②, ③ and ground with CONSULT or tester.
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (F3), (E3)
- Harness connectors (F4), (E4)
- 7.5A fuse
- Harness continuity between ignition coil relay and ignition switch
- Harness continuity between ignition coil relay and battery

If N.G., repair harness or connectors.

O.K.

G



MEF357C

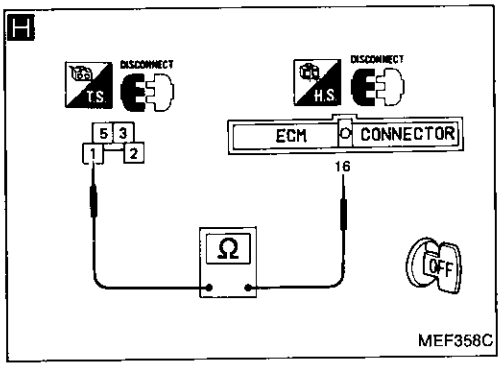
G

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminals ⑤ and ⓟ.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

H



MEF358C

H

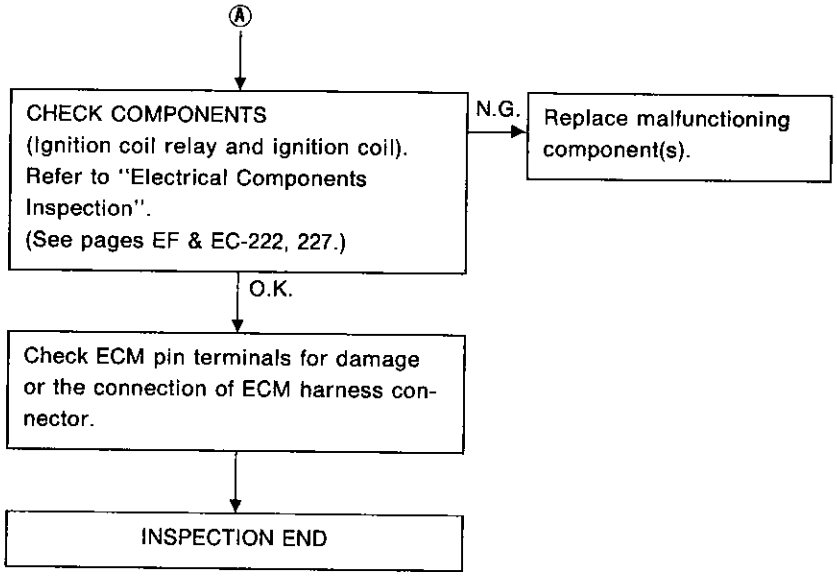
CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ⑯ and terminal ①.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

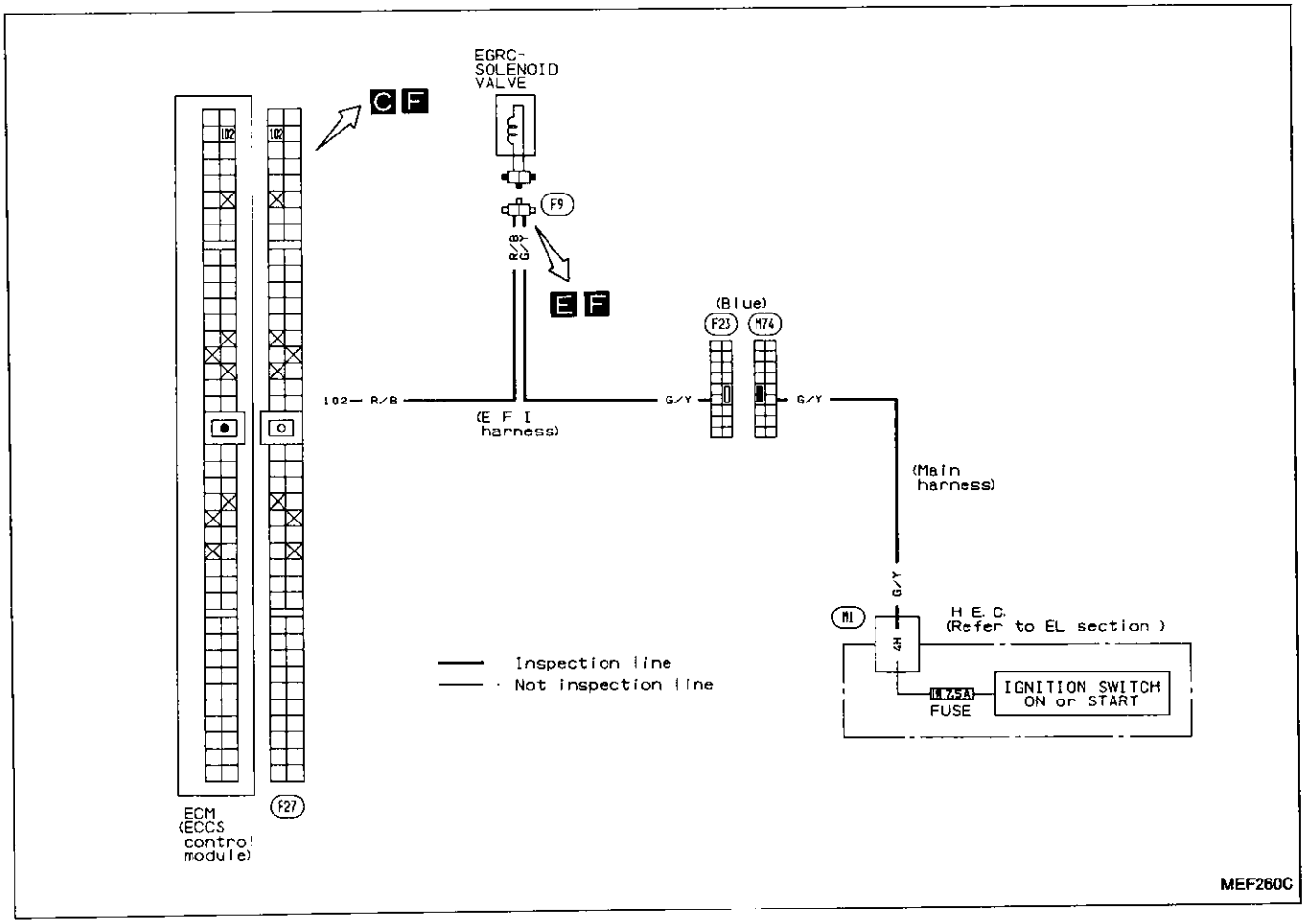
Ⓐ

IGNITION SIGNAL (Not self-diagnostic item-II)

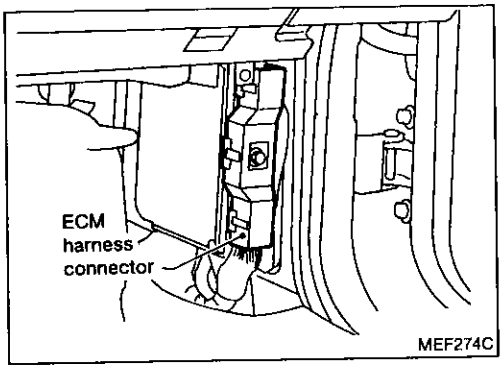


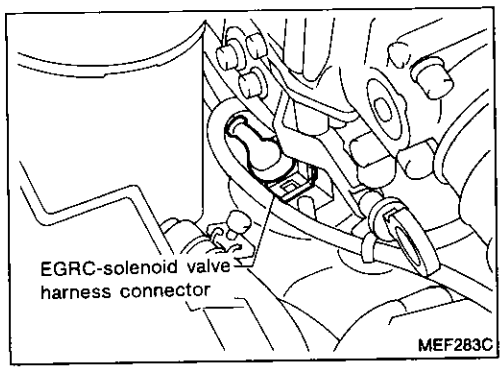
Diagnostic Procedure 20

E.G.R. CONTROL (Not self-diagnostic item)

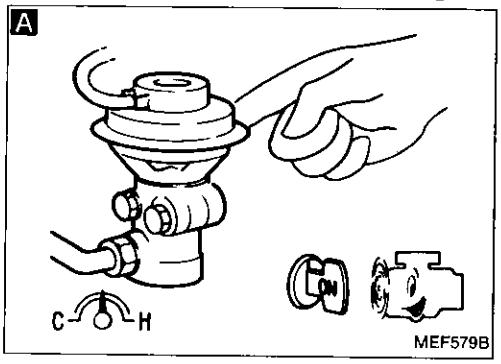


Harness layout





E.G.R. CONTROL (Not self-diagnostic item)



Non-California models

INSPECTION START

California models

INSPECTION START

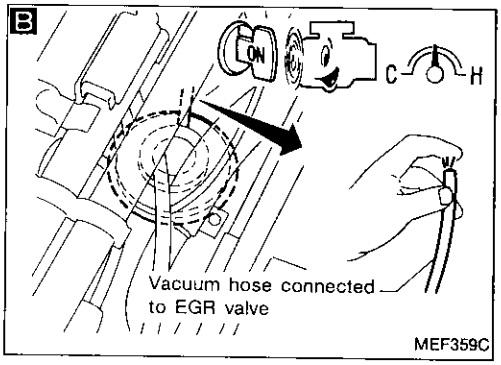
Go to "CHECK CONTROL FUNCTION".

Is lifted up and down.

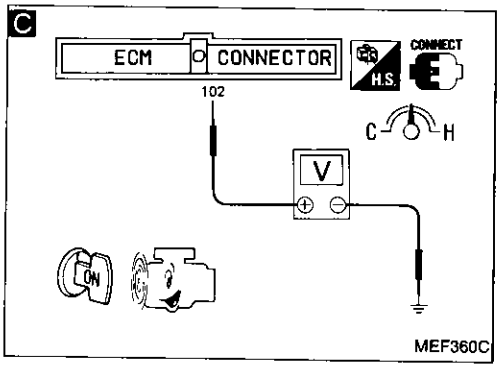
A

CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM (Refer to page EF & EC-50).
Make sure that diagnostic trouble code No. 12 is not displayed.
3) Make sure that EGR valve spring is lifted up and down when racing engine (2,000 rpm).
(Use your finger.)

INSPECTION END



Is not lifted up and down.



B

CHECK VACUUM SOURCE TO EGR VALVE.
1) Disconnect vacuum hose to EGR valve.
2) Make sure that vacuum exists under the following conditions.
At idle:
Vacuum should not exist.
Engine speed is 2,000 rpm:
Vacuum should exist.

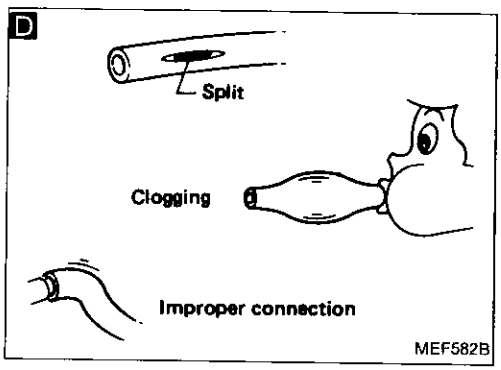
O.K.

CHECK COMPONENT (EGR valve).
Refer to "Electrical Components Inspection".
(See page EF & EC-223.)

N.G.

Replace EGR valve.

N.G.



C

CHECK CONTROL FUNCTION.
1) Check voltage between ECM terminal (102) and ground under the following conditions with CONSULT or tester.
Voltage:
At idle
Approximately 0V
Engine speed is 2,000 rpm
Battery voltage

D

O.K. (Non-California models)

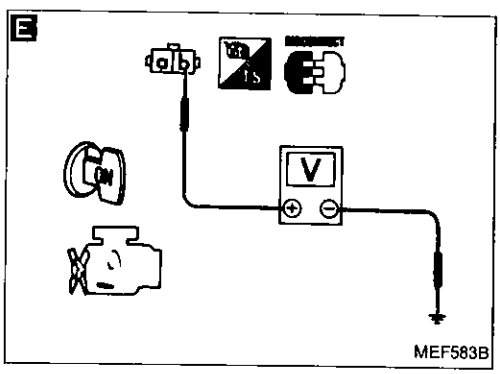
CHECK VACUUM HOSE.
Check vacuum hose for clogging, cracks and proper connection.

(California models)

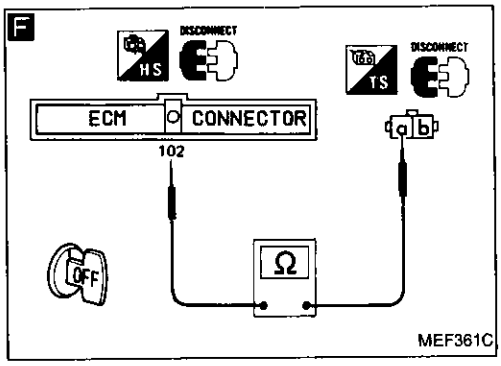
Go to "CHECK COMPONENT (EGRC-solenoid valve)".

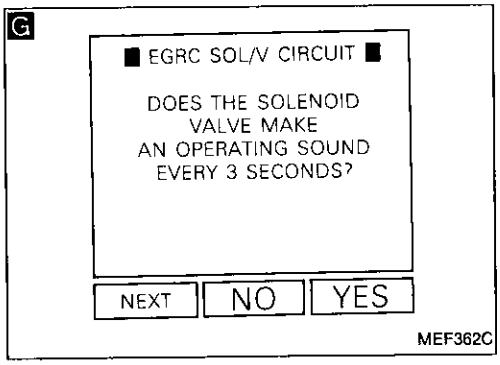
N.G.

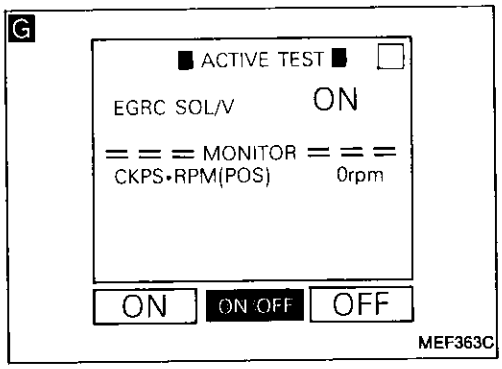
Ⓐ



E.G.R. CONTROL (Not self-diagnostic item)







Ⓐ

E

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect EGRC-solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓑ and ground with CONSULT or tester.
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (F23), (M74)
- H.E.C. harness connector (M1)
- 7.5A fuse
- Harness continuity between EGRC-solenoid valve and H.E.C.

If N.G., repair harness or connectors.

O.K. ↓

F

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (102) and terminal ⓐ.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

G

CHECK COMPONENT (EGRC-solenoid valve).

1) Reconnect ECM harness connector and EGRC-solenoid valve harness connector.
2) Turn ignition switch "ON".
3) Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

N.G. → Replace EGRC-solenoid valve.

OR

1) Reconnect ECM harness connector and EGRC-solenoid valve harness connector.
2) Turn ignition switch "ON".
3) Turn EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

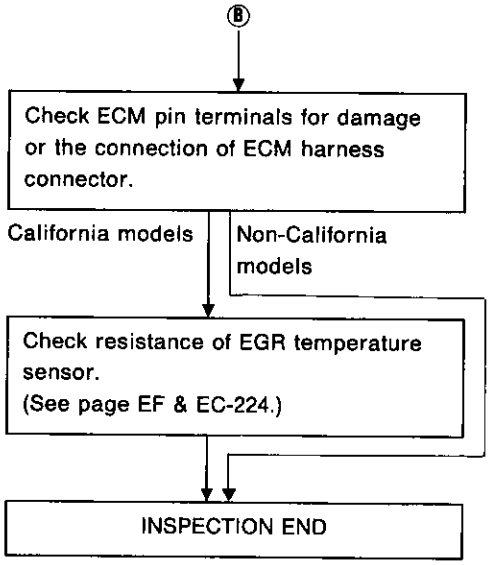
OR

Refer to "Electrical Components Inspection".
(See page EF & EC-223.)

O.K. ↓

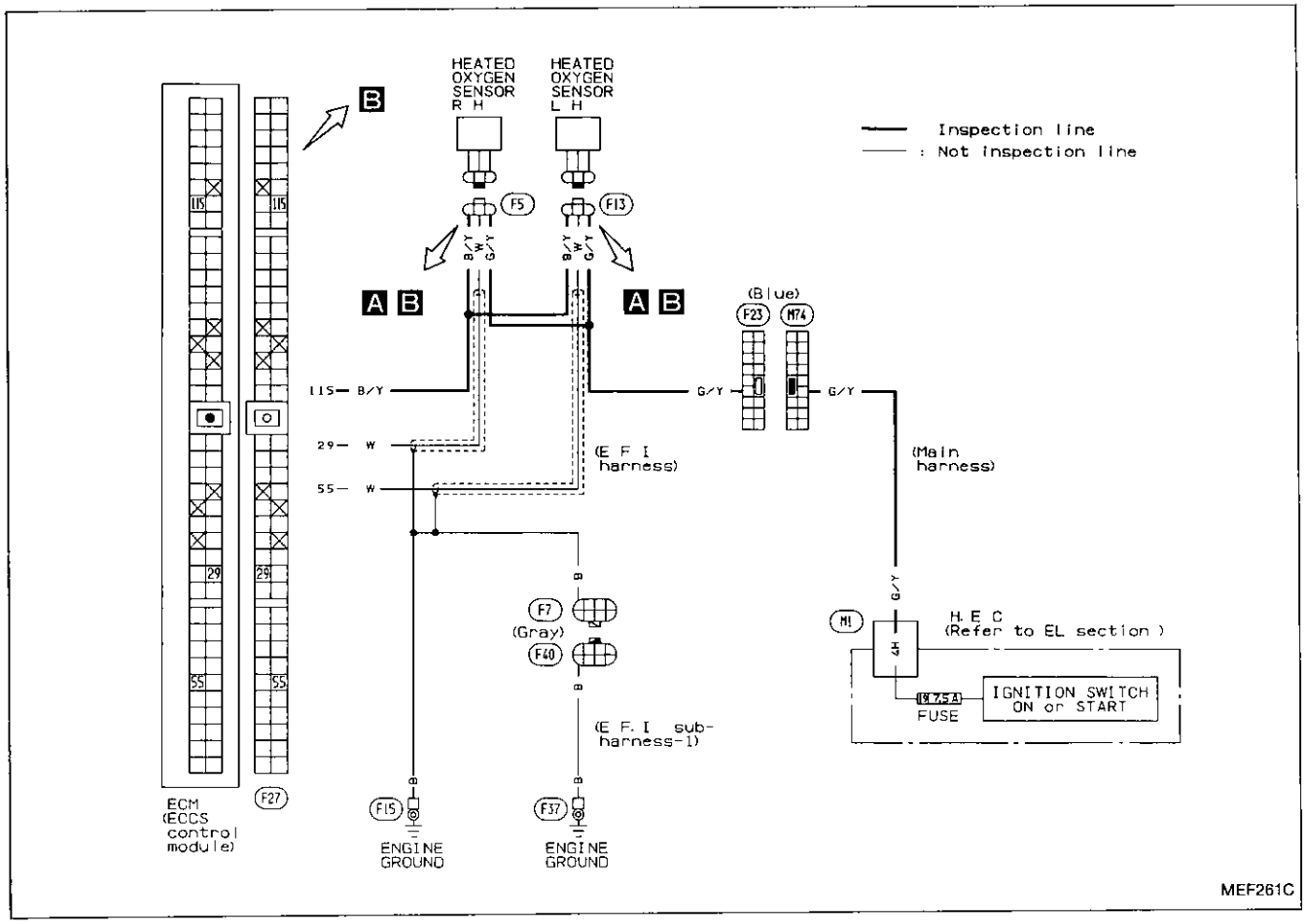
Ⓑ

E.G.R. CONTROL (Not self-diagnostic item)

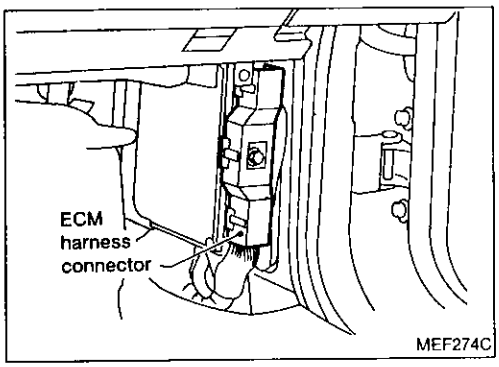


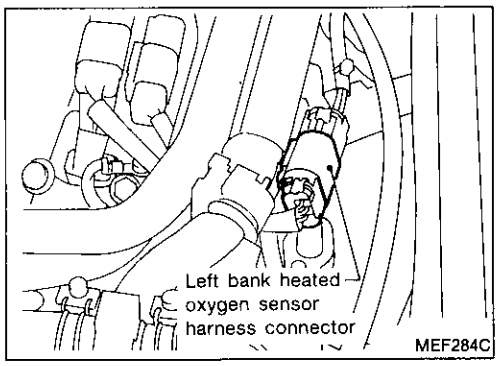
Diagnostic Procedure 21

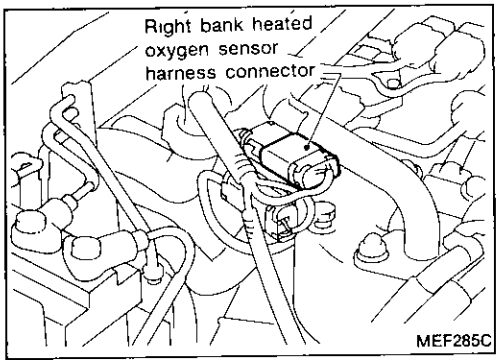
HEATED OXYGEN SENSOR HEATER L.H. and R.H. (Not self-diagnostic item)



Harness layout

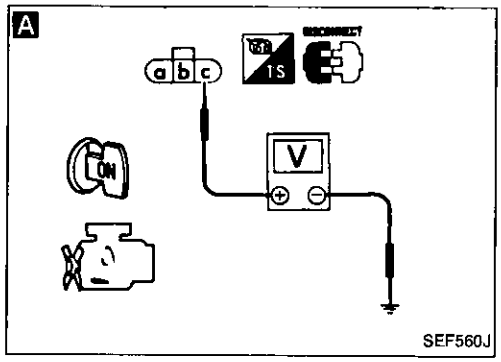






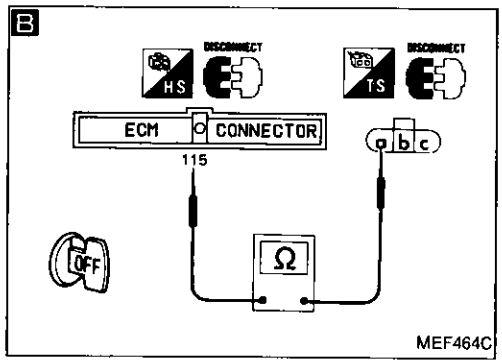
HEATED OXYGEN SENSOR HEATER L.H. and R.H. (Not self-diagnostic item)

A



SEF560J

B



MEF464C

INSPECTION START

A

CHECK POWER SUPPLY.
1) Disconnect heated oxygen sensor harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⑥ and ground.
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (F23), (M74)
- H.E.C. harness connector (M1)
- 7.5A fuse
- Harness continuity between heated oxygen sensor and H.E.C.

If N.G., repair harness or connectors.

O.K. ↓

B

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between terminal ⓐ and ECM terminal (115).
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

CHECK COMPONENT
(Heated oxygen sensor heater).
Refer to "Electrical Components Inspection".
(See page EF & EC-224.)

N.G. → Replace heated oxygen sensor.

O.K. ↓

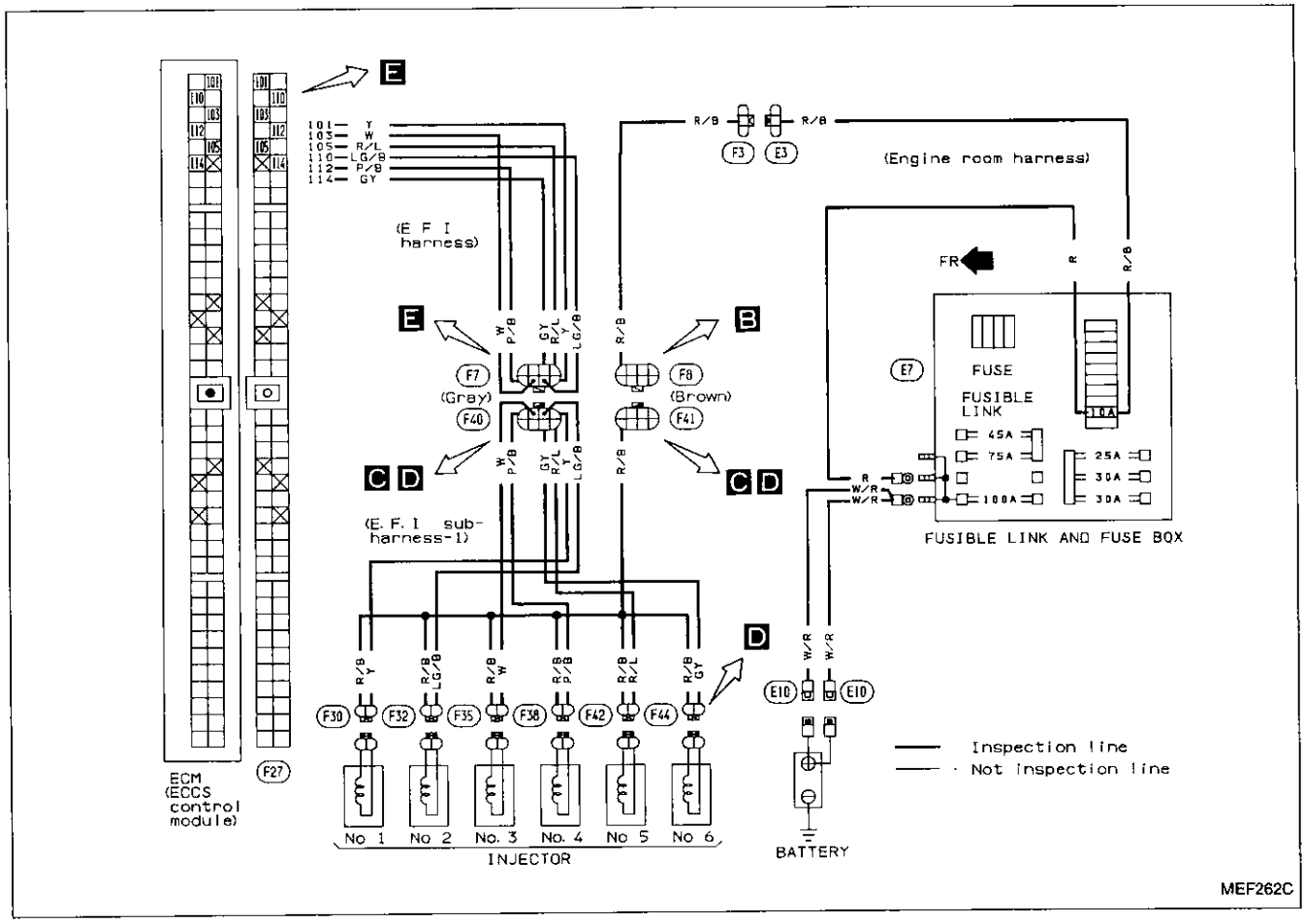
Check ECM pin terminals for damage or the connection of ECM harness connector.

↓

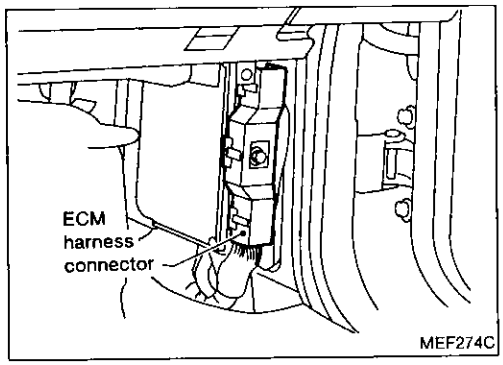
INSPECTION END

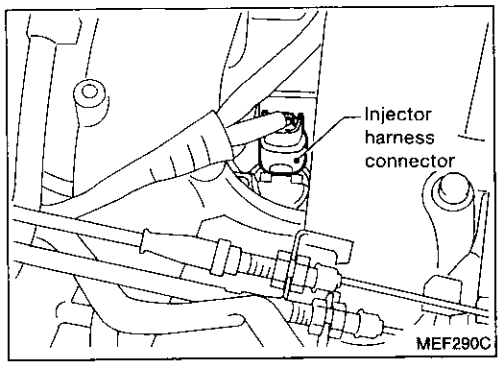
Diagnostic Procedure 22

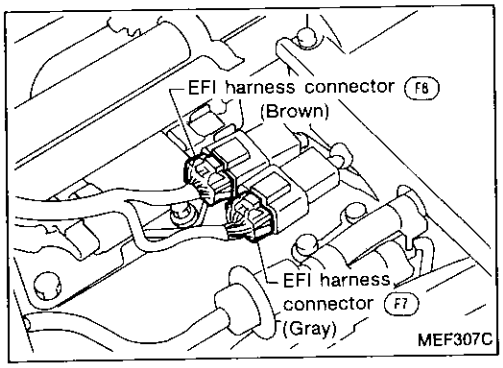
INJECTOR (Not self-diagnostic item)



Harness layout

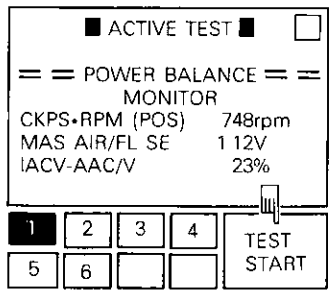






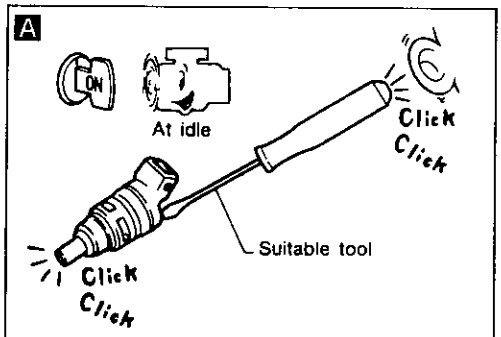
INJECTOR (Not self-diagnostic item)

A



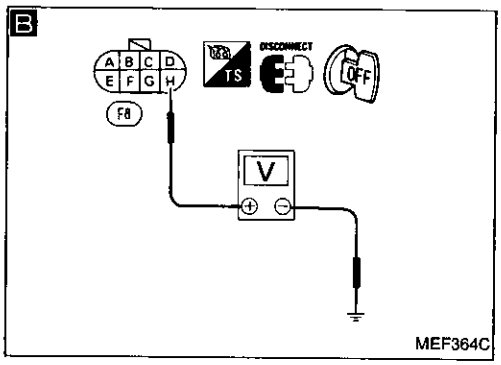
MEF341C

A



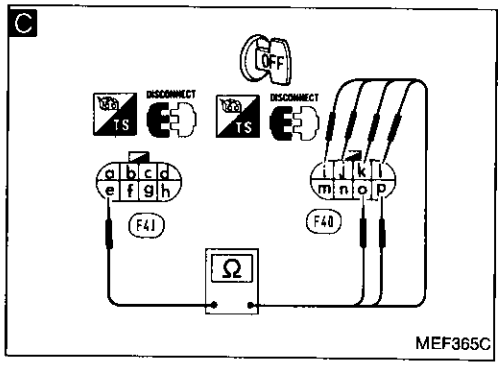
SEF730L

B



MEF364C

C



MEF365C

Non-California models

INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine.
2) Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3) Search for circuit which does not produce a momentary engine speed drop.

— OR —

2) Search for circuit which does not produce injector operating sound at idle.

O.K. → INSPECTION END

N.G.

B

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect E.F.I. harness connector (F8).
3) Check voltage between terminal (H) and ground with CONSULT or tester.
Voltage: Battery voltage

N.G. →
Check the following.
- Harness connectors (F3), (E3)
- 10A fuse
- Harness continuity between E.F.I. harness connector (F8) and battery

If N.G., repair harness or connectors.

O.K.

C

CHECK CIRCUIT CONTINUITY-I.
1) Disconnect E.F.I. harness connector (F7).
2) Check harness continuity between terminal (e) and terminals (i), (j), (k), (l), (o), (p).
Continuity should exist.

N.G. →

D

CHECK CIRCUIT CONTINUITY-II.
1) Disconnect injector harness connectors.
2) Check harness continuity between terminals (e) and (r), and terminal (g) and terminals (i), (j), (k), (l), (o), (p).
Continuity should exist.

If N.G., repair harness or connectors.

O.K.

CHECK COMPONENT (Injector).
Refer to "Electrical Components Inspection". (See page EF & EC-226.)
If N.G., replace injector.

O.K.

Ⓐ

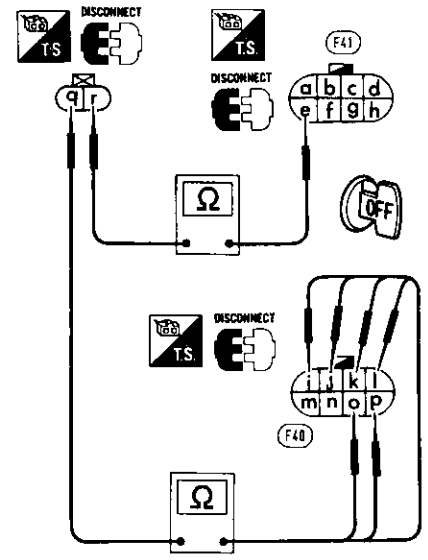
California models

INSPECTION START

Go to "CHECK POWER SUPPLY".

INJECTOR (Not self-diagnostic item)

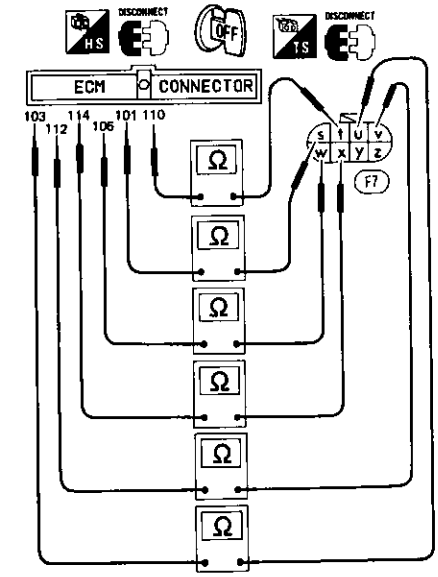
D



ⓘ : No. 1 cylinder
ⓚ : No. 2 cylinder
ⓙ : No. 3 cylinder
ⓙ : No. 4 cylinder
Ⓟ : No. 5 cylinder
ⓞ : No. 6 cylinder

MEF366C

E



(101) : No. 1 cylinder
(110) : No. 2 cylinder
(103) : No. 3 cylinder
(112) : No. 4 cylinder
(105) : No. 5 cylinder
(114) : No. 6 cylinder

MEF367C

Ⓐ

E

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between
ECM terminal (101) and terminal ⓢ,
ECM terminal (103) and terminal ⓤ,
ECM terminal (105) and terminal ⓦ,
ECM terminal (110) and terminal ⓘ,
ECM terminal (112) and terminal ⓥ,
ECM terminal (114) and terminal ⓧ.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector.

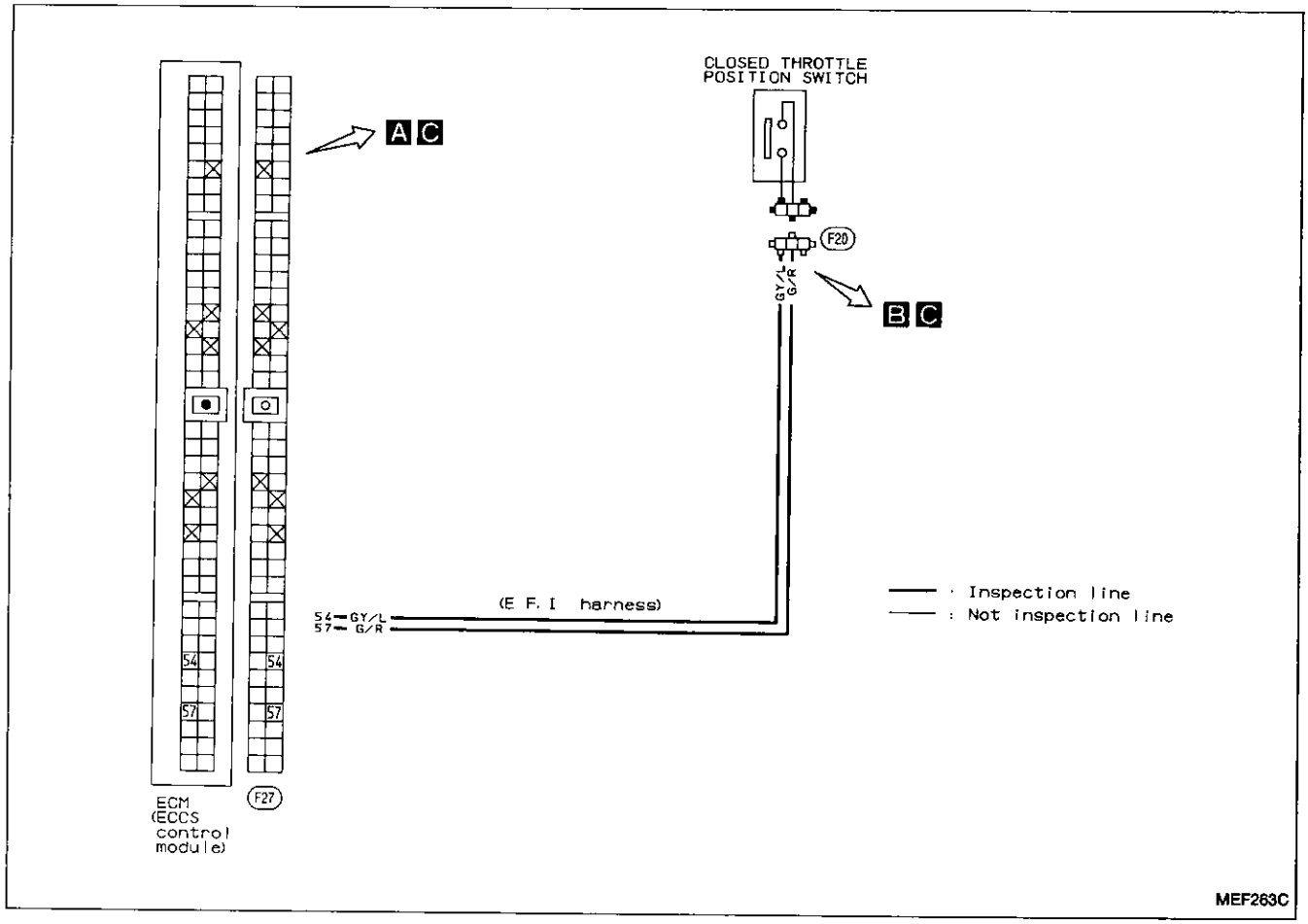
↓

INSPECTION END*

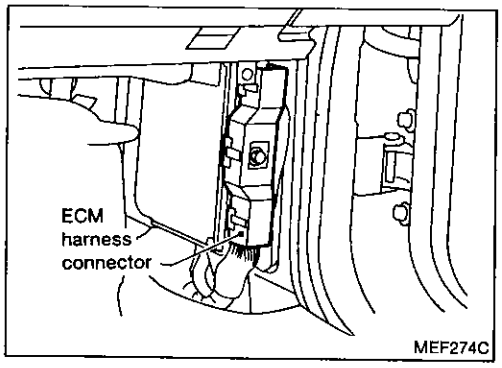
***: For California models, go to "CHECK OVERALL FUNCTION" if idle is still unstable. Then, perform "CHECK POWER SUPPLY-III" in "Diagnostic Procedure 1" (See page EF & EC-79.) after repair is completed.**

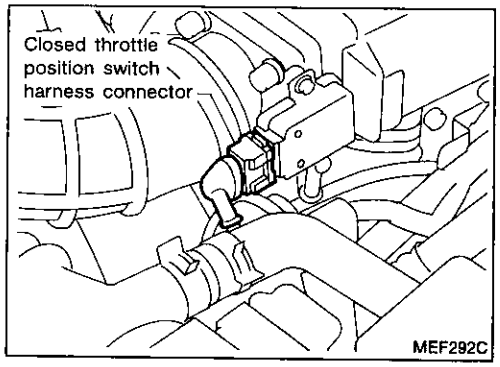
Diagnostic Procedure 23

CLOSED THROTTLE POSITION SWITCH (Not self-diagnostic item)

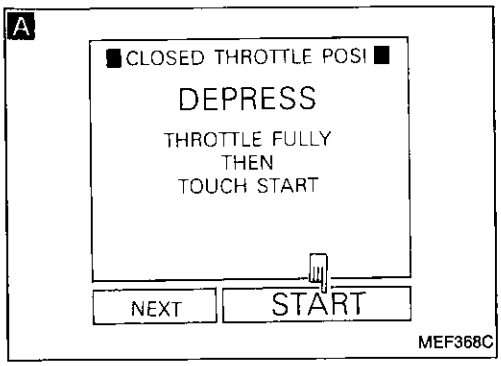


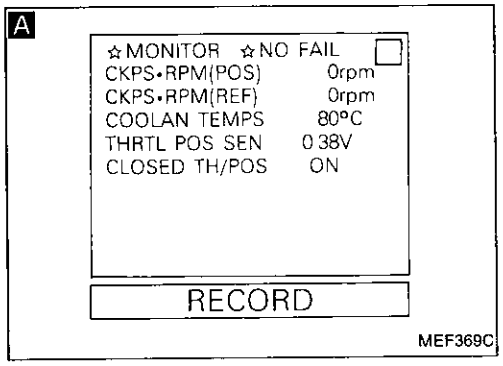
Harness layout

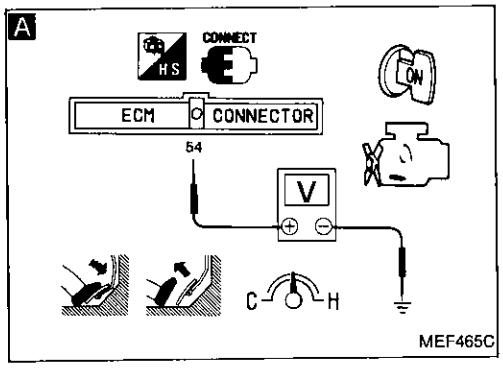


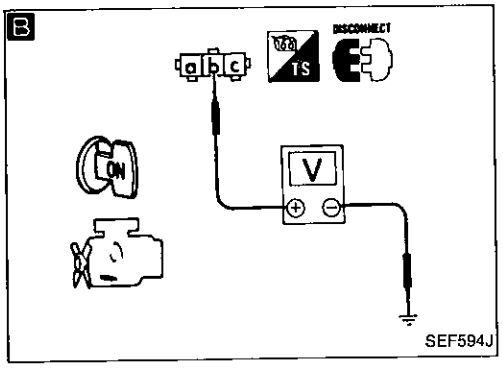


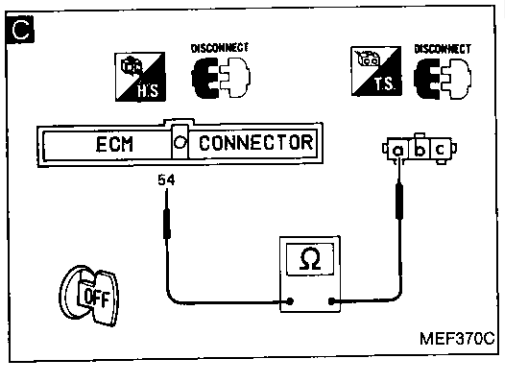
CLOSED THROTTLE POSITION SWITCH (Not self-diagnostic item)











INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF".
3) Disconnect throttle position sensor harness connector.
4) Turn ignition switch "ON".
5) Perform "CLOSED THROTTLE POSI" in "FUNCTION TEST" mode with CONSULT.

O.K. → INSPECTION END

OR

3) Disconnect throttle position sensor harness connector.
4) Turn ignition switch "ON".
5) Check "DATA MONITOR" mode with CONSULT.

CLOSED TH/POS:
Accelerator pedal is released ... ON
Accelerator pedal is depressed ... OFF

OR

3) Turn ignition switch "ON".
4) Check voltage between ECM terminal ⑭ and ground with CONSULT or tester under the following conditions.

Voltage:
Accelerator pedal is released
Approximately 7 - 10V
Accelerator pedal is depressed
Approximately 0V

N.G.

B

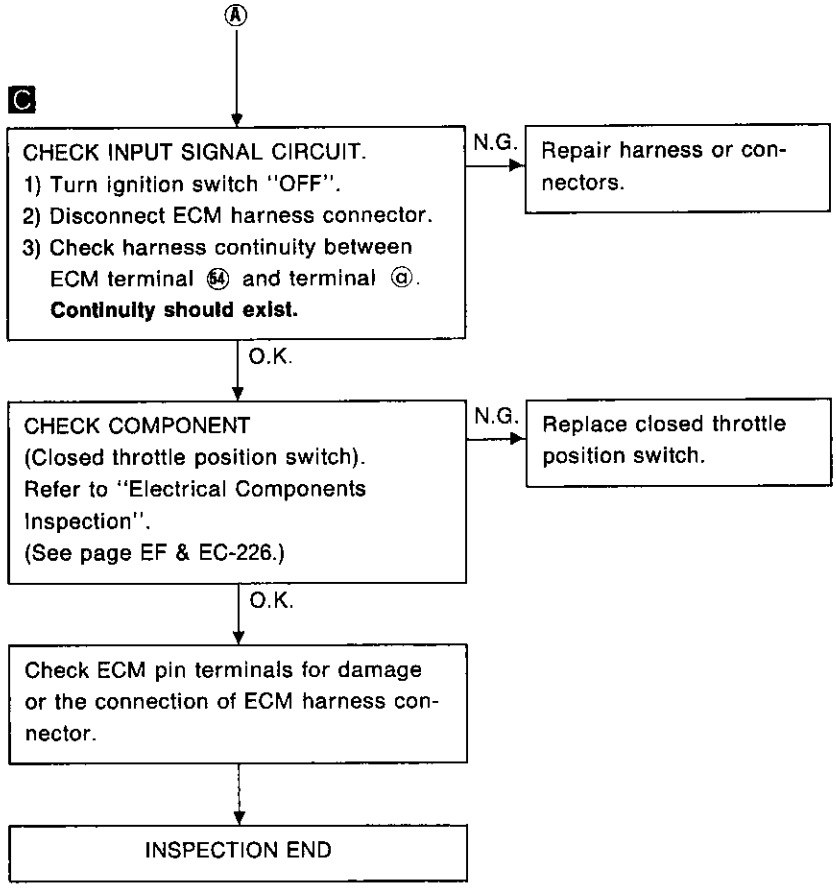
CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect closed throttle position switch harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓑ and ground with CONSULT or tester.
Voltage: Approximately 7 - 10V

N.G. → Repair harness or connectors.

O.K.

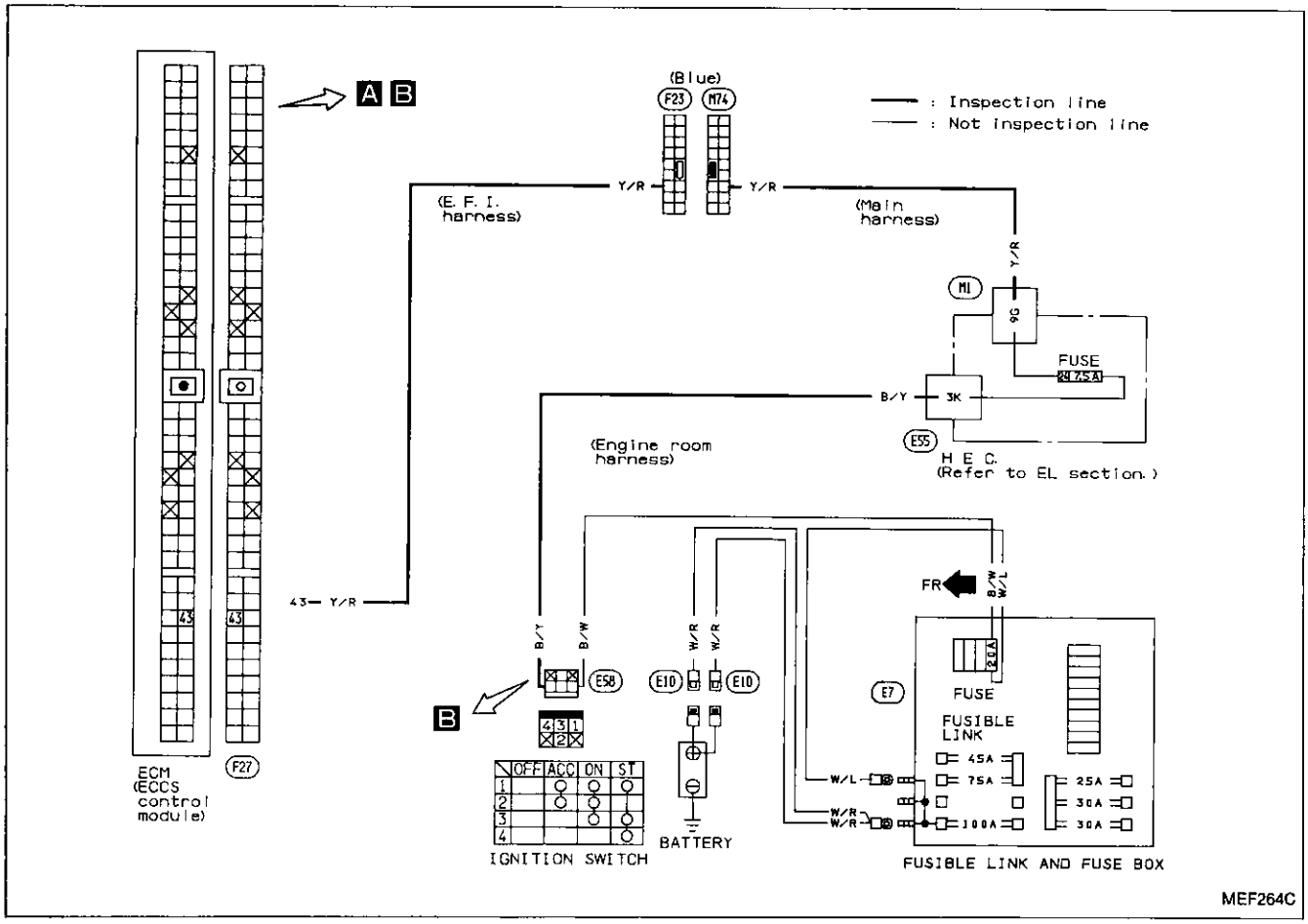
Ⓐ

CLOSED THROTTLE POSITION SWITCH (Not self-diagnostic item)

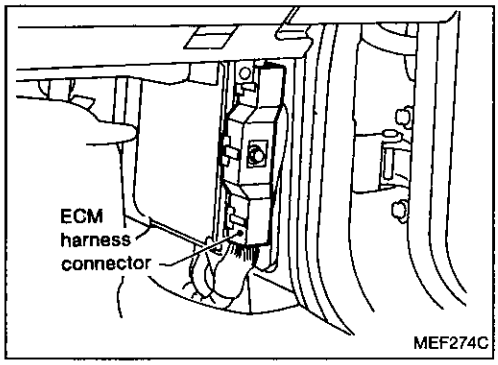


Diagnostic Procedure 24

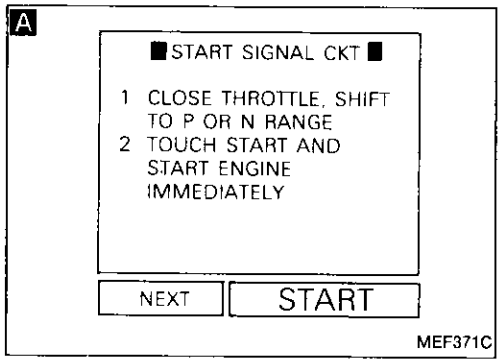
START SIGNAL (Not self-diagnostic item)

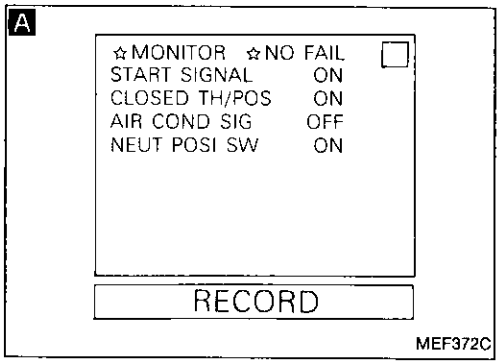


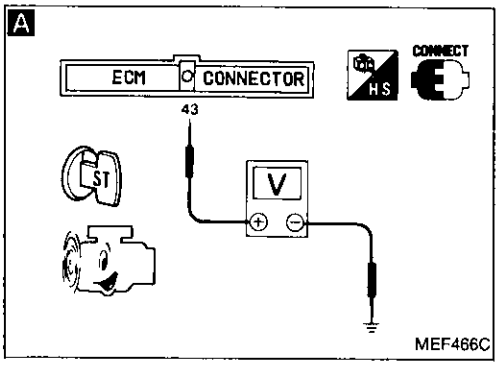
Harness layout

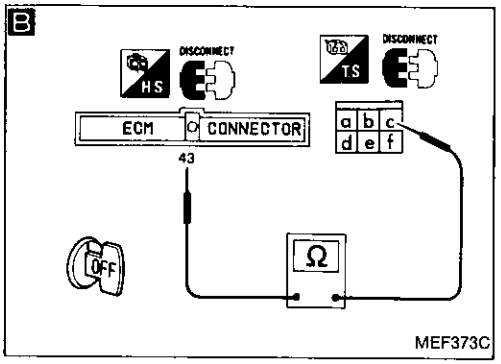


START SIGNAL (Not self-diagnostic item)









INSPECTION START

A

CHECK OVERALL FUNCTION.

1) Turn ignition switch "ON".
2) Perform "START SIGNAL CKT" in "FUNCTION TEST" mode with CONSULT.

O.K. → INSPECTION END

OR

1) Turn ignition switch "ON".
2) Check start signal in "DATA MONITOR" mode with CONSULT.

IGN "ON"	OFF
IGN "START"	ON

OR

1) Turn ignition switch to "START".
2) Check voltage between ECM terminal ㊸ and ground with CONSULT or tester.

Voltage:

Ignition switch "START"
Battery voltage
Except above
Approximately 0V

N.G.

B

CHECK INPUT SIGNAL CIRCUIT.

1) Turn ignition switch "OFF"
2) Disconnect ECM harness connector and ignition switch harness connector.
3) Check harness continuity between ECM terminal ㊸ and terminal ⓔ.

Continuity should exist.

N.G. → Check the following.
- Harness connectors (F23), (M74)
- H.E.C. harness connectors (M1), (E55)
- 7.5A fuse
- Harness continuity between ECM and ignition switch

If N.G., repair harness or connectors.

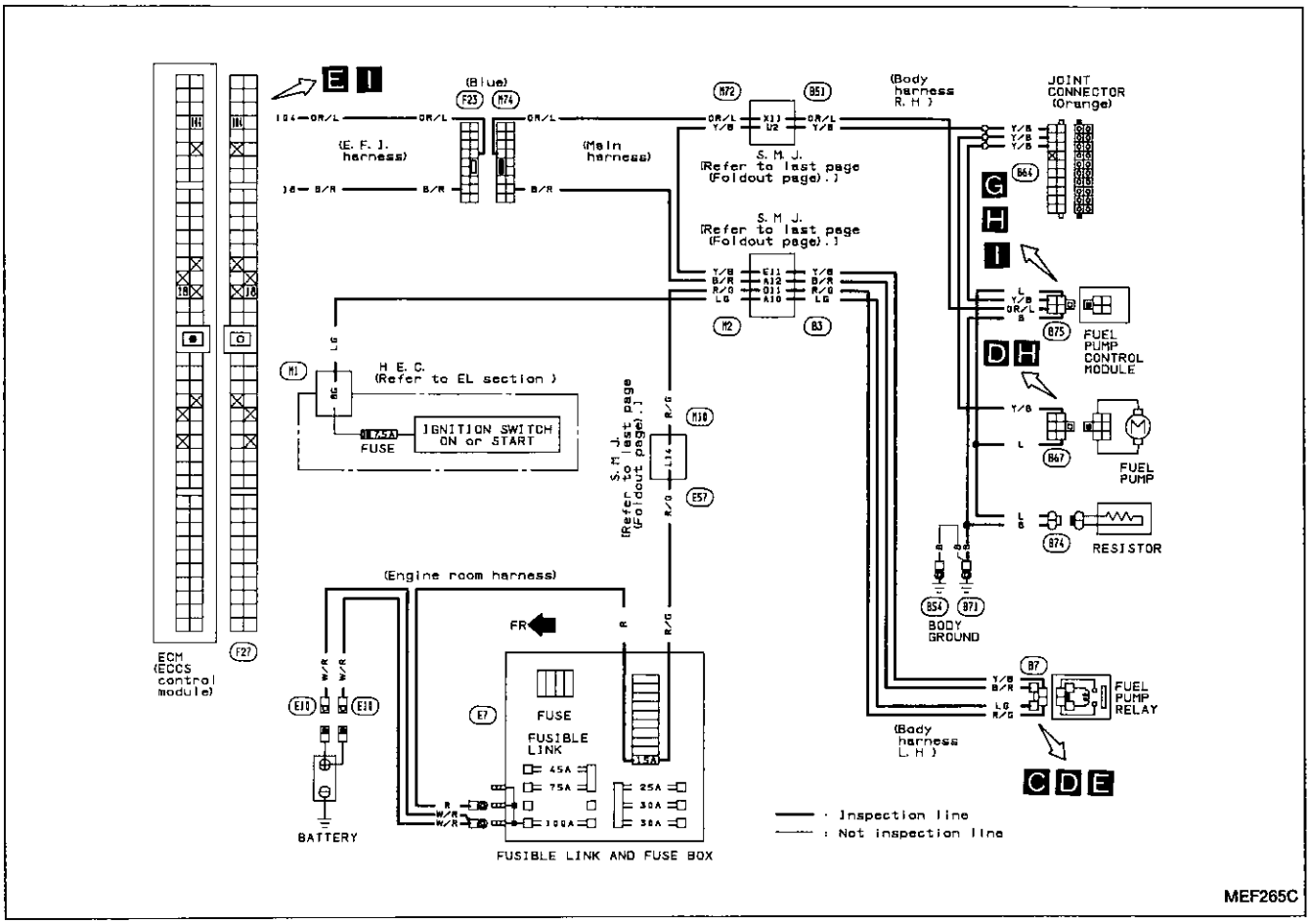
O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector.

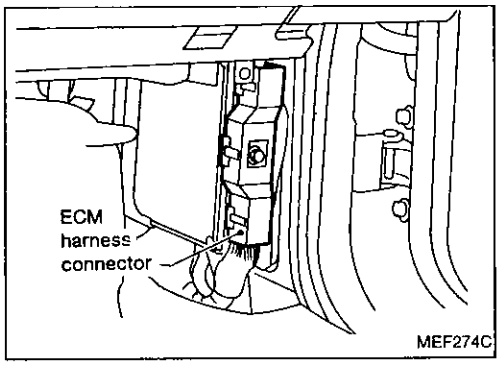
INSPECTION END

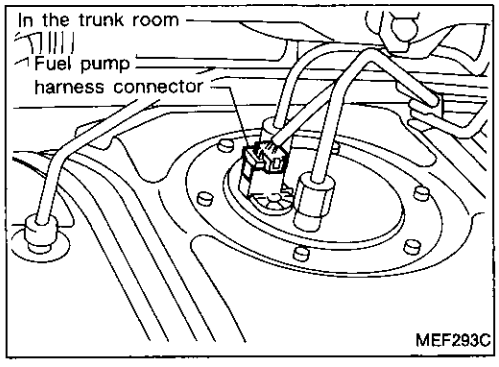
Diagnostic Procedure 25

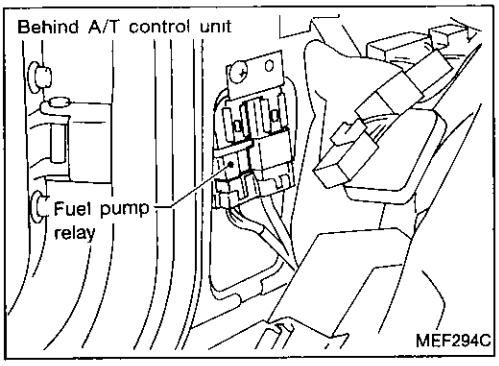
FUEL PUMP CONTROL (Not self-diagnostic item)

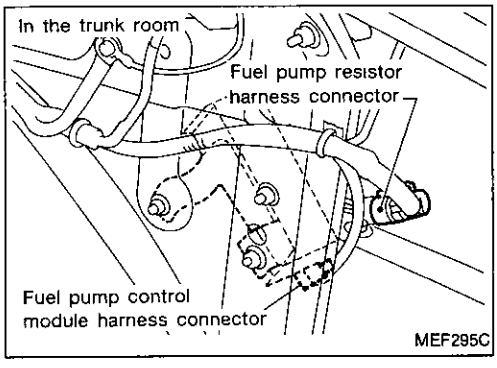


Harness layout



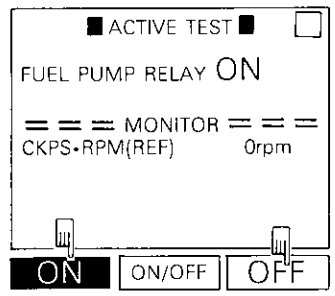






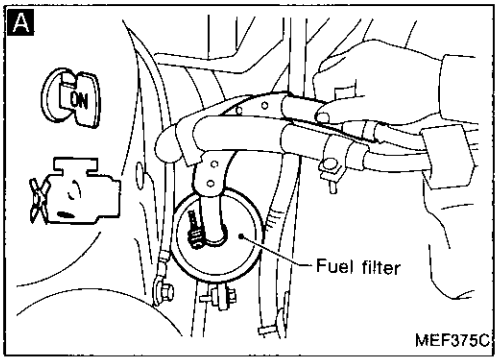
FUEL PUMP CONTROL (Not self-diagnostic item)

A



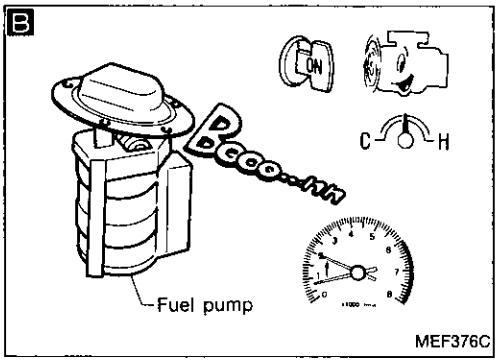
MEF374C

A



MEF375C

B



MEF376C

INSPECTION START

A

CHECK OVERALL FUNCTION-1.
1) Turn ignition switch "ON".
2) Perform "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT.
3) Pinch fuel feed hose with fingers.
Fuel pressure pulsation should be felt on the fuel feed hose.

N.G. → Check fuel pump relay circuit. (Go to Procedure A.)

OR

2) Pinch fuel feed hose with fingers.
Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned "ON".

O.K.

B

CHECK OVERALL FUNCTION-II.
1) Start engine and warm it up sufficiently.
2) Listen to fuel pump operating sound while racing engine from idle to about 2,000 rpm.
Operating sound at 2,000 rpm should be greater than it is at idle.

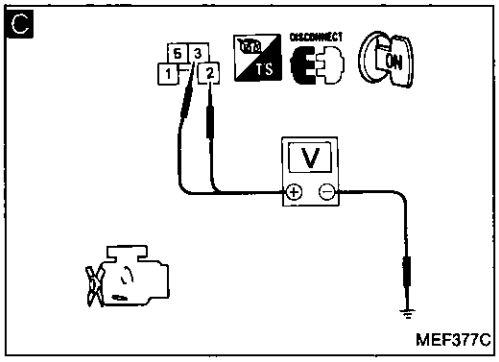
N.G. → Check fuel pump control module circuit. (Go to Procedure B.)

O.K.

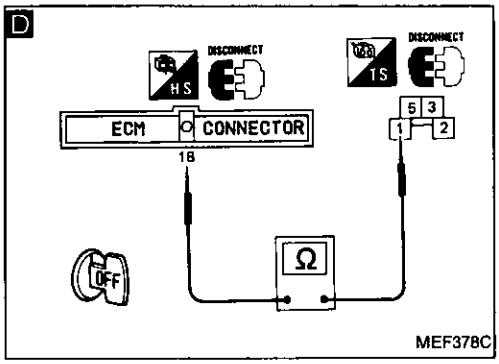
INSPECTION END

FUEL PUMP CONTROL (Not self-diagnostic item)

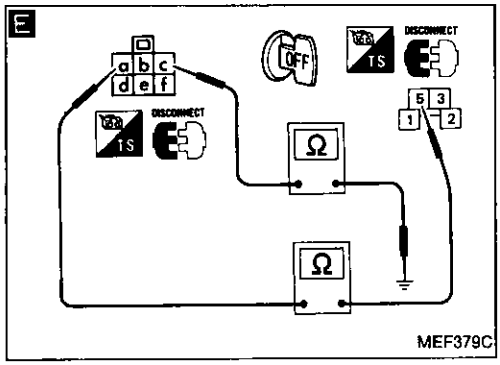
C



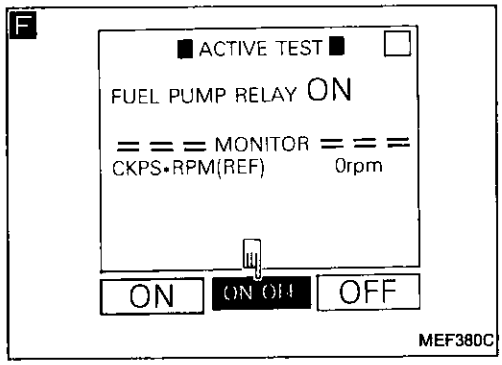
D



E



F



Procedure A

C

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump relay.
3) Turn ignition switch "ON".
4) Check voltage between terminals ②, ③ and ground with CONSULT or tester.
Voltage: Battery voltage

N.G. →
Check the following.
- Harness connectors (M2), (B3)
- Harness connectors (M10), (E57)
- H.E.C. harness connector (M1)
- 7.5A fuse
- 15A fuse
- Harness continuity between fuel pump relay and H.E.C.
- Harness continuity between fuel pump relay and battery

If N.G., repair harness or connectors.

O.K. ↓

D

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump harness connector.
3) Check harness continuity between terminals ⑤ and ⓒ, and terminal ⓒ and body ground.
Continuity should exist.

N.G. →
CHECK COMPONENT (Resistor).
Refer to "Electrical Components Inspection". (See page EF & EC-223.)
If N.G., replace resistor.

O.K. ↓
Check the following.
- Harness connectors (M2), (B3)
- Harness connectors (M72), (B51)
- Joint connector (B64)
- Harness continuity between fuel pump relay and fuel pump
- Harness continuity between fuel pump and body ground

If N.G., repair harness or connectors.

O.K. ↓

E

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ⑱ and terminal ①.
Continuity should exist.

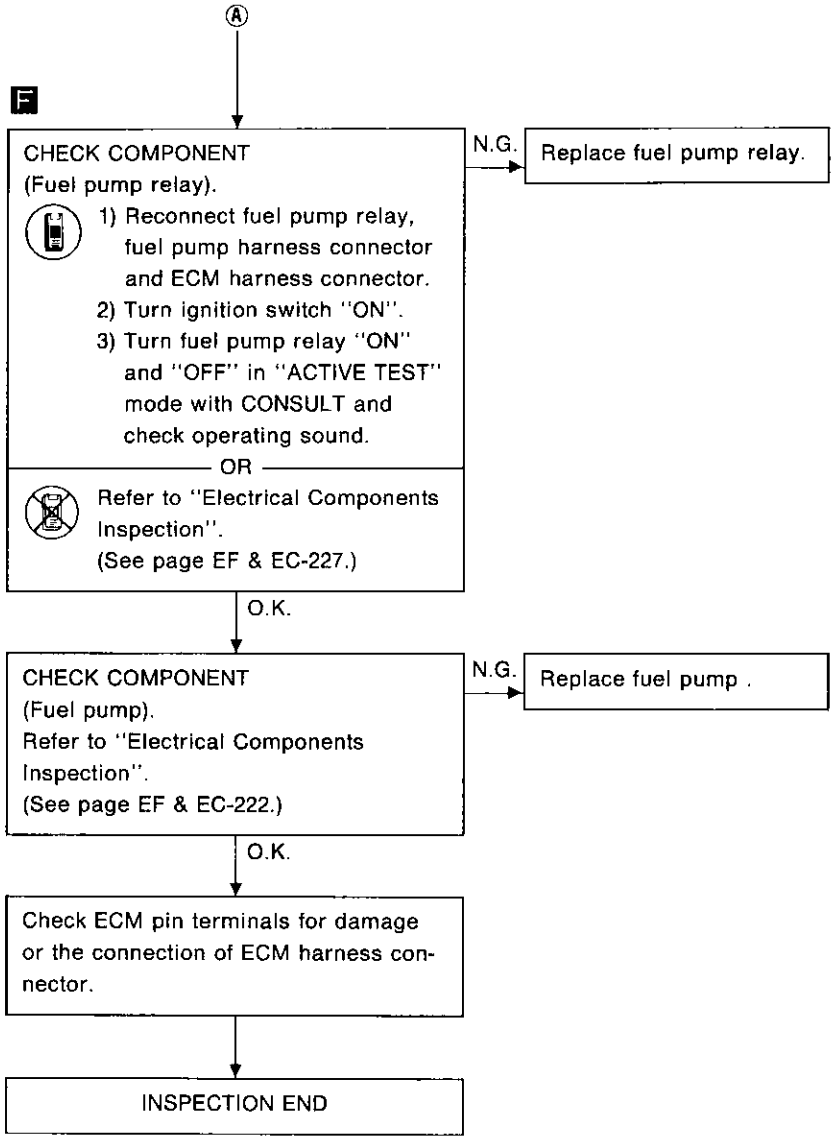
N.G. →
Check the following.
- Harness connectors (F23), (M74),
- Harness connectors (M2), (B3)
- Harness continuity between ECM and fuel pump relay

If N.G., repair harness or connectors.

O.K. ↓

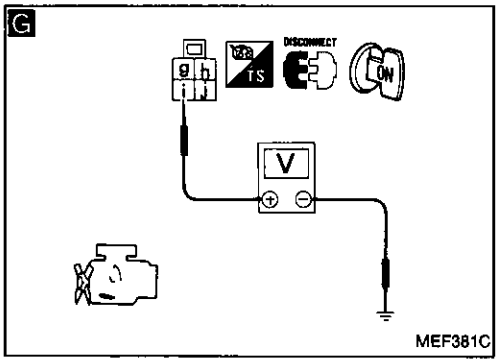
Ⓐ

FUEL PUMP (Not self-diagnostic item)

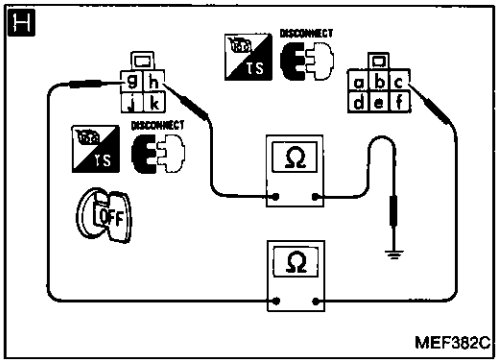


FUEL PUMP CONTROL (Not self-diagnostic item)

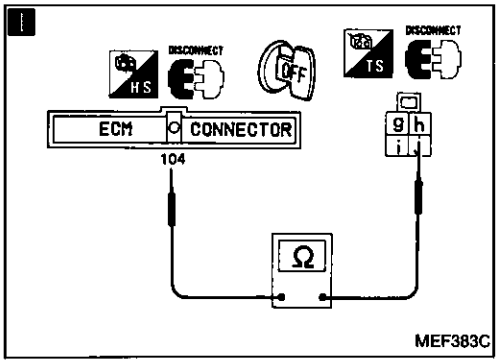
G



H



I



Procedure B

G

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump control module harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓘ and ground with CONSULT or tester.
Voltage:
Battery voltage should exist for 5 seconds after ignition switch is turned "ON".

N.G. → Check the following.
- Joint connector (B64)
- Harness continuity between fuel pump control module and joint connector (B64)

If N.G., repair harness or connectors.

O.K.

H

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump harness connector.
3) Check harness continuity between terminals ⓖ and ⓒ, and terminal ⓗ and body ground.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

I

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal (104) and terminal ⓙ.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F23), (M74)
- Harness connectors (M72), (B51)
- Harness continuity between ECM and fuel pump control module

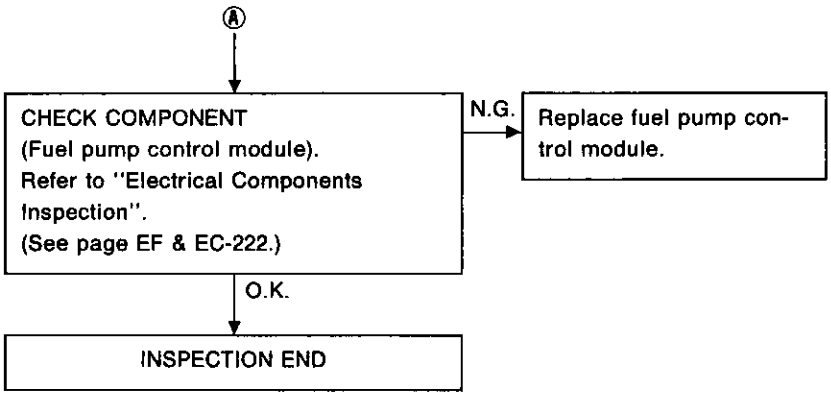
If N.G., repair harness or connectors.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector.

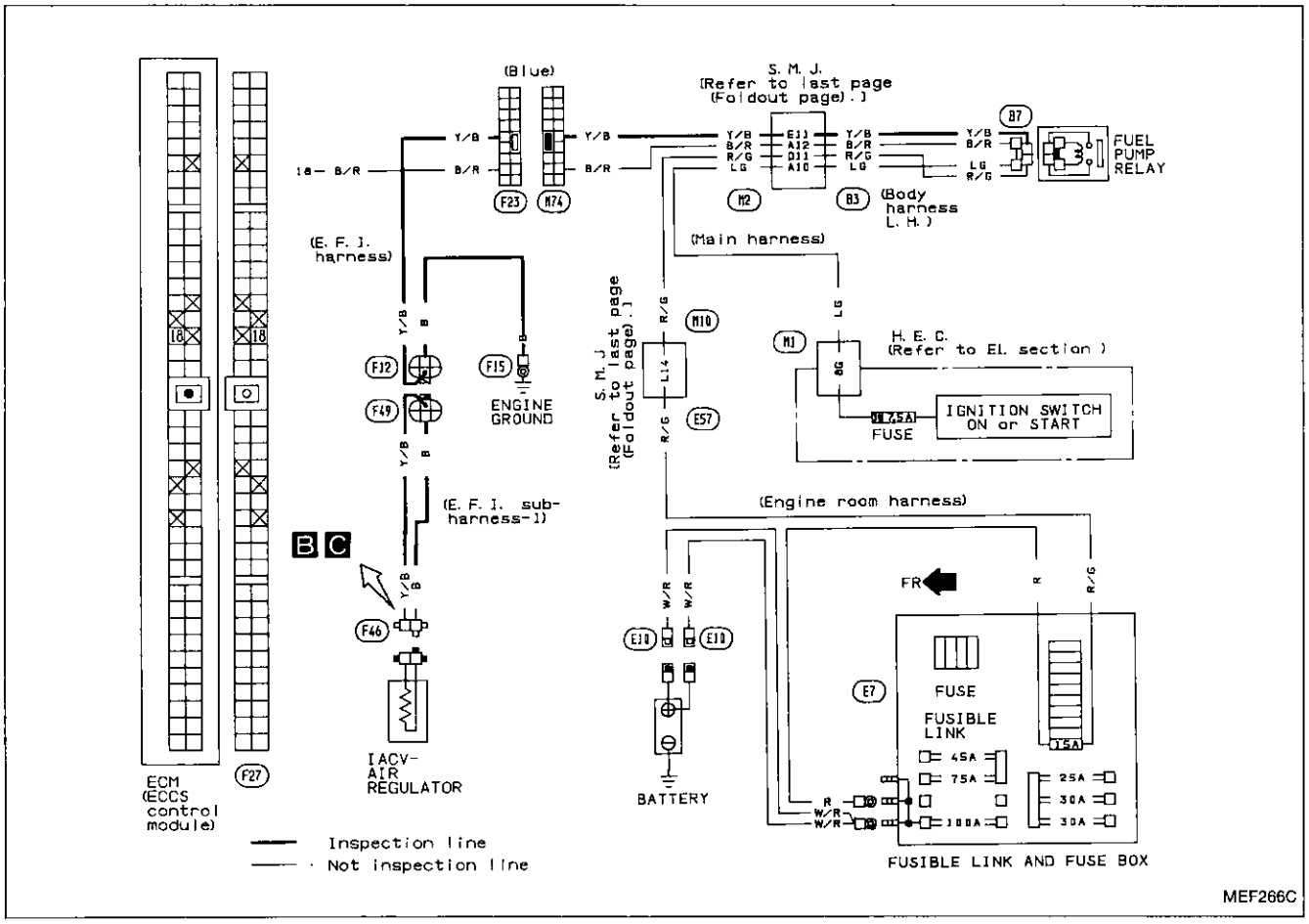
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FUEL PUMP (Not self-diagnostic item)

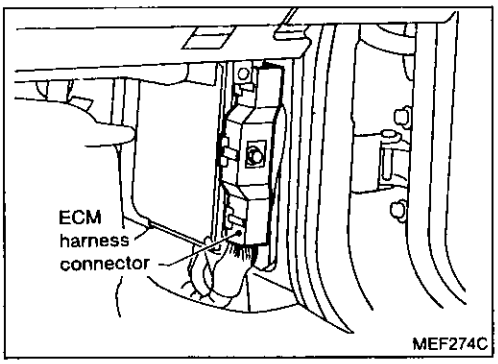


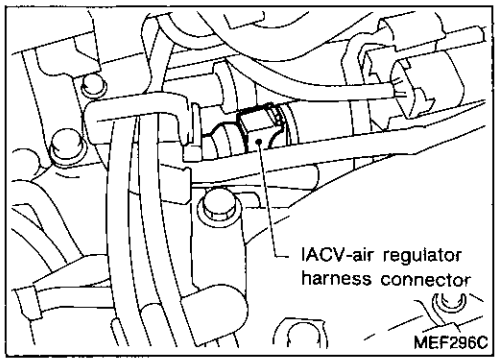
Diagnostic Procedure 26

IACV-AIR REGULATOR (Not self-diagnostic item)



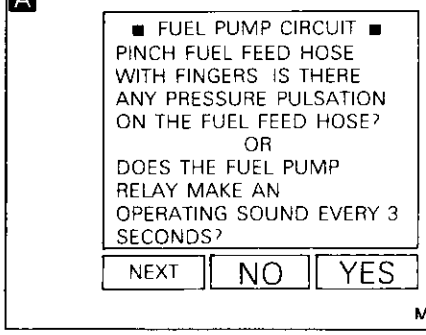
Harness layout





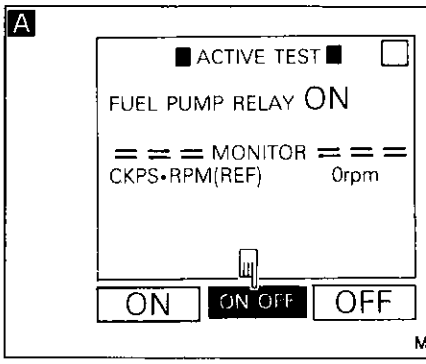
IACV-AIR REGULATOR (Not self-diagnostic item)

A



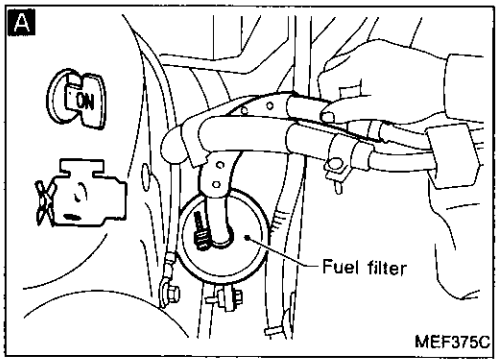
MEF384C

A



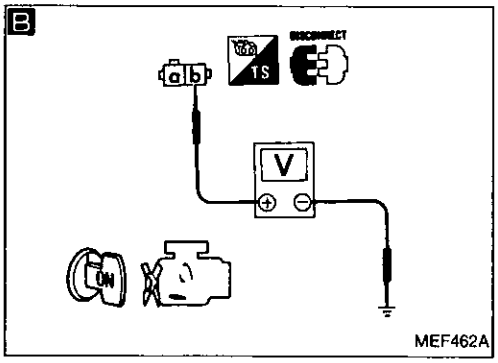
MEF385C

A



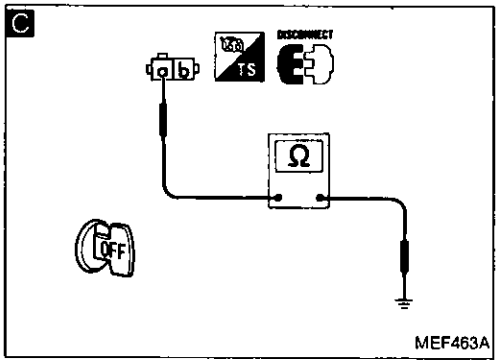
MEF375C

B



MEF462A

C



MEF463A

INSPECTION START

A

CHECK CONTROL FUNCTION.
1) Turn ignition switch "ON".
2) Perform "FUEL PUMP CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

2) Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

OR

2) Pinch fuel feed hose with fingers.
Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned "ON".

N.G. → Check fuel pump control circuit.
(See page EF & EC-148.)

O.K.

B

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect IACV-air regulator harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓑ and ground with CONSULT or tester.
Battery voltage should exist for 5 seconds after ignition switch is turned "ON".

N.G. → Check the following.
- Harness connectors (F49), (F12)
- Harness connectors (F23), (M74)
- Harness connectors (M2), (B3)
- Harness continuity between IACV-air regulator and fuel pump relay

If N.G., repair harness or connectors.

O.K.

C

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal ⓐ and body ground.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F49), (F12)
- Harness continuity between IACV-air regulator and engine ground

If N.G., repair harness or connectors.

O.K.

CHECK COMPONENT (IACV-air regulator).
Refer to "Electrical Components Inspection".
(See page EF & EC-226.)

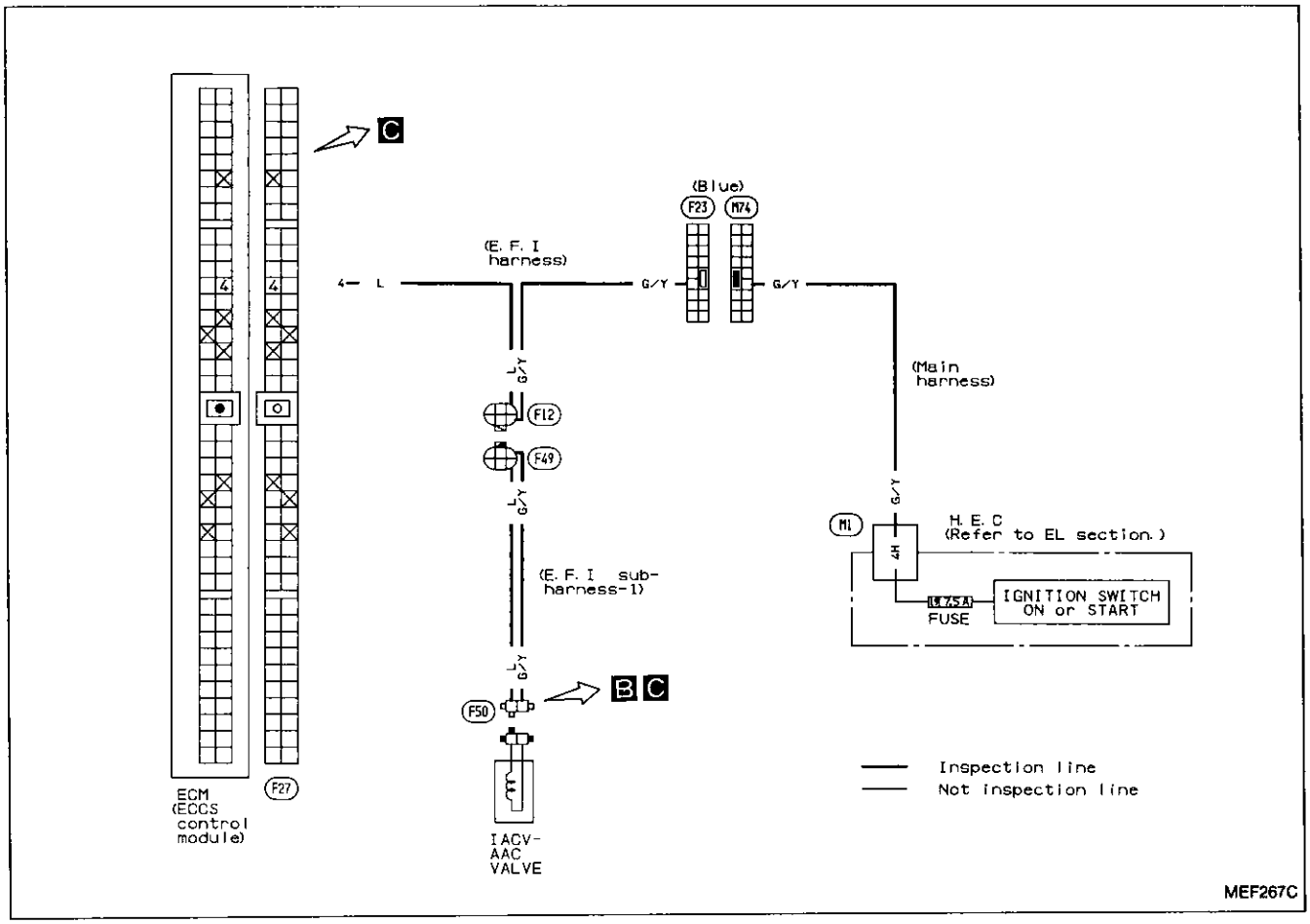
N.G. → Replace IACV-air regulator.

O.K.

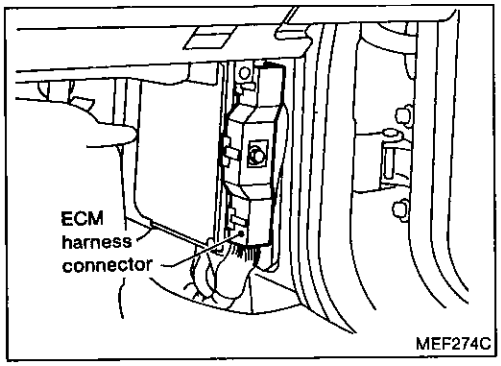
INSPECTION END

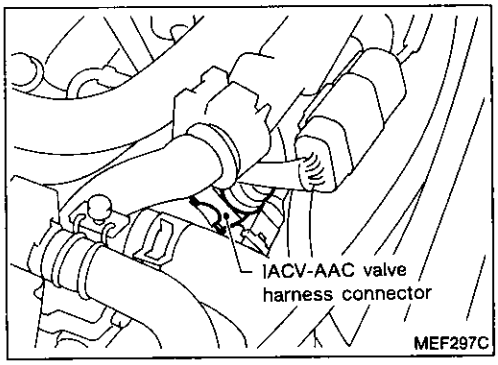
Diagnostic Procedure 27

IACV-AAC VALVE (Not self-diagnostic item)

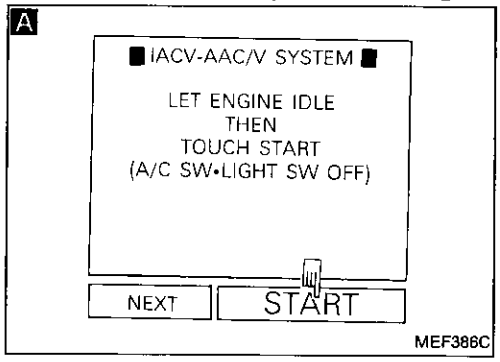


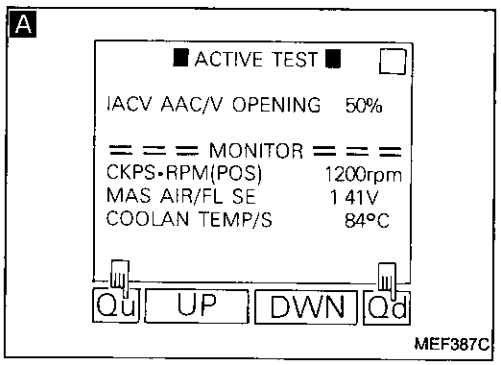
Harness layout

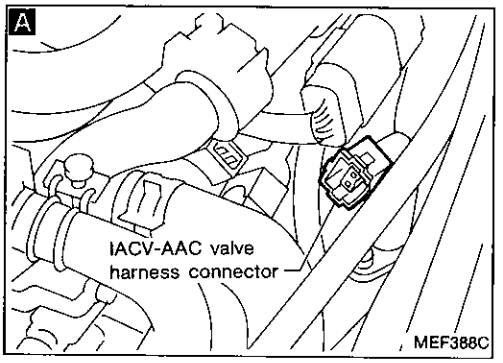


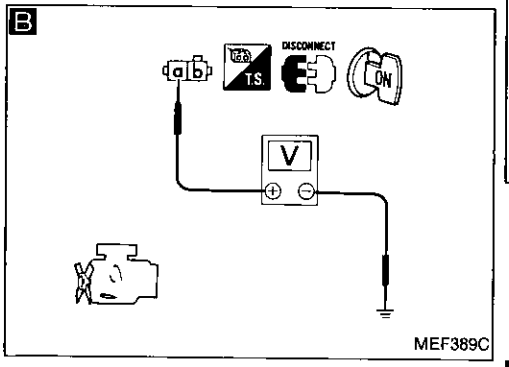


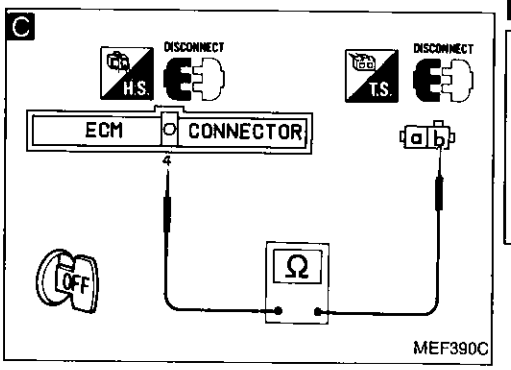
IACV-AAC VALVE (Not self-diagnostic item)











INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Check idle speed.
720 ± 50 rpm (in "N" position)
If N.G., adjust idle speed.
3) Perform "IACV-AAC/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.

O.K. → INSPECTION END

OR

3) Select "IACV-AAC/V OPENING" in "ACTIVE TEST" mode with CONSULT.
4) When touching "Qu" and "Qd", check that engine speed changes according to the IACV-AAC valve opening percentage.

OR

3) Disconnect IACV-AAC valve harness connector.
4) Make sure that idle speed drops.

N.G.

B

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect IACV-AAC valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓐ and ground with CONSULT or tester.
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (F49), (F12)
- Harness connectors (F23), (M74)
- H.E.C. harness connector (M1)
- 7.5A fuse
- Harness continuity between IACV-AAC valve and H.E.C.

If N.G., repair harness or connectors.

O.K.

C

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal ④ and terminal ⓑ.
Continuity should exist.

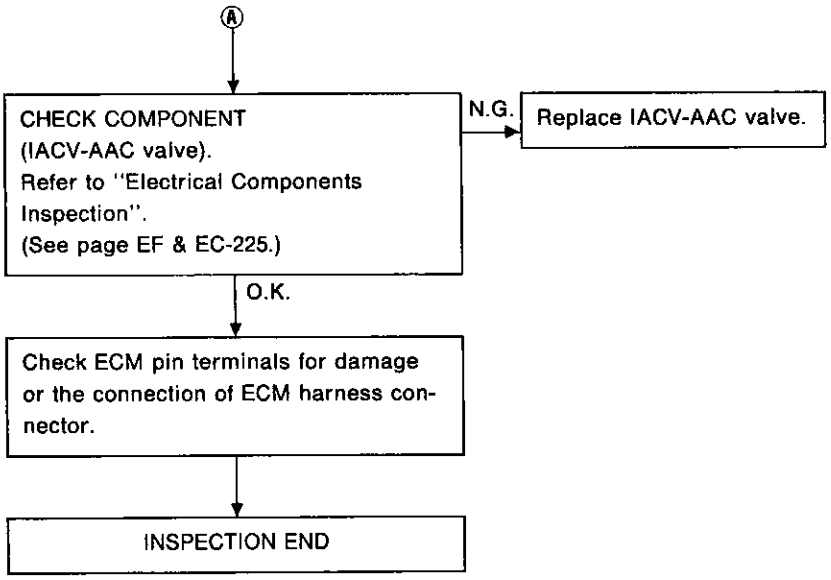
N.G. → Check the following.
- Harness connectors (F49), (F12)
- Harness continuity between ECM and IACV-AAC valve

If N.G., repair harness or connectors.

O.K.

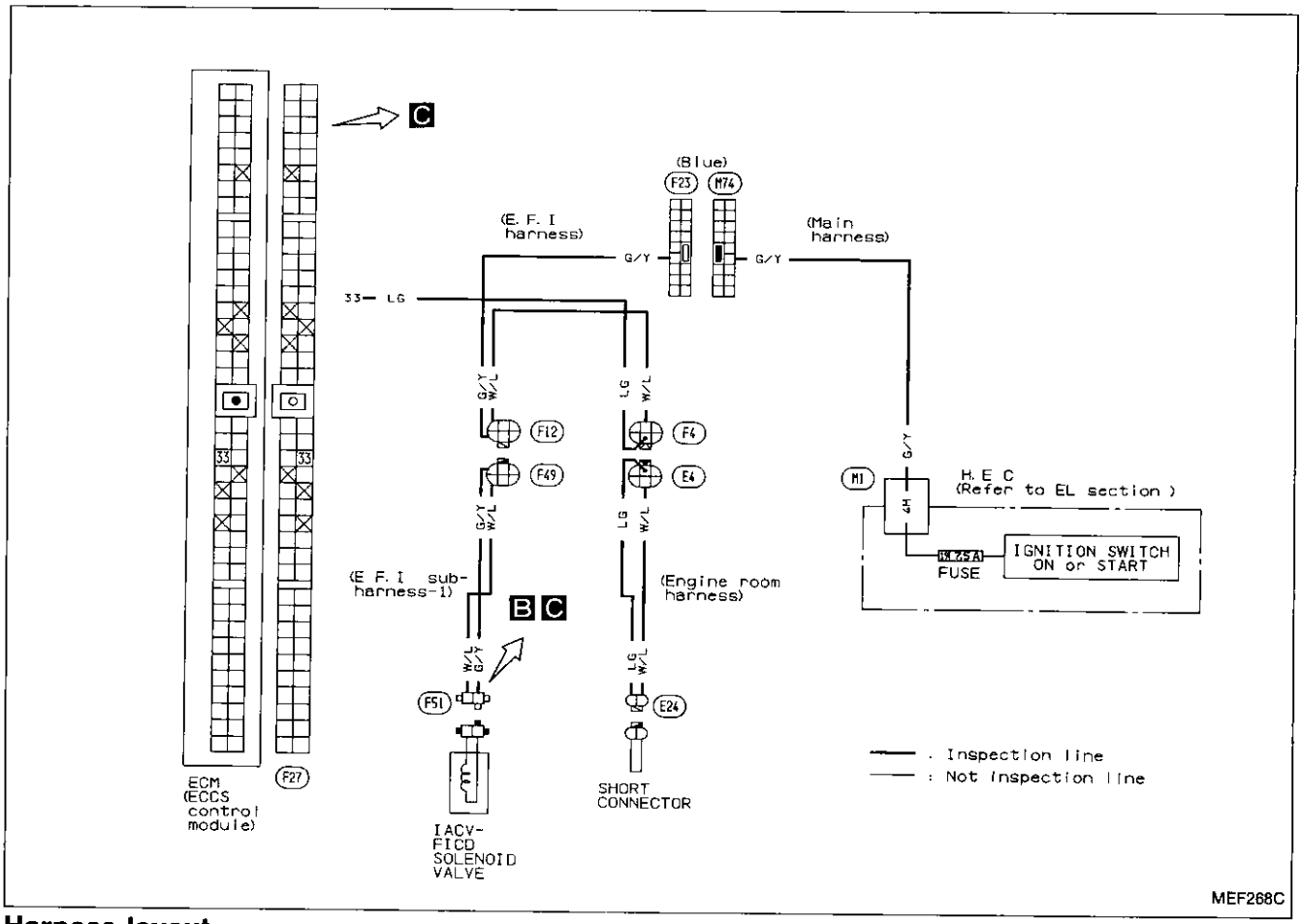
Ⓐ

IACV-AAC VALVE (Not self-diagnostic item)

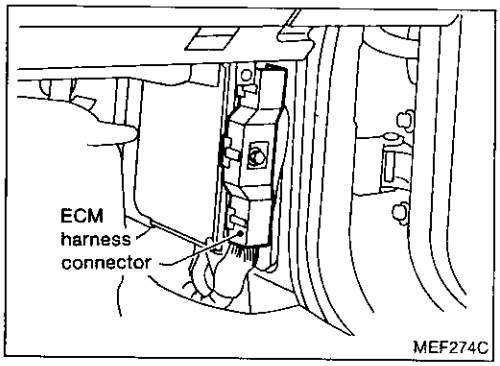


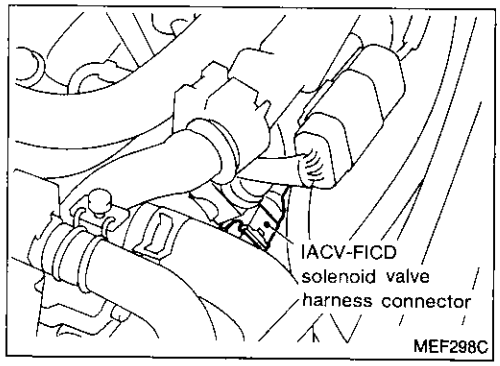
Diagnostic Procedure 28

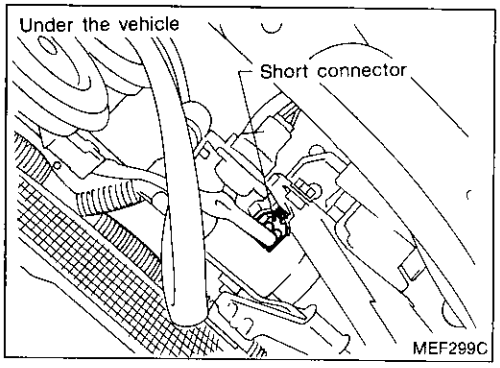
IACV-FICD SOLENOID VALVE (Not self-diagnostic item)



Harness layout

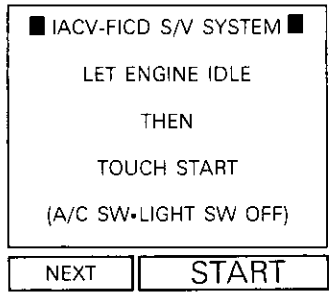






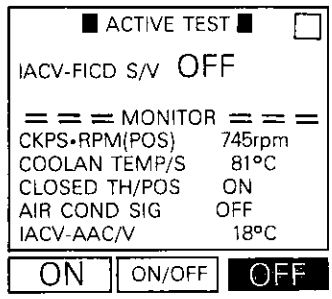
IACV-FICD SOLENOID VALVE (Not self-diagnostic item)

A



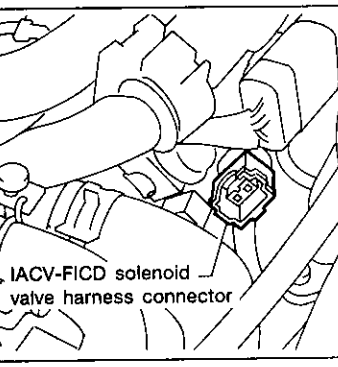
MEF391C

A



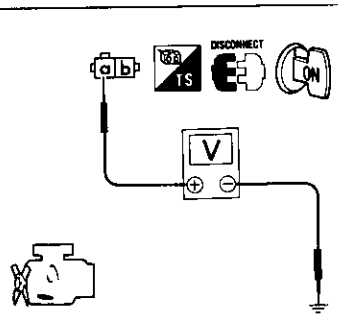
MEF392C

A



MEF393C

B



MEF394C

INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Check idle speed.
720 ± 50 rpm (In "N" position)
If N.G., adjust idle speed.

3) Perform "IACV-FICD S/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.

O.K. → INSPECTION END

OR

3) Perform "IACV-FICD SOL/V" in "ACTIVE TEST" mode with CONSULT.
4) Make sure that engine idle speed drops when IACV-FICD solenoid valve is turned "OFF".

OR

3) Turn both A/C switch and blower fan switch "ON".
4) Make sure that engine idle speed drops when IACV-FICD solenoid valve harness connector is disconnected.

N.G.

Check if air conditioner compressor functions normally.

N.G. → Refer to HA section.

O.K.

B

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect IACV-FICD solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓐ and ground with CONSULT or tester.
Voltage: Battery voltage

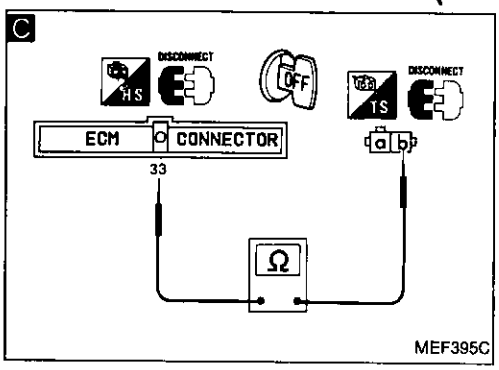
N.G. → Check the following.
- Harness connectors (F49), (F12)
- Harness connectors (F23), (M74)
- H.E.C. harness connector (M1)
- 7.5A fuse
- Harness continuity between IACV-FICD solenoid valve and H.E.C.

If N.G., repair harness or connectors.

O.K.

Ⓐ

IACV-FICD SOLENOID VALVE (Not self-diagnostic item)



Ⓐ

C

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal ㉝ and terminal ⓑ.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F49), (F12).
- Harness connectors (F4), (E4)
- Short connectors (E24)
- Harness continuity between ECM and IACV-FICD solenoid valve

If N.G., repair harness or connectors.

O.K. ↓

CHECK COMPONENT
(IACV-FICD solenoid valve).
Refer to "Electrical Components Inspection".
(See page EF & EC-225.)

N.G. → Replace IACV-FICD solenoid valve.

O.K. ↓

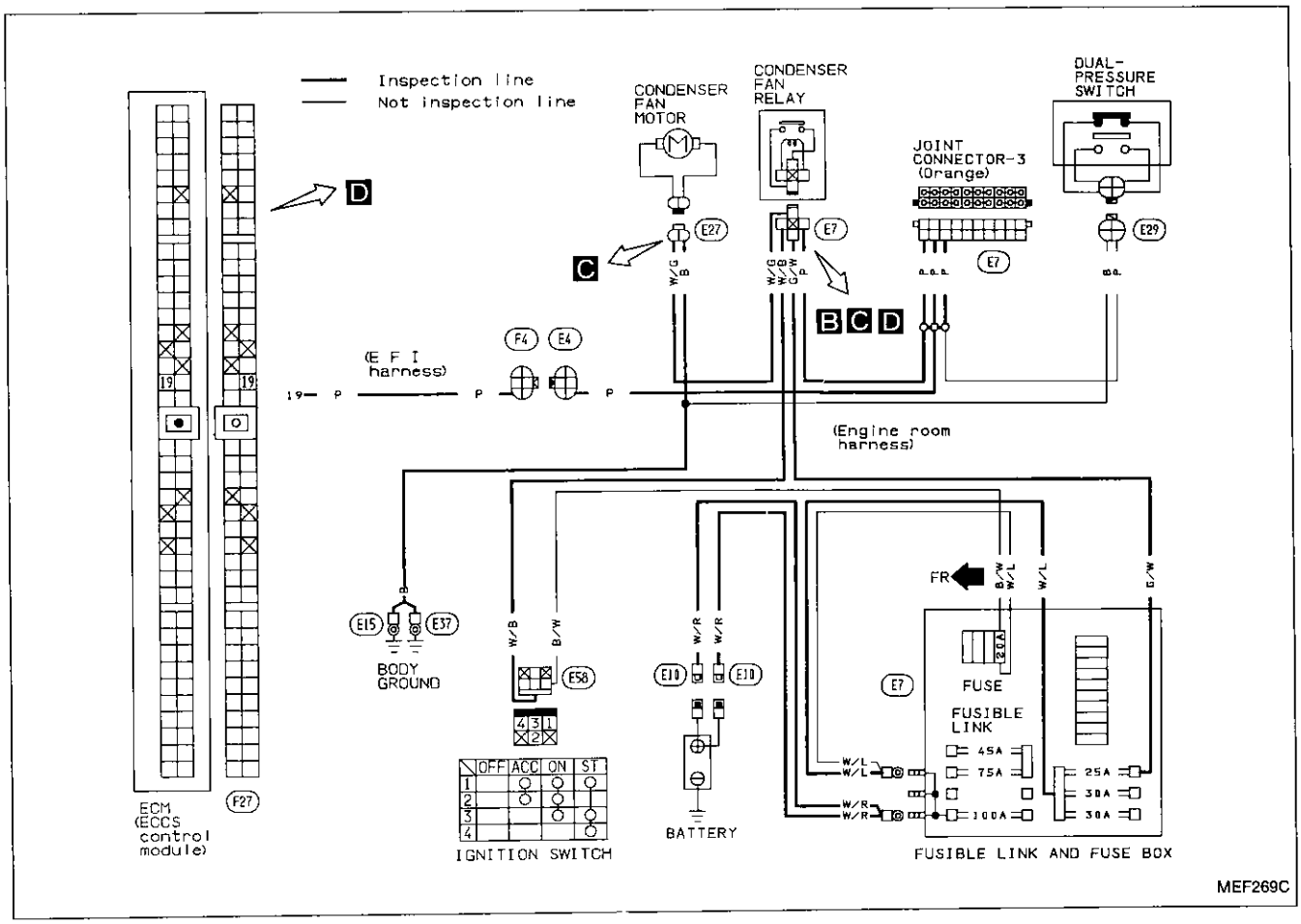
Check ECM pin terminals for damage or the connection of ECM harness connector.

↓

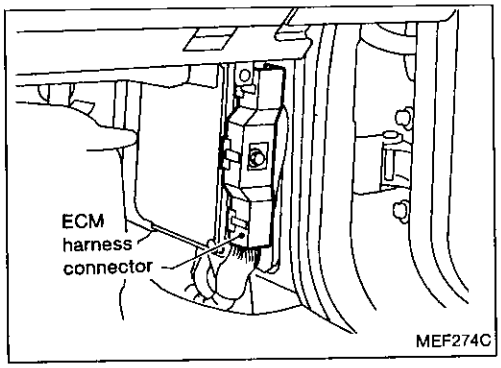
INSPECTION END

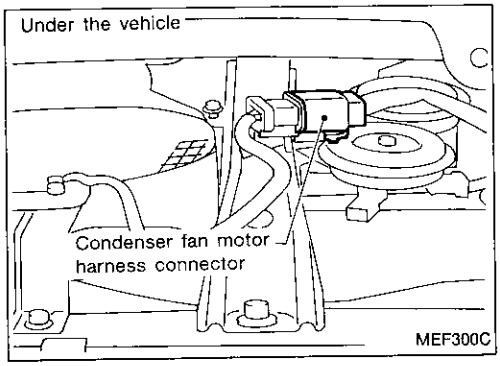
Diagnostic Procedure 29

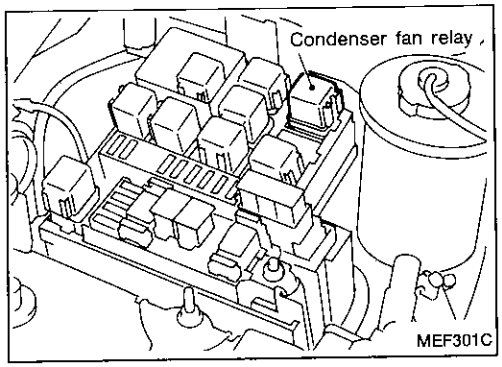
CONDENSER FAN CONTROL (Not self-diagnostic item)

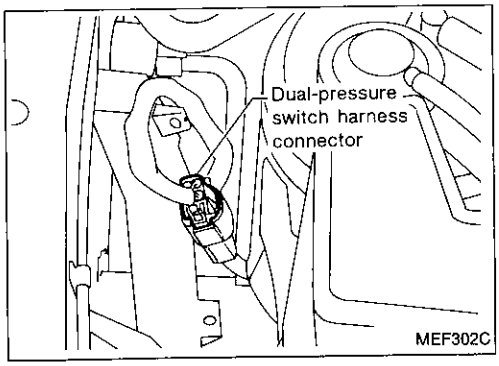


Harness layout



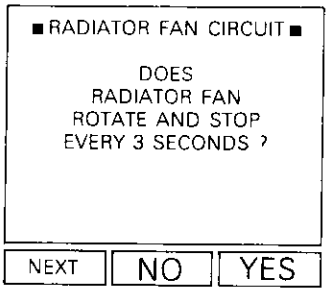






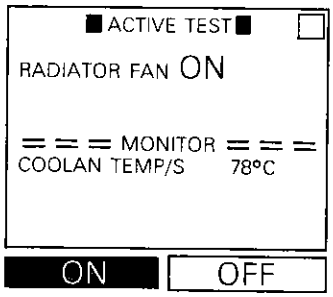
CONDENSER FAN CONTROL (Not self-diagnostic item)

A



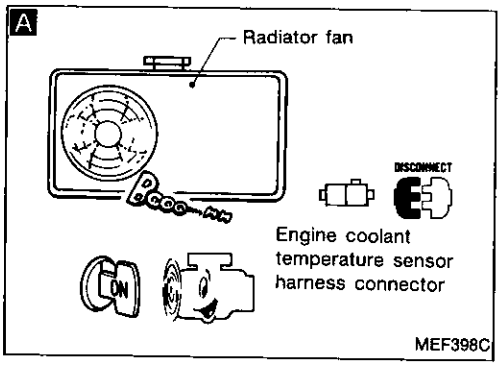
MEF396C

A



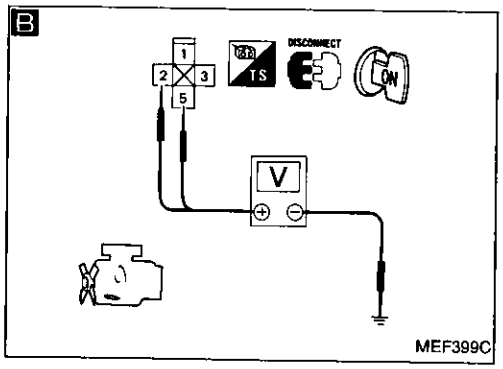
MEF397C

A



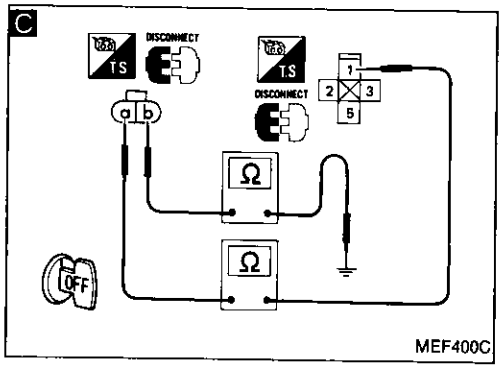
MEF398C

B



MEF399C

C



MEF400C

INSPECTION START

A

CHECK OVERALL FUNCTION.

1) Turn ignition switch "ON".
2) Perform "RADIATOR FAN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

O.K. → INSPECTION END

OR

1) Turn ignition switch "ON".
2) Perform "RADIATOR FAN" in "ACTIVE TEST" mode with CONSULT.

OR

1) Disconnect dual-pressure switch harness connector.
2) Disconnect engine coolant temperature sensor harness connector.
3) Start engine and let it idle.
4) Make sure that condenser fan motor operates.

N.G.

B

CHECK POWER SUPPLY.

1) Turn ignition switch "OFF".
2) Disconnect condenser fan relay.
3) Turn ignition switch "ON".
4) Check voltage between terminals ②, ⑤ and ground with CONSULT or tester.

Voltage: Battery voltage

N.G. → Check the following.
- 25A fusible link
- Harness continuity between condenser fan relay and battery
- Harness continuity between condenser fan relay and ignition switch

If N.G., repair harness or connectors.

O.K.

C

CHECK GROUND CIRCUIT.

1) Turn ignition switch "OFF".
2) Disconnect condenser fan motor harness connector.
3) Check harness continuity between terminals ① and ⓐ, and terminal ⓑ and body ground.

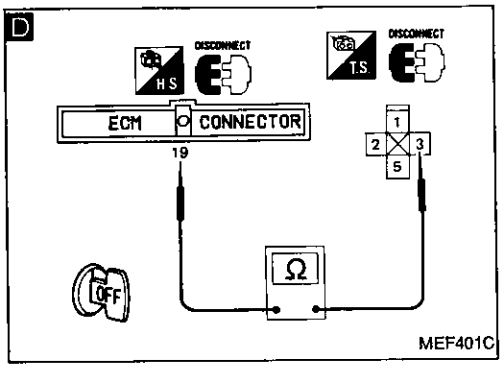
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

Ⓐ

CONDENSER FAN CONTROL (Not self-diagnostic item)



Ⓐ

D

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ⑲ and terminal ③.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (E4), (E4)
- Joint connector (E7)
- Harness continuity between ECM and condenser fan relay

If N.G., repair harness or connectors.

O.K. ↓

CHECK COMPONENT
(Condenser fan relay).
Refer to "Electrical Components Inspection".
(See page EF & EC-227.)

N.G. → Replace condenser fan relay.

O.K. ↓

CHECK COMPONENT
(Condenser fan motor).
Refer to "Electrical Components Inspection".
(See page EF & EC-228.)

N.G. → Replace condenser fan motor.

O.K. ↓

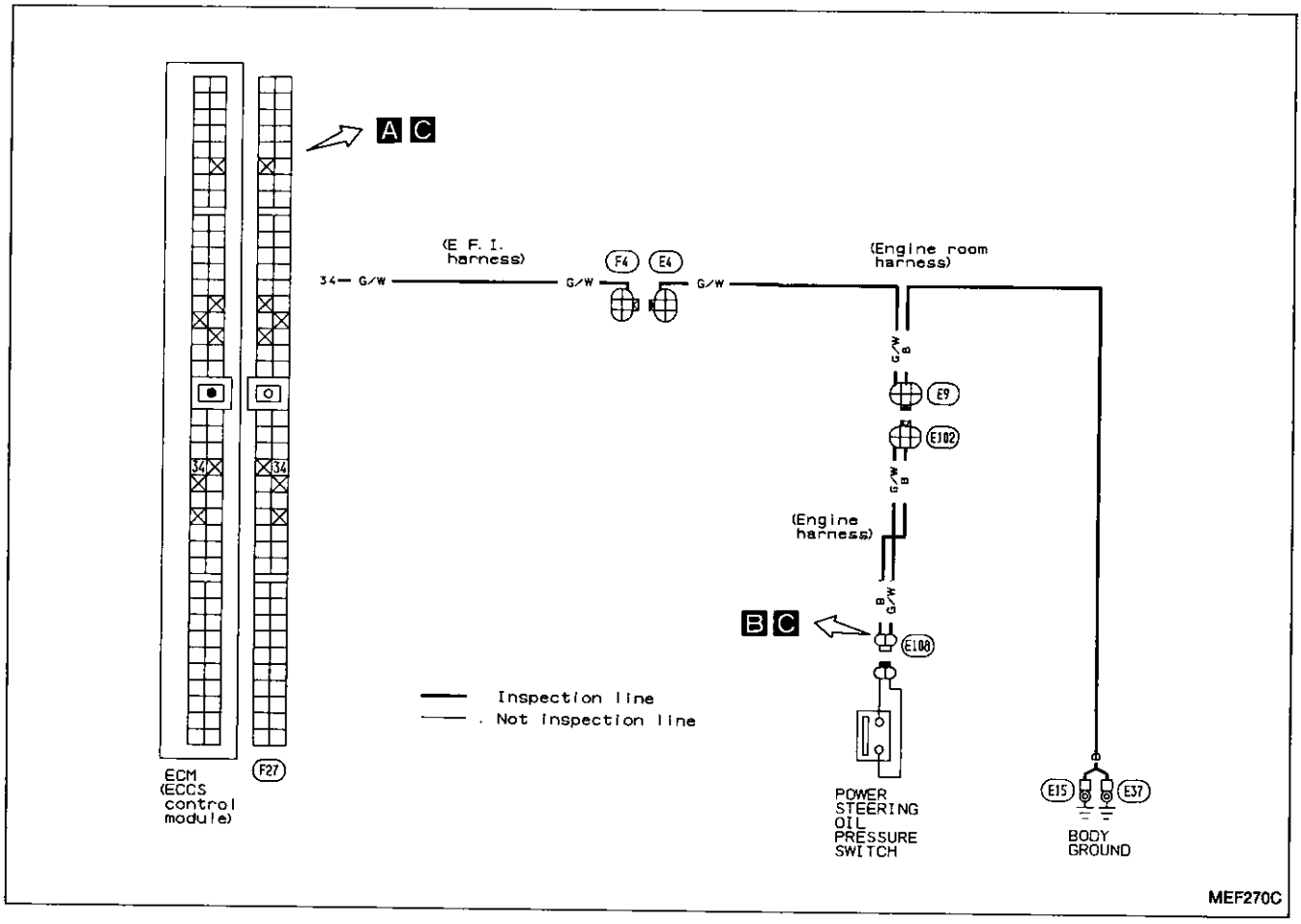
Check ECM pin terminals for damage or the connection of ECM harness connector.

↓

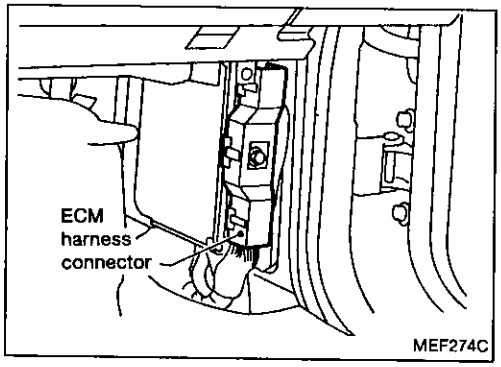
INSPECTION END

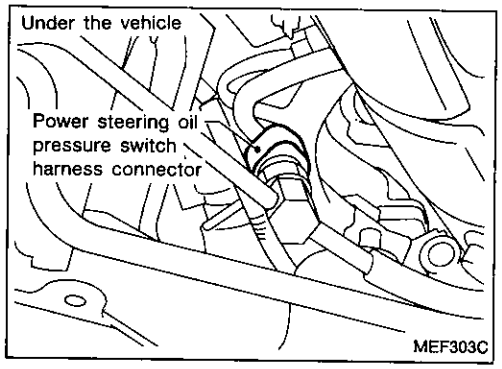
Diagnostic Procedure 30

POWER STEERING OIL PRESSURE SWITCH (Not self-diagnostic item)

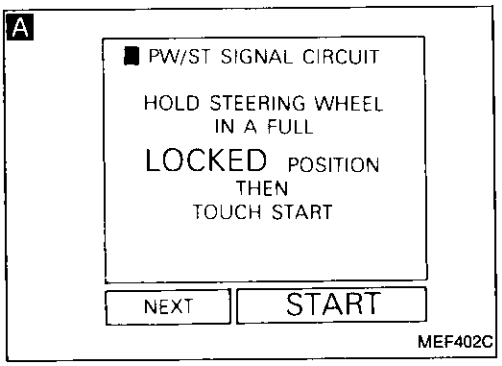


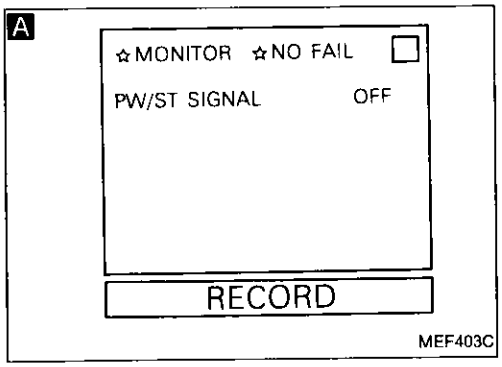
Harness layout

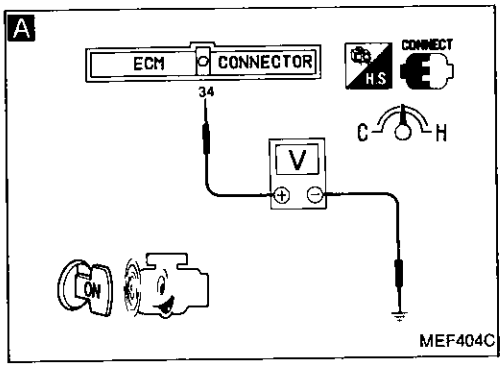


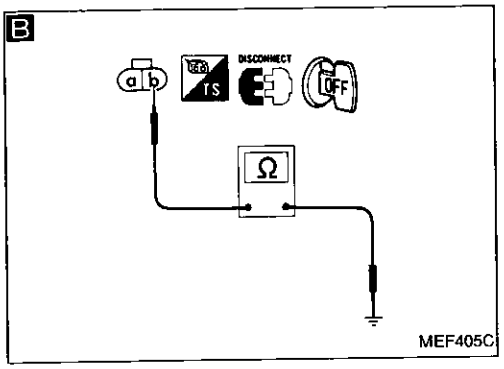


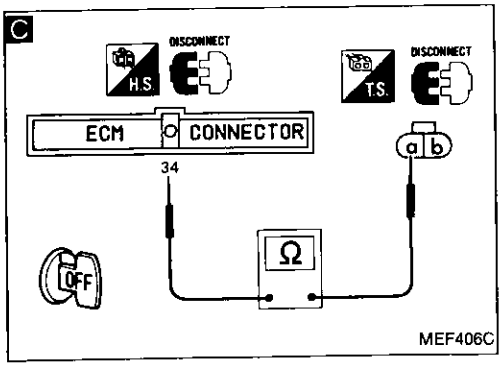
POWER STEERING OIL PRESSURE SWITCH (Not self-diagnostic item)











INSPECTION START

A

CHECK OVERALL FUNCTION.

1) Turn ignition switch "ON".
2) Perform "PW/ST SIGNAL CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

O.K. → INSPECTION END

— OR —

1) Start engine.
2) Check power steering oil pressure switch signal in "DATA MONITOR" mode with CONSULT.

Steering is neutral position: OFF
Steering is turned: ON

— OR —

1) Start engine.
2) Check voltage between ECM terminal ㉞ and ground with CONSULT or tester.

Voltage:
When steering wheel is turned quickly.
Approximately 0V
Except above
Approximately 5V

N.G.

B

CHECK GROUND CIRCUIT.

1) Turn ignition switch "OFF".
2) Disconnect power steering oil pressure switch harness connector.
3) Check harness continuity between terminal ⓑ and body ground.

Continuity should exist.

N.G. → Check the following.
- Harness connectors (E9), (E102).
- Harness continuity between power steering oil pressure switch and body ground

If N.G., repair harness or connectors.

O.K.

C

CHECK INPUT SIGNAL CIRCUIT.

1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ㉞ and terminal ⓐ.

Continuity should exist.

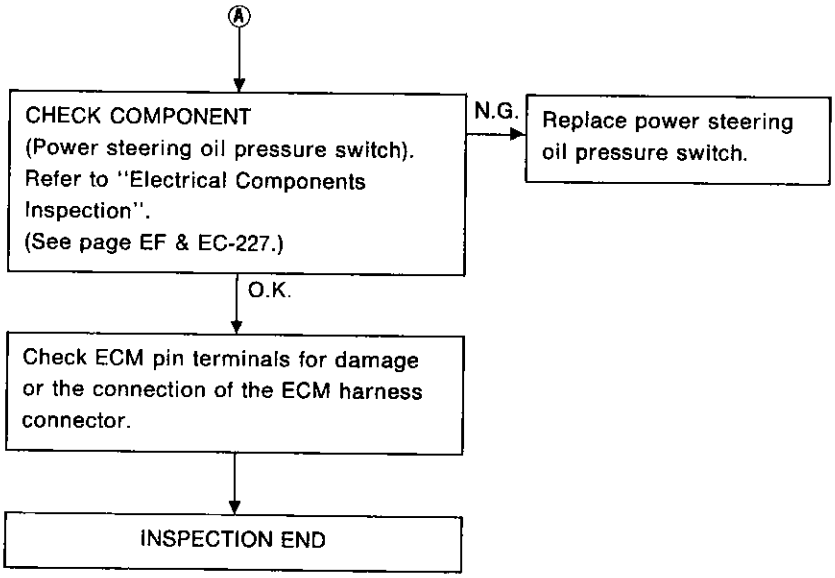
N.G. → Check the following.
- Harness connectors (F4), (E4)
- Harness connectors (E9), (E102)
- Harness continuity between ECM and power steering oil pressure switch

If N.G., repair harness or connectors.

O.K.

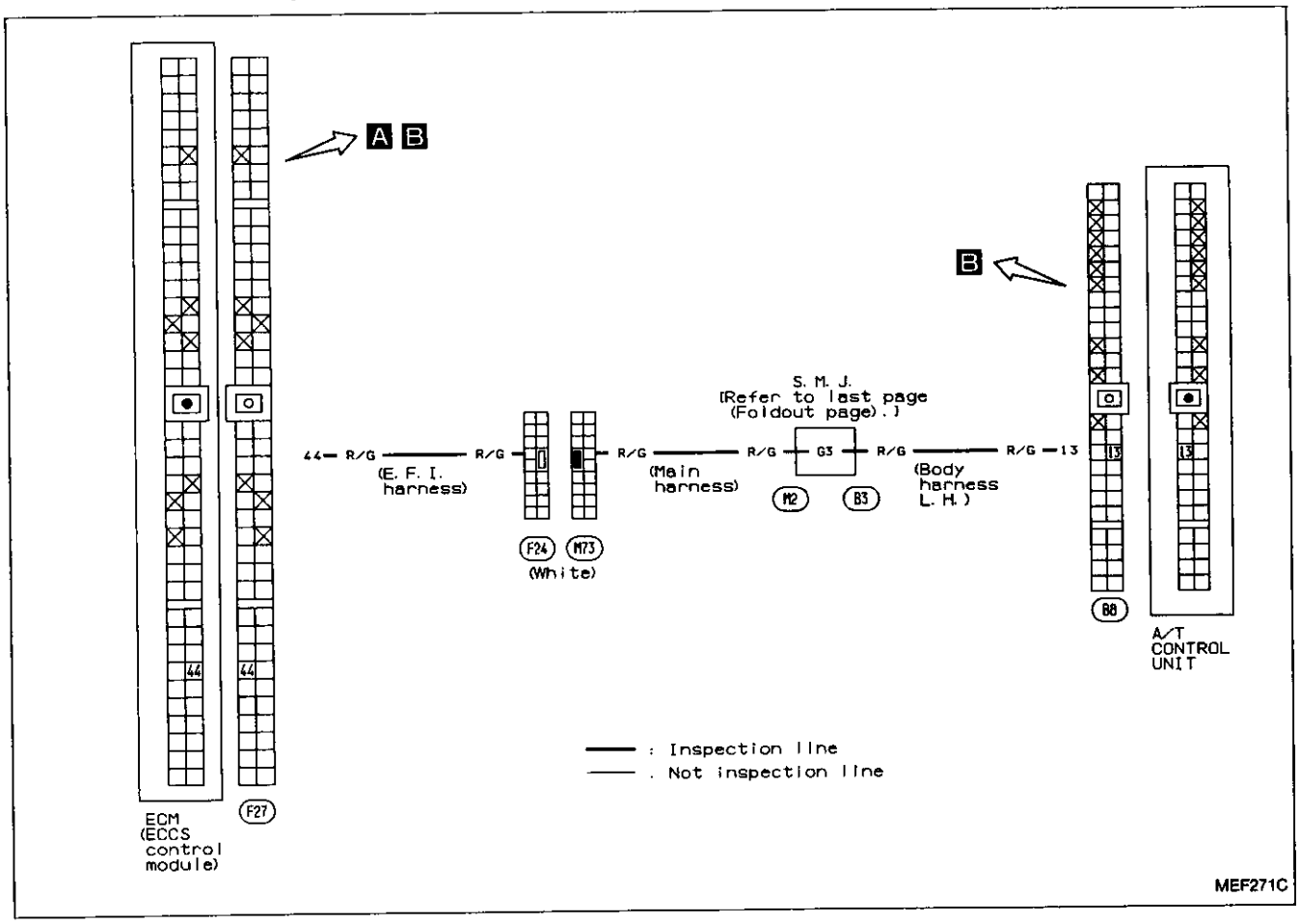
Ⓐ

POWER STEERING OIL PRESSURE SWITCH (Not self-diagnostic item)

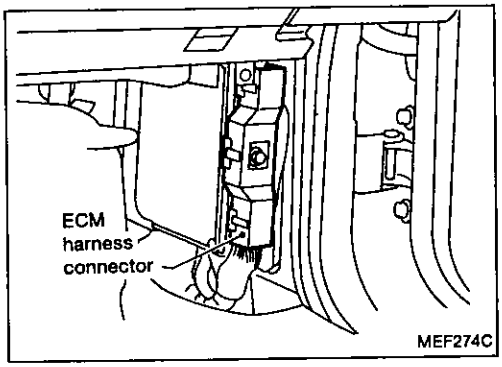


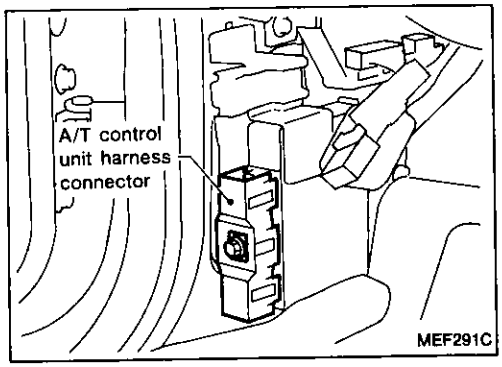
Diagnostic Procedure 31

A/T CONTROL UNIT (Neutral position signal) (Not self-diagnostic item)

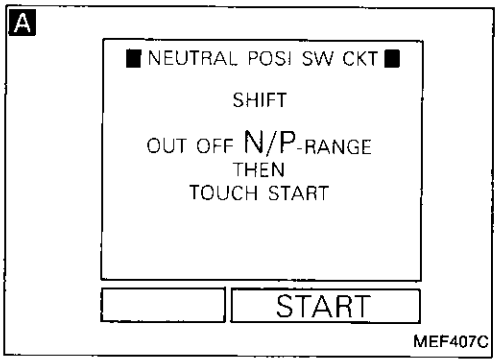


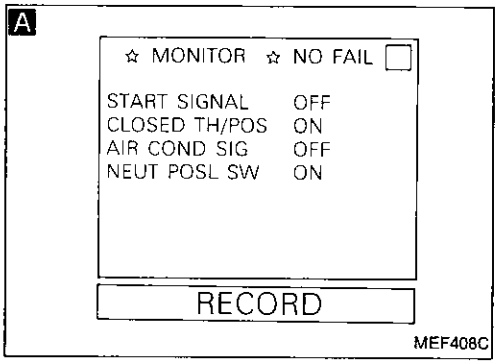
Harness layout

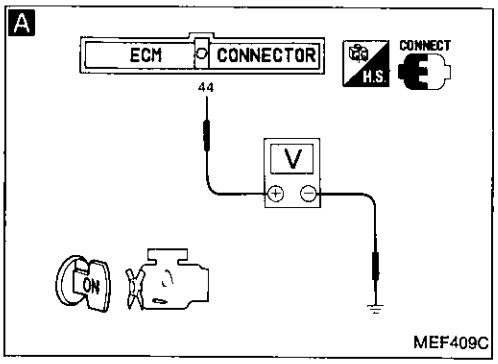


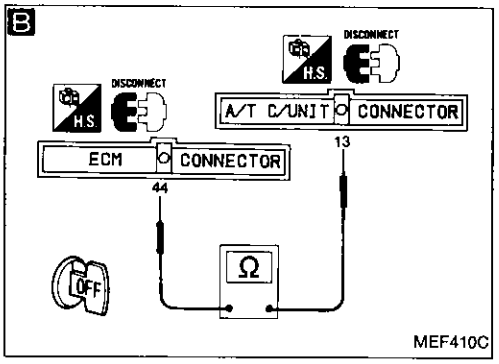


A/T CONTROL UNIT (Neutral position signal) (Not self-diagnostic item)









INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Turn ignition switch "ON".
2) Perform "NEUTRAL POSI SW CKT" in "FUNCTION TEST" mode with CONSULT.

OR

2) Check neutral position switch signal in "DATA MONITOR" mode with CONSULT.
"N" or "P": ON
Except above: OFF

OR

2) Check voltage between ECM terminal ㊹ and ground with CONSULT or tester.
Voltage:
"N" or "P"
Approximately 0V
Except above
Approximately 5V

O.K. → INSPECTION END

N.G.

B

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect control unit harness connector.
3) Disconnect A/T control unit harness connector.
4) Check harness continuity between ECM terminal ㊹ and terminal ⑬.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F24), (M73)
- Harness connectors (M2), (B3)
- Harness continuity between ECM and A/T control unit

If N.G., repair harness or connectors.

O.K.

CHECK INHIBITOR SWITCH FUNCTION.
Make sure that inhibitor switch functions properly. (Refer to AT section).

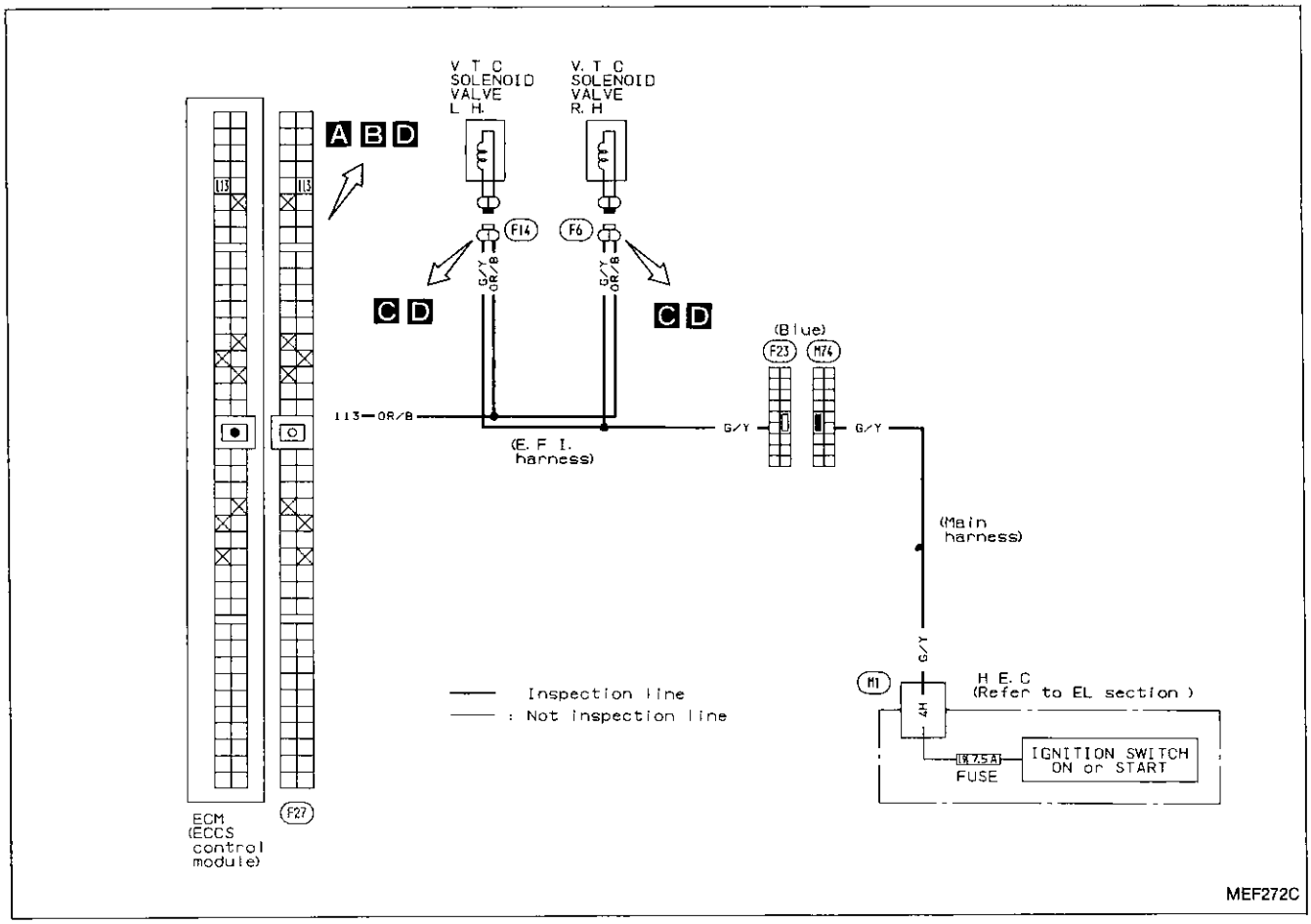
N.G. → Check inhibitor switch and circuit. (Refer to AT section.)

O.K.

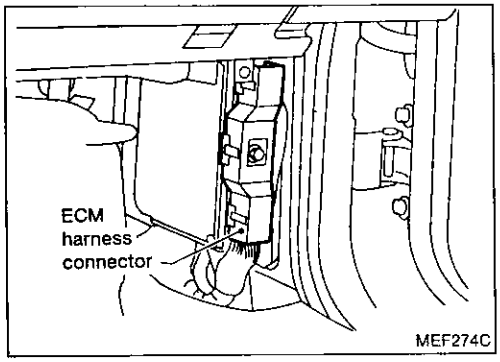
Check ECM pin terminals for damage or the connection of the ECM harness connector.

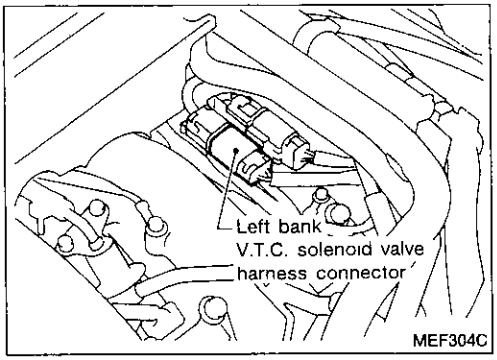
Diagnostic Procedure 32

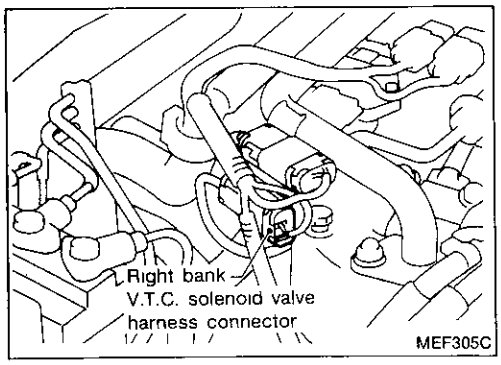
VALVE TIMING CONTROL (Not self-diagnostic item)



Harness layout

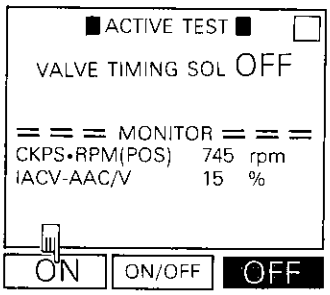






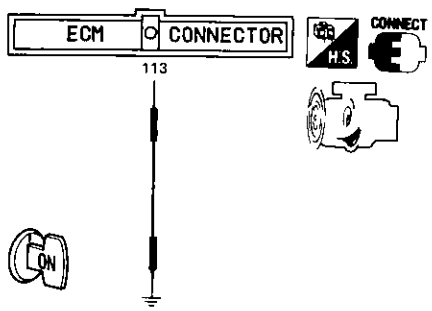
VALVE TIMING CONTROL (Not self-diagnostic item)

A



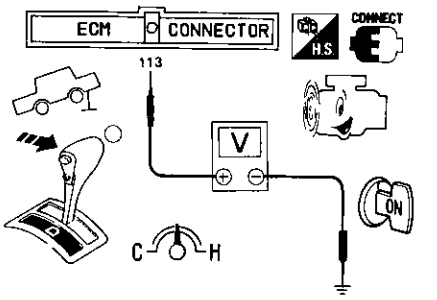
MEF411C

A



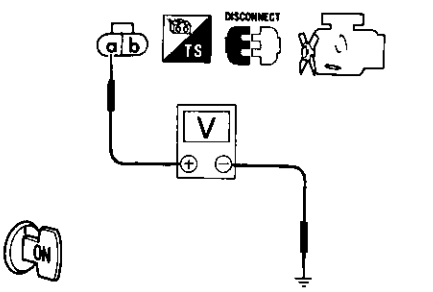
MEF412C

B



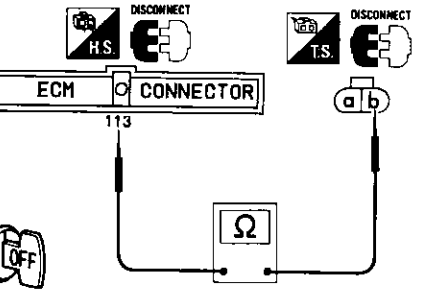
MEF413C

C



MEF414C

D



MEF415C

INSPECTION START

A

CHECK MECHANICAL FUNCTION.

1) Start engine and run it at idle.
2) Perform "VALVE TIMING SOL" in "ACTIVE TEST" mode with CONSULT and make sure that improper idle condition occurs.

OR

1) Connect a suitable jumper wire between ECM terminal (113) and body ground.
2) Start engine and make sure that improper idle condition occurs.

Occurs. → INSPECTION END

Does not occur.

B

CHECK ELECTRICAL CONTROL FUNCTION.

1) Stop engine.
2) Jack up drive wheel.
3) Start engine and warm it up sufficiently.
4) Shift select lever to any range except "N" or "P" range.
5) Check voltage between ECM terminal (113) and ground under the following conditions with CONSULT or tester.

Voltage:

Engine speed is about 2,000 rpm
Approximately 0V
At idle
Battery voltage

O.K. → CHECK COMPONENT (V.T.C. solenoid valve and V.T.C. valve). Refer to "Electrical Components Inspection". (See page EF & EC-226.)

N.G. → Replace malfunctioning component(s).

N.G.

C

CHECK POWER SUPPLY.

1) Stop engine.
2) Disconnect V.T.C. solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓐ and ground with CONSULT or tester.

Voltage: Battery voltage

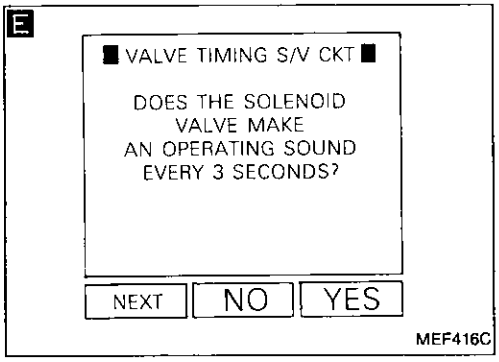
N.G. → Check the following.
- Harness connectors (F23), (M74)
- H.E.C. harness connector (M1)
- 7.5A fuse
- Harness continuity between V.T.C. solenoid valve and H.E.C.

If N.G., repair harness or connectors.

O.K.

Ⓐ

VALVE TIMING CONTROL (Not self-diagnostic item)



Ⓐ

D

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (113) and terminal (6).
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

E

CHECK COMPONENT
(V.T.C. solenoid valve).
Perform "VALVE TIMING S/V CKT" in "FUNCTION TEST" mode with CONSULT.

OR

Refer to "Electrical Components Inspection".
(See page EF & EC-226.)

N.G. → Replace V.T.C. solenoid valve.

O.K. ↓

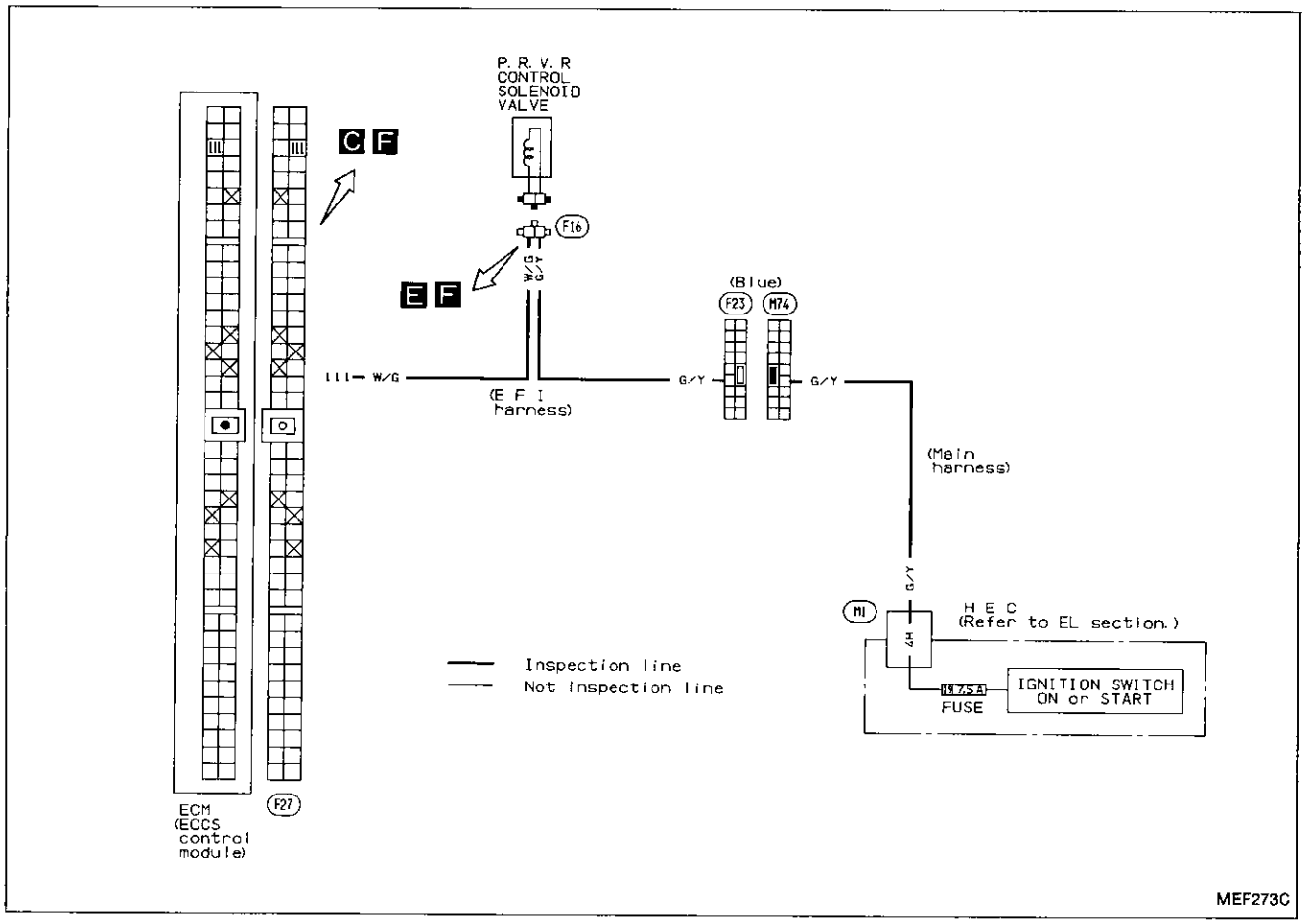
Check ECM pin terminals for damage or the connection of ECM harness connector.

↓

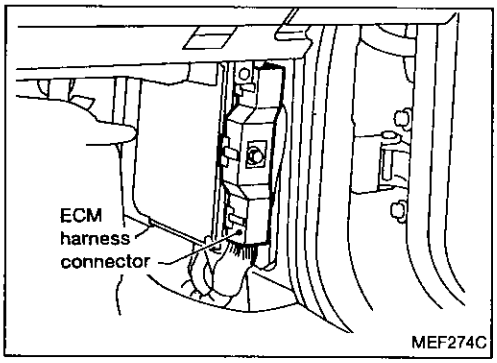
INSPECTION END

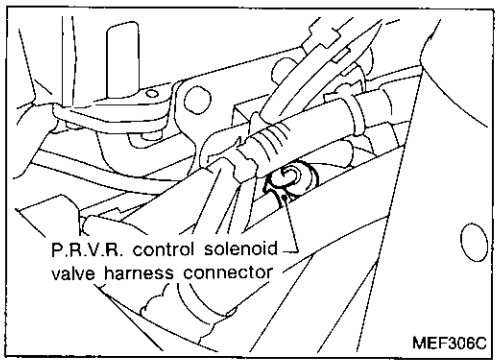
Diagnostic Procedure 33

P.R.V.R. CONTROL (Not self-diagnostic item)

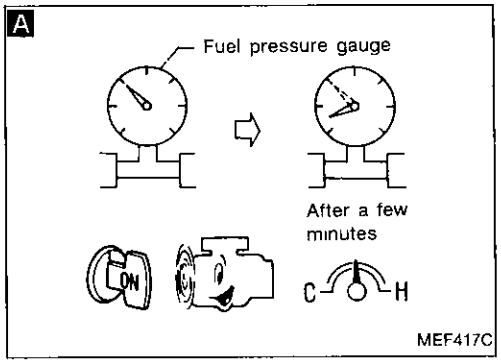


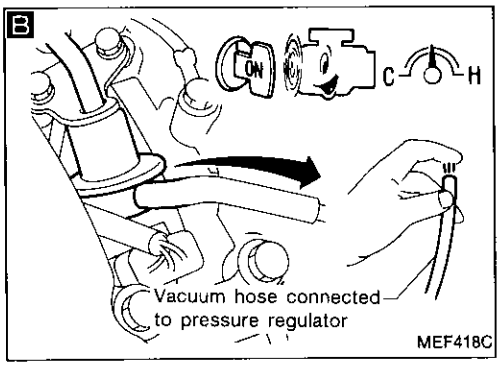
Harness layout

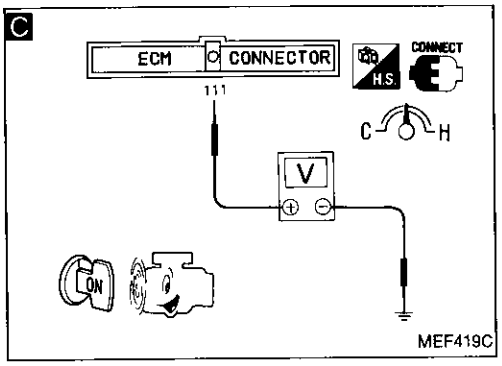


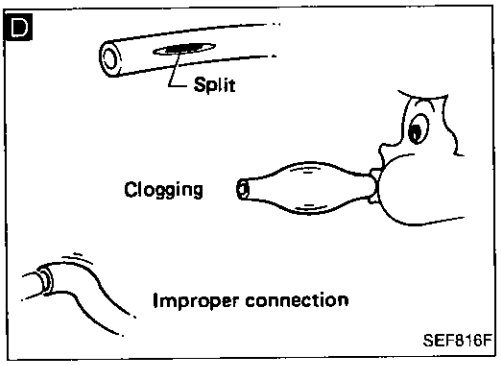


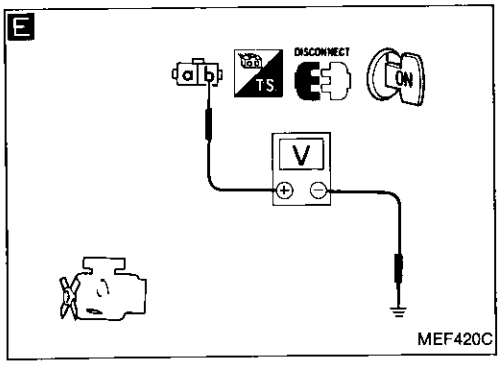
P.R.V.R. CONTROL (Not self-diagnostic item)











INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Install fuel pressure gauge in fuel feed hose
(See page EF & EC-229).
2) Start engine and warm it up sufficiently.
3) Stop engine.
4) Disconnect fuel temperature sensor harness connector and connect a suitable resistor (0.35 kΩ) between fuel temperature sensor harness connector terminal and ground.
5) Restart engine and let it idle.
6) Check fuel pressure.
Fuel pressure:
Approximately 294 kPa
(3.0 kg/cm², 43 psi)
7) Make sure that fuel pressure decreases after a few minutes.
Fuel pressure:
Approximately 235 kPa
(2.4 kg/cm², 34 psi)

O.K. → INSPECTION END

N.G.

B

CHECK VACUUM SOURCE TO FUEL PRESSURE REGULATOR.
1) Stop engine.
2) Disconnect vacuum hose connected to fuel pressure regulator.
3) Restart engine.
4) Make sure that vacuum exists.

N.G. → CHECK COMPONENT (Fuel pressure regulator). Refer to "Fuel Pressure Check". (See page EF & EC-229.)

O.K.

C

CHECK CONTROL FUNCTION.
1) Stop engine and reconnect vacuum hose to fuel pressure regulator.
2) Restart engine.
3) Check voltage between ECM terminal (111) and ground with CONSULT or tester.
Voltage: Approximately 0V
4) In a few minutes, recheck voltage between ECM terminal (111) and ground with CONSULT or tester.
Voltage: Battery voltage

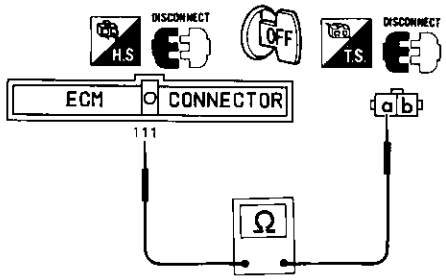
N.G. → **D** CHECK VACUUM HOSE. Check vacuum hose for clogging, cracks and proper connection.

O.K.

Ⓐ

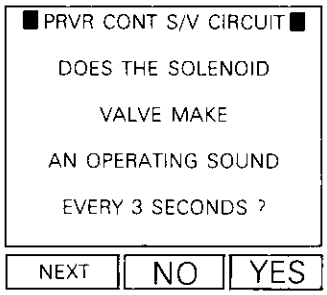
P.R.V.R. CONTROL (Not self-diagnostic item)

F



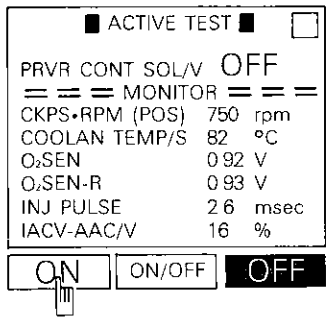
MEF421C

G



MEF422C

G



MEF423C

Ⓐ

E

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect P.R.V.R. control solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓑ and ground with CONSULT or tester.
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (F23), (M74)
- H.E.C. harness connector (M1)
- Harness continuity between P.R.V.R. control solenoid valve and H.E.C.

If N.G., repair harness or connectors.

O.K. ↓

F

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (111) and terminal ⓐ.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

G

CHECK COMPONENT
(P.R.V.R. control solenoid valve).

Perform "PRVR CONT S/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

N.G. → Replace P.R.V.R. control solenoid valve.

OR

1) Reconnect ECM harness connector and P.R.V.R. control solenoid valve harness connector.
2) Start engine.
3) Perform "PRVR CONT SOL VALVE" in "ACTIVE TEST" mode with CONSULT.

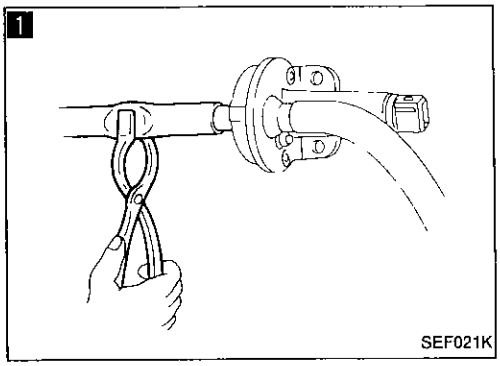
OR

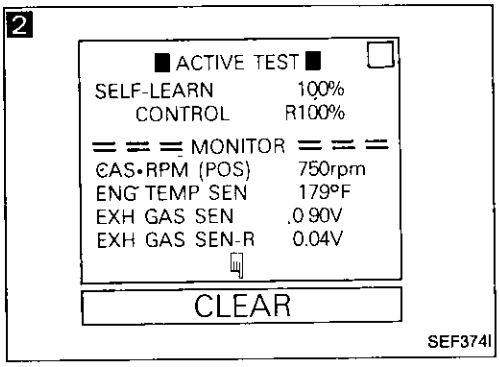
Refer to "Electrical Components Inspection".
(See page EF & EC-223.)

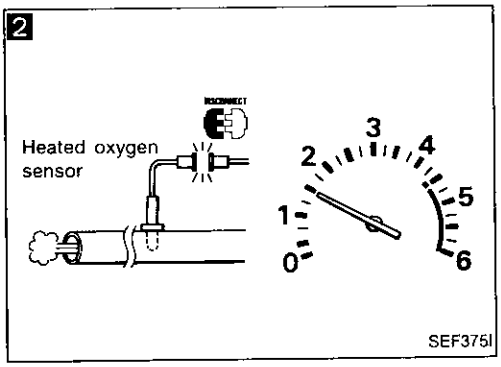
O.K. ↓

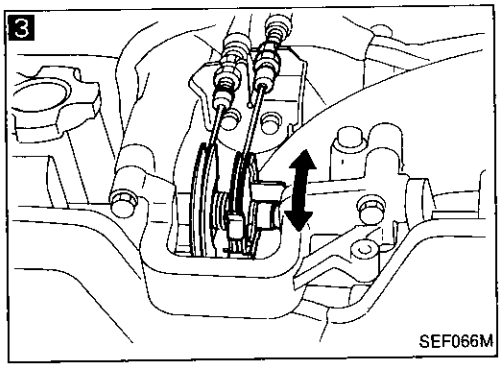
Check ECM pin terminals for damage or the connection of ECM harness connector.

Diagnostic Procedure 34 — High Idling after Warm-up









1

CHECK IACV-AIR REGULATOR.
When pinching the IACV-air regulator hose, does the engine speed drop?

Yes → Check IACV-air regulator and circuit.

No ↓

2

CHECK INTAKE AIR LEAK.

1. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode.
2. Clear the self-learning control coefficient by touching "CLEAR".
3. Does the engine speed drop?

Yes → Discover air leak location and repair.

OR

1. Disconnect heated oxygen sensor harness connectors.
2. After racing engine at 1,500 rpm under no load for about 30 seconds, does the engine speed drop?

No ↓

3

CHECK THROTTLE LINKAGE.

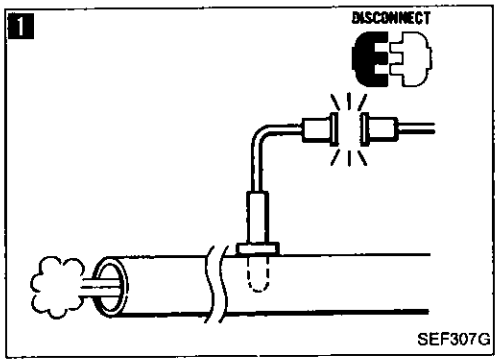
1. Check that throttle linkage moves smoothly.
2. Confirm that throttle valve both fully opens and fully closes.

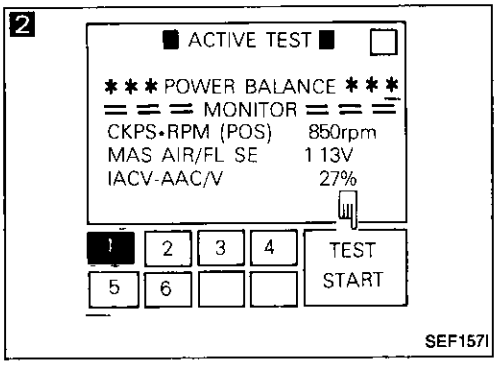
N.G. → Repair throttle linkage or sticking of throttle valve.

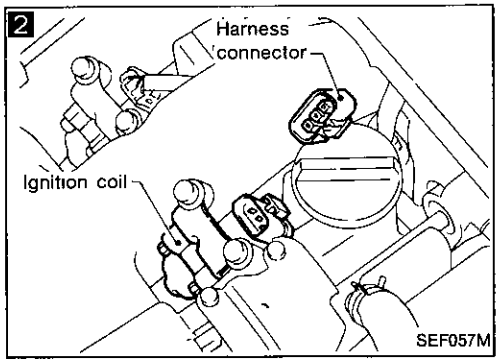
O.K. ↓

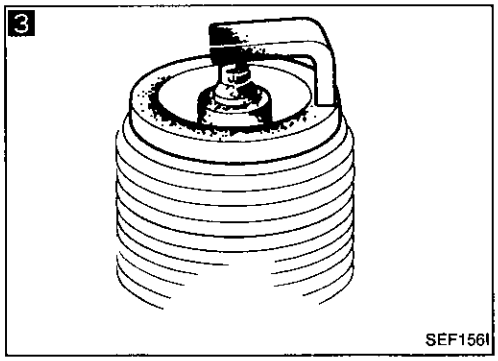
INSPECTION END

Diagnostic Procedure 35 — Hunting









1

CHECK HEATED OXYGEN SENSORS.
When disconnecting heated oxygen sensor harness connectors, is the hunting fixed?

Yes → Check heated oxygen sensor(s). (See page EF & EC-103.)

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 ignition coil harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

No → Go to **4**

Yes ↓

3

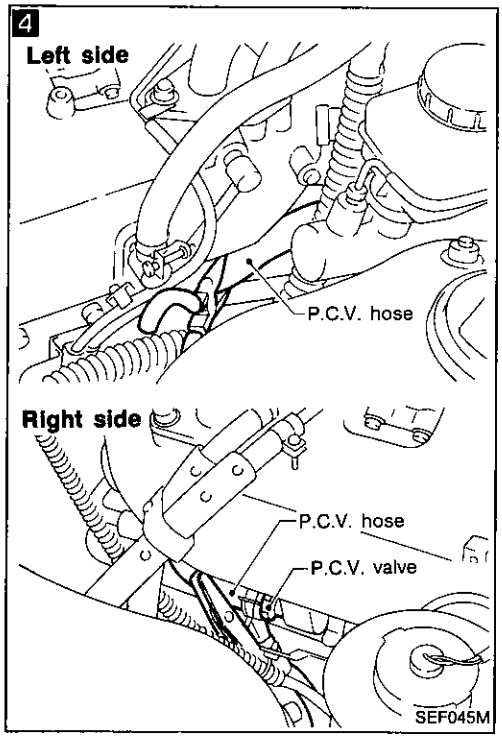
CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

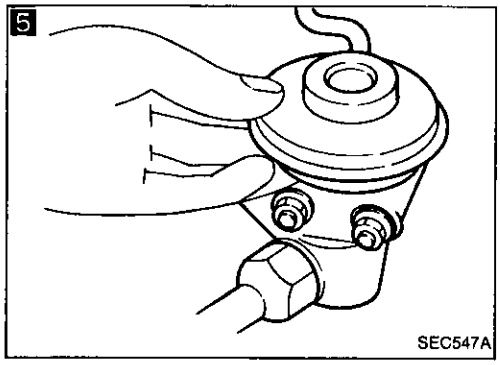
N.G. → Repair or replace spark plug(s).

O.K. ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 35 — Hunting (Cont'd)





Ⓐ

4

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

5

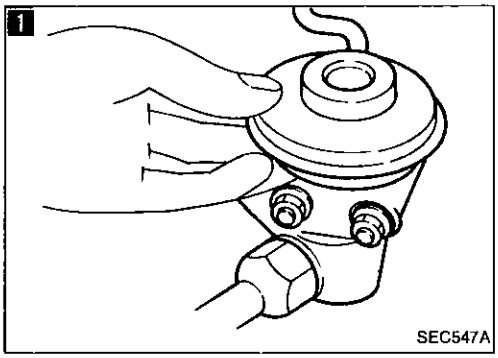
CHECK EGR VALVE.
Check EGR valve for sticking.

N.G. → Repair or replace.

O.K.

INSPECTION END

Diagnostic Procedure 36 — Unstable Idle


SEC547A

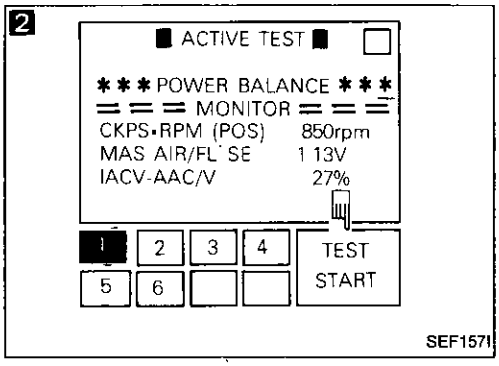
1

CHECK EGR VALVE.
Check EGR valve for sticking.

N.G. → Repair or replace.

O.K.

2



SEF157I

PERFORM POWER BALANCE TEST.

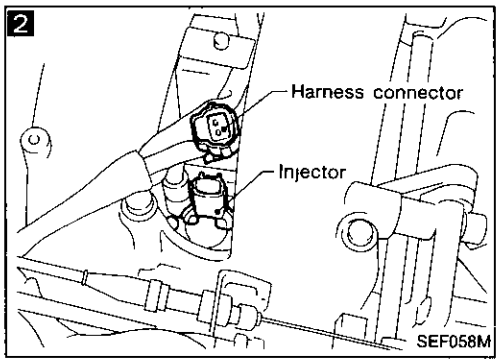
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

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 **6** .

Yes



SEF058M

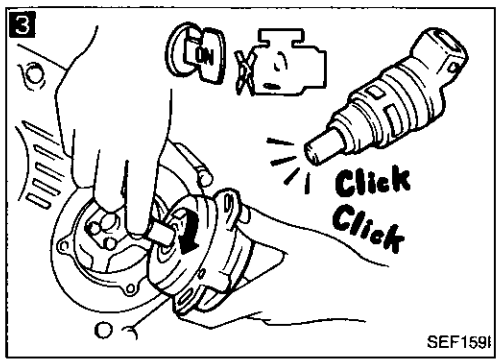
3

CHECK INJECTOR.

1. Remove crankshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating crankshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s).

Yes



SEF159I

4

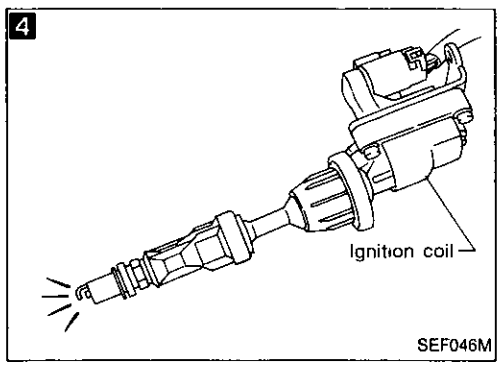
CHECK IGNITION SPARK.

1. Disconnect ignition coil assembly from collector.
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.

N.G. → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-94.)

O.K.

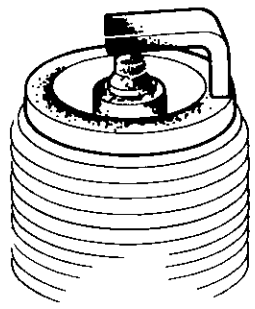
(Go to Ⓐ on next page.)



SEF046M

Diagnostic Procedure 36 — Unstable Idle (Cont'd)

5



SEF156I

Ⓐ

5

CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

N.G. → Repair or replace spark plug(s).

O.K.

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. 255 kPa
   (2.6 kg/cm², 37 psi)

N.G. → Check fuel pump and circuit.

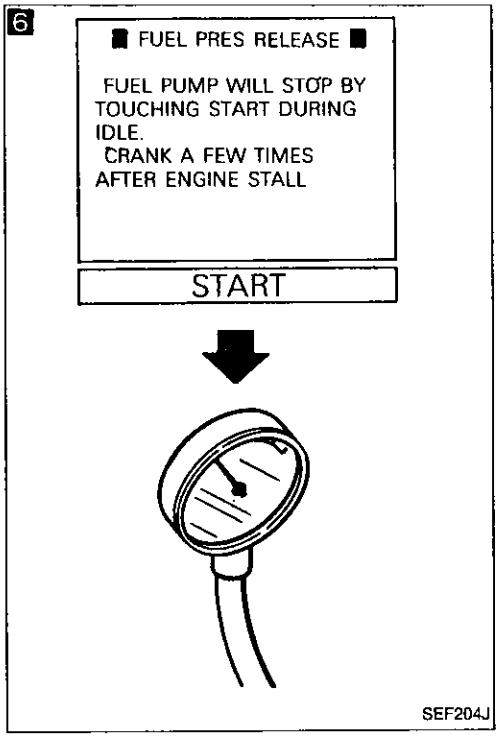
OR

1. Release fuel pressure to zero. (Refer to page EF & EC-229)
2. Install fuel pressure gauge and check fuel pressure.

O.K.

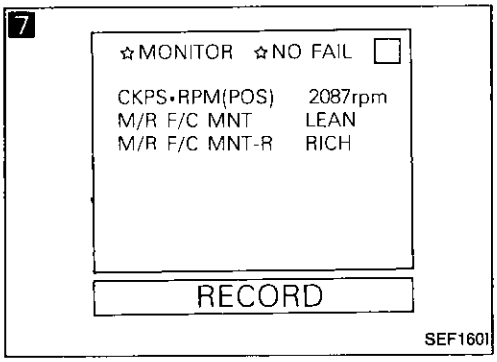
(Go to Ⓑ on next page.)

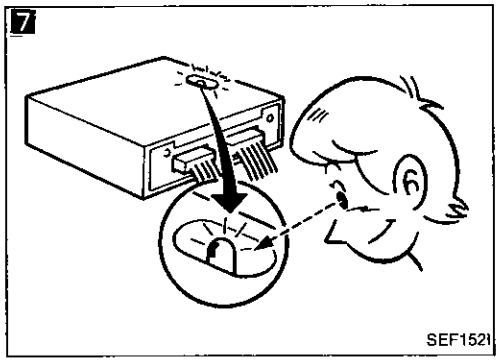
6



SEF204J

Diagnostic Procedure 36 — Unstable Idle (Cont'd)





Ⓑ

7

CHECK HEATED OXYGEN SENSOR.

1. See "M/R F/C MNT (right and left sides)" in "Data monitor" mode.
2. 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.
   RICH→LEAN→RICH→
   1 time 2 times
   LEAN→RICH.....

N.G. → Replace heated oxygen sensor(s).

OR

1. Set "Heated oxygen sensor monitor" in the self-diagnostic Diagnostic Test Mode II. (See page EF & EC-52.)
2. Maintaining engine at 2,000 rpm under no-load, check to make sure that RED LED on the ECM goes ON and OFF more than 5 times during 10 seconds.

O.K.

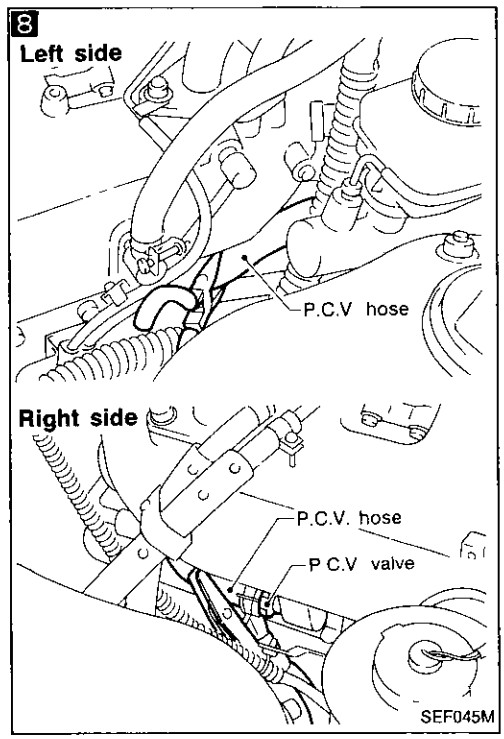
8

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

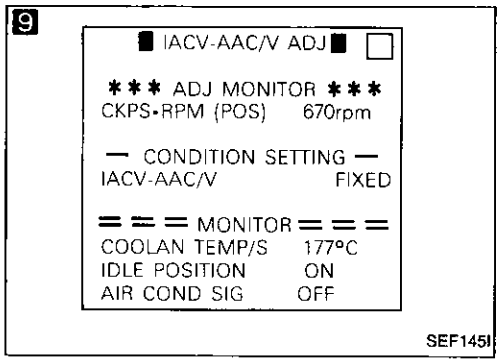
(Go to Ⓒ on next page.)



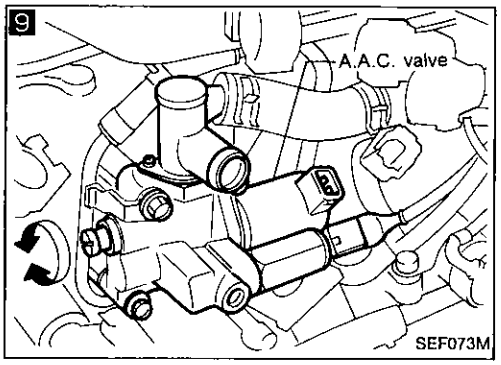
Diagnostic Procedure 36 — Unstable Idle (Cont'd)

Ⓒ

9



9



10



9

CHECK IDLE ADJ. SCREW CLOGGING.

1. Perform "IACV-AAC/V ADJ" in "WORK SUPPORT" mode.
2. Can you set engine speed as follows by turning idle adjusting screw?
   670±25 rpm
   (in "N" position)

No → Check for IAS clogging or throttle valve clogging.

OR

1. Disconnect IACV-AAC valve harness connector.
2. Can you set engine speed as follows by turning idle adjusting screw?
   670±25 rpm
   (in "N" position)

Yes ↓

10

CHECK COMPRESSION PRESSURE.

- Check compression pressure.

Standard: kPa (kg/cm², psi)/300 rpm
1,285 (13.1, 186)
Minimum: kPa (kg/cm², psi)/300 rpm
981 (10.0, 142)
Difference between each cylinder: kPa (kg/cm²,psi)/300 rpm
98 (1.0, 14)

N.G. → Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

O.K. ↓

11

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector.

N.G. → Repair or replace.

O.K. ↓

12

TRY A KNOWN GOOD ECM*

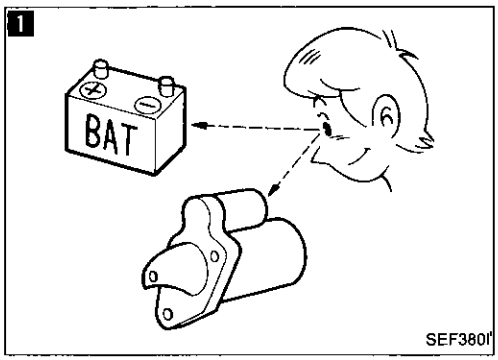
O.K. ↓

INSPECTION END

*: E.C.U. may be the cause of a problem, but this is rarely the case.

Diagnostic Procedure 37 — Hard to Start or Impossible to Start when the Engine is Cold

1

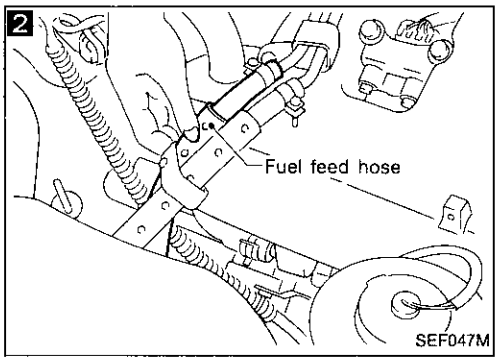


CHECK BATTERY AND STARTER.
Check battery and starter condition. (Refer to EL section.)

N.G. → Repair or replace.

O.K. ↓

2

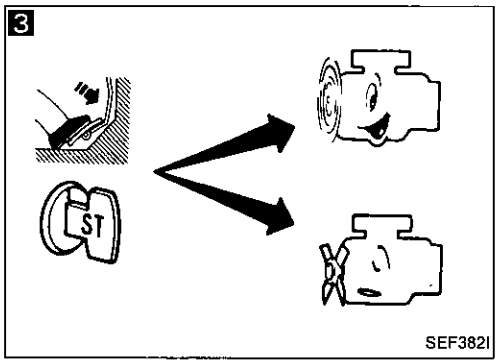


CHECK FUEL PRESSURE.
1. Pinch fuel feed hose with fingers.
2. When cranking the engine, is there any pressure on the fuel feed hose?

No → Check fuel pump and circuit. (See page EF & EC-148.)

Yes ↓

3

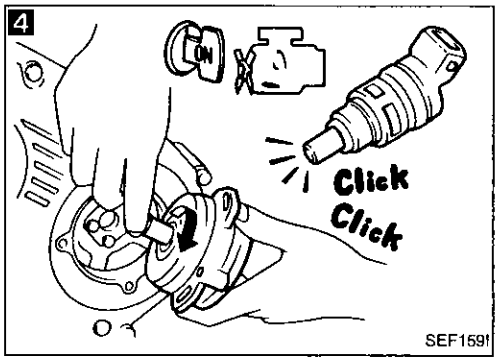


CHECK IACV-AIR REGULATOR AND IACV-AAC VALVE.
When pressing accelerator pedal fully, can you start the engine.

Yes → Check IACV-AAC valve, IACV-air regulator and circuits. (See pages EF & EC-154 - 158.)

No ↓

4

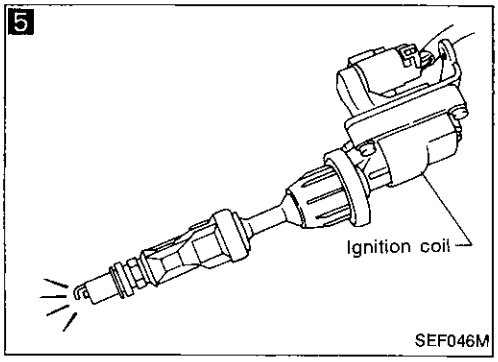


CHECK INJECTOR.
1. Remove crankshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating crankshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s).

Yes ↓

5



CHECK IGNITION SPARK.
1. Disconnect ignition coil assembly from collector.
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.

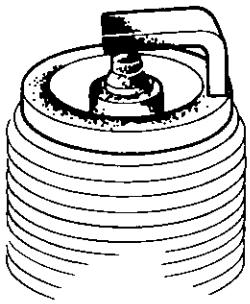
N.G. → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-94.)

O.K. ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 37 — Hard to Start or Impossible to Start when the Engine is Cold (Cont'd)

6



SEF156I

Ⓐ

6

CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

N.G. → Repair or replace spark plug(s).

O.K.

7

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector.

N.G. → Repair or replace.

O.K.

8

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-79.

N.G. → Repair or replace.

O.K.

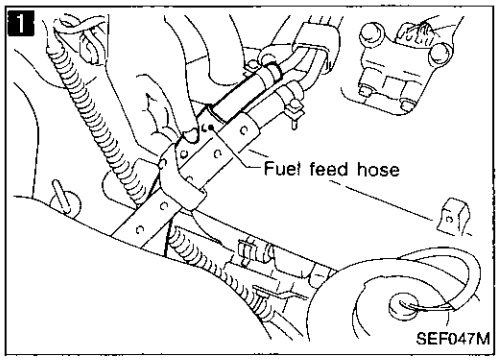
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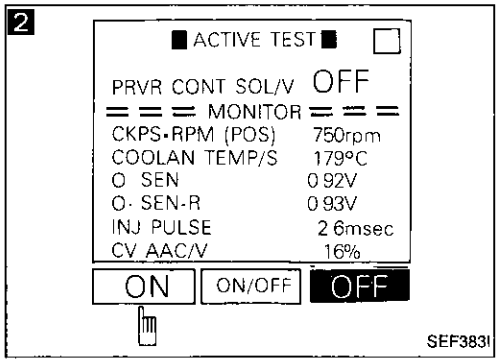
TRY A KNOWN GOOD ECM*

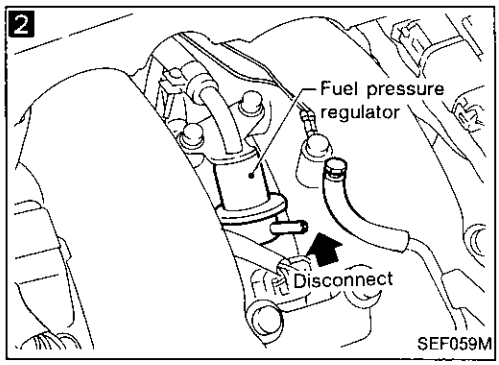
INSPECTION END

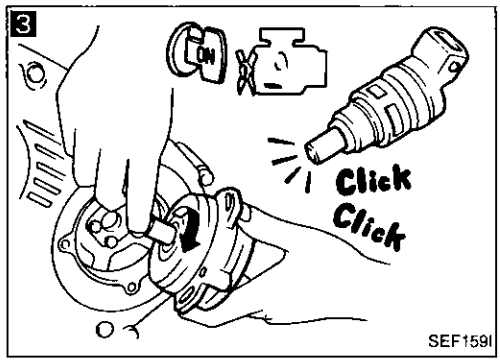
*: E.C.U. may be the cause of a problem, but this is rarely the case.

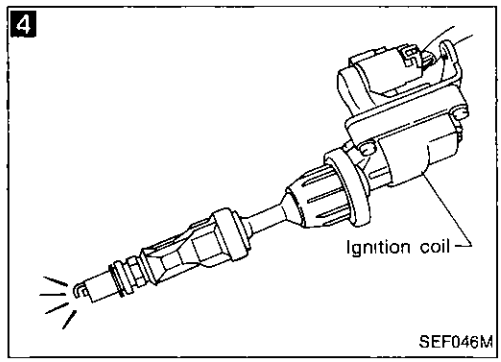
Diagnostic Procedure 38 — Hard to Start or Impossible to Start when the Engine is Hot











1

CHECK FUEL PRESSURE.
1. Pinch fuel feed hose with fingers.
2. When cranking the engine, is there any pressure on the fuel feed hose?

No → Check fuel pump and circuit. (See page EF & EC-148.)

Yes ↓

2

CHECK FUEL VAPOR.
1. Select "PRVR CONT SOL VALVE" in "ACTIVE TEST" mode.
2. After touching "ON", can you start the engine?

Yes → Check fuel properties.

OR

1. Disconnect fuel pressure regulator vacuum hose and plug hose.
2. Can you start engine?

No ↓

3

CHECK INJECTOR.
1. Remove crankshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating crankshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s).

Yes ↓

4

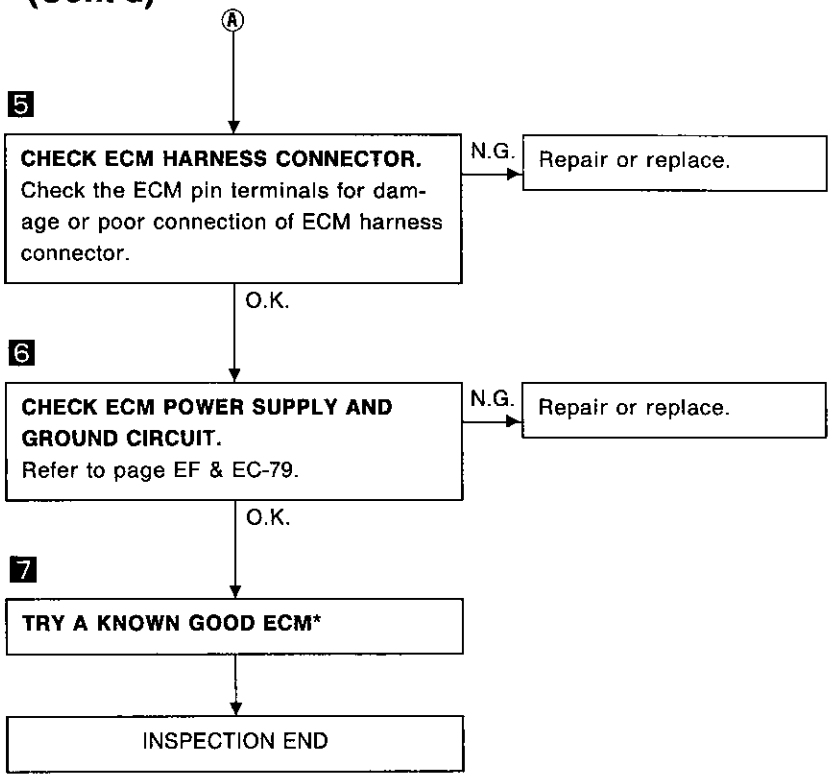
CHECK IGNITION SPARK.
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-94.)

O.K. ↓

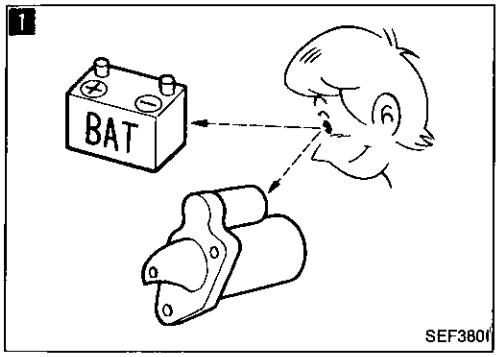
(Go to Ⓐ on next page.)

Diagnostic Procedure 38 — Hard to Start or Impossible to Start when the Engine is Hot (Cont'd)



*: E.C.U. may be the cause of a problem, but this is rarely the case.

Diagnostic Procedure 39 — Hard to Start or Impossible to Start under Normal Conditions

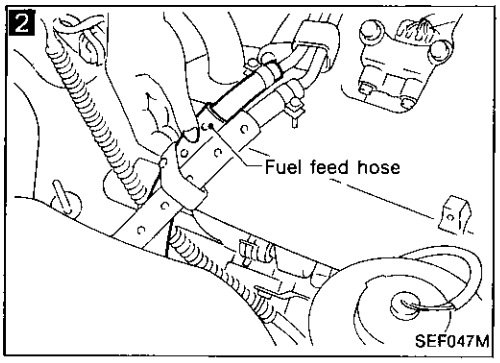


1

CHECK BATTERY AND STARTER.
Check battery and starter operation.
(Refer to EL section.)

N.G. → Repair or replace.

O.K. ↓

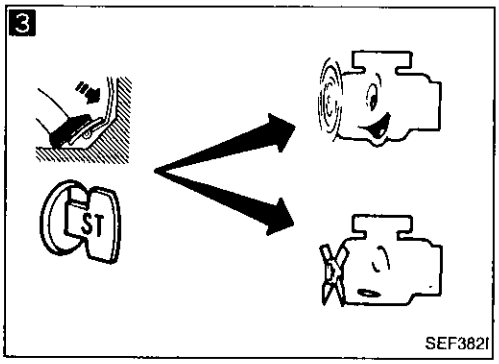


2

CHECK FUEL PRESSURE.
1. Pinch fuel feed hose with fingers.
2. When cranking the engine, is there any pressure on the fuel feed hose?

No → Check fuel pump and circuit. (See page EF & EC-148.)

Yes ↓

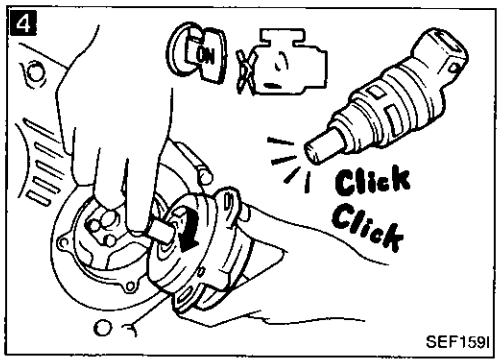


3

CHECK INJECTOR FOR LEAKAGE.
When pressing accelerator pedal fully, can you start the engine.

Yes → Check injector(s) for leakage.

No ↓

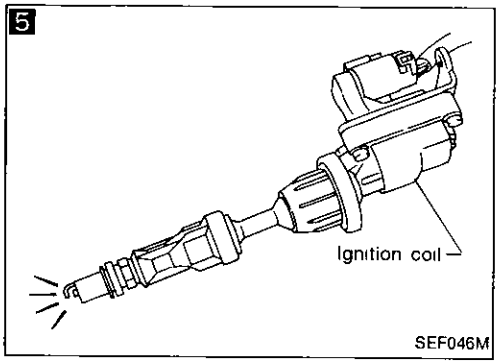


4

CHECK INJECTOR.
1. Remove crankshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating crankshaft position sensor shaft, does each injector make an operating sound?

No → Check injectors and circuits.

Yes ↓



5

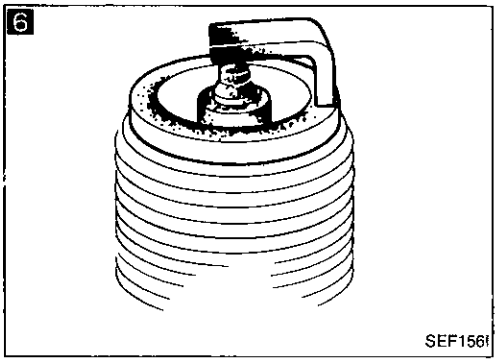
CHECK IGNITION SPARK.
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

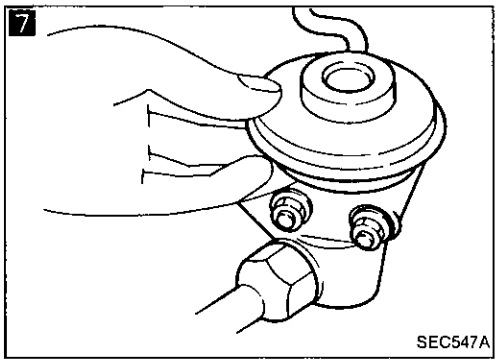
N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-94.)

O.K. ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 39 — Hard to Start or Impossible to Start under Normal Conditions (Cont'd)





Ⓐ

6

CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

N.G. → Repair or replace spark plug(s).

O.K.

7

CHECK EGR VALVE.
Check EGR valve for sticking.

N.G. → Repair or replace.

O.K.

8

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector.

N.G. → Repair or replace.

O.K.

9

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-79.

N.G. → Repair or replace.

O.K.

10

TRY A KNOWN GOOD ECM*

Trouble is fixed. → Replace ECM

Trouble is not fixed.

11

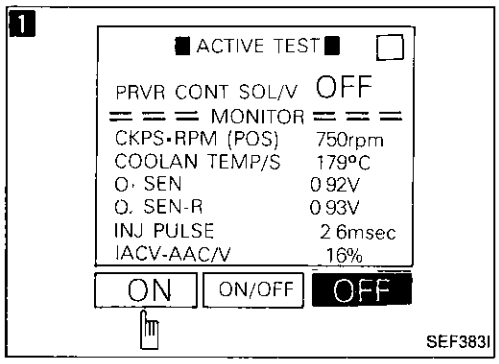
CHECK TIMING BELT FOR PROPER INSTALLATION.

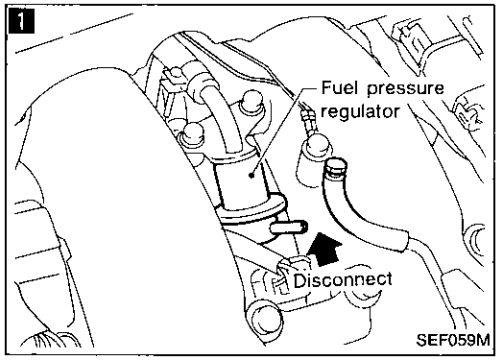
N.G. → Replace timing belt.

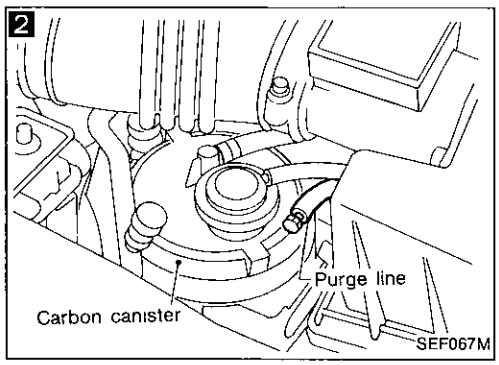
O.K.

INSPECTION END

*: E.C.U. may be the cause of a problem, but this is rarely the case.







Diagnostic Procedure 40 — Hesitation when the Engine is Hot

1

CHECK FUEL VAPOR.

1. Select "PRVR CONT SOL VALVE" in "ACTIVE TEST" mode.
2. After touching "ON", perform cruise test.
3. Does the hesitation disappear?

Yes → Check fuel properties.

OR

1. Disconnect fuel pressure regulator vacuum hose and plug hose.
2. Perform cruise test.
3. Does the hesitation disappear?

No

2

CHECK CANISTER PURGE.

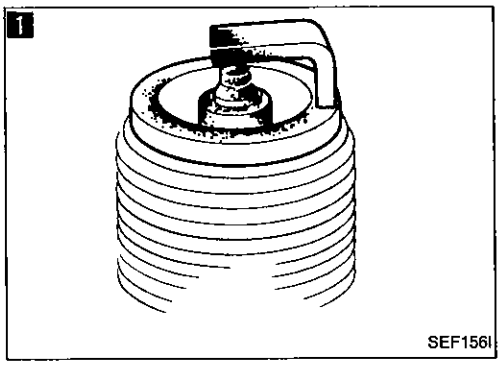
1. Disconnect canister purge line hose and plug hose.
2. Perform cruise test.
3. Does the hesitation disappear?

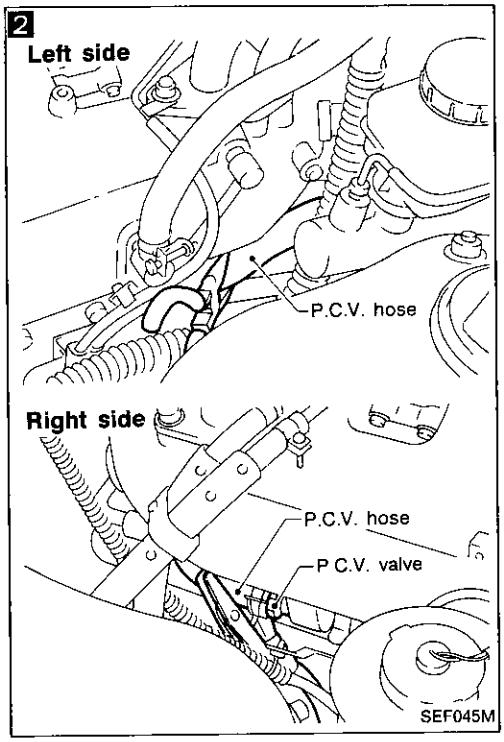
Yes → Check purge and vacuum lines.

No

INSPECTION END

Diagnostic Procedure 41 — Hesitation when the Engine is Cold





1

CHECK SPARK PLUGS.
Remove spark plugs and check for fouling, etc.

N.G. → Repair or replace spark plug(s).

O.K. ↓

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 ↓

3

TRY A KNOWN GOOD MASS AIR FLOW SENSOR.

Trouble is fixed. → Replace mass air flow sensor.

Trouble is not fixed. ↓

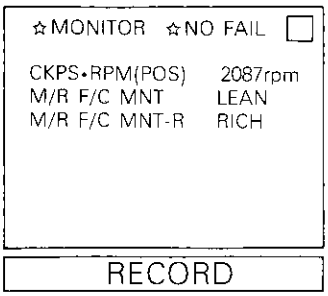
4

CHECK FOR INTAKE VALVE DEPOSITS.
If there are deposits on intake valves, remove them.

↓

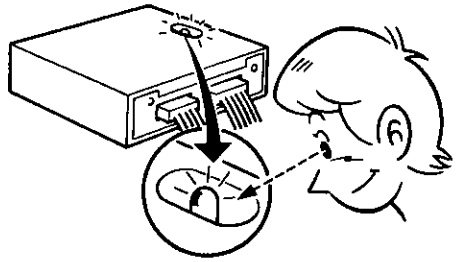
INSPECTION END

2



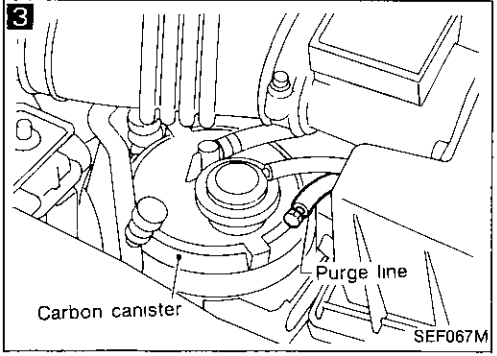
SEF160I

2



SEF152I

3



SEF067M

CHECK HEATED OXYGEN SENSOR.

1. See "M/R F/C MNT (right and left sides)" in "DATA MONITOR" mode.
2. 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.

RICH→LEAN→RICH→
1 time 2 times
LEAN→RICH.....

OR

1. Set "Heated oxygen sensor monitor" in the self-diagnostic Diagnostic Test Mode II. (See page EF & EC-52.)
2. Maintaining engine at 2,000 rpm under no load, check that RED LED on the ECM goes ON and OFF more than 5 times during 10 seconds.

Yes → Replace heated oxygen sensor(s).

No

3

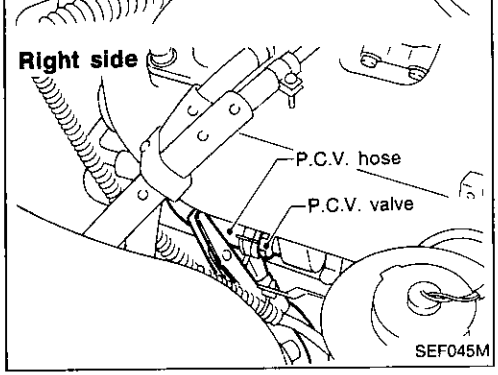
CHECK CANISTER PURGE.

1. Disconnect canister purge line hose and plug hose.
2. Perform cruise test.
3. Does the hesitation disappear?

Yes → Check purge and vacuum lines.

No

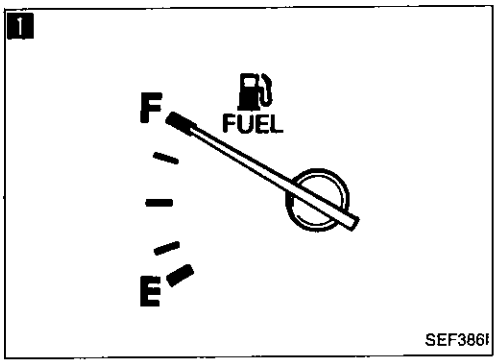
(Go to Ⓐ on next page.)



INSPECTION END

Diagnostic Procedure 43 — Engine Stalls when Turning

1



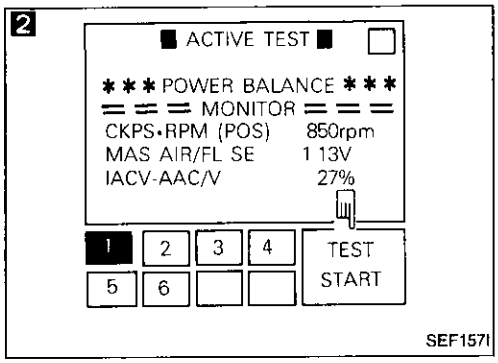
SEF386I

CHECK FUEL LEVEL.
Check to see that there is enough fuel in tank.

N.G. → Fill fuel tank with fuel.

O.K. ↓

2



SEF157I

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?

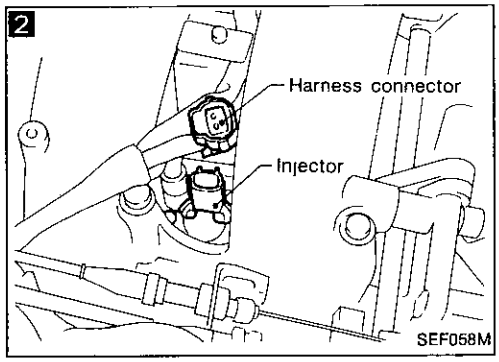
— OR —

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 ↓

2



SEF058M

3

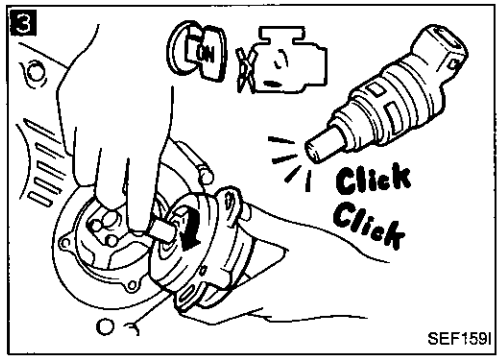
CHECK INJECTOR.

1. Remove crankshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating crankshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s).

Yes ↓

3



SEF159I

4

CHECK IGNITION SPARK.

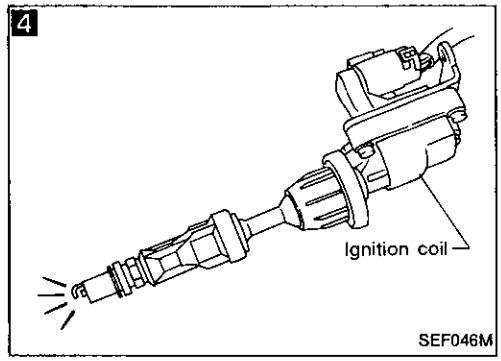
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-94.)

O.K. ↓

(Go to Ⓐ on next page.)

4



SEF046M

Diagnostic Procedure 43 — Engine Stalls when Turning (Cont'd)

5

■ FUEL PRES RELEASE ■

FUEL PUMP WILL STOP BY TOUCHING START DURING IDLE.
CRANK A FEW TIMES AFTER ENGINE STALL

START



SEF204J

Ⓐ

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. 255 kPa (2.6 kg/cm², 37 psi)
The moment throttle valve is fully open:
Approx. 304 kPa (3.1 kg/cm², 44 psi)

N.G. → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-229.)
2. Install fuel pressure gauge and check fuel pressure.

O.K.

6

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector.

N.G. → Repair or replace.

O.K.

7

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-79.

N.G. → Repair or replace.

O.K.

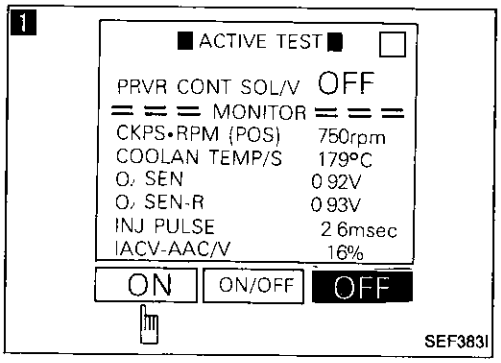
8

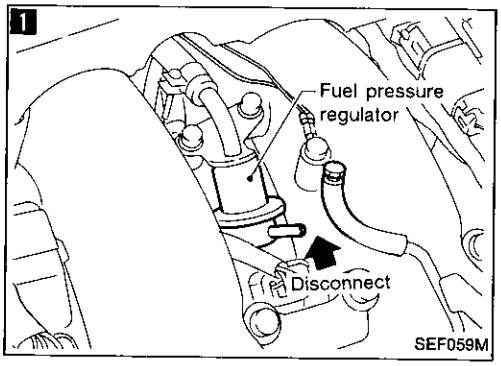
TRY A KNOWN GOOD ECM*

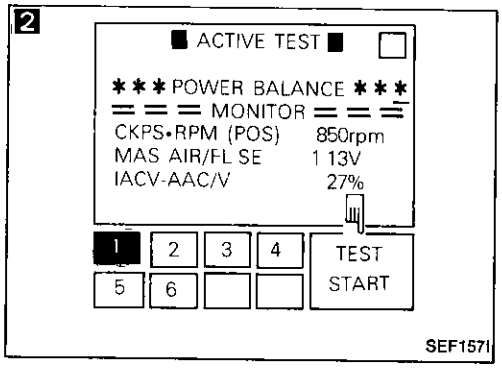
INSPECTION END

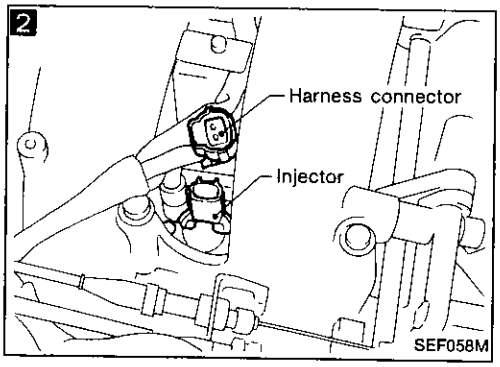
*: E.C.U. may be the cause of a problem, but this is rarely the case.

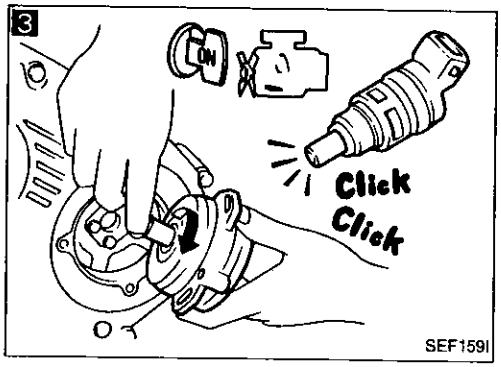
Diagnostic Procedure 44 — Engine Stalls when the Engine is Hot











1

CHECK FUEL VAPOR.

1. Select "PRVR CONT SOL VALVE" in "ACTIVE TEST" mode.
2. After touching "ON", perform cruise test.
3. Does the engine stall disappear?

Yes → Check fuel properties.

OR

1. Disconnect fuel pressure regulator vacuum hose and plug hose.
2. Perform cruise test.
3. Does the engine stall disappear?

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?

No → Go to 5

OR

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

Yes

3

CHECK INJECTOR.

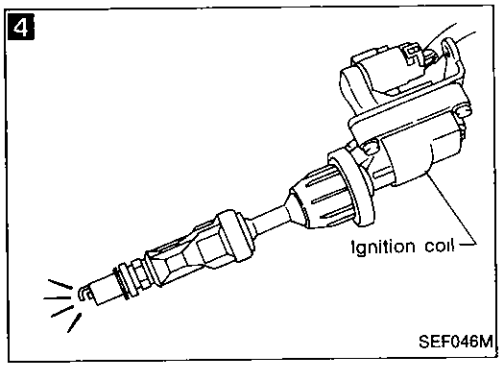
1. Remove crankshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating crankshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s).

Yes

(Go to Ⓐ on next page.)

Diagnostic Procedure 44 — Engine Stalls when the Engine is Hot (Cont'd)

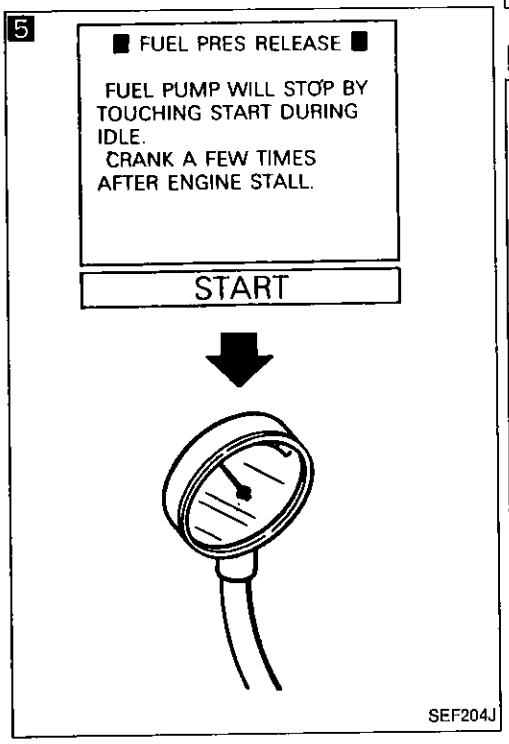


Ⓐ

4 **CHECK IGNITION SPARK.**
1. Disconnect ignition coil assembly from collector.
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.

N.G. → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-94.)

O.K. ↓



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. 255 kPa (2.6 kg/cm², 37 psi)
   The moment throttle valve is fully open:
   Approx. 304 kPa (3.1 kg/cm², 44 psi)

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-229.)
2. Install fuel pressure gauge and check fuel pressure.

N.G. → Check fuel pressure regulator diaphragm.

O.K. ↓

6 **CHECK ECM HARNESS CONNECTOR.**
Check the ECM pin terminals for damage or poor connection of ECM harness connector.

N.G. → Repair or replace.

O.K. ↓

7 **CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.**
Refer to page EF & EC-79.

N.G. → Repair or replace.

O.K. ↓

8 **TRY A KNOWN GOOD ECM***

Trouble is fixed. → Replace ECM.

Trouble is not fixed. ↓

9 **CHECK TIMING BELT FOR PROPER INSTALLATION.**

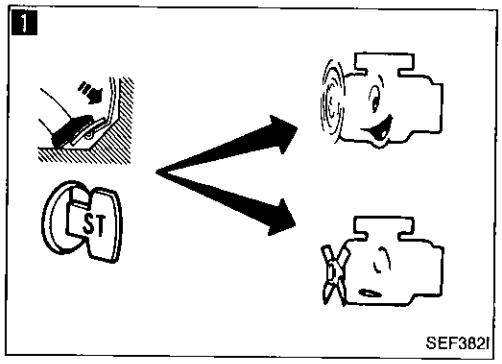
N.G. → Replace timing belt.

O.K. ↓

INSPECTION END

*: E.C.U. may be the cause of a problem, but this is rarely the case.

Diagnostic Procedure 45 — Engine Stalls when the Engine is Cold

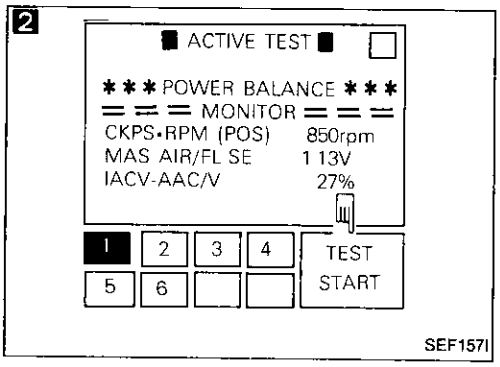


1

CHECK IACV-AIR REGULATOR AND IACV-AAC VALVE.
When the engine is cold, can you start the engine when pressing accelerator pedal fully?

N.G. → Check IACV-AAC valve, IACV-air regulator and circuits. (See pages EF & EC-154 - 158.)

O.K. ↓



2

PERFORM POWER BALANCE TEST.

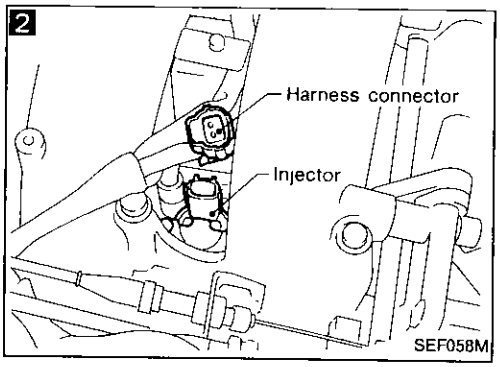
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

N.G. → Go to **6**.

— OR —

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

O.K. ↓



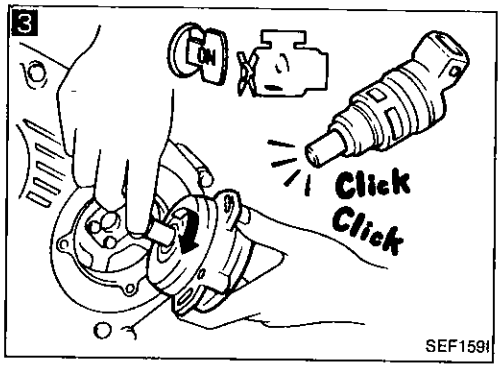
3

CHECK INJECTOR.

1. Remove crankshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating crankshaft position sensor shaft, does each injector make an operating sound?

N.G. → Check injector(s) and circuit(s).

O.K. ↓



4

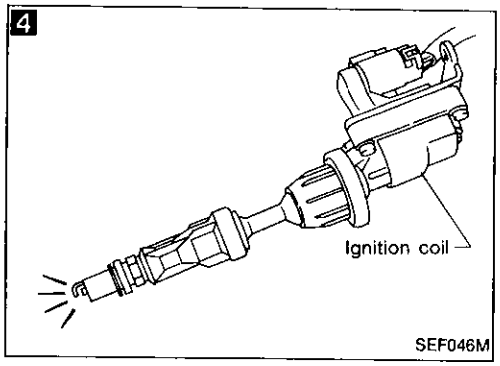
CHECK IGNITION SPARK.

1. Disconnect ignition coil assembly from collector.
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.

N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-94.)

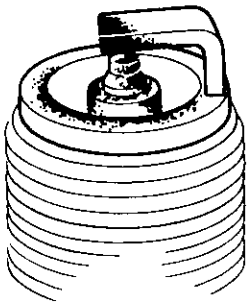
O.K. ↓

(Go to Ⓐ on next page.)



Diagnostic Procedure 45 — Engine Stalls when the Engine is Cold (Cont'd)

5



SEF156I

Ⓐ

5

CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

N.G. → Repair or replace spark plug(s).

O.K.

6

6

■ FUEL PRES RELEASE ■

FUEL PUMP WILL STOP BY TOUCHING START DURING IDLE.
CRANK A FEW TIMES AFTER ENGINE STALL.

START



SEF204J

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. 255 kPa (2.6 kg/cm², 37 psi)
   The moment throttle valve is fully open:
   Approx. 304 kPa (3.1 kg/cm², 44 psi)

N.G. → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-229.)
2. Install fuel pressure gauge and check fuel pressure.

O.K.

7

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector.

N.G. → Repair or replace.

O.K.

8

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-79.

N.G. → Repair or replace.

O.K.

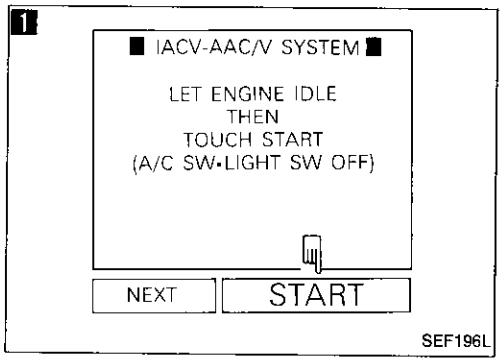
9

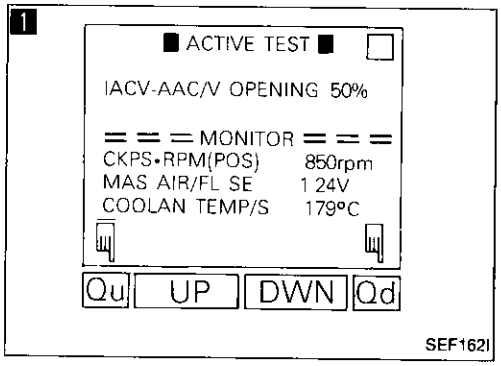
TRY A KNOWN GOOD ECM*

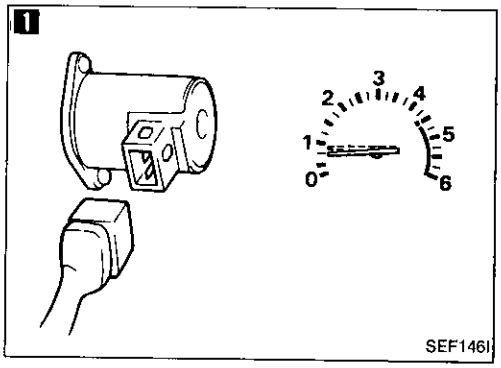
INSPECTION END

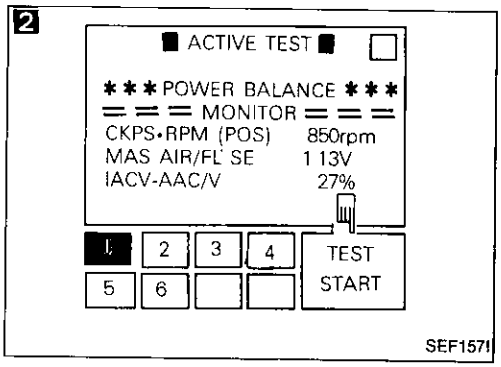
*: E.C.U. may be the cause of a problem, but this is rarely the case.

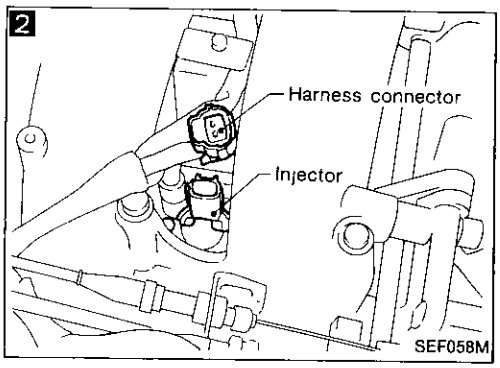
Diagnostic Procedure 46 — Engine Stalls when Stepping on the Accelerator Momentarily











1

CHECK OVERALL FUNCTION.
1. Start engine and warm it up sufficiently.
2. Check idle speed.
   720 ± 50 rpm
   (in "N" position)
3. Perform "IACV-AAC/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.

No → Check IACV-AAC valve and circuit. (See page EF & EC-156.)

OR

1. Select "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?

Yes

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?

No → Go to **5**

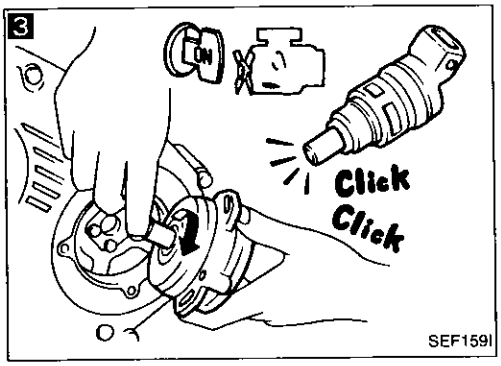
OR

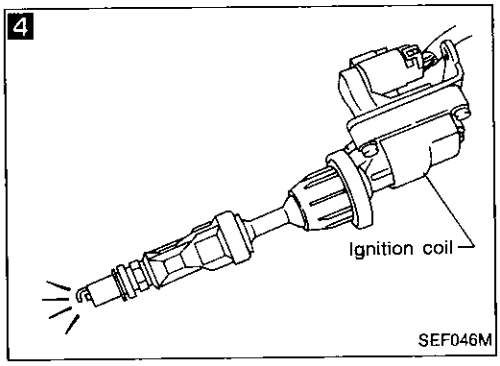
When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

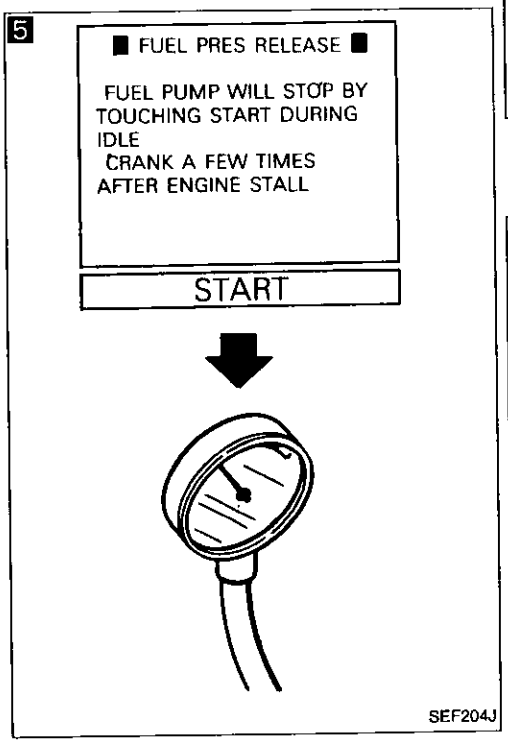
Yes

(Go to Ⓐ on next page.)

Diagnostic Procedure 46 — Engine Stalls when Stepping on the Accelerator Momentarily (Cont'd)







Ⓐ

3

CHECK INJECTOR.

1. Remove crankshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating crankshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and their circuit(s).

Yes ↓

4

CHECK IGNITION SPARK.

1. Disconnect ignition coil assembly from collector.
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.

N.G. → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-94.)

O.K. ↓

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. 255 kPa (2.6 kg/cm^2, 37 psi)
The moment throttle valve is fully open:
Approx. 304 kPa (3.1 kg/cm^2, 44 psi)

N.G. → Check fuel pressure regulator diaphragm.

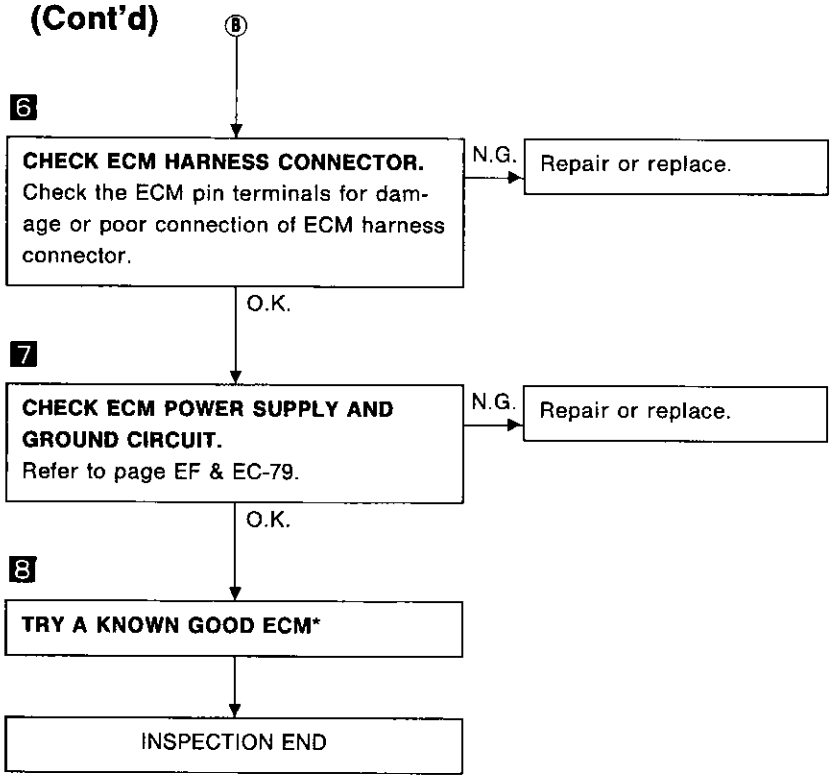
OR

1. Release fuel pressure to zero. (Refer to page EF & EC-229.)
2. Install fuel pressure gauge and check fuel pressure.

O.K. ↓

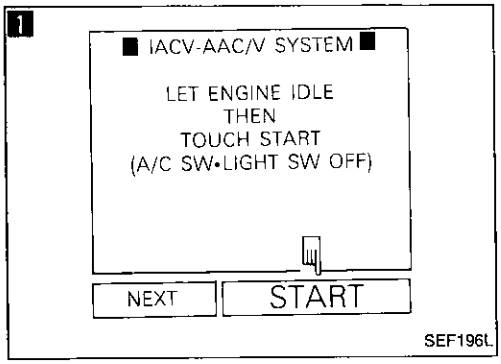
(Go to Ⓑ on next page.)

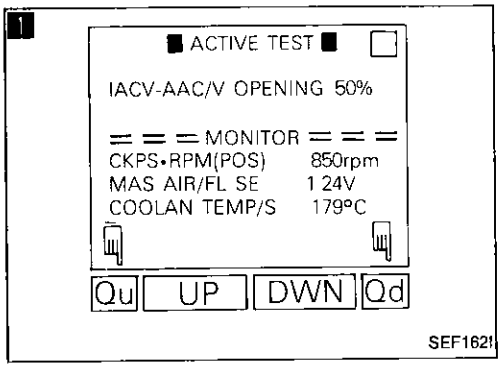
Diagnostic Procedure 46 — Engine Stalls when Stepping on the Accelerator Momentarily (Cont'd)

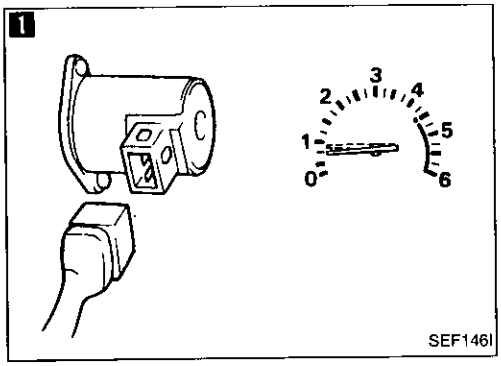


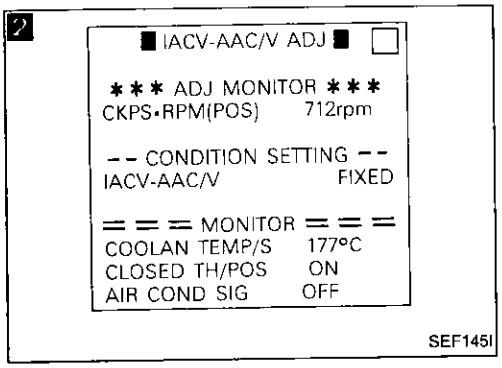
*: E.C.U. may be the cause of a problem, but this is rarely the case.

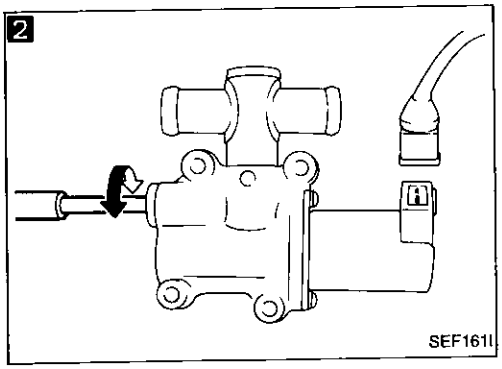
Diagnostic Procedure 47 — Engine Stalls after Decelerating











1

CHECK OVERALL FUNCTION.

1. Start engine and warm it up sufficiently.
2. Check idle speed.
   720±50 rpm
   (in "N" position)
3. Perform "IACV-AAC/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.

OR

1. Select "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 EF & EC-156.)

Yes

2

CHECK IDLE ADJ. SCREW CLOGGING.

1. Perform "IACV-AAC/V ADJ" in "WORK SUPPORT" mode.
2. Can you set engine speed as follows by turning idle adjusting screw?
   670±25 rpm
   (in "N" position)

OR

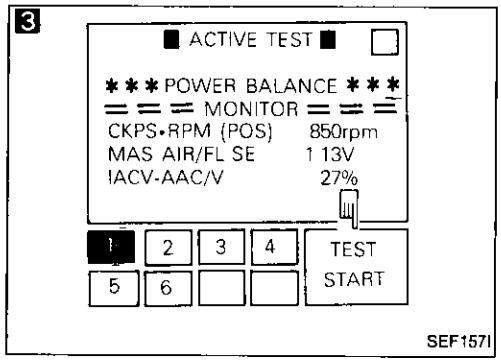
1. Disconnect IACV-AAC valve harness connector
2. Can you set engine speed as follows by turning idle adjusting screw?
   670±25 rpm
   (in "N" position)

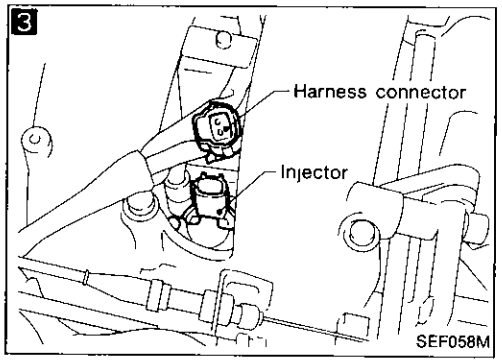
No → Check for IAS clogging or throttle body clogging.

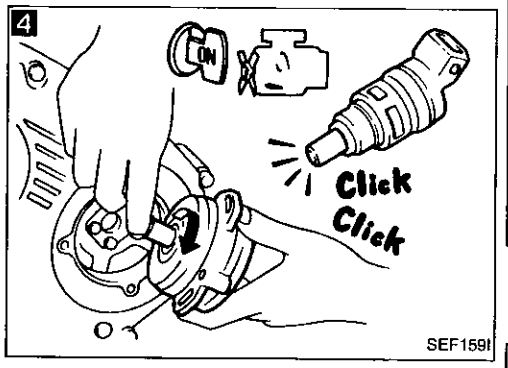
Yes

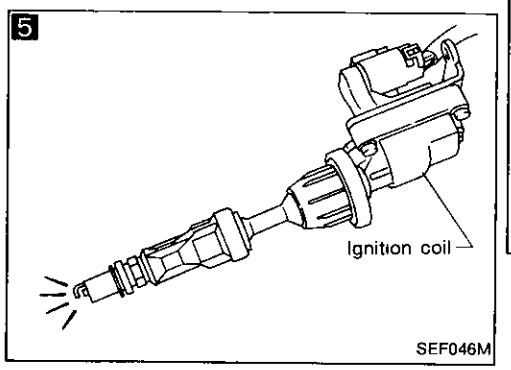
(Go to Ⓐ on next page.)

Diagnostic Procedure 47 — Engine Stalls after Decelerating (Cont'd)









Ⓐ

3

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 **6**

Yes ↓

4

CHECK INJECTOR.

1. Remove crankshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating crankshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s).

Yes ↓

5

CHECK IGNITION SPARK.

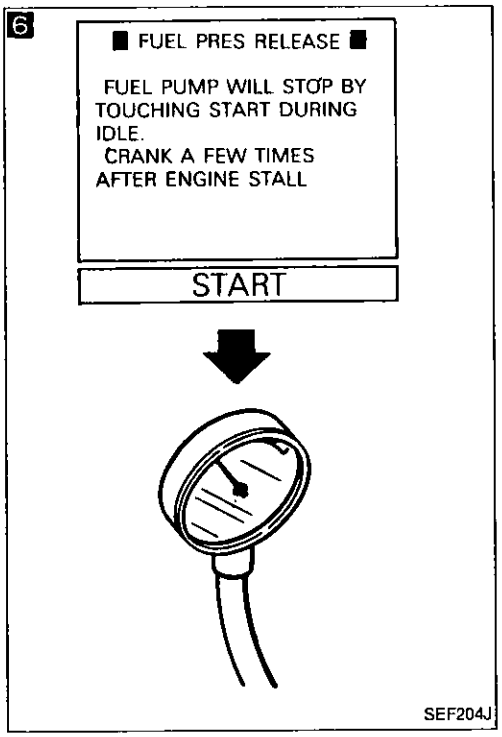
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

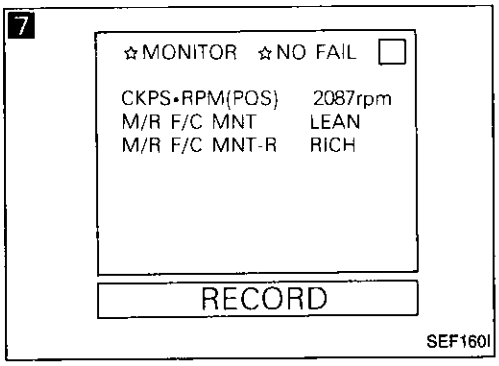
N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-94.)

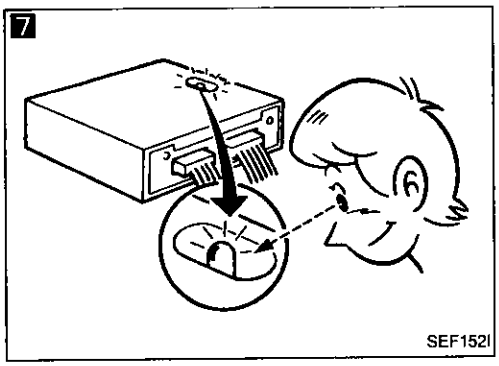
O.K. ↓

(Go to Ⓑ on next page.)

Diagnostic Procedure 47 — Engine Stalls after Decelerating (Cont'd)







Ⓑ

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. 255 kPa (2.6 kg/cm², 37 psi)
The moment throttle valve is fully open:
Approx. 304 kPa (3.1 kg/cm², 44 psi)

N.G. → Check fuel pressure regulator diaphragm.

— OR —

1. Release fuel pressure to zero. (Refer to page EF & EC-229.)
2. Install fuel pressure gauge and check fuel pressure.

O.K.

7

CHECK HEATED OXYGEN SENSOR.

1. See "M/R F/C MNT (right and left sides)" in "DATA MONITOR" mode.
2. 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.

RICH→LEAN→RICH→ LEAN→RICH.....
1 time **2 times**

N.G. → Replace heated oxygen sensor(s).

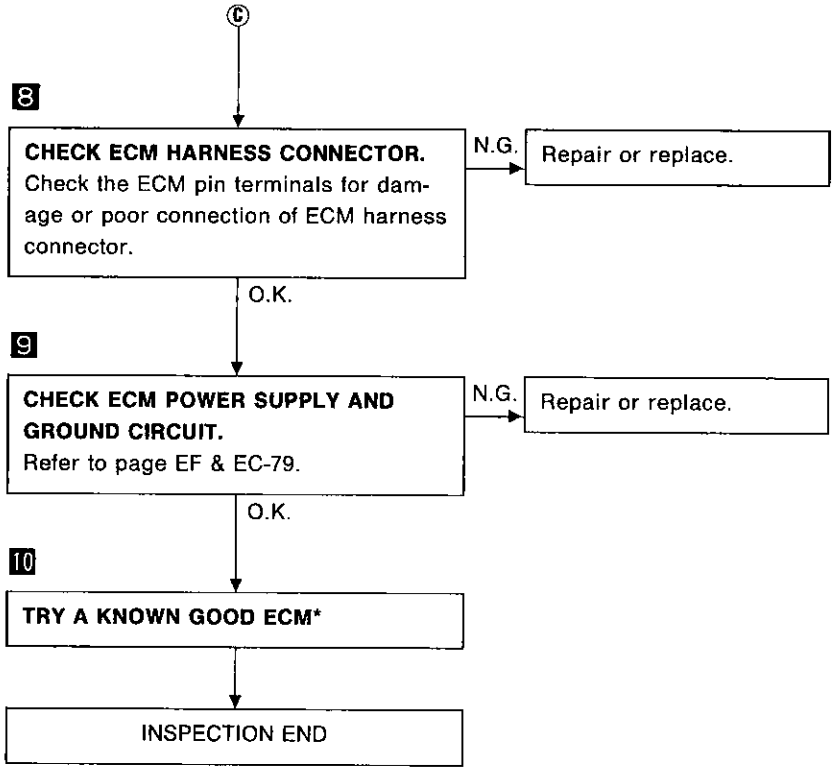
— OR —

1. Set "Heated oxygen sensor monitor" in the self-diagnostic Diagnostic Test Mode II. (See page EF & EC-52.)
2. Maintaining engine at 2,000 rpm under no load, check that RED LED on the ECM goes ON and OFF more than 5 times during 10 seconds.

O.K.

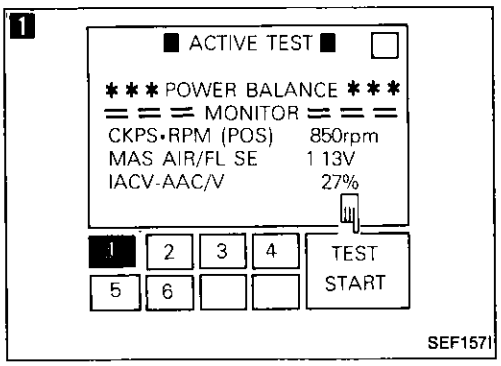
(Go to Ⓒ on next page.)

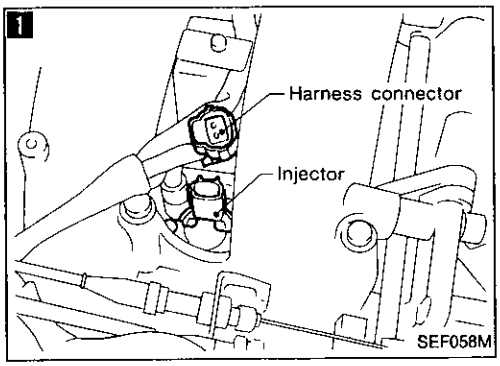
Diagnostic Procedure 47 — Engine Stalls after Decelerating (Cont'd)

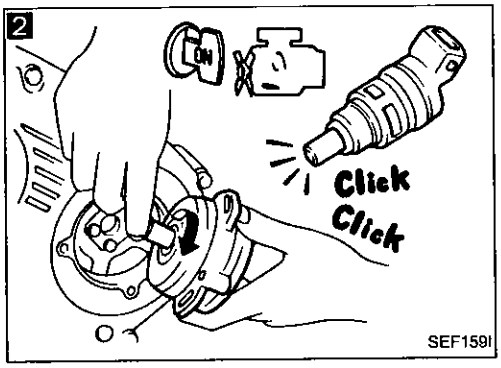


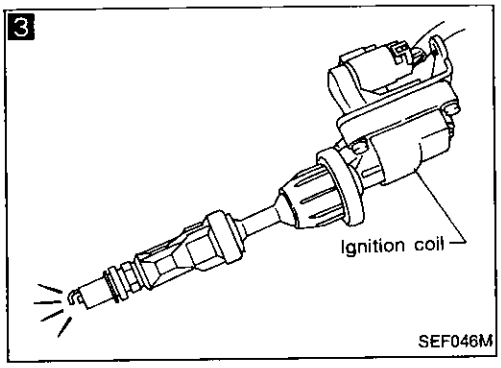
*: E.C.U. may be the cause of a problem, but this is rarely the case.

Diagnostic Procedure 48 — Engine Stalls when Accelerating or Cruising









1

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?

No → Go to **4** .

OR

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

Yes ↓

2

CHECK INJECTOR.

1. Remove crankshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating crankshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s).

Yes ↓

3

CHECK IGNITION SPARK.

1. Disconnect ignition coil assembly from collector.
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.

N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-94.)

O.K. ↓

(Go to Ⓐ on next page.)

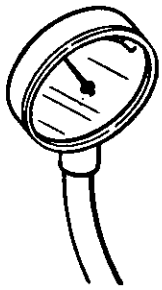
Diagnostic Procedure 48 — Engine Stalls when Accelerating or Cruising (Cont'd)

4

■ FUEL PRES RELEASE ■

FUEL PUMP WILL STOP BY TOUCHING START DURING IDLE
CRANK A FEW TIMES AFTER ENGINE STALL

START



SEF204J

Ⓐ

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. 255 kPa (2.6 kg/cm², 37 psi)
The moment throttle valve is fully open:
Approx. 304 kPa (3.1 kg/cm², 44 psi)

N.G. → Check fuel pump, circuit and fuel pressure regulator.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-229.)
2. Install fuel pressure gauge and check fuel pressure.

O.K.

5

CHECK FOR INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

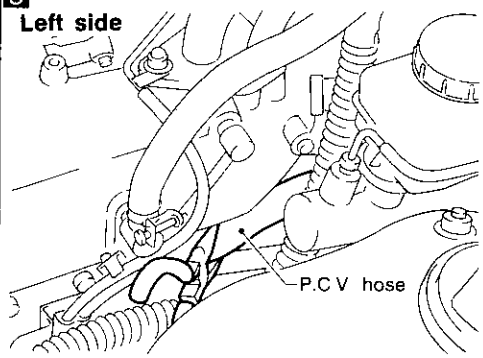
Yes → Discover air leak location and repair.

No

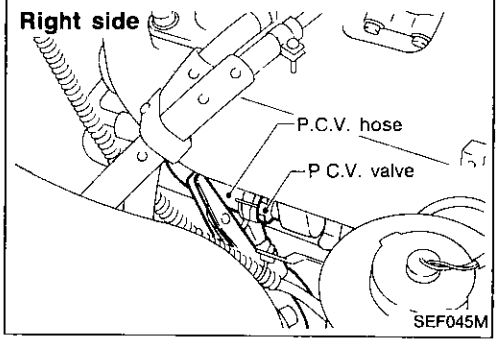
(Go to Ⓑ on next page.)

5

Left side

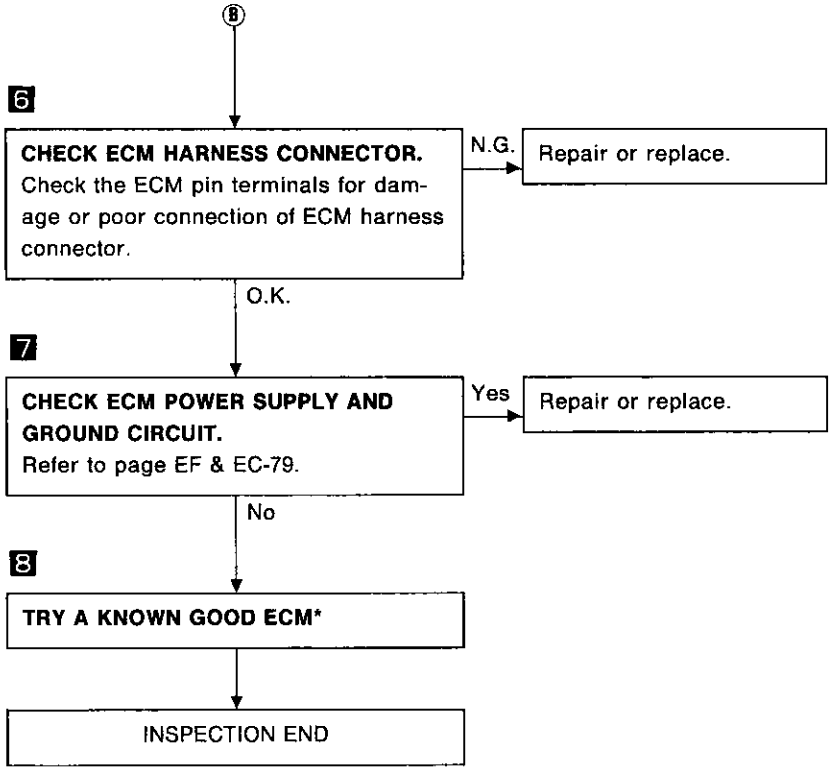


Right side



SEF045M

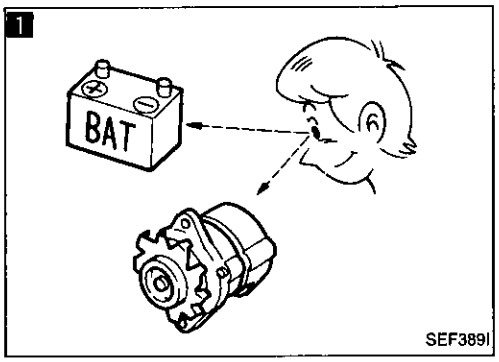
Diagnostic Procedure 48 — Engine Stalls when Accelerating or Cruising (Cont'd)



*: E.C.U. may be the cause of a problem, but this is rarely the case.

Diagnostic Procedure 49 — Engine Stalls when the Electrical Load is Heavy

1



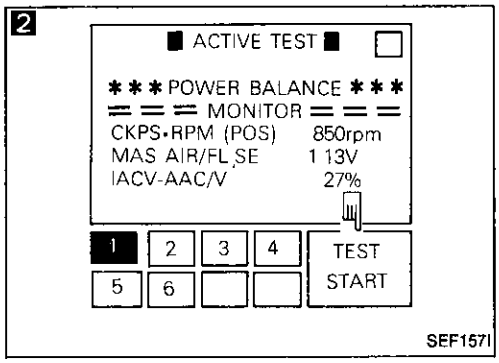
SEF389I

CHECK BATTERY AND ALTERNATOR.
Check battery and alternator condition. (Refer to EL section.)

N.G. → Repair or replace.

O.K. ↓

2



SEF157I

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?

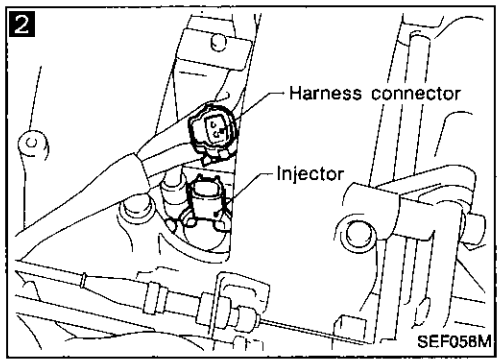
No → Go to 5

OR

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

Yes ↓

2



SEF058M

3

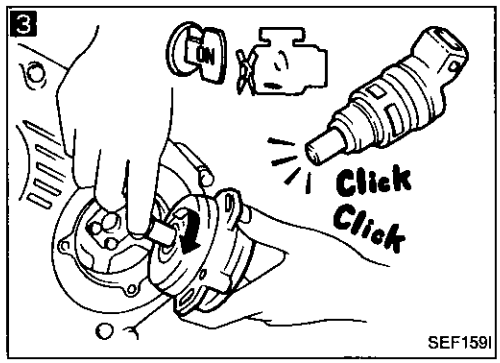
CHECK INJECTOR.

1. Remove crankshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating crankshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s).

Yes ↓

3



SEF159I

4

CHECK IGNITION SPARK.

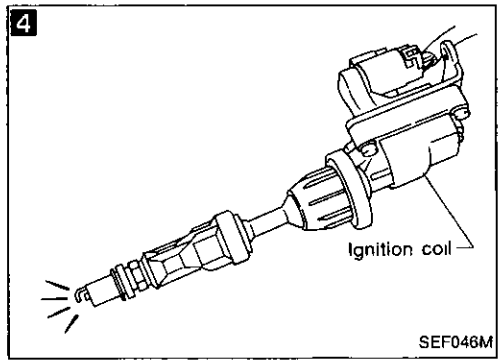
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-94.)

O.K. ↓

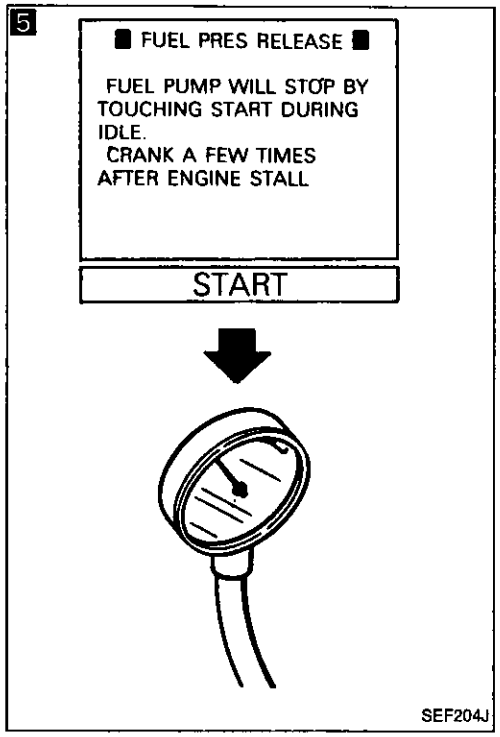
(Go to Ⓐ on next page.)

4



SEF046M

Diagnostic Procedure 49 — Engine Stalls when the Electrical Load is Heavy (Cont'd)



Ⓐ

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. 255 kPa (2.6 kg/cm², 37 psi)
The moment throttle valve is fully open:
Approx. 304 kPa (3.1 kg/cm², 44 psi)

N.G. → Check fuel pressure regulator diaphragm.

— OR —

1. Release fuel pressure to zero. (Refer to page EF & EC-229.)
2. Install fuel pressure gauge and check fuel pressure.

O.K.

6

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector.

N.G. → Repair or replace.

O.K.

7

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-79.

N.G. → Repair or replace.

O.K.

8

TRY A KNOWN GOOD ECM*

INSPECTION END

*: E.C.U. may be the cause of a problem, but this is rarely the case.

1

■ FUEL PRES RELEASE ■

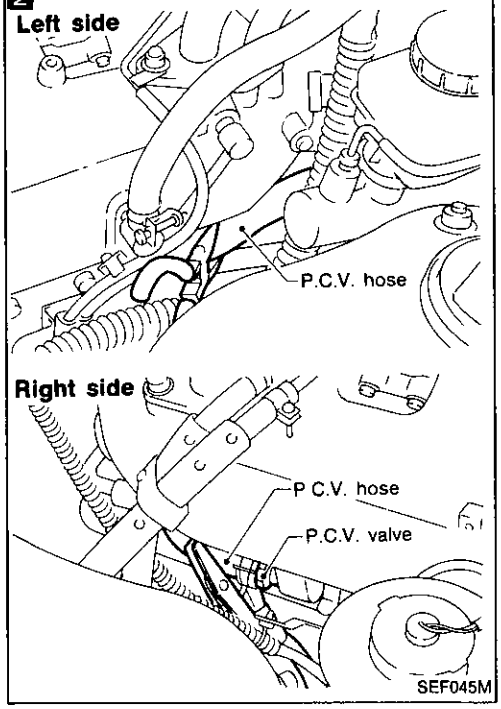
FUEL PUMP WILL STOP BY TOUCHING START DURING IDLE.
CRANK A FEW TIMES AFTER ENGINE STALL.

START



SEF204J

2



SEF045M

Diagnostic Procedure 50 — Lack of Power and Stumble

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. 255 kPa (2.6 kg/cm², 37 psi)
The moment throttle valve is fully open:
Approx. 304 kPa (3.1 kg/cm², 44 psi)

N.G. → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-229.)
2. Install fuel pressure gauge and check fuel pressure.

O.K.

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

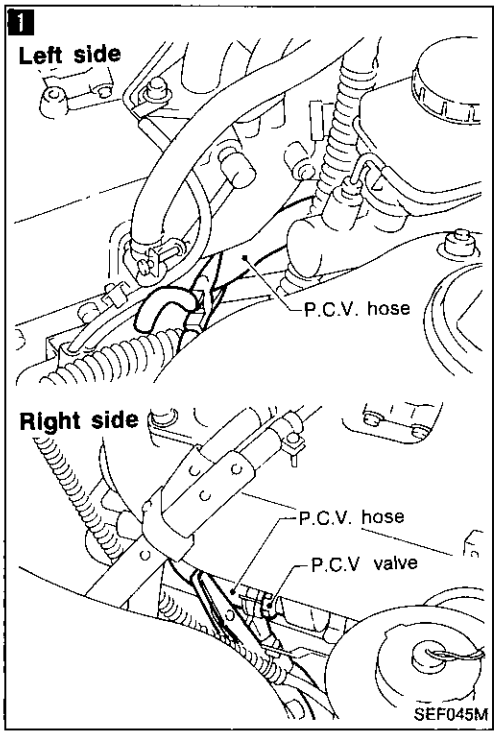
CHECK TIMING BELT FOR PROPER INSTALLATION.

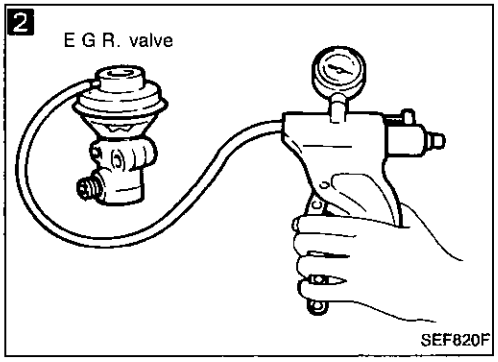
N.G. → Replace timing belt.

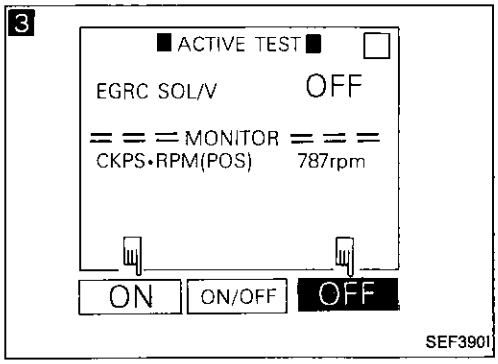
O.K.

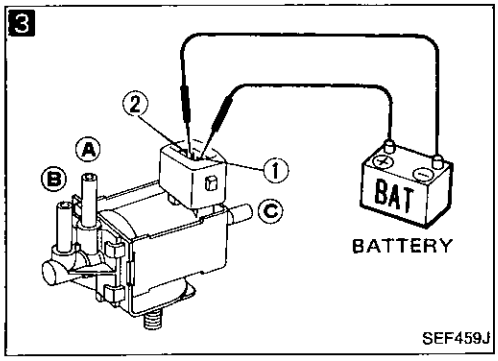
INSPECTION END

Diagnostic Procedure 51 — Knock









1

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

2

CHECK E.G.R. 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.

No → Check EGR valve for sticking.

Yes

3

CHECK EGRC-SOLENOID VALVE.

1. Select "EGRC SOL/V" in "ACTIVE TEST" mode.
2. Turn EGRC-solenoid valve ON and OFF.
3. Check operating sound.

OR

1. Disconnect EGRC-solenoid valve harness connector.
2. Supply EGRC-solenoid valve terminals with battery current and check operating sound.

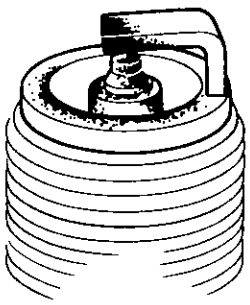
N.G. → Check solenoid valve and circuit.

O.K.

(Go to Ⓐ on next page.)

Diagnostic Procedure 51 — Knock (Cont'd)

5



SEF156I

Ⓐ

4

CHECK VACUUM HOSES.
Check the following vacuum hoses for clogging, cracks and poor connection.
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.

N.G. → Repair or replace.

O.K. ↓

5

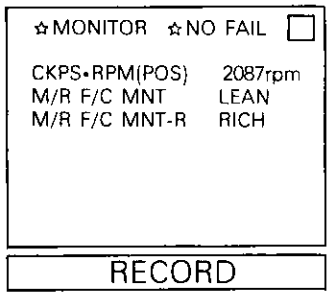
CHECK FOR OIL LEAK TO COMBUSTION CHAMBER.
Remove spark plugs and check for fouling with oil.

Yes → Check pistons, piston rings, valves, valve seats, valve oil seal, engine oil level, etc.

No ↓

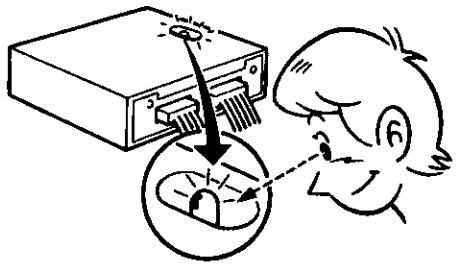
INSPECTION END

1



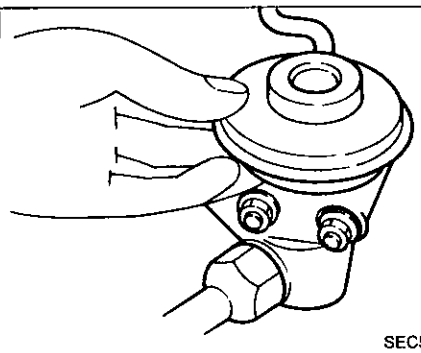
SEF160I

1



SEF152I

2



SEC547A

Diagnostic Procedure 52 — Surge

1

CHECK HEATED OXYGEN SENSOR.

1. See "M/R F/C MNT (right and left sides)" in "DATA MONITOR" mode.
2. 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.

RICH→LEAN→RICH→
1 time 2 times
LEAN→RICH.....

N.G. → Replace heated oxygen sensor(s).

OR

1. Set "Heated oxygen sensor monitor" in the self-diagnostic Diagnostic Test Mode II. (See page EF & EC-52.)
2. Maintaining engine at 2,000 rpm under no load, check that RED LED on the ECM goes ON and OFF more than 5 times during 10 seconds.

O.K. ↓

2

CHECK EGR VALVE.
Check EGR valve for sticking.

N.G. → Repair or replace.

O.K. ↓

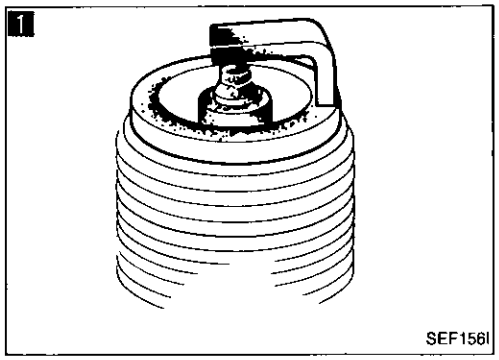
3

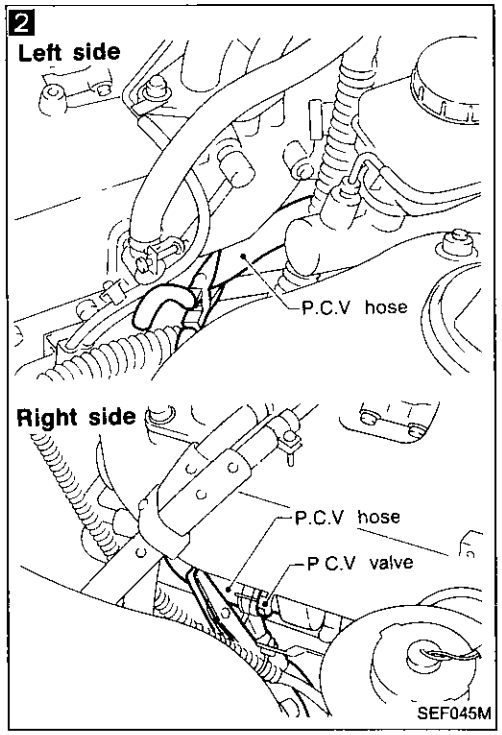
TRY A KNOWN GOOD ECM*

O.K. ↓

INSPECTION END

*: E.C.U. may be the cause of a problem, but this is rarely the case.





Diagnostic Procedure 53 — Backfire through the Intake

1

CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

N.G. → Repair or replace spark plug(s).

O.K. ↓

2

CHECK 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 ↓

3

CHECK FOR INTAKE VALVE DEPOSITS.
If there are deposits on intake valves, remove them.

↓

INSPECTION END

Diagnostic Procedure 54 — Backfire through the Exhaust

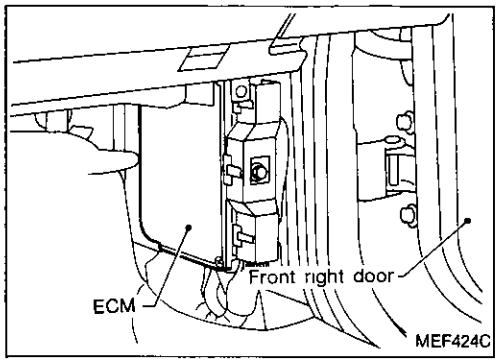
1

CHECK ENGINE COOLANT TEMPERATURE SENSOR.
Check engine coolant temperature sensor and its circuit. (See page EF & EC-89.)

N.G. → Replace or repair.

O.K. ↓

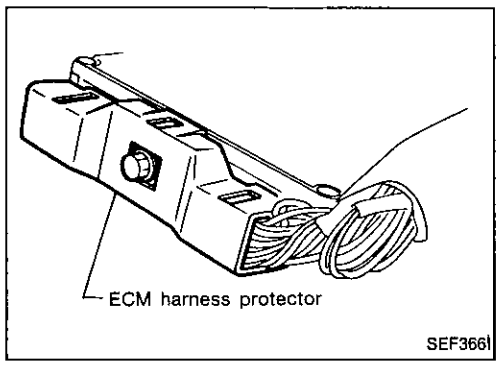
INSPECTION END



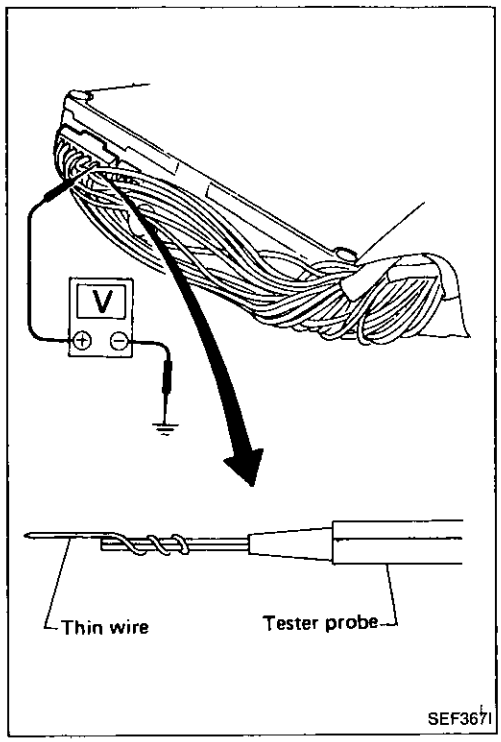
Electrical Components Inspection

ECM INPUT/OUTPUT SIGNAL INSPECTION

1. ECM is located behind front passenger side dash. For this inspection, remove the front passenger side dash.



2. Remove ECM harness protector.



3. Perform all voltage measurements with the connectors connected. Extend tester probe as shown to perform tests easily.

		Idle speed	
4	IACV-AAC valve	Engine is running. — Steering wheel is being turned. — Air conditioner is operating. — Rear defogger is "ON". — Headlamps are "ON".	4 - 8V
7	Tachometer	Engine is running. — Idle speed	Approximately 0.9V
		Engine is running. — Engine speed is 2,000 rpm.	Approximately 2.0V
9	Air conditioner relay	Engine is running. — A/C switch is "ON".	Approximately 0V
		Engine is running. — A/C switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
16	E.C.C.S. relay (Self-shut off)	Ignition switch "ON" ↓ Ignition switch "OFF" — For a few seconds after turning ignition switch "OFF".	0 - 1V
		Ignition switch "OFF" — In a few seconds after turning ignition switch "OFF".	BATTERY VOLTAGE (11 - 14V)
18	Fuel pump relay	Ignition switch "ON" — For 5 seconds after turning ignition switch "ON".	0.7 - 0.9V
		Ignition switch "ON" — 5 seconds after turning ignition switch "ON".	BATTERY VOLTAGE (11 - 14V)
		Engine is running. — Idle speed	0.7 - 0.9V
19	Condenser fan relay	Engine is running. — Condenser fan is not operating.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. — Condenser fan is operating.	Approximately 0V
23	Knock sensor	Engine is running. — Idle speed	Approximately 2.5V

27	Mass air flow sensor	Engine is running. (Warm-up condition) └ Idle speed	1.0 - 1.4V
		Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm	1.4 - 1.9V
28	Engine coolant temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with engine coolant temperature.
29 55	Heated oxygen sensor R.H. Heated oxygen sensor L.H.	Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm	0 - Approximately 1.0V
33	IACV-FICD solenoid valve	Engine is running. └ Air conditioner is not operating.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Air conditioner is operating.	Approximately 0V
34	Power steering oil pressure switch	Engine is running. └ Steering wheel is in the "straight ahead" position.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Steering wheel is turned.	Approximately 5V
36	Fuel temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with fuel temperature.
38	Throttle position sensor	Engine is running. (Warm-up condition)	Approximately 0.4 - 4V Output voltage varies with the throttle valve opening angle.
39	EGR temperature sensor	Engine is running. (Warm-up condition) └ Idle speed	Less than 4.5V
		Engine is running. (Warm-up condition) └ E.G.R. system is operating.	0 - 1.0V
41 51	Crankshaft position sensor (Reference signal),	Engine is running. Do not run engine at high speed under no-load.	1.0 - 1.5V
42 52	Crankshaft position sensor (Position signal)	Engine is running. Do not run engine at high speed under no-load.	2.0 - 2.4V Output voltage varies slightly with engine speed.

Electrical Components Inspection (Cont'd)

ECM inspection table

*Data are reference values.

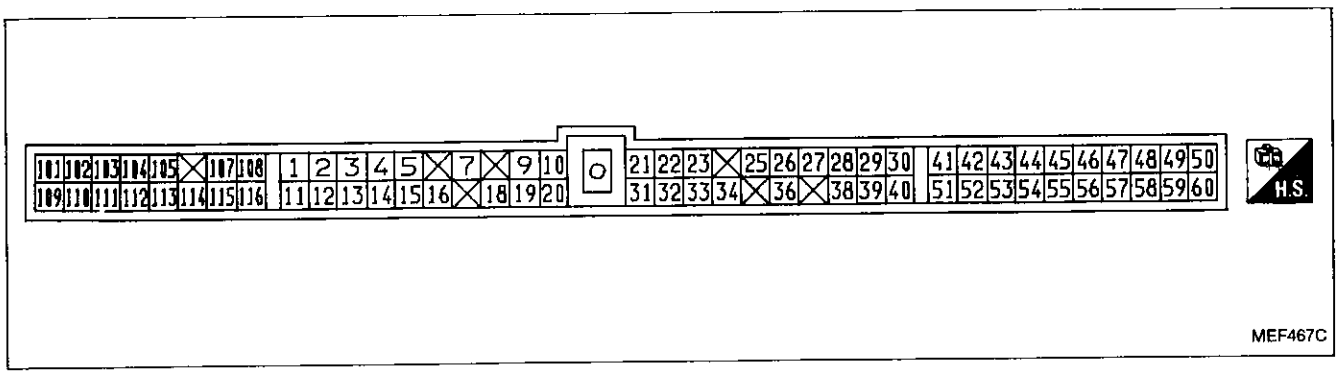
TERMINAL NO.	ITEM	CONDITION	*DATA
43	Start signal	Ignition switch "ON"	Approximately 0V
		Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)
44	A/T control unit (Neutral position signal)	Ignition switch "ON" └ Gear position is "N" or "P".	Approximately 0V
		Ignition switch "ON" └ Except the above gear position	Approximately 5V
45	Ignition switch	Ignition switch "OFF"	Approximately 0V
		Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
46	Air conditioner switch	Engine is running. └ A/C switch is "ON".	0.4 - 0.6V
		Engine is running. └ A/C switch is "OFF".	Approximately 5V
48	Power source for sensors	Ignition switch "ON"	Approximately 5V
49 59	Power supply	Ignition switch "ON" └ Engine is running.	BATTERY VOLTAGE (11 - 14V)
54	Closed throttle position switch	Engine is running. (Warm-up condition) └ Accelerator pedal is fully released.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. (Warm-up condition) └ Accelerator pedal is depressed.	Approximately 0V
57	Power source for closed throttle position switch	Ignition switch "ON"	7.0 - 10.0V
56	Throttle opening signal	Ignition switch "ON"	0.3 - Approximately 3.3V Output voltage varies with the throttle valve opening angle.
58	Battery	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
101 103 105 106 110 112 113 114	Injectors	Engine is running.	BATTERY VOLTAGE (11 - 14V)

ECM inspection table

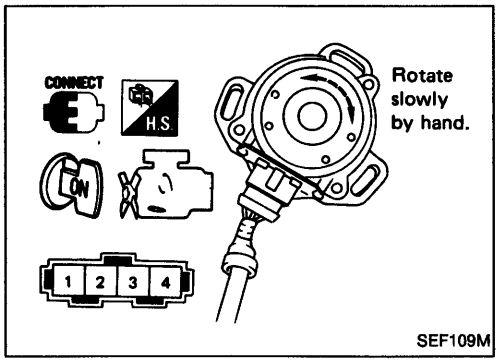
*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
102	EGRC-solenoid valve	Engine is running. (Warm-up condition) └ Idle speed	Approximately 0V
		Engine is running. (Warm-up condition) └ Engine speed is about 2,000 rpm.	BATTERY VOLTAGE (11 - 14V)
104	Fuel pump voltage control	Engine is running. └ Idle speed	Approximately 5V
		Engine is running. └ Engine speed is 2,000 rpm.	Approximately 0V
111	P.R.V.R. control solenoid valve	Stop and restart engine after warming it up. └ Fuel temperature is above 75°C (167°F).	0 - 1.0V (For 30 seconds after ignition switch is turned off.)
			BATTERY VOLTAGE (11 - 14V) (After 30 seconds)
		Stop and restart engine after warming it up. └ Fuel temperature is below 75°C (167°F).	BATTERY VOLTAGE (11 - 14V)
113	V.T.C. solenoid valve	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Engine speed is 2,000 rpm.	0.2 - 0.5V
115	Heated oxygen sensor heater	Engine is running. └ Engine speed is below 2,900 rpm.	Approximately 0V
		Engine is running. └ Engine speed is above 2,900 rpm.	BATTERY VOLTAGE (11 - 14V)

ECM HARNESS CONNECTOR TERMINAL LAYOUT



Electrical Components Inspection (Cont'd)



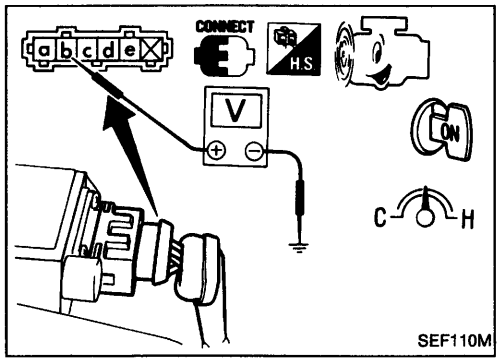
CRANKSHAFT POSITION SENSOR

1. Remove crankshaft position sensor from engine. (Crankshaft position sensor harness connector should remain connected.)
2. Turn ignition switch "ON".
3. Rotate crankshaft position sensor shaft slowly by hand and check voltage between terminals ①, ② and ground.

Terminal	Voltage
② (120° signal)	Voltage fluctuates between 5V and 0V.
① (1° signal)	

If N.G., replace crankshaft position sensor.

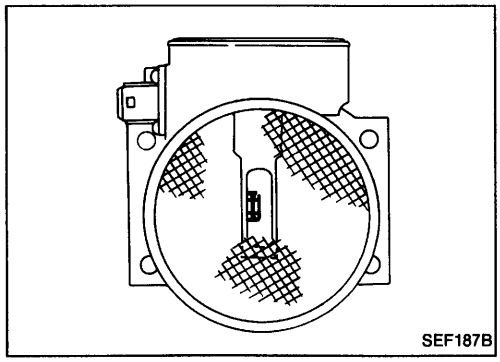
After this inspection, diagnostic trouble code No. 11 might be displayed though the crankshaft position sensor is functioning properly. In this case erase the stored memory.



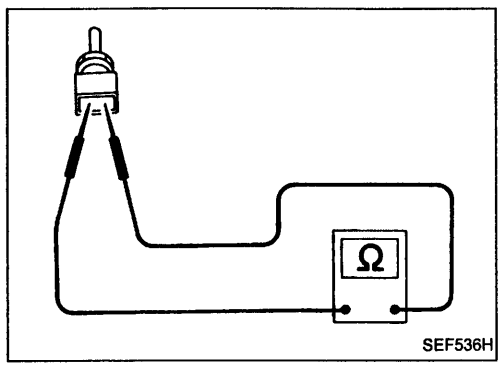
MASS AIR FLOW SENSOR

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 ⓑ and ground.

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Approximately 0.8
Idle (Engine is warm-up sufficiently.)	Approximately 0.8 - 1.5



5. If N.G., remove mass air flow sensor from air duct. Check hot wire for damage or dust.



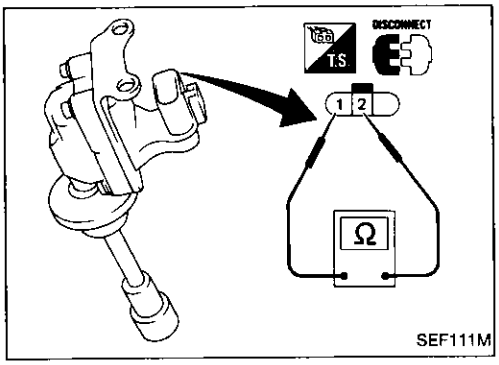
ENGINE COOLANT TEMPERATURE SENSOR

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 N.G., replace engine coolant temperature sensor.

Electrical Components Inspection (Cont'd)

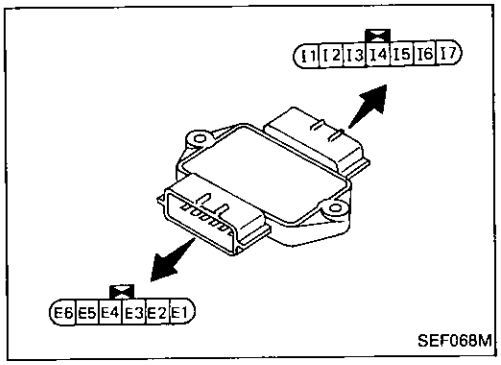


IGNITION COIL

1. Disconnect ignition coil harness connector.
2. Check resistance as shown in the figure.

Terminal	Resistance
① - ②	Approximately 0.9Ω

If N.G., replace ignition coil.

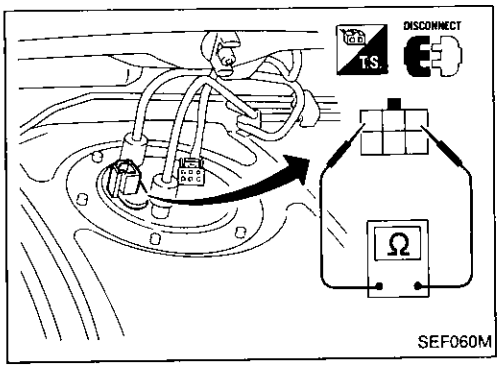


POWER TRANSISTOR

1. Disconnect power transistor harness connector.
2. Check power transistor continuity between terminals as shown in the figure.

Terminal combination						Tester polarity	Continuity	Tester polarity	Continuity
G E1	G E2	G E3	G E4	G E5	G E6	⊕ ⊖	No	⊖ ⊕	Yes
G I1	G I2	G I3	G I4	G I5	G I6	⊕ ⊖	Yes	⊖ ⊕	Yes
E1 I1	E2 I2	E3 I3	E4 I4	E5 I5	E6 I6	⊕ ⊖	Yes	⊖ ⊕	No

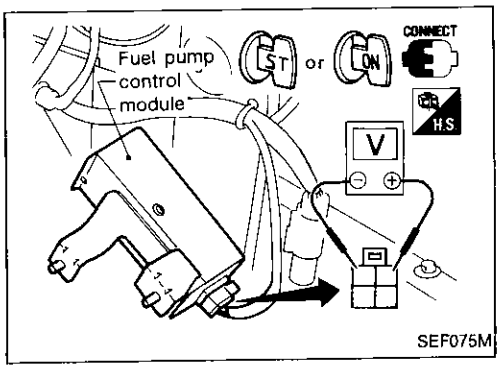
If N.G., replace power transistor.



FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals ⓐ and ⓒ.
   Resistance: Approximately 0.6Ω

If N.G., replace fuel pump.

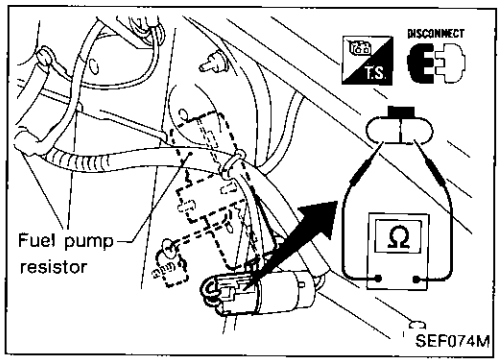


FUEL PUMP CONTROL MODULE

1. Start engine and warm it up sufficiently.
2. Check voltage between terminals ⓐ and ⓑ.

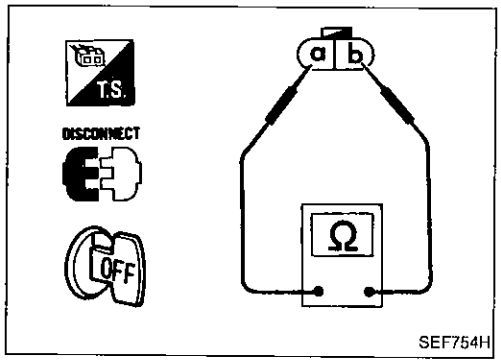
Engine speed	Voltage
Idling	4.2V
1,500 rpm	0V

Electrical Components Inspection (Cont'd)



DROPPING RESISTOR FOR FUEL PUMP

1. Check resistance between terminals ⓐ and ⓑ.
   Resistance: Approximately 1.2Ω

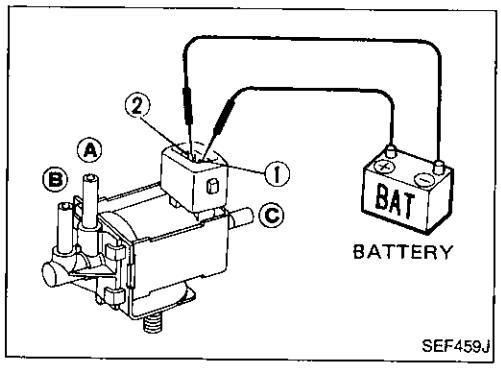


VEHICLE SPEED SENSOR

1. Jack up rear wheels. Use stands to support vehicle.
2. Disconnect vehicle speed sensor harness connector.
3. Check continuity between terminals ⓐ and ⓑ while rotating rear wheel by hand.

Continuity should come and go.

If N.G. replace vehicle speed sensor.

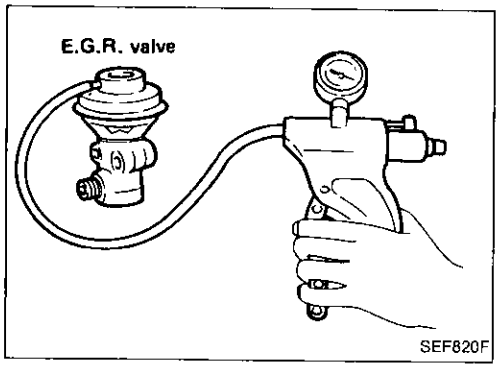


EGRC-SOLENOID VALVE
P.R.V.R. CONTROL SOLENOID VALVE

Check air passage continuity.

Condition	Air passage continuity between Ⓐ and Ⓑ	Air passage continuity between Ⓐ and Ⓒ
12V direct current supply between terminals ① and ②	Yes	No
No supply	No	Yes

If N.G., replace solenoid valve.



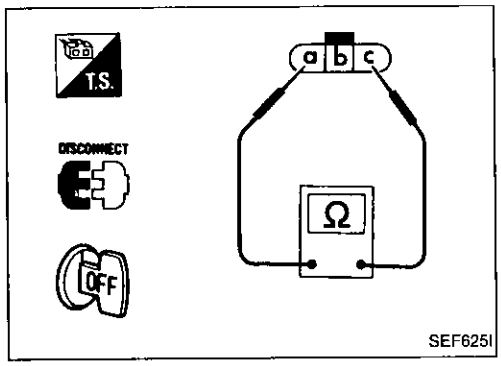
EGR VALVE

Apply vacuum to E.G.R. vacuum port with a hand vacuum pump.

EGR valve spring should lift.

If N.G., replace EGR valve.

Electrical Components Inspection (Cont'd)



HEATED OXYGEN SENSOR

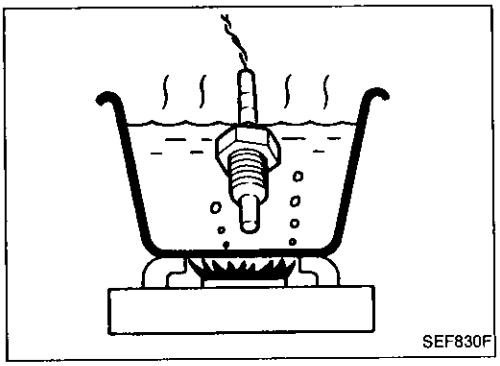
Refer to "Diagnostic Procedure 9".
(See page EF & EC-103.)

HEATED OXYGEN SENSOR HEATER

Check resistance between terminals ⓐ and ⓒ .

Resistance: 3 - 1,000Ω

If N.G., replace heated oxygen sensor.



EGR TEMPERATURE SENSOR

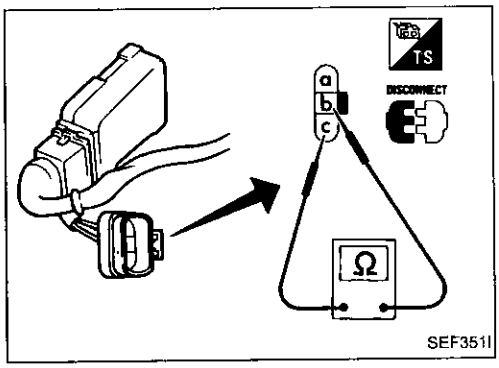
Check resistance change and resistance value at 100°C (212°F).

- **Resistance should decrease in response to temperature increase.**

Resistance: 100°C (212°F)

85.3 ± 8.53 kΩ

If N.G., replace EGR temperature sensor.



THROTTLE POSITION SENSOR

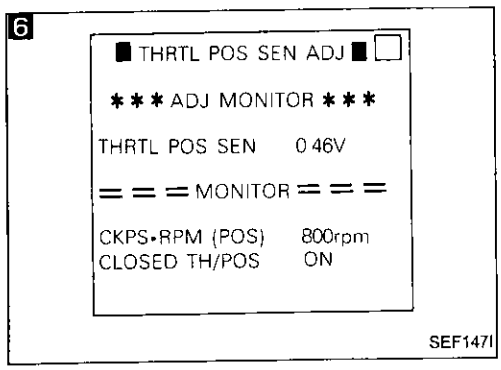
1. Disconnect throttle position sensor harness connector.
2. Make sure that resistance between terminals ⓑ and ⓕ changes when opening throttle valve manually.

Accelerator pedal conditions	Resistance kΩ
Completely released	Approximately 1.7
Partially released	1 - 10.5
Completely depressed	Approximately 10.5

If N.G., replace throttle position sensor.

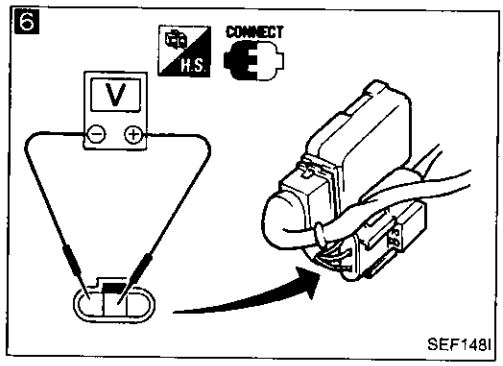
Adjustment

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:

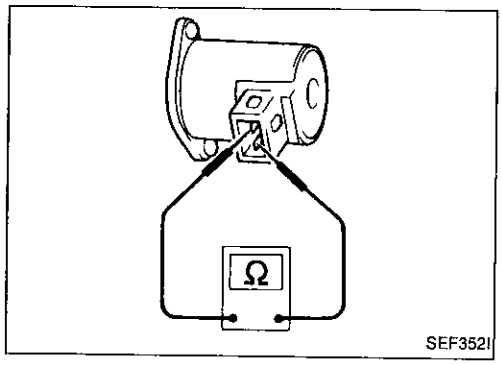


1. Install throttle position sensor body in throttle body. Do not tighten bolts.
2. Connect throttle position sensor and closed throttle position switch harness connector.
3. Start engine and warm it up sufficiently.
4. Perform "THRTL POS SEN ADJ" in "WORK SUPPORT" mode.
   Measure output voltage of throttle position sensor using voltmeter.

Electrical Components Inspection (Cont'd)



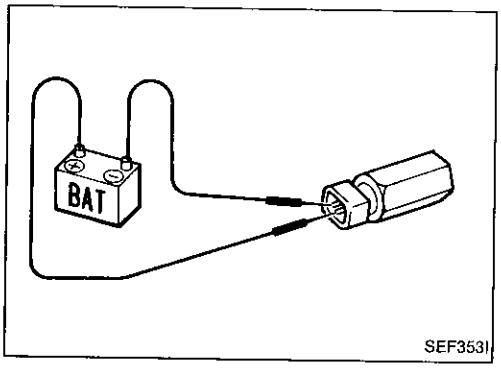
5. Adjust by rotating throttle position sensor body so that output voltage is 0.4 to 0.5V.
6. Tighten mounting bolts.
7. Disconnect throttle position sensor harness connector for a few seconds and then reconnect it.



IACV-AAC VALVE

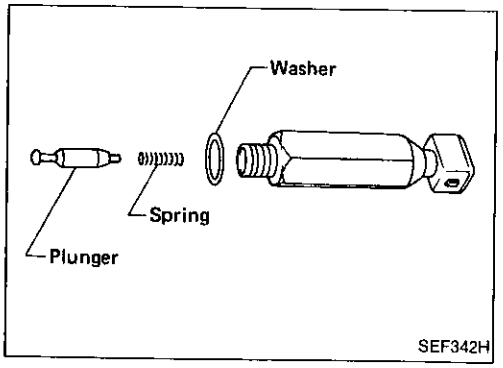
- Check IACV-AAC valve resistance.
  Resistance:
  Approximately 10Ω

- Check plunger for seizing or sticking.
- Check for broken spring.



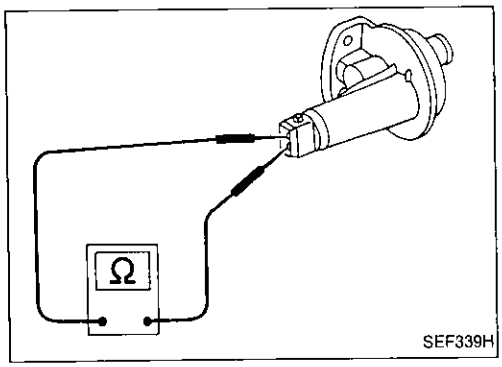
IACV-FICD SOLENOID VALVE

- Check for clicking sound when applying 12V direct current to terminals.



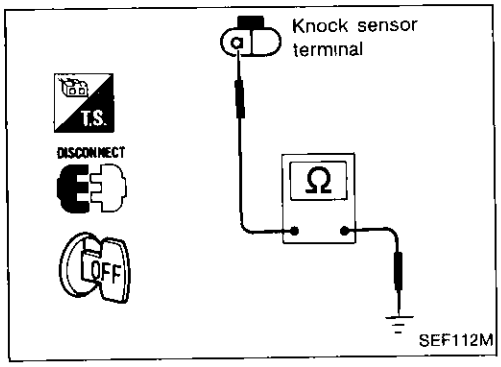
- Check plunger for seizing or sticking.
- Check for broken spring.

Electrical Components Inspection (Cont'd)



IACV-AIR REGULATOR

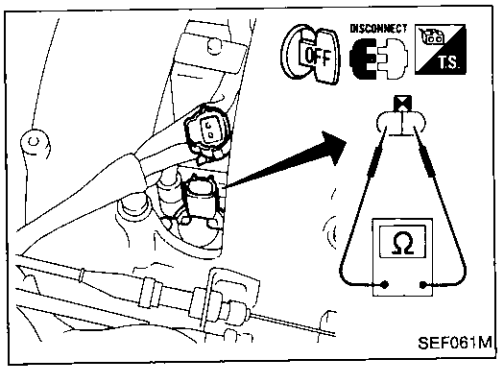
- Check IACV-air regulator resistance.
  Resistance:
  Approximately 70 - 80Ω
- Check IACV-air regulator for clogging.



KNOCK SENSOR

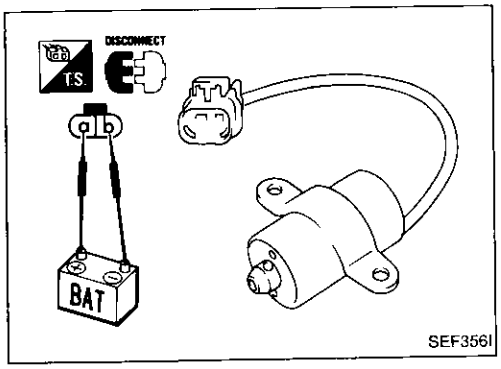
1. Disconnect knock sensor sub-harness connector.
2. Check continuity between terminal ⓐ and ground.

Continuity should exist.



INJECTOR

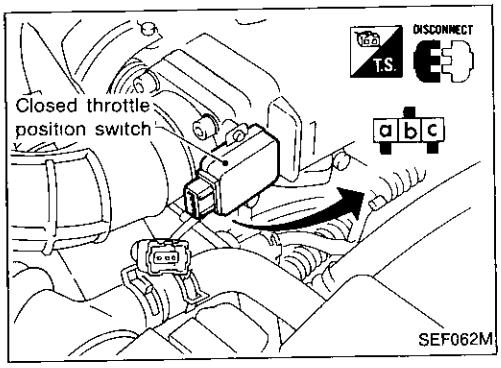
1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.
   Resistance: 10 - 14Ω
   If N.G., replace injector.



VALVE TIMING CONTROL SOLENOID VALVE

Check valve timing control solenoid valve for normal operation by supplying it with battery voltage between terminals ⓐ and ⓑ.

If N.G., replace solenoid valve.



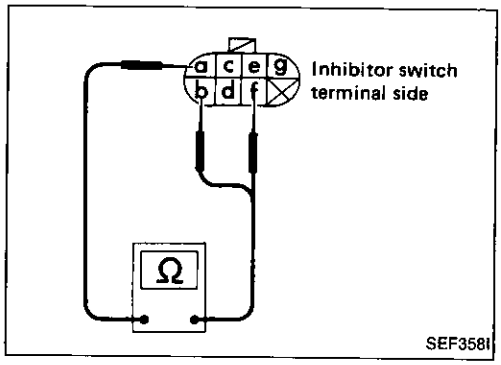
CLOSED THROTTLE POSITION SWITCH (Idle position)

1. Disconnect closed throttle position switch harness connector.
2. Check continuity between terminals ⓐ and ⓑ.

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

If N.G., replace closed throttle position switch.

Electrical Components Inspection (Cont'd)

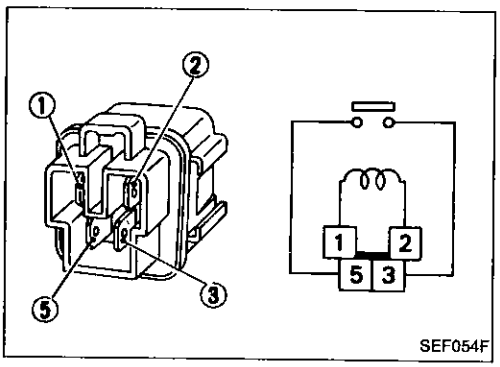


INHIBITOR SWITCH

Check continuity between terminals ⓐ and ⓑ, ⓕ.

Conditions	Continuity between terminals ⓐ and ⓑ	Continuity between terminals ⓐ and ⓕ
Shift to "P" position	Yes	No
Shift to "N" position	No	Yes
Shift to positions other than "P" and "N"	No	No

If N.G., replace inhibitor switch.

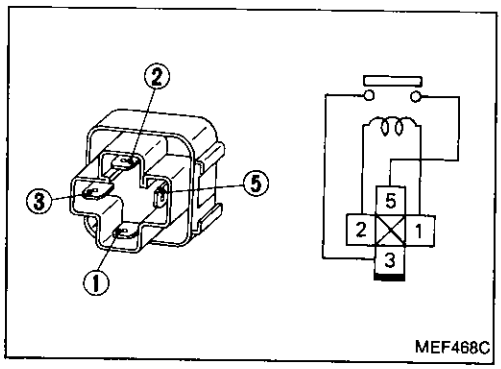


E.C.C.S. RELAY, FUEL PUMP RELAY AND IGNITION COIL RELAY

Check continuity between terminals ③ and ⑤.

Conditions	Continuity
12V direct current supply between terminals ① and ②	Yes
No current supply	No

If N.G., replace relay.



CONDENSER FAN RELAY

Check continuity between terminals ③ and ⑤.

Conditions	Continuity
12V direct current supply between terminals ① and ②	Yes
No current supply	No

If N.G., replace relay.

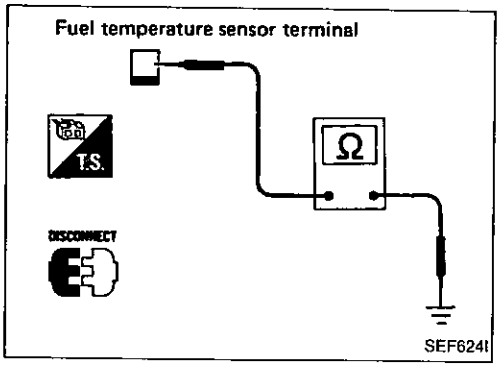
POWER STEERING OIL PRESSURE SWITCH

1. Disconnect power steering oil pressure switch harness connector.
2. Check resistance between terminals.

Resistance:

① When power steering does not work: ∞

② When power steering works: Approximately 0.45Ω



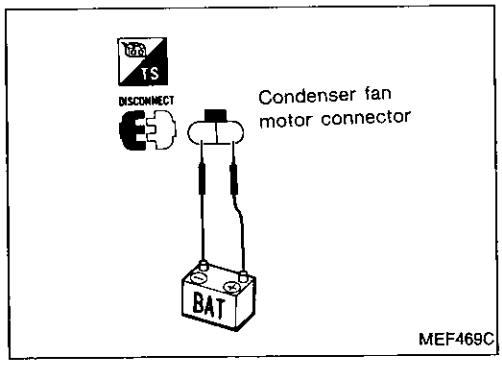
FUEL TEMPERATURE SENSOR

1. Disconnect fuel temperature sensor harness connector.
2. Check resistance between terminal and ground 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 N.G., replace fuel inhibitor switch.

Electrical Components Inspection (Cont'd)

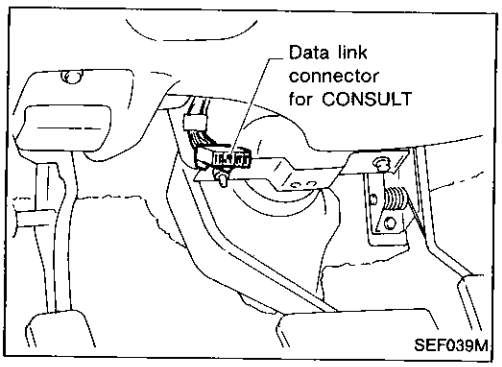


CONDENSER FAN MOTOR

1. Disconnect condenser fan motor harness connector.
2. Supply condenser fan motor terminals with battery voltage and check operation.

Condenser fan motor should operate.

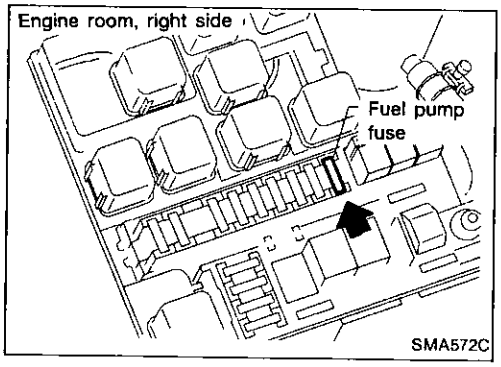
If N.G., replace condenser fan motor.



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.

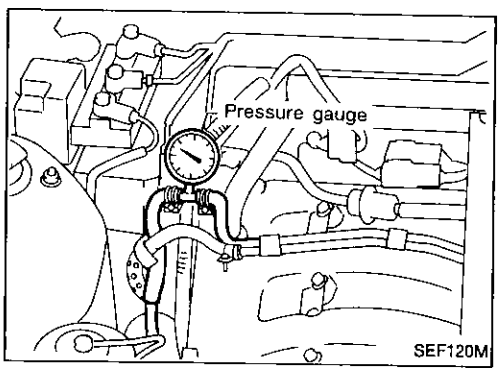


1. Remove fuel pump fuse.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch off and reconnect fuel pump relay or fuel pump connector.

Fuel Pressure Check

a. When reconnecting fuel line, always use new clamps.
b. Make sure that clamp screw does not contact adjacent parts.
c. Use a torque driver to tighten clamps.
d. Use Pressure Gauge to check fuel pressure.
e. Do not perform fuel pressure check while fuel pressure regulator control system is operating; otherwise, fuel pressure gauge might indicate incorrect readings.

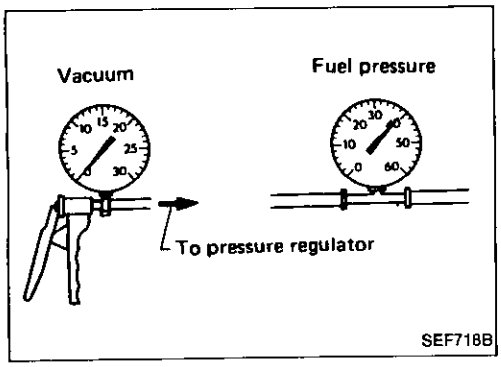
1. Release fuel pressure to zero.
2. Disconnect fuel hose between fuel filter and fuel tube (engine side).
3. Install pressure gauge between fuel filter and fuel tube.
4. Start engine and check for fuel leakage.



5. Read the indication of fuel pressure gauge.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   Approximately 250.1 kPa (2.55 kg/cm^2, 36.3 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   Approximately 299.1 kPa (3.05 kg/cm^2, 43.4 psi)

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.

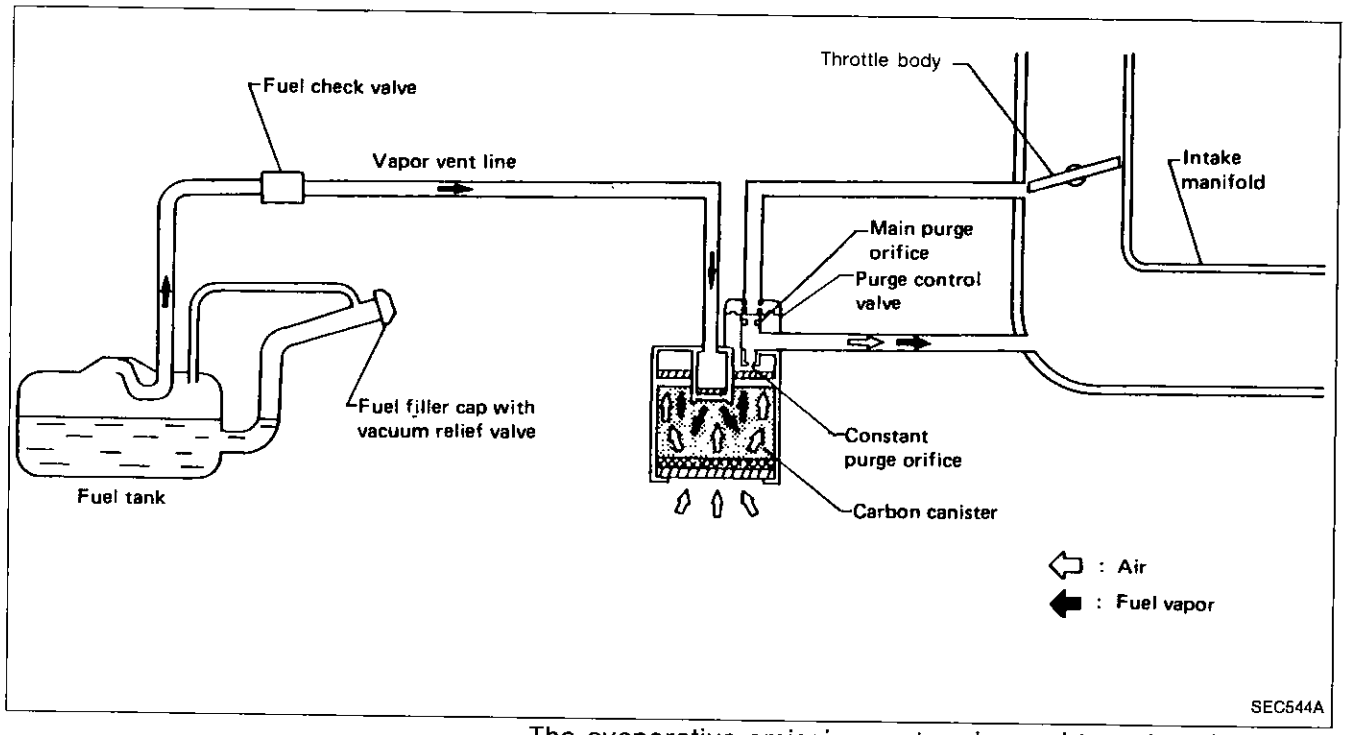
Injector Removal and Installation

1. Release fuel pressure to zero.
2. Drain coolant from radiator drain cock.
3. Remove or disconnect the following:
- Related harnesses, wires and tubes
- Intake manifold collector
  For details, refer to EM section.
4. Remove injectors with fuel tube assembly.
5. Remove injectors from fuel tube assembly.
6. Install injectors as follows:
1) Clean exterior of injector tail piece.
2) Use new O-rings.

CAUTION:
After properly connecting injectors to fuel tube assembly, check connections for fuel leakage.

7. Assemble injectors with fuel tube assembly to intake manifold.

Description

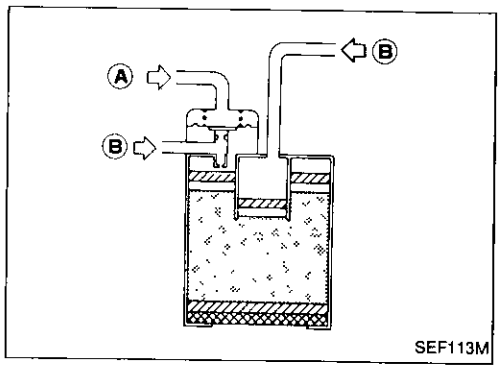


The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the carbon canister.

The fuel vapor from the sealed fuel tank is led into the canister which contains activated carbon and the vapor is stored there when the engine is not running.

The canister retains the fuel vapor until the canister is purged by the air drawn through the bottom of the canister to the intake manifold when the engine is running. When the engine runs at idle, the purge control valve is closed.

Only a small amount of stored vapor flows into the intake manifold through the constant purge orifice. As the engine speed increases, and the throttle vacuum rises higher, the purge control valve opens and the vapor is sucked into the intake manifold through both the main purge orifice and the constant purge orifice.



Inspection

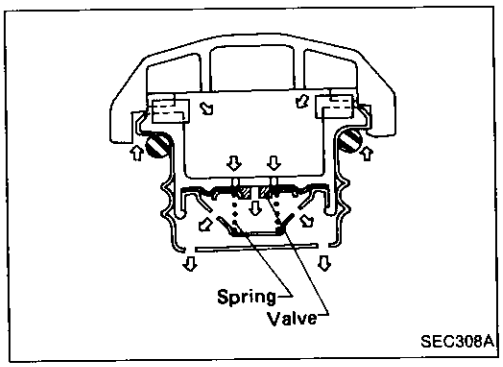
CARBON CANISTER

Check carbon canister as follows:

Ⓐ : Blow air and ensure that there is no leakage.

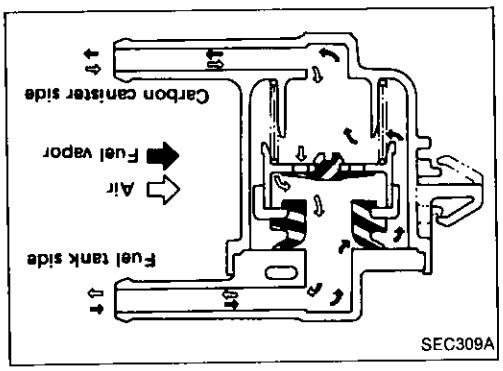
Ⓑ : Blow air and ensure that there is leakage.

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.



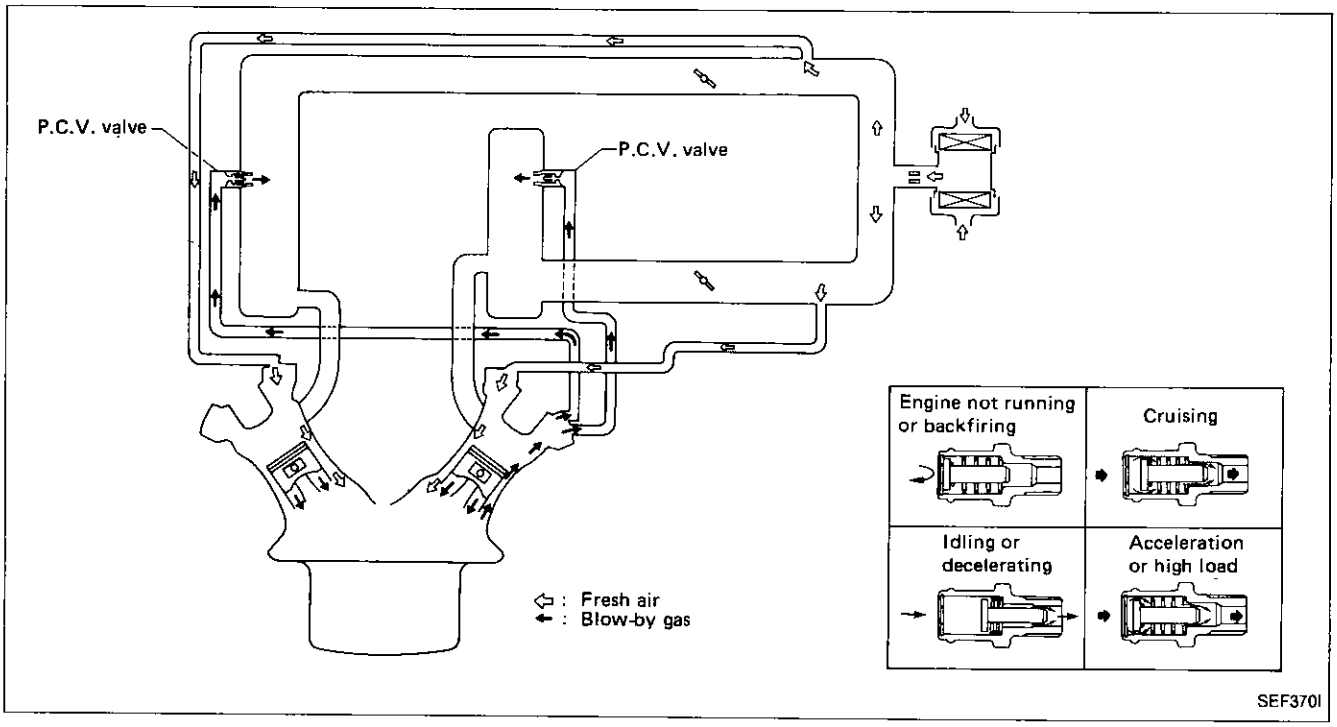
FUEL CHECK VALVE

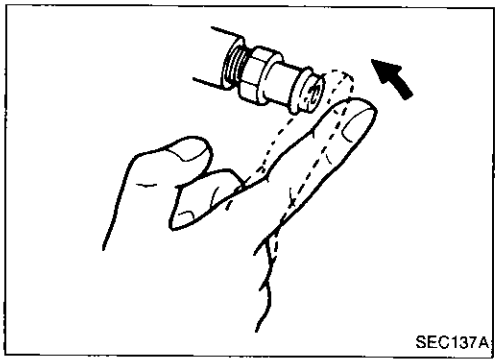
1. Blow air through connector on fuel tank side.
   A considerable resistance should be felt and a portion of air flow should be directed toward the canister.
2. Blow air through connector on canister side.
   Air flow should be smoothly directed toward fuel tank.
3. If fuel check valve is suspected of not properly functioning in steps 1 and 2 above, replace it.

Description

This system returns blow-by gas to both the intake manifold and air inlet tubes.
The positive crankcase ventilation (P.C.V.) 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 P.C.V. valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is then drawn from the air inlet tubes, through the hose connecting air inlet tubes to rocker cover, into the crankcase.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve, and its flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by some of the flow will go through the hose connection to the air inlet tubes under all conditions.

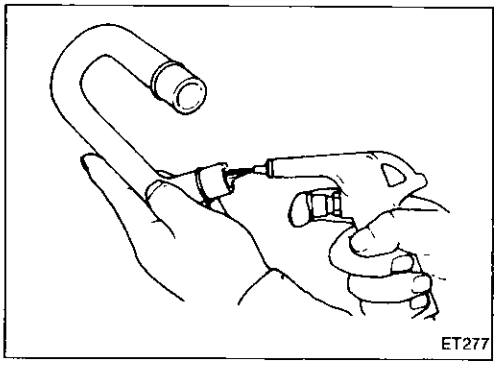




Inspection

P.C.V. (Positive Crankcase Ventilation)

With engine running at idle, remove ventilation hose from P.C.V. 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

PRESSURE REGULATOR	
Regulated pressure kPa (kg/cm^2, psi)	299.1 (3.05, 43.4)

Inspection and Adjustment

Idle speed*1	rpm	
No-load*2		
A/T (in "N" position)		720 ± 50
Air conditioner: ON		800 ± 50
Ignition timing	degree	15 ± 2 B.T.D.C.
Throttle position sensor idle position	V	0.4 - 0.5

*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)
- Radiator fan: OFF

IGNITION COIL

Primary voltage	V	12
Primary resistance [at 20°C (68°F)]	Ω	Approximately 0.9
Secondary resistance [at 20°C (68°F)]	Ω	Approximately 8

ENGINE COOLANT TEMPERATURE SENSOR AND FUEL 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	Approximately 0.6

EGR TEMPERATURE SENSOR

Resistance [at 100°C (212°F)]	kΩ	85.3 ± 8.53

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 1.7
Partially released	1.7 - 10.5
Completely depressed	Approximately 10.5

IACV-AIR REGULATOR

Resistance	Ω	70 - 80

ACCELERATOR CONTROL, FUEL & EXHAUST SYSTEMS

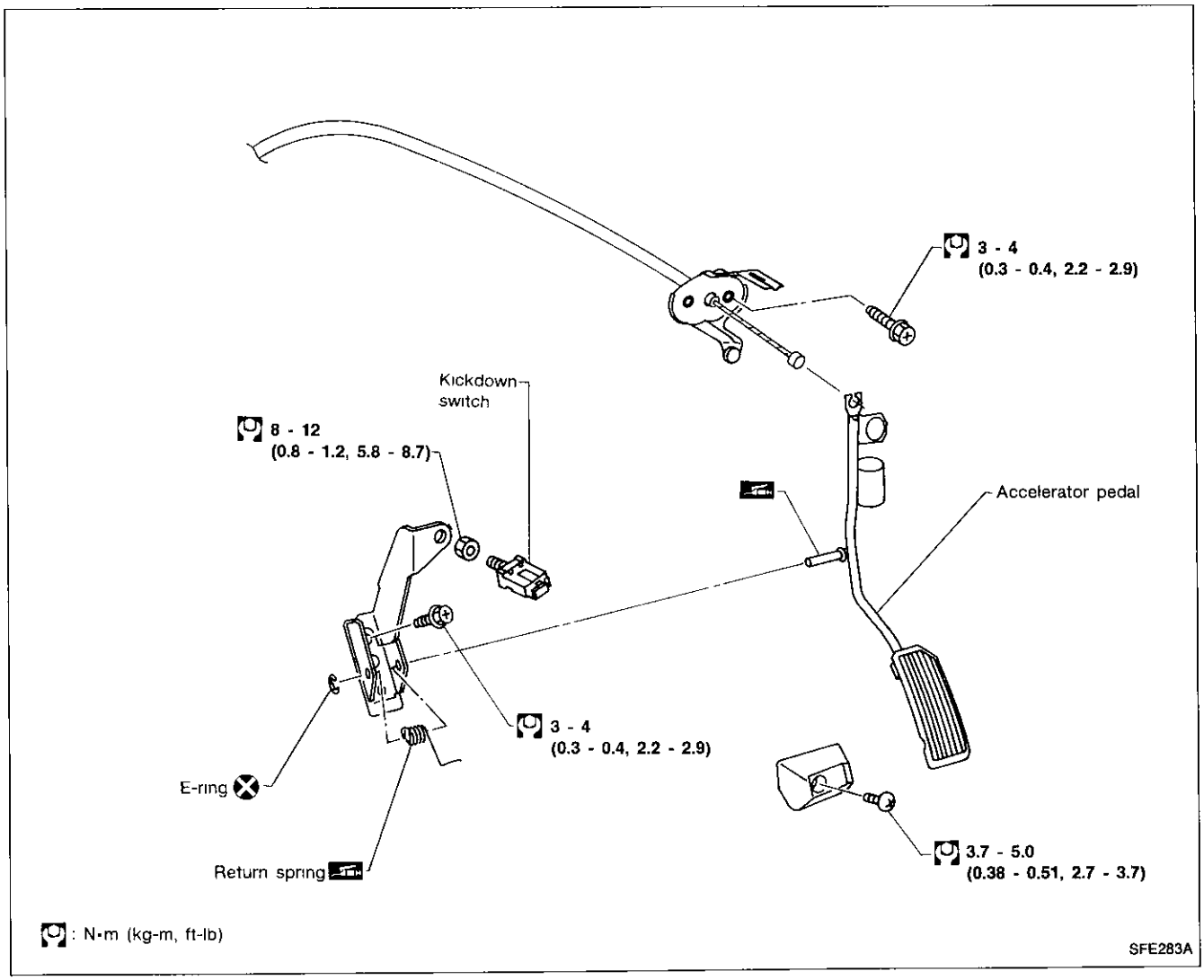
SECTION FE

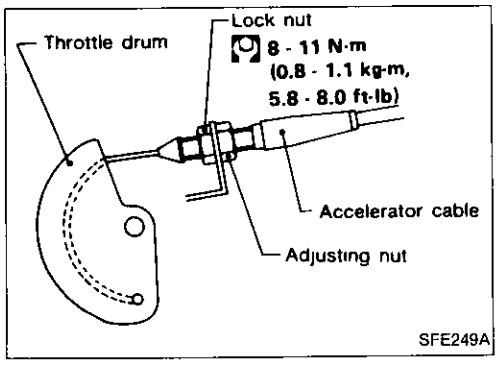
CONTENTS

ACCELERATOR CONTROL SYSTEM FE-2
FUEL SYSTEM FE-3
EXHAUST SYSTEM FE-6

CAUTION:

- **When removing accelerator cable, make a mark to indicate lock nut's initial position.**
- **Check that throttle valve fully opens when accelerator pedal is fully depressed and that it returns to idle position when pedal is released.**
- **Check accelerator control parts for improper contact with any adjacent parts.**
- **When connecting accelerator cable, be careful not to twist or scratch its inner wire.**
- **Refer to section EL for A.S.C.D. cable adjustment.**
- **Refer to "ON-VEHICLE SERVICE" in section AT for Kickdown switch adjustment.**





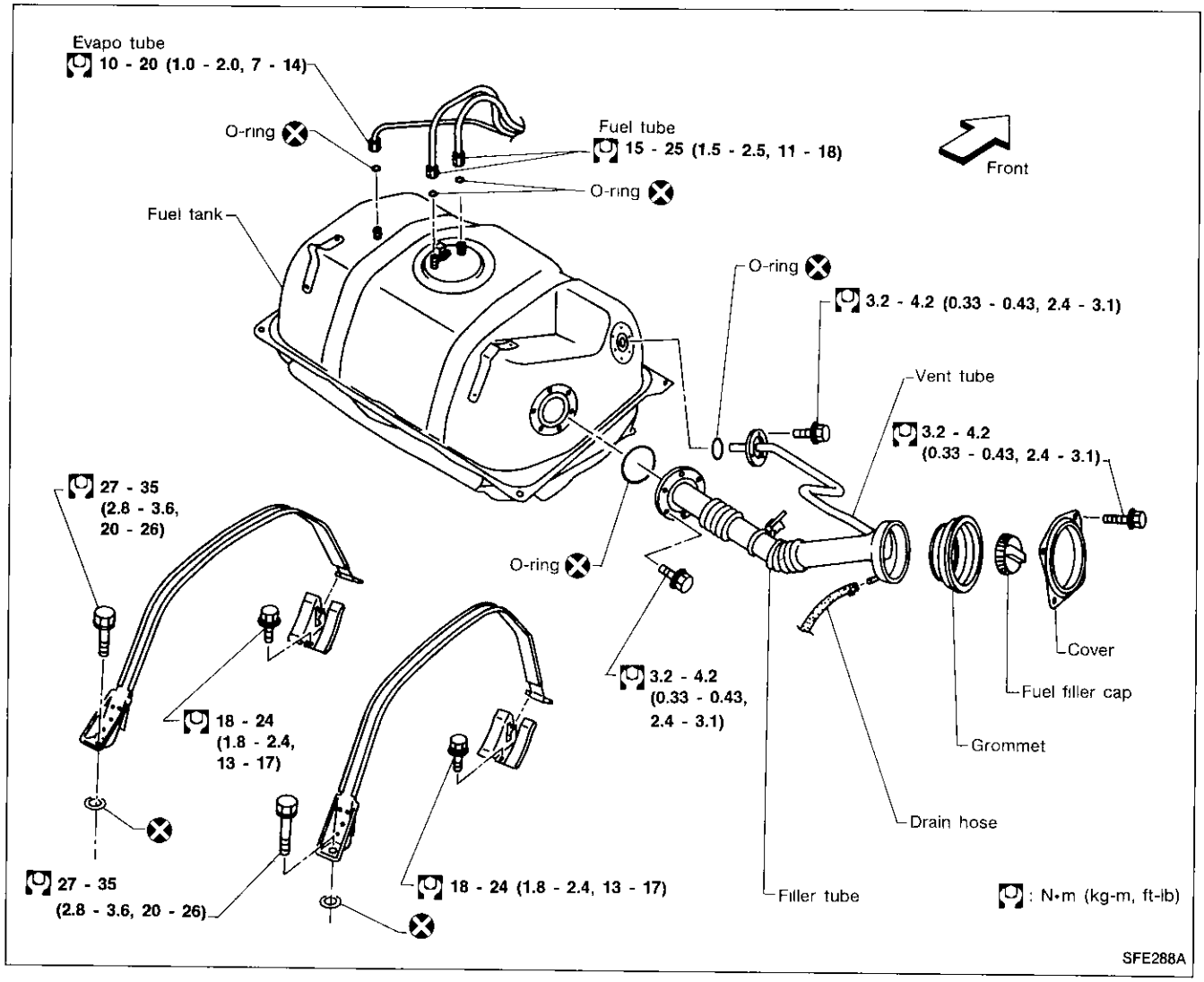
Adjusting Accelerator Cable

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 fasten it with lock nut.

WARNING:
When replacing fuel line parts, be sure to observe the following:

- **Put a "CAUTION: INFLAMMABLE" sign in workshop.**
- **Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.**
- **Be sure to disconnect battery ground cable before conducting operations.**
- **Be sure to furnish workshop with a CO_2 fire extinguisher.**
- **Drain fuel from fuel tank and put drained fuel in an explosion-proof container and put lid on securely.**

Fuel Tank

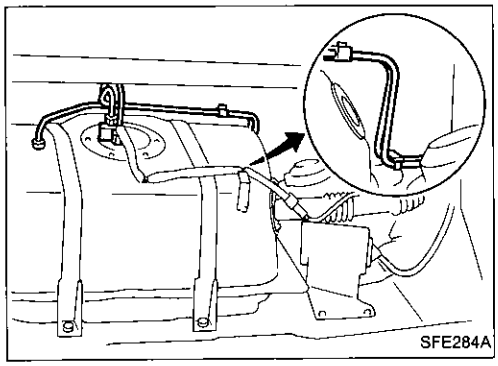


Fuel Tank (Cont'd)

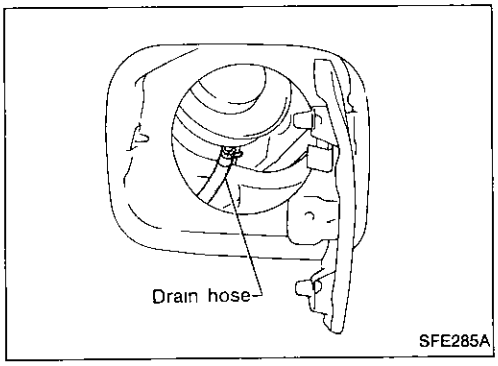
REMOVAL

CAUTION:

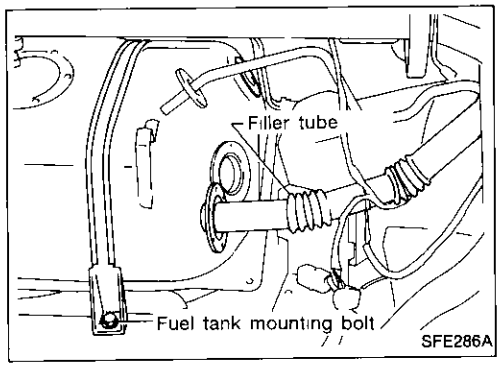
- **Do not disconnect any fuel line unless absolutely necessary.**
- **Plug pipe openings to prevent entry of dust or dirt.**
- **Do not pull drain hose as it may become disconnected from grommet on underside of vehicle.**



1. Release fuel pressure from fuel line. Refer to "Changing Fuel Filter" in section MA.
2. Remove trunk front finisher. (Refer to section BF.)
3. Disconnect connector, tubes and clip.

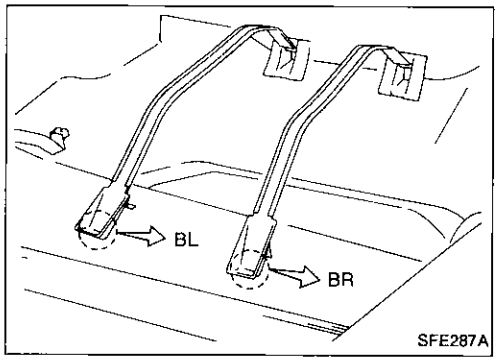


4. Remove cover and grommet.
5. Disconnect drain hose and fasten its end to the body with tape to prevent it from dropping.



6. Remove filler tube.
7. Remove the two fuel tank mounting bolts, and remove fuel tank.

Fuel Tank (Cont'd)

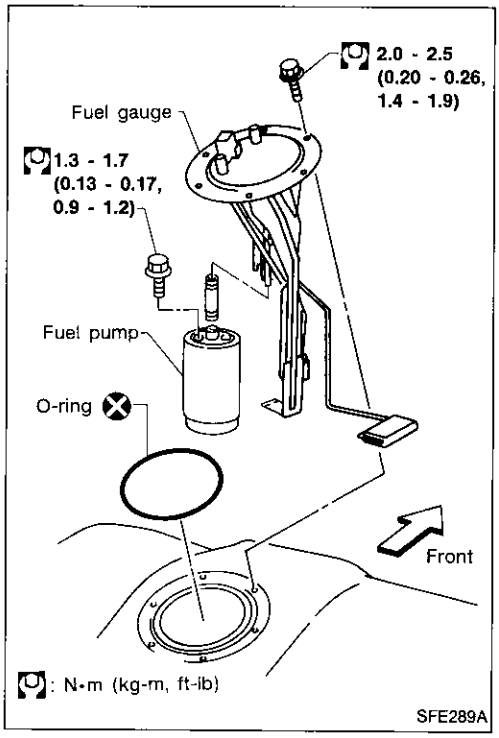


INSTALLATION

- Installation procedure is basically the reverse order of removal.
- Before installing fuel tank, make sure the two mounting bands are set in position. Each band has an identification mark as shown in the figure at left.

CAUTION:

- **Always replace O-ring with a new one.**
- **Do not kink or twist tubes when they are installed.**
- **Be careful of designated direction of fuel check valve. (Refer to section EF & EC.)**
- **Tighten bolts to specified torque. After installation, run engine and check for leaks at connections.**



Fuel Pump and Gauge

REMOVAL

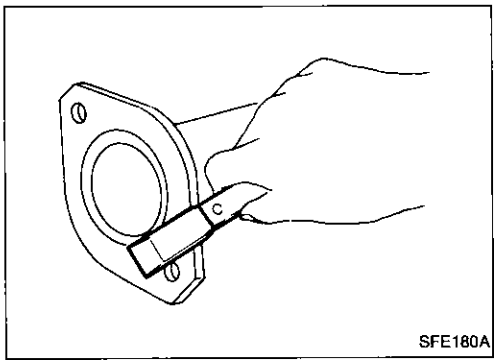
1. Release fuel pressure from fuel line. Refer to "Changing Fuel Filter" in section MA.
2. Remove trunk front finisher. (Refer to section BF.)
3. Disconnect connector and tubes.
4. Remove bolts and remove fuel pump and gauge assembly.
5. Loosen clamp and separate fuel pump and gauge.

INSTALLATION

- **Installation procedure is basically the reverse order of removal.**

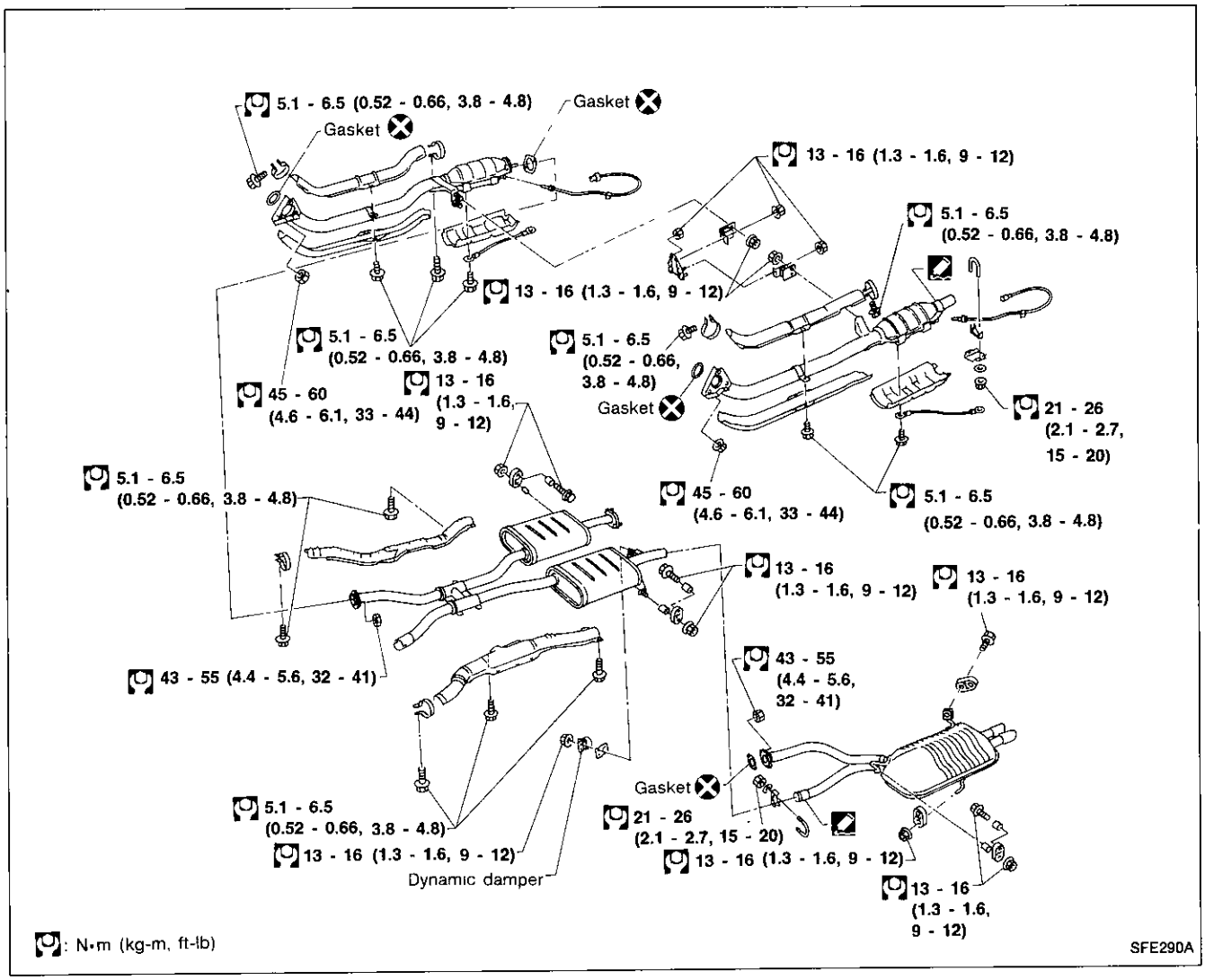
CAUTION:

- **Always replace O-ring with a new one.**
- **Tighten bolts to specified torque. After installation, run engine and check for leaks at connections.**



CAUTION:

- **When connecting center tube and muffler assembly, use the Genuine Nissan Sealant "Exhaust Sealant Kit 20720-N2226" or an equivalent to eliminate gas leaks at the joint.**
- **Always replace exhaust gaskets with new ones when reassembling. If gasket is left on flange surface, scrape off completely as shown at left.**
- **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 any of the above parts are not installed properly, excessive noise or vibration may be transmitted to the vehicle body.**



AUTOMATIC TRANSMISSION

SECTION AT

CONTENTS

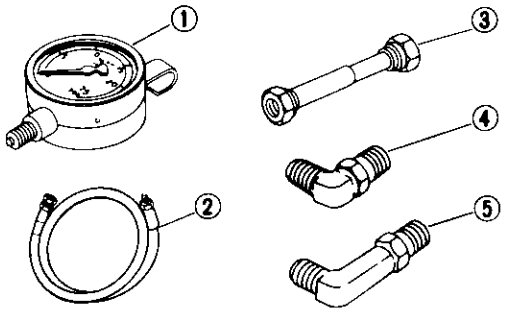
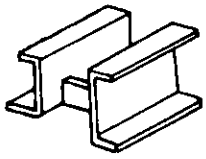
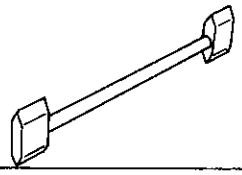
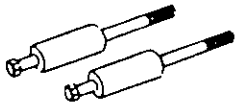
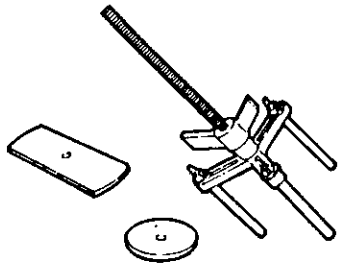
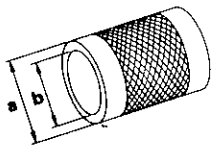
PREPARATION AND PRECAUTIONS ..... AT- 2
A/T CONTROL DIAGRAM ..... AT- 4
ON-VEHICLE SERVICE ..... AT- 7
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TROUBLE DIAGNOSES — A/T shift lock system ..... AT- 89
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DISASSEMBLY AT-106
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SERVICE DATA AND SPECIFICATIONS (S.D.S.) AT-179

When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

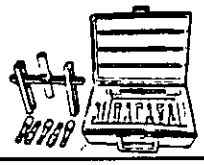
When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".

Preparation

SPECIAL SERVICE TOOLS

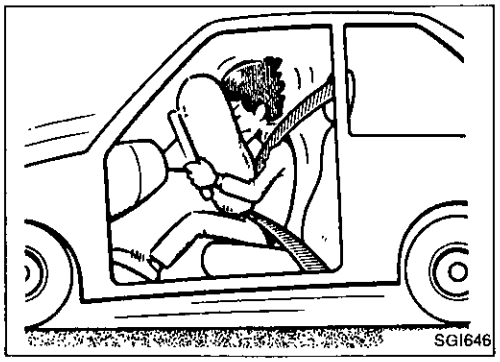
Tool number (Kent-Moore No.) Tool name	Description	
ST2505S001 (J25695-A) Oil pressure gauge set ① ST25051001 (—) Oil pressure gauge ② ST25052000 (—) Hose ③ ST25053000 (—) Joint pipe ④ ST25054000 (—) Adapter ⑤ ST25055000 (—) Adapter		Measuring line pressure
ST07870000 (J37068) Transmission case stand		Disassembling and assembling A/T
KV31102100 (J37065) Torque converter one-way clutch check tool		Checking one-way clutch in torque converter
ST25850000 (J25721-A) Sliding hammer		Removing oil pump assembly
KV31102400 (J34285 and J34285-87) Clutch spring compressor		Removing and installing clutch return springs
ST33200000 (J26082) Drift	 **a: 60mm (2.36 in) dia.** **b: 44.5mm (1.752 in) dia.**	Installing oil pump housing oil seal Installing rear oil seal

Preparation (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
(J34291) Shim setting gauge set		Selecting oil pump cover bearing race and oil pump thrust washer

Precautions

- Before proceeding with disassembly, thoroughly clean the outside of the transmission. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transmission.
- When disassembling parts, place them in order in a parts rack so that they can be put back into the unit in their proper positions.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals and O-rings should be replaced any time the transmission is disassembled.
- It is very important to perform functional tests whenever they are indicated.
- The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place removed parts in order on a parts rack so they can be put back in the valve body in the same positions and sequences. Care will also prevent springs and small parts from becoming scattered or lost.
- Properly installed valves, sleeves, plugs, etc. will slide along their bores in the valve body under their own weight.
- Before assembly, apply a coat of recommended A.T.F. to all parts. Petroleum jelly may be applied to O-rings and seals and used to hold small bearings and washers in place during reassembly. Do not use grease.
- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- After overhaul, refill the transmission with new A.T.F.


SGI646

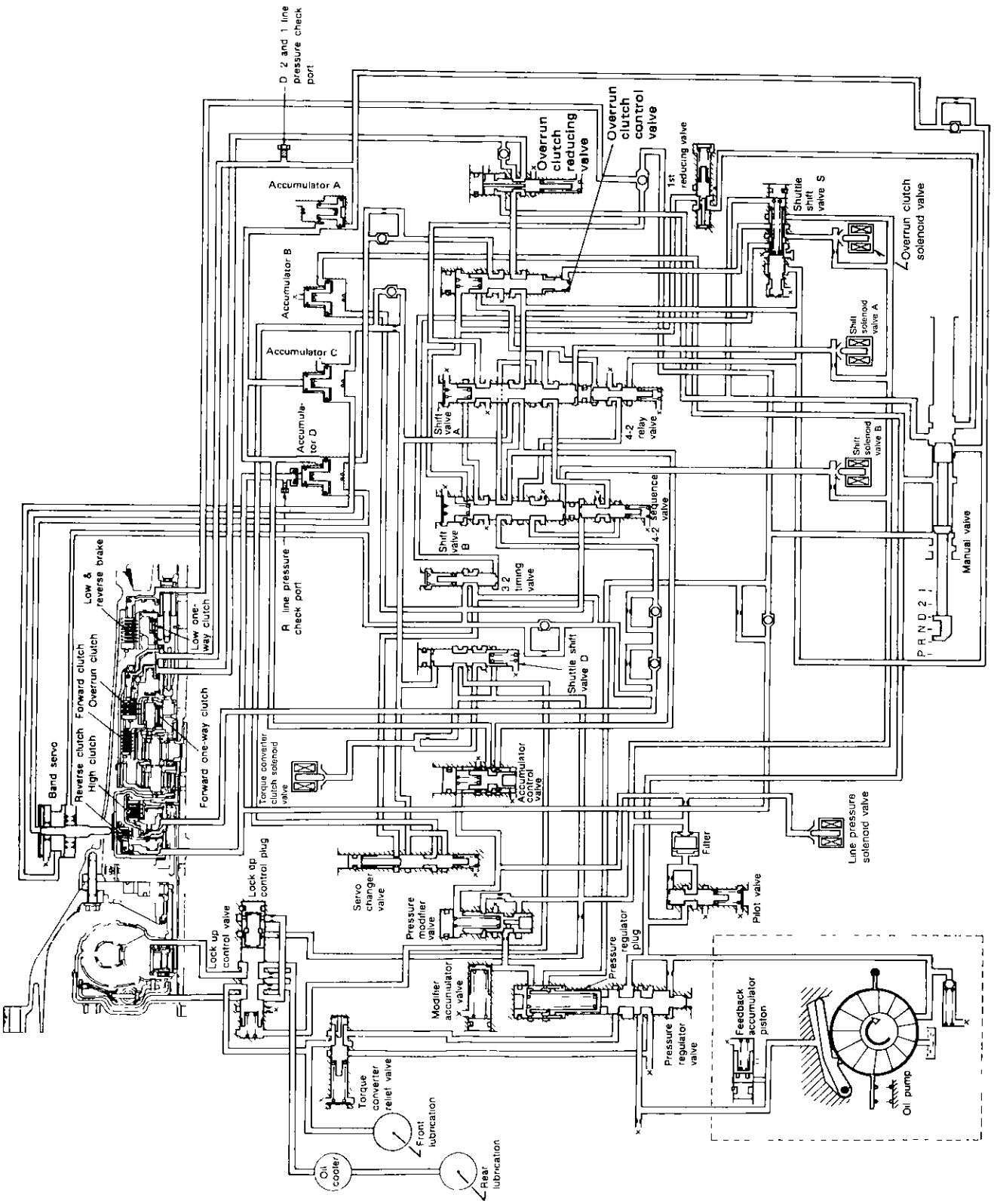
Precautions for Supplemental Restraint System "AIR BAG"

The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury in a frontal collision. The Supplemental Restraint System consists of air bags, sensors, a control unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in **section BF** of this Service Manual.

WARNING:

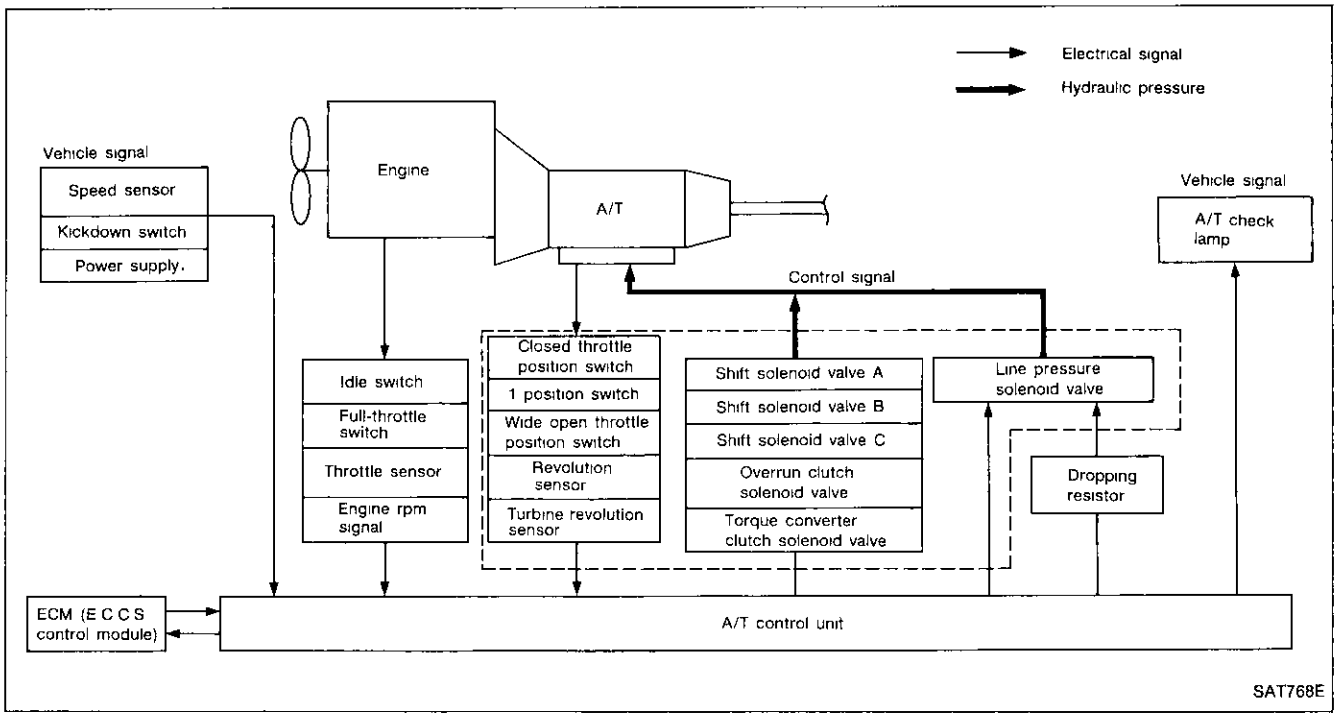
- **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal 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 "Air Bag".**

Hydraulic Control Circuits



SAT123B

Electrical Control Chart

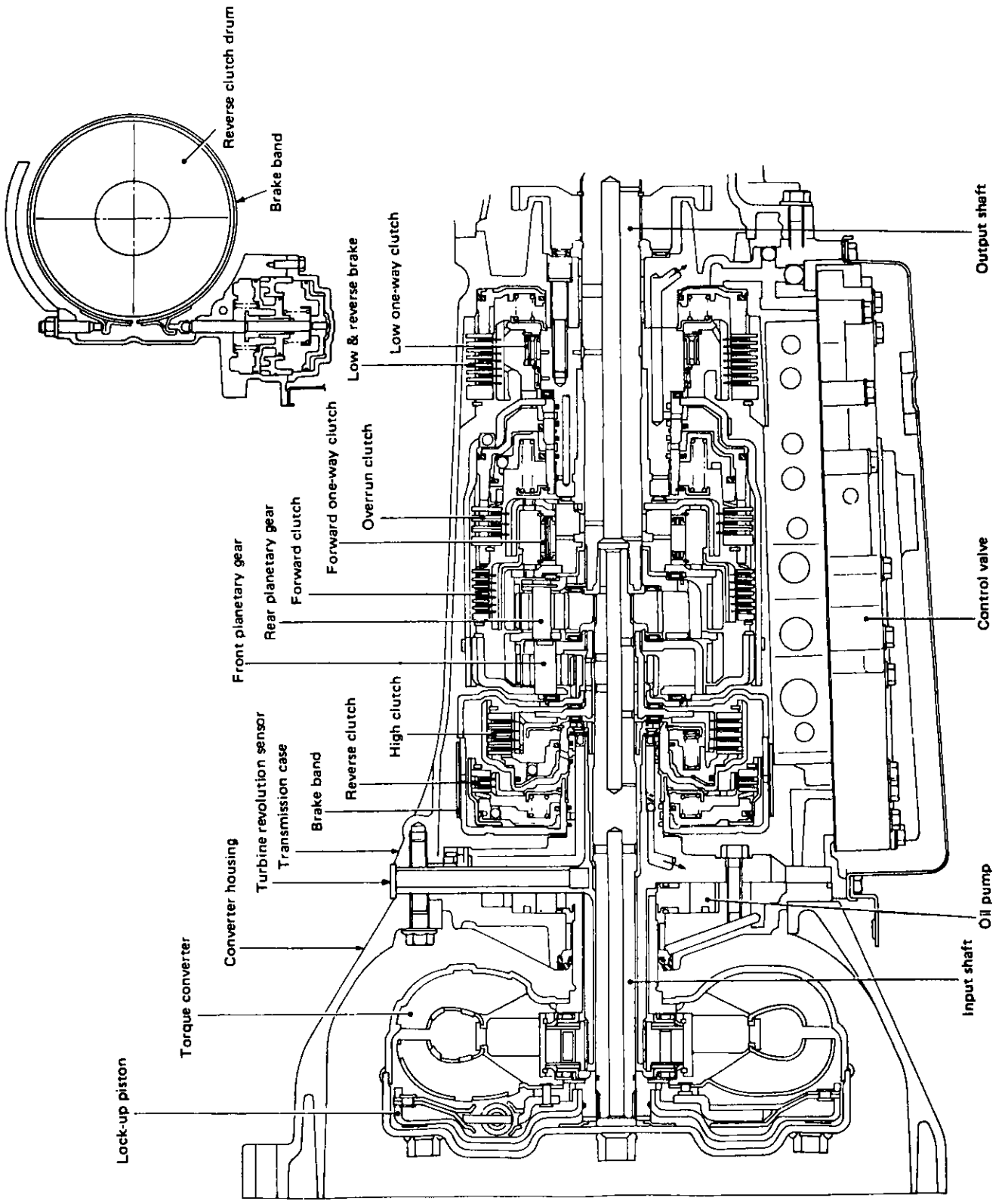


Mechanical Operation

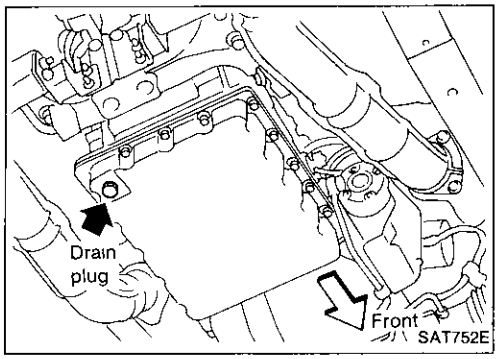
Shift position		R/C	H/C	F/C	O/C	Band servo: Applies in 2nd speed	Band servo: Releases in 3rd speed	Band servo: Applies in 4th speed	F/O.C	L/O.C	L & R/B	Remarks
P												PARK POSITION
R		○									○	REVERSE
N												NEUTRAL POSITION
D	1st			○					●	●		Automatic shift 1 ↔ 2 ↔ 3 ↔ 4
	2nd			○		○			●			
	3rd		○	○		⊗ *1	⊗		●			
	4th		○	⊗		⊗ *2	⊗	○				
3	1st			○	◎				●	●		Automatic shift 1 ↔ 2 ↔ 3 ← 4
	2nd			○	◎	○			●			
	3rd		○	○	◎	⊗ *1	⊗		●			
2				○	○	○			●		○	Locks in 2nd speed 1 ↔ 2 ← 3
1	1st			○	○				●		○	Locks in 1st speed 1 ← 2 ← 3
	2nd			○	○	○			●		○	

*1 : Oil pressure is applied to both 2nd "apply" side and 3rd "release" side of band servo piston. However, because oil pressure area on the "release" side is greater than that on the "apply" side, brake band does not contract.
*2 : Oil pressure is applied to 4th "apply" side in condition *1 above, and brake band contracts.
○ : Operates.
◎ : Operates when throttle opening is less than 1/16. Engine brake activates.
● : Operates during "progressive" acceleration.
⊗ : Operates but does not affect power transmission.
⊛ : Operates when throttle opening is less than 1/16 but does not affect engine brake.

Cross-sectional View

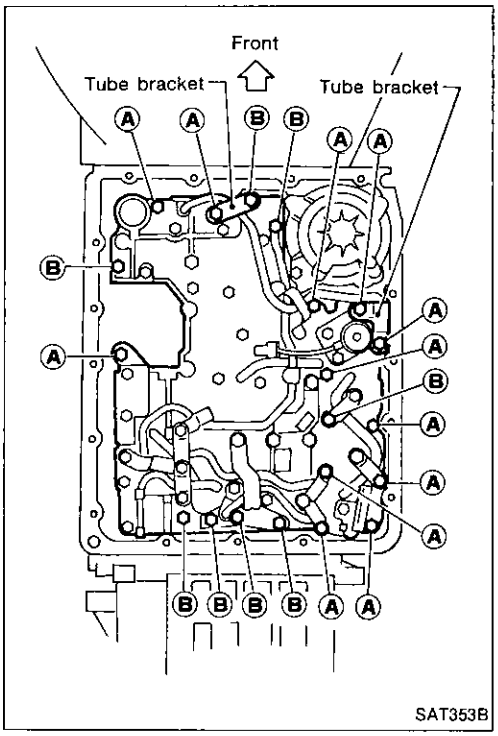


SAT487C



Control Valve Assembly and Accumulators Inspection

1. Drain fluid by removing drain plug.
2. Remove oil pan and gasket.
3. Remove oil strainer.

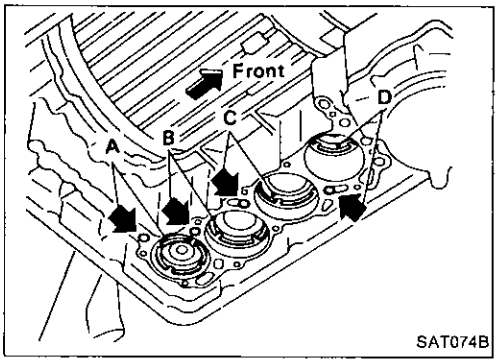


4. Remove control valve assembly by removing fixing bolts and disconnecting harness connector.

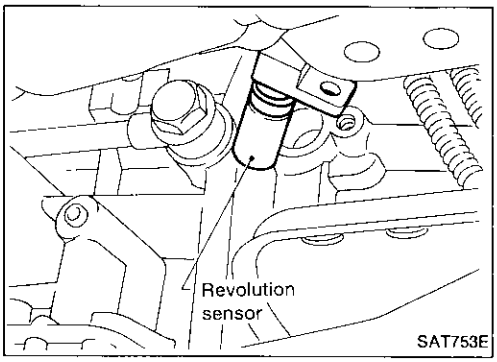
Bolt length and location

Bolt symbol	ℓmm (in)
Ⓐ	33 (1.30)
Ⓑ	45 (1.77)

5. Remove solenoids and valves from valve body if necessary.
6. Remove terminal cord assembly if necessary.

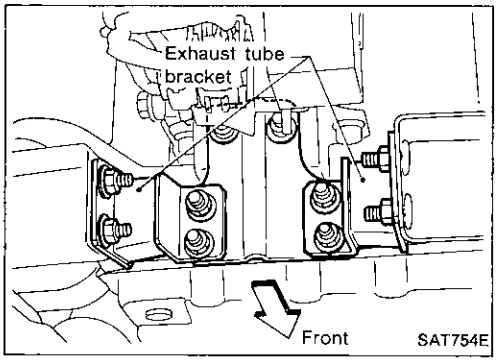


7. Remove accumulators A, B, C and D by applying compressed air if necessary.
- **Hold each piston with rag.**
8. Reinstall any part removed.
- **Always use new sealing parts.**



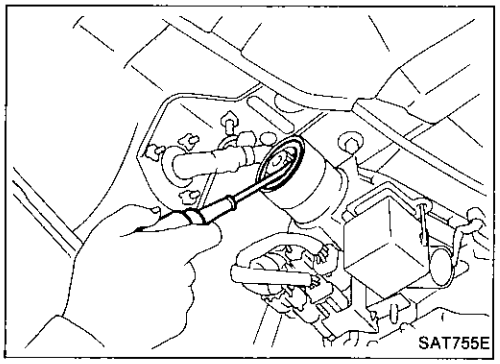
Revolution Sensor Replacement

1. Remove revolution sensor from A/T assembly.
2. Reinstall any part removed.
- **Always use new sealing parts.**

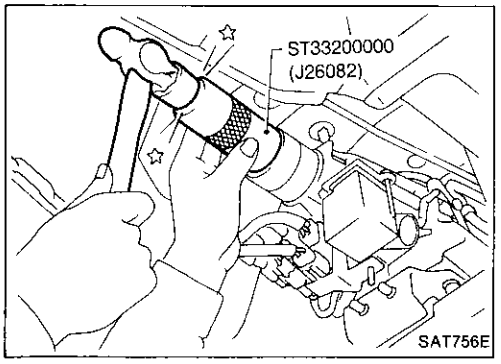


Rear Oil Seal Replacement

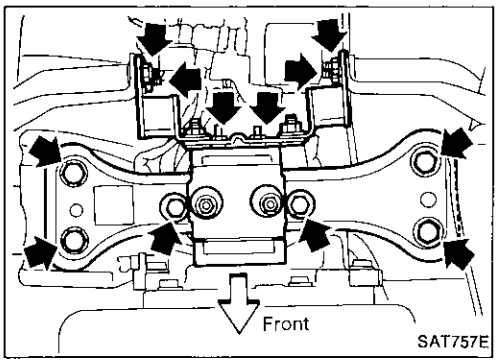
1. Remove exhaust tube front nuts on left and right sides.
2. Remove front tube after removing exhaust tube bracket.



3. Remove propeller shaft from vehicle. — Refer to section PD.
4. Remove rear oil seal.

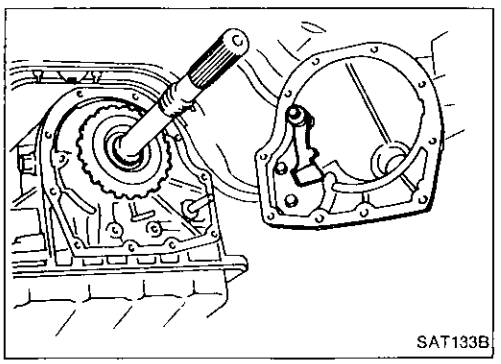


5. Install rear oil seal.
- **Apply A.T.F. before installing.**
6. Reinstall any part removed.

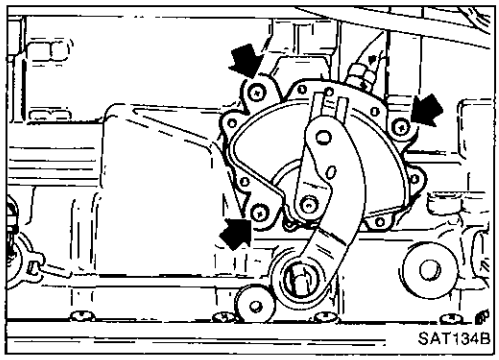


Parking Components Inspection

1. Remove exhaust tube front nuts on left and right sides.
2. Remove front tube after removing exhaust tube bracket.
3 Remove propeller shaft from vehicle. — Refer to section PD.
4. Remove rear engine mounting member from A/T assembly while supporting A/T with jack.

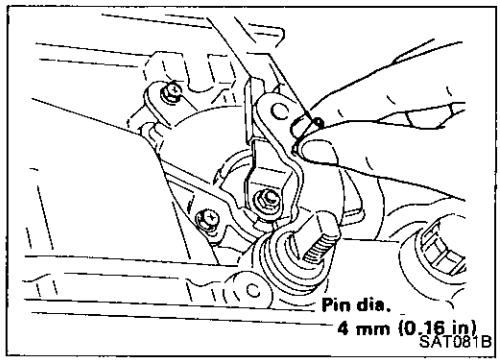


5. Remove rear extension from transmission case.
6. Replace parking components if necessary.
7. Reinstall any part removed.
- **Always use new sealing parts.**

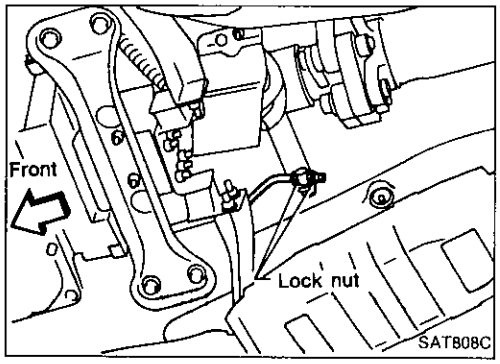


Inhibitor Switch Adjustment

1. Remove manual control linkage from manual shaft of A/T assembly.
2. Set manual shaft of A/T assembly in "N" position.
3. Loosen inhibitor switch fixing bolts.



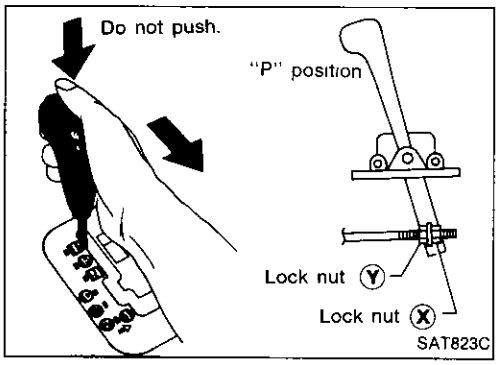
4. Insert pin into adjustment holes in both inhibitor switch and manual shaft of A/T assembly as near vertical as possible.
5. Reinstall any part removed.
6. Check continuity of inhibitor switch. — Refer to "Electrical Components Inspection".



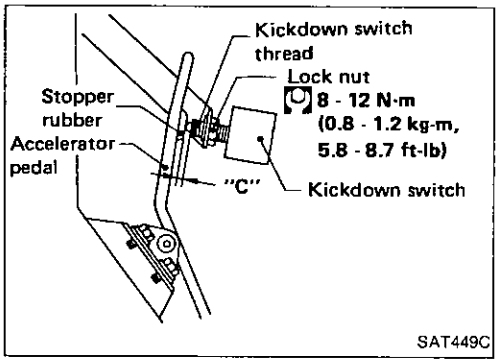
Manual Control Linkage Adjustment

Move selector lever from "P" position to "1" position. You should be able to feel the detents in each position. If the detents cannot be felt or the pointer indicating the position is improperly aligned, the linkage needs adjustment.

1. Place selector lever in "P" position.
2. Loosen lock nuts.



3. Tighten lock nut Ⓧ until it touches trunnion pulling selector lever toward "R" position side without pushing button.
4. Back off lock nut Ⓧ 1 turn and tighten lock nut Ⓨ to the specified torque.
   Lock nut:
   ⭘:11 - 15 N·m (1.1 - 1.5 kg-m, 8 - 11 ft-lb)
5. Move selector lever from "P" position to "1" position. Make sure that selector lever can move smoothly.



Kickdown Switch Adjustment

1. Adjust accelerator cable — Refer to section FE.
2. Adjust clearance "C" between stopper rubber and end of kickdown switch thread while depressing accelerator pedal fully.
   Clearance "C": 0.3 - 1.0 mm (0.012 - 0.039 in)

NOTE:

Contents

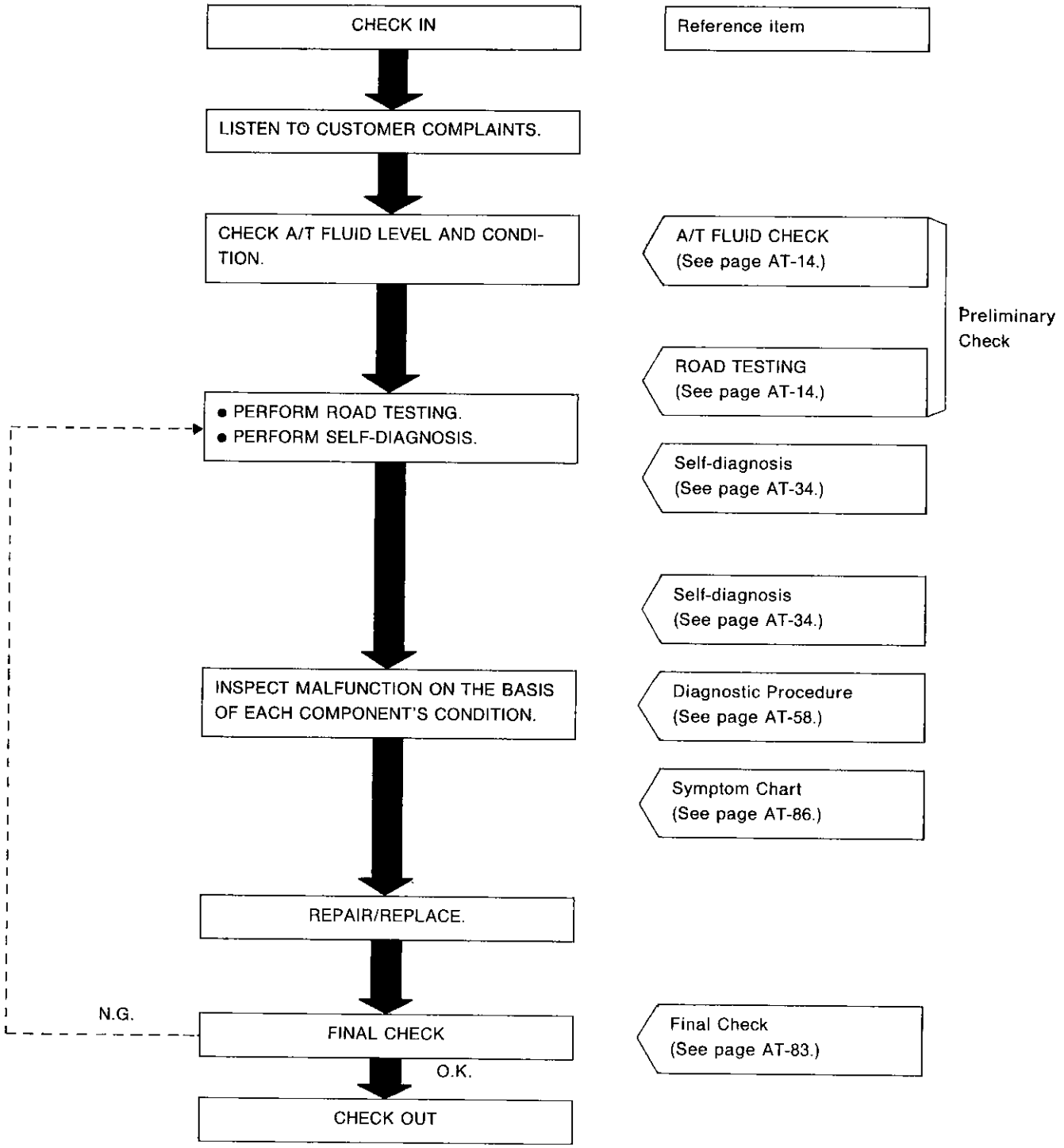
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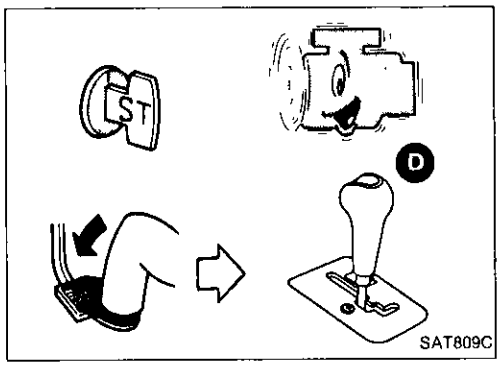
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Vehicle does not decelerate by engine brake when changing selector lever from "3" to "2" position with accelerator pedal released.) AT-70
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How to Perform Trouble Diagnoses for Quick and Accurate Repair

WORK FLOW





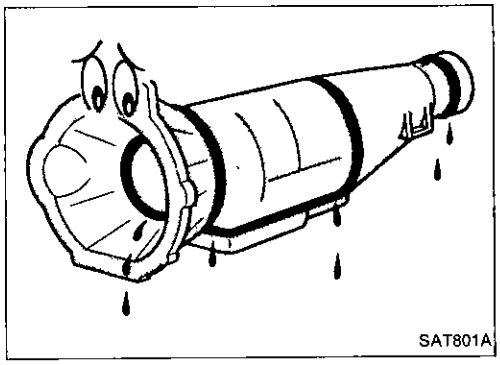
SAT809C

Preliminary Check

A/T FLUID CHECK

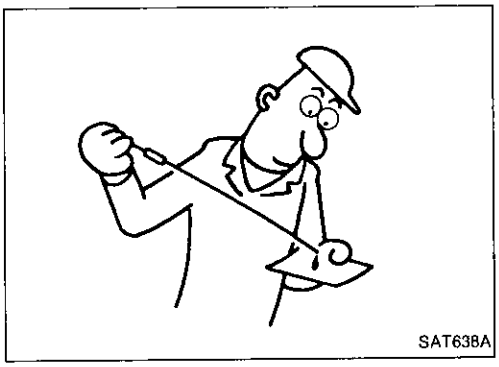
Fluid leakage check

1. Clean area suspected of leaking, — for example, mating surface of converter housing and transmission case.
2. Start engine, apply foot brake, place selector lever in "D" position and wait a few minutes.
3. Stop engine.


SAT801A

4. Check for fresh leakage.

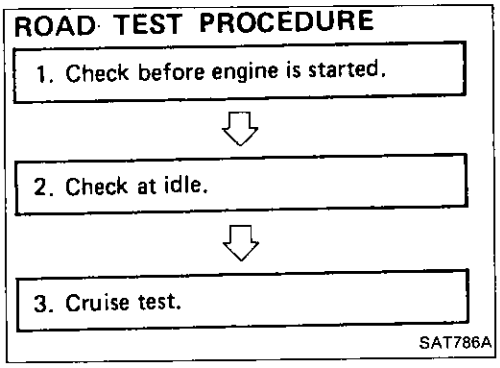
Fluid condition check


SAT638A

Fluid color	Suspected problem
Dark or black with burned odor	Wear of frictional material
Milky pink	Water contamination — Road water entering through filler tube or breather
Varnished fluid, light to dark brown and tacky	Oxidation — Over or under filling, overheating

Fluid level check — Refer to section MA.

ROAD TESTING

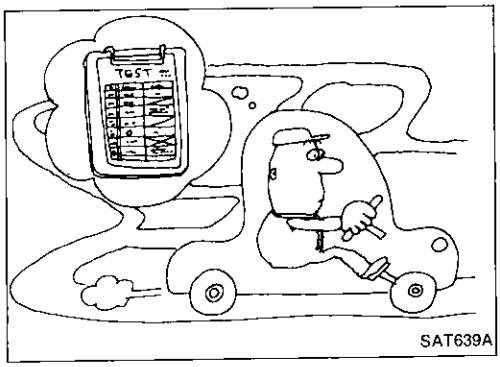


SAT786A

Description

- The purpose of this road test is to determine overall performance of automatic transmission and analyze causes of problems.
- The road test consists of the following three parts:

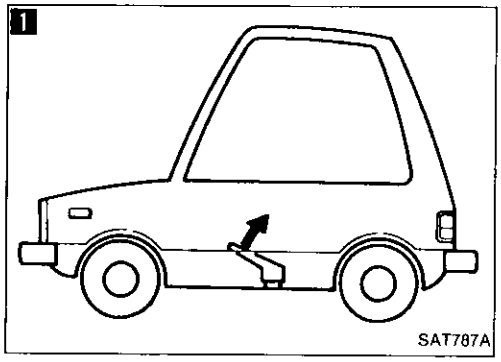
1. Check before engine is started
2. Check at idle
3. Cruise test


SAT639A

- Before road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items. Troubleshoot items which check out No Good after road test. Refer to "Self-diagnosis" and "Diagnostic Procedure".

Preliminary Check (Cont'd)

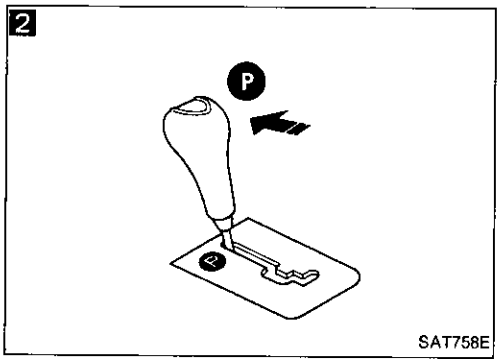
1. Check before engine is started



1

Park vehicle on flat surface.





2

Move selector lever to "P" position.

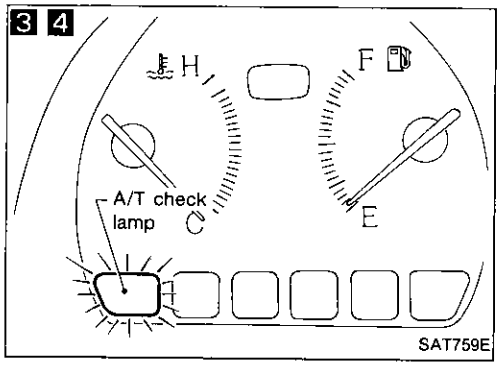


3

Does A/T check lamp come on for about 2 seconds?

No → Go to Diagnostic Procedure 1.

Yes



4

Does A/T check lamp flicker for about 8 seconds?

Yes → Perform self-diagnosis. — Refer to SELF-DIAGNOSIS PROCEDURE.

No

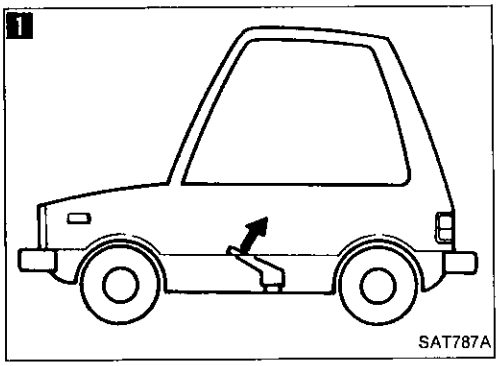


Perform self-diagnosis. — Refer to SELF-DIAGNOSIS PROCEDURE and note N.G. items.

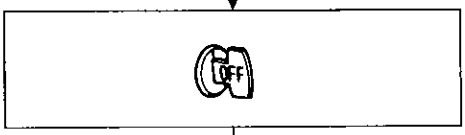
Go to "ROAD TESTING — 2. Check at idle".

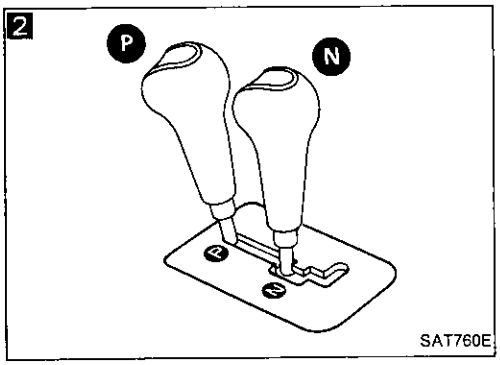
Preliminary Check (Cont'd)

2. Check at idle

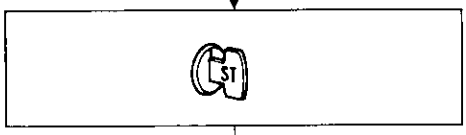


1. Park vehicle on flat surface.





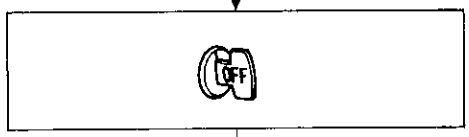
2. Move selector lever to "P" or "N" position.

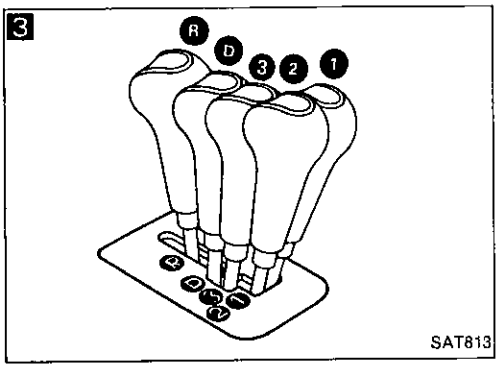


Is engine started?

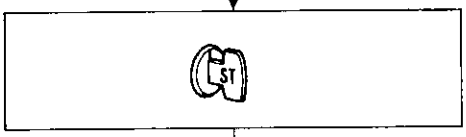
No → Go to Diagnostic Procedure 2.

Yes





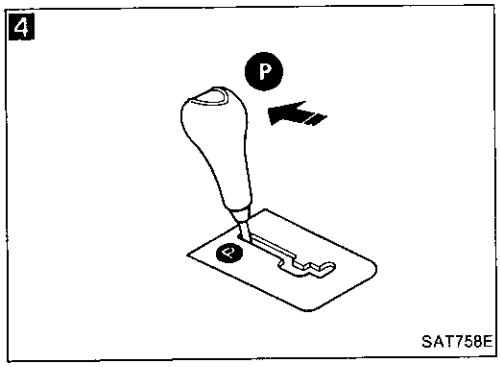
3. Move selector lever to "D", "1", "2", "3" or "R" position.

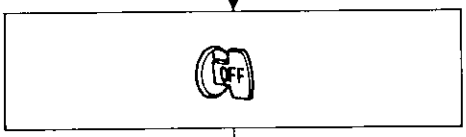


Is engine started?

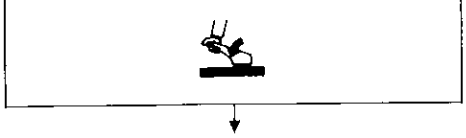
Yes → Go to Diagnostic Procedure 2.

No



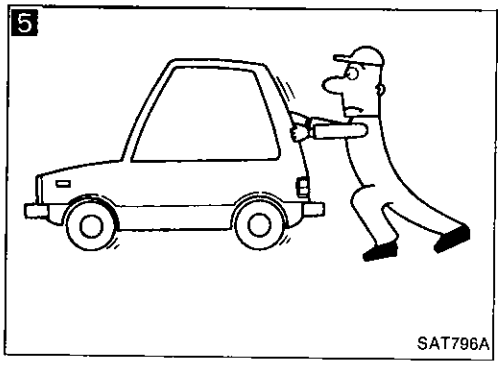


4. Move selector lever to "P" position.



Ⓐ

Preliminary Check (Cont'd)

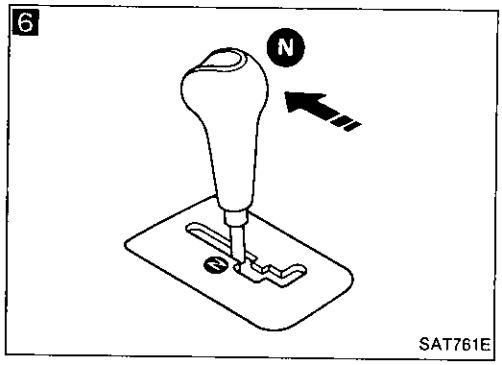

SAT796A

Ⓐ

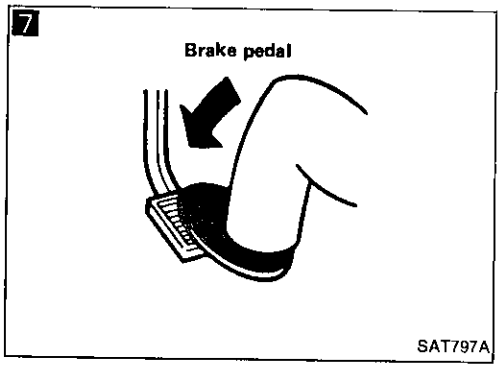
5 Push vehicle forward or backward.

Does vehicle move when it is pushed forward or backward? — Yes → Go to Diagnostic Procedure 3.

No


SAT761E

6 Move selector lever to "N" position.

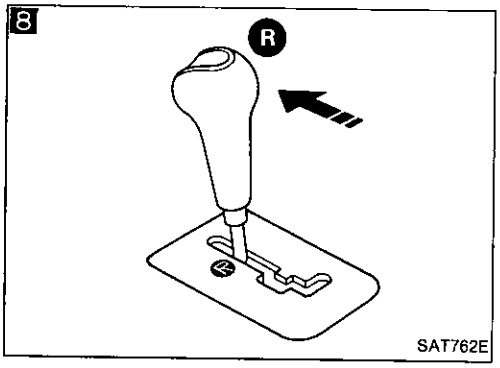


SAT797A

Does vehicle move forward or backward. — Yes → Go to Diagnostic Procedure 4.

No

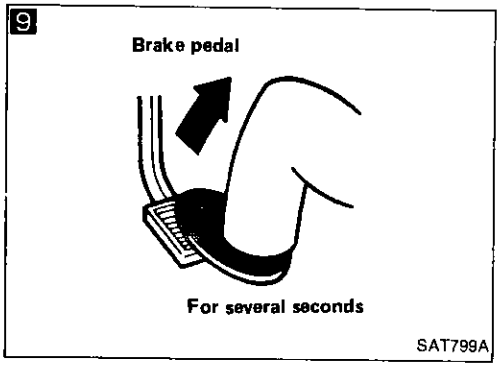
7 Apply foot brake.


SAT762E

8 Move selector lever to "R" position.

Is there large shock when changing from "N" to "R" position? — Yes → Go to Diagnostic Procedure 5.

No



SAT799A

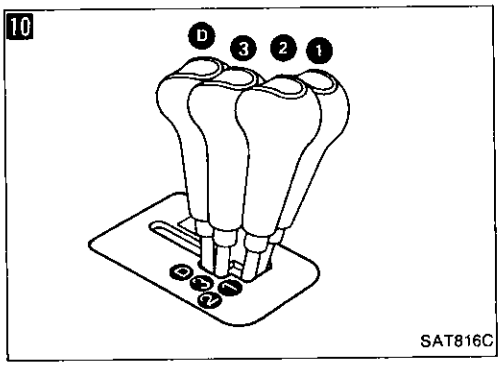
9 Release foot brake for several seconds.

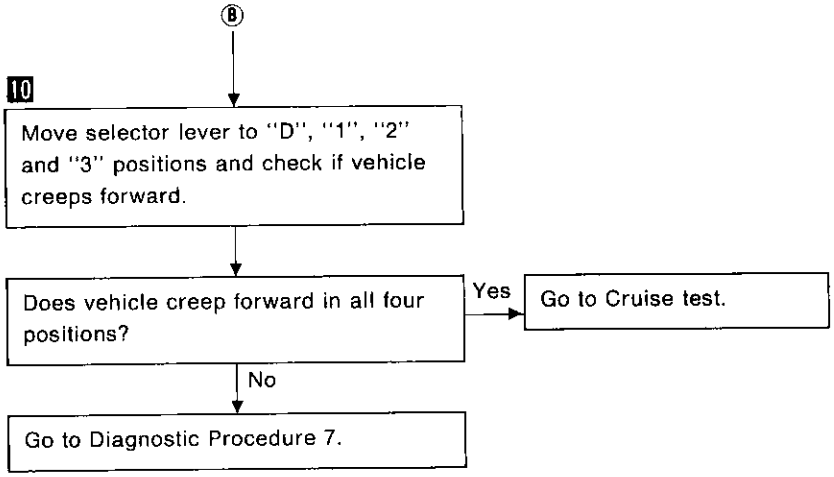
Does vehicle creep backward when foot brake is released? — No → Go to Diagnostic Procedure 6.

Yes

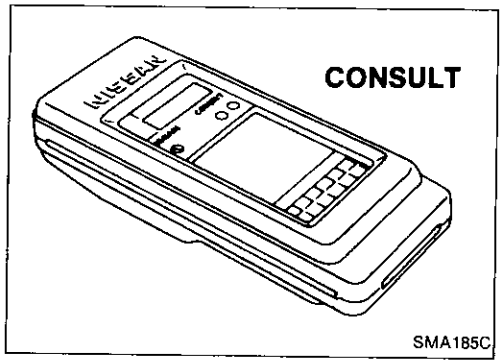
Ⓑ

Preliminary Check (Cont'd)





Preliminary Check (Cont'd)



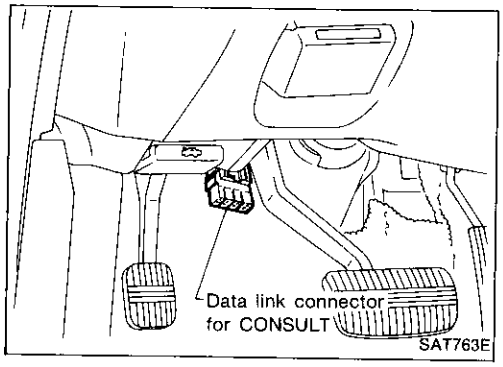
3. Cruise test

With CONSULT

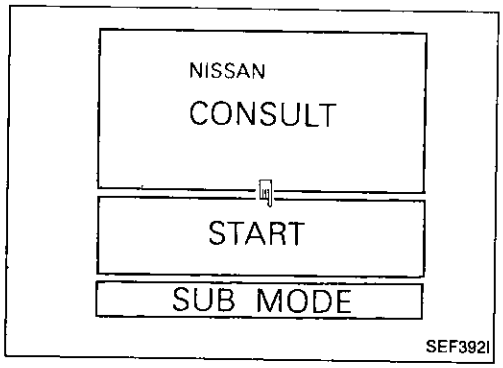
- Using CONSULT, conduct a cruise test and record the result.
- Print the result and ensure that shifts and lock-ups take place as per "Shift Schedule."
- Check all items listed in Parts 1 through 3.

CONSULT setting procedure

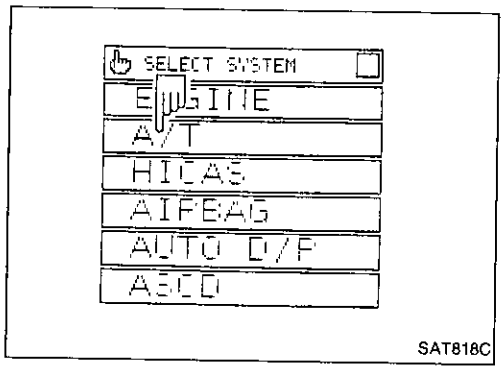
1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector for CONSULT. (Data link connector for CONSULT is located in left dash side panel.)



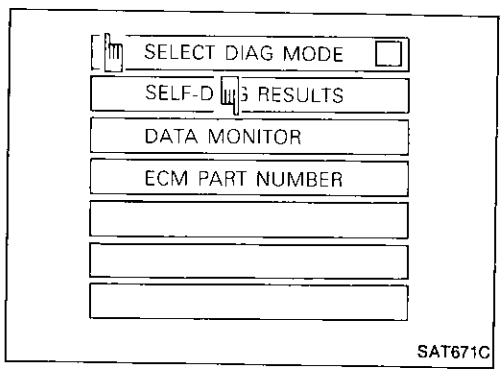
3. Turn on ignition switch.
4. Touch "START".



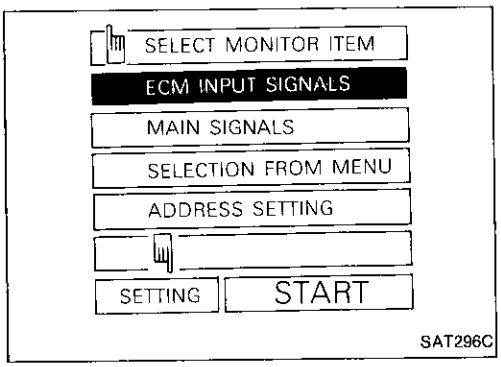
5. Touch "A/T".



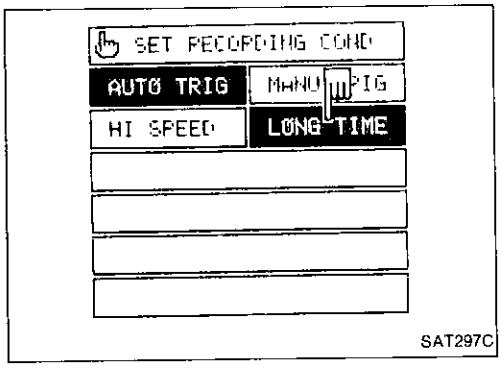
6. Touch "DATA MONITOR".



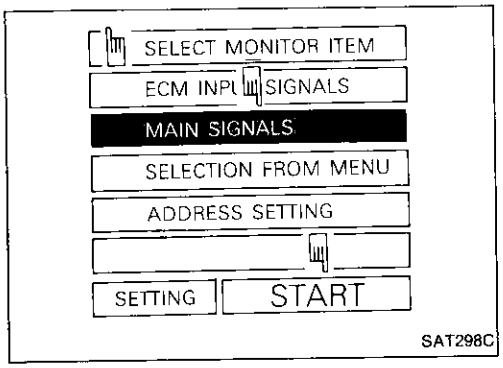
Preliminary Check (Cont'd)



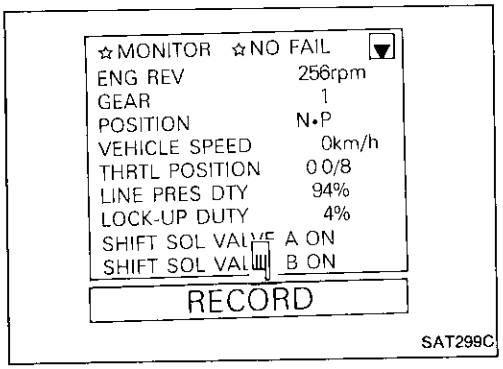
7. Touch "SETTING" to set recording condition.



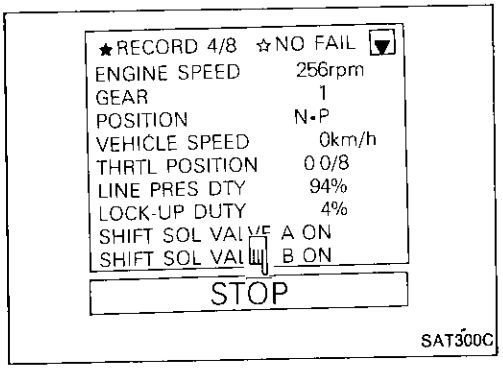
8. Touch "LONG TIME" and "ENTER" key.



9. Go back to SELECT MONITOR ITEM and touch "MAIN SIGNALS".
10. Touch "START".

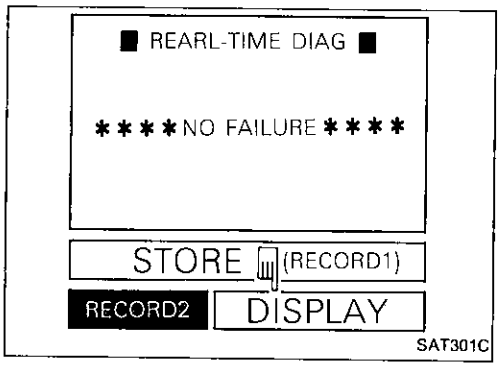


11. When performing cruise test, touch "RECORD".

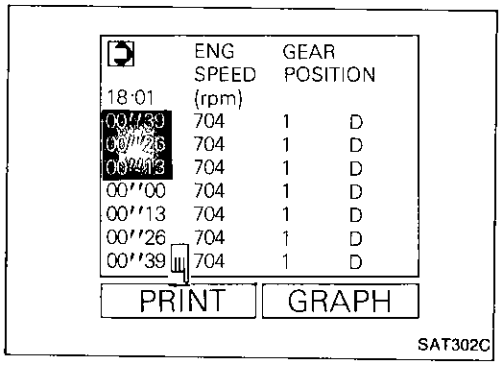


12. After finishing cruise test part 1, touch "STOP".

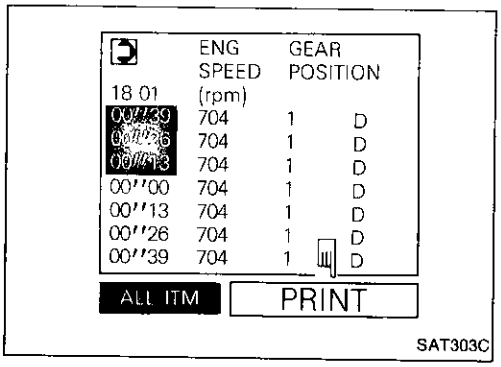
Preliminary Check (Cont'd)



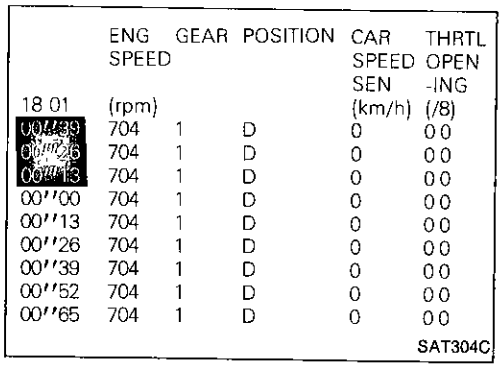
13. Touch "DISPLAY".



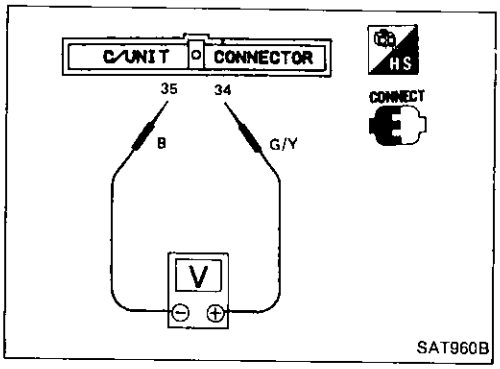
14. Touch "PRINT".



15. Touch "PRINT" again0



16. Check the monitor data printed out.
17. Continue cruise test part 2 and 3.

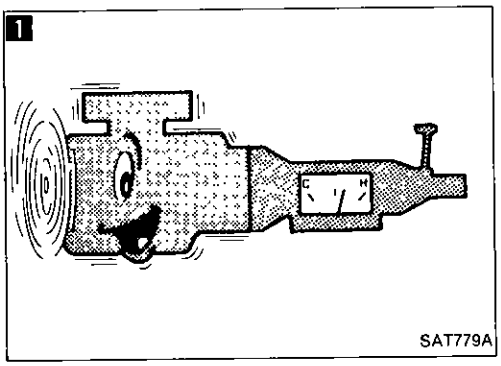


Without CONSULT

- Throttle position can be controlled by voltage across terminals ㉞ and ㉟ of A/T control unit.

Preliminary Check (Cont'd)

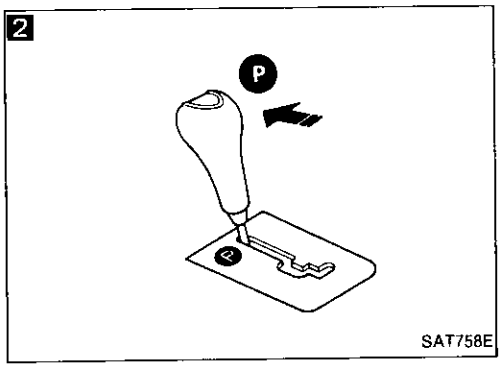
Cruise test — Part 1



1

Warm up engine until engine oil and A.T.F. reach operating temperature after vehicle has been driven approx. 10 minutes.

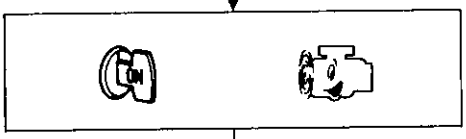
A.T.F. operating temperature:
50 - 80°C (122 - 176°F)

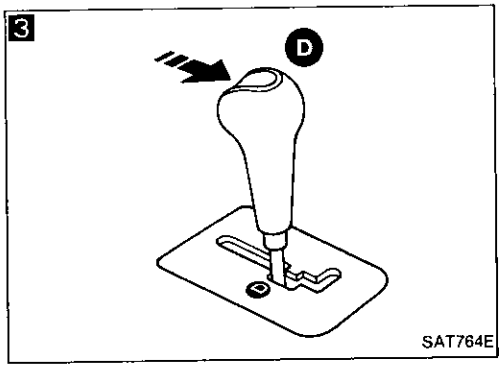


Park vehicle on flat surface.

2

Move selector lever to "P" position.



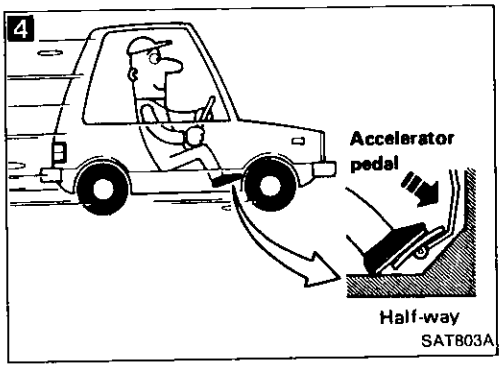


3

Move selector lever to "D" position.

4

Accelerate vehicle to half throttle.



Does vehicle start from D_2?

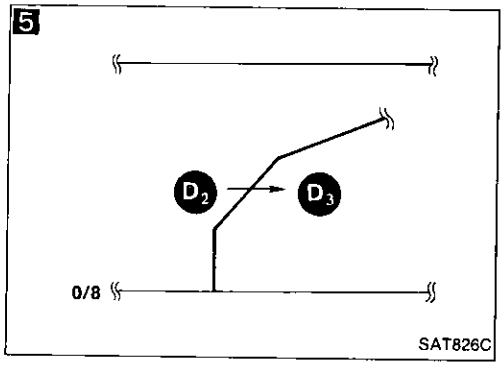
Read gear position.

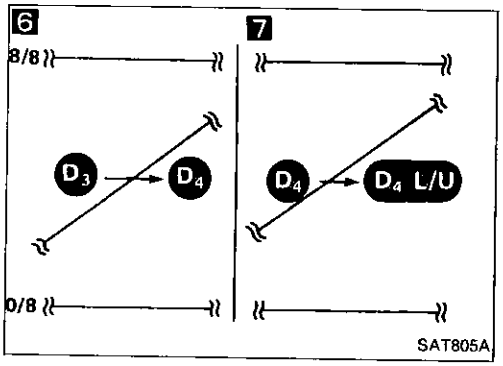
No → Go to Diagnostic Procedure 8.

Yes

Ⓐ

Preliminary Check (Cont'd)





Ⓐ

5

Does A/T shift from D_2 to D_3 at the specified speed?

Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D_2 to D_3:

Refer to Shift schedule.

No → Go to Diagnostic Procedure 10.

Yes

6

Does A/T shift from D_3 to D_4 at the specified speed?

Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D_3 to D_4:

Refer to Shift schedule.

No → Go to Diagnostic Procedure 11.

Yes

7

Does A/T perform lock-up at the specified speed?

Read vehicle speed, throttle opening when lock-up duty becomes 94%.

Specified speed when lock-up occurs:

Refer to Shift schedule.

No → Go to Diagnostic Procedure 12.

Yes

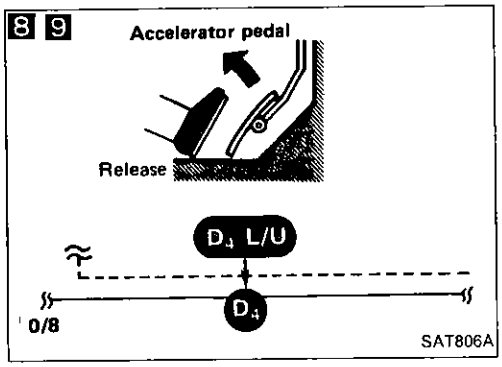
Does A/T hold lock-up condition for more than 30 seconds?

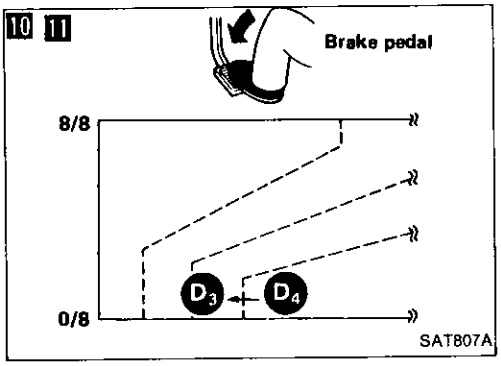
No → Go to Diagnostic Procedure 13.

Yes

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Preliminary Check (Cont'd)





Ⓑ

8

Release accelerator pedal.

9

Is lock-up released when accelerator pedal is released? — No → Go to Diagnostic Procedure 14.

Yes

10

Decelerate vehicle by applying foot brake lightly.

11

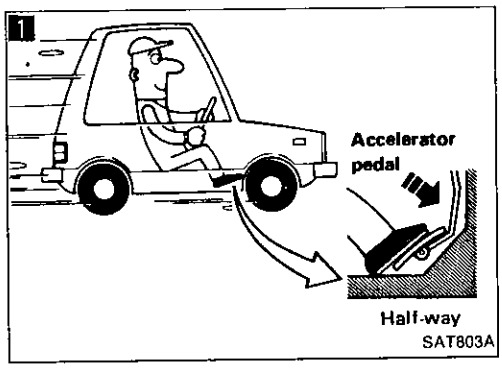
Does engine speed return to idle smoothly when A/T is shifted from D_4 to D_3? — No → Go to Diagnostic Procedure 15.

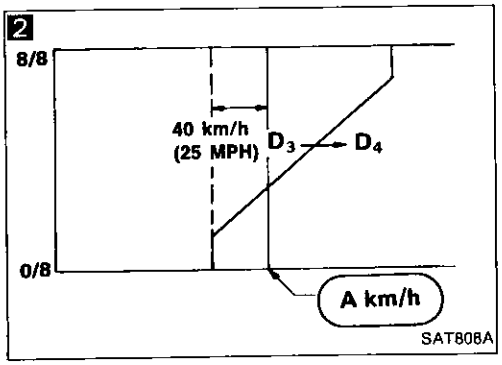
Read gear position and engine speed.

Yes

Stop vehicle.

Go to "Cruise test — Part 2"





Cruise test — Part 2

Confirm selector lever is in "D" position.

1

Accelerate vehicle to half throttle again.

Does vehicle start from D_2? — No → Go to Diagnostic Procedure 16.

Read gear position.

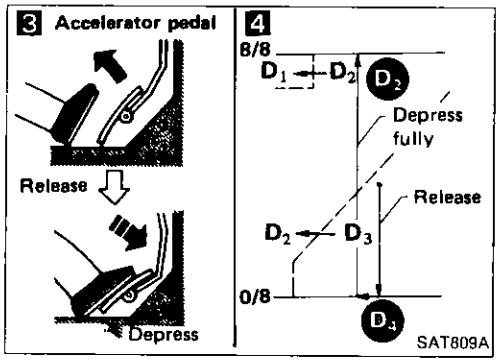
Yes

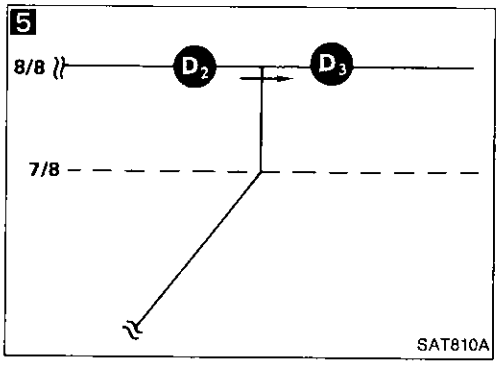
2

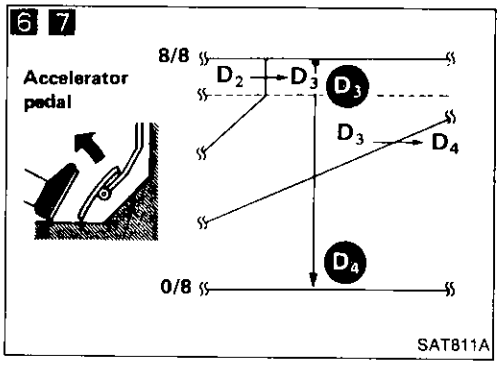
Accelerate vehicle to A km/h as shown in illustration.

Ⓐ

Preliminary Check (Cont'd)







Ⓐ

3 Release accelerator pedal and then quickly depress it fully.

4 Does A/T shift from D_4 to D_2 as soon as accelerator pedal is depressed fully?
Read gear position and throttle opening.
No → Go to Diagnostic Procedure 9.
Yes ↓

5 Does A/T shift from D_2 to D_3 at the specified speed?
Read gear position, throttle opening and vehicle speed.
Specified speed when shifting from D_2 to D_3:
Refer to Shift schedule.
No → Go to Diagnostic Procedure 10.
Yes ↓

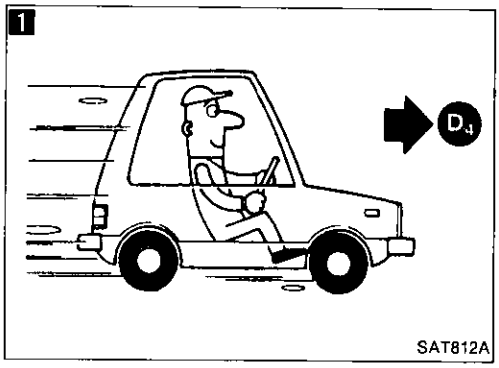
6 Release accelerator pedal after shifting from D_2 to D_3.

7 Does A/T shift from D_3 to D_4 and does vehicle decelerate by engine brake?
Read gear position, throttle opening and vehicle speed.
No → Go to Diagnostic Procedure 11.
Yes ↓

Stop vehicle.

Go to "Cruise test — Part 3".

Cruise test — Part 3

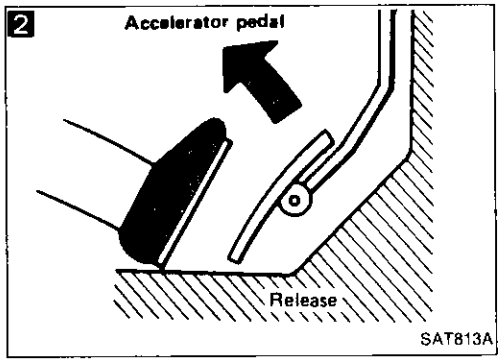


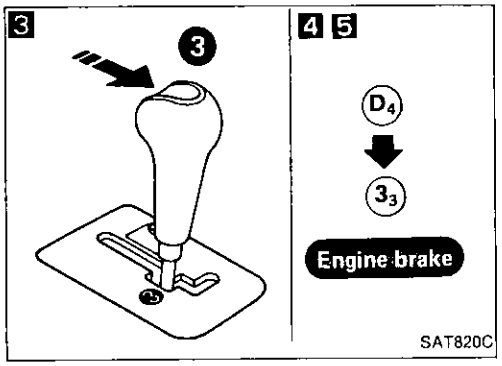
Confirm selector lever is in "D" position.

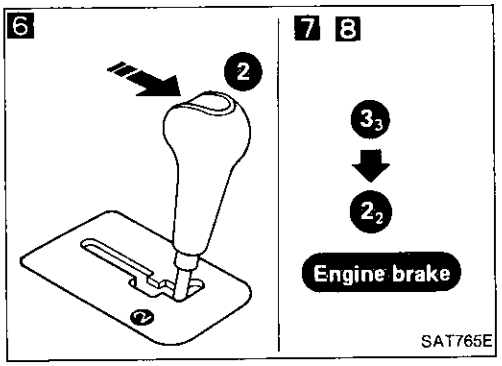
1 Accelerate vehicle, using half throttle, to D_4.

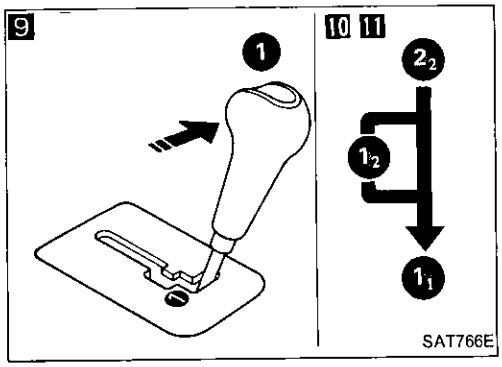
Ⓑ

Preliminary Check (Cont'd)









Ⓑ

2 Release accelerator pedal.

3 Move selector lever to "3" position.

4 Does A/T shift from D_4 to 3_3?
Read gear position and vehicle speed.
No → Go to Diagnostic Procedure 18.
Yes

5 Does vehicle decelerate by engine brake?
No → Go to Diagnostic Procedure 15.
Yes

6 Move selector lever from "3" to "2" position while driving in 3_3.

7 Does A/T shift from 3_3 to 2_2?
Read gear position.
No → Go to Diagnostic Procedure 19.
Yes

8 Does vehicle decelerate by engine brake?
No → Go to Diagnostic Procedure 15.
Yes

9 Move selector lever from "2" to "1" position while driving in 2_2.

10 Does A/T shift from 2_2 to 1_1 position?
Read gear position.
No → Go to Diagnostic Procedure 20.
Yes

11 Does vehicle decelerate by engine brake?
No → Go to Diagnostic Procedure 21.
Yes

Stop vehicle.

Perform self-diagnosis. — Refer to SELF-DIAGNOSIS PROCEDURE.

Preliminary Check (Cont'd)

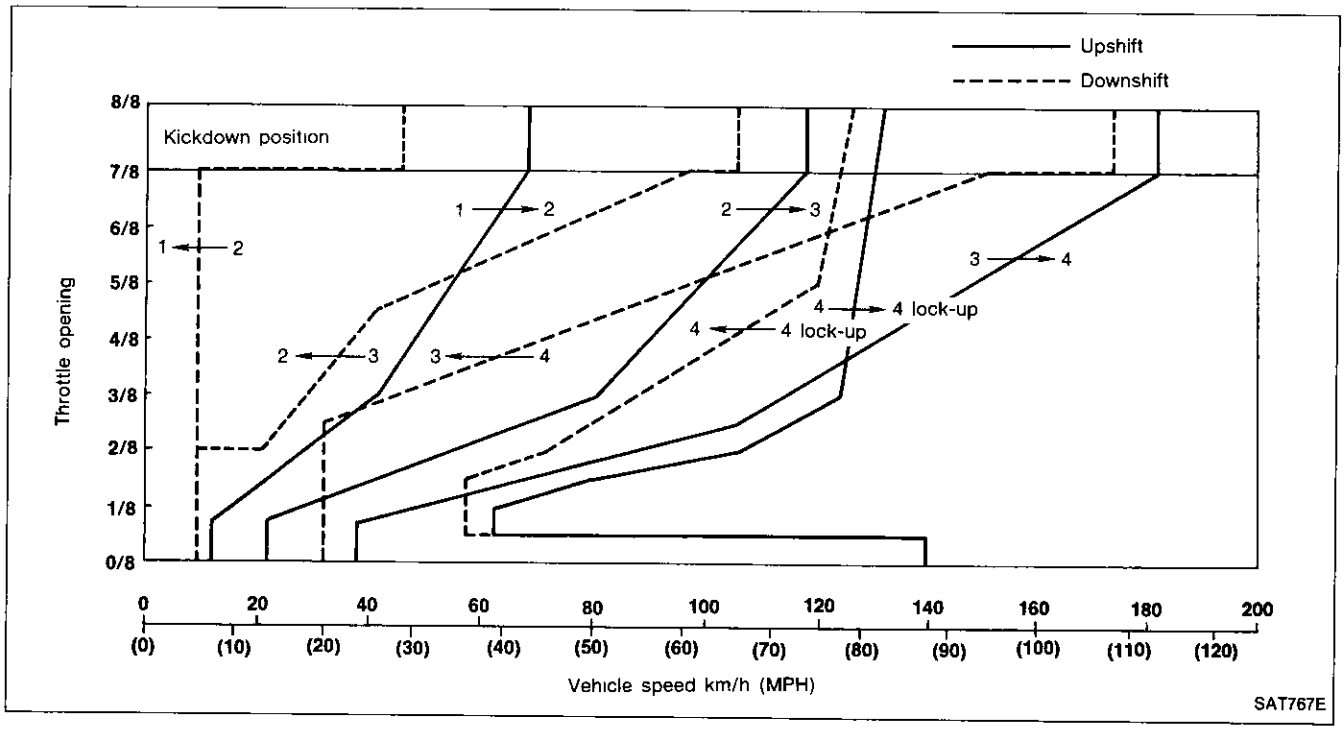
Vehicle speed when shifting gears

Throttle position	Vehicle speed km/h (MPH)					
	$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$
Full throttle	66 - 70 (41 - 43)	114 - 122 (71 - 76)	177 - 187 (110 - 116)	170 - 178 (106 - 111)	102 - 110 (63 - 68)	44 - 48 (27 - 30)
Half throttle	47 - 51 (29 - 32)	87 - 93 (54 - 58)	127 - 134 (79 - 83)	68 - 76 (42 - 47)	26 - 32 (16 - 20)	7 - 11 (4 - 7)

Vehicle speed when performing and releasing lock-up

Throttle position	O.D. switch [Shift position]	Vehicle speed km/h (MPH)	
		Lock-up "ON"	Lock-up "OFF"
Full throttle	ON [D_4]	178 - 186 (111 - 116)	170 - 178 (106 - 111)
Half throttle	ON [D_4]	127 - 135 (79 - 84)	100 - 108 (62 - 67)

Shift schedule



Diagnosis by CONSULT

NOTICE

1. The CONSULT electrically displays shift timing and lock-up timing (that is, operation timing of each solenoid).
   When a noticeable time difference occurs between shift timing which is manifested by shift shock and the CONSULT display, mechanical parts (except solenoids, sensors, etc.) are considered to be malfunctioning. Check mechanical parts using applicable diagnostic procedures.
2. Shift schedule (which implies gear position) displayed on CONSULT and that indicated in Service Manual may differ slightly. This occurs because of the following reasons:
   - Actual shift schedule has more or less tolerance or allowance,
   - Shift schedule indicated in Service Manual refers to the point where shifts starts, and
   - Gear position displayed on CONSULT indicates the point where shifts are completed.
3. Shift solenoid valve "A" or "B" is displayed on CONSULT at the start of shifting while gear position is displayed upon completion of shifting (which is computed by A/T control unit).

DATA MONITOR APPLICATION

Item	Application
Vehicle speed sensor 1 (A/T)	X
Vehicle speed sensor 2 (meter)	X
Throttle position sensor	X
Fluid temperature sensor	X
Battery voltage	X
Engine speed	X
Turbine revolution sensor	X
Selector lever switch (O.D. switch)	—
A.S.C.D. — cruise signal	X
A.S.C.D. — O.D. cut signal	X
Kickdown switch	X
Power shift switch	—
Closed throttle position switch	X
Wide open throttle position switch	X
Shift solenoid valve A	X
Shift solenoid valve B	X
Overrun clutch solenoid	X
*Shift solenoid valve A (feedback)	X
*Shift solenoid valve B (feedback)	X
*Overrun clutch solenoid valve (feedback)	X
Hold mode switch	—
1 position switch	X
2 position switch	X
3 position switch	X
D position switch	X
Park/neutral position switch	X
R position switch	X
Gear position	X
Range position	X
Vehicle speed	X
Throttle position	X
Line-pressure solenoid valve	X
Torque converter clutch solenoid valve	X

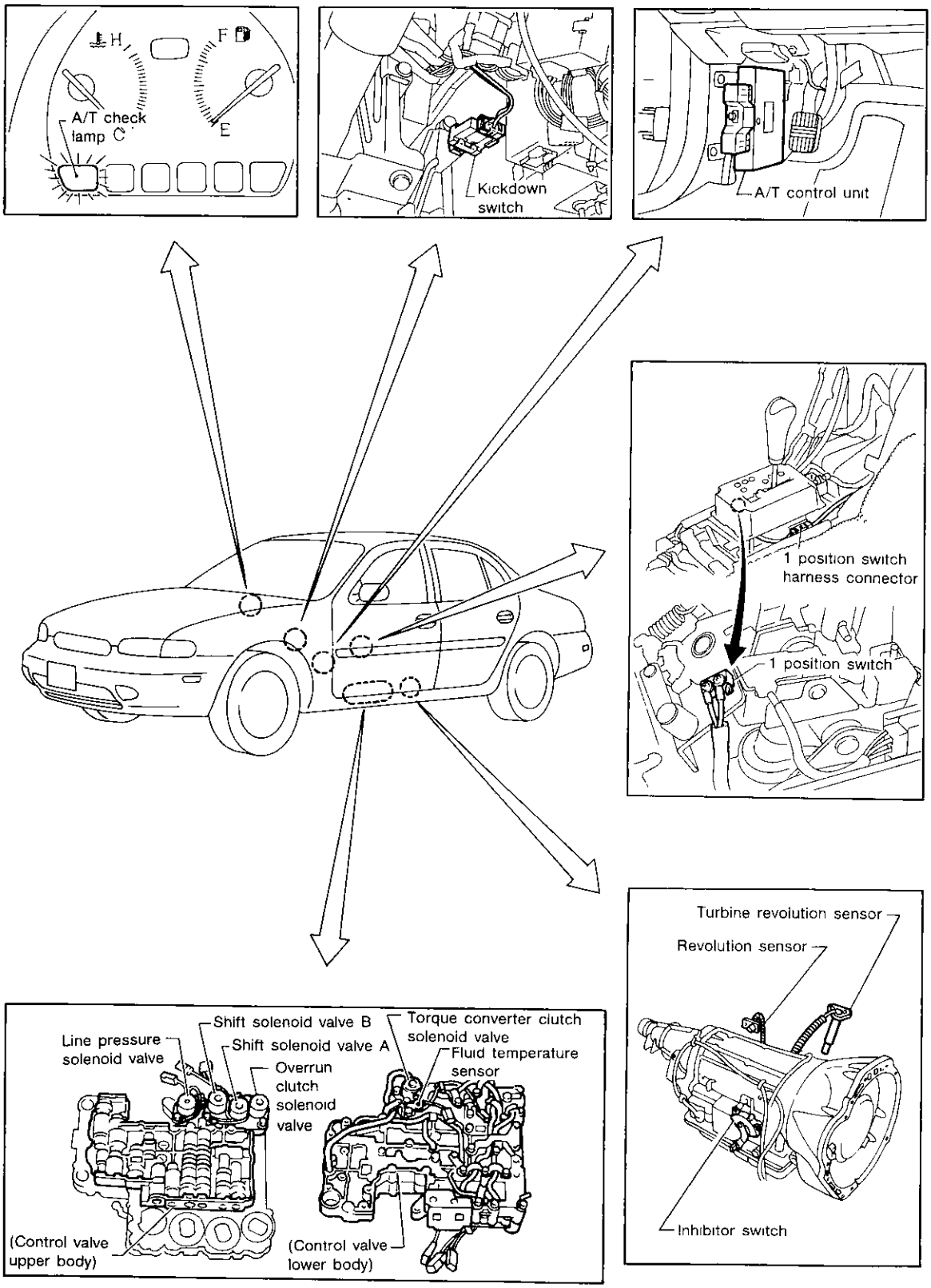
X: Applicable —: Not applicable

DATA ANALYSIS

Item	Display	Condition
Lock-up duty	Approximately 4% ↓ Approximately 94%	Lock-up "OFF" ↓ Lock-up "ON"
Line pressure duty	Approximately 29% ↓ Approximately 94%	Low line-pressure (Small throttle opening) ↓ High line-pressure (Large throttle opening)
Throttle position sensor	Approximately 0.5V	Fully-closed throttle
	Approximately 4V	Fully-open throttle
Fluid temperature sensor	Approximately 1.5V ↓ Approximately 0.5V	Cold [20°C (68°F)] ↓ Hot [80°C (176°F)]

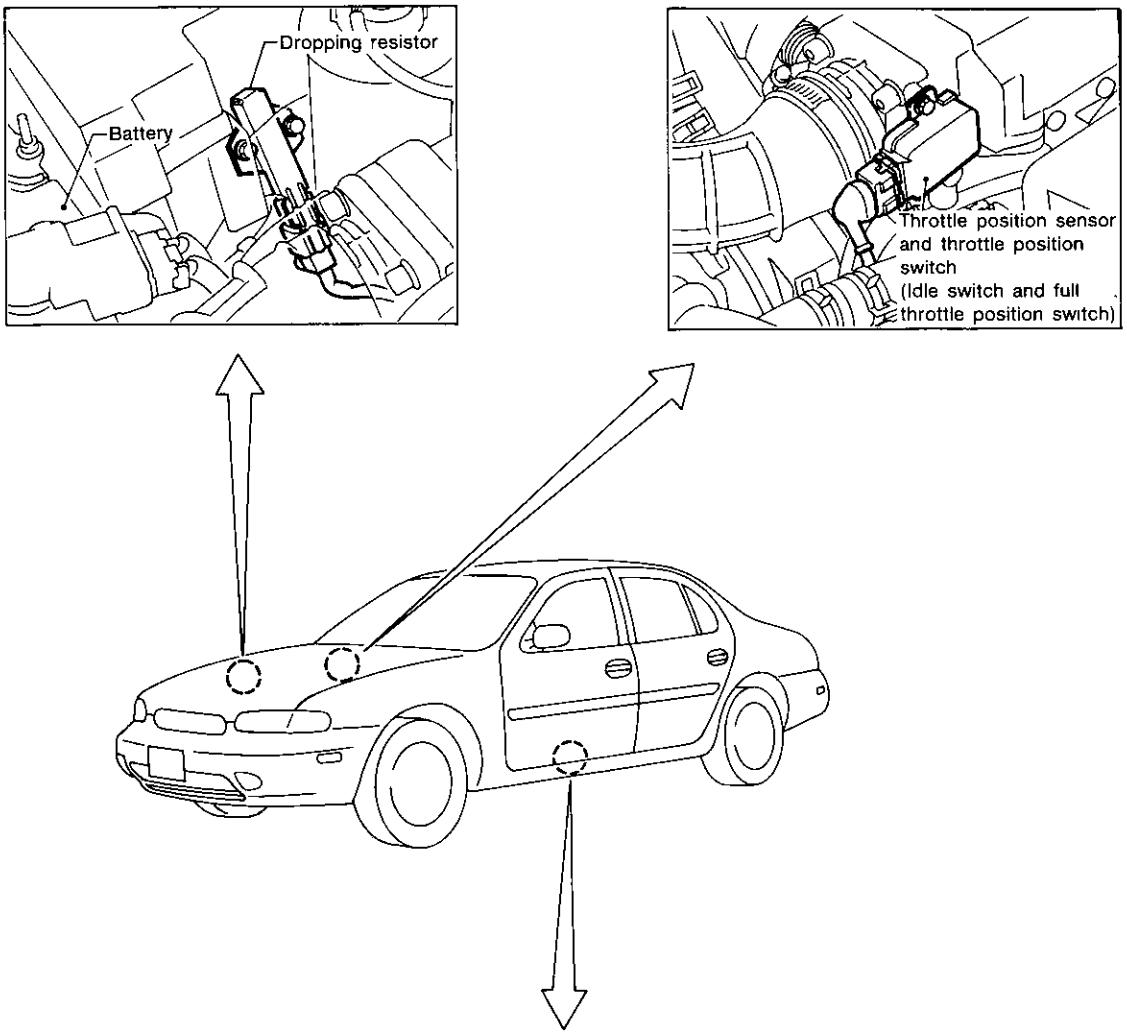
Gear position	1	2	3	4
Shift solenoid valve A	ON	OFF	OFF	ON
Shift solenoid valve B	ON	ON	OFF	OFF

A/T Electrical Parts Location



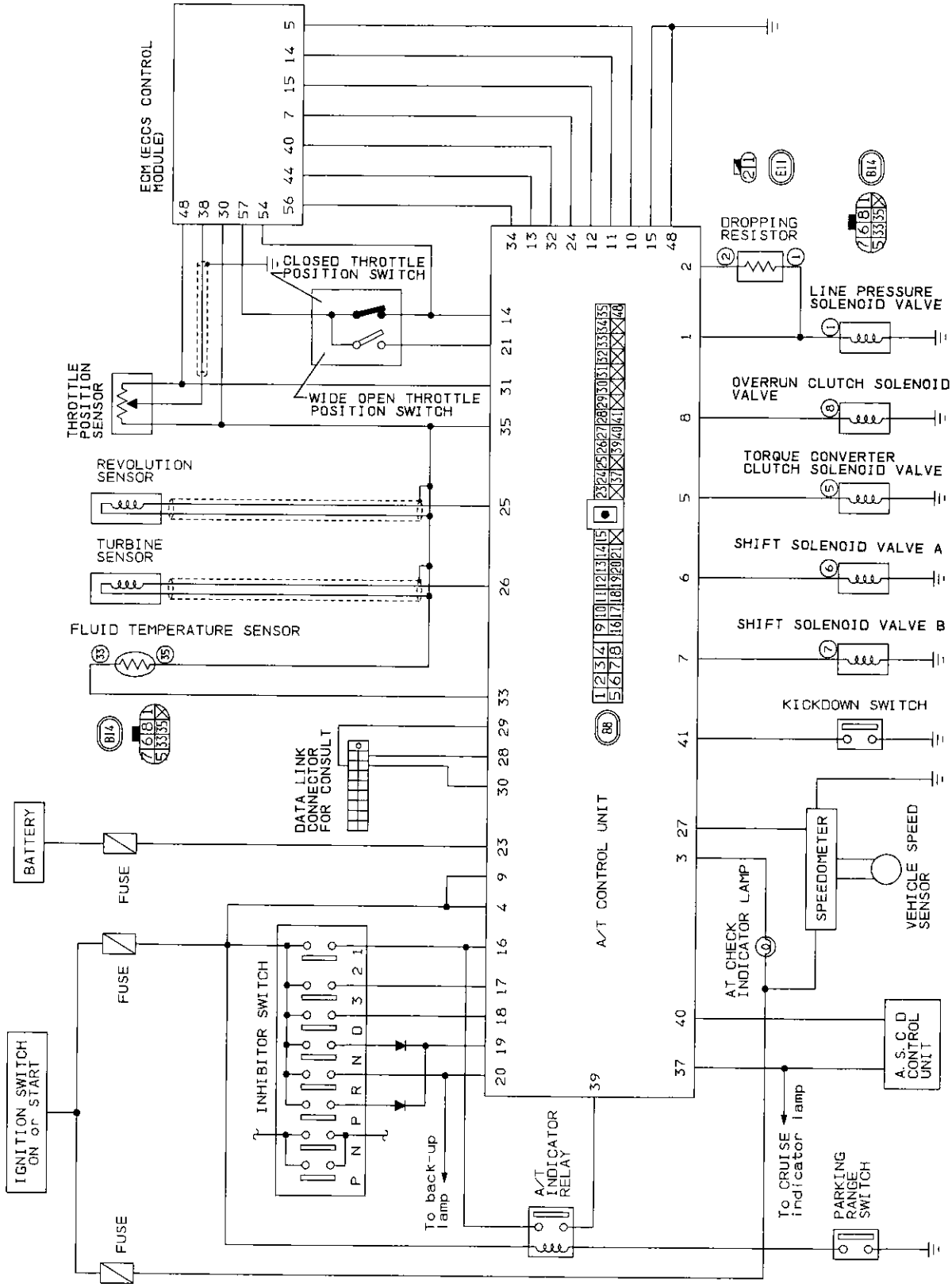
SAT769E

A/T Electrical Parts Location (Cont'd)



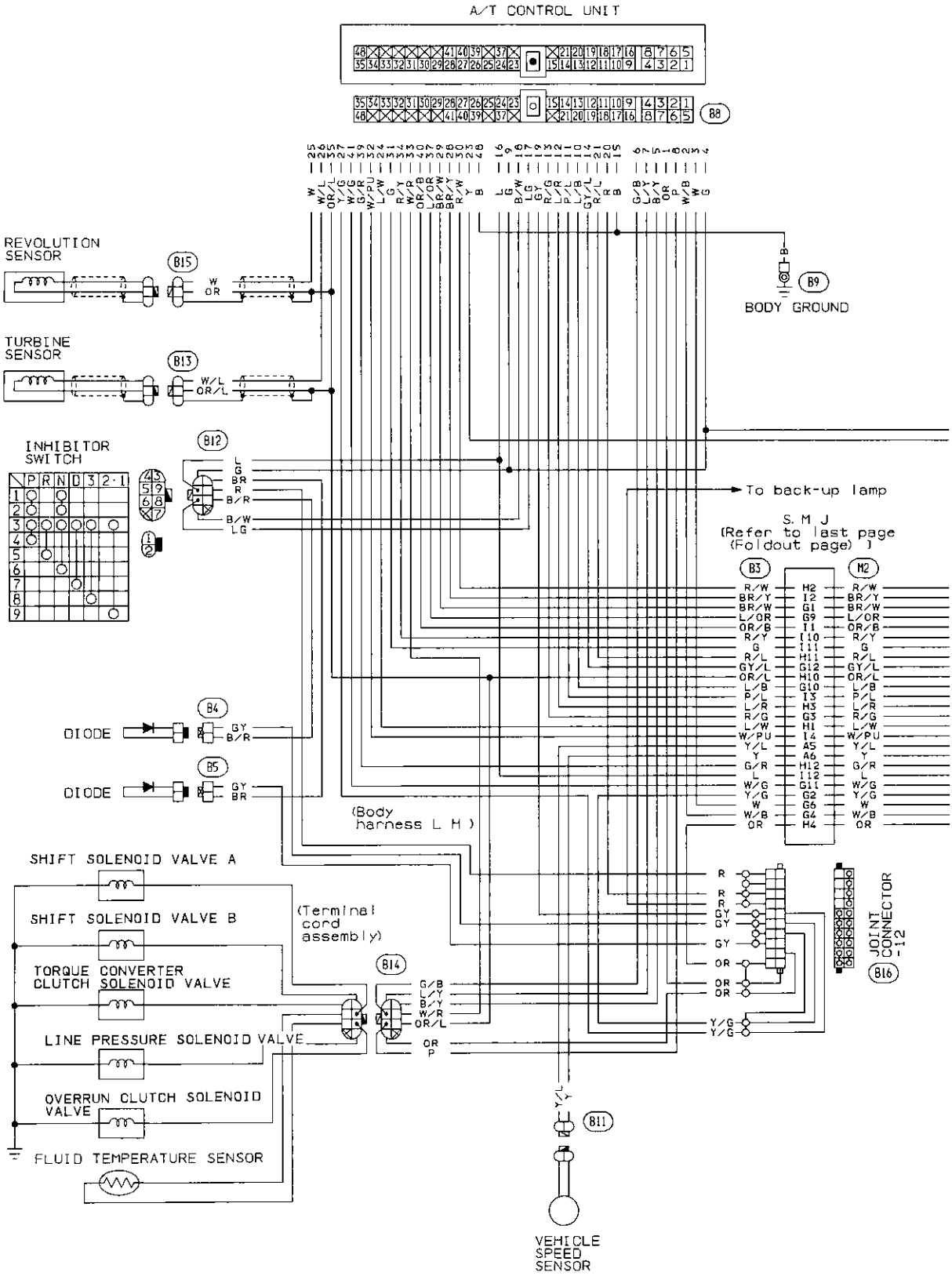
SAT773E

Circuit Diagram for Quick Pinpoint Check

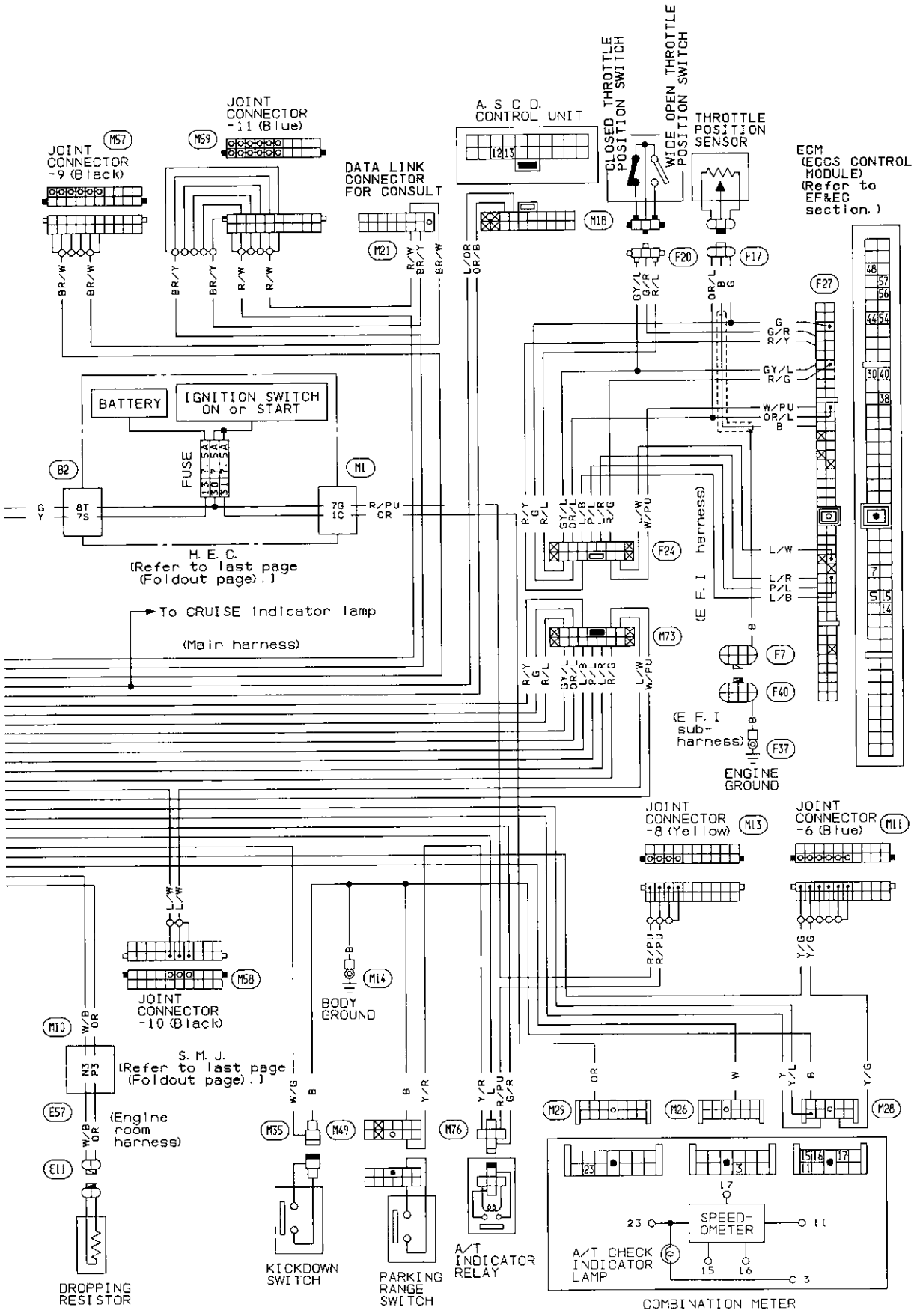


MAT053A

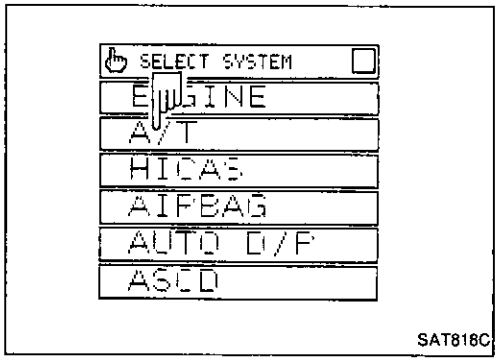
Wiring Diagram



Wiring Diagram (Cont'd)



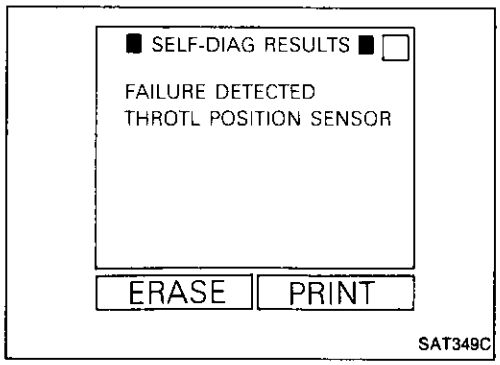
MAT054A



Self-diagnosis

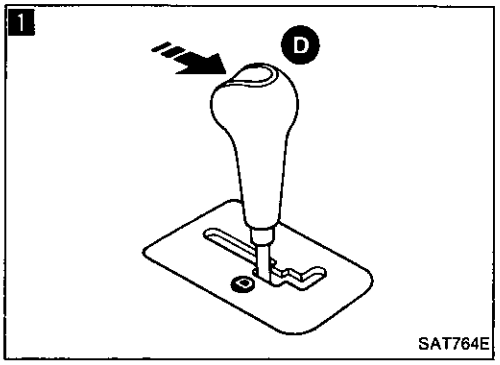
SELF-DIAGNOSTIC PROCEDURE (With CONSULT)

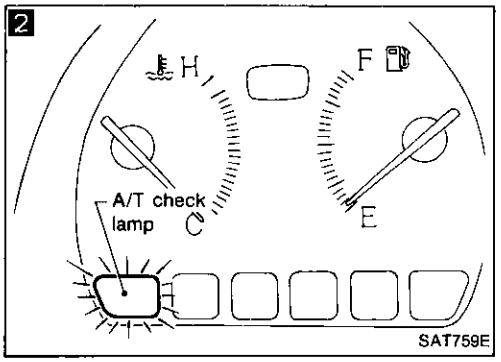
1. Turn on CONSULT.
2. Touch "A/T".

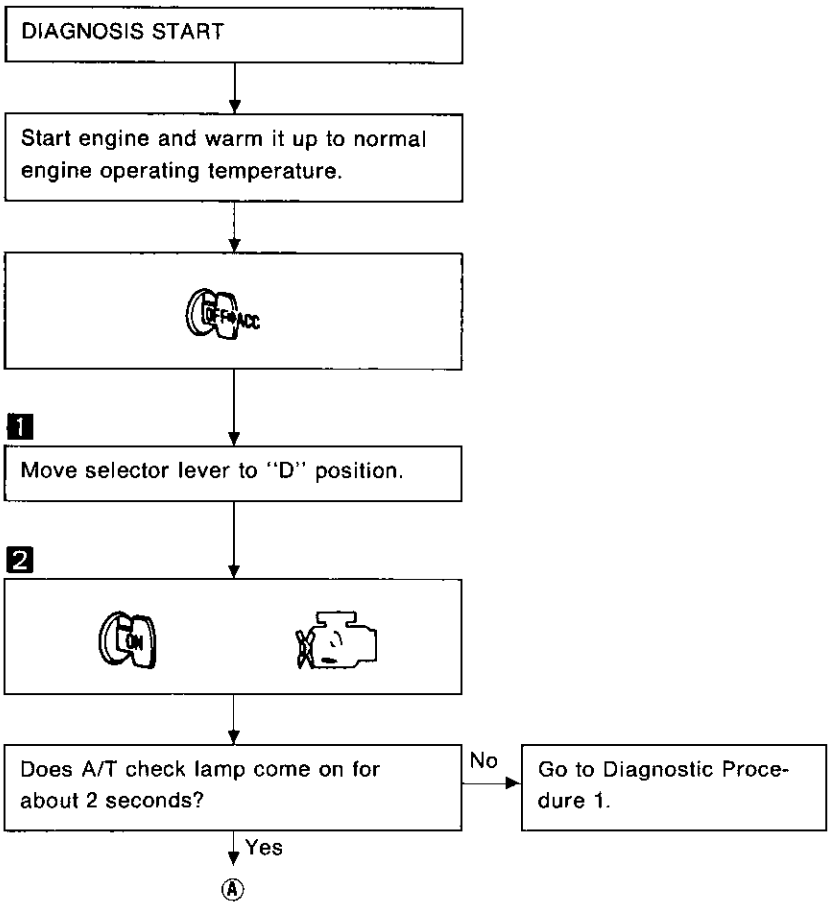


3. Touch "SELF-DIAGNOSIS".
   CONSULT performs REAL-TIME SELF-DIAGNOSIS.

SELF-DIAGNOSTIC PROCEDURE (Without CONSULT)

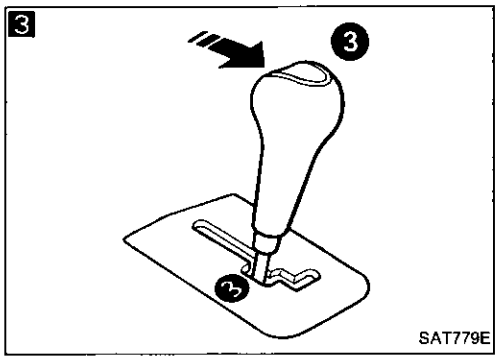




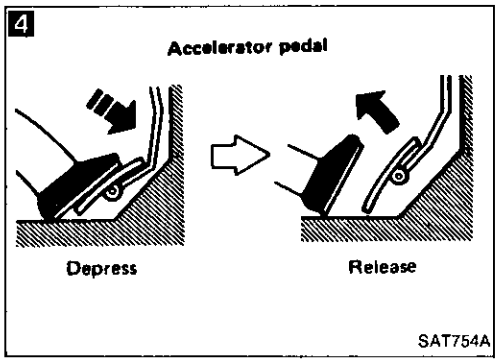


Self-diagnosis (Cont'd)

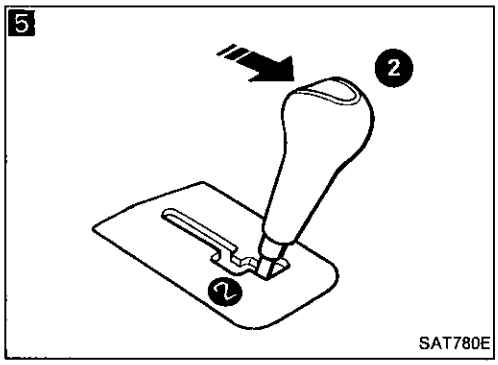
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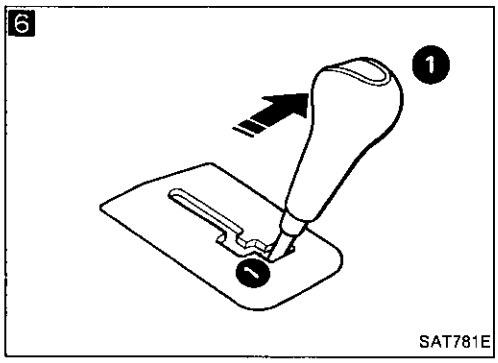
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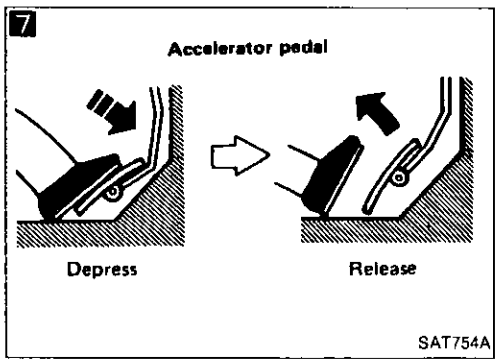
5



6



7



Ⓐ

3

Move selector lever to "3" position.

4

Depress accelerator pedal fully and release it.

5

Move selector lever to "2" position.

6

Move selector lever to "1" position.

7

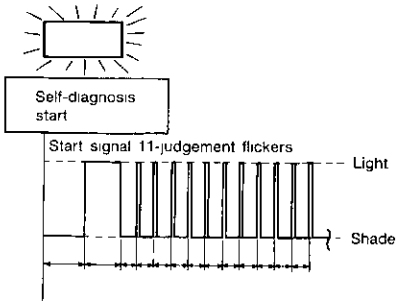
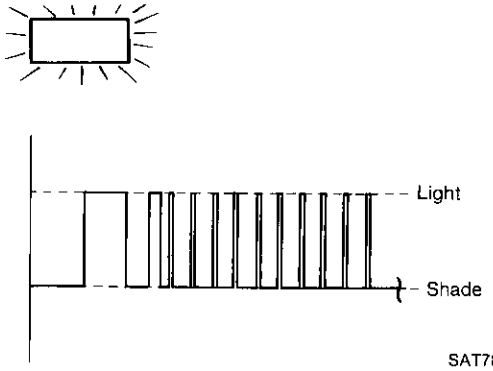
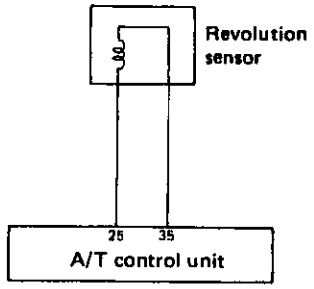
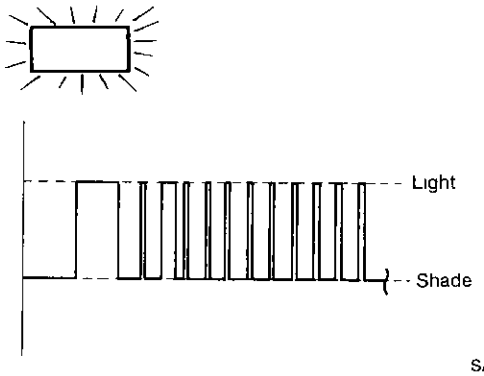
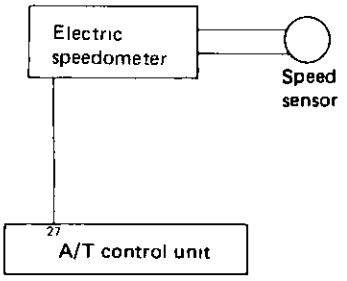
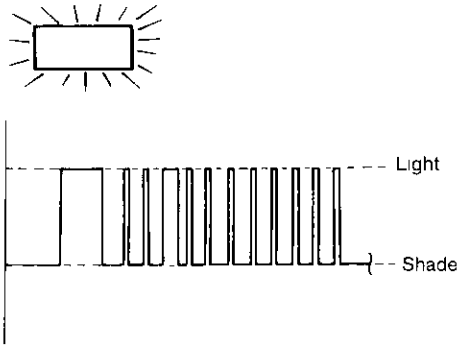
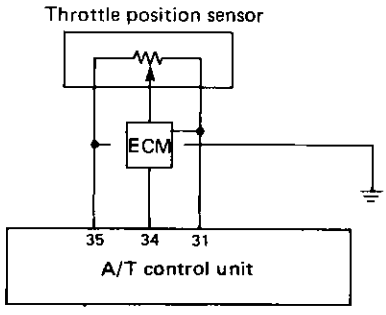
Depress accelerator pedal fully and release it.

Check A/T check lamp. Refer to JUDGMENT OF SELF-DIAGNOSIS CODE on next page.

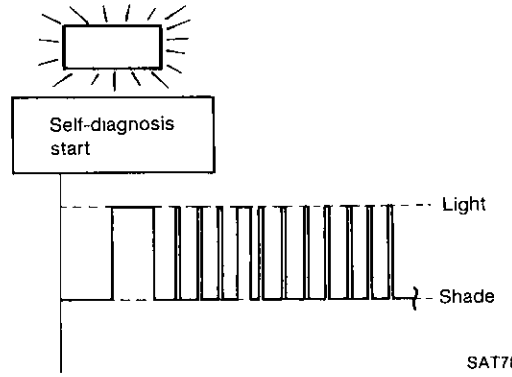
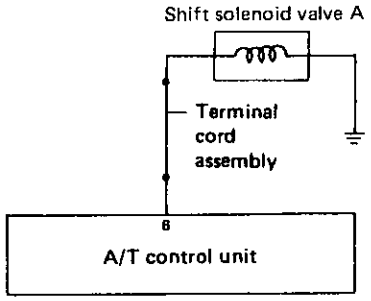
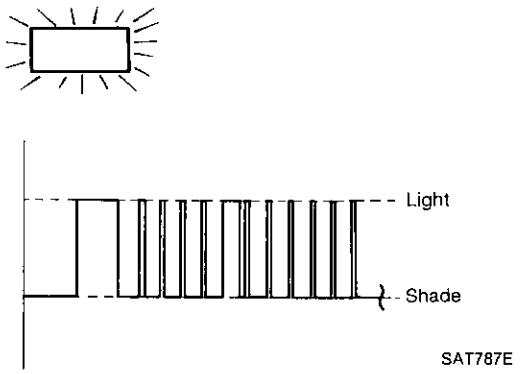
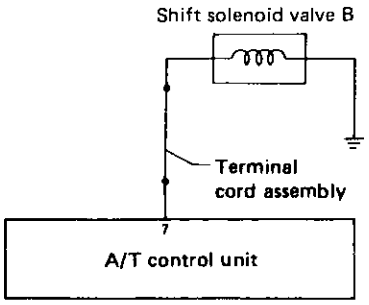
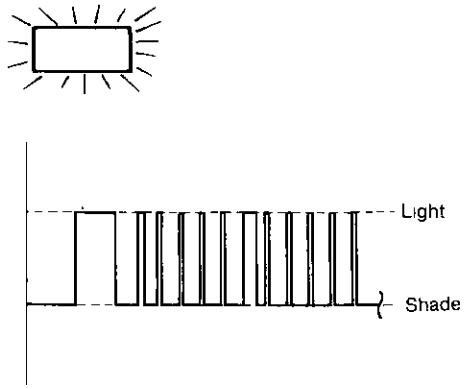
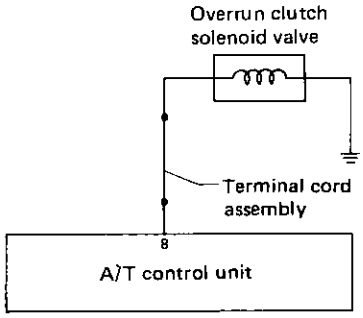
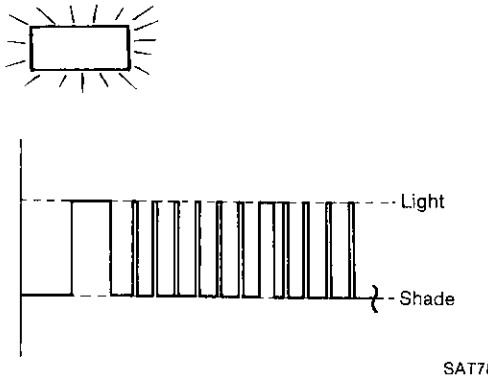
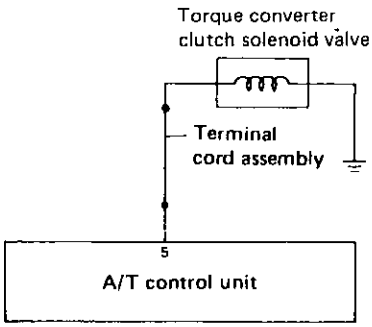
DIAGNOSIS END

Self-diagnosis (Cont'd)

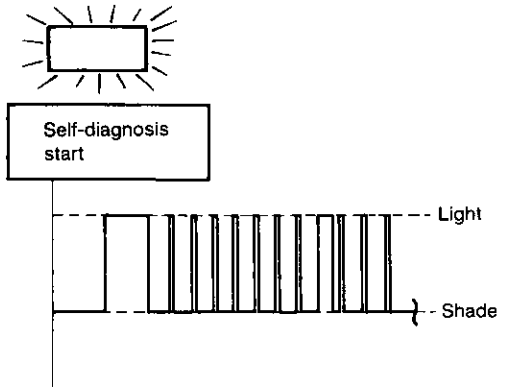
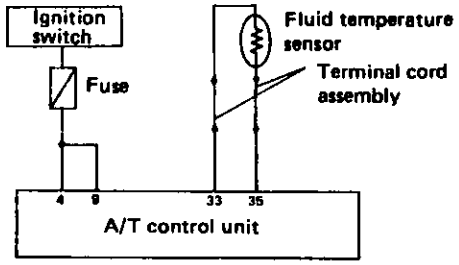
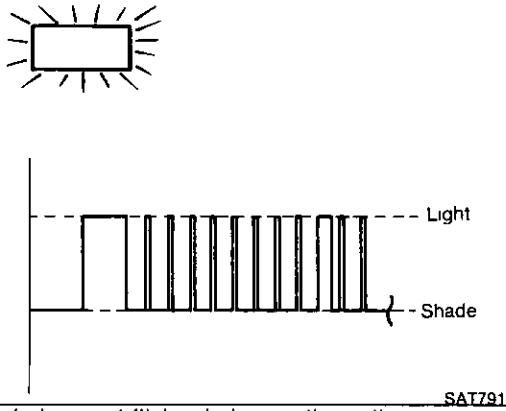
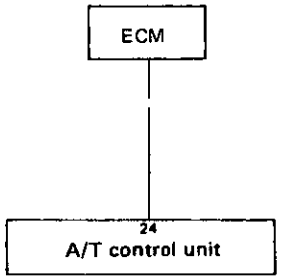
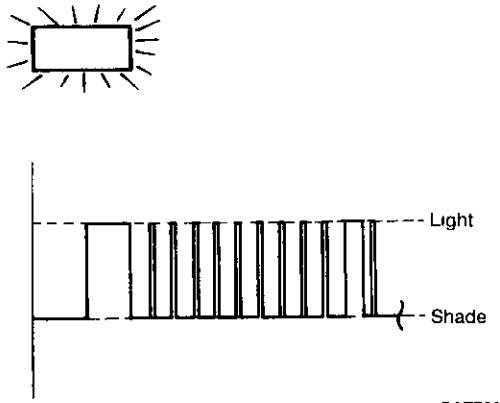
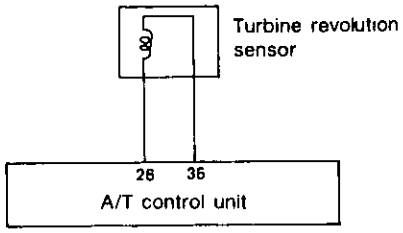
JUDGMENT OF SELF-DIAGNOSIS CODE

A/T check lamp	Damaged circuit
All judgement flickers are same.  SAT782E	All circuits that can be confirmed by self-diagnosis are O.K.
1st judgement flicker is longer than others.  SAT783E	Revolution sensor circuit is short-circuited or disconnected.  ➡ **Go to revolution sensor circuit check.** SAT965B
2nd judgement flicker is longer than others.  SAT784E	Speed sensor circuit is short-circuited or disconnected.  ➡ **Go to speed sensor circuit check.** SAT029E
3rd judgement flicker is longer than others.  SAT785E	Throttle position sensor circuit is short-circuited or disconnected.  ➡ **Go to throttle position sensor circuit check.** SAT967B

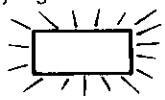
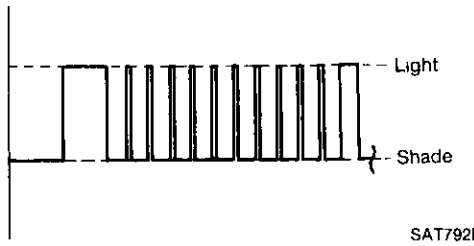
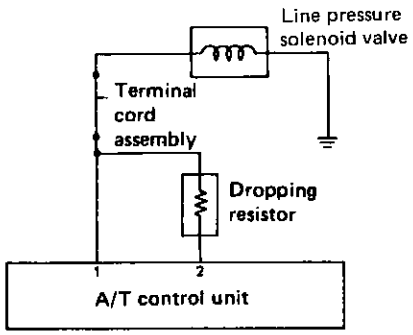
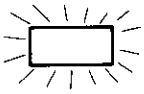
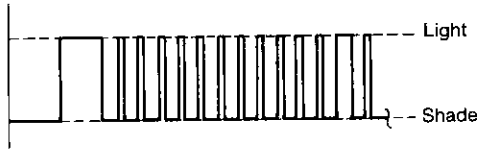
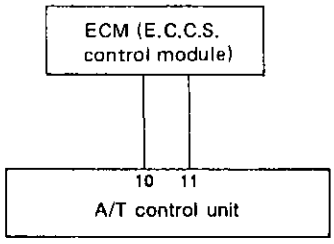
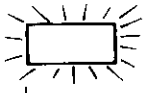
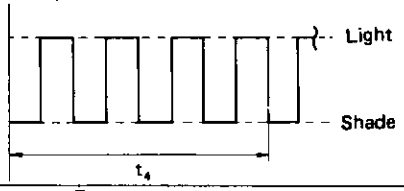
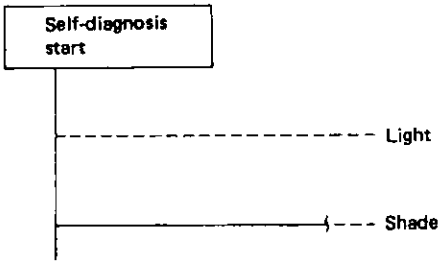
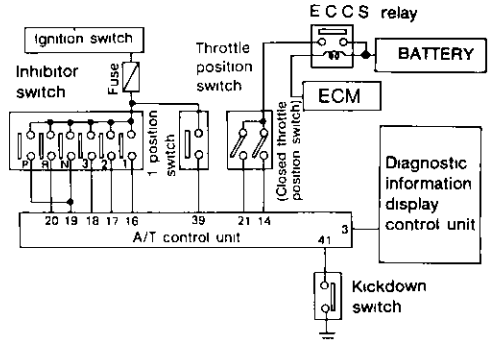
Self-diagnosis (Cont'd)

A/T check lamp	Damaged circuit
4th judgement flicker is longer than others. 	Shift solenoid valve A circuit is short-circuited or disconnected.  ➡**Go to shift solenoid valve A circuit check.** SAT968B
5th judgement flicker is longer than others. 	Shift solenoid valve B circuit is short-circuited or disconnected.  ➡**Go to shift solenoid valve B circuit check.** SAT969B
6th judgement flicker is longer than others. 	Overrun clutch solenoid valve circuit is short-circuited or disconnected.  ➡**Go to overrun clutch solenoid valve circuit check.** SAT970B
7th judgement flicker is longer than others. 	Torque converter clutch solenoid valve circuit is short-circuited or disconnected.  ➡**Go to torque converter clutch solenoid valve circuit check.** SAT971B

Self-diagnosis (Cont'd)

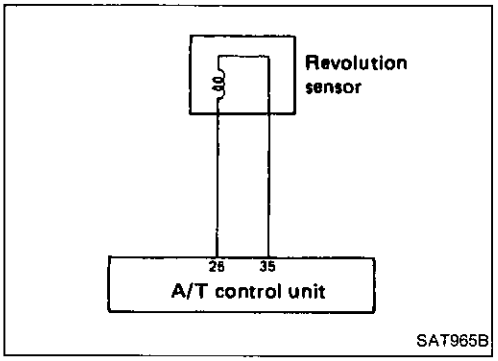
A/T check lamp	Damaged circuit
8th judgement flicker is longer than others.  SAT790E	Fluid temperature sensor is disconnected or A/T control unit power source circuit is damaged.  ➡ **Go to fluid temperature sensor and A/T control unit power source circuit check.** SAT972B
9th judgement flicker is longer than others.  SAT791E	Engine speed signal circuit is short-circuited or disconnected.  ➡ **Go to engine speed signal circuit check.** SAT973B
10th judgement flicker is longer than others.  SAT793E	Turbine revolution sensor circuit is short-circuited or disconnected.  ➡ **Go to turbine revolution sensor circuit check.** SAT843C

Self-diagnosis (Cont'd)

A/T check lamp	Damaged circuit
11th judgement flicker is longer than others.   SAT792E	Line pressure solenoid valve circuit is short-circuited or disconnected.  ➡ **Go to line pressure solenoid valve circuit check.** SAT974B
12th judgement flicker is longer than others.   SAT945F	Engine control circuit between A/T control unit and ECM (ECCS control module) is short-circuited or disconnected.  ➡ **Go to engine control circuit check.** SAT846C
Flickers as shown below.   SAT318C	Battery power is low. Battery has been disconnected for a long time. Battery is connected conversely. (When reconnecting A/T control unit connectors. — This is not a problem.)
Does not come on.   SAT146B	Inhibitor switch, 1 position switch, kickdown switch, closed throttle position switch or diagnostic information display system circuit is disconnected, or A/T control unit is damaged.  ➡ **Go to inhibitor switch,1 position switch, kickdown switch, closed throttle position switch, diagnostic information display system circuit checks.** SAT051E

Self-diagnosis (Cont'd)

REVOLUTION SENSOR CIRCUIT CHECK



CHECK REVOLUTION SENSOR. — Refer to "Electrical Components Inspection".

N.G. → Repair or replace revolution sensor.

O.K. ↓

A

CHECK INPUT SIGNAL.

1. 

2. 

- Select "ECM INPUT SIGNALS".
- Read out the value of "CAR SPEED SENSOR 1" while driving.
- Check the value changes according to driving speed.

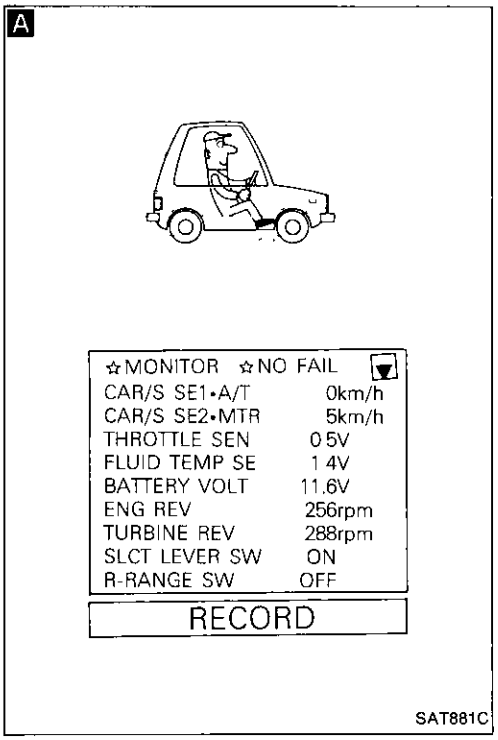
OR



Check voltage between A/T control unit terminal ㉕ and ground while driving.
(Measure with A.C. position.)
Voltage:
At 0 km/h (0 MPH):
0V
At 30 km/h (19 MPH):
1V or more
(Voltage rises gradually in response to vehicle speed.)

N.G. → Check harness continuity between A/T control unit and revolution sensor.

O.K. ↓

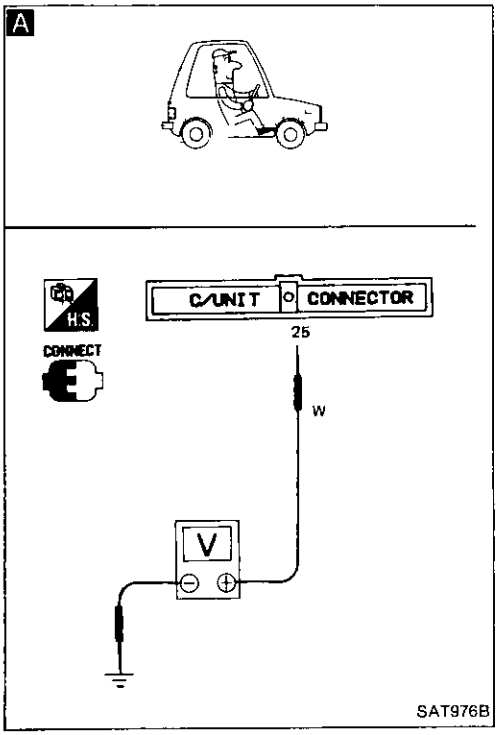


Perform self-diagnosis again after driving for a while.

N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

INSPECTION END



Self-diagnosis (Cont'd)

SPEED SENSOR CIRCUIT CHECK

A

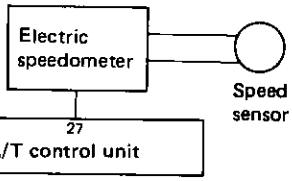


☆MONITOR	☆NO FAIL
CAR/S SE1•A/T	0km/h
CAR/S SE2•MTR	5km/h
THROTTLE SEN	0.5V
FLUID TEMP SE	1.4V
BATTERY VOLT	11.6V
ENG REV	256rpm
TURBINE REV	288rpm
SLCT LEVER SW	ON
R-RANGE SW	OFF

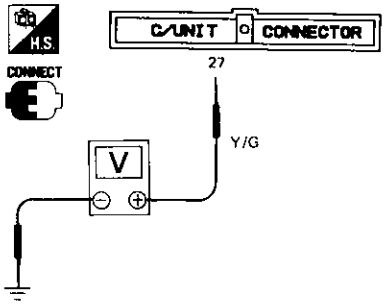
RECORD

SAT881C

A







SAT030E

A

CHECK INPUT SIGNAL.

1. 

2. ● Select "ECM INPUT SIGNALS".
● Read out the value of "CAR SPEED SENSOR 2" while driving.
● Check the value changes according to driving speed.

OR

● Check voltage between A/T control unit terminal ㉗ and ground while driving at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.
Voltage: Varies from 0V to 5V

N.G. → Check the following items.
- Speed sensor and ground circuit for speed sensor — Refer to section EL.
- Harness continuity between A/T control unit and speed sensor

O.K. ↓

Perform self-diagnosis again after driving for a while.

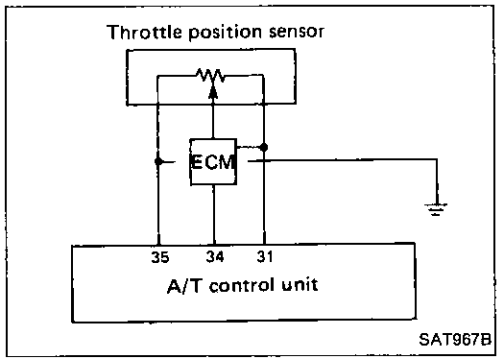
N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

INSPECTION END

Self-diagnosis (Cont'd)

THROTTLE POSITION SENSOR CIRCUIT CHECK



Perform self-diagnosis (Mode III) for engine control.

N.G. → Check throttle position sensor circuit for engine control. — Refer to section EF & EC.

O.K.

A

CHECK INPUT SIGNAL.

1. 

2.

- Select "ECM INPUT SIGNALS".
- Read out the value of "THROTTLE POSITION SENSOR".

Voltage:
Fully-closed throttle:
Approximately 0.5V
Fully-open throttle:
Approximately 4V

N.G. → Check harness continuity between ECM and A/T control unit regarding throttle position sensor circuit.

OR

- Check voltage between A/T control unit terminals ㉞ and ㉟ while accelerator pedal is depressed slowly.

Voltage:
Fully-closed throttle:
Approximately 0.5V
Fully-open throttle:
Approximately 4V
(Voltage rises gradually in response to throttle valve opening.)

O.K.

Perform self-diagnosis again after driving for a while.

N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

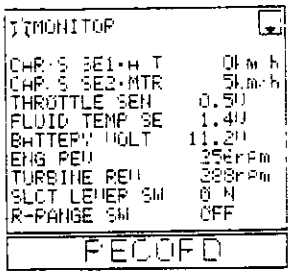
O.K.

INSPECTION END

A



Depress slowly.



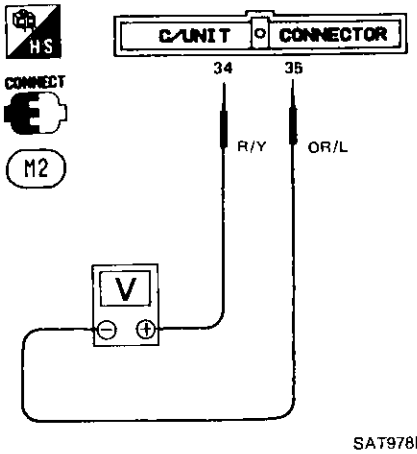
SAT858C

A



Depress slowly.

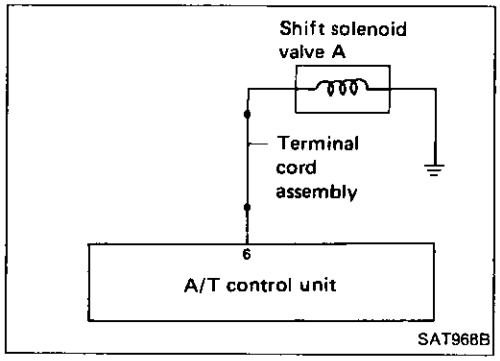
A/T control unit terminal

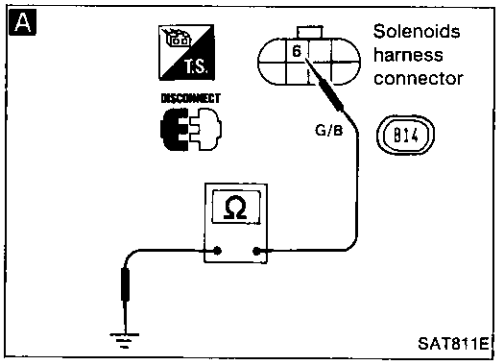


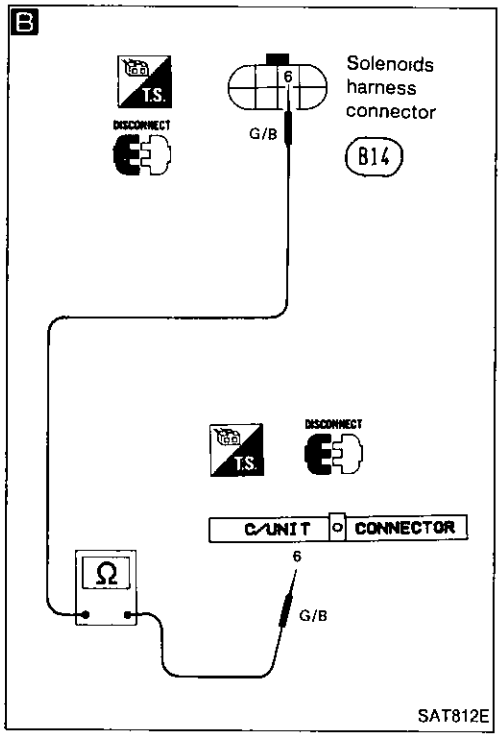
SAT978B

Self-diagnosis (Cont'd)

SHIFT SOLENOID VALVE A CIRCUIT CHECK







A

CHECK GROUND CIRCUIT.

1. 
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑥ and ground.
   Resistance: 20 - 40Ω

N.G. →
1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Shift solenoid valve A — Refer to "Electrical Components Inspection".
- Harness continuity of terminal cord assembly

O.K. ↓

B

CHECK POWER SOURCE CIRCUIT.

1. 
2. Disconnect A/T control unit connector.
3. Check resistance between terminal ⑥ and A/T control unit terminal ⑥.
   Resistance:
   · **Approximately 0Ω**
4. Reinstall any part removed.

N.G. → Repair or replace harness between A/T control unit and terminal cord assembly.

O.K. ↓

Perform self-diagnosis after driving for a while.

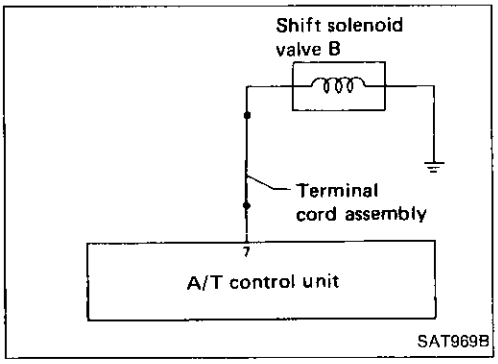
N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

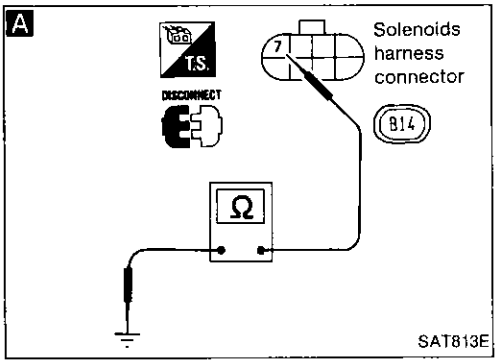
O.K. ↓

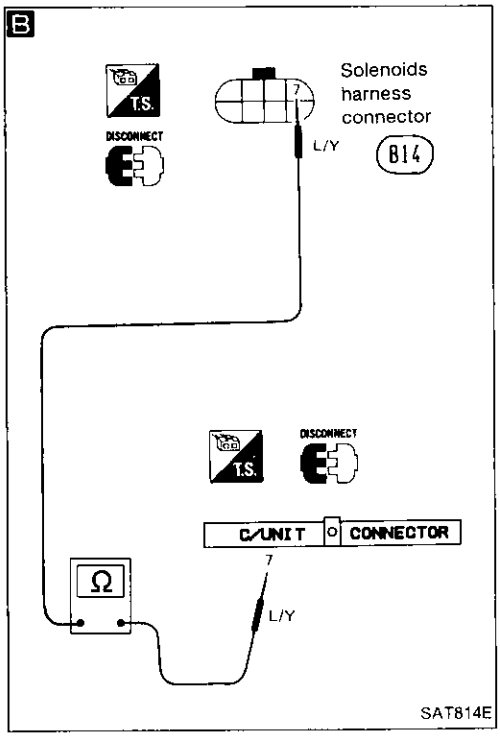
INSPECTION END

Self-diagnosis (Cont'd)

SHIFT SOLENOID VALVE B CIRCUIT CHECK







A

CHECK GROUND CIRCUIT.

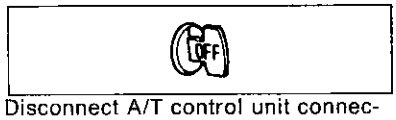
1. 
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑦ and ground.
   Resistance: 20 - 40Ω

N.G. →
1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Shift solenoid valve B — Refer to "Electrical Components Inspection".
- Harness continuity of terminal cord assembly

O.K. ↓

B

CHECK POWER SOURCE CIRCUIT.

1. 
2. Disconnect A/T control unit connector.
3. Check resistance between terminal ⑦ and A/T control unit terminal ⑦.
   Resistance:
   Approximately 0Ω
4. Reinstall any part removed.

N.G. → Repair or replace harness between A/T control unit and terminal cord assembly.

O.K. ↓

Perform self-diagnosis after driving for a while.

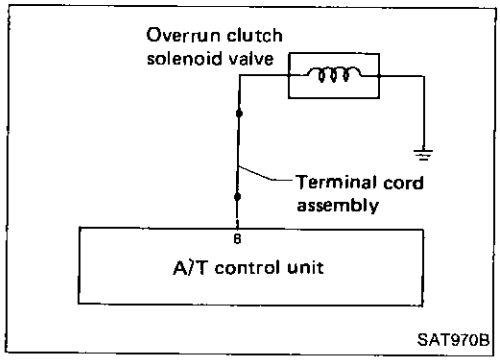
N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

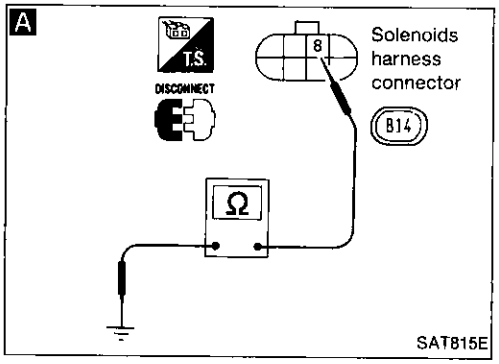
O.K. ↓

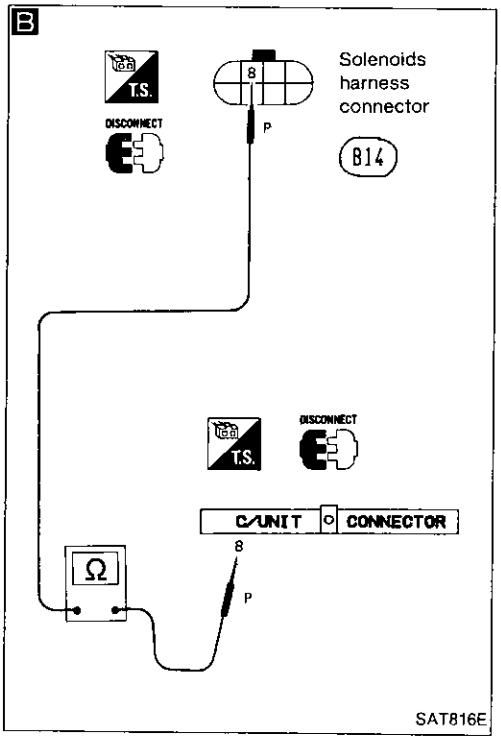
INSPECTION END

Self-diagnosis (Cont'd)

OVERRUN CLUTCH SOLENOID VALVE CIRCUIT CHECK

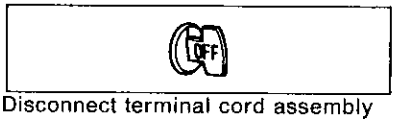






A

CHECK GROUND CIRCUIT.

1. 

2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑧ and ground.

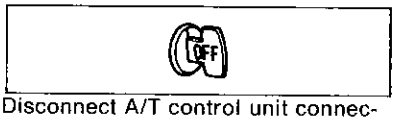
Resistance: 20 - 40Ω

N.G. →
1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Overrun clutch solenoid valve — Refer to "Electrical Components Inspection".
- Harness continuity of terminal cord assembly

O.K. ↓

B

CHECK POWER SOURCE CIRCUIT.

1. 

2. Disconnect A/T control unit connector.
3. Check resistance between terminal ⑧ and A/T control unit terminal ⑧.

Resistance:

Approximately 0Ω

4. Reinstall any part removed.

N.G. → Repair or replace harness between A/T control unit and terminal cord assembly.

O.K. ↓

Perform self-diagnosis after driving for a while.

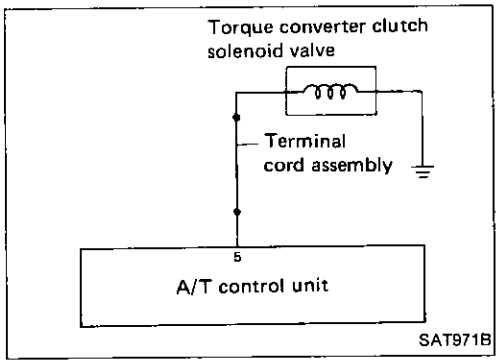
N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

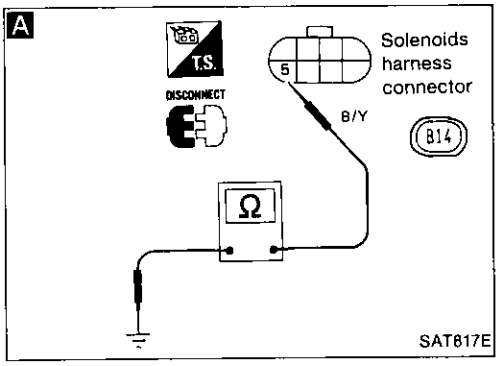
O.K. ↓

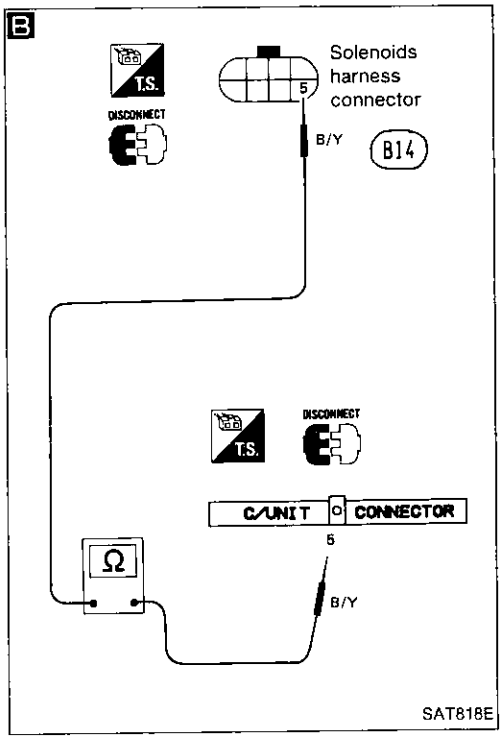
INSPECTION END

Self-diagnosis (Cont'd)

TORQUE CONVERTER CLUTCH SOLENOID VALVE CIRCUIT CHECK

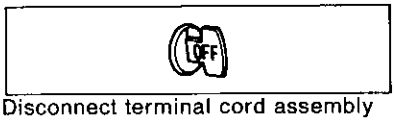






A

CHECK GROUND CIRCUIT.

1. 

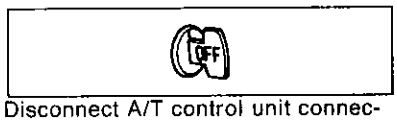
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑤ and ground.
   Resistance: 10 - 20Ω

N.G. →
1. Remove oil pan.
   — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Torque converter clutch solenoid valve — Refer to "Electrical Components Inspection".
- Harness continuity of terminal cord assembly

O.K. ↓

B

CHECK POWER SOURCE CIRCUIT.

1. 

2. Disconnect A/T control unit connector.
3. Check resistance between terminal ⑤ and A/T control unit terminal ⑤.
   Resistance:
   Approximately 0Ω
4. Reinstall any part removed.

N.G. → Repair or replace harness between A/T control unit and terminal cord assembly.

O.K. ↓

Perform self-diagnosis after driving for a while.

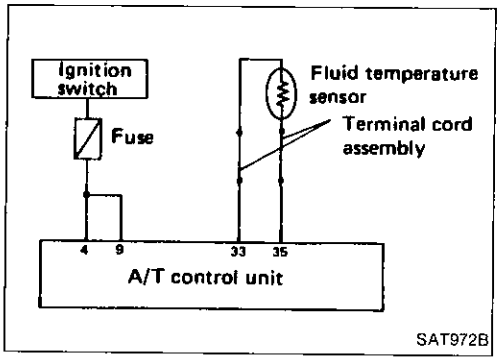
N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

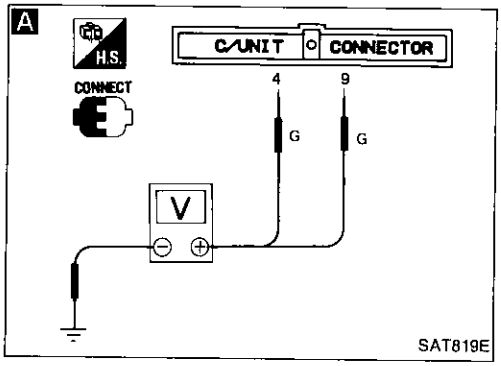
O.K. ↓

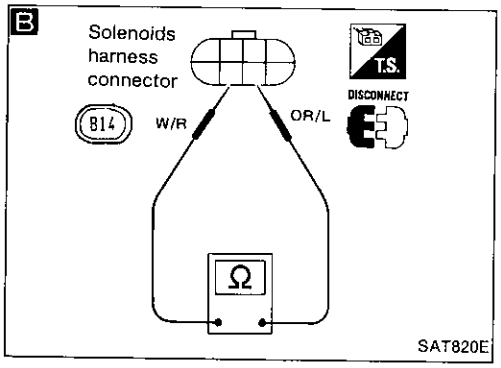
INSPECTION END

Self-diagnosis (Cont'd)

FLUID TEMPERATURE SENSOR CIRCUIT AND A/T CONTROL UNIT POWER SOURCE CIRCUIT CHECKS

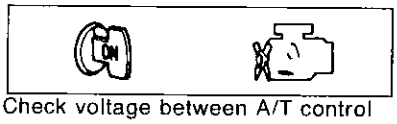






A

CHECK A/T CONTROL UNIT POWER SOURCE.

1. 

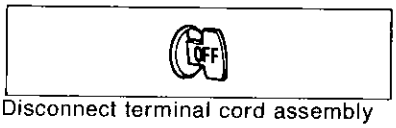
2. Check voltage between A/T control unit terminals ④, ⑨ and ground.
   Battery voltage should exist.

N.G. → Check the following items.
- Harness continuity between ignition switch and A/T control unit
- Ignition switch and fuse — Refer to section EL.

O.K. ↓

B

CHECK FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY.

1. 

2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminals ㉝ and ㉟ when A/T is cold.
   Resistance:
   Cold [20°C (68°F)]
   Approximately 2.5 kΩ
4. Reinstall any part removed.

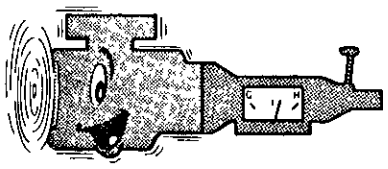
N.G. → 1. Remove control valve cover.
2. Check the following items.
- Fluid temperature sensor — Refer to "Electrical Components Inspection".
- Harness continuity of terminal cord assembly

O.K. ↓

Ⓐ

Self-diagnosis (Cont'd)

C

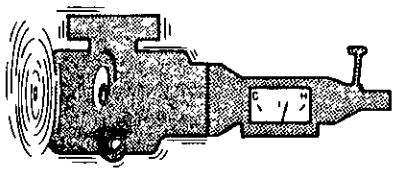


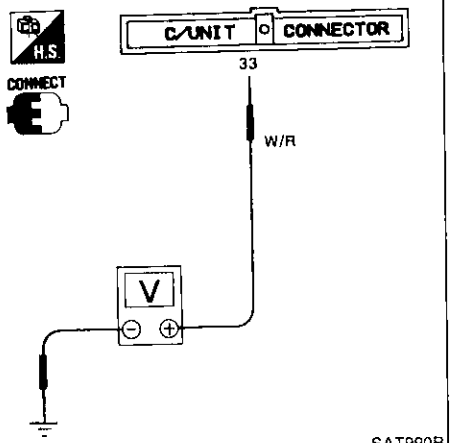
☆MONITOR ☆NO FAIL	
CAR/S SE1•A/T	0km/h
CAR/S SE2•MTR	5km/h
THROTTLE SEN	0.5V
FLUID TEMP SE	1.4V
BATTERY VOLT	11.6V
ENG REV	256rpm
TURBINE REV	288rpm
SLCT LEVER SW	OFF
R-RANGE SW	OFF

RECORD

SAT882C

C





SAT990B

Ⓐ

C

CHECK INPUT SIGNAL OF FLUID TEMPERATURE SENSOR.

1. 

2. ● Select "ECM INPUT SIGNALS".
   ● Read out the value of "FLUID TEMPERATURE SENSOR".
   Voltage:
   Cold [20°C (68°F)] →
   Hot [80°C (176°F)]:
   Approximately 1.5V → 0.5V

OR

● Check voltage between A/T control unit terminal ㉝ and ground while warming up A/T.
Voltage:
Cold [20°C (68°F)] →
Hot [80°C (176°F)]:
Approximately 1.5V → 0.5V

N.G. → Check harness continuity between A/T control unit and terminal cord assembly.

O.K. ↓

Perform self-diagnosis after driving for a while.

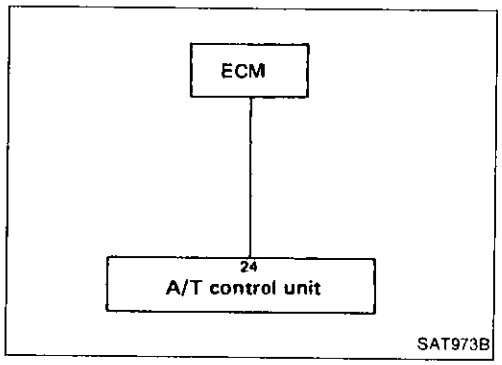
N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

INSPECTION END

Self-diagnosis (Cont'd)

ENGINE SPEED SIGNAL CIRCUIT CHECK



Check ignition circuit condition for engine. — N.G. → Repair or replace. — Refer to section EF & EC.

O.K. ↓

A

CHECK INPUT SIGNAL.

1. 

2. 
   - Select "ECM INPUT SIGNALS".
   - Read out the value of "ENGINE SPEED".
   - Check engine speed changes according to throttle opening.

N.G. → Check harness continuity between A/T control unit and ECM (ECCS control module).

OR

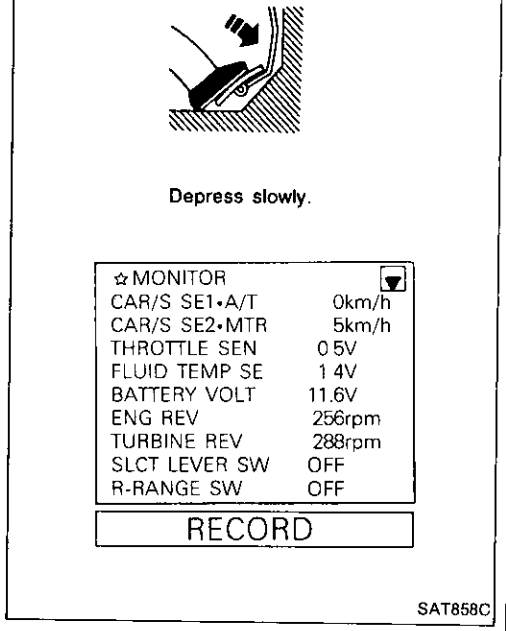

- Check voltage between A/T control unit terminal ㉔ and ground.
  Voltage: 0.9 - 4.5V

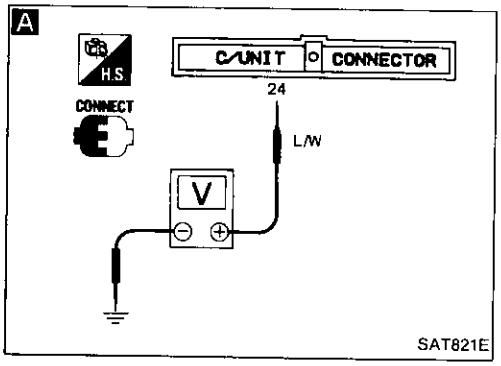
O.K. ↓

Perform self-diagnosis again after driving for a while. — N.G. → 1. Perform A/T control unit input/output signal inspection. 2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

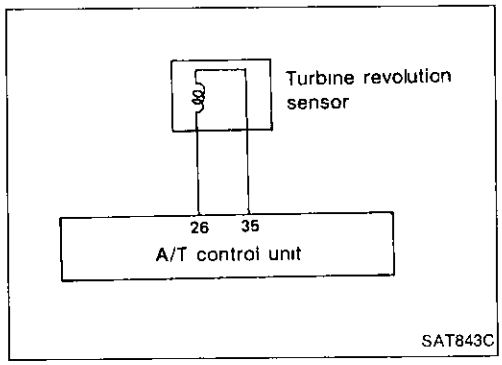
INSPECTION END





Self-diagnosis (Cont'd)

TURBINE REVOLUTION SENSOR CIRCUIT CHECK



CHECK TURBINE REVOLUTION SENSOR. — Refer to "Electrical Components Inspection"

N.G → Repair or replace turbine revolution sensor.

O.K.

A

CHECK INPUT SIGNAL.

1. 

2. ● Select "ECM INPUT SIGNALS".
   ● Read out the value of "TURBINE REVOLUTION SENSOR".
   ● Check the value changes according to engine speed.

N.G. → Check harness continuity between A/T control unit and turbine revolution sensor.

OR

Check voltage between A/T control unit terminal ㉕ and ground.
(Measure with AC range.)
Voltage: 0.3 - 4.5V

O.K.

Perform self-diagnosis again after driving for a while.

N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K.

INSPECTION END

A



Depress slowly.

☆MONITOR	
CAR/S SE1•A/T	0km/h
CAR/S SE2•MTR	5km/h
THROTTLE SEN	0.5V
FLUID TEMP SE	1.4V
BATTERY VOLT	11.6V
ENG REV	256rpm
TURBINE REV	288rpm
SLCT LEVER SW	OFF
R-RANGE SW	OFF

RECORD

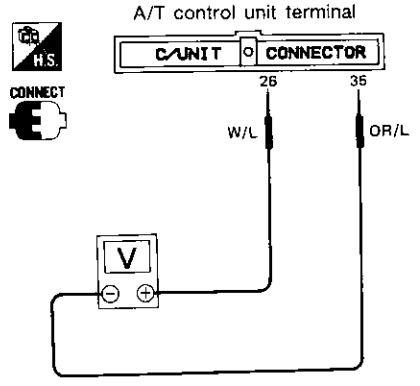
SAT858C

A



Depress slowly.

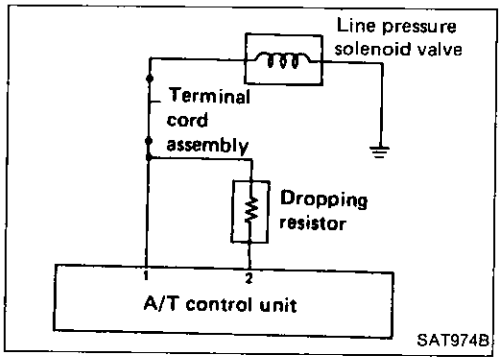
A/T control unit terminal



SAT823E

Self-diagnosis (Cont'd)

LINE PRESSURE SOLENOID VALVE CIRCUIT CHECK



A

CHECK GROUND CIRCUIT.

1. 

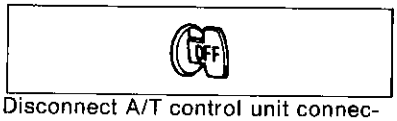
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ① and ground.
   Resistance: 2.5 - 5Ω

N.G. →
1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Line pressure solenoid valve — Refer to "Electrical Components Inspection".
- Harness continuity of terminal cord assembly

O.K. ↓

B

CHECK POWER SOURCE CIRCUIT.

1. 

2. Disconnect A/T control unit connector.
3. Check resistance between terminal ① and A/T control unit terminal ②.
   Resistance: 11.2 - 12.8Ω

N.G. →
Check the following items.
- Dropping resistor — Refer to "Electrical Components Inspection".
- Harness continuity between A/T control unit ② and terminal cord assembly

O.K. ↓

C

CHECK POWER SOURCE CIRCUIT.

1. 

2. Check resistance between terminal ① and A/T control unit terminal ①.
   Resistance:
   Approximately 0Ω
3. Reinstall any part removed.

N.G. →
Repair or replace harness between A/T control unit ① and terminal cord assembly.

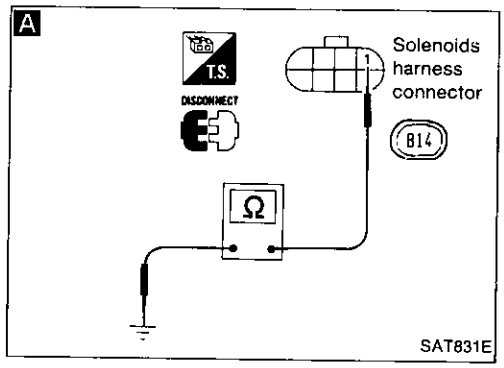
O.K. ↓

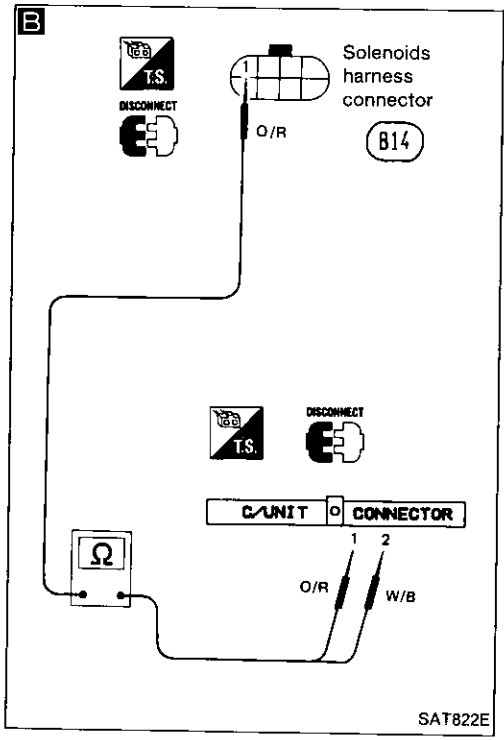
Perform self-diagnosis after driving for a while.

N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

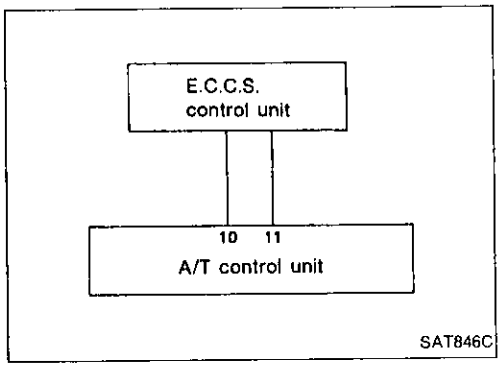
INSPECTION END

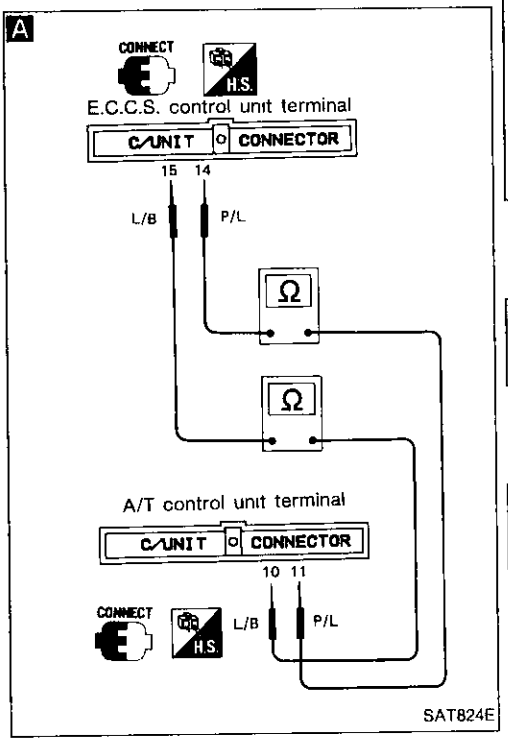




Self-diagnosis (Cont'd)

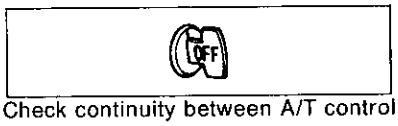
ENGINE CONTROL CIRCUIT CHECK





A

CHECK CIRCUIT BETWEEN A/T CONTROL UNIT AND ECM (ECCS CONTROL MODULE).

1. 

2. Check continuity between A/T control unit terminal ⑩ and ECM (ECCS control module) terminal ⑮.
   Continuity should exist.
3. Check continuity between A/T control unit terminal ⑪ and ECM (ECCS control module) terminal ⑭.
   Continuity should exist.

N.G. → Repair or replace harness and connector between A/T control unit and ECM (ECCS control module).

O.K. ↓

Perform self-diagnosis for engine control. — Refer to section EF & EC.

N.G. → Check ECM (ECCS control module) — Refer to section EF & EC.

O.K. ↓

Perform self-diagnosis again after driving for a while.

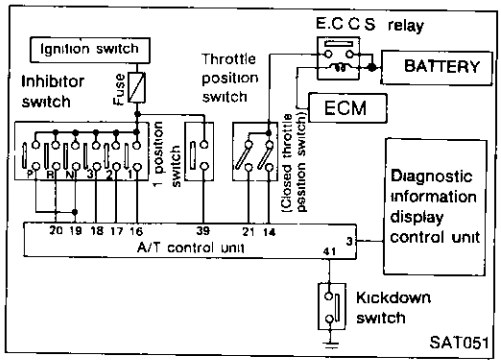
N.G. → If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

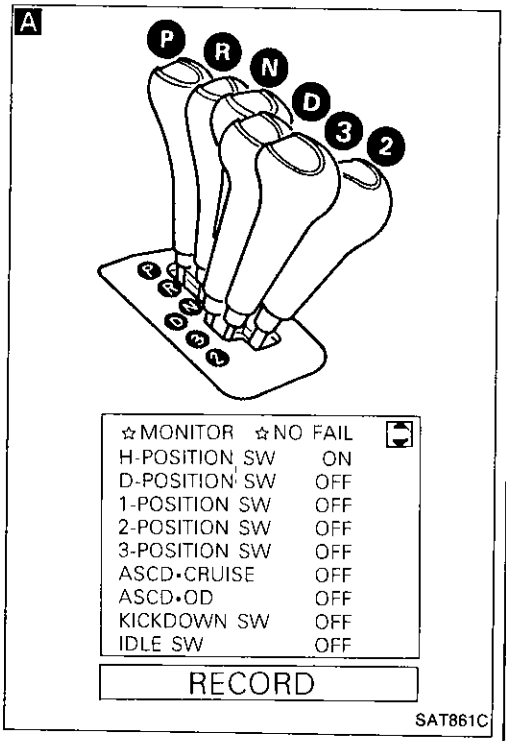
INSPECTION END

Self-diagnosis (Cont'd)

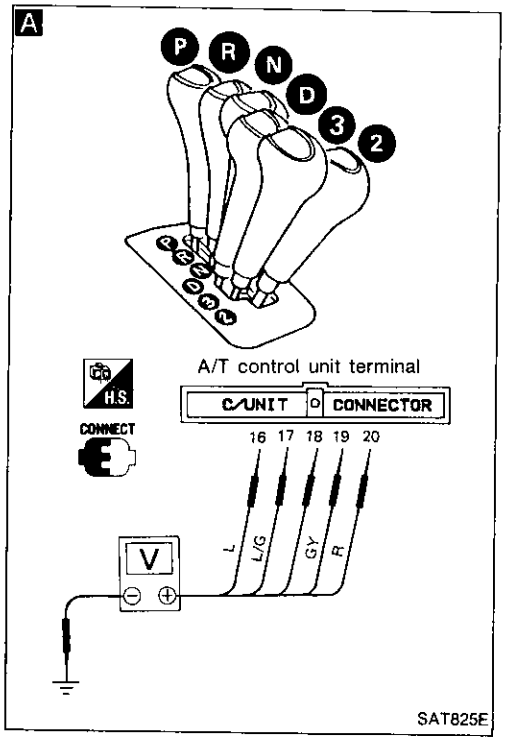
INHIBITOR SWITCH, 1 POSITION SWITCH, KICKDOWN SWITCH, CLOSED THROTTLE POSITION SWITCH AND DIAGNOSTIC INFORMATION DISPLAY CIRCUIT CHECKS



A



A



A

CHECK INHIBITOR SWITCH CIRCUIT.

1.



2.

- Select "ECM INPUT SIGNALS".
- Read out "R, N, D, 2 and 3 position switches" moving selector lever to each position.
- Check the selector lever position is indicated properly.

N.G. → Check the following items.
- Inhibitor switch — Refer to "Electrical Components Inspection".
- Harness continuity between ignition switch and inhibitor switch
- Harness continuity between inhibitor switch and A/T control unit

OR

Check voltage between A/T control unit terminals ⑯, ⑰, ⑱, ⑲, ⑳ and ground while moving selector lever through each position.

Voltage:

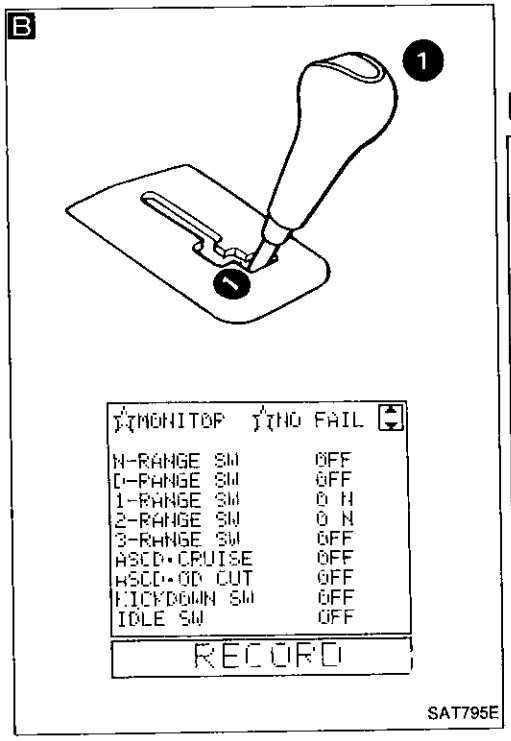
B: Battery voltage

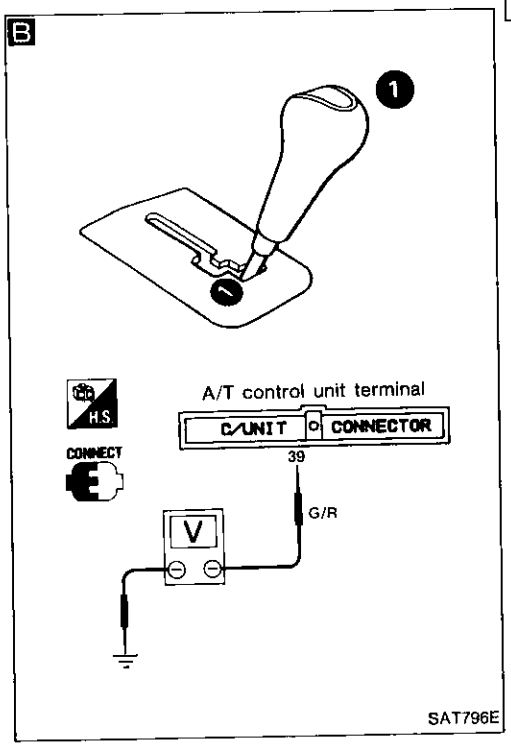
0: 0V

Lever position \ Terminal No.	⑲	⑳	⑱	⑰	⑯
P, N	B	0	0	0	0
R	0	B	0	0	0
D	0	0	B	0	0
3	0	0	0	B	0
2, 1	0	0	0	0	B

O.K. → Ⓐ

Self-diagnosis (Cont'd)





Ⓐ

B

CHECK 1 POSITION SWITCH CIRCUIT.

1. 

2. ● Select "ECM INPUT SIGNALS".
   ● Read out "1 position switch" moving selector lever to 1 position.
   ● Check the selector lever position is indicated properly.

— OR —

Check voltage between A/T control unit terminal ㊴ and ground while moving selector lever to 1 range.

Voltage:

Battery voltage

N.G. →

Check the following items.

- 1 position switch — Refer to "Electrical Components Inspection"
- Harness continuity between ignition switch and 1 position switch
- Harness continuity between 1 position switch and A/T control unit

O.K. ↓

Ⓑ

Self-diagnosis (Cont'd)

C



☆MONITOR	☆NO FAIL
H-POSITION SW	ON
D-POSITION SW	OFF
1-POSITION SW	OFF
2-POSITION SW	OFF
3-POSITION SW	OFF
ASCD•CRUISE	OFF
ASCD•OD	OFF
KICKDOWN SW	ON
IDLE SW	OFF

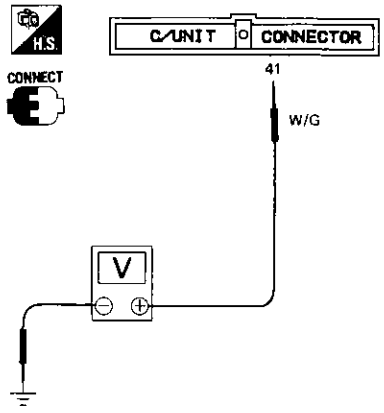
RECORD

SAT865C

C



A/T control unit terminal



SAT826E

Ⓑ

C

CHECK KICKDOWN SWITCH CIRCUIT.

1. 

2. ● Select "ECM INPUT SIGNALS".
● Read out "KICKDOWN SWITCH" depressing accelerator pedal fully.
● Check kickdown switch position is indicated properly.

— OR —

● Check voltage between A/T control unit terminal ㊶ and ground while depressing accelerator pedal slowly. (after warming up engine)

Voltage:

When releasing accelerator pedal:

3 - 8V

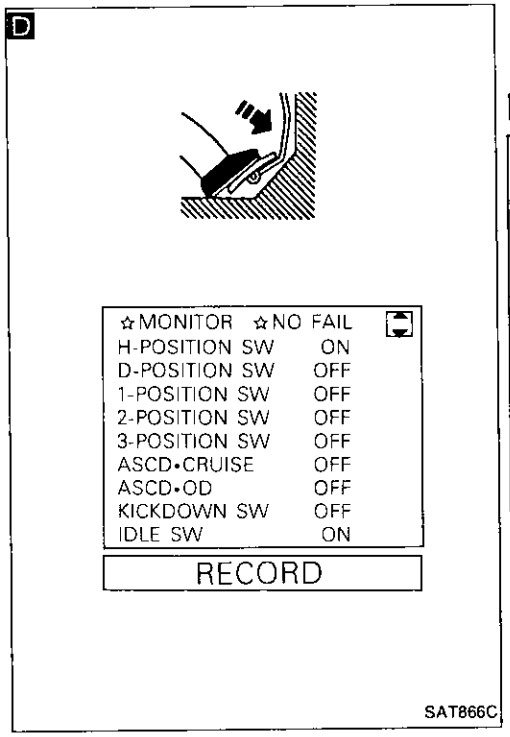
When depressing accelerator pedal fully:

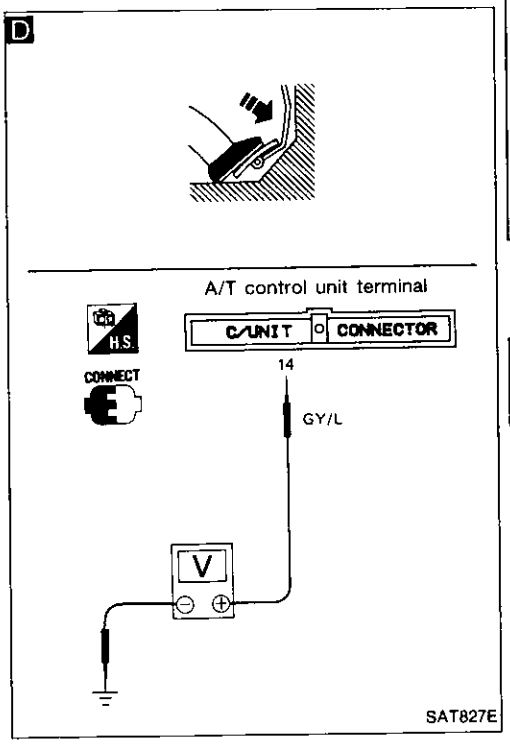
1 V or less

N.G. → Check the following items.
- Kickdown switch
- Harness continuity between A/T control unit and kickdown switch
- Harness continuity of ground circuit for kickdown switch

O.K. → Ⓒ

Self-diagnosis (Cont'd)





Ⓒ

CHECK CLOSED THROTTLE POSITION SWITCH CIRCUIT.

1. ON

2.
- Select "control unit INPUT SIGNALS".
- Read out "CLOSED THROTTLE POSITION SWITCH" depressing and releasing accelerator pedal.
- Check closed throttle position switch changes ON or OFF.

OR

- Check voltage between A/T control unit terminal ⑭ and ground while depressing accelerator pedal slowly.

Voltage:

When releasing accelerator pedal:

8 - 15V

When depressing accelerator pedal fully:

1 V or less

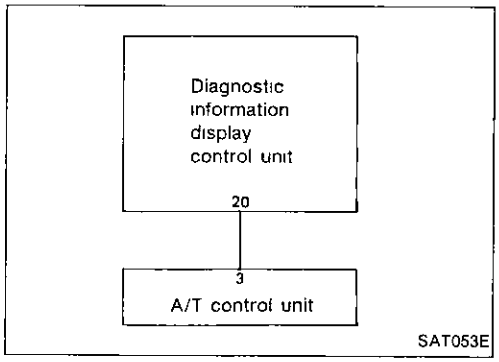
N.G. → Perform self-diagnosis (Mode IV) for engine control. Check closed throttle position switch circuit.

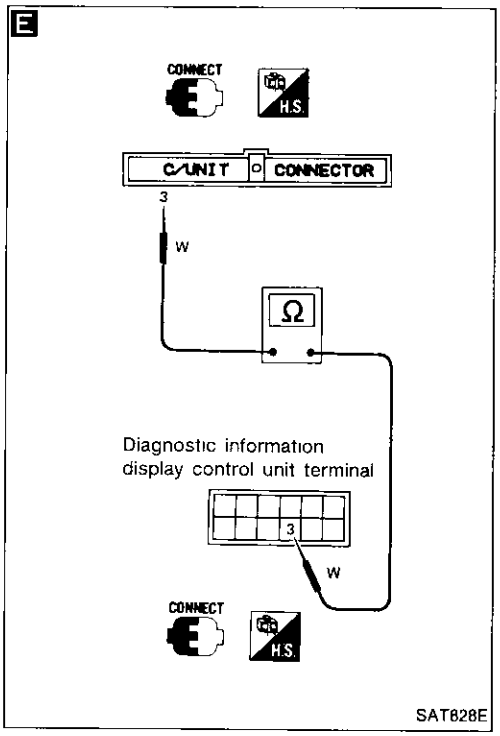
- O.K. → Check harness continuity between A/T control unit and closed throttle position switch.
- N.G. → Check closed throttle position switch circuit for engine control. — Refer to section EF & EC.

O.K. → Perform self-diagnosis again after driving for a while.

- N.G. → 1. Perform A/T control unit input/output signal inspection. 2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.
- O.K. → Ⓓ

Self-diagnosis (Cont'd)

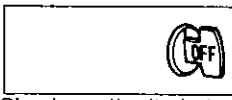




Ⓓ

E

CHECK DIAGNOSTIC INFORMATION DISPLAY CIRCUIT.

1. 

2. Check continuity between A/T control unit terminal ③ and diagnostic information display control unit terminal ⑳.
   Continuity should exist.

N.G. → Repair or replace harness and connectors between A/T control unit and diagnostic information display control unit.

O.K.

Check diagnostic information display system. — Refer to section EL.

N.G. → Repair or replace damaged parts.

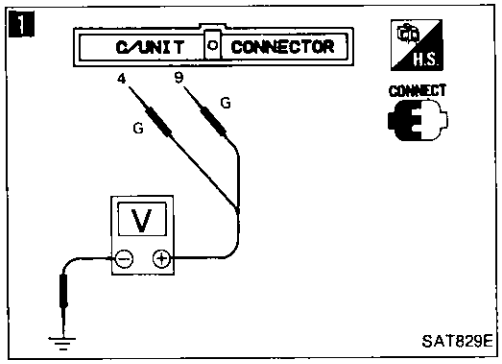
O K.

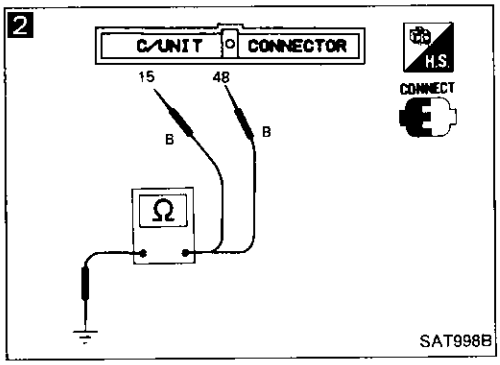
Perform self-diagnosis again after driving for a while.

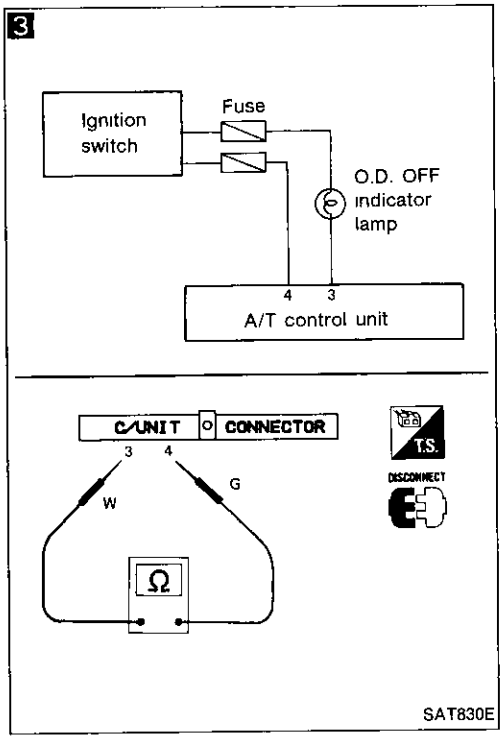
N.G. → Recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K.

INSPECTION END







Diagnostic Procedure 1

SYMPTOM: A/T CHECK lamp does not come on for about 2 seconds when turning ignition switch to "ON".

1

CHECK A/T CONTROL UNIT POWER SOURCE.

1. 

2. Check voltage between A/T control unit terminals ④, ⑨ and ground.
   Battery voltage should exist.

N.G. → Check the following items.
- Harness continuity between ignition switch and A/T control unit
- Ignition switch and fuse — Refer to section EL.

O.K. ↓

2

CHECK A/T CONTROL UNIT GROUND CIRCUIT.

1. 

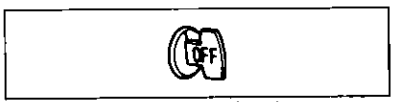
2. Disconnect A/T control unit connector.
3. Check resistance between A/T control unit terminals ⑮, ㊽ and ground.
   Resistance:
   Approximately 0Ω

N.G. → Check harness continuity between A/T control unit and ground.

O.K. ↓

3

CHECK LAMP CIRCUIT.

1. 

2. Disconnect A/T control unit connector.
3. Check resistance between A/T control unit terminals ③ and ④.
   Resistance: 50 - 100Ω
4. Reinstall any part removed.

N.G. → Check the following items.
- A/T check lamp
- Harness continuity between ignition switch and A/T check lamp
- Harness continuity between A/T check lamp and A/T control unit

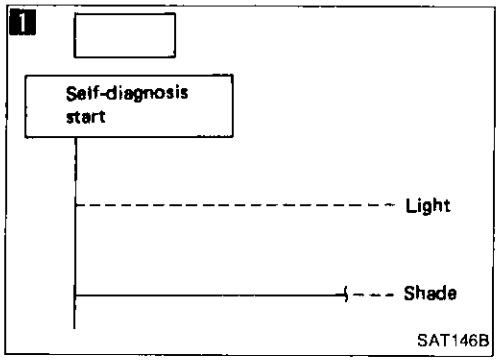
O.K. ↓

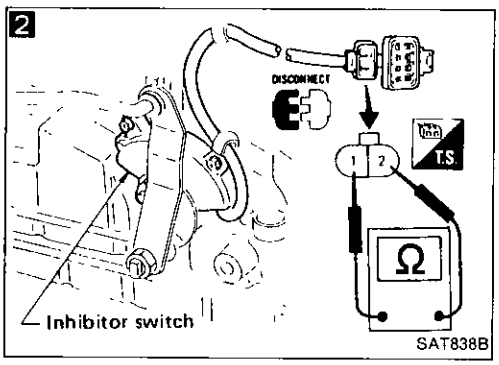
Check again.

N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

INSPECTION END





Diagnostic Procedure 2

SYMPTOM: Engine cannot be started with selector lever in "P" or "N" position or engine can be started with selector lever in "D", "3", "2", "1" or "R" position.

Does "ECM INPUT SIGNALS" show damage to inhibitor switch circuit? — Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis".

OR

1 Does self-diagnosis show damage to inhibitor switch circuit?

No

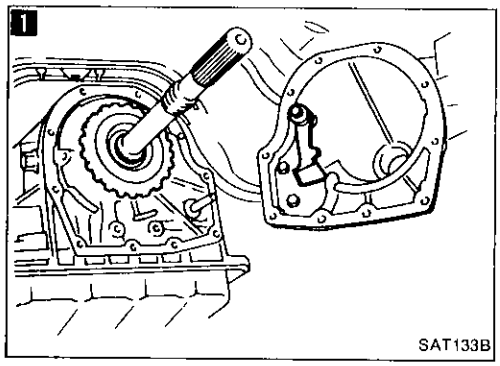
2 Check continuity of inhibitor switch 2-pin connector. — Refer to "Electrical Components Inspection". — N.G. → Repair or replace inhibitor switch.

O.K.

Check starting. — Refer to section EL. — N.G. → Repair or replace damaged parts.

O.K.

INSPECTION END



Diagnostic Procedure 3

SYMPTOM: Vehicle moves when it is pushed forward or backward with selector lever in "P" position.

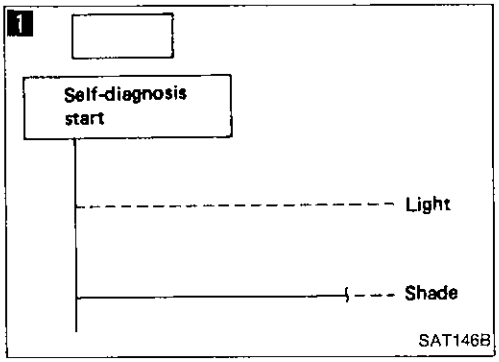
1 Check parking components. — Refer to "ON-VEHICLE SERVICE". — N.G. → Repair or replace damaged parts.

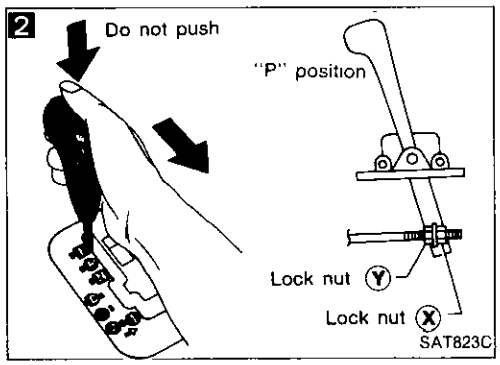
O.K.

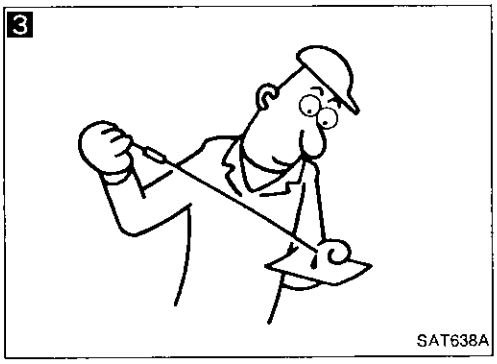
INSPECTION END

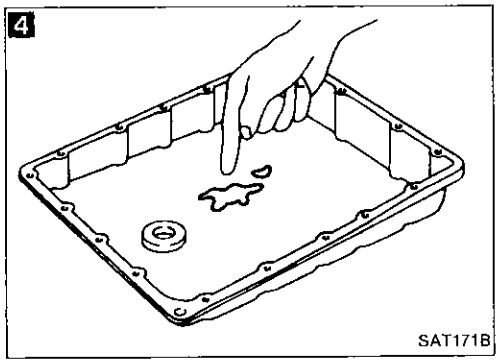
Diagnostic Procedure 4

SYMPTOM: Vehicle moves forward or backward when selecting "N" position.









Does "ECM INPUT SIGNALS" show damage to inhibitor switch circuit? — Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis".

OR

1 Does self-diagnosis show damage to inhibitor switch circuit?

No

Check manual control linkage. — Refer to "ON-VEHICLE SERVICE". — N.G. → 2 Adjust manual control linkage. — Refer to "ON-VEHICLE SERVICE".

O.K.

3 Check A/T fluid level again. — N.G. → Refill A.T.F.

O.K.

4 1. Remove oil pan.
2 Check A/T fluid condition. — N.G. →
1. Disassemble A/T.
2 Check the following items.
- Forward clutch assembly
- Overrun clutch assembly
- Reverse clutch assembly
- Accumulator piston D

O.K

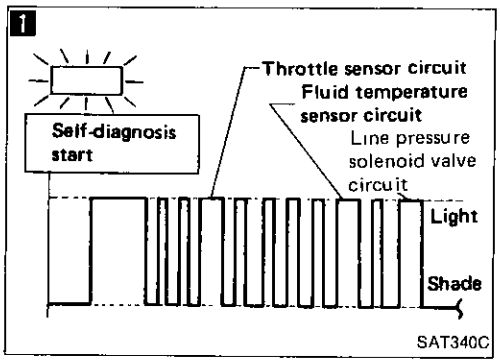
Check again. — N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

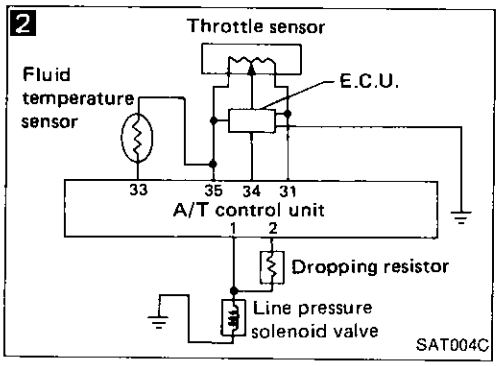
O.K.

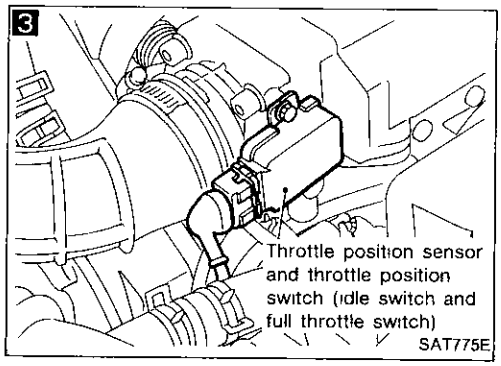
INSPECTION END

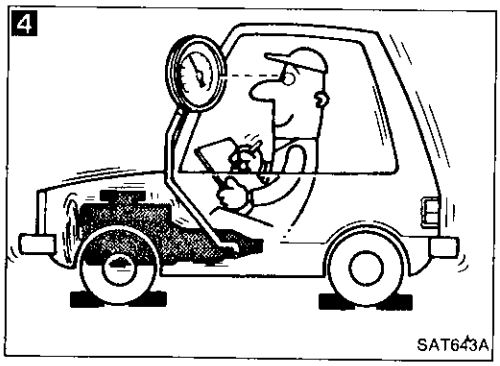
Diagnostic Procedure 5

SYMPTOM: There is large shock when changing from "N" to "R" position.









1 Does self-diagnosis show damage to throttle position sensor, line pressure solenoid or fluid temperature sensor circuit?

Yes → **2** Check damaged circuit. — Refer to "Self-diagnosis".

No ↓

3 Check throttle position sensor. — Refer to section EF & EC.

N.G. → Repair or replace throttle position sensor.

O.K. ↓

4 Check line pressure at idle with selector lever in "D" position. — Refer to "PRESSURE TESTING".

N.G. →
1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Valves to control line pressure (Pressure regulator valve, modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

O.K. ↓

Check again.

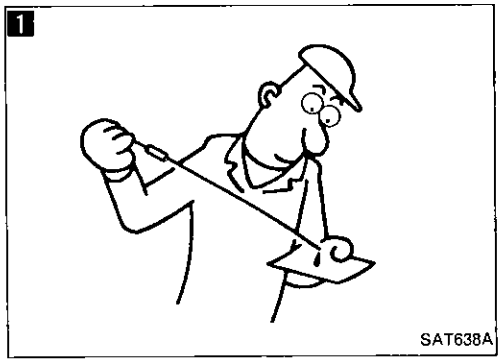
N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

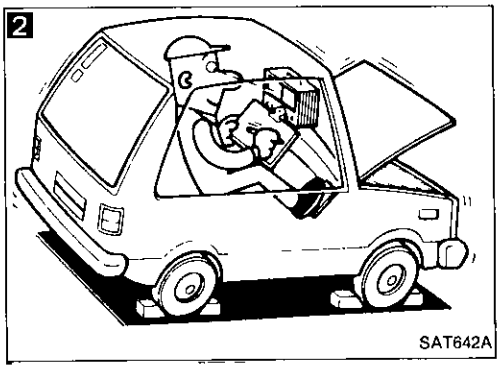
O.K. ↓

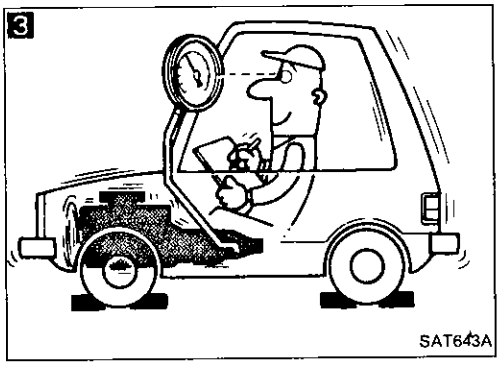
INSPECTION END

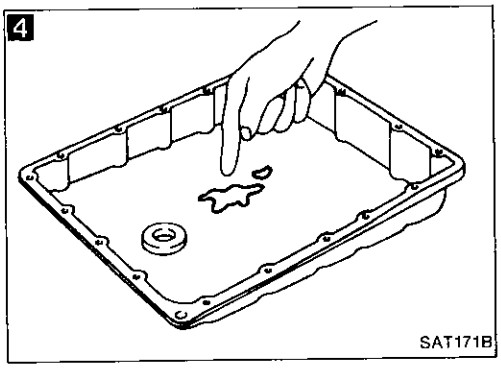
Diagnostic Procedure 6

SYMPTOM: Vehicle does not creep backward when selecting "R" position.









1

Check A/T fluid level again. — N.G. → Refill A.T.F.

O.K.

N.G. in both "1" and "R" position

2

Check stall revolution with selector lever in "1" and "R" position.

O.K.

O.K. in "1" position
N.G. in "R" position

3

Check line pressure at idle with selector lever in "R" position.
— Refer to "PRESSURE TESTING". — N.G. →

O.K.

4

1. Remove oil pan.
2. Check fluid condition. — N.G. →

O.K.

Check again. — N.G. →

O.K.

INSPECTION END

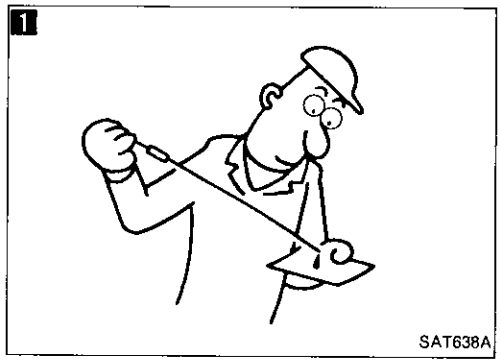
N.G. → 1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Valves to control line pressure (Pressure regulator valve, pilot valve and pilot filter)
- Line pressure solenoid valve

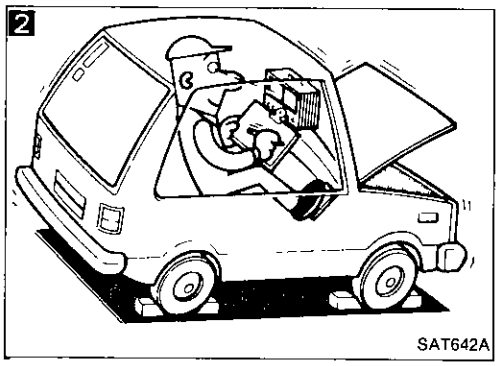
3. Disassemble A/T.
4. Check the following items.
- Oil pump assembly
- Torque converter
- Reverse clutch assembly
- High clutch assembly
- Low & reverse brake assembly
- Low one-way clutch

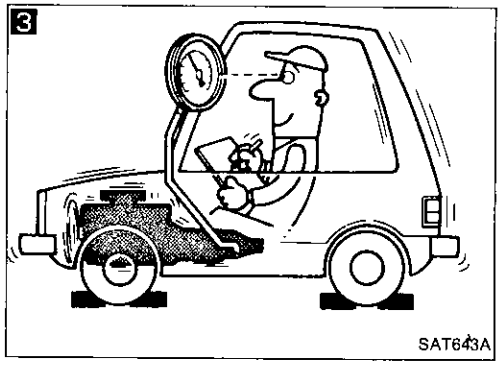
N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

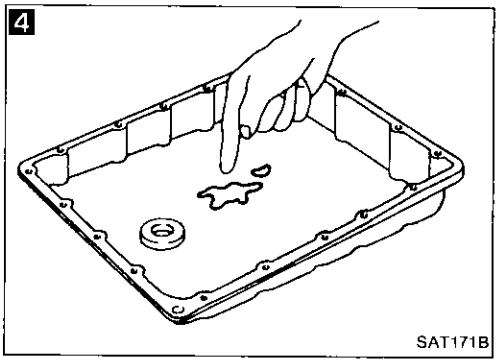
Diagnostic Procedure 7

SYMPTOM: Vehicle does not creep forward when selecting "D", "3" "2" or "1" position.









1

Check A/T fluid level again. — N.G. → Refill A.T.F.

O.K. ↓

2

Check stall revolution with selector lever in "D" position. — Refer to "STALL TESTING". — N.G. →

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Valves to control line pressure (Pressure regulator valve, modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve
3. Disassemble A/T.
4. Check the following items.
- Oil pump assembly

O.K. ↓

3

Check line pressure at idle with selector lever in "D" position. — Refer to "PRESSURE TESTING". — N.G. →

- Forward clutch assembly
- Forward one-way clutch
- Low one-way clutch
- Low & reverse brake assembly
- Torque converter

O.K. ↓

4

1. Remove oil pan.
2. Check A/T fluid condition.

— N.G. →

O.K. ↓

Check again. — N.G. →

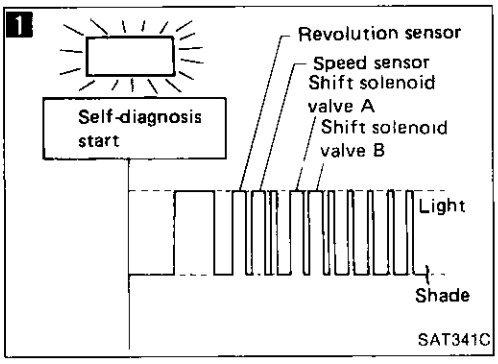
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

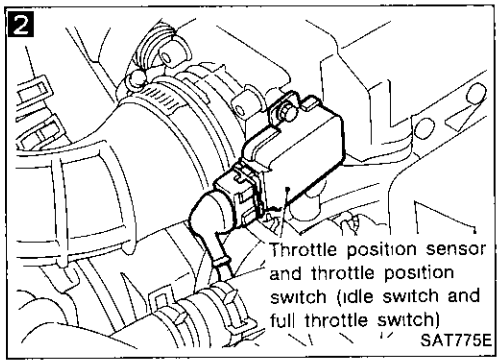
O.K. ↓

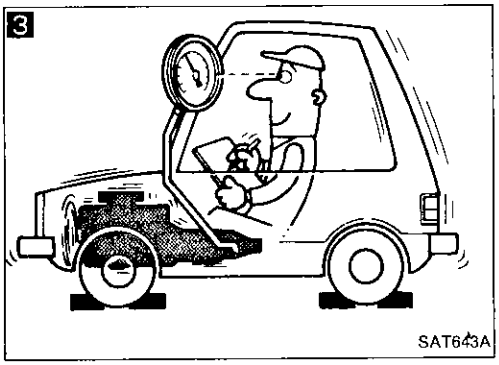
INSPECTION END

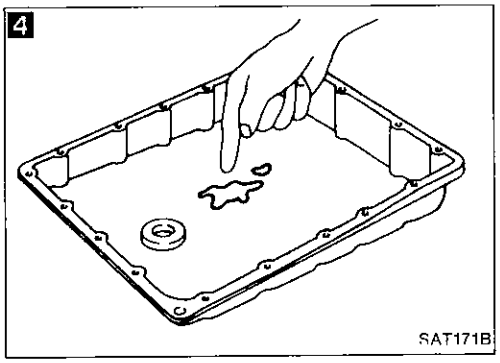
Diagnostic Procedure 8

SYMPTOM: Vehicle cannot be started from D_2 on Cruise test — Part 1.









Is Diagnostic Procedure 7 O.K.?
- No → Go to Diagnostic Procedure 7.
- Yes ↓

1

Does self-diagnosis show damage to revolution sensor, speed sensor, shift solenoid A or B after cruise test?
- Yes → Check damaged circuit. — Refer to "Self-diagnosis".
- No ↓

2

Check throttle position sensor. — Refer to section EF & EC.
- N.G. → Repair or replace throttle position sensor.
- O.K. ↓

3

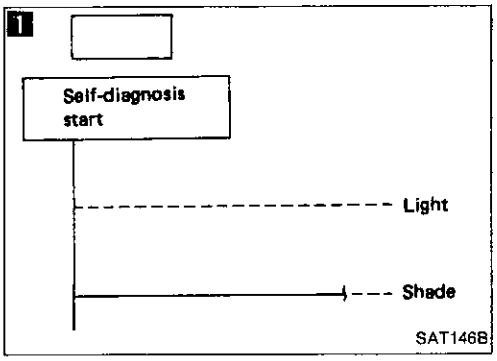
Check line pressure at stall point with selector lever in "D" position. — Refer to "PRESSURE TESTING".
- N.G. →
  1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
  2. Check the following items.
     - Shift valve A
     - Shift valve B
     - Shift solenoid valve A
     - Shift solenoid valve B
     - Pilot valve
     - Pilot filter
  3. Disassemble A/T.
  4. Check the following items.
     - Forward clutch assembly
     - Forward one-way clutch
     - Low one-way clutch
     - High clutch assembly
     - Torque converter
     - Oil pump assembly
- O.K. ↓

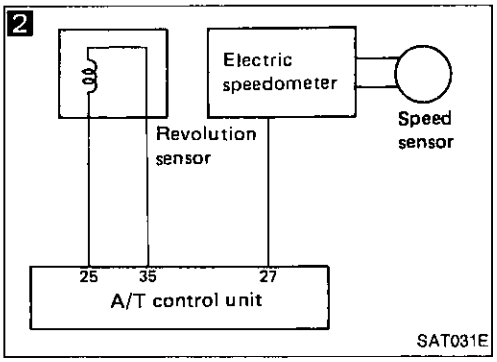
4

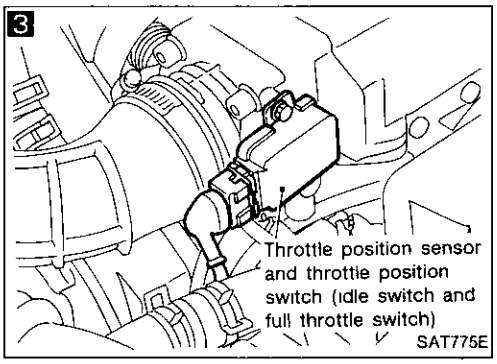
1. Remove oil pan.
2. Check A/T fluid condition.
- O.K. → (to N.G. items above)
- N.G. → (to N.G. items above)

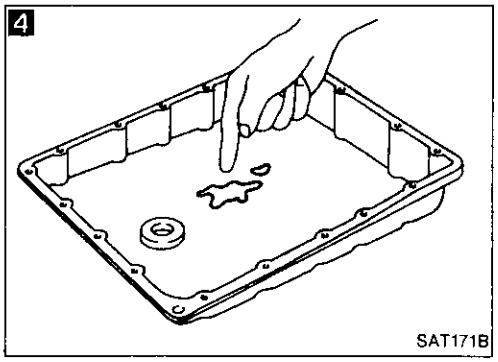
Check again.
- N.G. →
  1. Perform A/T control unit input/output signal inspection.
  2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.
- O.K. ↓

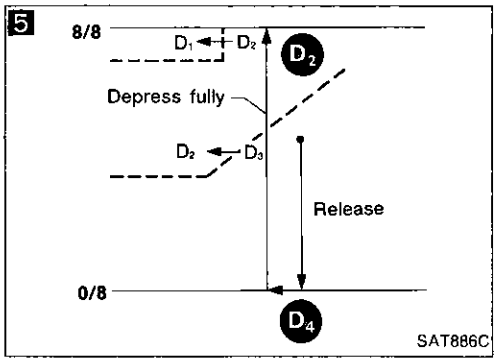
INSPECTION END











Diagnostic Procedure 9

SYMPTOM: A/T does not shift from D_4 to D_2 when depressing accelerator pedal fully at the specified speed.

Are Diagnostic Procedures 7 and 8 O.K.? — No → Go to Diagnostic Procedure 7 or 8.

Yes ↓

Does "ECM INPUT SIGNALS" show damage to inhibitor switch circuit? — Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis".

OR

1 Does self-diagnosis show damage to inhibitor switch circuit?

No ↓

2 Check revolution sensor and speed sensor circuit. — Refer to "Self-diagnosis". — N.G. → Repair or replace revolution sensor and speed sensor circuits.

O.K. ↓

3 Check throttle position sensor. — Refer to section EF & EC. — N.G. → Repair or replace throttle position sensor.

O.K. ↓

4 1. Remove oil pan.
2. Check A/T fluid condition. — N.G →
   1. Remove control valve assembly — Refer to "ON-VEHICLE SERVICE".
   2. Check the following items.
      - Shift valve A
      - Shift solenoid valve A
      - Pilot valve
      - Pilot filter

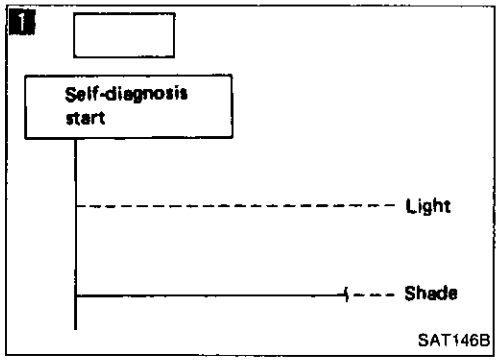
   O.K. ↓
   3. Disassemble A/T.
   4. Check the following items.
      - Servo piston assembly
      - Brake band
      - Oil pump assembly

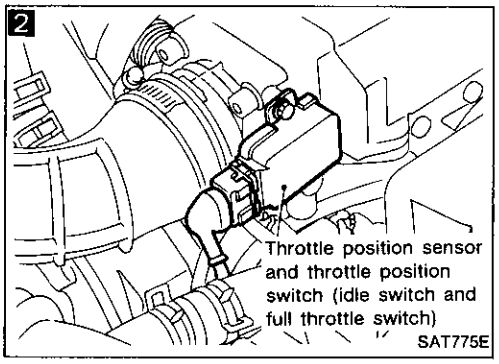
O.K. ↓

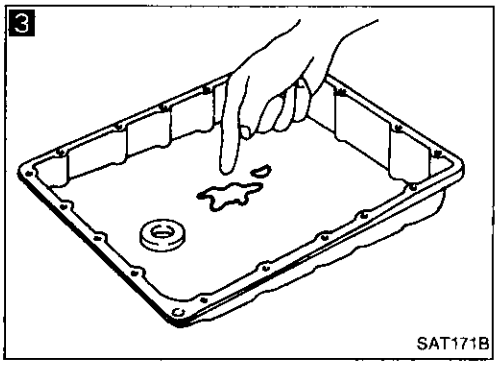
5 Check again. — N.G. →
1. Perform A/T control unit input/output signal inspection
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

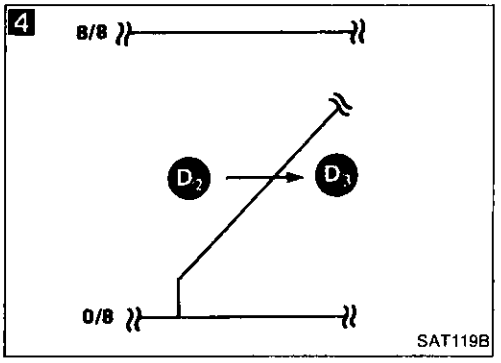
O.K. ↓

INSPECTION END









Diagnostic Procedure 10

SYMPTOM: A/T does not shift from D_2 to D_3 at the specified speed.

Are Diagnostic Procedures 7 and 8 O.K.?
- No → Go to Diagnostic Procedure 7 or 8.
- Yes ↓

Does "ECM INPUT SIGNALS" show damage to inhibitor switch circuit?
- Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis".

OR

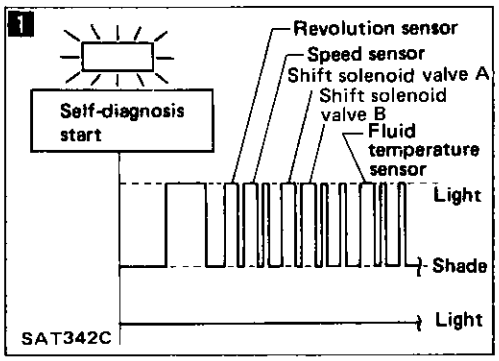
1
Does self-diagnosis show damage to inhibitor switch circuit?
- No ↓

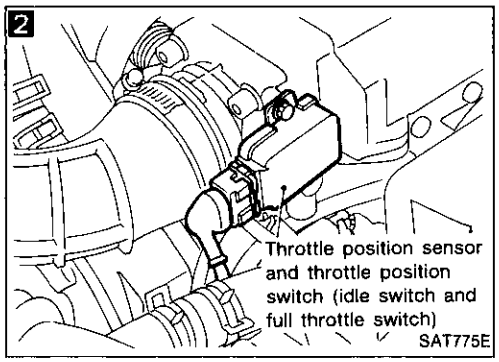
2
Check throttle position sensor. — Refer to section EF & EC.
- N.G. → Repair or replace throttle position sensor.
- O.K. ↓

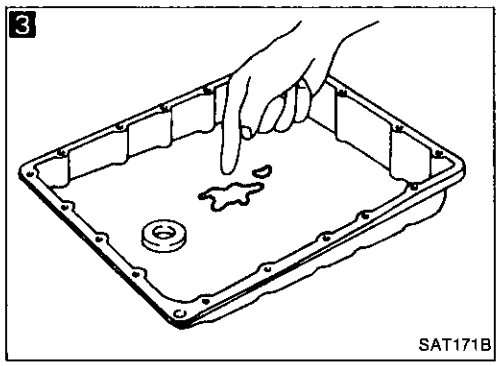
3
1. Remove oil pan.
2. Check A/T fluid condition.
- N.G. →
  1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
  2. Check the following items.
     - Shift valve B
     - Shift solenoid valve B
     - Pilot valve
     - Pilot filter
  3. Disassemble A/T.
  4. Check the following items.
     - Servo piston assembly
     - High clutch assembly
     - Oil pump assembly
- O.K. ↓

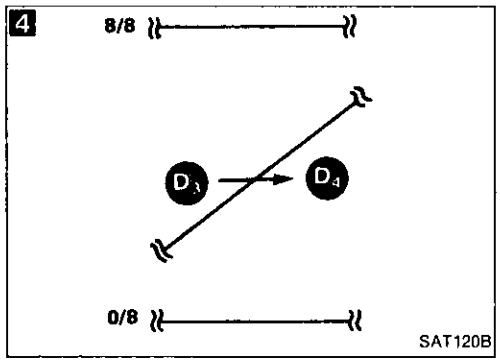
4
Check again.
- N.G. →
  1. Perform A/T control unit input/output signal inspection.
  2. If N G , recheck A/T control unit pin • terminals for damage or connection of A/T control unit harness connector.
- O.K. ↓

INSPECTION END









Diagnostic Procedure 11

SYMPTOM: A/T does not shift from D_3 to D_4 at the specified speed.

Are Diagnostic Procedures 7 and 8 O.K.?
- No → Go to Diagnostic Procedure 7 or 8.
- Yes ↓

1 Does self-diagnosis show damage to inhibitor switch, shift solenoid A, B, revolution sensor, speed sensor or fluid temperature sensor circuit after cruise test?
- Yes → Check damaged circuit. — Refer to "Self-diagnosis".
- No ↓

2 Check throttle position sensor. — Refer to section EF & EC.
- N.G. → Repair or replace throttle position sensor.
- O.K. ↓

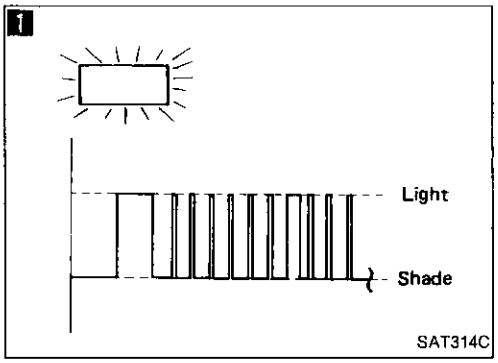
3 1. Remove oil pan.
2. Check A/T fluid condition.
- N.G. → 1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
  - Shift valve B
  - Overrun clutch control valve
  - Shift solenoid valve B
  - Pilot valve
  - Pilot filter

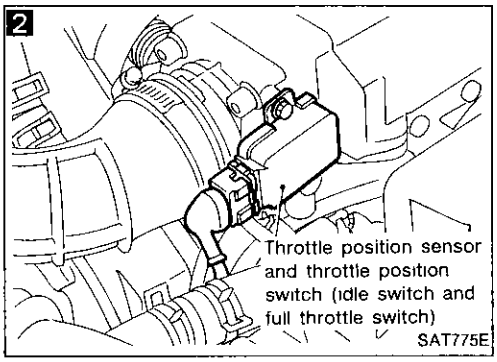
  3. Disassemble A/T.
  4. Check the following items.
  - Servo piston assembly
  - Brake band
  - Torque converter
  - Oil pump assembly

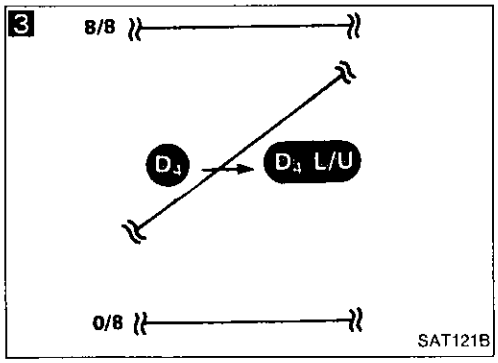
  → O.K. ↓ (from 1. Remove oil pan. 2. Check A/T fluid condition.)
  → O.K. ↓ (from 2. Check the following items.)
  → O.K. ↓ (from 3. Disassemble A/T. 4. Check the following items.)

4 Check again.
- N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.
- O.K. ↓

INSPECTION END







Diagnostic Procedure 12

SYMPTOM: A/T does not perform lock-up at the specified speed.

1

Does self-diagnosis show damage to torque converter clutch solenoid valve circuit after cruise test?

Yes → Check torque converter clutch solenoid valve circuit. — Refer to "Self-diagnosis".

No ↓

2

Check throttle position sensor. — Refer to section EF & EC.

N.G. → Repair or replace throttle position sensor.

O.K. ↓

1. Remove control valve. — Refer to "ON-VEHICLE SERVICE".
2. Check following items.
- Lock-up control valve
- Shuttle shift valve D
- Torque converter relief valve
- Torque converter clutch solenoid valve
- Pilot valve
- Pilot filter

N.G. → Repair or replace damaged parts.

O.K. ↓

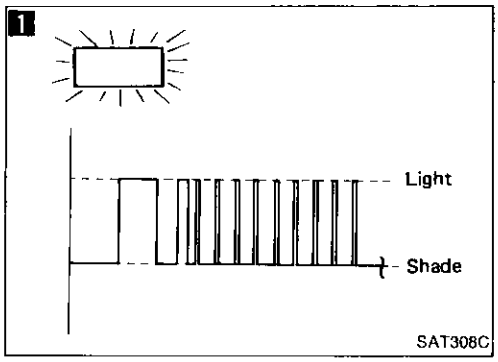
3

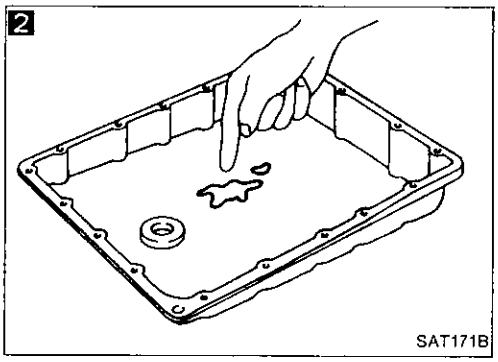
Check again.

N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

INSPECTION END





Diagnostic Procedure 13

SYMPTOM: A/T does not hold lock-up condition for more than 30 seconds.

1

Does self-diagnosis show damage to engine speed signal circuit after cruise test?

Yes → Check engine speed signal circuit. — Refer to "Self-diagnosis".

No

2

1. Remove oil pan.
2. Check A/T fluid condition.

N.G →
1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Lock-up control valve
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check torque converter and oil pump assembly.

O.K. → (Check again.)

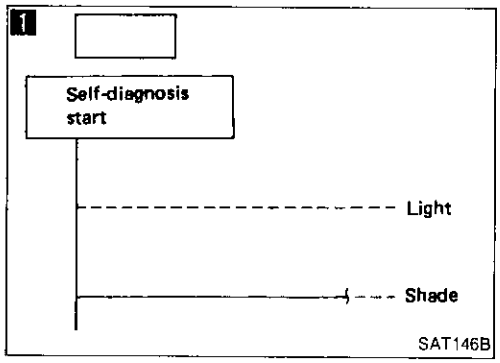
O.K. → (Check again.)

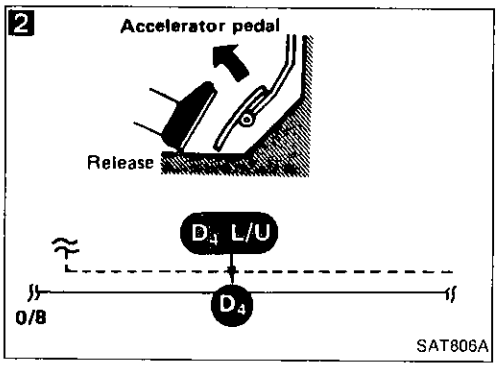
Check again.

N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K.

INSPECTION END





Diagnostic Procedure 14

SYMPTOM: Lock-up is not released when accelerator pedal is released.

Does "ECM INPUT SIGNALS" show damage to closed throttle position switch circuit?

Yes → Check closed throttle position switch circuit. — Refer to "Self-diagnosis".

OR

1

Does self-diagnosis show damage to closed throttle position switch circuit?

No

2

Check again.

N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

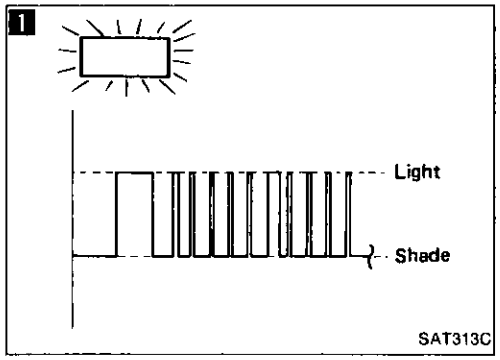
O.K.

INSPECTION END

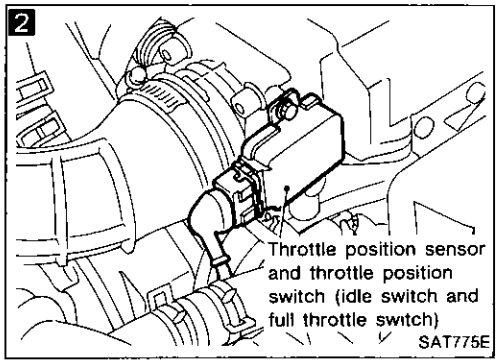
Diagnostic Procedure 15

SYMPTOM: Engine speed does not return to idle smoothly when A/T is shifted from D_4 to D_3 with accelerator pedal released.
Vehicle does not decelerate by engine brake when changing selector lever from "D" to "3" position with accelerator pedal released.
Vehicle does not decelerate by engine brake when changing selector lever from "3" to "2" position with accelerator pedal released.

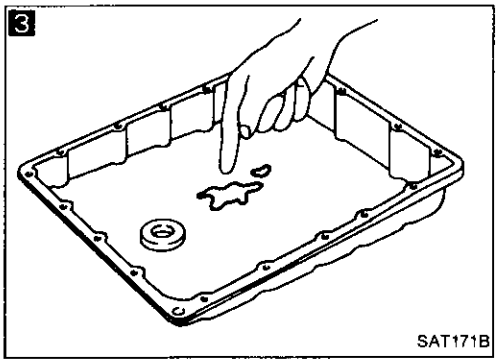
1



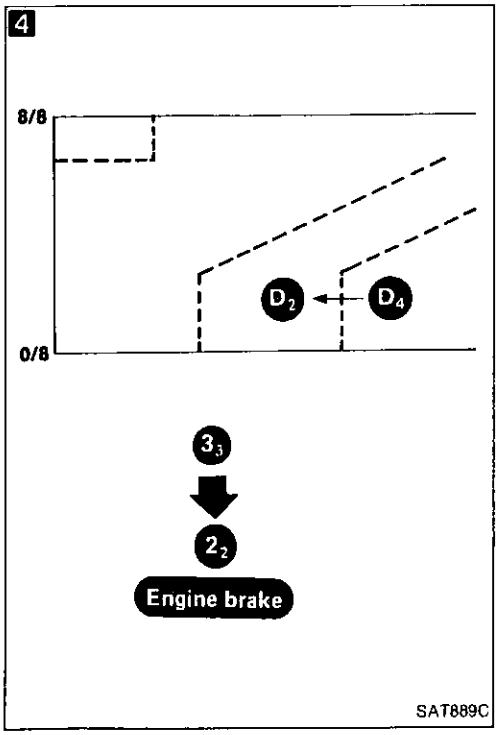
2



3



4



1

Does self-diagnosis show damage to overrun clutch solenoid valve circuit after cruise test?

Yes → Check overrun clutch solenoid valve circuit. — Refer to "Self-diagnosis".

No

2

Check throttle position sensor. — Refer to section EF & EC.

N.G. → Repair or replace throttle position sensor.

O.K.

3

1. Remove oil pan.
2. Check A/T fluid condition.

N.G. →
1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve

O.K. (from 1. Remove oil pan.)

O.K. (from 2. Check the following items.)

O.K. (from Overrun clutch solenoid valve)

3. Disassemble A/T.
4. Check the following items.
- Overrun clutch assembly
- Oil pump assembly

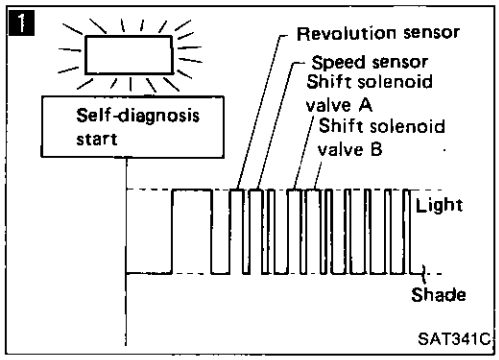
4

Check again.

N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K.

INSPECTION END



Diagnostic Procedure 16

SYMPTOM: Vehicle does not start from D_2 on Cruise test — Part 2

1 Does self-diagnosis show damage to revolution sensor, speed sensor, shift solenoid valve A or B after cruise test?

Yes → Check damaged circuit — Refer to "Self-diagnosis".

No ↓

2 Check again.

N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

Go to Diagnostic Procedure 8.

Diagnostic Procedure 17

SYMPTOM: A/T does not shift from D_2 to D_1 when depressing accelerator pedal fully at the specified speed.

Are Diagnostic Procedures 6 and 7 O.K.?
- No → Go to Diagnostic Procedure 6 or 7.
- Yes ↓

Does "ECM INPUT SIGNAL" show damage to inhibitor switch and 1 position switch circuit?
- Yes → Check inhibitor switch 1 position switch circuit. — Refer to "Self-diagnosis".

OR

1 Does self-diagnosis show damage to inhibitor switch circuit?
- No ↓

1 Check revolution sensor and speed sensor circuits. — Refer to "Self-diagnosis".
- N.G. → Repair or replace revolution sensor and speed sensor circuits.
- O.K. ↓

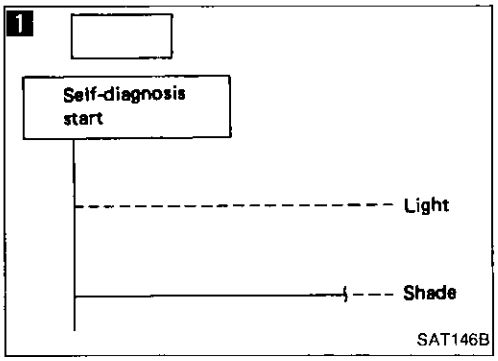
3 Check throttle position sensor. — Refer to section EF & EC.
- N.G. → Repair or replace throttle position sensor.
- O.K. ↓

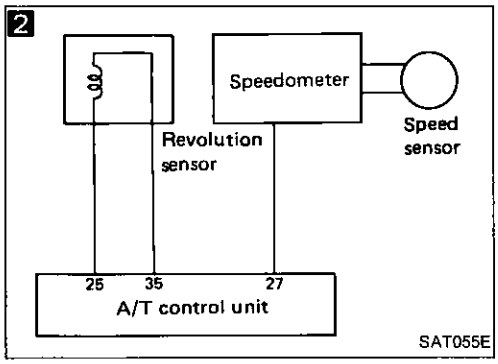
4 1. Remove oil pan.
2. Check A/T fluid condition.
- N.G. → 1. Remove control valve. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
  - Shift valve A
  - Shift solenoid valve A
  - Pilot valve
  - Pilot filter
- O.K. ↓

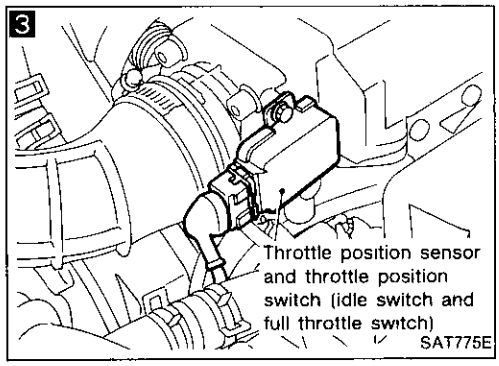
O.K. → 3. Disassemble A/T.
4. Check the following items.
- Servo piston assembly
- Brake band
- Oil pump assembly

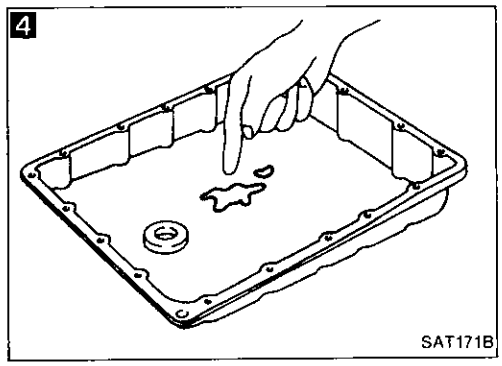
5 Check again.
- N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.
- O.K. ↓

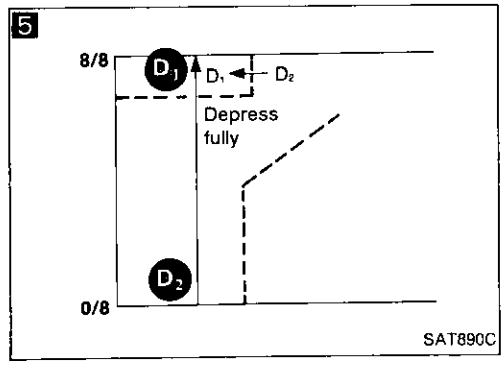
INSPECTION END

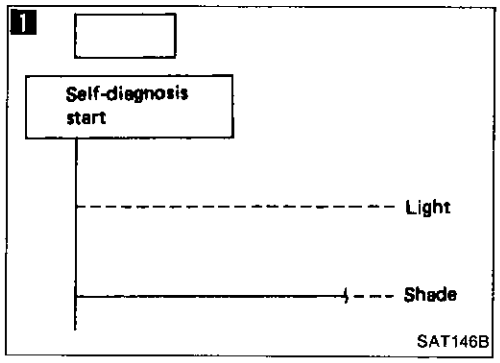












Diagnostic Procedure 18

SYMPTOM: A/T does not shift from D_4 to D_3 when changing selector lever from "D" to "3" position.

Does "ECM INPUT SIGNALS" show damage to inhibitor switch circuit?

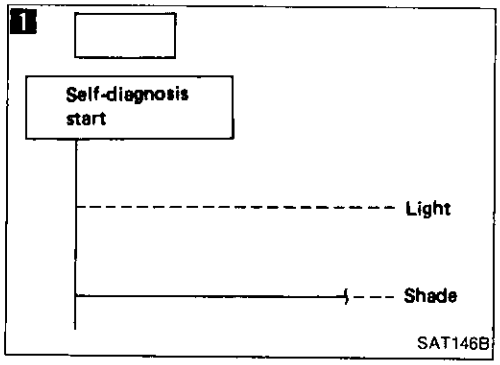
Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis".

OR

1

Does self-diagnosis show damage to inhibitor switch circuit?

No → Go to Diagnostic Procedure 10.



Diagnostic Procedure 19

SYMPTOM: A/T does not shift from 3_3 to 2_2 when changing selector lever from "3" to "2" position.

Does "ECM INPUT SIGNALS" show damage to inhibitor switch circuit?

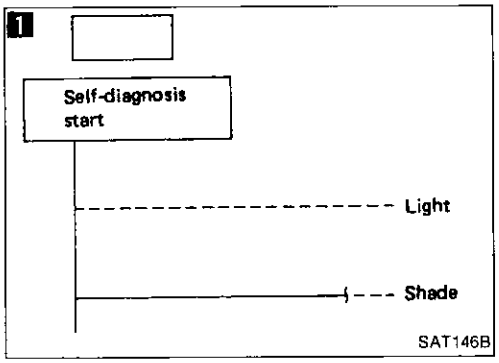
Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis"

OR

1

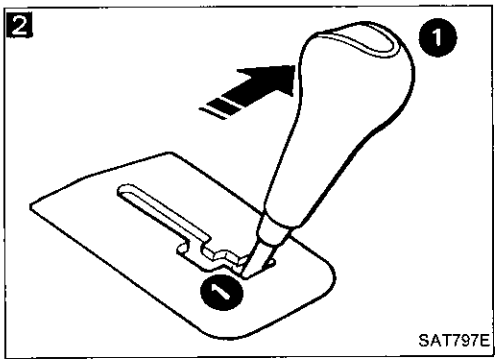
Does self-diagnosis show damage to inhibitor switch circuit?

No → Go to Diagnostic Procedure 9.



Diagnostic Procedure 20

SYMPTOM: A/T does not shift from 2_2 to 1_1 when changing selector lever from "2" to "1" position.



Does "ECM INPUT SIGNALS" show damage to inhibitor switch and 1 position switch circuits? — Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis".

OR

1 Does self-diagnosis show damage to inhibitor switch and 1 position switch circuits? — No

2 Check again. — N.G. → 1. Perform A/T control unit input/output signal inspection. 2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

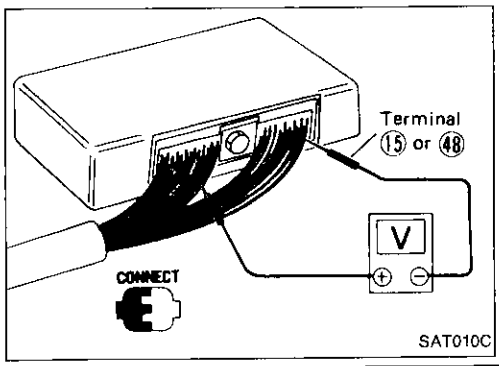
O.K. → **INSPECTION END**

Diagnostic Procedure 21

SYMPTOM: Vehicle does not decelerate by engine brake when shifting from 2_2 (1_2) to 1_1.

Is diagnostic procedure 6 O.K.? — No → Go to Diagnostic Procedure 6.

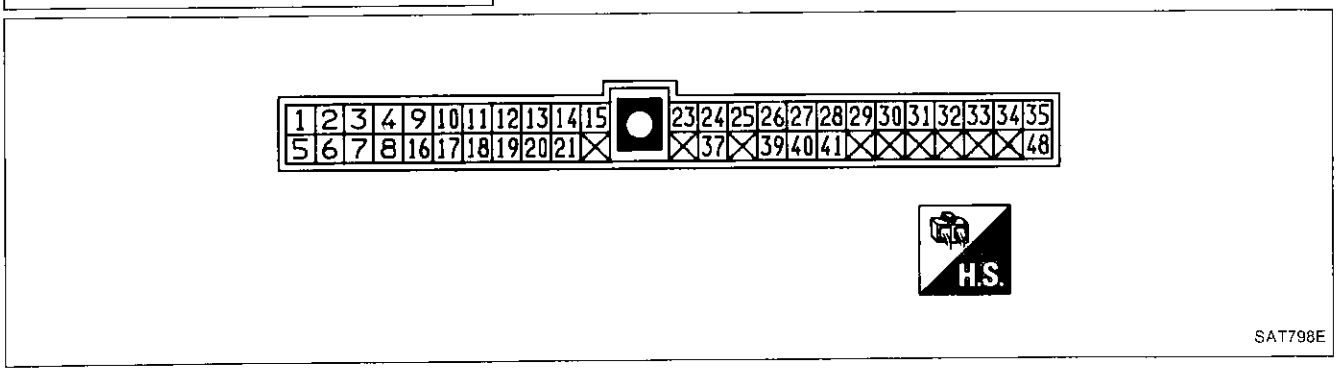
Yes → Go to Diagnostic Procedure 15.



Electrical Components Inspection

INSPECTION OF A/T CONTROL UNIT

- Measure voltage between each terminal and terminal ⑮ or ㊽ by following "A/T CONTROL UNIT INSPECTION TABLE".
- Pin connector terminal layout.



Electrical Components Inspection (Cont'd)

A/T CONTROL UNIT INSPECTION TABLE
(Data are reference values.)

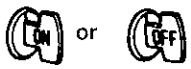
Terminal No.	Item	Condition		Judgment standard
1	Line pressure solenoid valve		When accelerator pedal is released after warming up engine.	1.5 - 2.5V
			When accelerator pedal is depressed fully after warming up engine.	0.5V or less
2	Line pressure solenoid valve (with dropping resistor)		When accelerator pedal is released after warming up engine.	5 - 14V
			When accelerator pedal is depressed fully after warming up engine.	0.5V or less
3	AT check lamp		When A/T check lamp is on.	1V or less
			When A/T check lamp is not on.	Batter voltage
4	Power source		When ignition switch is turned to "ON".	Battery voltage
			When ignition switch is turned to "OFF".	1V or less
5	Torque converter clutch solenoid valve		When A/T is performing lock-up.	8 - 15V
			When A/T is not performing lock-up.	1V or less
6	Shift solenoid valve A		When shift solenoid valve A is operating. (When driving in "D_1" or "D_4".)	Battery voltage
			When shift solenoid valve A is not operating. (When driving in "D_2" or "D_3".)	1V or less
7	Shift solenoid valve B		When shift solenoid valve B is operating. (When driving in "D_1" or "D_2".)	Battery voltage
			When shift solenoid valve B is not operating. (When driving in "D_3" or "D_4".)	1V or less
8	Overrun clutch solenoid valve		When timing solenoid is operating. (When driving in "D_1" or "D_4".)	Battery voltage
			When timing solenoid is not operating. (When driving in "D_2" or "D_3".)	1V or less

Electrical Components Inspection (Cont'd)

Terminal No.	Item	Condition	Judgment standard
9	Power source	Same as No. 4	
10*	—	—	—
11	—	—	—
12	—	—	—
13	—	—	—
14	Closed throttle position switch (in throttle position switch)	When accelerator pedal is released after warming up engine.	8 - 15V
		When accelerator pedal is depressed after warming up engine.	1V or less
15	Ground	—	—
16	Inhibitor "2" position switch	When selector lever is set to "2" and "1" position.	Battery voltage
		When selector lever is set to other positions.	1V or less
17	Inhibitor "3" position switch	When selector lever is set to "3" position.	Battery voltage
		When selector lever is set to other positions.	1V or less
18	Inhibitor "D" position switch	When selector lever is set to "D" position.	Battery voltage
		When selector lever is set to other positions.	1V or less
19	Inhibitor "N" or "P" position switch	When selector lever is set to "N" position.	Battery voltage
		When selector lever is set to other positions.	1V or less
20	Inhibitor "R" position switch	When selector lever is set to "R" position.	Battery voltage
		When selector lever is set to other positions.	1V or less
21	Wide open throttle position switch (in throttle position switch)	When accelerator pedal is depressed more than half-way after warming up engine.	8 - 15V
		When accelerator pedal is released after warming up engine.	1V or less
22	—	—	—

*: This terminal is connected to terminal No 36 of ECM (ECCS control module).
When diagnostic trouble code No. 54 appears during engine on-board diagnostic system, check line between above terminals for proper continuity.

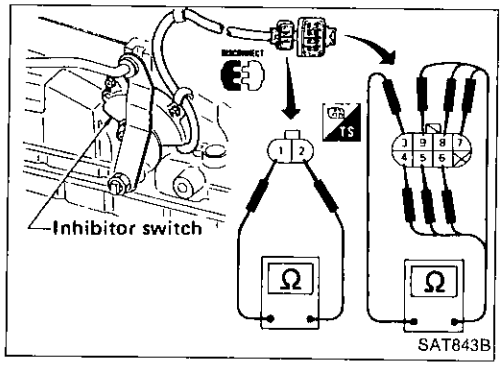
Electrical Components Inspection (Cont'd)

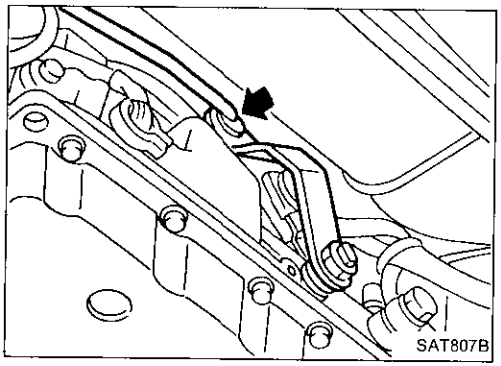
Terminal No.	Item	Condition		Judgment standard
23	Power source (Back-up)		When ignition switch is turned to "OFF".	Battery voltage
			When ignition switch is turned to "ON".	Battery voltage
24	Engine speed signal		When engine is running at idle speed.	0.9V
			When engine is running at 3,000 rpm.	Approximately 2.4V
25	Revolution sensor (Measure in AC range)		When vehicle is cruising at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
			When vehicle is parked.	0V
26	Turbine revolution sensor		When engine is running at 1,000 rpm	Approximately 1.2V Voltage rises gradually in response to engine speed.
27	Speed sensor		When vehicle is moving at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Vary from 0 to 5V
28	—		—	—
29	—		—	—
30	—		—	—
31	Throttle position sensor (Power source)		—	4.5 - 5.5V
32	—		—	—
33	Fluid temperature sensor		When A.T.F. temperature is 20°C (68°F).	Approximately 1.5V
			When A.T.F. temperature is 80°C (176°F).	Approximately 0.5V
34	Throttle position sensor		When accelerator pedal is depressed slowly after warming up engine.	Fully-closed throttle: Approximately 0.5V
			Voltage rises gradually in response to throttle opening angle.	Fully-open throttle: Approximately 4V
35	Throttle position sensor (Ground)		—	—
36	—		—	—

Electrical Components Inspection (Cont'd)

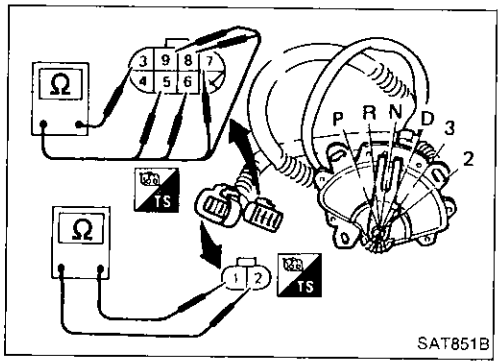
Terminal No.	Item	Condition		Judgment standard
37	A.S.C.D. cruise signal		When A.S.C.D. cruise is being performed. ("CRUISE" light comes on.)	Battery voltage
			When A.S.C.D. cruise is not being performed. ("CRUISE" light does not come on.)	1V or less
38	—		—	—
39	1 range switch		When selector lever is set to "1" position.	Battery voltage
			When selector lever is set to other positions.	1V or less
40	A.S.C.D. O.D. cut signal		When "ACCEL" set switch on A.S.C.D. cruise is released.	5 - 8V
			When "ACCEL" set switch on A.S.C.D. cruise is applied.	1V or less
41	Kickdown switch		When accelerator pedal is released after warming up engine.	3 - 8V
			When accelerator pedal is depressed fully after warming up engine.	1V or less
42	—		—	—
43	—		—	—
44	—		—	—
45	—		—	—
46	—		—	—
47	—		—	—
48	Ground		—	—

N	○	○	○			○			
D			○				○		
3			○					○	
2-1			○						○

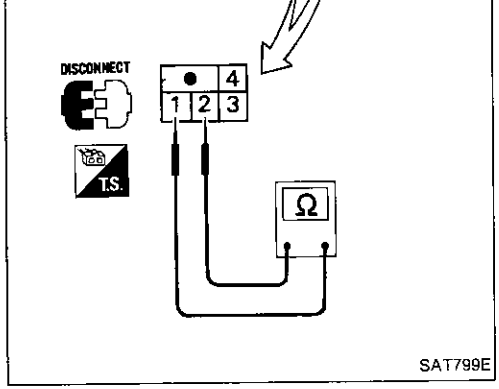




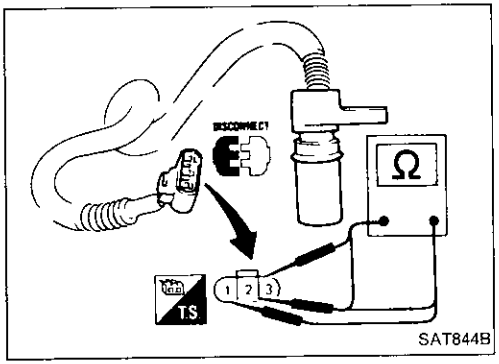
2. If N.G., check again with manual control linkage disconnected from manual shaft of A/T assembly. — Refer to step 1.
3. If O.K. on step 2, adjust manual control linkage. — Refer to "ON-VEHICLE SERVICE".



4. If N.G. on step 2, remove inhibitor switch from A/T and check continuity of inhibitor switch terminal. — Refer to step 1.
5. If O.K. on step 4, adjust inhibitor switch. — Refer to "ON-VEHICLE SERVICE".
6. If N.G. on step 4, replace inhibitor switch.



SAT799E

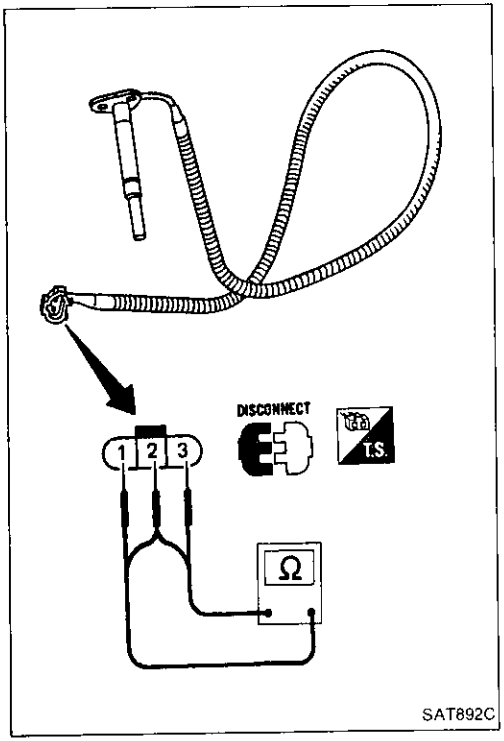


SAT844B

REVOLUTION SENSOR

- For removal and installation, refer to "ON-VEHICLE SERVICE".
- Check resistance between terminals ①, ② and ③.

Terminal No.		Resistance
①	②	500 - 650Ω
②	③	No continuity
①	③	No continuity

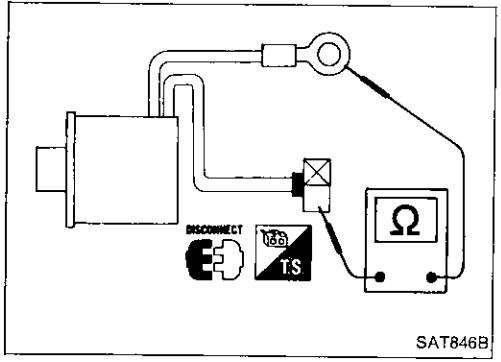


SAT892C

TURBINE REVOLUTION SENSOR

- Check resistance between terminals ①, ② and ③.

Terminal No.		Resistance
①	②	2,200 - 2,800Ω
②	③	No continuity
①	③	No continuity

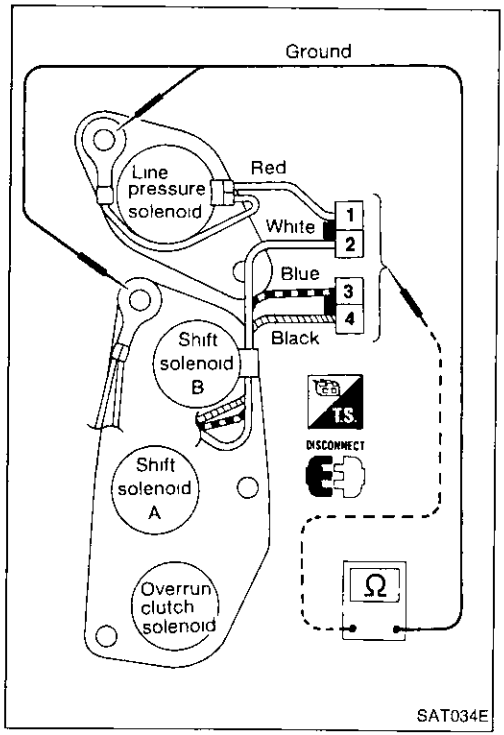


TORQUE CONVERTER CLUTCH SOLENOID VALVE

- For removal and installation, refer to "ON-VEHICLE SERVICE".
- Check resistance between two terminals.

Resistance:

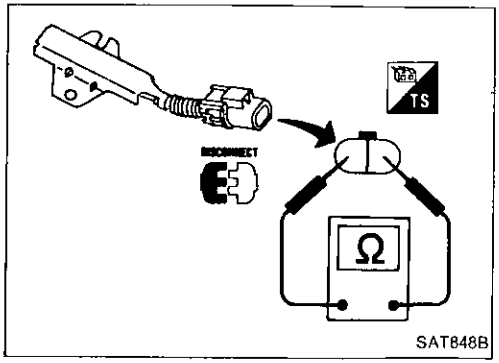
Torque converter clutch solenoid valve 10 - 20Ω



3-UNIT SOLENOID ASSEMBLY (Shift solenoids valve A, B and overrun clutch solenoid valve) AND LINE PRESSURE SOLENOID VALVE

- For removal and installation, refer to "ON-VEHICLE SERVICE".
- Check resistance between terminals of each solenoid.

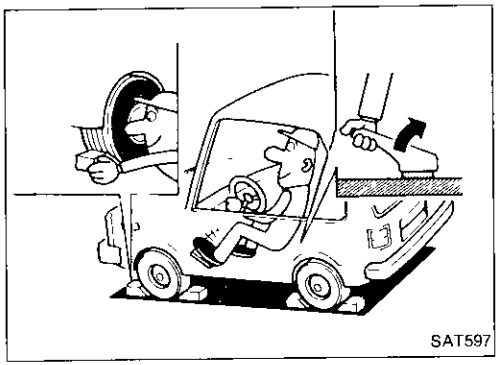
Solenoid	Terminal No.		Resistance
Shift solenoid valve A	③	Ground terminal	20 - 40Ω
Shift solenoid valve B	②		
Overrun clutch solenoid valve	④		
Line pressure solenoid valve	①		2.5 - 5Ω



DROPPING RESISTOR

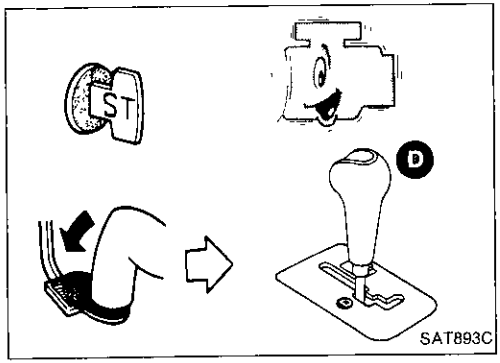
- Check resistance between two terminals.

Resistance: 11.2 - 12.8Ω


SAT597

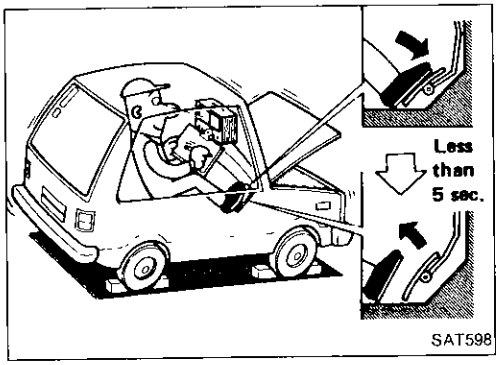
3. Set parking brake and block wheels.
4. Install a tachometer where it can be seen by driver during test.

- **It is good practice to put a mark on point of specified engine speed on indicator.**



SAT893C

5. Start engine, apply foot brake, and place selector lever in "D" position.

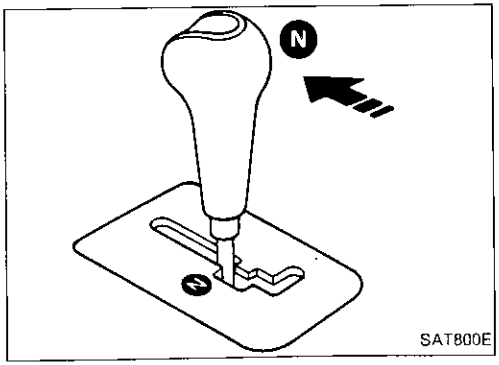


SAT598

6. Accelerate to wide-open throttle gradually while applying foot brake.
7. Quickly note the engine stall revolution and immediately release throttle.

- **During test, never hold throttle wide-open for more than 5 seconds.**

Stall revolution:
2,320 - 2,720 rpm



SAT800E

8. Shift selector lever to "N".
9. Cool off A.T.F.

- **Run engine at idle for at least one minute.**

10. Perform stall tests in the same manner as in steps 5 through 9 with selector lever in "2", "1" and "R", respectively.

Final Check (Cont'd)

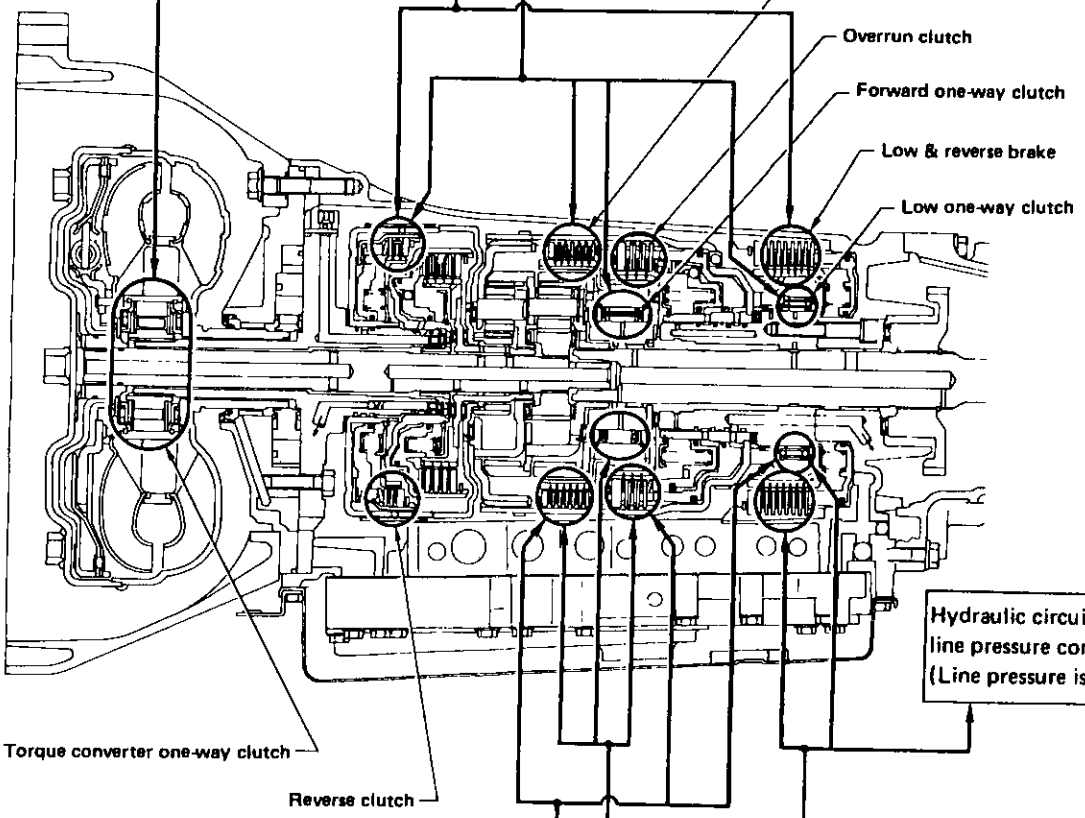
Judgement of stall test

Selector lever position	Judgement		
D	L	O	H
3	L	O	H
2	L	O	H
1	L	O	O
R	L	H	H

O : Stall revolution is normal.
H : Stall revolution is higher than specified.
L : Stall revolution is lower than specified.

Damaged components

Engine



Hydraulic circuit for line pressure control (Line pressure is low.)

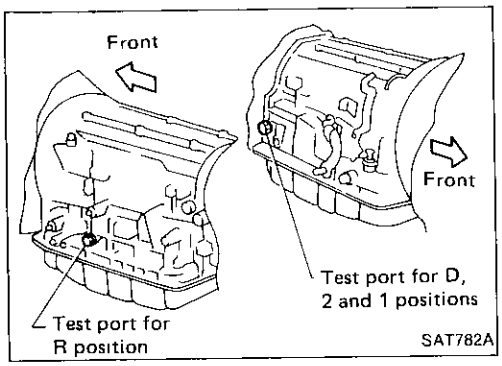
Clutches and brakes except high clutch and brake band are O.K. (Condition of high clutch and brake band cannot be confirmed by stall test.)

Selector lever position	Judgement			
D	H	H	H	O
3	H	H	H	O
2	H	H	H	O
1	O	H	H	O
R	O	O	H	O

SAT107B

Final Check (Cont'd)

PRESSURE TESTING

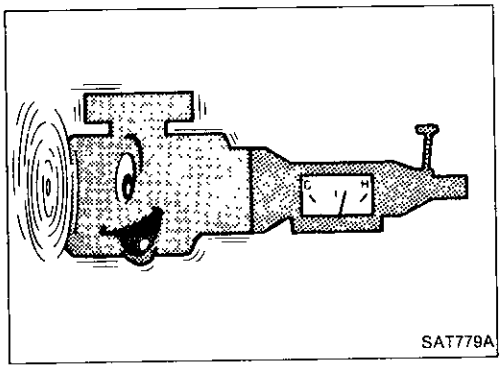


- Location of line pressure test port
- **Line pressure plugs are hexagon headed bolts.**
- **Always replace line pressure plugs as they are self-sealing bolts.**

Line pressure test procedure

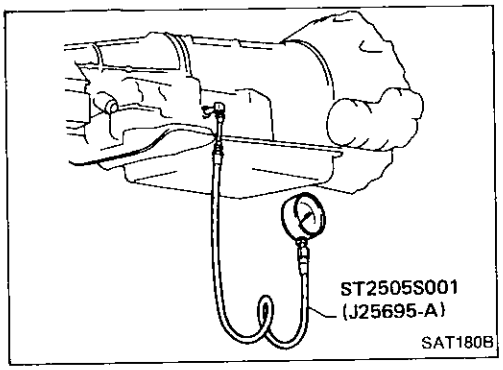
1. Check A/T and engine fluid levels. If necessary, add.
2. Warm up engine until engine oil and A.T.F. reach operating temperature after vehicle has been driven approx. 10 minutes.

   A.T.F. operating temperature:
   50 - 80°C (122 - 176°F)

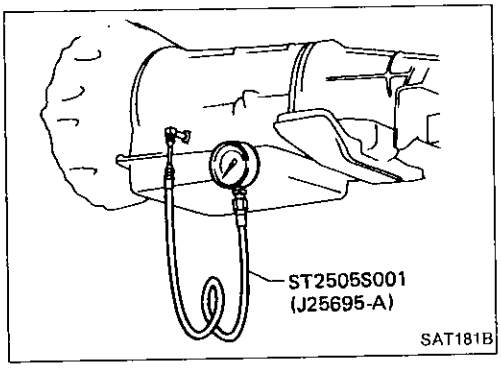


3. Install pressure gauge to line pressure port.

— D, 2 and 1 positions —

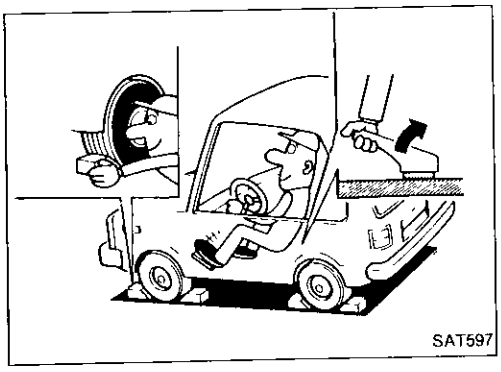


— R position —

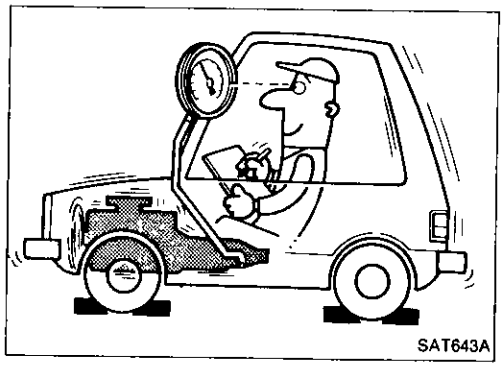


4. Set parking brake and block wheels.

- **Continue to depress brake pedal fully while line pressure test at stall speed is performed.**



Final Check (Cont'd)


SAT643A

5. Start engine and measure line pressure at idle and stall speed.

- **When measuring line pressure at stall speed, follow the stall test procedure.**

Line pressure:

Engine speed rpm	Line pressure kPa (kg/cm^2, psi)	
	D, 3, 2 and 1 positions	R position
Idle	422 - 461 (4.3 - 4.7, 61 - 67)	608 - 647 (6.2 - 6.6, 88 - 94)
Stall	1,020 - 1,098 (10.4 - 11.2, 148 - 159)	1,422 - 1,500 (14.5 - 15.3, 206 - 218)

JUDGMENT OF LINE PRESSURE TEST

Judgment		Suspected parts
At idle	Line pressure is low in all positions.	• Oil pump wear • Control piston damage • Pressure regulator valve or plug sticking • Spring for pressure regulator valve damaged • Fluid pressure leakage between oil strainer and pressure regulator valve
	Line pressure is low in particular position.	• Fluid pressure leakage between manual valve and particular clutch. • For example; If line pressure is low in "R" and "1" positions but is normal in "D", "3" and "2" position, fluid leakage exists at or around low & reverse brake circuit.
	Line pressure is high.	• Mal-adjustment of throttle position sensor • Fluid temperature sensor damaged • Line pressure solenoid valve sticking • Short circuit of line pressure solenoid valve circuit • Pressure modifier valve sticking • Pressure regulator valve or plug sticking
At stall speed	Line pressure is low.	• Mal-adjustment of throttle position sensor • Control piston damaged • Line pressure solenoid valve sticking • Short circuit of line pressure solenoid valve circuit • Pressure regulator valve or plug sticking • Pressure modifier valve sticking • Pilot valve sticking

Symptom Chart

Reference page (AT-)		ON vehicle: Fluid level	Control linkage	Inhibitor switch and 1 position switch	Throttle position sensor (Adjustment)	Revolution sensor and speed sensor	Engine speed signal	Engine idling rpm	Line pressure	Control valve assembly	Shift solenoid valve A	Shift solenoid valve B	Line pressure solenoid valve	Torque converter clutch solenoid valve	Overrun clutch solenoid valve	Fluid temperature sensor	Accumulator N-D	Accumulator 1-2	Accumulator 2-3	Accumulator 3-4 (N-R)	Ignition switch and starter	OFF vehicle: Torque converter	Oil pump	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrun clutch	Low one-way clutch	Low & reverse brake	Brake band	Turbine revolution sensor	Parking components
		9, 14	79 80	80	84	81, 121	81	81	7, 81	7	7	106, 117	134, 138	140, 151	140	144	80, 158																
Reference page (AT-)	Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transmission must be removed from the vehicle.																															
59	Engine does not start in "N", "P" positions	2	3																	1												
59	Engine starts in position other than "N" and "P"	1	2																													
—	Transmission noise in "P" and "N" positions	1		3	4	5		2													⑦	⑥										
59	Vehicle moves when changing into "P" position or parking gear does not disengage when shifted out of "P" position	1																													②	
60	Vehicle runs in "N" position.	1																		4			③		②		⑤					
62	Vehicle will not run in "R" position (but runs in "D", "3", "2" and "1" positions) Clutch slips. Very poor acceleration.	1					2	4		3													⑤	⑥	⑦		⑧		⑨			
—	Vehicle braked when shifting into "R" position	1	2				3	5		4														⑥	⑧		⑨			⑦		
—	Sharp shock in shifting from "N" to "D" position			2		5	1	3	7		6			4	8										⑩						⑨	
—	Vehicle will not run in "D", "3" and "2" positions (but runs in "1" and "R" position)		1																								②					
63	Vehicle will not run in "D", "1", "2" and "3" positions (but runs in "R" position) Clutch slips Very poor acceleration	1					2	4		3					5								⑥	⑦	⑧	⑨		⑩				
—	Clutches or brakes slip somewhat in starting.	1	2	3			4	6		5					7				8		⑬	⑫	⑩		⑨				⑪			
—	Excessive creep					1																										
62, 63	No creep at all.	1					2	3													⑥	⑤			④							
—	Failure to change gear from "D_1" to "D_2"		2	1	5			4	3																				⑥			
—	Failure to change gear from "D_2" to "D_3"	2	1	5				4		3														⑥					⑦			
—	Failure to change gear from "D_3" to "D_4".	2	1	4				3							5														⑥			
65, 66, 67	Too high a gear change point from "D_4" to "D_2", from "D_2" to "D_3", from "D_3" to "D_4"		1	2				3	4																							
—	Gear change directly from "D_1" to "D_3" occurs.	1															2												③			
—	Engine stops when shifting lever into "R", "D", "3", "2" and "1"					1		3			2										④											
—	Too sharp a shock in change from "D_1" to "D_2"		1				2	4				5		3															⑥			
—	Too sharp a shock in change from "D_2" to "D_3".		1				2	4							3									⑤					⑥			

Symptom Chart (Cont'd)

Reference page (AT-)		ON vehicle										OFF vehicle					
		9, 14	79 80	80	84	81, 121	81	81	7, 81	7	7	106, 117	134, 138	140, 151	140	144	80 158
Reference page (AT-)	Numbers are arranged in order of probability Perform inspections starting with number one and work up. Circled numbers indicate that the transmission must be removed from the vehicle	Fluid level Control linkage	Inhibitor switch Throttle position sensor (Adjustment)	Revolution sensor and speed sensor Engine speed signal	Engine idling rpm Line pressure	Control valve assembly Shift solenoid valve A	Shift solenoid valve B Line pressure solenoid valve	Torque converter clutch solenoid valve Overrun clutch solenoid valve	Fluid temperature sensor Accumulator N-D	Accumulator 1-2 Accumulator 2-3	Accumulator 3-4 (N-R) Ignition switch and starter	Torque converter Oil pump	Reverse clutch High clutch	Forward clutch Forward one-way clutch	Overrun clutch Low one-way clutch	Low & reverse brake Brake band	Turbine revolution sensor Parking components
—	Too sharp a shock in change from "D_3" to "D_4".	. .	. 1		2	4	.	. .		. .	3 .	. .		.	⑥	. ⑤	.
—	Almost no shock or clutches slipping in change from "D_1" to "D_2".	1 .	2		. 3	5 .	.		.	4 .	.		.	. .	.	⑥	
—	Almost no shock or slipping in change from "D_2" to "D_3".	1 .	2		3	5 .	.		.	. 4	.		. ⑥	. .		. ⑦	
—	Almost no shock or slipping in change from "D_3" to "D_4"	1 .	2		. 3	5 .	.	.		. .	4	.	⑥	.	.	. ⑦	.
—	Vehicle braked by gear change from "D_1" to "D_2"	1 .	.	.	.			.	.	.		.	② ④		⑤	③ .	
—	Vehicle braked by gear change from "D_2" to "D_3"	1						.				.			.	②	
—	Vehicle braked by gear change from "D_3" to "D_4".	1 .	. .	.	.	.		.	.	.		.	④ .	③	②	.	.
—	Maximum speed not attained. Acceleration poor	1	2	.		5 3	4	. .		.		⑪ ⑩	⑥ ⑦		.	⑨ ⑧	.
—	Failure to change gear from "D_4" to "D_3"	1	. 2	.	.	6 4	5	3	.	. .	.	.	.	. .	⑧ .	⑦	
—	Failure to change gear from "D_3" to "D_2" or from "D_4" to "D_2"	1 .	. 2	. .	.	5 3	4	.	.	.	.	.	⑥	.	. .	⑦	.
—	Failure to change gear from "D_2" to "D_1" or from "D_3" to "D_1"	1 .	2	.	.	5 3	4 .	.		.	. .	. .	⑦	. .	. ⑥	⑧	.
—	Gear change shock felt during deceleration by releasing accelerator pedal	. .	. 1		2	4 .	. .	. 3	.	. .	. .	.		.	. .		4
—	Too high a change point from "D_4" to "D_3", from "D_3" to "D_2", from "D_2" to "D_1"		1	2				.	.	.	.	.	.	.	.	.	.
—	Kickdown does not operate when depressing pedal in "D_4" within kickdown vehicle speed.		1	2	.	3	4			.	.	.	.	.	.	.	.
—	Kickdown operates or engine overruns when depressing pedal in "D_4" beyond kickdown vehicle speed limit	.	2	1	.	3	4			.	. .		.	.	.		.
—	Races extremely fast or slips in changing from "D_4" to "D_3" when depressing pedal.	1	2	.	3	5	4	. .		.		.	. ⑥	⑦		.	
—	Races extremely fast or slips in changing from "D_4" to "D_2" when depressing pedal	1 .	2		. 3	6 5	. 4	.		. .		.	.	⑧ .		. ⑦	. .
—	Races extremely fast or slips in changing from "D_3" to "D_2" when depressing pedal	1 .	2		3	5	. 4	.	8 .	. 10	.	. .	. ⑨	⑦	.	. ⑥	.
—	Races extremely fast or slips in changing from "D_4" or "D_3" to "D_1" when depressing pedal	1	. 2	.	. 3	5	4		. .			. .	.	⑥ ⑦	⑧	.	
—	Vehicle will not run in any range	1 2	.	.	. 3	. .	4	.	.		.	⑨ ⑤	. ⑥			⑧ ⑦	⑩
—	Transmission noise in "D", "3", "2", "1" and "R" positions.	1			.	.	.		. .	.	.	②	.		.		.

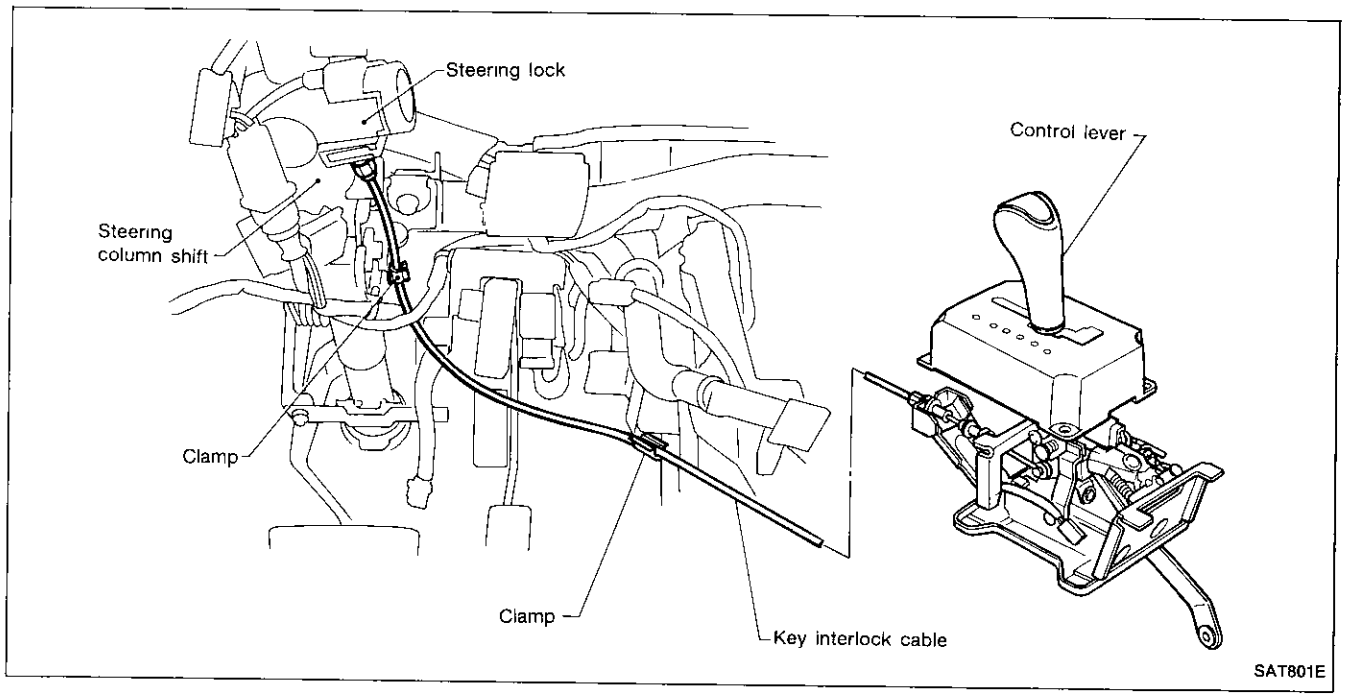
Symptom Chart (Cont'd)

Reference page (AT-)		ON vehicle: Fluid level / Control linkage	Inhibitor switch	Throttle position sensor (Adjustment)	Revolution sensor and speed sensor	Engine speed signal	Engine idling rpm / Line pressure	Control valve assembly / Shift solenoid valve A	Shift solenoid valve B / Line pressure solenoid valve	Torque converter clutch solenoid valve / Overrun clutch solenoid valve	Fluid temperature sensor / Accumulator N-D	Accumulator 1-2	Accumulator 2-3	Accumulator 3-4 (N-R) / Ignition switch and starter	OFF vehicle: Torque converter / Oil pump	Reverse clutch / High clutch	Forward clutch / Forward one-way clutch	Overrun clutch / Low one-way clutch	Low & reverse brake / Brake band	Turbine revolution sensor / Parking components
		9, 14	79 80	80	84	81, 121	81	81	7, 81	7	7	106, 117	134, 138	140, 151	140	144	80 158			
Reference page (AT-)	Numbers are arranged in order of probability Perform inspections starting with number one and work up. Circled numbers indicate that the transmission must be removed from the vehicle.																			
73	Failure to change from "3_3" to "2_2" when changing lever into "2" position	7	1 2			.	6 5	4 .	. 3	.	.	.	.	.	.	⑨ .	. ⑧			
—	Gear change from "2_2" to "2_3" in "2" position	.	1			.		.	.	.	.	.	.	.	.	. .				
73	Engine brake does not operate in "1" position	. 2	1 3	4		.	6 5		7	.	.			.	.	⑧ .	⑨ .	.		
—	Gear change from "1_1" to "1_2" in "1" position.	. 2	1	.		.	. .	. .	.	.	.	.	.	.	.	.	. .			
—	Does not change from "1_2" to "1_1" in "1" position	. .	1	2		. .	4 3		5	.	. .			.	. .	⑥	⑦			
—	Large shock changing from "1_2" to "1_1" in "1" position	.	.	.		. .	1 .	. .	.	.	.	. .			.	. .	②			
—	Transmission overheats.	1 .	. 3	.		2 4	6	5	. .	.	.	.	.	⑭ ⑦	⑧ ⑨	⑪	⑫ .	⑬ ⑩		
—	A.T.F shoots out during operation White smoke emitted from exhaust pipe during operation.	1		. .		.	.	.	.	.	. .	.	.		② ③	⑤ .	⑥ .	⑦ ④		
—	Offensive smell at fluid charging pipe.	1 .	.	.		.	.	.	.	.	. .	. .	.	② ③	④ ⑤	⑦ .	⑧ .	⑨ ⑥		.
—	Torque converter is not locked up.	.	3 1	2 4	. 6	8 .	. .	7 .	5	. .	. .	.	.	⑨ .	. .	. .	.	.	. .	
—	Lock-up piston slip	1 .	2	. .	. 3	6 .	. 5	4 .	. .	.	.	.	.	⑦ .	. .	. .	. .	.	.	
68	Lock-up point is extremely high or low.	.	. 1	2 .	.	4	.	3 .		. .	. .	. .	.	. .	. .	. .	. .	. .	. .	
—	A/T does not shift to "D_4" when driving with overdrive switch "ON"	.	2 1	3 .	8	6 4	. .	. 5	7	. .	.	.	.	.	. .	.	⑩ .	⑨		
—	Engine is stopped at "R", "D", "2" and "1" positions.	1	.			5 4	3 .	2 .	.	. .	.	.	.		. .	. .	. .	.	.	

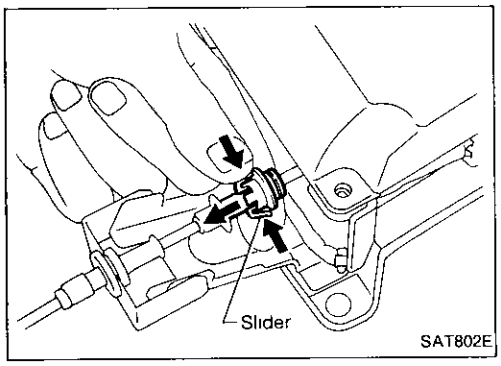
Contents

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Diagnostic Procedure 1
SYMPTOM 1 : With key in "ON" position selector lever cannot be moved from "P" position when applying
brake pedal or can be moved when releasing brake pedal.
Selector lever can be moved from "P" position when key is removed from key cylinder.
SYMPTOM 2 : Ignition key cannot be removed when selector lever is set to "P" position
or can be removed when selector lever is set to any position except "P". AT-94
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Shift Lock Control Unit Inspection Table AT-98
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Key Interlock Cable

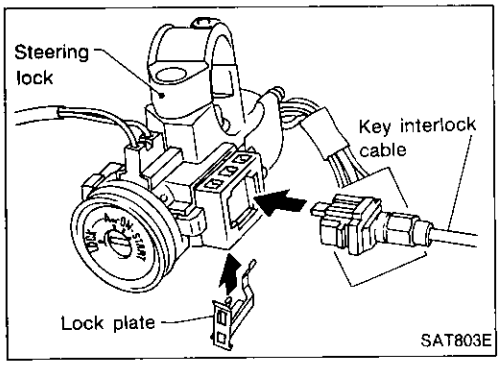


Key Interlock Cable (Cont'd)



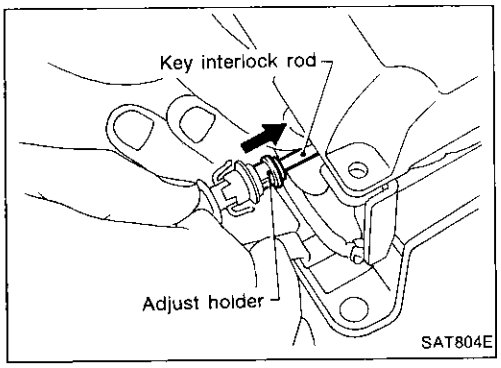
REMOVAL

1. Unlock slider from adjuster holder and remove rod from cable.

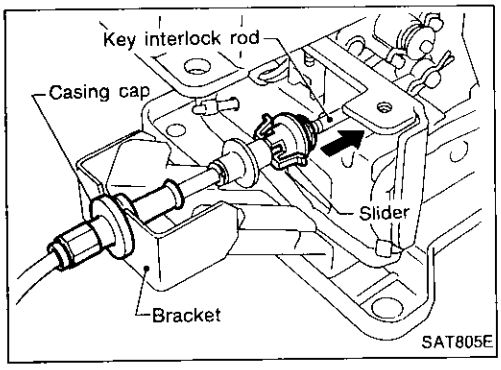


INSTALLATION

1. Set key interlock cable to steering lock assembly and install lock plate.
2. Clamp cable to steering column and fix to control cable with band.
3. Set control lever to P position.

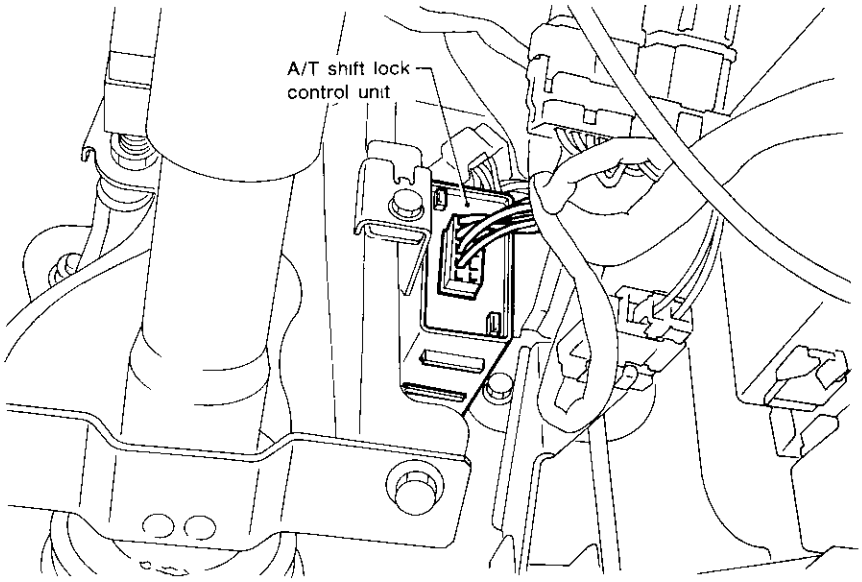


4. Insert interlock rod into adjuster holder.

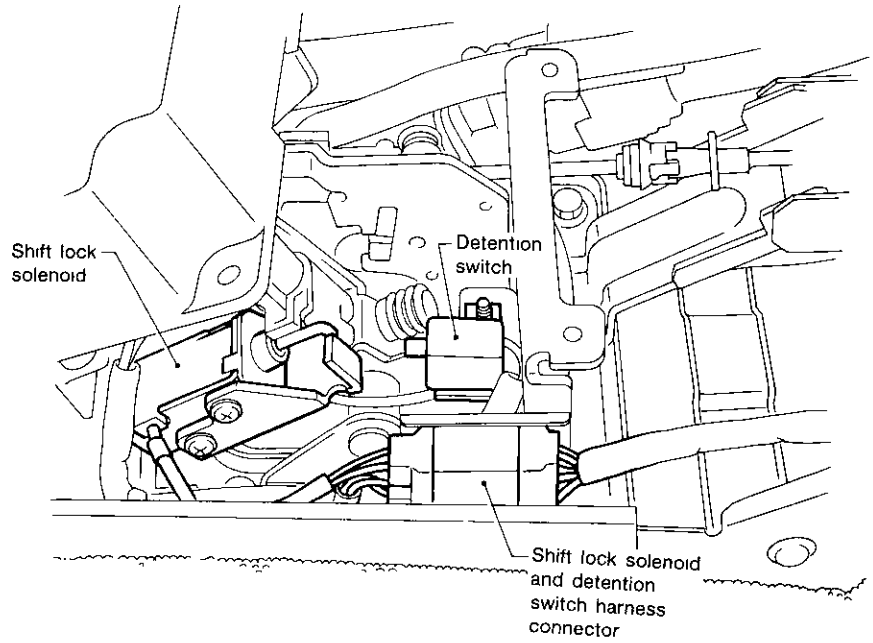


5. Install casing cap to bracket.
6. Move slider in order to fix adjuster holder to interlock rod.

Shift Lock System Electrical Parts Location

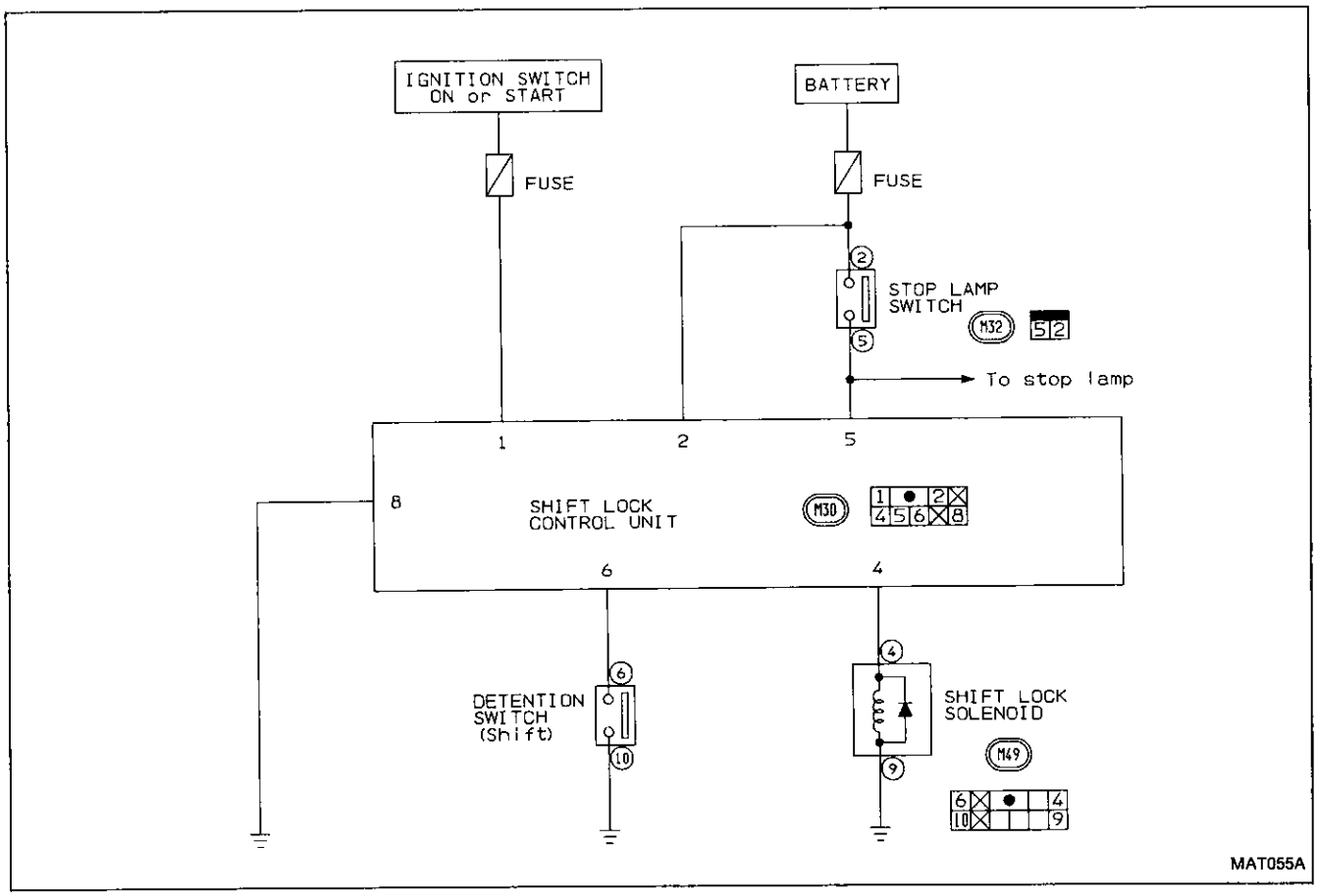


SAT806E

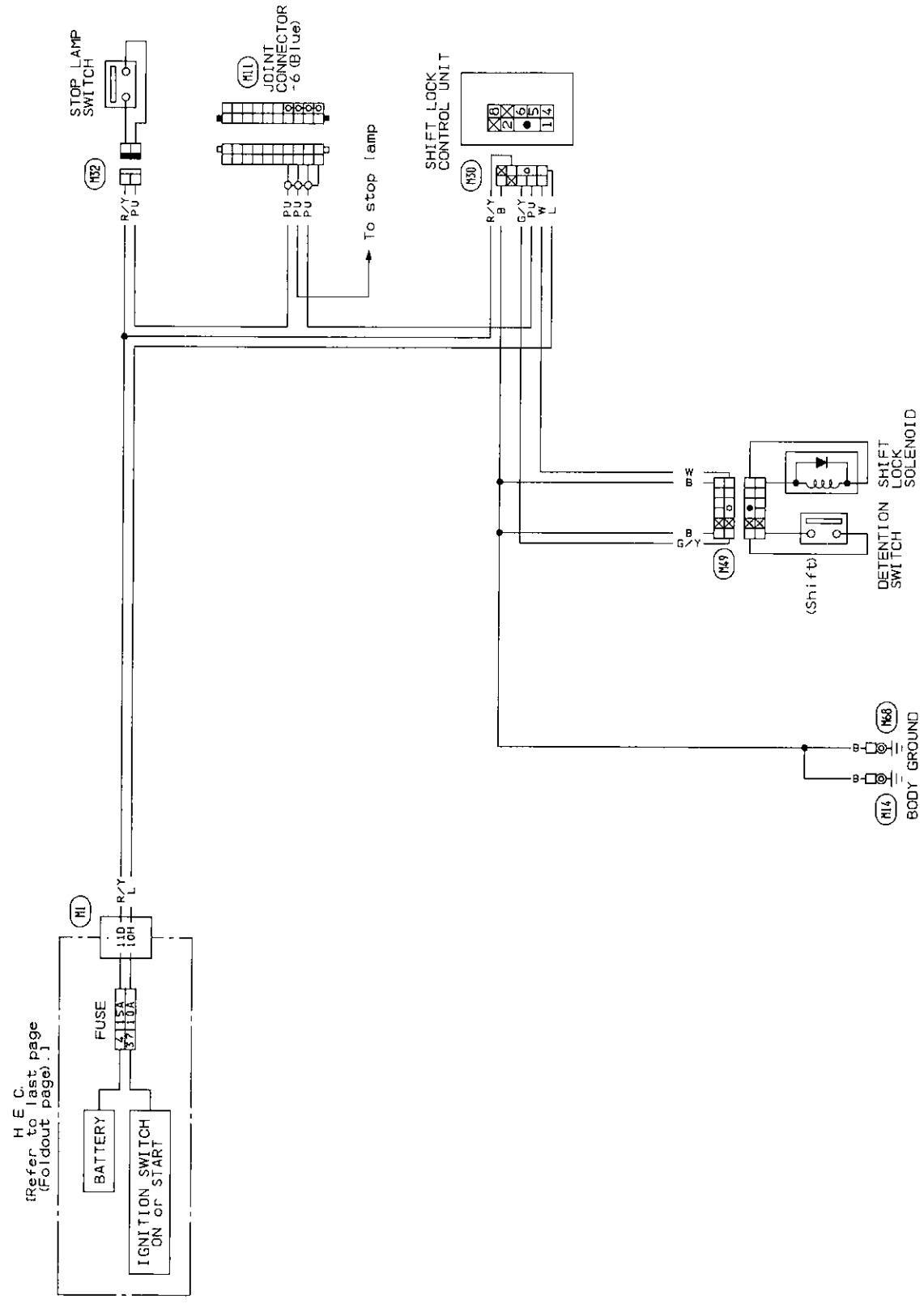


SAT807E

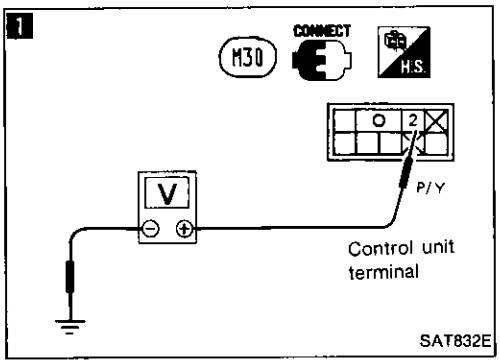
Circuit Diagram for Quick Pinpoint Check



Wiring Diagram

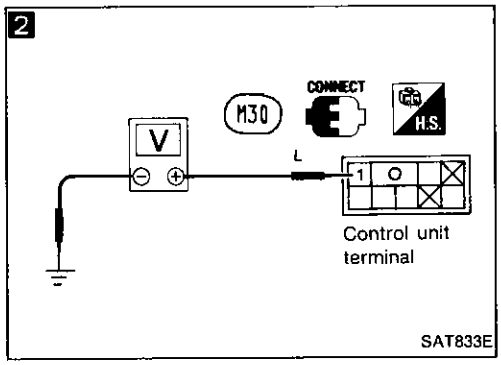


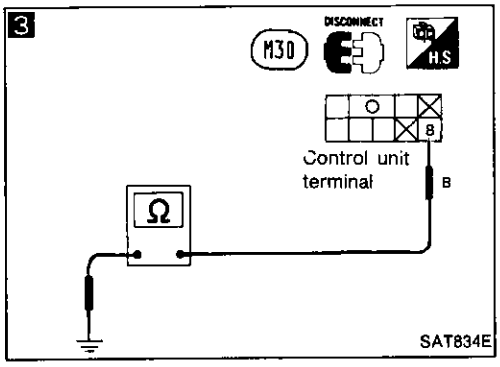
MAT056A



Diagnostic Procedure 1

SYMPTOM 1: With key in "ON" position, selector lever cannot be moved from "P" position when applying brake pedal or can be moved when releasing brake pedal.
Selector lever can be moved from "P" position when key is removed from key cylinder.
SYMPTOM 2: Ignition key cannot be removed when selector lever is set to "P" position or can be removed when selector lever is set to any position except "P".





Check key interlock cable for damage. — N.G. → Repair key interlock cable. Repair to key interlock cable.

O.K.

1 CHECK POWER SOURCE.

1. 

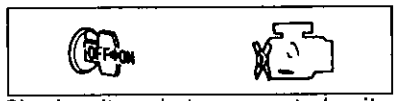
2. Check voltage between control unit harness terminal ② and ground.
Battery voltage should exist.

N.G. → Check the following items:
1. Harness continuity between battery and control unit harness terminal ②.
2. Fuse

O.K.

2 CHECK IGNITION SIGNAL.

1. 

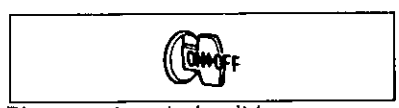
2. Check voltage between control unit harness terminal ① and ground.
0V
3. 

4. Check voltage between control unit harness terminal ① and ground.
Battery voltage should exist.

N.G. → Check the following items:
1. Harness continuity between battery and control unit harness terminal ①
2. Fuse
3. Ignition switch

O.K.

3 CHECK GROUND CIRCUIT FOR CONTROL UNIT.

1. 

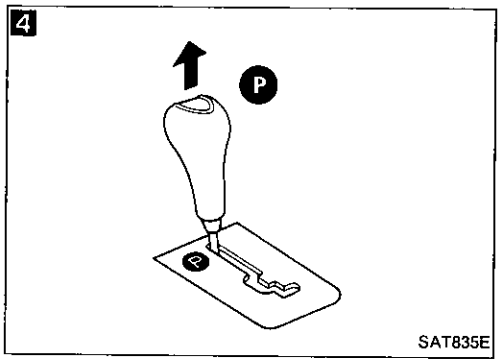
2. Disconnect control unit harness connector.
3. Check continuity between control unit harness terminal ⑧ and ground.
Continuity should exist.

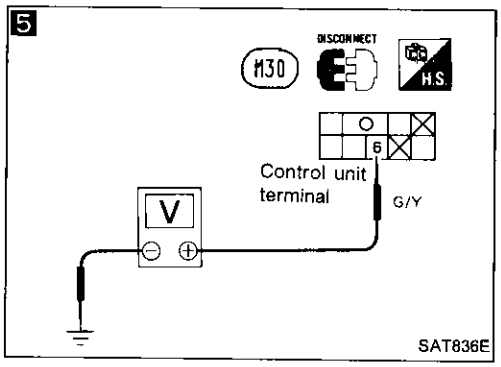
N.G. → Repair harness or connector.

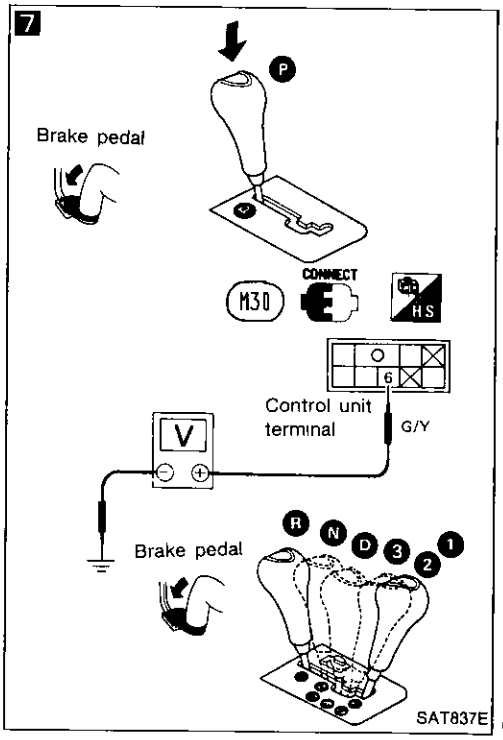
O.K.

Ⓐ

Diagnostic Procedure 1 (Cont'd)







Ⓐ

CHECK INPUT SIGNAL (DETENTION SWITCH).

1. Reconnect control unit harness connector.
2. 

4 3. Set selector lever to "P" position and release selector lever button.
When selector lever cannot be moved from "P" position with brake pedal depressed, set ignition key to "ACC" position and move lever then set ignition key "ON".

5 4. Disconnect control unit harness connector.
5. Check continuity between control unit harness terminal ⑥ and ground.
Continuity should not exist.

N.G. → Check detention switch—shift. (Refer to "COMPONENT CHECK".)

O.K.

CHECK INPUT SIGNAL (DETENTION SWITCH).

1. 

6 2. Check continuity between control unit harness terminal ⑥ and ground with brake pedal depressed and selector lever button pushed.
Continuity should exist.

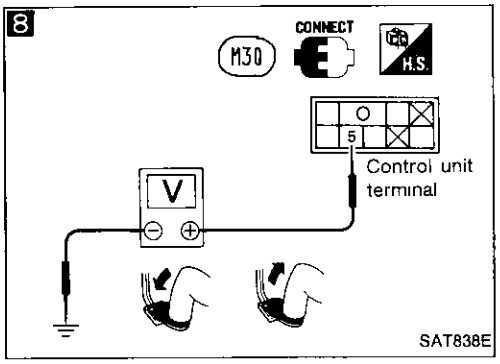
7 3. Check continuity between control unit harness terminal ⑥ and ground with selector lever set in any position except "P".
Battery voltage should exist.

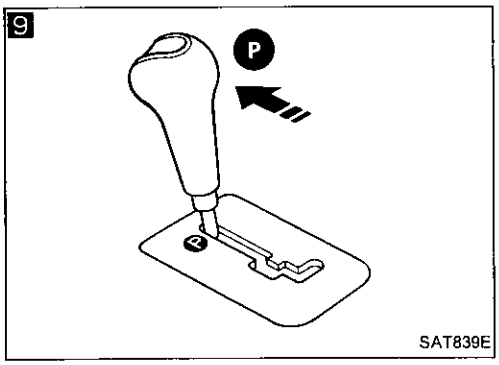
N.G. → Check the following items:
1. Harness continuity between control unit harness terminal ⑥ and detention switch harness terminal ⑤
2. Harness continuity between detention switch harness terminal ⑥ and ground.
3. Detention switch (Refer to "COMPONENT CHECK".)

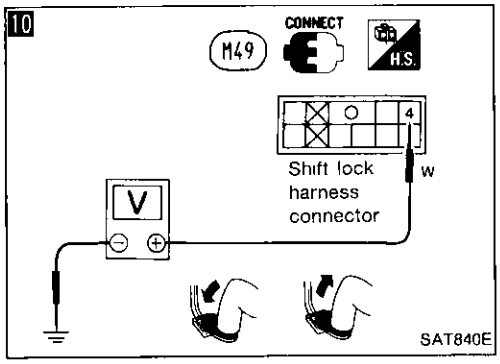
O.K.

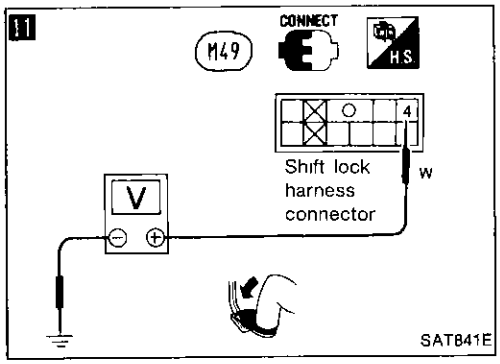
Ⓑ

Diagnostic Procedure 1 (Cont'd)





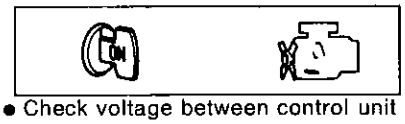




Ⓑ

8

CHECK INPUT SIGNAL (STOP LAMP SWITCH).



- Check voltage between control unit harness terminal ⑤ and ground.

Brake pedal	Voltage
Depressed	Battery voltage
Released	0V

N.G. → Check the following items:
1. Harness continuity between control unit harness terminal ⑤ and stop lamp switch harness terminal ②
2. Harness continuity between stop lamp switch harness terminal ① and fuse
3. Stop lamp switch (Refer to "COMPONENT CHECK".)

O.K. ↓

9

Set selector lever to "P" position.

CHECK OUTPUT SIGNAL (SHIFT LOCK SOLENOID).

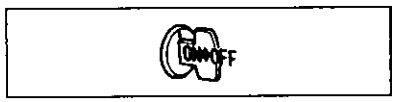
1.



10 2. Check voltage between shift lock harness connector terminal ④ and body ground.

Brake pedal	Voltage
Depressed	Battery voltage
Released	0V

3.



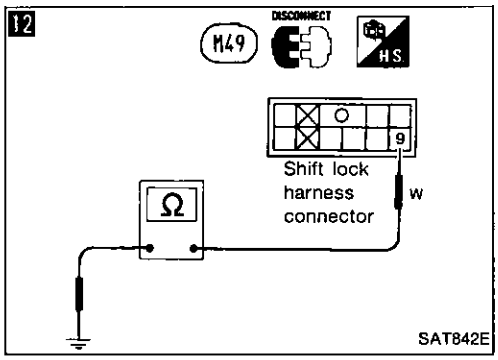
11 4. Check voltage between shift lock harness connector terminal ④ and ground with brake pedal depressed.
0V

N.G. → Check harness continuity between control unit harness terminal ④ and shift lock solenoid harness terminal ④.

O.K. ↓

Ⓒ

Diagnostic Procedure 1 (Cont'd)



Ⓒ

12

CHECK GROUND CIRCUIT FOR SHIFT LOCK SOLENOID.
1. Disconnect shift lock harness connector.
2. Check continuity between shift lock harness terminal ⑨ and ground.
Continuity should exist.

N.G. → Repair harness or connector.

O.K. ↓

Check shift lock solenoid.
(Refer to "COMPONENT CHECK".)

N.G. → Replace A/T shift lock control device assembly.

O.K. ↓

Reconnect shift lock harness connector. ↓



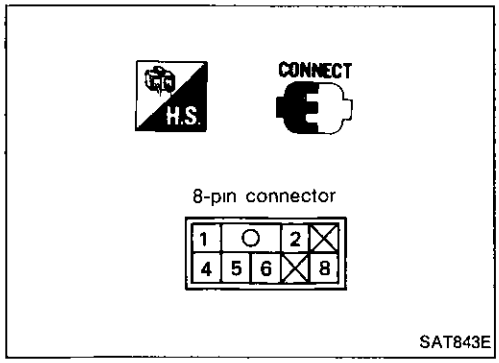
↓

Recheck shift lock operation.

N.G. → 1. Perform control unit input/output signal inspection test.
2. If N.G., recheck harness connector connection.

O.K. ↓

INSPECTION END



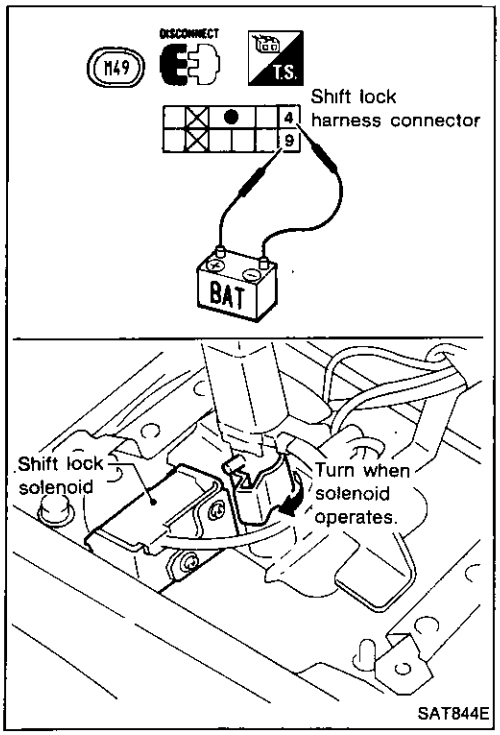
Shift Lock Control Unit Inspection

- Measure voltage between each terminal and terminal ⑧ by following "Shift Lock Control Unit Inspection Table".
- Pin connector terminal layout.

Shift Lock Control Unit Inspection Table

(Data are reference values.)

Terminal No. ⊕	Terminal No. ⊖	Item	Condition	Judgment standard
4	9	Shift lock signal	When selector lever is set in "P" position and brake pedal is depressed	Battery voltage
			Except above	0V
2		Power source	Any condition	Battery voltage
5		Stop lamp switch	When brake pedal is depressed	Battery voltage
			When brake pedal is released	0V
6		Detention switch	• When key is inserted into key cylinder and selector lever is set in "P" position with selector lever button pushed. • When selector is set in any position except "P".	Battery voltage
			Except above	0V
1		Ignition signal		Battery voltage
			Except above	0V
8	—	Ground	—	—

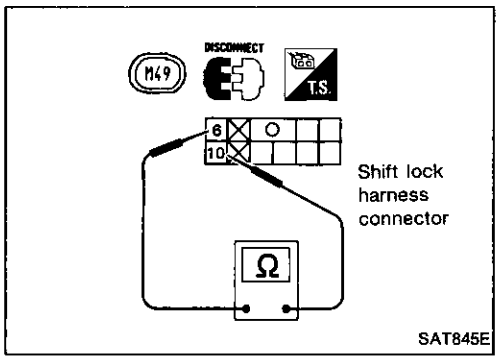


Component Check

SHIFT LOCK SOLENOID

- Check operation by applying battery voltage to shift lock harness connector.

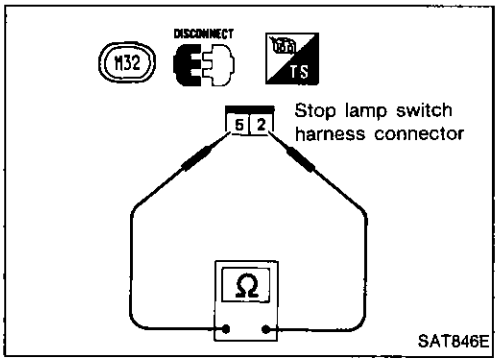
Component Check (Cont'd)



DETENTION SWITCH — Shift

- Check continuity between terminals ⑤ and ⑪ of shift lock harness connector.

Condition	Continuity
When selector lever is set in "P" position and selector lever button is released	No
Except the above	Yes

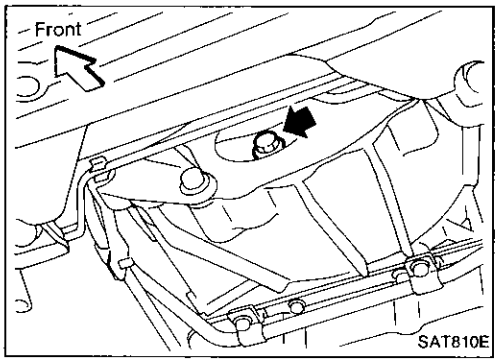


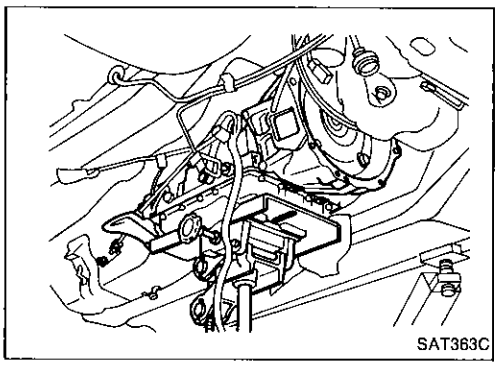
STOP LAMP SWITCH

- Check continuity between terminals ② and ⑤ of stop lamp switch harness connector.

Condition	Continuity
When brake pedal is depressed	Yes
When brake pedal is released	No

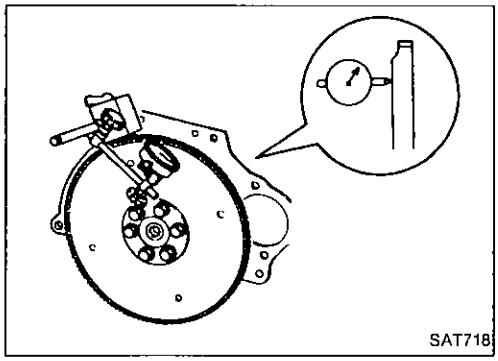
Check stop lamp switch after adjusting brake pedal — refer to section BR.

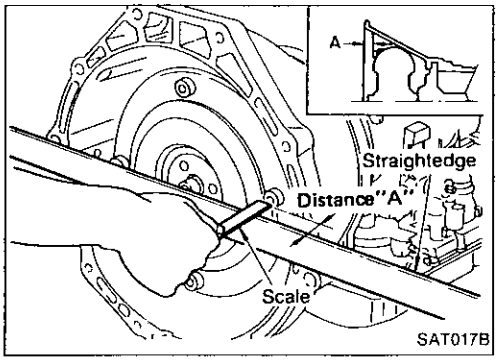




Removal

- Remove exhaust tube front nuts on left and right sides.
- Remove front tube after removing exhaust tube bracket.
- Remove fluid charging pipe from A/T assembly.
- Remove oil cooler pipe from A/T assembly.
- Remove control linkage from selector lever.
- Disconnect inhibitor switch and solenoid harness connectors.
- Plug up openings such as the oil charging pipe hole, etc.
- 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.**
- Remove starter motor.
- Remove gusset securing engine to A/T assembly.
- Remove bolts securing torque converter to drive plate.
- **Remove the bolts by turning crankshaft.**
- Support engine by placing a jack under oil pan.
- **Do not place jack under oil pan drain plug.**
- Remove transmission from engine.
- **Support automatic transmission, while removing it.**



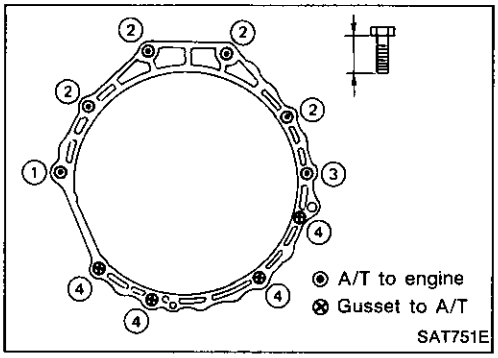


Installation

- Drive plate runout
  Maximum allowable runout:
  0.5 mm (0.020 in)
  If this runout is out of allowance, replace drive plate with ring gear.

- When connecting torque converter to transmission, measure distance "A" to be certain that they are correctly assembled.
  Distance "A":
  26 mm (1.02 in) or more
- Install converter to drive plate.
- Reinstall any part removed.
- **After converter is installed to drive plate, rotate crankshaft several turns and check to be sure that transmission rotates freely without binding.**

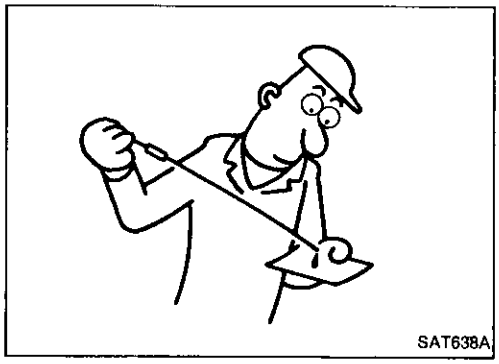
Installation (Cont'd)



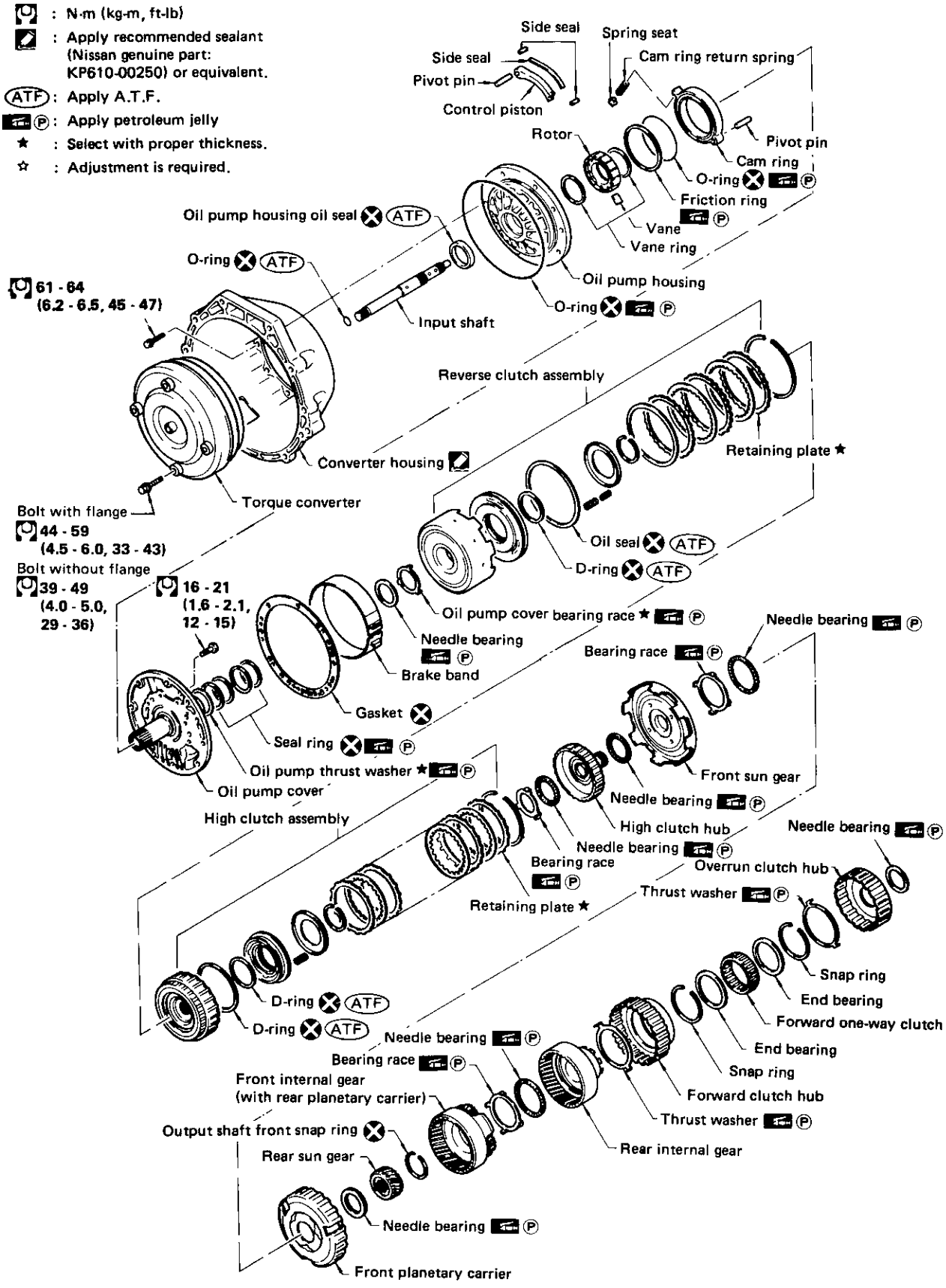
- Tighten bolts securing transmission.

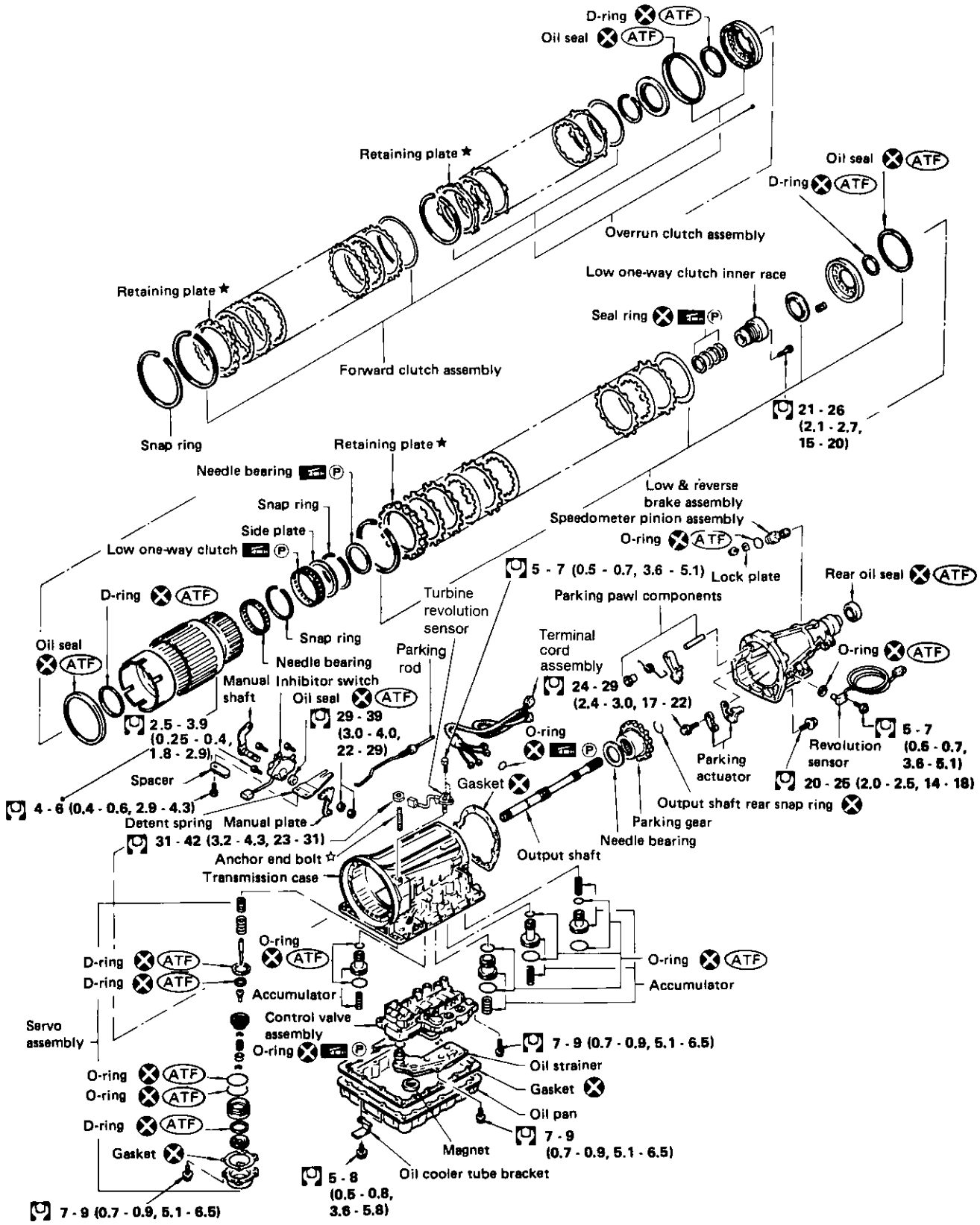
Bolt No.	Tightening torque N·m (kg-m, ft-lb)	Bolt length "ℓ" mm (in)
1	39 - 49 (4.0 - 5.0, 29 - 36)	60 (2.36)
2	39 - 49 (4.0 - 5.0, 29 - 36)	50 (1.97)
3	39 - 49 (4.0 - 5.0, 29 - 36)	45 (1.77)
4	29 - 39 (3.0 - 4.0, 22 - 29)	25 (0.98)
Gusset to engine	29 - 39 (3.0 - 4.0, 22 - 29)	20 (0.79)

- Reinstall any part removed.



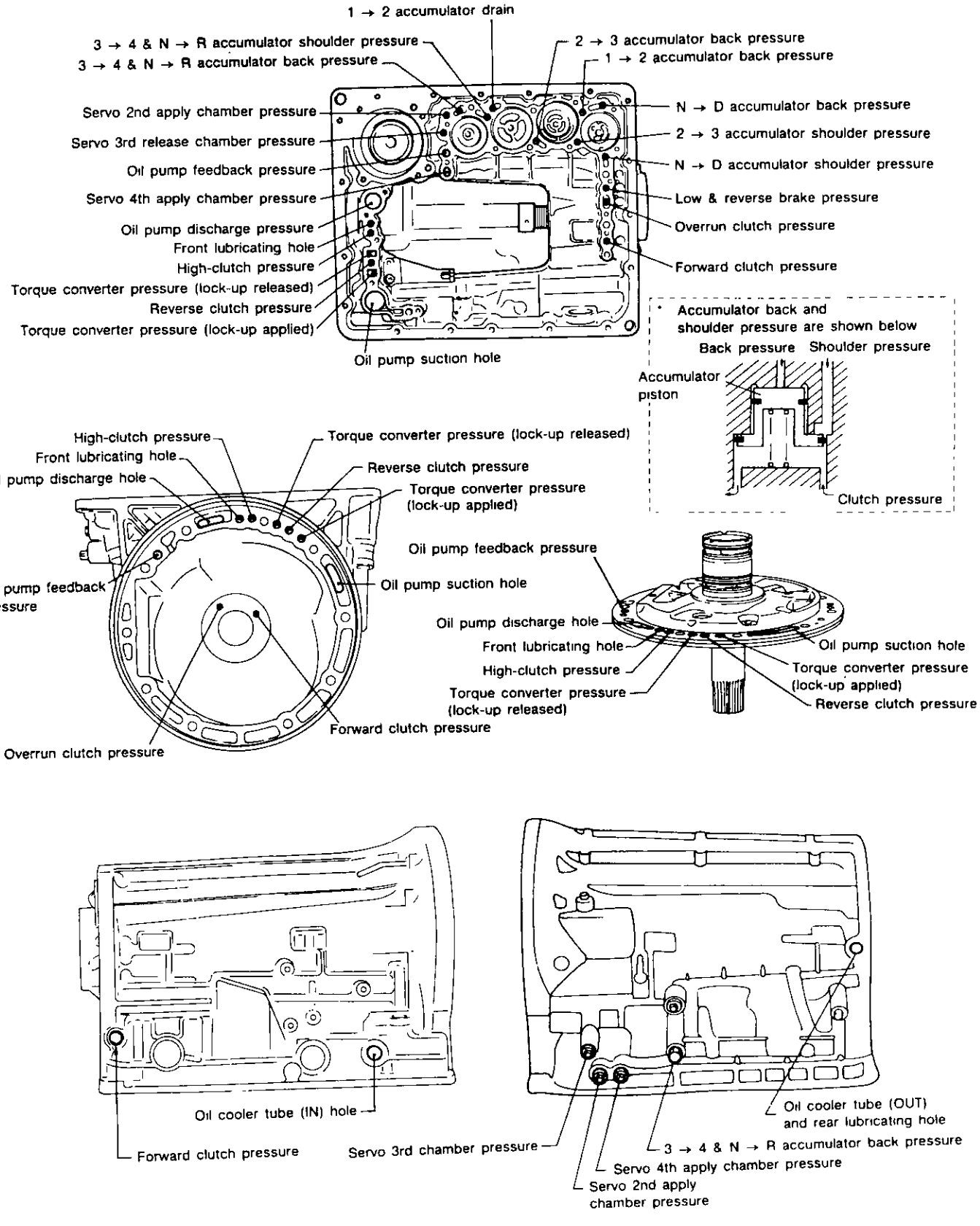
- Check fluid level in transmission.
- Move selector lever through all positions to be sure that transmission operates correctly.
  With parking brake applied, rotate engine at idling. Move selector lever through "N" to "D", to "2", to "1" and to "R". A slight shock should be felt by hand gripping selector each time transmission is shifted.
- Perform road test. — Refer to "ROAD TESTING".


: N·m (kg-m, ft-lb)
: Apply recommended sealant (Nissan genuine part: KP610-00250) or equivalent.
ATF : Apply A.T.F.
P : Apply petroleum jelly
★ : Select with proper thickness.
☆ : Adjustment is required.
Side seal
Side seal
Pivot pin
Control piston
Spring seat
Cam ring return spring
Rotor
Pivot pin
Cam ring
O-ring ATF P
Friction ring P
Vane
Vane ring
Oil pump housing oil seal ATF
O-ring ATF
61 - 64 (6.2 - 6.5, 45 - 47)
Input shaft
Oil pump housing
O-ring P
Reverse clutch assembly
Converter housing
Retaining plate ★
Torque converter
Bolt with flange
44 - 59 (4.5 - 6.0, 33 - 43)
Bolt without flange
39 - 49 (4.0 - 5.0, 29 - 36)
16 - 21 (1.6 - 2.1, 12 - 15)
Oil seal ATF
D-ring ATF
Oil pump cover bearing race ★ P
Needle bearing P
Brake band
Gasket
Seal ring P
Oil pump thrust washer ★ P
Oil pump cover
High clutch assembly
Needle bearing P
Bearing race P
Front sun gear
Needle bearing P
High clutch hub
Needle bearing P
Bearing race P
Retaining plate ★
Needle bearing P
Overrun clutch hub
Thrust washer P
Snap ring
End bearing
Forward one-way clutch
End bearing
Snap ring
Forward clutch hub
Thrust washer P
Rear internal gear
D-ring ATF
D-ring ATF
Needle bearing P
Bearing race P
Front internal gear (with rear planetary carrier)
Output shaft front snap ring
Rear sun gear
Needle bearing P
Front planetary carrier


D-ring ⊗ ATF
Oil seal ⊗ ATF
Retaining plate ★
Oil seal ⊗ ATF
D-ring ⊗ ATF
Overrun clutch assembly
Low one-way clutch inner race
Retaining plate ★
Seal ring ⊗ (P)
Forward clutch assembly
21 - 26 (2.1 - 2.7, 15 - 20)
Snap ring
Retaining plate ★
Needle bearing (P)
Snap ring
Side plate
Low one-way clutch (P)
Low & reverse brake assembly
Speedometer pinion assembly
O-ring ⊗ ATF
Lock plate
5 - 7 (0.5 - 0.7, 3.6 - 5.1)
Parking pawl components
Rear oil seal ⊗ ATF
D-ring ⊗ ATF
Turbine revolution sensor
Oil seal ⊗ ATF
Snap ring
Needle bearing
Inhibitor switch
Parking rod
Terminal cord assembly
24 - 29 (2.4 - 3.0, 17 - 22)
O-ring ⊗ ATF
Manual shaft
Oil seal ⊗ ATF
2.5 - 3.9 (0.25 - 0.4, 1.8 - 2.9)
29 - 39 (3.0 - 4.0, 22 - 29)
O-ring ⊗ (P)
5 - 7 (0.5 - 0.7, 3.6 - 5.1)
Revolution sensor
Parking actuator
20 - 25 (2.0 - 2.5, 14 - 18)
Spacer
Gasket ⊗
Output shaft rear snap ring ⊗
4 - 6 (0.4 - 0.6, 2.9 - 4.3)
Detent spring
Manual plate
Parking gear
31 - 42 (3.2 - 4.3, 23 - 31)
Needle bearing
Anchor end bolt ☆
Output shaft
Transmission case
O-ring ⊗ ATF
D-ring ⊗ ATF
D-ring ⊗ ATF
Accumulator
O-ring ⊗ ATF
Accumulator
Servo assembly
Control valve assembly
O-ring ⊗ (P)
7 - 9 (0.7 - 0.9, 5.1 - 6.5)
Oil strainer
Gasket ⊗
O-ring ⊗ ATF
O-ring ⊗ ATF
D-ring ⊗ ATF
Oil pan
7 - 9 (0.7 - 0.9, 5.1 - 6.5)
Gasket ⊗
Magnet
Oil cooler tube bracket
5 - 8 (0.5 - 0.8, 3.6 - 5.8)
7 - 9 (0.7 - 0.9, 5.1 - 6.5)

SAT641E

Oil Channel



SAT185B

Locations of Needle Bearings, Thrust Washers and Snap Rings

Outer diameter of snap rings

Item number	Outer diameter mm (in)
②	161.0 (6.34)
③	140.1 (5.52)
④	156.4 (6.16)
⑥	142.0 (5.59)
⑦	159.2 (6.27)

Thrust washers

Item number	Color
①	Black
⑤	White

Outer diameter of needle bearings

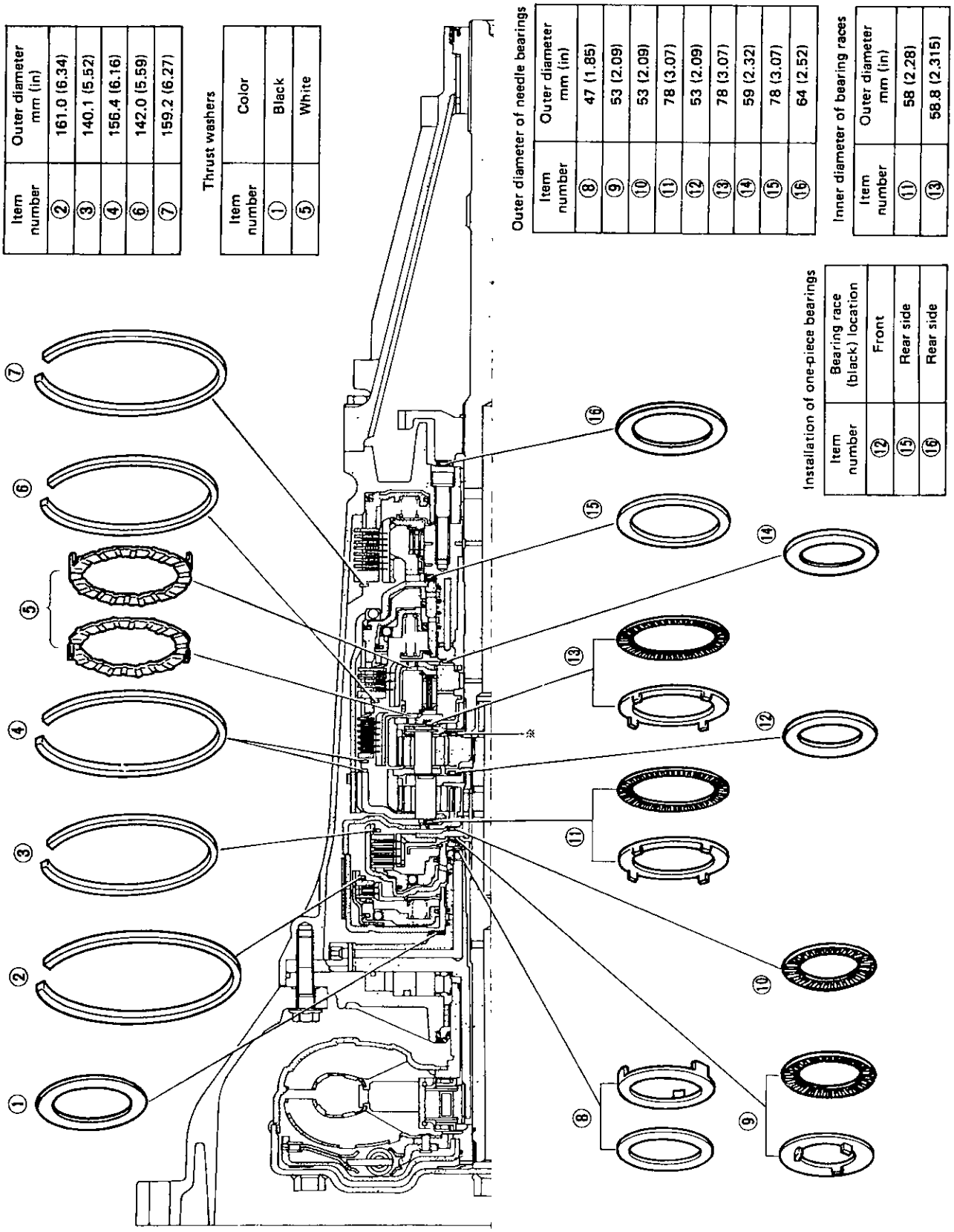
Item number	Outer diameter mm (in)
⑧	47 (1.85)
⑨	53 (2.09)
⑩	53 (2.09)
⑪	78 (3.07)
⑫	53 (2.09)
⑬	78 (3.07)
⑭	59 (2.32)
⑮	78 (3.07)
⑯	64 (2.52)

Inner diameter of bearing races

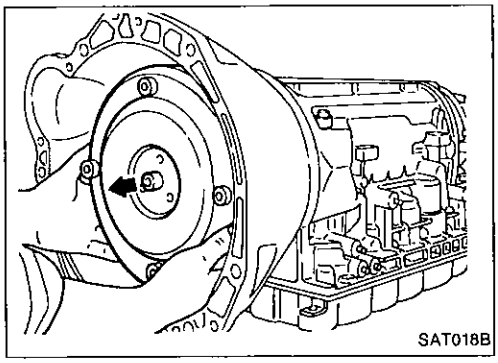
Item number	Outer diameter mm (in)
⑪	58 (2.28)
⑬	58.8 (2.315)

Installation of one-piece bearings

Item number	Bearing race (black) location
⑫	Front
⑮	Rear side
⑯	Rear side

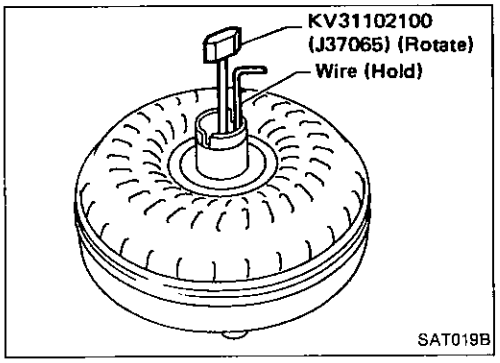


SAT647A


SAT018B

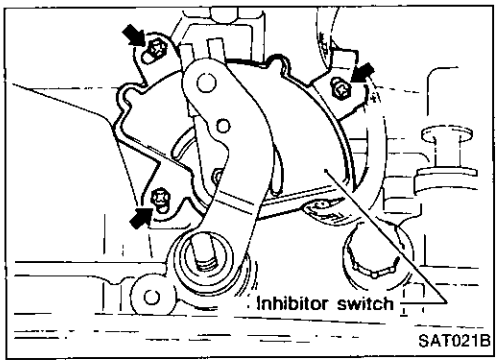
Disassembly

1. Remove torque converter by holding it firmly and turning while pulling straight out.



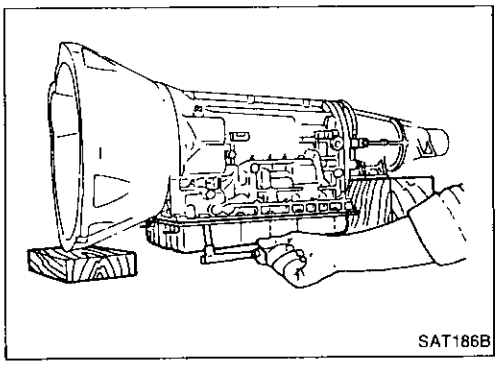
SAT019B

2. Check torque converter one-way clutch.
a. Insert Tool into spline of one-way clutch inner race.
b. Hook bearing support unitized with one-way clutch outer race with suitable wire.
c. Check that one-way clutch inner race rotates only clockwise with Tool while holding bearing support with wire.



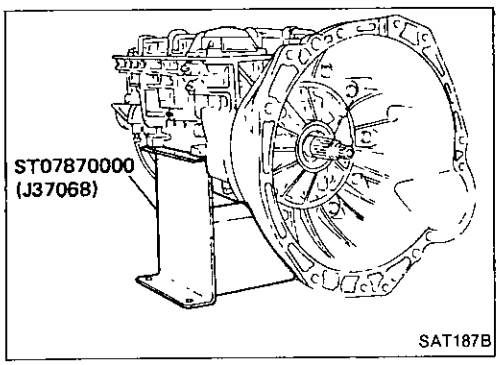
SAT021B

3. Remove inhibitor switch from transmission case.


SAT186B

4. Remove oil pan.
a. Drain A.T.F. from rear extension.
b. Raise oil pan by placing wooden blocks under converter housing and rear extension.
c. Separate the oil pan and transmission case.

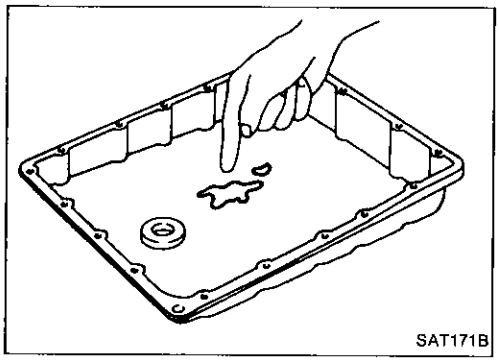
- **Always place oil pan straight down so that foreign particles inside will not move.**



SAT187B

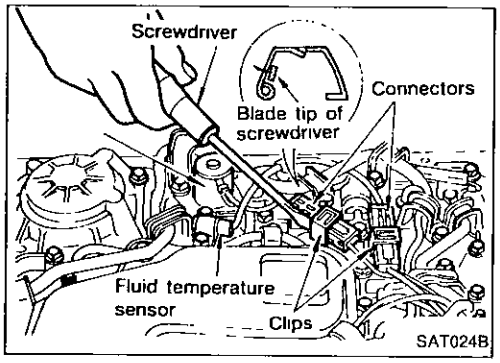
5. Place transmission into Tool with the control valve facing up.

Disassembly (Cont'd)

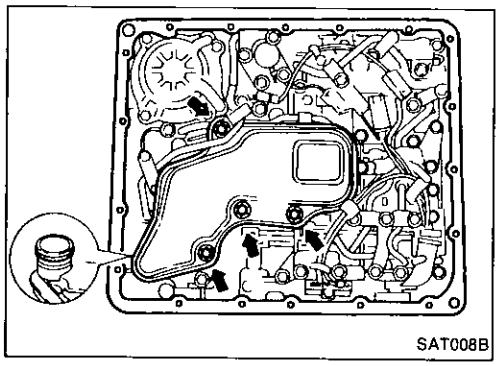


6. Check oil pan and oil strainer for accumulation of foreign particles.
- If materials of clutch facing are found, clutch plates may be worn.
- If metal filings are found, clutch plates, brake bands, etc. may be worn.
- If aluminum filings are found, bushings or aluminum cast parts may be worn.

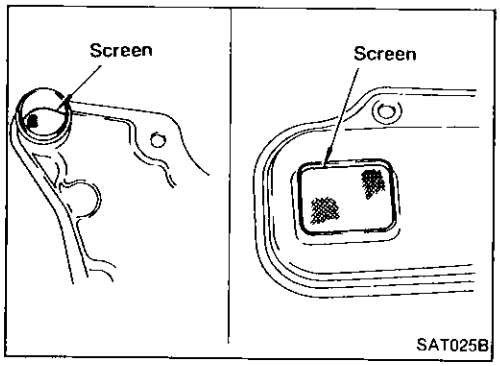
In above cases, replace torque converter and check unit for cause of particle accumulation.



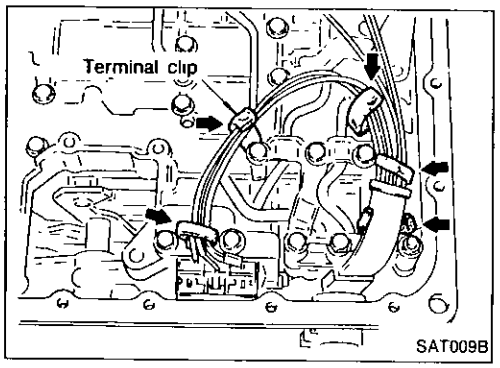
7. Remove torque converter clutch solenoid valve and fluid temperature sensor connectors.
- **Be careful not to damage connector.**



8. Remove oil strainer.
a. Remove oil strainer from control valve assembly. Then remove O-ring from oil strainer.

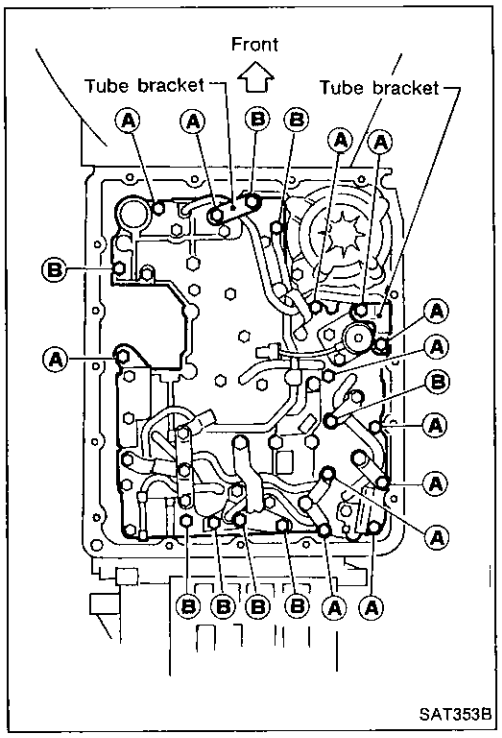


b. Check oil strainer screen for damage.



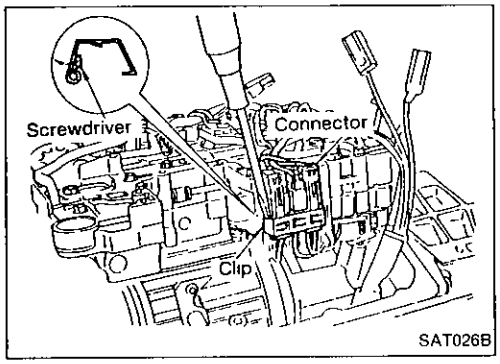
9. Remove control valve assembly.
a. Straighten terminal clips to free terminal cords then remove terminal clips.

Disassembly (Cont'd)



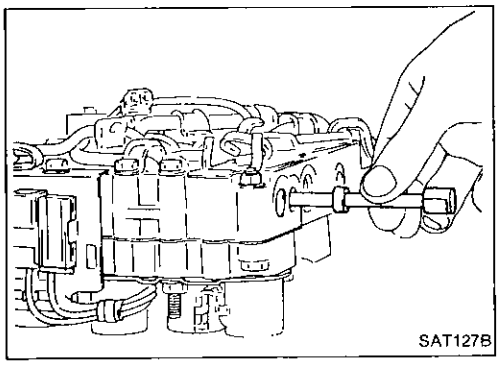
b. Remove bolts Ⓐ and Ⓑ, and remove control valve assembly from transmission.

Bolt symbol	ℓ mm (in)
Ⓐ	33 (1.30)
Ⓑ	45 (1.77)

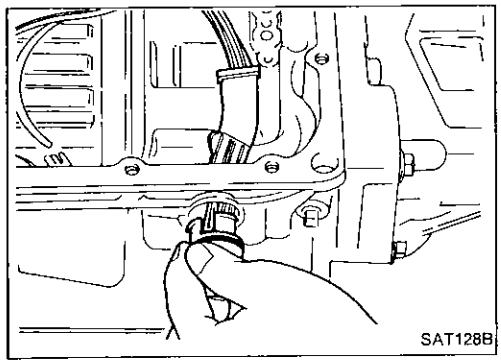


c. Remove solenoid connector.

- **Be careful not to damage connector.**



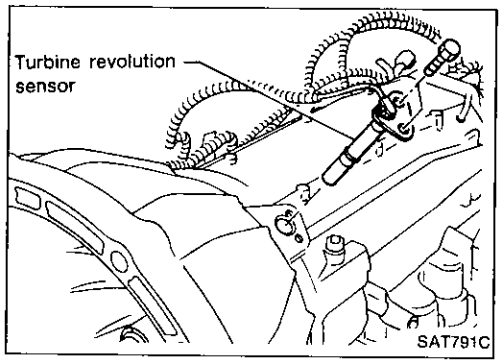
d. Remove manual valve from control valve assembly.



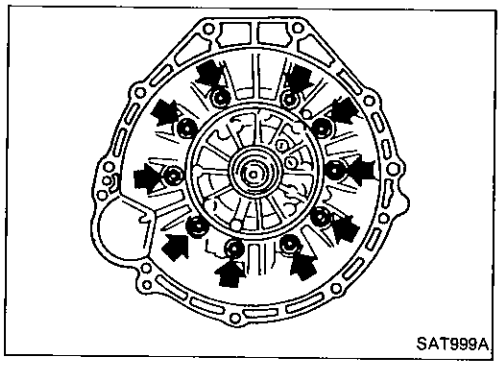
10. Remove terminal cord assembly from transmission case while pushing on stopper.

- **Be careful not to damage cord.**
- **Do not remove terminal cord assembly unless it is damaged.**

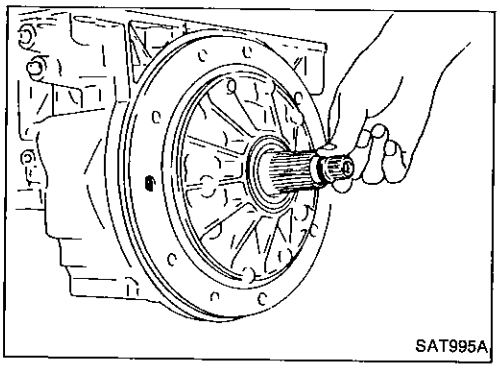
Disassembly (Cont'd)



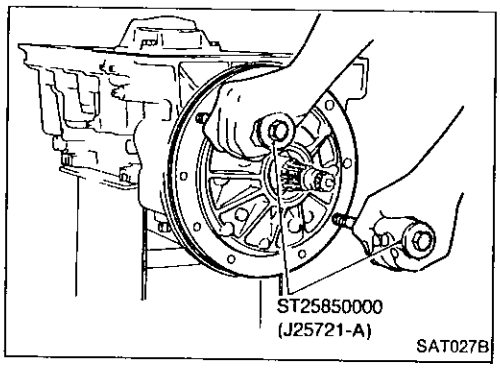
11. Remove turbine revolution sensor.



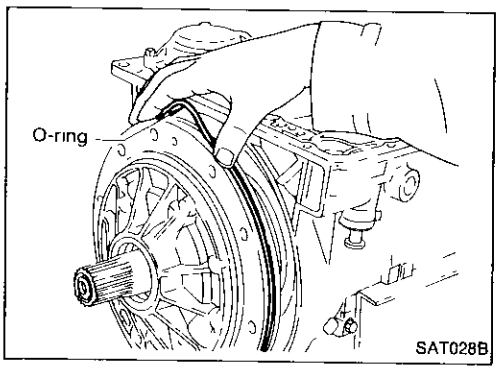
12. Remove converter housing from transmission case.



13. Remove O-ring from input shaft.



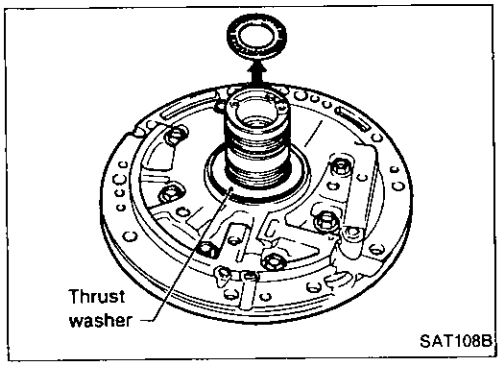
14. Remove oil pump assembly.
a. Attach Tool to oil pump assembly and extract it evenly from transmission case.



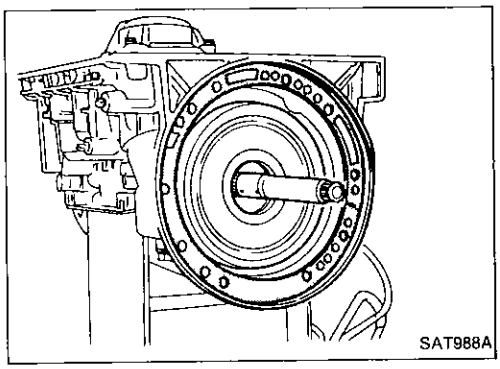
b. Remove O-ring from oil pump assembly.
c. Remove traces of sealant from oil pump housing.

- **Be careful not to scratch pump housing.**

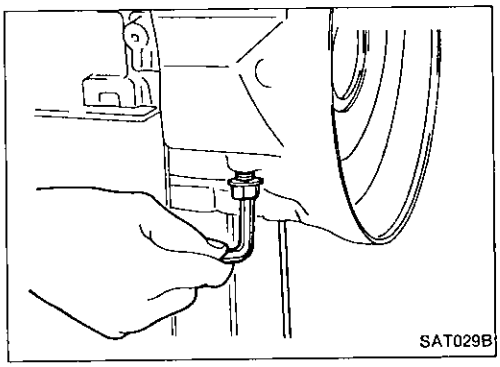
Disassembly (Cont'd)



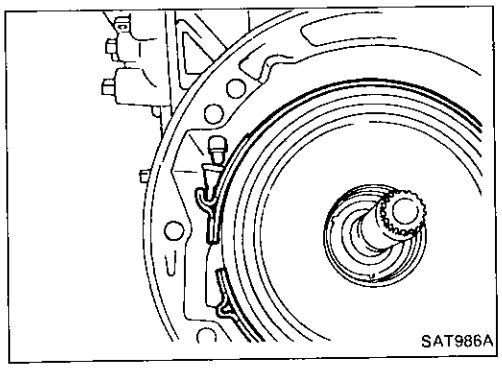
d. Remove needle bearing and thrust washer from oil pump assembly.



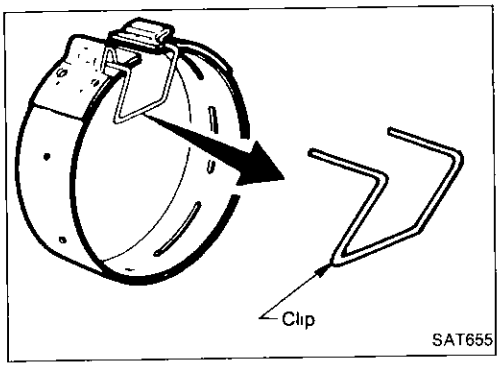
15. Remove input shaft and oil pump gasket.



16. Remove brake band and band strut.
a. Loosen lock nut and remove band servo anchor end pin from transmission case.

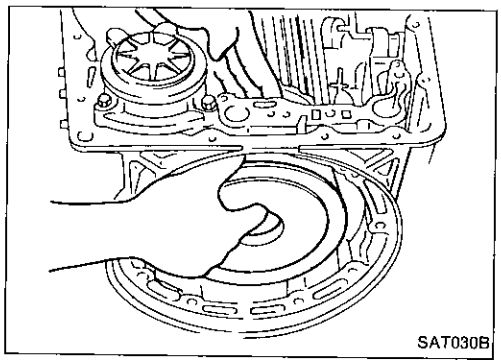


b. Remove brake band and band strut from transmission case.

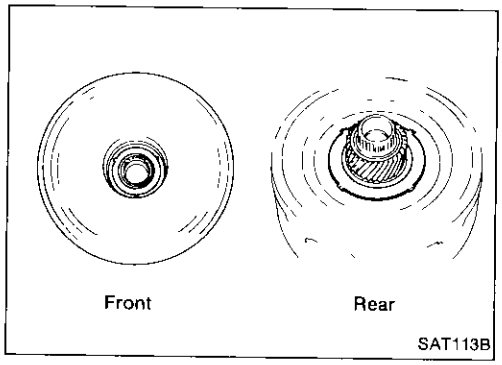


c. Hold brake band in a circular shape with clip.

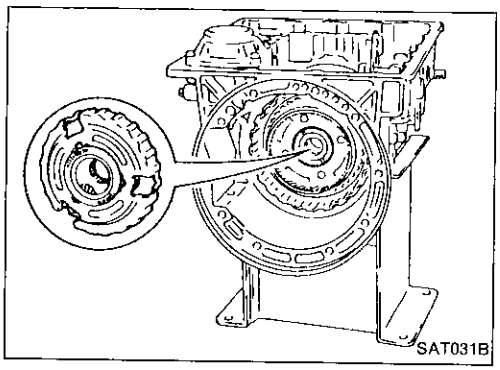
Disassembly (Cont'd)



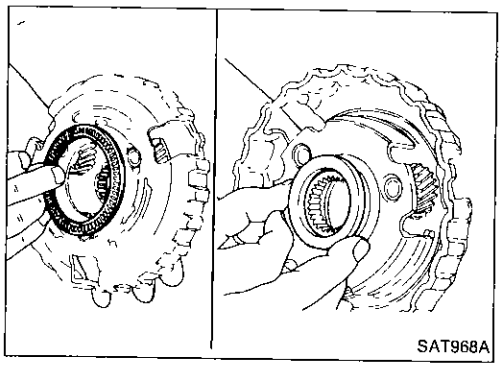
17. Remove front side clutch and gear components.
a. Remove clutch pack (reverse clutch, high clutch and front sun gear) from transmission case.



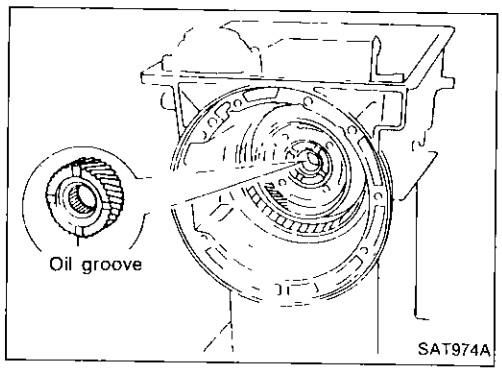
b. Remove front bearing race from clutch pack.
c. Remove rear bearing race or front needle bearing from clutch pack.



d. Remove front planetary carrier from transmission case.

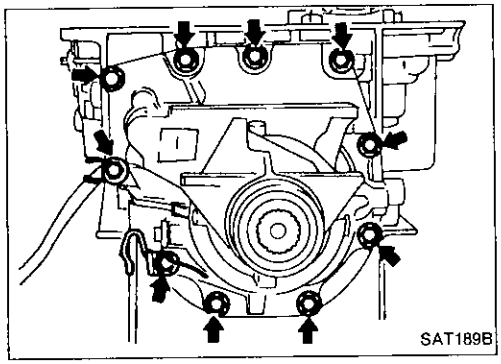


e. Remove front needle bearing or front bearing race from front planetary carrier.
f. Remove rear needle bearing from front planetary carrier.

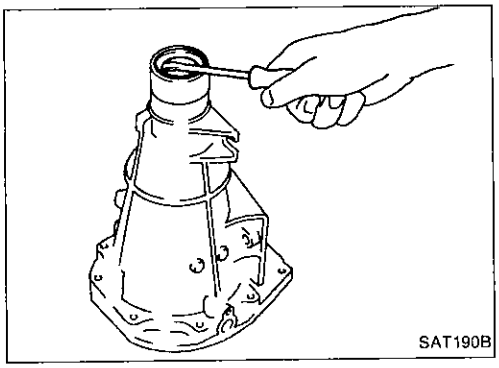


g. Remove rear sun gear from transmission case.

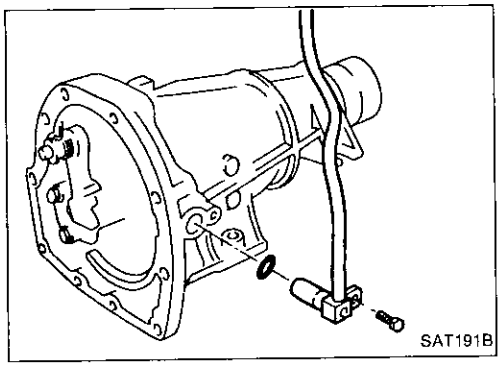
Disassembly (Cont'd)



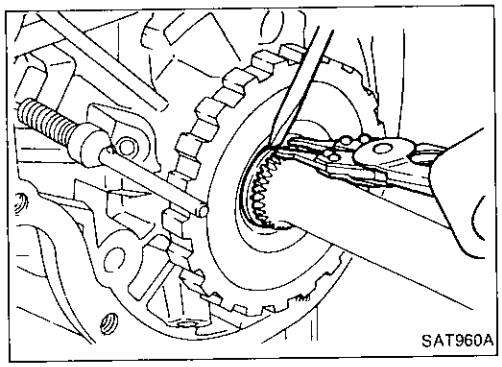
18. Remove rear extension.
a. Remove rear extension from transmission case.
b. Remove rear extension gasket from transmission case.



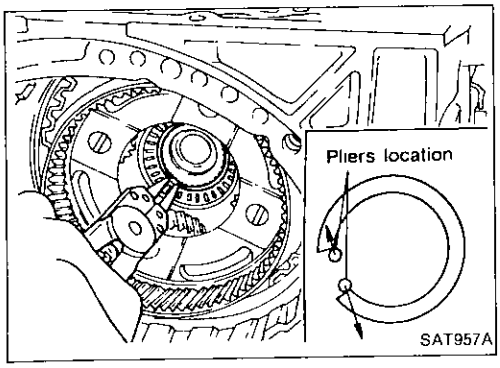
c. Remove oil seal from rear extension.
- **Do not remove oil seal unless it is to be replaced.**



d. Remove revolution sensor from rear extension.
e. Remove O-ring from revolution sensor.



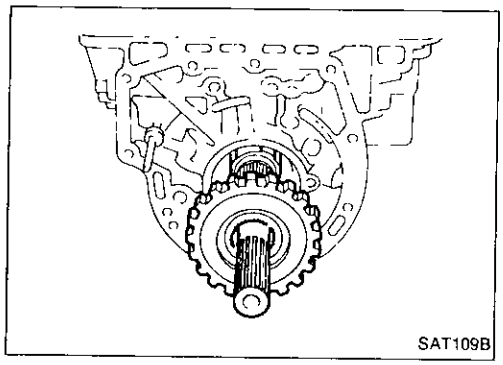
19. Remove output shaft and parking gear.
a. Remove rear snap ring from output shaft.



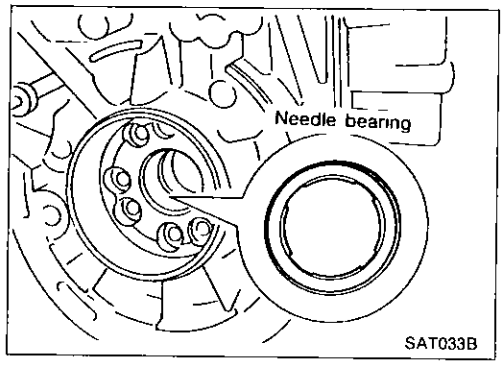
b. Slowly push output shaft all the way forward.
- **Do not use excessive force.**

c. Remove snap ring from output shaft.

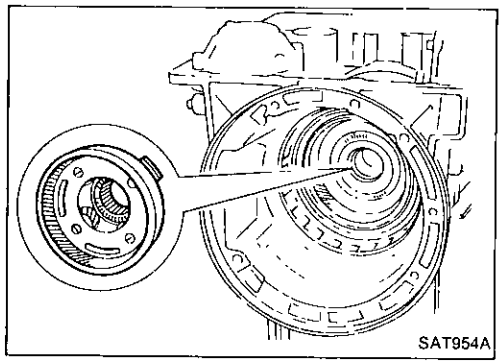
Disassembly (Cont'd)



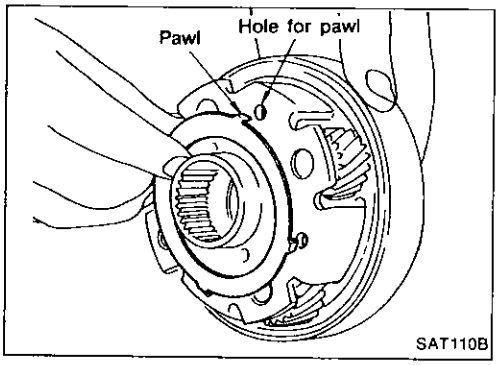
d. Remove output shaft and parking gear as a unit from transmission case.
e. Remove parking gear from output shaft.



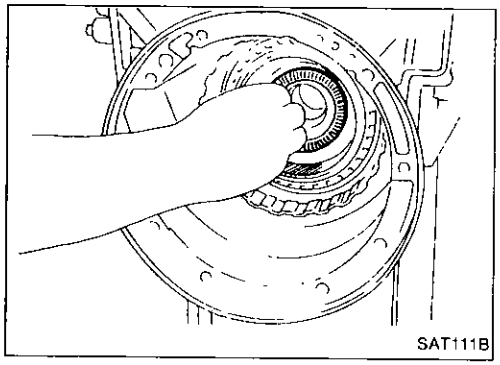
f. Remove needle bearing from transmission case.



20. Remove rear side clutch and gear components.
a. Remove front internal gear.

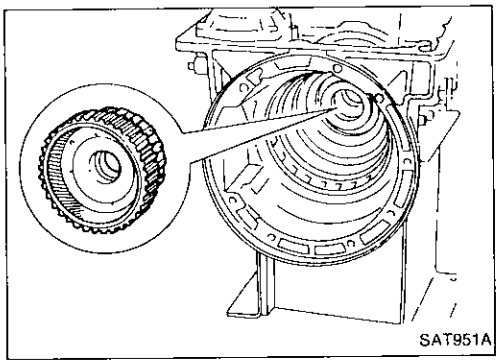


b. Remove bearing race from front internal gear.

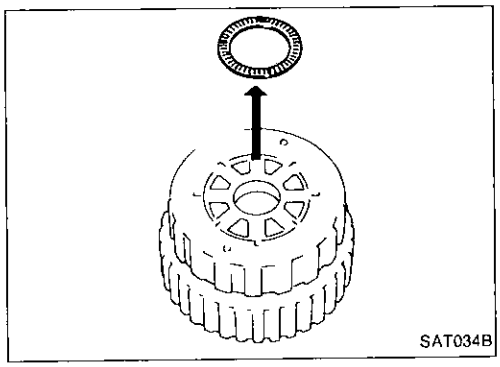


c. Remove needle bearing from rear internal gear.

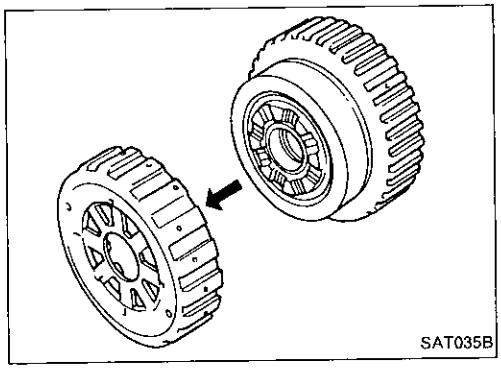
Disassembly (Cont'd)


SAT951A

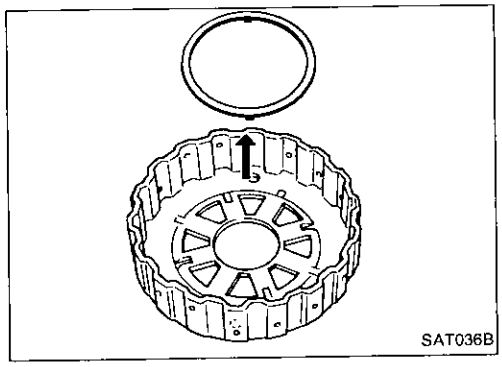
d. Remove rear internal gear, forward clutch hub and overrun clutch hub as a set from transmission case.


SAT034B

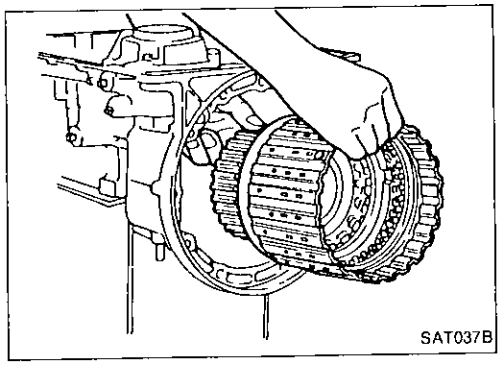
e. Remove needle bearing from overrun clutch hub.


SAT035B

f. Remove overrun clutch hub from rear internal gear and forward clutch hub.

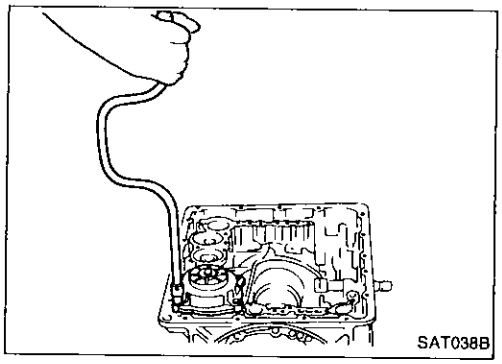

SAT036B

g. Remove thrust washer from overrun clutch hub.

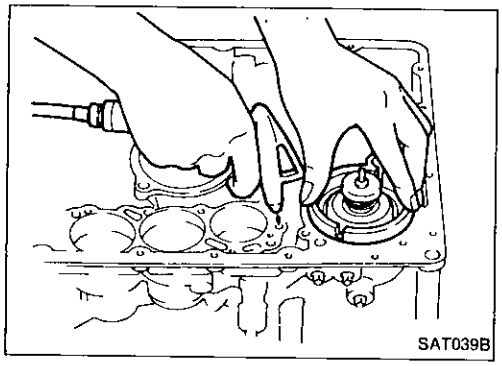

SAT037B

h. Remove forward clutch assembly from transmission case.

Disassembly (Cont'd)

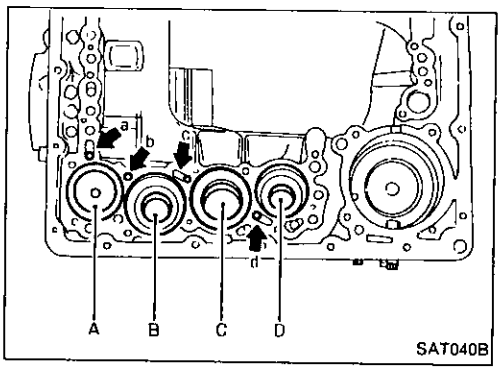


21. Remove band servo and accumulator components.
a. Remove band servo retainer from transmission case.



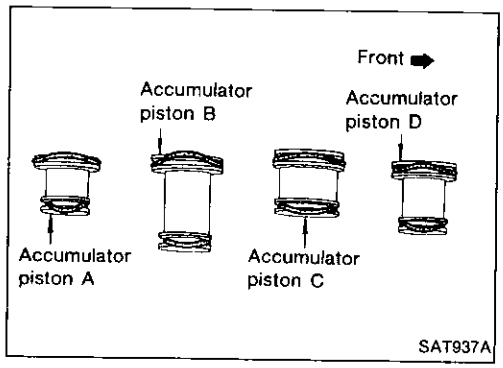
b. Apply compressed air to oil hole until band servo piston comes out of transmission case.
- **Hold piston with a rag and gradually direct air to oil hole.**

c. Remove return springs.

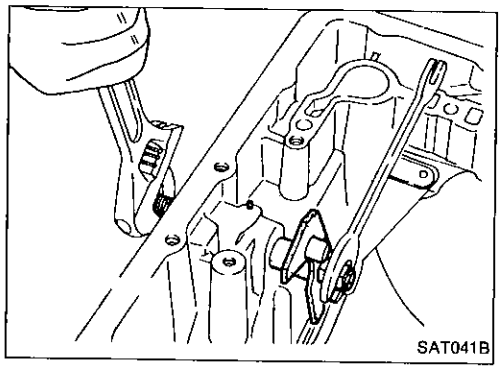


d. Remove springs from accumulator pistons B, C and D.
e. Apply compressed air to each oil hole until piston comes out.
- **Hold piston with a rag and gradually direct air to oil hole.**

Identification of accumulator pistons	A	B	C	D
Identification of oil holes	a	b	c	d

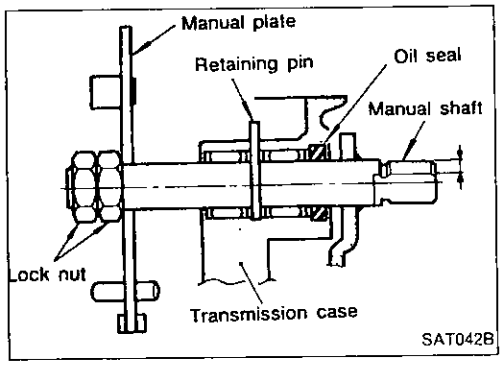


f. Remove O-ring from each piston.

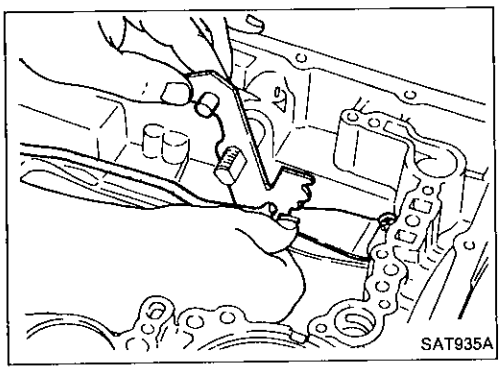


22. Remove manual shaft components, if necessary.
a. Hold width across flats of manual shaft (outside the transmission case) and remove lock nut from shaft.

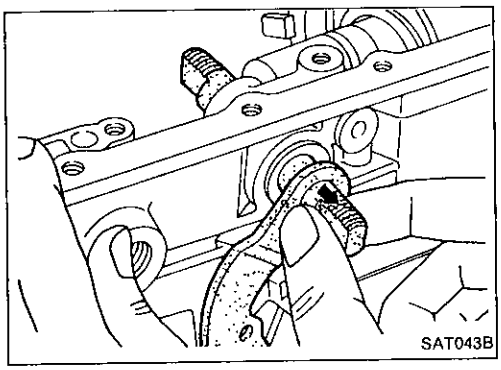
Disassembly (Cont'd)



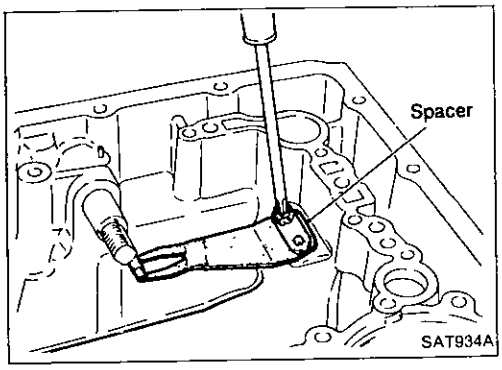
b. Remove retaining pin from transmission case.



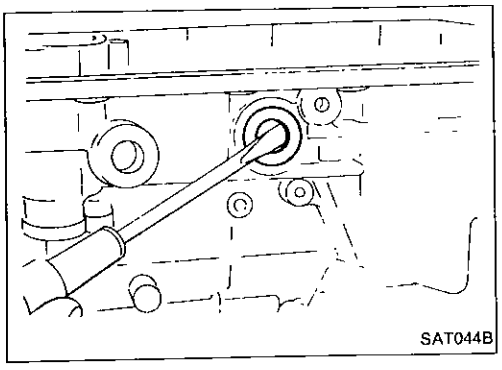
c. While pushing detent spring down, remove manual plate and parking rod from transmission case.



d. Remove manual shaft from transmission case.

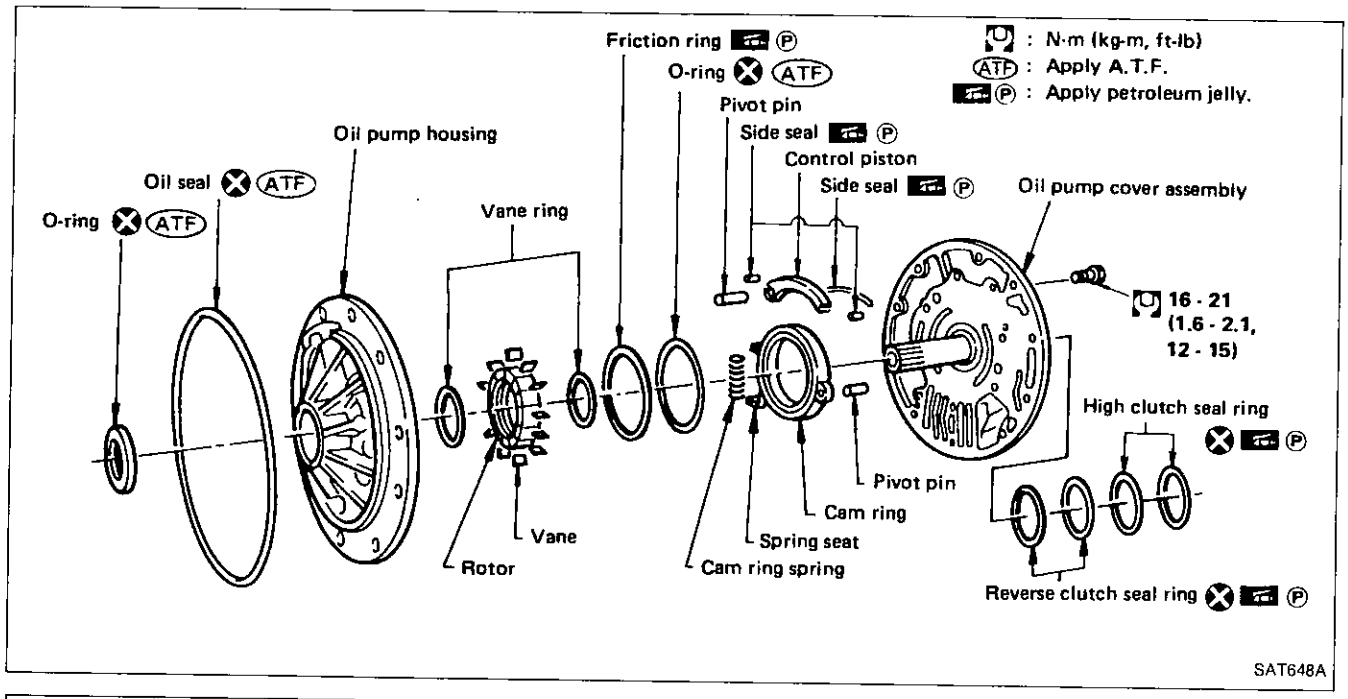


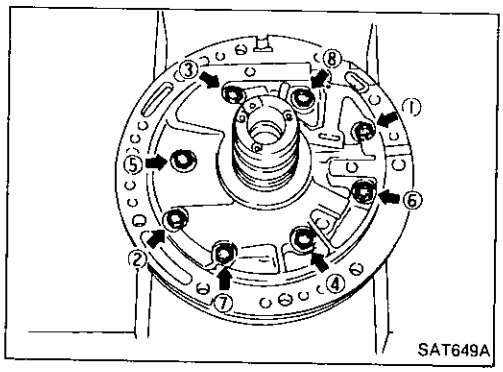
e. Remove spacer and detent spring from transmission case.



f. Remove oil seal from transmission case.

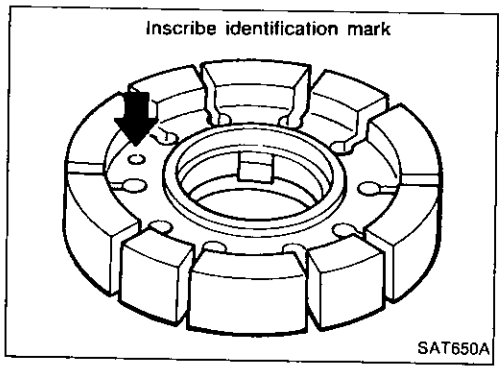
Oil Pump





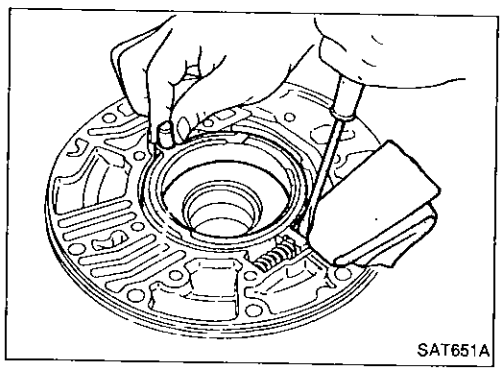
DISASSEMBLY

1. Loosen bolts in numerical order and remove oil pump cover.



2. Remove rotor, vane rings and vanes.

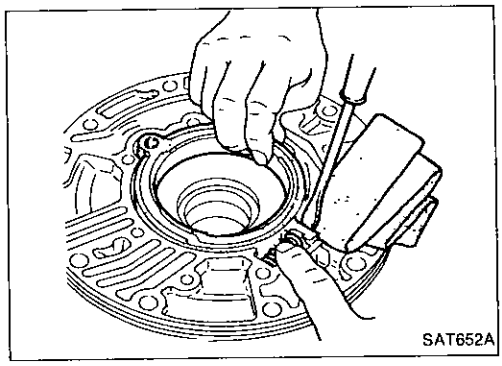
- **Inscribe a mark on back of rotor for identification of fore-aft direction when reassembling rotor. Then remove rotor.**



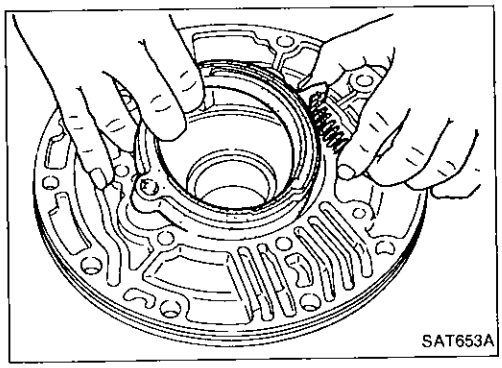
3. While pushing on cam ring remove pivot pin.

- **Be careful not to scratch oil pump housing.**

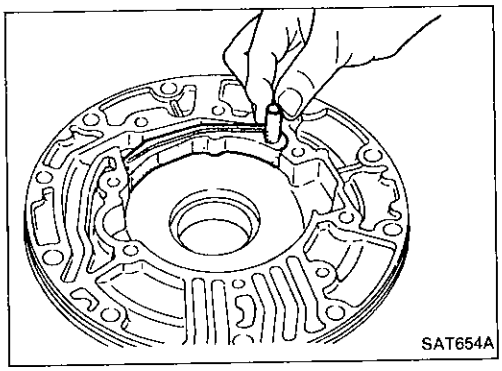
Oil Pump (Cont'd)


SAT652A

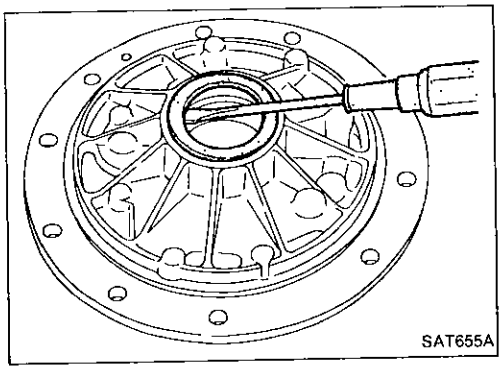
4. While holding cam ring and spring lift out cam ring spring.
- **Be careful not to damage oil pump housing.**
- **Hold cam ring spring to prevent it from jumping.**


SAT653A

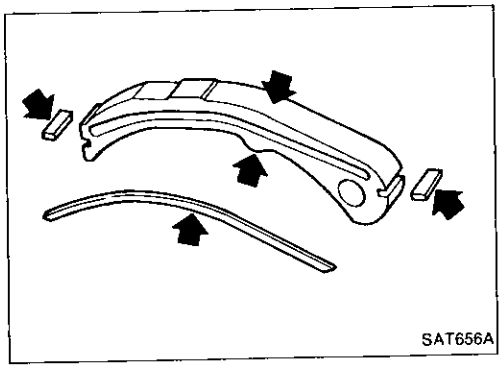
5. Remove cam ring and cam ring spring from oil pump housing.


SAT654A

6. Remove pivot pin from control piston and remove control piston assembly.


SAT655A

7. Remove oil seal from oil pump housing.
- **Be careful not to scratch oil pump housing.**

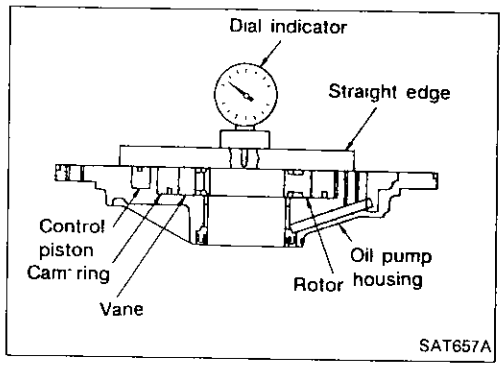

SAT656A

INSPECTION

Oil pump cover, rotor, vanes, control piston, side seals, cam ring and friction ring

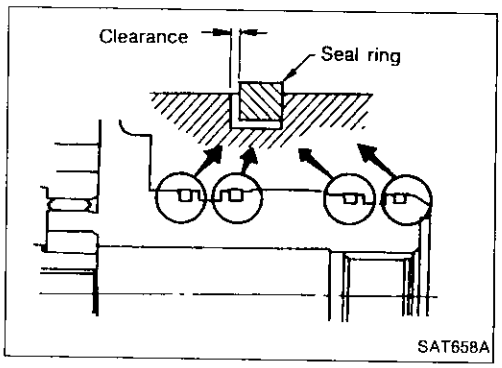
- Check for wear or damage.

Oil Pump (Cont'd)



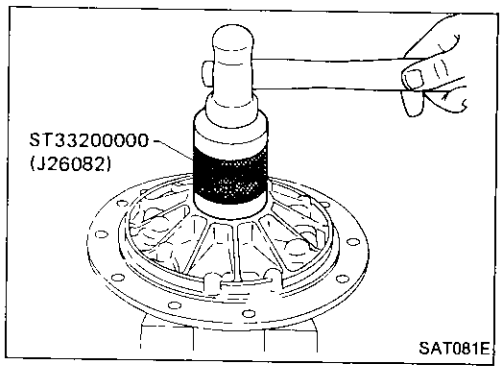
Side clearances

- Measure side clearances between end of oil pump housing and cam ring, rotor, vanes and control piston in at least four places along their circumferences. Maximum measured values should be within specified ranges.
- **Before measuring side clearance, check that friction rings, O-ring, control piston side seals and cam ring spring are removed.**
  Standard clearance (Cam ring, rotor, vanes and control piston):
  Refer to S.D.S.
- If not within standard clearance, replace oil pump assembly except oil pump cover assembly.



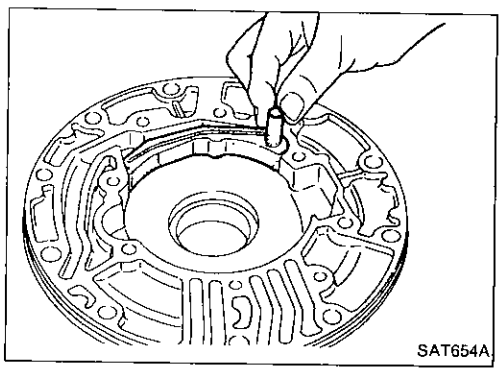
Seal ring clearance

- Measure clearance between seal ring and ring groove.
  Standard clearance:
  0.10 - 0.25 mm (0.0039 - 0.0098 in)
  Wear limit:
  0.25 mm (0.0098 in)
- If not within wear limit, replace oil pump cover assembly.



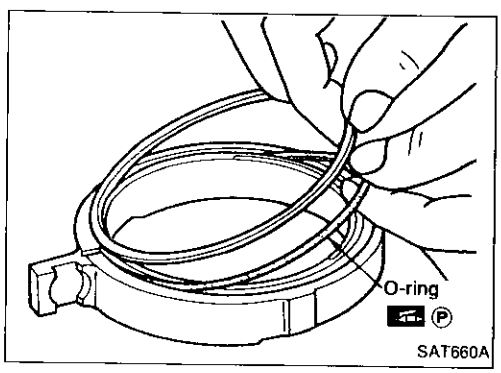
ASSEMBLY

1. Drive oil seal into oil pump housing.
- **Apply A.T.F. to outer periphery and lip surface.**



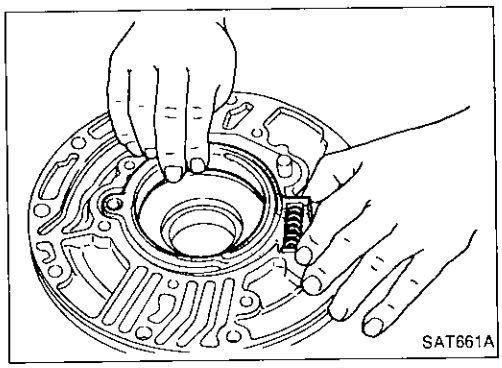
2. Install cam ring in oil pump housing by the following steps.
a. Install side seal on control piston.
- **Pay attention to its direction — Black surface goes toward control piston.**
- **Apply petroleum jelly to side seal.**

b. Install control piston on oil pump.

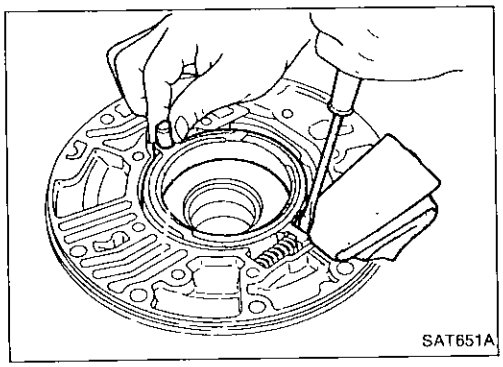


c. Install O-ring and friction ring on cam ring.
- **Apply petroleum jelly to O-ring.**

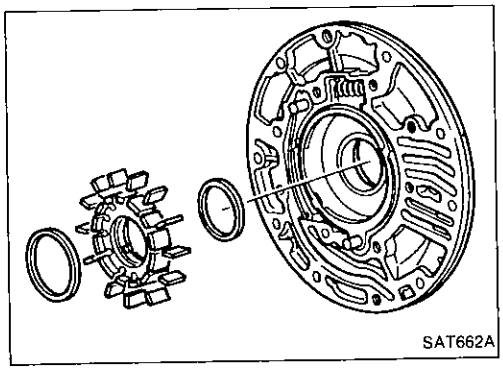
Oil Pump (Cont'd)



d. Assemble cam ring, cam ring spring and spring seat. Install spring by pushing it against pump housing.

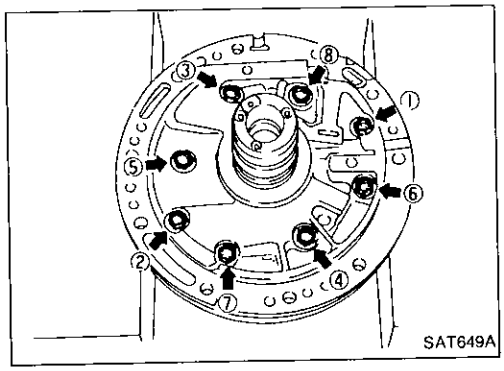


e. While pushing on cam ring install pivot pin.



3. Install rotor, vanes and vane rings.

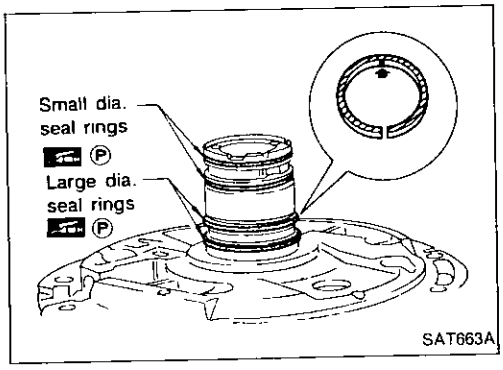
- **Pay attention to direction of rotor.**



4. Install oil pump housing and oil pump cover.

a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly in oil pump housing assembly, then remove masking tape.

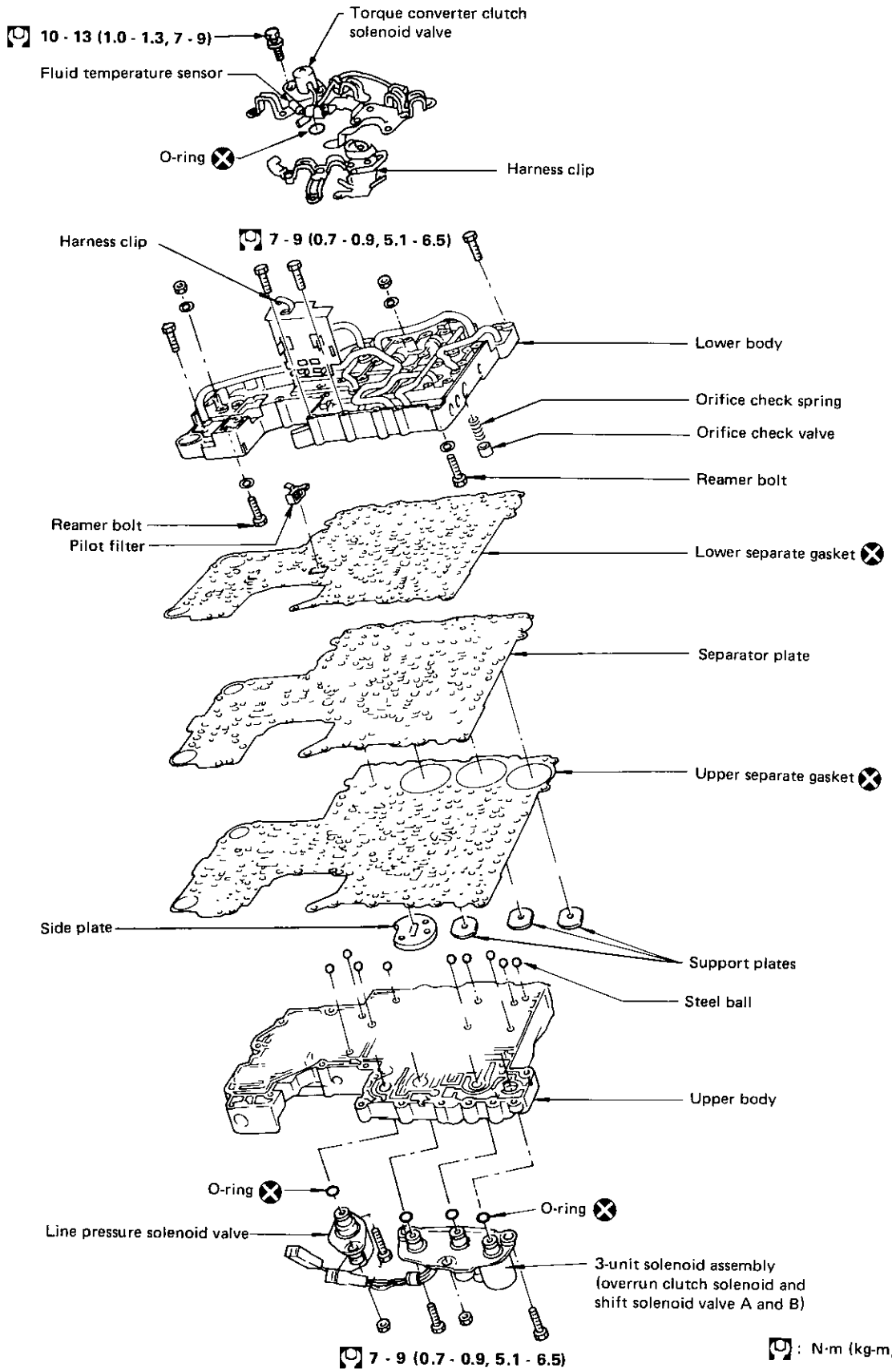
b. Tighten bolts in a criss-cross pattern.



5. Install seal rings carefully after packing ring grooves with petroleum jelly. Press rings down into jelly to a close fit.

- **Seal rings come in two different diameters. Check fit carefully in each groove.**
  Small dia. seal ring:
  No mark
  Large dia. seal ring:
  Yellow mark in area shown by arrow
- **Do not spread gap of seal ring excessively while installing. It may deform ring.**

Control Valve Assembly

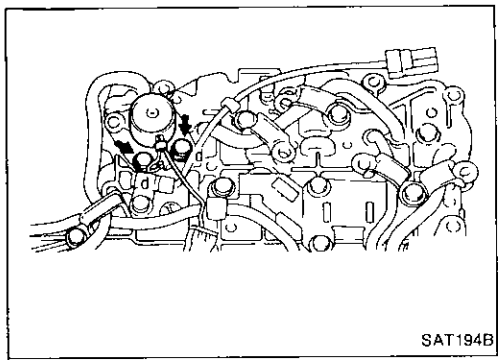


: N·m (kg-m, ft-lb)

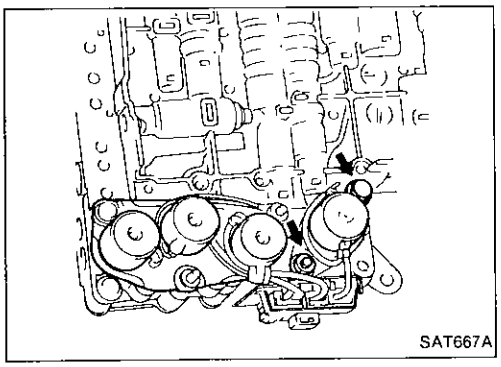
SAT638C

Control Valve Assembly (Cont'd)

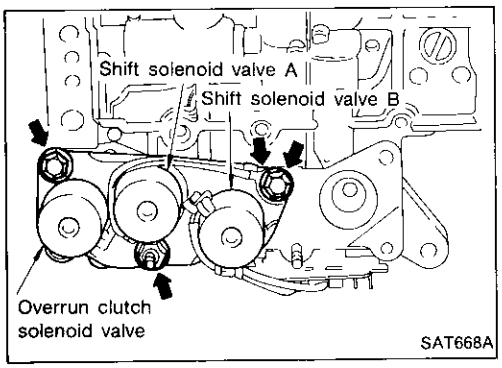
DISASSEMBLY


SAT194B

1. Remove solenoids.
a. Remove torque converter clutch solenoid valve and side plate from lower body.
b. Remove O-ring from solenoid valve.

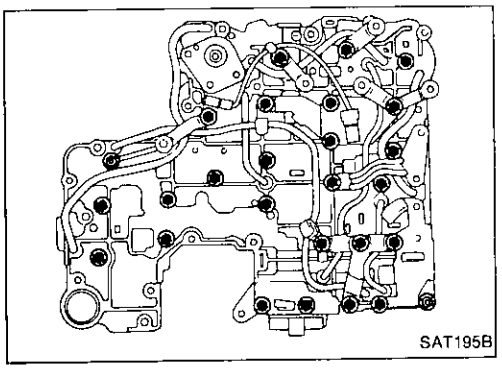

SAT667A

c. Remove line pressure solenoid valve from upper body.
d. Remove O-ring from solenoid.



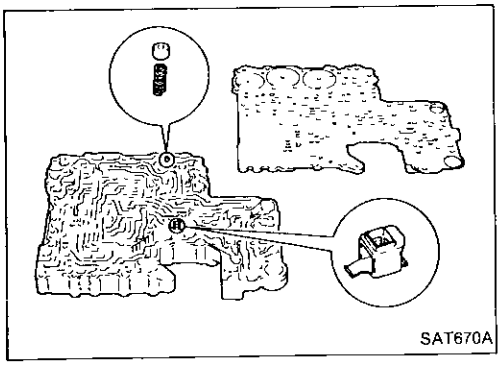
SAT668A

e. Remove 3-unit solenoid assembly from upper body.
f. Remove O-rings from solenoids.


SAT195B

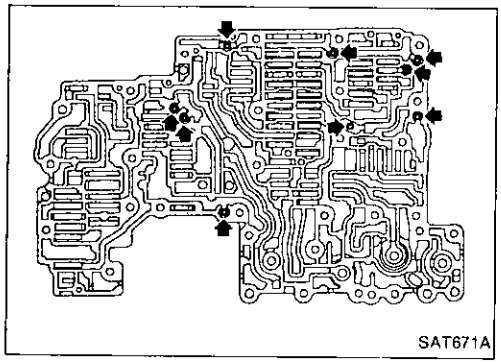
2. Disassemble upper and lower bodies.
a. Place upper body facedown, and remove bolts, reamer bolts and support plates.
b. Remove lower body, separator plate and separate gasket as a unit from upper body.

- **Be careful not to drop pilot filter, orifice check valve, spring and steel balls.**


SAT670A

c. Place lower body facedown, and remove separate gasket and separator plate.
d. Remove pilot filter, orifice check valve and orifice check spring.

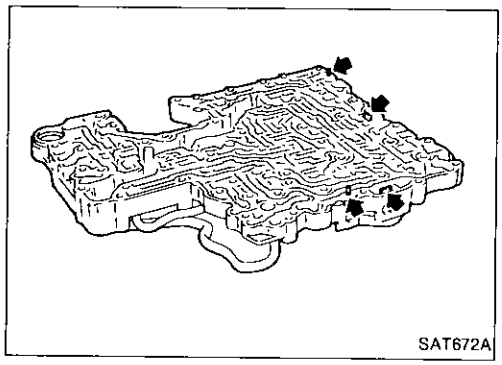
Control Valve Assembly (Cont'd)


SAT671A

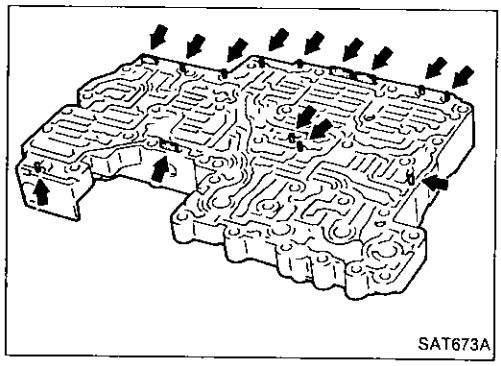
e. Check to see that steel balls are properly positioned in upper body and then remove them from upper body.

INSPECTION

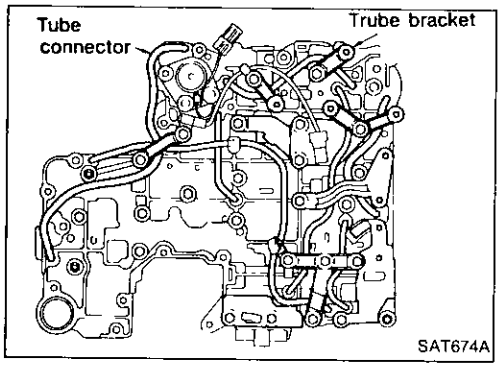
Lower and upper bodies


SAT672A

- Check to see that there are pins and retainer plates in lower body.

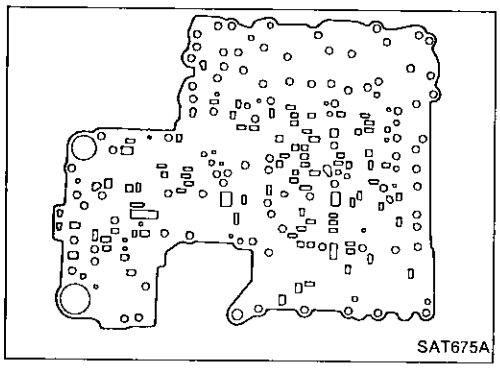

SAT673A

- Check to see that there are pins and retainer plates in upper body.
- **Be careful not to lose these parts.**



SAT674A

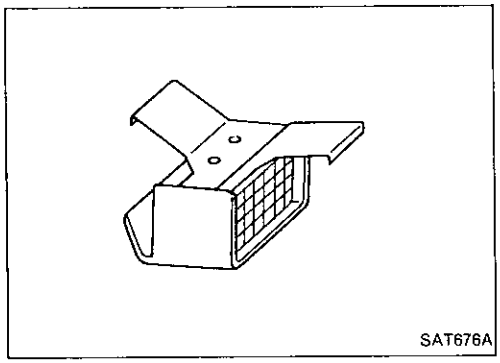
- Check to make sure that oil circuits are clean and free from damage.
- Check tube brackets and tube connectors for damage.


SAT675A

Separator plates

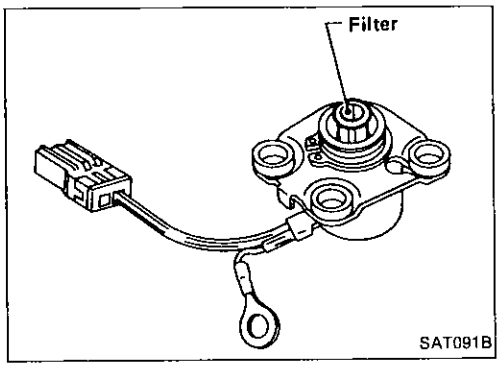
- Check to make sure that separator plate is free of damage and not deformed and oil holes are clean.

Control Valve Assembly (Cont'd)



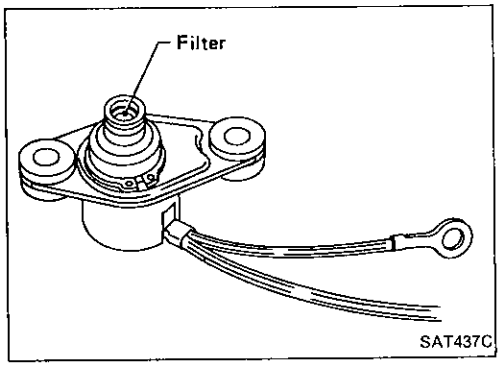
Pilot filter

- Check to make sure that filter is not clogged or damaged.



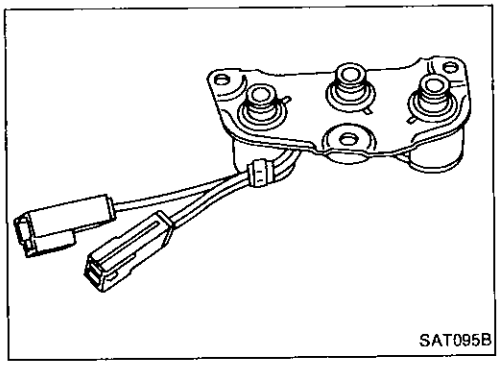
Torque converter clutch solenoid valve

- Check that filter is not clogged or damaged.
- Measure resistance. — Refer to "Electrical Components Inspection".



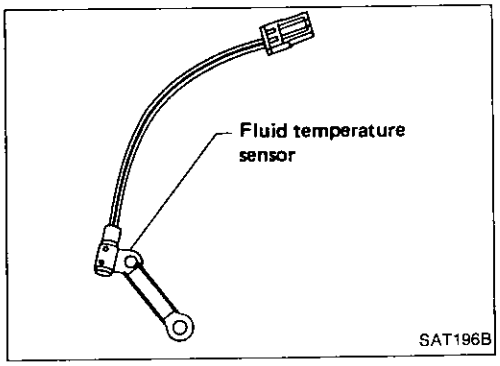
Line pressure solenoid valve

- Check that filter is not clogged or damaged.
- Measure resistance. — Refer to "Electrical Components Inspection".



3-unit solenoid assembly (Overrun clutch solenoid valve and shift solenoids valve A and B)

- Measure resistance of each solenoid. — Refer to "Electrical Components Inspection".

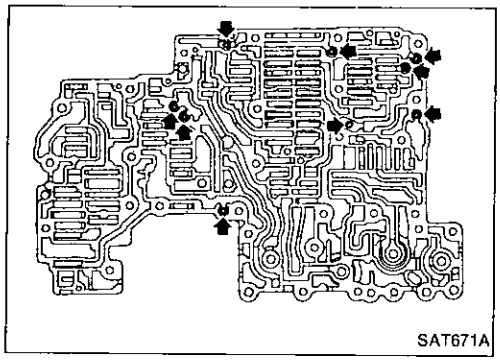


Fluid temperature sensor

- Measure resistance. — Refer to "Electrical Components Inspection".

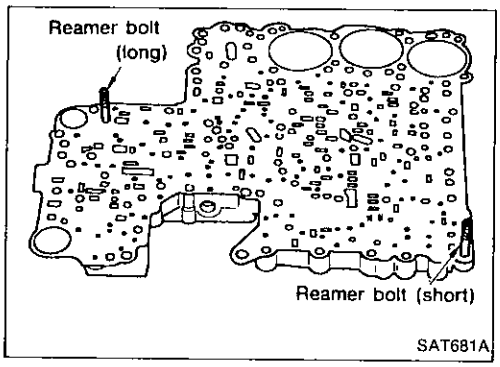
Control Valve Assembly (Cont'd)

ASSEMBLY


SAT671A

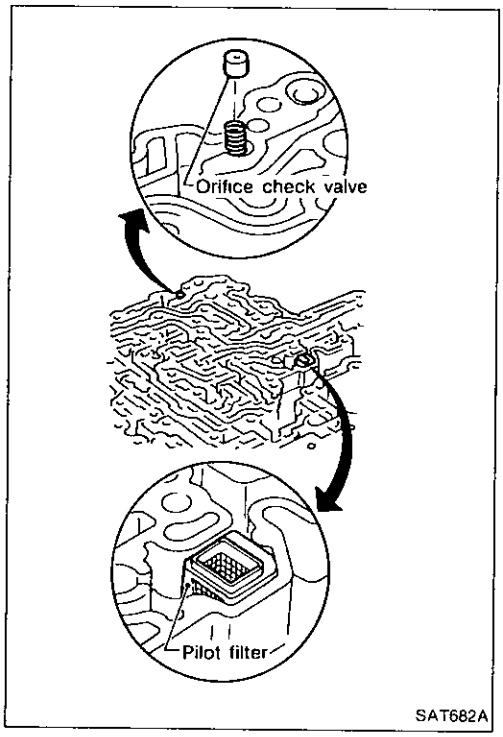
1. Install upper and lower bodies.

a. Place oil circuit of upper body face up. Install steel balls in their proper positions.



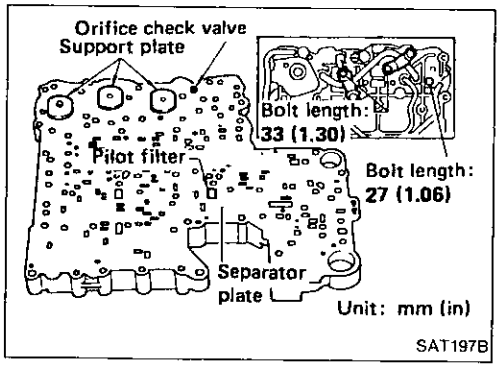
SAT681A

b. Install reamer bolts from bottom of upper body and install separate gaskets.



SAT682A

c. Place oil circuit of lower body face up. Install orifice check spring, orifice check valve and pilot filter.

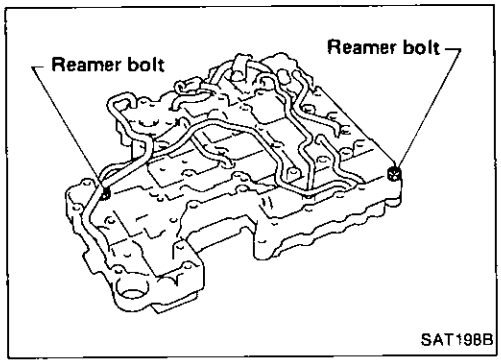


SAT197B

d. Install lower separate gaskets and separator plates on lower body.

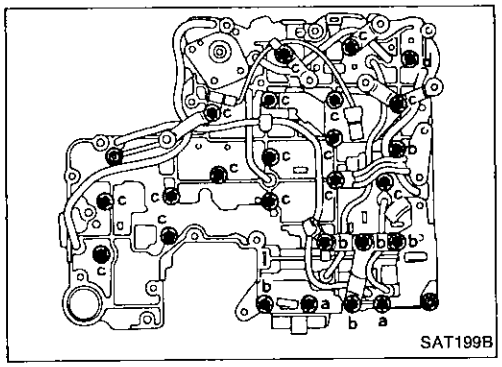
e. Install and temporarily tighten support plates, fluid temperature sensor and tube brackets.

Control Valve Assembly (Cont'd)



f. Temporarily assemble lower and upper bodies, using reamer bolt as a guide.

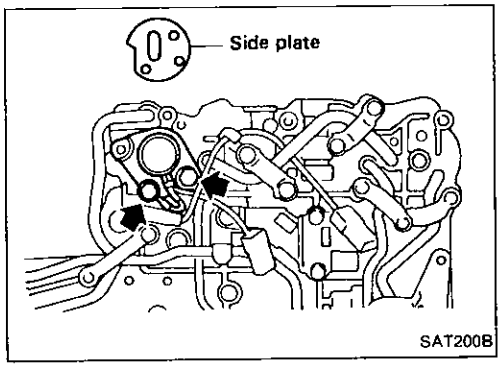
- **Be careful not to dislocate or drop steel balls, orifice check spring, orifice check valve and pilot filter.**



g. Install and temporarily tighten bolts and tube brackets in their proper locations.

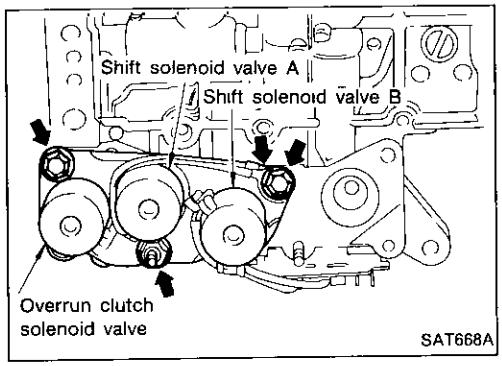
Bolt length and location:

Item \ Bolt symbol	a	b	c	d
Bolt length mm (in)	70 (2.76)	50 (1.97)	33 (1.30)	27 (1.06)

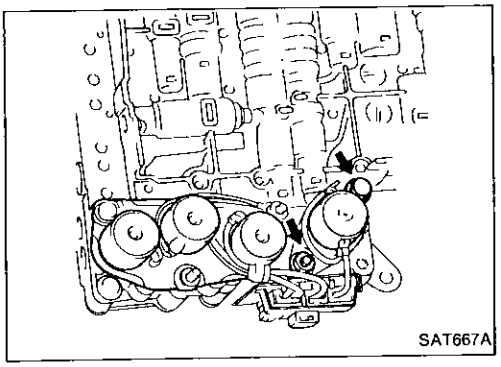


2. Install solenoids.

a. Attach O-ring and install torque converter clutch solenoid valve and side plates onto lower body.



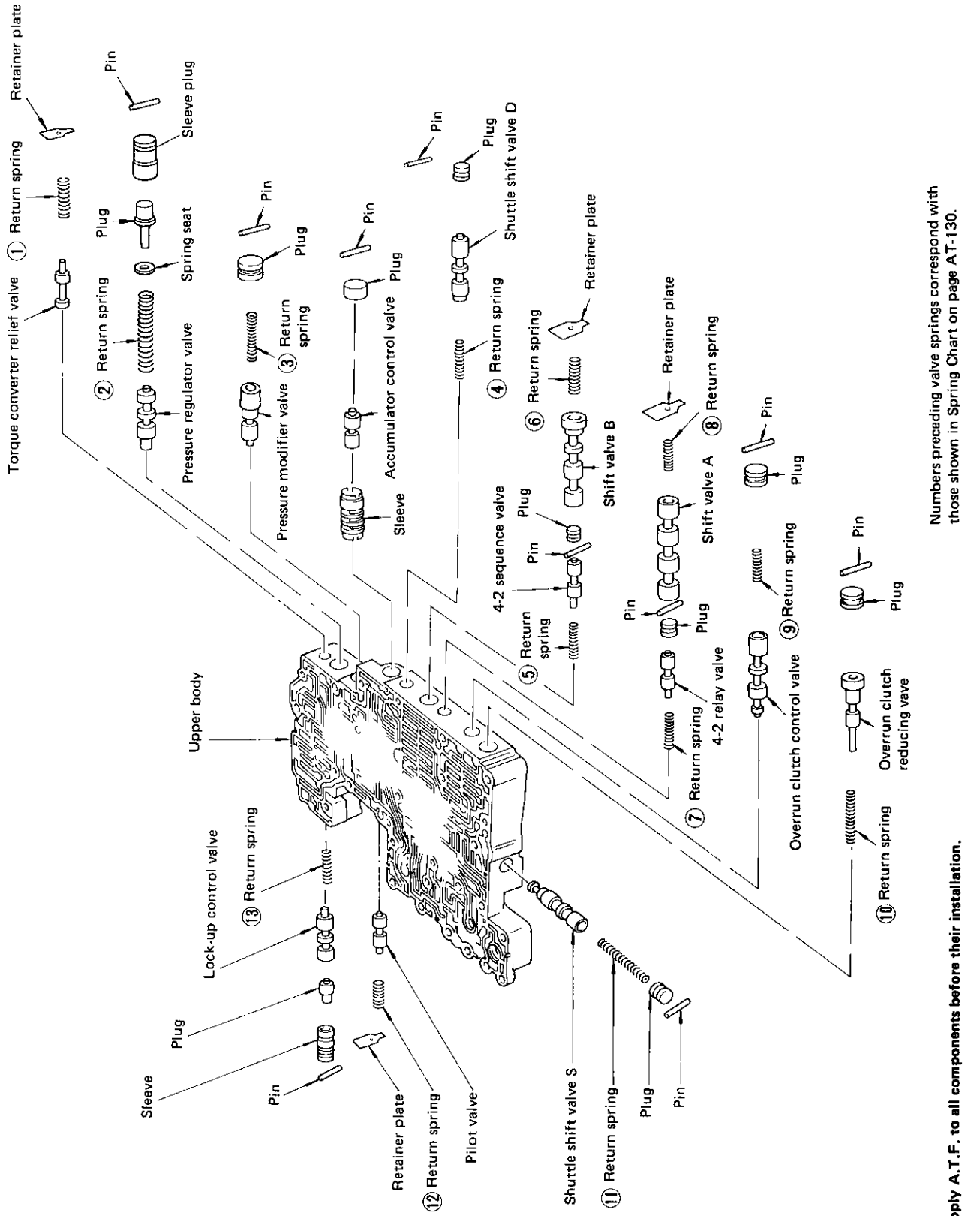
b. Attach O-rings and install 3-unit solenoids assembly onto upper body.



c. Attach O-ring and install line pressure solenoid onto upper body.

3. Tighten all bolts.

Control Valve Upper Body



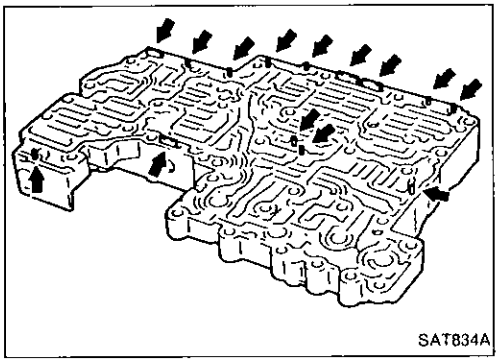
Numbers preceding valve springs correspond with those shown in Spring Chart on page AT-130.

Apply A.T.F. to all components before their installation.

SAT639C

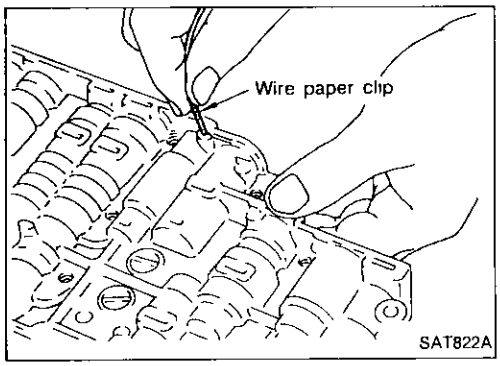
Control Valve Upper Body (Cont'd)

DISASSEMBLY


SAT834A

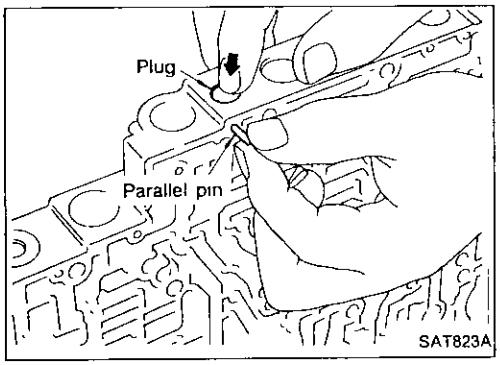
1. Remove valves at parallel pins.

- **Do not use a magnetic hand.**



SAT822A

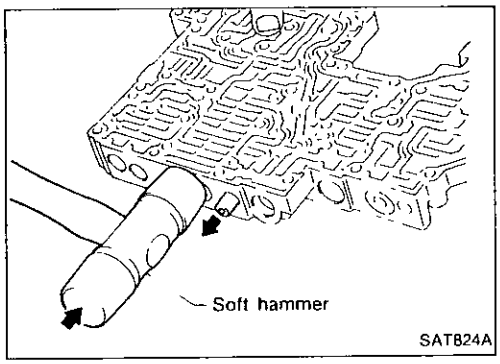
a. Use a wire paper clip to push out parallel pins.



SAT823A

b. Remove parallel pins while pressing their corresponding plugs and sleeves.

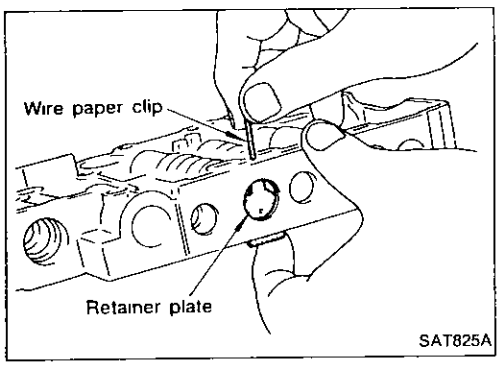
- **Remove plug slowly to prevent internal parts from jumping out.**



SAT824A

c. Place mating surface of valve facedown, and remove internal parts.

- **If a valve is hard to remove, place valve body facedown and lightly tap it with a soft hammer.**
- **Be careful not to drop or damage valves and sleeves.**

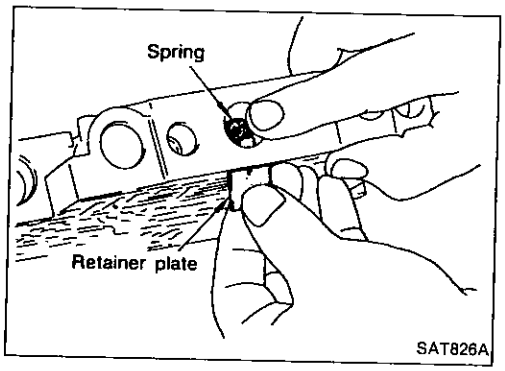


SAT825A

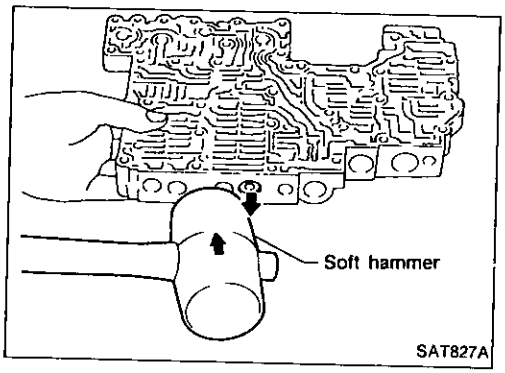
2. Remove valves at retainer plates.

a. Pry out retainer plate with wire paper clip.

Control Valve Upper Body (Cont'd)

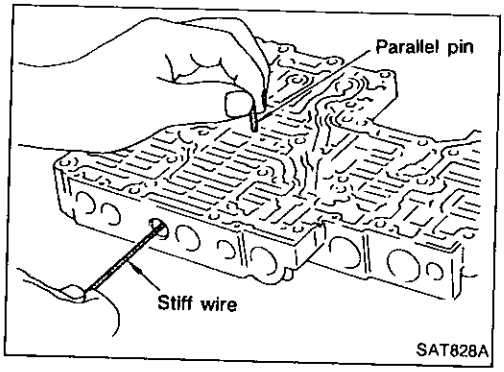


b. Remove retainer plates while holding spring.

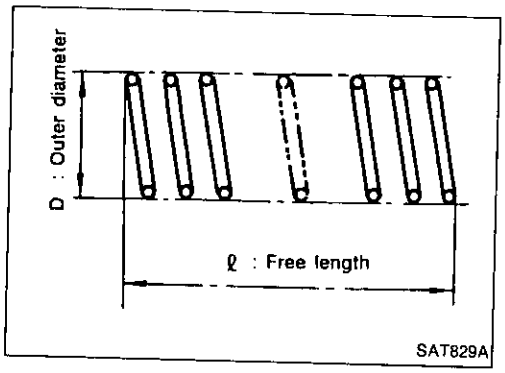


c. Place mating surface of valve facedown, and remove internal parts.

- **If a valve is hard to remove, lightly tap valve body with a soft hammer.**
- **Be careful not to drop or damage valves, sleeves, etc.**



- 4-2 sequence valve and relay valve are located far back in upper body. If they are hard to remove, carefully push them out using stiff wire.
- **Be careful not to scratch sliding surface of valve with wire.**



INSPECTION

Valve springs

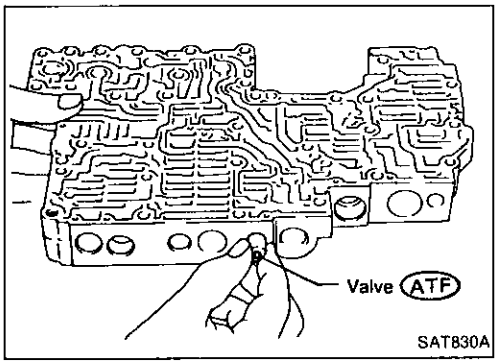
- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.
- Numbers of each valve spring listed in table below are the same as those in the figure on AT-127.

Control Valve Upper Body (Cont'd)

Inspection standard

Unit: mm (in)

Parts / Item		Part No.	ℓ	D
①	Torque converter relief valve spring	31742-41X23	38.0 (1.496)	9.0 (0.354)
②	Pressure regulator valve spring	31742-41X24	44.02 (1.7331)	14.0 (0.551)
③	Pressure modifier valve spring	31742-41X19	31.95 (1.2579)	6.8 (0.268)
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	31742-71X00	35.0 (1.378)	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)



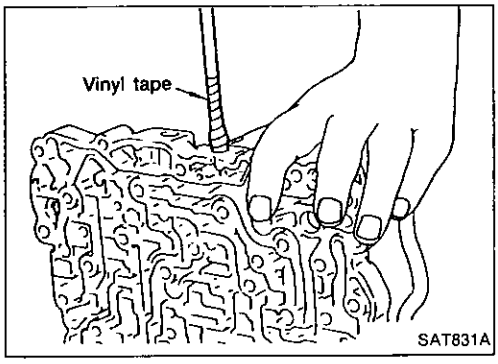
- Replace valve springs if deformed or fatigued.

Control valves

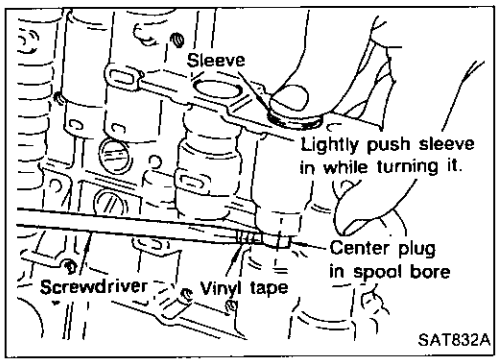
- Check sliding surfaces of valves, sleeves and plugs.

ASSEMBLY

1. Lubricate the control valve body and all valves with A.T.F. Install control valves by sliding them carefully into their bores.
- **Be careful not to scratch or damage valve body.**



- Wrap a small screwdriver with vinyl tape and use it to insert the valves into proper position.



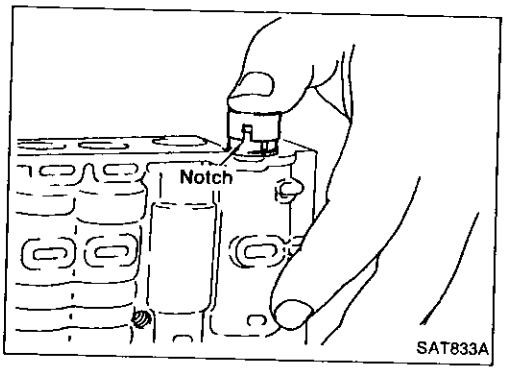
Pressure regulator valve

- If pressure regulator plug is not centered properly, sleeve cannot be inserted into bore in upper body. If this happens, use vinyl tape wrapped screwdriver to center sleeve until it can be inserted.
- Turn sleeve slightly while installing.

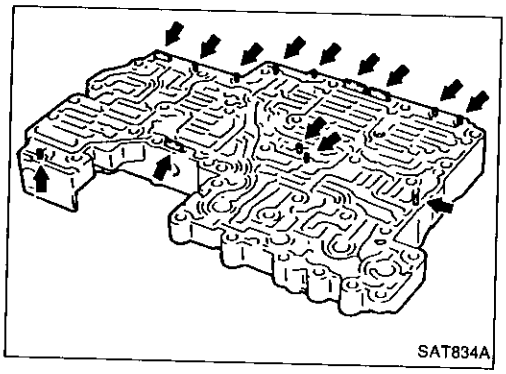
Control Valve Upper Body (Cont'd)

Accumulator control plug

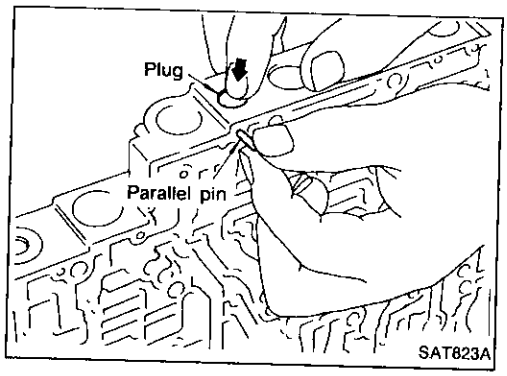
- Align protrusion of accumulator control sleeve with notch in plug.
- Align parallel pin groove in plug with parallel pin, and install accumulator control valve.



2. Install parallel pins and retainer plates.

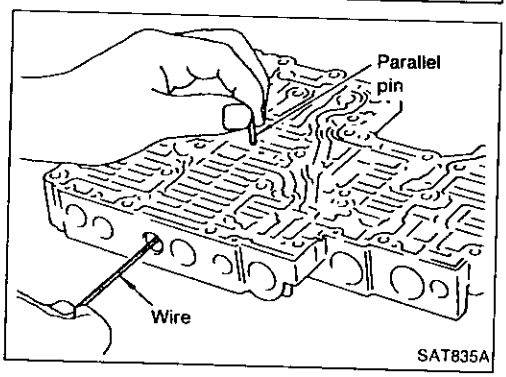


- **While pushing plug, install parallel pin.**

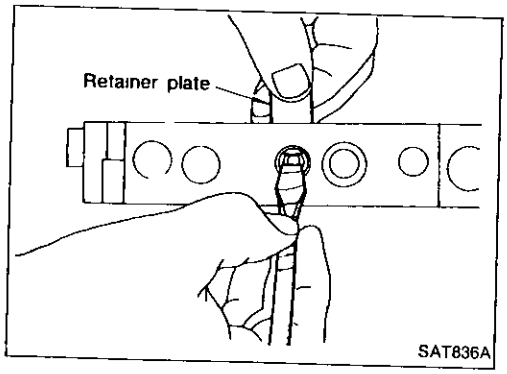


4-2 sequence valve and relay valve

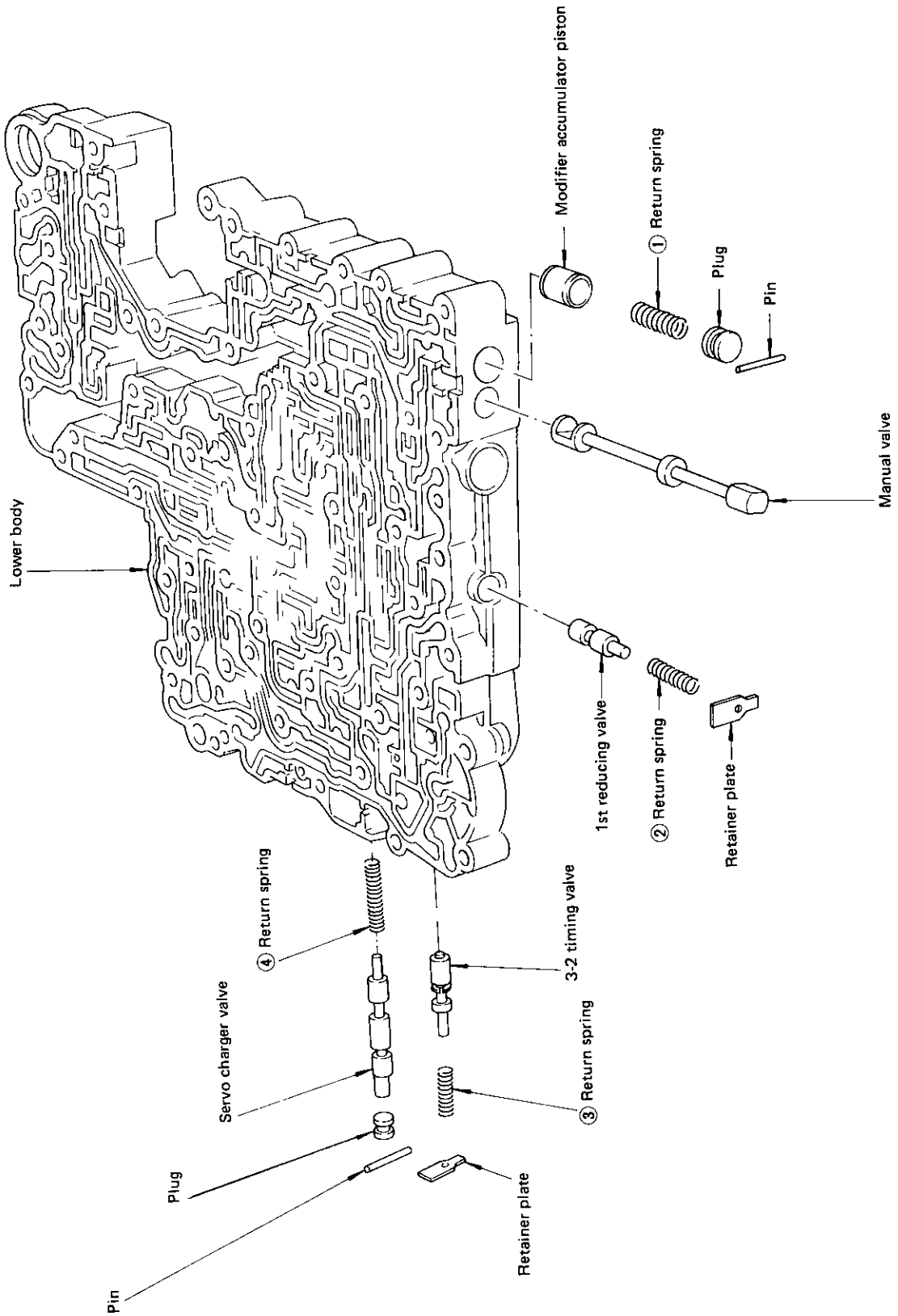
- Push 4-2 sequence valve and relay valve with wire wrapped in vinyl tape to prevent scratching valve body. Install parallel pins.



- Insert retainer plate while pushing spring.



Control Valve Lower Body

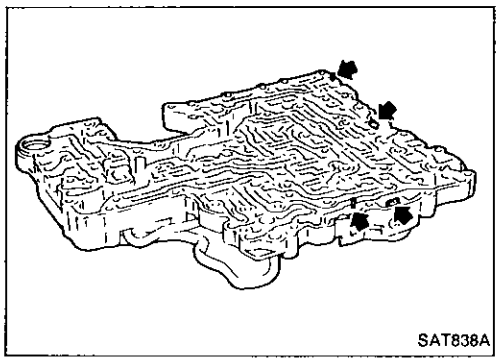


Numbers preceding valve springs correspond with those shown in Spring Chart on page AT-133.

Apply A.T.F. to all components before their installation.

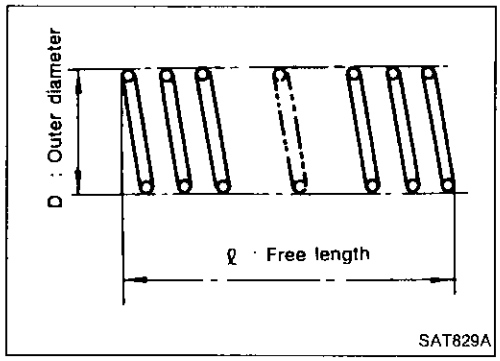
SAT640C

Control Valve Lower Body (Cont'd)


SAT838A

DISASSEMBLY

1. Remove valves at parallel pins.
2. Remove valves at retainer plates.
   For removal procedures, refer to "DISASSEMBLY" of Control Valve Upper Body.



SAT829A

INSPECTION

Valve springs

- Check each valve spring for damage or deformation. Also measure free length and outer diameter.
- Numbers of each valve spring listed in table below are the same as those in the figure on AT-132.

Inspection standard:

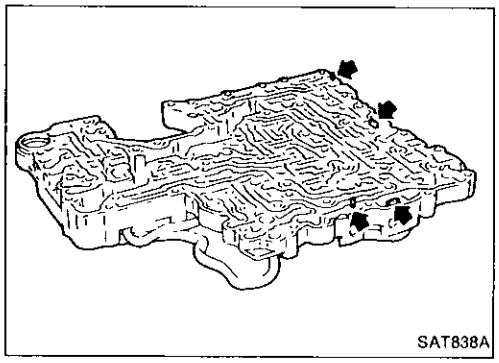
Unit: mm (in)

Parts / Item		Part No.	ℓ	D
①	Modifier accumulator piston spring	31742-41X15	30.5 (1.201)	9.8 (0.386)
②	1st reducing valve spring	31756-41X05	25.4 (1.000)	6.75 (0.2657)
③	3-2 timing valve spring	31742-41X08	20.55 (0.8091)	6.75 (0.2657)
④	Servo charger valve spring	31742-41X06	23.0 (0.906)	6.7 (0.264)

- Replace valve springs if deformed or fatigued.

Control valves

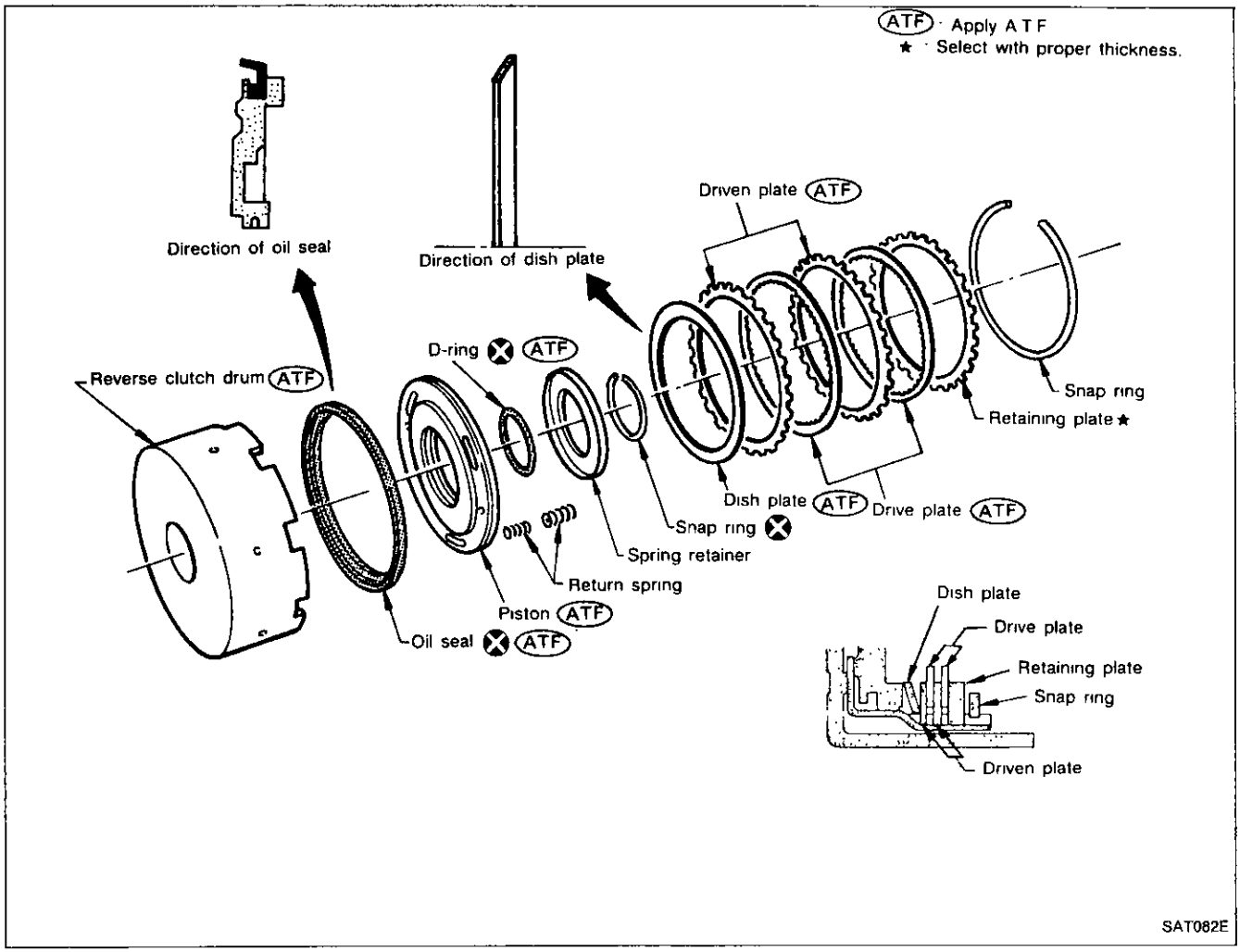
- Check sliding surfaces of control valves, sleeves and plugs for damage.

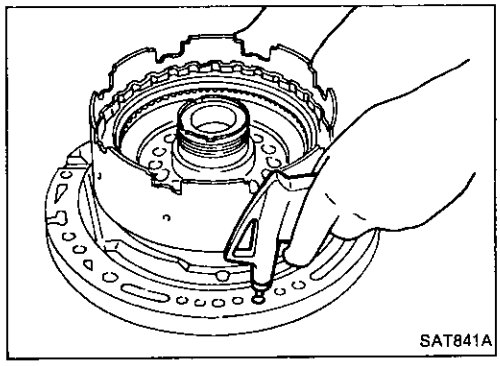

SAT838A

ASSEMBLY

- Install control valves. For installation procedures, refer to "ASSEMBLY" of Control Valve Upper Body.

Reverse Clutch





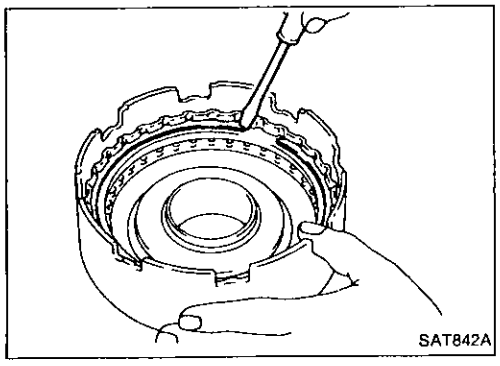
DISASSEMBLY

1. Check operation of reverse clutch.

a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.

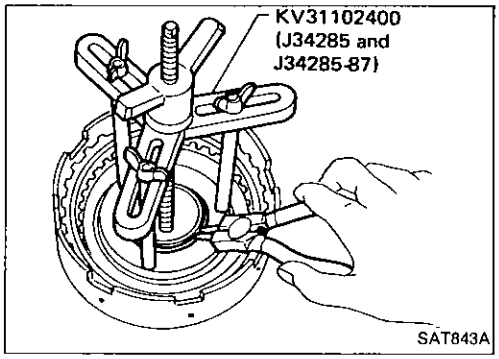
b. Check to see that retaining plate moves to snap ring.

c. If retaining plate does not move to snap ring, D-ring or oil seal may be damaged or fluid may be leaking at piston check ball.

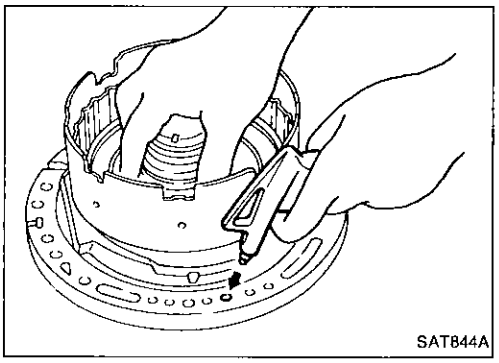


2. Remove drive plates, driven plates, retaining plate, dish plate and snap ring.

Reverse Clutch (Cont'd)



3. Remove snap ring from clutch drum while compressing clutch springs.
- **Do not expand snap ring excessively.**
4. Remove spring retainer and return spring.

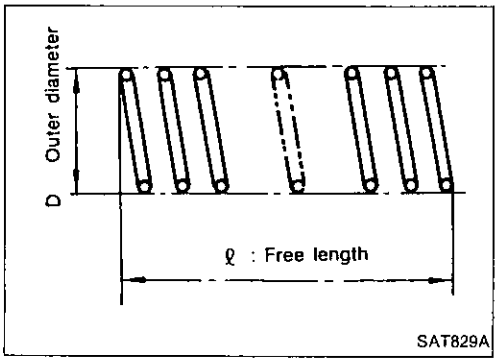


5. Install seal ring onto oil pump cover and install reverse clutch drum. While holding piston, gradually apply compressed air to oil hole until piston is removed.
- **Do not apply compressed air abruptly.**
6. Remove D-ring and oil seal from piston.

INSPECTION

Reverse clutch snap ring and spring retainer

- Check for deformation, fatigue or damage.



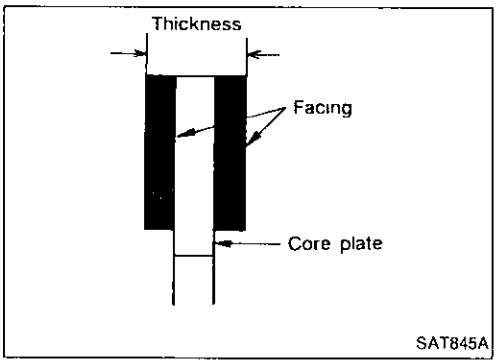
Reverse clutch return springs

- Check for deformation or damage. Also measure free length and outside diameter.

Inspection standard:

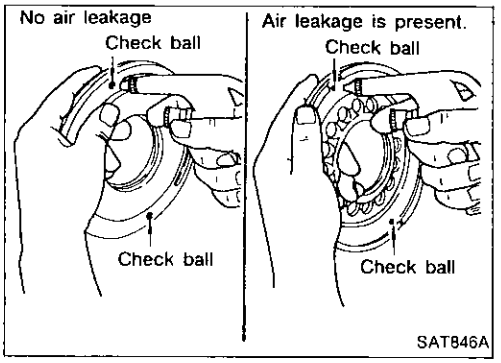
Unit: mm (in)

Part No.	ℓ	D
31505-41X02	19.69 (0.7752)	11.6 (0.457)



Reverse clutch drive plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Standard value: 2.0 mm (0.079 in)
  Wear limit: 1.8 mm (0.071 in)
- If not within wear limit, replace.



Reverse clutch dish plate

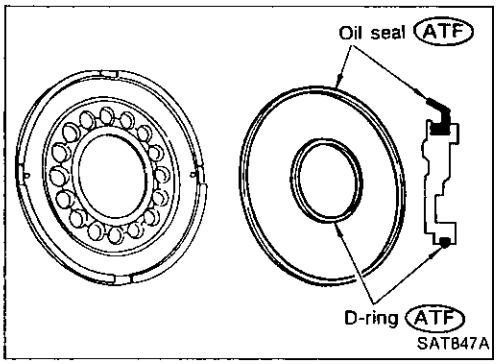
- Check for deformation or damage.

Reverse clutch piston

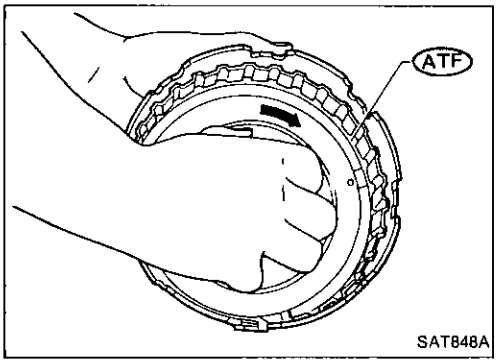
- Shake piston to assure that balls are not seized.
- Apply compressed air to check ball oil hole opposite the return spring to assure that there is no air leakage.
- Also apply compressed air to oil hole on return spring side to assure that air leaks past ball.

Reverse Clutch (Cont'd)

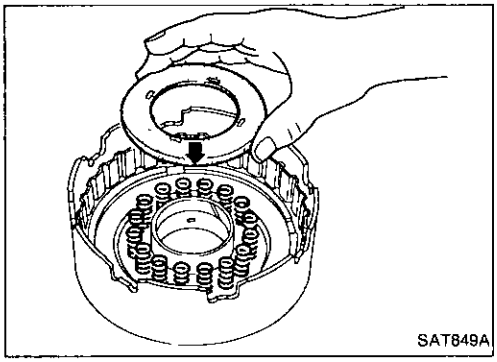
ASSEMBLY



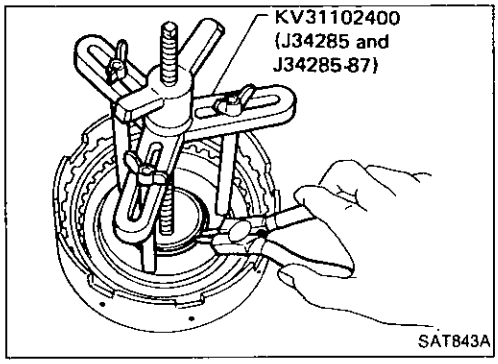
1. Install D-ring and oil seal on piston.
- **Apply A.T.F. to both parts.**



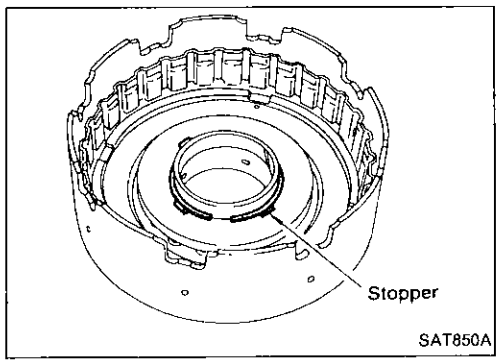
2. Install piston assembly by turning it slowly and evenly.
- **Apply A.T.F. to inner surface of drum.**



3. Install return springs and spring retainer.

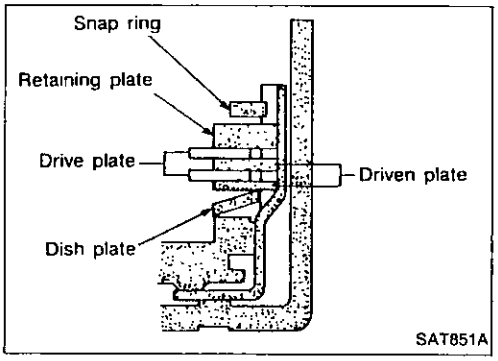


4. Install snap ring while compressing clutch springs.

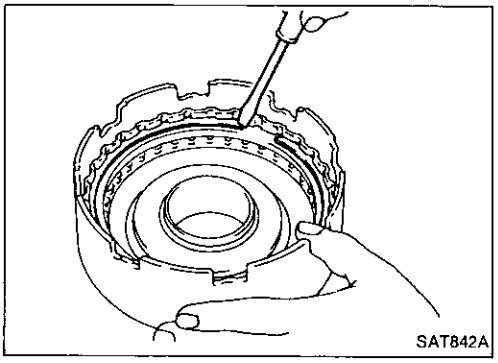


- **Do not align snap ring gap with spring retainer stopper.**

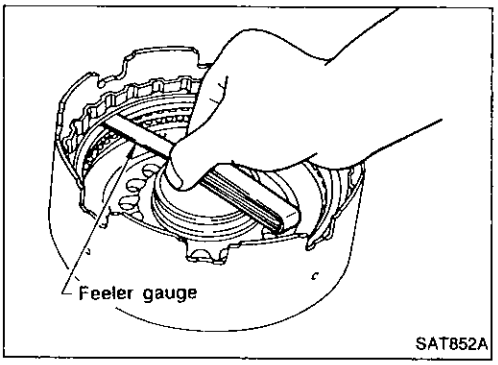
Reverse Clutch (Cont'd)



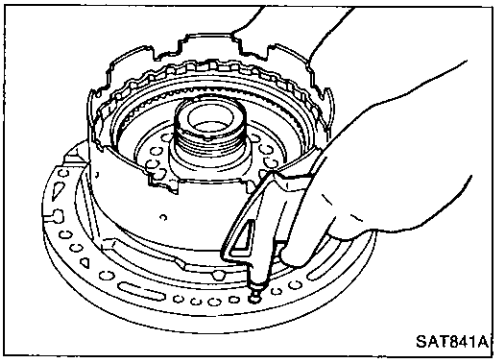
5. Install drive plates, driven plates, retaining plate and dish plate.



6. Install snap ring.

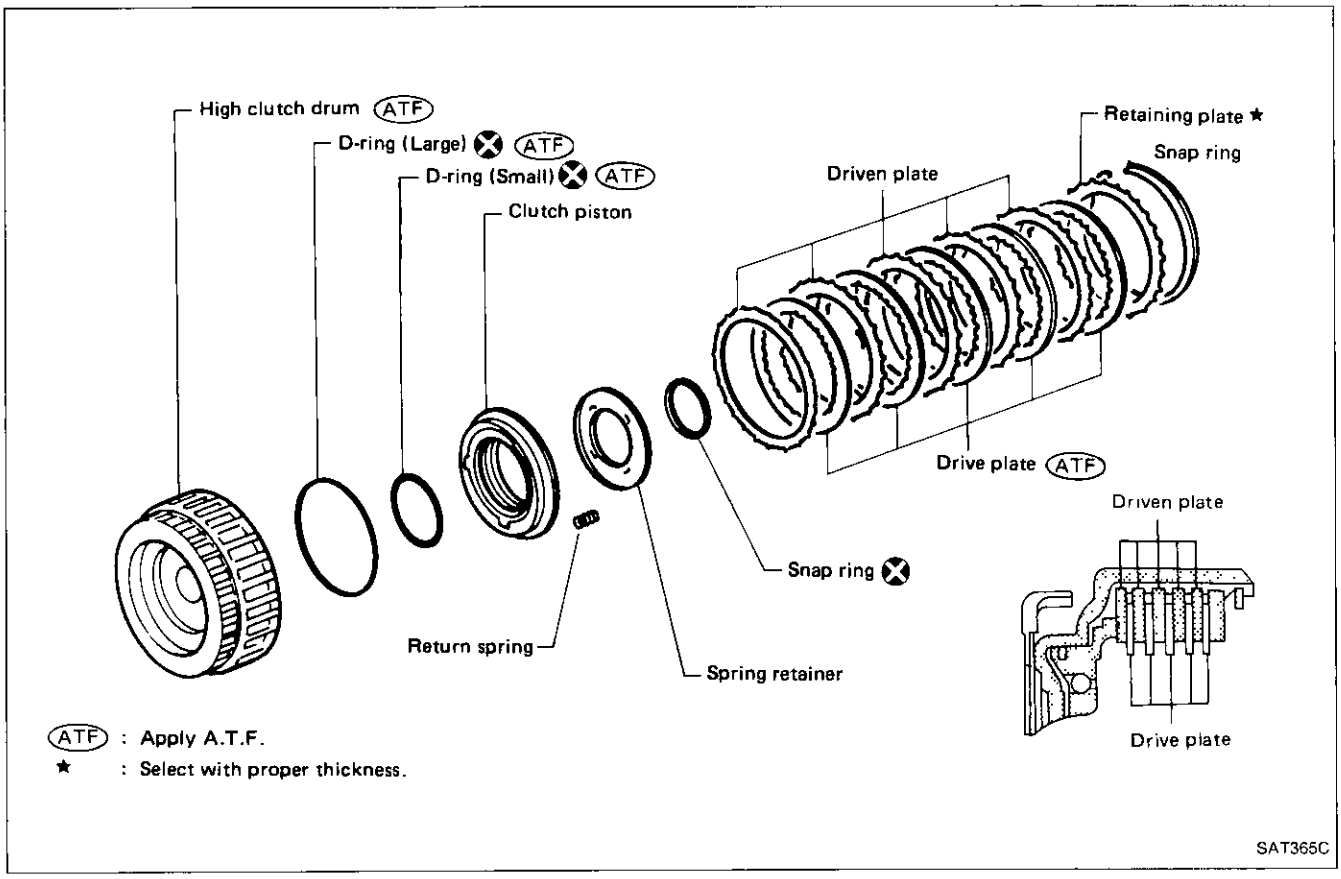


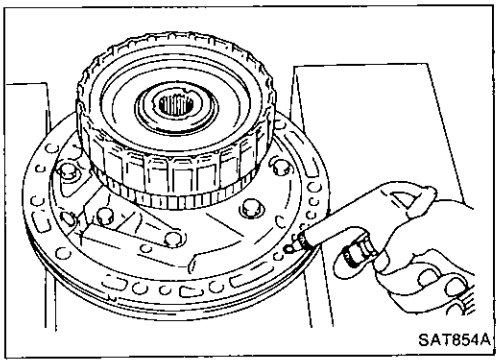
7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.
   Specified clearance:
   Standard
   0.5 - 0.8 mm (0.020 - 0.031 in)
   Allowable limit
   1.2 mm (0.047 in)
   Retaining plate:
   Refer to S.D.S.



8. Check operation of reverse clutch.
   Refer to "DISASSEMBLY" of Reverse Clutch.

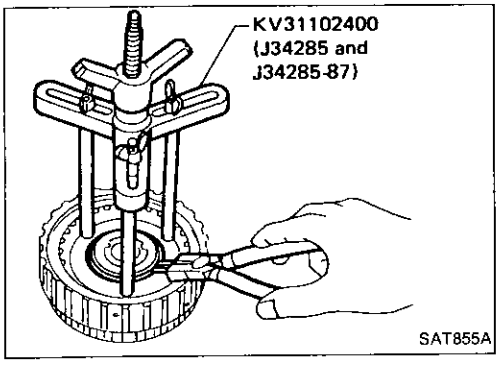
High Clutch





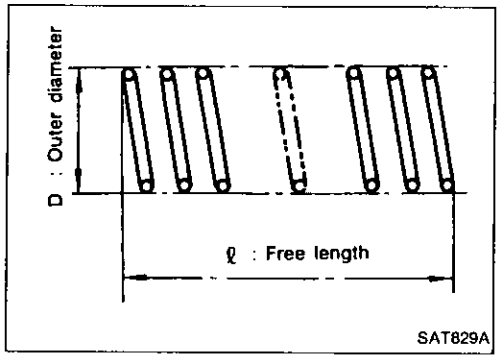
Service procedures for high clutch are essentially the same as those for reverse clutch, with the following exception:

- Check of high clutch operation



- Removal and installation of return spring

High Clutch (Cont'd)

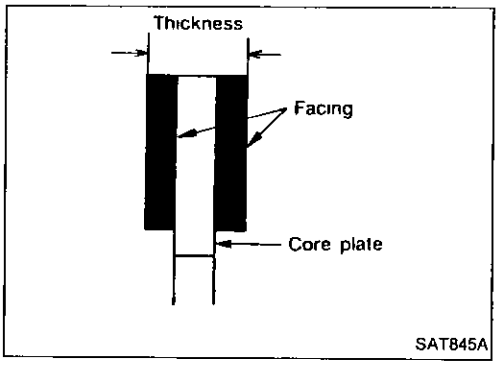


- Inspection of high clutch return springs

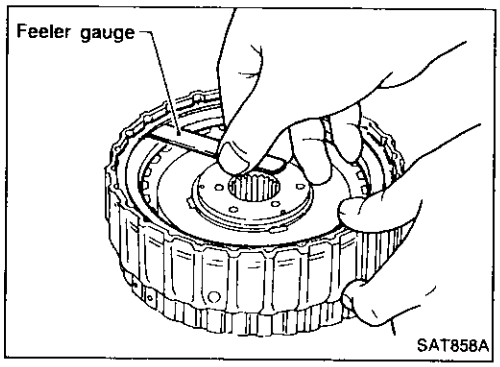
Inspection standard:

Unit: mm (in)

Part No.	ℓ	D
31505-21X03	22.06 (0.8685)	11.6 (0.457)



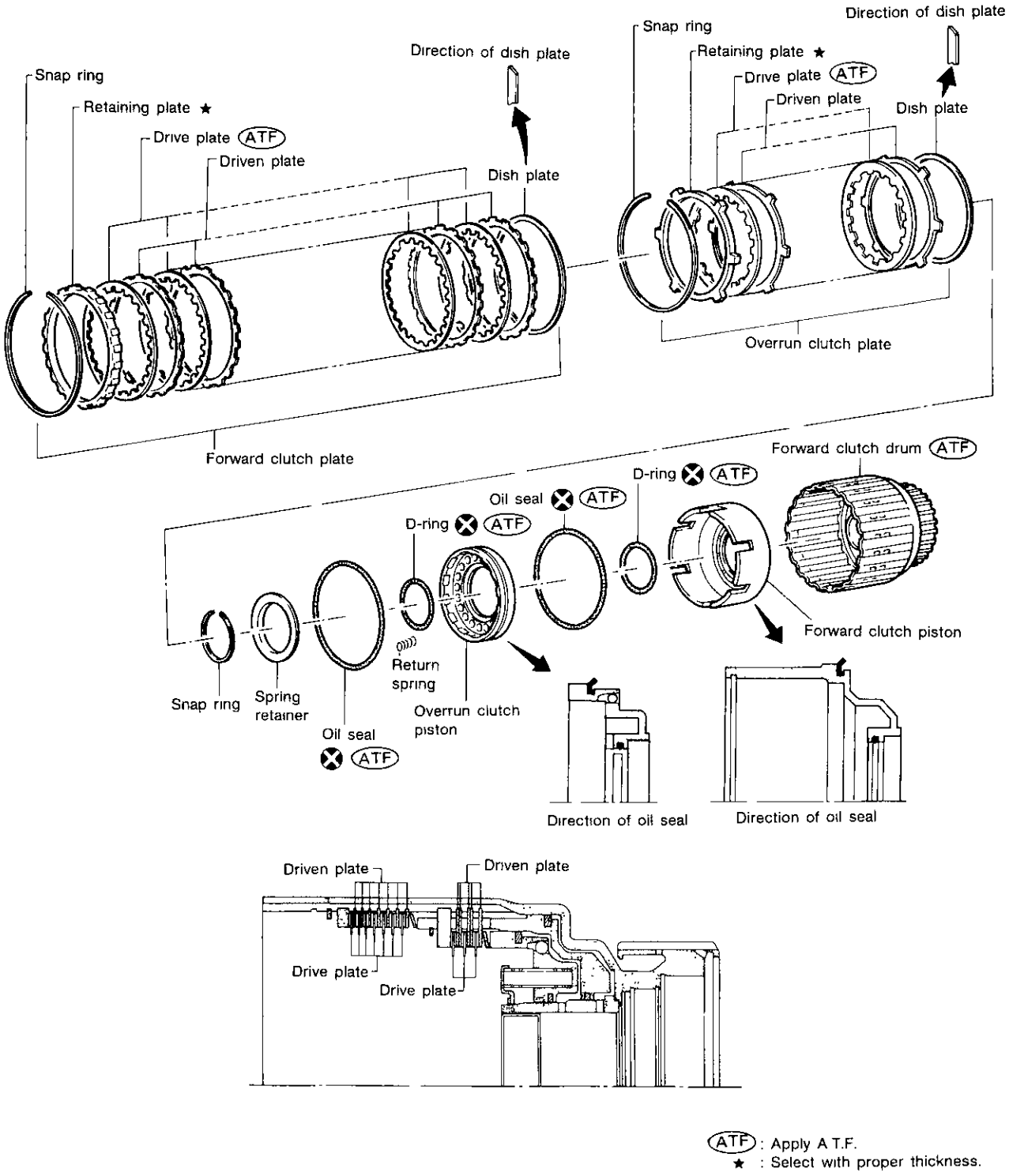
- Inspection of high clutch drive plate
  Thickness of drive plate:
  Standard
  1.6 mm (0.063 in)
  Wear limit
  1.4 mm (0.055 in)



- Measurement of clearance between retaining plate and snap ring
  Specified clearance:
  Standard
  1.8 - 2.2 mm (0.071 - 0.087 in)
  Allowable limit
  3.2 mm (0.126 in)
  Retaining plate:
  Refer to S.D.S.

Forward and Overrun Clutches

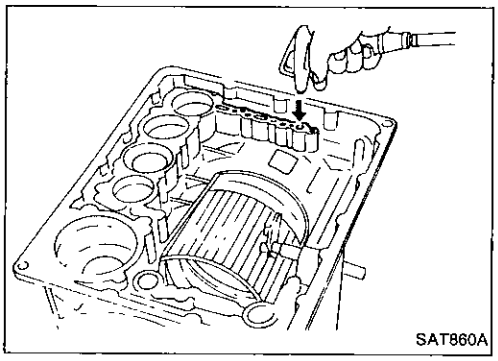
For the number of clutch sheets (drive plate and driven plate), refer to the below cross-section.



(ATF) : Apply A.T.F.
★ : Select with proper thickness.

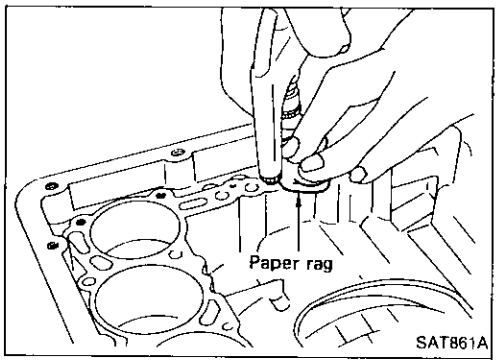
SAT642E

Forward and Overrun Clutches (Cont'd)


SAT860A

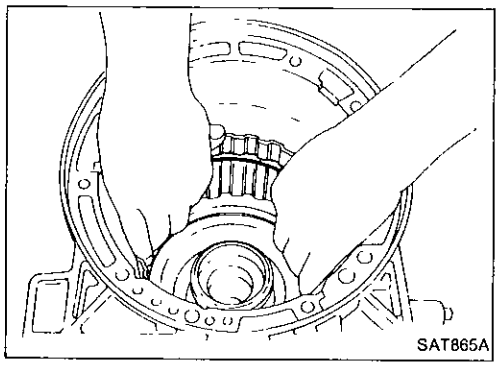
Service procedures for forward and overrun clutches are essentially the same as those for reverse clutch, with the following exception:

- Check of forward clutch operation.

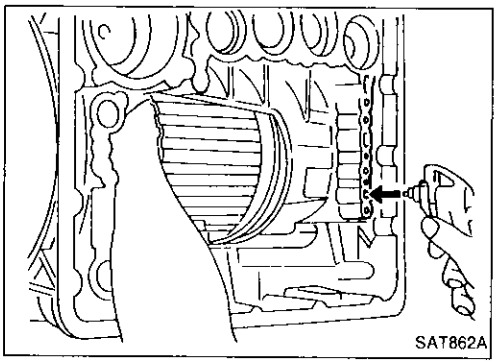


SAT861A

- Check of overrun clutch operation.

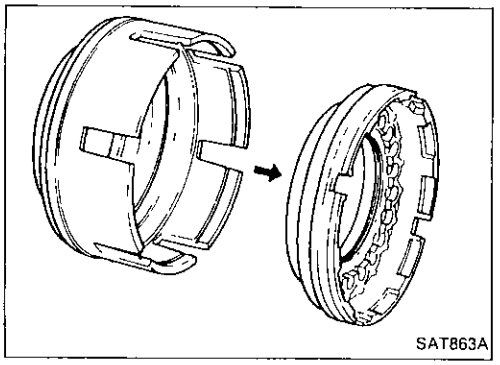

SAT865A

- Removal of forward clutch drum
  Remove forward clutch drum from transmission case by holding snap ring.


SAT862A

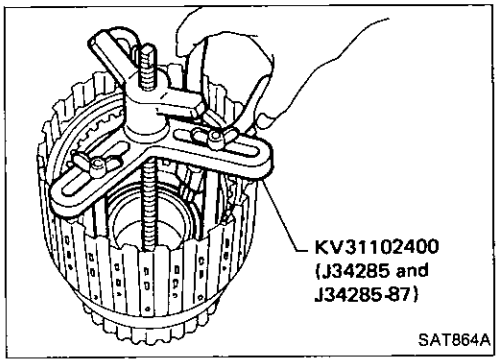
- Removal of forward clutch and overrun clutch pistons

1. While holding overrun clutch piston, gradually apply compressed air to oil hole.

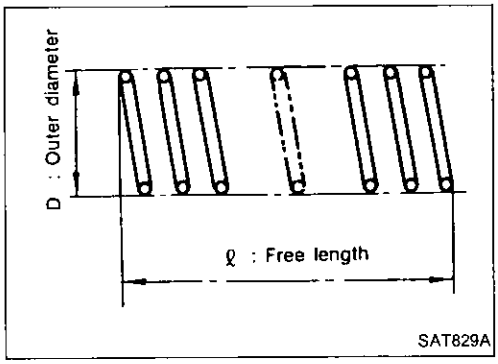

SAT863A

2. Remove overrun clutch from forward clutch.

Forward and Overrun Clutches (Cont'd)



- Removal and installation of return springs

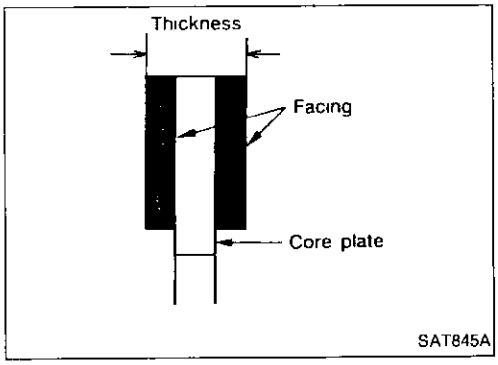


- Inspection of forward clutch and overrun clutch return springs

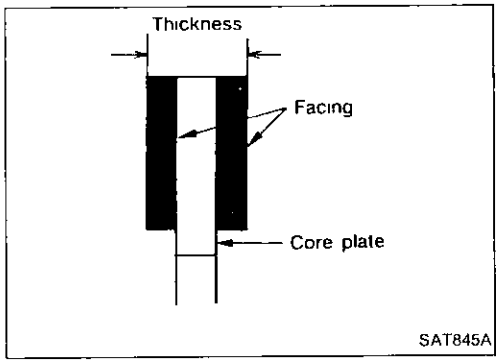
Inspection standard:

Unit: mm (in)

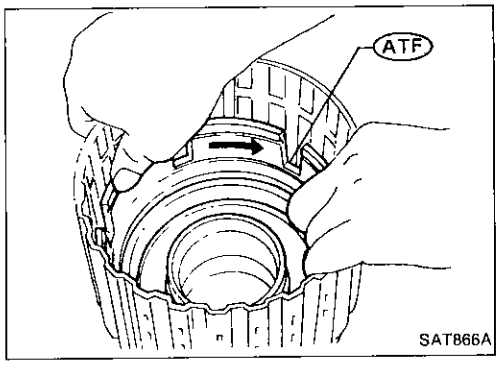
Part No.	ℓ	D
31505-41X01	35.77 (1.4083)	9.7 (0.382)



- Inspection of forward clutch drive plates
  Thickness of drive plate:
  Standard
  1.6 mm (0.063 in)
  Wear limit
  1.4 mm (0.055 in)



- Inspection of overrun clutch drive plates
  Thickness of drive plate:
  Standard
  2.0 mm (0.079 in)
  Wear limit
  1.8 mm (0.071 in)

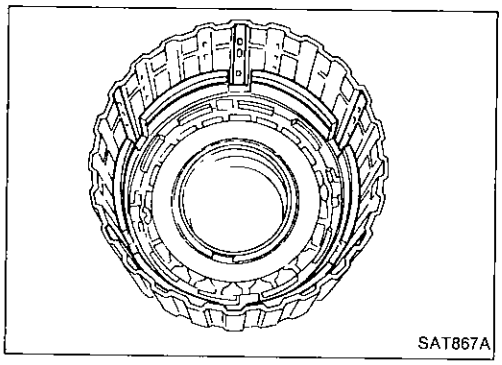


- Installation of forward clutch piston and overrun clutch piston

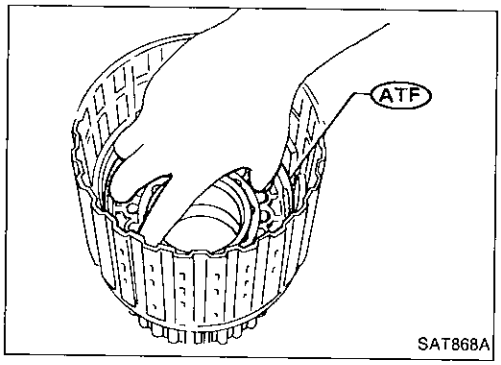
1. Install forward clutch piston by turning it slowly and evenly.

- **Apply A.T.F. to inner surface of clutch drum.**

Forward and Overrun Clutches (Cont'd)

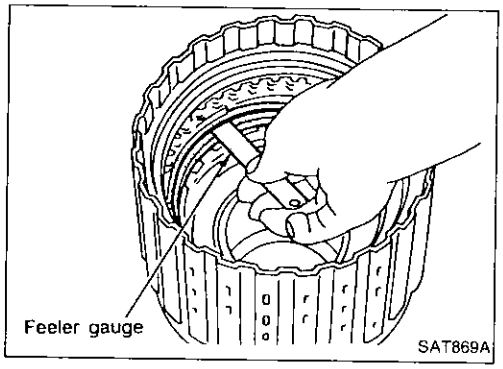

SAT867A

- **Align notch in forward clutch piston with groove in forward clutch drum.**



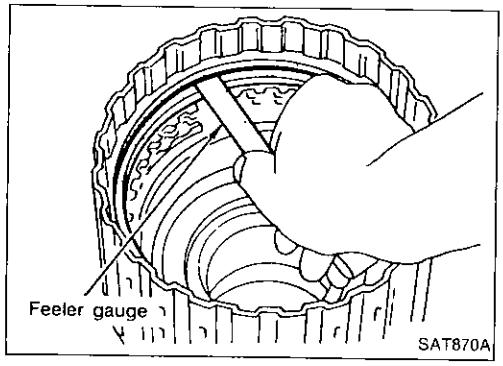
SAT868A

2. Install overrun clutch by turning it slowly and evenly.
- **Apply A.T.F. to inner surface of forward clutch piston.**



SAT869A

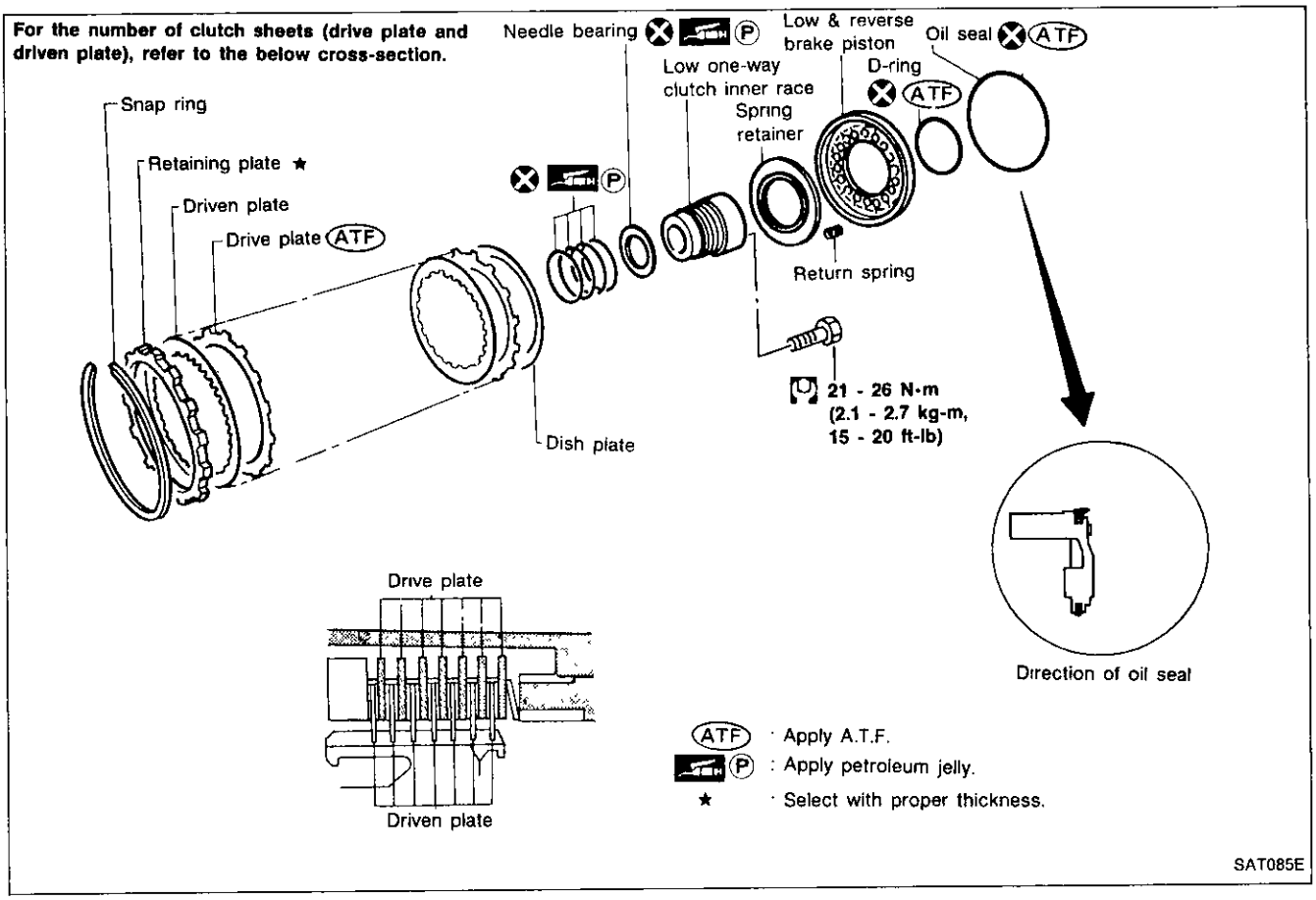
- Measurement of clearance between retaining plate and snap ring of overrun clutch
  Specified clearance:
  Standard
  1.0 - 1.4 mm (0.039 - 0.055 in)
  Allowable limit
  2.0 mm (0.079 in)
  Retaining plate:
  Refer to S.D.S.

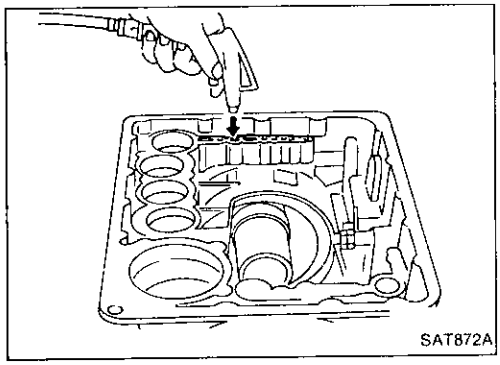


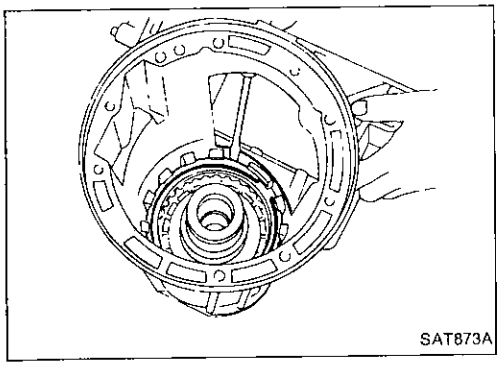
SAT870A

- Measurement of clearance between retaining plate and snap ring of forward clutch
  Specified clearance:
  Standard
  0.45 - 0.85 mm (0.0177 - 0.0335 in)
  Allowable limit
  2.25 mm (0.0886 in)
  Retaining plate:
  Refer to S.D.S.

Low & Reverse Brake







DISASSEMBLY

1. Check operation of low and reverse brake.

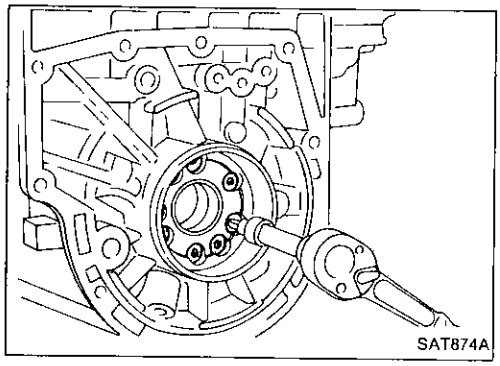
a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.

b. Check to see that retaining plate moves to snap ring.

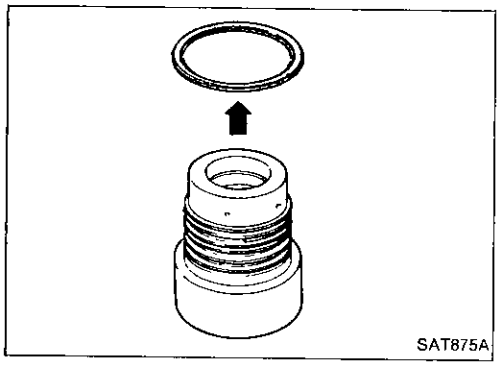
c. If retaining plate does not move to snap ring, D-ring or oil seal may be damaged or fluid may be leaking at piston check ball.

2. Remove snap ring, low and reverse brake drive plates, driven plates and dish plate.

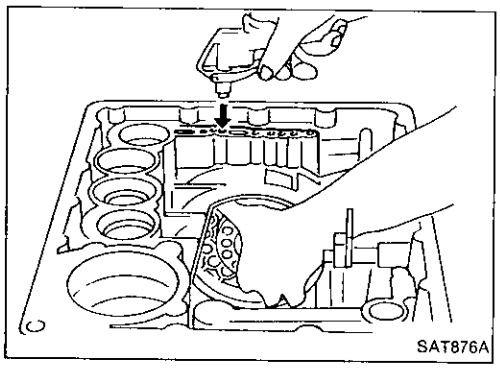
Low & Reverse Brake (Cont'd)


SAT874A

3. Remove low one-way clutch inner race, spring retainer and return spring from transmission case.


SAT875A

4. Remove seal rings from low one-way clutch inner race.
5. Remove needle bearing from low one-way clutch inner race.

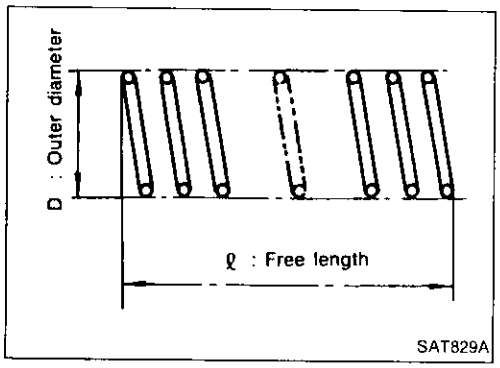

SAT876A

6. Remove low and reverse brake piston using compressed air.
7. Remove oil seal and D-ring from piston.

INSPECTION

Low and reverse brake snap ring and spring retainer

- Check for deformation, or damage.



SAT829A

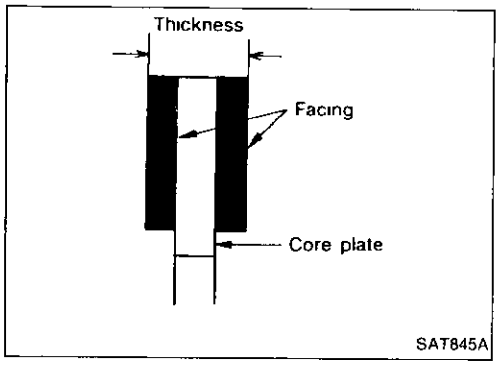
Low and reverse brake return springs

- Check for deformation or damage. Also measure free length and outside diameter.

Inspection standard:

Unit: mm (in)

Part No.	ℓ	D
31505-41X03	22.9 (0.902)	11.6 (0.457)



SAT845A

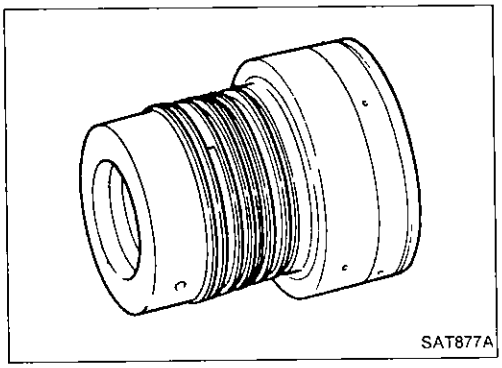
Low and reverse brake drive plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate:
Standard value
2.0 mm (0.079 in)
Wear limit
1.8 mm (0.071 in)

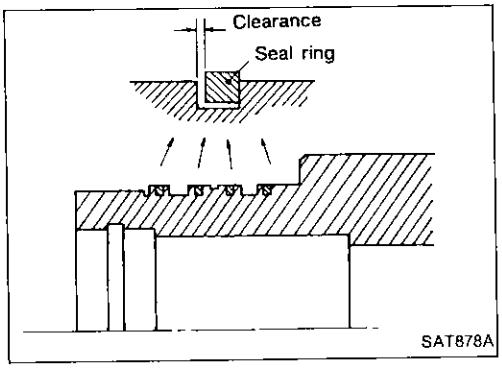
- If not within wear limit, replace.

Low & Reverse Brake (Cont'd)


SAT877A

Low one-way clutch inner race

- Check frictional surface of inner race for wear or damage.



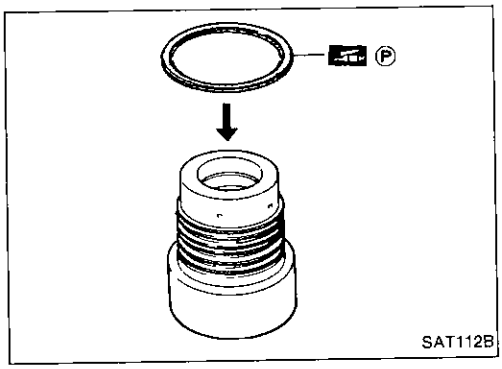
SAT878A

- Install a new seal rings onto low one-way clutch inner race.
- **Be careful not to expand seal ring gap excessively.**
- Measure seal ring-to-groove clearance.

  Inspection standard:

  Standard value: 0.10 - 0.25 mm (0.0039 - 0.0098 in)

  Allowable limit: 0.25 mm (0.0098 in)
- If not within allowable limit, replace low one-way clutch inner race.

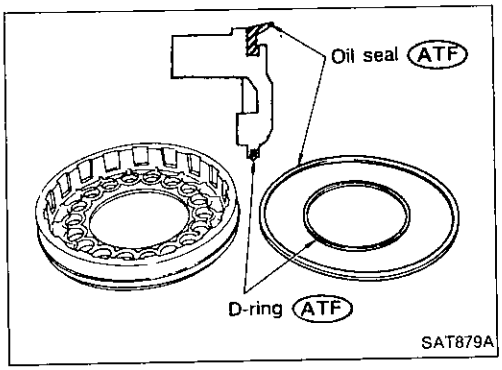


SAT112B

ASSEMBLY

1. Install bearing onto one-way clutch inner race.

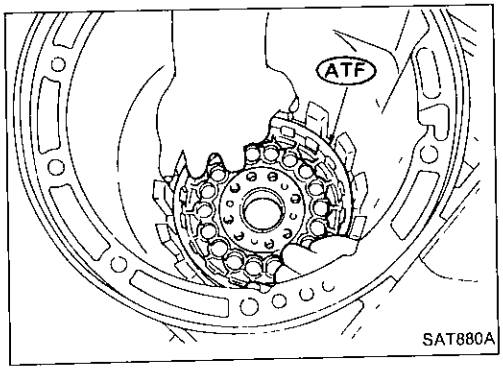
- **Pay attention to its direction — Black surface goes to rear side.**
- **Apply petroleum jelly to needle bearing.**



SAT879A

2. Install oil seal and D-ring onto piston.

- **Apply A.T.F. to oil seal and D-ring.**

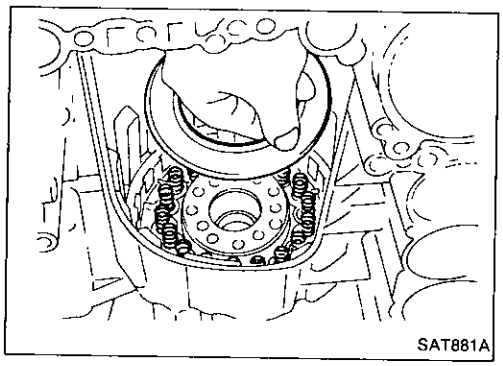


SAT880A

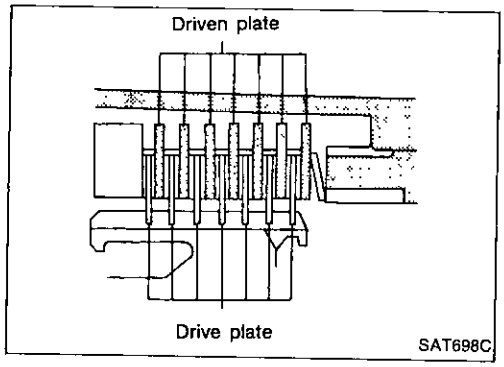
3. Install piston by rotating it slowly and evenly.

- **Apply A.T.F. to inner surface of transmission case.**

Low & Reverse Brake (Cont'd)

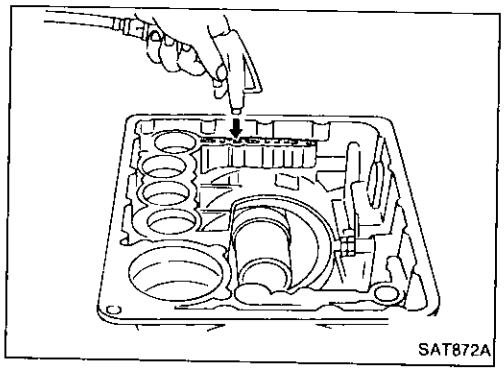

SAT881A

4. Install return springs, spring retainer and low one-way clutch inner race onto transmission case.

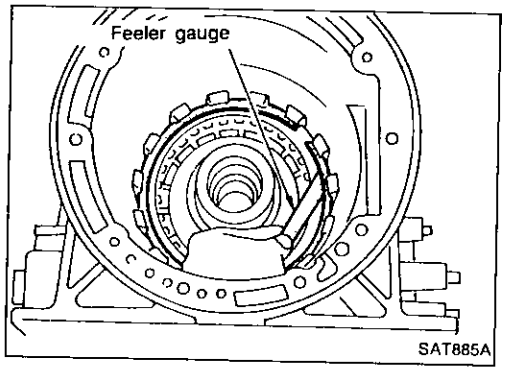


SAT698C

5. Install dish plate, low and reverse brake drive plates, driven plates and retaining plate.
6. Install snap ring on transmission case.

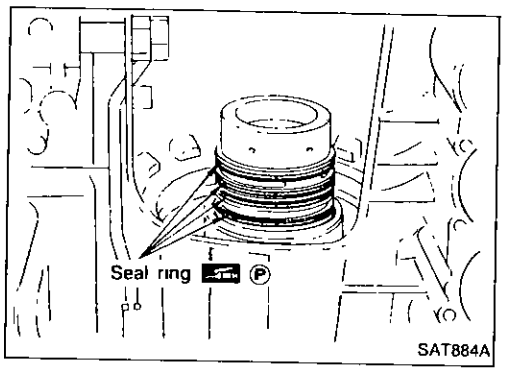

SAT872A

7. Check operation of low and reverse brake clutch piston. Refer to "DISASSEMBLY".



SAT885A

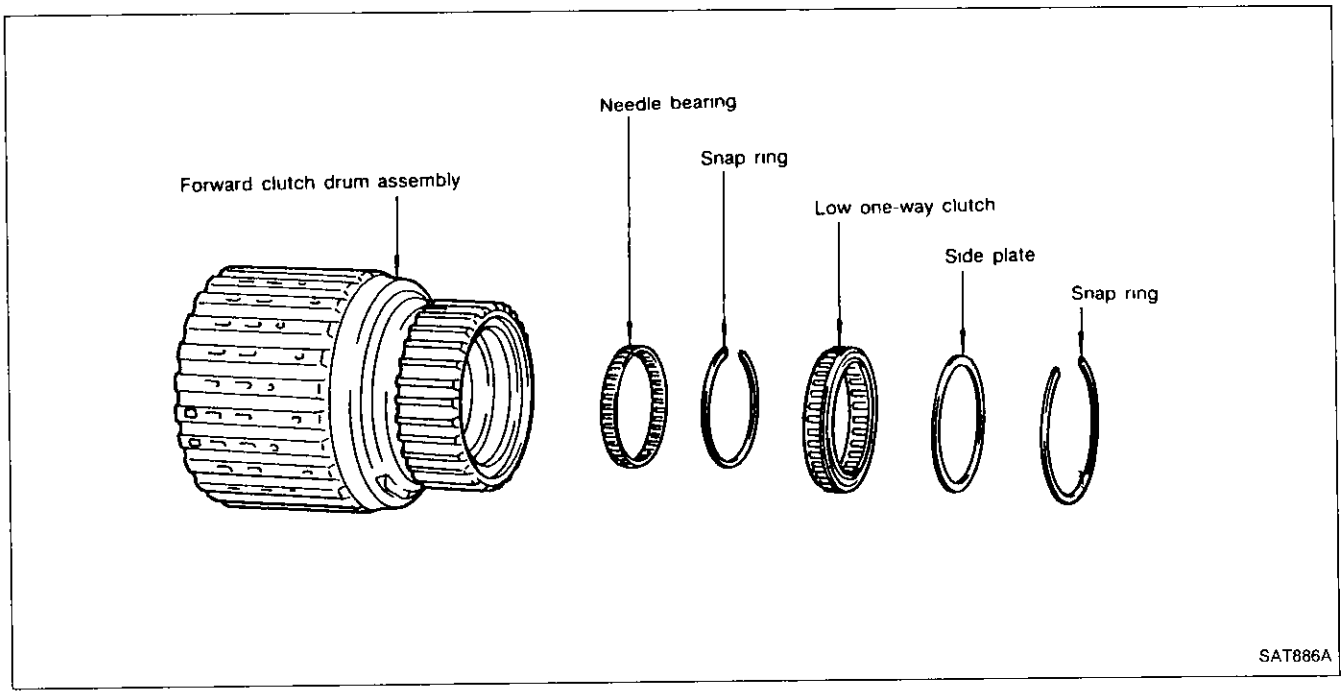
8. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.
   Specified clearance:
   Standard
   0.7 - 1.1 mm (0.028 - 0.043 in)
   Allowable limit
   2.9 mm (0.114 in)
   Retaining plate:
   Refer to S.D.S.

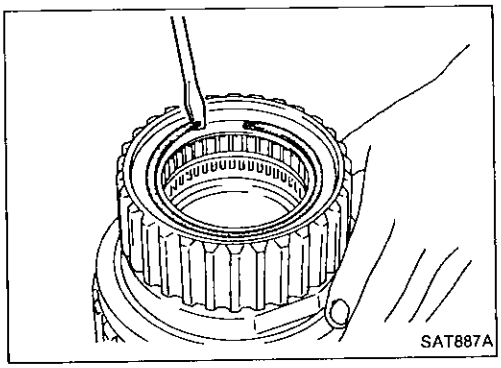


SAT884A

9. Install low one-way clutch inner race seal ring.
- **Apply petroleum jelly to seal ring.**
- **Make sure seal rings are pressed firmly into place and held by petroleum jelly.**

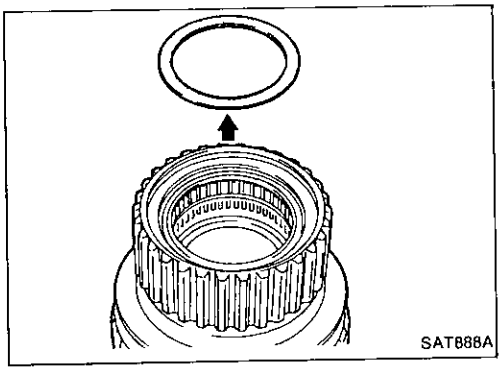
Forward Clutch Drum Assembly



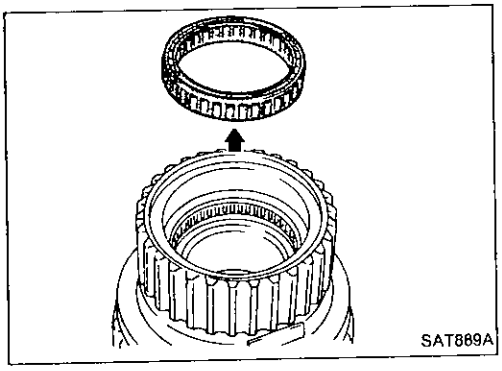


DISASSEMBLY

1. Remove snap ring from forward clutch drum.

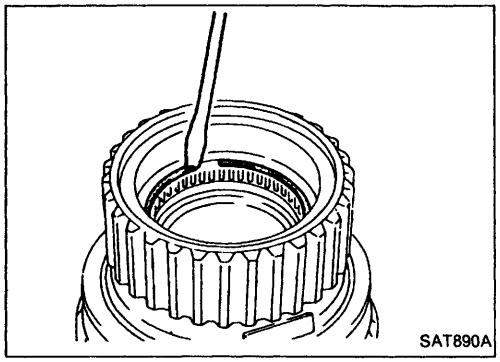


2. Remove side plate from forward clutch drum.

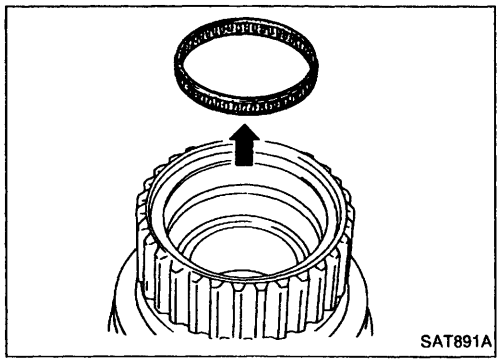


3. Remove low one-way clutch from forward clutch drum.

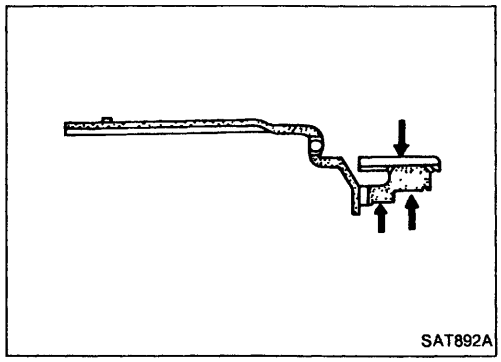
Forward Clutch Drum Assembly (Cont'd)



4. Remove snap ring from forward clutch drum.



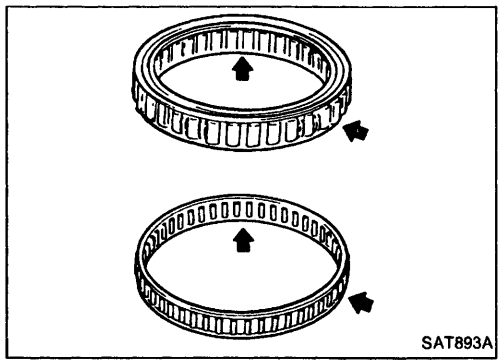
5. Remove needle bearing from forward clutch drum.



INSPECTION

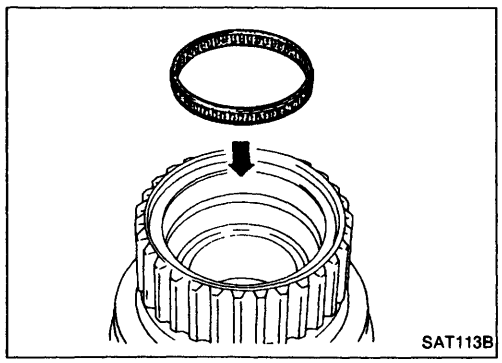
Forward clutch drum

- Check spline portion for wear or damage.
- Check frictional surfaces of low one-way clutch and needle bearing for wear or damage.



Needle bearing and low one-way clutch

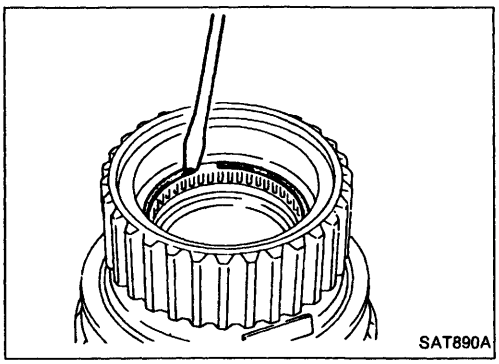
- Check frictional surface for wear or damage.



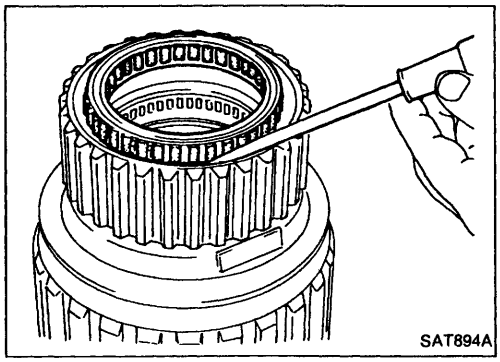
ASSEMBLY

1. Install needle bearing in forward clutch drum.

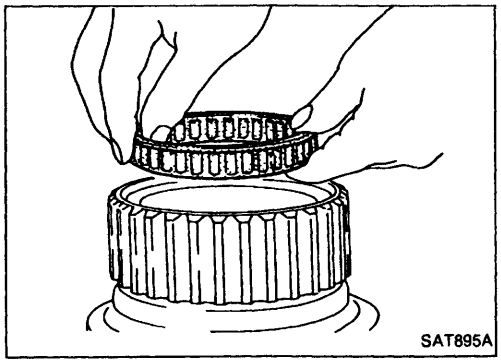
Forward Clutch Drum Assembly (Cont'd)


SAT890A

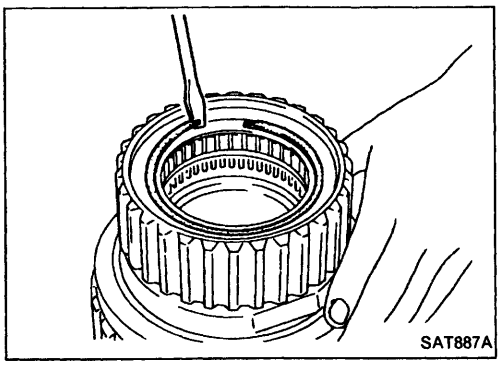
2. Install snap ring onto forward clutch drum.


SAT894A

3. Install low one-way clutch onto forward clutch drum by pushing the roller in evenly.

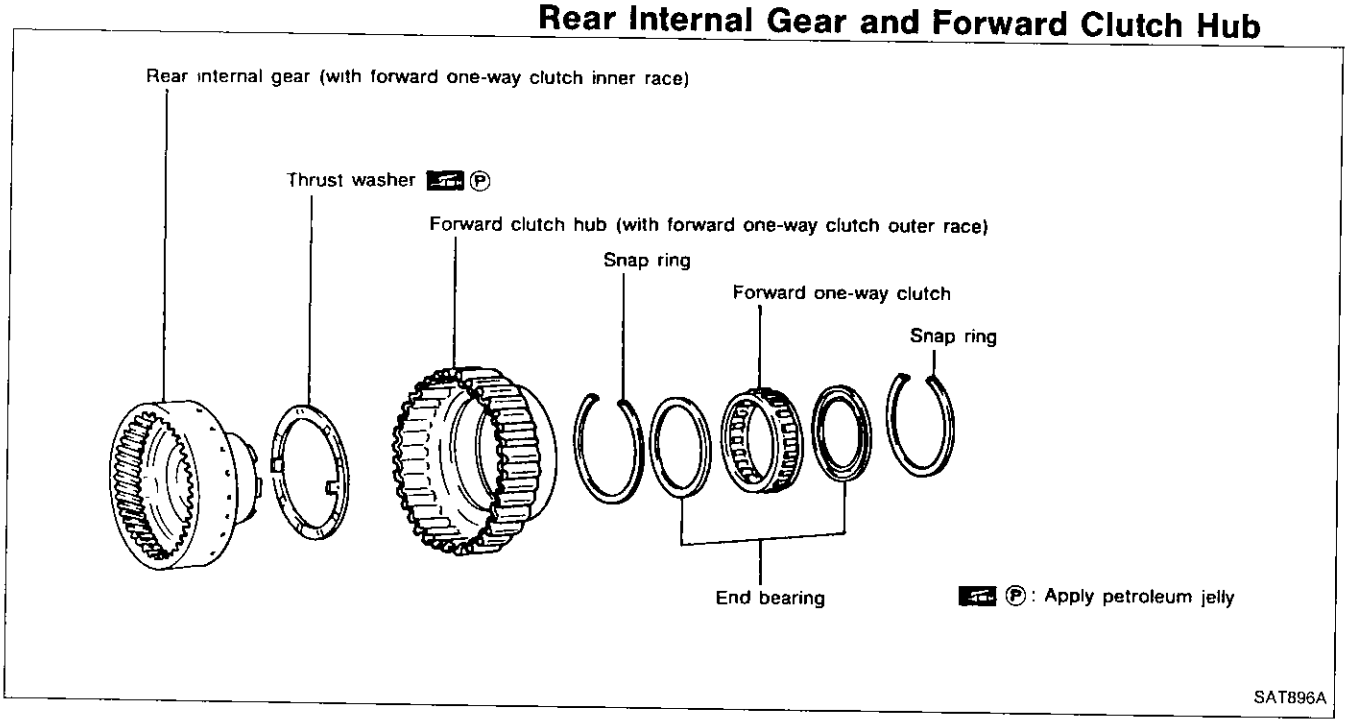

SAT895A

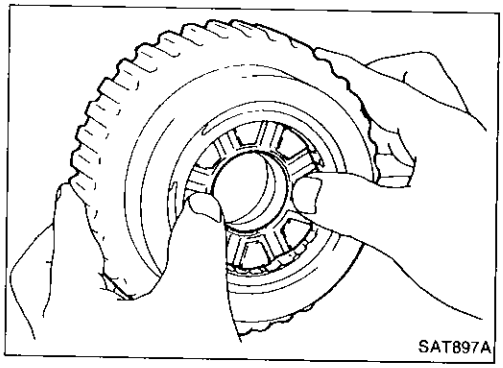
- **Install low one-way clutch with flange facing rearward.**


SAT887A

4. Install side plate onto forward clutch drum.
5. Install snap ring onto forward clutch drum.

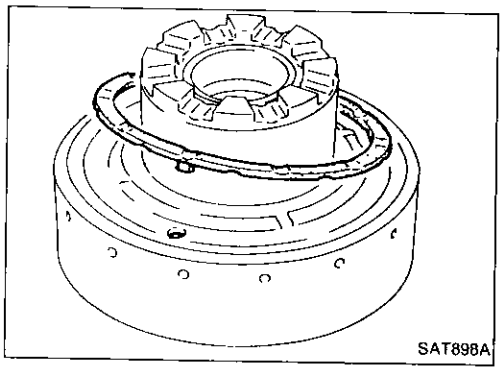
Rear Internal Gear and Forward Clutch Hub



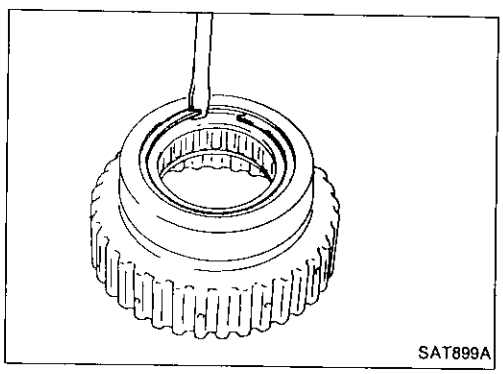


DISASSEMBLY

1. Remove rear internal gear by pushing forward clutch hub forward.

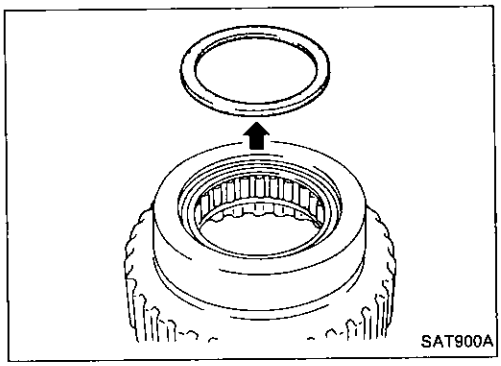


2. Remove thrust washer from rear internal gear.

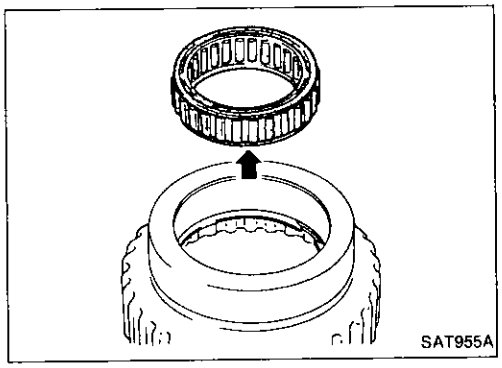


3. Remove snap ring from forward clutch hub.

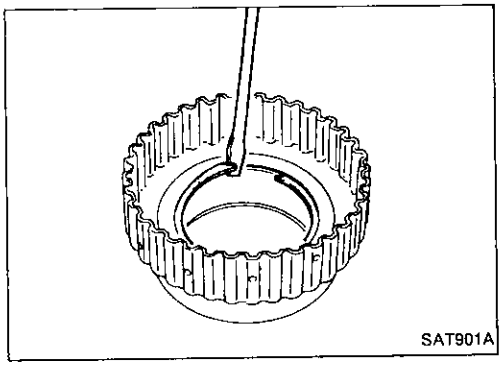
Rear Internal Gear and Forward Clutch Hub (Cont'd)



4. Remove end bearing.



5. Remove forward one-way clutch and end bearing as a unit from forward clutch hub.

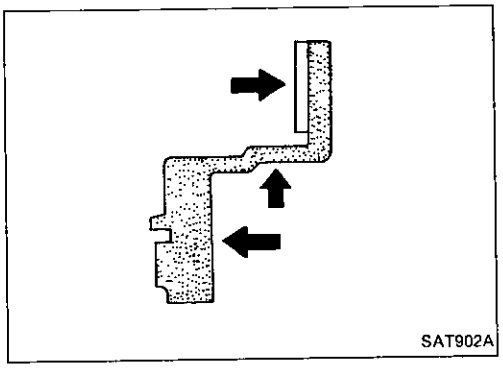


6. Remove snap ring from forward clutch hub.

INSPECTION

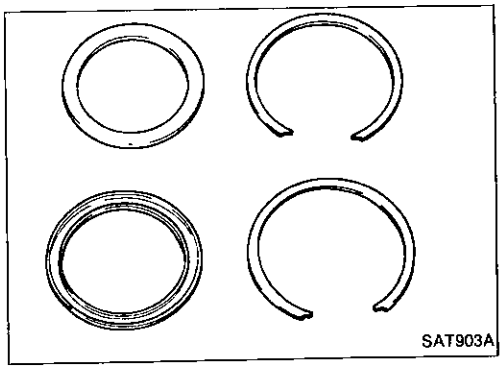
Rear internal gear and forward clutch hub

- Check gear for excessive wear, chips or cracks.
- Check frictional surfaces of forward one-way clutch and thrust washer for wear or damage.
- Check spline for wear or damage.



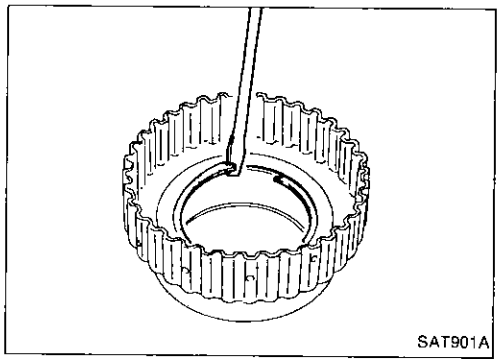
Snap ring and end bearing

- Check for deformation or damage.

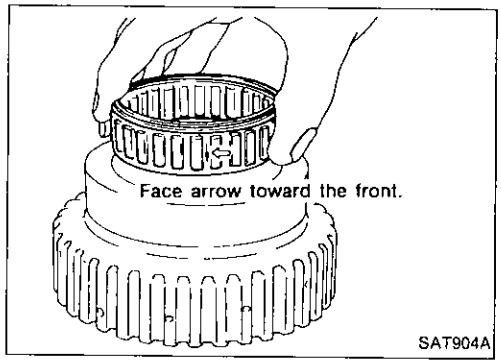


Rear Internal Gear and Forward Clutch Hub (Cont'd)

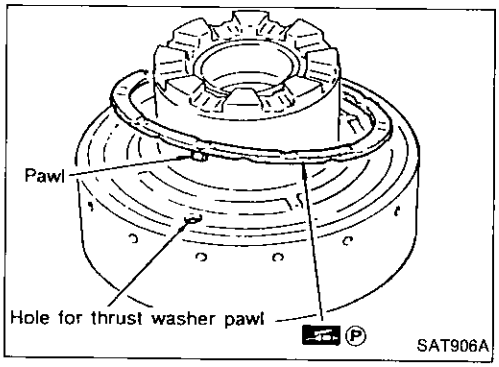
ASSEMBLY



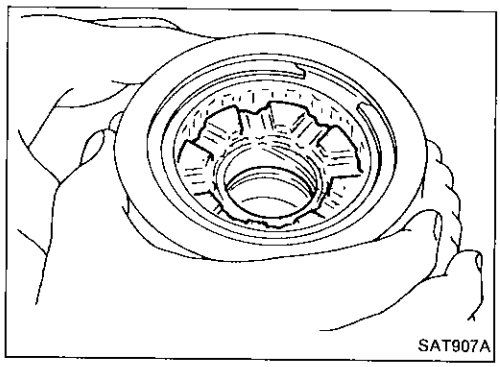
1. Install snap ring onto forward clutch hub.
2. Install end bearing.



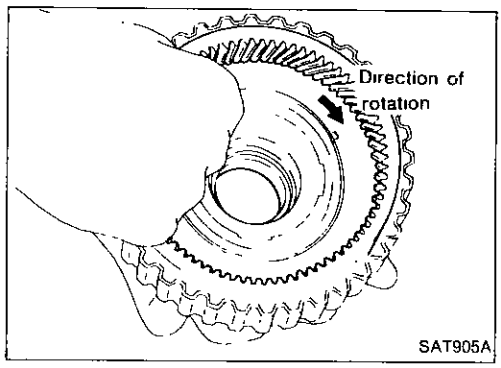
3. Install forward one-way clutch onto clutch hub.
- **Install forward one-way clutch with flange facing rearward.**
4. Install end bearing.
5. Install snap ring onto forward clutch hub.



6. Install thrust washer onto rear internal gear.
- **Apply petroleum jelly to thrust washer.**
- **Securely insert pawls of thrust washer into holes in rear internal gear.**

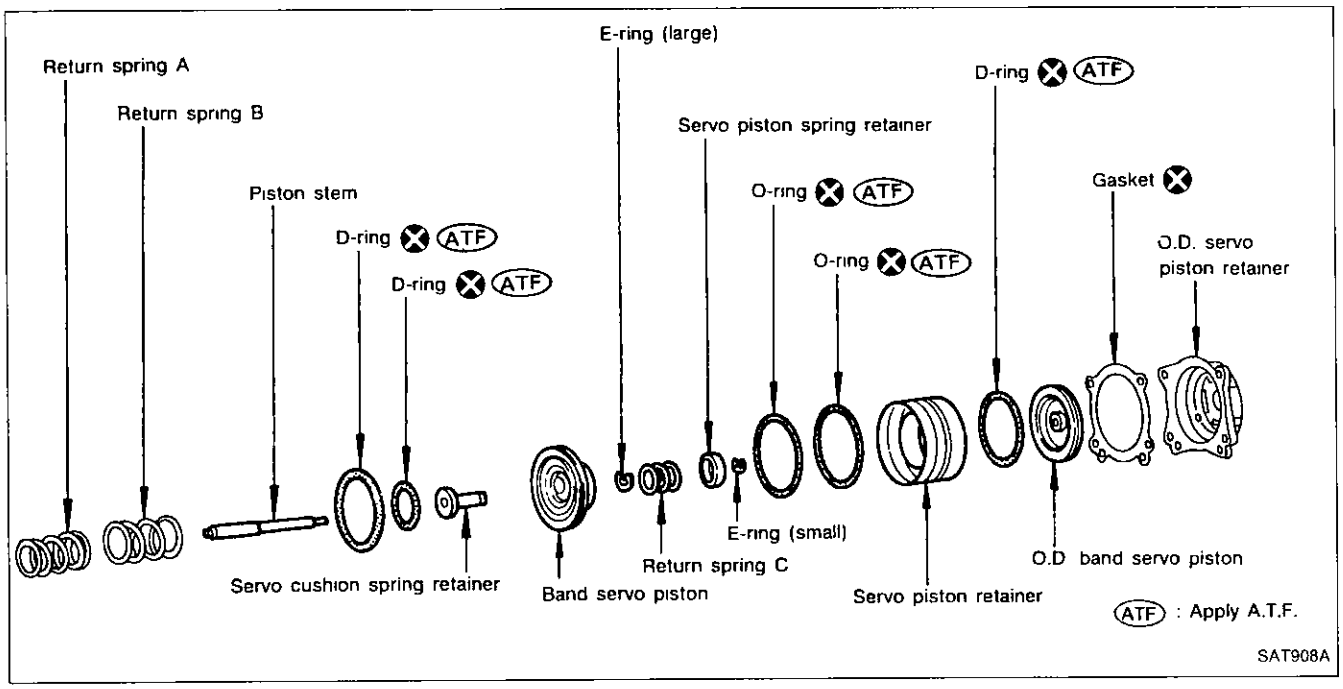


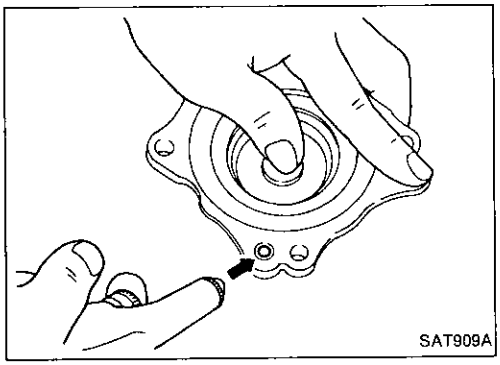
7. Position forward clutch hub in rear internal gear.



8. After installing, check to assure that forward clutch hub rotates clockwise.

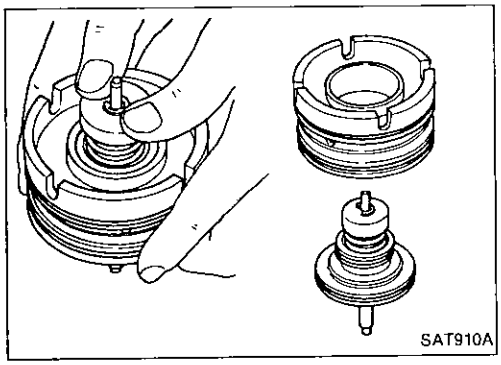
Band Servo Piston Assembly



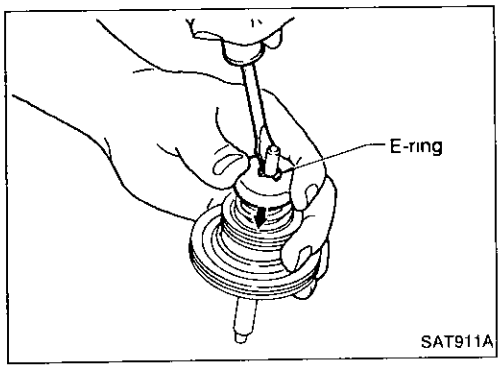


DISASSEMBLY

1. Block one oil hole in O.D. servo piston retainer and the center hole in O.D. band servo piston.
2. Apply compressed air to the other oil hole in piston retainer to remove O.D. band servo piston from retainer.
3. Remove D-ring from O.D. band servo piston.

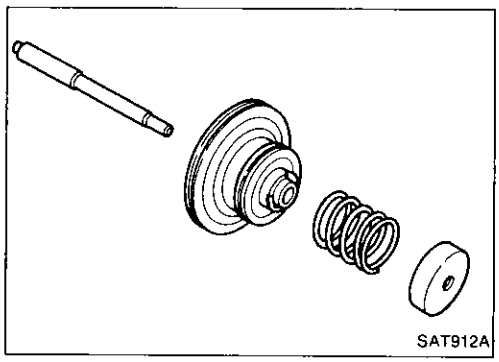


4. Remove band servo piston assembly from servo piston retainer by pushing it forward.

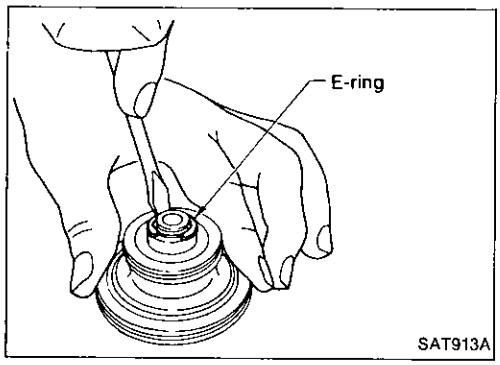


5. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.

Band Servo Piston Assembly (Cont'd)

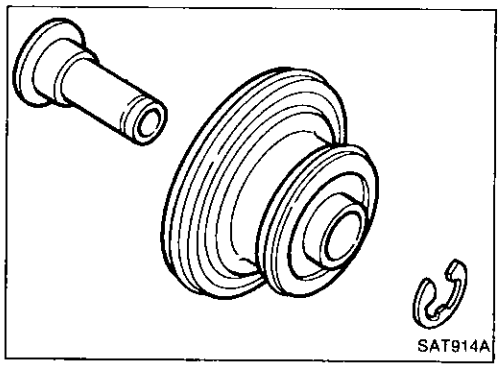

SAT912A

6. Remove servo piston spring retainer, return spring C and piston stem from band servo piston.

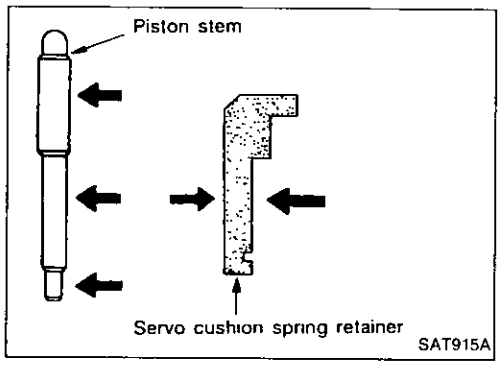


SAT913A

7. Remove E-ring from band servo piston.


SAT914A

8. Remove servo cushion spring retainer from band servo piston.
9. Remove D-rings from band servo piston.
10. Remove O-rings from servo piston retainer.

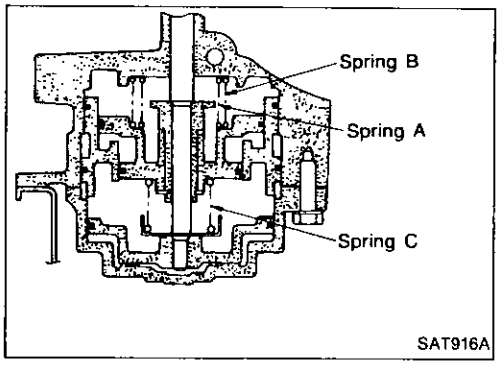


SAT915A

INSPECTION

Pistons, retainers and piston stem

- Check frictional surfaces for abnormal wear or damage.



SAT916A

Return springs

- Check for deformation or damage. Measure free length and outer diameter.

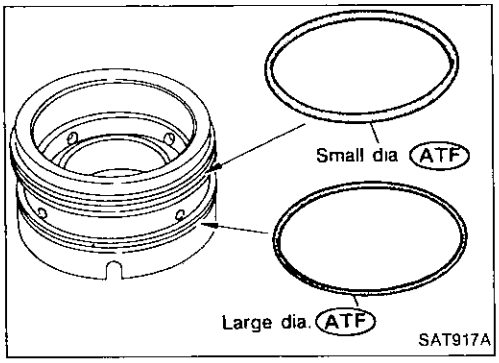
Inspection standard:

Unit: mm (in)

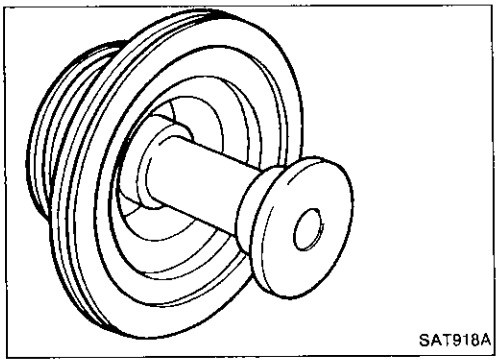
Parts	Free length	Outer diameter
Spring A	45.6 (1.795)	34.3 (1.350)
Spring B	53.8 (2.118)	40.3 (1.587)
Spring C	29.7 (1.169)	27.6 (1.087)

Band Servo Piston Assembly (Cont'd)

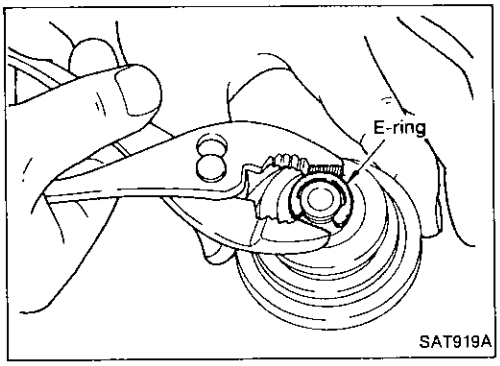
ASSEMBLY



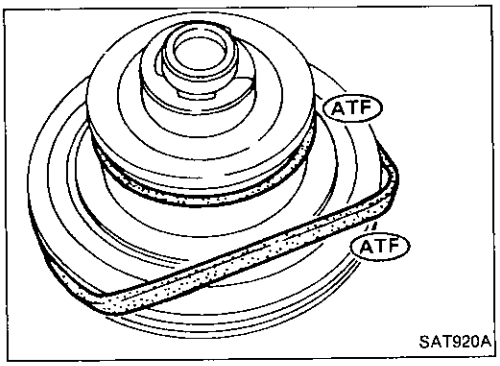
1. Install O-rings onto servo piston retainer.
- **Apply A.T.F. to O-rings.**
- **Pay attention to position of each O-ring.**



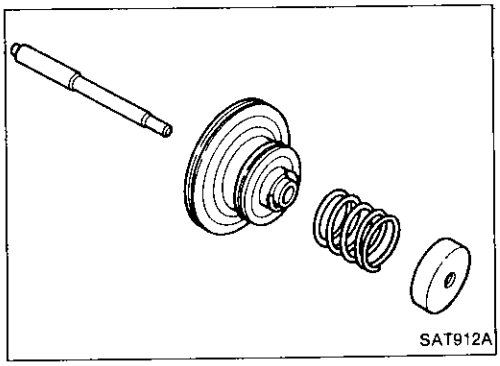
2. Install servo cushion spring retainer onto band servo piston.



3. Install E-ring onto servo cushion spring retainer.

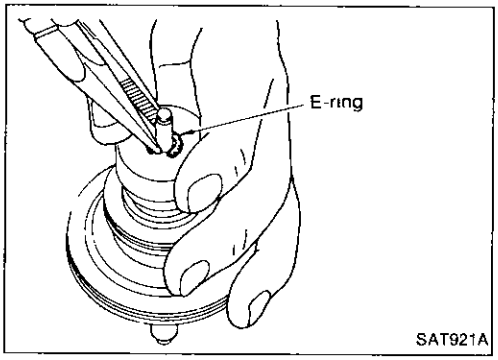


4. Install D-rings onto band servo piston.
- **Apply A.T.F. to D-rings.**

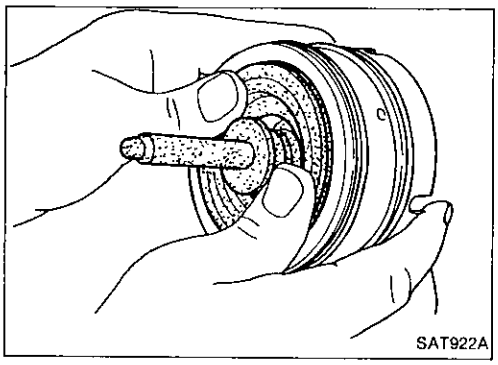


5. Install servo piston spring retainer, return spring C and piston stem onto band servo piston.

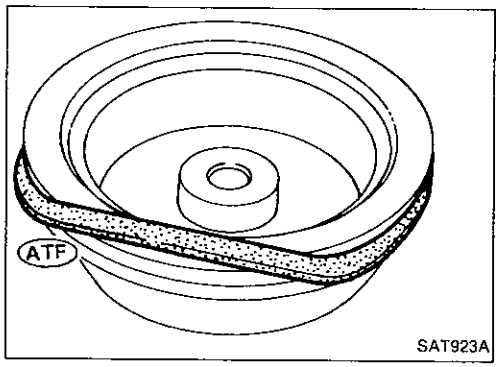
Band Servo Piston Assembly (Cont'd)



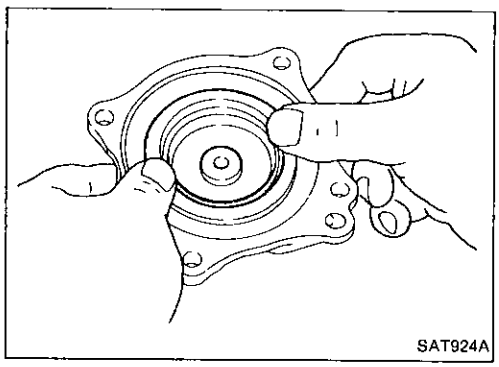
6. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.



7. Install band servo piston assembly onto servo piston retainer by pushing it inward.

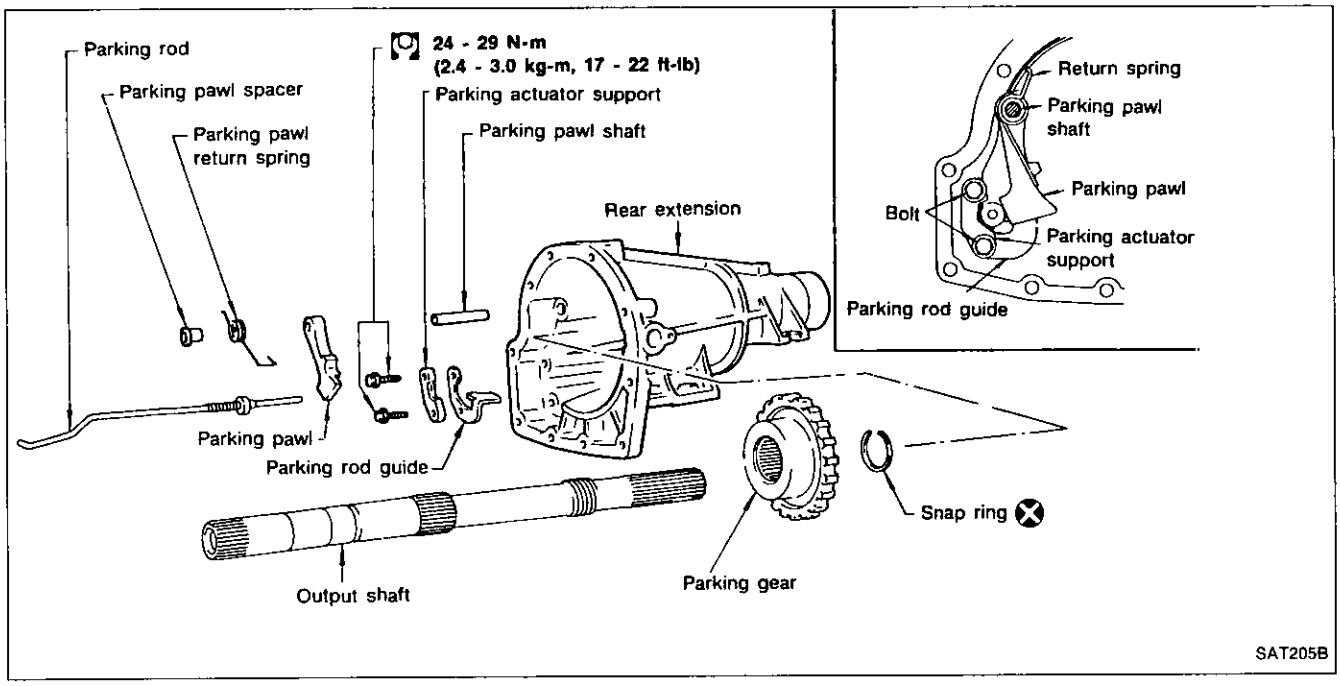


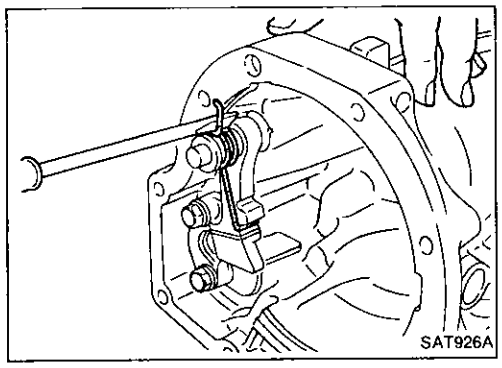
8. Install D-ring on O.D. band servo piston.
- **Apply A.T.F. to D-ring.**



9. Install O.D. band servo piston onto servo piston retainer by pushing it inward.

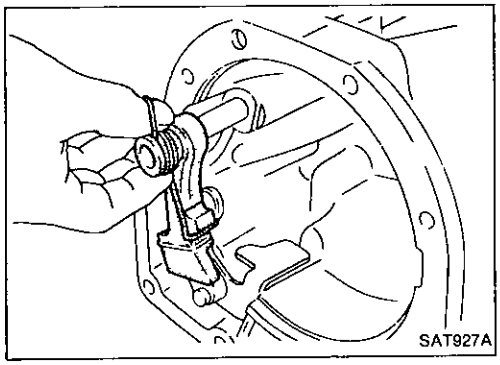
Parking Pawl Components



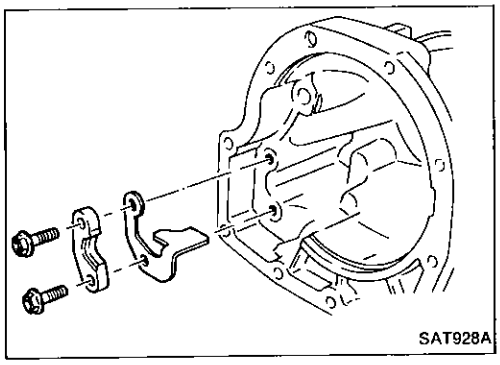


DISASSEMBLY

1. Slide return spring to the front of rear extension flange.

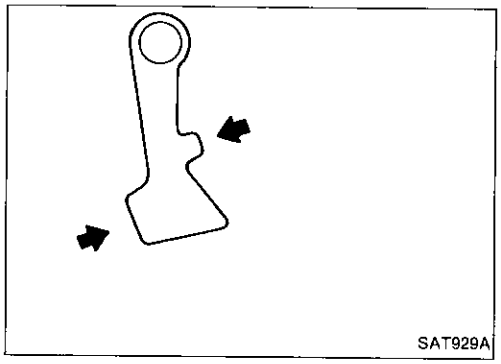


2. Remove return spring, pawl spacer and parking pawl from rear extension.
3. Remove parking pawl shaft from rear extension.



4. Remove parking actuator support and rod guide from rear extension.

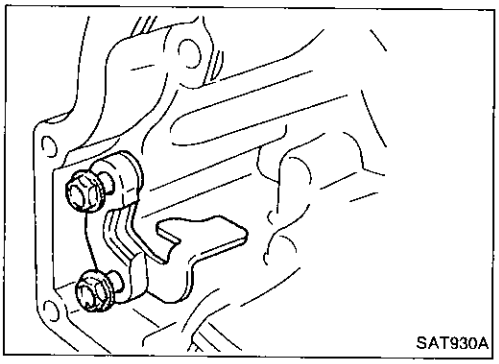
Parking Pawl Components (Cont'd)


SAT929A

INSPECTION

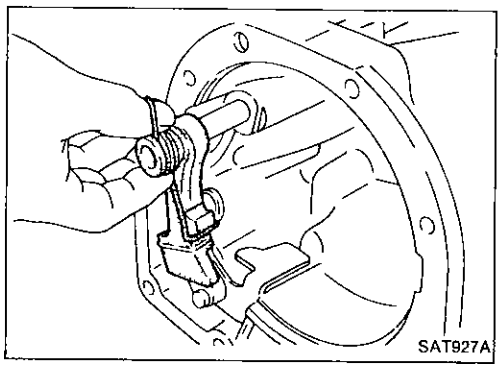
Parking pawl and parking actuator support

- Check contact surface of parking rod for wear.

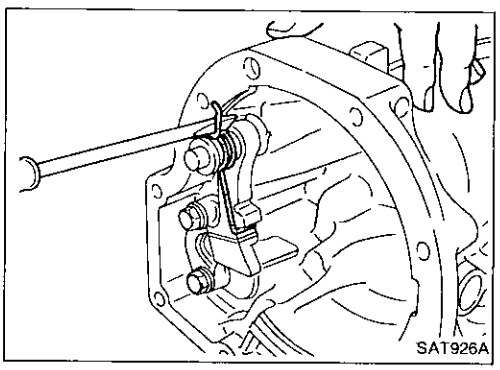

SAT930A

ASSEMBLY

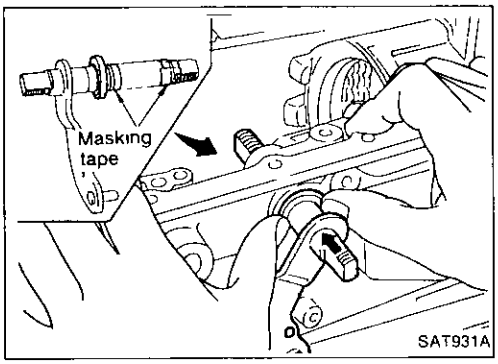
1. Install rod guide and parking actuator support onto rear extension.
2. Insert parking pawl shaft into rear extension.


SAT927A

3. Install return spring, pawl spacer and parking pawl onto parking pawl shaft.


SAT926A

4. Bend return spring upward and install it onto rear extension.



Assembly

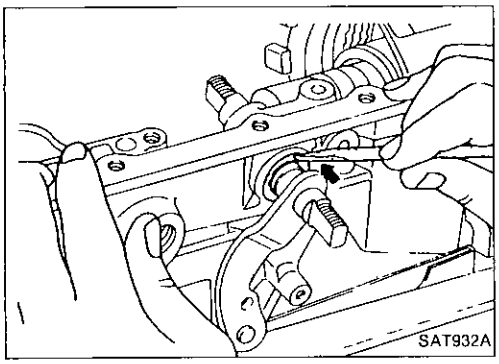
1. Install manual shaft components.

a. Install oil seal onto manual shaft.

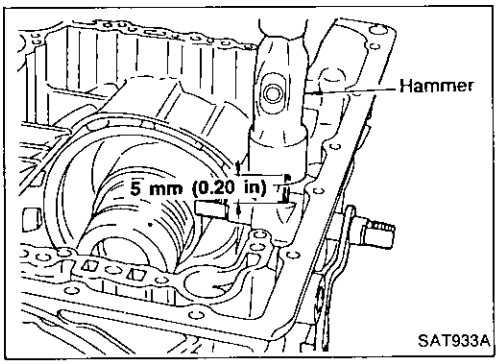
- **Apply A.T.F. to oil seal.**
- **Wrap threads of manual shaft with masking tape.**

b. Insert manual shaft and oil seal as a unit into transmission case.

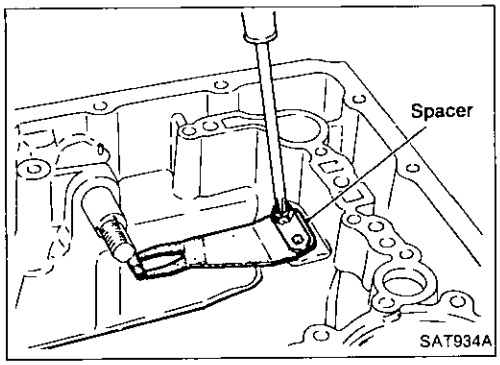
c. Remove masking tape.



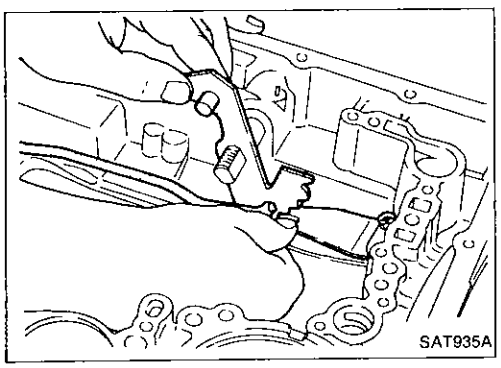
d. Push oil seal evenly and install it onto transmission case.



e. Align groove in shaft with drive pin hole, then drive pin into position as shown in figure at left.

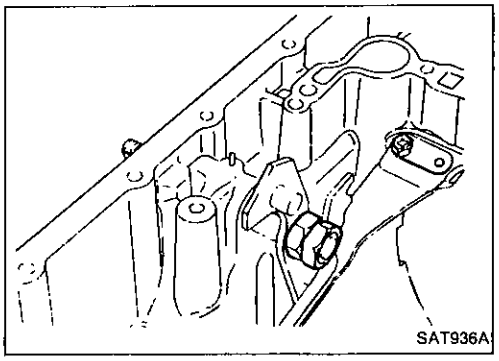


f. Install detent spring and spacer.

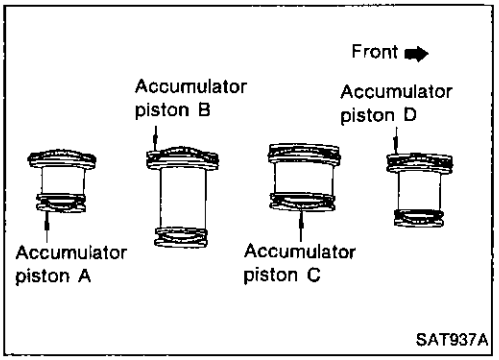


g. While pushing detent spring down, install manual plate onto manual shaft.

Assembly (Cont'd)



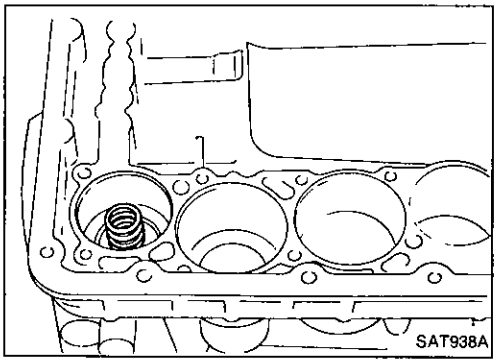
h. Install lock nuts onto manual shaft.



2. Install accumulator piston.
a. Install O-rings onto accumulator piston.
- **Apply A.T.F. to O-rings.**

Accumulator piston O-rings: Unit: mm (in)

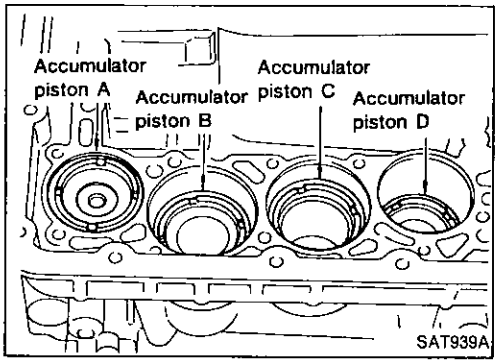
Accumulator	A	B	C	D
Small diameter end	29 (1.14)	26.9 (1.059)	39.4 (1.551)	29 (1.14)
Large diameter end	39.4 (1.551)	44.2 (1.740)	44.2 (1.740)	39.4 (1.551)



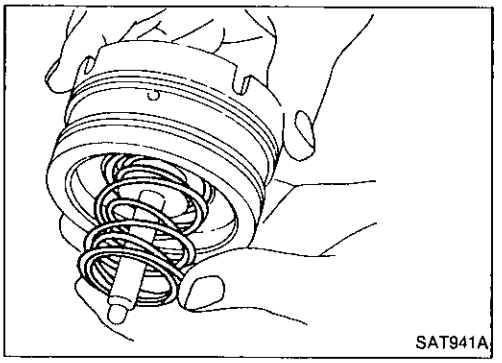
b. Install return spring for accumulator A onto transmission case.

Free length of return spring: Unit: mm (in)

Accumulator	A
Free length	43 (1.69)

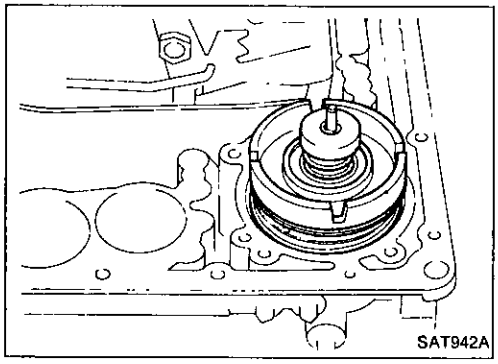


c. Install accumulator pistons A, B, C and D.
- **Apply A.T.F. to transmission case.**



3. Install band servo piston.
a. Install return springs onto servo piston.

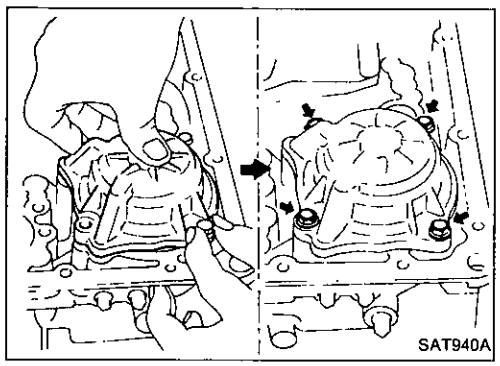
Assembly (Cont'd)



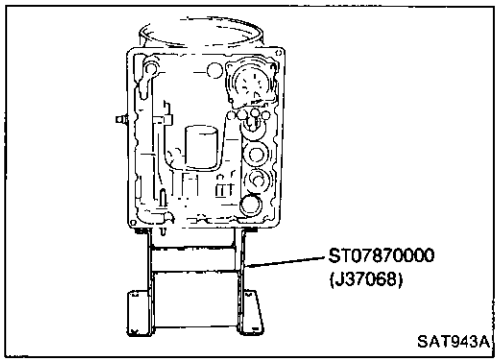
b. Install band servo piston onto transmission case.

- **Apply A.T.F. to O-ring of band servo piston and transmission case.**

c. Install gasket for band servo onto transmission case.

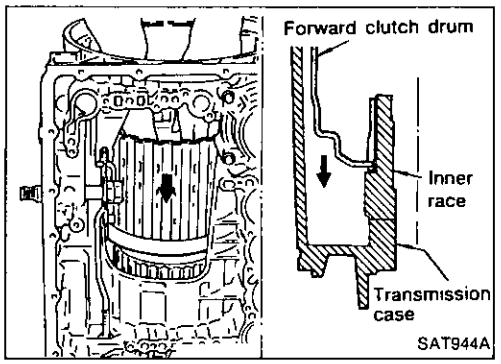


d. Install band servo retainer onto transmission case.

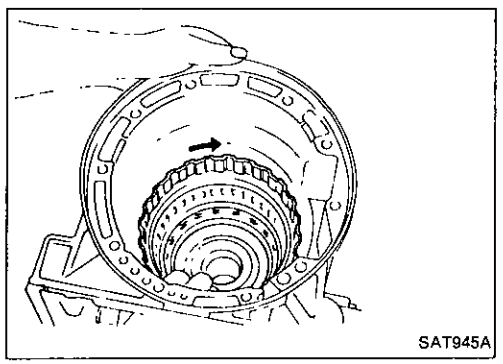


4. Install rear side clutch and gear components.

a. Place transmission case in vertical position.

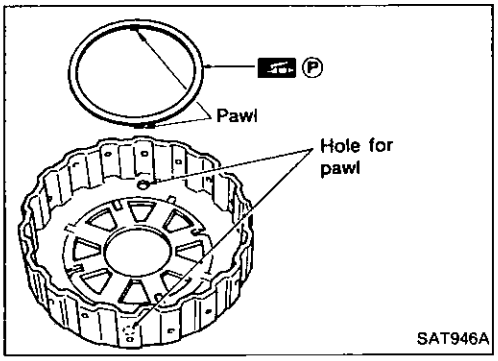


b. Slightly lift forward clutch drum assembly and slowly rotate it clockwise until its hub passes fully over the clutch inner race inside transmission case.



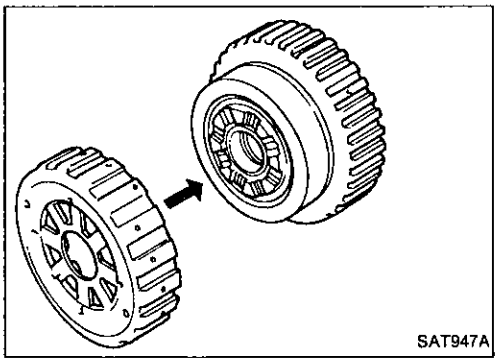
c. Check to be sure that rotation direction of forward clutch assembly is correct.

Assembly (Cont'd)

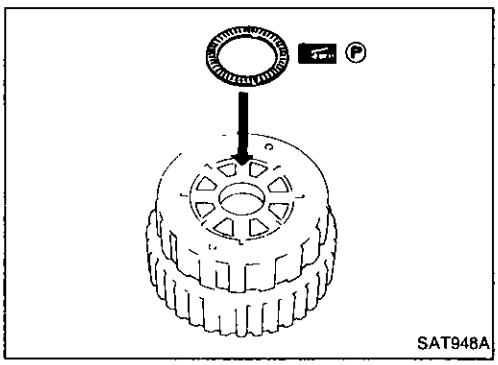


d. Install thrust washer onto front of overrun clutch hub.

- **Apply petroleum jelly to the thrust washer.**
- **Insert pawls of thrust washer securely into holes in overrun clutch hub.**

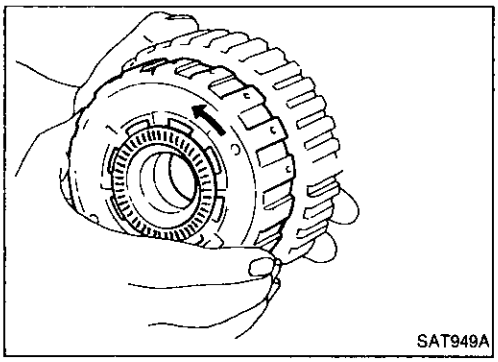


e. Install overrun clutch hub onto rear internal gear assembly.

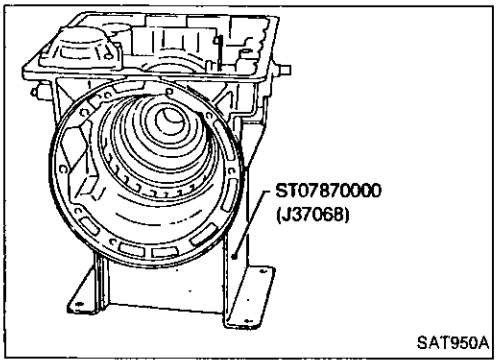


f. Install needle bearing onto rear of overrun clutch hub.

- **Apply petroleum jelly to needle bearing.**

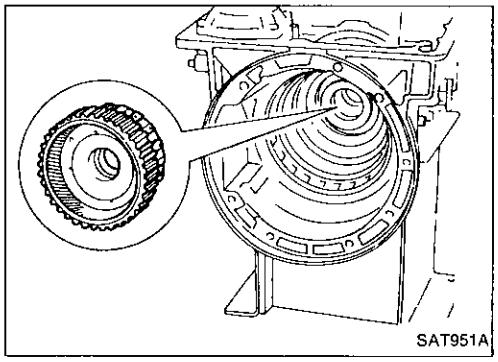


g. Check that overrun clutch hub rotates as shown while holding forward clutch hub.

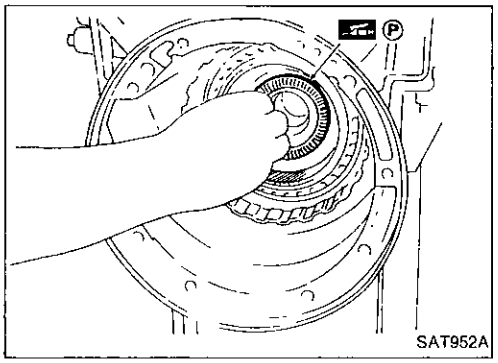


h. Place transmission case into horizontal position.

Assembly (Cont'd)

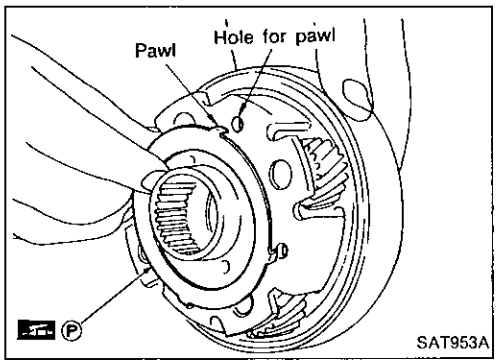


i. Install rear internal gear, forward clutch hub and overrun clutch hub as a unit onto transmission case.



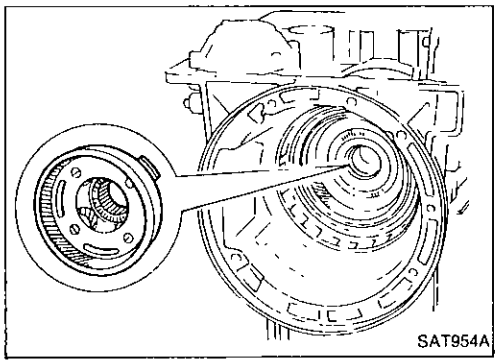
j. Install needle bearing onto rear internal gear.

- **Apply petroleum jelly to needle bearing.**



k. Install bearing race onto rear of front internal gear.

- **Apply petroleum jelly to bearing race.**
- **Securely engage pawls of bearing race with holes in front internal gear.**

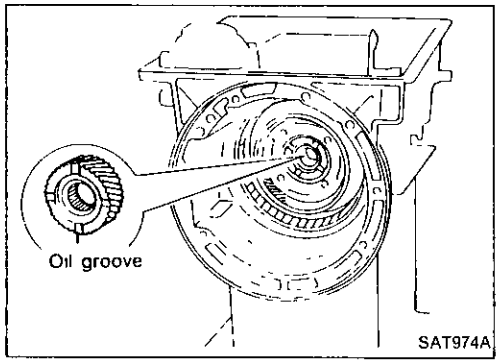


l. Install front internal gear on transmission case.

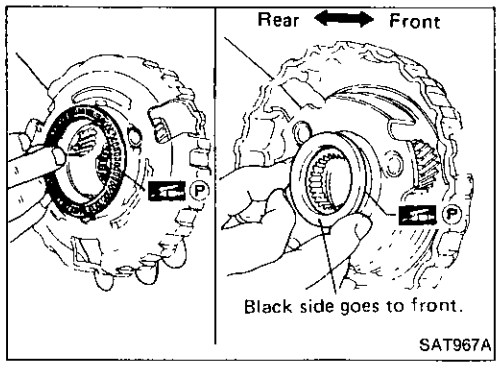
Adjustment

When any parts listed in the following table are replaced, total end play or reverse clutch end play must be adjusted.

Item / Part name	Total end play	Reverse clutch end play
Transmission case	•	•
Low one-way clutch inner race	•	•
Overrun clutch hub	•	•
Rear internal gear	•	•
Rear planetary carrier	•	•
Rear sun gear	•	•
Front planetary carrier	•	•
Front sun gear	•	•
High clutch hub	•	•
High clutch drum	•	•
Oil pump cover	•	•
Reverse clutch drum	—	•



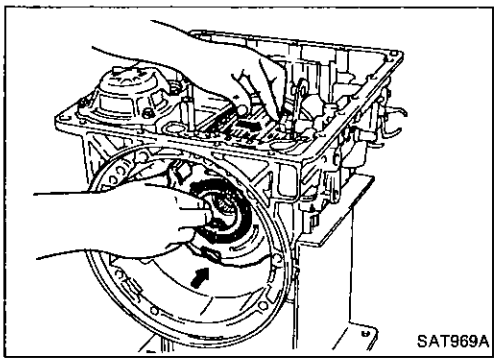
1. Install front side clutch and gear components.
a. Install rear sun gear on transmission case.
- **Pay attention to its direction.**



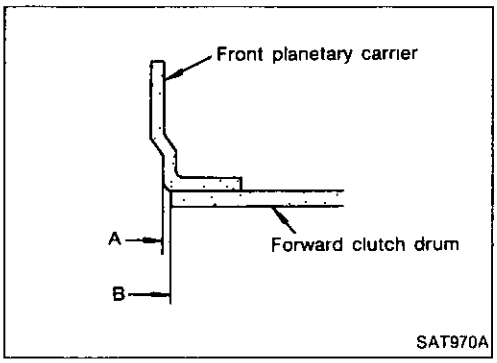
b. Install needle bearing on front of front planetary carrier.
- **Apply petroleum jelly to needle bearing.**

c. Install needle bearing on rear of front planetary carrier.
- **Apply petroleum jelly to bearing.**
- **Pay attention to its direction — Black side goes to front.**

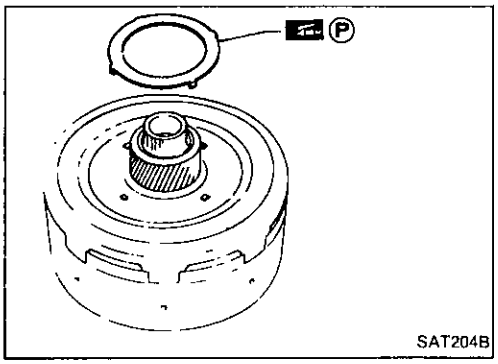
Adjustment (Cont'd)



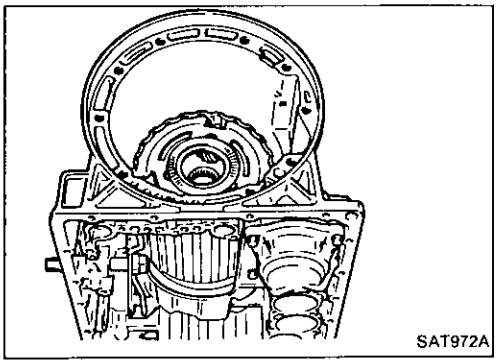
d. While rotating forward clutch drum clockwise, install front planetary carrier on forward clutch drum.



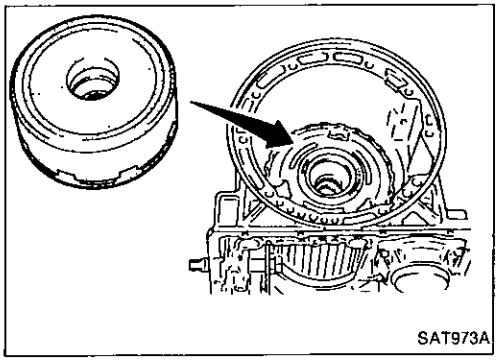
- **Check that portion A of front planetary carrier protrudes approximately 2 mm (0.08 in) beyond portion B of forward clutch assembly.**



e. Install bearing race on rear of clutch pack.
- **Apply petroleum jelly to bearing races.**
- **Securely engage pawls of bearing race with hole in clutch pack.**

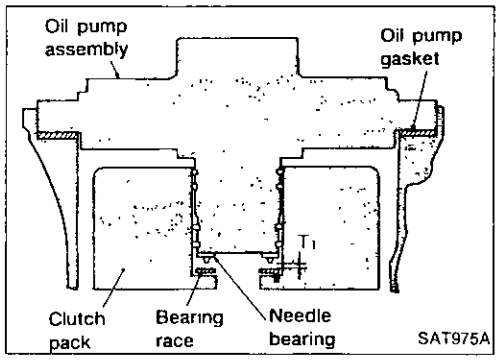


f. Place transmission case in vertical position.

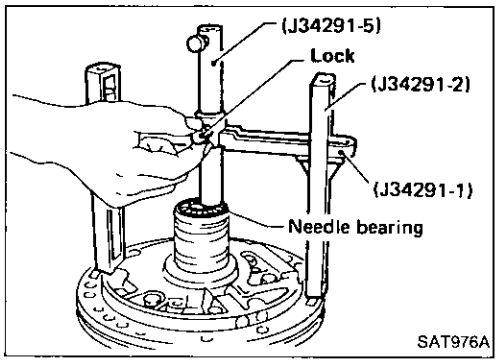


g. Install clutch pack into transmission case.

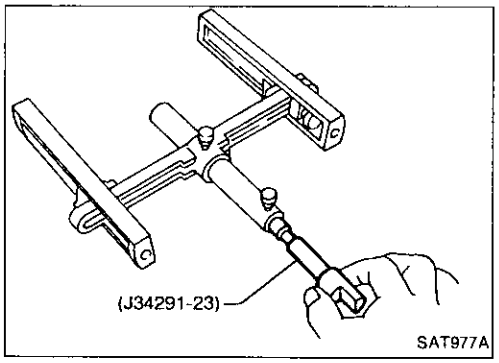
Adjustment (Cont'd)



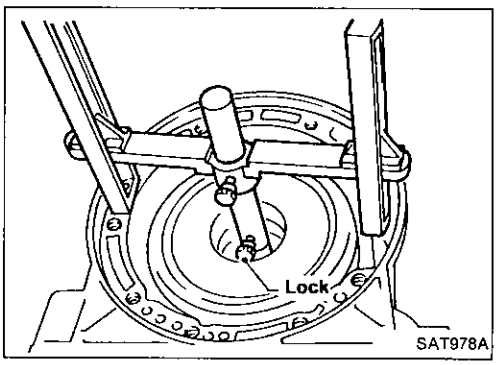
2. Adjust total end play.
   Total end play "T_1":
   0.25 - 0.55 mm (0.0098 - 0.0217 in)



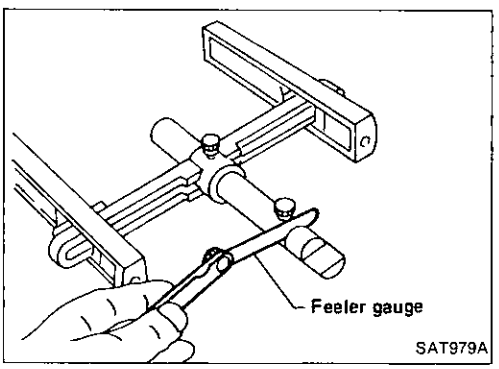
a. With needle bearing installed, place J34291-1 (bridge), J34291-2 (legs) and the J34291-5 (gauging cylinder) onto oil pump. The long ends of legs should be placed firmly on machined surface of oil pump assembly and gauging cylinder should rest on top of the needle bearing. Lock gauging cylinder in place with set screw.



b. Install J34291-23 (gauging plunger) into gauging cylinder.



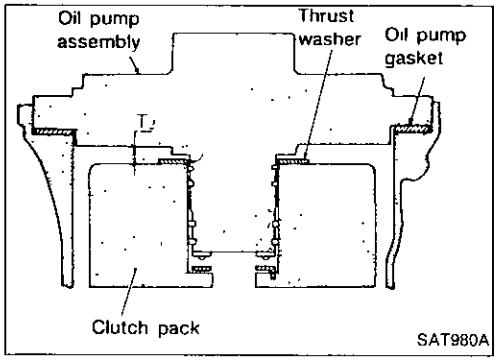
c. With original bearing race installed inside reverse clutch drum, place shim selecting gauge with its legs on machined surface of transmission case (no gasket) and allow gauging plunger to rest on bearing race. Lock gauging plunger in place with set screw.



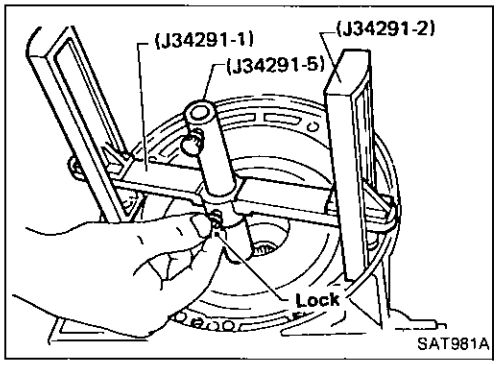
d. Remove Tool and use feeler gauge to measure gap between gauging cylinder and gauging plunger. This measurement should give exact total end play.
   Total end play "T_1":
   0.25 - 0.55 mm (0.0098 - 0.0217 in)

- If end play is out of specification, decrease or increase thickness of oil pump cover bearing race as necessary.
  Available oil pump cover bearing race:
  Refer to S.D.S.

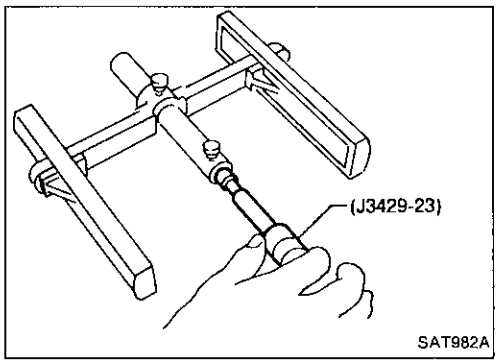
Adjustment (Cont'd)



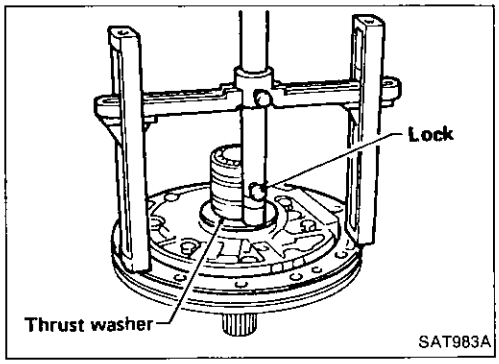
3. Adjust reverse clutch drum end play.
   Reverse clutch drum end play "T_2":
   0.55 - 0.90 mm (0.0217 - 0.0354 in)



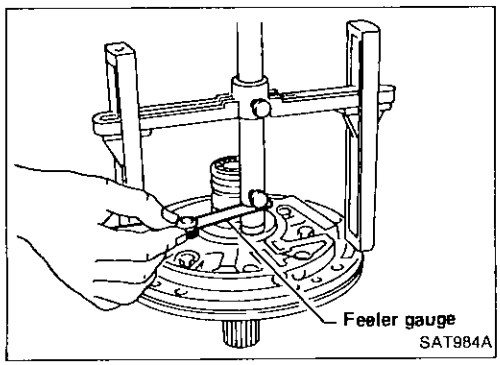
a. Place J34291-1 (bridge), J34291-2 (legs) and J34291-5 (gauging cylinder) on machined surface of transmission case (no gasket) and allow gauging cylinder to rest on front thrust surface of reverse clutch drum. Lock cylinder in place with set screw.



b. Install J34291-23 (gauging plunger) into gauging cylinder.

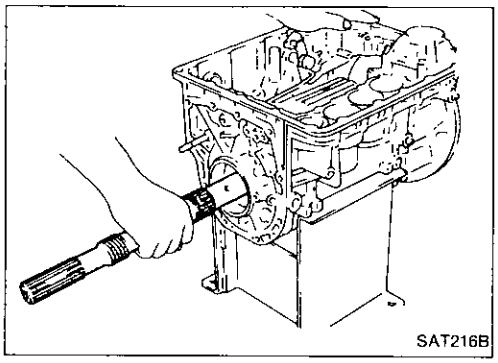


c. With original thrust washer installed on oil pump, place shim setting gauge legs onto machined surface of oil pump assembly and allow gauging plunger to rest on thrust washer. Lock plunger in place with set screw.



d. Use feeler gauge to measure gap between gauging plunger and gauging cylinder. This measurement should give you exact reverse clutch drum end play.
   Reverse clutch drum end play "T_2":
   0.55 - 0.90 mm (0.0217 - 0.0354 in)

- If end play is out of specification, decrease or increase thickness of oil pump thrust washer as necessary.
  Available oil pump thrust washer:
  Refer to S.D.S.

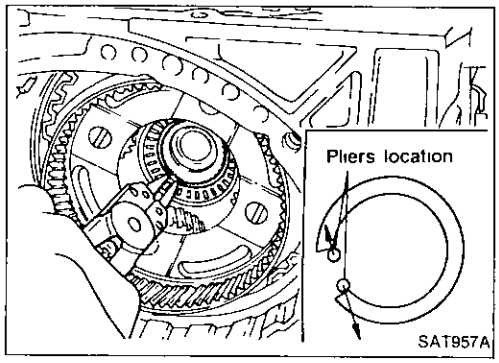

SAT216B

Assembly

1. Install output shaft and parking gear.

a. Insert output shaft from rear of transmission case while slightly lifting front internal gear.

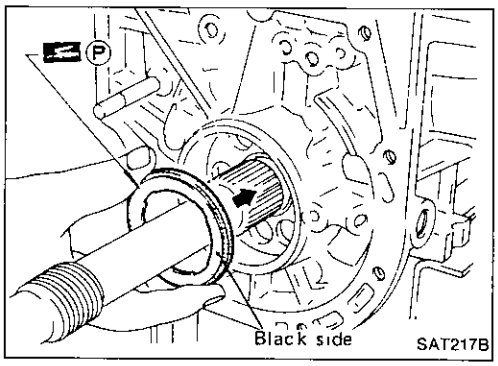
- **Do not force output shaft against front of transmission case.**



SAT957A

b. Carefully push output shaft against front of transmission case. Install snap ring on front of output shaft.

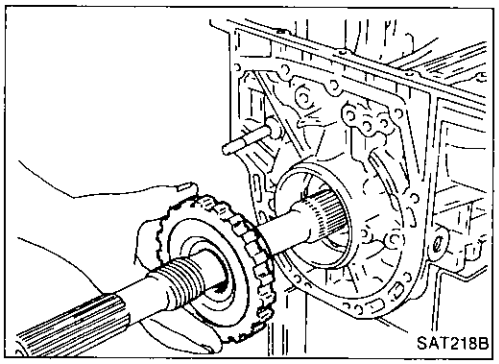
- **Check to be sure output shaft cannot be removed in rear direction.**



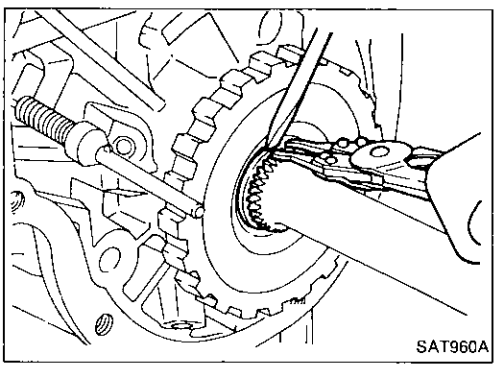
SAT217B

c. Install needle bearing on transmission case.

- **Pay attention to its direction — Black side goes to rear.**
- **Apply petroleum jelly to needle bearing.**


SAT218B

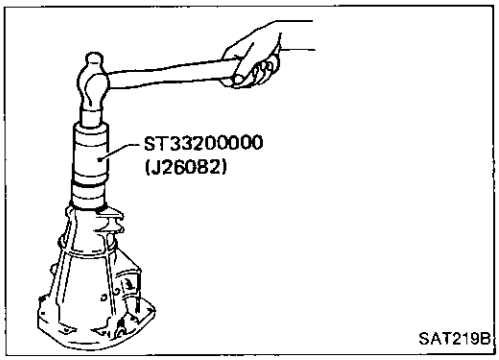
d. Install parking gear on transmission case.


SAT960A

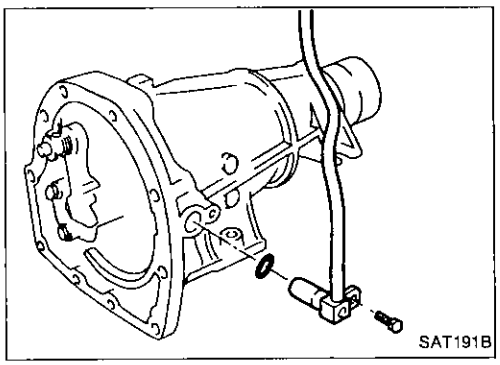
e. Install snap ring on rear of output shaft.

- **Check to be sure output shaft cannot be removed in forward direction.**

Assembly (Cont'd)

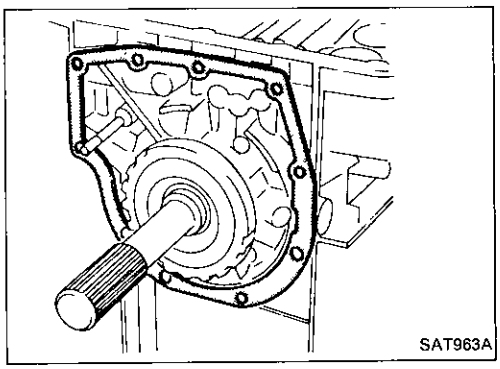


2. Install rear extension.
a. Install oil seal on rear extension.
- **Apply A.T.F. to oil seal.**

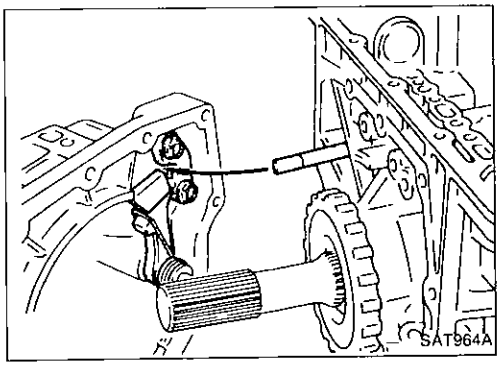


b. Install O-ring on revolution sensor.
- **Apply A.T.F. to O-ring.**

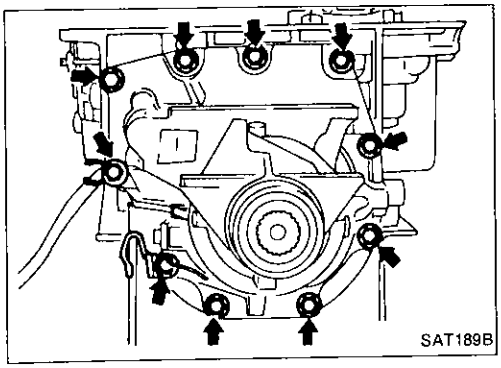
c. Install revolution sensor on rear extension.



d. Install rear extension gasket on transmission case.

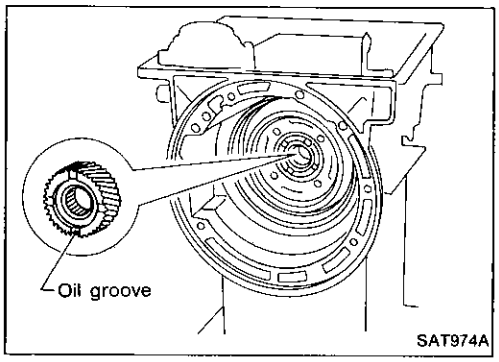


e. Install parking rod on transmission case.

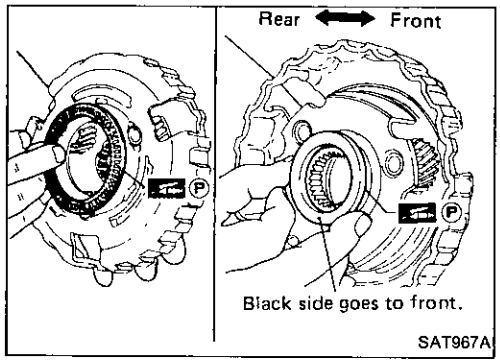


f. Install rear extension on transmission case.

Assembly (Cont'd)

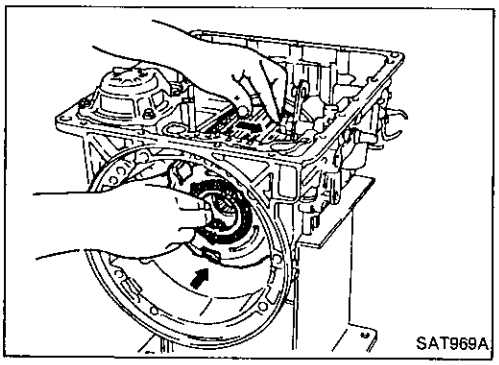


3. Install front side clutch and gear components.
a. Install rear sun gear on transmission case.
- **Pay attention to its direction.**

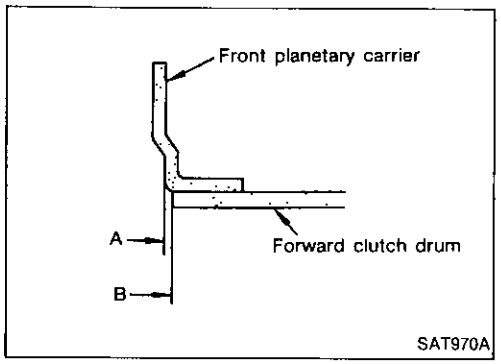


b. Make sure needle bearing is on front of front planetary carrier.
- **Apply petroleum jelly to needle bearing.**

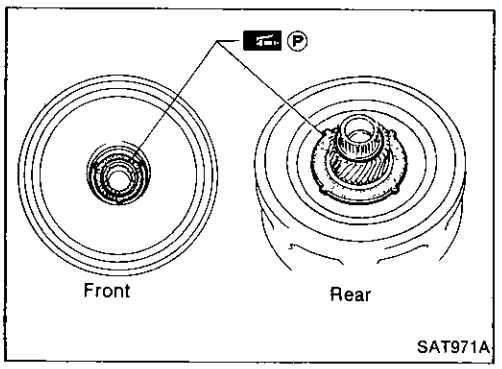
c. Make sure needle bearing is on rear of front planetary carrier.
- **Apply petroleum jelly to bearing.**
- **Pay attention to its direction — Black side goes to front.**



d. While rotating forward clutch drum clockwise, install front planetary carrier on forward clutch drum.

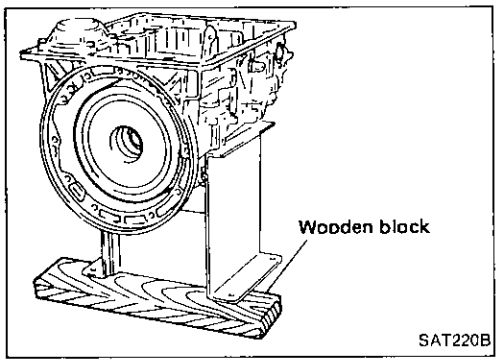


- **Check that portion A of front planetary carrier protrudes approximately 2 mm (0.08 in) beyond portion B of forward clutch assembly.**

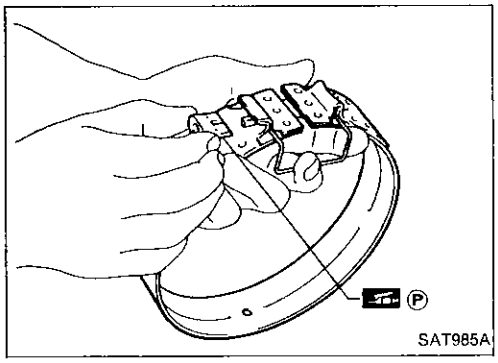


e. Make sure bearing races are on front and rear of clutch pack.
- **Apply petroleum jelly to bearing races.**
- **Securely engage pawls of bearing races with holes in clutch pack.**

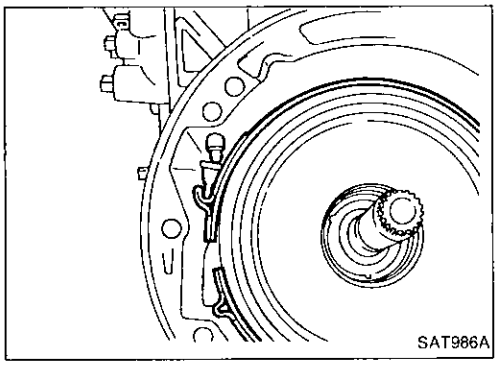
Assembly (Cont'd)



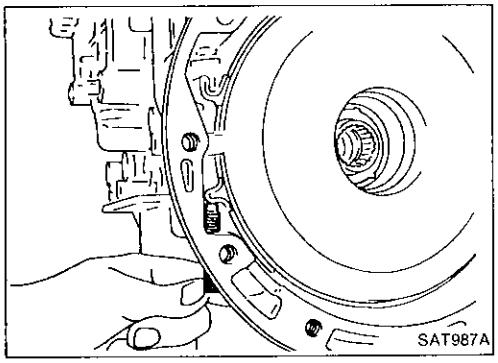
f. Install clutch pack into transmission case.



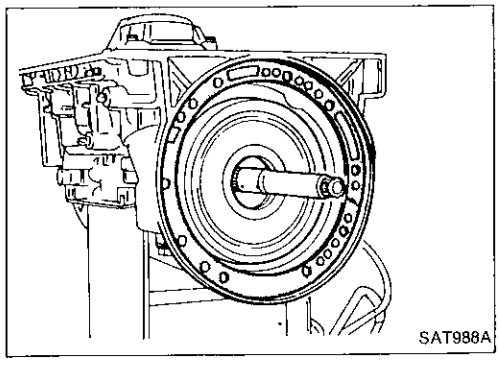
4. Install brake band and band strut.
a. Install band strut on brake band.
- **Apply petroleum jelly to band strut.**



b. Place brake band on periphery of reverse clutch drum, and insert band strut into end of band servo piston stem.

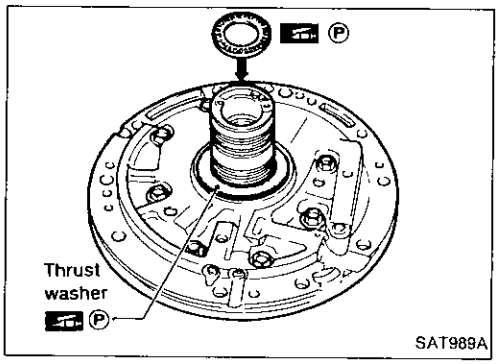


c. Install anchor end bolt on transmission case. Then, tighten anchor end bolt just enough so that reverse clutch drum (clutch pack) will not tilt forward.



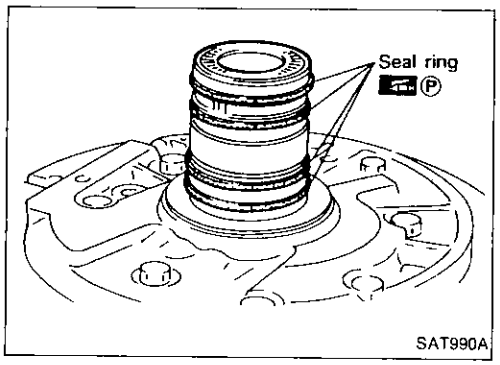
5. Install input shaft on transmission case.
- **Pay attention to its direction — O-ring groove side is front.**
6. Install gasket on transmission case.

Assembly (Cont'd)

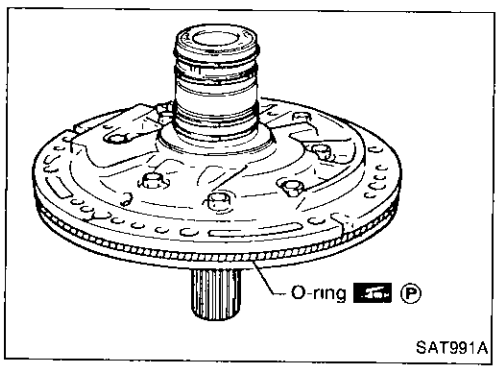


7. Install oil pump assembly.
a. Install needle bearing on oil pump assembly.
- **Apply petroleum jelly to the needle bearing.**

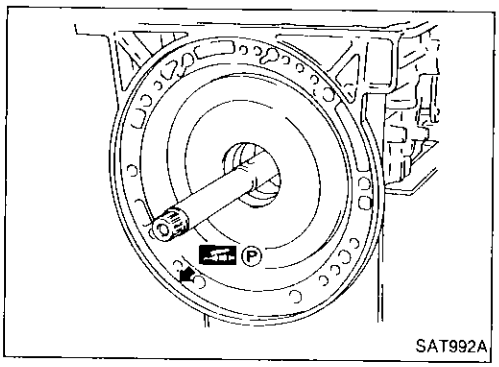
b. Install selected thrust washer on oil pump assembly.
- **Apply petroleum jelly to thrust washer.**



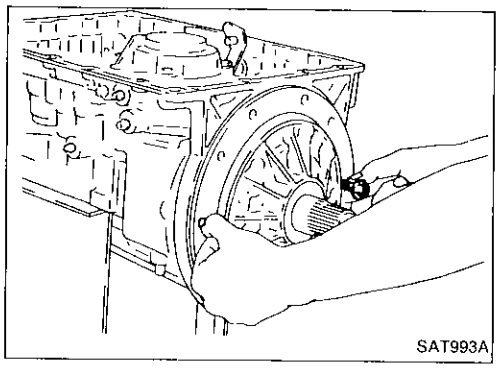
c. Carefully install seal rings into grooves and press them into the petroleum jelly so that they are a tight fit.



d. Install O-ring on oil pump assembly.
- **Apply petroleum jelly to O-ring.**

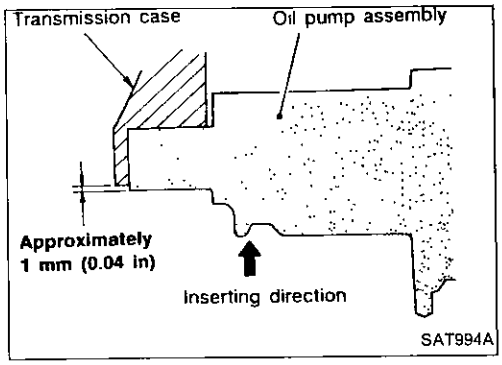


e. Apply petroleum jelly to mating surface of transmission case and oil pump assembly.

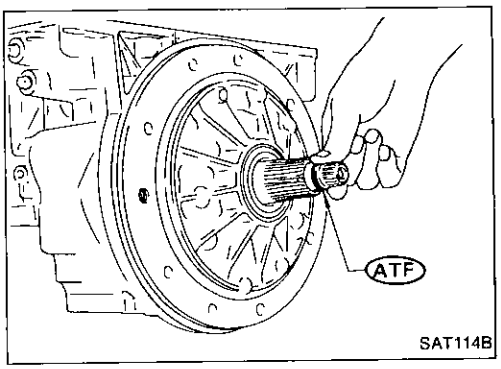


f. Install oil pump assembly.
- **Install two converter housing securing bolts in bolt holes in oil pump assembly as guides.**

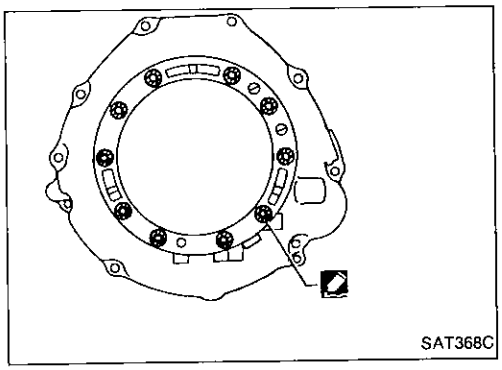
Assembly (Cont'd)



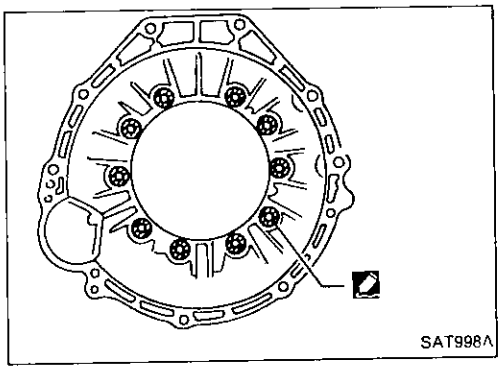
- **Insert oil pump assembly to the specified position in transmission, as shown at left.**



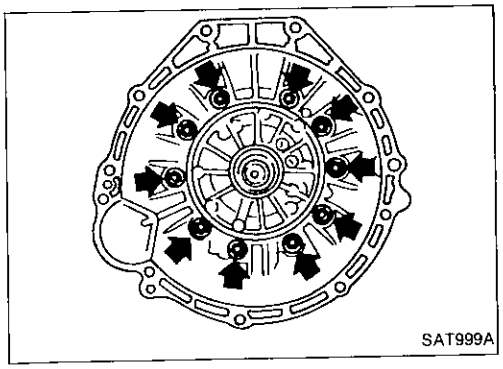
8. Install O-ring on input shaft.
- **Apply A.T.F. to O-rings.**



9. Install converter housing.
a. Apply recommended sealant (Nissan genuine part: KP610-00250 or equivalent) to outer periphery of bolt holes in converter housing.
- **Do not apply too much sealant.**

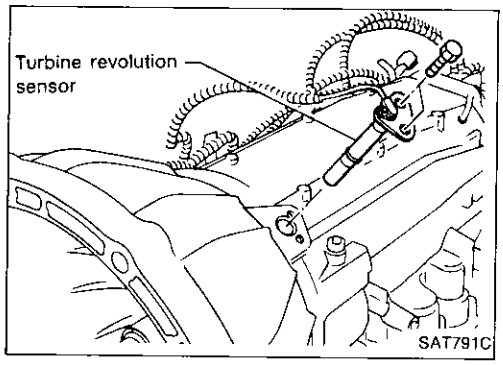


b. Apply recommended sealant (Nissan genuine part: KP610-00250 or equivalent) to seating surfaces of bolts that secure front of converter housing.

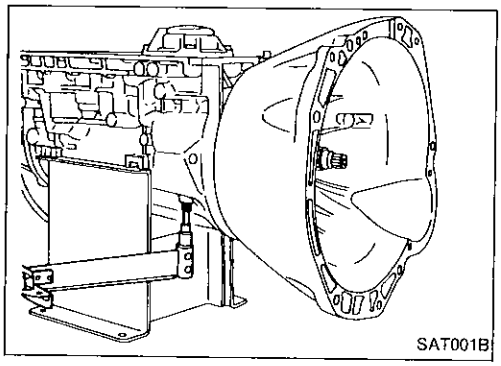


c. Install converter housing on transmission case.

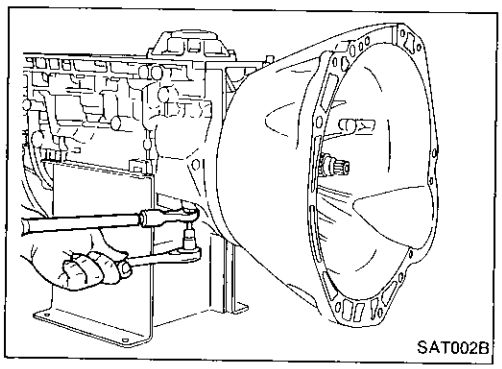
Assembly (Cont'd)



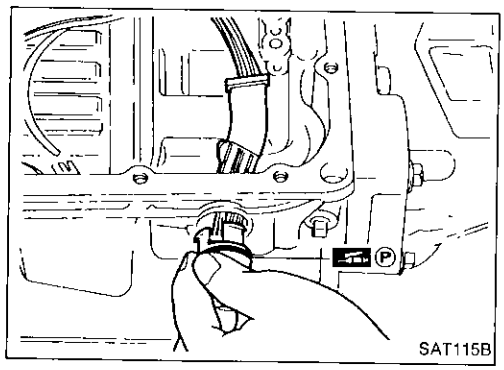
10. Install turbine revolution sensor.



11. Adjust brake band.
a. Tighten anchor end bolt to specified torque.
Anchor end bolt:
: 4 - 6 N·m (0.4 - 0.6 kg-m, 2.9 - 4.3 ft-lb)
b. Back off anchor end bolt two and a half turns.

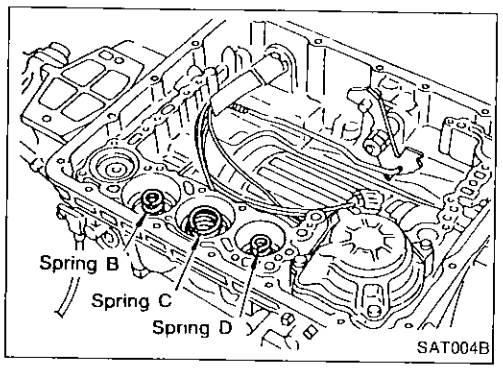


c. While holding anchor end pin, tighten lock nut.



12. Install terminal cord assembly.
a. Install O-ring on terminal cord assembly.
- **Apply petroleum jelly to O-ring.**

b. Compress terminal cord assembly stopper and install terminal cord assembly on transmission case.



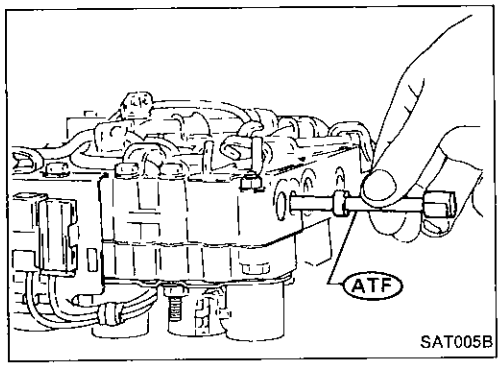
13. Install control valve assembly.
a. Install accumulator piston return springs B, C and D.

Free length of return springs:

Unit: mm (in)

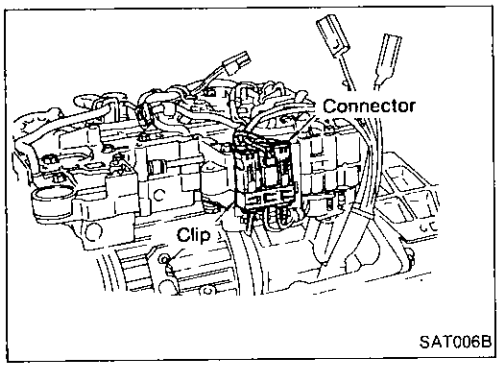
Item \ Accumulator	B	C	D
Free length	66 (2.60)	45 (1.77)	58.4 (2.299)

Assembly (Cont'd)

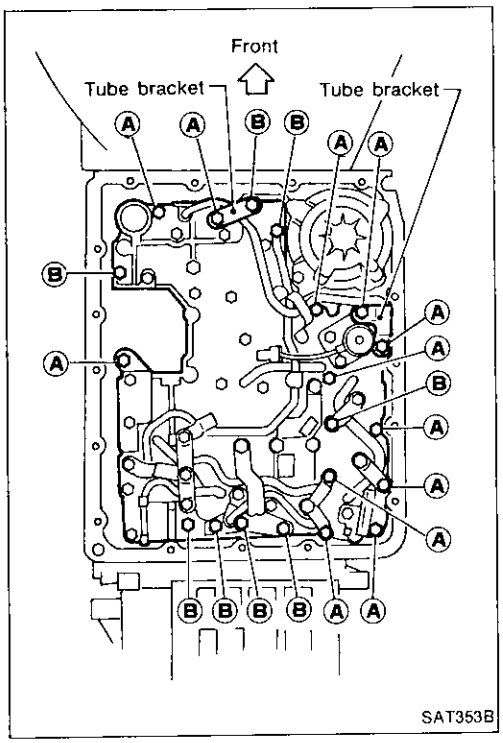


b. Install manual valve on control valve.

- **Apply A.T.F. to manual valve.**



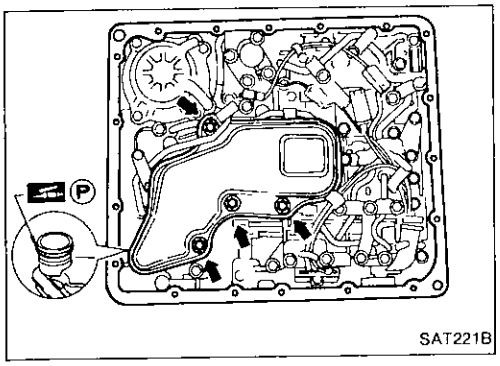
c. Place control valve assembly on transmission case. Connect solenoid connector for upper body.
d. Install connector clip.



e. Install control valve assembly on transmission case.
f. Install connector tube brackets and tighten bolts Ⓐ and Ⓑ.

- **Check that terminal assembly harness does not catch.**

Bolt symbol	ℓ mm (in)
Ⓐ	33 (1.30)
Ⓑ	45 (1.77)

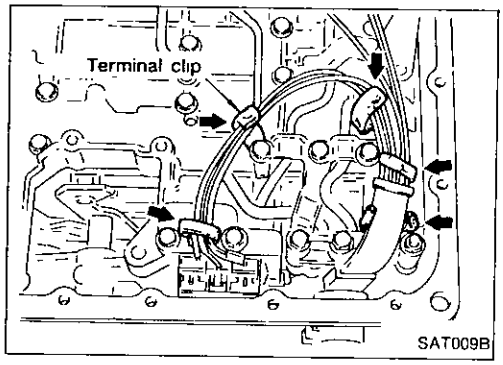


g. Install O-ring on oil strainer.

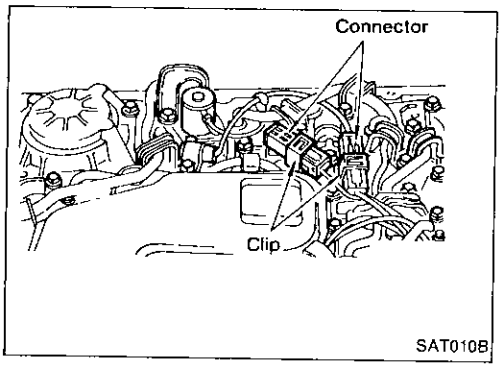
- **Apply petroleum jelly to O-ring.**

h. Install oil strainer on control valve.

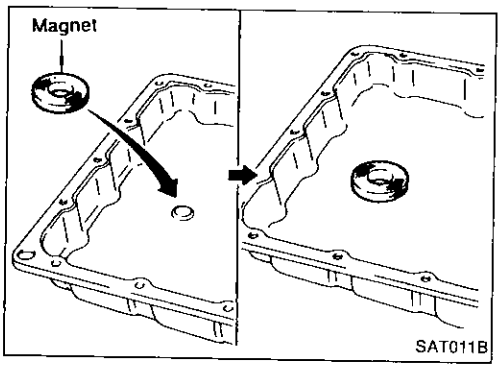
Assembly (Cont'd)



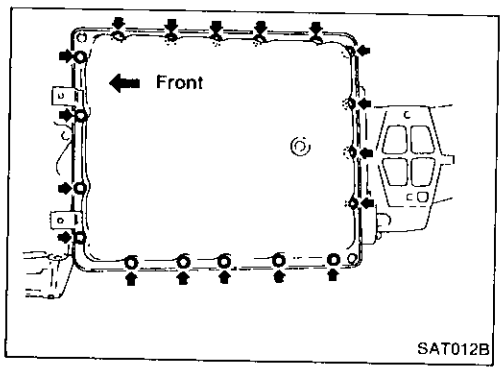
i. Securely fasten terminal harness with clips.



j. Install torque converter clutch solenoid valve and fluid temperature sensor connectors.

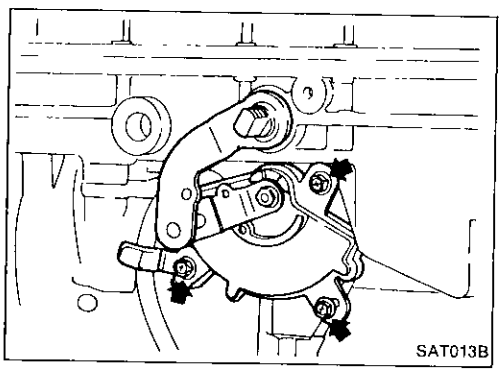


14. Install oil pan.
a. Attach a magnet to oil pan.



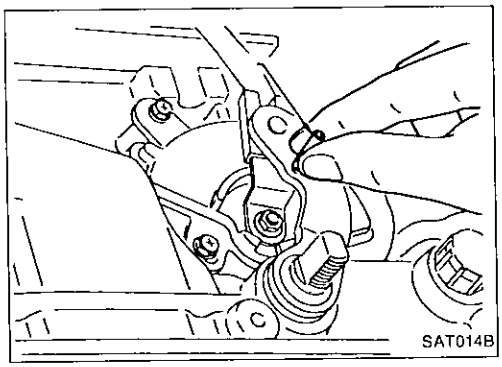
b. Install oil pan gasket on transmission case.
c. Install oil pan and bracket on transmission case.

- **Tighten four bolts in a criss-cross pattern to prevent dislocation of gasket.**

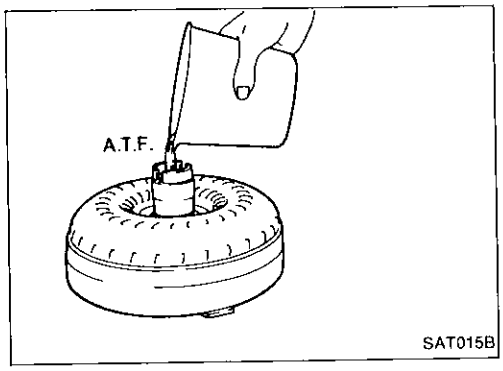


15. Install inhibitor switch.
a. Check that manual shaft is in "1" position.
b. Temporarily install inhibitor switch on manual shaft.
c. Move manual shaft to "N".

Assembly (Cont'd)

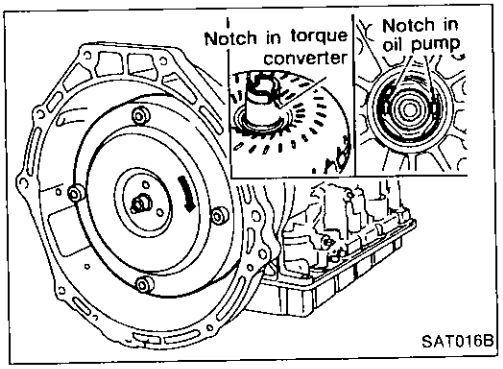


d. Tighten bolts while inserting 4.0 mm (0.157 in) dia. pin vertically into locating holes in inhibitor switch and manual shaft.

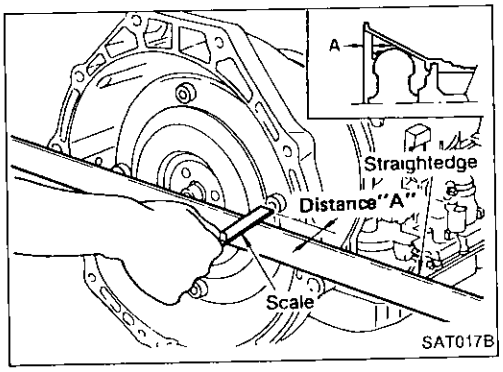


16. Install torque converter.
a. Pour A.T.F. into torque converter.

- **Approximately 2 liters (2-1/8 US qt, 1-3/4 Imp qt) of fluid are required for a new torque converter.**
- **When reusing old torque converter, add the same amount of fluid as was drained.**



b. Install torque converter while aligning notches and oil pump.



c. Measure distance A to check that torque converter is in proper position.
Distance "A":
26 mm (1.02 in) or more

General Specifications

Engine	VG30DE
Automatic transmission model	RE4R01A
Transmission model code number	45 x 71
Stall torque ratio	2.0 : 1
Transmission gear ratio	
1st	2.785
2nd	1.545
Top	1.000
O.D.	0.694
Reverse	2.272
Recommended oil	Automatic transmission fluid Type DEXRON™
Oil capacity ℓ (US qt, Imp qt)	8.3 (8-3/4, 7-1/4)

Specifications and Adjustment

VEHICLE SPEED WHEN SHIFTING GEARS

Throttle position	Vehicle speed km/h (MPH)					
	$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$
Full throttle	66 - 70 (41 - 43)	114 - 122 (71 - 76)	177 - 187 (110 - 116)	170 - 178 (106 - 111)	102 - 110 (63 - 68)	44 - 48 (27 - 30)
Half throttle	47 - 51 (29 - 32)	87 - 93 (54 - 58)	127 - 134 (79 - 83)	68 - 76 (42 - 47)	26 - 32 (16 - 20)	7 - 11 (4 - 7)

VEHICLE SPEED WHEN PERFORMING AND RELEASING LOCK-UP

Throttle position	O.D. switch [Shift range]	Vehicle speed km/h (MPH)	
		Lock-up "ON"	Lock-up "OFF"
Full throttle	ON [D_4]	178 - 186 (111 - 116)	170 - 178 (106 - 111)
Half throttle	ON [D_4]	127 - 135 (79 - 84)	100 - 108 (62 - 67)

STALL REVOLUTION

Stall revolution rpm
2,320 - 2,720

LINE PRESSURE

Engine speed rpm	Line pressure kPa (kg/cm², psi)	
	D, 3, 2 and 1 positions	R position
Idle	422 - 461 (4.3 - 4.7, 61 - 67)	608 - 647 (6.2 - 6.6, 88 - 94)
Stall	1,020 - 1,098 (10.4 - 11.2, 148 - 159)	1,422 - 1,500 (14.5 - 15 3, 206 - 218)

Specifications and Adjustment (Cont'd)

RETURN SPRINGS

Unit: mm (in)

Parts		Item	Part No.	Free length	Outer diameter
Control valve	Upper body	Torque converter relief valve spring	31742-41X23	38 0 (1.496)	9 0 (0.354)
		Pressure regulator valve spring	31742-41X24	44.02 (1 7331)	14.0 (0.551)
		Pressure modifier valve spring	31742-41X19	31 95 (1 2579)	6.8 (0.268)
		Shuttle shift valve D spring	31762-41X00	26.5 (1.043)	6 0 (0 236)
		4-2 sequence valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
		Shift valve B spring	31762-41X01	25 0 (0.984)	7 0 (0.276)
		4-2 relay valve spring	31756-41X00	29.1 (1.146)	6 95 (0.2736)
		Shift valve A spring	31762-41X01	25 0 (0.984)	7.0 (0.276)
		Overrun clutch control valve spring	31762-41X03	23.6 (0.929)	7.0 (0.276)
		Overrun clutch reducing valve spring	31742-71X00	35 0 (1.378)	7.0 (0.276)
		Shuttle shift valve S spring	31762-41X04	51.0 (2 008)	5 65 (0.2224)
		Pilot valve spring	31742-41X13	25.7 (1 012)	9.1 (0.358)
		Lock-up control valve spring	31742-41X22	18.5 (0.728)	13 0 (0.512)
	Lower body	Modifier accumulator piston spring	31742-41X15	30.5 (1.201)	9.8 (0 386)
		1st reducing valve spring	31756-41X05	25 4 (1.000)	6 75 (0 2657)
		3-2 timing valve spring	31742-41X08	20.55 (0.8091)	6.75 (0.2657)
		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	22.06 (0.8685)	11.6 (0 457)
Forward clutch (Overrun clutch)		20 pcs	31505-41X01	35.77 (1.4083)	9 7 (0.382)
Low & reverse brake		18 pcs	31505-41X03	22.9 (0.902)	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	31605-41X06	58.4 (2 299)	

Specifications and Adjustment (Cont'd)

ACCUMULATOR O-RING

Accumulator	Diameter mm (in)			
	A	B	C	D
Small diameter end	29 (1.14)	26 9 (1.059)	39.4 (1.551)	29 (1.14)
Large diameter end	39.4 (1.551)	44.2 (1.740)	44.2 (1.740)	39 4 (1.551)

CLUTCHES AND BRAKES

Reverse clutch

Number of drive plates	2
Number of driven plates	2
Thickness of drive plate mm (in)	
Standard	2.0 (0.079)
Wear limit	1.8 (0 071)
Clearance mm (in)	
Standard	0 5 - 0.8 (0.020 - 0.031)
Allowable limit	1.2 (0.047)

Thickness of retaining plate	Thickness mm (in)	Part number
	4 6 (0 181)	31537-21X00
	4.8 (0.189)	31537-21X01
	5.0 (0.197)	31537-21X02
	5.2 (0 205)	31537-21X03
	5.4 (0.213)	31537-21X04

High clutch

Number of drive plates	5
Number of driven plates	5
Thickness of drive plate mm (in)	
Standard	1.6 (0.063)
Wear limit	1.4 (0.055)
Clearance mm (in)	
Standard	1.8 - 2.2 (0 071 - 0.087)
Allowable limit	3.2 (0.126)

Thickness of retaining plate	Thickness mm (in)	Part number
	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 mm (in)	
Standard	1.6 (0.063)
Wear limit	1.4 (0.055)
Clearance mm (in)	
Standard	0 45 - 0.85 (0.0177 - 0 0335)
Allowable limit	2.25 (0 0886)

Thickness of retaining plate	Thickness mm (in)	Part number
	4.0 (0.157)	31537-41X07
	4.2 (0.165)	31537-41X08
	4.4 (0.173)	31537-41X09
	4.6 (0 181)	31537-41X10
	4.8 (0.189)	31537-41X11
	5.0 (0.197)	31537-41X12
	5.2 (0 205)	31537-41X13

Overrun clutch

Number of drive plates	3
Number of driven plates	5
Thickness of drive plate mm (in)	
Standard	2.0 (0.079)
Wear limit	1.8 (0.071)
Clearance mm (in)	
Standard	1.0 - 1.4 (0.039 - 0.055)
Allowable limit	2.0 (0.079)

Thickness of retaining plate	Thickness mm (in)	Part number
	4.0 (0.157)	31537-41X79
	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
	5.2 (0.205)	31537-41X20

Specifications and Adjustment (Cont'd)

Low & reverse brake		
Number of drive plates	7	
Number of driven plates	7	
Thickness of drive plate 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	2.9 (0.114)	
Thickness of retaining plate	Thickness mm (in)	Part number
	7.2 (0.283)	31667-41X13
	7.4 (0.291)	31667-41X14
	7.6 (0.299)	31667-41X07
	7.8 (0 307)	31667-41X08
	8.0 (0.315)	31667-41X00
	8.2 (0.323)	31667-41X01
Brake band		
Anchor end bolt tightening torque N·m (kg-m, ft-lb)	4 - 6 (0.4 - 0.6, 2.9 - 4.3)	
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 - 0.0098)
Allowable limit	0.25 (0.0098)

TOTAL END PLAY

Total end play "T_1"	0.25 - 0.55 mm (0.0098 - 0.0217 in)	
Thickness of oil pump cover bearing race	Thickness mm (in)	Part number
	0.8 (0.031)	31429-21X00
	1.0 (0.039)	31429-21X01
	1.2 (0.047)	31429-21X02
	1.4 (0.055)	31429-21X03
	1.6 (0.063)	31429-21X04
	1.8 (0.071)	31429-21X05
	2.0 (0.079)	31429-21X06

REVERSE CLUTCH DRUM END PLAY

Reverse clutch drum end play "T_2"	0.55 - 0.90 mm (0.0217 - 0.0354 in)	
Thickness of oil pump thrust washer	Thickness mm (in)	Part number
	0.7 (0.028)	31528-21X00
	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 (1.1 - 1.5 kg-m, 8 - 11 ft-lb)
Distance between end of converter housing and torque converter	26.0 mm (1.024 in) or more
Drive plate runout limit	0 5 mm (0.020 in)

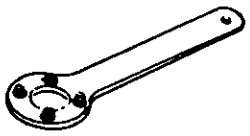
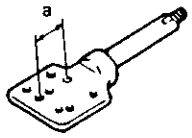
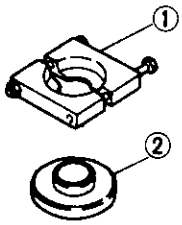
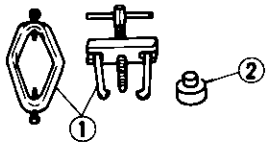
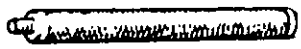
PROPELLER SHAFT & DIFFERENTIAL CARRIER

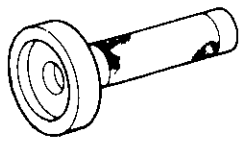
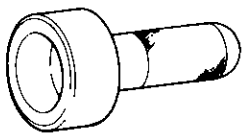
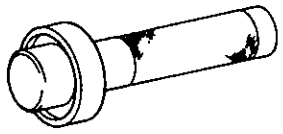
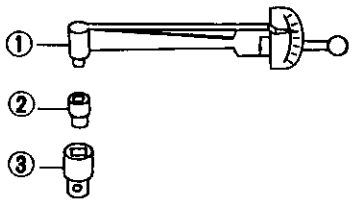
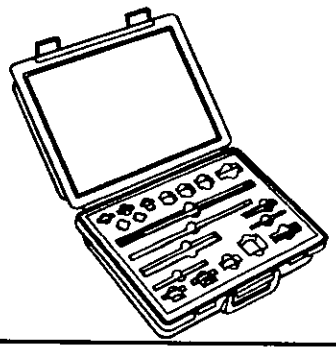
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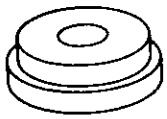
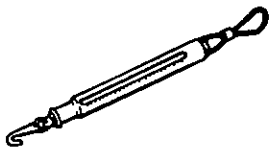
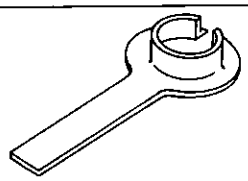
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SERVICE DATA AND SPECIFICATIONS (S.D.S.) PD-29

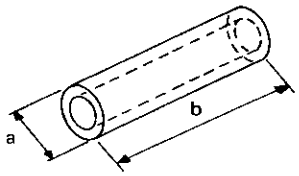
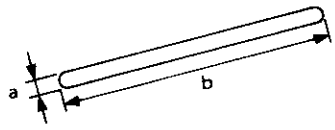
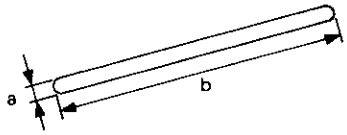
SPECIAL SERVICE TOOLS

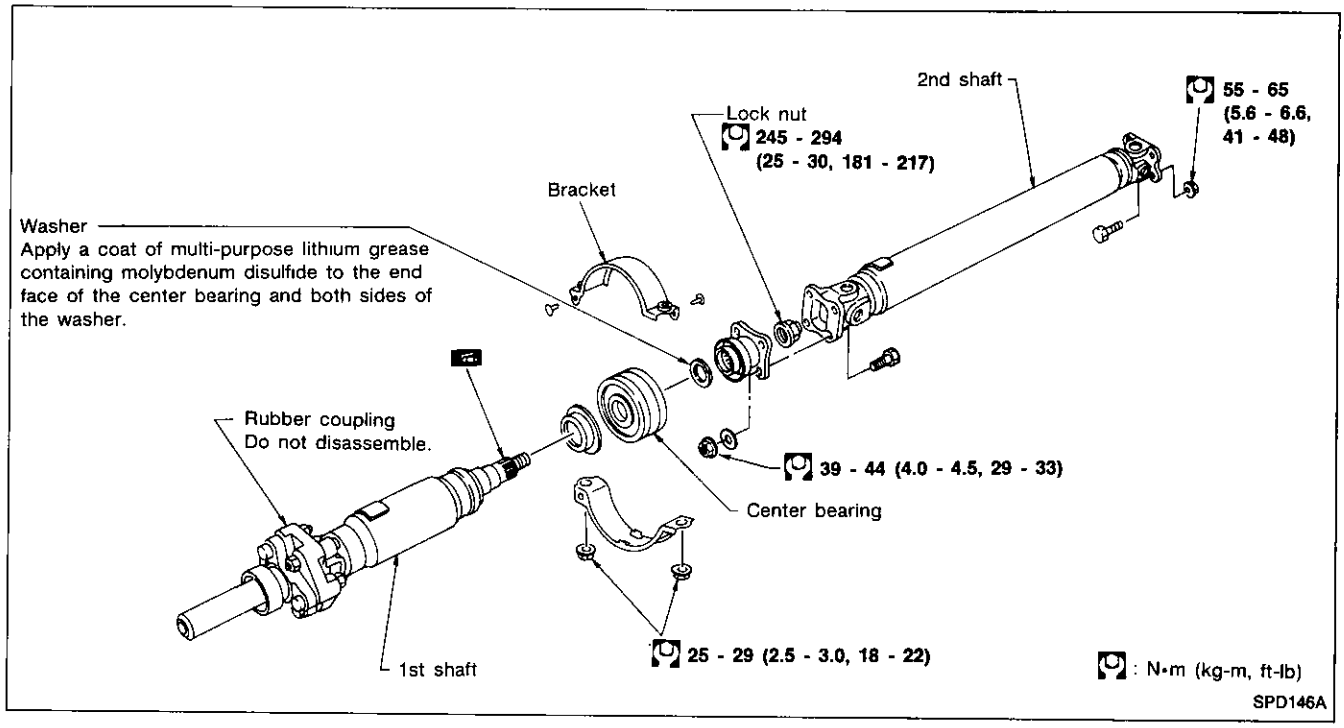
Tool number (Kent-Moore No.) Tool name	Description	
ST38060002 (J34311) Drive pinion flange wrench	 **Use two holes and propeller shaft connecting bolt to hold companion flange.**	Removing and installing propeller shaft lock nut, and drive pinion lock nut.
KV38100800 (—) Equivalent tool (J25604-01) Differential attachment	 **a: 156 mm (6.14 in)**	Mounting final drive (To use, make a new hole.)
ST3090S000 (—) Drive pinion rear inner race puller set ① ST30031000 (J22912-01) Puller ② ST30901000 (—) Equivalent tool (J26010-01) Base		Removing and installing drive pinion rear cone
ST3306S001 (—) Differential side bearing puller set ① ST33051001 (—) Equivalent tool (J22888) Body ② ST33061000 (J8107-2) Equivalent tool (J26010-01) Adapter		Removing and installing differential side bearing inner cone
ST30611000 (J25742-1) Drift		Installing pinion rear bearing outer race
ST30613000 (J25742-3) Drift		Installing pinion front bearing outer race

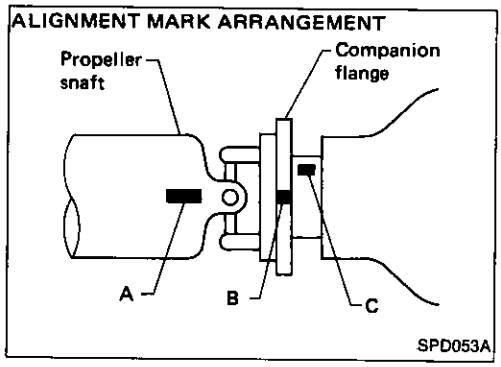
Tool number (Kent-Moore No.) Tool name	Description	
KV38100200 (J26233) Gear carrier side oil seal drift		Installing side oil seal
KV38100500 (—) Gear carrier front oil seal drift		Installing front oil seal
KV38100300 (J25523) Differential side bearing inner cone		Installing side bearing inner cone
KV38100600 (J25267) Side bearing spacer drift		Installing side bearing spacer
ST3127S000 (See J25765-A) Preload gauge ① GG91030000 (J25765) Torque wrench ② HT62940000 (—) Socket adapter ③ HT62900000 (—) Socket adapter		Measuring pinion preload and total preload
HA72400000 (—) Slide hammer		Removing differential case assembly
(J34309) Differential shim selector		Adjusting bearing preload and gear height

Tool number (Kent-Moore No.) Tool name	Description	
(J25269-4) Side bearing discs (2 Req'd)		Selecting pinion height adjusting washer
(J8129) Spring gauge		Measuring carrier turning torque
KV38107900 (J39352) Side oil seal protector		Installing final drive side flange

COMMERCIAL SERVICE TOOLS

Tool name	Description	
Drift		Installing pinion rear bearing outer race **a: 89 mm (3.50 in) dia.** **b: 200 mm (7.87 in)**
Drift		Installing final drive side flange **a: 12 mm (0.47 in) dia.** **b: 250 mm (9.84 in)**
Drift		Installing final drive side flange **a: 18 mm (0.71 in) dia.** **b: 310 mm (12.20 in)**





On-vehicle Service

PROPELLER SHAFT VIBRATION

If vibration is present at high speed, check mounting between propeller shaft and companion flange.

Make sure alignment marks A and B are located as close to each other as possible.

If not, change mounting as indicated in "Installation".

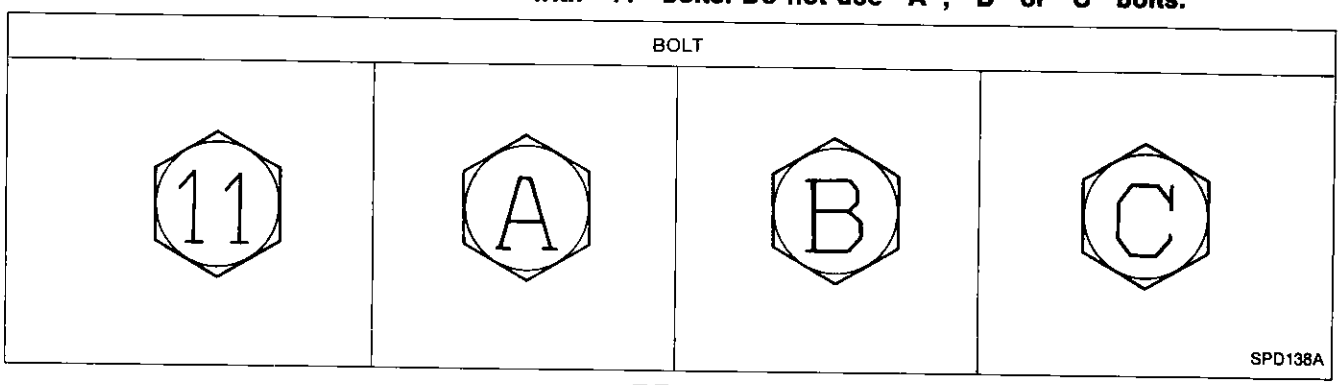
APPEARANCE CHECKING

- Inspect propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly.
- If center bearing is noisy or damaged, replace center bearing.

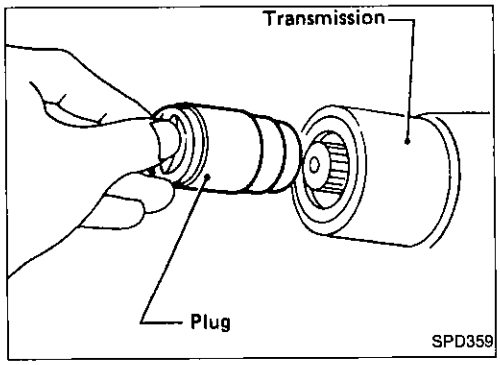
Removal

Before removing propeller shaft from vehicle, check marks on bolt heads so that bolts can be reused in their original positions.

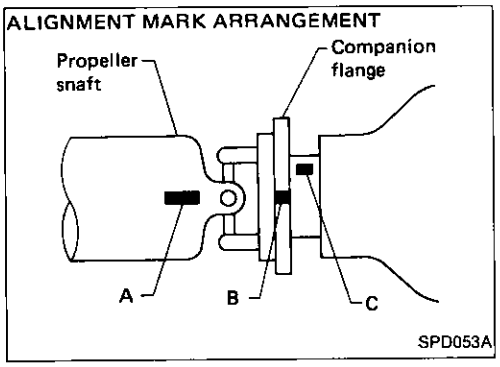
If propeller shaft is replaced with a new one, replace all bolts with "11" bolts. Do not use "A", "B" or "C" bolts.



Removal (Cont'd)

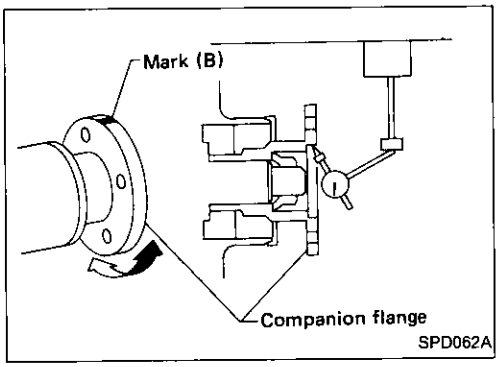


- Draw out propeller shaft from transmission and plug up rear end of transmission rear extension housing.

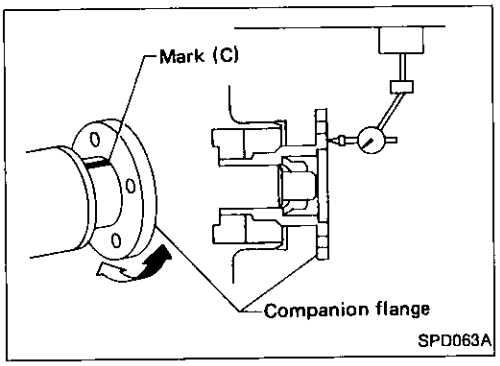


Installation

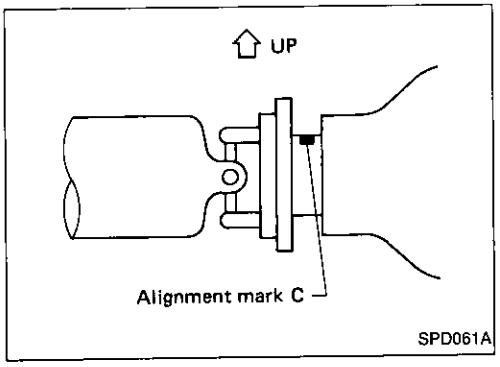
If companion flange has been removed, put new alignment marks B and C on it before reassembling using the following procedure. (When final drive and propeller shaft are separated from each other or when either part is replaced with a new one, perform step 4.)



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.

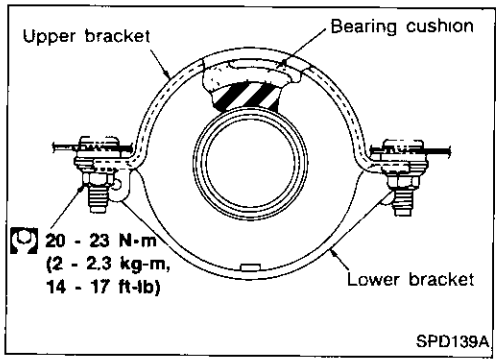


3. Mark (C)
   A. Measure companion flange surface runout.
   B. Determine the position where maximum runout is read on dial gauge. Put mark (shown by C in figure at left) on flange perimeter corresponding to maximum runout position.



4. Position companion flange and propeller shaft so that alignment marks A and B are as close to each other as possible. Temporarily attach bolts and nuts.
5. While pressing down propeller shaft with alignment mark C facing upward, tighten the lower nut to specified torque.
6. Tighten remaining nuts to specified torque.

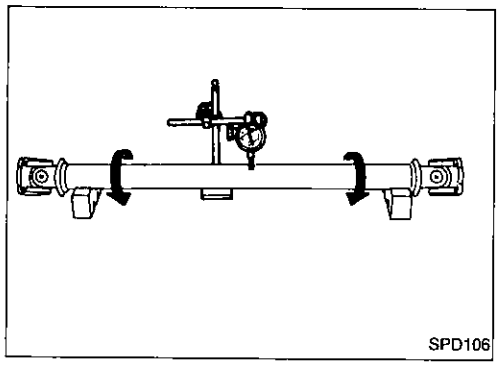
Installation (Cont'd)



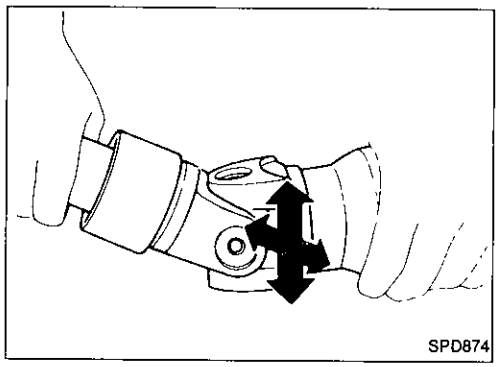
CENTER BEARING BRACKET INSTALLATION

- Position the bearing cushion overlap as illustrated at left.

Inspection



- Inspect propeller shaft runout. If runout exceeds specifications, replace propeller shaft assembly.
  Runout limit: 0.6 mm (0.024 in)

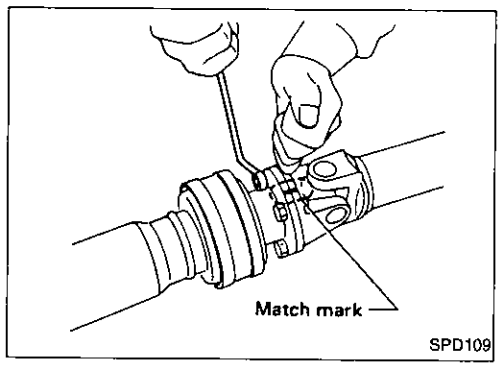


- Inspect journal axial play.
  If the play exceeds specifications, replace propeller shaft assembly.
  Journal axial play:
  0 mm (0 in)

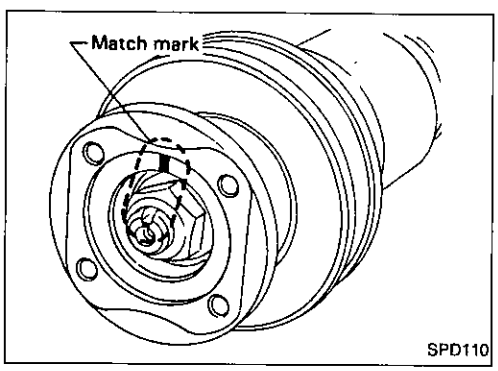
Disassembly

FRONT CENTER BEARING

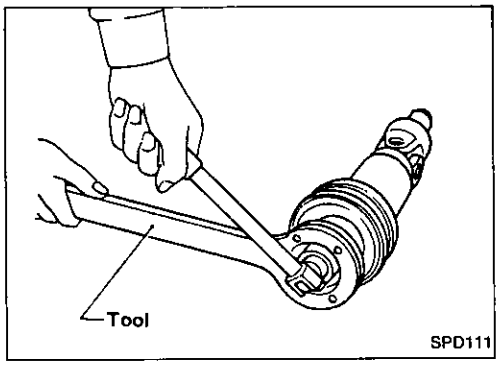
1. Put matchmarks on flanges, and separate 2nd tube from 1st tube.



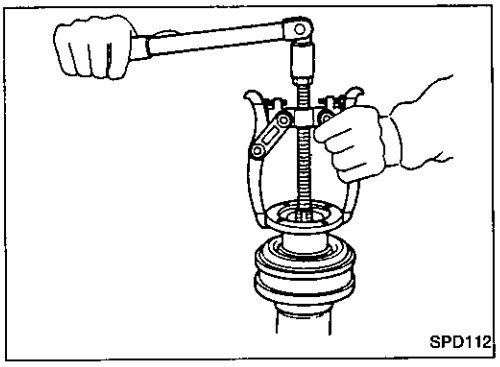
2. Put matchmarks on the flange and shaft.



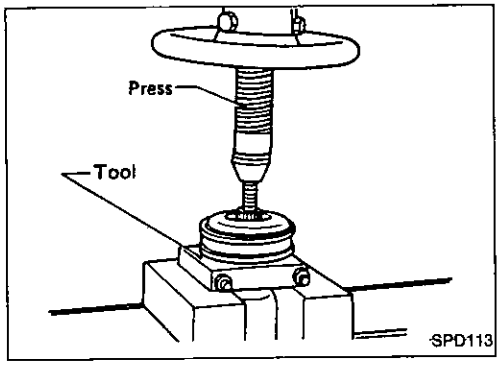
Disassembly (Cont'd)



3. Remove lock nut with Tool.
   Tool number: ST38060002 (J34311)



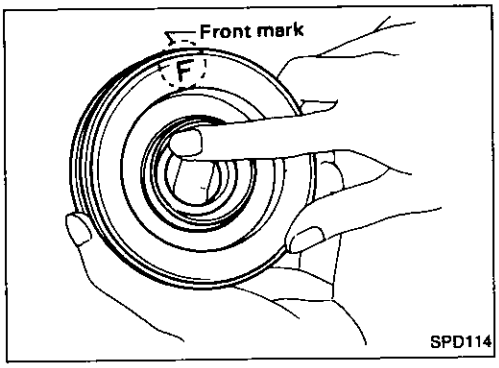
4. Remove companion flange with puller.



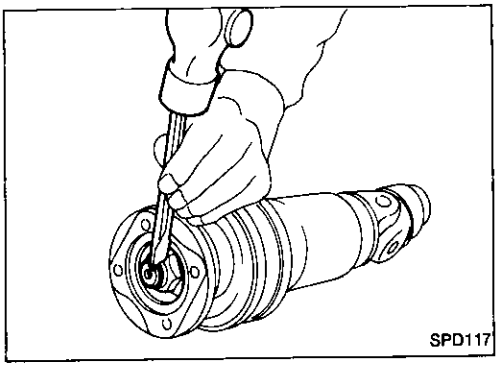
5. Remove center bearing with Tool and press.
   Tool number: ST30031000 (J22912-01)

Assembly

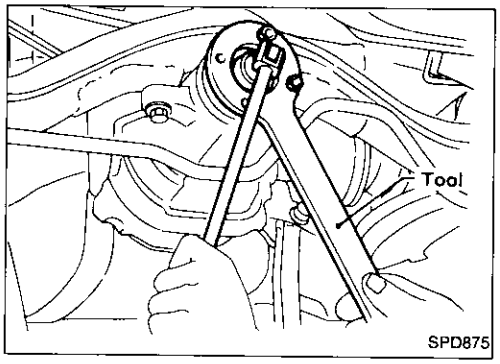
CENTER BEARING



- When installing center bearing, position the "F" mark on center bearing toward front of vehicle.
- **Apply a coat of multi-purpose lithium grease containing molybdenum disulfide to the end face of the center bearing and both sides of the washer.**

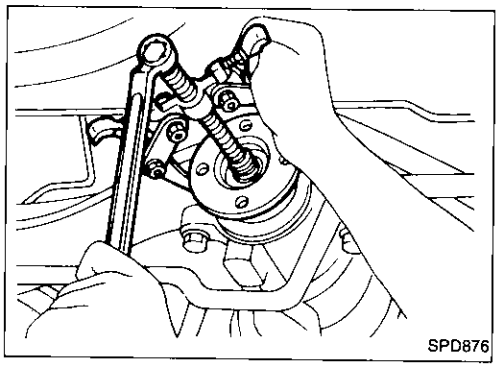


- Stake the nut. Always use new one.
- Align matchmarks when assembling tubes.

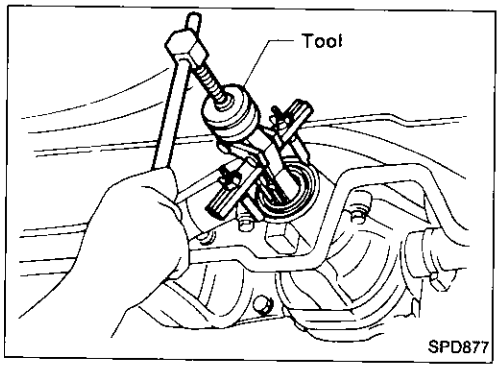


Front Oil Seal Replacement

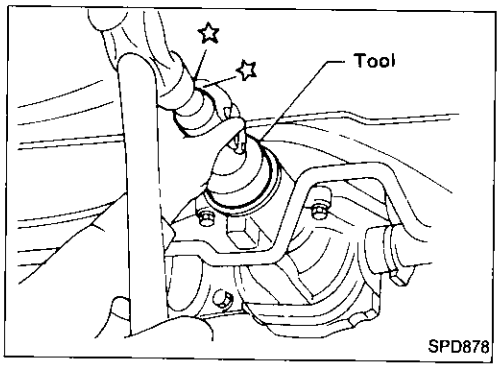
1. Remove propeller shaft.
2. Loosen drive pinion nut with Tool.
   Tool number: ST38060002 (J34311)



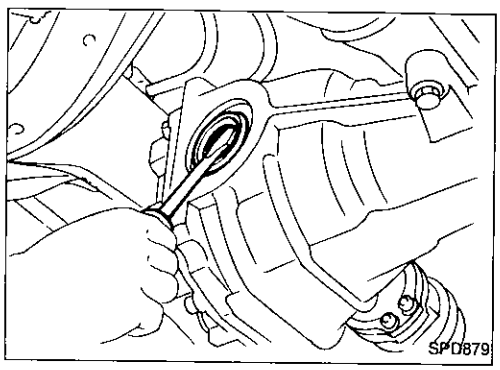
3. Remove companion flange.



4. Remove front oil seal.



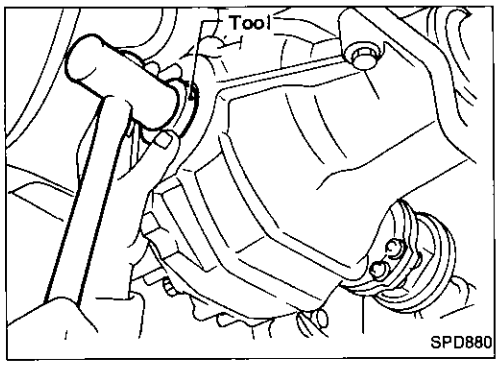
5. Apply multi-purpose grease to sealing lips of oil seal. Press front oil seal into carrier.
6. Install companion flange and drive pinion nut.
7. Install propeller shaft.



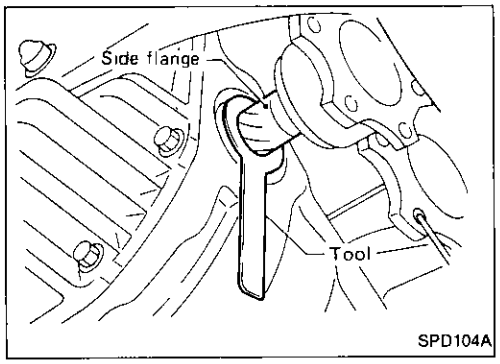
Side Oil Seal Replacement

1. Remove drive shafts.
   Refer to RA section.
2. Remove oil seal.

Side Oil Seal Replacement (Cont'd)

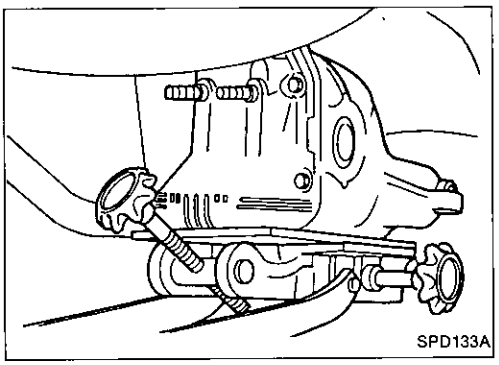


3. Apply multi-purpose grease to sealing lips of oil seal. Press-fit oil seal into carrier with Tool.
   Tool number: KV38100200 (J26233)
4. Install drive shafts.



SIDE FLANGE INSTALLATION

Use Tool to prevent side oil seal from being damaged by spline portion of side flange.
Tool number: KV38107900



Removal

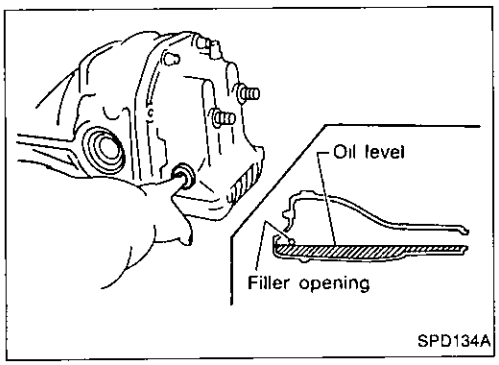
- Remove propeller shaft.

Insert plug into rear oil seal after removing propeller shaft.

- Remove drive shafts.
  Refer to RA section.
- Pull off final drive backward together with jack.

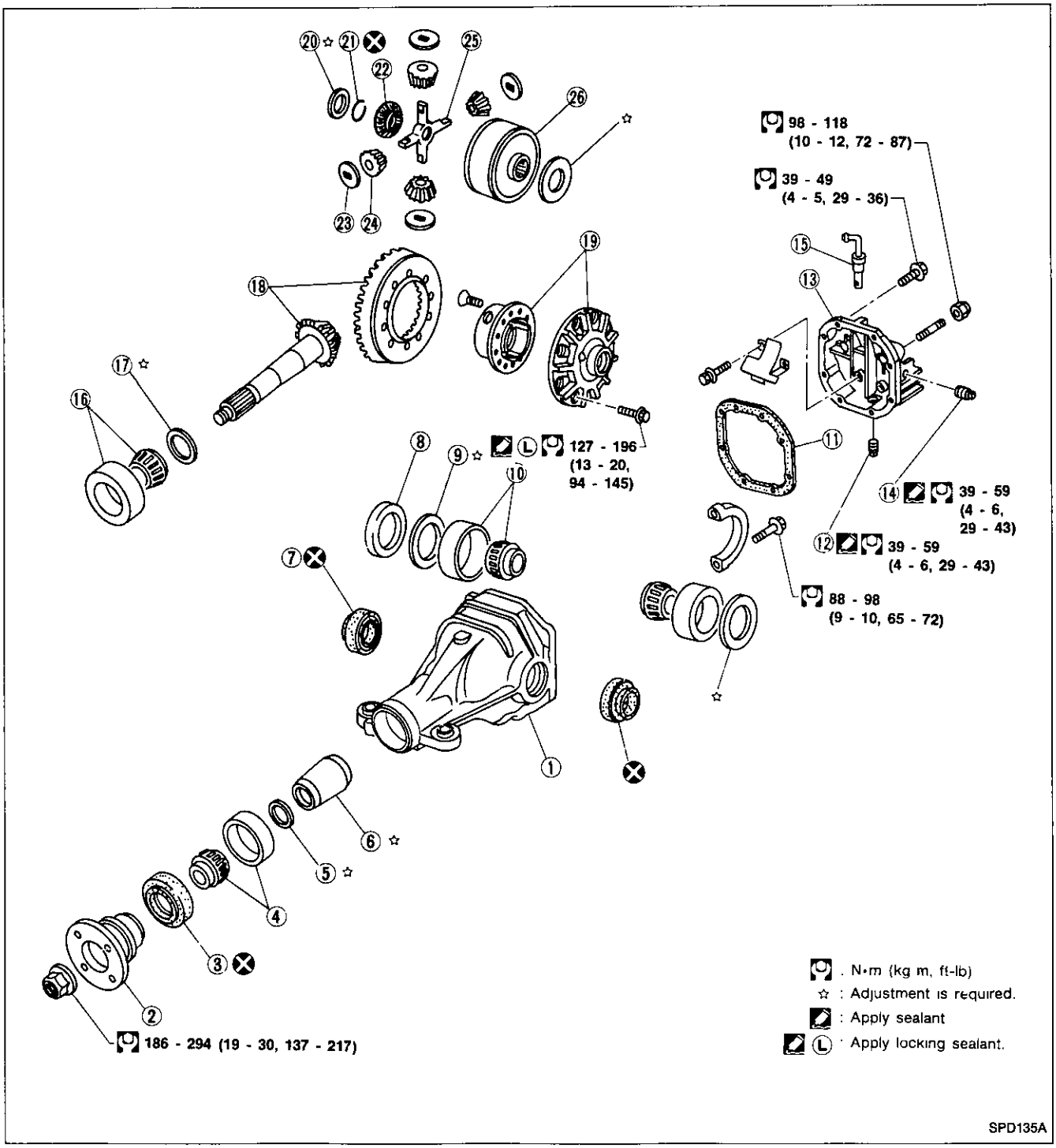
CAUTION:

- **Be careful not to damage spline, sleeve yoke and front oil seal, when removing propeller shaft.**
- **After final drive is removed, support suspension member on a stand to prevent its insulators from being twisted or damaged.**

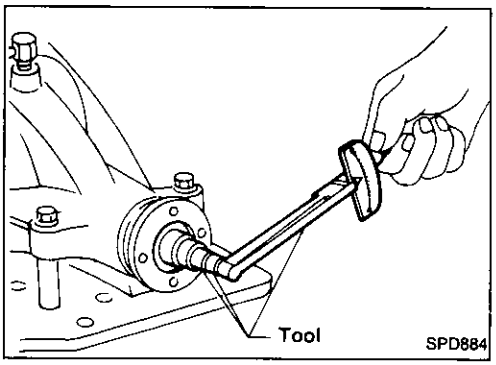


Installation

- Fill final drive with recommended gear oil.



① Gear carrier
② Companion flange
③ Front oil seal
④ Pinion front bearing
⑤ Pinion bearing adjusting washer
⑥ Pinion bearing adjusting spacer (Solid spacer)
⑦ Side oil seal
⑧ Side bearing spacer
⑨ Side bearing adjusting washer
⑩ Side bearing
⑪ Gasket
⑫ Drain plug
⑬ Rear cover
⑭ Filler plug
⑮ Breather
⑯ Pinion rear bearing
⑰ Pinion height adjusting washer
⑱ Hypoid gear set
⑲ Differential case
⑳ Side gear thrust washer
㉑ Circular clip
㉒ Side gear (R.H.)
㉓ Pinion mate thrust washer
㉔ Pinion mate gear
㉕ Pinion mate shaft
㉖ Side gear (L.H.) with viscous coupling

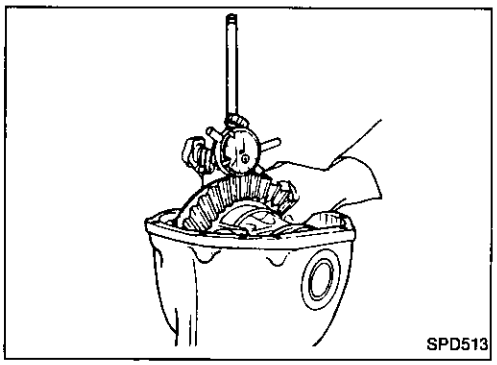


Pre-inspection

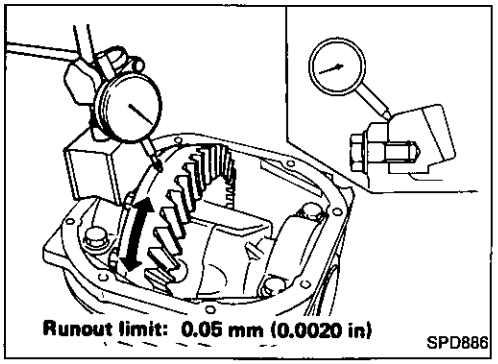
Before disassembling final drive, perform the following inspection.

- Total preload

1) Turn drive pinion in both directions several times to set bearing rollers.
2) Check total preload with Tool.
   Tool number: ST3127S000 (See J25765-A)
   Total preload:
   1.4 - 3.1 N·m
   (14 - 32 kg-cm, 12 - 28 in-lb)



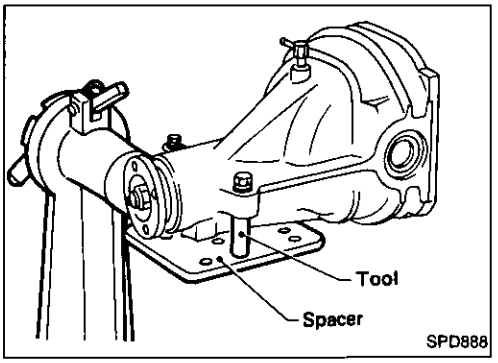
- Ring gear to drive pinion backlash
  Check ring gear-to-drive pinion backlash with a dial indicator at several points.
  Ring gear backlash:
  0.10 - 0.15 mm (0.0039 - 0.0059 in)

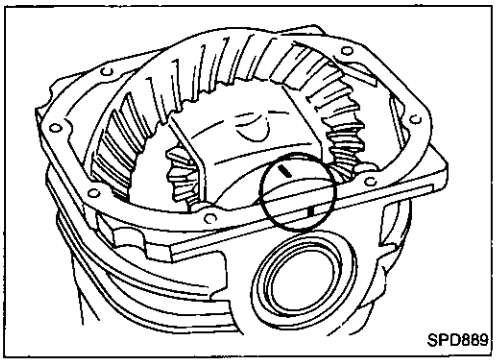


- Ring gear runout
  Check runout of ring gear with a dial indicator.
  Runout limit:
  0.05 mm (0.0020 in)
- Tooth contact
  Check tooth contact. (Refer to Adjustment.)

Differential Carrier

1. Using two 45 mm (1.77 in) spacers, mount carrier on Tool.
   Tool number: KV38100800 (—)

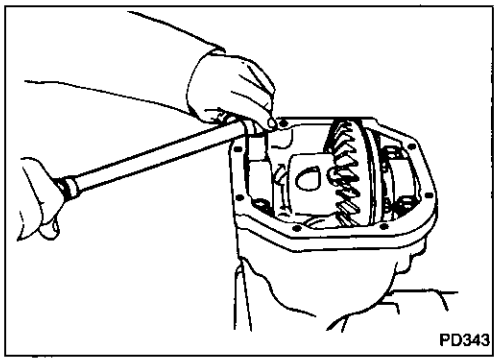




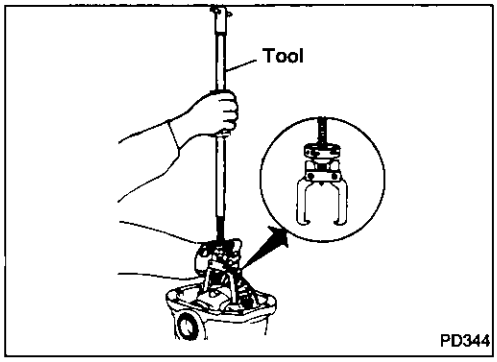
2. Paint or punch matchmarks on one side of the side bearing cap so it can be properly reinstalled.

Bearing caps are line-board during manufacture. Replace them in their proper positions.

Differential Carrier (Cont'd)

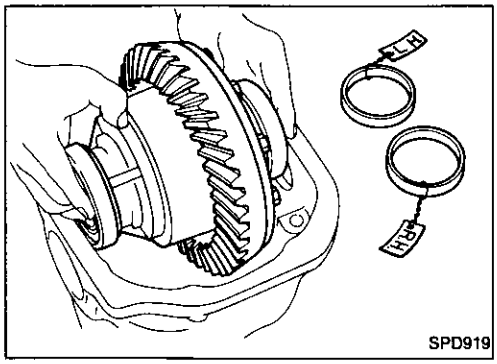

PD343

3. Remove side bearing caps.



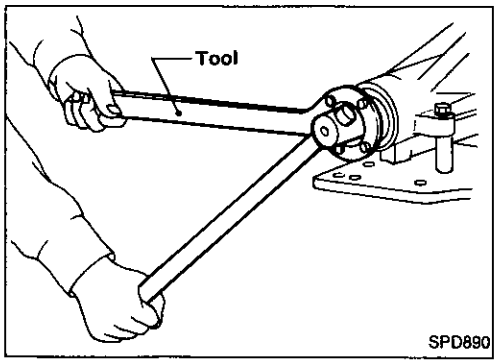
PD344

4. Lift differential case assembly out with Tool.
   Tool number: HT72400000 (—)



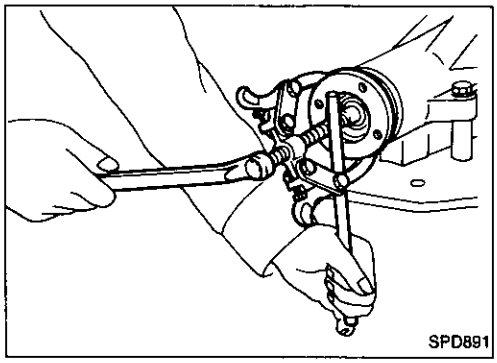
SPD919

Keep the side bearing outer races together with inner cone — do not mix them up.

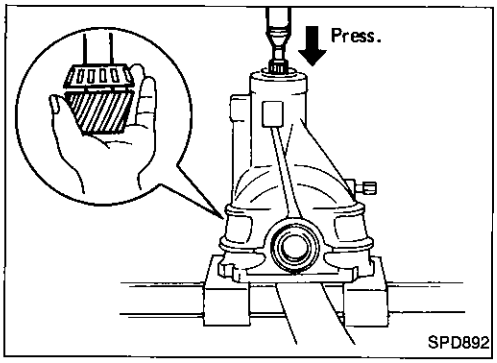


SPD890

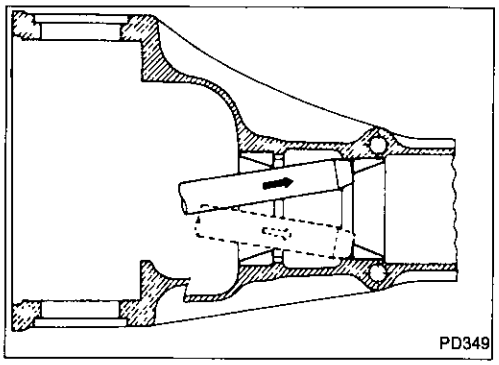
5. Loosen drive pinion nut and pull off companion flange.


SPD891

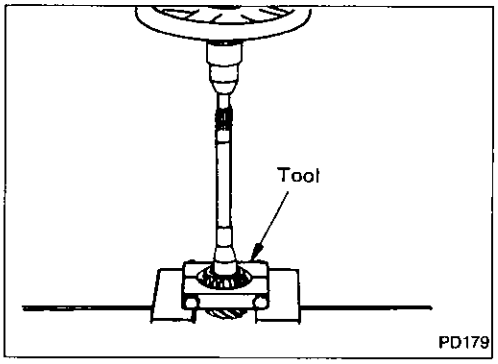
Differential Carrier (Cont'd)



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.

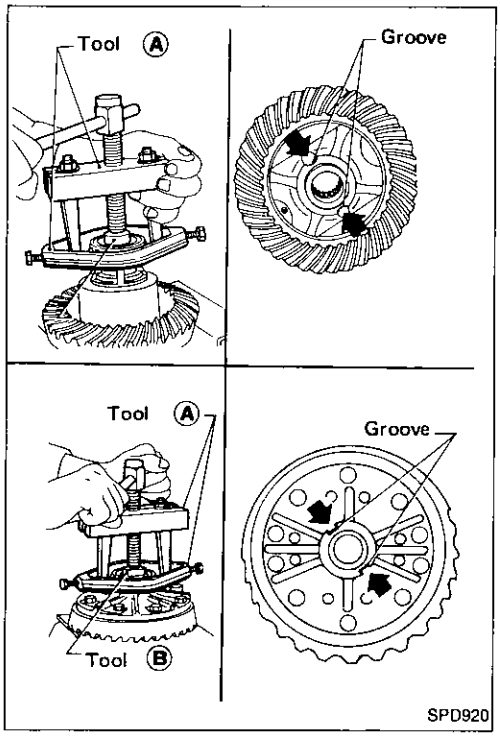


10. Remove pinion bearing outer races with a brass drift.



11. Remove pinion rear bearing inner race and drive pinion height adjusting washer with suitable tool.

Differential Case



1. Remove side bearing inner cones.

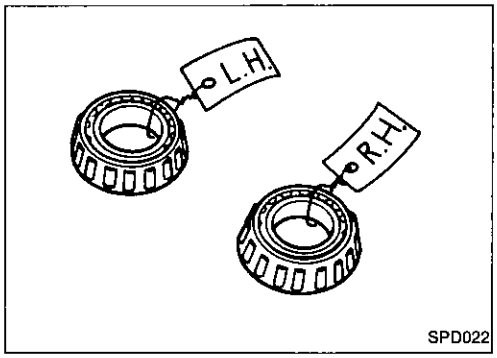
To prevent damage to bearing, engage puller jaws in groove.

Tool number:

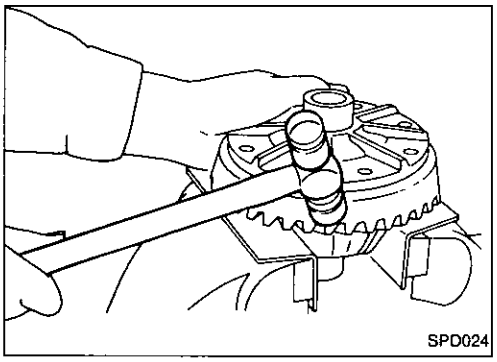
Ⓐ ST33051001 (—)

Ⓑ ST33061000 (J8107-2)

Differential Case (Cont'd)

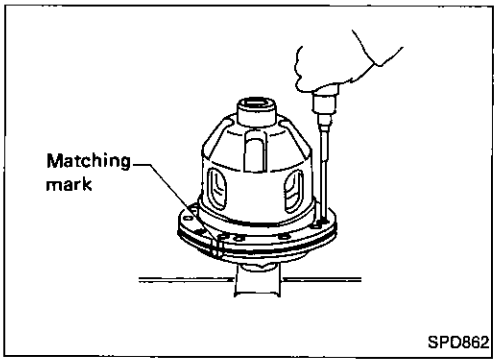


Be careful not to confuse left- and right-hand parts.

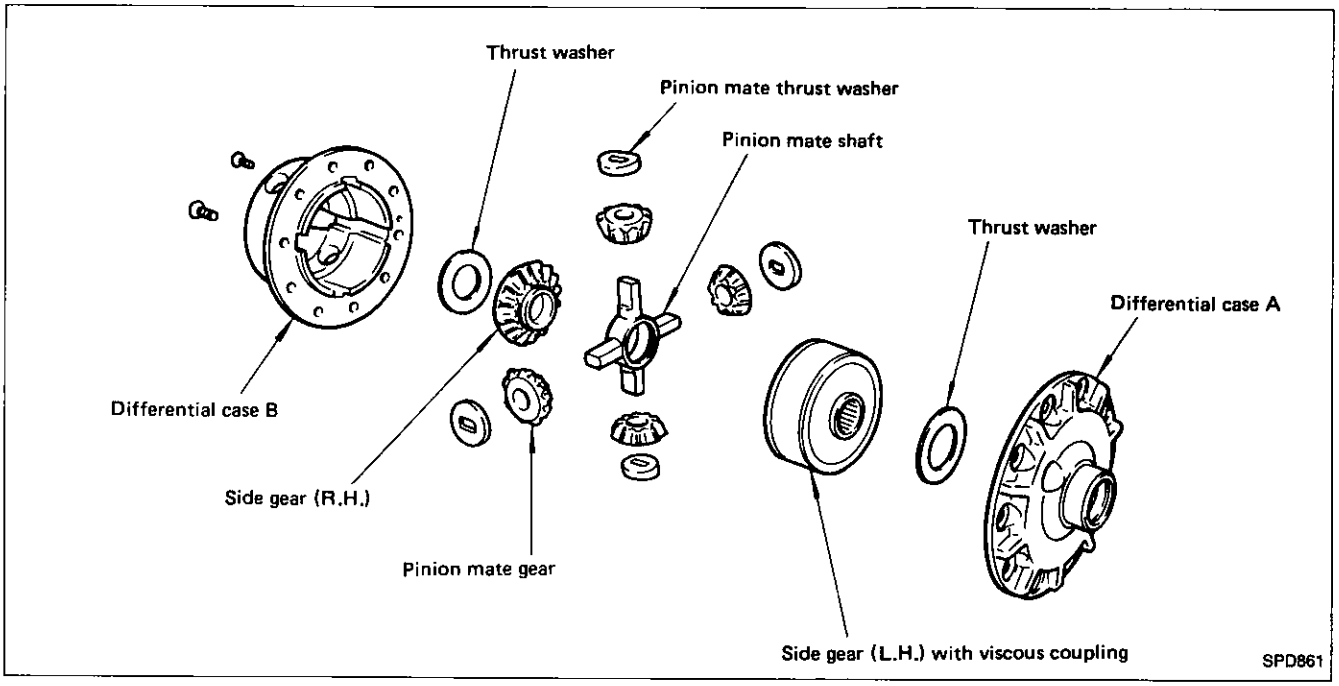


2. Loosen ring gear bolts in a criss-cross fashion.
3. Tap ring gear off the differential case with a soft hammer.

Tap evenly all around to keep ring gear from binding.

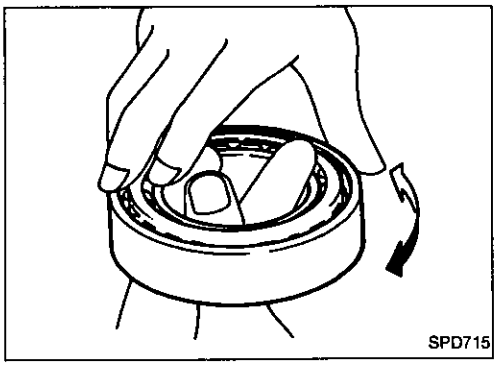


4. Loosen screws on differential cases A and B.
5. Separate differential cases A and B.



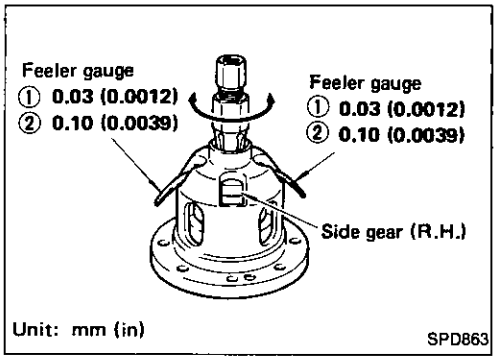
Contact Surfaces

1. Clean the disassembled parts in suitable solvent and blow dry with compressed air.
2. If following surfaces are found to be burred or scratched, smooth with oil stone.
- Differential case A
- Differential case B
- Side gear
- Pinion mate gear
- Pinion mate shaft
3. Check viscous coupling for oil leakage. If it is faulty, replace it with new one.



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

THRUST WASHER SELECTION

Whenever side gears or pinion mate gears are replaced, select suitable thrust washers as follows:

1. Clean side gears and pinion mate gears using white gasoline.
2. Before assembling gears, apply hypoid gear oil to frictional surfaces.
3. 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.
4. Position differential assembly so that right side gear is on the upper side. Place a 0.03 mm (0.0012 in) feeler gauge (for example) between right side gear and thrust washer.

Do not place feeler gauge at groove side of differential case.

5. Also place a 0.03 mm (0.0012 in) additional feeler gauge between right side gear and thrust washer so that it is positioned diagonal to (180° apart from) the feeler gauge described previously.
6. Rotate right side gear with a suitable tool attached to splines. If right side gear cannot be rotated, replace thrust washer used on left side gear with a thinner one.
7. 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 does, replace thrust washer on left side gear with a thicker one so that right side gear does not rotate.
8. As explained in above example, select suitable thrust washers to ensure that:

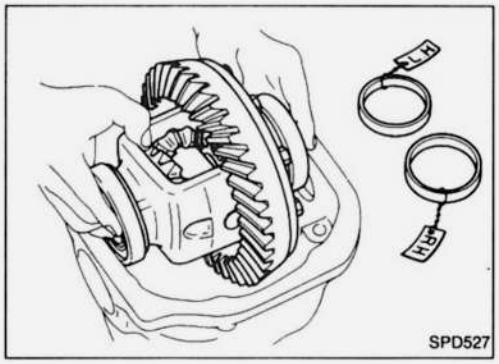
a) Both side gears rotate. [0.03 mm (0.0012 in) feeler gauges are used in this case.]
b) Side gear is held stationary. [0.10 mm (0.0039 in) gauges are used in this case.]

For quiet and reliable final drive operation, the following five adjustments must be made correctly.

1. Side bearing preload
2. Pinion gear height
3. Pinion bearing preload
4. Ring gear to pinion backlash (Refer to ASSEMBLY.)
5. Ring and pinion gear tooth contact pattern

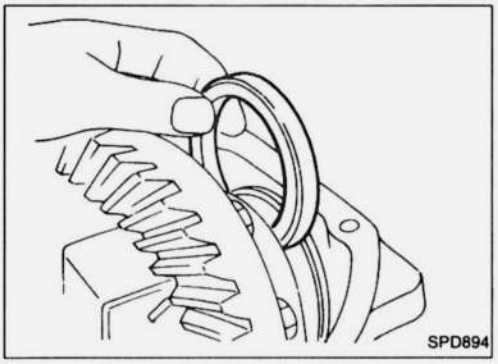
Side Bearing Preload

A selection of carrier side bearing preload shims is required for successful completion of this procedure.



SPD527

1. Make sure all parts are clean and that the bearings are well lubricated with light oil or Dexron™ type automatic transmission fluid.
2. Place the differential carrier, with side bearings and bearing races installed, into the final drive housing.

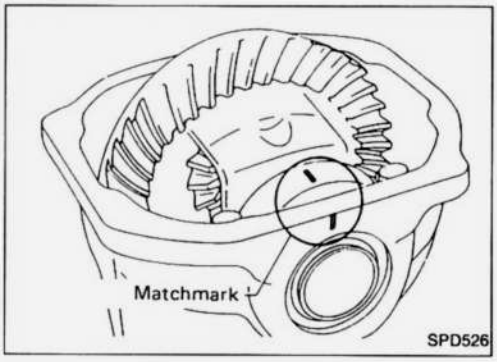

SPD894

3. Put the side bearing spacer in place on the ring gear end of the carrier.

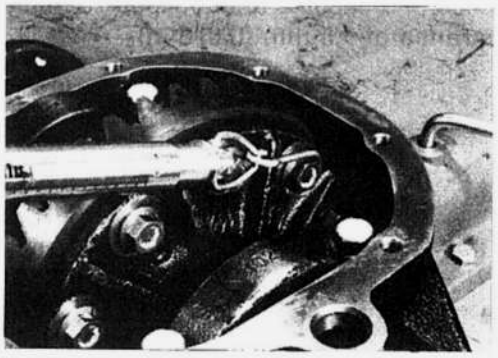


4. Using the J-25267 side bearing spacer drift, place both of the original carrier side bearing preload shims on the carrier end, opposite the ring gear.

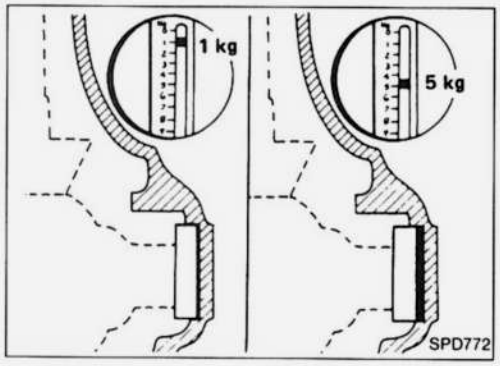
Side Bearing Preload (Cont'd)



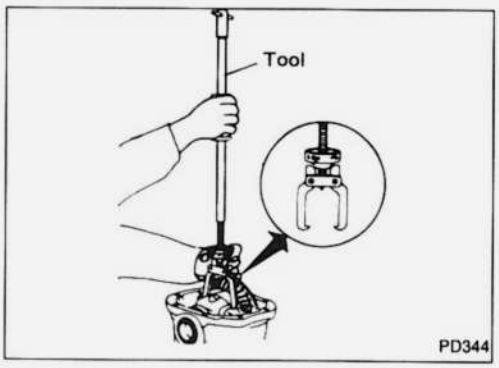
5. Install the side bearing caps in their correct locations and torque the bearing cap retaining bolts.
   Specification:
   88 - 98 N·m (9 - 10 kg-m, 65 - 72 ft-lb)
6. Turn the carrier several times to seat the bearings.



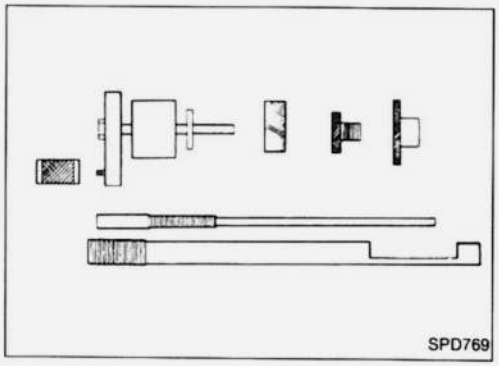
7. Measure the turning torque of the carrier at the ring gear retaining bolts with a spring gauge, J-8129.
   Specification:
   34.3 - 39.2 N (3.5 - 4 kg, 7.7 - 8.8 lb)
   of pulling force at the ring gear bolt



8. If the carrier turning torque is not within the specification range, increase or decrease the total thickness of the side bearing adjusting washers until the turning torque is correct. If the turning torque is less than the specified range, install washers of greater thickness; if the turning torque is greater than the specification, install thinner washers. See the S.D.S. section for washer dimensions and part numbers.
9. Record the total amount of washer thickness required for the correct carrier side bearing preload.



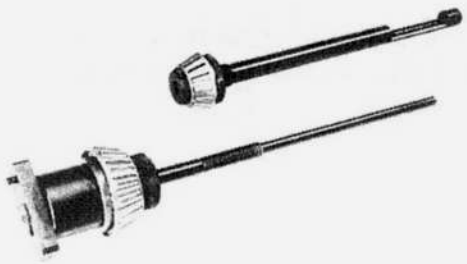
10. Remove the carrier from the final drive housing, saving the selected preload washers for later use during the assembly of the final drive unit.



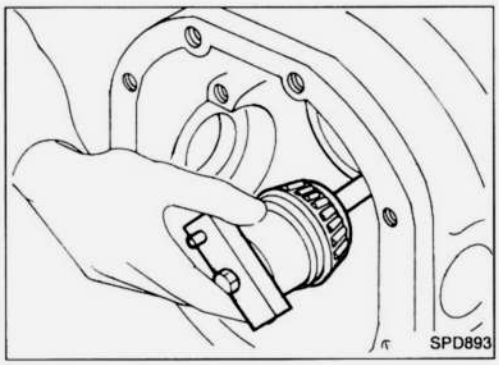
Pinion Gear Height and Pinion Bearing Preload

1. Make sure all parts are clean and that the bearings are well lubricated.
2. Assemble the pinion gear bearings into the pinion preload shim selector Tool, J-34309.

Pinion Gear Height and Pinion Bearing Preload (Cont'd)



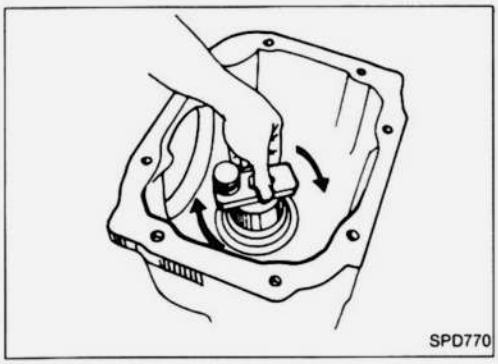
- **Front pinion bearing** — make sure the J-34309-3 front pinion bearing seat is secured tightly against the J-34309-2 gauge anvil. Then turn the front pinion bearing pilot, J-34309-5, to secure the bearing in its proper position.
- **Rear pinion bearing** — the rear pinion bearing pilot, J-34309-8, is used to center the rear pinion bearing only. The rear pinion bearing locking seat, J-34309-4, is used to lock the bearing to the assembly.
- **Installation of J-34309-9 and J-34309-16** — place a suitable 2.5 mm (0.098 in) thick plain washer between J-34309-9 and J-34309-16. Both surfaces of J-34309-9 and J-34309-16 must be parallel with a clearance of 2.5 mm (0.098 in).



3. Place the pinion preload shim selector Tool, J-34309-1, gauge screw assembly with the pinion rear bearing inner cone installed into the final drive housing.

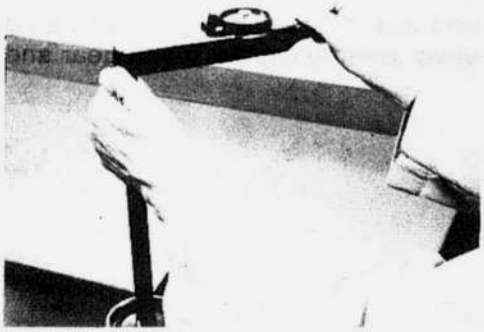


4. Assemble the front pinion bearing inner cone and the J-34309-2 gauge anvil together with the J-34309-1 gauge screw in the final drive housing. Make sure that the pinion height gauge plate, J-34309-16, will turn a full 360 degrees, and tighten the two sections together by hand.



5. Turn the assembly several times to seat the bearings.

Pinion Gear Height and Pinion Bearing Preload (Cont'd)



6. Measure the turning torque at the end of the J-34309-2 gauge anvil using torque wrench J-25765A.
   Turning torque specification:
   1.0 - 1.3 N·m (10 - 13 kg-cm, 8.7 - 11.3 in-lb)



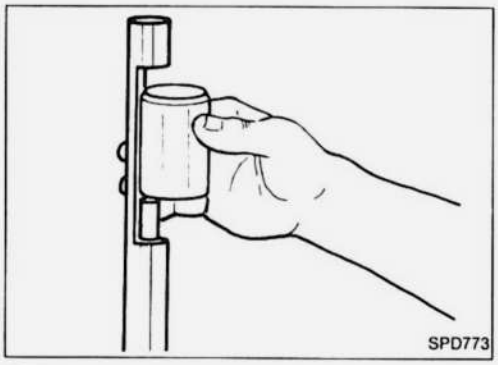
7. Place the J-34309-11 "R200A" pinion height adapter onto the gauge plate and tighten it by hand.

CAUTION:
Make sure all machined surfaces are clean.



— PINION BEARING PRELOAD WASHER SELECTION —

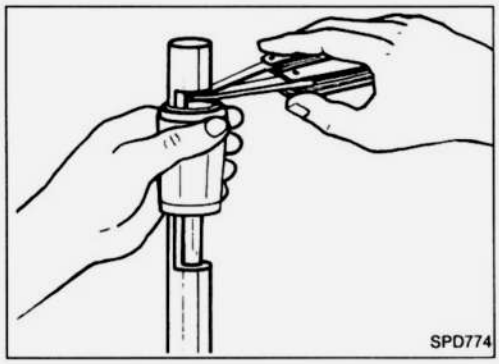
8. Place the solid pinion bearing spacer, small end first, over the J-34309-2 gauge anvil and seat the small end squarely against the tip of the J-34309-1 gauge screw in the tool recessed portion.





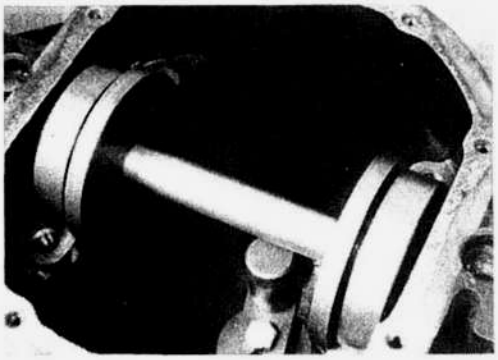
9. Select the correct thickness of pinion bearing preload adjusting washer using a standard gauge of 3.5 mm (0.138 in) and your J-34309-101 feeler gauge. *The exact measurement you get with your gauges is the thickness of the adjusting washer required.* Select the correct washer.
   Drive pinion bearing preload adjusting washer:
   Refer to S.D.S.

Pinion Gear Height and Pinion Bearing Preload (Cont'd)



10. Set your selected, correct pinion bearing preload adjusting washer aside for use when assembling the pinion gear and bearings into the final drive.

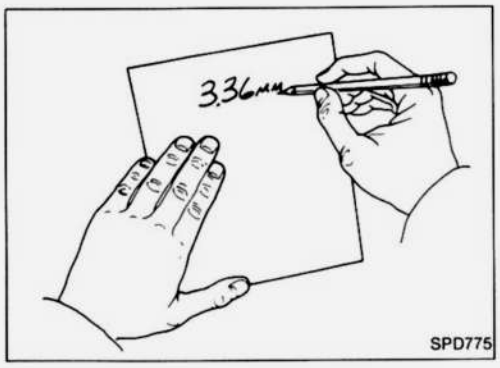
— PINION HEIGHT ADJUSTING WASHER SELECTION —



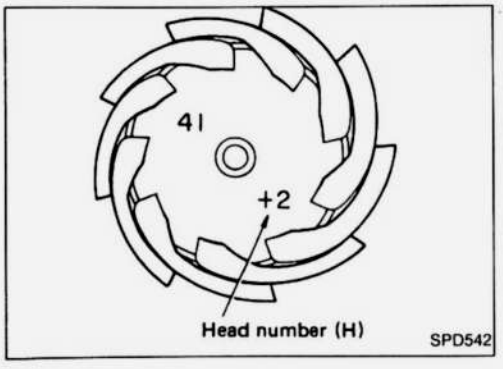
11. Now, position the side bearing discs, J-25269-4, and arbor firmly into the side bearing bores.
    Install the side bearing caps and tighten the cap bolts to proper torque.



12. Select the correct *standard* pinion height adjusting washer thickness using a standard gauge of 3 mm (0.12 in) and your J-34309-101 feeler gauge. Measure the distance between the J-34309-11 pinion height adapter including the standard gauge and the arbor.



13. Write down your exact measurement (the value of feeler gauge).



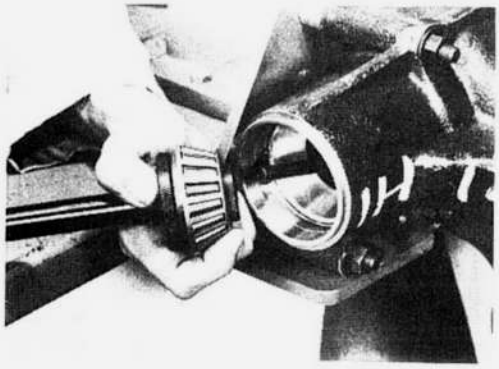
14. Correct the pinion height washer size by referring to the "pinion head number."

There are two numbers painted on the pinion gear. The first one refers to the pinion and ring gear as a matched set and should be the same as the number on the ring gear. The second number is the "pinion head height number," and it refers to the ideal pinion height from standard for quietest operation. Use the following chart to determine the correct pinion height washer.

Pinion Gear Height and Pinion Bearing Preload (Cont'd)

Pinion head height number	Add or remove from the standard pinion height washer thickness measurement
− 6	Add 0.06 mm (0.0024 in)
− 5	Add 0.05 mm (0.0020 in)
− 4	Add 0.04 mm (0.0016 in)
− 3	Add 0.03 mm (0.0012 in)
− 2	Add 0.02 mm (0.0008 in)
− 1	Add 0.01 mm (0.0004 in)
0	Use the selected washer thickness
+ 1	Subtract 0.01 mm (0.0004 in)
+ 2	Subtract 0.02 mm (0.0008 in)
+ 3	Subtract 0.03 mm (0.0012 in)
+ 4	Subtract 0.04 mm (0.0016 in)
+ 5	Subtract 0.05 mm (0.0020 in)
+ 6	Subtract 0.06 mm (0.0024 in)

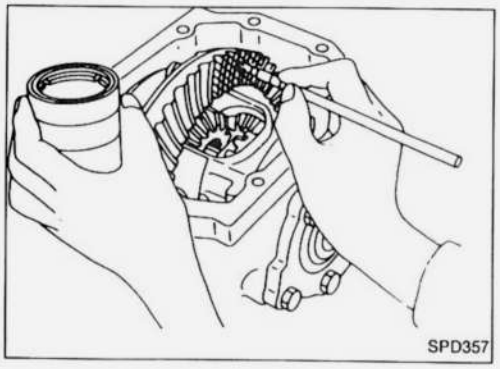
15. Select the correct pinion height washer from the following chart.
    Drive pinion height adjusting washer (R200):
    Refer to S.D.S.



16. Remove the J-34309 pinion preload shim selector Tool from the final drive housing and disassemble to retrieve the pinion bearings.

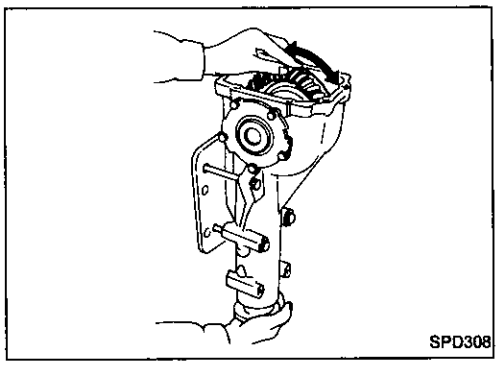
Tooth Contact

Checking gear tooth contact pattern is necessary to verify correct relationship between ring gear and drive pinion.
Hypoid gear set which is not positioned properly in relation to one another may be noisy, or have short life or both. With the checking of gear tooth contact pattern, the most desirable contact for low noise level and long life can be assured.



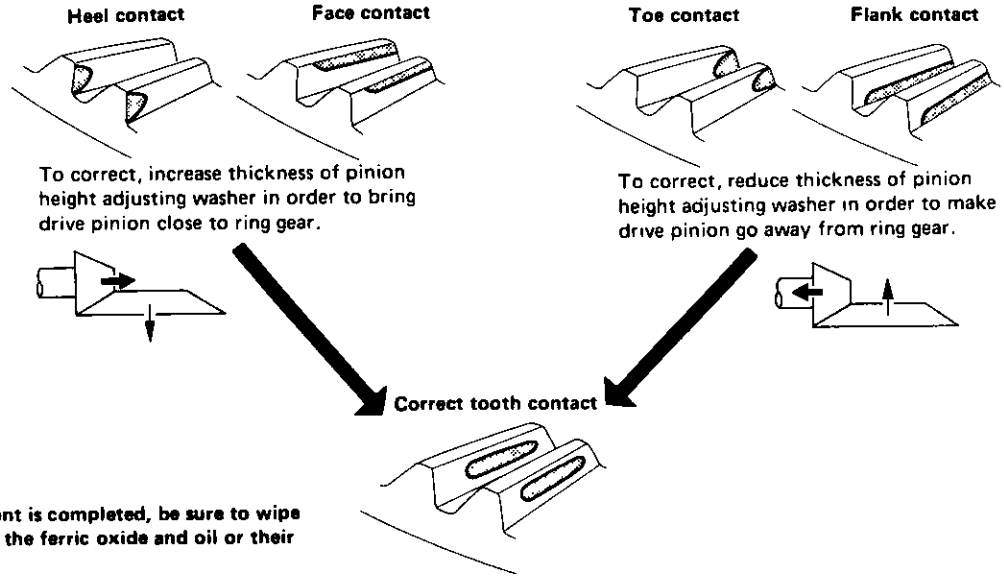
1. Thoroughly clean ring gear and drive pinion teeth.
2. Sparingly apply a mixture of powdered ferric oxide and oil or equivalent to 3 or 4 teeth of ring gear drive side.

Tooth Contact (Cont'd)


SPD308

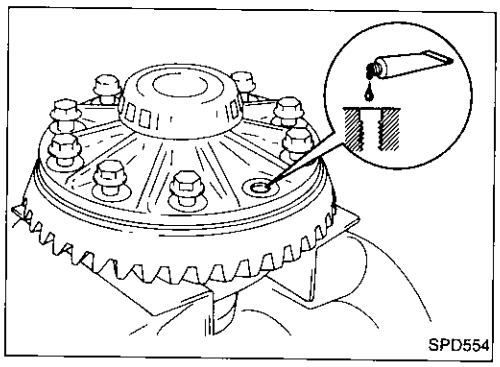
3. Hold companion flange steady by hand and rotate the ring gear in both directions.

Usually the pattern will be correct if you have calculated the shims correctly and the backlash is correct.
However, in rare cases you may have to use trial-and-error processes until you get a good tooth contact pattern.
The tooth pattern is the best indication of how well a differential has been set up.



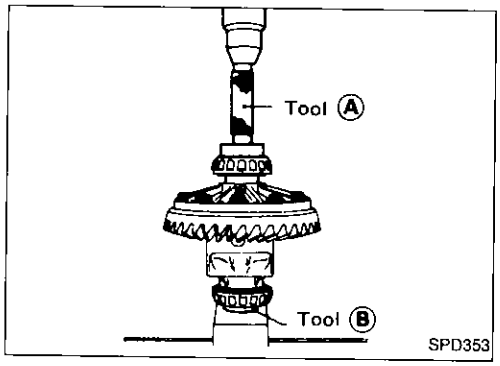
When adjustment is completed, be sure to wipe off completely the ferric oxide and oil or their equivalent.

SPD007



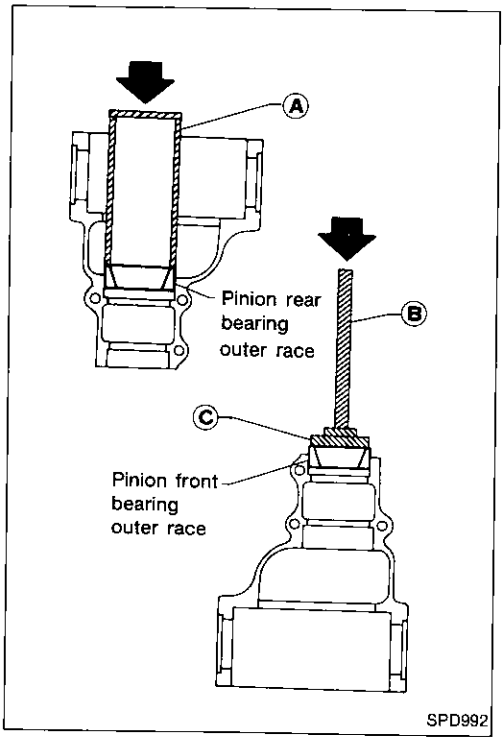
1. Place differential case on ring gear.
2. Apply locking sealant to ring gear bolts, and install them.

Tighten bolts in a criss-cross fashion, lightly tapping bolt head with a hammer.



3. Press-fit side bearing inner cones on differential case with Tool.

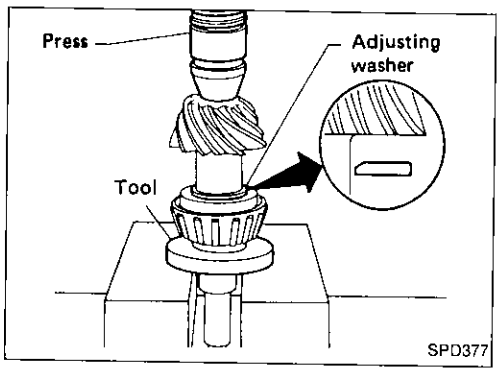
Tool number:
- **Ⓐ KV38100300 (J25523)**
- **Ⓑ ST33061000 (J8107-2)**



4. Press-fit front and rear bearing outer races with Tools.

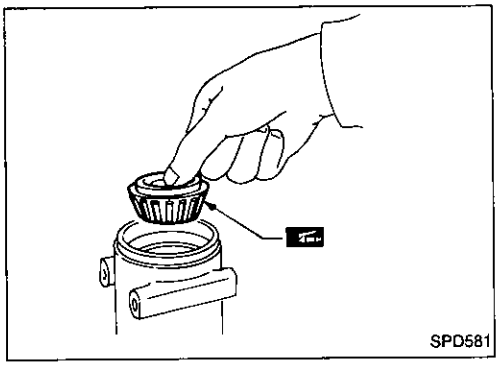
Tool number:
- **Ⓐ Suitable tool**
- **Ⓑ ST3061100 (J25742-1)**
- **Ⓒ ST30701000 (J25742-3)**

5. Select pinion bearing adjusting washer and drive pinion bearing spacer, referring to ADJUSTMENT.

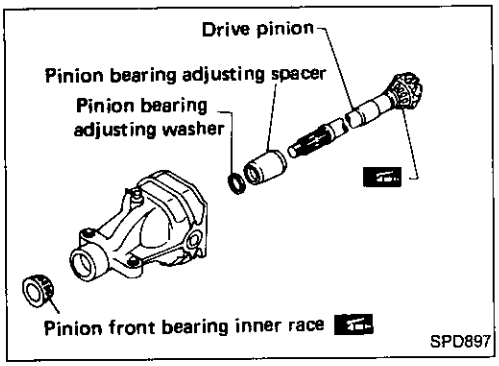


6. Install drive pinion height adjusting washer in drive pinion, and press-fit pinion rear bearing inner cone in it, using press and Tool.

Tool number: ST30901000 (—)

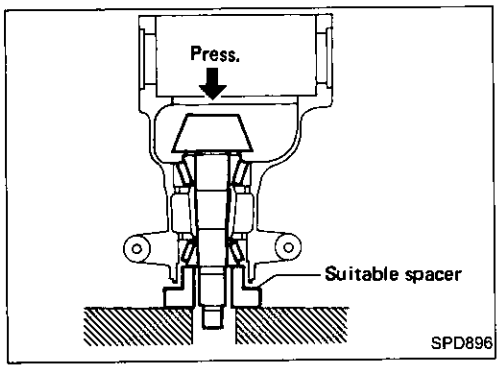


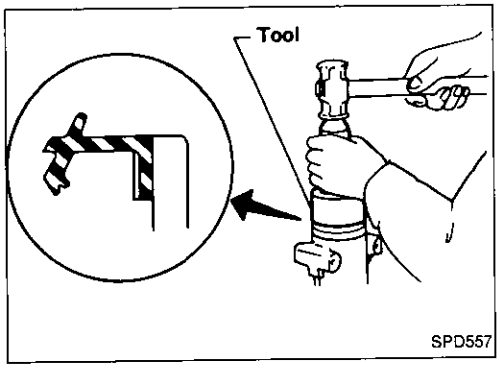
7. Place pinion front bearing inner cone in final drive housing.



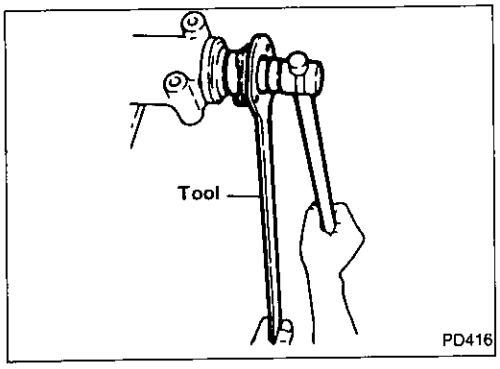
8. Set drive pinion assembly (as shown in figure at left) in differential carrier and install drive pinion, with press and suitable tool.

Stop when drive pinion touches bearing.
Apply multi-purpose grease to pinion rear bearing inner race and pinion front bearing inner race.



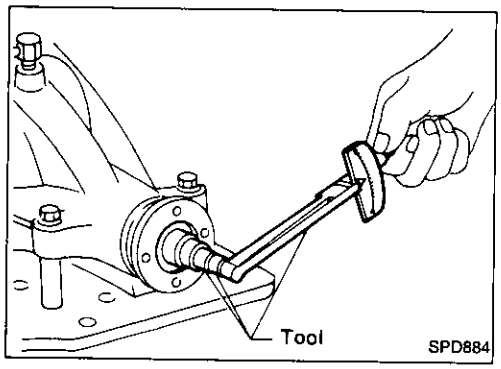


9. Install front oil seal with Tool.
Tool number: KV38100500 (—)



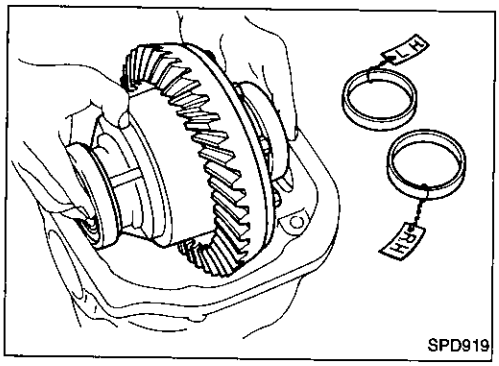
10. Install companion flange, and tighten pinion nut to specified torque with Tool.

Ascertain that threaded portion of drive pinion and pinion nut are free from oil or grease.
Tool number: ST38060002 (J34311)

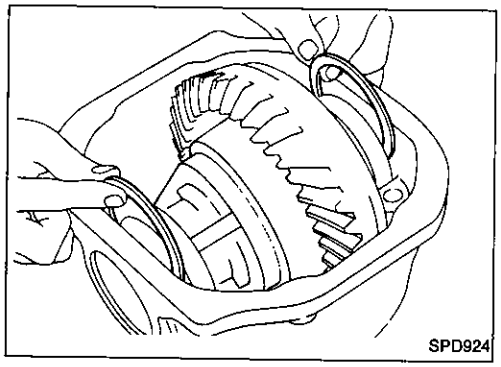


11. Turn drive pinion in both directions several times, and measure pinion bearing preload.
    Pinion bearing preload:
    1.1 - 1.4 N·m
    (11 - 14 kg-cm, 9.5 - 12.2 in-lb)

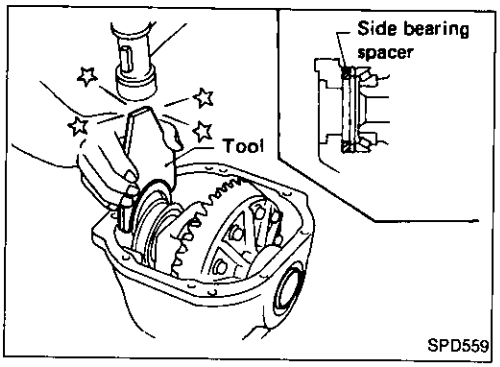
When pinion bearing preload is outside the specifications, replace pinion bearing adjusting washer and spacer with a different thickness.



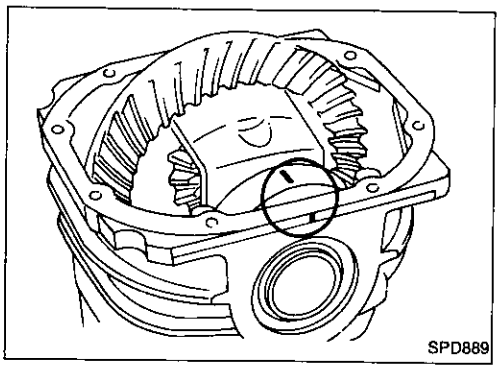
12. Select side bearing adjusting washer.
    Refer to ADJUSTMENT.
13. Install differential case assembly with side bearing outer races into gear carrier.



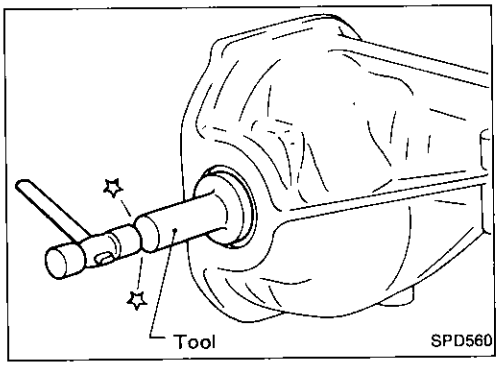
14. Insert left and right side bearing adjusting washers in place between side bearings and carrier.



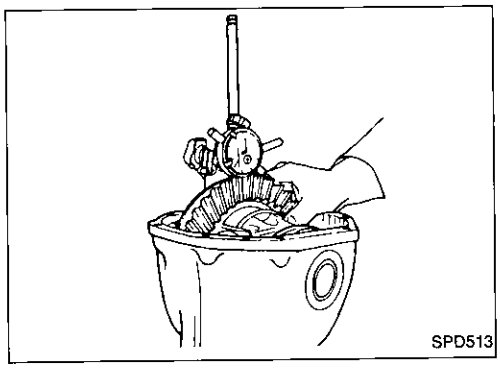
15. Drive in side bearing spacer with Tool.
    Tool number: KV38100600 (J25267)



16. Align mark on bearing cap with that on gear carrier and install bearing cap on gear carrier.



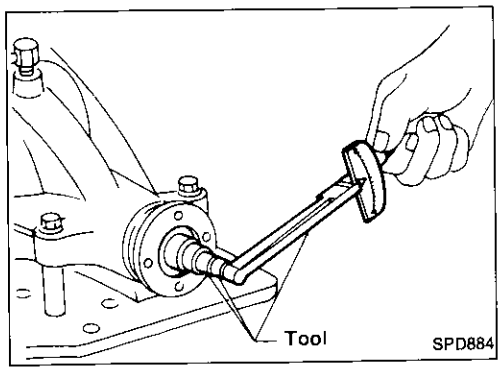
17. Install side oil seal.
    Tool number: KV38100200 (J26233)



18. Measure ring gear-to-drive pinion backlash with a dial indicator.
    Ring gear backlash:
    0.10 - 0.15 mm
    (0.0039 - 0.0059 in)

- If backlash is too small, 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.



19. Check total preload with Tool.

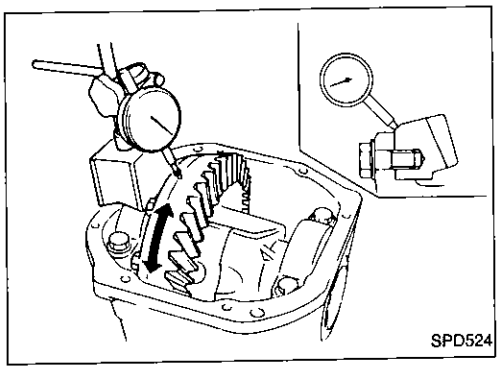
When checking preload, turn drive pinion in both directions several times to seat bearing rollers correctly.

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 to each side.
- If preload is too small, add the same amount of shim to each side.

Never add or remove a different number of shims for each side as it will change ring gear backlash.

20. Recheck ring gear backlash because increase or decrease in thickness of shims will cause change of ring gear-to-pinion backlash.



20. Check runout of ring gear with a dial indicator.
    Runout limit: 0.05 mm (0.0020 in)

- If backlash varies excessively in different places, foreign matter may be caught between the ring gear and the differential case.
- If the backlash varies greatly when the ring gear runout is within a specified range, replace the hypoid gear set or differential case.

21. Check tooth contact.
    Refer to ADJUSTMENT.
22. Install rear cover and gasket.

Propeller Shaft

GENERAL SPECIFICATIONS

Unit: mm (in)

Propeller shaft model	3S71C-R
Number of joints	3
Coupling method with transmission	Sleeve type
Type of journal bearings	Shell type (Non-disassembly type)
Shaft length (Spider to spider)	
1st	731 (28.78)
2nd	665 (26.18)
Shaft outer diameter	
1st	82.6 (3.252)
2nd	65.0 (2.559)

SPECIFICATIONS AND ADJUSTMENT

Unit: mm (in)

Propeller shaft runout limit	0.6 (0.024)
Journal axial play	0 (0)

Final Drive

GENERAL SPECIFICATIONS

Final drive model	R200V
Ring gear pitch diameter mm (in)	205 (8.07)
Gear ratio	3.916
Number of teeth (Ring gear/Drive pinion)	47/12
Oil capacity (approx.) ℓ (US pt, Imp pt)	1.5 (3-1/8, 2-5/8)
Number of pinion gears	4
Side gear bearing spacer location	Right

INSPECTION AND ADJUSTMENT (R200V)

Ring gear runout

Ring gear runout limit mm (in)	0.05 (0.0020)

Side gear adjustment

Clearance between side gear and differential case mm (in)	0.03 - 0.09 (0.0012 - 0.0035)

Final Drive (Cont'd)

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

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 N·m (kg-cm, in-lb)	1.1 - 1.4 (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 (0.0039 - 0.0059)
Total preload N·m (kg-cm, in-lb)	1.4 - 3.1 (14 - 32, 12 - 28)

Available side bearing adjusting washers

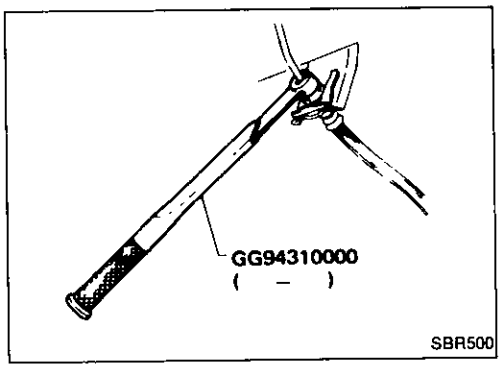
Thickness mm (in)	Part number
2.00 (0.0787)	38453-N3100
2.05 (0.0807)	38453-N3101
2.10 (0.0827)	38453-N3102
2.15 (0.0846)	38453-N3103
2.20 (0.0866)	38453-N3104
2.25 (0.0886)	38453-N3105
2.30 (0.0906)	38453-N3106
2.35 (0.0925)	38453-N3107
2.40 (0.0945)	38453-N3108
2.45 (0.0965)	38453-N3109
2.50 (0.0984)	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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FRONT AXLE AND FRONT SUSPENSION ..... FA- 4
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FRONT SUSPENSION FA-14
FRONT SUSPENSION — Coil Spring and Strut Assembly FA-15
FRONT SUSPENSION — Tension Rod and Stabilizer Bar FA-20
FRONT SUSPENSION — Transverse Link Assembly FA-21
SERVICE DATA AND SPECIFICATIONS (S.D.S.) FA-22

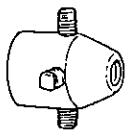
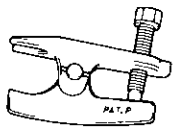
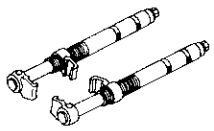
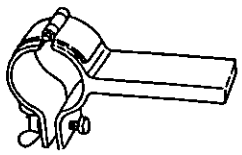
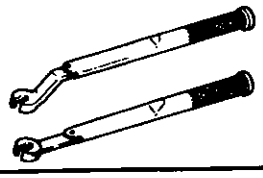


Precautions

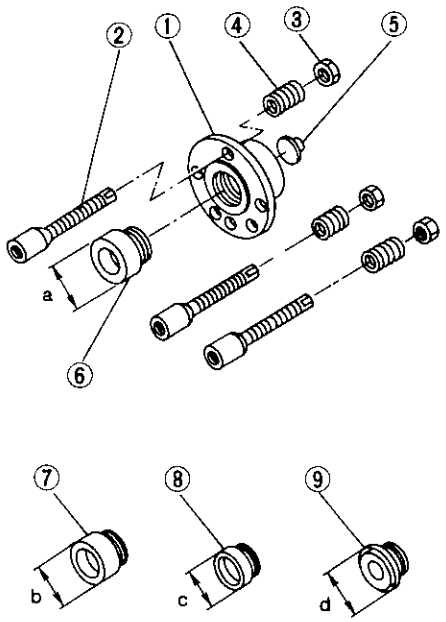
- **When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.**
  ***: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**
- **When removing each suspension part, check wheel alignment and adjust if necessary.**
- **Use Tool when removing or installing brake tubes.**

Preparation

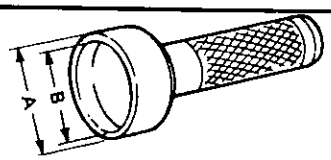
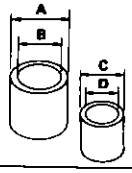
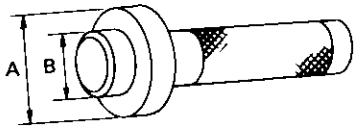
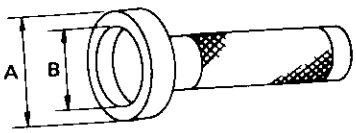
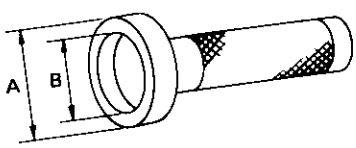
SPECIAL SERVICE TOOLS

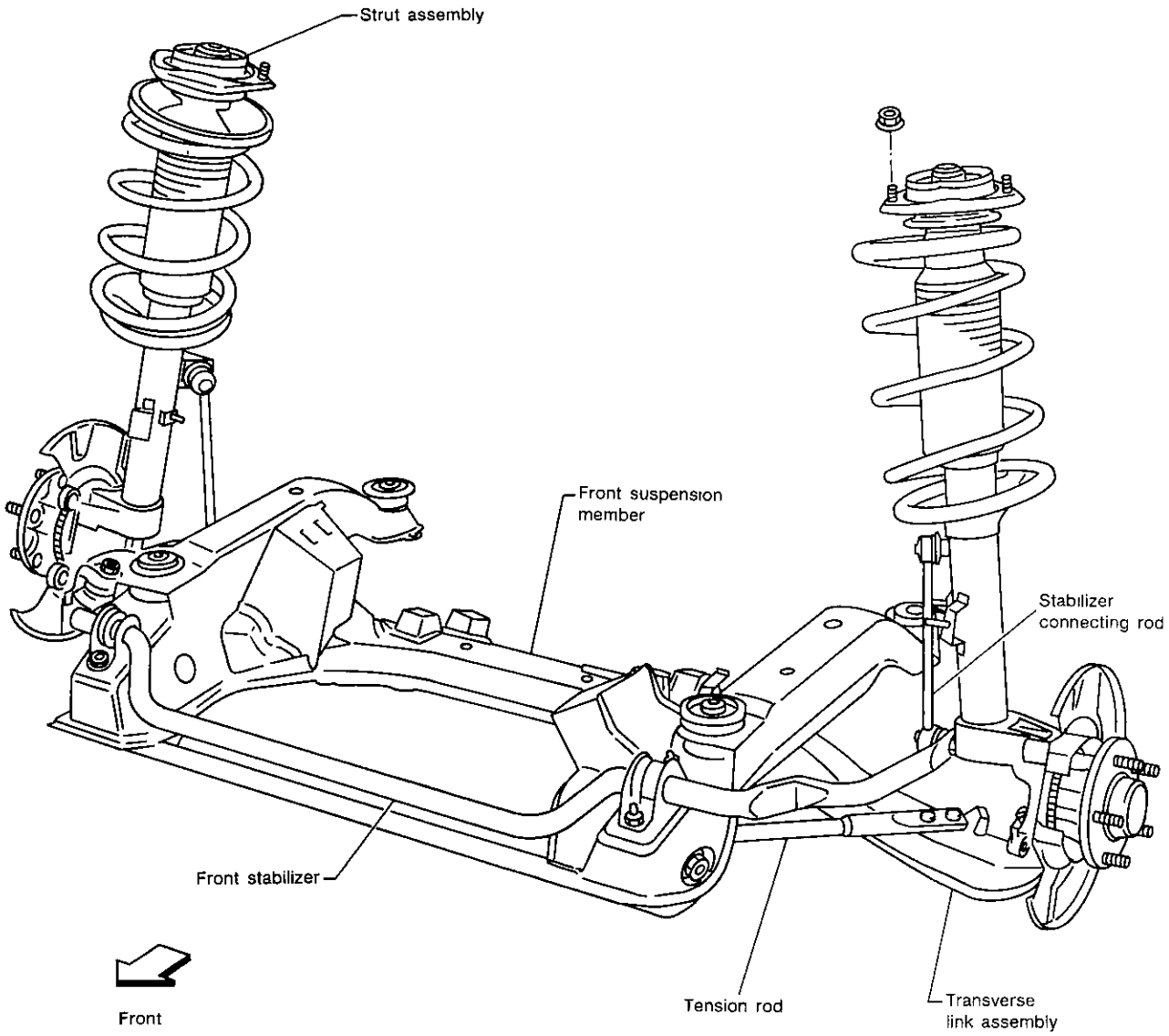
Tool number (Kent-Moore No.) Tool name	Description	
KV401021S0 (—) Bearing race drift		Installing wheel bearing outer race
HT72520000 (J25730-A) Ball joint remover		Removing tie-rod outer end and lower ball joint
HT71780000 (—) Spring compressor		Removing and installing coil spring
ST35652000 (—) Strut attachment		Fixing strut assembly
GG94310000 (—) Flare nut torque wrench		Removing and installing brake piping

Preparation (Cont'd)

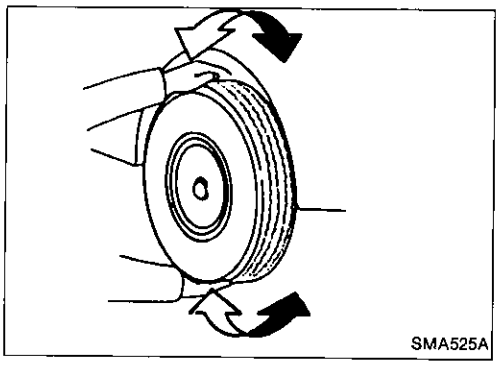
Tool number (Kent-Moore No.) Tool name	Description
KV991040S0 C.C.K. holder KV99104010 Attachment set ① Plate ② Guide bolts ③ Nuts ④ Springs ⑤ Center plate ⑥ KV99104020 Adapter A ⑦ KV99104030 Adapter B ⑧ KV99104040 Adapter C ⑨ KV99104050 Adapter D	 Attaching wheel alignment gauge **a: 72 mm (2.83 in) dia.** **b: 65 mm (2.56 in) dia.** **c: 57 mm (2.24 in) dia.** **d: 53.4 mm (2.102 in) dia.**

COMMERCIAL SERVICE TOOLS

Tool name	Description
Front axle grease seal drift	 Installing front axle grease seal **A: 70 mm (2.76 in) dia.** **B: 60 mm (2.36 in) dia.**
Tension rod bushing drift	 Removing and installing tension rod bushing **A: 75 mm (2.95 in) dia.** **B: 66 mm (2.60 in) dia.** **C: 62 mm (2.44 in) dia.** **D: 25 - 55 mm (0.98 - 2.17 in) dia.**
Wheel bearing drift	 Removing wheel bearing **A: 49 mm (1.93 in) dia.** **B: 41 mm (1.61 in) dia.**
Wheel bearing drift	 Installing wheel bearing **A: 79 mm (3.11 in) dia.** **B: 59 mm (2.32 in) dia.**
Cap drift	 Installing hub cap **A: 77 mm (3.03 in) dia.** **B: 55.5 mm (2.185 in) dia.**


Strut assembly
Front suspension member
Stabilizer connecting rod
Front stabilizer
Front
Tension rod
Transverse link assembly

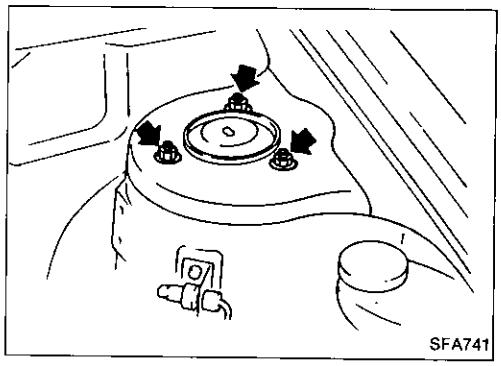
SFA354B


SMA525A

Front Axle and Front Suspension Parts

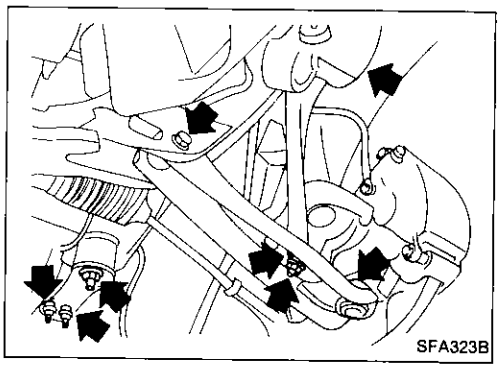
Check front axle and front suspension parts for looseness, cracks, wear or other damage.

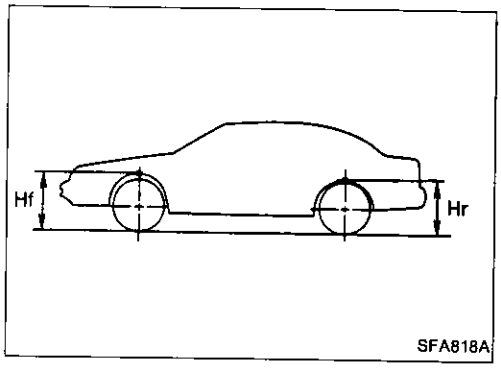
- Shake each front wheel to check for excessive play.


SFA741

- Make sure that cotter pin is inserted.
- Retighten all nuts and bolts to the specified torque.

Tightening torque:
Refer to FRONT SUSPENSION.


SFA323B



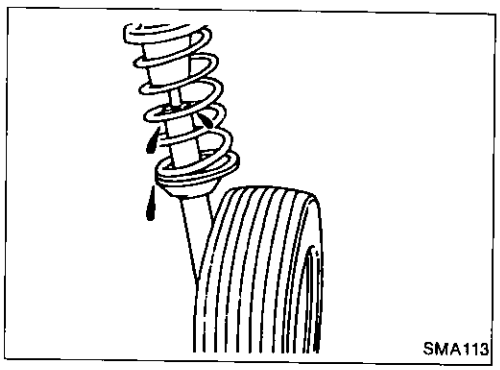
SFA818A

- Check spring height from top of wheelarch to ground.

(1) Vehicle must be unladen*, parked on a level surface, and tires checked for proper inflation and wear (tread wear indicator must not be showing).
*: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

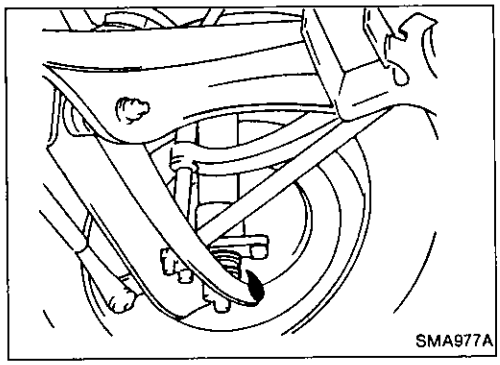
(2) Bounce vehicle up and down several times before measuring.
Standard height: Refer to S.D.S.

(3) Spring height is not adjustable. If out of specification, check for worn springs or suspension parts.

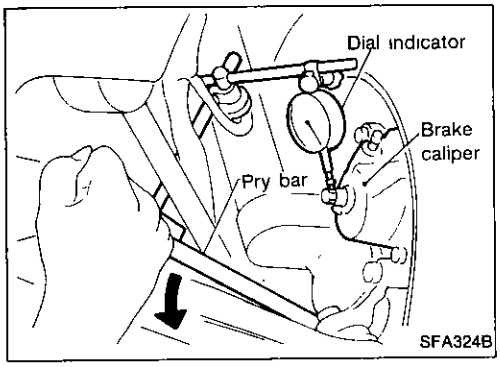

SMA113

- Check strut (Shock absorber) for oil leakage or damage.

Front Axle and Front Suspension Parts (Cont'd)



- Check suspension ball joint for grease leakage and ball joint dust cover for cracks or other damage.

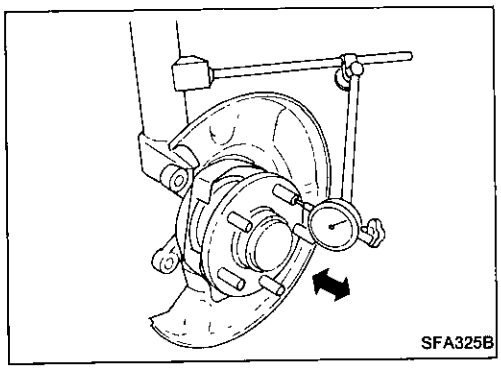


- Check suspension ball joint end play.

(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:
0.1 - 1.3 mm (0.004 - 0.051 in)

(6) If ball joint movement is beyond specifications, remove and recheck it.



Front Wheel Bearing

Check that wheel bearings operate smoothly, as well as axial end play and grease leakage.

Axial end play limit: 0 mm (0 in)

PRELOAD ADJUSTMENT

Be sure to adjust wheel bearing preload as described below after wheel bearing has been replaced or front axle has been reassembled.

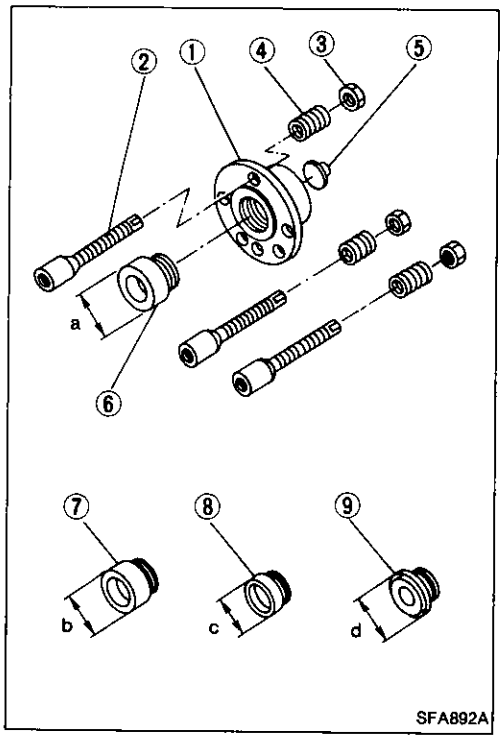
1. Before adjustment, thoroughly clean all parts to prevent dirt entry.

Front Wheel Alignment

CAMBER, CASTER AND KINGPIN INCLINATION

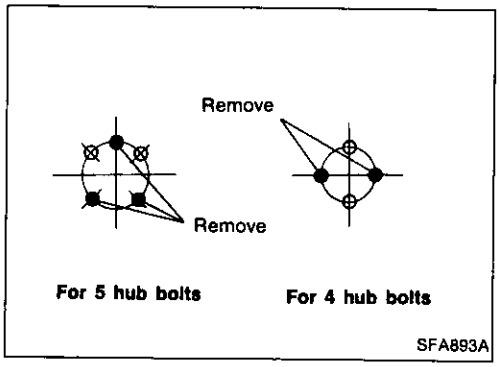
Camber, caster and kingpin inclination are preset at factory and cannot be adjusted.

1. Set vehicle on turning radius gauge.

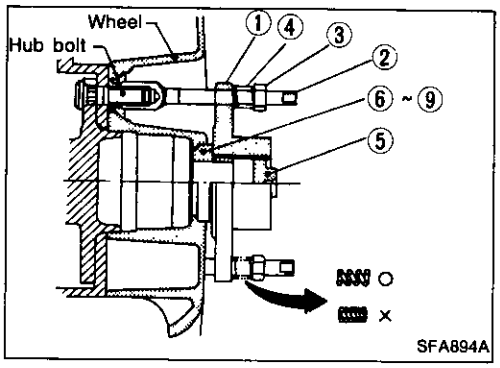


2. Mount Tool as follows.
   Tool number:
   KV99104050
   KV99104010 ① to ⑤
   KV99104020 ⑥
   KV99104030 ⑦
   KV99104040 ⑧
   KV99104050 ⑨

a. Select adapter which corresponds with wheel or hub shape from four types ⑥ to ⑨.
b. Screw selected adapter in until it contacts plate ①.



c. Remove wheel nuts.

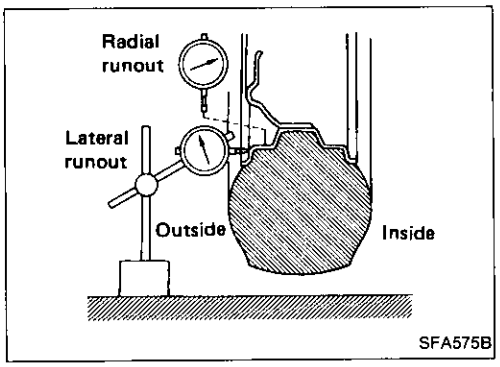


d. Install guide bolts ② to where wheel nuts were removed and tighten them by hand.
e. Install plate and adapter assembly to guide bolts ②.
f. Install springs ④ onto guide bolts ②. Then tighten nuts ③ evenly until a little before springs ④ are completely compressed.
g. Install center plate ⑤.
h. Mount wheel alignment gauge on attachment plate.

Front Wheel Alignment (Cont'd)

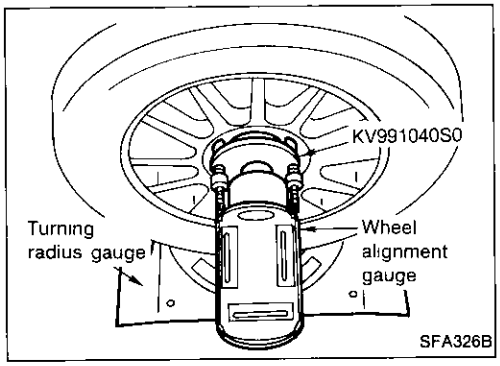
Before checking front wheel alignment, be sure to make a preliminary inspection (Unladen*).

*: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.



PRELIMINARY INSPECTION

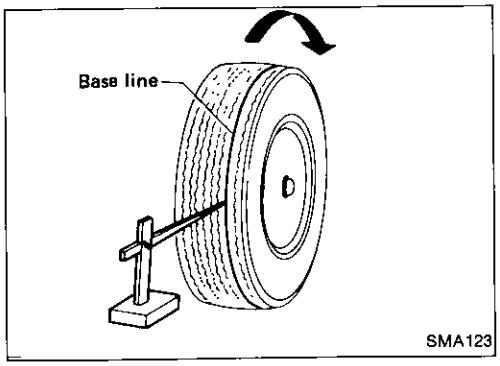
1. Check tires for wear and improper inflation.
2. Check wheel runout.
   Wheel runout:
   Refer to S.D.S.
3. Check front wheel bearings for looseness.
4. Check front suspension for looseness.
5. Check steering linkage for looseness.
6. Check that front shock absorbers work properly by using the standard bounce test.
7. Check vehicle posture (Unladen).



CAMBER, CASTER AND KINGPIN INCLINATION

Camber, caster and kingpin inclination are preset at factory and cannot be adjusted.

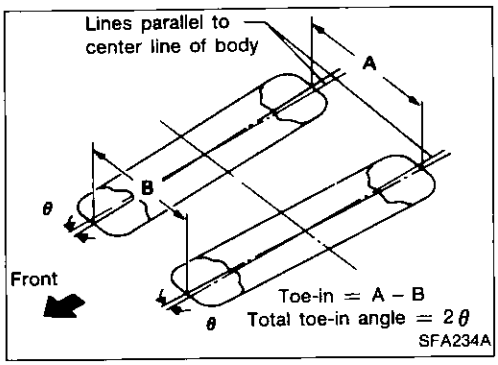
1. Measure camber, caster and kingpin inclination of both right and left wheels with a suitable alignment gauge.
   Camber, Caster and Kingpin inclination:
   Refer to S.D.S.
2. If camber, caster and kingpin inclination are not within specification, inspect and replace any damaged or worn front suspension parts.



TOE-IN

1. Draw a base line across the tread.

- After lowering front of vehicle, move it up and down to eliminate friction, and set steering wheel in straight-ahead position.

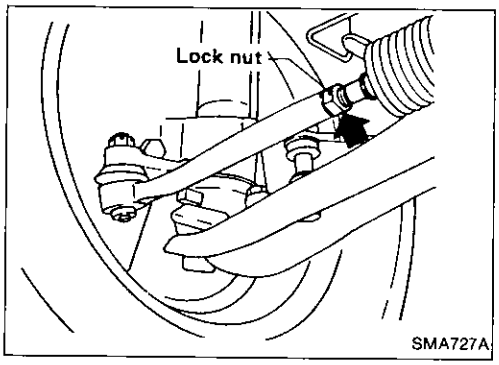


2. Measure toe-in.

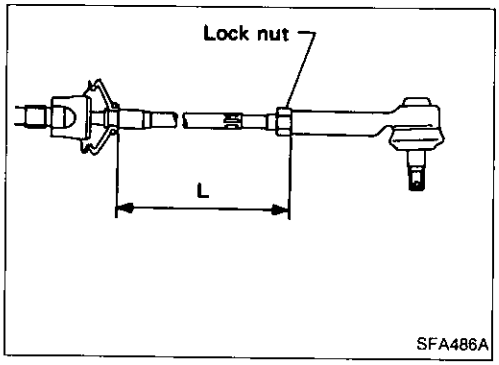
- Measure distance "A" and "B" at the same height as hub center.

Toe-in:
Refer to S.D.S.

Front Wheel Alignment (Cont'd)

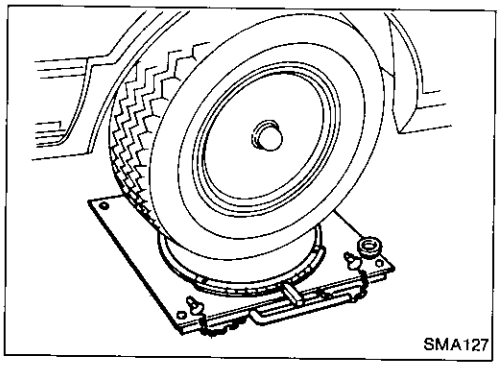


3. Adjust toe-in by varying the length of steering tie-rods.
(1) Loosen lock nuts.
(2) Adjust toe-in by screwing tie-rods in and out.



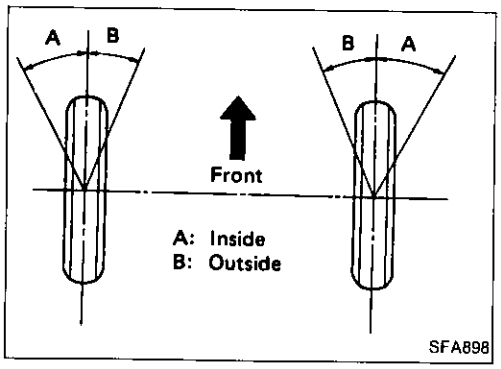
Standard length "L":
Refer to section ST.

(3) Tighten lock nuts to specified torque.
Lock nut tightening torque:
Refer to section ST.

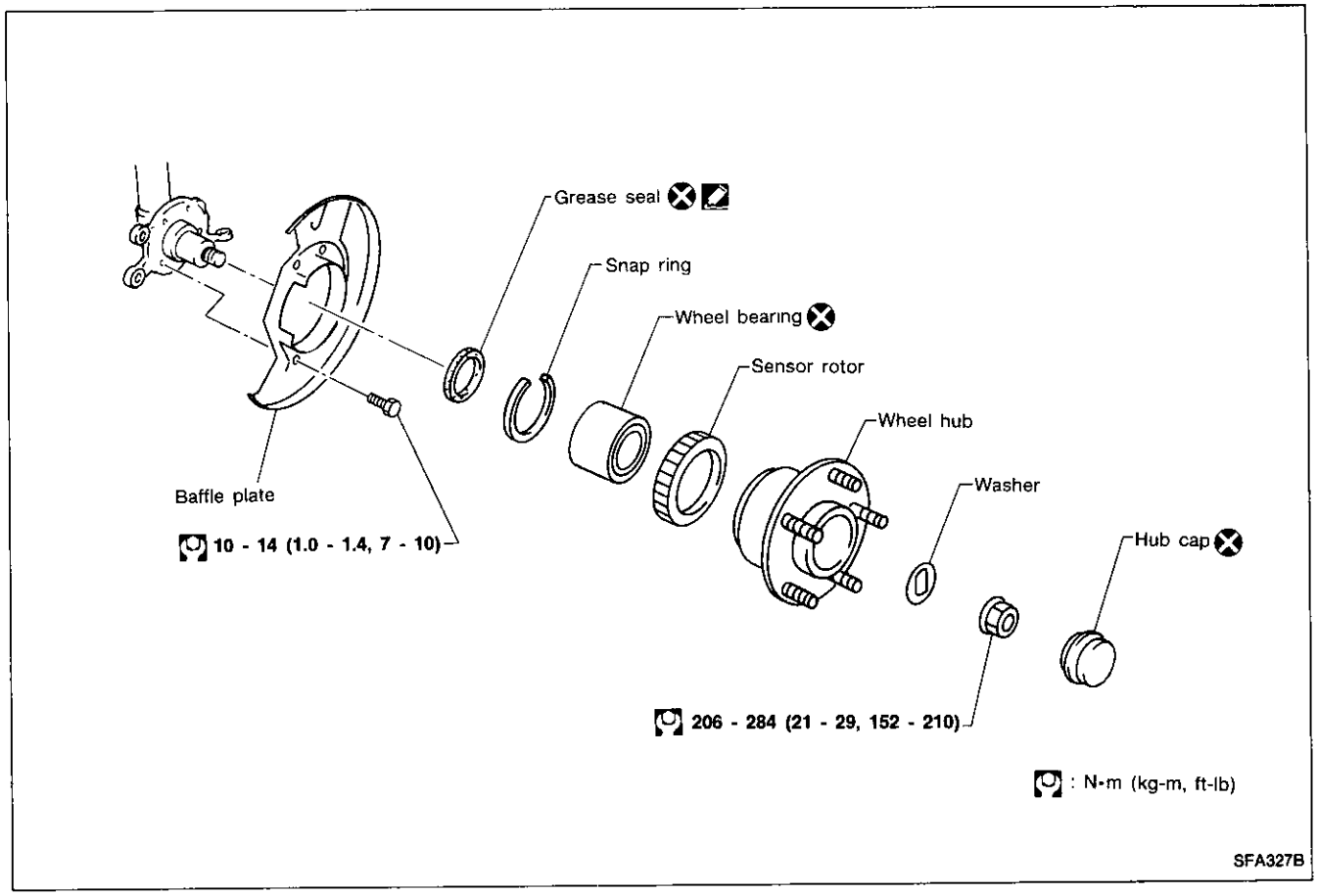


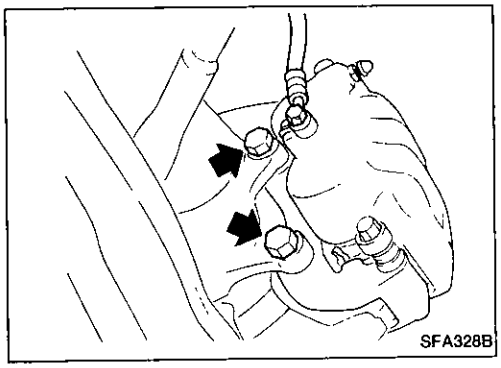
FRONT WHEEL TURNING ANGLE

1. Set wheels in straight-ahead position and 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.
Wheel turning angle (Full turn):
Inside wheel: 35°20' - 39°20'
Outside wheel: 31°50'

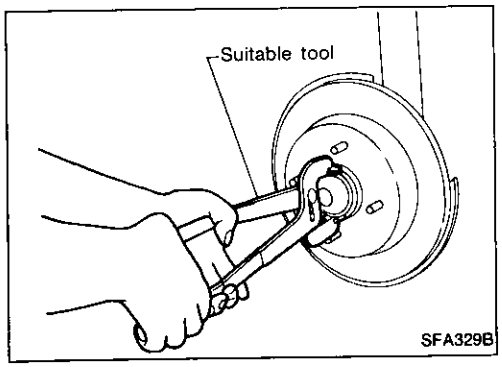




Removal

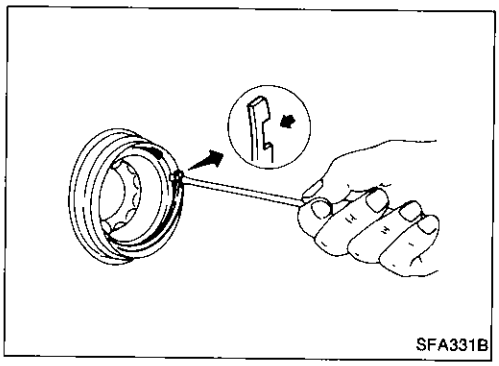
- Remove brake caliper assembly and rotor.

Brake hose need not be disconnected from brake caliper. Be careful not to depress brake pedal, or piston will pop out. Do not pull or twist brake hose.

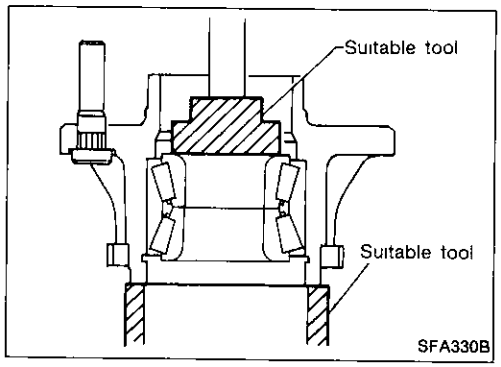


- Remove wheel hub from spindle.

Removal (Cont'd)



- Remove grease seal.
- Remove snap ring.



- Press out bearing and race as a set.

Inspection

WHEEL BEARING

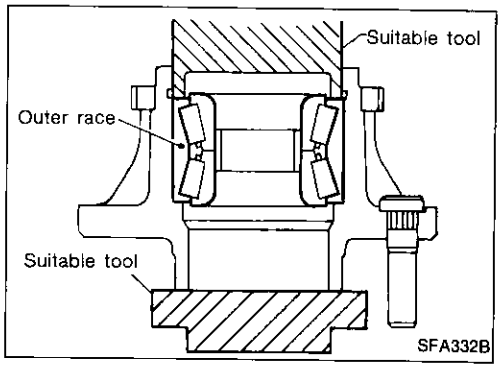
Check wheel bearing to see that it rolls freely and is free from noise, crack, pitting, or wear, and replace if damaged.

WHEEL HUB

Check wheel hub for crack by a magnetic exploration or dyeing test, and replace if cracked.

KNUCKLE SPINDLE

Check knuckle spindle for deformation, tapping mark, or cracks (by magnetic or dyeing test) and replace if damaged.



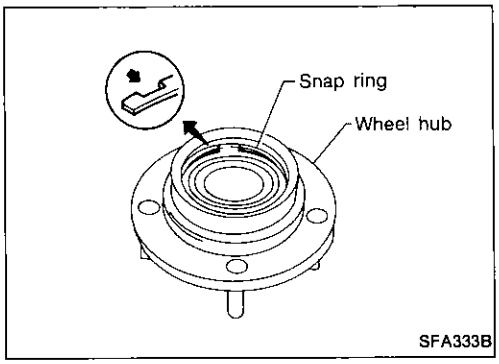
Installation

- Press new wheel bearing assembly into wheel hub.
  Maximum load P:
  29 kN (3 ton, 3.3 US ton, 3.0 Imp ton)

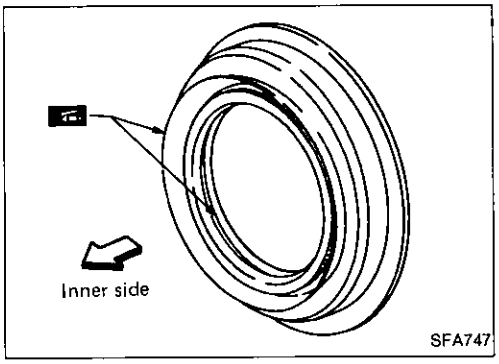
CAUTION:

- **Do not press inner race of wheel bearing assembly.**
- **Do not apply oil or grease to mating surfaces of wheel bearing outer race and wheel hub.**

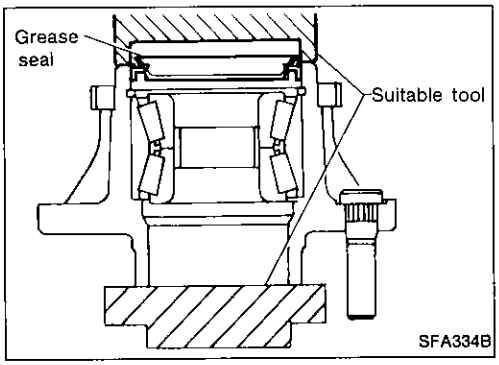
Installation (Cont'd)



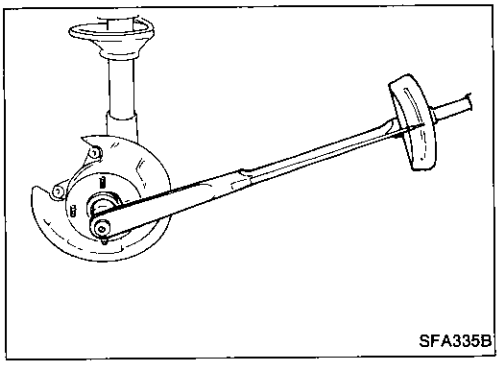
- Install snap ring.



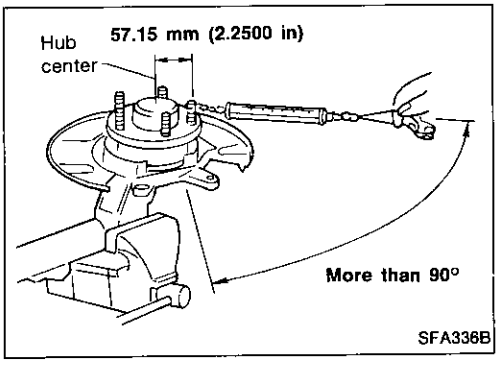
- Pack grease seal lip with recommended multi-purpose grease.



- Install grease seal.



- Install wheel hub.
- Tighten wheel bearing lock nut to the specified torque.

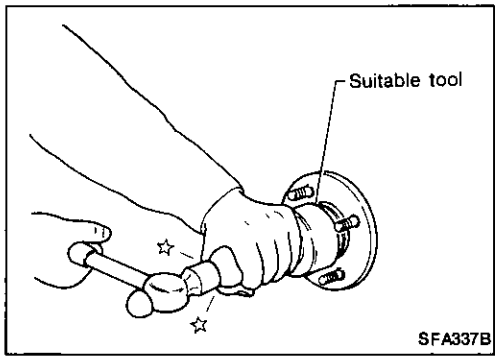


- Turn wheel hub several times in both directions to seat wheel bearing correctly.
- Attach spring balance to wheel hub bolt (as shown at left) and pull it at a speed of 10 rpm to measure rotation torque.

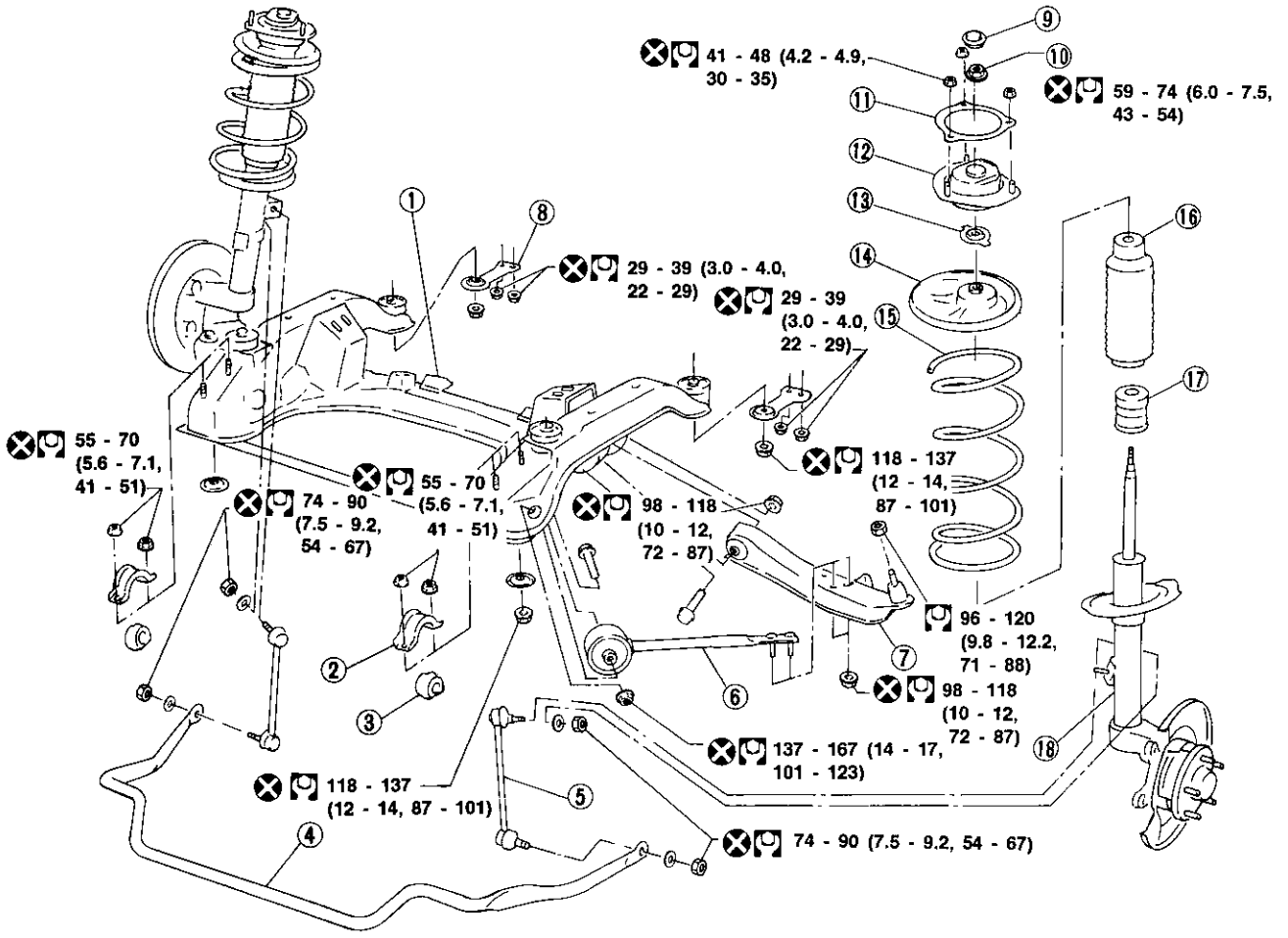
Rotation torque:
0.25 - 2.11 N·m (2.5 - 21.5 kg-cm, 2.2 - 18.9 in-lb)
Spring balance indication:
3.9 - 37.3 N (0.4 - 3.8 kg, 0.9 - 8.4 lb)

If bearing preload does not meet the specification, replace wheel bearing assembly.

Installation (Cont'd)



- Clinch lock nut using standard screwdriver and install hub cap using a suitable tool.
- Install strut.
  Refer to "FRONT SUSPENSION — Coil Spring and Strut Assembly".

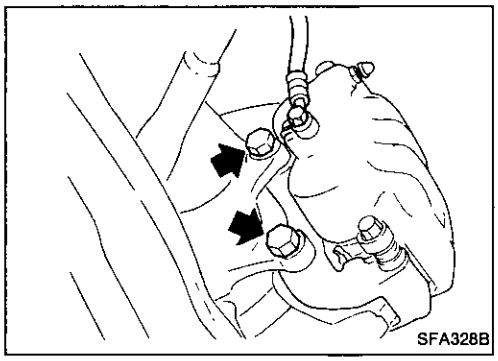


- When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.
  * Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

: N·m (kg-m, ft-lb)

SFA338B

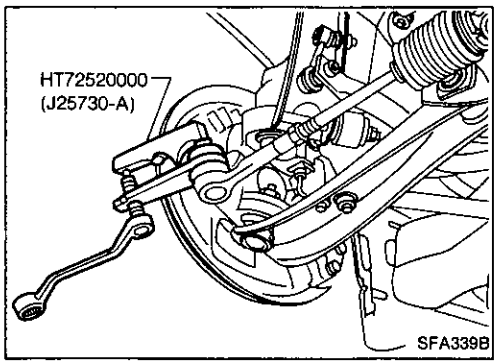
① Front suspension member
② Stabilizer bar clamp
③ Bushing
④ Stabilizer bar
⑤ Stabilizer connecting rod
⑥ Tension rod
⑦ Transverse link
⑧ Member stay
⑨ Cap
⑩ Lock nut
⑪ Gasket
⑫ Strut mounting insulator
⑬ Upper plate
⑭ Spring upper seat
⑮ Coil spring
⑯ Dust cover
⑰ Bound bumper
⑱ Strut assembly



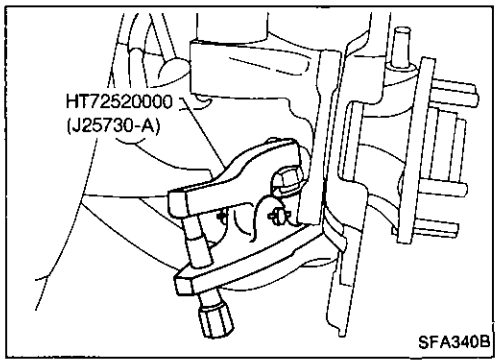
Removal and Installation

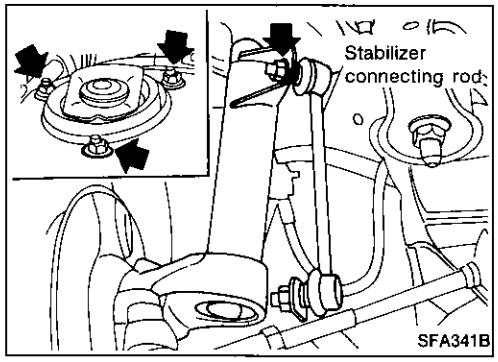
- Remove brake caliper assembly and rotor.

Brake hose need not be disconnected from brake caliper. Be careful not to depress brake pedal, or piston will pop out. Do not pull or twist brake hose.

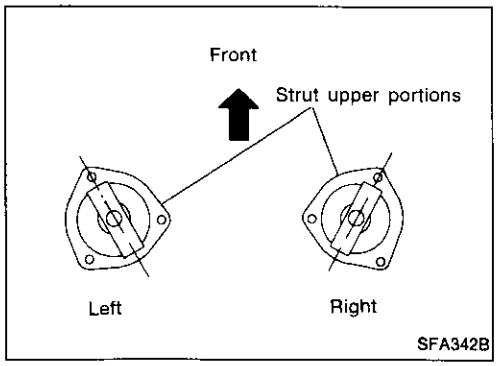


- Remove tie-rod ball joint and lower ball joint with Tool.

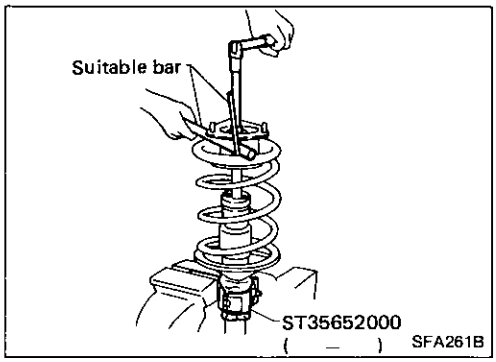




- Remove stabilizer connecting rod upper nut, separate strut assembly and stabilizer connecting rod.
- Remove strut assembly upper nuts.



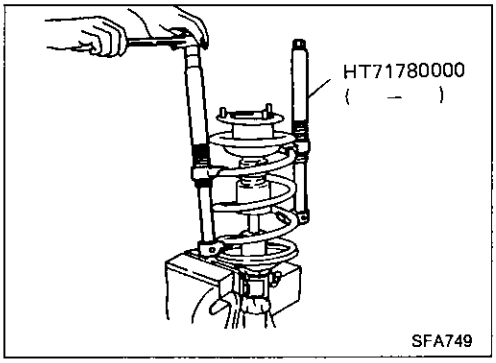
- To install, reverse above removal procedures.
  Installation position of upper end of strut is shown at left.



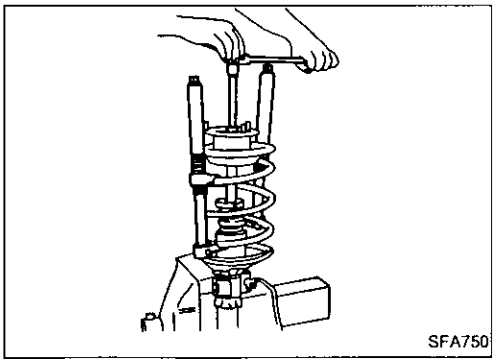
Disassembly

1. Set strut assembly on vice with attachment, then loosen piston rod lock nut.

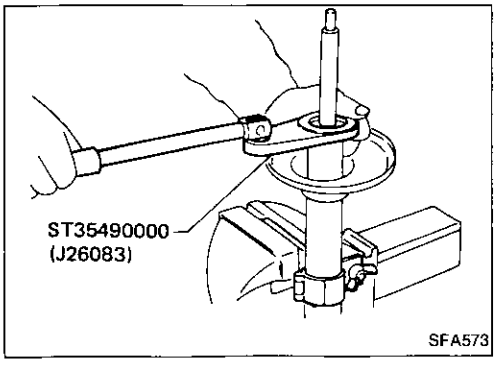
Do not remove piston rod lock nut.



2. Compress spring with Tool so as to permit turning of strut mounting insulator by hand.



3. Remove piston rod lock nut. Then remove coil spring.



4. Remove gland packing with Tool.

- **Avoid dirt and dust getting into gland packing portion.**

5. Retract piston rod by pushing it down until it bottoms. Then, slowly withdraw piston rod from cylinder together with piston guide.

Inspection

Wash all parts, except for nonmetallic parts, clean with suitable solvent and dry with compressed air.
Blow dirt and dust off of nonmetallic parts using compressed air.

STRUT ASSEMBLY

- Oil oozing out around gland packing does not need strut replacement.
  If oil leakage is evident on spring seat, check piston rod gland packing and O-ring.
  If oil leakage occurs on welded portion of outer strut casing, replace strut assembly.
- If shock absorber itself is malfunctioning, replace as shock absorber kit.

GLAND PACKING

Check gland packing for oil leakage. Replace gland packing if necessary.

STRUT MOUNTING INSULATOR

Check cemented rubber-to-metal portion for melting or cracks. Check rubber parts for deterioration. Replace if necessary.

THRUST SEAT

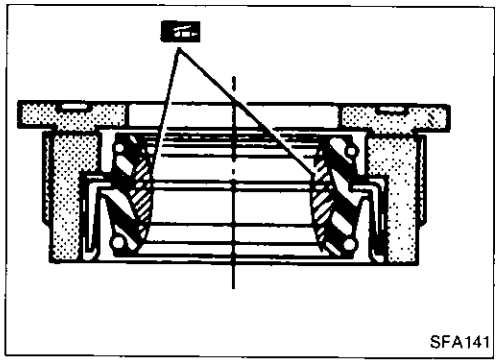
Check for cracks, deformation or other damage. Replace if necessary.

COIL SPRING

Check for cracks, deformation or other damage. Replace if necessary.

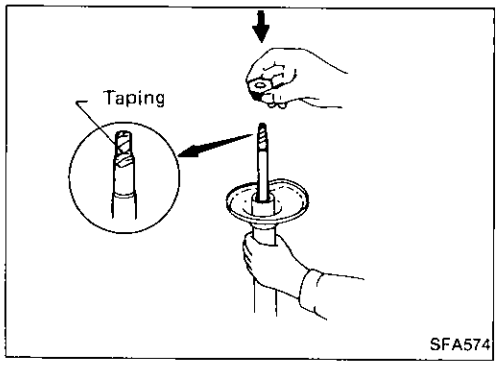
Assembly

- Lubricate sealing lip of gland packing.


SFA141

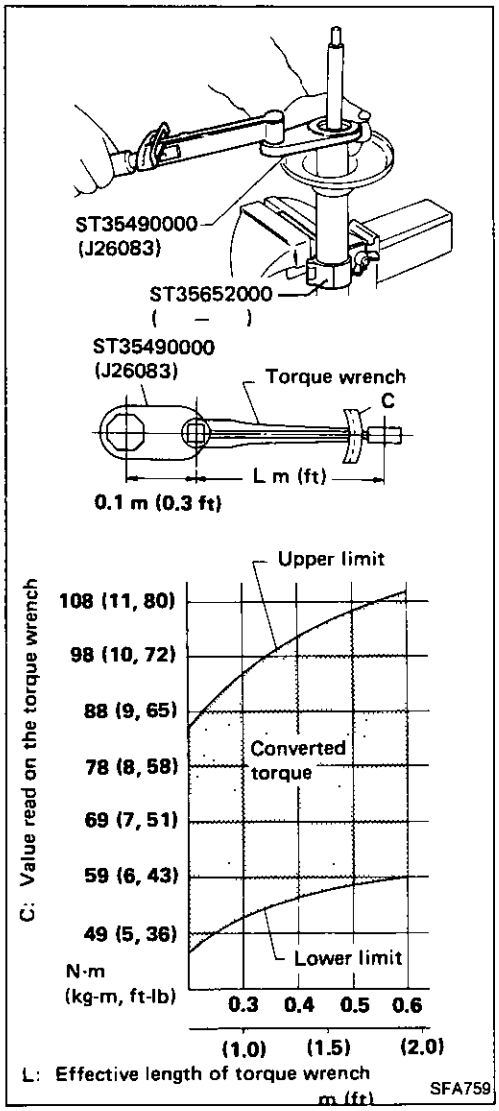
- Install gland packing.

Cover piston rod with tape so as not to damage oil sealing lip.

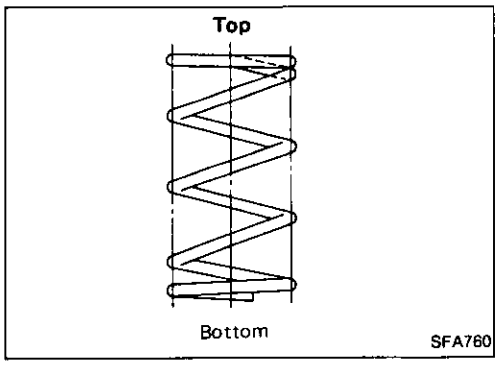


SFA574

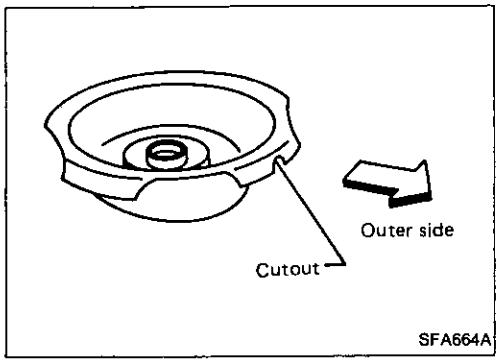
Assembly (Cont'd)



- Tighten gland packing to the specified torque (refer to chart at left) with Tool.

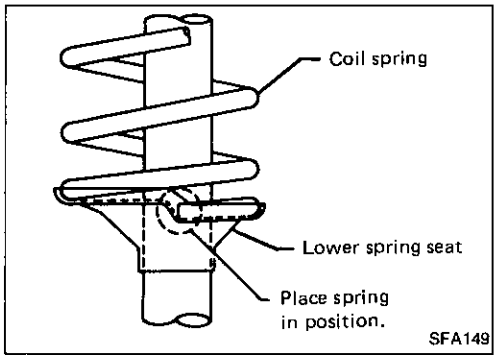


- When installing coil spring, be careful not to reverse top and bottom direction. (top end is flat.)

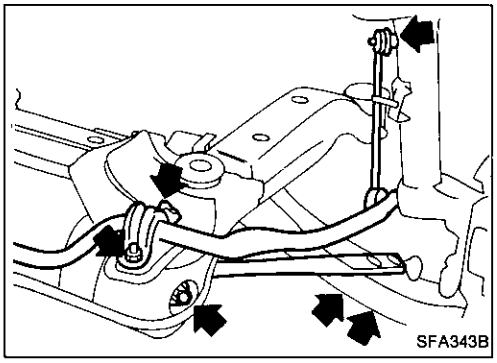


- Install upper spring seat with its cutout facing the outer side of vehicle.

Assembly (Cont'd)

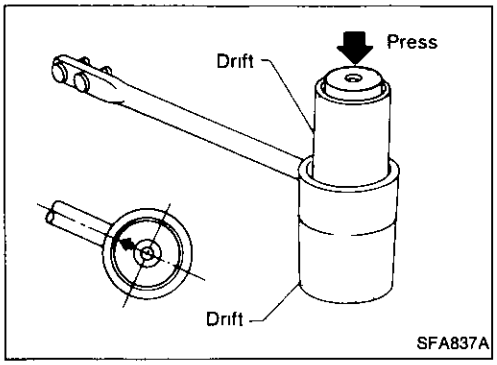


After placing spring in position on lower spring seat, release spring compressor gradually.

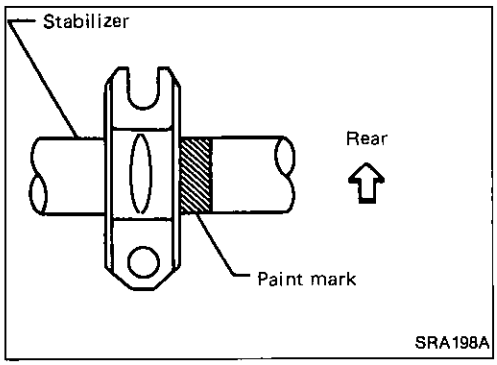


Removal and Installation

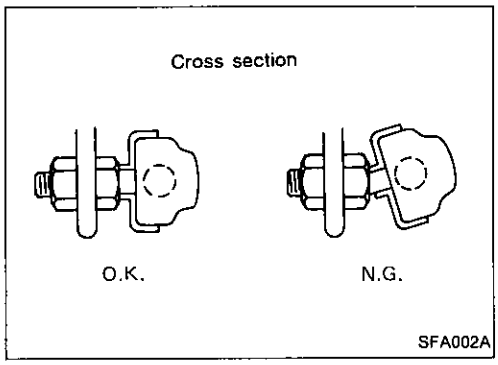
- Remove tension rod and stabilizer bar.



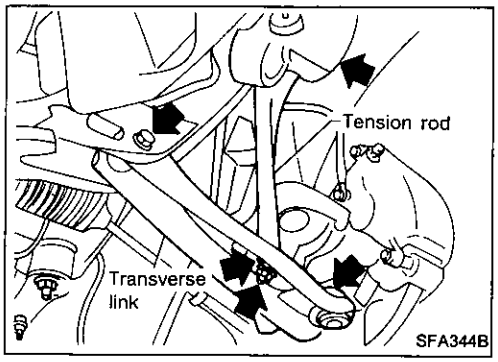
- When removing tension rod bushing, place one drift on lower side of bushing and the other on upper side, as shown at left, and press bushing out.
- Place arrow mark on bushing facing tension rod before installing bushing.



- When installing stabilizer, make sure that paint mark and clamp face in their correct directions.

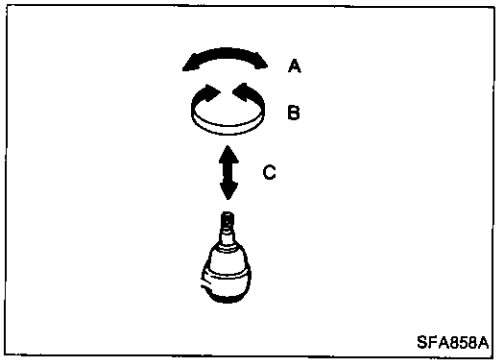


- Install stabilizer bar with ball joint socket properly placed.



Removal and Installation

- Separate suspension ball joint from knuckle arm.
- Remove tension rod and transverse link assembly.



Inspection

- Check tension rod, stabilizer bar and transverse link for damage, cracks, deformation; replace transverse link assembly if necessary.
- Check rubber bushing for damage, cracks and deformation; replace tension rod or transverse link assembly if necessary.
- Check ball joint for play. If ball stud is worn, play in axial direction is excessive or joint is hard to swing, replace lower ball joint.
  Before checking, turn ball joint at least 10 revolutions so that ball joint is properly broken in.
  Swinging force:
  Refer to S.D.S.
  Turning torque:
  Refer to S.D.S.
  Vertical end play:
  Refer to S.D.S.
- Check dust cover for damage. Replace it and cover clamp if necessary.

General Specifications

COIL SPRING

Applied model	Without HICAS	With HICAS
Wire diameter mm (in)	14.6 (0.575)	14.2 (0.559)
Coil diameter mm (in)	170.1 (6.70)	169.7 (6.68)
Free length mm (in)	430.0 (16.93)	410.0 (16.14)
Spring constant N/mm (kg/mm, lb/in)	19.6 (2.0, 112)	21.6 (2.2, 123)
Identification color	Red x 1, Blue x 1	Orange x 1, Purple x 1

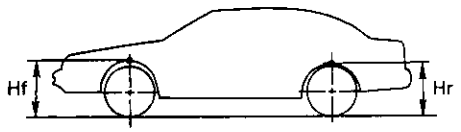
SHOCK ABSORBER (STRUT)

Applied model	All
Piston rod diameter mm (in)	25.0 (0.984)
Damping force [at 0.3 m (1.0 ft)/sec.] N (kg, lb)	
Expansion	618 - 853 (63 - 87, 139 - 192)
Compression	196 - 314 (20 - 32, 44 - 71)

FRONT STABILIZER BAR

Applied model	Without HICAS	With HICAS
Stabilizer diameter mm (in)	25 (0.98)	24 (0.94)
Identification color	Blue	Red

WHEELARCH HEIGHT (Unladen*)



SFA818A

Applied model	Without HICAS	With HICAS
Front (Hf) mm (in)	697 (27.44)	696 (27.40)
Rear (Hr) mm (in)	681 (26.81)	680 (26.77)

*: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

TENSION ROD

Rod diameter	mm (in)	20 (0.79)

Inspection and Adjustment

WHEEL ALIGNMENT (Unladen*1)

Camber	degree	–1°30′ to 0°
Caster	degree	5°50′ - 7°20′
Kingpin inclination	degree	12°40′ - 14°10′
Toe-in		
A – B	mm (in)	0 - 2 (0 - 0.08)
Total angle 2θ	degree	0′ - 10′
Front wheel turning angle*2	degree	
Inside		35°20′ - 39°20′
Outside		31°50′

*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 end play limit	mm (in)	0 (0)
Wheel bearing lock nut tightening torque	N·m (kg-m, ft-lb)	206 - 284 (21 - 29, 152 - 210)
Maximum wheel bearing preload measured at wheel hub bolt	N (kg, lb)	37.3 (3.8, 8.4)

LOWER BALL JOINT

Swinging force at cotter pin hole	N (kg, lb)	8.8 - 59.8 (0.9 - 6.1, 2.0 - 13.5)
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 RUNOUT (Radial and lateral)

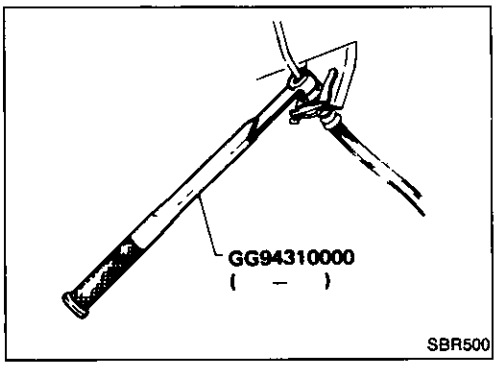
Wheel type		Aluminum wheel
Radial runout limit	mm (in)	0.3 (0.012)
Lateral runout limit	mm (in)	

REAR AXLE & REAR SUSPENSION

SECTION RA

CONTENTS

PRECAUTIONS AND PREPARATION ..... RA- 2
REAR AXLE AND REAR SUSPENSION ..... RA- 4
ON-VEHICLE SERVICE ..... RA- 5
REAR AXLE ..... RA- 8
REAR AXLE — Wheel Hub and Axle Housing RA-10
REAR AXLE — Drive Shaft RA-13
REAR SUSPENSION RA-20
REAR SUSPENSION — Coil Spring and Shock Absorber RA-22
REAR SUSPENSION — Multi-link and Lower Ball Joint RA-24
REAR SUSPENSION — Stabilizer Bar RA-27
SUPER HICAS RA-28
SERVICE DATA AND SPECIFICATIONS (S.D.S.) RA-30

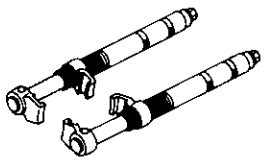
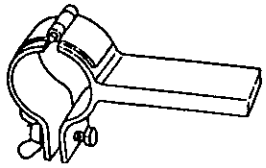
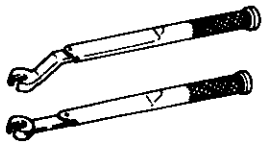
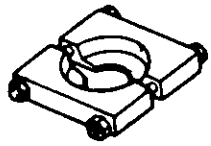
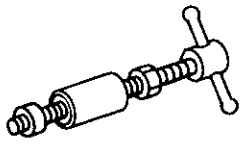


Precautions

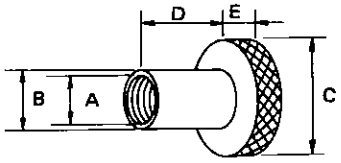
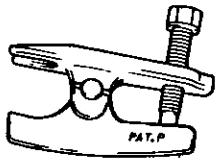
- **When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.**
  *** Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**
- **Use Tool when removing or installing brake lines.**
- **When removing each suspension part, check wheel alignment and adjust if necessary.**
- **Do not jack up at the lower arm.**

Preparation

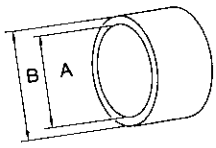
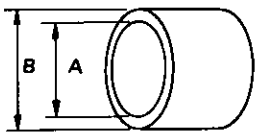
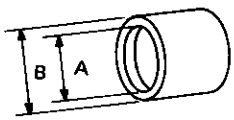
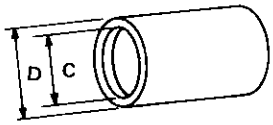
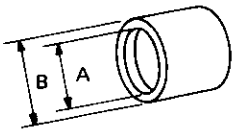
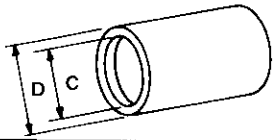
SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description	
HT71780000 (—) Spring compressor		Removing and installing coil spring
ST35652000 (—) Shock absorber attachment		Fixing strut assembly
GG94310000 (—) Flare nut torque wrench		Removing and installing brake piping
ST30031000 (J22912-01) Bearing puller		Removing inner race of wheel bearing
ST38280000 (—) Arm bushing remover		Removing and installing rear axle housing bushing

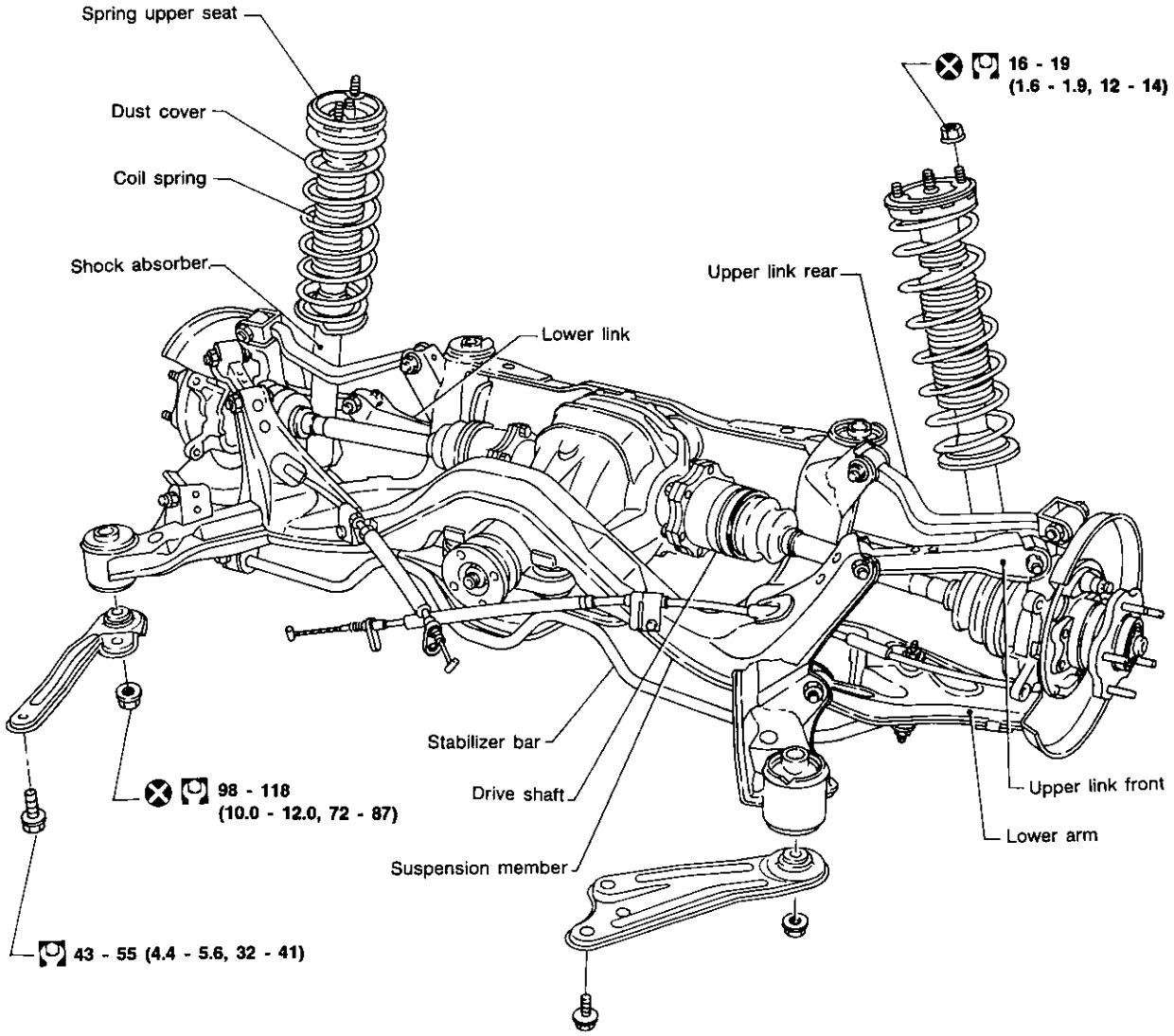
Preparation (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
IM23600800 (—) Attachment		Measure rear wheel alignment **A: Screw M24 x 1.5** **B: 35 (1.38) dia.** **C: 65 (2.56) dia.** **D: 56 (2.20)** **E: 12 (0.47)** Unit: mm (in)
HT72520000 (J25730-A) Ball joint remover		Removing tie-rod outer end and lower ball joint

COMMERCIAL SERVICE TOOLS

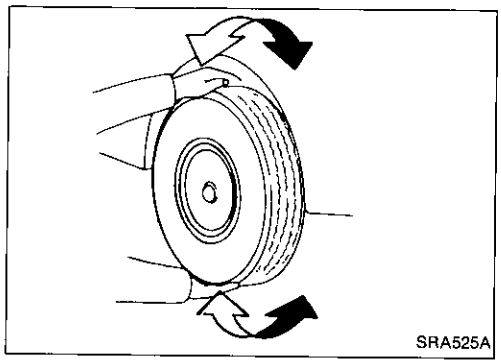
Tool name	Description	
Rear wheel bearing drift		Installing wheel bearing **A: 68.5 mm (2.697 in) dia.** **B: 76 mm (2.99 in) dia.**
Rear drive shaft plug seal drift		Installing rear drive shaft plug seal **A: 72 mm (2.83 in) dia.** **B: 78 mm (3.07 in) dia.**
Rear axle housing ball joint drift	 	Removing ball joint **A: 20 (0.79) dia.** **B: 28 (1.10) dia.** **C: 40 (1.57) dia.** **D: 43 (1.69) dia.** Unit: mm (in)
Rear axle housing ball joint drift	 	Installing ball joint **A: 33 (1.30) dia.** **B: 43 (1.69) dia.** **C: 30 (1.18) dia.** **D: 40 (1.57) dia.** Unit: mm (in)

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.
For models equipped with SUPER HICAS system, refer to "SUPER HICAS".



: N•m (kg-m, ft-lb)

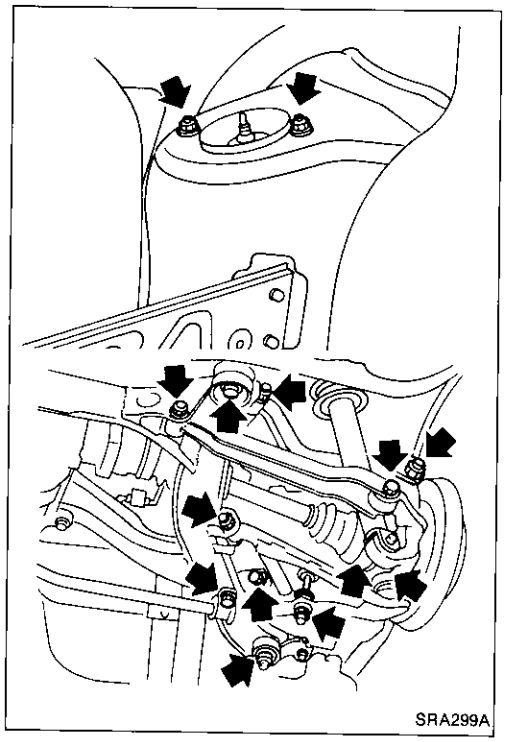
SRA534A


SRA525A

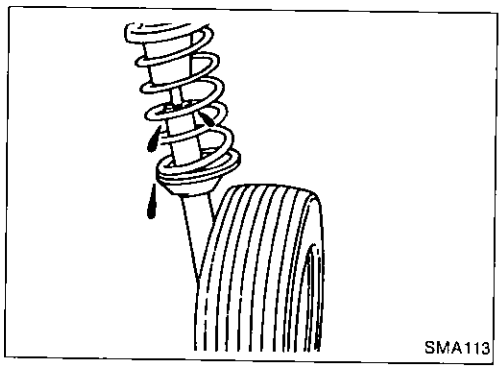
Rear Axle and Rear Suspension Parts

Check axle and suspension parts for looseness, wear or damage.

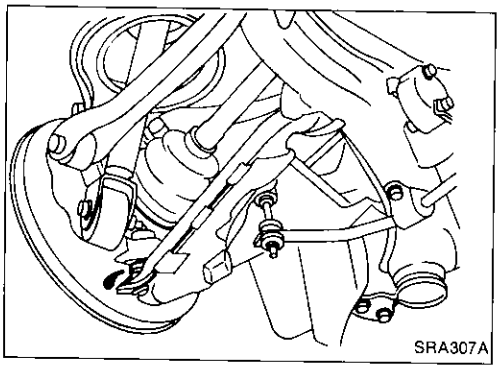
- Shake each rear wheel to check for excessive play.


SRA299A

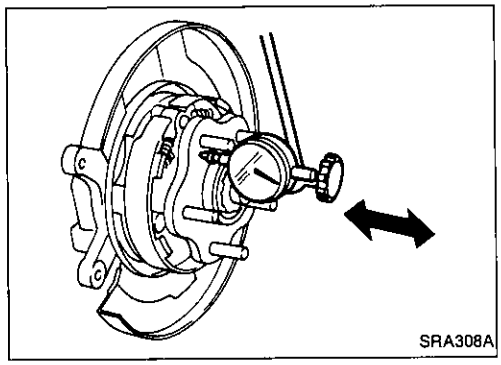
- Retighten all nuts and bolts to the specified torque.
  Tightening torque:
  Refer to drawing in REAR SUSPENSION.
- Make sure that cotter pin is inserted.


SMA113

- Check shock absorber for oil leakage or other damage.
- Check wheelarch height. Refer to section FA.


SRA307A

- Check suspension ball joint for grease leakage and ball joint dust cover for cracks or other damage.

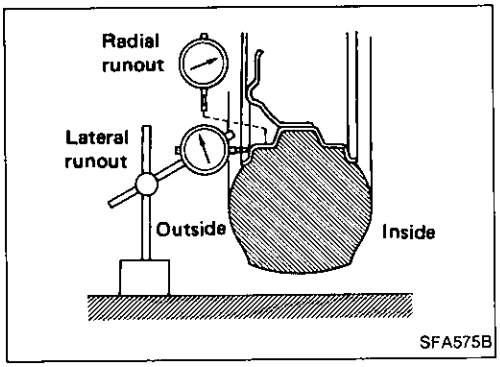


Rear Wheel Bearing

- Check wheel bearings for smooth operation.
- Check axial end play.

Axial end play:
0.05 mm (0.0020 in) or less

If axial end play is not within specification or wheel bearing does not turn smoothly, replace wheel bearing assembly.
Refer to REAR AXLE — Wheel Hub and Axle Housing.



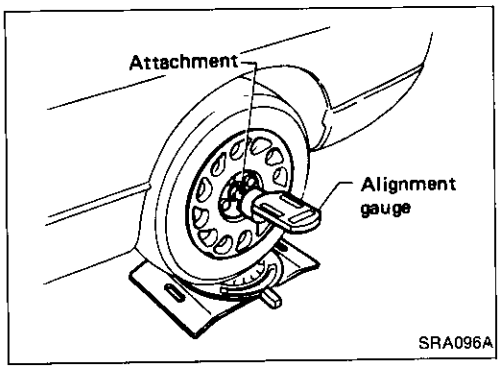
Rear Wheel Alignment

Before checking rear wheel alignment, be sure to make a preliminary inspection.

PRELIMINARY INSPECTION

Make the following checks. Adjust, repair or replace if necessary.

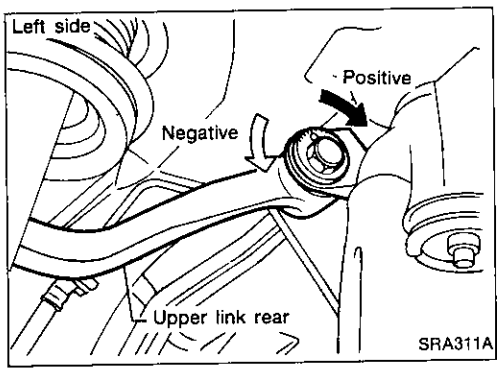
- Check tires for wear and for improper inflation.
- Check rear wheel bearings for looseness.
- Check wheel runout.
  Refer to S.D.S. in section FA.
- Check that rear shock absorber works properly.
- Check rear axle and rear suspension parts for looseness.
- Check vehicle posture (Unladen).
  ("Unladen": 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 S.D.S.

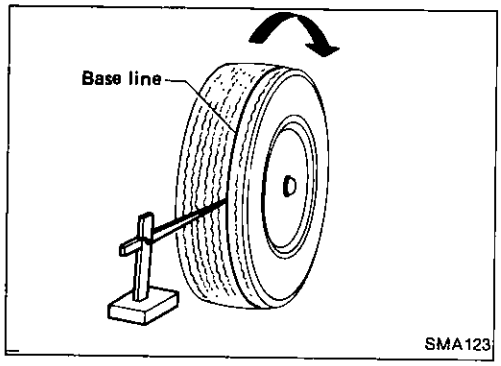


If camber is not within specification, adjust by turning the adjusting bolt.

(1) Turn the adjusting bolt to adjust.
Camber changes about 5' 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)

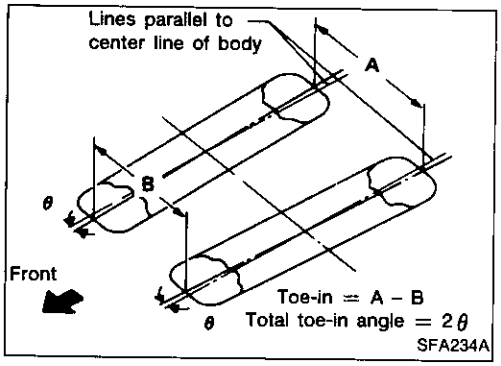
Rear Wheel Alignment (Cont'd)



TOE-IN

1. Draw a base line across the tread.

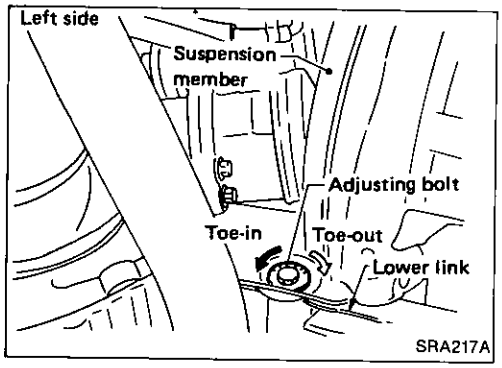
After lowering rear of vehicle, move it up and down to eliminate friction.



2. Measure toe-in.

Measure distance "A" and "B" at the same height as hub center.

Toe-in:
Refer to S.D.S.

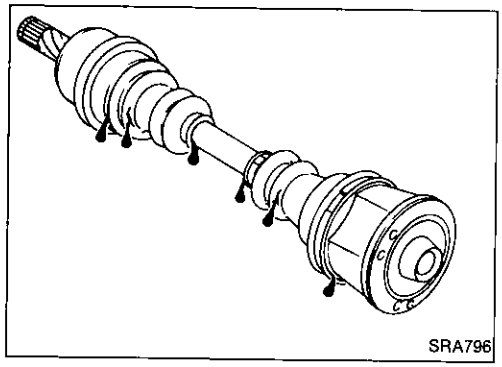


3. Adjust toe-in by turning adjusting bolts. For models equipped with SUPER HICAS system, refer to SUPER HICAS.

Toe changes about 1.5 mm (0.059 in) [One side] with each graduation of the adjusting bolt.

4. Tighten to the specified torque.

: 69 - 88 N·m
(7.0 - 9.0 kg-m, 51 - 65 ft-lb)

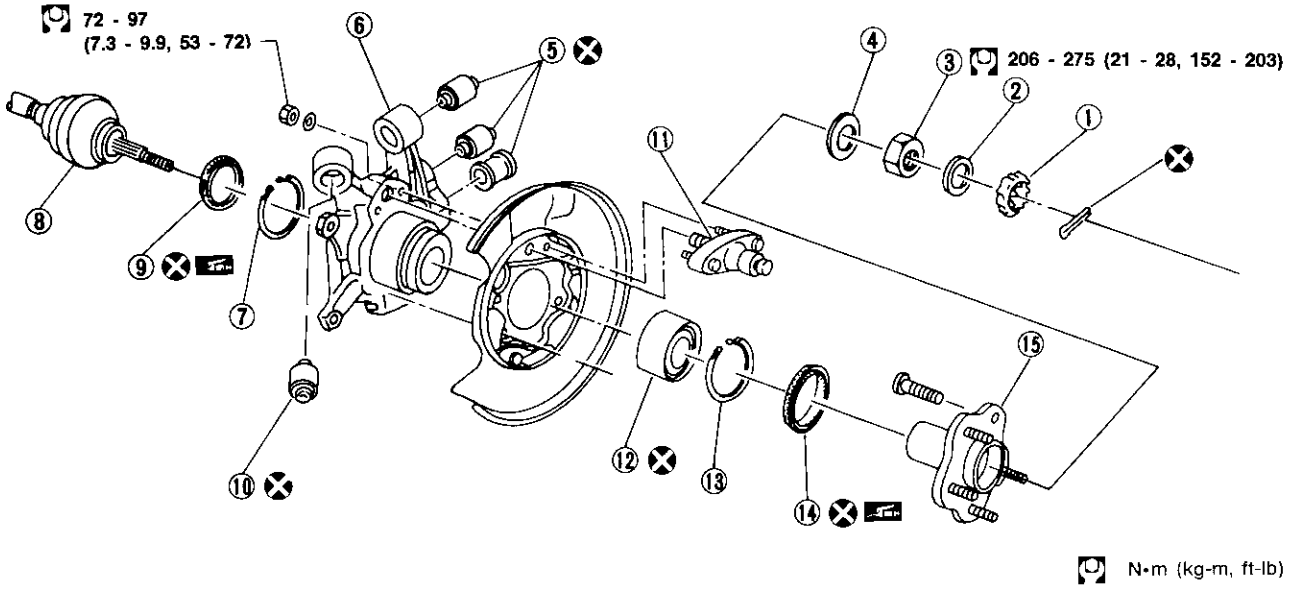


Drive Shaft

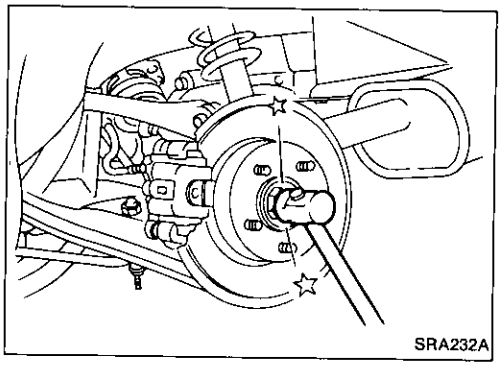
Check boot and drive shaft for cracks, wear, damage or grease leakage.

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.



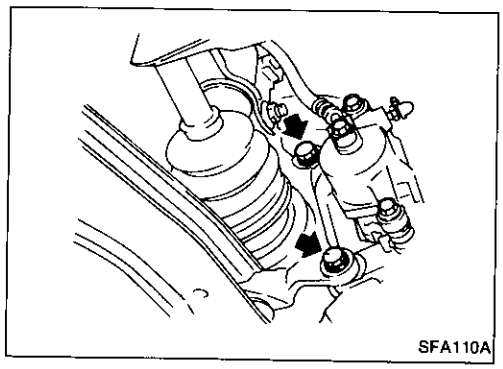
① Adjusting cap
② Insulator
③ Wheel bearing lock nut
④ Washer
⑤ Bushing
⑥ Axle housing
⑦ Snap ring
⑧ Drive shaft
⑨ Grease seal
⑩ Bushing
⑪ Brake anchor pin
⑫ Wheel bearing
⑬ Snap ring
⑭ Grease seal
⑮ Wheel hub


SRA232A

Removal

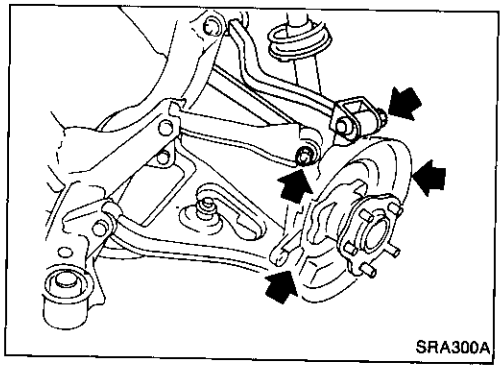
- Remove wheel bearing lock nut.
- Separate drive shaft from axle housing by lightly tapping it. If it is hard to remove use puller.

When removing drive shaft, cover boots with shop towel to prevent them from being damaged.

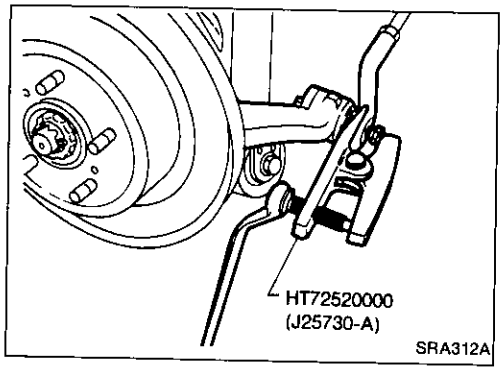

SFA110A

- Remove brake caliper assembly and rotor.

Brake line need not be disconnected from brake caliper. Be careful not to depress brake pedal, or piston will pop out.
Do not pull or twist brake hose.


SRA300A

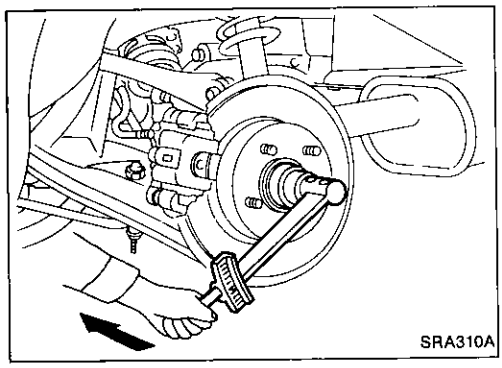
- Remove axle housing.



SRA312A

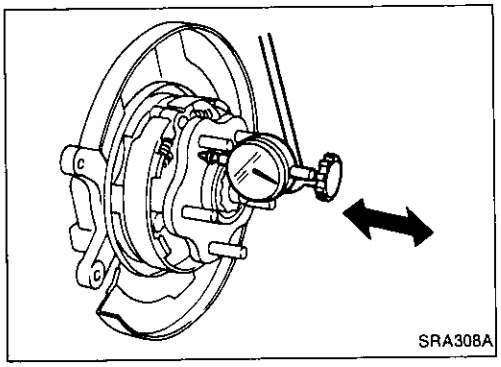
- Disconnect ball joint with Tool. (Models with SUPER HICAS system)

Do not remove nut completely while using Tool.


SRA310A

Installation

- Install axle housing with wheel hub.
- Tighten wheel bearing lock nut.
  : 206 - 275 N·m
  (21 - 28 kg-m, 152 - 203 ft-lb)


SRA308A

- Check wheel bearing axial end play.
  Axial end play: 0.05 mm (0.0020 in) or less
- Make sure that wheel bearings operate smoothly.
- Check toe-in — Refer to ON-VEHICLE SERVICE.

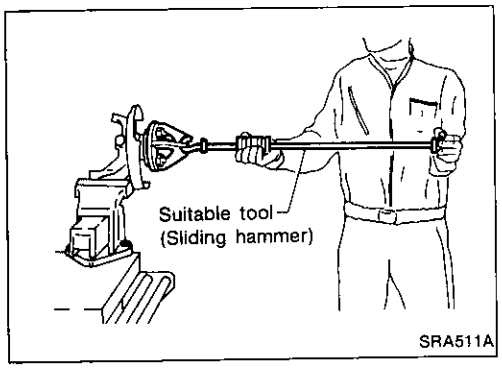
Disassembly

CAUTION:
Wheel bearing usually does not require maintenance. If any of the following symptoms are noted, replace wheel bearing assembly.

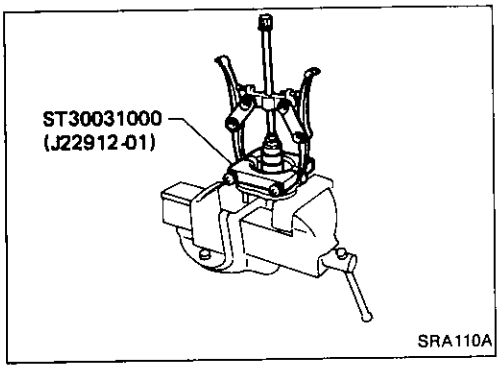
- **Growling noise is emitted from wheel bearing during operation.**
- **Wheel bearing drags or turns roughly when hub is turned with your hand after bearing lock nut is tightened to specified torque.**
- **After wheel bearing is removed from hub.**

WHEEL BEARING

- Remove wheel hub from axle housing using a suitable tool.



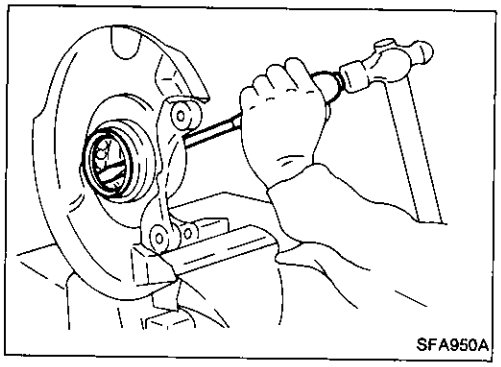
SRA511A



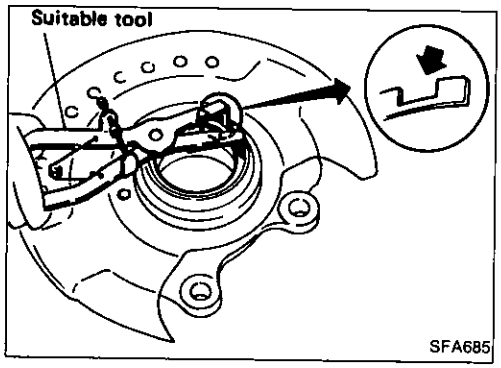
SRA110A

- Remove inner race from hub using a bearing replacer/puller.

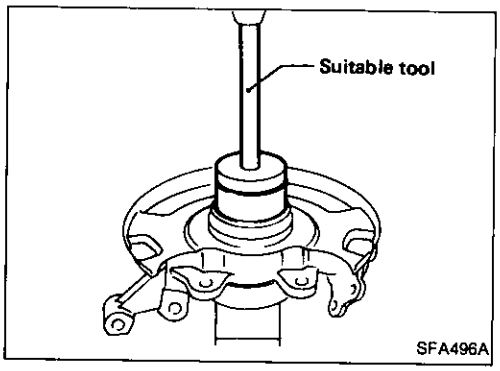
Disassembly (Cont'd)



- Remove grease seal from axle housing.

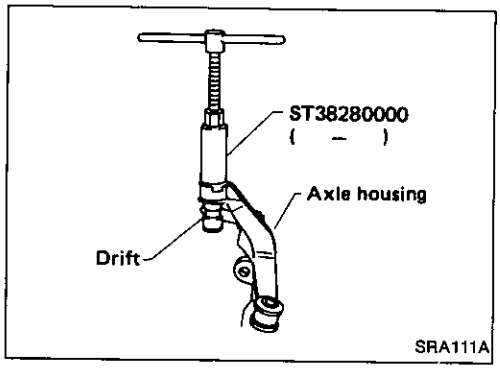


- Remove snap ring.



- Press out bearing outer race.

CAUTION:
Do not reuse old inner race although it is of the same brand as the bearing assembly.

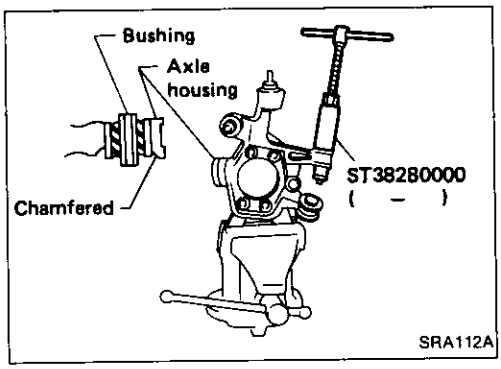


AXLE HOUSING

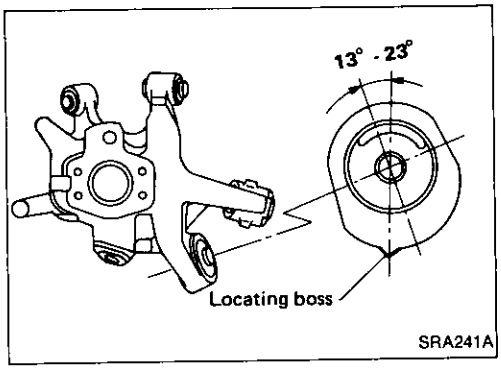
- Attach a drift on outer shell of bushing as shown in figure at left, remove bushing using arm bushing remover.

When placing axle housing in a vise, use wooden blocks or copper plates as pads.

Disassembly (Cont'd)



- Ensure axle housing bore is free from scratches or deformities before pressing bushing into it.
- Attach bushing to chamfered bore end of axle housing and press it until it is flush with end face of axle housing.



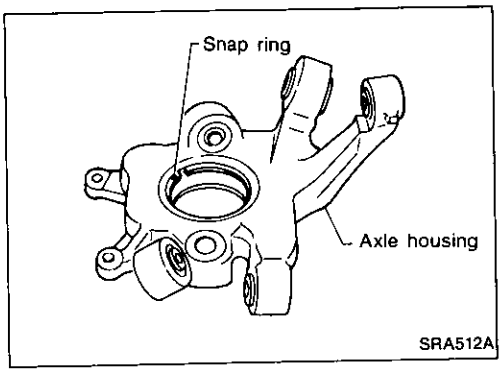
- When installing shock absorber bushing, make sure that it is positioned as shown.

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.
- Check snap ring for wear or cracks.

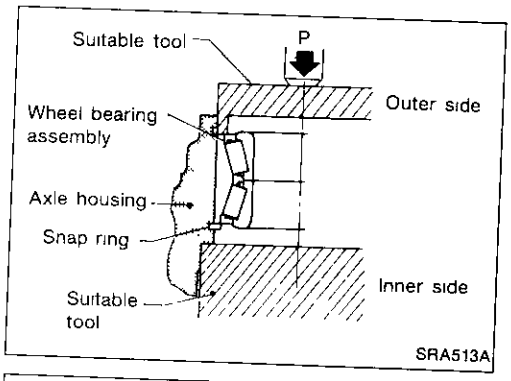
Replace if necessary.



Assembly

1. Install snap ring into groove of axle housing.

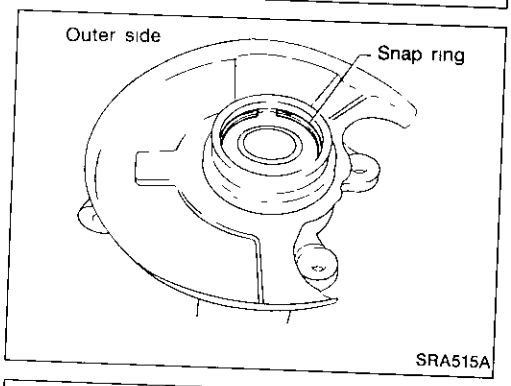
Assembly (Cont'd)



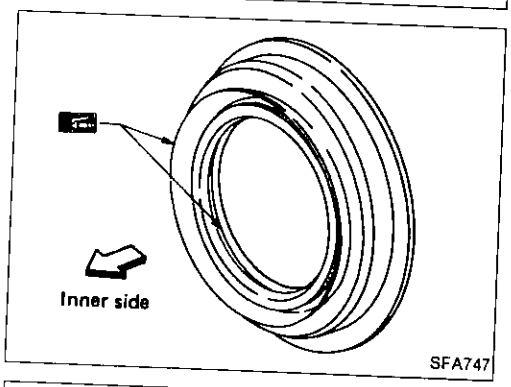
2. Press new wheel bearing assembly into axle housing.
   Maximum load P:
   29 kN (3 t, 3.3 US ton, 3.0 Imp ton)

CAUTION:

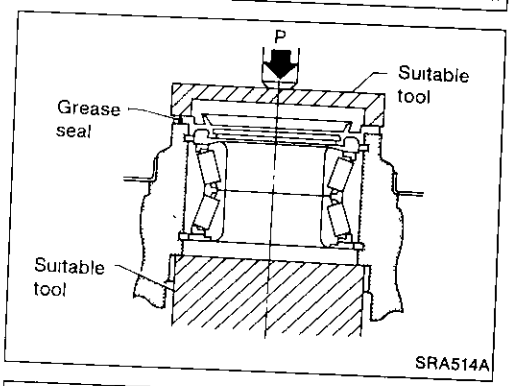
- **Do not press inner race of wheel bearing assembly.**
- **Do not apply oil or grease to mating surfaces of wheel bearing outer race and axle housing.**



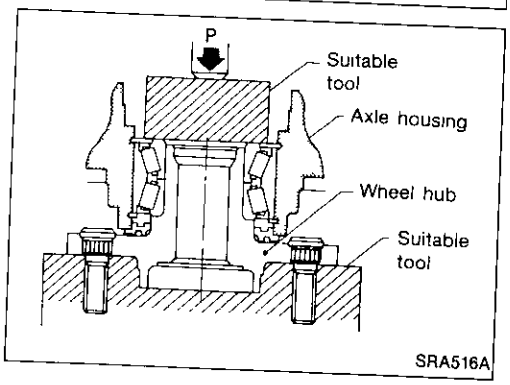
- Install snap ring.



- Pack grease seal lip with multi-purpose grease.



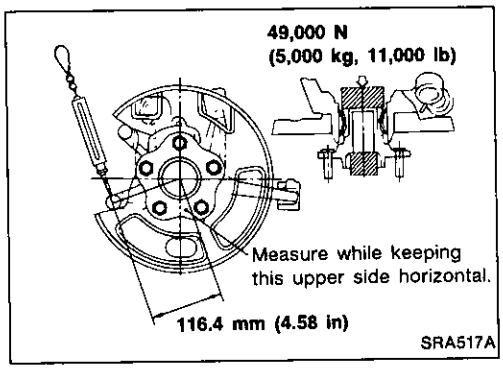
- Install outer grease seal.



- Press wheel hub into axle housing with suitable tool.
  Maximum load P:
  29 kN (3 ton, 3.3 US ton, 3.0 Imp ton)

Be careful not to damage grease seal.

Assembly (Cont'd)



With wheel hub pressed into axle housing, apply 49,000 N (5,000 kg, 11,000 lb) to wheel hub and rotate both clockwise and counterclockwise 10 times to minimize resistance.

Attach spring scale in the position shown at left and pull at a rate of 10 rpm to measure rotating torque.

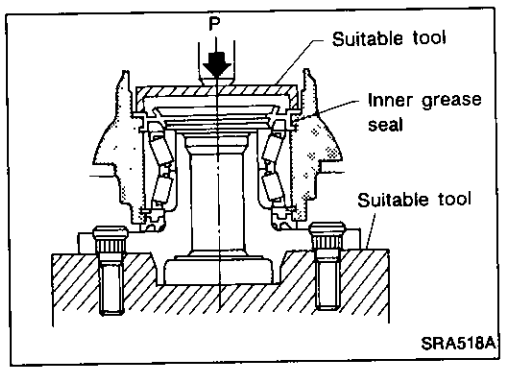
Load:
49,000 N (5,000 kg, 11,000 lb)

Rotating torque:
0.2 - 2.4 N·m (0.023 - 0.24 kg-m, 0.2 - 1.7 ft-lb)

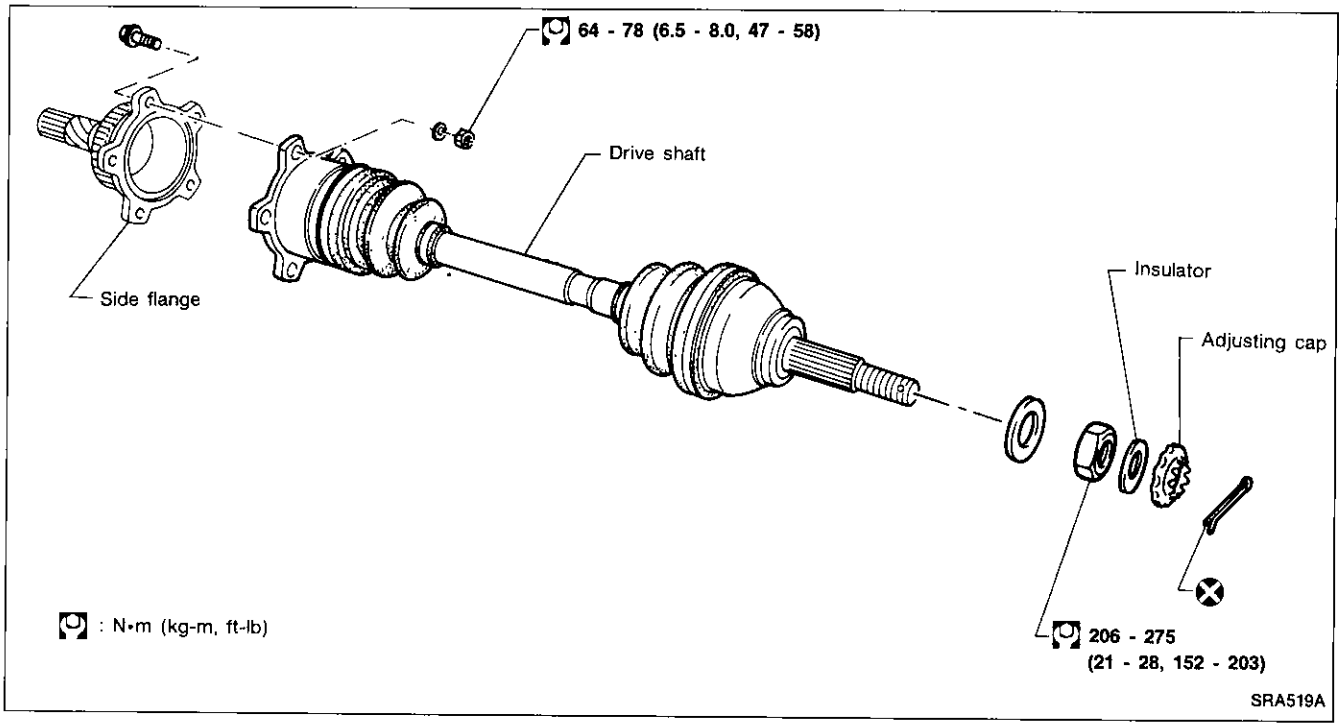
Spring scale reading:
2.0 - 20.6 N (0.2 - 2.1 kg, 0.4 - 4.6 lb)

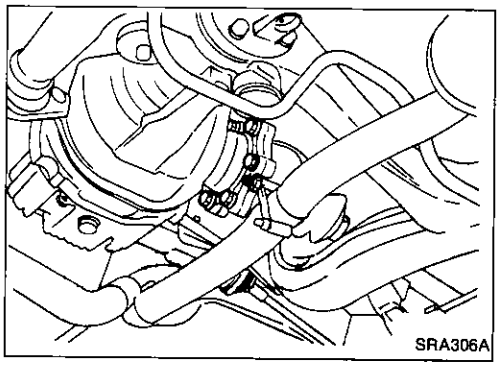
If measured value is outside specifications, replace wheel bearing.

Also make sure axial play does not exist in wheel hub when a 49,000 N (5,000 kg, 11,000 lb) load is applied.



- Install inner grease seal.



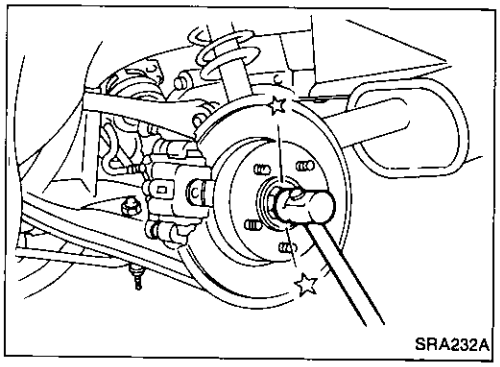


Removal

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

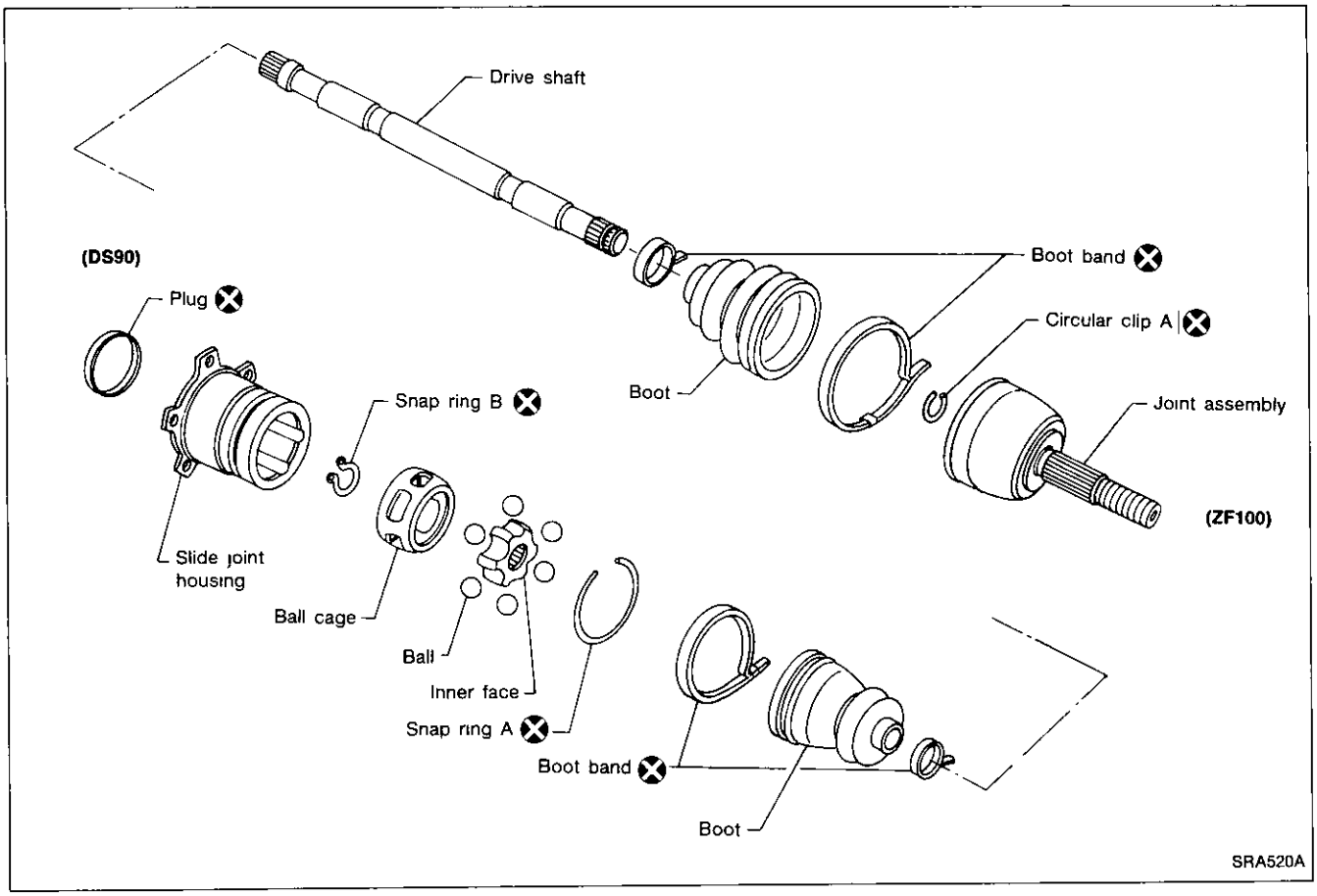
Remove drive shaft by lightly tapping it with a copper hammer. If it is hard to remove, use puller.

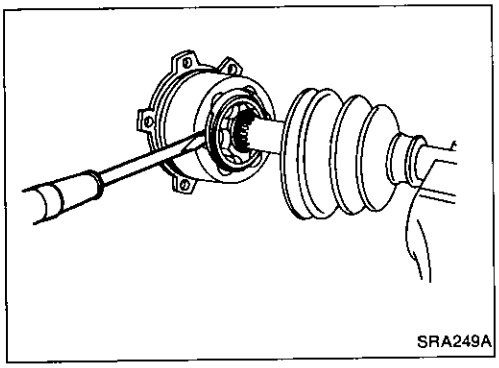
To avoid damaging threads of drive shaft, install a nut while removing drive shaft.

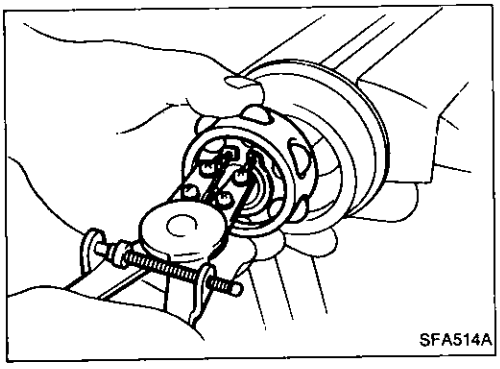
Installation

- Insert drive shaft from wheel hub and temporarily tighten wheel bearing lock nut.
- Tighten side flange mounting bolts to specified torque.
- Tighten wheel bearing lock nut to specified torque. Refer to REAR AXLE — Wheel Hub and Axle Housing.

Components







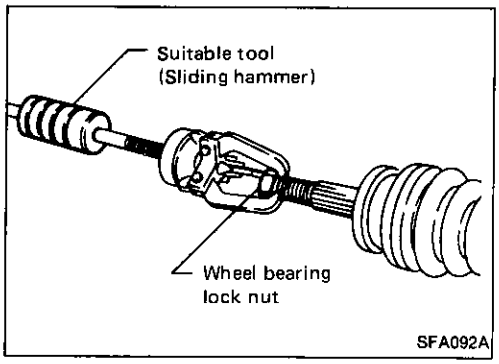
Disassembly

FINAL DRIVE SIDE

1. Remove boot bands.
2. Put matchmarks on slide joint housing and inner race, before separating joint assembly.
3. Pry off snap ring "A" with a screwdriver, and pull out slide joint housing.
4. Put matchmarks on inner race and drive shaft.
5. Pry off snap ring "B", then remove ball cage, inner race and balls as a unit.
6. Draw out boot.

Cover drive shaft serration with tape so as not to damage the boot.

Disassembly (Cont'd)



WHEEL SIDE

CAUTION:

The joint on the wheel side cannot be disassembled.

- Before separating joint assembly, put matchmarks on drive shaft and joint assembly.
- Separate joint assembly with suitable tool.

Be careful not to damage threads on drive shaft.

- Remove boot bands.

Inspection

Thoroughly clean all parts in cleaning solvent, and dry with compressed air. Check parts for evidence of 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.

JOINT ASSEMBLY (Final drive side)

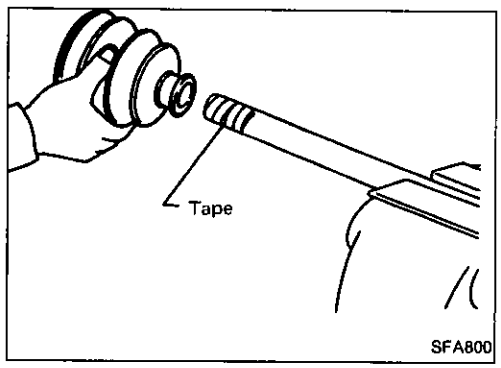
- Replace any parts of double offset joint which show signs of scorching, rust, wear or excessive play.
- Check serration for deformation. Replace if necessary.
- Check slide joint housing for any damage. Replace if necessary.

JOINT ASSEMBLY (Wheel side)

Replace joint assembly if it is deformed or damaged.

Assembly

- **After drive shaft has been assembled, ensure that it moves smoothly over its entire range without binding.**
- **Use NISSAN GENUINE GREASE or equivalent after every overhaul.**

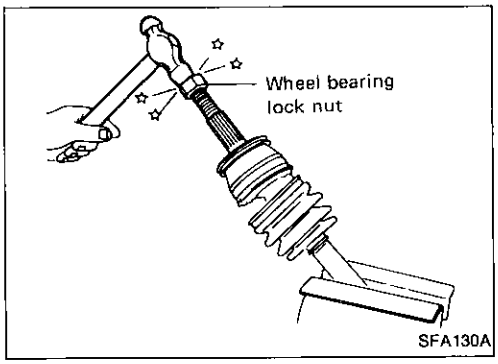


WHEEL SIDE

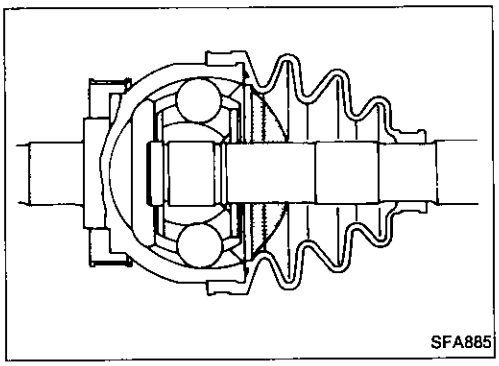
1. Install boot and new small boot band on drive shaft.

Cover drive shaft serration with tape so as not to damage boot during installation.

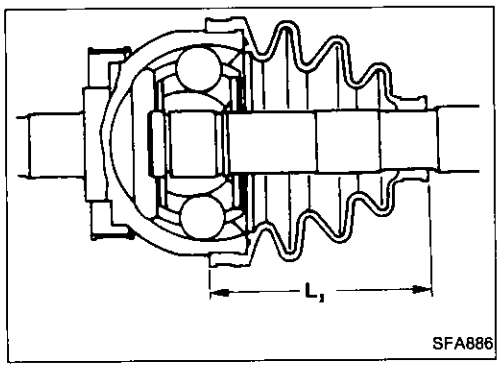
Assembly (Cont'd)



2. Set joint assembly onto drive shaft by lightly tapping it. Install joint assembly securely, ensuring marks which were made during disassembly are properly aligned.



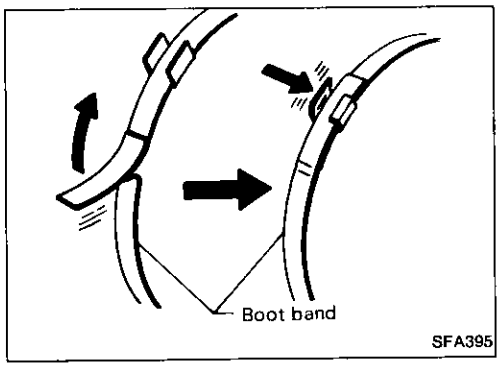
3. Pack drive shaft with specified amount of grease.
   Specified amount of grease:
   165 - 175 g (5.82 - 6.17 oz)



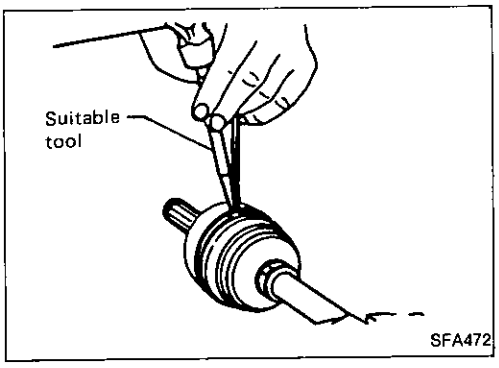
4. Set boot so that it does not swell and deform when its length is "L_1".

Make sure that boot is properly installed on the drive shaft groove.

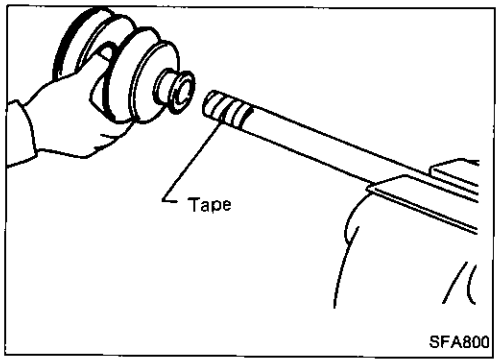
Length "L_1":
96 - 98 mm (3.78 - 3.86 in)



5. Lock new larger and smaller boot bands securely with a suitable tool.



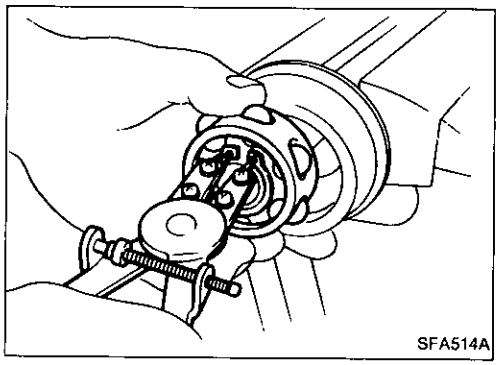
Assembly (Cont'd)



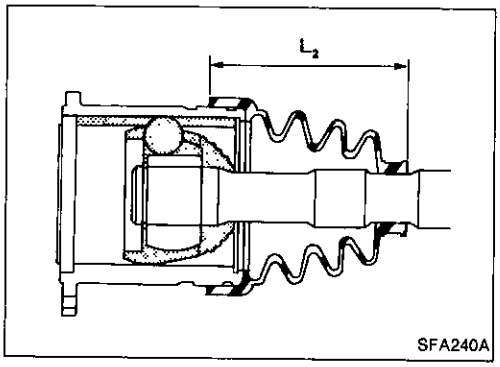
FINAL DRIVE SIDE

1. Install boot and new small boot band on drive shaft.

Cover drive shaft serration with tape so as not to damage boot during installation.



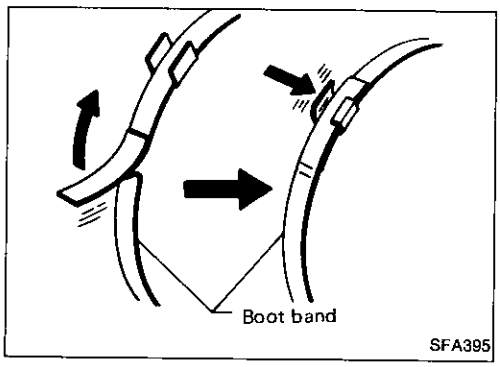
2. Securely install ball cage, inner race and balls as a unit, making sure the marks which were made during disassembly are properly aligned.
3. Install new snap ring "B".



4. Pack drive shaft with specified amount of grease.
   Specified amount of grease:
   165 - 175 g (5.82 - 6.17 oz)
5. Install slide joint housing, then install new snap ring "A".
6. Set boot so that it does not swell and deform when its length is "L_2".

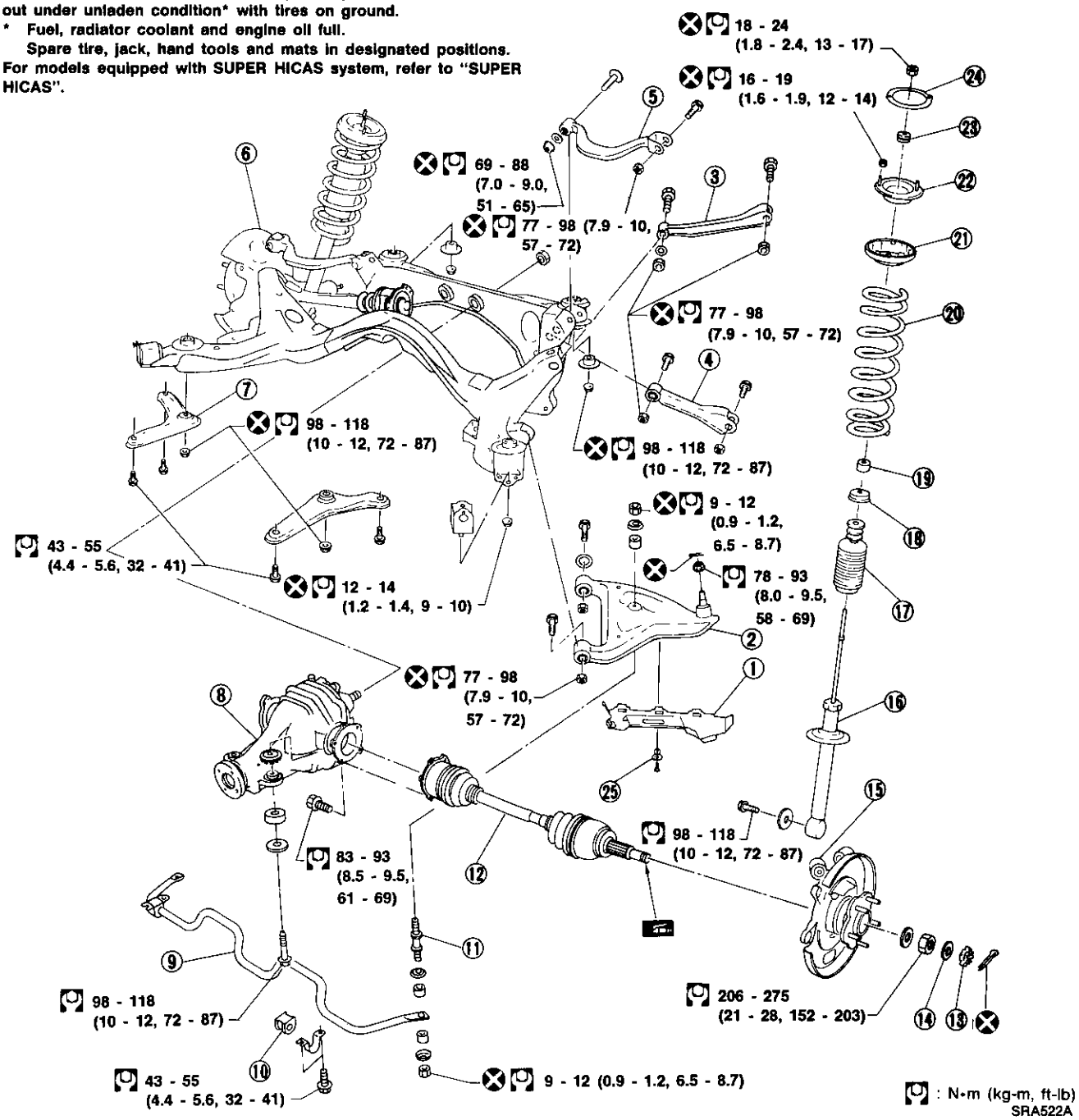
Make sure that boot is properly installed on the drive shaft groove.

Length "L_2":
93 - 95 mm (3.66 - 3.74 in)



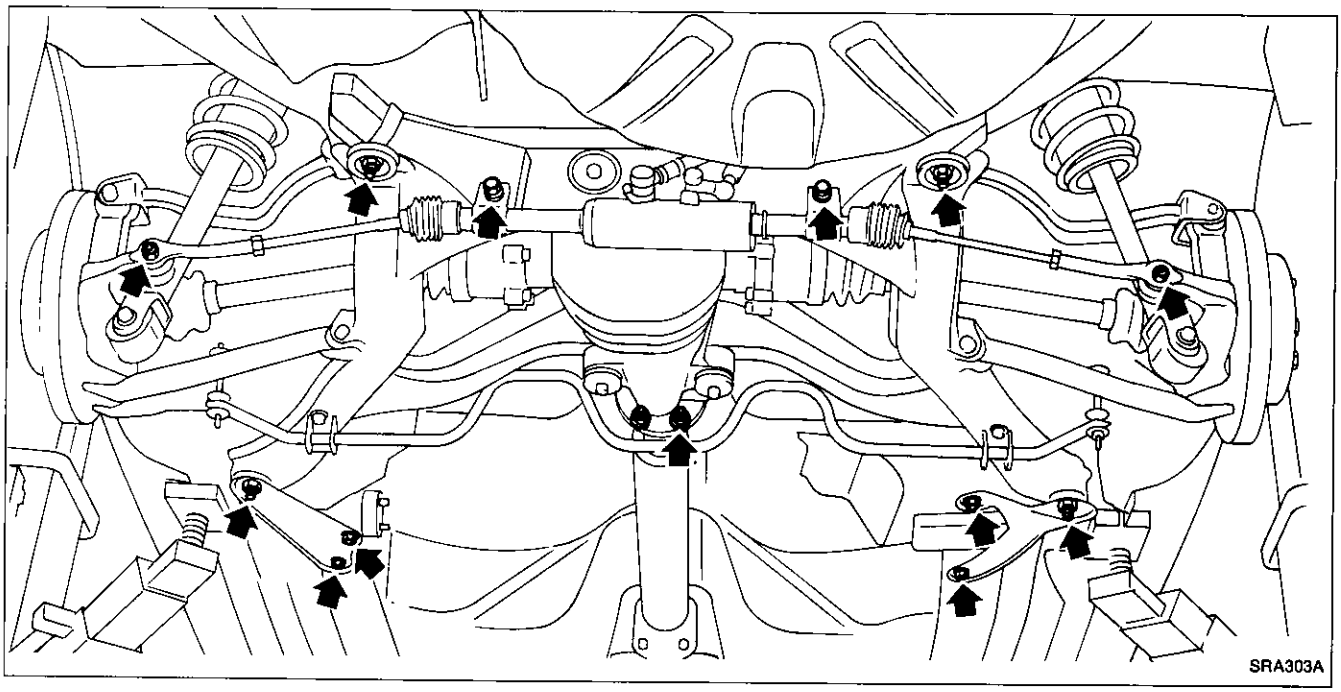
7. Lock new larger and smaller boot bands securely with a suitable tool.

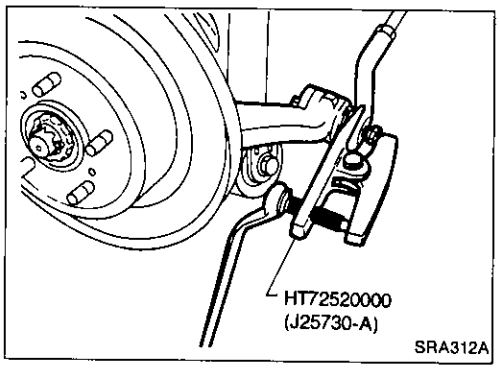
CAUTION:
Do not jack up at lower link.
When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.
*** Fuel, radiator coolant and engine oil full.**
Spare tire, jack, hand tools and mats in designated positions.
For models equipped with SUPER HICAS system, refer to "SUPER HICAS".



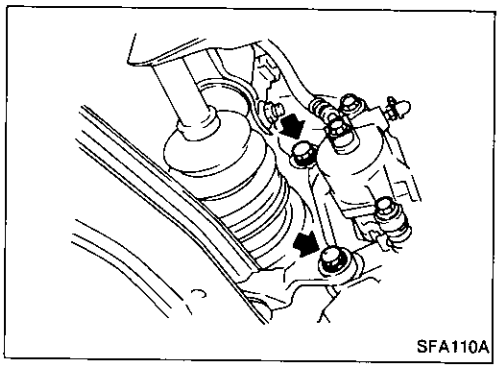
① Protector
② Lower link
③ Lateral link
④ Front upper link
⑤ Rear upper link
⑥ Suspension member
⑦ Member stay
⑧ Final drive
⑨ Stabilizer
⑩ Bushing
⑪ Connecting rod
⑫ Drive shaft
⑬ Adjusting cap
⑭ Insulator
⑮ Axle housing
⑯ Shock absorber
⑰ Bound bumper
⑱ Plate
⑲ Bushing
⑳ Coil spring
㉑ Upper rubber seat
㉒ Upper spring seat
㉓ Bushing
㉔ Gasket
㉕ Clip

Removal and Installation



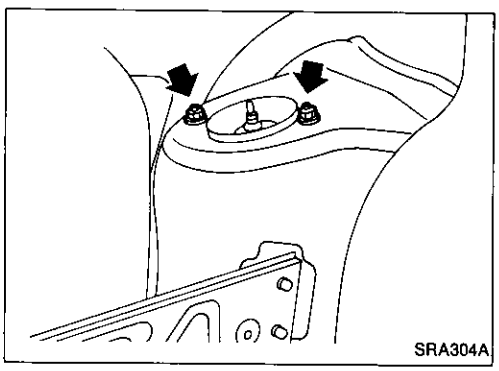


- Remove exhaust tube.
- Disconnect propeller shaft rear end.
- Disconnect hand brake wire front end.
- For models equipped with SUPER HICAS system, refer to SUPER HICAS.
- Use Tool to disconnect ball joints (SUPER HICAS).



- Remove brake caliper assembly.

Brake line need not be disconnected from brake caliper.
Be careful not to depress brake pedal, or piston will pop out.
Do not pull or twist brake hose.



- Remove upper end nuts of shock absorber.

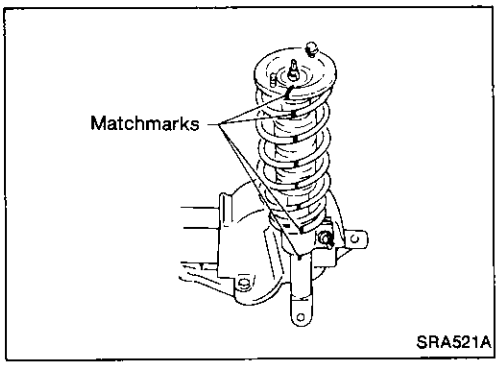
Do not remove piston rod lock nut.

- Remove suspension member fixing nuts. Then draw out rear axle and rear suspension assembly.

Removal

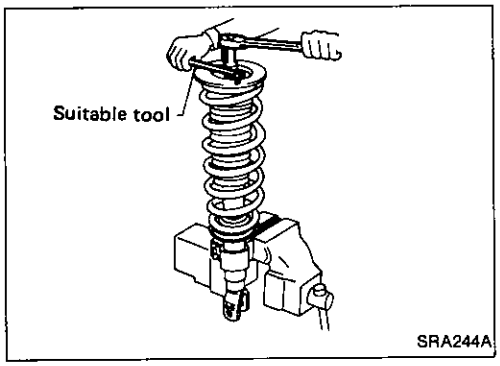
Remove shock absorber upper and lower fixing nuts.

Do not remove piston rod lock nut on vehicle.



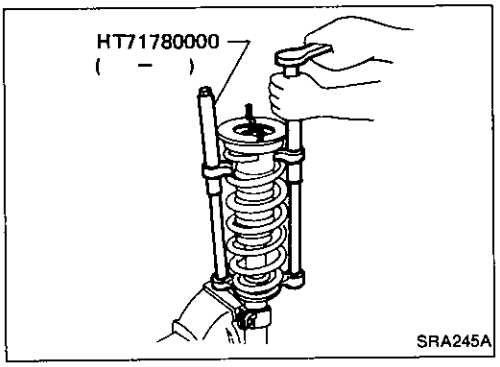
Disassembly

- Put matchmarks on coil spring and shock absorber.

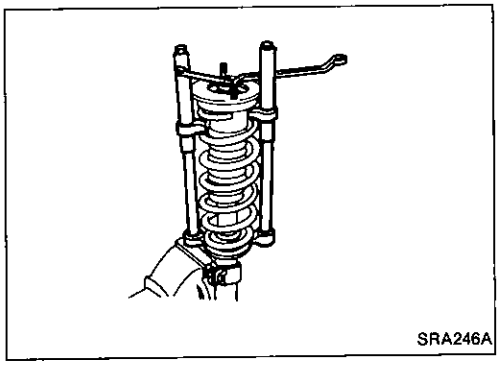


1. Set shock absorber on vise with attachment, then loosen piston rod lock nut.

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

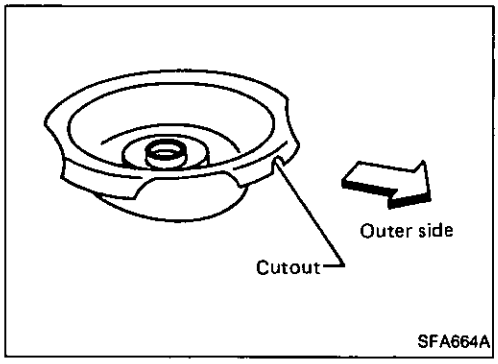
- Check for smooth operation through a full stroke, both compression and extension.
- Check for oil leakage occurring on welded or gland packing portions.
- Check piston rod for cracks, deformation or other damage. Replace if necessary.

UPPER RUBBER SEAT AND BUSHING

Check rubber parts for deterioration or cracks.
Replace if necessary.

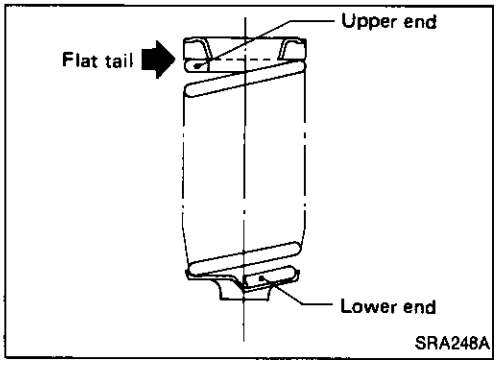
COIL SPRING

Check for cracks, deformation or other damage. Replace if necessary.

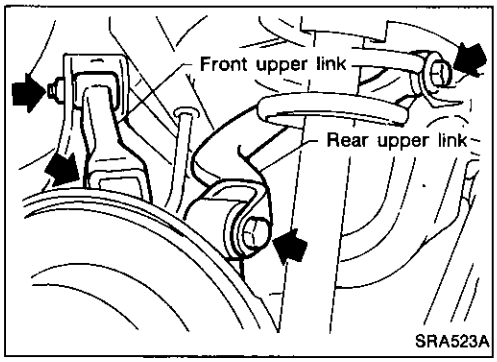


Assembly

- Install upper spring seat with its cutout facing the outer side of vehicle.

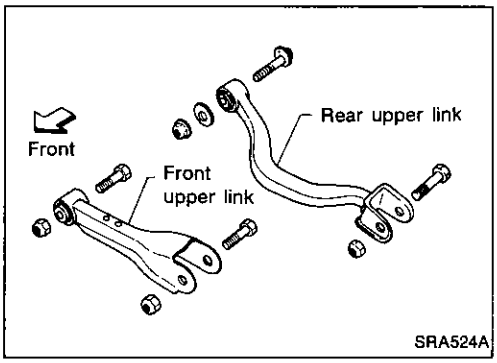


- When installing coil spring on strut, it must be positioned as shown in figure at left.

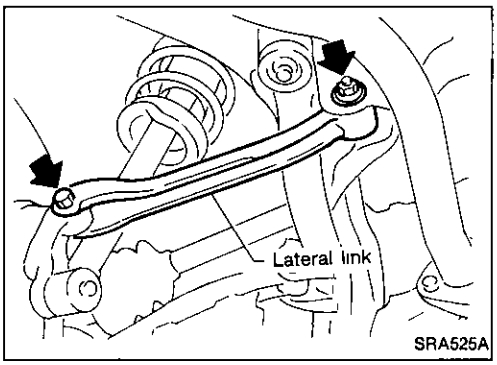


Removal and Installation

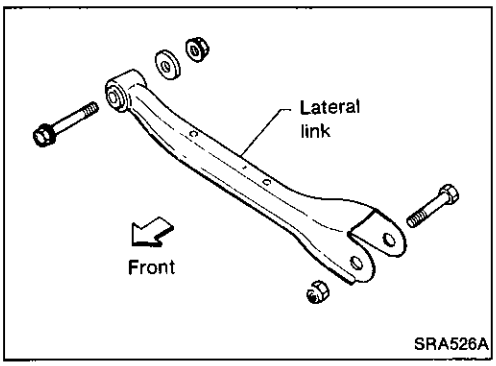
- Remove upper link.



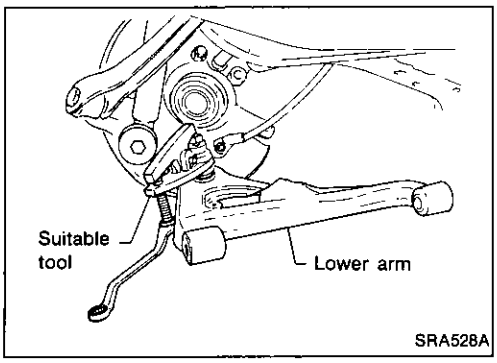
- Install upper link.



- Remove lateral link.

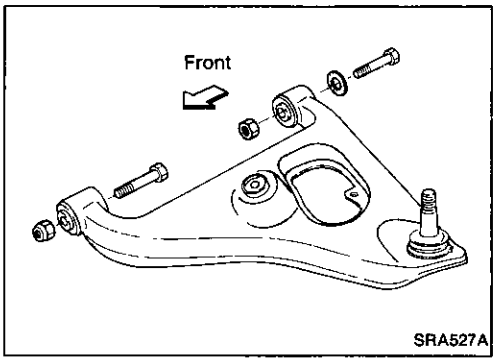


- Install lateral link.

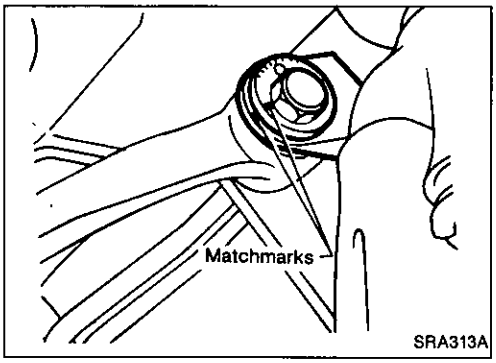


- Remove lower arm.

Removal and Installation (Cont'd)

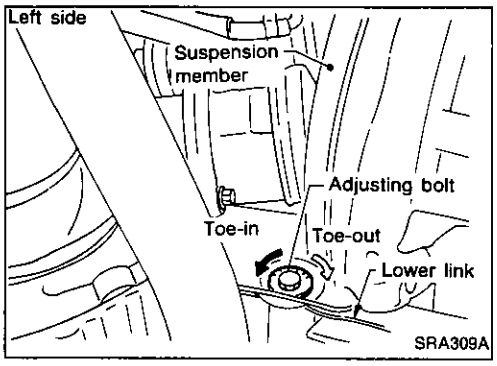


- Install lower arm.



Before removing, put matchmarks on adjusting bolt.

- When installing, final tightening must be done under unladen condition with tires on ground.



- After installation, check wheel alignment. Refer to Rear Wheel Alignment in ON-VEHICLE SERVICE.

Inspection

REAR SUSPENSION MEMBER

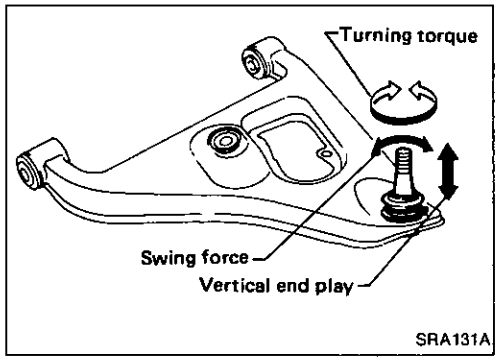
Replace suspension member assembly if cracked or deformed or if any part (insulator, for example) is damaged.

UPPER, LOWER AND LATERAL LINKS

Replace upper, lower or lateral link as required if cracked or deformed or if bushing is damaged.

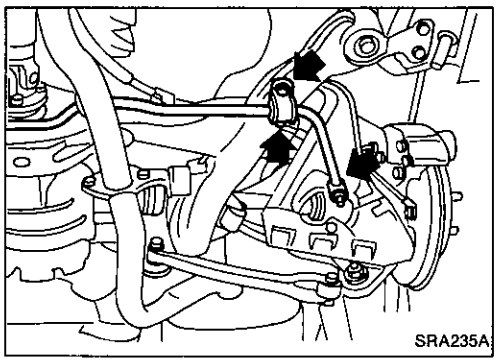
Inspection (Cont'd)

SUSPENSION LOWER BALL JOINT



- Measure swing force, turning torque and vertical end play in axial direction. (Use same measurement procedures as that of FA section.)
- If ball stud is worn, play in axial direction is excessive, or joint is hard to swing, replace lower arm.

Ball joint specifications	Swing force	7.8 - 54.9 N (0.8 - 5.6 kg, 1.8 - 12.3 lb)
	Turning torque	0.5 - 3.4 N·m (5 - 35 kg-cm, 4.3 - 30.4 in-lb)
	Vertical end play	0 mm (0 in)

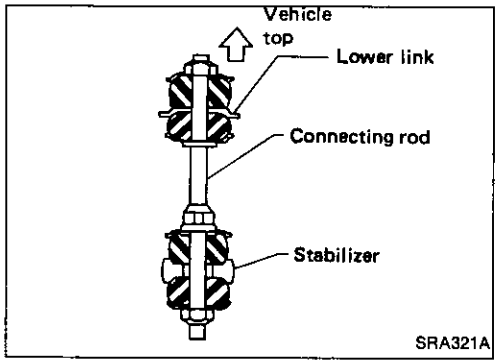


Removal

Remove connecting rod and clamp.

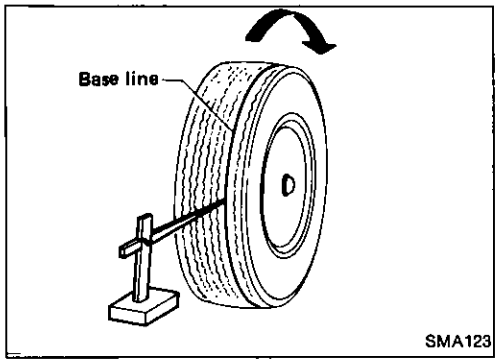
Inspection

- 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).

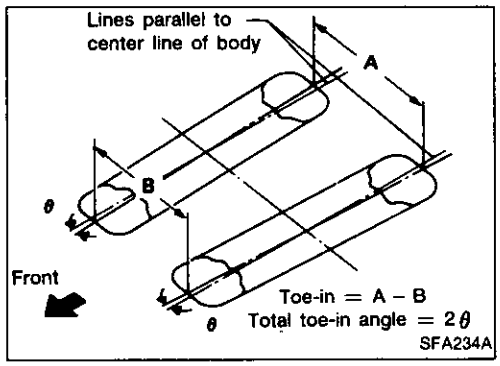


Rear Wheel Alignment

TOE-IN

1. Draw a base line across the tread.

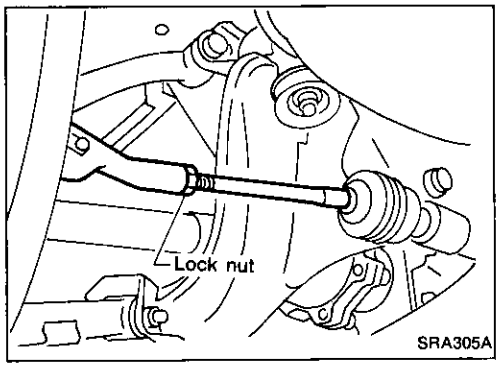
After lowering rear of vehicle, move it up and down to eliminate friction.



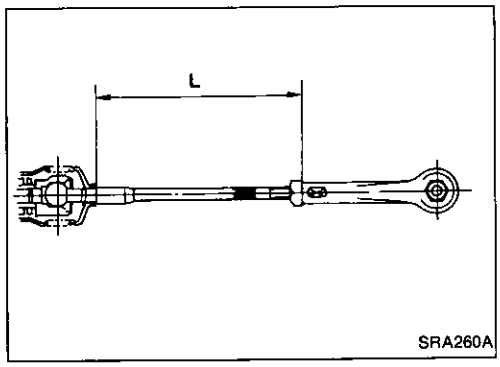
2. Measure toe-in.

Measure distance "A" and "B" at the same height as hub center.

Toe-in:
Refer to S.D.S.



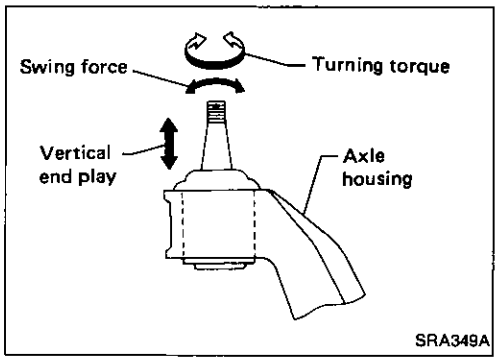
3. Adjust toe-in by varying length of power cylinder lower links.
(1) Loosen lock nuts.
(2) Adjust toe-in by turning lower links forward or backward.



Make sure both lower links are the same length.
Standard length "L":
185.5 mm (7.30 in)

(3) Tighten lock nuts to the specified torque.
: 37 - 46 N·m
(3.8 - 4.7 kg-m, 27 - 34 ft-lb)

- Refer to ON-VEHICLE SERVICE for other procedures.

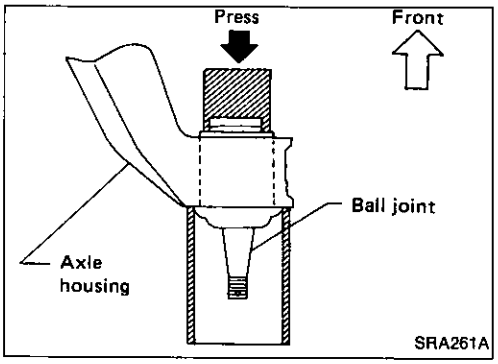


Rear Axle Housing Ball Joint

INSPECTION

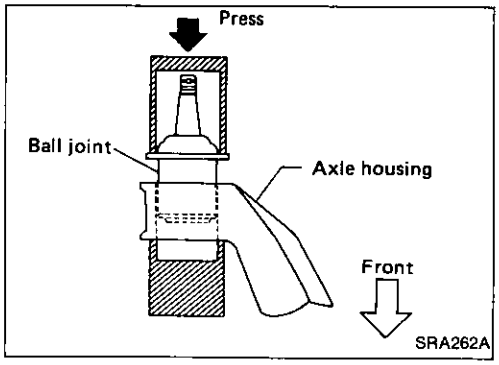
- Measure swing force, turning torque and vertical end play in axial direction.
- If ball stud is worn, play in axial direction is excessive, or joint is hard to swing, replace ball joint.

Ball joint specifications	Swing force	6.9 - 68.6 N (0.7 - 7.0 kg, 1.5 - 15.4 lb)
	Turning torque	0.3 - 2.9 N·m (3 - 30 kg-cm, 2.6 - 26.0 in-lb)
	Vertical end play	0 mm (0 in)



REMOVAL

- Remove ball joint snap ring.
- Press out ball joint from axle housing.



ASSEMBLY

- Press new ball joint assembly into axle housing.
- Install snap ring into groove of ball joint.
- Refer to REAR AXLE — Wheel Hub and Axle Housing for other procedures.
- Refer to section ST for power cylinder and SUPER HICAS — Trouble Diagnoses.

General Specifications

COIL SPRING

Applied model	Without HICAS	With HICAS
Wire diameter mm (in)	12.3 (0.484)	12.6 (0.496)
Coil diameter mm (in)		
Small	103.1 (4.06)	103.4 (4.07)
Large	119.3 (4.70)	119.6 (4.71)
Free length mm (in)	430.0 (16.93)	410.0 (16.14)
Spring constant N/mm (kg/mm, lb/in)	19.6 (2.0, 112)	21.6 (2.2, 123)
Identification color	Red x 1, Orange x 1	White x 1, Purple x 1

STRUT

Applied model	All
Piston rod diameter mm (in)	12.5 (0.492)
Damping force [at 0.3 m (1.0 ft)/sec.] N (kg, lb)	
Expansion	706 - 961 (72 - 98, 159 - 216)
Compression	255 - 392 (26 - 40, 57 - 88)

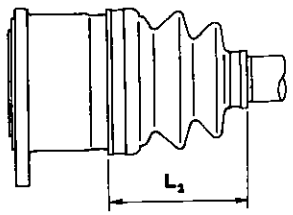
STABILIZER BAR

Applied model	Without HICAS	With HICAS
Diameter mm (in)	19.1 (0.752)	17.3 (0.681)

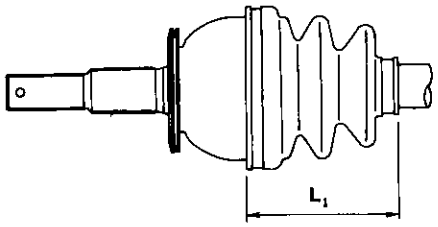
DRIVE SHAFT

Joint type	
Final drive side	DS90
Wheel side	ZF100
Grease	Nissan genuine grease or equivalent
Specified amount of grease g (oz)	
Final drive side	165 - 175 (5.82 - 6.17)
Wheel side	165 - 175 (5.82 - 6.17)
Boot length mm (in)	
Final drive side (L_2)	93 - 95 (3.66 - 3.74)
Wheel side (L_1)	96 - 98 (3.78 - 3.86)

Final drive side



Wheel drive side



SRA533A

Inspection and Adjustment

WHEEL ALIGNMENT (Unladen*)

Camber	degree	–1°30′ to –0°30′
Toe-in		
A – B	mm (in)	0 - 4 (0 - 0.16)
Total angle 2θ	degree	0′ - 28′

* Fuel, radiator coolant and engine oil full.
Spare tire, jack, hand tools and mats in designated positions.

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 (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	

LOWER BALL JOINT

Swing force (Measuring point: cotter pin hole of ball stud)	N (kg, lb)	7.8 - 54.9 (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)

LOWER LINK BALL JOINT (SUPER HICAS)

Swing force (at cotter pin hole)	N (kg, lb)	6.9 - 68.6 (0.7 - 7.0, 1.5 - 15.4)
Turning torque	N·m (kg-cm, in-lb)	0.3 - 2.9 (3 - 30, 2.6 - 26.0)
Vertical end play	mm (in)	0 (0)

BRAKE SYSTEM

SECTION BR

CONTENTS

PRECAUTIONS AND PREPARATION ..... BR- 2
CHECK AND ADJUSTMENT ..... BR- 3
AIR BLEEDING ..... BR- 4
BRAKE HYDRAULIC LINE ..... BR- 5
CONTROL VALVE ..... BR- 6
BRAKE PEDAL AND BRACKET ..... BR- 7
MASTER CYLINDER ..... BR- 9
BRAKE BOOSTER BR-12
VACUUM HOSE BR-14
FRONT DISC BRAKE BR-15
REAR DISC BRAKE BR-19
REAR DISC BRAKE — Parking Drum Brake BR-23
PARKING BRAKE CONTROL BR-27
ANTI-LOCK BRAKING SYSTEM BR-29
TROUBLE DIAGNOSES BR-33
SERVICE DATA AND SPECIFICATIONS (S.D.S.) BR-52

When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

[0002] When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".

Precautions

SUPPLEMENTAL RESTRAINT SYSTEM "AIR BAG"

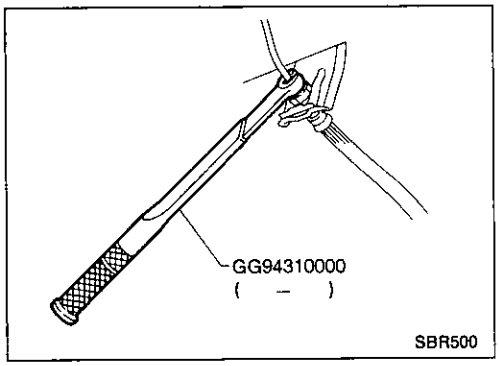
The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury in a frontal collision. The Supplemental Restraint System consists of air bags sensors, a control unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in **section BF** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized INFINITI 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 "Air Bag".**

BRAKE SYSTEM

- **Use brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**
- **To clean 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 hydraulic system.**



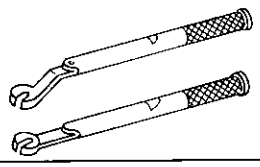
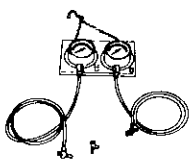
- **Use Tool when removing and installing brake tube.**

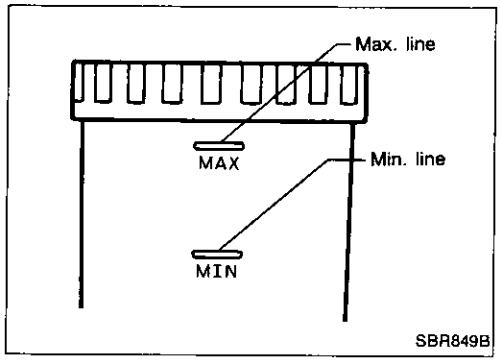
WARNING:

- **Clean brakes with a vacuum dust collector to minimize risk of health hazard from powder draffs caused by friction.**

Preparation

SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description	
GG94310000 (—) Flare nut torque wrench		Removing and installing each brake piping
KV991V0010 (—) Brake fluid pressure gauge		Measuring brake fluid pressure



Checking Brake Fluid Level

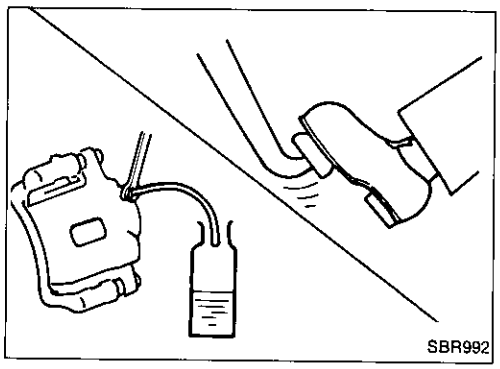
- Check fluid level in reservoir tank. It should be between Max. and Min. lines on reservoir tank.
- If fluid level is extremely low, check brake system for leaks.
- When brake warning lamp comes on even when parking brake lever is released, check brake system for leaks.

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.



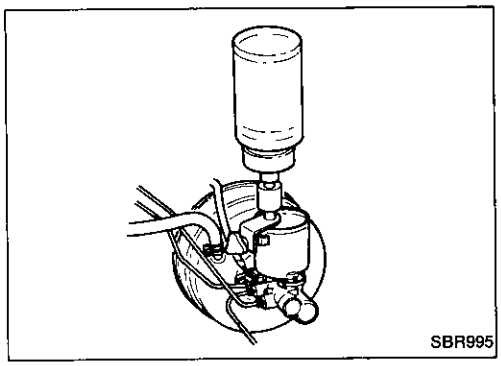
Changing Brake Fluid

CAUTION:

- **Refill with new brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**

1. Connect a vinyl tube to each air bleeder valve.
2. Drain brake fluid from each air bleeder valve by depressing brake pedal.
3. Refill until new brake fluid comes out of each air bleeder valve.

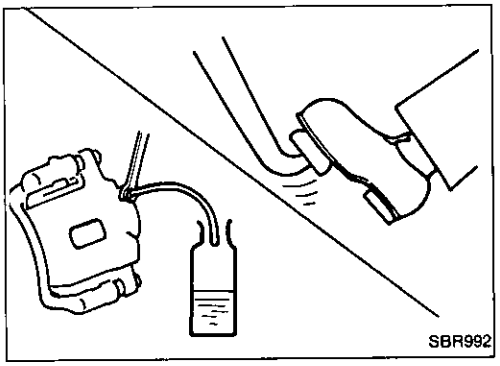
   Use same procedure as in bleeding hydraulic system to refill brake fluid. Refer to "Bleeding Procedure" in "AIR BLEEDING".


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Bleeding Procedure

CAUTION:

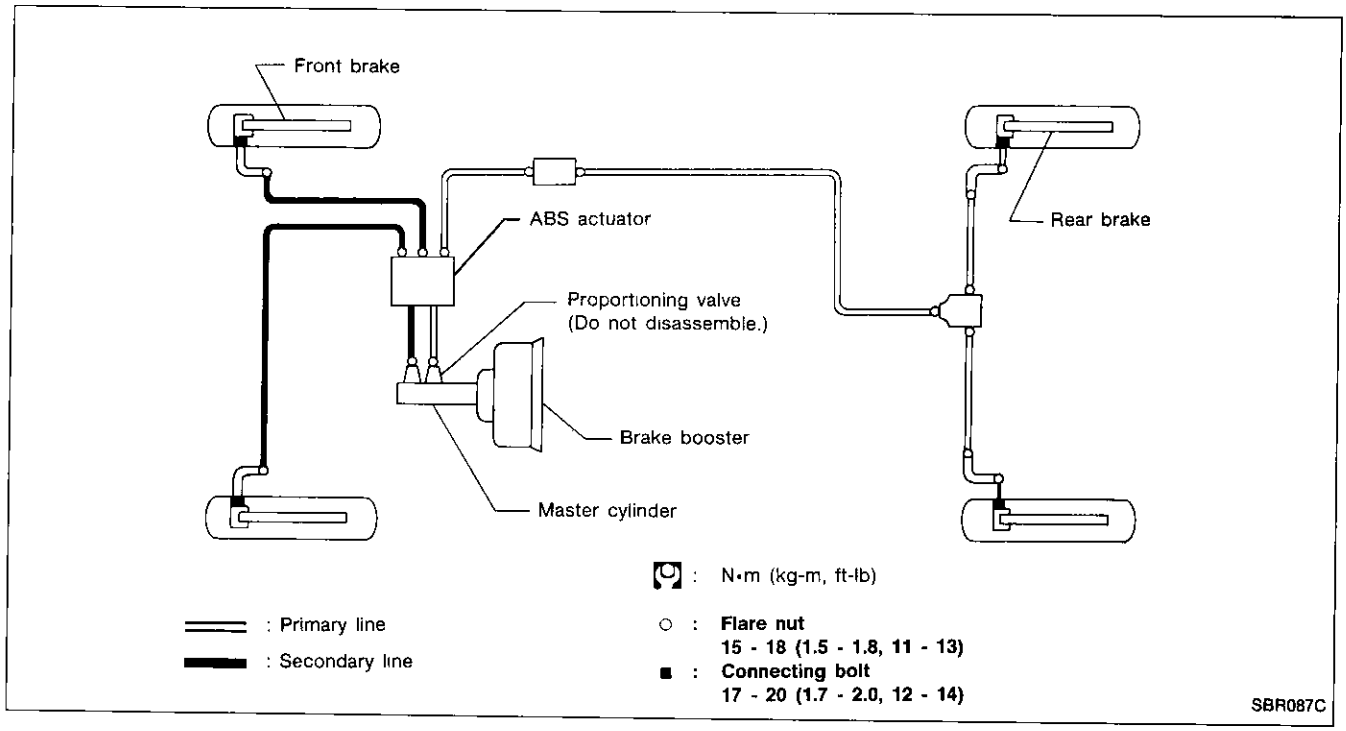
- **Carefully monitor brake fluid level at master cylinder during bleeding operation.**
- **Fill reservoir with new brake fluid "DOT 3". Make sure it is full at all times while bleeding air out of system.**
- **Place a container under master cylinder to avoid spillage of brake fluid.**

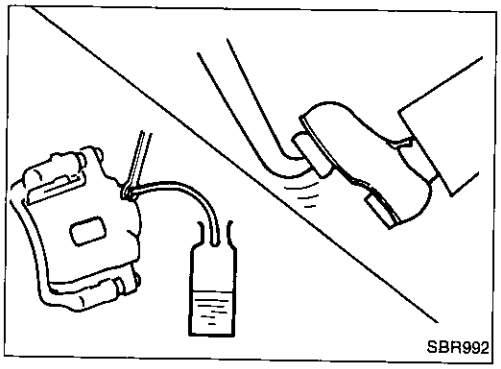

SBR992

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.

- Bleed air in the following order.

Master cylinder
↓
Right rear brake
↓
Left rear brake
↓
Right front brake
↓
Left front brake





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 a vinyl tube to air bleeder valve.
2. Drain brake fluid from each air bleeder valve by depressing brake pedal.
3. Remove flare nut securing brake tube to hose, then withdraw lock spring.
4. Cover openings to prevent entrance of dirt whenever disconnecting hydraulic line.

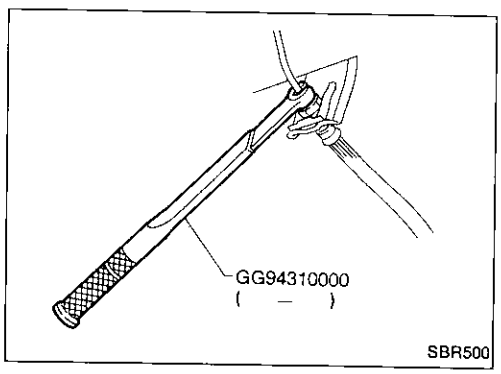
Inspection

Check brake lines (tubes and hoses) for cracks, deterioration or other damage. Replace any damaged parts.

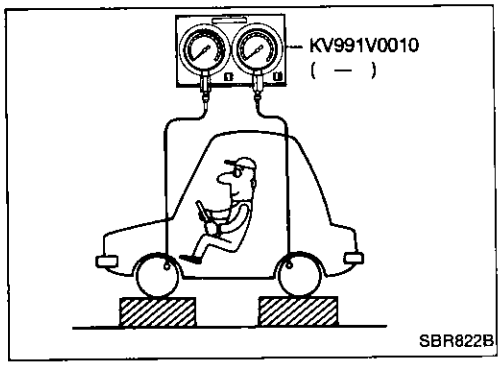
Installation

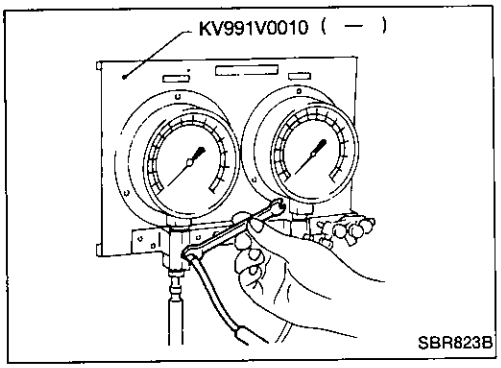
CAUTION:

- **Refill with new brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**



1. Tighten all flare nuts and connecting bolts.
   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 Procedure" in "AIR BLEEDING".





Proportioning Valve

INSPECTION

CAUTION:

- **Carefully monitor brake fluid level at master cylinder.**
- **Use new brake fluid "DOT 3".**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on paint areas, wash it away with water immediately.**
- **Depress pedal slowly when raising front brake pressure.**
- **Check rear brake pressure 2 seconds after front brake pressure reaches specified value.**
- **Disconnect harness connectors from ABS actuator relay before checking.**

1. Connect Tool to air bleeders of front and rear brakes on either L.H. and R.H. side.
2. Bleed air from the Tool.
3. Check rear brake pressure by depressing brake pedal (increasing front brake pressure).

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

Applied pressure (Front brake)	D_1	5,394 (55, 782)
Output pressure (Rear brake)	D_2	3,138 - 3,531 (32 - 36, 455 - 512)

If output pressure is out of specifications, replace master cylinder assembly (built-in type).

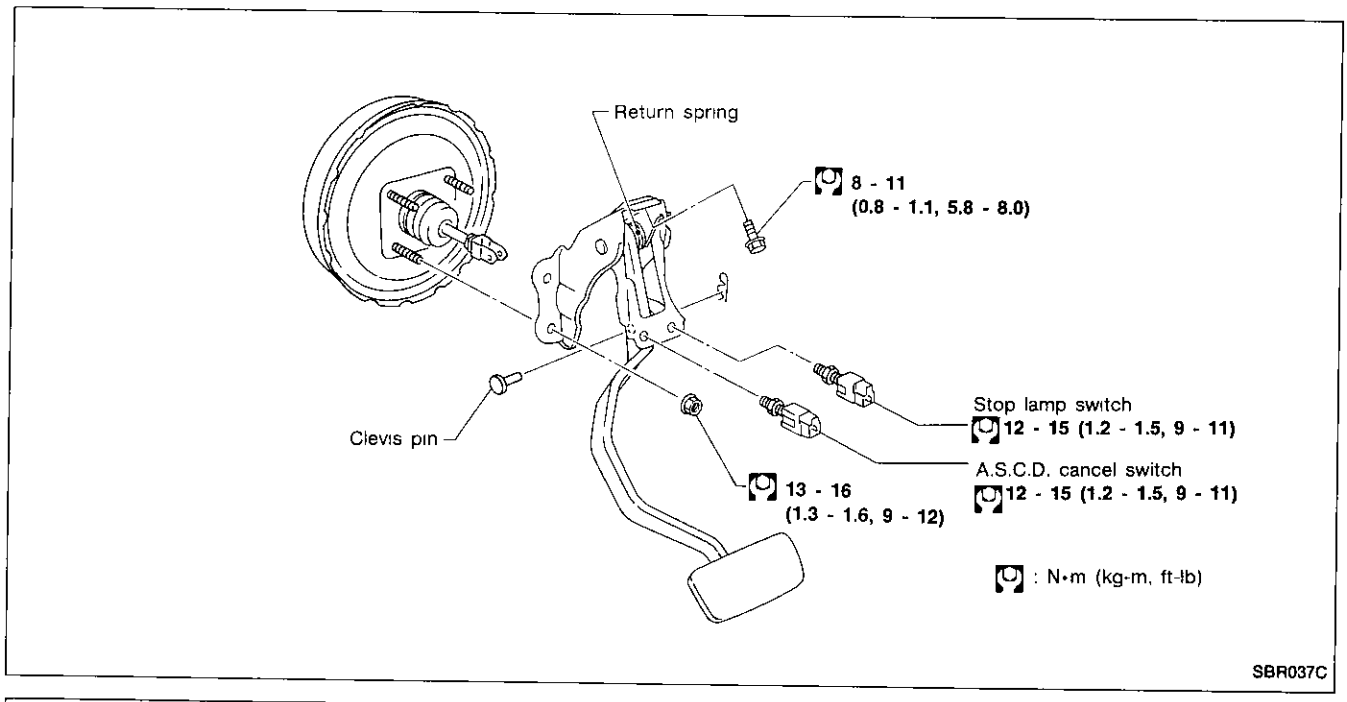
4. Bleed air after disconnecting the Tool. Refer to "Bleeding Procedure" in "AIR BLEEDING".

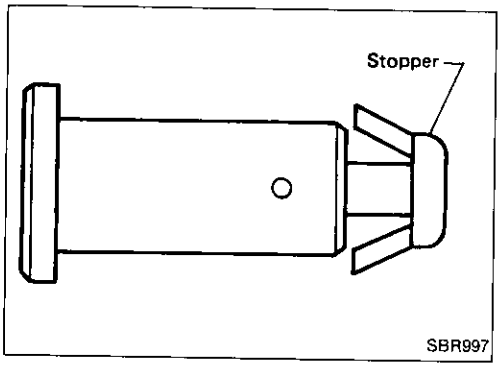
REMOVAL AND INSTALLATION (Built-in type)

Always replace together with master cylinder as an assembly.

- Refer to "MASTER CYLINDER".

Removal and Installation

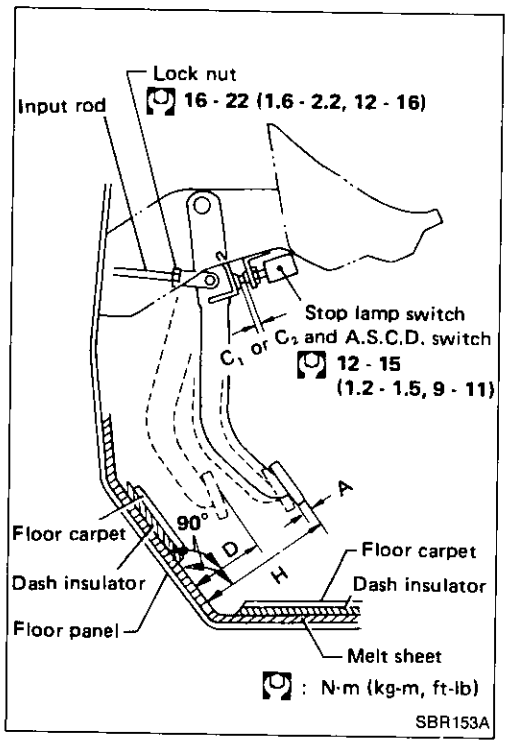




Inspection

Check brake pedal for following items:

- Brake pedal bend
- Clevis pin deformation
- Crack of any welded portion
- Crack or deformation of clevis pin stopper



Adjustment

Check brake pedal free height from dash reinforcement panel.

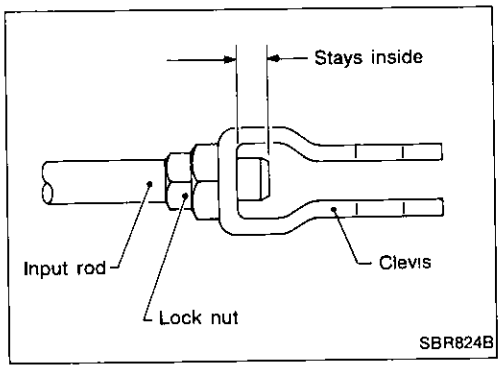
H: Free height
Refer to S.D.S.

D: Depressed height
Refer to S.D.S.
Under force of 490 N (50 kg, 110 lb) with engine running

C_1, C_2: Clearance between pedal stopper and threaded end of stop lamp switch and A.S.C.D. switch
0.3 - 1.0 mm (0.012 - 0.039 in)

A: Pedal free play
1.0 - 3.0 mm (0.039 - 0.118 in)

Adjustment (Cont'd)



If necessary, adjust brake pedal free height.

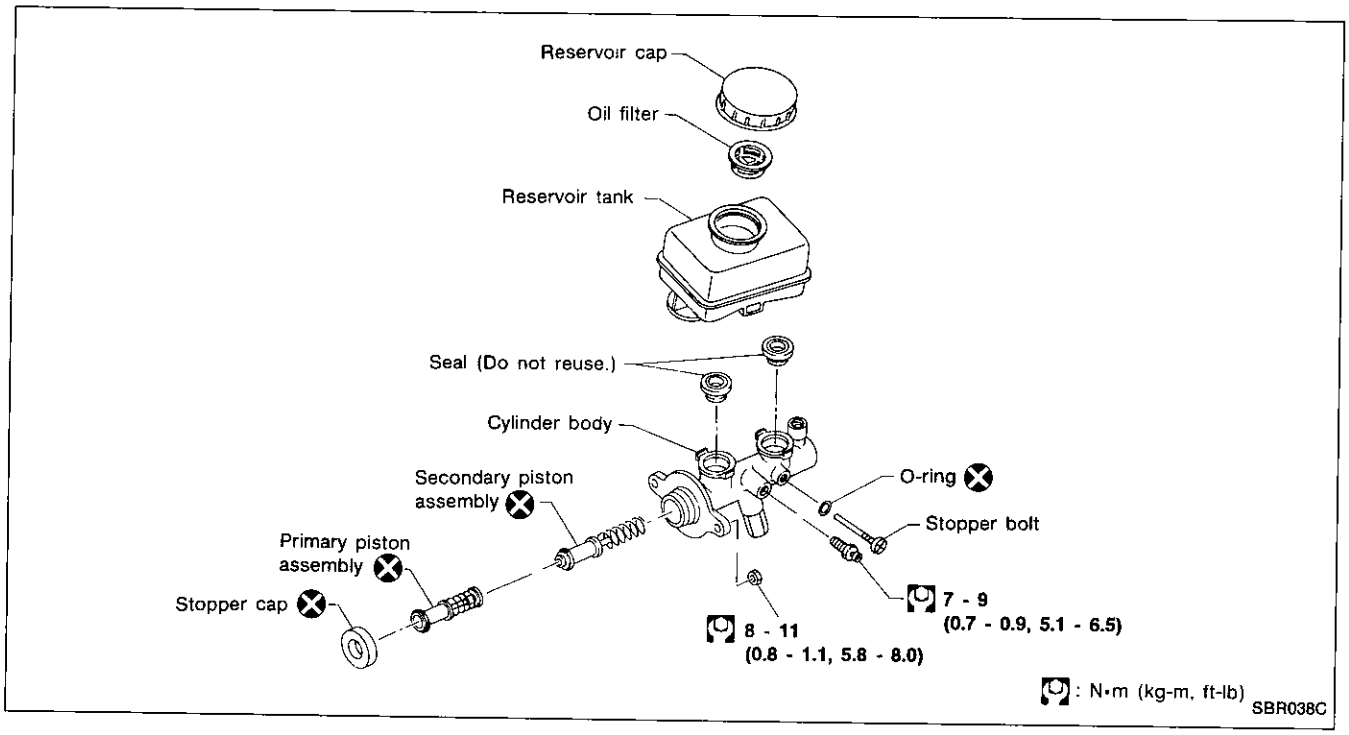
1. Loosen lock nut and adjust pedal free height by turning brake booster input rod. Then tighten lock nut.

Make sure that tip of input rod stays inside of clevis.

2. Loosen lock nut and adjust clearance "C_1" and "C_2" with stop lamp switch and A.S.C.D. switch respectively. Then tighten lock nuts.
3. Check pedal free play.

Make sure that stop lamps go off when pedal is released.

4. Check brake pedal's depressed height while engine is running.
   If depressed height is below specified value, check brake system for leaks, accumulation of air or any damage to components (master cylinder, etc.); then make necessary repairs.

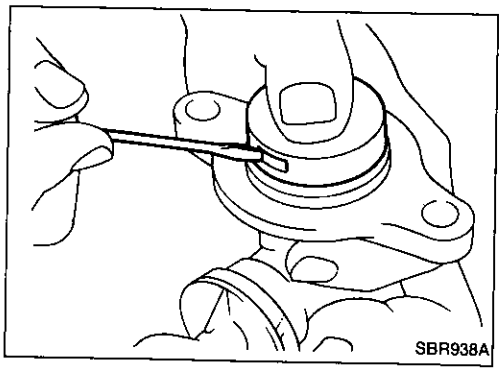


Removal

CAUTION:

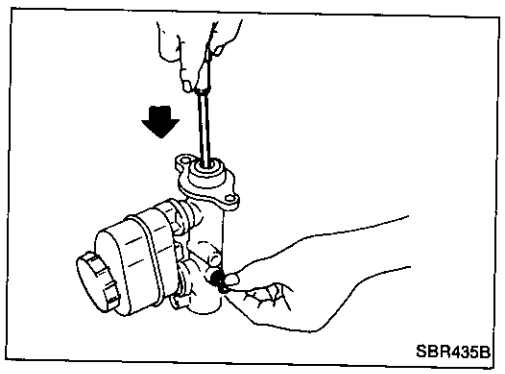
Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.

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.



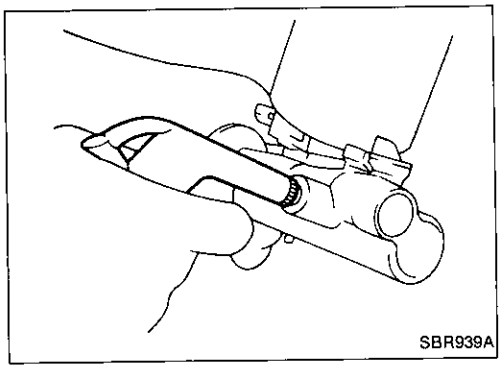
Disassembly

1. Bend claws of stopper cap outward.



2. Remove valve stopper while piston is pushed into cylinder.

Disassembly (Cont'd)


SBR939A

3. Remove piston assemblies.

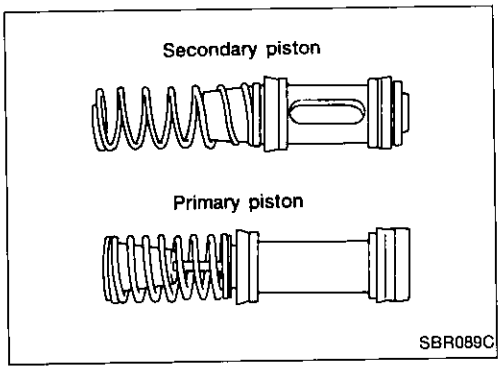
If it is difficult to remove secondary piston assembly, gradually apply compressed air through fluid outlet.

4. Draw out reservoir tank.

Inspection

Check master cylinder for pin holes or scratches on inner wall.

Replace if damaged.

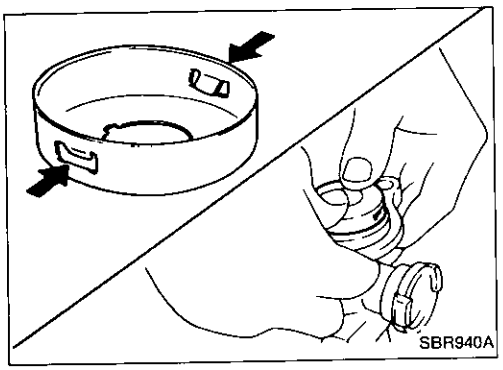


SBR089C

Assembly

1. Insert secondary piston assembly. Then insert primary piston assembly.

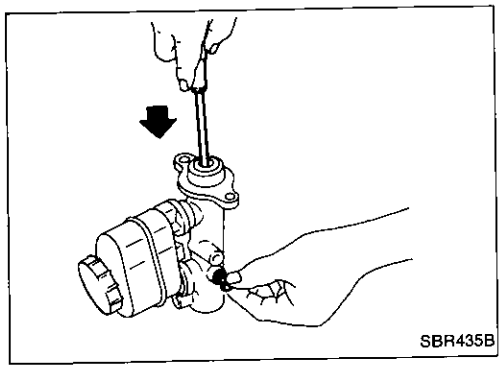
- **Pay attention to direction of piston cups in figure at left. Also, insert pistons squarely to avoid scratches on cylinder bore.**
- **Pay attention to alignment of secondary piston slit with valve stopper mounting hole of cylinder body.**


SBR940A

2. Install stopper cap.

Before installing stopper cap, ensure that claws are bent inward.

3. Push reservoir tank seals.
4. Push reservoir tank into master cylinder.


SBR435B

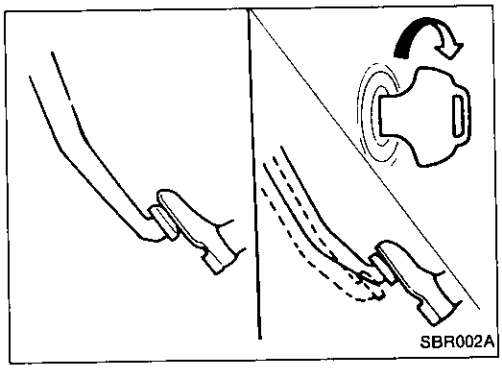
5. Install valve stopper while piston is pushed into cylinder.

Installation

CAUTION:

- **Refill with new brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**

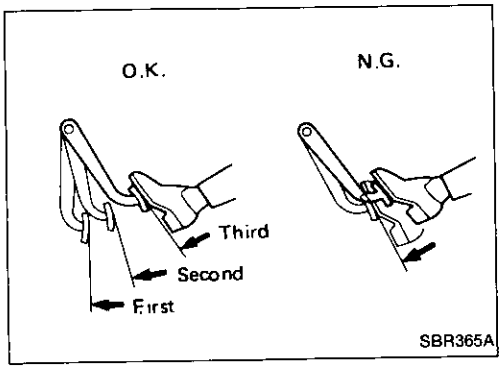
1. Place master cylinder onto brake booster and secure mounting nuts lightly.
2. Fit flare nuts to master cylinder.
3. Tighten mounting nuts.
   : 8 - 11 N·m (0.8 - 1.1 kg-m, 5.8 - 8.0 ft-lb)
4. Tighten flare nuts.
   : 15 - 18 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)
5. Bleed air. Refer to "Bleeding Procedure" in "AIR BLEEDING".



On-vehicle Service

OPERATING CHECK

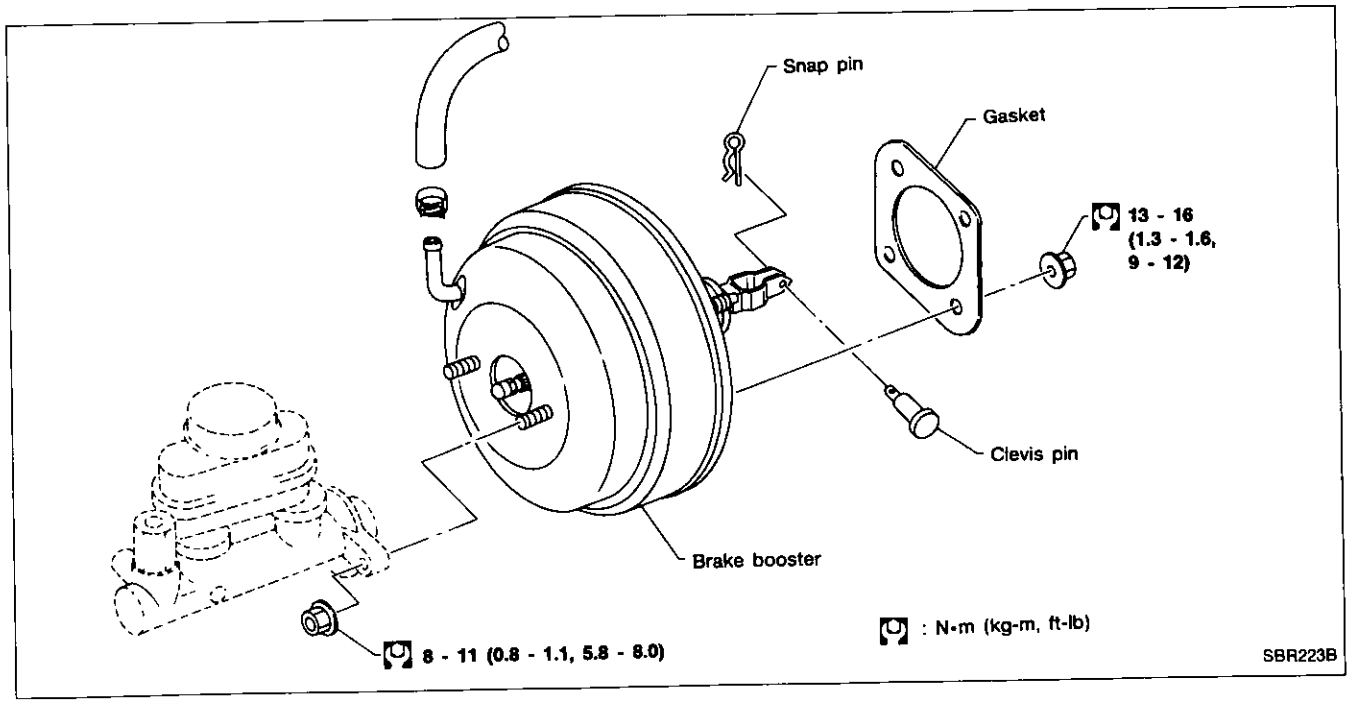
- Depress brake pedal several times with engine off, and check that there is no change in pedal stroke.
- Depress brake pedal, then start engine. If pedal goes down slightly, operation is normal.



AIRTIGHT CHECK

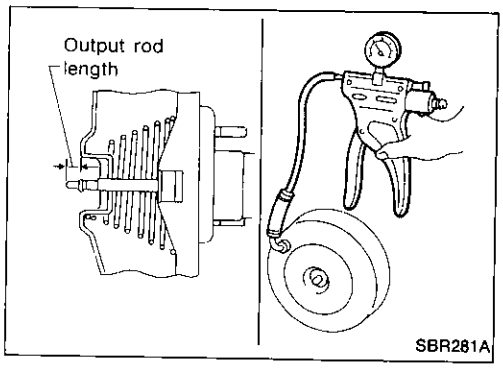
- Start engine, and stop it after one or two minutes. Depress brake pedal several times slowly. If pedal goes further down the first time and gradually rises after second or third time, booster is airtight.
- Depress brake pedal while engine is running, and stop engine with pedal depressed. If there is no change in pedal stroke after holding pedal down **30 seconds**, brake booster is airtight.

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

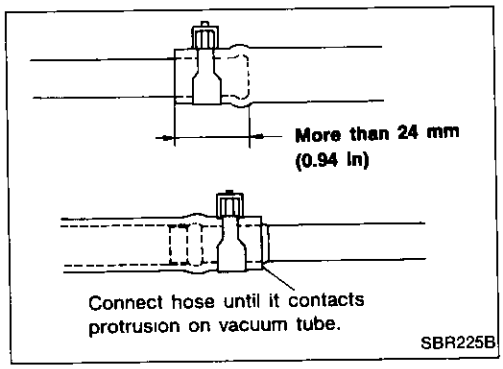
1. Apply vacuum of –66.7 kPa (–500 mmHg, –19.69 inHg) to brake booster with a handy vacuum pump.
2. Check output rod length.
   Specified length:
   10.275 - 10.525 mm (0.4045 - 0.4144 in)

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 "DOT 3".**
- **Never reuse drained brake fluid.**
- **Take care not to damage brake booster mounting bolt thread when installing. Due to the acute angle of installation, the threads can be damaged on the metal surrounding the dash panel holes.**

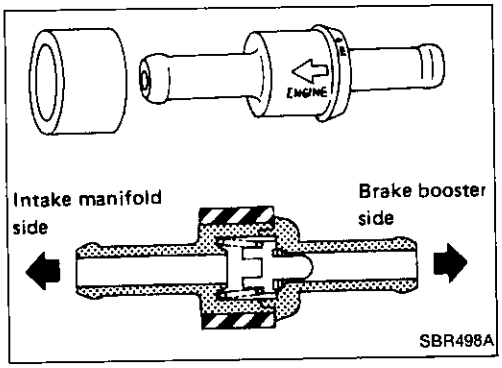
1. Fit booster, then secure mounting nuts (brake pedal bracket to brake booster) lightly.
2. Connect brake pedal and booster input rod with clevis pin.
3. Secure mounting nuts.
   : 13 - 16 N·m (1.3 - 1.6 kg-m, 9 - 12 ft-lb)
4. Install master cylinder. Refer to "Installation" in "MASTER CYLINDER".
5. Bleed air. Refer to "Bleeding Procedure" in "AIR BLEEDING".



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.**

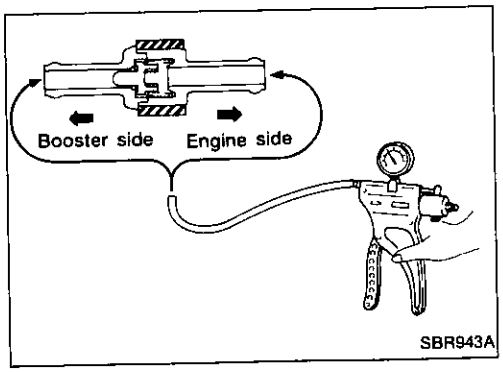


- **Install check valve, paying attention to its direction.**

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.

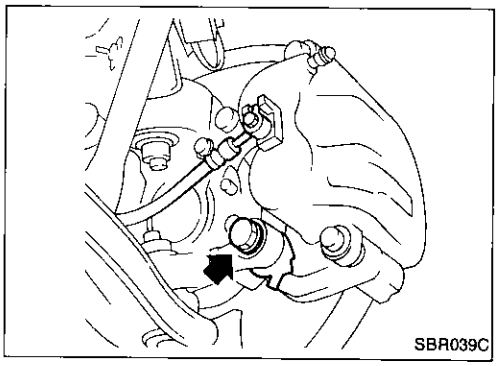
Pad Replacement

WARNING:

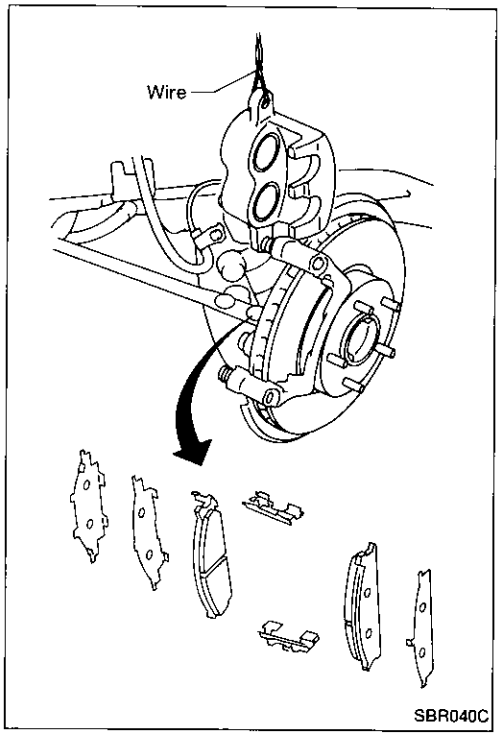
Clean brakes with a vacuum dust collector to minimize the hazard of airborne asbestos or other materials.

CAUTION:

- **(When cylinder body is open,) do not depress brake pedal, or piston will pop out.**
- **Be careful not to damage piston boot or get oil on rotor. Always replace shims when replacing pads.**
- **If shims are rusted or show peeling of the rubber coat, replace them with new shims.**
- **It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend cylinder body with wire so as not to stretch brake hose.**


SBR039C

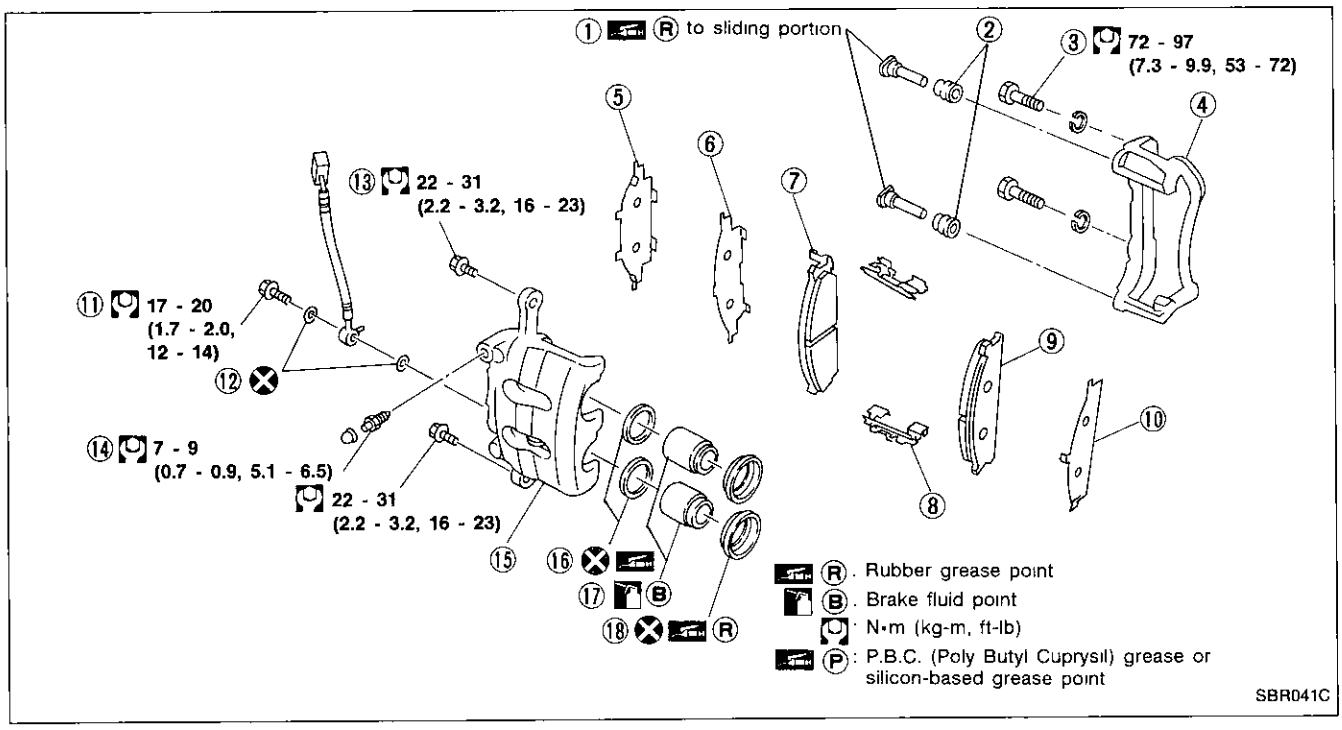
1. Remove master cylinder reservoir cap.
2. Remove lower pin bolt.



SBR040C

3. Open cylinder body upward. 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)

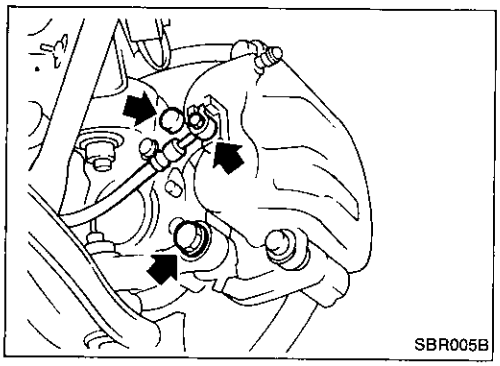
- **Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston.**



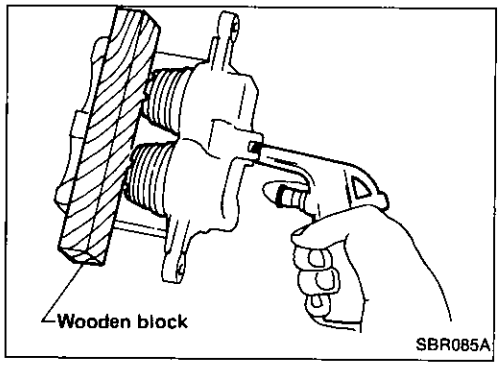
① Main pin
② Pin boot
③ Torque member fixing bolt
④ Torque member
⑤ Shim cover
⑥ Inner shim
⑦ Inner pad
⑧ Pad retainer
⑨ Outer pad
⑩ Outer shim
⑪ Connecting bolt
⑫ Copper washer
⑬ Main pin bolt
⑭ Bleed valve
⑮ Cylinder body
⑯ Piston seal
⑰ Piston
⑱ Piston boot

Removal

WARNING:
Clean brakes with a vacuum dust collector to minimize risk of health hazard from powder draffs caused by friction.



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

WARNING:
Do not place your fingers in front of piston.
CAUTION:
Do not scratch or score cylinder wall.

1. Push out piston with dust seal with compressed air.
2. Remove piston seal with a suitable tool.

Inspection — Caliper

CYLINDER BODY

- Check inside surface of cylinder for score, rust, wear, damage or presence of foreign objects. If any of the above conditions are observed, replace cylinder body.
- Minor damage from rust or foreign objects may be eliminated by polishing surface with a fine emery paper. Replace cylinder body if necessary.

CAUTION:
Use brake fluid to clean. Never use mineral oil.

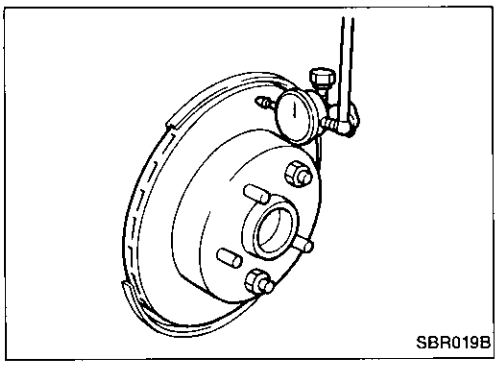
PISTON

CAUTION:
Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign objects are stuck to sliding surface.

Check piston for score, rust, wear, damage or presence of foreign objects. Replace if any of the above conditions are observed.

SLIDE PIN, PIN BOLT AND PIN BOOT

Check for wear, cracks, rust or other damage. Replace if any of the above conditions are observed.


SBR019B

Inspection — Rotor

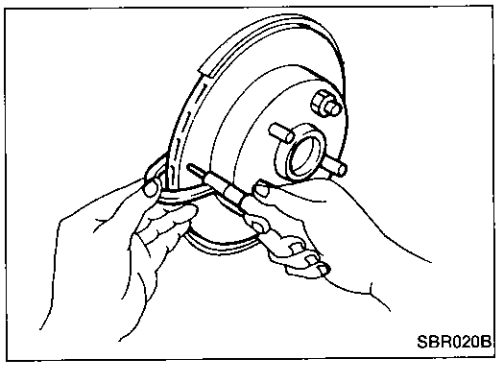
RUNOUT

1. Secure rotor to wheel hub with at least two nuts (M12 × 1.25).
2. Check runout using a dial indicator.

Make sure that wheel bearing axial end play is within the specifications before measuring. Refer to section FA.

Maximum runout:
0.07 mm (0.0028 in)

3. If the runout is out of specification, find minimum runout position as follows:
   a. Remove nuts and rotor from wheel hub.
   b. Shift the rotor one hole and secure rotor to wheel hub with nuts.
   c. Measure runout.
   d. Repeat steps a. to c. so that minimum runout position can be found.
4. If the runout is still out of specification, turn rotor with on-car brake lathe ("MAD, DL-8700", "AMMCO 700 and 705" or equivalent).

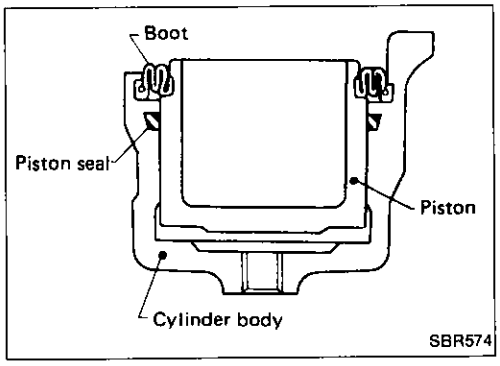

SBR020B

THICKNESS

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.

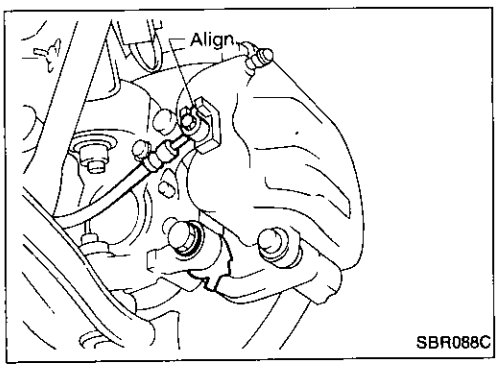
Rotor repair limit:
26.0 mm (1.024 in)



SBR574

Assembly

1. Insert piston seal into groove on cylinder body.
2. With piston boot fitted to piston, insert piston boot into groove on cylinder body and install piston.
3. Properly secure piston boot



SBR088C

Installation

CAUTION:

- **Refill with new brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**

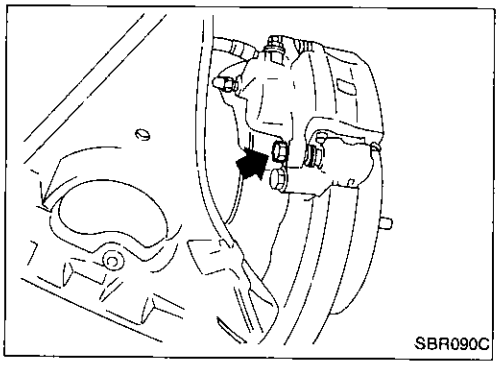
1. Install caliper assembly.
2. Install brake hose to caliper securely.
3. Install all parts and secure all bolts.
4. Bleed air. Refer to "Bleeding Procedure" in "AIR BLEEDING".

Pad Replacement

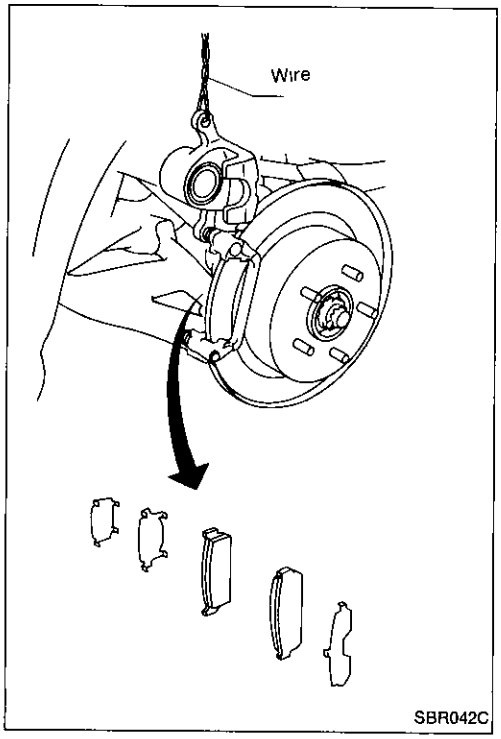
WARNING:
Clean brakes with a vacuum dust collector to minimize risk of health hazard from powder draffs caused by friction.

CAUTION:

- **When cylinder body is open, do not depress brake pedal, or piston will pop out.**
- **Be careful not to damage piston boot or get oil on rotor. Always replace shims when replacing pads.**
- **If shims are rusted or show peeling of 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.**


SBR090C

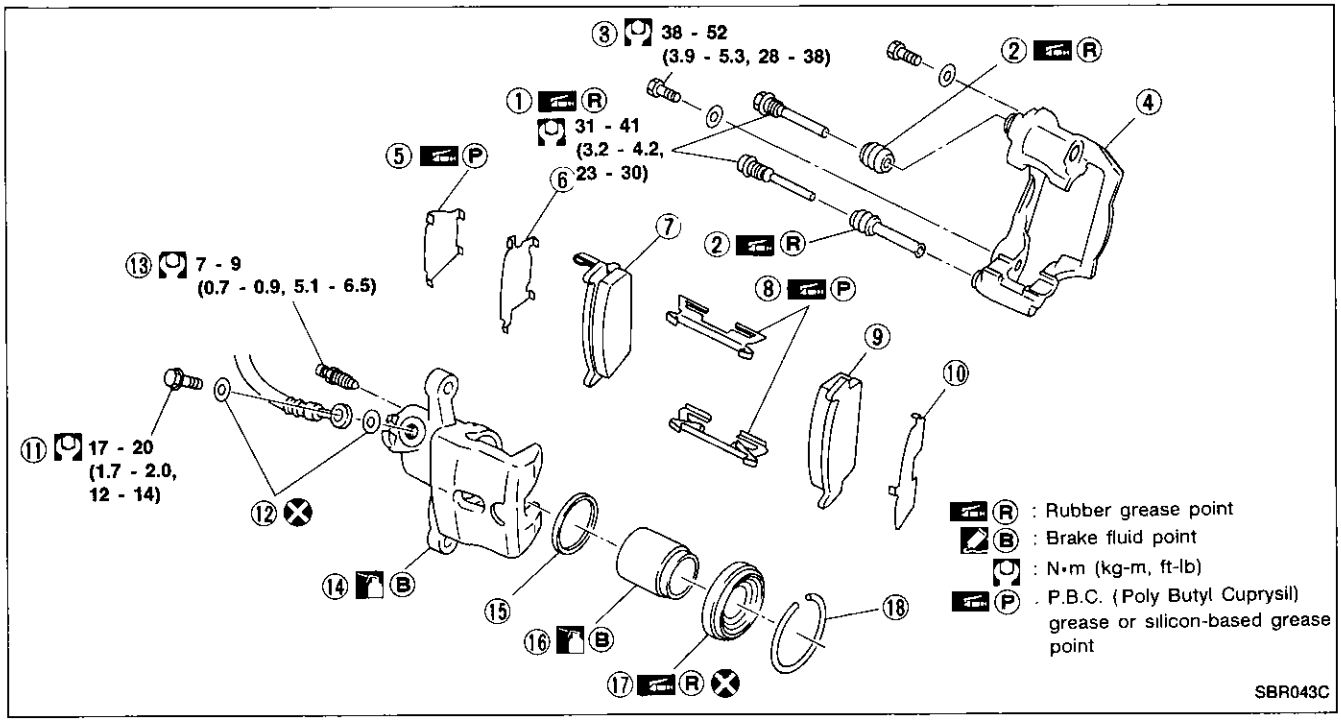
1. Remove master cylinder reservoir cap.
2. Remove lower pin bolt.



SBR042C

3. Open cylinder body upward. Then remove pad retainers, and inner and outer shims.
   Standard pad thickness:
   10 mm (0.39 in)
   Pad wear limit:
   2.0 mm (0.079 in)

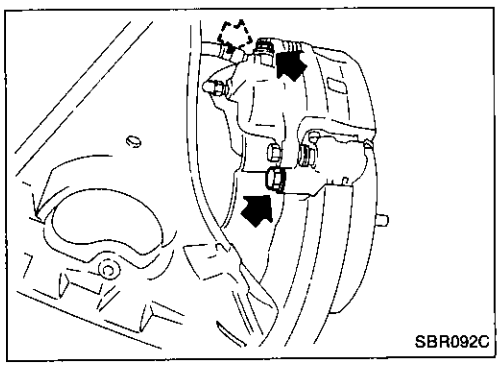
- **Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston.**



① Main pin bolt
② Pin boot
③ Torque member fixing bolt
④ Torque member
⑤ Shim cover
⑥ Inner shim
⑦ Inner pad
⑧ Pad retainer
⑨ Outer pad
⑩ Outer shim
⑪ Connecting bolt
⑫ Copper washer
⑬ Bleed valve
⑭ Cylinder body
⑮ Piston seal
⑯ Piston
⑰ Piston boot
⑱ Retainer

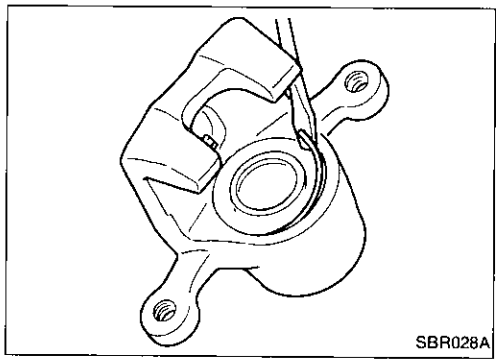
Removal

WARNING:
Clean brakes with a vacuum dust collector to minimize risk of health hazard from powder draffs caused by friction.



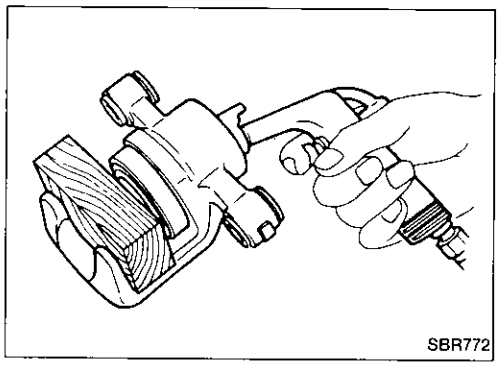
Remove torque member fixing bolts and connecting bolt.

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.


SBR028A

Disassembly

1. Remove piston boot retainer with a screwdriver.


SBR772

WARNING:
Do not place your fingers in front of piston.
CAUTION:
Do not scratch or score cylinder wall.

2. Push out piston and piston boot with compressed air.
3. Remove piston seal with a suitable tool.

Inspection — Caliper

CYLINDER BODY

- Check inside surface of cylinder for score, rust, wear, damage or presence of foreign objects. If any of the above conditions are observed, replace cylinder body.
- Minor damage from rust or foreign objects may be eliminated by polishing surface with a fine emery paper. Replace cylinder body if necessary.

CAUTION:
Use brake fluid to clean cylinder. Never use mineral oil.

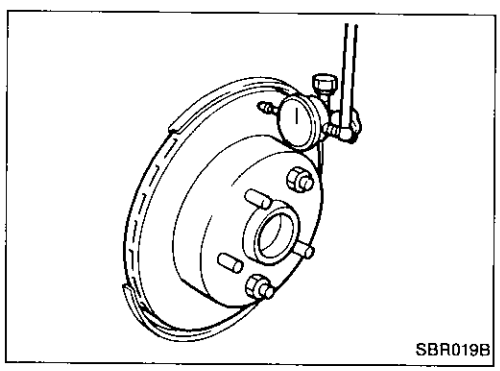
PISTON

CAUTION:
Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign objects are stuck to sliding surface.

Check piston for score, rust, wear, damage or presence of foreign objects. Replace if any of the above conditions are observed.

SLIDE PIN, PIN BOLT AND PIN BOOT

Check for wear, cracks, rust or other damage. Replace if any of the above conditions are observed.


SBR019B

Inspection — Rotor

RUNOUT

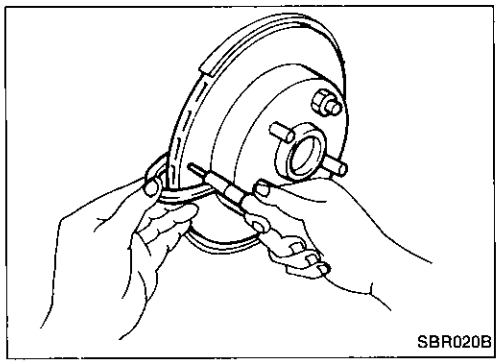
1. Secure rotor to wheel hub with two nuts (M12 x 1.25).
2. Check runout using a dial indicator.

Make sure that wheel bearing axial end play is within the specifications before measuring. Refer to section RA.

3. Change relative positions of rotor and wheel hub so that runout is minimized.

Maximum runout
0.15 mm (0.0059 in)

Inspection — Rotor (Cont'd)



THICKNESS

Rotor repair limit:

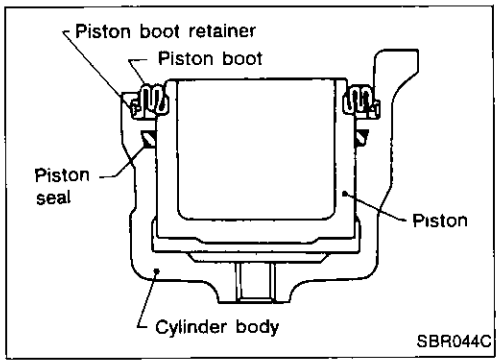
Minimum thickness

14.0 mm (0.551 in)

Thickness variation (At least 8 portions)

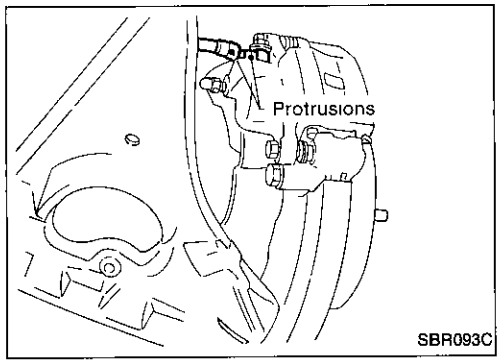
Maximum 0.02 mm (0.0008 in)

Replace rotor if any of the above do not meet the specifications.



Assembly

1. Insert piston seal into groove on cylinder body.
2. With piston boot fitted to piston, insert piston boot into groove on cylinder body and install piston.
3. Properly secure piston boot.
4. Secure piston boot with retainer.



Installation

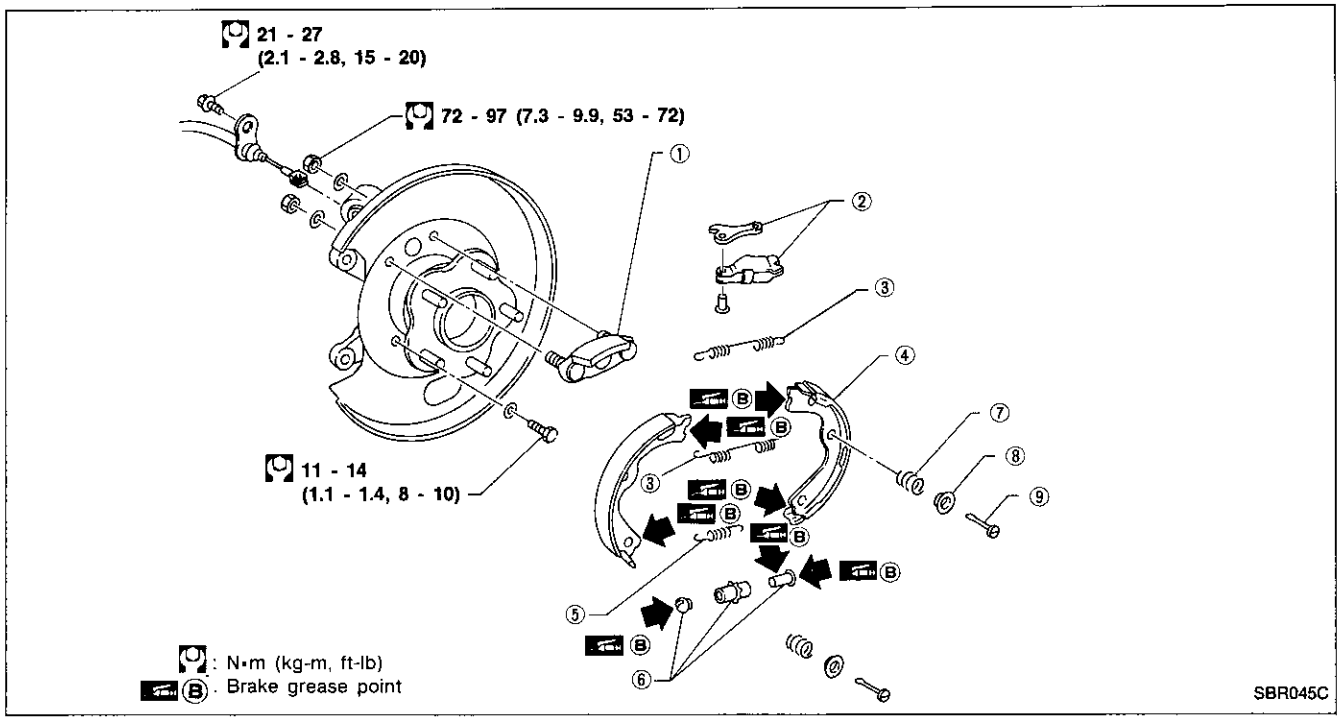
CAUTION:

- **Refill with new brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**

1. Install caliper assembly.

Do not forget to install shims and washers.

2. Install brake hose to caliper securely.
3. Install all parts and secure all bolts.
4. Bleed air. Refer to "Bleeding Procedure" in "AIR BLEEDING".

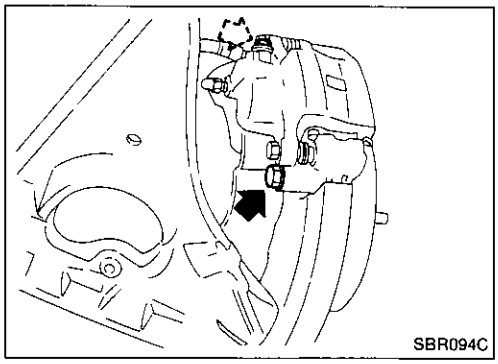


① Anchor block
② Toggle lever
③ Return spring
④ Shoe
⑤ Adjuster spring
⑥ Adjuster
⑦ Anti-rattle spring
⑧ Retainer
⑨ Anti-rattle pin

Removal

WARNING:

Clean brakes with a vacuum dust collector to minimize risk of health hazard from powder draffs caused by friction.



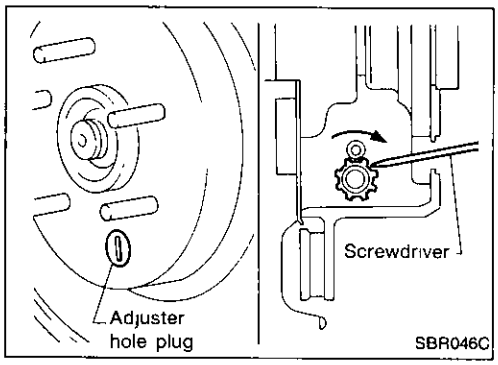
CAUTION:

Make sure parking brake lever is released completely.

1. Remove torque member fixing bolts (Rear disc brake assembly mounting bolts).

Suspend caliper assembly with wire so as not to stretch brake hose.

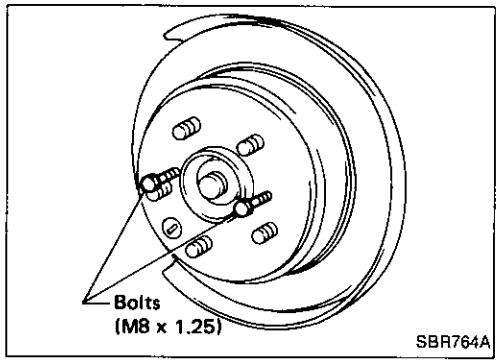
Removal (Cont'd)



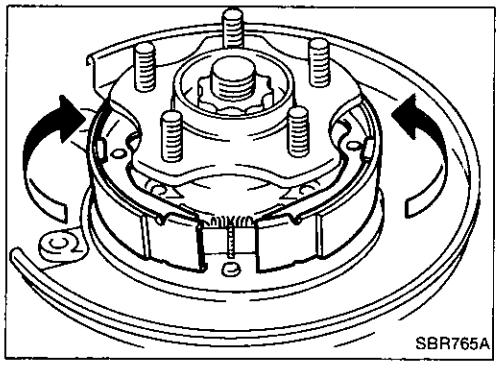
2. Release parking brake lever fully, then remove drum.

If drum is hard to remove, the following procedures should be carried out:

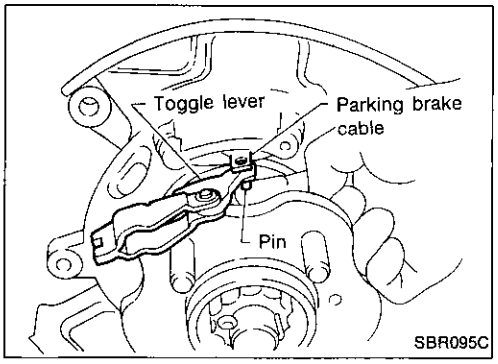
a. Remove plug.
b. Insert screwdriver through plug hole.
c. Turn adjuster to make clearance between brake shoe and drum.



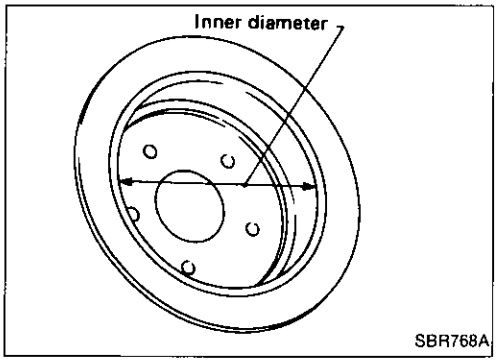
d. Fit two bolts to the drum as shown and tighten gradually.



3. After removing retainer, remove spring by rotating shoes.
4. Remove adjuster.

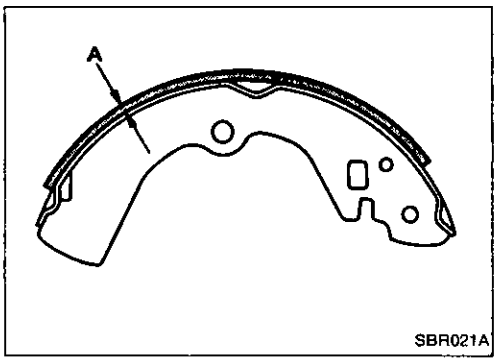


5. Disconnect parking brake cable from toggle lever after drawing out toggle lever pin.



Inspection — Drum

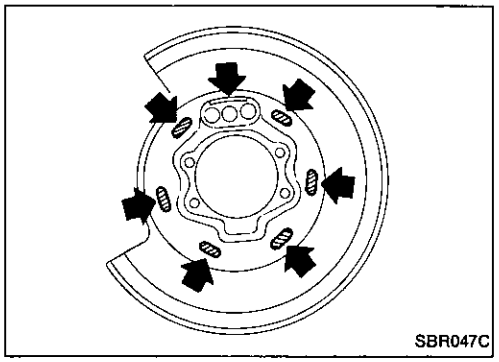
Maximum inner diameter:
173.0 mm (6.81 in)



Inspection — Lining

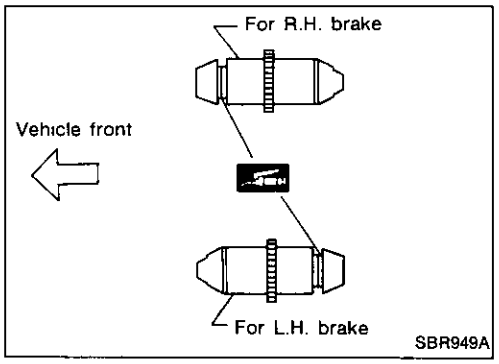
Check lining thickness.

Standard lining thickness:
3.0 mm (0.118 in)
Lining wear limit (A):
1.5 mm (0.059 in)



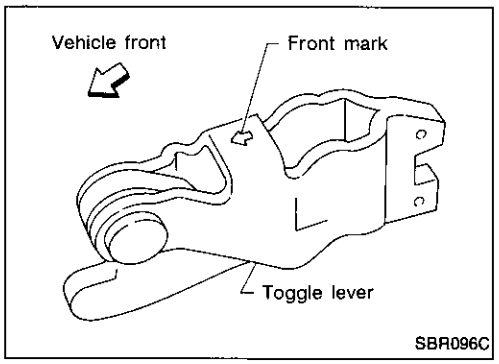
Installation

1. Apply brake grease to the contact areas shown at left.



2. Shorten adjuster by rotating it.

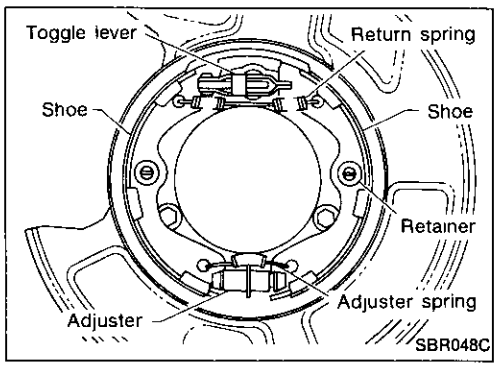
Pay attention to direction of adjuster.



3. Connect parking brake cable to toggle lever.

Pay attention to direction of adjuster.

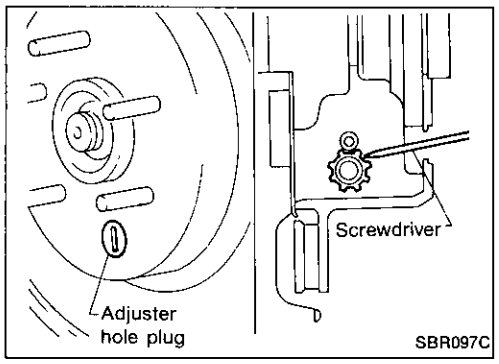
4. Install all parts.



5. Check all parts are installed properly.

Pay attention to direction of adjuster and toggle lever.

6. Install drum.
7. Install rear disc brake assembly.



Shoe Clearance Adjustment

1. Remove adjuster hole plug, and turn down adjuster wheel with a screwdriver until brake is locked.

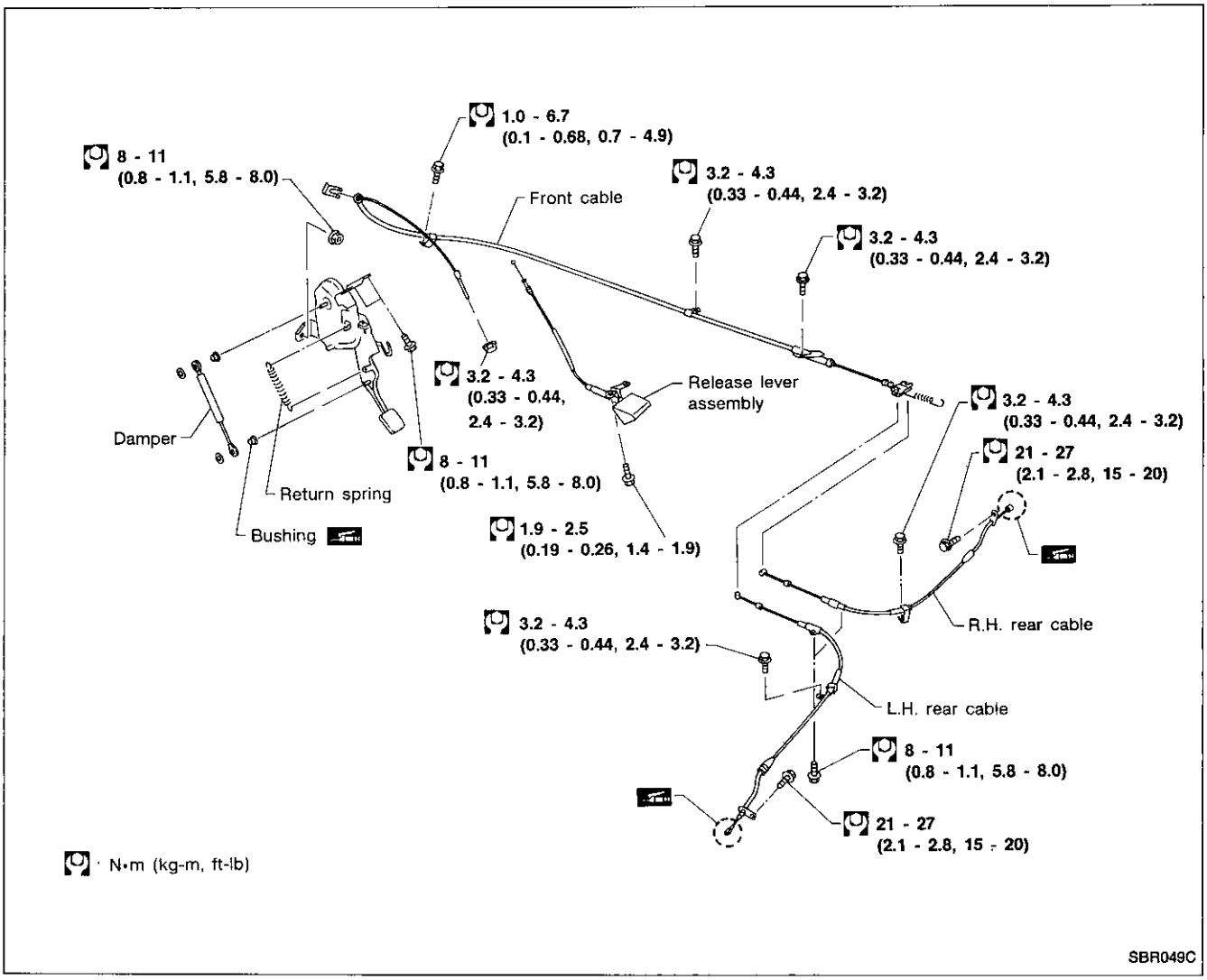
Make sure that parking control lever is released completely.

2. Return adjuster wheel 5 to 6 latches.
3. Install adjuster hole plug, and make sure that there is no drag between shoes and brake drum when rotating disc rotor.
4. Adjust parking brake cable. Refer to "Adjustment" in "PARKING BRAKE CONTROL".

Breaking in Drum and Lining

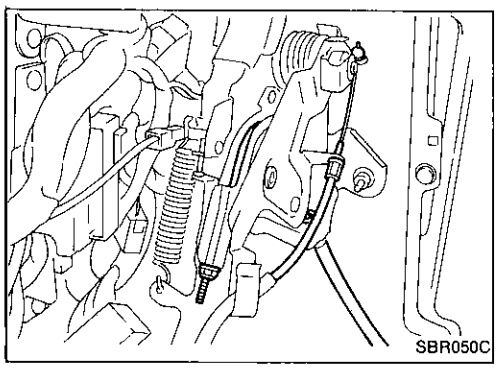
Carry out following procedures to bed down parking brake when stopping effect of parking brake is weakened, or brake shoes and/or drums are replaced.

1. Drive the unloaded vehicle on a safe, level and dry road.
2. Depress parking brake pedal with a force of 255N (26 kg, 57 lb).
3. While depressing the pedal, continue to drive the vehicle forward 100 m (328 ft) at approximately 35 km/h (22 MPH).
4. After releasing the pedal, drive the vehicle under the normal conditions for two minutes to cool down the parking drum brake.
5. Repeat steps 1 through 4 two times.



Removal and Installation

- Parking brake cables can be removed without removing pedal assembly.
- In order to remove front cable, it is necessary to remove center console. (Refer to section BF.)
- In order to remove pedal assembly, it is necessary to remove instrument panel assembly and air duct. (Refer to section BF.)



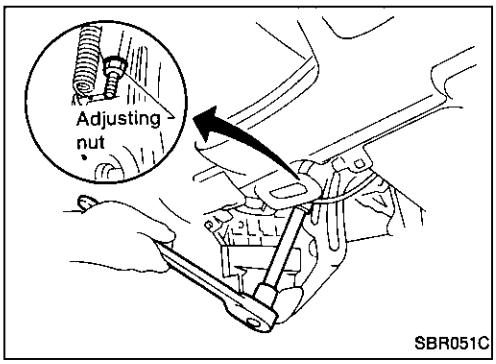
- The figure at left shows how front and release cables are connected to pedal assembly.

Inspection

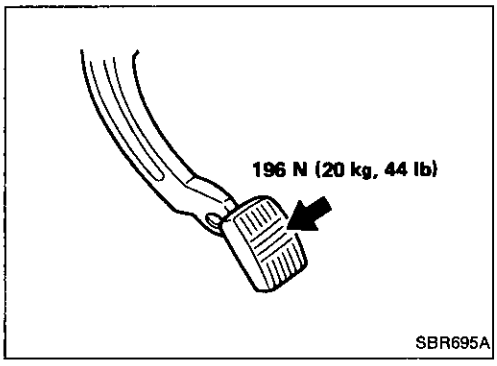
1. Check control lever for wear or other damage. Replace if necessary.
2. Check wires for discontinuity or deterioration. Replace if necessary.
3. Check warning lamp and switch. Replace if necessary.
4. Check parts at each connecting portion and, if deformed or damaged, replace.

Adjustment

On models equipped with parking drum brake, perform shoe clearance adjustment before adjusting parking brake control. Refer to "Shoe Clearance Adjustment" in "REAR DISC BRAKE — Parking Drum Brake".

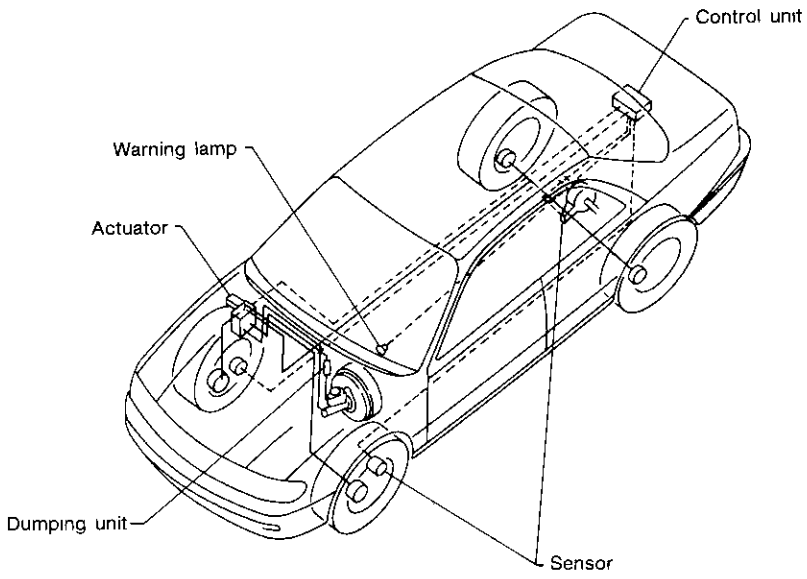


1. Release parking brake pedal and loosen adjusting nut. Adjust parking brake by turning adjusting nut.



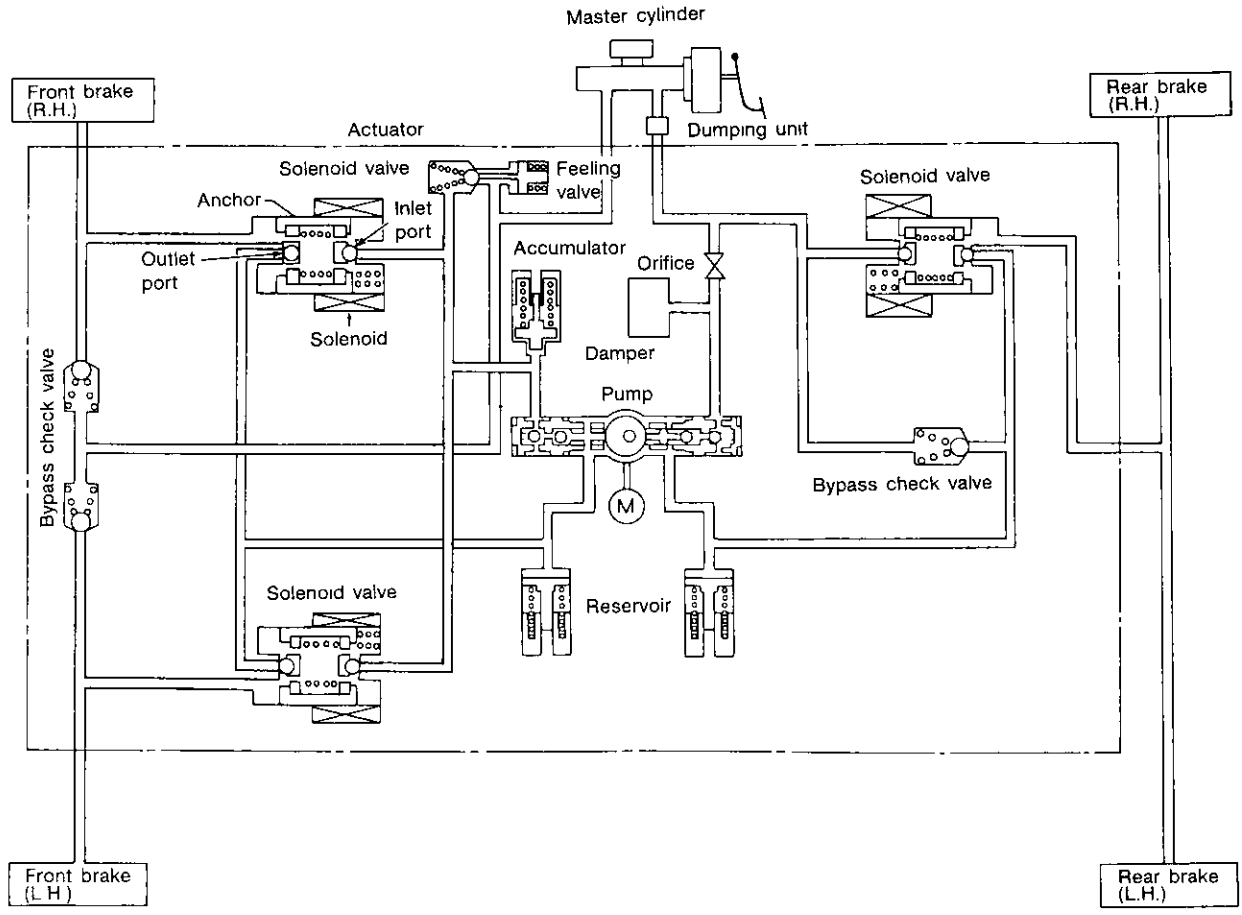
2. Depress parking brake pedal several times with specified amount of force. Check pedal stroke and ensure smooth operation.
   Pedal stroke:
   75 - 90 mm (2.95 - 3.54 in)

System components



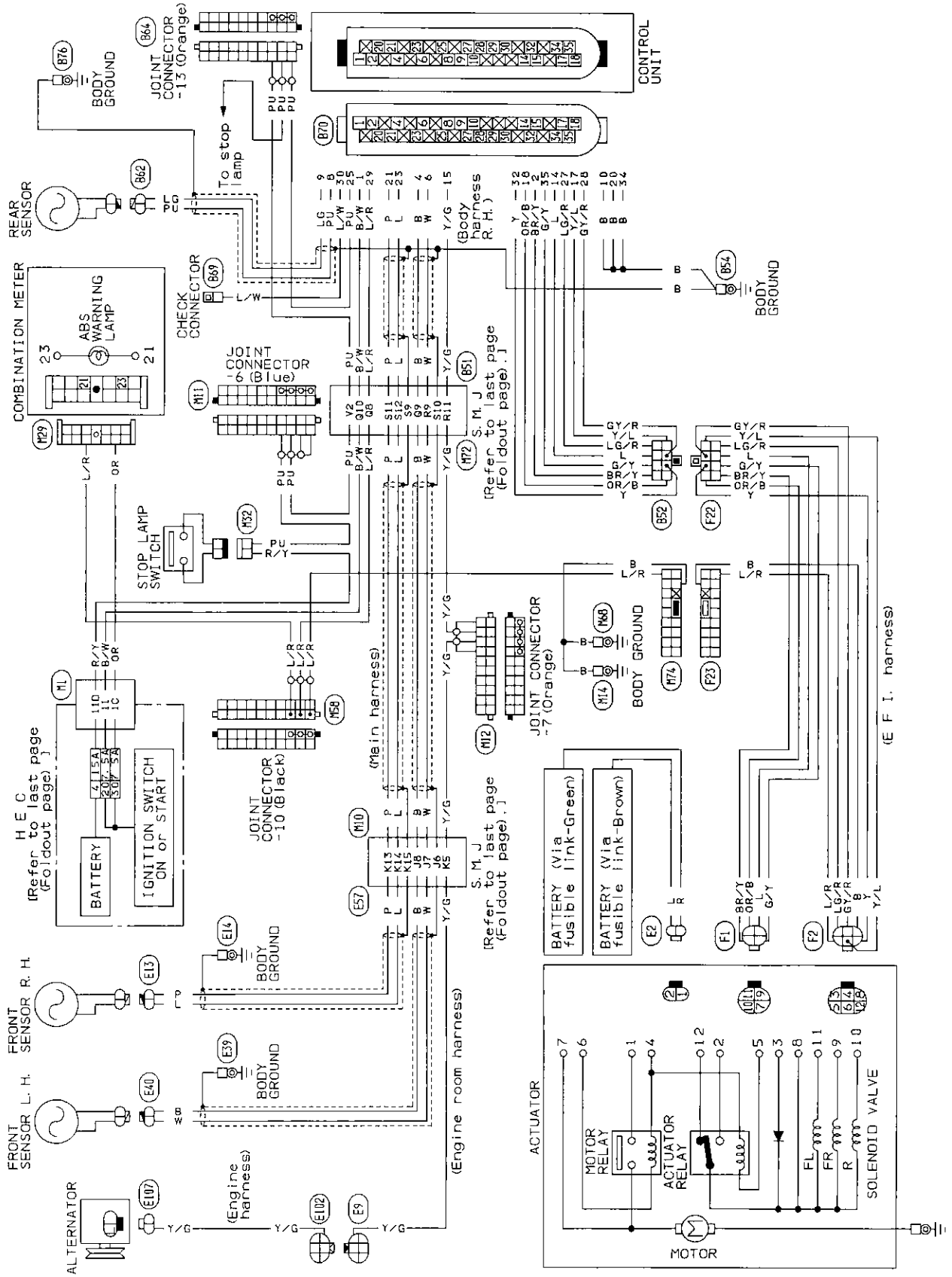
SBR103C

Operation of actuator hydraulic circuit



SBR104C

Wiring Diagram

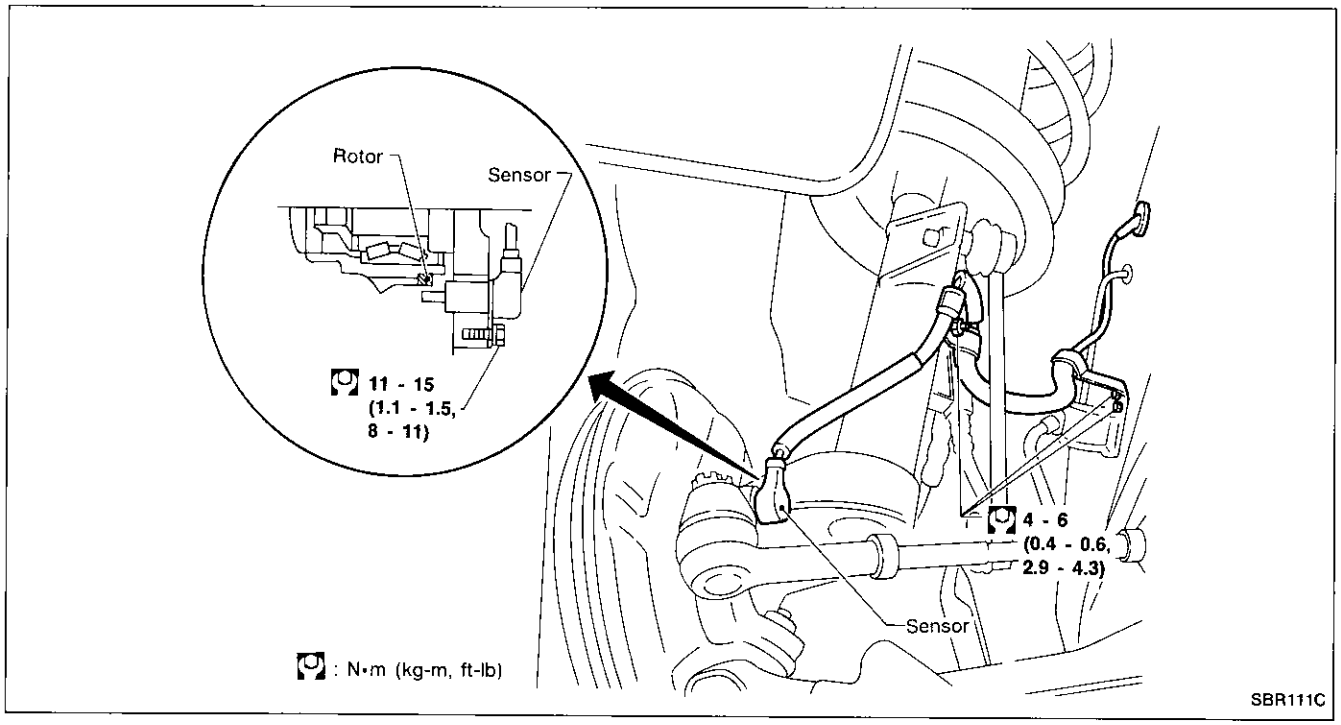


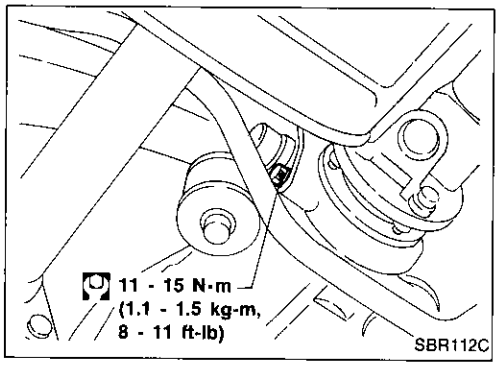
MBR046A

Removal and Installation

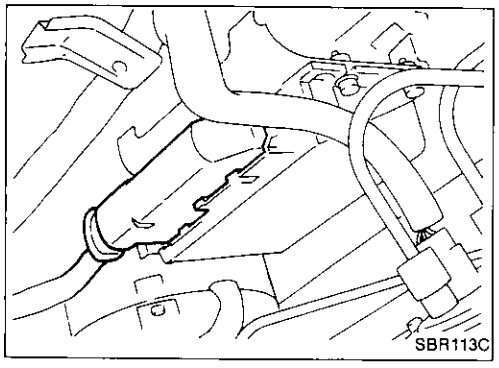
CAUTION:
Be careful not to damage sensor edge and sensor rotor teeth.

FRONT WHEEL SENSOR





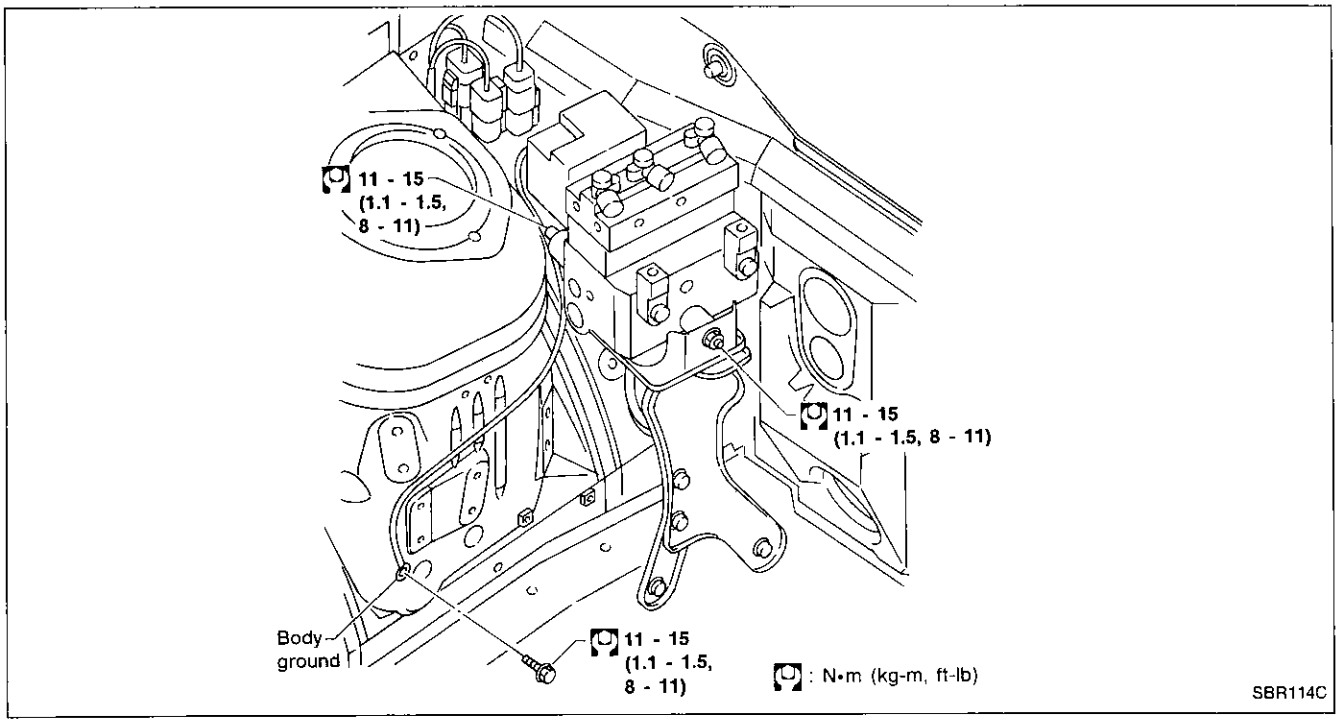
REAR WHEEL SENSOR



CONTROL UNIT

Removal and Installation (Cont'd)

ACTUATOR

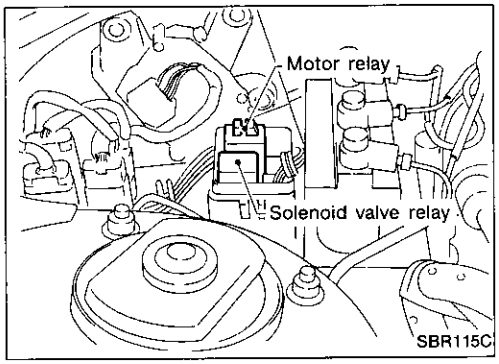


CAUTION:

After installation, pay attention to the following points.

- **Refill brake fluid and bleed air. Refer to "CHECK AND ADJUSTMENT" and "AIR BLEEDING" respectively.**

1. Drain brake fluid. Disconnect brake tubes.
2. Remove actuator.



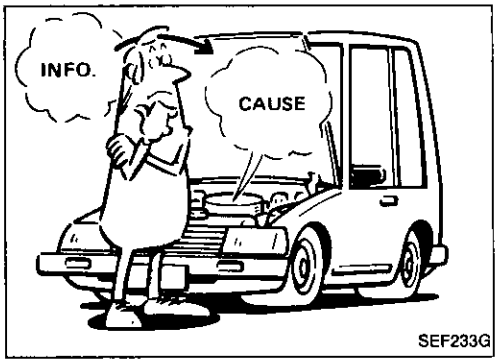
ACTUATOR RELAYS

4-terminals: MOTOR RELAY
5-terminals: SOLENOID VALVE RELAY

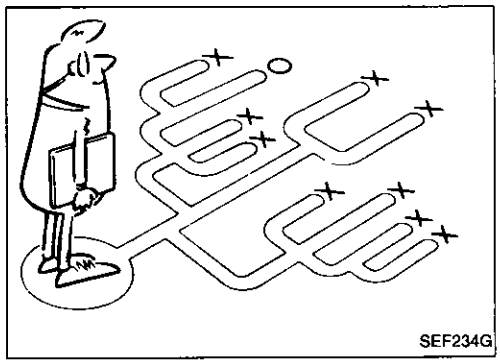
1. Disconnect battery cable.
2. Remove actuator relay cover.

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Component Parts and Harness Connector Location BR-38
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Diagnostic Procedure 9 ..... BR-50
Electrical Component Inspection BR-51



SEF233G


SEF234G

How to Perform Trouble Diagnoses for Quick and Accurate Repair

INTRODUCTION

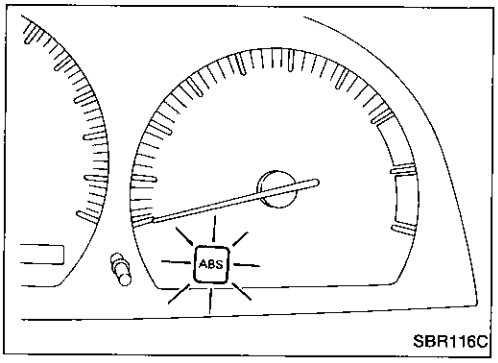
The ABS system has an electronic control unit to control major functions. The control unit accepts input signals from sensors and instantly drives actuators. It is essential that both kinds of signals are proper and stable. At the same time, it is important that there are no conventional problems such as air leaks in the booster or lines, lack of brake fluid, or other problems with 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.

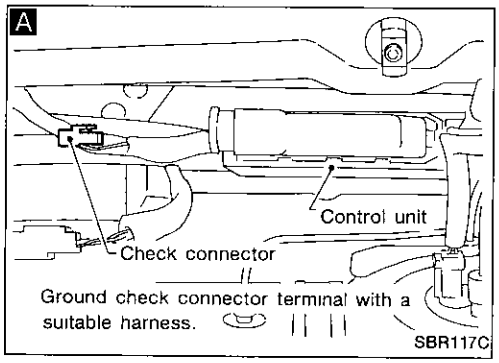


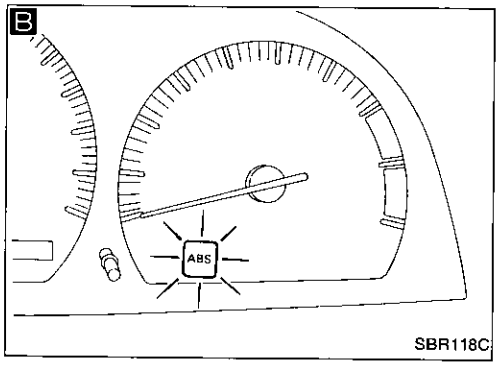
Self-diagnosis

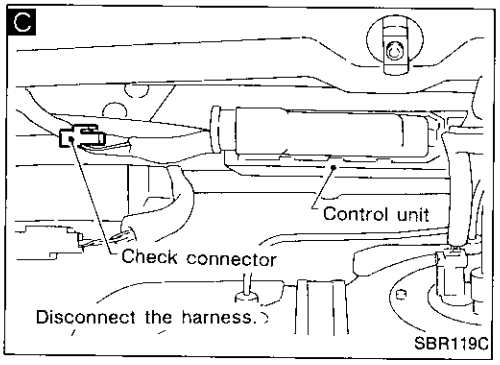
FUNCTION

- When a problem occurs in the ABS, the warning lamp on the instrument panel comes on. The warning lamp is also lit by grounding the self-diagnostic (check) terminal located on the check connector to actuate the self-diagnostic results mode. The location of the malfunction is indicated by the warning lamp flashing on the instrument panel.

SELF-DIAGNOSIS PROCEDURE







Drive vehicle over 30 km/h (20 MPH) for at least one minute.

↓

Turn ignition switch "OFF".

↓

A

Ground terminal "L" of check connector with a suitable harness.

↓

Turn ignition switch "ON" while grounding terminal "L".
Do not depress brake pedal.

↓

B

After 3.6 seconds, the warning lamp starts flashing to indicate the malfunction code No. (See NOTE 1.)

↓

After verifying the location of the malfunction with the malfunction code chart, make the necessary repairs following the instructions in the diagnostic procedures.

↓

After the malfunctions are repaired, erase the malfunction codes stored in the control unit. (See "HOW TO ERASE SELF-DIAGNOSTIC RESULTS".)

↓

Rerun the self-diagnostic results mode to verify that the malfunction codes have been erased.

↓

C

Disconnect the check terminal from the ground. The self-diagnostic results mode is now complete.

↓

Ⓐ

NOTE 1: The indication terminates after five minutes. However, when the ignition switch is turned from "OFF" to "ON", the indication starts flashing again.

Self-diagnosis (Cont'd)

Ⓐ

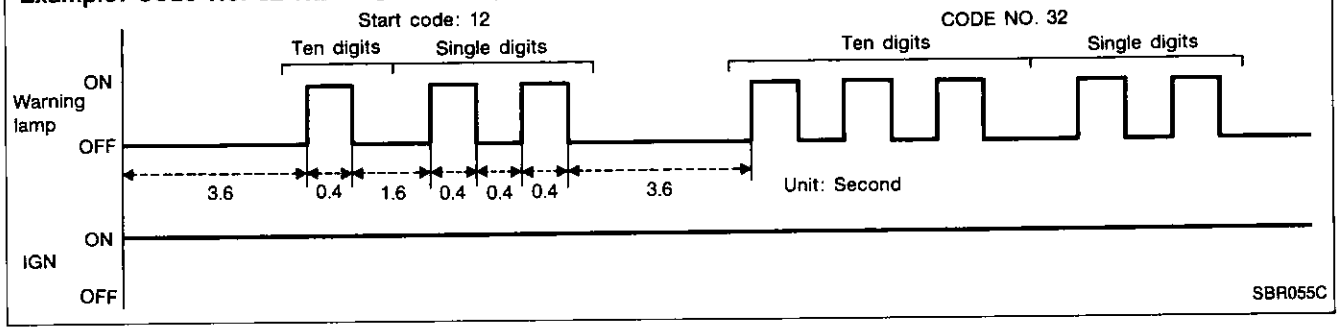
Check warning lamp for deactivation after driving vehicle over 30 km/h (20 MPH) for at least one minute.

After making certain that warning lamp does not come on, test the ABS in a safe area to verify that it functions properly.

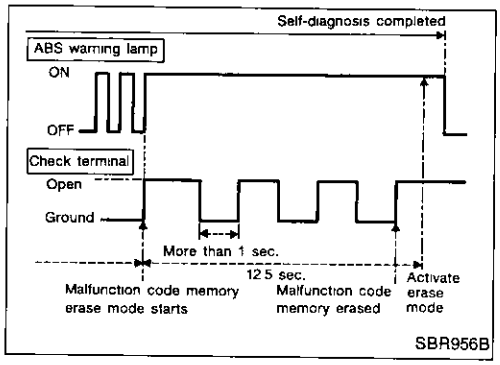
HOW TO READ SELF-DIAGNOSTIC RESULTS (Malfunction codes)

- Determine the code No. by counting the number of times the warning lamp flashes on and off.
- When several malfunctions occur at one time, up to three code Nos. can be stored; the latest malfunction will be indicated first.
- The indication begins with the start code 12, after which a maximum of three code Nos. appear in the order of the latest one first. The indication then returns to the start code to repeat (the indication will stay on for five minutes at the most).
- The malfunction code chart is given on the next page.

Example: Code No. 32 REAR SENSOR SHORT-CIRCUIT



Self-diagnosis (Cont'd)



HOW TO ERASE SELF-DIAGNOSTIC RESULTS (Malfunction codes)

a. Under the self-diagnostic results mode, the malfunction memory erase mode starts when the check terminal is disconnected from the ground.

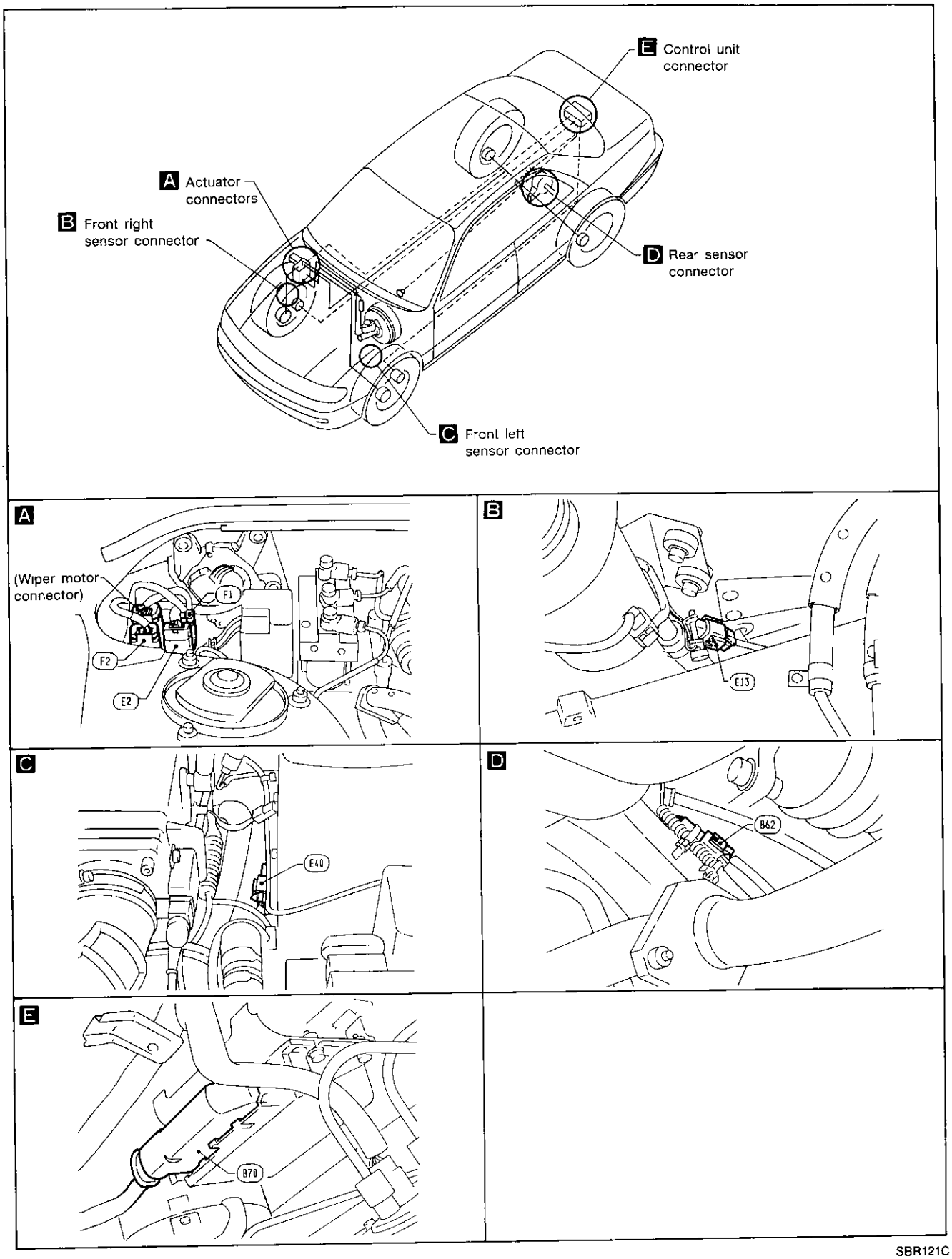
b. The self-diagnostic results (malfunction codes) can be erased by grounding the check terminal more than three times in succession within 12.5 seconds after the erase mode starts. (Each grounding must be longer than one second.)
The ABS warning lamp stays on while the self-diagnosis is in the erase mode, and goes out after the erase operation has been completed.
The self-diagnosis is also completed at the same time.

After the erase operation is completed, it is necessary to rerun the self-diagnostic mode to verify that malfunction codes no longer appear. Only the start code should be indicated when erase operation is completed and system is functioning normally.

MALFUNCTION CODE CHART

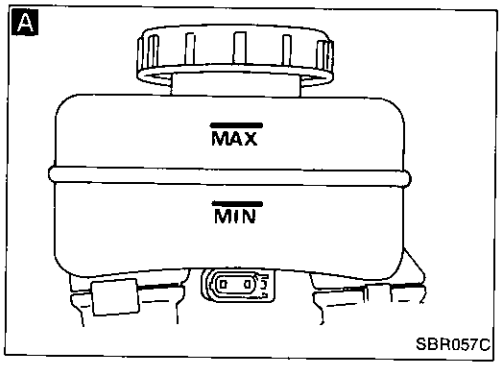
Code No.	Malfunctioning part	Diagnostic procedure
45	Front left actuator solenoid	3
41	Front right actuator solenoid	3
55	Rear actuator solenoid	3
25	Front left sensor (open-circuit)	4
26	Front left sensor (short-circuit)	4
21	Front right sensor (open-circuit)	4
22	Front right sensor (short-circuit)	4
31 or 35	Rear sensor (open-circuit)	4
32 or 36	Rear sensor (short-circuit)	4
18	Sensor rotor	4
61	Actuator motor or motor relay	5
63	Solenoid valve relay	6
57	Power supply (Low voltage)	7
16	Stop lamp switch circuit	8
71	Control unit	9
Warning lamp stays on, does not blink.	Solenoid valve relay stuck or control unit power supply circuit	2
Warning lamp does not come on.	Warning lamp bulb	1

Component Parts and Harness Connector Location



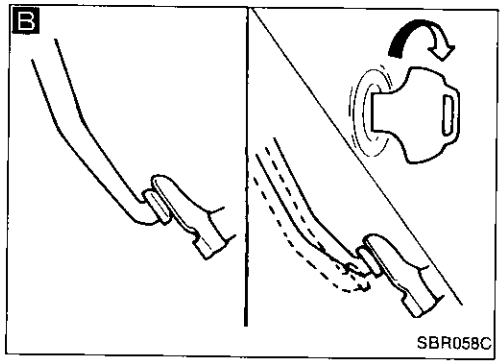
SBR121C

A



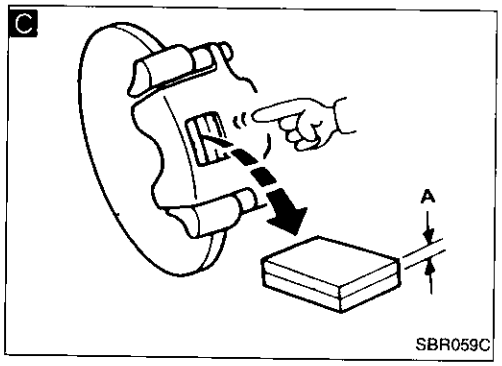
SBR057C

B



SBR058C

C



SBR059C

Preliminary Check

A

Check brake fluid level in reservoir tank. N.G. → Fill up brake fluid.

O.K.

Check brake line for leakage. N.G. → Repair.

O.K.

B

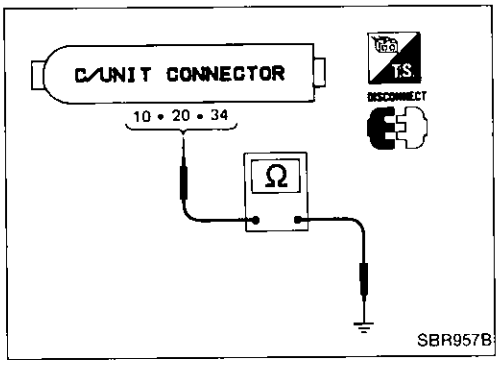
Check brake booster for operation and air tightness.
Refer to "On-vehicle Service" of BRAKE BOOSTER. N.G. → Replace.

O.K.

C

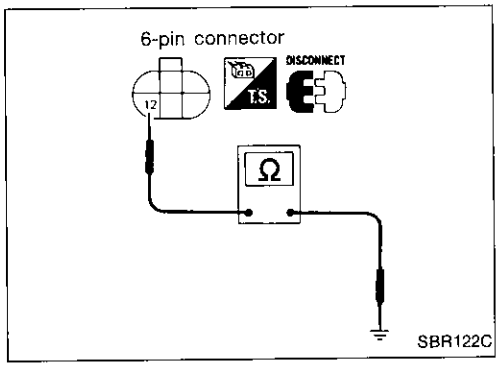
Check brake pads and rotor.
Refer to "Inspection" of FRONT and REAR DISC BRAKES. N.G. → Replace.

Preliminary Check (Cont'd)



CONTROL UNIT GROUND

- Check resistance between both terminals.
  Resistance: 0Ω

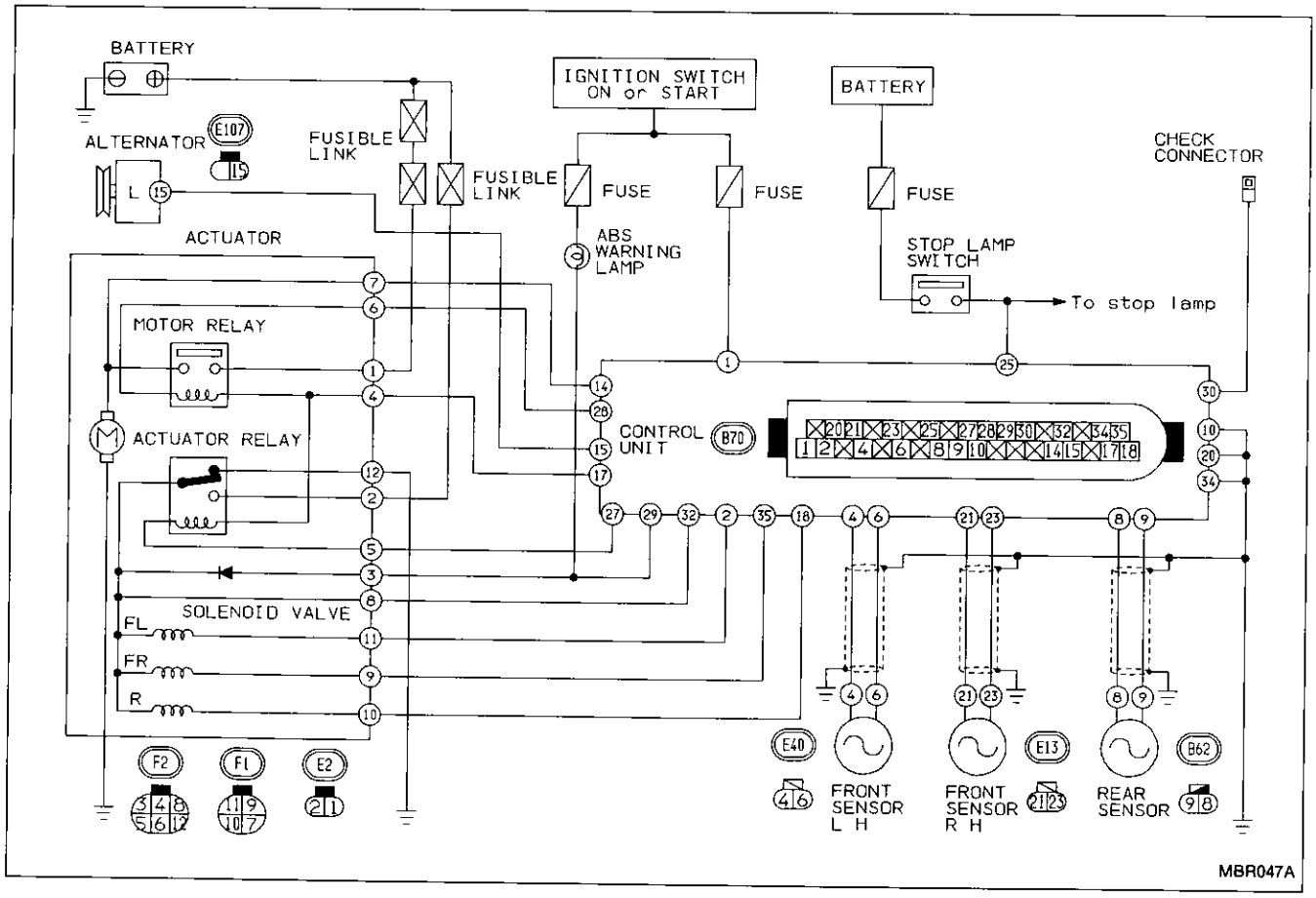


ACTUATOR GROUND

- Check resistance between actuator harness connector terminal ⑫ and ground.
  Resistance: 0Ω

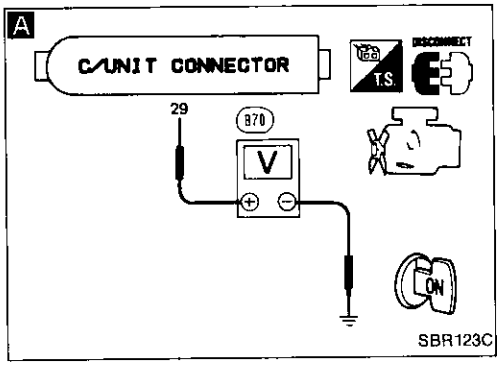
Circuit Diagram for Quick Pinpoint Check

- The unit side connectors with a double circle "⬭" are connected to the harness side connectors shown in the "Component Parts and Connector Location". (See page BR-38.)
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle " ○ ".



Diagnostic Procedure 1 (Not self-diagnostic item)

Warning lamp does not work before engine starts.



WARNING LAMP CIRCUIT CHECK

Check 10A fuse (No. 21). For fuse layout, refer to Circuit Diagram on fold-out page.

N.G. → Replace fuse.

O.K. ↓

Check warning lamp bulb.

N.G. → Replace bulb.

O.K. ↓

A

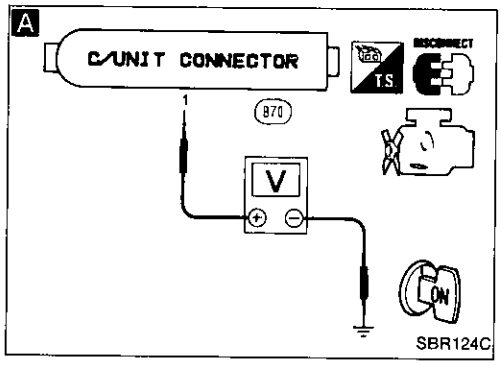
- Install 10A fuse and bulb.
- Disconnect connectors from control unit and actuator.
- Check voltage between control unit terminal ㉙ and ground after turning ignition switch "ON".

Battery voltage should exist.

N.G. → Repair harness and connectors.

O.K. ↓

Carry out self-diagnosis.



Diagnostic Procedure 2 (Not Self-diagnostic Item)

Warning lamp does not blink but stays on continuously.

A

CONTROL UNIT POWER SUPPLY CIRCUIT

- Disconnect connector from control unit.
- Check voltage between control unit connector terminal ① and ground after turning ignition switch "ON".
  Battery voltage should exist.

N.G. → Repair harness and connector.

O.K. ↓

GROUND-SHORT CHECK FOR WARNING LAMP CIRCUIT

- Turn ignition switch "OFF". Disconnect actuator connector.
- Check whether warning lamp goes on after turning ignition switch "ON".
  Warning lamp should not go on.
- Turn ignition switch "OFF".

N.G. → Repair harness and connector.

O.K. ↓

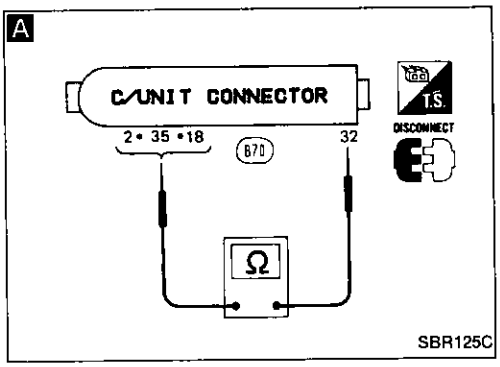
ACTUATOR SOLENOID VALVE RELAY CHECK

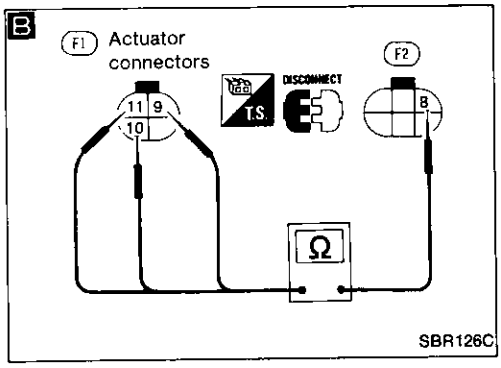
Refer to SOLENOID VALVE RELAY in Electrical Components Inspection.

N.G. → Replace solenoid valve relay.

O.K. ↓

- Erase self-diagnostic results.
- Carry out self-diagnosis.
  Refer to "Self-diagnosis".
- Inspect the system according to the code No.





Diagnostic Procedure 3

ACTUATOR SOLENOID (Malfunction code No. 45, 41 or 55)

A

ACTUATOR SOLENOID VALVE CHECK.

- Disconnect control unit connector.
- Check resistance between control unit connector terminals.

Code No. 45
Terminals ㉜ and ②
Code No. 41
Terminals ㉜ and ㉟
Code No. 55
Terminals ㉜ and ⑱
Resistance: 0.8 - 1.5Ω

O.K. → Replace control unit.

N.G. ↓

B

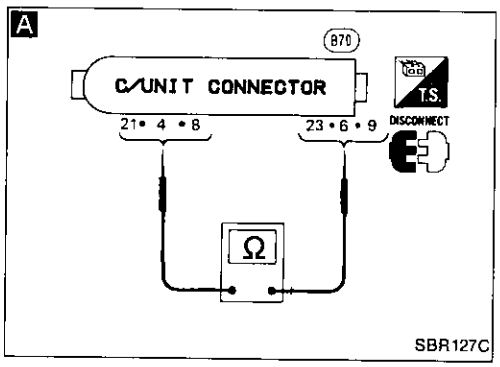
- Disconnect actuator relay connectors.
- Check resistance between actuator relay connector terminals.

Code No. 45
Terminals ⑧ and ⑪
Code No. 41
Terminals ⑧ and ⑨
Code No. 55
Terminals ⑧ and ⑩
Resistance: 0.8 - 1.5Ω

O.K. → Repair harness between actuator relay connector and control unit connector.

N.G. ↓

Replace actuator.



Diagnostic Procedure 4

WHEEL SENSOR OR ROTOR

(Malfunction code No. 21, 22, 25, 26, 31, 35, 32, 36 or 18)

A

WHEEL SENSOR ELECTRICAL CHECK → O.K. → Ⓐ

- Disconnect control unit connector.
- Check resistance between control unit connector terminals.

Code No. 21 or 22 (Front R.H. wheel)
Terminals ㉑ and ㉓
Code No. 25 or 26 (Front L.H. wheel)
Terminals ④ and ⑥
Code No. 31, 35, 32 or 36
(Rear wheel)
Terminals ⑧ and ⑨
Resistance: 0.9 - 1.1Ω

N.G.

Note

CHECK WHEEL SENSOR → N.G.

Refer to WHEEL SENSOR in Electrical Components Inspection.

Note

Replace wheel sensor.

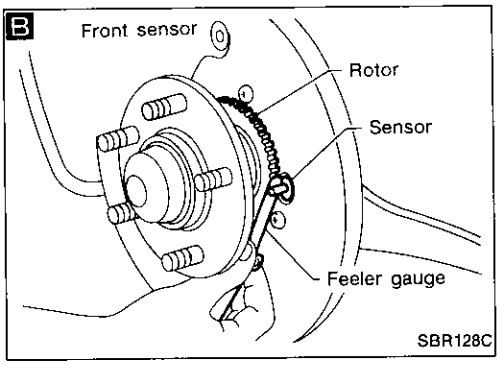
O.K.

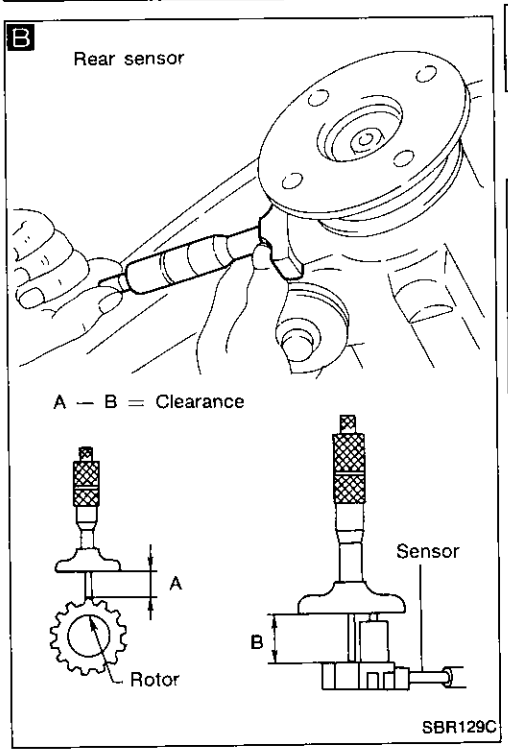
Note

Repair harness and connectors between control unit connector and wheel sensor connector.

Note: Wheel position should be distinguished by code No.

Diagnostic Procedure 4 (Cont'd)





Ⓐ

Note

WHEEL SENSOR MECHANICAL CHECK

Check for inflation pressure, wear and size of each tire.

N.G. → Note: Adjust tire pressure or replace tire(s).

O.K. ↓

Note

Check wheel bearing axial end play. Refer to section FA or RA.

N.G. → Note: Follow the direction in section FA or RA.

O.K. ↓

B Note

Check clearance between sensor and rotor.

Clearance: 0.45 - 0.8 mm (0.0177 - 0.0315 in) (Front)
0.35 - 0.625 mm (0.0138 - 0.0246 in) (Rear)

N.G. → Note: Clean sensor fixing portion, or replace sensor.

O.K. ↓

Note

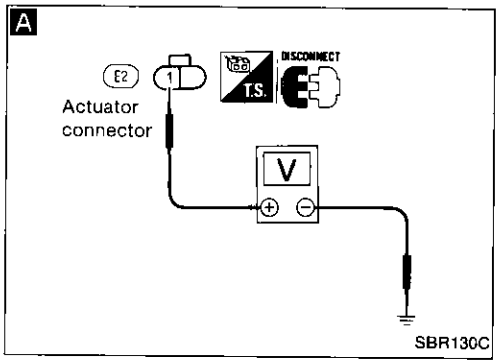
Check sensor rotor for teeth damage.

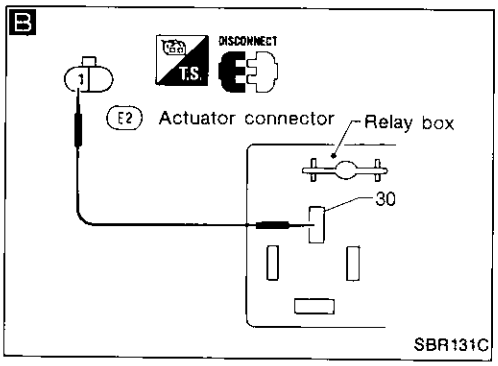
N.G. → Note: Replace sensor rotor (with drive shaft, wheel hub).

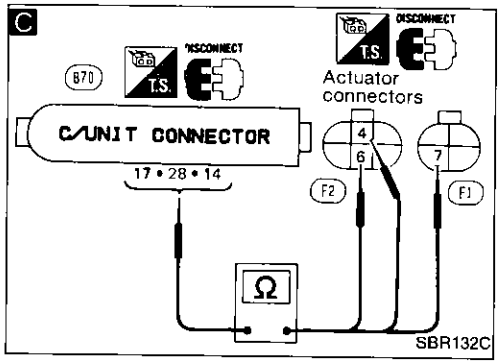
O.K. ↓

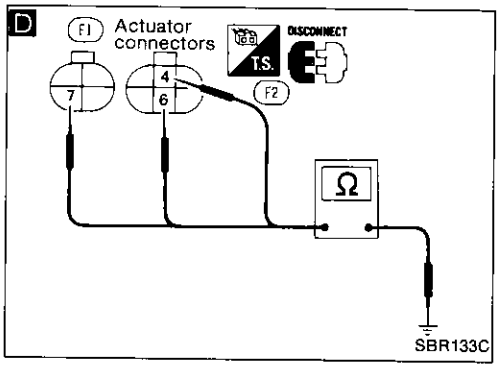
Replace control unit.

Note: Wheel position should be distinguished by code No.









Diagnostic Procedure 5

MOTOR RELAY OR MOTOR

(Malfunction code No. 61)

A

MOTOR POWER SUPPLY CHECK

- Disconnect connectors from actuator.
- Check voltage between terminal ① and ground.

Battery voltage should exist.

N.G. → Repair harness and connectors.

O.K. ↓

MOTOR RELAY CHECK

Refer to MOTOR RELAY in Electrical Components Inspection.

N.G. → Replace motor relay.

O.K. ↓

B

MOTOR CHECK

Check motor by connecting terminal ① for actuator connector and terminal ㉚ for motor relay terminal with a suitable harness.

Motor should operate.

Do not connect harness for more than 5 seconds.

N.G. → Replace actuator.

O.K. ↓

C

CIRCUIT CHECK

- Disconnect control unit connector.
- Check continuity between control unit connector terminals and actuator connector terminals.

Control unit	Actuator
⑰	④
㉘	⑥
⑭	⑦

Continuity should exist.

N.G.

O.K. ↓

D

Check continuity between actuator connector terminals ④, ⑥, ⑦ and ground.

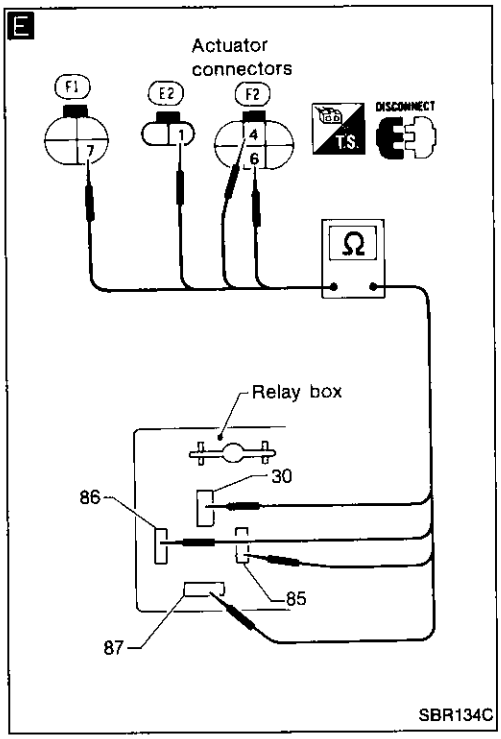
Continuity should not exist.

N.G. → Repair harness and connectors.

O.K. ↓

Ⓐ

Diagnostic Procedure 5 (Cont'd)



Ⓐ

E

ACTUATOR RELAY BOX CHECK

N.G. → Replace actuator.

Check continuity between relay terminals and actuator connector terminals.

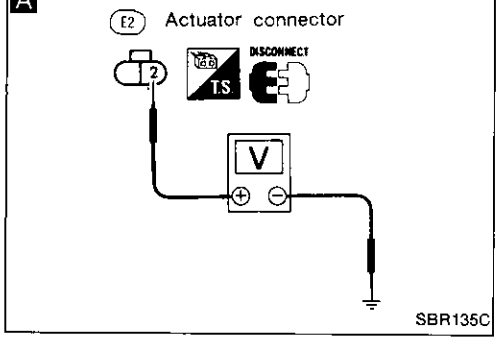
Relay terminals	Connector terminals
⑧⑦	①
⑧⑥	④
⑧⑤	⑥
⑧⑩	⑦

Continuity should exist.

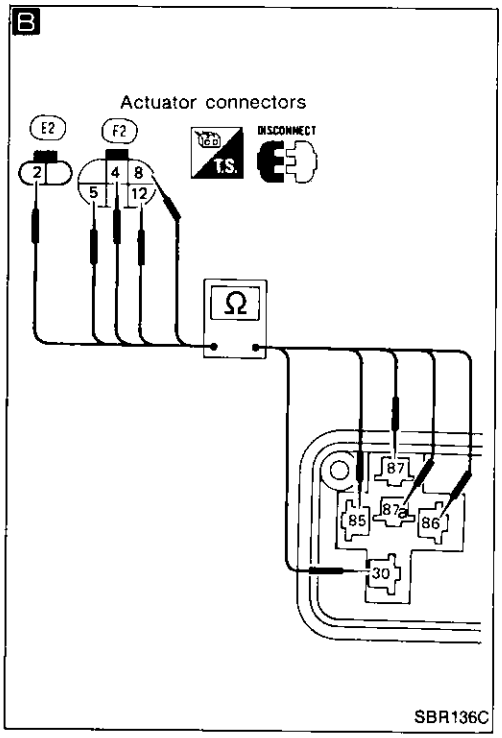
O.K. ↓

Replace control unit.

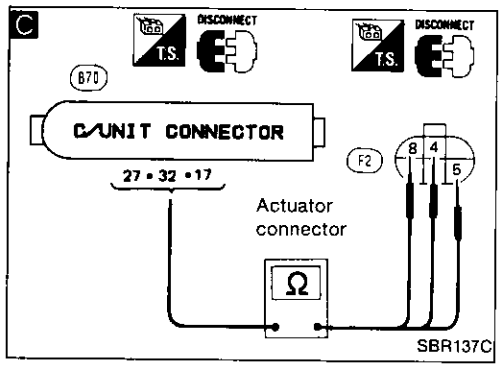
A



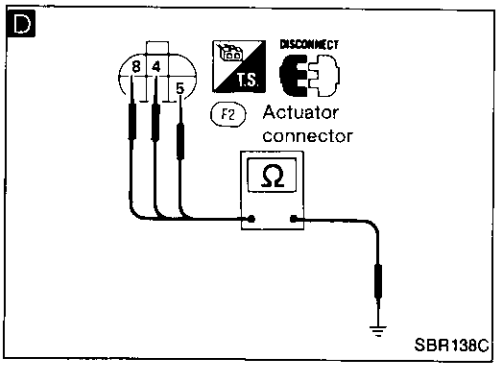
B



C



D



Diagnostic Procedure 6

SOLENOID VALVE RELAY

(Malfunction code No. 63)

A

SOLENOID VALVE POWER SUPPLY CHECK

- Disconnect connectors from actuator.
- Check voltage between terminal ② and ground.

Battery voltage should exist.

N.G. → Repair harness and connector.

O.K. ↓

SOLENOID VALVE RELAY CHECK

Refer to SOLENOID VALVE RELAY in Electrical Components Inspection.

N.G. → Replace relay.

O.K. ↓

B

ACTUATOR RELAY BOX CHECK

Check continuity between relay terminals and actuator connector terminals.

Relay terminals	Connector terminals
㉚	⑧
㉟	⑤
㊱	④
㊲	②
87a	⑫

Continuity should exist.

N.G. → Replace actuator.

O.K. ↓

C

CIRCUIT CHECK

- Disconnect control unit connector.
- Check continuity between control unit connector terminals and actuator connector terminals.

Control unit	Actuator
⑰	④
㉗	⑤
㉜	⑧

Continuity should exist.

N.G. ↓

O.K. ↓

D

Check continuity between actuator connector terminals ④, ⑤, ⑧ and ground.

Continuity should not exist.

N.G. → Repair harness and connectors.

O.K. ↓

Replace control unit.

Diagnostic Procedure 7

POWER SUPPLY (Low voltage)

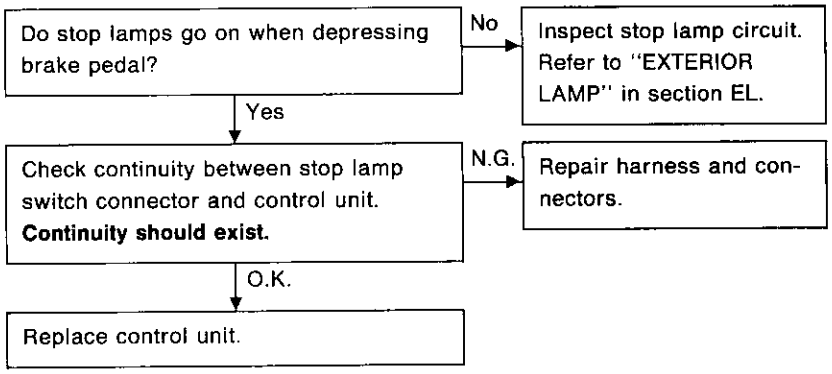
(Malfunction code No. 57)

BATTERY CHECK
Check battery. Refer to "BATTERY" in section EL.

Diagnostic Procedure 8

STOP LAMP SWITCH CIRCUIT

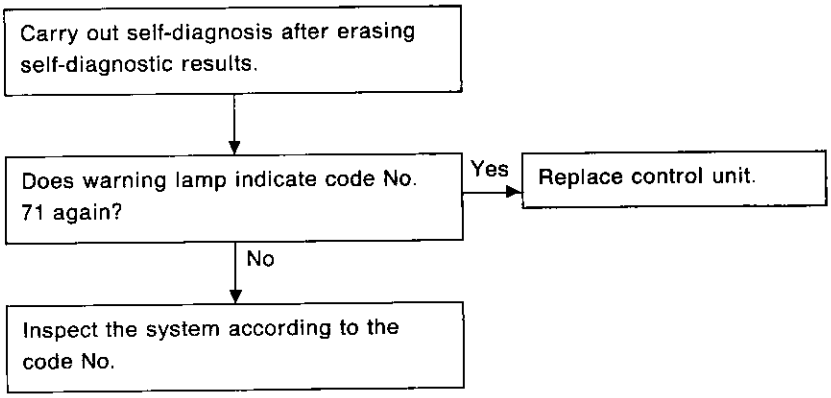
(Malfunction code No. 16)

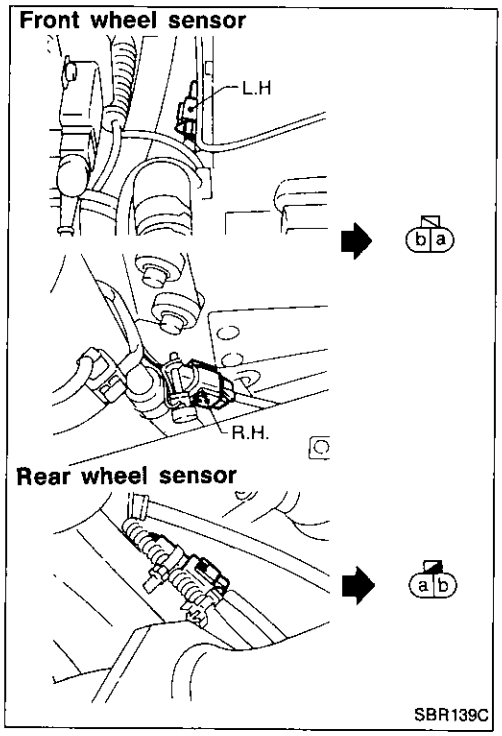


Diagnostic Procedure 9

CONTROL UNIT

(Malfunction code No. 71)



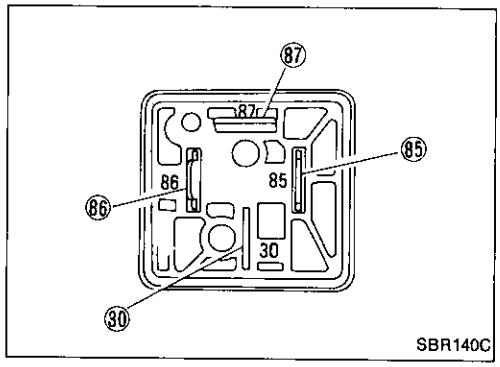


Electrical Components Inspection

WHEEL SENSOR

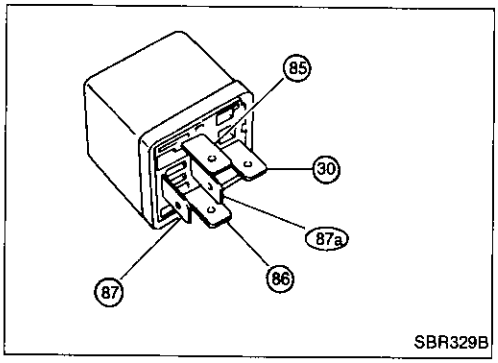
Check resistance between terminals ⓐ and ⓑ

Resistance: 0.9 - 1.1Ω



ACTUATOR MOTOR RELAY

Condition	Continuity existence between terminals 30 and 87
Battery voltage not applied between terminals 85 and 86.	No
Battery voltage applied between terminals 85 and 86.	Yes



SOLENOID VALVE RELAY

Condition	Continuity existence between terminals 30 and 87a	Continuity existence between terminals 30 and 87
Battery voltage not applied between terminals 85 and 86.	Yes	No
Battery voltage applied between terminals 85 and 86.	No	Yes

General Specifications

Front brake	
Brake model	CL28VF disc brake
Cylinder bore diameter x number of pistons mm (in)	42.8 (1.685) x 2
Lining length x width x thickness mm (in)	127 x 56 x 9.5 (5.00 x 2.20 x 0.374)
Rotor outer diameter x thickness mm (in)	280 x 28 (11.02 x 1.10)
Rear brake	
Brake model	AD11VB disc brake
Cylinder bore diameter x number of piston mm (in)	38.2 (1.504) x 1
Lining length x width x thickness mm (in)	97.4 x 33.9 x 10 (3.835 x 1.335 x 0.39)
Rotor outer diameter x thickness mm (in)	292 x 16 (11.50 x 0.63)

Parking brake	
Brake model	DS17HE drum brake
Lining length x width x thickness mm (in)	154.1 x 25.0 x 3.0 (6.07 x 0.984 x 0.118)
Drum inner diameter mm (in)	172.0 (6.77)
Master cylinder	
Cylinder bore diameter mm (in)	25.40 (1)
Control valve	
Valve model	Proportioning valve (within master cylinder)
Split point [kPa (kg/cm^2, psi)] x reducing ratio	1,961 (20, 284) x 0.4
Brake booster	
Booster model	M215T
Diaphragm diameter mm (in)	Primary: 230 (9.06) Secondary: 205 (8.07)
Brake fluid	
Recommended brake fluid	DOT 3

Inspection and Adjustment

DISC BRAKE

Unit: mm (in)

Location	Front	Rear
Brake model	CL28VF	AD11VB
Lining wear limit		
Minimum thickness	2.0 (0.079)	
Rotor repair limit		
Minimum thickness	26.0 (1.024)	14.0 (0.551)

DRUM BRAKE

Unit: mm (in)

Location	Rear
Brake model	DS17HE
Lining wear limit	
Minimum thickness	1.5 (0.059)
Drum repair limit	
Maximum inner diameter	173.0 (6.81)
Brake shoe "backoff" adjustment	5 - 6 latches

BRAKE PEDAL

Unit: mm (in)

Free height "H"	184 - 194 (7.24 - 7.64)
Depressed height "D" [under force of 490 N (50 kg, 110 lb) with engine running]	95 (3.74) or more
Clearance "C" between pedal stopper and threaded end of stop lamp switch or A.S.C.D. switch	0.3 - 1.0 (0.012 - 0.039)
Pedal free play	1.0 - 3.0 (0.039 - 0.118)

PARKING BRAKE

Unit: mm (in)

Control type	Foot lever
Pedal stroke [under force of 196 N (20 kg, 44 lb)]	75 - 90 (2.95 - 3.54)

STEERING SYSTEM

SECTION ST

CONTENTS

PRECAUTIONS AND PREPARATION ..... ST- 2
ON-VEHICLE SERVICE ..... ST- 5
STEERING WHEEL AND STEERING COLUMN ST-10
POWER STEERING GEAR AND LINKAGE ST-14
POWER STEERING OIL PUMP ST-26
TWIN ORIFICE POWER STEERING SYSTEM ST-29
TWIN ORIFICE POWER STEERING SYSTEM — Trouble Diagnoses ST-31
SUPER HICAS SYSTEM ST-42
SUPER HICAS SYSTEM — On-vehicle Service ST-43
SUPER HICAS SYSTEM — Repair of Component Parts ST-47
SUPER HICAS SYSTEM — Trouble Diagnoses ST-58
SERVICE DATA AND SPECIFICATIONS (S.D.S.) ST-90





Precautions for Supplemental Restraint System "AIR BAG"

The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury in a frontal collision. The Supplemental Restraint System consists of air bags, sensors, a control unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in **section BF** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized INFINITI 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 "Air Bag".**

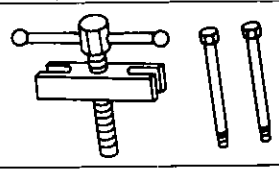
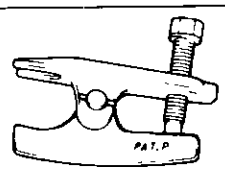
STEERING SYSTEM

- **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.**
- **When disassembling parts, be sure to place them in order in a parts rack so they can be reinstalled in their proper positions.**
- **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 A.T.F.* 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.**

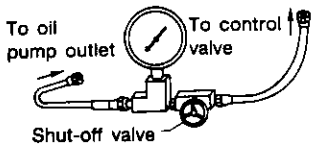
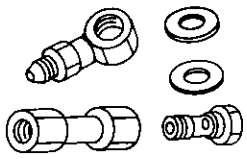
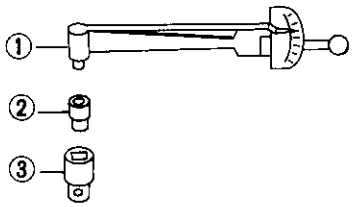
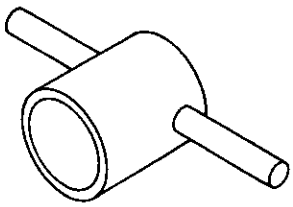
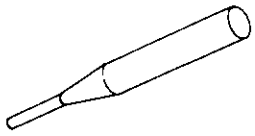
***: Automatic transmission fluid**

Preparation

SPECIAL SERVICE TOOLS

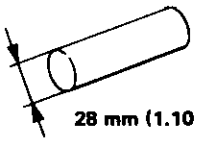
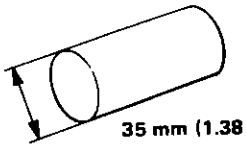
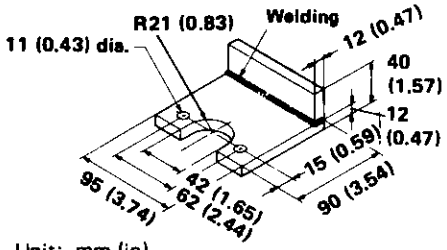
Tool number (Kent-Moore No.) Tool name	Description	
KV48100700 (J26364) Torque adapter		Measuring pinion rotating torque
ST27180001 (J25726-A) Steering wheel puller		Removing steering wheel
HT72750000 (J24319-01) Ball joint remover		Removing ball joint

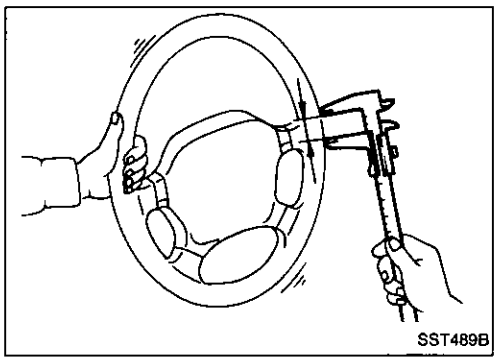
Preparation (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
ST27091000 (J26357) Pressure gauge		Measuring oil pressure
KV48102500 (—) Pressure gauge adapter		Measuring oil pressure
ST3127S000 (See J25765-A) ① GG91030000 (J25765-A) Torque wrench ② HT6294000 (—) Socket adapter ③ HT62900000 (—) Socket adapter		Measuring turning torque
KV48104400 (—) Rack seal ring reformer		Reforming teflon ring
KV32101100 (—) Pin punch		Removing and installing tube seat

Preparation (Cont'd)

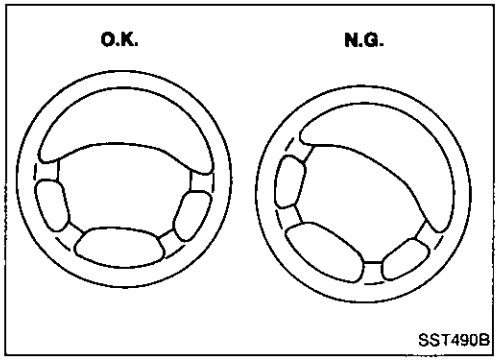
COMMERCIAL SERVICE TOOLS

Tool name	Description	
Rear oil seal drift		Installing rear oil seal
Pinion oil seal drift		Installing pinion oil seal
Oil pump attachment		Disassembling and assembling oil pump


SST489B

Checking Steering Wheel Play

- With wheels in a straight-ahead position, check steering wheel play.
  Steering wheel play:
  35 mm (1.38 in) or less
- If it is not within specification, check steering gear assembly when front suspension and axle, steering gear assembly and steering column are mounted correctly.



SST490B

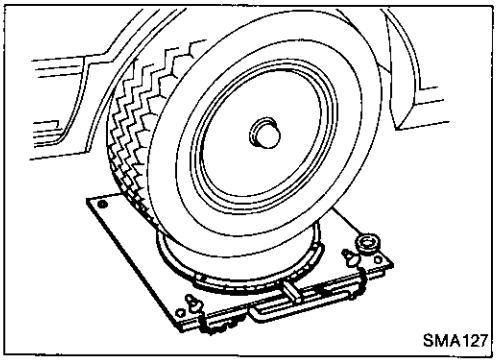
Checking Neutral Position on Steering Wheel

Pre-checking

- Make sure that wheel alignment is correct.
  Wheel alignment:
  Refer to S.D.S. in section FA.
- Verify that the steering gear is centered before removing the steering wheel.

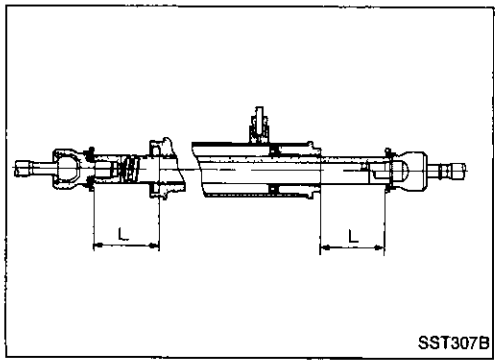
Checking

1. Check that the steering wheel is in the neutral position when driving straight ahead.
2. If it is not in the neutral position, remove the steering wheel and reinstall it correctly.
3. If the neutral position is between two serrated teeth, loosen tie-rod lock nut and move tie-rod in the opposite direction by the same amount on both left and right sides to compensate for error in the neutral position.


SMA127

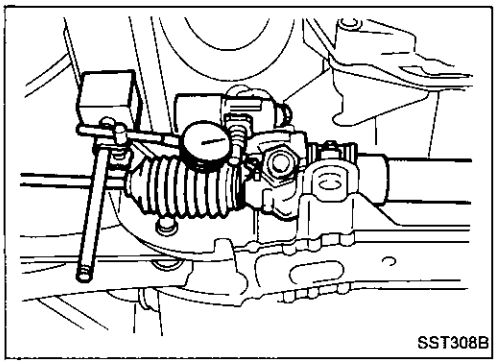
Front Wheel Turning Angle

1. Rotate steering wheel all the way right and left; measure turning angle.
   Turning angle of full turns:
   Refer to S.D.S. in section FA.



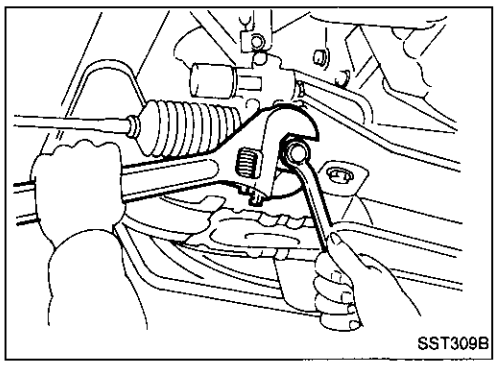
SST307B

2. If it is not within specification, check rack stroke.
   Rack stroke "L":
   Refer to S.D.S.



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:
  ±2 mm (±0.08 in) or less
2. If movement exceeds the limit, replace mount insulator after confirming proper installation of gear housing clamps.



Adjusting Rack Retainer

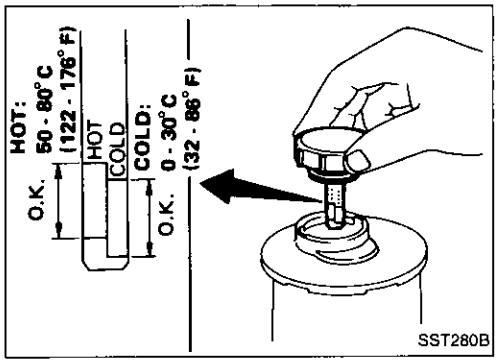
- Perform this driving test on a flat road.

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°) position.

- If any abnormality is found, correct it by resetting adjusting screw.

Checking and Adjusting Drive Belts

Refer to section MA for Drive Belt Inspection.

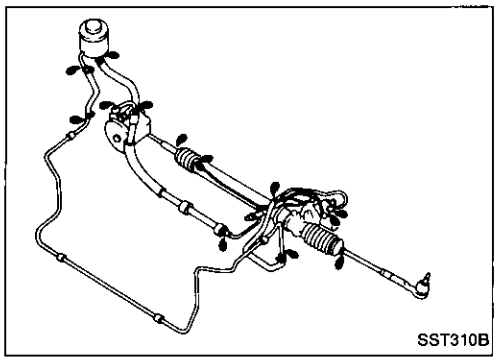


Checking Fluid Level

Check fluid level.
Fluid level should be checked using "HOT" range on dipstick at fluid temperatures of 50 to 80°C (122 to 176°F) or using "COLD" range on dipstick at fluid temperatures of 0 to 30°C (32 to 86°F).

CAUTION:

- **Do not overfill.**
- **Recommended fluid is Automatic Transmission Fluid "DEXRON™" type.**


SST310B

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.

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.

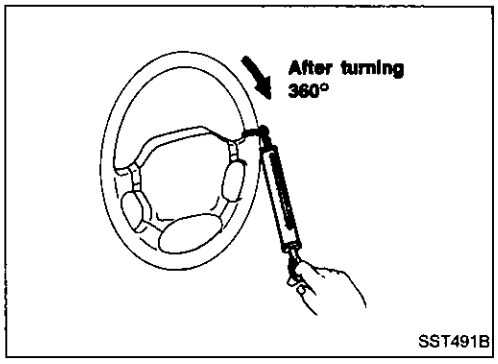
Bleeding Hydraulic System

1. Raise front end of vehicle until wheels clear ground.
2. Add fluid into oil tank to specified level. Meanwhile, 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. Generation of air bubbles in reservoir tank
b. Generation of clicking noise in oil pump
c. Excessive buzzing in oil pump

While the vehicle is stationary or while turning the steering wheel slowly, fluid noise may occur in the valve or oil pump. This noise is inherent in this steering system, and it will not affect performance or durability of the system.



Checking Steering Wheel Turning Force

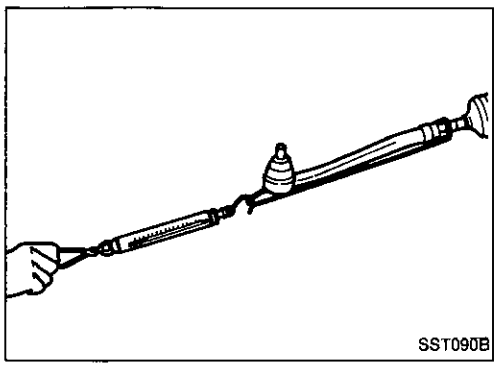
1. Park vehicle on a level, dry surface and set parking brake.
2. Start engine.
3. Bring power steering fluid up to adequate operating temperature. [Make sure temperature of fluid is approximately 60 to 80°C (140 to 176°F).]

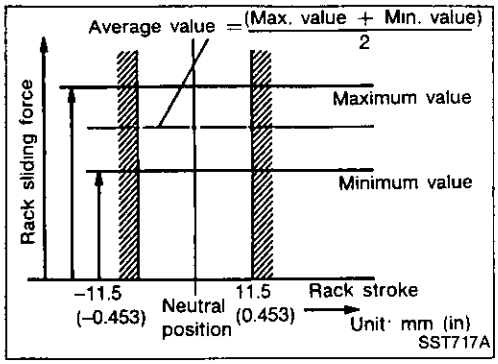
Tires need to be inflated to normal pressure.

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 specifications, check rack sliding force to detect condition of steering gear assembly.

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. While pulling tie-rod slowly in the ±11.5 mm (±0.453 in) range from the neutral position, make sure rack sliding force is within specification.
   Average rack sliding force:
   Without HICAS
   206 - 265 N (21 - 27 kg, 46 - 60 lb)
   With HICAS
   201.0 - 250.1 N (20.5 - 25.5 kg, 45.2 - 26.2 lb)
d. Check sliding force outside above range.
   Maximum rack sliding force:
   Not more than 39 N (4 kg, 9 lb) beyond above value

6. 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.

1. Set Tool. Open shut-off valve. Then bleed air. (See "Bleeding Hydraulic System".)
2. Run engine.

Make sure temperature of fluid in tank rises to 60 to 80°C (140 to 176°F).

WARNING:

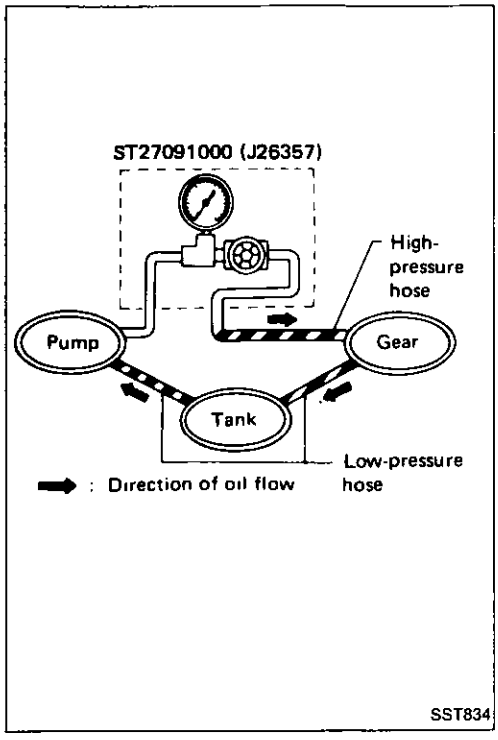
Warm up engine with shut-off valve fully opened. If engine is started with shut-off valve closed, oil pressure in oil pump will increase to relief pressure, resulting in an abnormal rise in oil temperature.

3. Check pressure with steering wheel fully turned to left and right positions with engine idling at 1,000 rpm.

CAUTION:

Do not hold the steering wheel in a locked position for more than 15 seconds.

Oil pump maximum standard pressure:
7,649 - 8,238 kPa (78 - 84 kg/cm^2, 1,109 - 1,194 psi)



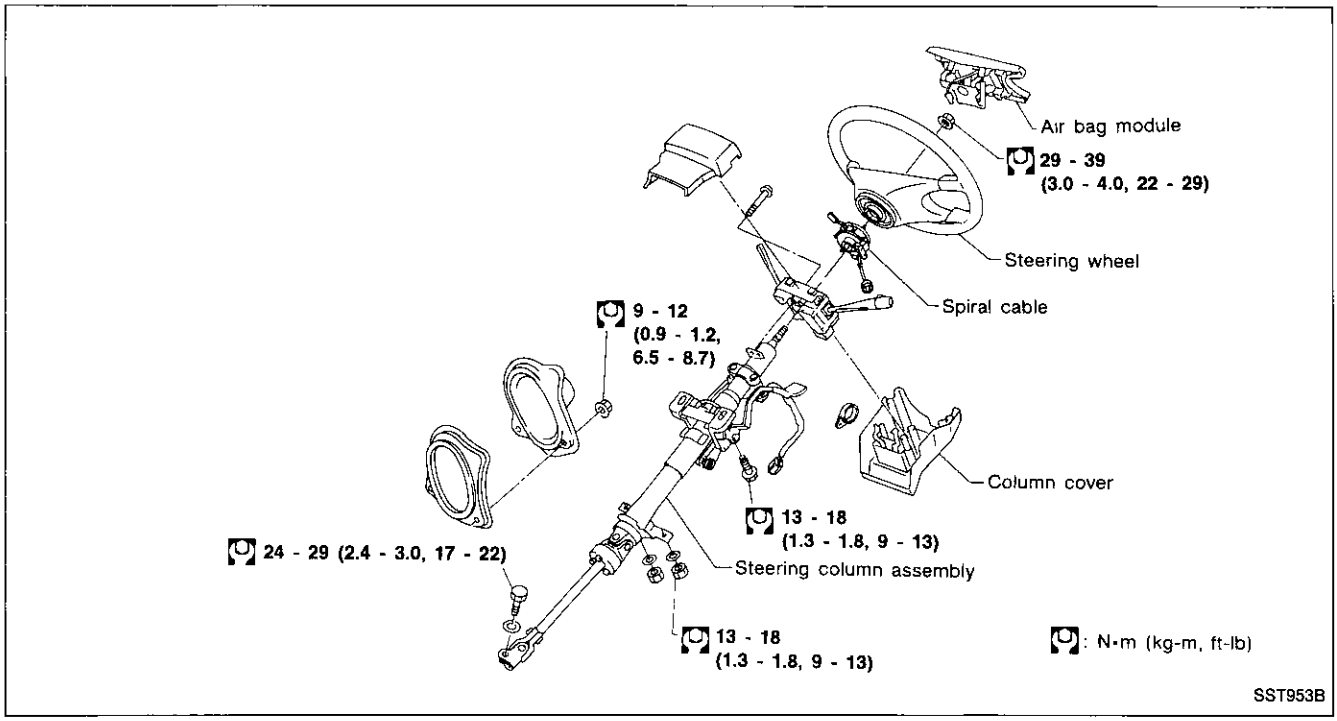
Checking Hydraulic System (Cont'd)

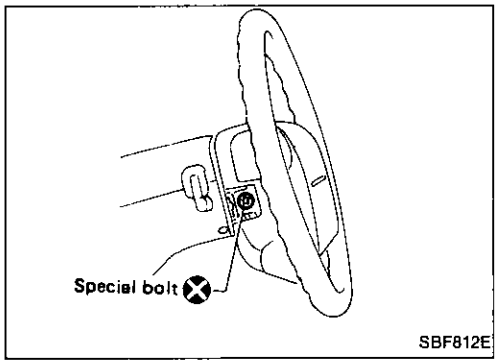
4. If oil pressure is below the standard pressure, slowly close shut-off valve and check pressure.
- When pressure reaches standard pressure, gear is damaged.
- When pressure remains below standard pressure, pump is damaged.

CAUTION:

Do not close shut-off valve for more than 15 seconds.

5. If oil pressure is higher than standard pressure, check oil pump flow control valve.
6. After checking hydraulic system, remove Tool and add fluid as necessary, then completely bleed air out of system.

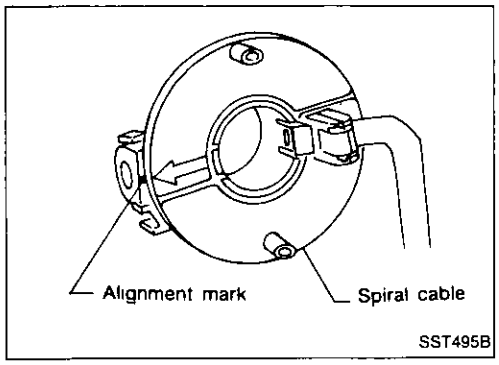




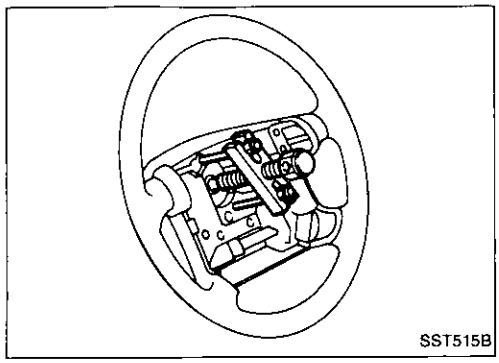
Removal

STEERING WHEEL (With air bag)

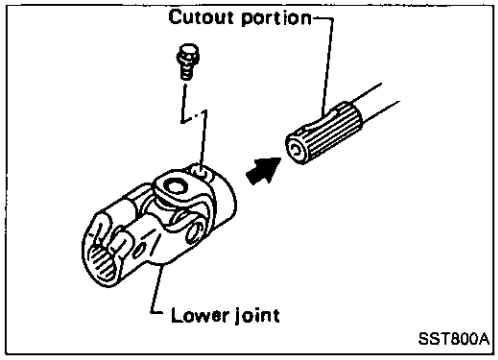
- Remove screws from both sides of steering wheel and pull out horn pad. Refer to section BF for Air Bag Module and Spiral Cable Removal.



- Align spiral cable correctly when installing steering wheel.



- Remove steering wheel with Tool.



Installation

STEERING COLUMN

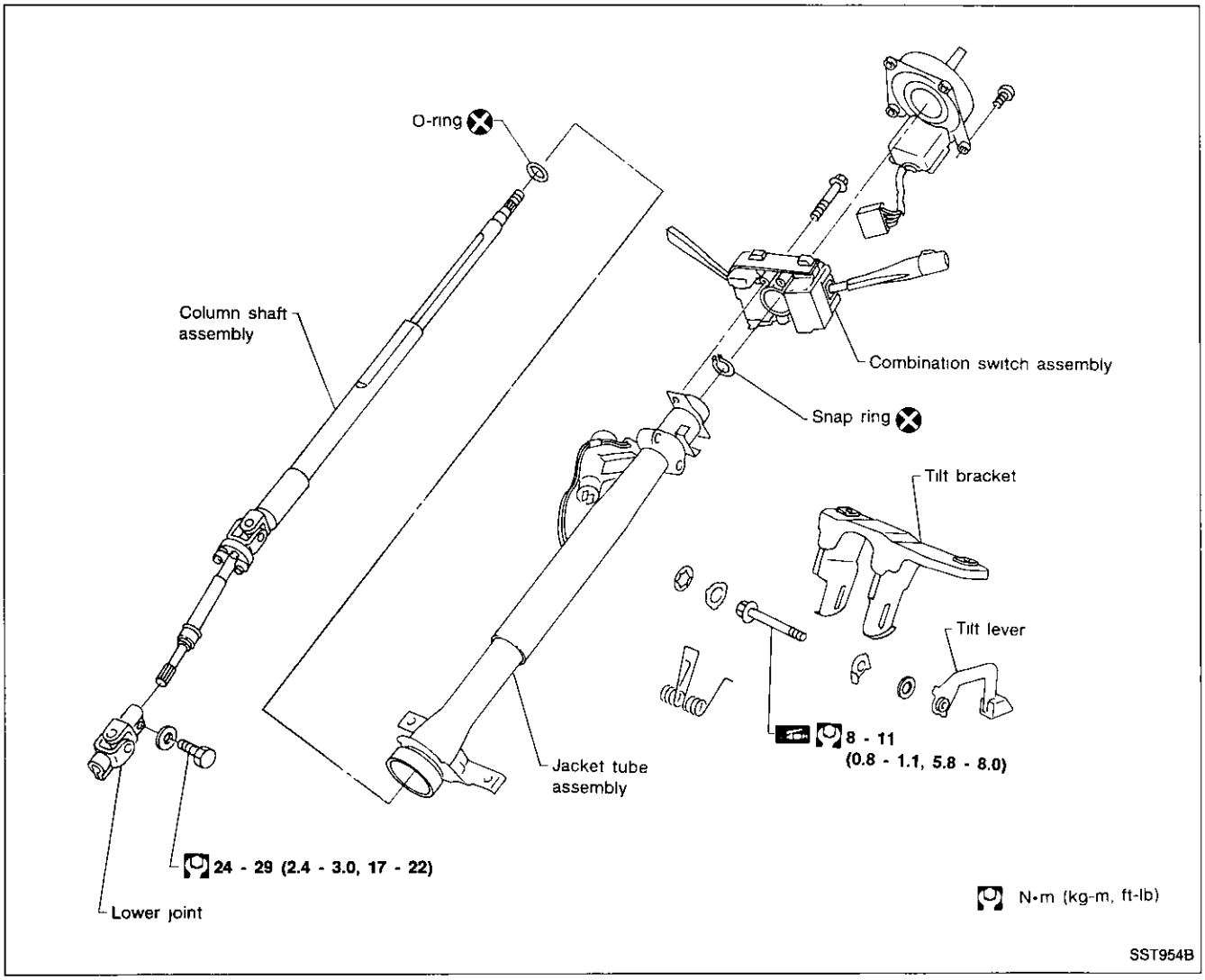
- When installing steering column, fingertighten all lower bracket and clamp retaining bolts; then tighten them securely. Do not apply undue stress to steering column.
- When attaching coupling joint, be sure tightening bolt faces cutout portion.

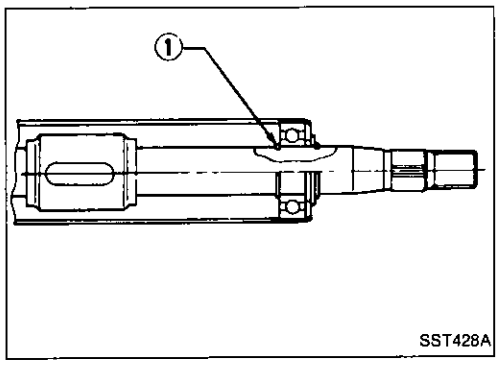
CAUTION:

After installing steering column, turn steering wheel to make sure it moves smoothly and that the number of turns from the straight forward position to left and right locks are equal.

Be sure that the steering wheel is in a neutral position when driving straight ahead.

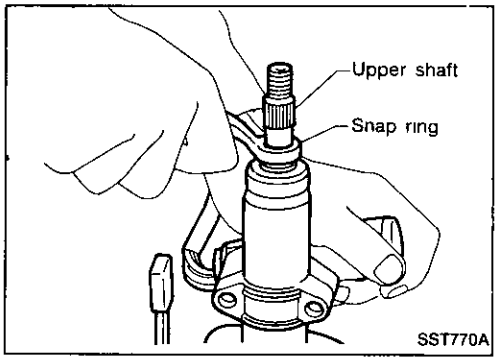
Disassembly and Assembly



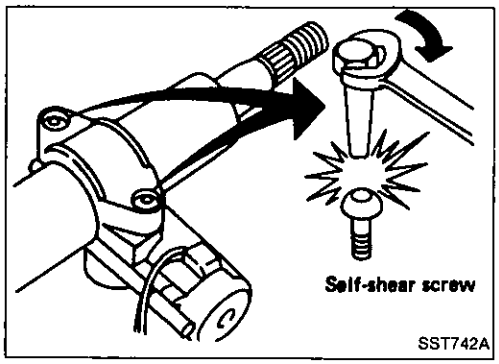


- When disassembling and assembling, unlock steering lock with key.
- Install O-ring ① before inserting shaft into jacket tube. Ensure that rounded surface of snap ring faces toward bearing when snap ring is installed.

Disassembly and Assembly (Cont'd)



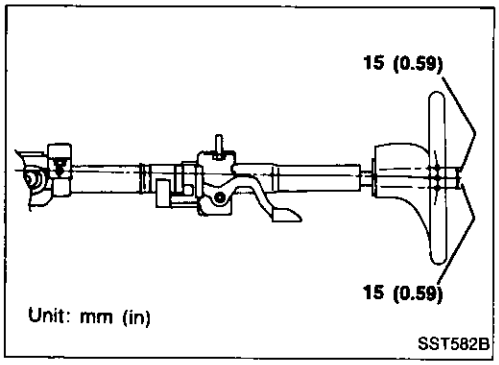
- Install snap ring on upper shaft with box wrench.



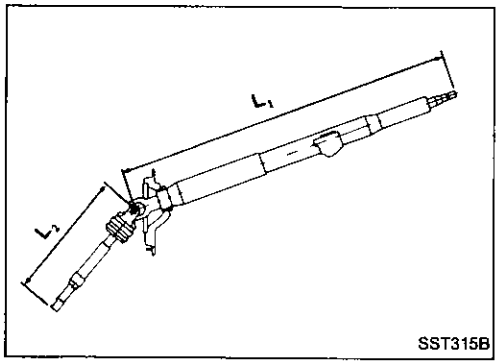
- Steering lock

a) Break self-shear type screws with a drill or other appropriate tool.

b) Install self-shear type screws and then cut off self-shear type screw heads.



- After installing steering column, check tilt mechanism operation.



Inspection

- When steering wheel can not be rotated smoothly, check the steering column for the following matters and replace damaged parts.

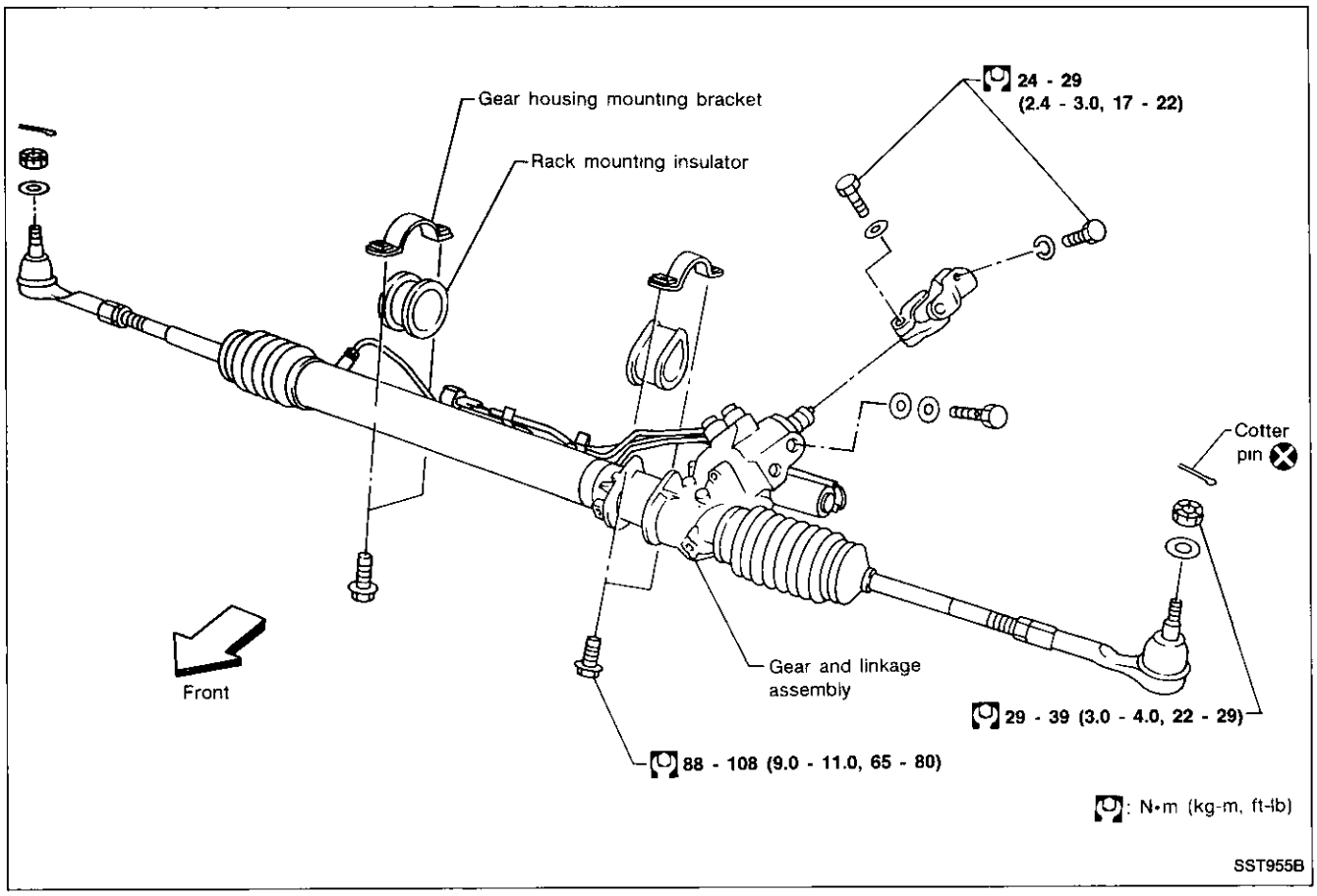
a. Check column bearings for damage or unevenness. Lubricate with recommended multi-purpose grease or replace steering column as an assembly, if necessary.

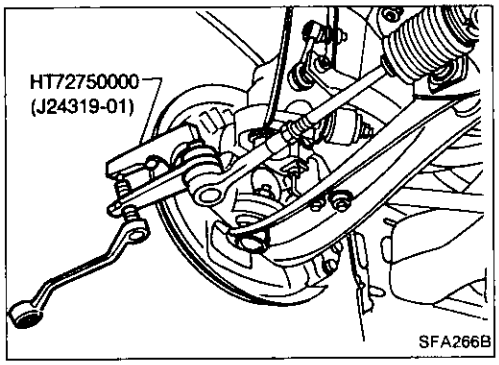
b. Check steering column lower shaft for deformation or breakage. Replace if necessary.

- When the vehicle is involved in a light collision, check steering column length "L_1" and steering column lower shaft length "L_2". If it is not within specifications, replace steering column as an assembly.

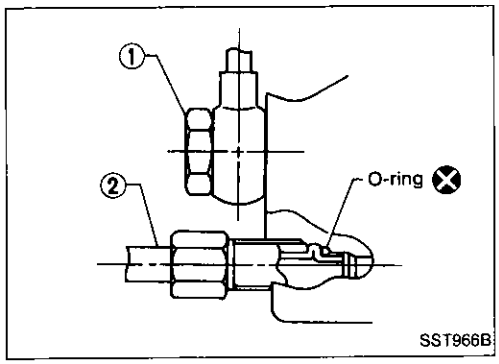
Steering column length "L_1":
749.4 - 751.0 mm (29.50 - 29.57 in)
Steering column lower shaft length "L_2":
280.6 - 282.2 mm (11.05 - 11.11 in)

Removal and Installation





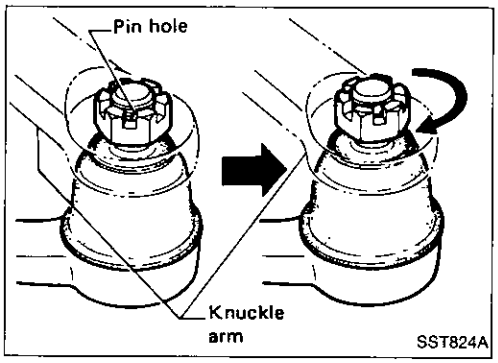
- Detach tie-rod outer sockets from knuckle arms with Tool.



- Install pipe connector.
  - ① Low-pressure side
    : 36 - 40 N·m (3.7 - 4.1 kg-m, 27 - 30 ft-lb)
  - ② High-pressure side
    : 15 - 25 N·m (1.5 - 2.5 kg-m, 11 - 18 ft-lb)

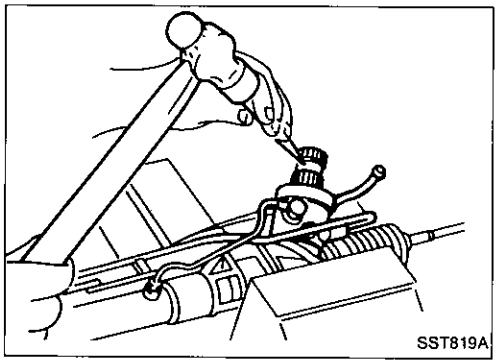
Removal and Installation (Cont'd)

- Observe specified tightening torque when tightening high-pressure and low-pressure pipe connectors. Excessive tightening can damage threads or damaged connector O-ring.
- The O-ring in low-pressure pipe connector is larger than that in high-pressure connector. Take care to install the proper O-ring.

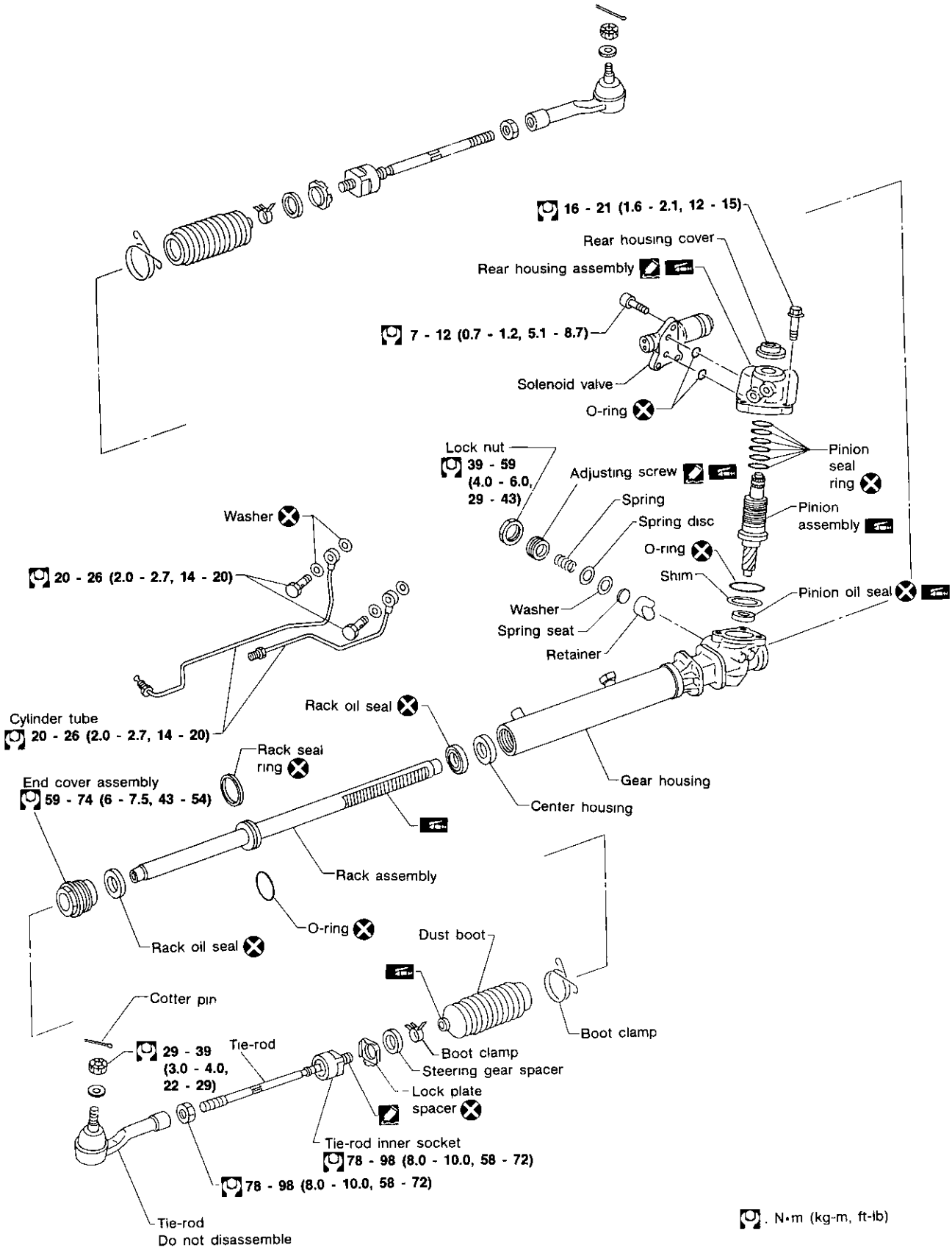


- Initially, tighten nut on tie-rod outer socket and knuckle arm to 29 to 39 N·m (3 to 4 kg-m, 22 to 29 ft-lb). Then tighten further to align nut groove with first pin hole so that cotter pin can be installed.

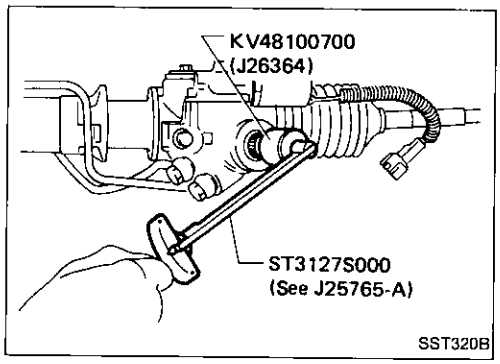
CAUTION:
Tightening torque must not exceed 49 N·m (5 kg-m, 36 ft-lb).



- Before removing lower joint from gear, set gear in neutral (wheels in straight-ahead position). After removing lower joint, put matchmarks on pinion shaft and pinion housing to record neutral position of gear.
- To install, set left and right dust boots to equal deflection, and attach lower joint by aligning matchmarks of pinion shaft and pinion housing.


16 - 21 (1.6 - 2.1, 12 - 15)
Rear housing cover
Rear housing assembly
7 - 12 (0.7 - 1.2, 5.1 - 8.7)
Solenoid valve
O-ring
Lock nut
39 - 59 (4.0 - 6.0, 29 - 43)
Adjusting screw
Spring
Spring disc
Pinion seal ring
Pinion assembly
O-ring
Shim
Pinion oil seal
Washer
Spring seat
Retainer
Washer
20 - 26 (2.0 - 2.7, 14 - 20)
Cylinder tube
20 - 26 (2.0 - 2.7, 14 - 20)
Rack oil seal
Rack seal ring
End cover assembly
59 - 74 (6 - 7.5, 43 - 54)
Gear housing
Center housing
Rack assembly
O-ring
Rack oil seal
Dust boot
Boot clamp
Cotter pin
29 - 39 (3.0 - 4.0, 22 - 29)
Tie-rod
Boot clamp
Steering gear spacer
Lock plate
spacer
Tie-rod inner socket
78 - 98 (8.0 - 10.0, 58 - 72)
78 - 98 (8.0 - 10.0, 58 - 72)
Tie-rod
Do not disassemble
. N•m (kg-m, ft-lb)

SST986B



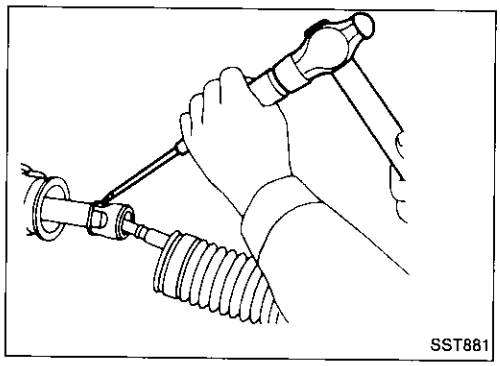
Disassembly

1. Prior to disassembling, measure pinion rotating torque. Record the pinion rotating torque as a reference.

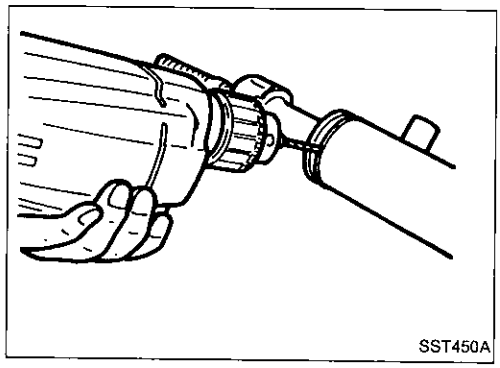
- **Before measuring, disconnect cylinder tube and drain fluid.**
- **Use soft jaws when holding steering gear housing. Handle gear housing carefully, as it is made of aluminum. Do not grip cylinder in a vise.**

2. Remove pinion gear.

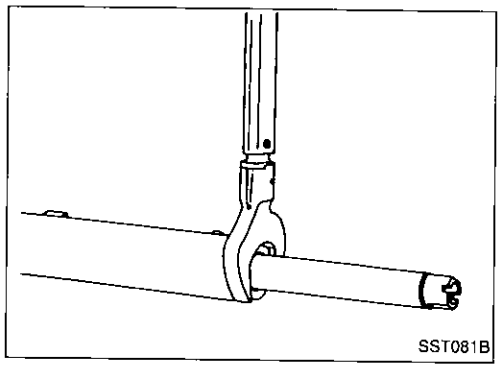
- **Be careful not to damage pinion gear when removing pinion seal ring.**



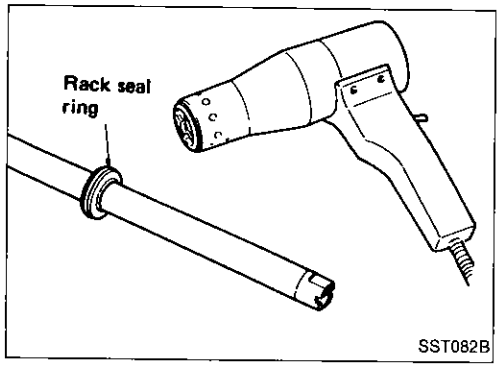
3. Remove tie-rod outer sockets and boots.
4. Loosen tie-rod inner socket by prying up staked portion, and remove socket.
5. Remove retainer.
6. Remove pinion assembly.



7. Drill staked portion of cylinder end cover with drill of 2 to 2.5 mm (0.079 to 0.098 in) diameter, until the staking is eliminated.



8. Remove gear housing end cover assembly with Tool.
9. Draw out rack assembly.

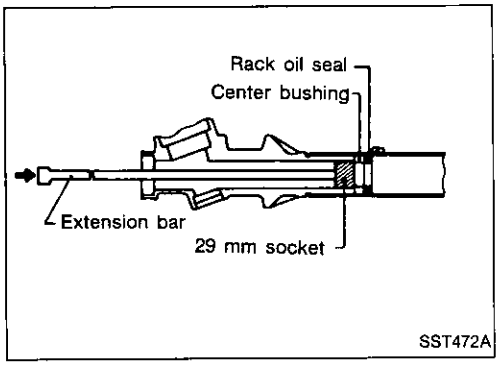


10. Remove rack seal ring.

- Using a heat gun, heat rack seal to approximately 40°C (104°F).
- Remove rack seal ring.
- Replace rack seal ring and O-ring with new ones.

Be careful not to damage rack.

Disassembly (Cont'd)



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, and blow dry with compressed air, if available.

BOOT

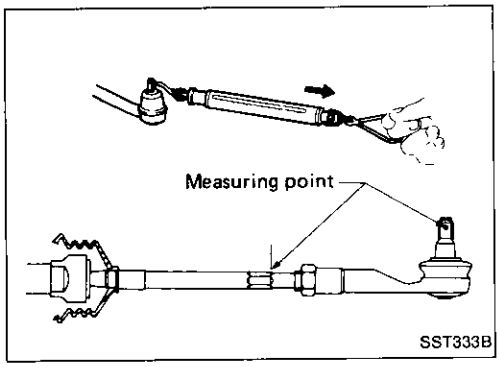
Check condition of boot. If cracked excessively, replace it.

RACK

Thoroughly examine rack gear. If damaged, cracked or worn, replace it.

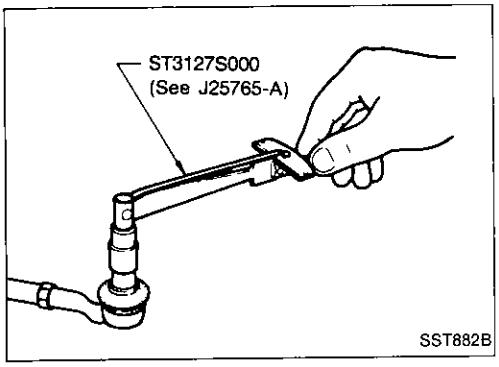
PINION ASSEMBLY

- Thoroughly examine pinion gear. If pinion gear is damaged, cracked or worn, replace it.
- Inspect bearings to see that they roll freely and are free from cracked, pitted, or worn balls, rollers and races. Replace if necessary.



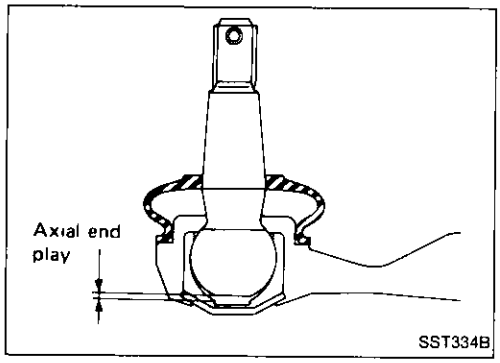
TIE-ROD OUTER AND INNER SOCKET

- Check ball joint for swinging force.
  Tie-rod outer ball joint:
  4.9 - 46.1 N
  (0.5 - 4.7 kg, 1.1 - 10.4 lb)
  Tie-rod inner ball joint:
  7.8 - 73.6 N
  (0.8 - 7.5 kg, 1.8 - 16.5 lb)



- Check ball joint for rotating torque.
  Tie-rod outer ball joint:
  0.29 - 2.94 N·m
  (3.0 - 30.0 kg-cm, 2.6 - 26.0 in-lb)
  Tie-rod inner ball joint:
  1.0 - 8.8 N·m (10 - 90 kg-cm, 8.7 - 78.1 in-lb)

Inspection (Cont'd)

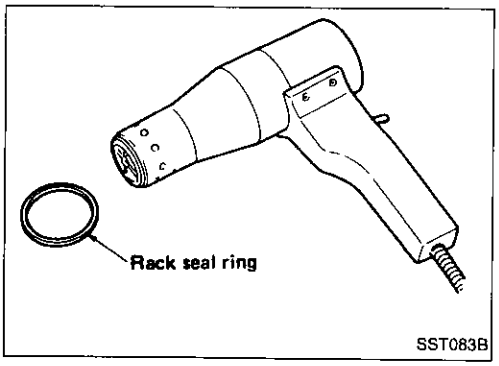


- Check ball joint for axial end play.
  Tie-rod outer ball joint:
  0 mm (0 in)
  Tie-rod inner ball joint:
  0 mm (0 in)
- Check condition of dust cover. If cracked excessively, replace it.

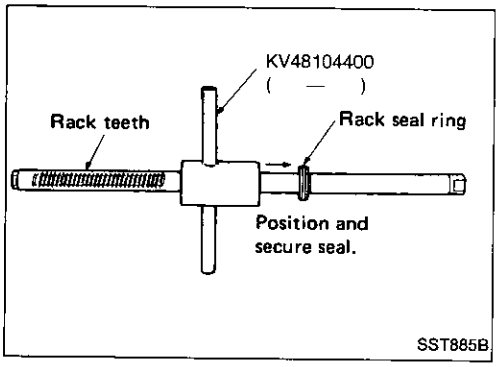
CYLINDER TUBES

Check cylinder tubes for scratches or other damage. Replace if necessary.

Assembly

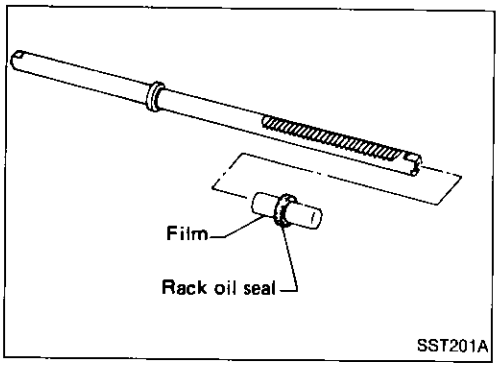


1. Using a heat gun, heat rack seal ring (made of Teflon) to approximately 40°C (104°F) and install it onto rack with your hand.



- Using Tool, compress periphery of rack seal ring (made of Teflon) to position and secure it on rack.

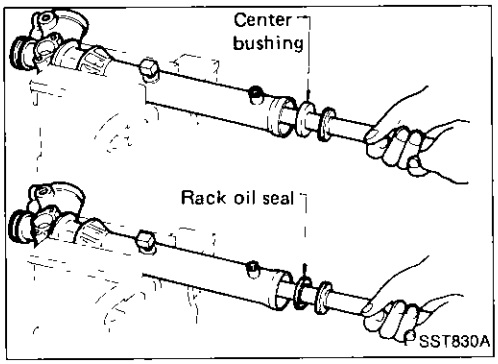
Always insert the tool from the rack gear side.



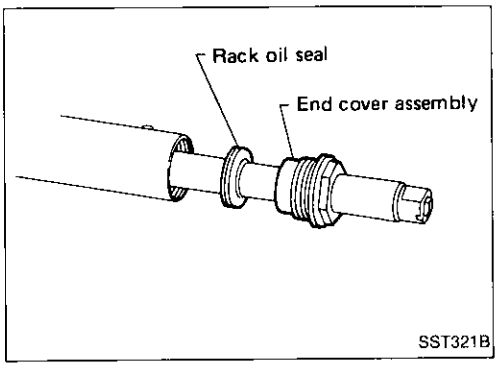
2. Insert rack oil seal.

- **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.**

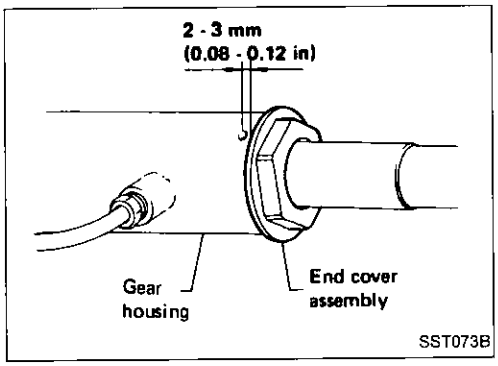
Assembly (Cont'd)



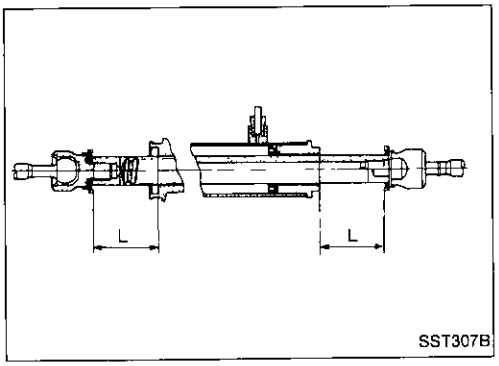
3. Install center bushing and rack oil seal with rack assembly.



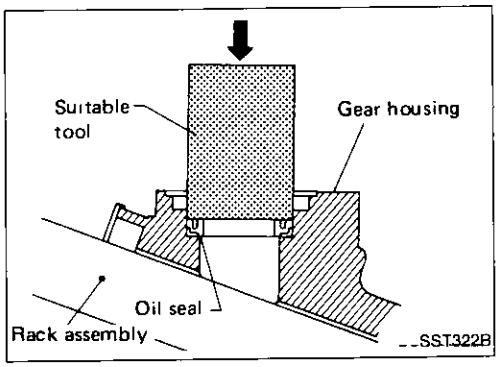
4. Insert rack oil seal and end cover assembly to rack then tighten end cover assembly.



5. Fasten cylinder end cover assembly to gear housing by staking.

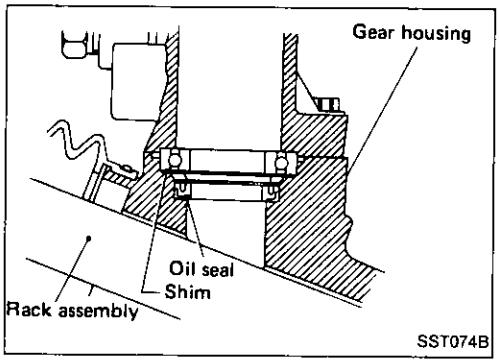


6. Set rack gear in neutral position.
   Rack stroke "L":
   Refer to S.D.S.

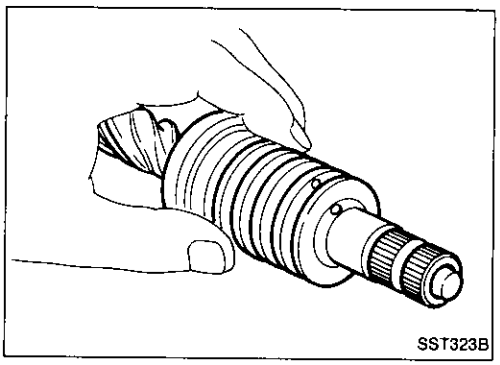


7. Coat seal lip of oil seal with multi-purpose grease and install new pinion oil seal to pinion housing with a suitable tool.
   - Make sure lip of oil seal faces up when installed.

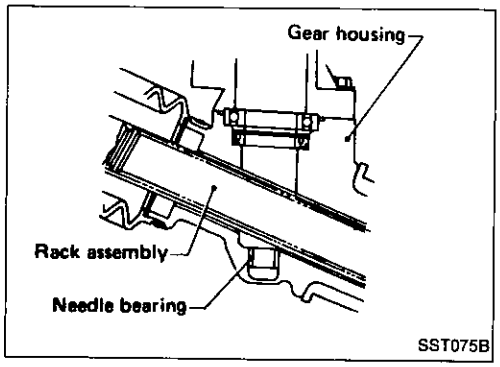
Assembly (Cont'd)



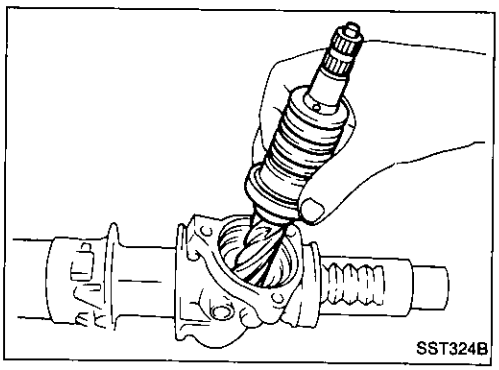
8. Install pinion bearing adjusting shim(s).
- Whenever pinion assembly, gear housing and rear housing are disassembled, replace shim(s) with new ones. Always use the same number of shim(s) when replacing.



9. Install pinion seal ring 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.

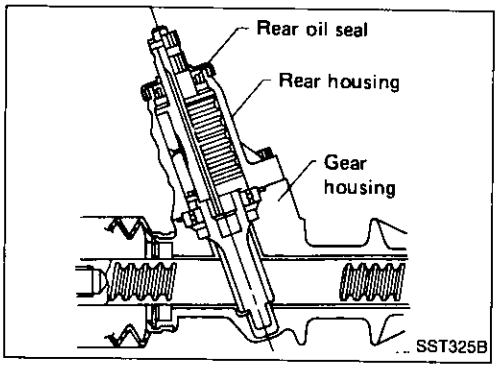


10. Apply a coat of multi-purpose grease to needle bearing roller and oil seal lip before installing pinion assembly in gear housing.



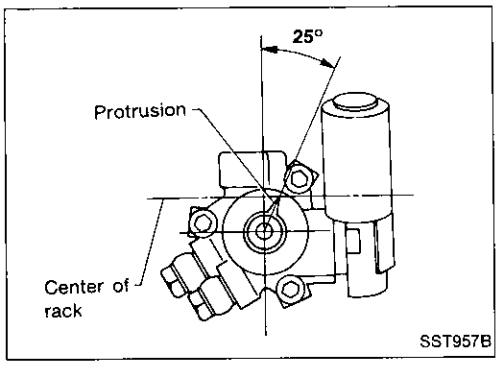
11. Install pinion assembly to pinion housing.

Be careful not to damage pinion oil seal.



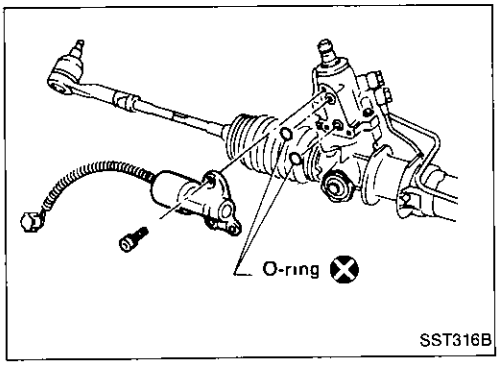
12. Apply a coat of multi-purpose grease to rear oil seal lip before installing rear housing.

Assembly (Cont'd)

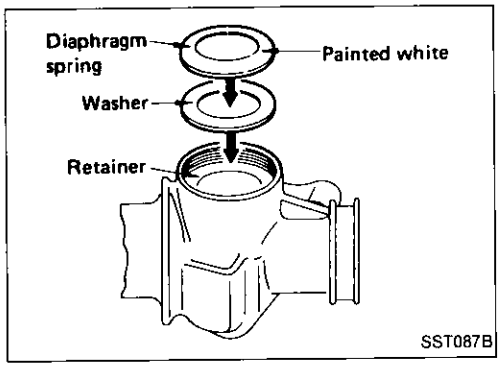


13. Install rear cover cap so that protrusion of rear housing cover is positioned as shown in figure at left.

Be careful not to damage worm ring and oil seal.

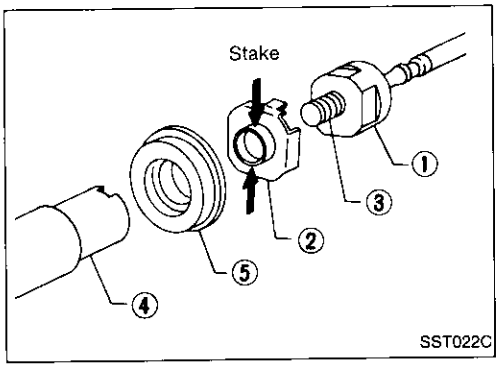


14. Install solenoid valve.

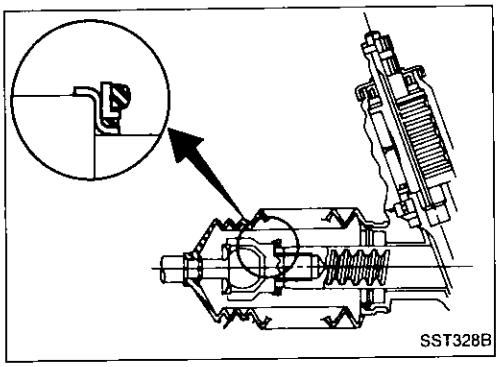


15. Install diaphragm spring at retainer.
- Always install retainer, spring washer and diaphragm spring in that order.
- Make sure convex end (painted white) of diaphragm spring faces outward when installing.

16. Install retainer spring and adjusting screw temporarily.

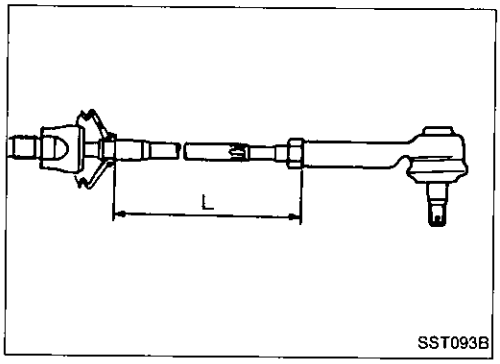


CAUTION:
Ensure steering gear spacer is installed with rubber side facing rack.
- Attach lock plate ② to side rod inner socket ①.
- Insert steering gear spacer ⑤ to rack ④.
- Apply locking sealant to inner socket threads ③. Screw inner socket into rack ④ and tighten to specified torque.
- Stake lock plate at two places.

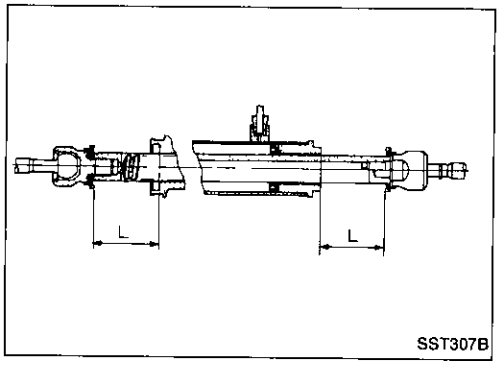


17. Install steering gear spacer ⑤ to lock plate ②.

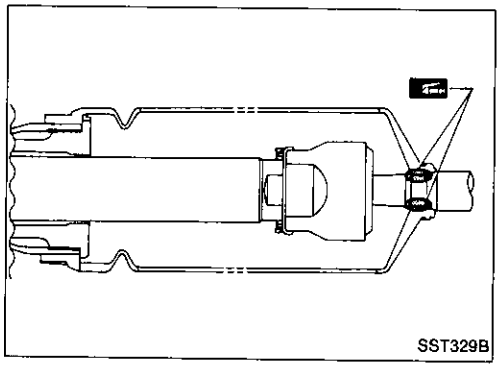
Assembly (Cont'd)



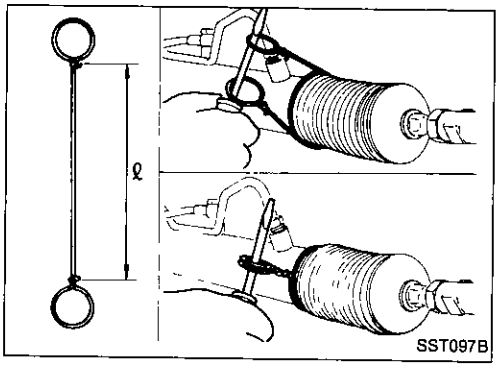
18. Tighten outer socket lock nut.
    Tie-rod length "L":
    Refer to S.D.S.



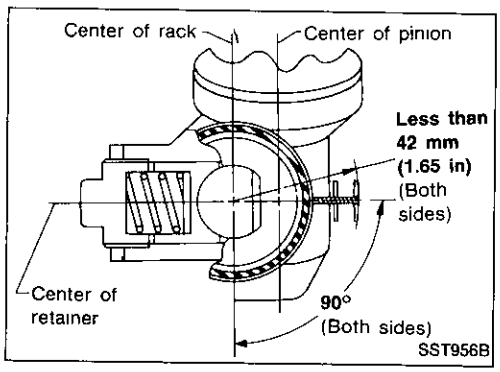
19. Measure rack stroke.
    Rack stroke "L":
    Refer to S.D.S.



20. Before installing boot, coat the contact surfaces between boot and tie-rod with grease.

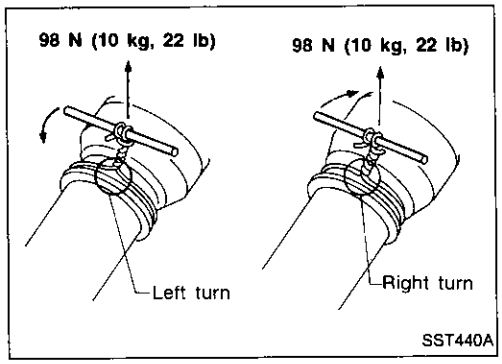


21. Install boot clamps.
- To install, wrap boot clamp around boot groove twice. Tighten clamp by twisting rings at both ends 4 to 4-1/2 turns with screwdriver while pulling with a force of approx. 98 N (10 kg, 22 lb).

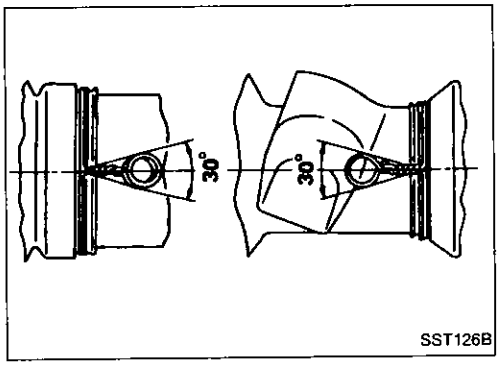


- Install boot clamp so that it is to the rear of the vehicle when gear housing is attached to the body. (This will prevent interference with other parts.)

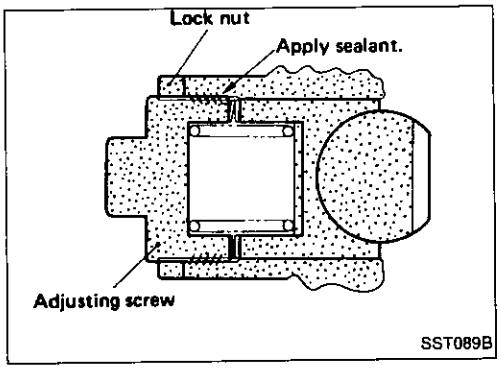
Assembly (Cont'd)



- Twist boot clamp in the direction shown in figure at left.



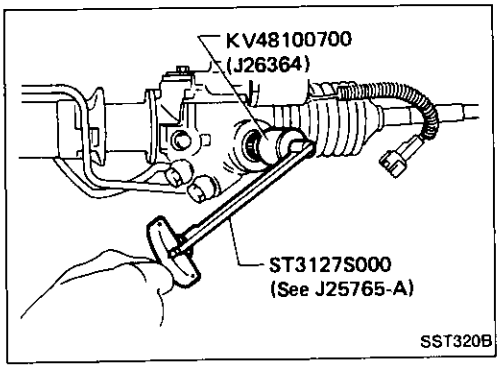
- After twisting boot clamp, bend twisted and diagonally so it does not contact boot.

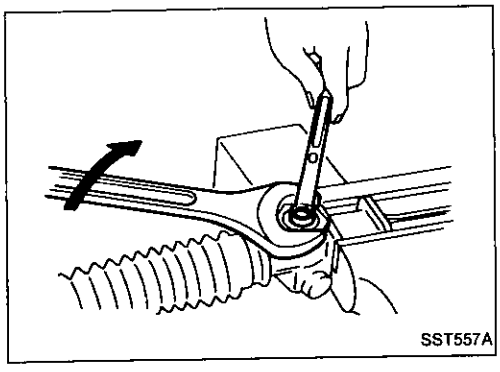


Adjustment

Adjust pinion rotating torque as follows:

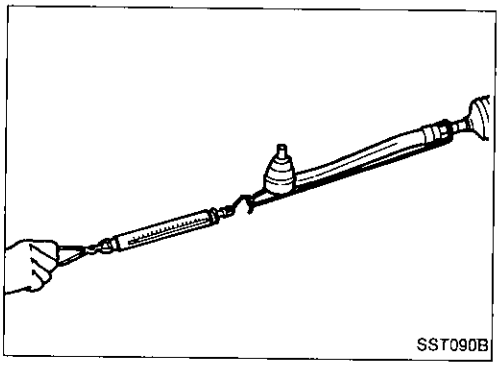
1. Set gears to Neutral without fluid in the gear.
2. Coat the adjusting screw with locking sealant and screw it in.
3. Lightly tighten lock nut.
4. Tighten adjusting screw to a torque of 4.9 to 5.9 N·m (50 to 60 kg-cm, 43 to 52 in-lb).
5. Loosen adjusting screw, then retighten it to 0.05 to 0.20 N·m (0.5 to 2 kg-cm, 0.43 to 1.74 in-lb).
6. Move rack over its entire stroke several times.
7. Measure pinion rotating torque within the range of 180° from neutral position.
   Stop the gear at the point of maximum torque.
8. Loosen adjusting screw, then retighten it to 4.9 N·m (50 kg-cm, 43 in-lb).
9. Loosen adjusting screw by 50° to 110°.



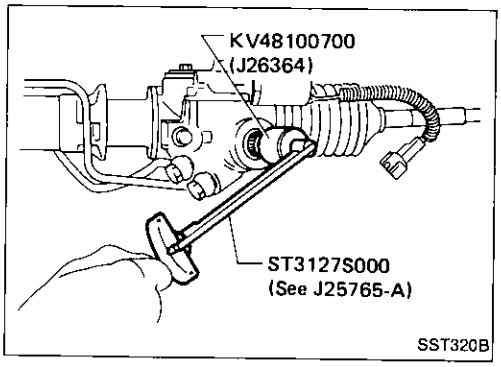


10. Prevent adjusting screw from turning, and tighten lock nut to specified torque.

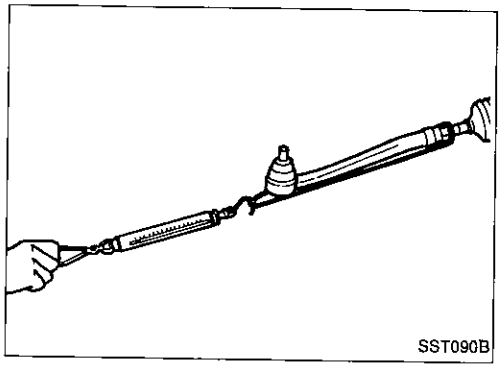
Adjustment (Cont'd)

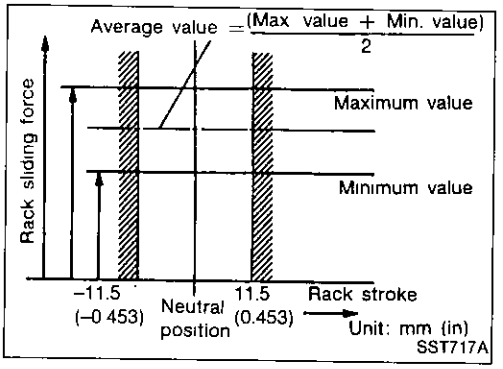


11. Check steering gear for rack sliding frictional force.
    Around neutral point of rack stroke
    ±5.5 mm (±0.217 in):
    122.6 - 166.7 N (12.5 - 17 kg, 27.6 - 37.5 lb)
    Except for neutral point:
    122.6 - 186.3 N (12.5 - 19 kg, 27.6 - 41.9 lb)
- If sliding frictional force is out of specification, repeat the adjustment procedure, starting from No. 4.
- After the readjustment, if sliding force is still out of specification, steering gear is damaged.

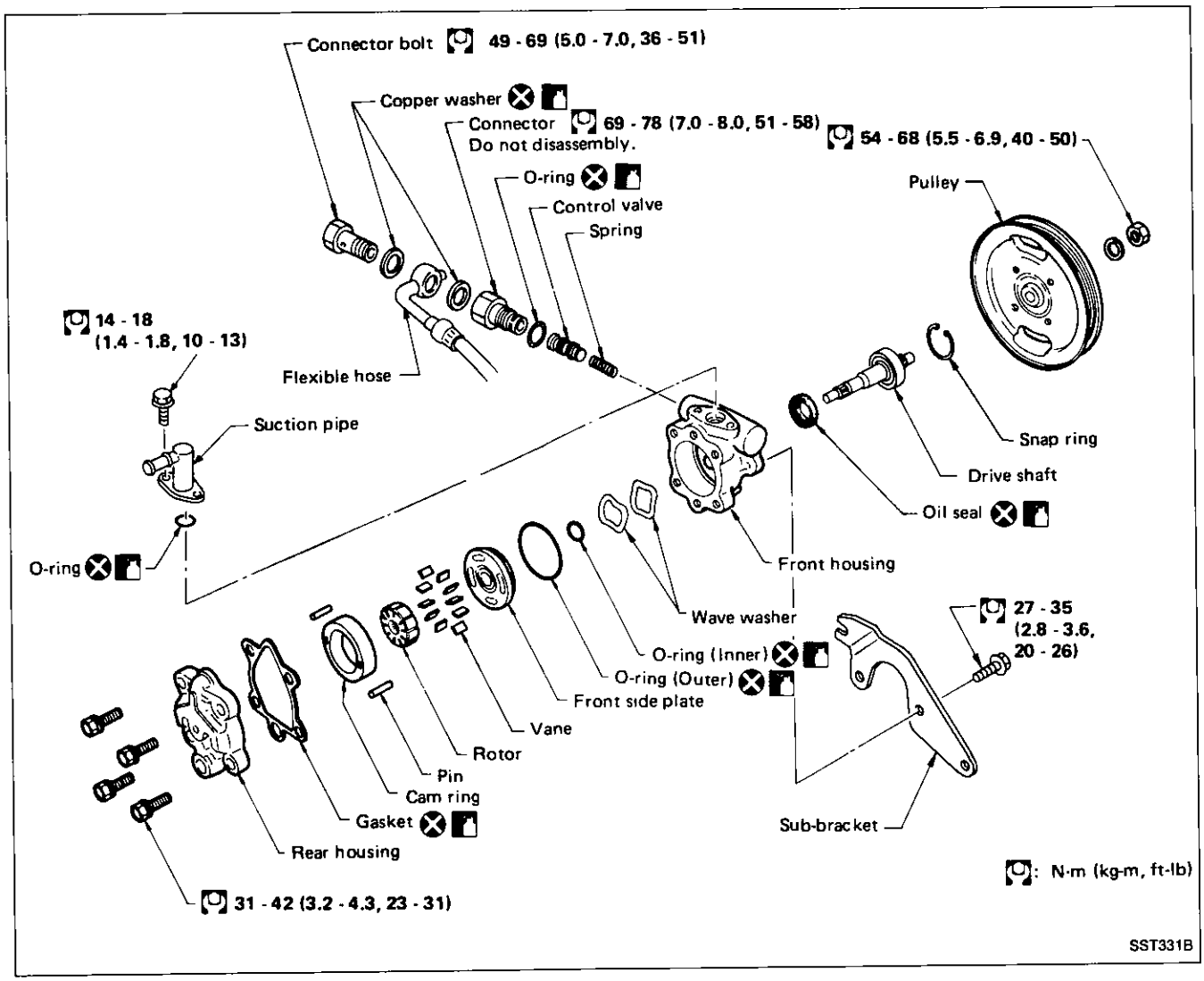


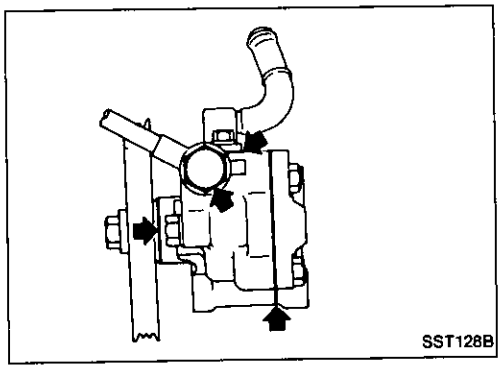
12. Measure pinion rotating torque within the range of ±100° from the neutral point.
    Average rotating torque
    [(Max. measured value + Min. measured value) x 0.5]:
    0.8 - 1.3 N·m (8 - 13 kg-cm, 6.9 - 11.3 in-lb)
    Maximum torque increment:
    Less than 0.4 N·m (4 kg-cm, 3.5 in-lb)
    Except for above mentioned measuring range:
    Maximum rotating torque
    1.9 N·m (19 kg-cm, 16 in-lb)
    Maximum torque increment
    Less than 0.6 N·m (6 kg-cm, 5.2 in-lb)
- If pinion rotating torque is not within specification, readjust it.
- After the readjustment, if pinion rotating torque is still out of specification, steering gear is damaged.





13. 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. While pulling tie-rod slowly in the ±11.5 mm (±0.453 in) range from the neutral position, make sure rack sliding force is within specification.
    Average rack sliding force:
    216 - 275 N (22 - 28 kg, 49 - 62 lb)
g. Check sliding force outside above range.
    Maximum rack sliding force:
    Not more than 294 N (30 kg, 66 lb) beyond above value
- 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.





Pre-disassembly Inspection

Disassemble the power steering oil pump only if the following items are found.

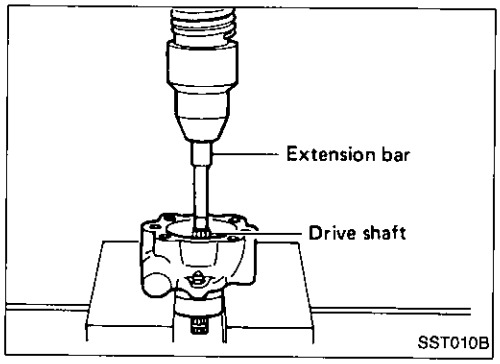
- Oil leak from any point shown in the figure.
- Deformed or damaged pulley.
- Poor performance

Disassembly

CAUTION:

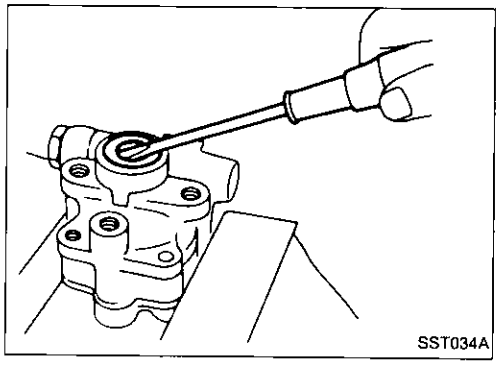
- **Parts which can be disassembled are strictly limited. Never disassemble parts other than those specified.**
- **Disassemble in as clean a place as possible.**
- **Clean your hands before disassembly.**
- **Do not use rags; use nylon cloths or paper towels.**
- **Follow the procedures and cautions in the Service Manual.**
- **When disassembling and reassembling, do not let foreign matter enter or contact the parts.**

Disassembly (Cont'd)



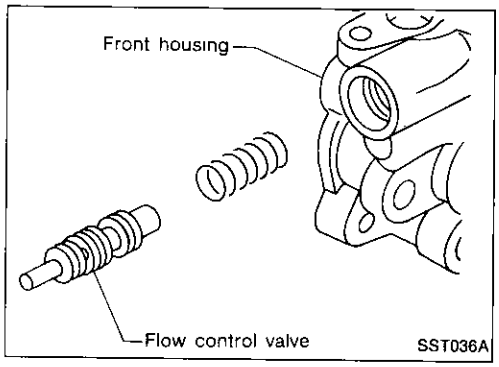
- Remove snap ring, then draw drive shaft out.

Be careful not to drop drive shaft.



- Remove oil seal.

Be careful not to damage front housing.

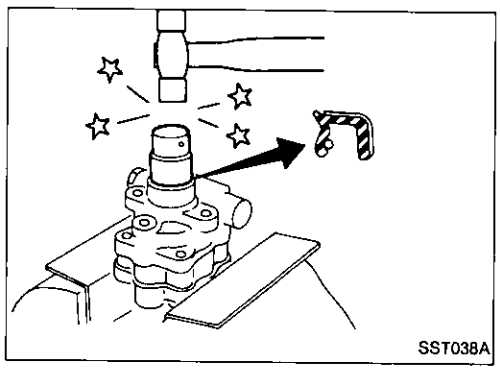


- Remove connector.

Be careful not to drop control valve.

Inspection

Inspect each component part for wear, deformation, scratches, and cracks. If damage is found, replace the part.

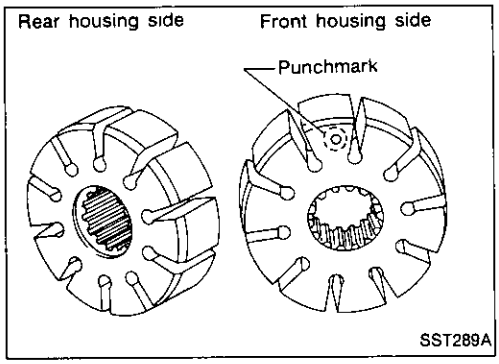


Assembly

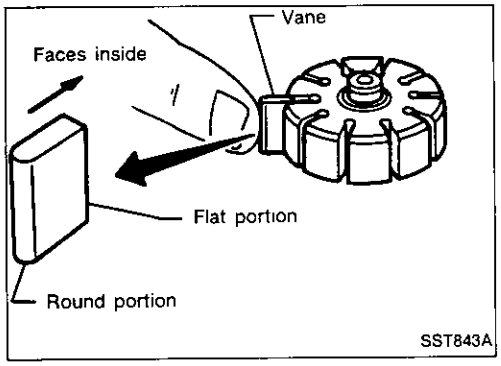
Assemble oil pump, noting the following instructions.

- 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 A.T.F. when assembling.

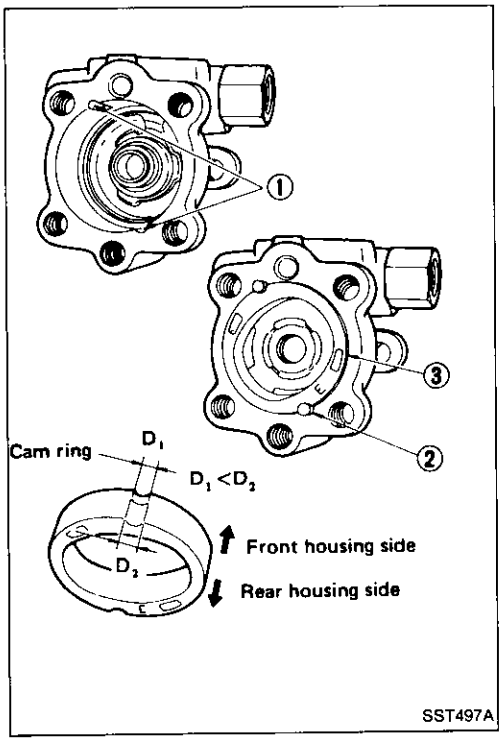
Assembly (Cont'd)



- Pay attention to rotor direction.

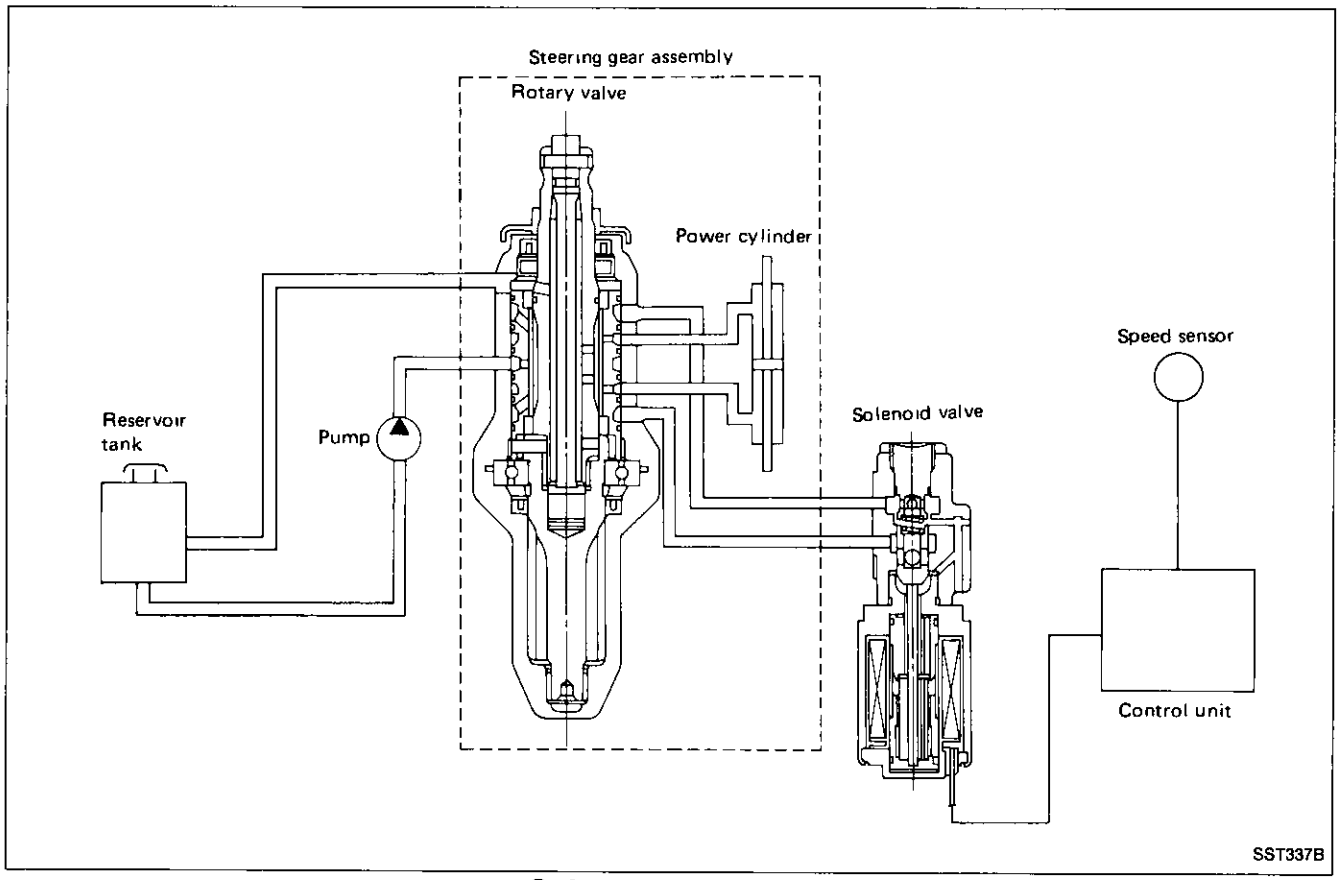


- When assembling vanes to rotor, rounded surfaces of vanes must face cam ring side.

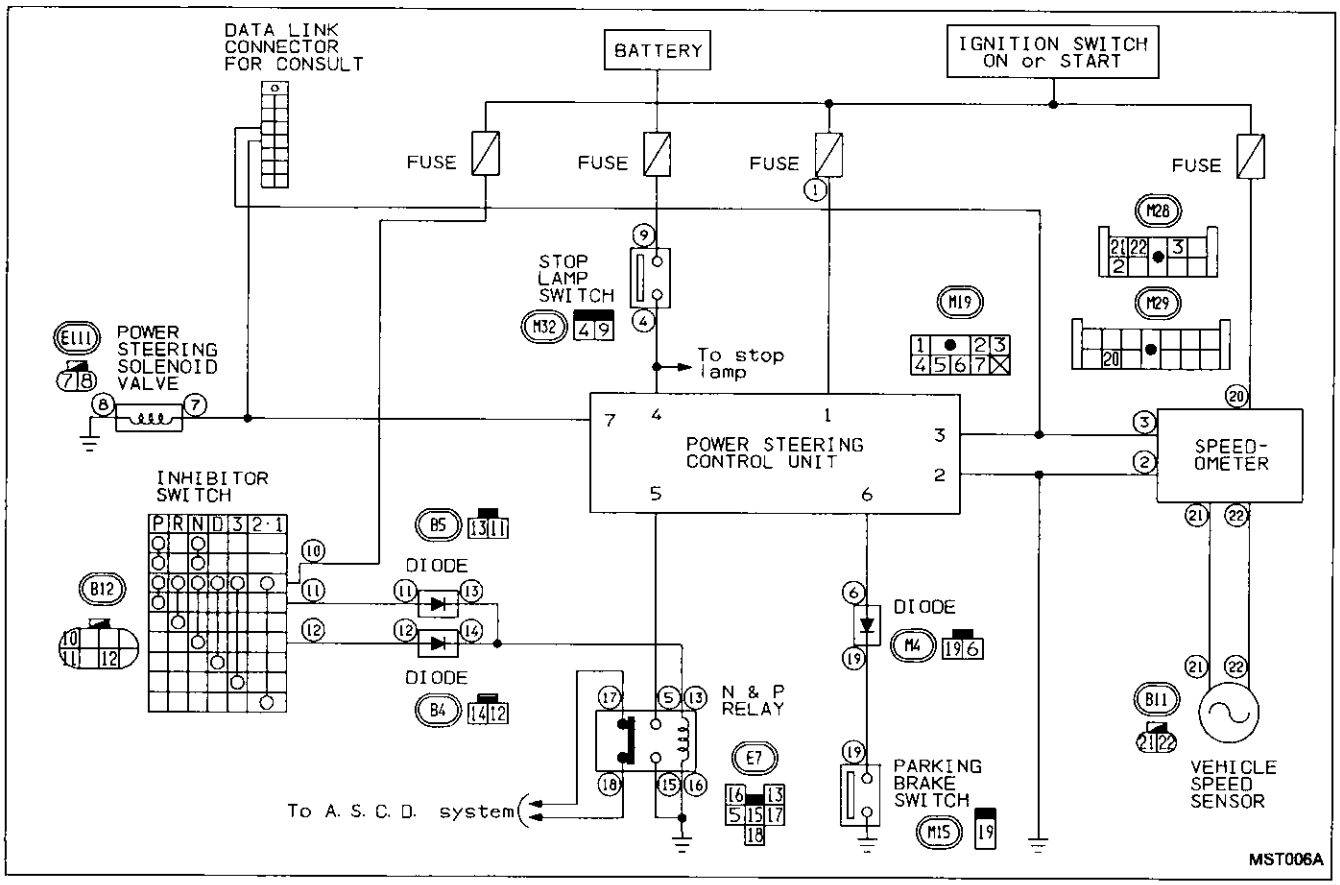


- Insert pin ② into pin groove ① of front housing and front side plate. Then install cam ring ③ as shown at left.

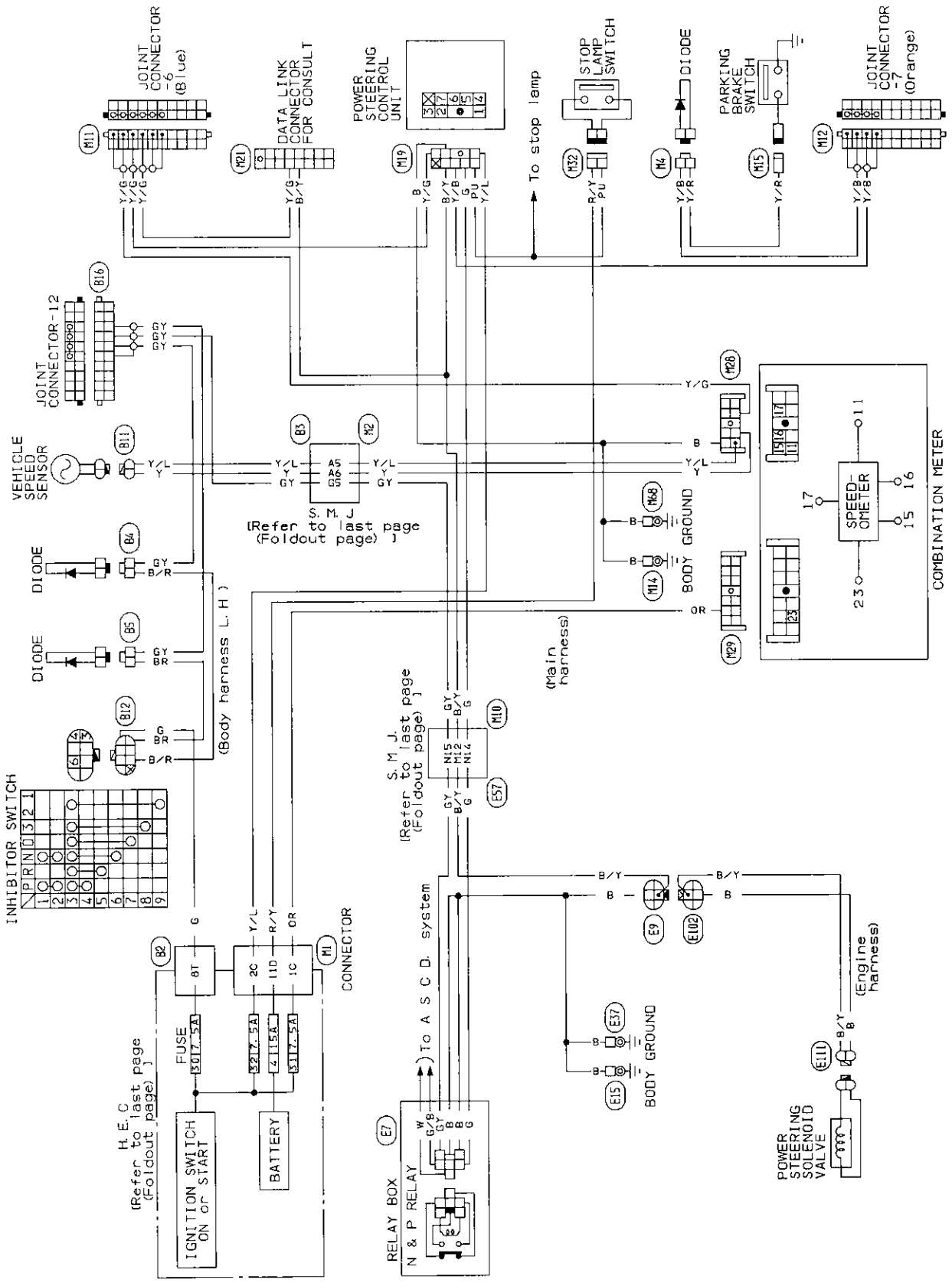
Hydraulic Circuit



Schematic



Wiring Diagram



MST005A

Precautions

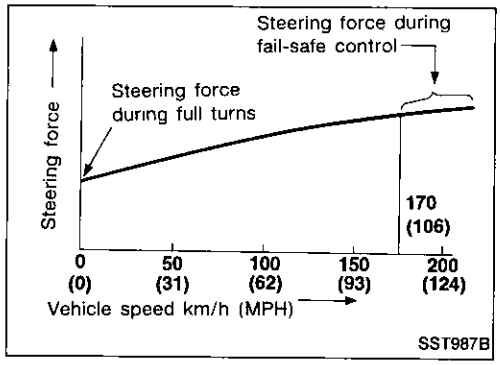
BEFORE DIAGNOSING THE POWER STEERING SYSTEM, ENSURE THAT:

Vehicle stopped

a. Power steering components (gears, oil pump, pipes, etc.) are free from leakage, and that oil level is correct.
b. Tires are inflated to specified pressure and are of specified size, and that steering wheel is a genuine Nissan part.
c. Wheel alignment is adjusted properly.
d. Suspension utilizes the original design, and is free of modifications which increase vehicle weight.

Vehicle in operation

a. Understand the trouble symptoms.
b. Engine is operating properly.



PRELIMINARY KNOWLEDGE HELPFUL IN CONDUCTING DIAGNOSES

The power steering system is a twin orifice type, which uses a vehicle-speed sensing, electronic control design. Valve sensitivity is controlled in response to vehicle speed to achieve optimum steering effort. When a vehicle-speed signal is not entered into the power steering control unit for approximately 10 seconds during normal operation (see NOTE below), a fail-safe system activates to maintain the steering effort at a level similar to that experienced during high-speed operation.
More precisely, if a foot-brake signal, parking-brake signal and transmission position signal (N or P-range signal) are not entered, the power steering system is held in a "fail-safe" control state. When this happens, a symptom referred to as "heavy steering during stationary turns" sometimes occurs.

NOTE:
Normal operation refers to a driving condition in which the foot brake pedal and parking brake lever are released, the shift lever is in any position other than "P" or "N".

Diagnostic Procedure 1

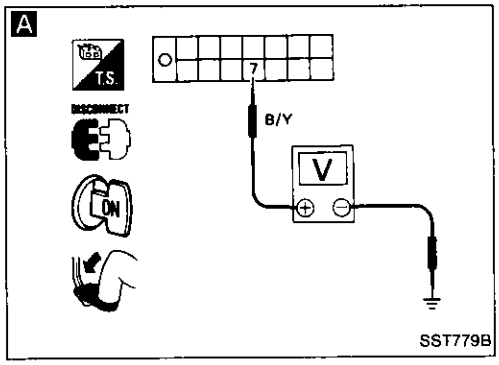
SYMPTOM:

Heavy steering operation during stationary turns

START

1) CHECK STOP LAMP SIGNAL.
Turn ignition switch "ON" (with engine OFF), release foot brake pedal and parking brake lever.
Set shift lever to any position except "P" and "N".

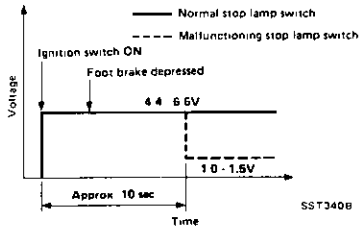
A



A

Depress brake pedal and measure voltage between solenoid valve terminals of data link connector for CONSULT.

O.K. → Go to 2).



Voltage:

4.4 - 6.6 volts (constant) ... O.K.

Outside the above range or voltage fluctuations ... N.G.

N.G.

Check if terminal voltage drops to 1 - 1.5V range approx. 10 seconds after ignition switch is turned ON.

No change (outside 4.4 - 6.6V range) ... O.K.

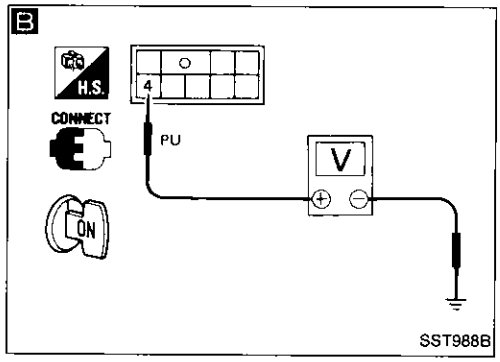
Voltage drop ... N.G.

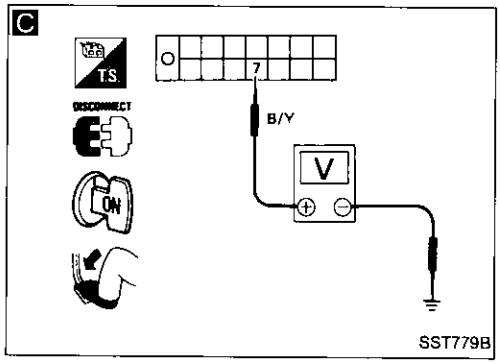
O.K. → Go to 5).

N.G.

Ⓐ

Diagnostic Procedure 1 (Cont'd)





Ⓐ

B

Check if stop lamp switch signal is present at power steering control unit.
YES (12 volts — Brake pedal depressed.) ... O.K.
NO (0 volts) ... N.G.

N.G. → Malfunctioning stop lamp switch system

O.K.

Ensure that power steering control unit connector is connected properly.

C

After ignition switch is turned "ON", depress brake pedal and measure voltage between solenoid valve terminals of data link connector for CONSULT.
4.4 - 6.6 volts (constant) ... O.K.
Voltage fluctuations ... N.G.

N.G. → Malfunctioning power steering control unit.

O.K.

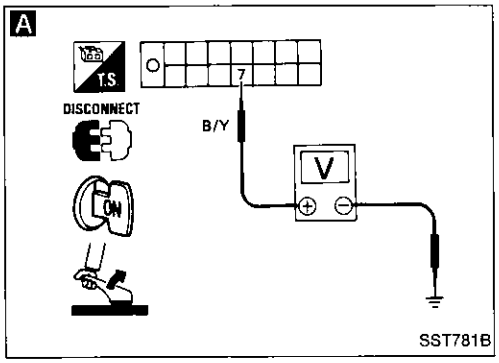
Check if heavy steering operation occurs during stationary turns.
YES ... N.G.
NO (Lighter steering operation) ... O.K.

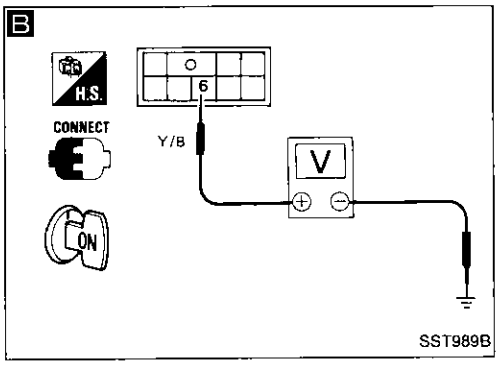
N.G. → Go to 4).

O.K.

END

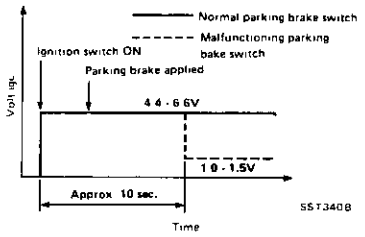
Diagnostic Procedure 1 (Cont'd)





A

2) CHECK PARKING BRAKE SIGNAL.
Release foot brake pedal and apply parking brake lever.
Measure voltage between solenoid valve terminals of data link connector for CONSULT.



Voltage:
4.4 - 6.6V (constant) ... O.K.
Outside the above range or voltage fluctuations ... N.G.

O.K. → Go to 3).

N.G.

Check if terminal voltage drops to 1.0 - 1.5V range approx. 10 seconds after ignition switch is turned ON.
No change (outside 4.4 - 6.6V range) ... O.K.
Voltage drop ... N.G.

O.K. → Go to 5).

N.G.

B

Check if parking brake switch signal is present at power steering control unit.
YES (0 volts — Parking brake applied.)
NO (12 volts) ... N.G.

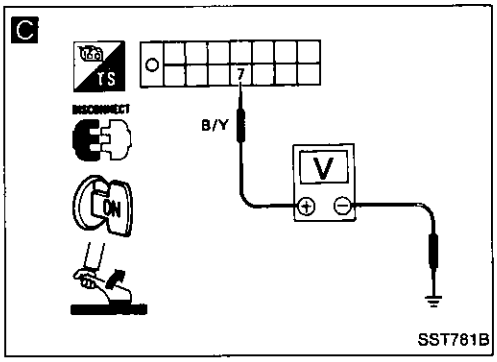
N.G. → Malfunctioning parking brake system

O.K.

Ensure that power steering control unit connector is connected properly.

Ⓑ

Diagnostic Procedure 1 (Cont'd)



Ⓑ

C

Turn ignition switch ON and apply parking brake lever.
Measure voltage between solenoid valve terminals of data link connector for CONSULT.
Voltage:
4.4 - 6.6 volts (constant) ... O.K.
Voltage fluctuations ... N.G.

N.G. → Malfunctioning power steering control unit

O.K. ↓

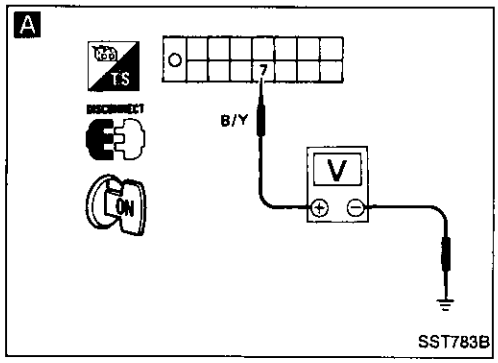
Check if heavy steering operation occurs during stationary turns.
YES ... N.G.
NO (lighter steering operation) ... O.K.

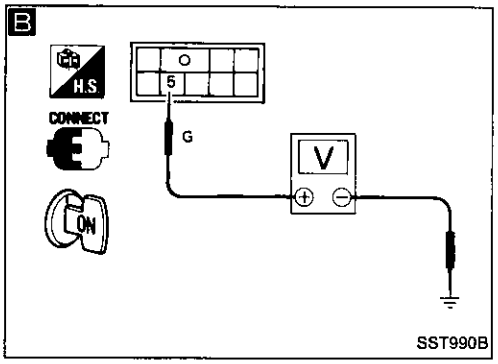
N.G. → Go to 4).

O.K. ↓

END

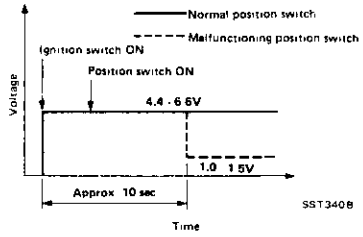
Diagnostic Procedure 1 (Cont'd)





A

3) CHECK NEUTRAL POSITION SIGNAL.
Release parking brake lever.
Move shift lever to Neutral position.
Measure voltage between solenoid valve terminals of data link connector for CONSULT.



Voltage:
4.4 - 6.6V (constant) ... O.K.
Outside the 4.4 - 6.6V range or Voltage fluctuations ... N.G.

O.K. → Move shift lever to "P" position.
Measure voltage between solenoid valve terminals at data link connector for CONSULT.
Voltage:
4.4 - 6.6V (constant) ... O.K.
Outside the above range or voltage fluctuations ... N.G.

O.K. → Go to 4).

N.G. → B

B

Check if terminal voltage drops to 1.0 - 1.5V range approx. 10 seconds after ignition switch is turned ON.
No change (outside 4.4 - 6.6V range) ... O.K.
Voltage drop ... N.G.

O.K. → Go to 5).

N.G. ↓

Check if position switch signal is present at power steering control unit.
YES (0 volts, when position switch is ON) ... O.K.
NO (4 - 5 volts) ... N.G.

N.G. → Malfunctioning position switch system

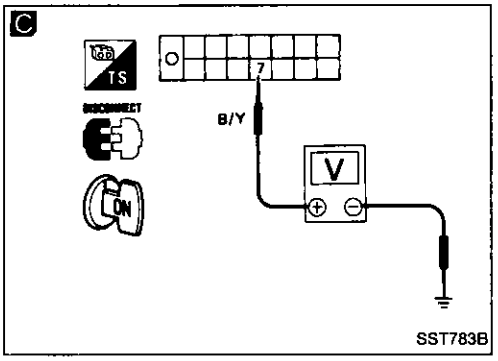
O.K. ↓

Ensure that power steering control unit connector is connected properly.

↓

Ⓒ

Diagnostic Procedure 1 (Cont'd)



Ⓒ

C

Turn ignition switch ON, and move shift lever to "P" position.
Measure voltage between solenoid valve terminals of data link connector for CONSULT.
Voltage:
4.4 - 6. 6V (constant) ... O.K.
Voltage fluctuations ... N.G.

N.G. → Malfunctioning power steering control unit

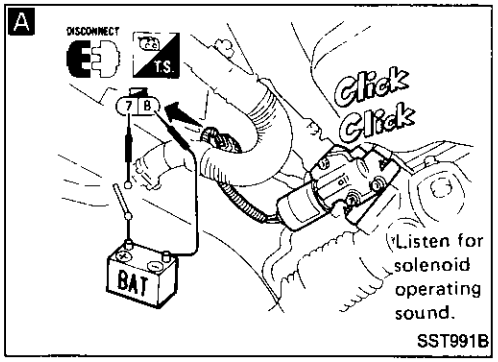
O.K. ↓

Check if heavy steering operation occurs during stationary turns.
YES ... N.G.
NO (Lighter steering operation) ... O.K.

N.G. → Go to 1).

O.K. ↓

END



A

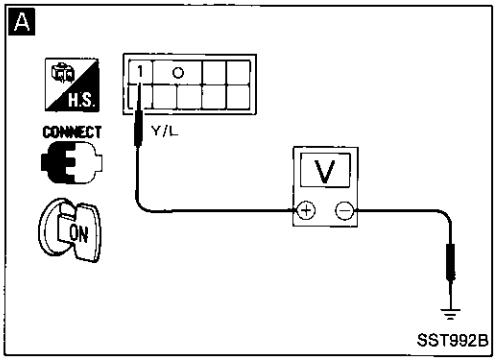
4) CHECK POWER STEERING SOLENOID VALVE FOR PROPER OPERATION.
Disconnect solenoid valve connector.
Check if plunger clicks when voltage is applied between connector terminals (on solenoid valve side).
Clicks ... O.K.
NO clicks ... N.G.

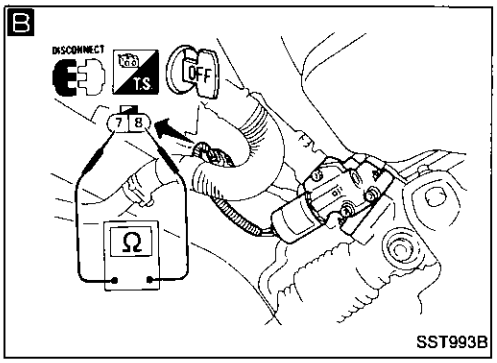
N.G. → Malfunctioning power steering solenoid valve

O.K. ↓

- Malfunctioning steering gear assembly
- Malfunctioning oil pump

Diagnostic Procedure 1 (Cont'd)





A

5) CHECK POWER STEERING CONTROL UNIT FOR PROPER OPERATION.
Check if power voltage is present at power steering control unit.
YES (12V) ... O.K.
NO (0V) ... N.G.

N.G. → Malfunctioning ignition power circuit

O.K. ↓

B

Measure solenoid valve resistance.
Disconnect solenoid valve connector, and measure resistance between connector terminals (on solenoid valve side.)
Resistance:
4 - 6 ohms ... O.K.
0 ohms or infinite ... N.G.

N.G. → Malfunctioning solenoid valve system

O.K. ↓

Ensure that power steering control unit connector is connected properly.

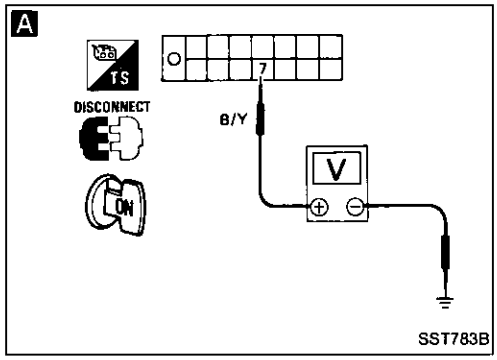
↓

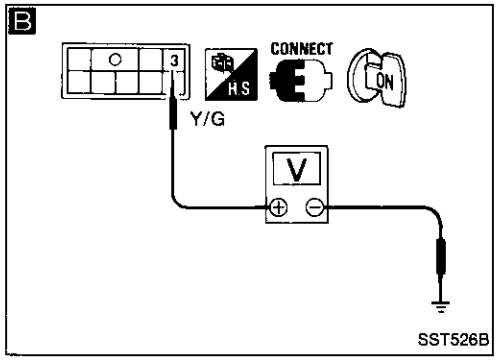
Check if heavy steering operation occurs during stationary turns.
YES ... N.G.
NO (Lighter steering operation) ... O.K.

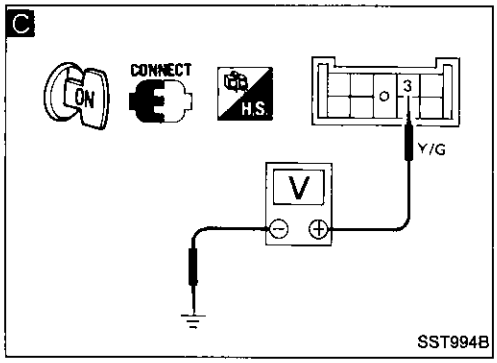
N.G. → Malfunctioning power steering control unit

O.K. ↓

END







Diagnostic Procedure 2

SYMPTOM:

Light steering operation during high-speed driving

Raise rear wheels off ground and start engine.

A

Measure voltage between solenoid valve terminals of data link connector for CONSULT while driving vehicle from 0 to 100 km/h (0 to 62 MPH).
Voltage:
0 km/h (0 MPH):
4.4 - 6.6V ... O.K.
100 km/h (62 MPH):
2.4 - 3.6V ... O.K.
Constant voltage ... N.G.

O.K. → Ⓒ

N.G.

Check speedometer for proper operation.
YES ... O.K.
NO ... N.G.

N.G. → Malfunctioning vehicle speed sensor or speedometer

O.K.

Check A.S.C.D. and vehicle speed-sensing door lock for proper operation.
YES ... O.K.
NO ... N.G.

N.G. → C

C

Check if vehicle speed signal is present at speedometer.
Disconnect speedometer from vehicle to facilitate work. Reconnect wiring.
Measure voltage between speedometer terminals while driving vehicle at very slow speeds.
1 volt (Min.) and 5 volts (Max.) are alternately repeated ... O.K.
No voltage is present ... N.G.

O.K. → B

N.G. → Malfunctioning speedometer

B

Check if vehicle speed signal is present at power steering control unit.
While driving at very slow speeds, connect power steering unit connector.
Measure terminal voltage.
1 volt (Min.) and 5 volts (Max.) are alternately repeated ... O.K.
No voltage is present ... N.G.

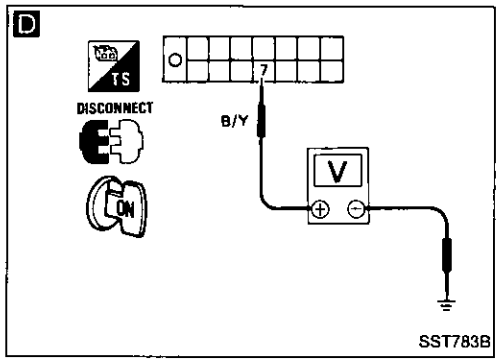
N.G. → Improper connection between speedometer and power steering control unit

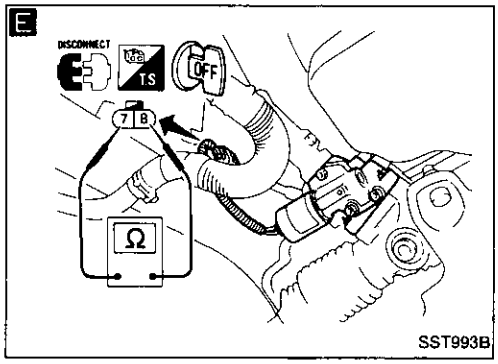
O.K.

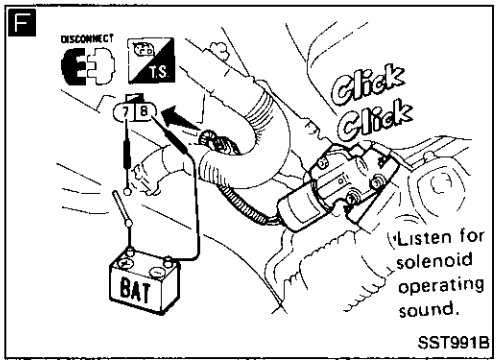
Ensure that power steering control unit connector is connected properly.

Ⓐ

Diagnostic Procedure 2 (Cont'd)







Ⓐ

D

Measure voltage between solenoid valve connector terminals of data link connector for CONSULT while driving vehicle from 0 to 100 km/h (0 to 62 MPH).

Voltage:

0 km/h (0 MPH):

4.4 - 6.6V ... O.K.

100 km/h (62 MPH):

2.4 - 3.6V ... O.K.

No voltage variations ... N.G.

O.K. → Check if steering operation is heavy during high-speed driving.

YES ... O.K.

NO ... N.G.

N.G. → Ⓒ

O.K. → END

N.G. ↓

E

Measure solenoid valve resistance. Disconnect solenoid valve connector, and measure resistance between connector terminals (on solenoid valve side).

Resistance:

4 - 6 ohms ... O.K.

0 ohms or infinite ... N.G.

O.K. ↓

Malfunctioning power steering control unit

N.G. → F

F

Disconnect solenoid valve connector.
Apply voltage between connector terminals (on solenoid valve side) and listen for clicks (which indicate operation).

Clicks ... O.K.

No clicks ... N.G.

N.G. → Malfunctioning solenoid valve

O.K. →

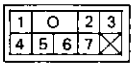
- Malfunctioning steering gear assembly
- Malfunctioning oil pump

Control Unit Inspection Table

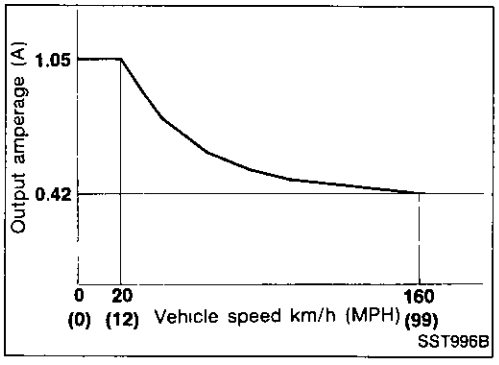
The standard values (voltage), measured with an analog tester in contact with the control unit terminal, are shown below:

Terminal No.	Application	Standard value
1	Power	Approx. 12V
2	Ground	0V
3	Vehicle speed sensor input	1 volt (min.) and 5 volts (max.) are alternately repeated when vehicle is driven at very slow speeds.
4	Stop lamp switch input	Pressed: Approx. 12V Released: 0V
5	Neutral switch input	0V (selector lever in "N" or "P") Approx. 12V (except for the above)
6	Parking brake switch input	Applied: 0V Released: Approx. 12V
7	Power steering solenoid valve output	0 km/h 4.4 - 6.6V 100 km/h 2.4 - 3.6V Fail-safe 1.6 - 2.4V

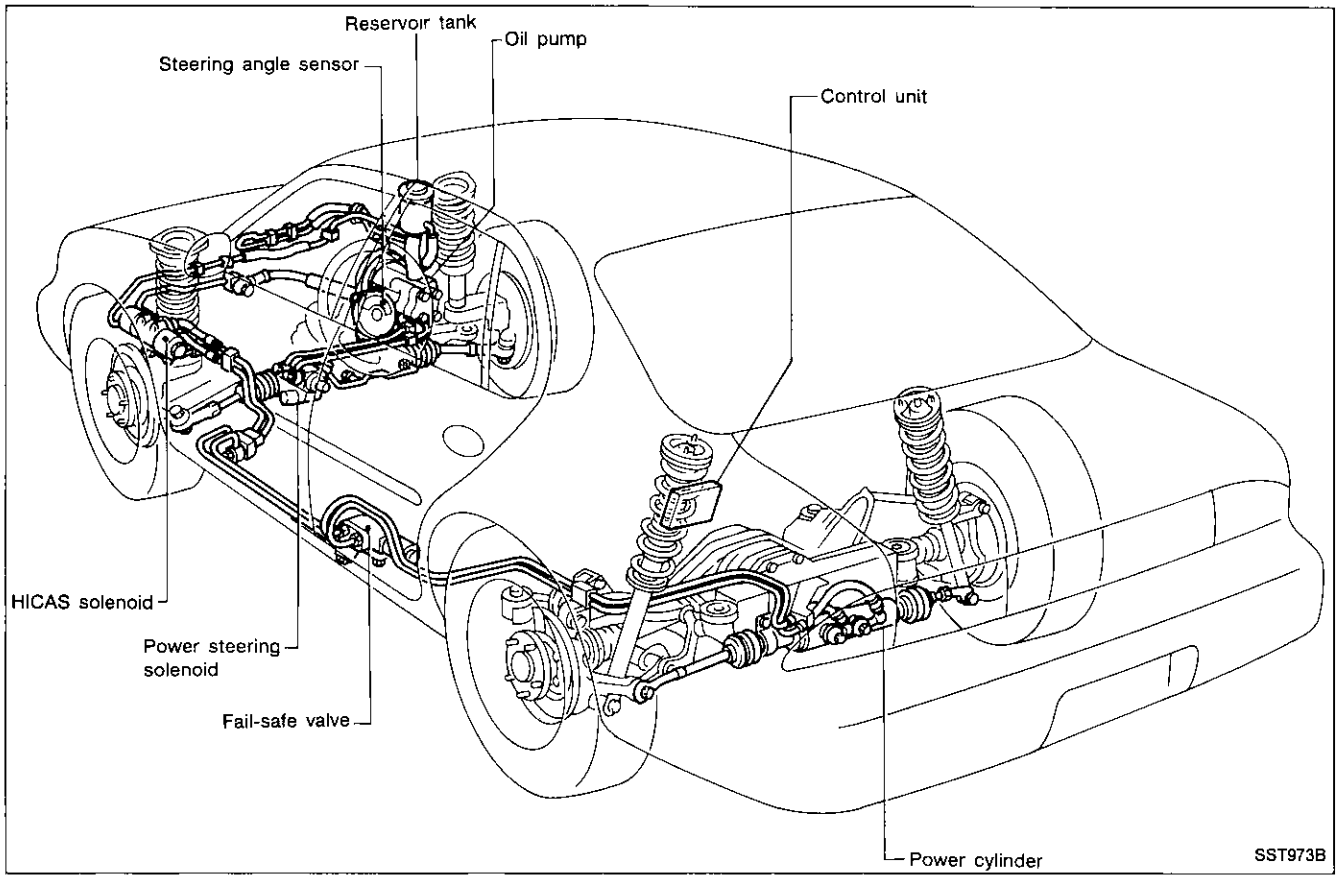




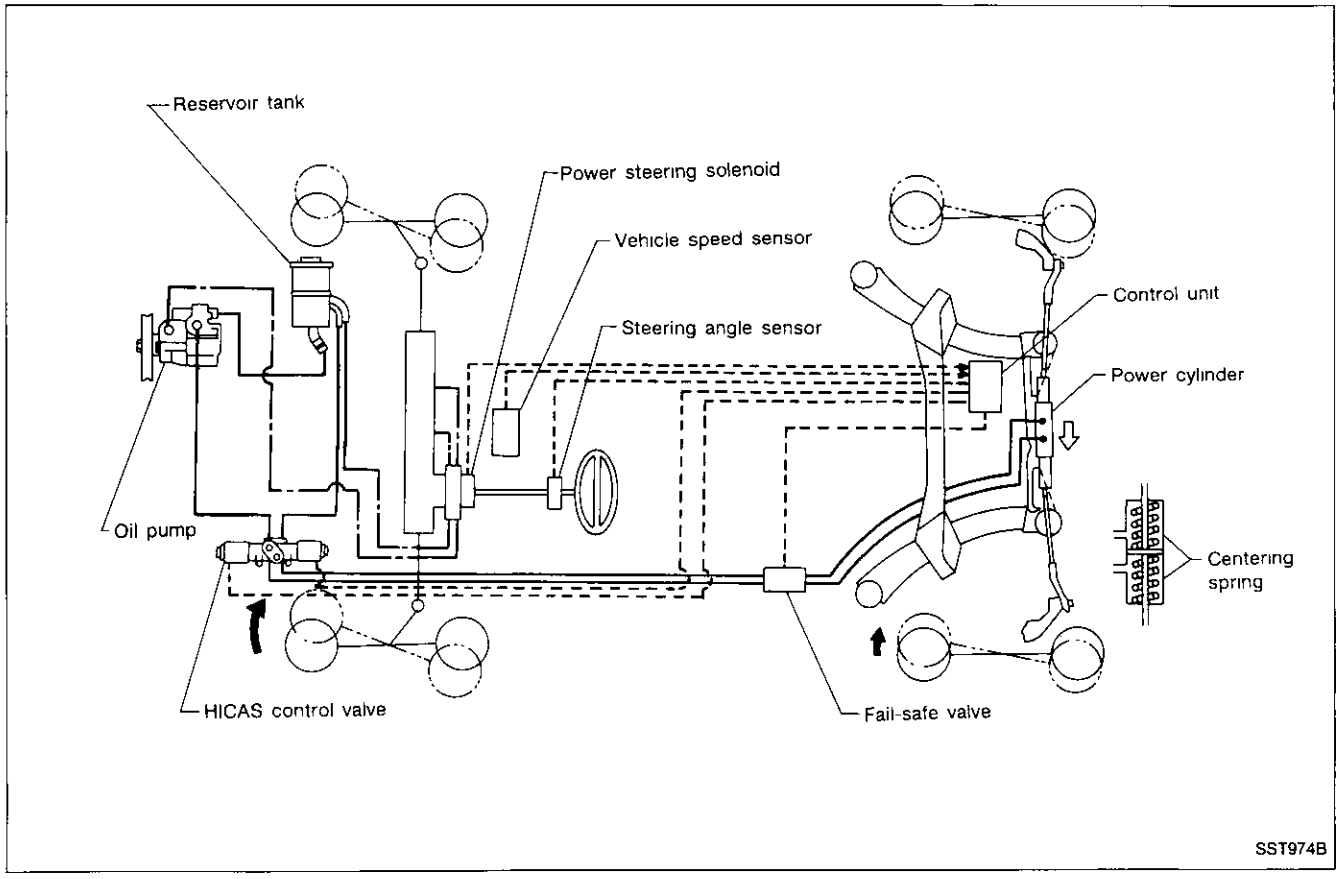
Performance of Controller

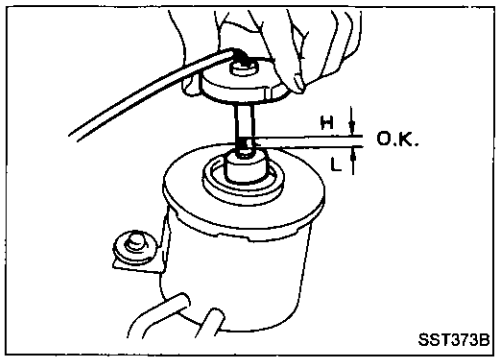


HICAS Component Parts Location



System Diagram





Checking Fluid Level

Maintain the fluid level so that the lower surface of the float is maintained between the "L" and "H" marks on the gauge rod. The fluid level should be checked when the engine is stopped and the fluid temperature is about 30°C (86°F).

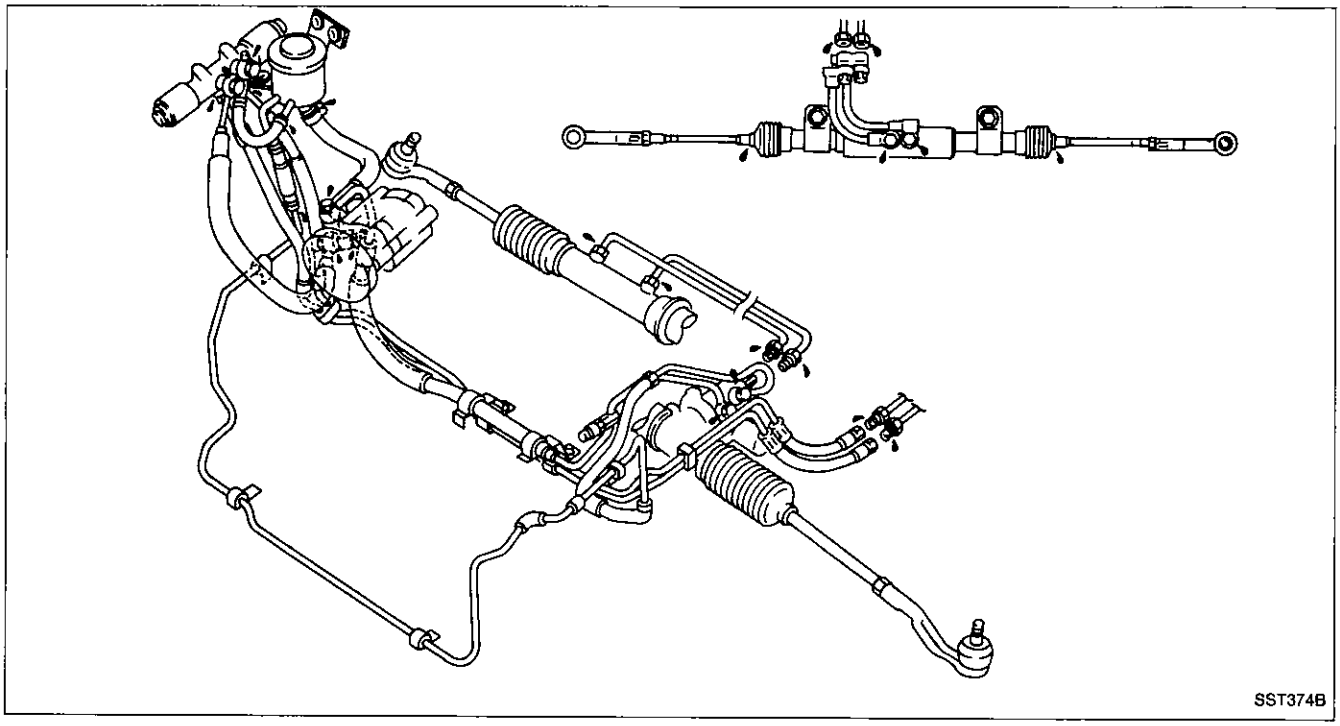
CAUTION:

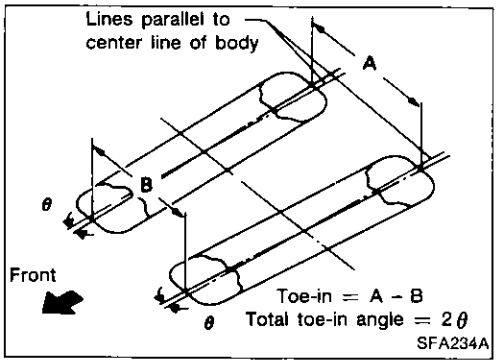
- **Do not overfill.**
- **Recommended fluid is Automatic Transmission Fluid "Dexron™" type.**

Checking Fluid Leakage

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

Fluid leakage should be checked for when the oil temperature is normal with the engine idling.





Measuring Rear Toe-in

Measure distance "A" and "B" at the same height as hub center.

Toe-in:

Refer to S.D.S. in RA section.

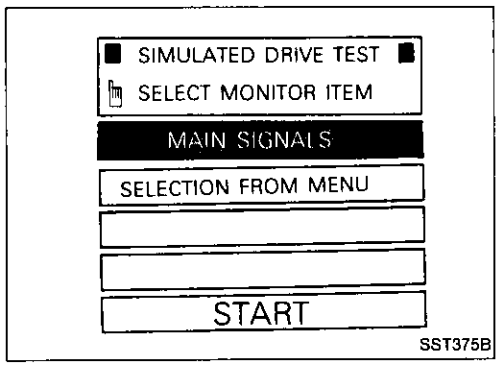
Inspection of HICAS System Operation

CAUTION:

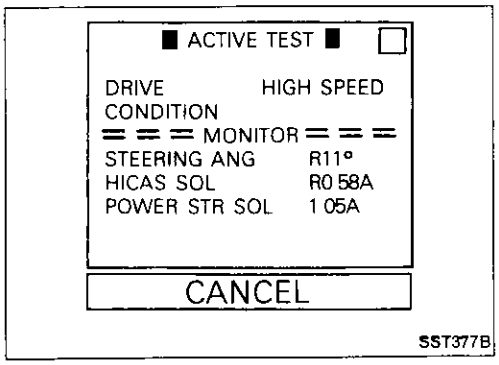
Ensure that shift lever is set to "P" position before checking HICAS system operation.

When CONSULT is used:

1. Have a helper sit in the driver's compartment and raise vehicle.
   (Use a two-pole lift or a center pole lift so that the four wheels are free to rotate.)
2. Connect CONSULT unit to data link connector and start engine.
3. Touch "START" on CONSULT display.
4. Touch "HICAS", "ACTIVE TEST" and "SIMULATED DRIVE" in that order.



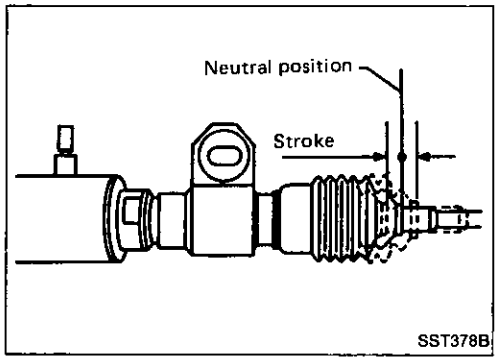
5. Touch "START" when MAIN SIGNALS display is reversed.



6. Touch "START."

After simulated drive condition has continued for 5 minutes, it will automatically cancel and CONSULT unit will then show "TEST IS INTERRUPTED TO AVOID OIL TEMP. RISE" display. To cancel this mode during self-diagnosis, simply touch "CANCEL".

Inspection of HICAS System Operation (Cont'd)

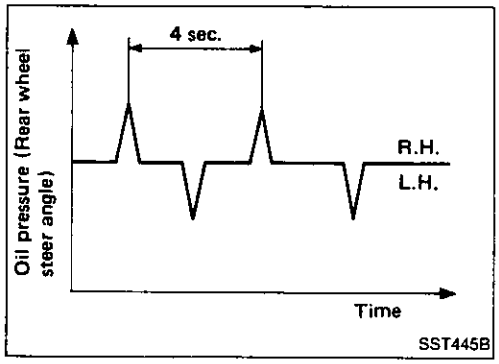


7. Operate engine at speeds greater than 2,000 rpm, and turn steering wheel 180° in one direction from the neutral position. Measure extension value of one power cylinder rod and retraction value of the other. Then, turn steering wheel 180° in the other direction from the neutral position, and measure extension value of one cylinder rod and retraction value of the other. Determine strokes of respective power cylinders by adding (measured) extension and retraction values.

Measure rod strokes in as short a period of time as possible.

Specifications:

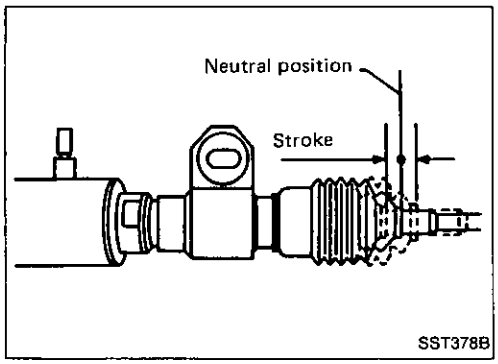
When turned to the right
3 mm (0.12 in)
When turned to the left
3 mm (0.12 in)
Total stroke
6 mm (0.24 in)



When CONSULT is not used:

1. Have a helper sit in the driver's compartment and raise vehicle.
   (Use a 2-pole lift or a center pole lift so that the four wheels are free to rotate.)
2. Set HICAS system in self-diagnosis mode.
(1) Turn ignition switch "OFF".
(2) Set shift lever to "P" or "N" position.
(3) Turn ignition switch "ON".
(4) Immediately start engine.
(5) Turn steering wheel from left to right (at least 20° from the neutral position) 5 times or more, then depress foot brake pedal at least 5 times all within 10 seconds after ignition switch has been turned "ON".
3. Set steering wheel to a point approximately 10° from the neutral position and check to ensure that rear wheels turn to the left and right alternately.

Inspection of HICAS System Operation (Cont'd)



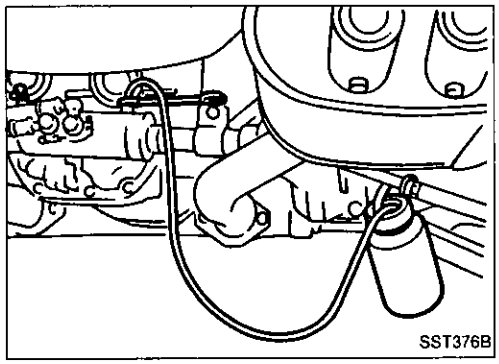
4. Operate engine at speeds greater than 2,000 rpm, and turn steering wheel 180° in one direction from the neutral position. Measure extension value of one power cylinder rod and retraction value of the other. Then, turn steering wheel 180° in the other direction from the neutral position, and measure extension value of one cylinder rod and retraction value of the other. Determine strokes of respective power cylinder rods by adding (measured) extension and retraction values.

Measure rod strokes in as short a period of time as possible.

Specifications:

When turned to the right
3 mm (0.12 in)
When turned to the left
3 mm (0.12 in)
Total stroke
6 mm (0.24 in)

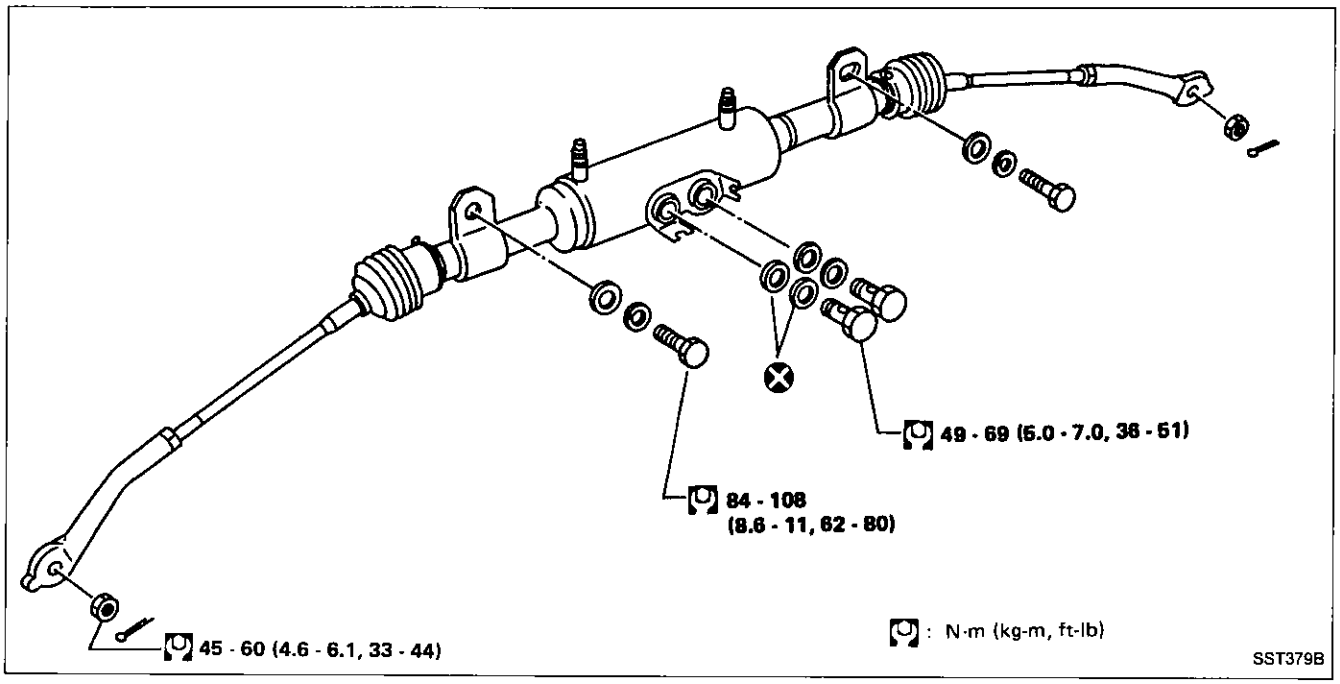
Do not depress foot brake pedal during operation check, otherwise the operation will be stopped.

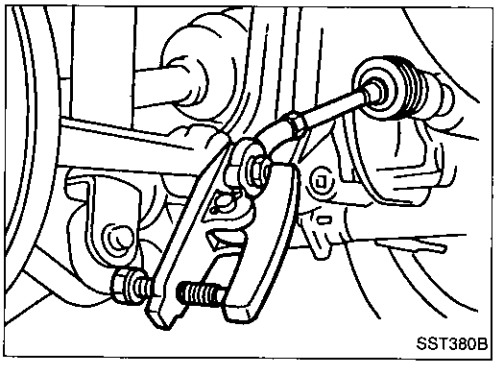


Bleeding Hydraulic System

Before bleeding air from the HICAS system, be sure to bleed air from the power steering system.
Refer to "SUPER HICAS SYSTEM — Repair of Component Parts".

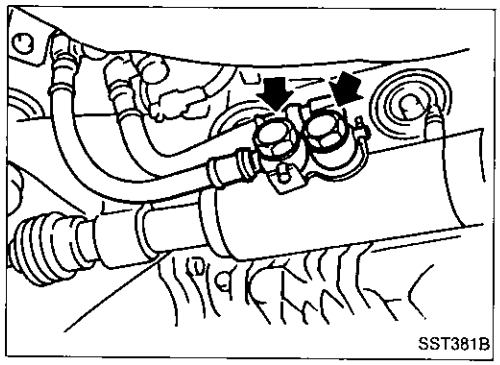
Power Cylinder





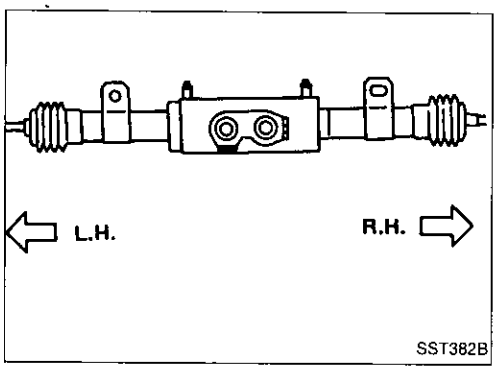
REMOVAL

- Detach power cylinder lower links from axle housing sockets with Tool.



- Disconnect oil pipes from power cylinders and remove power cylinders.

CAUTION:
Plug openings of oil pipes and power cylinders to prevent entry of foreign particles after removal.

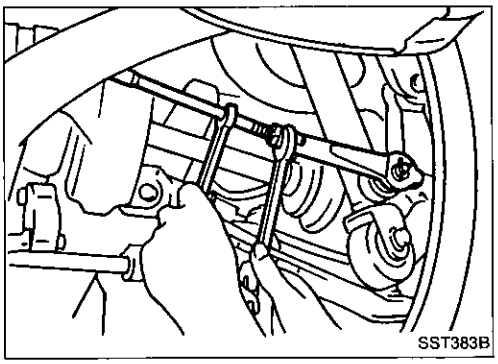


INSTALLATION

1. Before installing power cylinder on suspension member, wipe power cylinder bracket and mating surface of suspension member. Using the left side of the bracket as a reference point, locate the right side (oblong hole side) and install power cylinder.

CAUTION:
a. To prevent entry of foreign particles, clean oil pipes and connectors using dry compressed air.
b. Ensure that your hands are clean and free from foreign particles when connecting oil pipes.

Power Cylinder (Cont'd)

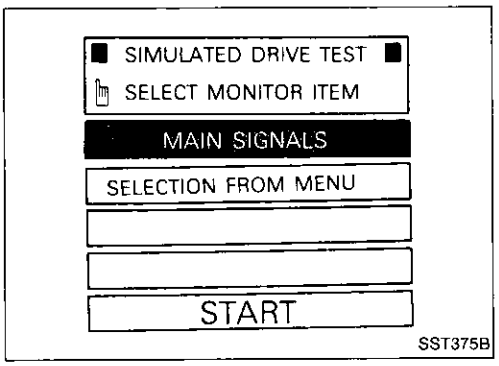

SST383B

2. Install power cylinders and oil pipes.
3. After installing lower link assemblies, check toe-in to ensure that it is within specifications. If it is not within specifications, perform proper adjustments.
   Refer to "SUPER HICAS" in section RA.

BLEEDING HYDRAULIC SYSTEM

Before bleeding air from the HICAS system, be sure to bleed air from the power steering system.

CAUTION:
Ensure that shift lever is set to "P" position.



SST375B

When CONSULT is used:

1. Connect CONSULT unit to data link connector on body side.
2. Have a helper sit in the driver's compartment and raise vehicle.

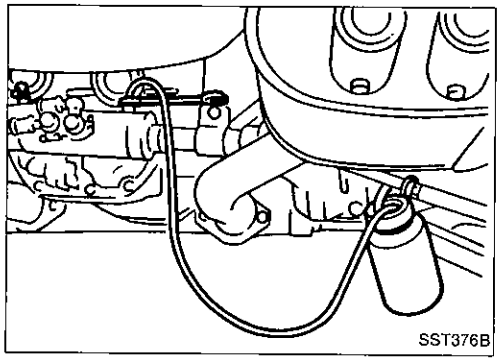
Use a two-pole lift or a center pole lift so that the four wheels are free to rotate.

3. Start engine.
4. Touch "START" on CONSULT display. (Display will then change.)
5. Touch "HICAS", "ACTIVE TEST", "SIMULATED DRIVE" and "START" in that order.

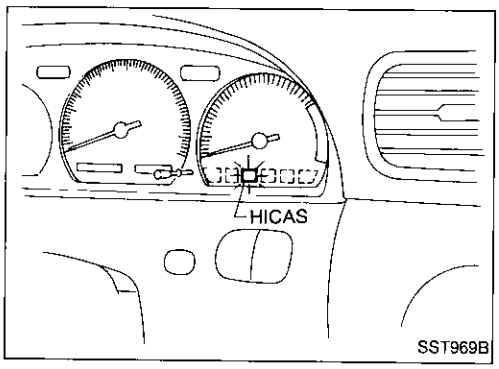
Before touching "START", ensure that MAIN SIGNALS display is reversed.

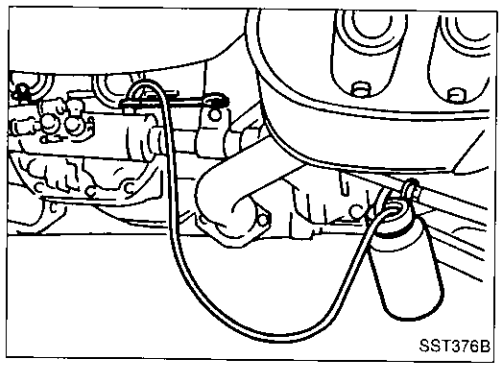
6. Touch "START".

Power Cylinder (Cont'd)



7. Operate engine at speeds greater than 2,000 rpm, and turn steering wheel 180° to the right from the neutral position. Loosen right power cylinder bleeder valve to bleed air, then retighten. Return steering wheel to the neutral position.
8. Operate engine at speeds greater than 2,000 rpm, and turn steering wheel 180° to the left from the neutral position. Loosen left power cylinder bleeder valve to bleed air, then retighten. Return steering wheel to the neutral position.
9. Repeat steps 7. and 8. until there are no air bubbles in fluid. While bleeding air from power cylinders, never allow fluid level to drop below inlet port of reservoir tank (by adding fluid as required).
10. Touch "CANCEL" on CONSULT display and turn ignition switch OFF.





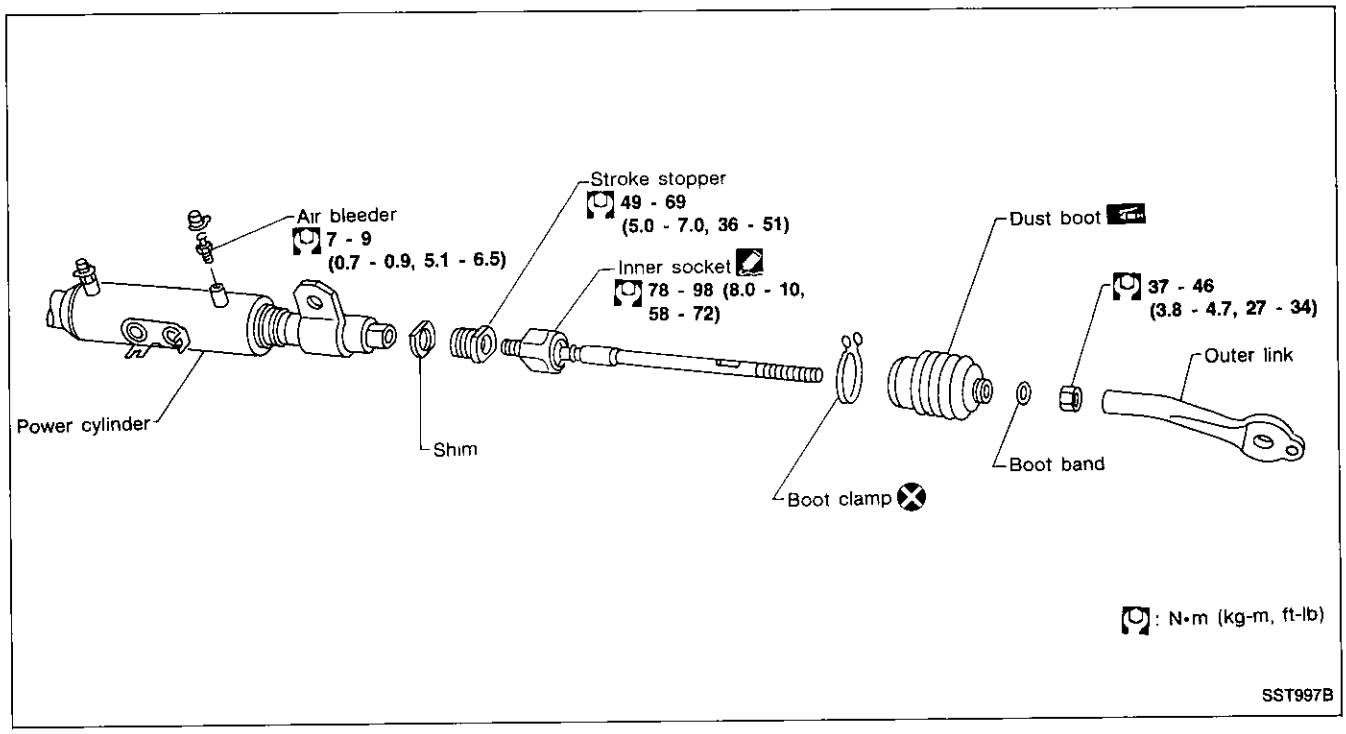
When CONSULT is not used:

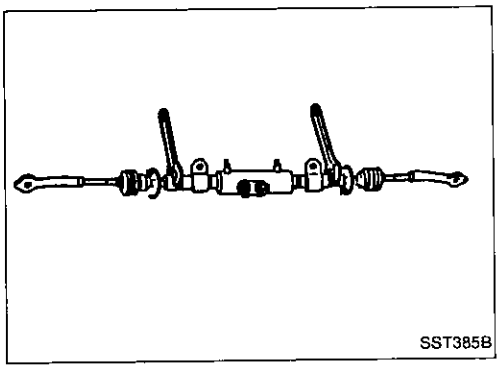
1. Have a helper sit in the driver's compartment, and raise vehicle.

Use a two-pole lift or center pole lift so that the four wheels are free to rotate.

2. Set HICAS system in self-diagnosis mode.
(1) Turn ignition switch "OFF".
(2) Set shift lever to "P" or "N" position.
(3) Turn ignition switch "ON".
(4) Immediately start engine.
(5) Turn steering wheel from left to right (at least 20° from the neutral position) 5 times or more, then depress foot brake pedal at least 5 times all within 10 seconds after ignition switch has been turned "ON".
3. Set steering wheel within 10° from the neutral position. Ensure that rear wheels turn to the left and right alternately.
4. Operate engine at idling speed, and turn steering wheel 180° to the right from the neutral position. Loosen right power cylinder bleeder valve to bleed air, then retighten. Return steering wheel to the neutral position.
5. Operate engine at idling speed, and turn steering wheel 180° to the left from the neutral position. Loosen left power cylinder bleeder valve to bleed air, then retighten. Return steering wheel to the neutral position.
6. Repeat steps 4. and 5. above until there are no air bubbles in fluid. While bleeding air from power cylinders, never allow fluid level to drop below inlet port of reservoir tank (by adding fluid as required).
7. Turn ignition switch OFF to complete self-diagnosis operation.

Power Cylinder (Cont'd)

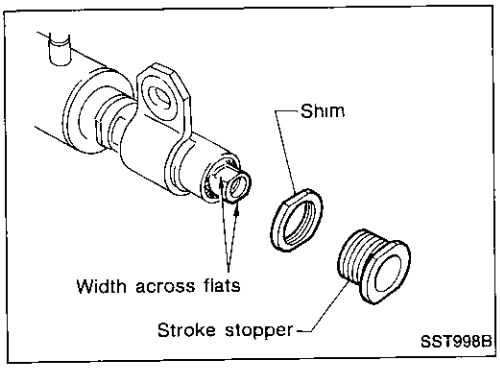




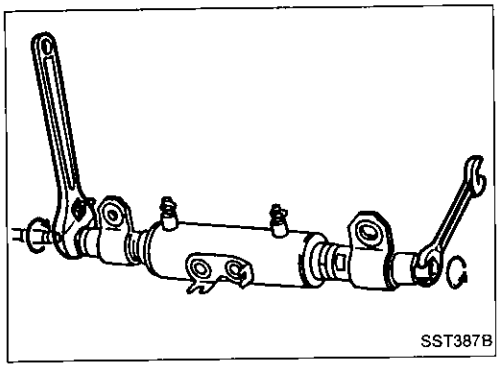
Power cylinder assembly cannot be disassembled. When it is malfunctioning, replace power cylinder as an assembly.

DISASSEMBLY

1. Remove clamps from left and right dust boots, and move dust boots toward outer links.
2. Attach wrenches to left and right ball joint sockets, and turn in directions that loosen lower links. Remove one of loosened lower link assemblies.



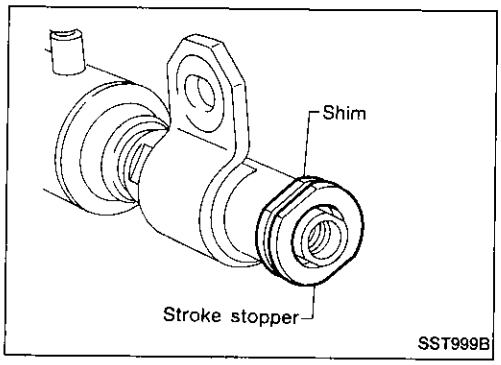
3. Remove stroke stopper from which lower link assembly was removed.



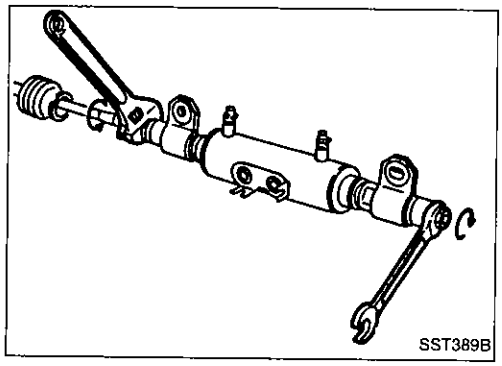
- While attaching a wrench to "width across flats" section of rod end from which stroke stopper was removed, remove the other lower link assembly.

Power Cylinder (Cont'd)

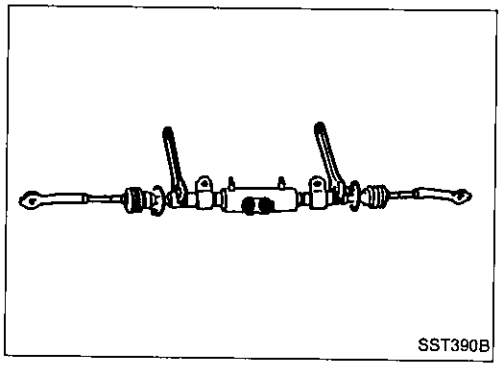
ASSEMBLY



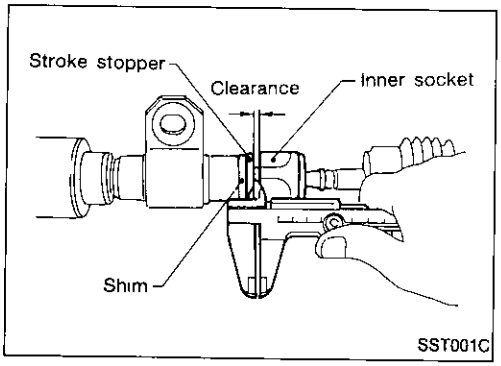
1. Install stroke stopper and shim on the lower link assembly to be assembled.



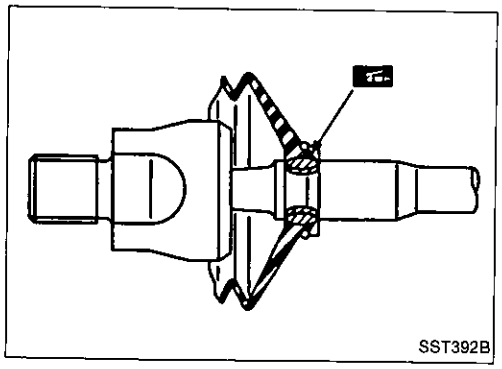
2. Apply Locktite to inner ball joint thread. Attach a wrench to "width across flats" section of piston rod (located on the other side) to prevent rod from turning. Install lower link assembly.



3. After installing stroke stopper and shim on the other lower link assembly, install lower link assembly. Attach a wrench to inner ball joint (to prevent it from turning), tighten inner socket to specified torque.
   Inner socket:
   : 78 - 98 N·m (8 - 10 kg-m, 58 - 72 ft-lb)



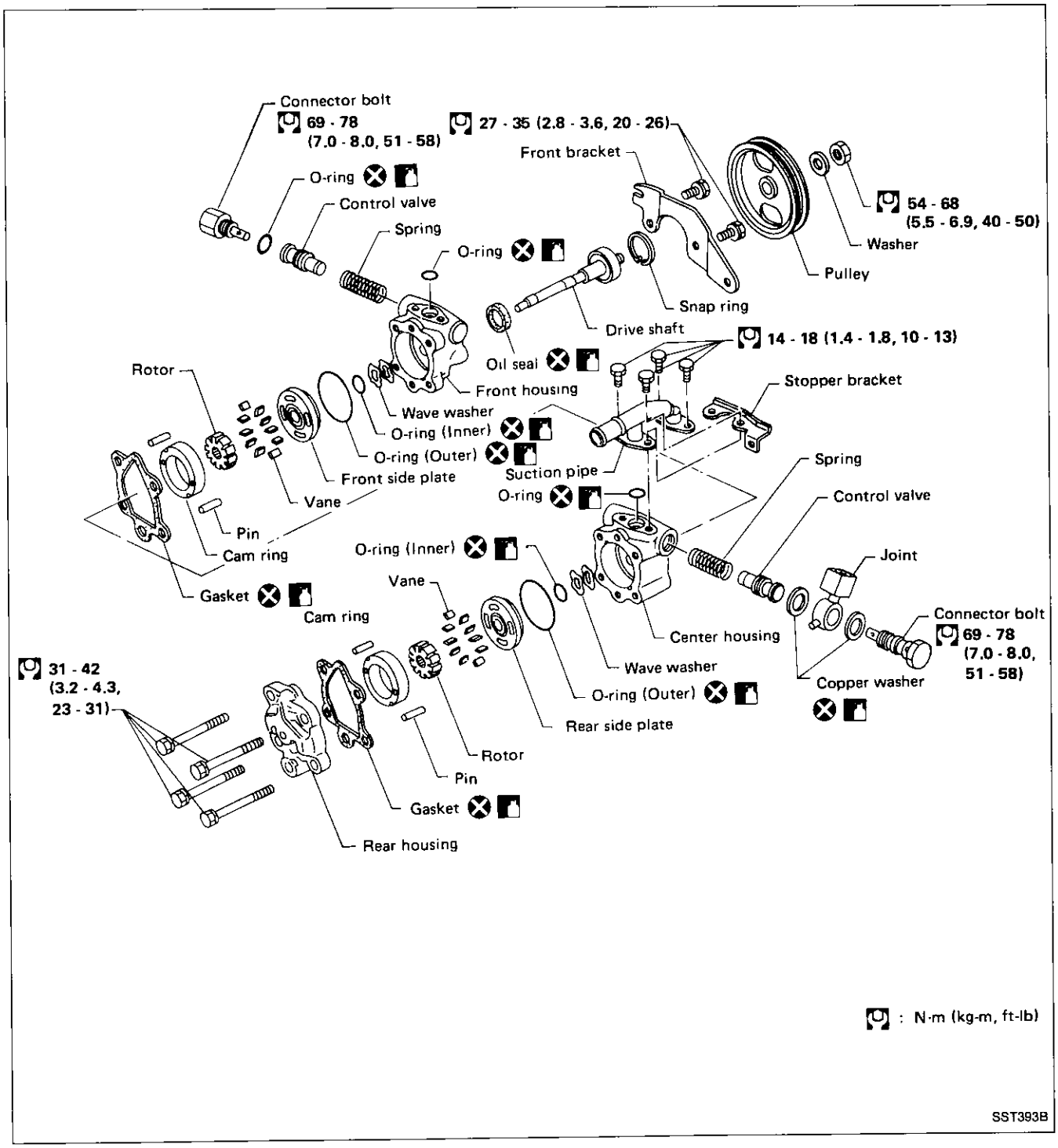
4. Tighten stroke stopper to the specified torque. Check clearance between inner socket and stroke stopper.
   Clearance:
   2.9 - 3.1 mm (0.114 - 0.122 in)



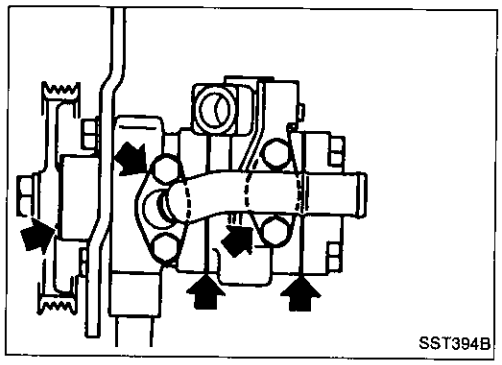
5. Install dust boot using new boot band and clamp.

- **Apply a coat of grease to grooves at boot location.**

Oil Pump


Connector bolt
69 - 78 (7.0 - 8.0, 51 - 58)
27 - 35 (2.8 - 3.6, 20 - 26)
Front bracket
O-ring
Control valve
Spring
O-ring
54 - 68 (5.5 - 6.9, 40 - 50)
Washer
Pulley
Snap ring
Drive shaft
14 - 18 (1.4 - 1.8, 10 - 13)
Oil seal
Rotor
Front housing
Stopper bracket
Wave washer
O-ring (Inner)
O-ring (Outer)
Front side plate
Suction pipe
Spring
O-ring
Control valve
Vane
Pin
Cam ring
O-ring (Inner)
Joint
Vane
Gasket
Cam ring
Center housing
Connector bolt
69 - 78 (7.0 - 8.0, 51 - 58)
Wave washer
31 - 42 (3.2 - 4.3, 23 - 31)
O-ring (Outer)
Copper washer
Rear side plate
Rotor
Pin
Gasket
Rear housing
: N·m (kg-m, ft-lb)
SST393B

Oil Pump (Cont'd)


SST394B

PRE-DISASSEMBLY INSPECTION

Disassemble the power steering oil pump only if the following items are found.

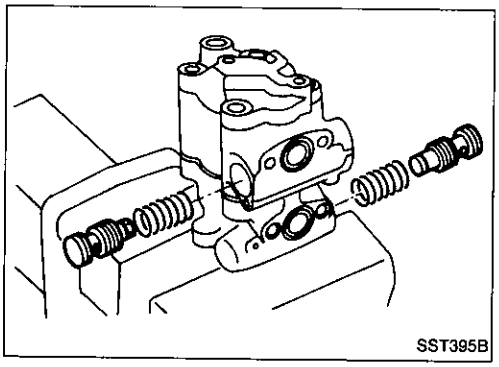
- Oil leak from any point shown in the figure.
- Deformed or damaged pulley.

Procedures for disassembly and assembly are the same as those for the power steering oil pump.

Disassembly

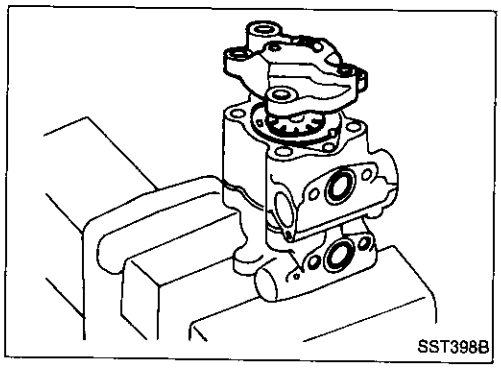
CAUTION:

- **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.**

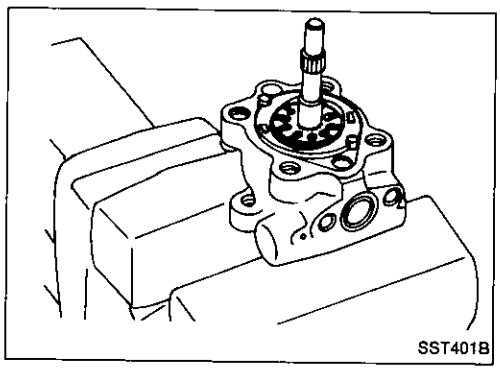

SST395B

1. Remove connector.

Be careful not to drop control valve.
Be careful not to confuse main side with sub side.


SST398B

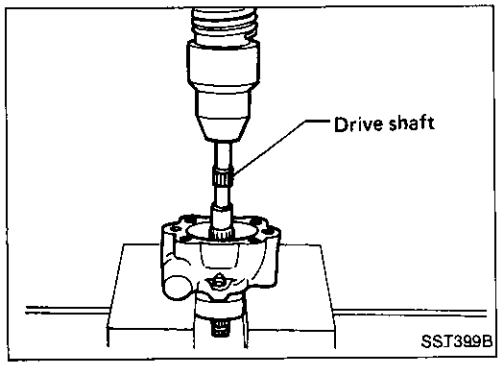
2. Remove rear housing.
3. Remove center housing.
4. Remove cam ring, rotor and other parts from center housing (sub side).


SST401B

5. Remove cam ring, rotor and other parts from front housing (main side).

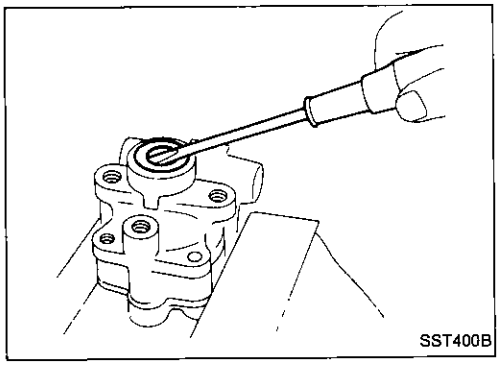
Be careful not to confuse main side with sub side.

Disassembly (Cont'd)



6. Remove snap ring, then draw drive shaft out.

Be careful not to drop drive shaft.



7. Remove oil seal.

Be careful not to damage front housing.

Inspection

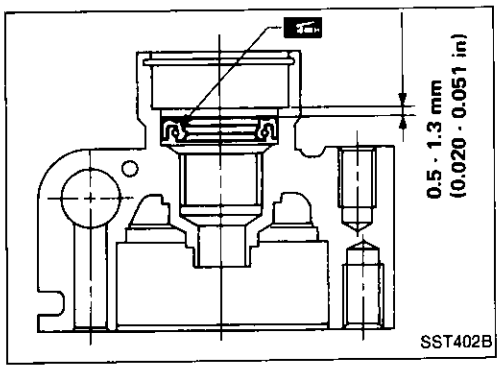
If any of the following parts are scratched or damaged, replace oil pump assembly.

- Mating surfaces of front housing and cam center housing
- Mating surfaces of rear housing and cam center housing
- Front housing bushing (at drive shaft support location)
- Flow control valve
- Drive shaft
- Rotor

Assembly

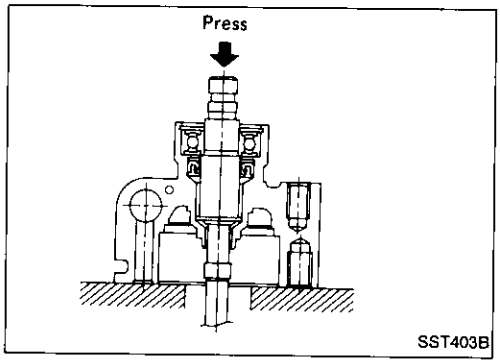
Assemble oil pump in the reverse order of disassembly, noting the following instructions.

- Before installation, coat the O-rings and oil seal with A.T.F.
- Make sure O-rings and oil seal are properly installed.
- When assembling vanes to rotor, rounded surfaces of vanes must face cam case side.
- Always install new O-rings and oil seal.
- Be careful of oil seal direction.

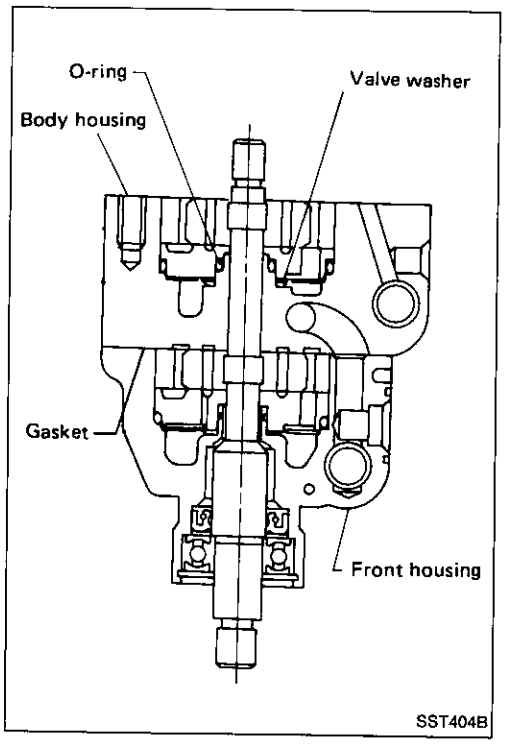


1. Press oil seal into front housing and apply grease to sealing lips.

Assembly (Cont'd)

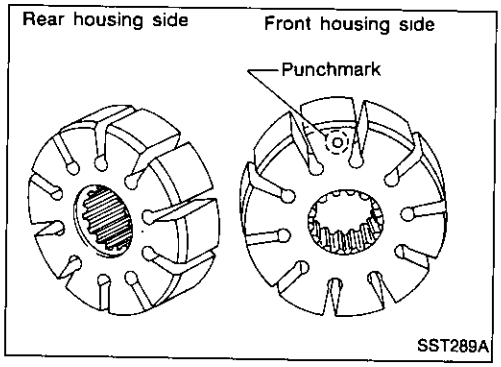


2. Press shaft assembly into front housing and install snap ring.



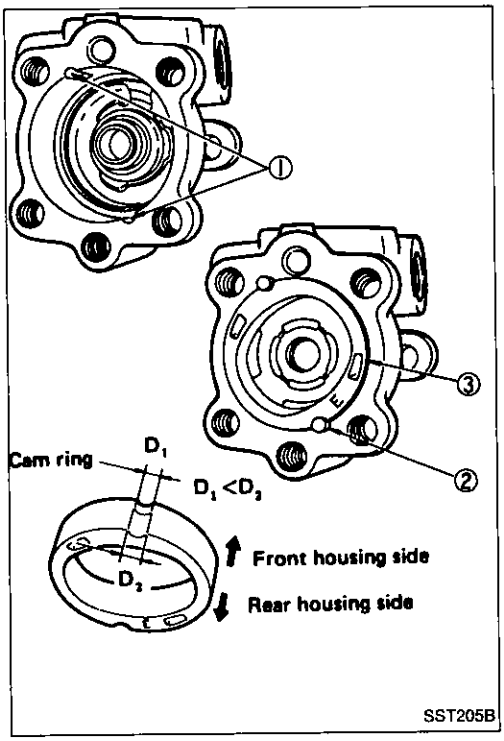
3. Install component parts on front housing in the order indicated below:
1) O-ring x 2
2) Wave washer
3) Side plate
4) Rotor [thickness: 16.25 mm (0.6398 in) (main side); 13 mm (0.51 in) (sub side)]
5) Vane
6) Pin
7) Cam ring [thickness: 16.25 mm (0.6398 in) (main side); 13 mm (0.51 in) (sub side)]
4. Place packing on front housing and position center housing on the packing. In the manner similar to step 3. above, install component parts on front housing (sub side).

CAUTION:
- **Ensure that O-rings are positioned properly.**
- **Ensure that vane is installed with curved side facing cam ring.**
- **Use cam, rotor vane as original single unit.**
- **Ensure that control valve moves smoothly.**



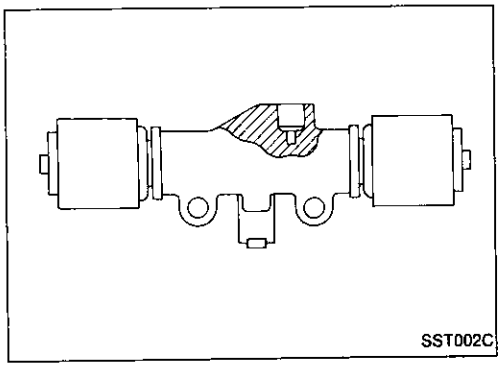
- Pay attention to rotor direction.

Assembly (Cont'd)

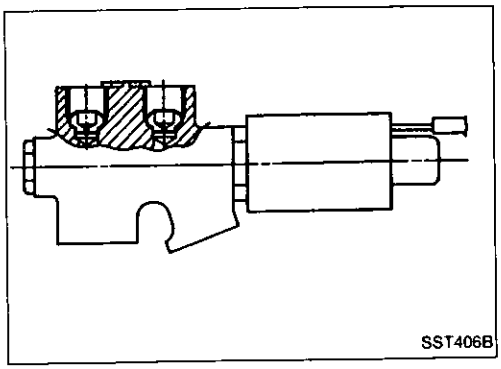


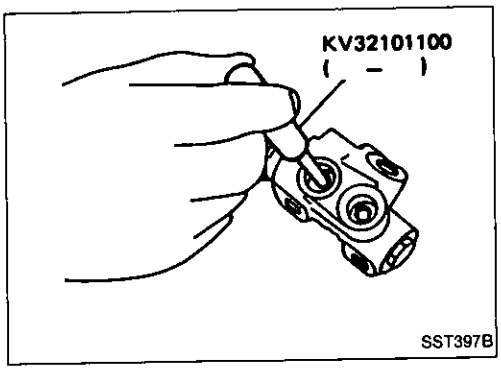
- Pay attention to cam ring direction.

HICAS Solenoid and Fail-safe Valve



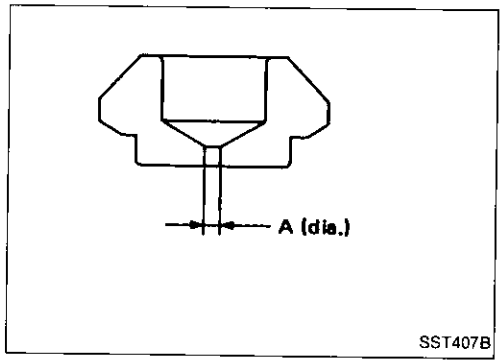
- Do not loosen lock nut which secures solenoid since HICAS solenoid fail-safe valves are of types that should not be disassembled.
- If any part is found to be malfunctioning, always replace as a valve assembly.



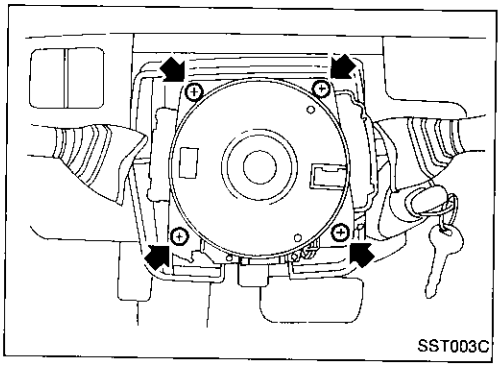


- Whenever tubes for fail-safe valves are disconnected, check tube seat for scratches or damage. A scratched or cracked tube seat may cause oil leakage. Replace it using pin punch.

HICAS Solenoid and Fail-safe Valve (Cont'd)

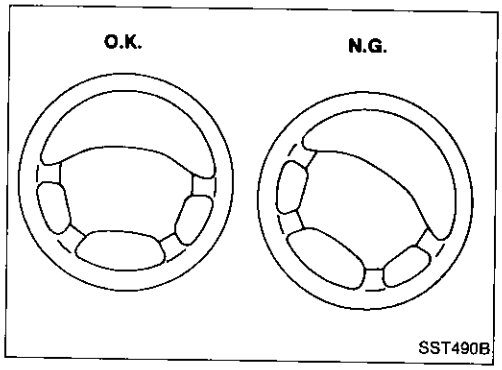


		Fail-safe valve
Part No.		49528-52L10
A (dia.)	mm (in)	6.5 (0.256)



Steering Angle Sensor

- Ensure that steering angle sensor bolts are secure and tight.
- If any part of steering angle sensor is malfunctioning, replace steering angle sensor assembly.



Steering Wheel

CHECKING NEUTRAL POSITION

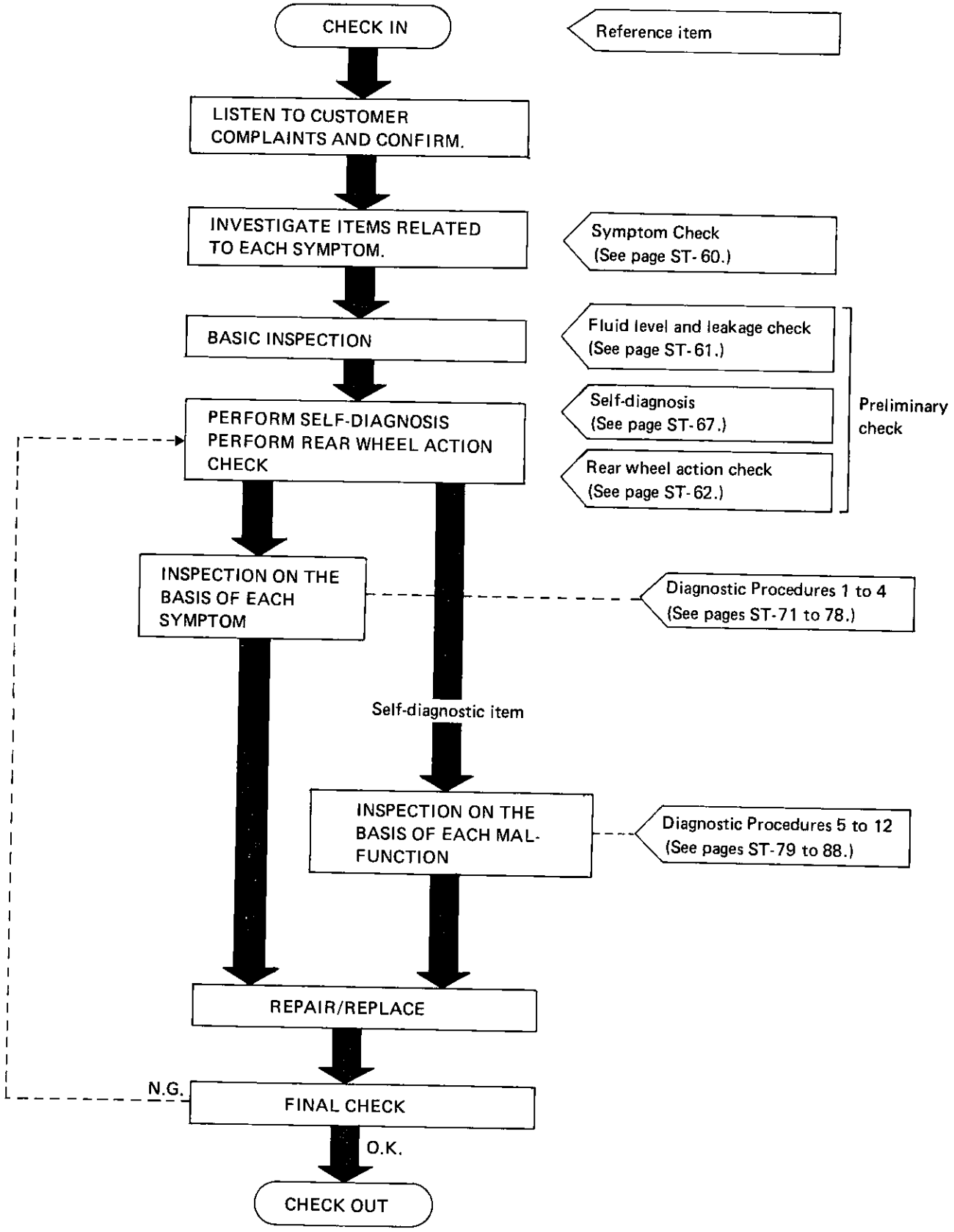
- Check that steering wheel is in neutral position when driving straight ahead at a speed of at least 70 km/h (43 MPH).
- If it is not in neutral position, remove steering wheel and reinstall it correctly.
- If neutral position is between two serrated teeth, loosen tie-rod lock nut and move tie-rod in the opposite direction by the same amount on both left and right sides to compensate for error in neutral position.

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Diagnostic Procedure 11 ..... ST-87
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Control Unit Inspection Table ST-89

How to Perform Trouble Diagnoses for Quick and Accurate Repair

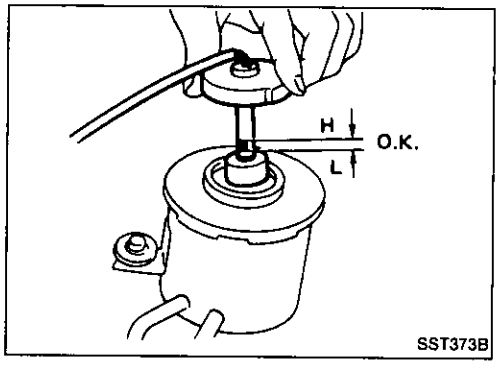
WORK FLOW



Symptom Chart

DIAGNOSTIC TABLE

PROCEDURE				Preliminary Check			Diagnostic Procedure											
REFERENCE PAGE (ST-)				61	61	62	71	71	73	74	79	81	82	83	84	85	87	88
SYMPTOM				Preliminary check 1	Preliminary check 2	Preliminary check 3	Diagnostic procedure 1	Diagnostic procedure 2	Diagnostic procedure 3	Diagnostic procedure 4	Diagnostic procedure 5	Diagnostic procedure 6	Diagnostic procedure 7	Diagnostic procedure 8	Diagnostic procedure 9	Diagnostic procedure 10	Diagnostic procedure 11	Diagnostic procedure 12
No warning lamp comes on when ignition switch is turned "ON"				○			○											
Warning lamp comes on when engine is running				○	○	○		○		○	○	○	○	○	○	○	○	○
Abnormal noise is emitted.				○	○	○			○									
Vehicle behavior is unusual (due to malfunctioning HICAS system.)				○	○	○				○	○	○	○	○	○	○	○	○
Self-diagnostic results	System is not set in self-diagnosis mode.										○							
	Self-diagnosis code No.	Diagnosed part	CONSULT indication															
	1	HICAS solenoid (RH) output is not present.	HICAS SOLENOID-R [ABNORMAL SIGNAL]									○						
	2	HICAS solenoid (LH) output is not present.	HICAS SOLENOID-L [ABNORMAL SIGNAL]									○						
	3	Fail-safe valve output is not present.	FAIL-SAFE VALVE [ABNORMAL SIGNAL]										○					
	4	Power steering solenoid output is not present	POWER STEERING SOL [ABNORMAL SIGNAL]											○				
	5	Vehicle speed signal is not present	VEHICLE SPEED SENSOR [NO SIGNAL] (-a) CAR SPEED SENSOR [SIG-SUDDEN TURN] (-b)												○			
	6	Steering angle sensor input is not present.	STEERING ANGLE SEN [NO ANG SIGNAL] (-a) STEERING ANGLE SEN [NO NEUT SIGNAL] (-b) STEERING ANGLE SEN [NEUT SIG-360° OFF] (-c) STEERING ANGLE SEN [NEUT SIG-30° ON] (-d)													○		
	7																	
	8	Parking brake input is not present.	—														○	
	9	Inhibitor switch input is not present.	—															○

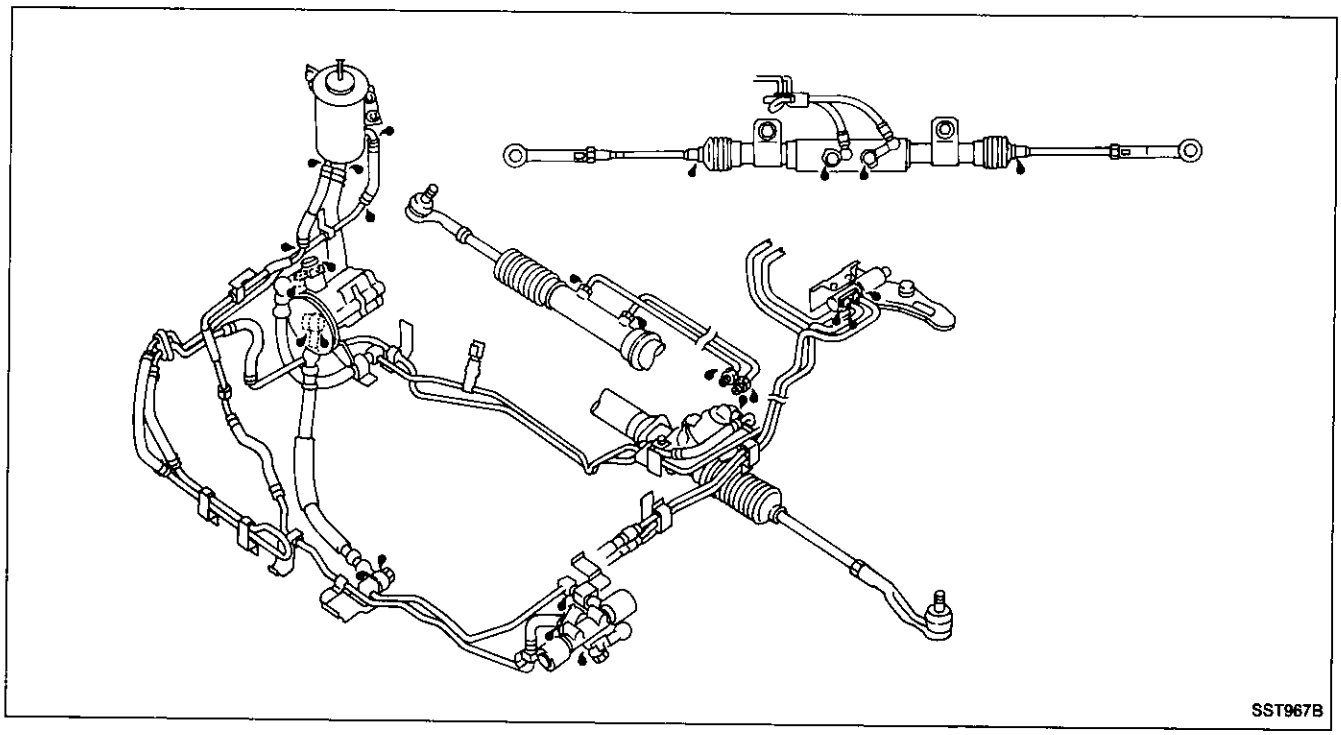


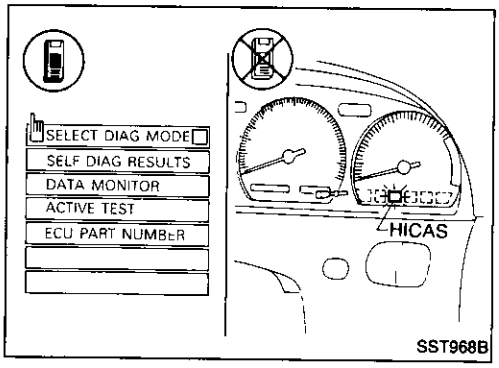
Preliminary Check

CHECK 1

Checking fluid level and fluid leakage

Refer to "SUPER HICAS SYSTEM — On-vehicle Service" on page ST-43.



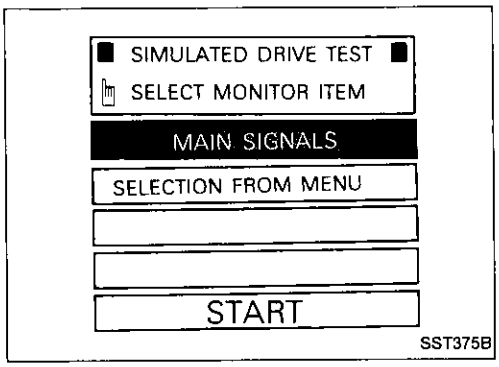


CHECK 2

Perform self-diagnosis.

Refer to "Self-diagnosis" on page ST-67.

Preliminary Check (Cont'd)

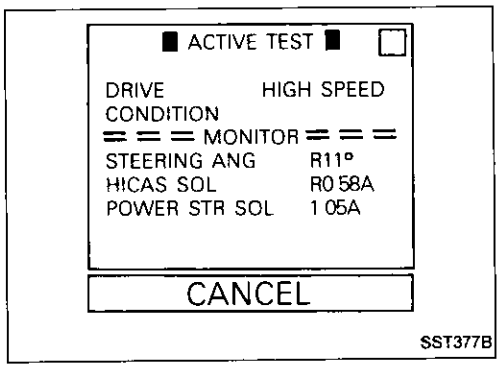


CHECK 3

Perform rear wheel action check.

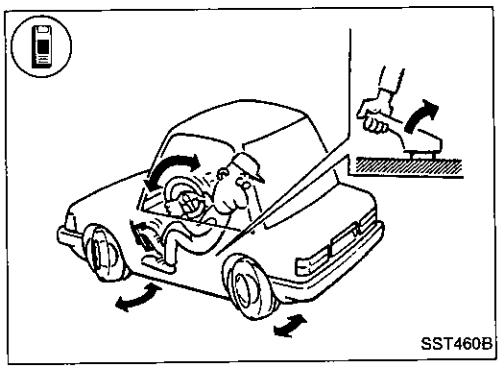
When CONSULT is used:

1. Have a helper sit in the driver's compartment, and raise vehicle.
   (Use a two-pole lift or a center pole lift so that the four wheels are free to rotate.)
2. Connect CONSULT unit to data link connector and start engine.
3. Touch "START" on CONSULT display.
4. Touch "HICAS", "ACTIVE TEST" and "SIMULATED DRIVE" in that order.
5. Touch "START" when "MAIN SIGNALS" display is reversed.



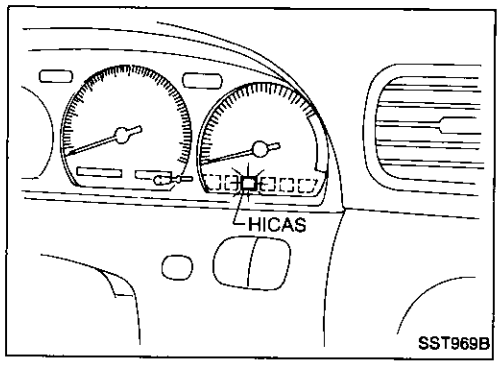
6. Touch "START."

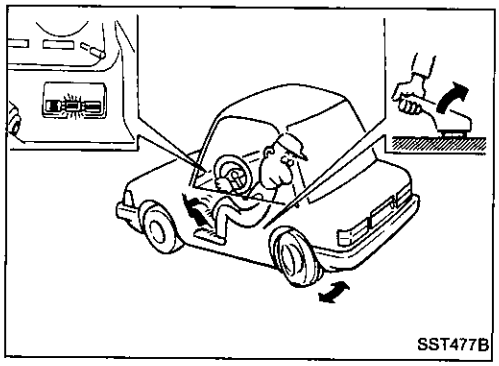
After simulated drive condition has continued for 5 minutes, it will automatically cancel and CONSULT unit will then show "TEST IS INTERRUPTED TO AVOID OIL TEMP RISE" display. To cancel this mode during self-diagnosis, simply touch "CANCEL".



7. While running engine at speeds greater than 2,000 rpm, turn steering wheel 180° to the left and right from the neutral position. Ensure that rear wheels steer in response to rotation of steering wheel.

Preliminary Check (Cont'd)

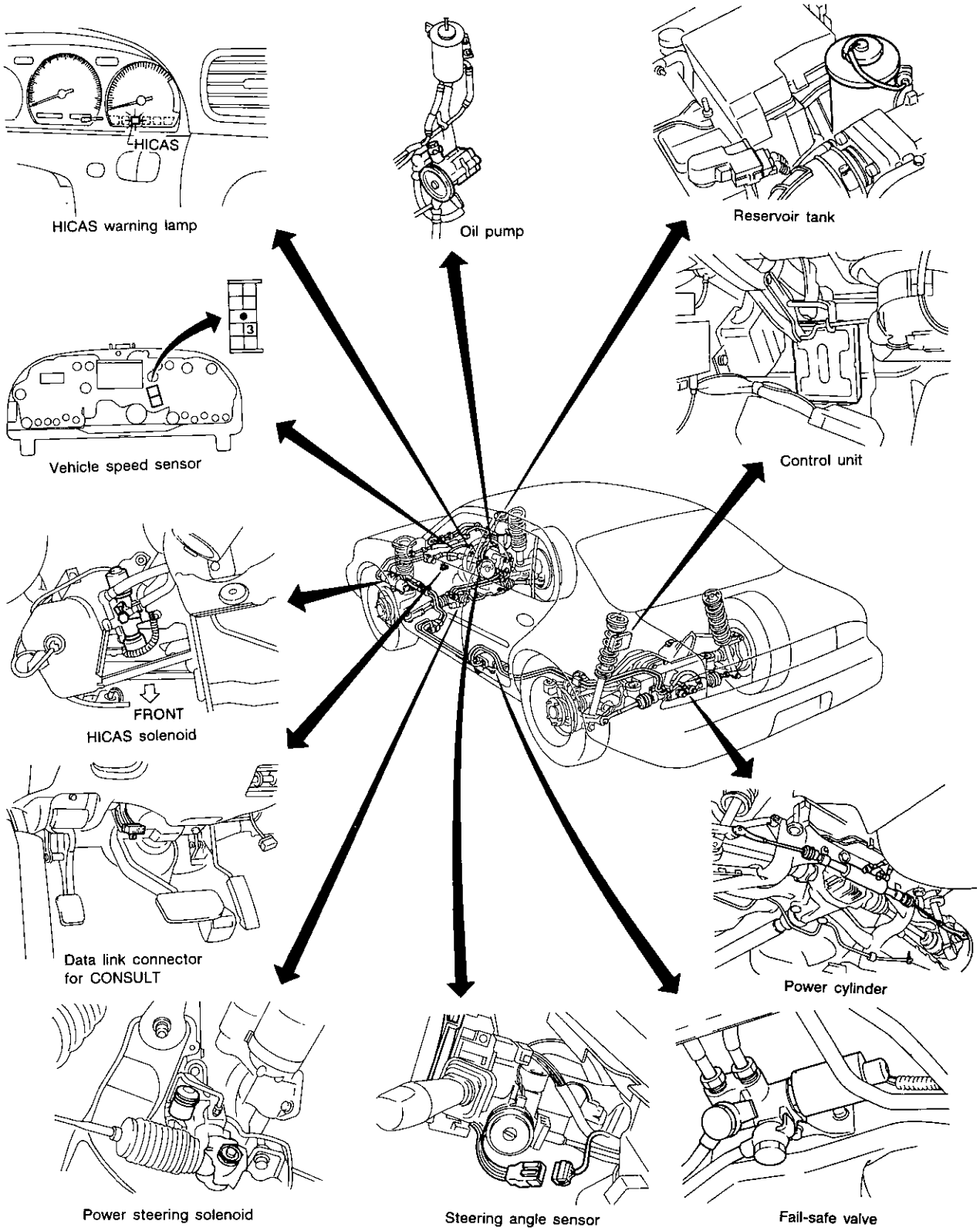




When CONSULT is not used:

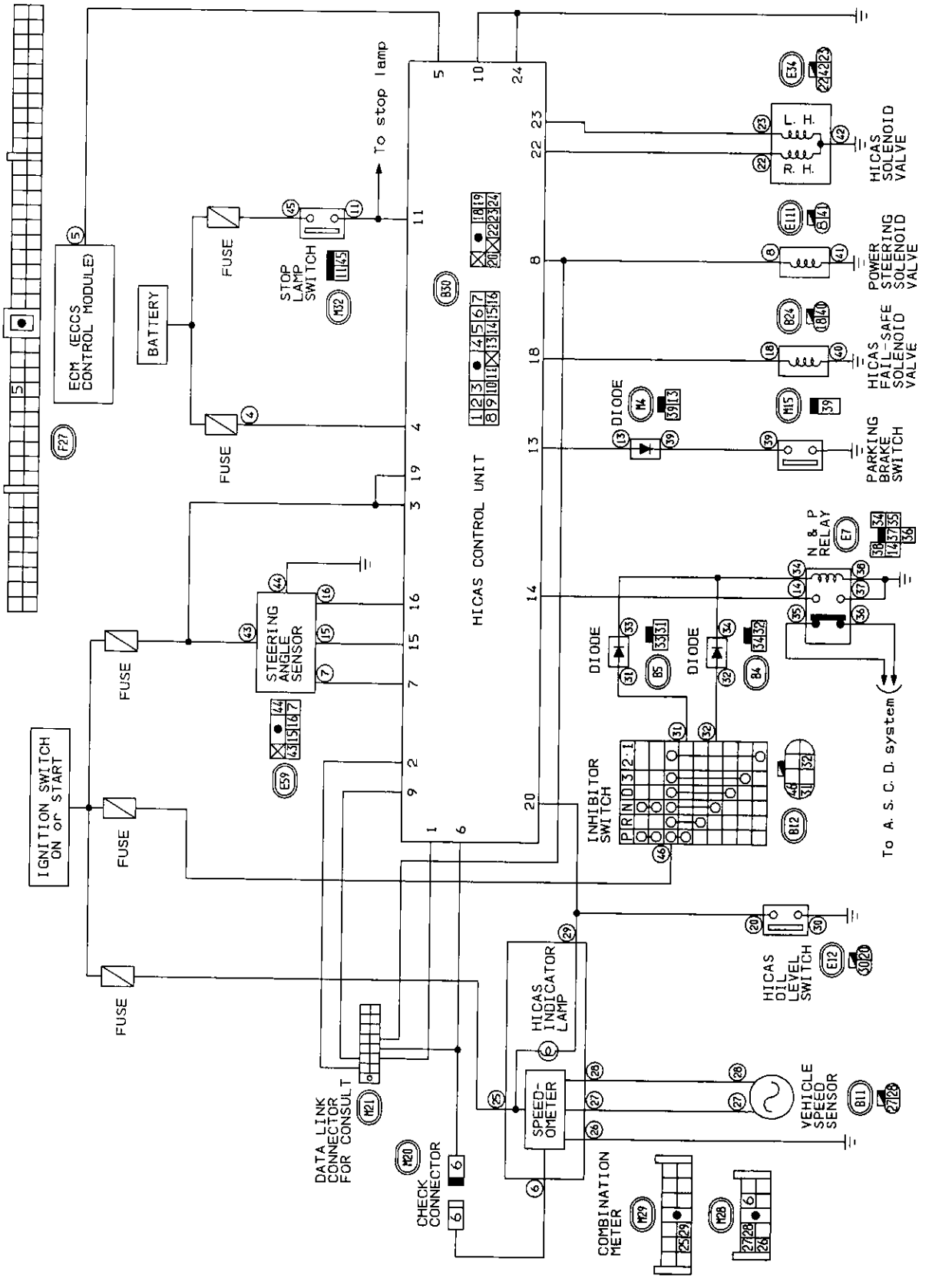
1. Turn key switch "OFF".
2. Set HICAS system in self-diagnosis mode.
(1) Turn ignition switch "OFF".
(2) Set shift lever to "P" or "N" position.
(3) Turn ignition switch "ON".
(4) Immediately start engine.
(5) Turn steering wheel from left to right (at least 20° from the neutral position) 5 times or more, then depress foot brake pedal at least 5 times all within 10 seconds after ignition switch has been turned "ON".
3. Set steering wheel to a point approximately 10° from the neutral position and check to ensure that rear wheels turn to the left and right alternately.

Component Parts and Harness Connector Location



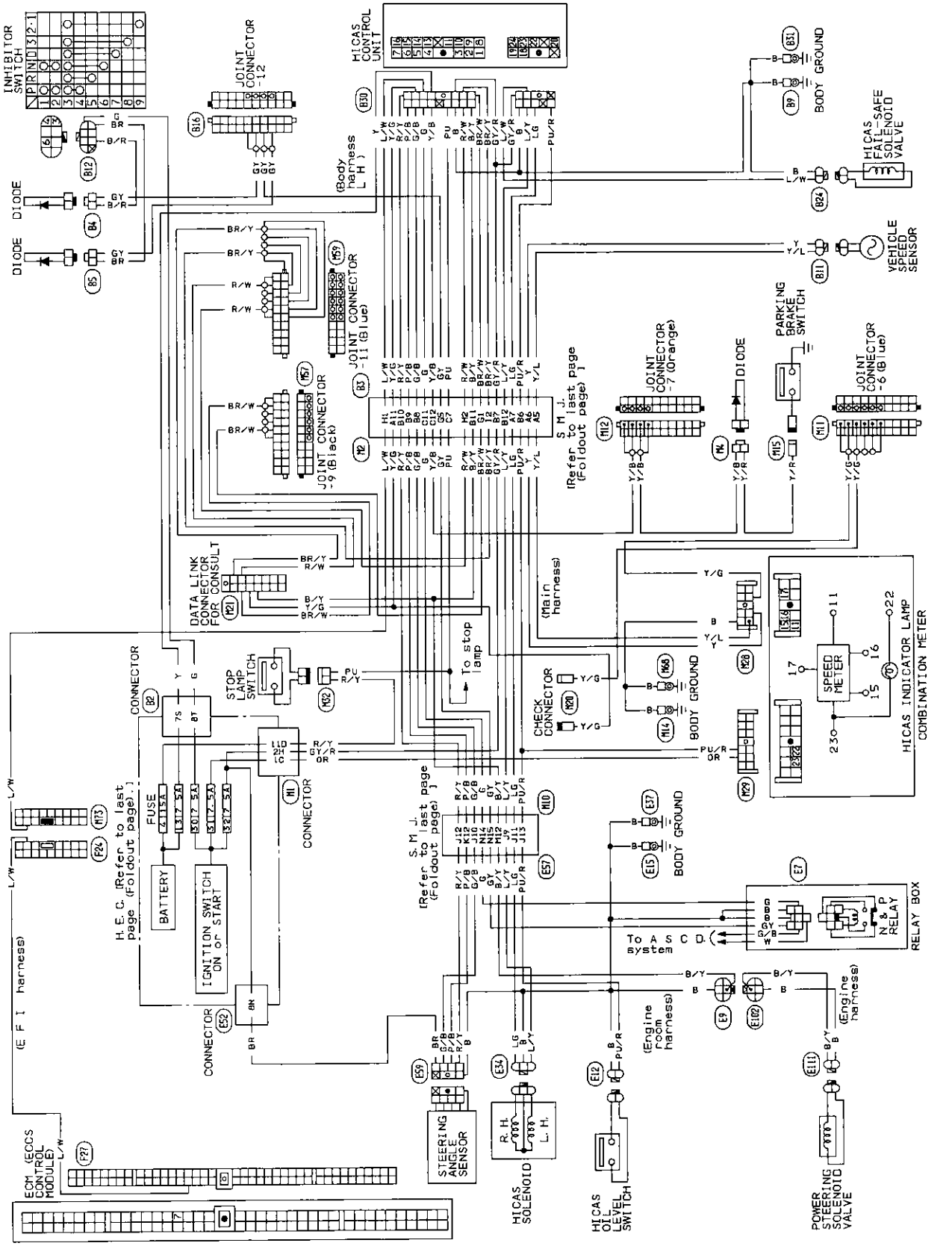
SST970B

Circuit Diagram for Quick Pinpoint Check

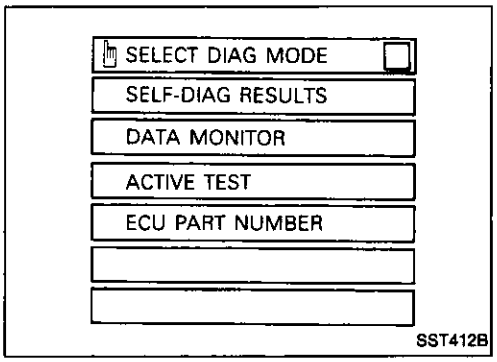


MST008A

Wiring Diagram



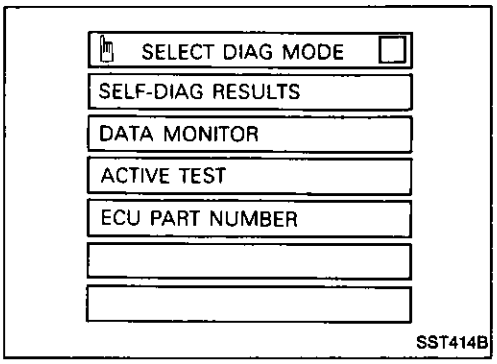
MST007A



Self-diagnosis (When CONSULT is used)

- Start engine.
- Touch START (on CONSULT display).
- Touch HICAS.
- Touch SELF-DIAG RESULTS.

Refer to CONSULT operation manual "HICAS" for details.



For reference:
Recording input/output signals using data monitor function

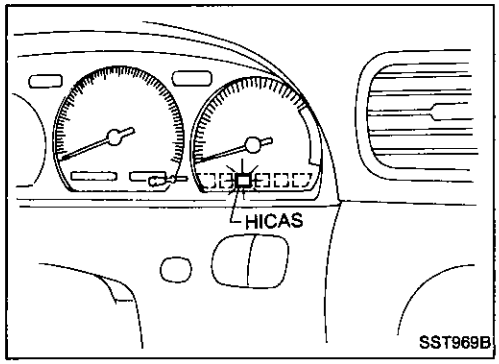
- Start engine.
- Touch START (on CONSULT display).
- Touch HICAS.
- Touch DATA MONITOR.

Refer to CONSULT operation manual "HICAS" for details.

Self-diagnosis (When CONSULT is not used)

SELF-DIAGNOSIS PROCEDURES

1. Input starting conditions for self-diagnosis.
(1) Turn ignition switch "OFF".
(2) Set shift lever to "P" or "N" position.
(3) Turn ignition switch "ON".
(4) Immediately start engine.
(5) Turn steering wheel from left to right (at least 20° from the neutral position) 5 times or more, then depress foot brake pedal at least 5 times all within 10 seconds after ignition switch has been turned "ON".
2. Input self-diagnosis item.
(1) Depress and release foot brake pedal.
(2) Turn steering wheel from left to right (at least 20°) from the neutral position.
(3) Disengage and engage parking brake lever. Move shift lever to any position other than Neutral or Parking and return to Parking.
(4) Move car at least 3 meters (10 ft) forward and proceed at an indicated speed of at least 2 km/h (1 MPH) in self-diagnosis mode.
3. The self-diagnosis mode will then appear in the "HICAS" warning lamp.



When all systems are normal:

HICAS warning lamp flashes at 0.25-second intervals.

Self-diagnosis (When CONSULT is not used) (Cont'd)

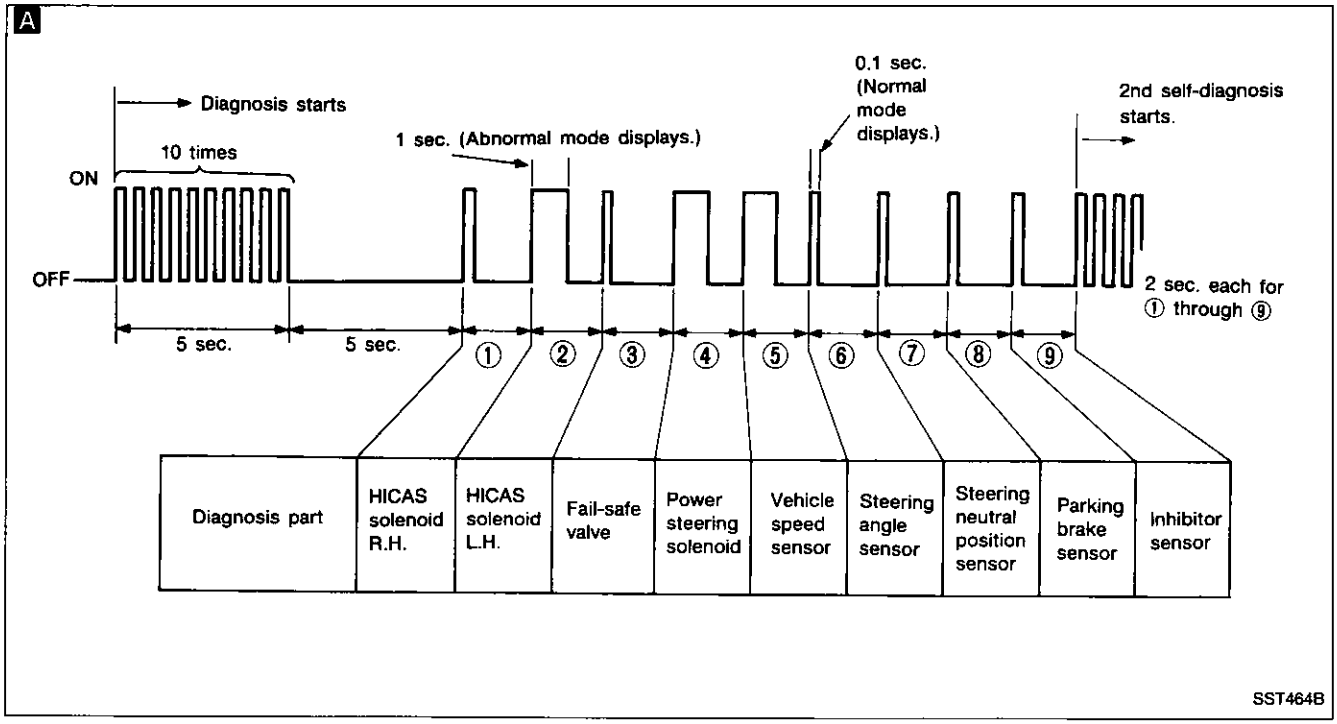
When there is a system malfunction:

Example: When ② HICAS solenoid LH, ④ power steering solenoid and ⑤ vehicle speed sensor have experienced a malfunction.

The warning lamp displays abnormal mode (1 sec. ON).

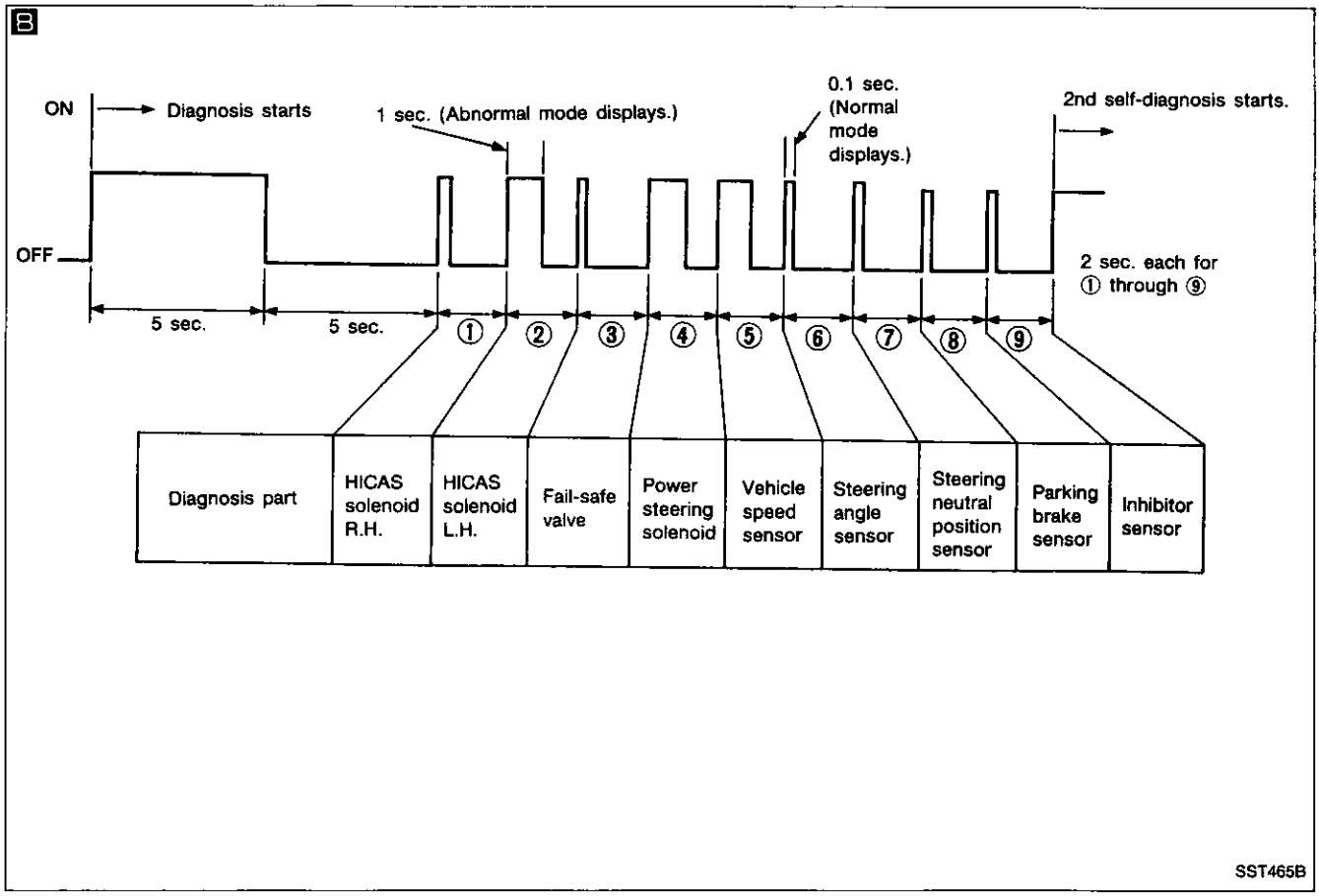
A If fail-safe system was operated (fail-safe valve is operating) when ignition switch was turned OFF for the last time, fail-safe items will be displayed in numerical order in modes indicated. After all items are displayed, display is repeated again.

- **To change the display mode to A , turn OFF ignition switch after mode B is displayed.**
- **When battery charge is insufficient, mode B is displayed.**



Self-diagnosis (When CONSULT is not used) (Cont'd)

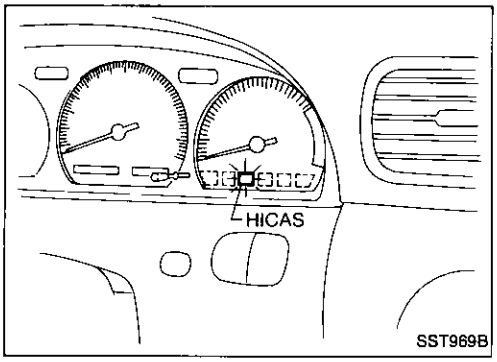
B If fail-safe system was not operated when ignition switch was turned OFF for the last time, display will show self-diagnosis results in numerical sequence in modes indicated below. After all self-diagnosis results are shown, display is repeated again.



CANCELING THE SELF-DIAGNOSIS FUNCTION

There are three methods for canceling the self-diagnosis function, as described below:

- The self-diagnosis system is canceled by the turning ignition switch "OFF".
- After self-diagnosing has been operated for approximately 5 minutes, the self-diagnosis system will be automatically canceled.
- The self-diagnosis system is canceled by a vehicle speed of 30 km/h (19 MPH) or over.



Diagnostic Procedure 1

SYMPTOM:
No warning lamp comes on when ignition switch is turned "ON".

START

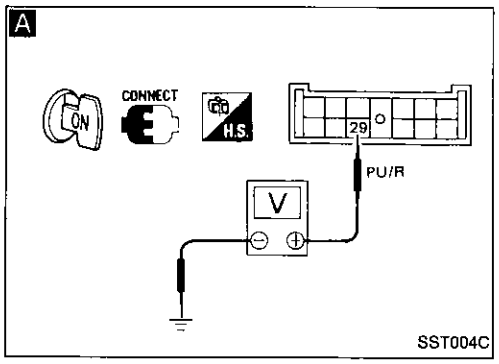
A

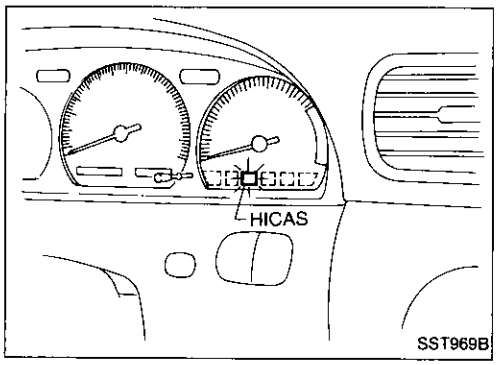
CHECK WARNING LAMP POWER SUPPLY.
1) Turn ignition switch "ON".
2) Measure voltage across warning lamp connector terminal ㉙ and ground.
Voltage:
Approximately 12V

N.G. → Check and repair wiring.

O.K. ↓

Replace warning lamp.





Diagnostic Procedure 2

SYMPTOM (A):
Warning lamp comes on during operation.

START

A

Check in self-diagnosis mode.
Refer to page ST-67.

Repair malfunctioning part detected by self-diagnosis.
Refer to Diagnostic Procedures 5 to 12.

O.K. → END

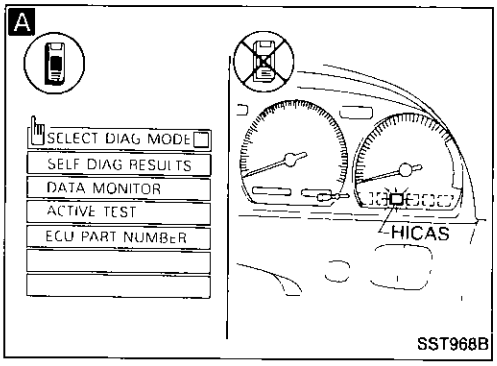
N.G. ↓

Check connectors for improper contact.

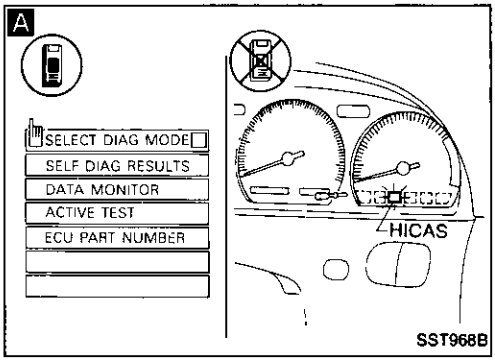
O.K. → END

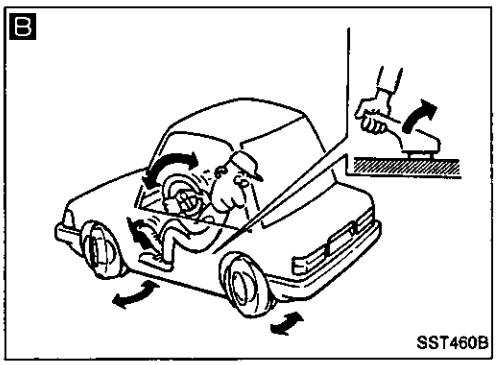
N.G. ↓

Check steering neutral position.
Refer to page ST-57.

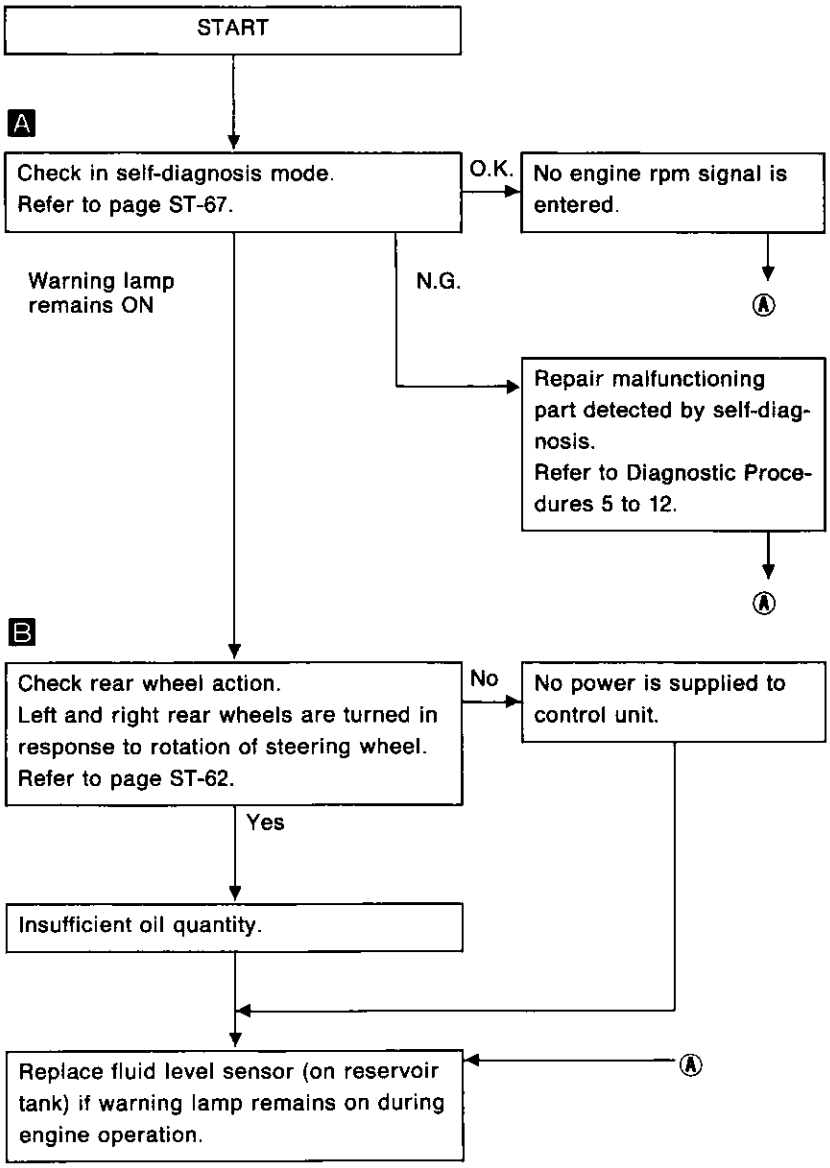


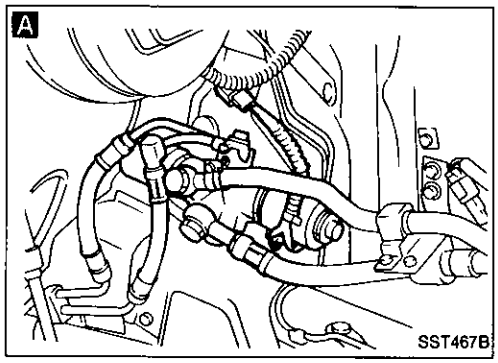
Diagnostic Procedure 2 (Cont'd)

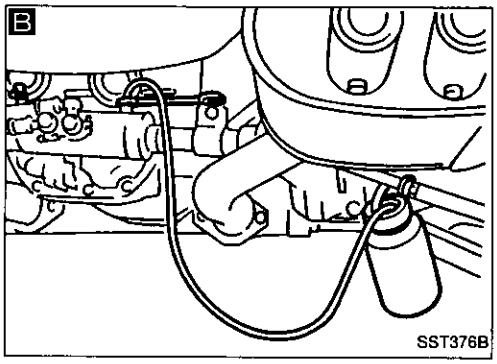


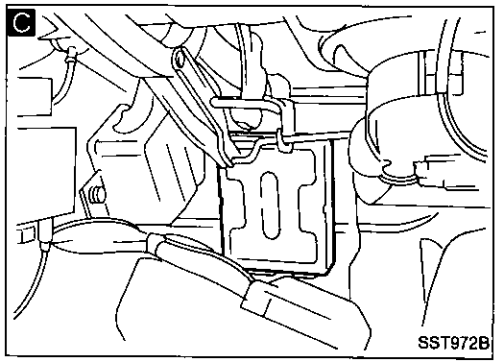


SYMPTOM (B):
Warning lamp comes on when ignition switch is turned ON; however, it does not go out after engine start.









Diagnostic Procedure 3

SYMPTOM:
Abnormal noise occurs.

START

A

Disconnect HICAS solenoid connector and check noise for changes.

Yes → Noise stops.

No → Noise occurs in any system other than HICAS.

Locate and repair.

B

Bleed air from hydraulic system.
Refer to page ST-48.

N.G. → C

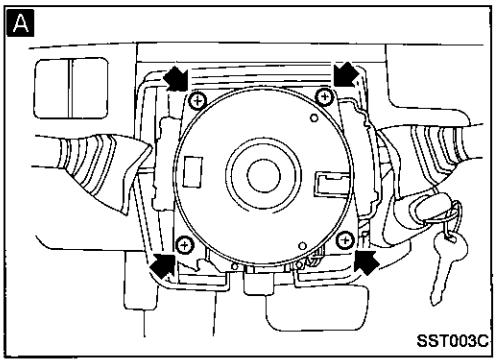
O.K. → END

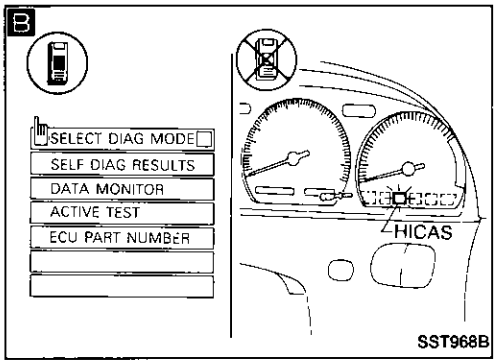
C

Replace control unit.

N.G. → Replace HICAS solenoid valve.

O.K. → END





Diagnostic Procedure 4

SYMPTOM:

Vehicle behavior is abnormal. (Vehicle sways or jerks.)

START

A

Check steering wheel neutral position for misalignment and steering angle sensors for looseness.
Refer to page ST-57.

O.K. → END

N.G.

B

Check in self-diagnosis mode.
Refer to page ST-67.

N.G. → Repair malfunctioning system detected by self-diagnosis.
Refer to Diagnostic Procedures 5 to 12.

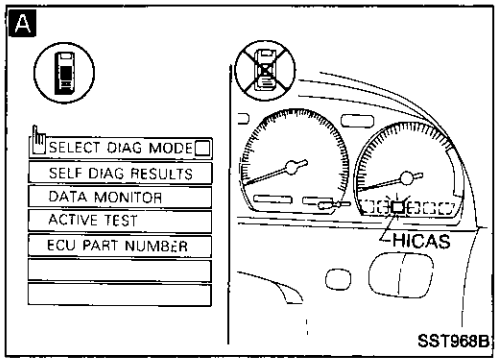
O.K.

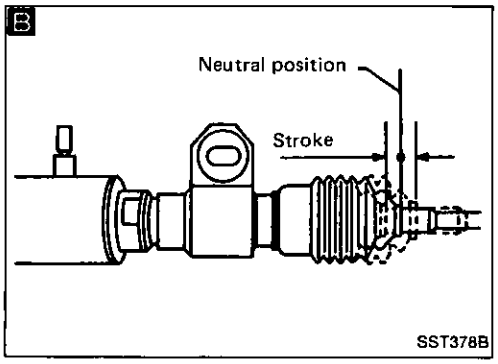
Check static HICAS characteristic performance.
Refer to flow chart A on page ST-75.

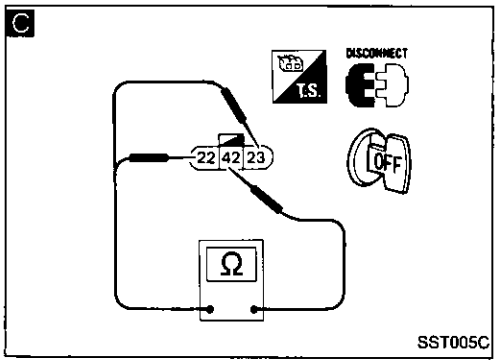
Check dynamic HICAS characteristic performance.
Refer to flow chart B on page ST-77.

Diagnostic Procedure 4 (Cont'd)

A. Static HICAS characteristic performance check







START

A

Set CONSULT in ACTIVE TEST mode.

OR

Set self-diagnosis mode.
Refer to page ST-67.

B

- Run engine at a speed or less than 2,000 rpm.
- Turn steering wheel approximately 180° to the left or right.

CHECK POWER CYLINDER STROKES.
Each stroke from neutral position:
2.9 - 3.1 mm (0.114 - 0.122 in)
Refer to page ST-44.

O.K. → END

Ⓑ

N.G.

C

CHECK RESISTANCE OF HICAS SOLENOID VALVE.
Stop engine and disconnect HICAS solenoid valve.
Measure resistance between HICAS solenoid connector terminals ㉒ and ㉓, and ㊷.
Resistance:
4 - 6Ω

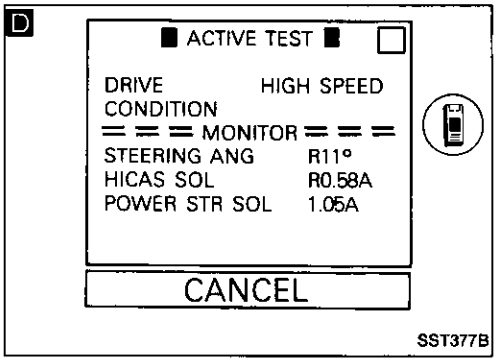
N.G. → Replace HICAS solenoid valve.

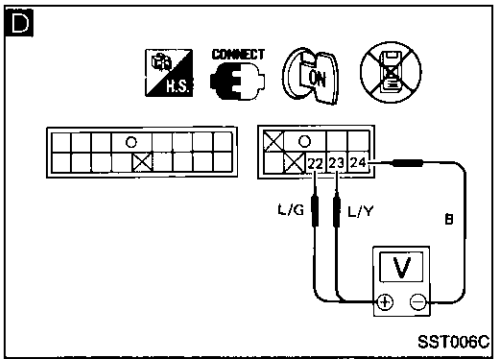
Ⓑ

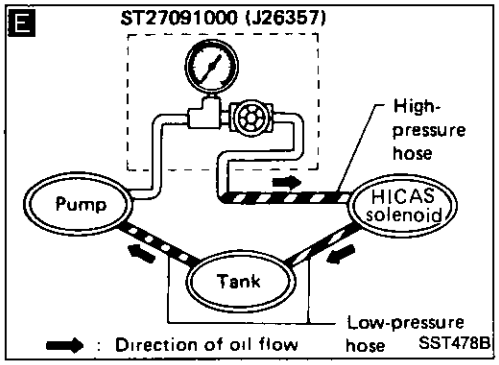
O.K.

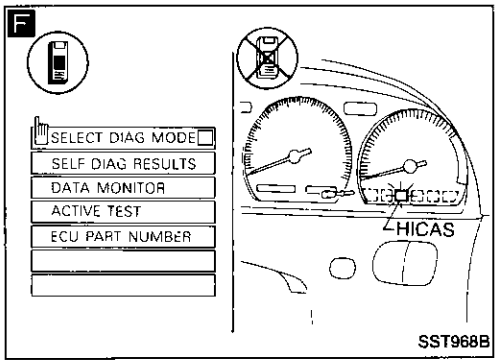
Ⓐ

Diagnostic Procedure 4 (Cont'd)









Ⓐ

D

CHECK CONTROL UNIT OUTPUT VOLTAGE.

Set CONSULT in ACTIVE TEST mode.

HICAS solenoid valve output amperes:

1.1 - 1.2A

OR

Set self-diagnosis mode.

- Run engine at a speed of more than 2,000 rpm.
- Turn steering wheel approximately 180°.
- Measure voltage across control unit connector terminals ㉒ and ㉓ , and ㉔ .

Output voltage:

More than 4.4V

N.G. → Replace control unit. → Ⓑ

O.K.

E

CHECK HICAS OIL PUMP RELIEF PRESSURE.

- Cancel self-diagnosis mode.
- Check HICAS oil pump relief pressure with engine running at a speed of more than 2,000 rpm.

Relief pressure:

More than 5,884 kPa

(60 kg/cm², 853 psi)

N.G. → Replace oil pump. → Ⓑ

O.K.

F

CHECK OIL PRESSURE AT FAIL- SAFE VALVE.

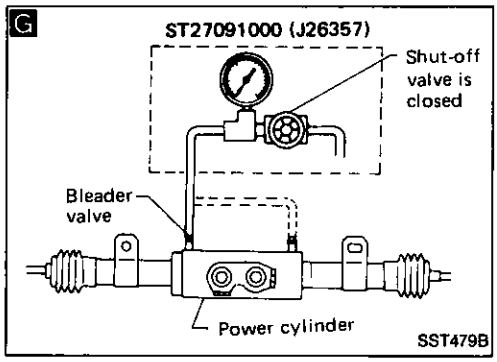
Set CONSULT in ACTIVE TEST mode.

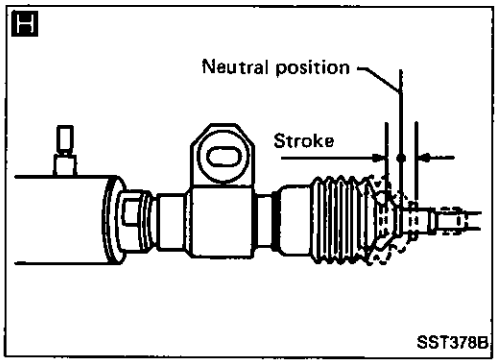
OR

Set self-diagnosis mode.

Ⓒ

Diagnostic Procedure 4 (Cont'd)





Ⓒ

G

- Run engine at a speed of more than 2,000 rpm and turn steering wheel approximately 180° to the left and right.
- Check oil pressure at bleeder valve of power cylinder.

Oil pressure:
More than 5,394 kPa
(55 kg/cm², 782 psi)

N.G. → Replace HICAS solenoid valve.

O.K. ↓

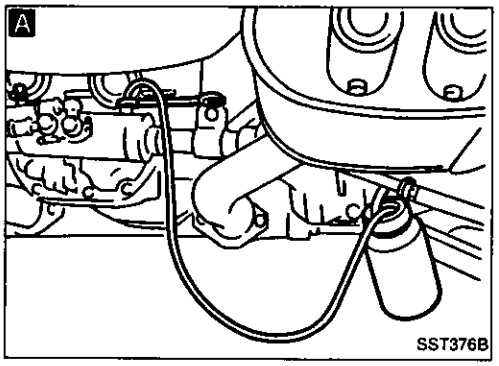
Replace power cylinder.

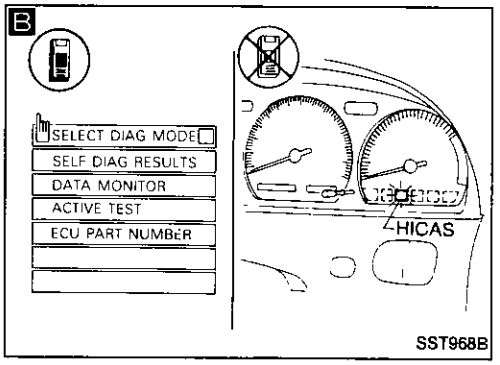
H

CHECK POWER CYLINDER STROKE.
Each stroke from neutral position:
2.9 - 3.1 mm
(0.114 - 0.122 in)
Refer to page ST-44.

N.G. → Replace fail- safe valve.

O.K. → Ⓑ





B. Dynamic HICAS characteristic performance check

START

A

CHECK PIPING AND CONNECTIONS.
ALSO BLEED AIR FROM HYDRAULIC SYSTEM.

- Replace piping or connectors which are found to be damaged.
- Bleed air from hydraulic system. Refer to page ST-48.

B

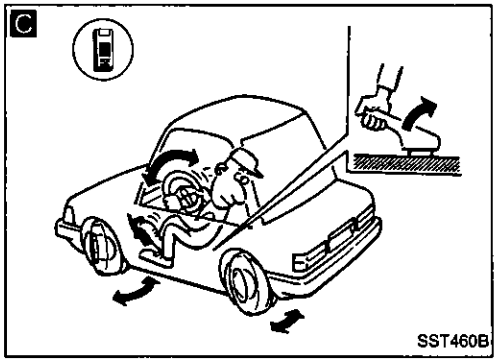
Set CONSULT in ACTIVE TEST mode.

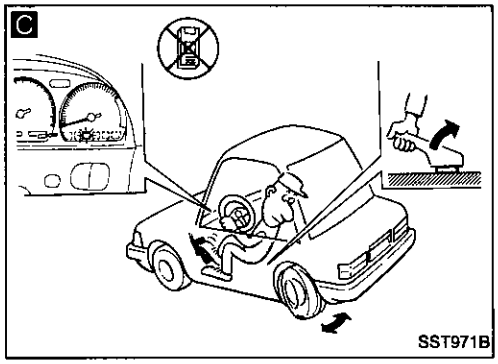
— OR —

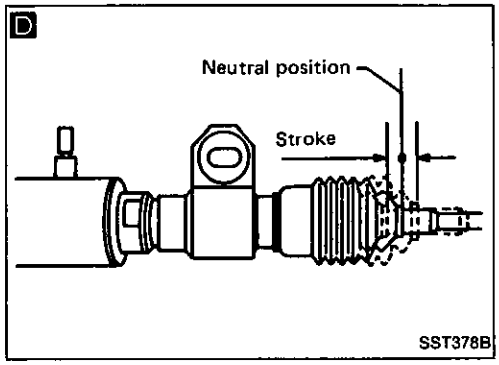
Set in self-diagnosis mode. Refer to page ST-67.

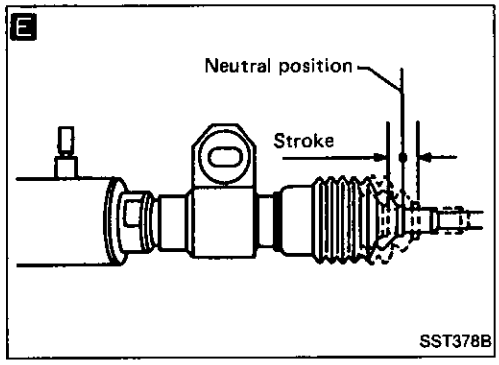
Ⓐ

Diagnostic Procedure 4 (Cont'd)









Ⓐ

Run engine at a speed of more than 2,000 rpm.

C

CHECK REAR WHEELS FOR PROPER MOVEMENT.

Ensure that rear wheel turns to the left or right when steering wheel is turned to the left or right.

OR

Ensure that rear wheels intermittently turn to the left and right when steering wheel is set to the neutral position.

D

CHECK POWER CYLINDER STROKES.
Each stroke from neutral position:
More than 2.0 mm (0.079 in)

O.K. → END

N.G.

Replace HICAS solenoid valve.

E

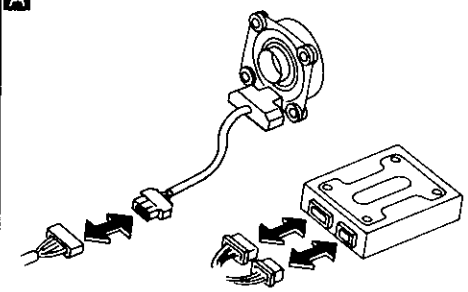
CHECK POWER CYLINDER STROKE.
- After replacing HICAS solenoid valve, check power cylinder stroke.
  Each stroke from neutral position:
  More than 2.0 mm (0.079 in)

O.K. → END

N.G.

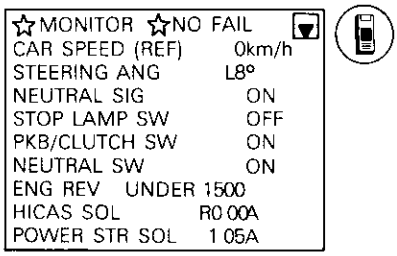
Replace power cylinder.

A



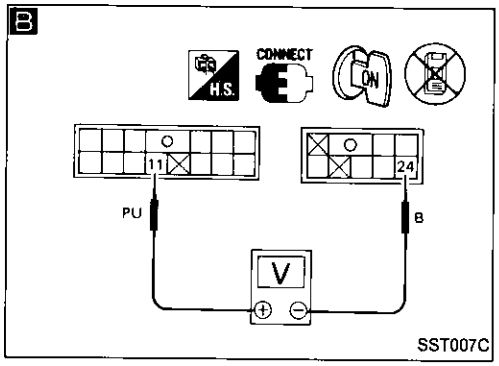
SST446B

B



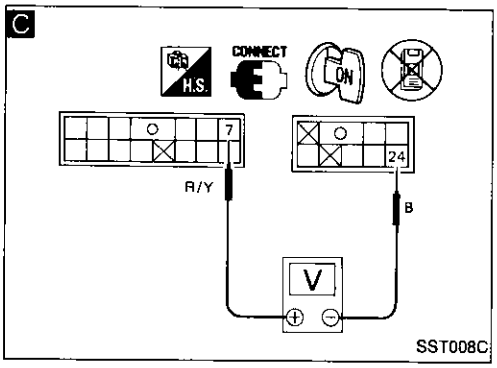
SST416B

B



SST007C

C



SST008C

Diagnostic Procedure 5

SYMPTOM:
System is not set in self-diagnosis mode.

START

A

CHECK CONNECTOR CONTINUITY.
Disconnect steering angle sensor connector and control unit connector, and reconnect them firmly. Conduct self-diagnosis.

O.K. → Poor connector connection

N.G.

B

CHECK STOP LAMP INPUT SIGNAL.
Set CONSULT in DATA MONITOR mode.
ON-OFF display

N.G. → Malfunctioning stop lamp switch system

— OR —

Check that stop lamp input is present at control unit.
Brake ON:
Approximately 12V
Brake OFF:
0V

O.K.

C

CHECK STEERING NEUTRAL POSITION SENSOR INPUT SIGNAL.
Set CONSULT in DATA MONITOR mode.
ON-OFF display

O.K. → Replace control unit.

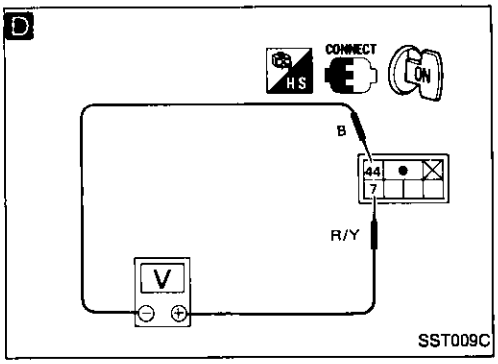
— OR —

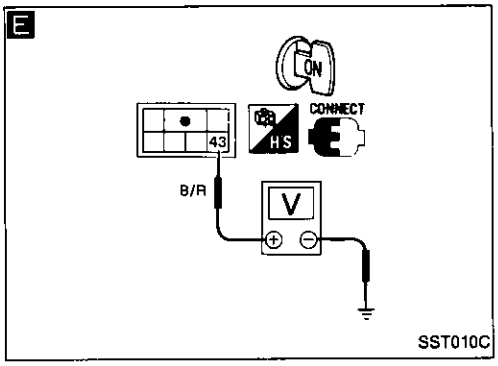
Check that steering neutral input is present at control unit when steering wheel is turned to the left and right at least 20° from the neutral position.
Neutral position:
Approximately 5V
When turned at least 20°:
0V

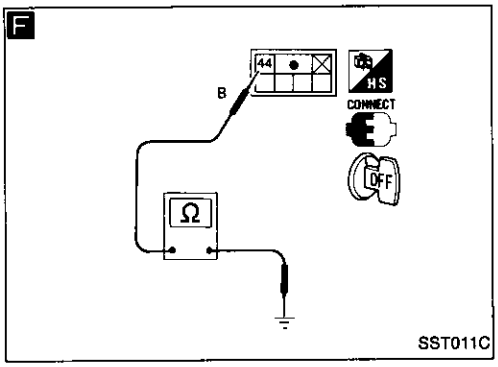
N.G.

Ⓐ

Diagnostic Procedure 5 (Cont'd)







Ⓐ

D

CHECK STEERING NEUTRAL POSITION SENSOR OUTPUT SIGNAL.
Check that steering neutral output is present when steering wheel is turned to the left and right at least 20° from the neutral position.
Neutral position:
Approximately 5V
When turned at least 20°:
0V

O.K. → Repair or replace harness between control unit and steering angle sensor.

N.G. ↓

E CHECK STEERING ANGLE SENSOR POWER SUPPLY.
1) Turn ignition switch "ON".
2) Measure voltage across steering angle sensor connector terminal IGN and ground.
Voltage:
Approximately 12V

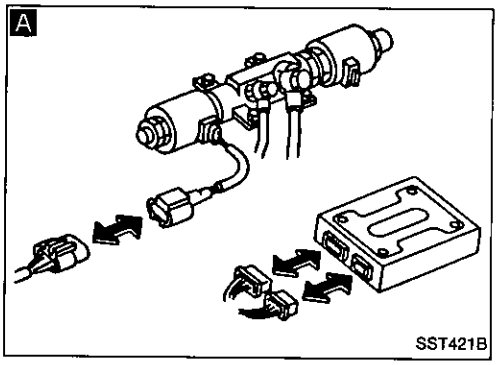
O.K. → Replace steering angle sensor.

F CHECK STEERING ANGLE SENSOR GROUND CIRCUIT.
Check continuity between steering angle sensor terminal GND and body metal (ground).
Continuity should exist.

N.G. ↓

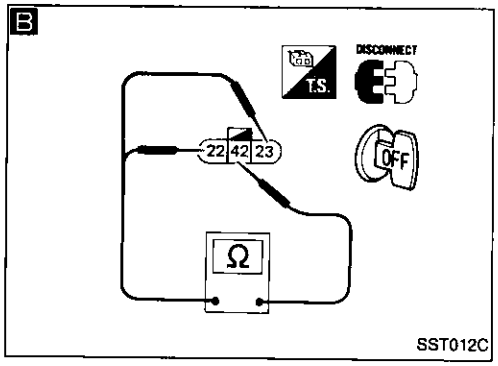
Check and repair power supply harness or ground harness.

A



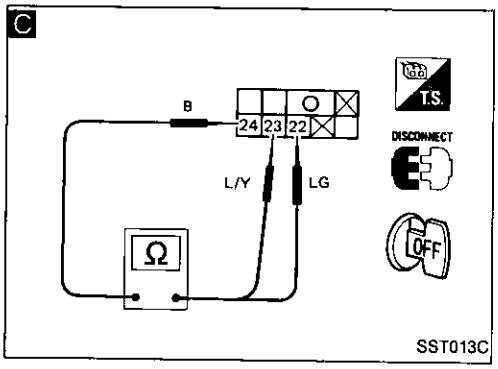
SST421B

B



SST012C

C



SST013C

Diagnostic Procedure 6

SYMPTOM:
HICAS solenoid (left and right) output is not present.

START

A

CHECK CONNECTOR CONTINUITY.
Disconnect HICAS solenoid connector and control unit connector, and reconnect them firmly. Conduct self-diagnosis.

O.K. → Poor connector connection

N.G.

B

CHECK RESISTANCE OF LEFT AND RIGHT HICAS SOLENOIDS (on solenoid side).
1) Disconnect HICAS solenoid connector.
2) Measure resistance between HICAS solenoid connector terminals ㉒ and ㉓, and ㊷.
Resistance:
4 - 6Ω

N.G. → Replace HICAS solenoid

O.K.

C

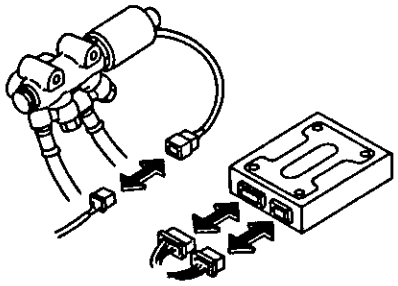
CHECK RESISTANCE OF LEFT AND RIGHT HICAS SOLENOIDS (on control unit side).
1) Disconnect control unit connector.
2) Measure resistance between body connector terminals ㉒ and ㉓, and ㉔.
Resistance:
4 - 6Ω

O.K. → Replace control unit.

N.G.

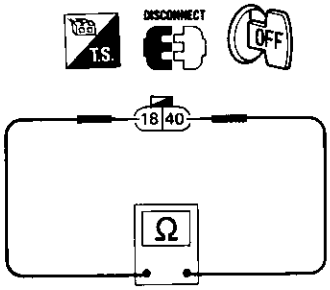
Repair or replace harness between control unit and HICAS solenoid.

A



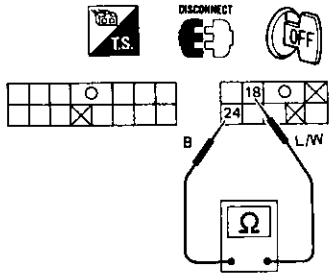
SST424B

B



SST014C

C



SST015C

Diagnostic Procedure 7

SYMPTOM:
Fail-safe valve output is not present.

START

A

CHECK CONNECTOR CONTINUITY.
Disconnect fail-safe valve connector and control unit connector, and reconnect them firmly. Conduct self-diagnosis.

O.K. → Poor connector connection

N.G.

B

CHECK RESISTANCE OF FAIL- SAFE VALVE (on fail-safe valve side).
1) Disconnect fail-safe valve connector.
2) Measure resistance between connector terminals ⑱ and ㊵.
Resistance:
13 - 17Ω

N.G. → Replace fail-safe valve.

O.K.

C

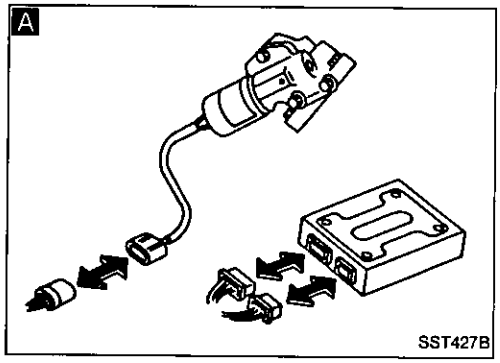
CHECK RESISTANCE OF FAIL- SAFE VALVE (on control unit side).
1) Disconnect control unit connector.
2) Measure resistance between body connector terminals ⑱ and ㉔.
Resistance:
13 - 17Ω

O.K. → Replace control unit.

N.G.

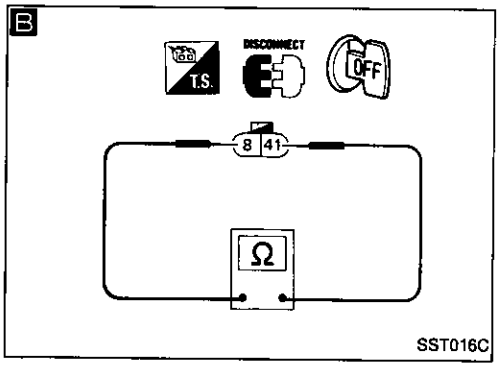
Repair or replace harness between control unit and fail- safe valve.

A



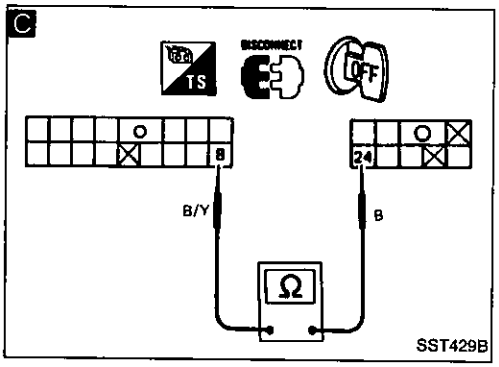
SST427B

B



SST016C

C



SST429B

Diagnostic Procedure 8

SYMPTOM:

Power steering solenoid output is not present.

START

A

CHECK CONNECTOR CONTINUITY.
Disconnect power steering solenoid connector and control unit connector, and reconnect them firmly. Conduct self-diagnosis.

O.K. → Poor connector connection

N.G.

B

CHECK RESISTANCE OF POWER STEERING SOLENOID (on solenoid side).
1) Disconnect power steering solenoid connector.
2) Measure resistance between solenoid connector terminals ⑧ and ㊶.
Resistance:
4 - 6Ω

N.G. → Replace power steering solenoid.

O.K.

C

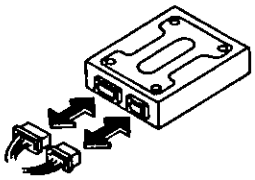
CHECK RESISTANCE OF POWER STEERING SOLENOID (on control unit side).
1) Disconnect control unit connector.
2) Measure resistance between body connector terminals ⑧ and ㉔.
Resistance:
4 - 6Ω

O.K. → Replace control unit.

N.G.

Repair or replace harness between control unit and power steering solenoid.

A



SST430B

B

☆MONITOR ☆NO FAIL	
CAR SPEED (REF)	0km/h
STEERING ANG	L8°
NEUTRAL SIG	ON
STOP LAMP SW	OFF
PKB/CLUTCH SW	ON
NEUTRAL SW	ON
ENG REV	UNDER 1500
HICAS SOL	R0.00A
POWER STR SOL	1.05A

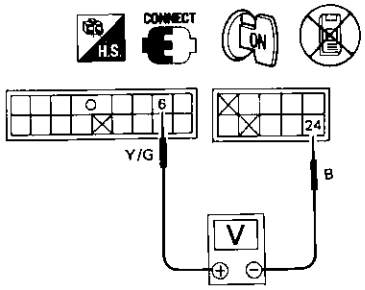
RECORD

☆MONITOR ☆NO FAIL	
FAILSAFE/V	OFF
FAILSAFE	NON
WARNING LAMP	OFF

RECORD

SST416B

B



SST017C

Diagnostic Procedure 9

SYMPTOM:

Vehicle speed signal is not present.

START

A

CHECK CONNECTOR CONTINUITY.
Disconnect control unit connector and reconnect it firmly. Conduct self-diagnosis.

O.K. → Poor connector connection

N.G.

B

CHECK CONTROL UNIT INPUT SIGNAL.
1) Raise rear end of vehicle so that rear wheels rotate freely.
2) Set CONSULT in DATA MONITOR mode.
Vehicle speed display (km/h)

O.K. → Replace control unit.

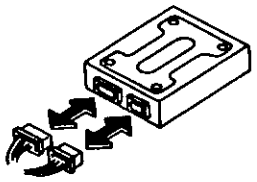
OR

2) Measure voltage variations between control unit connector terminals ⑥ and ㉔ while slowly rotating rear wheels by hand.
Voltage must change between 0 and 5V.

N.G.

Repair or replace harness between speed sensor or control unit and speedometer.

A



SST430B

B

☆MONITOR ☆NO FAIL	
CAR SPEED (REF)	0km/h
STEERING ANG	L8°
NEUTRAL SIG	ON
STOP LAMP SW	OFF
PKB/CLUTCH SW	ON
NEUTRAL SW	ON
ENG REV	UNDER 1500
HICAS SOL	R0.00A
POWER STR SOL	1.05A

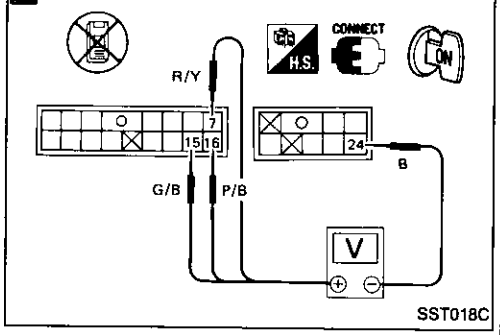
RECORD

☆MONITOR ☆NO FAIL	
FAILSAFE/V	OFF
FAILSAFE	NON
WARNING LAMP	OFF

RECORD

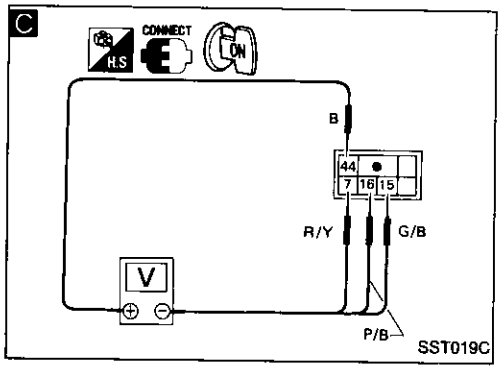
SST416B

B



SST018C

C



SST019C

Diagnostic Procedure 10

SYMPTOM:
Steering angle sensor input is not present.

START

A

CHECK CONNECTOR CONTINUITY.
Disconnect control unit connector and reconnect it firmly. Conduct self-diagnosis.

O.K. → Poor connector connection

N.G.

B

CHECK CONTROL UNIT INPUT SIGNAL.
1) Turn ignition switch "ON".
2) Set CONSULT in DATA MONITOR mode.
Steering angle deg.
Neutral signal ON-OFF

O.K. → Replace control unit.

OR

2) Measure voltage variations between control unit terminals ⑦, ⑮ and ⑯, and ㉔ when steering wheel is slowly turned to the left and right at least 20° from the neutral position.
Do not turn steering wheel quickly.
Voltage must change from 0 to at least 5V.

N.G.

C

CHECK STEERING ANGLE SENSOR OUTPUT SIGNAL.
1) Turn signal switch "ON".
2) Measure voltage variations between steering angle sensor connector terminals ⑦, ⑮ and ⑯, and ㊹.
Voltage must change from 0 to at least 5V.

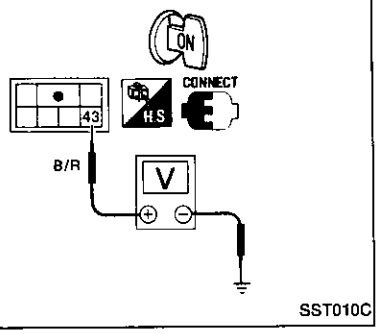
O.K. → Repair or replace harness between control unit and steering angle sensor.

N.G.

Ⓐ

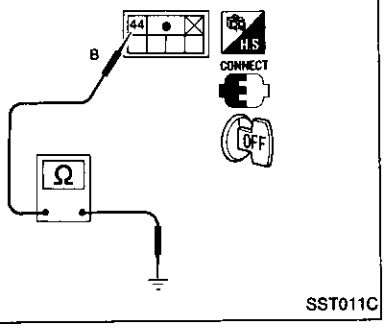
Diagnostic Procedure 10 (Cont'd)

D



SST010C

E



SST011C

Ⓐ

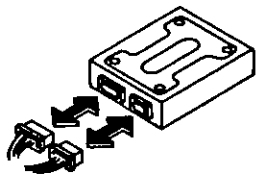
D CHECK STEERING ANGLE SENSOR POWER SUPPLY.
1) Turn ignition switch "ON".
2) Measure voltage across steering angle sensor connector terminal ㊸ and ground.
Voltage:
Approximately 12V

O.K. → Replace steering angle sensor.

E CHECK STEERING ANGLE SENSOR GROUND CIRCUIT.
Check continuity between steering angle sensor terminal ㊹ and body metal (ground).
Continuity should exist.

N.G. → Repair or replace power supply harness or ground harness.

A



SST430B

B

☆MONITOR ☆NO FAIL
CAR SPEED (REF) 0km/h
STEERING ANG L8°
NEUTRAL SIG ON
STOP LAMP SW OFF
PKB/CLUTCH SW ON
NEUTRAL SW ON
ENG REV UNDER 1500
HICAS SOL R0 00A
POWER STR SOL 1 05A

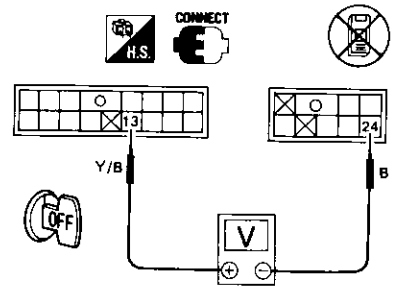
RECORD

☆MONITOR ☆NO FAIL
FAILSAFE/V OFF
FAILSAFE NON
WARNING LAMP OFF

RECORD

SST416B

B



SST020C

Diagnostic Procedure 11

SYMPTOM:
Parking brake input is not present.

START

A

CHECK CONNECTOR CONTINUITY.
Disconnect control unit connector and reconnect it firmly. Conduct self-diagnosis.

O.K. → Poor connector connection

N.G.

B

CHECK CONTROL UNIT INPUT SIGNAL.

Set CONSULT in DATA MONITOR mode.
ON-OFF display

OR

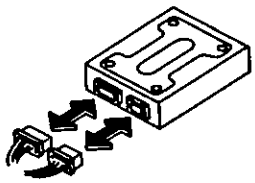
Measure voltage variations between control unit terminals ⑬ and ㉔ when parking brake is engaged.
Voltage:
0V → Approximately 12V

O.K. → Replace control unit.

N.G.

Check parking brake switch or clutch switch and harness.

A



SST430B

B

☆MONITOR ☆NO FAIL	
CAR SPEED (REF)	0km/h
STEERING ANG	L8°
NEUTRAL SIG	ON
STOP LAMP SW	OFF
PKB/CLUTCH SW	ON
NEUTRAL SW	ON
ENG REV	UNDER 1500
HICAS SOL	R0.00A
POWER STR SOL	1.05A

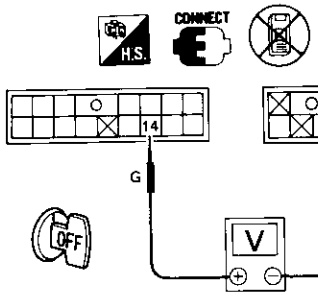
RECORD

☆MONITOR ☆NO FAIL	
FAILSAFE/V	OFF
FAILSAFE	NON
WARNING LAMP	OFF

RECORD

SST416B

B



SST021C

Diagnostic Procedure 12

SYMPTOM:

Inhibitor switch input is not present.

START

A

CHECK CONNECTOR CONTINUITY.
Disconnect control unit connector and reconnect it firmly. Conduct self-diagnosis.

O.K. → Poor connector connection

N.G.

B

CHECK CONTROL UNIT INPUT SIGNAL.
Set CONSULT in DATA MONITOR mode.
ON-OFF display

— OR —

Measure voltage variations between control unit terminals ⑭ and ㉔ when shift lever is moved from P to any other position.
Voltage:
0V → Approximately 12V

O.K. → Replace control unit.

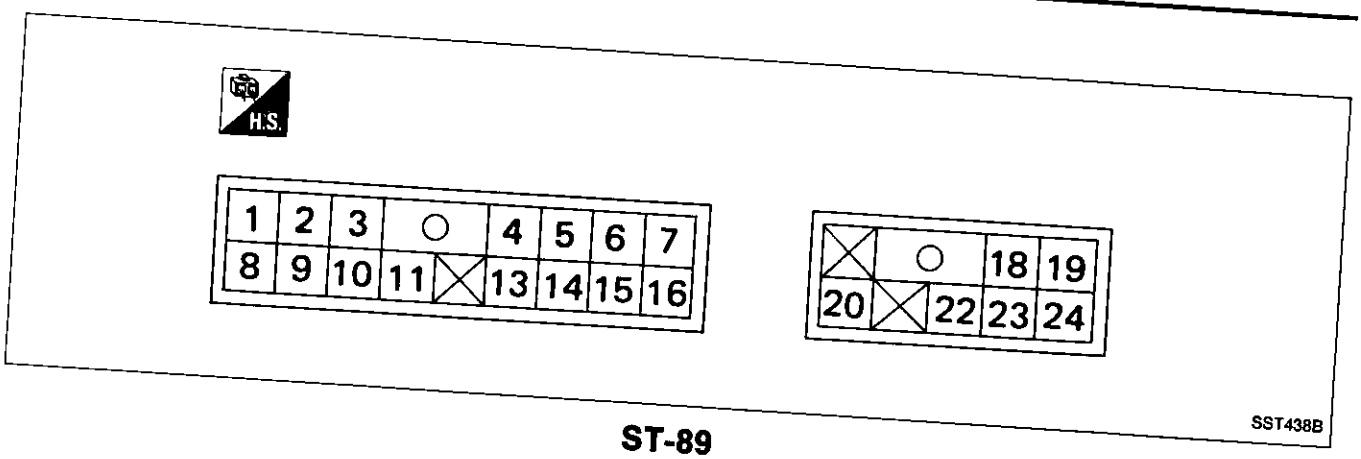
N.G.

Check inhibitor switch or neutral switch and harness.

Control Unit Inspection Table

The standard values (voltage) measured with an analog tester, in contact with the control unit terminal, are shown below:

Terminal No.	Application	Standard value
1	Service support CLK input	Pulse wave (153.6 kHz Approximately 7V)
2	Service support RX output (Reception from CONSULT)	(Not specified serial pulse data)
3	IGN power supply	Key switch ON: Approximately 12V Key switch in other position: 0V
4	Battery	Approximately 12V
5	E.C.C.S. revolution signal	Refer to "Electrical Components Inspection" in "TROUBLE DIAGNOSES" section of EF & EC.
6	Vehicle speed signal	Rear wheel rotating 0V ←→ greater than 5V (approx.), intermittent
7	Steering neutral position sensor	Approximately 5V (Neutral position)
8	Resistance of power steering solenoid	4 - 6Ω
9	Service support TX output (Transmission for CONSULT)	(Not specified serial pulse data)
10	Ground	0V
11	Stop lamp switch signal	Brake ON: Approximately 12V Brake OFF: 0V
13	Parking brake signal	Parking brake engaged: Approximately 12V
14	Inhibitor signal	Shift lever in any position other than Parking: Approximately 12V
15	Steering angle sensor-1 signal	Steering wheel turned 0 ←→ Approximately 5V, intermittent
16	Steering angle sensor-2 signal	Steering wheel turned 0 ←→ Approximately 5V, intermittent
18	Resistance of fail-safe valve	13 - 17Ω
19	IGN power supply	Ignition switch ON: Approximately 12V Ignition switch in other position: 0V
20	HICAS warning lamp	Lamp ON: 0V Lamp OFF: Approximately 12V
22	Resistance of HICAS solenoid (R.H.)	4 - 6Ω (Voltage varies with steering operation.)
23	Resistance of HICAS solenoid (L.H.)	4 - 6Ω (Voltage varies with steering operation.)
24	Ground	0V



General Specifications

	Without SUPER HICAS	With SUPER HICAS
Steering model	Power steering	
Steering gear type	PR26SE	
Steering overall gear ratio	17.0	
Turn of steering wheel (Lock to lock)	2.9	
Steering column type	Collapsible	

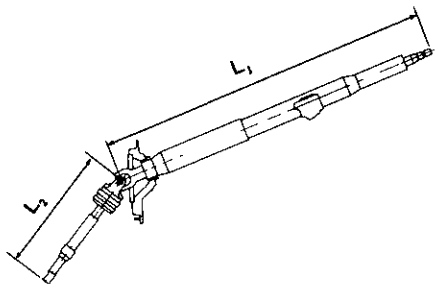
Inspection and Adjustment

STEERING WHEEL

Steering wheel axial play mm (in)	0 (0)
Steering wheel play mm (in)	0 - 35 (0 - 1.38)

STEERING COLUMN

Steering column length "L_1" mm (in)	642.2 - 643.8 (25.28 - 25.35)
Steering column lower shaft length "L_2" mm (in)	326.4 - 328.0 (12.85 - 12.91)

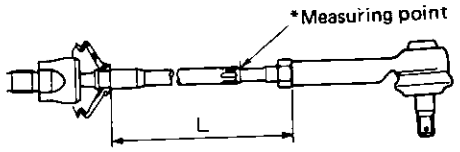


SST315B

STEERING GEAR AND LINKAGE

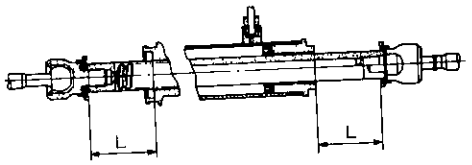
Item \ Steering gear type	PR26SE
Tie-rod outer ball joint	
Swinging force (at cotter pin hole) N (kg, lb)	4.9 - 46.1 (0.5 - 4.7, 1.1 - 10.4)
Rotating torque N·m (kg-cm, in-lb)	0.29 - 2.94 (3.0 - 30.0, 2.6 - 26.0)
Axial end play mm (in)	0 (0)
Tie-rod inner ball joint	
Swinging force* N (kg, lb)	7.8 - 73.6 (0.8 - 7.5, 1.8 - 16.5)
Rotating torque N·m (kg-cm, in-lb)	1.0 - 8.8 (10 - 90, 8.7 - 78.1)
Axial end play mm (in)	0 (0)
Tie-rod standard length "L" mm (in)	163.3 (6.43)

*: Measuring point



SST304B

Rack stroke "L"	mm (in)	65.5 (2.579)



SST307B

Inspection and Adjustment (Cont'd)

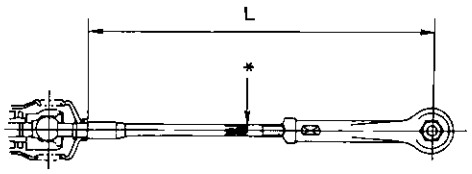
POWER STEERING

	Without SUPER HICAS	With SUPER HICAS
Rack sliding force N (kg, lb)		
Under normal operating oil pressure		
Range within ±11.5 mm (±0.453 in) from the neutral position	216 - 275 (22 - 28, 49 - 62)	
Except above range	Not more than 294 (30, 66)	
Retainer adjustment		
Adjusting screw		
Initial tightening torque N·m (kg-cm, in-lb)	4.9 - 5.9 (50 - 60, 43 - 52)	
Retightening torque after loosening	0.2 (2, 1.7)	
Tightening torque after gear has settled	4.9 (50, 43)	
Returning angle degree	50° - 110°	
Pinion gear preload without gear oil N·m (kg-cm, in-lb)		
Within 100° from the neutral position		
Average rotating torque	0.78 - 1.27 (8.0 - 13.0, 6.9 - 11.3)	
Maximum torque deviation	0.4 (4, 3.5)	
Except above range		
Maximum rotating torque	1.9 (19, 16)	
Maximum torque deviation	0.6 (6, 5.2)	
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 (US qt, Imp qt)	1.3 (1-3/8, 1-1/8)	2.0 (2-1/8, 1-3/4)
Oil pump maximum pressure kPa (kg/cm², psi)	7,649 - 8,238 (78 - 84, 1,109 - 1,194)	Main: 7,649 - 8,238 (78 - 84, 1,109 - 1,194) Sub: 6,375 - 6,865 (65 - 70, 924 - 995)

POWER CYLINDER LOWER LINK (SUPER HICAS)

Power cylinder lower link ball joint		
Swinging force*	N (kg, lb)	2.9 - 41.2 (0.3 - 4.2, 0.7 - 9.3)
Axial end play	mm (in)	0 (0)
Power cylinder lower link standard length "L"	mm (in)	309.5 (12.19)
Stroke	mm (in)	3.0 (0.118)

*: Measuring point



SST486B

SECTION BF

CONTENTS

GENERAL SERVICING
(Including all clips & fasteners) ..... BF- 2
BODY END ..... BF- 5
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DOOR — Power Window BF-12
DOOR — Trouble Diagnoses for Power Window BF-14
DOOR — Power Door Lock BF-22
DOOR — Remote Control System BF-28
DOOR — Trouble Diagnoses for Remote Control System BF-30
INSTRUMENT PANEL BF-39
INTERIOR AND EXTERIOR
(In EXTERIOR, including "Weatherstrips") BF-41
SEAT BF-52
SUN ROOF BF-57
WINDSHIELD AND WINDOWS BF-59
MIRROR — Door Mirror BF-60
REAR AIR SPOILER BF-62
BODY ALIGNMENT BF-63
SUPPLEMENTAL RESTRAINT SYSTEM (SRS) BF-67
TROUBLE DIAGNOSES — Supplemental Restraint System (SRS) BF-78

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".

Precautions

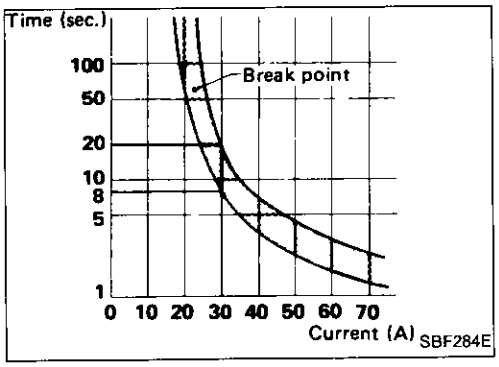
- When removing or installing various parts, place a cloth or padding onto the vehicle body to prevent scratches.
- Handle trim, molding, instruments, grille, etc. carefully during removing or installation. Be careful not to soil or damage them.
- Apply sealing compound where necessary when installing 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 "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System "Air Bag" and "Seat Belt Pre-tensioner" 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 bags (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioners sensors, a control unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **BF section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized INFINITI 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 SYSTEM.**



Circuit Breaker Inspection

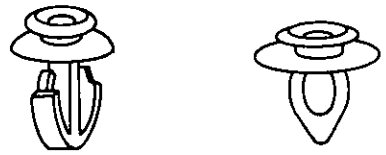
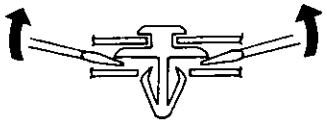
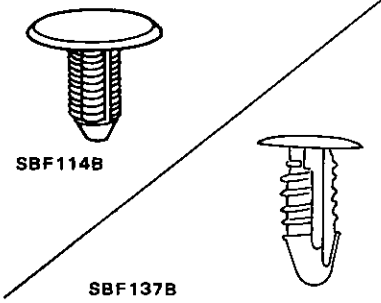
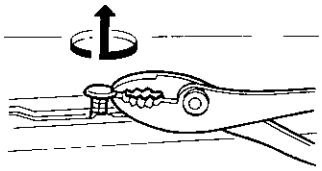
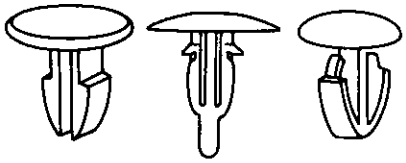
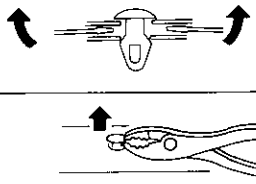
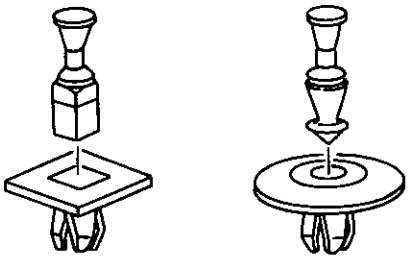
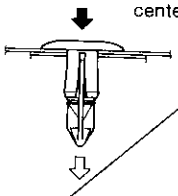
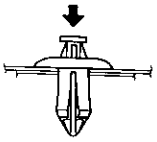
For example, when current is 30A, the circuit is broken within 8 to 20 seconds.

Circuit breakers are used in the following systems.

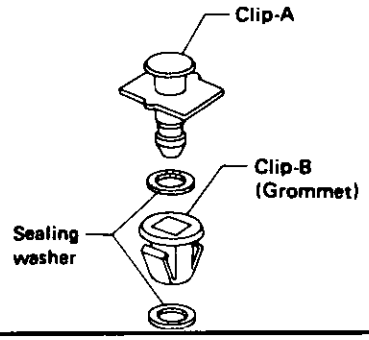
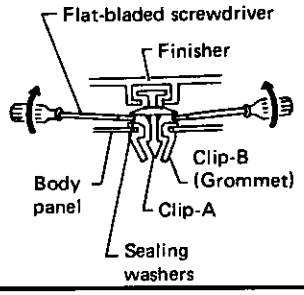
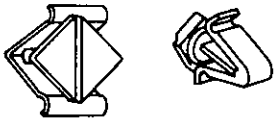
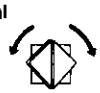
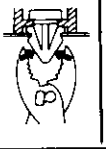
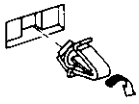
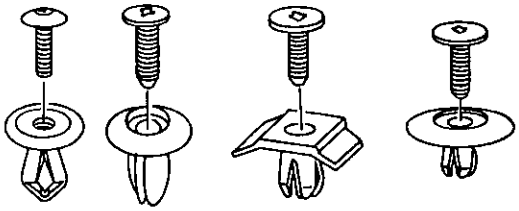
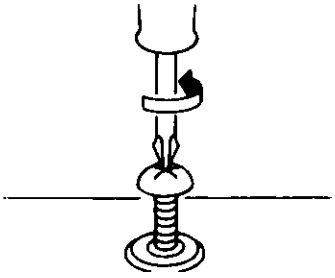
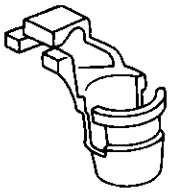
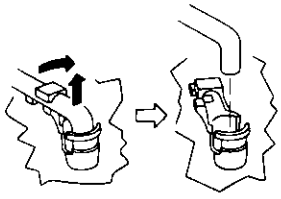
- Power window & power door lock
- Power seat
- Power sun roof

Clip and Fastener

- Clips and fasteners in BF section correspond to the following numbers and symbols.
- Replace any clips and/or fasteners which are damaged during removal or installation.

Symbol No.	Shapes	Removal & Installation
C101		**Removal:** Remove by bending up with flat-bladed screwdrivers. 
C102	 SBF114B SBF137B	 **Removal:** Pull up by rotating.
C103		**Removal:** Remove with a flat-bladed screwdriver or pliers 
C203		Push center pin to catching position. (Do not remove center pin by hitting it.) Push  Push  **Installation:**

Clip and Fastener (Cont'd)

Symbol No.	Shapes	Removal & Installation
CF118		**Removal:** 
CG101		**Removal**  Rotate 45° to remove.  **Removal** **Installation** 
CS101		**Removal:** Screw out with a Phillips screwdriver. 
CR103		**Removal:** Holder portion of clip must be spread out to remove rod. 

Body Front End

- 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.

WARNING:

a. Be careful not to scratch hood stay when installing hood. A scratched stay may cause gas leakage.

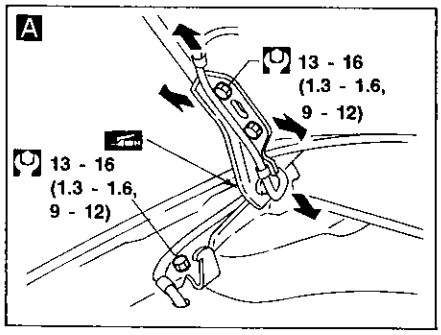
b. The contents of the hood stay are under pressure. Do not take apart, puncture, apply heat or allow fire near it.

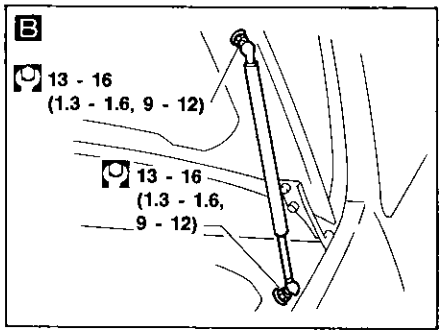
CAUTION:

Do not touch reinforcement with bare hands. Wear leather working gloves, since reinforcement surface is covered with fiberglass.

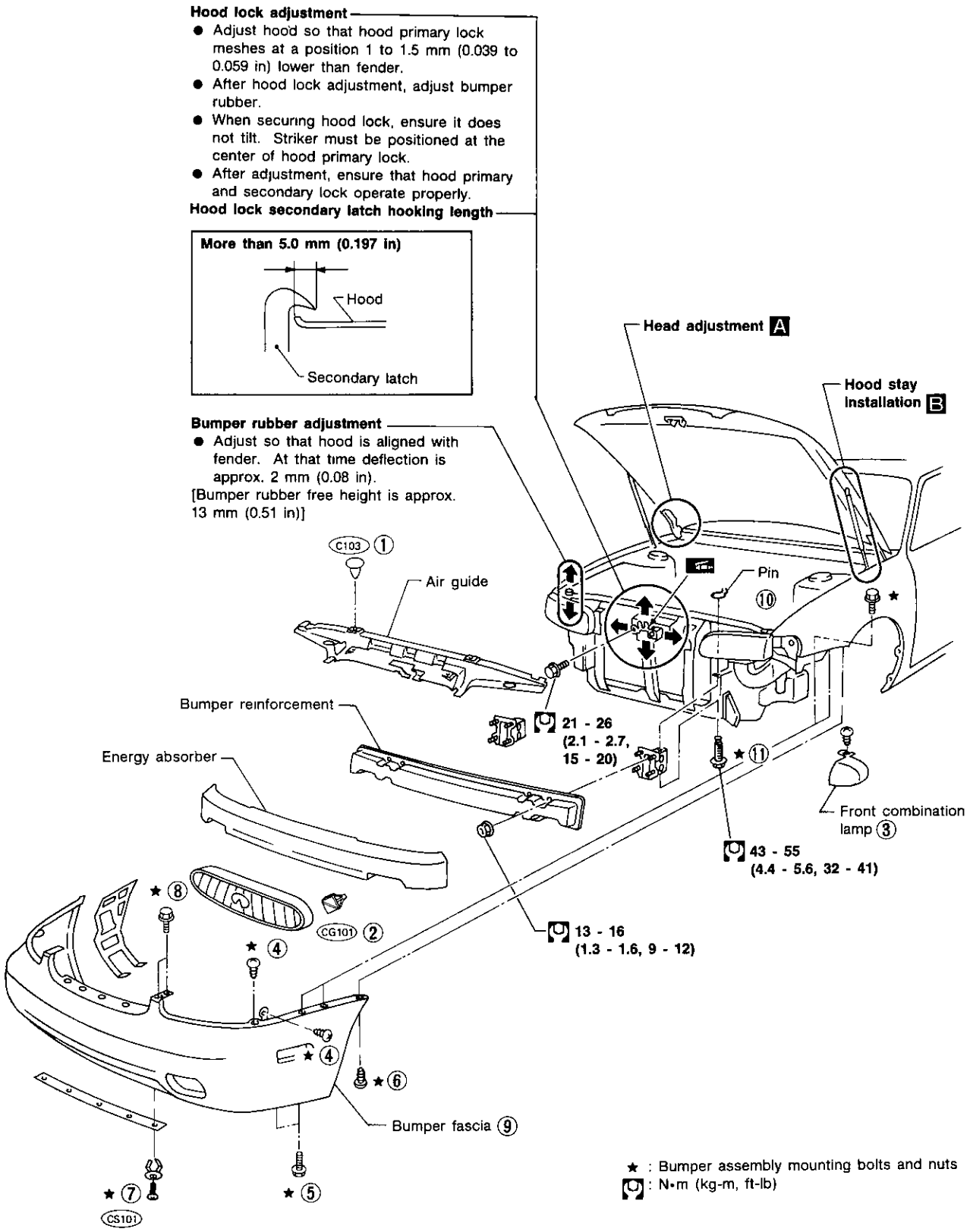
REMOVAL — Front bumper assembly

① Remove clips (C103) securing air guide; remove air guide.
② Remove front grille.
③ Remove left and right combination lamps.
④ Remove screws securing left and right side stays to bumper fascia.
⑤ Remove screws securing left and right fender protectors.
⑥ Remove screws located at wheel opening. Remove bumper fascia and fender.
⑦ Remove clips (CS101) from lower side of apron at opening of bumper fascia.
⑧ Remove two bolts securing left headlamp stay. Similarly, remove right headlamp stay.
⑨ Disconnect front turn signal lamps and front side marker lamp harness connectors. Pull bumper fascia out.
⑩ Remove pins.
⑪ Remove left and right bolts securing bumper stay to side member.





Body Front End (Cont'd)



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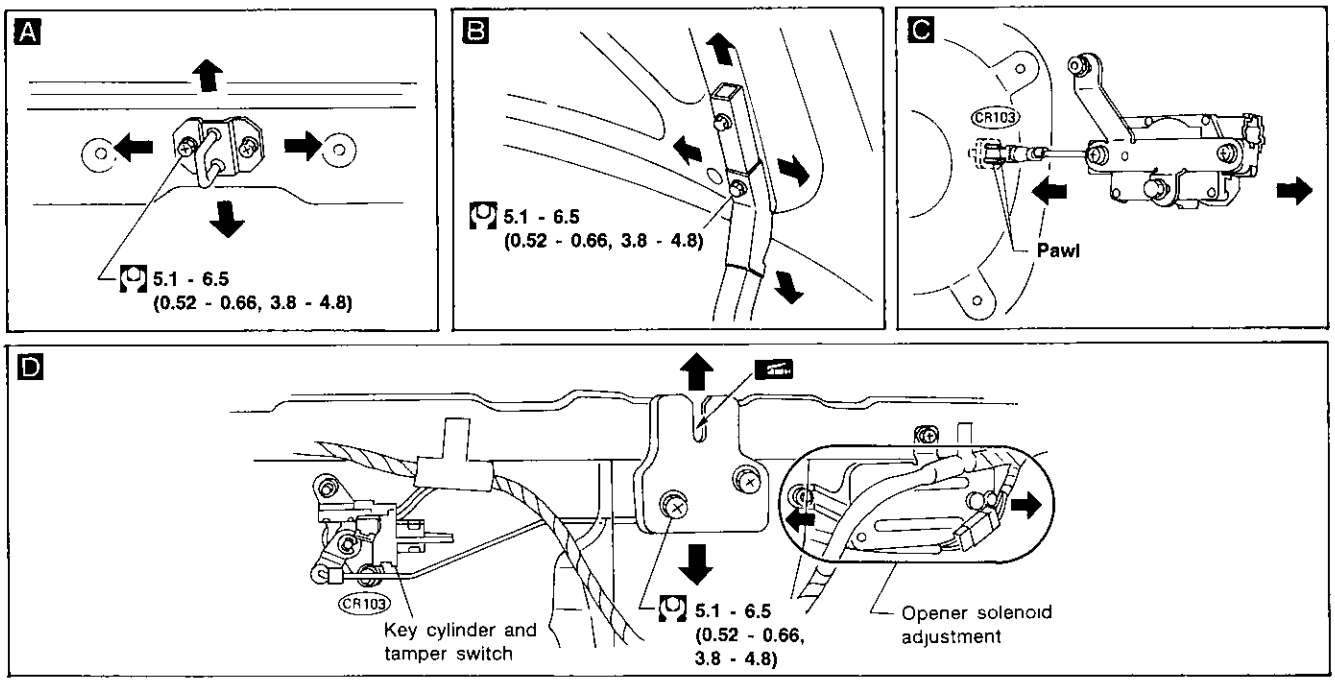
Body Rear End and Opener

- Trunk lid adjustment: Adjust at hinge-trunk 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 open smoothly.

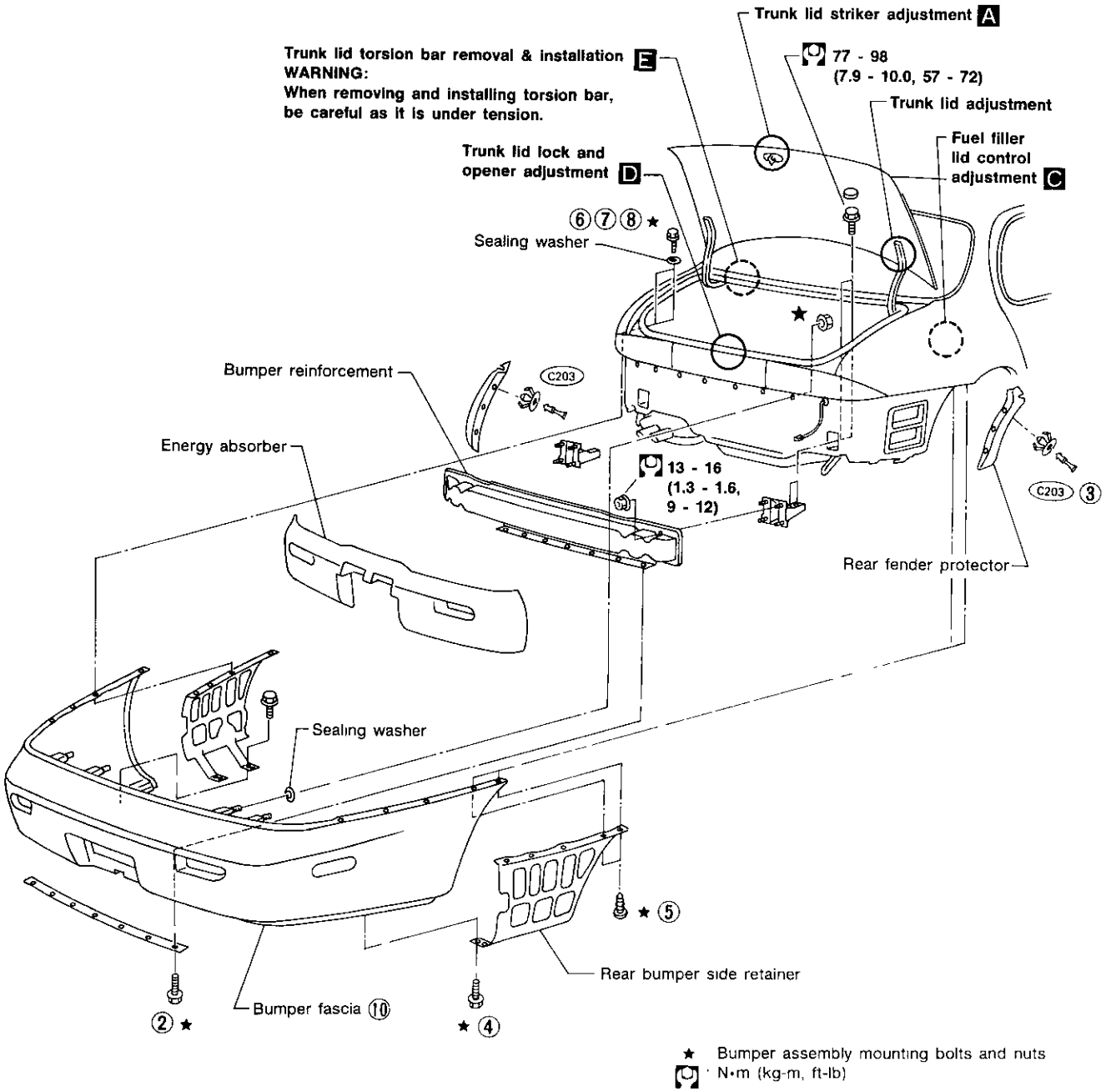
CAUTION:
Do not touch reinforcement with bare hands. Wear leather working gloves, since reinforcement surface is covered with fiberglass.

REMOVAL — Rear bumper assembly

① Remove license plate.
② Remove bolts from lower side of rear bumper.
③ Remove clips (C203) securing rear fender protectors.
④ Remove screws from lower side of each side bumper.
⑤ Remove screws securing wheelarch to each bumper side.
⑥ Remove trunk trim. Refer to "LUGGAGE COMPARTMENT TRIM" in "Interior" for details.
⑦ Working inside trunk, remove power antenna motor.
⑧ Working inside trunk, remove bolts securing each bumper side to fender.
⑨ Also remove nuts from center of trunk compartment.
⑩ Pull bumper fascia out. Disconnect rear side marker lamps and back-up lamp harness connectors.
⑪ Remove bumper stays. Working inside trunk, remove left and right plugs from floor, then remove bolts.



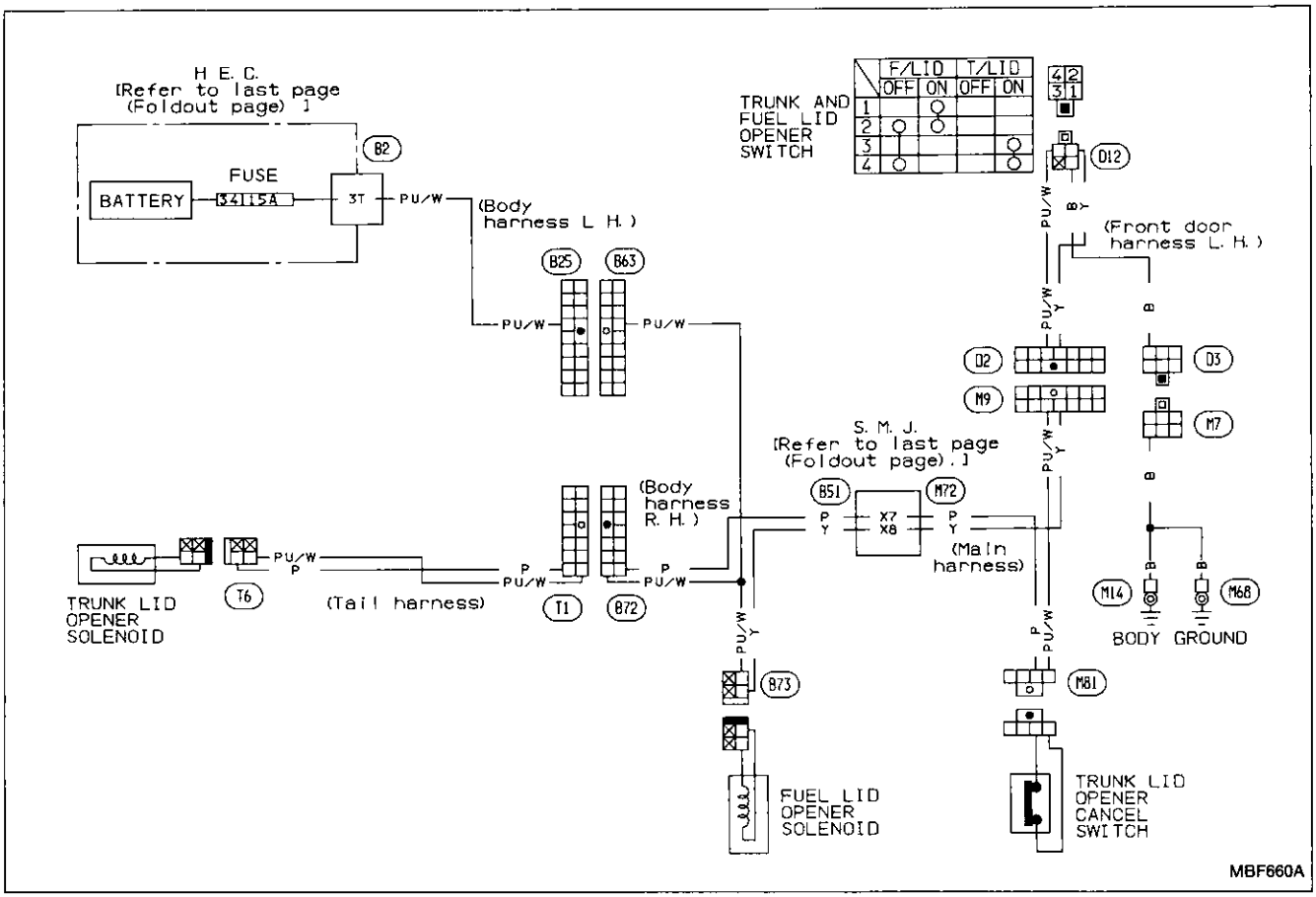
Body Rear End and Opener (Cont'd)



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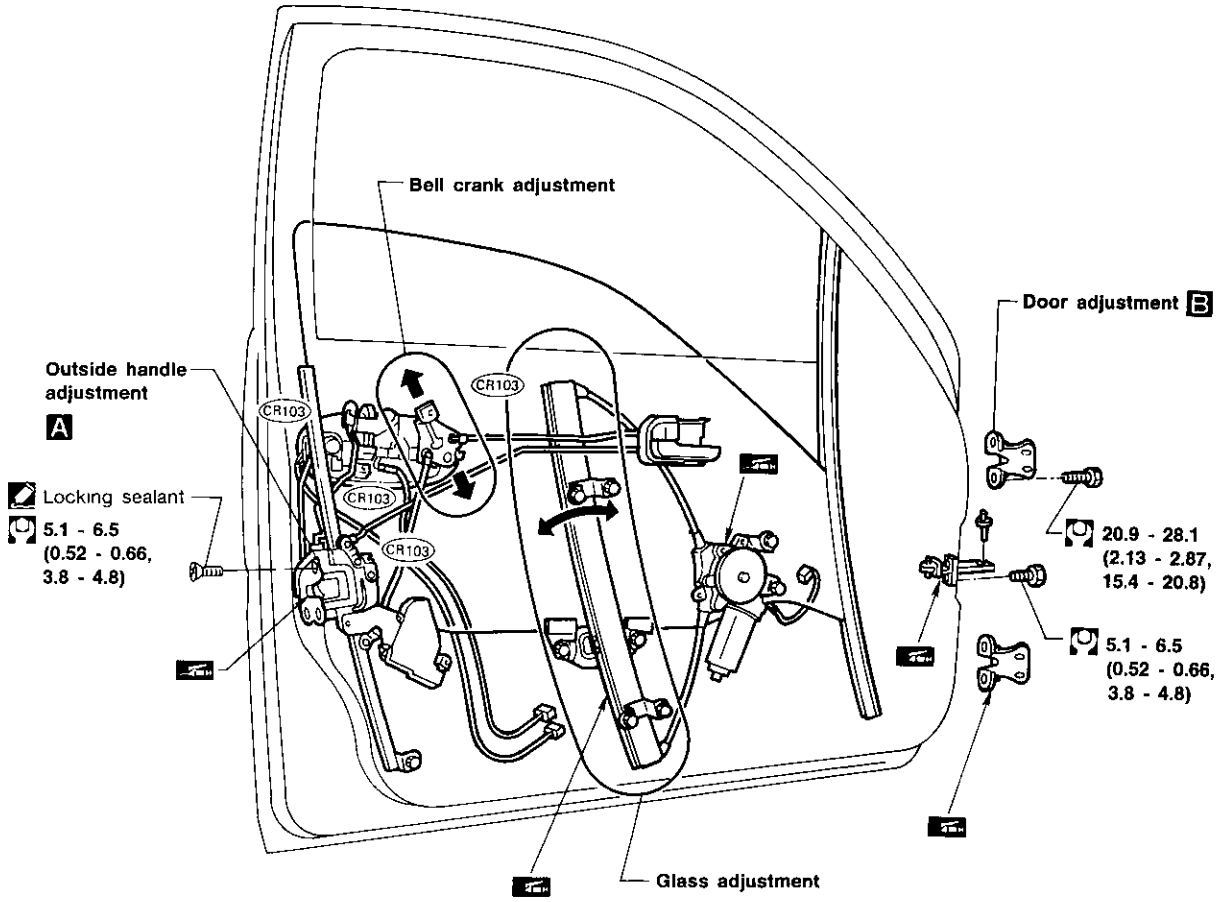
Body Rear End and Opener (Cont'd)

TRUNK LID AND FUEL FILLER LID OPENER/WIRING DIAGRAM

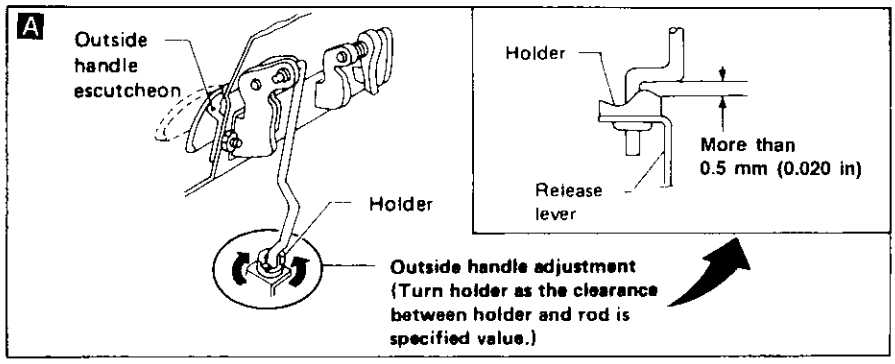


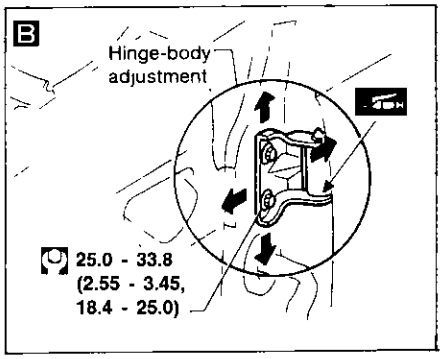
Front Door

- After adjusting door or door lock, check door lock operation.

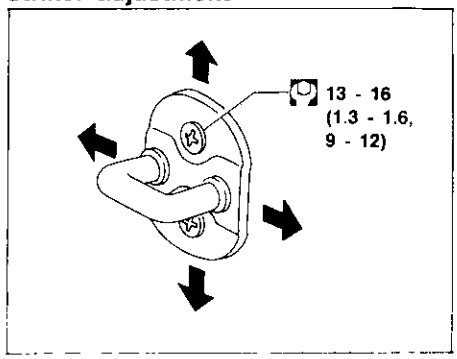


: N•m (kg-m, ft-lb)



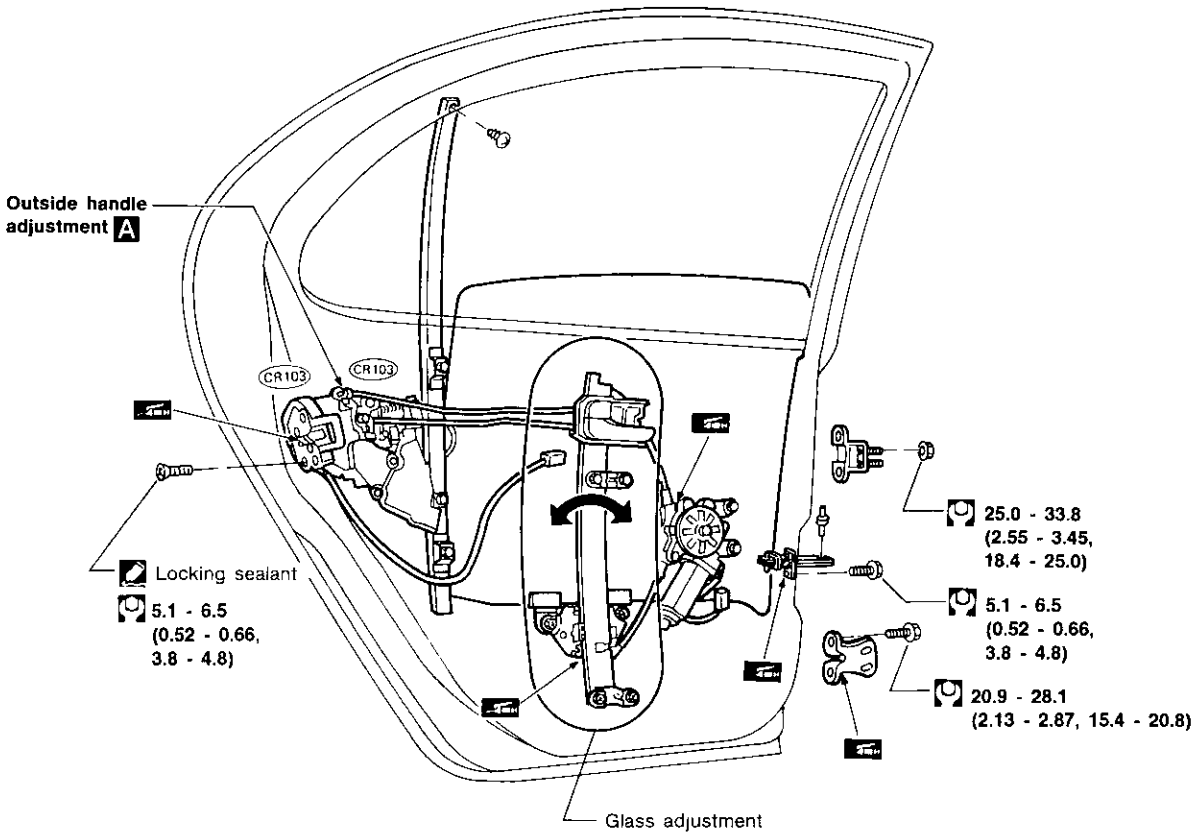


Striker adjustment

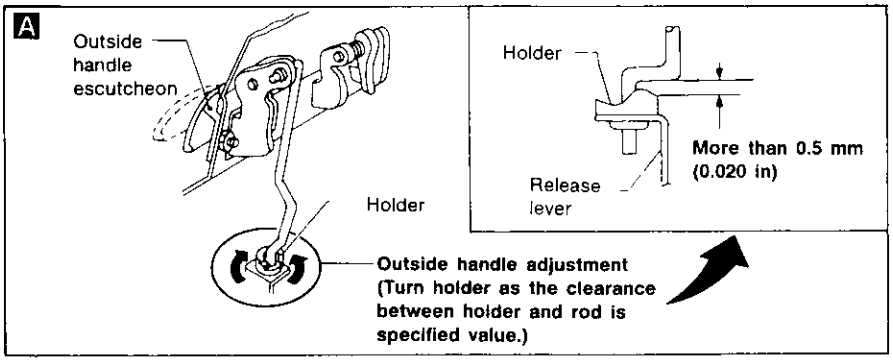


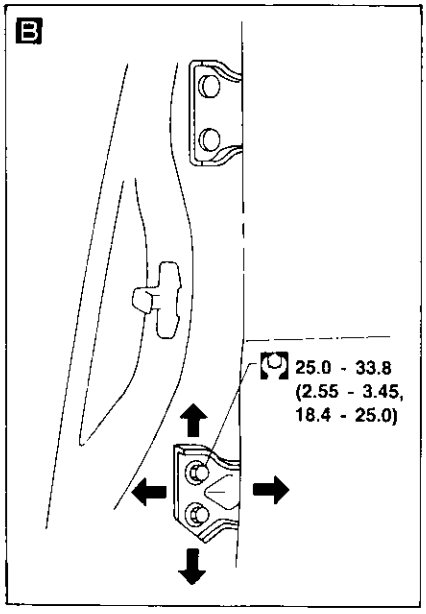
MBF639A

Rear Door

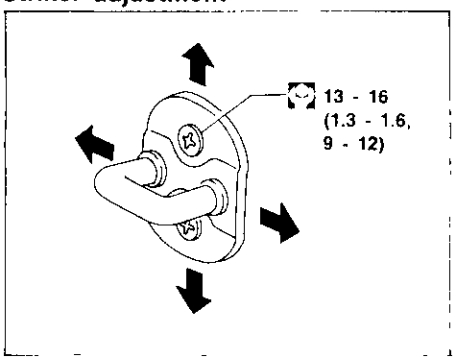


N•m (kg-m, ft-lb)





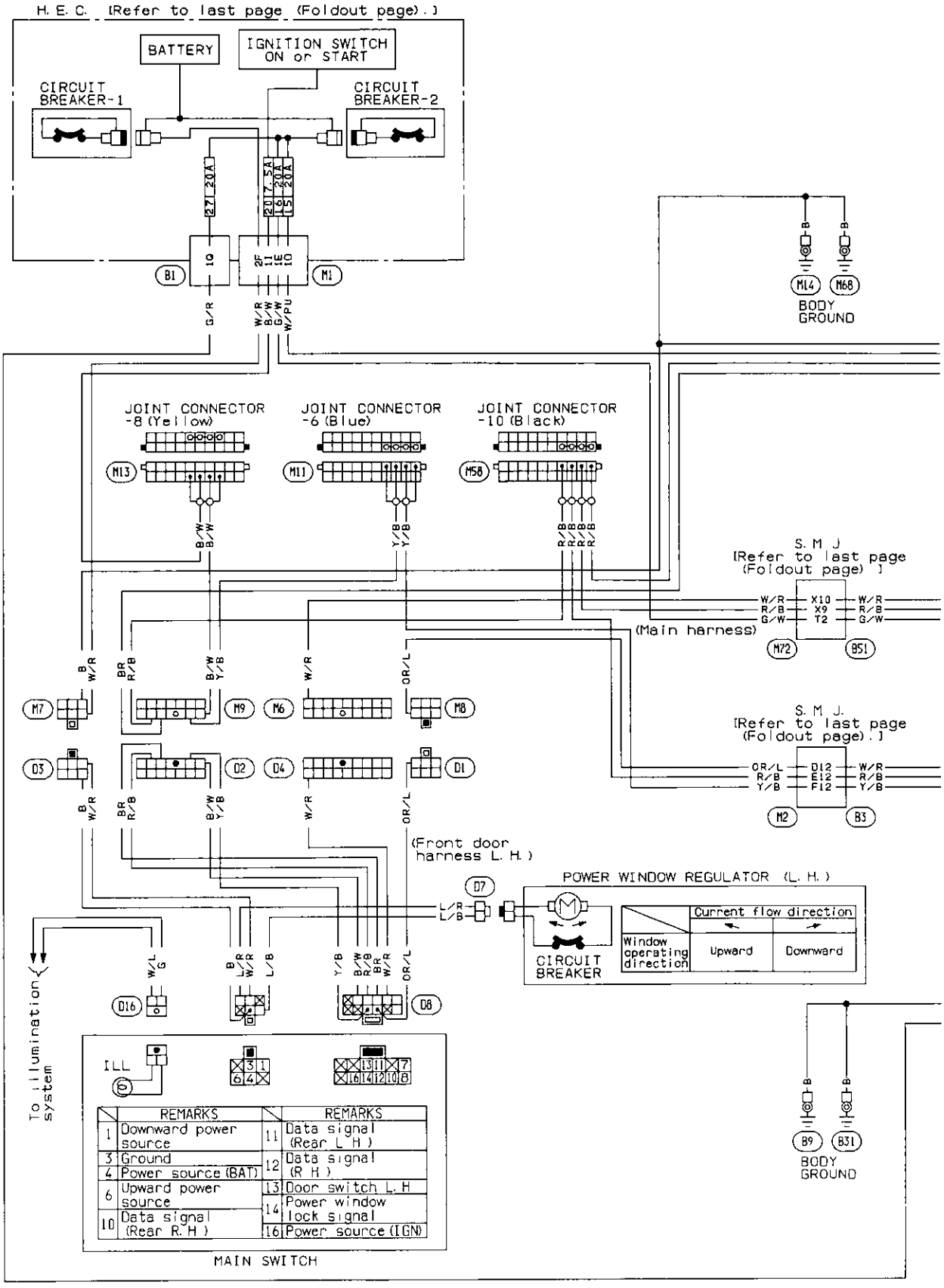
Striker adjustment



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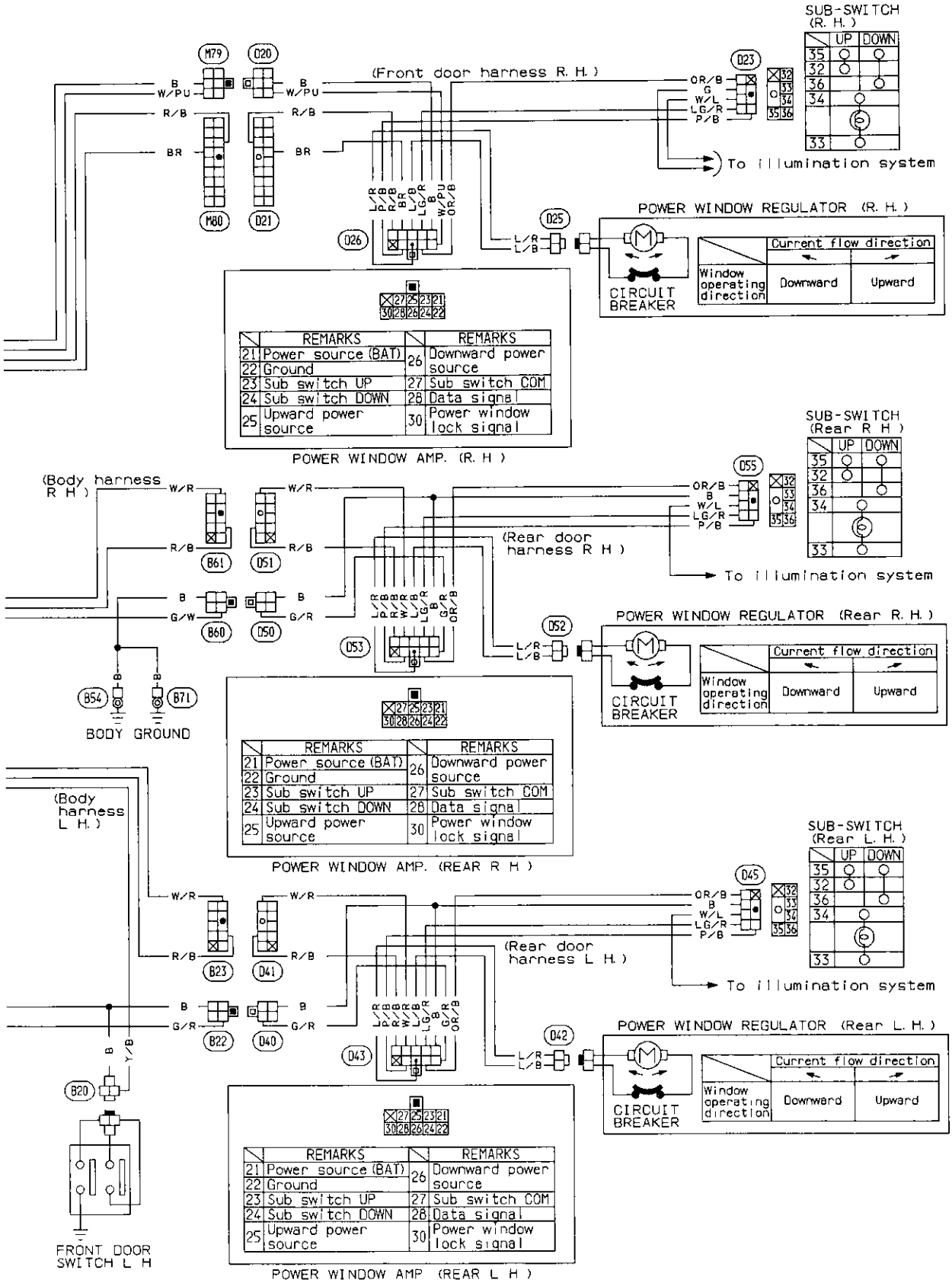
Power Window

WIRING DIAGRAM



	REMARKS		REMARKS
1	Downward power source	11	Data signal (Rear L. H.)
3	Ground	12	Data signal (R. H.)
4	Power source (BAT)	13	Door switch L. H.
6	Upward power source	14	Power window lock signal
10	Data signal (Rear R. H.)	16	Power source (IGN)

Power Window (Cont'd)



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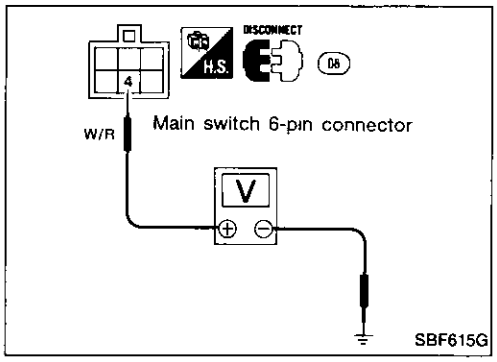
Contents

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Circuit Diagram for Quick Pinpoint Check BF-16
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Diagnostic Procedure 3
(Check power window lock signal circuit.) BF-19
Diagnostic Procedure 4
(Check data line signal circuit.) BF-20
Electrical Components Inspection BF-21

Since left and right component parts are basically the same, harness layout and methods for electrical components inspection are shown for one side only. Although methods for checking component parts on both sides are described in the flow chart, making it easier to troubleshoot, apply checking procedures to either side that have malfunction during trouble diagnoses.

Symptom Chart

Procedure	Main Power Supply and Ground Circuit Check			Diagnostic Procedure				Electrical Components Inspection	
Reference Page	BF-15	BF-15	BF-15	BF-17	BF-18	BF-19	BF-20	BF-21	BF-21
SYMPTOM	Procedure 1	Procedure 2	Procedure 3	Procedure 1	Procedure 2	Procedure 3	Procedure 4	Power window motor(s)	Power window switch(es)
All power windows cannot be operated.	○		○	○	○	○	○	○	○
Passenger power windows cannot be operated.		○			○	○	○	○	○
Driver's power window cannot be operated but other windows can be operated.				○				○	
Passenger power windows cannot be operated by main switch but can be operated by passenger's switches.							○		

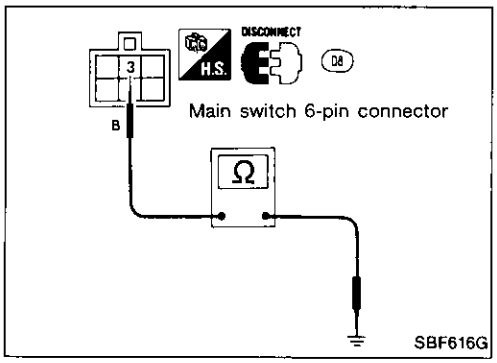


Main Power Supply and Ground Circuit Check

PROCEDURE 1

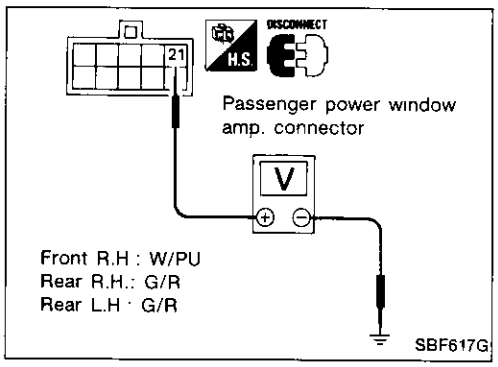
Main power supply

Terminals	Battery voltage existence
④ - Ground	Yes



Ground circuit

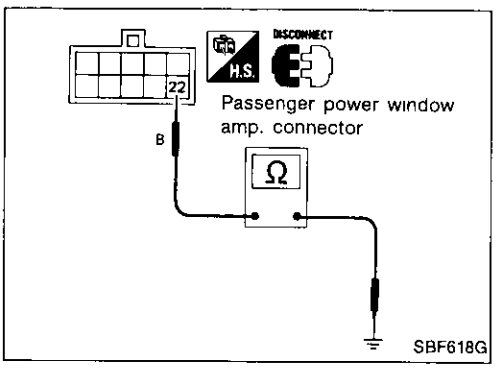
Terminals	Continuity
③ - Ground	Yes



PROCEDURE 2

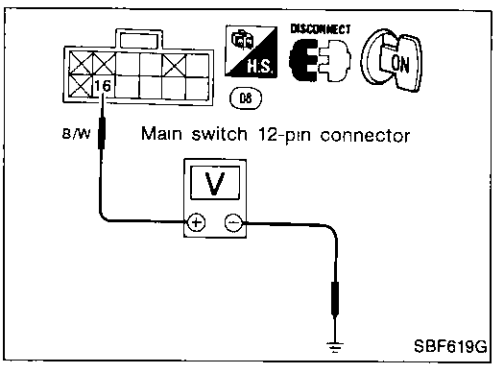
Power supply for power window amp. (front and rear passengers)

Terminals	Battery voltage existence
㉑ - Ground	Yes



Ground circuit for power window amp. (front and rear passengers)

Terminals	Continuity
㉒ - Ground	Yes

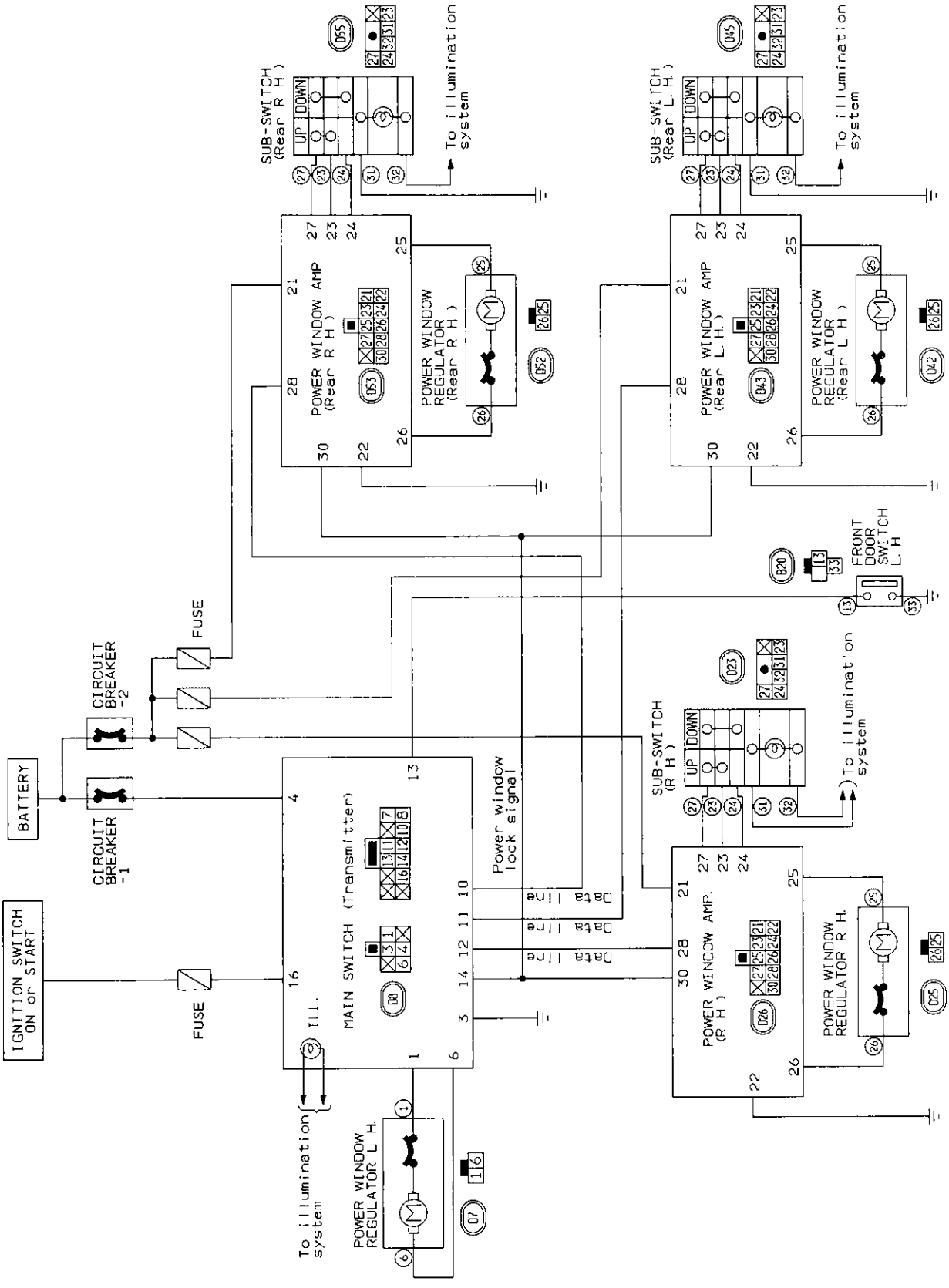


PROCEDURE 3

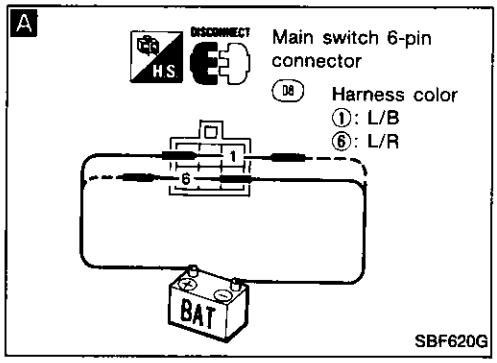
Power supply for ignition signal

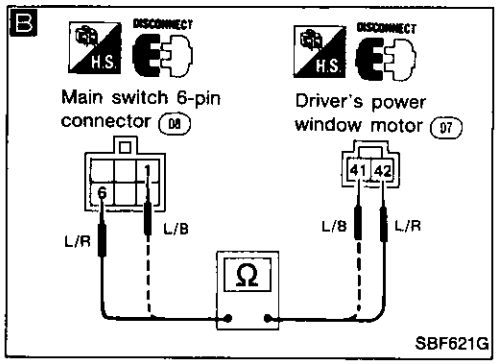
Terminals	Ignition switch	Battery voltage existence
⑯ - Ground	ON	Yes

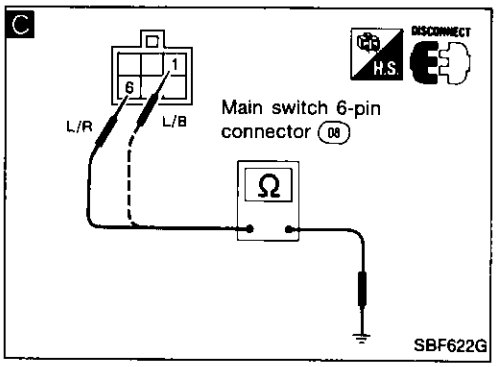
Circuit Diagram for Quick Pinpoint Check



MBF682A







Diagnostic Procedure 1

SYMPTOM:

Driver's power window cannot be operated but other power windows can be operated.

START

A

CHECK DRIVER'S WINDOW MOTOR CIRCUIT.
1) Disconnect 6-pin connector from main switch.
2) Check power window operation.

Terminals		Window
⊕	⊖	
⑥	①	Up
①	⑥	Down

O.K. → Replace main switch.

N.G.

B

1) Disconnect connector from driver's power window motor.
2) Check continuity.

Terminals
① - ㊶
⑥ - ㊷

Continuity should exist.

N.G. → Repair harness.

O.K.

C

Does continuity exist?

Terminals
① - Ground
⑥ - Ground

Yes → Repair harness. There will be incorrect grounding.

No

Go to POWER WINDOW MOTOR in Electrical Components Inspection. (See page BF-21.)

O.K. → Check system again.

N.G.

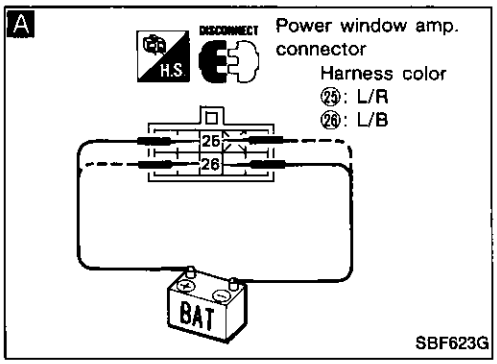
Check power window motor harness for open or short circuit.

N.G. → Repair harness.

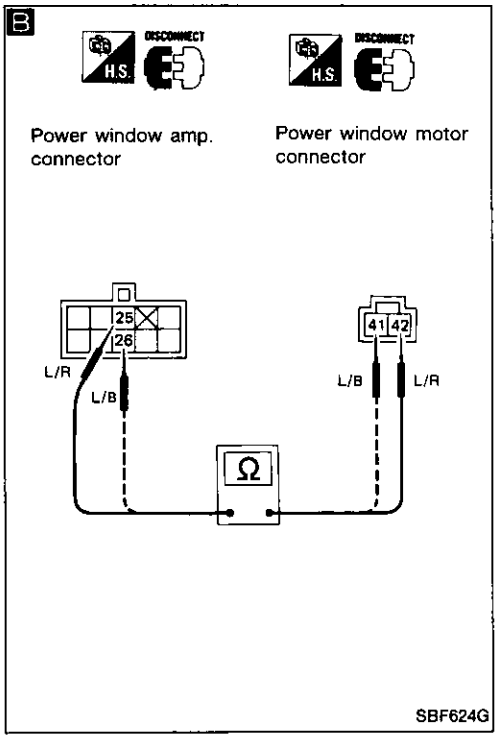
O.K.

Replace power window motor.

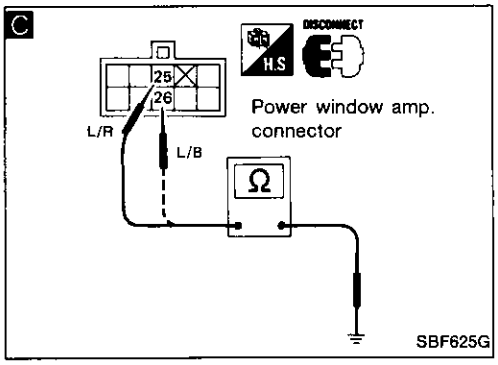
A



B



C



Diagnostic Procedure 2

SYMPTOM:

Passenger power windows cannot be operated.

START

A

CHECK PASSENGER POWER WINDOW CIRCUIT.
1) Disconnect connector from power window amp.
2) Check power window.

Terminals		Window operation
⊕	⊖	
㉖	㉕	Up
㉕	㉖	Down

O.K. → Go to Diagnostic Procedure 3. (See page BF-19.)

N.G.

B

1) Disconnect connector from power window motor.
2) Check continuity.

Terminals
㉕ - ㊷
㉖ - ㊶

Continuity should exist.

N.G. → Repair harness.

O.K.

C

Does continuity exist?

Terminals
㉕ - Ground
㉖ - Ground

Yes → Repair harness. There will be incorrect grounding.

No

Go to POWER WINDOW MOTOR in Electrical Components Inspection. (See page BF-21.)

O.K. → Check system again.

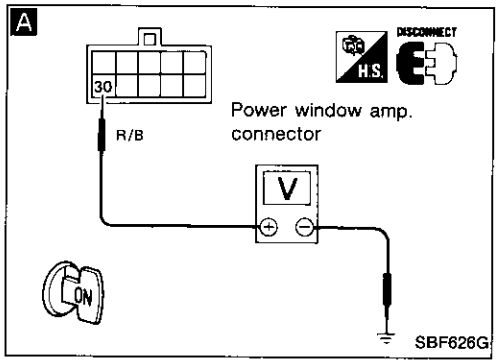
N.G.

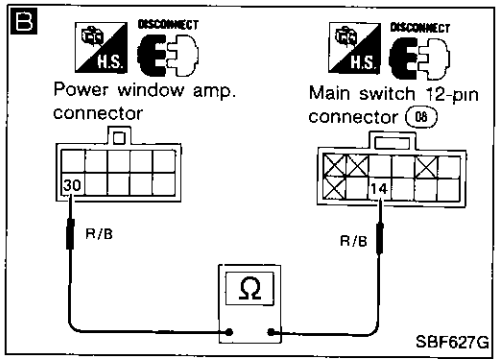
Check power window motor harness for open or short circuit.

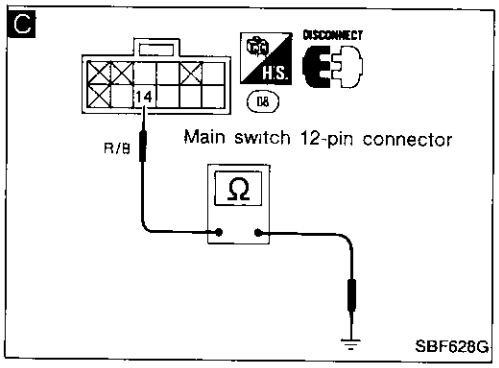
N G → Repair harness

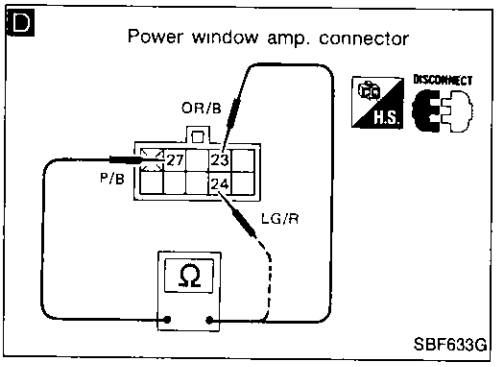
O.K.

Replace power window motor.









Diagnostic Procedure 3

SYMPTOM:

Passenger power windows cannot be operated but driver's power window can be operated.

START

A

CHECK POWER WINDOW LOCK SIGNAL CIRCUIT.
1) Disconnect connector from power window amp.
2) Check battery voltage between terminal (30) for each connector and ground while ignition switch is "ON".

Terminals	Power window lock switch	Battery voltage exists
(30) - Ground	ON	No
	OFF	Yes

O.K. → **D**

Check continuity.

Terminals	Passenger switches	Continuity
(23) - (27)	Up	Yes
	Down	No
(24) - (27)	Up	No
	Down	Yes

O.K. → Replace power window amp.

N.G. → Go to POWER WINDOW SWITCH in Electrical Components Inspection. (See page BF-21.)

O.K. → Repair harness between power window amp. and power window switch.

N.G. → Replace power window switch.

N.G. → Repair harness.

B

1) Disconnect 12-pin connector from main switch.
2) Check continuity between terminal (30) for each connector and (14) for main switch connector.

Terminals
(30) - (14)

Continuity should exist.

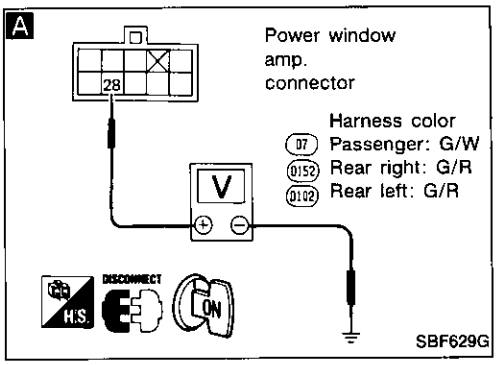
O.K. → **C**

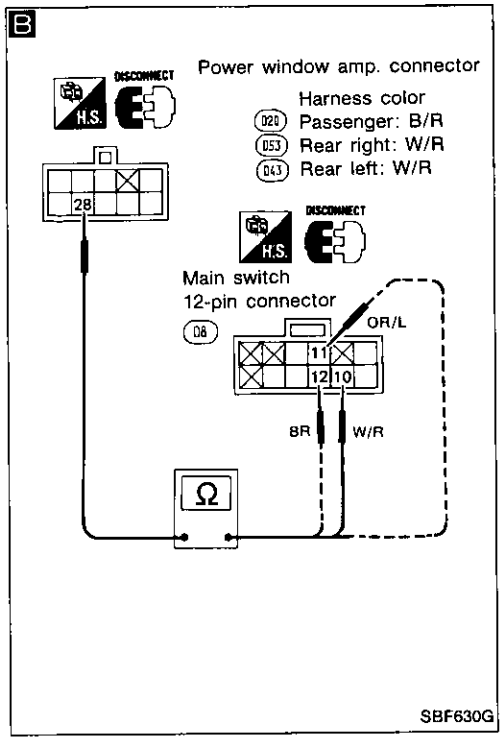
Does continuity exist?

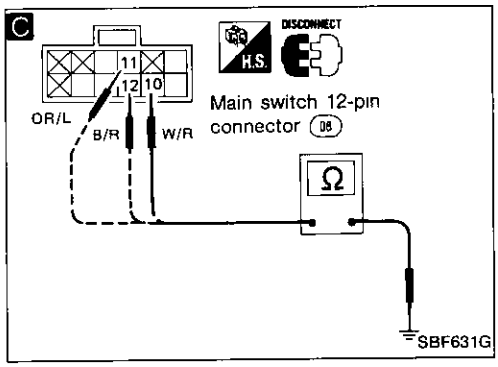
Terminals
(14) - Ground

Yes → Repair harness. There will be incorrect grounding.

No → Replace main switch.







Diagnostic Procedure 4

SYMPTOM:

Passenger power windows cannot be operated by main switch but can be operated by passenger's switches.

START

A

CHECK DATA LINE SIGNAL CIRCUIT.
1) Disconnect connectors from power window amp.
2) Check voltage while power window lock switch is "OFF".

Terminals	Main switch operation	Voltage
(28) - Ground	Up	Above 12V
	Down	Approx. 4V
	No operation	Approx. 0V

O.K. → Replace switch.

N.G.

B

1) Disconnect 12-pin connector from main switch.
2) Check continuity.

	Terminals
Passenger	(12) - (28)
Rear left	(11) - (28)
Rear right	(10) - (28)

Continuity should exist.

N.G. → Repair harness.

O.K.

C

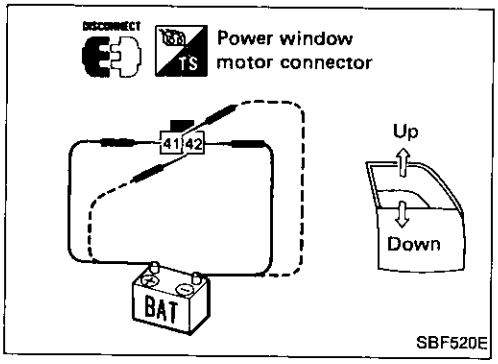
Does continuity exist?

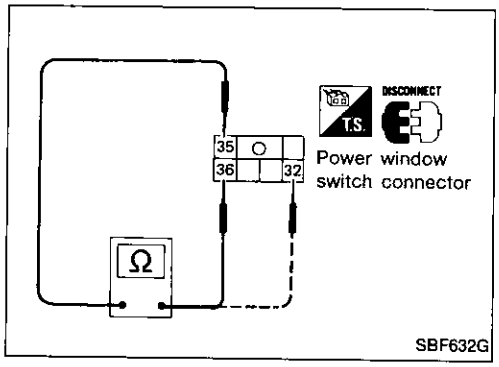
	Terminals
Passenger	(12) - Ground
Rear left	(11) - Ground
Rear right	(10) - Ground

Yes → Repair harness. There will be incorrect grounding.

No

Replace main switch.





Electrical Components Inspection

POWER WINDOW MOTOR

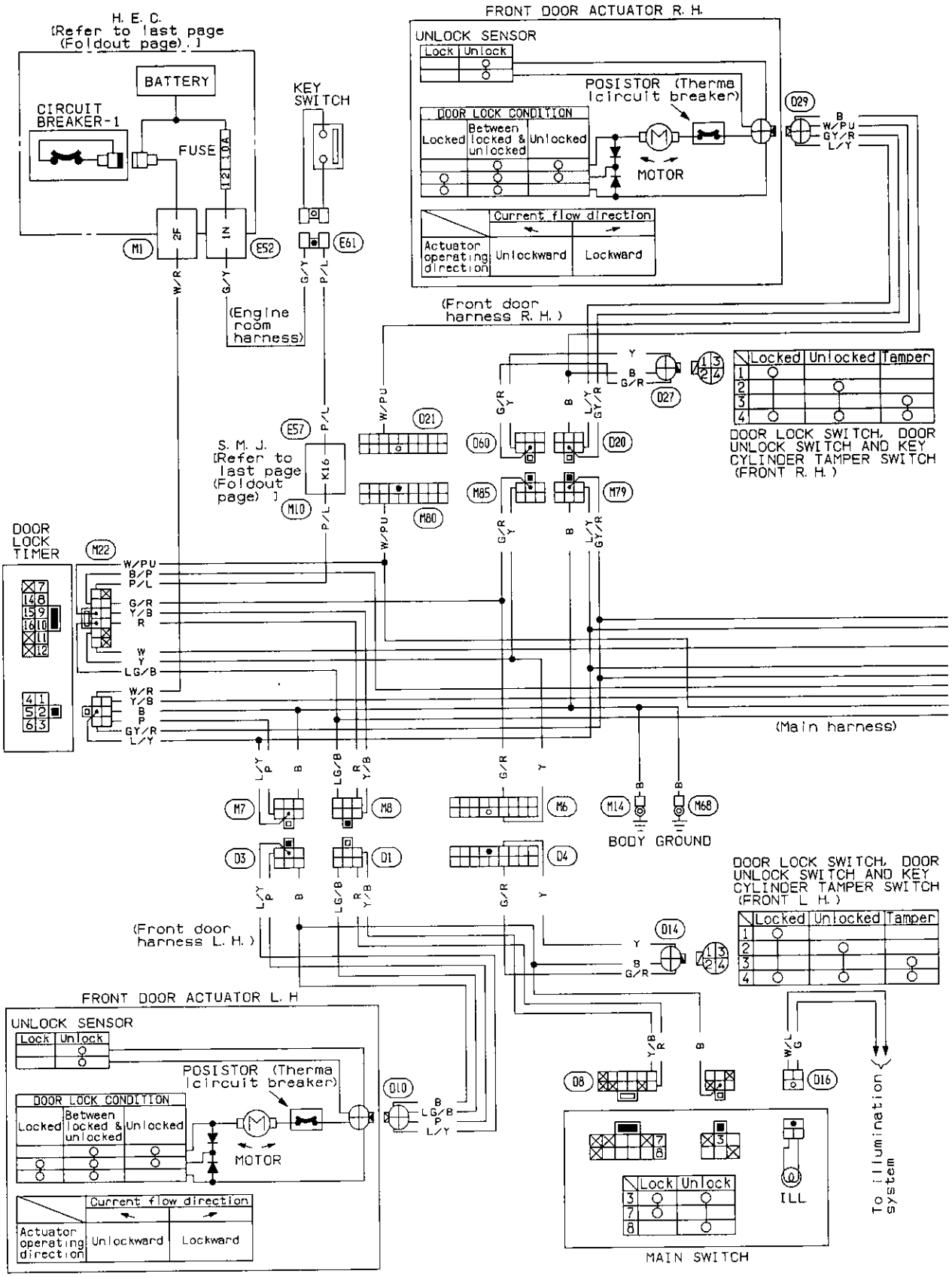
Terminals		Operation
⊕	⊖	
㊶	㊷	Downward
㊷	㊶	Upward

POWER WINDOW SWITCH

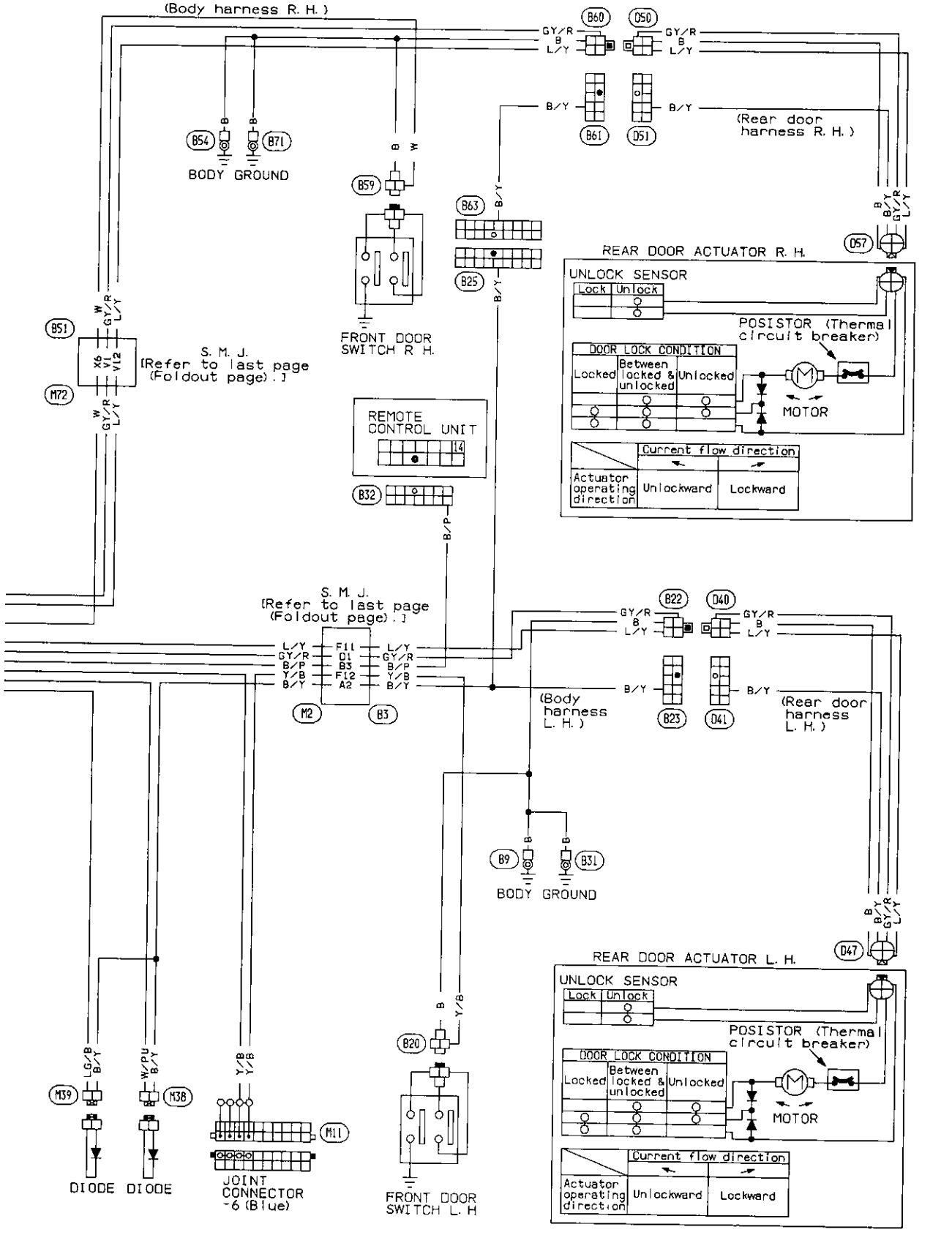
Terminals	Condition	Continuity
㉜ - ㉟	UP	Yes
	Down	No
㊱ - ㉟	UP	No
	Down	Yes

Power Door Lock

WIRING DIAGRAM



Power Door Lock (Cont'd)



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Power Door Lock (Cont'd)

DOOR LOCK TIMER INSPECTION

- Carry out the following inspections:

(1) Check power source and ground.
(2) Check input signals.
If the input signal is N.G., go to ELECTRICAL COMPONENTS INSPECTION.
(3) Check output signals.
If the input signal is O.K., and the output signal is N.G., replace the door lock timer.
If the input signal and output signal are O.K., check door lock actuator in ELECTRICAL COMPONENTS INSPECTION.

Lock & unlock operation by lock knob or main switch

(The voltages are approximate values.)

Connections			Operations			
			Lock knob switch L.H.	Lock knob switch R.H.	Main switch	
			Unlock → Lock	Unlock → Lock	N → Unlock	N → Lock
1	Power source		12V	12V	12V	12V
5	Ground		Ground	Ground	Ground	Ground
7	Input signals	Key switch	Either key switch or door switches are off. (Key is not in the ignition or all doors are closed.)			
4		Door switch L.H.				
12		Door switch R.H.				
10		Lock knob switch L.H.	ON (Ground) → OFF (Open)	—	—	—
9		Lock knob switch R.H.	—	ON (Ground) → OFF (Open)	—	—
14		Door lock key switch	—	—	—	—
16		Lock & unlock switch (lock)	—	—	—	OFF (Open) → ON (Ground)
15		Lock & unlock switch (unlock)	—	—	OFF (Open) → ON (Ground)	—
2	Output signals	Door lock actuator (Lock power source)	0V → 12V → 0V (Approx. 1.0 sec.)	0V → 12V → 0V (Approx. 1.0 sec.)	0V	0V → 12V → 0V (Approx. 1.0 sec.)
3		Door lock actuator (Unlock power source)	0V	0V	0V → 12V → 0V (Approx. 1.0 sec.)	0V

Power Door Lock (Cont'd)

Unlock operation by door lock key switch

(The voltages are approximate values.)

Connections			Operations		
			Door lock key switch L.H.		
			N → Unlock → N → Unlock		Unlock → Lock
1	Lock source		12V	12V	12V
5	Ground		Ground	Ground	Ground
7	Input signal	Key switch	Either key switch or door switches are off. (Key is not in the ignition or all doors are closed.)		
4		Door switch L.H.			
12		Door switch R.H.			
10		Lock knob switch L.H.	—	—	ON (Ground) → OFF (Open)
9		Lock knob switch R.H.	—	—	—
14		Door lock key switch	OFF (Open) → ON (Ground) → OFF (Open) → ON (Ground) → OFF (Open)		OFF (Open)
16		Lock & unlock switch (lock)	—	—	—
15		Lock & unlock switch (unlock)	—	—	—
2	Output signal	Door lock actuator (Lock power source)	0V	0V	0V → 12V → 0V (Approx. 1.0 sec.)
3		Door lock actuator (Unlock power source)	0V	0V → 12V → 0V (Approx. 1.0 sec.)	0V

- The second unlock signal of door lock key switch is counted when it is within approximately 4 seconds of the first signal.
- Lock operation by key is mechanically transmitted to the lock knob switch.
- Operation of door lock key switch R.H. is the same as L.H.

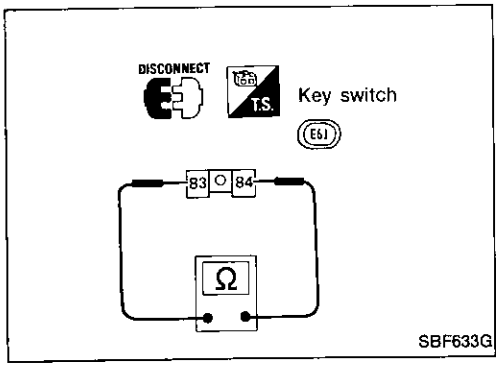
Power Door Lock (Cont'd)

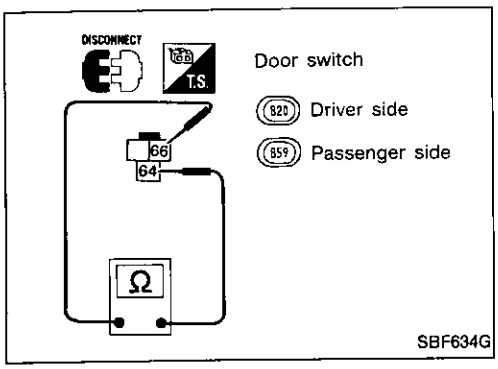
Key reminder operation

(The voltages are approximate values.)

	Connections		Operations	
			Lock knob switch L.H.	Main switch
			Unlock → Lock → Automatically unlocked	N → Lock → Automatically unlocked
1	Power source		12V	12V
5	Ground		0V	0V
7	Input signal	Key switch	ON (12V) — Key is in the ignition.	
4	Input signal	Door switch L.H.	ON (Ground) — Either door is open.	
12	Input signal	Door switch R.H.		
10	Input signal	Lock knob switch L.H.	ON (Ground) → OFF (Open) → ON (Ground)	—
9	Input signal	Lock knob switch R.H.	—	—
14	Input signal	Door lock key switch	—	—
16	Input signal	Lock & unlock switch lock	—	OFF (Open) → ON (Ground) → OFF (Open)
15	Input signal	Lock & unlock switch unlock	—	—
2	Output signal	Door lock actuator (Lock power source)	0V → 12V → 0V (Approx. 0.3 sec.)	0V → 12V → 0V (Approx. 0.3 sec.)
3	Output signal	Door lock actuator (Unlock power source)	0V → 12V → 0V (Approx. 1.4 sec.)	0V → 12V → 0V (Approx. 1.4 sec.)

- Operation of lock knob switch R.H. is the same as L.H.





ELECTRICAL COMPONENTS INSPECTION

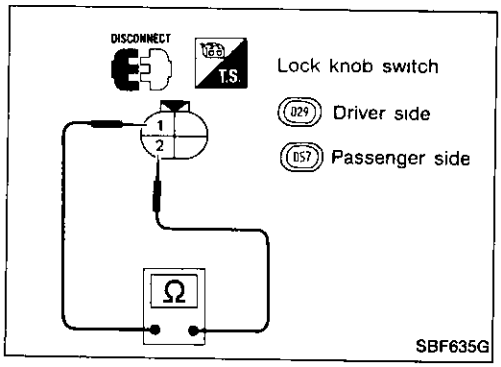
Key switch

Terminals	Condition	Continuity
⑧③ - ⑧④	Key is in the ignition.	Yes
	Key is not in the ignition.	No

Door switch

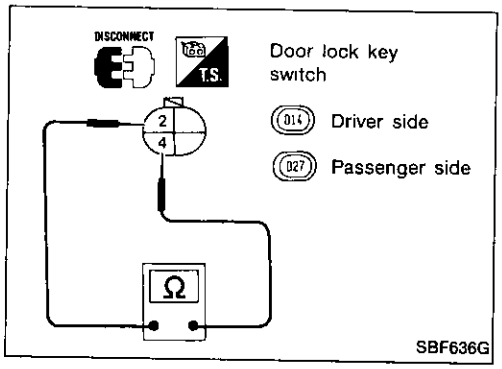
Terminals	Condition	Continuity
⑥④ - ⑥⑥	Door is closed.	No
	Door is open.	Yes

Power Door Lock (Cont'd)



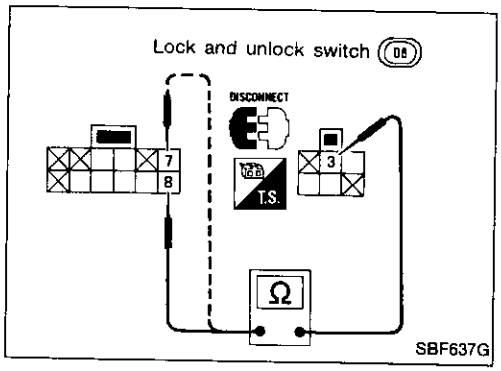
Lock knob switch

Terminals	Condition	Continuity
① - ②	Lock	No
	Unlock	Yes



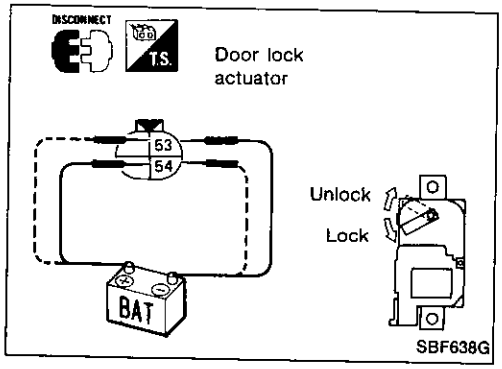
Door unlock key switch

Terminals	Operation	Continuity
② - ④	Key is turned toward unlock	Yes
	Except above	No



Lock and unlock switch

Terminals	Operation	Continuity
③ - ⑦	Lock	Yes
	Neutral and unlock	No
③ - ⑧	Unlock	Yes
	Neutral and unlock	no

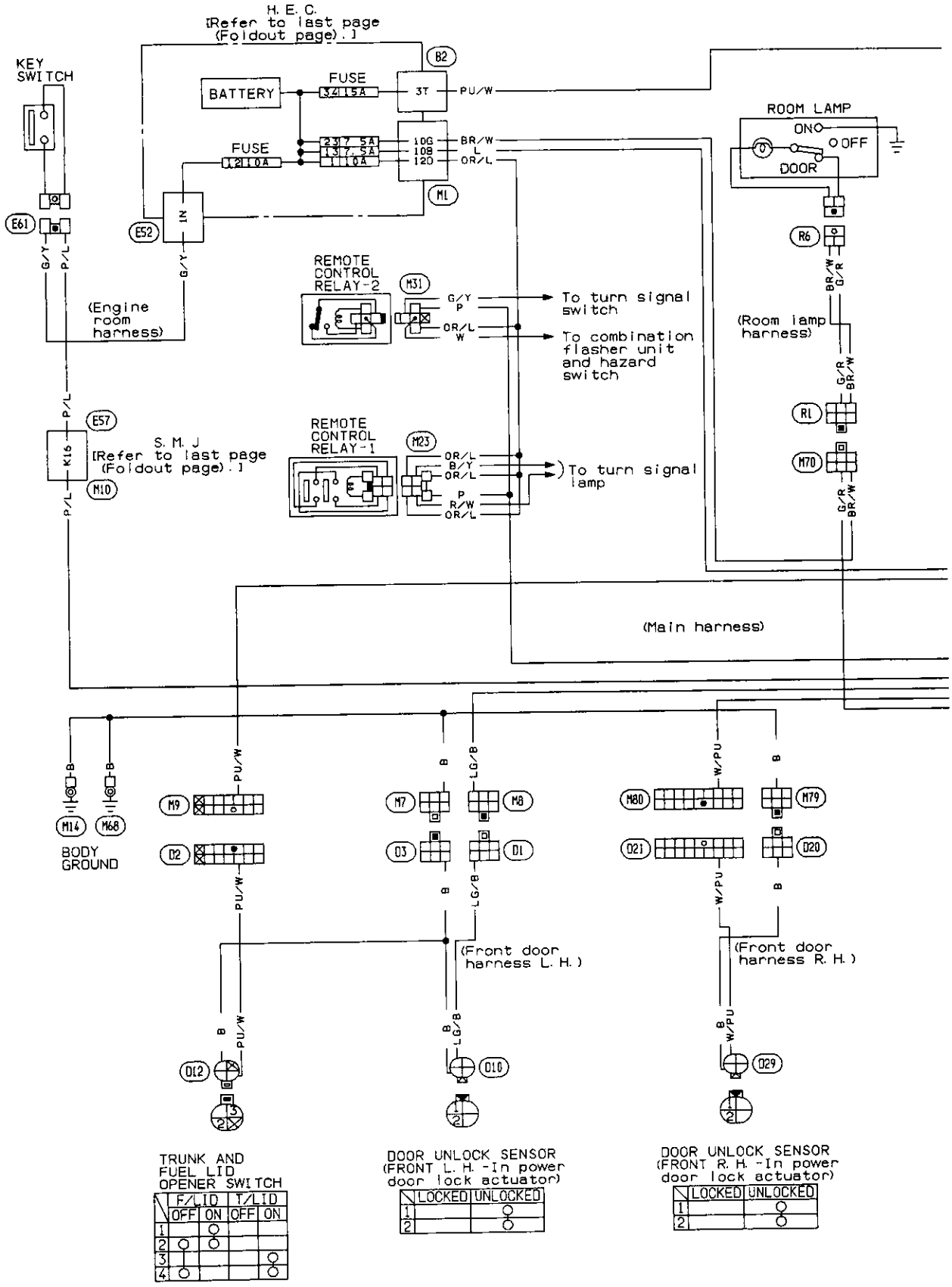


Door lock actuator

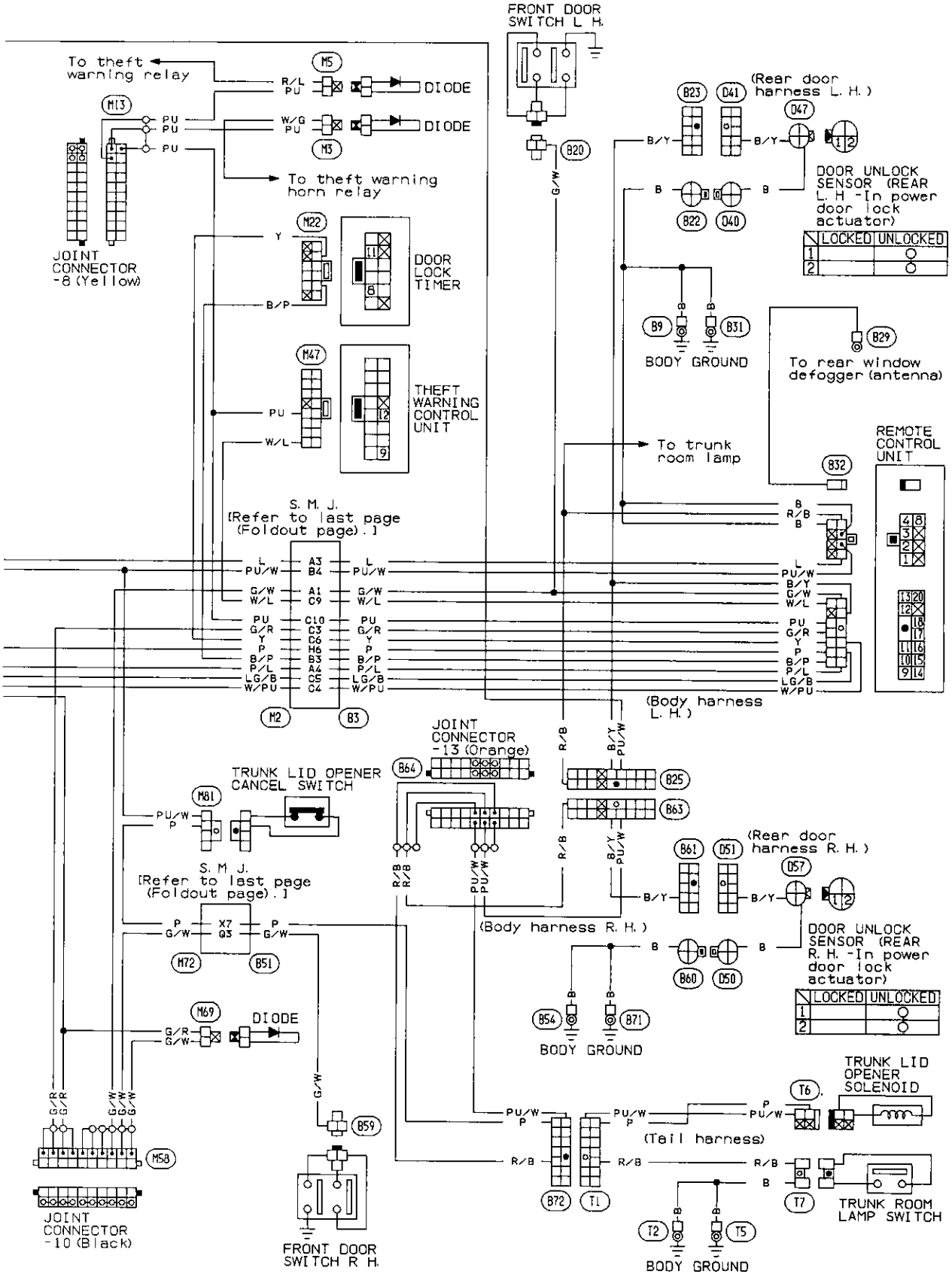
Terminals		Operation
⊕	⊖	
⑤③	⑤④	Lock
⑤④	⑤③	Unlock

Remote Control System

WIRING DIAGRAM

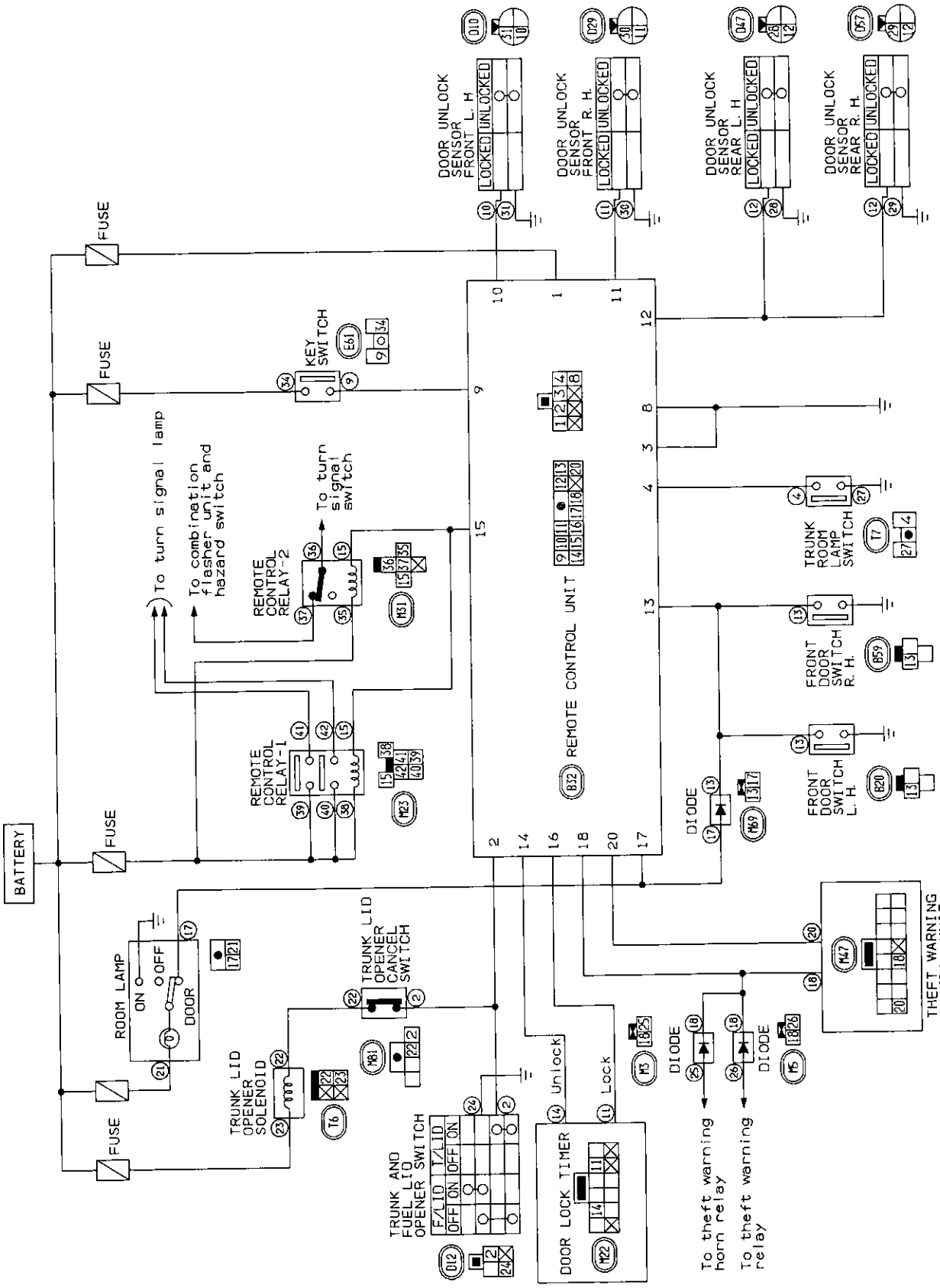


Remote Control System (Cont'd)



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Circuit Diagram for Quick Pinpoint Check

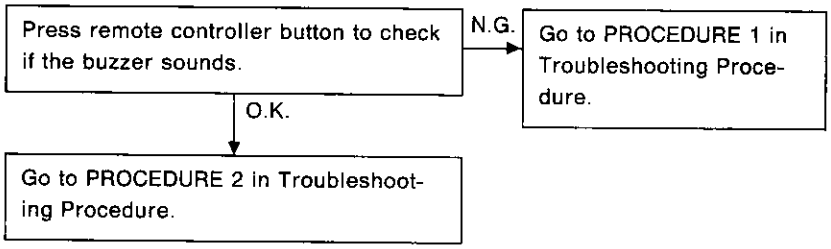


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Preliminary Inspection

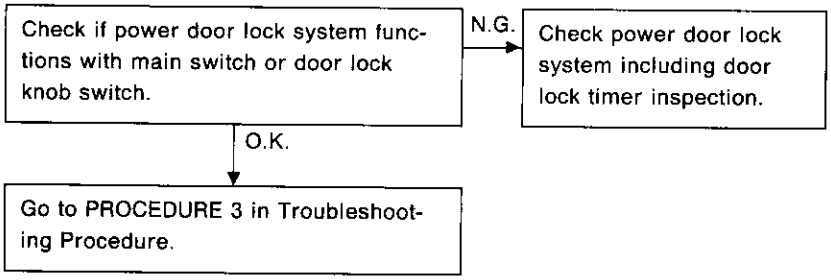
PRELIMINARY INSPECTION PROCEDURE 1

All functions of remote control system function.



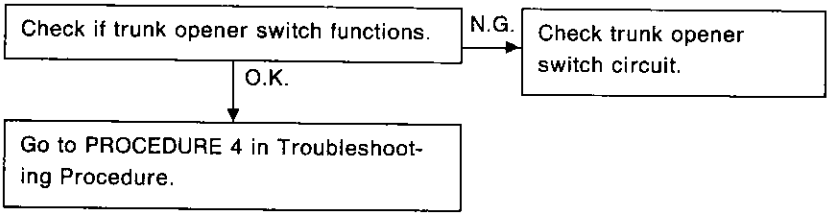
PRELIMINARY INSPECTION PROCEDURE 2

Door lock and unlock does not function.



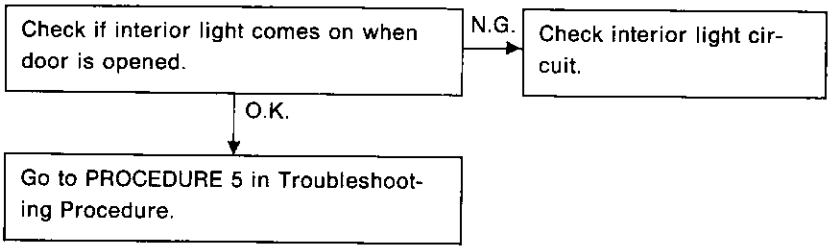
PRELIMINARY INSPECTION PROCEDURE 3

Trunk open function does not function.



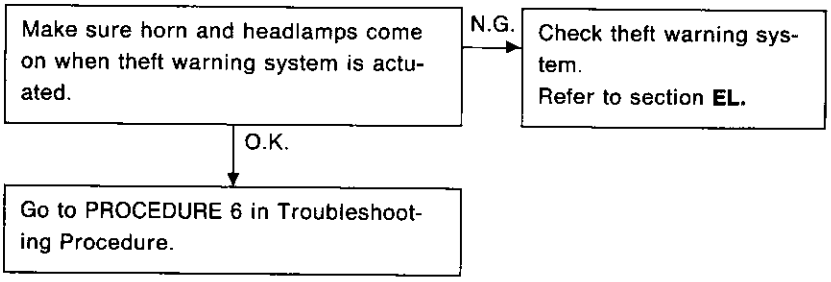
PRELIMINARY INSPECTION PROCEDURE 4

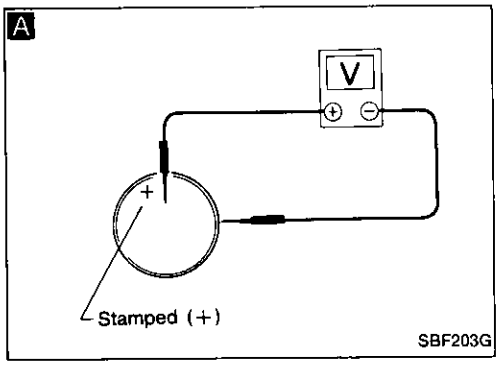
Interior light does not function.



PRELIMINARY INSPECTION PROCEDURE 5

Panic alarm does not function.





Troubleshooting Procedure

PROCEDURE 1

Remote controller buzzer does not sound when the button is pressed.

A

CHECK REMOTE CONTROLLER BATTERY.
Remove battery and measure voltage across battery positive and ground terminals ⊕ and ⊖.

Measuring terminal		Standard value
⊕	⊖	
Battery positive terminal ⊕	Battery positive terminal ⊖	3V or more

N.G. → Replace battery.

O.K. ↓

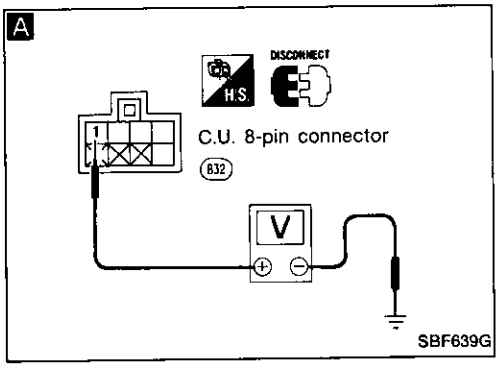
1) Push door lock button of remote controller before installing battery.
2) Reset battery in remote controller to make sure the buzzer sounds twice.

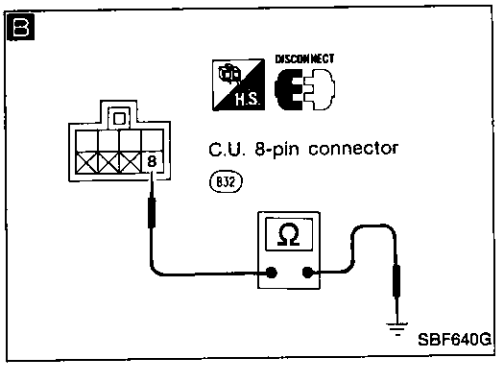
O.K. → Check system operation.

N.G. ↓

Replace controller.

Note:
Remote controller does not function if battery is not set correctly.





PROCEDURE 2

All remote controls do not function even if remote controller buzzer does sound.

A

CHECK MAIN POWER SUPPLY AND GROUND CIRCUIT.
1) Remove key from ignition.
2) Disconnect 8-pin connector from control unit. Check voltage across remote control unit terminal ① and GND.
Battery voltage should exist.

N.G. → Check power supply harness.

O.K. ↓

B

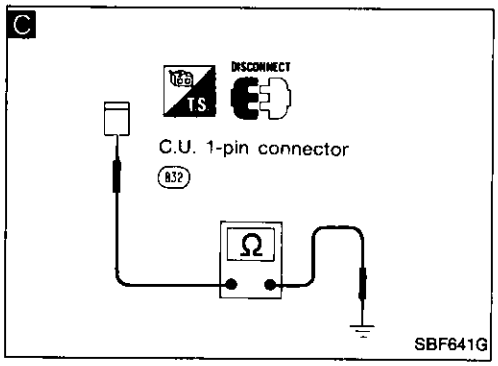
Check continuity between terminal ⑧ and GND.
Continuity should exist.

N.G. → Check GND harness.

O.K. ↓

Ⓐ

Troubleshooting Procedure (Cont'd)



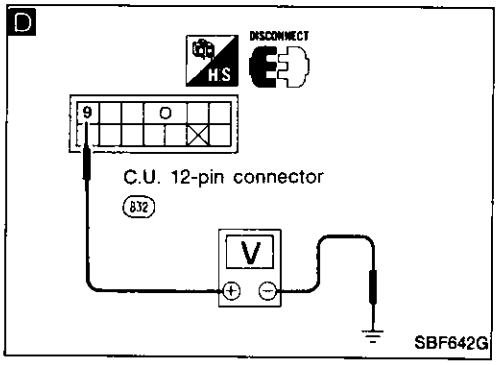
Ⓐ

C

CHECK ANTENNA CIRCUIT.
Disconnect 1-pin connector from control unit.
Check continuity between a terminal and GND.
Continuity should exist.

N.G. → Check antenna circuit.

O.K. ↓

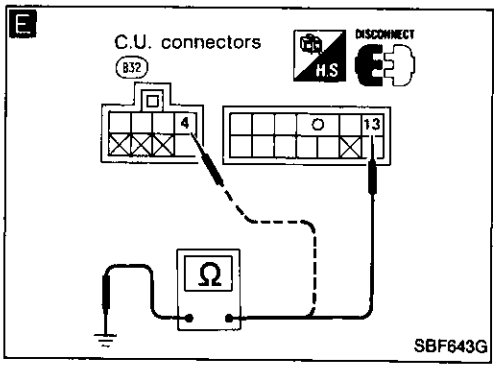


D

CHECK IGNITION KEY SWITCH CIRCUIT.
Disconnect 12-pin connector from control unit.
Check voltage across remote control unit terminal ⑨ and GND.
Does battery voltage exist?

Yes → Check ignition key switch.

No ↓



E

CHECK DOOR SWITCH CIRCUIT.
Close all doors and push trunk switch.
Check continuity between terminals ④ and GND, ⑬ and GND.
Does continuity exist?

Yes → Check door switch circuit.

No ↓

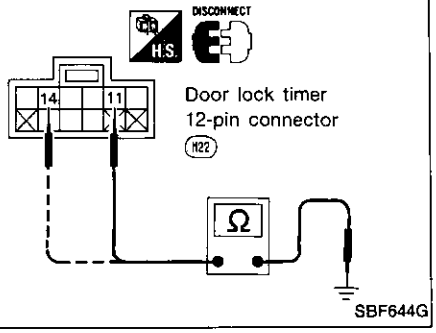
Replace control unit.

Troubleshooting Procedure (Cont'd)

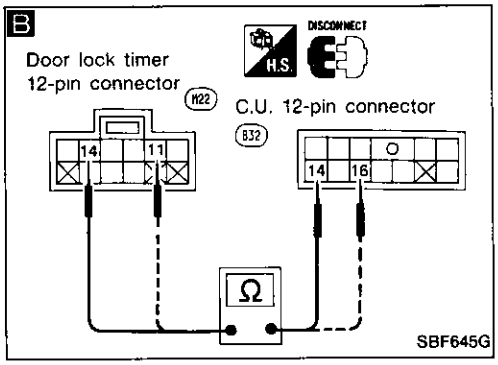
PROCEDURE 3

Door lock and unlock remote control do not function. Everything else does not function.

A



B



A

CHECK DOOR LOCK AND UNLOCK SIGNAL FOR DOOR LOCK TIMER.

1) Remove key from ignition.
2) Close all doors and trunk.
3) Remove door lock timer 12-pin connector.
   Push remote controller buttons and check continuity between terminals ⑪ and GND, ⑭ and GND.

Terminals	Operation	Continuity
⑪ - GND	Lock	Yes
	Unlock	No
⑭ - GND	Unlock	Yes
	Lock	No

O.K. → Check power door lock system.

N.G. ↓

Does continuity exist continually?

Yes → Repair harness. (There might be incorrect grounding.)

No ↓

B

Remove remote control unit 12-pin connector.
Check continuity between remote control unit terminals and door lock timer.

Terminals	
Remote control	Door lock timer
⑭	⑭
⑯	⑪

Continuity should exist.

N.G. → Repair harness.

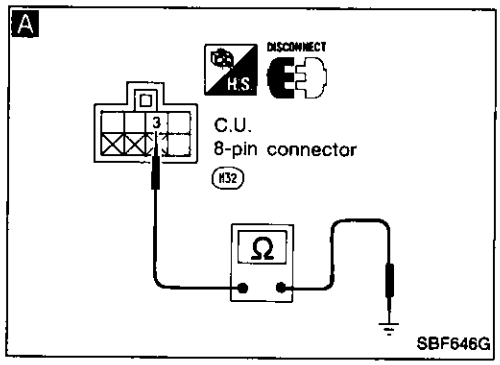
O.K. ↓

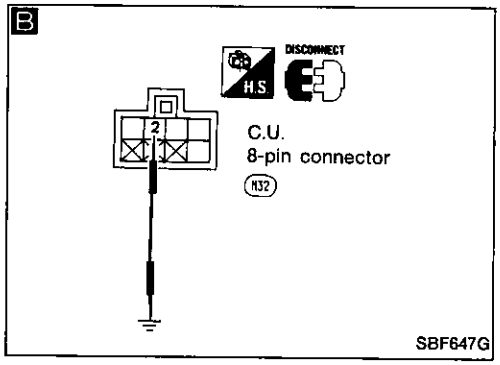
Replace remote control unit.

Troubleshooting Procedure (Cont'd)

PROCEDURE 4

Trunk open remote control does not function. Everything else does function.





A

CHECK GROUND CIRCUIT FOR TRUNK OPEN FUNCTION.
Disconnect 8-pin connector from remote control unit.
Check continuity between terminal ③ and ground.
Continuity should exist.

N.G. → Repair harness.

O.K. ↓

B

Ground remote control unit connector terminal ②.
Does trunk lid opener function?

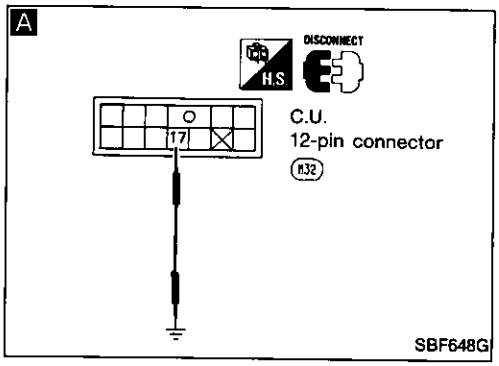
No → Check trunk lid opener circuit.

Yes ↓

Replace control unit.

PROCEDURE 5

Interior light does not function. Everything else does function.



A

CHECK INTERIOR LIGHT CIRCUIT.
Disconnect remote control unit 12-pin connector.
Ground remote control unit connector terminal ⑰.
Does interior light function?

No → Check interior light circuit.

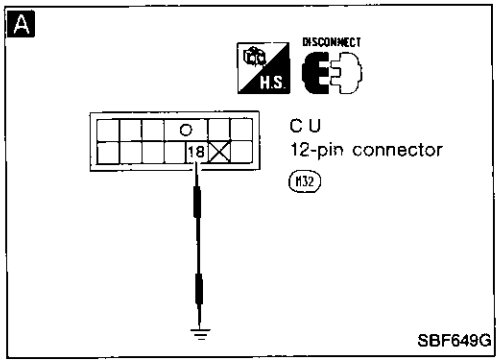
Yes ↓

Replace control unit.

Troubleshooting Procedure (Cont'd)

PROCEDURE 6

Panic alarm function does not function. Everything else does function.



A

CHECK PANIC ALARM CIRCUIT.
Disconnect 12-pin connector from remote control unit.
Ground remote control unit connector terminal ⑱.
Does panic alarm function function?

Yes → Replace control unit.

No ↓

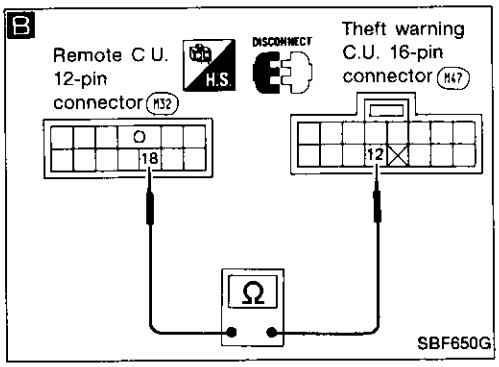
B

Disconnect 16-pin connector from theft warning control unit.
Check continuity between terminals ⑱ of remote control unit connector and ⑫ of theft warning control unit.
Does continuity exist?

Yes → Check theft warning system.
Refer to section **EL.**

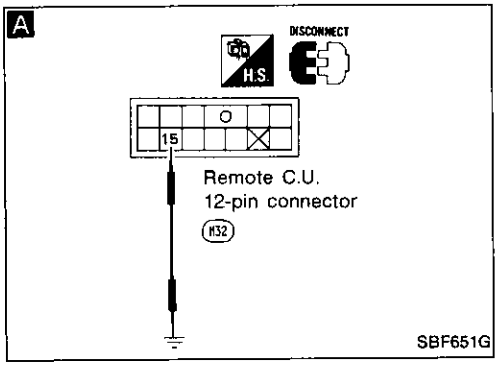
No ↓

Repair harness.



PROCEDURE 7

Hazard indicator flashing does not function. Everything else does function.



A

CHECK HAZARD INDICATOR FLASHING CIRCUIT.
Disconnect 12-pin connector from remote control unit.
Ground remote control unit connector terminal ⑮.
Does hazard indicator flashing function function?

Yes → Replace control unit.

No ↓

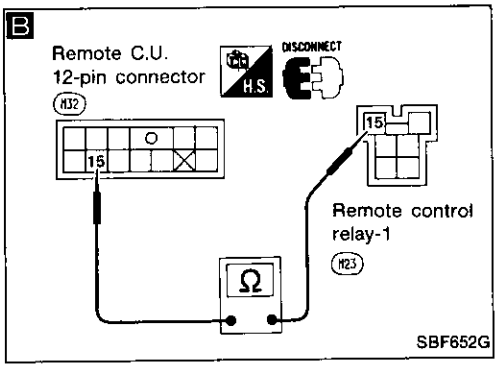
B

Disconnect remote control relay-1 connector.
Check continuity between terminals ⑮ of remote control unit connector and remote control relay-1.
Does continuity exist?

Yes → Check remote control relay-1 and harness.

No ↓

Repair harness.

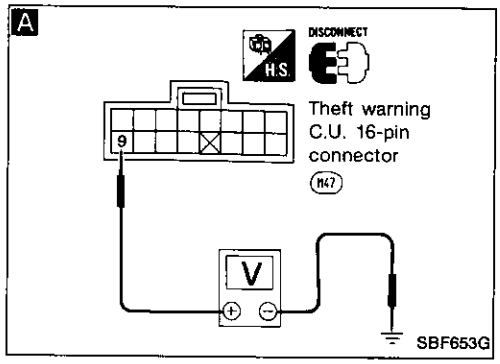


Troubleshooting Procedure (Cont'd)

PROCEDURE 8

Theft warning is actuated when door is unlocked or trunk lid is opened with remote control.

A



CHECK THEFT WARNING CANCEL SIGNAL CIRCUIT.

1) Disconnect theft warning control unit 16-pin connector.
2) Remove key from ignition.
3) Close all doors and trunk lid.
   Check voltage between terminal ⑨ and GND when door unlock remote control function is operated.

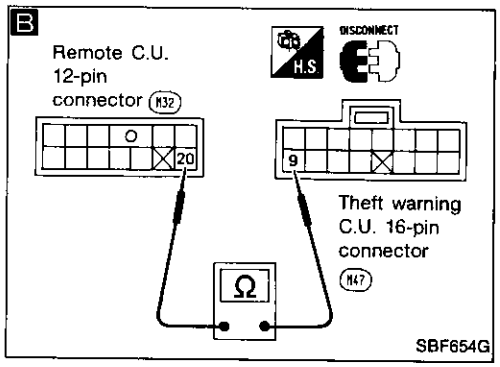
Terminal	Operation	Voltage
⑨ - GND	Door is unlocked	12V → 0V → 12V

Does voltmeter gauge move when door is unlocked?

Yes → Check theft warning system.
Refer to section **EL.**

No ↓

B



Disconnect 12-pin connector from remote control unit.
Check continuity between terminals ⑳ of remote control unit and ⑨ of theft warning control unit.
Does continuity exist?

Yes → Replace remote control unit.

No ↓

Repair harness

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) Open the trunk.
(2) Close and lock all doors.
(3) Insert and remove the key from the ignition six times within 10 seconds.

ID code entry:

(4) ID code entry is enabled when the driver's door lock knob switch is manually unlocked → locked during this "setting" mode.
(5) If remote controller input is provided (for example, if door is locked using the remote controller) during this ID code entry enable state, a new ID code can be entered.
(6) A maximum of four ID codes can be entered in succession by again turning the driver's door lock knob switch unlocked → locked.
(7) This ID code entry enable state and setting mode remain until any one of the doors is opened.

Note

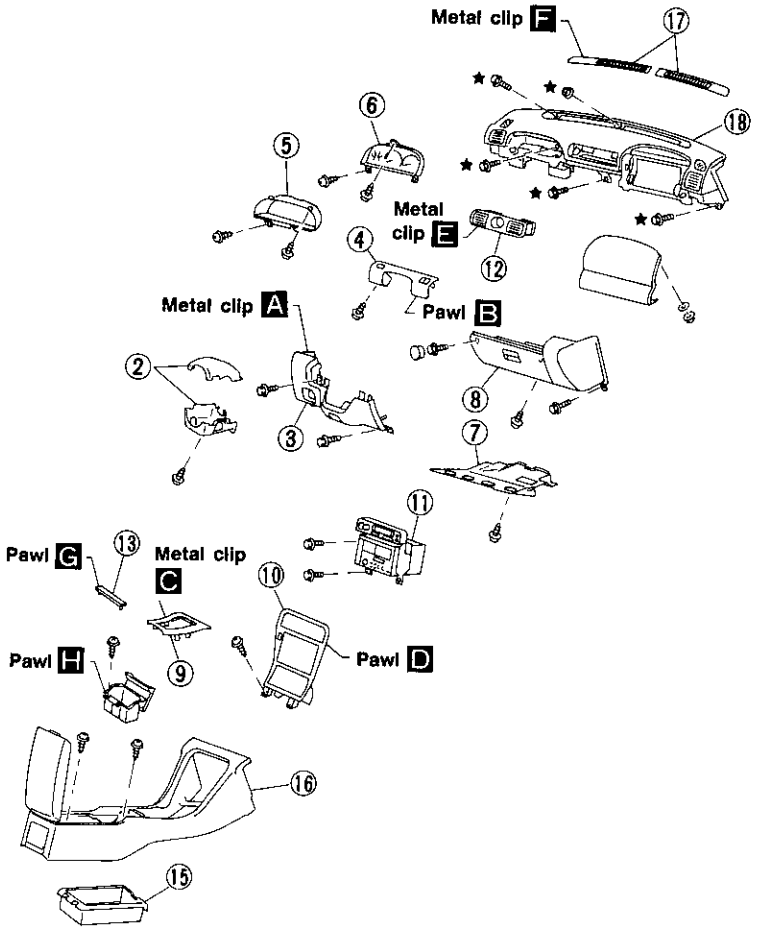
- **If a new ID code is entered in the "setting" mode, the previously entered three ID codes are deleted.**
- **If the same ID code as that existing in the memory is input, the entry is canceled, and no ID code will be entered.**
- **Entry of maximum four ID codes is allowed and any attempt to enter more will be ignored.**
- **All 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.**

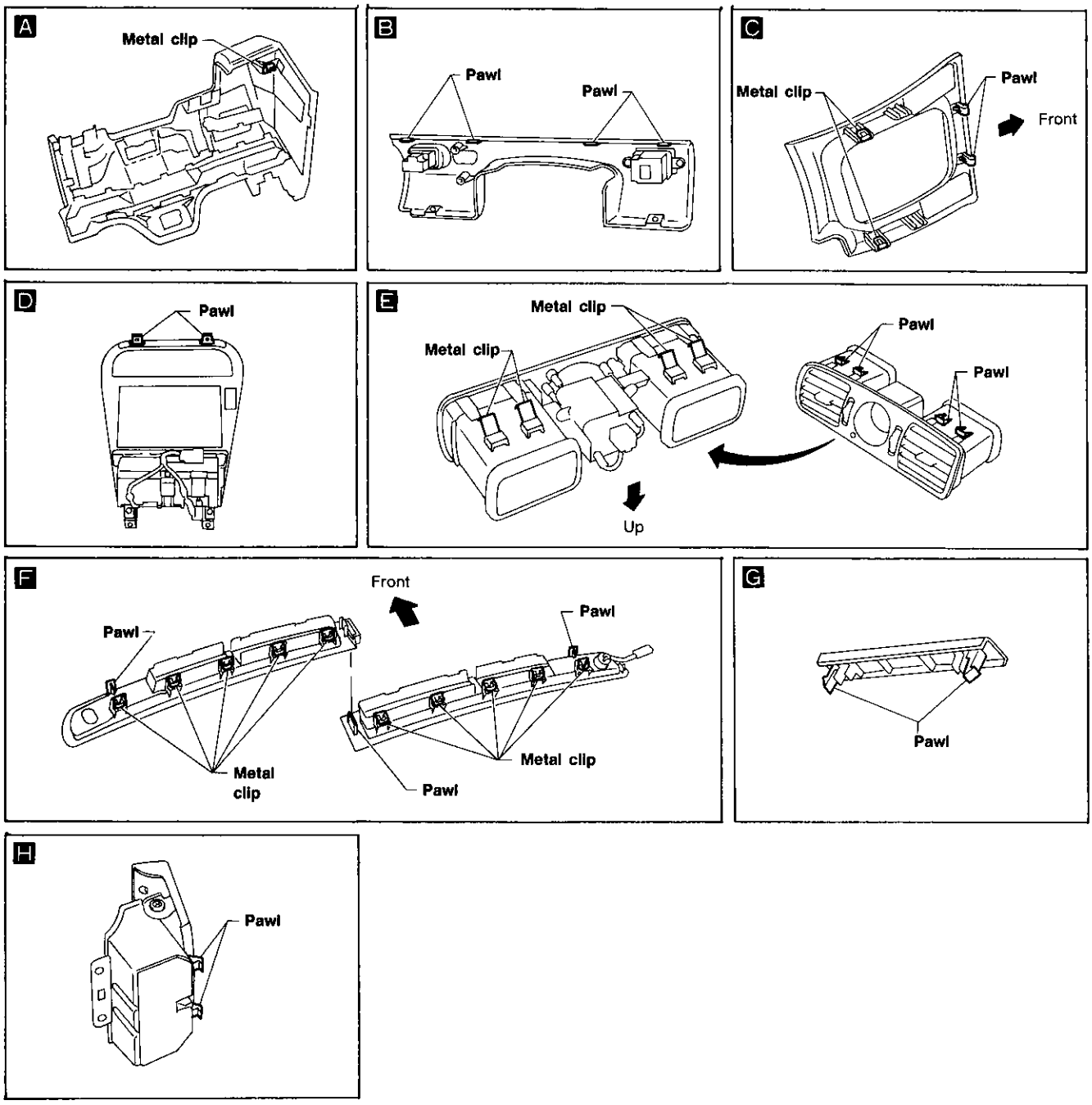
CAUTION:

a. Disconnect ground terminal from battery in advance.
b. Disconnect air bag system line in advance.
c. Be careful not to scratch pad and other parts.

REMOVAL — Instrument panel assembly

① Remove steering wheel. Disengage air bag system in advance.
② Remove steering column cover.
③ Remove lower instrument panel on driver's side.
④ Remove cluster lid D.
⑤ Remove cluster lid A.
⑥ Remove combination meter.
⑦ Remove lower instrument cover on passenger side.
⑧ Remove glove box assembly.
⑨ Remove A/T finisher.
⑩ Remove cluster lid C.
⑪ Remove A/C control and radio.
⑫ Remove center ventilator.
⑬ Remove console mask.
⑭ Remove cup holder.
⑮ Remove console pocket.
⑯ Remove lower instrument center panel.
⑰ Remove defroster grille.
⑱ Remove front pillar garnish. Refer to "SIDE AND FLOOR TRIM" in "Interior" for details.
⑲ Remove instrument panel and pads.




A
Metal clip
B
Pawl
Pawl
C
Metal clip
Pawl
Front
D
Pawl
E
Metal clip
Metal clip
Pawl
Pawl
Up
F
Front
Pawl
Pawl
Metal clip
Metal clip
Pawl
G
Pawl
H
Pawl

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Interior

SIDE AND FLOOR TRIM — Passenger room

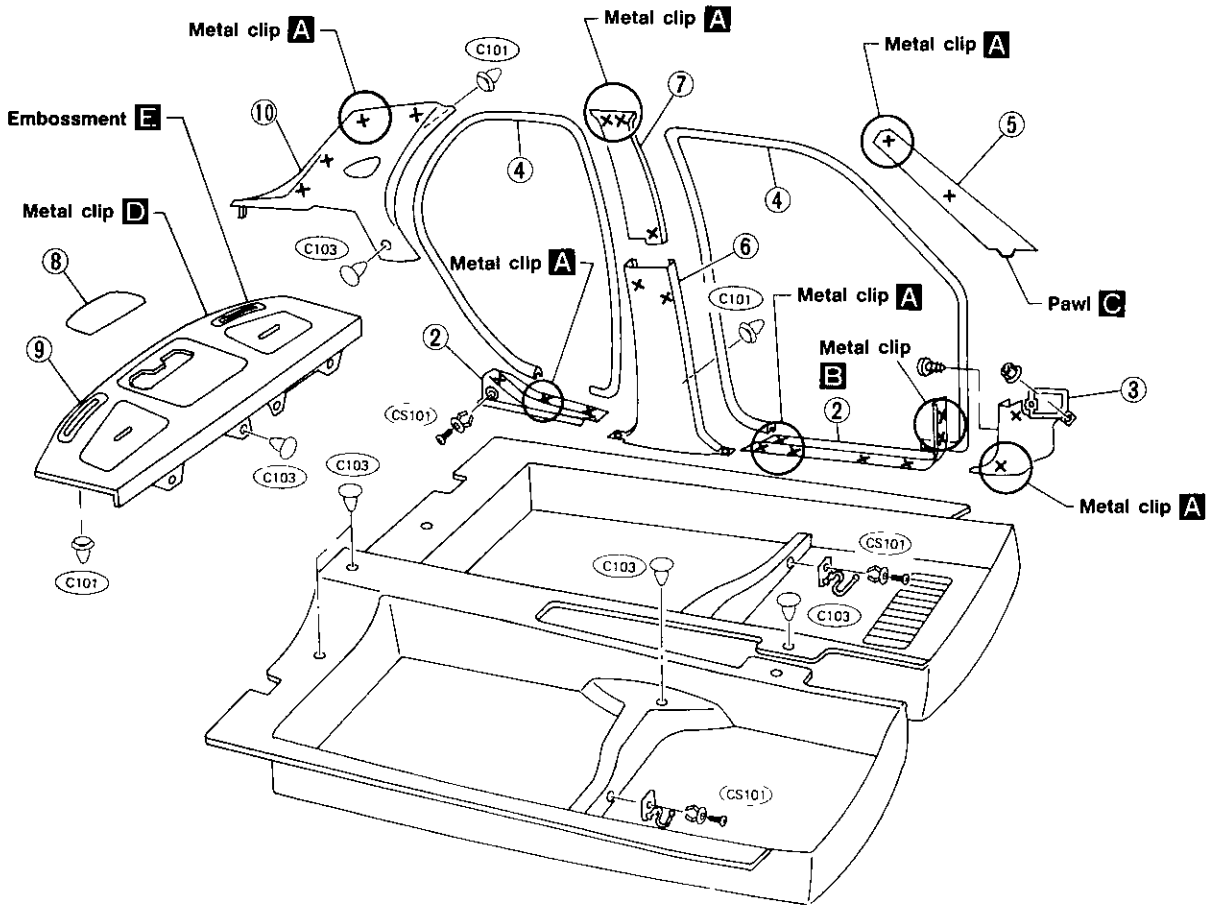
CAUTION:

a. Be sure to remove front, center and rear pillar garnishes by pulling them straight out. Use a long flat-bladed screwdriver when removing metal clips from rear pillar garnish Ⓐ.

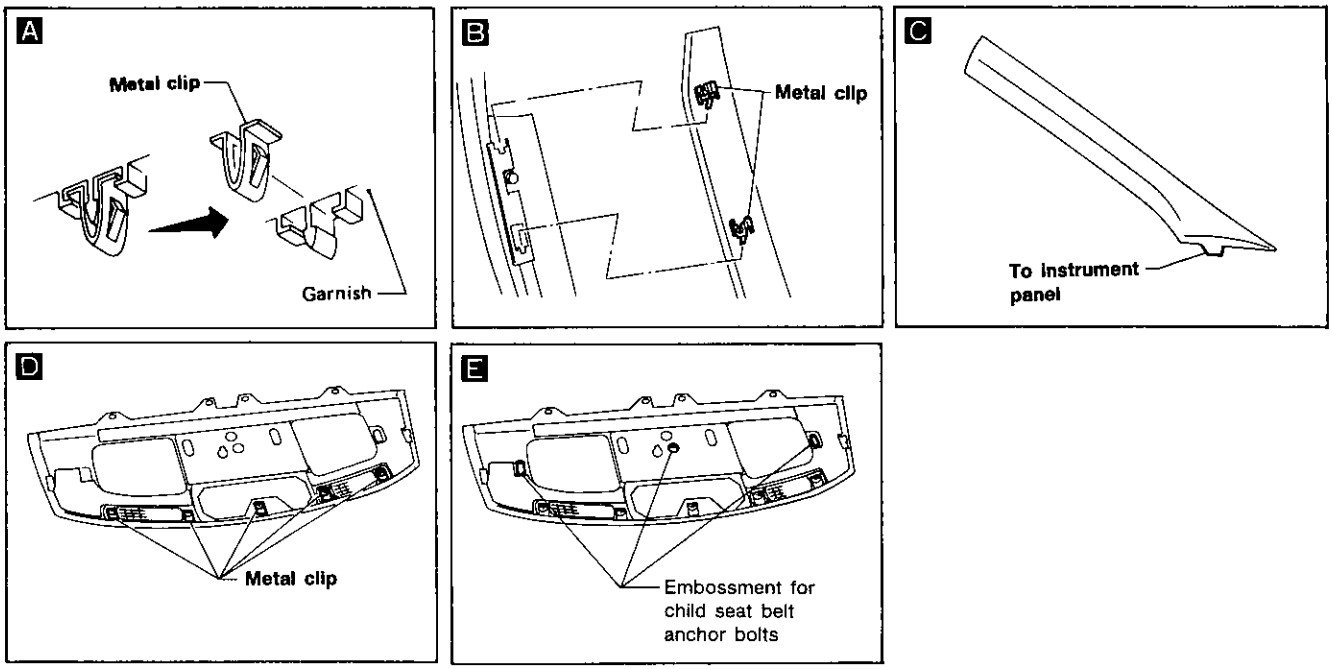
b. Wrap the tip of flat-bladed screwdriver with a cloth when removing metal clips from garnishes.

Removal — Body side trim

① Remove front and rear seats. For details, refer to "Front Seat" and "Rear Seat" in "SEAT".
② Remove front and rear kick plates.
③ Remove dash side lower finishers.
④ Remove front and rear body side welts.
⑤ Remove front pillar garnishes.
⑥ Remove center pillar lower garnishes.
⑦ Remove center pillar upper garnishes.
⑧ Remove high-mounted stop lamp.
⑨ Remove rear parcel shelf finisher.
⑩ Remove rear pillar garnishes.



Interior (Cont'd)



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ROOF TRIM

CAUTION:

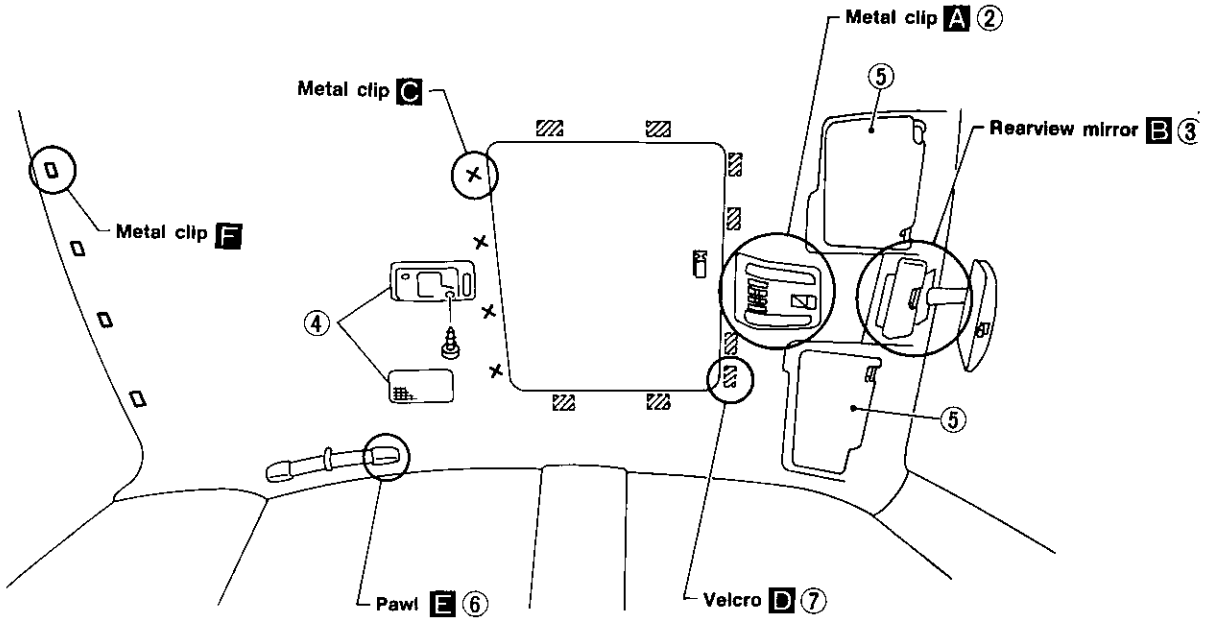
a. Front garnish is heavy. Always support each side of sun visor firmly when removing or installing front garnish.
b. Remove metal clip from rear of front garnish by pulling it toward rear of vehicle.
c. Headlining metal clip removal
1) Remove retainer from sun roof side.
2) Remove rear metal clip by pulling it straight down.
3) Remove metal clip from rear of sun roof by pulling it toward front of vehicle.

Removal — Headlining

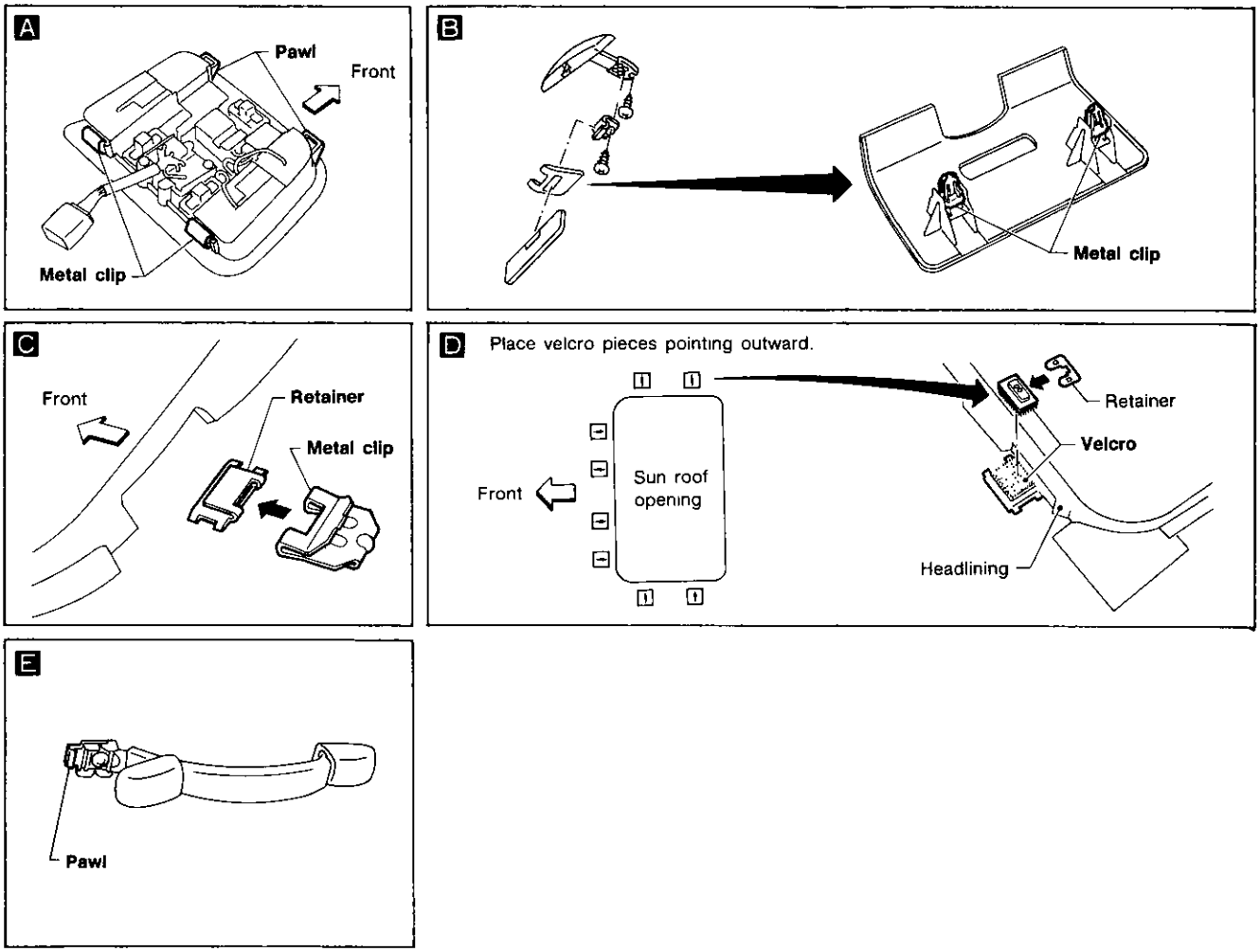
① Remove body side trim. Refer to "Removal — Body side trim" for details.
② Remove sun roof switch assembly.
③ Remove rearview mirror assembly.
④ Remove room lamp assembly.
⑤ Remove sun visors.
⑥ Remove assist grips.
⑦ Remove velcro retainers from sun roof opening.

Velcro

① Detach roof panel-side velcro pieces from headlinings using screwdriver.
② Secure detached velcro pieces to roof panel with retainers paying attention to installation direction.



Velcro

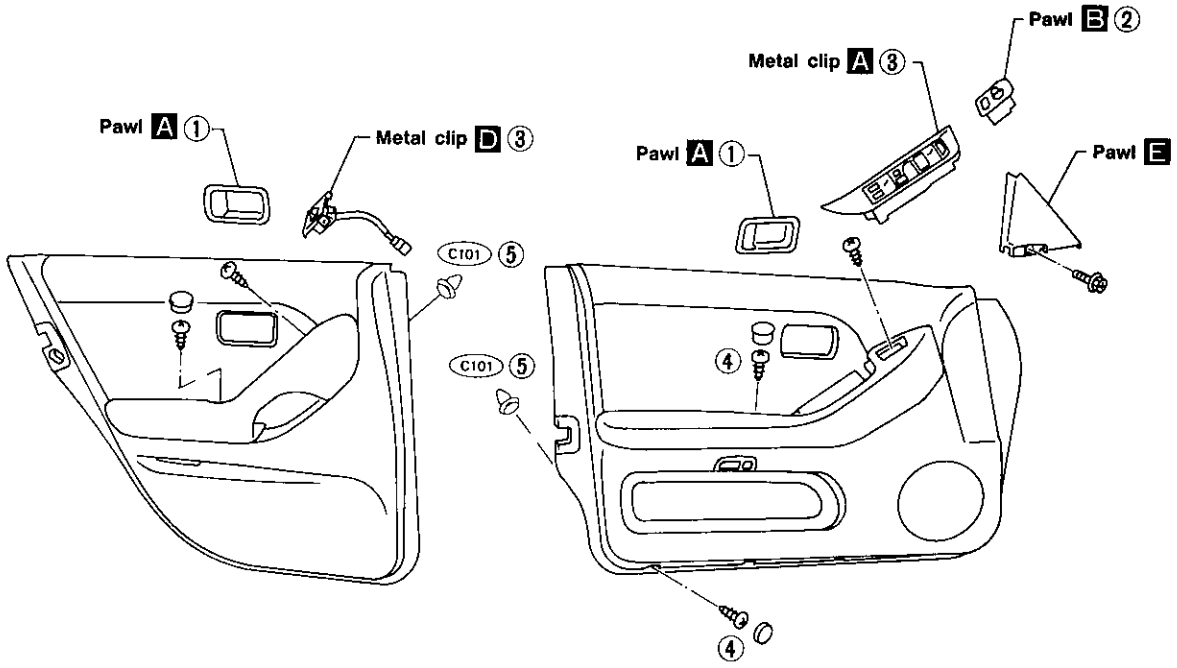

A
Pawl
Front
Metal clip
B
Metal clip
C
Front
Retainer
Metal clip
D
Place velcro pieces pointing outward.
Front
Sun roof opening
Retainer
Velcro
Headlining
E
Pawl

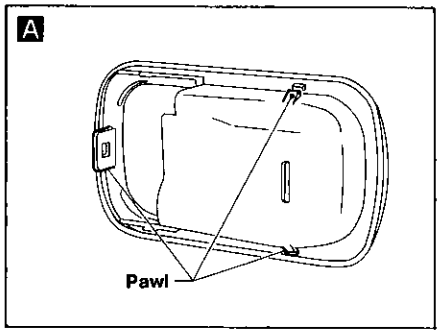
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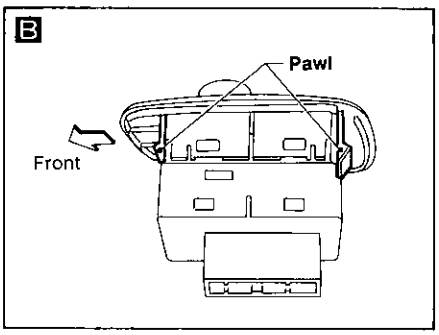
DOOR TRIM

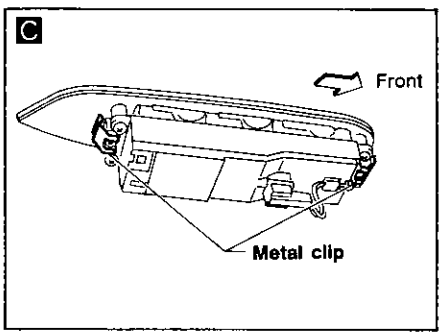
Removal — Door trim

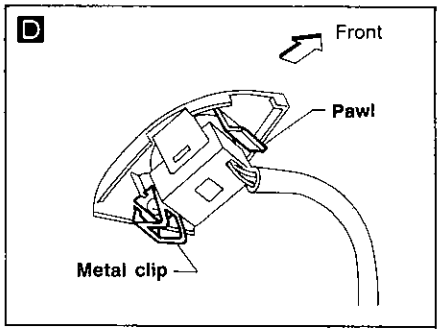
① Remove inside handle escutcheon.
② Remove door mirror switch.
③ Remove front and rear power window switches.
④ Remove eight screws.
⑤ Remove clips (C101) securing door finisher.
⑥ Lift out door finisher.

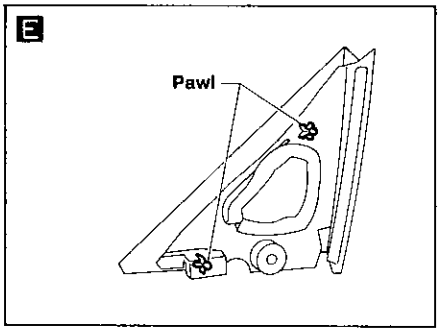






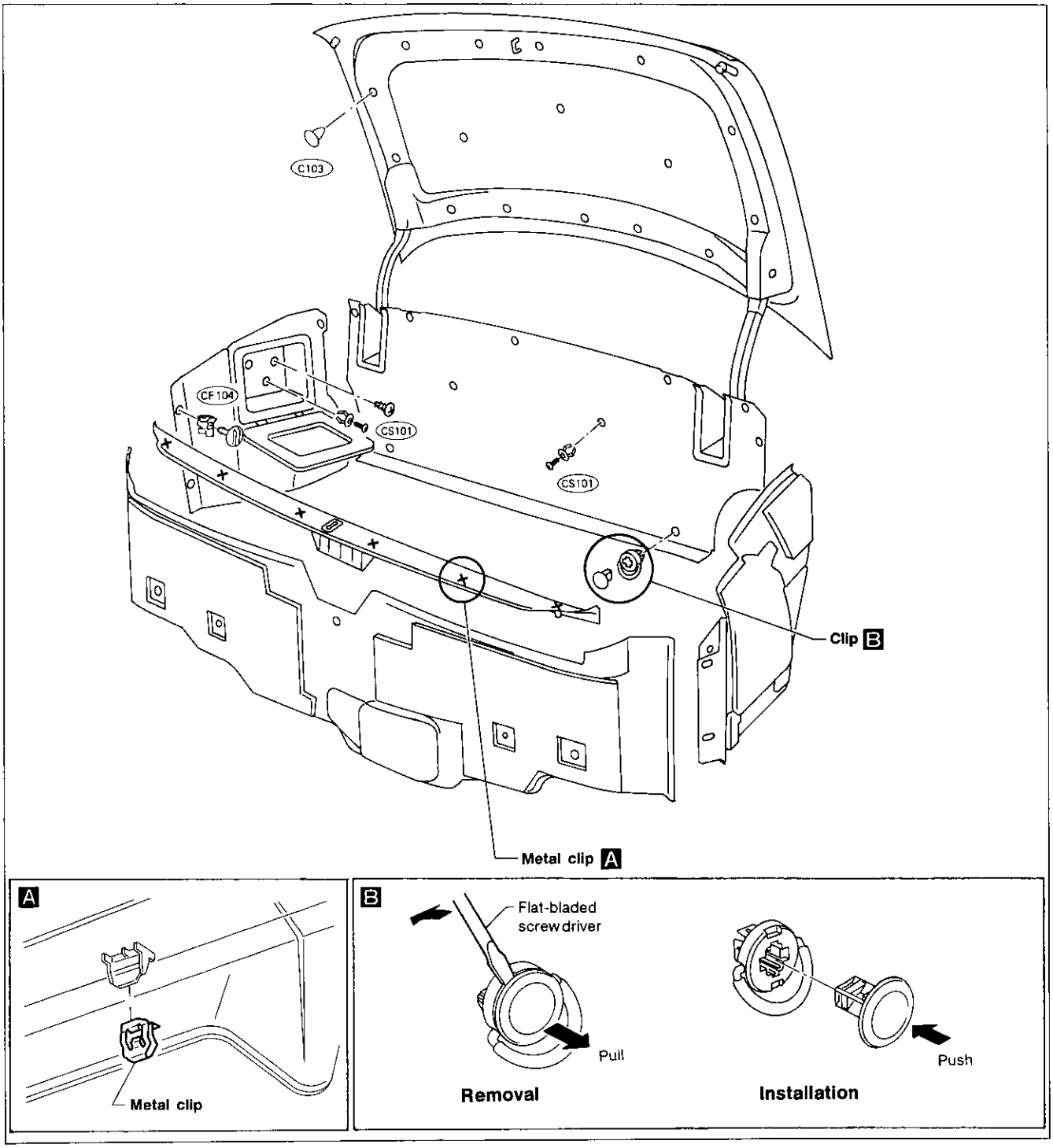




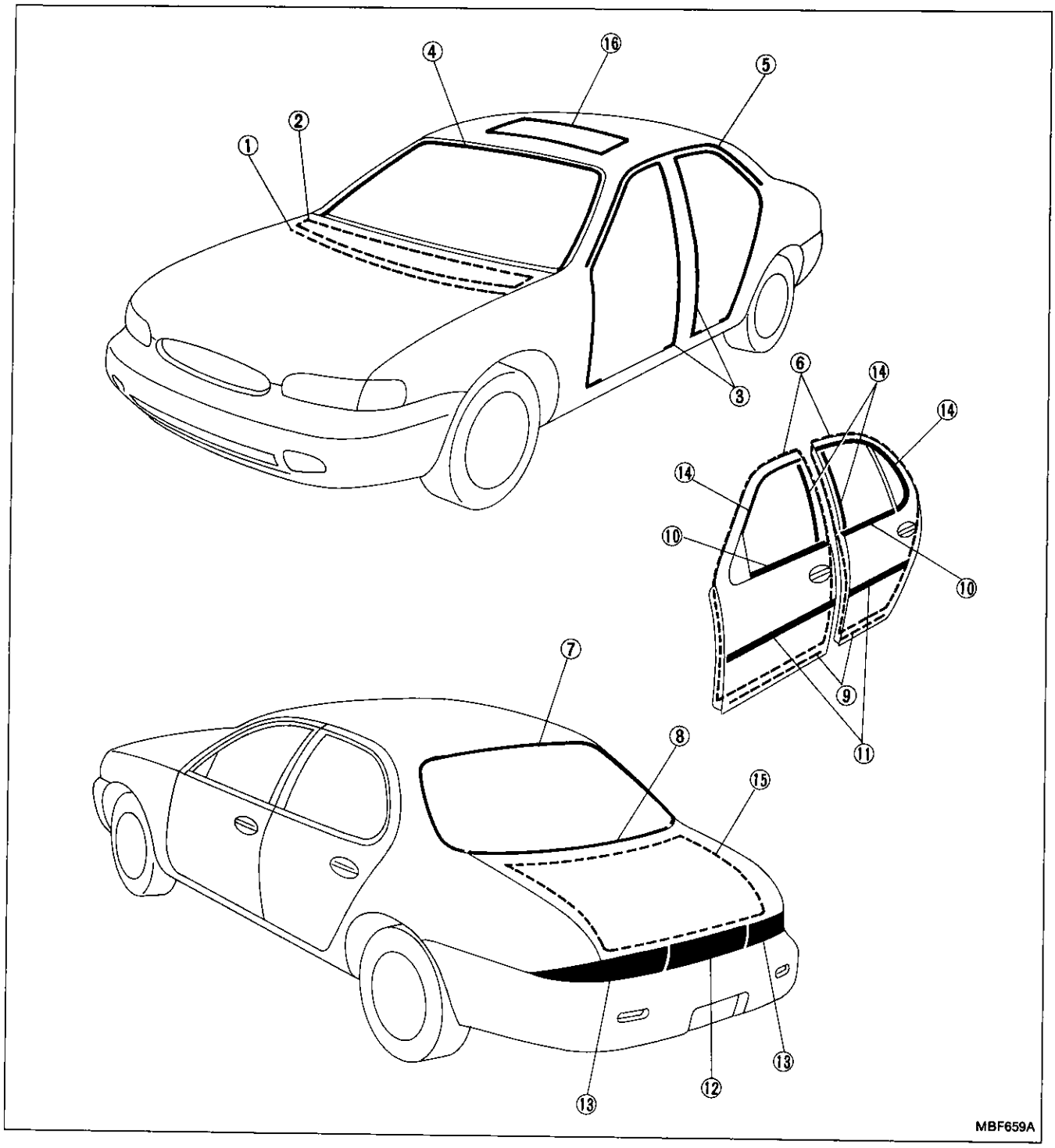


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LUGGAGE COMPARTMENT TRIM — Trunk space

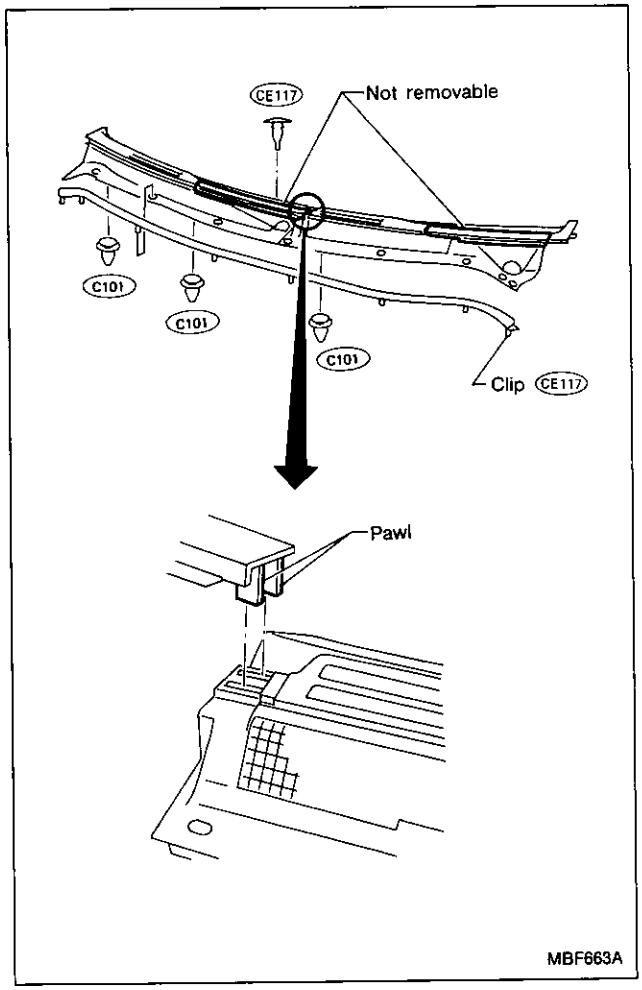


Exterior

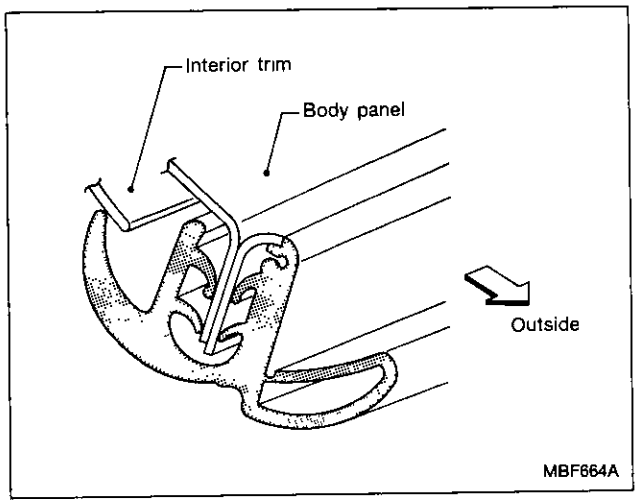


Exterior (Cont'd)

① ② Cowl top seal and cowl top grille



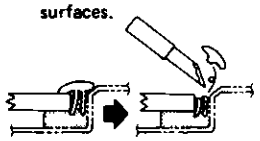
③ Body side welt



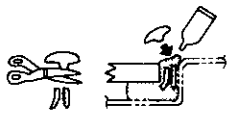
④ Windshield upper molding and side molding

Method 1

Cut off top portion of molding and clean glass and panel surfaces.



Apply sealant to top portion of molding.



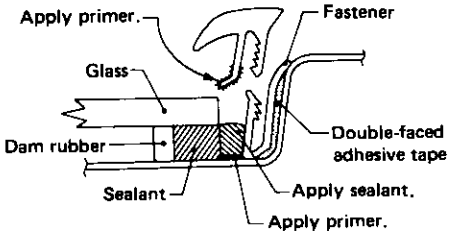
Cut off lower portion of new molding.



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.

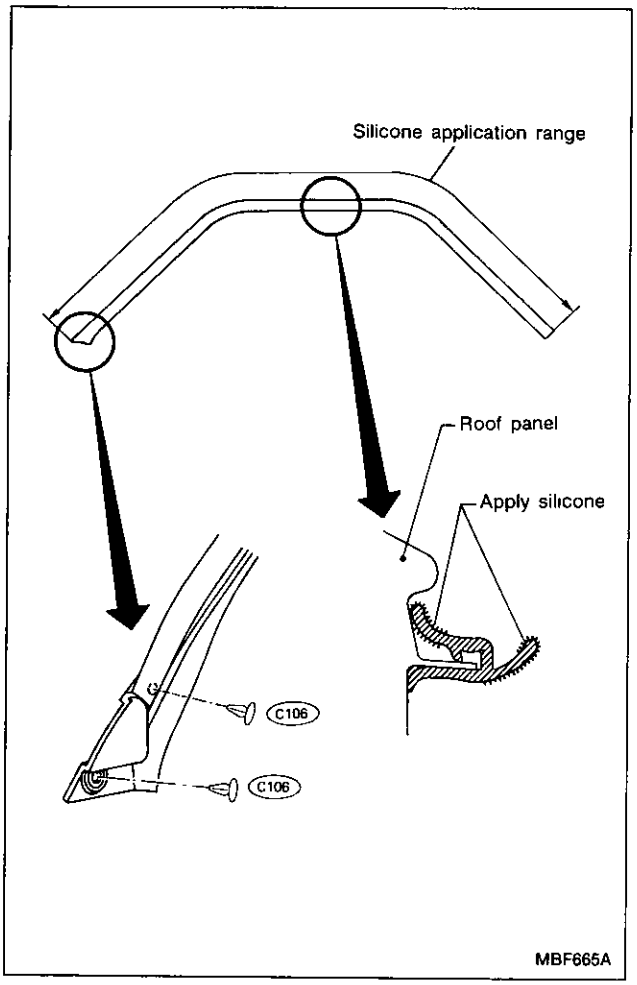


4. Install molding by aligning the molding mark located on center with vehicle center.
   Be sure to install tightly so that there is no gap around the corner.

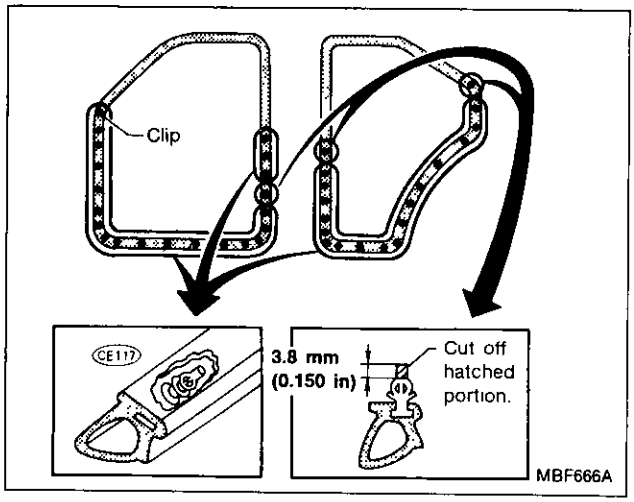
SBF161E

Exterior (Cont'd)

⑤ Drip molding



⑥ Door weatherstrip



⑦ Rear window upper molding and side molding

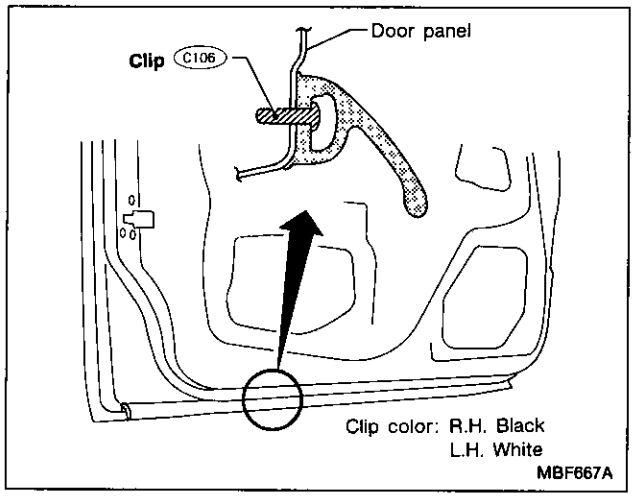
Basically the same as windshield upper molding and side molding.

Refer to ④ Windshield upper molding and side molding.

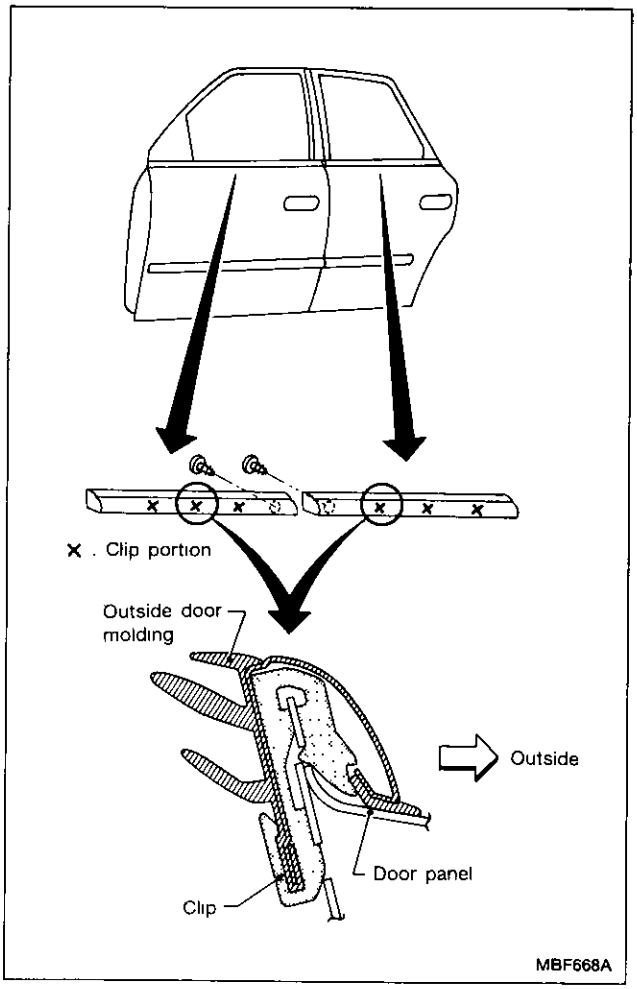
⑧ Rear window lower molding

Mounted with screws.

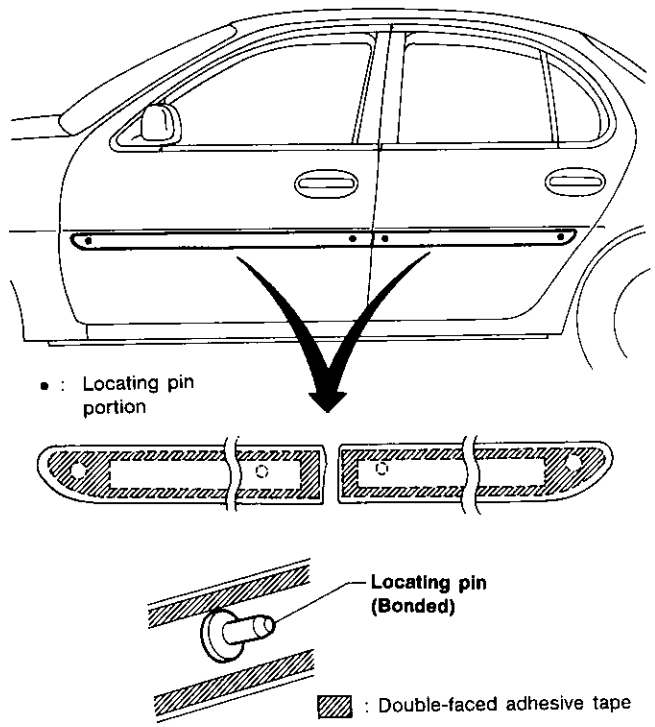
⑨ Door parting seal



⑩ Door outside molding

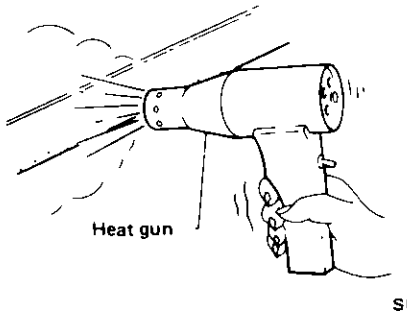


⑪ Side guard molding



- **Removal:**

1. Heat molding portion to 30 to 40°C (86 to 104°F) with a heat gun.



SBF455A

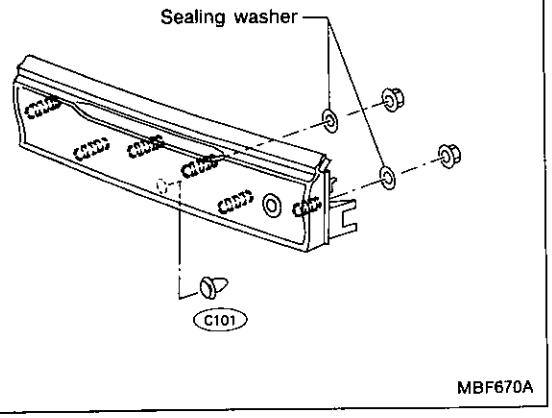
2. Raise end of molding and, while cutting off bonding agent, detach molding.

- **Installation:**

1. Remove all traces of bonding agent from body panel. Then clean contact face of body.
2. Heat body panel and molding to 30 to 40°C (86 to 104°F) with a heat gun. Then install molding.

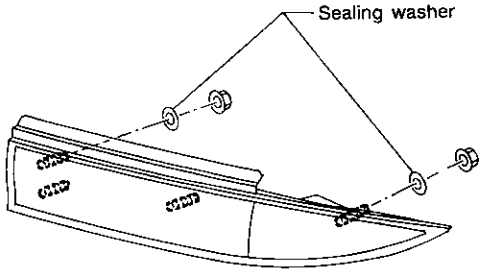
MBF669A

⑫ Rear garnish



MBF670A

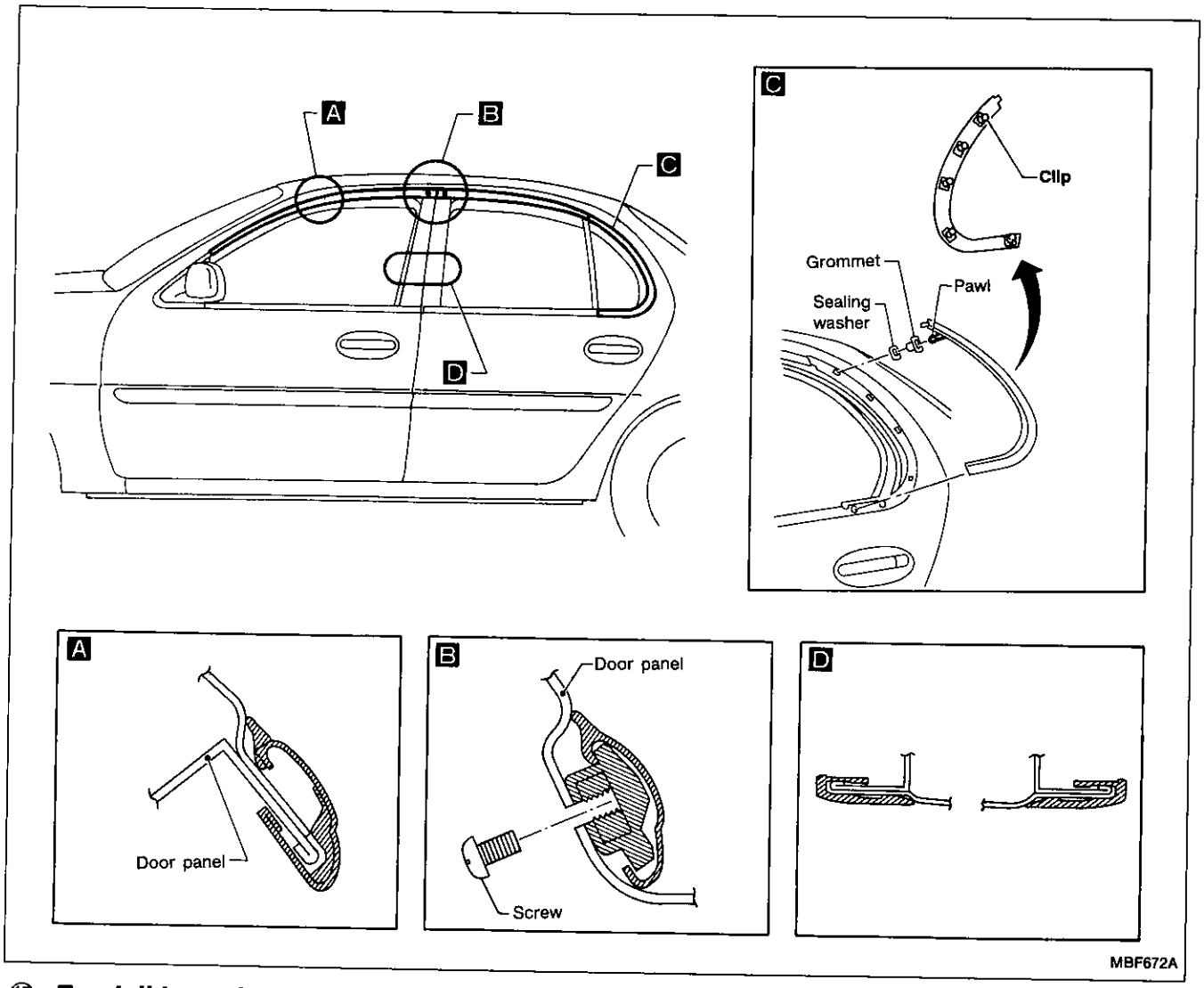
⑬ Rear combination lamp



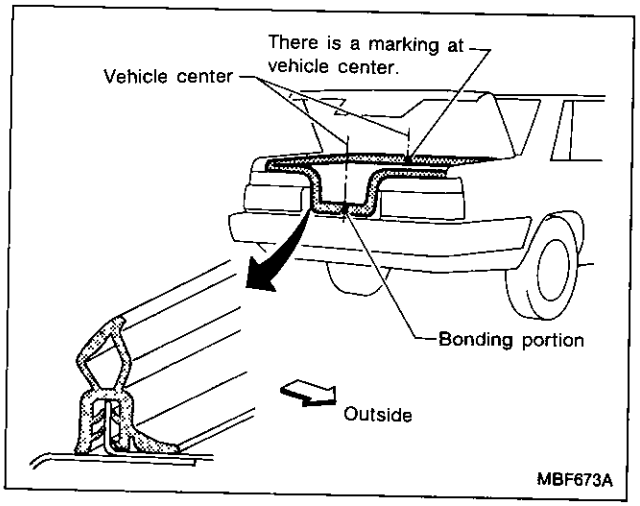
MBF671A

Exterior (Cont'd)

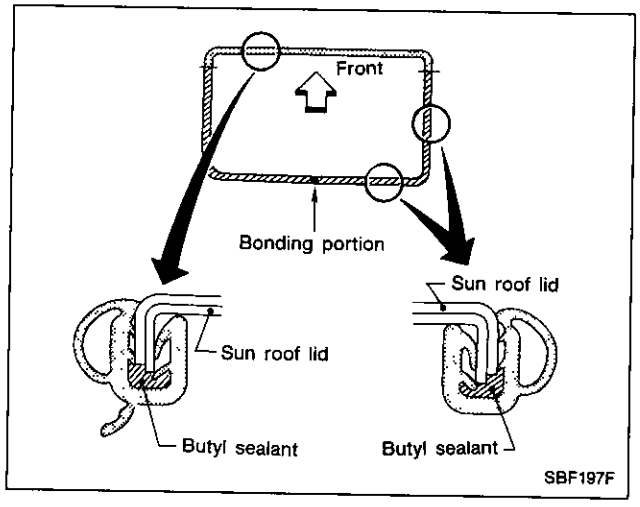
⑭ Front and rear door sash molding



⑮ Trunk lid weatherstrip



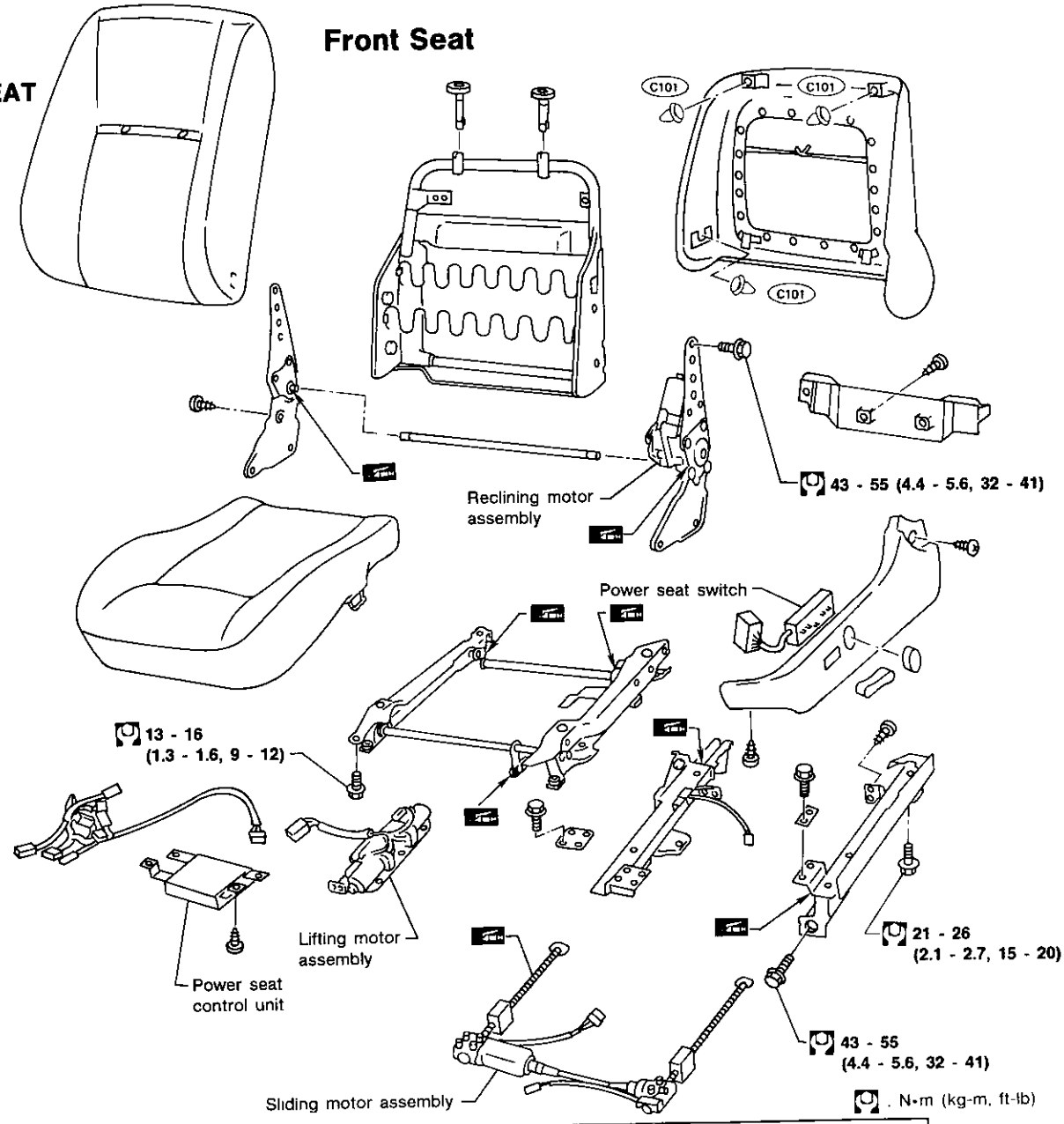
⑯ Sun roof weatherstrip

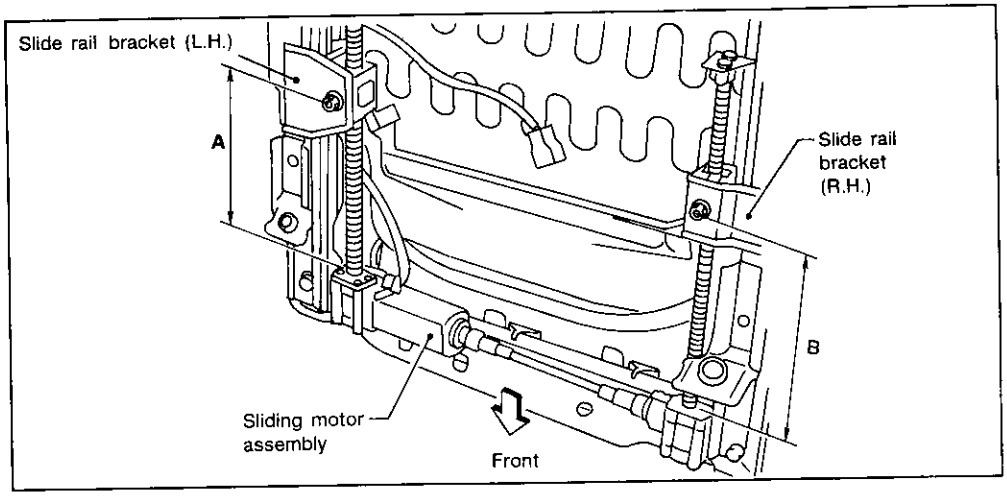


- When removing or installing the seat trim, carefully handle it to keep dirt out and avoid damage.

Front Seat

POWER SEAT



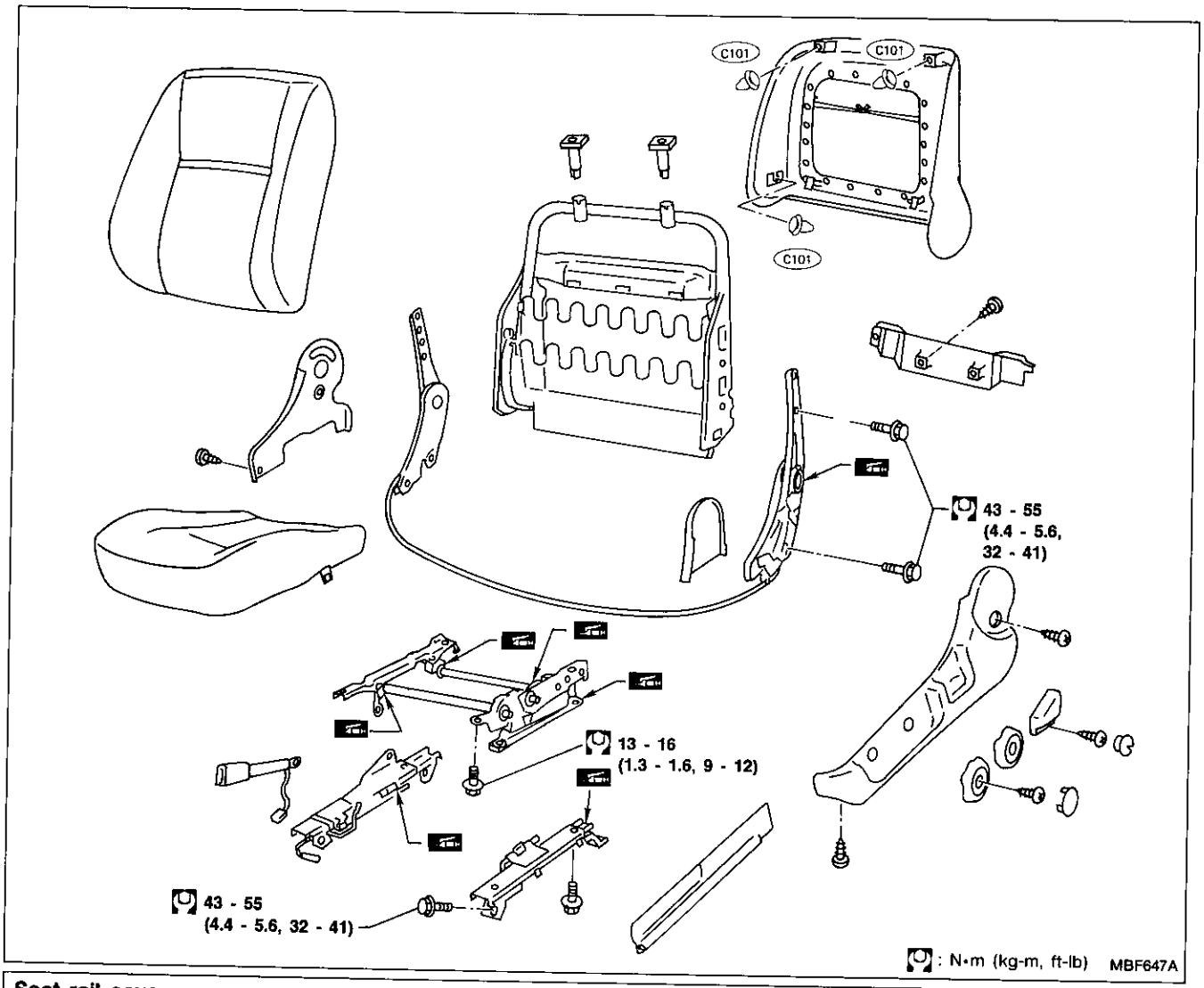


Sliding motor installation
When installing sliding motor, an equal distance should be placed between left/right slide rail brackets and sliding motor

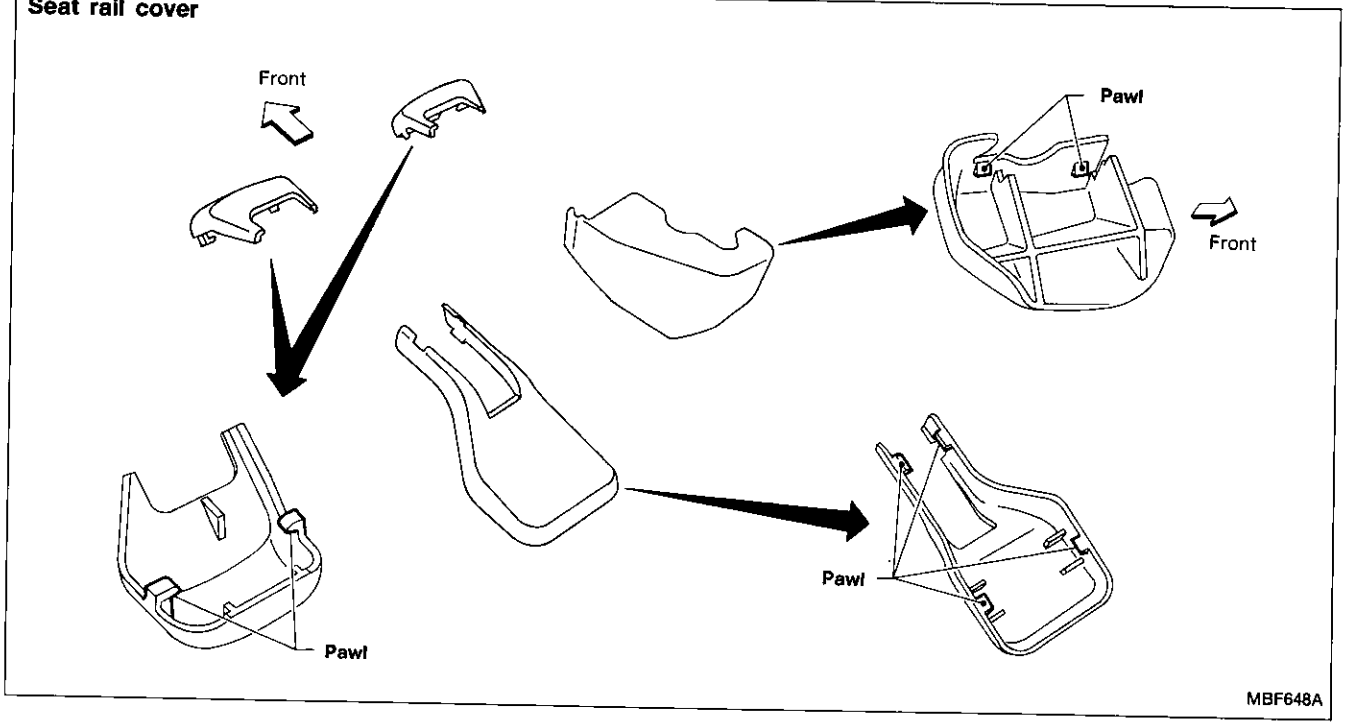
MBF646A

Front Seat (Cont'd)

MANUAL SEAT

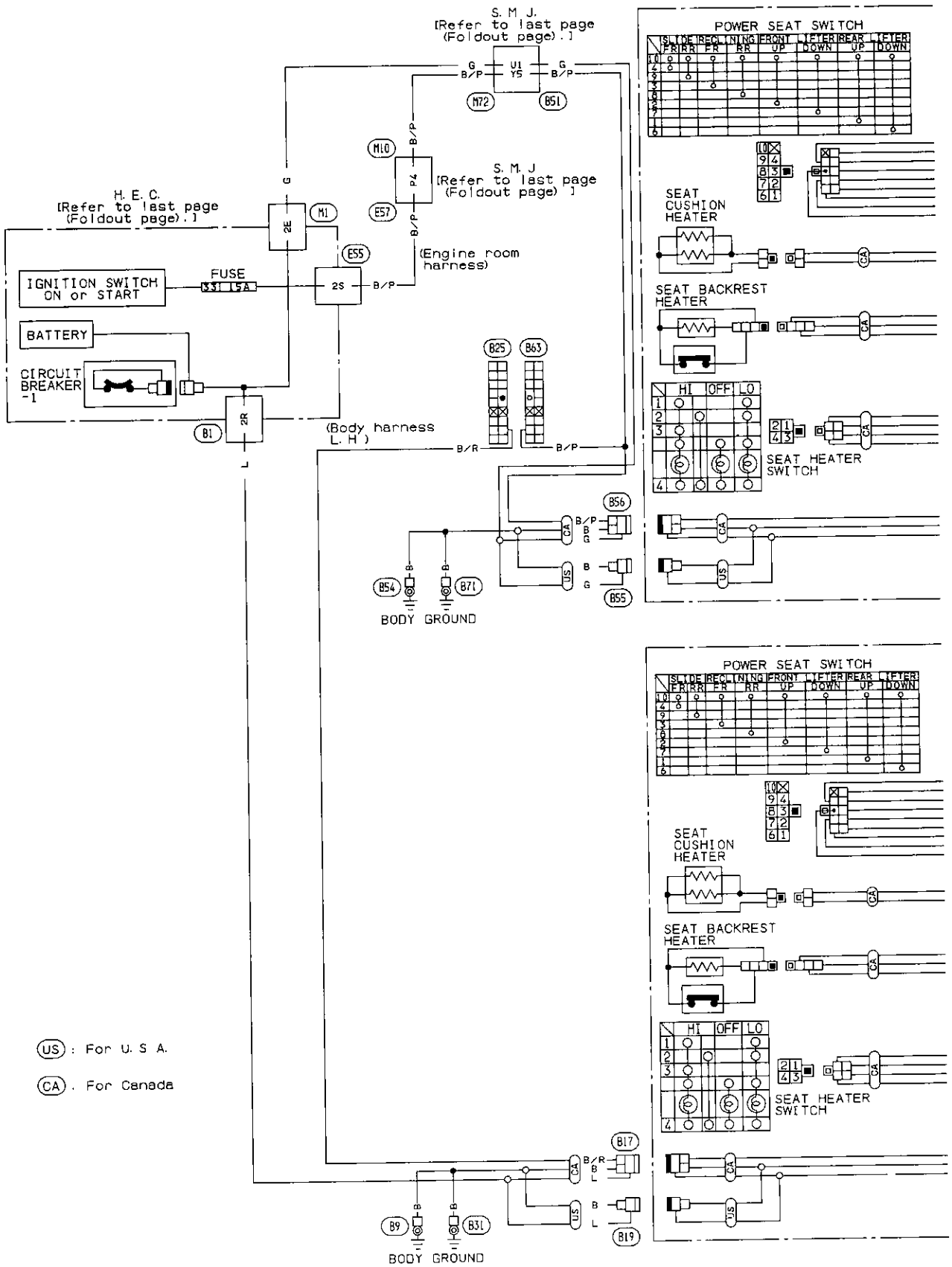


Seat rail cover

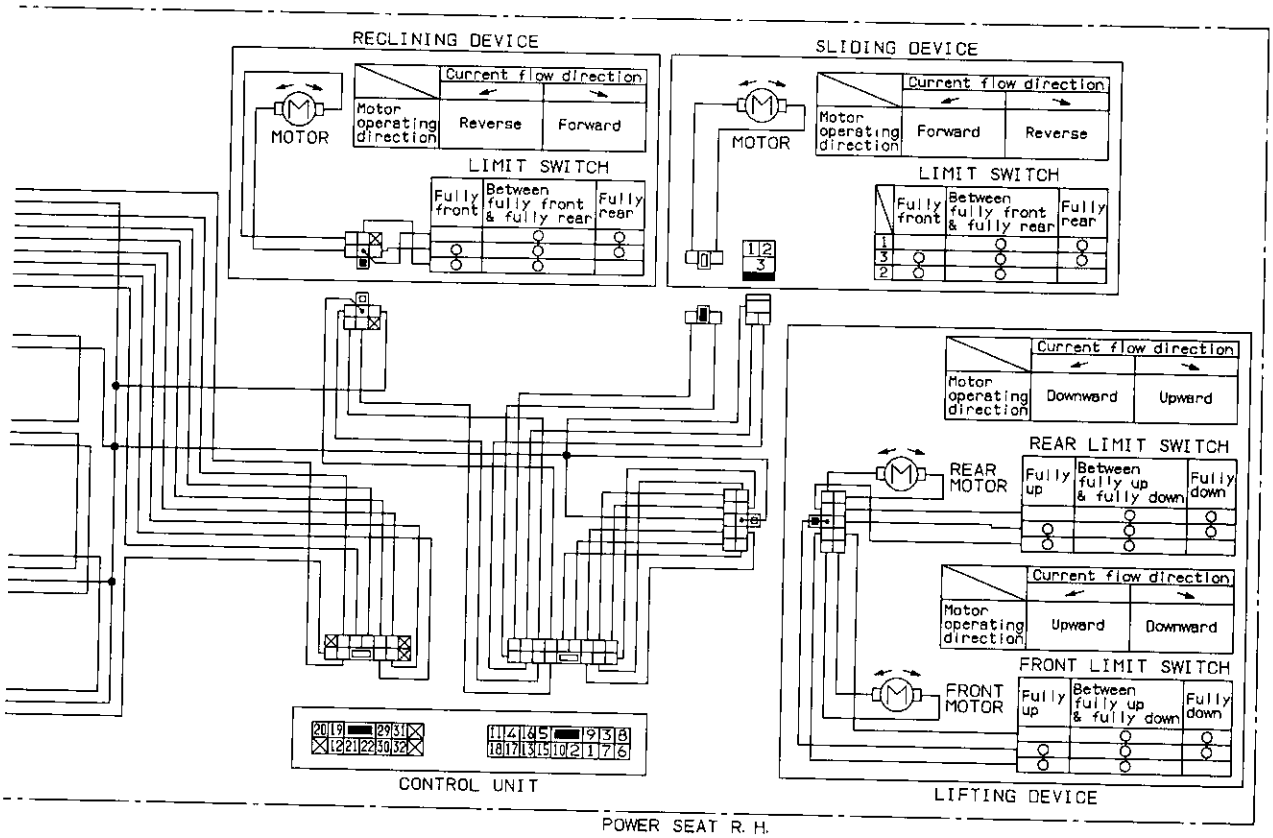


Front Seat (Cont'd)

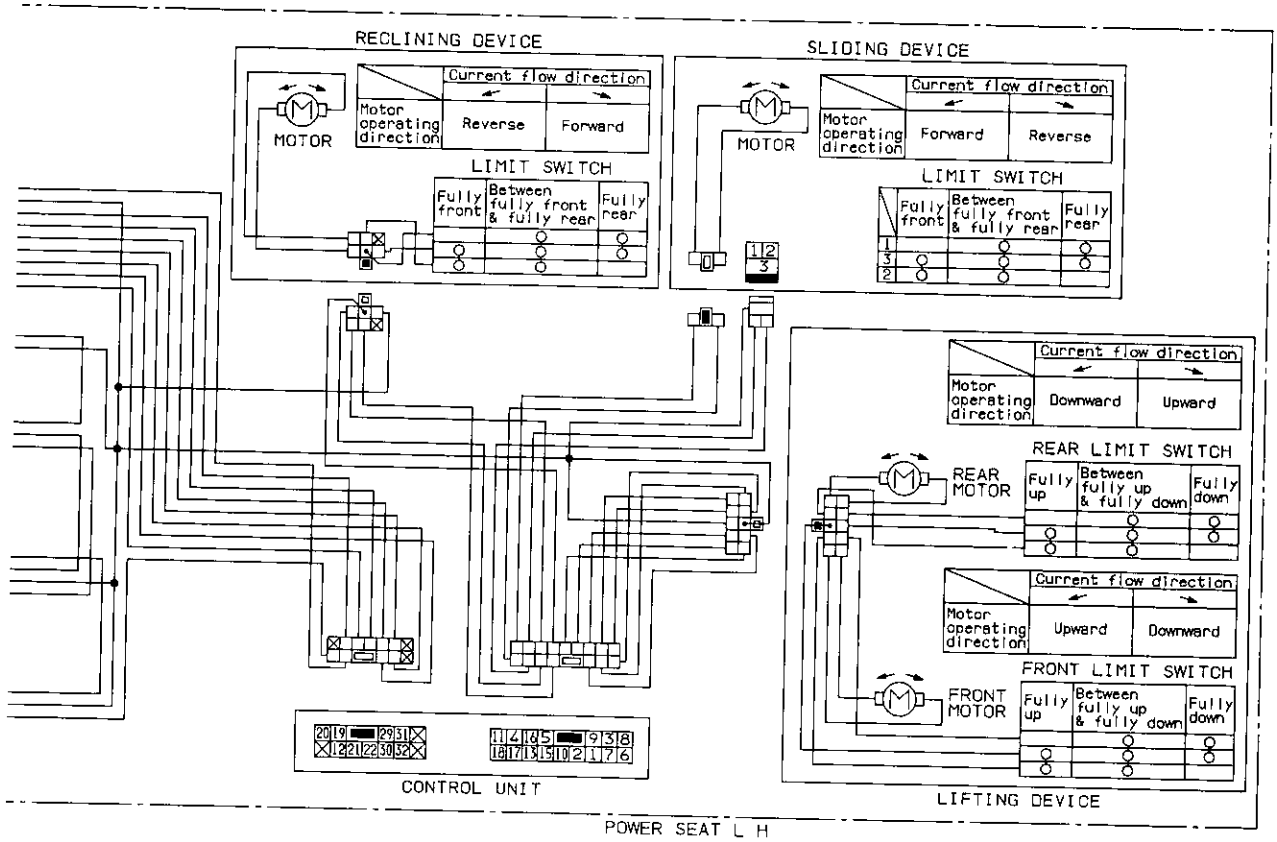
POWER SEAT/WIRING DIAGRAM



Front Seat (Cont'd)



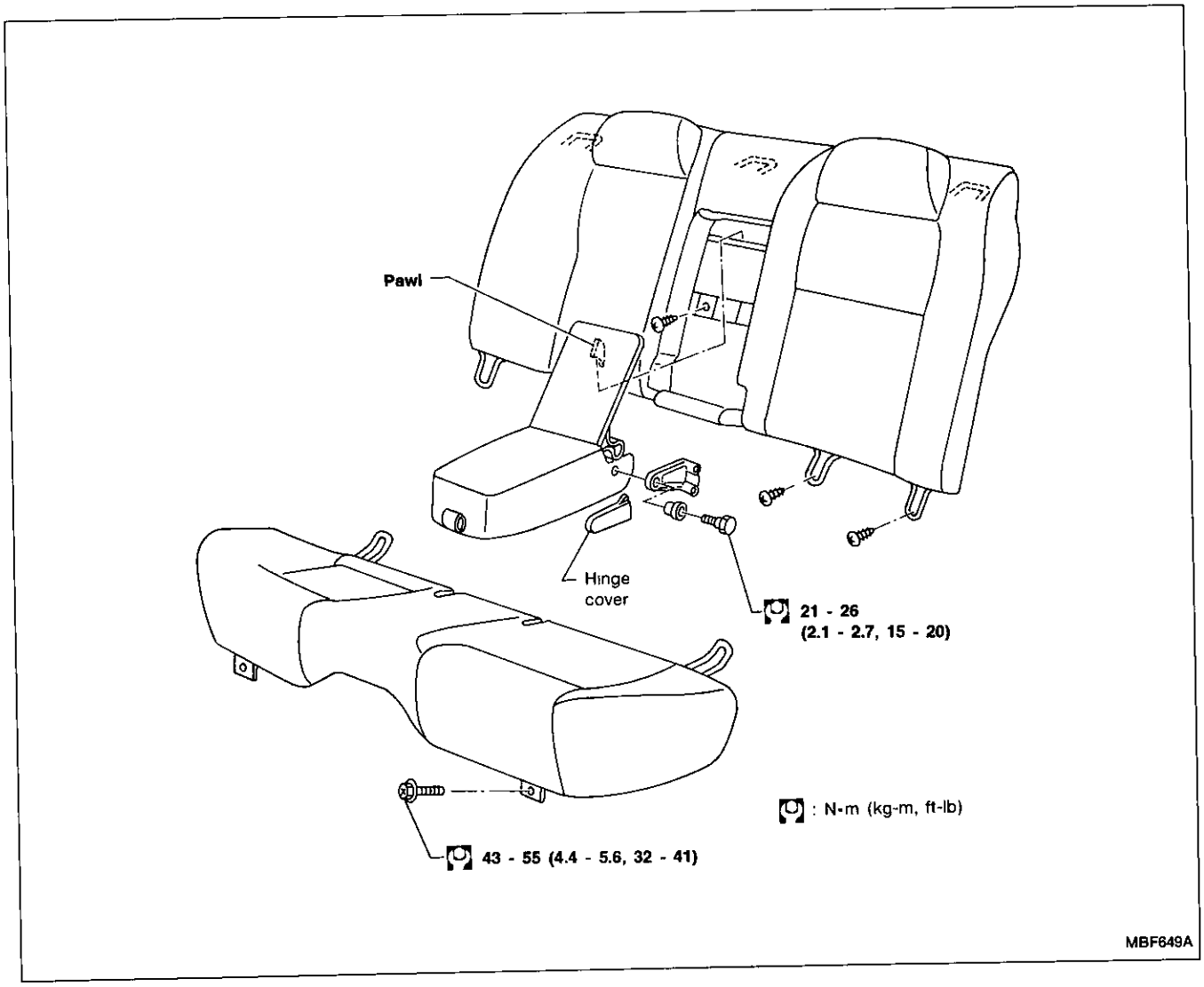
POWER SEAT R. H.

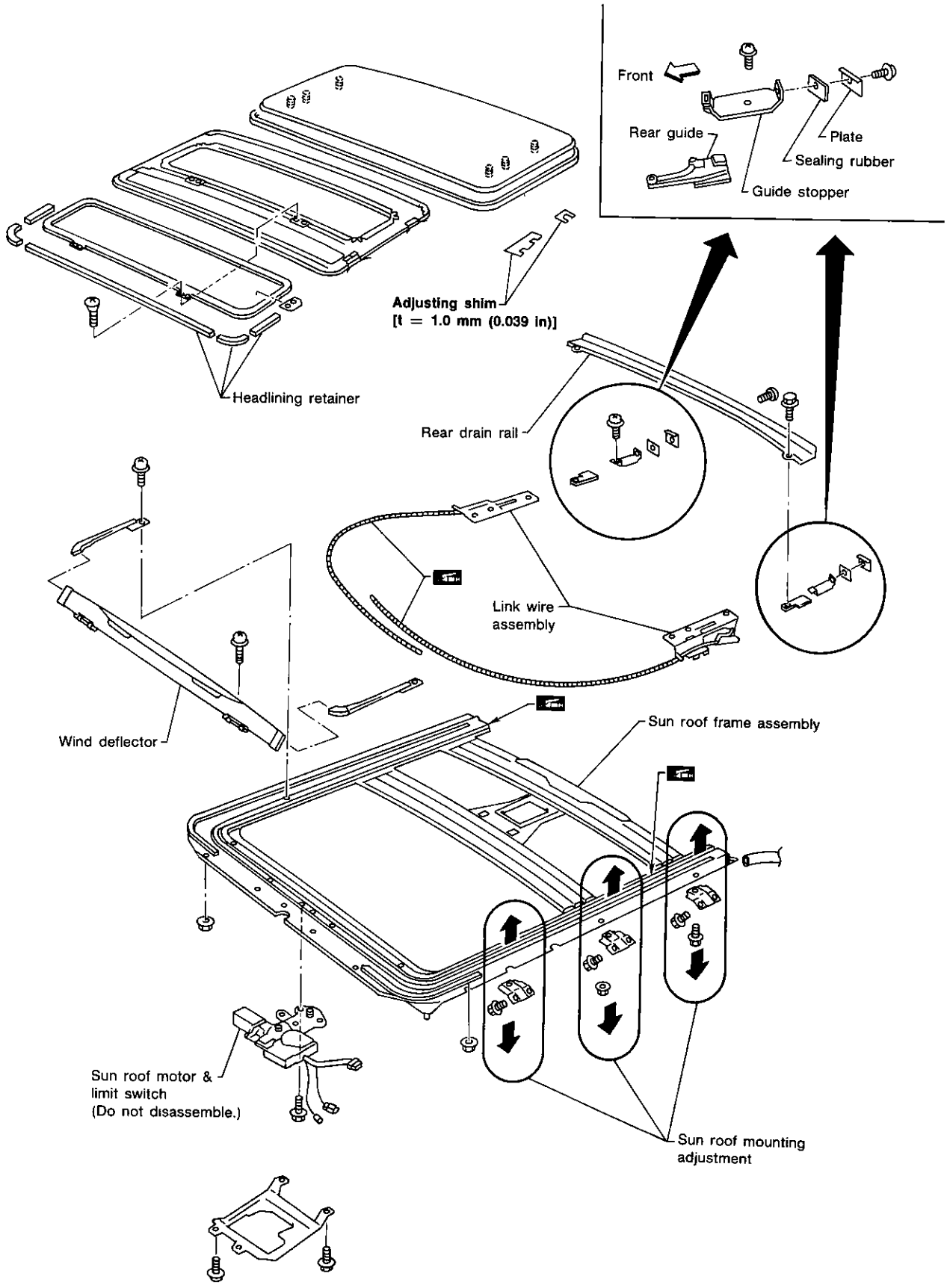


POWER SEAT L. H.

MBF689A

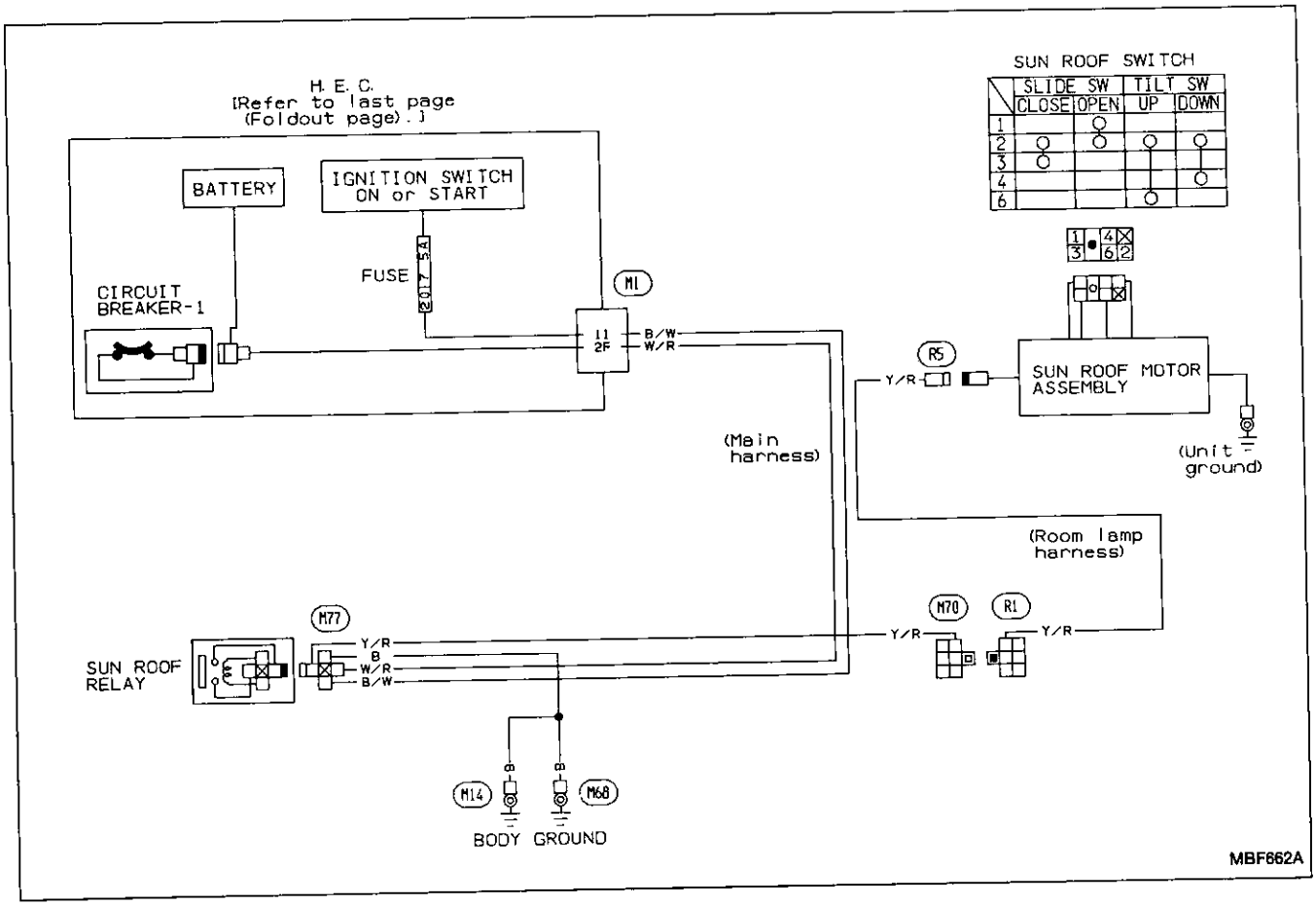
Rear Seat


Pawl
Hinge cover
21 - 26 (2.1 - 2.7, 15 - 20)
43 - 55 (4.4 - 5.6, 32 - 41)
: N·m (kg-m, ft-lb)
MBF649A


Front
Rear guide
Plate
Sealing rubber
Guide stopper
Adjusting shim
[t = 1.0 mm (0.039 in)]
Headlining retainer
Rear drain rail
Link wire assembly
Wind deflector
Sun roof frame assembly
Sun roof motor & limit switch (Do not disassemble.)
Sun roof mounting adjustment

MBF650A

Wiring Diagram



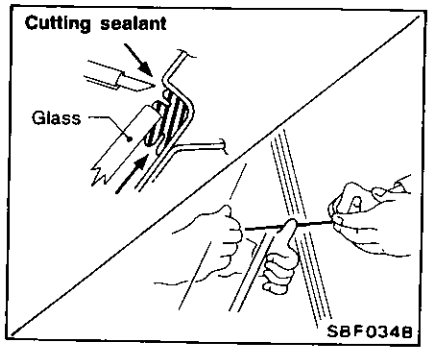
Windshield and Rear Window

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 for about 24 hours.**

WARNING:

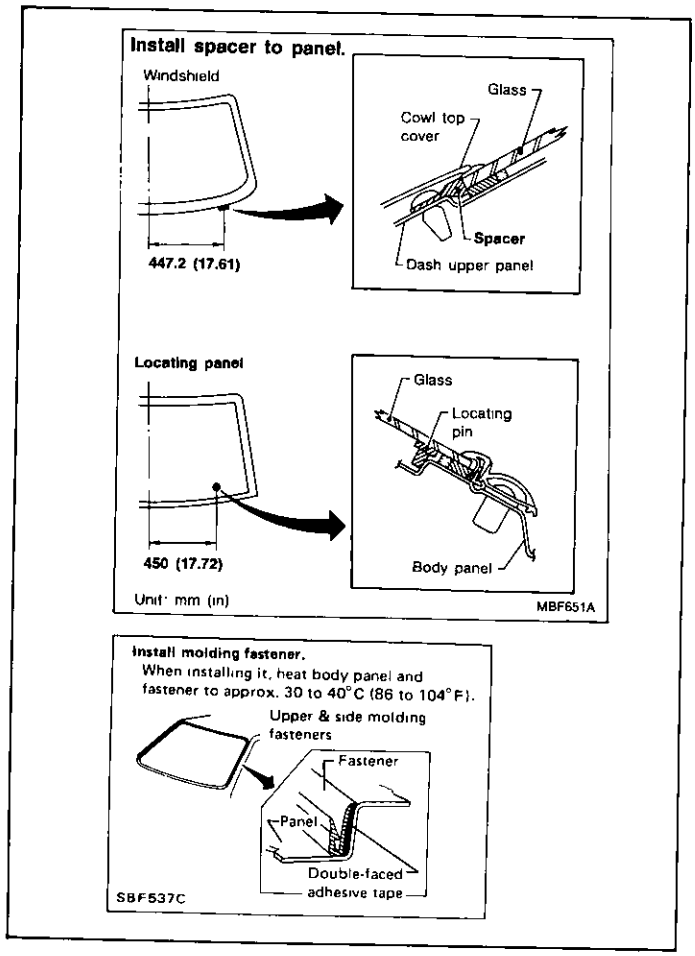
Keep heat and open flames away as primers are flammable.

CAUTION:

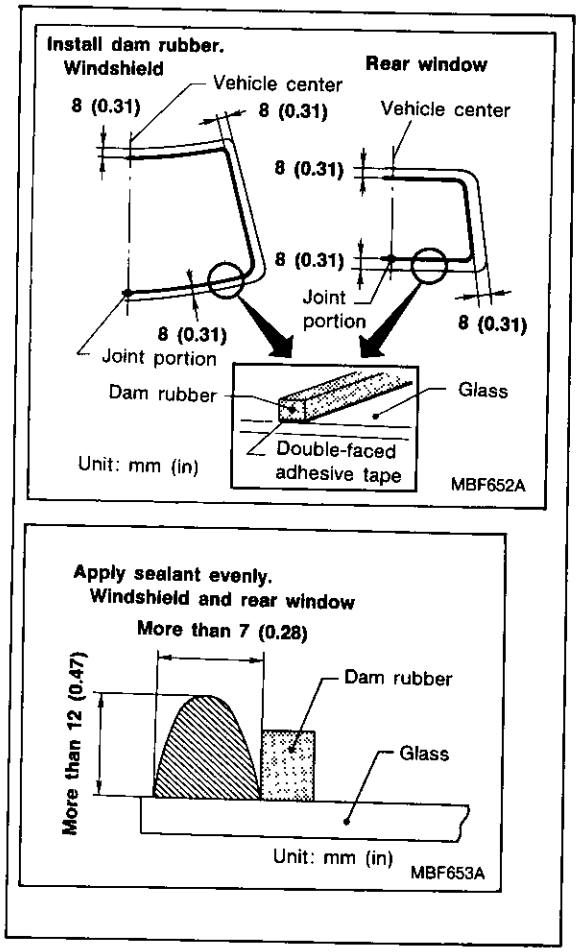
Advise the user of the fact that vehicle should not be driven on rough roads or surfaces until sealant has properly vulcanized.

- **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.**
- **Windshield glass should be installed within 15 minutes of applying sealant: sealant starts to harden 15 minutes after it is applied.**
- **Molding must be installed securely so that it is in position and leaves no gap.**

Body side



Glass side



REPAIRING WATER LEAKS FOR WINDSHIELD

Leaks can be repaired without removing and reinstalling glass.

If water is leaking between caulking material and body or between glass and caulking material, determine the extent of the leak by applying water while pushing glass outward.

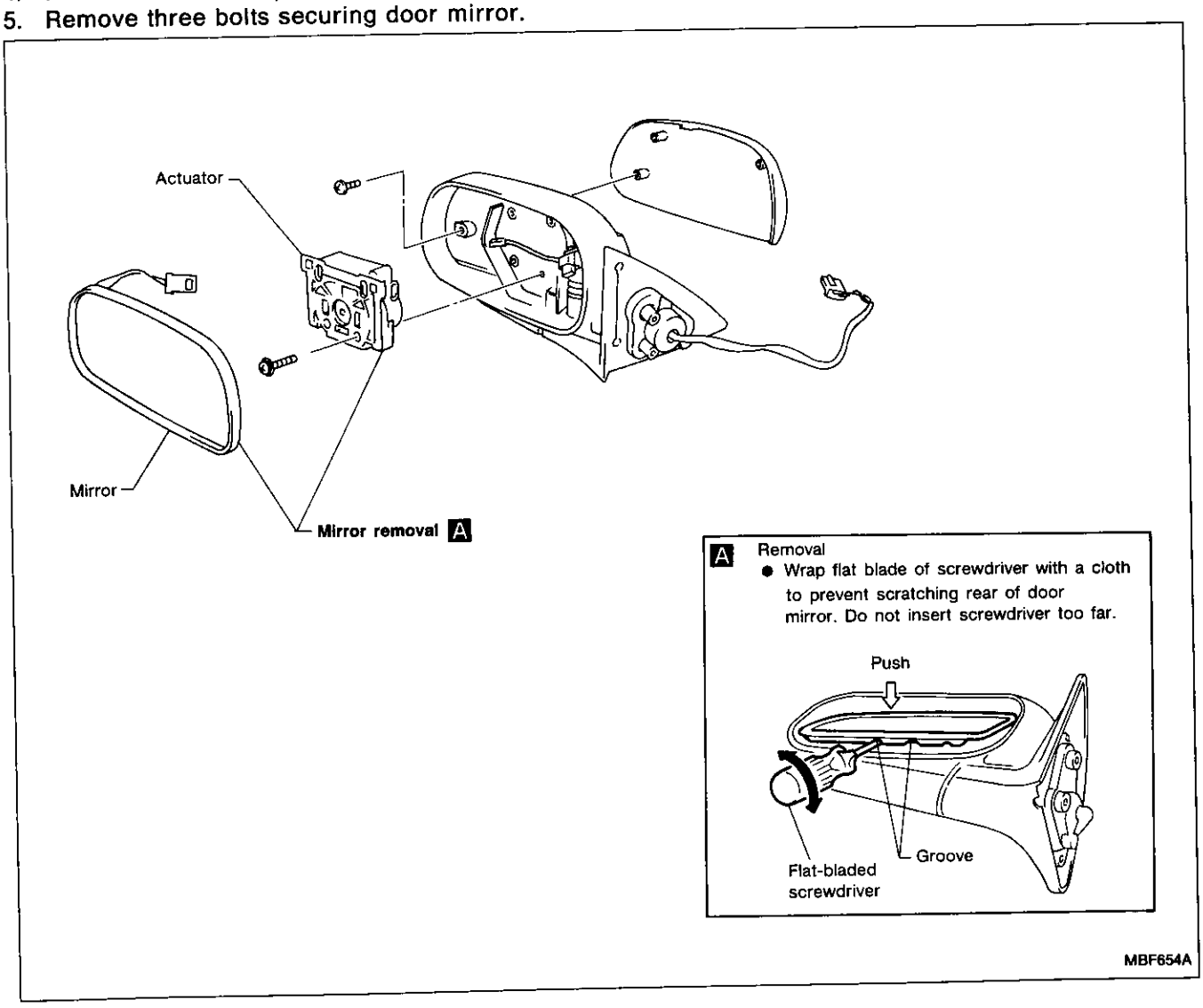
To stop the leak, apply primer (if necessary) and then sealant to the leak point.

Door Mirror

CAUTION:
Be careful not to scratch door rearview mirror body.

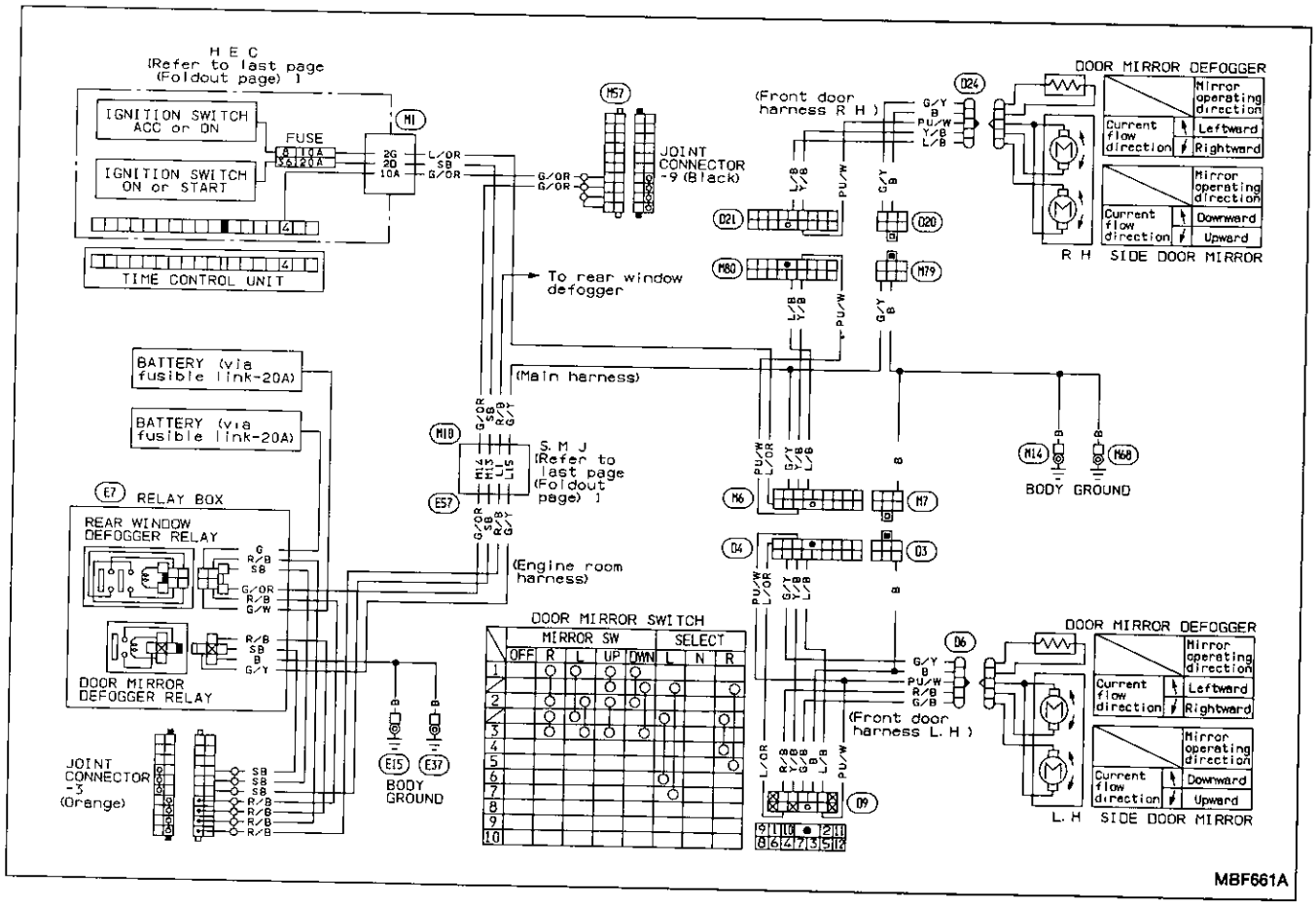
REMOVAL — Door mirror

1. Remove door trim. Refer to "Removal — Door trim" in "Interior" for details.
2. Remove inner cover front corner of door.
3. Disconnect door mirror harness connector.
4. Remove harness clips.
5. Remove three bolts securing door mirror.



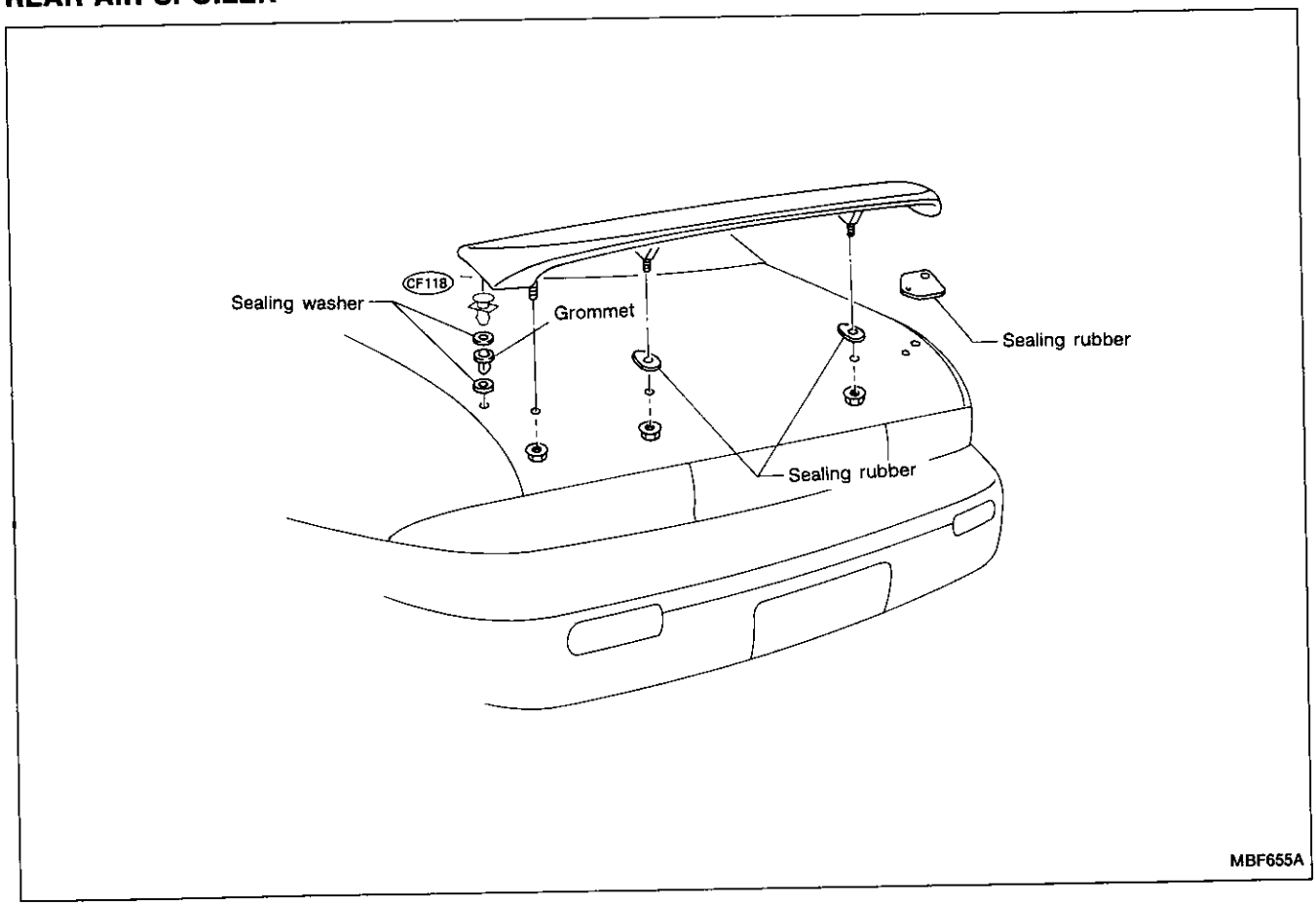
Door Mirror (Cont'd)

WIRING DIAGRAM

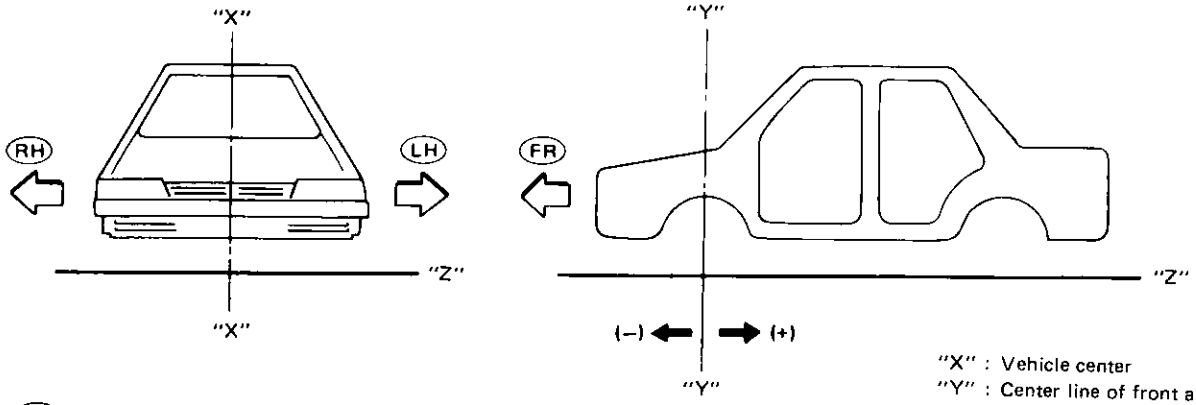


- When installing, make sure that there are not gaps or waves at ends of air spoiler.
- Before installing spoiler, clean and remove oil from surface where spoiler will be mounted.

REAR AIR SPOILER



- All dimensions indicated in figures are actual ones.
- When a tram tracking gauge is used, adjust both pointers to equal length and 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".

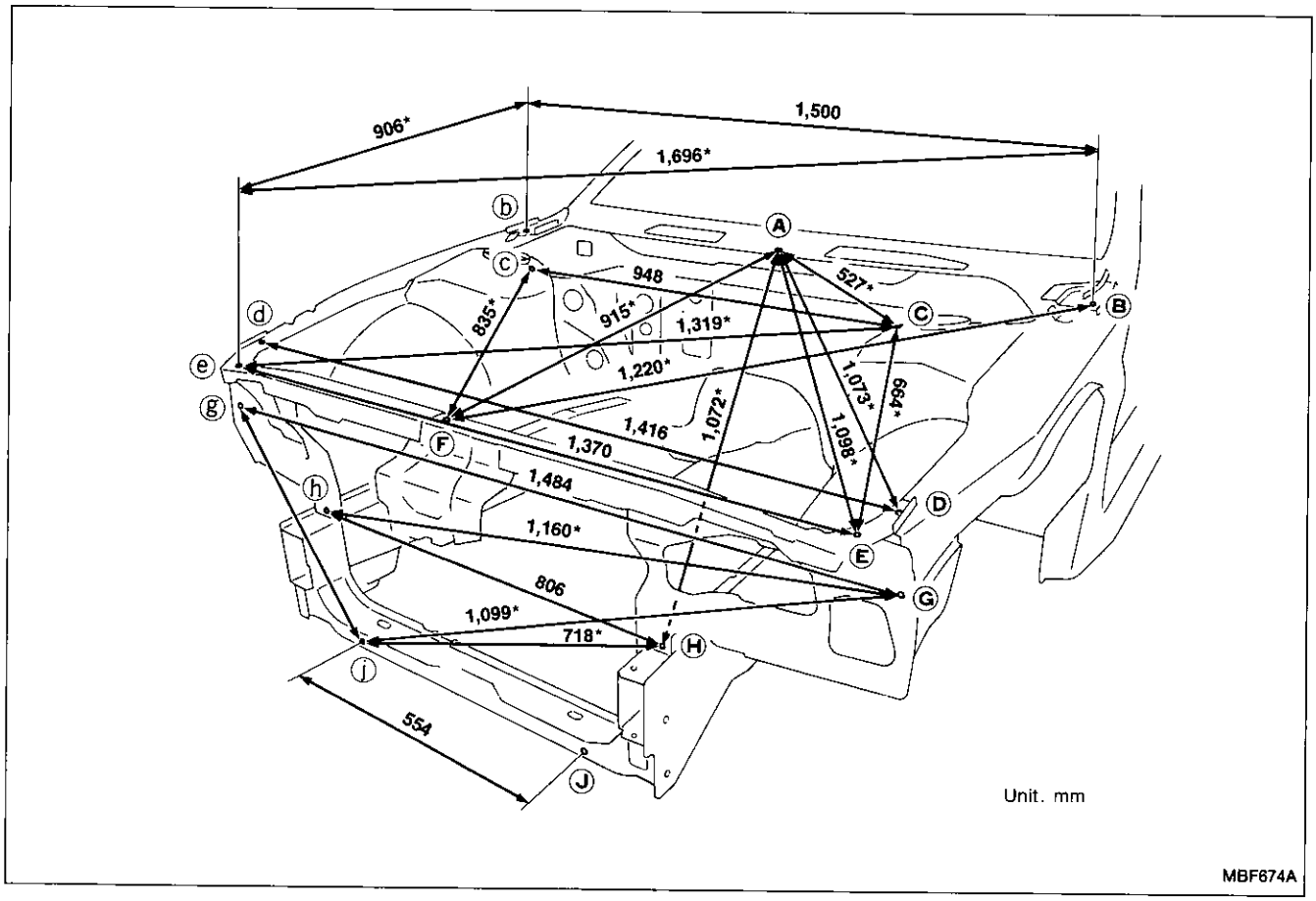


(LH) : L.H. side
(RH) : R.H. side

"X" : Vehicle center
"Y" : Center line of front axle
"Z" : Imaginary base line
[200 mm below datum line ("OZ" at design plan)]

Engine Compartment

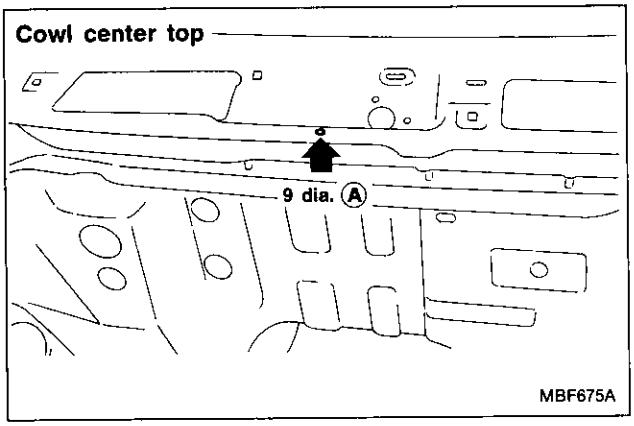
MEASUREMENT

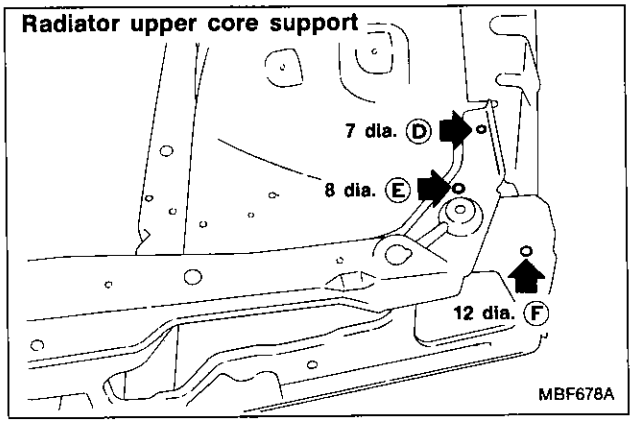


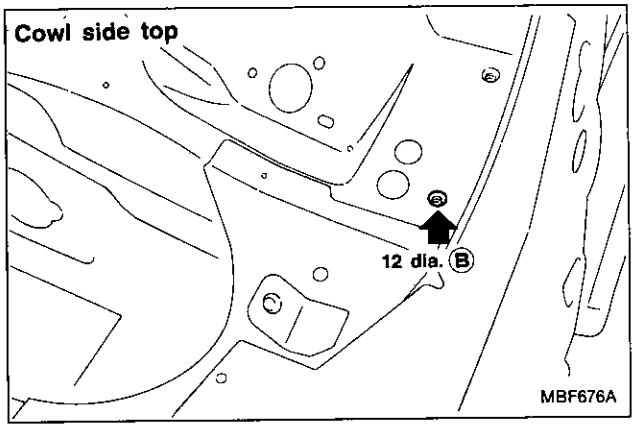
Engine Compartment (Cont'd)

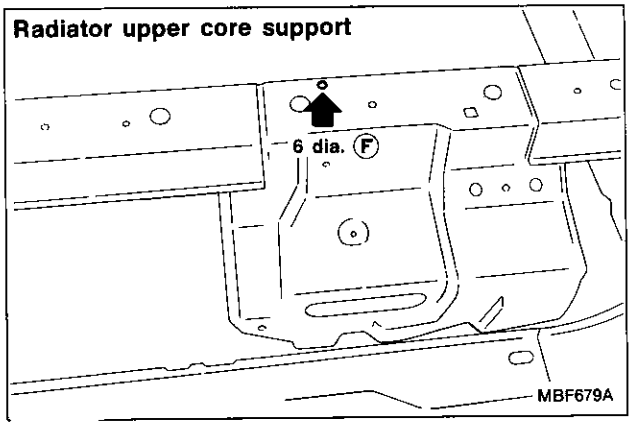
MEASUREMENT POINTS

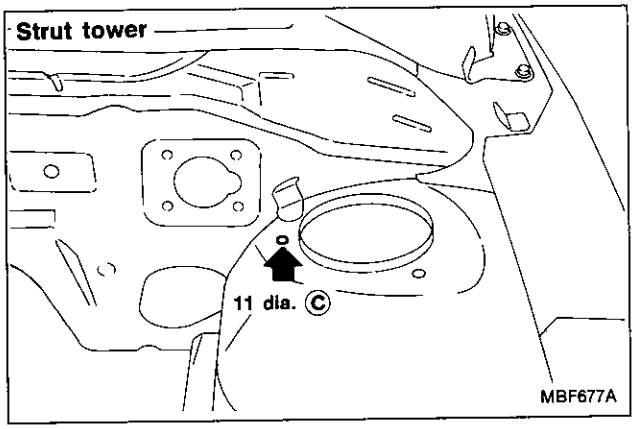
Unit: mm

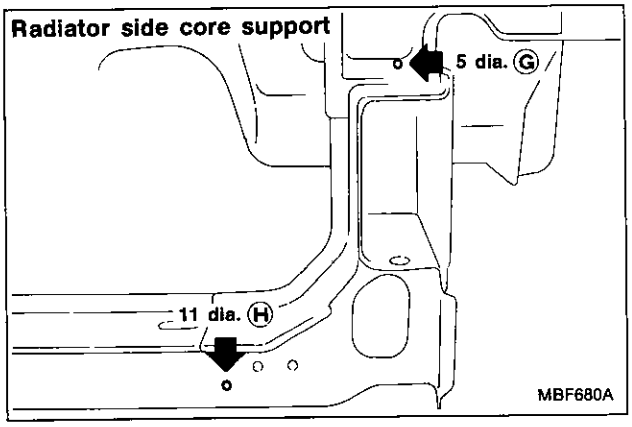






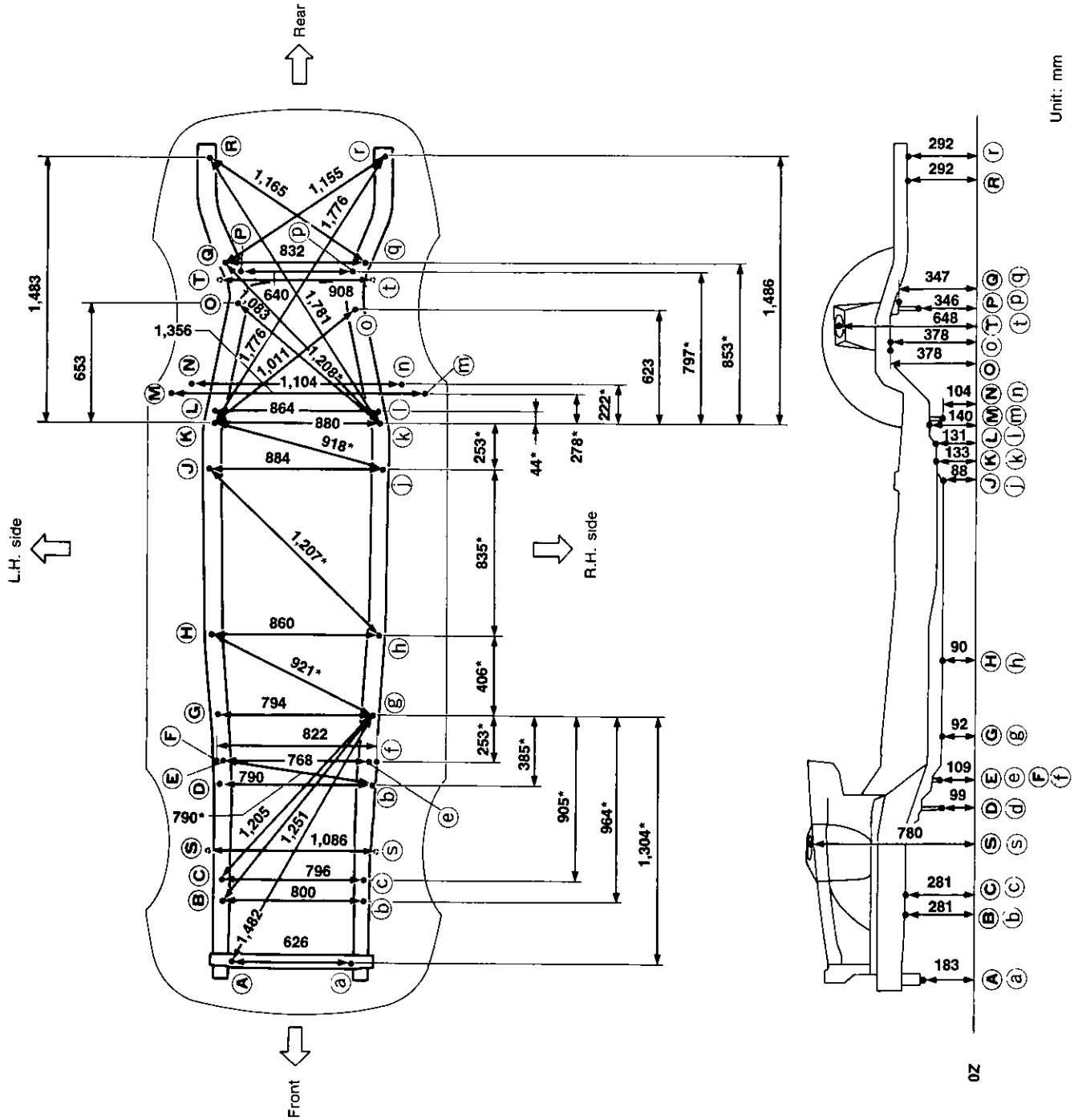






Underbody

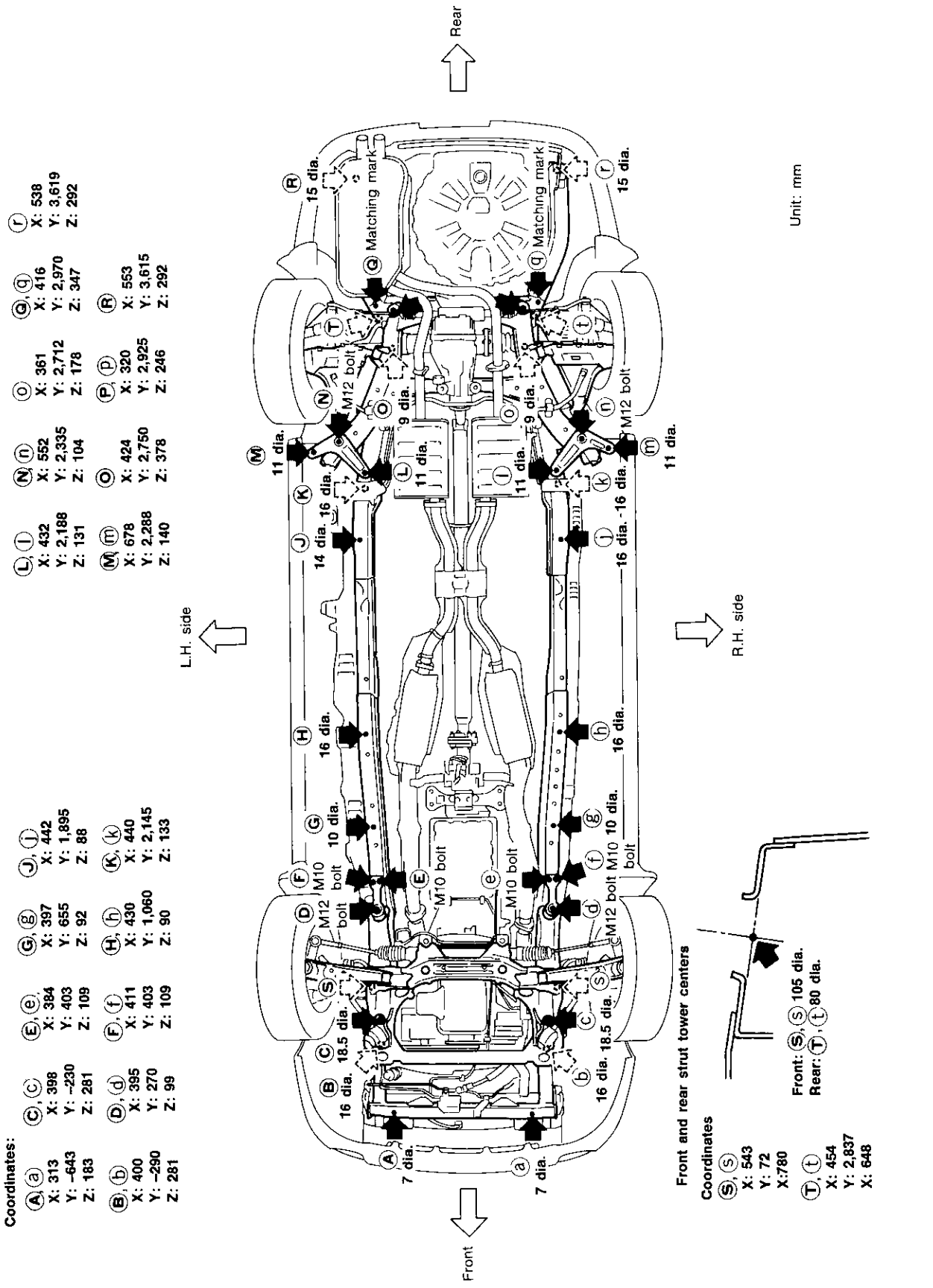
MEASUREMENT



MBF687A

Underbody (Cont'd)

MEASUREMENT POINTS



Coordinates:

Ⓐ, ⓐ	Ⓒ, ⓒ	Ⓔ, ⓔ	Ⓖ, ⓖ	Ⓙ, ⓙ	
X: 313	X: 398	X: 384	X: 397	X: 442	
Y: –643	Y: –230	Y: 403	Y: 655	Y: 1,895	
Z: 183	Z: 281	Z: 109	Z: 92	Z: 88	
Ⓑ, ⓑ	Ⓓ, ⓓ	Ⓕ, ⓕ	Ⓗ, ⓗ	Ⓚ, ⓚ	
X: 400	X: 395	X: 411	X: 430	X: 440	
Y: –290	Y: 270	Y: 403	Y: 1,060	Y: 2,145	
Z: 281	Z: 99	Z: 109	Z: 90	Z: 133	

Ⓛ, ⓛ	Ⓝ, ⓝ	Ⓞ, ⓞ	Ⓠ, ⓠ	Ⓡ, ⓡ	
X: 432	X: 552	X: 361	X: 416	X: 538	
Y: 2,188	Y: 2,335	Y: 2,712	Y: 2,970	Y: 3,619	
Z: 131	Z: 104	Z: 178	Z: 347	Z: 292	
Ⓜ, ⓜ	Ⓞ	Ⓟ, ⓟ	Ⓡ		
X: 678	X: 424	X: 320	X: 553		
Y: 2,288	Y: 2,750	Y: 2,925	Y: 3,615		
Z: 140	Z: 378	Z: 246	Z: 292		

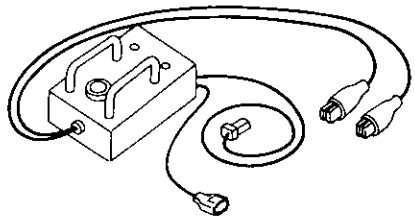
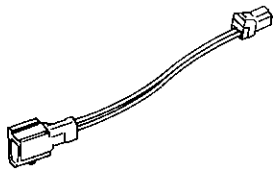
MBF688A

Precautions for SRS "Air Bag" and "Seat Belt Pre-tensioner" Service

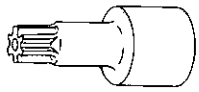
- Do not use a circuit tester to check SRS circuits.
- Before servicing the SRS, turn ignition switch "OFF", disconnect battery ground cable and wait for at least 10 minutes.
  For approximately ten minutes after the cables are removed, it is still possible for the air bag to inflate. Therefore, do not work on any air bag system connectors or wires until at least ten minutes have passed.
- SRS sensors must always be installed with their arrow marks "⇦" facing the front of the vehicle for proper operation. Also check sensors 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.
- If front of vehicle is damaged in a collision, always check the crash zone sensor and the wiring harness.

Preparation

SPECIAL SERVICE TOOL

Tool number (Kent-Moore No.) Tool name	Description
(J38381) Deployment tool	 Disposing of air bag module
(J38381-30) Deployment tool adapters	

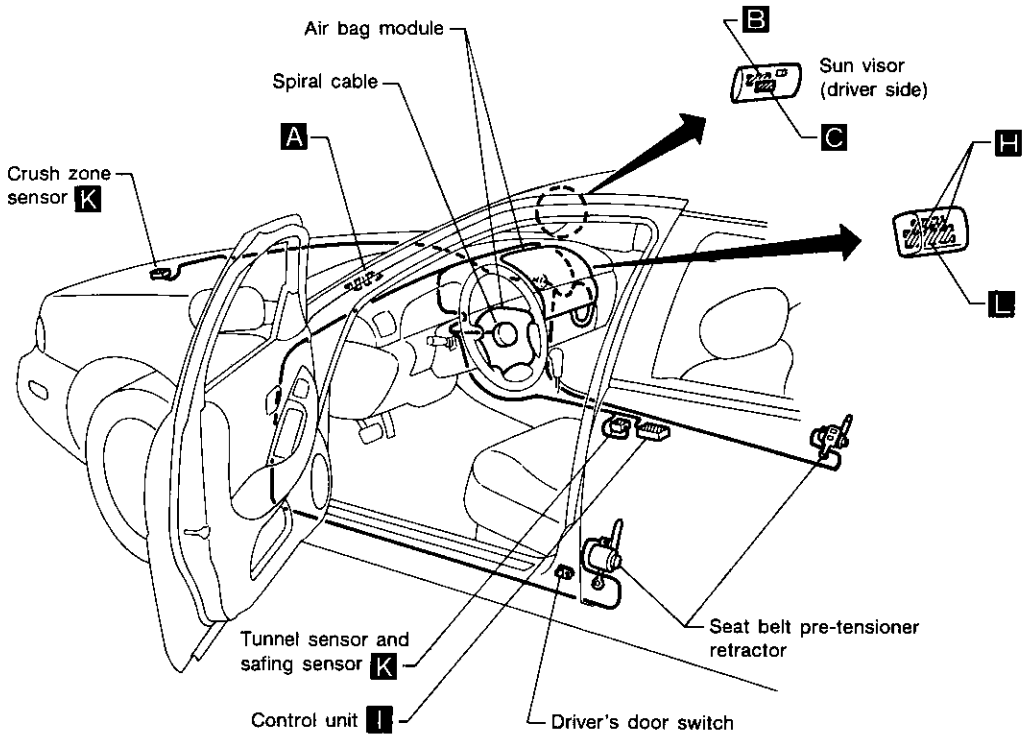
COMMERCIAL SERVICE TOOLS

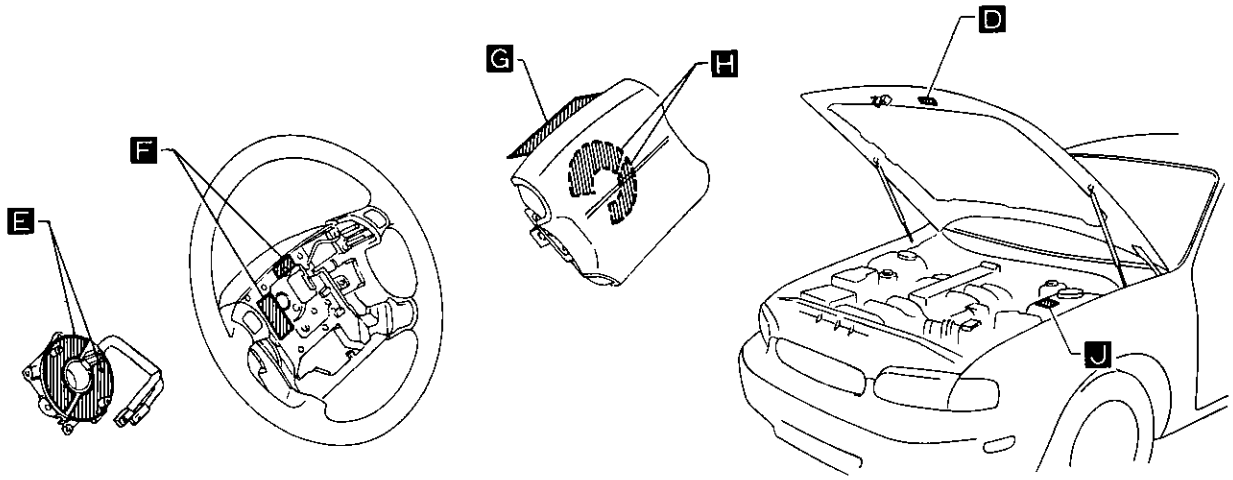
Tool name	Description
Special torx bit	 Use for special bolts (tamper resistant screw)
Spiral cable stopper	 Avoiding unexpected spiral cable rotation

- When laying aside a single pre-tensioner (belt assembly), make sure cylinder tip does not point towards a person. Always place pre-tensioner in a box if possible. (If pre-tensioner should go off accidentally, rubber cap will jump out of cylinder tip, blowing out highemperature gas.)

Caution Labels and SRS Component Parts Location

The CAUTION LABELS are important when servicing SRS system in the field. If they are dirty or damaged, replace them with new ones.





MBF656A

Caution Labels and SRS Component Parts Location (Cont'd)

A

DRIVER-AIRBAG

B

INFORMATION SRS AIRBAG

- THIS CAR IS EQUIPPED WITH A DRIVER AIR BAG AS A SUPPLEMENTAL RESTRAINT SYSTEM (S.R.S.) TO HELP PROTECT FRONT OCCUPANTS IN A FRONTAL COLLISION.
- ALWAYS USE SEAT BELTS & CHILD SEAT.
- THE SYSTEM MUST BE INSPECTED 10 YEARS AFTER DATE OF MANUFACTURE, AS NOTED ON THE CERTIFICATION LABEL LOCATED ON THE LEFT FRONT DOOR.
- IF ANY OF THE FOLLOWING CONDITIONS OCCUR, THE SYSTEM MUST BE SERVICED:
  THE "AIR BAG" LAMP DOES NOT GO ON.
  FLASHES INTERMITTENTLY OR REMAINS ON.
- SEE YOUR OWNER'S MANUAL FOR DETAILS ABOUT THE FUNCTIONING, SERVICE, AND DISPOSAL PROCEDURES FOR THE SYSTEM.

C

NOTICE SRS AIRBAG

- THIS CAR IS EQUIPPED WITH AIR BAGS TO SUPPLEMENT THE SEAT BELTS.
- ALWAYS USE SEAT BELTS & CHILD SEAT.
- READ THE INFORMATION ON THE REVERSE SIDE.

D

WARNING SRS AIRBAG

- THIS CAR IS EQUIPPED WITH AIR BAGS AS A SUPPLEMENTAL RESTRAINT SYSTEM (S.R.S.)
- ALL S.R.S. ELECTRICAL WIRING AND CONNECTORS ARE COLORED YELLOW.
- DO NOT USE ELECTRICAL TEST EQUIPMENT ON THESE CIRCUITS.
- TAMPERING WITH OR DISCONNECTING THE S.R.S. WIRING AND CONNECTORS COULD RESULT IN ACCIDENTAL DEPLOYMENT OF THE AIR BAGS OR MAKE THE SYSTEM INOPERATIVE, WHICH MAY RESULT IN SERIOUS INJURY.

E

CAUTION SRS AIRBAG

- BEFORE ASSEMBLY;
  — LINE UP THE FRONT WHEELS STRAIGHT AHEAD.
  — ALIGN THE ARROW WITH THE YELLOW MARK ON THE SIDE GEAR.
  — READ SERVICE MANUAL.
- NO SERVICEABLE PARTS INSIDE.
- DO NOT DISASSEMBLE OR TAMPER.

F

WARNING SRS AIRBAG

BEFORE MOUNTING STEERING WHEEL;

- MAKE SURE THAT THE FRONT WHEELS ARE IN STRAIGHT-AHEAD POSITION.
- ALIGN THE ARROW WITH THE YELLOW MARK ON THE SIDE GEAR. (SPIRAL CABLE)
- READ SERVICE MANUAL.

G

WARNING SRS AIRBAG

- THIS AIRBAG MODULE CANNOT BE REPAIRED.
- USE DIAGNOSTIC INSTRUCTIONS TO DETERMINE IF THE UNIT IS OPERATIONAL.
- IF NOT OPERATIONAL, REPLACE AND DISPOSE OF THE ENTIRE UNIT AS DIRECTED IN THE INSTRUCTIONS.
- UNDER NO CIRCUMSTANCES SHOULD A DIAGNOSIS BE PERFORMED USING ELECTRICALLY POWERED TEST EQUIPMENT OR PROBING DEVICES.
- TAMPERING OR MISHANDLING CAN RESULT IN PERSONAL INJURY.
- STORE THE REMOVED AIRBAG MODULE WITH THE PAD SURFACE UP.
- FOR SPECIAL HANDLING OR STORAGE REFER TO SERVICE MANUAL.

Caution Labels and SRS Component Parts Location (Cont'd)

H

DANGER POISON

- KEEP OUT OF THE REACH OF CHILDREN.
- CONTAINS SODIUM AZIDE AND POTASSIUM NITRATE.
- CONTENTS ARE POISONOUS AND EXTREMELY FLAMMABLE.
- CONTACT WITH ACID, WATER OR HEAVY METALS MAY PRODUCE HARMFUL AND IRRITATING GASES OR EXPLOSIVE COMPOUNDS.
- DO NOT DISMANTLE, INCINERATE, OR BRING INTO CONTACT WITH ELECTRICITY OR STORE AT TEMPERATURES EXCEEDING 200°F.
- FIRST AID: IF CONTENTS ARE SWALLOWED, INDUCE VOMITING;
  - — FOR EYE CONTACT, FLUSH EYES WITH WATER FOR 15 MINUTES
  - — IF GASES FROM ACID OR WATER CONTACT ARE INHALED, SEEK FRESH AIR
  - — IN EVERY CASE, GET PROMPT MEDICAL ATTENTION
- FOR ADDITIONAL INFORMATION, SEE MATERIAL SAFETY DATA SHEET (MSDS) FOR THIS PRODUCT.

I

CAUTION SRS AIRBAG

- NO SERVICEABLE PARTS INSIDE.
- DO NOT DISASSEMBLE OR TAMPER.
- DO NOT DROP; KEEP DRY.
- WHILE REMOVED, STORE IN A CLEAN AND DRY AREA.
- IF WET CONDITION OCCURS, THIS UNIT MUST BE SERVICED.

J

CAUTION SRS AIRBAG

- TO AVOID DAMAGING THE S.R.S. SPIRAL CABLE, REMOVE THE STEERING WHEEL BEFORE REMOVING THE STEERING LOWER JOINT.

K

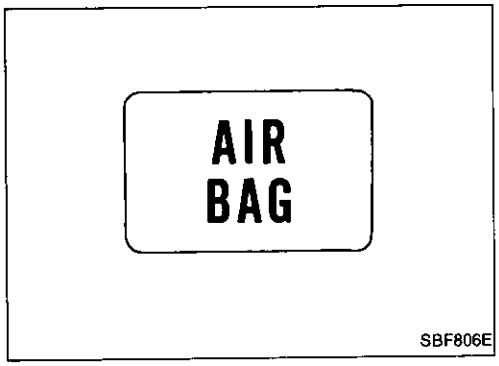
WARNING SRS AIRBAG

- DO NOT DISASSEMBLE OR TAMPER.
- DISMANTLING AND INSTALLATION SHOULD ONLY BE PERFORMED BY TRAINED PERSONNEL.

L

WARNING SRS AIRBAG

- THIS AIR BAG MODULE CANNOT BE REPAIRED.
- USE DIAGNOSTIC INSTRUCTIONS TO DETERMINE IF THE UNIT IS OPERATIONAL.
- IF NOT OPERATIONAL, REPLACE AND DISPOSE OF THE ENTIRE UNIT AS DIRECTED IN THE INSTRUCTIONS.
- UNDER NO CIRCUMSTANCES SHOULD A DIAGNOSIS BE PERFORMED USING ELECTRICALLY POWERED TEST EQUIPMENT OR PROBING DEVICES.
- TAMPERING OR MISHANDLING CAN RESULT IN PERSONAL INJURY.
- STORE THE REMOVED AIR BAG MODULE WITH THE BAG—COVER SURFACE UP.
- FOR SPECIAL HANDLING OR STORAGE REFER TO SERVICE MANUAL.



Maintenance Items

1. Check "AIR BAG" warning lamp
   When the ignition key is in the "ON" or "START" position, the "AIR BAG" warning lamp will illuminate for about 7 seconds and then turn off. This means that the system is operational.

Maintenance Items (Cont'd)

2. Visually check SRS components

(1) Sensors
- Check sensors to ensure the arrow marks face the front of the vehicle.
- Check body and sensor brackets for deformities or rust.
- Check sensor case for dents, cracks, deformities or rust.
- Check sensor harness for binds, connector for damage, and terminals for deformities.

(2) Control unit — Airbag
- Check case and bracket for dents, cracks or deformities.
- Check connectors for damage, and terminals for deformities.

(3) Main harness and instrument harness
- Check connectors for poor connections.
- Check harnesses for binds, connectors for damage, and terminals deformities.

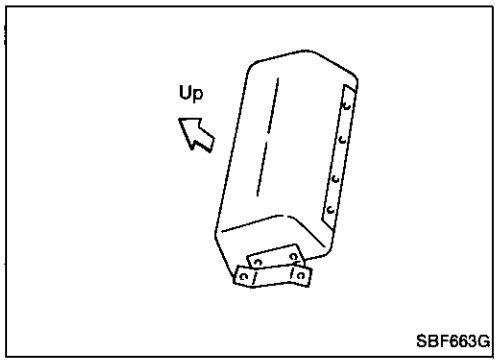
(4) Spiral cable
- Visually check lock (engagement) pins and combination switch for damage.
- Check connectors, flat cable and protective tape for damage.
- Check steering wheel for noise, binds or difficult operation.

(5) Steering wheel
- Check harness (built into steering wheel) and connectors for damage, and terminals for deformities.
- Install air bag module to check fit or alignment with steering wheel.
- Check steering wheel for excessive free play.

(6) Air bag module
- Remove air bag module from steering wheel.
  Check harness cover and connectors for damage, terminals for deformities, and harness for binds.
- Install air bag module to steering wheel to check fit or alignment with the wheel.

CAUTION:
Replace previously used screws with new ones.

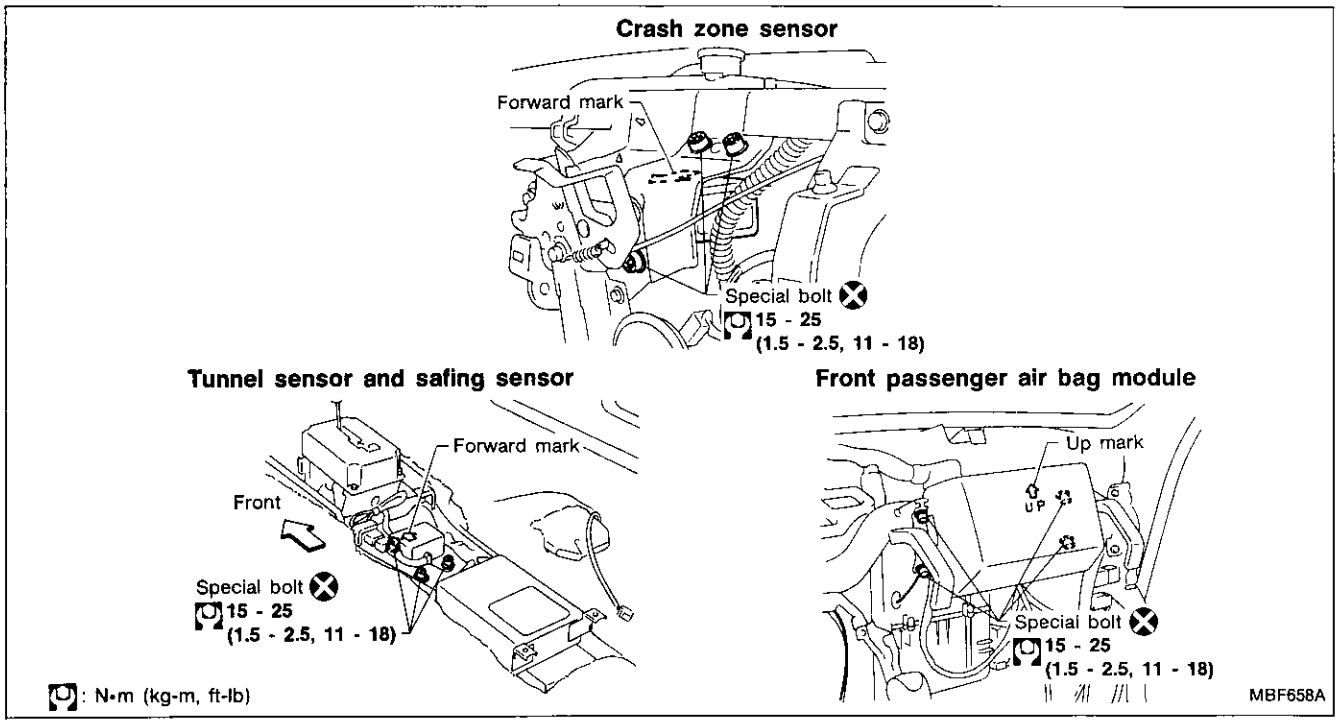
(7) Seat belt pre-tensioner
- After installing pre-tensioner into vehicle, check tension reducer for operation as follows and make sure connector is correctly installed.
- Turn ignition switch on and insert buckle to fasten seat belt.
- Pull seat belt out more than 200 mm and then retract it.
- Under this condition, make sure tension reducer is operating. (If tension reducer is operating, turn ignition switch off and retracing force will become stronger.)



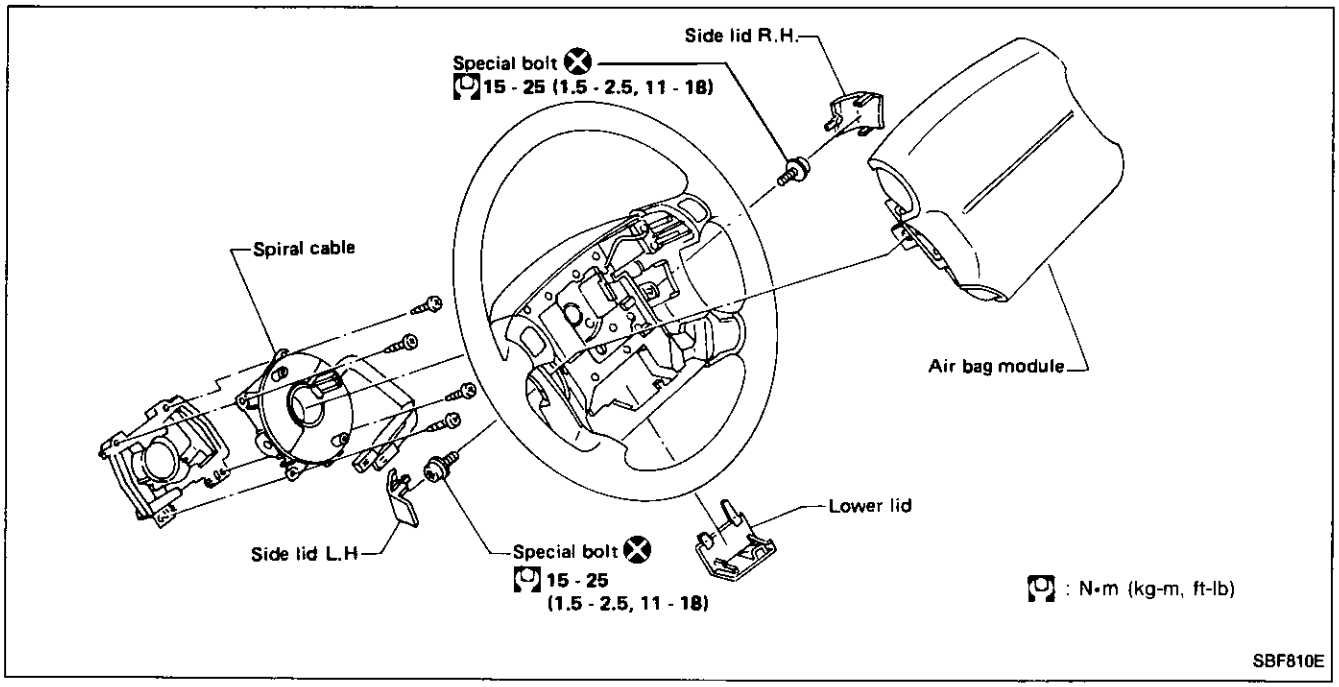
Removal and Installation — Control Unit, Sensors and Front Passenger Air Bag Module

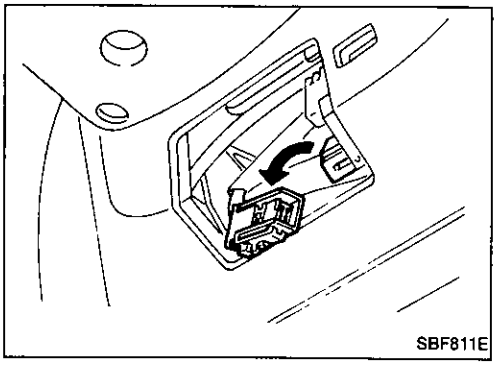
CAUTION:

- **Before servicing SRS, turn the ignition switch off, disconnect battery ground cable and wait for at least 10 minutes.**
- **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.**
- Check all sensors for proper installation.
- Check all sensors 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 sensor brackets to ensure they are free of deformities or rust.



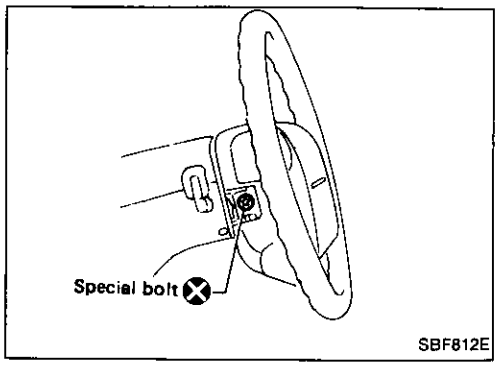
Removal — Air Bag Module and Spiral Cable



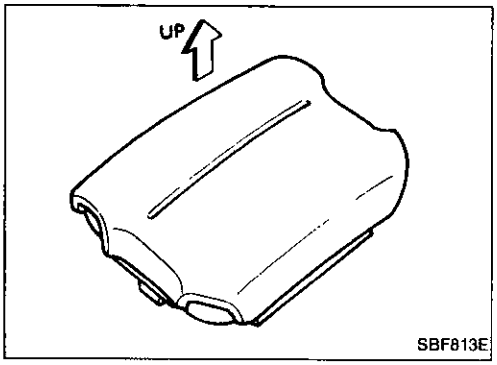


CAUTION:
Before servicing SRS, turn the ignition switch off, disconnect battery ground cable and wait for at least 10 minutes.

1. Remove lower lid from steering wheel, and disconnect air bag module connector.

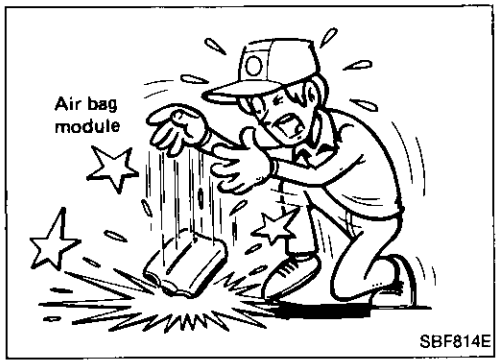


2. Remove side lid. Using the T50H torx bit, remove left and right special bolts. Air bag module can then be removed.



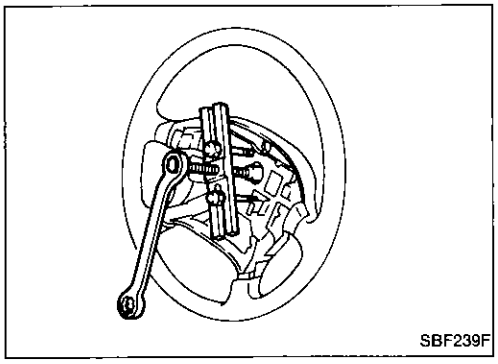
CAUTION:
- **Always place air bag module with pad side facing upward.**
- **Do not attempt to disassemble air bag module.**
- **The special bolts are coated with bonding agent. Discard old ones after removal; replace with new ones.**

Removal — Air Bag Module and Spiral Cable (Cont'd)

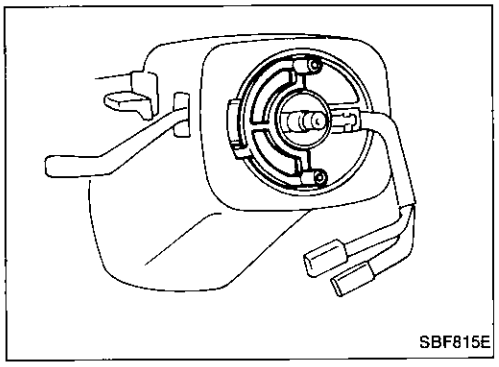


SBF814E

- **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 100°C (212°F).**
- **Do not allow oil, grease or water to come in contact with the air bag module.**


SBF239F

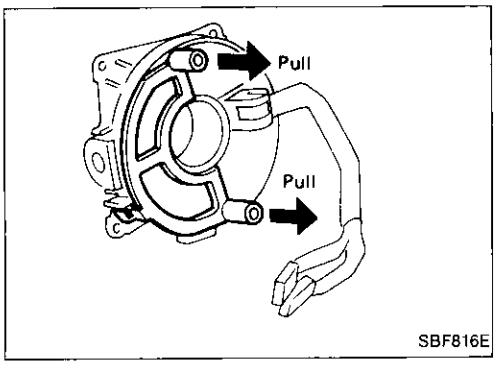
3. Set steering wheel in the neutral position.
4. Disconnect horn connector and remove nuts.
5. Using steering wheel puller, remove steering wheel. Be careful not to over-tighten puller bolt on steering wheel.


SBF815E

6. Attach spiral cable to stopper.
7. Remove steering column cover.
8. Disconnect connector and remove the four screws. The spiral cable can then be removed.

Installation — Air Bag Module and Spiral Cable

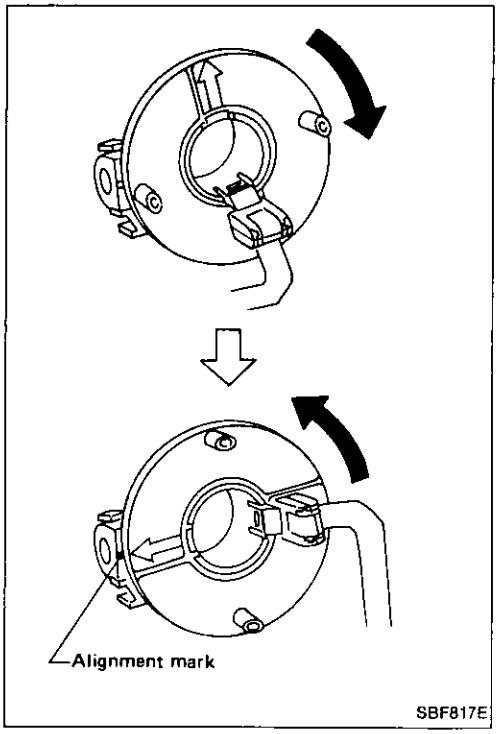
1. Connect spiral cable connector and tighten with screws. Install steering column cover.



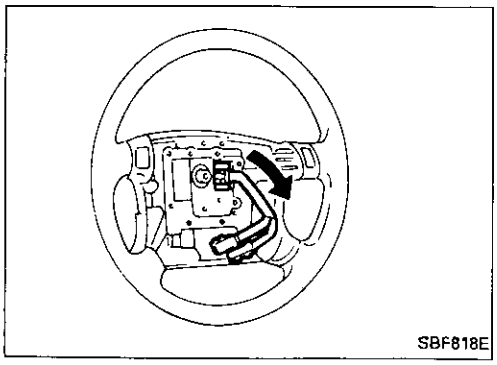
SBF816E

2. Remove stopper by pulling two pin guides.

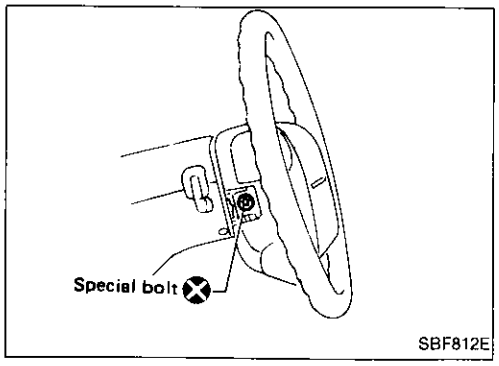
Installation — Air Bag Module and Spiral Cable (Cont'd)



- Alignment of spiral cable with neutral position
  If stopper is not used, align spiral cable with neutral position as follows:
  Turn spiral cable clockwise until it catches stopper. Then, back spiral cable off approximately two turns until yellow alignment mark appears on left gear. Align arrow mark "⇦" of spiral cable with this yellow mark.

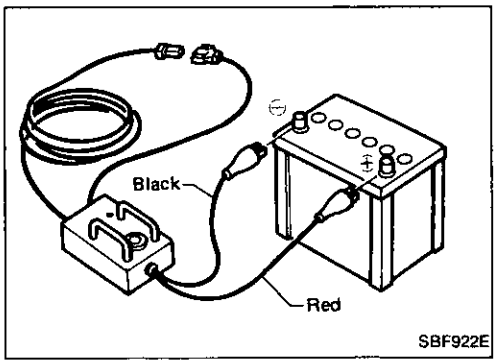


3. Install steering wheel setting spiral cable pin guides, and pull spiral cable through.
4. Connect horn connector and engage spiral cable with pawls in steering wheel.
5. Tighten nuts.



6. Position air bag module and tighten with new special bolts.
7. Connect air bag module connector.
8. Install all lids.

9. Conduct self-diagnosis to ensure entire SRS operates properly. (Use CONSULT or warning lamp check.)



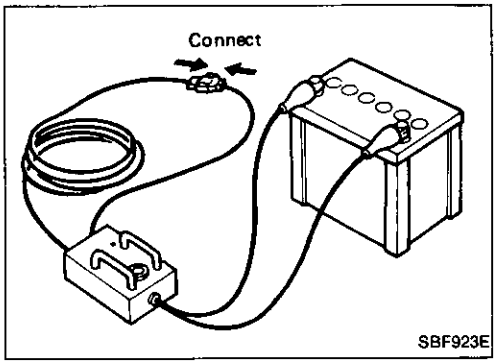
SBF922E

Scrapping Air Bag and Seat Belt Pre-tensioners

Before scrapping air bag modules, seat belt pre-tensioners or a vehicle equipped with an SRS system, be sure to deactivate the units or the system.

CONNECTING TO BATTERY

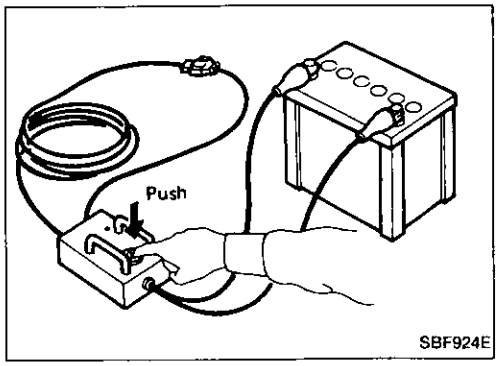
Prepare a 12-volt battery. Locate it approximately 5 m (16 ft) away from vehicle and connect deployment tool's battery cable. Ensure right side light illuminates and left side light does not illuminate. If not, replace the battery with a new one.



SBF923E

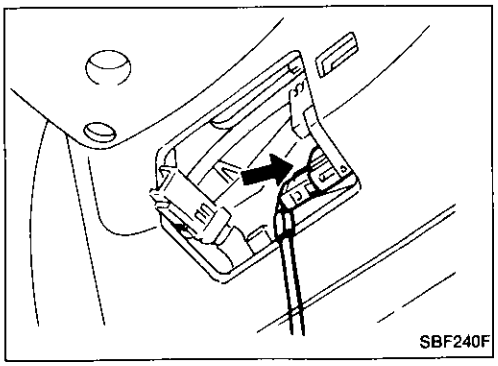
DEPROYMENT TOOL CHECK

Connect check connector.



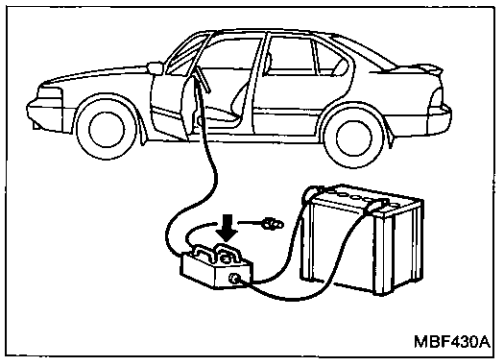
SBF924E

Push deproyment tool switch to "ON" to ensure green light illuminates. If not, replace the deployment tool.


SBF240F

CONNECTING TO AIR BAG AND SEAT BELT PRE-TENSIONER

1. Disconnect the prepared battery cable.
2. Also disconnect the vehicle battery ground cable and wait 10 minutes.
3. Disconnect air bag module and seat belt pre-tensioner connector.
4. Connect deployment tool connector.
   For front passenger air bag and seat belt pre-tensioners, attach the adapters to the tool connector.
5. Reconnect the battery cable to the prepared battery. Ensure red light illuminates.


MBF430A

Scrapping Air Bag and Seat Belt Pre-tensioners (Cont'd)

DEPLOYMENT

Press tool switch. Green light will illuminate and air bag will deploy.

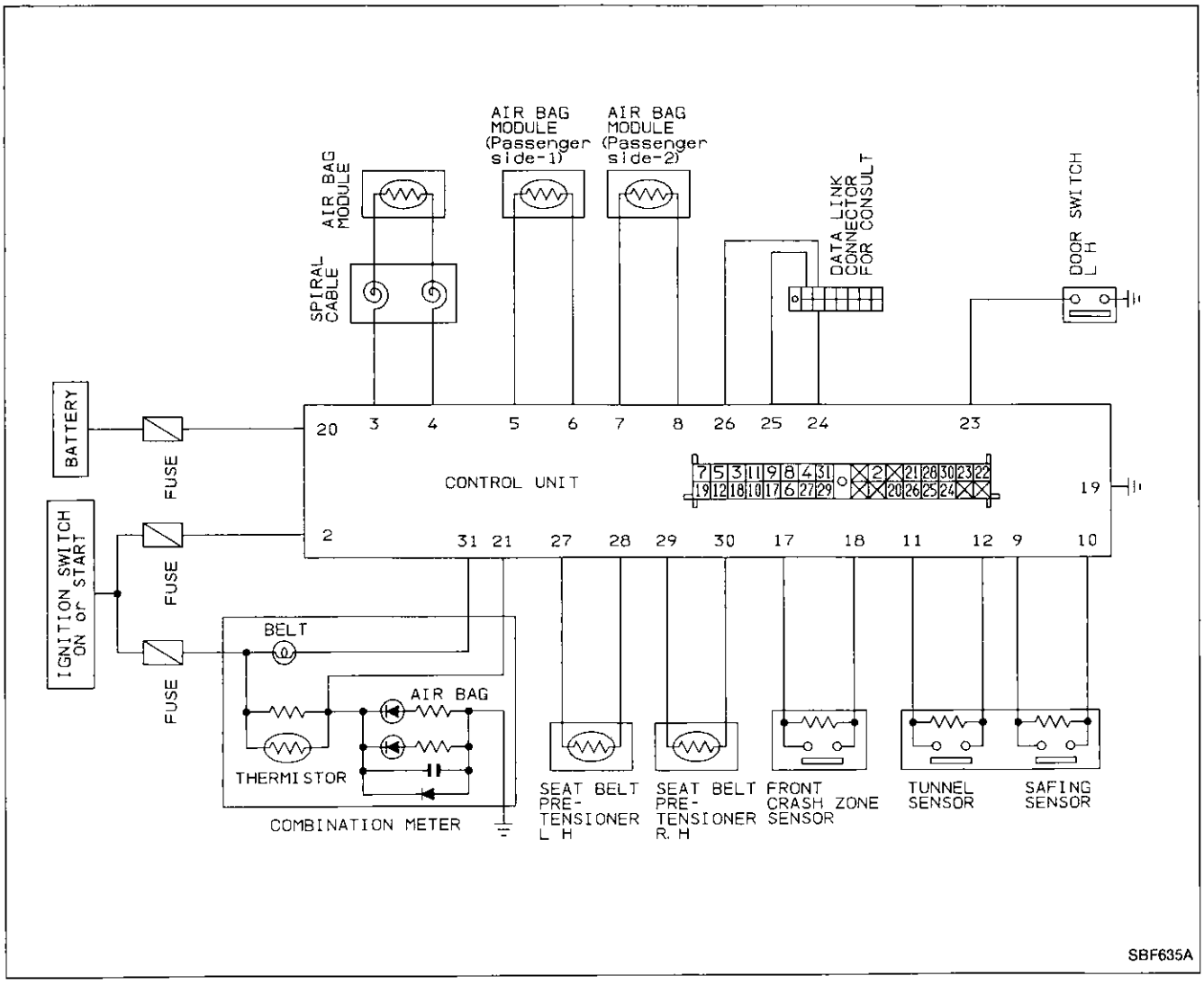
CAUTION:

- **When deploying air bag, ensure vehicle is empty.**
- **No poisonous gas is produced upon air bag deployment. However, be careful not to inhale gas since it irritates throat and can cause choking.**
- **Due to heat, leave air bag module unattended for more than 30 minutes and leave seat belt pre-tensioner unattended for more than 10 minutes after deployment.**
- **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.**

Contents

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Diagnostic Procedure 2 ..... BF-86
SYMPTOM: Warning lamp does not come on.
Diagnostic Procedure 3 ..... BF-87
SYMPTOM: Warning lamp does not go off.
Collision Diagnosis BF-88

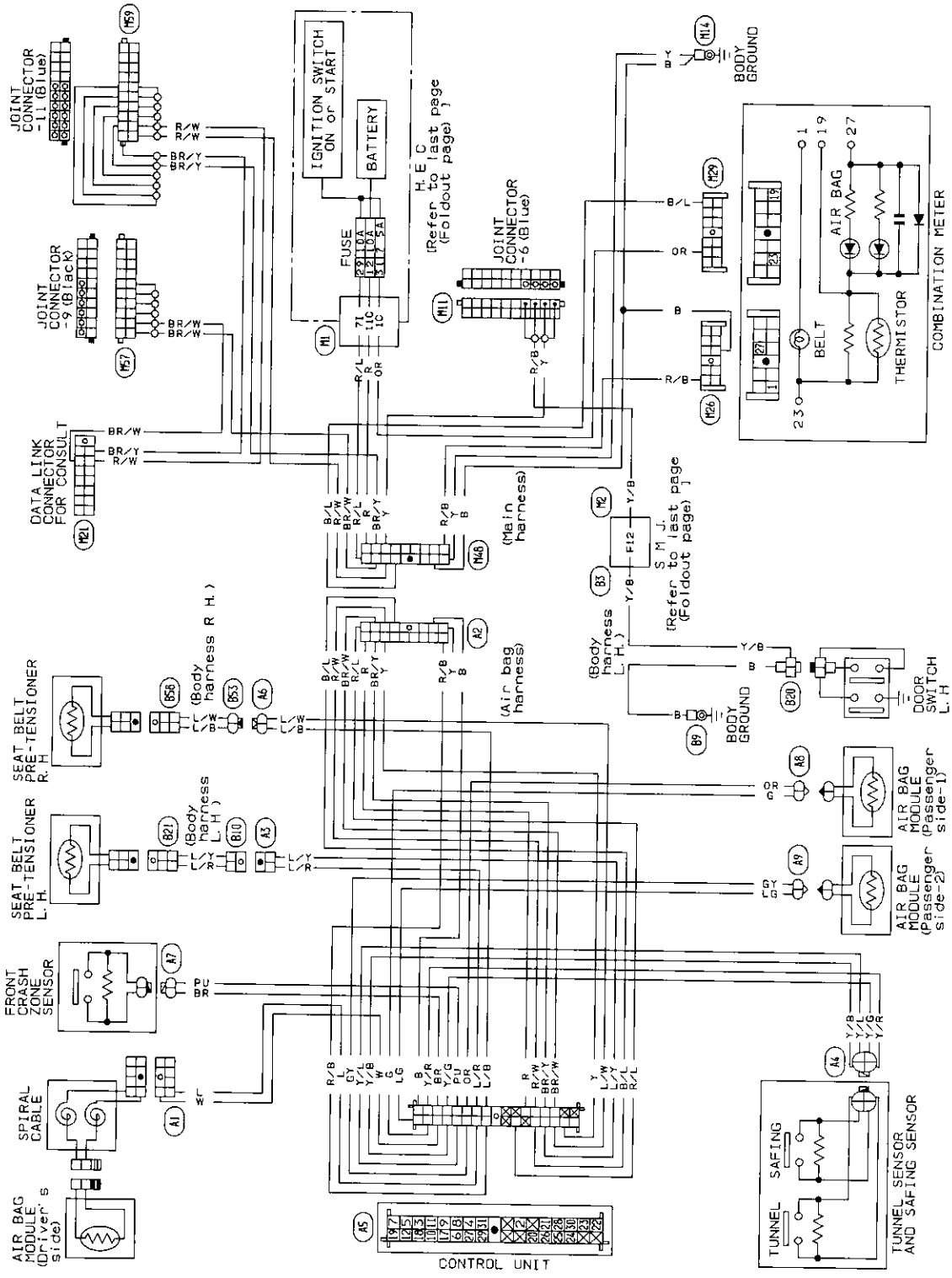
Schematic



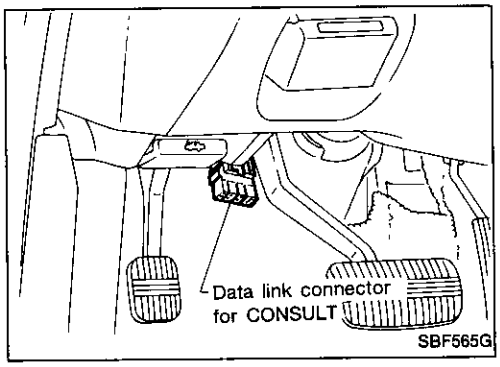
Wiring Diagram

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.**



SBF636A



Self-diagnosis

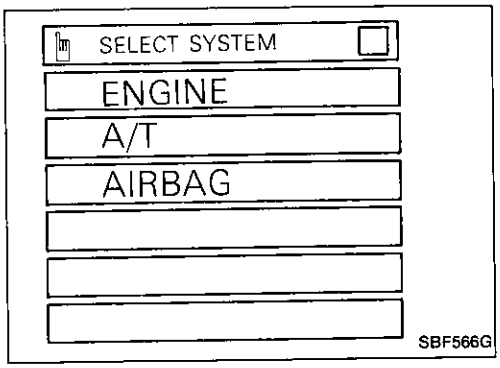
USING CONSULT

The self-diagnosis results can be read by CONSULT, as follows:

1. Connect "CONSULT" to vehicle harness connector.
↓
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 RESULT 1" (first page — present mode). The problem code last indicated is displayed on "SELF DIAG RESULT 2" (second page — initial mode).
↓
7. When "PRINT" is pressed, information displayed on "SELF DIAG RESULTS 1 and 2" is printed out.
↓
8. After repairing malfunctioning parts, press "ERASE" to clear self-diagnosis results.

- **After repairing malfunctioning parts, attempt to clear self-diagnosis results from memory.**
- **If malfunctioning parts are not completely repaired, self-diagnosis results remain stored in memory.**

↓
9. Push Back Key of CONSULT until SELECT SYSTEM mode appears to make "SELF-DIAGNOSIS" user mode.
↓
10. Push the power off switch.
↓
11. Turn off ignition switch.



Self-diagnosis (Cont'd)

Self-diagnosis results

Failure parts group [Present] and [Initial]	Explanation	Repair order * Recheck SRS at each replacement.
NO SELF DIAGNOSTIC FAILURE INDICATED.	Normal. The SRS system is in good order.	—
SAFING SENSOR [OPEN/UPR-VB-SHORT]	The circuit for the safing sensor is open or the wire from the control unit (terminal No. 9) to the safing sensor is shorted to some power supply circuit.	1. Visually check the wiring harness connections. 2. Replace the safing sensor. (safing sensor and tunnel sensor unit) 3. Replace the control unit. 4. Replace the main harness.
SAFING SENSOR [SHORT/UPR-GND-SHORT]	Both the wires for the safing sensor are shorted or the wire from the control unit (terminal No. 9) to the safing sensor is shorted to ground.	
AIRBAG MODULE [OPEN]	The circuit for driver's air bag module is open. (including the spiral cable)	1. Visually check the wiring harness connections. 2. Replace the spiral cable. 3. Replace driver's air bag module. (Before disposing of it, it must be deployed.) 4. Replace the control unit. 5. Replace the main harness.
AIRBAG MODULE [VB-SHORT]	The circuit for driver's air bag module is shorted to some power supply circuit. (including the spiral cable)	
AIRBAG MODULE [GND-SHORT]	The circuit for driver's air bag module is shorted to ground. (including the spiral cable)	
AIRBAG MODULE [SHORT]	The circuits for driver's air bag module are shorted to each other.	
ASSIST A/B MODULE 1 [OPEN]	The circuit for front passenger air bag module 1 is open.	1. Visually check the wiring harness connections. 2. Replace front passenger air bag module. (Before disposing of it, it must be deployed.) 3. Replace the control unit. 4. Replace the main harness.
ASSIST A/B MODULE 1 [VB-SHORT]	The circuit for front passenger air bag module 1 is shorted to some power supply circuit.	
ASSIST A/B MODULE 1 [GND-SHORT]	The circuit for front passenger air bag module 1 is shorted to ground.	
ASSIST A/B MODULE 1 [SHORT]	The circuits for front passenger air bag module 1 are shorted to each other.	
ASSIST A/B MODULE 2 [OPEN]	The circuit for front passenger air bag module 2 is open.	1. Visually check the wiring harness connections. 2. Replace front passenger air bag module. (Before disposing of it, it must be deployed.) 3. Replace the control unit. 4. Replace the main harness.
ASSIST A/B MODULE 2 [VB-SHORT]	The circuit for front passenger air bag module 2 is shorted to some power supply circuit.	
ASSIST A/B MODULE 2 [GND-SHORT]	The circuit for front passenger air bag module 2 is shorted to ground.	
ASSIST A/B MODULE 2 [SHORT]	The circuits for front passenger air bag module 2 are shorted to each other.	

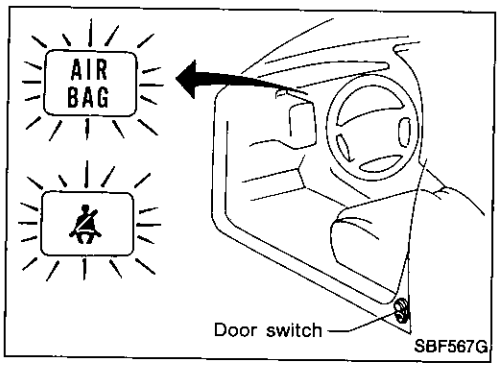
Self-diagnosis (Cont'd)

Failure parts group [Present] and [Initial]	Explanation	Repair order * Recheck SRS at each replacement.
TUNNEL SENSOR [OPEN/UPR-VB-SHORT]	The circuit for the tunnel sensor is open or the wire from the control unit (terminal No. 11) to the tunnel sensor is shorted to some power supply circuit.	1. Visually check the wiring harness connections. 2. Replace the tunnel sensor. (safing sensor and tunnel sensor unit) 3. Replace the control unit. 4. Replace the main harness.
TUNNEL SENSOR [SHORT/UPR-GND-SHORT]	Both the wires for the tunnel sensor are shorted or the wire from the control unit (terminal No. 11) to the tunnel sensor is shorted to ground.	
CRASH ZONE SEN-CTR [OPEN/UPR-VB-SHORT]	The circuit for the crash zone sensor is open or the wire from the control unit (terminal No. 17) to the crash zone sensor is shorted to some power supply circuit.	1. Visually check the wiring harness connections. 2. Replace the crash zone sensor. 3. Replace the control unit. 4. Replace the main harness.
CRASH ZONE SEN-CTR [SHORT/UPR-GND-SHORT]	Both the wires for the crash zone sensor are shorted or the wire from the control unit (terminal No. 17) to the crash zone sensor is shorted to ground.	
DRIVE PRE-TENSION [OPEN/VB-SHORT]	The circuit for the driver's pre-tensioner is open or shorted to some power supply circuit.	1. Visually check the wiring harness connections. 2. Replace the driver's seat belt. (Before disposing, it must be deactivated.) 3. Replace the control unit. 4. Replace the main harness.
DRIVE PRE-TENSION [GND-SHORT]	The circuit for the driver's pre-tensioner is shorted to ground.	
ASSIST PRE-TENSION [OPEN/VB-SHORT]	The circuit for the front passenger pre-tensioner is open or shorted to some power supply circuit.	1. Visually check the wiring harness connections. 2. Replace the front passenger seat belt. (Before disposing, it must be deactivated.) 3. Replace the control unit. 4. Replace the main harness.
ASSIST PRE-TENSION [GND-SHORT]	The circuit for the front passenger pre-tensioner is shorted to ground.	
CONTROL UNIT	The control unit (diagnostic unit) is out of order.	1. Visually check the wiring harness connections. 2. Replace the control unit. 3. Replace the main harness.
INDEFINITE FAILURES [AIR BAG]	A problem which cannot be specified occurs because more than two parts except seat belt pre-tensioners are out of order.	1. See the SELF-DIAGNOSIS RESULT 2 failure parts group [Initial], then repair as necessary. 2. Visually check the wiring harness connections. 3. Replace the control unit. 4. Replace all sensors, spiral cable and air bag modules and seat belts. 5. Replace the main harness.
INDEFINITE FAILURES [PRE-TENSIONER]	Driver's and front passenger seat belt pre-tensioners are out of order.	1. Visually check the wiring harness connections. 2. Replace the driver's and front passenger seat belts. (Before disposing, they must be deactivated.) 3. Replace the control unit. 4. Replace the main harness.

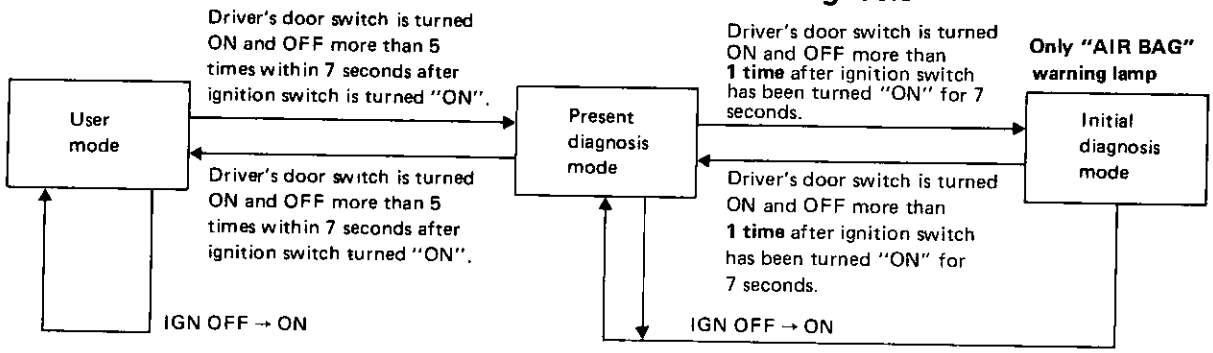
Self-diagnosis (Cont'd)

USING THE WARNING LAMP

Self-diagnosis results can be also read by using the "AIR BAG" warning lamp for SRS system except seat belt pre-tensioner. The warning lamps operate as shown below:



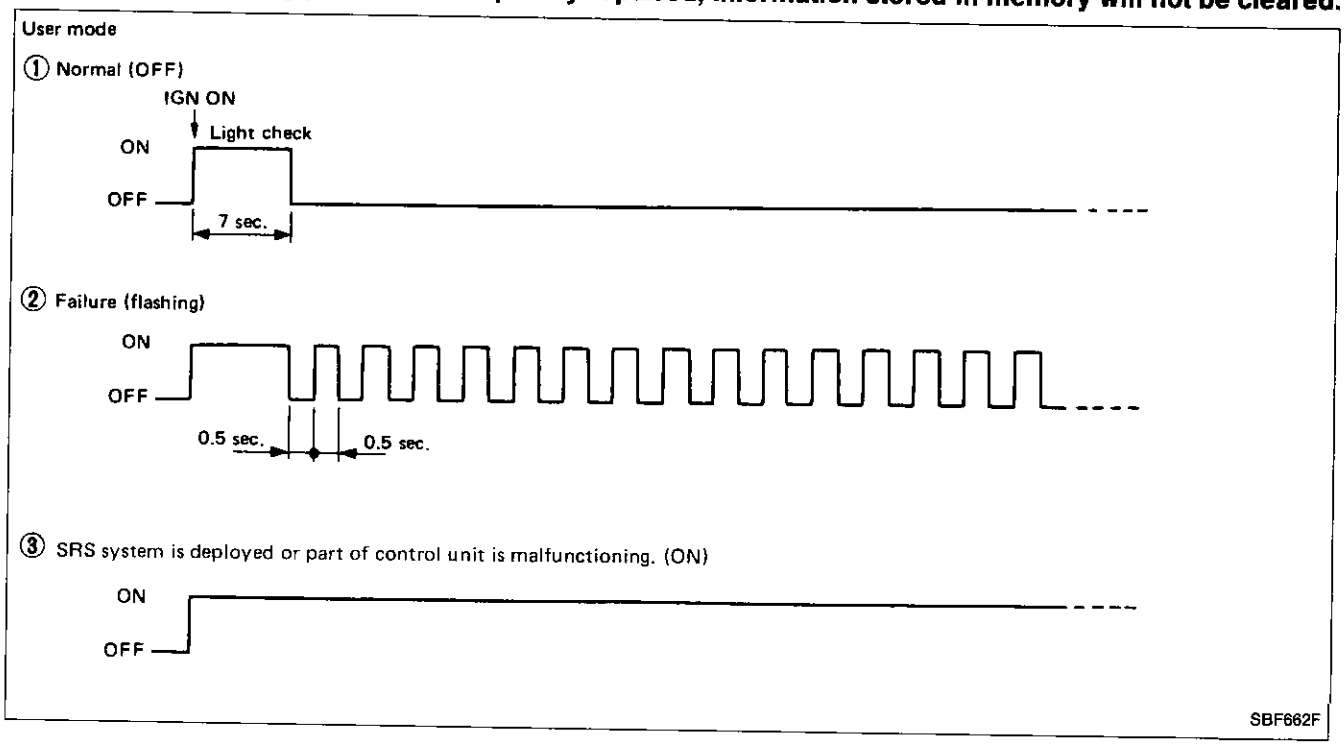
How to alternate self-diagnosis



Problem codes are displayed in present diagnosis mode (self-diagnosis result 1). The problem code last indicated is displayed in initial diagnosis mode (self-diagnosis result 2).

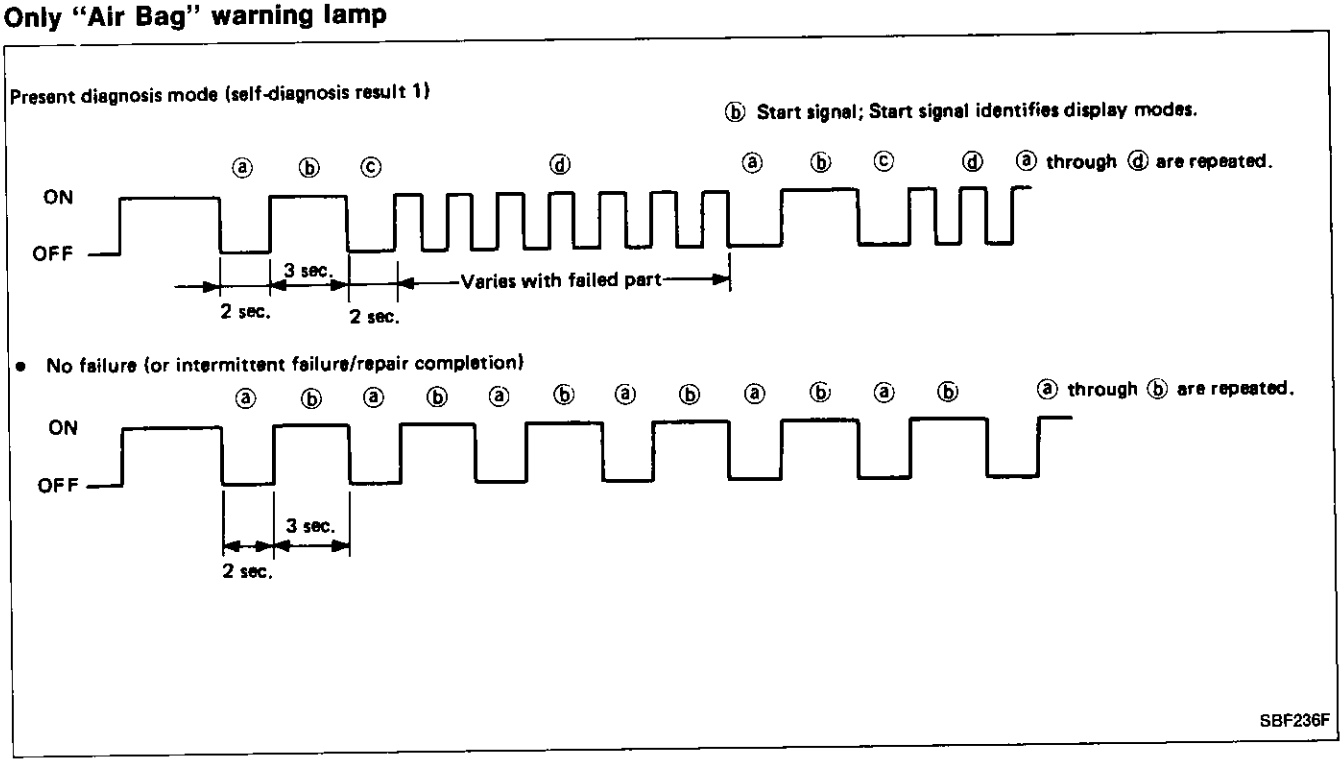
After the malfunctioning parts have been repaired and the system is returned to the user mode, the present diagnosis mode information, displayed as self-diagnosis results, is automatically cleared from memory.

- **After repairing malfunctioning part, attempt to clear self-diagnosis results from memory.**
- **If a malfunctioning part is not completely repaired, information stored in memory will not be cleared.**

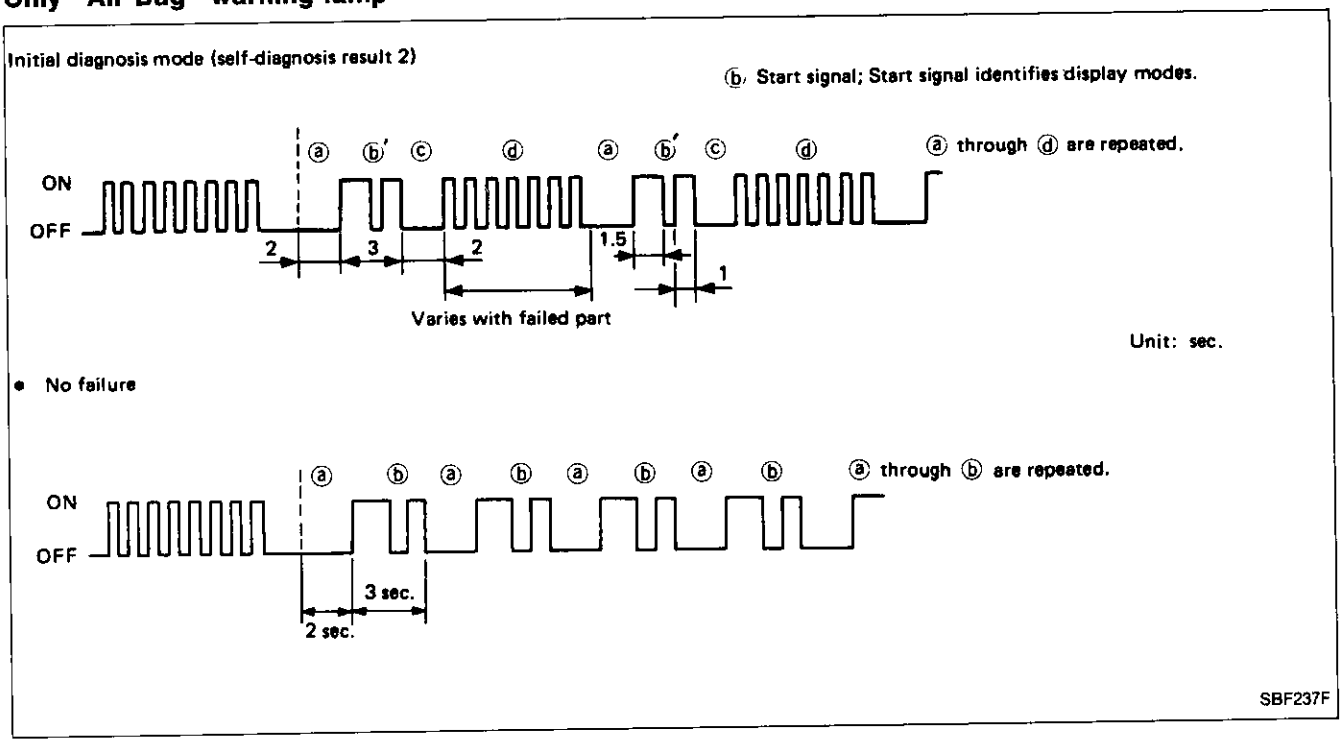


Self-diagnosis (Cont'd)

Only "Air Bag" warning lamp



Only "Air Bag" warning lamp

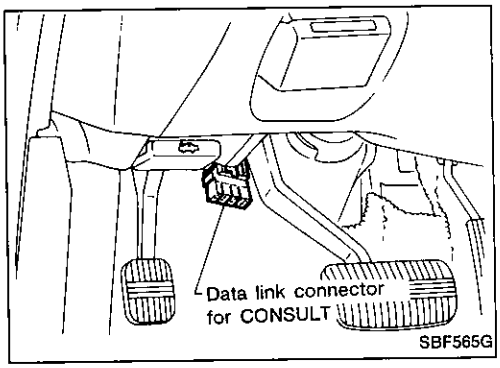


Self-diagnosis results in present- and initial-diagnosis modes can be identified by number of flashes (d). Refer to Table on next page for failed parts.

Self-diagnosis (Cont'd)

Warning lamp flashing times and repair

Warning lamp	Flash code ⓓ (# of flashes)	Explanation	Repair order * Recheck SRS at each replacement.
"AIR BAG" warning lamp	0	Normal. The SRS "Air Bag" is in good order.	—
	1	The circuit for the safing sensor is out of order.	1. Visually check the wiring harness connections. 2. Replace the safing sensor. (safing sensor and tunnel sensor unit) 3. Replace the control unit. 4. Replace the main harness.
	2	The circuit for the driver's air bag module is out of order.	1. Visually check the wiring harness connections. 2. Replace the spiral cable. 3. Replace the driver's air bag module. (Before disposing of it, it must be deployed.) 4. Replace the control unit. 5. Replace the main harness.
	3	The circuit for the tunnel sensor is out of order.	1. Visually check the wiring harness connections. 2. Replace the tunnel sensor. (safing sensor and tunnel sensor unit) 3. Replace the control unit. 4. Replace the main harness.
	6	The circuit for the center crash zone sensor is out of order.	1. Visually check the wiring harness connections. 2. Replace the center crash zone sensor. 3. Replace the control unit. 4. Replace the main harness.
	7	The control unit (diagnostic unit) is out of order.	1. Visually check the wiring harness connections. 2. Replace the control unit. 3. Replace the main harness.
	8	The circuit for the front passenger air bag module is out of order.	1. Visually check the wiring harness connections. 2. Replace the front passenger air bag module. (Before disposing of it, it must be deployed.) 3. Replace the control unit. 4. Replace the main harness.
	9	More than two parts groups are out of order.	1. See the SELF-DIAGNOSIS RESULT 2 failure parts group [Initial], then repair it. 2. Visually check the wiring harness connections. 3. Replace the control unit. 4. Replace all sensors, spiral cable and air bag module. 5. Replace the main harness.



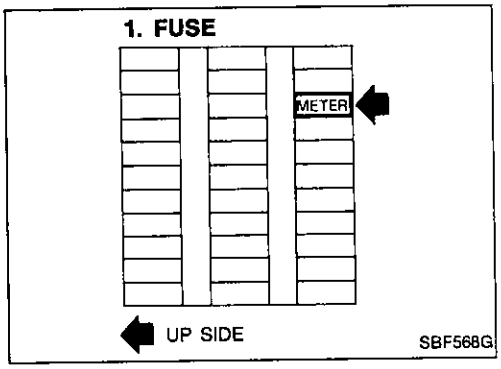
Diagnostic Procedure 1

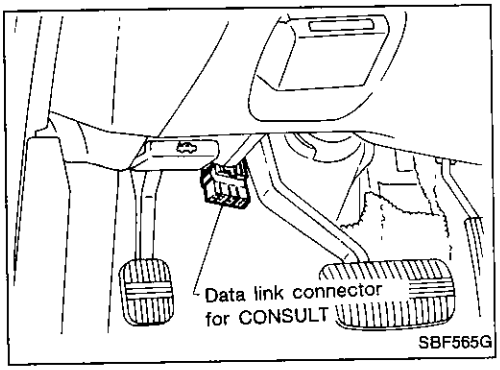
SYMPTOM: Warning lamp flashes.

Connect the CONSULT and operate it. Read the SELF-DIAGNOSIS RESULTS 1 and 2. → Refer to SELF-DIAGNOSIS RESULTS and repair.

OR

Refer to warning lamp self-diagnosis. → Refer to the number of warning lamp flashes. Repair as necessary.

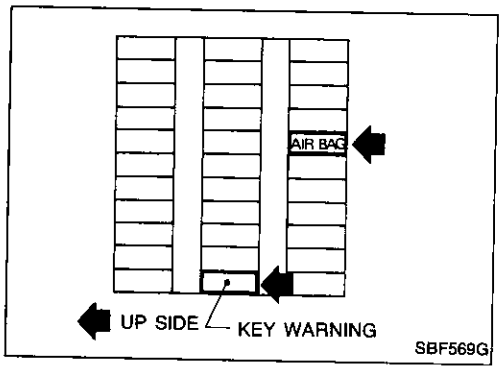


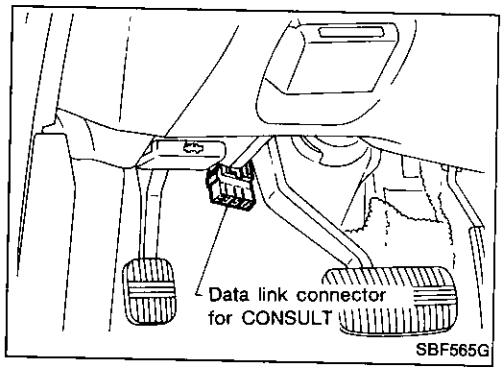


Diagnostic Procedure 2

SYMPTOM: Warning lamp does not come on.

1. Check the warning lamp fuse. — N.G. → Replace the fuse.
   O.K.
2. Connect the CONSULT unit and begin diagnosis.
   • Is "AIR BAG" displayed on the CONSULT screen? — N.G. → Replace the control unit.
   O.K.
3. Read the SELF-DIAGNOSIS RESULTS 1 and 2. — N.G. → Refer to SELF-DIAGNOSIS RESULTS and repair.
   O.K.
4. Check the warning lamp bulb. — N.G. → Replace the warning lamp bulb.
   O.K.
5. Check the warning lamp harness connection. — N.G. → Replace the harness.
   O.K.
6. Replace the control unit.





Diagnostic Procedure 3

SYMPTOM: Warning lamp does not go off.

1. Have the air bag modules and seat belt pre-tensioners been deployed?
   - Yes → Replace the air bag modules and seat belt pre-tensioners.
   - No ↓
2. Check the fuse used for the SRS "Air Bag" and "Elec Device".
   - N.G. → Replace the fuse.
   - O.K. ↓
3. Connect the CONSULT unit and operate it.
   - ● Is "AIR BAG" displayed on the CONSULT?
   - N.G. → Replace the control unit.
   - O.K. ↓
4. Read the SELF-DIAGNOSIS RESULTS 1 and 2.*
   - N.G. → Refer to SELF-DIAGNOSIS RESULTS and repair.

   OR

   Refer to the warning lamp self-diagnosis.*
   - N.G. → Refer to the warning lamp flashing times and repair as necessary.
   - O.K. ↓
5. Check the harness connection between the warning lamp and the control unit.
   - N.G. → Replace the harness.
   - O.K. ↓
6. Replace the control unit.

* Recheck SRS after each replacement.

Collision Diagnosis

To repair the SRS system, perform the following steps.

① Check the control unit (diagnostic unit).
- Connect CONSULT and then erase the memory. (However, the memory may not be cleared.)

OR

- Check "AIR BAG" warning lamp and perform the following twice: turn driver's door switch ON and OFF 5 times within 7 seconds after ignition switch turned "ON".

↓ If "AIR BAG" warning lamp comes on continuously.

Replace the control unit.

② Remove the deployed air bag modules and seat belt pre-tensioners.

③ Check the SRS components using the table shown below:
- If the SRS components are showing any visible damage such as dents, cracks, or deformation, replace them with new ones.

④ Conduct self-diagnosis using CONSULT or warning lamp to ensure entire SRS operates properly except open circuits of air bag modules and seat belt pre-tensioners.

⑤ Install new air bag modules and seat belt pre-tensioners.

	Inspection (when air bag deploys in collision)	Inspection (when air bag does not deploy in low-speed collision)
Steering wheel	(1) Check harness (built into steering wheel) and connectors for damage, and terminals for deformities. (2) Install air bag module to check fit or alignment with steering wheel. (3) Check steering wheel for excessive free play.	
In-compartment sensor All sensors (except those affected by collision)	(1) Check body and sensor brackets for deformities or rust. (2) Check sensor case for dents, cracks, deformities or rust. (3) Check sensor harness for binds, connector for damage, and terminals for deformities.	
Air bag modules and seat belt pre-tensioners	Replace air bag modules and seat belt pre-tensioners.	(1) Remove air bag modules and seat belt pre-tensioners. Check harness cover and connectors for damage, terminals for deformities, and harness for binds. (2) Install driver's air bag module to steering wheel to check fit or alignment with the wheel. (3) Replace air bag module screws with new ones.
Harness connector (Main and Instrument harness)	(1) Check connectors for poor connections. (2) Check harness for binding, connectors for damage, and terminals for deformities.	
Spiral cable	(1) Visually check lock (engagement) pins and combination switch for damage. (2) Check connectors, flat cable and protective tape for damage. (3) Check steering wheel for noise, binds or heavy operation.	
Control unit	Replace control unit (diagnostic unit).	(1) Check case and bracket for dents, cracks or deformities. (2) Check connectors for damage, and terminals for deformities.

HEATER & AIR CONDITIONER

SECTION HA

CONTENTS

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DESCRIPTION — Refrigeration System ..... HA- 12
PREPARATION ..... HA- 18
SERVICE PROCEDURES ..... HA- 22
LUBRICATION OIL — Checking and Adjusting ..... HA- 26
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TROUBLE DIAGNOSES ..... HA- 38
SYSTEM DESCRIPTION HA-105
SERVICE DATA AND SPECIFICATIONS (S.D.S.) HA-126

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".



Supplemental Restraint System "AIR BAG"

The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury in a frontal collision. The Supplemental Restraint System consists of air bags, sensors, a control unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in **section BF** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized INFINITI 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 "Air Bag".**

Precautions for Working with HFC-134a (R-134a)

WARNING:

- CFC-12 (R-12) refrigerant and HFC-134a (R-134a) refrigerant must never be mixed, even in the smallest amounts, as they are incompatible with each other. If the refrigerants are mixed, compressor failure is likely to occur.
- Use only specified lubrication oil for the HFC-134a (R-134a) A/C system and HFC-134a (R-134a) components. If lubrication oil other than that specified is used, compressor failure is likely to occur.
- The specified HFC-134a (R-134a) lubrication oil absorbs moisture from the atmosphere at a rapid rate, therefore 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. Also, complete the connection of all refrigerant loop components as quickly as possible to minimize the entry of moisture into the system.
  - c: Use the specified lubrication oil from a sealed container only. Containers must be re-sealed immediately after dispensing the lubrication oil. Lubrication oil in containers which are not properly sealed will become moisture saturated, and such lubrication oil is no longer suitable for use and should be properly disposed of.
  - d: Avoid breathing A/C refrigerant and lubrication oil vapor or mist. Exposure may irritate eyes, nose and throat. Use only approved recovery/recycling equipment to discharge HFC-134a (R-134a) systems. If accidental system discharge occurs, ventilate work area before resuming work.
  - e: Do not allow lubrication oil (Nissan A/C System Oil Type S) to come in contact with styrofoam parts. Damage may result.

General Refrigerant Precautions

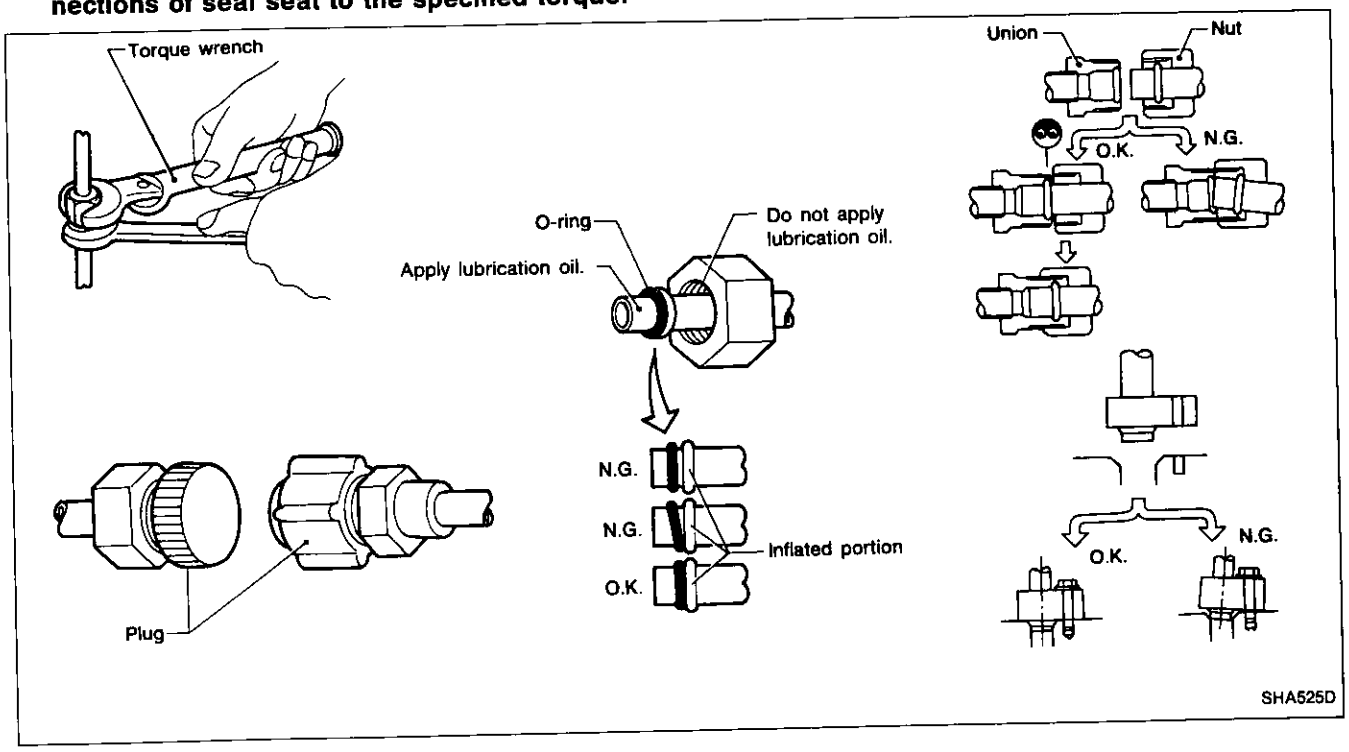
WARNING:

- 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. Then gradually loosen the discharge side hose fitting and remove it.
CAUTION:
When replacing or cleaning refrigerant cycle components, observe the following.

- **Do not leave compressor on its side or upside down for more than 10 minutes, as compressor oil will enter low pressure chamber.**
- **When connecting tubes, always use a torque wrench and a back-up wrench.**
- **After disconnecting tubes, plug all openings immediately to prevent entrance of dirt and moisture.**
- **When installing an air conditioner in the vehicle, the pipes must be connected as the final stage of the operation. The seal caps of the pipes and other components must not be removed until their removal is required for connection.**
- **To prevent the condensation of moisture inside A/C components, components stored in cool areas should be allowed to warm to the working area temperature before removing the seal caps.**
- **Thoroughly remove moisture from the refrigeration system before charging the refrigerant.**
- **Always replace used O-rings.**
- **When connecting tube, apply lubrication oil to portions shown in illustration. Be careful not to apply oil to threaded portion.**
  Lubrication oil name: Nissan A/C System Oil Type S
  Part number: KLH00-PAGS0
- **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

- Attach a blind plug to the suction port (low pressure) and discharge port (high pressure) of the compressor to prevent oil from leaking out and dust from getting inside.
- Do not keep the compressor in the upside down position or laid on its side for more than 10 minutes.
- When replacing the compressor, be sure to remove oil from the compressor and check the oil quantity extracted.
- When replacing with a new compressor, be sure to remove oil from the new compressor so that the quantity of oil remaining in the new compressor is equal to the quantity collected from the removed compressor. See the section "LUBRICATION OIL".
- Pay attention so as not to allow dirt and oil to attach on the friction surfaces between clutch and pulley. If the surface is contaminated with oil, wipe it off by using a clean waste cloth moistened with thinner.
- After completing the compressor service operation, be sure to rotate the compressor shaft more than five turns in both directions by hand to equalize oil distribution inside the compressor, then run the compressor for about one hour by idling the engine.

Introduction

The Automatic Temperature Control (ATC) system provides automatic regulation of the vehicles interior temperature based on the operator selected "set temperature", regardless of the outside temperature changes. This is done by utilizing a microcomputer, also referred to as the automatic amplifier, 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

The air mix door is automatically controlled so that in-vehicle temperature will reach, and be maintained at the operator selected "set temperature". For a given set temperature, the mix door position will depend on: Ambient temperature, in-vehicle temperature, amount of sunload, and intake air temperature.

Fan speed control

The blower speed is automatically controlled, with the actual speed (for a given set temperature) depending on: Ambient temperature, in-vehicle temperature, amount of sunload, intake air temperature, and mix door position. Additionally, when the system is turned on, the blower will start slowly and then increase speed (over a period of approximately 5 seconds) until the objective speed is reached. When cold starting in cold ambient temperatures, the blower operation will be delayed to prevent blowing cold air on the occupants feet.

Intake door control

The intake door position will be determined by: Ambient temperature, in-vehicle temperature, and whether the compressor is on or off.

Outlet door control

The outlet door position will be determined by: Ambient temperature, in-vehicle temperature, intake air temperature, and amount of sunload.

Compressor clutch control

The compressor operation (ON-OFF) is automatically controlled by the ambient sensor and intake sensor to prevent evaporator from freezing.

Recirculation switch

If the operator does not want outside air, the RECIRC switch should be pushed. The passenger compartment air will be recirculated for approx. 10 minutes, then the RECIRC function will be automatically canceled.

Self-diagnostic system

The self-diagnostic system consists of five steps. Each step can be accessed by pushing the switches on the automatic amplifier.

STEP 1: Checks L.E.D.s and segments of the display.
STEP 2: Checks each sensor circuit for open or short circuit.
STEP 3: Checks mode door position.
STEP 4: Checks operation of each actuator.
STEP 5: Checks temperature detected by each sensor.
AUXILIARY TRIMMER MECHANISM: Temperature setting trimmer.

CONSULT operation

In addition to AUXILIARY TRIMMER MECHANISM in Self-diagnostic system, recent changes have made it possible to use CONSULT. This enables the following functions to be controlled by AUTOMATIC MODE.

STEP 1: Adjustment of highest blower fan speed
(the adjustment of blower motor voltage)
STEP 2: Adjustment of highest blower fan speed changing point
(the adjustment of the time required for cool-down)
STEP 3: Adjustment of outlet door changing point
(the adjustment of the time required to change B/L to F/D)

Features (Cont'd)

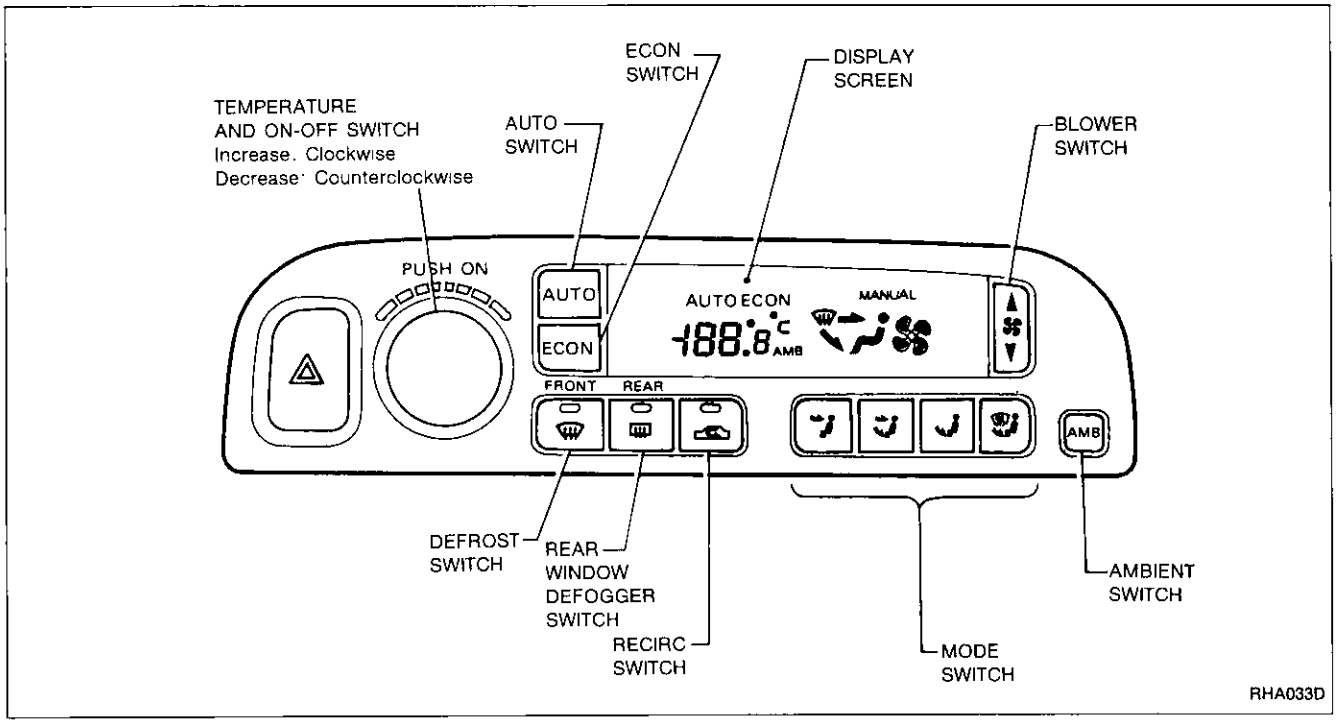
Memory function

When the ignition switch is turned from "ON" to "OFF", the auto amplifier stores the set temperature and inputs of various switches in its memory. When the ignition switch is turned from "OFF" to "ON", the system begins operation with the information stored in the memory, then immediately compensates for the actual operating conditions.

Refrigeration cycle

Refer to page HA-12 for the description of the refrigeration cycle.

Control Operation



DISPLAY SCREEN
Displays the operational status of the system.

AUTO SWITCH
The compressor, air inlet door, air mix door, outlet doors, and blower speed are automatically controlled so that the in-vehicle temperature will reach, and be maintained at the set temperature selected by the operator.

ECON SWITCH
Fully automatic control with the compressor off. With the compressor off, the system will not remove heat (cool) or de-humidify. The system will maintain the in-vehicle temperature at the set temperature when the set temperature is above the ambient (outside) temperature.

TEMPERATURE INCREASE/DECREASE AND ON-OFF SWITCH
Increases or decreases the set temperature.
The compressor and blower are off, the air inlet door is set to the outside air position, and the air outlet doors are set to the foot (76% foot and 24% defrost) position. In the off position the ATC system uses the vehicle's "flow through" ventilation to try to maintain the interior temperature based on the temperature set when the system was last operating.

BLOWER 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. There selections are available (as shown on the display screen):
VENT , B/L , FOOT/DEF1 , FOOT/DEF2

Control Operation (Cont'd)

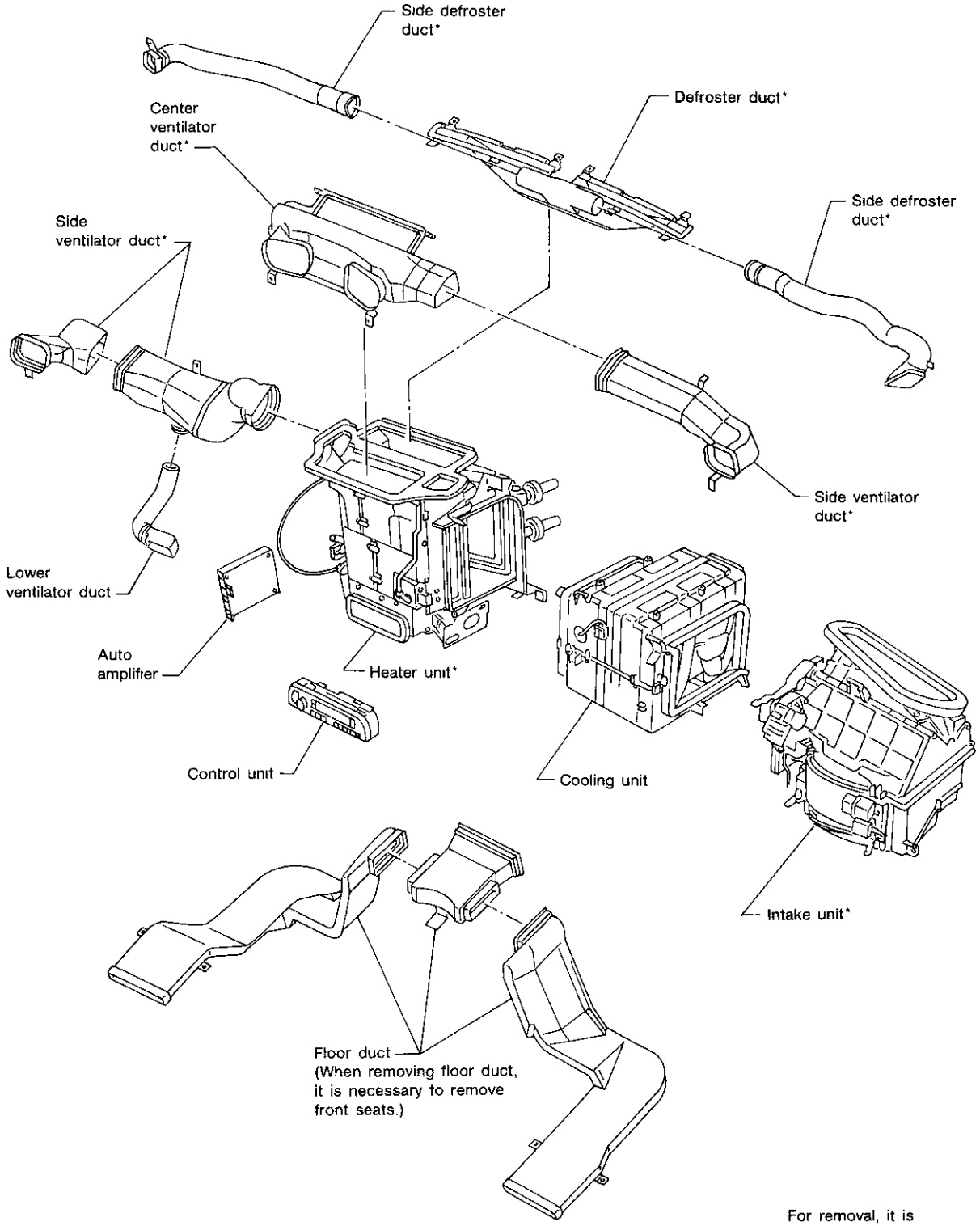
AMBIENT SWITCH
Shows the ambient (outside) air temperature on the display screen for 5 seconds.

RECIRC SWITCH
Positions the air inlet door to the recirculation position for 10 minutes, after which automatic control resumes.

DEFROST SWITCH
Positions the air discharge doors to the defrost position. Also positions the air inlet door to the outside air position. The compressor operates at ambient temperature approx. 12°C (54°F) or above.

REAR WINDOW DEFOGGER SWITCH
Activates and deactivates the rear window defogger.

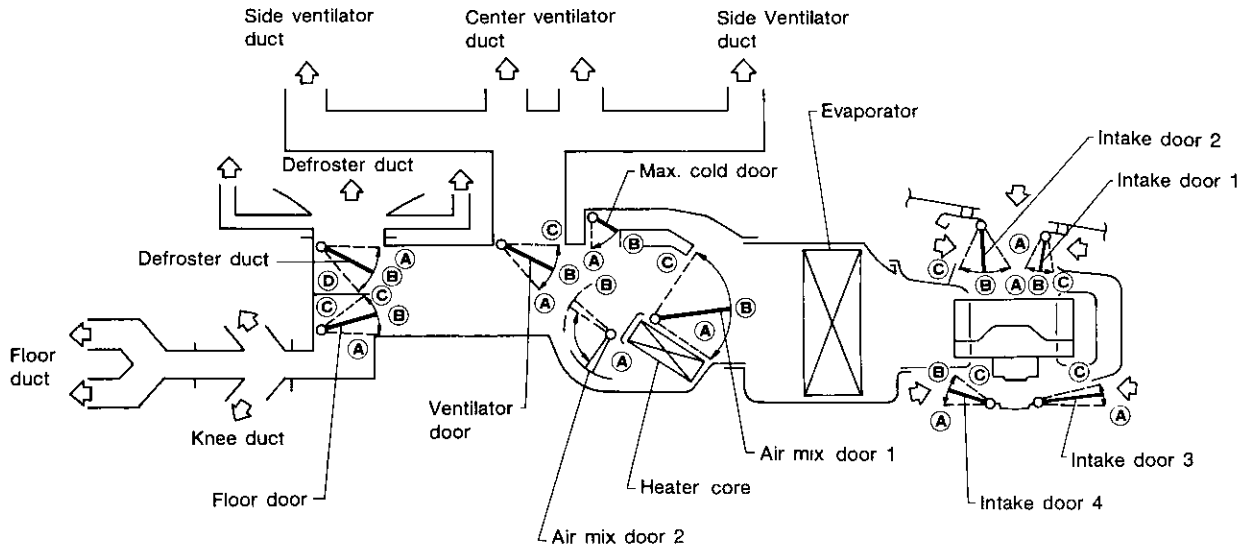
Component Layout



For removal, it is necessary to remove instrument assembly.

RHA034D

Air Flow



RHA035D

POSITION / DOOR	MODE BUTTON				DEF BUTTON		AUTO BUTTON	ECON BUTTON	REC BUTTON		TEMPERATURE SWITCH		
	VENT	B/L	F/D1	F/D2	ON	OFF*1			ON	OFF	COLD ◁ ○ ▷ HOT		
							AUTO	ECON					
					INDICATOR				INDICATOR		18°C (65°F)	~	32°C (85°F)
					ON	OFF			ON	OFF			
VENT DOOR	Ⓐ	Ⓑ	Ⓒ	Ⓒ	Ⓒ		AUTO	AUTO					
FLOOR DOOR	Ⓐ	Ⓑ	Ⓒ	Ⓑ	Ⓐ								
DEF DOOR	Ⓐ	Ⓐ	Ⓑ	Ⓒ	Ⓓ								
AIR MIX DOOR 1											Ⓐ	AUTO	Ⓒ
AIR MIX DOOR 2											Ⓐ		Ⓑ
MAX. COLD DOOR		Ⓐ									Ⓐ		Ⓑ
INTAKE DOOR 1					Ⓒ				Ⓐ	AUTO			
INTAKE DOOR 2					Ⓒ				Ⓐ				
INTAKE DOOR 3					Ⓒ				Ⓐ				Ⓑ*2
INTAKE DOOR 4					Ⓒ				Ⓐ				Ⓑ*2

*1: System in F/D1 or F/D2 mode with fan operating at high speeds.
*2: When AUTO or ECON switch and MODE switch are pressed.

Refrigeration Cycle

REFRIGERANT FLOW

The refrigerant flows in the standard pattern, that is, through the compressor, the condenser, the liquid tank, through the evaporator, and back to the compressor.
The refrigerant evaporation through the evaporator coil is controlled by an externally equalized expansion valve, located inside the evaporator case.

FREEZE PROTECTION

Under normal operating conditions, when the AUTO is switched on, the compressor runs continuously, and the evaporator pressure, and therefore temperature, is controlled by the V-6 variable displacement compressor to prevent freeze up.

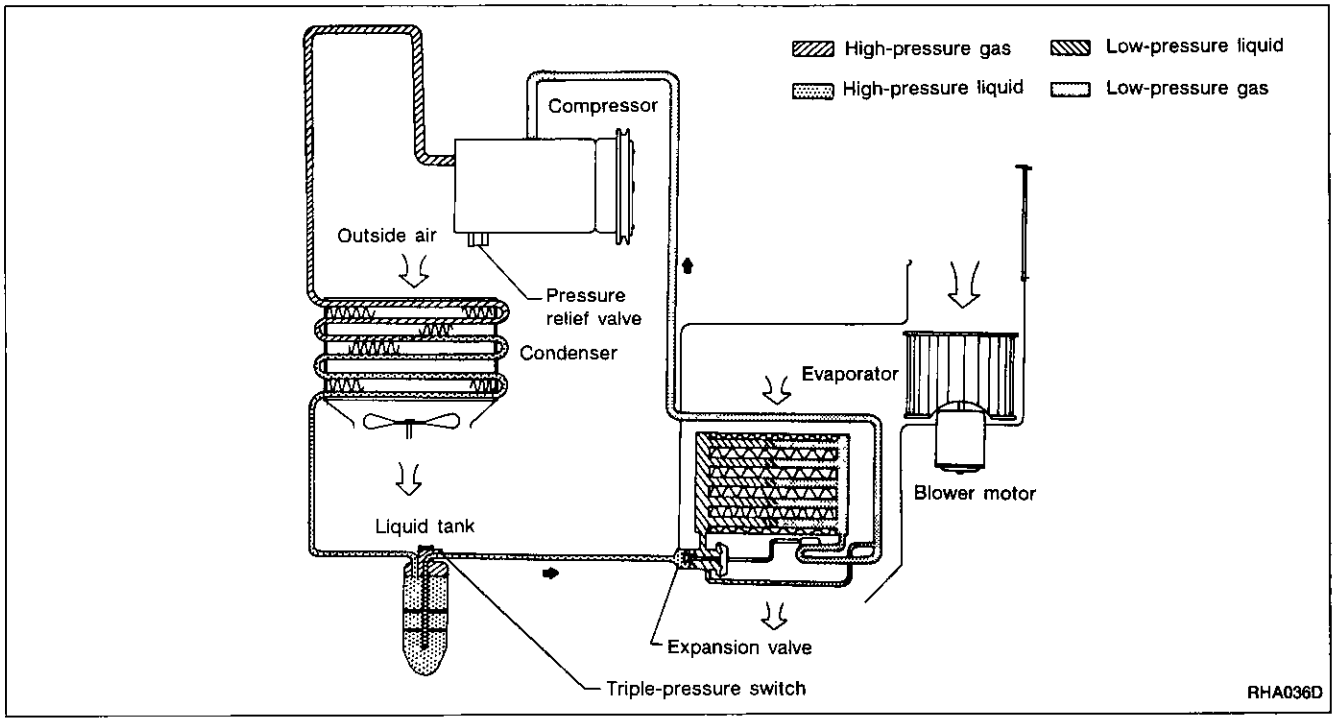
REFRIGERANT SYSTEM PROTECTION

Triple-pressure switch

The refrigerant system is protected against excessively high or low pressures by the triple-pressure switch, located on the liquid tank. If the system pressure rises above, or falls below the specifications, the triple-pressure switch opens to interrupt the compressor operation and to operate the condenser fan motor.

Pressure relief valve

The refrigerant system is also protected by a pressure relief valve, located on the bottom of compressor. When the pressure of refrigerant in the system increases to an abnormal level [more than 3,727 kPa (38 kg/cm^2, 540 psi)], the release port on the pressure relief valve automatically opens and releases refrigerant into the atmosphere.



V-6 Variable Displacement Compressor

GENERAL INFORMATION

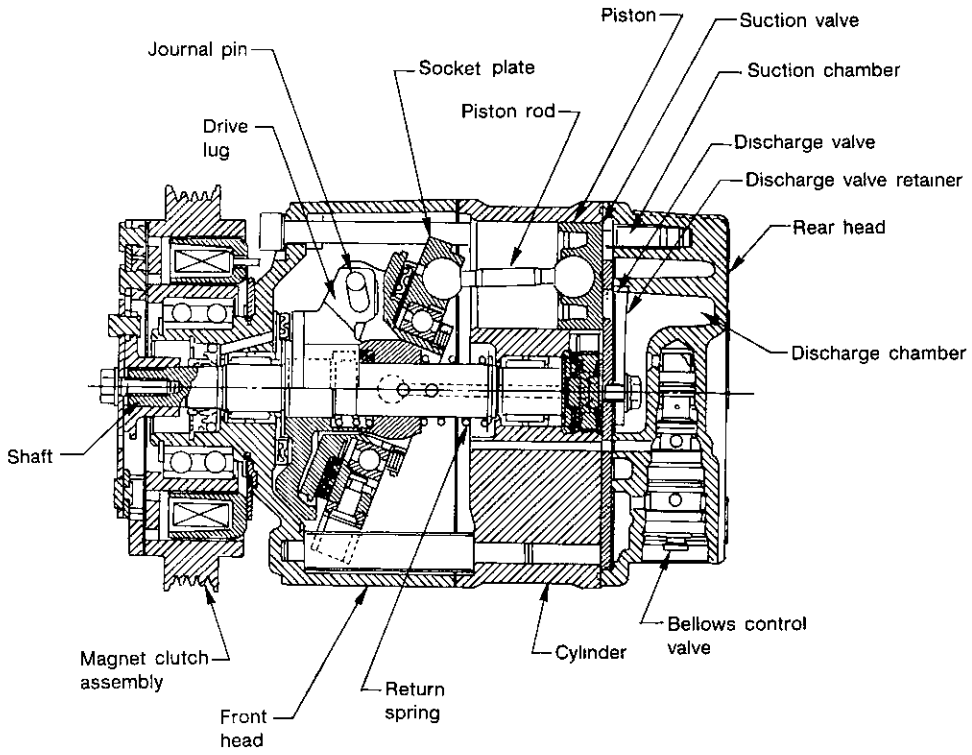
1. The V-6 variable compressor differs from previous units in that the vent temperatures do not drop too far below 5°C (41°F) at an evaporator intake air temperature of less than 20°C (68°F) while the engine is running at speeds less than 1,500 rpm. This is because the V-6 compressor provides a means of "capacity" control.
2. The V-6 variable compressor provides refrigerant control under varying conditions. During the winter season when ambient temperatures are low, it sometimes does not produce high refrigerant pressure discharge (compared to previous units) when used with automobile air conditioning systems.
3. A "clanking" sound may occasionally be heard during refrigerant charge. The sound indicates that the tilt angle of the swash plate has changed and is not a problem.
4. In air conditioning systems which are equipped with the V-6 compressor, the clutch remains engaged unless the system main switch, fan switch or ignition switch is turned OFF. When ambient (outside) temperatures are low or when the amount of refrigerant is insufficient, the clutch is disengaged to protect the compressor.
5. A constant range of suction pressure is maintained when engine speed is greater than a certain value. It normally ranges from 147 to 177 kPa (1.5 to 1.8 kg/cm^2, 21 to 26 psi) under varying conditions.
   In previous compressors, however, suction pressure was reduced with increases in engine speed.

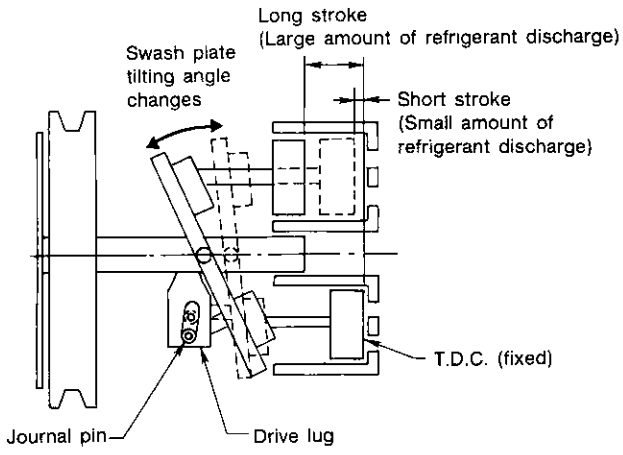
V-6 Variable Displacement Compressor (Cont'd)

DESCRIPTION

General

The variable compressor is basically a swash plate type that changes piston stroke in response to the required cooling capacity.
The tilt of the swash plate allows the piston's stroke to change so that refrigerant discharge can be continuously changed from 10.5 to 184 cm^3 (0.641 to 11.228 cu in).





Discharge control	Discharge capacity cm^3 (cu in)/rev.	Piston stroke length mm (in)
Minimum	10.5 (0.641)	1.6 (0.063)
Maximum	184 (11.228)	28.6 (1.126)

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V-6 Variable Displacement Compressor (Cont'd)

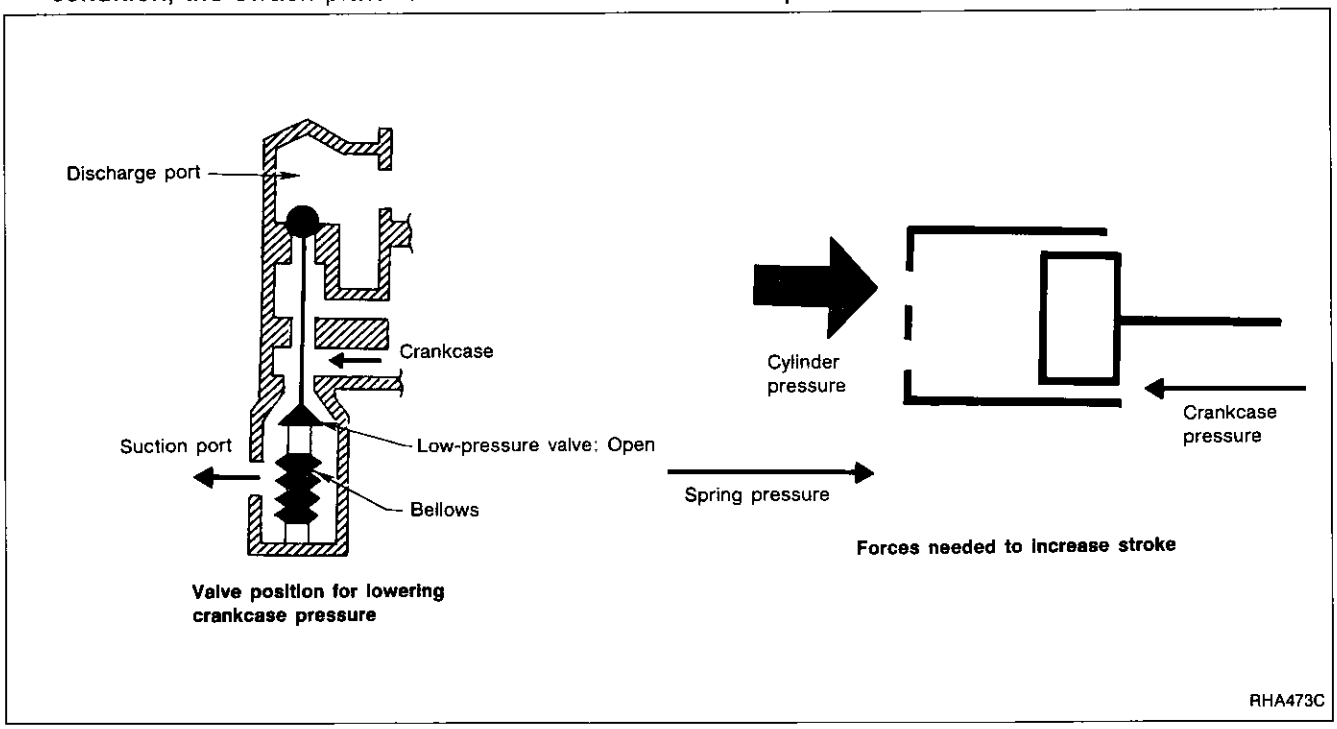
Operation

1. Operation control valve

Operation control valve is located in the suction port (low-pressure) side, and opens or closes in response to changes in refrigerant suction pressure.
Operation of the valve controls the internal pressure of the crankcase.
The angle of the swash plate is controlled between the crankcase's internal pressure and the piston cylinder pressure.

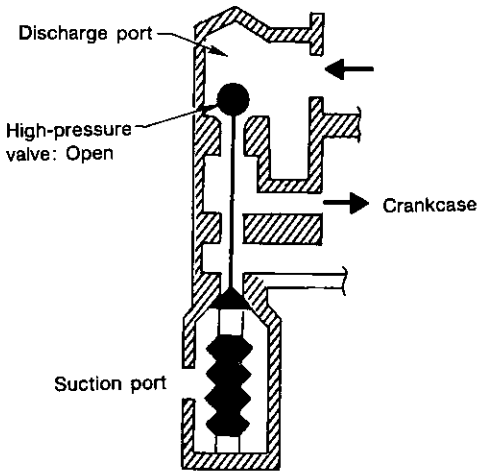
2. Maximum cooling

Refrigerant pressure on the low-pressure side increases with an increase in heat loads.
When this occurs, the control valve's bellows compress to open the low-pressure side valve and close the high-pressure side valve.
This causes the crankcase's internal pressure to equal the pressure on the low-pressure side and the cylinder's internal pressure to be greater than the crankcase's internal pressure. Under this condition, the swash plate is set to the maximum stroke position.

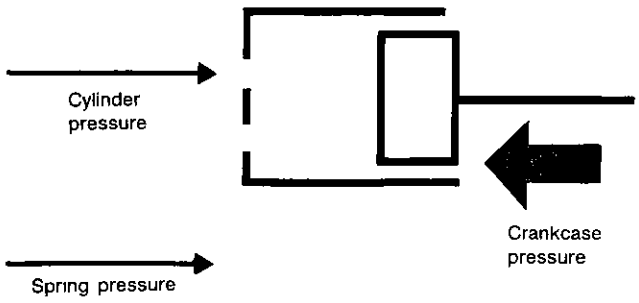


3. Capacity control

- Refrigerant pressure on suction side is low during high speed driving or when ambient or interior temperature is low.
- The bellows expands when refrigerant pressure on the suction pressure side drops below approximately 177 kPa (1.8 kg/cm^2, 26 psi).
  Since suction pressure is low, it makes the suction port close and the discharge port open. Thus, crankcase pressure becomes high as high pressure enters the crankcase.
- The force acts around the journal pin near the swash plate, and is generated by the pressure difference before and behind the piston.
  The drive lug and journal pin are located where the piston generates the highest pressure. Piston pressure is between suction pressure Ps and discharge pressure Pd, which is near suction pressure Ps. If crankcase pressure Pc rises due to capacity control, the force around the journal pin makes the swash plate angle decrease and also the piston stroke decrease. In other words, the pressure difference between the piston and the crankcase according to crankcase pressure increase changes the angle of the swash plate.

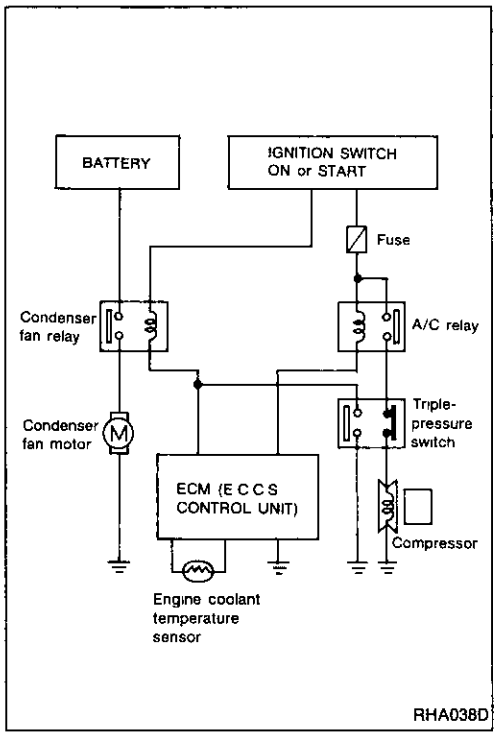


Valve position for raising crankcase pressure



Forces needed to decrease stroke

RHA474C



Condenser Fan Motor Operation System

The condenser fan motor is controlled according to A/C system pressure and engine coolant temperature.

OPERATION

A/C system pressure (Triple-pressure switch)

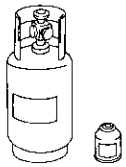
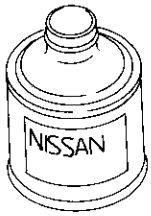
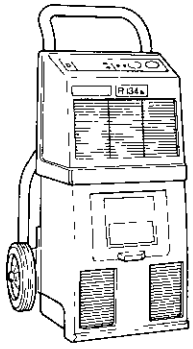
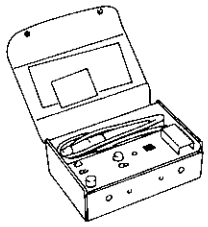
High-pressure side line pressure kPa (kg/cm^2, psi)	Condenser fan motor	Condenser fan control relay	
Decreasing to 1,128 - 1,324 (11.5 - 13.5, 164 - 192)	OFF	Relay	OFF
Increasing to 1,422 - 1,618 (14.5 - 16.5, 206 - 235)	ON		ON

Engine coolant temperature

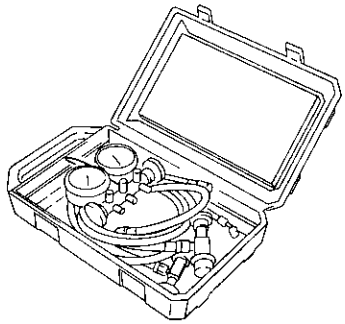
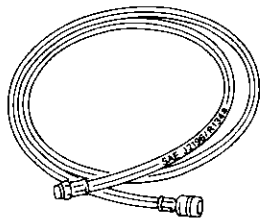
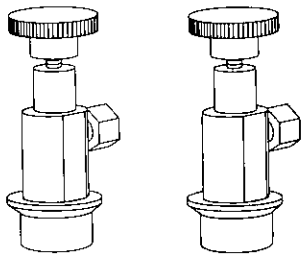
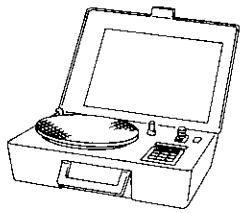
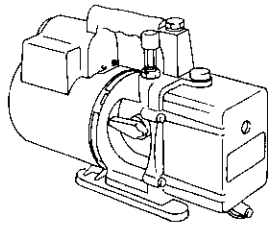
Engine coolant temperature °C (°F)	Condenser fan motor	Condenser fan control relay	
Decreasing to 90 - 96 (194 - 205)	OFF	Relay	OFF
Increasing to 97 - 103 (207 - 217)	ON		ON

HFC-134a (R-134a) Service Tools and Equipment

It is important to understand that HFC-134a (R-134a) refrigerant, and the specified lubricant which must be used with HFC-134a (R-134a), must never be mixed with CFC-12 (R-12) refrigerant and/or the CFC-12 (R-12) lubricant.
This means that separate and non-interchangeable service equipment must be used for handling each type of refrigerant/lubricant.
To prevent the mixing of refrigerants/lubricants, 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).
Adaptors to convert from one size fitting to the other must never be used: refrigerant/lubricant contamination will occur and compressor failure will result.

Tool number (Kent-Moore No.) Tool name	Description	Note
HFC-134a (R-134a) refrigerant		Container color: Light blue Container marking: HFC-134a (R-134a) Fitting size: Thread size • large container 1/2"-16 ACME
KLH00-PAGS0 (—) Nissan A/C System Oil Type S		Type: Poly alkyline glycol oil (PAG), type S Application: HFC-134a (R-134a) swash plate (piston) compressors (Nissan only) Lubricity: 40 mℓ (1.4 US fl oz, 1.4 Imp fl oz)
(J-39500-INF) Recovery/Recycling equipment (ACR4)		Function: Refrigerant Recovery and Recycling and Recharging
(J-39400) Electrical leak detector		Power supply: • DC 12 V (Cigarette lighter)

HFC-134a (R134a) Service Tools and Equipment (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	Note
(J-39183) Manifold gauge set (with hoses and couplers)		Identification: ● The gauge face indicates R-134a. Fitting size: Thread size ● 1/2"-16 ACME
Service hoses ● High side hose (J-39501-72) ● Low side hose (J-39502-72) ● Utility hose (J-39476-72)		Hose color: ● Low hose: Blue with black stripe ● High hose: Red with black stripe ● Utility hose: Yellow with black stripe or green with black stripe Fitting size: Thread size ● 1/2"-16 ACME
Service couplers ● High side coupler (J-39500-20) ● Low side coupler (J-39500-24)		Fitting size: ● M14 x 1.5 fitting is optional
(J-39650) Refrigerant weight scale		For measuring of refrigerant Fitting size: Thread size ● 1/2"-16 ACME
(J-39649) Vacuum pump (Including the isolator valve)		Capacity: ● Air displacement: 4 CFM ● Micron rating: 20 microns ● Oil capacity: 482 g (17 oz) Fitting size: Thread size ● 1/2"-16 ACME

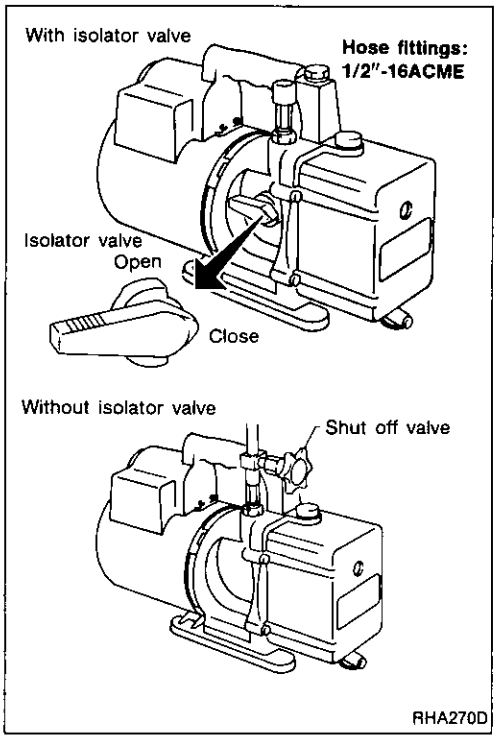
Precautions for Service Equipment

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.

ELECTRICAL LEAK DETECTOR

Be certain to follow the manufactures instructions for tester operation and tester maintenance.



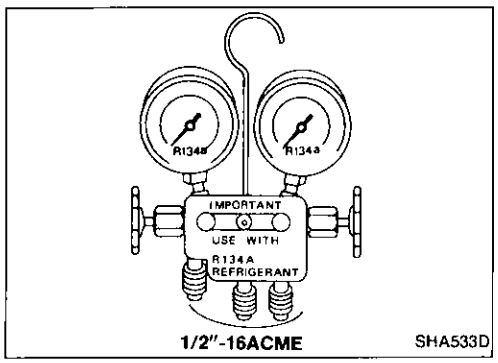
VACUUM PUMP

The lubricant contained inside the vacuum pump is not compatible with the specified lubricant for HFC-134a (R-134a) A/C systems. Since the vent side of the vacuum pump is exposed to atmospheric pressure, it is possible for the vacuum pump lubricant to migrate out of the pump into the service hose if the pump is switched off after evacuation (vacuuming) and the service hose is not isolated from the vacuum pump.

To prevent the migration of vacuum pump lubricant into service hoses, it is necessary to use a valve (which can be manually opened or closed) near the connection of the service hose to the pump.

- On a vacuum pump which is equipped with an isolator valve (usually part of the vacuum pump), closing this valve will isolate the service hose from the pump.
- For pumps without an isolator valve, be certain that the service hose is equipped with a manual shut off valve near the pump end of the hose.
- Hoses which contain an automatic shut off valve at the end of the service hose must be disconnected from the vacuum pump to prevent the migration of lubricant: as long as the hose is connected, the valve is open and lubricant may migrate.

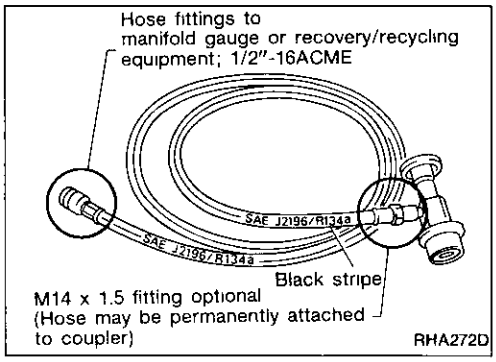
One-way valves which open when vacuum is applied and close under a no vacuum condition are not recommended, because this valve may restrict the pump's ability to pull a deep vacuum.



MANIFOLD GAUGE SET

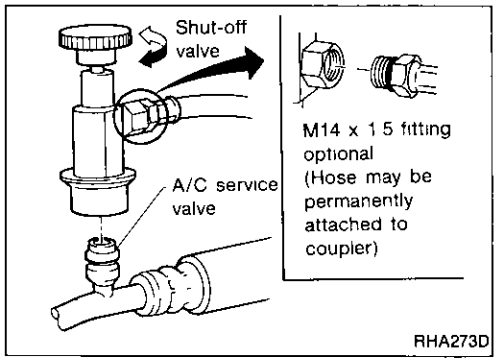
Be certain that the gauge face indicates R-134a or 134a. Be certain that the manifold gauge set has the 1/2''-16 ACME threaded connections for service hoses, and that no refrigerants other than HFC-134a (R-134a) (along with only specified lubricants) have been used with the manifold gauge set.

Precautions for Service Equipment (Cont'd)



SERVICE HOSES

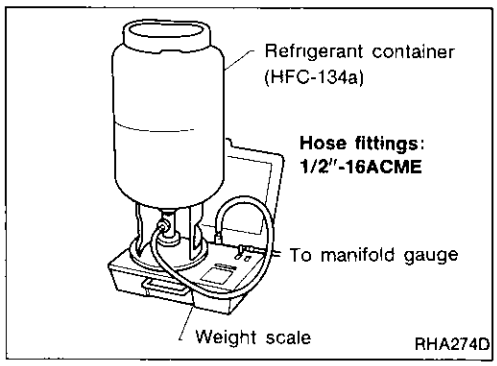
Be certain that the service hoses display the markings described (colored hose with black stripe). Be certain that all hoses include positive shut off devices (either manual or automatic) near the end of the hoses opposite the manifold gauge.



SERVICE COUPLERS

Never attempt to connect HFC-134a (R-134a) service couplers to an CFC-12 (R-12) A/C system. Although the HFC-134a (R-134a) couplers will not secure on to the CFC-12 (R-12) system, CFC-12 (R-12) refrigerant and lubricant will be discharged into the HFC-134a (R-134a) coupler, causing contamination.

Shut off valve rotation	A/C service valve
Clockwise	Open
Counterclockwise	Close



REFRIGERANT WEIGHT SCALE

If the scale allows electronic control of the flow of refrigerant through the scale, be certain that the hose fitting size is 1/2"-16 ACME, and that no refrigerant other than HFC-134a (R-134a) (along with only specified lubricant) has been used with the scale.

CHARGING CYLINDER

The charging cylinder is not recommended because refrigerant may be vented into the air from the top valve of the cylinder when filling the cylinder with refrigerant. Additionally, the accuracy of the cylinder is generally less than that of an electronic scale or of quality recycle/recharge equipment.

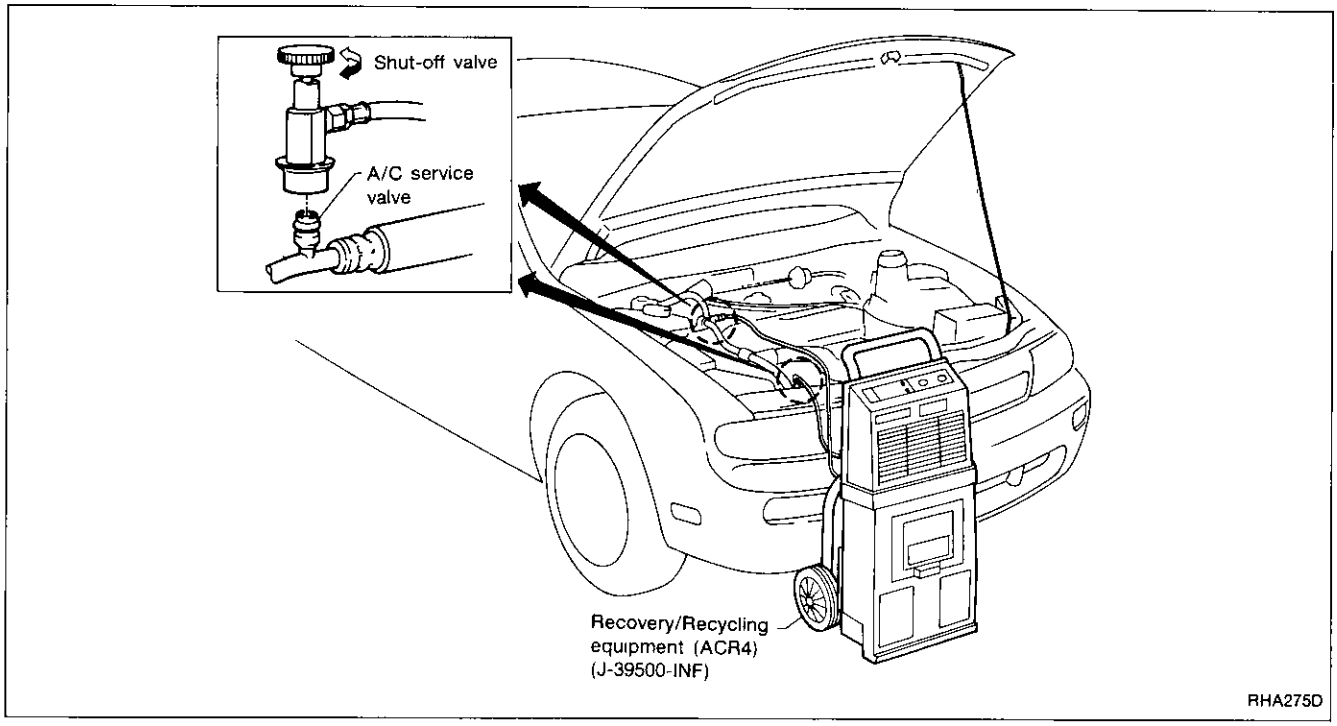
HFC-134a (R-134a) Service Procedure

SETTING OF SERVICE TOOLS AND EQUIPMENT

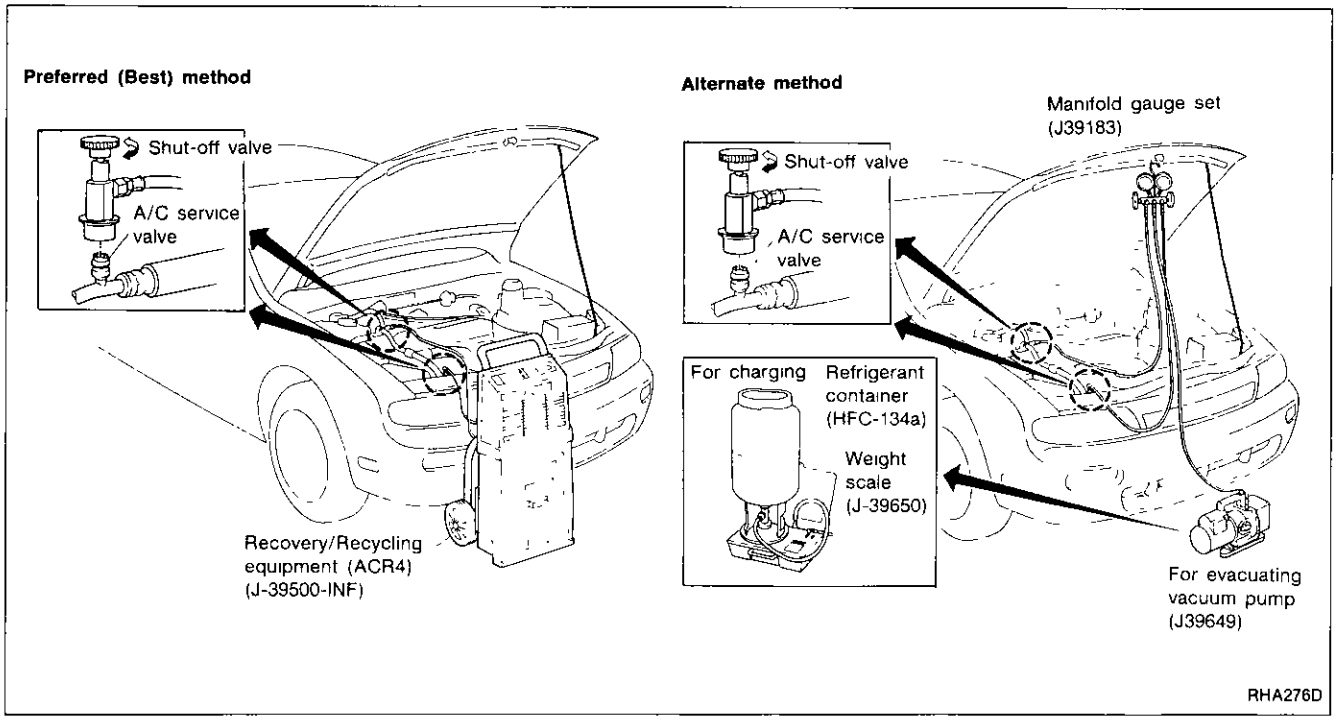
DISCHARGING REFRIGERANT

WARNING:

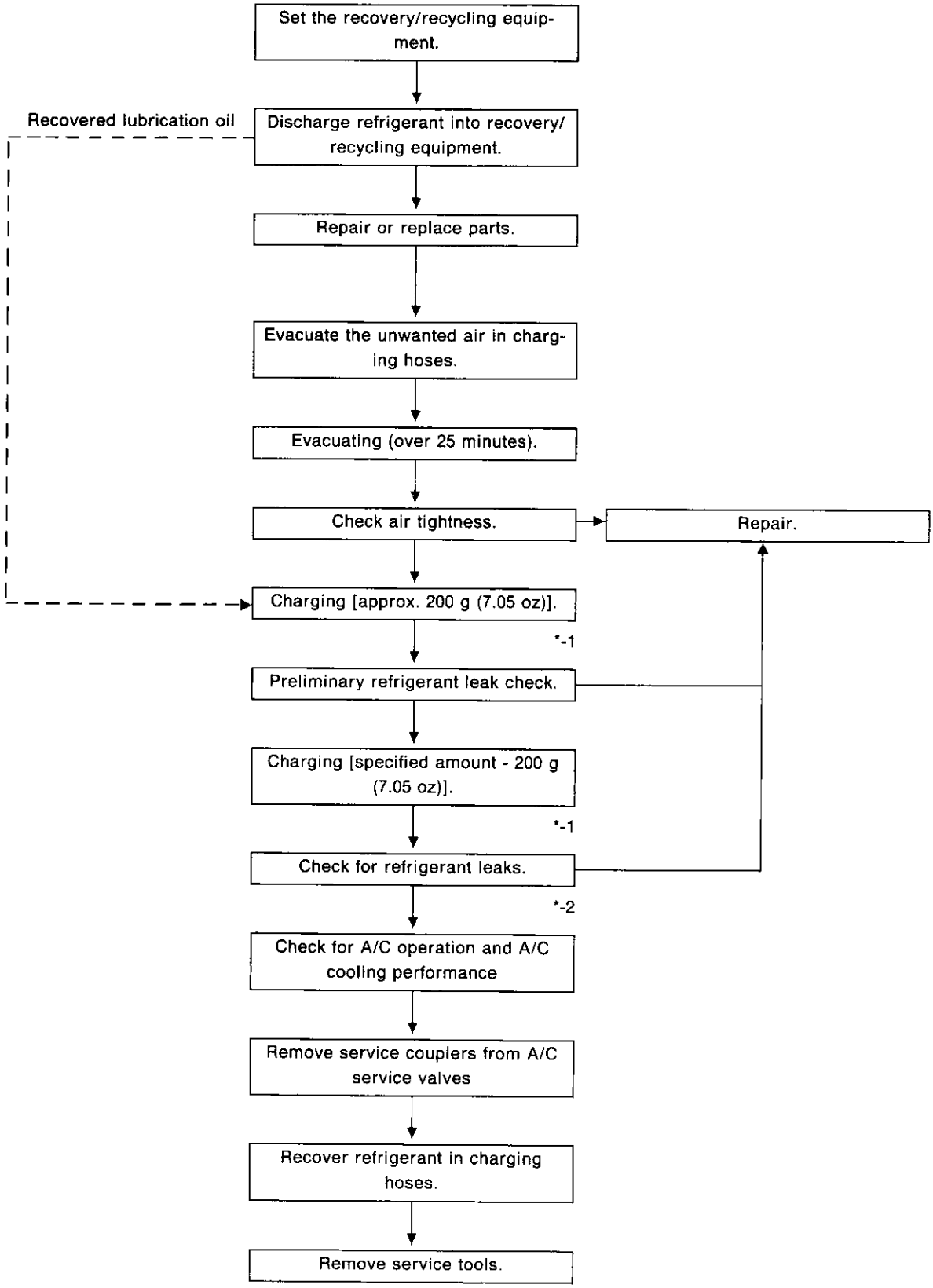
Avoid breathing A/C refrigerant and lubrication oil vapor or mist. Exposure may irritate eyes, nose and throat. Use only approved recovery/recycling equipment to discharge HFC-134a (R-134a) systems. If accidental system discharge occurs, ventilate work area before resuming work.



EVACUATING SYSTEM AND CHARGING REFRIGERANT



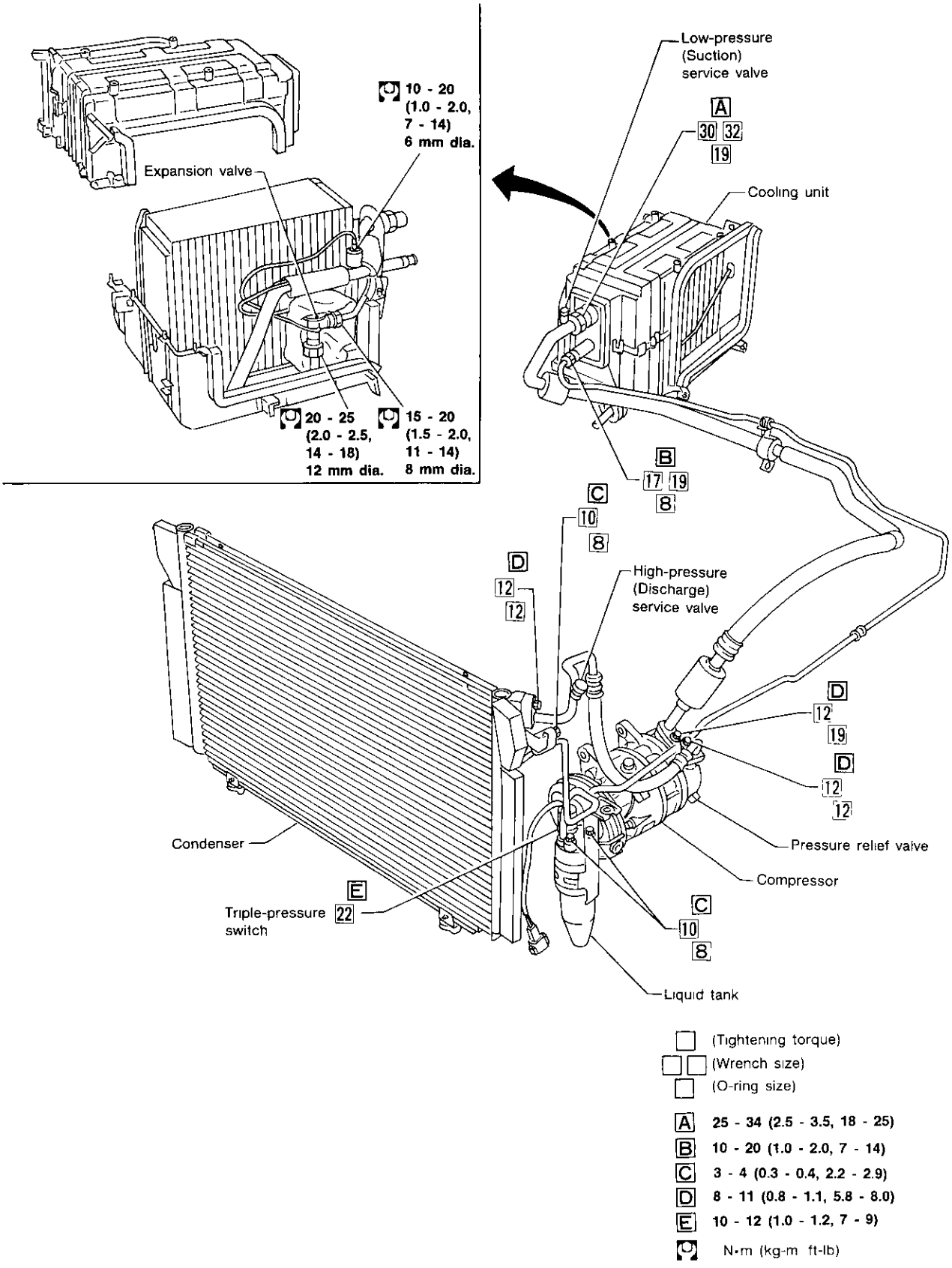
HFC-134a (R-134a) Service Procedure (Cont'd)



Note: *-1 Before charging refrigerant, ensure engine is off.
*-2 Before checking for leaks, start engine to activate air conditioning system then turn in off.

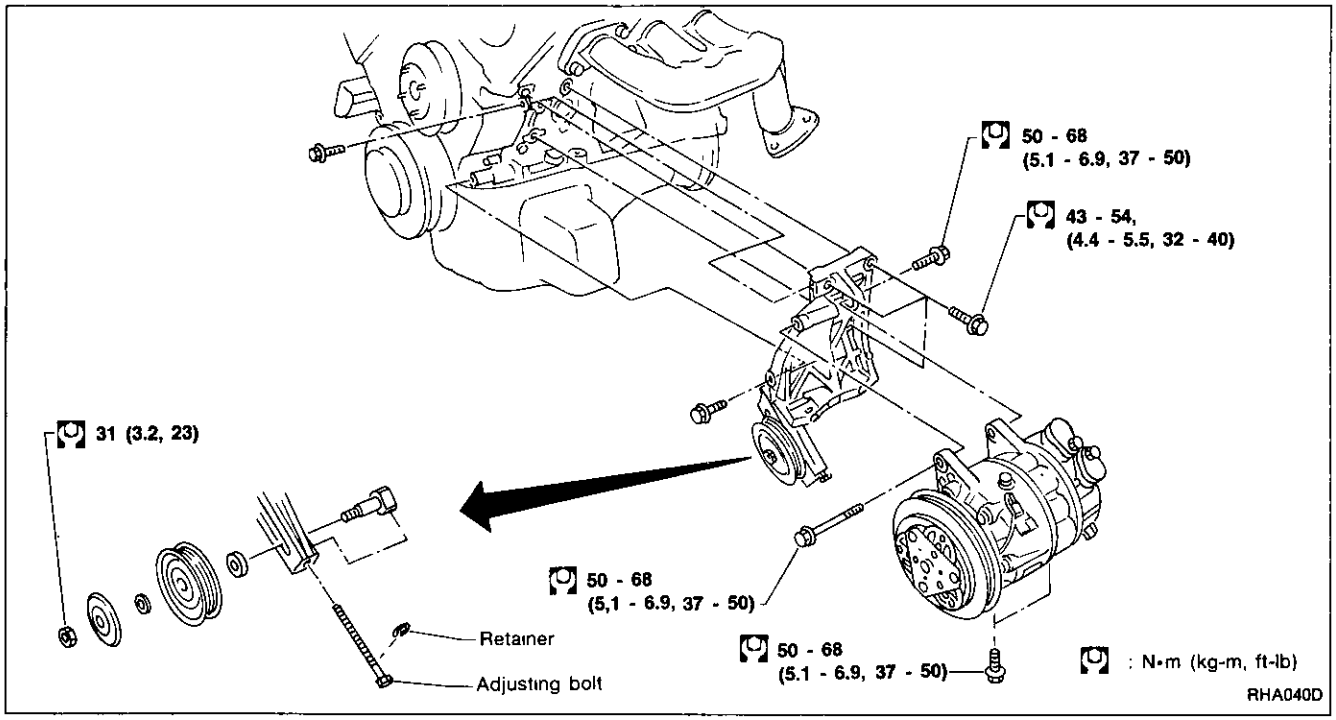
Refrigerant Lines

- **Refer to "Precautions for Refrigerant Connection" on page HA-4.**



RHA039D

Compressor Mounting



Belt Tension

- **Refer to MA section.**

Fast Idle Control Device (F.I.C.D.)

- **Refer to EF & EC section.**

Lubrication oil

Name: Nissan A/C System Oil Type S
Part number: KLH00-PAGS0

Maintenance of Oil Quantity in Compressor

The oil used to lubricate the compressor circulates through the system with the refrigerant. Whenever any component of the system is replaced or a large amount of gas leakage occurs, add oil to the compressor to maintain the specified amount.
If oil quantity is not maintained properly, the following malfunctions may result:

- Lack of oil: May lead to a seized compressor
- Excessive oil: Inadequate cooling (thermal exchange impeded)

Checking and Adjusting

Adjust the oil quantity according to the flowchart shown below.

START

Can oil return operation be performed?
- A/C system works properly.
- There is no evidence of a large amount of oil leakage.

Yes → Perform oil return operation, proceeding as follows:

1. Start engine, and set the following conditions:
   - **Test condition**
     Engine speed: Idling to 1,200 rpm
     A/C or AUTO switch: ON
     Blower speed: Max. position
     Temp. control: Optional [Set so that intake air temperature is 25 to 30°C (77 to 86°F).]
2. **Next item is for V-5 or V-6 compressor. Connect the manifold gauge, and check that the high pressure side pressure is 588 kPa (6 kg/cm², 85 psi) or higher.**
   If less than the reference level, attach a cover to the front face of the condenser to lower the pressure.
3. Perform oil return operating for about 10 minutes.
4. Stop engine

CAUTION:
If excessive oil leakage is noted, do not perform the oil return operation.

No

Should the compressor be replaced?

No

Yes

Ⓐ
(Go to next page.)

Is there any part to be replaced? (Evaporator, condenser, liquid tank or in case there is evidence of a large amount of oil leakage.)

Yes → After replacing any of the following major components of the system, be sure to add the correct amount of oil to the system.

Amount of oil to be added

Part replaced	Oil to be added to system		Remarks
	Amount of oil mℓ (US fl oz, Imp fl oz)	Ratio (%)	
Evaporator	75 (2 5, 2.6)	30	—
Condenser	75 (2 5, 2.6)	20	—
Liquid tank	5 (0 2, 0.2)	10	Add if compressor is not replaced *1
In case of refrigerant leak	30 (1 0, 1.1)	—	Large leak
	—	—	Small leak*2

No

Carry out the A/C performance test.

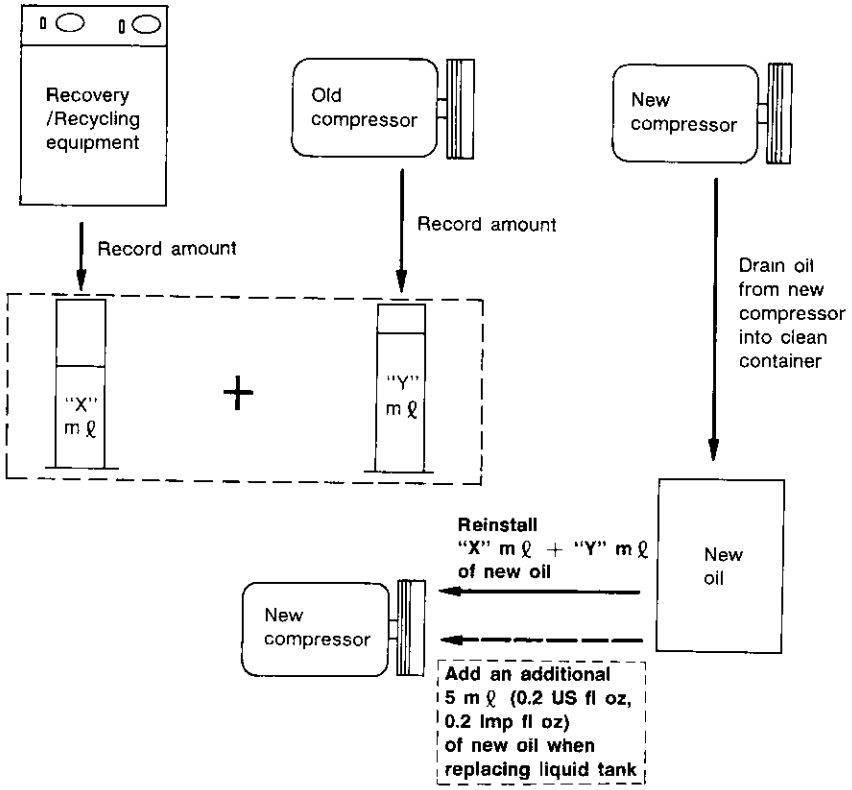
*1: If compressor is replaced, addition of oil is included in the flow chart.
*2: If refrigerant leak is small, no addition of oil is needed. "Ratio" in this table indicated the ratio of added oil to the overall amount of oil needed in the system.

Checking and Adjusting (Cont'd)

Ⓐ

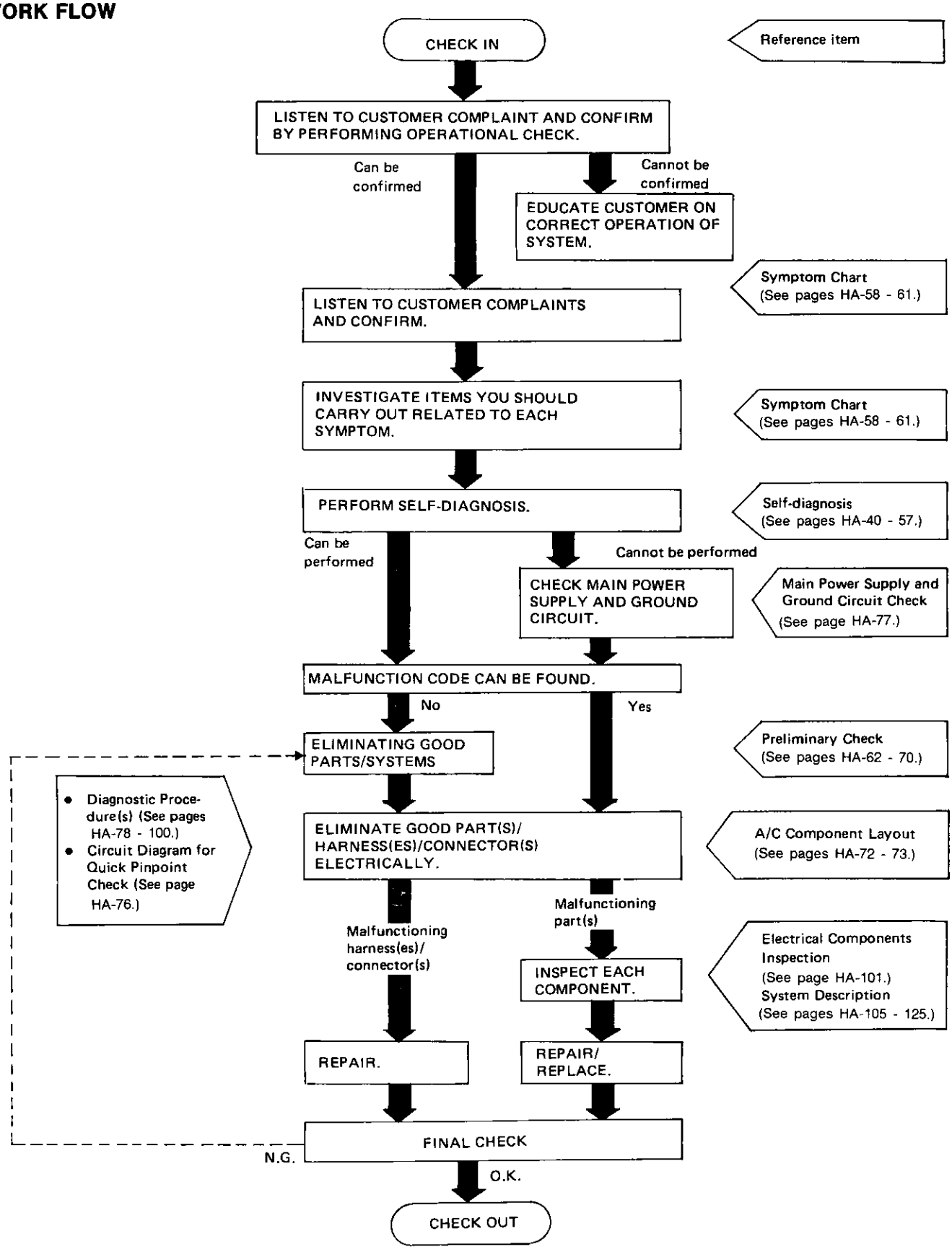
1. Discharge refrigerant into the refrigerant recovery/recycling equipment. Measure oil discharged into the recovery/recycling equipment.
2. Remove the drain plug (for V-5 or V-6, and DKS-16H compressor) and drain the oil from the "old" (removed) compressor into a graduated container, and record the amount of oil drained.
3. Remove the drain plug and drain the oil from the "new" compressor into a separate, clean container.
4. Measure an amount of the new oil equivalent to that drained from the "old" compressor, and add this oil to the "new" compressor through the drain plug or suction port opening.
5. Measure an amount of the "new" oil equivalent to that recovered during discharging, and add this oil to the "new" compressor through the drain plug or 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 US fl oz, 0.2 Imp fl oz) of oil at this time.
   Do not add this 5 mℓ (0.2 US fl oz, 0.2 Imp fl oz) of oil if only replacing the compressor.

Oil adjusting procedure for compressor replacement



How to Perform Trouble Diagnoses for Quick and Accurate Repair

WORK FLOW

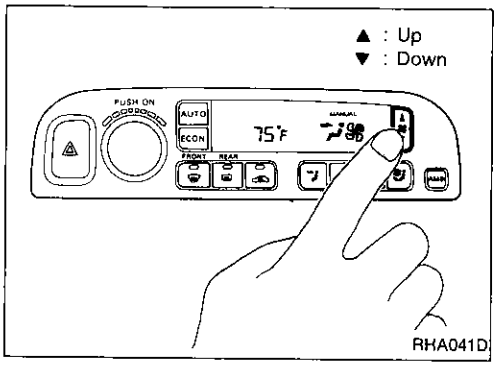


Operational Check

The purpose of the operational check is to confirm that the system operates as it should. The systems which will be checked are the blower, mode (discharge air), ambient display, intake air, defrost, econ, auto, temperature decrease, temperature increase, and the memory function.

CONDITIONS:

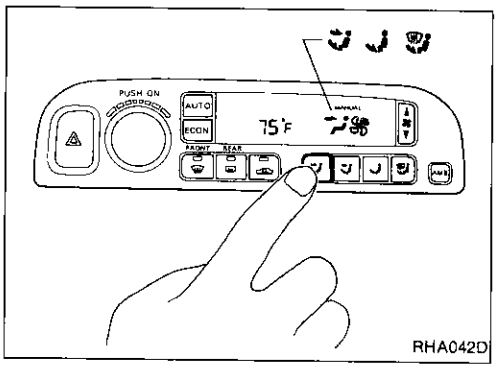
Engine running at normal operating temperature.



PROCEDURE:

1. Check blower

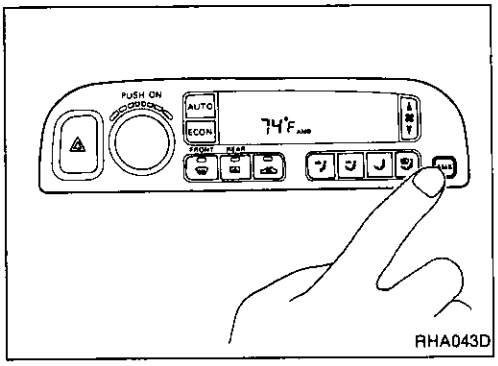
1) Press FAN switch (▲: Up) one time.
   MANUAL should appear on the display.
   Blower should operate on low speed, and the fan symbol should have one blade lit ( ).
2) Press FAN switch one more time.
3) Continue checking blower speed and fan symbol until all four speeds have been checked.
4) Leave blower on high speed.
5) Press FAN switch (▼: Down) one time. Blower should operate in third speed.
6) Continue checking blower speed and fan symbol until all three speeds have been checked.



2. Check discharge air

1) Press the switch.
   Display should show air to the face.
2) Confirm that all discharge air comes out the face vents.
3) Press switch.
   Display should show air to face and foot (bi-level).
4) Confirm that discharge air comes out the face and foot vents.
5) Press switch.
   Display should show air to foot.
6) Confirm that discharge air comes mostly from the foot outlets, with some air from the defroster outlets.
7) Press switch.
   Display should show air to foot and defrost.
8) Confirm that discharge air comes mostly from the defrost vents, with some air from the foot outlets.

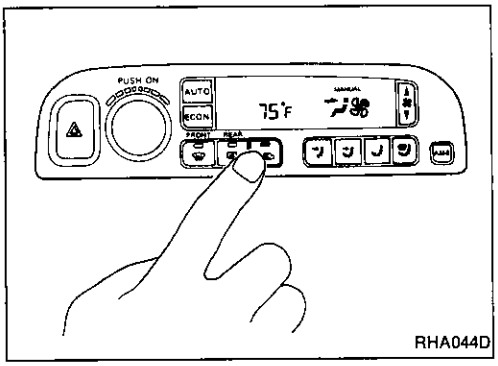
Operational Check (Cont'd)



RHA043D

3. Check ambient display

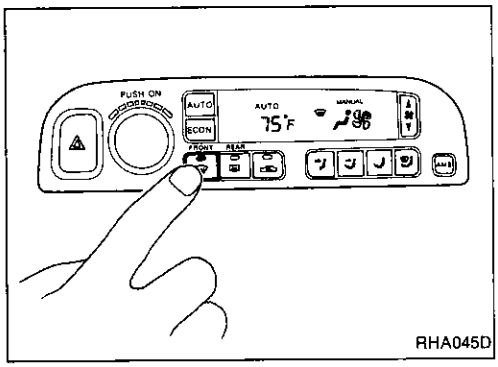
Press the AMB switch.
Display should show the outside (ambient) temperature for approximately 5 seconds.



RHA044D

4. Check recirc

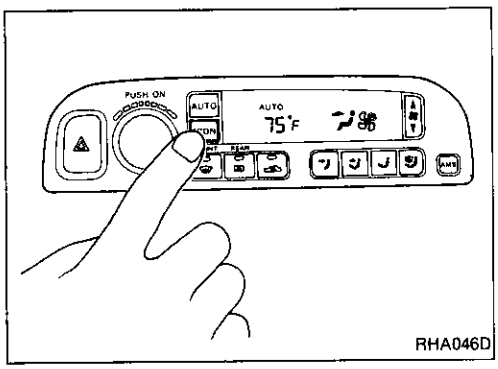
1) Press RECIRC switch.
   RECIRC indicator should light.
2) Listen for intake door position change (you should hear blower sound change slightly).



RHA045D

5. Check defrost

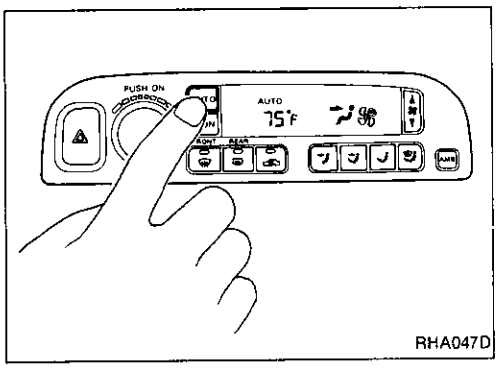
1) Press defrost switch.
2) Check that RECIRC is canceled.
   The discharge air should be coming only from the defrost vents.
3) Confirm that the compressor clutch is engaged (visual inspection).
   The display should indicate AUTO, MANUAL, and defrost ( ).



RHA046D

6. Check ECON mode

1) Press ECON switch.
   Defrost should be canceled.
   Discharge air outlet will depend on ambient, in-vehicle, and set temperatures.
   Display should indicate ECON (no AUTO, no MANUAL).
2) Confirm that the compressor clutch is not engaged (visual inspection).

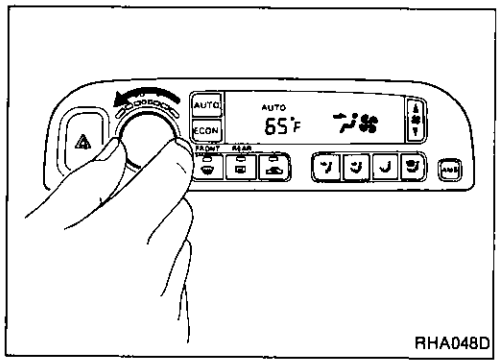


RHA047D

7. Check AUTO mode

1) Press AUTO switch.
2) Confirm that the compressor clutch engages (audio or visual inspection).
   Display should indicate AUTO (no ECON, no MANUAL).
   (Discharge air will depend on ambient, in-vehicle, and set temperatures).

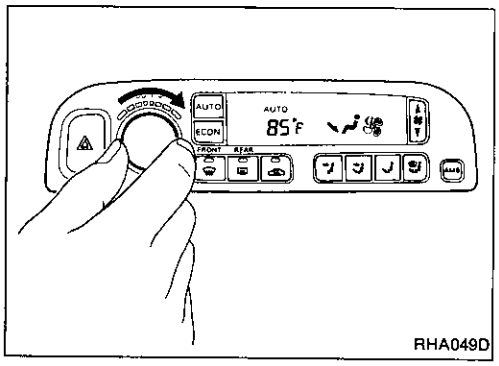
Operational Check (Cont'd)



RHA048D

8. Check temperature decrease

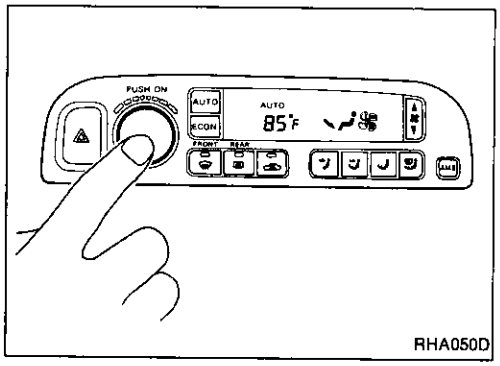
1) Turn temperature switch counterclockwise until 18°C (65°F) is displayed.
2) Check for cold air at discharge air outlets.



RHA049D

9. Check temperature increase

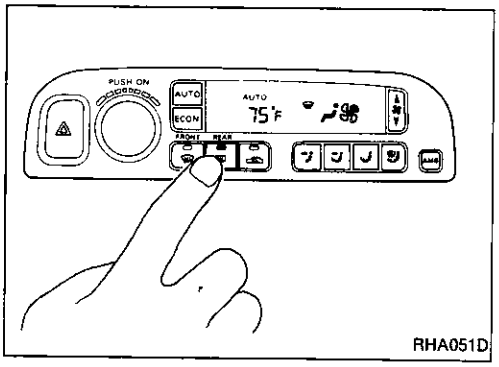
1) Turn temperature switch clockwise until 32°C (85°F) is displayed.
2) Listen for changes in blower speed as set temperature changes.
3) Check for hot air at discharge air outlets.



RHA050D

10. 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 remained at 32°C (85°F).



RHA051D

11. Check rear window defogger

1) Press rear window defogger switch.
   Rear window defogger indicator should turn on.

Performance Chart

TEST CONDITION

Before conducting performance test, disconnect ambient sensor harness connector and make short circuit using jumper cable.

Testing must be performed as follows:

Vehicle location: Indoors or in the shade (in a well ventilated place)
Doors: Closed
Door window: Open
Hood: Open
(AUTO) switch: ON
Temperature switch (P.T.C.): Max. COLD set
Mode switch: (Ventilation) set
(REC) switch: (Recirculation) set
(fan) switch: Max. speed set
Engine speed: 1,500 rpm
Time required before starting testing after air conditioner starts operating: More than 10 minutes

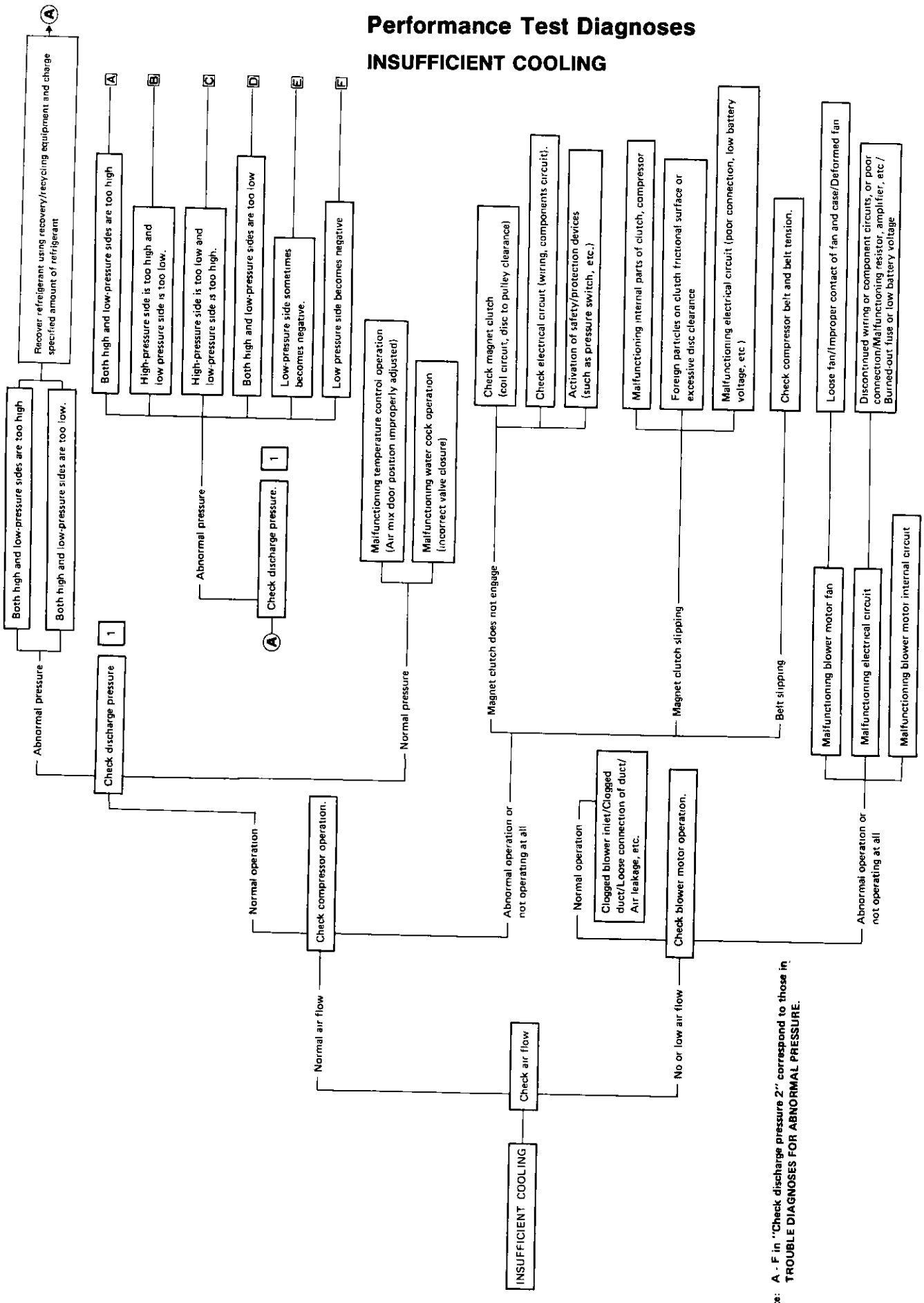
TEST READING

Recirculating-to-discharge air temperature table

Inside air (Recirculating air) at blower assembly inlet		Discharge air temperature at center ventilator °C (°F)
Relative humidity %	Air temperature °C (°F)	
50 - 60	20 (68)	1.7 - 2.5 (35 - 37)
	25 (77)	4.3 - 5.3 (40 - 42)
	30 (86)	8.4 - 10.2 (47 - 50)
	35 (95)	13.0 - 15.3 (55 - 60)
60 - 70	20 (68)	2.5 - 3.7 (37 - 39)
	25 (77)	5.3 - 7.0 (42 - 45)
	30 (86)	10.2 - 12.0 (50 - 54)
	35 (95)	15.3 - 18.5 (60 - 65)

Ambient air temperature-to-compressor pressure table

Ambient air		High-pressure (Discharge side) kPa (kg/cm^2, psi)	Low-pressure (Suction side) kPa (kg/cm^2, psi)
Relative humidity %	Air temperature °C (°F)		
50 - 70	20 (68)	843 - 1,030 (8.6 - 10.5, 122 - 149)	147 - 177 (1.5 - 1.8, 21 - 26)
	25 (77)	1,040 - 1,275 (10.6 - 13.0, 151 - 185)	147 - 186 (1.5 - 1.9, 21 - 27)
	30 (86)	1,255 - 1,540 (12.8 - 15.7, 182 - 223)	157 - 196 (1.6 - 2.0, 23 - 28)
	35 (95)	1,500 - 1,824 (15.3 - 18.6, 218 - 264)	167 - 216 (1.7 - 2.2, 24 - 31)
	40 (104)	1,746 - 2,128 (17.8 - 21.7, 253 - 309)	196 - 265 (2.0 - 2.7, 28 - 38)



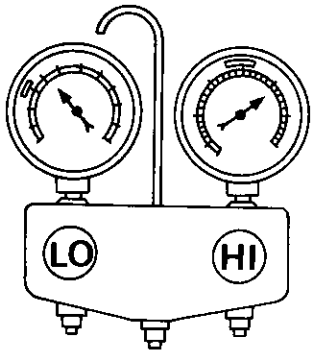
Note: A - F in "Check discharge pressure 2" correspond to those in TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE.

Performance Test Diagnoses

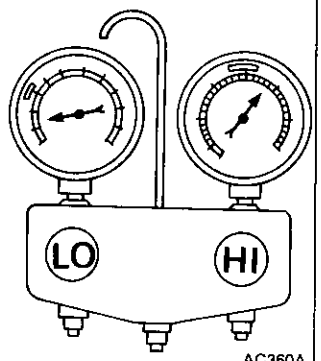
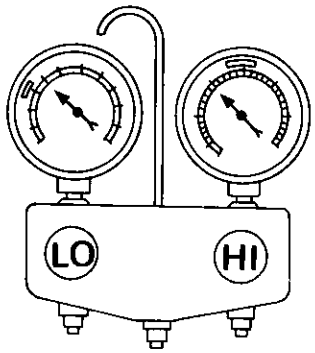
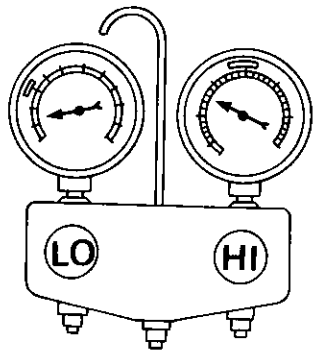
TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE

Whenever abnormal pressure of high and/or low sides of the system is noted, diagnosis must be conducted by using a manifold gauge. The large-line zone on the gauge scale (see illustrations.) shown in the following table refers to the standard (normal) pressure range for the corresponding pressure side (high or low). Since the standard (normal) pressure, however, differs from vehicle to vehicle, refer to the "Ambient Temperature-Pressure Characteristics" chart.

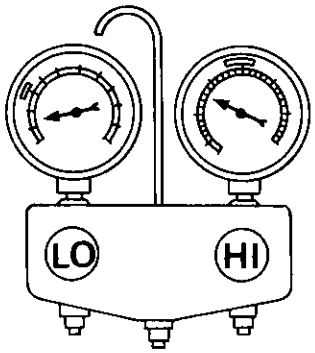
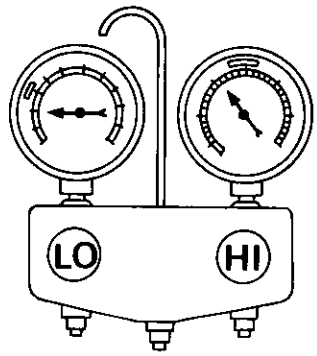
Pressure measurements are effective only when ambient temperature is in the range indicated under the heading "INSPECTION DATA (1) Measurement of system pressures".

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Both high and low-pressure sides are too high. A  AC359A	• Pressure is reduced soon after water is splashed on condenser.	Excessive refrigerant charge in refrigeration cycle	Reduce refrigerant until specified pressure is obtained.
	Air suction by radiator or condenser fan is insufficient.	Insufficient condenser cooling performance ↓ ① Condenser fan are clogged. ② Improper rotation of radiator fan or condenser fan	• Clean condenser. • Check and repair radiator or condenser fan as necessary.
	• Low-pressure pipe is not cold. • When compressor is stopped high-pressure value quickly drops by approximately 196 kPa (2 kg/cm^2, 28 psi). It then decreases gradually thereafter.	Poor heat exchange in condenser (After compressor operation stops, high pressure decreases too slowly.) ↓ Air in refrigeration cycle	Evacuate repeatedly and recharge system.
	Engine tends to overheat.	Engine cooling systems malfunction.	Check and repair each engine cooling system.
	• Areas near low-pressure pipe connection and service valves are considerably cold compared with areas near expansion valve outlet or evaporator. • Plates are sometimes covered with frost.	• Excessive liquid refrigerant on low-pressure side • Excessive refrigerant discharge flow • Expansion valve is open a little compared with the specification. ↓ ① Improper thermal valve installation ② Improper expansion valve adjustment	Replace expansion valve.

Performance Test Diagnoses (Cont'd)

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
High-pressure side is too high and low-pressure side is too low. B  AC360A	Upper side of condenser and high-pressure side are hot, however, liquid tank is not so hot.	High-pressure tube or parts located between compressor and condenser are clogged or crushed.	• Check and repair or replace malfunctioning parts. • Check compressor oil for contamination.
High-pressure side is too low and low-pressure side is too high. C  AC356A	High and low-pressure sides become equal soon after compressor operation stops.	Compressor pressure operation is improper. ↓ Damaged inside compressor packings	Replace compressor.
	No temperature difference between high and low-pressure sides	Compressor discharge capacity does not change. (Compressor stroke is set at maximum.)	Replace compressor.
Both high-and low-pressure sides are too low. D  AC353A	• There is a big temperature difference between liquid tank outlet and inlet. Outlet temperature is extremely low. • Liquid tank inlet and expansion valve are frosted.	Liquid tank inside is clogged a little.	• Replace liquid tank • Check compressor oil for contamination.
	• Temperature of expansion valve inlet is extremely low as compared with areas near liquid tank. • Expansion valve inlet may be frosted. • Temperature difference occurs somewhere in high-pressure side	High-pressure pipe located between liquid tank and expansion valve is clogged.	• Check and repair malfunctioning parts. • Check compressor oil for contamination.

Performance Test Diagnoses (Cont'd)

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Both high and low-pressure sides are too low. D  AC353A	There is a big temperature difference between expansion valve inlet and outlet while the valve itself is frosted.	Expansion valve closes a little compared with the specification. ↓ ① Improper expansion valve adjustment ② Malfunctioning thermal valve ③ Outlet and inlet may be clogged.	• Remove foreign particles by using compressed air. • Check compressor oil for contamination.
	Areas near low-pressure pipe connection and service valve are extremely cold as compared with areas near expansion valve outlet and evaporator.	Low-pressure pipe is clogged or crushed.	• Check and repair malfunctioning parts. • Check compressor oil for contamination.
	Air flow volume is not enough or is too low.	Evaporator is frozen. ↓ Compressor discharge capacity does not change. (Compressor stroke is set at maximum length.)	Replace compressor.
Low-pressure side sometimes becomes negative. E  AC354A	• Air conditioning system does not function and does not cyclically cool the compartment air. • The system constantly functions for a certain period of time after compressor is stopped and restarted.	Refrigerant does not discharge cyclically. ↓ Moisture is frozen at expansion valve outlet and inlet. ↓ Water is mixed with refrigerant.	• Drain water from refrigerant or replace refrigerant. • Replace liquid tank.

Performance Test Diagnoses (Cont'd)

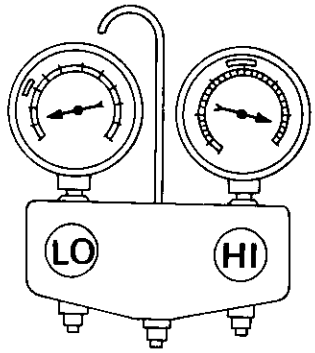
Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Low-pressure side becomes negative. F  AC362A	Liquid tank or front/rear side of expansion valve's pipe is frosted or dewed.	High-pressure side is closed and refrigerant does not flow. ↓ Expansion valve or liquid tank is frosted.	After the system is left at rest, start it again in order to confirm whether or not problem is caused by water or foreign particles. ● If the problem is due to water, drain water from refrigerant or replace refrigerant. ● If it is due to foreign particles, remove expansion valve and remove them with dry and compressed air. ● If either of the above methods cannot correct the problem, replace expansion valve. ● Replace liquid tank. ● Check compressor oil for contamination.

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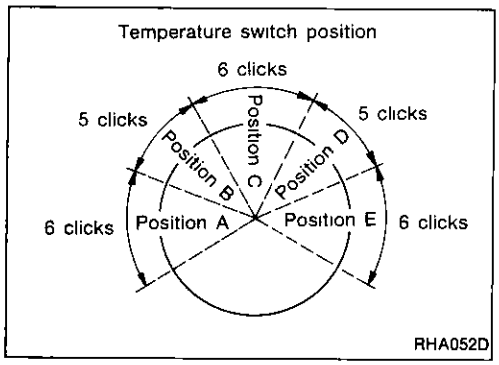
Self-diagnosis

CONSULT AND ON-BOARD SELF-DIAGNOSTIC SYSTEM

Functions of CONSULT and the ON-BOARD SELF-DIAGNOSTIC SYSTEM are as follows:

ITEM	MONITOR				CHANGING PARAMETER	
	CONSULT		ON-BOARD		CONSULT	ON-BOARD
L.E D.s and segments	WORK SUPPORT	○	STEP 1	○		
Mode door motor position switch	WORK SUPPORT	○	STEP 3	○		
Intake door motor position switch	WORK SUPPORT	○	STEP 3	○		
Temperature setting trimmer	WORK SUPPORT	○	Temp. setting trimmer	○	○	○
Intake memory adjustment*1	WORK SUPPORT	X				
Max. outlet flow adjustment	WORK SUPPORT	○			○	
Fan speed control adjustment	WORK SUPPORT	○			○	
Mode door control adjustment	WORK SUPPORT	○			○	
Ambient sensor	SELF-DIAGNOSIS RESULTS	○	STEP 5	○		
In-vehicle sensor	SELF-DIAGNOSIS RESULTS	○	STEP 5	○		
Intake sensor	SELF-DIAGNOSIS RESULTS	○	STEP 5	○		
Engine coolant temperature sensor (Thermal transmitter)	SELF-DIAGNOSIS RESULTS	○	STEP 2	○		
Sunload sensor	SELF-DIAGNOSIS RESULTS	○	STEP 2	○		
P.B.R.	SELF-DIAGNOSIS RESULTS	○	STEP 2	○		
Control switches	DATA MONITOR	○				
Mode door position	ACTIVE TEST	○	STEP 4	○		
Intake door position	ACTIVE TEST	○	STEP 4	○		
Air mix door angle	ACTIVE TEST	○	STEP 4	○		
Blower motor voltage	ACTIVE TEST	○	STEP 4	○		
Fresh vent angle*2	ACTIVE TEST	○	STEP 4	○		
Compressor operation	ACTIVE TEST	○	STEP 4	○		
Trimmed temperature	DATA MONITOR	○				
Intake door position memory*1	DATA MONITOR	X				
Highest blower fan speed	DATA MONITOR	○				
Highest blower fan speed changing point	DATA MONITOR	○				
Outlet door changing point	DATA MONITOR	○				

***1: Items shown on CONSULT's display but cannot be activated.**
***2: Items shown on CONSULT's display but not provided with fresh vent system.**

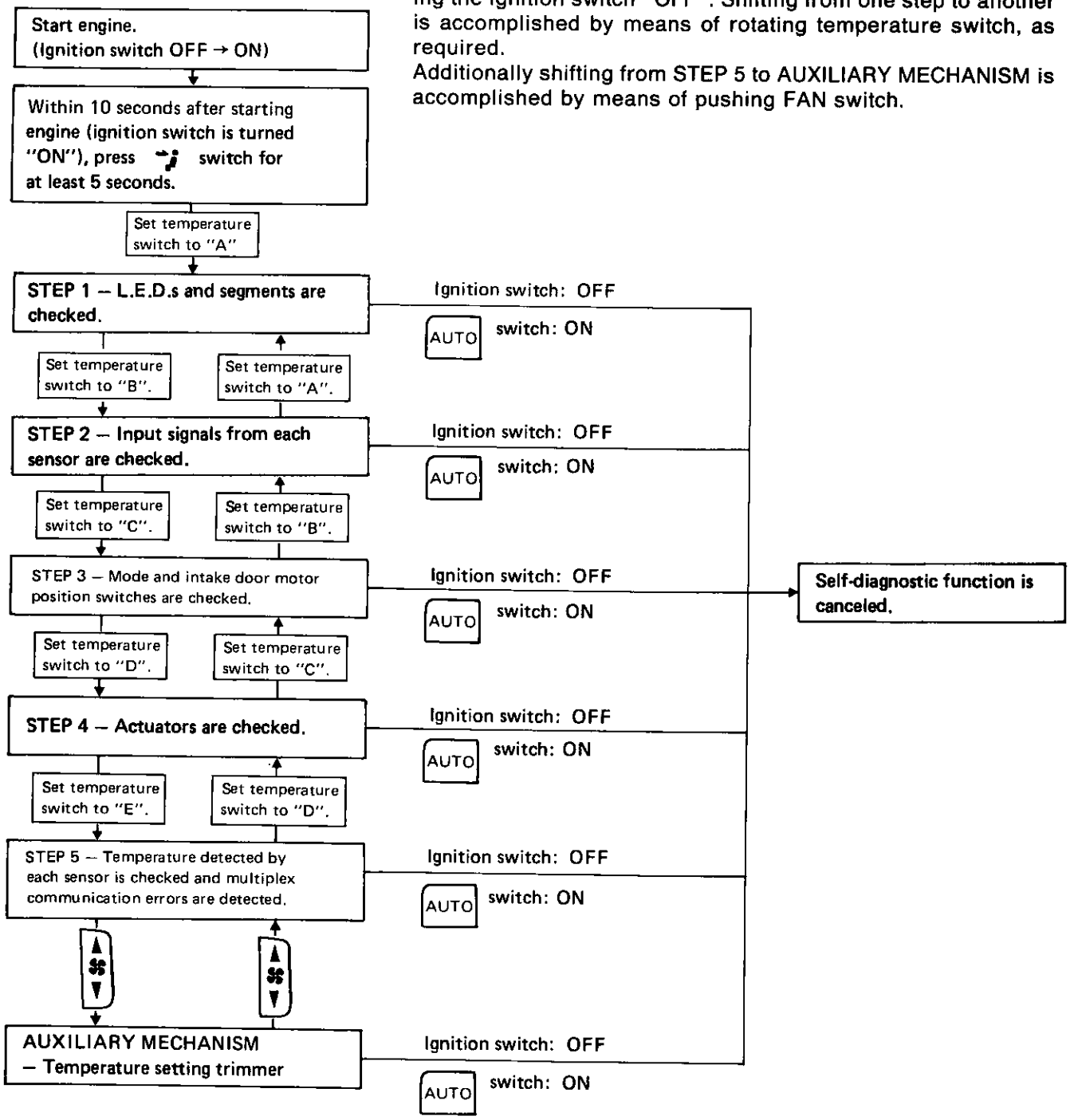


Self-diagnosis — ON-BOARD

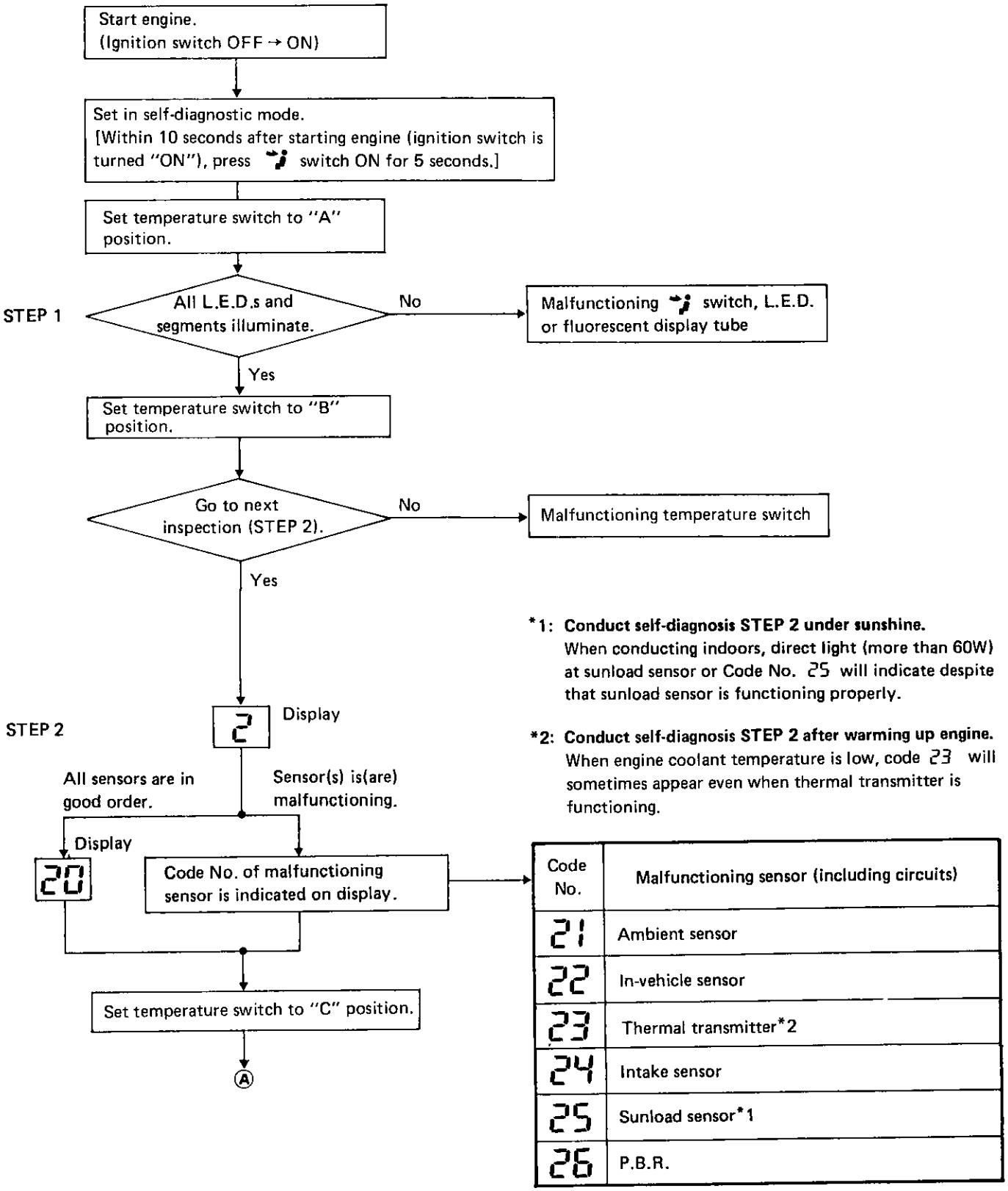
INTRODUCTION AND GENERAL DESCRIPTION

The self-diagnostic system diagnoses sensors, door motors, blower motor and multiplex communication errors, etc. by system line. Refer to applicable sections (items) for details. Shifting from normal control to the self- diagnostic system is accomplished by starting the engine (turning the ignition switch from "OFF" to "ON") and pressing [7] switch for at least 5 seconds. The [7] switch must be pressed within 10 seconds after starting the engine (ignition switch is turned "ON"). This system will be canceled by either pressing [AUTO] switch or turning the ignition switch "OFF". Shifting from one step to another is accomplished by means of rotating temperature switch, as required.

Additionally shifting from STEP 5 to AUXILIARY MECHANISM is accomplished by means of pushing FAN switch.



STEP BY STEP PROCEDURE

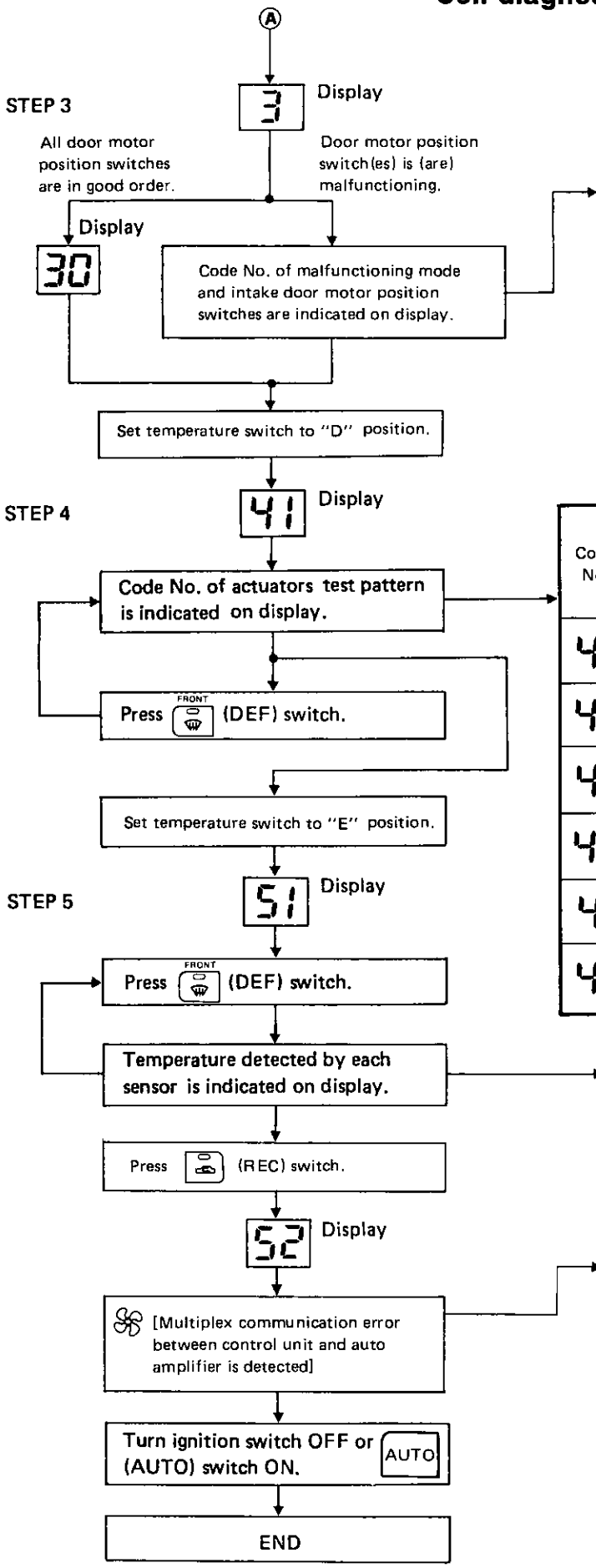


*1: **Conduct self-diagnosis STEP 2 under sunshine.**
When conducting indoors, direct light (more than 60W) at sunload sensor or Code No. 25 will indicate despite that sunload sensor is functioning properly.

*2: **Conduct self-diagnosis STEP 2 after warming up engine.**
When engine coolant temperature is low, code 23 will sometimes appear even when thermal transmitter is functioning.

Code No.	Malfunctioning sensor (including circuits)
21	Ambient sensor
22	In-vehicle sensor
23	Thermal transmitter*2
24	Intake sensor
25	Sunload sensor*1
26	P.B.R.

Self-diagnosis — ON-BOARD (Cont'd)



Code No.	Malfunctioning mode door motor position switch (including circuits)		
31	VENT	36	FRE
32	B/L	37	80% FRE
33	FOOT/DEF 1	38	20% FRE
34	FOOT/DEF 2	39	REC
35	DEF		

Code No.	Actuators test pattern					
	Mode door	Intake door	Air mix door	Blower motor	Compressor	Max. cold door
41	VENT	REC	Full Cold	4 - 5V	ON	Shut
42	B/L	20% FRE	Full Cold	9 - 11V	ON	Open
43	B/L	20% FRE	Full Hot	7 - 9V	OFF	Open
44	F/D 1	80% FRE	Full Hot	7 - 9V	OFF	Shut
45	F/D 2	FRE	Full Hot	7 - 9V	ON	Shut
46	DEF	FRE	Full Hot	10 - 12V	ON	Shut

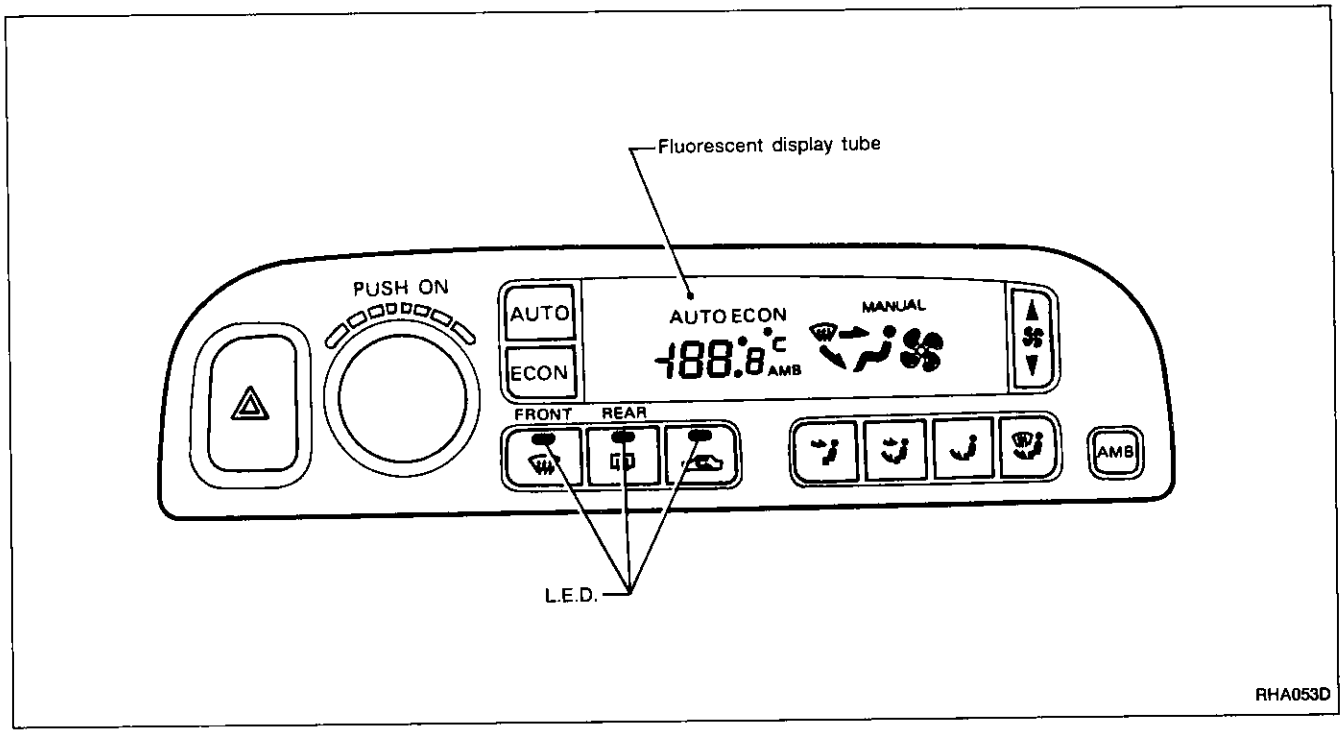
Display	Signal direction
52	In good order
52	Control unit → Auto amp.
52 blinks two times ↓ 52	Auto amp. → Control unit

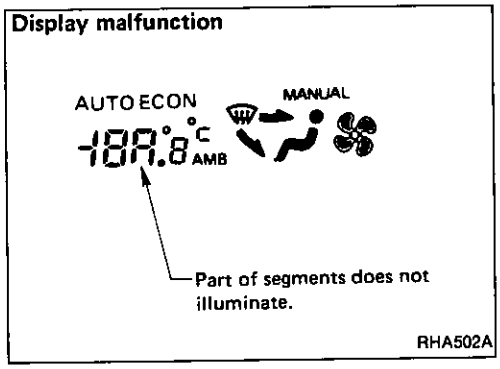
Self-diagnosis — ON-BOARD (Cont'd)

HOW TO INTERPRET THE RESULTS

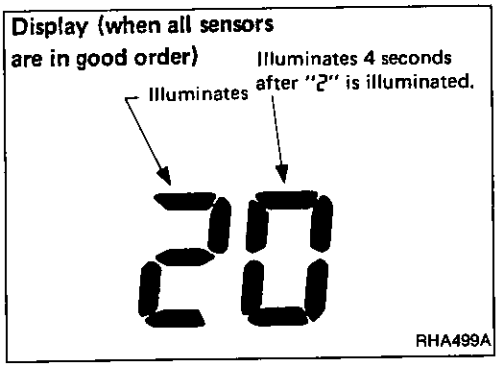
STEP 1: Checks L.E.D.s and segments

When switch's L.E.D. and segments are in good order in STEP 1 mode, the corresponding L.E.D. and fluorescent display tube will illuminate.





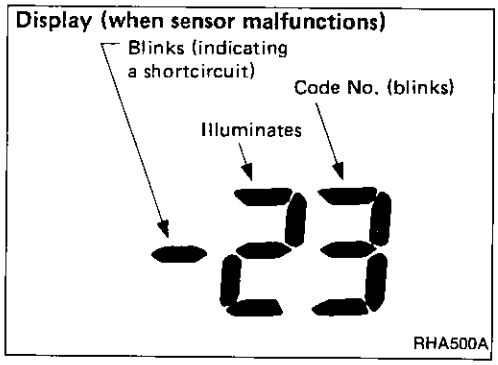
If L.E.D.s or segments malfunction, L.E.D. will not come on or display will show incomplete segment.



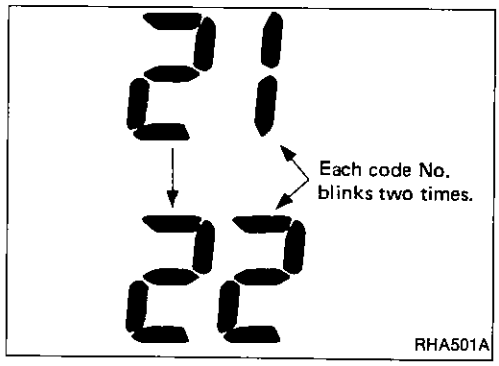
STEP 2: Checks each sensor circuit for open or short circuit

Display shows "2 " in STEP 2 mode.
When all sensors are in good order, display shows "20".
It takes approximately 4 seconds to check all sensors.

Self-diagnosis — ON-BOARD (Cont'd)



If a sensor is malfunctioning, the corresponding code No. blinks on display. A short circuit is identified by a blinking "– " mark preceding mode number.



If two or more sensors malfunction, corresponding code Nos. respectively blink two times.

Sensors and abnormalities

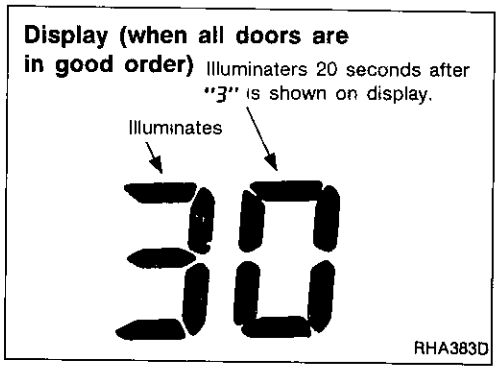
If a circuit is opened or shorted, display shows its code No. when input corresponds with any of following conditions.

Code No.	Sensor	Open circuit	Short circuit
21	Ambient sensor	Less than –41.9°C (–43°F)	Greater than 100°C (212°F)
22	In-vehicle sensor	Less than –41.9°C (–43°F)	Greater than 100°C (212°F)
23	Thermal transmitter*3	Less than –25.6°C (–14°F)	Greater than 150°C (302°F)
24	Intake sensor	Less than –41.9°C (–43°F)	Greater than 100°C (212°F)
25	Sunload sensor*2	Less than 0.01515 mA	Greater than 0.545 mA
26	P.B.R.*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: 0%, Full hot: 100%)

*2: **Conduct self-diagnosis STEP 2 under sunshine.**
When conducting indoors, direct light (more than 60W) at sunload sensor.

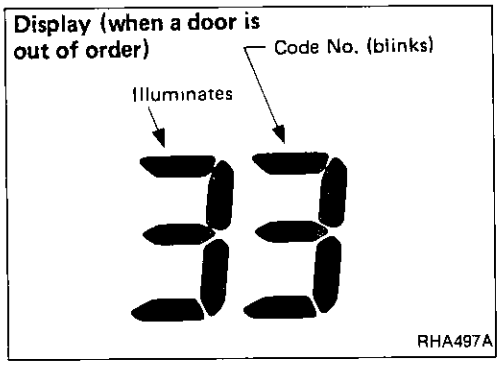
*3: **Conduct self-diagnosis STEP 2 after warming up engine.**



STEP 3: Checks mode and intake door positions

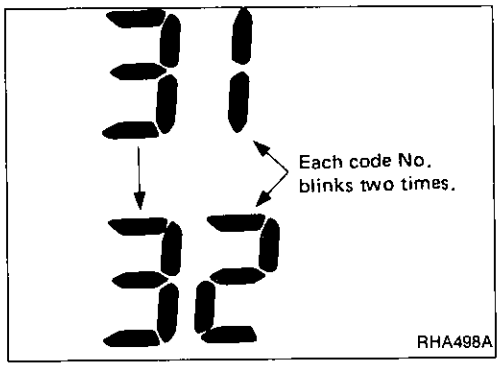
Display shows "3 " in STEP 3 mode.
When all doors are in good order, display will then show "30)".
It takes approximately 20 seconds to check all mode and intake doors.

Self-diagnosis — ON-BOARD (Cont'd)



When abnormalities are detected, display shows a code No. corresponding with malfunctioning part.

Code No.	31	32	33	34	35	36	37	38	39
Malfunctioning part	VENT	B/L	F/D 1	F/D 2	DEF	FRE	80% FRE	20% FRE	REC



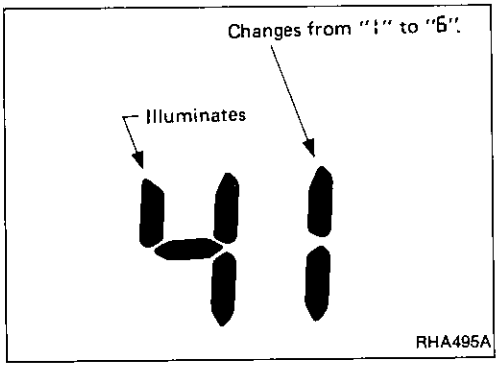
If two or more mode or intake doors are out of order, corresponding code numbers respectively blink two times.
If mode door motor harness connector is disconnected, the following display pattern will appear.

31 → 32 → 33 → 34 → 35

If intake mode door harness connector is disconnected, the following display pattern will appear.

36 → 37 → 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".

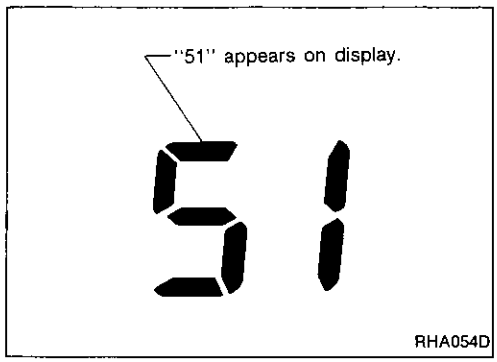
During inspection in STEP 4 mode, auto amplifier will forcefully transmit an output to the affected actuators in response to code No. shown on display, as indicated in table below.

Checks must be made visually, by listening to any noise, or by touching air outlets with your hand, etc. for improper operation.

Code No. / Actuator	41	42	43	44	45	46
Mode door	VENT	B/L	B/L	F/D 1	F/D 2	DEF
Intake door	REC	20% FRE	20% FRE	80% FRE	FRE	FRE
Air mix door	Full Cold	Full Cold	Full Hot	Full Hot	Full Hot	Full Hot
Blower motor	4 - 5 V	9 -11 V	7 - 9 V	7 - 9 V	7 - 9 V	10 - 12 V
Compressor	ON	ON	OFF	OFF	ON	ON
Max. cold door	Shut	Open	Open	Shut	Shut	Shut

Operating condition of each actuator cannot be checked by indicators.

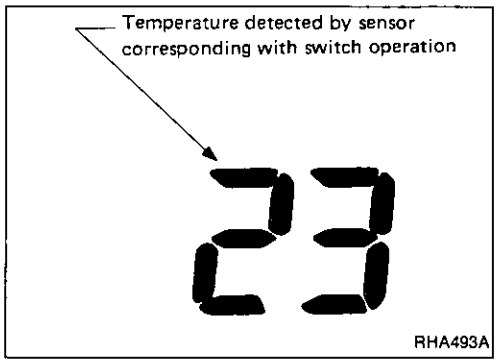
Self-diagnosis — ON-BOARD (Cont'd)

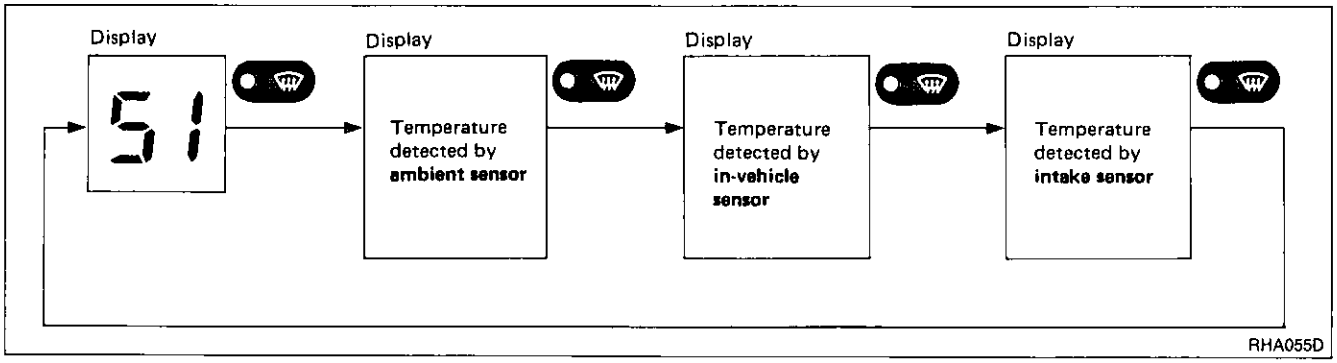


STEP 5: Checks temperature detected by sensors, and detects multiplex communication error

Display shows "51" in STEP 5 mode.

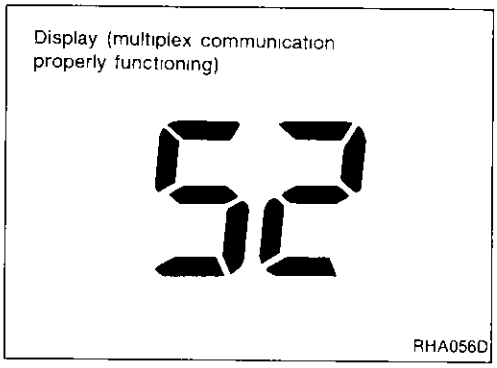
- When (DEF) switch is pressed one time, display shows temperature detected by ambient sensor.
- When (DEF) switch is pressed second time, display shows temperature detected by in-vehicle sensor.
- When (DEF) switch is pressed third time, display shows temperature detected by intake sensor.
- When (DEF) switch is pressed fourth time, display returns to original presentation "51".





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 **Electrical Components Inspection**.

Display shows "52" in STEP 5 mode.
[Multiplex communication error between control unit and auto amplifier is detected]



Display	Signal direction
52	In good order
52	Control unit → auto amplifier
52 blinks two times. ↓ 52	Auto amplifier → control unit

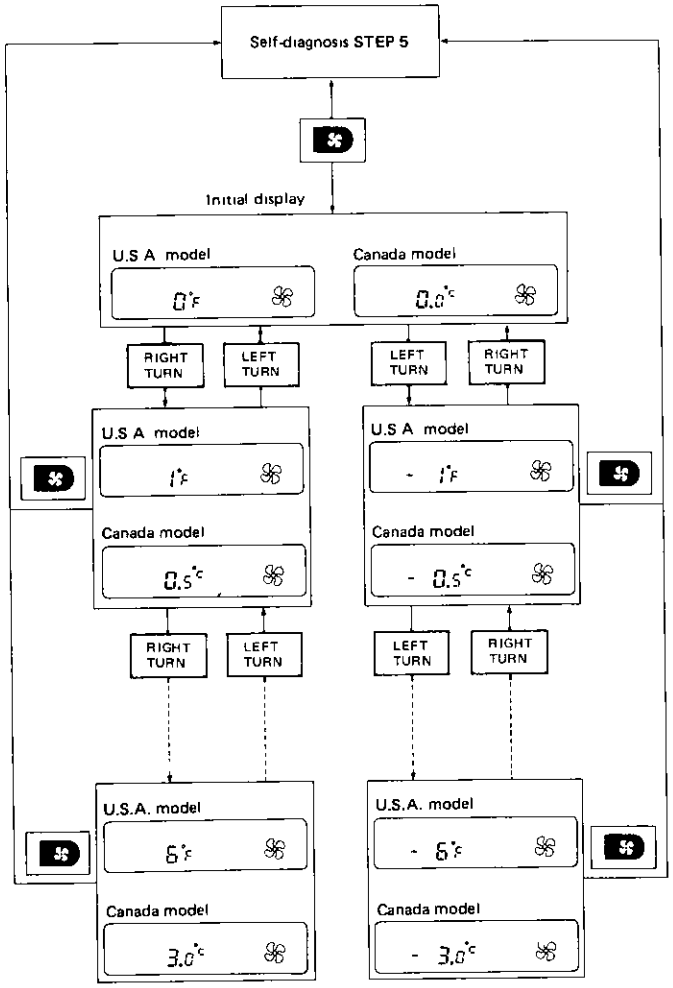
Self-diagnosis — ON-BOARD (Cont'd)

AUXILIARY MECHANISM: Temperature setting trimmer

This trimmer compensates for differences between temperature setting (displayed digitally) and temperature felt by driver in a range of ±3°C (±6°F).

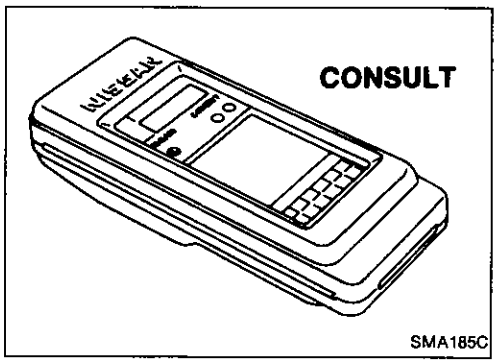
Operating procedures for this trimmer are as follows:

Starting with STEP 5 under "Self-diagnostic mode", press (fan) switch to set air conditioning system in auxiliary mode and then set temperature switch to desired temperature. Temperature will change at a rate of 0.5°C (1°F) each time a switch is turned.



RHA057D

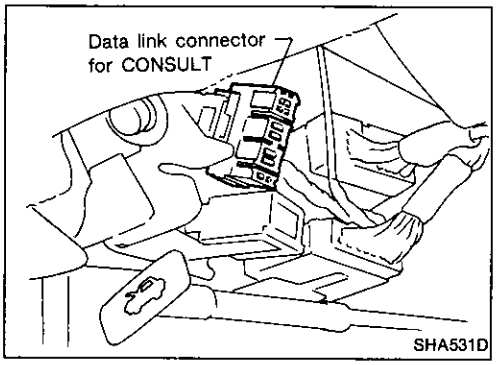
When battery cable is disconnected, trimmer operation is canceled and temperature set becomes that of initial condition i.e. 0°C (0°F).

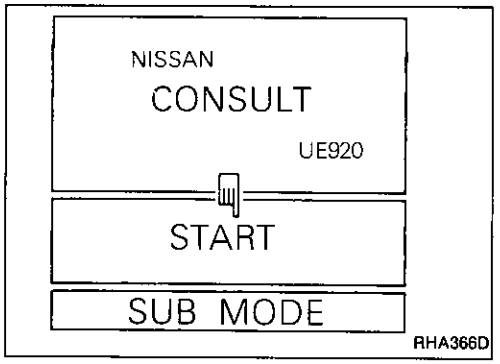


Self-diagnosis — Consult

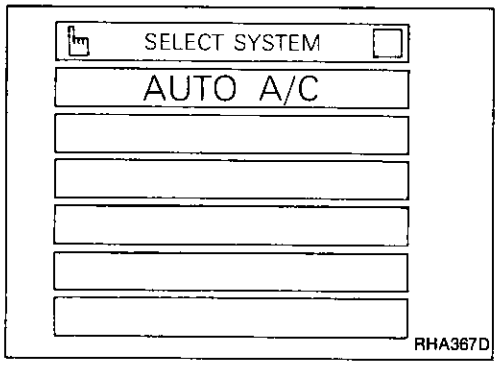
CONSULT INSPECTION PROCEDURE

1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector. (Data link connector is located in left dash side panel.)

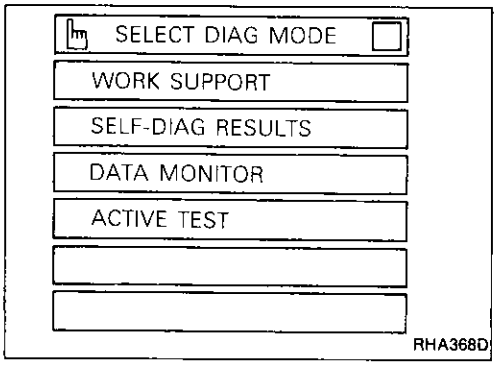




3. Turn on ignition switch.
4. Touch "START".



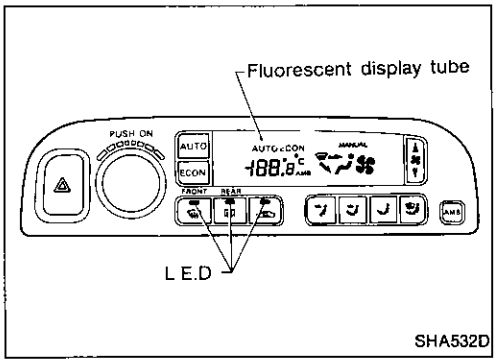
5. Touch "AUTO A/C".



6. Perform each diagnostic mode according to the inspection sheet on the next page.

Self-diagnosis — Consult (Cont'd)

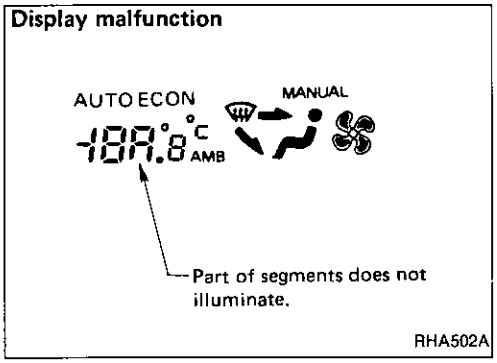
WORK SUPPORT



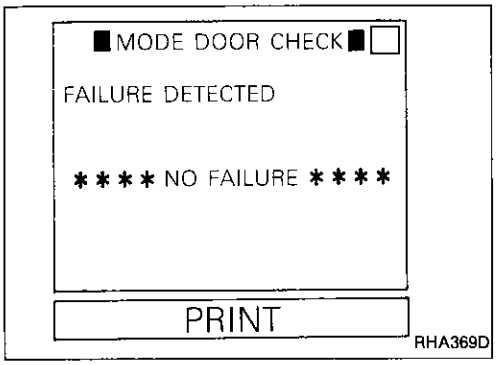
SEGMENT CHECK: Checks L.E.D.s and segments

Touch "SEGMENT CHECK".
When switch's L.E.D. and segments are in good order in WORK SUPPORT — Segment check mode, the corresponding L.E.D. and fluorescent display tube will illuminate.

Display malfunction

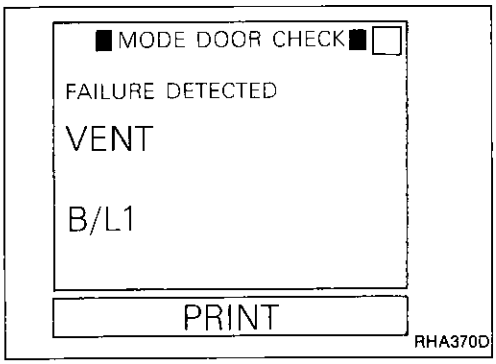


If L.E.D.s or segments malfunction, L.E.D. will not come on or display will show incomplete segment.



MODE DOOR CHECK: Checks mode door position

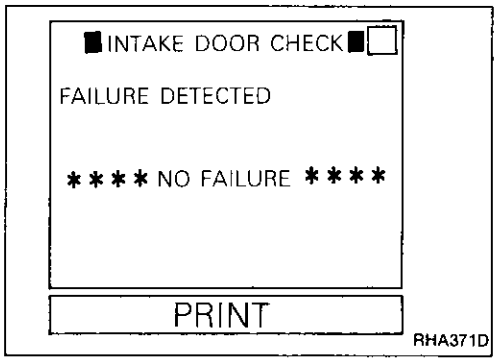
Touch "MODE DOOR CHECK" and then touch "START". When all doors are functioning, display will show "NO FAILURE".



When abnormalities are detected, display shows a malfunction position.
If two or more mode doors are out of order, corresponding mode doors respectively blink two times.
If any mode door motor harness connector is disconnected, display will show all mode door positions.

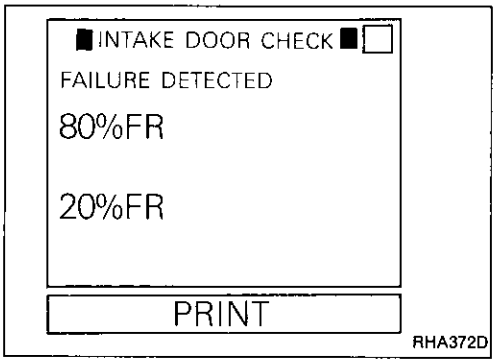
If any mode door motor position switch is malfunctioning, mode door motor will also malfunction.

Self-diagnosis — Consult (Cont'd)



INTAKE DOOR CHECK: Checks intake door position.

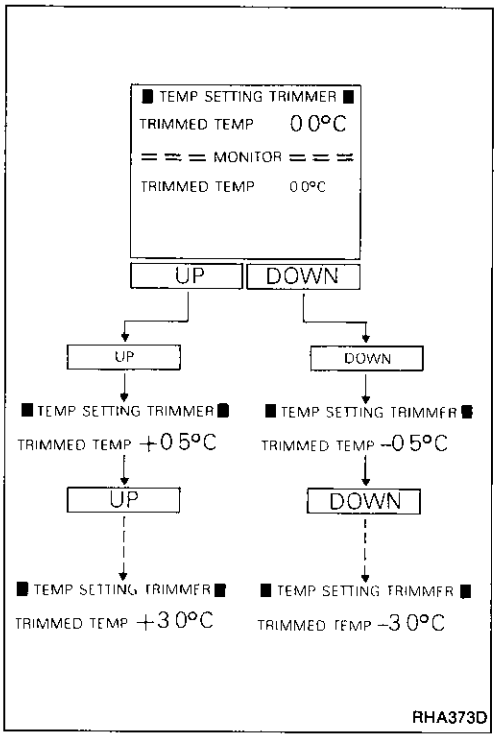
Touch "INTAKE DOOR CHECK", and then touch "START".
When all doors are in good order, display will show "NO FAILURE".



When abnormalities are detected, display shows a malfunction position.
If two or more intake doors are out of order, corresponding intake doors respectively blink two times.
If intake door motor harness connector is disconnected, display will show all positions except "FRE".
If any intake door motor position switch is malfunctioning, intake door motor will also malfunction.

TEMP SETTING TRIMMER: Temperature setting trimmer.

This trimmer compensates for differences between temperature setting (Displayed digitally) and temperature felt by the driver in a range of ±3°C (±6°F).
Operation procedures for this trimmer are as follows:



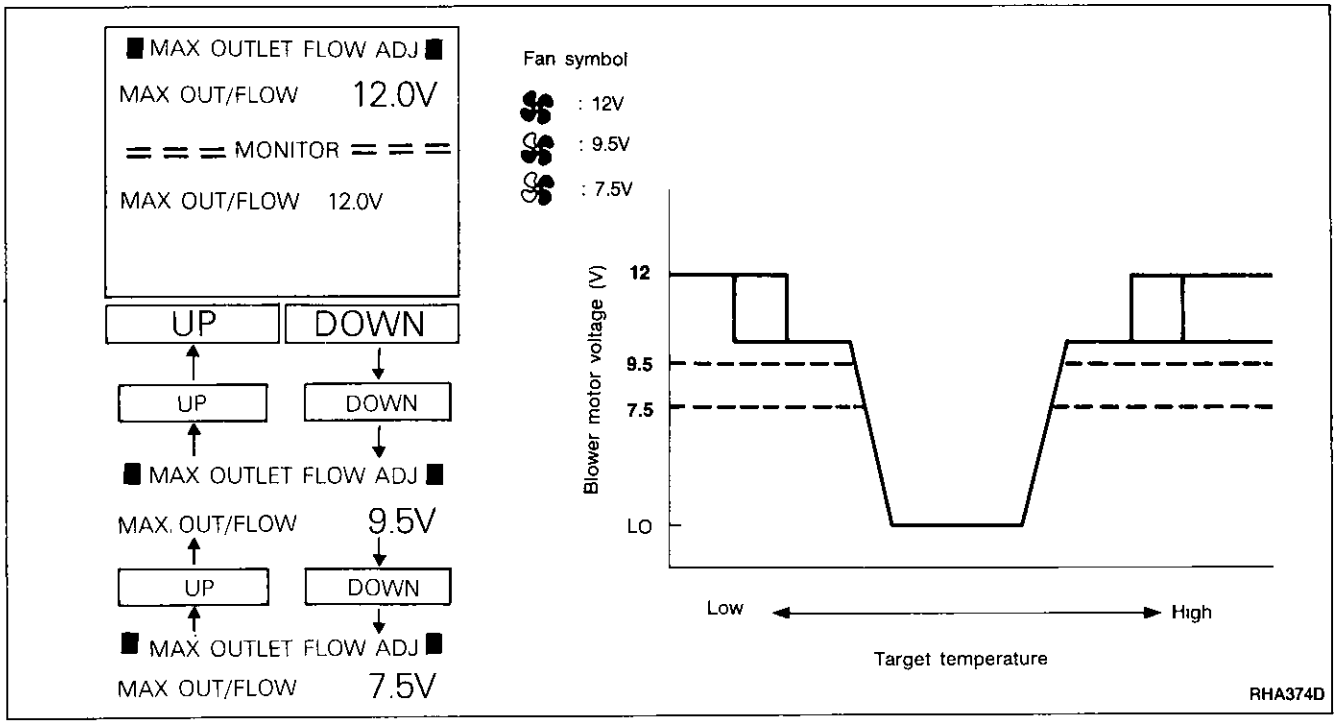
Touch "TEMP SETTING TRIMMER", and then touch "START".
Next, touch either the UP or DOWN switch as desired.
Temperature will change at a rate of 0.5°C (1°F) each time a switch is touch.

When battery cable is disconnected, trimmer operation is canceled and temperature set returns to the initial condition i.e. 0°C (0°F).

Self-diagnosis — Consult (Cont'd)

MAX. OUTLET FLOW ADJUSTMENT: Adjustment of highest blower fan speed.

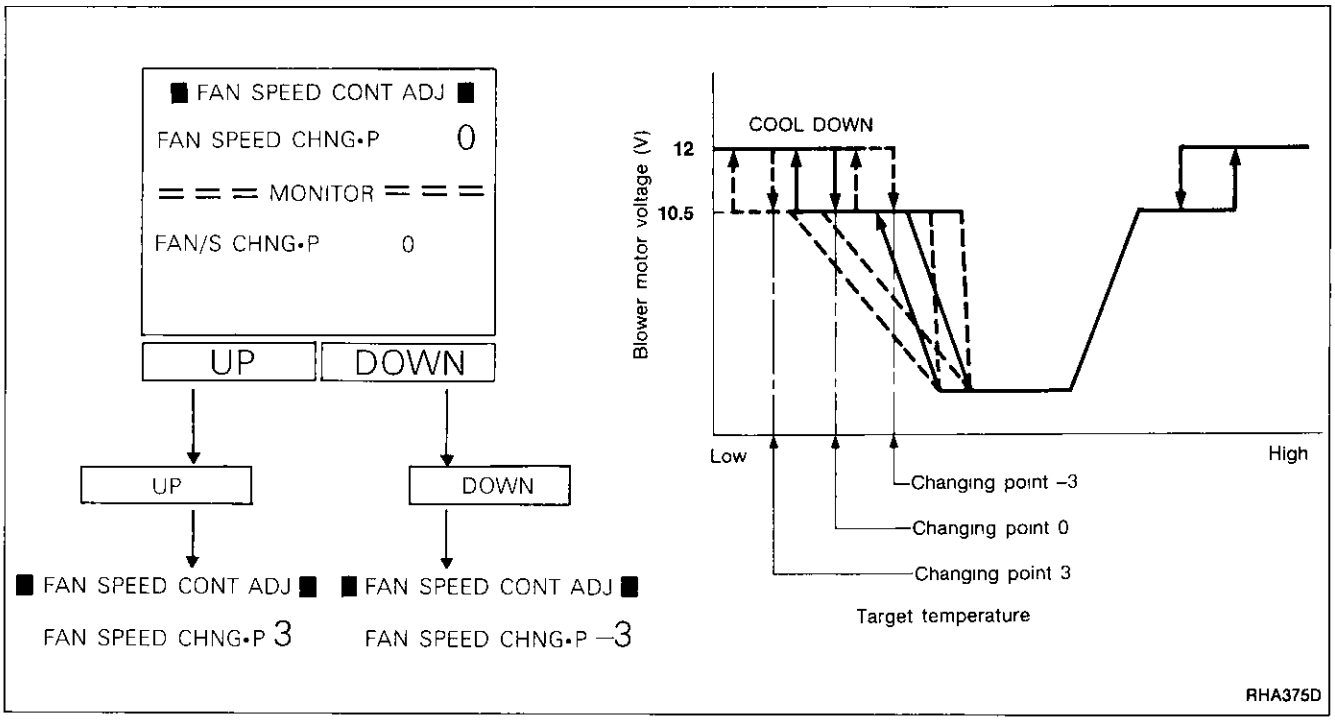
For passenger's comfort, maximum air flow of automatic control (blower motor voltage) can be set at three different levels.
Operating procedure for this adjustment are as follows:
Touch "MAX OUTLET FLOW ADJUSTMENT", and touch "START". Then, touch either UP or DOWN switch as desired.



FAN SPEED CONTROL ADJUSTMENT: Adjustment of highest blower fan speed changing point.

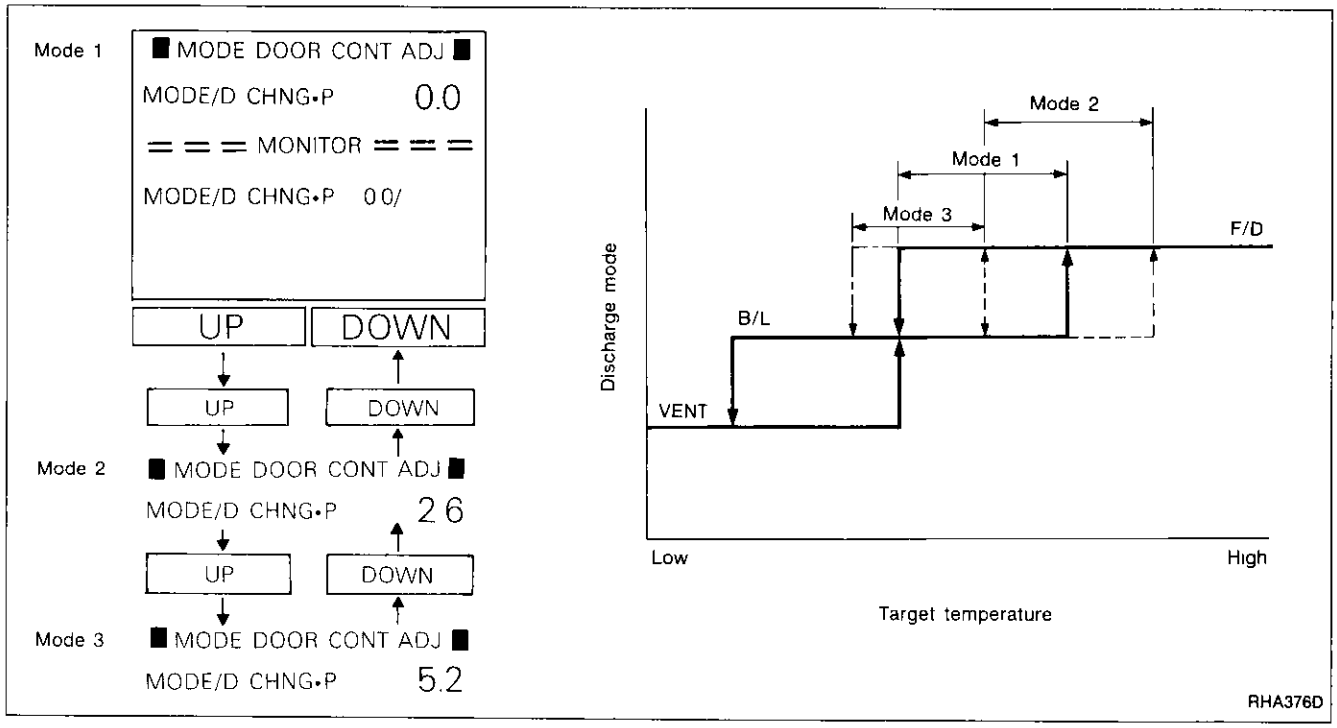
For passenger's comfort, blower high relay operating time period during cool down (voltage changes from 12V to 10.5V) can be set at three different levels.
Operating procedure for this adjustment are as follows:
Touch "FAN SPEED CONTROL ADJUSTMENT", and touch "START". Then, touch either UP or DOWN switch as desired.

Self-diagnosis — Consult (Cont'd)



MODE DOOR CONTROL ADJUSTMENT: Adjusting outlet door changing point.

For passenger's comfort, time setting when changing from B/L to F/D mode can be set at three different levels.
(Operating procedure for this adjustment are as follows:)
Touch "MODE DOOR CONTROL ADJUSTMENT", and then touch "START". Then, touch UP switch as desired.

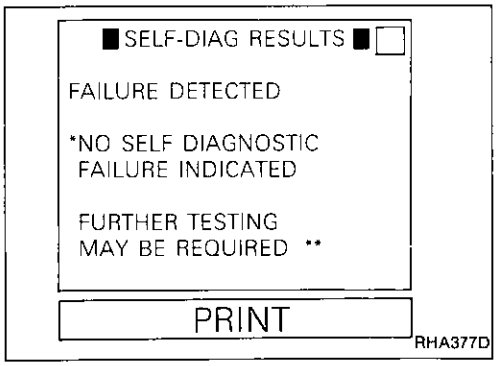


Self-diagnosis — Consult (Cont'd)

SELF-DIAGNOSTIC RESULTS

Checks each sensor circuit for open or short circuit.

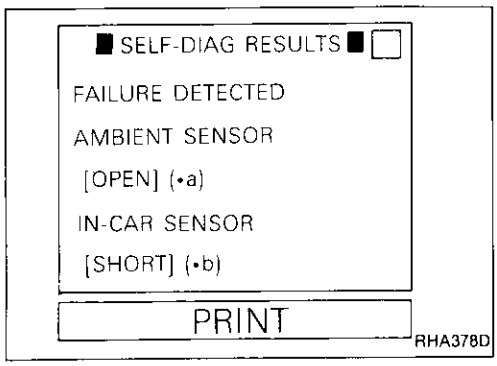
DIAGNOSTIC ITEM	DIAGNOSTIC ITEM IS DETECTED WHEN ...
Ambient sensor	Each sensor circuit is open or shorted.
In-vehicle sensor	
Engine coolant temperature sensor (Thermal transmitter)	
Intake sensor	
Sunload sensor	
P.B.R.	



Touch "SELF-DIAGNOSTIC RESULTS", and then touch "START". When all sensors are in good order, display will show "NO SELF DIAGNOSTIC FAILURE INDICATED".

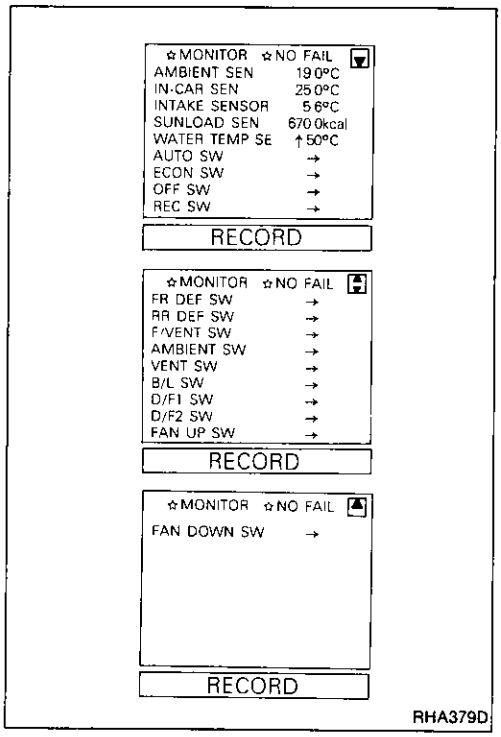
CAUTION:

- **Before conducting SELF-DIAGNOSTIC RESULTS mode, warm up engine. When engine coolant temperature is low, display can sometimes show "WATER TEMPERATURE SENSOR [OPEN] (·a)" even though the sensor is functioning properly.**
- **Conduct SELF-DIAGNOSTIC RESULTS mode under direct sunshine if possible. When conducting indoors, direct electric light (min. 60W) on the sunload sensor. Otherwise, display will show "SUNLOAD SENSOR [OPEN] (·a)" even when the sensor is functioning properly.**



If a sensor is malfunctioning, the corresponding sensor on display.
If circuit is opened, [OPEN] (·a)
If circuit is shorted, [SHORT] (·b)

Self-diagnosis — Consult (Cont'd)



DATA MONITOR

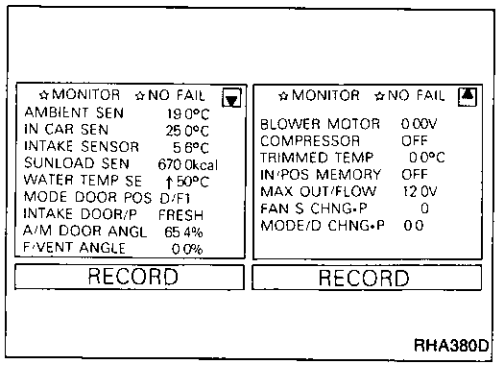
Input/Output data in the auto amp. is displayed. Touch "DATA MONITOR".

ECU Input signals

Touch "ECU INPUT SIGNALS".

Switch communication check

For switches shown on the display, press applicable switch on control unit. When the direction of the arrow "→" changes, switch communication is in functioning properly.



Main signals

Touch "MAIN SIGNALS", and touch "START".

Selection from menu.

Touch "SELECTION FROM MENU".
These are the available items to be checked:

- AMBIENT SENSOR
- IN-CAR (IN-VEHICLE) SENSOR
- INTAKE SENSOR
- SUNLOAD SENSOR
- WATER TEMP. SENSOR (THERMAL TRANSMITTER)
- AUTO SW
- ECON SW
- OFF SW
- REC SW
- FR DEF SW
- RR DEF SW
- AMBIENT SW
- VENT SW
- B/L SW
- D/F1 SW
- D/F2 SW
- FAN UP SW
- FAN DOWN SW
- MODE DOOR POSITION

Self-diagnosis — Consult (Cont'd)

- INTAKE DOOR POSITION
- AIR MIX DOOR ANGLE
- BLOWER MOTOR
- COMPRESSOR
- TRIMMED TEMP.
  (TEMP. SETTING TRIMMER)
- MAX. OUTLET FLOW
- FAN SPEED CHANGING POINT
- MODE DOOR CHANGING POINT

Self-diagnosis — Consult (Cont'd)

ACTIVE TEST

Checks operation of each actuator.

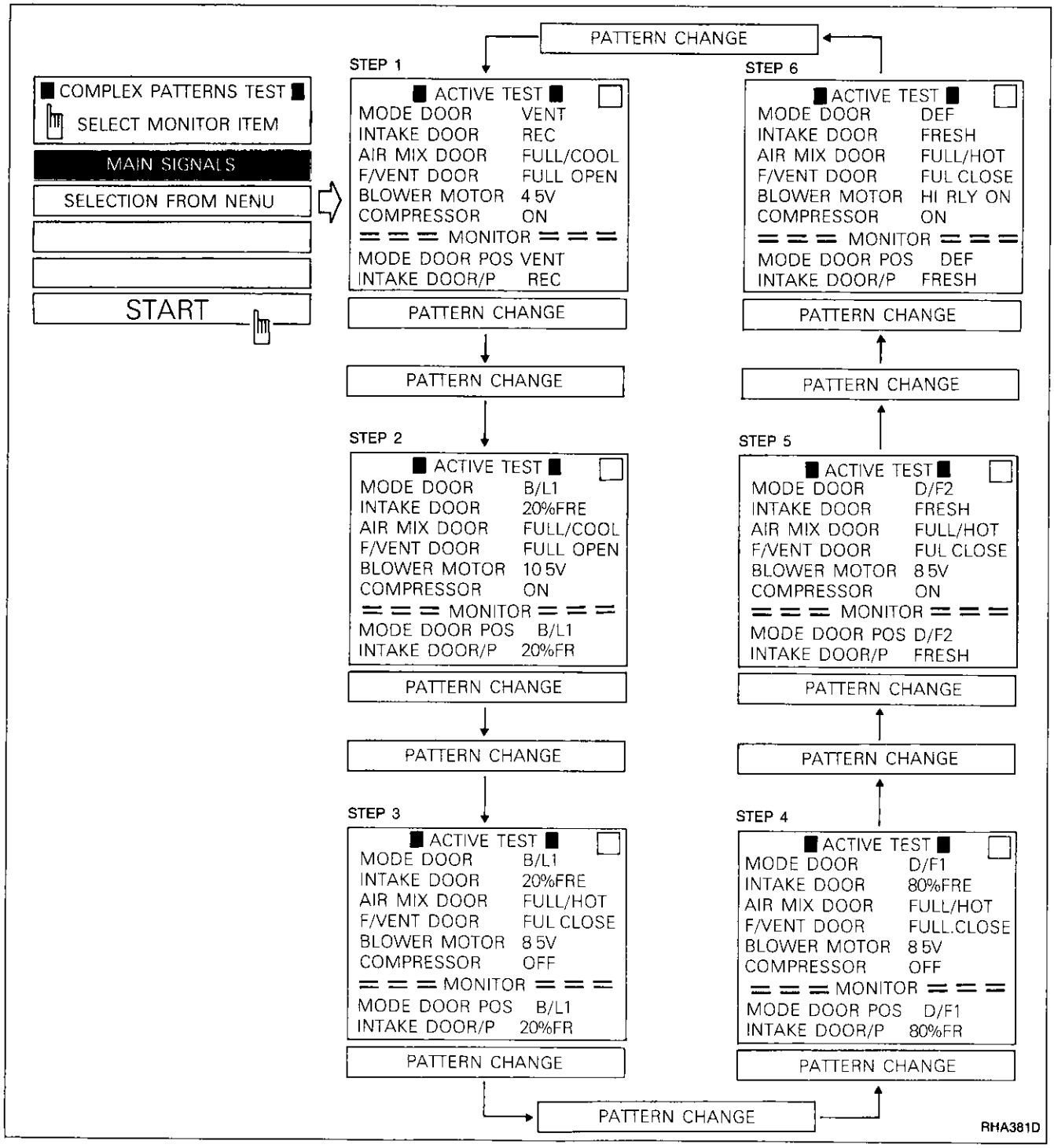
Mode in which CONSULT drives some actuators apart from the auto amp. and also shifts some parameters in a specified range.

Checks must be made visually, by listening for noise, or by touching air outlets with hand, etc for improper operation.

Touch "ACTIVE TEST".

Touch "COMPLEX PATTERNS".

Touch "START". Display shows STEP 1 in "ACTIVE TEST" mode.



Symptom Chart

DIAGNOSTIC TABLE

PROCEDURE / SYMPTOM			Self-diagnosis						CONSULT						Preliminary Check							
			STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	AUXILIARY MECHANISM	WORK SUPPORT — SEGMENT CHECK	WORK SUPPORT — MODE DOOR CHECK	WORK SUPPORT — INTAKE DOOR CHECK	WORK SUPPORT — TEMP SETTING TRIMMER	SELF-DIAGNOSIS RESULTS	ACTIVE TEST	Preliminary Check 1	Preliminary Check 2	Preliminary Check 3	Preliminary Check 4	Preliminary Check 5	Preliminary Check 6	Preliminary Check 7	Preliminary Check 8
Air outlet does not change.			❶	❷	❸	○	○		❶	❸			❷	○	❹							
Intake door does not change.			❶	❷	❸	○	○		❶		❸		❷	○		❹						
Insufficient cooling			○	○	○	○	○	○	○	○	○	○	○	○	○	○	❶		○	○	○	
Insufficient heating			○	○	○	○	○	○	○	○	○	○	○	○	○	○		❶	○		○	
Blower motor operation is malfunctioning.			❶	❷		○	○		❶				❷	○					❸			
Magnet clutch does not engage.			❶	❷		○	○		❶				❷	○						❸		
Discharge air temperature does not change.			❶	❷		○	○		❶				❷	○							❸	
Noise																						❶
Result of SELF-DIAGNOSIS RESULTS mode with CONSULT or Self-diagnosis STEP 2	21	Ambient sensor circuit is open.	❶	❷			○		❶				❷									
	22	In-vehicle sensor circuit is open.	❶	❷			○		❶				❷									
	23	Thermal transmitter circuit is open.	❶	❷					❶				❷									
	24	Intake sensor circuit is open.	❶	❷			○		❶				❷									
	25	Sunload sensor circuit is open.	❶	❷					❶				❷									
	26	P.B.R. circuit is open.	❶	❷					❶				❷									

❶, ❷: The number means checking order.
○: As for checking order, refer to each flow chart. (It depends on malfunctioning portion.)

Symptom Chart (Cont'd)

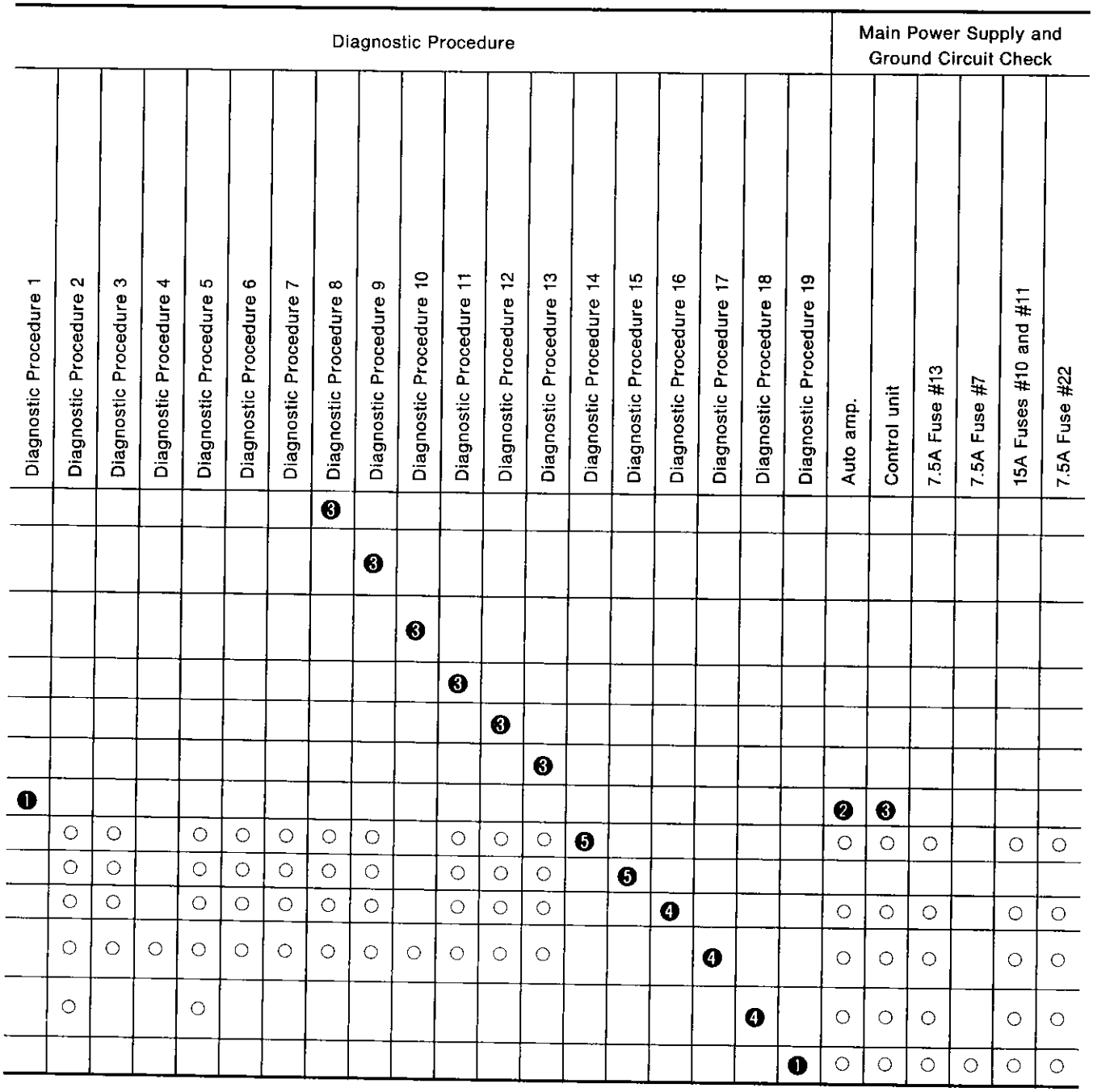
	Diagnostic Procedure																			Main Power Supply and Ground Circuit Check					
	Diagnostic Procedure 1	Diagnostic Procedure 2	Diagnostic Procedure 3	Diagnostic Procedure 4	Diagnostic Procedure 5	Diagnostic Procedure 6	Diagnostic Procedure 7	Diagnostic Procedure 8	Diagnostic Procedure 9	Diagnostic Procedure 10	Diagnostic Procedure 11	Diagnostic Procedure 12	Diagnostic Procedure 13	Diagnostic Procedure 14	Diagnostic Procedure 15	Diagnostic Procedure 16	Diagnostic Procedure 17	Diagnostic Procedure 18	Diagnostic Procedure 19	Auto amp.	Control unit	7.5A Fuse #13	7.5A Fuse #7	15A Fuses #10 and #11	7.5A Fuse #22
		○	○		○	○	○	○	○		○	○	○	○						○	○	○		○	○
		○	○		○	○	○	○	○		○	○	○		○					○	○	○		○	○
		○	○		○	○	○	○	○		○	○	○	○	○	○	○	○		○	○	○		○	○
		○	○		○	○	○	○	○		○	○	○	○		○				○	○	○		○	○
		○	○	○	○	○	○	○	○	○	○	○	○				○			○	○	○		○	○
		○	○		○	○	○	○	○		○	○	○					○		○	○	○		○	○
		○	○		○	○	○	○	○		○	○	○			○				○	○	○		○	○
	❸																								
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Symptom Chart (Cont'd)

PROCEDURE / SYMPTOM			Self-diagnosis						CONSULT						Preliminary Check								
			STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	AUXILIARY MECHANISM	WORK SUPPORT — SEGMENT CHECK	WORK SUPPORT — MODE DOOR CHECK	WORK SUPPORT — INTAKE DOOR CHECK	WORK SUPPORT — TEMP SETTING TRIMMER	SELF-DIAGNOSIS RESULTS	ACTIVE TEST	Preliminary Check 1	Preliminary Check 2	Preliminary Check 3	Preliminary Check 4	Preliminary Check 5	Preliminary Check 6	Preliminary Check 7	Preliminary Check 8
Result of SELF-DIAGNOSIS RESULTS mode with CONSULT or Self-diagnosis STEP 2	-21	Ambient sensor circuit is shorted.	❶	❷			○		❶				❷										
	-22	In-vehicle sensor circuit is shorted.	❶	❷			○		❶				❷										
	-23	Thermal transmitter circuit is shorted.	❶	❷					❶				❷										
	-24	Intake sensor circuit is shorted.	❶	❷			○		❶				❷										
	-25	Sunload sensor circuit is shorted.	❶	❷					❶				❷										
	-26	P.B.R. circuit is shorted.	❶	❷					❶				❷										
Self-diagnosis cannot be performed.																							
Mode door motor does not operate normally.			❶	❷	❸	❹	○		❶	❸			❷	❹									
Intake door motor does not operate normally.			❶	❷	❸	❹			❶		❸		❷	❹									
Air mix door motor does not operate normally.			❶	❷		❹			❶				❷	❸									
Blower motor operation is malfunctioning under out of Starting Fan Speed Control.			❶	❷		○	○		❶				❷	○					❸				
Magnet clutch does not operate after performing Preliminary Check 6.			❶	❷		○	○		❶				❷	○						❸			
Max. cold door motor does not operate normally.																							

❶, ❷: The number means checking order.
○: As for checking order, refer to each flow chart. (It depends on malfunctioning portio.)

Symptom Chart (Cont'd)



Preliminary Check

PRELIMINARY CHECK 1

Air outlet does not change

CHECK SENSOR CIRCUIT.
Set up "SELF-DIAGNOSIS RESULTS" mode with CONSULT.
or
Set up Self-diagnosis STEP 2.
Code No. 20 should be indicated on the display after approx. 4 seconds.
Is each sensor circuit normal?

N.G.

CHECK SENSOR CIRCUIT IN DETAIL ACCORDING TO THE DIAGNOSTIC PROCEDURE BELOW CORRESPONDING TO EACH CODE NO.

CONSULT indication	Self-diagnosis code No.	How to repair
Ambient sensor circuit is open.	21	Go to Diagnostic procedure 2.
Ambient sensor circuit is shorted.	-21	Go to Diagnostic procedure 8.
In-vehicle sensor circuit is open.	22	Go to Diagnostic procedure 3.
In-vehicle sensor circuit is shorted.	-22	Go to Diagnostic procedure 9.
Water temp. sensor circuit is open.	23	Go to Diagnostic procedure 4.
Water temp. sensor circuit is shorted.	-23	Go to Diagnostic procedure 10.
Intake sensor circuit is open.	24	Go to Diagnostic procedure 5.
Intake sensor circuit is shorted.	-24	Go to Diagnostic procedure 11.
Sunload sensor circuit is open.	25	Go to Diagnostic procedure 6.
Sunload sensor circuit is shorted.	-25	Go to Diagnostic procedure 12.
P.B.R. circuit is open.	26	Go to Diagnostic procedure 7.
P.B.R. circuit is shorted.	-26	Go to Diagnostic procedure 13.

When malfunctioning sensor circuits for ambient sensor, in-vehicle sensor and intake sensor are suspected, it is useful to check temperature detected by each sensor with Self-diagnosis STEP 5 to confirm the temperature is within normal range before performing Diagnostic Procedure.
By using CONSULT and selecting DATA MONITOR mode, temperature of each sensor (ambient, in-vehicle, engine coolant temperature, intake, sunload) can be confirmed.

O.K.

CHECK MODE DOOR MOTOR.
Set up "WORK SUPPORT — Mode door check" mode with CONSULT.
or
Set up Self-diagnosis STEP 3.
Code No. 30 should be indicated on the display after approx. 20 seconds.
Is mode door motor operating normally?

N.G.

Go to **Diagnostic Procedure 14.**

O.K.

CHECK MODE DOOR OPERATION.
Set up "ACTIVE TEST" mode with CONSULT.
or
Set up Self-diagnosis STEP 4.
Does air outlet change according to each mode?

Set mode	VENT	B/L 1	B/L 1	D/F 1	D/F 2	DEF
Code No.	41	42	43	44	45	46
Air outlet	VENT	B/L	B/L	F/D 1	F/D 2	DEF

Refer to Air Flow.

N.G.

CHECK SIDE LINK MECHANISM.
Refer to Control Linkage Adjustment.

N.G.

Repair or adjust.

O.K.

Go to **Diagnostic Procedure 14.**

O.K.

Air outlet control system is normal. Refer to **Outlet door control specification.**

PRELIMINARY CHECK 2

Intake door does not change.

CHECK SENSOR CIRCUIT.
Set up "SELF-DIAGNOSIS RESULTS" mode with CONSULT.
or
Set up Self-diagnosis STEP 2.
Code No. 20 should be indicated on the display after approx. 4 seconds.
Is each sensor circuit normal?

N.G. → CHECK SENSOR CIRCUIT IN DETAIL ACCORDING TO THE DIAGNOSTIC PROCEDURE BELOW CORRESPONDING TO EACH CODE NO.

CONSULT indication	Self-diagnosis code No.	How to repair
Ambient sensor circuit is open.	21	Go to Diagnostic procedure 2.
Ambient sensor circuit is shorted.	-21	Go to Diagnostic procedure 8.
In-vehicle sensor circuit is open.	22	Go to Diagnostic procedure 3.
In-vehicle sensor circuit is shorted.	-22	Go to Diagnostic procedure 9.
Water temp. sensor circuit is open.	23	Go to Diagnostic procedure 4.
Water temp sensor circuit is shorted.	-23	Go to Diagnostic procedure 10.
Intake sensor circuit is open.	24	Go to Diagnostic procedure 5.
Intake sensor circuit is shorted	-24	Go to Diagnostic procedure 11.
Sunload sensor circuit is open	25	Go to Diagnostic procedure 6.
Sunload sensor circuit is shorted.	-25	Go to Diagnostic procedure 12.
P.B.R. circuit is open.	26	Go to Diagnostic procedure 7.
P.B.R. circuit is shorted.	-26	Go to Diagnostic procedure 13.

When malfunctioning sensor circuits for ambient sensor, in-vehicle sensor and intake sensor are suspected, it is useful to check temperature detected by each sensor with Self-diagnosis STEP 5 to confirm the temperature is within normal range before performing Diagnostic Procedure.
By using CONSULT and selecting DATA MONITOR mode, temperature of each sensor (ambient, in-vehicle, engine coolant temperature, intake, sunload) can be confirmed.

O.K.

CHECK INTAKE DOOR MOTOR.
Set up "WORK SUPPORT — Intake door check" mode with CONSULT.
or
Set up Self-diagnosis STEP 3.
Code No. 30 should be indicated on the display after approx. 20 seconds.
Is intake door motor operating normally?

N.G. → Go to **Diagnostic Procedure 15.**

O.K.

CHECK INTAKE DOOR OPERATION.
Set up "ACTIVE TEST" mode with CONSULT.
or
Set up Self-diagnosis STEP 4.
Does intake air change according to each mode?

Set mode	REC	20% FRE	20% FRE	80% FRE	FRE	FRE
Code No.	41	42	43	44	45	46
Air intake	REC	20% FRE	20% FRE	80% FRE	FRE	FRE

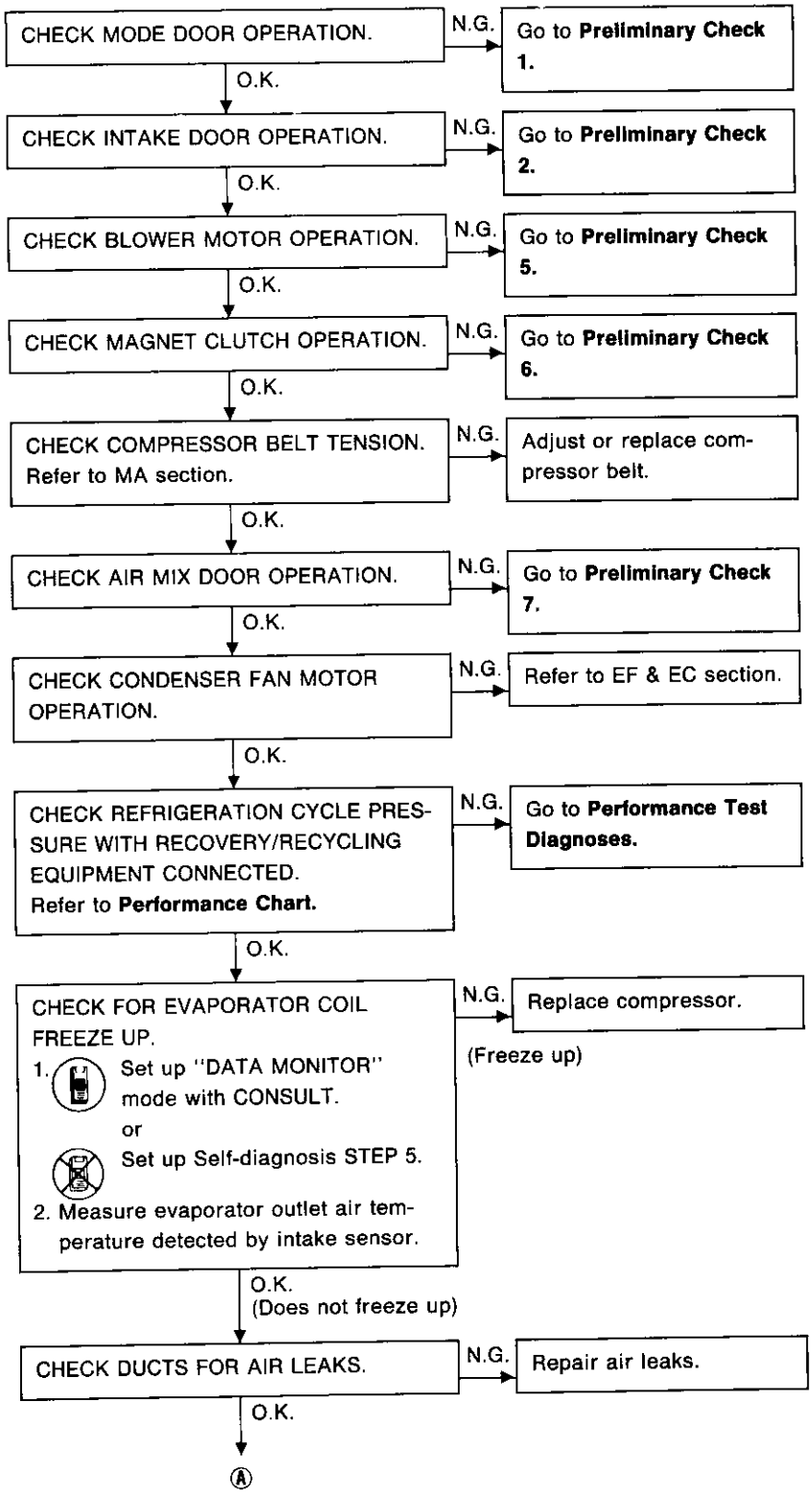
N.G. → CHECK INTAKE DOOR ROD or LEVER MECHANISM.
Refer to Control Linkage Adjustment.
N.G. → Repair or adjust.

O.K. → Go to **Diagnostic Procedure 15.**

O.K. → Intake door control system is normal.
Refer to **Intake door control specification.**

PRELIMINARY CHECK 3

Insufficient cooling



Preliminary Check (Cont'd)

Ⓐ

PERFORM TEMPERATURE SETTING TRIMMING.

1.  Set up "WORK SUPPORT — temp. setting trimmer" mode with CONSULT.

   or

    Set up AUXILIARY MECHANISM mode in Self-diagnosis.

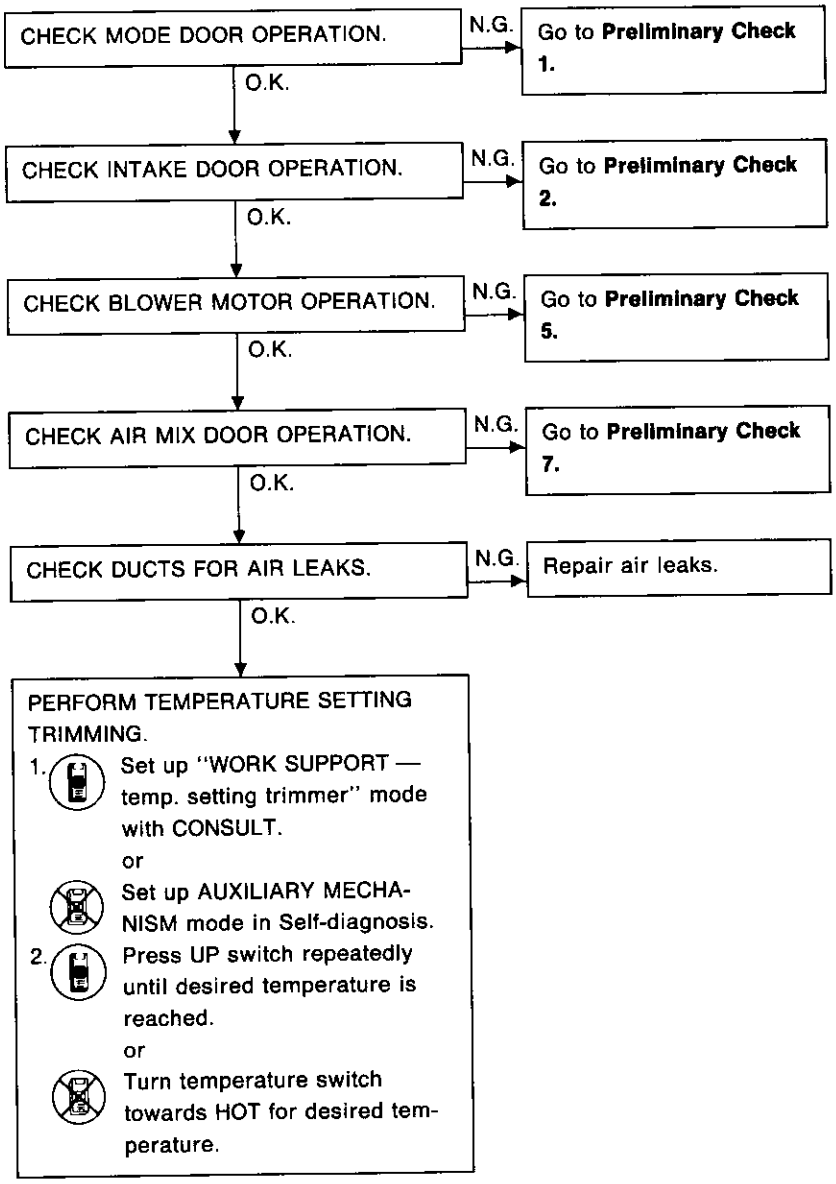
2.  Press DOWN switch repeatedly until desired temperature is reached.

   or

    Turn temperature switch towards COLD for desired temperature.

PRELIMINARY CHECK 4

Insufficient heating



PRELIMINARY CHECK 5

Blower motor operation is malfunctioning.

CHECK SENSOR CIRCUIT.
Set up "SELF-DIAGNOSIS RESULTS" mode with CONSULT.
or
Set up Self-diagnosis STEP 2.
Code No. 20 should be indicated on the display after approx. 4 seconds.
Is each sensor circuit normal?

N.G. →

CHECK SENSOR CIRCUIT IN DETAIL ACCORDING TO THE DIAGNOSTIC PROCEDURE BELOW CORRESPONDING TO EACH CODE NO.

CONSULT indication	Self-diagnosis code No.	How to repair
Ambient sensor circuit is open.	21	Go to Diagnostic procedure 2.
Ambient sensor circuit is shorted.	-21	Go to Diagnostic procedure 8.
In-vehicle sensor circuit is open.	22	Go to Diagnostic procedure 3.
In-vehicle sensor circuit is shorted.	-22	Go to Diagnostic procedure 9.
Water temp. sensor circuit is open.	23	Go to Diagnostic procedure 4.
Water temp. sensor circuit is shorted.	-23	Go to Diagnostic procedure 10.
Intake sensor circuit is open.	24	Go to Diagnostic procedure 5.
Intake sensor circuit is shorted.	-24	Go to Diagnostic procedure 11.
Sunload sensor circuit is open.	25	Go to Diagnostic procedure 6.
Sunload sensor circuit is shorted.	-25	Go to Diagnostic procedure 12.
P.B.R. circuit is open.	26	Go to Diagnostic procedure 7.
P.B.R. circuit is shorted.	-26	Go to Diagnostic procedure 13.

When malfunctioning sensor circuits for ambient sensor, in-vehicle sensor and intake sensor are suspected, it is useful to check temperature detected by each sensor with Self-diagnosis STEP 5 to confirm the temperature is within normal range before performing Diagnostic Procedure.
By using CONSULT and selecting DATA MONITOR mode, temperature of each sensor (ambient, in-vehicle, engine coolant temperature, intake, sunload) can be confirmed.

O.K. ↓

CHECK BLOWER MOTOR OPERATION.
Set up "ACTIVE TEST" mode with CONSULT.
or
Set up Self-diagnosis STEP 4.
Does blower motor speed change according to each ordered fan speed?

N.G. → Go to **Diagnostic Procedure 17.**

O.K. ↓

Is engine coolant temperature lower than 50°C (122°F) and are air outlets set in B/L or FOOT/DEF mode?

No → Blower motor operation is normal.
Refer to **Fan speed control specification.**

Yes ↓

IS BLOWER MOTOR CONTROLLED UNDER STARTING FAN SPEED CONTROL?
Refer to **Starting fan speed control specification.**

No → Check engine coolant temperature sensor control circuit.
Refer to EF & EC section.

Yes ↓

Blower motor operation is normal.

PRELIMINARY CHECK 6

Magnet clutch does not engage.

CHECK SENSOR CIRCUIT.

Set up "SELF-DIAGNOSIS RESULTS" mode with CONSULT.

or

Set up Self-diagnosis STEP 2.

Code No. 20 should be indicated on the display after approx. 4 seconds.

Is each sensor circuit normal?

N.G. →

CHECK SENSOR CIRCUIT IN DETAIL ACCORDING TO THE DIAGNOSTIC PROCEDURE BELOW CORRESPONDING TO EACH CODE NO.

CONSULT indication	Self-diagnosis code No.	How to repair
Ambient sensor circuit is open.	21	Go to Diagnostic procedure 2.
Ambient sensor circuit is shorted.	-21	Go to Diagnostic procedure 8.
In-vehicle sensor circuit is open.	22	Go to Diagnostic procedure 3.
In-vehicle sensor circuit is shorted.	-22	Go to Diagnostic procedure 9.
Water temp. sensor circuit is open.	23	Go to Diagnostic procedure 4.
Water temp. sensor circuit is shorted.	-23	Go to Diagnostic procedure 10.
Intake sensor circuit is open.	24	Go to Diagnostic procedure 5.
Intake sensor circuit is shorted.	-24	Go to Diagnostic procedure 11.
Sunload sensor circuit is open.	25	Go to Diagnostic procedure 6.
Sunload sensor circuit is shorted.	-25	Go to Diagnostic procedure 12.
P.B.R. circuit is open.	26	Go to Diagnostic procedure 7.
P.B.R. circuit is shorted.	-26	Go to Diagnostic procedure 13.

When malfunctioning sensor circuits for ambient sensor, in-vehicle sensor and intake sensor are suspected, it is useful to check temperature detected by each sensor with Self-diagnosis STEP 5 to confirm the temperature is within normal range before performing Diagnostic Procedure.

By using CONSULT and selecting DATA MONITOR mode, temperature of each sensor (ambient, in-vehicle, engine coolant temperature, intake, sunload) can be confirmed.

O.K. ↓

CHECK MAGNET CLUTCH OPERATION.

Set up "ACTIVE TEST" mode with CONSULT.

or

Set up Self-diagnosis STEP 4.

Check if magnet clutch engages according to order from CONSULT or each code No.

Set mode	ON	ON	OFF	OFF	ON	ON
Code No.	41	42	43	44	45	46
Magnet clutch operation	ON	ON	OFF	OFF	ON	ON

N.G. →

CHECK REFRIGERANT.
Connect recovery/recycling equipment then check system pressure.

N.G. →

Go to **Performance Test Diagnoses.**

O.K. ↓

Go to **Diagnostic Procedure 18.**

O.K. ↓

Magnet clutch control system is normal.
Refer to MAGNET CLUTCH CONTROL.

PRELIMINARY CHECK 7

Discharged air temperature does not change.

CHECK SENSOR CIRCUIT.

Set up "SELF-DIAGNOSIS RESULTS" mode with CONSULT.

or

Set up Self-diagnosis STEP 2.

Code No. 20 should be indicated on the display after approx. 4 seconds.

Is each sensor circuit normal?

N.G. → CHECK SENSOR CIRCUIT IN DETAIL ACCORDING TO THE DIAGNOSTIC PROCEDURE BELOW CORRESPONDING TO EACH CODE NO.

CONSULT indication	Self-diagnosis code No.	How to repair
Ambient sensor circuit is open.	21	Go to Diagnostic procedure 2.
Ambient sensor circuit is shorted.	-21	Go to Diagnostic procedure 8.
In-vehicle sensor circuit is open.	22	Go to Diagnostic procedure 3.
In-vehicle sensor circuit is shorted.	-22	Go to Diagnostic procedure 9.
Water temp. sensor circuit is open.	23	Go to Diagnostic procedure 4.
Water temp. sensor circuit is shorted.	-23	Go to Diagnostic procedure 10.
Intake sensor circuit is open.	24	Go to Diagnostic procedure 5.
Intake sensor circuit is shorted.	-24	Go to Diagnostic procedure 11.
Sunload sensor circuit is open.	25	Go to Diagnostic procedure 6.
Sunload sensor circuit is shorted.	-25	Go to Diagnostic procedure 12.
P.B.R. circuit is open.	26	Go to Diagnostic procedure 7.
P.B.R. circuit is shorted.	-26	Go to Diagnostic procedure 13.

When malfunctioning sensor circuits for ambient sensor, in-vehicle sensor and intake sensor are suspected, it is useful to check temperature detected by each sensor with Self-diagnosis STEP 5 to confirm the temperature is within normal range before performing Diagnostic Procedure.

By using CONSULT and selecting DATA MONITOR mode, temperature of each sensor (ambient, in-vehicle, engine coolant temperature, intake, sunload) can be confirmed.

O.K.

CHECK AIR MIX DOOR OPERATION.

Set up "ACTIVE TEST" mode with CONSULT.

or

Set up Self-diagnosis STEP 4.

Check if discharge air temperature changes as shown in the following chart.

Set mode	Full cold	Full cold	Full hot	Full hot	Full hot	Full hot
Code No	41	42	43	44	45	46
Discharge air temperature	Full cold	Full cold	Full hot	Full hot	Full hot	Full hot

N.G. → CHECK AIR MIX DOOR MECHANISM. Repair to Control Linkage Adjustment. N.G. → Repair or adjust.

O.K.

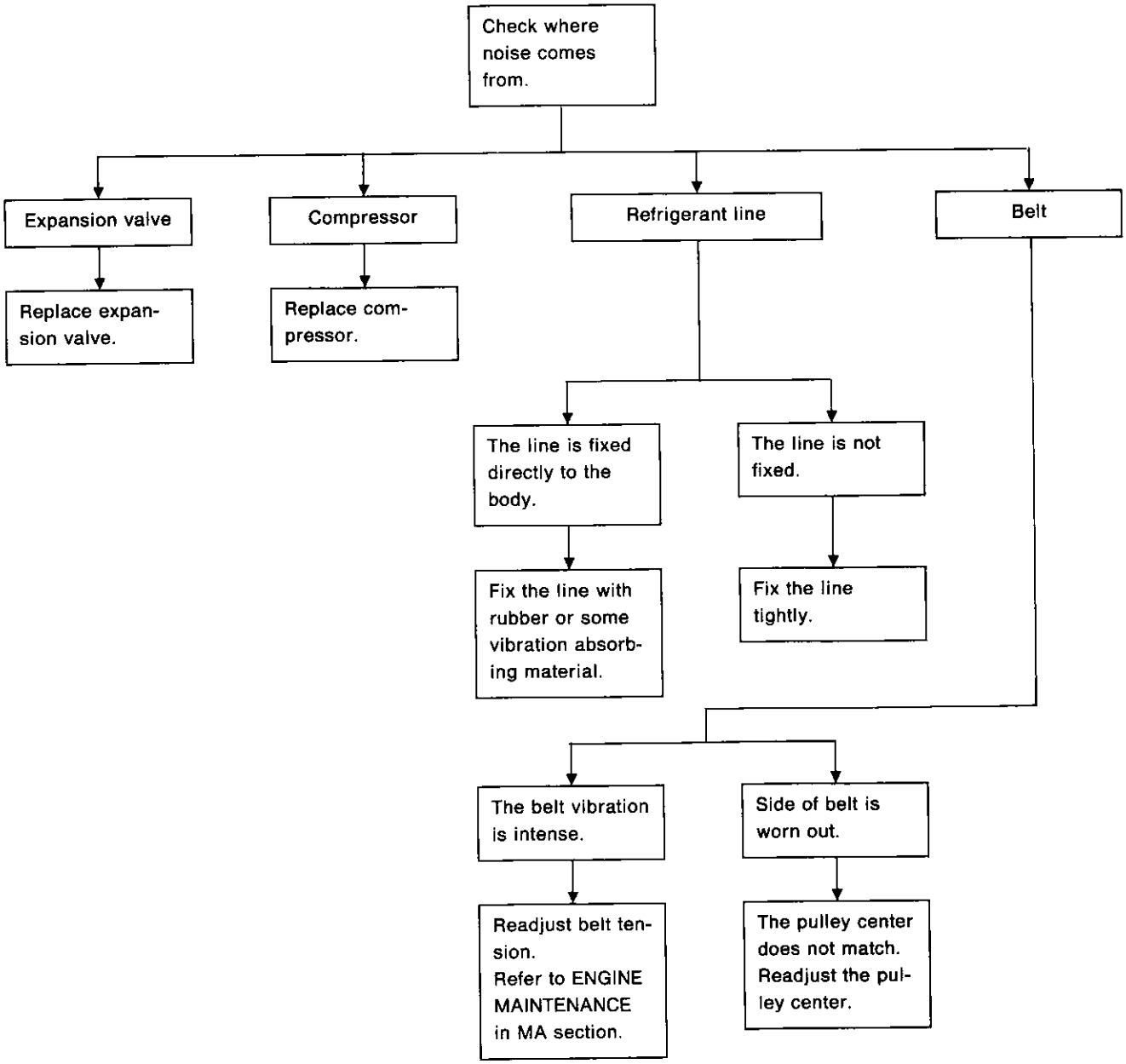
Go to **Diagnostic Procedure 16.**

O.K.

Air mix door control system is normal. Refer to **Specification of air mix door control.**

PRELIMINARY CHECK 8

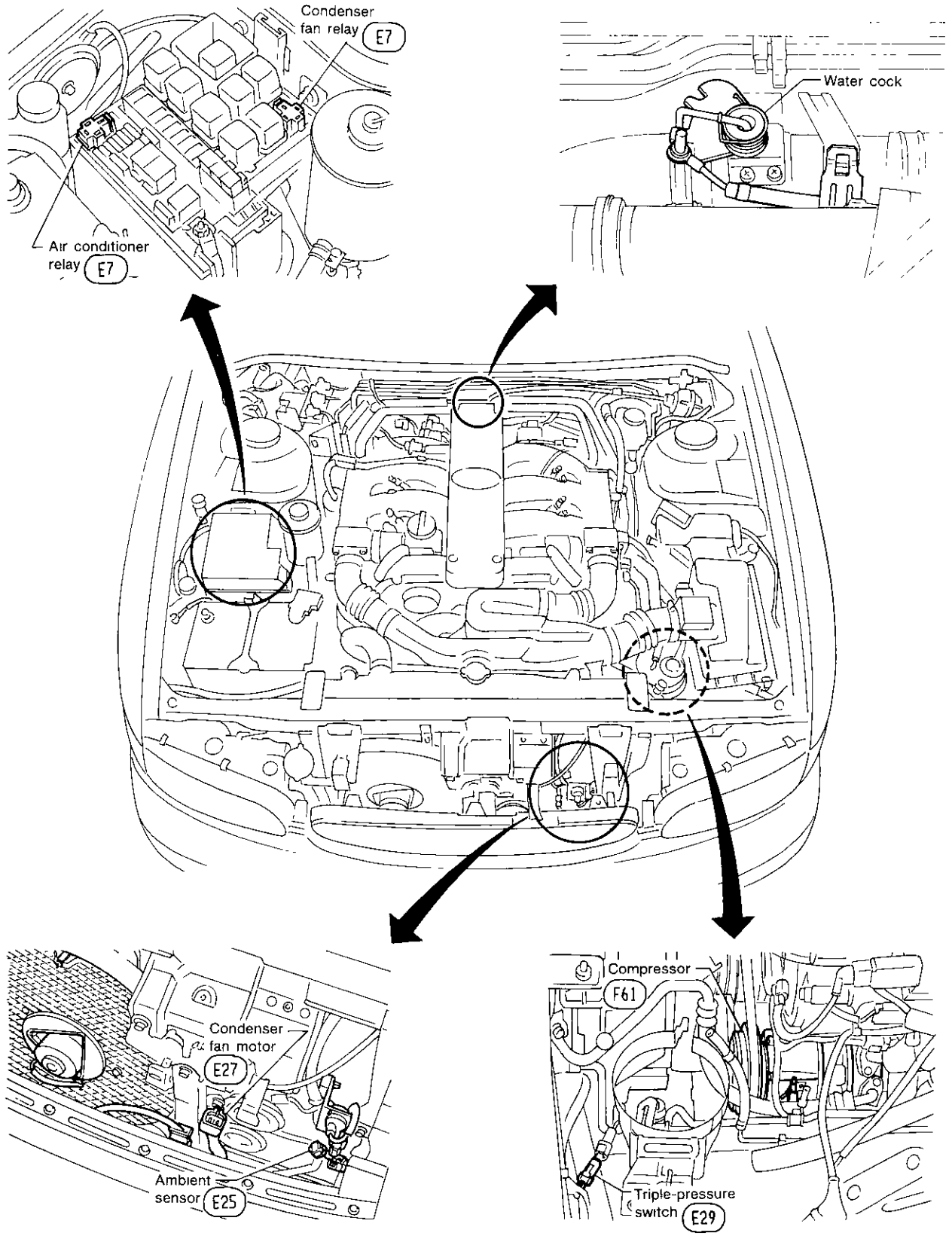
Noise



NOTE

A/C Component Layout

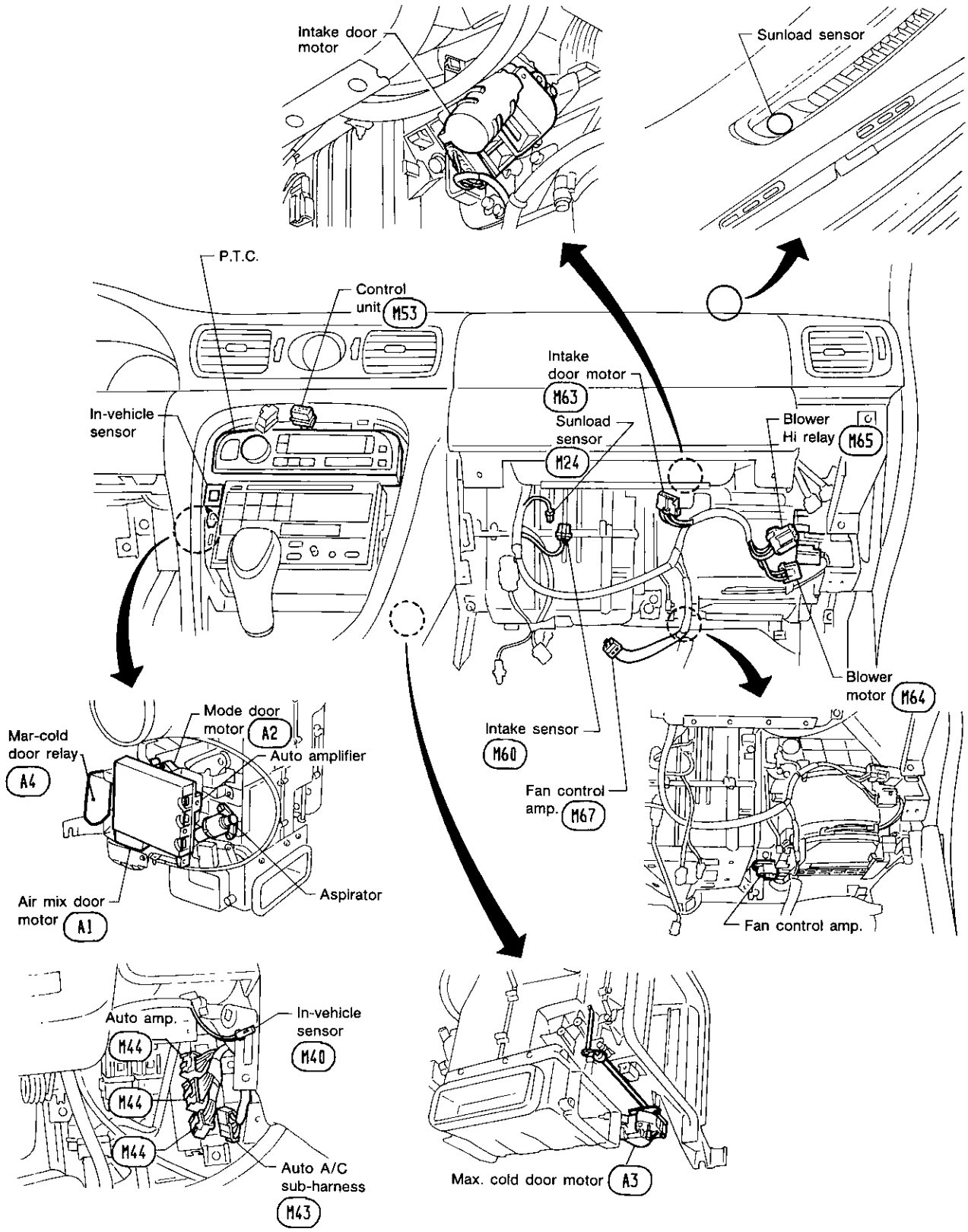
ENGINE COMPARTMENT



RHA058D

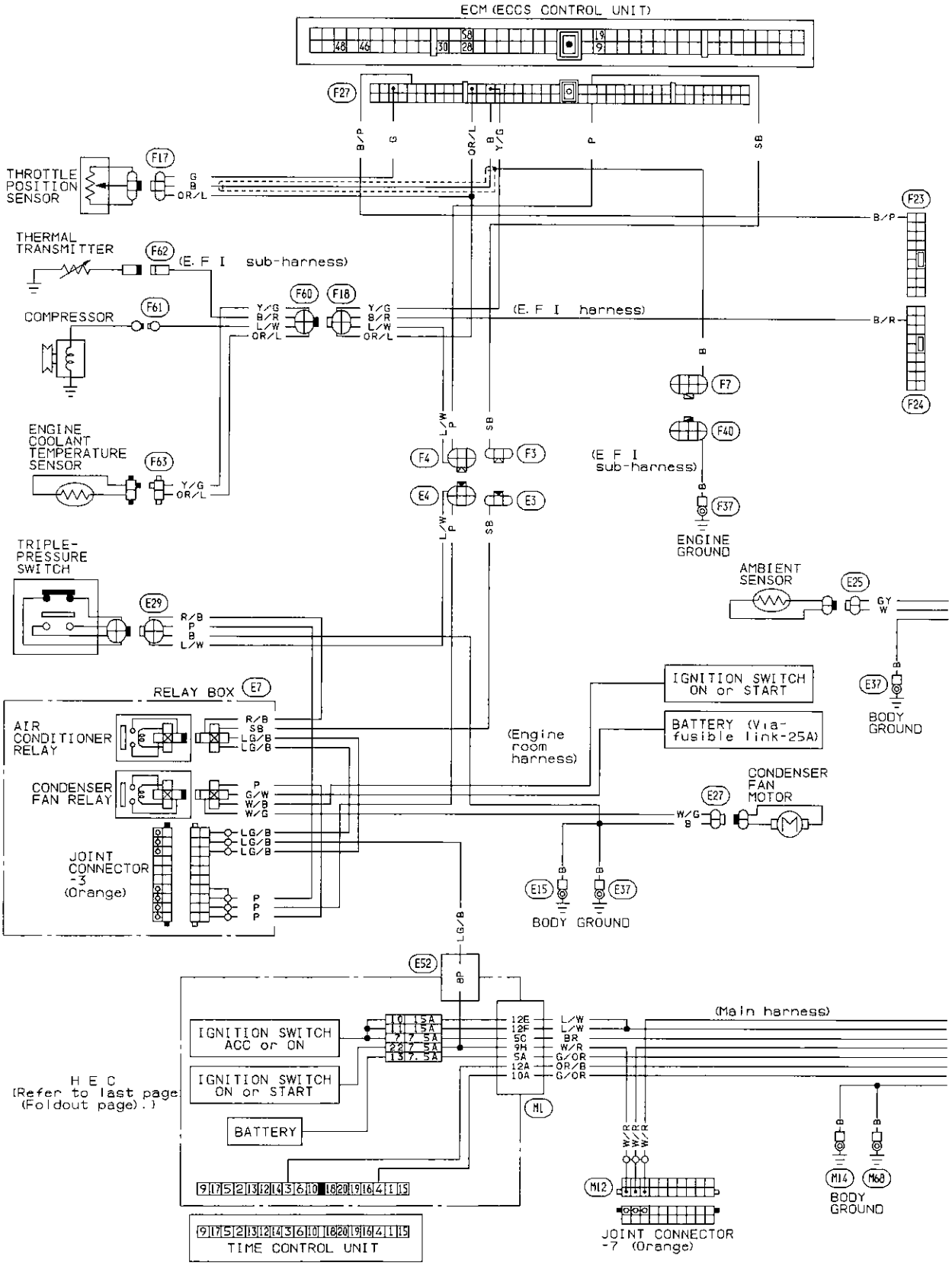
A/C Component Layout (Cont'd)

PASSENGER COMPARTMENT

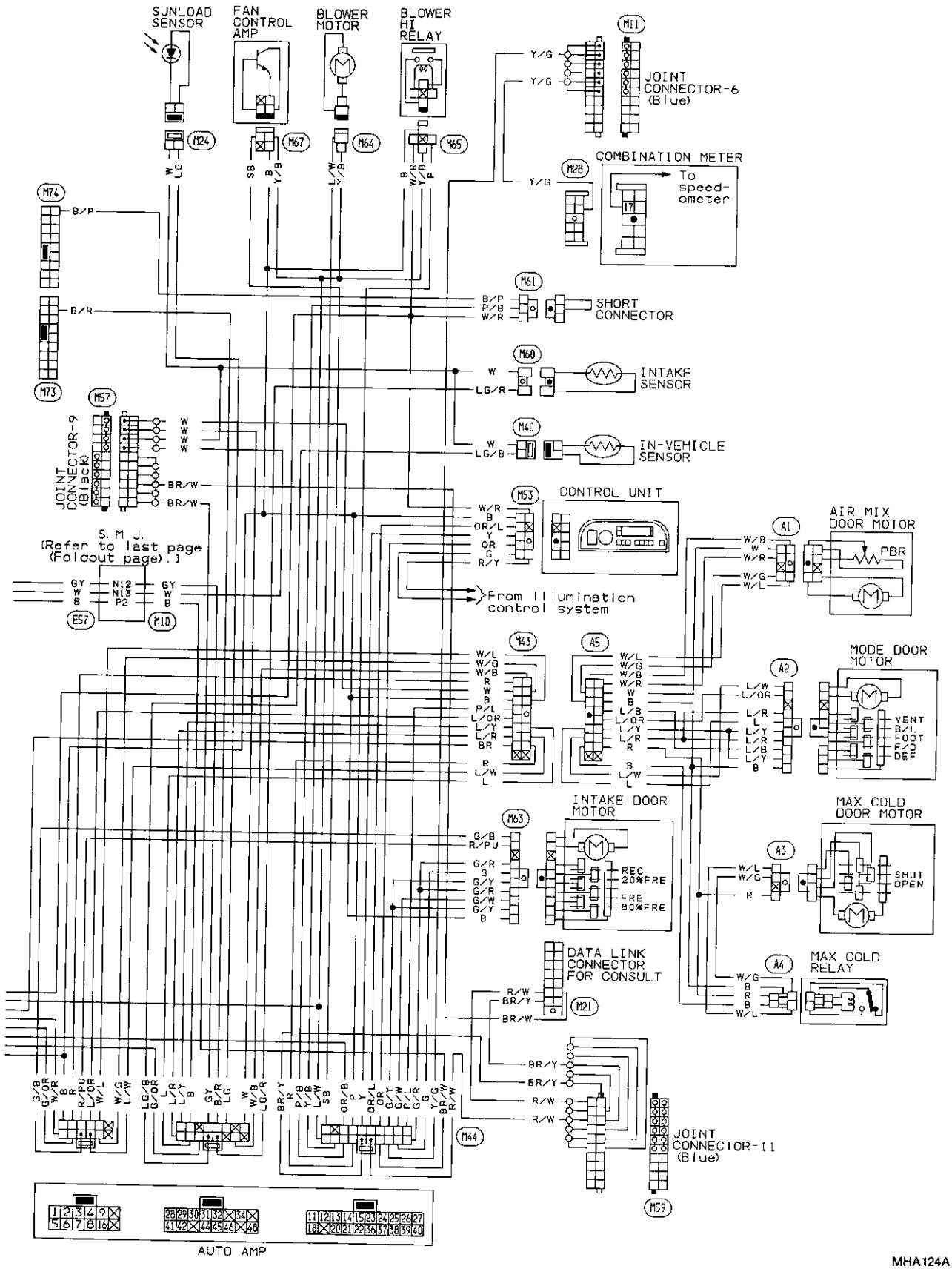


RHA059D

Wiring Diagram

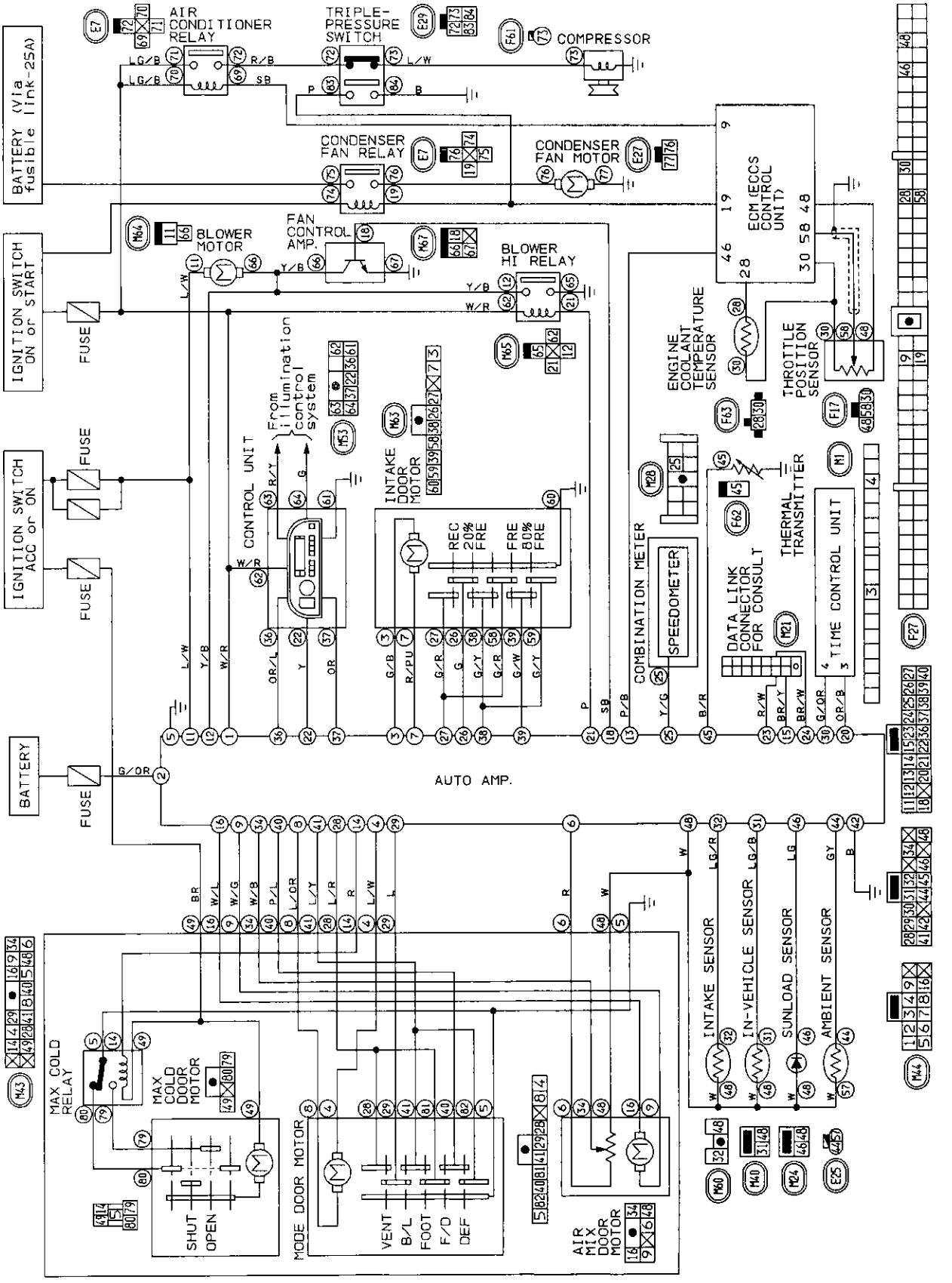


Wiring Diagram (Cont'd)



MHA124A

Circuit Diagram for Quick Pinpoint Check



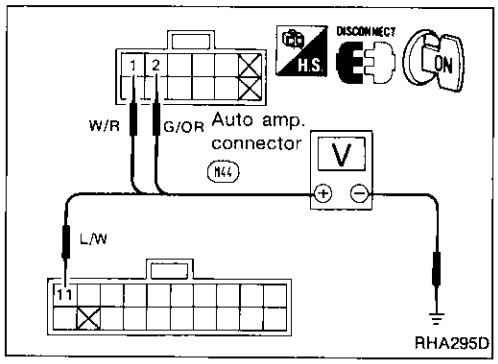
MHA123A

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 Wiring Diagram.

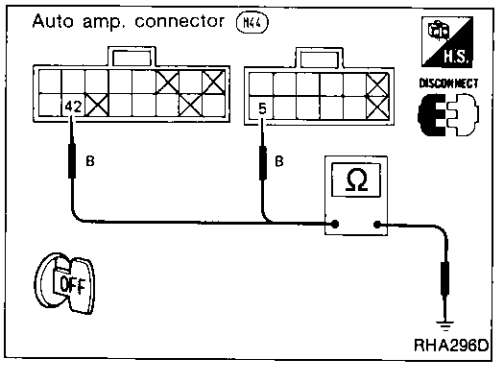


AUTO AMP. CHECK

Check power supply circuit for auto amp. with ignition switch ON.

Measure voltage across terminal No. ①, ②, ⑪ and body ground.

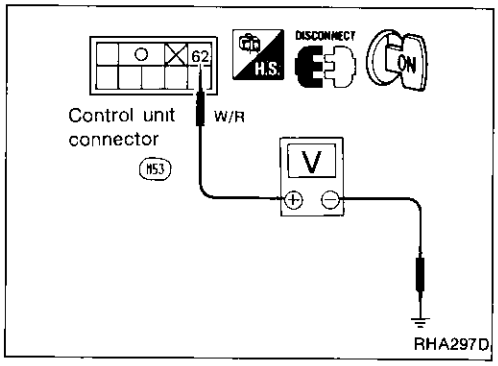
Voltmeter terminal		Voltage
⊕	⊖	
①	Body ground	Approx. 12V
②		
⑪		



Check body ground circuit for auto amp. with ignition switch OFF.

Check for continuity between terminal No. ⑤, ㊷ and body ground.

Ohmmeter terminal		Continuity
⊕	⊖	
⑤	Body ground	Yes
㊷		

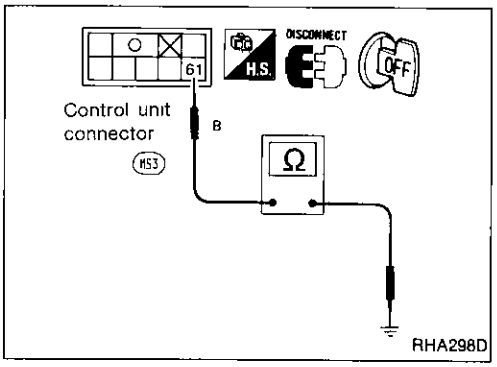


CONTROL UNIT CHECK

Check power supply circuit for control unit with ignition switch ON.

Measure voltage across terminal No. ㊷ and body ground.

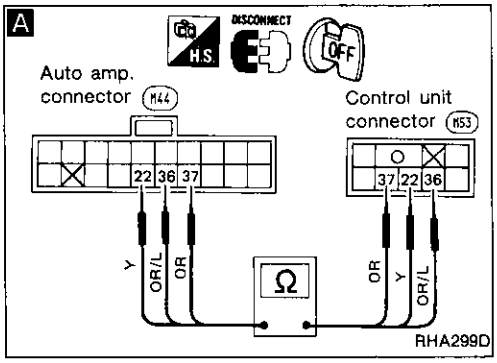
Voltmeter terminal		Voltage
⊕	⊖	
㊷	Body ground	Approx. 12V



Check body ground circuit for control unit with ignition switch OFF.

Check for continuity between terminal No. ㊶ and body ground.

Ohmmeter terminal		Continuity
⊕	⊖	
㊶	Body ground	Yes



Diagnostic Procedure 1

SYMPTOM: Self-diagnosis cannot be performed.

CHECK MAIN POWER SUPPLY AND GROUND CIRCUIT FOR AUTO AMP. AND CONTROL UNIT. (Refer to page HA-77.)

N.G. → Repair Main Power Supply and Ground Circuit.

O.K. ↓

A

Note

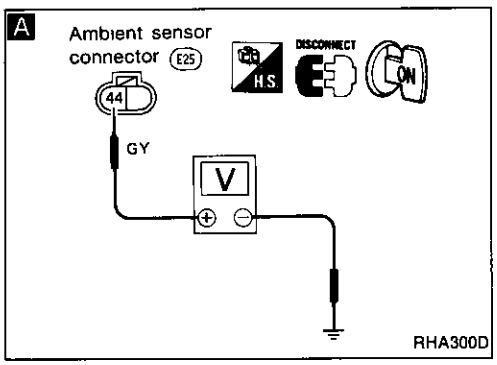
Check circuit continuity between each terminal on auto amp. and on control unit.

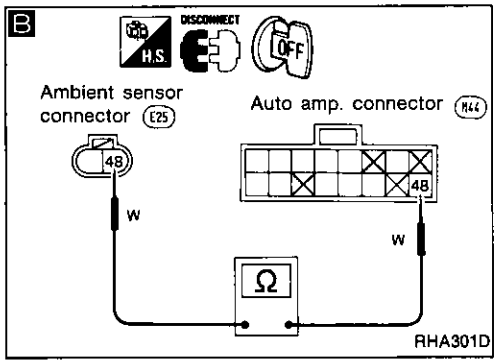
Terminal No.		Continuity
⊕	⊖	
Auto amp.	Control unit	
㉒	㉒	Yes
㊱	㊱	
㊲	㊲	

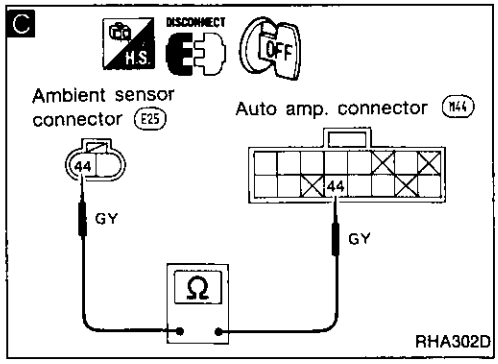
O.K. ↓

Replace auto amp. or control unit.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.







Diagnostic Procedure 2

SYMPTOM: Ambient sensor circuit is open. (21 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2; or AMBIENT SENSOR [OPEN] (-a) is indicated on CONSULT as a result of conducting "SELF-DIAGNOSIS RESULTS" mode with CONSULT.)

A

CHECK AMBIENT SENSOR CIRCUIT BETWEEN AMBIENT SENSOR AND AUTO AMP.
Disconnect ambient sensor harness connector.
Do approx. 5 volts exist between ambient sensor harness terminal No. 44 and body ground?

N.G. → Disconnect auto amp. harness connector.

C

Note

Check circuit continuity between ambient sensor harness terminal No. 44 and auto amp. harness terminal No. 44.

O.K. → Replace auto amp.

O.K. → Disconnect auto amp. harness connector.

B

Note

Check circuit continuity between ambient sensor harness terminal No. 48 and auto amp. harness terminal No. 48.

O.K. →

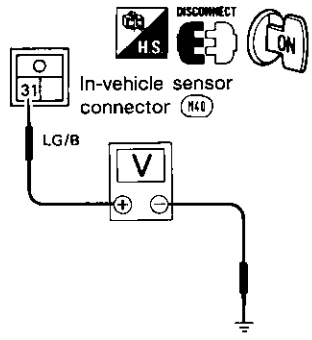
CHECK AMBIENT SENSOR.
(Refer to Control System Input Components.)

N.G. → Replace ambient sensor.

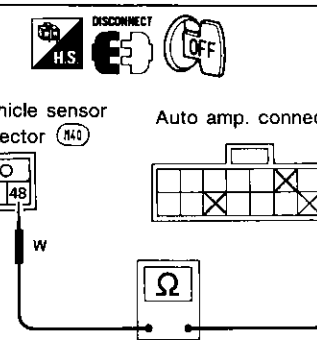
O.K. → Replace auto amp.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

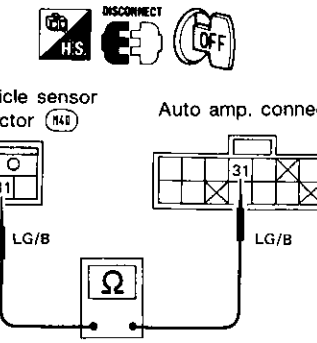
A



B



C



Diagnostic Procedure 3

SYMPTOM: In-vehicle sensor circuit is open. (22 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2; or IN-VEHICLE SENSOR [OPEN] (·a) is indicated on CONSULT as a result of conducting "SELF-DIAGNOSIS RESULTS" mode with CONSULT.)

A

CHECK IN-VEHICLE SENSOR CIRCUIT BETWEEN IN-VEHICLE SENSOR AND AUTO AMP.
Disconnect in-vehicle sensor harness connector.
Do approx. 5 volts exist between in-vehicle sensor harness terminal No. ㉛ and body ground?

N.G. → Disconnect auto amp. harness connector.

C

Note

Check circuit continuity between in-vehicle sensor harness terminal No. ㉛ and auto amp. harness terminal No. ㉛.

O.K. → Replace auto amp.

O.K. → Disconnect auto amp. harness connector.

B

Note

Check circuit continuity between in-vehicle sensor harness terminal No. ㊽ and auto amp. harness terminal No. ㊽.

O.K. → CHECK IN-VEHICLE SENSOR. (Refer to Control System Input Components.)

N.G. → Replace in-vehicle sensor.

O.K. → Replace auto amp.

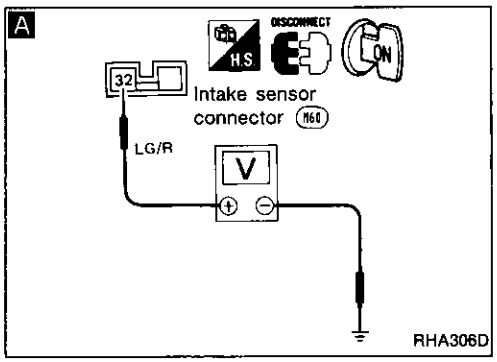
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

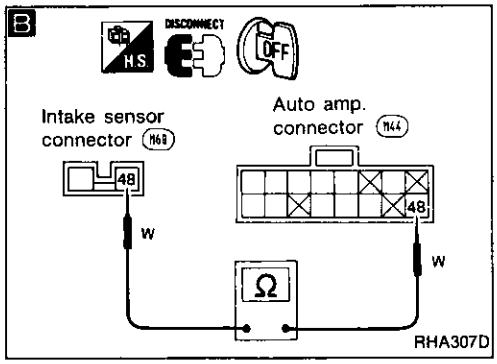
Diagnostic Procedure 4

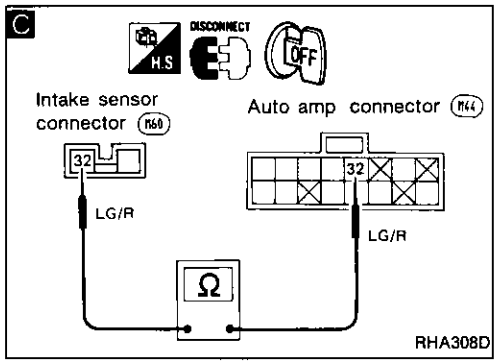
SYMPTOM: Thermal transmitter circuit is open. (23 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2; or WATER TEMP. SENSOR [OPEN] (·a) is indicated on CONSULT as a result of conducting "SELF-DIAGNOSIS RESULTS" mode with CONSULT.)

Check engine coolant temperature sensor

Refer to EF & EC section.







Diagnostic Procedure 5

SYMPTOM: Intake sensor circuit is open. (24 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2; or INTAKE SENSOR [OPEN] (·a) is indicated on CONSULT as a result of conducting "SELF-DIAGNOSIS RESULTS" mode with CONSULT.)

A

CHECK INTAKE SENSOR CIRCUIT BETWEEN INTAKE SENSOR AND AUTO AMP.
Disconnect intake sensor harness connector.
Do approx. 5 volts exist between intake sensor harness terminal No. ㉜ and body ground?

N.G. → Disconnect auto amp. harness connector.

C Note

Check circuit continuity between intake sensor harness terminal No. ㉜ and auto amp. harness terminal No. ㉜.

O.K. → Replace auto amp.

O.K. → Disconnect auto amp. harness connector.

B Note

Check circuit continuity between intake sensor harness terminal No. ㊽ and auto amp. harness terminal No. ㊽.

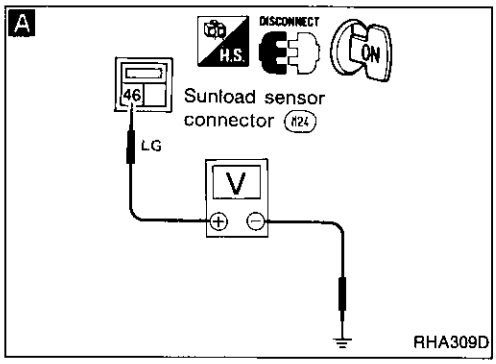
O.K.

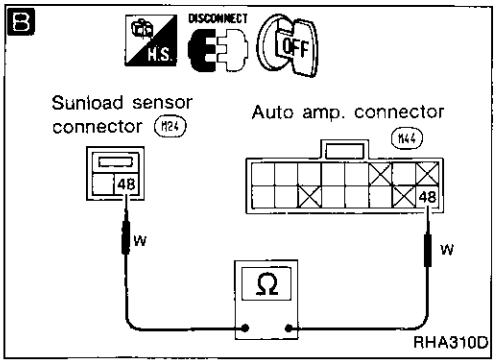
CHECK INTAKE SENSOR.
(Refer to Control System Input Components.)

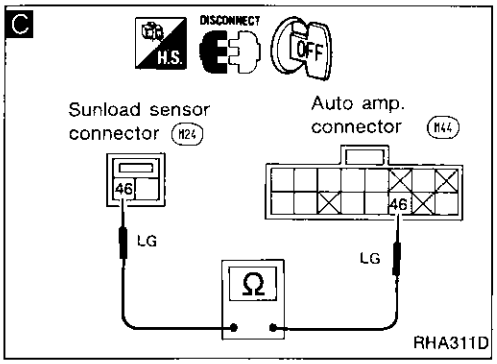
N.G. → Replace intake sensor.

O.K. → Replace auto amp.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.







Diagnostic Procedure 6

SYMPTOM: Sunload sensor circuit is open. (25 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2; or SUNLOAD SENSOR [OPEN] (·a) is indicated on CONSULT as a result of conducting "SELF-DIAGNOSIS RESULTS" mode with CONSULT.)

A

CHECK SUNLOAD SENSOR CIRCUIT BETWEEN SUNLOAD SENSOR AND AUTO AMP.
Disconnect sunload sensor harness connector.
Do approx. 5 volts exist between sunload sensor harness terminal No. 46 and body ground?

N.G. → Disconnect auto amp. harness connector.

C

Note

Check circuit continuity between sunload sensor harness terminal No. 46 and auto amp. harness terminal No. 46.

O.K. → Replace auto amp.

O.K. → Disconnect auto amp. harness connector.

B

Note

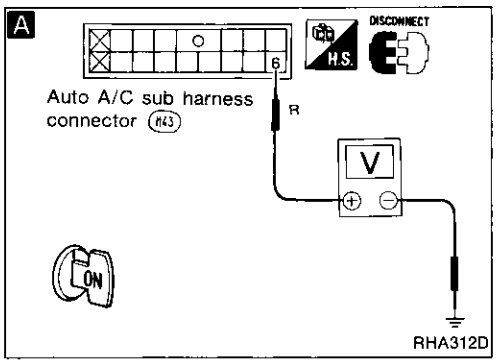
Check circuit continuity between sunload sensor harness terminal No. 46 and auto amp. harness terminal No. 48.

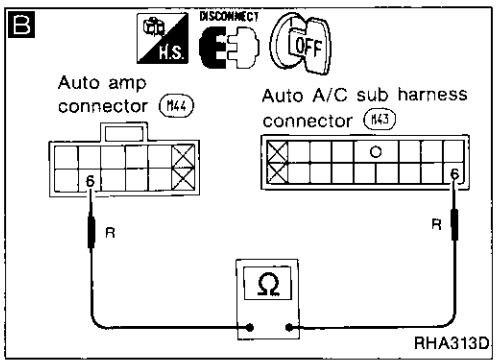
O.K. → CHECK SUNLOAD SENSOR.
(Refer to Control System Input Components.)

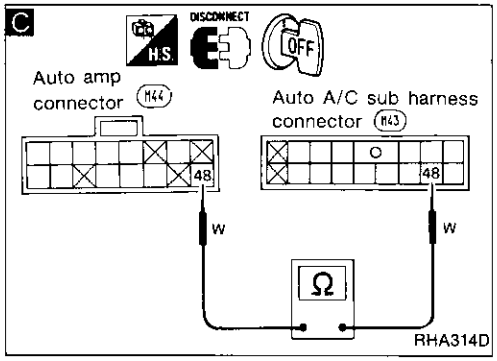
N.G. → Replace sunload sensor.

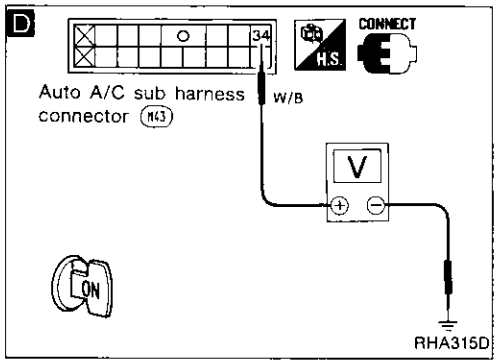
O.K. → Replace auto amp.

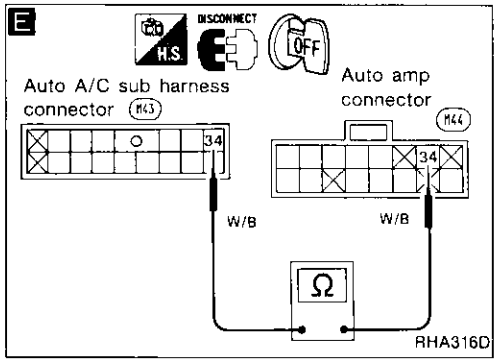
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.











Diagnostic Procedure 7

SYMPTOM: P.B.R. circuit is open. (25 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2; or P.B.R. [OPEN] (-a) is indicated on CONSULT as a result of conducting "SELF-DIAGNOSIS RESULTS" mode with CONSULT.)

A

CHECK P.B.R. CIRCUIT BETWEEN P.B.R. AND AUTO AMP.
Disconnect auto A/C sub harness connector.
Do approx. 5 volts exist between auto A/C sub harness terminal No. ⑥ and body ground?

N.G. → Disconnect auto amp. harness connector.

B Note

Check circuit continuity between auto A/C sub harness terminal No. ⑥ and auto amp. harness terminal No. ⑥

O.K. → Replace auto amp.

O.K. → Disconnect auto amp. harness connector.

C Note

Check circuit continuity between auto A/C sub harness terminal No. ㊽ and auto amp. harness terminal No. ㊽ .

O.K.

D

CHECK P.B.R. CIRCUIT BETWEEN P.B.R. AND AUTO AMP.
Reconnect auto amp. harness connector.
Do approx. 5 volts exist between auto A/C sub harness terminal No. ㉞ and body ground?

N.G. → Disconnect auto amp. harness connector.

E Note

Check circuit continuity between auto A/C sub harness terminal No. ㉞ and auto amp. harness terminal No. ㉞ .

O.K. → Replace auto amp.

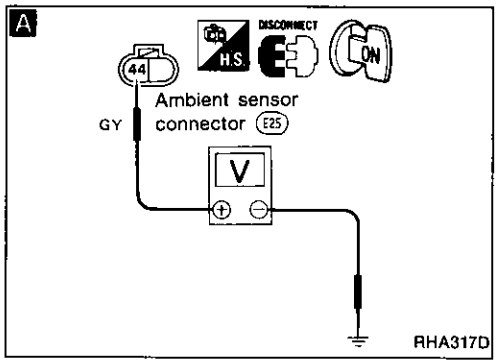
O.K.

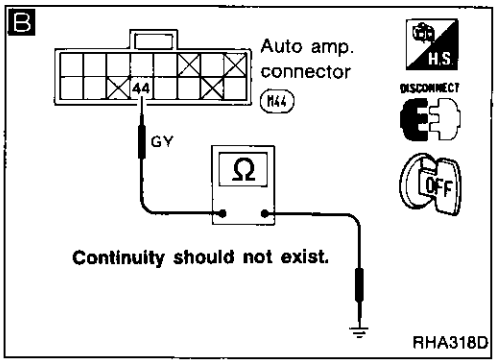
CHECK P.B.R.
(Refer to Control System Output Components.)

N.G. → Replace air mix door motor (P.B.R.).

O.K. → Replace auto amp.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.





Diagnostic Procedure 8

SYMPTOM: Ambient sensor circuit is shorted. (-21 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2; or AMBIENT SENSOR [SHORT] (·b) is indicated on CONSULT as result of conducting "SELF-DIAGNOSIS RESULTS" mode with CONSULT.)

A

CHECK AMBIENT SENSOR CIRCUIT BETWEEN AMBIENT SENSOR AND AUTO AMP.
Disconnect ambient sensor harness connector.
Do approx. 5 volts exist between ambient sensor harness terminal No. ㊹ and body ground?

N.G. → Disconnect auto amp. harness connector.

B

Check circuit continuity between auto amp. harness terminal No. ㊹ and body ground.

Note

O.K. → Replace auto amp.

O.K. →

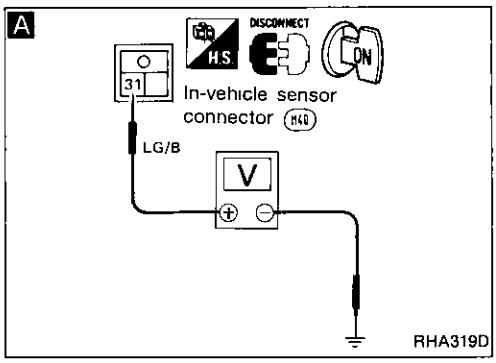
CHECK AMBIENT SENSOR.
(Refer to Control System Input Components.)

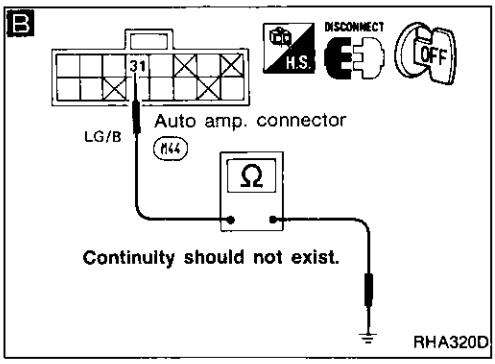
N.G. → Replace ambient sensor.

O.K. →

Replace auto amp.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.





Diagnostic Procedure 9

SYMPTOM: In-vehicle sensor circuit is shorted. (-22 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2; or IN-VEHICLE SENSOR [SHORT] (-b) is indicated on CONSULT as a result of conducting "SELF-DIAGNOSIS RESULTS" mode with CONSULT.)

A

CHECK IN-VEHICLE SENSOR CIRCUIT BETWEEN IN-VEHICLE SENSOR AND AUTO AMP.
Disconnect in-vehicle sensor harness connector.
Do approx. 5 volts exist between in-vehicle sensor harness terminal No. 31 and body ground?

N.G. → Disconnect auto amp. harness connector.

B

Note

Check circuit continuity between auto amp. harness terminal No. 31 and body ground.

O.K. → Replace auto amp.

O.K. →

CHECK IN-VEHICLE SENSOR.
(Refer to Control System Input Components.)

N.G. → Replace in-vehicle sensor.

O.K. →

Replace auto amp.

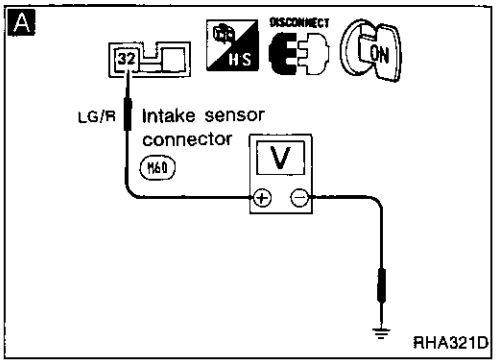
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

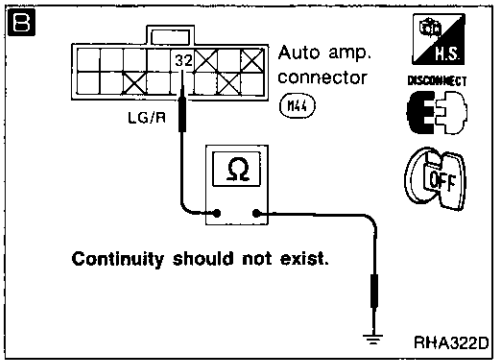
Diagnostic Procedure 10

SYMPTOM: Thermal transmitter circuit is shorted. (-23 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2; or WATER TEMP. SENSOR [SHORT] (·b) is indicated on CONSULT as a result of conducting "SELF-DIAGNOSIS RESULTS" mode with CONSULT.)

Check engine coolant temperature sensor

Refer to EF & EC section.





Diagnostic Procedure 11

SYMPTOM: Intake sensor circuit is shorted. (-24 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2; or INTAKE SENSOR [SHORT] (·b) is indicated on CONSULT as a result of conducting "SELF-DIAGNOSIS RESULTS" mode with CONSULT.)

A

CHECK INTAKE SENSOR CIRCUIT BETWEEN INTAKE SENSOR AND AUTO AMP.
Disconnect intake sensor harness connector.
Do approx. 5 volts exist between intake sensor harness terminal No. 32 and body ground?

N.G. → Disconnect auto amp. harness connector.

B

Note

Check circuit continuity between auto amp. harness terminal No. 32 and body ground.

O.K. → Replace auto amp.

O.K. →

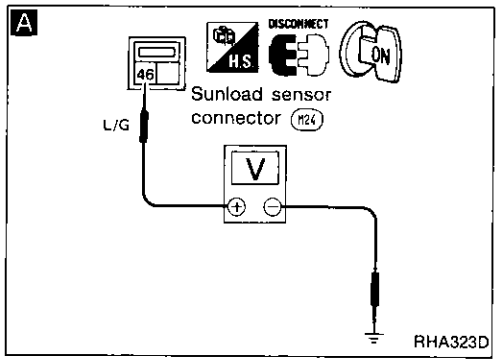
CHECK INTAKE SENSOR.
(Refer to Control System Input Components.)

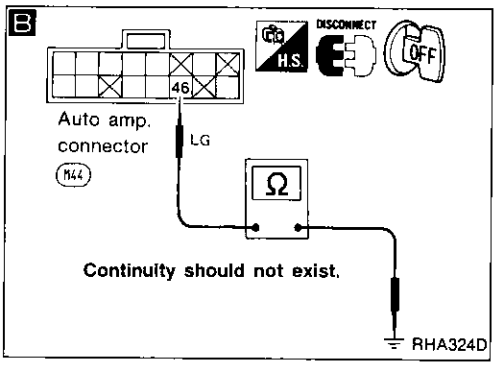
N.G. → Replace intake sensor.

O.K. →

Replace auto amp.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.





Diagnostic Procedure 12

SYMPTOM: Sunload sensor circuit is shorted. (-25 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2; or SUNLOAD SENSOR [SHORT] (-b) is indicated on CONSULT as a result of conducting "SELF-DIAGNOSIS RESULTS" mode with CONSULT.)

A

CHECK SUNLOAD SENSOR CIRCUIT BETWEEN SUNLOAD SENSOR AND AUTO AMP.
Disconnect sunload sensor harness connector.
Do approx. 5 volts exist between sunload sensor harness terminal No. 46 and body ground?

N.G. → Disconnect auto amp. harness connector.

B

Note

Check circuit continuity between auto amp. harness terminal No. 46 and body ground.

O.K. → Replace auto amp.

O.K. ↓

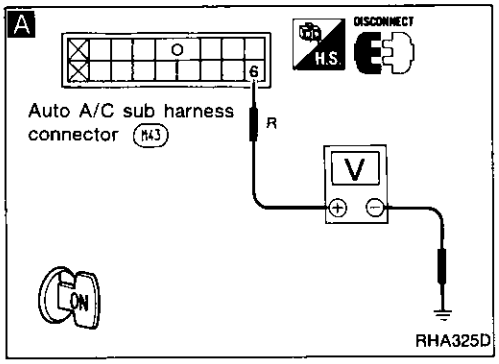
CHECK SUNLOAD SENSOR.
(Refer to Control System Input Components.)

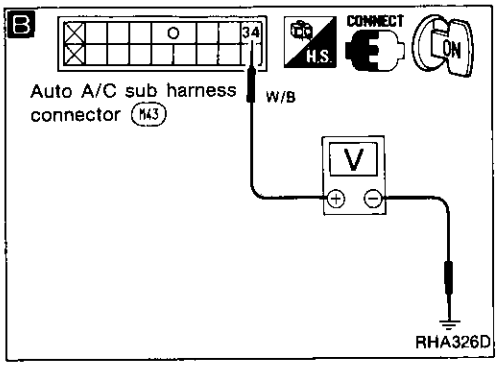
N.G. → Replace sunload sensor.

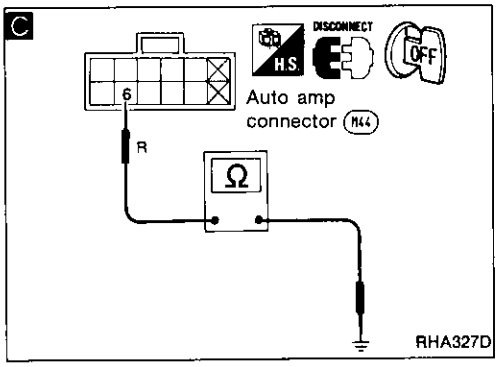
O.K. ↓

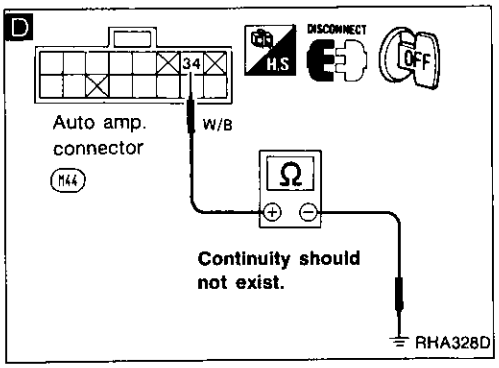
Replace auto amp

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.









Diagnostic Procedure 13

SYMPTOM: P.B.R. circuit is shorted. (-26 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2; or P.B.R. [SHORT] (-b) is indicated on CONSULT as a result of conducting "SELF-DIAGNOSIS RESULTS" mode with CONSULT.)

A

CHECK P.B.R. CIRCUIT BETWEEN P.B.R. AND AUTO AMP.
Disconnect auto A/C sub harness connector.
Do approx. 5 volts exist between auto A/C sub harness terminal No. ⑥ and body ground?

N.G. → Disconnect auto amp. harness connector.

C

Check circuit continuity between auto amp. harness terminal No. ⑥ and body ground. (Note)

O.K. → Replace auto amp.

O.K. →

B

CHECK P.B.R. CIRCUIT BETWEEN P.B.R. AND AUTO AMP.
Do approx. 5 volts exist between auto A/C sub harness terminal No. ㉞ and body ground?

N.G. → Disconnect auto amp. harness connector.

D

Check circuit continuity between auto amp. harness terminal No. ㉞ and body ground. (Note)

O.K. → Replace auto amp.

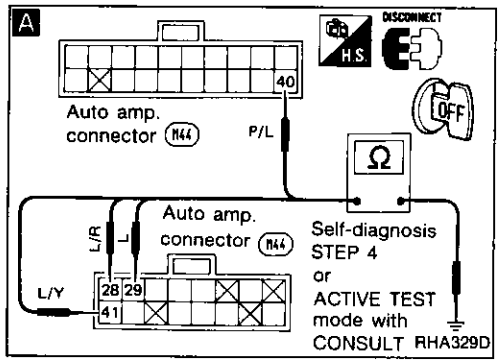
O.K. →

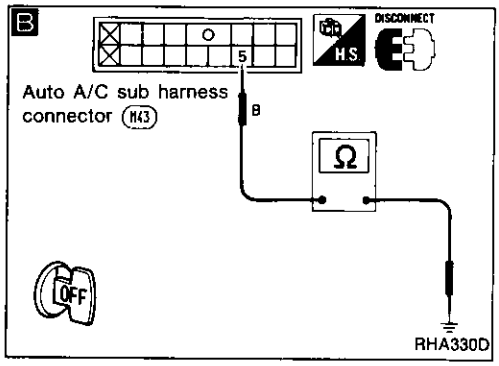
CHECK P.B.R.
(Refer to Control System Output Components.)

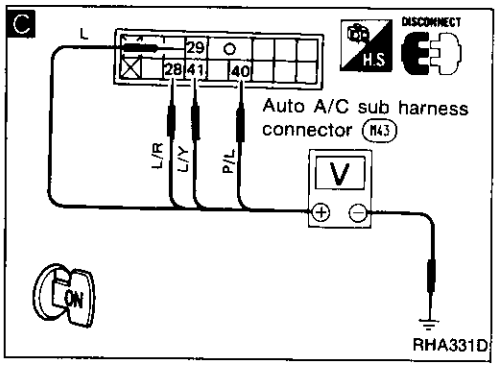
O.K. → INSPECTION END

N.G. → Replace air mix door motor.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.







Diagnostic Procedure 14

SYMPTOM: Mode door motor does not operate normally.

- **Perform Preliminary Check 1 before referring to the following flow chart.**

A

CHECK MODE DOOR MOTOR POSITION SWITCH.

1. Set up mode VENT in "ACTIVE TEST" mode with CONSULT.
   or
   Set up code No. 41 in Self-diagnosis STEP 4.
2. Disconnect auto amp. harness connector after turning ignition switch OFF.
3. Check if continuity exists between terminal No. 28 or 29 of auto amp. harness connector and body ground.
4. Using above procedure, check for continuity in the other modes indicated in the chart below.

Set mode	Code No	Condition	Terminal No. ⊕	Terminal No. ⊖	Continuity
VENT	41	VENT	28 or 29	Body ground	Yes
B/L 1	42 or 43	B/L	29 or 41		
F/D 1	44	F/D 1	28 or 41		
F/D 2	45	F/D 2	28 or 40		
DEF	46	DEF	40 or 41		

N.G. → Disconnect auto A/C sub harness connector.

B

Note

CHECK BODY GROUND CIRCUIT FOR MODE DOOR MOTOR.
Does continuity exist between auto A/C sub harness terminal No. 5 and body ground?

O.K. → Reconnect auto amp. harness connector.

C

CHECK POWER SUPPLY FOR MODE DOOR MOTOR CONTROL CIRCUIT.
Do approx. 5 volts exist between auto A/C sub harness terminals and body ground?

Terminal No. ⊕	Terminal No. ⊖	Voltage
28	Body ground	Approx 5V
29		
40		
41		

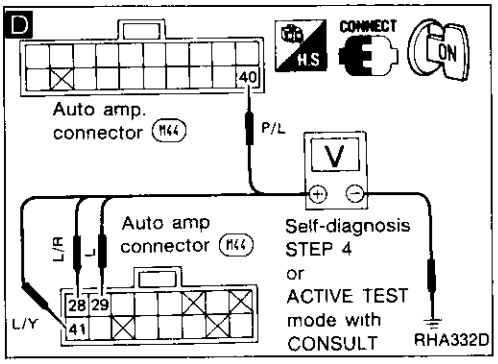
O.K. → Reconnect auto A/C sub harness connector.

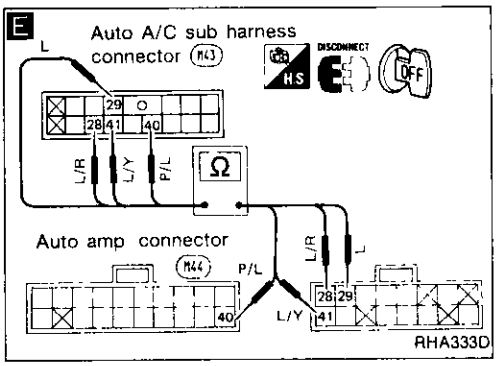
N.G. → Ⓑ (Go to next page.)

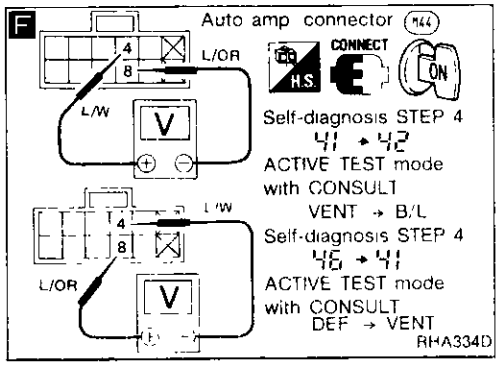
O.K. → INSPECTION END

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 14 (Cont'd)







Ⓐ

D

CHECK MODE DOOR MOTOR POSITION SWITCH.

1. Set up "ACTIVE TEST" mode with CONSULT.
   or
   Set up Self-diagnosis STEP 4.
2. Measure voltage across auto amp. harness terminals and body ground.

Set mode	Code No	Condition	Terminal No ⊕ 40	⊕ 28	⊕ 41	⊕ 29	⊖
VENT	41	VENT	5V	0V	5V	0V	Body ground
B/L 1	42 or 43	B/L	5V	5V	0V	0V	
D/F 1	44	D/F 1	5V	0V	0V	5V	
D/F 2	45	D/F 2	0V	0V	5V	5V	
DEF	46	DEF	0V	5V	0V	5V	

0V Approx 0V 5V Approx 5V

O K.

F

CHECK FOR AUTO AMP. OUTPUT

Set up "ACTIVE TEST" mode with CONSULT

Do approx. 10 volts exist between auto amp. harness terminals No. (4) and (8) when set mode is switched from "VENT" to "B/L" or when set mode is switched from "DEF" to "VENT"?

or

Set up Self-diagnosis STEP 4

Do approx. 10.5 volts exist between auto amp. harness terminals No. (4) and (8) when code No. is switched from "41" to "42" or when code No. is switched from "46" to "41"?

Set mode	Code No	Mode door motor operation	Terminal No 4	Terminal No 8	Voltage V
VENT → B/L	41 → 42	VENT → B/L	⏚		Approx. 10.5
DEF → VENT	46 → 41	DEF → VENT	⏚		
-		Stop			Less than approx. 1.5

O K.

Replace mode door motor

N.G. → Replace auto amp

Ⓑ

E

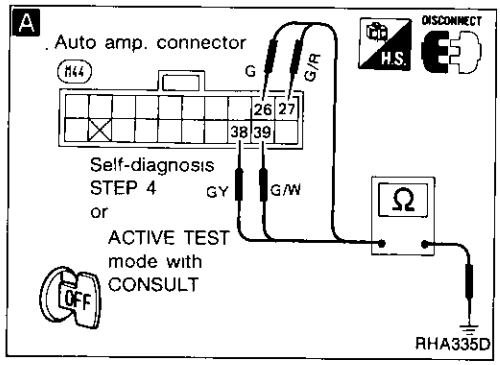
Check circuit continuity between each terminal on auto amp. and on auto A/C sub harness.

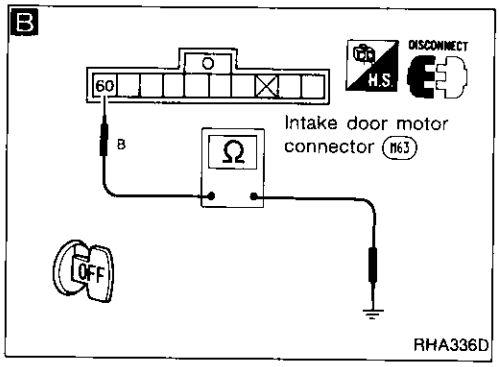
Terminal No. ⊕	Terminal No. ⊖	Continuity
Auto amp.	Auto A/C sub harness	Yes
28	28	
29	29	
40	40	
41	41	

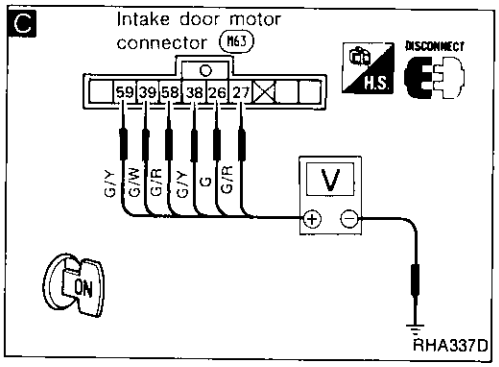
O.K. → Replace auto amp.

N.G. → Replace mode door motor.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.







Diagnostic Procedure 15

SYMPTOM: Intake door motor does not operate normally.

- **Perform Preliminary Check 2 before referring to the following flow chart.**

A

CHECK INTAKE DOOR MOTOR POSITION SWITCH.

1. Set up mode REC in "ACTIVE TEST" mode with CONSULT.
   or
   Set up code No. 41 in Self-diagnosis STEP 4.
2. Disconnect auto amp. harness connector after turning ignition switch OFF.
3. Check if continuity exists between terminal No. (27) or (26) of auto amp. harness connector and body ground.
4. Using above procedure, check for continuity in the other modes indicated in the chart below.

Set mode	Code No.	Condition	Terminal No ⊕	Terminal No ⊖	Continuity
REC	41	REC	(26) or (27)	Body ground	Yes
20% FRE	42 or 43	20% FRE	(26) or (38)		
80% FRE	44	80% FRE	(26) or (39)		
FRE	45 or 46	FRE	(27) or (39)		

O.K.

INSPECTION END

N.G.

Disconnect intake door motor harness connector.

B Note

CHECK BODY GROUND CIRCUIT FOR INTAKE DOOR MOTOR.
Does continuity exist between intake door motor harness terminal No. (60) and body ground?

O.K.

Reconnect auto amp. harness connector.

C

CHECK POWER SUPPLY FOR INTAKE DOOR MOTOR CONTROL CIRCUIT.
Do approx. 5 volts exist between intake door motor harness terminals and body ground?

Terminal No ⊕	Terminal No ⊖	Voltage
(27)	Body ground	Approx. 5V
(26)		
(38)		
(58)		
(39)		
(59)		

O.K

Reconnect intake door motor harness connector.

N.G.

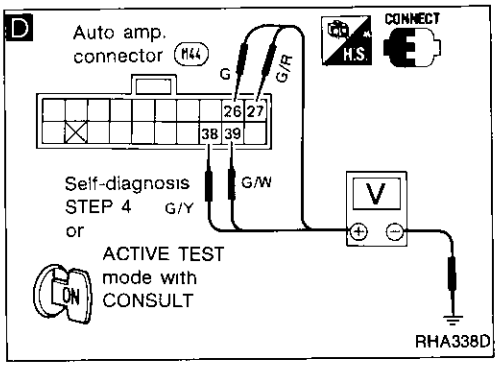
Ⓐ Ⓑ

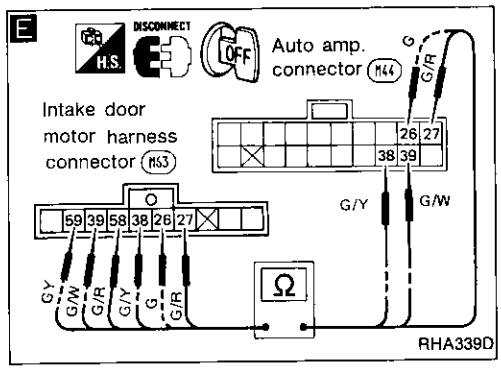
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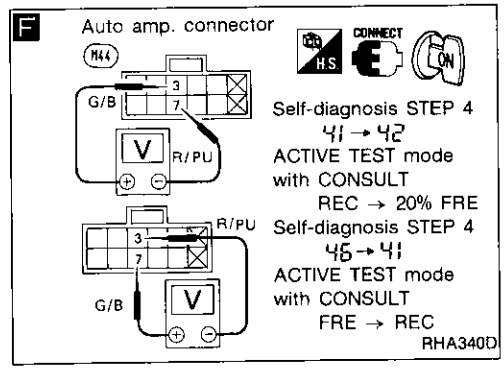
Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 15 (Cont'd)







Ⓐ

D

CHECK INTAKE DOOR MOTOR POSITION SWITCH.

1. Set up "ACTIVE TEST" mode with CONSULT.
   or
   Set up Self-diagnosis STEP 4.
2. Measure voltage across auto amp. harness terminals and body ground.

Set mode	Code No.	Condition	Terminal No. ⊕ 24	27	38	26	Terminal No. ⊖
REC	41	REC	5V	0V	5V	0V	Body ground
20% FRE	42 or 43	20% FRE	5V	5V	0V	0V	
80% FRE	44	80% FRE	0V	5V	0V	5V	
FRE	45	FRE	0V	0V	5V	5V	

0V: Approx. 0V, 5V: Approx. 5V

O.K.

N.G. → Replace intake door motor.

F

CHECK FOR AUTO AMP. OUTPUT.

Set up "ACTIVE TEST" mode with CONSULT.

Do approx. 10 volts exist between auto amp. harness terminals No. ③ and ⑦ when set mode is switched from "REC" to "20% FRE" or when set mode is switched from "FRESH" to "REC"?

or

Set up Self-diagnosis STEP 4.

Do approx. 10.5 volts exist between auto amp. harness terminals No. ③ and ⑦ when code No. is switched from "41" to "42" or when code No. is switched from "46" to "41"?

Set mode	Code No.	Intake door motor operation	Terminal No. ③	⑦	Voltage
REC → 20% FRE	41 → 42	REC → 20% FRE	⊕	⊖	Approx. 10.5
FRE → REC	46 → 41	FRE → REC	⊖	⊕	
—	—	Stop	⊖	⊖	Less than approx. 1.5

N.G. → Replace auto amp.

O.K.

Replace intake door motor.

Ⓑ

E

Note

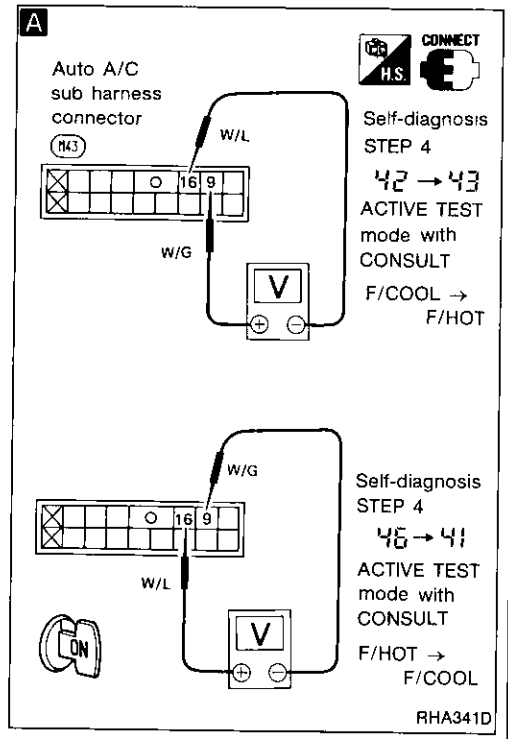
Check circuit continuity between each terminal on auto amp. and on intake door motor.

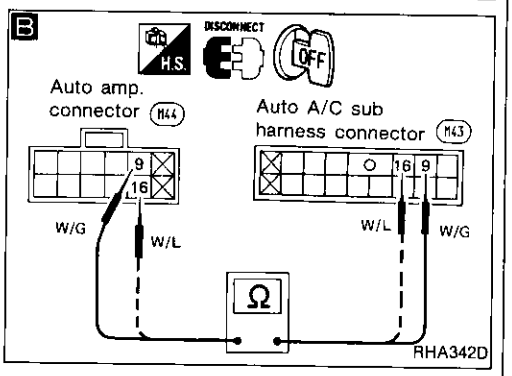
Terminal No. ⊕ Auto amp.	Terminal No. ⊖ Intake door motor	Continuity
27	27 or 54	Yes
26	26	
38	38 or 58	
39	39	

O.K.

Replace auto amp.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.





Diagnostic Procedure 16

SYMPTOM: Air mix door motor does not operate normally.

- **Perform Preliminary Check 7 before referring to the following flow chart.**

CHECK P.B.R.
(Refer to Control System Output Components.)

N.G. → Replace air mix door motor (P.B.R.).

O.K. ↓

A

CHECK FOR AUTO AMP. OUTPUT.

Set up "ACTIVE TEST" mode with CONSULT.

Do approx. 10 volts exist between auto A/C sub harness terminals No. ⑨ and ⑯ when set mode is switched from "FULL/COOL" to "FULL/HOT" or when set mode is switched from "FULL/HOT" to "FULL/COOL"?

or

Set up Self-diagnosis STEP 4.

Do approx. 10.5 volts exist between auto A/C sub harness terminals No. ⑨ and ⑯ when code No. is switched from "42" to "43" or when code No. is switched from "46" to "41"?

N.G. → Disconnect auto amp. and auto A/C sub harness connectors.

Set mode	Code No	Air mix door operation	Terminal No. ⑨	Terminal No. ⑯	Voltage V
F/C → F/H	42 → 43	Cold → Hot	⊕	⊖	Approx. 10.5
F/H → F/C	46 → 41	Hot → Cold	⊖	⊕	
—	—	Stop	⊖	⊖	Less than approx. 1.5

B

Note

Check circuit continuity between auto amp. harness terminal No. ⑨ (⑯) and auto A/C sub harness terminal No. ⑨ (⑯).

O.K. ↓

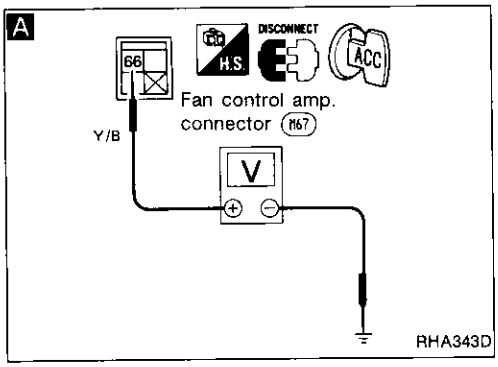
Replace auto amp.

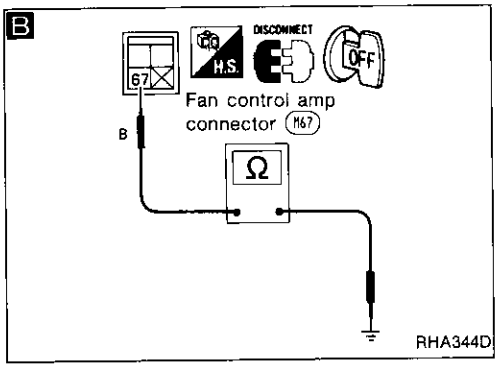
O.K. ↓

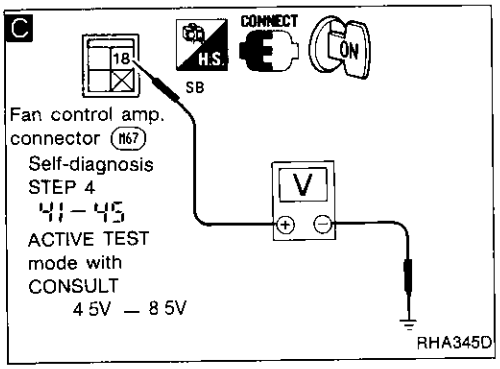
Replace air mix door motor.

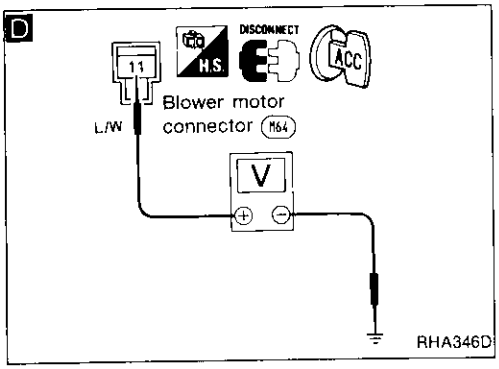
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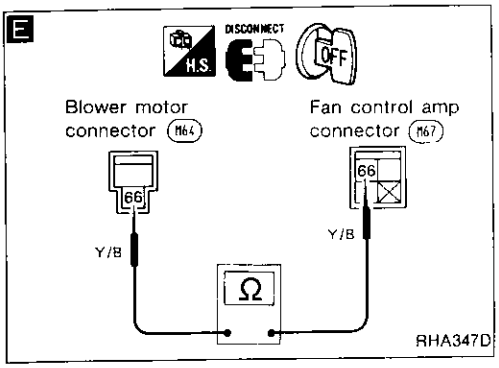
If the result is N.G. after checking circuit continuity, repair harness or connector.











Diagnostic Procedure 17

SYMPTOM: Blower motor operation is malfunctioning under out of Starting Fan Speed Control.

- **Perform Preliminary Check 5 before referring to the following flow chart.**

A

CHECK POWER SUPPLY FOR FAN CONTROL AMP.
Disconnect fan control amp. harness connector.
Do approx. 12 volts exist between fan control amp. harness terminal No. ⑯ and body ground?

N.G. → **D**

CHECK POWER SUPPLY FOR BLOWER MOTOR.
Disconnect blower motor harness connector.
Do approx. 12 volts exist between blower motor harness terminal No. ⑪ and body ground?

O.K. → **B**

N.G. → Check 15A fuses at fuse block. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

B Note

CHECK BODY GROUND CIRCUIT FOR FAN CONTROL AMP.
Does continuity exist between fan control amp. harness terminal No. ⑰ and body ground?

O.K. →

Reconnect fan control amp. harness connector.

→ **C**

CHECK FOR AUTO AMP. OUTPUT.

1. Set up "ACTIVE TEST" mode with CONSULT.

   or

   Set up Self-diagnosis STEP 4.

2. Measure voltage across fan control amp harness terminal No. ⑱ and body ground

Set mode	Code No	Terminal No ⊕	Terminal No ⊖	Voltage
4 5V - 8.5V	41-45	⑱	Body ground	Approx 1 - 3V

N.G. → Ⓐ (Go to next page)

O.K. →

Replace fan control amp.

E Note

Check circuit continuity between blower motor harness terminal No. ⑯ and fan control amp. harness terminal No. ⑯.

O.K. →

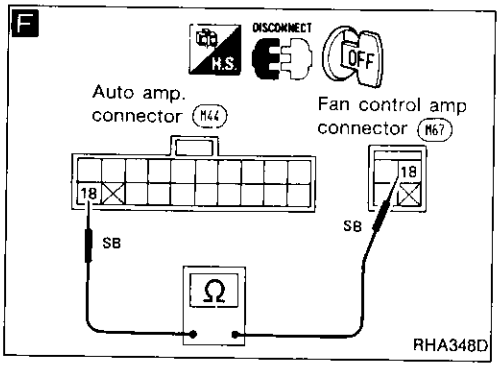
CHECK BLOWER MOTOR. (Refer to Electrical Components Inspection.)

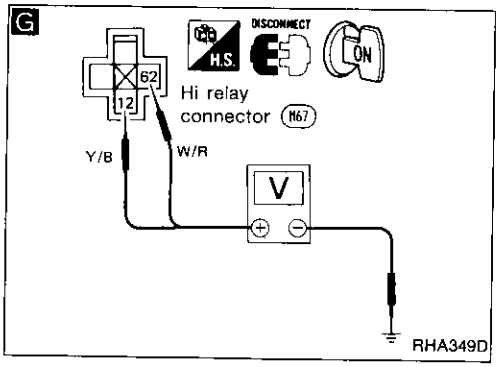
O.K. →

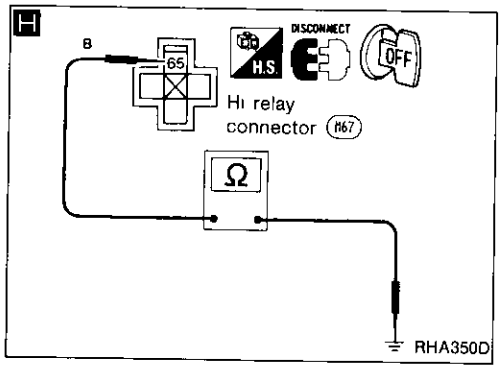
Replace blower motor.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 17 (Cont'd)







Ⓐ

Disconnect auto amp. and fan control amp. harness connector.

F Note

Does continuity exist between auto amp. harness terminal No. ⑱ and fan control amp. harness terminal No. ⑱?

O.K.

G

CHECK POWER SUPPLY FOR HI RELAY
Do approx. 12 volts exist between Hi relay harness terminals No. ⑫, ⑫② and body ground?

N.G. → Check 7.5A or 15A fuses at fuse block. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

O.K.

H Note

CHECK BODY GROUND CIRCUIT FOR HI RELAY.
Does continuity exist between Hi relay harness terminal No. ⑮ and body ground?

O.K.

CHECK HI RELAY AFTER DISCONNECTING IT.
(Refer to Electrical Components Inspection.)

N.G. → Replace Hi relay.

O.K.

Reconnect Hi relay.

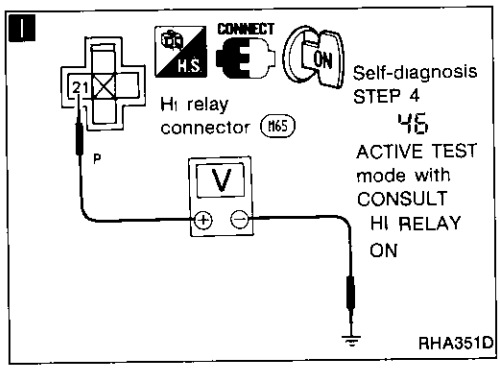
Ⓑ

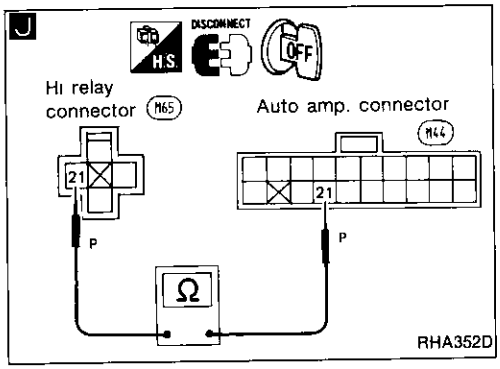
(Go to next page.)

Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 17 (Cont'd)





Ⓑ

I

CHECK FOR AUTO AMP. OUTPUT.

1. Set up mode HI RELAY ON in "ACTIVE TEST" mode with CONSULT.

   or

   Set up code No. 46 in Self-diagnosis STEP 4.

2. Measure voltage across Hi relay harness terminal No. ㉑ and body ground.

Set mode	Code No.	Terminal No. ⊕	Terminal No. ⊖	Voltage
HI RELAY ON	46	㉑	Body ground	Less than approx. 1.5V

N.G. → Disconnect Hi relay and auto amp. harness connectors.

J

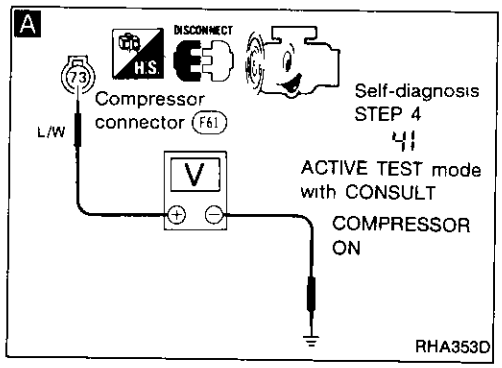
Note

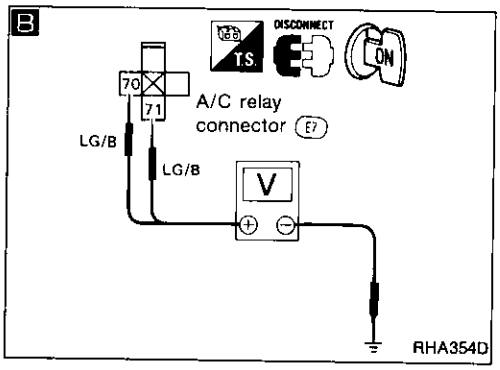
Does continuity exist between Hi relay harness terminal No. ㉑ and auto amp. harness terminal No. ㉑ ?

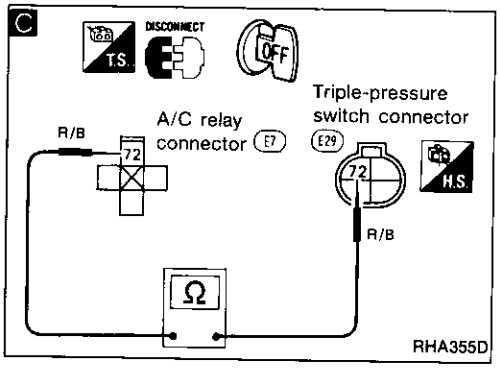
O.K. → Replace auto amp.

O.K. → Replace blower motor.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.







Diagnostic Procedure 18

SYMPTOM: Magnet clutch does not engage after performing Preliminary Check 6.

- **Perform Preliminary Check 6 before referring to the flow chart.**

A

CHECK POWER SUPPLY FOR COMPRESSOR.
1. Disconnect compressor harness connector.
2. Set up mode COMPRESSOR ON in "ACTIVE TEST" mode with CONSULT.
   or
   Set up code No. 41 in Self-diagnosis STEP 4.
3. Do approx. 12 volts exist between compressor harness terminal No. 73 and body ground?

N.G. → B

B

CHECK POWER SUPPLY FOR A/C RELAY.
Disconnect A/C relay.
Do approx. 12 volts exist between A/C relay harness terminals No. 70, 71 and body ground?

O.K. → CHECK POWER SUPPLY CIRCUIT AND 7.5A FUSE AT FUSE BLOCK. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

N.G.

O.K. → Check magnet clutch.

Check magnet clutch. → Replace compressor.

Replace compressor. → CHECK A/C RELAY AFTER DISCONNECTING IT. (Refer to Electrical Components Inspection.)

CHECK A/C RELAY AFTER DISCONNECTING IT. (Refer to Electrical Components Inspection.)

N.G. → Replace A/C relay.

O.K. → C

C

Note

Disconnect triple-pressure switch harness connector.
Check circuit continuity between A/C relay harness terminal No. 72 and triple-pressure switch harness terminal No. 72.

O.K. → CHECK TRIPLE-PRESSURE SWITCH. (Refer to Electrical Components Inspection.)

CHECK TRIPLE-PRESSURE SWITCH. (Refer to Electrical Components Inspection.)

N.G. → Replace triple-pressure switch.

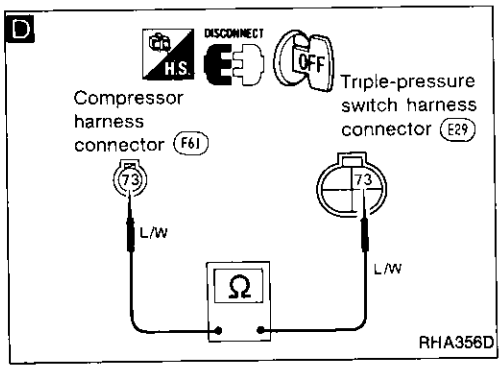
O.K. → Ⓐ

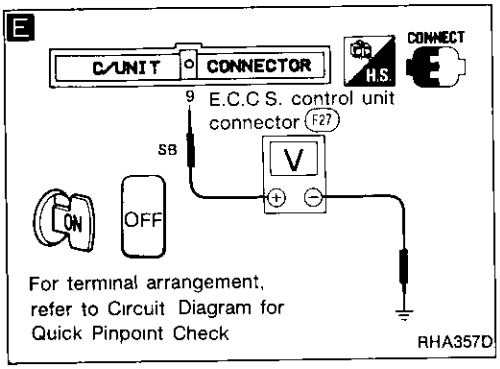
(Go to next page.)

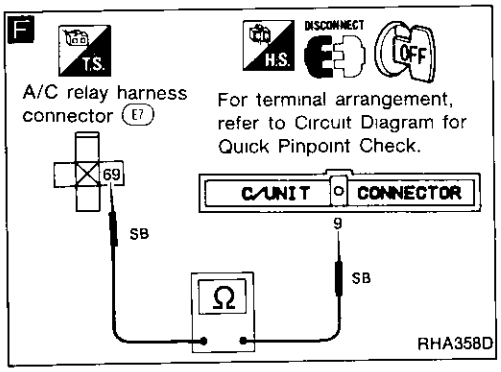
Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 18 (Cont'd)







Ⓐ

D Note

Check circuit continuity between compressor harness terminal No. ⑦③ and triple-pressure switch harness terminal No. ⑦③.

O.K.

Reconnect A/C relay.

E

CHECK COIL SIDE CIRCUIT OF A/C RELAY.
Do approx. 12 volts exist between E.C.C.S. control unit harness terminal No. ⑨ and body ground?

N.G. →

F Note

Disconnect A/C relay harness connector.
Check circuit continuity between A/C relay harness terminal No. ⑥⑨ and E.C.C.S. control unit harness terminal No. ⑨.

O.K.

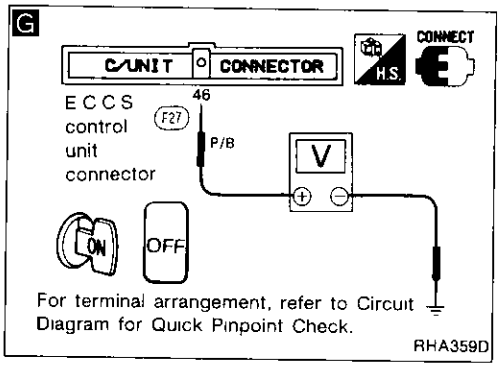
Reconnect E.C.C.S. control unit harness connector.

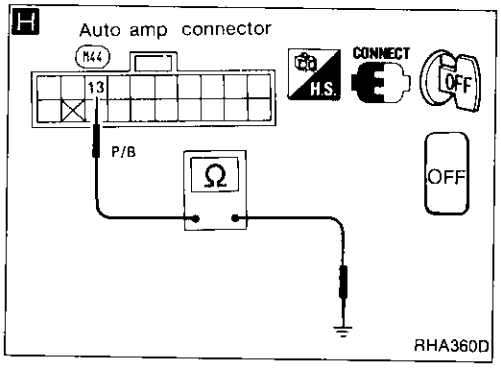
Ⓑ

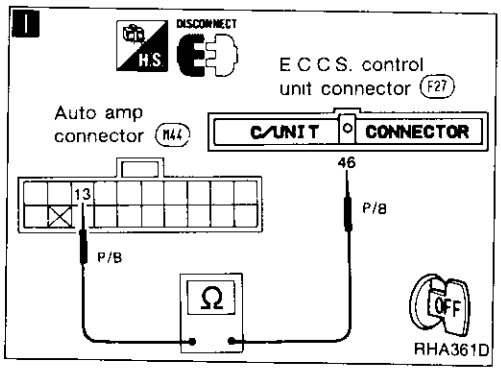
(Go to next page)

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 18 (Cont'd)







Ⓑ

G

CHECK COIL SIDE CIRCUIT OF A/C RELAY CONTROLLED BY E.C.C.S. CONTROL UNIT.
Do more than 8 volts exist between E.C.C.S. control unit harness terminal No. ㊻ and body ground?

N.G. → CHECK E.C.C.S. CONTROL UNIT. (Refer to EF & EC section.)

O K.

Disconnect auto amp. harness connector.

H

CHECK AUTO AMP. CIRCUIT BETWEEN E.C.C.S. CONTROL UNIT AND AUTO AMP.
Do more than 8 volts exist between auto amp. harness terminal No. ⑬ and body ground?

N.G. → I Note: Check circuit continuity between auto amp. harness terminal No. ⑬ and E.C.C.S. control unit harness terminal No. ㊻.

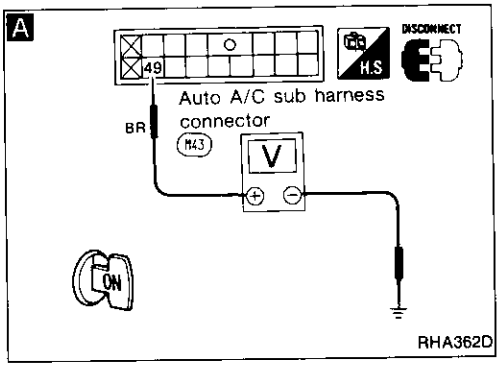
O.K.

Replace auto amp.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 19

SYMPTOM: Max. cold door motor does not operate normally.

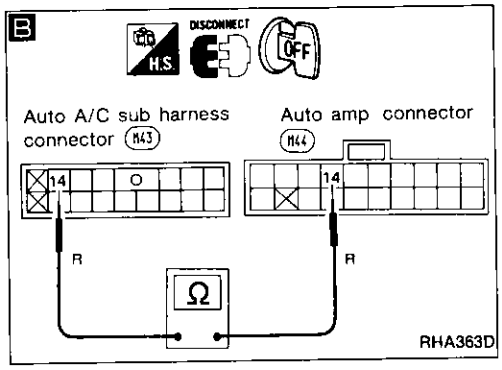


A

CHECK POWER SUPPLY FOR MAX. COLD DOOR MOTOR.
Disconnect auto A/C sub harness connector.
Do approx. 12 volts exist between auto A/C sub harness terminal No. ㊾ and body ground?

N.G. → Check 7.5A fuse at fuse block.
(Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram".)

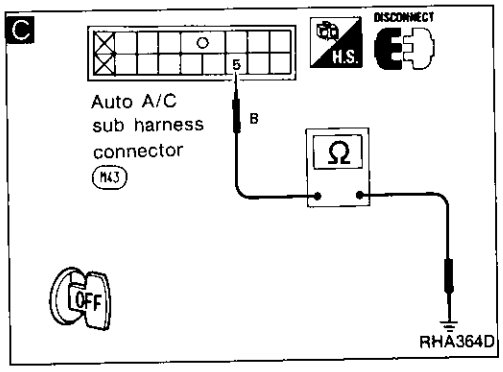
O.K. ↓



B Note

Disconnect auto amp. harness connector.
Check circuit continuity between auto amp. harness terminal No. ⑭ and auto A/C sub harness terminal No. ⑭

O.K. ↓

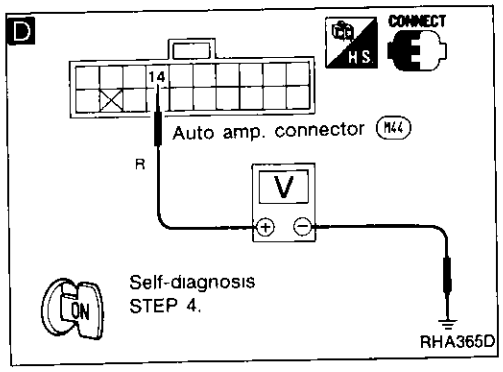


C Note

Check circuit continuity between auto A/C sub harness terminal No. ⑤ and body ground.

O.K. ↓

Reconnect auto amp. and auto A/C sub harness connectors.



D

CHECK FOR AUTO AMP. OUTPUT.
Set up Self-diagnosis STEP 4.
Measure voltage across auto amp. harness terminal No. ⑭ and body ground.

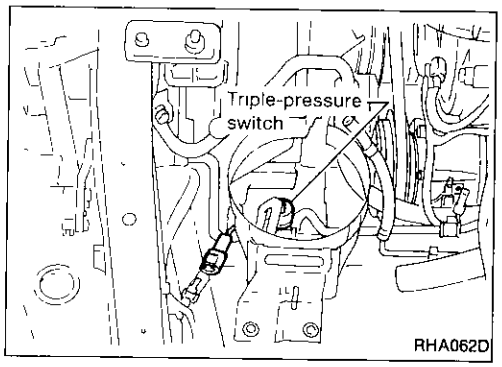
N.G. → Replace auto amp.

Code No.	Max. cold door operation	Terminal No. ⊕	Terminal No. ⊖	Voltage
42, 43	Open	⑭	Body ground	Less than approx. 1.5V
Other	Shut			Approx. 12V

O.K. ↓

Replace max. cold door motor or max. cold door relay, or repair harness or connector.

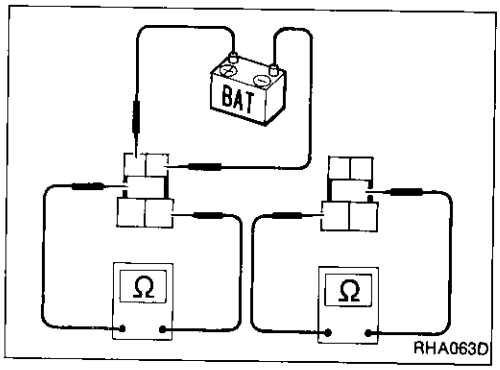
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.



Electrical Components Inspection

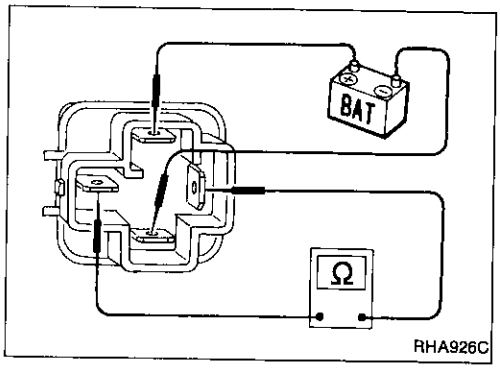
TRIPLE-PRESSURE SWITCH

High-pressure side line pressure kPa (kg/cm^2, psi)	Operation	Continuity
Decreasing to 152.0 - 201.0 (1.55 - 2.05, 22.0 - 29.2) Increasing to 2,452 - 2,844 (25 - 29, 356 - 412)	Turn OFF	Does not exist
Increasing to 157 - 226 (1.6 - 2.3, 23 - 33) Decreasing to 1,863 - 2,256 (19 - 23, 270 - 327)	Turn ON	Exists



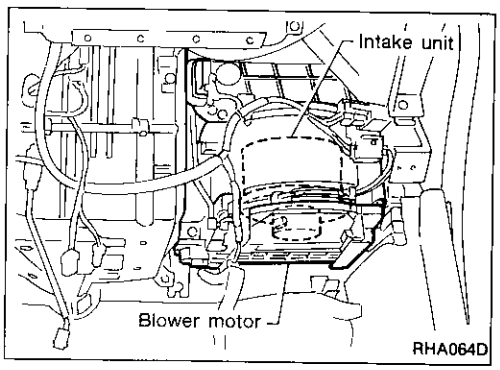
MAX. COLD RELAY

Check circuit continuity between terminals by supplying 12 volts to coil side terminals of relay.



A/C RELAY, CONDENSER FAN RELAY AND BLOWER HIGH RELAY

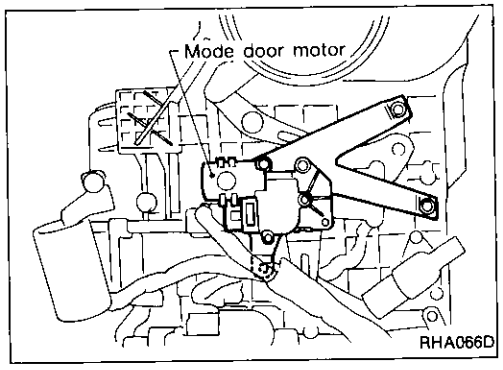
Check circuit continuity between terminals by supplying 12 volts to coil side terminals of relay.



BLOWER MOTOR

Confirm smooth rotation of the blower motor.

- Ensure that there are no foreign particles inside the intake unit.



Control Linkage Adjustment

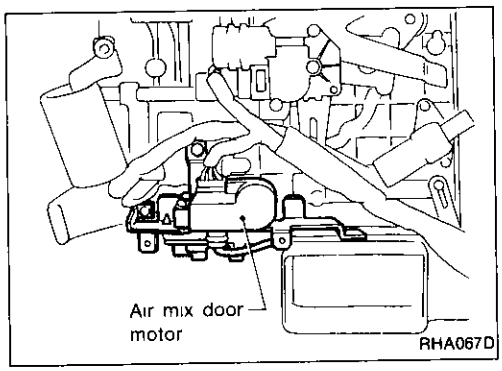
MODE DOOR

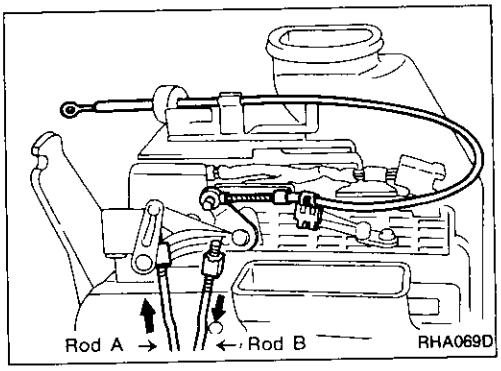
1. Install mode door motor on heater unit and connect to body harness.
2. Set up "ACTIVE TEST" mode with CONSULT or set up self-diagnosis STEP 4.
3. Set mode door to the following position.

	VENT
	41

4. Move side link by hand and hold mode door in VENT mode.
5. Attach mode door motor rod to side link rod holder.
6. Make sure mode door operates when position is changed with CONSULT or when code is changed from No. 41 to other codes.

	VENT	B/L1	B/L2	F/D1	F/D2	DEF
	41	42	43	44	45	46





AIR MIX DOOR

1. Install air mix door motor on heater unit and connect to body harness.
2. Set up "ACTIVE TEST" mode with CONSULT or set up self-diagnosis STEP 4.
3. Set air mix door to the following position.

	FULL/COOL
	41

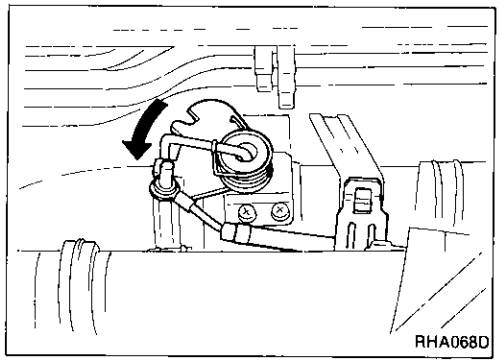
4. Pull rod A toward driver (FULL COLD) and secure to rod holder.
5. Set air mix door to the following position.

	FULL/HOT
	46

6. Push rod B toward passenger side (FULL HOT) and secure to rod holder.
7. Make sure air mix door operates when position is changed with CONSULT or when code is changed from No. 45 to other codes.

	FULL/ COOL	FULL/ COOL	FULL/HOT	FULL/HOT	FULL/HOT	FULL/HOT
	41	42	43	44	45	46

Control Linkage Adjustment (Cont'd)

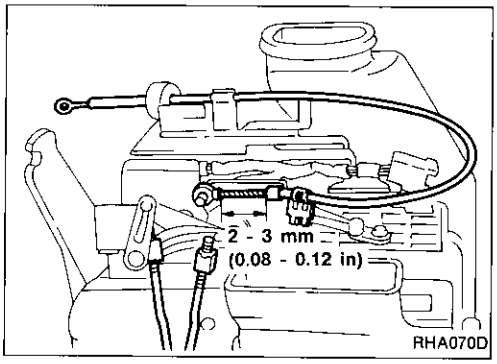


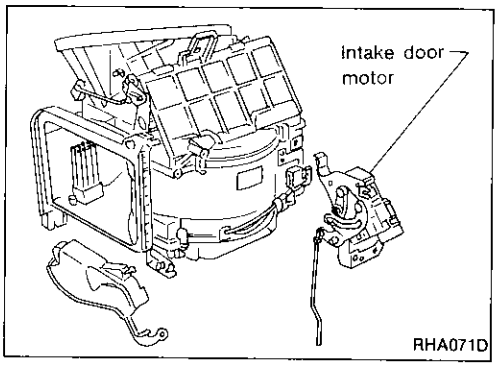
WATER COCK CABLE

1. Set up "ACTIVE TEST" mode with CONSULT or set up self-diagnosis STEP 4.
2. Set air mix door to the following position.

	FULL/COOL
	41

3. Pull inner cable of water cock cable assembly back (cock closed) and attach to link; clamp outer cable.
4. Make sure inner and outer cables move smoothly with a clearance of 2 to 3 mm (0.08 to 0.12 in) between the two when the air mix door is set to "FULL HOT" using either "Air mix door FULL/COOL" in "ACTIVE TEST" mode with CONSULT or code No. 46 in step 4 of self-diagnosis.





INTAKE DOOR

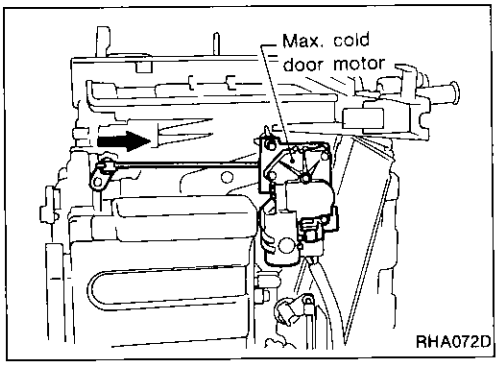
1. Install intake door motor on intake unit and connect it to body harness.
2. Set up "ACTIVE TEST" mode with CONSULT or set up self-diagnosis STEP 4.
3. Set intake door to the following position.

	REC
	41

4. Move intake door link by hand and hold it in REC position.
5. Attach intake door lever to rod holder.
6. Make sure intake door operates when position is changed with CONSULT or when code is changed from No. 41 to other codes.

	REC	20% FRE	20% FRE	80% FRE	FRESH	FRESH
	41	42	43	44	45	46

Control Linkage Adjustment (Cont'd)



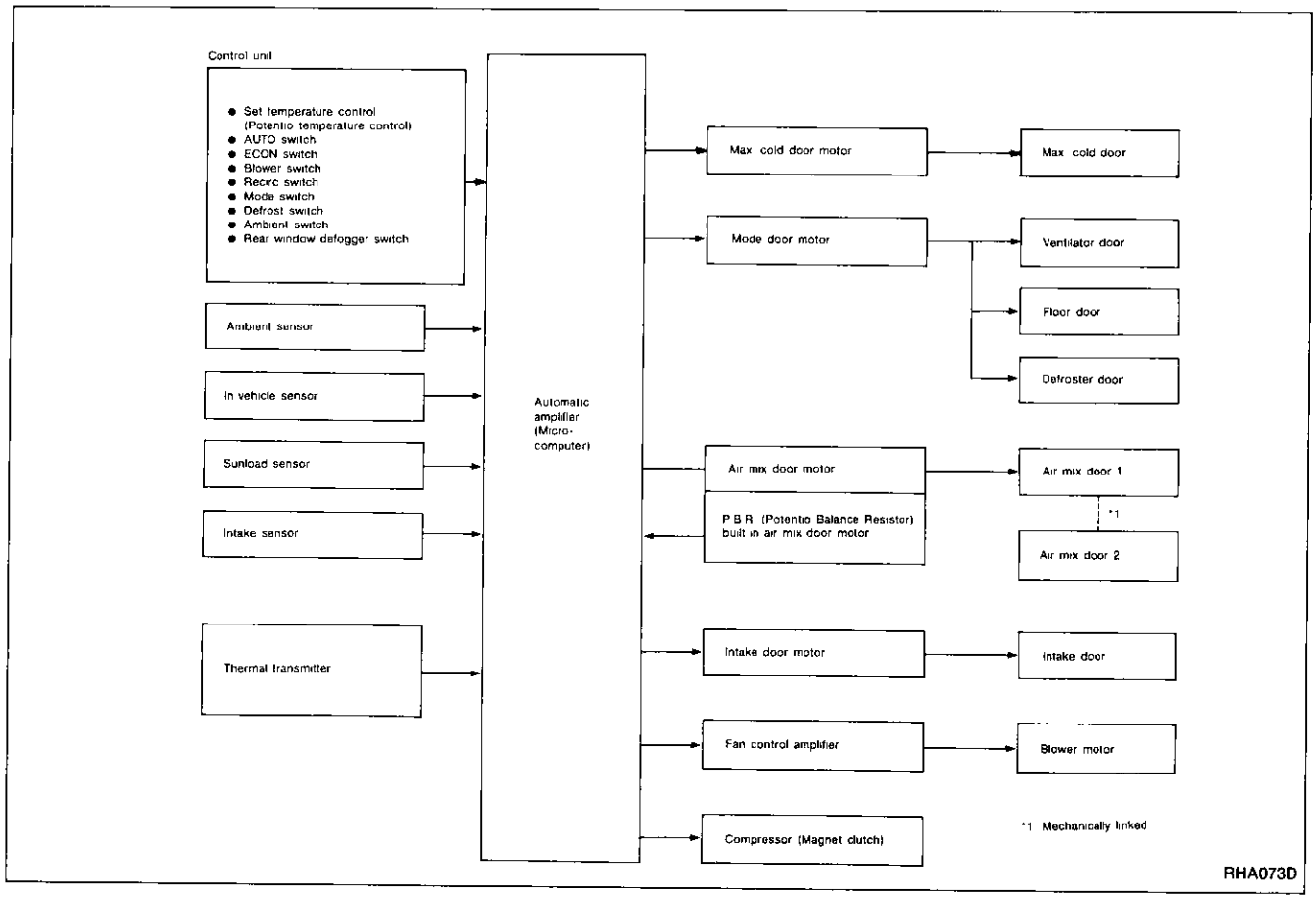
MAX. COLD DOOR

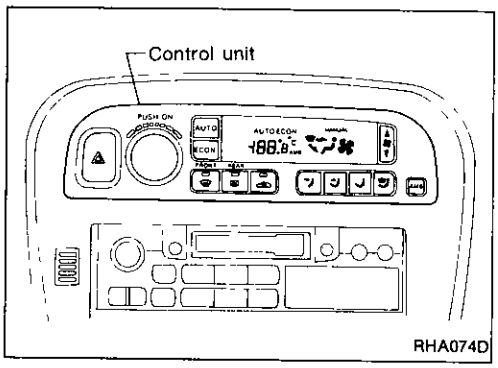
1. Install max. cold door motor on heater unit and connect to body harness.
2. Set up code No. 41 in self-diagnosis STEP 4.
3. Move max. cold door link by hand and hold it in the shut position.
4. Attach max. cold door lever to rod holder.
5. Make sure max. cold door operates properly when changing from code No. 41 to 42 by pushing (DEF) switch.

41	42	43	44	45	46
Shut	Open		Shut		

Overview of Control System

The control system consists of a) input sensors and switches, b) the automatic amplifier (microcomputer), and c) outputs. The relationship of these components is shown in the diagram below:



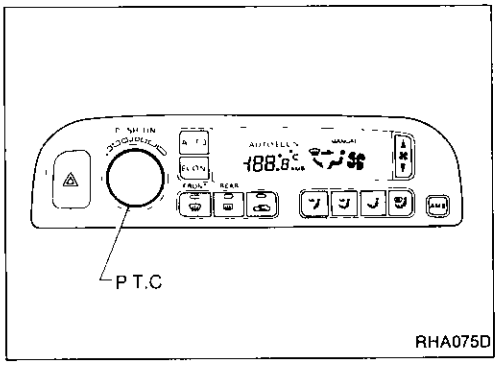


Control System Input Components

CONTROL UNIT

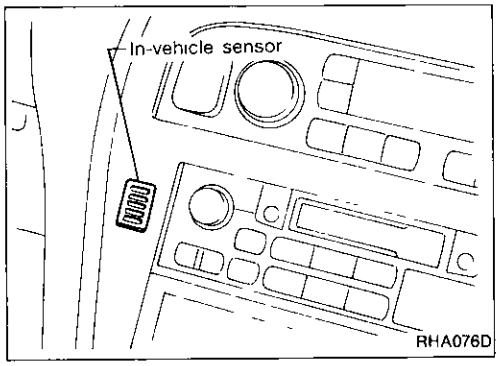
By means of multiplex communication, the control unit signals to the auto amp. the switch position and display mode.

Control System Input Components (Cont'd)



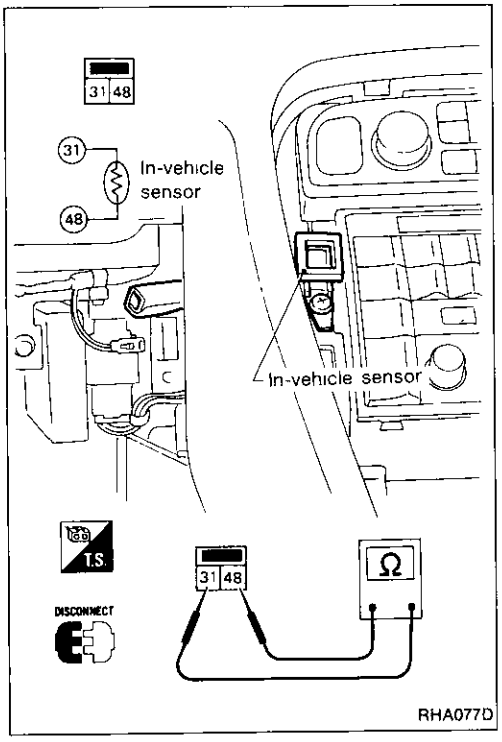
POTENTIO TEMPERATURE CONTROL (P.T.C.)

The P.T.C. is built into the auto amplifier. It can be set at intervals of 0.5°C (1.0°F) in the 18°C (65°F) to 32°C (85°F) temperature range by rotating the temperature switch. Setting temperature is digitally displayed.



IN-VEHICLE SENSOR

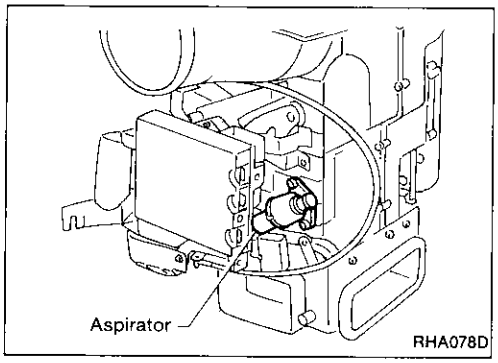
The in-vehicle sensor is attached to cluster lid C. It converts variations in temperature of compartment air drawn from the aspirator into a resistance value which is then input into the auto amplifier. (A more detailed description of the aspirator is shown on the following page.)



After disconnecting in-vehicle sensor harness connector, measure resistance between terminals ㉛ and ㊽ at sensor harness side, using the table below.

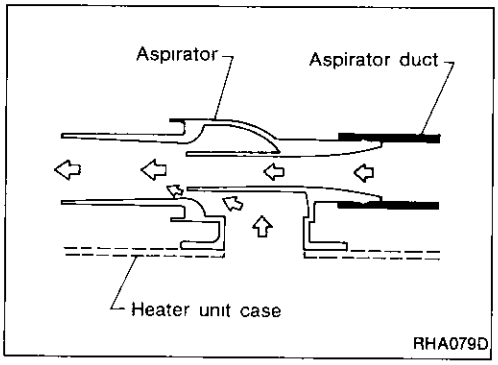
Temperature °C (°F)	Resistance kΩ
–35 (–31)	38.35
–30 (–22)	28.62
–25 (–13)	21.61
–20 (–4)	16.50
–15 (5)	12.73
–10 (14)	9.92
–5 (23)	7.80
0 (32)	6.19
5 (41)	4.95
10 (50)	3.99
15 (59)	3.24
20 (68)	2.65
25 (77)	2.19
30 (86)	1.81
35 (95)	1.51
40 (104)	1.27
45 (113)	1.07
50 (122)	0.91
55 (131)	0.77
60 (140)	0.66
65 (149)	0.57

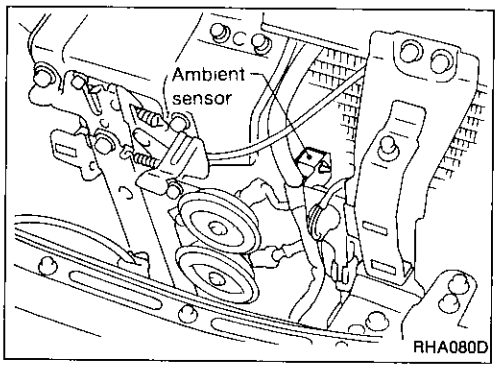
Control System Input Components (Cont'd)



ASPIRATOR

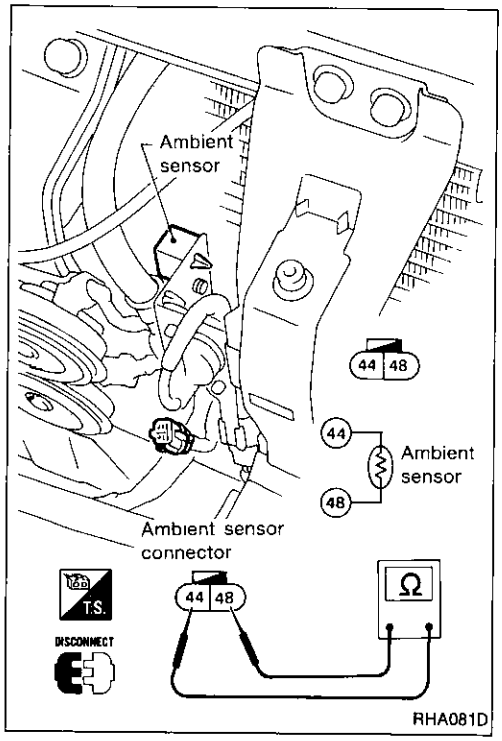
The aspirator is located below the side link of heater unit. It produces vacuum pressure due to air discharged from the heater unit, continuously taking compartment air in the aspirator.





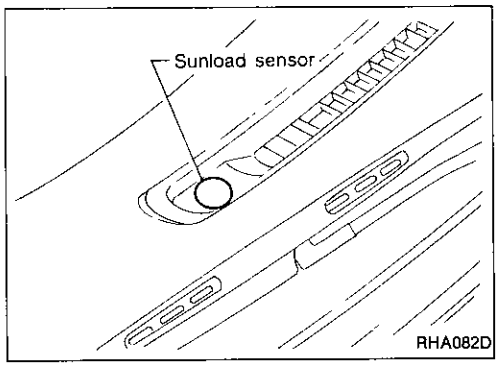
AMBIENT SENSOR

The ambient sensor is attached in front of the driver's side condenser. It detects ambient temperature and converts it into a resistance value which is then input to the auto amplifier.
After disconnecting ambient sensor harness connector, measure resistance between terminals ㊹ and ㊽ at sensor harness side, using the table below.



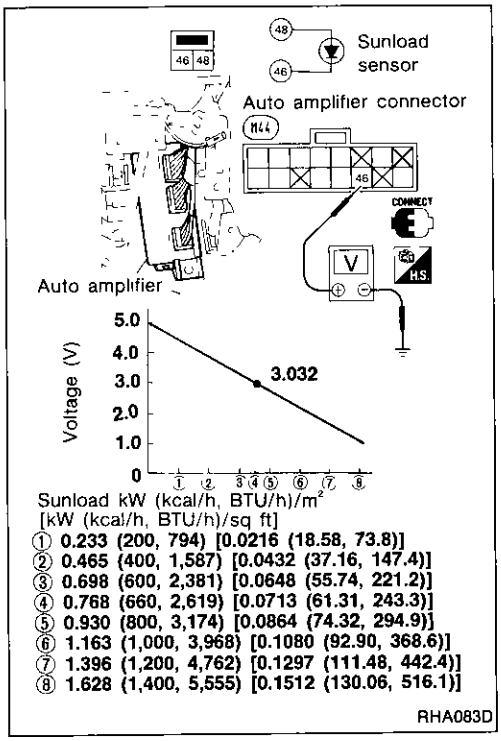
Temperature °C (°F)	Resistance kΩ
–35 (–31)	38.35
–30 (–22)	28.62
–25 (–13)	21.61
–20 (–4)	16.50
–15 (5)	12.73
–10 (14)	9.92
–5 (23)	7.80
0 (32)	6.19
5 (41)	4.95
10 (50)	3.99
15 (59)	3.24
20 (68)	2.65
25 (77)	2.19
30 (86)	1.81
35 (95)	1.51
40 (104)	1.27
45 (113)	1.07
50 (122)	0.91
55 (131)	0.77
60 (140)	0.66
65 (149)	0.57

Control System Input Components (Cont'd)



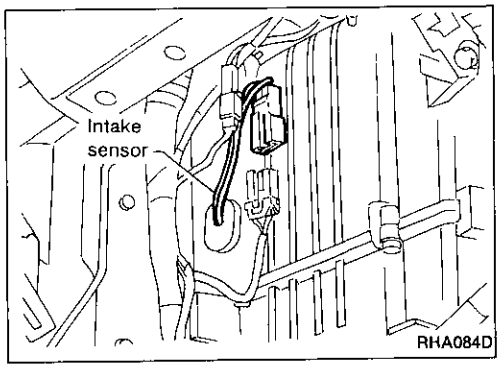
SUNLOAD SENSOR

The sunload sensor is located on the right 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 amplifier.



Measure voltage across terminal No. ㊻ and body ground.

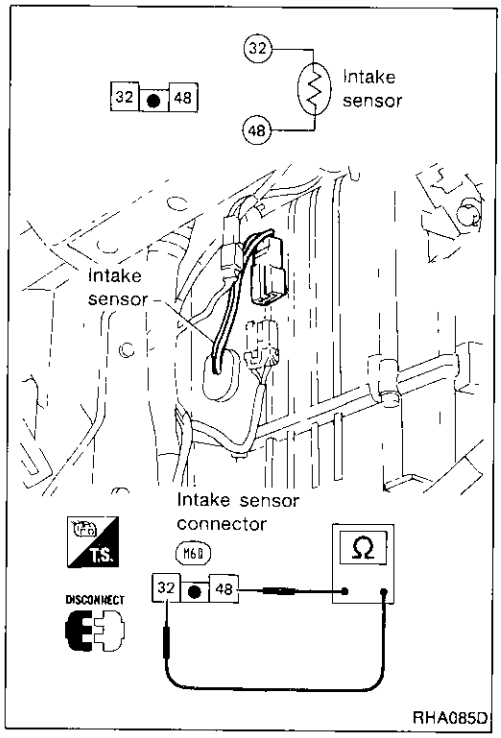
- **When checking sunload sensor, select a place where sun shines directly on it.**
- **Sunload under direct sunlight is equivalent to approximately 0.768 kW (660 kcal/h, 2,619 BTU/h)/m² [0.0713 kW (61.31 kcal/h, 243.3 BTU/h)/sq ft].**



INTAKE SENSOR

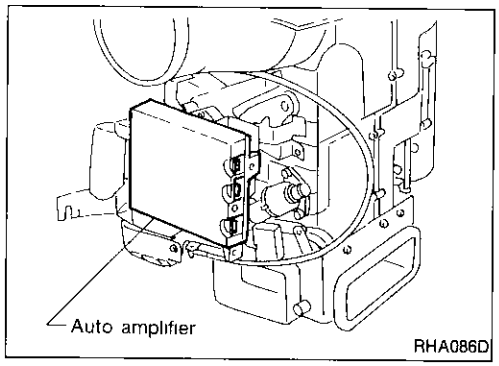
The intake sensor is located on the cooling unit. It converts temperature of air after it passes through the evaporator into a resistance value which is then input to the auto amplifier.

Control System Input Components (Cont'd)



After disconnecting intake sensor harness connector, measure resistance between terminals ㉜ and ㊽ at sensor harness side, using the table below.

Temperature °C (°F)	Resistance kΩ
–35 (–31)	38.13
–30 (–22)	27.74
–25 (–13)	20.95
–20 (–4)	16.00
–15 (5)	12.34
–10 (14)	9.62
–5 (23)	7.56
0 (32)	6.00
5 (41)	4.80
10 (50)	3.87
15 (59)	3.14
20 (68)	2.57
25 (77)	2.12
30 (86)	1.76
35 (95)	1.47
40 (104)	1.23
45 (113)	1.04
50 (122)	0.88
55 (131)	0.75
60 (140)	0.64
65 (149)	0.55



Control System Automatic Amplifier (Auto amp.)

The auto amplifier has a built-in microcomputer which processes information sent from various sensors needed for air conditioner operation. The air mix door motor, mode door motor, intake door motor, max. cold door motor, blower motor and compressor are then controlled.

The auto amplifier is unitized with control mechanisms. Signals from various switches and Potentio Temperature Control (P.T.C.) are directly entered into auto amplifier.

Self-diagnostic functions are also built into auto amplifier to provide quick check of malfunctions in the auto air conditioner system.

AMBIENT TEMPERATURE INPUT PROCESS

The automatic amplifier includes a "processing circuit" for the ambient sensor input. When the temperature detected by the ambient sensor increases quickly, the processing circuit allows the auto amp. to recognize an ambient temperature increase of only 0.33°C (0.6°F) per 100 seconds.

As an example, consider stopping for a cup of coffee after high speed driving. Even though the actual ambient temperature has not changed, the temperature detected by the ambient sensor will increase because heat radiated from the engine compartment can radiate to the front grille area (where the ambient sensor is located).

Control System Automatic Amplifier (Auto amp.) (Cont'd)

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 A.T.C. system operation due to small or quick variations in detected sunload.

For example, consider driving along a road bordered by an occasional group of large trees. The sunload detected by the sunload sensor will vary whenever the trees obstruct the sunlight. The processing circuit averages the detected sunload over a period of time, so that the (insignificant) effect of the trees momentarily obstructing the sunlight does not cause any change in the A.T.C. 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

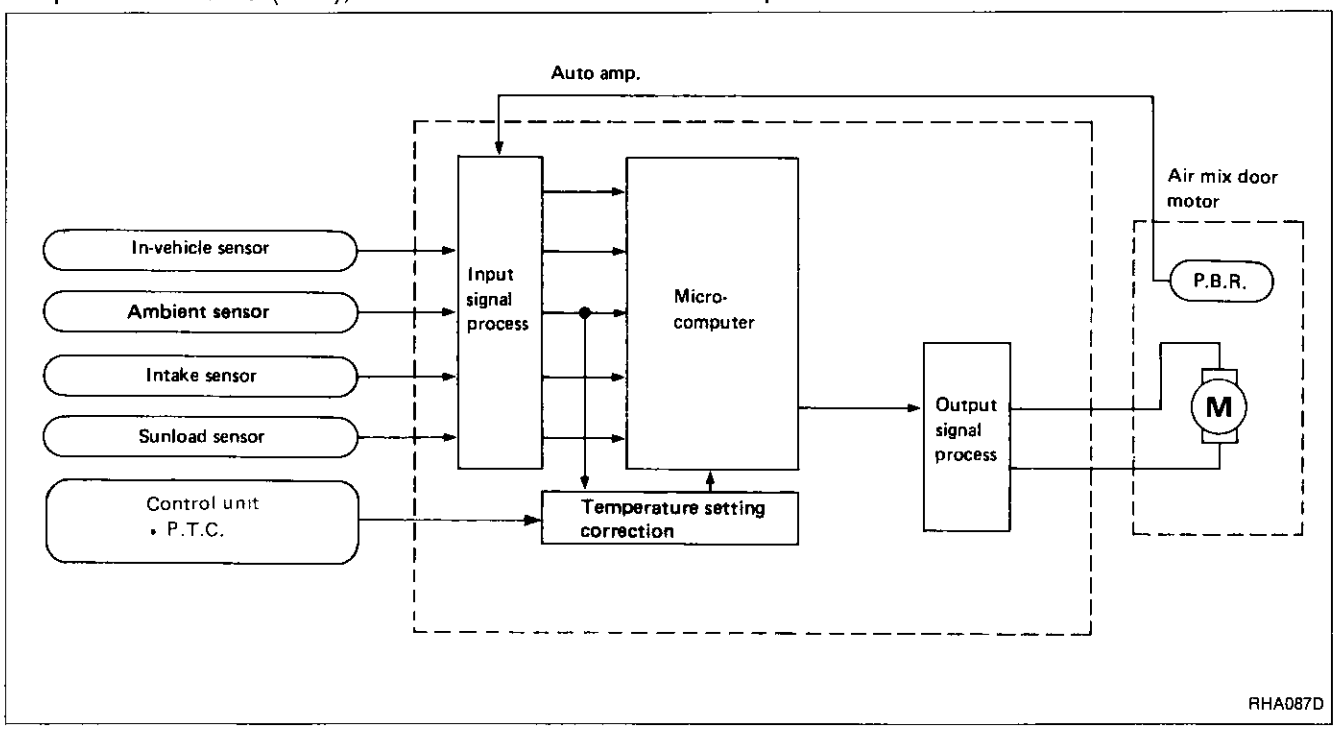
AIR MIX DOOR CONTROL (Automatic temperature control)

Component parts

Air mix door control system components are:
1) Auto amplifier
2) Control unit (P.T.C.)
3) Air mix door motor (P.B.R.)
4) In-vehicle sensor
5) Ambient sensor
6) Sunload sensor
7) Intake sensor

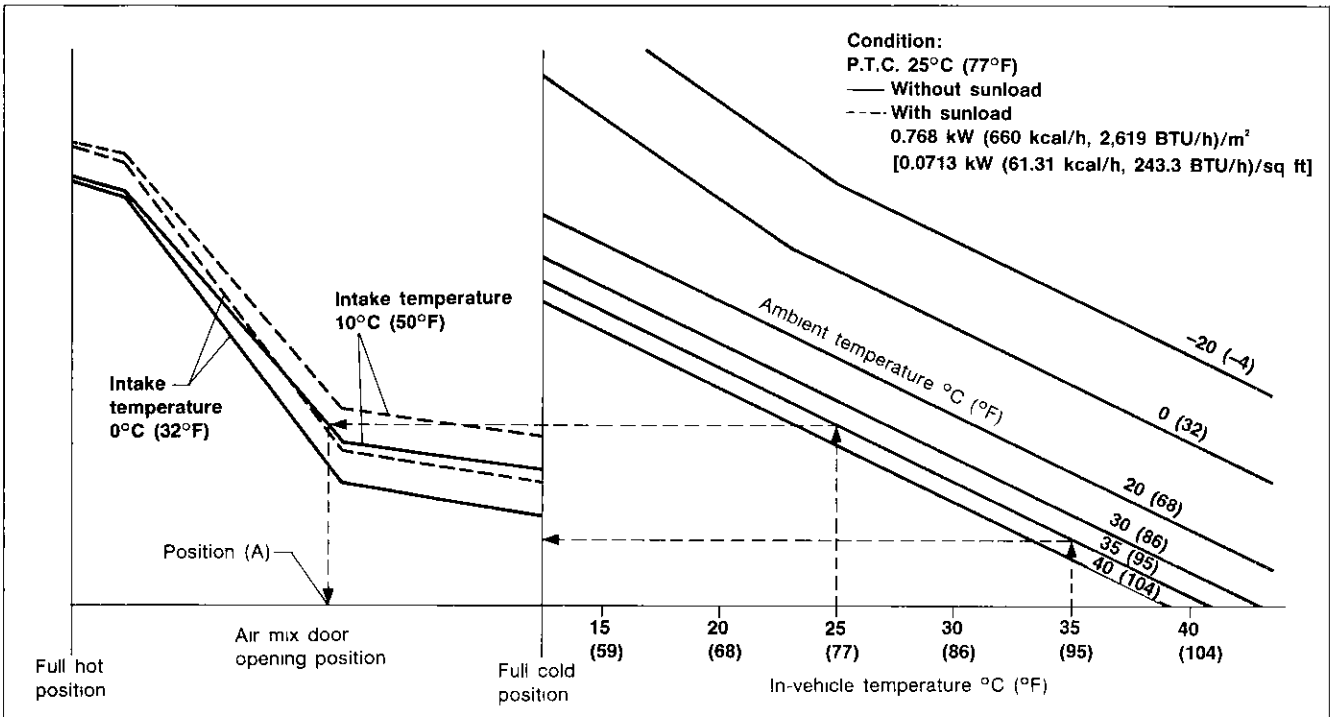
System operation

Temperature set by Potentio Temperature Control (P.T.C.) is compensated through setting temperature correction circuit to determine target temperature.
Auto amplifier 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 intake air temperature).
When set temperature is 18°C (65°F), air mix door motor will be in the FULL COLD position; when set temperature is 32°C (85°F), motor will be in the FULL HOT position.



Control System Output Components (Cont'd)

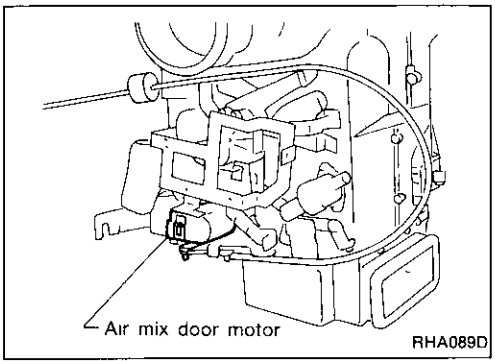
Air mix door control specification



Example:

- **If temperature setting is set at 25°C (77°F) under no sunload condition when ambient and in-vehicle temperature is 35°C (95°F), air mix door is initially automatically set in full cold position.**
- **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) if intake temperature is 10°C (50°F).**
  Air mix door opening position is always fed back to auto amplifier by P.B.R. built-in air mix door motor.

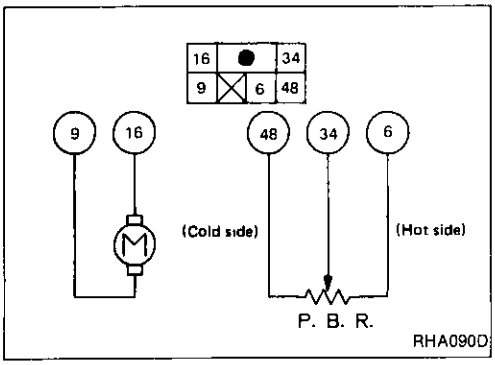
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AIR MIX DOOR MOTOR

The air mix door motor is attached to the heater unit. It rotates so that the air mix door is opened to a position set by the auto amplifier. Motor rotation is then conveyed through a shaft and air mix door position is then fed back to the auto amplifier by P.B.R. built-in air mix door motor.

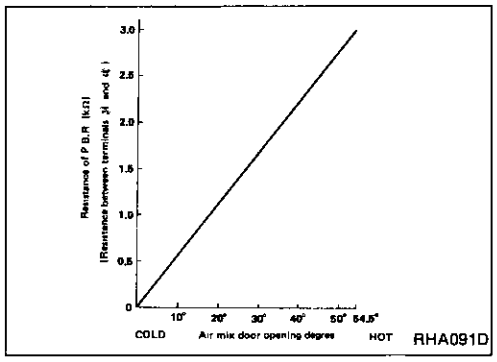


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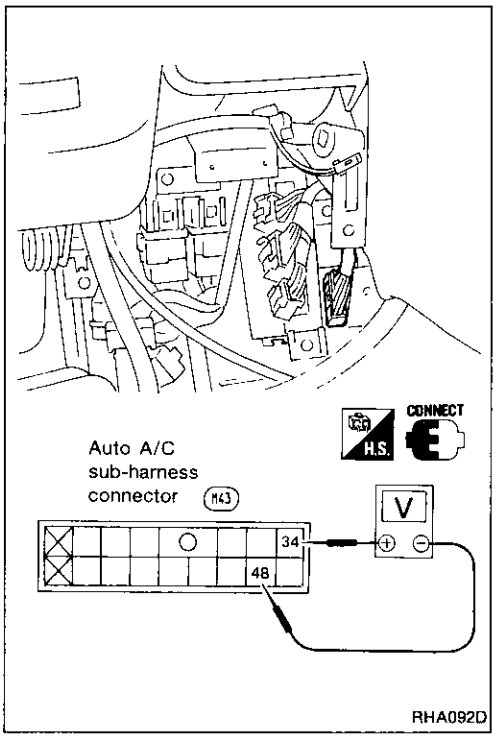
Air mix door motor operation

9	16	Air mix door operation	Direction of lever movement
⊕	⊖	COLD → HOT	Clockwise (Downward)
⊖	⊖	STOP	STOP
⊖	⊕	HOT → COLD	Counterclockwise (Upward)

Control System Output Components (Cont'd)

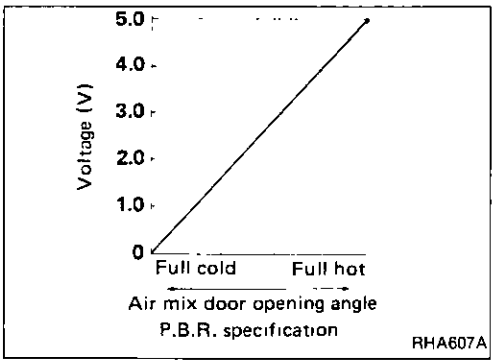


P.B.R. characteristics



P.B.R.

Measure voltage between terminals ㉞ and ㊽ at vehicle harness side.



Ignition switch: ON

- Ensure tester pointer deflects smoothly when P.T.C. is moved from 18°C (65°F) to 32°C (85°F) and vice versa.

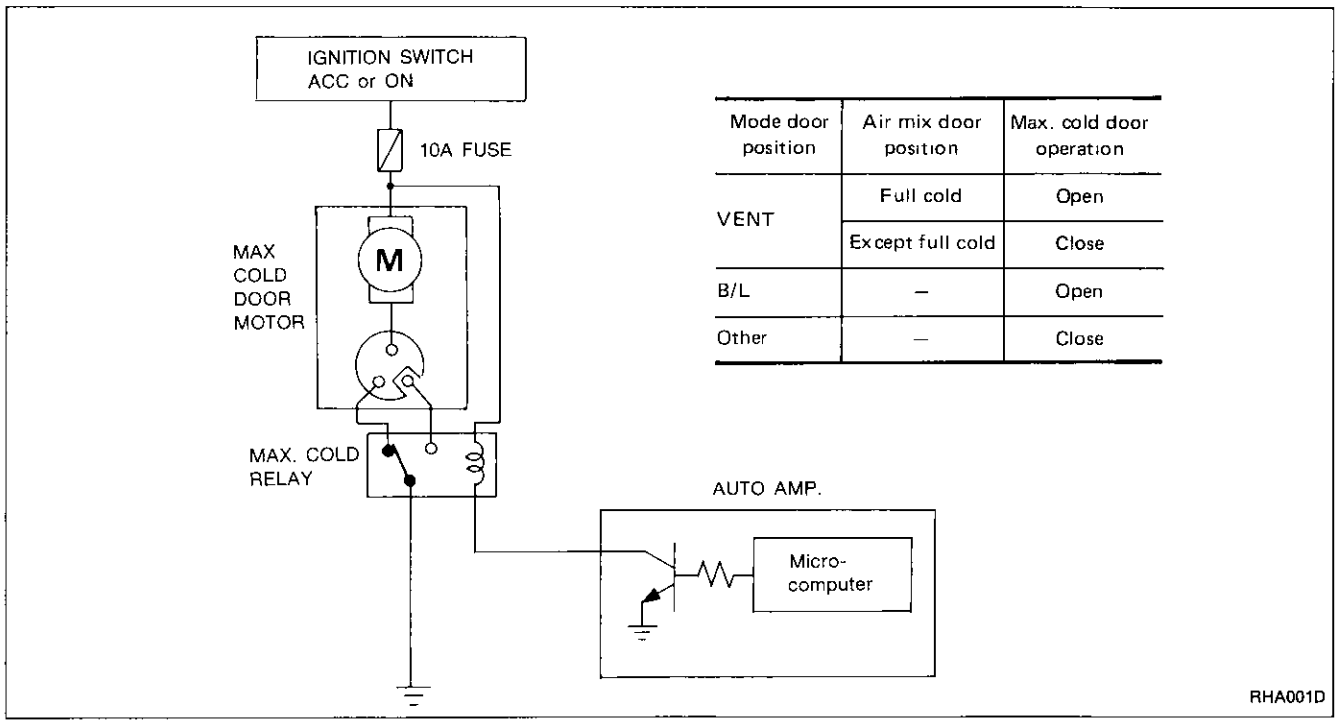
MAX. COLD DOOR CONTROL

Component parts

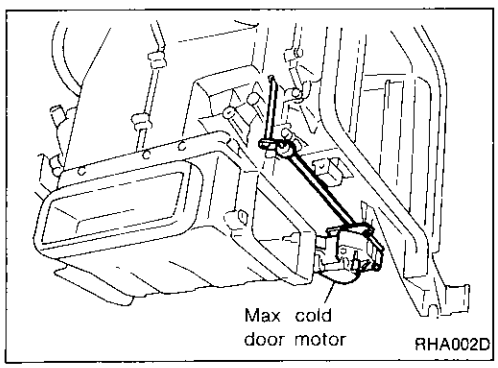
Max. cold door control system components are:
1) Auto amplifier
2) Max. cold door motor
3) Control unit (P.T.C.)
4) Air mix door motor (P.B.R.)
5) In-vehicle sensor
6) Ambient sensor
7) Sunload sensor
8) Intake sensor

System operation

The auto amplifier will activate the max. cold door motor and open the max. cold door when the air outlets are set to the B/L position or also when the air mix door is set to the "FULL COLD" position with air outlets set to VENT. In all other modes the max. cold door is closed.



Mode door position	Air mix door position	Max. cold door operation
VENT	Full cold	Open
	Except full cold	Close
B/L	–	Open
Other	–	Close



MAX. COLD DOOR MOTOR

The max. cold door motor is attached to the heater unit. It rotates so that the max. cold door is opened to the position set by the auto amplifier.
Motor rotation is conveyed to a link which activates the max. cold door.

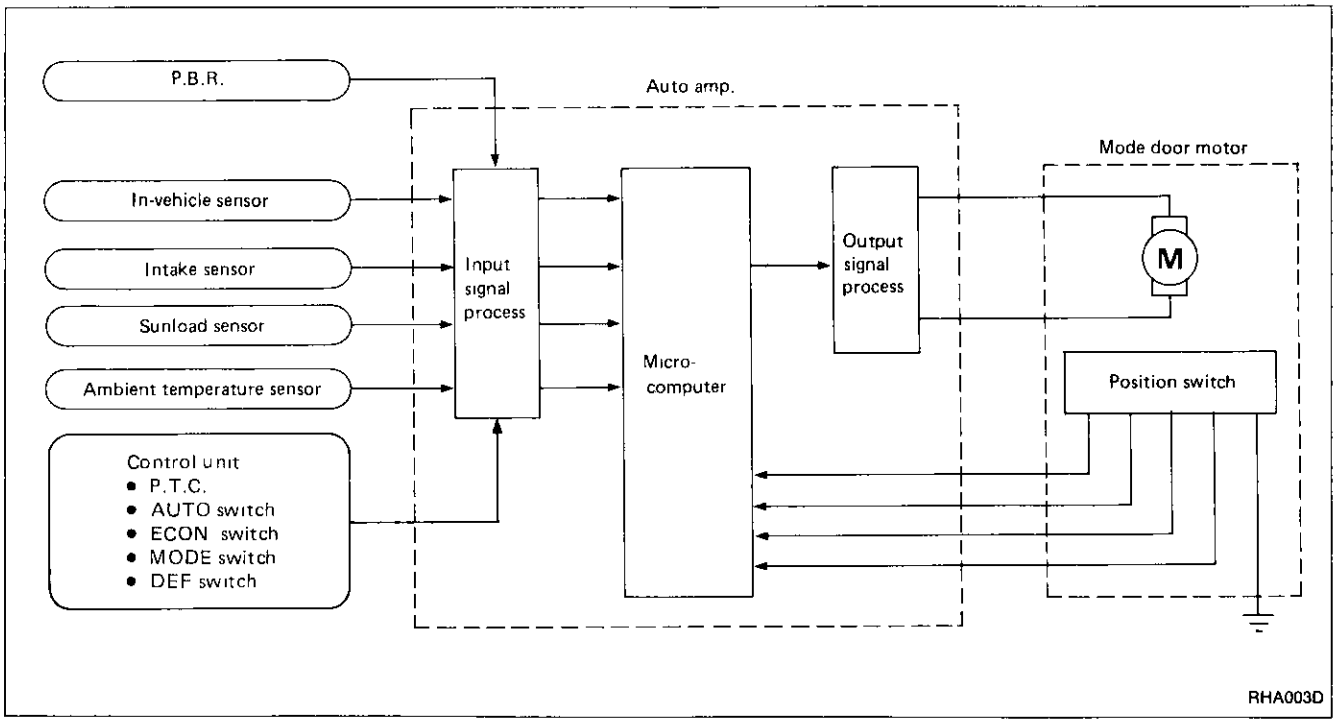
OUTLET DOOR CONTROL

Component parts

Outlet door control system components are:
1) Auto amplifier
2) Control unit (P.T.C., and AUTO, ECON, MODE, DEF switches)
3) Mode door motor
4) P.B.R.
5) In-vehicle sensor
6) Ambient sensor
7) Sunload sensor
8) Intake sensor

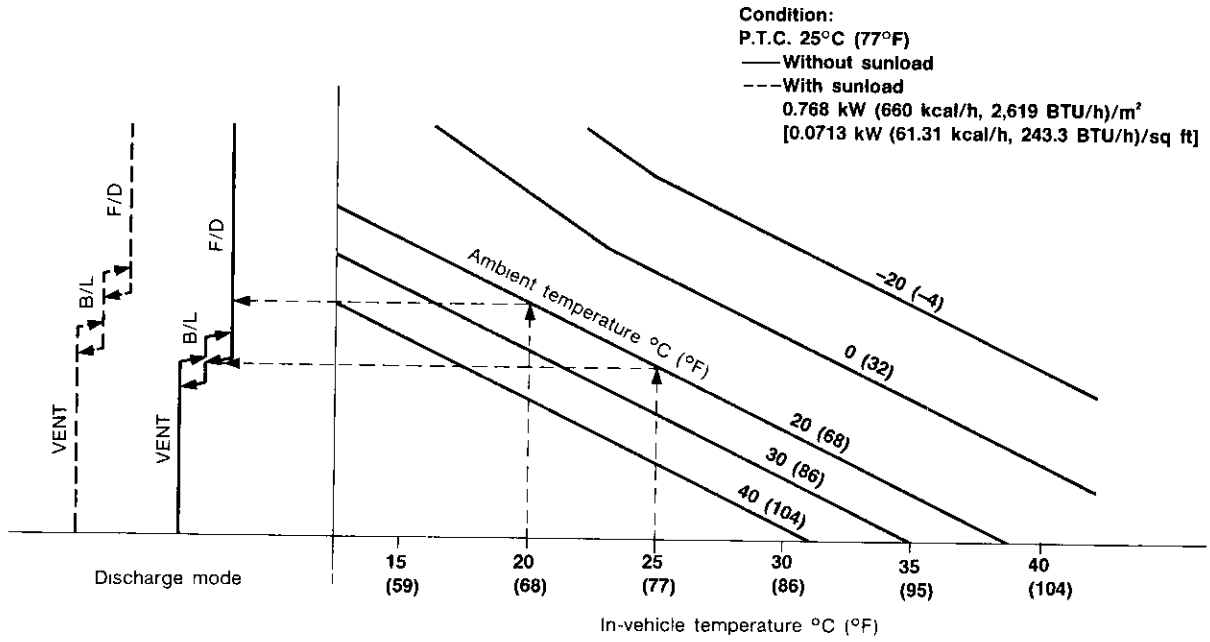
System operation

The auto amplifier computes the air outlet conditions according to the ambient temperature and the in-vehicle temperature. The computed outlet conditions are then corrected for sunload to determine air outlet through which air is discharged into the passenger compartment.
When the air outlet is automatically selected as FOOT/DEF, the actual outlet will be either F/D1 or F/D2 depending on the target temperature and the ambient temperature.
When the OFF switch is pushed, the auto amplifier sets the mode door at the "F/D 1" position.



Control System Output Components (Cont'd)

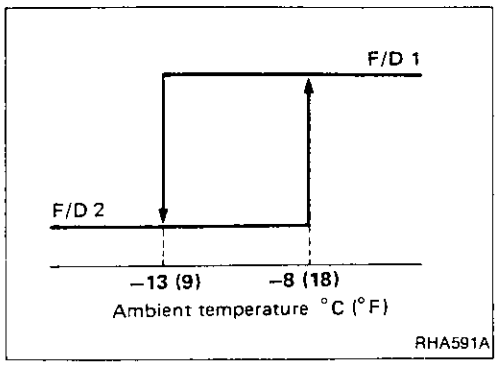
Outlet door control specification



Example:

- **If temperature setting is set at 25°C (77°F) under no sunload condition when ambient and in-vehicle temperature are 20°C (68°F), mode door is set automatically at F/D position.**
- **Then in-vehicle temperature will lower and when objective temperature 25°C (77°F) is reached mode door will shift from VENT position to B/L.**

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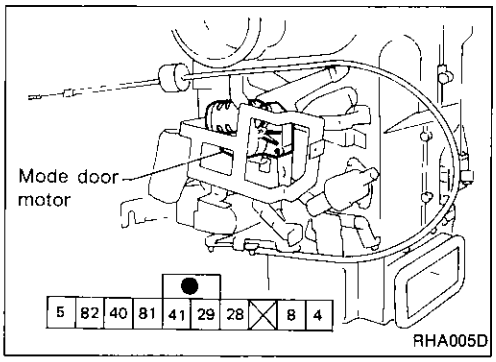


RHA591A

FOOT/DEF mode specification

- When the air outlet is automatically selected as F/D, when target temperature is high, the air outlet is fixed at F/D 1.
- When the target temperature is low, the air outlet will be either F/D 1 or F/D 2 depending on the ambient temperature.
- When the ambient temperature decreases to –13°C (9°F), air outlet is changed from F/D1 to F/D2.
- When the ambient temperature increases to –8°C (18°F), air outlet is changed from F/D2 to F/D1.

Control System Output Components (Cont'd)

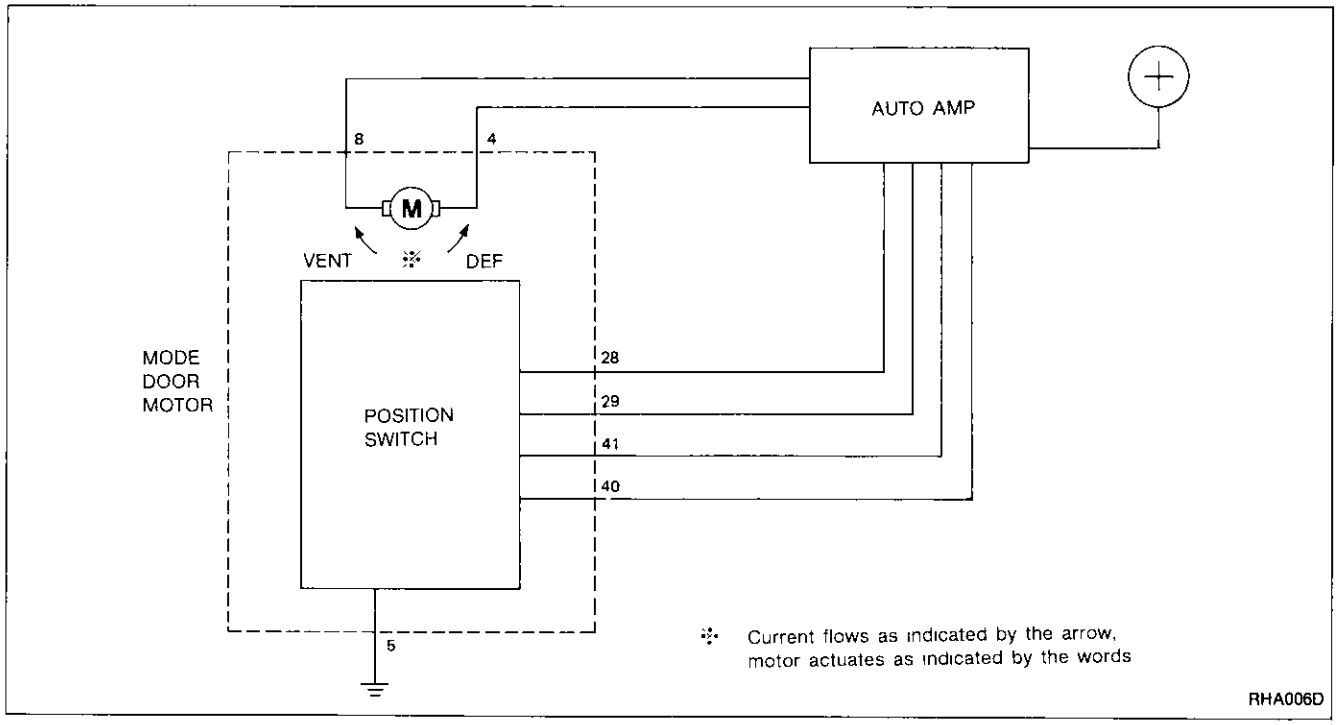


MODE DOOR MOTOR

The mode door motor is attached to the heater unit. It rotates so that air is discharged from outlet set by the auto amplifier. Motor rotation is conveyed to a link which activates the mode door.

Mode door motor operation

8	4	Mode door operation	Direction of side link rotation
⊕	⊖	VENT → DEF	Counterclockwise
⊖	⊖	STOP	STOP
⊖	⊕	DEF → VENT	Clockwise



INTAKE DOOR CONTROL

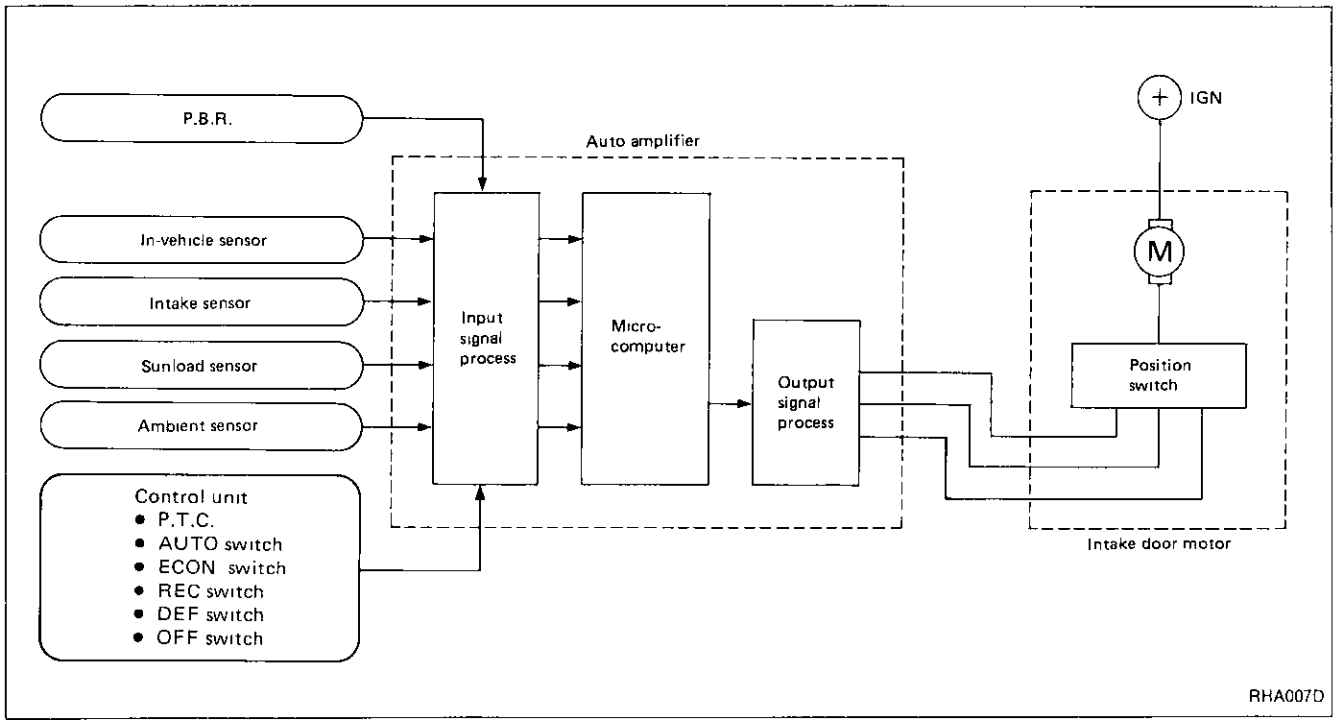
Components parts

Intake door control system components are:

1) Auto amplifier
2) Control unit
   (P.T.C., AUTO, ECON, DEF, REC switches)
3) Intake door motor
4) P.B.R.
5) In-vehicle sensor
6) Ambient sensor
7) Sunload sensor
8) Intake sensor

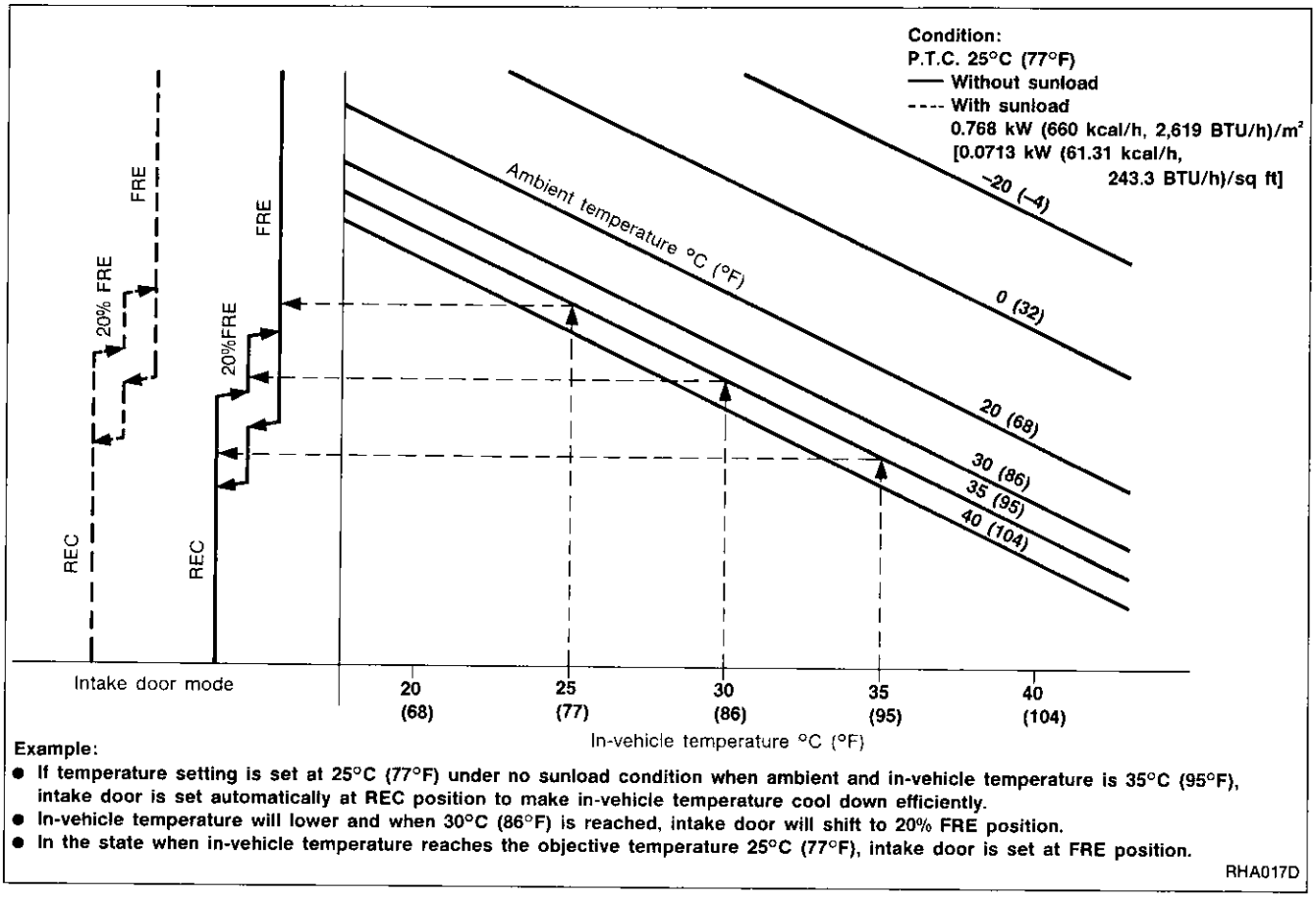
System operation

The intake door control determines the intake door position based on both ambient and in-vehicle temperature. When the ECON, DEF, or OFF switches are pushed, the auto amplifier sets the intake door at the "Fresh" position. When the compressor is turned OFF from ON (to prevent the auto amplifier from becoming frozen), the intake door is automatically changed to the "Fresh" position (even if it has been set at the "REC" position).



Control System Output Components (Cont'd)

Intake door control specification

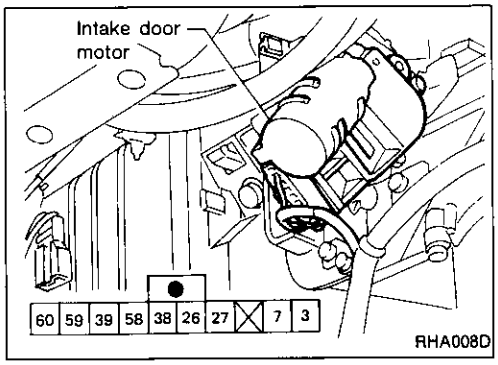


Example:

- If temperature setting is set at 25°C (77°F) under no sunload condition when ambient and in-vehicle temperature is 35°C (95°F), intake door is set automatically at REC position to make in-vehicle temperature cool down efficiently.
- In-vehicle temperature will lower and when 30°C (86°F) is reached, intake door will shift to 20% FRE position.
- In the state when in-vehicle temperature reaches the objective temperature 25°C (77°F), intake door is set at FRE position.

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Control System Output Components (Cont'd)

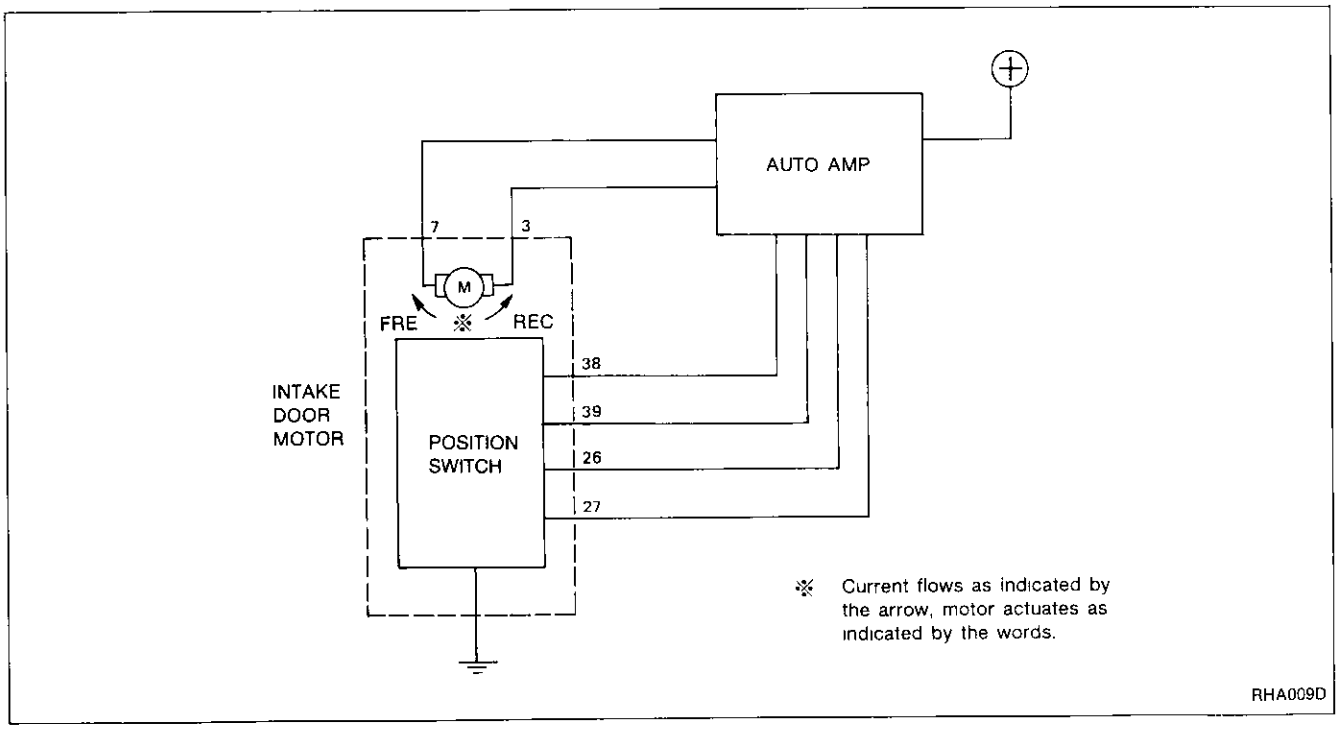


INTAKE DOOR MOTOR

The intake door motor is attached to the intake unit. It rotates so that air is drawn from inlets set by the auto amplifier. Motor rotation is conveyed to a lever which activates the intake door.

Intake door motor operation

7	3	Intake door operation	Movement of side link rotation
⊕	⊖	FRE → REC	Counterclockwise
⊖	⊖	STOP	STOP
⊖	⊕	REC → FRE	Clockwise



FAN SPEED CONTROL

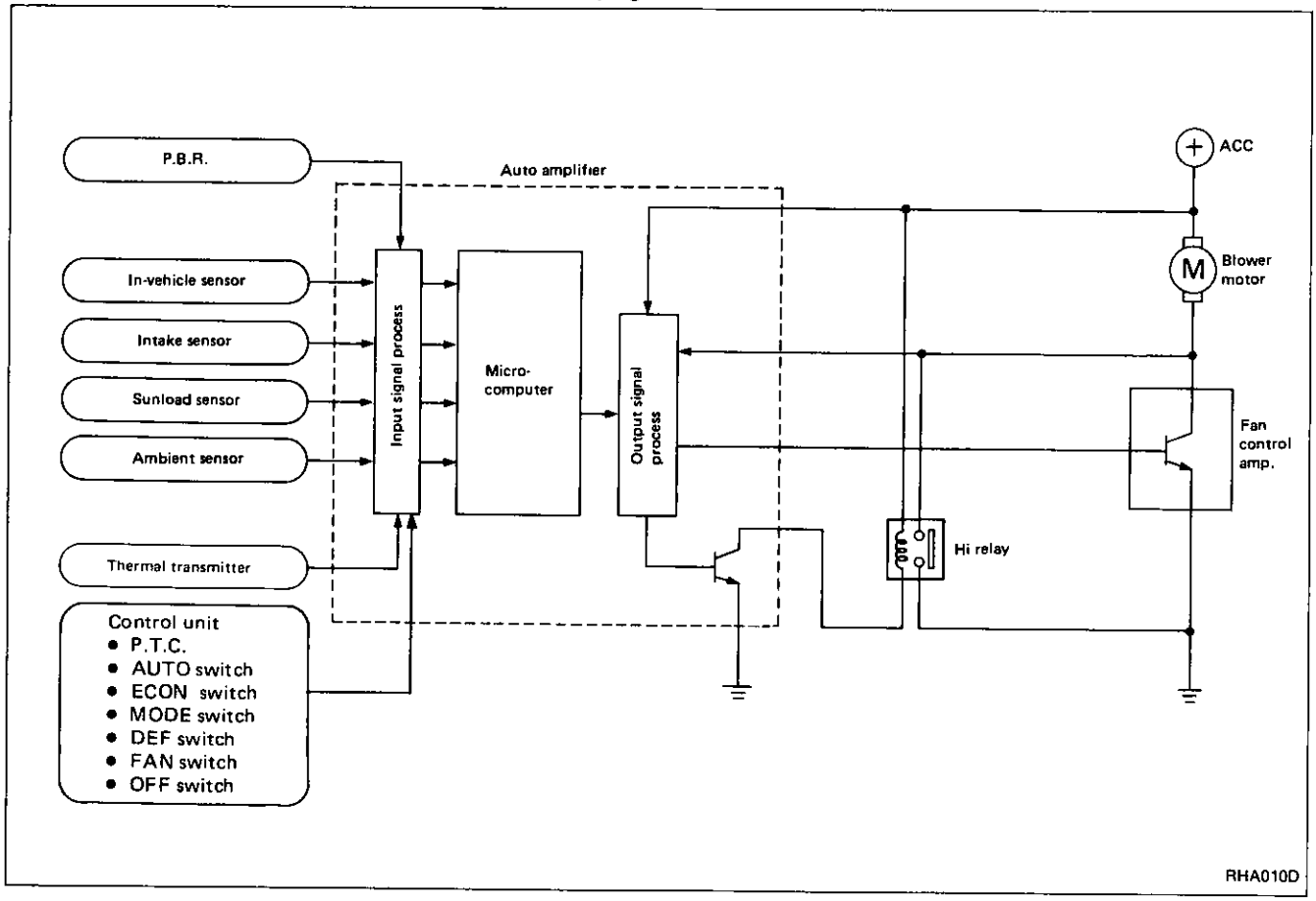
Component parts

Fan speed control system components are:

1) Auto amplifier
2) Control unit
   (P.T.C., AUTO, ECON, MODE, DEF, FAN, OFF switches)
3) Fan control amplifier
4) P.B.R.
5) In-vehicle sensor
6) Ambient sensor
7) Sunload sensor
8) Intake sensor
9) Hi relay
10) Thermal transmitter

System operation

For description of system operation, see next page.



AUTOMATIC MODE

In the automatic mode, the blower motor speed is calculated by the automatic amplifier based on inputs from the P.B.R., in-vehicle sensor, sunload sensor, and ambient sensor. The blower motor applied voltage ranges from approximately 5 volts (lowest speed) to 12 volts (highest speed).
The control blower speed (in the range of 5 to 10.5V), the automatic amplifier 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. If the computed blower voltage (from automatic amplifier) is above 10.5 volts, the high blower relay is activated. The high blower relay provides a direct path to ground (bypassing the fan control amplifier), and the blower motor operates at high speed.

STARTING BLOWER SPEED CONTROL

Start up from "COLD SOAK" condition (Automatic mode)

In a cold start up condition where the engine temperature is below 50°C (122°F) and when the air outlet has been automatically set to B/L or FOOT/DEF, the blower will not operate for a short period of time (up to 150 seconds). The exact start delay time varies depending on the outlet door control and engine temperature.
In the most extreme case (very low ambient) the blower starting delay will be 150 seconds as described above. After this delay, the blower will operate at low speed until the engine temperature rises above 50°C (122°F), at which time 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 button is pushed. The blower speed will gradually rise to the objective speed over a time period of 5 seconds or less (actual time depends on the objective blower speed).
When the blower starts and the compressor comes ON at a recirculating air temperature of greater than 35°C (95°F), the blower will stop for 3 seconds.

BLOWER SPEED COMPENSATION

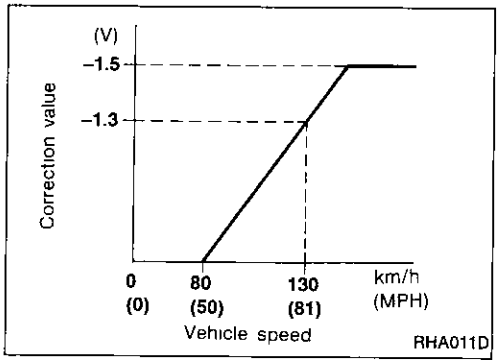
Sunload

When the in-vehicle temperature and the set temperature are very close, the blower will be operating at low speed. The low speed will vary depending on the sunload. During conditions of high sunload, the blower low speed is "normal" low speed (approx. 6V). During low or no sunload conditions, the low speed will drop to "low" low speed (approx. 5V).

Ambient

When the ambient temperature is in the "moderate" range [10 – 15°C (50 - 59°F)], the computed blower voltage will be compensated (reduced) by up to 3.5V (depending on the blower speed). In the "extreme" ambient ranges [below 0°C (32°F) and above 20°C (68°F)] the computed objective blower voltage is not compensated at all. In the ambient temperature ranges between "moderate" and "extreme" [0 - 10°C (32 - 50°F) and 15 - 20°C (59 - 68°F)], the amount of compensation (for a given blower speed) varies depending on the ambient temperature.

Control System Output Components (Cont'd)



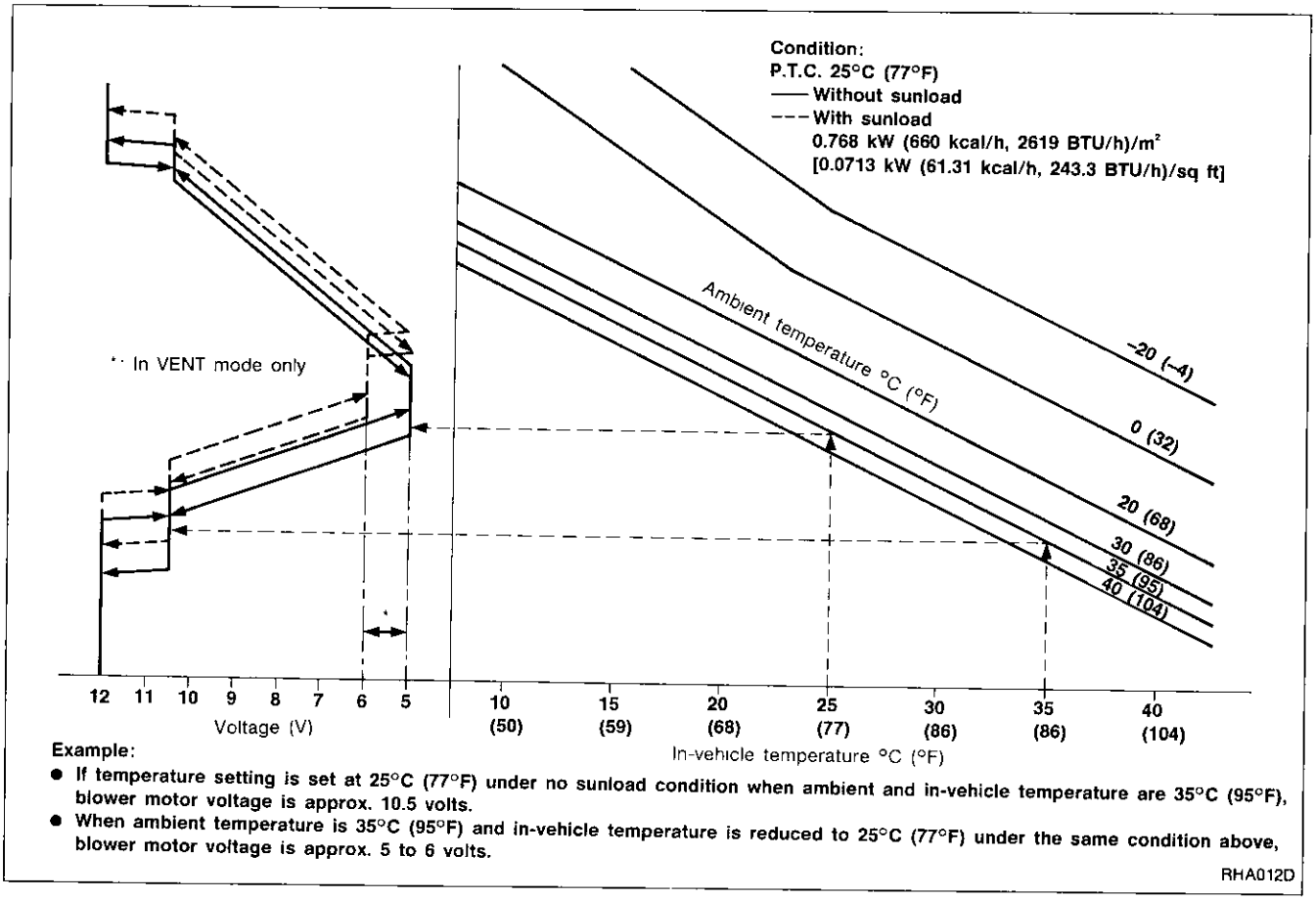
On-coming air

When the intake position is "FRESH" while driving at speeds greater than 80 km/h (50 MPH), blower motor voltage will be decreased to a minimum 1.5 volts, to prevent an abrupt increase in airflow due to ram pressure.

Mode

If the mode door motor starts up when the blower motor is using more than 8.5 volts, the auto amplifier will lower the motor voltage to 8.5 volts.

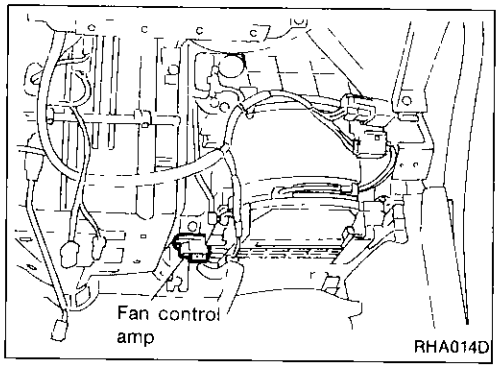
Fan speed control specification



Example:

- 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), blower motor voltage is approx. 10.5 volts.
- When ambient temperature is 35°C (95°F) and in-vehicle temperature is reduced to 25°C (77°F) under the same condition above, blower motor voltage is approx. 5 to 6 volts.

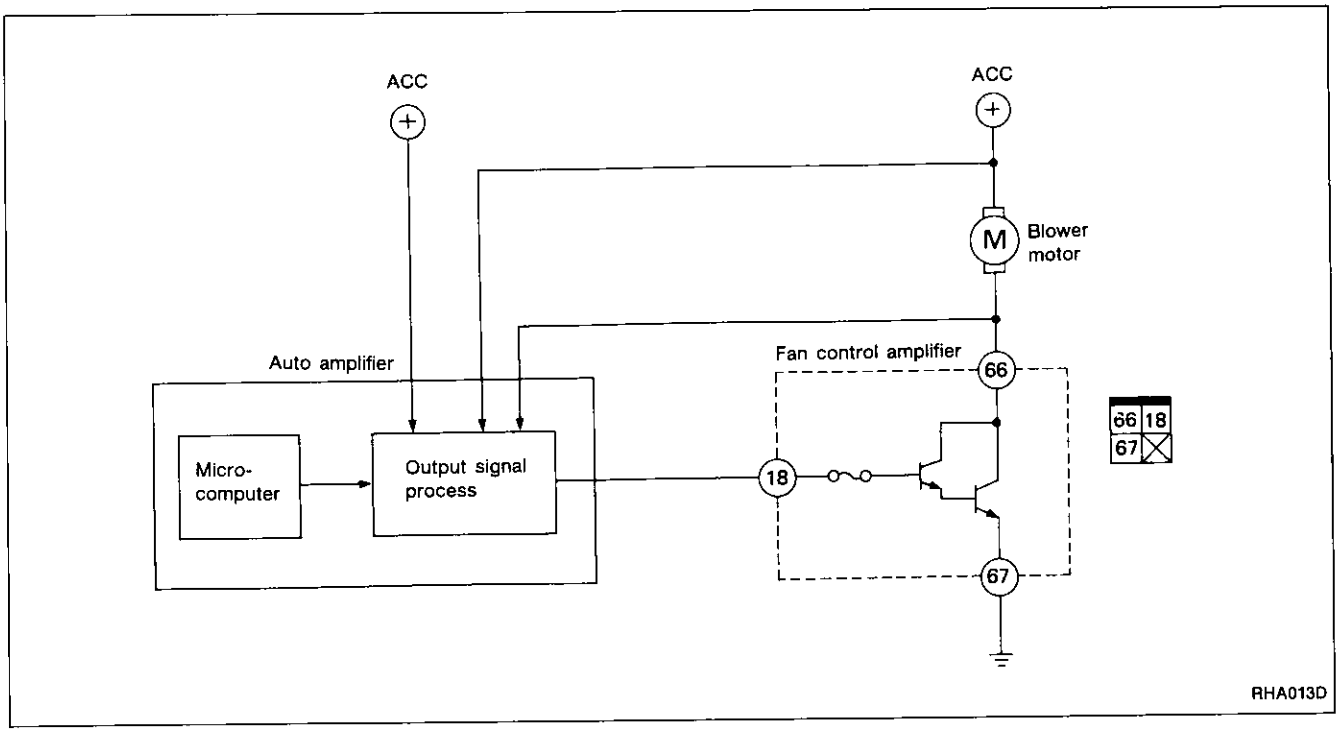
RHA012D

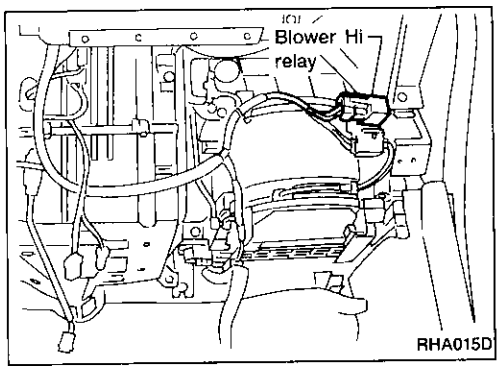


FAN CONTROL AMPLIFIER

The fan control amplifier is installed on the intake unit. It amplifies the base current of the auto amplifier and controls the blower fan motor speed.

Control System Output Components (Cont'd)





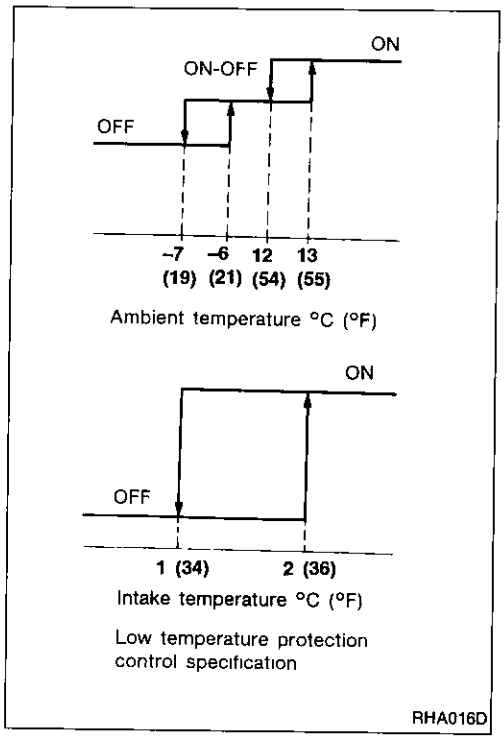
HI RELAY

The Hi relay is located on the intake unit. It receives a signal from the auto amplifier to operate the blower motor at high speed.

MAGNET CLUTCH CONTROL

Auto amplifier controls compressor operation by ambient temperature, intake temperature, and signal from E.C.C.S. control unit.

Control System Output Components (Cont'd)



Low temperature protection control

Auto amplifier will turn the compressor "ON" or "OFF" as determined by a signal detected by ambient temperature sensor and intake sensor.

When ambient temperatures are greater than 12°C (54°F), the compressor turns "ON". The compressor turns "OFF" when ambient temperatures are less than –7°C (19°F).

When ambient temperatures are between 12°C (54°F) and –7°C (19°F), the auto amplifier controls the ON-OFF operation of the compressor as determined by a signal detected by the intake sensor.

Acceleration cut control

The E.C.C.S. control unit will turn the compressor "ON" or "OFF" based on the signal from the throttle sensor and vehicle speed sensor.

General Specifications

COMPRESSOR

Model	CALSONIC make V-6
Type	V-6 variable displacement
Displacement cm^3 (cu in)/rev.	
Max.	184 (11.228)
Min.	10.5 (0.641)
Cylinder bore x stroke mm (in)	37 (1 46) x [1.6 - 28.6 (0.063 - 1.126)]
Direction of rotation	Clockwise (viewed from drive end)
Drive belt	Poly V

LUBRICATION OIL

Model	CALSONIC make V-6
Name	Nissan A/C System Oil Type S
Part number	KLH00-PAGS0
Capacity mℓ (US fl oz, Imp fl oz)	
Total in system	250 (8.5, 8.8)
Compressor (Service part) charging amount	250 (8.5, 8.8)

REFRIGERANT

Type	HFC-134a (R-134a)
Capacity kg (lb)	**0.70-0.80kg (1.54-1.76 lb)**

Inspection and Adjustment

ENGINE IDLING SPEED (When A/C is ON)

- Refer to EF & EC section.

BELT TENSION

- Refer to Checking Drive Belts (MA section).

ELECTRICAL SYSTEM

SECTION EL

When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**

CONTENTS

PRECAUTIONS ..... EL- 2
HARNESS CONNECTOR ..... EL- 3
STANDARDIZED RELAY ..... EL- 4
POWER SUPPLY ROUTING ..... EL- 7
BATTERY ..... EL- 13
STARTING SYSTEM ..... EL- 21
STARTING SYSTEM — Starter — ..... EL- 23
CHARGING SYSTEM ..... EL- 28
CHARGING SYSTEM — Alternator — ..... EL- 30
COMBINATION SWITCH ..... EL- 35
HEADLAMP ..... EL- 38
EXTERIOR LAMP ..... EL- 43
INTERIOR LAMP ..... EL- 47
METER AND GAUGES ..... EL- 49
WARNING LAMPS AND CHIME ..... EL- 54
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REAR WINDOW DEFOGGER ..... EL- 77
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TELEPHONE ..... EL- 85
AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.) ..... EL- 87
THEFT WARNING SYSTEM EL-109
LOCATION OF ELECTRICAL UNITS EL-129
HARNESS LAYOUT EL-133
SUPER MULTIPLE JUNCTION (S.M.J.) EL-149



Precautions for Supplemental Restraint System "AIR BAG"

The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury in a frontal collision. The Supplemental Restraint System consists of air bags, sensors, a control unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safety is included in **section BF** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized INFINITI 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 "Air Bag".**

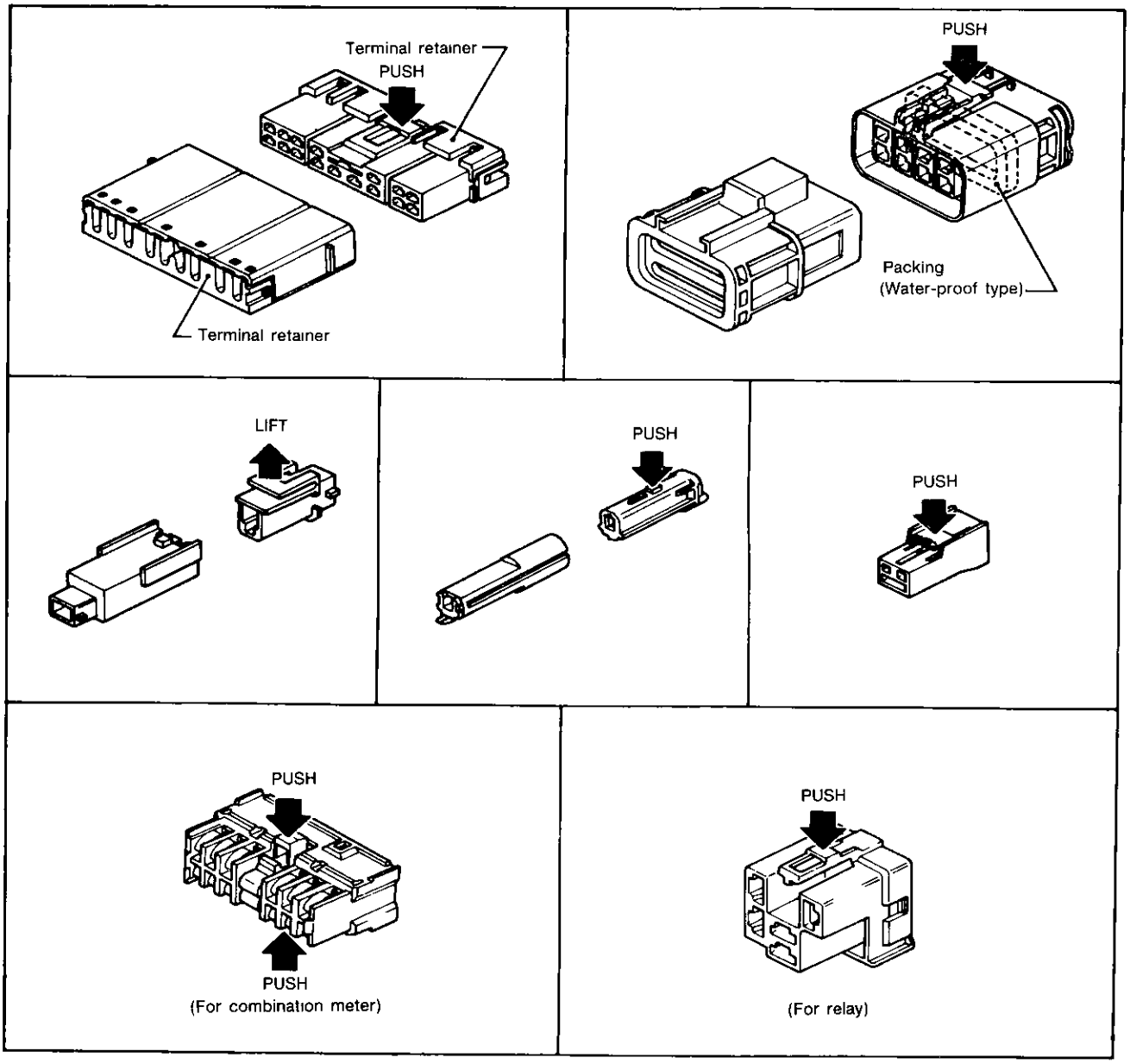
Description

HARNESS CONNECTOR

- All harness connectors have been modified to prevent accidental loosing 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]

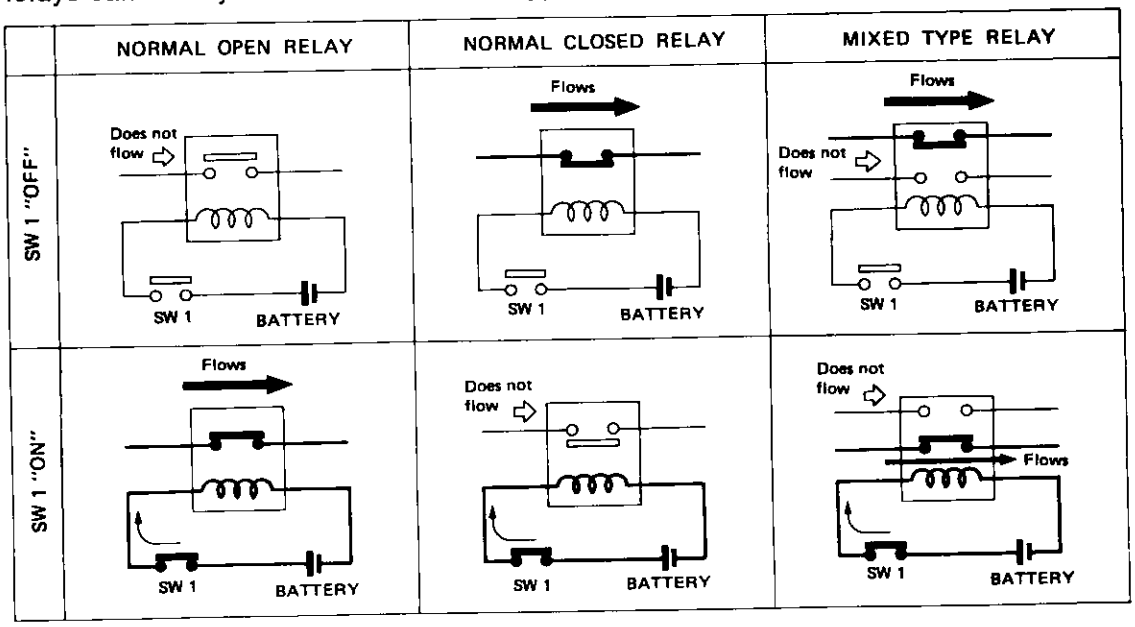


SEL769D

Description

NORMAL OPEN, NORMAL CLOSED AND MIXED TYPE RELAYS

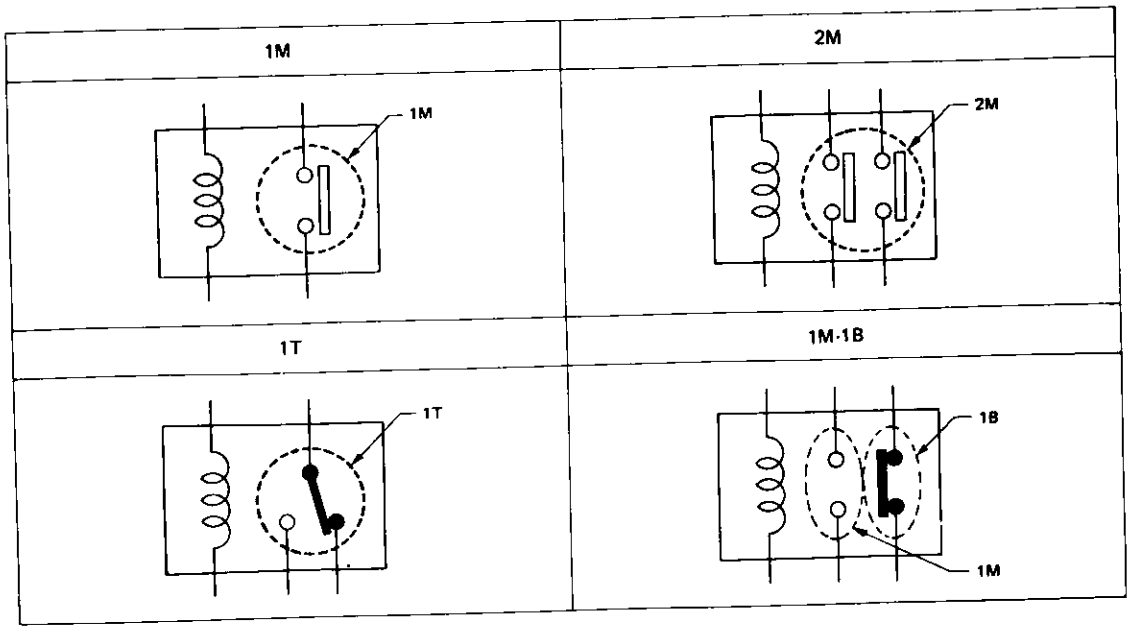
Relays can mainly be divided into three types: normal open, normal closed and mixed type relays.



SEL881H

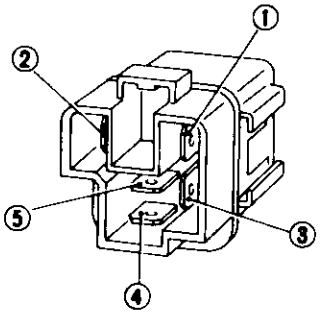
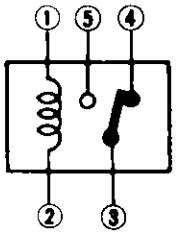
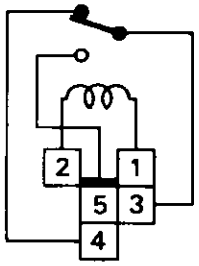
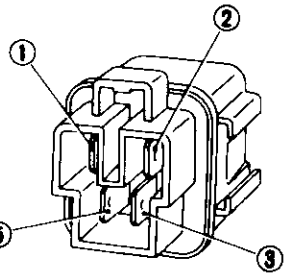
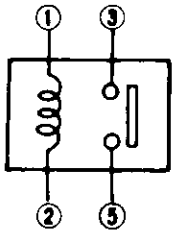
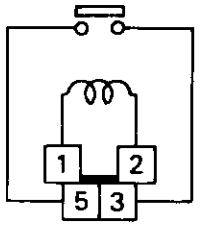
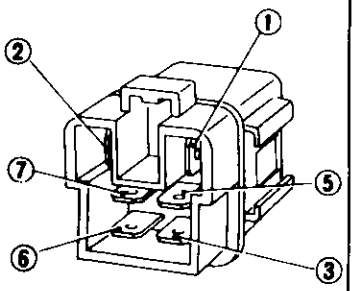
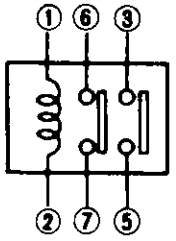
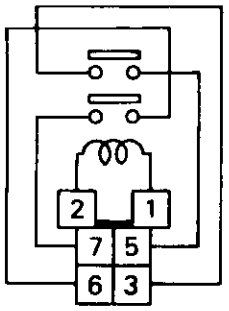
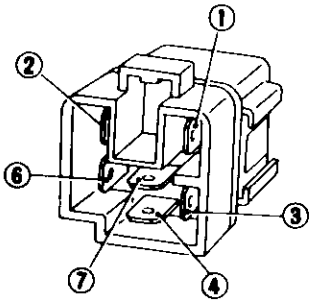
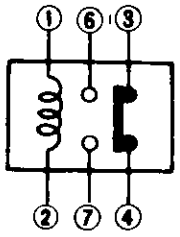
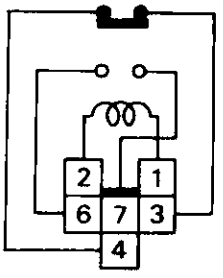
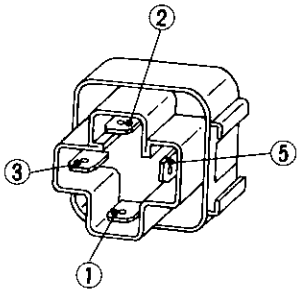
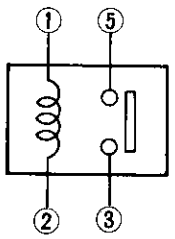
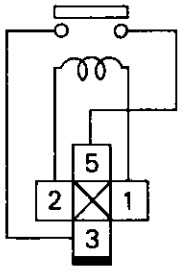
TYPE OF STANDARDIZED RELAYS

1M ... 1 Make
1T ... 1 Transfer
2M ... 2 Make
1M·1T ... 1 Make 1 Break



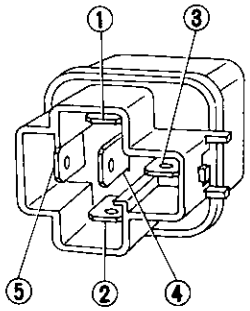
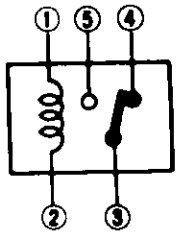
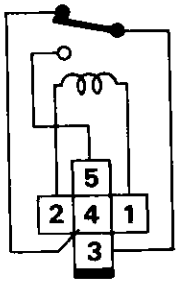
SEL882H

Description (Cont'd)

Type	Outer view	Circuit	Connector symbol and connection	Case color
1T				BLACK
1M				BLUE or GREEN
2M				BROWN
1M·1B				GRAY
1M				BLUE

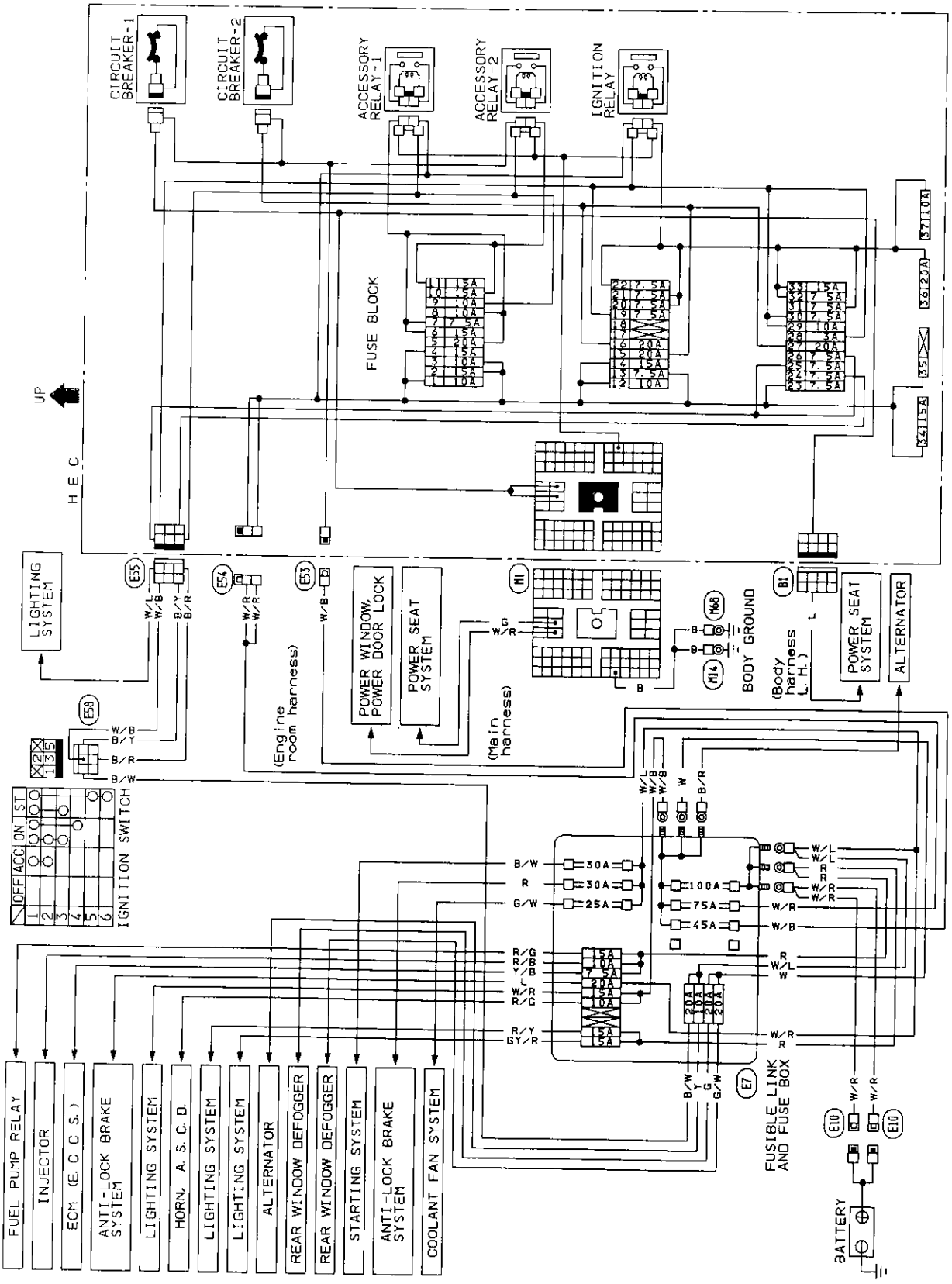
MEL202B

Description (Cont'd)

Type	Outer view	Circuit	Connector symbol and connection	Case color
1T				BLACK

Wiring Diagram

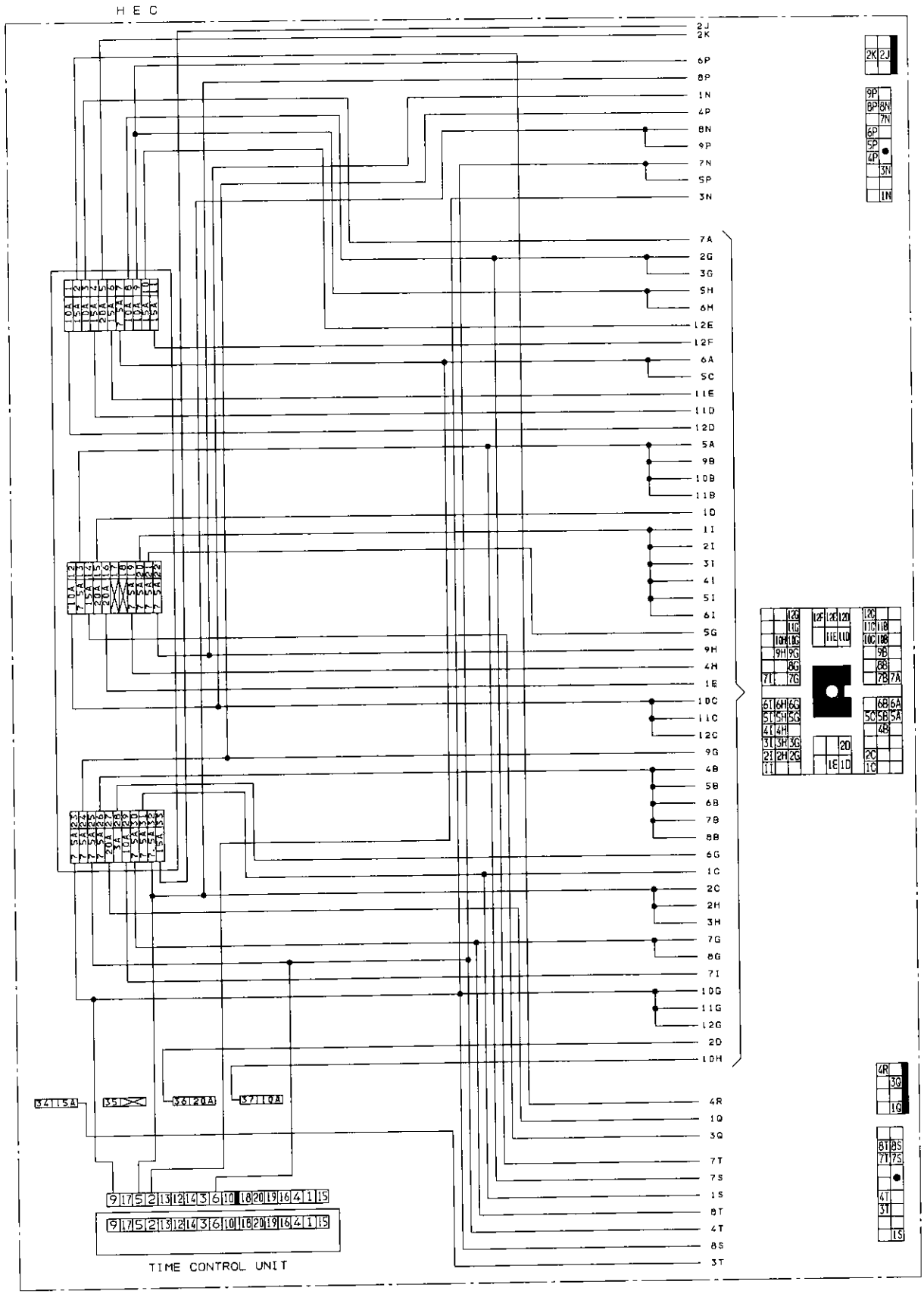
UPPER FUSE BLOCK INSIDE H.E.C.



MEL383B

Wiring Diagram (Cont'd)

LOWER FUSE BLOCK INSIDE H.E.C.



Wiring Diagram (Cont'd)

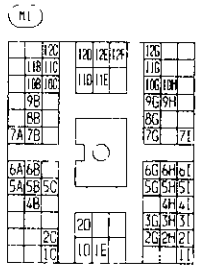


2J — B/P — POWER SEAT
2K — LG — WIPER AND WASHER

6P — NOT USED
6P — LG/B — AIR CONDITIONER
1N — G/Y — KEY SWITCH
4P — L/R — STARTER RELAY
8N — BR — STEERING SENSOR
9P — NOT USED
7N — Y/B — CLEARANCE LAMP L H
5F — Y/B — CLEARANCE LAMP R H
3N — Y/B — KEY ILLUMINATION

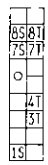


7A — G/B — TELEPHONE
2G — L/OR — DOOR MIRROR
3G — NOT USED
5H — W — TELEPHONE
6H — B/P — AUDIO
12E — L/W — BLOWER MOTOR
12F — L/W — BLOWER MOTOR
6A — NOT USED
5C — BR — POWER ANTENNA
11E — R/L — CIGARETTE LIGHTER
11D — R/Y — STOP LAMP
12D — OR/L — HAZARD WARNING
5A — G/OR — CLOCK
9B — P/B — BUZZER
10B — L — REMOTE CONTROL DOOR LOCK SYSTEM
11B — NOT USED
1D — W/PU — POWER WINDOW AND POWER DOOR LOCK
1I — B/W — ANTI-LOCK BRAKE SYSTEM
2I — NOT USED
3I — NOT USED
4I — NOT USED
5I — OR/L — HEADLAMP
6I — NOT USED
5G — B/R — TURN SIGNAL LAMP
9H — W/R — AIR CONDITIONER
4H — G/Y — ECM (E C C S CONTROL UNIT)
1E — G/W — POWER WINDOW AND POWER DOOR LOCK
10C — G/Y — THEFT WARNING SYSTEM
11C — R — SUPPLEMENTAL RESTRAINT SYSTEM (AIR BAG)
12C — NOT USED
9G — Y/R — ECM (E C C S CONTROL UNIT)
4B — Y/B — METER ILLUMINATION LAMP
5B — R/Y — HAZARD SWITCH ILLUMINATION LAMP
6B — BR/Y — CLOCK ILLUMINATION LAMP
7B — PU/W — GLOVE BOX LAMP
8B — W/L — MAIN SWITCH (P/W & P/D LOCK) ILLUMINATION LAMP
6G — L — TELEPHONE
1C — OR — WARNING LAMP
2C — Y/L — ELECTRONIC POWER STEERING SYSTEM
2H — GY/R — HICAS CONTROL SYSTEM
3H — NOT USED
7G — R/PU — A/T CONTROL SYSTEM
8G — LG — ECM (E C C S CONTROL UNIT)
7I — R/L — SUPPLEMENTAL RESTRAINT SYSTEM (AIR BAG)
10G — BR/W — INTERIOR LAMP
11G — W/G — FOOTWELL LAMP L H
12G — R/G — FOOTWELL LAMP R H
2D — SB — REAR WINDOW DEFOGGER
10H — L — SHIFT LOCK CONTROL SYSTEM



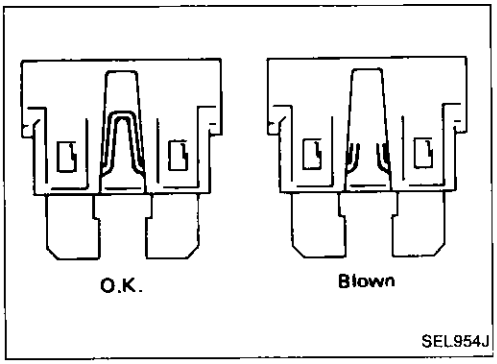


4R — W/R — AUDIO
1Q — G/R — POWER WINDOW AND POWER DOOR LOCK
3Q — W/G — AUDIO



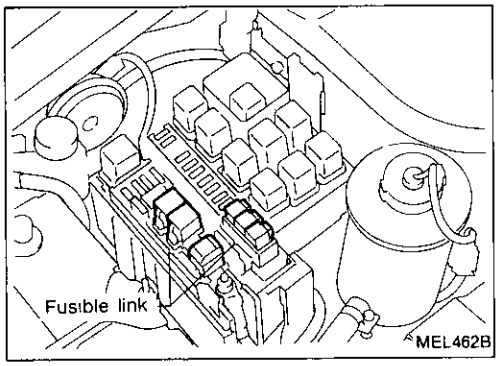
7T — G — POWER SEAT
7S — Y — A/T CONTROL SYSTEM
1S — NOT USED
8T — G — A/T CONTROL SYSTEM
4T — W/L — TAIL LAMP
8S — R/Y — TRUNK ROOM LAMP
3T — PU/W — TRUNK AND FUEL LID OPENER

SEL384B



Fuse

a. **If fuse is blown, be sure to eliminate cause of problem before installing new fuse.**
b. **Use fuse of specified rating. Never use fuse of more than specified rating.**
c. **Do not install fuse in oblique direction; always insert it into fuse holder properly.**
d. **Remove fuse for clock if vehicle is not used for a long period of time.**



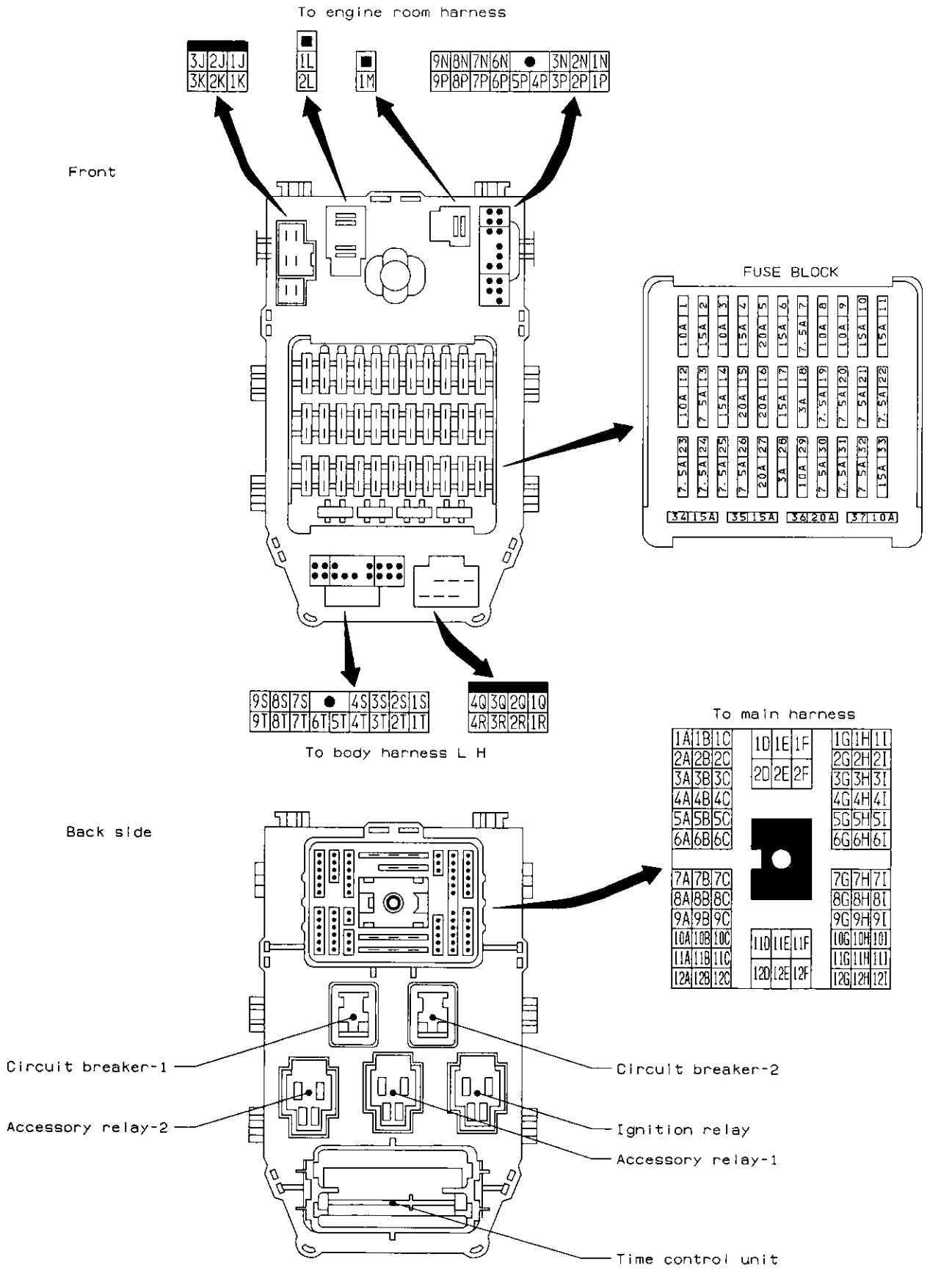
Fusible Link

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:

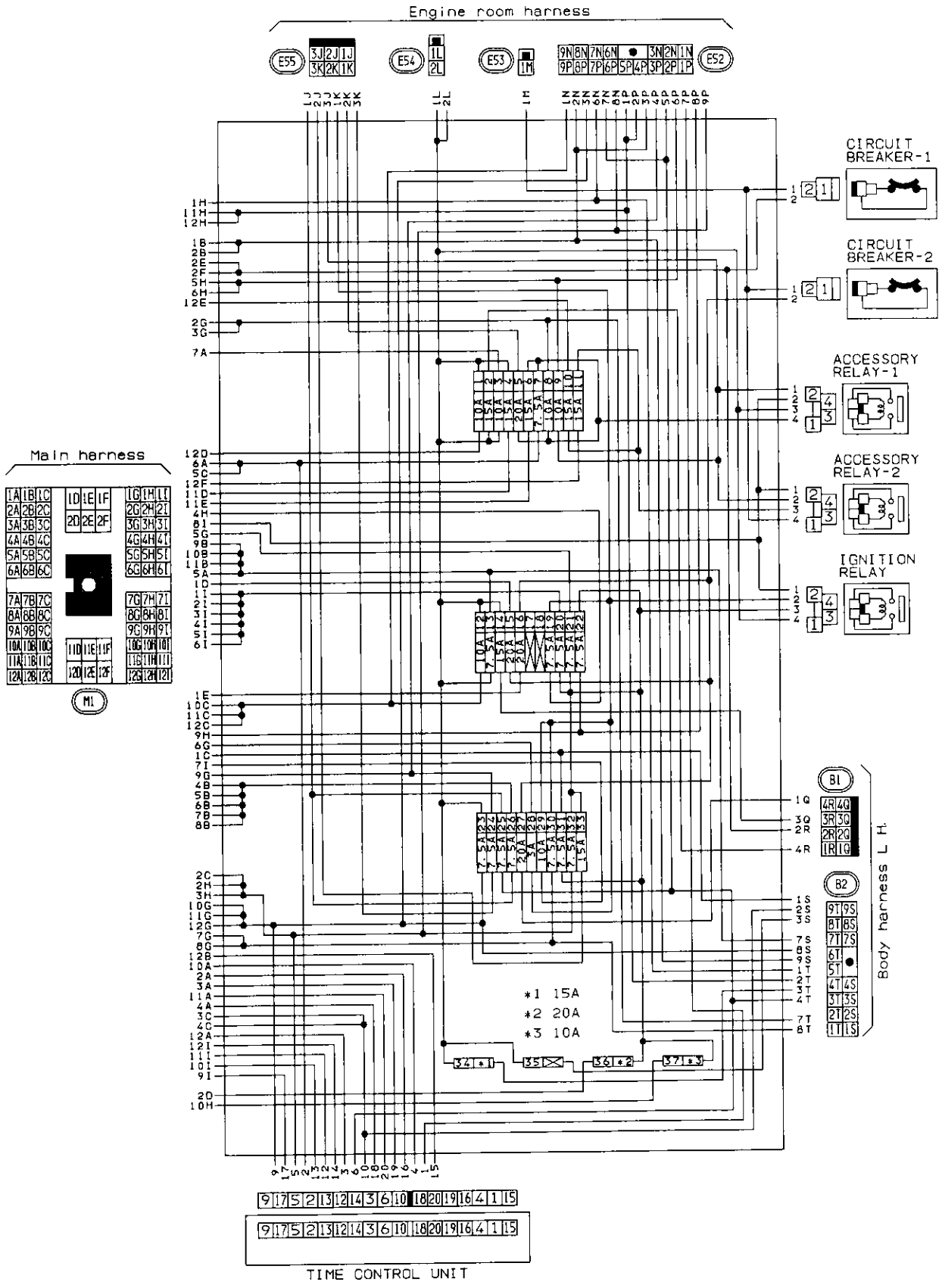
a. **If fusible link should melt, it is possible that a critical circuit (power supply or large current carrying circuit) is shorted. In such a case, carefully check these circuits and eliminate cause of problem.**
b. **Never wrap periphery of fusible link with vinyl tape. Extreme care should be taken with this link to ensure that it does not come into contact with any other wiring harness, or vinyl or rubber parts.**

Construction and Terminal Arrangement



MEL431B

Internal Circuit

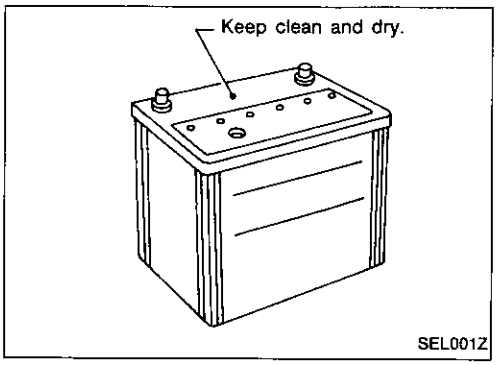


MEL385B

CAUTION:

a. If it becomes necessary to start the engine with a booster battery and jumper cables, use a 12-volt booster battery.

b. After connecting battery cables, ensure that they are tightly clamped to battery terminals for good contact.

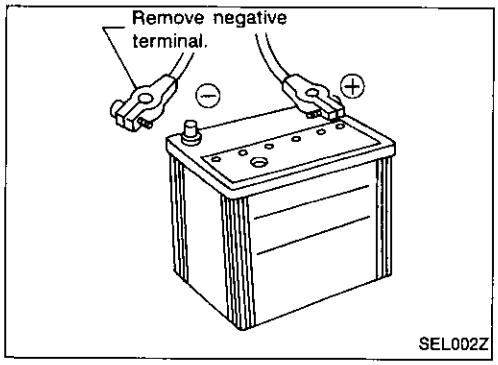


How to Handle Battery

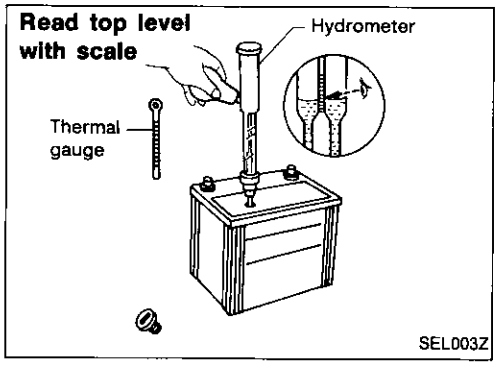
METHODS OF PREVENTING OVER-DISCHARGE

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.
  If the top surface of a battery is wet with electrolyte or water, leakage current will cause the battery to discharge. Always keep the battery clean and dry.



- 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.

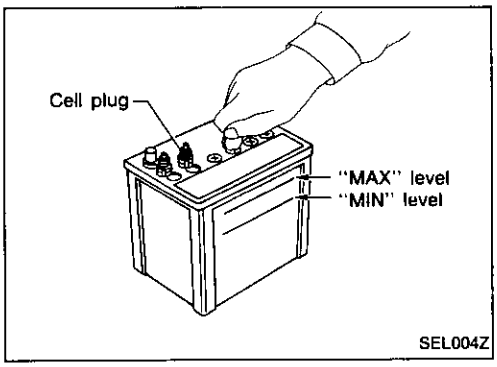
How to Handle Battery (Cont'd)

CHECKING ELECTROLYTE LEVEL

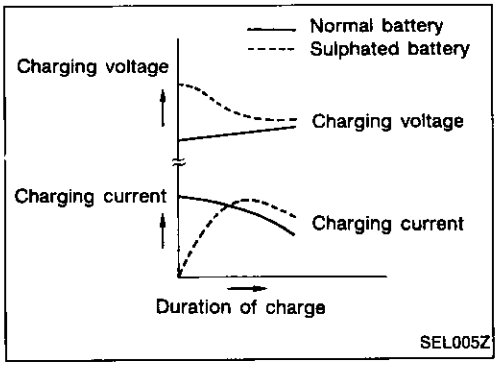
WARNING:

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.

Normally the battery does not require additional water. However, when the battery is used under severe conditions, adding distilled water may be necessary during the battery life.



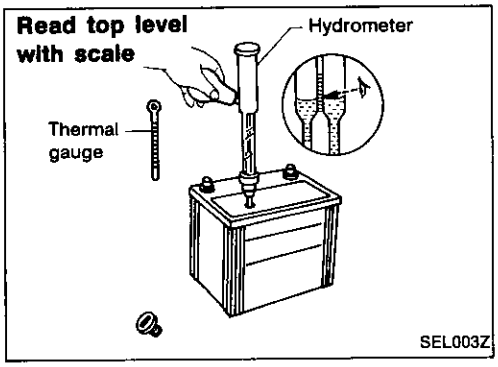
- Remove the cell plug using a suitable tool.
- Add distilled water up to the MAX level.



SULPHATION

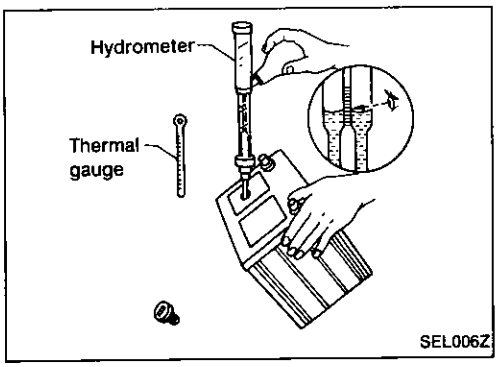
When a battery has been left unattended for a long period of time and has a specific gravity of less than 1.100, it will be completely discharged, resulting in sulphation on the cell plates.

Compared with a battery discharged under normal conditions, the current flow in a "sulphated" battery is not as smooth although its voltage is high during the initial stage of charging, as shown in the figure at the left.



SPECIFIC GRAVITY CHECK

1. Read hydrometer and thermometer indications at eye level.



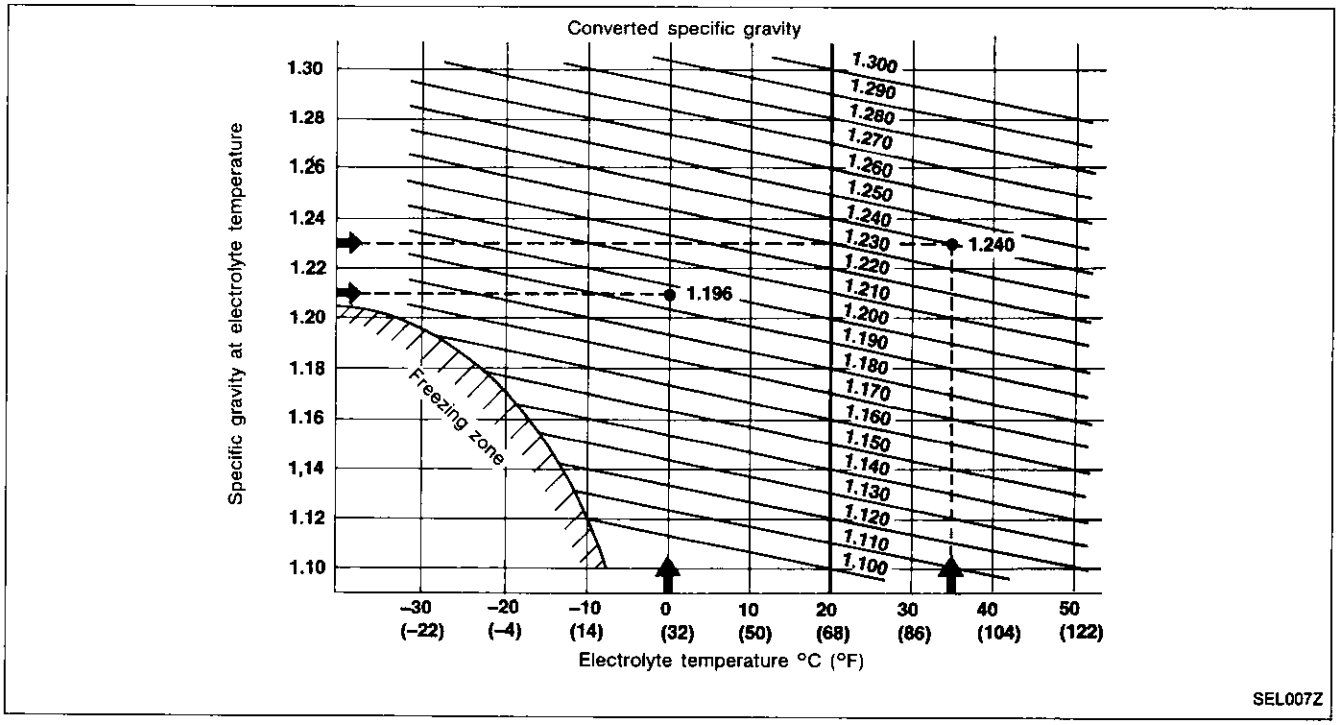
- When electrolyte level is too low, tilt battery case to raise it for easy measurement.

How to Handle Battery (Cont'd)

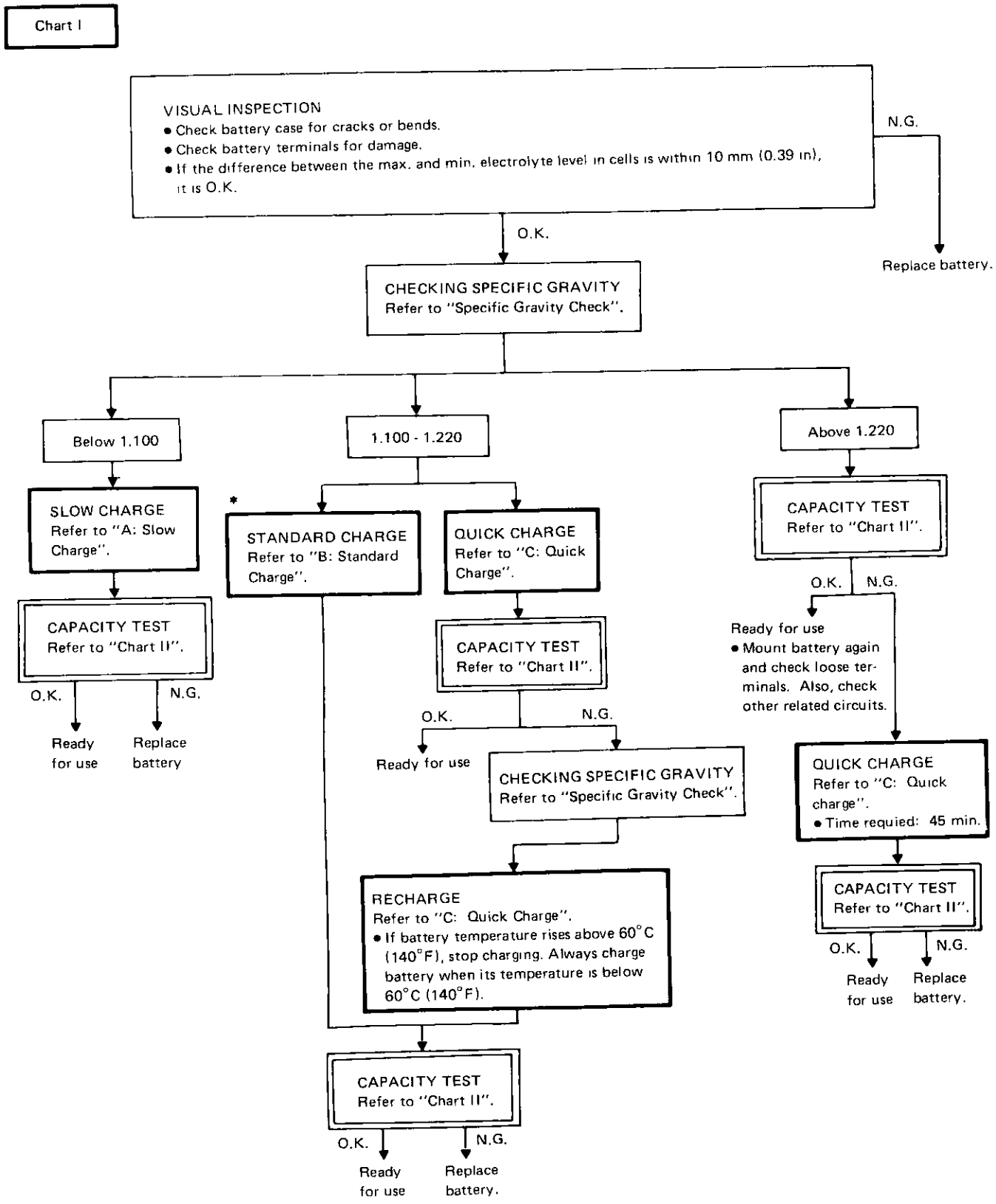
2. Convert into specific gravity at 20°C (68°F).

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.



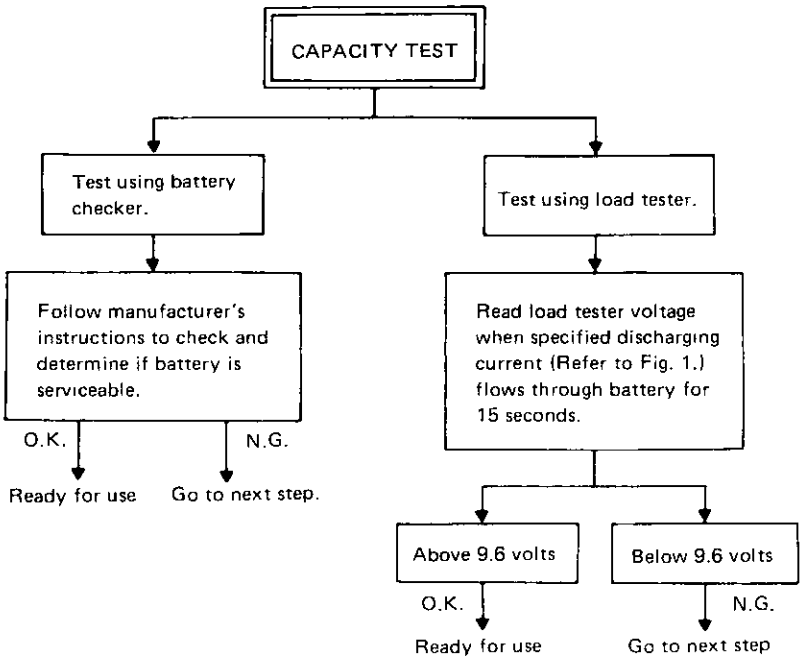
Battery Test and Charging Chart



* **"STANDARD CHARGE" is recommended if the vehicle is in storage after charging.**

Battery Test and Charging Chart (Cont'd)

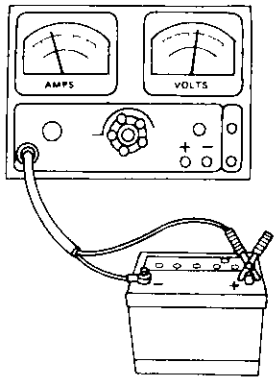
Chart II



- 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



SEL008Z

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 — O.K. → Continue to charge for 12 hours.

Below 12 volts or above 15 volts — N.G. → Replace battery.

CHECKING SPECIFIC GRAVITY
Refer to "Specific Gravity Check".

Conduct additional charge as per Fig. 3, if necessary.

Go to "CAPACITY TEST".

Fig. 2 INITIAL CHARGING CURRENT SETTING (Slow charge)

BATTERY TYPE / CONVERTED SPECIFIC GRAVITY	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)
Below 1.100	4.0 (A)	5.0 (A)	7.0 (A)	8.0 (A)	9.0 (A)	10.0 (A)	14.0 (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. 3 ADDITIONAL CHARGE (Slow charge)

Below 1.150	1.150 - 1.200	1.200 - 1.240	Above 1.240
Charge for 5 hours at initial charging current setting.	Charge for 4 hours at initial charging current setting.	Charge for 2 hours at initial charging current setting.	

Go to "CAPACITY TEST".

CAUTION:

a. 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.

b. Keep battery away from open flame while it is being charged.

c. When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.

d. If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F).

Battery Test and Charging Chart (Cont'd)

B: STANDARD CHARGE

Determine initial charging current from specific gravity, referring to Fig. 4.

↓

Charge battery for 8 hours.

↓

CHECKING SPECIFIC GRAVITY
Refer to "Specific Gravity Check".

↓

Conduct additional charge as per Fig. 5, if necessary.

↓

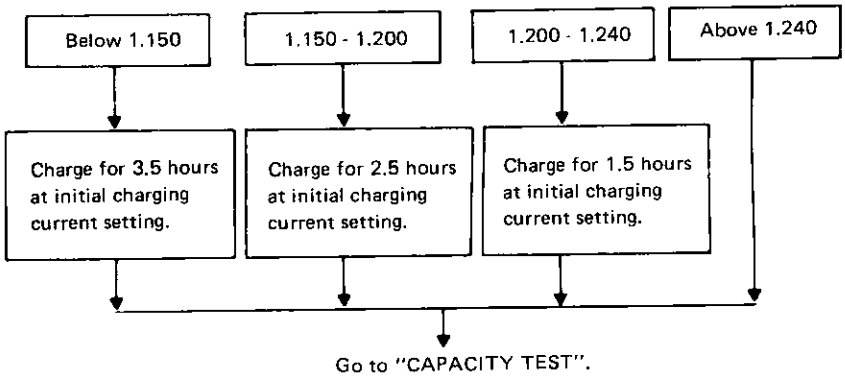
Go to "CAPACITY TEST".

Fig. 4 INITIAL CHARGING CURRENT SETTING
(Standard charge)

BATTERY TYPE / CONVERTED SPECIFIC GRAVITY	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)
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:

a. Do not use standard charge method on a battery whose specific gravity is less than 1.100.
b. 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.
c. Keep battery away from open flame while it is being charged.
d. When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.
e. If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F).

Battery Test and Charging Chart (Cont'd)

C: QUICK CHARGE

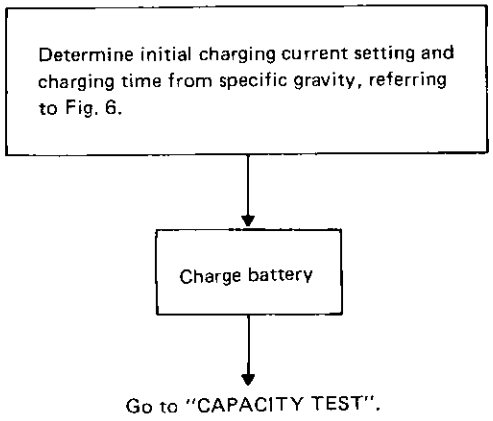


Fig. 6 INITIAL CHARGING CURRENT SETTING AND CHARGING TIME (Quick charge)

BATTERY TYPE / CURRENT [A] / CONVERTED SPECIFIC GRAVITY	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)
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.

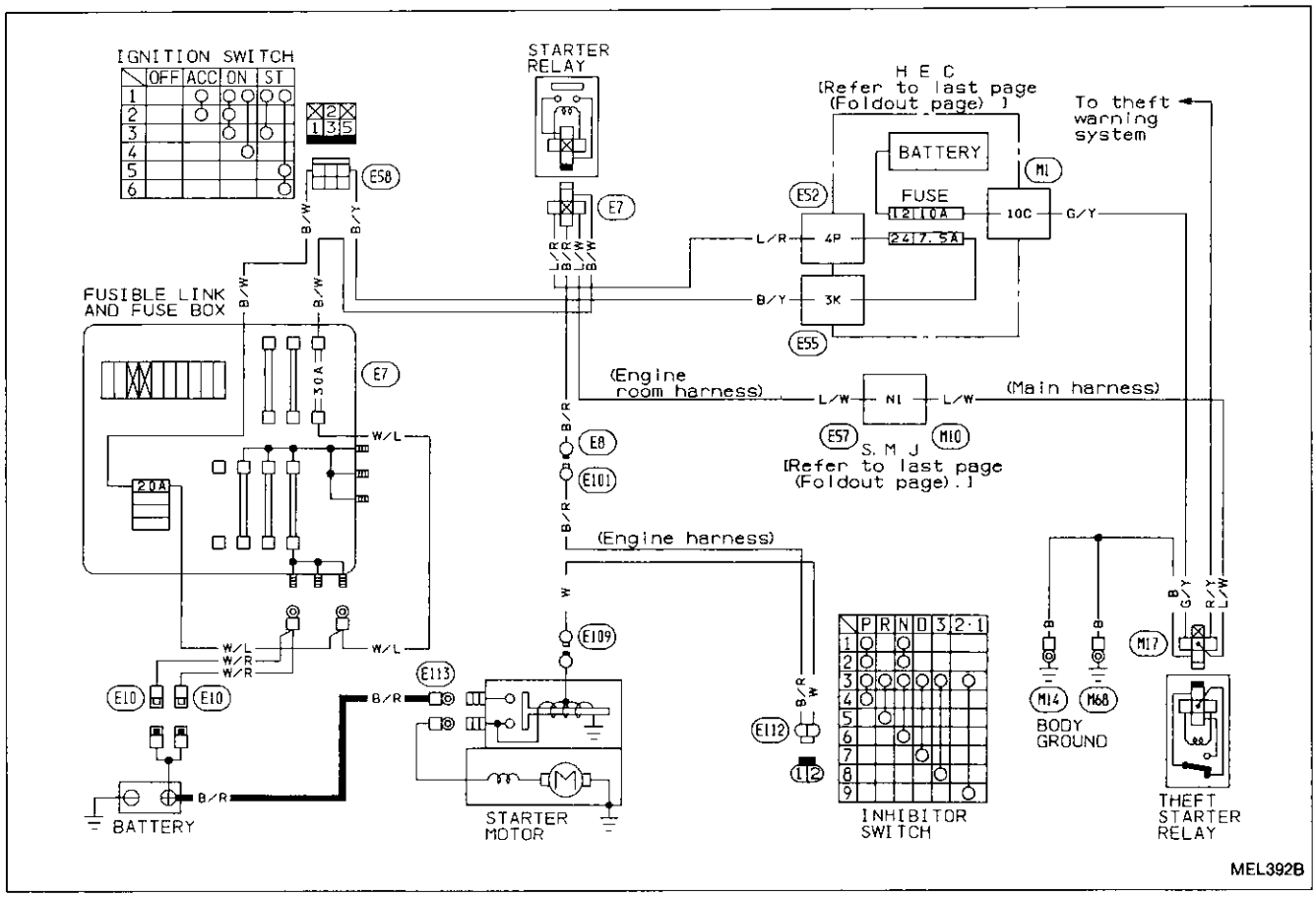
CAUTION:

a. Do not use quick charge method on a battery whose specific gravity is less than 1.100.
b. 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.
c. Keep battery away from open flame while it is being charged.
d. When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.
e. 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).
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 (S.D.S.)

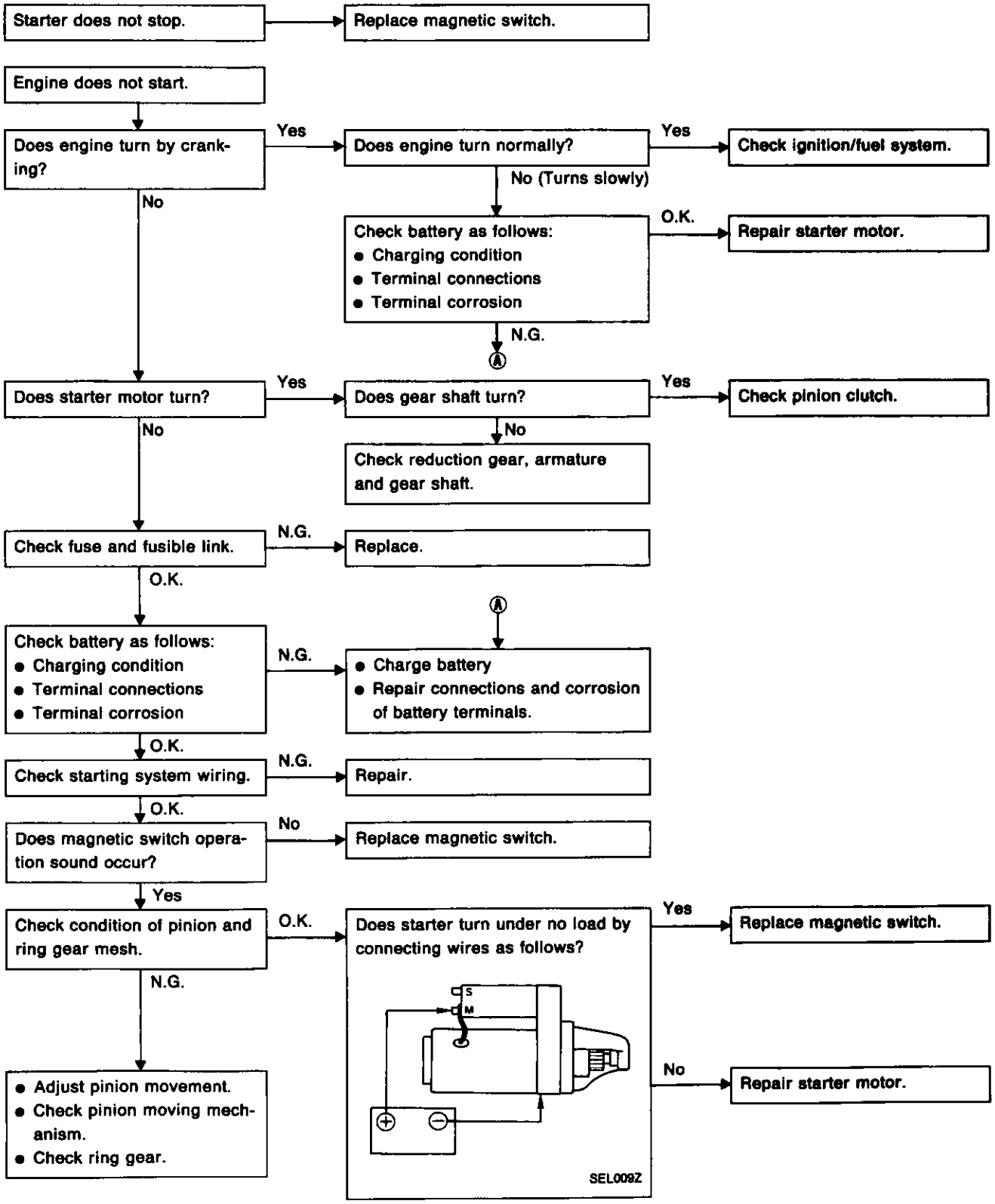
Type		80D26R
Capacity	V-AH	12-65

Wiring Diagram



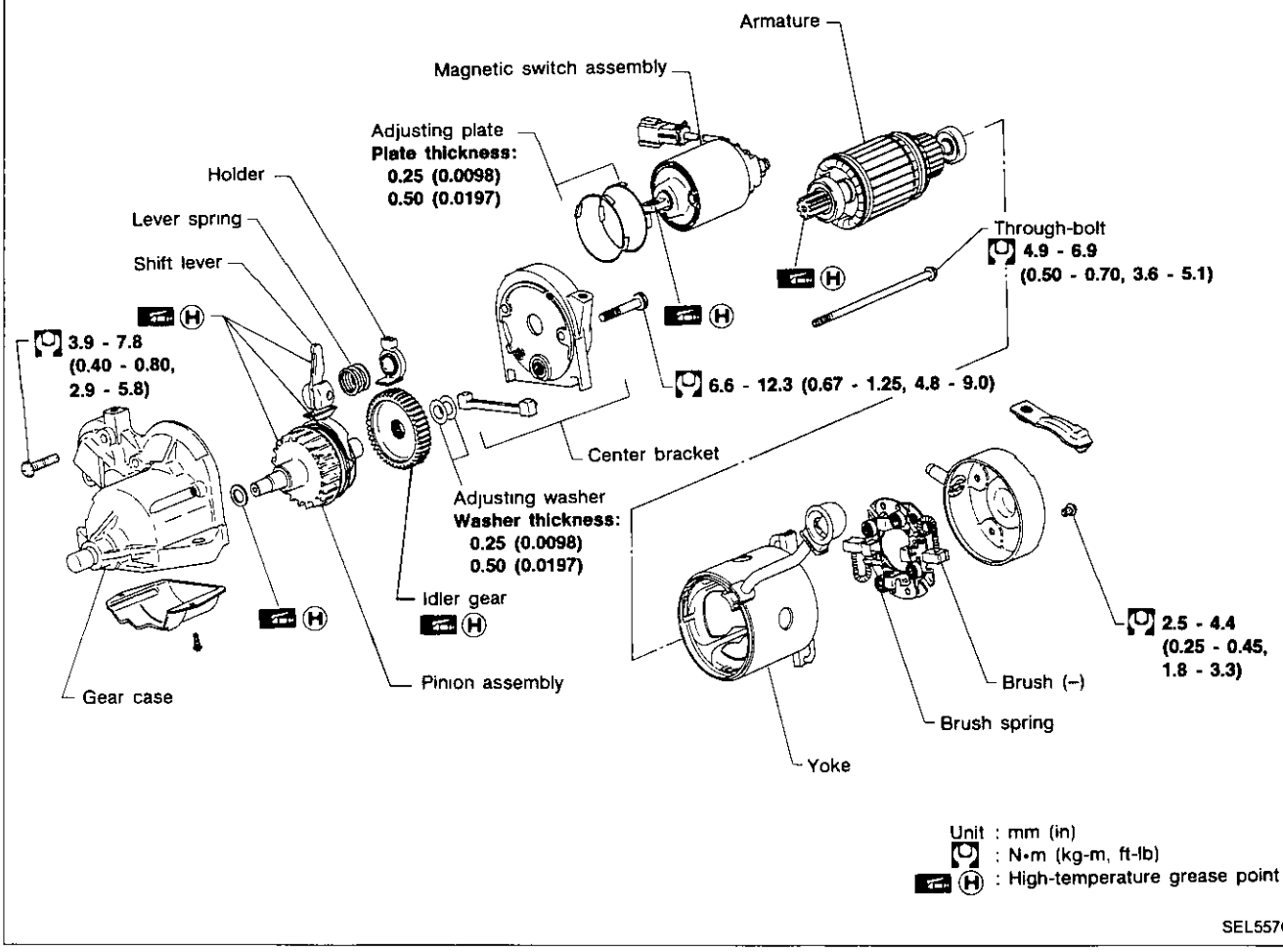
Trouble-shooting

If any abnormality is found, immediately disconnect battery negative terminal.

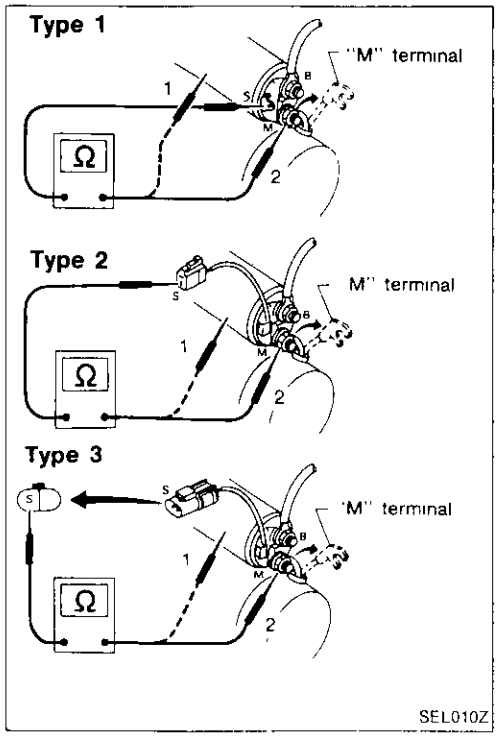


Construction

M2T25281



SEL557Q



SEL010Z

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).

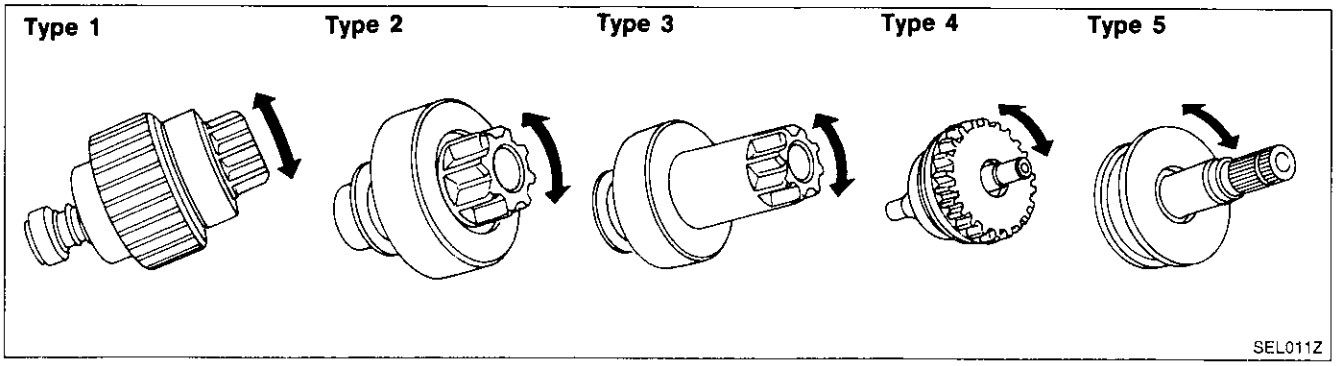
- No continuity ... Replace.

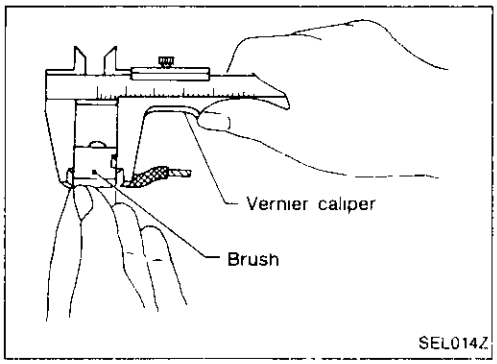
2. Continuity test (between "S" terminal and "M" terminal).

- 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.





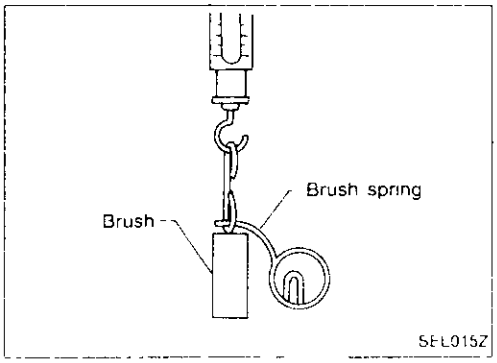
Brush Check

BRUSH

Check wear of brush.

Wear limit length:
Refer to S.D.S.

- Excessive wear ... Replace.



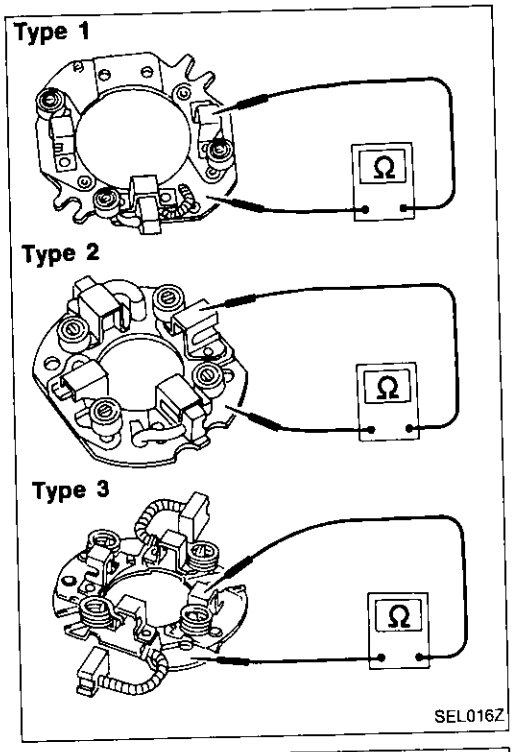
BRUSH SPRING PRESSURE

Check brush spring pressure with brush spring detached from brush.

Spring pressure (with new brush):
Refer to S.D.S.

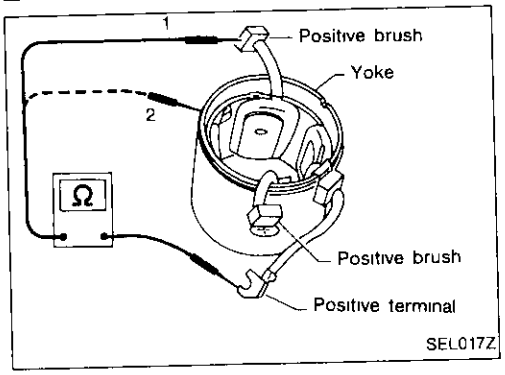
- Not within the specified values ... Replace.

Brush Check (Cont'd)



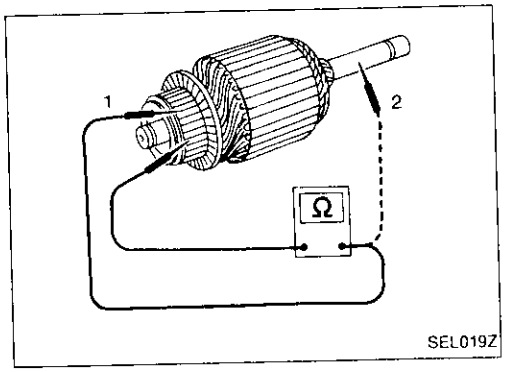
BRUSH HOLDER

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.



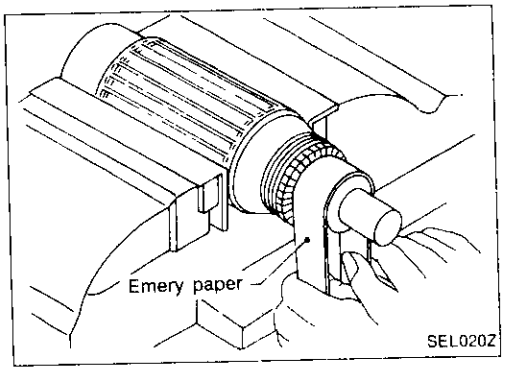
Yoke Check

1. Continuity test (between field coil positive terminal and positive brushes).
- No continuity ... Replace yoke assembly.
2. Insulation test (between field coil positive terminal and yoke).
- Continuity exists. ... Replace yoke assembly.



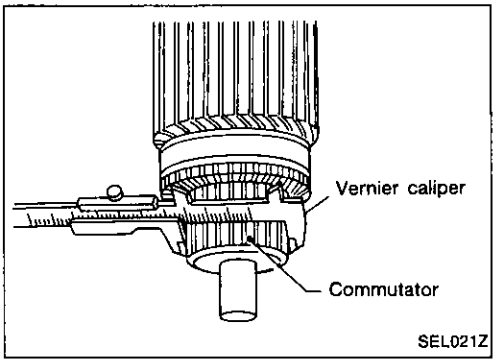
Armature Check

1. Continuity test (between two segments side by side).
- No continuity ... Replace.
2. Insulation test (between each commutator bar and shaft).
- Continuity exists. ... Replace.

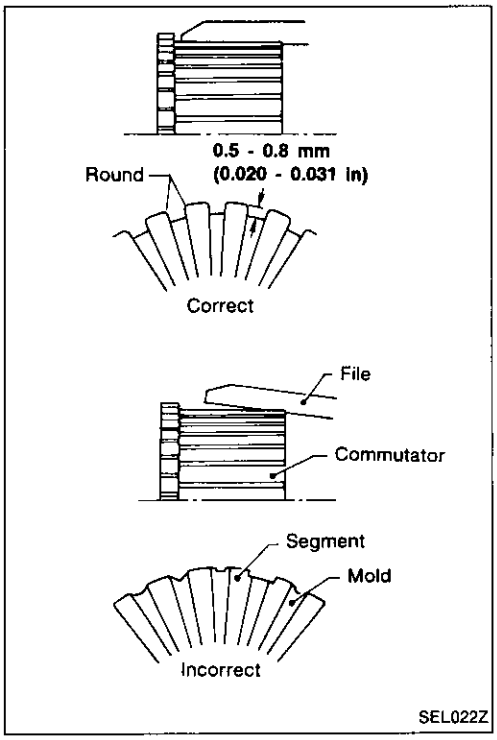


3. Check commutator surface.
- Rough ... Sand lightly with No. 500 - 600 emery paper.

Armature Check (Cont'd)



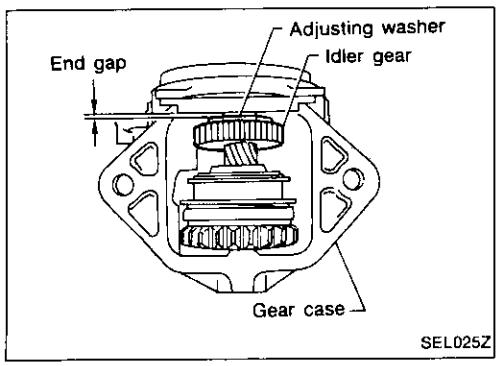
4. Check diameter of commutator.
   Commutator minimum diameter:
   Refer to S.D.S.
- Less than specified value ... Replace.



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)

Assembly

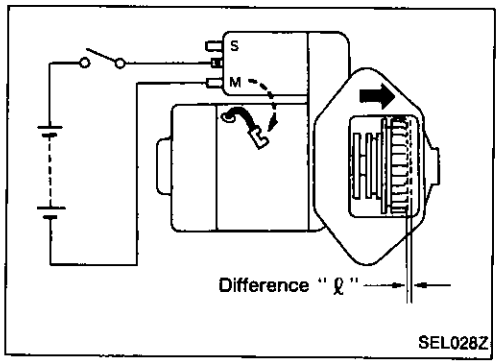
Apply high-temperature grease to lubricate the bearing, gears and frictional surface when assembling the starter.
Carefully observe the following instructions.



END GAP ADJUSTMENT

Check end gap by turning idle gear in axial direction.
End gap:
0.1 - 0.5 mm (0.004 - 0.020 in)
- Not in the specified value ... Adjust by adjusting washer.

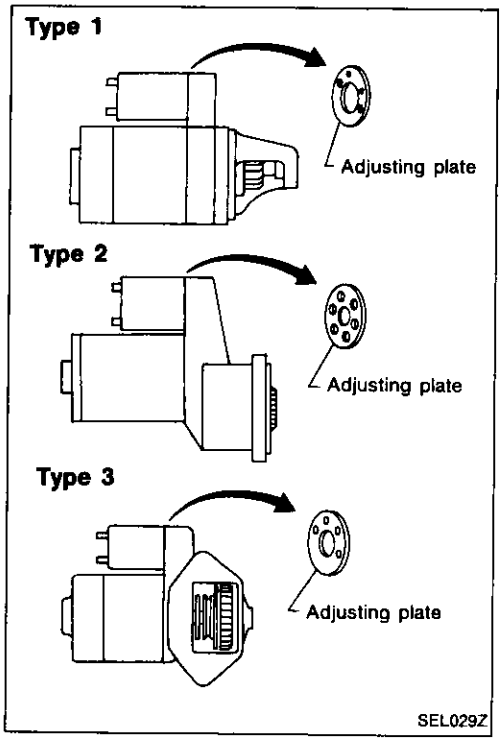
Assembly (Cont'd)



PINION PROTRUSION LENGTH ADJUSTMENT

Measure difference in height "ℓ" of pinion assembly front edge when pinion assembly is forced out by the magnetic switch and then when it is pulled out by hand.

Difference "ℓ":
Refer to S.D.S.



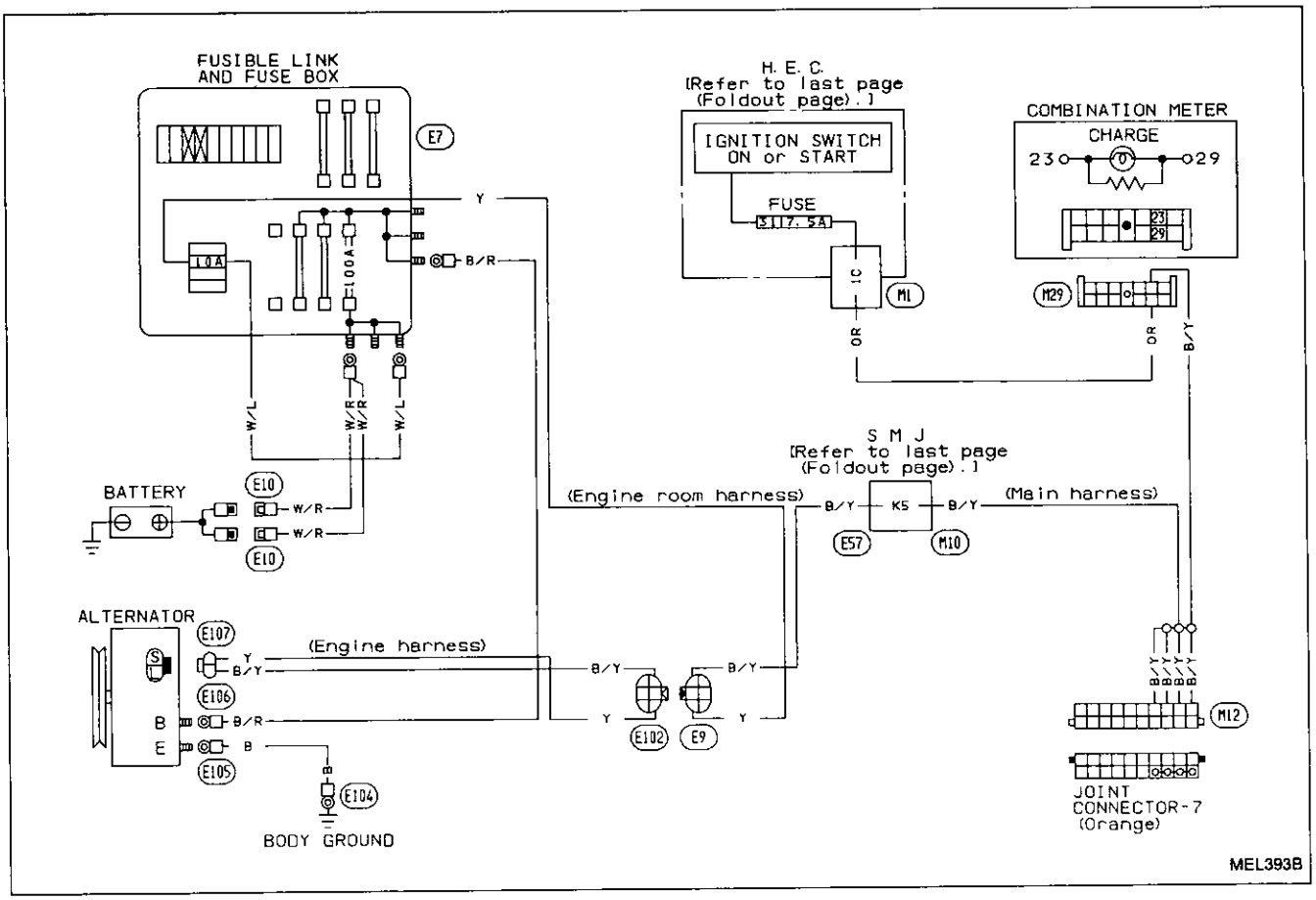
- Not in the specified value ... Adjust by adjusting plate.

Service Data and Specifications (S.D.S.)

STARTER

Type			M2T25281
			Reduction gear
System voltage		V	12
No-load	Terminal voltage	V	11.0
	Current	A	70
	Revolution	rpm	More than 2,000
Minimum length of brush		mm (in)	11.5 (0.453)
Brush spring tension (With new brush)		N (kg, lb)	13.7 - 25.5 (1.4 - 2.6, 3.1 - 5.7)
Minimum diameter of commutator		mm (in)	31.4 (1.236)
Difference "ℓ" in height of pinion assembly		mm (in)	0.3 - 2.0 (0.012 - 0.079)

Wiring Diagram

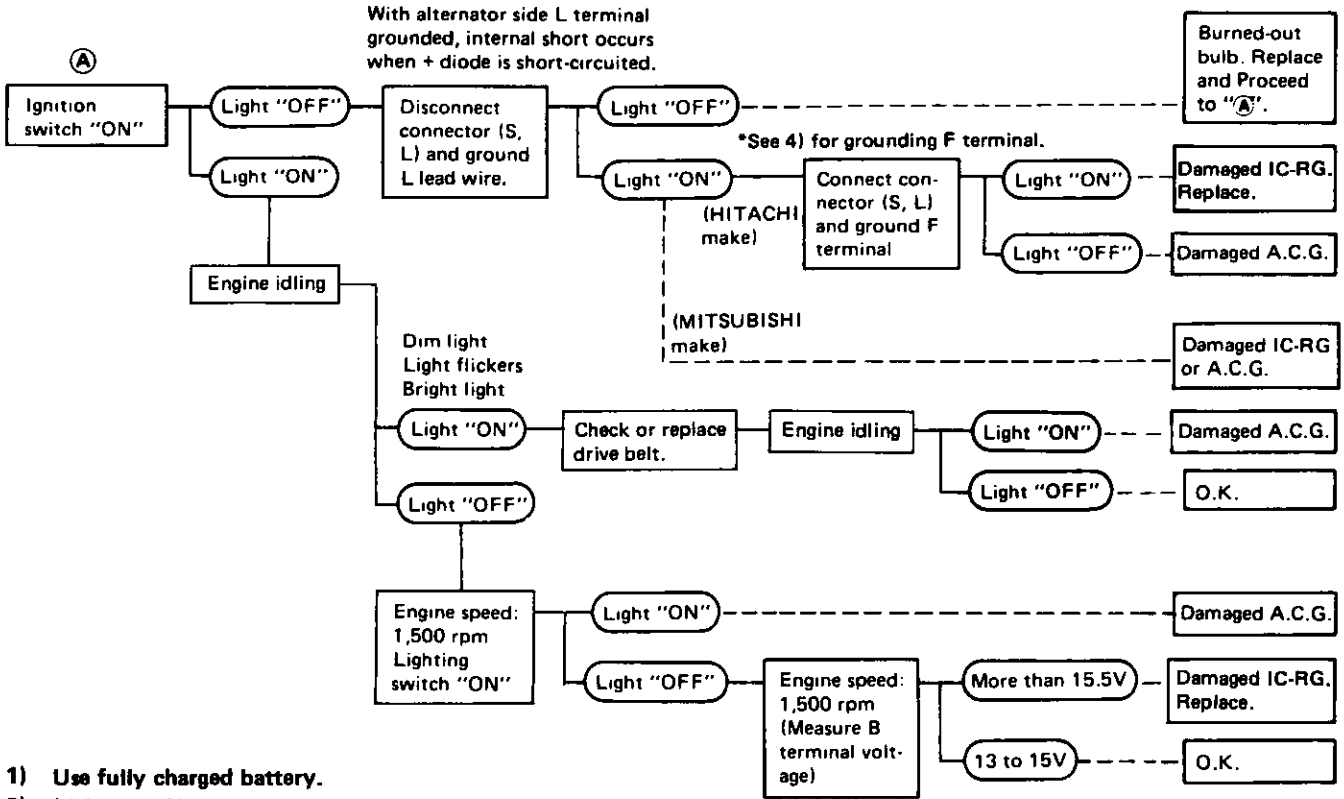


Trouble-shooting

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.

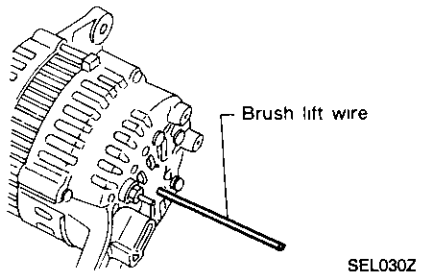
WITH IC REGULATOR



1) **Use fully charged battery.**
2) **Light : Charge warning light**
   A.C.G. : Alternator parts except IC regulator
   IC-RG : IC regulator
   O.K. : IC-alternator is in good condition.
3) **When reaching "Damaged A.C.G.", remove alternator from vehicle and disassemble, inspect and correct or replace faulty parts.**
4) ***Method of grounding F terminal (HITACHI make only)**

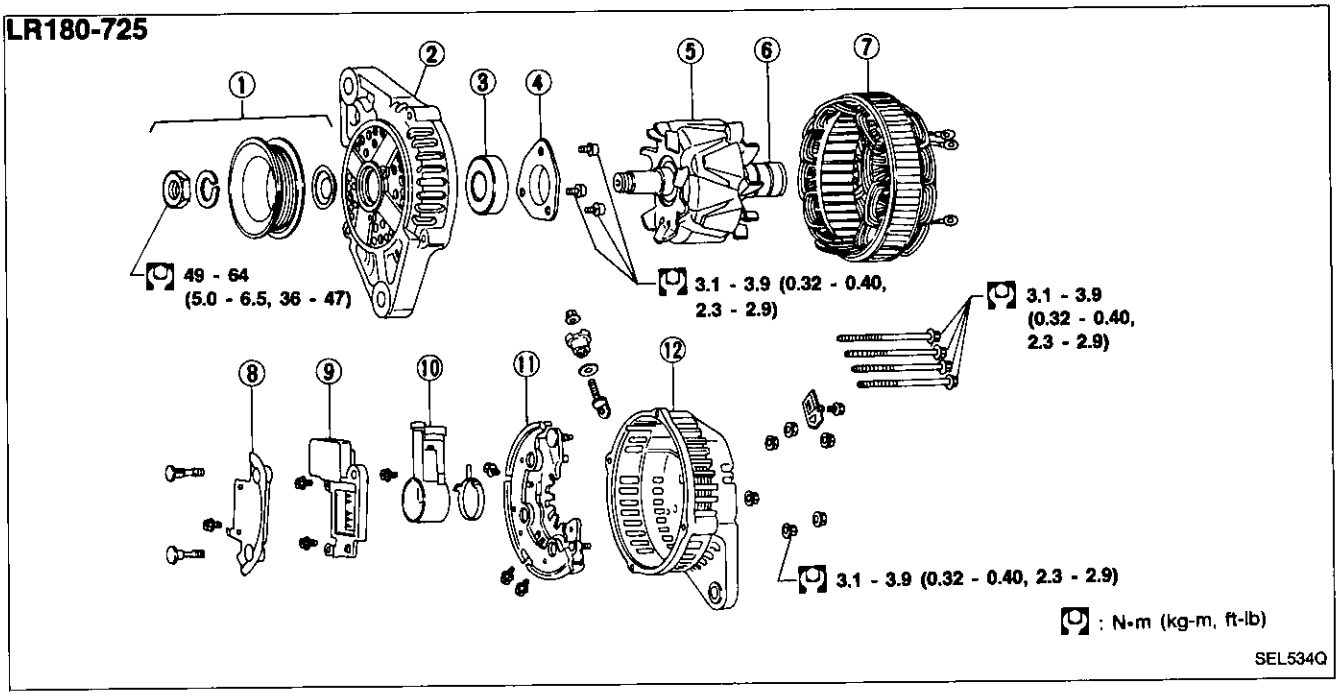
Gasoline engine model

Contact tip of wire with brush and attach wire to alternator body.

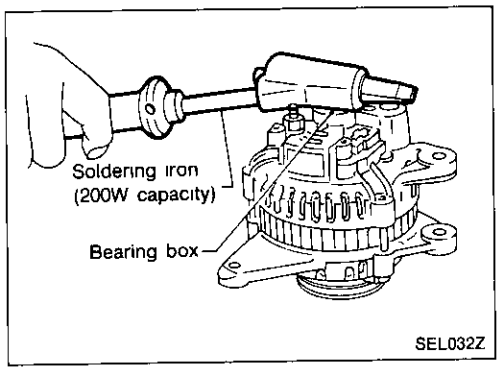


5) **Terminals "S", "L", "B" and "E" are marked on rear cover of alternator.**

Construction



① Pulley assembly
② Front cover
③ Front bearing
④ Retainer
⑤ Rotor
⑥ Slip ring
⑦ Stator
⑧ Condenser
⑨ IC regulator assembly
⑩ Brush holder
⑪ Diode assembly
⑫ Rear cover



Disassembly

REAR COVER REMOVAL

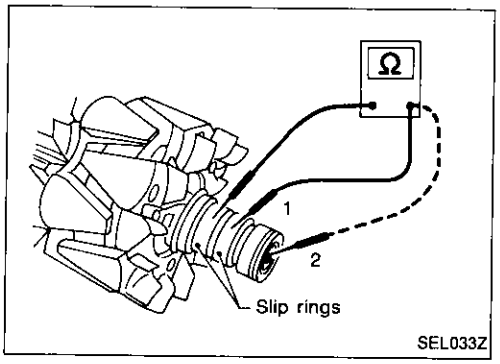
CAUTION:

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

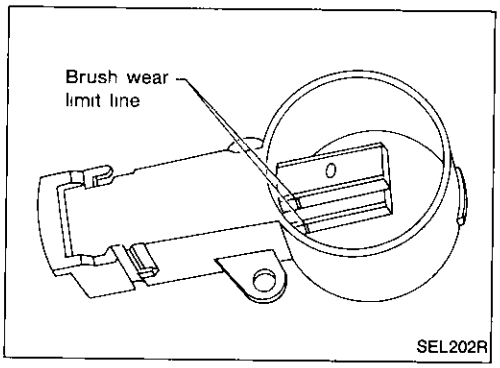
CAUTION:

- **Do not reuse rear bearing after removal. Replace with a new one.**
- **Do not lubricate rear bearing outer race.**



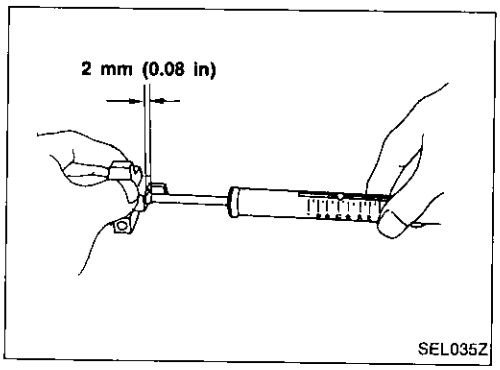
Rotor Check

1. Resistance test
   Resistance: Refer to S.D.S.
   - 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 S.D.S.
   - Not within the specified values ... Replace rotor.

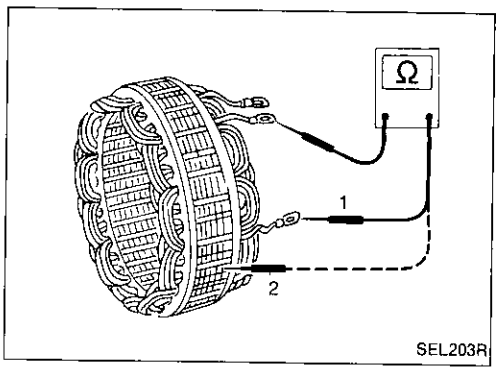


Brush Check

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.



3. Check brush lead wire for damage.
   - Damaged ... Replace.
4. Check brush spring pressure.
   Measure brush spring pressure with brush projected approximately 2 mm (0.08 in) from brush holder.
   Spring pressure:
   Refer to S.D.S.
   - Not within the specified values ... Replace.



Stator Check

1. Continuity test
   - No continuity ... Replace stator.
2. Ground test
   - Continuity exists ... Replace stator.

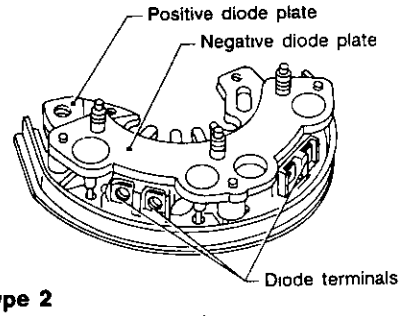
Diode Check

MAIN DIODES

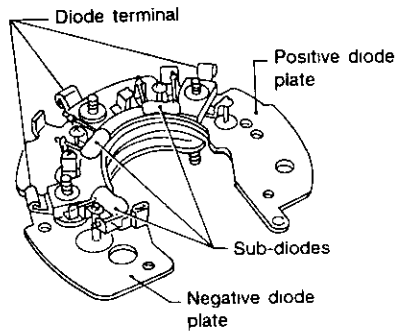
- Use an ohmmeter to check condition of diodes as indicated in chart below.
- If any of the test results is not satisfactory, replace diode assembly.

	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	

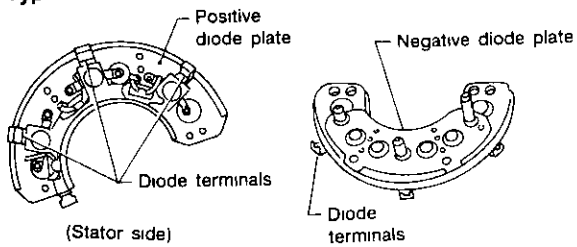
Type 1



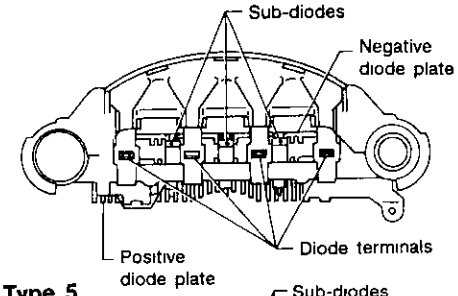
Type 2



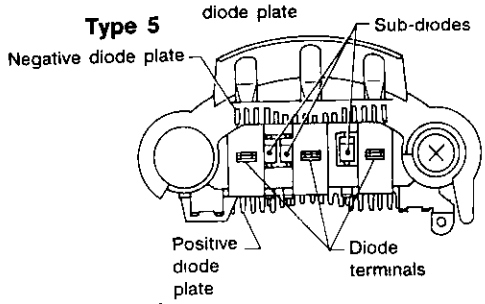
Type 3



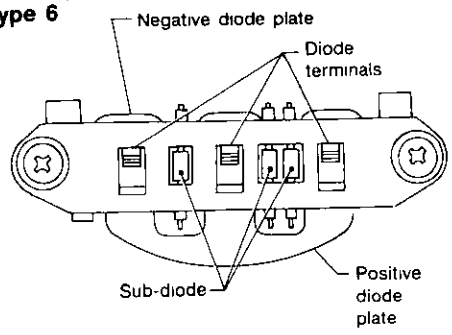
Type 4



Type 5



Type 6

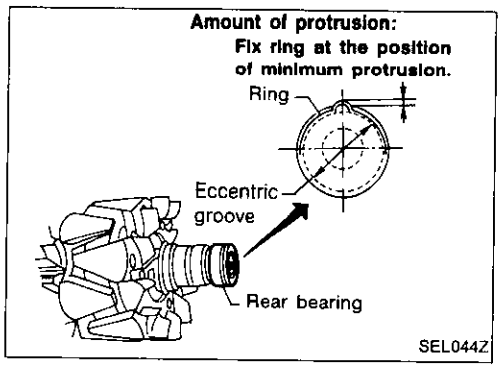


SEL039Z

Assembly

Carefully observe the following instructions.

- When soldering each stator coil lead wire to diode assembly terminal, carry out the operation as fast as possible.

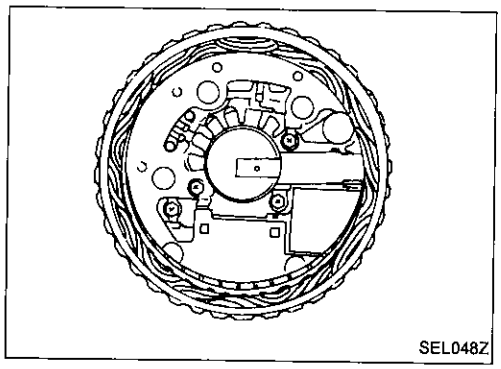


RING FITTING IN REAR BEARING

- 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.

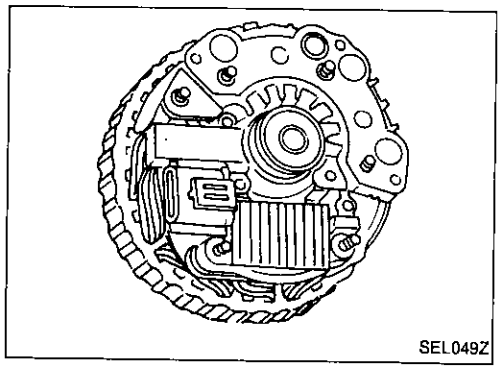


REAR COVER INSTALLATION

(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.

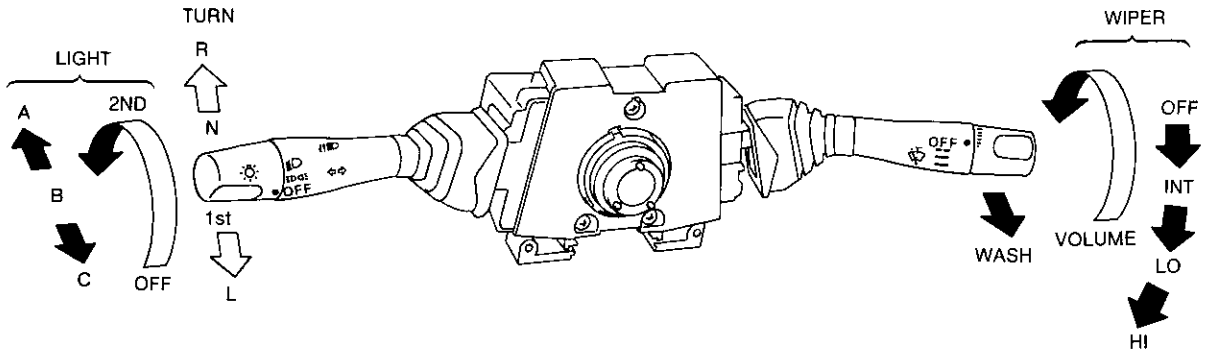


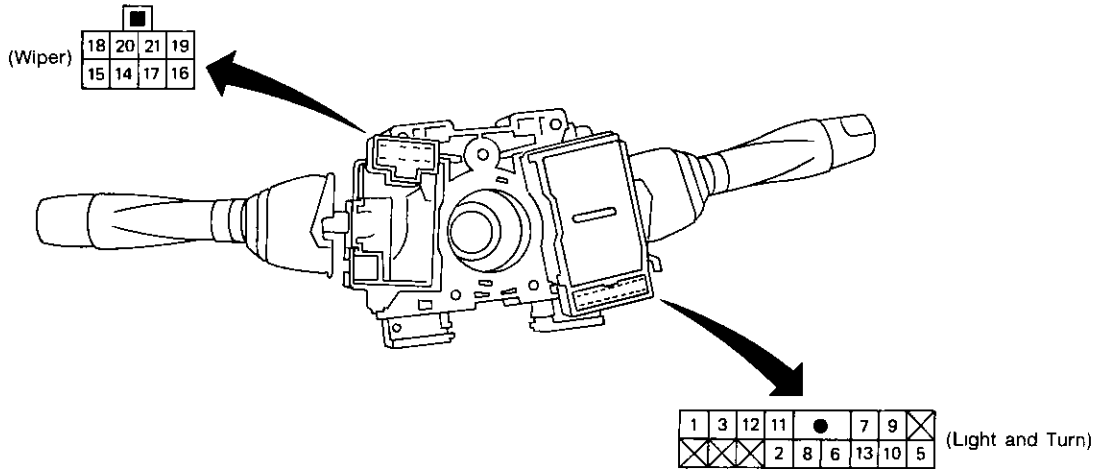
Service Data and Specifications (S.D.S.)

ALTERNATOR

Type		LR190-717
		HITACHI
Nominal rating	V-A	12-90
Ground polarity		Negative
Minimum revolution under no-load (When 13.5 volts is applied)	rpm	Less than 1,000
Hot output current	A/rpm	More than 23/1,300 More than 63/2,500 More than 87/5,000
Regulated output voltage	V	14.1 - 14.7
Minimum length of brush	mm (in)	6.0 (0.236)
Brush spring pressure	N (g, oz)	1.000 - 3.432 (102 - 350, 3.60 - 12.34)
Slip ring minimum diameter	mm (in)	More than 26.0 (1.024)
Rotor (Field coil) resistance	Ω	3.4

Combination Switch/Check





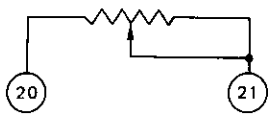
LIGHTING SWITCH

	OFF	1	2
5		○	○ ○ ○ ○ ○
6		○	○ ○ ○ ○ ○
7	○		○ ○ ○ ○ ○
8			○ ○ ○
9	○		○ ○ ○ ○ ○
10			○ ○ ○
11	○	○	○
12	○	○	○
13	○	○	○

WIPER SWITCH

	OFF	INT	LO	HI	WASH
14	○	○			
15	○	○	○		
16		○	○		
17		○	○	○	
18		○	○	○	○
19					○

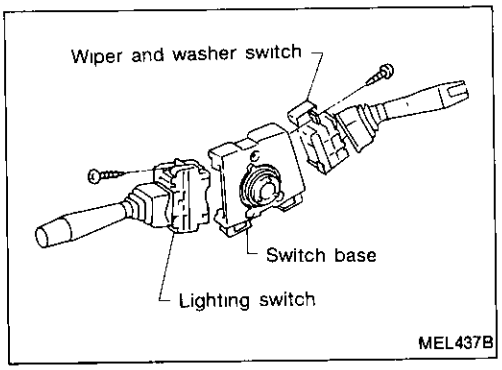
INTERMITTENT WIPER VOLUME



TURN SIGNAL SWITCH

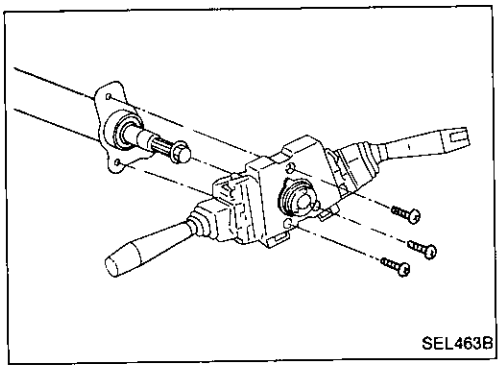
	R	N	L
1	○		○
2	○		
3			○

MEL430B



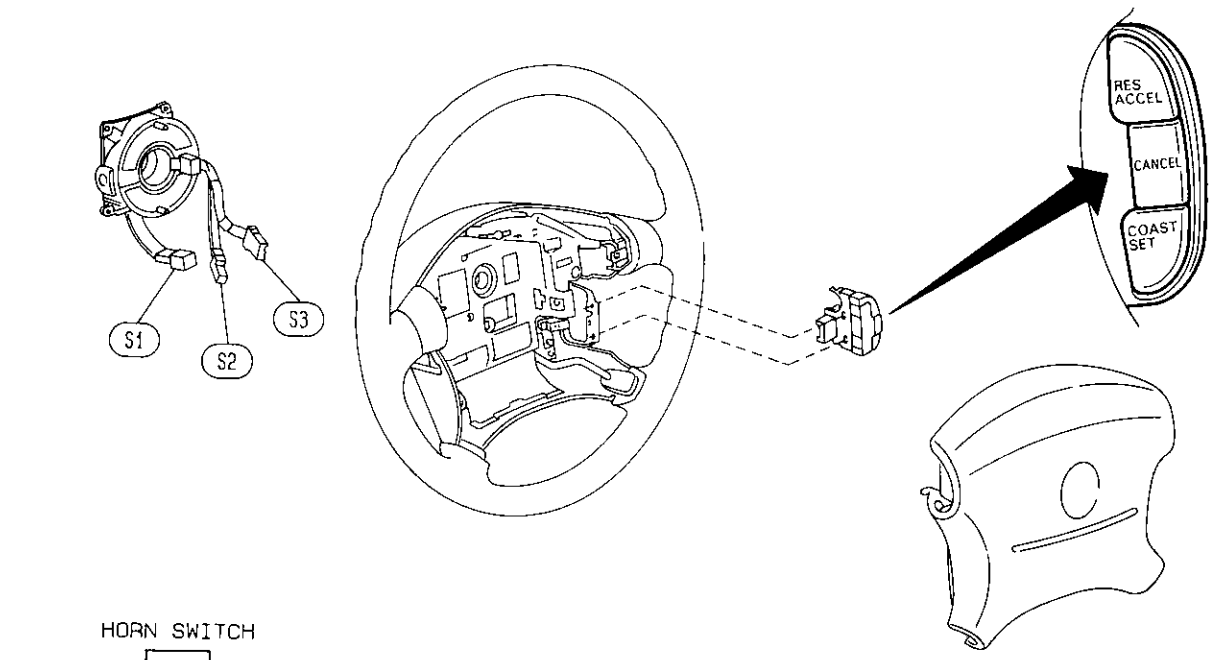
Combination Switch/Replacement

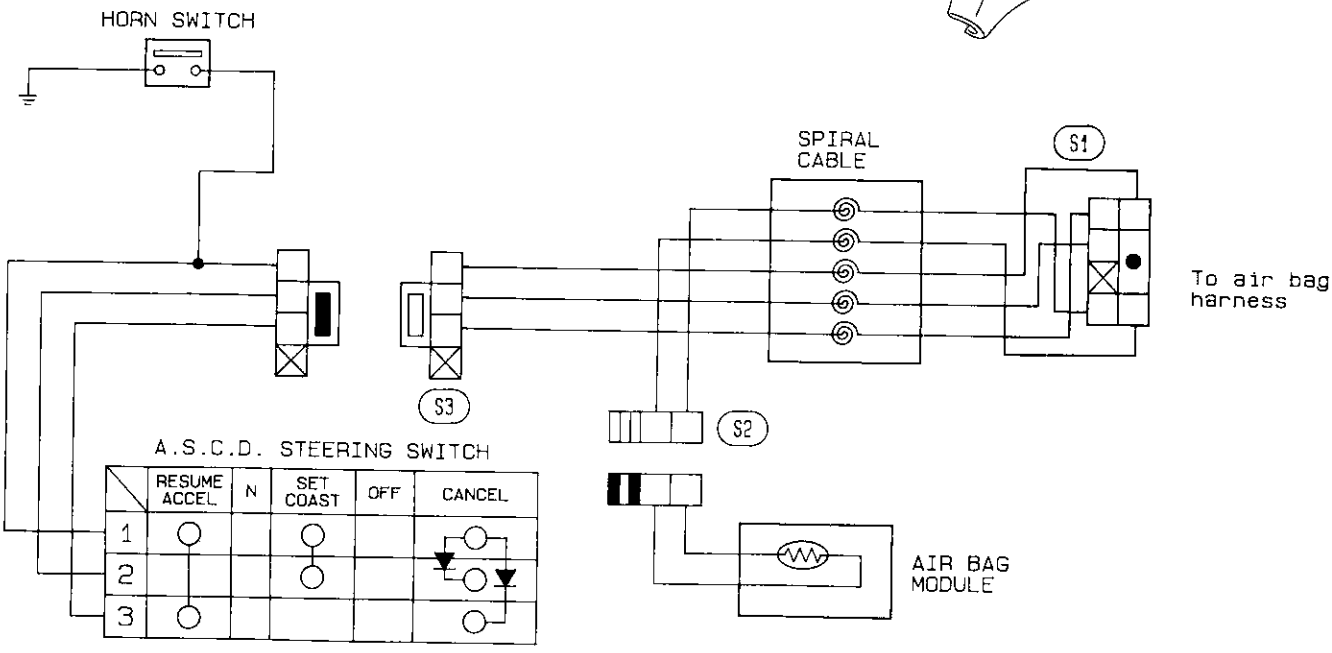
- Each switch can be replaced without removing combination switch base.



- To remove combination switch base, remove base attaching screw.

Steering Switch/Check

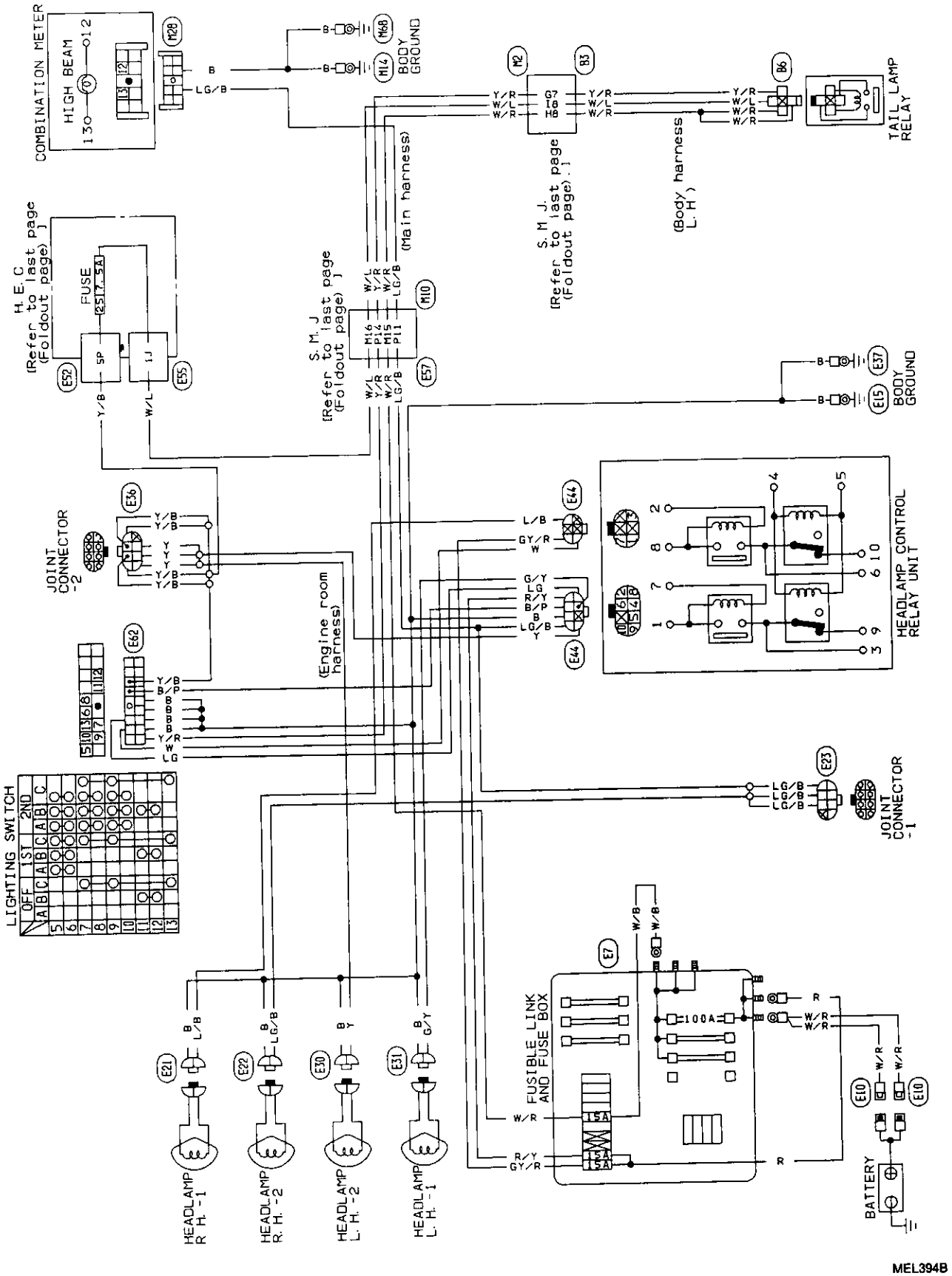




MEL454B

Wiring Diagram

FOR U.S.A.



MEL394B

Operation (Daytime light system for Canada)

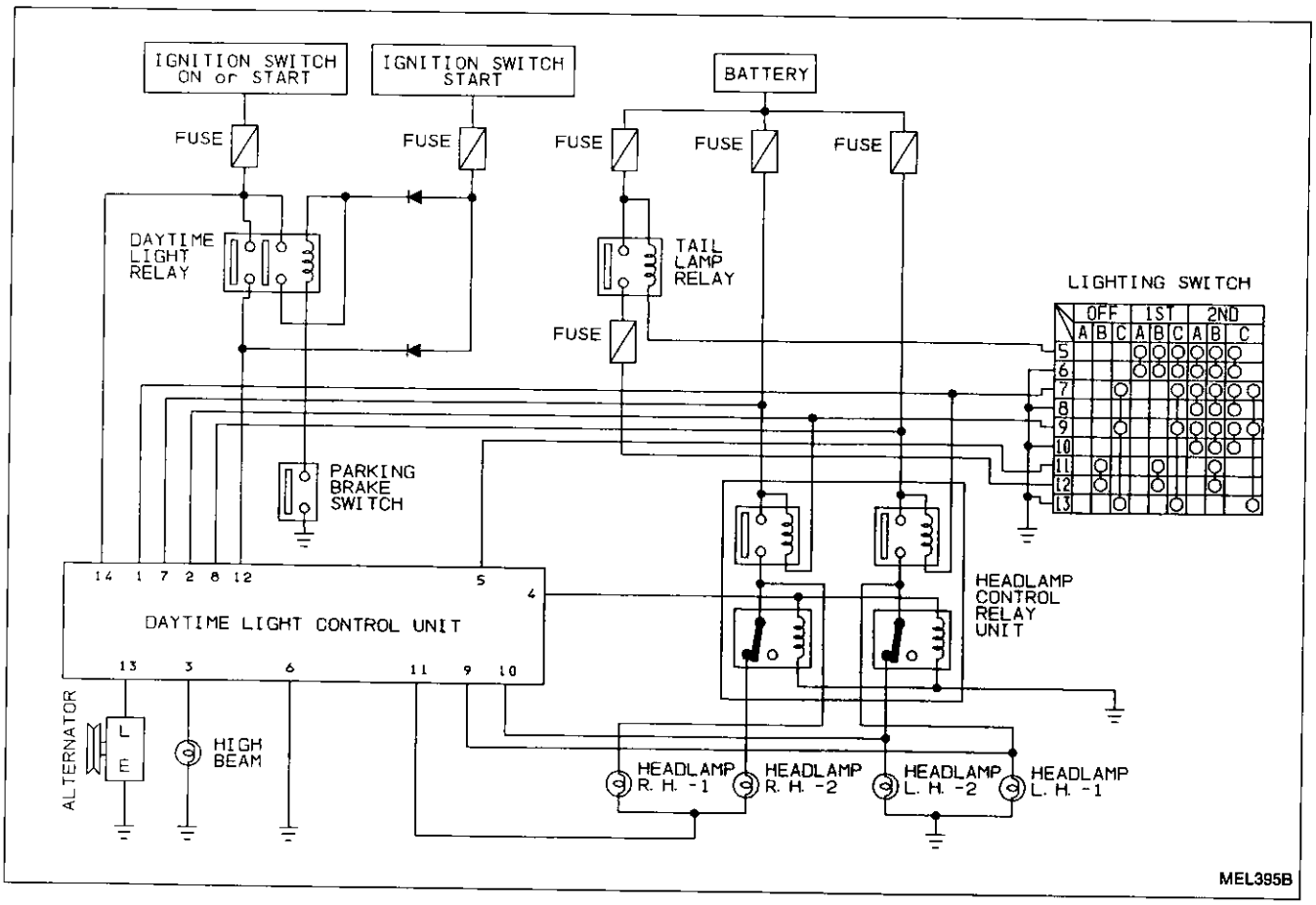
After starting the engine with the lighting switch in the "OFF" position or "1ST" position, the headlamp high beam automatically turns on. Lighting switch operations other than the above are the same as conventional light systems.

Engine		With engine stopped									With engine running								
Lighting switch		OFF			1ST			2ND			OFF			1ST			2ND		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Headlamp	High beam	×	×	○	×	×	○	○	×	○	△	△	○	△	△	○	○	×	○
	Low beam	×	×	×	×	×	×	×	○	×	×	×	×	×	×	×	×	○	×
Clearance and tail lamp		×	×	×	○	○	○	○	○	○	×	×	×	○	○	○	○	○	○
License and instrument illumination lamp		×	×	×	○	○	○	○	○	○	×	×	×	○	○	○	○	○	○

○: Lamp "ON"
×: Lamp "OFF"
△: Lamp dims.
□: Added functions

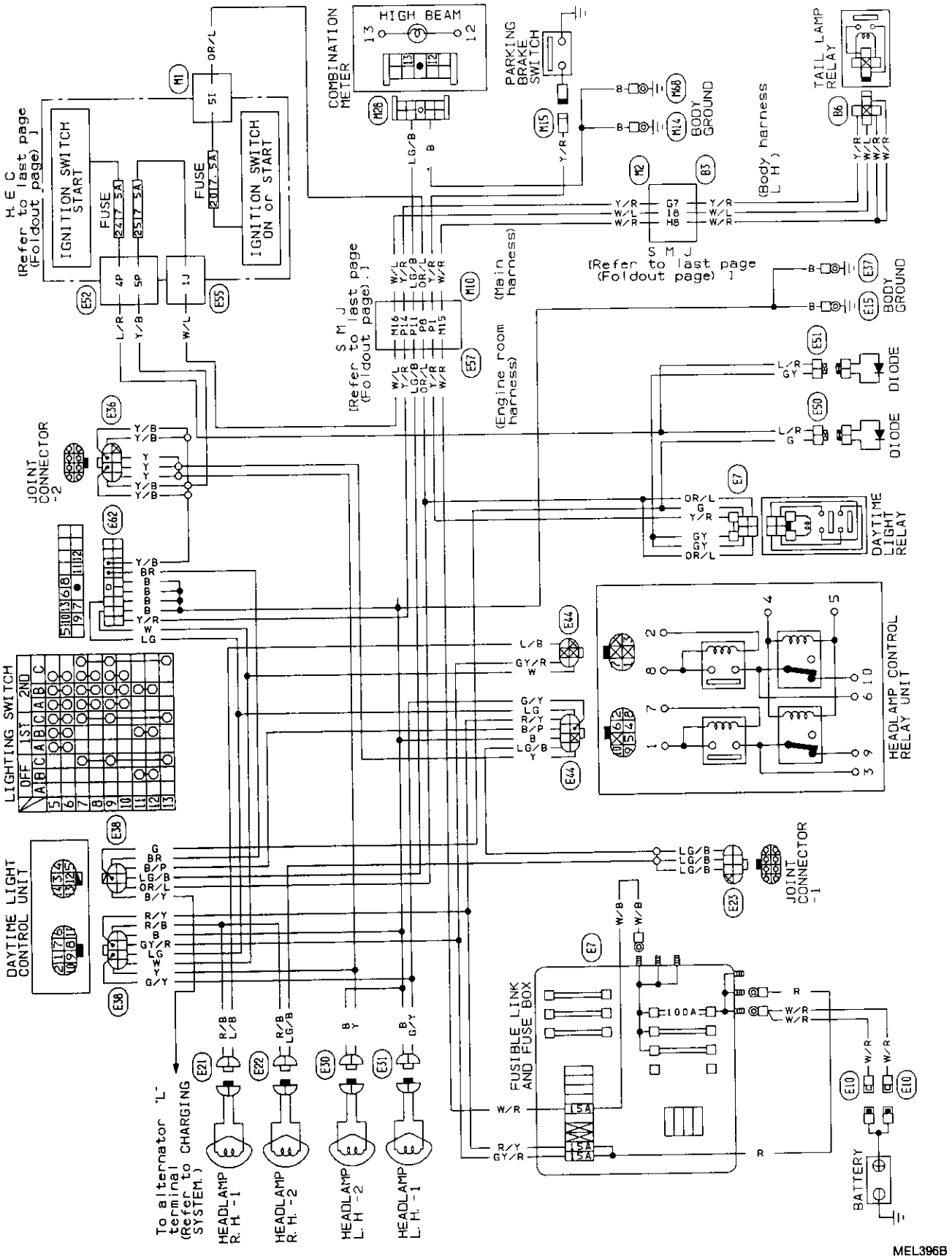
Schematic

FOR CANADA

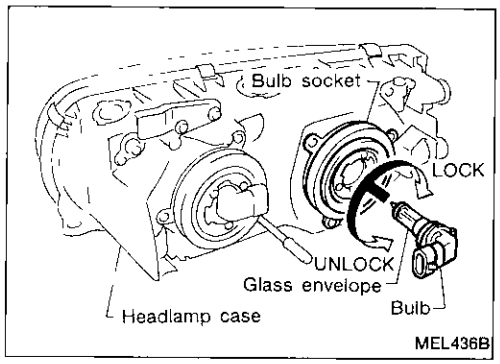


Wiring Diagram

FOR CANADA



MEL396B



Bulb Replacement

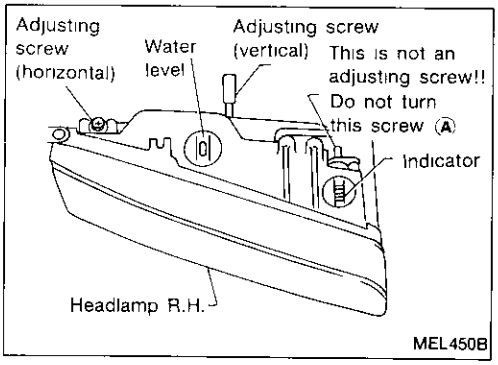
The headlamp is a semi-sealed beam type which uses a replaceable halogen bulb. The bulb can be replaced from the engine compartment side without removing the headlamp body.

- **Grasp only the plastic base when handling the bulb. Never touch the glass envelope.**

1. Disconnect the battery cable.
2. Turn the bulb retaining ring counterclockwise until it is free from the headlamp reflector, and then remove it.
3. Disconnect the harness connector from the back side of the bulb.
4. Remove the headlamp bulb carefully. Do not shake or rotate the bulb when removing it.
5. Install in the reverse order of removal.

CAUTION:

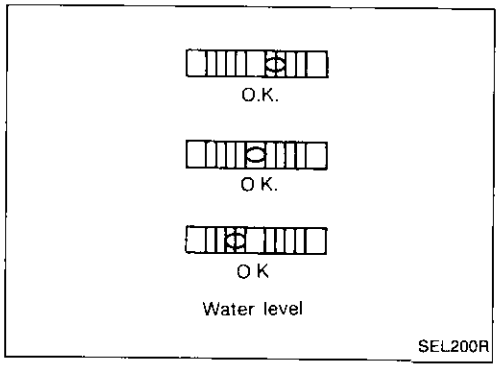
- **Do not leave the bulb out of the headlamp reflector for a long period of time as dust, moisture, smoke, etc. may enter the headlamp body and affect the performance of the headlamp. Thus, the headlamp bulb should not be removed from the headlamp reflector until just before a replacement bulb is to be installed.**



Aiming Adjustment

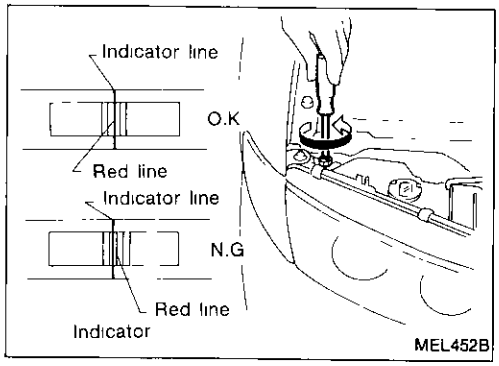
Before performing aiming adjustment, make sure of the following.

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.



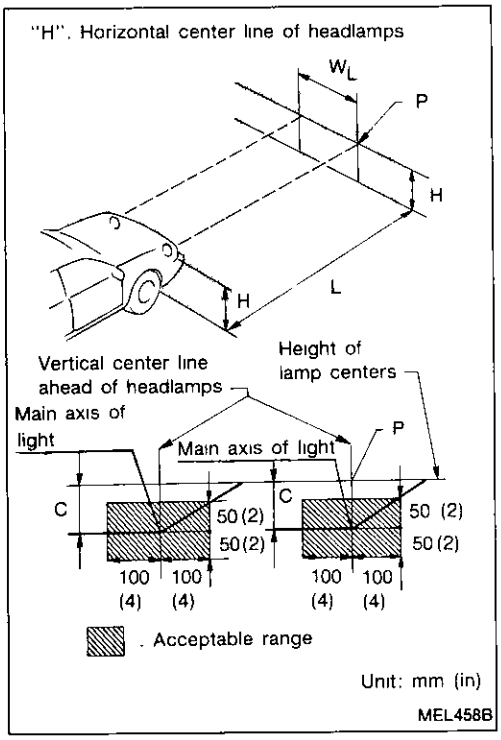
LOW BEAM

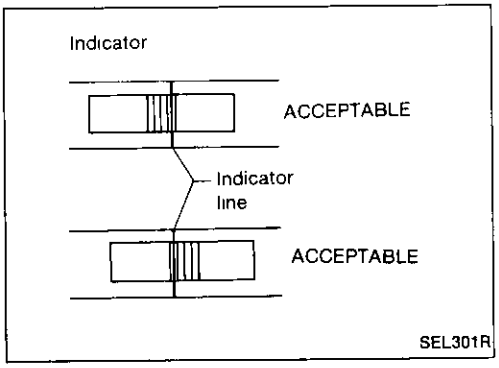
1. Open the hood.
2. Adjust water level by turning the adjusting screw (vertical direction).
   The bubble should be centered in the gauge as shown in the illustration.



3. Adjust indicator by turning the adjusting screw with a Philips screwdriver. (horizontal direction)
   The inner red line should align with the indicator line.
   Never turn screw Ⓐ.

Aiming Adjustment (Cont'd)





ADJUSTMENT AFTER HEADLAMP ASSEMBLY REPLACEMENT

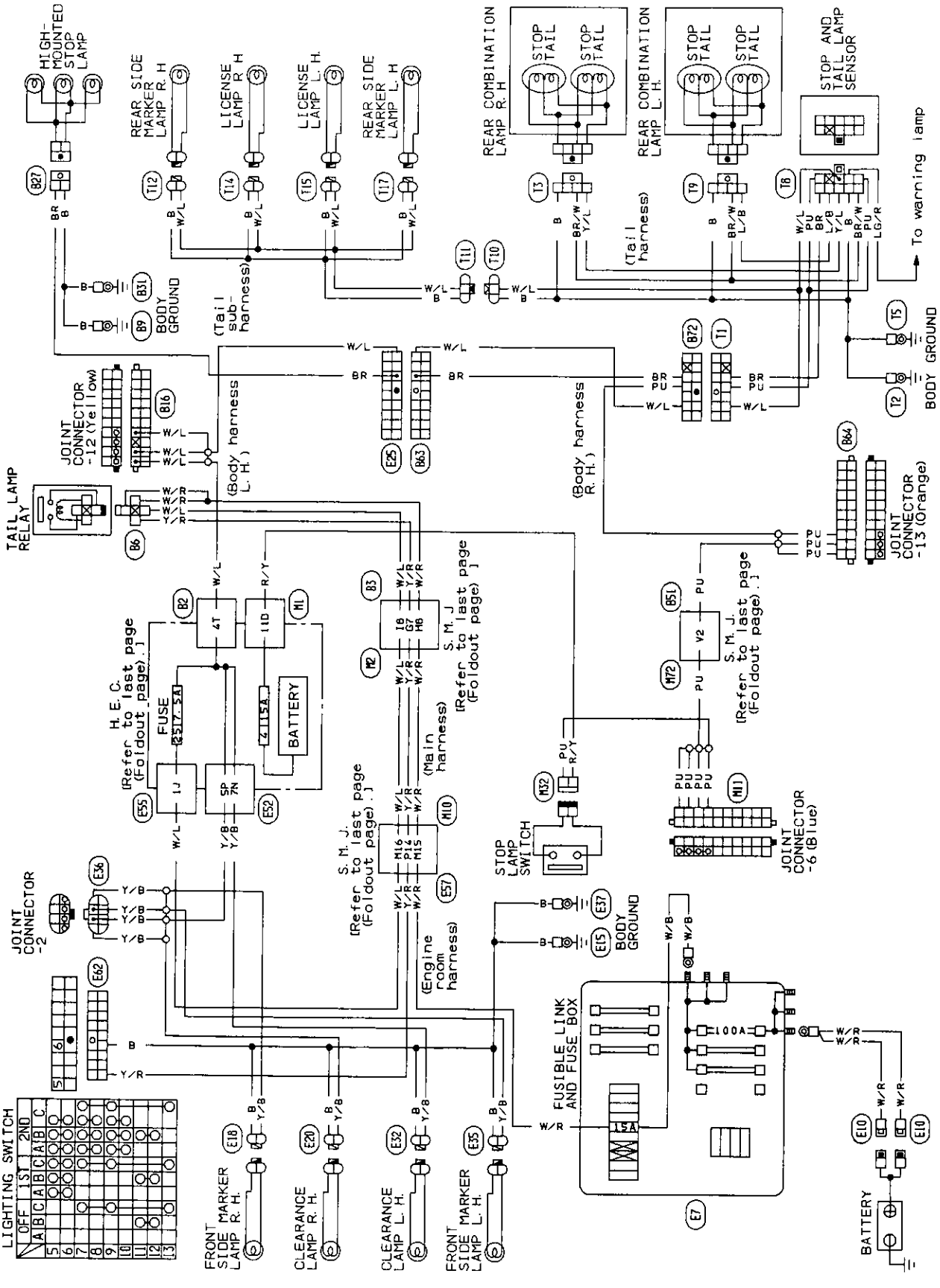
If the vehicle has had front body repair and the headlamp assembly has been replaced, the aiming should be checked using the aiming chart as shown in the illustration.

a. Adjust headlamps so that main axis of light is parallel to center line of body and is aligned with point P shown in the illustration.

b. Dotted lines in illustration show center of headlamp.
- **"H": Horizontal center line of headlamps**
- **"W_L": Distance between each headlamp center**
- **"L": 7,620 mm (300.00 in)**
- **"C": 75 mm (2.95 in)**

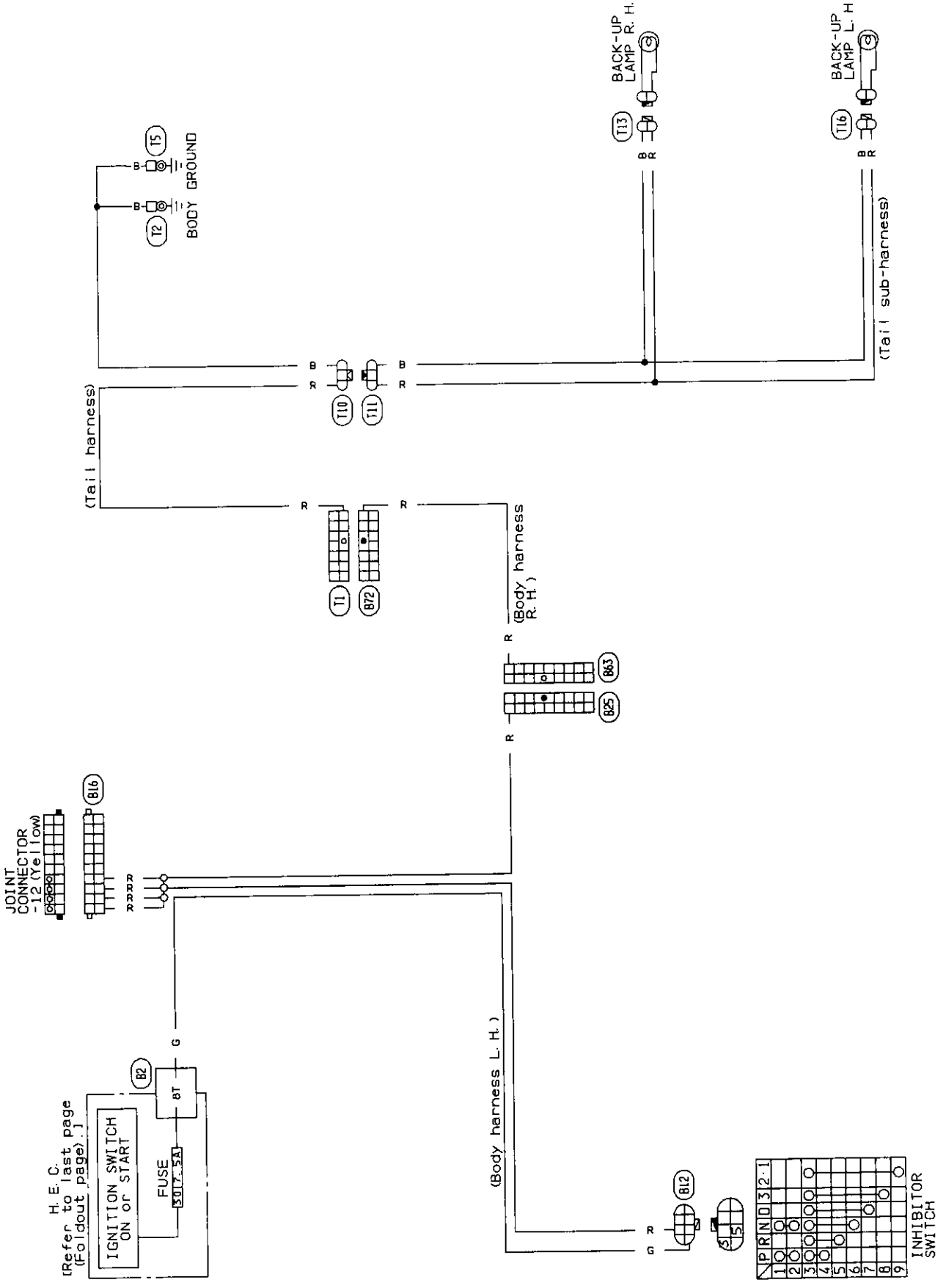
Even if the horizontal indicator does not align with the indicator line after aiming by the chart, the following variations are acceptable.

Clearance, License, Tail and Stop Lamps/Wiring Diagram



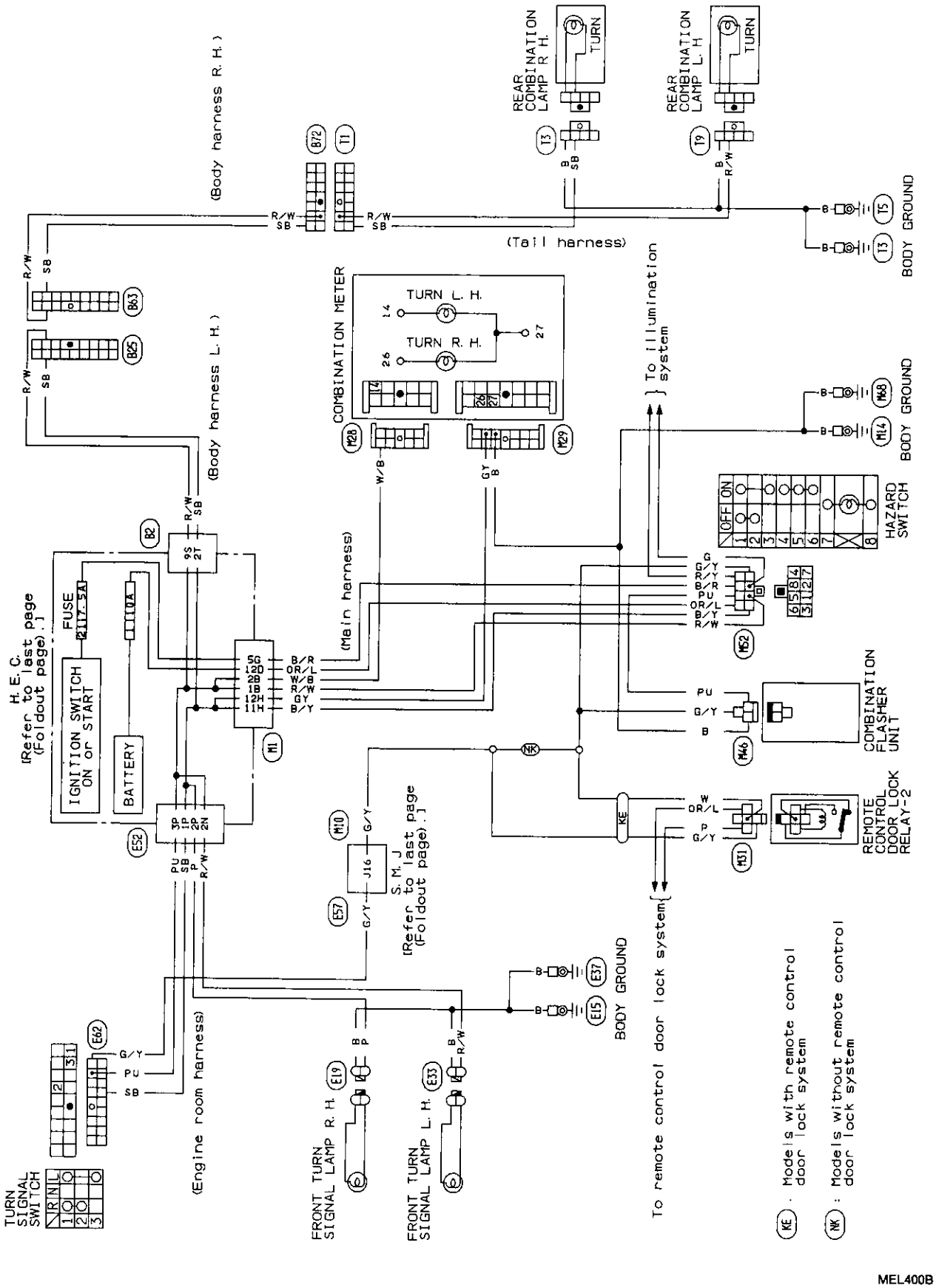
MEL397B

Back-up Lamp/Wiring Diagram

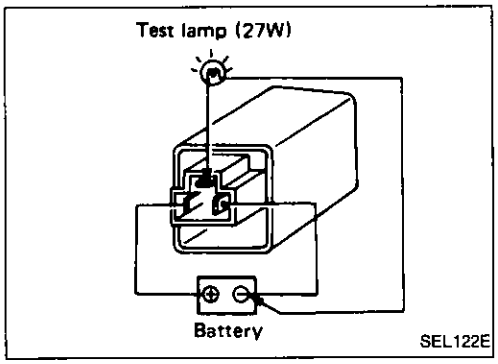


MEL398B

Turn Signal and Hazard Warning Lamps/Wiring Diagram



MEL400B



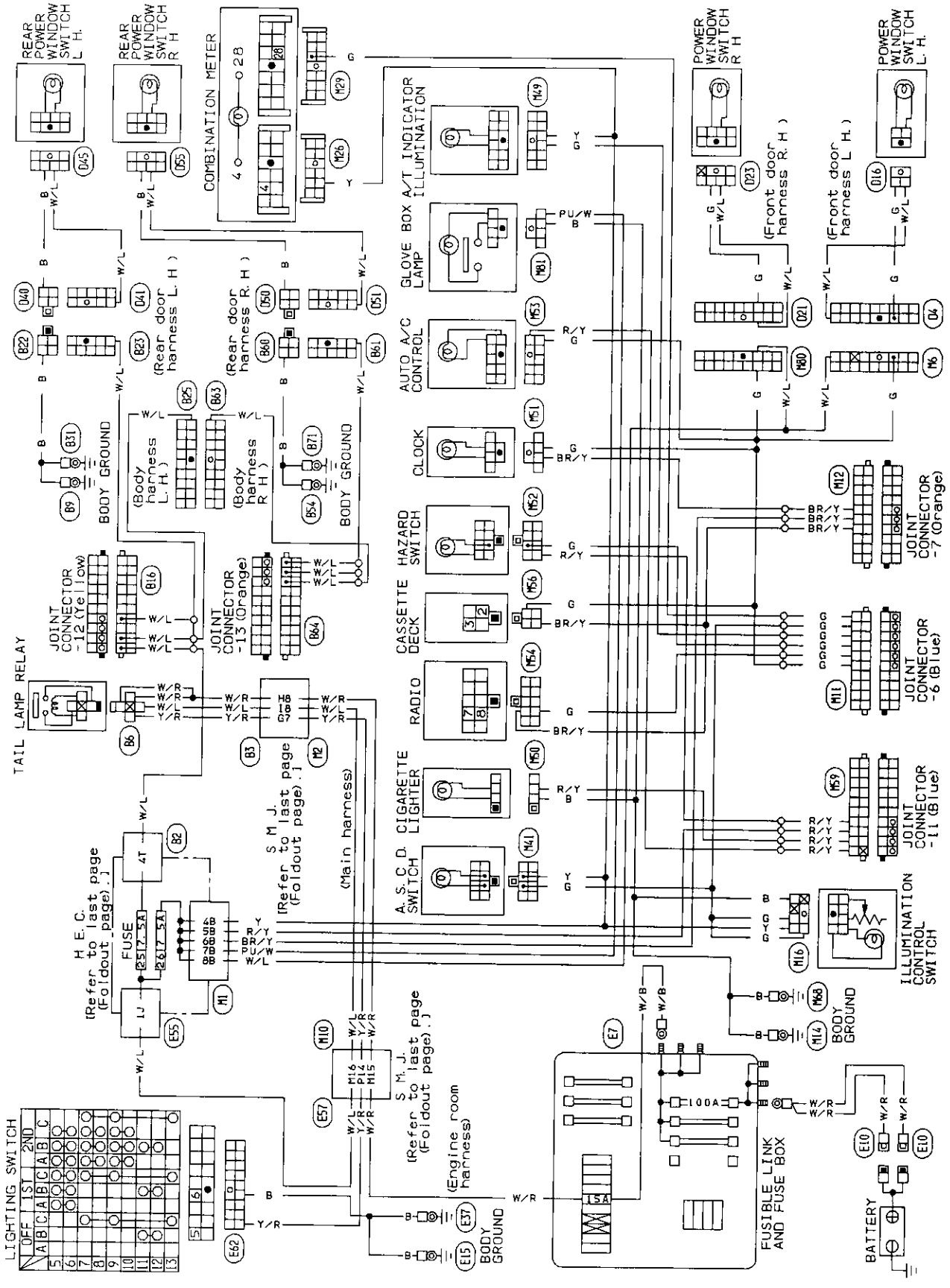
Combination Flasher Unit Check

- 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.

Bulb Specifications

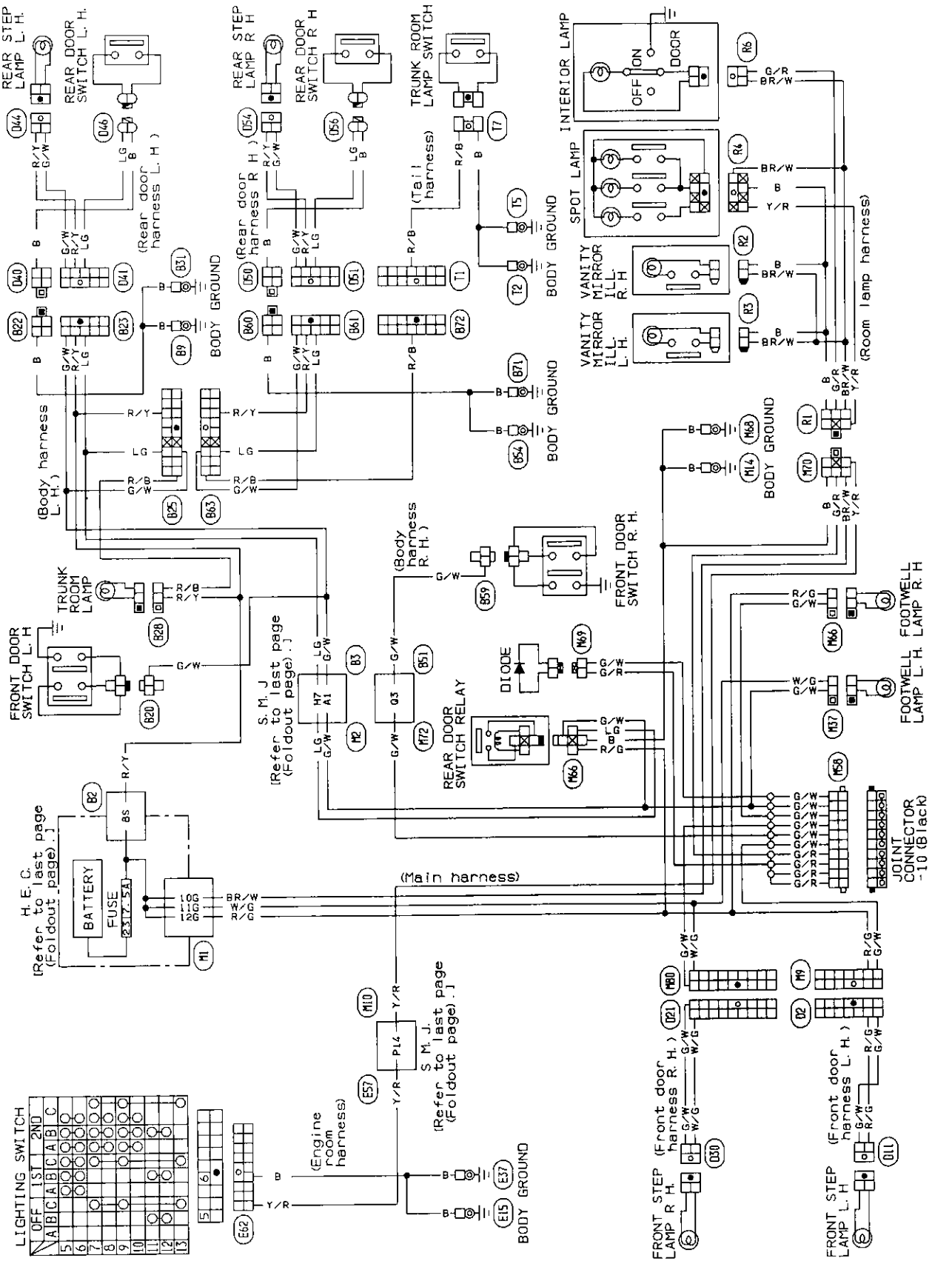
	Wattage (12 volt)	Bulb No.
Headlamp		
High beam (Inside)	65	9005
Low beam (Outside)	55	9006
Front turn signal	27	1157NA
Front clearance lamp	5	—
Front side marker lamp	3.8	194
Rear combination lamp		
Turn signal	27	1156
Stop/Tail	27/8	1157
Back-up lamp	27	1156
Rear side marker lamp	3.8	194
License plate lamp	5	—
High-mounted stop lamp	18	921
Interior lamp	10	—
Spot lamp		
(Type A)	10	—
(Type B)	8	—
Step lamp	3.4	—
Trunk room lamp	3.4	—

Illumination/Wiring Diagram



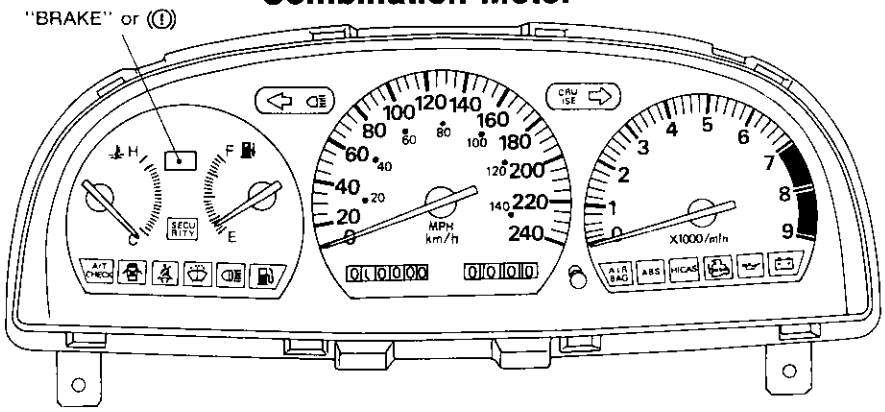
MEL401B

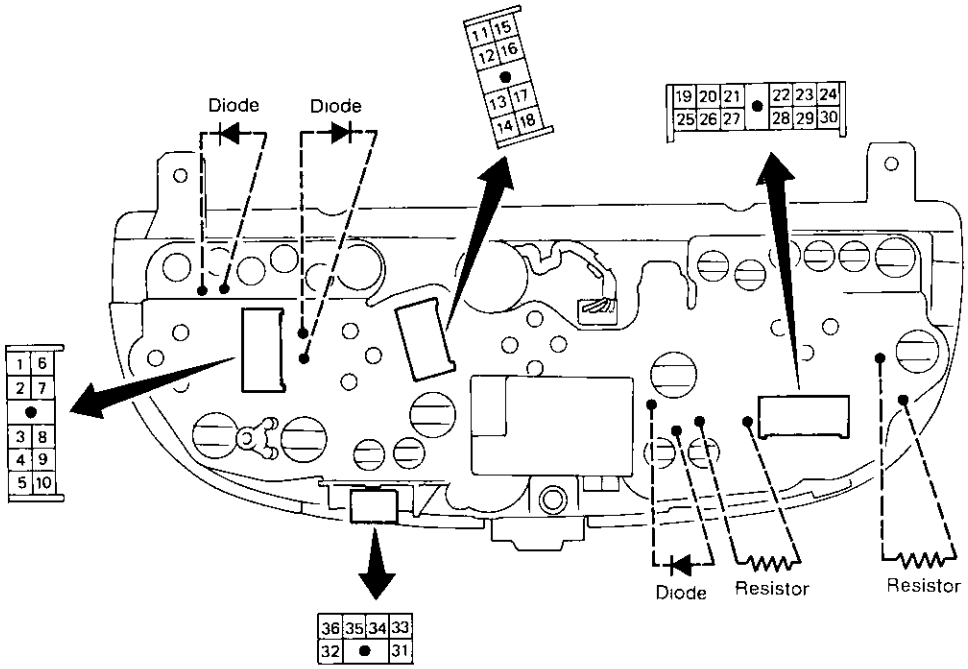
Interior and Trunk Room Lamps/Wiring Diagram

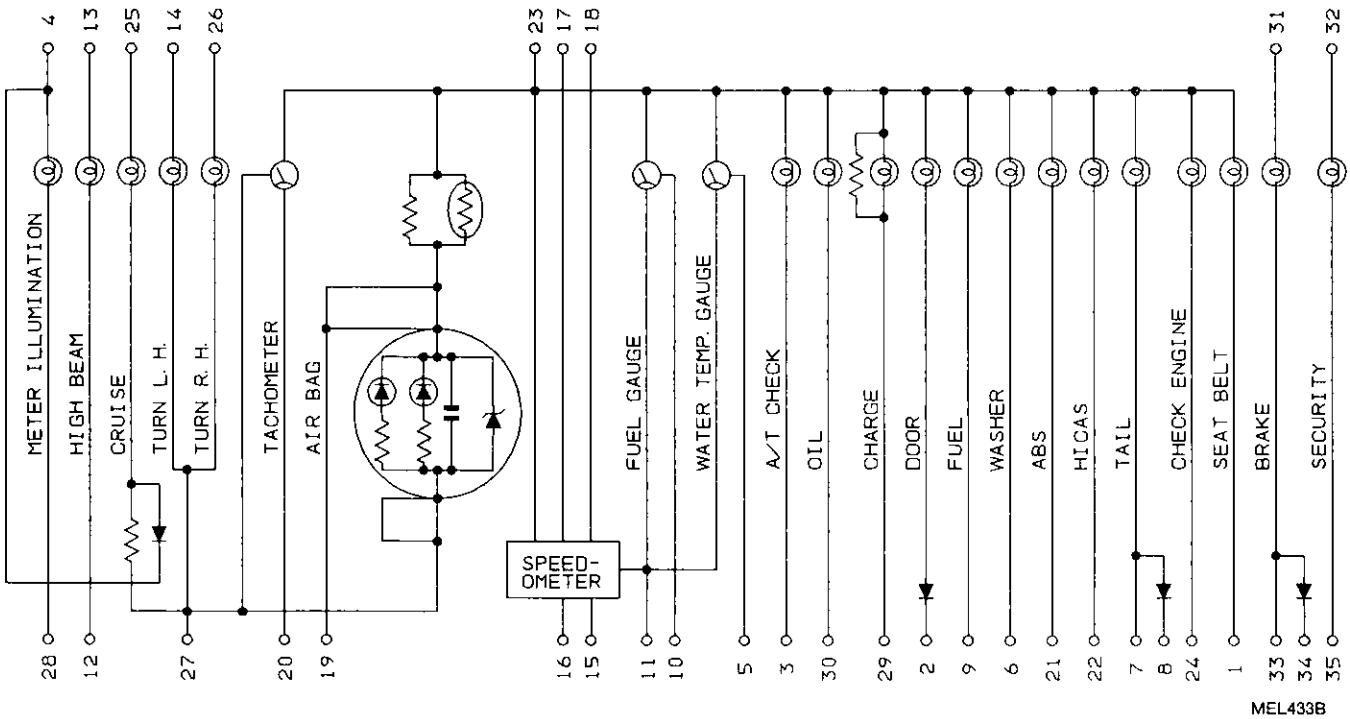


MEL402B

Combination Meter

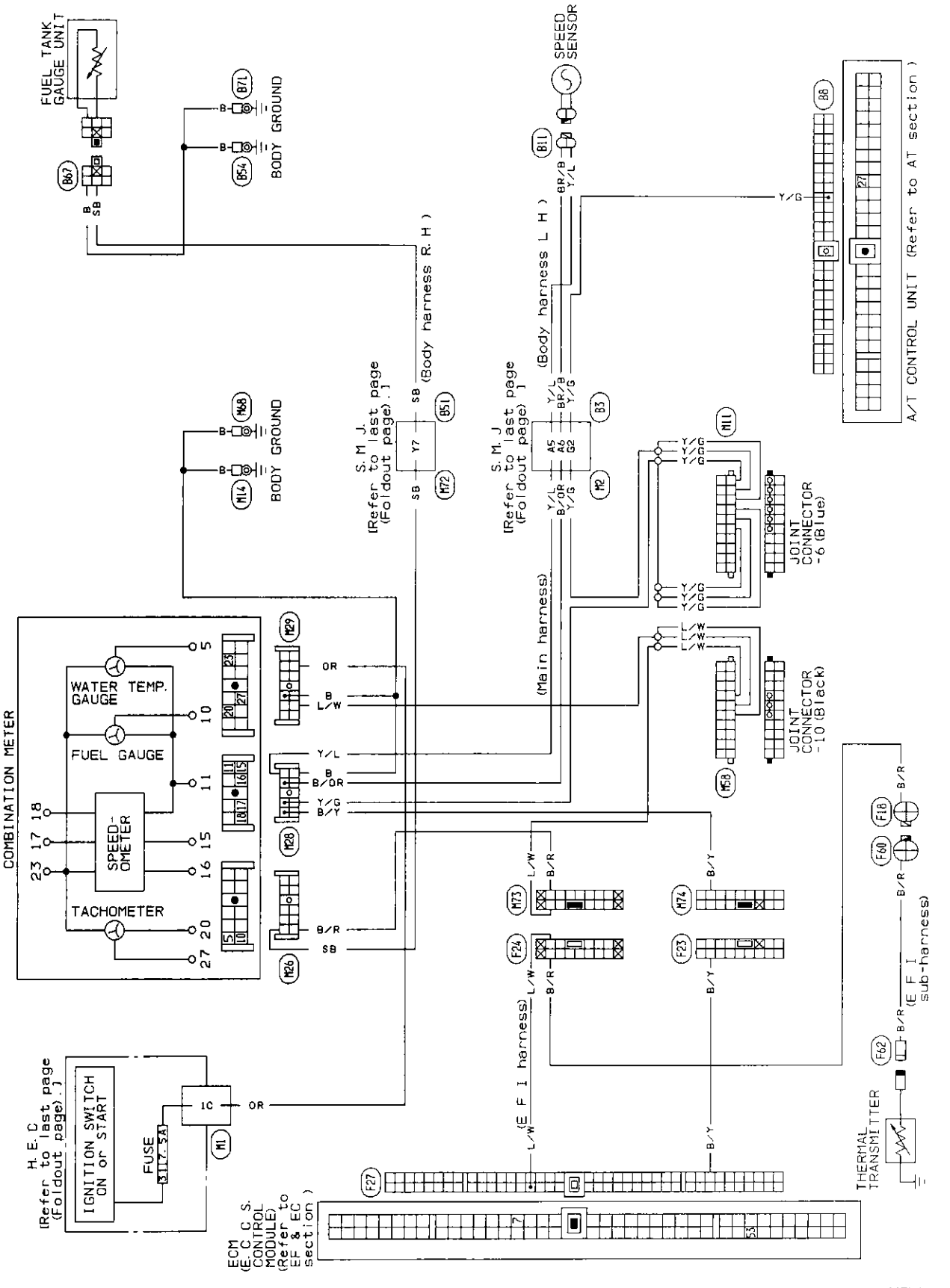




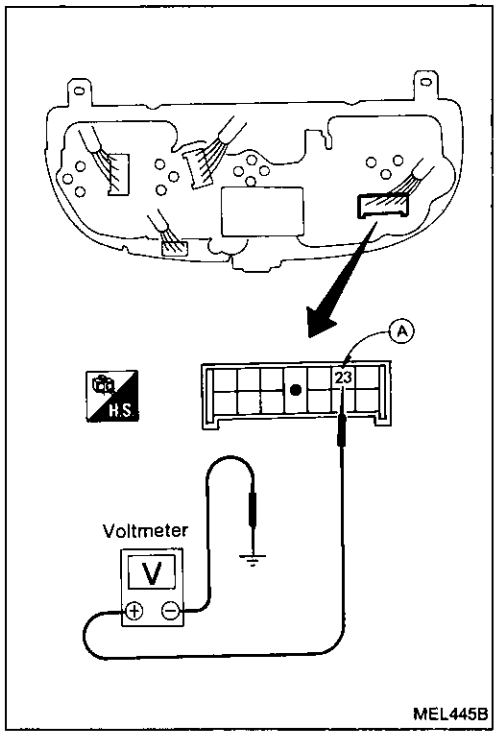


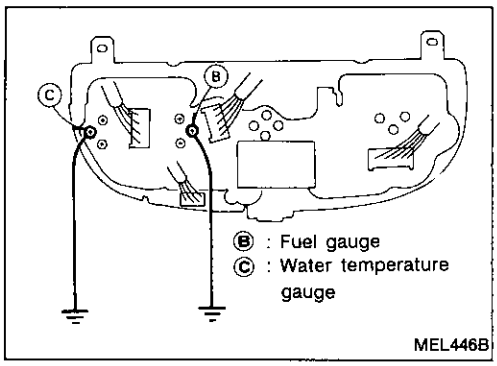
MEL433B

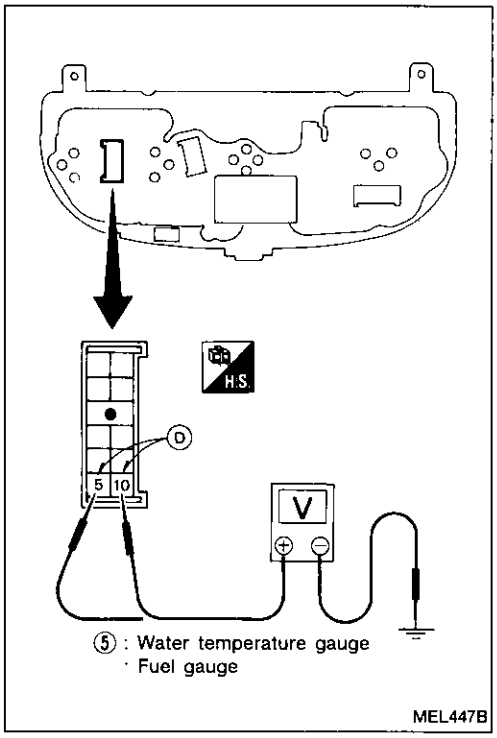
Speedometer, Tachometer, Temp. and Fuel Gauges/Wiring Diagram



MEL403B







Inspection/Fuel Gauge and Water Temperature Gauge

INSPECTION START

↓

CHECK POWER SOURCE.
1) Turn ignition switch "ON".
2) Check voltage between terminal Ⓐ and ground.
Battery voltage should exist.

N.G. → Check the following items.
1) Harness continuity between battery terminal and combination meter
2) Ignition relay
3) Fusible link and fuse
4) Ignition switch

O.K. ↓

CHECK GAUGE OPERATION.
1) Turn ignition switch "ON".
2) Connect terminals Ⓑ (Fuel), Ⓒ (Temp.) and ground with wire **for less than 10 seconds.**
3) Check operation of gauge.
Gauge should move smoothly to full scale.

N.G. → Repair or replace gauge.

O.K. ↓

Check harness continuity between component and combination meter Ⓓ.

N.G. → Repair or replace.

O.K. ↓

CHECK COMPONENT.
Check gauge units and harness.
Refer to "Fuel Tank Gauge Unit Check", "Thermal Transmitter Check".

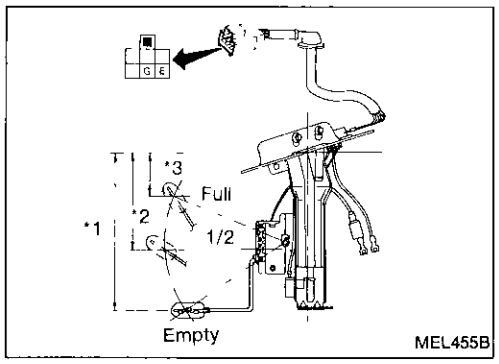
N.G. → Repair or replace.
Refer to FE section. (Fuel tank gauge unit)

O.K. ↓

Reinstall any part removed.

↓

INSPECTION END



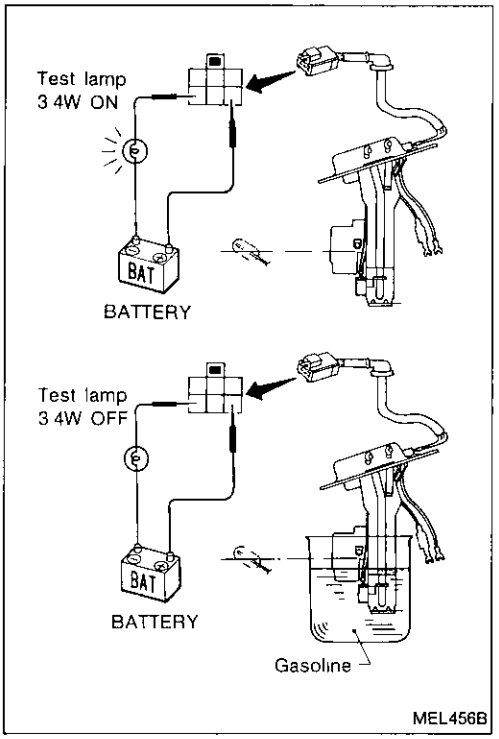
Fuel Tank Gauge Unit Check

- For removal, refer to FE section.

Check the resistance between terminals Ⓖ and Ⓔ.

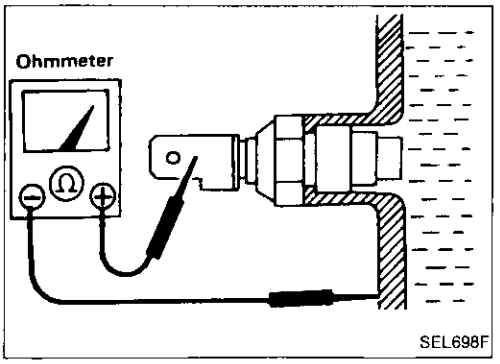
Ohmmeter (+)	Ohmmeter (−)	Float position		mm (in)	Resistance value (Ω)
G	E	*3	Full	48 (1.89)	Approx. 4 - 6
		*2	1/2	112 (4.41)	27 - 34
		*1	Empty	172 (6.77)	78 - 85

*1 and *3: When float rod is in contact with stopper.



Fuel Warning Lamp Sensor Check

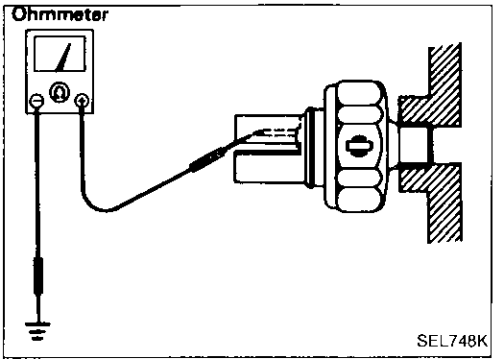
- It will take a short time for the bulb to light.



Thermal Transmitter Check

Check the resistance between the terminals of thermal transmitter and body ground.

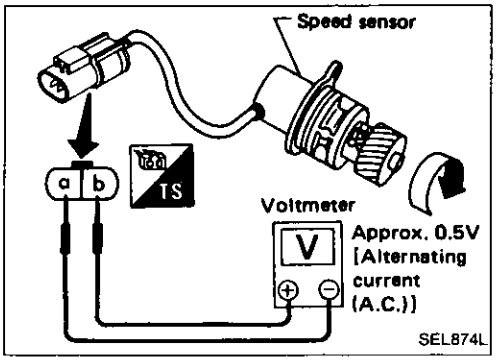
Water temperature	Resistance
60°C (140°F)	Approx. 70 - 90Ω
100°C (212°F)	Approx. 21 - 24Ω



Oil Pressure Switch Check

	Oil pressure kPa (kg/cm², psi)	Continuity
Engine start	More than 10 - 20 (0.1 - 0.2, 1.4 - 2.8)	NO
Engine stop	Less than 10 - 20 (0.1 - 0.2, 1.4 - 2.8)	YES

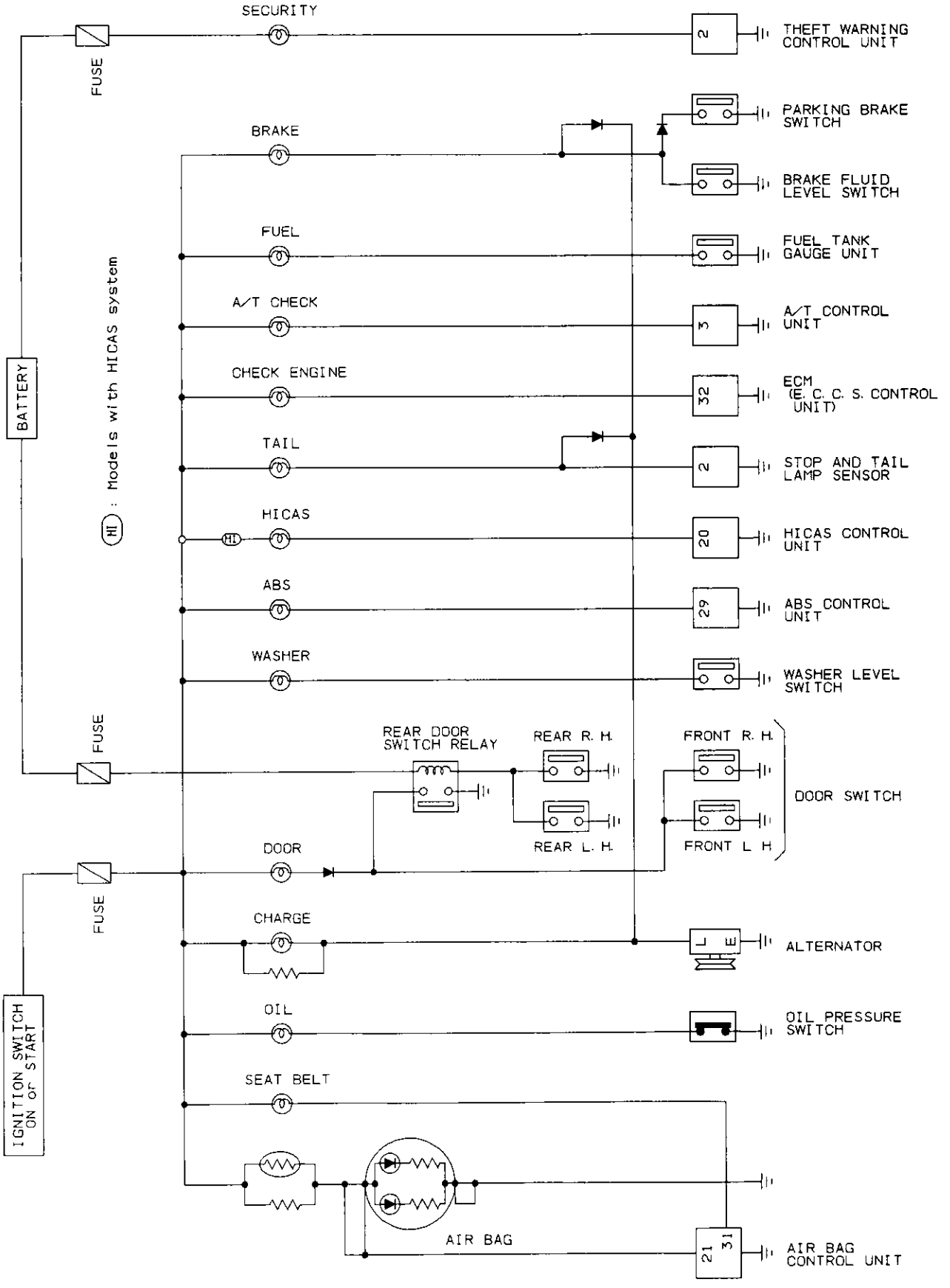
Check the continuity between the terminals of oil pressure switch and body ground.



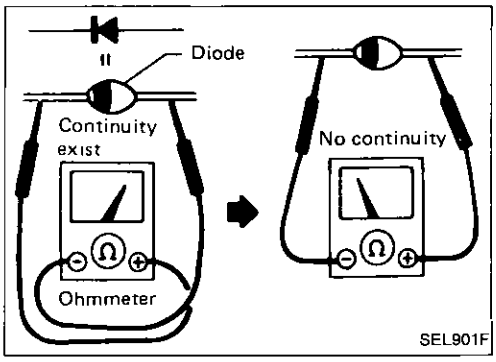
Speed Sensor Signal Check

1. Remove speed sensor from transmission.
   Location: Refer to "Location of Electrical Units"
2. Turn speedometer pinion quickly and measure voltage across ⓐ and ⓑ.

Warning Lamps/Schematic

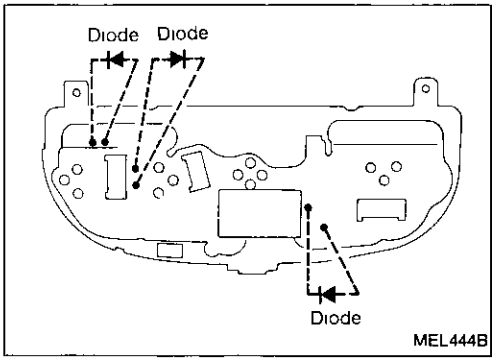


MEL405B



Diode Check

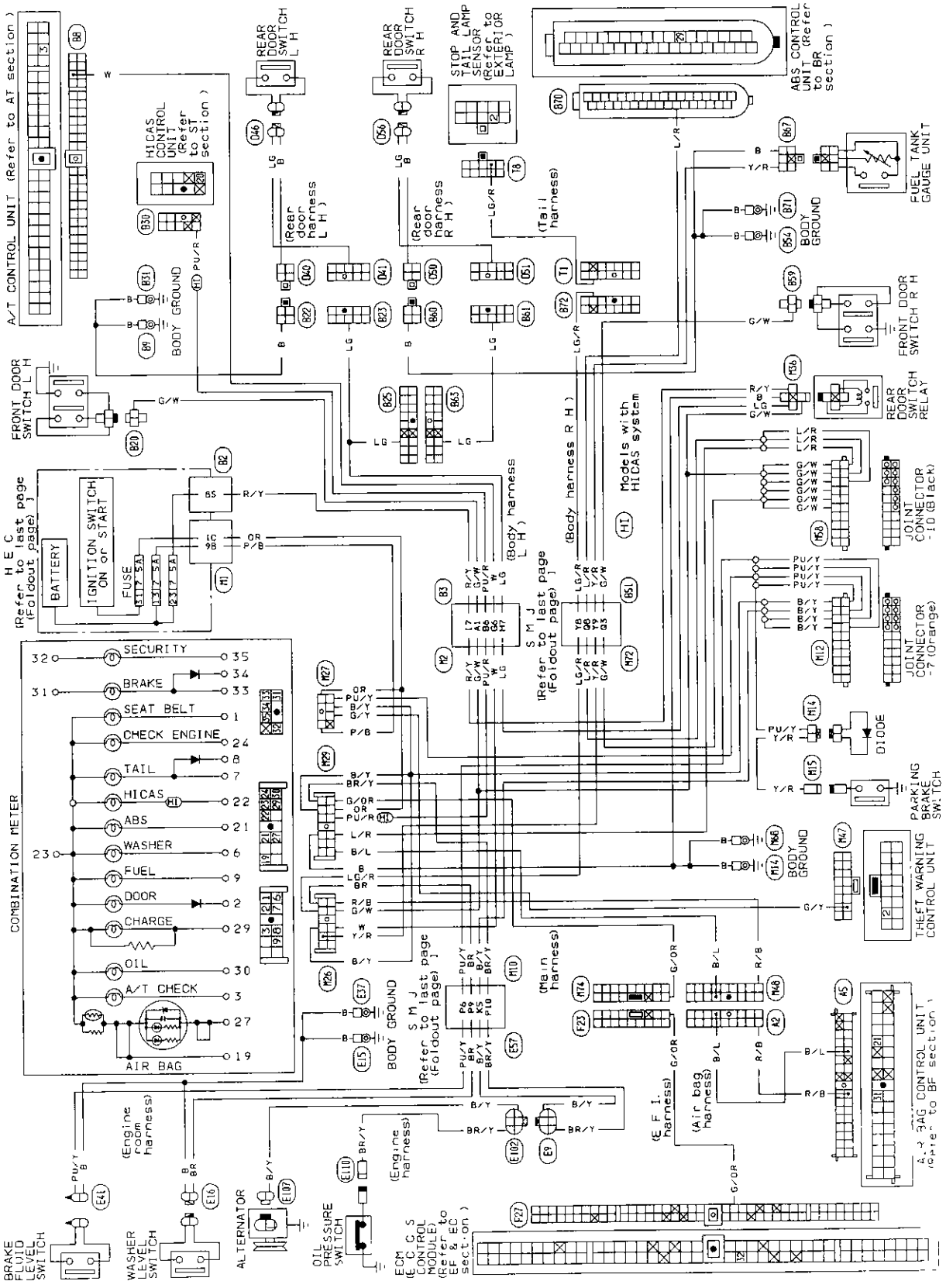
- Check continuity using an ohmmeter.
- Diode is functioning properly if test results are as shown in the figure at left.



- Diodes for warning lamps are built into the combination meter printed circuit.

Refer to "Combination Meter".

Warning Lamps/Wiring Diagram



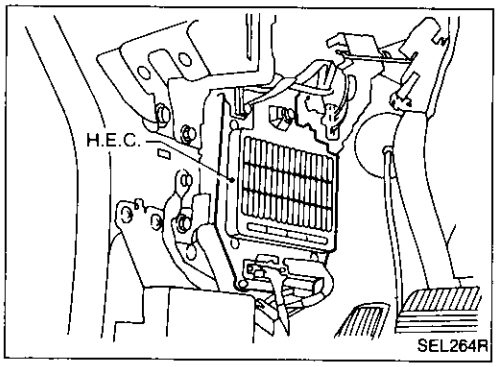
MEL404B

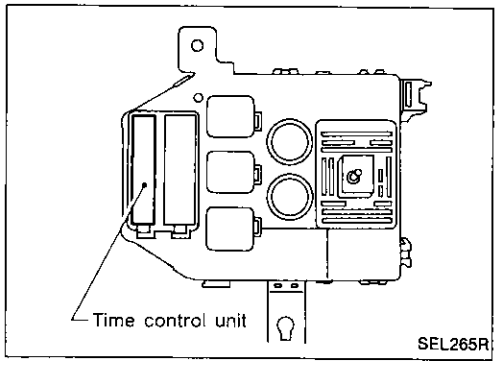
Description

FUNCTION

- Time control unit has the following functions.

Item		Details of control
1, 2	Intermittent wiper control	Regulates intermittent time from approximately 3 to 23 seconds depending on the intermittent wiper volume setting.
3	Washer and wiper combination control	Wiper is operated in conjunction with washer switch.
4	Light warning chime timer	When driver's door is opened with light switch ON and ignition switch OFF, warning chime sounds.
5	Ignition key warning chime timer	When driver's door is opened with ignition switch OFF, warning chime sounds.
6	Seat belt warning chime timer	Sounds warning chime for about 7 seconds if ignition switch is turned "ON" when seat belt switch is "ON" (seat belt is unfastened).
7	Seat belt warning lamp timer	Seat belt warning lamp blinks for about 7 seconds when ignition switch is turned to "ON".
8	Rear defogger timer	Rear defogger operates for about 15 minutes when defogger switch is ON.
9	Interior lamp timer	Fades out interior lamp when driver's side door is opened and closed.
10	Door key hole illumination	Illuminates for about 7 seconds when door outside handle is pulled.

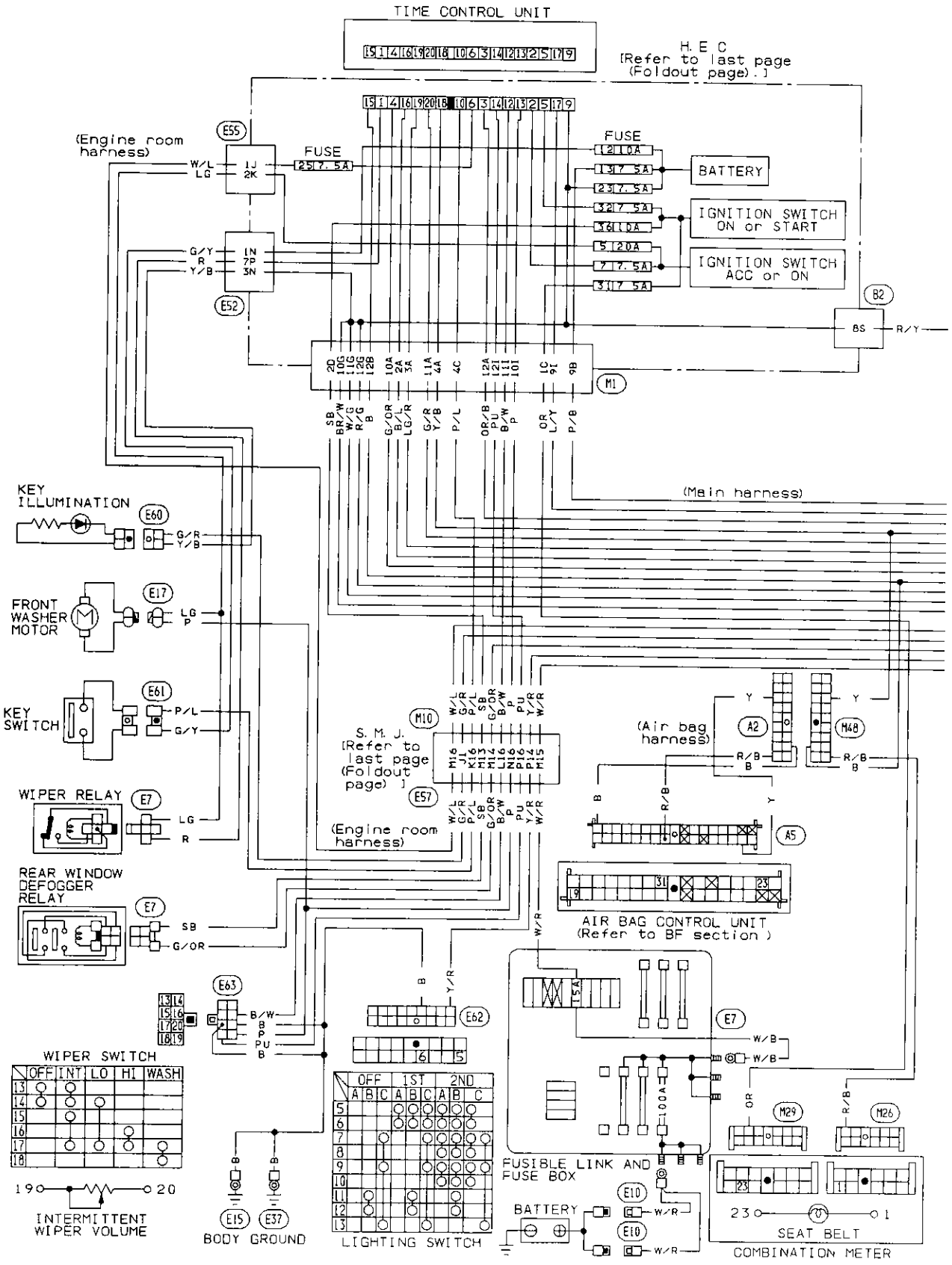




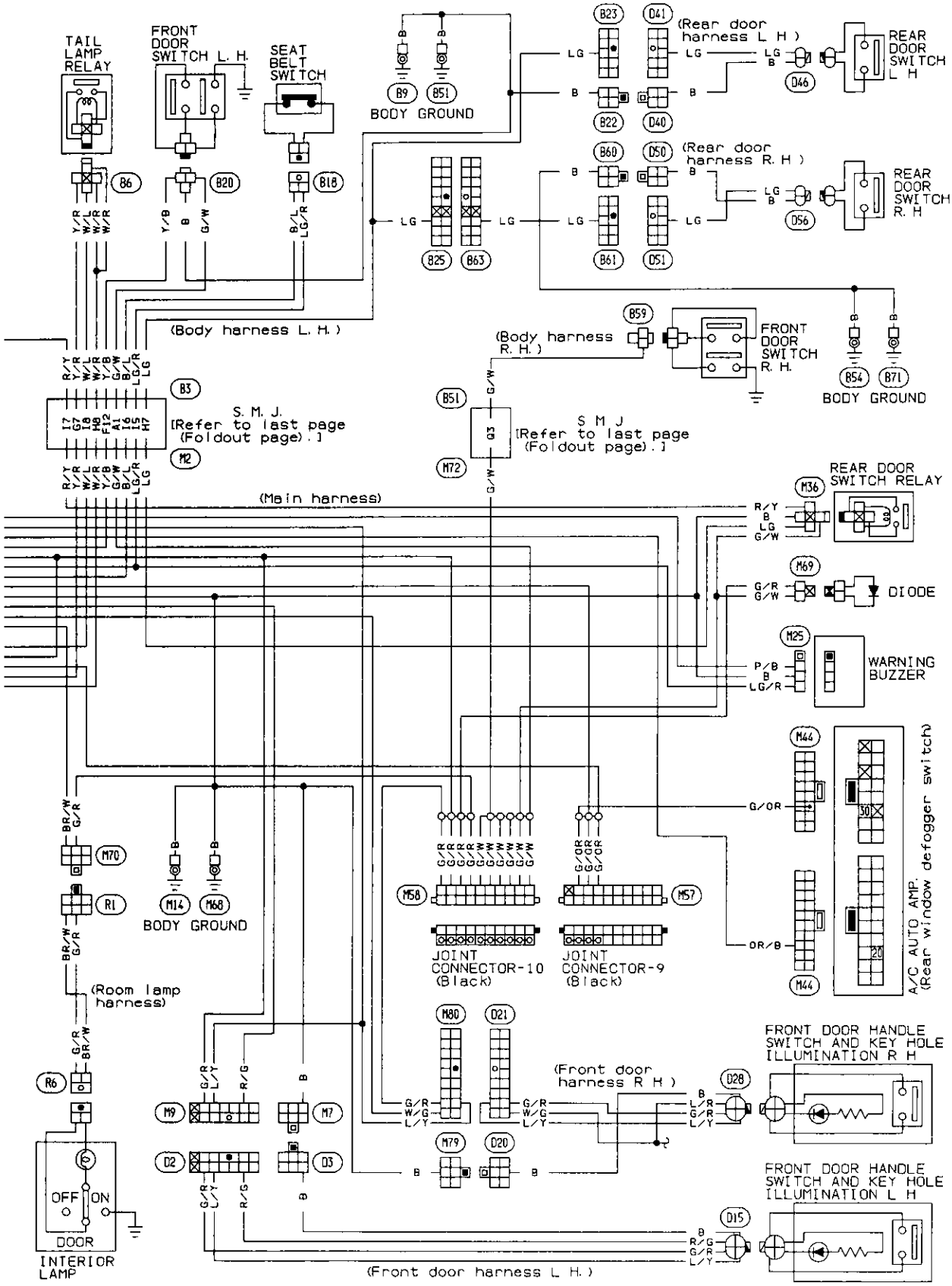
UNIT LOCATION

- Time control unit locates behind H.E.C.

Wiring Diagram



Wiring Diagram (Cont'd)



MEL389B

Trouble Diagnoses

SYMPTOM CHART

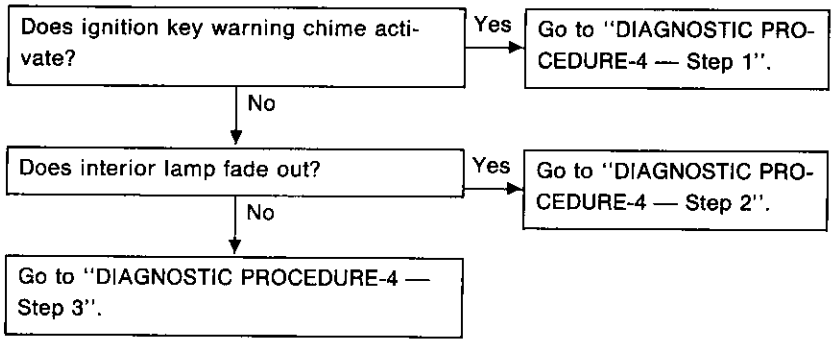
PROCEDURE		Preliminary Check			Main Power Supply and Ground Circuit Check	Diagnostic Procedure									
REFERENCE PAGE		EL-81	EL-81	EL-81	EL-82	EL-84	EL-85	EL-85	EL-86	EL-87	EL-88	EL-89	EL-89	EL-90	EL-91
SYMPTOM		Procedure 1	Procedure 2	Procedure 3	Main power supply and Ground circuit	Diagnostic Procedure 1	Diagnostic Procedure 2	Diagnostic Procedure 3	Diagnostic Procedure 4	Diagnostic Procedure 5	Diagnostic Procedure 6	Diagnostic Procedure 7	Diagnostic Procedure 8	Diagnostic Procedure 9	Diagnostic Procedure 10
Wiper & washer	Intermittent wiper does not operate.				○	○									
	Intermittent time of wiper cannot be adjusted.						○								
	Wiper and washer activate individually but not in combination.							○							
Warning	Light warning chime does not activate.	○			○				○						
	Ignition key warning chime does not activate.		○		○					○					
	Seat belt warning chime does not activate.			○	○						○				
	Seat belt warning lamp does not come on, or does not go off after coming on.				○							○			
Rear defogger	Rear defogger does not activate, or go off after activating.				○								○		
Illumination	Interior lamp does not fade out after driver's door is closed.				○									○	
	Door key hole illumination does not come on even if door handle is pulled.				○										○

Trouble Diagnoses (Cont'd)

PRELIMINARY CHECK

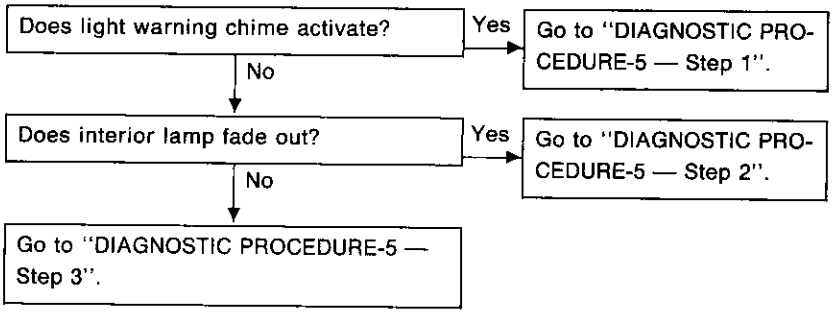
Procedure 1

- Light warning chime does not activate.



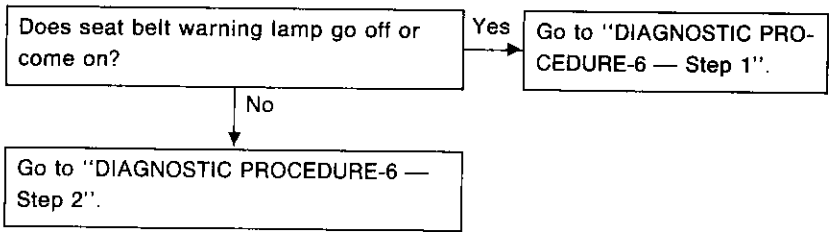
Procedure 2

- Ignition key warning chime dose not activate.



Procedure 3

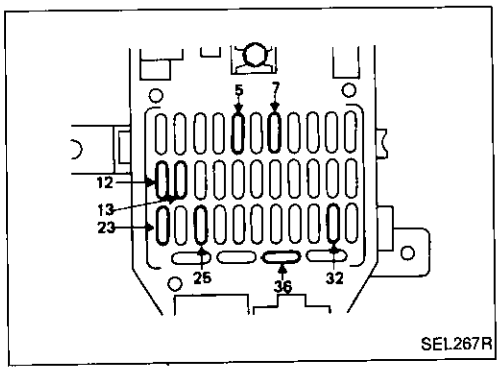
- Seat belt warning chime does not activate.



Trouble Diagnoses (Cont'd)

PREPARATIONS FOR TROUBLE DIAGNOSES

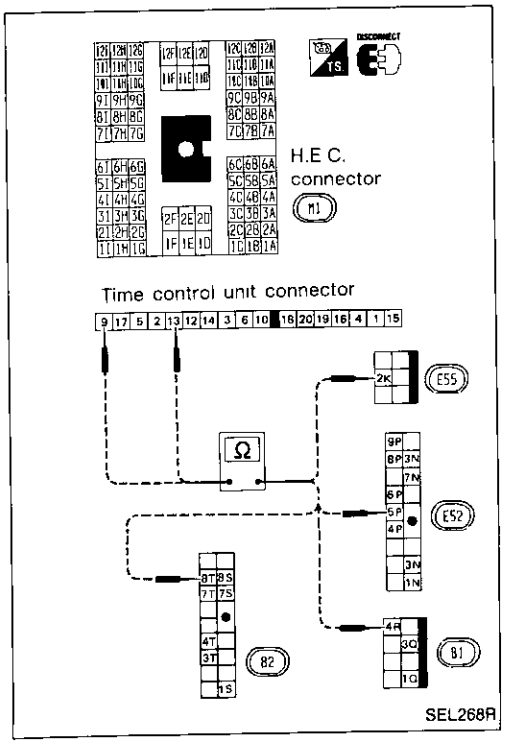
- Check for blown fuses. If necessary, repair or replace harness or related part.
- Check H.E.C. internal circuit (continuity check) before diagnosing. This is because the time control unit is directly connected to the H.E.C. which functions as an intermediate joint for input and output.
- Check the power supply and ground circuits of time control unit. Repair or replace harness if necessary.



FUSE CHECK

Power fuse check in H.E.C.

Fuse	Amperage	Power supply system	Main part generating loads
#5	20A	ACC	Wiper motor
#7	7.5A	ACC	Power antenna, Audio
#12	10A	BAT	Key switch, Air bag, Theft warning system
#13	7.5A	BAT	Clock, A/T control, Remote control door lock
#23	7.5A	BAT	Interior lamp, Footwell lamp
#25	7.5A	BAT	Tail lamp, Clearance lamp
#32	7.5A	IGN	HICAS, Power steering



INTERNAL CIRCUIT CHECK IN H.E.C. (Continuity check)

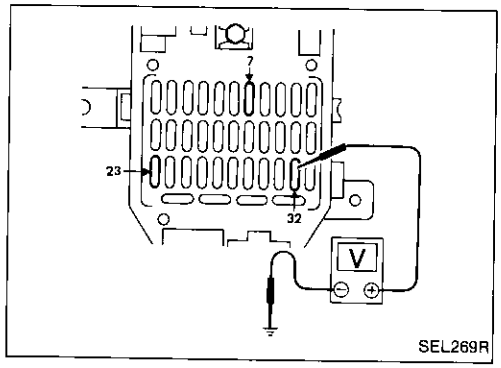
- Remove H.E.C. from vehicle.
- Remove TCU from H.E.C.

Trouble Diagnoses (Cont'd)

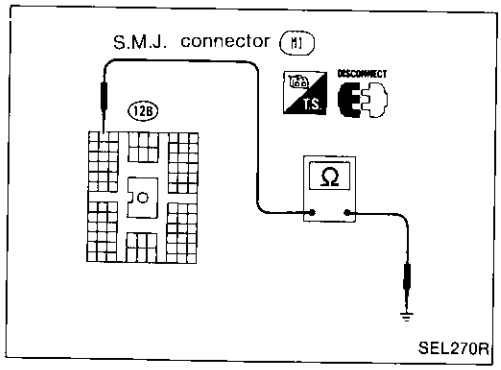
- Check for continuity between TCU connector and connector for the TCU output and input listed below:

TCU connector	Connector for TCU output and input	TCU connector	Connector for TCU output and input
1	7P (E52)	9	12G (M1)
2	2K (E55)	12	11I (M1)
3	12A (M1)	13	10I (M1)
4	10A (M1)	14	12I (M1)
5	2D (M1)	16	2A (M1)
6	1J (E55)	17	9I (M1)
9	8S (B2)	18	4A (M1)
9	1N (E52)	19	3A (M1)
9	10G (M1)	20	11A (M1)
9	11G (M1)		

When checking TCU connector terminals ⑤ and ②, apply 12V to (E54) connector terminals 1L and 2L while grounding (M1) connector terminal (12B)



SEL269R



SEL270R

MAIN POWER SUPPLY AND GROUND CIRCUIT CHECK

Main power supply

Check the voltage at the back side of each fuse.

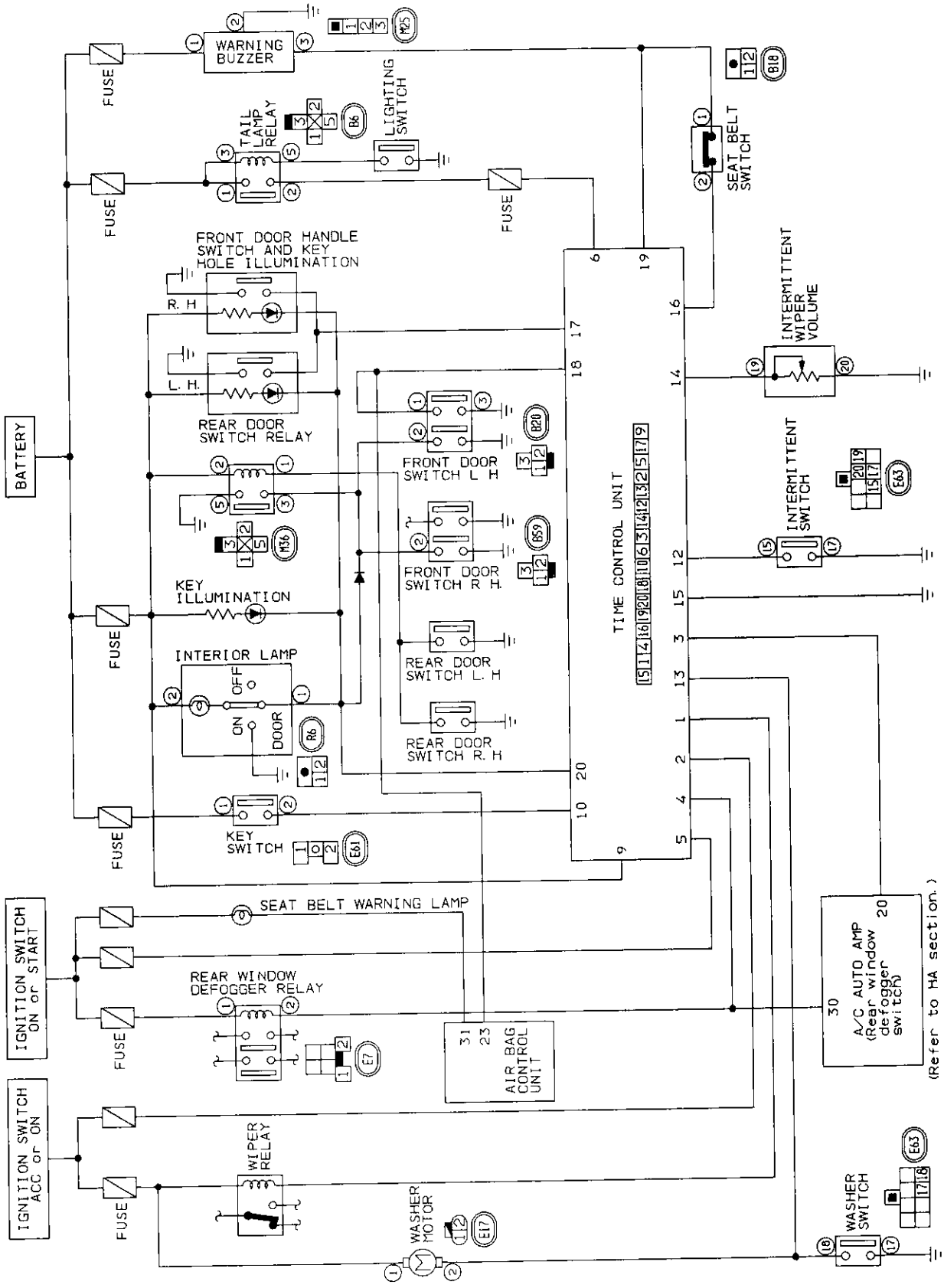
Fuse	Battery voltage existence condition		
	Ignition switch position		
	OFF	ACC	ON
#23	Yes	Yes	Yes
#32	No	No	Yes
#7	No	Yes	Yes

Ground circuit

Terminals	Continuity
(12B) - Ground	Yes

Trouble Diagnoses (Cont'd)

CIRCUIT DIAGRAM FOR QUICK PINPOINT CHECK



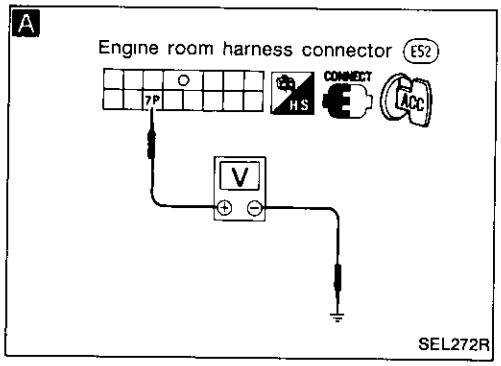
MEL388B

Trouble Diagnoses (Cont'd)

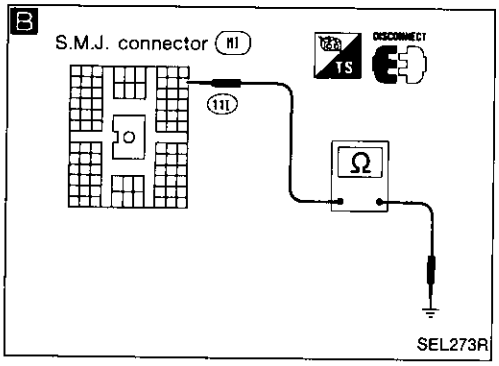
DIAGNOSTIC PROCEDURE 1

SYMPTOM: Intermittent wiper does not operate.

A



B



A

WIPER RELAY OUTPUT SIGNAL CHECK

1) Turn ignition switch to "ACC".
2) Turn wiper switch to "INT" or "OFF".
3) Measure voltage between E52 connector terminal 7P and ground.

Condition of wiper switch	Voltage [V]
OFF	Approx. 12
INT	Pointer swings from 0 to 12 every 3 to 23 seconds

O.K. → Check wiper relay. Refer to "WIPER AND WASHER".

- O.K. → Check wiper relay circuit.
- N.G. → Replace wiper relay.

N.G. →

B

INTERMITTENT SWITCH INPUT SIGNAL CHECK

Measure resistance between S.M.J. connector M1 terminal 11L and ground.

Turn wiper switch to "INT" or "OFF".

Condition of wiper switch	Continuity
OFF	No
INT	Yes

N.G. → Check wiper switch. Check harness continuity between T.C.U. and wiper switch.

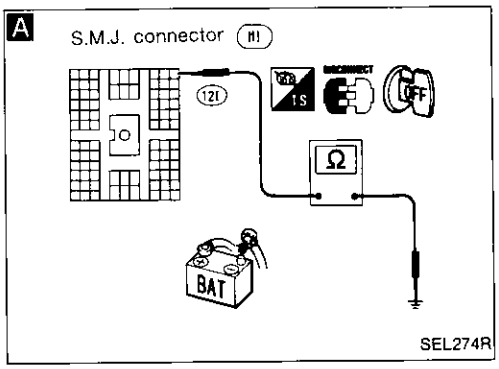
O.K. →

Replace control unit.

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 2

SYMPTOM: Intermittent time of wiper cannot be adjusted.



A

INTERMITTENT WIPER VOLUME INPUT SIGNAL CHECK

Measure resistance between S.M.J. connector (M1) terminal (12I) and ground while turning intermittent wiper volume.

Position of wiper knob	Resistance [Ω]
S	0
L	Approx. 1 k

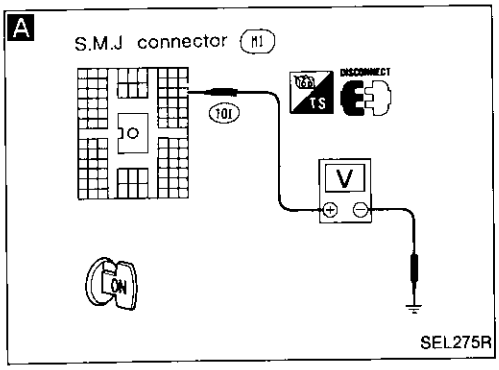
O.K. → Replace control unit.

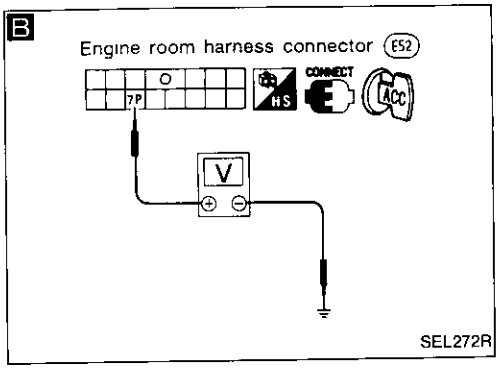
N.G. ↓

Check intermittent wiper volume.
Check harness continuity between T.C.U. and wiper switch.

DIAGNOSTIC PROCEDURE 3

SYMPTOM: Wiper and washer activate individually but not in combination.





A

WASHER SWITCH INPUT SIGNAL CHECK

1) Turn ignition switch to "ACC".
2) Measure voltage between S.M.J. connector (M1) terminal (10I) and ground.

Condition of washer switch	Voltage [V]
OFF	Approx. 12
ON	0

N.G. → Check harness continuity between T.C.U. and washer switch.

O.K. ↓

B

WIPER RELAY OUTPUT SIGNAL CHECK

Connect S.M.J. connector.
Measure voltage between engine room harness connector (E52) terminal (7P) and ground after operating washer switch.
0V for approx. 3 seconds after washer has operated.

N.G. → Replace control unit.

O.K. ↓

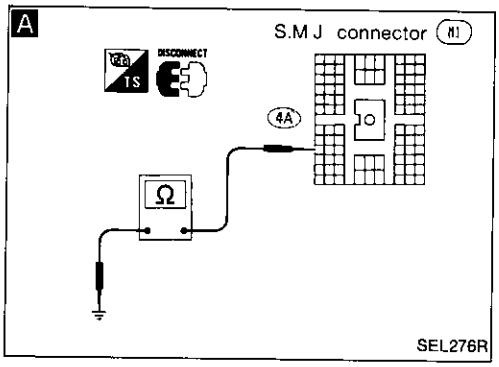
Replace wiper relay.

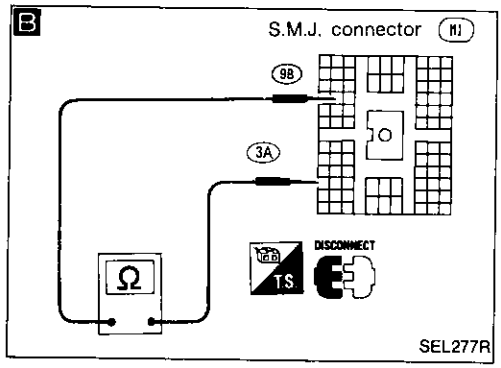
Trouble Diagnoses (Cont'd)

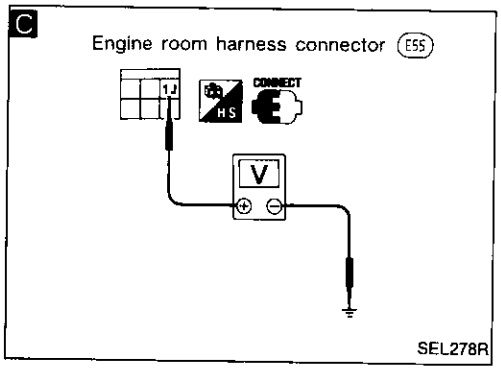
DIAGNOSTIC PROCEDURE 4

SYMPTOM: Light warning chime does not activate.

- Perform "PRELIMINARY CHECK — Procedure 1" before referring to the following flow chart.







A — Step 3

DOOR SWITCH FUNCTION CHECK
Measure resistance between S.M.J. connector M1 terminal 4A and ground.

Condition of driver's door	Continuity
Door is closed	No
Door is open	Yes

N.G. → Check door switch. Check harness continuity between T.C.U. and door switch.

O.K. ↓

B — Step 2

CHIME CONTINUITY CHECK
Measure resistance between S.M.J. connector M1 terminals 3A and 9B.
Continuity should exist.

N.G. → Check chime. Check harness continuity between T.C.U. and chime.

O.K. ↓

C — Step 1

LIGHT SWITCH INPUT SIGNAL CHECK
Connect S.M.J. connector M1.
Measure voltage between engine room harness connector E55 terminal 1J and ground.

Condition	Voltage [V]
Light switch is ON	Approx. 12
Light switch is OFF	0

N.G. → Check light switch and tail lamp relay. Check harness continuity between T.C.U. and light switch.

O.K. ↓

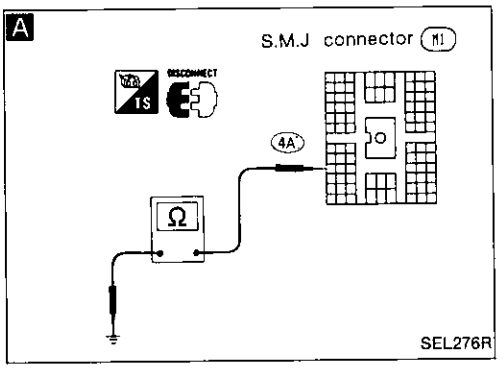
Replace control unit.

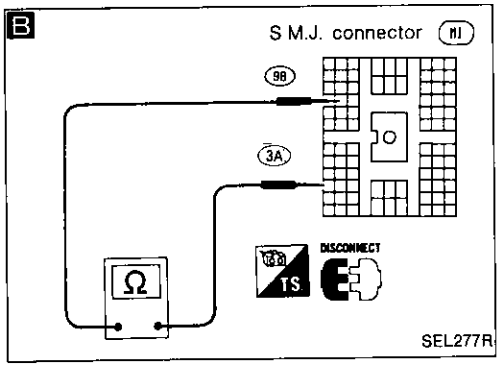
Trouble Diagnoses (Cont'd)

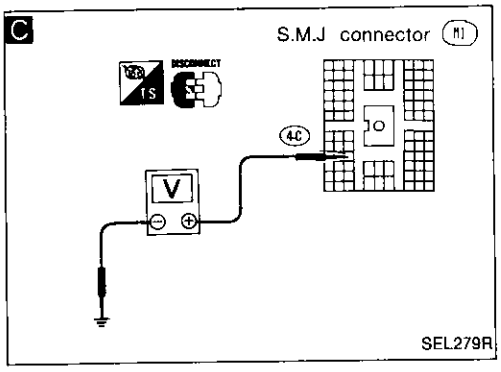
DIAGNOSTIC PROCEDURE 5

SYMPTOM: Ignition key warning chime does not activate.

- Perform "PRELIMINARY CHECK — Procedure 2" before referring to the following flow chart.







A

Step 3

DOOR SWITCH FUNCTION CHECK
Measure resistance between S.M.J. connector M1 terminal 4A and ground.

Condition of driver's door	Continuity
Door is closed	No
Door is open	Yes

N.G. → Check door switch.
Check harness continuity between T.C.U. and door switch.

O.K. ↓

B

Step 2

CHIME CONTINUITY CHECK
Measure resistance between S.M.J. connector M1 terminals 3A and 9B.
Continuity should exist.

N.G. → Check chime.
Check harness continuity between T.C.U. and chime.

O.K. ↓

B

Step 1

IGNITION KEY SWITCH INPUT SIGNAL CHECK
Measure voltage between S.M.J. connector M1 terminal 4C and ground.

Condition	Voltage [V]
Key is inserted	Approx. 12
Key is pulled	0

N.G. → Check ignition key switch.
Check harness continuity between T.C.U. and ignition key switch.

O.K. ↓

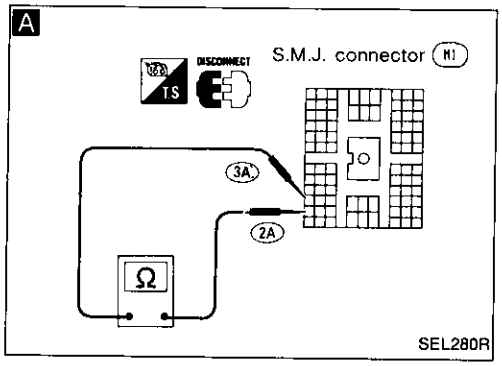
Replace control unit.

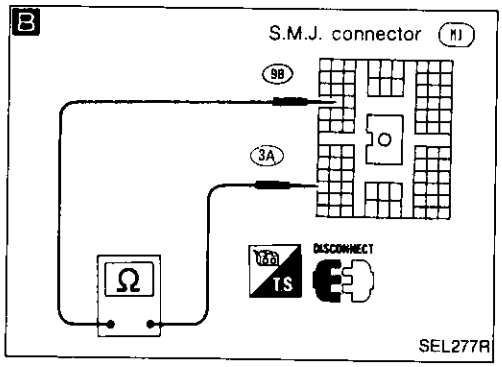
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 6

SYMPTOM: Seat belt warning chime does not activate.

- Perform "PRELIMINARY CHECK — Procedure 3" before referring to the following flow chart.





A

Step 2

SEAT BELT SWITCH FUNCTION CHECK
Check continuity between S.M.J. connector M1 terminals 3A and 2A.

Condition	Continuity
Unfastened	Yes
Fastened	No

N.G. → Check seat belt switch. Check harness continuity between T.C.U. and seat belt switch.

O.K. ↓

B

Step 1

CHIME CONTINUITY CHECK
Measure resistance between S.M.J. connector M1 terminal 3A and 9B.
Continuity should exist.

N.G. → Check chime. Check harness continuity between T.C.U. and chime.

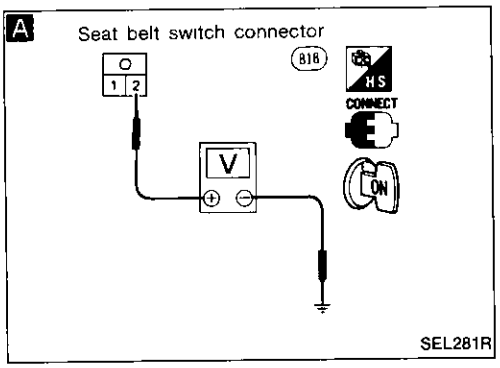
O.K. ↓

Replace control unit.

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 7

SYMPTOM: Seat belt warning lamp does not come on, or does not go off after coming on.



A

WARNING LAMP OUTPUT SIGNAL CHECK
1) Connect all H.E.C. connectors.
2) Turn ignition switch "ON". Measure voltage between terminal and ground as shown.
3) Does voltmeter needle keep swinging for about 7 seconds after ignition switch has been turned on?

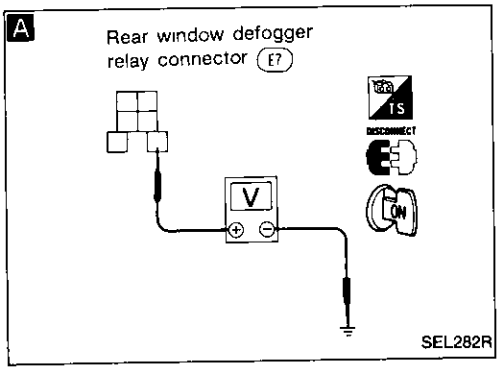
Yes → Check warning lamp. Check harness continuity between T.C.U. and warning lamp.

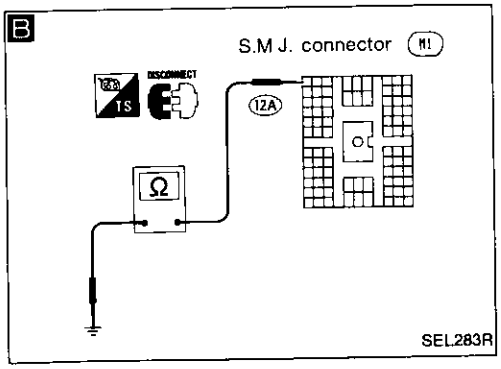
No ↓

Replace control unit.

DIAGNOSTIC PROCEDURE 8

SYMPTOM: Rear defogger does not activate, or does not go off after activating.





A

REAR WINDOW DEFOGGER OUTPUT SIGNAL CHECK
Measure voltage between rear window defogger relay connector terminal and ground.

Condition of ignition switch	Voltage [V]
Ignition switch is "OFF"	Approx. 12
Ignition switch is "ON"	0

O.K. → Check rear window defogger relay. Check circuit between rear window defogger relay and S.M.J. connector terminal 10A. Check rear window defogger circuit.

N.G. ↓

Check power supply. → N.G. → Remedy.

O.K. ↓

B

REAR WINDOW DEFOGGER SWITCH FUNCTION CHECK
1) Disconnect S.M.J. connector M1.
2) Check continuity between S.M.J. connector terminal 12A and ground.

Condition of defogger switch	Continuity
Defogger switch is "OFF"	No
Defogger switch is "ON"	Yes

N.G. → Check rear window defogger switch. Check harness continuity between T.C.U. and rear window defogger switch.

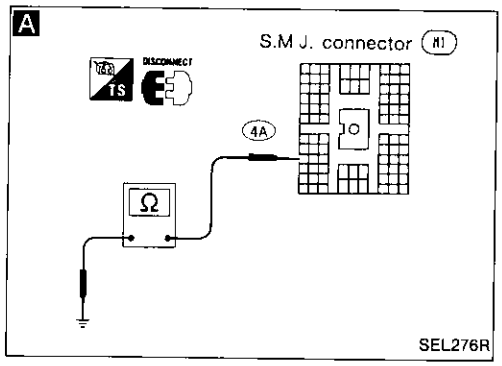
O.K. ↓

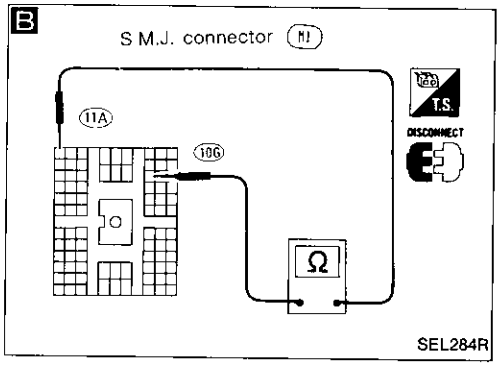
Replace control unit.

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 9

SYMPTOM: Interior lamp does not fade out after driver's door is closed.





A

DOOR SWITCH FUNCTION CHECK
Measure resistance between S.M.J. connector M1 terminal 4A and ground.

Condition of driver's door	Continuity
Door is closed	Yes
Door is open	No

N.G. → Check door switch. Check harness continuity between T.C.U. and door switch.

O.K. ↓

B

INTERIOR LAMP SIGNAL CHECK
Measure resistance between S.M.J. connector M1 terminal 11A and 10G

Interior lamp switch position	Continuity
Interior lamp. Door	Yes
Interior lamp: OFF	No

O.K. → Check interior lamp and harness between T.C.U. and interior lamp.

N.G. ↓

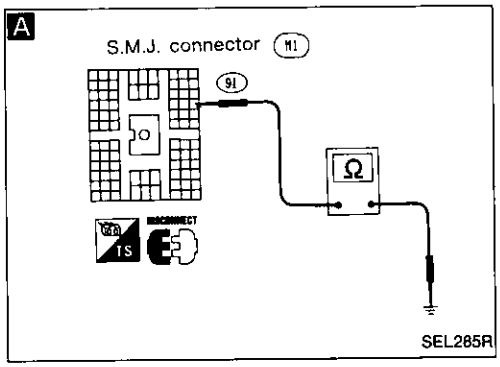
Replace T.C.U.

Trouble Diagnoses (Cont'd)

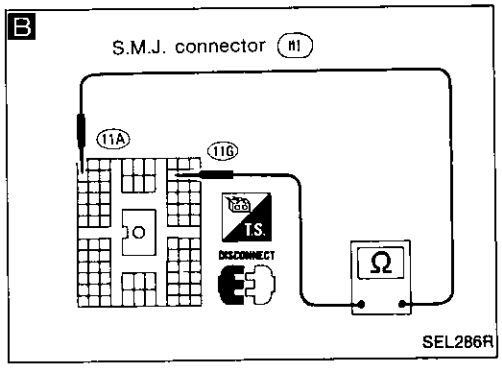
DIAGNOSTIC PROCEDURE 10

SYMPTOM: Door key hole illumination does not come on even if door handle is pulled.

A



B



A

DOOR SWITCH INPUT SIGNAL CHECK
Measure resistance between S.M.J. connector M1 terminal 9I and ground.

Condition of driver's handle	Continuity
Handle is pulled	No
Handle is released	Yes

N.G. → Check door handle switch.
Check harness continuity between T.C.U. and door handle switch.

O.K. ↓

B

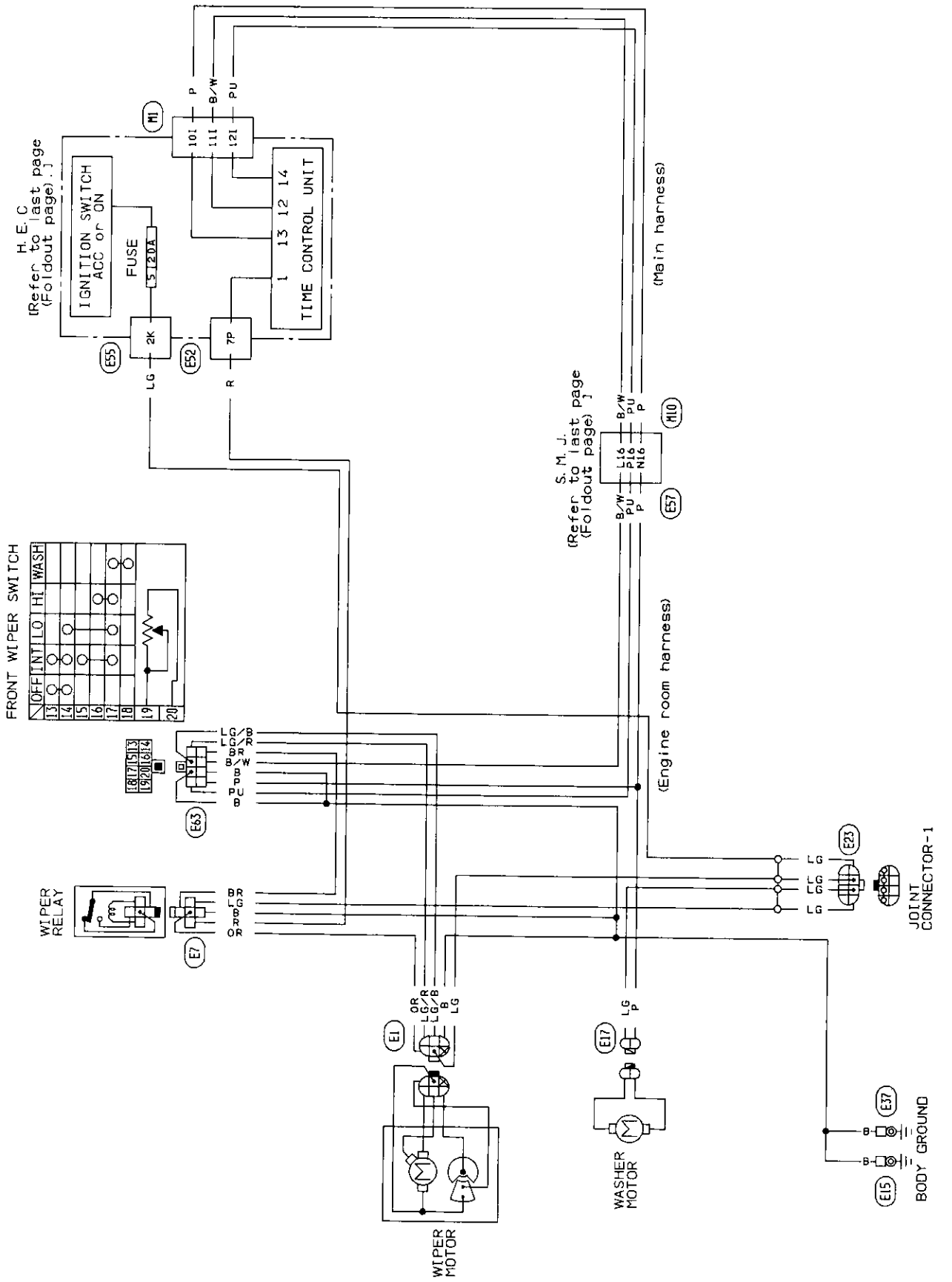
KEY HOLE ILLUMINATION SIGNAL CHECK
Measure resistance between S.M.J. connector M1 terminals 11G and 11A.
Continuity should exist.

O.K. → Check key hole illumination and harness between T.C.U. and key hole illumination.

N.G. ↓

Replace T.C.U.

Wiper and Washer/Wiring Diagram



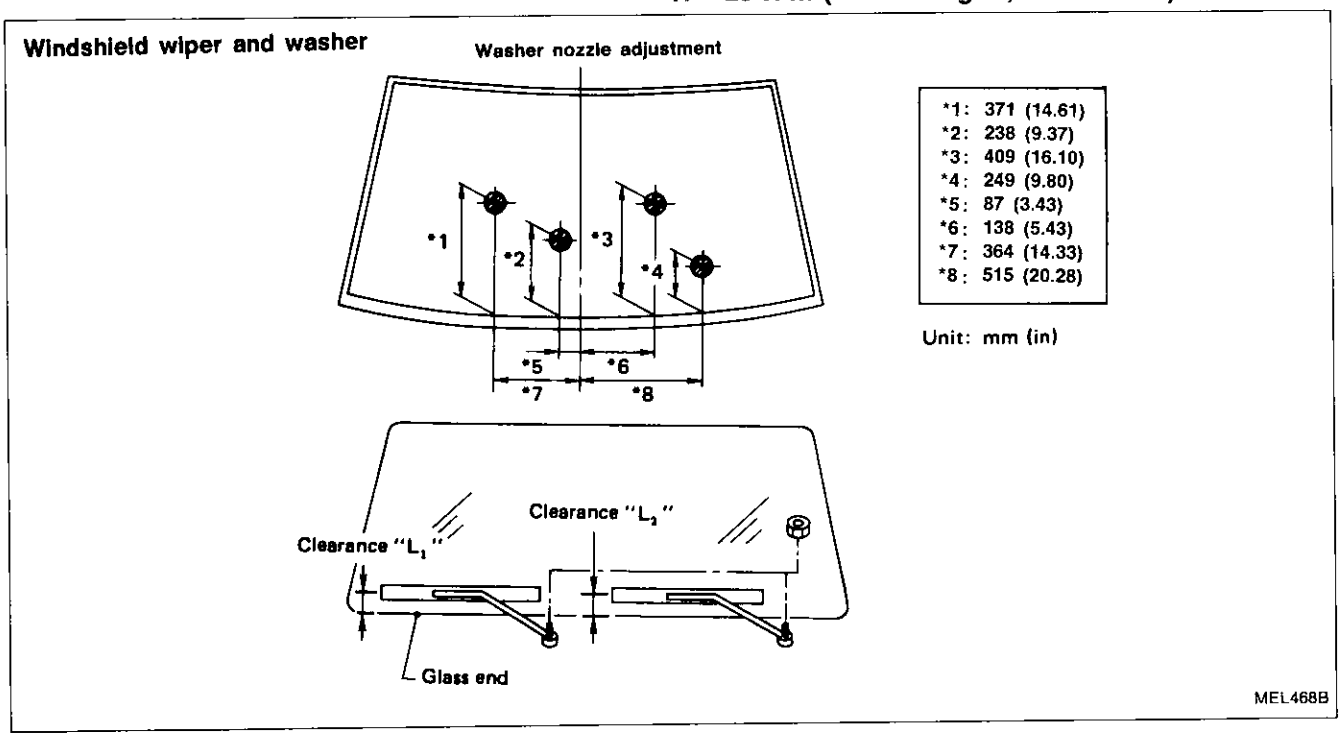
MEL406B

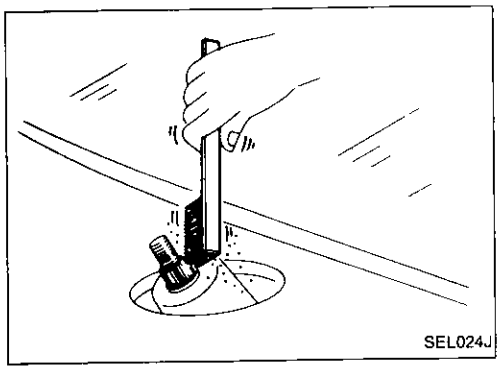
Installation

1. Prior to wiper arm installation, turn on wiper switch to operate wiper motor and then turn it "OFF" (Auto Stop).
2. Lift the blade up and then set it down onto glass surface to set the blade center to clearance "L_1" or "L_2" immediately before tightening nut.
3. Eject washer fluid. Turn on wiper switch to operate wiper motor and then turn it "OFF".
4. Ensure that wiper blades stop within clearance "L_1" & "L_2".
   Clearance "L_1": 29 - 44 mm (1.14 - 1.73 in)
   Clearance "L_2": 22 - 37 mm (0.87 - 1.46 in)

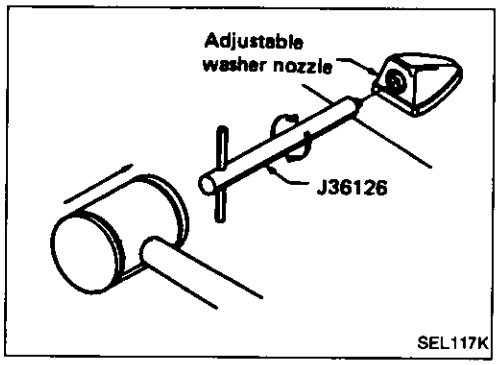
- Tighten windshield wiper arm nuts to specified torque.
  Windshield wiper:
  17 - 23 N·m (1.7 - 2.3 kg-m, 12 - 17 ft-lb)

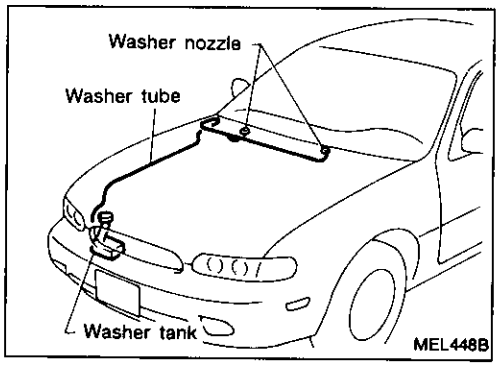
Windshield wiper and washer





- **Before reinstalling wiper arm, clean up the pivot area as illustrated. This will reduce possibility of wiper arm looseness.**



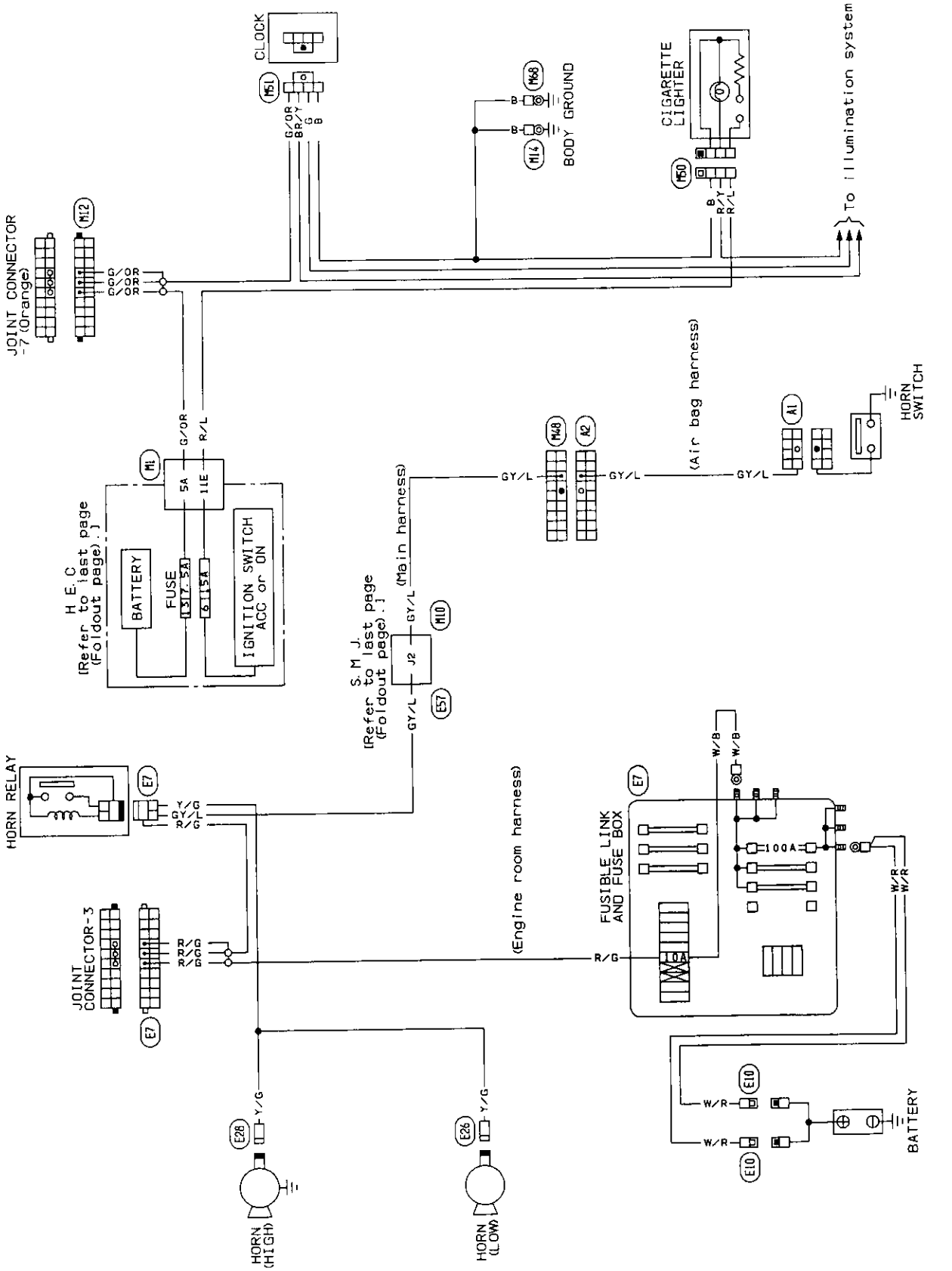


Washer Nozzle Adjustment

- Using Tool J36126, adjust windshield washer nozzle to correct its spray pattern.

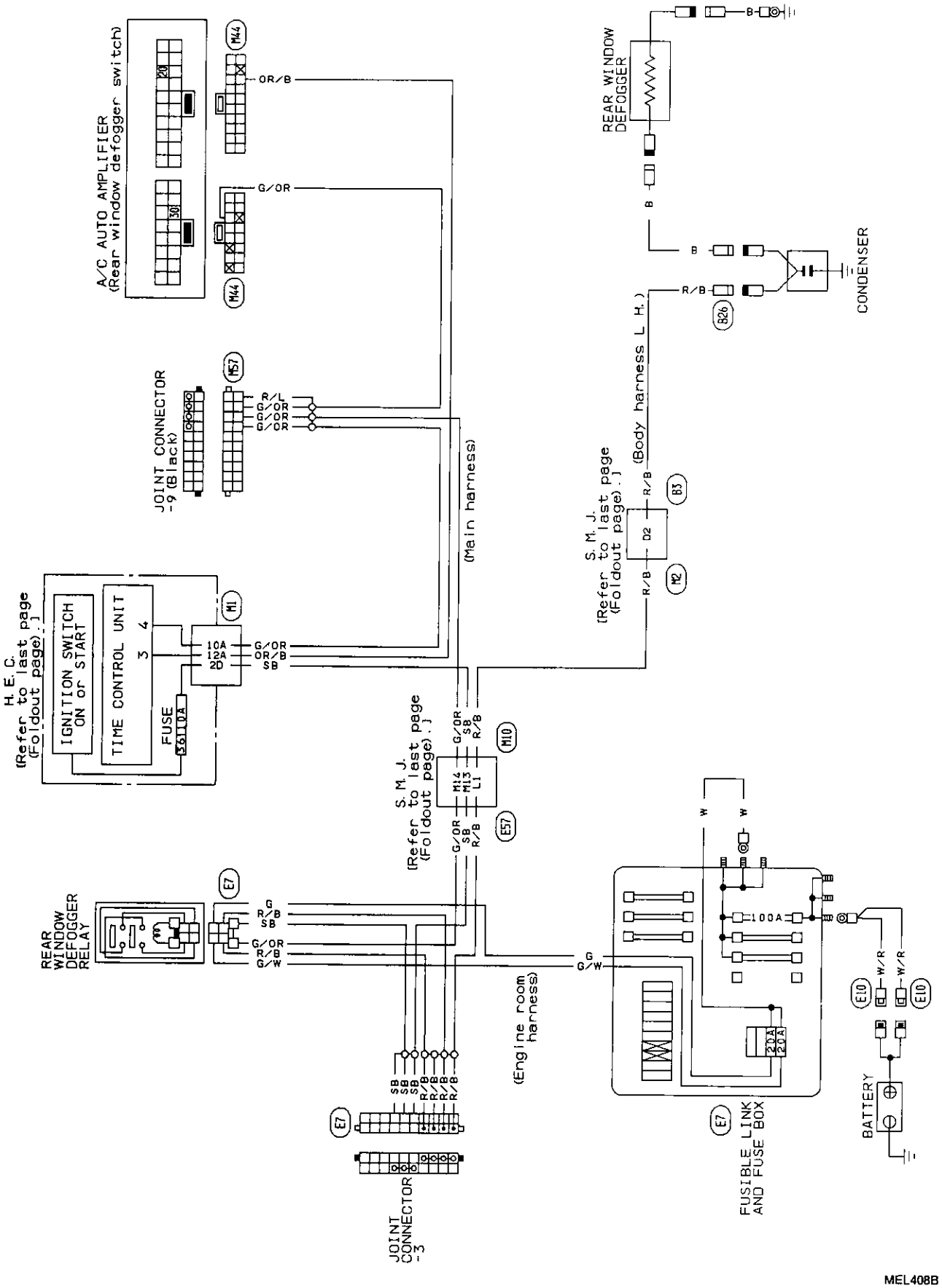
Before attempting to turn the nozzle, gently tap the end of the tool to free the nozzle.
This will prevent "rounding out" the small female square in the center of the nozzle.

Wiring Diagram

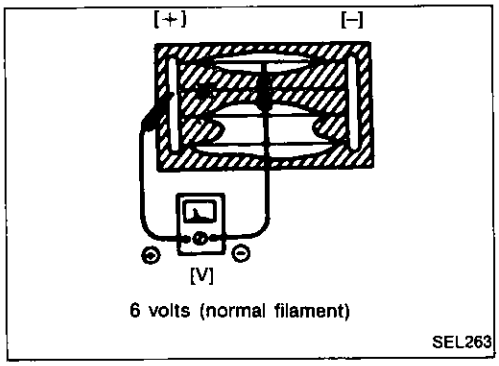


MEL407B

Wiring Diagram

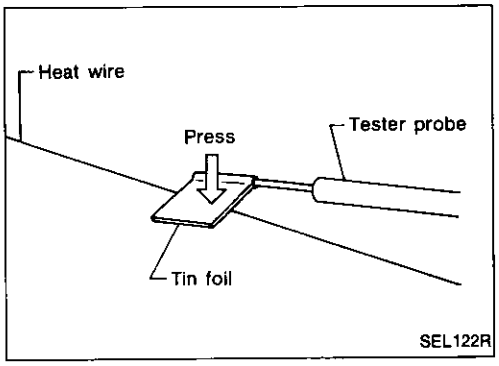


MEL408B

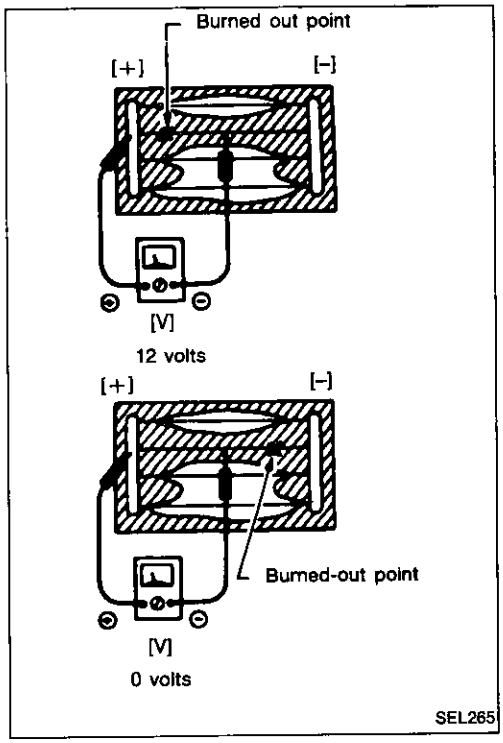


Filament Check

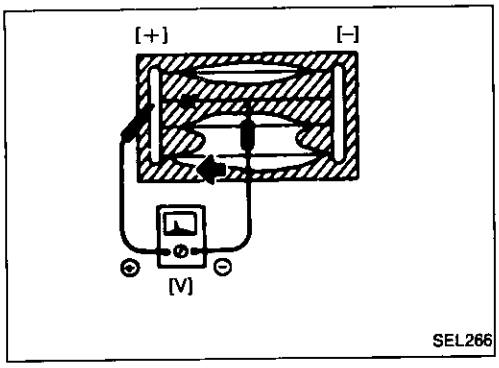
1. Attach probe circuit tester (in volt range) to middle portion of each filament.



- **When measuring voltage, wind a piece of tin foil around the top of the negative probe and press the foil against the wire with your finger as shown.**



2. If a filament is burned out, circuit tester registers 0 or 12 volts.

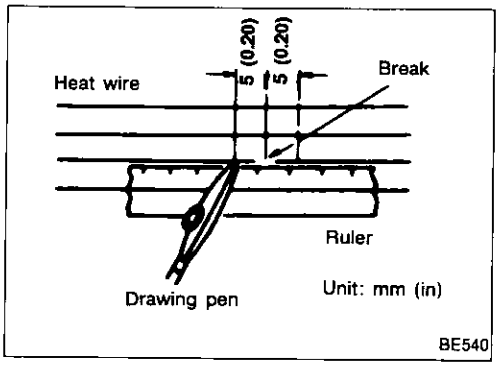


3. To locate burned out point, move probe to left and right along filament to determine point where tester needle swings abruptly.

Filament Repair

REPAIR EQUIPMENT

1. Conductive silver composition (Dupont No. 4817 or equivalent)
2. Ruler 30 cm (11.8 in) long
3. Drawing pen
4. Heat gun
5. Alcohol
6. Cloth



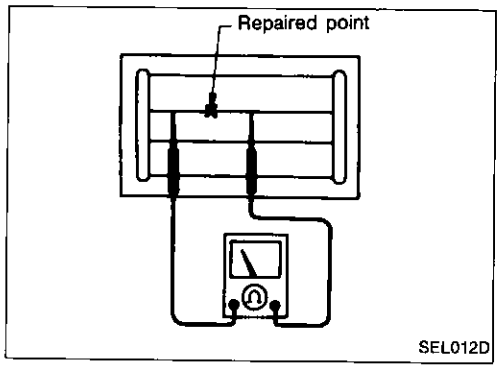
REPAIRING PROCEDURE

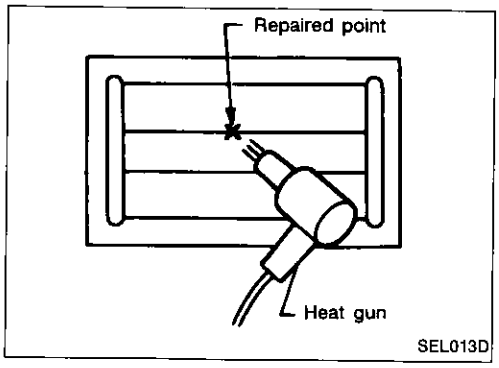
1. Wipe broken heat wire and its surrounding area clean with a cloth dampened in alcohol.
2. Apply a small amount of conductive silver composition to tip of drawing pen.

Shake silver composition container before use.

3. Place ruler on glass along broken line. Deposit conductive silver composition on break with drawing pen. Slightly overlap existing heat wire on both sides [preferably 5 mm (0.20 in)] of the break.
4. After repair has been completed, check repaired wire for continuity. This check should be conducted 10 minutes after silver composition is deposited.

Do not touch repaired area while test is being conducted.

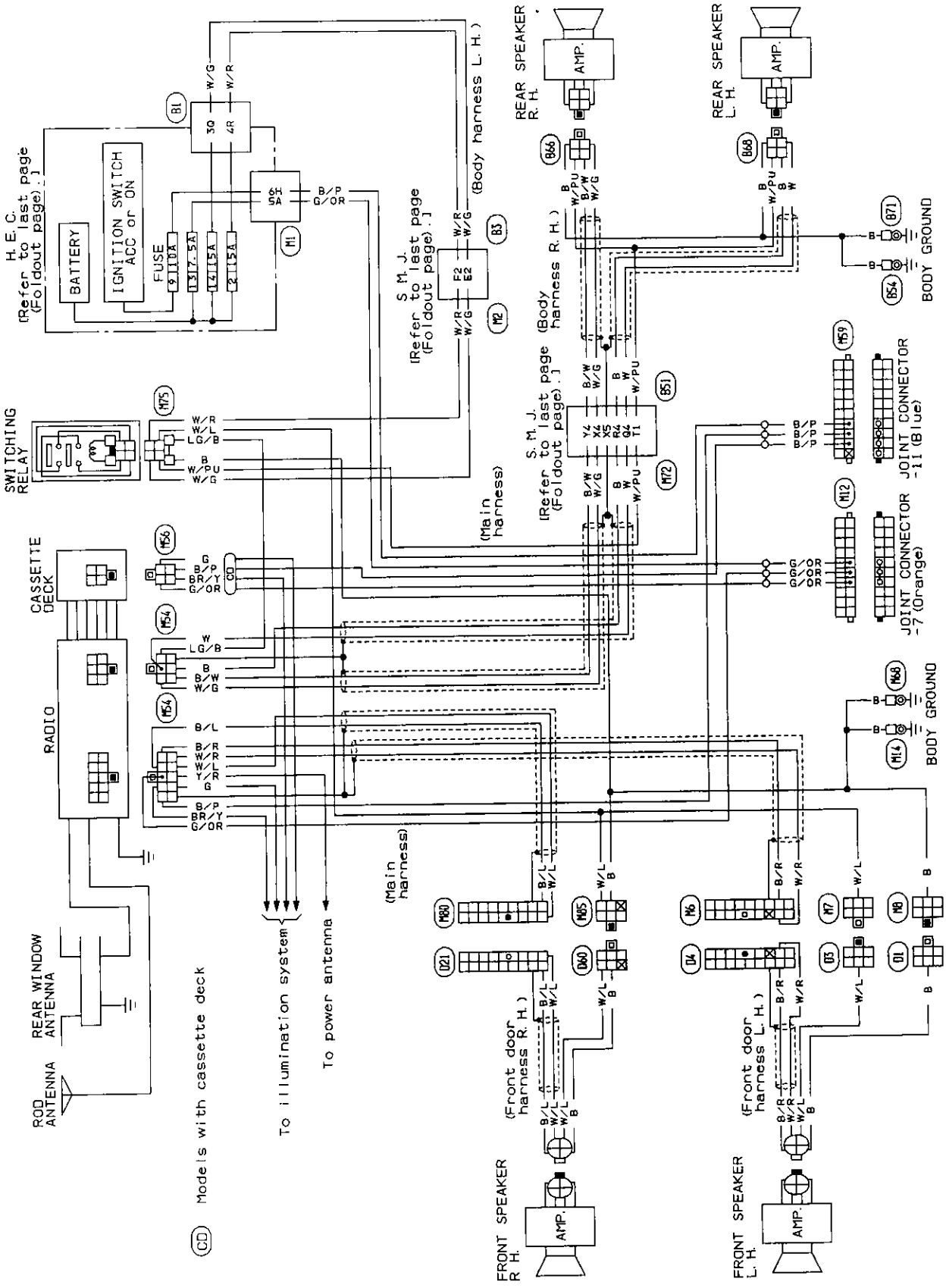




5. Apply a constant stream of hot air directly to the repaired area for approximately 20 minutes with a heat gun. A minimum distance of 3 cm (1.2 in) should be kept between repaired area and hot air outlet. If a heat gun is not available, let the repaired area dry for 24 hours.

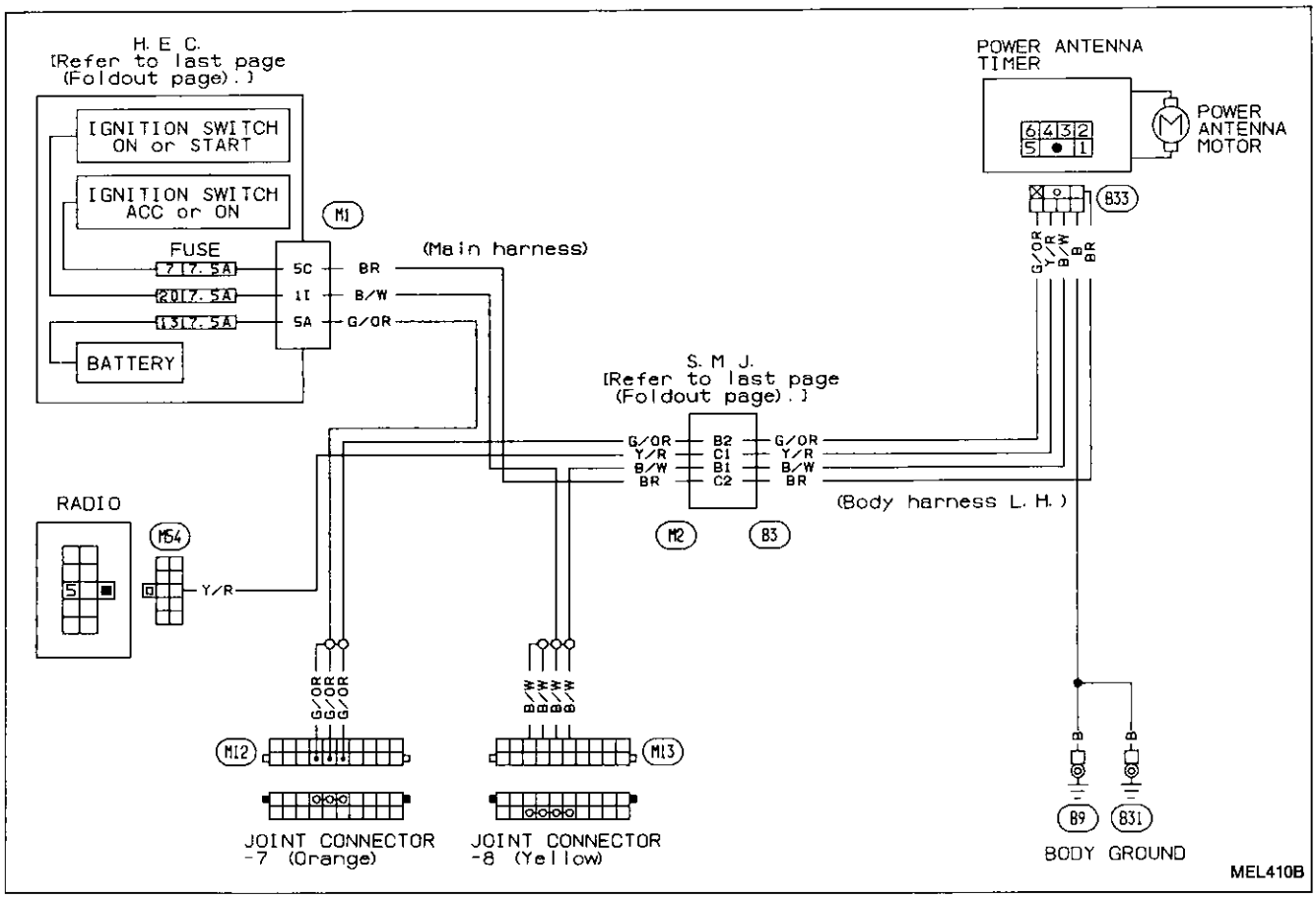
Audio/Wiring Diagram

BOSE SYSTEM

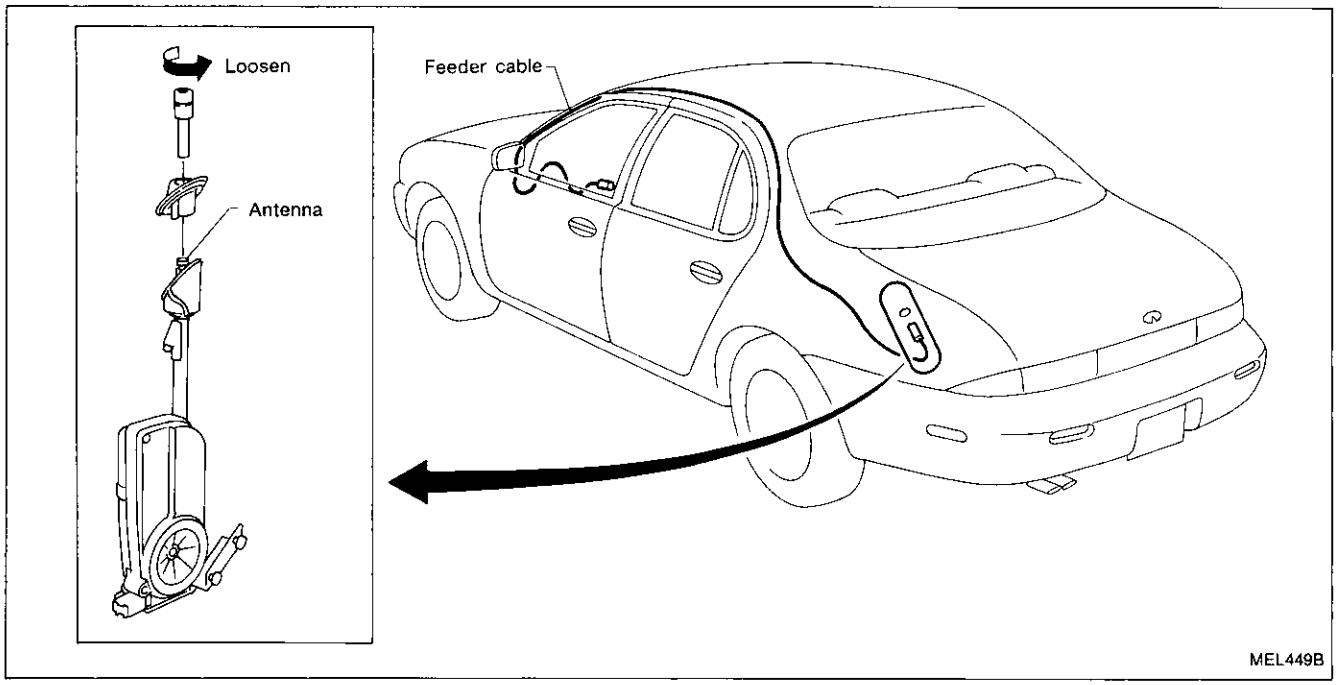


MEL409B

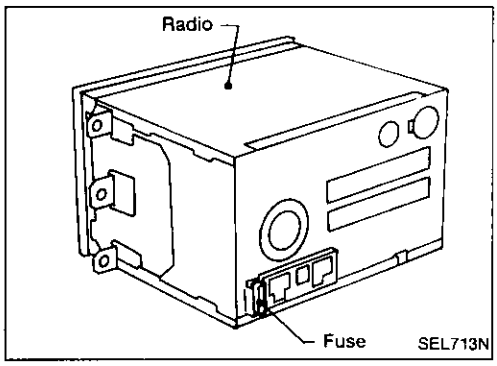
Power Antenna/Wiring Diagram

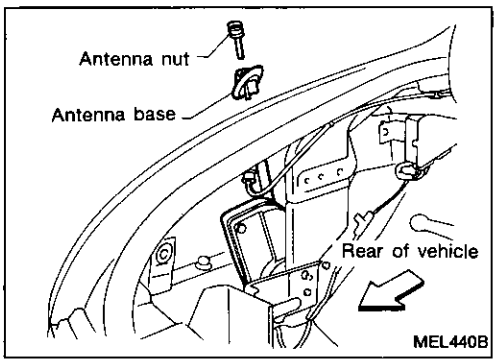


Location of Antenna



Radio Fuse Check

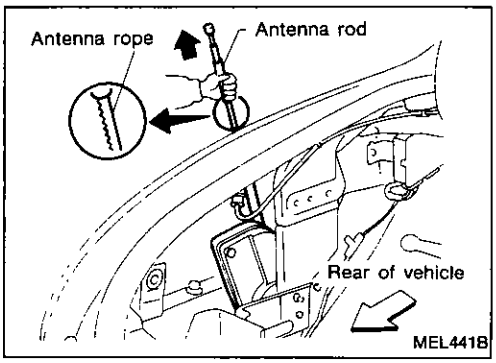




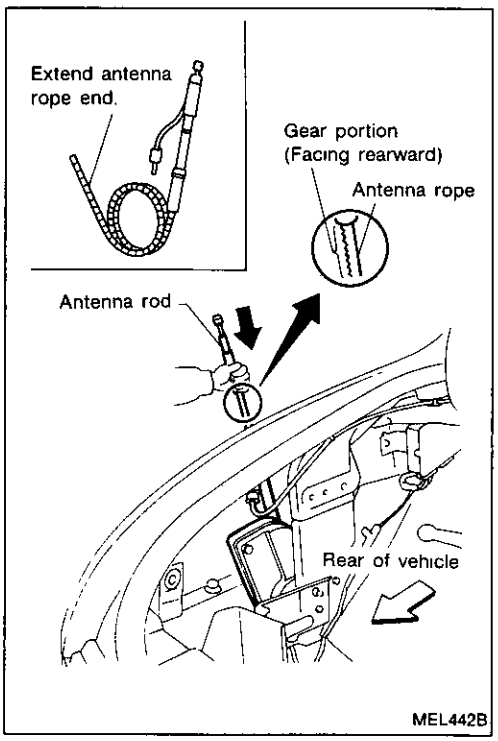
Antenna Rod Replacement

REMOVAL

1. Remove antenna nut and antenna base.

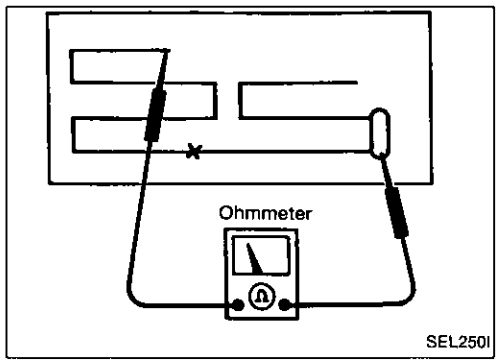


2. Withdraw antenna rod while raising it by operating antenna motor.



INSTALLATION

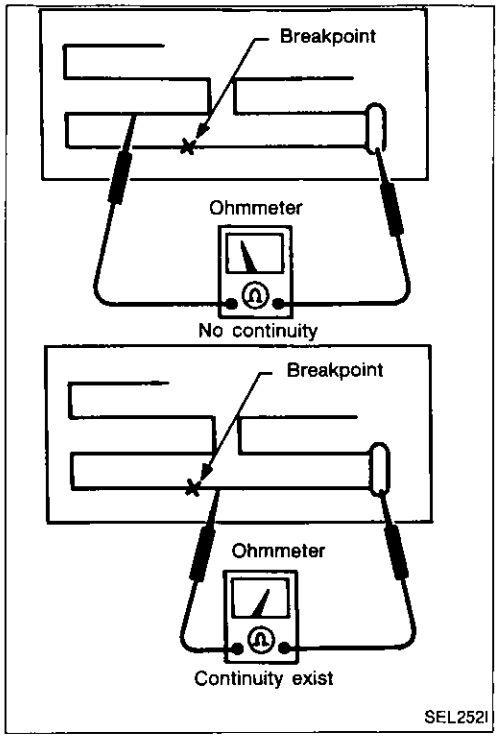
1. Lower antenna rod by operating antenna motor.
2. Insert gear section of antenna rope into place with it facing toward antenna motor.
3. As soon as antenna rope is wound on antenna motor, stop antenna motor. Insert antenna rod lower end into antenna motor pipe.
4. Retract antenna rod completely by operating antenna motor.
5. Install antenna nut and base.



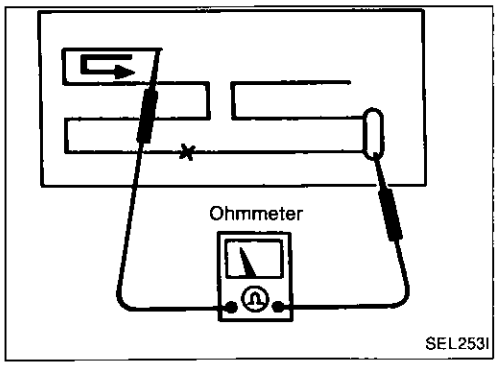
Window Antenna Repair

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.

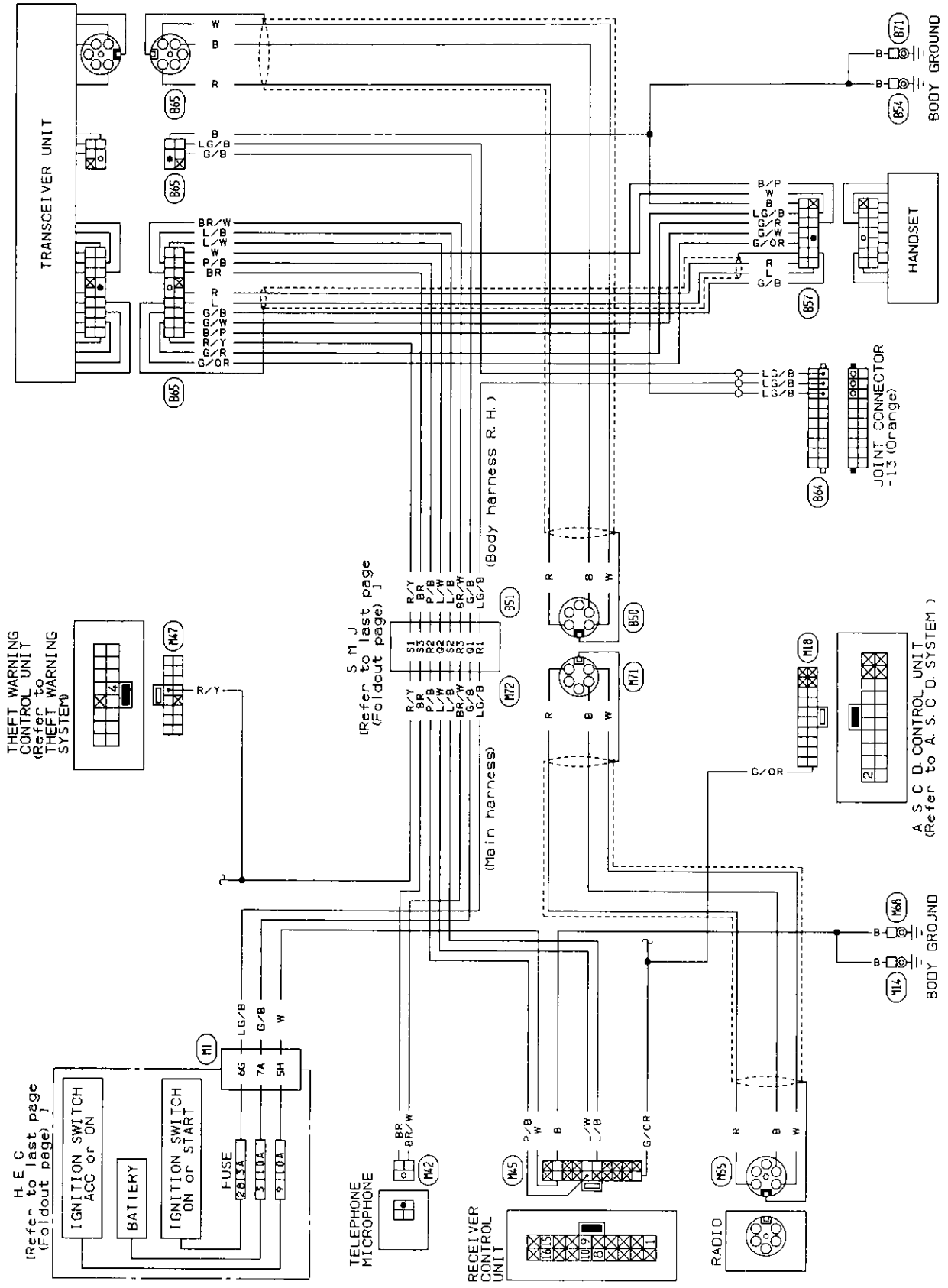


3. To locate broken point, move probe to left and right along element to determine point where tester needle swings abruptly.

ELEMENT REPAIR

Refer to REAR WINDOW DEFOGGER "Filament Repair".

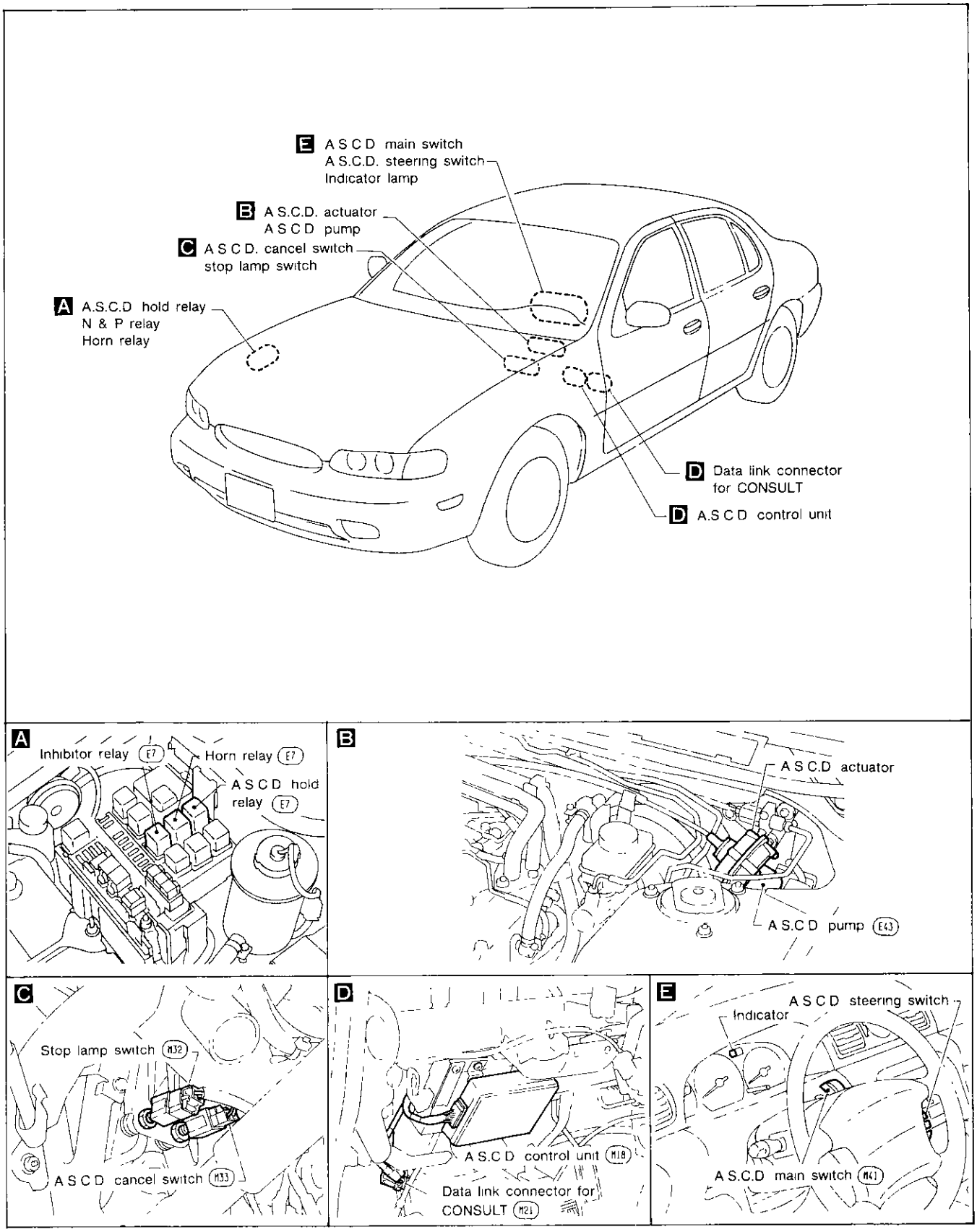
Telephone/Wiring Diagram



MEL411B

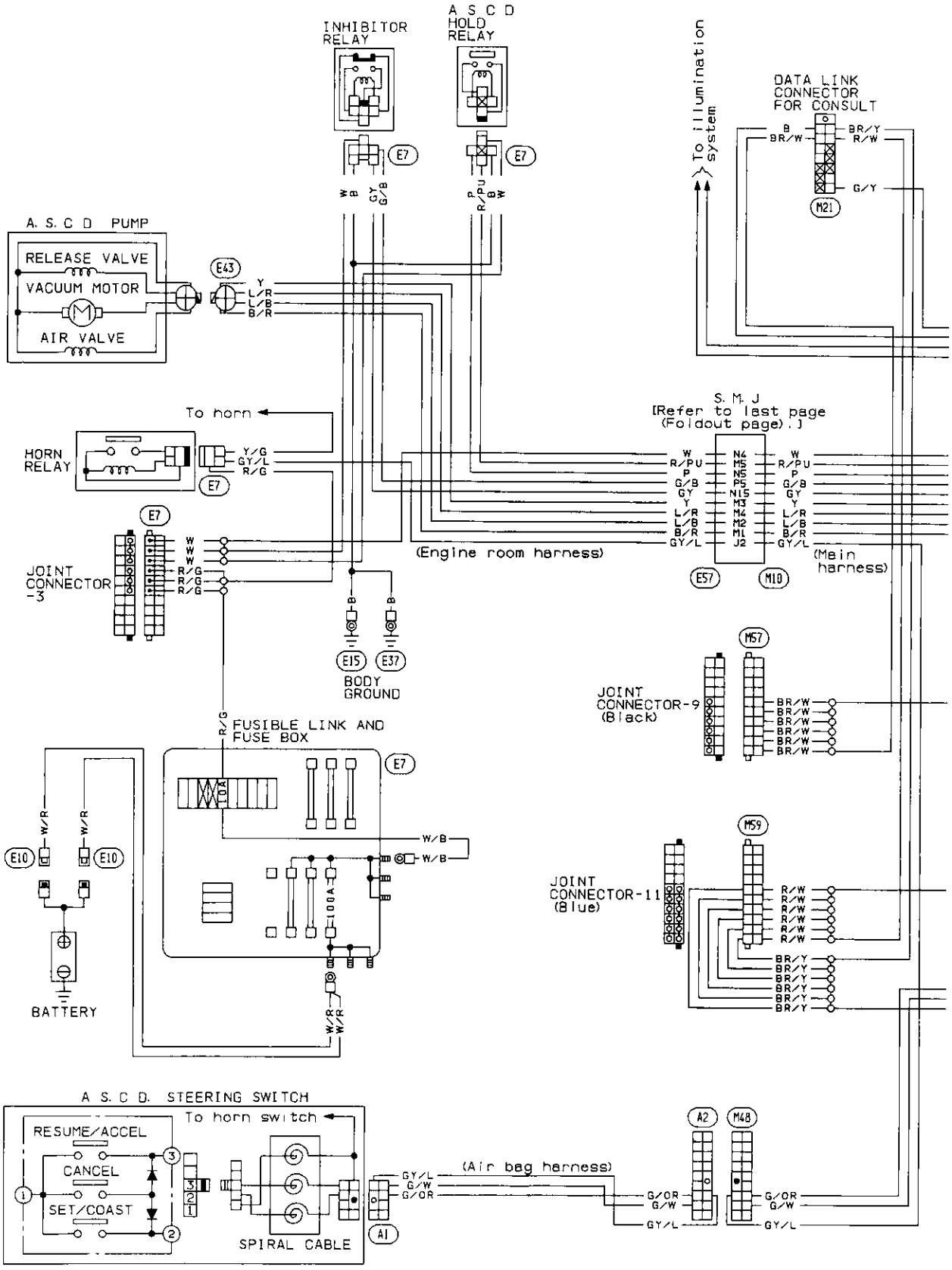
NOTE

Component Parts and Harness Connector Location

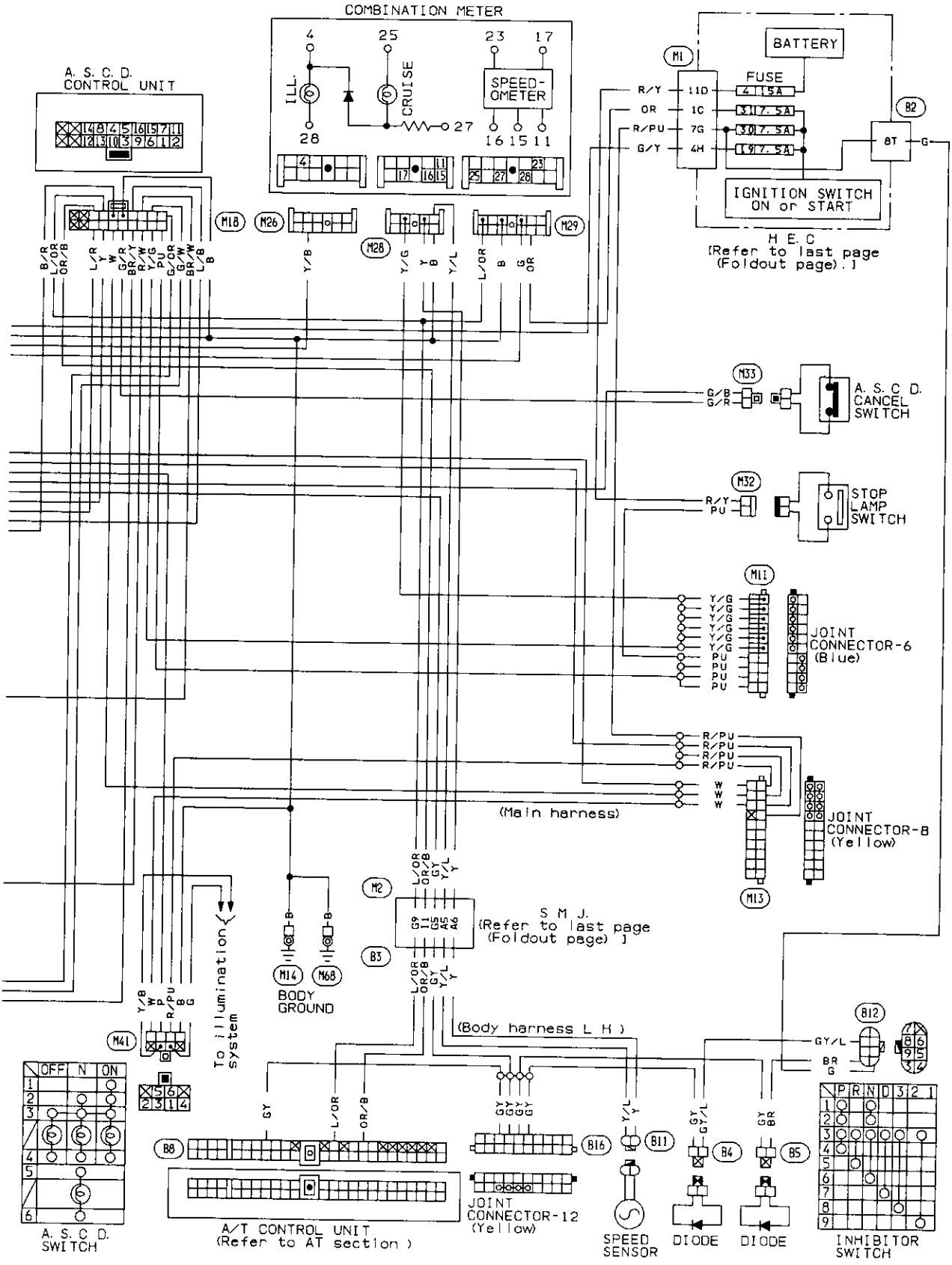


MEL461B

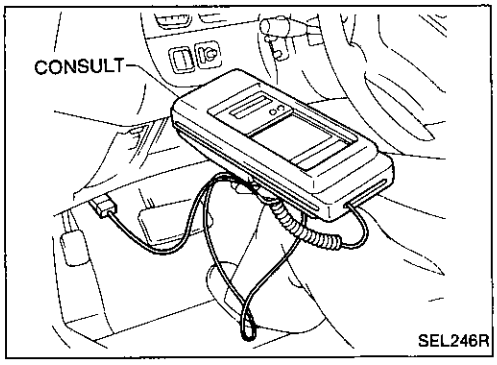
Wiring Diagram



Wiring Diagram (Cont'd)



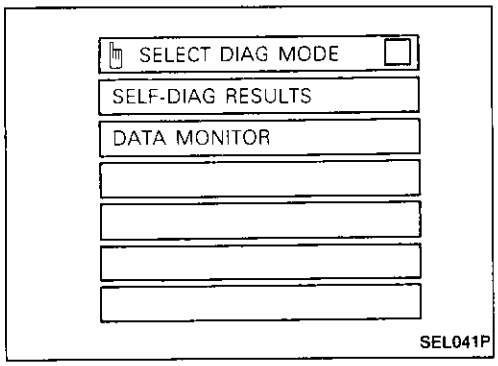
MEL387B



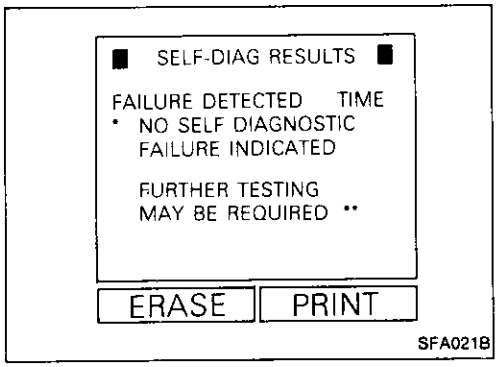
Trouble Diagnoses

CONSULT

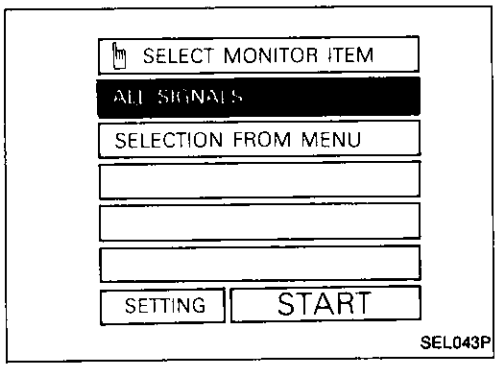
1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector.



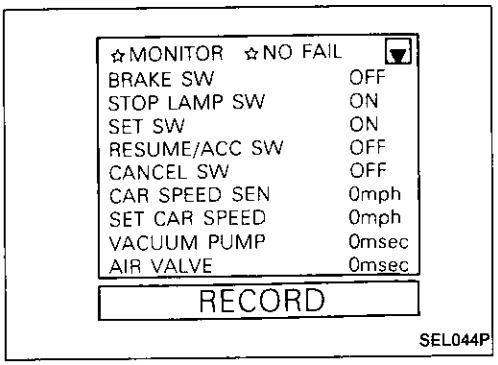
3. Turn on ignition switch.
4. Turn on A.S.C.D. main switch.
5. Touch START (on CONSULT display).
6. Touch A.S.C.D.
7. Touch SELF-DIAG RESULTS.



- Self-diagnostic results are shown on display.
  Refer to table on page EL-111.



8. Touch DATA MONITOR.



- Touch START.
- Data monitor results are shown on display.
  Refer to table on page EL-111.

For further information, read the CONSULT Operation Manual.

Trouble Diagnoses (Cont'd)

Self-diagnostic results

Diagnostic item	Description
* NO SELF DIAGNOSTIC FAILURE INDICATED. FURTHER TESTING MAY BE REQUIRED.**	• Even if no self diagnostic failure is indicated, further testing may be required as far as the customer complains.
POWER SUPPLY-VALVE	• The power supply circuit for the valves is open. (An abnormally high voltage is entered.)
VACUUM PUMP	• The vacuum pump circuit is open or shorted. (An abnormally high or low voltage is entered.)
AIR VALVE	• The air valve circuit is open or shorted. (An abnormally high or low voltage is entered.)
CAR/S SEN/FAILSAFE	• The vehicle speed sensor or the fail-safe circuit is malfunctioning.
CONTROL UNIT	• The A.S.C.D. control unit is malfunctioning.
RELEASE VALVE	• The release valve circuit is open or shorted. (An abnormally high or low voltage is entered.)
BRAKE SW/STOP/L SW	• The brake (cancel) switch or stop lamp switch is malfunctioning.

Data monitor

Monitored item	Description
BRAKE SW	• Indicates [ON/OFF] condition of the brake (cancel) switch circuit.
STOP LAMP SW	• Indicates [ON/OFF] condition of the stop lamp switch circuit.
SET SW	• Indicates [ON/OFF] condition of the set switch circuit.
RESUME/ACC SW	• Indicates [ON/OFF] condition of the resume/accelerate switch circuit.
CANCEL SW	• Indicates [ON/OFF] condition of the cancel circuit.
CAR SPEED SEN	• The present vehicle speed computed from the vehicle speed sensor signal is displayed.
SET CAR SPEED	• The preset vehicle speed is displayed.
VACUUM PUMP	• The operation time of the vacuum pump is displayed.
AIR VALVE	• The operation time of the air valve is displayed.
PW SUP-VALVE	• Indicates [ON/OFF] condition of the circuit for the air valve and the release valve.
CRUISE LAMP	• Indicates [ON/OFF] condition of the cruise lamp circuit.
A/T OD CANCEL	• Indicates [ON/OFF] condition of the OD cancel circuit.
FAIL SAFE·LOW	• The fail-safe (LOW) circuit function is displayed.
FAIL SAFE·SPD	• The fail-safe (SPEED) circuit function is displayed.

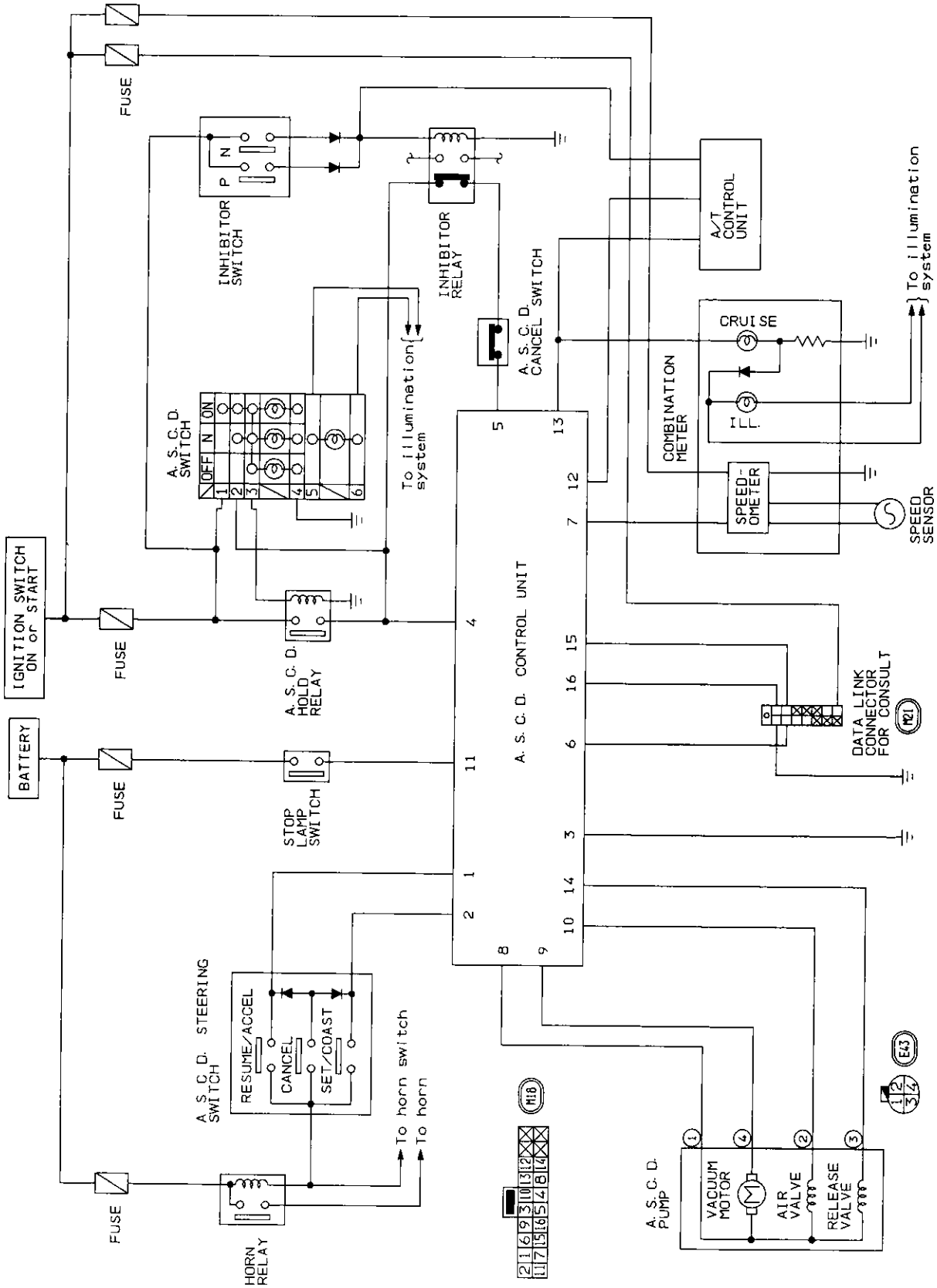
Trouble Diagnoses (Cont'd)

SYMPTOM CHART

PROCEDURE	Diagnostic Procedure								Electrical Components Inspection						
REFERENCE PAGE	EL-114	EL-117	EL-117	EL-118	EL-119	EL-120	EL-122	EL-124	EL-125	EL-126	EL-127	EL-127	EL-127	EL-127	EL-128
SYMPTOM	Diagnostic Procedure 1	Diagnostic Procedure 2	Diagnostic Procedure 3	Diagnostic Procedure 4	Diagnostic Procedure 5	Diagnostic Procedure 6	Diagnostic Procedure 7	Diagnostic Procedure 8	A.S.C.D. wire adjustment	A.S.C.D. actuator/A.S.C.D. pump	A.S.C.D. main switch	A.S.C.D. steering switch	A.S.C.D. brake switch and stop lamp switch	Inhibitor switch	Speed sensor
A.S.C.D. control unit cannot be set properly.	○									○	○	○	○	○	○
Engine hunts		○							○	○					
Large difference between set speed and actual vehicle speed.			○						○	○					
Deceleration is greatest immediately after A.S.C.D. has been set.				○					○	○					
ACCEL switch will not operate.	○				○							○			
RESUME switch will not operate.	○					○						○	○		
Set speed cannot be canceled.							○		○	○			○		
"CRUISE" indicator lamp blinks.								○		○		○	○		

Trouble Diagnoses (Cont'd)

CIRCUIT DIAGRAM FOR QUICK PINPOINT CHECK

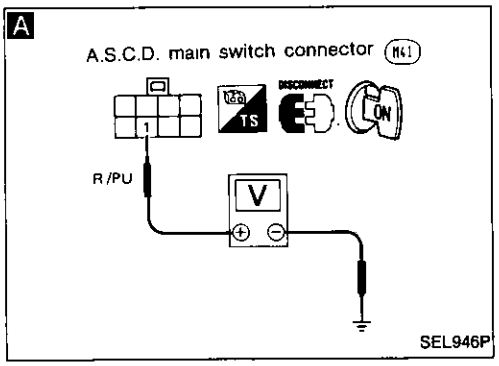


MEL386B

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 1

SYMPTOM: A.S.C.D. control cannot be set.



Turn A.S.C.D. main switch "OFF" and "ON" to make sure indicator illuminates.

N.G. → A

O.K. ↓

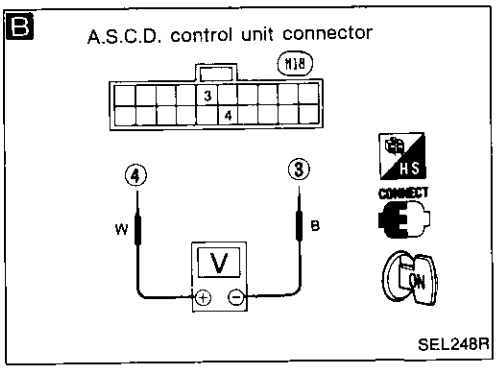
A

CHECK POWER SUPPLY FOR A.S.C.D. MAIN SWITCH.

1. Disconnect main switch harness connector.
2. Do approx. 12 volts exist between main switch harness terminal ① and body ground?

No → Check fuse and harness.

Yes → CHECK A.S.C.D. MAIN SWITCH.
Refer to "Electrical Components Inspection".
CHECK A.S.C.D. HOLD RELAY.



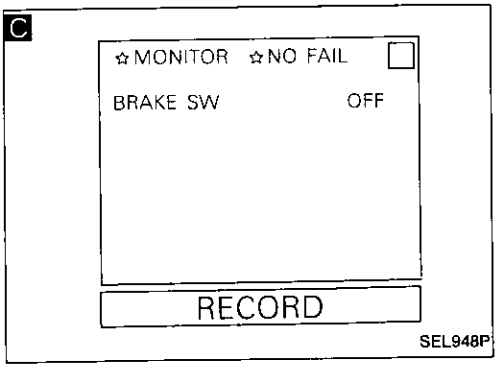
B

CHECK POWER SUPPLY CIRCUIT FOR A.S.C.D. CONTROL UNIT.

1. Turn A.S.C.D. main switch "ON".
2. Check voltage between control unit harness terminal ④ and ③.
   Battery voltage should exist.

N.G. → Check continuity between control unit harness terminal ④ and A.S.C.D. hold relay.

O.K. ↓



C

CHECK CUT-OFF CIRCUIT FOR A.S.C.D. CONTROL UNIT.

See "BRAKE SW" in "Data monitor" mode.

BRAKE SWITCH
When switch is depressed: OFF
When switch is released: ON

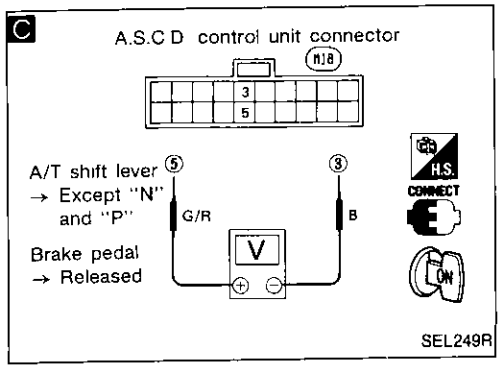
— OR —

Check voltage between control unit harness terminals ⑤ and ③.
Battery voltage should exist.

N.G. → CHECK A.S.C.D. BRAKE SWITCH AND INHIBITOR SWITCH.
Refer to "Electrical Components Inspection".
CHECK N & P RELAY.

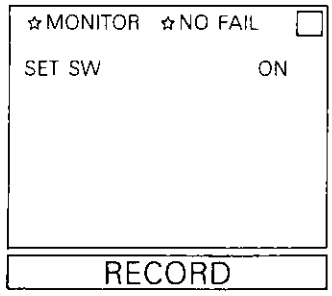
O.K. ↓

Ⓐ
(Next page)



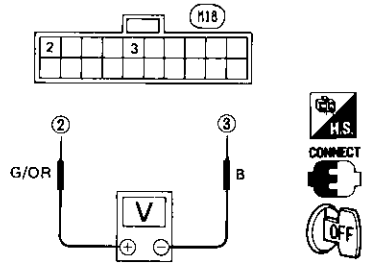
Trouble Diagnoses (Cont'd)

D



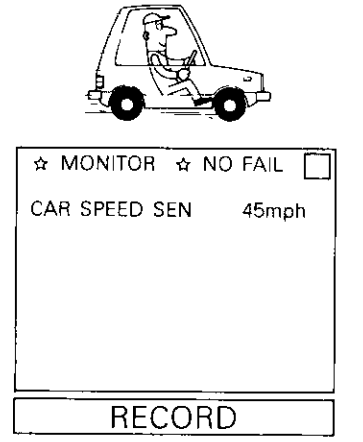
SEL950P

D



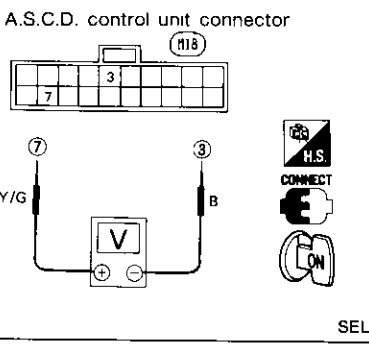
SEL250R

E



SEL952P

E



SEL251R

Ⓐ

D

CHECK SET/COAST SWITCH CIRCUIT FOR A.S.C.D. CONTROL UNIT.

See "SET SW" in "Data monitor" mode.

SET SW
When switch is pressed: ON
When switch is released: OFF

N.G. → Does horn work?

No → Check fuse and horn relay.

Yes → CHECK A.S.C.D. STEERING SWITCH. Refer to "Electrical Components Inspection".

OR

1. Push and hold SET/COAST button on A.S.C.D. steering switch.
2. Check voltage between control unit harness terminals ② and ③.

Battery voltage should exist.

O.K.

E

CHECK SPEED SENSOR CIRCUIT.

See "CAR SPEED SEN" in "Data monitor" mode while driving.

N.G. → CHECK SPEED SENSOR. Refer to "Electrical Components Inspection".

OR

1. Apply wheel chocks and jack up rear of vehicle.
2. Connect voltmeter between control unit harness terminals ⑦ and ③.
3. Slowly turn front wheel.
4. Check deflection of voltmeter pointer.

O.K.

CHECK A.S.C.D. ACTUATOR/A.S.C.D. PUMP. Refer to "Electrical Components Inspection".

N.G. → Replace A.S.C.D. actuator/ A.S.C.D. pump.

O.K.

Ⓑ

(Next page)

Trouble Diagnoses (Cont'd)

F



☆ MONITOR ☆ NO FAIL

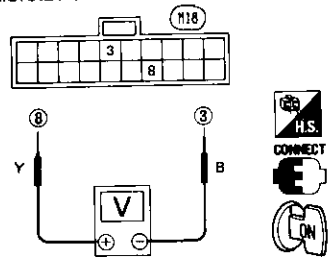
PW SUP-VALVE ON

RECORD

SEL954P

F

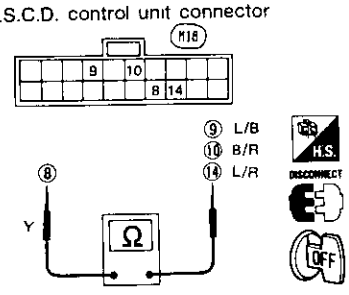
A.S.C.D. control unit connector



SEL252R

G

A.S.C.D. control unit connector



SEL253R

Ⓑ

F

CHECK OUTPUT FOR A.S.C.D. ACTUATOR/A.S.C.D. PUMP.

1. Read out "PW SUP-VALVE" in "Data monitor" mode while driving.

PW SUP-VALVE:

ON (When A.S.C.D. is operating.)

OFF (When A.S.C.D. is not operating.)

N.G. → Replace A.S.C.D. control unit.

OR

1. Check voltage between control unit harness terminals ⑧ and ③.

Voltage is 0V

O.K.

G

CHECK A.S.C.D. ACTUATOR/A.S.C.D. PUMP CIRCUIT.

1. Disconnect A.S.C.D. control unit connector.
2. Measure resistance between control unit harness terminals ⑧ and ⑨, ⑩, ⑭.

Terminals		Resistance [Ω]
⑧	⑨	Approx. 8 - 45
	⑩	Approx. 65
	⑭	Approx. 65

O.K. → Replace A.S.C.D. control unit.

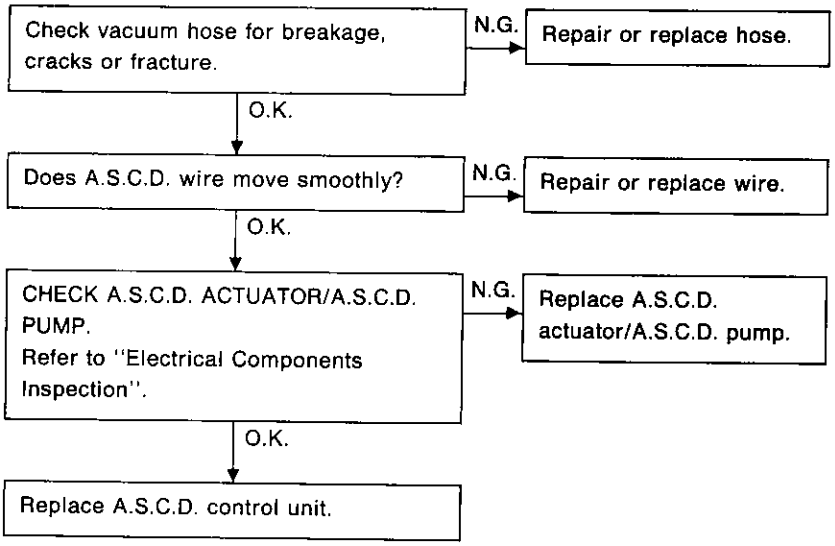
N.G.

Repair short or open circuit in A.S.C.D. actuator/A.S.C.D. pump harness.

Trouble Diagnoses (Cont'd)

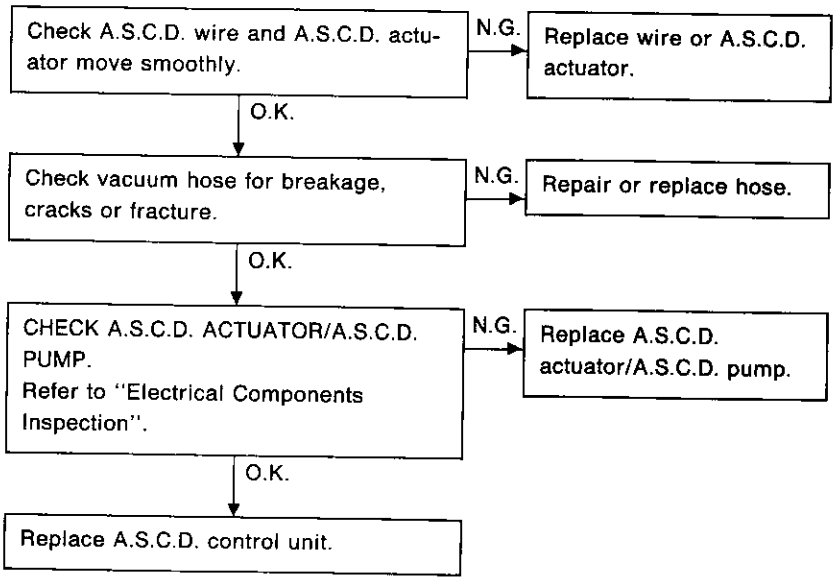
DIAGNOSTIC PROCEDURE 2

SYMPTOM: Engine hunts.



DIAGNOSTIC PROCEDURE 3

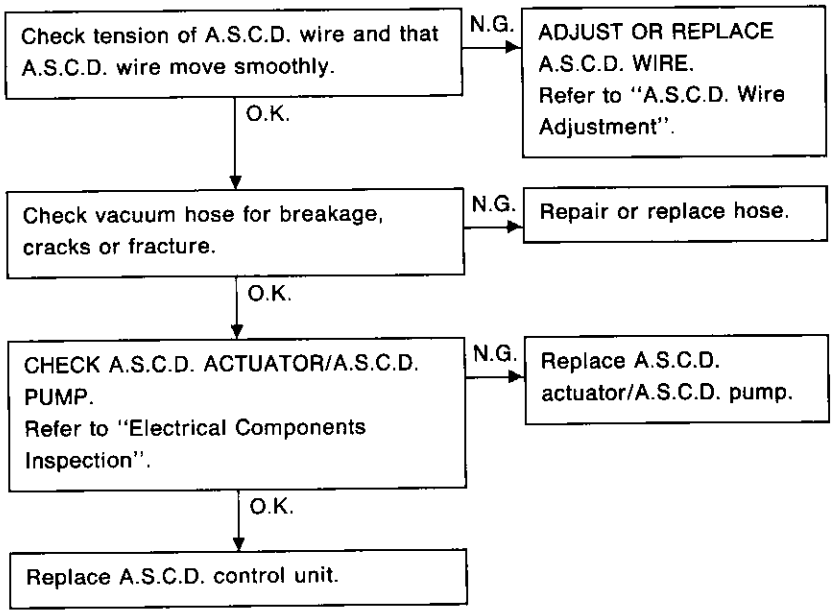
SYMPTOM: Large difference between set vehicle speed and actual speed.



Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 4

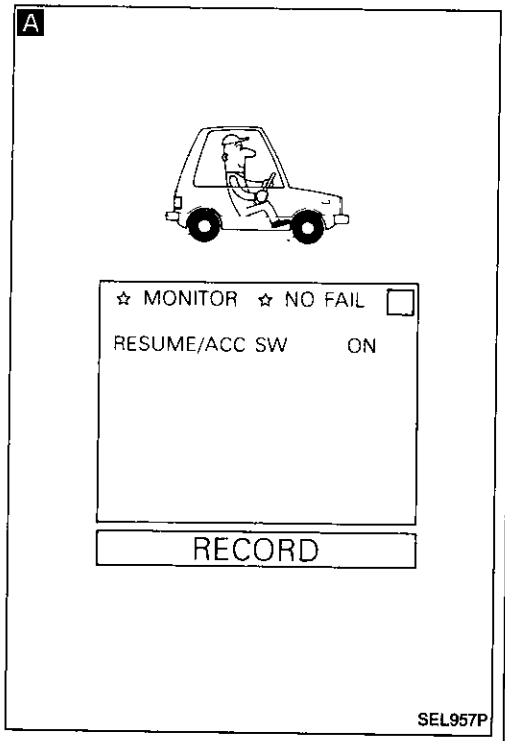
SYMPTOM: Deceleration is greatest immediately after A.S.C.D. has been set.

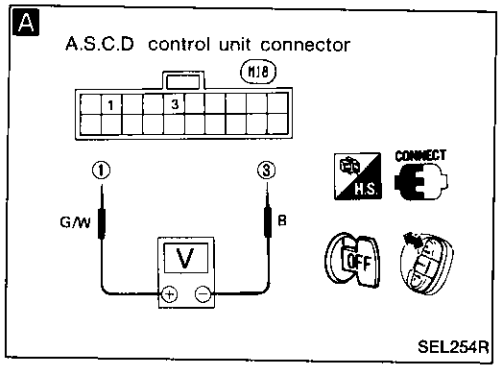


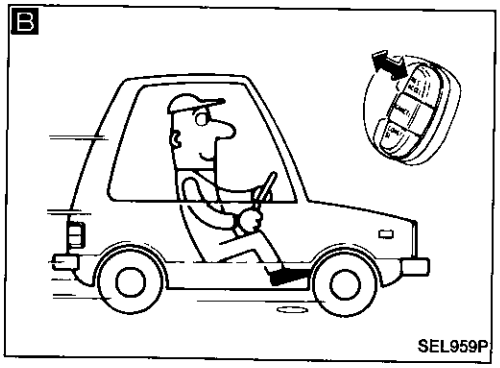
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 5

SYMPTOM: ACCEL switch will not operate.







Check constant-speed function for operating using SET/COAST switch.

N.G. → Go to "DIAGNOSTIC PROCEDURE 1".

O.K.

A

CHECK RESUME/ACCEL SWITCH CIRCUIT.

See "RESUME/ACC SW" in "Data monitor" mode.

RESUME/ACC SW

When switch is pressed: ON

When switch is released: OFF

N.G. → CHECK A.S.C.D. STEERING SWITCH. Refer to "Electrical Components Inspection".

OR

Check voltage between control unit harness terminals ① and ③.

- After pressing and holding RESUME/ACC switch.
  Battery voltage should exist.
- After releasing RESUME/ACC switch.
  Voltage is 0V.

O.K.

B

Does vehicle accelerate when RESUME/ACCEL switch is pressed?

No → Replace control unit.

Yes

B

Does vehicle maintain the new (faster) speed when RESUME/ACCEL switch is released?

No → Replace control unit.

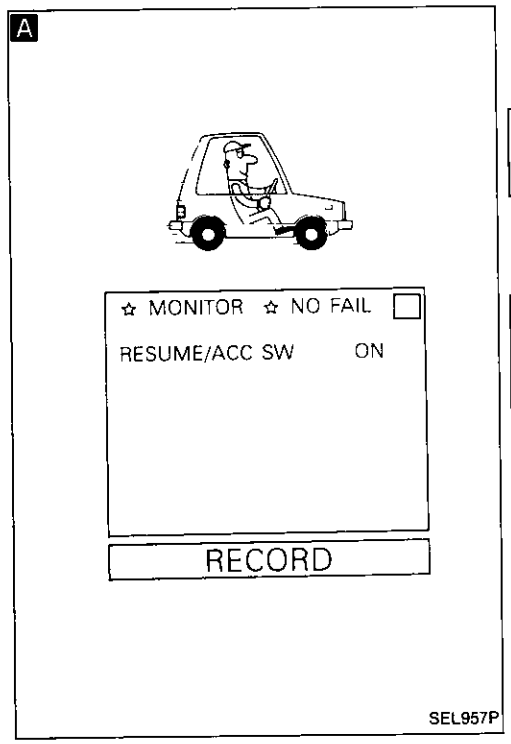
Yes

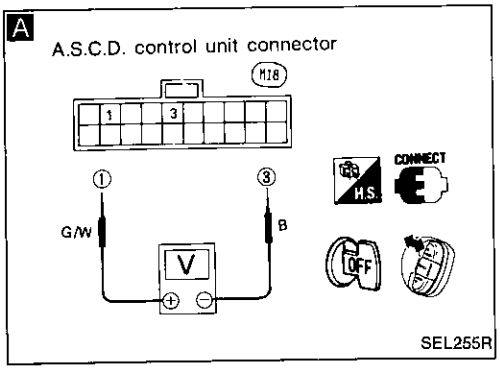
System is O.K.

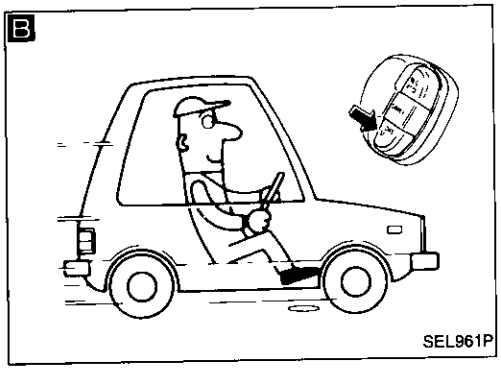
Trouble Diagnoses (Cont'd)

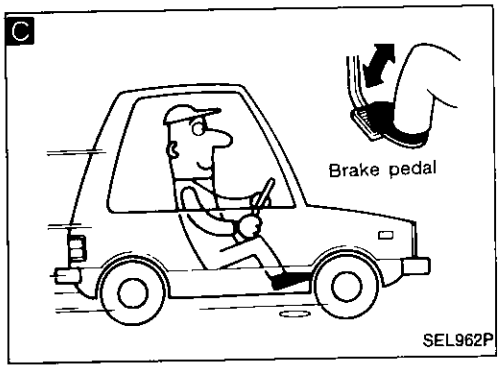
DIAGNOSTIC PROCEDURE 6

SYMPTOM: RESUME switch will not operate.









Check constant-speed function for operation using SET/COAST switch.
N.G. → Go to "DIAGNOSTIC PROCEDURE 1".
O.K.

A

CHECK RESUME/ACCEL SWITCH CIRCUIT.
N.G. → CHECK A.S.C.D. STEERING SWITCH. Refer to "Electrical Components Inspection".

See "RESUME/ACC SW" in "Data monitor" mode.
RESUME/ACC SW
When switch is pressed: ON
When switch is released: OFF

OR

Check voltage between control unit harness terminals ① and ③.
- After pressing and holding RESUME/ACC switch.
  Battery voltage should exist.
- After releasing RESUME/ACC switch.
  Voltage is 0V.

O.K.

B

Set vehicle speed at 80 km/h (50 MPH) by pressing SET/COAST switch.
O.K.

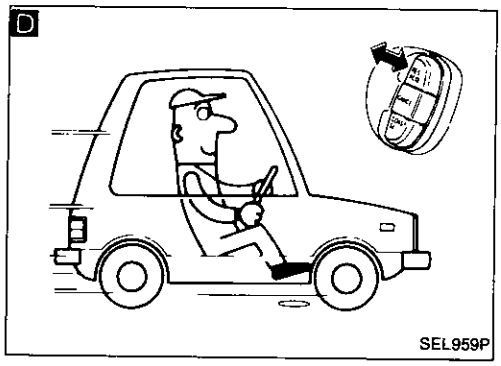
C

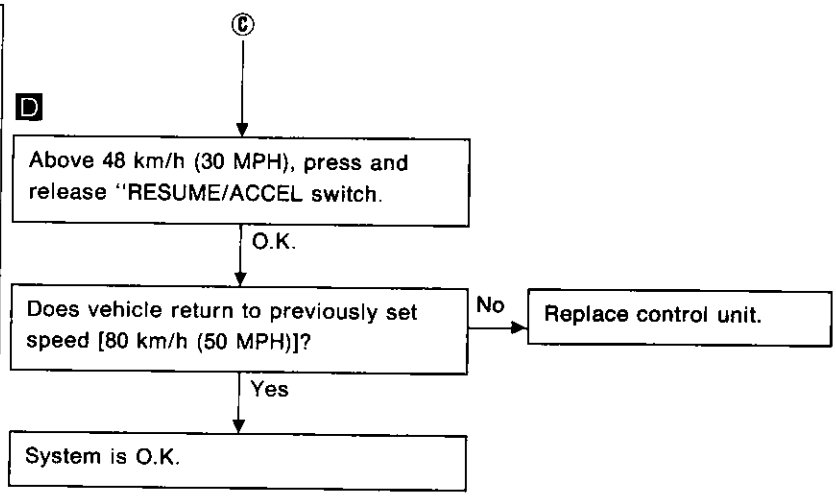
While cruising at set speed, depress and release brake pedal.
O.K.

Does speed control disengage and "CRUISE" lamp turn off?
No → CHECK STOP LAMP SWITCH AND A.S.C.D. BRAKE SWITCH. Refer to "Electrical Components Inspection".
Yes

Ⓒ
(Next page)

Trouble Diagnoses (Cont'd)



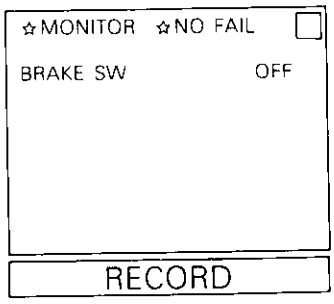


Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 7

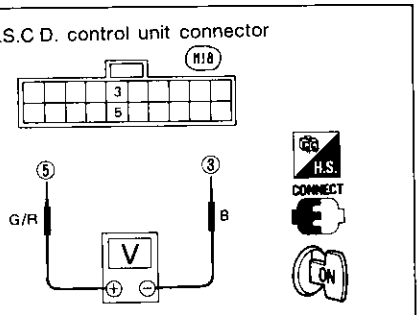
SYMPTOM: Set speed cannot be cancelled.

A



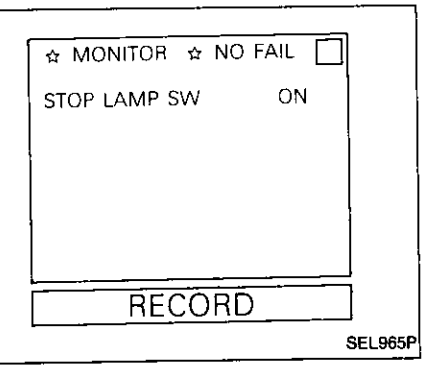
SEL948P

A



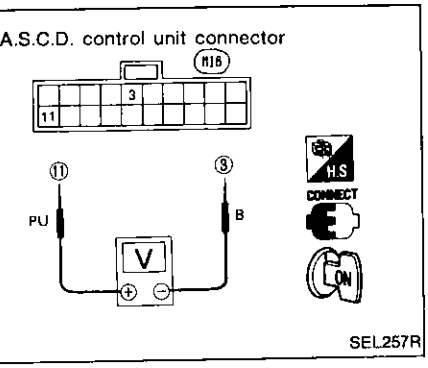
SEL256R

B



SEL965P

B



SEL257R

A

CHECK A.S.C.D. BRAKE AND INHIBITOR SWITCH CIRCUIT.

1. Turn A.S.C.D. main switch "ON".
2. See "BRAKE SW" in "Data monitor" mode.

BRAKE SW

When brake pedal is released: ON

When brake pedal is depressed: OFF

OR

2. Check voltage between control unit harness terminals ⑤ and ③.

Condition		Voltage [Ω]
A.S.C.D. brake switch	Depressed	0
	Released	Approx. 12
A/T shift lever position is at any position except N or P.		Approx. 12
A/T shift lever position is at N or P.		0

N.G. → CHECK A.S.C.D. BRAKE and INHIBITOR SWITCH. Refer to "Electrical Components Inspection".

O.K.

B

CHECK STOP LAMP SWITCH CIRCUIT.

See "STOP LAMP SW" in "Data monitor" mode.

STOP LAMP SW

When brake pedal is released: OFF

When brake pedal is depressed: ON

OR

Check voltage between control unit harness terminals ⑪ and ③.

Condition		Voltage [V]
Stop lamp switch	Depressed	Approx. 12
	Released	0

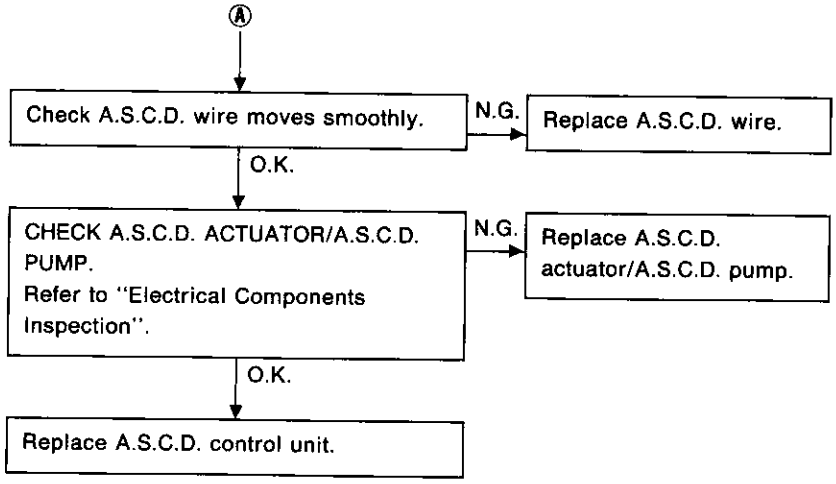
N.G. → CHECK STOP LAMP SWITCH. Refer to "Electrical Components Inspection".

O.K.

Ⓐ

(Next page)

Trouble Diagnoses (Cont'd)



Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 8

SYMPTOM: "CRUISE" indicator lamp blinks.

Does indicator lamp blink when A.S.C.D. main switch is turned to "ON" again?

Yes → Does indicator lamp blink when brake pedal is depressed slowly?

No → CHECK A.S.C.D. ACTUATOR/A.S.C.D. PUMP.
Refer to "Electrical Components Inspection".

N.G. → Replace A.S.C.D. actuator/ A.S.C.D. pump.

O.K. → CHECK A.S.C.D. ACTUATOR/A.S.C.D. PUMP CIRCUIT.

1. Check voltage between control unit harness terminals ⑧ and ③.
   Voltage is 0V.
2. Disconnect A.S.C.D. control unit connector.
3. Measure resistance between control unit harness terminals ⑧ and ⑨, ⑩, ⑭.

N.G. → Repair short or open circuit in A.S.C.D. actuator/ A.S.C.D. pump harness.

Terminals		Resistance [Ω]
⑧	⑨	Approx. 8 - 45
	⑩	Approx. 65
	⑭	Approx. 65

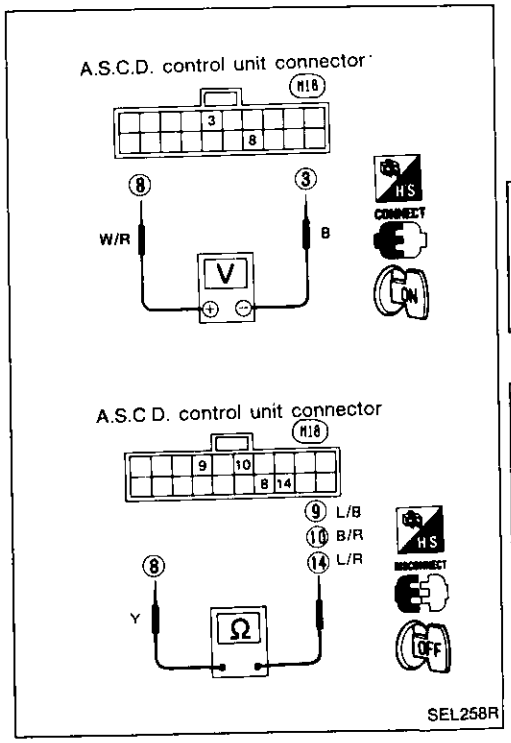
O.K. → Replace A.S.C.D. control unit.

No → CHECK A.S.C.D. STEERING SWITCH.
Refer to "Electrical Components Inspection".

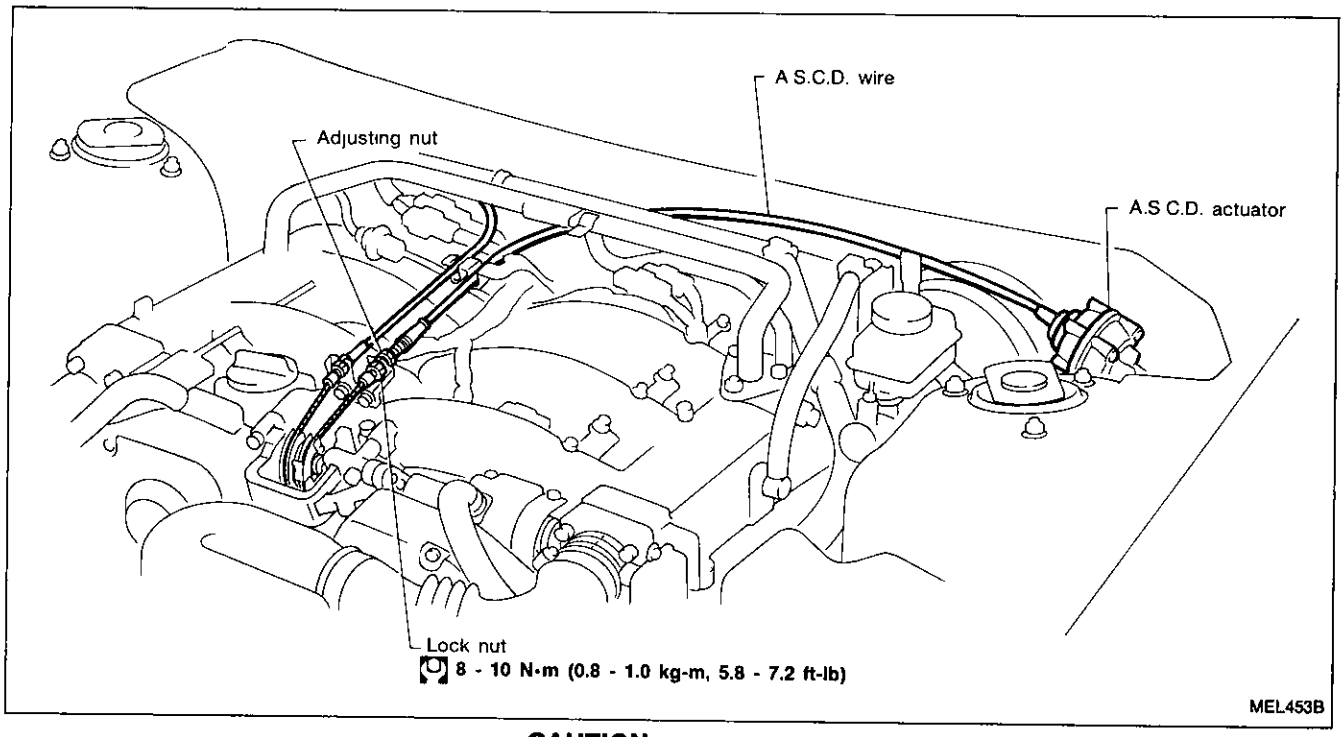
N.G. → Replace A.S.C.D. steering switch.

O.K. → Replace control unit.

No → Yes → Adjust installation of stop lamp switch and A.S.C.D. brake switch.
Refer to BR section.



A.S.C.D. Wire Adjustment



CAUTION:

- **Be careful not to twist A.S.C.D. wire when removing it.**
- **Do not tense A.S.C.D. wire excessively during adjustment.**

After confirming that accelerator wire is properly adjusted, adjust the tension of A.S.C.D. wire in the following manner.

(1) After adjusting the length of the accelerator wire, turn a securing nut by 1/2 to 1 turn from throttle open starting position to the wire loosening direction to fix. (Must be securing carried out to prevent response delay of operation of the A.S.C.D.)

(2) Securely tighten lock nut to hold adjusting nut in place.

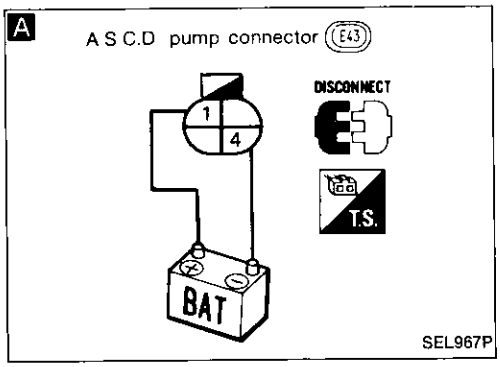
- For A.S.C.D. cancel switch and clutch switch adjustment, refer to BR and CL sections.

A.S.C.D. Wire Adjustment (Cont'd)

ELECTRICAL COMPONENTS INSPECTION

A.S.C.D. actuator/A.S.C.D. pump

1. Disconnect A.S.C.D. actuator/A.S.C.D. pump connector.
2. Check A.S.C.D. actuator/A.S.C.D. pump operations as shown.

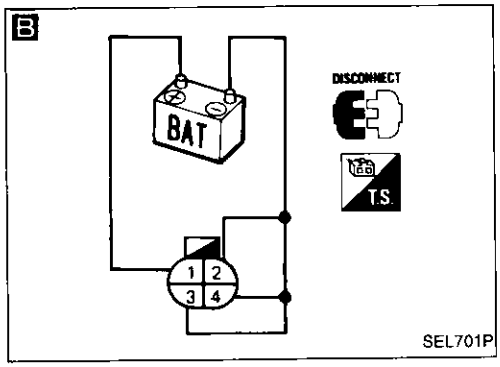


A

Check to see if motor starts when 12V D.C. is applied across ① and ④.

N.G. → Replace A.S.C.D. pump.

O.K.



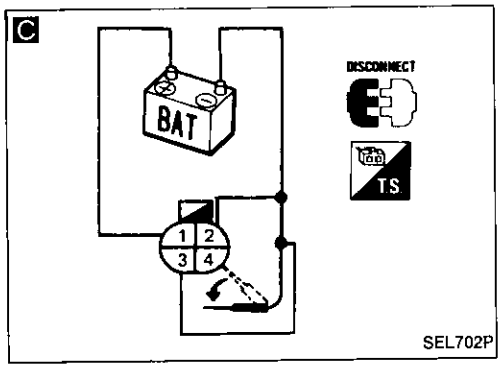
B

Check to see if A.S.C.D. wire is pulled when 12V D.C. is applied across ①, ②, ③ and ④.

N.G. → Disconnect vacuum hose from A.S.C.D. actuator and check for presence of vacuum pressure at A.S.C.D. pump.

- N.G. → Replace A.S.C.D. pump.
- O.K. → Replace A.S.C.D. actuator.

O.K. (wire is pulled.)

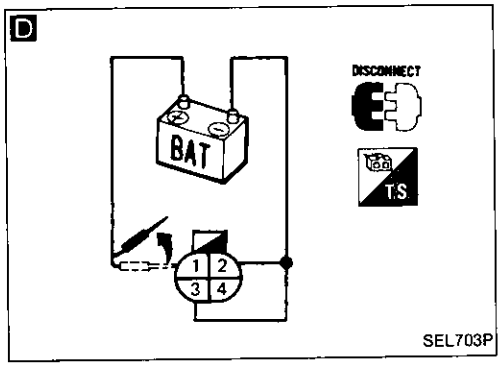


C

Check to see if A.S.C.D. wire returns to original position 50 to 60 seconds after disconnecting lead from ④.

N.G. → Replace A.S.C.D. pump.

O.K. (Wire does not return.)



D

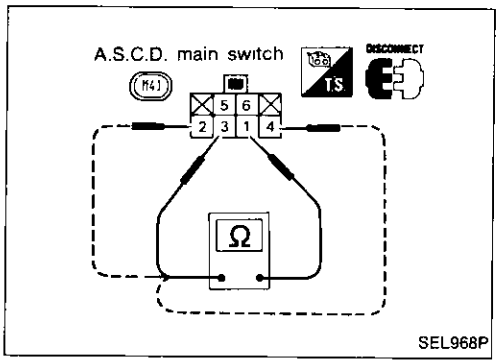
Disconnect lead from ① to see if A.S.C.D. wire returns immediately.

N.G. → Replace A.S.C.D. pump.

O.K. (Wire returns.)

A.S.C.D. actuator/A.S.C.D. pump are O.K.

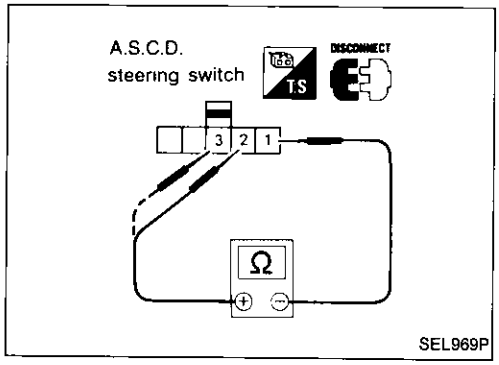
A.S.C.D. Wire Adjustment (Cont'd)



A.S.C.D. main switch

Check continuity between terminals by pushing switch to each position.

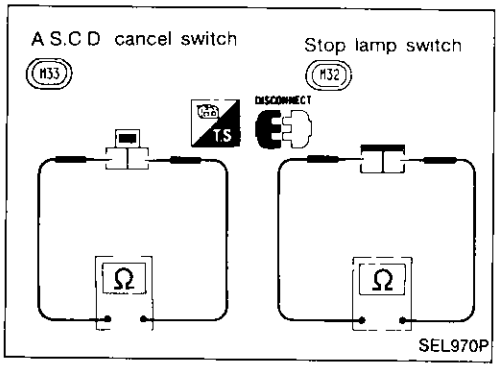
Switch position \ Terminals	1	2	3	4	5	6
ON	○	○	○	ⓐ ○		
N		○	○	ⓐ ○	ILL.	
OFF			○	ⓐ ○	○ ⓐ ○	



A.S.C.D. steering switch

Check continuity between terminals by pushing each button.

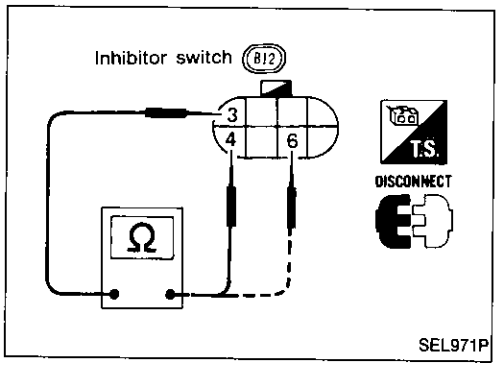
Button \ Terminal	1	2	3
SET/COAST	○	○	
RESUME/ACCEL	○		○
CANCEL	○	▶ ○	
	○	▶	○



A.S.C.D. cancel switch and stop lamp switch

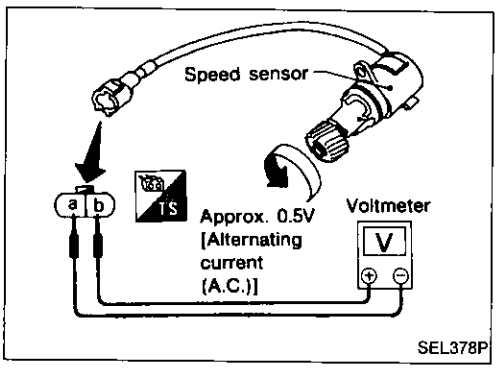
Condition	Continuity	
	A.S.C.D. cancel switch	Stop lamp switch
When brake pedal is depressed	No	Yes
When brake pedal is released	Yes	No

Check each switch after adjusting brake pedal — refer to BR section.



Inhibitor switch

Condition	Continuity
When shift lever position is "N" or "P"	Yes
When shift lever position is any position except "N" or "P"	No

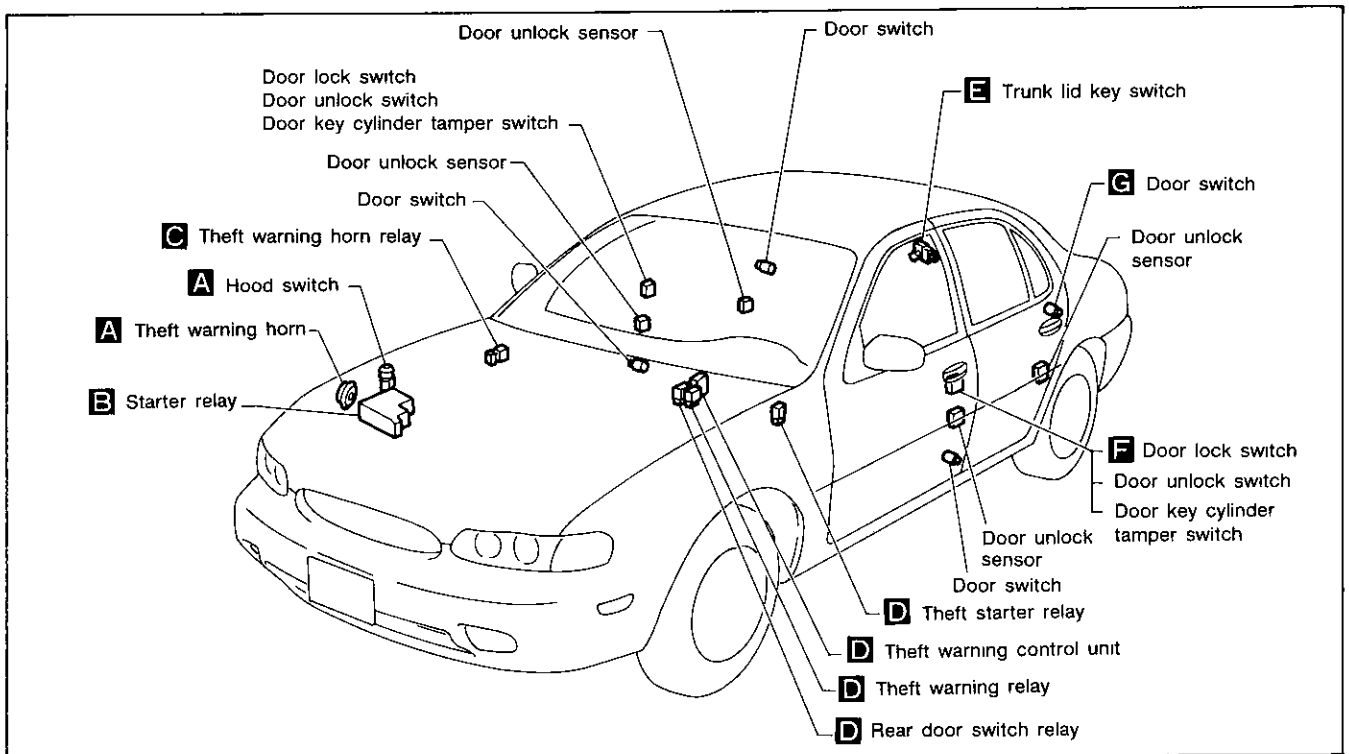


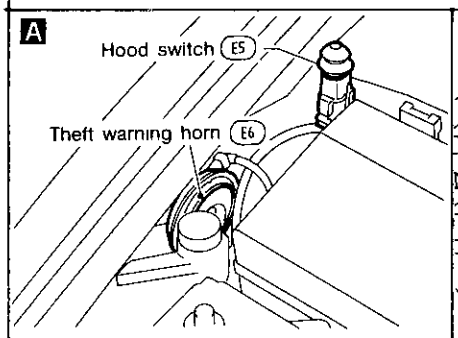
Speed sensor

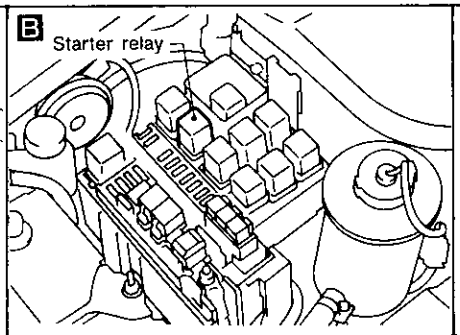
1. Remove speed sensor from transaxle.
2. Turn speedometer pinion quickly and measure voltage across ⓐ and ⓑ.

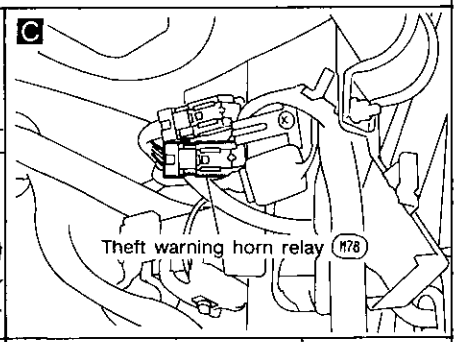
NOTE

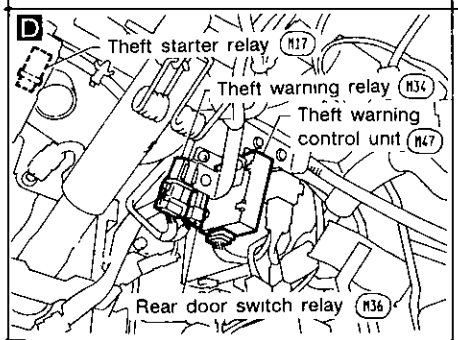
Component Parts and Harness Connector Location

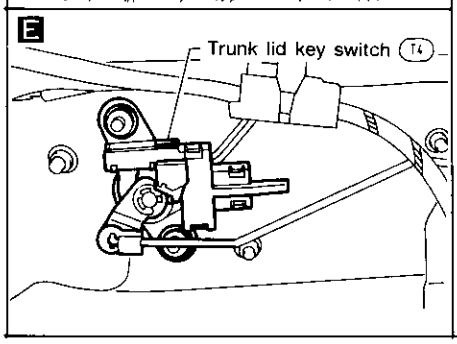


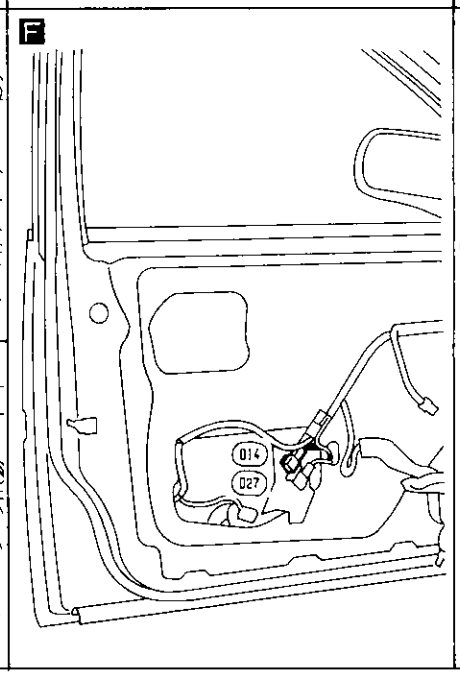


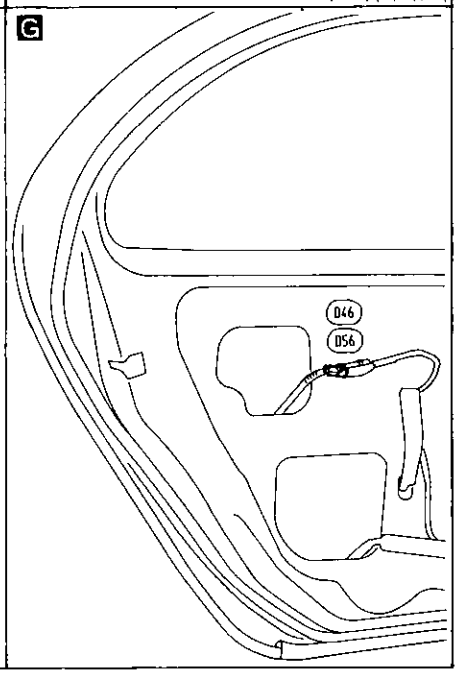






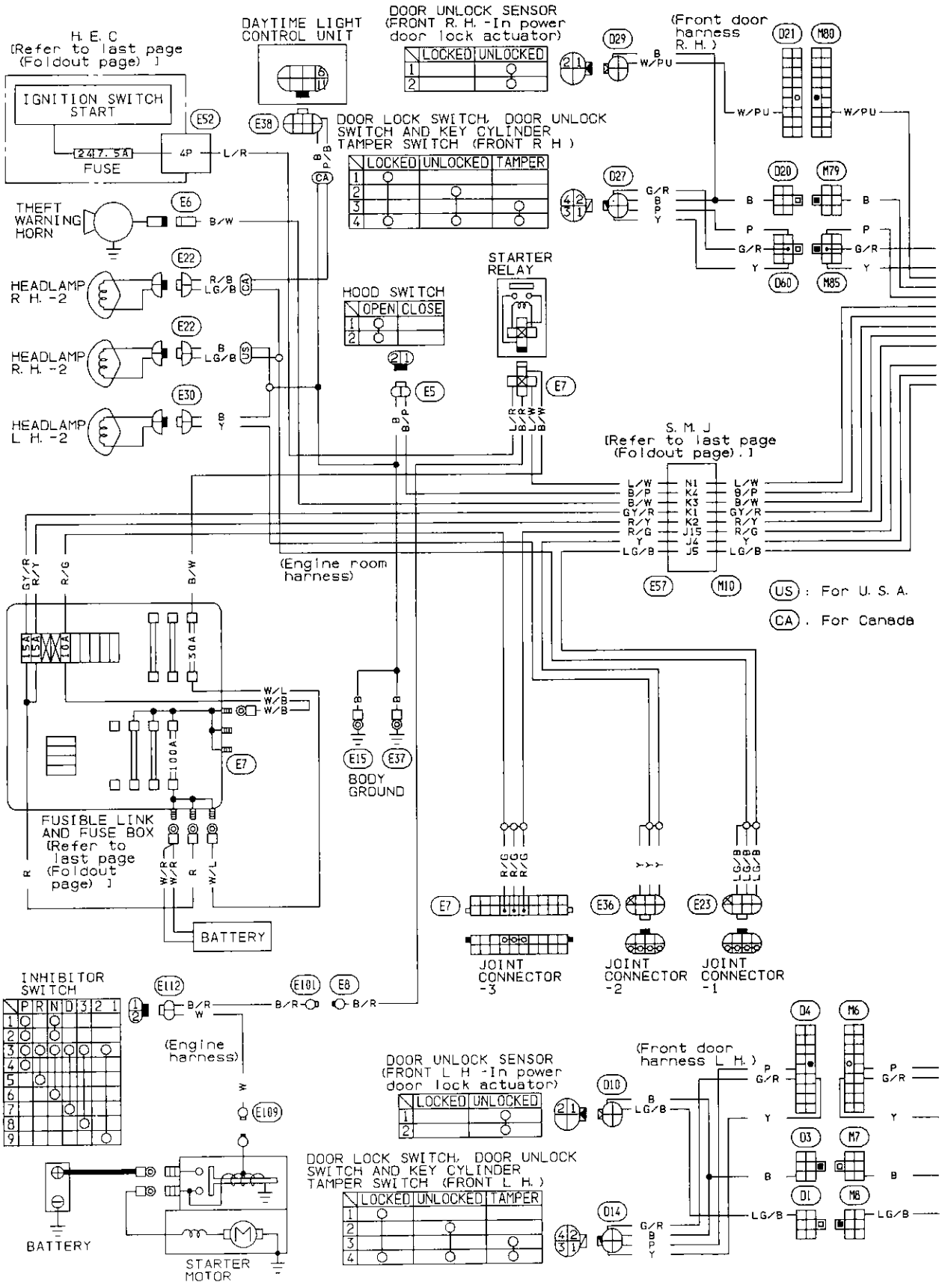




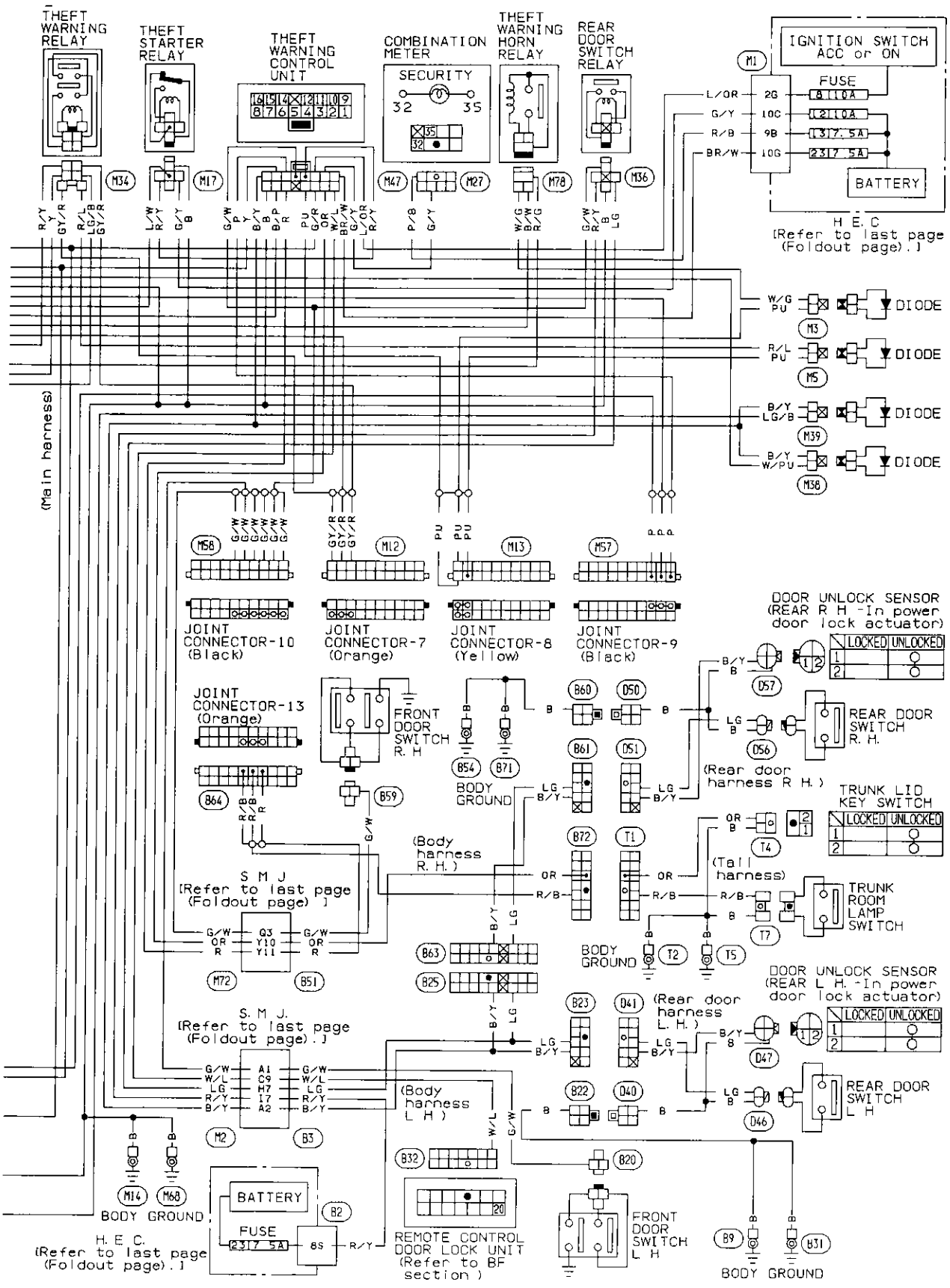


MEL460B

Wiring Diagram



Wiring Diagram (Cont'd)

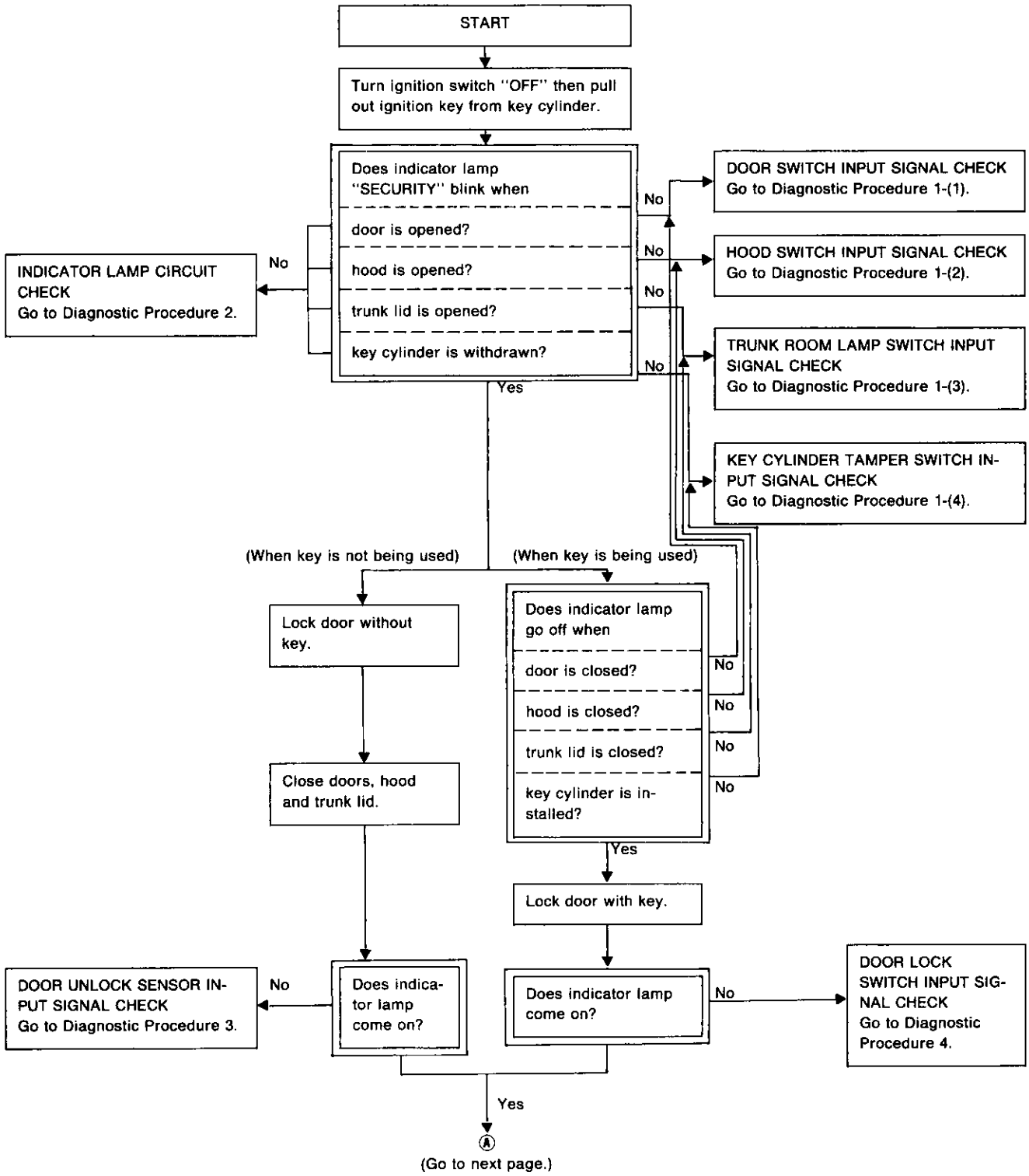


MEL391B

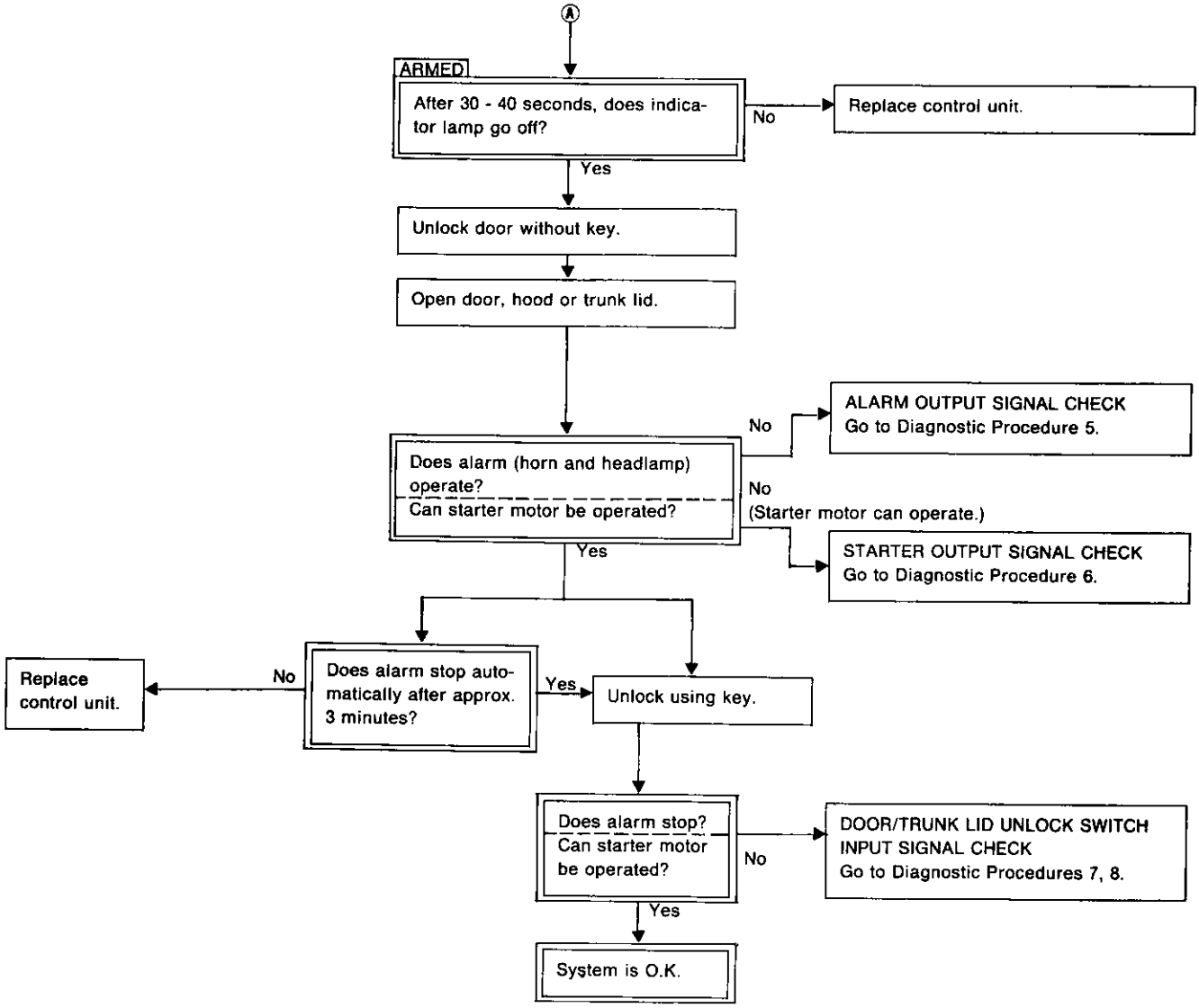
Trouble Diagnoses

SYSTEM OPERATION CHECK

If ignition switch is set in the "ACC" position in the step of START to ARMED or in the ARMED state shown in this flow chart, the system operation is canceled.

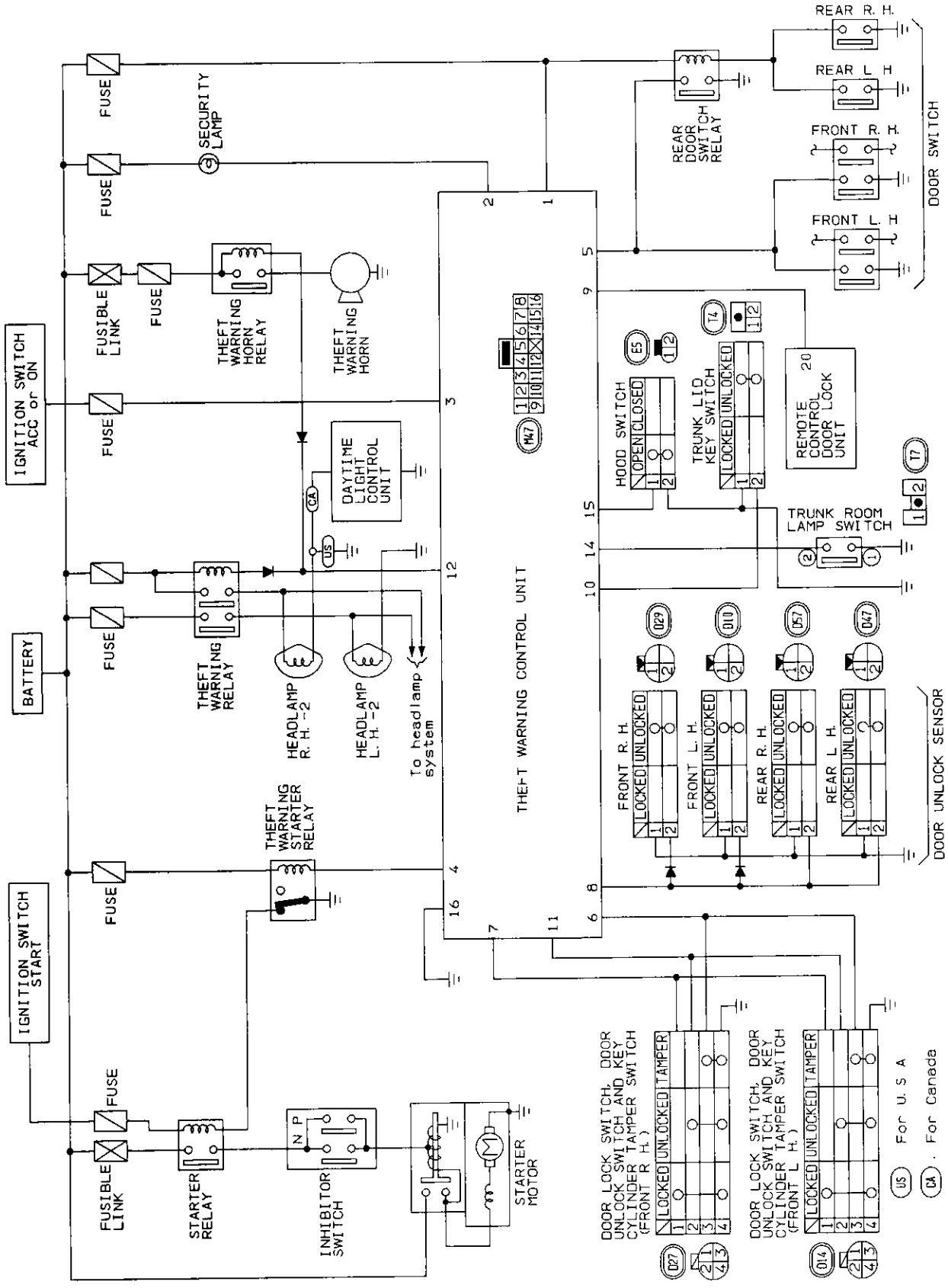


Trouble Diagnoses (Cont'd)



Trouble Diagnoses (Cont'd)

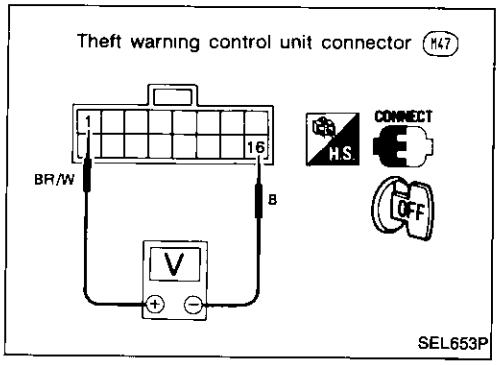
CIRCUIT DIAGRAM FOR QUICK PINPOINT CHECK



MEL390B

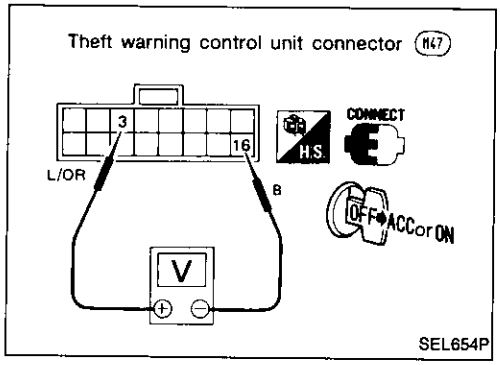
Trouble Diagnoses (Cont'd)

POWER SUPPLY AND GROUND CIRCUIT CHECK



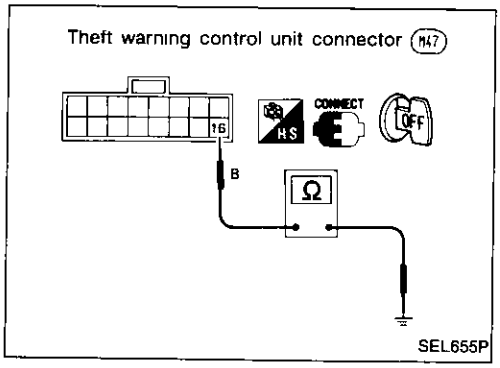
Main power supply circuit check

Terminals	Ignition switch position		
	OFF	ACC	ON
① - ⑯	Battery voltage	Battery voltage	Battery voltage



Power supply circuit check for system cancel

Terminals	Ignition switch position		
	OFF	ACC	ON
③ - ⑯	0V	Battery voltage	Battery voltage



Ground circuit check

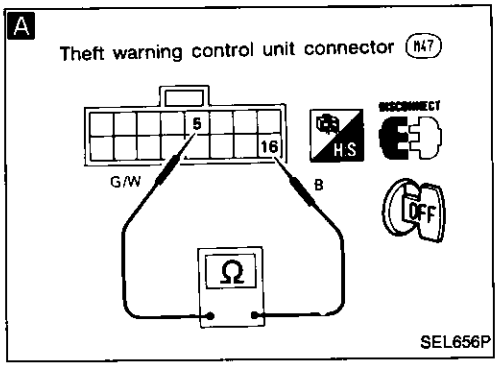
Terminals	Continuity
⑯ - Ground	Yes

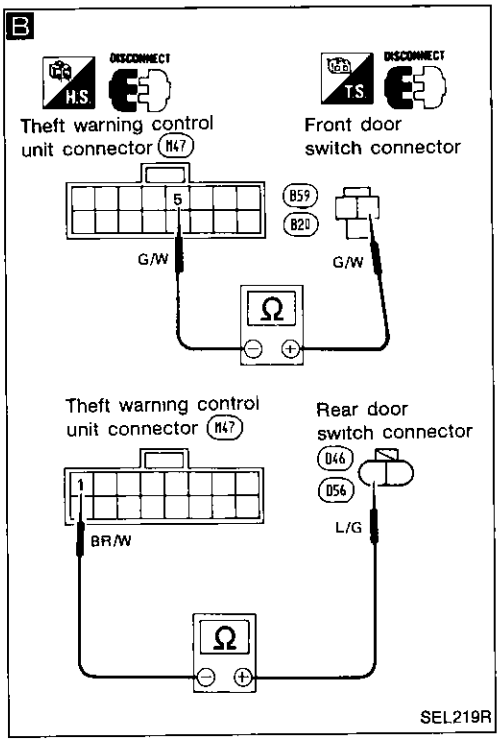
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 1

SYMPTOM: ● **Indicator lamp does not blink.**
● **Indicator lamp remains blinking.**

Diagnostic procedure 1-(1)





A

DOOR SWITCH INPUT SIGNAL CHECK
Check continuity between control unit harness terminals ⑤ and ⑯.

Condition	Continuity
All doors are closed	No
At least one door is open	Yes

O.K. → Go to Diagnostic Procedure 2.

N.G.

DOOR SWITCH CHECK
Refer to "Electrical Components Inspection".

N.G. → Replace door switch.

O.K.

B

DOOR SWITCH CIRCUIT CHECK
Check harness continuity between control unit harness terminal ⑤ or ① and door switch harness terminal.
Continuity should exist.

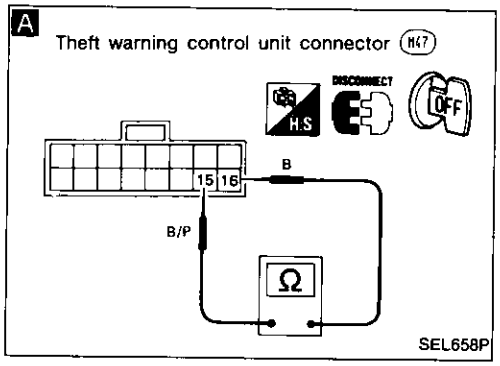
N.G. → Repair harness or connectors.

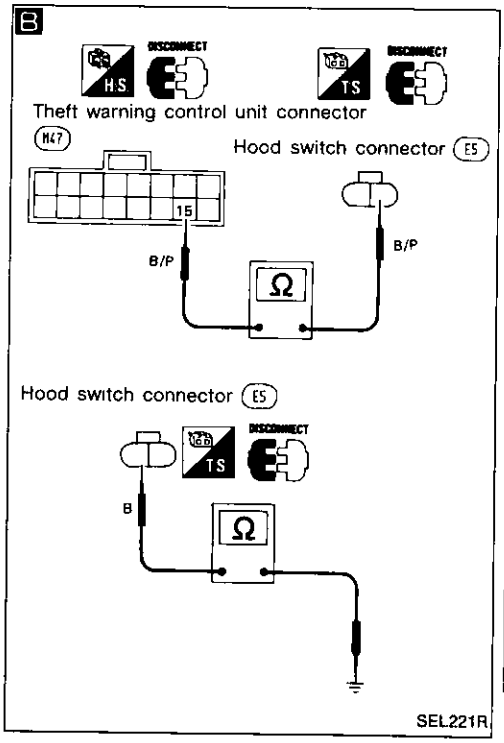
O.K.

CHECK THE CONNECTIONS AT EACH CONNECTOR.

Trouble Diagnoses (Cont'd)

Diagnostic procedure 1-(2)





A

HOOD SWITCH INPUT SIGNAL CHECK
Check continuity between control unit harness terminals ⑮ and ⑯.

Condition	Continuity
Hood is open	Yes
Hood is closed	No

O.K. → Go to Diagnostic Procedure 2.

N.G.

Check hood switch and hood fitting condition.

N.G. → Adjust installation of hood switch or hood.

O.K.

HOOD SWITCH CHECK
Refer to "Electrical Components Inspection".

N.G. → Replace hood switch.

O.K.

B

HOOD SWITCH CIRCUIT CHECK
- Check harness continuity between control unit harness terminal ⑮ and hood switch harness terminal.
- Check harness continuity between hood switch terminal and body ground.

Continuity should exist.

N.G. → Repair harness or connectors.

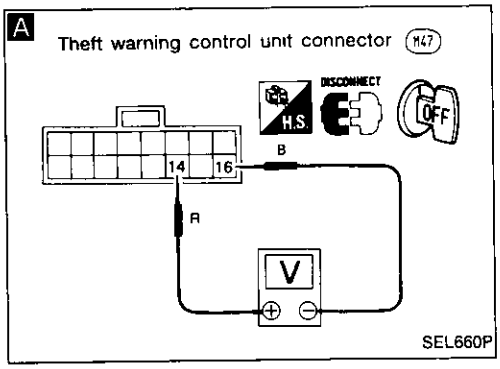
O.K.

CHECK THE CONNECTIONS AT EACH CONNECTOR.

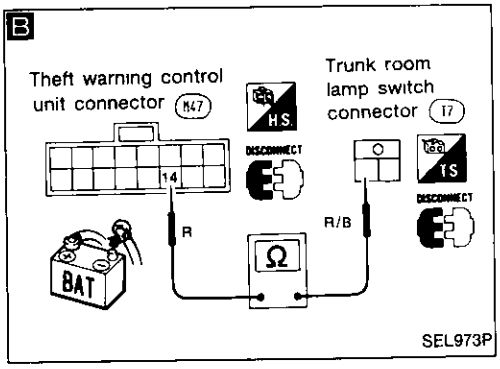
Trouble Diagnoses (Cont'd)

Diagnostic procedure 1-(3)

A



B



A

TRUNK ROOM LAMP SWITCH INPUT SIGNAL CHECK

Check voltage between control unit harness terminals ⑭ and ⑯.

Condition	Voltage
Trunk lid is open	Approx. 0V
Trunk lid is closed	Approx. 12V

O.K. → Go to Diagnostic Procedure 2.

N.G. ↓

Does trunk room lamp come on?

Yes → B

No ↓

TRUNK ROOM LAMP SWITCH CHECK

Refer to "Electrical Components Inspection".

O.K. → TRUNK ROOM LAMP SWITCH CIRCUIT CHECK

Check harness continuity between control unit harness terminal ⑭ and trunk room lamp harness terminal.

N.G. ↓

Replace trunk room lamp switch.

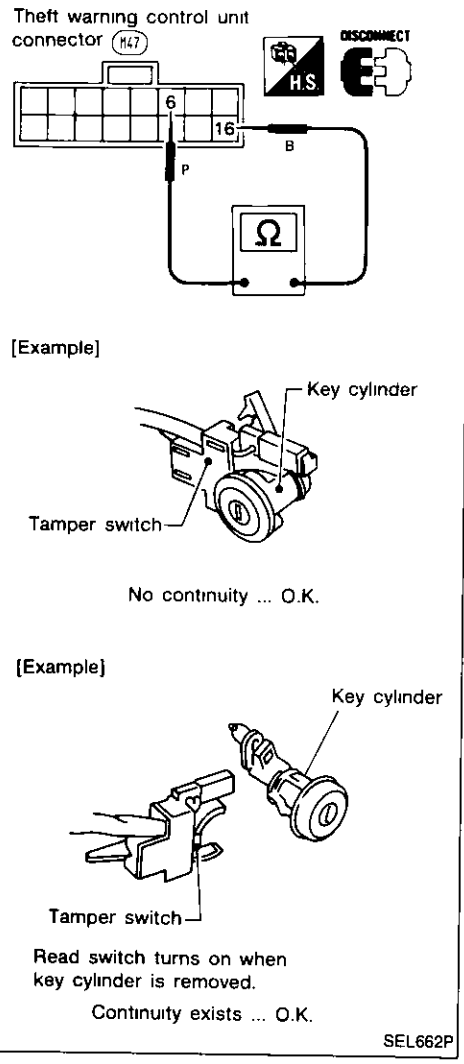
O.K. ↓

CHECK THE CONNECTIONS AT EACH CONNECTOR.

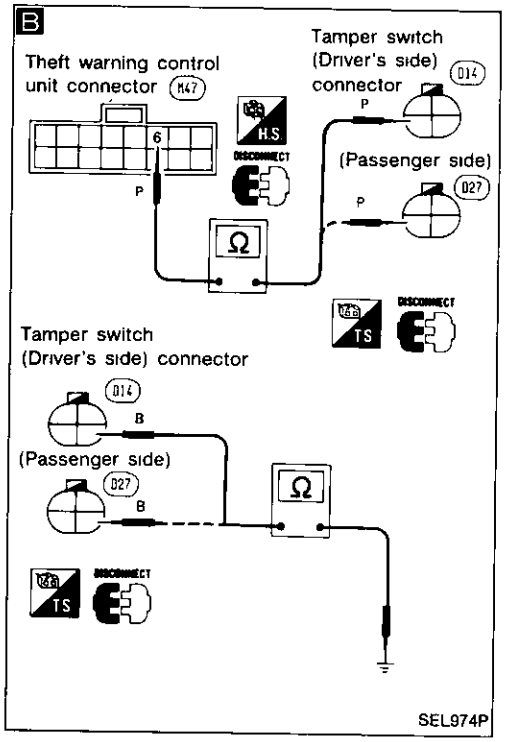
Trouble Diagnoses (Cont'd)

Diagnostic procedure 1-(4)

A



B



A

KEY CYLINDER TAMPER SWITCH INPUT SIGNAL CHECK
Check continuity between control unit harness terminals ⑥ and ⑯.

Condition	Continuity
Tamper switch is	
Normal	No
Removed	Yes

O.K. → Go to Diagnostic Procedure 2.

N.G.

KEY CYLINDER TAMPER SWITCH CHECK
Refer to "Electrical Components Inspection".

N.G. → Replace key cylinder tamper switch.

O.K.

B

KEY CYLINDER TAMPER SWITCH CIRCUIT CHECK
- Check harness continuity between control unit harness terminal ⑥ and tamper switch harness terminal.
- Check harness continuity between tamper switch terminal and body ground.

Continuity should exist.

N.G. → Repair harness and connectors.

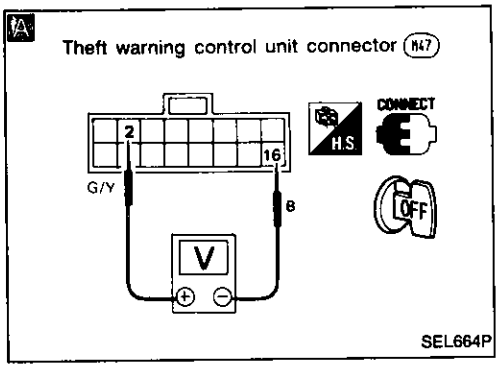
O.K.

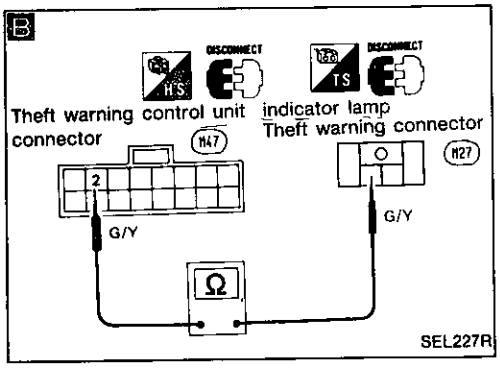
CHECK THE CONNECTIONS AT EACH CONNECTOR.

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 2

SYMPTOM: Indicator lamp does not blink.





A

INDICATOR LAMP OUTPUT SIGNAL CHECK
Check voltage between control unit harness terminals ② and ⑯.
Pointer of voltmeter should deflect intermittently.

N.G. → **Replace control unit.**

O.K. ↓

INDICATOR LAMP CHECK
Refer to "Electrical Components Inspection".

N.G. → **Replace indicator lamp.**

O.K. ↓

B

INDICATOR LAMP CIRCUIT CHECK
Check harness continuity between control unit harness terminal ② and indicator lamp harness terminal.
Continuity should exist.

N.G. → **Repair harness or connectors.**

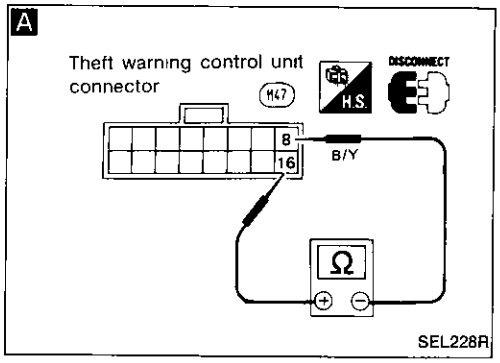
O.K. ↓

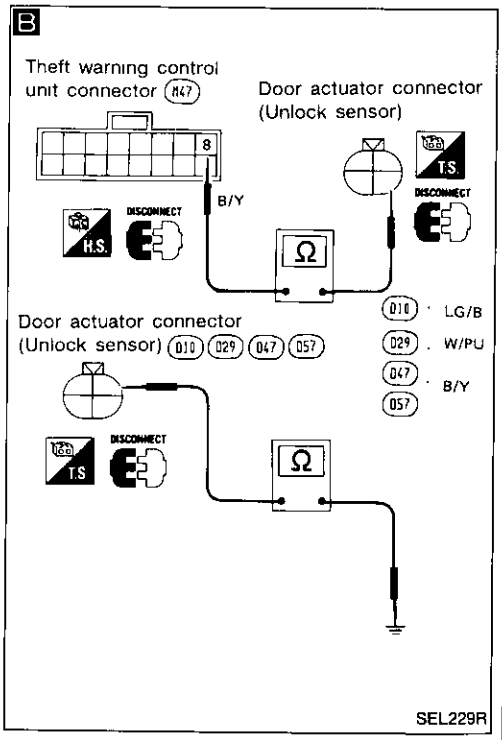
CHECK THE CONNECTIONS AT EACH CONNECTOR.

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 ⑧ and ⑯.

	Condition	Continuity
⑧	All doors are locked.	No
	At least one is unlocked.	Yes

O.K. → Go to Diagnostic Procedure 3.

O.K. → Replace control unit.

N.G. →

DOOR UNLOCK SENSOR CHECK

Refer to "Electrical Components Inspection".

N.G. → Replace door lock actuator.

O.K. →

B

DOOR UNLOCK SENSOR CIRCUIT CHECK

- Check harness continuity between control unit harness terminal ⑧, ⑨ and door actuator terminal.
- Check harness continuity between door actuator terminal and body ground.

Continuity should exist.

N.G. → Repair harness or connectors.

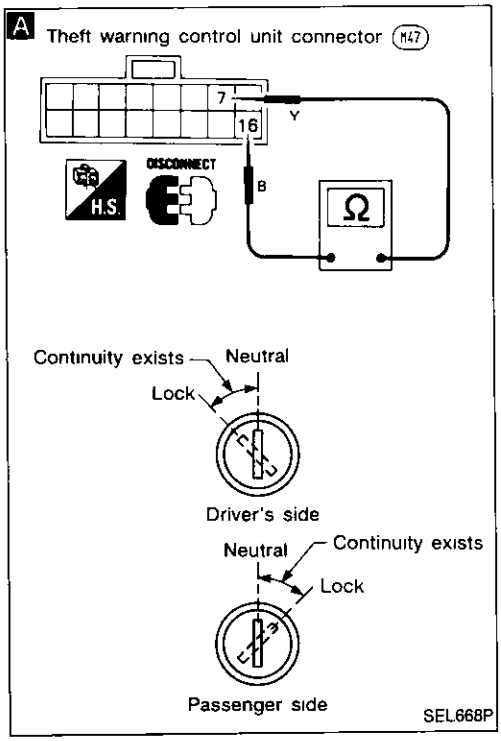
O.K. →

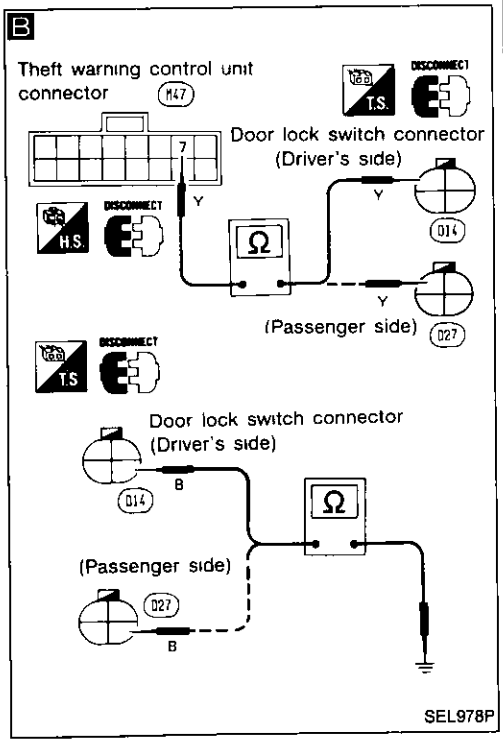
CHECK THE CONNECTIONS AT EACH CONNECTOR.

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 4

SYMPTOM: Indicator lamp does not come on.





A

DOOR LOCK SWITCH INPUT SIGNAL CHECK (LOCK SIGNAL)
Check continuity between control unit harness terminals ⑦ and ⑯.

Key position	Continuity
Neutral/Lock	No
Between neutral and lock	Yes

O.K. → Go to Diagnostic Procedure 3.

O.K. → Replace control unit.

N.G. →

DOOR LOCK SWITCH CHECK
Refer to "Electrical Components Inspection".

N.G. → Replace key cylinder switch.

O.K. →

B

DOOR LOCK SWITCH CIRCUIT CHECK
- Check harness continuity between control unit harness terminal ⑦ and door lock switch terminal.
- Check harness continuity between door lock switch terminal and body ground.

Continuity should exist.

N.G. → Repair harness or connectors.

O.K. →

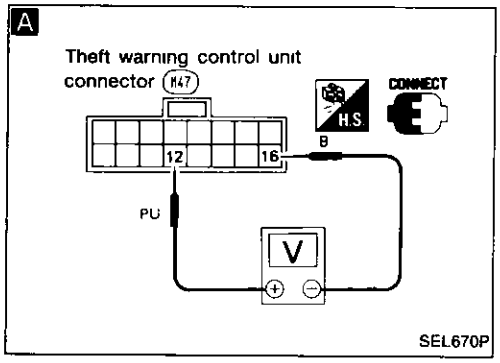
CHECK THE CONNECTIONS AT EACH CONNECTOR.

Trouble Diagnoses (Cont'd)

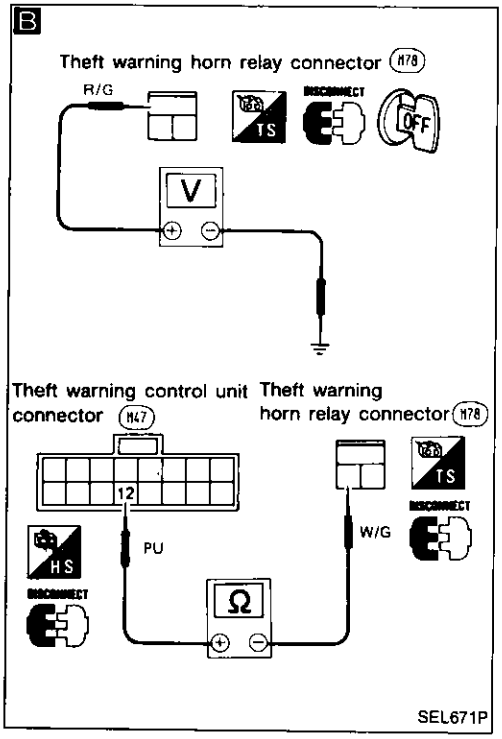
DIAGNOSTIC PROCEDURE 5

SYMPTOM: Alarm does not operate.

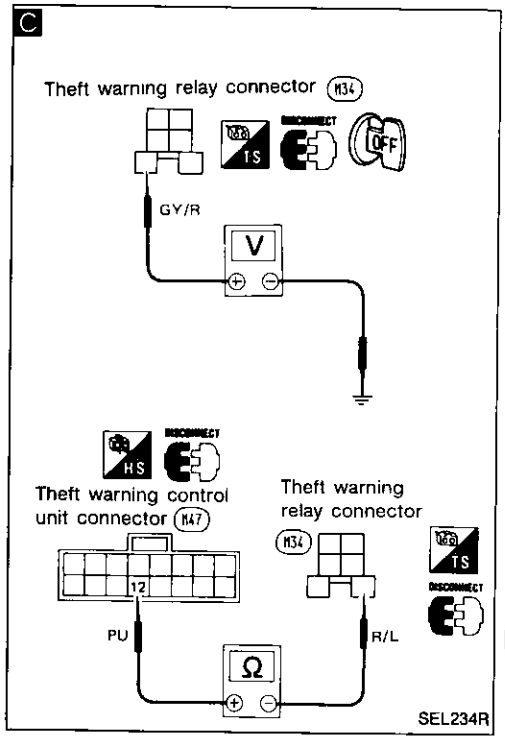
A



B



C



A

ALARM SIGNAL OUTPUT CHECK
Check voltage between control unit harness terminals ⑫ and ⑯.

Condition	Voltmeter
Except alarm phase	12V
Alarm phase	Pointer deflects intermittently

N.G. → Replace control unit.

O.K. ↓

Check theft warning horn relay. → N.G. → Replace relay.

O.K. ↓

B

THEFT WARNING HORN CIRCUIT CHECK
Check if voltage across theft warning horn relay harness terminal and body is 12V.
Check continuity between theft warning horn relay terminal and control unit harness terminal ⑫.
Continuity should exist.

N.G. → Repair harness and connectors.

O.K. ↓

Check theft warning relay-1. → N.G. → Replace theft warning relay-1.

O.K. ↓

C

THEFT WARNING HEADLAMP CIRCUIT CHECK
Check if voltage across theft warning relay-1 harness terminal and body is 12V.
Check continuity between theft warning relay-1 terminal and control unit harness terminals ⑫.

N.G. → Repair harness and connectors.

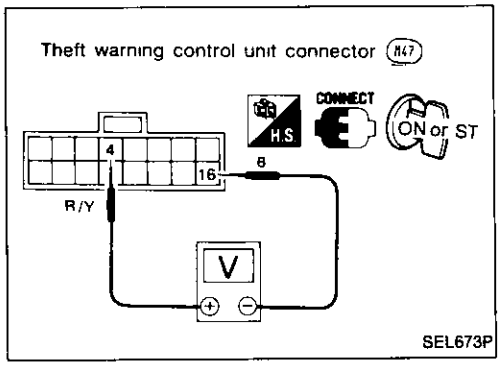
O.K. ↓

Does headlamp come on when turning lighting switch "ON"? → No → Check headlamp system. Refer to "HEADLAMP".

Yes ↓

Repair harness and connectors between lamp relay and headlamp.

Trouble Diagnoses (Cont'd)



DIAGNOSTIC PROCEDURE 6

SYMPTOM: STARTER MOTOR can be operated. (Starter killed phase)

STARTER MOTOR KILL OUTPUT SIGNAL CHECK.
Check voltage between control unit harness terminals ④ and ⑯ when ignition switch is turned to ON or "START".

Approx. 12V → Replace control unit.

Approx. 0V ↓

Check theft warning relay-2.

N.G. → Replace theft warning relay-2.

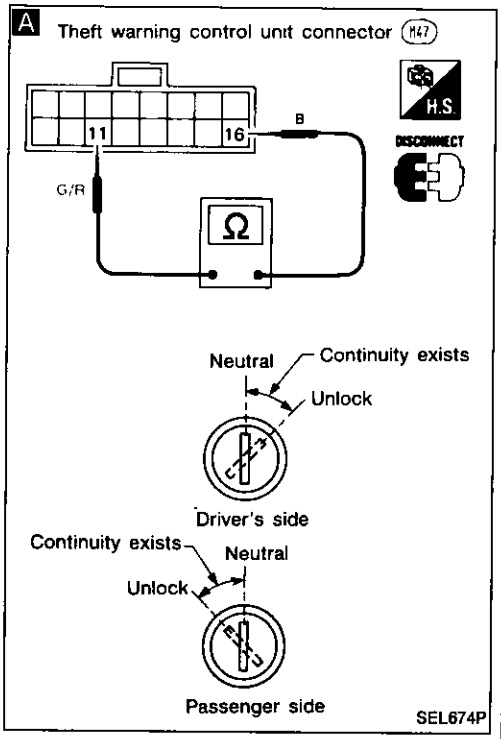
O.K. ↓

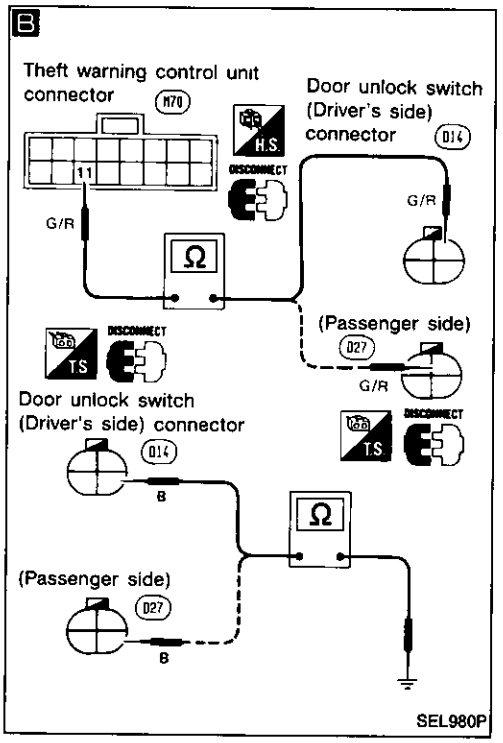
Repair harness between control unit and theft warning relay-2.

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 ⑯.

Key position	Continuity
Neutral/Unlock	No
Between neutral and unlock	Yes

O.K. → Replace control unit.

N.G.

DOOR UNLOCK SWITCH CHECK
Refer to "Electrical Components Inspection".

N.G. → Replace key cylinder switch.

O.K.

B

DOOR UNLOCK SWITCH CIRCUIT CHECK
- Check harness continuity between control unit harness terminal ⑪ and door unlock switch terminal.
- Check harness continuity between door unlock switch terminal and body ground.

Continuity should exist.

N.G. → Repair harness or connectors.

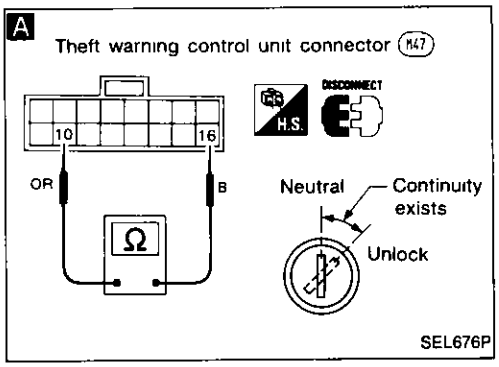
O.K.

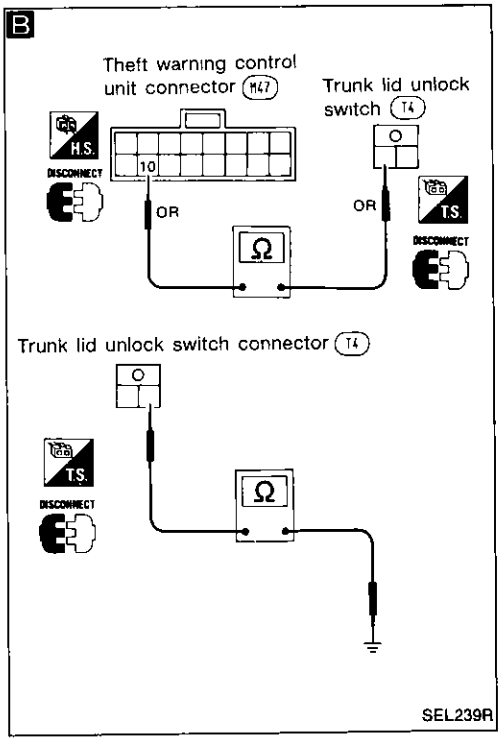
CHECK THE CONNECTIONS AT EACH CONNECTOR.

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 8

SYMPTOM: Alarm does not stop even if stop signal is given.





A

TRUNK LID UNLOCK SWITCH INPUT SIGNAL CHECK (UNLOCK SIGNAL)
Check continuity between control unit harness terminals ⑩ and ⑱.

Key position	Continuity
Neutral/Unlock	No
Between neutral and unlock	Yes

O.K. → Replace control unit.

N.G. ↓

TRUNK LID UNLOCK SWITCH CHECK
Refer to "Electrical Components Inspection".

N.G. → Replace key cylinder switch.

O.K. ↓

B

TRUNK LID UNLOCK SWITCH CIRCUIT CHECK
- Check harness continuity between control unit harness terminal ⑩ and trunk lid unlock switch terminal.
- Check harness continuity between trunk lid unlock switch terminal and body ground.

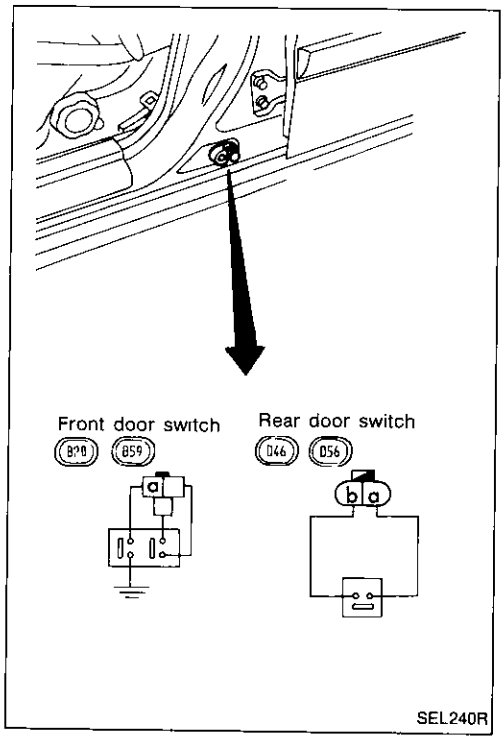
N.G. → Repair harness or connectors.

O.K. ↓

CHECK THE CONNECTIONS AT EACH CONNECTOR.

Trouble Diagnoses (Cont'd)

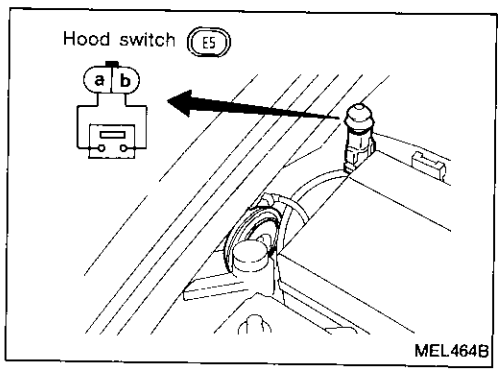
ELECTRICAL COMPONENTS INSPECTION



Door switches

Check continuity between terminals when door switch is pushed and released.

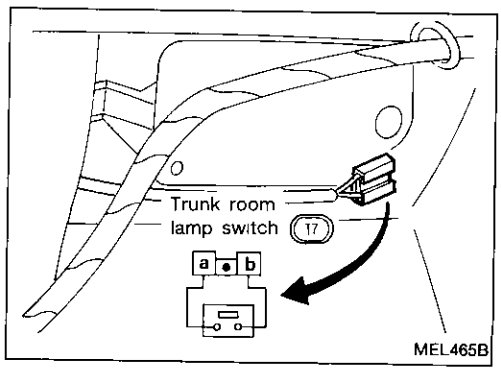
Terminal	Pushed	Released
a		○
b (switch body)		○



Hood switch

Check continuity between terminals when hood switch is pushed and released.

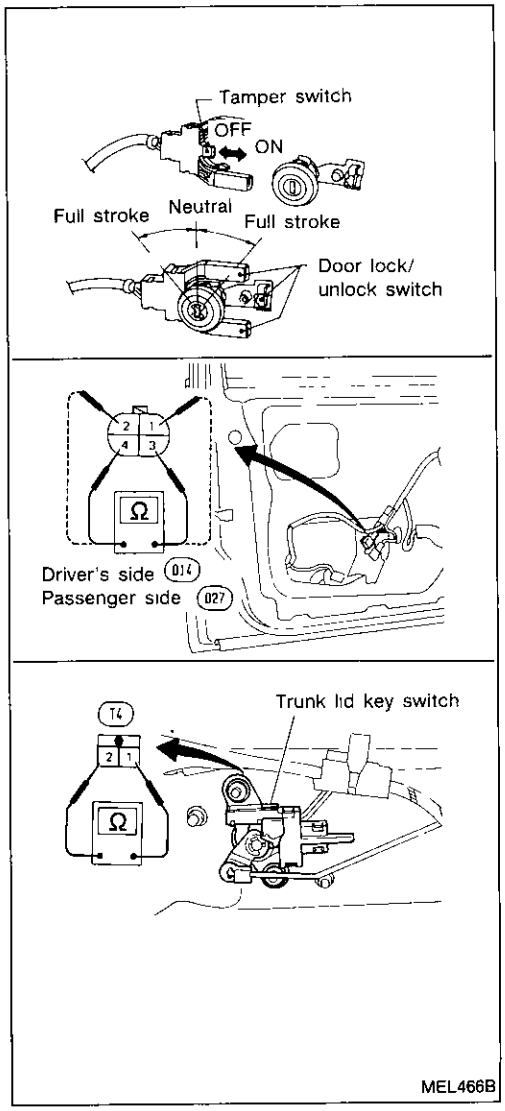
Terminal	Pushed	Released
a		○
b		○



Trunk room lamp switch

Terminal \ Trunk lid	Closed	Open
a		○
b		○

Trouble Diagnoses (Cont'd)



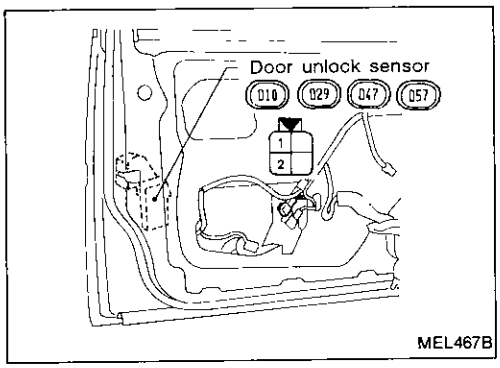
Key cylinder tamper switch, door lock switch and door unlock switch

- **Door**

	TAMPER SWITCH		DOOR LOCK SWITCH			DOOR UNLOCK SWITCH	
	Key cylinder is installed	Key cylinder is removed	Full stroke	Between full stroke and neutral	Neutral	Between full stroke and neutral	Full stroke
1				○			
2						○	
3		○					
4		○		○		○	

Trunk lid

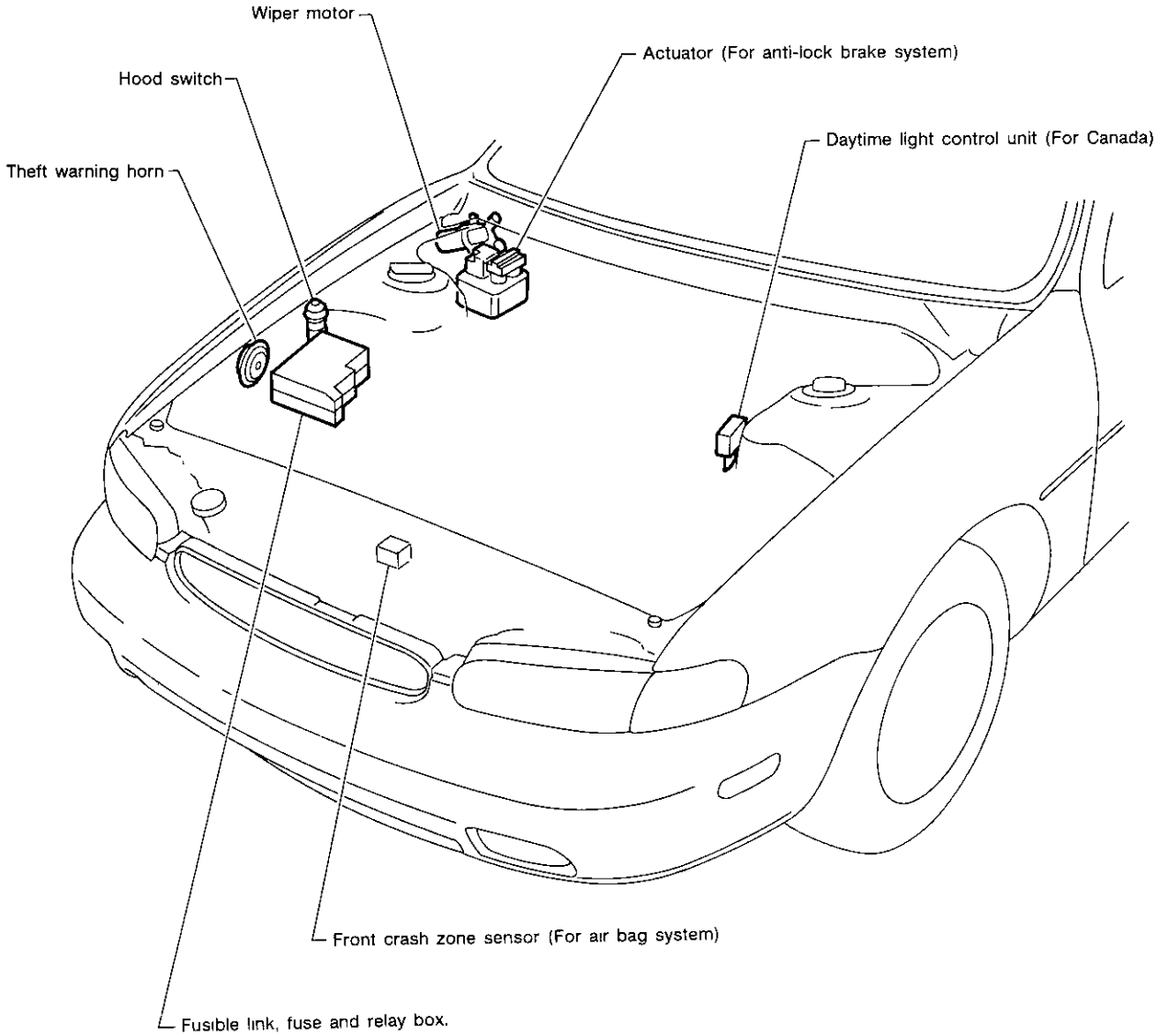
	TAMPER SWITCH		Trunk lid unlock switch		
	Key cylinder is installed	Key cylinder is removed	Full stroke	Between full stroke and neutral	Neutral
1				○	
2		○			
3		○		○	



Door unlock sensor

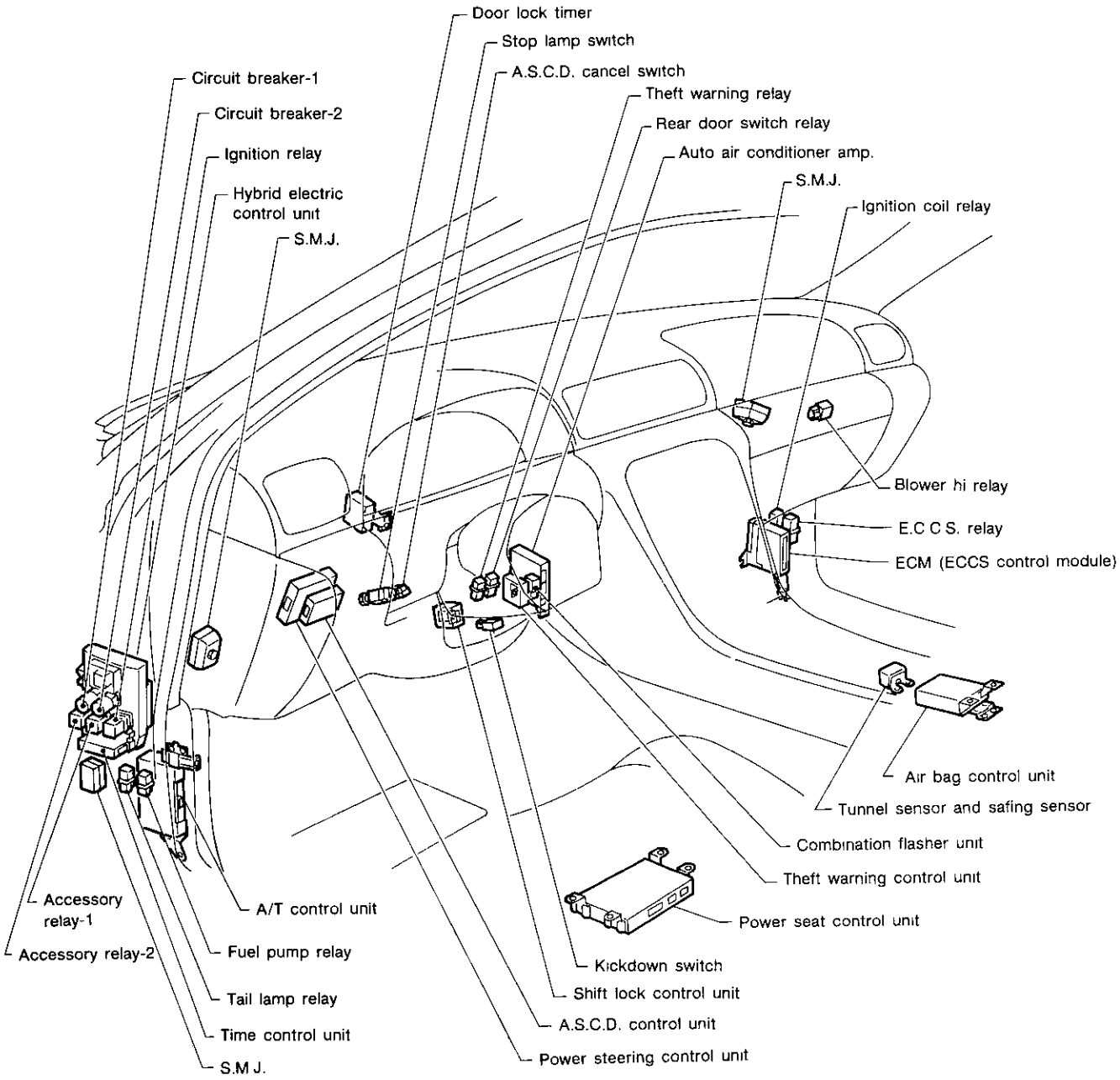
	LOCK	UNLOCK
1		○
2		○

Engine Compartment



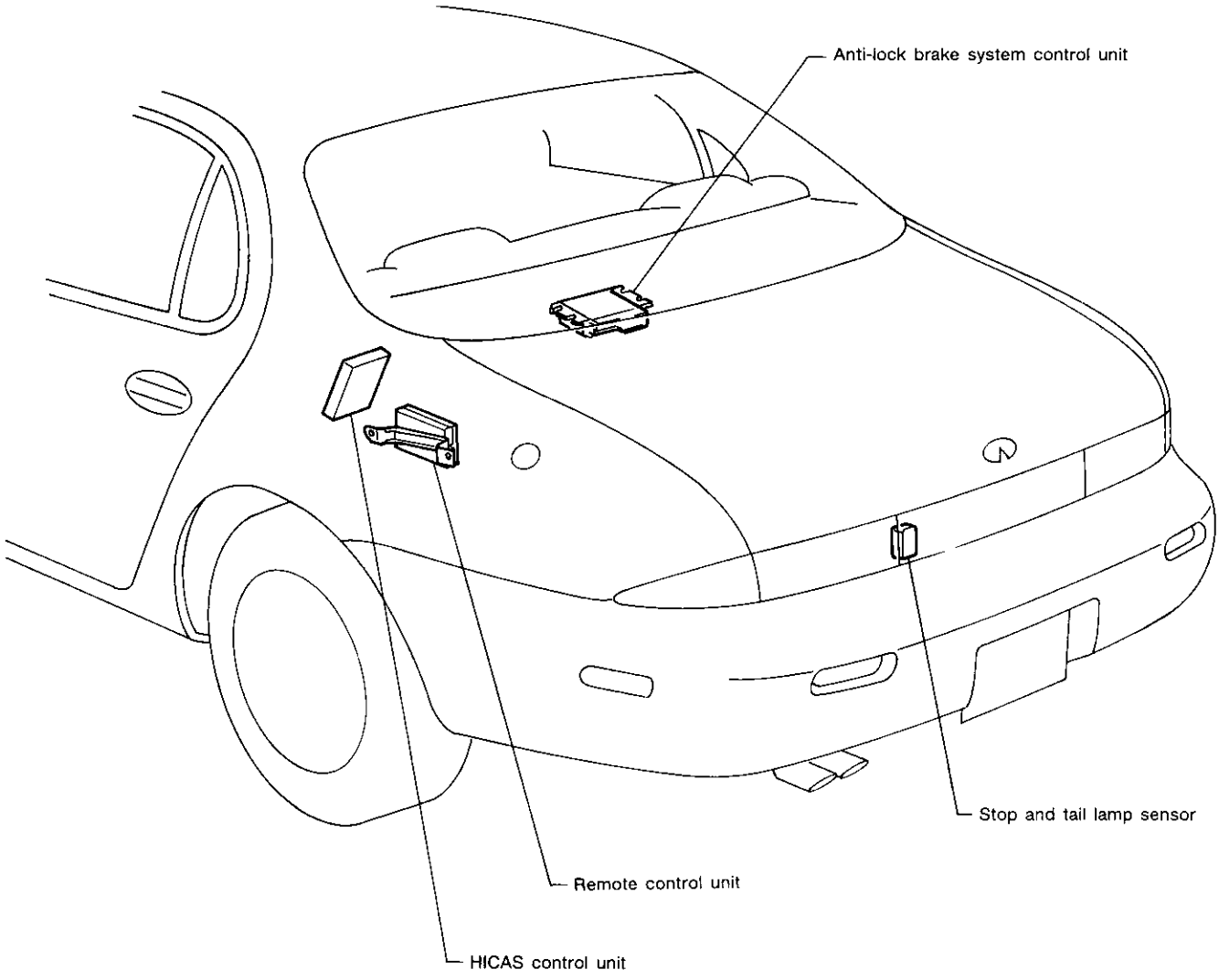
MEL433B

Passenger Compartment



MEL434B

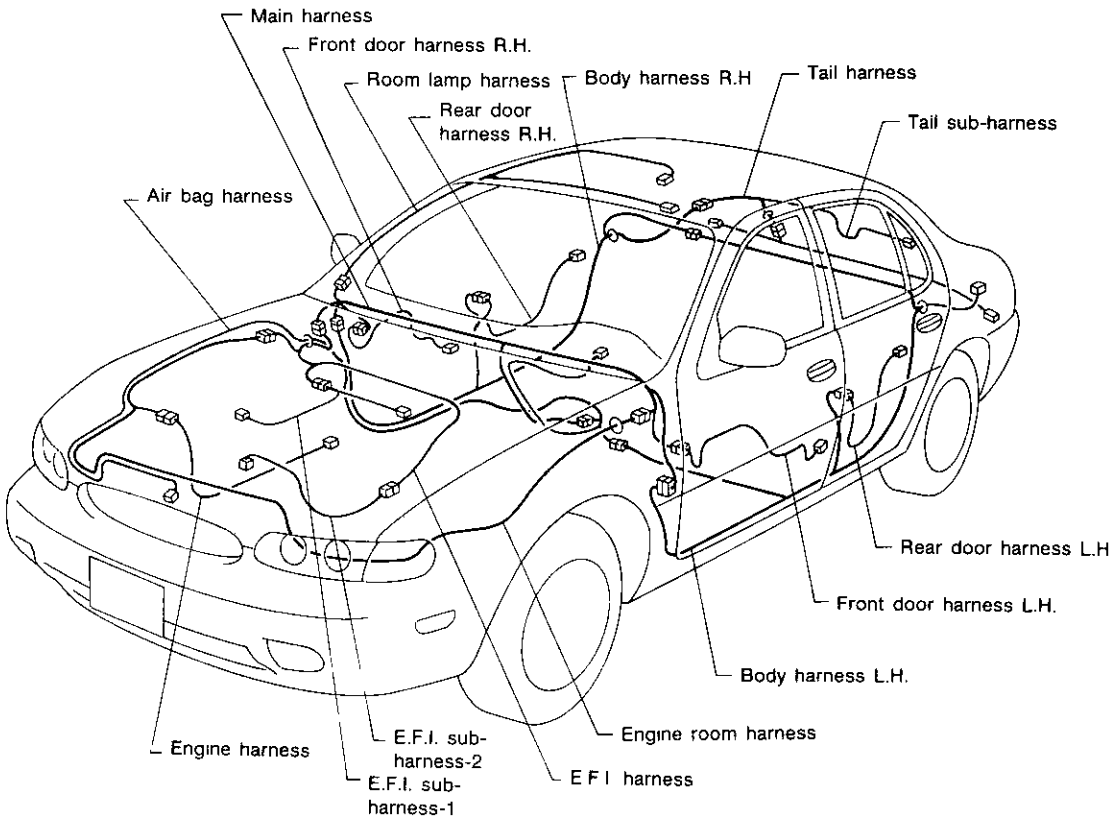
Luggage Compartment



MEL435B

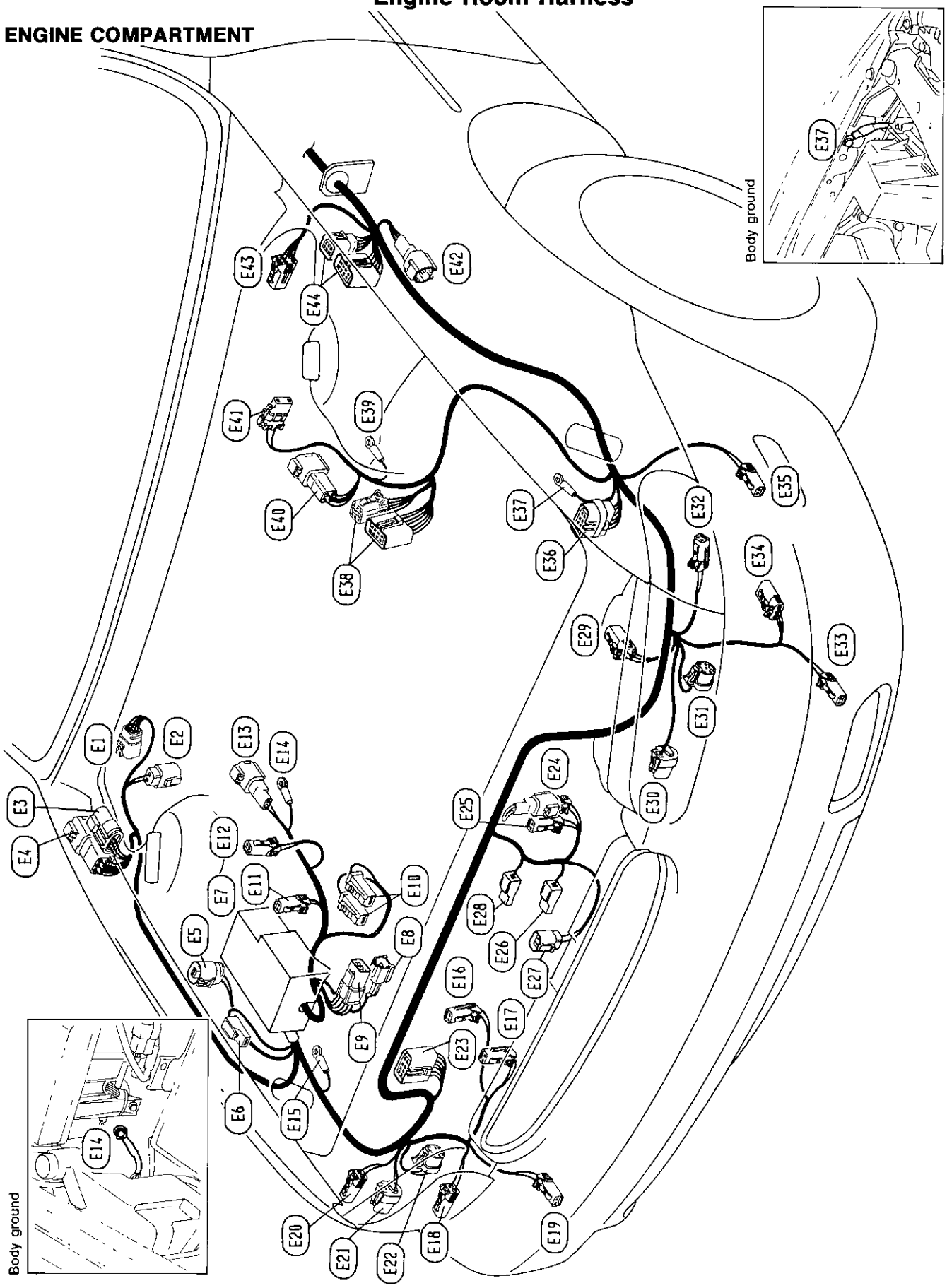
NOTE

Outline



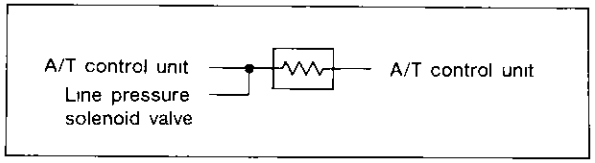
MEL432B

Engine Room Harness

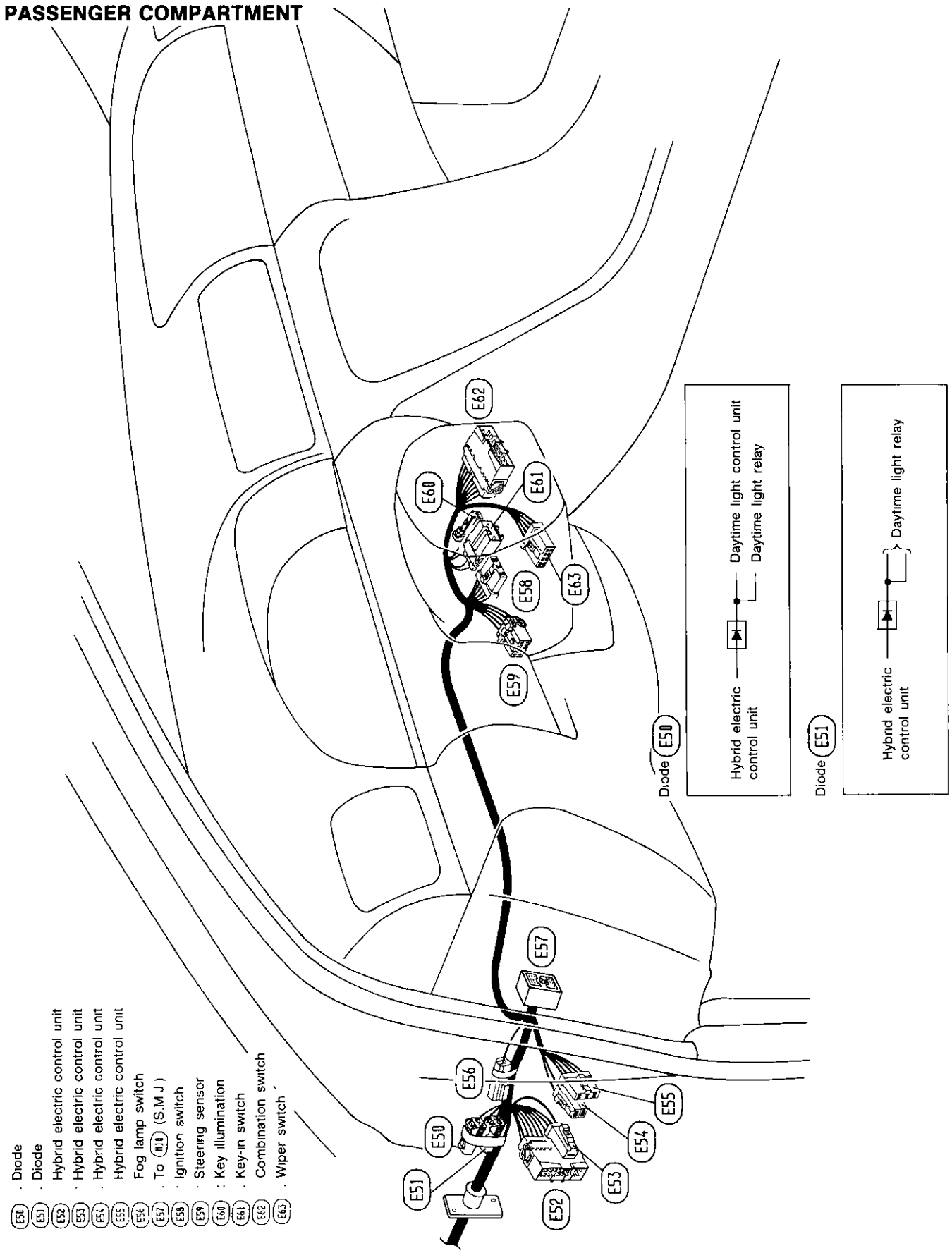


(E1) : Wiper motor
(E2) . Actuator (For anti-lock brake system)
(E3) . To (F3)
(E4) . To (F4)
(E5) · Hood switch
(E6) . Theft warning horn
(E7) · Fuse, fusible link and relay box
(E8) . To (E101)
(E9) · To (E102)
(E10) . Battery
(E11) . Dropping resistor
(E12) : Power steering fluid level switch
(E13) : Front sensor R.H (For anti-lock brake system)
(E14) · Body ground (For anti-lock brake system)
(E15) · Body ground
(E16) · Washer sensor
(E17) · Washer motor
(E18) : Front side marker lamp R.H
(E19) · Front turn signal lamp R.H.
(E20) · Clearance lamp R.H.
(E21) · Headlamp R.H.-1
(E22) : Headlamp R.H.-2
(E23) . Joint connector-1
(E24) Short connector
(E25) . Ambient sensor
(E26) Horn (Low)
(E27) · Radiator fan motor
(E28) Horn (High)
(E29) · Triple-pressure switch
(E30) . Headlamp L.H.-2
(E31) · Headlamp L.H.-1
(E32) . Clearance lamp L.H.
(E33) : Front turn signal lamp L.H.
(E34) : HICAS solenoid
(E35) : Front side marker lamp L.H.
(E36) : Joint connector-2
(E37) : Body ground
(E38) : Daytime light control unit (For Canada)
(E39) : Body ground (For anti-lock brake system)
(E40) : Front sensor L.H. (For anti-lock brake system)
(E41) : Brake fluid level switch
(E42) . Fog lamp
(E43) . A.S.C.D. pump
(E44) : Headlamp control relay unit

Resistor (E11)



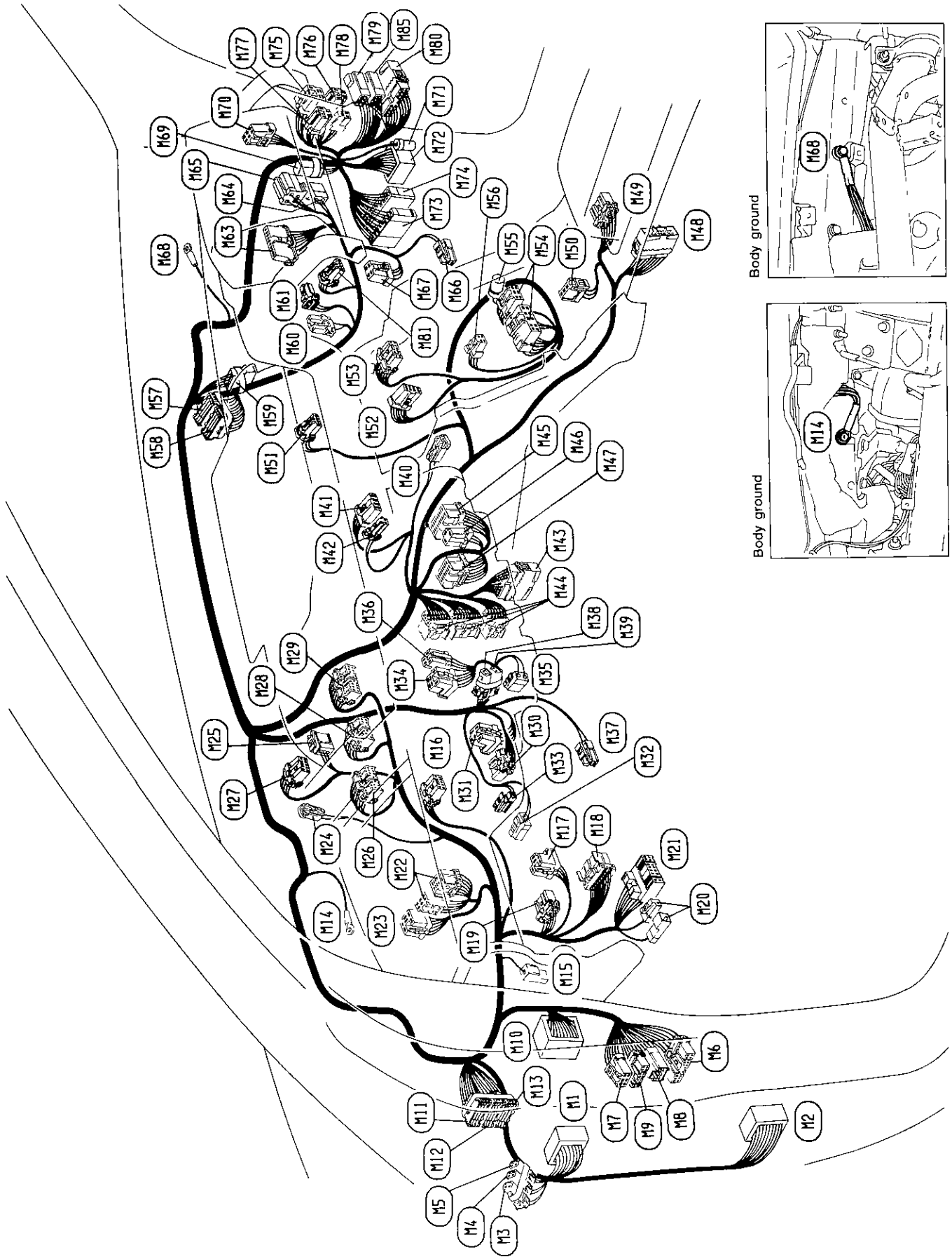
Engine Room Harness (Cont'd)



MEL419B

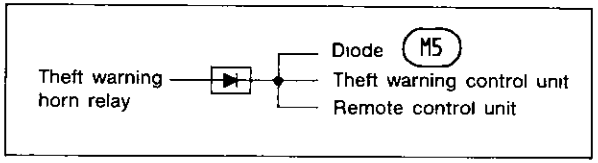
NOTE

Main Harness

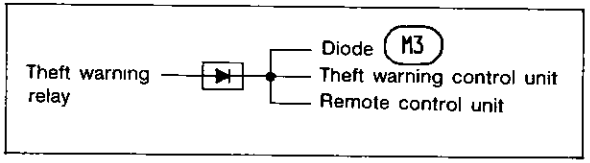


M1 : Hybrid electric control unit
M2 : To B3 (S.M.J.)
M3 : Diode
M4 : Diode
M5 : Diode
M6 : To D4
M7 : To D3
M8 : To D1
M9 : To D2
M10 : To E57 (S.M.J.)
M11 : Joint connector-6
M12 : Joint connector-7
M13 : Joint connector-8
M14 : Body ground
M15 : Parking brake switch
M16 : Illumination control switch
M17 : Theft starter relay
M18 : A.S.C.D. control unit
M19 : E.P.S. control unit
M20 : Check connector
M21 : Data link connector for CONSULT
M22 : Door lock control unit
M23 : Keyless entry relay-1
M24 : Sunload sensor
M25 : Buzzer
M26 : Combination meter
M27 : Combination meter
M28 : Combination meter
M29 : Combination meter
M30 : Shift lock control unit
M31 : Keyless entry relay-2
M32 : Stop lamp switch
M33 : A.S.C.D. cancel switch
M34 : Theft warning relay
M35 : Kickdown switch
M36 : Rear door switch relay
M37 : Footwell lamp L.H.
M38 : Diode
M39 : Diode
M40 : In-vehicle sensor
M41 : A.S.C.D. main switch
M42 : Telephone microphone
M43 : Auto air conditioner sub-harness
M44 : Auto air conditioner amp.
M45 : Receiver control unit
M46 : Combination flasher unit
M47 : Theft warning control unit
M48 : To A2
M49 : Parking range switch
M50 : Cigarette lighter
M51 : Clock
M52 : Hazard switch
M53 : Control unit (For air conditioner system)
M54 : Radio
M55 : Radio
M56 : CD player
M57 : Joint connector-9
M58 : Joint connector-10
M59 : Joint connector-11
M60 : Intake sensor
M61 : Thermo amp.
M63 : Intake door motor
M64 : Blower motor
M65 : Blower HI relay
M66 : Footwell lamp. R.H.
M67 : Fan control amp.
M68 : Body ground
M69 : Diode
M70 : To R1
M71 : To B50
M72 : To B51 (S.M.J.)
M73 : To F24
M74 : To F23
M75 : Switching relay
M76 : A/T indicator relay
M77 : Sun roof relay
M78 : Theft horn relay
M79 : To D20
M80 : To D21
M81 : Glove box lamp and trunk opener cancel switch
M85 : To D60

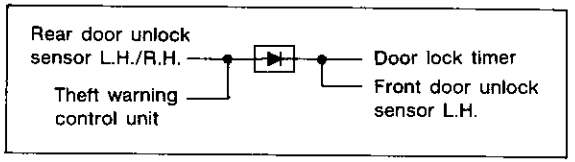
Diode M3



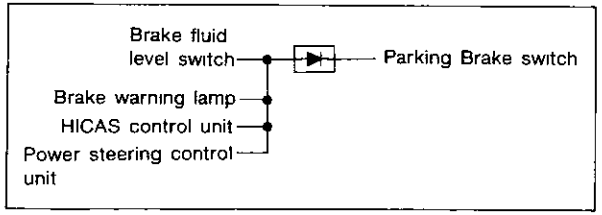
Diode M5



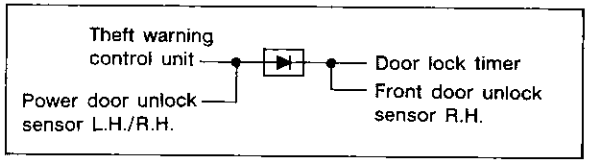
Diode M39



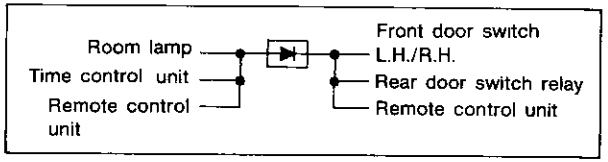
Diode M4



Diode M32

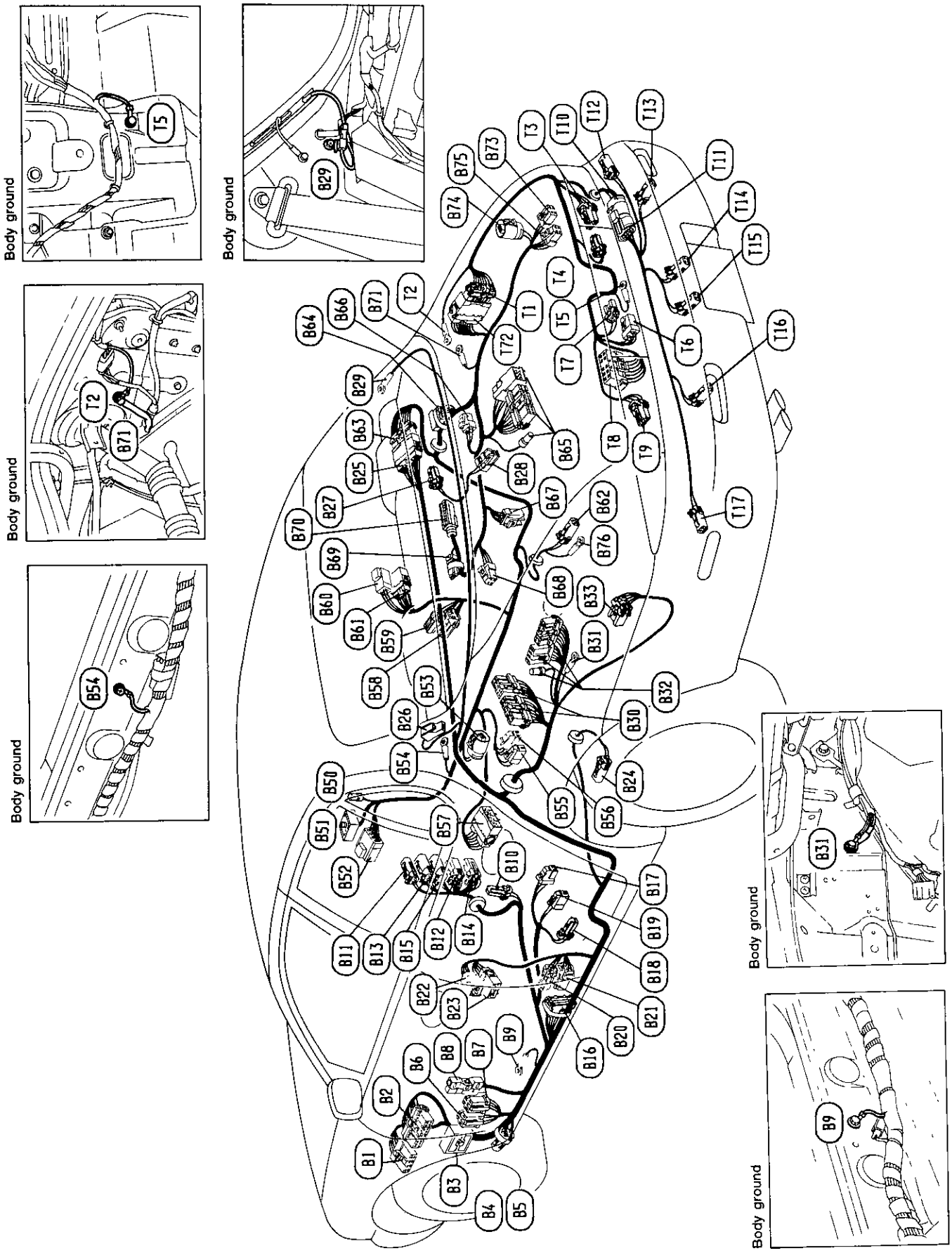


Diode M69



MEL420B

Body Harness and Tail Harness



Body harness L.H.

(B1) : Hybrid electric control unit
(B2) : Hybrid electric control unit
(B3) : To (M2) (S.M.J.)
(B4) . Diode
(B5) . Diode
(B6) : Tail lamp relay
(B7) : Fuel pump relay
(B8) : A/T control unit
(B9) : Body ground
(B10) : To (A3)
(B11) : Revolution sensor
(B12) : Inhibitor switch
(B13) . Turbine sensor
(B14) . To terminal cord assembly
(B15) . Vehicle speed sensor
(B16) . Joint connector-12
(B17) . To power seat harness L.H (For Canada)
(B18) · T/LOCK SW DR
(B19) : To power seat harness L.H. (For U.S.A.)
(B20) . Front door switch L.H.
(B21) . Seat belt pre-tensioner L.H.
(B22) : To (D40)
(B23) . To (D41)
(B24) : HICAS solenoid
(B25) : To (B63)
(B26) : Rear window defogger
(B27) : High-mounted stop lamp
(B28) : Trunk room lamp
(B29) : Antenna (For keyless entry system)
(B30) : HICAS control unit
(B31) : Body ground
(B32) : Keyless entry control unit
(B33) : Power antenna

Body harness R.H.

(B50) . To (M71)
(B51) : To (M72) (S.M.J.)
(B52) : To (F22)
(B53) · To (A6)
(B54) . Body ground
(B55) : To power seat harness R.H (For U.S.A.)
(B56) : To power seat harness R.H. (For Canada)
(B57) : Telephone
(B58) : Seat belt pre-tensioner R.H.
(B59) : Front door switch R.H.
(B60) To (D58)
(B61) : To (D51)
(B62) : Rear sensor (For anti-lock brake system)
(B63) : To (B25)
(B64) . Joint connector-13
(B65) : Telephone
(B66) : Rear speaker R.H.
(B67) · Fuel tank unit
(B68) · Rear speaker L.H.
(B69) : Check connector
(B70) . Anti-lock brake system control unit
(B71) : Body ground
(B72) : To (T1)
(B73) · Fuel lid opener solenoid
(B74) : Dropping resistor
(B75) : FPCM
(B76) · Body ground

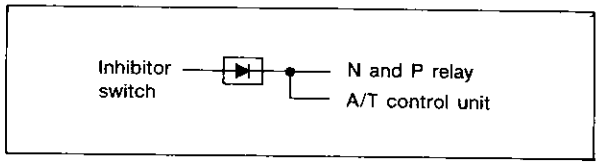
Tail harness

(T1) : To (B72)
(T2) : Body ground
(T3) : Rear combination lamp R.H.
(T4) : Trunk lid key switch
(T5) : Body ground
(T6) : Trunk lid opener solenoid
(T7) : Trunk room lamp switch
(T8) : Stop and tail lamp sensor
(T9) : Rear combination lamp L.H.
(T10) : To (T11)

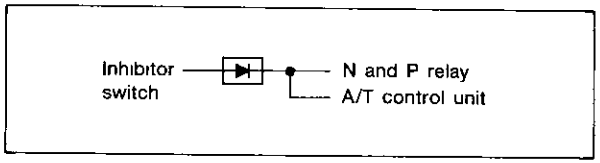
Tail sub-harness

(T11) · To (T10)
(T12) : Rear side marker R.H.
(T13) : Back-up lamp R.H.
(T14) : License lamp R.H.
(T15) : License lamp L.H.
(T16) : Back-up lamp L.H.
(T17) : Rear side marker L.H.

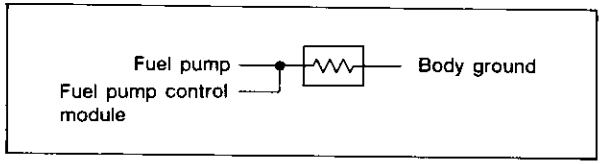
Diode (B4)



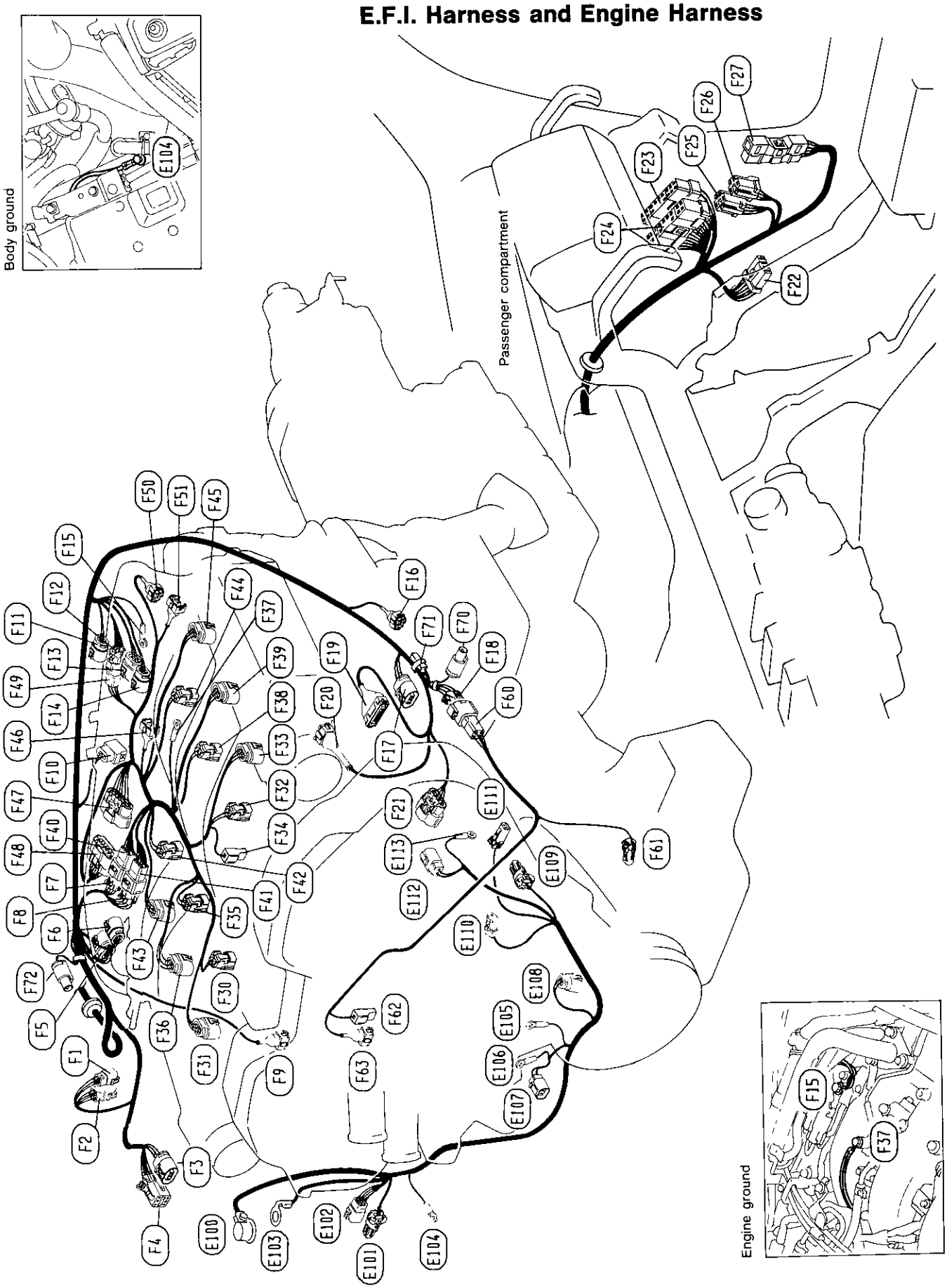
Diode (B5)



Resistor (B74)



E.F.I. Harness and Engine Harness



E.F.I. harness

- (F1) . Actuator (For anti-lock brake system)
- (F2) Actuator (For anti-lock brake system)
- (F3) · To (E3)
- (F4) . To (E4)
- (F5) Oxygen sensor R.H
- (F6) V.T.C solenoid valve R H
- (F7) · To (F40)
- (F8) To (F41)
- (F9) E G R. cut solenoid valve
- (F10) E.G R temperature sensor
- (F11) : Knock sensor
- (F12) · To (F49)
- (F13) . Oxygen sensor L H
- (F14) V.T C. solenoid valve L H
- (F15) Engine ground
- (F16) . P.R V.R. solenoid
- (F17) . Throttle position sensor
- (F18) . To (F60)
- (F19) Mass air flow sensor
- (F20) Throttle position switch
- (F21) . Crankshaft position sensor
- (F22) . To (B52)
- (F23) To (M74)
- (F24) · To (M73)
- (F25) · Ignition coil relay
- (F26) E C.C.S. relay
- (F27) : ECM (E C C.S control unit)
- (F70) : Check connector
- (F71) Resistor
- (F72) Check connector

E.F.I. sub-harness-1

- (F30) Injector No. 1
- (F31) · Ignition coil No. 1
- (F32) · Injector No 2
- (F33) : Ignition coil No. 2
- (F34) : Fuel temperature sensor
- (F35) . Injector No. 3
- (F36) : Ignition coil No. 3
- (F37) . Engine ground
- (F38) . Injector No. 4
- (F39) Ignition coil No. 4
- (F40) · To (F7)
- (F41) · To (F8)
- (F42) Injector No. 5
- (F43) · Ignition coil No. 5
- (F44) · Injector No 6
- (F45) . Ignition coil No 6
- (F46) . Air regulator
- (F47) . Power transistor unit
- (F48) · Power transistor unit
- (F49) · To (F12)
- (F50) · A.A C. solenoid valve
- (F51) . F.I.C.D solenoid valve

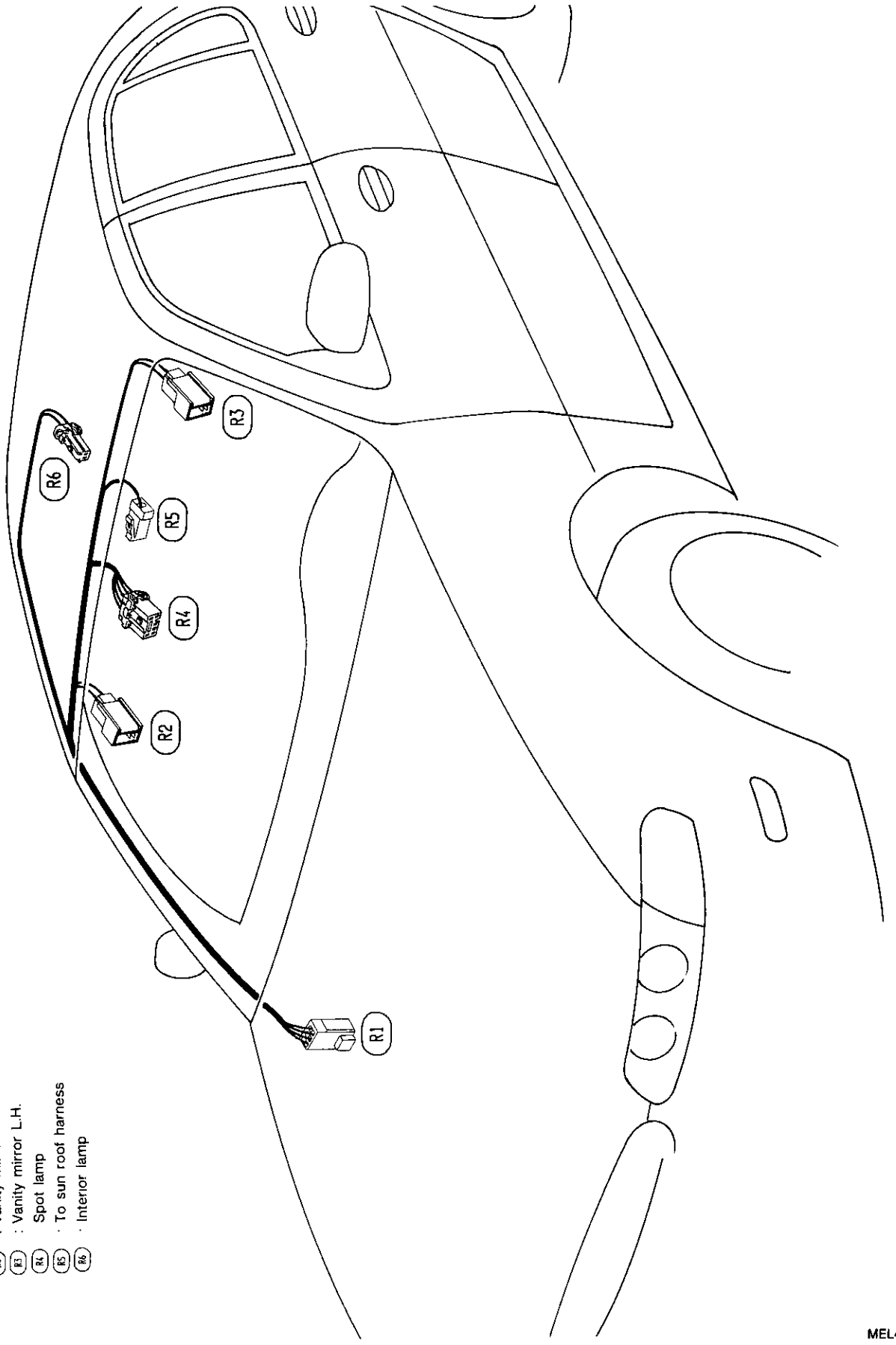
E.F.I. sub-harness-2

- (F60) To (F18)
- (F61) · Compressor
- (F62) : Thermal transmitter
- (F63) Engine coolant temperature sensor

Engine harness

- (E100) · Battery
- (E101) · To (E8)
- (E102) · To (E9)
- (E103) . Hybrid electric control unit
- (E104) . Body ground
- (E105) . Alternator
- (E106) · Alternator
- (E107) · Alternator
- (E108) : Power steering oil pressure switch
- (E109) · Starter motor
- (E110) · Oil pressure switch
- (E111) E.P.S. solenoid
- (E112) · Inhibitor switch
- (E113) · Starter motor

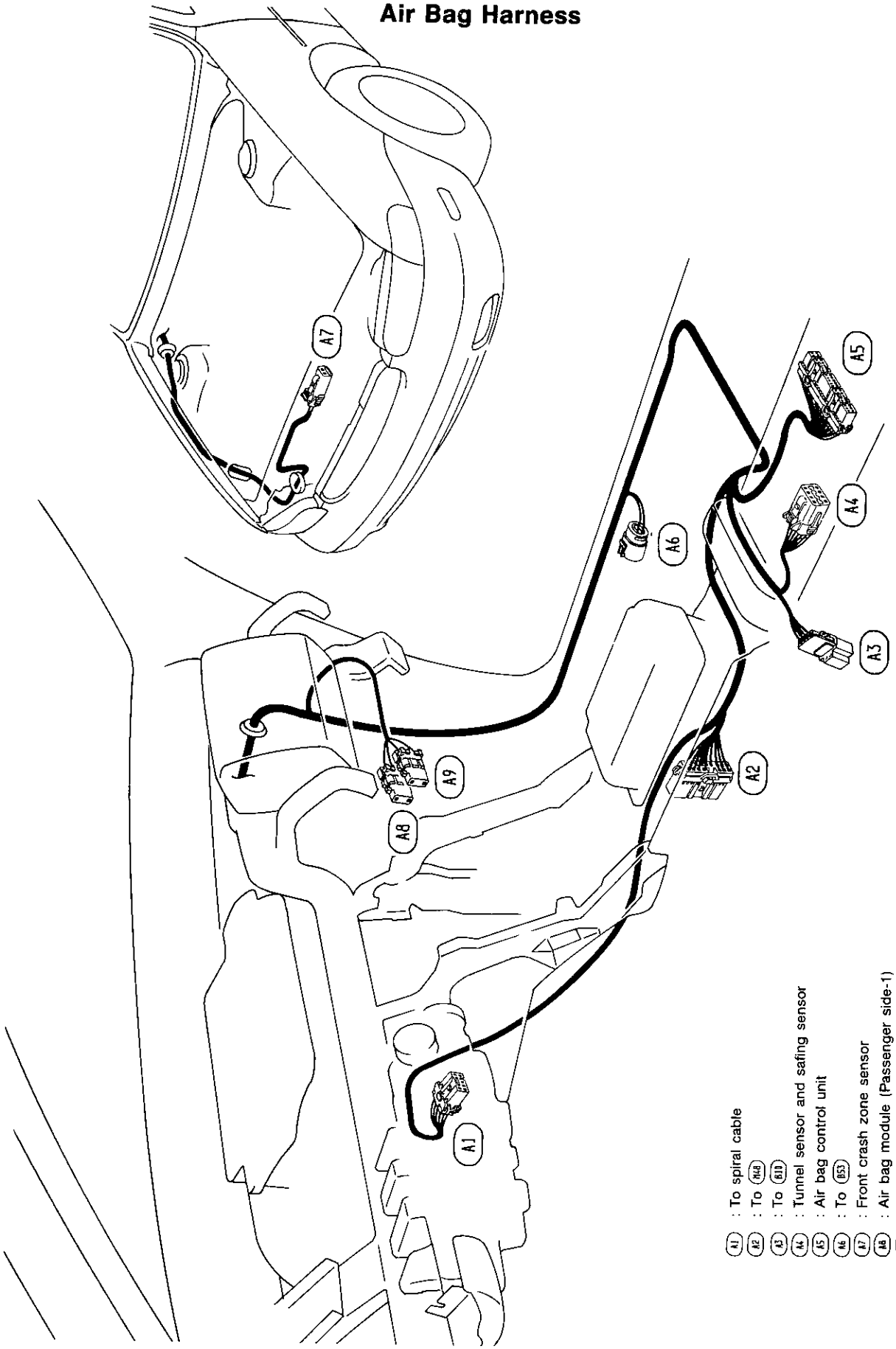
Room Lamp Harness



R1 : To M70
R2 : Vanity mirror R.H
R3 : Vanity mirror L.H.
R4 : Spot lamp
R5 : To sun roof harness
R6 : Interior lamp

MEL423B

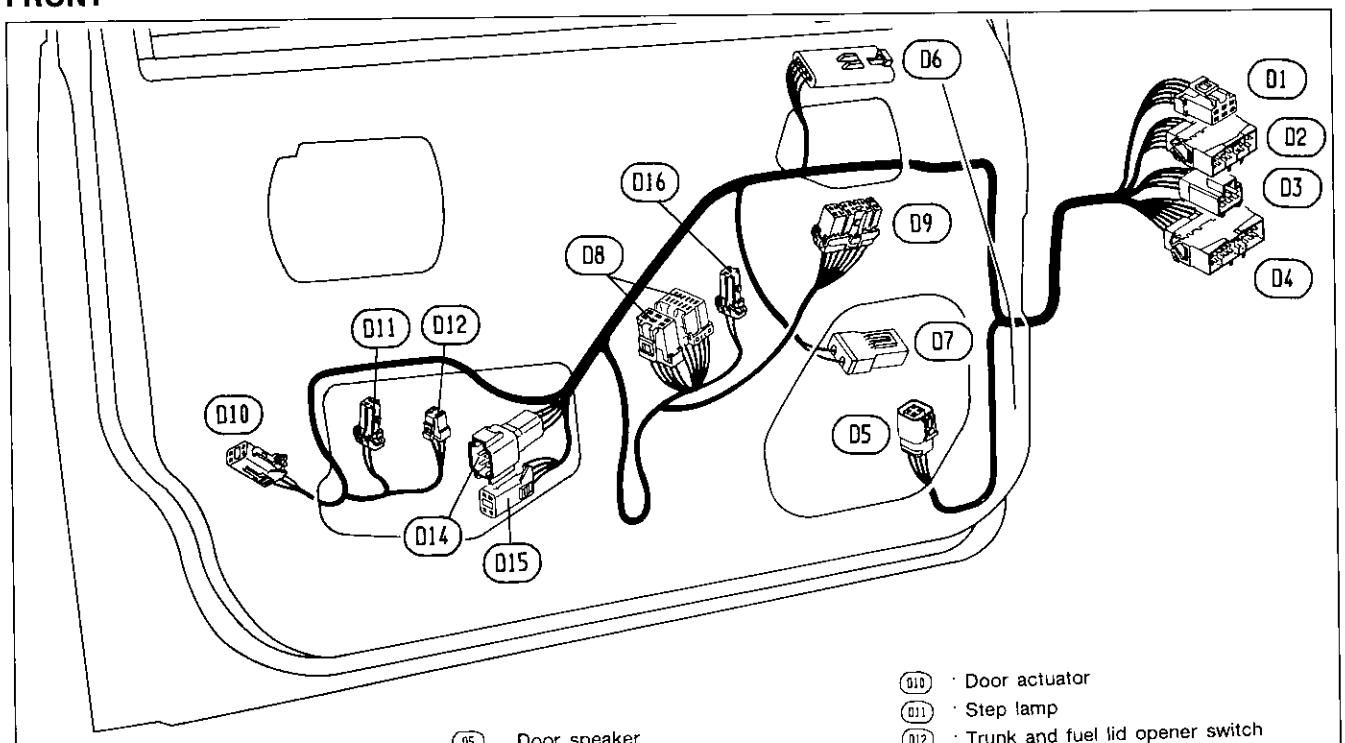
Air Bag Harness



MEL424B

Door Harness (L.H. side)

FRONT



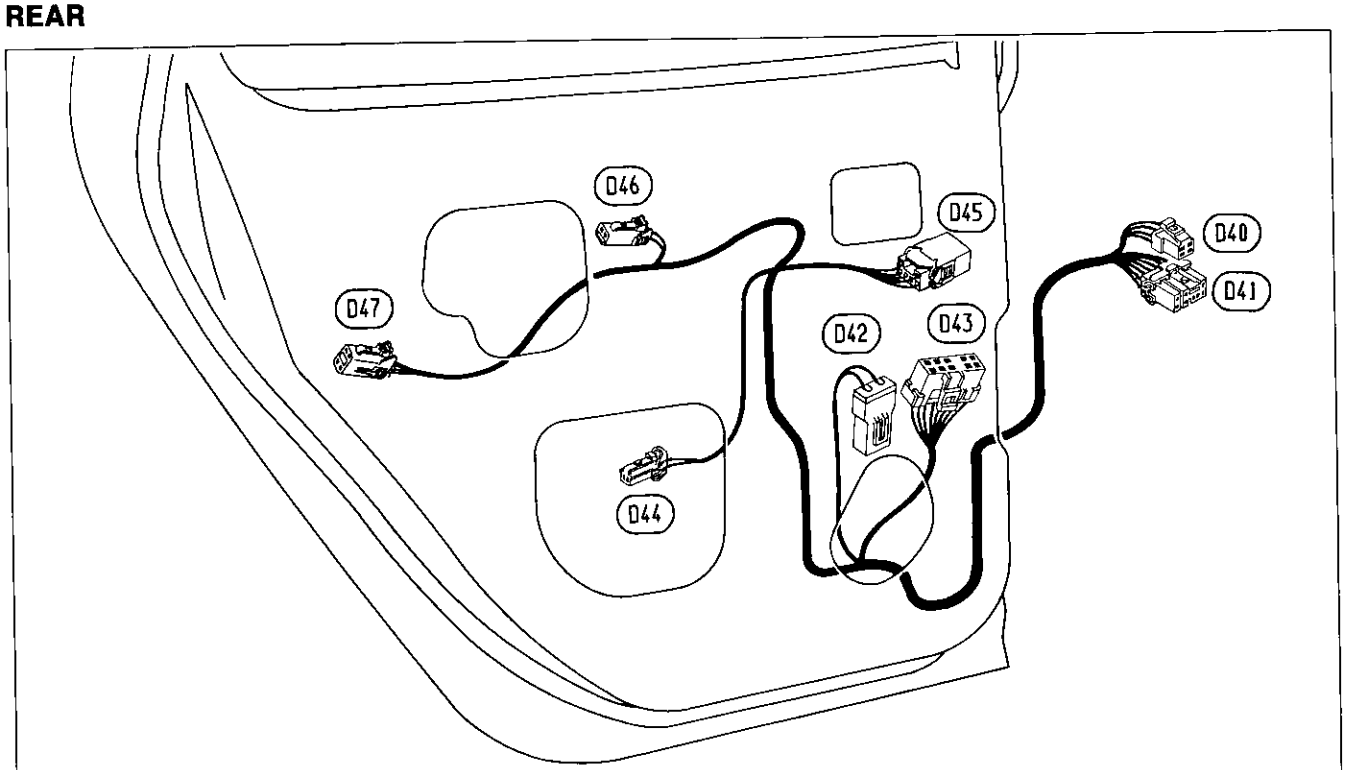
D1 To M8
D2 : To M9
D3 To M7
D4 . To M6

D5 . Door speaker
D6 . Door mirror
D7 . Power window regulator
D8 : Main switch
D9 : Door mirror switch

D10 · Door actuator
D11 · Step lamp
D12 : Trunk and fuel lid opener switch
D14 . Key switch
D15 Entry key switch
D16 : Main switch illumination

MEL425B

REAR



D48 : To B22
D41 : To B23
D42 : Power window regulator
D43 : Power window amplifier

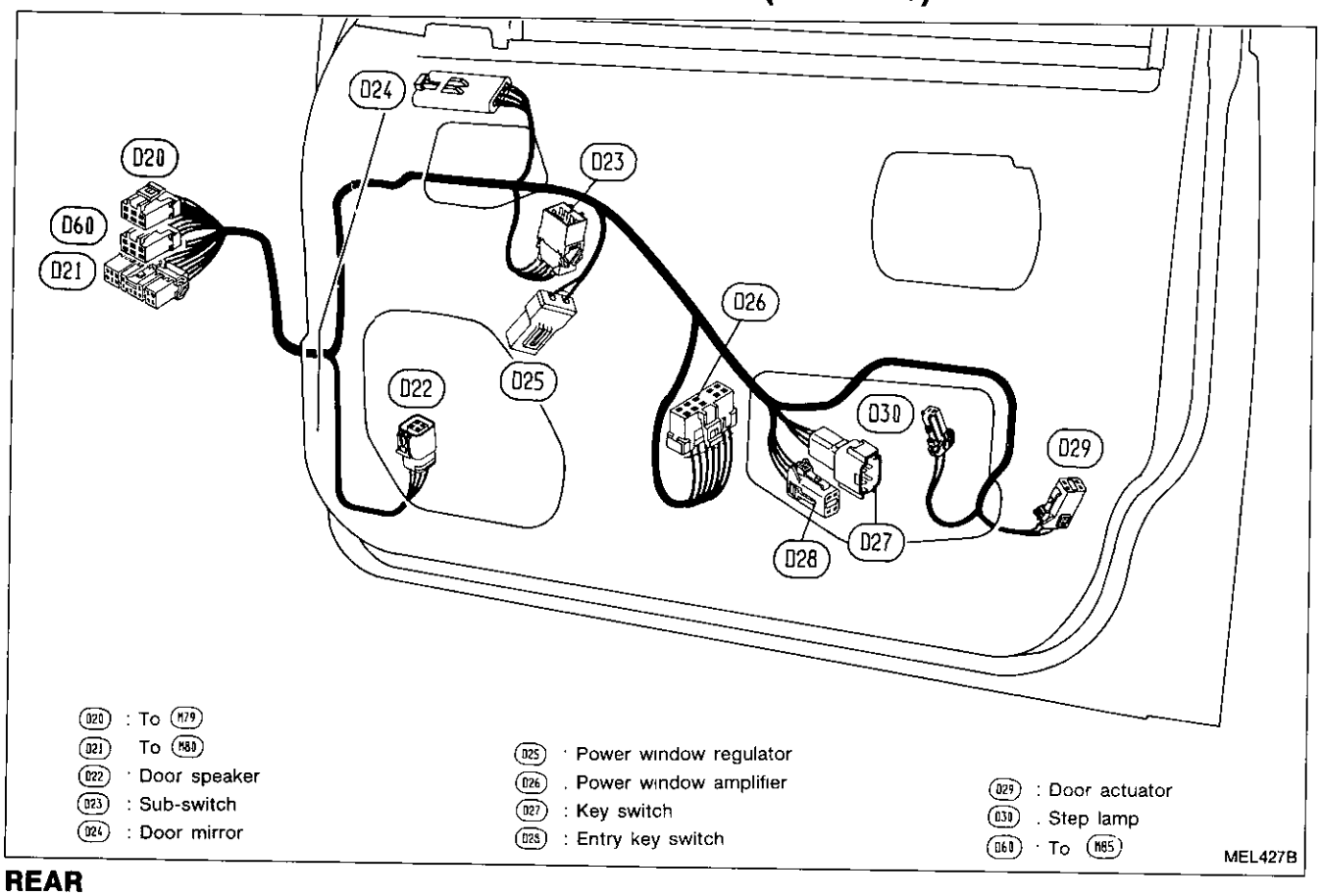
D44 · Step lamp
D45 : Sub-switch

D46 . Door switch
D47 : Door actuator

MEL426B

Door Harness (R.H. side)

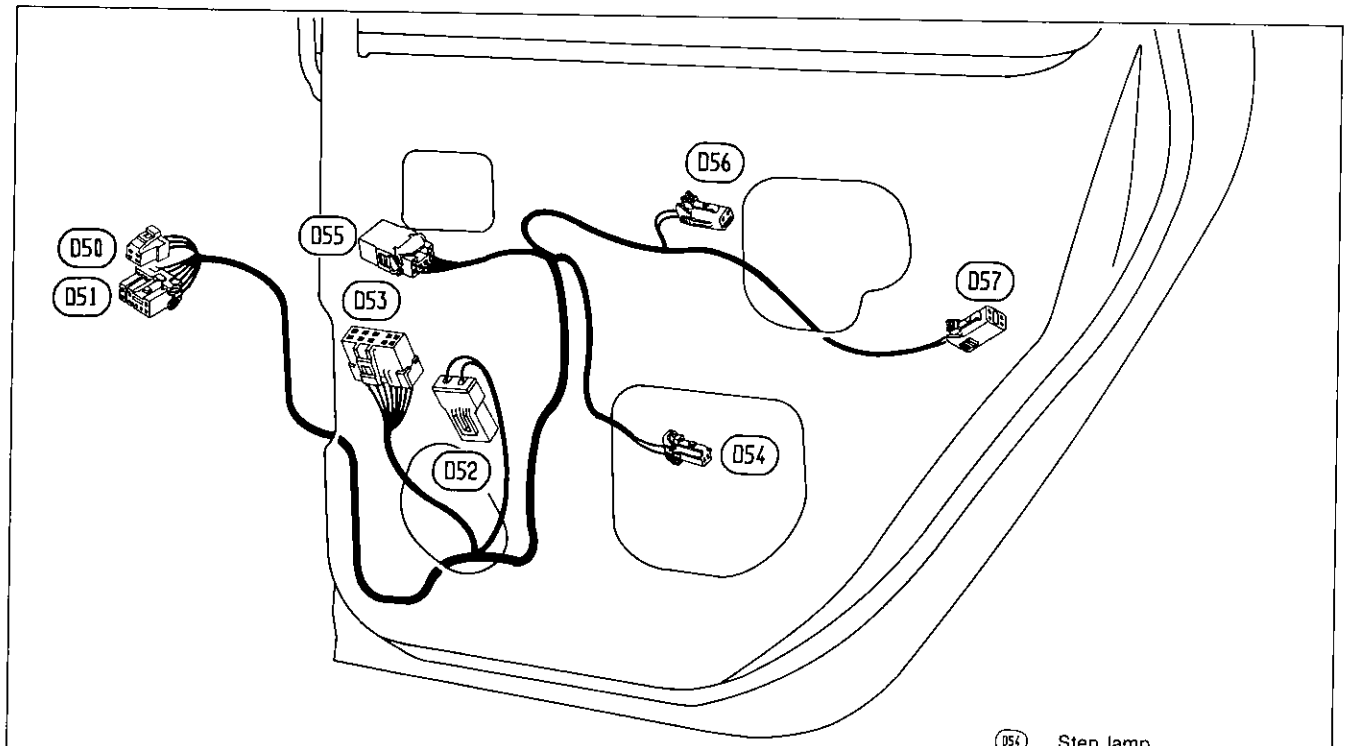
FRONT



D20 : To M79
D21 To M80
D22 · Door speaker
D23 : Sub-switch
D24 : Door mirror
D25 · Power window regulator
D26 . Power window amplifier
D27 : Key switch
D28 : Entry key switch
D29 : Door actuator
D30 . Step lamp
D60 · To M85

MEL427B

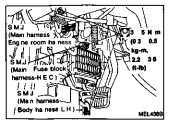
REAR

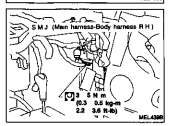


D50 . To B61
D51 : To B61
D52 : Power window regulator
D53 : Power window amplifier
D54 . Step lamp
D55 · Sub-switch
D56 : Door switch
D57 : Door actuator

MEL428B

NOTE





INSTALLATION

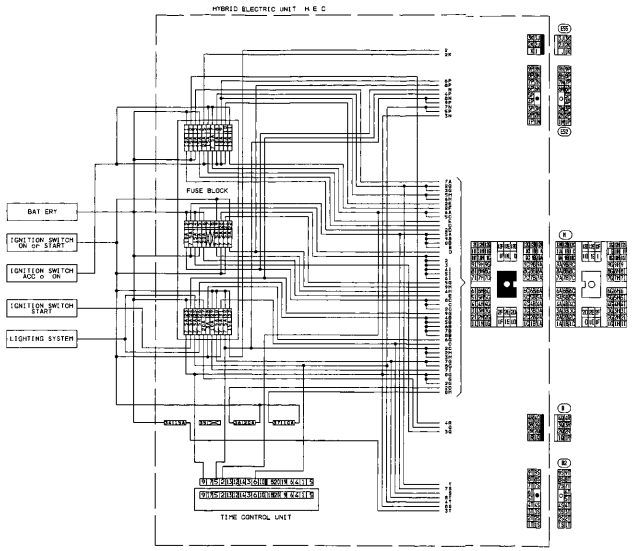
To install S M J tighten bolts until orange fulltight mark appears and then retighten to specified torque as required

3 5 N m
(0 3 0.5 kg-m, 2.2 - 3 6 ft-lb)

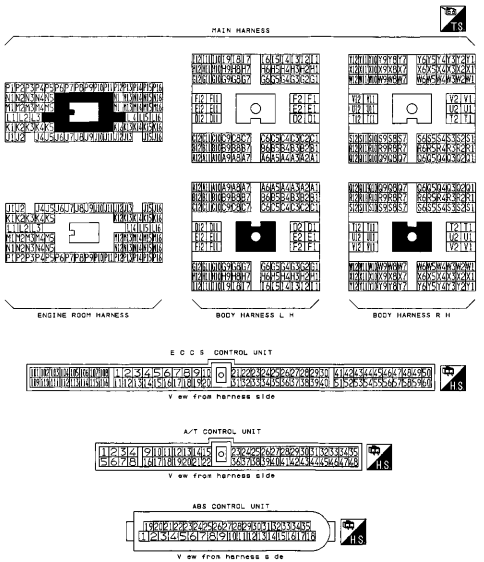
CAUTION

Do not overtighten bolts, otherwise, they may be damaged

Terminal Arrangement

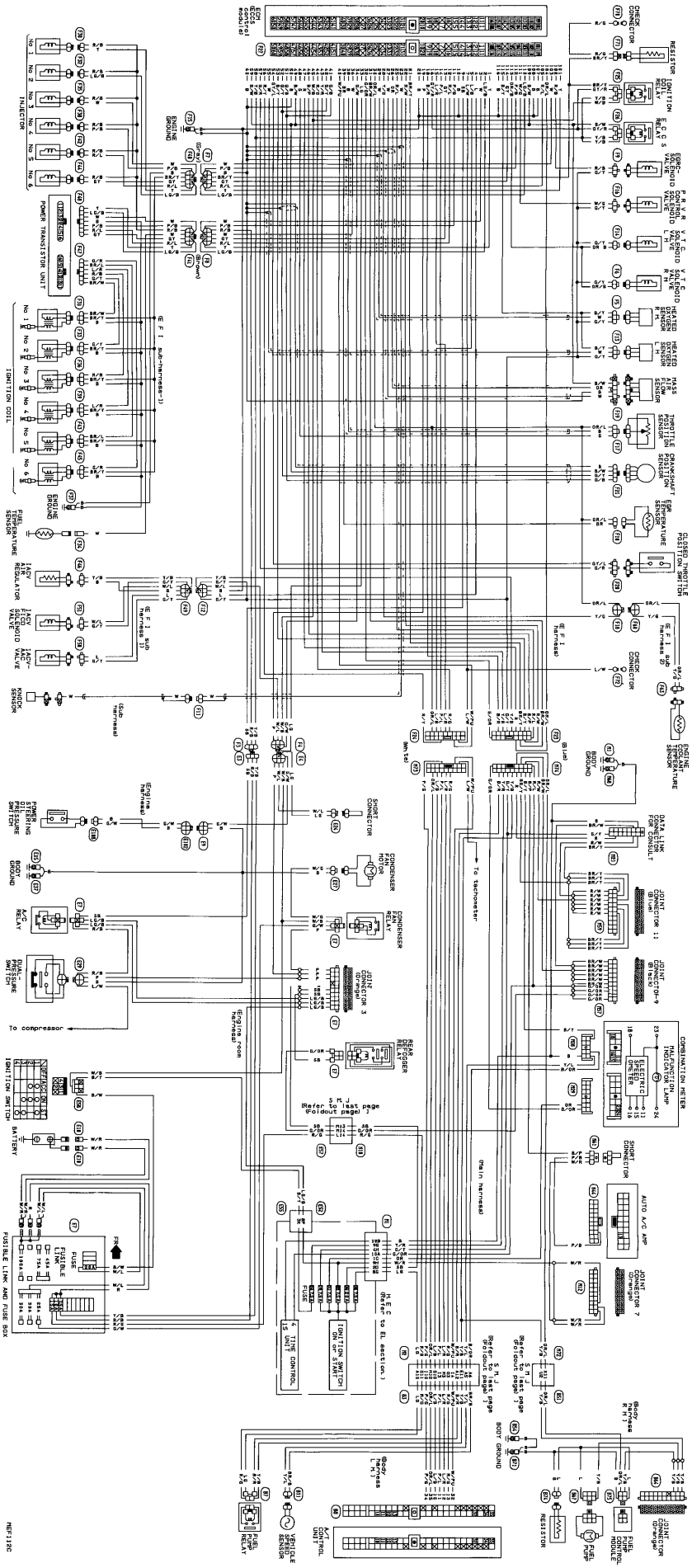


Terminal Arrangement (Cont'd)

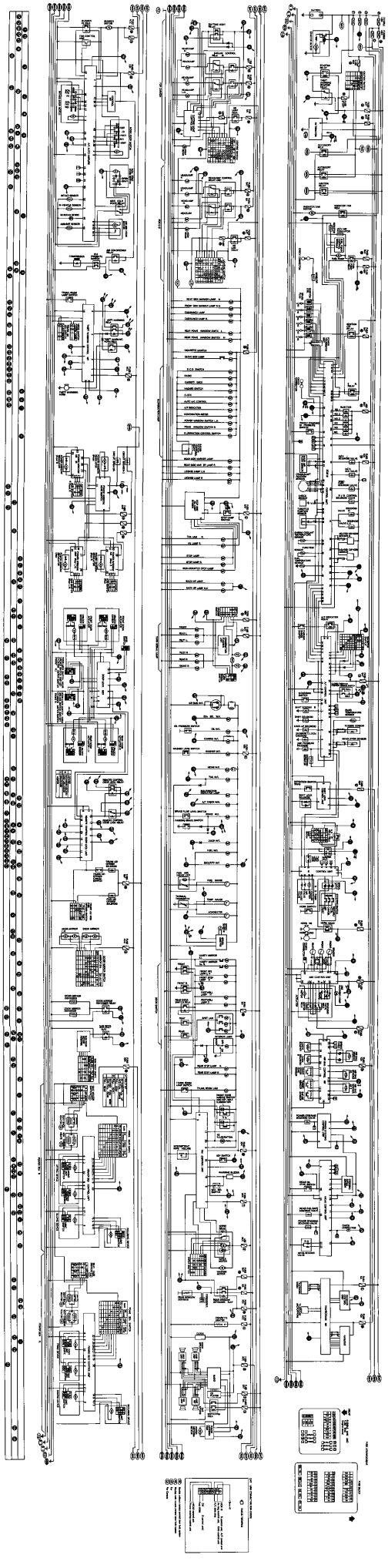


Terminal Arrangement (Cont'd)

1993 INFINITI J30
E. C. C. S. WIRING DIAGRAM


ECM (Control module)
CHECK CONNECTOR
RESISTOR
IGNITION CONT. RELAY
E.C.C.S. RELAY
EGRC-SOLENOID VALVE
P.R.V.R. CONTROL SOLENOID VALVE
V.I.C. SOLENOID VALVE LH
V.I.C. SOLENOID VALVE RH
HEATED OXYGEN SENSOR RH
HEATED OXYGEN SENSOR LH
MASS AIR FLOW SENSOR
THROTTLE POSITION SENSOR
CRANKSHAFT POSITION SENSOR
ECT SENSOR
CLOSED THROTTLE POSITION SWITCH
INJECTOR
IGNITION COIL
POWER TRANSISTOR UNIT
ENGINE GROUND
THERMOSENSOR
IACV REGULATOR
IACV SOLENOID VALVE
IACV-AAC VALVE
KNOCK SENSOR
ENGINE TEMPERATURE SENSOR
BODY GROUND
DATA LINK CONNECTOR FOR CONSULT
POWER STEERING OIL PRESSURE SWITCH
SHORT CONNECTOR
CONDENSER FAN MOTOR
CONDENSER RELAY
A/C RELAY
DUAL PRESSURE SWITCH
To compressor
To tachometer
JOINT CONNECTOR 1
JOINT CONNECTOR 9
JOINT CONNECTOR 3
REAR DEFOGGER RELAY
COMBINATION METER
MALFUNCTION INDICATOR LAMP
ELECTRIC DIMETER
Engine room harness
Main harness
IGNITION SWITCH
BATTERY
FUSIBLE LINK AND FUSE BOX
FUSIBLE LINK
FUSE
SPARE
SPARE
SPAR

1993 INFINITI J30
CIRCUIT DIAGRAM



INCH TO METRIC CONVERSION TABLE

(Rounded-off for automotive use)

inches	mm	inches	mm
.100	2.54	.610	15.49
.110	2.79	.620	15.75
.120	3.05	.630	16.00
.130	3.30	.640	16.26
.140	3.56	.650	16.51
.150	3.81	.660	16.76
.160	4.06	.670	17.02
.170	4.32	.680	17.27
.180	4.57	.690	17.53
.190	4.83	.700	17.78
.200	5.08	.710	18.03
.210	5.33	.720	18.29
.220	5.59	.730	18.54
.230	5.84	.740	18.80
.240	6.10	.750	19.05
.250	6.35	.760	19.30
.260	6.60	.770	19.56
.270	6.86	.780	19.81
.280	7.11	.790	20.07
.290	7.37	.800	20.32
.300	7.62	.810	20.57
.310	7.87	.820	20.83
.320	8.13	.830	21.08
.330	8.38	.840	21.34
.340	8.64	.850	21.59
.350	8.89	.860	21.84
.360	9.14	.870	22.10
.370	9.40	.880	22.35
.380	9.65	.890	22.61
.390	9.91	.900	22.86
.400	10.16	.910	23.11
.410	10.41	.920	23.37
.420	10.67	.930	23.62
.430	10.92	.940	23.88
.440	11.18	.950	24.11
.450	11.43	.960	24.38
.460	11.68	.970	24.64
.470	11.94	.980	24.89
.480	12.19	.990	25.15
.490	12.45	1.000	25.40
.500	12.70	2.000	50.80
.510	12.95	3.000	76.20
.520	13.21	4.000	101.60
.530	13.46	5.000	127.00
.540	13.72	6.000	152.40
.550	13.97	7.000	177.80
.560	14.22	8.000	203.20
.570	14.48	9.000	228.60
.580	14.73	10.000	254.00
.590	14.99	20.000	508.00
.600	15.24		

METRIC TO INCH CONVERSION TABLE

(Rounded-off for automotive use)

mm	inches	mm	inches
1	.0394	51	2.008
2	.079	52	2.047
3	.118	53	2.087
4	.157	54	2.126
5	.197	55	2.165
6	.236	56	2.205
7	.276	57	2.244
8	.315	58	2.283
9	.354	59	2.323
10	.394	60	2.362
11	.433	61	2.402
12	.472	62	2.441
13	.512	63	2.480
14	.551	64	2.520
15	.591	65	2.559
16	.630	66	2.598
17	.669	67	2.638
18	.709	68	2.677
19	.748	69	2.717
20	.787	70	2.756
21	.827	71	2.795
22	.866	72	2.835
23	.906	73	2.874
24	.945	74	2.913
25	.984	75	2.953
26	1.024	76	2.992
27	1.063	77	3.031
28	1.102	78	3.071
29	1.142	79	3.110
30	1.181	80	3.150
31	1.220	81	3.189
32	1.260	82	3.228
33	1.299	83	3.268
34	1.339	84	3.307
35	1.378	85	3.346
36	1.417	86	3.386
37	1.457	87	3.425
38	1.496	88	3.465
39	1.535	89	3.504
40	1.575	90	3.543
41	1.614	91	3.583
42	1.654	92	3.622
43	1.693	93	3.661
44	1.732	94	3.701
45	1.772	95	3.740
46	1.811	96	3.780
47	1.850	97	3.819
48	1.890	98	3.858
49	1.929	99	3.898
50	1.969	100	3.937