QUICK REFERENCE INDEX

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MAINTENANCE	MA
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ENGINE LUBRICATION & COOLING SYSTEMS	LC
ENGINE FUEL & EMISSION CONTROL SYSTEM	EF & EC
ACCELERATOR CONTROL, FUEL & EXHAUST SYSTEMS	FE
AUTOMATIC TRANSMISSION	AT
PROPELLER SHAFT & DIFFERENTIAL CARRIER	PD
FRONT AXLE & FRONT SUSPENSION	FA
REAR AXLE & REAR SUSPENSION	RA
BRAKE SYSTEM	BR
STEERING SYSTEM	ST
BODY	BF
HEATER & AIR CONDITIONER	HA
ELECTRICAL SYSTEM	EL

INFINITI®

Q45

MODEL G50 SERIES

INFINITI®

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FOREWORD

This manual contains maintenance and repair procedures for the 1993 INFINITI Q45.

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.



I N F I N I T I ®

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

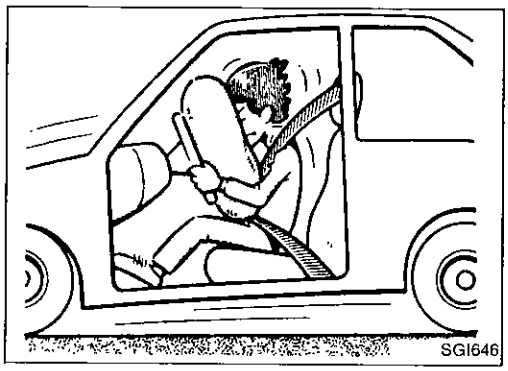
GENERAL INFORMATION

SECTION GI

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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"

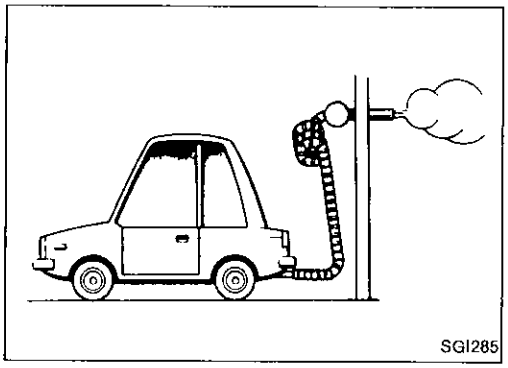
The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury to the driver in a frontal collision. The Supplemental Restraint System consists of an air bag (located in the center of the steering wheel), sensors, a diagnosis unit, warning lamp, wiring harness and spiral cable. 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 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 "FULL-ACTIVE SUSPENSION"

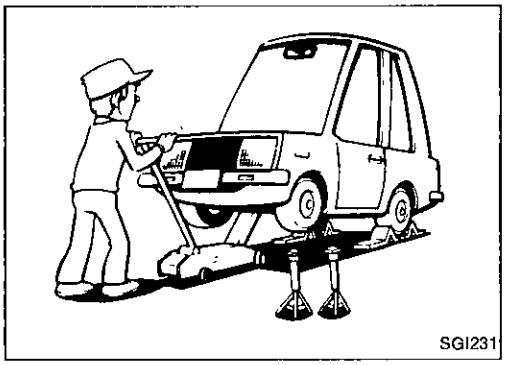
1. Do not disconnect battery terminals or remove fuses for approximately 2 minutes after stopping the engine. Doing so may change vehicle height.
2. Before raising the vehicle using a jack, wait at least 2 minutes after stopping the engine.
3. Do not get under the vehicle when it is raised with only a jack and do not start the engine.
4. Before working under the vehicle, raise the four wheels off the ground and properly support the vehicle using rigid racks.


SGI285

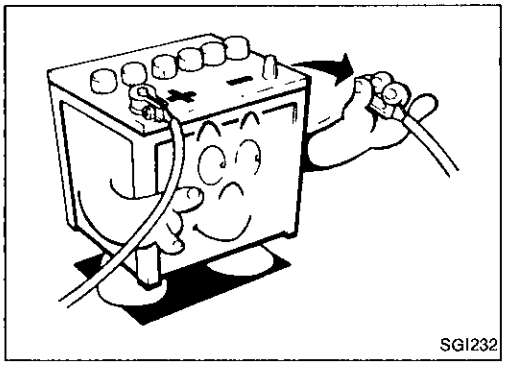
General Precautions

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.

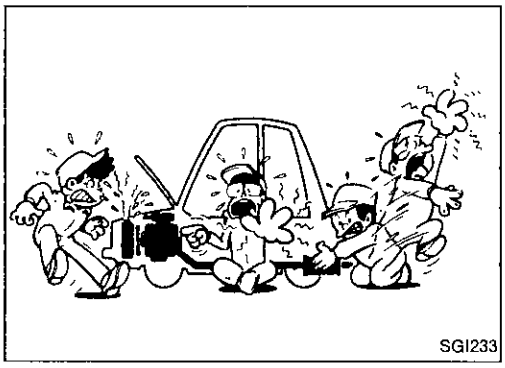
General Precautions (Cont'd)


SGI231

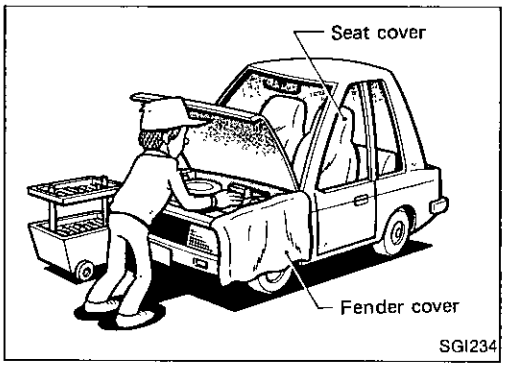
2. Before jacking up the vehicle, apply wheel chocks or other tire blocks to the wheels to prevent the vehicle from moving. After jacking up the vehicle, support the vehicle weight with safety stands at the points designated for proper lifting and towing before working on the vehicle.
   These operations 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.


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.

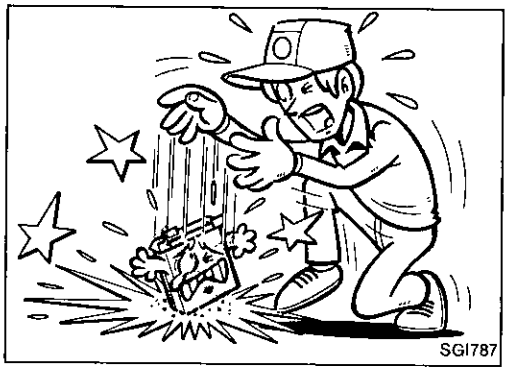


SGI234

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.

General Precautions (Cont'd)

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 ECMs).
    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.


SGI787

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 three way catalyst.
2. When checking for ignition spark or measuring engine compression, make tests quickly and only when necessary.
3. Do not run engine when the fuel tank level is low, otherwise the engine may misfire causing damage to the converter.
4. Do not place the vehicle on inflammable material. Keep inflammable material off the exhaust pipe.

Precautions for Fuel

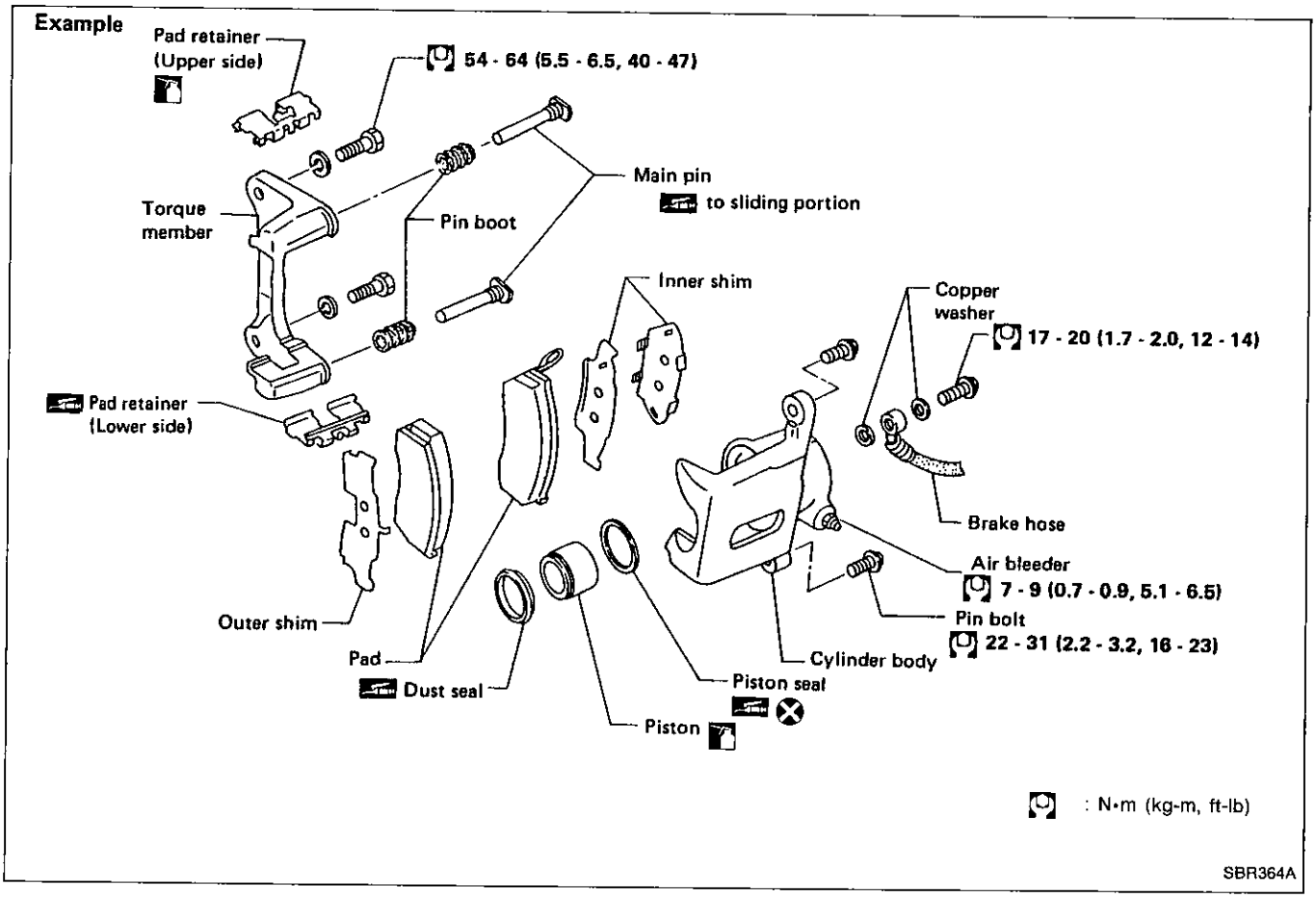
To maintain engine and exhaust system durability and performance, UNLEADED PREMIUM gasoline with an octane rating of at least 91 AKI (Research octane number 96) must be used.

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 three way catalyst 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**.



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.
P/S	:	Power steering

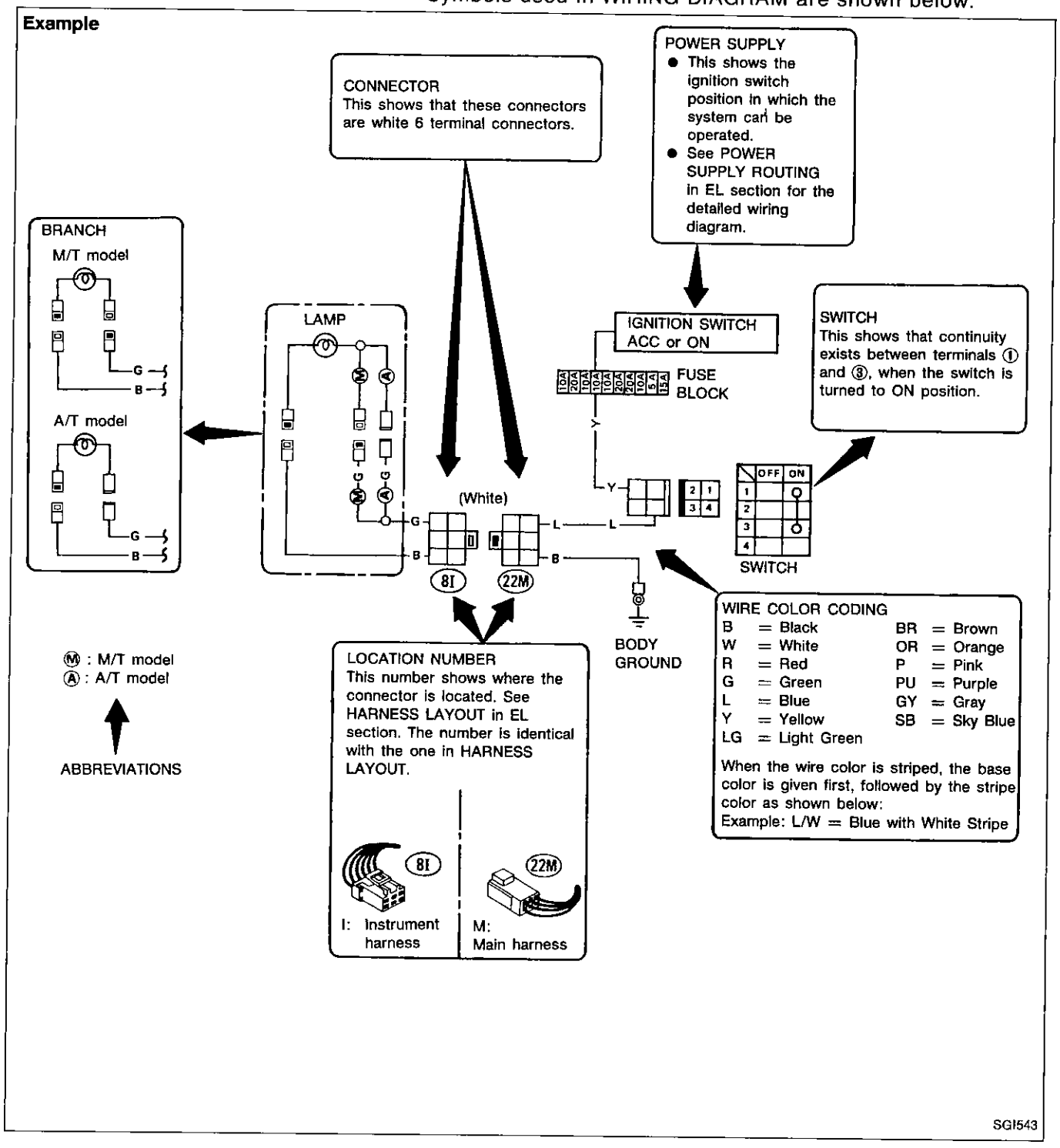
S.D.S.	:	Service Data and Specifications
SAE	:	Society of Automotive Engineers Inc.
L.H., R.H.	:	Left-Hand, Right-Hand
FR, RR	:	Front, Rear
A/T	:	Automatic Transaxle/Transmission
Tool	:	Special Service Tools
A.T.F.	:	Automatic Transmission Fluid
D_1	:	Drive range 1st gear
D_2	:	Drive range 2nd gear
D_3	:	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

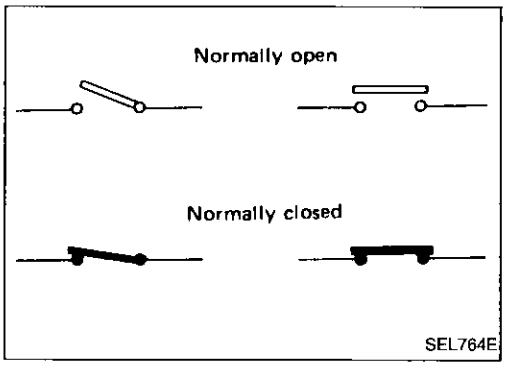
8. The **UNITS** given in this manual are primarily expressed as SI UNITS (International System of Unit), and alternately expressed in the metric system and in the yard/pound system.
   "Example"
   Tightening torque:
   59 - 78 N·m (6.0 - 8.0 kg-m, 43 - 58 ft-lb)
9. **TROUBLE DIAGNOSES** are included 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:

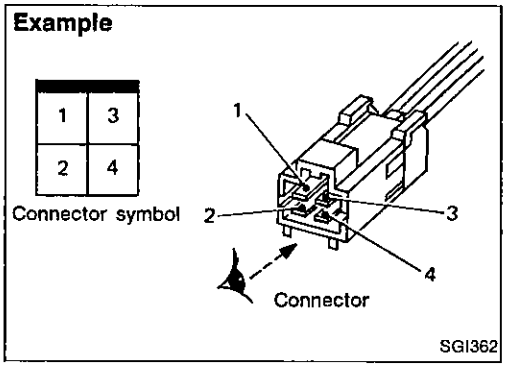




SWITCH POSITIONS

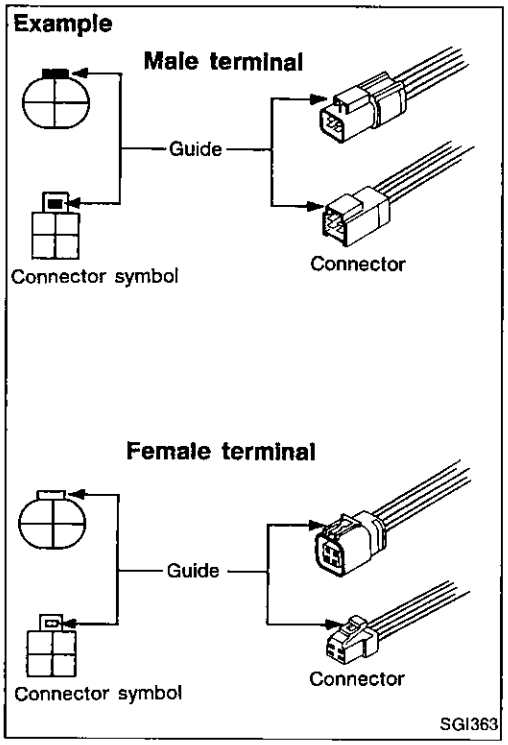
Wiring diagram switches are shown with the vehicle in the following condition.

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



CONNECTOR SYMBOLS

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

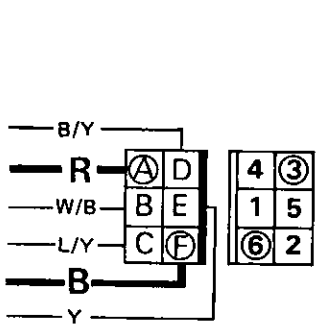


- Male and female terminals
  Connector guides for male terminals are shown in black and female terminals in white in wiring diagrams.

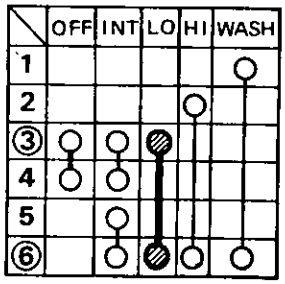
MULTIPLE SWITCH

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

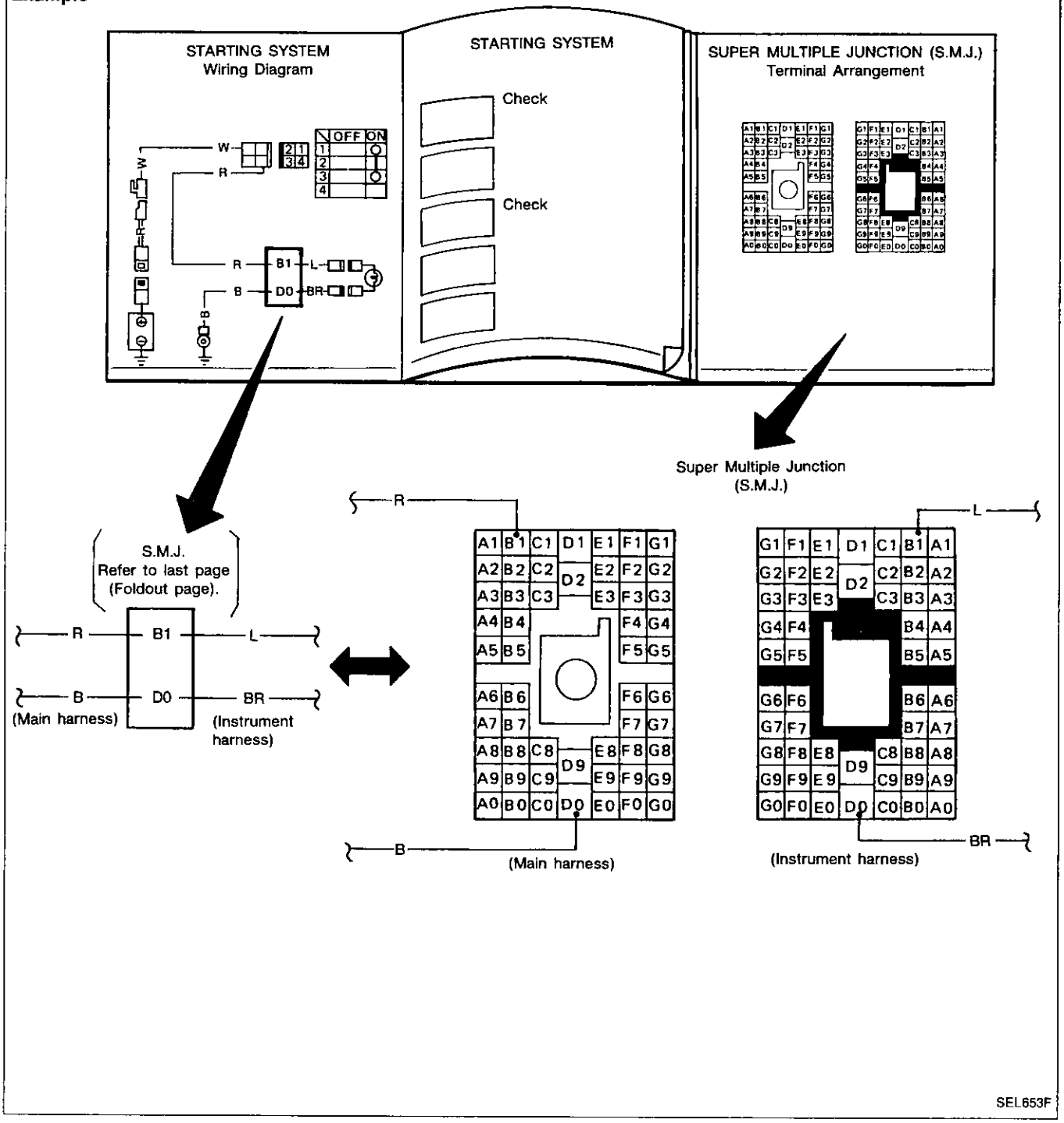
Continuity circuit: Red wire – Ⓐ terminal – ③ terminal – Wiper switch (● – ●: LO) – ⑥ terminal – Ⓕ terminal – Black wire

SGI365

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.

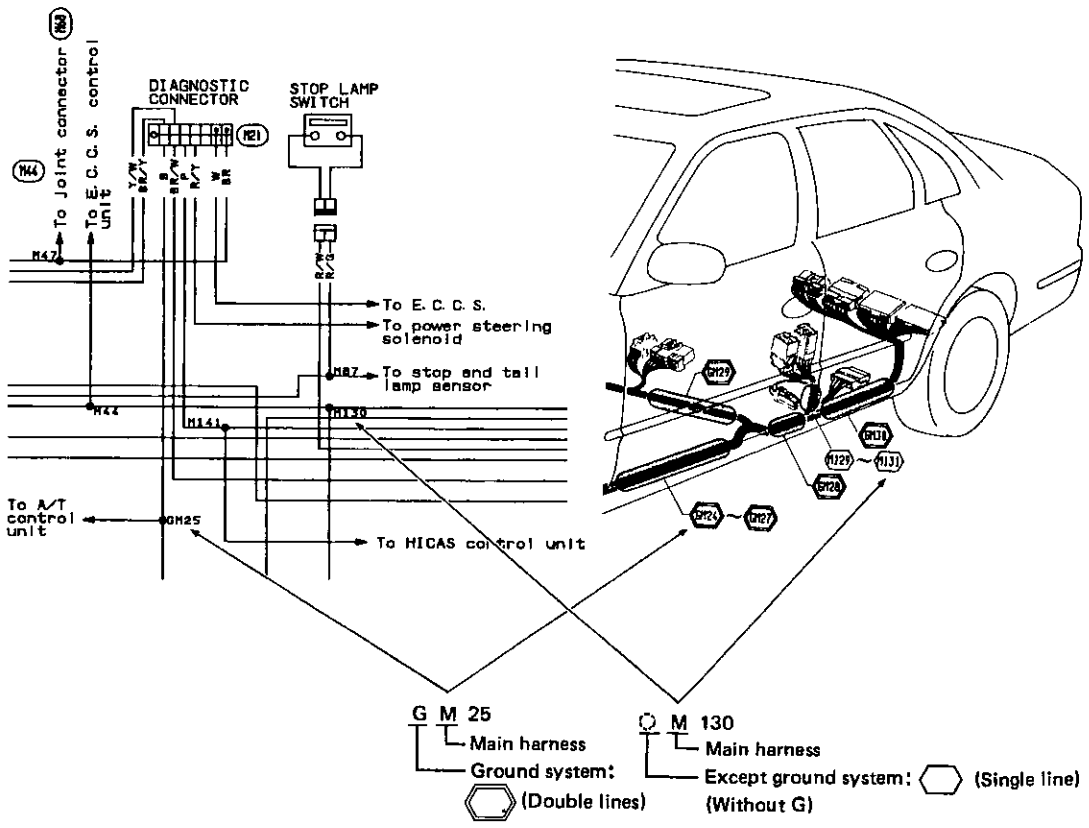
Example



SPLICE LOCATION

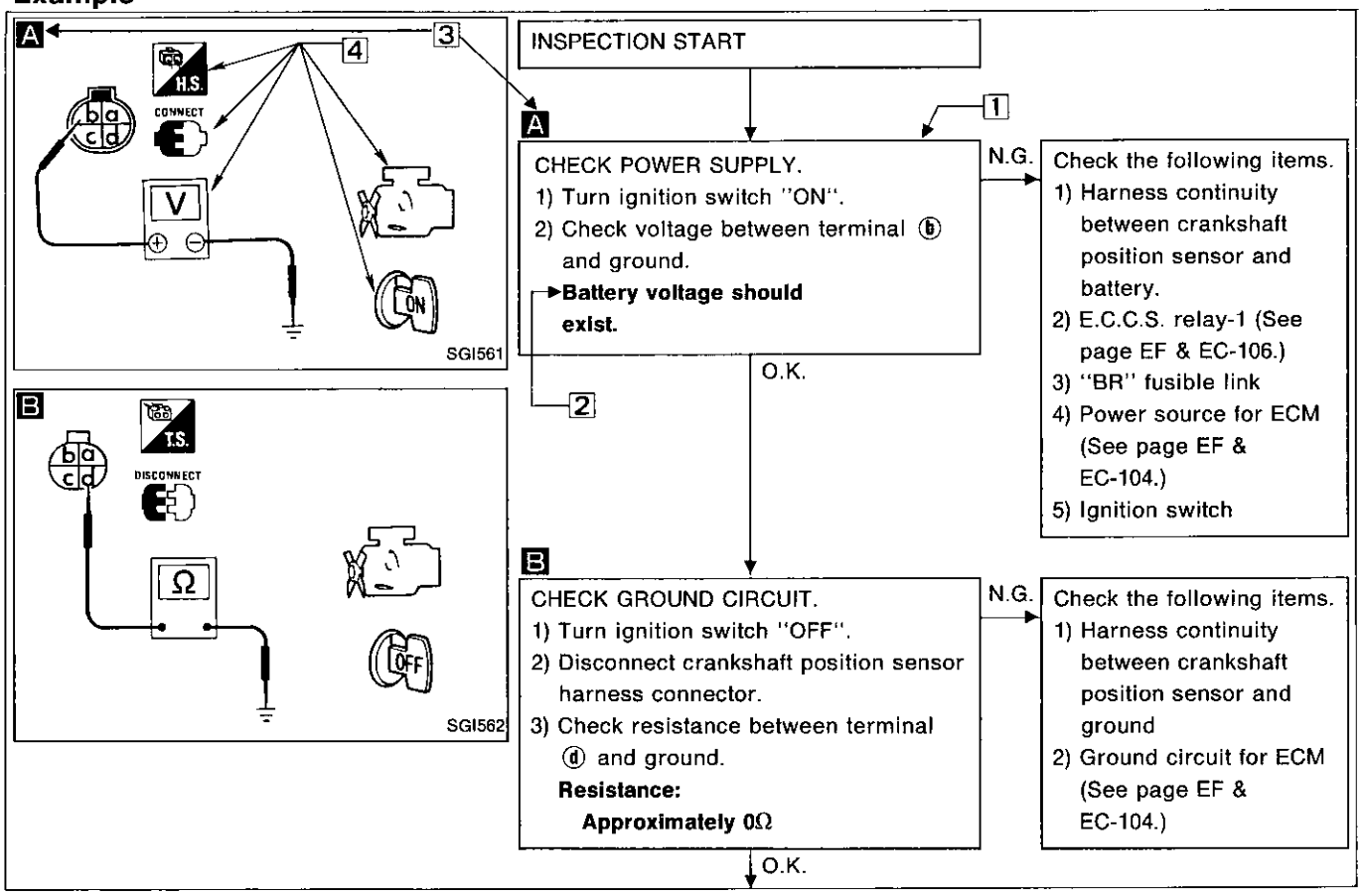
- "GM25", "M130" etc., which are shown in the wiring diagram, refer to wiring harness splice points. These points are located in shaded areas " GM25 ", " M130 ", etc. in illustrations under the title "SPLICE LOCATION".
- Wiring harness splice points are subject to change without prior notice.

Example



SEL192Q

Example



NOTICE

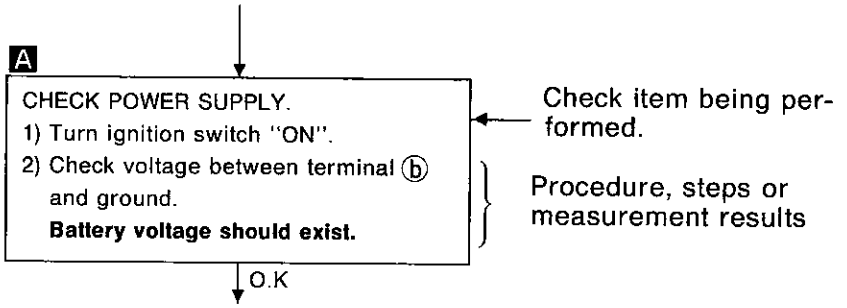
The flow chart indicates work procedures required to diagnose problems effectively. Observe the following instructions before diagnosing.

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:

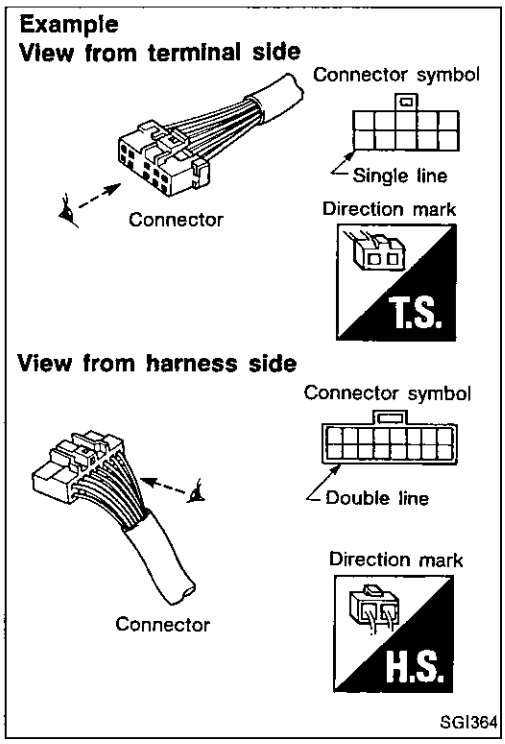
Battery voltage → 11 - 14V or approximately 12V
Voltage: Approximately 0V → Less than 1V

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.**

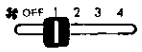
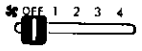
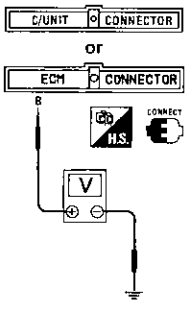
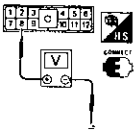
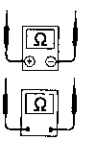
- **All connector symbols shown from the terminal side are enclosed by a single line.**



: **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

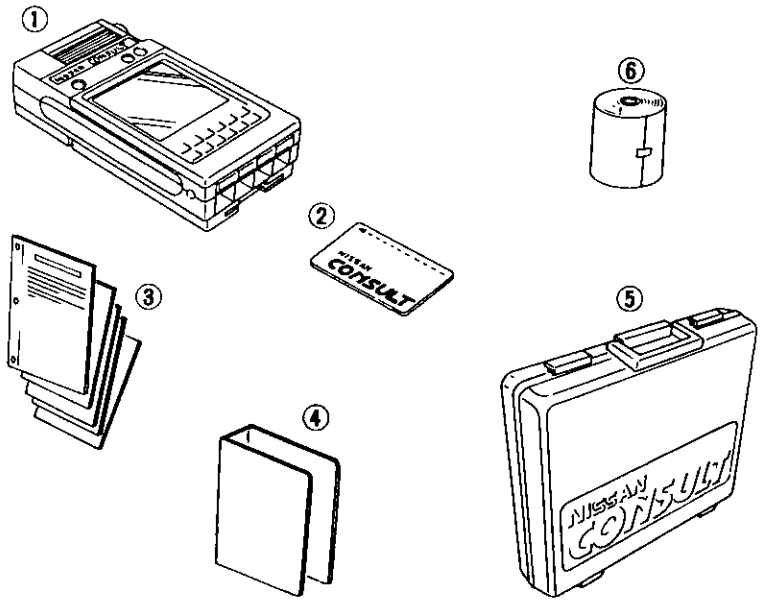
Symbol	Symbol explanation	Symbol	Symbol explanation
	Check after disconnecting the connector to be measured.		Current should be measured with an ammeter.
	Check after connecting the connector to be measured.		Procedure with CONSULT
	Insert key into ignition switch.		Procedure without CONSULT
	Remove 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 ECM, A/T control unit, full-active suspension control unit and TCS 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.		

Function and System Application

Diagnostic test mode	Function	E.C.C.S.	A/T	Air bag	HICAS	ASCD	*AUTO D/P	ACTIV SUS
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on CONSULT.	×	—	—	—	—	—	×
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	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.	×	—	—	—	—	—	—

× : Applicable
*AUTO D/P: Automatic drive positioner system

Checking Equipment

Tool name	Description
NISSAN CONSULT kit ① CONSULT unit and accessories ② Program card (UE920) ③ Operation manuals ④ Binder ⑤ Carrying case ⑥ Thermal paper (Rolls)	

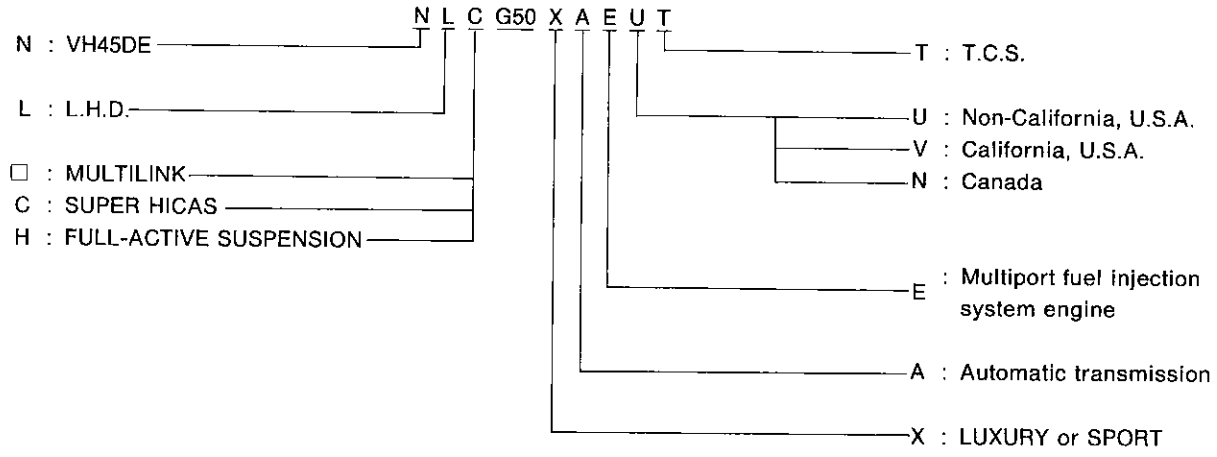
When ordering the above equipment, contact your INFINITI distributor.

Model Variation

Body	Destination	Grade		Model	Engine	Transmission	Differential carrier
Sedan	Non-California	Luxury	—	NL-XAEU	VH45DE	RE4R03A	R200V
				NL-XAEUT			
			T.S.P.	NLC-XAEU			
			A.S.P.	NLH-XAEU			
	California		—	NL-XAEV			
				NL-XAEVT			
			T.S.P.	NLC-XAEV			
			A.S.P.	NLH-XAEV			
	Canada		—	NL-XAEN			
				NL-XAENT			

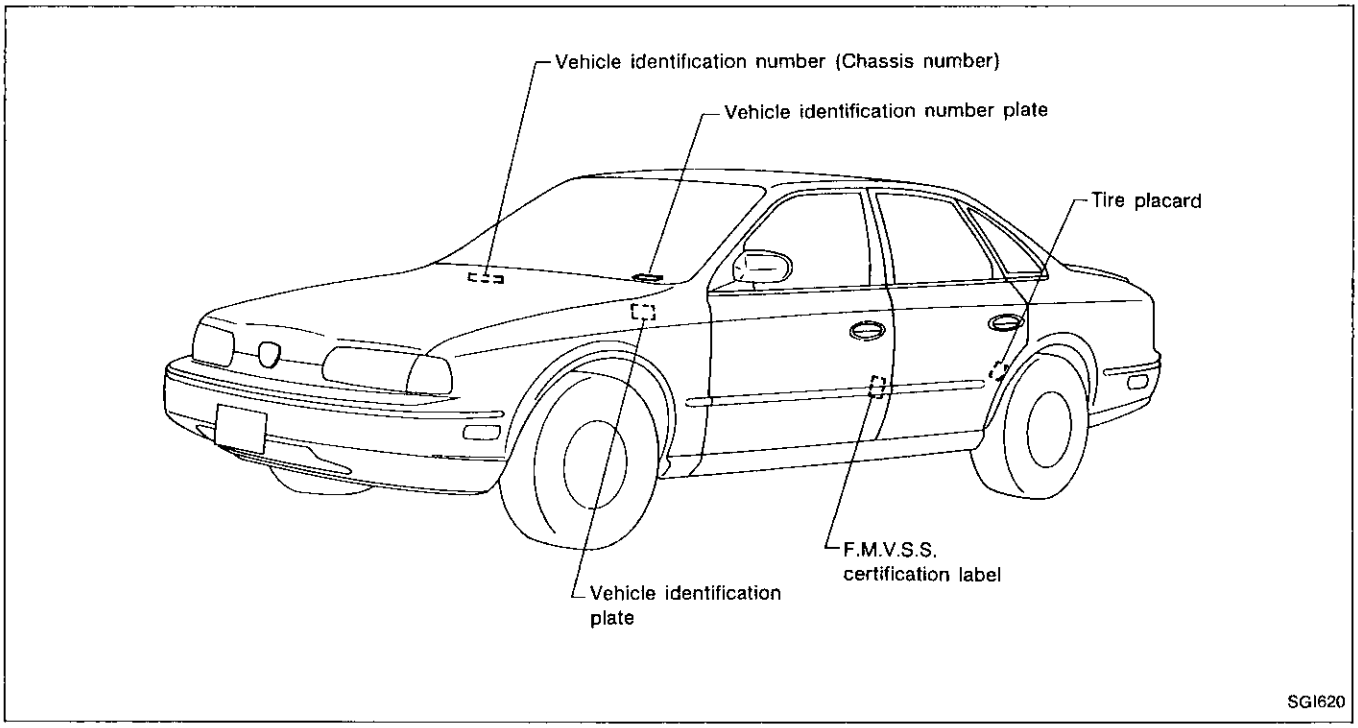
T.S.P. = Touring Susp. Pack
A.S.P. = Active suspension pack

Prefix and suffix designations:



□: means no indication.

Identification Number



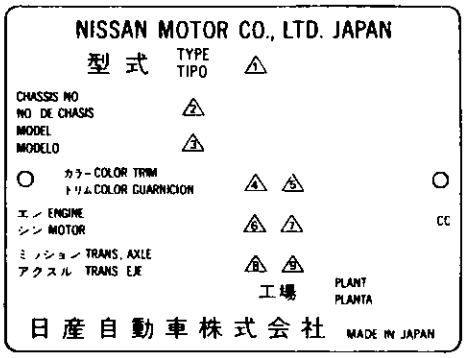
VEHICLE IDENTIFICATION NUMBER ARRANGEMENT

JNK N G 0 1 C * P M 000001

- Manufacturer
  - JNK : Nissan, Passenger vehicle
- Engine type
  - N : VH45DE
- Vehicle line
  - G : Infiniti Q45
- Model change (0 to 9)
- Body type
  - 1 : 4-Door Sedan
- Restraint system
  - C : Driver side 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

Identification Number (Cont'd)

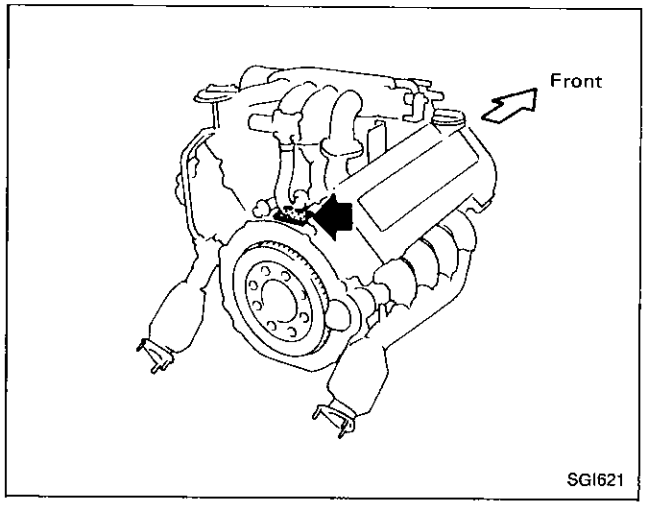
IDENTIFICATION PLATE



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

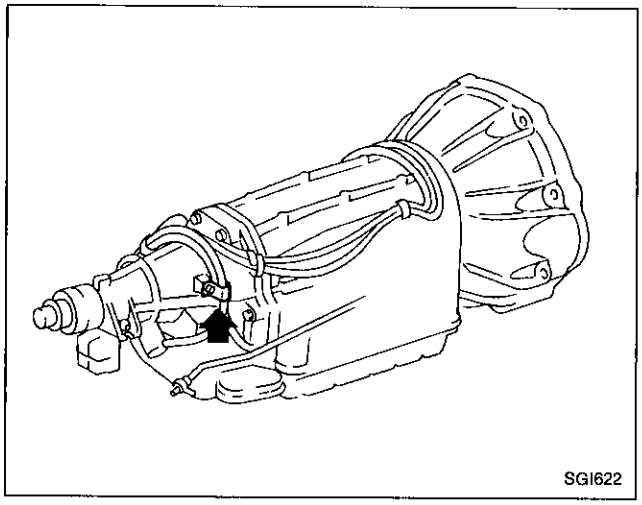
SGI315

ENGINE SERIAL NUMBER



SGI621

AUTOMATIC TRANSMISSION NUMBER



SGI622

Dimensions

Unit: mm (in)

	Sedan	Active suspension
Overall length	5,075 (199.8) 5,090 (200.4)*	5,075 (199.8)
Overall width	1,825 (71.9)	1,825 (71.9)
Overall height	1,435 (56.5)	1,425 (56.1)
Front tread	1,570 (61.8)	1,570 (61.8)
Rear tread	1,570 (61.8)	1,570 (61.8)
Wheelbase	2,875 (113.2)	2,880 (113.4)

*With front and rear license plates installed

Wheels and Tires

		Conventional	Spare (T-type)
Road wheel	Aluminum	15 x 6-1/2JJ	16 x 4T
	Offset mm (in)	45 (1.77)	30 (1.18)
Tire size		P215/65R15 95V	T135/90D16

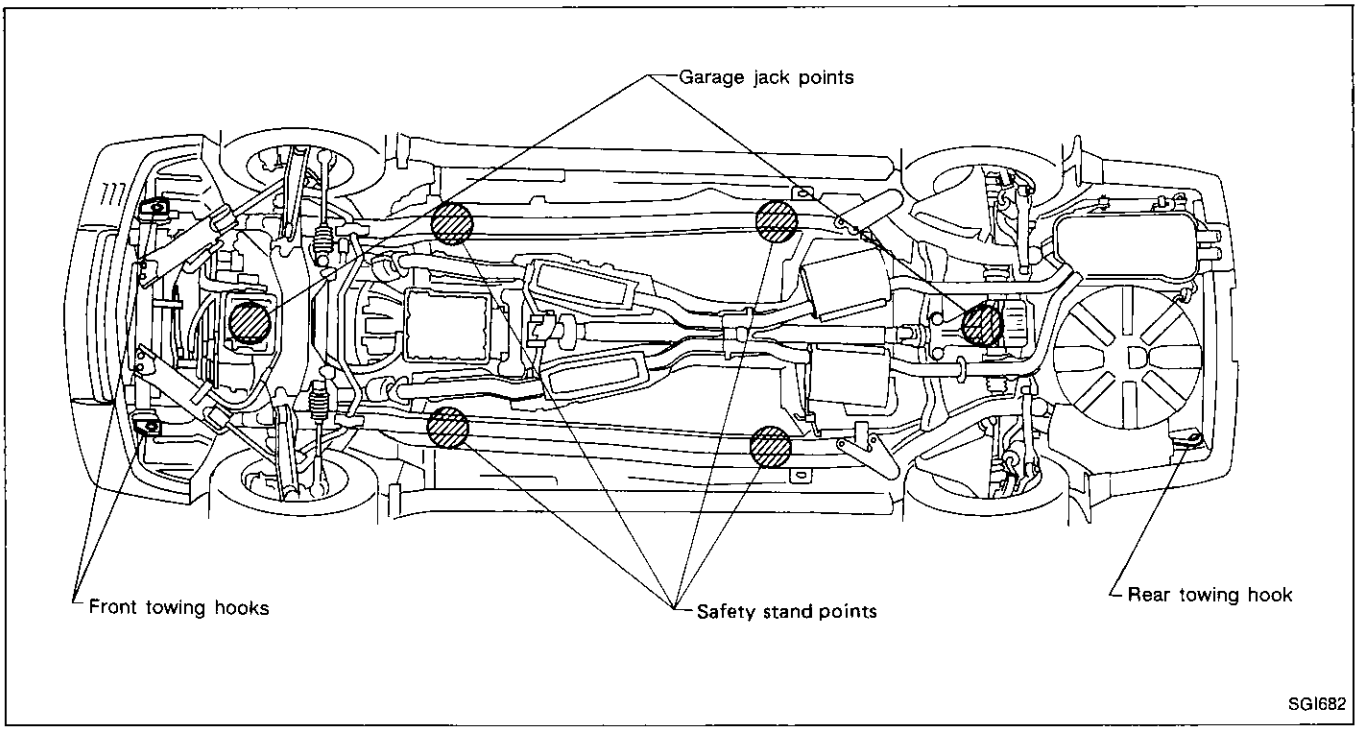
Garage Jack and Safety Stand

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.

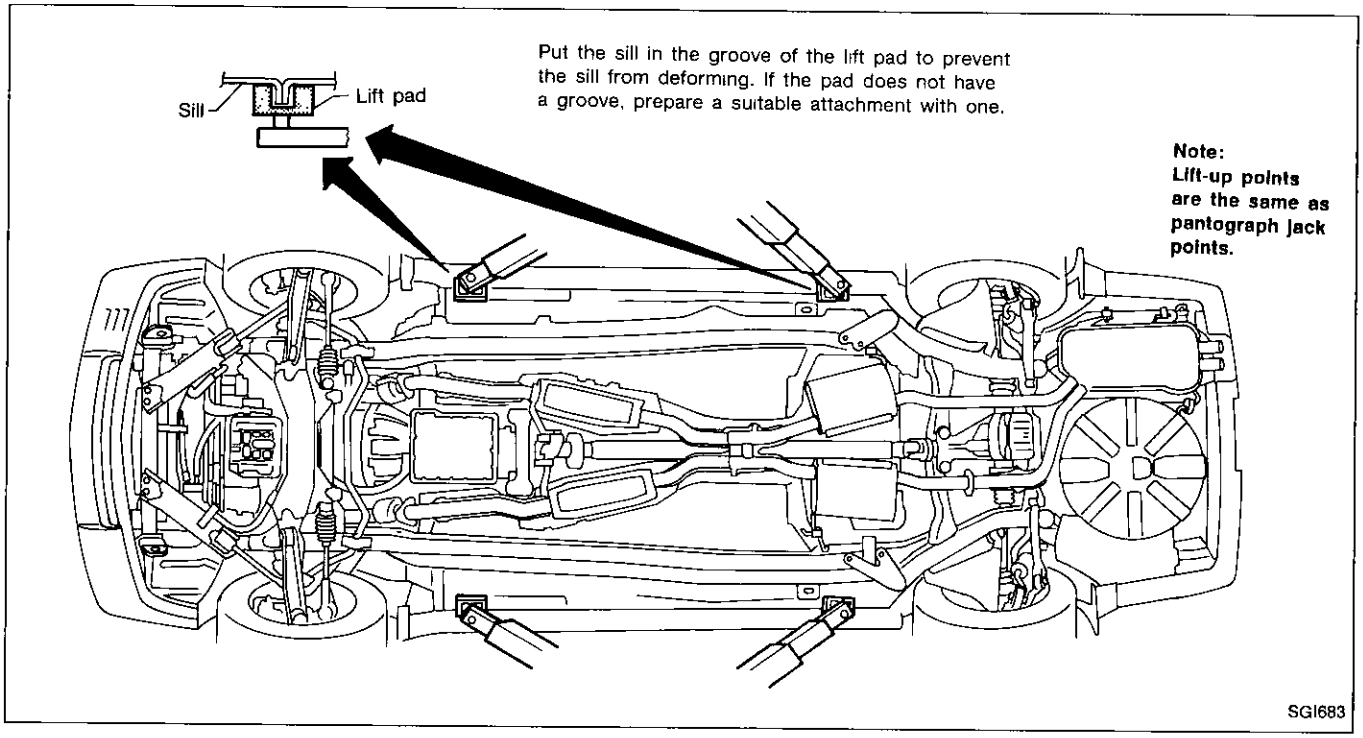


2-pole Lift

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.

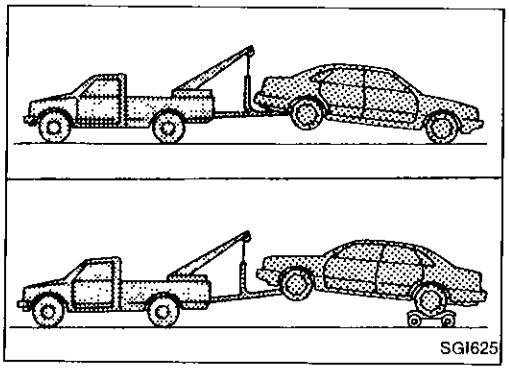
When setting the lift arm, do not allow the arm to contact the brake tubes and fuel lines.



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 "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.

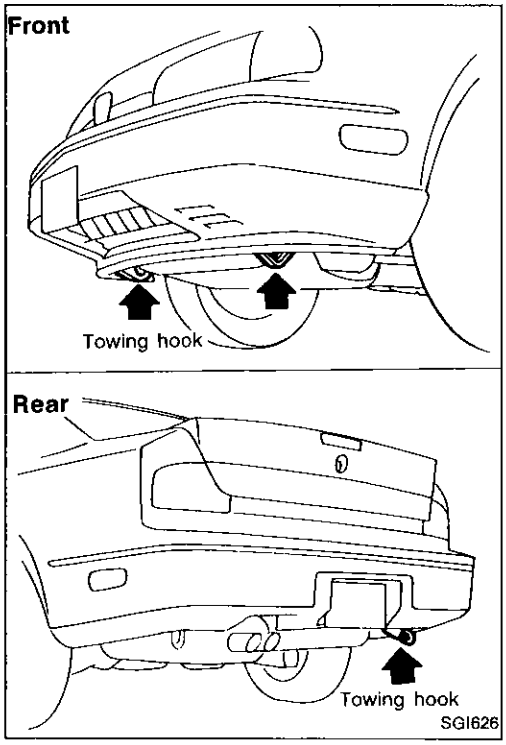
Speed:

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

- **Always pull the cable straight out from the vehicle. Never pull on the hook at a sideways angle.**
- **Use the towing hooks only to free a vehicle stuck in sand, snow, mud, etc. Never tow the vehicle using only the towing hooks.**

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

GI

MA

EM

LC

EF & EC

FE

AT

PD

FA

RA

BR

ST

BF

HA

EL

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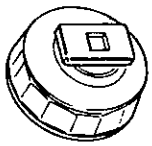
Supplemental Restraint System "AIR BAG"

The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury to the driver in a frontal collision. The Supplemental Restraint System consists of an air bag (located in the center of the steering wheel), sensors, a diagnostic 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:

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".**

Special Service Tool

Tool number (Kent-Moore No.) Tool name	Description
KV10105900 (J34274) Oil filter wrench	

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 , 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-9
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-19
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 adjusters, 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-19
Brakes Check that the brake does not pull the vehicle to one side when applied.	—
Brake pedal 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-8 BR-11
Parking brake Check that the pedal has the proper travel and confirm that your vehicle is held securely on a fairly steep hill with only the parking brake applied.	BR-24

Item	Reference page
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-16
Battery Check the fluid level in each cell. It should be between the "MAX" and "MIN" lines.	—
Engine drive belts Make sure that no belt is frayed, worn, cracked or oily.	MA-9
Engine oil level Check the level on the dipstick after parking the vehicle on a level spot and turning off the engine.	MA-13
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-15
Exhaust system Make sure there are no loose supports, cracks or holes. If the sound of the exhaust seems unusual or there is a smell of exhaust fumes, immediately locate the trouble and correct it.	MA-15
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.

Schedule 1

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

MAINTENANCE OPERATION		MAINTENANCE INTERVAL																Reference page
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	
	(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-12
Engine oil filter (Use part No. 15208-60U00 or equivalent)		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	MA-13
Service "E"																		
Air cleaner filter	See NOTE (1)								[R]								[R]	MA-12
Service "F"																		
Vapor lines									I*								I*	MA-14
Fuel lines									I*								I*	MA-11
Fuel filter	See NOTE (2)*																	MA-11
Service "G"																		
Drive belts	See NOTE (3)																I*	MA-9
Service "J"																		
Engine coolant	See NOTE (4)																R*	MA-10
Service "H"																		
Spark plugs (PLATINUM-TIPPED type)																	[R]	MA-13
CHASSIS AND BODY MAINTENANCE																		
Service "B"																		
Brake pads & discs			I		I		I		I		I		I		I		I	MA-16
Steering gear & linkage, axle & suspension parts			I		I		I		I		I		I		I		I	MA-17, FA-6, RA-5
Steering linkage ball joints & front suspension ball joints			I		I		I		I		I		I		I		I	MA-17, FA-6
SUPER HICAS linkage			I		I		I		I		I		I		I		I	MA-18
Exhaust system			I		I		I		I		I		I		I		I	MA-15
Service "D"																		
Brake lines & cables					I				I				I				I	MA-16
Automatic transmission oil & differential gear oil	See NOTE (5)				I				I				I				I	MA-15
Full-Active suspension fluid					I				I				I				I	MA-18
Service "J"																		
Full-Active suspension fluid																	[R]	MA-18
Air bag system	See NOTE (6)																	BF-152

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.

Schedule 2

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

MAINTENANCE OPERATION		MAINTENANCE INTERVAL								Reference page
Perform at number of miles, kilometers or months, whichever comes first	Miles x 1,000	7.5	15	22.5	30	37.5	45	52.5	60	
	(km x 1,000)	(12)	(24)	(36)	(48)	(60)	(72)	(84)	(96)	
	Months	6	12	18	24	30	36	42	48	
EMISSION CONTROL SYSTEM MAINTENANCE										
Service "A"										
Engine oil		R	R	R	R	R	R	R	R	MA-12
Service "C"										
Engine oil filters (Use Part No. 15208-60U00 or equivalent)			R		R		R		R	MA-13
Service "E"										
Air cleaner filter					[R]				[R]	MA-12
Service "F"										
Vapor lines					I*				I*	MA-14
Fuel lines					I*				I*	MA-11
Fuel filter	See NOTE (1)*									MA-11
Service "G"										
Drive belts	See NOTE (2)								I*	MA-9
Service "J"										
Engine coolant	See NOTE (3)								R*	MA-10
Service "H"										
Spark plugs (PLATINUM-TIPPED Type)									[R]	MA-13
CHASSIS AND BODY MAINTENANCE										
Service "D"										
Brake lines & cables			I		I		I		I	MA-16
Brake pads & discs			I		I		I		I	MA-16
Automatic transmission oil & differential gear oil			I		I		I		I	MA-15
Exhaust system					I				I	MA-15
Full-Active suspension fluid			I		I		I		I	MA-18
Service "F"										
Steering gear linkage axle & suspension parts					I				I	MA-17, FA-6, RA-5
SUPER HICAS linkage					I				I	MA-18
Service "J"										
Full-Active suspension fluid									[R]	MA-18
Air bag system	See NOTE (4)									BF-152

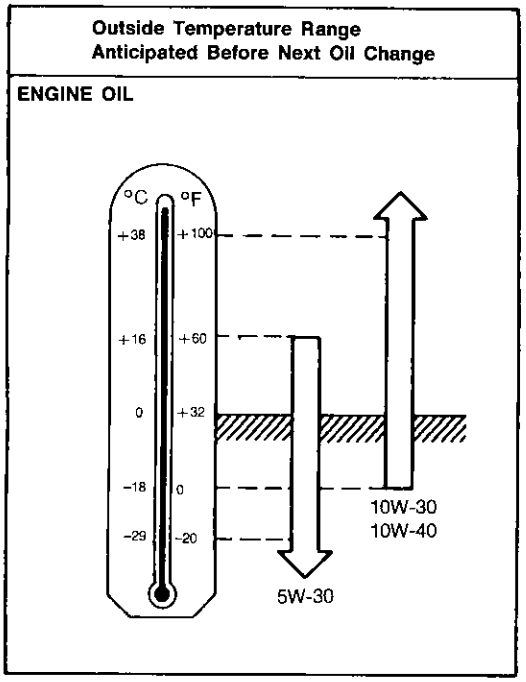
NOTE:
(1) If vehicle is operated under extremely adverse weather conditions or in areas where ambient temperatures are either extremely low or extremely high, the filters might become clogged. In such an event, replace them immediately.
(2) After 60,000 miles (96,000 km) or 48 months, inspect every 15,000 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

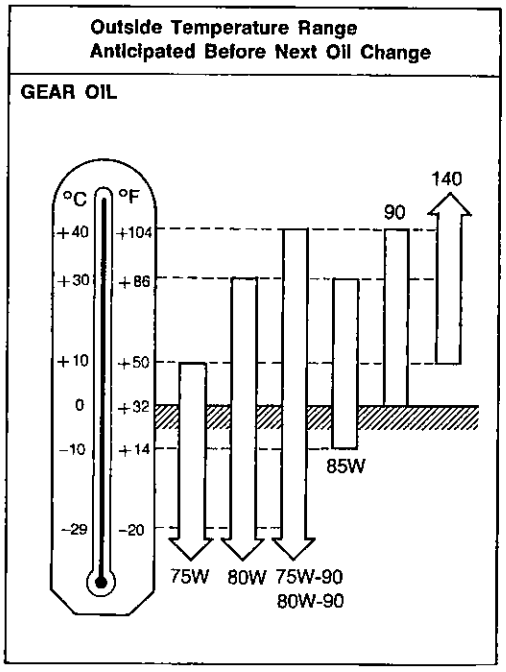
	Capacity (Approximate)			Recommended fluids and lubricants
	US measure	Imp measure	Liter	
Engine oil (Refill)				
With oil filter	6-3/8 qt	5-1/4 qt	6.0	Energy Conserving Oils of API SG*2, *3
Without oil filter	5-7/8 qt	4-7/8 qt	5.6	
Cooling system (With reservoir)	10-7/8 qt	9-1/8 qt	10.3	Anti-freeze coolant (Ethylene glycol base)
Differential gear oil	3-1/8 pt	2-5/8 pt	1.5	API GL-5*2
Automatic transmission fluid	10-3/4 qt	9 qt	10.2	Genuine Nissan ATF or equivalent Type DEXRON™ II
Full-Active suspension fluid	6 qt	5 qt	5.7	Genuine "Fluid-A Active Suspension"
Power steering fluid	—	—	—	Type DEXRON™ II or equivalent
Brake and TCS fluid	—	—	—	Genuine Brake Fluid*1 or equivalent DOT 3 (US FMVSS No. 116)
Multi-purpose grease	—	—	—	NLGI No. 2 (Lithium soap base)

*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.

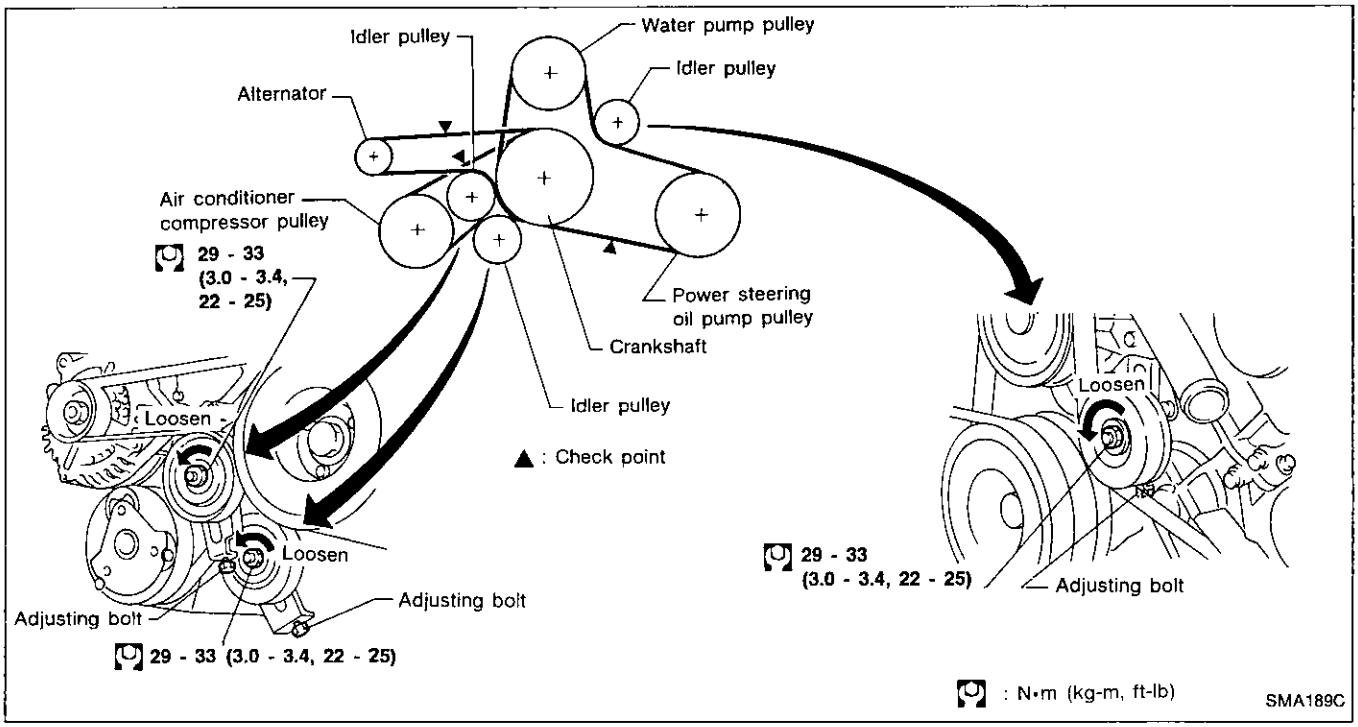
SAE Viscosity Number



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



75W-90 for transmission and 80W-90 for differential gear are 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 deflections by pushing on the belt midway between pulleys.

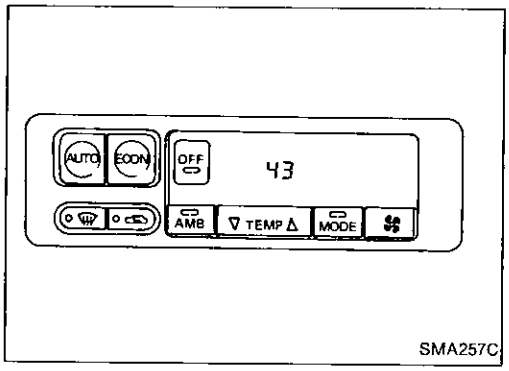
Adjust if belt deflections exceed the limit.

Belt deflection:

Unit: mm (in)

	Used belt deflection		Deflection of new belt
	Limit	Deflection after adjustment	
Alternator	14 (0.55)	9 - 10 (0.35 - 0.39)	7.5 - 8.5 (0.295 - 0.335)
Air conditioner compressor	12 (0.47)	8.5 - 9.5 (0.335 - 0.374)	7.5 - 8.5 (0.295 - 0.335)
Power steering oil pump			
Without SUPER HICAS or FULL-ACTIVE SUSPENSION	14 (0.55)	9 - 10 (0.35 - 0.39)	8 - 9 (0.31 - 0.35)
With SUPER HICAS or FULL-ACTIVE SUSPENSION	13 (0.51)	7 - 8 (0.28 - 0.31)	5.5 - 6.5 (0.217 - 0.256)
Applied pushing force	98 N (10 kg, 22 lb)		

Inspect drive belt deflections when engine is cold.



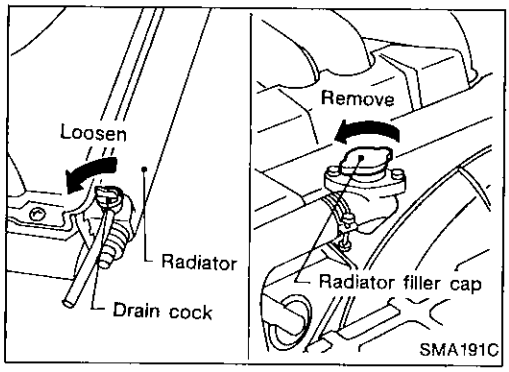
Changing Engine Coolant

WARNING:

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

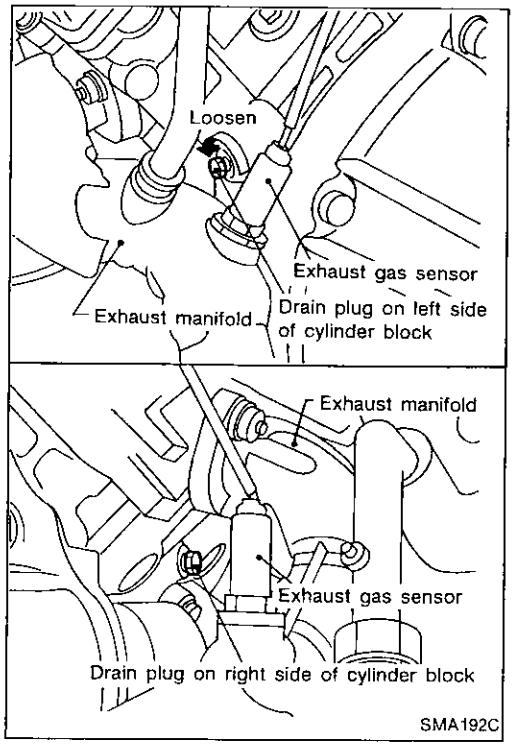
1. Perform self-diagnosis step 4 of Automatic Air Conditioner system, referring to the following notes. (Refer to HA section.)

1) Turn ignition switch from "OFF" to "ON".
2) Within 10 seconds after ignition switch is turned "ON", press OFF switch for at least 5 seconds.
3) Press (HOT) switch 3 times.
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.
   This step is necessary to allow heater water cock to open wide.



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

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



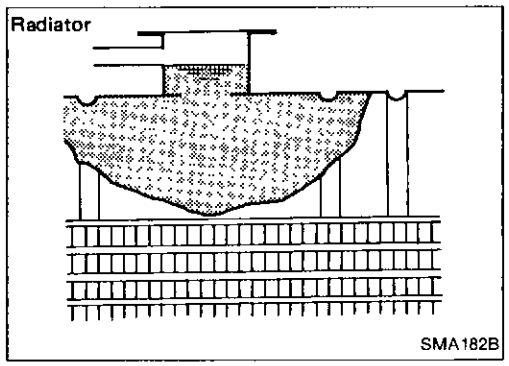
3. Open drain plugs on both sides of cylinder block.
4. Close drain cock and tighten drain plug securely.
5. Fill radiator with water.
6. Perform self-diagnosis step 4 of Automatic Air Conditioner system, referring to the following notes. (Refer to HA section.)

1) Turn ignition switch from "OFF" to "START".
2) Within 10 seconds after starting engine , press OFF switch for at least 5 seconds.
3) Press (HOT) switch 3 times.
4) Press (DEF) switch 2 times.
5) Confirm indication of the A/C display shown at left above.
6) Wait 10 seconds and warm up engine sufficiently.
   This step is necessary to allow heater water cock to open wide.

7. Stop engine and wait until it cools down.
8. Repeat step 2 through step 7 until clear water begins to drain from radiator.
9. Drain water.

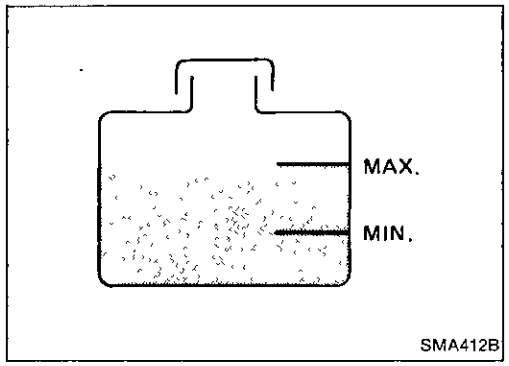
- **Apply sealant to the thread of drain plug.**
  : 15 - 25 N·m
  (1.5 - 2.5 kg-m, 11 - 18 ft-lb)

Changing Engine Coolant (Cont'd)

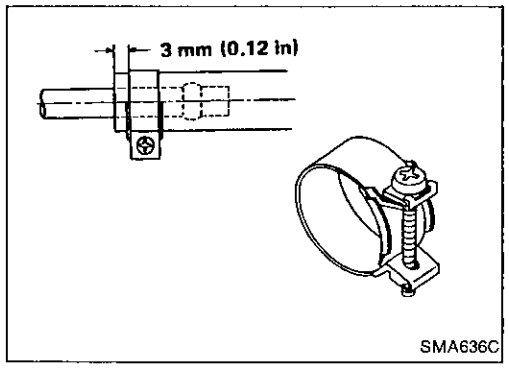


10. Fill radiator with coolant up to specified level.
    Follow instructions attached to anti-freeze container for mixing ratio of anti-freeze to water.
    Coolant capacity (With reservoir tank):
    10.3 ℓ (10-7/8 US qt, 9-1/8 Imp qt)
    Reservoir tank:
    0.7 ℓ (3/4 US qt, 5/8 Imp qt)

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



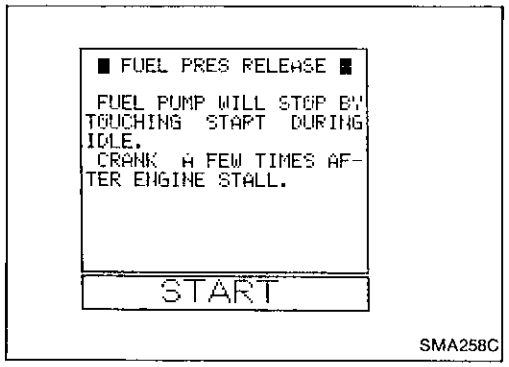
11. Remove reservoir tank, drain coolant, then clean reservoir tank.
12. Fill reservoir tank with coolant up to "MAX" level.
13. Repeat step 6.
14. Stop engine and cool it down, then add coolant as necessary.



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 malfunctioning parts.

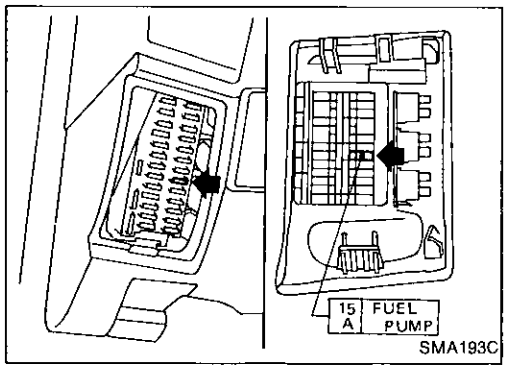
CAUTION:
Tighten high-pressure rubber hose clamp so that clamp end is 3 mm (0.12 in) from hose end.
Tightening torque specifications are the same for all rubber hose clamps.
Ensure that screw does not contact adjacent parts.



Changing Fuel Filter

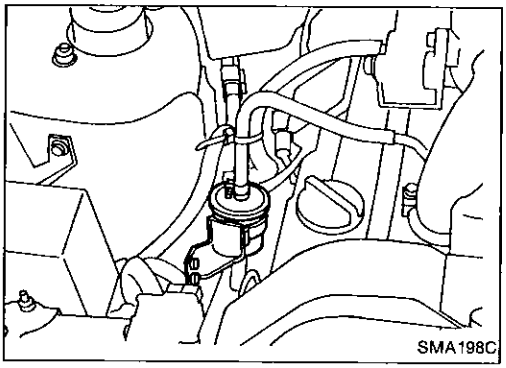
WARNING:
Before removing fuel filter, release fuel pressure from fuel line to eliminate danger.

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



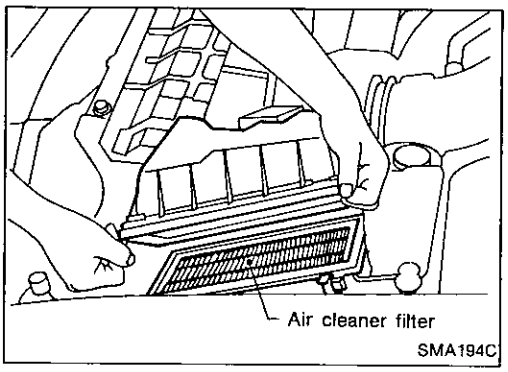
1. Remove fuse for fuel pump and start engine.
2. After engine stalls, crank engine two or three times to make sure that fuel pressure is released.
   Then turn ignition switch off and reinstall fuse for fuel pump.

Changing Fuel Filter (Cont'd)


SMA198C

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

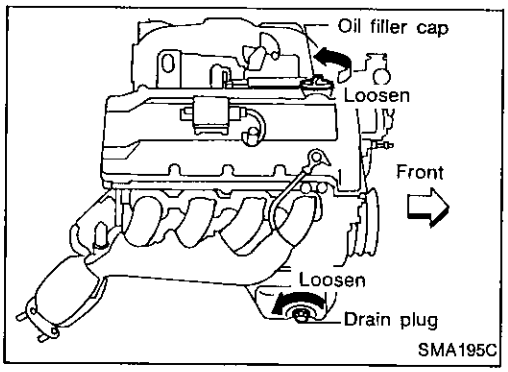
- **Be careful not to spill fuel over engine compartment. Place a shop towel to absorb fuel.**
- **Use a high-pressure type fuel filter. Do not use a synthetic resinous fuel filter.**
- **When tightening fuel hose clamps, refer to "Checking Fuel Lines".**



SMA194C

Changing Air Cleaner Filter

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



SMA195C

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.
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):

With oil filter 6.0 ℓ (6-3/8 US qt, 5-1/4 Imp qt)

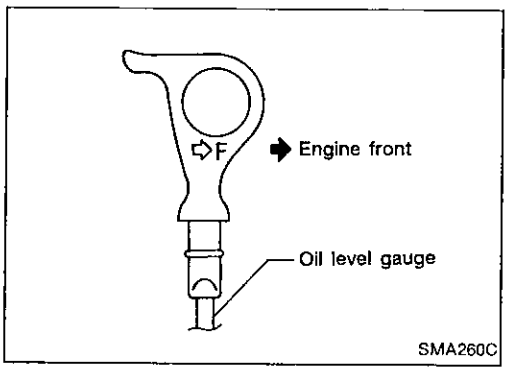
Without oil filter 5.6 ℓ (5-7/8 US qt, 4-7/8 Imp qt)

CAUTION:

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

  Drain plug:

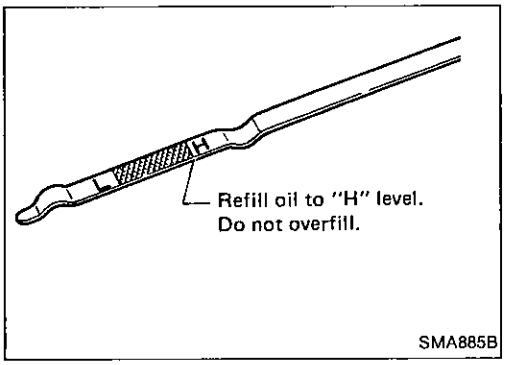
  : 29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)
- **The refill capacity changes depending on the oil temperature and drain time, use these values as a reference and be certain to check with the dipstick when changing the oil.**



SMA260C

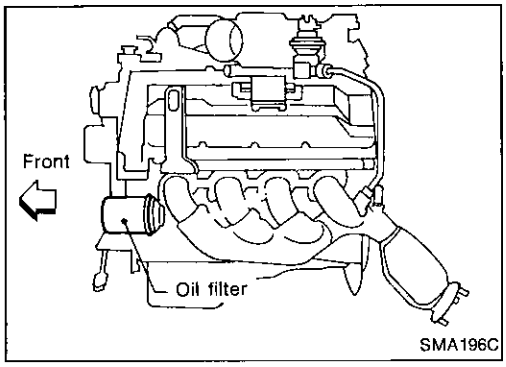
- **Make sure direction of oil level gauge is correct before checking oil level.**

Changing Engine Oil (Cont'd)



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

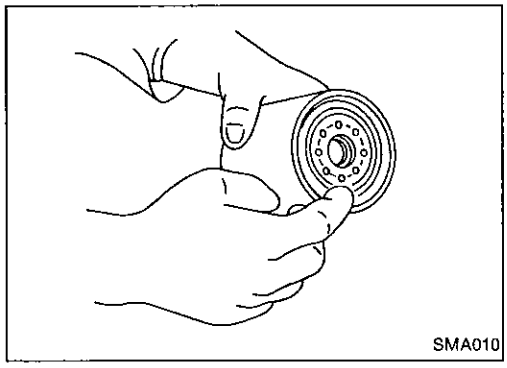
Changing Oil Filter



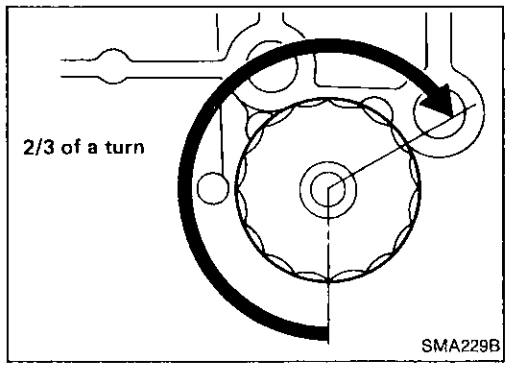
1. Remove oil filter with Tool.

WARNING:

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



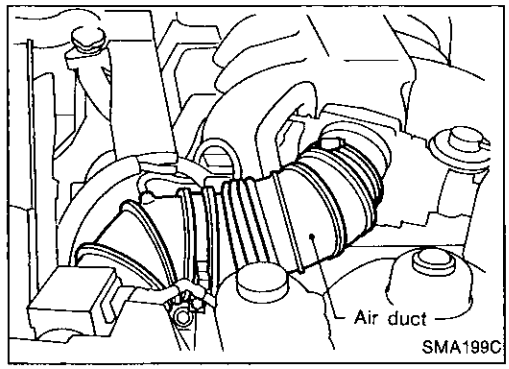
2. Before installing new oil filter, clean the oil filter mounting surface on cylinder block, and coat the rubber seal of oil filter with a little engine oil.



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

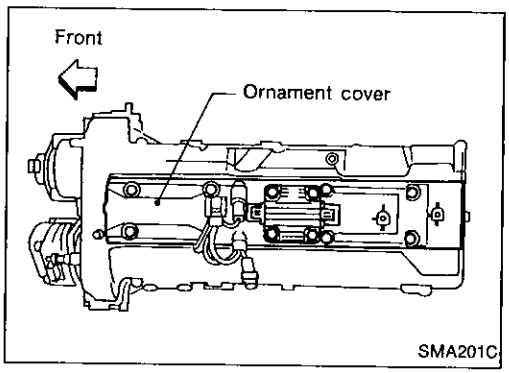
Refer to Changing Engine Oil.

Changing Spark Plugs

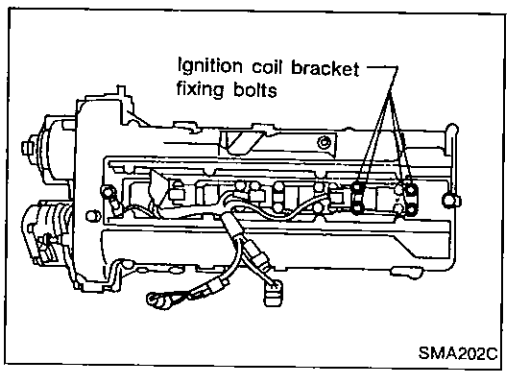


1. Remove air duct (left bank only).
2. Disconnect power transistor connectors.

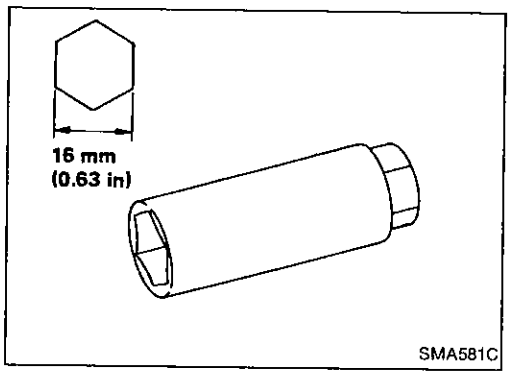
Changing Spark Plugs (Cont'd)



3. Remove ornament cover.



4. Disconnect harness connector between ignition coil and power transistor.
5. Remove ignition coil bracket fixing bolts and pull out this bracket with ignition coils.

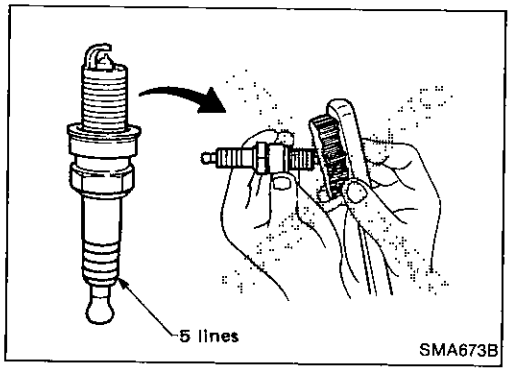


6. Remove spark plugs with suitable spark plug wrench.

Spark plug (Platinum-tipped type):

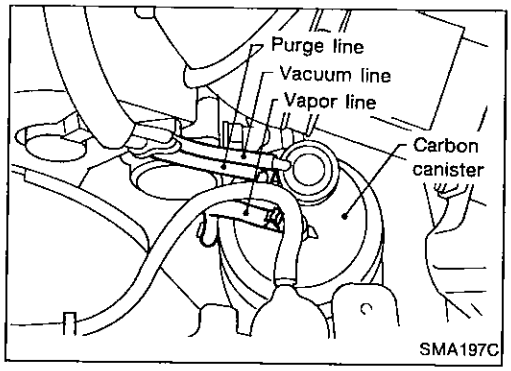
Standard type	**PFR6B-11**
Hot type	**PFR5B-11**
Cold type	**PFR7B-11**

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



- **Checking and adjusting plug gap are not required between renewals.**
- **Never use a wire brush for cleaning.**
- **If plug tip is covered with carbon, spark plug cleaner can be used.**

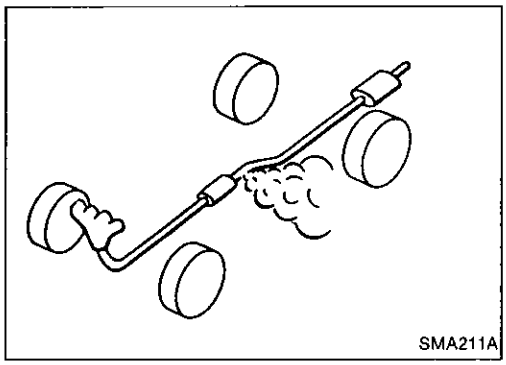
Cleaner air pressure:
Less than 588 kPa (6 kg/cm^2, 85 psi)
Cleaning time:
Less than 20 seconds



Checking Vapor Lines

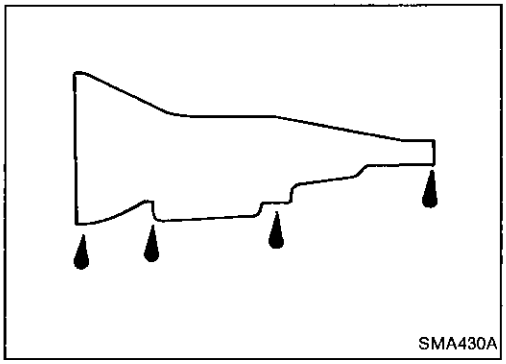
1. Visually inspect vapor lines for improper attachment cracks, damage, loose connections, chafing and deterioration.
2. Inspect vacuum relief valve of fuel tank filler cap for clogging, sticking, etc.

Refer to EVAPORATIVE EMISSION SYSTEM in EF & EC section.


SMA211A

Checking Exhaust System

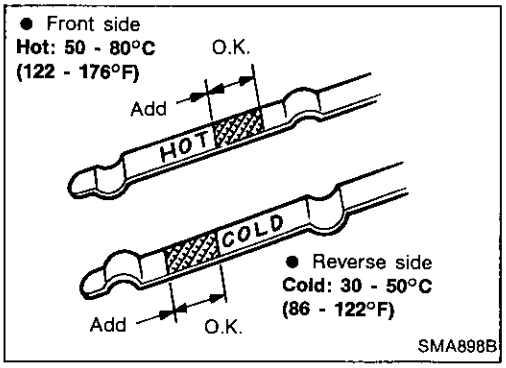
Check exhaust pipes, muffler and mounting for improper attachment and for leaks, cracks, damage, loose connections, chafing and deterioration.


SMA430A

Checking A/T Fluid

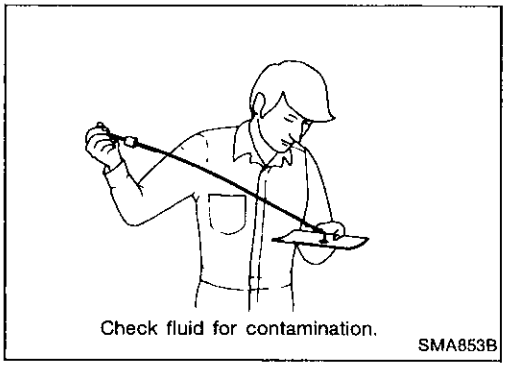
1. Check for fluid leakage and fluid level.
   Fluid level should be checked using "HOT" range on dipstick at fluid temperatures of 50 to 80°C (122 to 176°F) after vehicle has been driven approximately 5 minutes in urban areas after engine is warmed up. But it can be checked at fluid temperatures of 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.



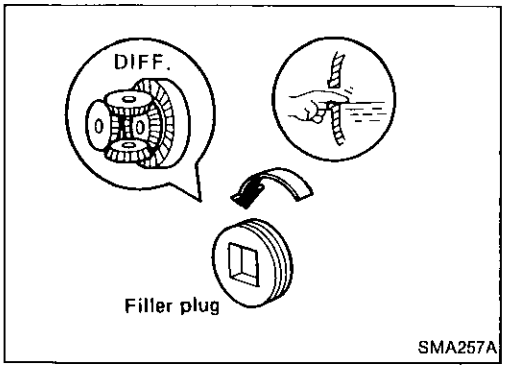
SMA898B

2. 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.


Check fluid for contamination.
SMA853B

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 capacity (With torque converter):
   10.2 ℓ (10-3/4 US qt, 9 Imp qt)



SMA257A

Checking Differential Gear Oil

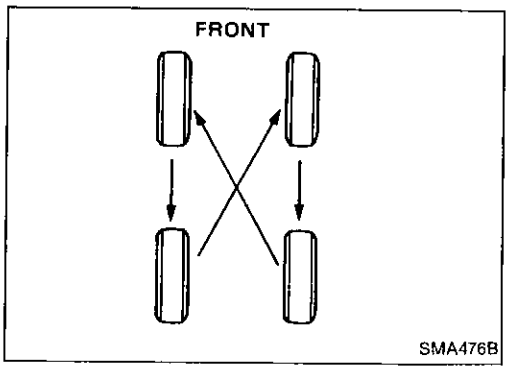
1. Check for oil leakage and oil level.
   Filler plug:
   [O]: 39 - 59 N·m (4 - 6 kg-m, 29 - 43 ft-lb)

Changing Differential Gear Oil

1. Drain oil and refill with new gear oil.
2. Check oil level.
   Oil capacity: 1.5 ℓ (3-1/8 US pt, 2-5/8 Imp pt)
   [O]: Drain plug: 39 - 59 N·m (4 - 6 kg-m, 29 - 43 ft-lb)

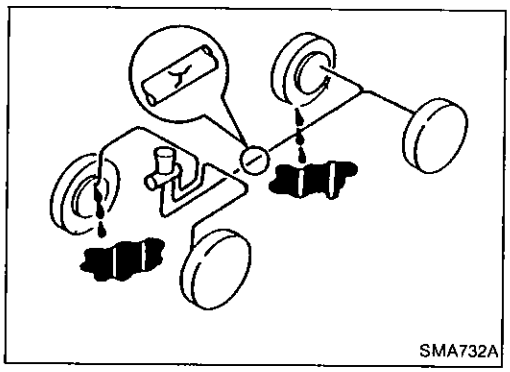
Balancing Wheels

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



Tire Rotation

- **Do not include the T-type spare tire when rotating the tires.**
  Wheel nuts:
  [O]: 98 - 118 N·m (10.0 - 12.0 kg-m, 72 - 87 ft-lb)

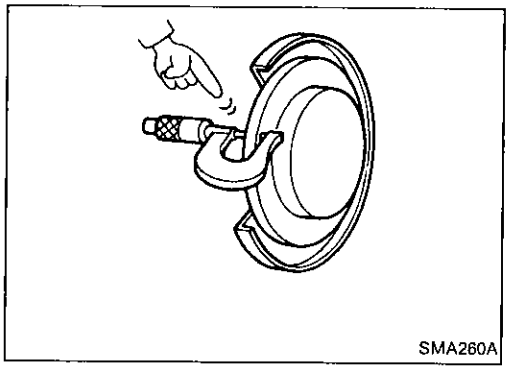


Checking Brake Fluid Level and Leaks

- 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.



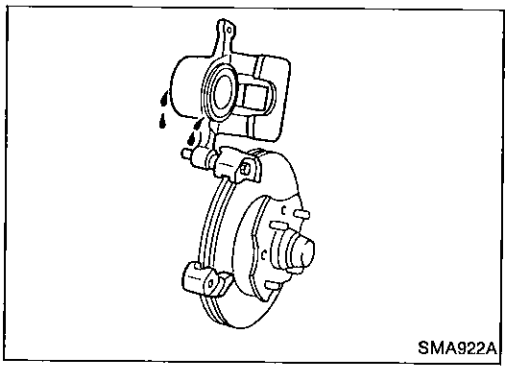
Checking Disc Brake

ROTOR

- Check condition and thickness.

Unit: mm (in)

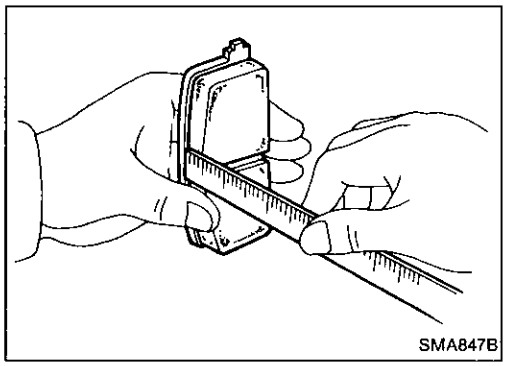
	Front	Rear
Standard thickness	28.0 (1.102)	9.0 (0.354)
Minimum thickness	26.0 (1.024)	8.0 (0.315)



CALIPER

- Check operation and for leakage.

Checking Disc Brake (Cont'd)

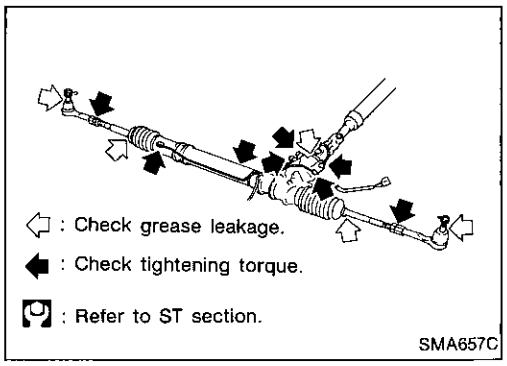


PAD

- Check for wear or damage.

Unit: mm (in)

	Front	Rear
Standard thickness	9.5 (0.374)	10.0 (0.394)
Minimum thickness	2.0 (0.079)	



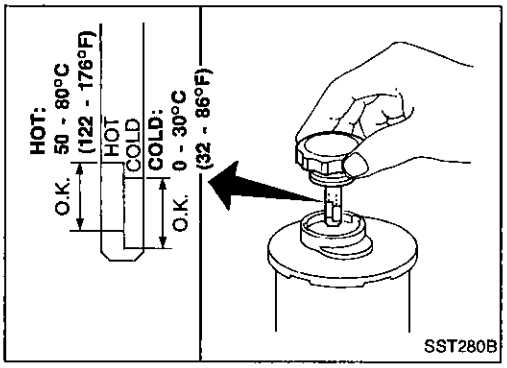
Checking Steering Gear and Linkage

STEERING GEAR

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

STEERING LINKAGE

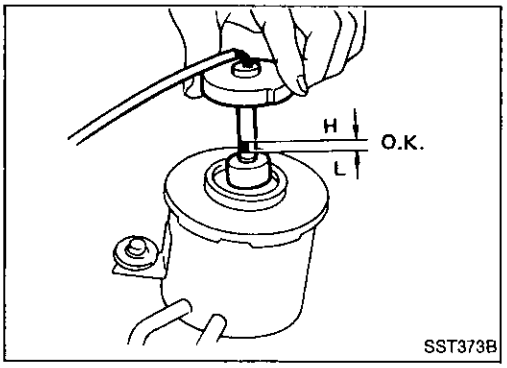
- Check ball joint, dust cover and other component parts for looseness, wear, damage or grease leakage.



Checking Power Steering Fluid and Lines

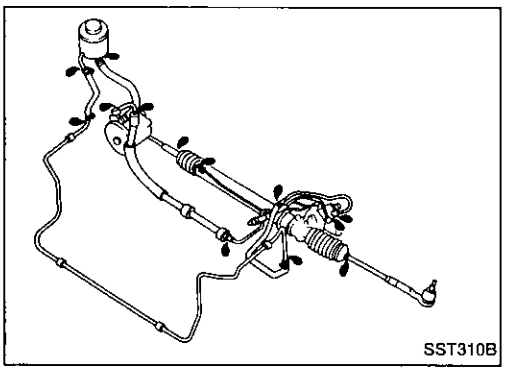
- Checking fluid level (Without SUPER HICAS system)
  Fluid level should be checked using "HOT" range on dipstick at fluid temperatures of 50 to 80°C (122 to 176°F) or using "COLD" range on dipstick at fluid temperatures of 0 to 30°C (32 to 86°F).

CAUTION:
Do not overfill.

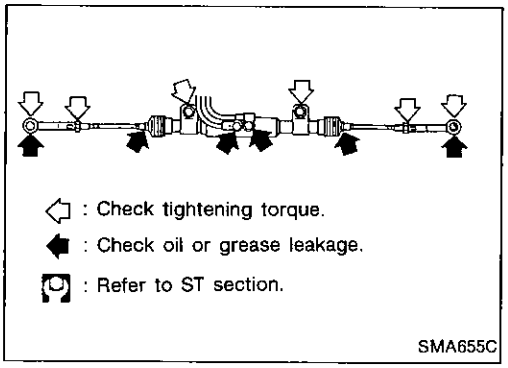


- Checking fluid level (With SUPER HICAS system)
  Maintain the fluid level so that the lower surface of the float is maintained between the "L" and "H" marks on the gauge rod. The fluid level should be checked when the engine is stopped and the fluid

CAUTION:
Do not overfill.

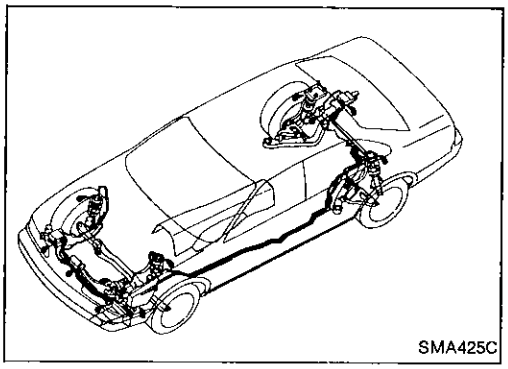


- Check lines for improper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.



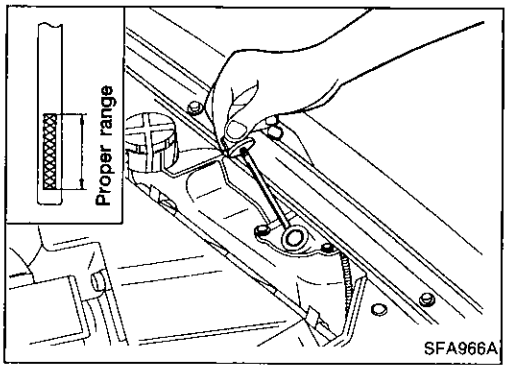
Checking SUPER HICAS Linkage (With SUPER HICAS system)

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



Checking FULL-ACTIVE SUSPENSION Fluid and Lines

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



2. Check fluid level.

a. Park vehicle on level surface and set selector lever in "P" position.

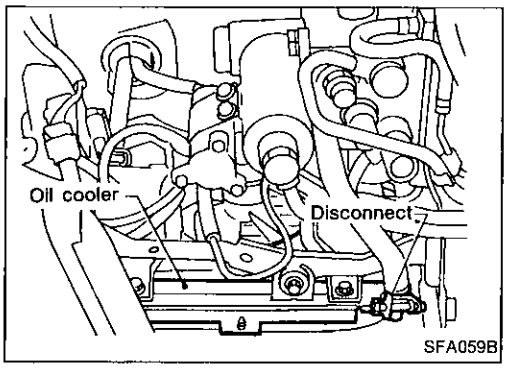
b. Make sure that not passengers nor any cargo is in vehicle, and that necessary equipment, such as spare tire, jack, on-board tools, are provided.

c. Start engine, and warm up to raise active suspension oil temperature about 60°C (140°F).

d. Remove reservoir level gauge, and make sure that oil level is in the proper range.
Level gauge is a screw type, and oil level should be checked with the level gauge fitted securely.

e. If oil level is too low, add specified oil (genuine fluid A-Active Suspension) through filler. Add oil until actual oil level is aligned with proper UPPER range mark.

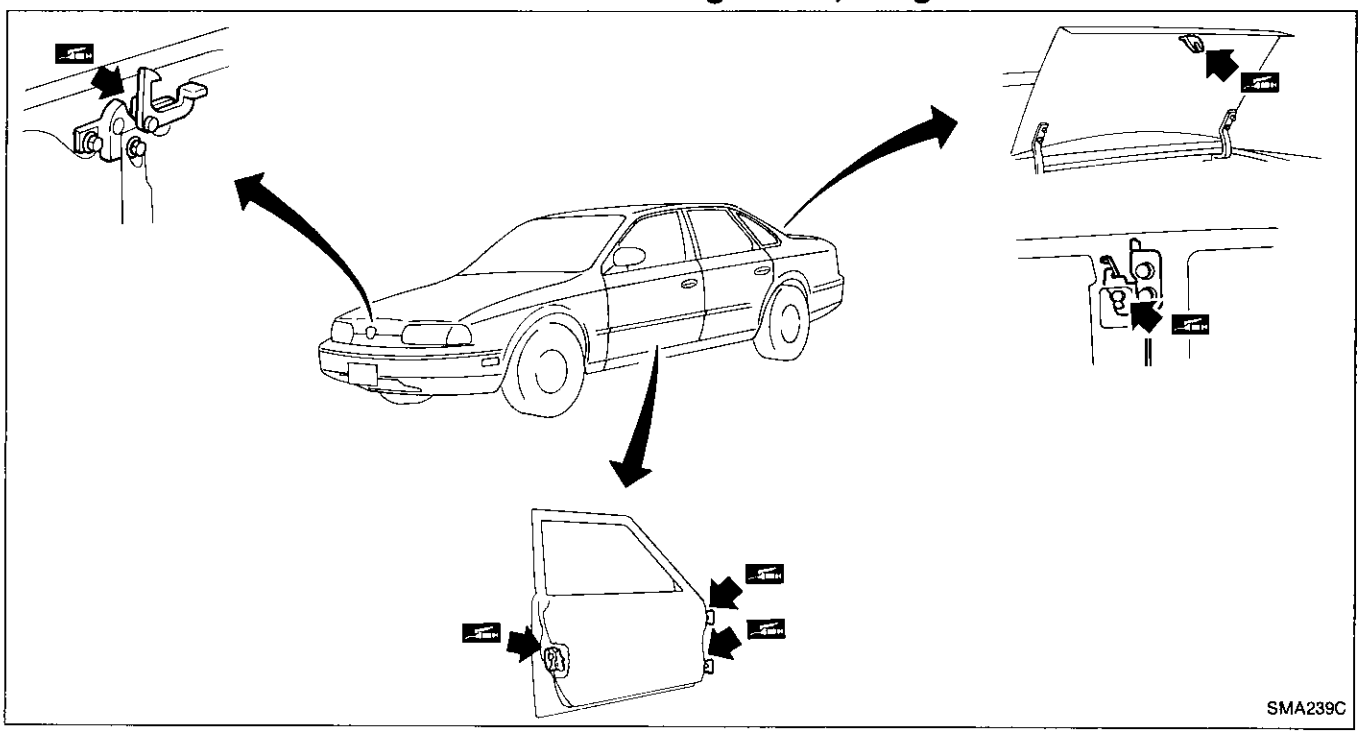
Do not overfill.



Changing FULL-ACTIVE SUSPENSION Fluid

Disconnect rubber hose running to multi-valve unit located below oil cooler. Change fluid.
For details of fluid change, refer to "On-vehicle Inspection" in FULL-ACTIVE SUSPENSION, FA section.

Lubricating Locks, Hinges and Hood Latches

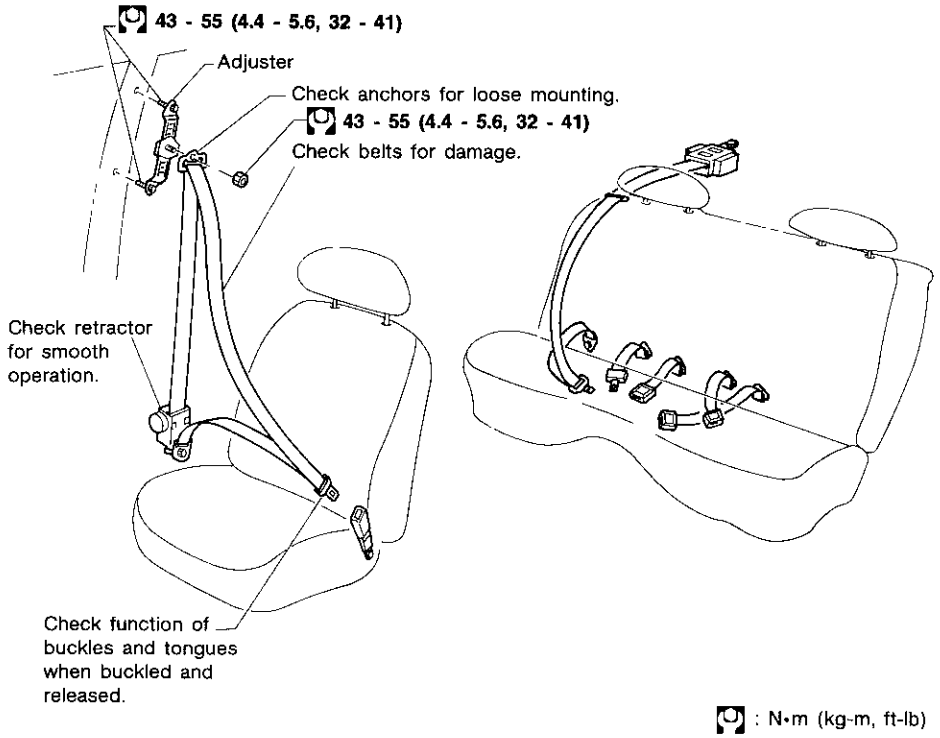


Checking Seat Belts, Buckles, Retractors, Anchors and Adjusters

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 NISSAN genuine seat belt assembly.**

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



Engine Maintenance

INSPECTION AND ADJUSTMENT

Drive belt deflection

Unit: mm (in)

	Used belt deflection		Deflection of new belt
	Limit	Deflection after adjustment	
Alternator	14 (0.55)	9 - 10 (0.35 - 0.39)	7.5 - 8.5 (0.295 - 0.335)
Air conditioner compressor	12 (0.47)	8.5 - 9.5 (0.335 - 0.374)	7.5 - 8.5 (0.295 - 0.335)
Power steering oil pump			
Without SUPER HICAS or FULL-ACTIVE SUSPENSION	14 (0.55)	9 - 10 (0.35 - 0.39)	8 - 9 (0.31 - 0.35)
With SUPER HICAS or FULL-ACTIVE SUSPENSION	13 (0.51)	7 - 8 (0.28 - 0.31)	5.5 - 6.5 (0.217 - 0.256)
Applied pushing force	98 N (10 kg, 22 lb)		

Spark plug

Standard type	PFR6B-11
Hot type	PFR5B-11
Cold type	PFR7B-11

Chassis and Body Maintenance

INSPECTION AND ADJUSTMENT

Brake

Unit: mm (in)

Disc brake	
Pad	
Standard thickness	
Front	9.5 (0.374)
Rear	10.0 (0.394)
Minimum thickness	
Front	2.0 (0.079)
Rear	2.0 (0.079)
Rotor	
Standard thickness	
Front	28.0 (1.102)
Rear	9.0 (0.354)
Minimum thickness	
Front	26.0 (1.024)
Rear	8.0 (0.315)

Wheel balance

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

ENGINE MECHANICAL

SECTION EM

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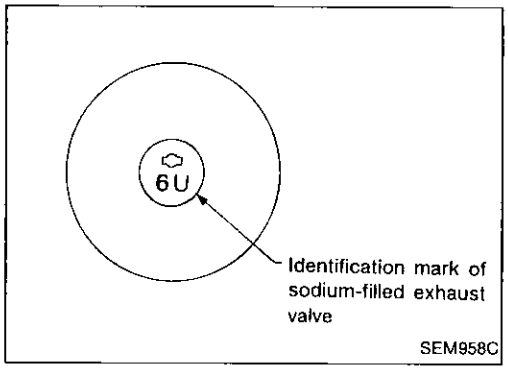
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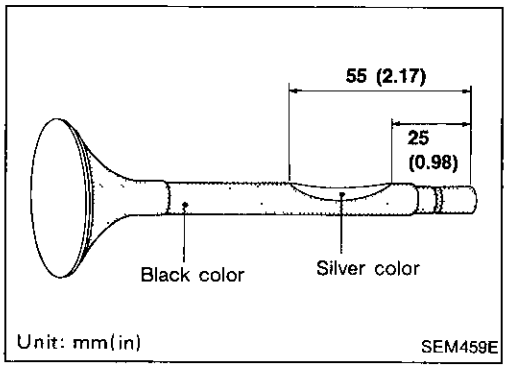
Special Cautions to Ensure the Safe Disposal of Sodium-filled Exhaust Valves

Handling and disposal of sodium-filled exhaust valves requires special care and consideration. Under conditions such as breakage with subsequent contact with water, metal sodium which lines the inner portion of exhaust valve will react violently, forming sodium hydroxide and hydrogen which may result in an explosion.
Sodium-filled exhaust valve is identified on the top of its stem as shown in illustration.

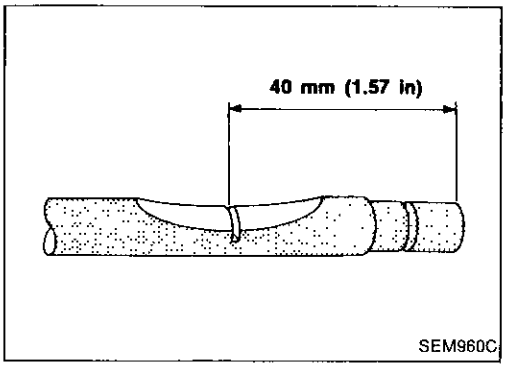
DEALER DISPOSAL INSTRUCTIONS

CAUTION:

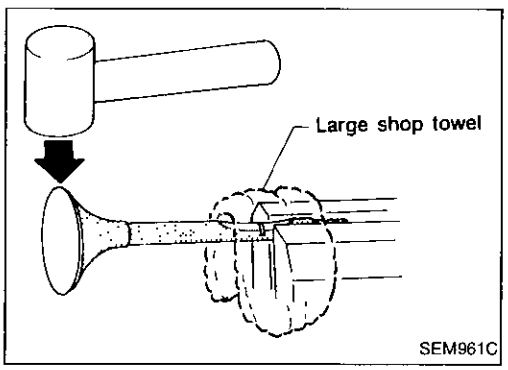
- **Use approved shatter-resistant eye protection when performing this procedure.**
- **Perform this and all subsequent disposal work procedures in an open room, away from flammable liquids. Keep a fire extinguisher, rated at least 10 ABC, in close proximity to the work area.**
- **Be sure to wear rubber gloves when performing the following operations.**
- **Make sure the resultant (high alkalinity) waste water does not contact your skin. If the waste water does contact you, wash the contacted area immediately with large quantities of water.**
- **Dealers should check their respective state and local regulations concerning any chemical treatment or waste water discharge permits which may be required to dispose of the resultant (high alkalinity) waste water.**



1. Clamp valve stem in a vice.
2. The valve has a specially-hardened surface. To cut through it, first remove a half-round section, approximately 30 mm (1.18 in) long using air-powered grinder until black color is removed and silver color appears.

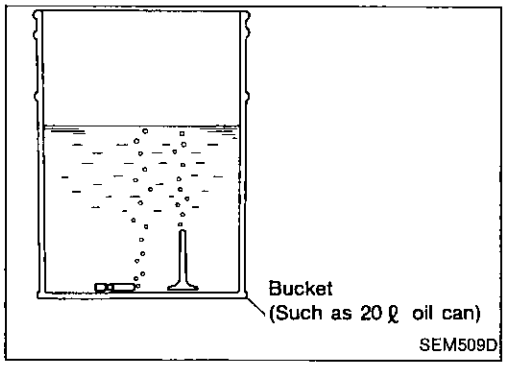


3. Use hacksaw to cut through approximately half the diameter of valve stem. Make the serration at a point 40 mm (1.57 in) from the end of valve stem.



4. Cover the serrated end of the valve with a large shop towel. Strike the valve face end with a hammer, separating it into two pieces.
5. Fill a bucket (such as a 20 ℓ oil can) with at least 10 ℓ (2-5/8 US gal, 2-1/4 Imp gal) of water. Carefully place the already-cut (serrated) valves into the water one-at-a-time using a set of large tweezers and quickly move away at least 2.7 m (9 ft).

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



6. The valves should be placed in a standing position as shown in the illustration to allow complete reaction. After the bubbling action has subsided, additional valves can be placed into the bucket allowing each subsequent chemical reaction to subside. However, no more than 8 valves should be placed in the same 10 ℓ (2-5/8 US gal, 2-1/4 Imp gal) amount of water. The complete chemical reaction may take as long as 4 to 5 hours. Remove the valves using a set of large tweezers after the chemical reaction has stopped. Afterwards, valves can be disposed as ordinary scrap .

Parts Requiring Angular Tightening

- Some engine parts are tightened with angular-tightening method rather than torque setting method.
- If these parts are tightened with torque setting method, dispersal of the tightening force (axial bolt force) would be two or three times wider than that of 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 angular-tightening method, they should be used for reference only.
- To assure the satisfactory maintenance of the engine, bolts and nuts must be tightened with 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) Main bearing cap bolts and nuts
  (3) Connecting rod cap nuts

Supplemental Restraint System "AIR BAG"

The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury to the driver in a frontal collision. The Supplemental Restraint System consists of an air bag (located in the center of the steering wheel), sensors, a diagnostic 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.

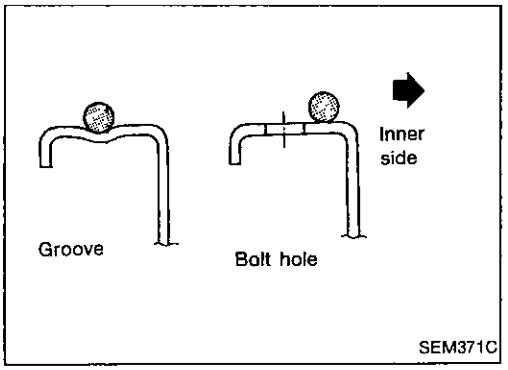
WARNING:

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



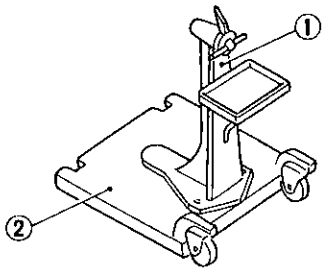
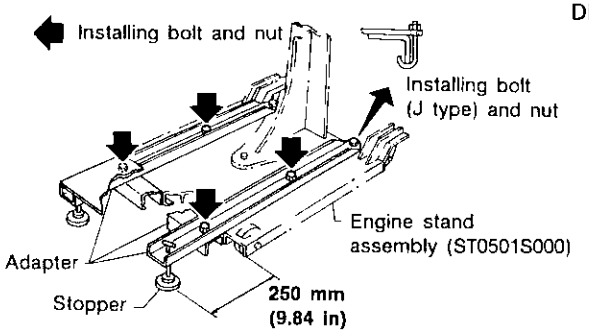
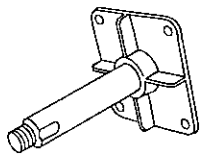
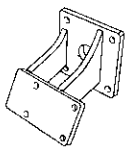
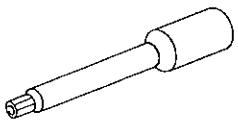
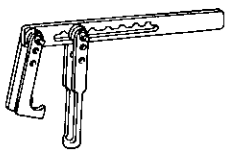
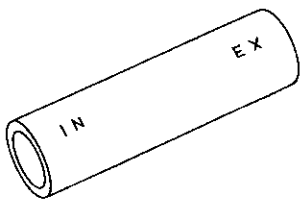
a. Before applying liquid gasket, use a scraper to remove all traces of old gasket from mating surfaces and grooves. Then completely clean oil stains from these portions.

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).**

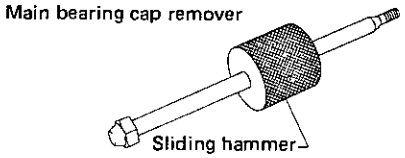
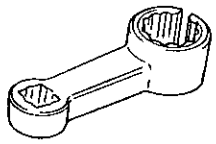
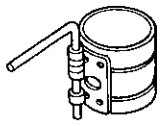
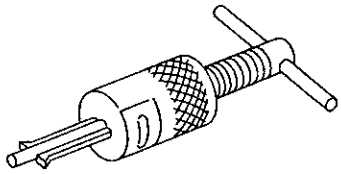
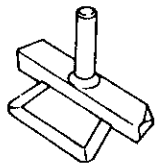
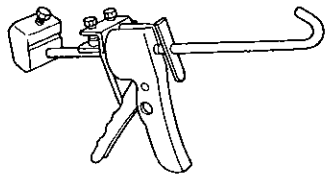
c. Apply liquid gasket to inner surface around bolt holes. (Assembly should be done within 5 minutes after coating.)

d. Wait at least 30 minutes before refilling engine oil and engine coolant.

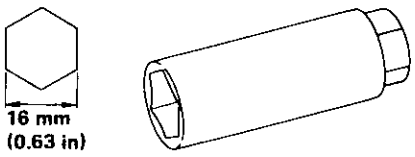
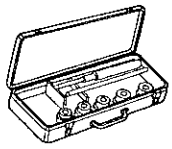
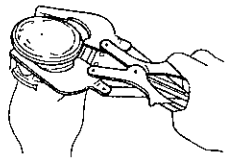
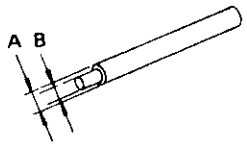
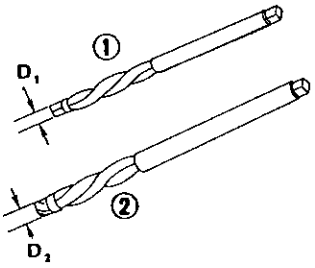
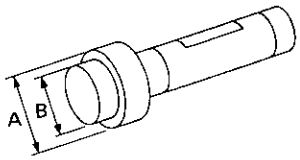
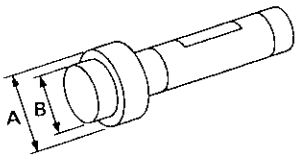
Special Service Tools

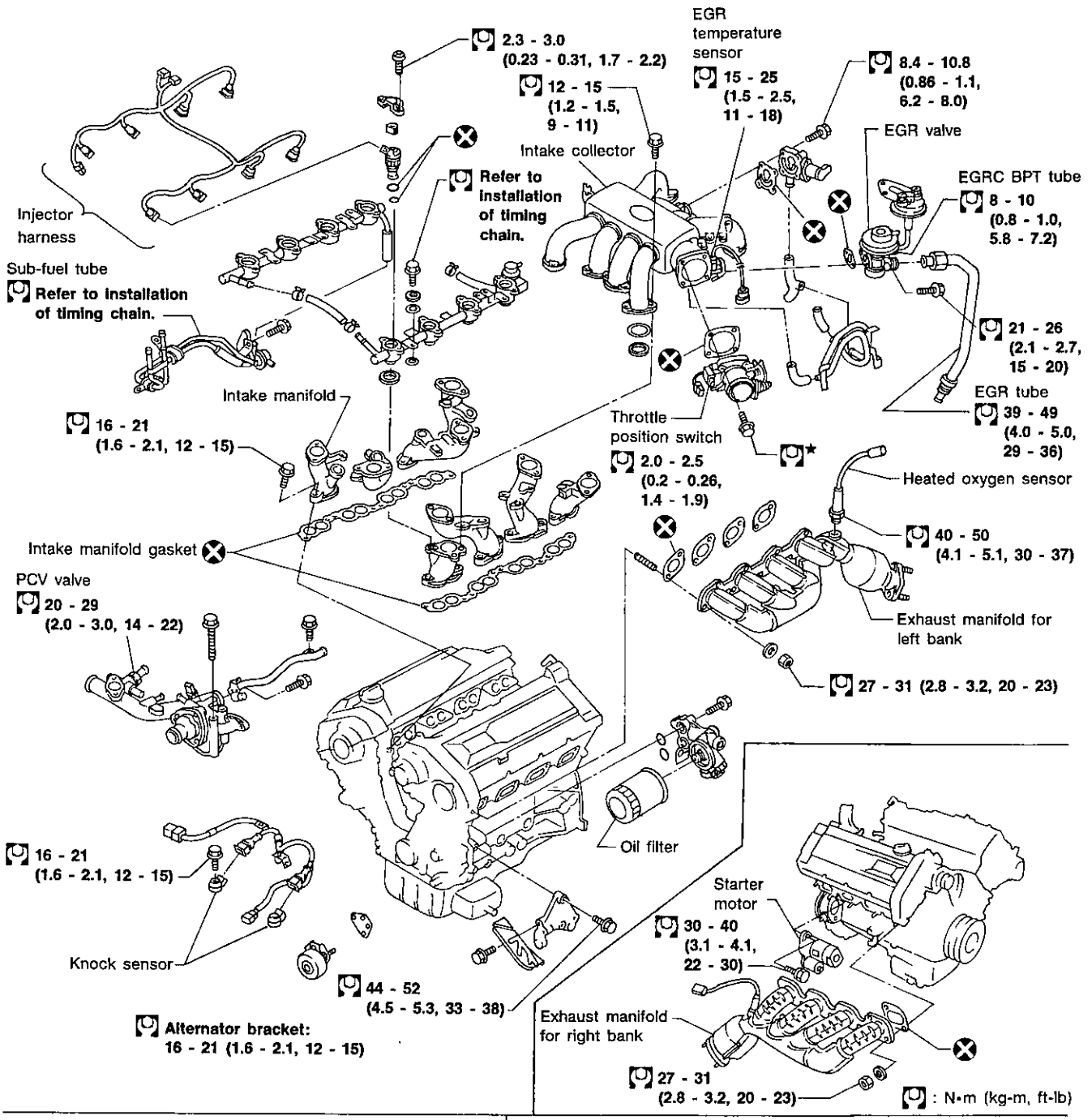
Tool number (Kent-Moore No.) Tool name	Description
ST0501S000 (—) Engine stand assembly ① ST05011000 (—) Engine stand ② ST05012000 (—) Base	Disassembling and assembling 
KV10114900 (—) Engine stand support arm	Disassembling and assembling 
KV10106500 (—) Engine stand shaft	
KV10114600 (—) Engine sub-attachment	
ST10120000 (J24239-01) Cylinder head bolt wrench	Loosening and tightening cylinder head bolt 
KV10109210 (—) Valve spring compressor	Disassembling and assembling valve components 
KV10115000 (—) Valve oil seal drift	Installing valve oil seal 

Special Service Tools (Cont'd)

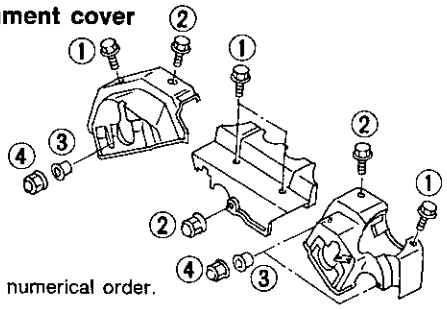
Tool number (Kent-Moore No.) Tool name	Description	
KV10114700 (—) Main bearing cap remover		Removing main bearing cap
(J-38365) Heated oxygen sensor wrench		Loosening or tightening heated oxygen sensor
EM03470000 (J8037) Piston ring compressor		Installing piston assembly into cylinder bore
ST16610001 (J23907) Pilot bushing puller		Removing crankshaft pilot bushing
KV10111100 (J37228) Seal cutter		Removing oil pan
WS39930000 (—) Tube presser		Pressing the tube of liquid gasket

Commercial Service Tools

Tool name	Description	
Spark plug wrench		Removing and installing spark plug
Valve seat cutter set		Finishing valve seat dimensions
Piston ring expander		Removing and installing piston ring
Valve guide drift	 **Intake:** **A = 11.5 mm (0.453 in) dia.** **B = 6.5 mm (0.256 in) dia.** **Exhaust:** **A = 12.5 mm (0.492 in) dia.** **B = 7.5 mm (0.295 in) dia.**	Removing and installing valve guide
Valve guide reamer	 **Intake:** **D_1 = 7.000 mm (0.2756 in) dia.** **Exhaust:** **D_1 = 8.000 mm (0.3150 in) dia.** **Intake:** **D_2 = 11.175 mm (0.4400 in) dia.** **Exhaust:** **D_2 = 12.175 mm (0.4793 in) dia.**	Reaming valve guide ① or hole for oversize valve guide ②
Front oil seal drift	 **A = 75 mm (2.95 in) dia.** **B = 45 mm (1.77 in) dia.**	Installing front oil seal
Rear oil seal drift	 **A = 110 mm (4.33 in) dia.** **B = 80 mm (3.15 in) dia.**	Installing rear oil seal

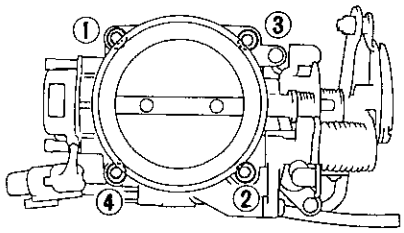


Front ornament cover



Tighten in numerical order.

6.3 - 8.3 (0.64 - 0.85, 4.6 - 6.1)



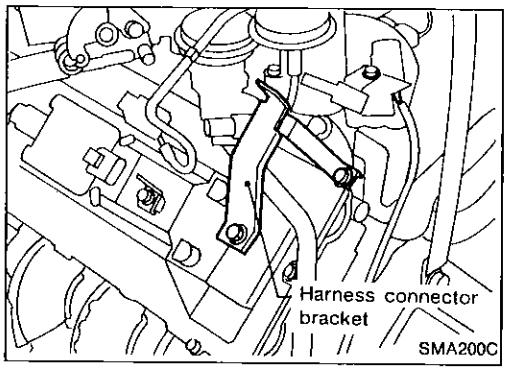
Tighten in numerical order.

*** Throttle body bolts**

Tightening procedure

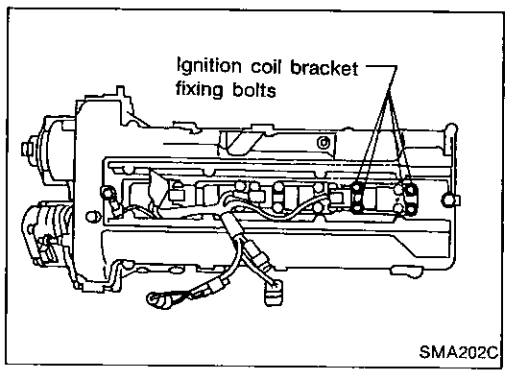
1) Tighten all bolts to 9 to 11 N•m (0.9 to 1.1 kg-m, 6.5 to 8.0 ft-lb)
2) Tighten all bolts to 18 to 22 N•m (1.8 to 2.2 kg-m, 13 to 16 ft-lb)

SEM454E

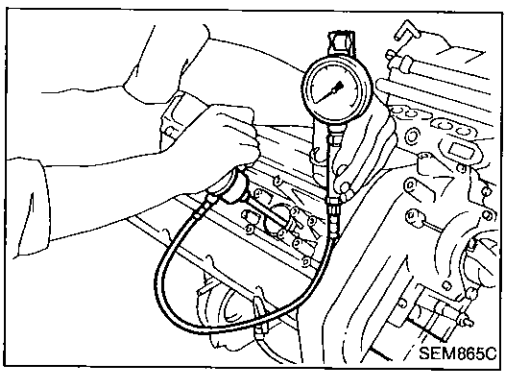


Measurement of Compression Pressure

1. Warm up engine.
2. Turn ignition switch off.
3. Release fuel pressure.
   Refer to "Releasing Fuel Pressure" in section EF & EC.
4. Remove air duct (only left bank).
5. Disconnect power transistor connectors.
6. Remove harness connector bracket (only left bank).



7. Remove ornamental rocker covers.
8. Disconnect harness connector between ignition coil and power transistor.
9. Remove ignition coil bracket fixing bolts and pull out this bracket with ignition coils.
10. Remove all spark plugs.



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

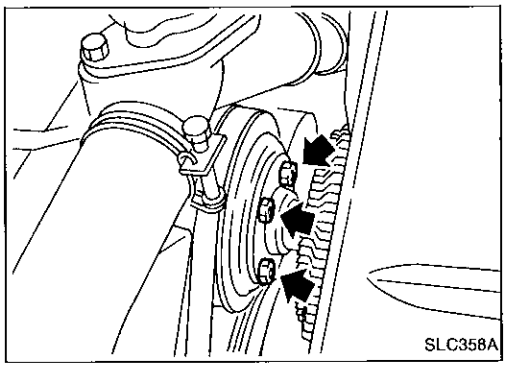
- **Use a fully-charged battery to get specified engine speed.**

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

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

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

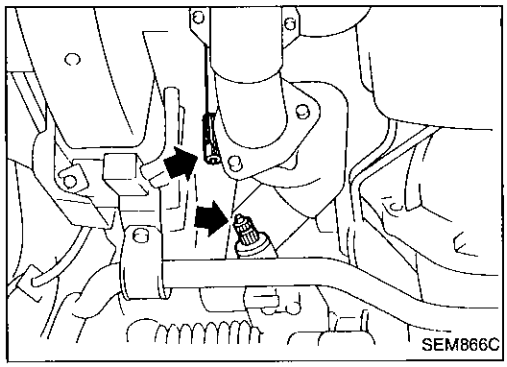
- **If adding oil helps compression, piston rings may be worn or damaged. Replace piston rings after checking piston.**
- **If pressure stays low, a valve may be sticking or seating improperly. Inspect valve and valve seat. (Refer to S.D.S.)**
- **If compression in any two adjacent cylinders is low and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



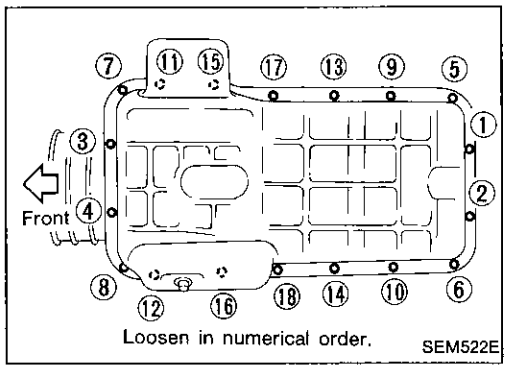
Removal

1. Remove engine under cover.
2. Drain engine oil.
3. Remove fan coupling with fan.
4. Remove the following parts.

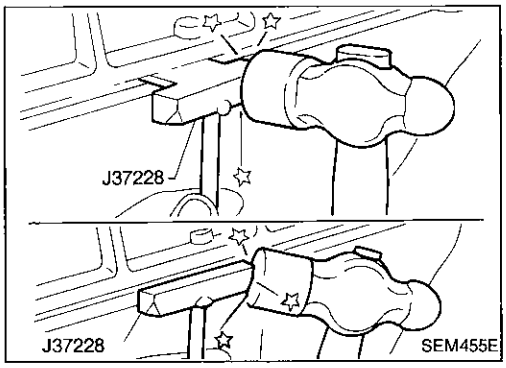
- All drive belts
- Alternator
- A/C compressor
- Engine gusset



5. Remove steering lower joint.
6. Set a suitable transmission jack under the transmission. Hoist engine with engine slinger.
7. Remove suspension member assembly.



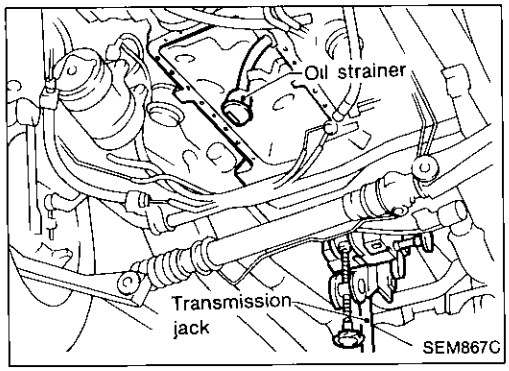
8. Remove oil pan.

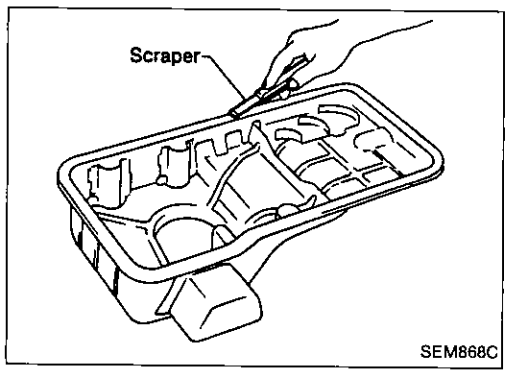


9. Remove oil pan.
(1) Insert Tool between cylinder block and oil pan.

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

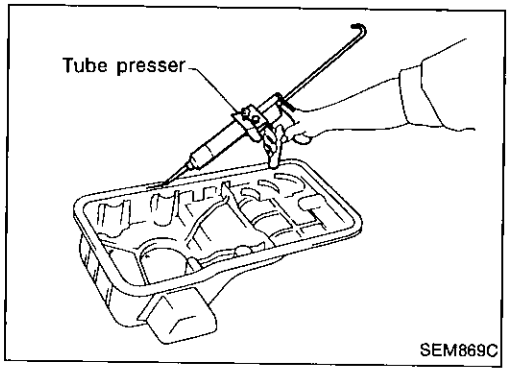
(2) Slide Tool by tapping its side with a hammer, and remove oil pan.



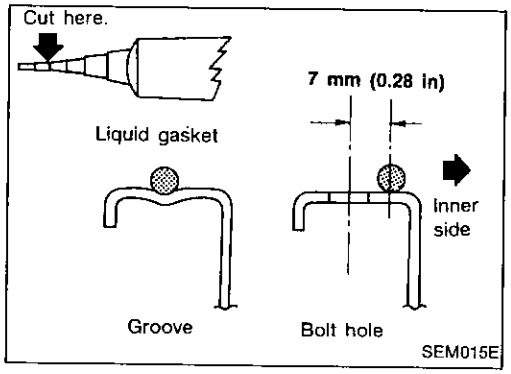


Installation

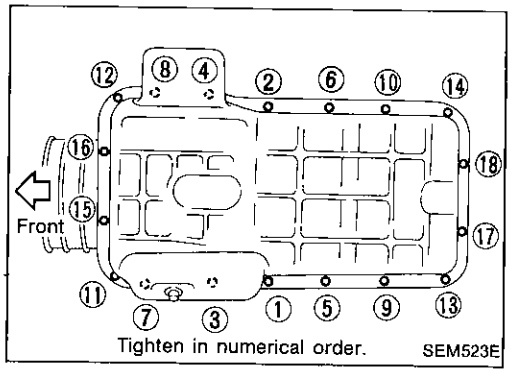
1. Before installing oil pan, remove all traces of liquid gasket from mating surface using a scraper.
- Also remove traces of liquid gasket from mating surface of cylinder block.



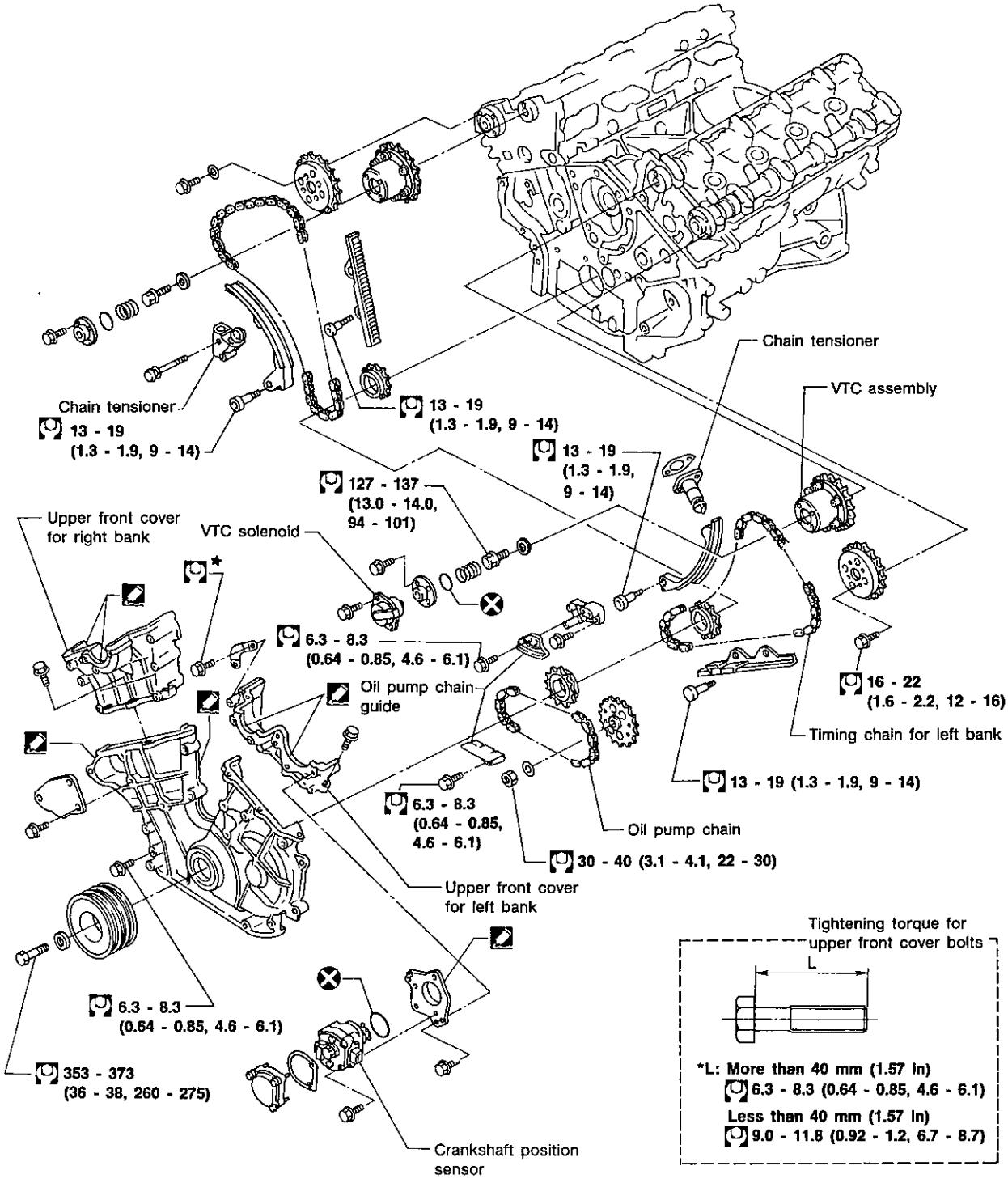
2. Apply a continuous bead of liquid gasket to mating surface of oil pan.
- **Use Genuine Liquid Gasket or equivalent.**



- Be sure liquid gasket is 3.5 to 4.5 mm (0.138 to 0.177 in) wide.
3. Apply liquid gasket to inner sealing surface as shown in figure.
- Attaching should be done within 5 minutes after coating.



4. Install oil pan.
- Install bolts/nuts in the reverse order of removal.
- Wait at least 30 minutes before refilling engine oil.



: N•m (kg-m, ft-lb)

: Liquid gasket

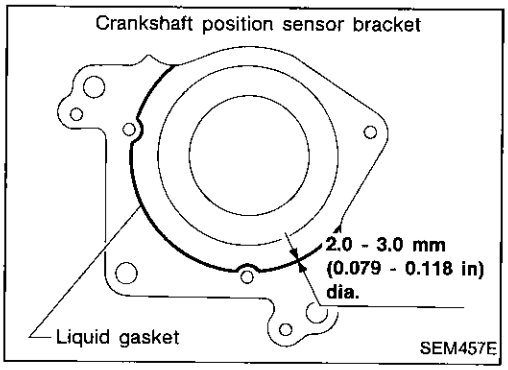
SEM456E

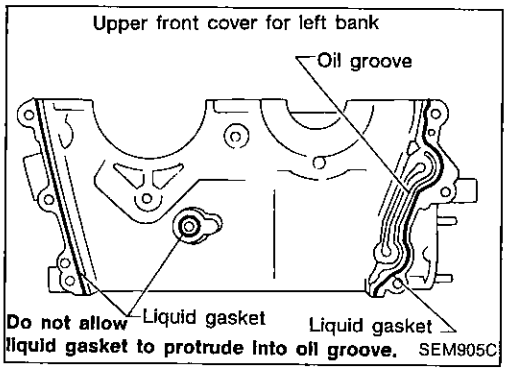
POSITION FOR APPLYING LIQUID GASKET

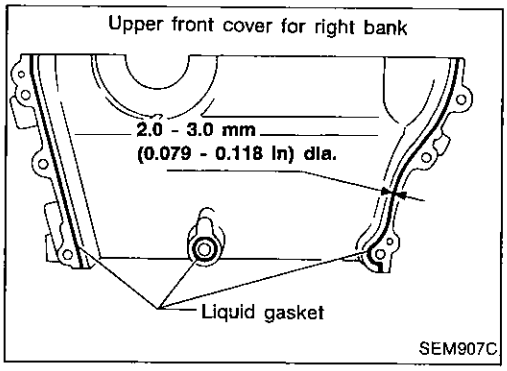
Refer to "Installation" in "OIL PAN" for installing oil pan.

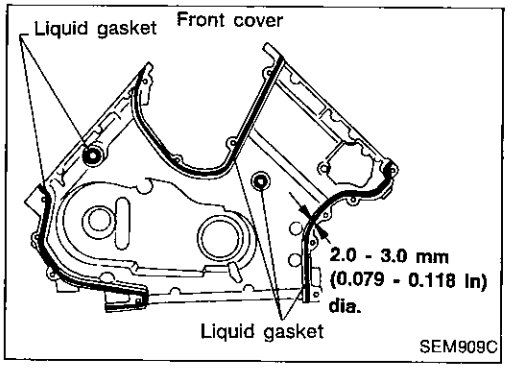
CAUTION:

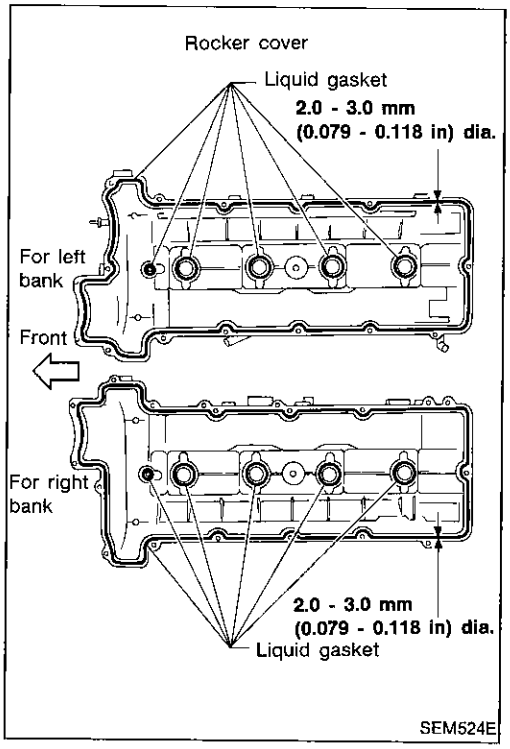
- **After removing timing chain, do not turn crankshaft and camshaft separately, or valves will strike piston heads.**

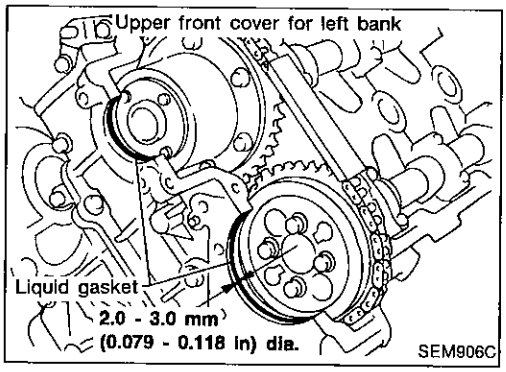


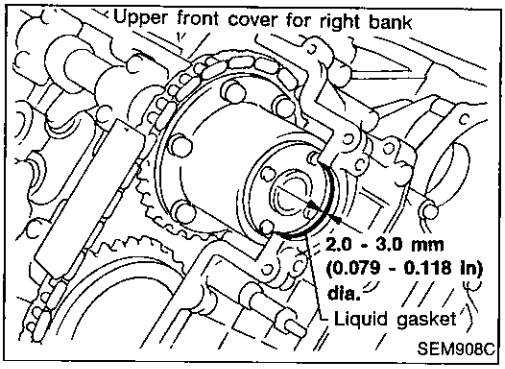


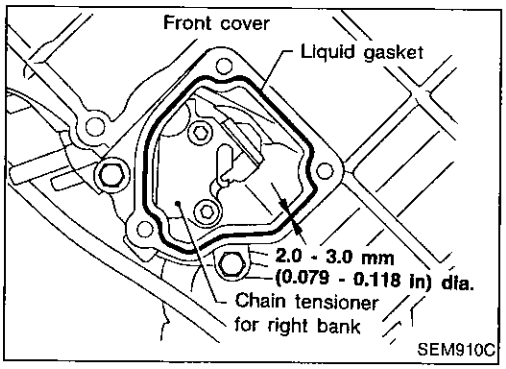


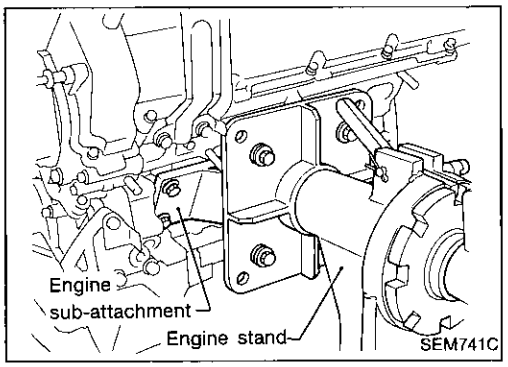






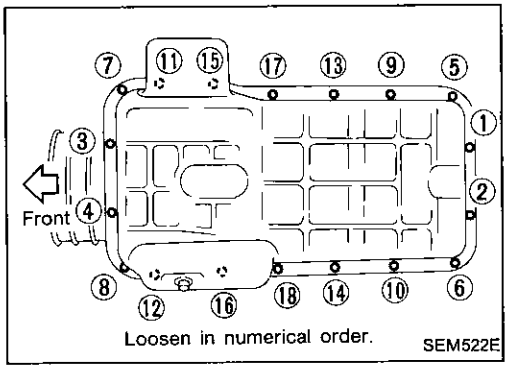






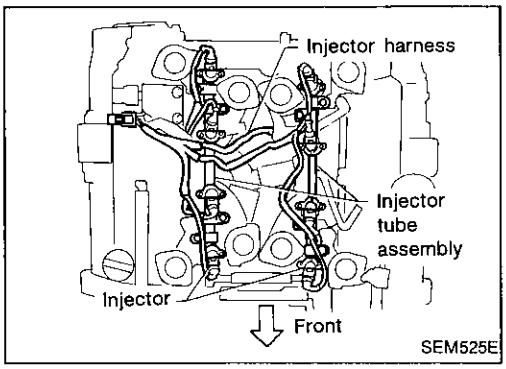
Removal

1. Remove engine with transmission. Refer to "ENGINE REMOVAL".
2. Remove the following parts
   - Suspension member
   - Engine mounts
   - A/C compressor bracket
   - Exhaust manifold
   - Cooling fan with coupling
   - Engine gusset
   - Transmission
3. Place engine on a work stand.
4. Remove oil pan.
5. Remove intake collector.

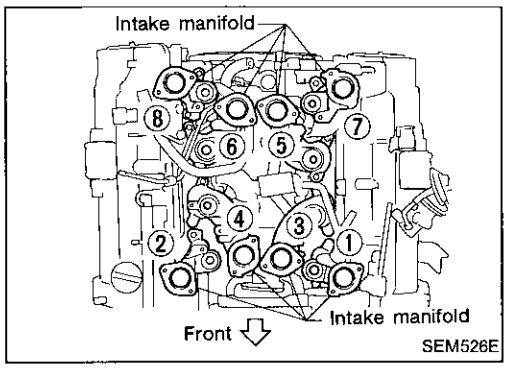


6. Disconnect injector harness connector and remove injector tube assembly with injector.

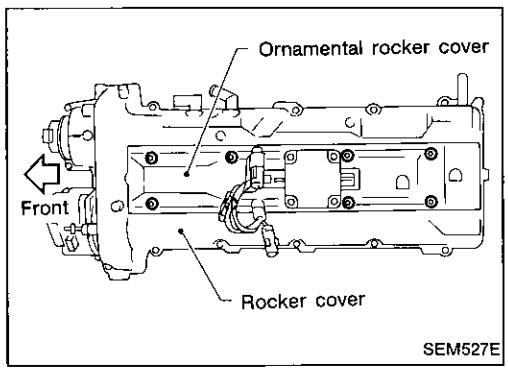
Be careful not to let rubber washer fall into intake manifold.



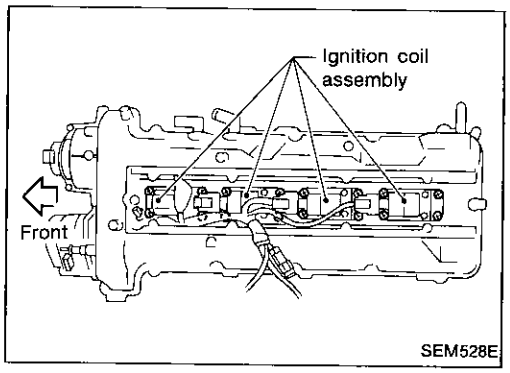
7. Remove intake manifold.



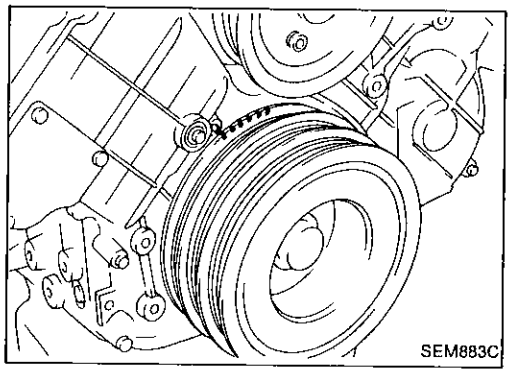
8. Remove ornamental rocker cover.



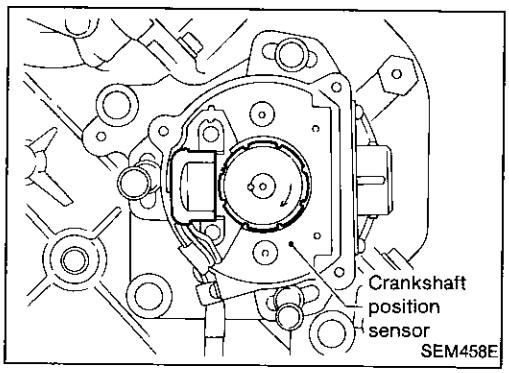
Removal (Cont'd)

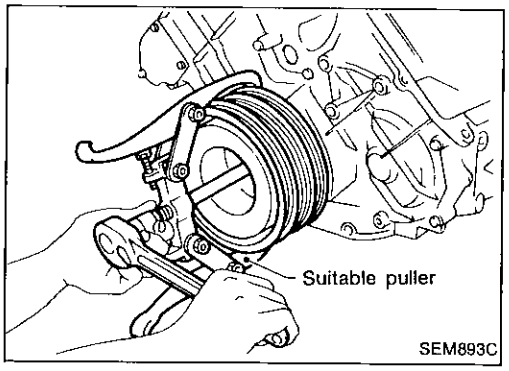


9. Remove all ignition coils and spark plugs.

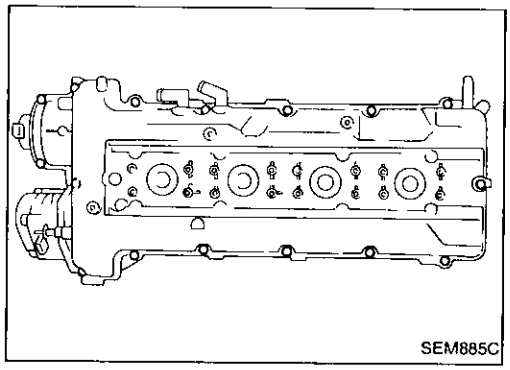


10. Set No. 1 piston at T.D.C. on its compression stroke.



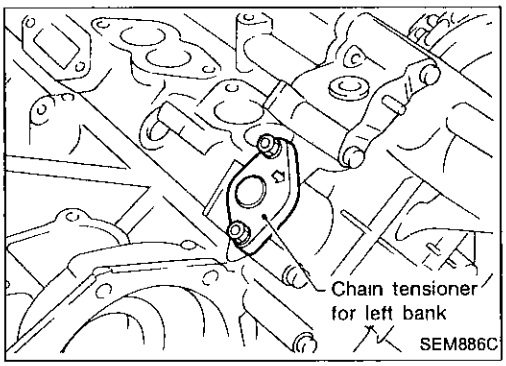


11. Remove crankshaft pulley.

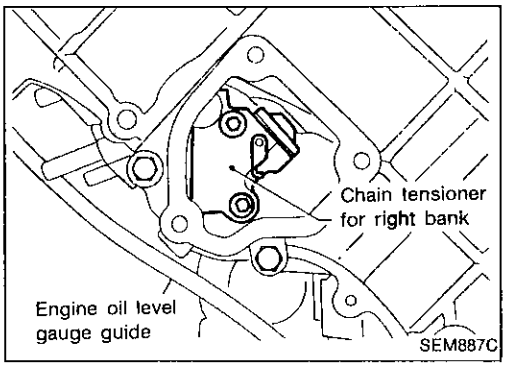


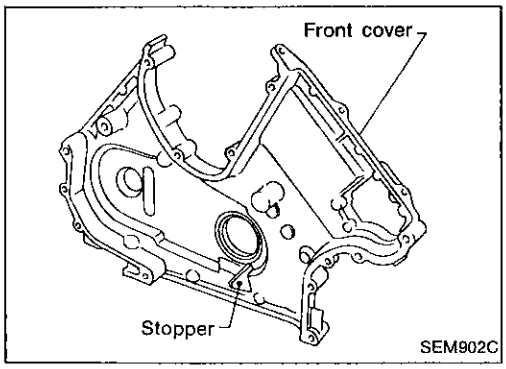
12. Remove rocker covers.
13. Remove crankshaft position sensor and VTC solenoid.

Removal (Cont'd)



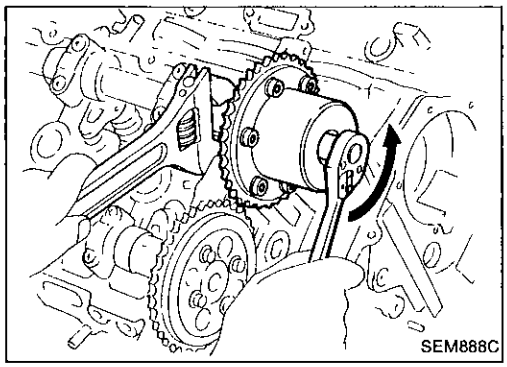
14. Remove chain tensioners.
15. Remove upper front covers.



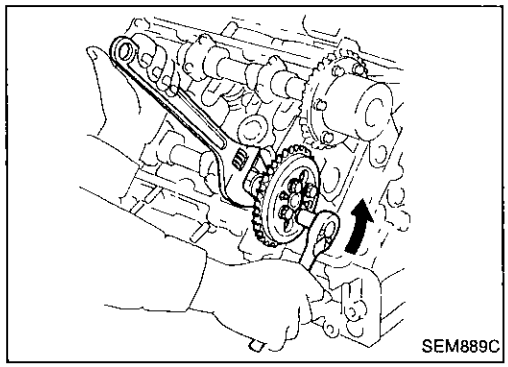


16. Remove front cover.
- Timing chain will not be disengaged or dislocated from crankshaft sprocket unless front cover is removed. For this reason, stopper need not be used.

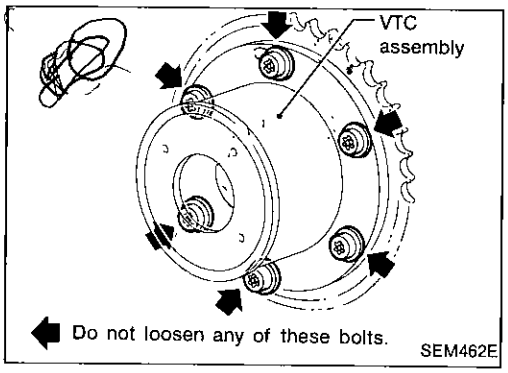
Cast portion of front cover is located on lower side of crankshaft sprocket so timing chain is not disengaged from sprocket.



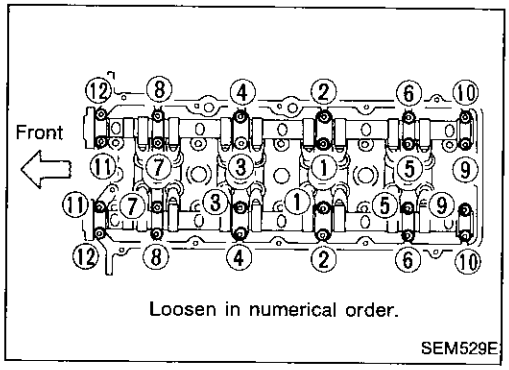
17. Remove VTC assembly and camshaft sprocket.
18. Remove oil pump chain and timing chains.



Removal (Cont'd)

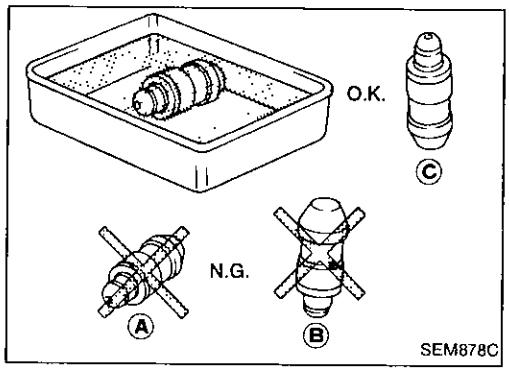


CAUTION:
Valve timing control (VTC) assembly
Do not attempt to disassemble VTC assembly since it is difficult to reassemble accurately in the field. If they should be disassembled, VTC assembly must be replaced with a new one.

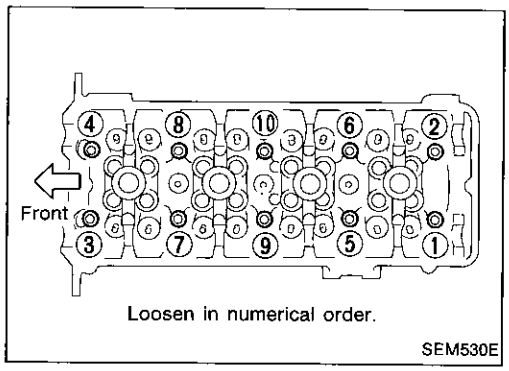


19. Remove camshaft bracket and camshaft.
- These parts should be reassembled in their original positions.

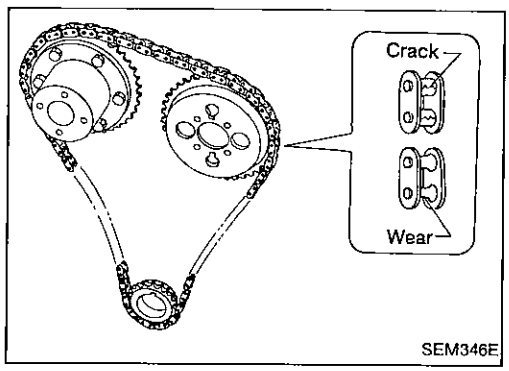
20. Remove rocker arm and hydraulic lash adjuster.
- Be sure to tie each hydraulic lash adjuster with string so that it can be reassembled in its original position during reassembly.



- **If hydraulic lash adjuster is kept on its side, there is a risk of air entering it. After removal, always set hydraulic lash adjuster straight up, or when laying it on its side, have it soak in new engine oil.**
- **Do not disassemble hydraulic lash adjuster.**
- **Attach tags to valve lifters so as not to mix them up.**

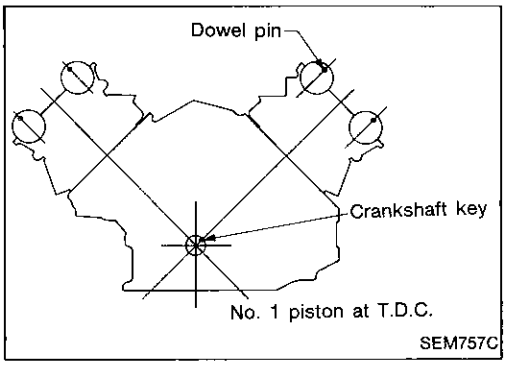


21. Remove cylinder head assembly and cylinder head gasket.
- Head warpage or cracking could result from removing in incorrect order.
- Cylinder head bolts should be loosened in two or three steps.



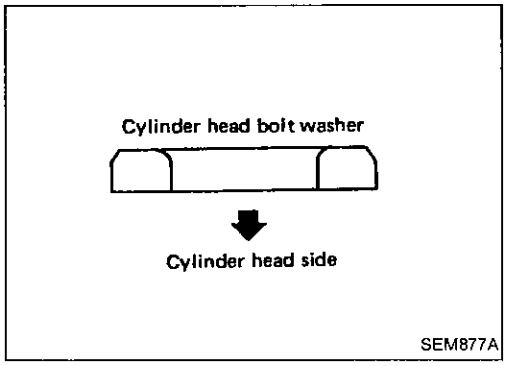
Inspection

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

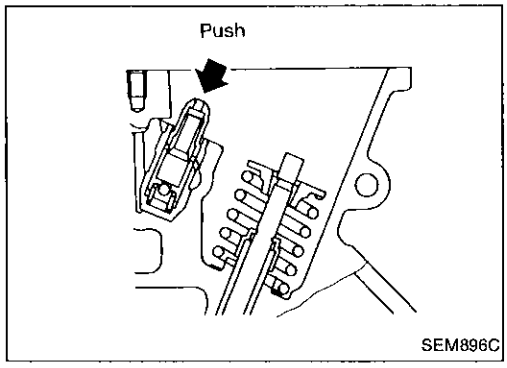


Installation

1. Position crankshaft so that No. 1 piston is set at T.D.C. on compression stroke.
2. Turn crankshaft until No. 1 piston is set at approximately 45° before T.D.C. on compression stroke. (At this point, No. 3 piston will be at the same height as No. 1 piston to prevent interference of valves and pistons.)

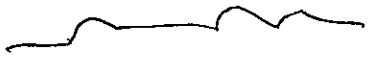


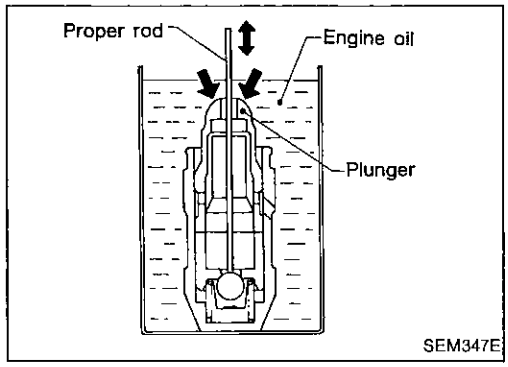
3. Install cylinder heads with new gaskets and temporarily tighten cylinder head bolts for both right and left bank cylinder heads when installing front cover.
- Temporarily tighten cylinder head bolts. This is necessary to avoid damaging cylinder head gaskets.
- Be sure to install washers between bolts and cylinder head.
- Do not rotate crankshaft and camshaft separately, or valves will hit piston heads.



4. Install hydraulic lash adjusters and check them.

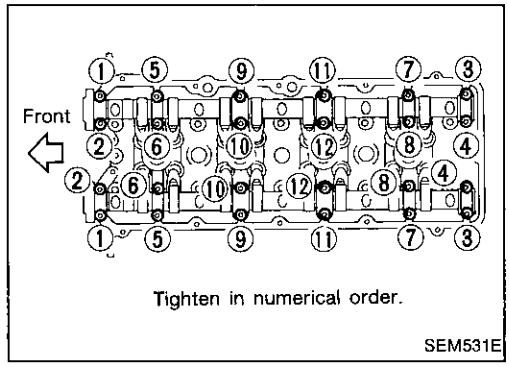
1) When rocker arm can be moved at least 1 mm (0.04 in) by pushing at hydraulic lash adjuster location, it indicates that there is air in the high pressure chamber.
Noise will be emitted from hydraulic lash adjuster if engine is started without bleeding air.





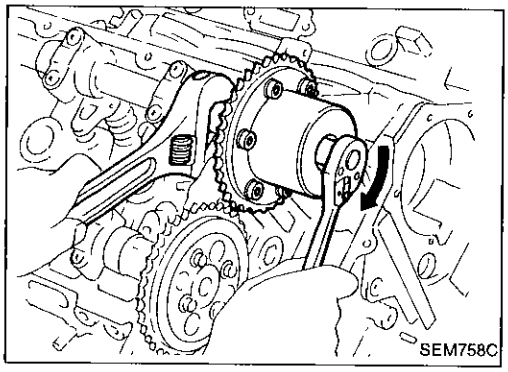
2) Remove hydraulic lash adjuster and dip in a container filled with engine oil. While pushing plunger as shown in figure, lightly push check ball using proper rod. Air is completely bled when plunger no longer moves.

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

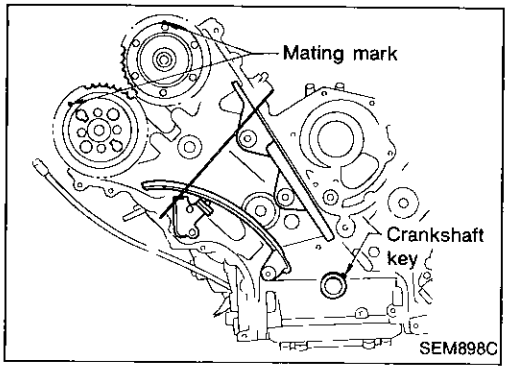


5. Install rocker arm, camshaft and camshaft bracket for right bank.

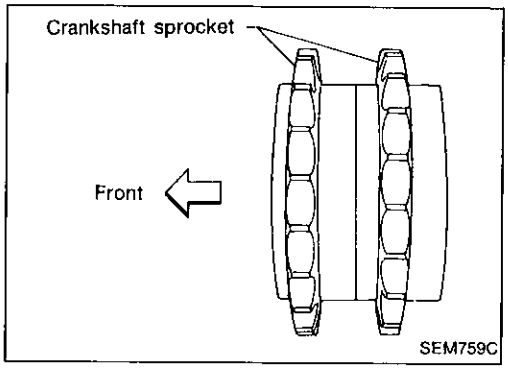
Installation (Cont'd)



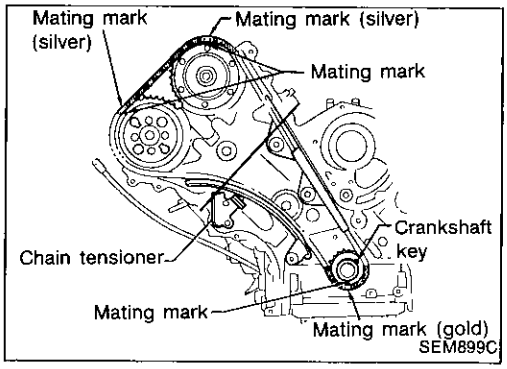
6. Install VTC assembly and exhaust cam sprocket on right bank.



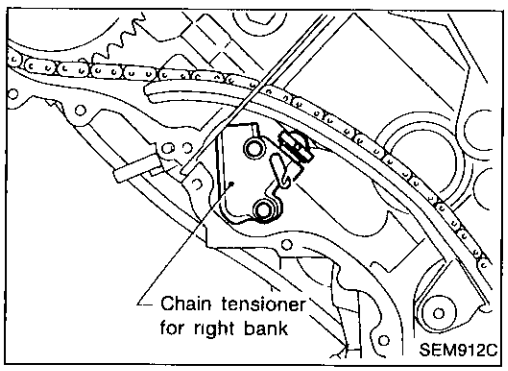
7. After making sure that camshafts are still correctly positioned turn crankshaft clockwise to set No. 1 piston at T.D.C. on compression stroke.



8. Install two sprockets on crankshaft.

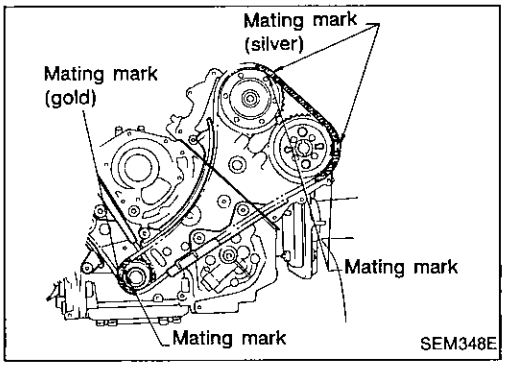


9. While aligning matching marks on crankshaft sprocket and camshaft sprockets (on both intake and exhaust sides) with those on chain, install chain on right bank.
- Be careful not to damage cylinder head gasket when installing chain.

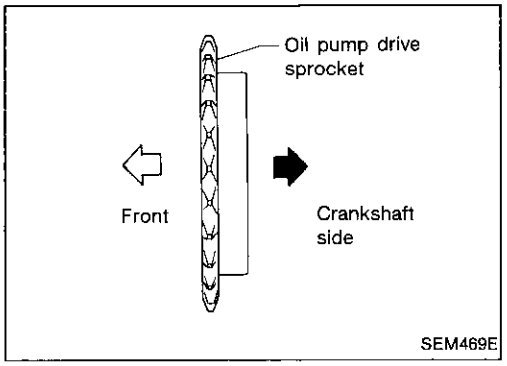


10. Install chain tensioner on right bank.

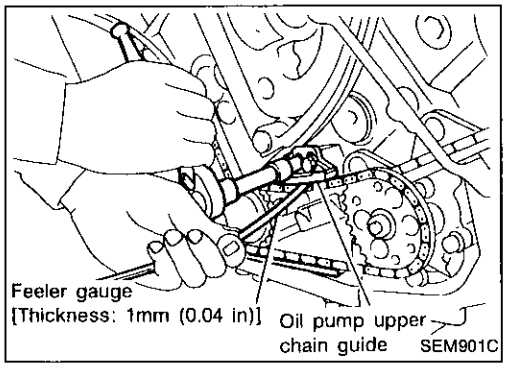
Installation (Cont'd)



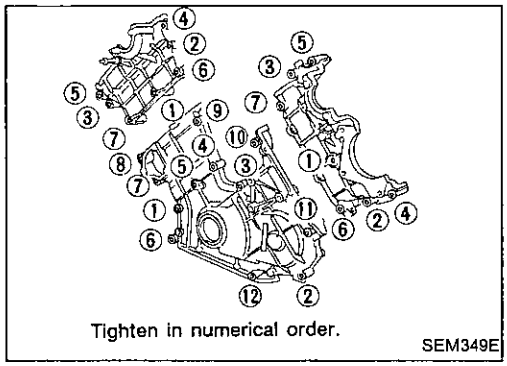
11. Turn crankshaft approximately 120° clockwise from the point where No. 1 piston is at T.D.C. on compression stroke. (At this point, valves in left bank still remain unlifted.)
12. Correctly position camshafts for left cylinder head.
13. Install VTC assembly and exhaust cam sprocket on left bank.
14. While aligning matching marks on crankshaft sprocket and camshaft sprockets (on both intake and exhaust sides) with those on chain, install chain on left bank.



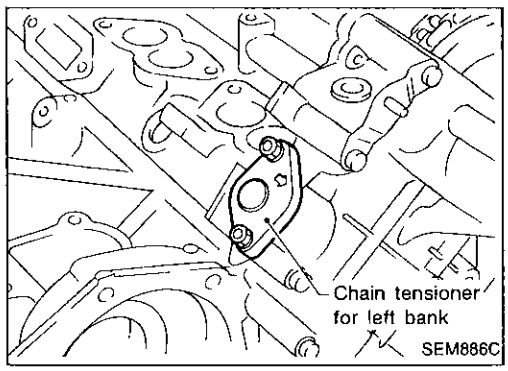
15. Install oil pump chain and sprockets.



16. Install oil pump chain guides.
- Place a 1 mm (0.04 in) feeler gauge between the upper chain guide and chain before assembling chain guides. Force applied to chain is equivalent to upper chain guide weight.



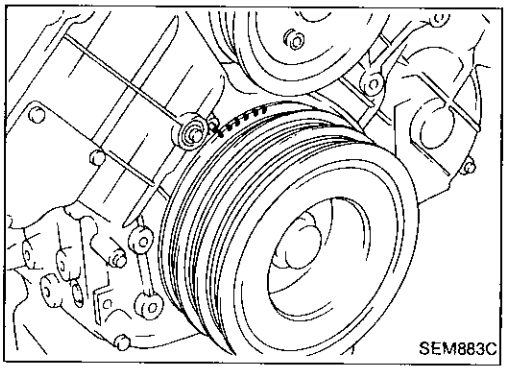
17. Install front covers.
- Be careful not to damage cylinder head gasket when installing front cover.



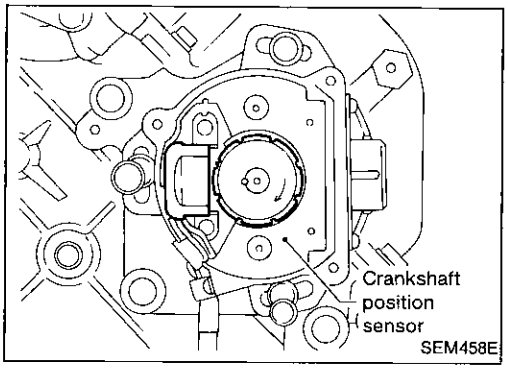
18. Install chain tensioner for left bank.
19. Install the following parts.
- Crankshaft position sensor
- VTC solenoid

20. Install crank pulley.

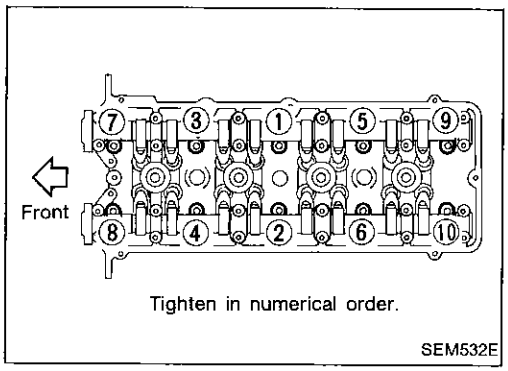
Installation (Cont'd)


SEM883C

21. Set No. 1 piston at T.D.C. on its compression stroke.



SEM458E

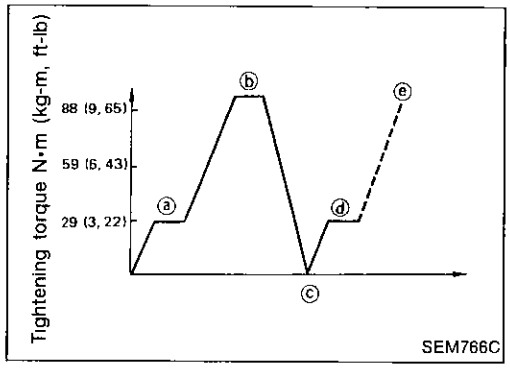


Tighten in numerical order.
SEM532E

22. Tighten cylinder head bolts.

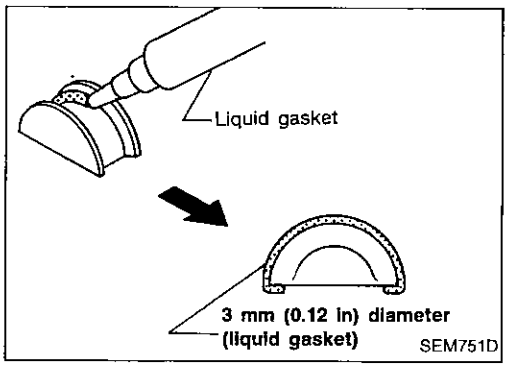
- **Tightening procedure**

ⓐ **Tighten bolts to 29 N·m (3.0 kg-m, 22 ft-lb).**
ⓑ **Tighten bolts to 93 N·m (9.5 kg-m, 69 ft-lb).**
ⓒ **Loosen bolts completely.**
ⓓ **Tighten bolts to 25 to 34 N·m (2.5 to 3.5 kg-m, 18 to 25 ft-lb).**
ⓔ **Turn bolts 90 to 95 degrees clockwise or if angle wrench is not available, tighten bolts to 93 to 98 N·m (9.5 to 10.0 kg-m, 69 to 72 ft-lb).**



SEM766C

	Tightening torque N·m (kg-m, ft-lb)
ⓐ	29 (3.0, 22)
ⓑ	93 (9.5, 69)
ⓒ	0 (0, 0)
ⓓ	29 ± 5 (3.0 ± 0.5, 21.7 ± 3.6)
ⓔ	90^{+5}_{-0} degrees or 93^{+5}_{-0} ($9.5^{+0.5}_{-0}$, $68.7^{+3.6}_{-0}$)

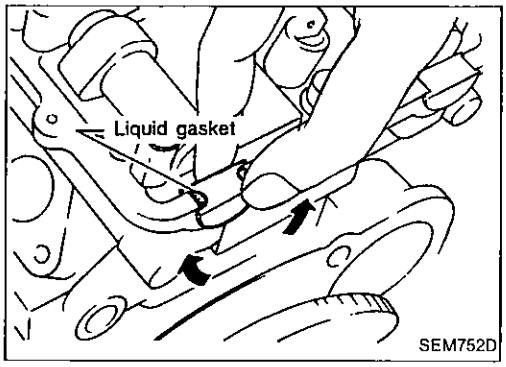


SEM751D

23. Install rubber plugs as follows:
(1) Apply liquid gasket to rubber plugs.

- **Before applying liquid gasket, clean mating surface of oily stains and make sure that mating surface is free from dirt and dust particles.**
- **Rubber plugs should be installed within 5 minutes of applying liquid gasket.**

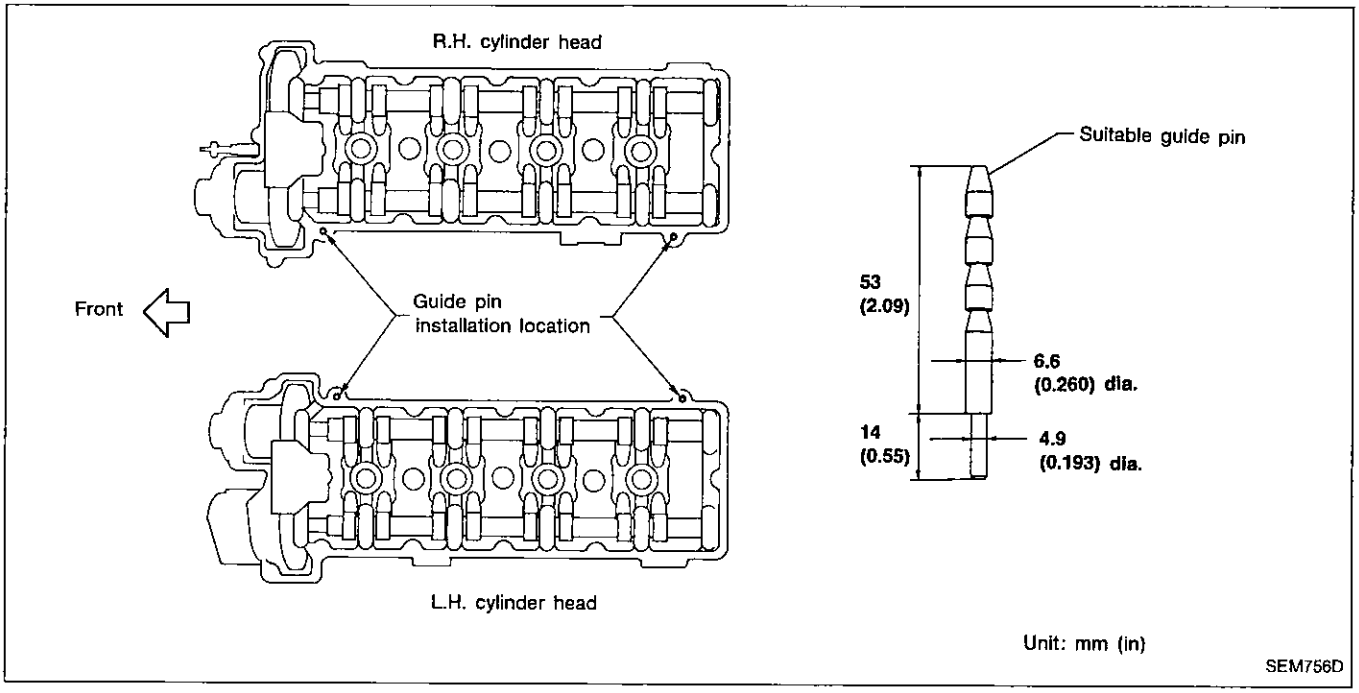
Installation (Cont'd)

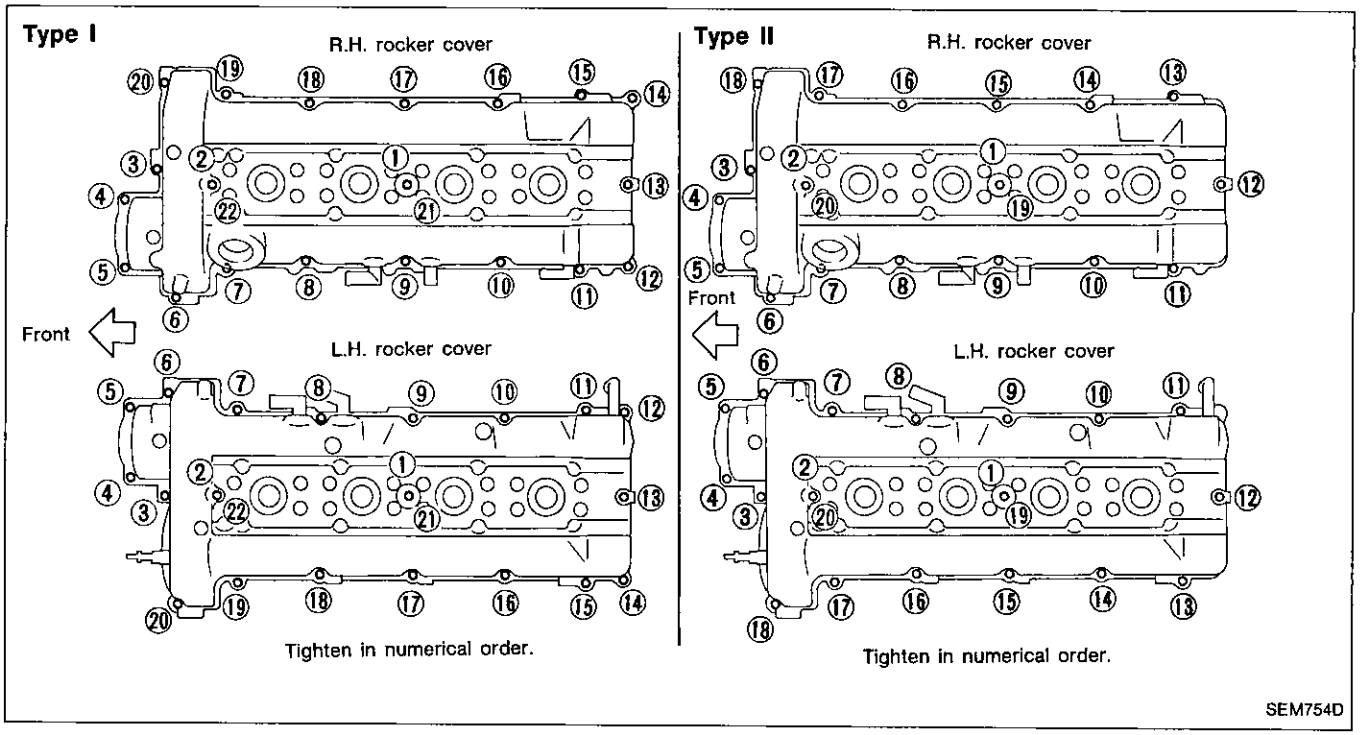


(2) Install rubber plugs, then move them with your fingers to uniformly spread the gasket on cylinder head surface.

- **Rubber plugs should be installed flush with the surface.**
- **Do not start the engine for 30 minutes after installing rocker cover.**
- **Install rocker cover within 5 minutes of installing rubber plugs.**

24. Install rocker cover.



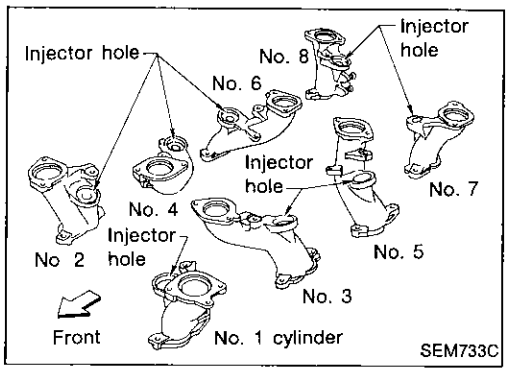


Installation (Cont'd)

(1) Install a suitable guide pin to cylinder head.
(2) Apply liquid gasket to rocker cover.
(3) Install rocker cover using guide pin.
(4) Remove guide pin.

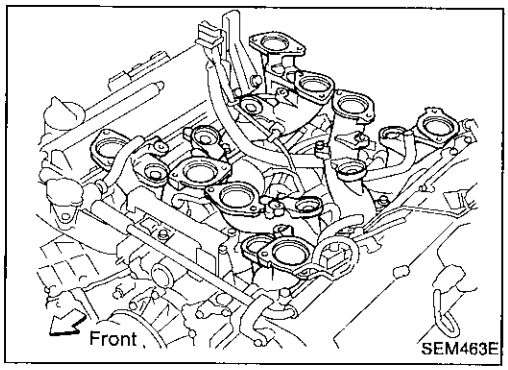
- **Always use a suitable guide pin to install rocker cover.**

(5) Tighten rocker cover bolts.

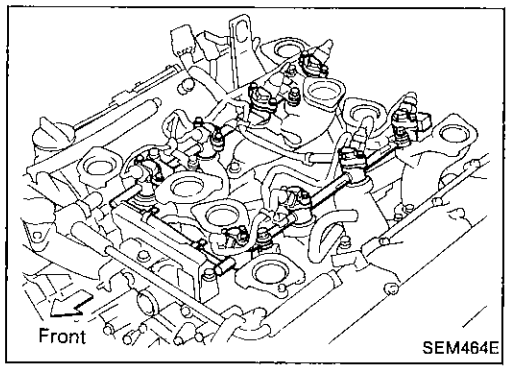


25. Install intake manifolds, fuel tube assemblies (including fuel injectors) and intake collector.

- The intake manifold assembly utilizes a nonunitized design. Use the following procedure when installing the eight intake manifolds to make installation of the fuel tube assemblies and collectors less difficult.

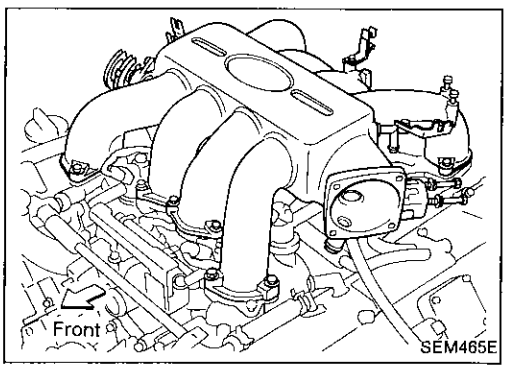


1) Install the eight intake manifolds in their proper positions on cylinder head, and lightly tighten mounting bolts.



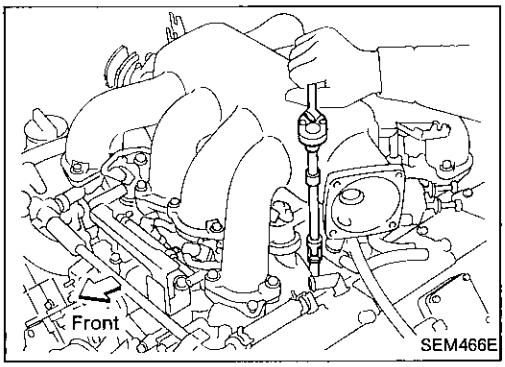
2) Connect injector tube assemblies (including fuel injectors) to intake manifolds, and lightly tighten mounting bolts.

- **Be careful not to let rubber washer fall into intake manifold.**

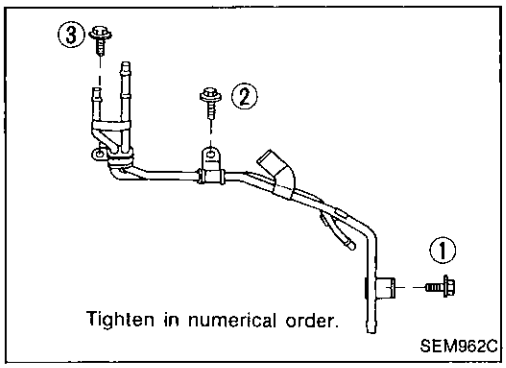


3) Install intake collector and lightly tighten mounting bolts.

Installation (Cont'd)



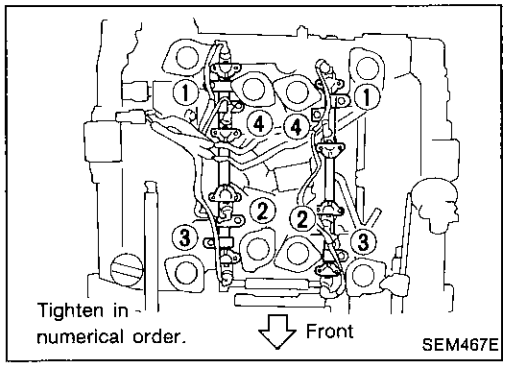
4) Tighten intake manifolds mounting bolts at cylinder head.
5) Remove intake collectors.
6) Tighten intake manifolds to the specified torque.



7) Tighten sub-fuel tubes in numerical order.

- **Tightening procedure**

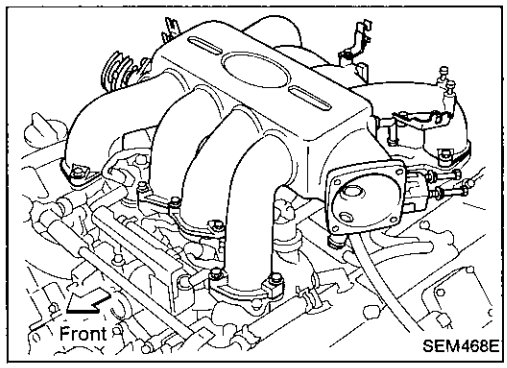
(1) Tighten all bolts to 4.2 to 5.9 N·m (0.43 to 0.60 kg-m, 3.1 to 4.3 ft-lb).
(2) Tighten all bolts to 8.4 to 10.8 N·m (0.86 to 1.1 kg-m, 6.2 to 8.0 ft-lb).



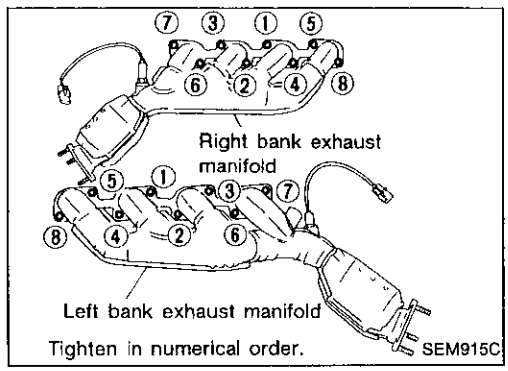
8) Tighten injector tube assemblies in numerical order.

- **Tightening procedure**

(1) Tighten all bolts to 9.3 to 10.8 N·m (0.95 to 1.1 kg-m, 6.9 to 8.0 ft-lb).
(2) Tighten all bolts to 21 to 26 N·m (2.1 to 2.7 kg-m, 15 to 20 ft-lb).



9) Install intake collectors and tighten to the specified torque.

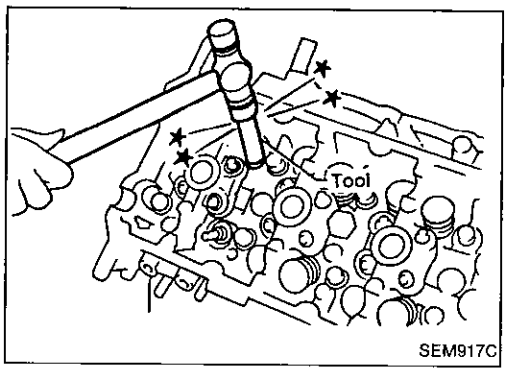


26. Install exhaust manifolds.

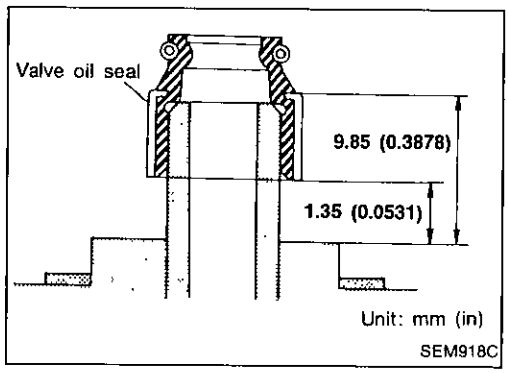
VALVE OIL SEAL

1. Remove engine with transmission from vehicle.
2. Remove rocker cover.
3. Remove camshaft.
4. Remove rocker arm.
5. Remove valve spring and valve oil seal with suitable tool.

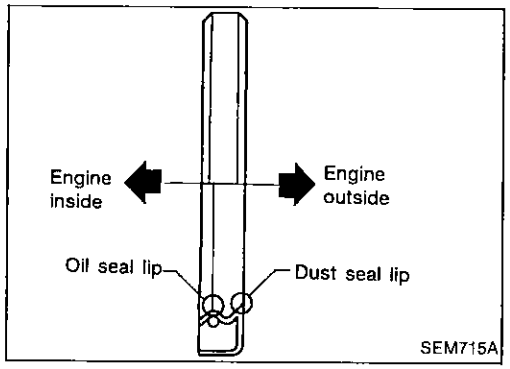
Piston concerned should be set at T.D.C. to prevent valves from falling.



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



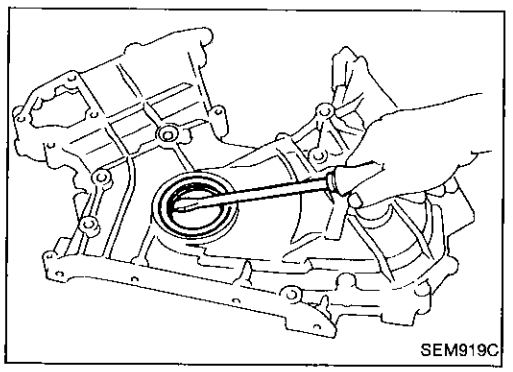
OIL SEAL INSTALLING DIRECTION

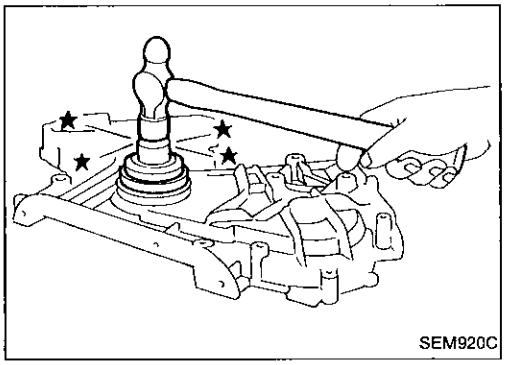


FRONT OIL SEAL

1. Remove the following parts.
- Engine under cover
- Cooling fan
- Engine gusset
- Lower rear plate (Removal of crankshaft pulley bolt requires removal of this part.)
- Crank shaft pulley

2. Remove front oil seal.

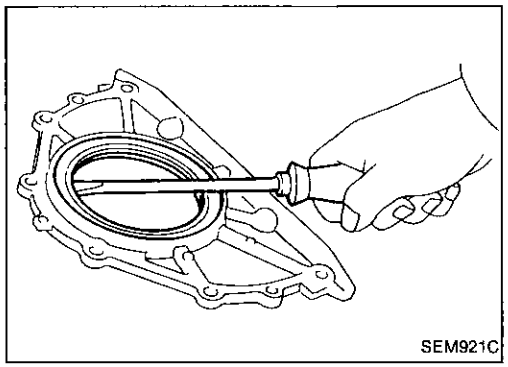



SEM920C

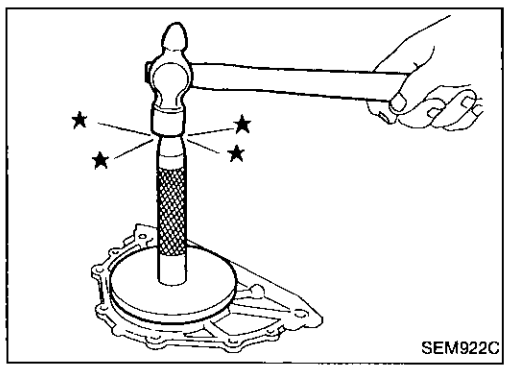
3. Apply engine oil to new oil seal and install it using suitable tool.

REAR OIL SEAL

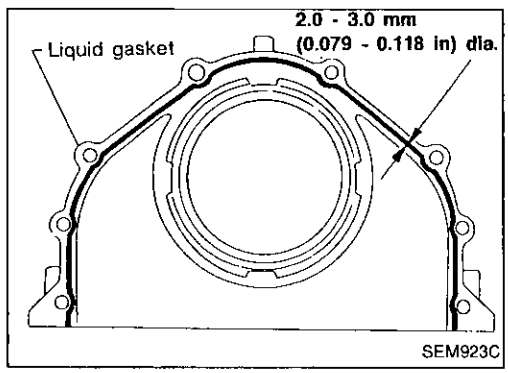
1. Remove drive plate.
2. Remove rear oil seal retainer.
3. Remove traces of liquid gasket using scraper.


SEM921C

4. Remove rear oil seal from rear oil seal retainer.

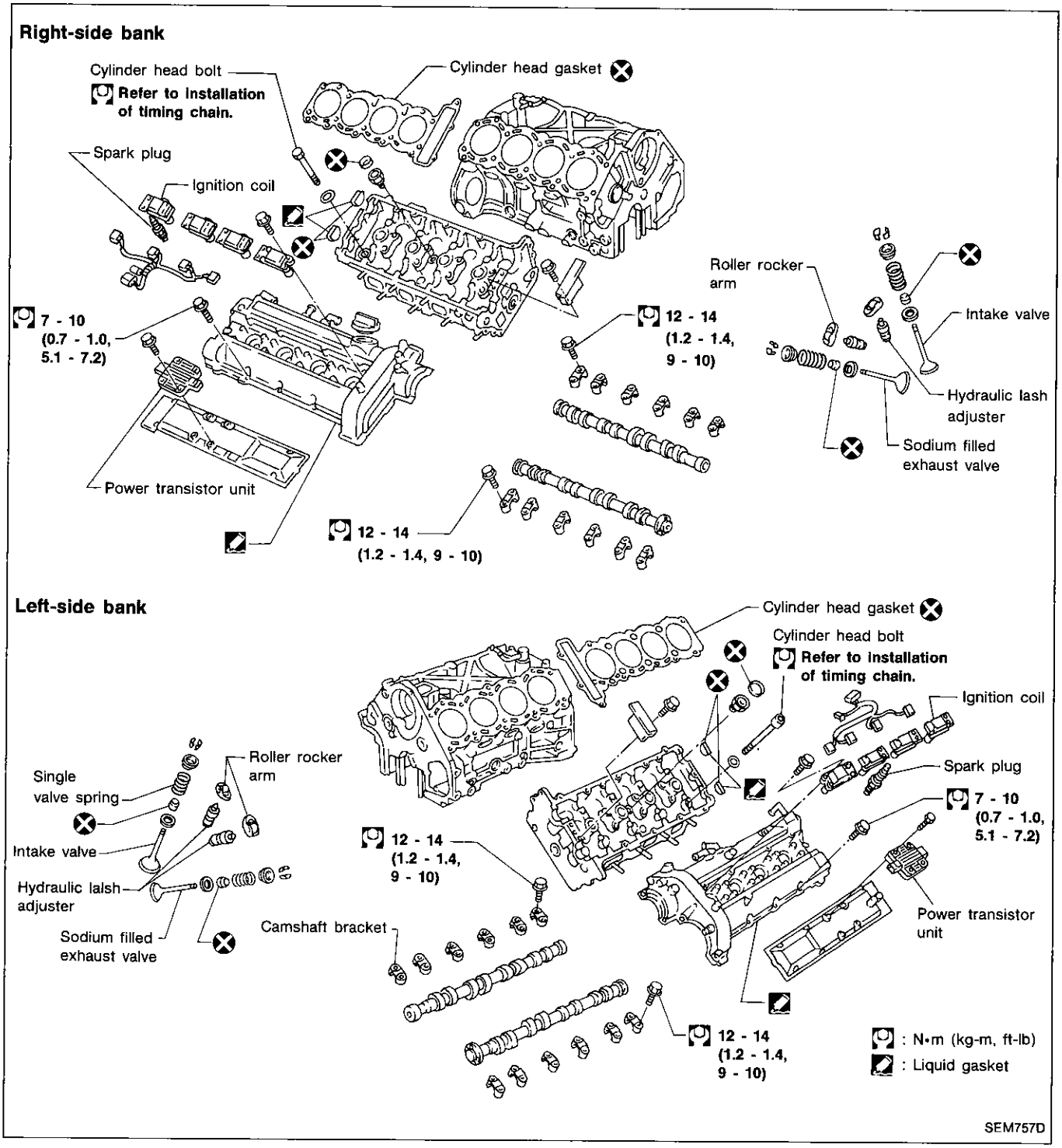

SEM922C

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



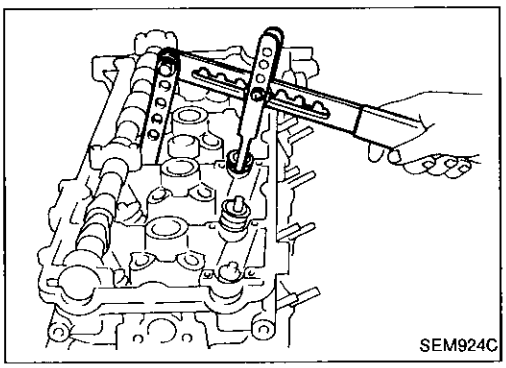
SEM923C

6. Apply a continuous bead of liquid gasket to rear oil seal retainer.



CAUTION:

- **When installing sliding parts such as rocker arms, camshaft 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.**

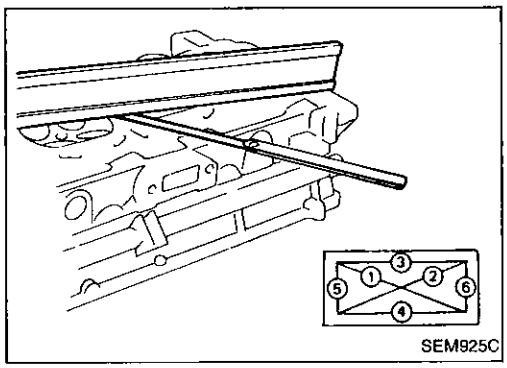

SEM924C

Removal

- This removal is the same procedure as those for timing chain. Refer to "Removal" in "TIMING CHAIN".

Disassembly

1. Remove valve components with Tool.
2. Remove valve oil seal with a suitable tool.



SEM925C

Inspection

CYLINDER HEAD DISTORTION

Head surface flatness:

Standard

Less than 0.03 mm (0.0012 in)

Limit

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 relationship with the amount of cylinder block resurfacing.

Amount of cylinder head resurfacing is "A".

Amount of cylinder block resurfacing is "B".

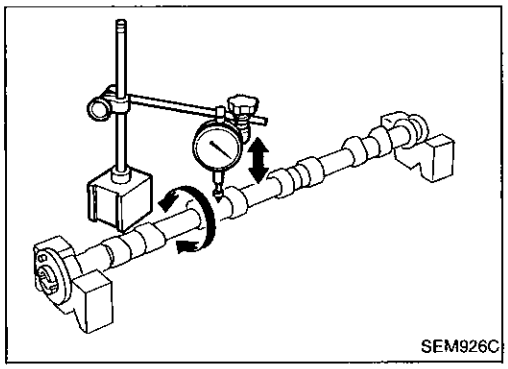
The maximum limit is as follows:

A + B = 0.2 mm (0.008 in)

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

Nominal cylinder head height:

130.7 - 130.9 mm (5.146 - 5.154 in)


SEM926C

CAMSHAFT VISUAL CHECK

Check camshaft for scratches, seizure and wear.

CAMSHAFT RUNOUT

1. Measure camshaft runout at the center journal.

Runout (Total indicator reading):

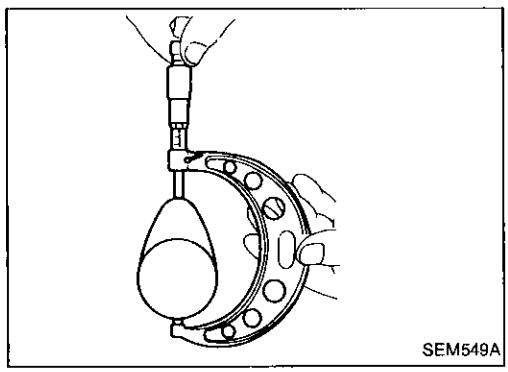
Standard

Less than 0.02 mm (0.0008 in)

Limit

0.05 mm (0.0020 in)

2. If it exceeds the limit, replace camshaft.


SEM549A

CAMSHAFT CAM HEIGHT

1. Measure camshaft cam height.

Standard cam height:

Intake

37.919 - 38.109 mm (1.4929 - 1.5004 in)

Exhaust

35.279 - 35.469 mm (1.3889 - 1.3964 in)

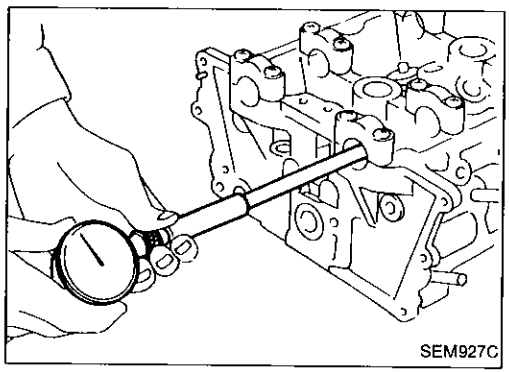
Cam wear limit:

Intake & Exhaust

0.05 mm (0.0020 in)

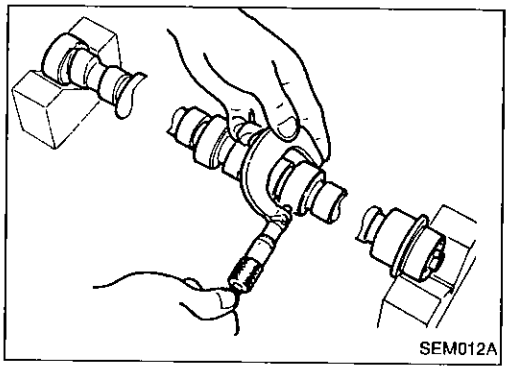
2. If wear is beyond the limit, replace camshaft.

Inspection (Cont'd)

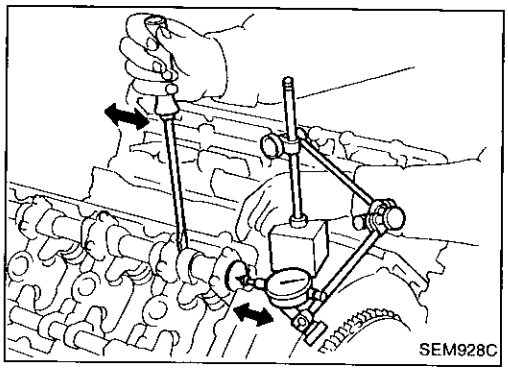


CAMSHAFT JOURNAL CLEARANCE

1. Install camshaft bracket and tighten bolts to the specified torque.
2. Measure inner diameter of camshaft bearing.
   Standard inner diameter:
   26.000 - 26.021 mm (1.0236 - 1.0244 in)

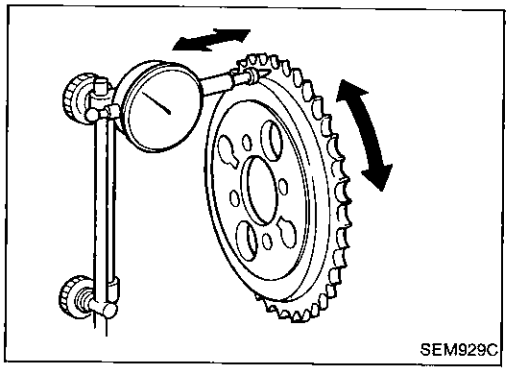


3. Measure outer diameter of camshaft journal.
   Standard outer diameter:
   25.935 - 25.955 mm (1.0211 - 1.0218 in)
4. If clearance exceeds the limit, replace camshaft and/or cylinder head.
   Camshaft journal clearance:
   Standard
   0.045 - 0.086 mm (0.0018 - 0.0034 in)
   Limit
   0.15 mm (0.0059 in)



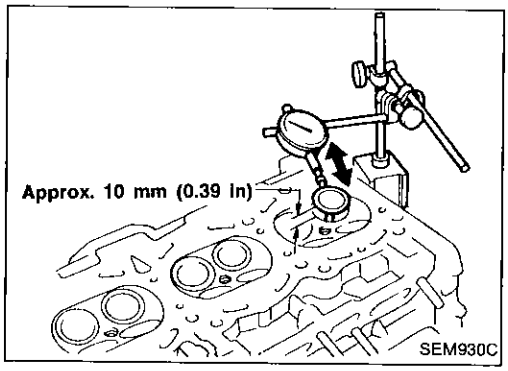
CAMSHAFT END PLAY

1. Install camshaft and thermostat housing in cylinder head.
2. Measure camshaft end play.
   Camshaft end play:
   Standard
   0.070 - 0.148 mm (0.0028 - 0.0058 in)
   Limit
   0.20 mm (0.0079 in)



CAMSHAFT SPROCKET RUNOUT

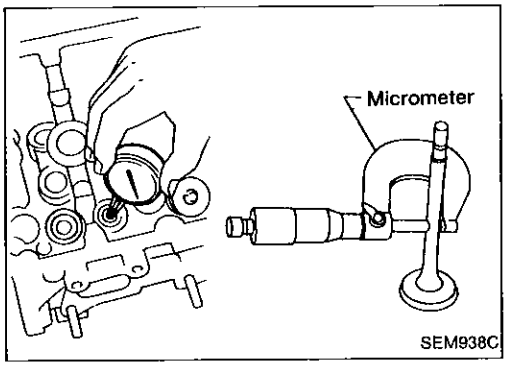
1. Install sprocket on camshaft.
2. Measure camshaft sprocket runout.
   Runout (Total indicator reading):
   Limit 0.15 mm (0.0059 in)
3. If it exceeds the limit, replace camshaft sprocket.



VALVE GUIDE CLEARANCE

1. Measure valve deflection in a parallel direction with rocker arm. (Valve and valve guide mostly wear in this direction.)
   Valve deflection limit (Dial gauge reading):
   Intake & Exhaust
   0.15 mm (0.0059 in)

Inspection (Cont'd)

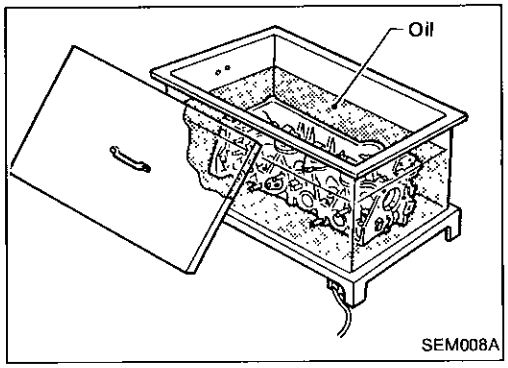


2. If it exceeds the limit, check valve to valve guide clearance.
a. Measure valve stem diameter and valve guide inner diameter.
b. Check that clearance is within specification.

Valve to valve guide clearance:

Unit: mm (in)

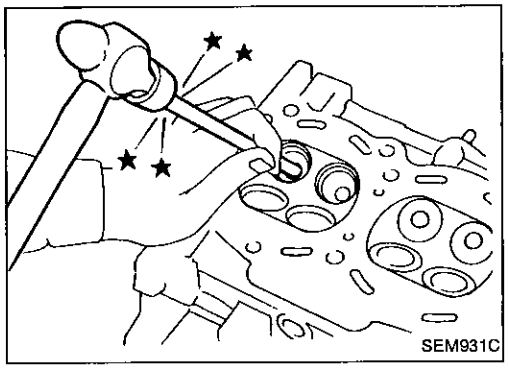
	Standard	Limit
Intake	0.029 - 0.052 (0.0011 - 0.0020)	0.080 (0.0031)
Exhaust	0.035 - 0.051 (0.0014 - 0.0020)	0.080 (0.0031)



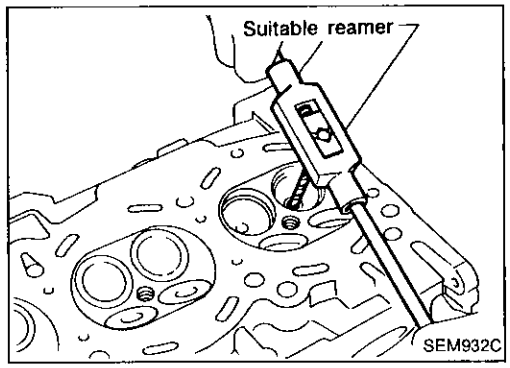
c. If it exceeds the limit, replace valve or valve guide.

VALVE GUIDE REPLACEMENT

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



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.

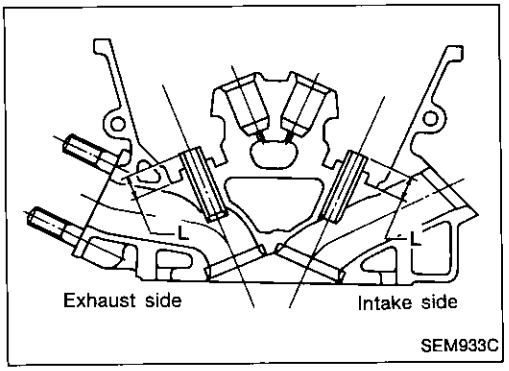
Valve guide hole diameter (for service parts):

Intake

11.175 - 11.196 mm (0.4400 - 0.4408 in)

Exhaust

12.175 - 12.196 mm (0.4793 - 0.4802 in)

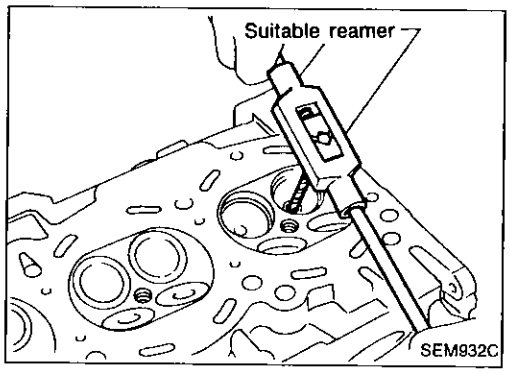


4. Heat cylinder head to 110 to 130°C (230 to 266°F) and press service valve guide onto cylinder head.

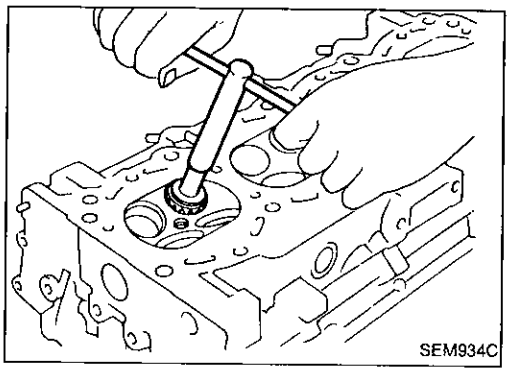
Projection "L":

13.15 - 13.35 mm (0.5177 - 0.5256 in)

Inspection (Cont'd)



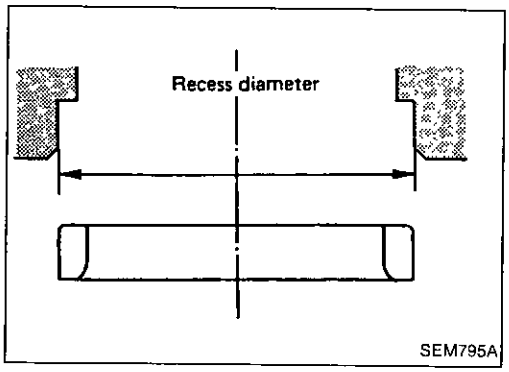
5. Ream valve guide.
   Finished size:
   Intake
   7.000 - 7.018 mm (0.2756 - 0.2763 in)
   Exhaust
   8.000 - 8.011 mm (0.3150 - 0.3154 in)



VALVE SEATS

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

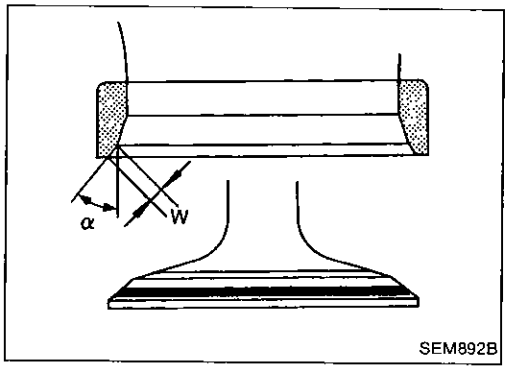
- **Before repairing valve seats, check valve and valve guide for wear. If they have worn, replace them. Then correct valve seat.**
- **Cut with both hands to uniform the cutting surface.**



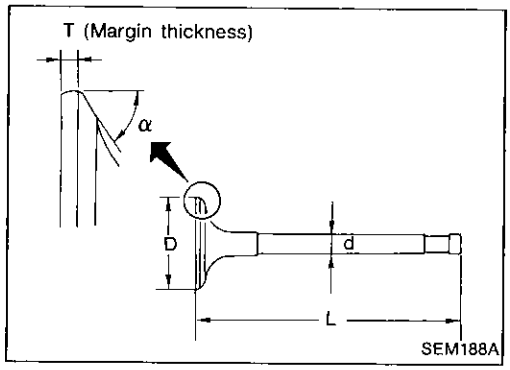
REPLACING VALVE SEAT FOR SERVICE PARTS

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 39.500 - 39.516 mm (1.5551 - 1.5557 in)
   Exhaust 34.500 - 34.516 mm (1.3583 - 1.3589 in)

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



3. Heat cylinder head to 110 to 130°C (230 to 266°F).
4. Press fit valve seat until it seats on the bottom.
5. Cut or grind valve seat using suitable tool at the specified dimensions as shown in S.D.S.
6. After cutting, lap valve seat with abrasive compound.
7. Check valve seating condition.
   Seat face angle "α": 44°53' - 45°07' deg.
   Contacting width "W":
   Intake 1.49 - 1.62 mm (0.0587 - 0.0638 in)
   Exhaust 1.77 - 1.90 mm (0.0697 - 0.0748 in)



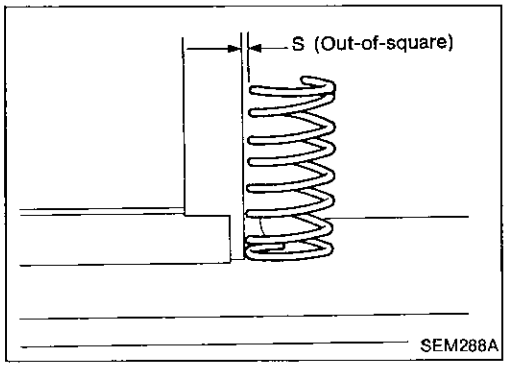
VALVE DIMENSIONS

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.

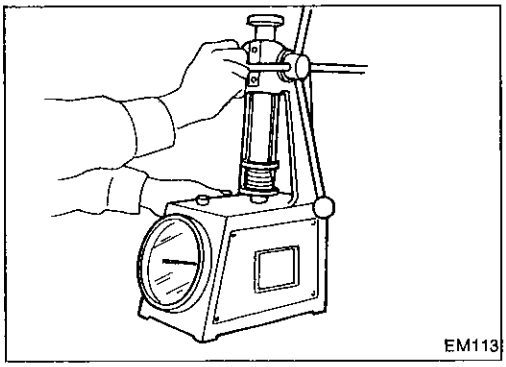
Inspection (Cont'd)



VALVE SPRING

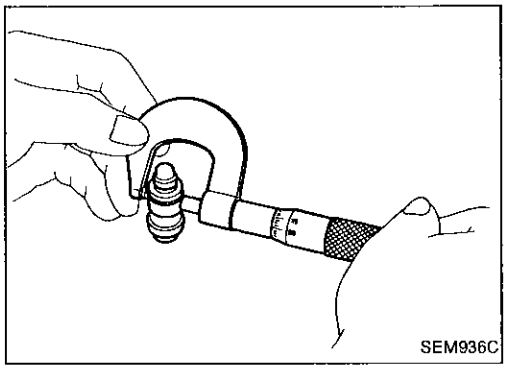
Squareness

1. Measure "S" dimension.
   Out-of-square:
   Less than 2.06 mm (0.0811 in)
2. If it exceeds the limit, replace spring.



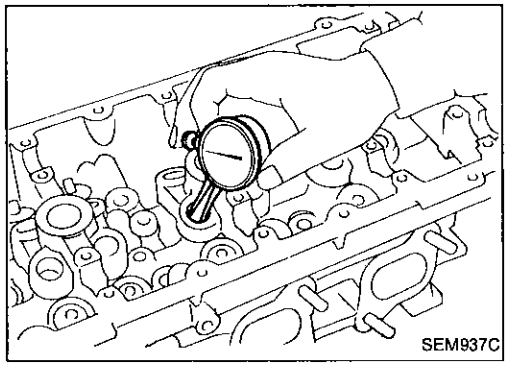
Pressure

Check valve spring pressure.
Pressure: N (kg, lb) at height mm (in)
Standard
535.5 (54.6, 120.4) at 26.8 (1.055)
Limit
More than 477.6 (48.7, 107.4) at 26.8 (1.055)
If it exceeds the limit, replace spring.

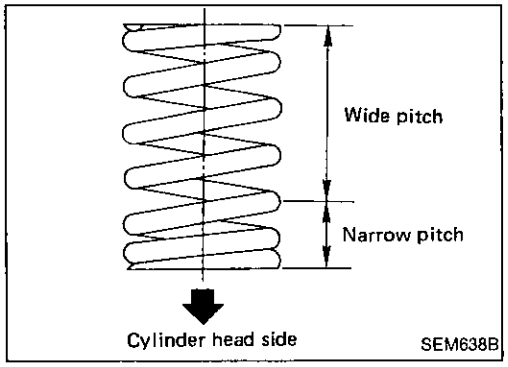


HYDRAULIC LASH ADJUSTER

1. Check contact and sliding surfaces for wear or scratches.
2. Check diameter of lash adjuster.
   Outer diameter:
   16.980 - 16.993 mm (0.6685 - 0.6690 in)



3. Check lash adjuster guide inner diameter.
   Inner diameter:
   17.000 - 17.020 mm (0.6693 - 0.6701 in)
   Standard clearance between lash adjuster and adjuster guide:
   0.007 - 0.040 mm (0.0003 - 0.0016 in)



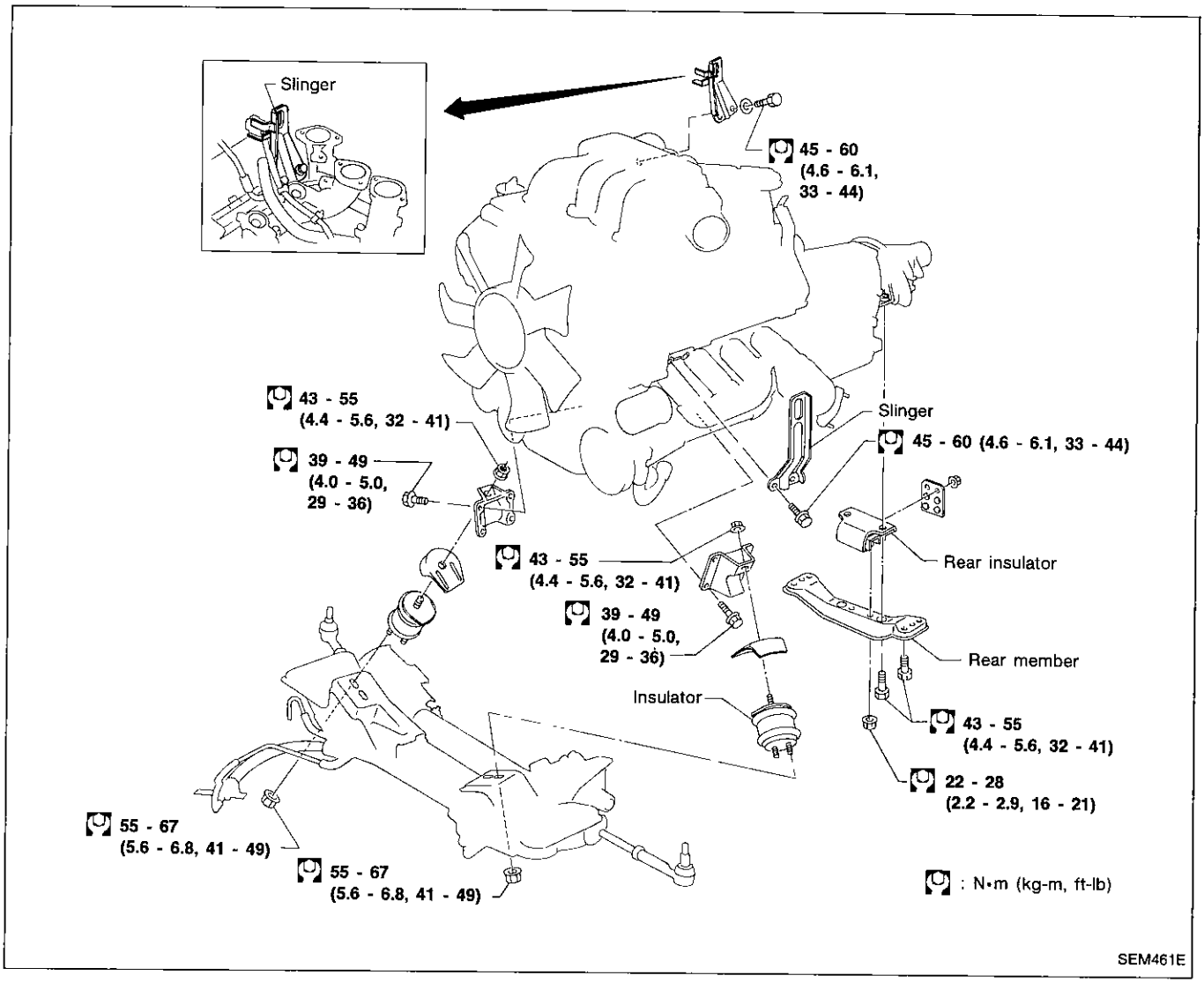
Assembly

1. Install valve component parts.

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

Installation

- This installation is the same procedure as those for timing chain. Refer to "Installation" in "TIMING CHAIN".

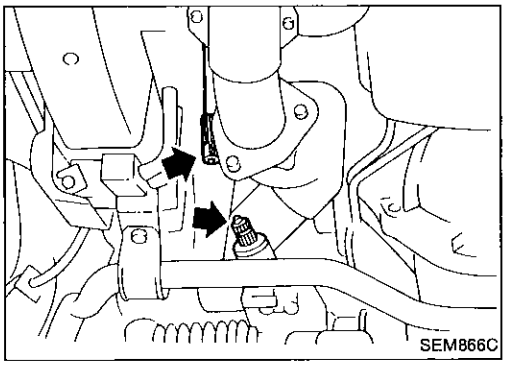


WARNING:

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

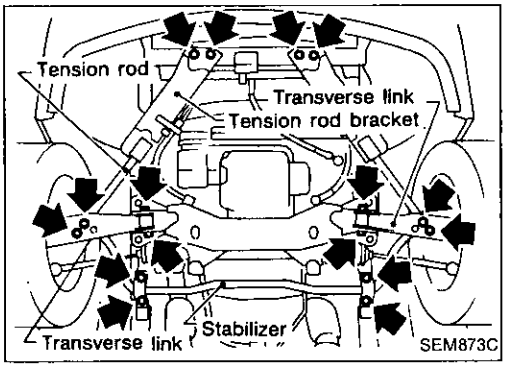
CAUTION:

- **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.**


SEM866C

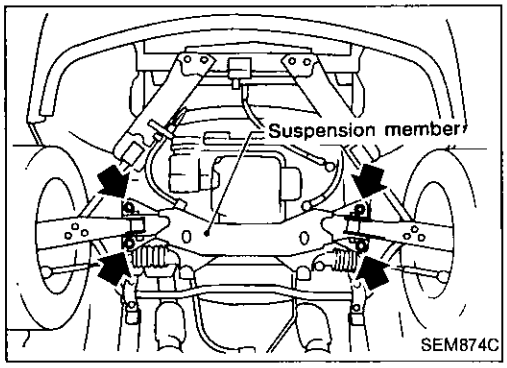
Removal

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, harness and connectors and so on.
5. Remove exhaust tubes and propeller shaft.
6. Remove radiator and shroud.
7. Remove drive belts.
8. Remove alternator, A/C compressor and power steering tube from engine.
9. Remove steering lower joint.
10. Remove stabilizer, transverse link and tension rod with bracket.
11. Set a suitable transmission jack under transmission. Hoist engine with engine slinger.

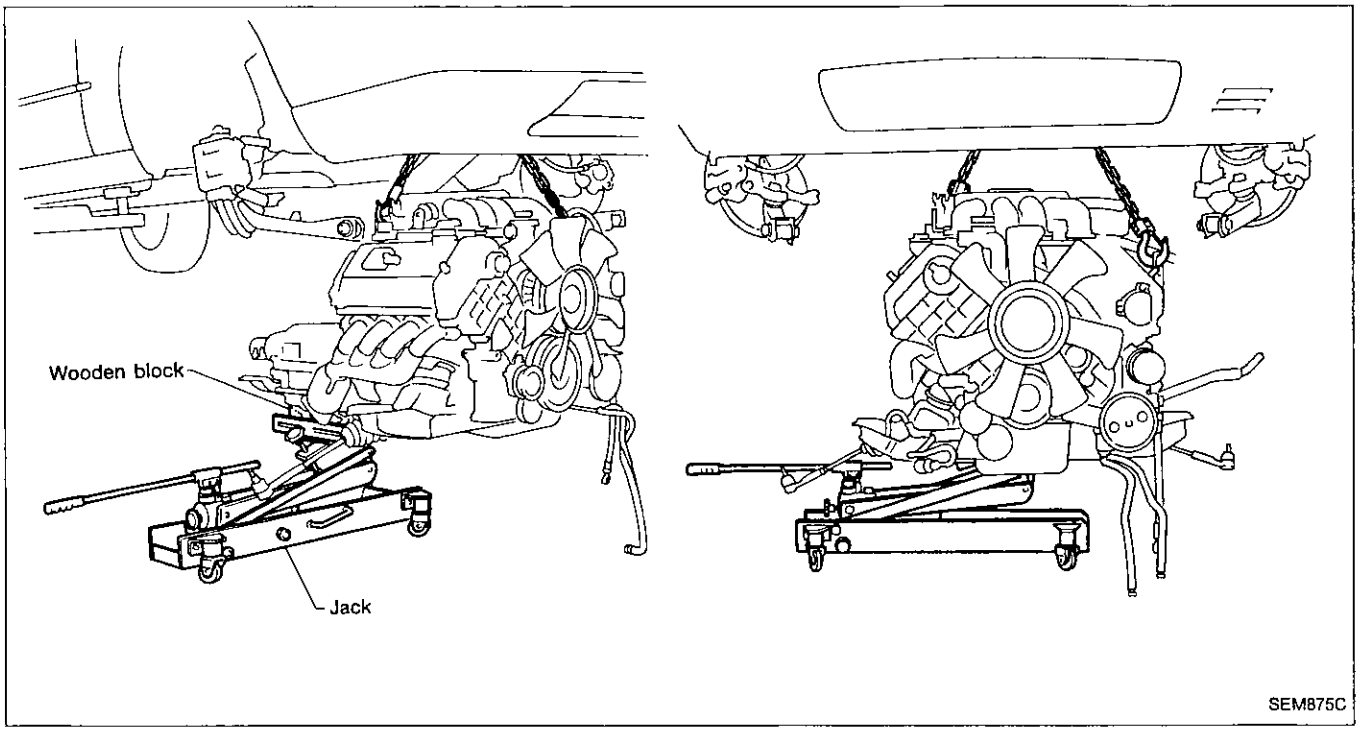


SEM873C

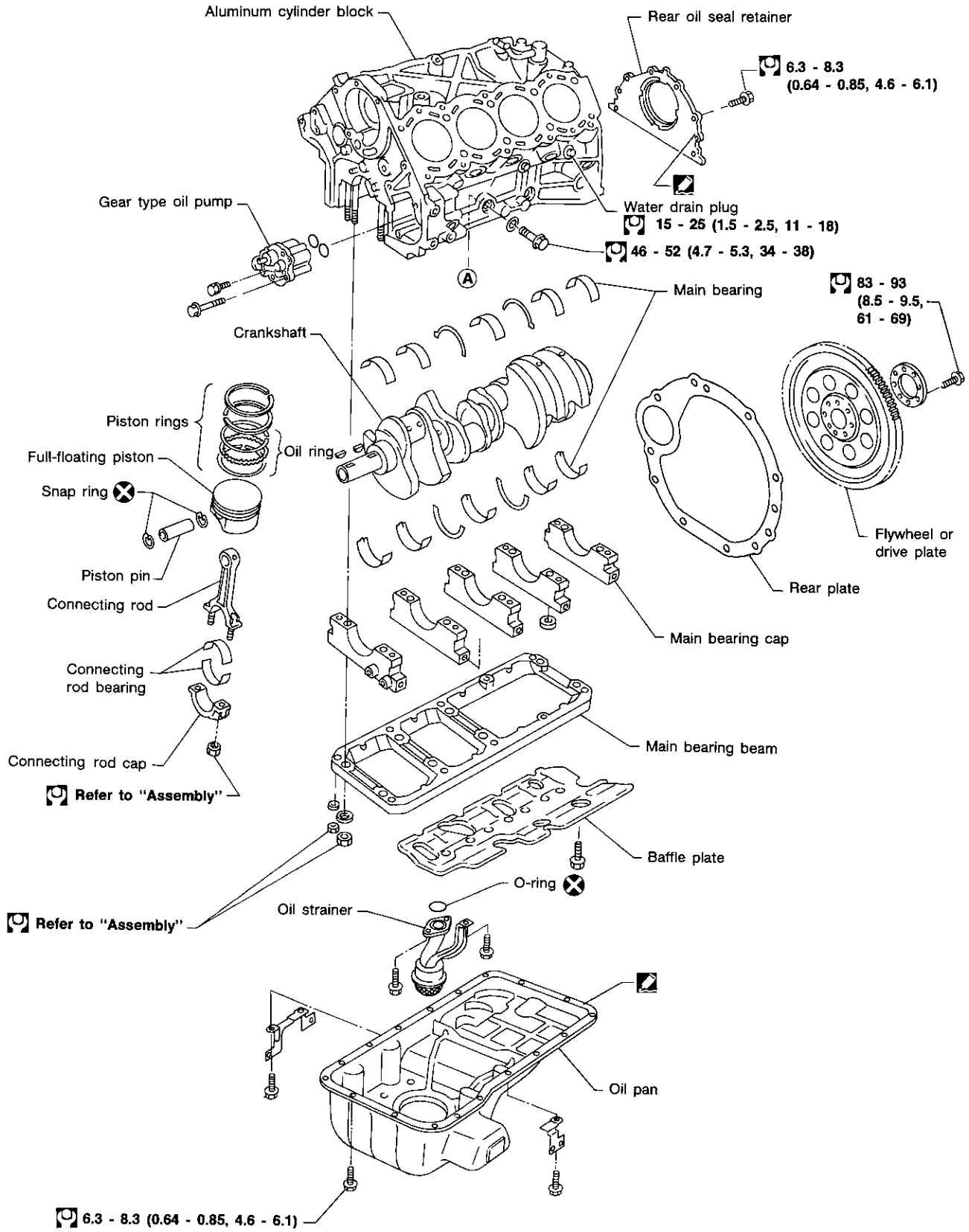
12. Remove suspension member fixing bolts.
13. Remove engine mounting bolts from both sides and then slowly lower transmission jack.
14. Remove engine with transmission as shown in following figure.



SEM874C



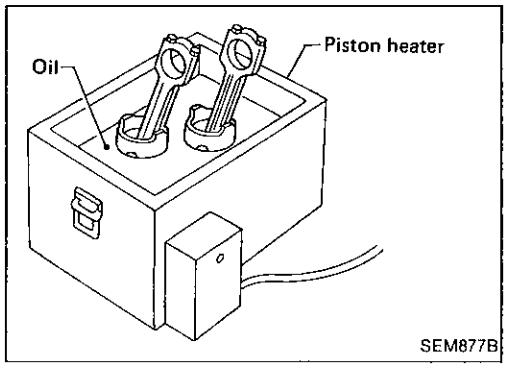
SEM875C


Aluminum cylinder block
Rear oil seal retainer
6.3 - 8.3
(0.64 - 0.85, 4.6 - 6.1)
Gear type oil pump
Water drain plug
15 - 25 (1.5 - 2.5, 11 - 18)
46 - 52 (4.7 - 5.3, 34 - 38)
A
Main bearing
83 - 93
(8.5 - 9.5,
61 - 69)
Crankshaft
Piston rings
Oil ring
Full-floating piston
Snap ring
Flywheel or
drive plate
Rear plate
Piston pin
Connecting rod
Main bearing cap
Connecting
rod bearing
Main bearing beam
Connecting rod cap
Refer to "Assembly"
Baffle plate
O-ring
Refer to "Assembly"
Oil strainer
Oil pan
6.3 - 8.3 (0.64 - 0.85, 4.6 - 6.1)
: N•m (kg-m, ft-lb)
: Liquid gasket

SEM533E

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.**



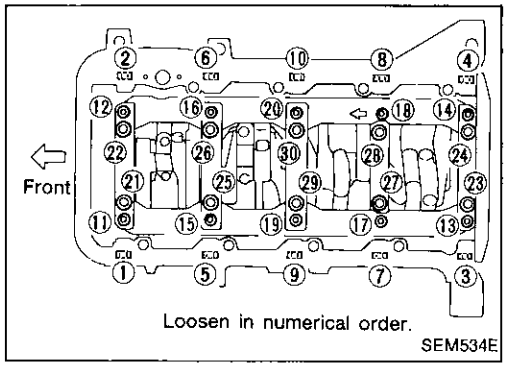
SEM877B

Disassembly

PISTON AND CRANKSHAFT

1. Remove timing chain.
   Refer to "Removal" in "TIMING CHAIN".
2. Remove baffle plate.
3. Remove pistons with connecting rod.

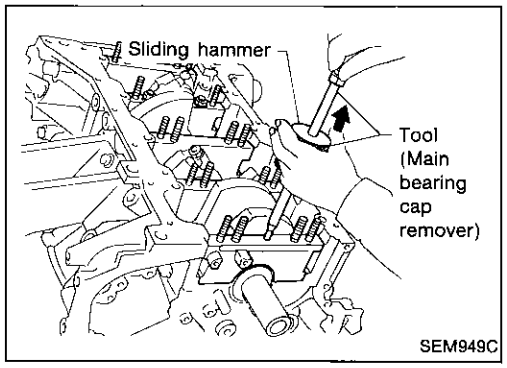
- When disassembling piston and connecting rod, remove snap ring first, then heat piston to 60 to 70°C (140 to 158°F) or use piston pin press stand at room temperature.



SEM534E

4. Remove bearing beam, bearing cap and crankshaft.

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



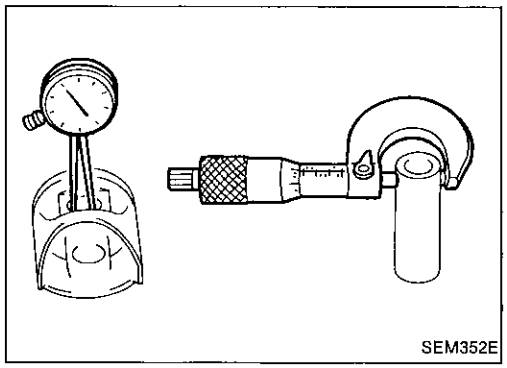
SEM949C

Inspection

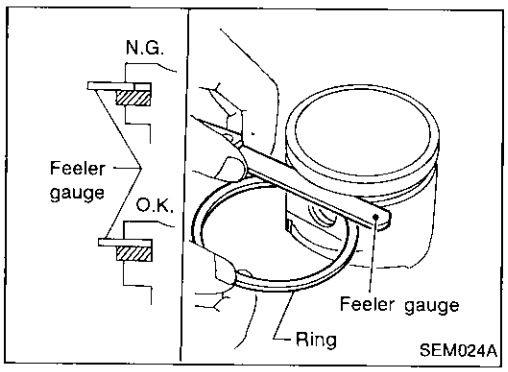
PISTON AND PISTON PIN CLEARANCE

1. Measure inner diameter of piston pin hole "dp".
   Standard diameter "dp":
   21.987 - 21.999 mm (0.8656 - 0.8661 in)
2. Measure outer diameter of piston pin "Dp".
   Standard diameter "Dp":
   21.989 - 22.001 mm (0.8657 - 0.8662 in)
3. Calculate piston pin clearance.
   dp – Dp = –0.004 to 0 mm (–0.0002 to 0 in)

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


SEM352E

Inspection (Cont'd)



PISTON RING SIDE CLEARANCE

Side clearance:

Top ring

0.040 - 0.080 mm (0.0016 - 0.0031 in)

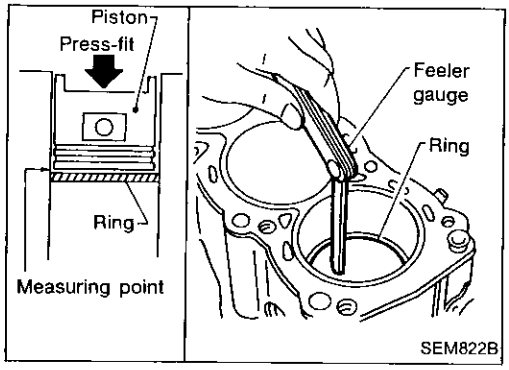
2nd ring

0.030 - 0.070 mm (0.0012 - 0.0028 in)

Max. limit of side clearance:

0.1 mm (0.004 in)

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



PISTON RING END GAP

End gap:

Top ring 0.27 - 0.46 mm (0.0106 - 0.0181 in)

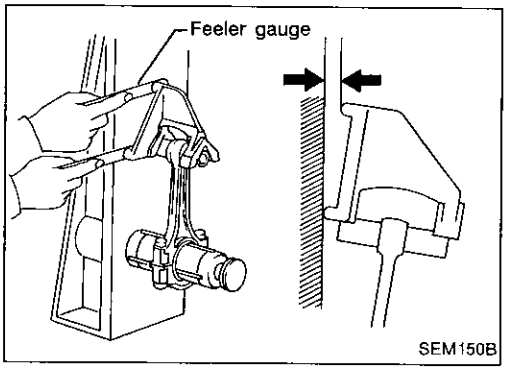
2nd ring 0.39 - 0.63 mm (0.0154 - 0.0248 in)

Oil ring 0.20 - 0.69 mm (0.0079 - 0.0272 in)

Max. limit of ring 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.



CONNECTING ROD BEND AND TORSION

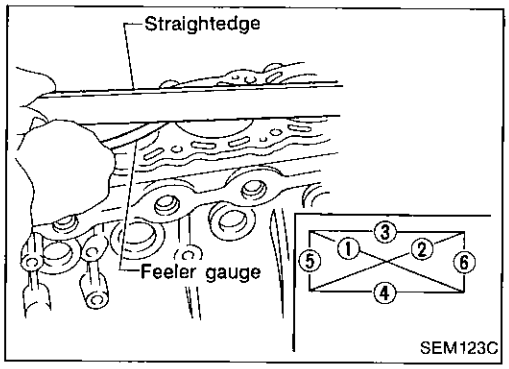
Bend: Limit 0.15 mm (0.0059 in)

per 100 mm (3.94 in) length

Torsion: Limit 0.30 mm (0.0118 in)

per 100 mm (3.94 in) length

If it exceeds the limit, replace connecting rod assembly.



CYLINDER BLOCK DISTORTION AND WEAR

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

   Standard: Less than 0.03 mm (0.0012 in)

   Limit: 0.10 mm (0.0039 in)

2. If out of specification, resurface it.

   The resurfacing limit is determined by the relationship with the amount of cylinder head resurfacing.

Amount of cylinder head resurfacing is "A".

Amount of cylinder block resurfacing is "B".

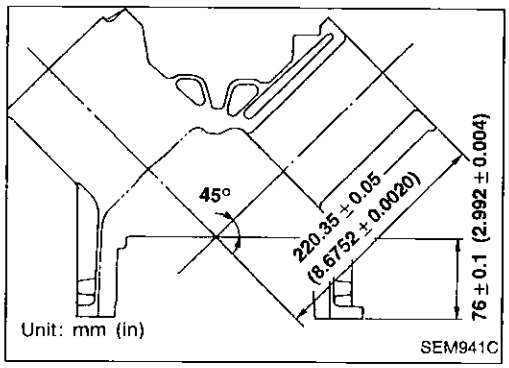
The maximum limit is as follows:

A + B = 0.2 mm (0.008 in)

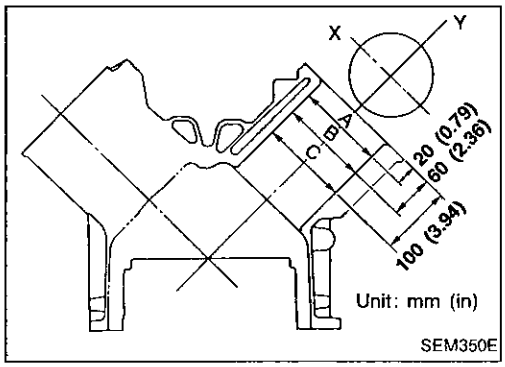
Nominal cylinder block height from crankshaft center:

220.3 - 220.4 mm (8.673 - 8.677 in)

3. If necessary, replace cylinder block.



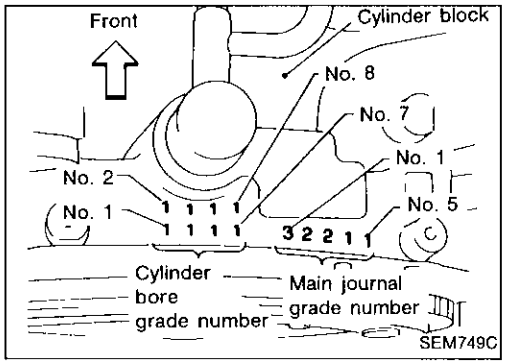
Inspection (Cont'd)

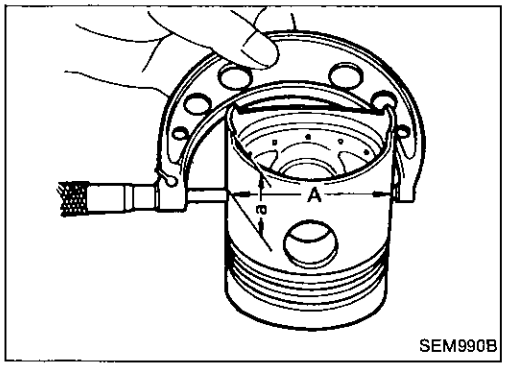


PISTON-TO-BORE CLEARANCE AND BORING

1. Using a bore gauge, measure cylinder bore for wear, out-of-round and taper.
   Standard inner diameter:
   93.000 - 93.030 mm (3.6614 - 3.6626 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: 0.010 mm (0.0004 in)
   If it exceeds the limit, rebore all cylinders. Replace cylinder block if necessary.
2. Check for scratches and seizure. If necessary, hone it.

- **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 bottom):
   11.5 mm (0.453 in)
4. Check that piston-to-bore clearance is within specification.
   Piston-to-bore clearance:
   0.010 - 0.030 mm (0.0004 - 0.0012 in)
5. Determine piston oversize according to amount of cylinder wear.

Oversize pistons are available for service. Refer to 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.

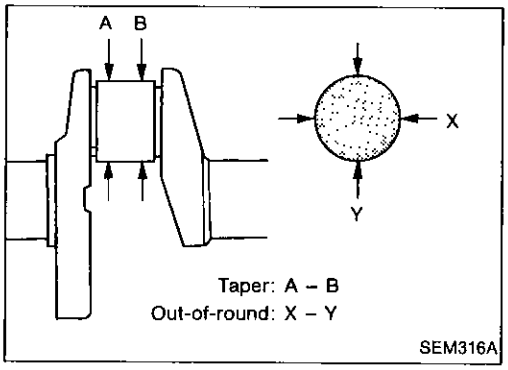
- **When any cylinder needs boring, all other cylinders must also be bored.**
- **Do not cut too much out of cylinder bore at a time. Cut only 0.05 mm (0.0020 in) or so in diameter at a time.**

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

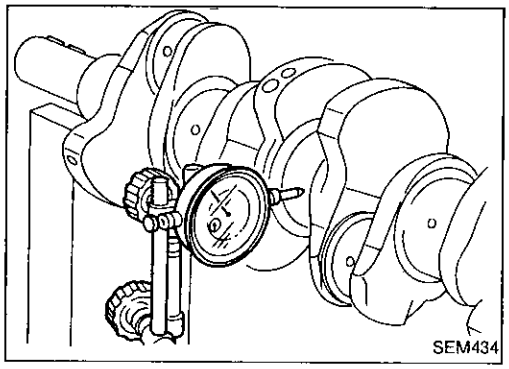
- **Measurement should be done after cylinder bore cools down.**

Inspection (Cont'd)

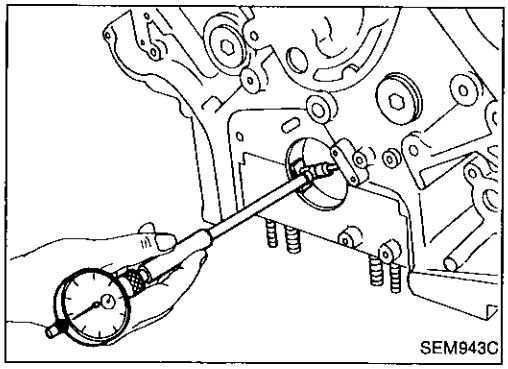
CRANKSHAFT



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



3. Measure crankshaft runout.
   Runout (Total indicator reading):
   Less than 0.05 mm (0.0020 in)



BEARING CLEARANCE

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

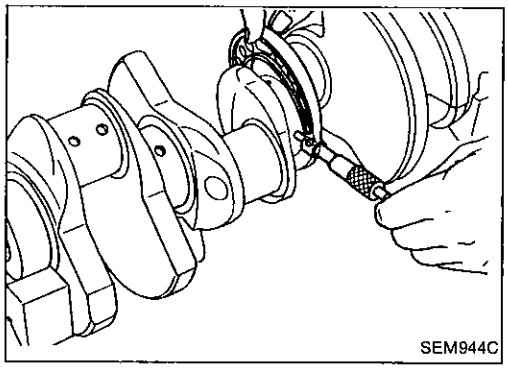
Method A (Using bore gauge & micrometer)

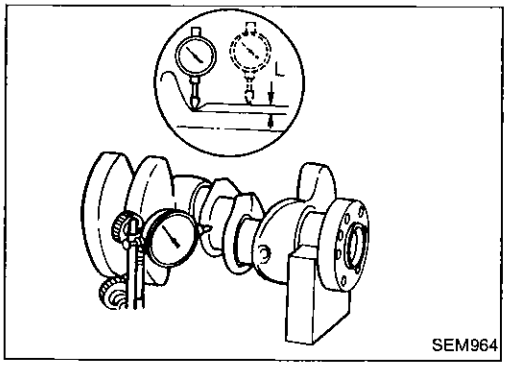
Main bearing

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.

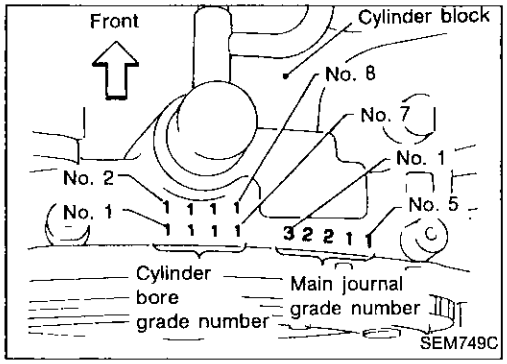
3. Measure inner diameter "A" of each main bearing.
4. Measure outer diameter "Dm" of each crankshaft main journal.
5. Calculate main bearing clearance.
   Main bearing clearance = A – Dm
   Standard: 0.012 - 0.030 mm (0.0005 - 0.0012 in)
   Limit: 0.050 mm (0.0020 in)
6. If it exceeds the limit, replace bearing.
7. If clearance cannot be adjusted within the standard, grind crankshaft journal and use undersized bearing.





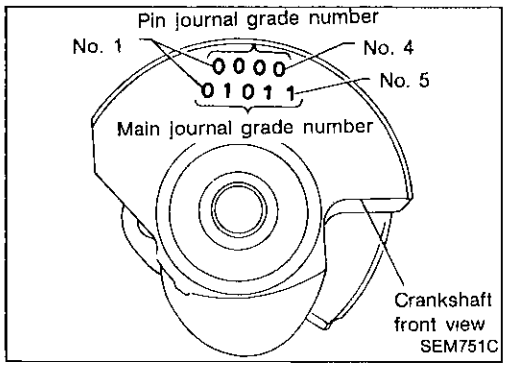
a. When grinding crankshaft journal, confirm that "L" dimension in fillet roll is more than the specified limit.
   "L": 0.1 mm (0.004 in)
b. Refer to S.D.S. for grinding crankshaft and available service parts.

Inspection (Cont'd)



8. If crankshaft is reused, measure main bearing clearances and select thickness of main bearings.
   If crankshaft is replaced with a new one, 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 in either Arabic or Roman numerals.



b. Grade number of each crankshaft main journal is punched on the respective crankshaft in either Arabic or Roman numerals.

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

How to select main bearings

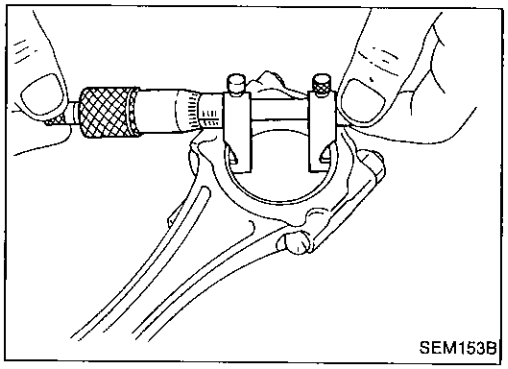
Main Bearing		Cylinder block journal grade number			
		0	1 (I)	2 (II)	3 (III)
Crankshaft journal grade number	0	0	1	2	3
	1 (I)	1	2	3	4
	2 (II)	2	3	4	5
	3 (III)	3	4	5	6

Identification mark and color

0	1	2	3	4	5	6
A, Black	B, Brown	C, Green	D, Yellow	E, Blue	F, Pink	G, No color

For example:
Cylinder block journal grade number: 1
Crankshaft journal grade number: 2
Main bearing grade number = 1 + 2
= 3
= D, Yellow

Inspection (Cont'd)

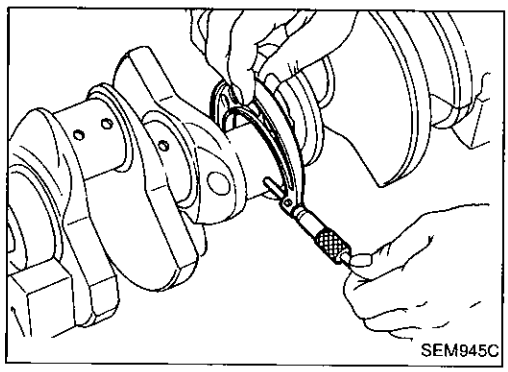

SEM153B

Connecting rod bearing (Big end)

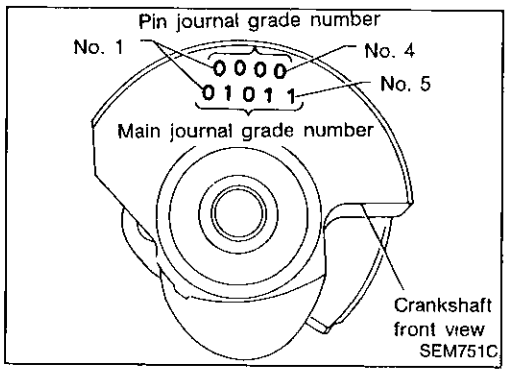
1. Install connecting rod bearing to connecting rod and cap.
2. Install connecting rod cap to connecting rod.

Tighten bolts to the specified torque.

3. Measure inner diameter "C" of each bearing.
4. Measure outer diameter "Dp" of each crankshaft pin journal.


SEM945C

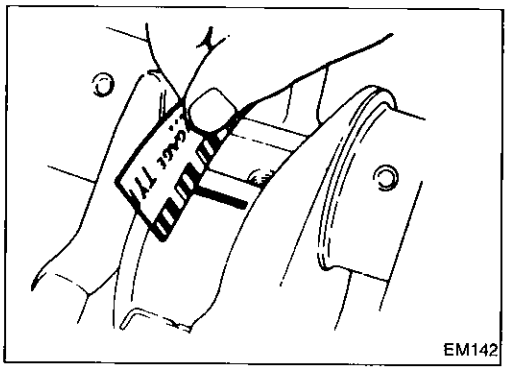
5. Calculate connecting rod bearing clearance.
   Connecting rod bearing clearance = C – Dp
   Standard: 0.020 - 0.045 mm (0.0008 - 0.0018 in)
   Limit: 0.065 mm (0.0026 in)
6. If it exceeds the limit, replace bearing.
7. If clearance cannot be adjusted within the standard of any bearing, grind crankshaft journal and use undersized bearing.
   Refer to step 7 of "BEARING CLEARANCE — Main bearing".



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

Connecting rod bearing grade number:

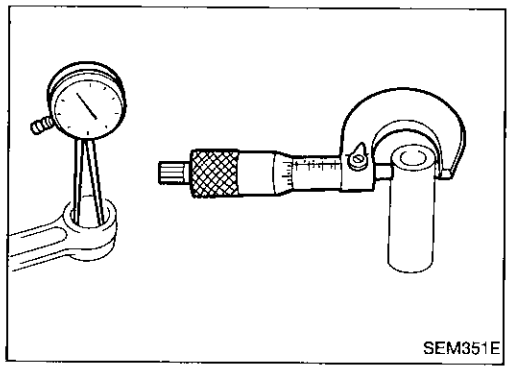
Crank pin grade number	Connecting rod bearing grade number	Identification color
0	0	No color
1 (I)	1 (I)	Brown
2 (II)	2 (II)	Green


EM142

Method B (Using plastigage)

CAUTION:

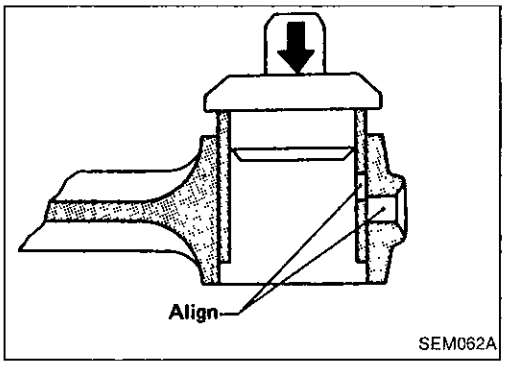
- **Do not turn crankshaft or connecting rod while plastigage is being inserted.**
- **When bearing clearance exceeds the specified limit, ensure that the proper bearing has been installed. Then if excessive bearing clearance exists, use a thicker main bearing or undersized bearing so that the specified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


SEM351E

CONNECTING ROD BUSHING CLEARANCE (Small end)

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

Inspection (Cont'd)



REPLACEMENT OF CONNECTING ROD BUSHING (Small end)

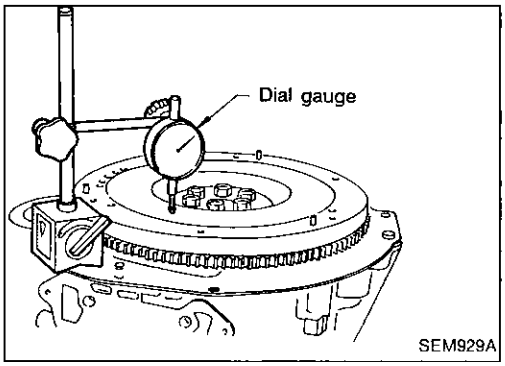
1. Drive in small end bushing until it is flush with end surface of rod.

Be sure to align oil holes.

2. After driving in small end bushing, ream the bushing so that clearance between connecting rod bushing and piston pin is the specified value.

Clearance:

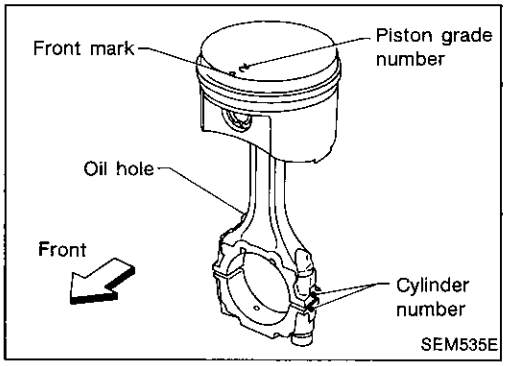
0.005 - 0.017 mm (0.0002 - 0.0007 in)



DRIVE PLATE RUNOUT

Drive plate runout (Total indicator reading):

Less than 0.20 mm (0.0079 in)

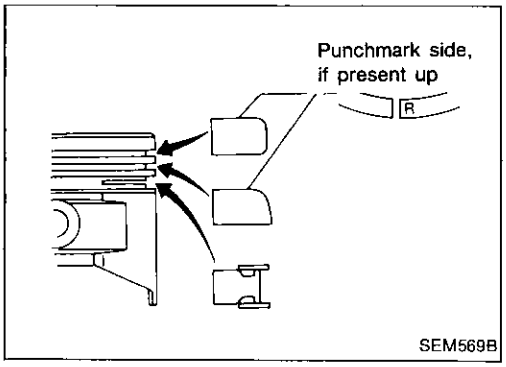


Assembly

PISTON

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

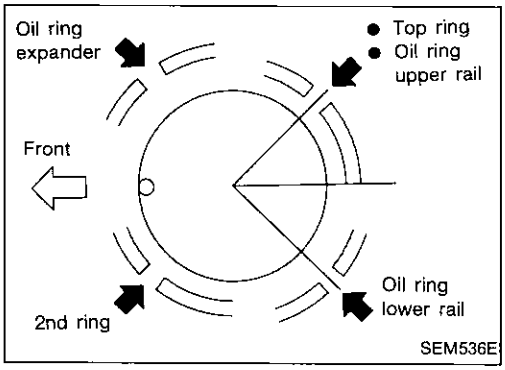
- **Align the direction of piston and connecting rod.**
- **Numbers stamped on connecting rod and cap correspond to each cylinder.**
- **After assembly, make sure connecting rod swings smoothly.**



3. Set piston rings as shown.

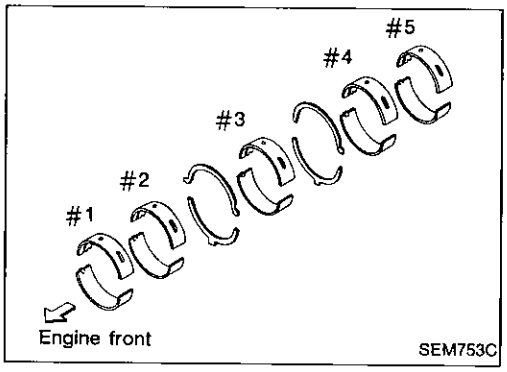
CAUTION:

- **When piston rings are not replaced, make sure that piston rings are mounted in their original positions.**
- **When piston rings are being replaced and no punchmark is present, piston rings can be mounted with either side up.**



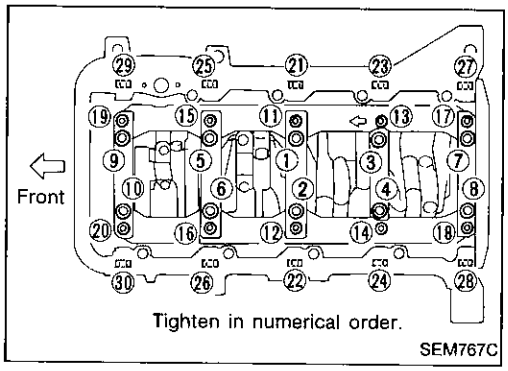
Assembly (Cont'd)

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" of this section.**



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

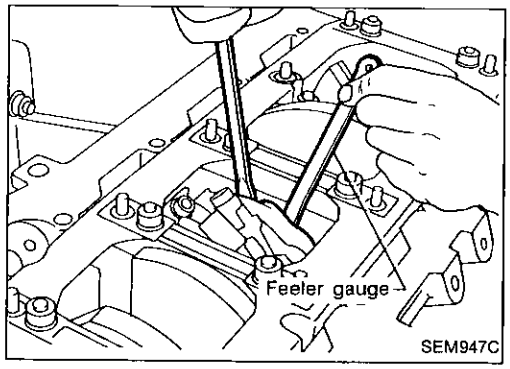
- **Prior to tightening bearing cap bolts, place bearing cap in its proper position by shifting crankshaft in the axial direction.**
- **Tightening procedure**

1) Tighten nuts (① - ⑳) to ⓐ.
2) Turn nuts (① - ⑳) ⓑ degrees clockwise or if angle wrench is not available, tighten all nuts to ⓒ.
3) Tighten all bolts (㉑ - ㉚) to ⓓ.

Unit: N·m (kg-m, ft-lb)

	Nuts (① ② ⑤ - ⑩)	Nuts (③ ④)	Nuts (⑪ - ⑳)	Bolts (㉑ - ㉚)
ⓐ	46 ± 3 (4.7 ± 0.3, 34.0 ± 2.2)	43 ± 3 (4.4 ± 0.3, 31.8 ± 2.2)	22 ± 3 (2.2 ± 0.3, 15.9 ± 2.2)	—
ⓑ	50^{+5}_{-0} degrees	40^{+5}_{-0} degrees	50^{+5}_{-0} degrees	—
ⓒ	113 ± 3 (11.5 ± 0.3, 83.2 ± 2.2)	111 ± 3 (11.3 ± 0.3, 81.7 ± 2.2)	43 ± 3 (4.4 ± 0.3, 31.8 ± 2.2)	—
ⓓ	—	—	—	49 ± 3 (5.0 ± 0.3, 36.2 ± 2.2)

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

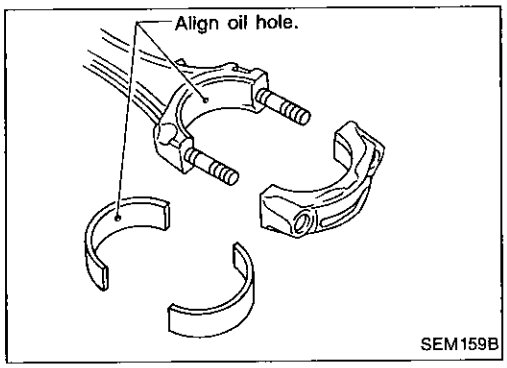


3. Measure crankshaft end play.

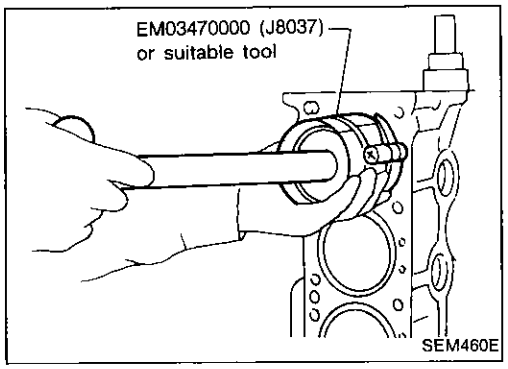
Crankshaft end play:
Standard
0.10 - 0.26 mm (0.0039 - 0.0102 in)
Limit
0.30 mm (0.0118 in)

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

Assembly (Cont'd)

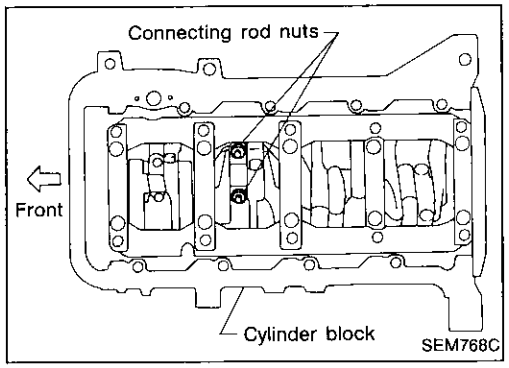


4. Install connecting rod bearings in connecting rods and connecting rod caps.
- **Confirm that correct bearings are used. Refer to "Inspection".**
- **Install bearings so that oil hole in connecting rod aligns with oil hole of bearing.**



5. Install pistons with connecting rods.

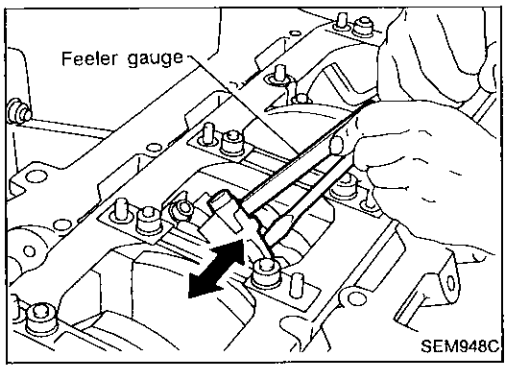
a. Install them into corresponding cylinders with Tool.
- **Be careful not to scratch cylinder wall by connecting rod.**
- **Arrange so that front mark on piston head faces toward front of engine.**



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

Tightening procedure:

1) **Tighten nuts to 14 to 16 N·m (1.4 to 1.6 kg-m, 10 to 12 ft-lb).**
2) **Turn nuts 60 to 65 degrees clockwise or if angle wrench is not available, tighten nuts to 38 to 44 N·m (3.9 to 4.5 kg-m, 28 to 33 ft-lb).**



6. Measure connecting rod side clearance.

Connecting rod side clearance:

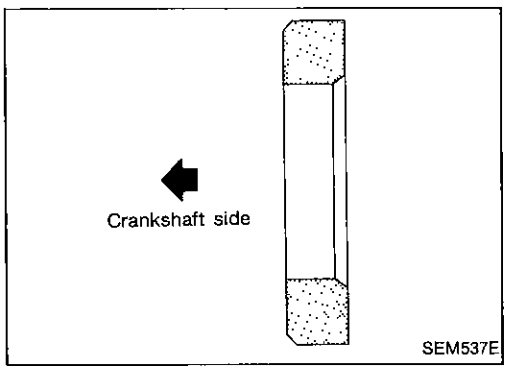
Standard

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.



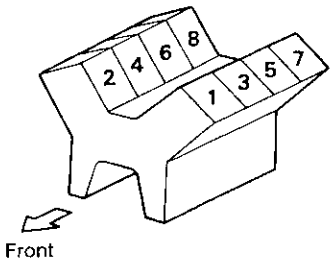
REPLACING PILOT CONVERTER

1. Remove pilot converter.
2. Install pilot converter.

General Specifications

Cylinder arrangement		V-8
Displacement	cm^3 (cu in)	4,494 (274.22)
Bore and stroke	mm (in)	93 x 82.7 (3.66 x 3.256)
Valve arrangement		D.O.H.C.
Firing order		1-8-7-3-6-5-4-2
Number of piston rings		
Compression		2
Oil		1
Number of main bearings		5
Compression ratio		10.2

Cylinder number



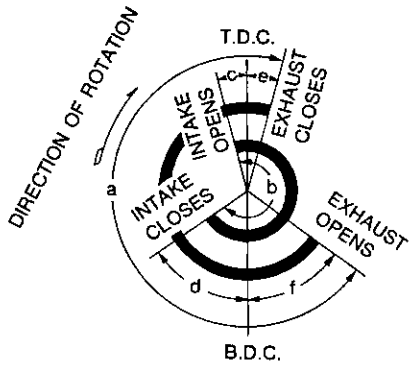
SEM957C

COMPRESSION PRESSURE

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

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

Valve timing



EM120

Unit: degree

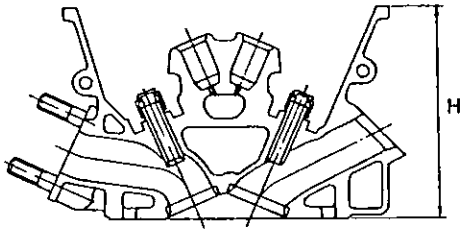
a	b	c	d	e	f
248	248	0	68	8	60

Inspection and Adjustment

CYLINDER HEAD

Unit: mm (in)

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



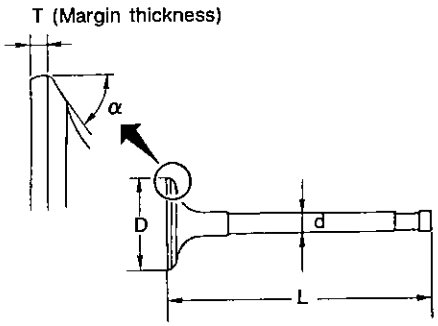
Nominal cylinder head height:
H = 130.7 - 130.9 mm (5.146 - 5.154 in)

SEM956C

Inspection and Adjustment (Cont'd)

VALVE

Unit: mm (in)



SEM188

Valve head diameter "D"	
Intake	38.0 - 38.2 (1.496 - 1.504)
Exhaust	33.0 - 33.2 (1.299 - 1.307)
Valve length "L"	
Intake	101.70 - 102.30 (4.0039 - 4.0276)
Exhaust	102.12 - 102.72 (4.0205 - 4.0441)
Valve stem diameter "d"	
Intake	6.966 - 6.971 (0.2743 - 0.2744)
Exhaust	7.960 - 7.965 (0.3134 - 0.3136)
Valve seat angle "α"	
Intake	45°15' - 45°45'
Exhaust	
Valve margin "T"	
Intake	1.15 - 1.45 (0.0453 - 0.0571)
Exhaust	1.45 - 1.75 (0.0571 - 0.0689)
Valve margin "T" limit	More than 0.5 (0.020)
Valve stem end surface grinding limit	Less than 0.2 (0.008)
Valve clearance	
Intake	0 (0)
Exhaust	0 (0)

Valve spring

Free height	mm (in)	47.31 (1.8626)
Pressure N (kg, lb) at height mm (in)		
Standard		535.5 (54.6, 120.4) at 26.8 (1.055)
Limit		477.6 (48.7, 107.4) at 26.8 (1.055)
Out-of-square	mm (in)	Less than 2.06 (0.0811)

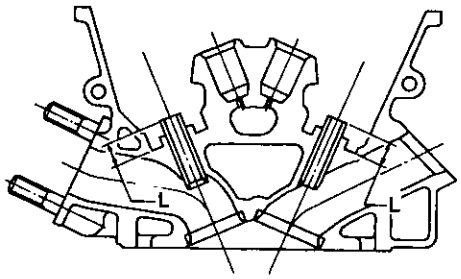
Hydraulic lash adjuster (H.L.A.)

Unit: mm (in)

H.L.A. outer diameter	16.980 - 16.993 (0.6685 - 0.6690)
H.L.A. guide inner diameter	17.000 - 17.020 (0.6693 - 0.6701)
Clearance between H.L.A. and H.L.A. guide	0.007 - 0.040 (0.0003 - 0.0016)

Valve guide

Unit: mm (in)



Exhaust side Intake side

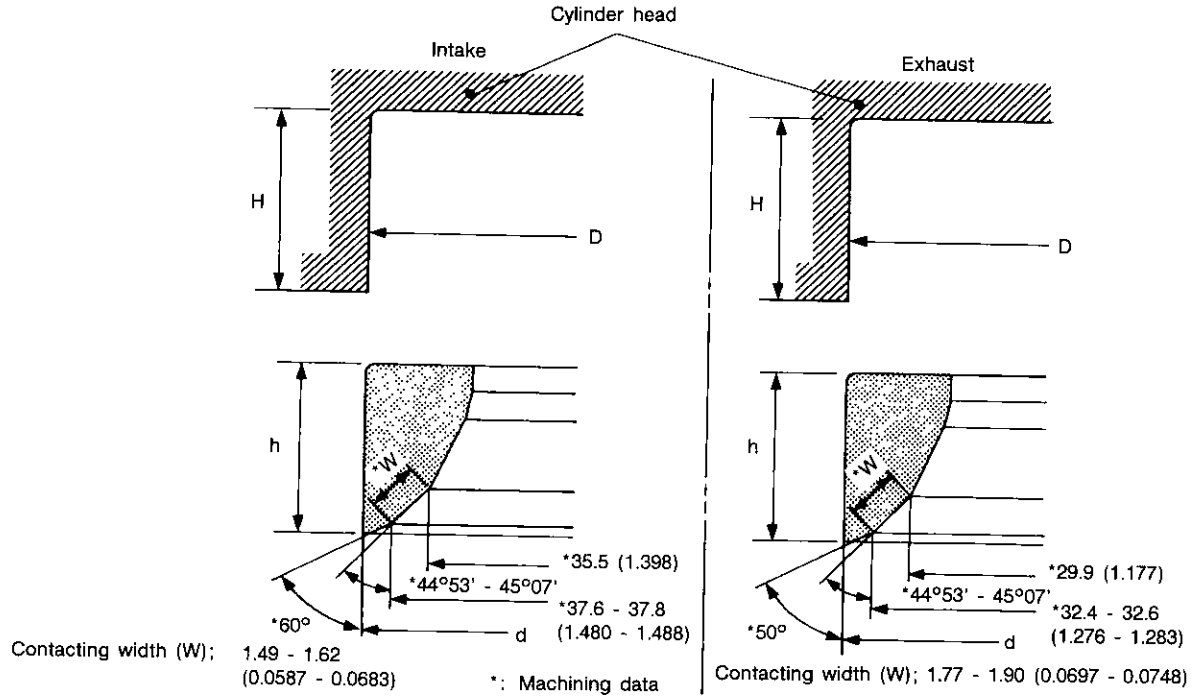
SEM933C

		Standard	Service
Valve guide Outer diameter	Intake	11.023 - 11.034 (0.4340 - 0.4344)	11.223 - 11.234 (0.4418 - 0.4423)
	Exhaust	12.023 - 12.034 (0.4733 - 0.4738)	12.223 - 12.234 (0.4812 - 0.4817)
Valve guide Inner diameter (Finished size)	Intake	7.000 - 7.018 (0.2756 - 0.2763)	
	Exhaust	8.000 - 8.011 (0.3150 - 0.3154)	
Cylinder head valve guide hole diameter	Intake	10.975 - 10.996 (0.4321 - 0.4329)	11.175 - 11.196 (0.4400 - 0.4408)
	Exhaust	11.975 - 11.996 (0.4715 - 0.4723)	12.175 - 12.196 (0.4793 - 0.4802)
Interference fit of valve guide		0.027 - 0.059 (0.0011 - 0.0023)	
		Standard	Limit
Stem to guide clearance	Intake	0.029 - 0.052 (0.0011 - 0.0020)	0.080 (0.0031)
	Exhaust	0.035 - 0.051 (0.0014 - 0.0020)	0.080 (0.0031)
Valve deflection limit		—	0.15 (0.0059)
Projection length "L"		13.15 - 13.35 (0.5177 - 0.5256)	

Inspection and Adjustment (Cont'd)

VALVE SEAT

Unit: mm (in)



SEM755C

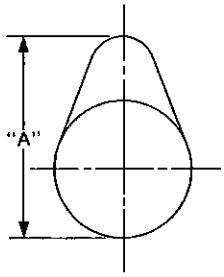
		Standard	Service
Cylinder head seat recess diameter (D)	In.	39.000 - 39.016 (1.5354 - 1.5361)	39.500 - 39.516 (1.5551 - 1.5557)
	Ex.	34.000 - 34.016 (1.3386 - 1.3392)	34.500 - 34.516 (1.3583 - 1.3589)
Valve seat interference fit	In.	0.081 - 0.113 (0.0032 - 0.0044)	
	Ex.	0.064 - 0.096 (0.0025 - 0.0038)	
Valve seat outer diameter (d)	In.	39.097 - 39.113 (1.5392 - 1.5399)	39.597 - 39.613 (1.5589 - 1.5596)
	Ex.	34.080 - 34.096 (1.3417 - 1.3424)	34.580 - 34.596 (1.3614 - 1.3620)
Depth (H)	In.	6.32 - 6.52 (0.2488 - 0.2567)	
	Ex.	6.15 - 6.35 (0.2421 - 0.2500)	
Height (h)		6.2 - 6.3 (0.244 - 0.248)	

Inspection and Adjustment (Cont'd)

CAMSHAFT AND CAMSHAFT BEARING

Unit: mm (in)

	Standard	Limit
Camshaft journal to bearing clearance	0.045 - 0.086 (0.0018 - 0.0034)	0.15 (0.0059)
Inner diameter of camshaft bearing	26.000 - 26.021 (1.0236 - 1.0244)	—
Outer diameter of camshaft journal	25.935 - 25.955 (1.0211 - 1.0218)	—
Camshaft runout [T.I.R.*]	Less than 0.02 (0.0008)	0.05 (0.0020)
Camshaft sprocket runout [T.I.R.*]	Less than 0.15 (0.0059)	—
Camshaft end play	0.070- 0.148 (0.0028 - 0.0058)	0.20 (0.0079)



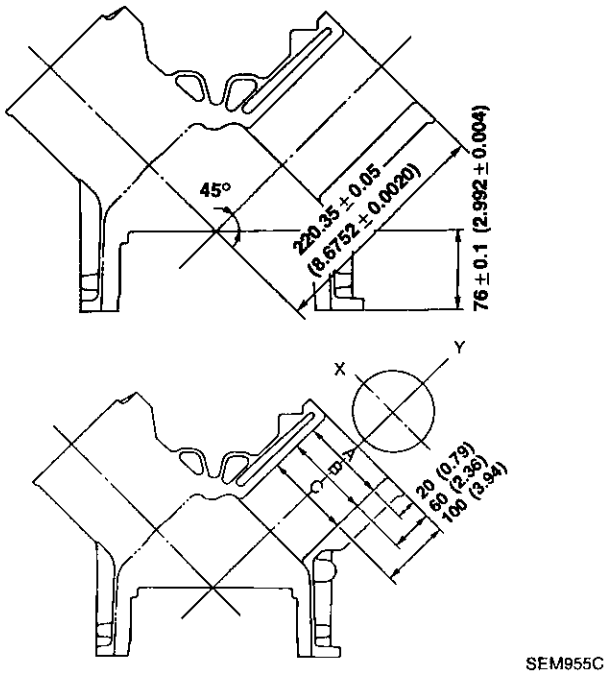
EM671

Cam height "A"	
Intake	37.919 - 38.109 (1.4929 - 1.5004)
Exhaust	35.279 - 35.469 (1.3889 - 1.3964)
Wear limit of cam height	0.05 (0.0020)

*Total indicator reading

CYLINDER BLOCK

Unit: mm (in)



SEM955C

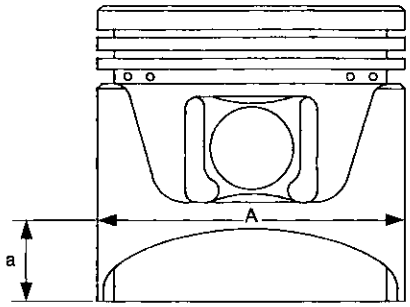
Surface flatness	
Standard	Less than 0.03 (0.0012)
Limit	0.10 (0.0039)
Cylinder bore	
Inner diameter	
Standard	
Grade No. 1	93.000 - 93.010 (3.6614 - 3.6618)
Grade No. 2	93.010 - 93.020 (3.6618 - 3.6622)
Grade No. 3	93.020 - 93.030 (3.6622 - 3.6626)
Wear limit	0.20 (0.0079)
Out-of-round (X – Y)	Less than 0.015 (0.0006)
Taper (A – B – C)	Less than 0.010 (0.0004)
Difference in inner diameter between cylinders	
Limit	Less than 0.03 (0.0012)
Main journal inner diameter	
Grade No. 0	68.944 - 68.950 (2.7143 - 2.7146)
Grade No. 1	68.950 - 68.956 (2.7146 - 2.7148)
Grade No. 2	68.956 - 68.962 (2.7148 - 2.7150)
Grade No. 3	68.962 - 68.968 (2.7150 - 2.7153)

Inspection and Adjustment (Cont'd)

PISTON, PISTON RING AND PISTON PIN

Available piston

Unit: mm (in)



SEM750C

Piston skirt diameter "A"	
Standard	
Grade No. 1	92.980 - 92.990 (3.6606 - 3.6610)
Grade No. 2	92.990 - 93.000 (3.6610 - 3.6614)
Grade No. 3	93.000 - 93.010 (3.6614 - 3.6618)
0.20 (0.0079) oversize (Service)	93.180 - 93.210 (3.6685 - 3.6697)
"a" dimension	11.5 (0.453)
Piston clearance to cylinder block	0.010 - 0.030 (0.0004 - 0.0012)
Piston pin hole diameter	21.987 - 21.999 (0.8656 - 0.8661)

Piston ring

Unit: mm (in)

	Standard	Limit
Side clearance		
Top	0.040 - 0.080 (0.0016 - 0.0031)	0.1 (0.004)
2nd	0.030 - 0.070 (0.0012 - 0.0028)	
End gap		
Top	0.27 - 0.46 (0.0106 - 0.0181)	1.0 (0.039)
2nd	0.39 - 0.63 (0.0154 - 0.0248)	
Oil (rail ring)	0.20 - 0.69 (0.0079 - 0.0272)	

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	
Standard	0.005 - 0.017 (0.0002 - 0.0007)
Limit	0.023 (0.0009)

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

CONNECTING ROD

Unit: mm (in)

Center distance	146.95 - 147.05 (5.7854 - 5.7894)
Bend, torsion [per 100 (3.94)]	
Limit	0.15 (0.0059)
Torsion [per 100 (3.94)]	
Limit	0.3 (0.0012)
Connecting rod small end inner diameter	24.980 - 25.000 (0.9835 - 0.9843)
Piston pin bushing inner diameter*	22.000 - 22.012 (0.8661 - 0.8666)
Connecting rod big end inner diameter	55.000 - 55.013 (2.1654 - 2.1659)
Side clearance	
Standard	0.20 - 0.35 (0.0079 - 0.0138)
Limit	0.40 (0.0157)

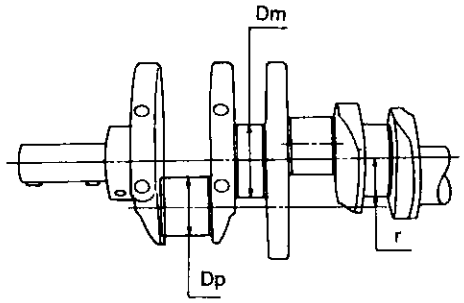
*After installing in connecting rod

Inspection and Adjustment (Cont'd)

CRANKSHAFT

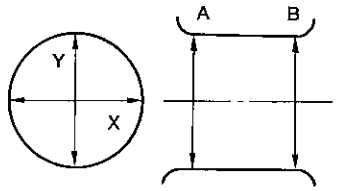
Unit: mm (in)

Main journal dia. "Dm"	
Grade No. 0	63.958 - 63.964 (2.5180 - 2.5183)
Grade No. 1	63.952 - 63.958 (2.5178 - 2.5180)
Grade No. 2	63.946 - 63.952 (2.5176 - 2.5178)
Grade No. 3	63.940 - 63.946 (2.5173 - 2.5176)
Pin journal dia. "Dp"	
Grade No. 0	51.968 - 51.974 (2.0460 - 2.0462)
Grade No. 1	51.962 - 51.968 (2.0457 - 2.0460)
Grade No. 2	51.956 - 51.962 (2.0455 - 2.0457)
Center distance "r"	41.31 - 41.39 (1.6264 - 1.6295)
Out-of-round (X – Y)	
Standard	Less than 0.005 (0.0002)
Taper (A – B)	
Standard	Less than 0.005 (0.0002)
Runout [T.I.R.]	
Standard	Less than 0.025 (0.0010)
Limit	Less than 0.05 (0.0020)
Free end play	
Standard	0.10 - 0.26 (0.0039 - 0.0102)
Limit	0.30 (0.0118)



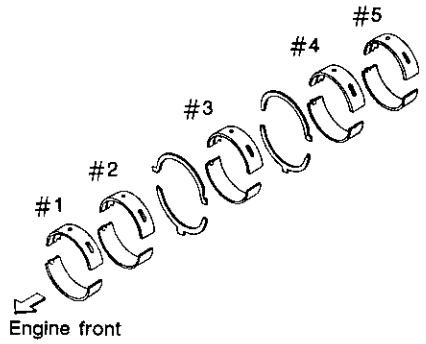
SEM954C

Out-of-round X – Y
Taper A – B



EM715

AVAILABLE MAIN BEARING



SEM753C

No. 1 and 5 main bearing

Standard size

Unit: mm (in)

Grade number	Thickness "T"	Width "W"	Identification color (mark)
0	2.481 - 2.484 (0.0977 - 0.0978)	20.0 (0.787)	Black (A)
1	2.484 - 2.487 (0.0978 - 0.0979)		Brown (B)
2	2.487 - 2.490 (0.0979 - 0.0980)		Green (C)
3	2.490 - 2.493 (0.0980 - 0.0981)		Yellow (D)
4	2.493 - 2.496 (0.0981 - 0.0983)		Blue (E)
5	2.496 - 2.499 (0.0983 - 0.0984)		Pink (F)
6	2.499 - 2.502 (0.0984 - 0.0985)		No color (G)

Inspection and Adjustment (Cont'd)

No. 2 and 4 main bearing

Standard size

Unit: mm (in)

Grade number	Thickness "T"	Width "W"	Identification color (mark)
0	2.481 - 2.484 (0.0977 - 0.0978)	22.3 (0.878)	Black (A)
1	2.484 - 2.487 (0.0978 - 0.0979)		Brown (B)
2	2.487 - 2.490 (0.0979 - 0.0980)		Green (C)
3	2.490 - 2.493 (0.0980 - 0.0981)		Yellow (D)
4	2.493 - 2.496 (0.0981 - 0.0983)		Blue (E)
5	2.496 - 2.499 (0.0983 - 0.0984)		Pink (F)
6	2.499 - 2.502 (0.0984 - 0.0985)		No color (G)

No. 3 main bearing

Standard size

Unit: mm (in)

Grade number	Thickness "T"	Width "W"	Identification color (mark)
0	2.481 - 2.484 (0.0977 - 0.0978)	21.3 (0.839)	Black (A)
1	2.484 - 2.487 (0.0978 - 0.0979)		Brown (B)
2	2.487 - 2.490 (0.0979 - 0.0980)		Green (C)
3	2.490 - 2.493 (0.0980 - 0.0981)		Yellow (D)
4	2.493 - 2.496 (0.0981 - 0.0983)		Blue (E)
5	2.496 - 2.499 (0.0983 - 0.0984)		Pink (F)
6	2.499 - 2.502 (0.0984 - 0.0985)		No color (G)

Undersize

Unit: mm (in)

	Thickness	Main journal diameter "Dm"
0.25 (0.0098)	2.613 - 2.621 (0.1029 - 0.1032)	Grind so that bearing clearance is the specified value.

AVAILABLE CONNECTING ROD BEARING

Connecting rod bearing

Standard size

Unit: mm (in)

Grade number	Thickness "T"	Identification color (mark)
0	1.500 - 1.503 (0.0591 - 0.0592)	No color (A)
1	1.503 - 1.506 (0.0592 - 0.0593)	Brown (B)
2	1.506 - 1.509 (0.0593 - 0.0594)	Green (C)

Undersize

Unit: mm (in)

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

Bearing clearance

Unit: mm (in)

Main bearing clearance	
Standard	0.012 - 0.030 (0.0005 - 0.0012)
Limit	0.050 (0.0020)
Connecting rod bearing clearance	
Standard	0.020 - 0.045 (0.0008 - 0.0018)
Limit	0.065 (0.0026)

MISCELLANEOUS COMPONENTS

Unit: mm (in)

Drive plate	
Runout [T.I.R.]*	Less than 0.20 (0.0079)

*Total indicator reading

ENGINE LUBRICATION & COOLING SYSTEMS

SECTION LC

CONTENTS

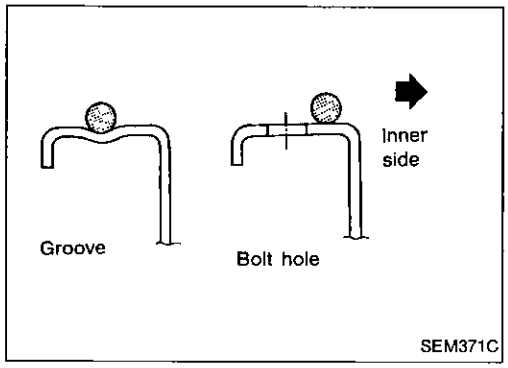
PRECAUTIONS AND PREPARATION 2
The Supplemental Restraint System "AIR BAG" 2
Liquid Gasket Application Procedure 2
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ENGINE LUBRICATION SYSTEM 3
Lubrication Circuit 3
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The Supplemental Restraint System "AIR BAG"

The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury to the driver in a frontal collision. The Supplemental Restraint System consists of an air bag (located in the center of the steering wheel), sensors, a diagnosis 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:

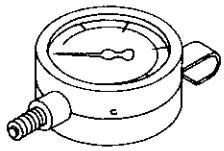
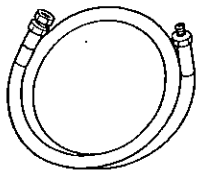
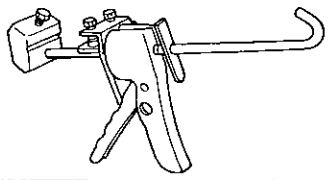
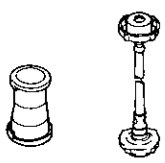
a. **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized INFINITI dealer.**
b. **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal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



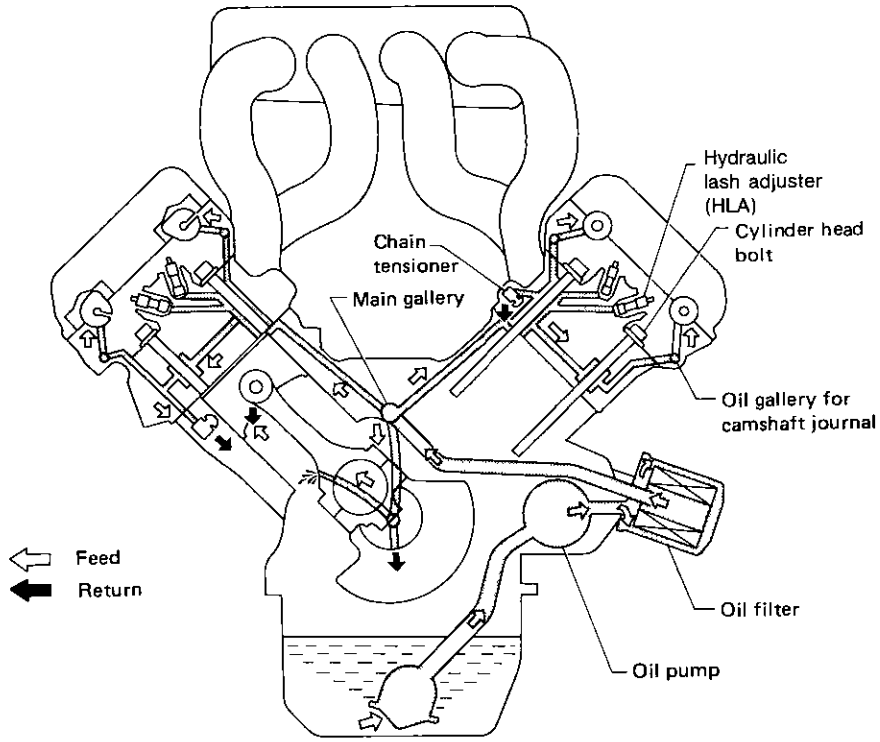
Liquid Gasket Application Procedure

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.

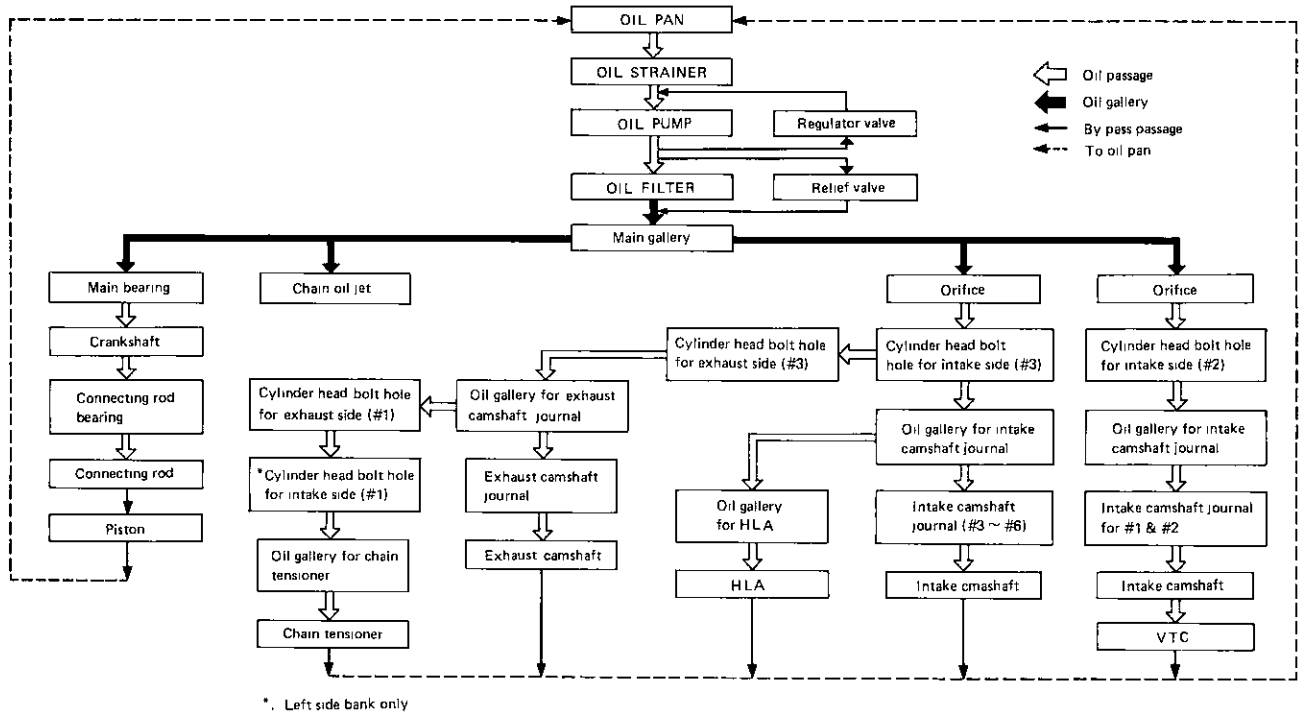
Special Service Tools

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

Lubrication Circuit



SLC844A



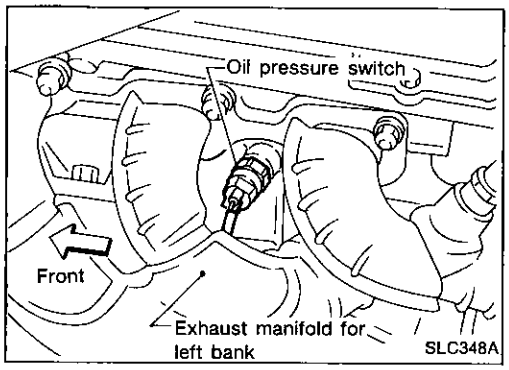
*. Left side bank only

SLC845A

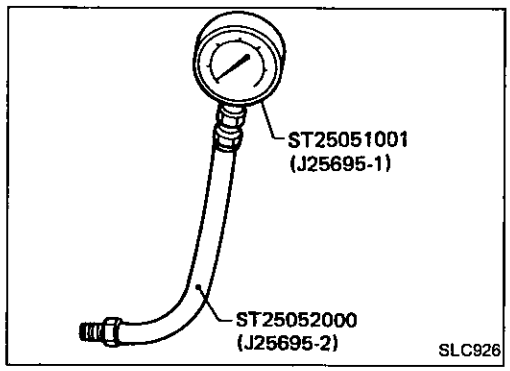
Oil Pressure Check

WARNING:

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



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



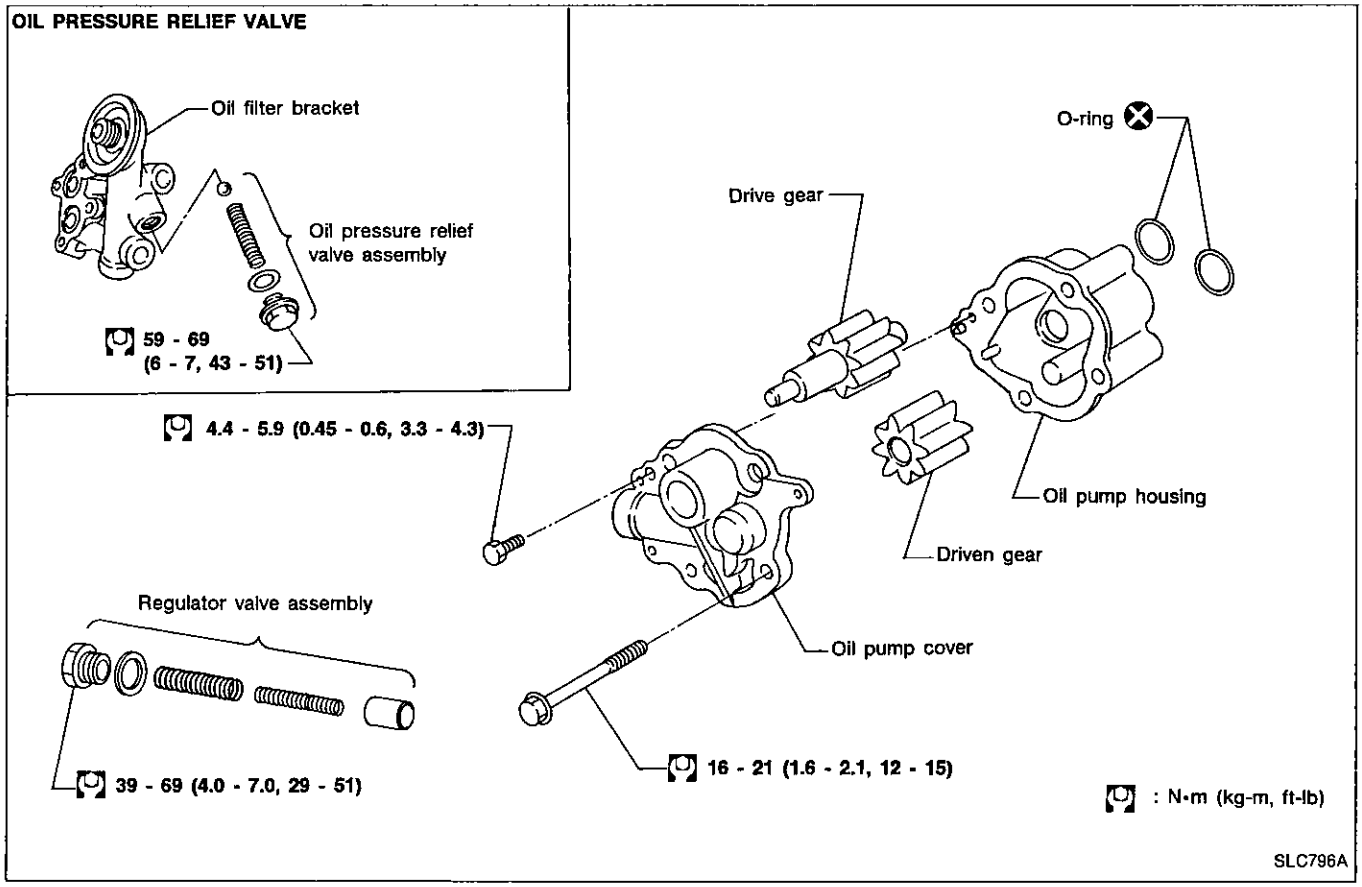
3. Install pressure gauge.
4. Start engine and warm it up to normal operating temperature.
5. Check oil pressure with engine running under no-load.

Engine speed rpm	Approximate discharge pressure kPa (kg/cm^2, psi)
Idle speed	More than 98 (1.0, 14)
3,000	461 - 559 (4.7 - 5.7, 67 - 81)

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

6. Install oil pressure switch with sealant.

Oil Pump



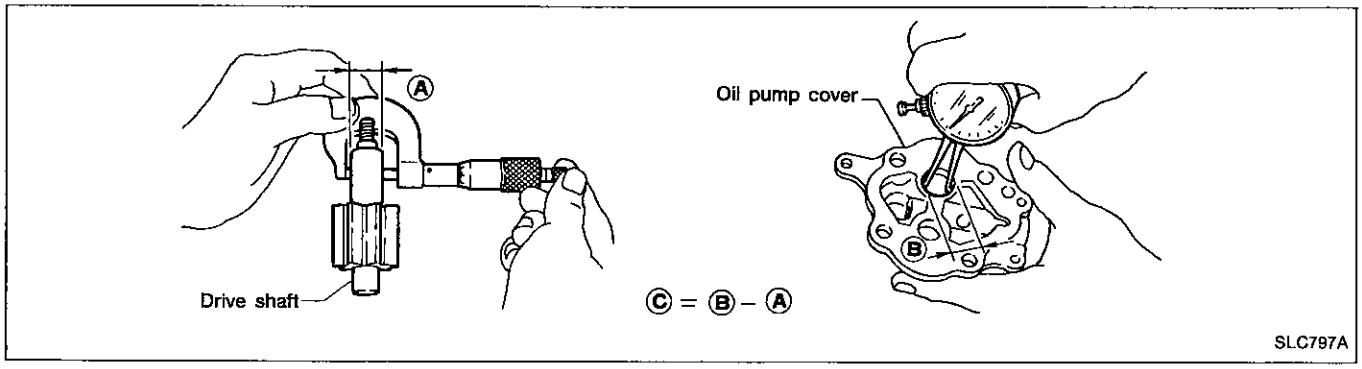
INSPECTION

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

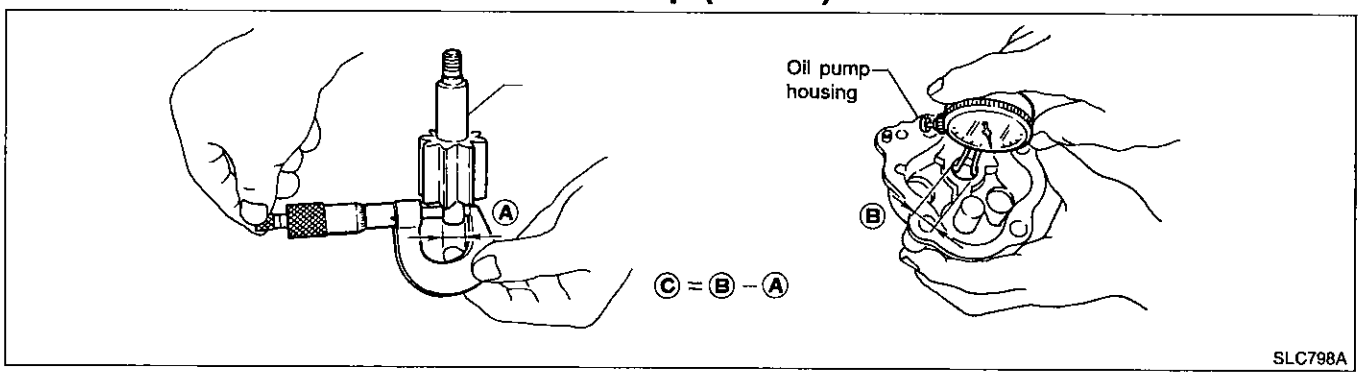
Standard clearance:

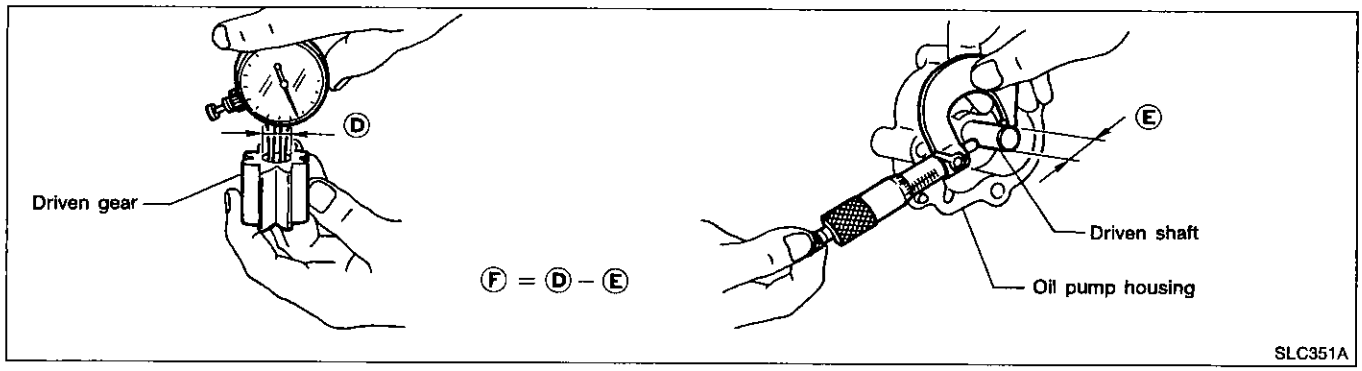
Unit: mm (in)

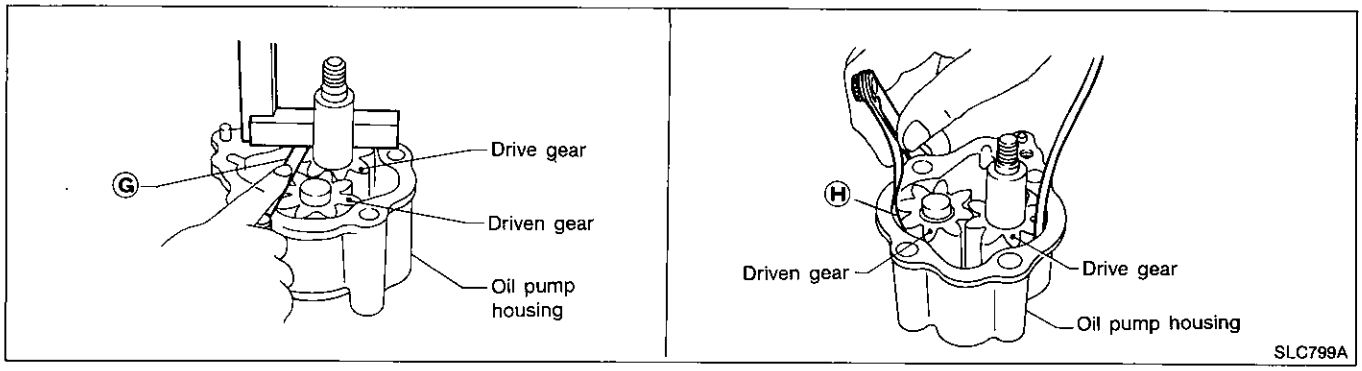
Drive shaft to cover and housing: Ⓒ	0.024 - 0.069 (0.0009 - 0.0027)
Driven gear to driven shaft : Ⓕ	0.025 - 0.064 (0.0010 - 0.0025)
Drive and driven gear to housing: Ⓖ	0.08 - 0.130 (0.0031 - 0.0051)
Drive and driven gear to housing: Ⓗ	0.125 - 0.245 (0.0049 - 0.0096)

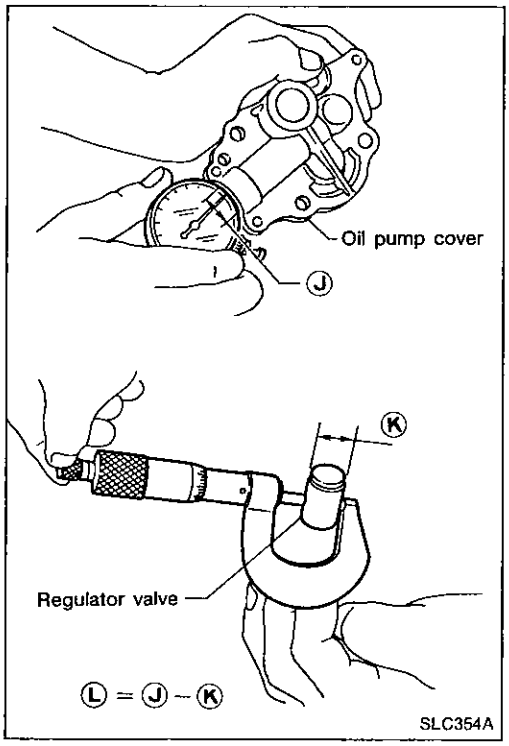


Oil Pump (Cont'd)









REGULATOR VALVE INSPECTION

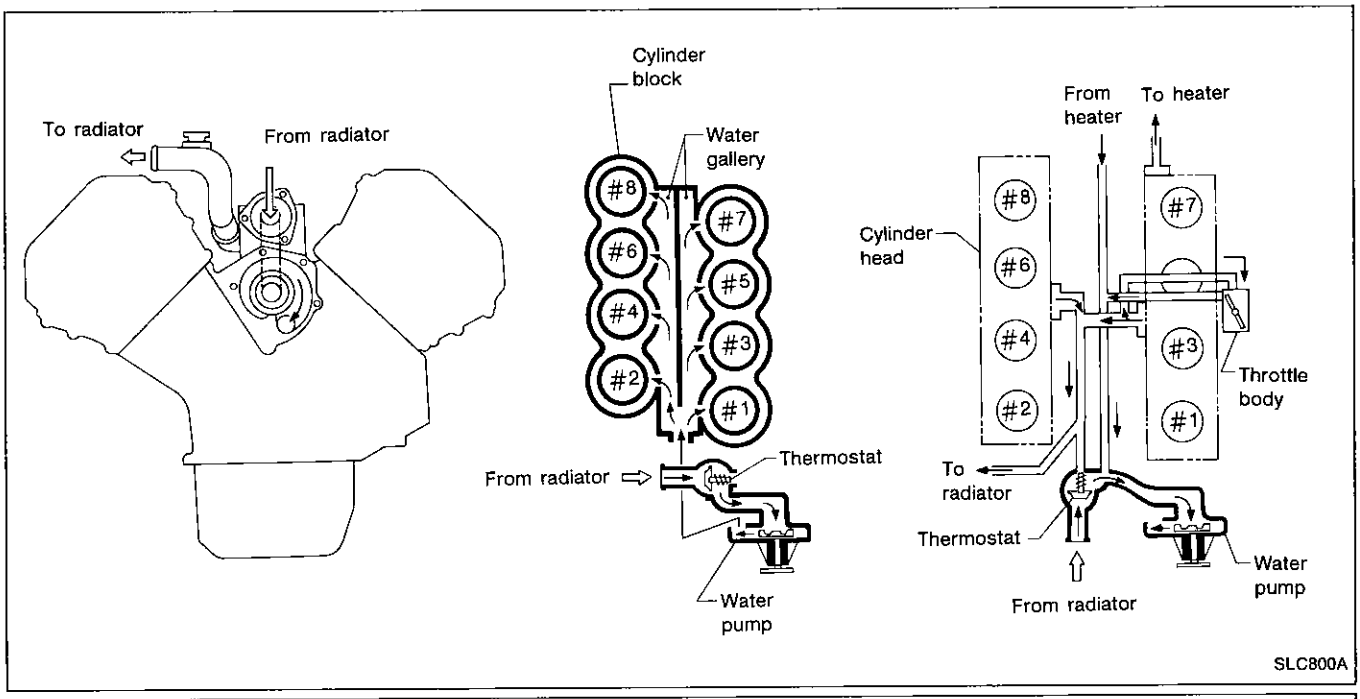
1. Visually inspect components for wear and damage.
2. Check oil pressure regulator valve sliding surface and valve spring.
3. Coat regulator valve with engine oil and check that it falls smoothly into the valve hole by its own weight.
4. Check regulator valve to oil pump cover clearance.

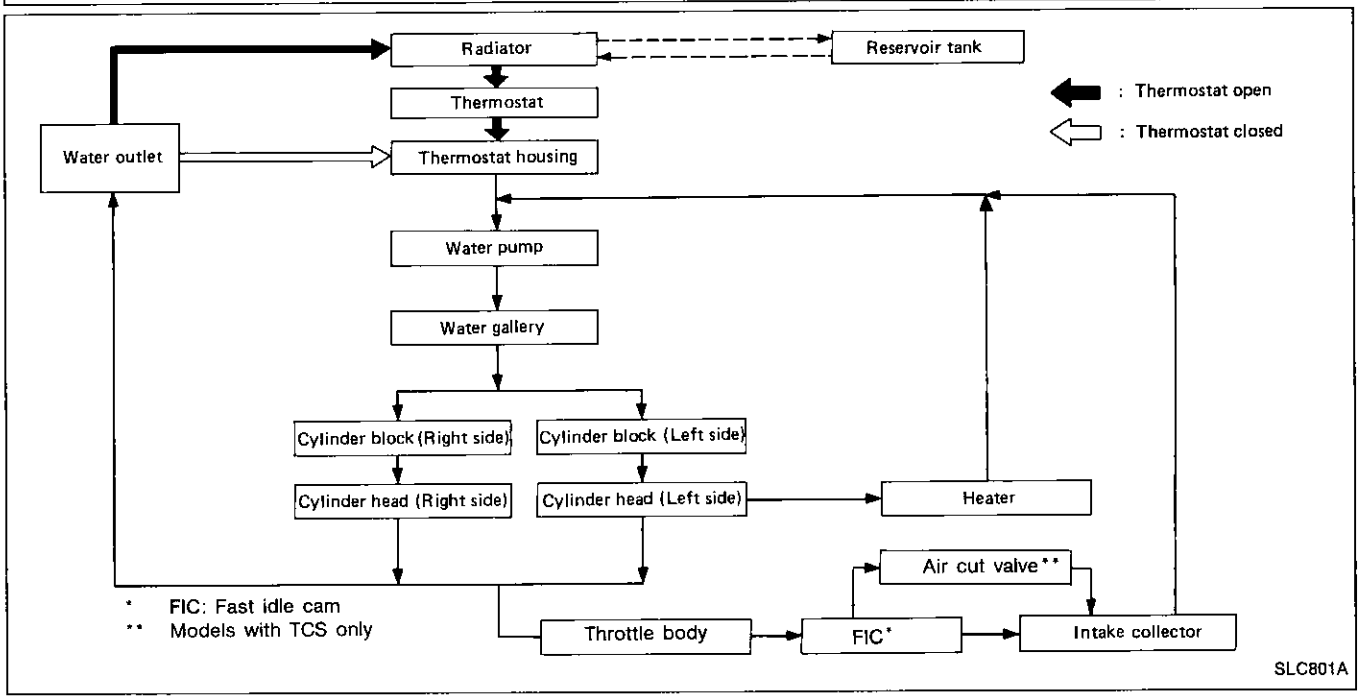
Standard clearance:

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

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

Cooling Circuit





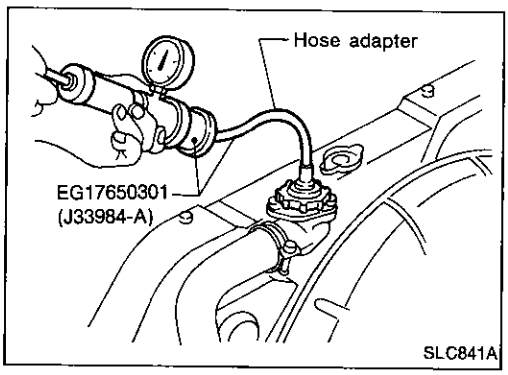
System Check

WARNING:

Never remove the radiator cap when the engine is hot; serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap and carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape and then turn the cap all the way off.

System Check (Cont'd)



CHECKING COOLING SYSTEM HOSES

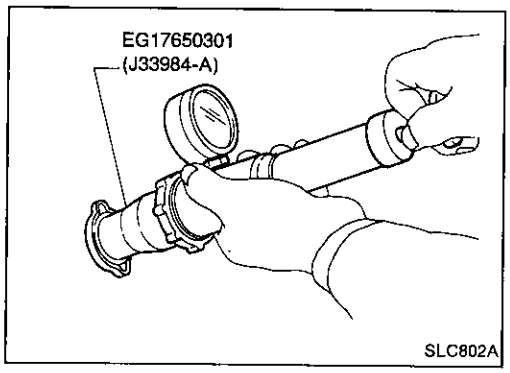
Check hoses for improper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.

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 damage radiator.



CHECKING RADIATOR CAP

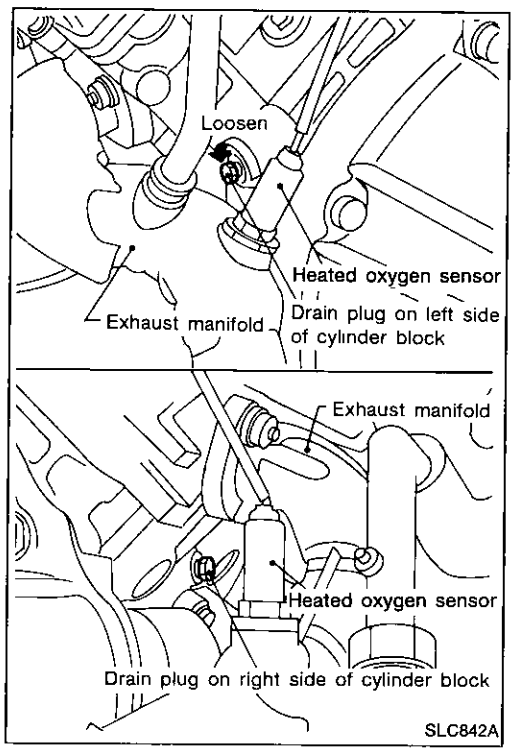
To check radiator cap, apply pressure to cap with a tester.

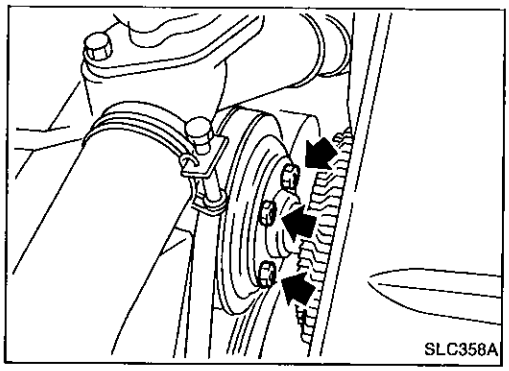
Radiator cap relief pressure:
78 - 98 kPa (0.8 - 1.0 kg/cm^2, 11 - 14 psi)

Water Pump

REMOVAL

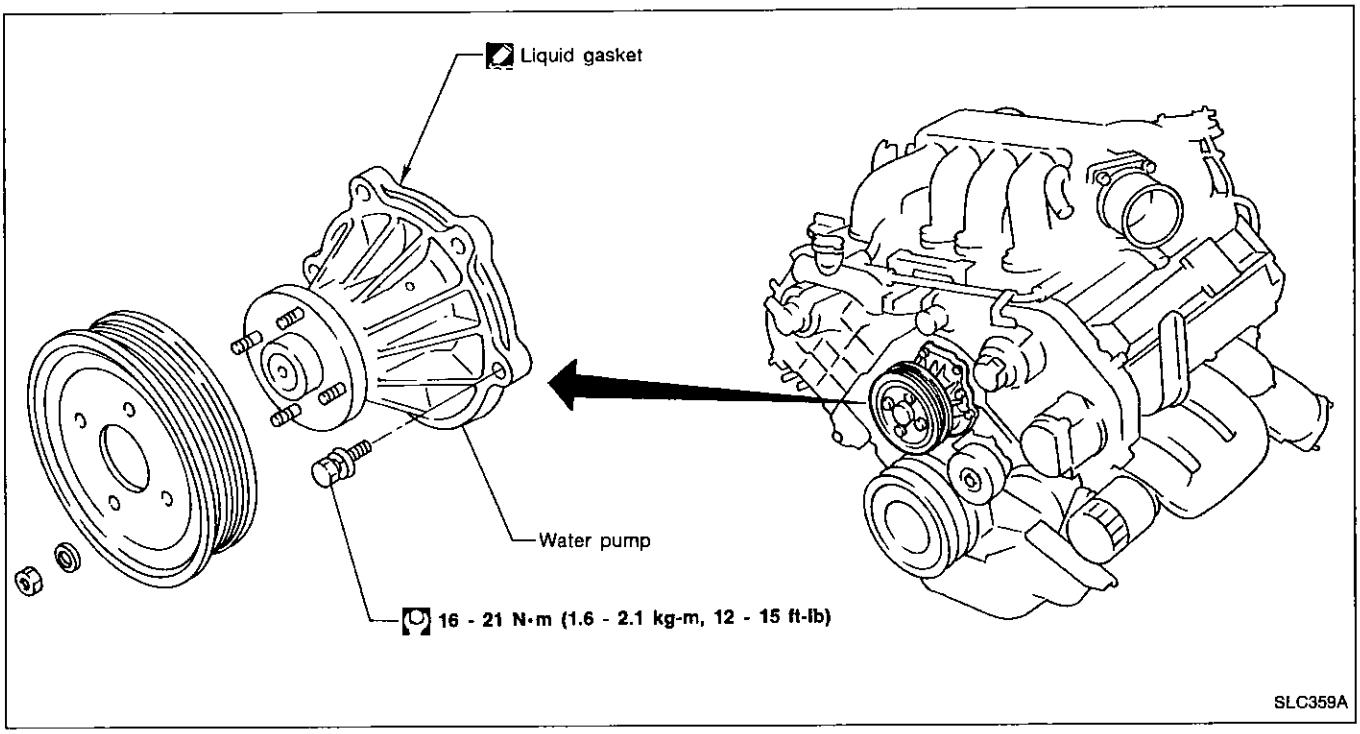
1. Drain coolant from drain cocks on both sides of cylinder block and radiator.





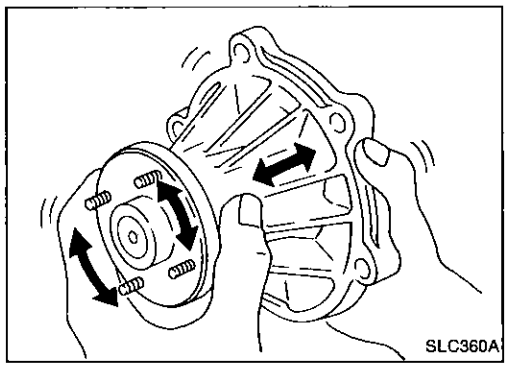
2. Remove fan coupling with fan.
3. Loosen power steering pump drive belt.
4. Remove water pump.

Water Pump (Cont'd)



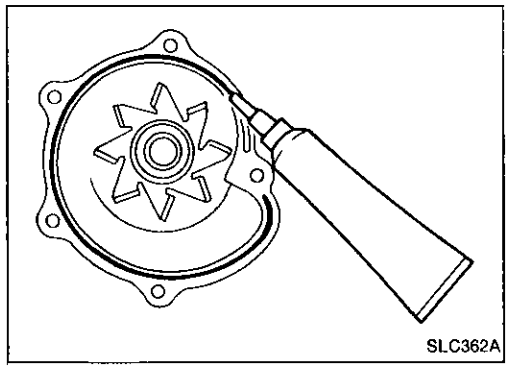
CAUTION:

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



INSPECTION

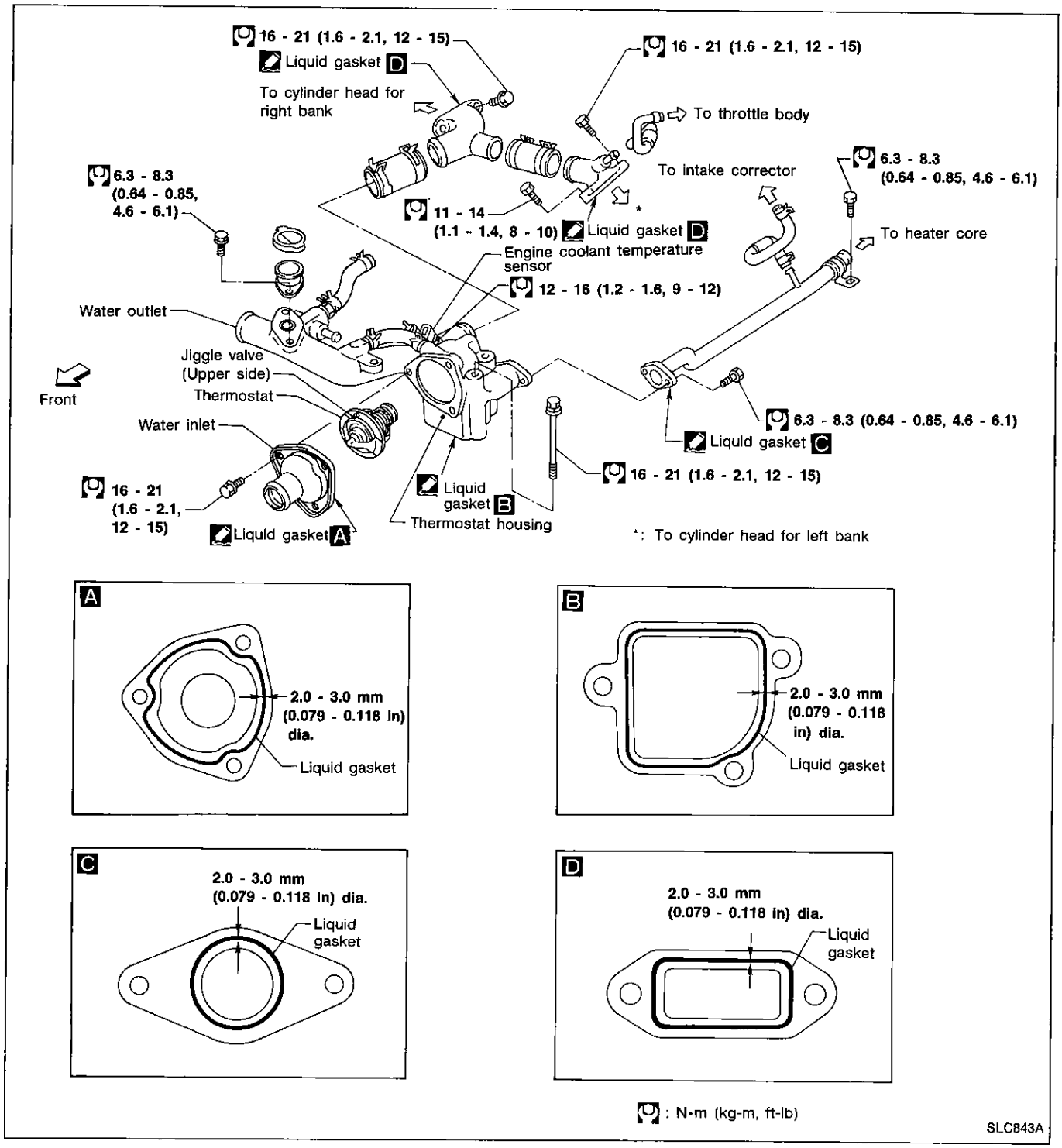
1. Check for badly rusted or corroded vanes and body assembly.
2. Check for rough operation due to excessive end play.



INSTALLATION

1. Before installing water pump, remove all traces of liquid gasket from mating surface using a scraper.
   - Also remove traces of liquid gasket from mating surface of cylinder block.
2. Apply a continuous bead of liquid gasket to mating surface of water pump.
   - Use Genuine Liquid Gasket or equivalent.

Thermostat

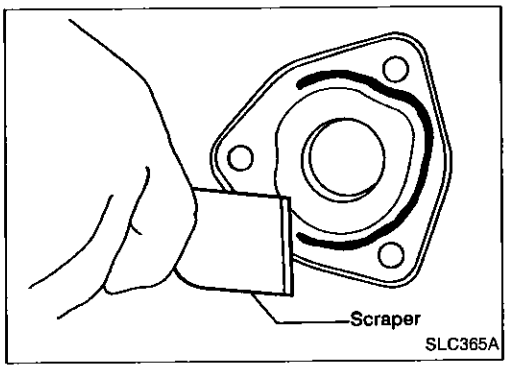


REMOVAL AND INSTALLATION

Removal

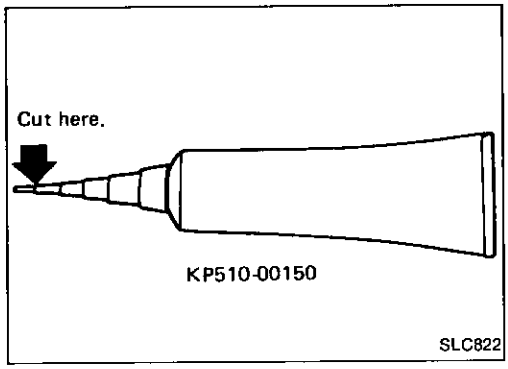
1. Drain coolant from drain cocks on both sides of cylinder block and radiator
2. Remove front ornament cover.
3. Remove water inlet and thermostat.

Thermostat (Cont'd)

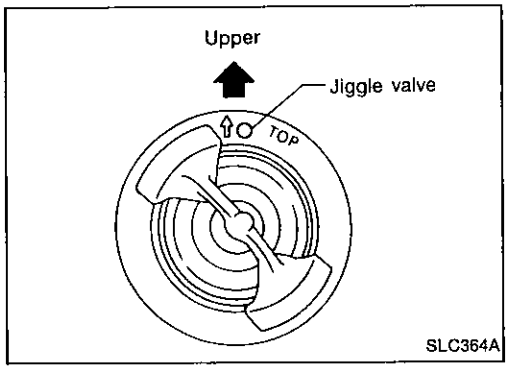


Installation

- Remove liquid gasket from mating surface of each part using a scraper.
- Similarly, remove liquid gasket from mating surface.
- Clean all traces of liquid gasket using white gasoline.

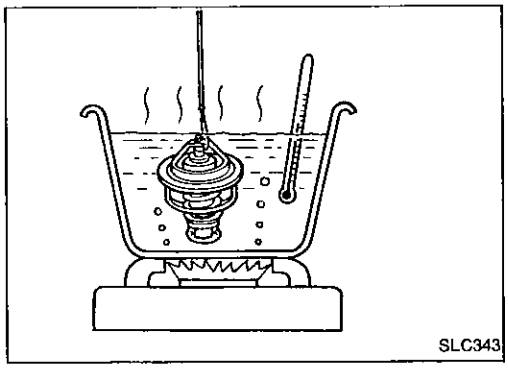


- Cut off tip of nozzle of liquid gasket tube at point shown in figure.
- Use Genuine Liquid Gasket or equivalent.



INSPECTION

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



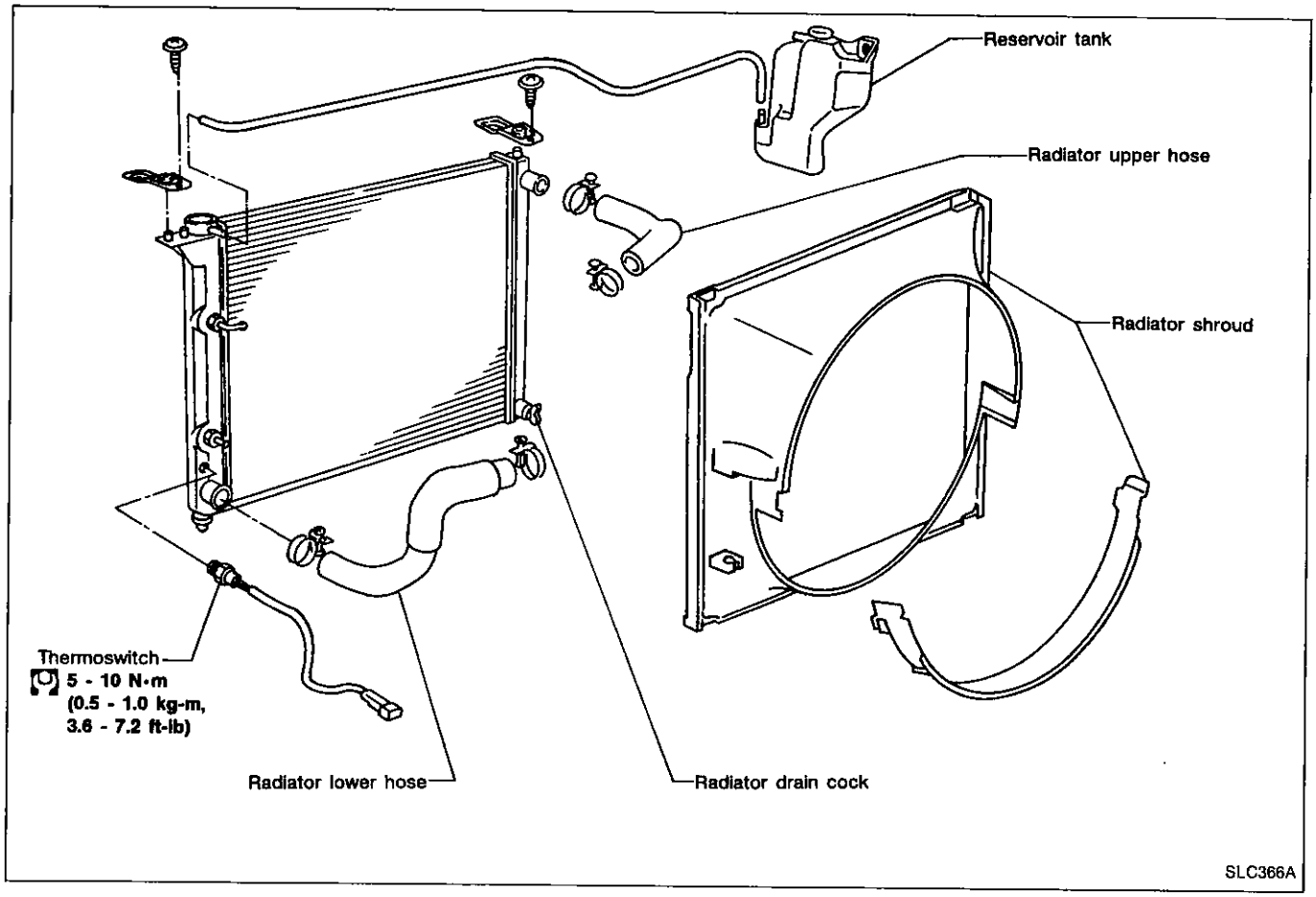
2. Check valve opening temperature and maximum valve lift.

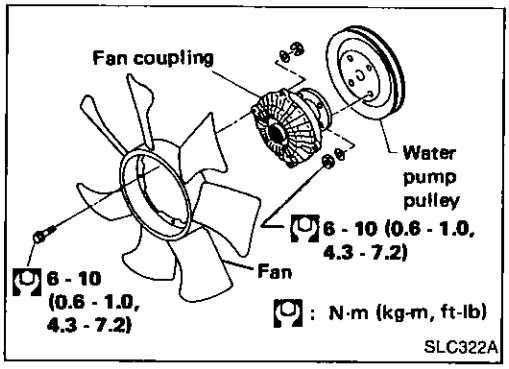
Valve opening temperature	°C (°F)	76.5 (170)
Maximum valve lift	mm/°C (in/°F)	10/90 (0.39/194)

3. Then check if valve closes at 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.**

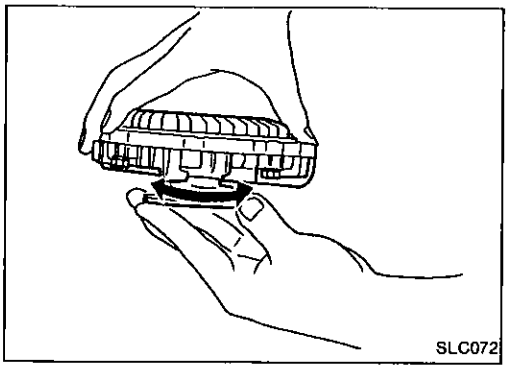
Radiator





Cooling Fan

DISASSEMBLY AND ASSEMBLY



INSPECTION

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

Engine Lubrication System

Oil pressure check

Engine speed rpm	Approximate discharge pressure kPa (kg/cm^2, psi)
Idle speed	More than 98 (1.0, 14)
3,000	461 - 559 (4.7 - 5.7, 67 - 81)

Oil pump

Unit: mm (in)

Drive shaft to oil pump cover and housing: Ⓒ	0.024 - 0.069 (0.0009 - 0.0027)
Driven gear to driven shaft: Ⓕ	0.025 - 0.064 (0.0010 - 0.0025)
Drive and driven gear to oil pump housing: Ⓖ	0.08 - 0.130 (0.0031 - 0.0051)
Drive and driven gear to oil pump housing: Ⓗ	0.125 - 0.245 (0.0049 - 0.0096)

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)

Radiator

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

Cap relief pressure	78 - 98 (0.8 - 1.0, 11 - 14)
Leakage test pressure	157 (1.6, 23)

ENGINE FUEL & EMISSION CONTROL SYSTEM

SECTION EF & EC

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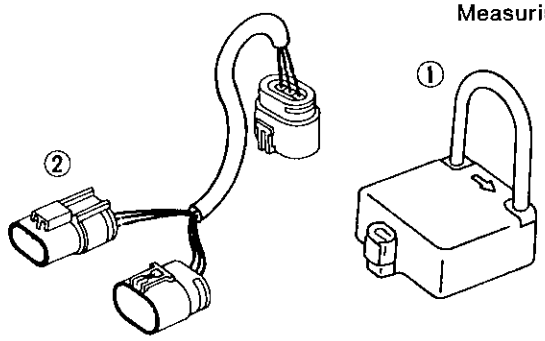
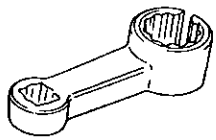
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Note: Refer to Foldout page for "ECCS WIRING DIAGRAM".

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".

Special Service Tools

Tool number (Kent-Moore No.) Tool name	Description
① KV109D0010 (J36777-1) Ignition timing adapter coil ② KV109D0015 (J36777-2) Adapter harness	Measuring ignition timing 
(J38365) Heated oxygen sensor wrench	Loosening or tightening heated oxygen sensor 

Supplemental Restraint System "AIR BAG"

The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury to the driver in a frontal collision. The Supplemental Restraint System consists of an air bag (located in the center of the steering wheel), sensors, a diagnostic 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:

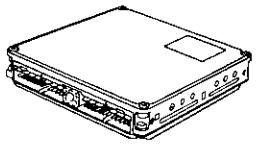
a. **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized INFINITI dealer.**
b. **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal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

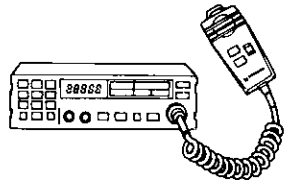
INJECTOR
- Do not disconnect injector harness connectors with engine running.
- Do not apply battery power directly to injectors.

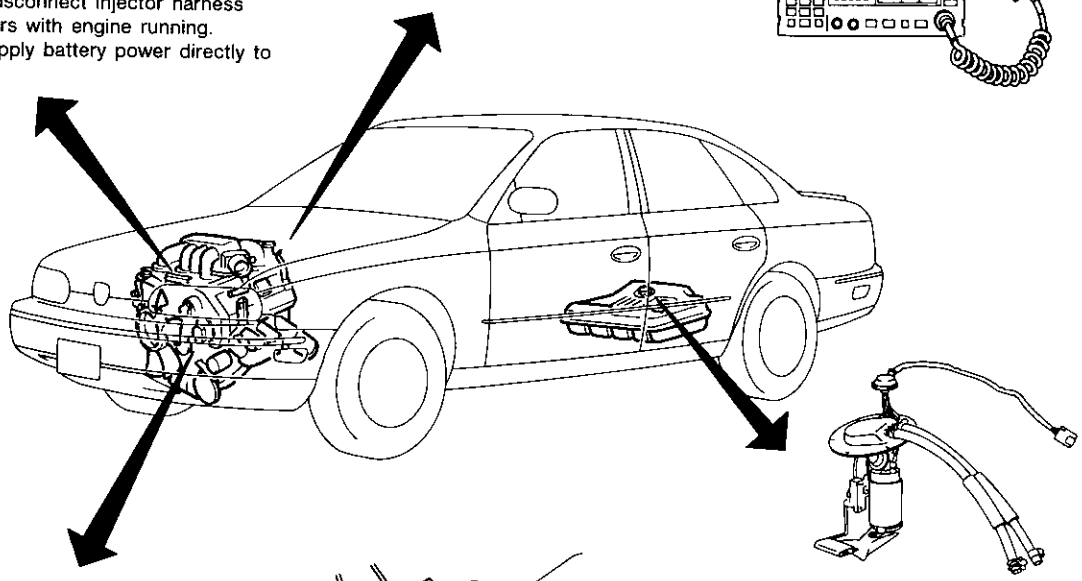
ECM
- Do not disassemble ECM (ECCS control module).
- Do not turn diagnosis mode selector forcibly.
- If a battery terminal is disconnected, the memory will return to the ECM value. The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a problem. Do not replace parts because of a slight variation.



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 away as possible from the electronic control units.
2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls.
   Do not let them run parallel for a long distance.
3) Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
4) Be sure to ground the radio to vehicle body.





ECCS 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.



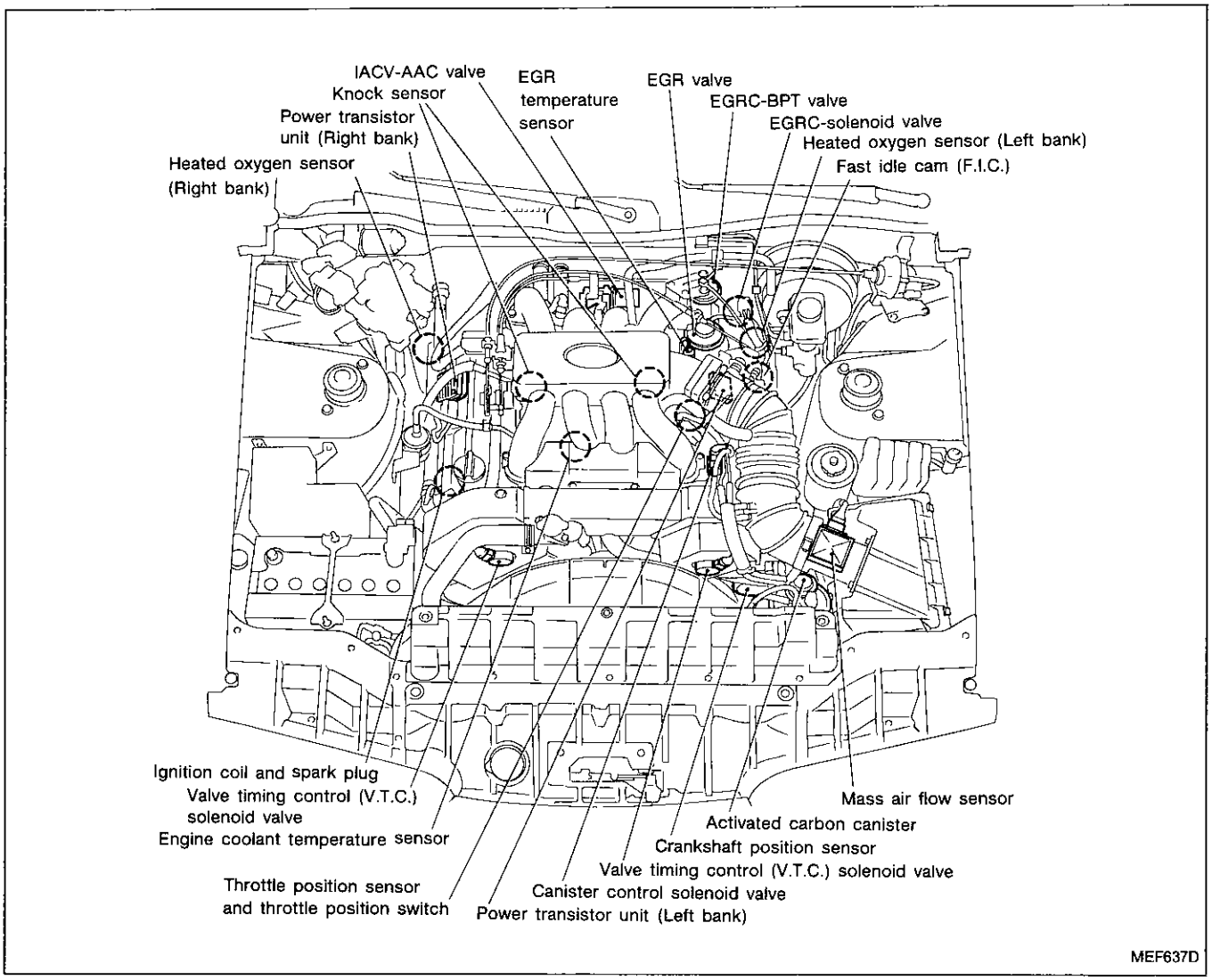
WHEN STARTING
- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.

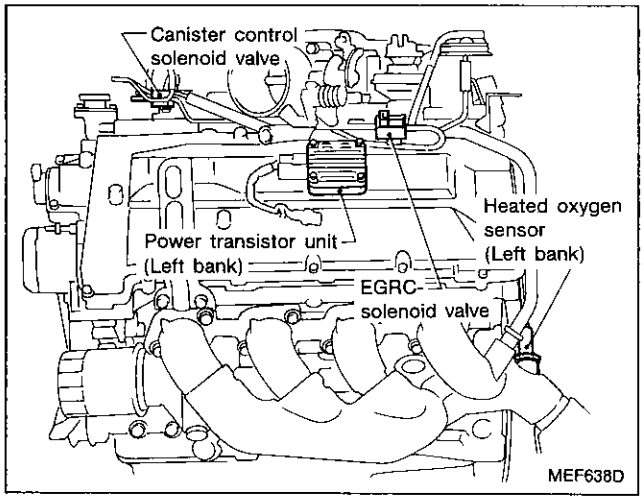
FUEL PUMP
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.

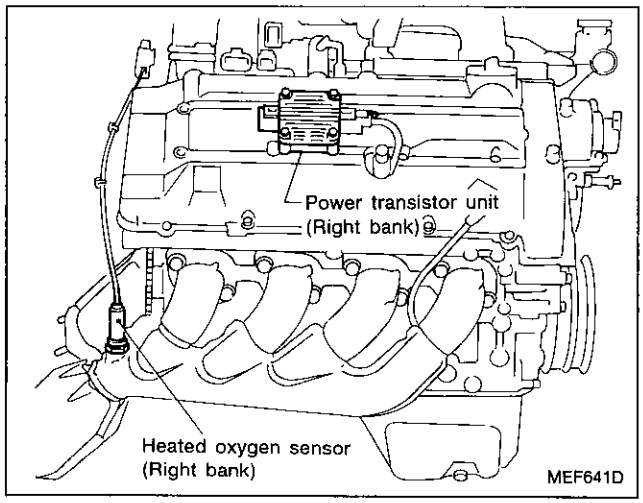
ECM HARNESS HANDLING
- Securely connect ECM harness connectors.
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in) away from adjacent harnesses, to prevent an ECM system malfunction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

MEF636D

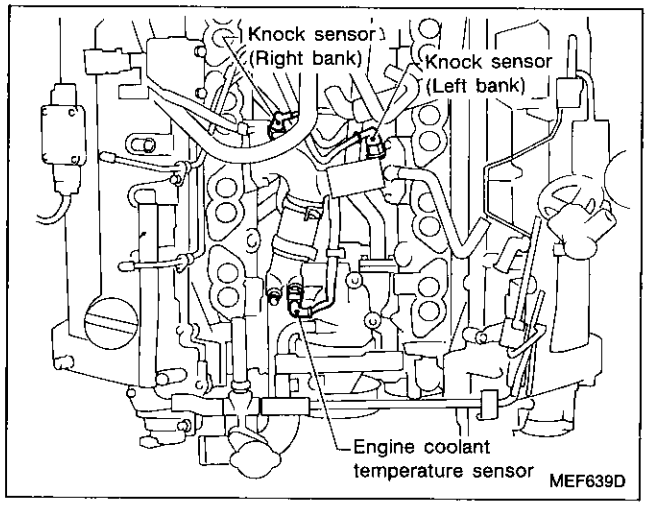
ECCS Component Parts Location

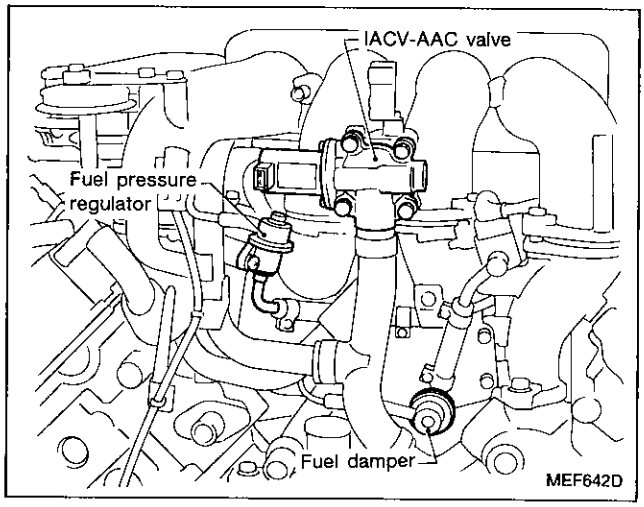


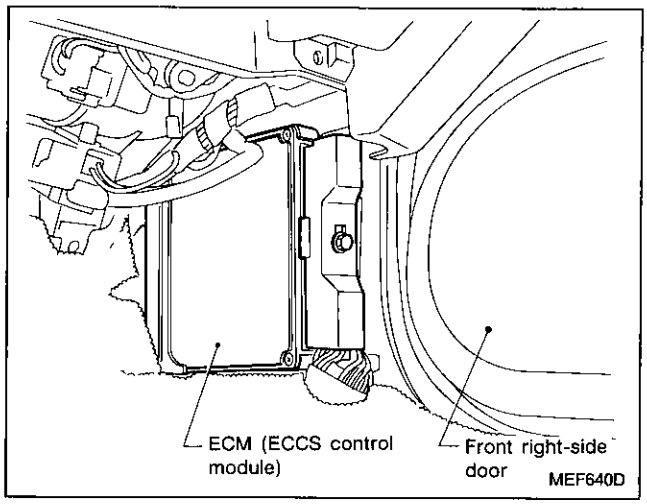


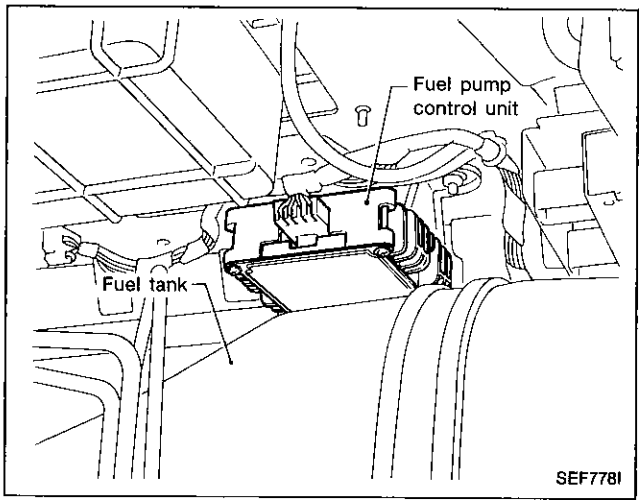


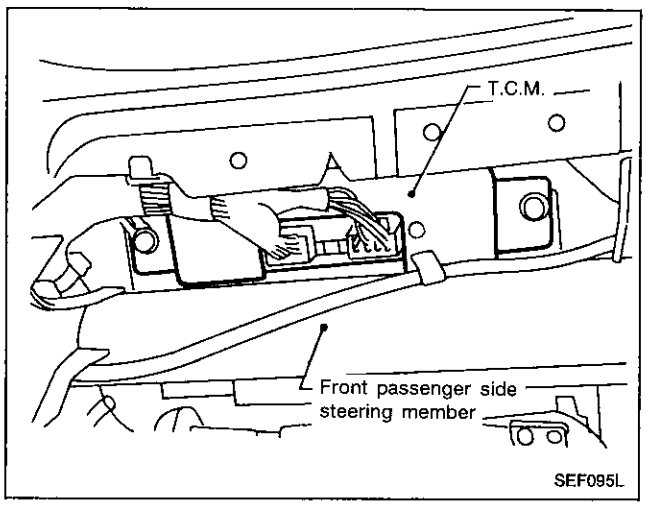
ECCS Component Parts Location (Cont'd)

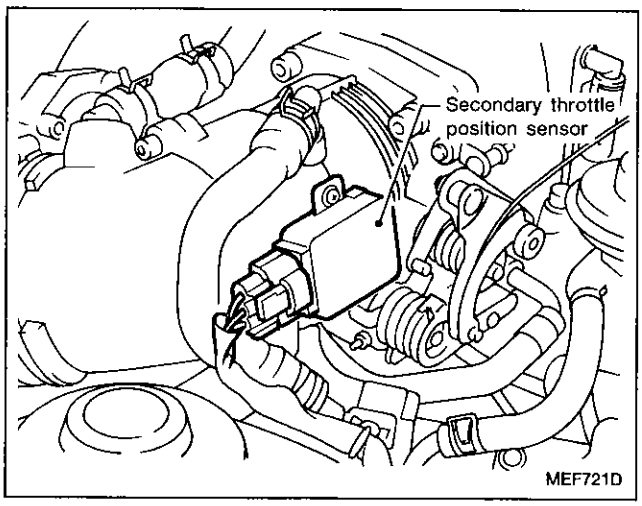




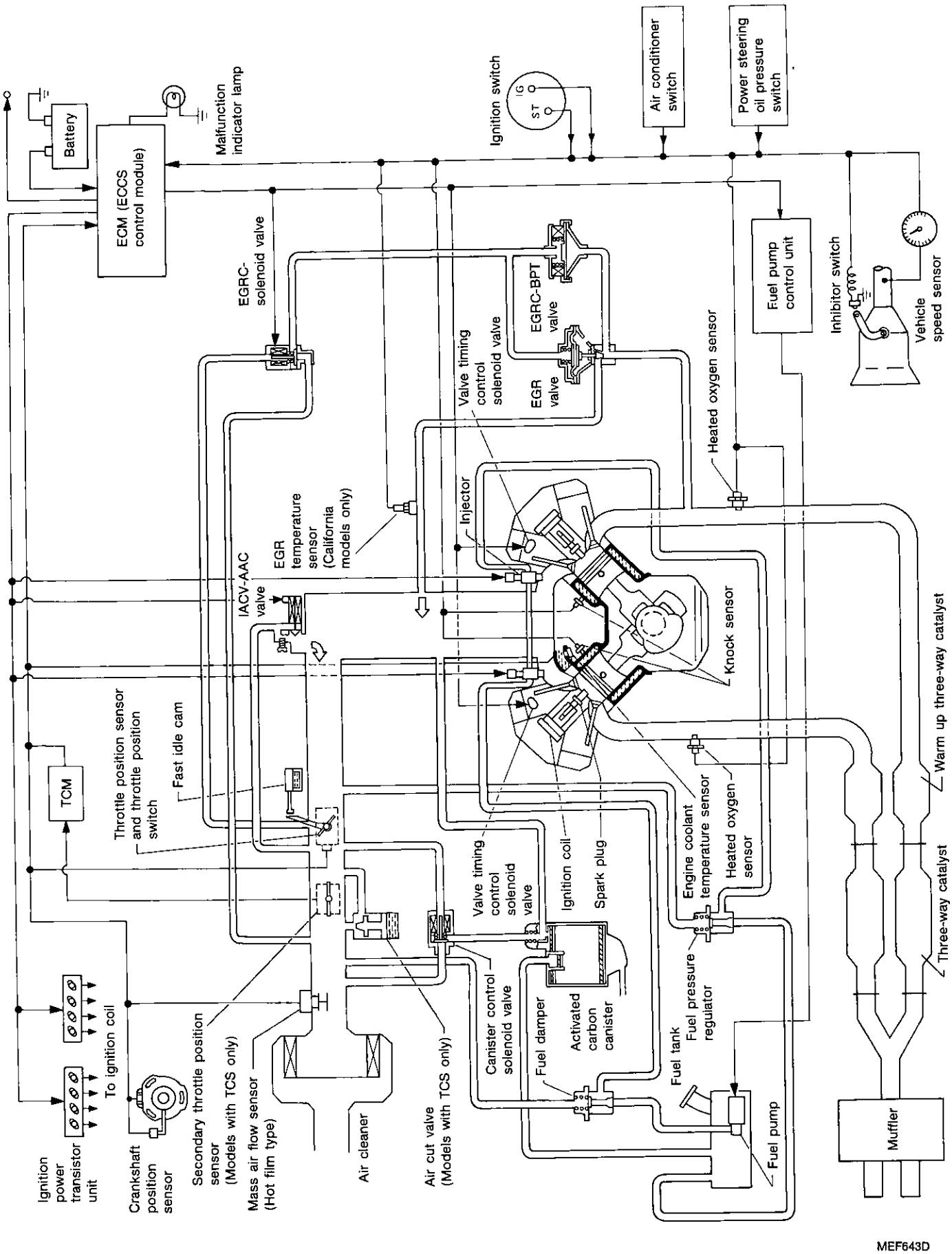






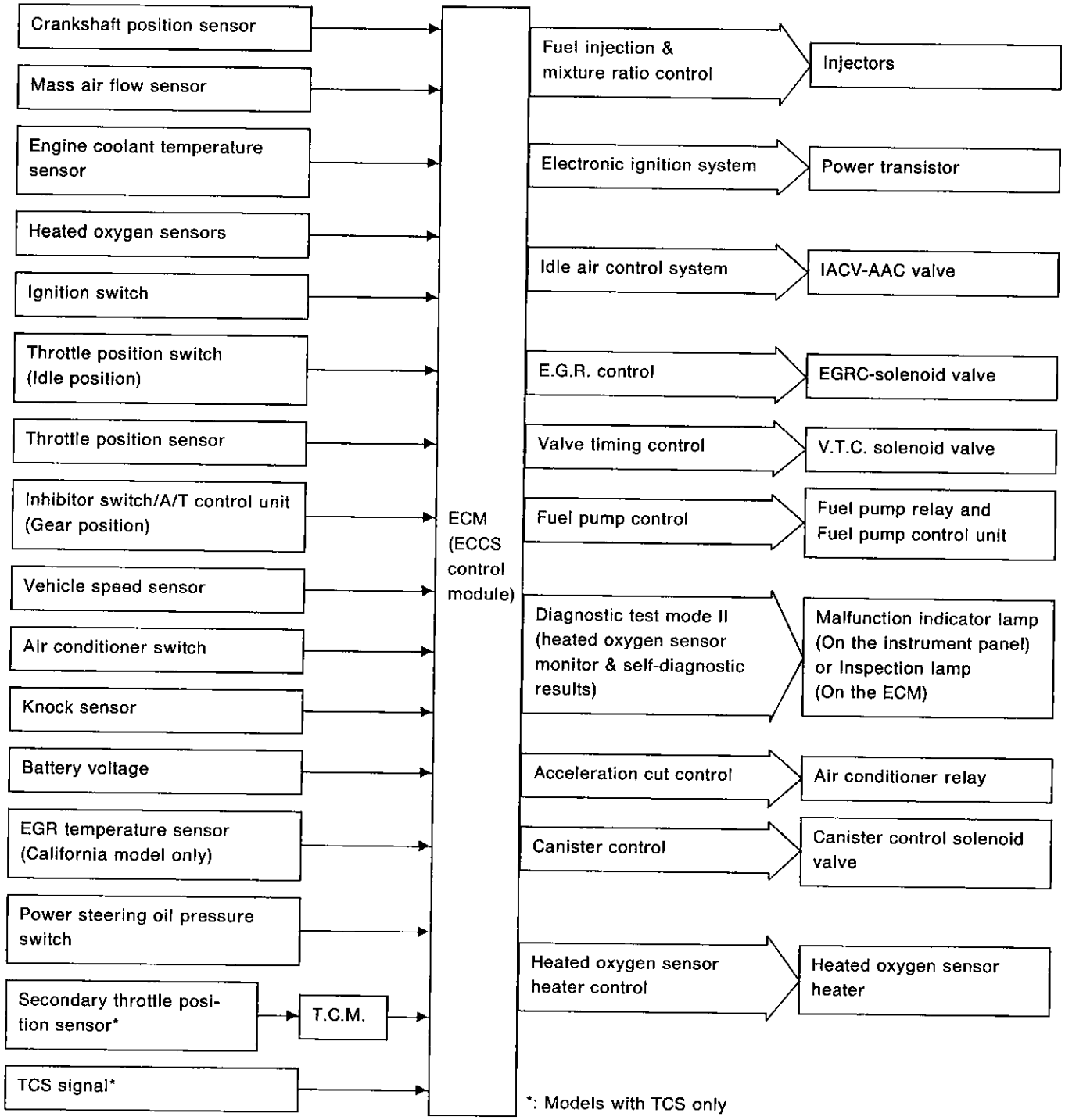


System Diagram

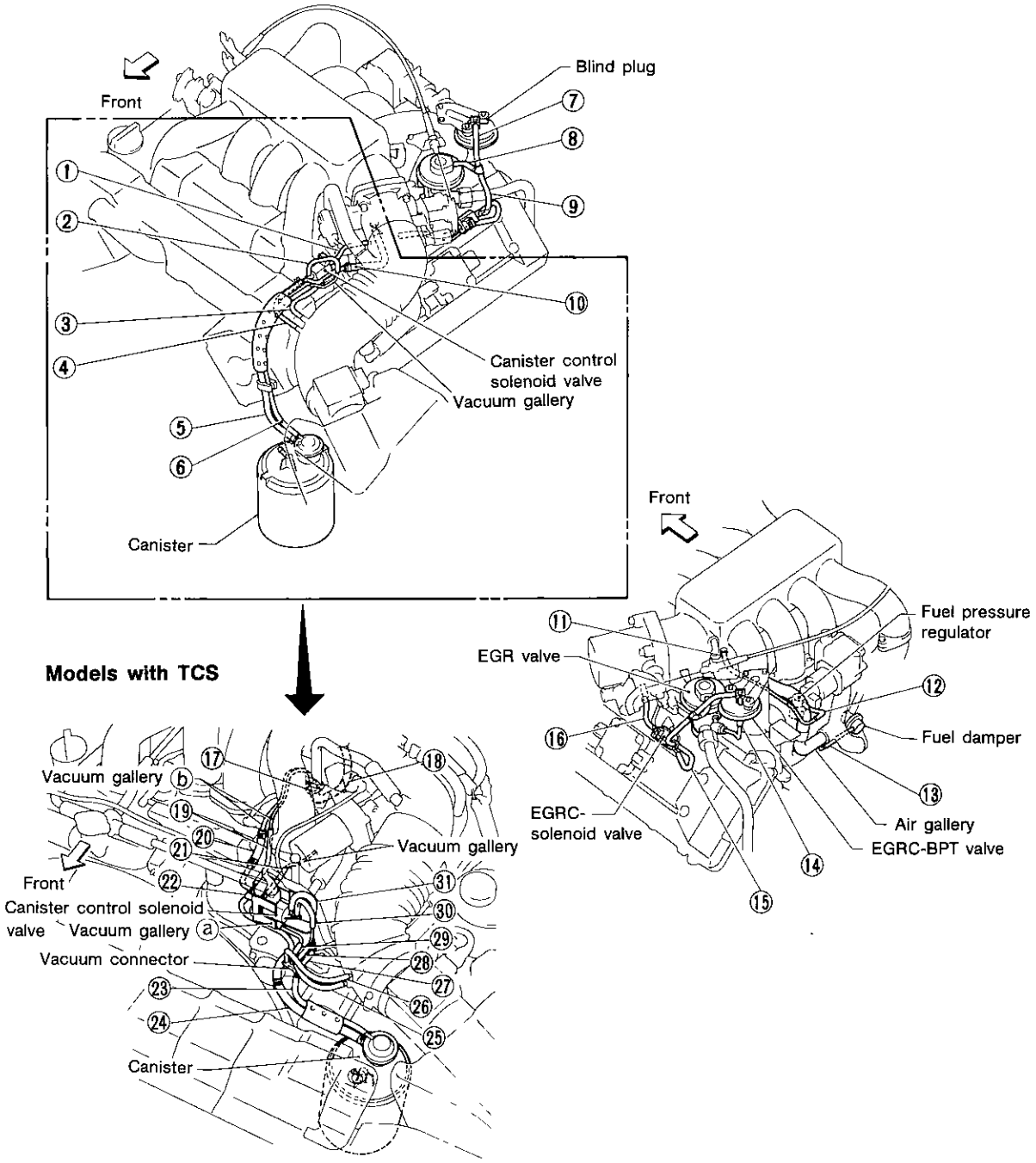


MEF643D

System Chart



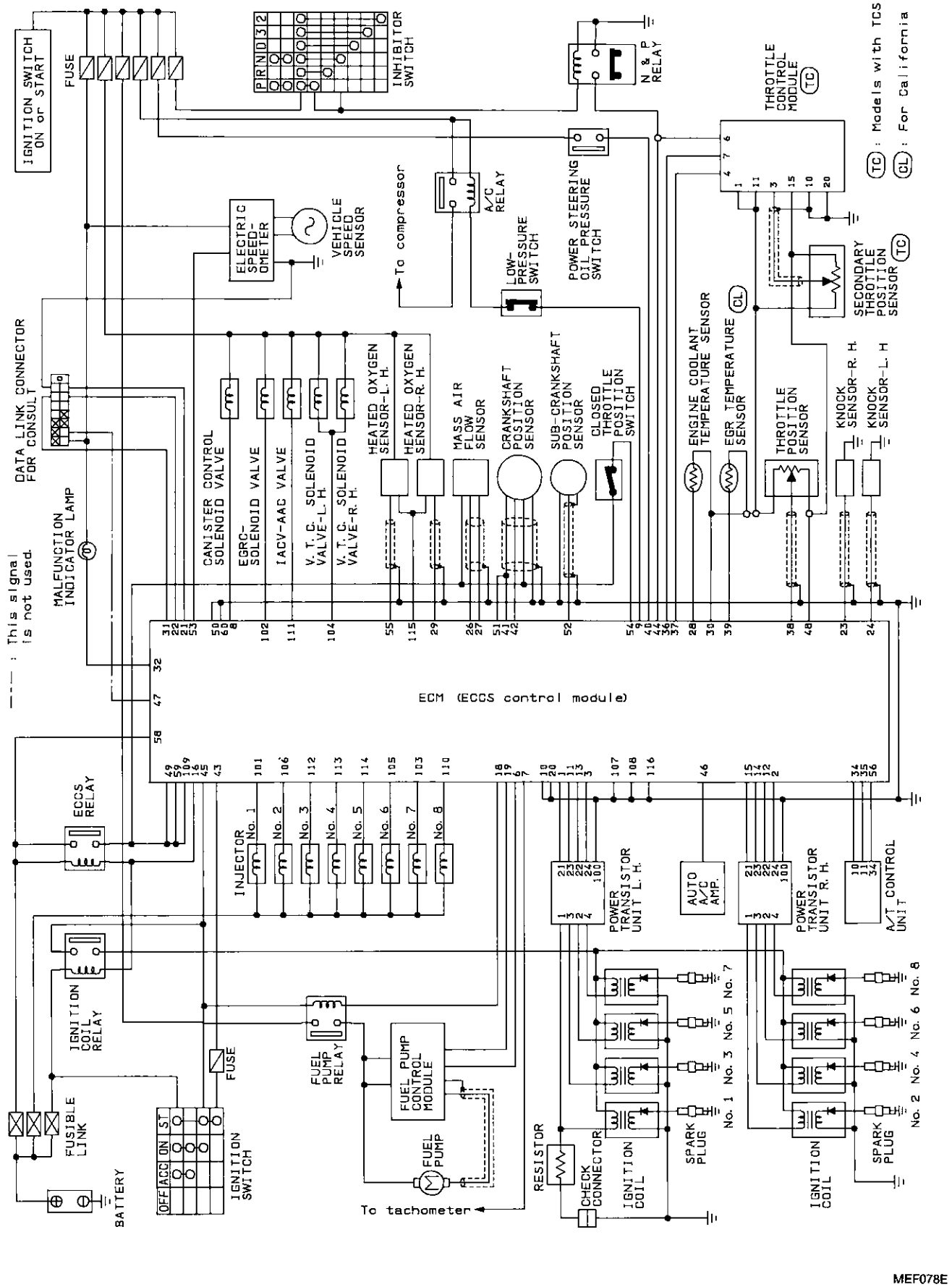
Vacuum Hose Drawing



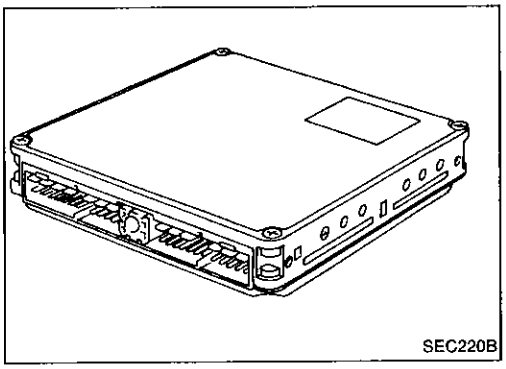
MEF644D

① Canister control solenoid valve to throttle body
② Vacuum gallery to canister control solenoid valve
③ Air duct to vacuum gallery
④ Air duct to canister control solenoid valve
⑤ Canister to vacuum gallery (For purge)
⑥ Canister to vacuum gallery
⑦ EGRC-BPT valve to 3-way connector
⑧ EGR valve to 3-way connector
⑨ 3-way connector to EGRC-solenoid valve
⑩ Vacuum gallery to throttle body
⑪ Intake collector to vacuum pipe
⑫ Fuel pressure regulator to vacuum pipe
⑬ Fuel damper to air gallery
⑭ EGR valve to EGRC-BPT valve
⑮ Vacuum gallery to EGRC-solenoid valve
⑯ EGRC-solenoid valve to throttle body
⑰ Vacuum gallery ⓑ to throttle body
⑱ Vacuum gallery ⓑ to intake collector (Canister purge line)
⑲ Vacuum gallery ⓑ to vacuum gallery ⓐ
⑳ Vacuum gallery ⓑ to vacuum gallery ⓐ (Canister purge line)
㉑ Vacuum gallery to vacuum gallery ⓐ
㉒ Vacuum gallery ⓐ to canister control solenoid valve
㉓ Vacuum connector to canister
㉔ Vacuum gallery ⓐ to canister (For purge)
㉕ Vacuum connector to air duct (For EGR control)
㉖ Vacuum connector to air duct (For canister control)
㉗ ㉘ : Vacuum connector to vacuum gallery ⓐ
㉙ Vacuum connector to vacuum gallery ⓐ (For EGR control)
㉚ ㉛ : Vacuum gallery ⓐ to canister control solenoid valve

Circuit Diagram

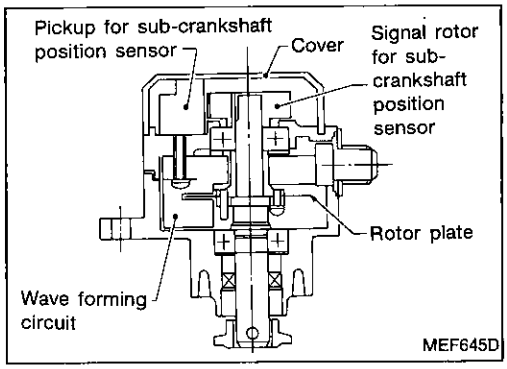


MEF078E


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.



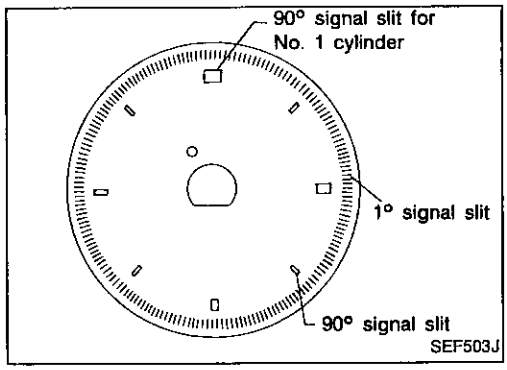
MEF645D

Crankshaft Position Sensor (CKPS)

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

The 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.

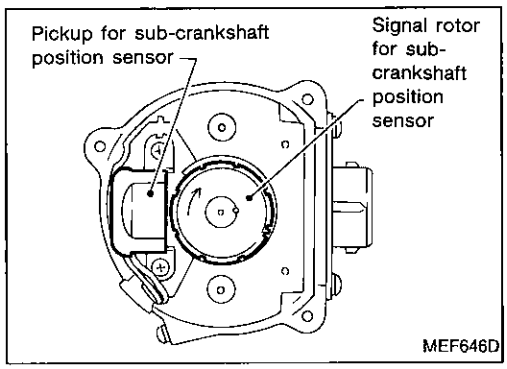
When the rotor plate passes between the L.E.D. and the photo diode, the slits in the rotor plate continually cut the light being transmitted to the photo diode from the L.E.D. This generates rough-shaped pulses which are converted into on-off pulses by the wave-forming circuit, which are sent to the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



SEF503J

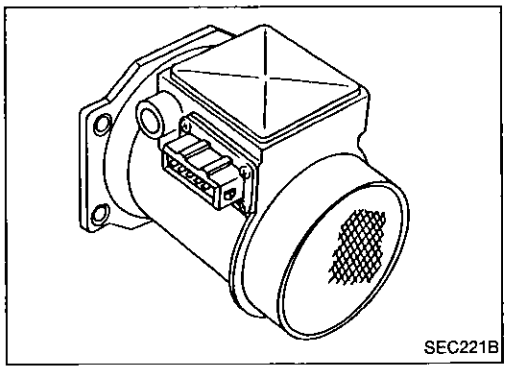
Sub-crankshaft position sensor operates when crankshaft position sensor is malfunctioning.

The sub-crankshaft position sensor is a small magnetic generator which consists of a signal rotor and a pickup. The perimeter of the signal rotor has grooves which change the magnetic lines of force across the pickup so that a pulse is produced.



MEF646D

Mass Air Flow Sensor (MAFS)

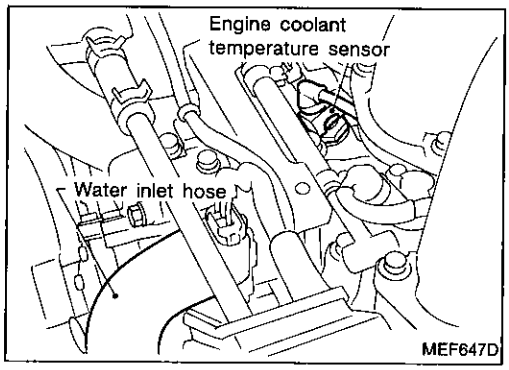

SEC221B

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.

Mass Air Flow Sensor (MAFS) (Cont'd)

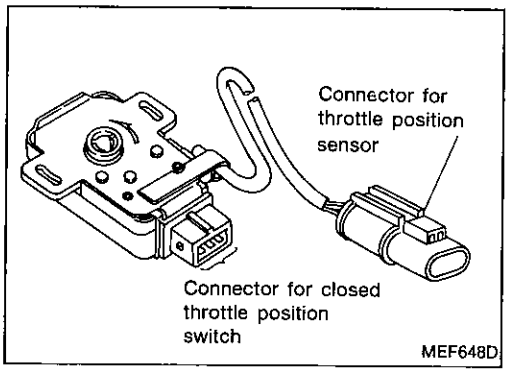
Therefore, it is necessary to supply the hot film with more electric current in order to maintain the temperature of the hot film. The ECM detects the air flow by means of this current change.



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.

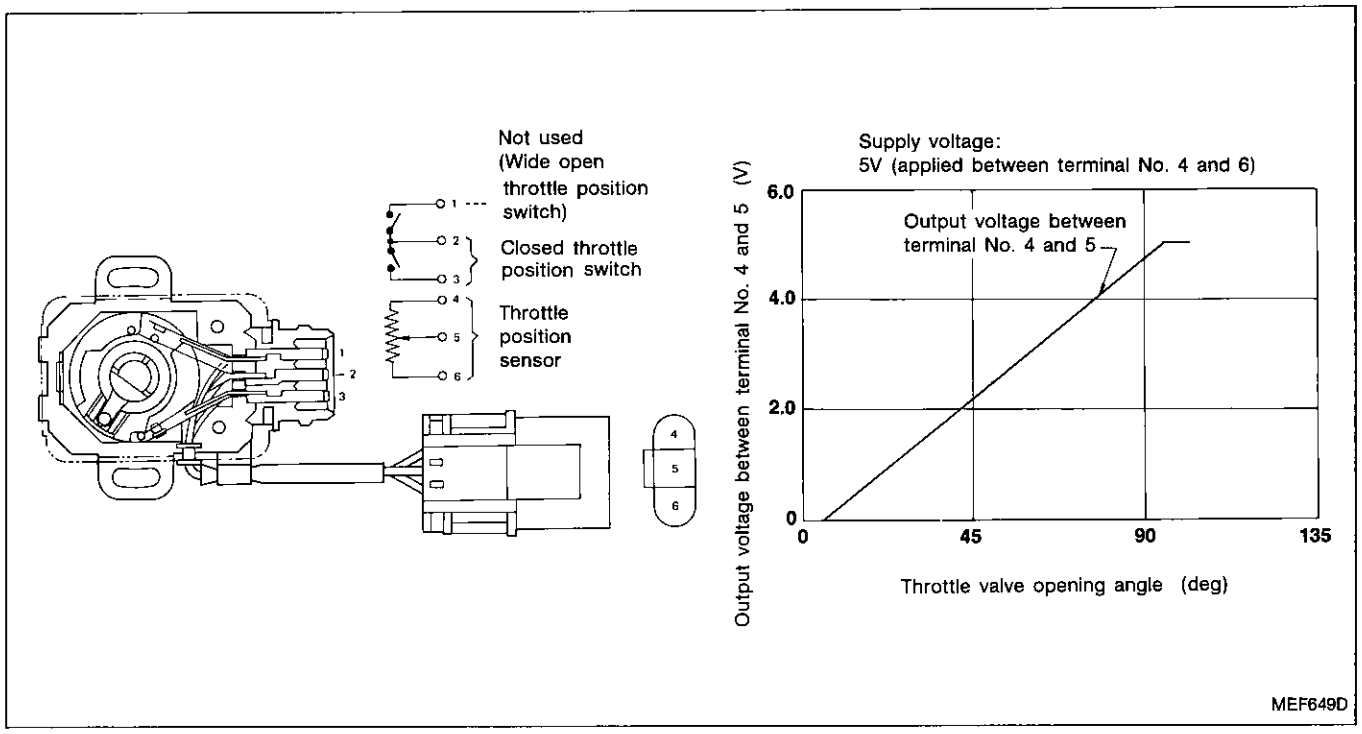


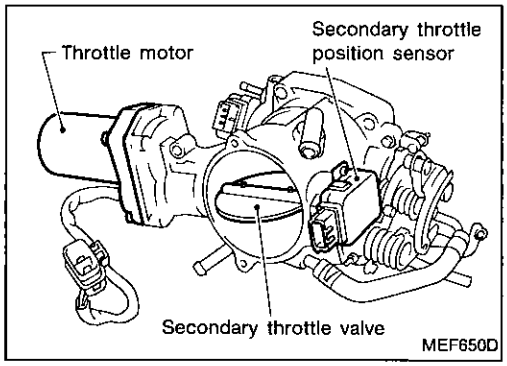
Throttle Position Sensor (TP) & Soft/Hard Closed Throttle Position (CTP) Switch

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.

Closed throttle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This system is called "soft closed throttle position switch". It controls engine operation such as fuel cut. 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.

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

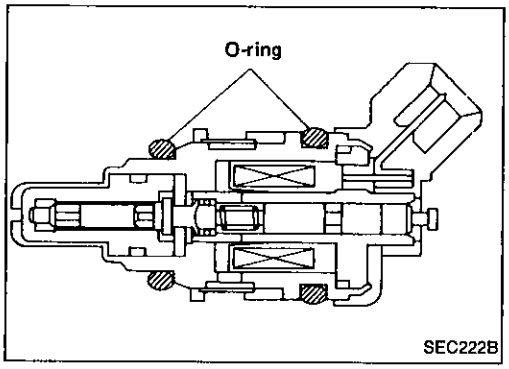




Secondary Throttle Position Sensor (TP) (Models with TCS only)

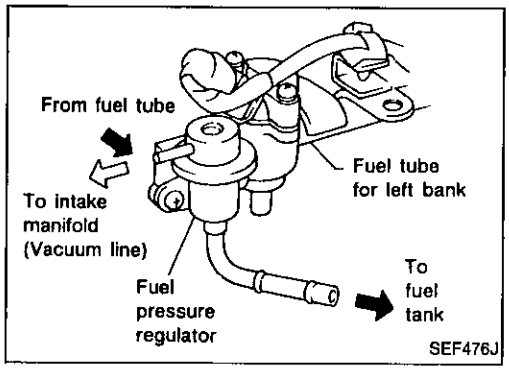
The secondary throttle position sensor responds to the movement of the throttle motor which is controlled by the T.C.M.
This sensor is a kind of potentiometer which transforms the secondary throttle position into output voltage, and emits the voltage signal to the T.C.M. In addition, the sensor detects the opening and closing speed and position of the secondary throttle valve and feeds the voltage signal to the T.C.M.
When the secondary throttle valve opening becomes smaller than the ordinary throttle valve opening due to TCS operation, then, and only then, the signal from the secondary throttle valve is used for engine control in place of the signal from the ordinary throttle position sensor. The signal of the secondary throttle valve first enters the T.C.M., from where it is sent to the ECM.

WARNING:
Before touching the secondary throttle valve, be sure to disconnect the throttle motor connector; otherwise, injury may occur due to accidental actuation of the valve.



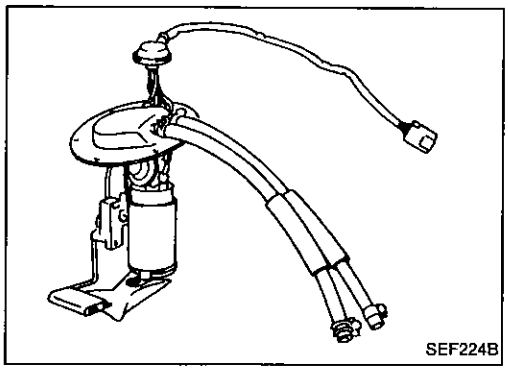
Fuel Injector

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.



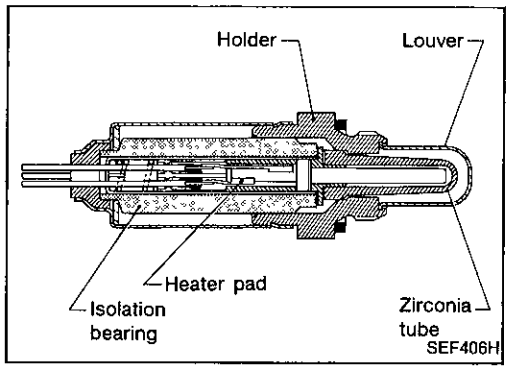
Fuel Pressure Regulator

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.



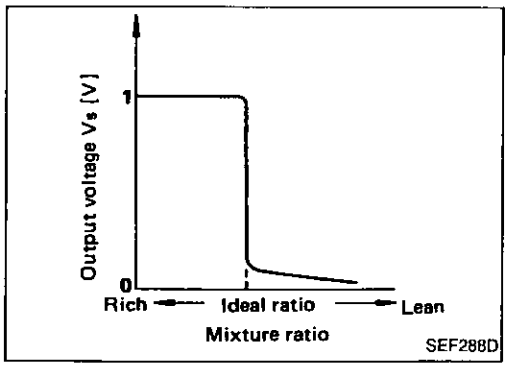
Fuel Pump

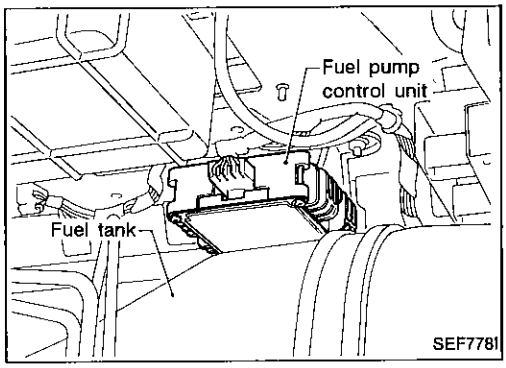
The fuel pump is an in-tank type with a fuel damper. Both the pump and damper are located in the fuel tank.



Heated Oxygen Sensor (HO2S)

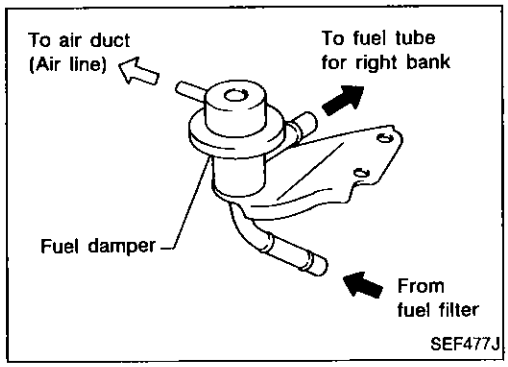
The heated oxygen sensor, which is placed into the exhaust outlet, monitors the amount of oxygen in the exhaust gas.
The sensor has a closed-end tube made of ceramic zirconia. The outer surface of the tube is exposed to exhaust gas, and the inner surface to atmosphere. The zirconia of the tube compares 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.





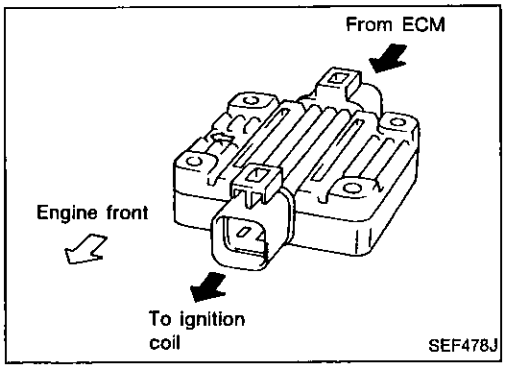
Fuel Pump Control Unit

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



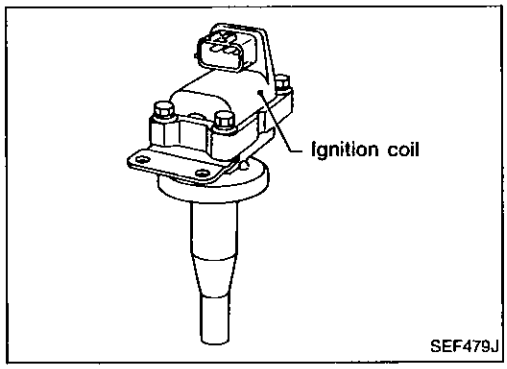
Fuel Damper

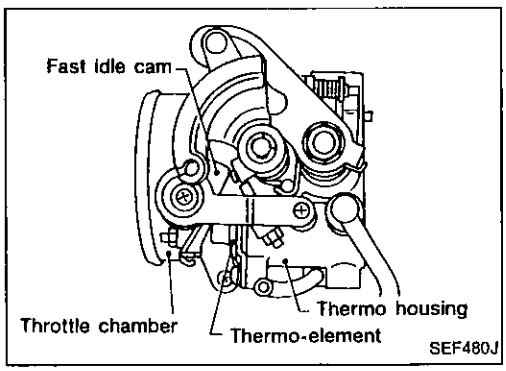
The fuel damper, which consists of a diagram, reduces fuel pressure pulsation in the fuel feed line between the fuel filter and injectors.



Power Transistor Unit & Ignition Coil

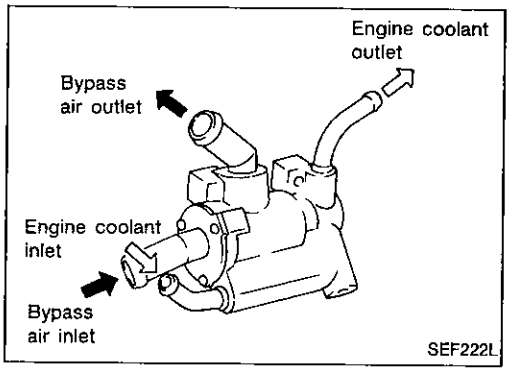
The ignition signal from the ECM is amplified by the two power transistors, which turn the ignition coil primary circuit on and off, inducing the proper high voltage in the secondary circuit. The ignition coil is a small, molded type.





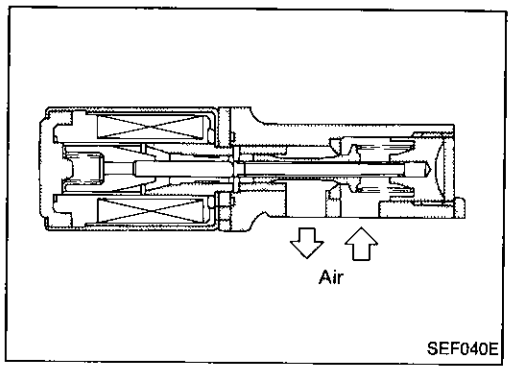
Fast Idle Cam (F.I.C.)

The F.I.C. is installed on the throttle body to maintain adequate engine speed while the engine is cold. It is operated by a volumetric change in wax located inside the thermo-element. The thermo-element is controlled by engine coolant temperature.



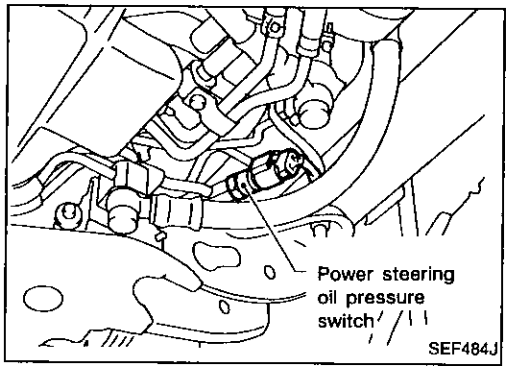
Air Cut Valve (Models with TCS only)

The function is the same as for the F.I.C. This valve is used to adjust the quantity of air which bypasses the secondary throttle valve. The air cut valve is operated by a volumetric change in wax located inside the thermo-element. The thermo-element is controlled by engine coolant temperature.
Accordingly, the quantity of bypass air is larger before engine warm up than after warm up.



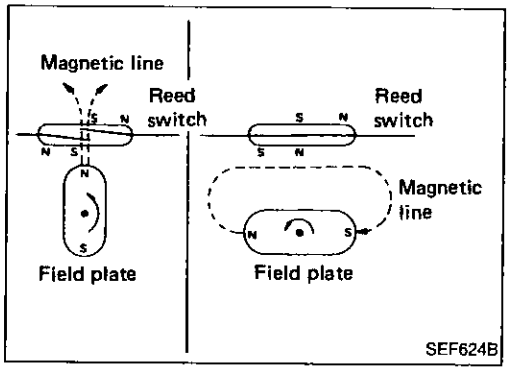
Idle Air Control Valve (IACV)-Auxiliary Air Control (AAC) Valve

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.



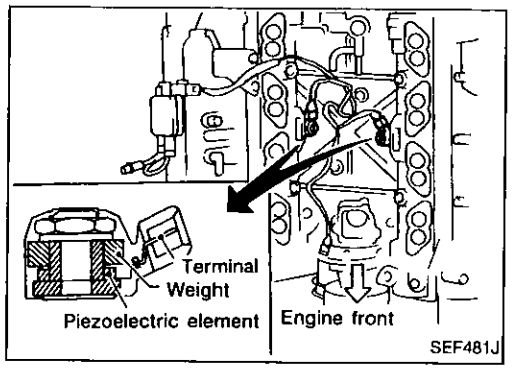
Power Steering Oil Pressure Switch

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.



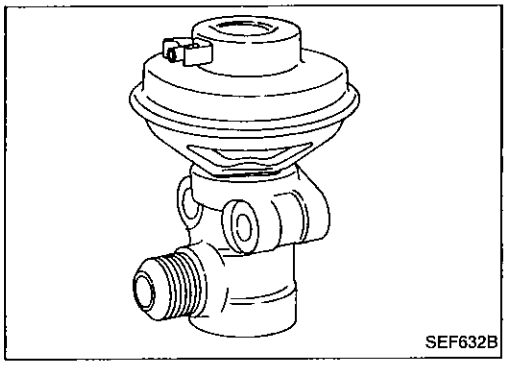
Vehicle Speed Sensor (VSS)

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.



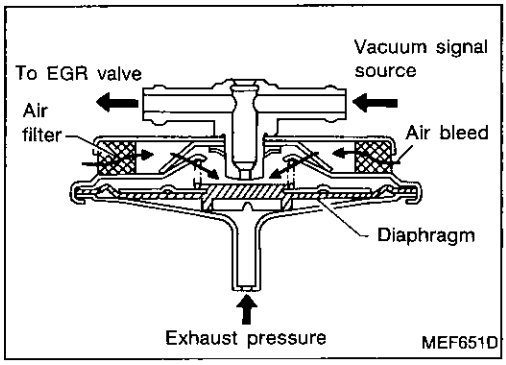
Knock Sensor (KS)

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.


SEF632B

Exhaust Gas Recirculation (EGR) Valve

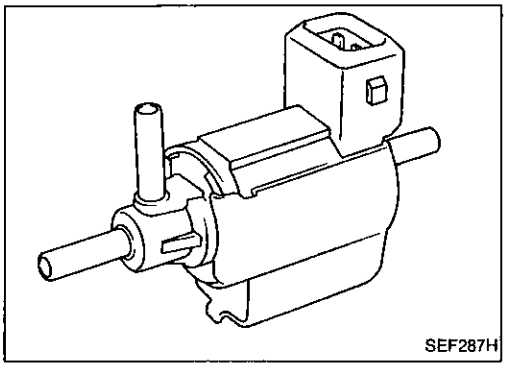
The EGR valve controls the quantity of exhaust gas to be diverted to the intake manifold through vertical movement of a taper valve connected to the diaphragm. Vacuum is applied to the diaphragm in response to the opening of the throttle valve.



MEF651D

EGR Control (EGRC)-BPT Valve

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

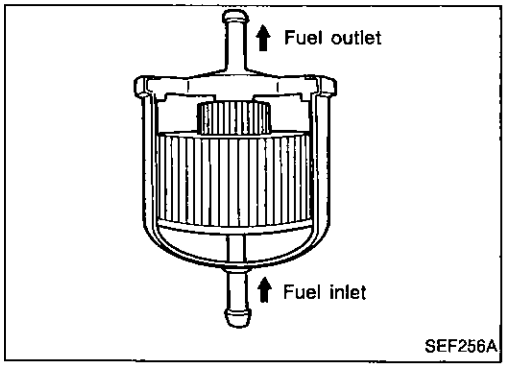

SEF287H

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.

Canister Control Solenoid Valve

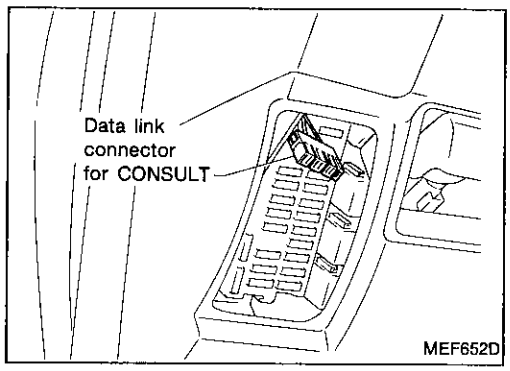
The solenoid valve responds to the ON/OFF signal from the ECM. When it is off, a vacuum signal from the throttle body is fed into the canister and fuel vapor is lead to the intake manifold. When the ECM sends an ON signal, the coil pulls the plunger downward and cuts the vacuum signal.



SEF256A

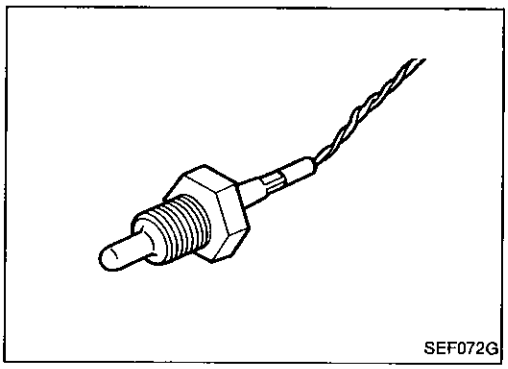
Fuel Filter

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



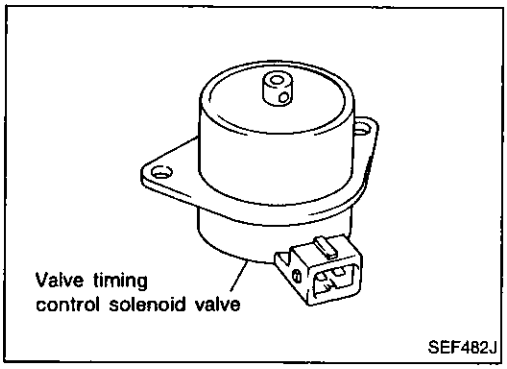
Data Link Connector for CONSULT

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



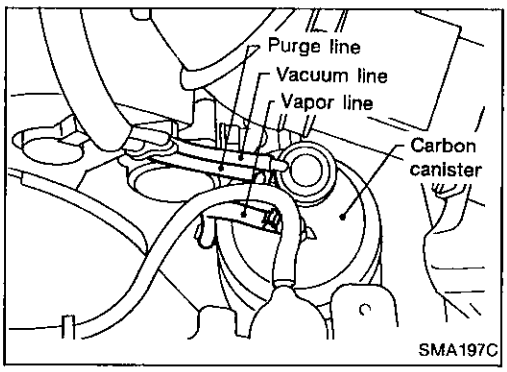
EGR Temperature Sensor (California models only)

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.

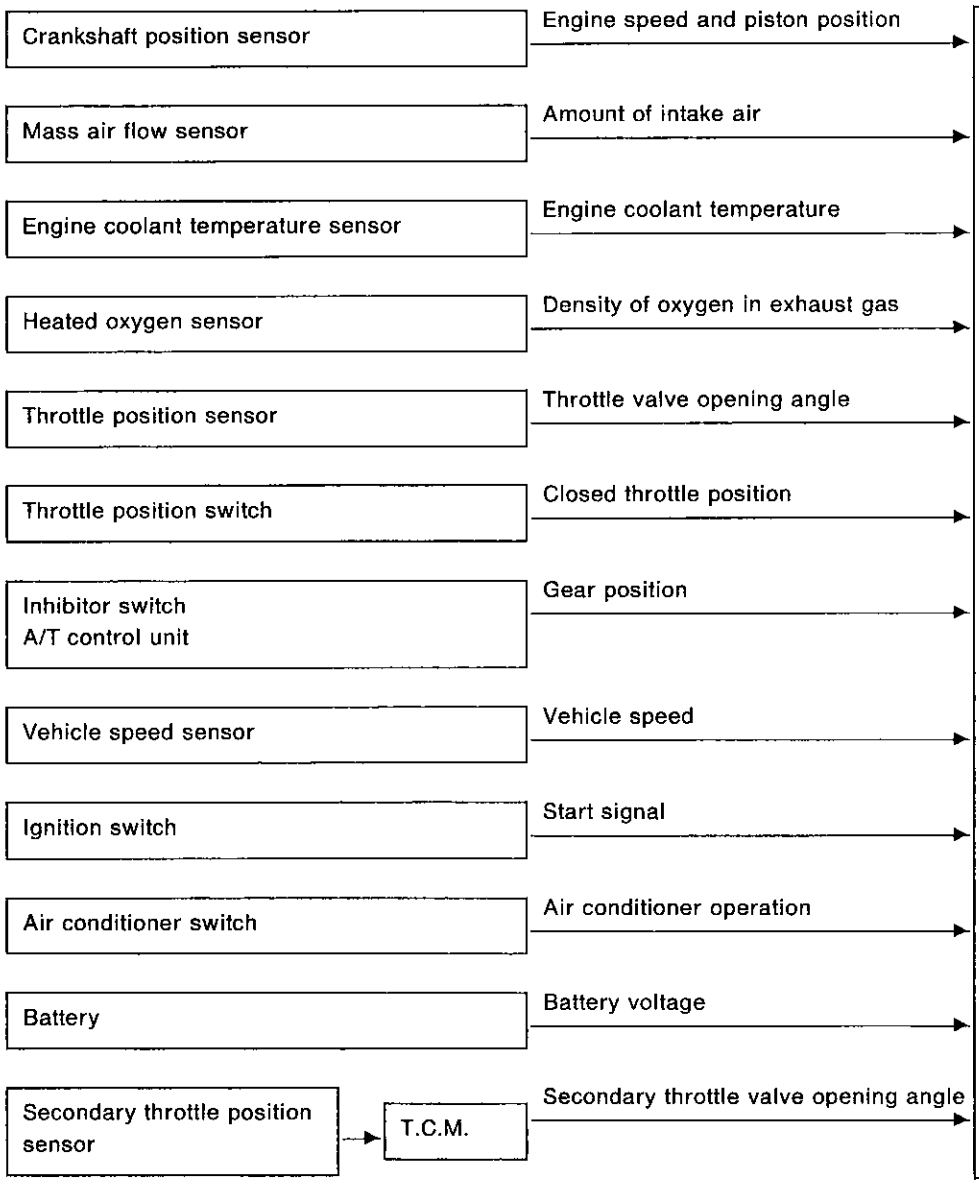


Carbon Canister

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.

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 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.

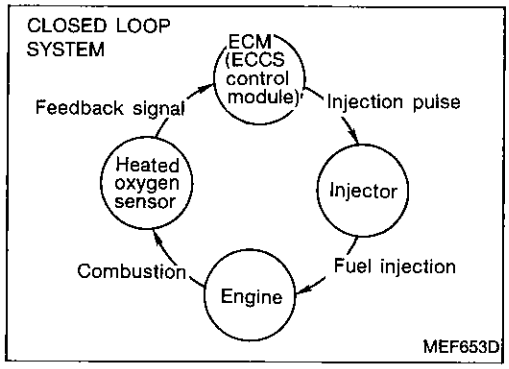
<Fuel increase>

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 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.

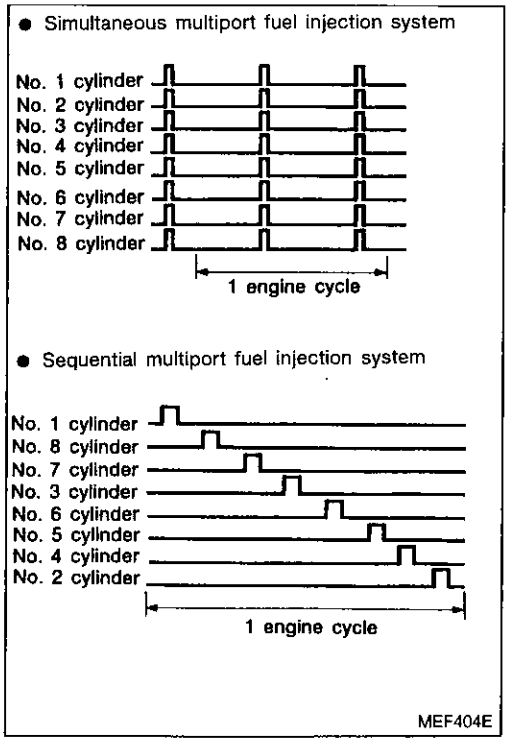
This stage refers to the closed loop control condition. The open loop control condition refers to that under which the ECM detects any of the following conditions and feedback control stops in order to maintain stabilized fuel combustion.

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

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 differences (e.g., mass air flow sensor hot film) and changes to the E.C.C.S. parts during operation (injector clogging, etc.) which directly affect the mixture ratio.

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



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 eight cylinders simultaneously twice each engine cycle.

In other words, pulse signals of the same width are simultaneously transmitted from the ECM to the eight 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.

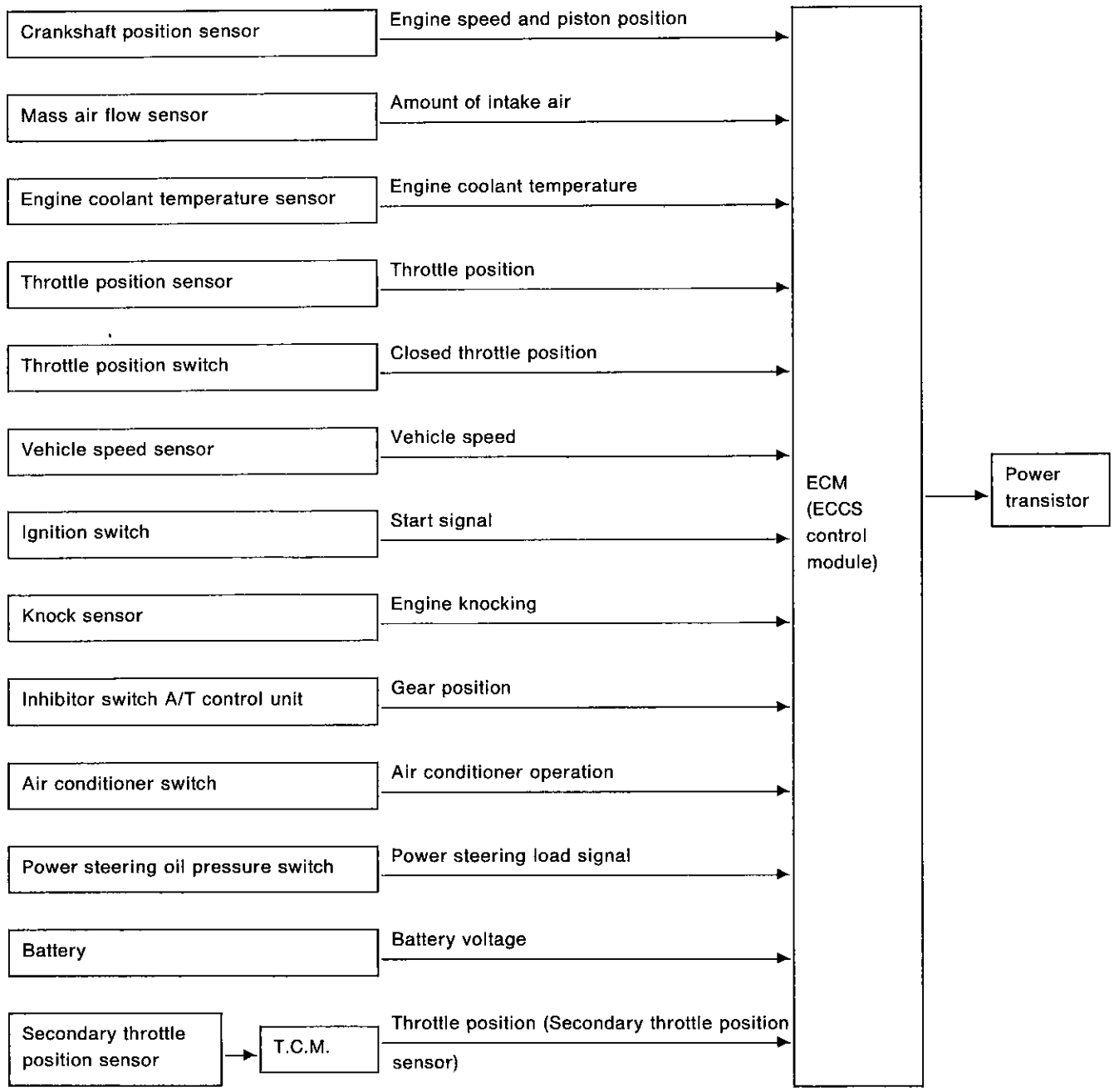
When the engine is being started and/or if the fail-safe system (C.P.U., crankshaft position sensor) is operating, simultaneous multiport fuel injection system is used. When the engine is running sequential multiport fuel injection system is used.

FUEL SHUT-OFF

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

Electronic Ignition (EI) System

INPUT/OUTPUT SIGNAL LINE



Electronic Ignition (EI) System (Cont'd)

SYSTEM DESCRIPTION

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

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

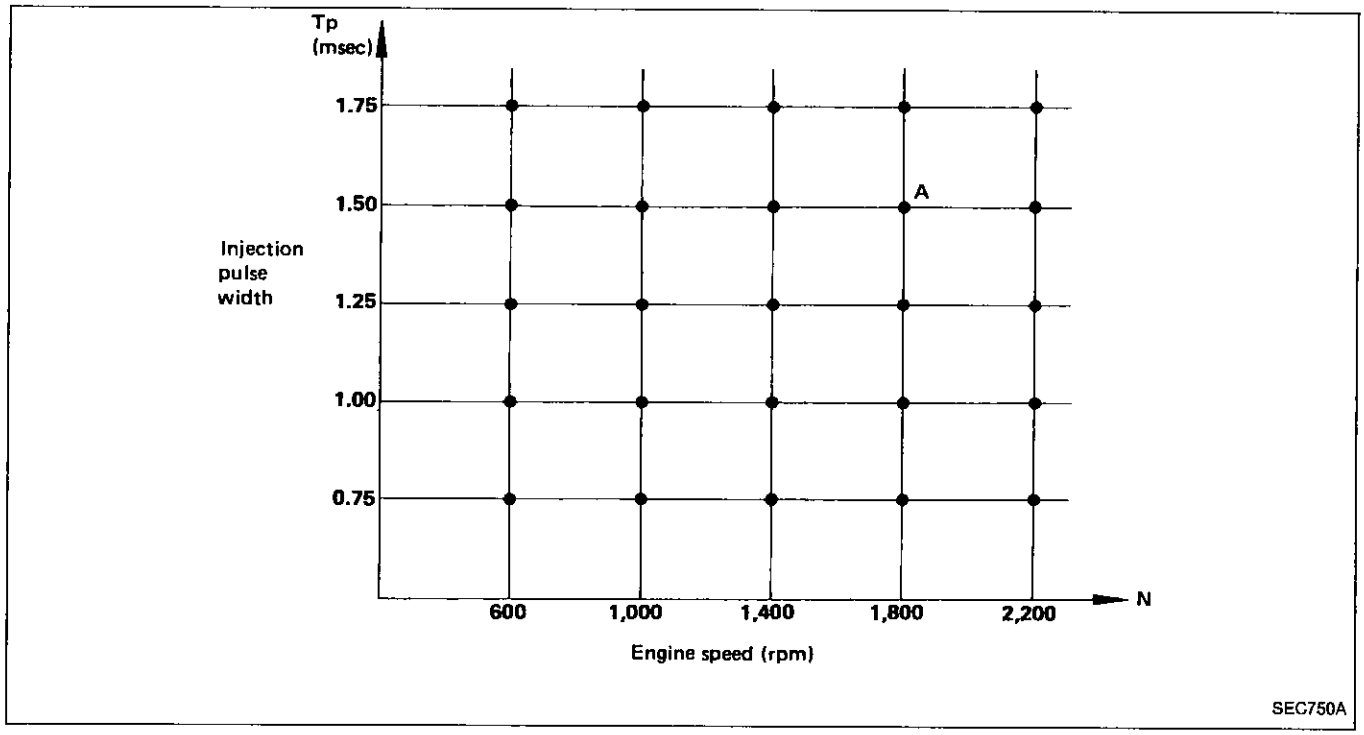
The ECM detects information such as the injection pulse width and crankshaft position sensor signal which varies every moment. Then responding to this information, ignition signals are transmitted to the power transistor.

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.

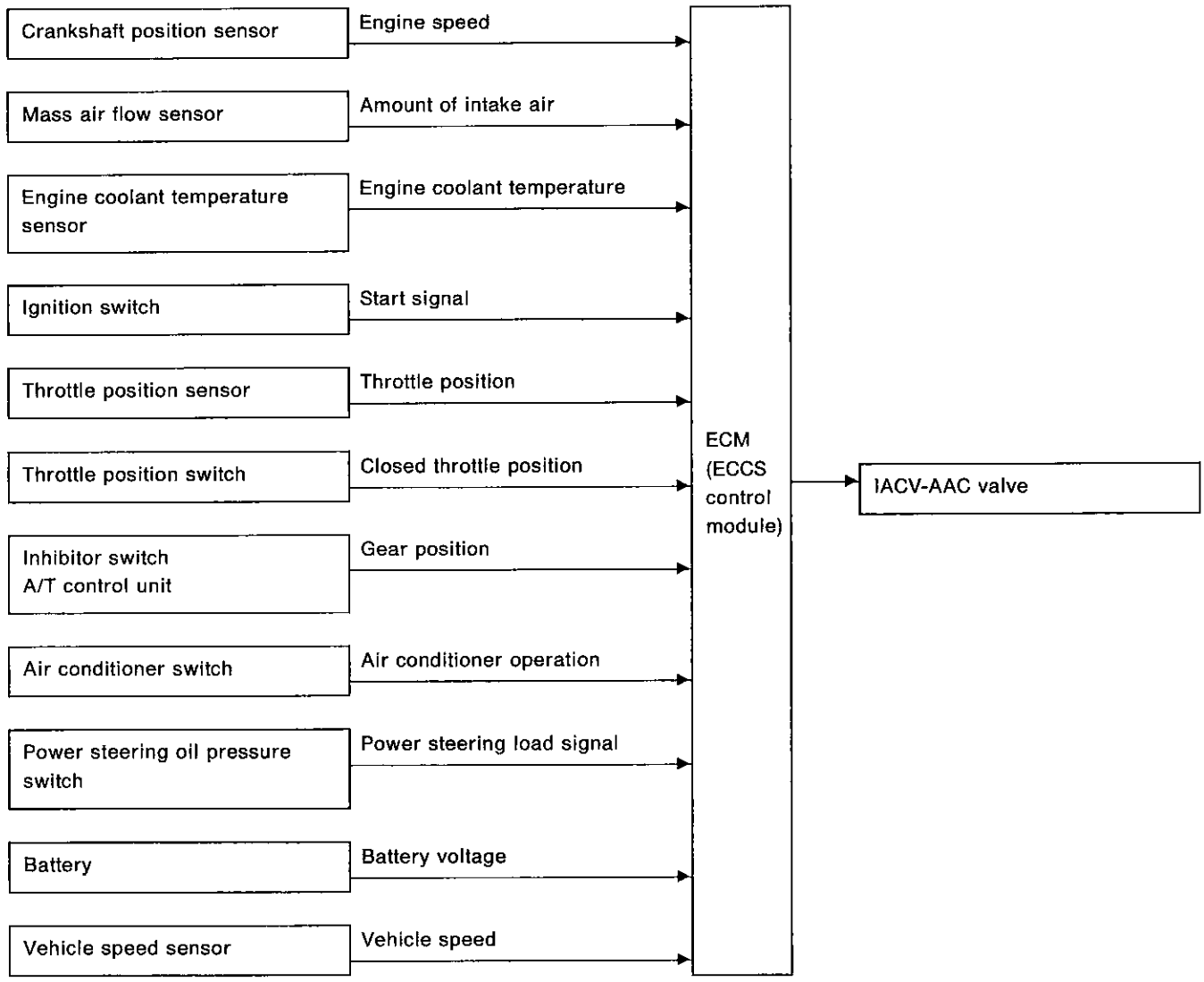


The retard system, actuated by the knock sensor, is designed only for emergencies. The basic ignition timing is pre-programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. Consequently, the retard system does not operate under normal driving conditions.

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



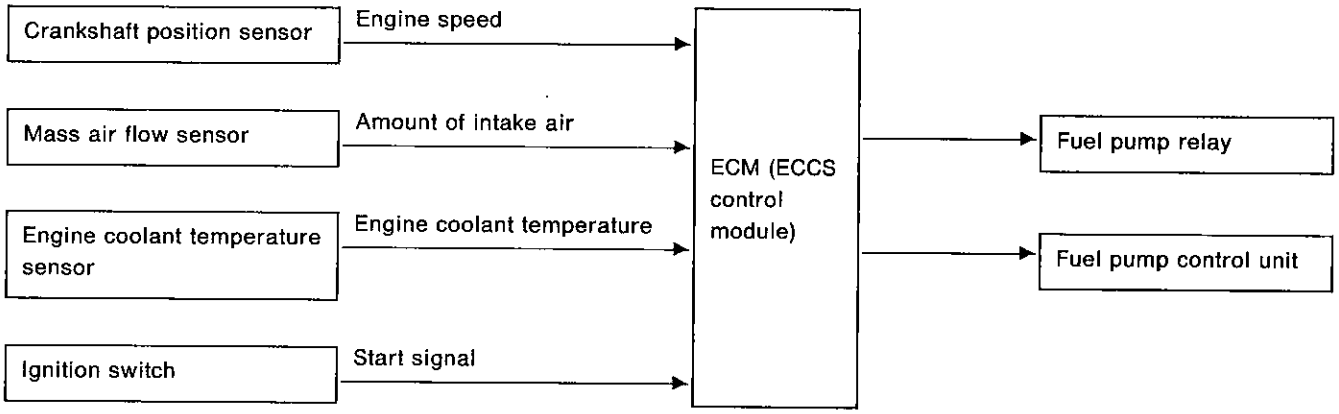
SYSTEM DESCRIPTION

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 the 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 the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as noise and vibration transmitted to the vehicle interior, fuel consumption, and engine load.

Fuel Pump Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

Fuel pump ON-OFF control

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine start-up. If the ECM receives a 1° signal from the 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 the battery from discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1.5 seconds
Except as shown above	Stops

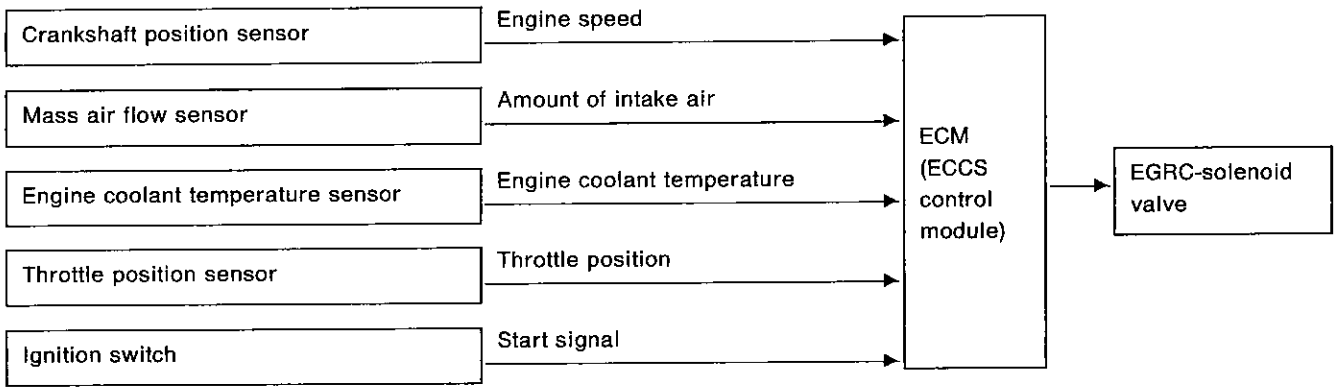
Fuel pump voltage control

The fuel pump is controlled in 3-steps by the fuel pump control unit which adjusts the voltage supplied to the fuel pump.

Conditions	Amount of fuel flow	Supplied voltage
• Engine cranking • Engine coolant temperature below 0°C (32°F) • Engine is running under heavy load and high speed conditions	high	Battery voltage (11 - 14V)
• Engine is running under middle load and middle speed conditions	middle	Approximately 7.8V
Those other than above	low	Approximately 5.6V

Exhaust Gas Recirculation (EGR) System

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

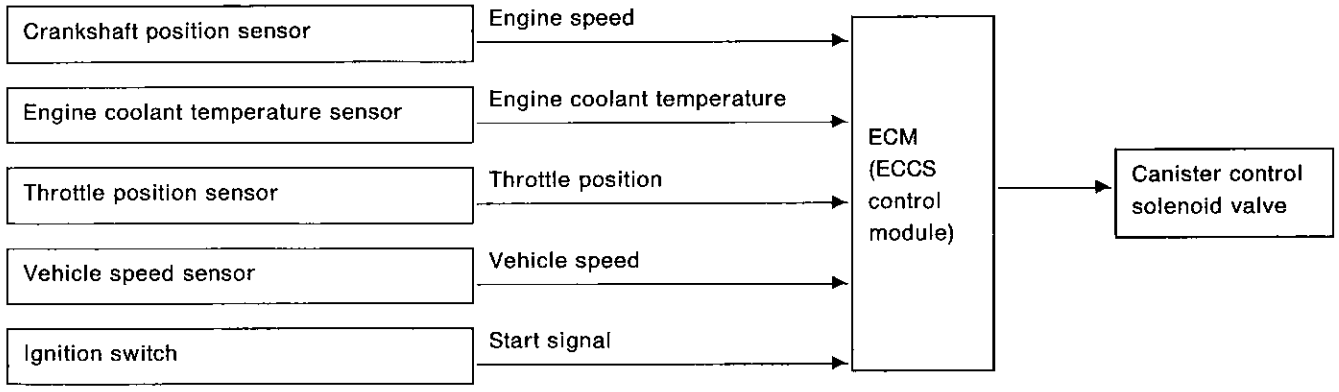
A system is provided which precisely cuts and controls the port vacuum applied to the EGR valve to suit engine operating conditions.
This cut-and-control operation is accomplished through the ECM. When the ECM detects any of the following conditions, current flows through the solenoid valve in the EGR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

Canister Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

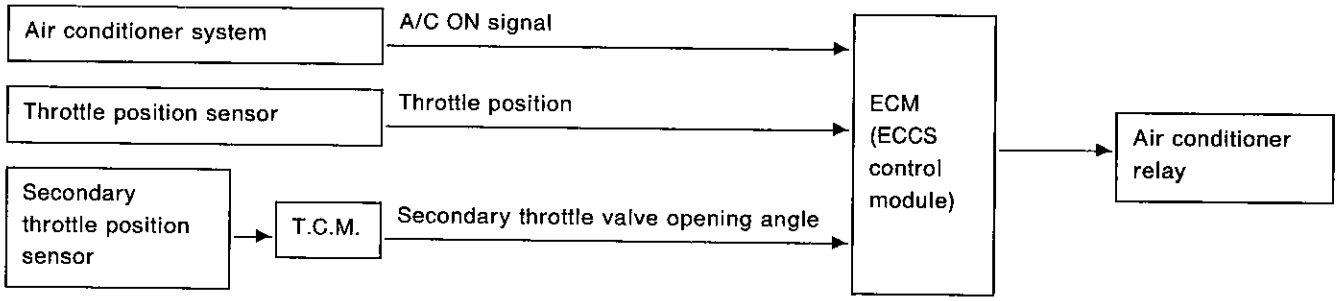
Also a system is provided which precisely cuts and controls the port vacuum applied to the canister to suit engine operating conditions.
This cut-and-control operation is accomplished through the ECM. When the ECM detects any of the following conditions, current flows through the solenoid valve in the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

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

1) Start switch "ON"
2) Closed throttle position
3) Low and high engine coolant temperature
4) During deceleration
5) Engine stopped
6) Vehicle speed: below 20 km/h (12MPH)

Acceleration Cut Control

INPUT/OUTPUT SIGNAL LINE



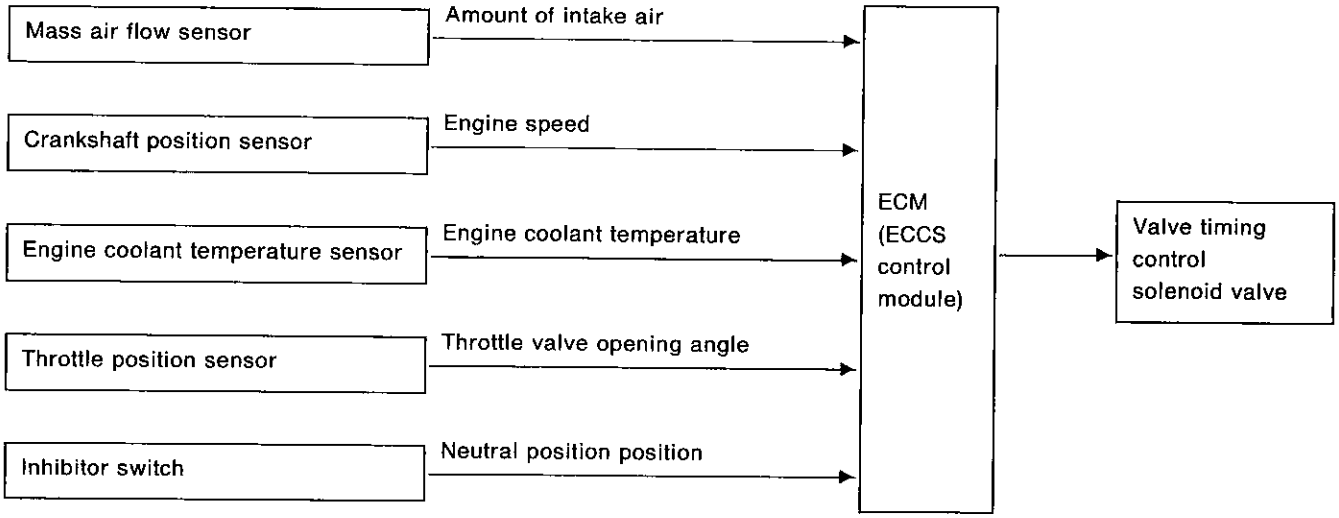
SYSTEM DESCRIPTION

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 (V.T.C.)

INPUT/OUTPUT SIGNAL LINE



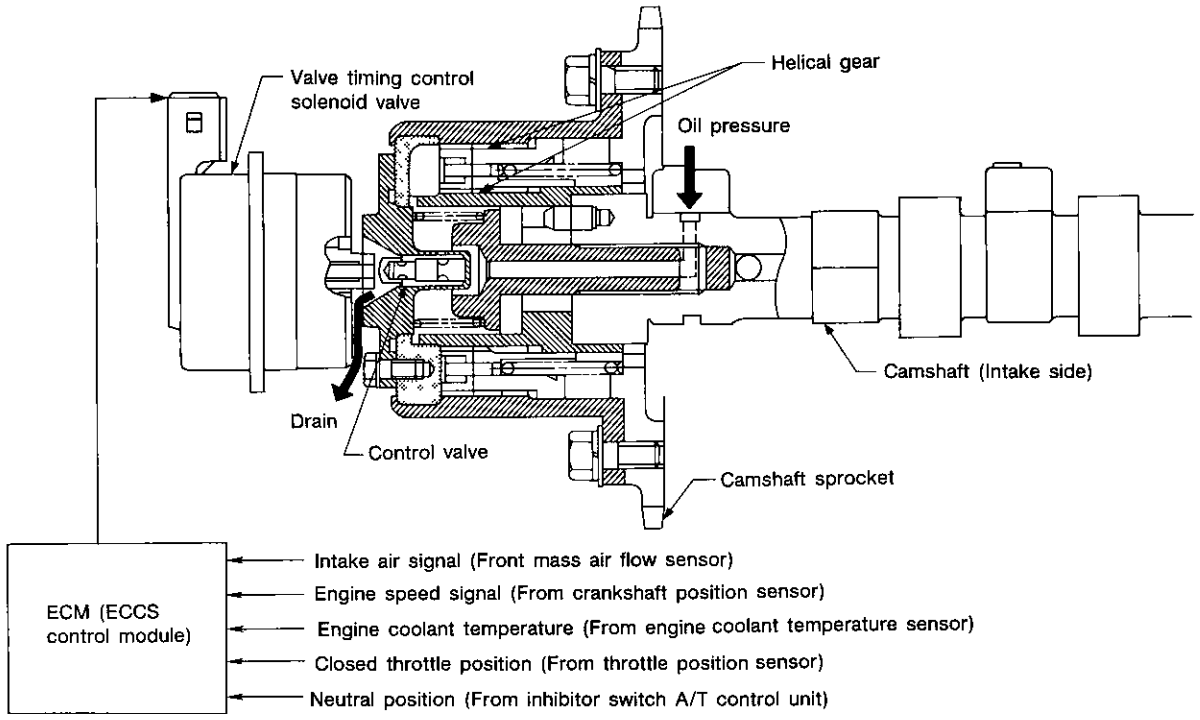
SYSTEM DESCRIPTION

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

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

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

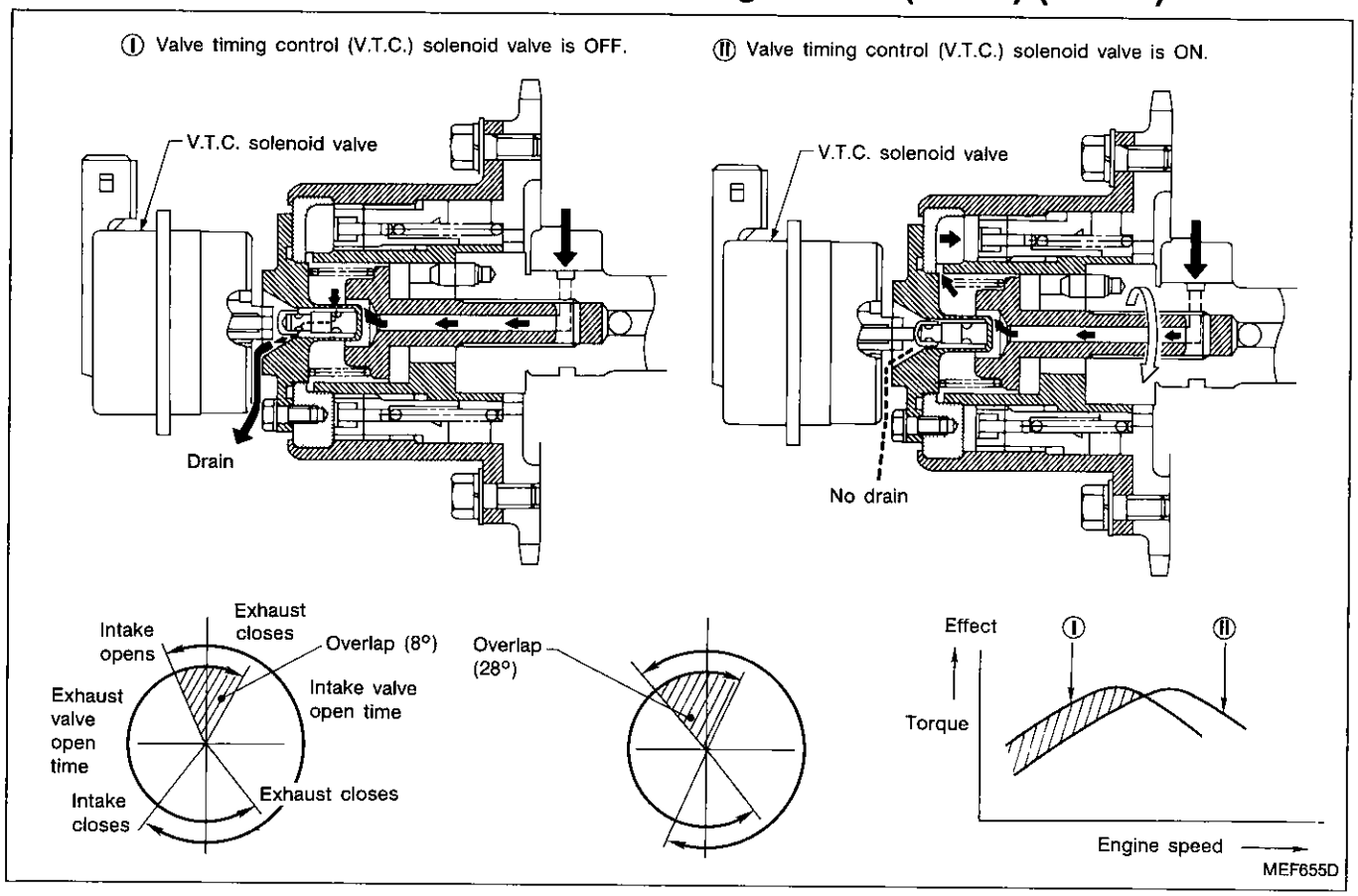
Valve Timing Control (V.T.C.) (Cont'd)



OPERATION

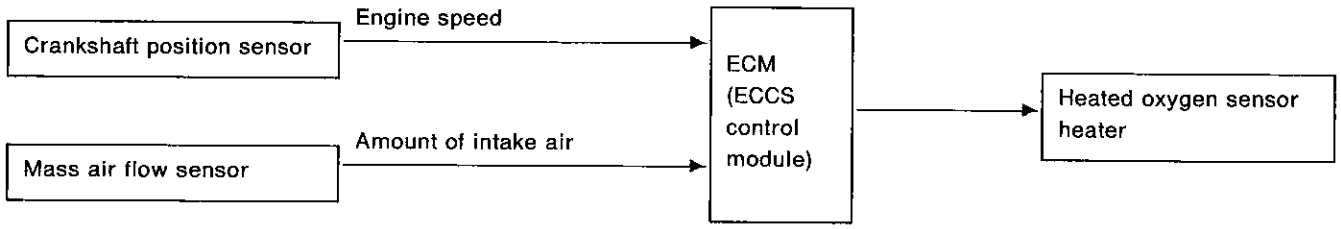
Engine operating condition	Valve timing control solenoid valve	Intake valve opening and closing time	Valve overlap	Engine torque curve
• Except at idle • Engine coolant temperature is between 70°C (158°F) and 110°C (230°F). • Engine speed is below 4,600 rpm. • Engine load is high. • Inhibitor switch is OFF.	ON	Advance	Increased	Ⅱ
Those other than above	OFF	Retard	Decreased	Ⅰ

Valve Timing Control (V.T.C.) (Cont'd)



Heated Oxygen Sensor (HO2S) Heater Control

INPUT/OUTPUT SIGNAL LINE



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

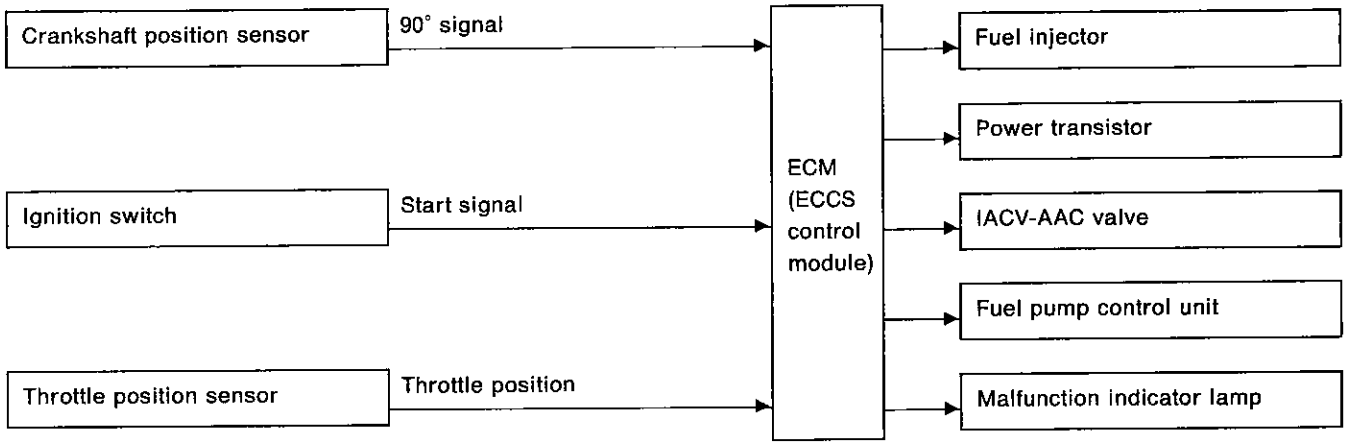
OPERATION

Engine speed rpm	Engine load	Heated oxygen sensor heater
Above 2,250	Heavy load	OFF
	Middle or light load	OFF
Below 2,250	Heavy load	OFF
	Middle or light load	ON

Fail-safe System

C.P.U. MALFUNCTION

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

Fail-safe system activating condition when ECM is malfunctioning

The fail-safe mode operates when the computing function of the ECM is judged to be malfunctioning.
When the fail-safe system activates, i.e. if a malfunction condition is detected in the 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, 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.

CRANKSHAFT POSITION SENSOR MALFUNCTION

Fail-safe system activating condition

The fail-safe mode operation starts as soon as all of the following conditions occur:
(1) No 90° signal pulse (reference signal) is detected for several seconds, or 1° signal (position signal) is equivalent to 0 rpm.
(2) The start signal was input continuously for more than several seconds.
(3) The battery voltage is higher than 10V.
(4) The inhibitor switch is in the "P" or "N" position.
(5) The computing function of the ECM was judged faulty.

When the crankshaft position sensor fail-safe system activates, the MALFUNCTION INDICATOR LAMP on the instrument panel lights to warn the driver.

Engine control with fail-safe system operating

When the fail-safe system is operating, fuel injection, ignition timing, engine idle speed, and EGR operation are controlled under certain limitations.
This crankshaft position sensor has a sub-crankshaft position sensor. When the crankshaft position sensor fail-safe system activates, the sub-crankshaft position sensor substitutes for the main one. At this time, engine speed will not rise over 3,000 rpm.

Fail-safe System (Cont'd)

Cancellation of fail-safe system

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

MASS AIR FLOW SENSOR MALFUNCTION

If the mass air flow sensor output voltage is below the specified value, the ECM senses an mass air flow sensor malfunction. In the case of a malfunction, the throttle position sensor substitutes for the mass air flow sensor.
Although the mass air flow sensor is malfunctioning, it is possible to start the engine and drive the vehicle. But engine speed will not rise more than 2,000 rpm in order to inform the driver of fail-safe system operation while driving.

Operation (Mass air flow sensor malfunction)

Engine condition	Starter switch	Fail-safe system	Fail-safe functioning
Stopped	ANY	Does not operate	—
Cranking	ON	Operates	Engine will be started by a pre-determined injection pulse on ECM.
Running	OFF		Engine speed will not rise above 2,000 rpm

ENGINE COOLANT TEMPERATURE SENSOR MALFUNCTION

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

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

THROTTLE POSITION SENSOR MALFUNCTION

Description

When the output signal of throttle position sensor is abnormal the ECM judges it as a malfunctioning of throttle position sensor.
The ECM do not use the throttle position sensor signal.

Operation

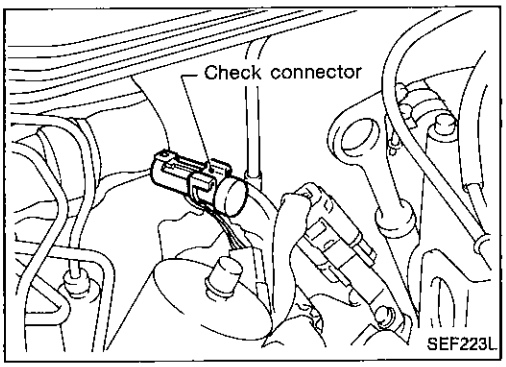
	Driving condition
Just as closed throttle position switch is turned ON.	Normal
Just as closed throttle position switch is turned OFF.	Poor acceleration

KNOCK SENSOR MALFUNCTION

When ECM (ECCS control module) judged to be malfunctioning, ignition timing is controlled numerical value for regular gasoline.

SECONDARY THROTTLE POSITION SENSOR MALFUNCTION

If the secondary throttle position sensor circuit, located between the ECM and the T.C.M., malfunctions, the ECM will receive a TCS output (ON-OFF) signal. This in turn activates the TCS to control engine operation. In other words, while the TCS is operating with the engine in a fail-safe mode, vehicle acceleration will decrease only slightly.

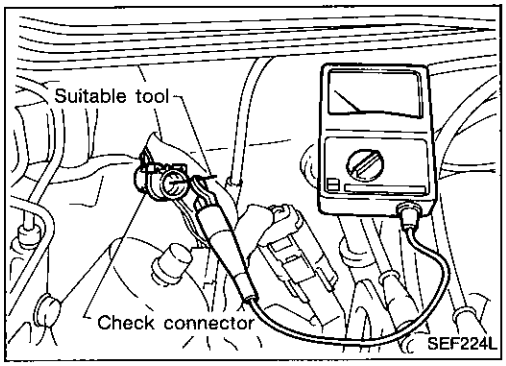


Direct Ignition System

CHECKING IDLE SPEED AND IGNITION TIMING

Idle speed

1. Disconnect check connector for voltage type tachometer.

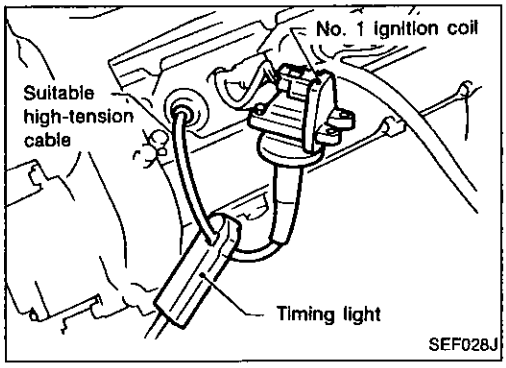


2. Connect tachometer using a suitable tool.

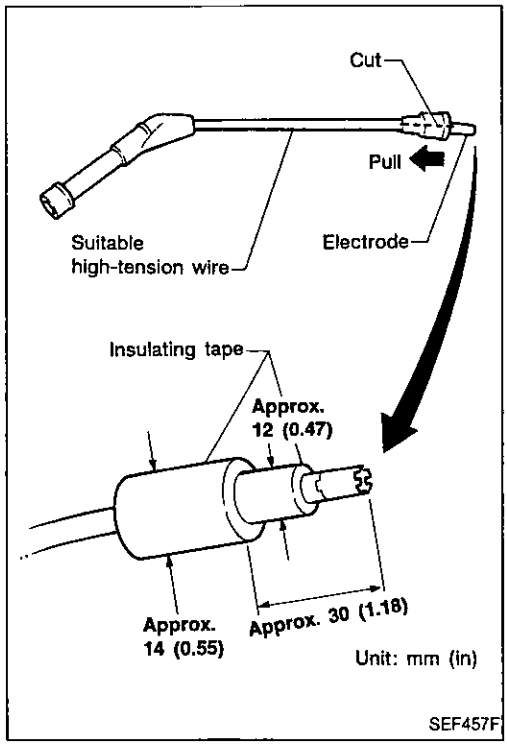
Ignition timing

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

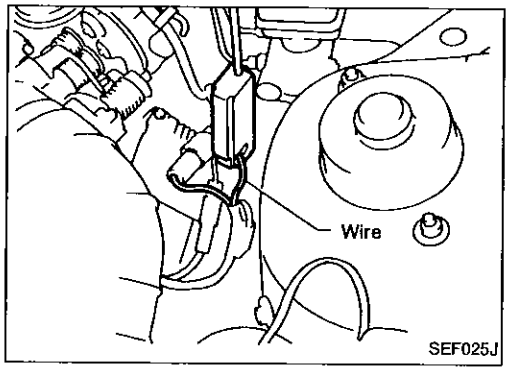
1. Remove No. 1 or No. 6 ignition coil.
2. Connect No. 1 or No. 6 ignition coil and No. 1 or No. 6 spark plug with a suitable high-tension wire as shown, and attach timing light the above procedures, enlarge the end of a suitable high-tension wire with insulating tape as shown.
3. Check ignition timing.



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

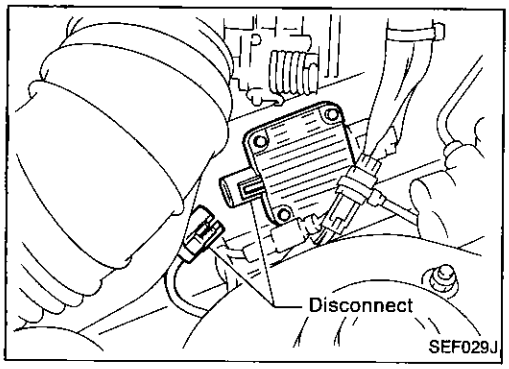


Direct Ignition System (Cont'd)



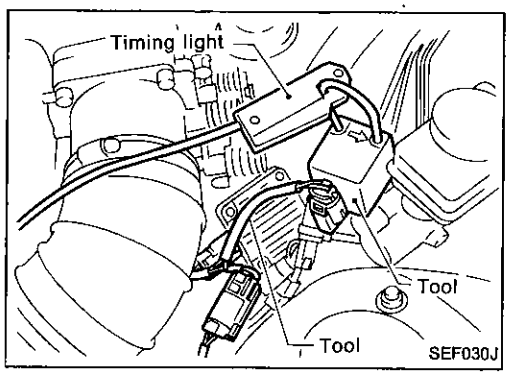
- **Method B (Without S.S.T.)**

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.

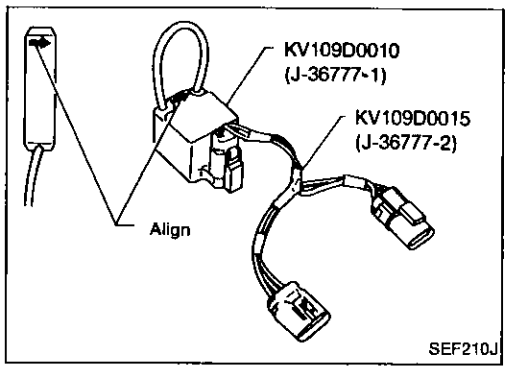


- **Method C (With S.S.T.)**

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.

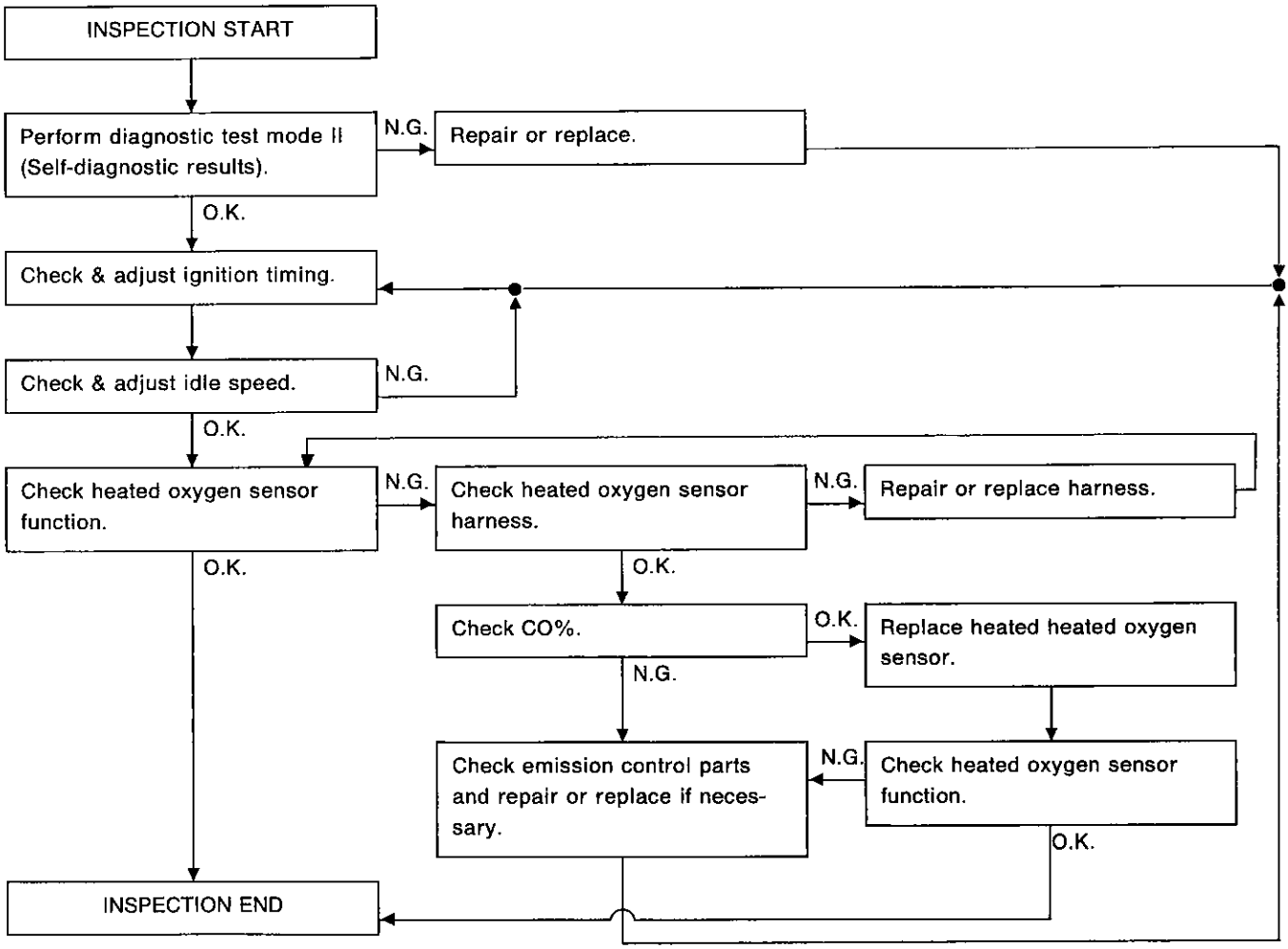
PREPARATION

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
- EGR valve operation
- Throttle valve

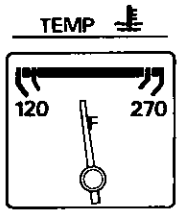
2. On air conditioner equipped models, checks should be carried out while the air conditioner is "OFF".
3. On automatic transmission equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in "N" position.
4. When measuring "CO" percentage, 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



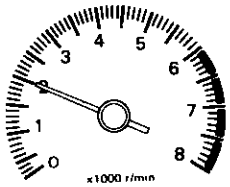
START

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



SEF246F

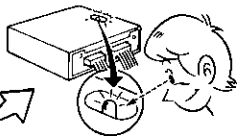
Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.



SEF247F

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

Perform diagnostic test mode II (Self-diagnostic results).


SEF362I

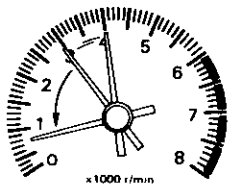
O.K. / N.G.

Repair or replace components as necessary.

Does engine run smoothly?

O.K. / N.G.

Clean injectors.



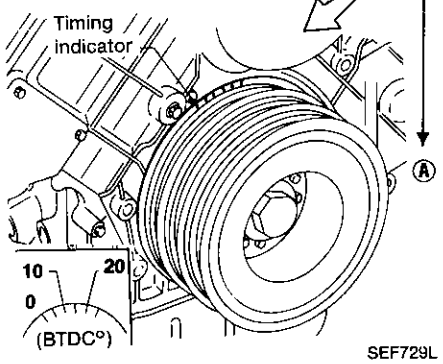
SEF248F

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

Check ignition timing with a timing light.

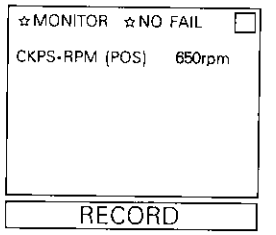
15° ± 2° B.T.D.C.

O.K. / N.G.



SEF729L

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



MFE656D

Check idle speed.

Read line speed in "DATA" MONITOR" mode with CONSULT

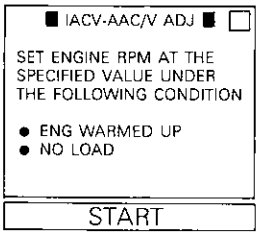
OR

Check idle speed.

A/T: 650 ± 50 rpm (in "N" position)

O.K.

N.G.

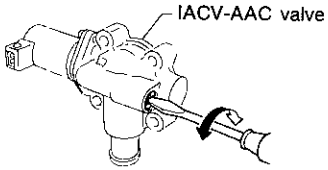


MEF657D

1) Select "IACV-AAC VALVE ADJ" in "WORK SUPPORT" model.
2) Touch "START".

OR

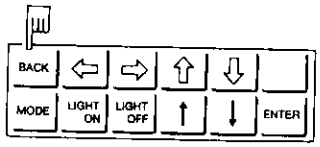
Disconnect IACV-AAC valve harness connector.



MEF658D

Adjust idle speed by turning idle speed adjusting screw.

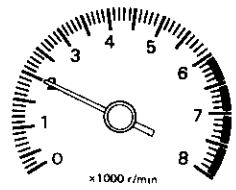
A/T: 600 ± 25 rpm (in "N" position)



SEF913J

1) Touch "BACK".

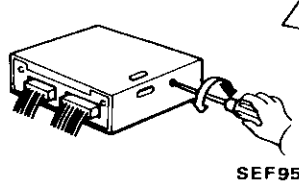
1) Connect IACV-AAC valve harness connector.

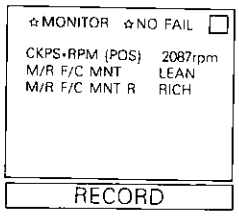


SEF247F

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 (heated oxygen sensor monitor).


SEF957D



MEF659D

Ⓓ

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 .....

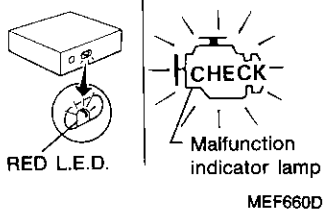
OR

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



MEF660D

Replace left bank heated oxygen sensor. ← Ⓙ

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.

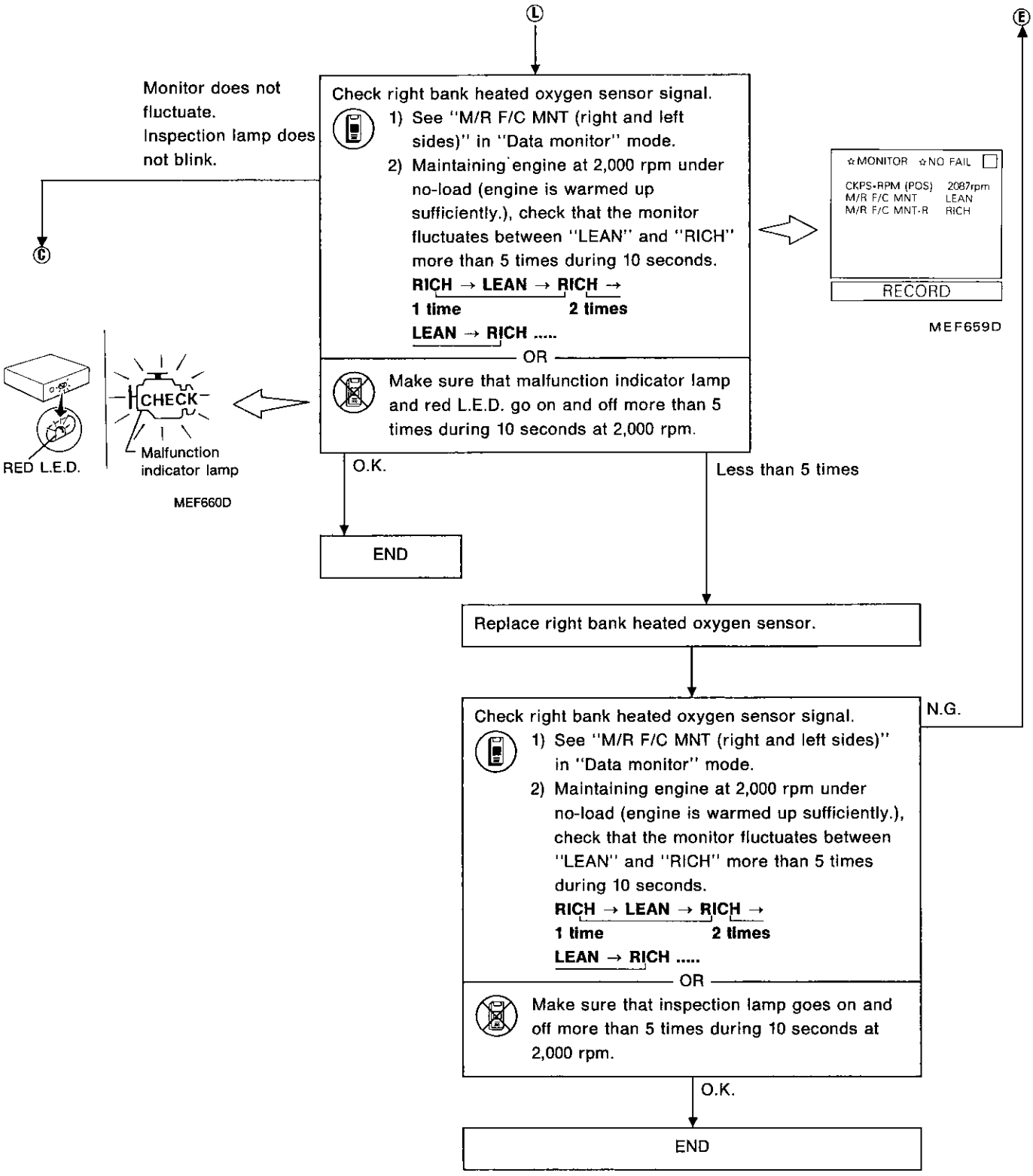
RICH → LEAN → RICH →
1 time 2 times
LEAN → RICH .....

OR

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

N.G. → Ⓚ

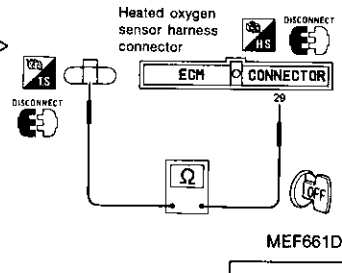
Ⓛ Ⓔ Ⓕ


Ⓛ
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
MEF659D
CHECK
RED L.E.D.
Malfunction indicator lamp
MEF660D
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 .....O.K.
Continuity does not exist.....N.G.



Ⓕ

O.K.

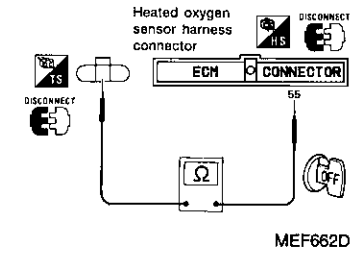
Repair or replace harness.

Ⓘ

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.

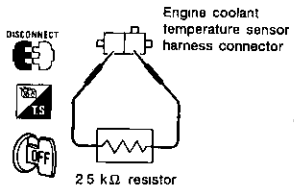
N.G.

Repair or replace harness.

Ⓘ

Connect 76-pin connector to ECM.

Ⓖ

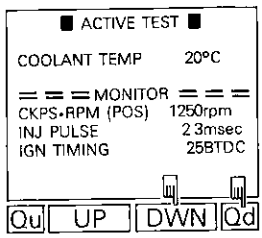


MEF663D

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

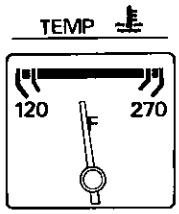
OR

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

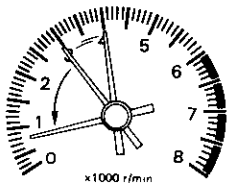


MEF664D

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



SEF246F



SEF248F

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

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. → Ⓗ

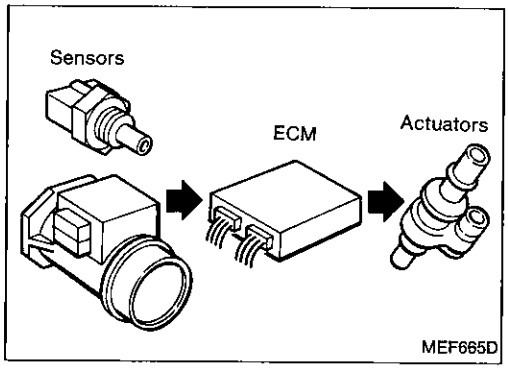
*: ECM may be the cause of a problem, but this is rarely the case.

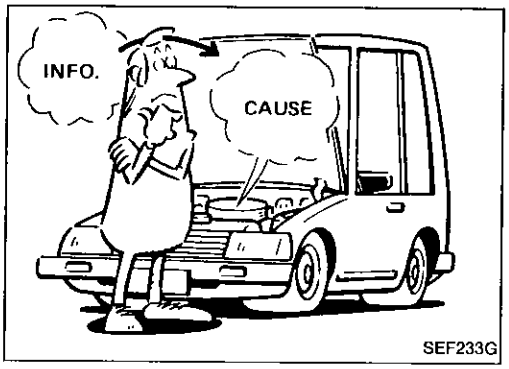
Contents

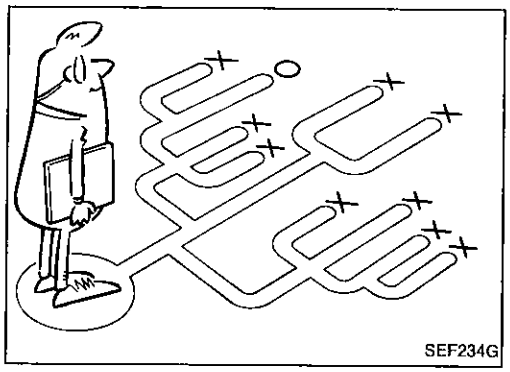
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How to Perform Trouble Diagnoses for Quick and Accurate Repair

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.

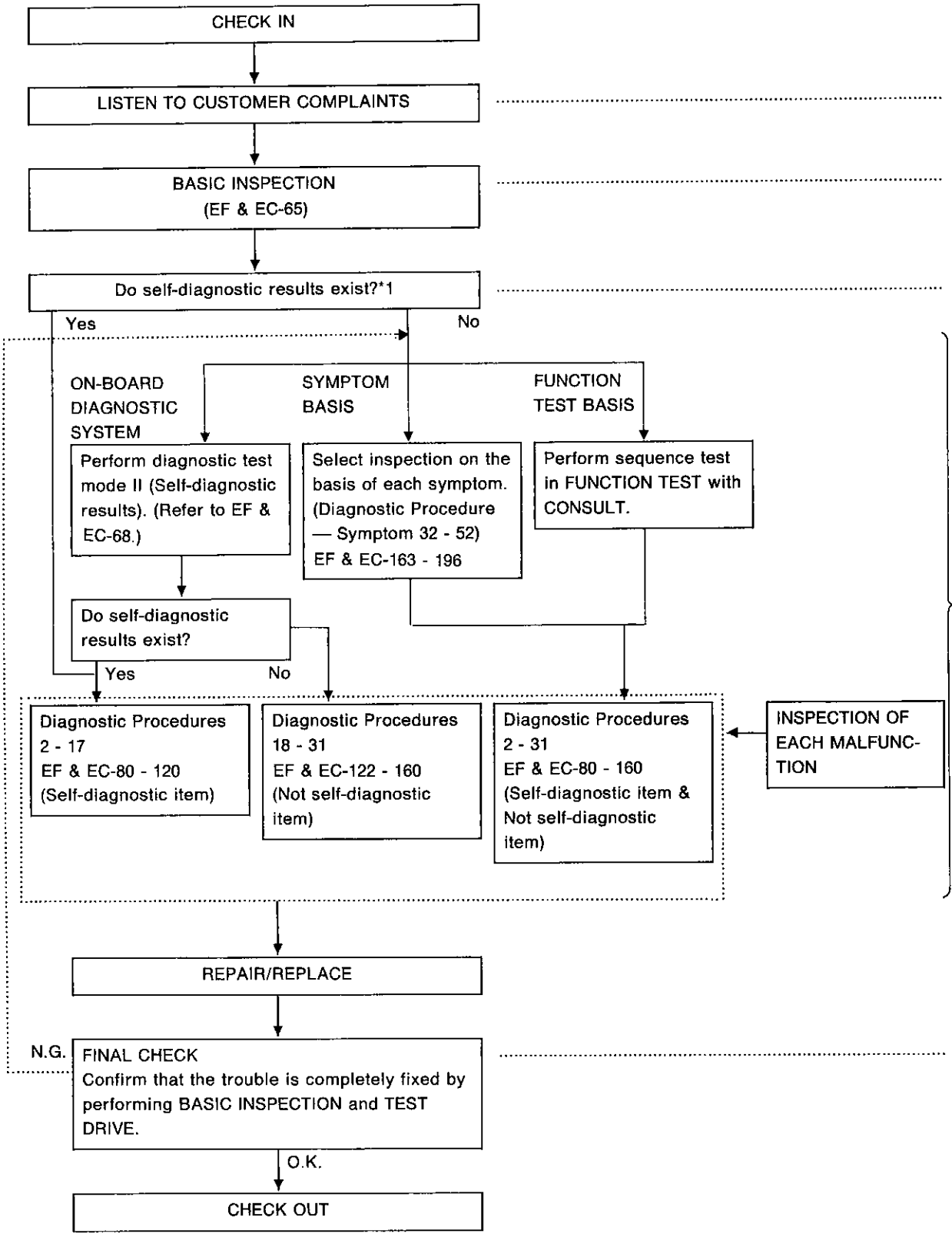
A visual check only may not find the cause of the problems, so a road test with a circuit tester connected to a suspected circuit should be performed.

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 2 - 31. 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 - 31. 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 diagnostic test mode II (self-diagnostic results). However, inspection is started by assuming that the diagnostic test mode II (self-diagnostic results) has already been performed. ● When a system having the diagnostic test mode II (self-diagnostic results) function contains any circuit placed outside the range of this diagnostic test mode II (self-diagnostic results) function, it is arranged that the "Not self-diagnostic item" of such a system will be performed when the self-diagnostic result is OK. 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

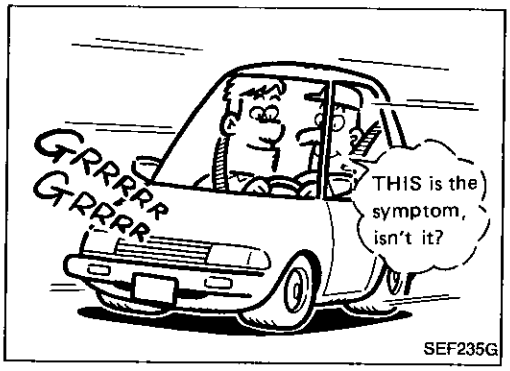
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DIAGNOSTIC WORKSHEET

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	

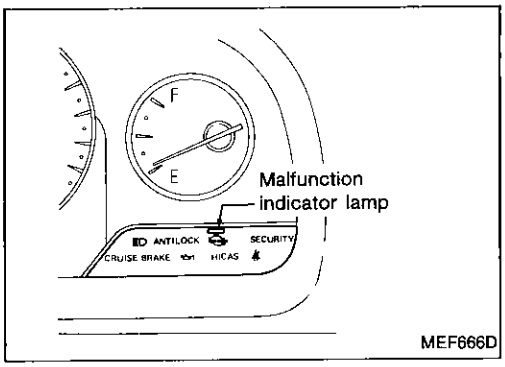


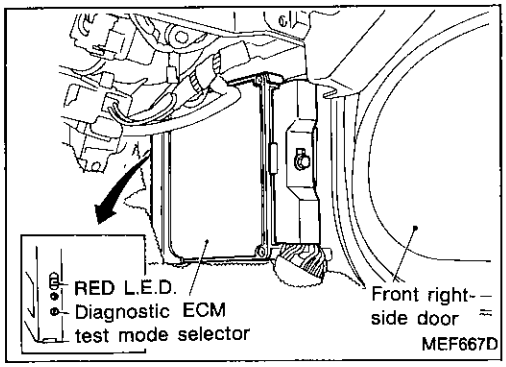
How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont'd)

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 diagnostic test mode II (Self-diagnostic results) at 2,000 rpm.
4	Idle speed	IACV-AAC valve	Raised	Turn idle adjusting screw counterclockwise.
			Lowered	Turn idle adjusting screw clockwise.
5	Electrical connection (Electric continuity)	Harness connectors and wires	Poor electrical connection or improper wiring	Tap or wiggle.
				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	Throttle position sensor condition	ECM	ON-OFF switching	Rotate throttle position sensor body.
10	Ignition spark	Timing light	Spark power check	Try to flash timing light for each cylinder using ignition coil adapter (S.S.T.).





On-board Diagnostic System

MALFUNCTION INDICATOR LAMP

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.

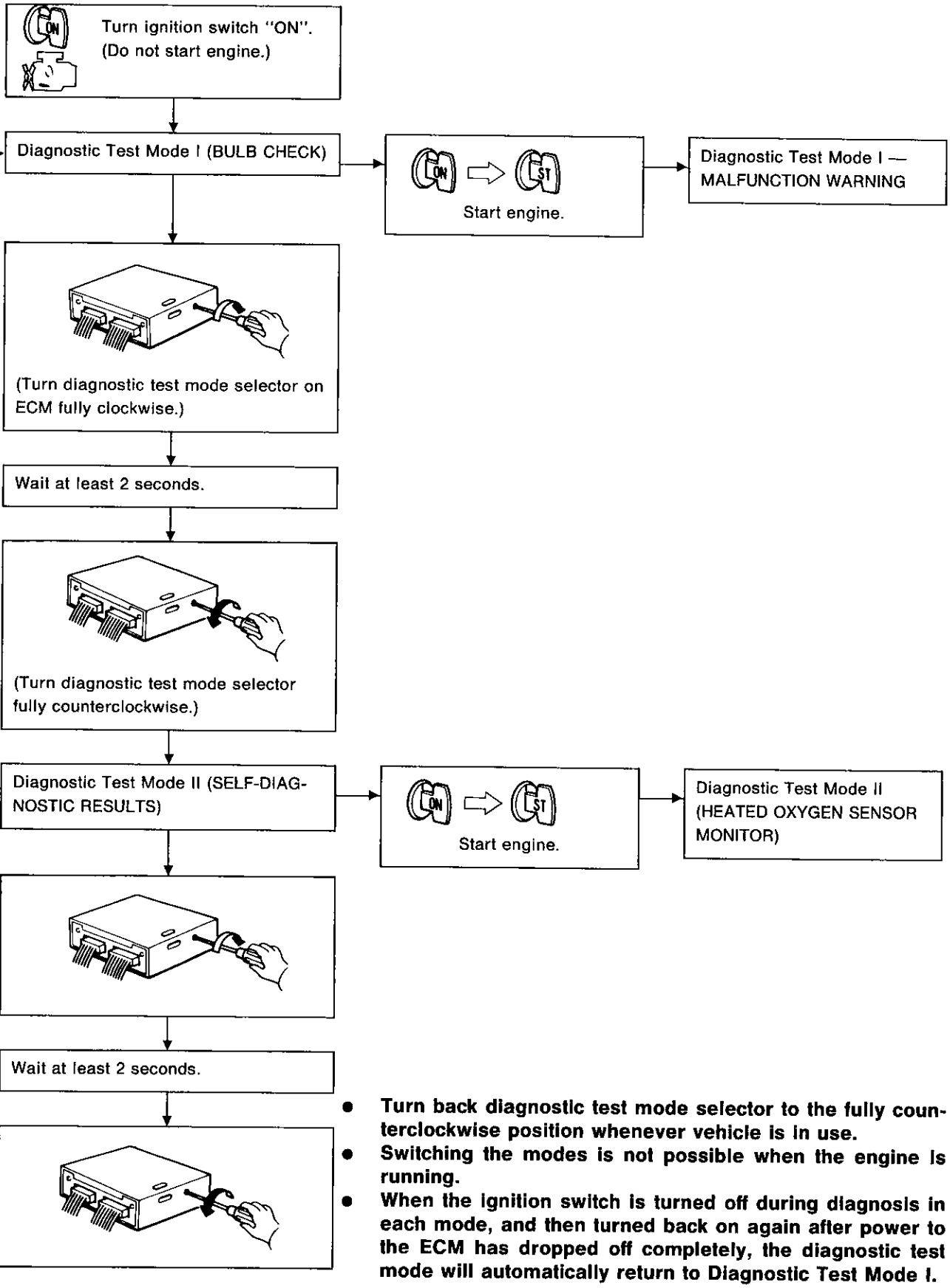
The ECM has only one RED L.E.D.

ON-BOARD DIAGNOSTIC SYSTEM FUNCTION

Condition		Diagnostic Test Mode	
		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 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 diagnostic test mode 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	EGR 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

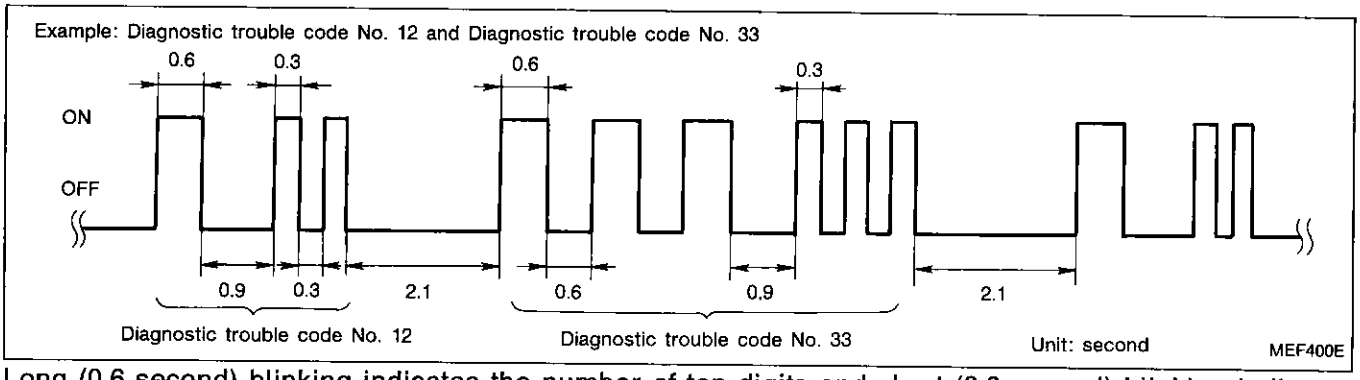
MALFUNCTION INDICATOR LAMP and RED L.E.D.	Condition
ON	When the ECM's C.P.U. or crankshaft position sensor is malfunctioning.
OFF	O.K.

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

CAUTION:
The diagnostic test 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 CHECK	Mass air flow sensor circuit	X	X
13 CHECK	Engine coolant temperature sensor circuit	X	X
14 CHECK	Vehicle speed sensor circuit	X	X
16*2)	TCS signal circuit	X	X
21*1)	Ignition signal circuit	X	X
31 CHECK	ECM	X	X
32 CHECK	EGR function	X	—
33 CHECK	Heated oxygen sensor circuit (Left bank)	X	X
34	Knock sensor circuit	X	X
35 CHECK	EGR temperature sensor circuit	X	—
43 CHECK	Throttle position sensor circuit	X	X
45 CHECK	Injector leak	X	—
46*2)	Secondary throttle position sensor circuit	X	X
51 CHECK	Injector circuit	X	—
53 CHECK	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
CHECK : 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.
*2): Models with TCS only

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)
16*2)	TCS signal circuit	• The TCS signal circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • T.C.M.
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	EGR 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
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
46*2)	Secondary throttle position sensor circuit	• The secondary throttle position sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Secondary throttle position sensor • T.C.M.
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.

*2): Models with TCS only

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

HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

The diagnostic trouble code is erased from the backup memory on the ECM when the diagnostic test mode is changed from Diagnostic Test Mode II to Diagnostic Test Mode I. (Refer to "HOW TO SWITCH DIAGNOSTIC TEST MODES".)

- **When the battery terminal is disconnected, the diagnostic trouble code will be lost from the backup memory within 24 hours.**
- **Do not erase the stored memory before beginning diagnostic test mode II (Self-diagnostic results).**

On-board Diagnostic System — Diagnostic Test Mode II (Heated oxygen sensor monitor)

DESCRIPTION

In this mode, the MALFUNCTION INDICATOR LAMP 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.

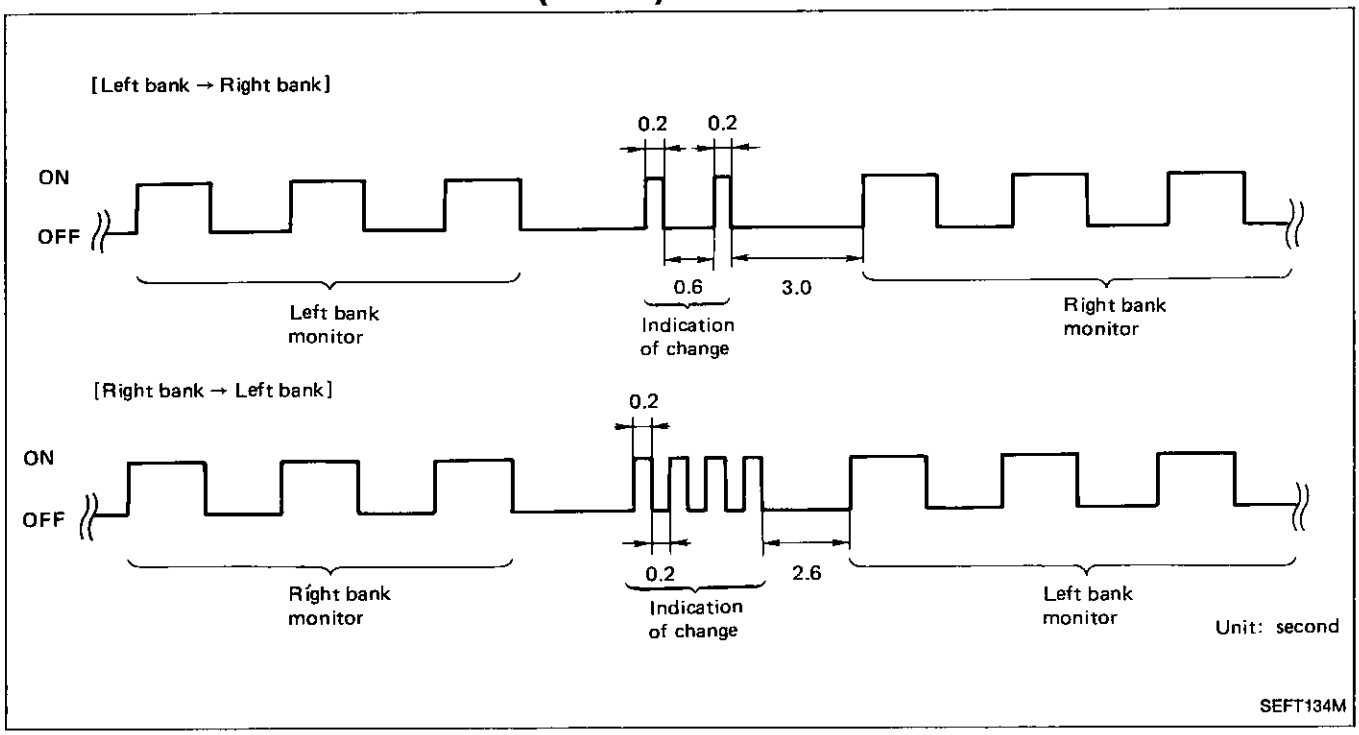
If two heated oxygen sensors (right bank and left bank) are fitted on the engine, the left bank heated oxygen sensor monitor operates first, when selecting this mode.

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.

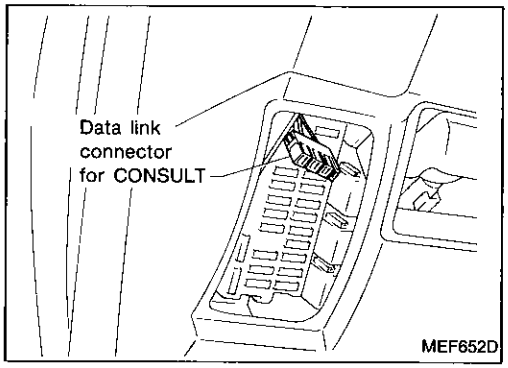
- These procedures should be carried out when the engine is running.

On-board Diagnostic System — Diagnostic Test Mode II (Heated oxygen sensor monitor) (Cont'd)



HOW TO CHECK HEATED OXYGEN SENSOR

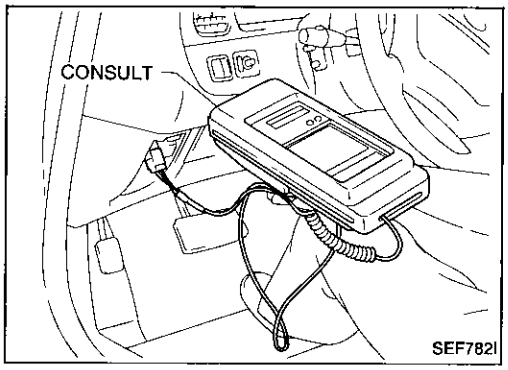
1. Set Diagnostic Test Mode II. (Refer to "HOW TO SWITCH DIAGNOSTIC TEST MODES".)
2. Start engine and warm it up until engine coolant temperature indicator points to the middle of the gauge.
3. Run engine at about 2,000 rpm for about 2 minutes under no-load conditions.
4. Make sure RED L.E.D. or MALFUNCTION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

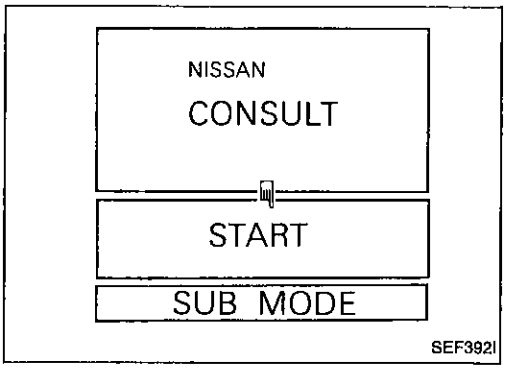


Consult

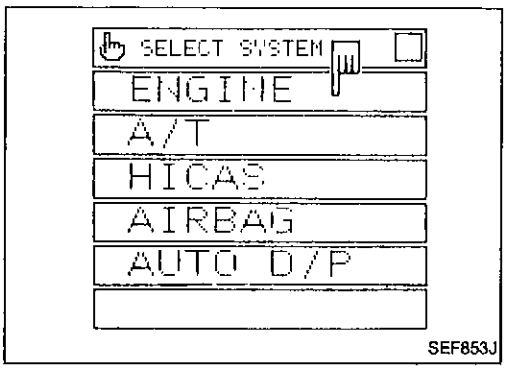
CONSULT INSPECTION PROCEDURE

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.)

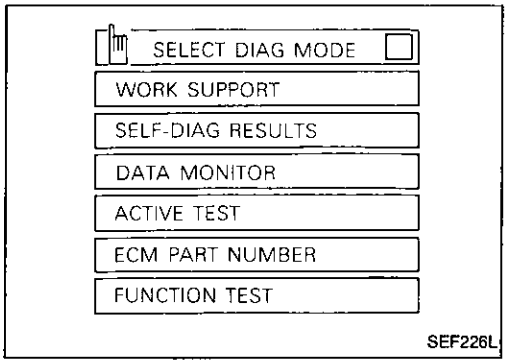




3. Turn on ignition switch.
4. Touch "START".



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)

ECCS COMPONENT PARTS APPLICATION

ECCS COMPONENT PARTS		DIAGNOSTIC TEST MODE				
		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 sensors		X	X		X
	Throttle position sensor	X	X	X		X
	EGR temperature sensor*		X	X		
	Knock sensor		X			
	Ignition switch (start signal)			X		X
	Air conditioner switch			X		
	Neutral position switch			X		X
	Power steering oil pressure switch			X		X
	Battery			X		
	A/T signal		X			
OUTPUT	Injectors		X	X	X	X
	Power transistor (ignition timing)		X (Ignition signal)	X	X	X
	IACV-AAC valve	X		X	X	X
	Valve timing control solenoid valve			X	X	X
	EGRC-solenoid valve			X	X	X
	Air conditioner relay			X		
	Fuel pump relay	X		X	X	X

*: The ECCS 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 numbers	ECM part numbers can be read.
Function test	Conducted by CONSULT instead of a technician to determine whether each system is "OK" or "NG".

Consult (Cont'd)

WORK SUPPORT MODE

WORK ITEM	CONDITION	USAGE
THRTL POS SEN ADJ	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
IACV-AAC VALVE ADJ	SET ENGINE RPM 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 IDLE. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line

Consult (Cont'd)

SELF-DIAGNOSTIC RESULTS MODE

DIAGNOSTIC ITEM	DIAGNOSTIC ITEM IS DETECTED WHEN	CHECK ITEM (REMEDY)
CRANKSHAFT POSITION SEN**	• 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.)
MASS AIR FLOW SEN	• 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.)
COOLANT TEMP SEN	• 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 SEN	• The vehicle speed sensor circuit is open or shorted.	• Harness and connector • Vehicle speed sensor (reed switch)
TCS SIGNAL***	• The TCS signal circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • T.C.M.
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).)
EGRC SOLENOID/V*	• EGR valve does not operate. (EGR valve spring does not lift.)	• EGR valve • EGRC-solenoid valve
OXYGEN SEN OXYGEN SEN-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
THROTTLE POSI SEN	• The throttle position sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Throttle position sensor
INJECTOR·LEAK*	• Fuel leaks from injector.	• Injector
TCS THROTTLE SEN***	• The secondary throttle position sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Secondary throttle position sensor • T.C.M.
INJECTOR · OPEN*	• The injector circuit is open or shorted.	• Injector
A/T COMM LINE	• The A/T communication line is open or shorted.	• Harness and connector

*: The diagnostic items marked * are applicable to vehicles for California only.
**: Check items causing a malfunction of crankshaft position sensor circuit first, if both "CRANKSHAFT POSITION SEN (No. 11)" and "IGN SIGNAL-PRIMARY (No. 21)" are displayed one after the other.
***: Models with TCS only

DATA MONITOR MODE

Remarks : • Specification data are reference values.
• Specification data are output/input values which are detected or supplied by ECM at the connector.
*Specification data may not be directly related to their components signals/values/operations.
ie. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing being not adjusted to the specification data. This IGN TIMING monitors the calculated data by ECM according to the input signals from crankshaft position sensor and other ignition timing related sensors.
• If the real-time diagnosis results are NG and the self-diagnostic results are OK when diagnosing the mass air flow sensor, first check to see if the fuel pump control circuit is normal.
• 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" • Selector lever "N" position • No-load	Idle	1.0 - 1.4V	• Harness and connector • Mass air flow sensor
		2,000 rpm	1.4 - 1.9V	
COOLANT 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	
THRTL/P SEN2	• Ignition switch: ON (Engine stopped) • Disconnect throttle motor harness connector	Secondary throttle valve fully open	4.0 - 4.7V	• Harness and connector • Secondary throttle position sensor • Secondary throttle position sensor adjustment • T.C.M.
		Secondary throttle valve fully closed	Approx. 0.5V (at least 0.3V)	
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: Closed throttle position (Engine: After warming up)	ON	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment • 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	
NEUT POSI 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	
INJ PULSE	• Engine: After warming up • A/C switch "OFF" • Selector lever "N" position • No-load	Idle	1.8 - 2.5 msec.	• Harness and connector • Injector • Mass air flow sensor • Intake air system
INJ PULSE-R		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	—	
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	
VALVE TIM SOL	• Jack up rear wheel • Engine: After warming up	• Idle	OFF	• Harness and connector • Valve timing solenoid valve
		• Shift selector lever to any position except "N" or "P" position • Quickly depress accelerator pedal, then quickly release it	OFF → ON → 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	

ACTIVE TEST MODE

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• 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	• 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	• 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
IGNITION TIMING	• 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	• Engine: After warming up, idle the engine. • A/C switch "OFF" • Selector lever "N" position • 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
FUEL PUMP RELAY	• 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 VALVE TIM SOL	• 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-LEARNING CONT	• In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen.		

Consult (Cont'd)

FUNCTION TEST MODE

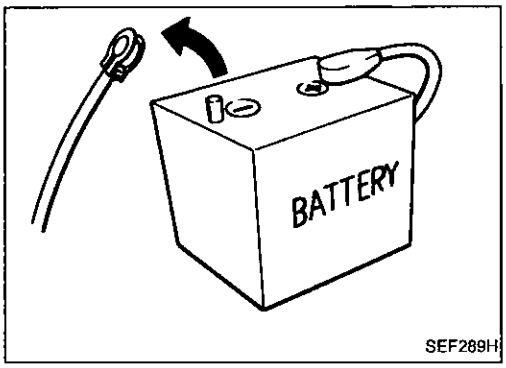
FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
SELF-DIAG RESULTS	• Ignition switch: ON (Engine stopped) • Displays the self-diagnostic results.	—		Objective system
CLOSED THROTTLE POSI (CLOSED THROTTLE POSITION SWITCH CIRCUIT)	• Ignition switch: ON (Engine stopped) • Closed throttle position switch circuit is tested when throttle is opened and closed fully. ("CLOSED THROTTLE POSI" 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-POSITION	OFF	• Harness and connector • Neutral position switch/ Inhibitor switch • Linkage + Inhibitor switch adjustment
		IN N-POSITION	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
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

Consult (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
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 CIRCUIT	• 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
MIXTURE RATIO TEST	• Air-fuel ratio feedback circuit (injection system, ignition system, vacuum system, etc.) is tested by examining the heated oxygen sensor output at 2,000 rpm under non-loaded state.	• O2 SEN COUNT: More than 5 times during 10 seconds (O2 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) • Heated oxygen sensor circuit • Heated oxygen sensor operation • Fuel pressure high or low • Mass air flow sensor

Consult (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
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 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

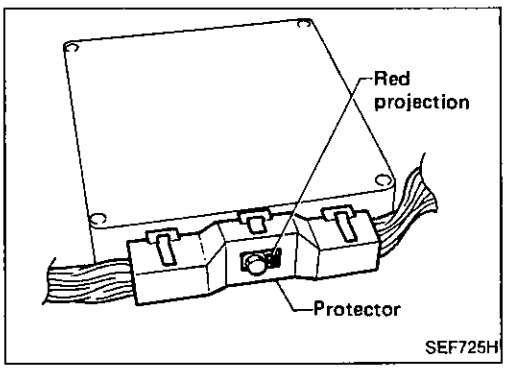


SEF289H

Diagnostic Procedure

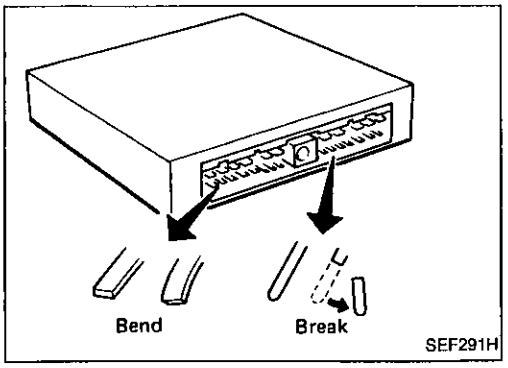
CAUTION:

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

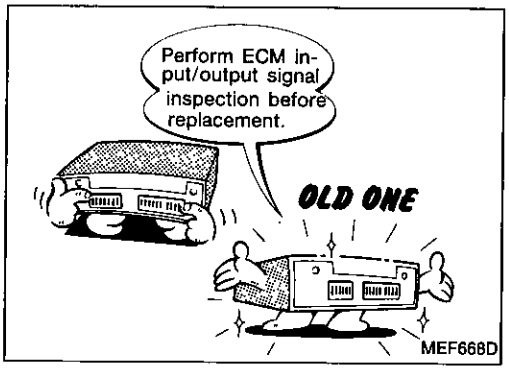
2. **When connecting ECM harness connector, tighten securing bolt until red projection is in line with connector face.**



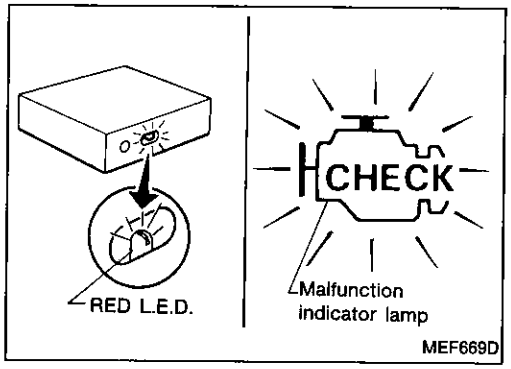
SEF291H

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.**

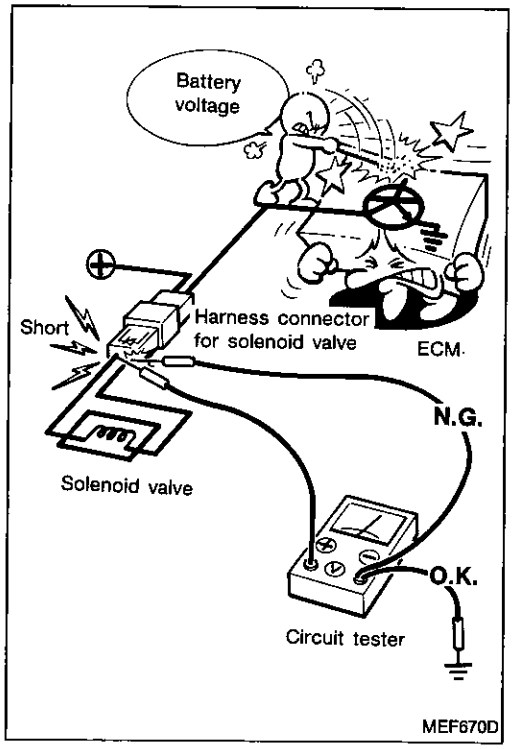
Diagnostic Procedure (Cont'd)



5. **Before replacing ECM, perform ECM input/output signal inspection and make sure whether ECM functions properly or not. (See page EF & EC-197.)**



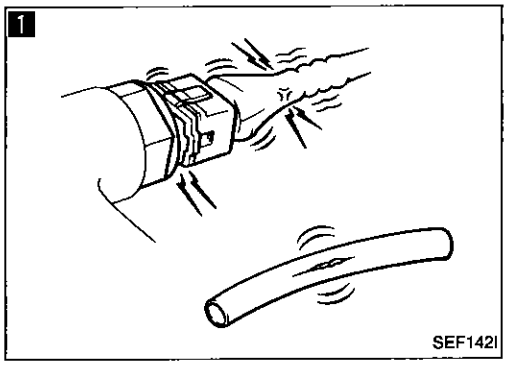
6. **After performing this "Diagnostic Procedure", perform diagnostic test mode II (Self-diagnostic results) and driving test.**



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


SEF142I

BEFORE STARTING

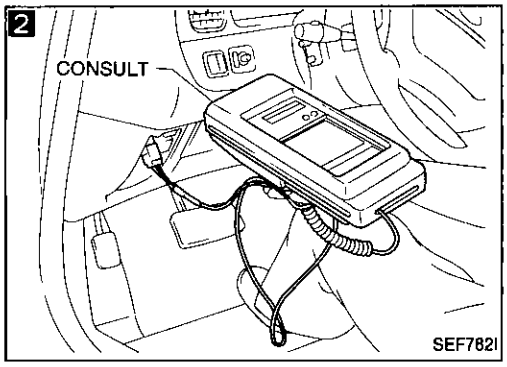
1. Check service records for any recent repairs that may indicate a related problem, or the current need for scheduled maintenance.
2. Open engine hood and check the following:

- 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.)

2



SEF782I

3

DOES ENGINE START?

No → GO TO 6

Yes

4

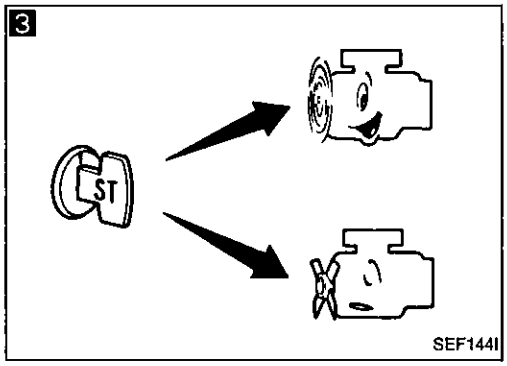
CHECK IGNITION TIMING.
Warm up engine sufficiently and check ignition timing at idle using timing light. (Refer to page EF & EC-31.)
Ignition timing: 15° ± 2° B.T.D.C.

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

O.K.

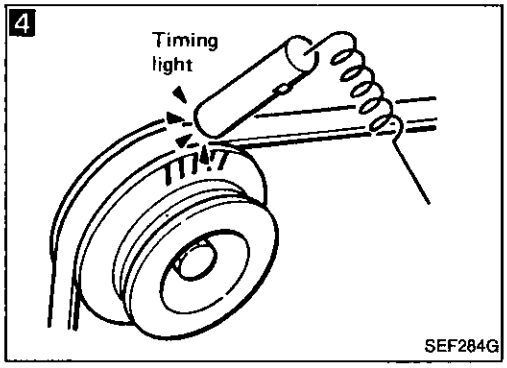
(Go to Ⓐ on next page.)

3



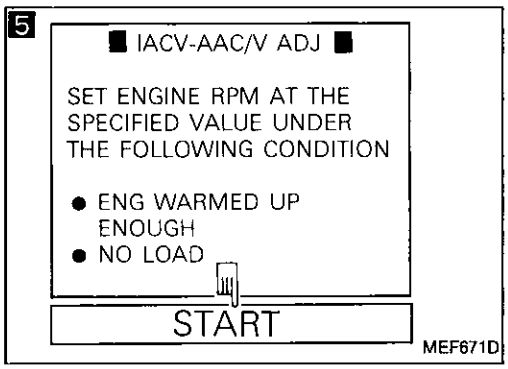
SEF144I

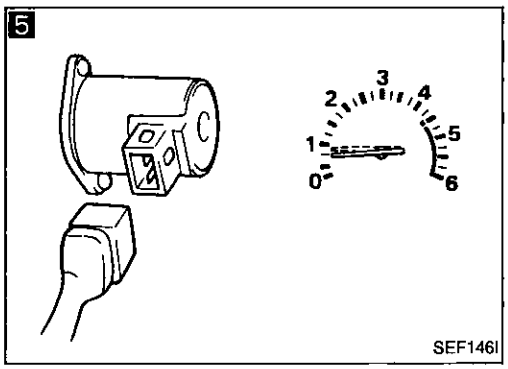
4

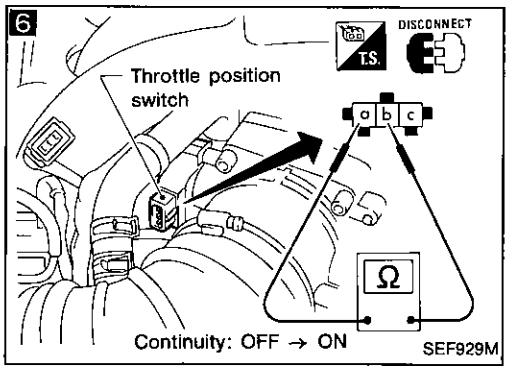


SEF284G

Basic Inspection (Cont'd)







Ⓐ

5

CHECK IDLE ADJ. SCREW INITIAL SET RPM.

1. Select "IACV-AAC VALVE 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 & THROTTLE POSITION SWITCH POSITION.

1. Start engine and warm it up sufficiently.
2. Disconnect throttle position switch harness connector.
3. Checck closed throttle position switch OFF → ON speed, closing throttle valve manually.

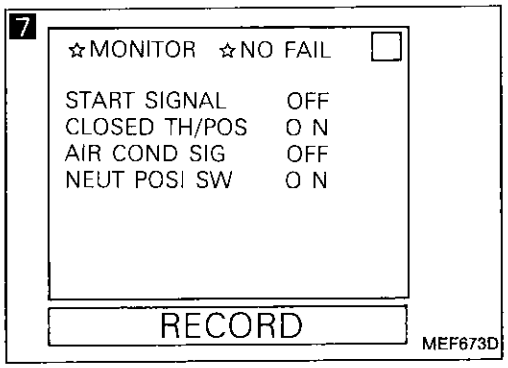
Closed throttle position switch OFF → ON speed: 810±150 rpm (In "N" position)

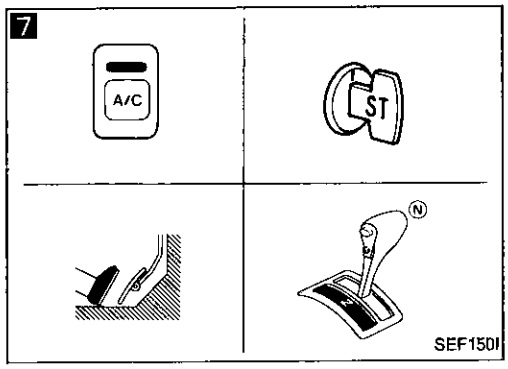
N.G. → Adjust throttle position sensor & throttle position switch position .

O.K. ↓

(Go to Ⓑ on next page.)

Basic Inspection (Cont'd)





Ⓑ

7

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.

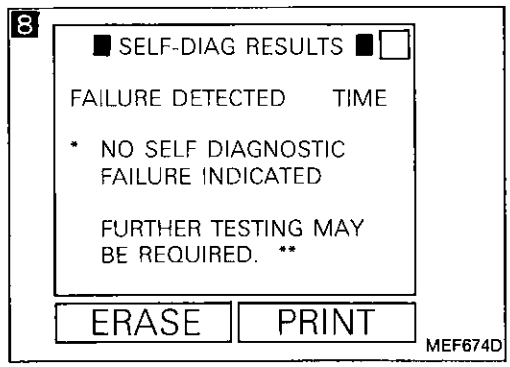
N.G. → Repair or replace the malfunctioning switch or its circuit.

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
Closed throttle position	Engine warmed up sufficiently closed throttle 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 (Parking) position switch	Selector lever is "N" or "P" position → Except "N" and "P" position	0 → 8.0 - 10.0

O.K.



8

READ SELF-DIAGNOSTIC RESULTS.

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

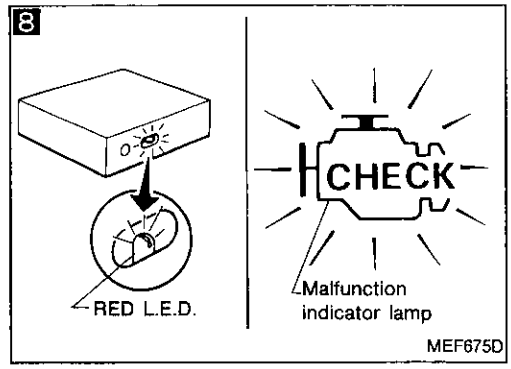
Yes → Go to the relevant inspection procedure.

OR

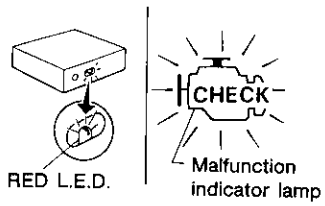
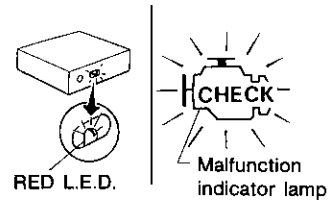
1. Set Diagnostic Test Mode II. (Self-diagnostic results) (Refer to page EF & EC-50.)
2. Count the number of malfunction indicator lamp and RED L.E.D. flashes and read out the diagnostic trouble codes.
3. Are the diagnostic trouble codes being output?

No

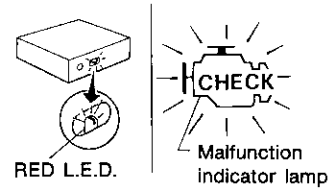
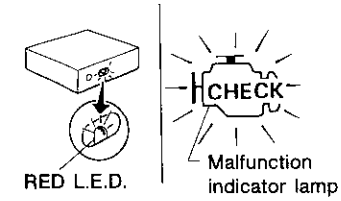
INSPECTION END



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

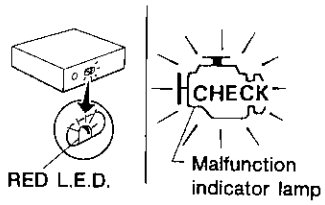
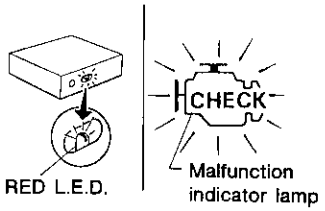
Detected items	Display Diagnostic trouble code No.	How to perform diagnostic test mode II (Self-diagnostic results) judgement	
		Illustration	Method
Crankshaft position sensor circuit	11	☆MONITOR ☆NO FAIL CKPS•RPM(POS) 650rpm CKPS•RPM(REF) 650rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O2 SEN 0.06V O2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD MEF676D  MEF677D	**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 diagnostic test mode II (Self-diagnostic results) 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) 650rpm CKPS•RPM(REF) 650rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O2 SEN 0.06V O2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD MEF676D  MEF677D	**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 diagnostic test mode II (Self-diagnostic results) 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)

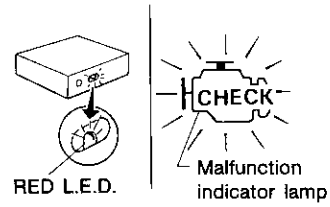
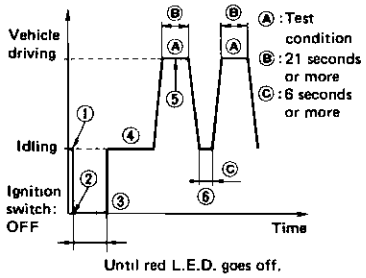
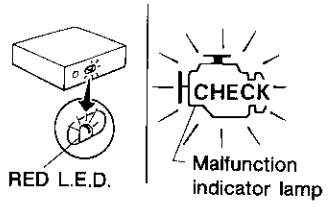
Detected items	Display Diagnostic trouble code No.	How to perform diagnostic test mode II (Self-diagnostic results) judgement	
		Illustration	Method
Engine coolant temperature sensor circuit	13	☆MONITOR ☆NO FAIL CKPS•RPM(POS) 650rpm CKPS•RPM(REF) 650rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O2 SEN 0.06V O2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD MEF676D  MEF677D	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON" or start engine. 2) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** OR 2) Perform diagnostic test mode II (Self-diagnostic results) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**
Vehicle speed sensor circuit*	14	■VEHICLE SPEED SEN CKT■ AFTER TOUCH START, DRIVE VEHICLE AT 10km/h (6mph) OR MORE WITHIN 15sec. NEXT START SEF678D ☆MONITOR ☆NO FAIL VHCL SPEED SE 20km/h NEUT POSI SW OFF RECORD SEF679D  MEF677D	**CHECK OVERALL FUNCTION.** 1) Jack up drive wheels. 2) Start engine. 3) Perform "VEHICLE SPEED SEN CIRCUIT" 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: 1,750 ± 150 rpm (2) Intake manifold vacuum: –60.0 ± 6.7 kPa (–450 ± 50 mmHg, –17.72 ± 1.97 inHg) (3) Vehicle speed 5 km/h (3MPH) or more 3) If malfunction indicator lamp comes on during test drive, perform diagnostic test mode II (Self-diagnostic results) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**

*: Diagnostic teset mode II (Self-diagnostic results) is not performed but this method provides results which are equal to the self-diagnostic results.

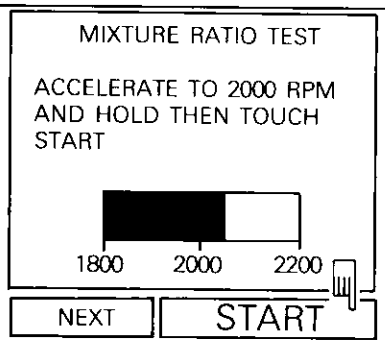
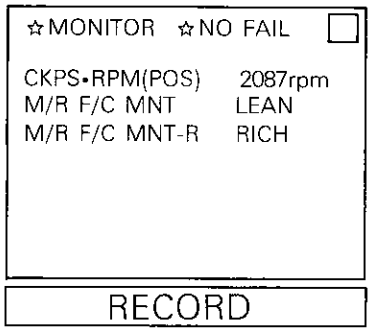
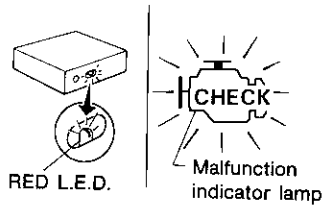
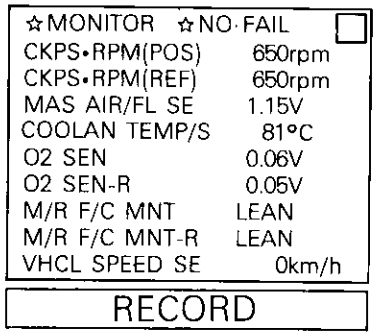
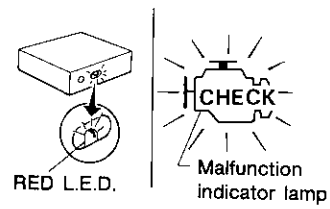
How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

Detected items	Display Diagnostic trouble code No.	How to perform diagnostic test mode II (Self-diagnostic results) judgement	
		Illustration	Method
TCS Signal circuit	16	☆MONITOR ☆NO FAIL CKPS•RPM(POS) 0rpm CKPS•RPM(REF) 0rpm MAS AIR/FL SE 0.08V COOLAN TEMP/S 24°C O2 SEN 0.00V O2 SEN-R 0.00V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD MEF680D  MEF677D	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON". 2) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** OR 1) Turn ignition switch "ON". 2) Perform diagnostic test mode II (Self-diagnostic results) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**
Ignition signal circuit	21	☆MONITOR ☆NO FAIL CKPS•RPM(POS) 650rpm CKPS•RPM(REF) 650rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O2 SEN 0.06V O2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD MEF676D  MEF677D	**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 diagnostic test mode II (Self-diagnostic results) 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)

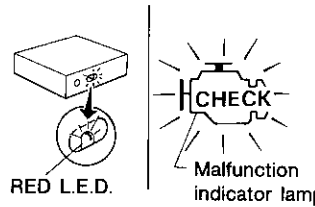
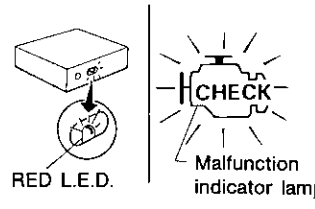
Detected items	Display Diagnostic trouble code No.	How to perform diagnostic test mode II (Self-diagnostic results) judgement	
		Illustration	Method
ECM	31	☆MONITOR ☆NO FAIL CKPS•RPM(POS) 0rpm CKPS•RPM(REF) 0rpm MAS AIR/FL SE 0.08V COOLAN TEMP/S 24°C O2 SEN 0.00V O2 SEN-R 0.00V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD MEF680D  MEF677D	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON". 2) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** OR 2) Perform diagnostic test mode II (Self-diagnostic results) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**
EGR function	32	**A** **ROAD TEST** **Test condition** **Drive vehicle under the following conditions with a suitable shift position.** **(1) Engine speed: 1,700±200 rpm** **(2) Intake manifold vacuum: −42.7±10.7 kPa (−320±80 mmHg, −12.60±3.15 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 150 seconds. ⑤ Shift to suitable gear position and drive in "Test condition" for at least 21 seconds. ⑥ Decrease engine revolutions to less than 1,500 rpm for at least 6 seconds. ⑦ Repeat steps ⑤ through ⑥ at lest 1 more time. SEF104L **B**  MEF681D	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON". 2) Perform diagnostic test mode II (Self-diagnostic results) 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 diagnostic test mode II (Self-diagnostic results) 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)

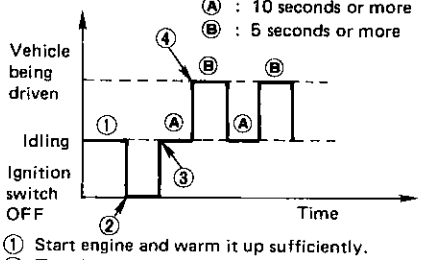
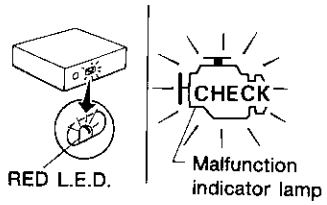
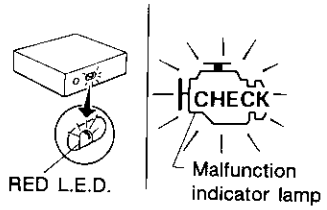
Detected items	Display Diagnostic trouble code No.	How to perform diagnostic test mode II (Self-diagnostic results) judgement	
		Illustration	Method
Heated oxygen sensor circuit (Left bank)*	33	 MEF682D  MEF683D	**CHECK OVERALL FUNCTION.** 1) Start engine and warm it up sufficiently. 2) Perform "MIXTURE 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 diagnostic test mode II (heated oxygen sensor monitor).
Heated oxygen sensor circuit (Right bank)*	53	 MEF677D	
Knock sensor circuit	34	 MEF676D  MEF677D	**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 diagnostic test mode II (Self-diagnostic results) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**

*: Diagnostic test mode II (Self-diagnostic results) is not performed but this method provides results which are equal to the self-diagnostic results.

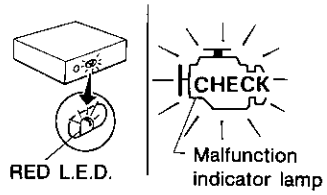
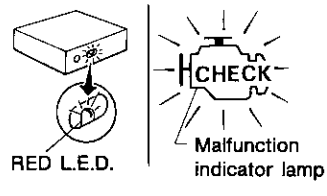
How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

Detected items	Display Diagnostic trouble code No.	How to perform diagnostic test mode II (Self-diagnostic results) judgement	
		Illustration	Method
EGR temperature sensor circuit	35	☆MONITOR ☆NO FAIL CKPS•RPM(POS) 650rpm CKPS•RPM(REF) 650rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O2 SEN 0.06V O2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF676D  SEF677D	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Start engine and warm it up sufficiently. 2) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** OR 2) Turn ignition switch "OFF" and then "ON". 3) Perform diagnostic test mode II (Self-diagnostic results) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**
Throttle position sensor circuit	43	☆MONITOR ☆NO FAIL CKPS•RPM(POS) 650rpm CKPS•RPM(REF) 650rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O2 SEN 0.06V O2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF676D  SEF677D	**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" position), and run engine at vehicle speed of 5 km/h (3 MPH) or higher for at least 10 seconds. 4) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** OR 4) Turn ignition switch "OFF" and then "ON". 5) Perform diagnostic test mode II (Self-diagnostic results) 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)

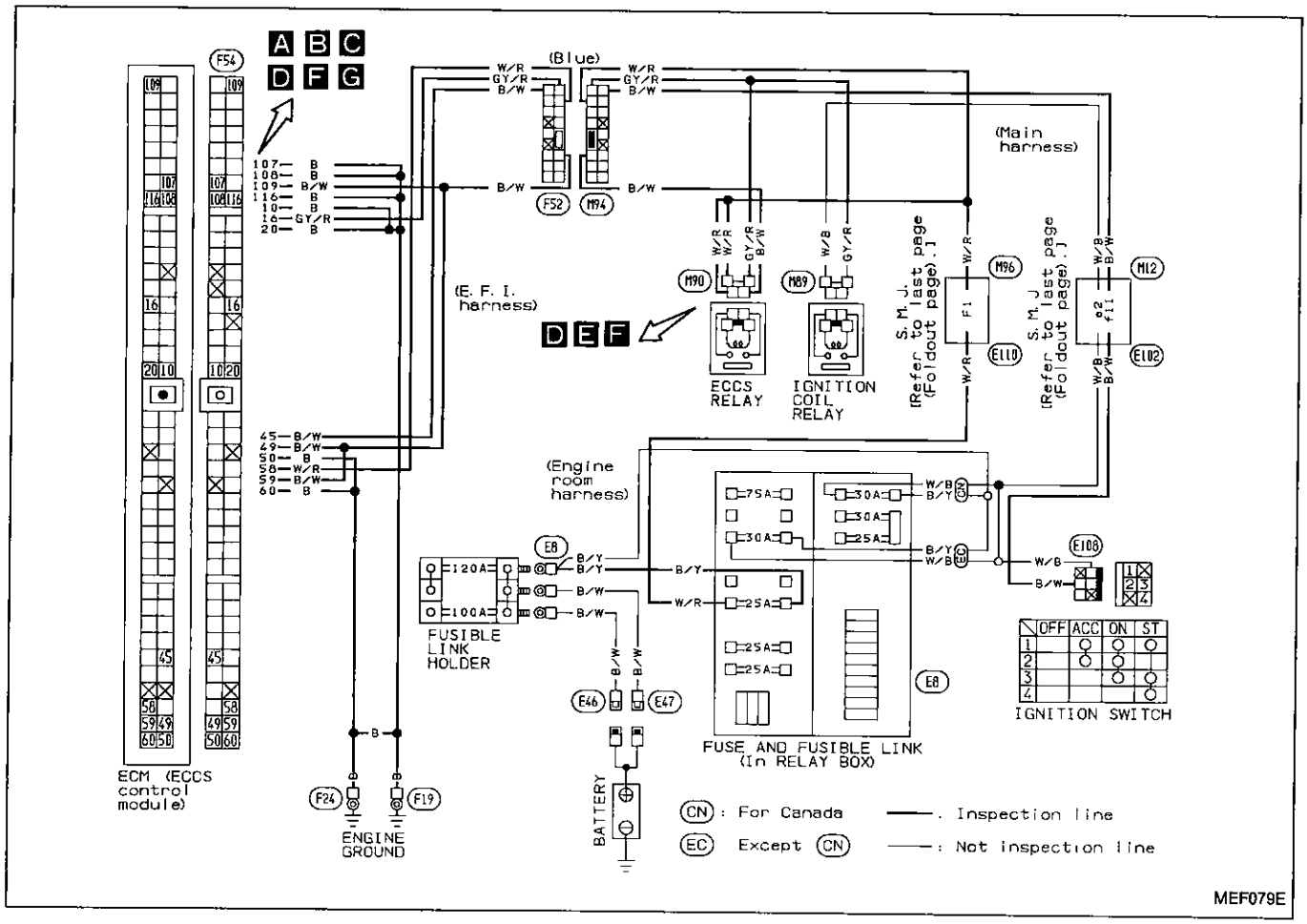
Detected items	Display Diagnostic trouble code No.	How to perform diagnostic test mode II (Self-diagnostic results) judgement	
		Illustration	Method
Injector leak	45	**A ROAD TEST** **Test condition** **Drive vehicle under the following conditions with a suitable shift position.** **(1) Engine speed: 1,700±400 rpm** **(2) Intake manifold vacuum:** **−46.7±13.3 kPa** **(−350±100 mmHg, −13.78±3.94 inHg)** **Driving mode** Ⓐ : 10 seconds or more Ⓑ : 5 seconds or more  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. SEF241L **B**  MEF684D	**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 diagnostic test mode II (Self-diagnostic results) with ECM. **B** **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**
Secondary throttle position sensor circuit	46	☆MONITOR ☆NO FAIL CKPS•RPM(POS) 0rpm CKPS•RPM(REF) 0rpm MAS AIR/FL SE 0.08V COOLAN TEMP/S 24°C O2 SEN 0.00V O2 SEN-R 0.00V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD MEF680D  SEF677D	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON". 2) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** OR 1) Turn ignition switch "ON". 2) Perform diagnostic test mode II (Self-diagnostic results) 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)

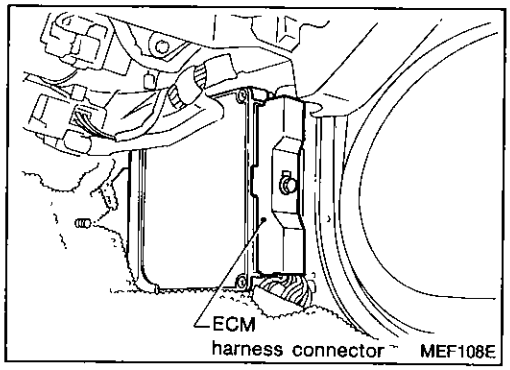
Detected items	Display Diagnostic trouble code No.	How to perform diagnostic test mode II (Self-diagnostic results) judgement	
		Illustration	Method
Injector circuit	51	☆MONITOR ☆NO FAIL CKPS•RPM(POS) 650rpm CKPS•RPM(REF) 650rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O2 SEN 0.06V O2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF676D  SEF677D	**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 diagnostic test mode II (Self-diagnostic results) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**
Signal circuit from A/T control unit to ECM	54	☆MONITOR ☆NO FAIL CKPS•RPM(POS) 650rpm CKPS•RPM(REF) 650rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O2 SEN 0.06V O2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF676D  SEF677D	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON" or start engine. 2) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** OR 2) Perform diagnostic test mode II (Self-diagnostic results) with ECM. **Malfunction indicator lamp and red L.E.D. display diagnostic trouble code No. 55.**

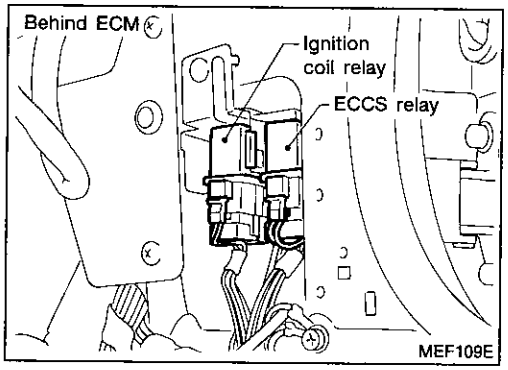
Diagnostic Procedure 1

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

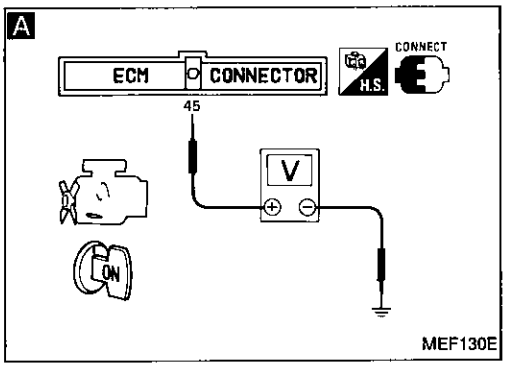


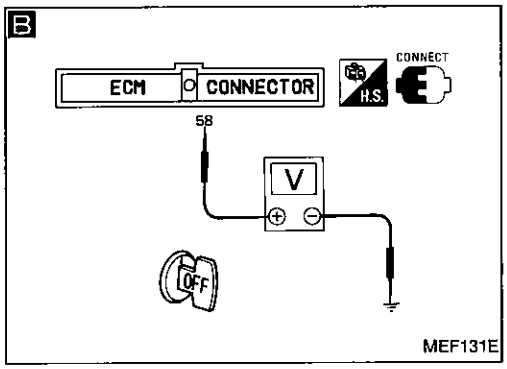
Harness layout

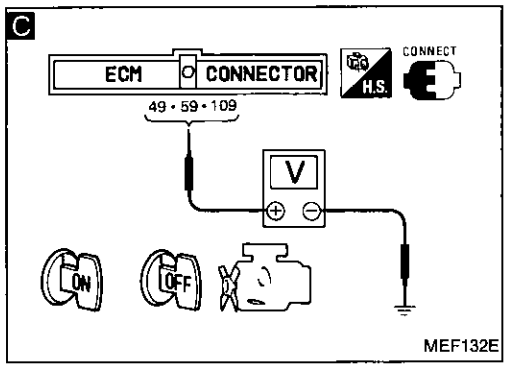


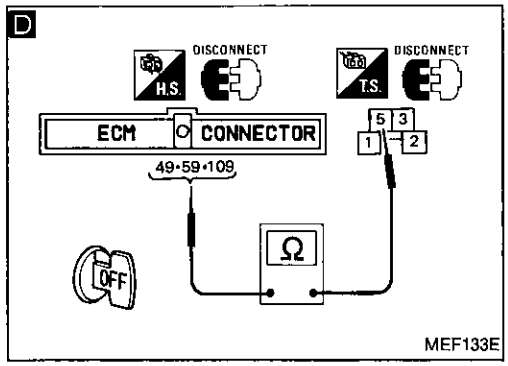


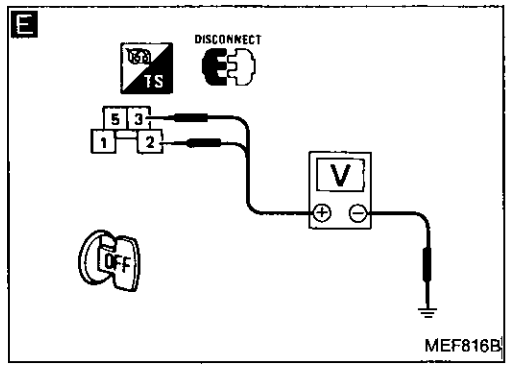
MAIN POWER SUPPLY AND GROUND CIRCUIT
(Not self-diagnostic item)











INSPECTION START

Start engine.
Is engine running?

No → Check the following.
- Harness continuity between ECM and ignition coil relay

If N.G., repair harness or connectors.

O.K.

A

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

If N.G., check the following.
- Harness connectors (F52), (M94)
- Harness connectors (M12), (E102)
- Harness continuity between ECM and ignition switch

If N.G., repair harness or connectors.

O.K.

Go to "CHECK GROUND CIRCUIT".

Yes

B

CHECK POWER SUPPLY-II.
1) Stop engine.
2) Check voltage between ECM terminals ㊽ and ground with CONSULT or tester.
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (F52), (M94)
- Harness connectors (M96), (E110)
- 25A fusible link
- Harness continuity between ECM and fusible link holder

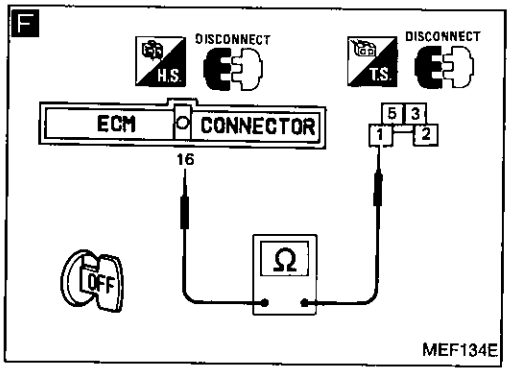
If N.G., repair harness or connectors.

O.K.

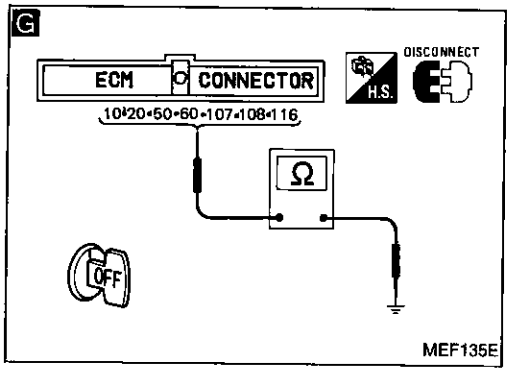
Ⓐ

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

F



G



Ⓐ

C

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 (ECCS relay)".

Case-1

D

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

N.G. → Check the following.
- Harness connectors (F52), (M94)
- Harness continuity between ECM and ECCS relay

If N.G., repair harness or connectors.

O.K.

E

CHECK VOLTAGE BETWEEN ECCS 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 ECCS relay and harness connector (M96)

If N.G., repair harness or connectors.

O.K.

F

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

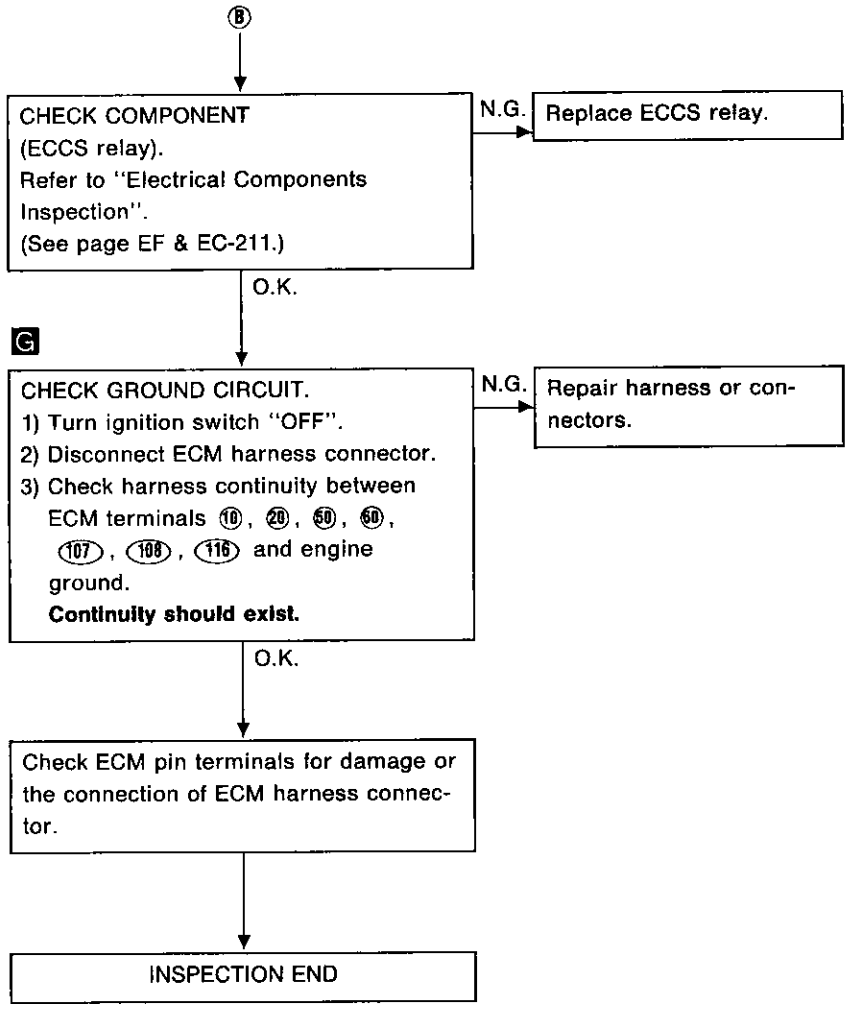
N.G. → Check the following.
- Harness continuity between ECCS relay and harness connector (M94)

If N.G., repair harness or connectors.

O.K.

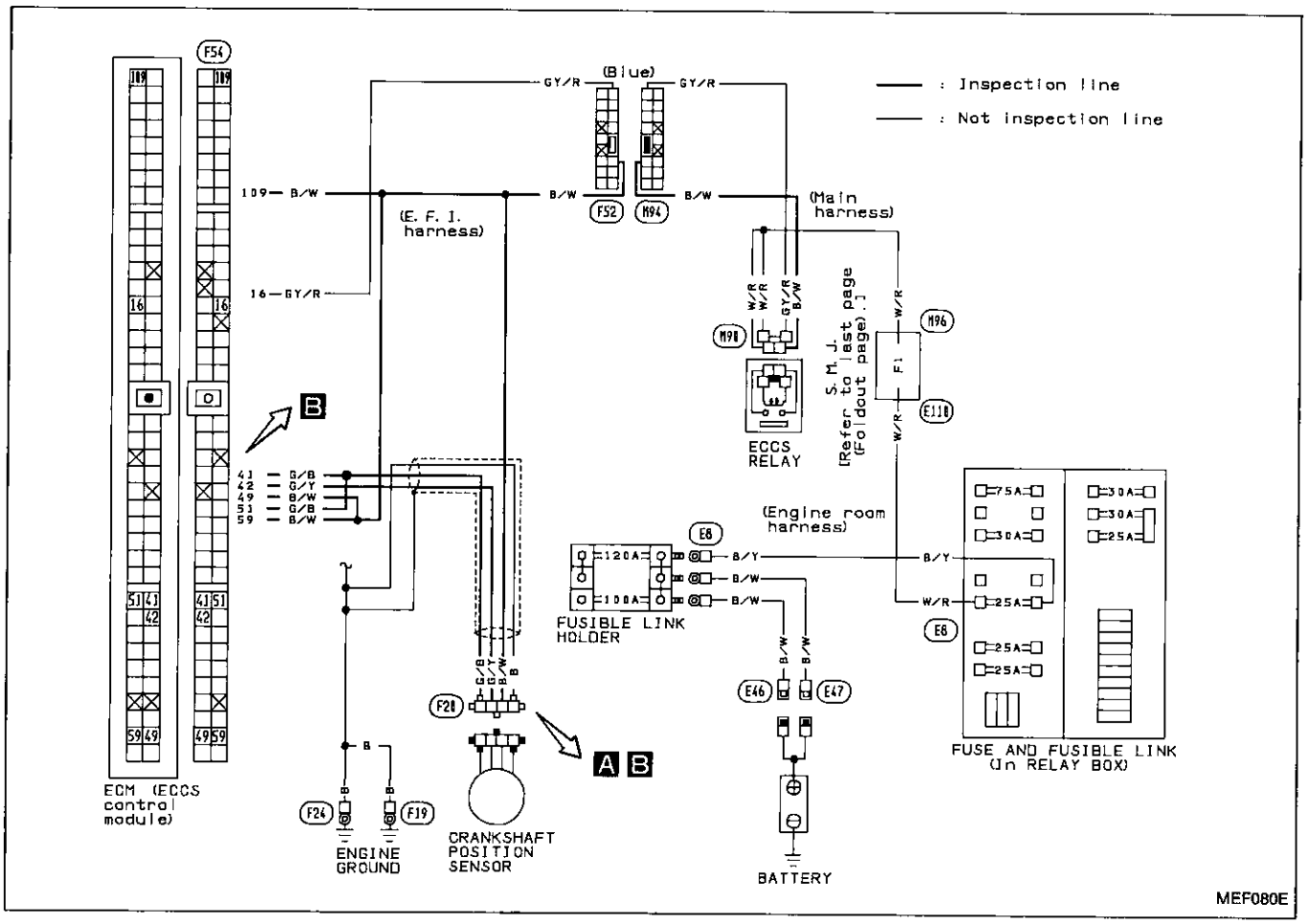
Ⓑ

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

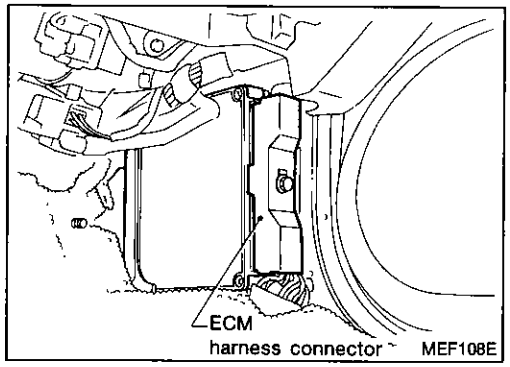


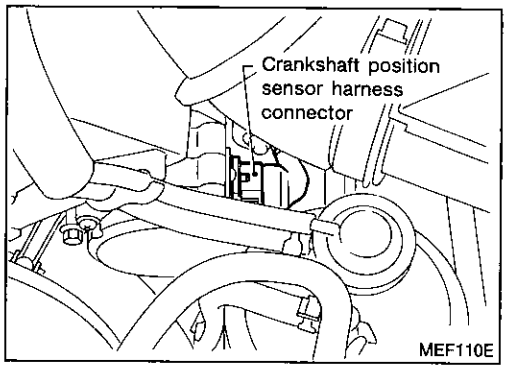
Diagnostic Procedure 2

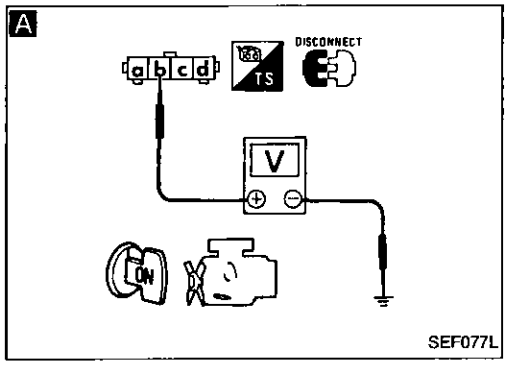
CRANKSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)

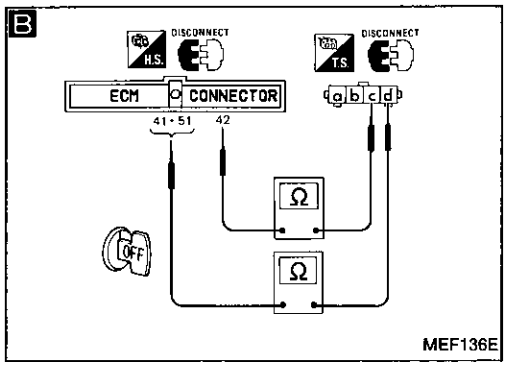


Harness layout









CRANKSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)

INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
See page EF & EC-68.

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 connectors (F52), (M94)
- Harness continuity between crankshaft position sensor and ECCS 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 (90° signal), terminal ⓒ and ECM terminal ㊷ (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-202.)

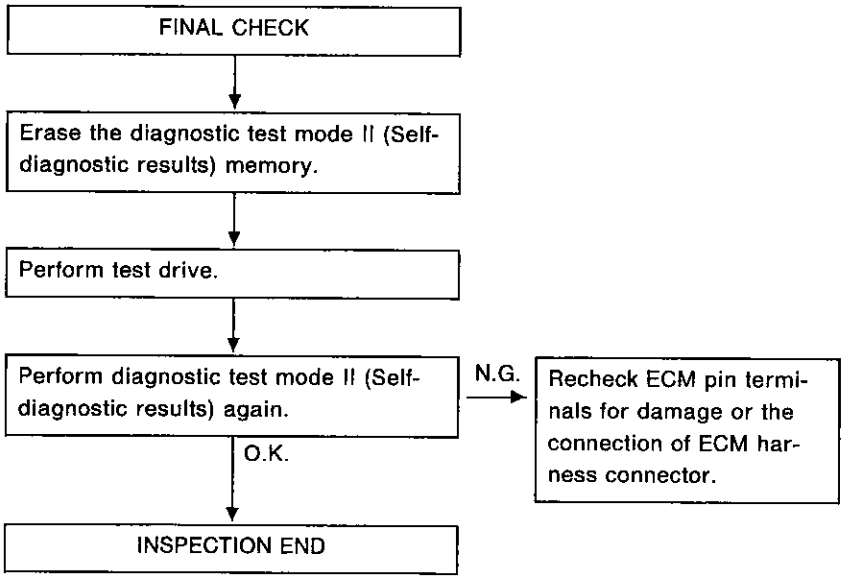
N.G. → Replace crankshaft position sensor.

O.K.

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

CRANKSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)

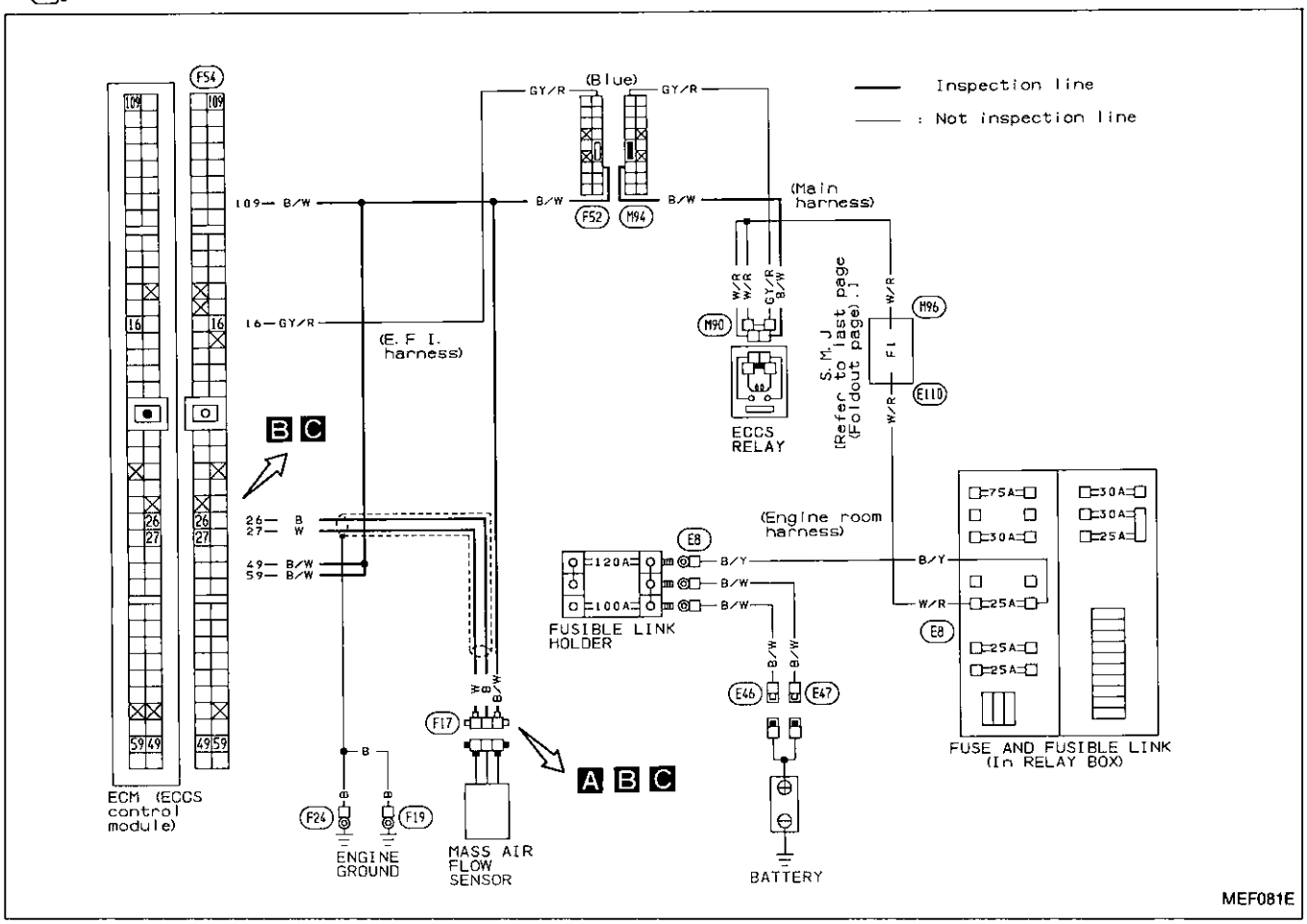
Perform FINAL CHECK by the following procedure after repair is completed.



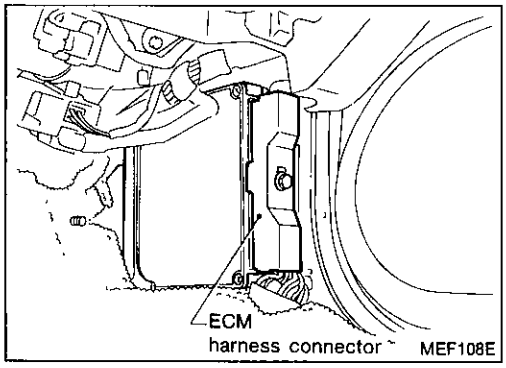
Diagnostic Procedure 3

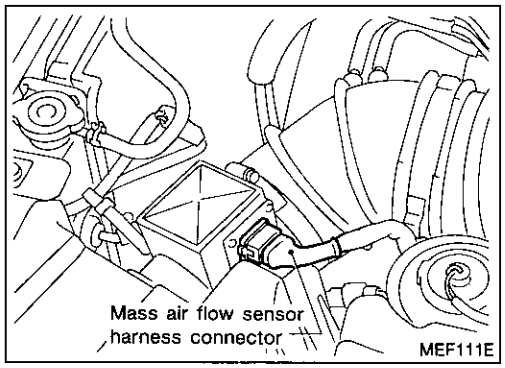
MASS AIR FLOW SENSOR (Diagnostic trouble code No. 12)

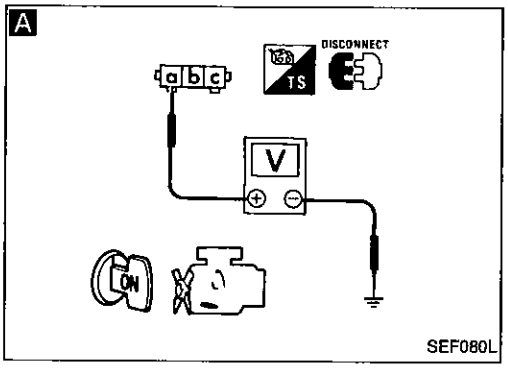
(Malfunction indicator lamp item)

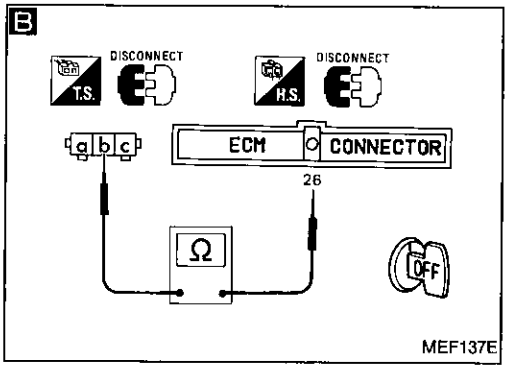


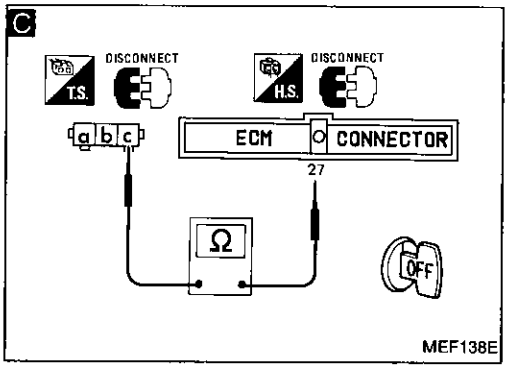
Harness layout











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

INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
See page EF & EC-68.

O.K. → INSPECTION END

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 connectors (F52), (M94)
- Harness continuity between mass air flow sensor and ECCS relay
- Harness continuity between mass air flow sensor and ECM

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 ㉖.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

C

CHECK INPUT SIGNAL CIRCUIT.
1) Check harness continuity between terminal ⓒ 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-202.)

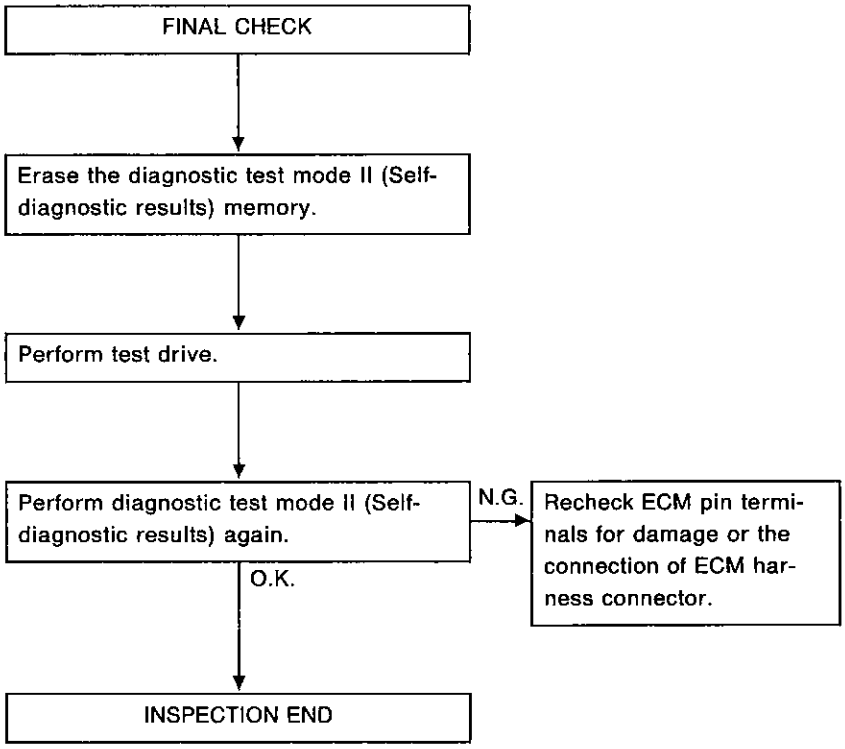
N.G. → Replace mass air flow sensor.

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)

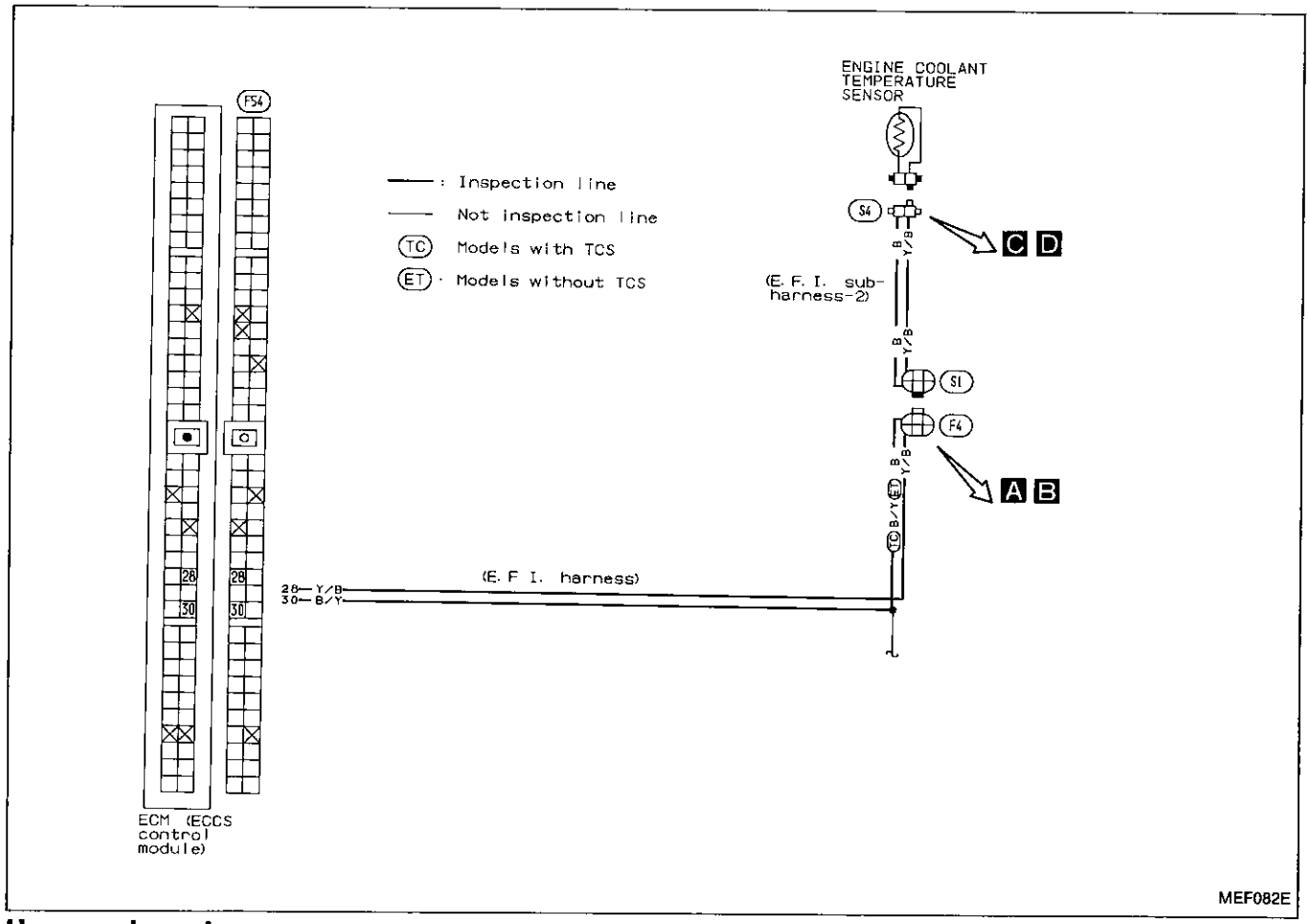
Perform FINAL CHECK by the following procedure after repair is completed.



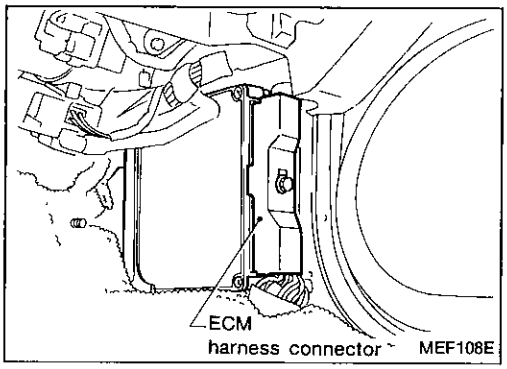
Diagnostic Procedure 4

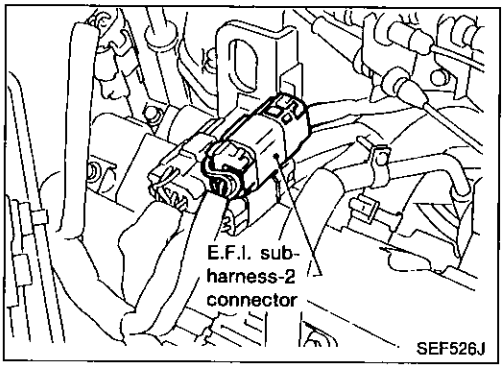
ENGINE COOLANT TEMPERATURE SENSOR (Diagnostic trouble code No. 13)

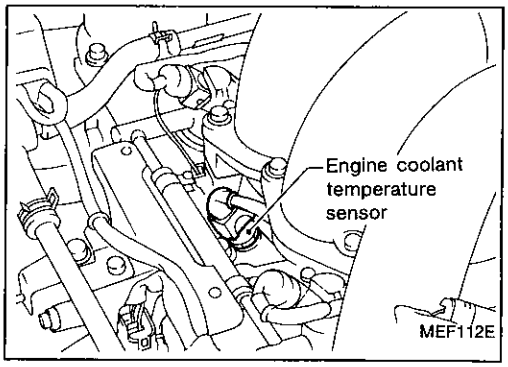
(Malfunction indicator lamp item)



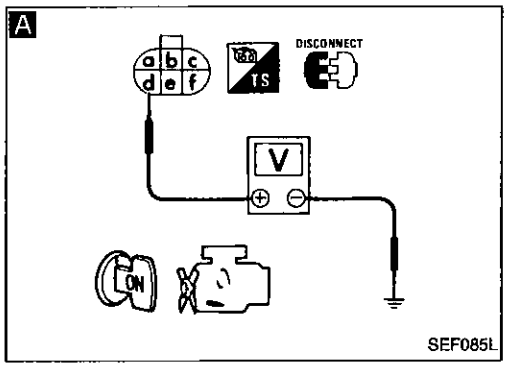
Harness layout

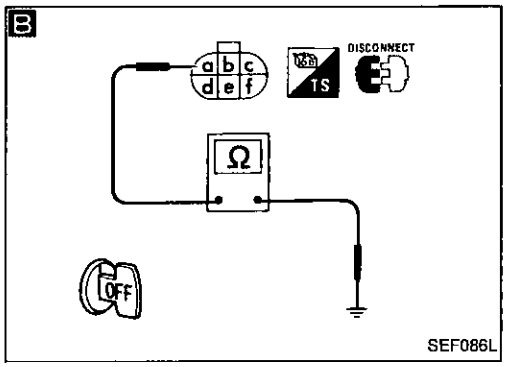


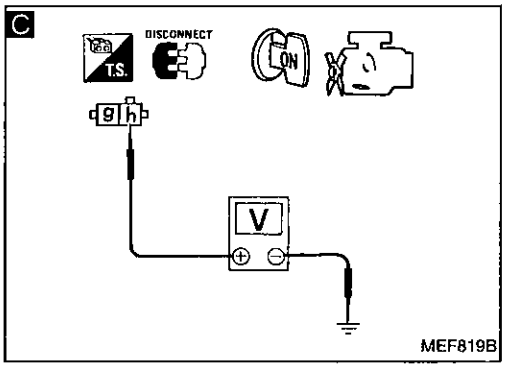


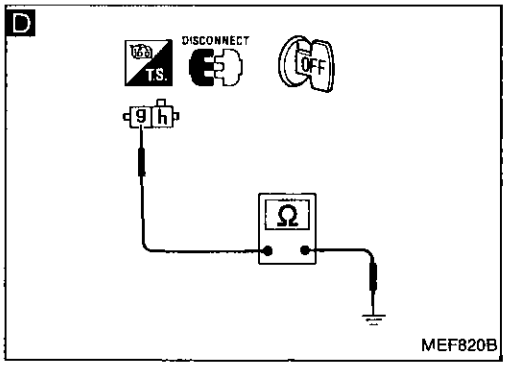


ENGINE COOLANT TEMPERATURE SENSOR
(Diagnostic trouble code No. 13)
(Malfunction indicator lamp item)









INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-69.
- O.K. → INSPECTION END
- N.G. ↓

A

CHECK POWER SUPPLY-I.
1) Turn ignition switch "OFF".
2) Disconnect E.F.I. sub-harness-2 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-I.
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. ↓

C

CHECK POWER SUPPLY-II.
1) Reconnect E.F.I. sub-harness-2 connector.
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. → Repair harness or connectors.
- O.K. ↓

D

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

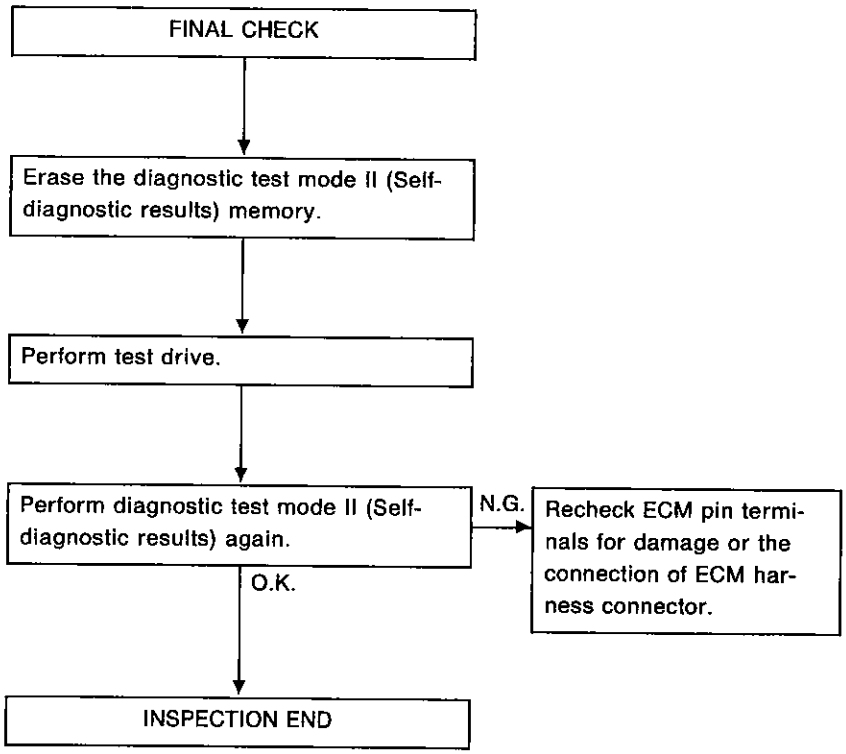
- N.G. → Repair harness or connectors.
- O.K. ↓

CHECK COMPONENT
(Engine coolant temperature sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-203.)

- N.G. → Replace engine coolant temperature sensor.
- O.K. ↓

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

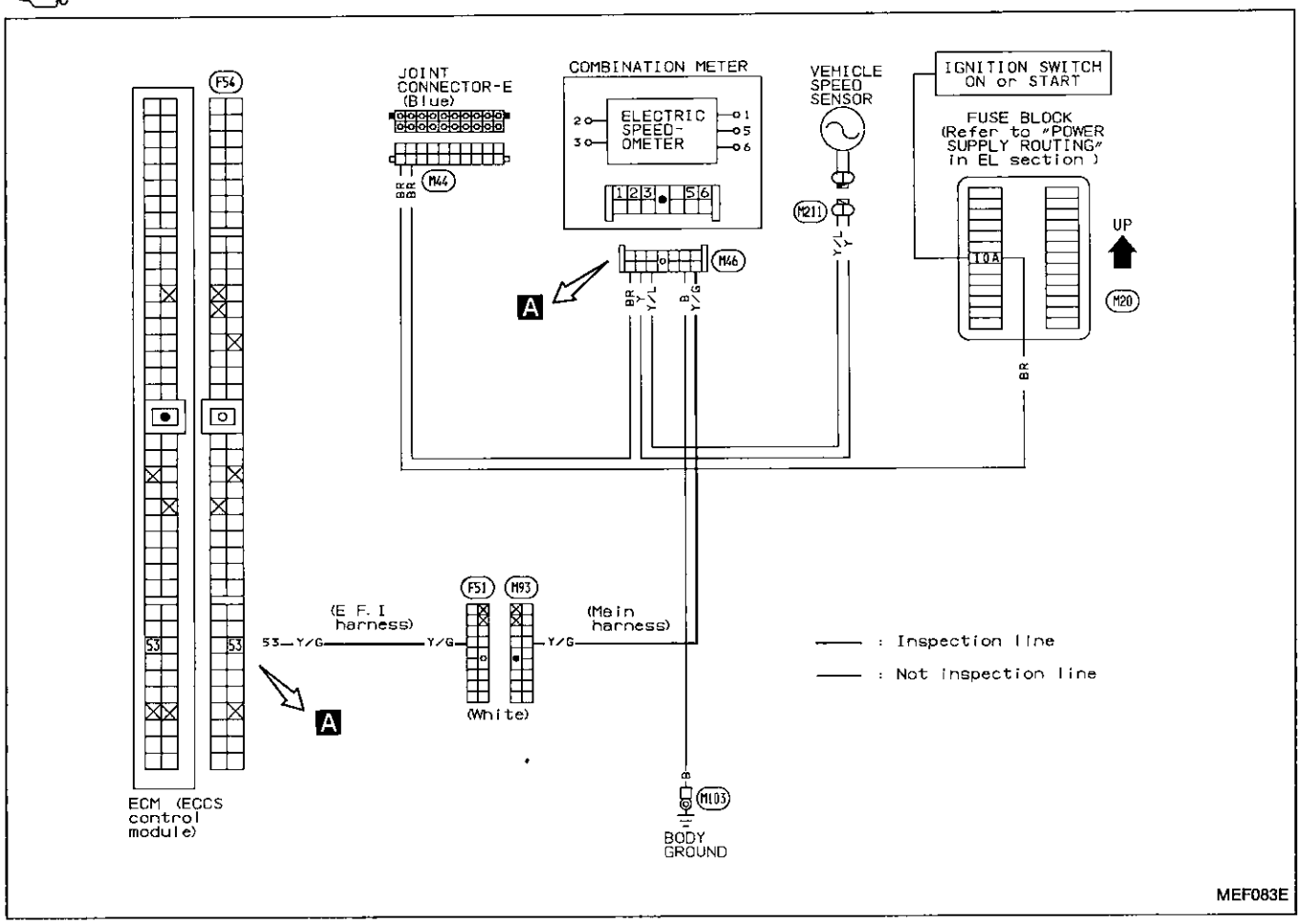
ENGINE COOLANT TEMPERATURE SENSOR
(Diagnostic trouble code No. 13)
(CHECK) (Malfunction indicator lamp item)
Perform FINAL CHECK by the following procedure after repair is completed.



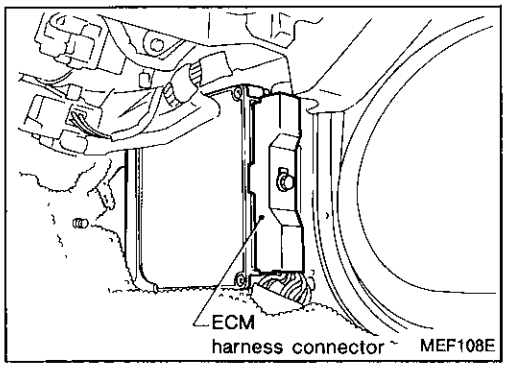
Diagnostic Procedure 5

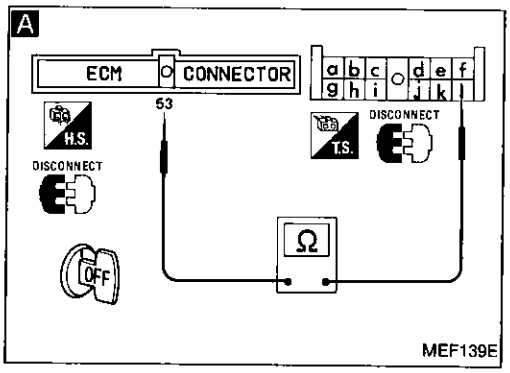
VEHICLE SPEED SENSOR (Diagnostic trouble code No.14)

CHECK (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-69.
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 (53) and terminal ①.
Continuity should exist.
N.G. → Check the following.
- Harness connectors (F51), (M93)
- 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.

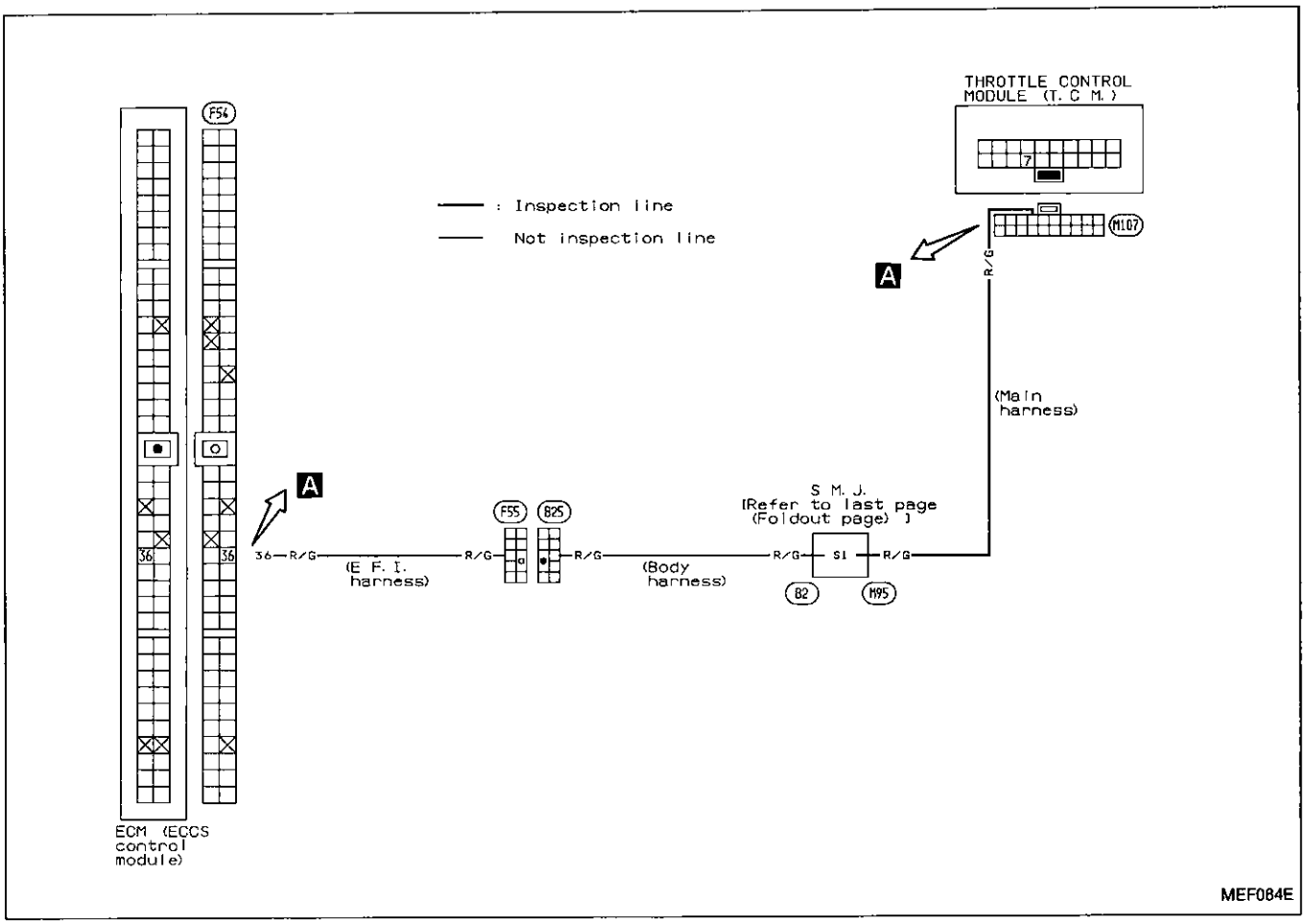
Check overall function again.
N.G. → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

O.K.

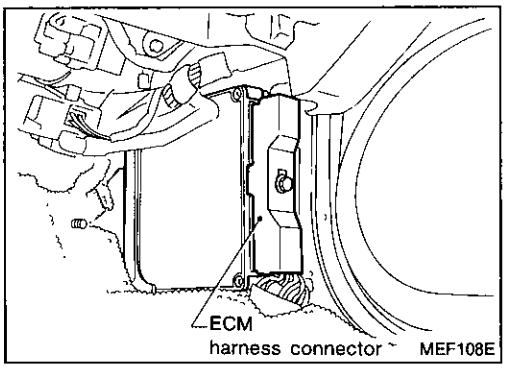
INSPECTION END

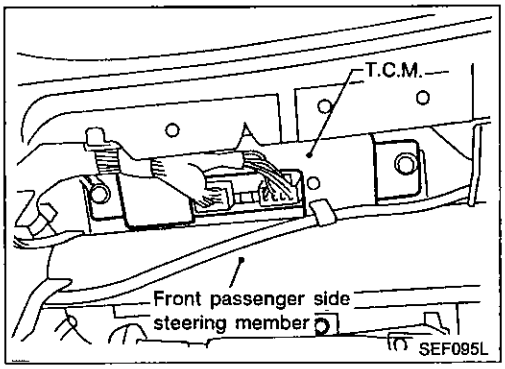
Diagnostic Procedure 6

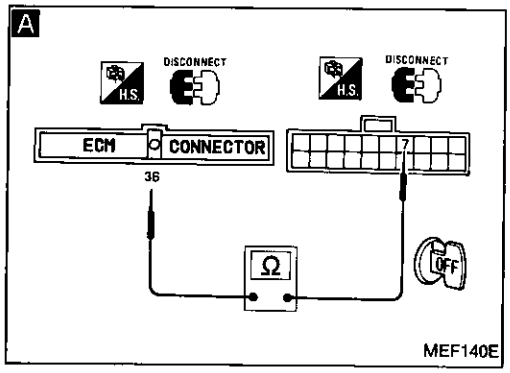
TCS SIGNAL (Diagnostic trouble code No. 16): TCS models



Harness layout







TCS SIGNAL (Diagnostic trouble code No. 16): TCS models

INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-70.

O.K. → INSPECTION END

N.G.

A

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector and T.C.M. 20-pin harness connector.
3) Check harness continuity between ECM terminal (36) and T.C.M. terminal (7).
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F55), (B25)
- Harness connectors (B2), (M95)
- Harness continuity between ECM and T.C.M.

If N.G., repair harness or connectors.

O.K.

CHECK T.C.M. FUNCTION.
Make sure that T.C.M. and circuit function properly. (Refer to BR section.)

N.G. → Repair malfunctioning parts.

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 diagnostic test mode II (Self-diagnostic results) again.

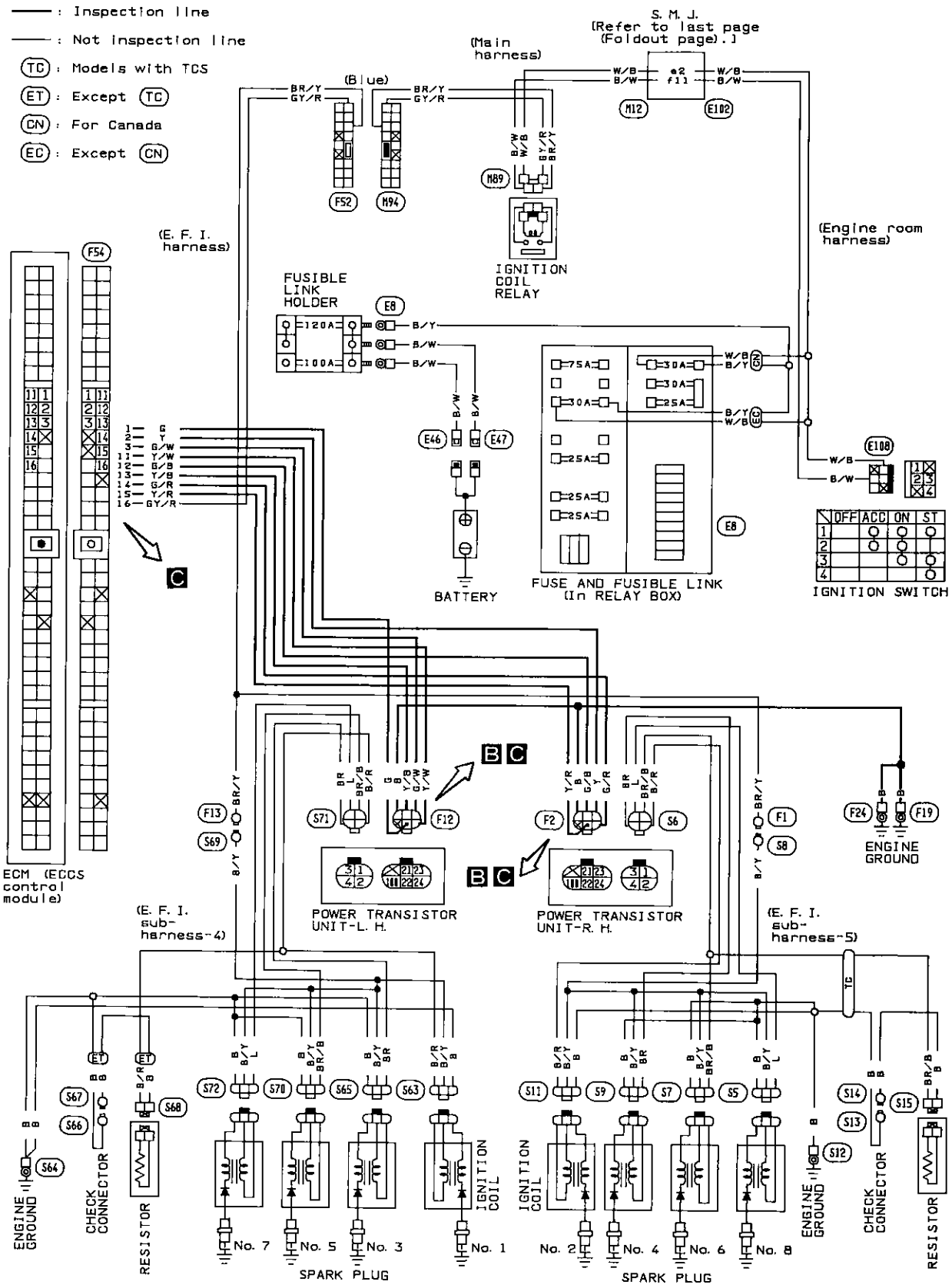
N.G. → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

O.K.

INSPECTION END

Diagnostic Procedure 7

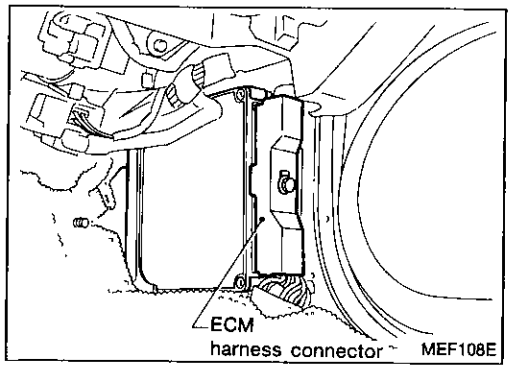
IGNITION SIGNAL (Diagnostic trouble code No. 21)

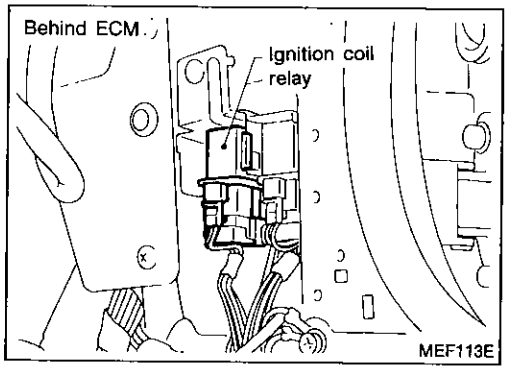


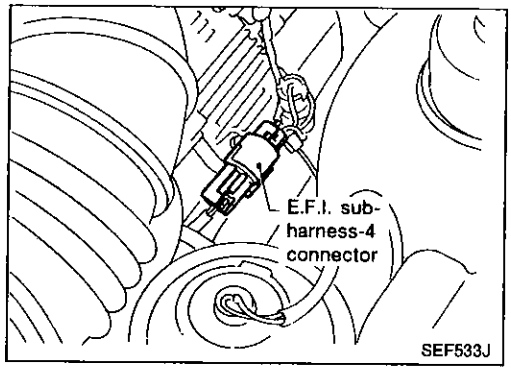
MEF085E

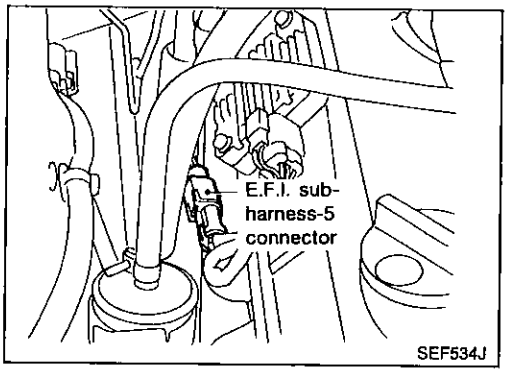
IGNITION SIGNAL (Diagnostic trouble code No. 21)

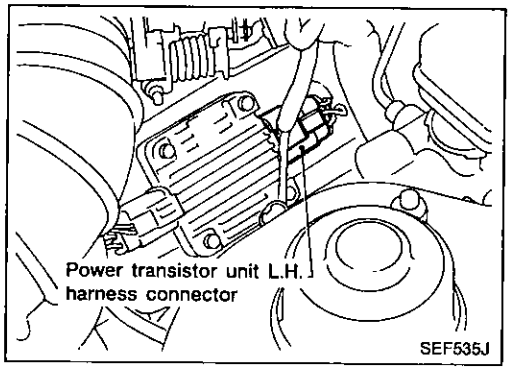
Harness layout

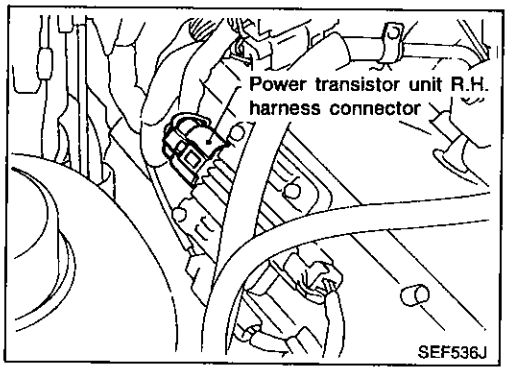


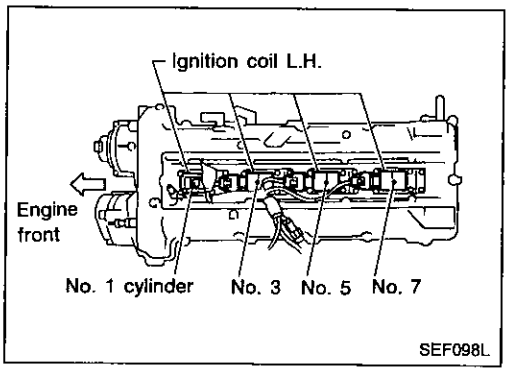


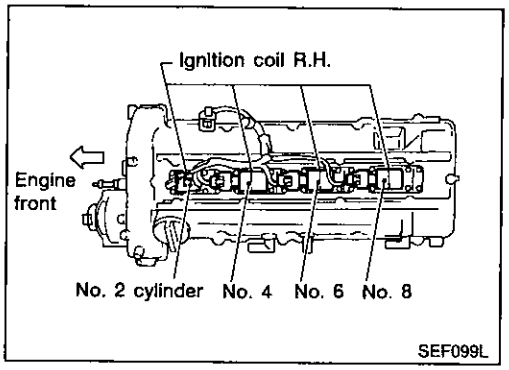




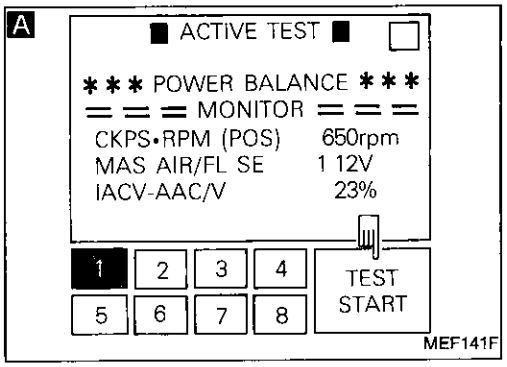


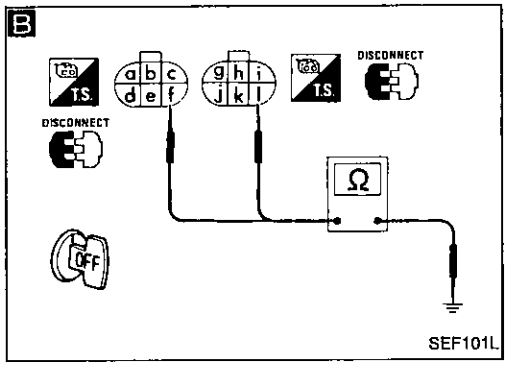


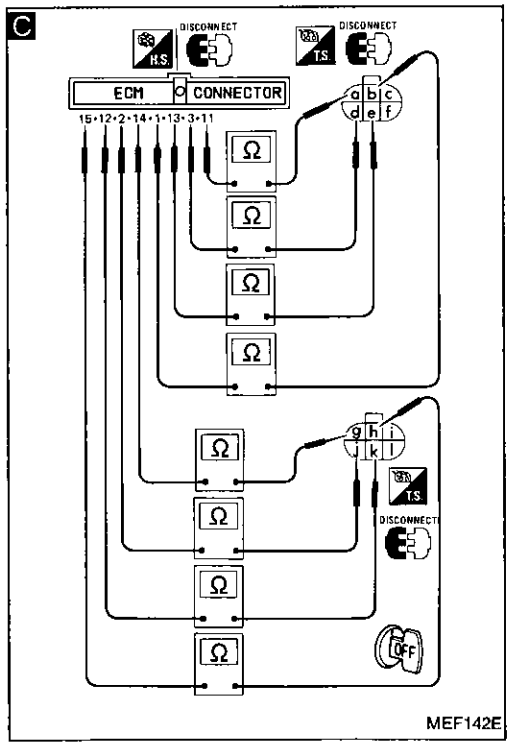




IGNITION SIGNAL (Diagnostic trouble code No. 21)







INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-70.

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

N.G.

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.

Case 1:
When either cylinders Nos. 1, 3, 5 and 7 or Nos. 2, 4, 6 and 8 are all N.G.

Case 2:
Except case 1

B

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

O.K.

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 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 ⓔ,
ECM terminal ⑭ and terminal ⓖ,
ECM terminal ⑮ and terminal ⓗ.
Continuity should exist.

O.K.

CHECK COMPONENT (Power transistor unit).
Refer to "Electrical Components Inspection".
(See pages EF & EC-203.)

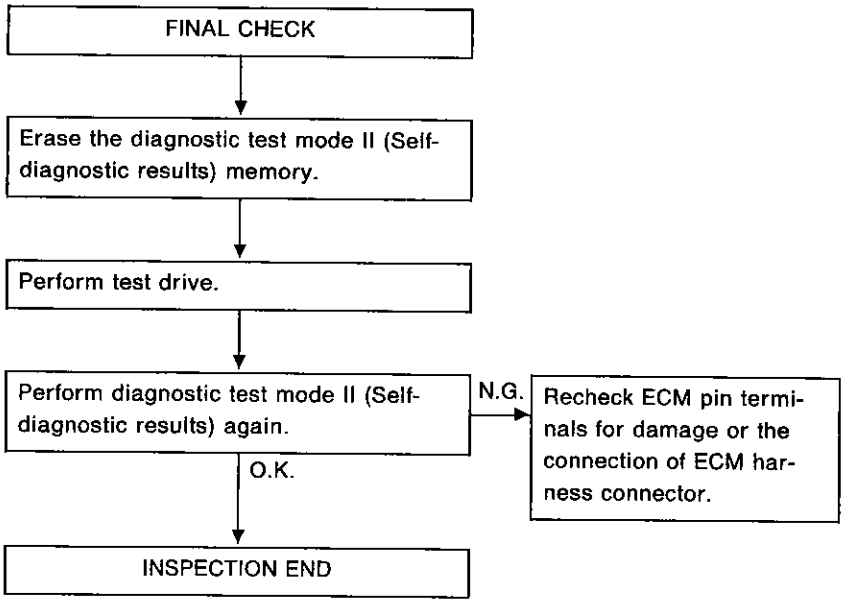
N.G. → Replace power transistor.

O.K.

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

IGNITION SIGNAL (Diagnostic trouble code No. 21)

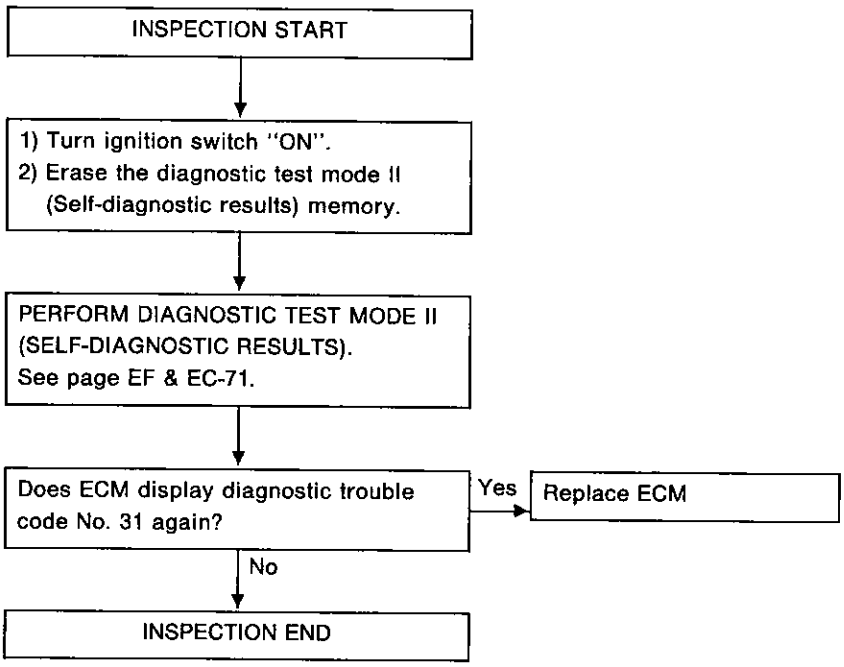
Perform FINAL CHECK by the following procedure after repair is completed.



Diagnostic Procedure 8

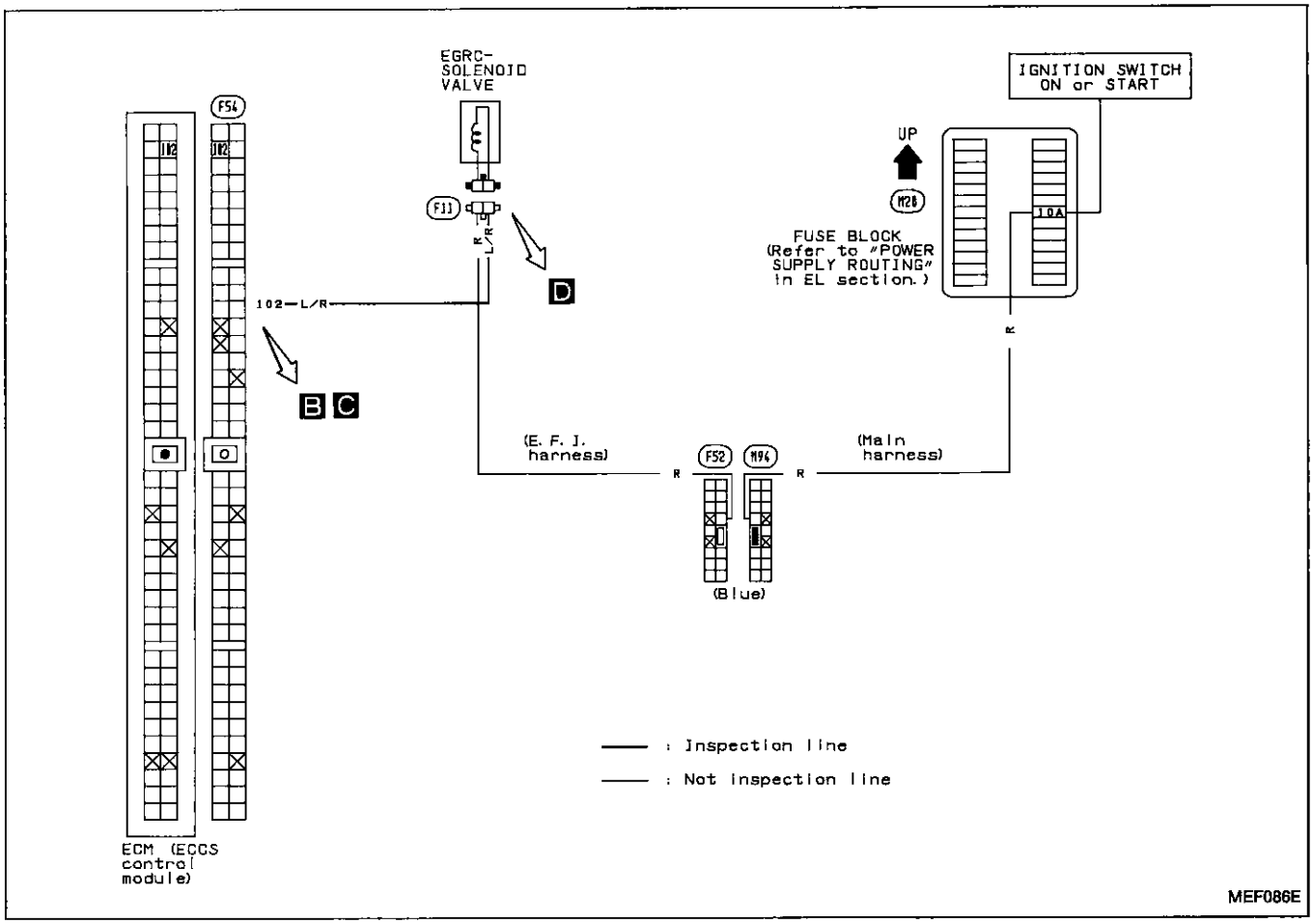
ECM (ECCS CONTROL MODULE) (Diagnostic trouble code No. 31)

(Malfunction indicator lamp item)

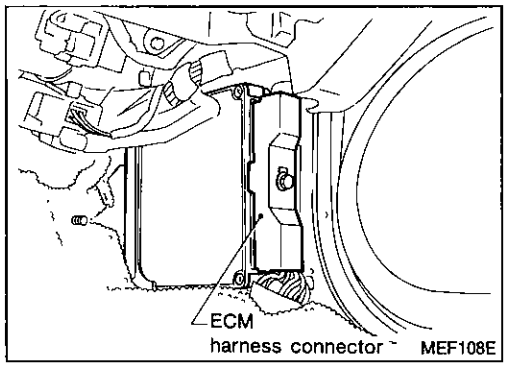


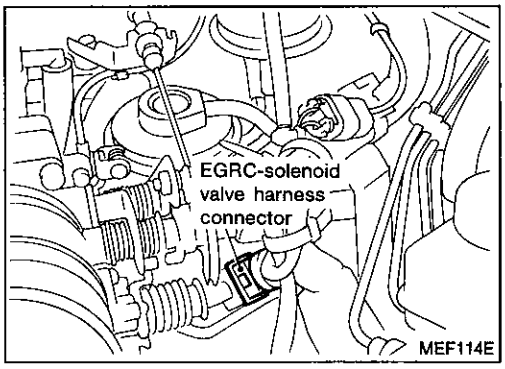
Diagnostic Procedure 9

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

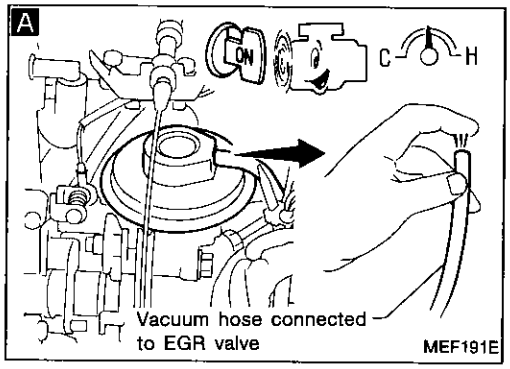


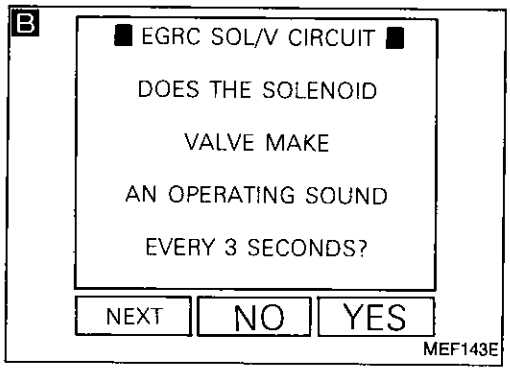
Harness layout

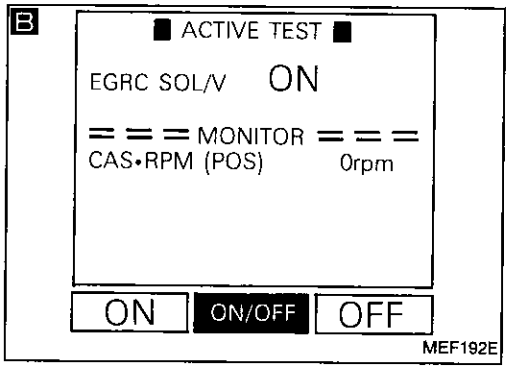


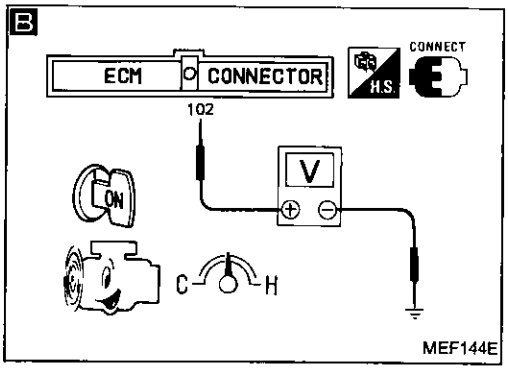


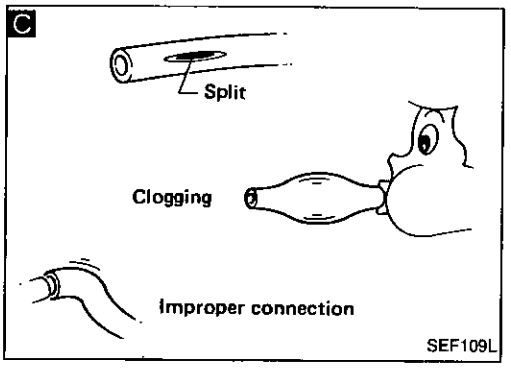
EGR FUNCTION (Diagnostic trouble code No. 32)
(Malfunction indicator lamp item): California models











INSPECTION START

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

O.K. → INSPECTION END

N.G.

A

CHECK VACUUM SOURCE TO EGR VALVE.
1) Start engine and warm it up sufficiently.
2) Perform diagnostic test mode II (Self-diagnostic results). Make sure that diagnostic trouble code No. 11 and 12 are not displayed.
3) Keep engine speed at about 2,000 rpm.
4) Disconnect vacuum hose to EGR valve.
5) Make sure that vacuum exists. **Vacuum should exist.**

O.K. → CHECK COMPONENTS (EGR valve, and EGRC-BPT valve). Refer to "Electrical Components Inspection". (See page EF & EC-206.)

N.G. → Replace malfunctioning component(s).

N.G.

B

CHECK CONTROL FUNCTION.
1) Stop engine.
2) Turn ignition switch "ON".
3) Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

— OR —

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

— OR —

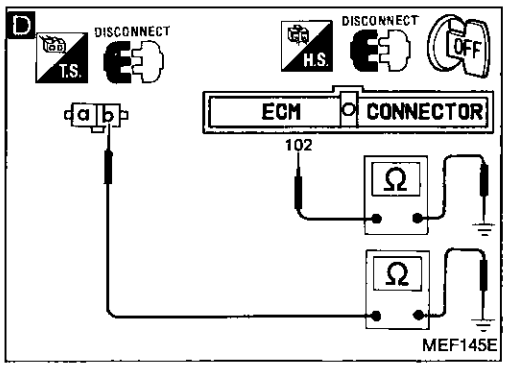
1) Check voltage between ECM terminal (102) and ground under the following conditions with CONSULT or tester.
Voltage:
At idle
Approximately 0V
Engine speed is about 2,000 rpm.
Battery voltage

O.K. → **C**

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

N.G.

Ⓐ



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

Ⓐ

D

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Disconnect EGRC-solenoid valve harness connector.
4) Check harness continuity between ECM terminal (102) and ground, terminal (b) and ground.
Continuity should not exist.

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

O.K. ↓

CHECK COMPONENT (EGRC-solenoid valve).
Refer to "Electrical Components Inspection".
(See page EF & EC-206.)

N.G. → Replace EGRC-solenoid valve.

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-207.)

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 diagnostic test mode II (Self-diagnostic results) again.

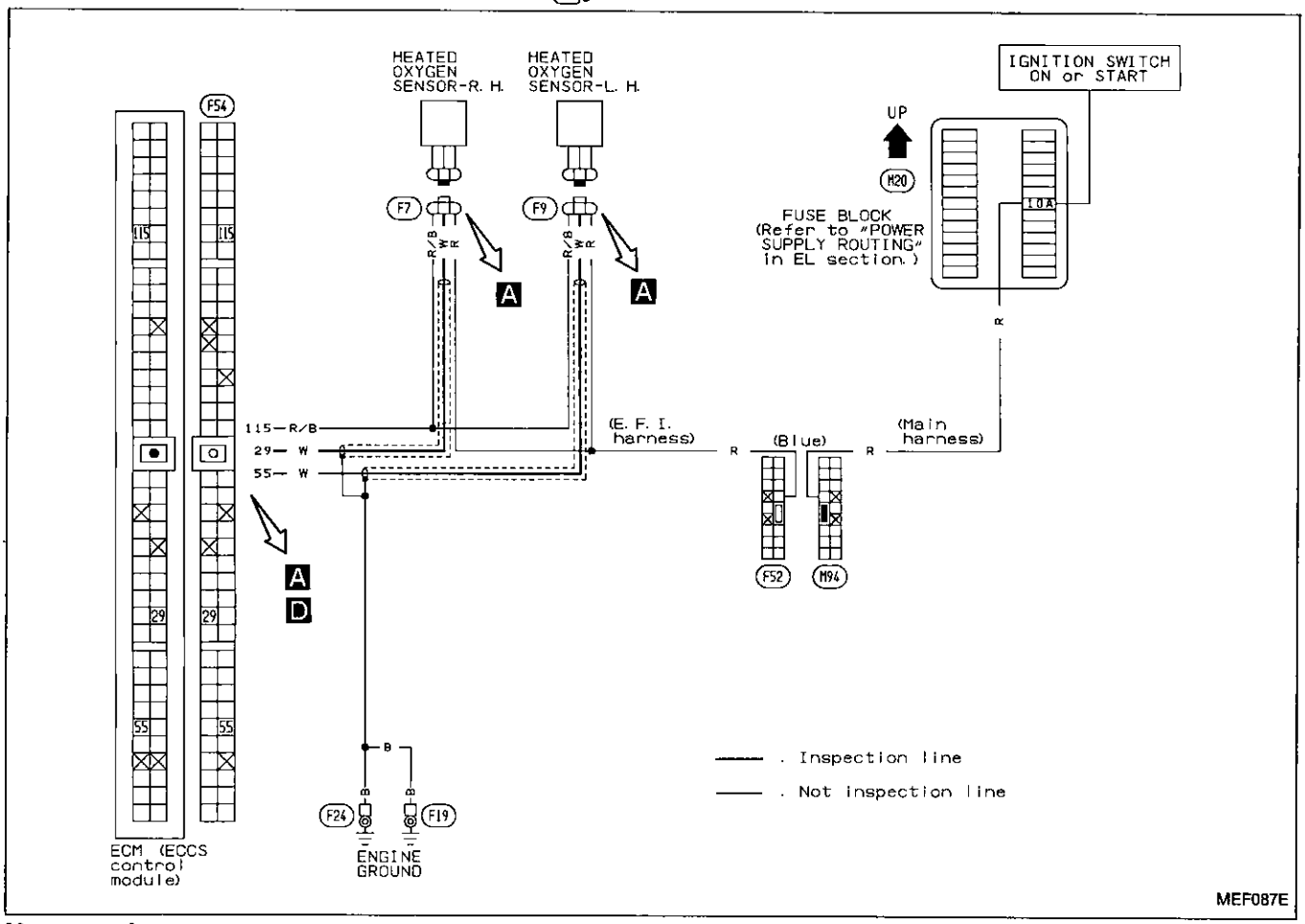
N.G. → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

O.K. ↓

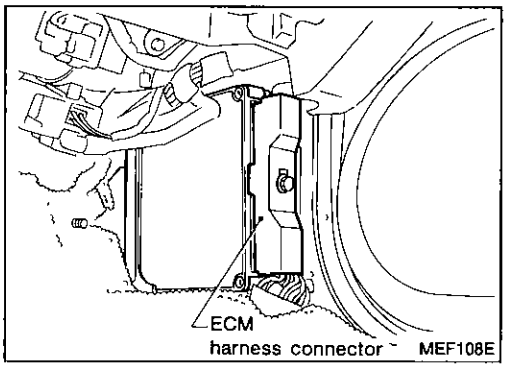
INSPECTION END

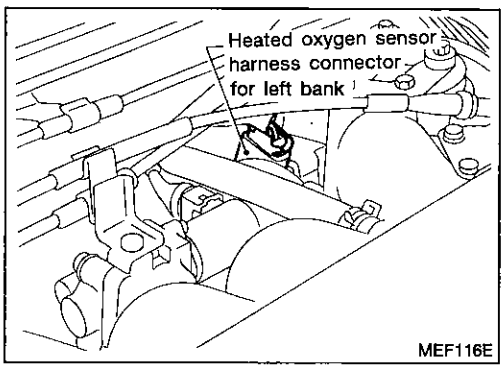
Diagnostic Procedure 10

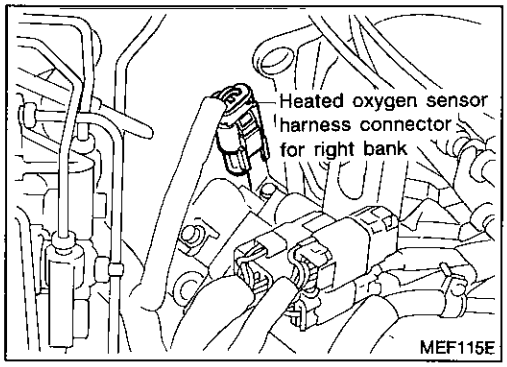
HEATED OXYGEN SENSOR L.H. (Diagnostic trouble code No. 33) HEATED OXYGEN SENSOR R.H. (Diagnostic trouble code No. 53) CHECK (Malfunction indicator lamp item)



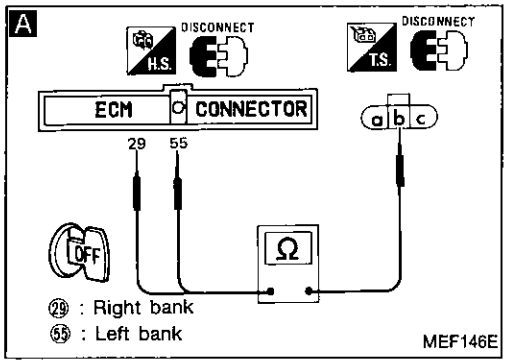
Harness layout

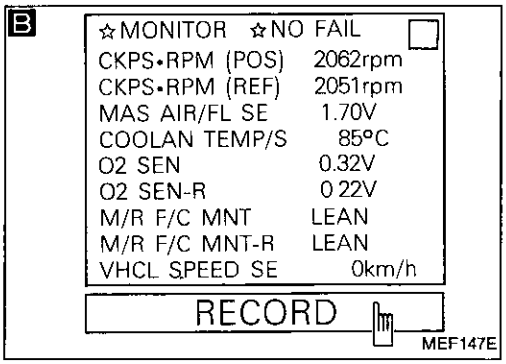


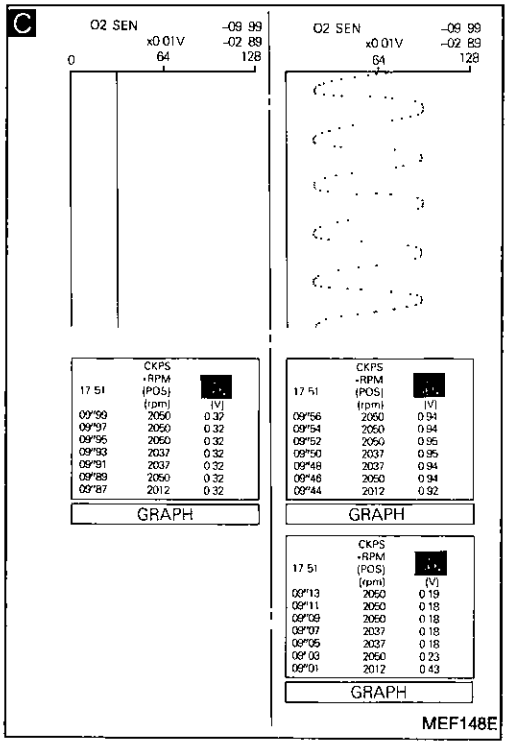


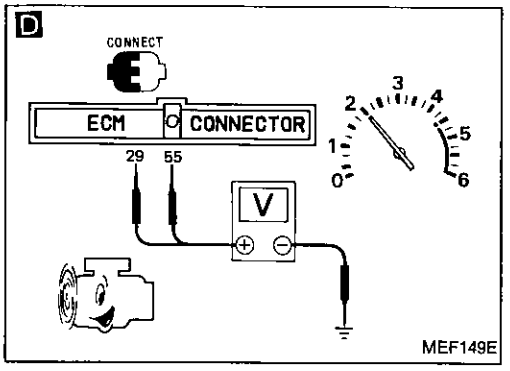


HEATED OXYGEN SENSOR L.H. (Diagnostic trouble code No. 33) HEATED OXYGEN SENSOR R.H. (Diagnostic trouble code No. 53) (Malfunction indicator lamp item)









INSPECTION START

CHECK OVERALL FUNCTION.
See page EF & EC-72.
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 ⑥.
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 "O2 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.**

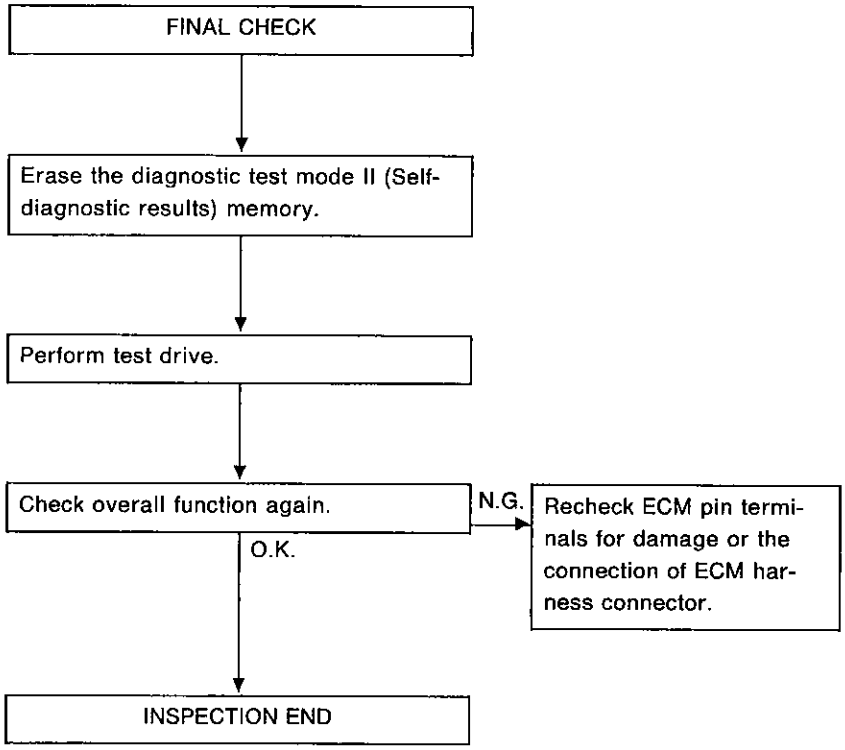
O.K.

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)

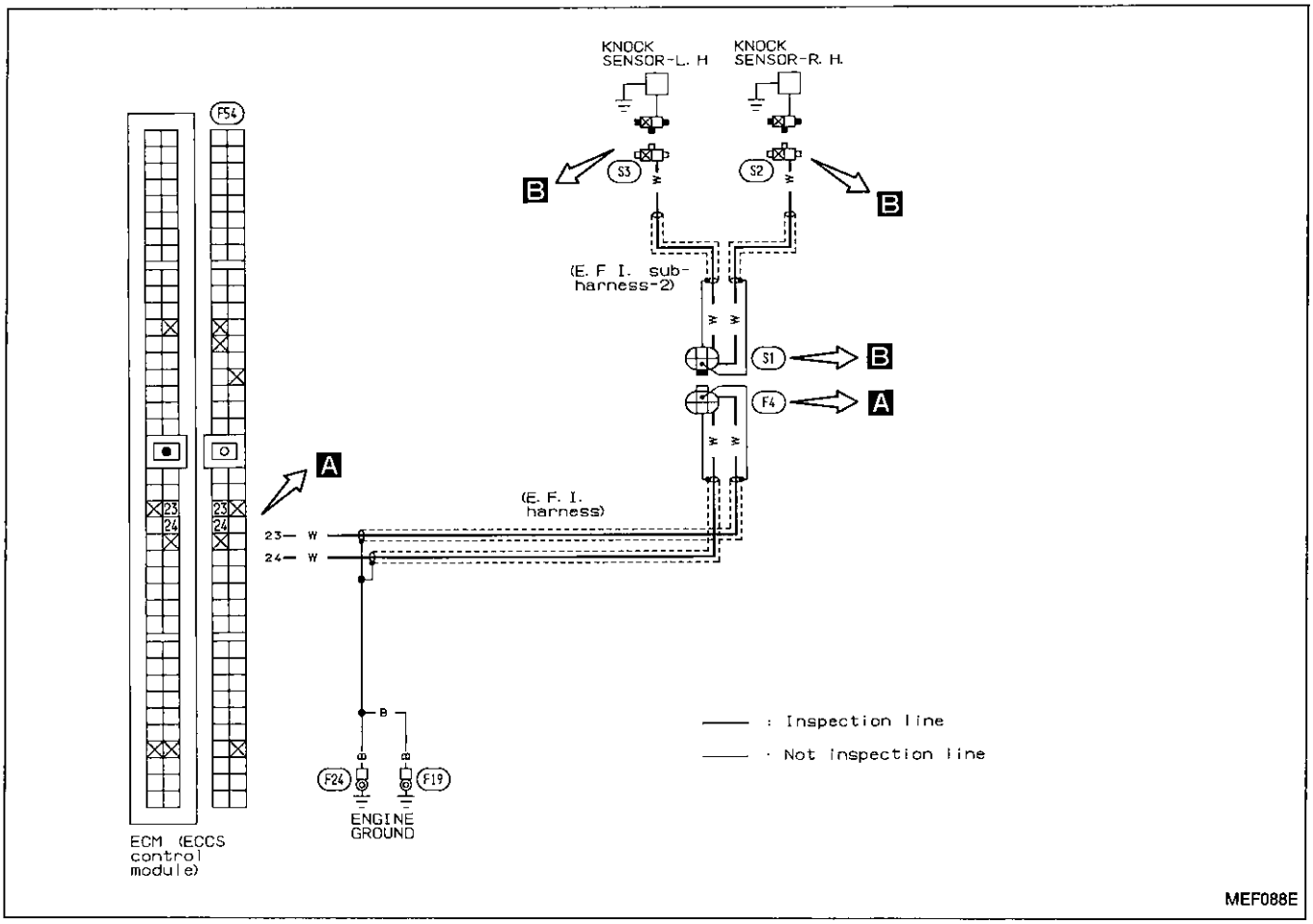
(Malfunction indicator lamp item)

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

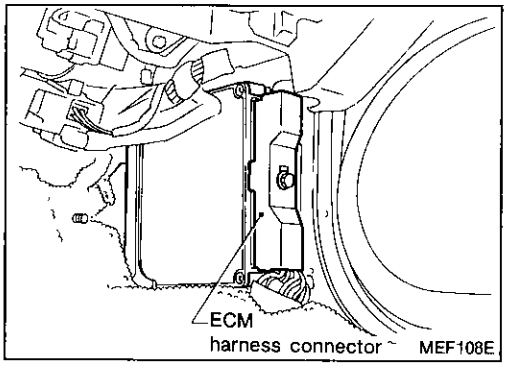


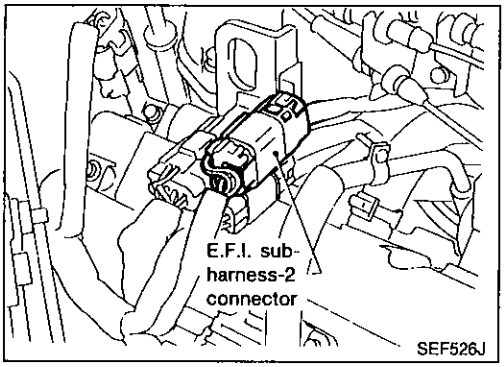
Diagnostic Procedure 11

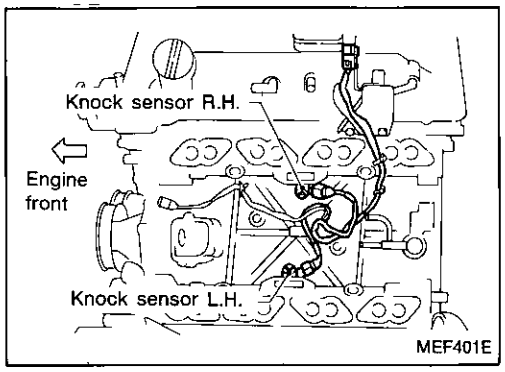
KNOCK SENSOR (Diagnostic trouble code No. 34)



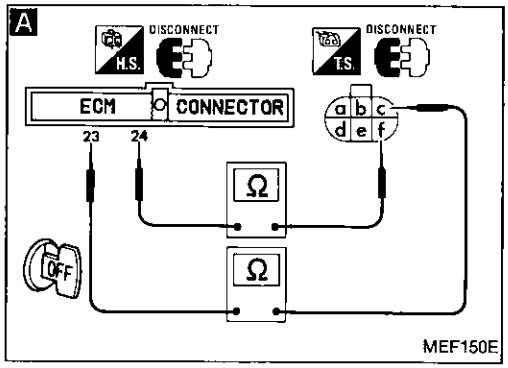
Harness layout

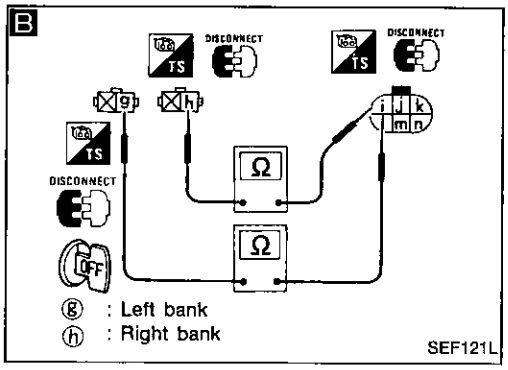






KNOCK SENSOR (Diagnostic trouble code No. 34)





INSPECTION START

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

O.K. → INSPECTION END

N.G.

A

CHECK INPUT SIGNAL CIRCUIT-I.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector and E.F.I. sub-harness-2 connector.
3) Check harness continuity between terminal ⓒ and ECM terminal ㉓, terminal ⓕ and ECM terminal ㉔.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

B

CHECK INPUT SIGNAL CIRCUIT-II.
1) Disconnect knock sensor-L.H. & R.H. harness connectors.
2) Check harness continuity between the following terminals.
- ⓖ and ⓘ
- ⓗ 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-210.)

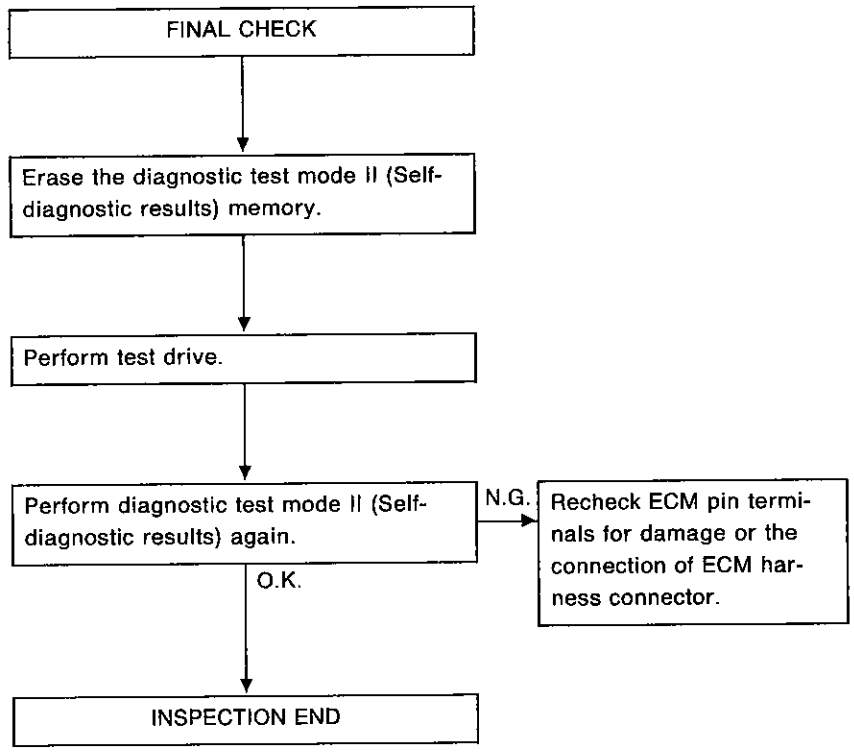
N.G. → Replace knock sensor.

O.K.

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

KNOCK SENSOR (Diagnostic trouble code No. 34)

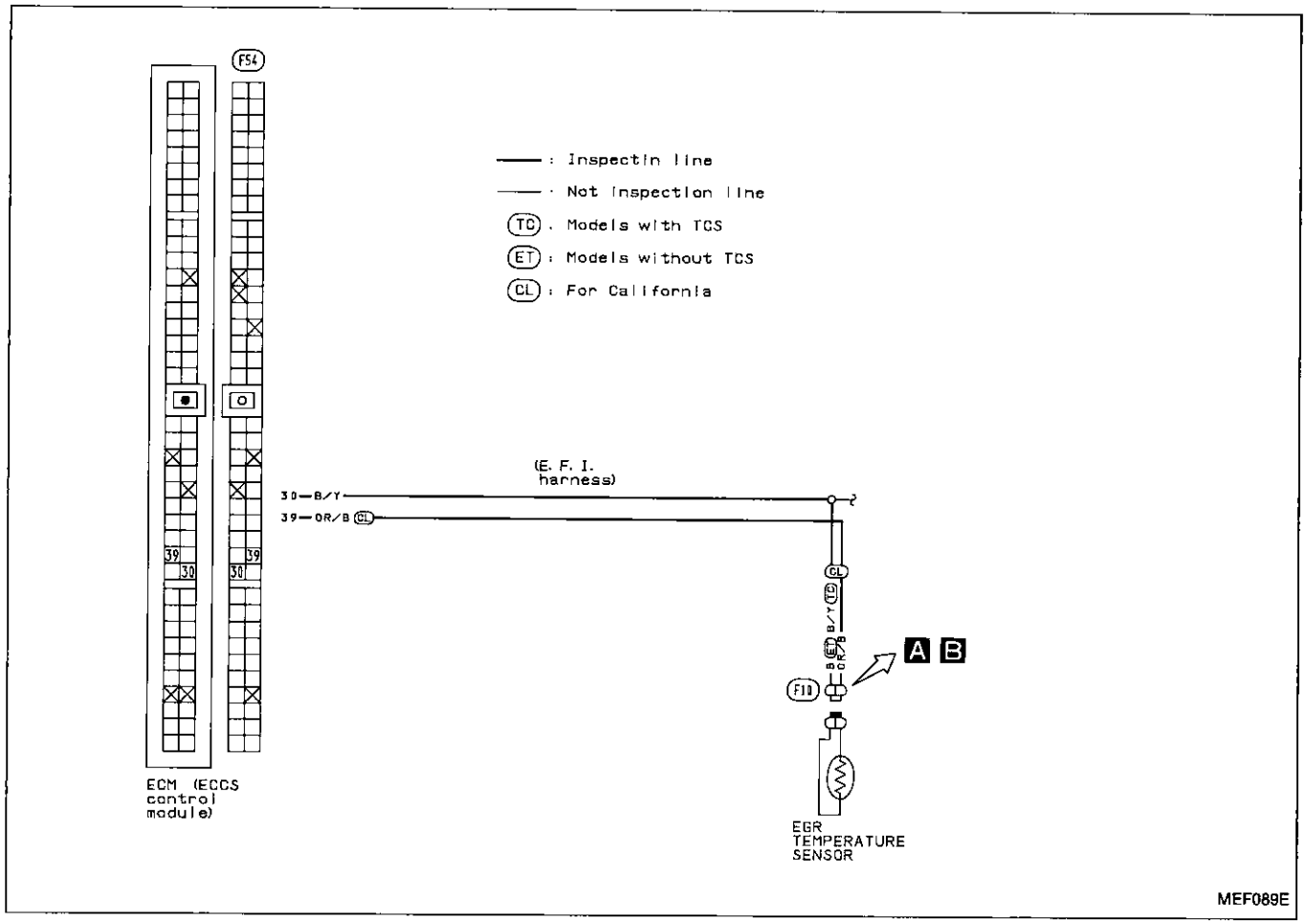
Perform FINAL CHECK by the following procedure after repair is completed.



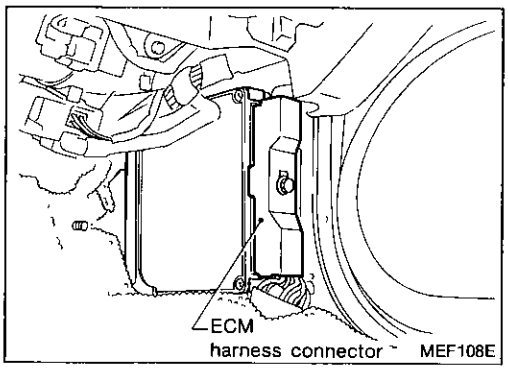
Diagnostic Procedure 12

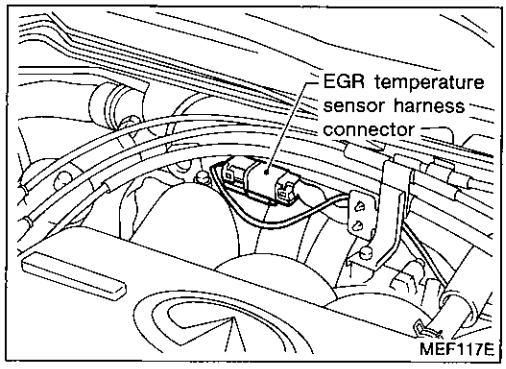
EGR TEMPERATURE SENSOR (Diagnostic trouble code No. 35)

CHECK (Malfunction indicator lamp item): California models only

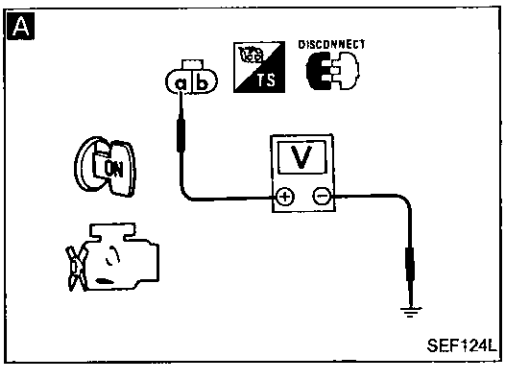


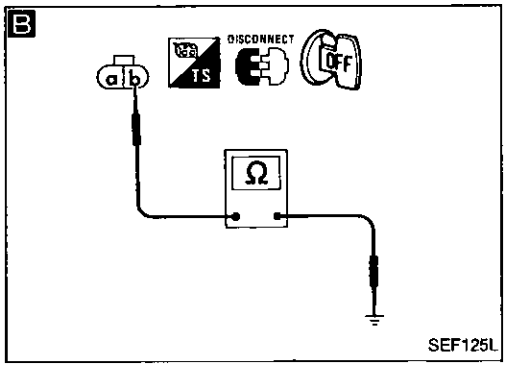
Harness layout





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





INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-73.
- 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. → Repair harness or connectors.
- O.K. ↓

CHECK COMPONENT (EGR temperature sensor). Refer to "Electrical Components Inspection". (See page EF & EC-207.)
- N.G. → Replace EGR 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.

↓

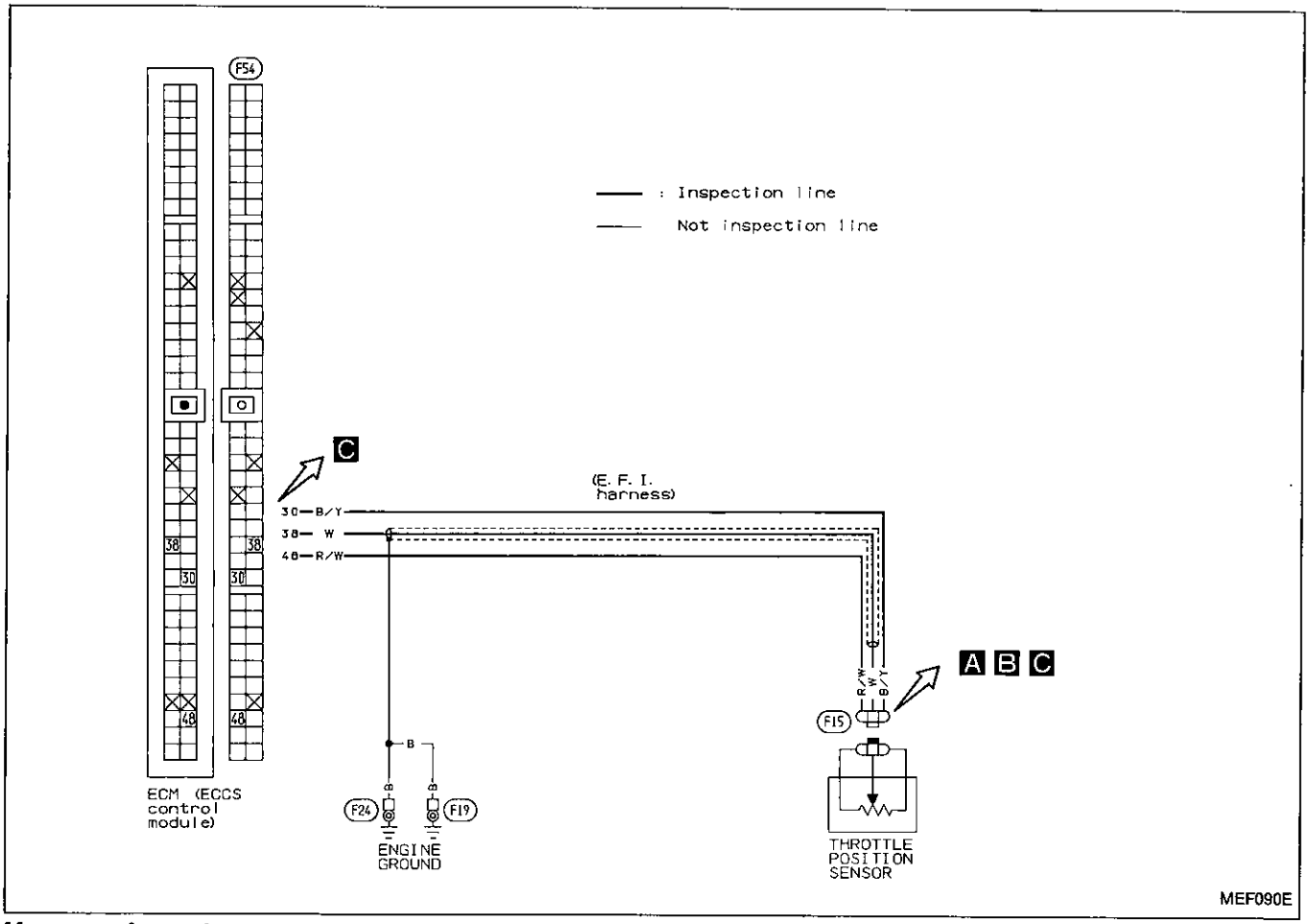
Perform diagnostic test mode II (Self-diagnostic results) again.
- N.G. → Recheck ECM pin terminals for damage or the connection of ECM harness connector.
- O.K. ↓

INSPECTION END

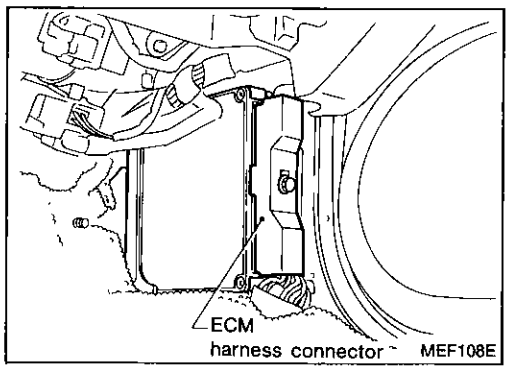
Diagnostic Procedure 13

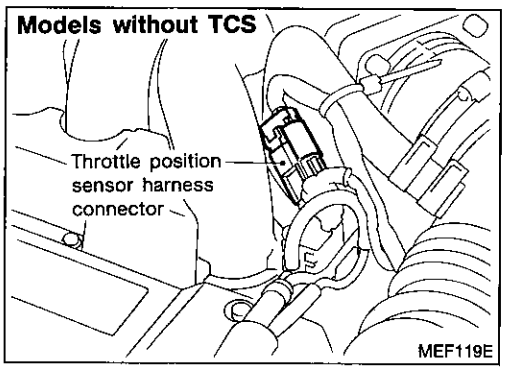
THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43)

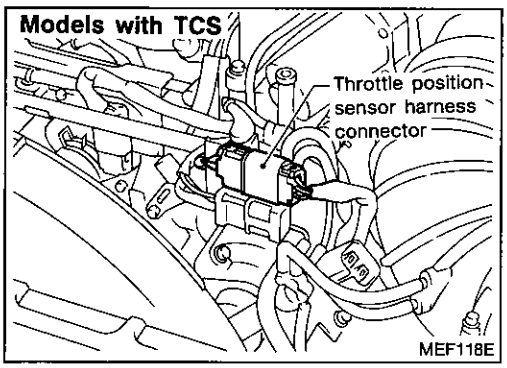
CHECK (Malfunction indicator lamp item)



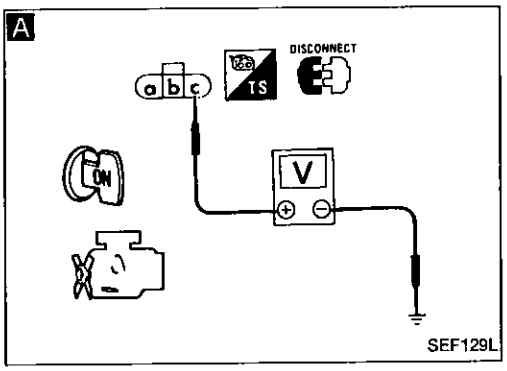
Harness layout

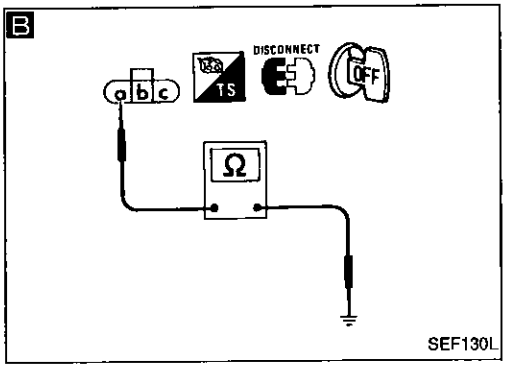


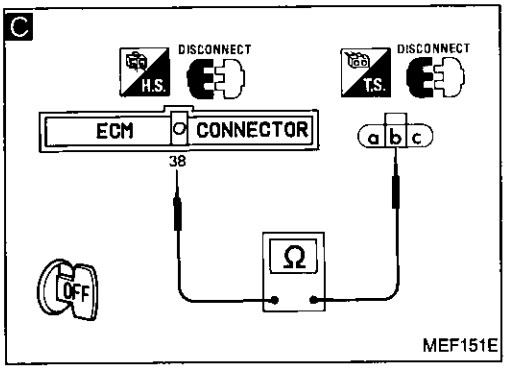




THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43) (Malfunction indicator lamp item)







INSPECTION START

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

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 ⑧ and engine ground.
Continuity should exist.

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-208.)

N.G. → Replace throttle position sensor.

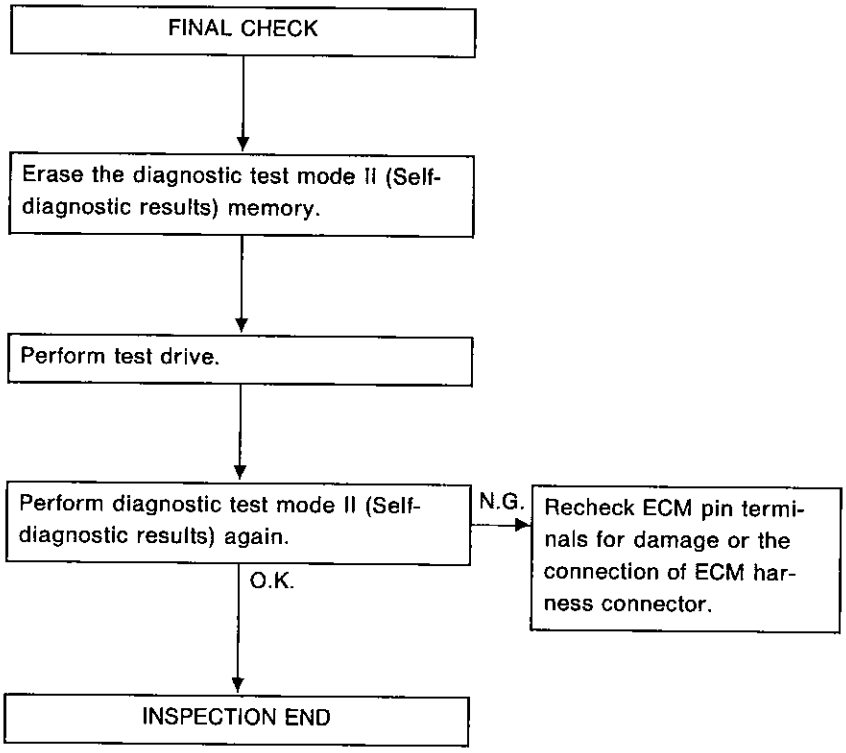
O.K.

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.



A

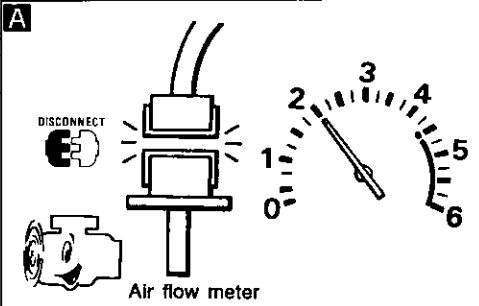
■ ACTIVE TEST ■

SELF-LEAN CONTROL	100% R100%
MONITOR	
CKPS·RPM(POS)	650rpm
COOLAN TEMP/S	82°C
O2 SEN	0.16V
O2 SEN-R	0.17V
A/F ALPHA	92%
A/F ALPHA-R	96%

CLEAR

MEF152E

A



SEF229L

Diagnostic Procedure 14

INJECTOR LEAK (Diagnostic trouble code No. 45)

CHECK (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-LEAN CONTROL" 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 (self-diagnostic results).
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 (self-diagnostic results).

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

O.K. → INSPECTION END

N.G.

Remove injector assembly. (See page EF & EC-216.) Keep fuel hose and all injectors connected to injector gallery.

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

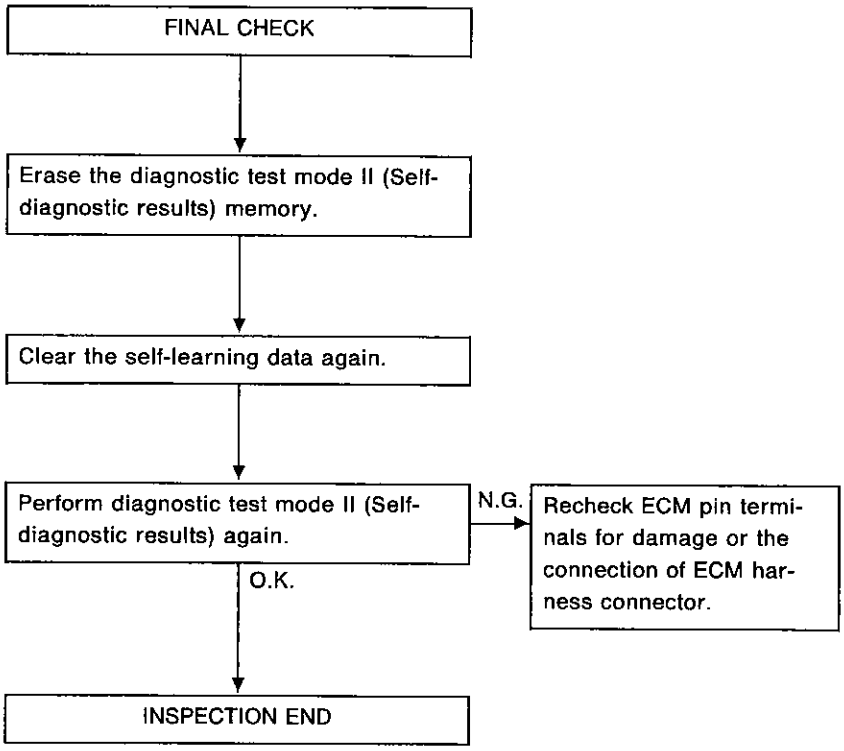
Drips → Replace the injectors from which fuel is dripping.

Does not drip

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

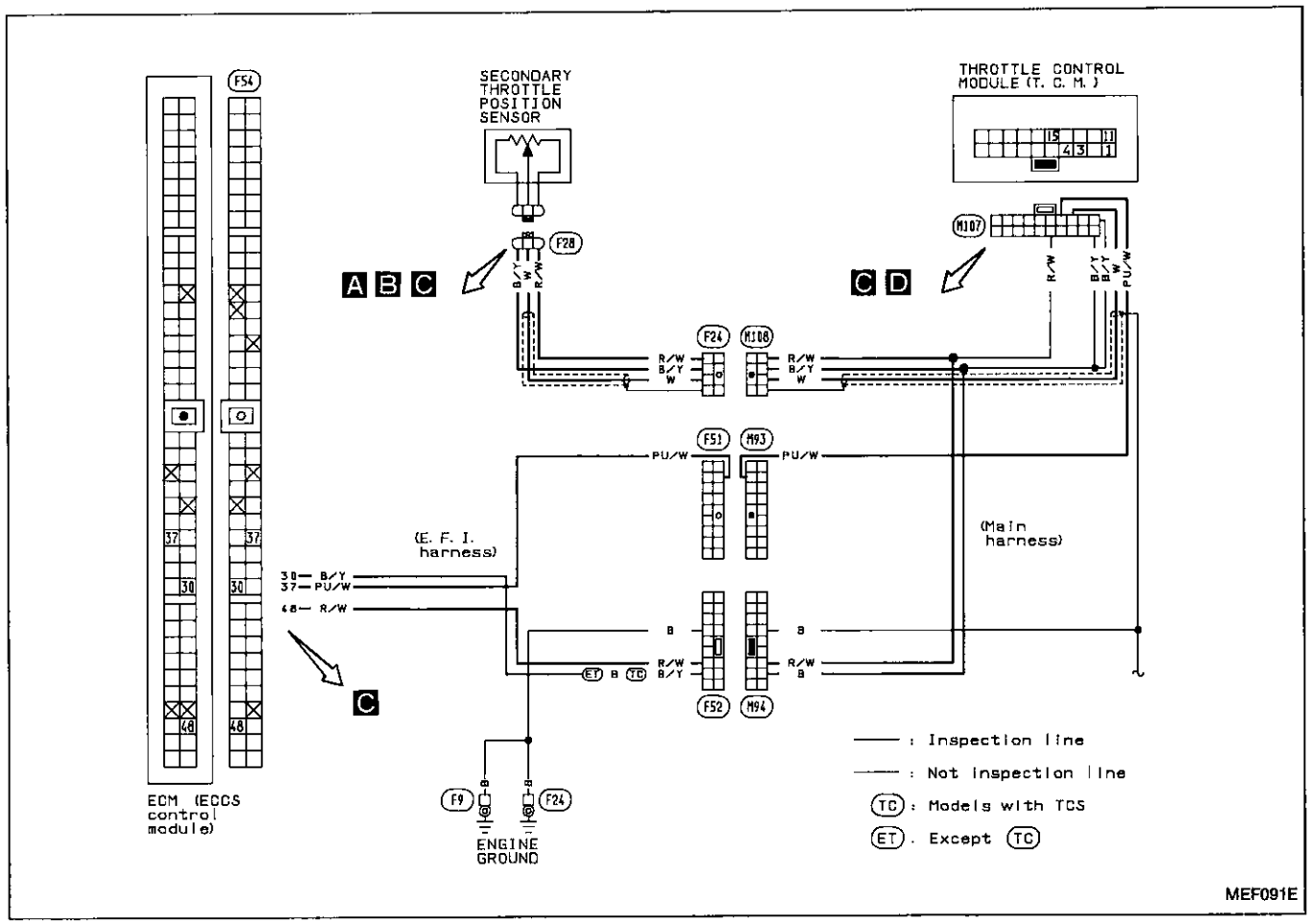
INJECTOR LEAK (Diagnostic trouble code No. 45)
(Malfunction indicator lamp item): California models only

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

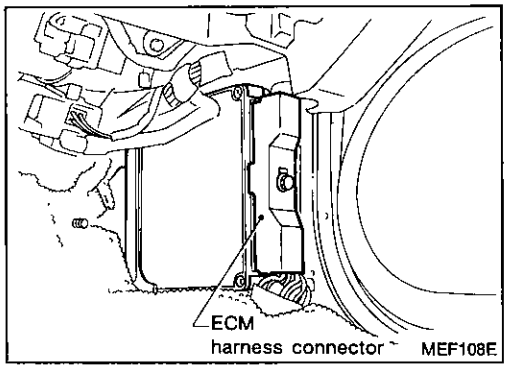


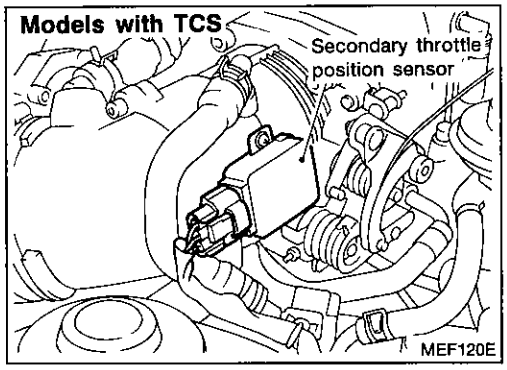
Diagnostic Procedure 15

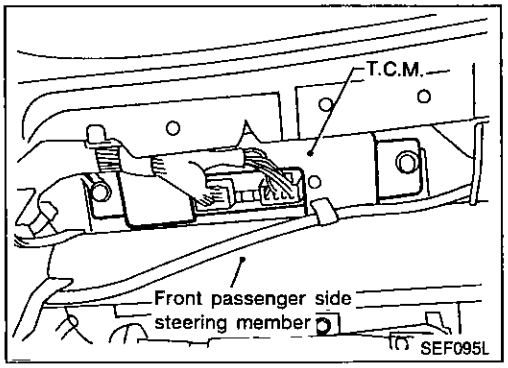
SECONDARY THROTTLE POSITION SENSOR (Diagnostic trouble code No. 46): TCS models



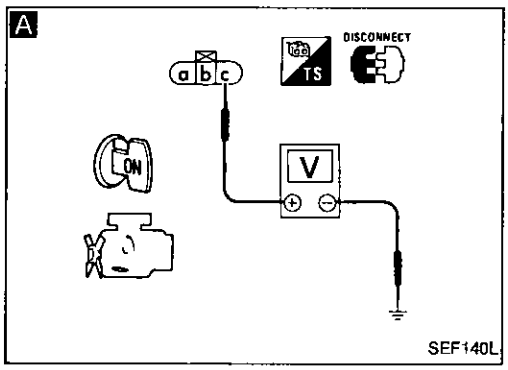
Harness layout

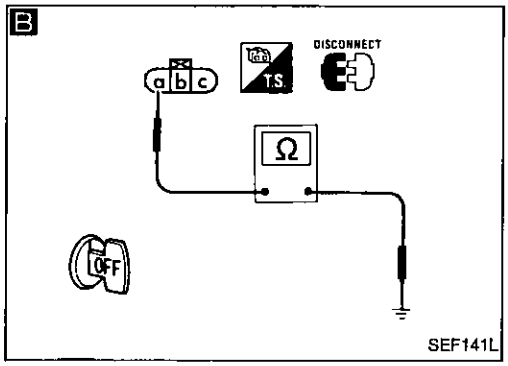


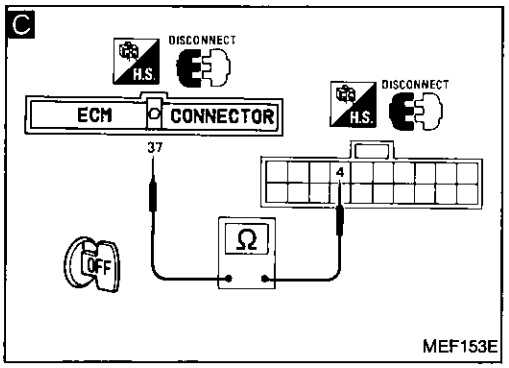


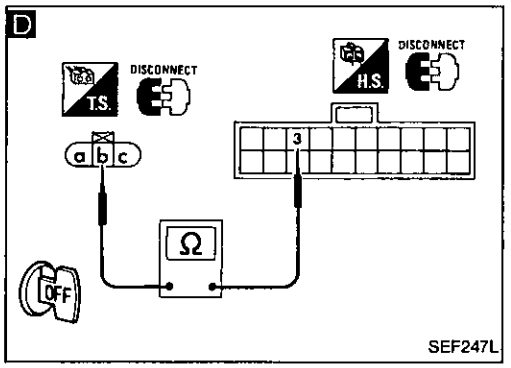


SECONDARY THROTTLE POSITION SENSOR (Diagnostic trouble code No. 46): TCS models









INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
See page EF & EC-74.
- O.K. → INSPECTION END
- N.G. ↓

A

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect secondary 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. → Check the following.
  - Harness connectors (F24), (M108)
  - Harness connectors (M94), (F52)
  - Harness continuity between secondary throttle position sensor and ECM

  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 ground.
Continuity should exist.

- N.G. → Check the following.
  - Harness connectors (F24), (M108)
  - Harness connectors (M94), (F52)
  - Harness continuity between secondary throttle position sensor and ECM

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

C

CHECK INPUT SIGNAL CIRCUIT-I.
1) Disconnect ECM harness connector and T.C.M. harness connector.
2) Check harness continuity between ECM terminal ㊲ and T.C.M. terminal ④.
Continuity should exist.

- N.G. → Check the following.
  - Harness connectors (F51), (M93)
  - Harness continuity between ECM and T.C.M.

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

D

CHECK INPUT SIGNAL CIRCUIT-II.
1) Check harness continuity between T.C.M. terminal ③ and terminal ⓑ.
Continuity should exist.

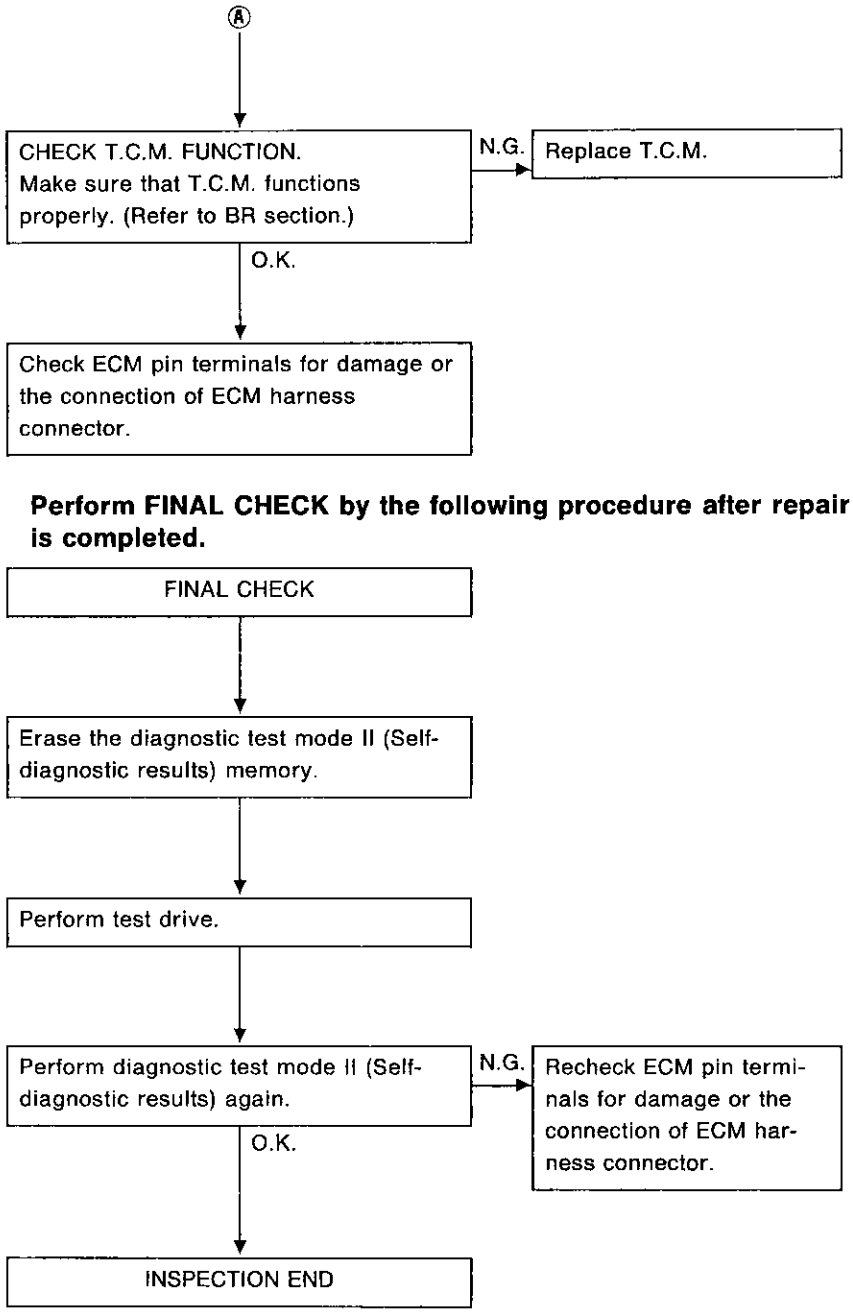
- N.G. → Check the following.
  - Harness connectors (F24), (M108)
  - Harness continuity between T.C.M. and secondary throttle position sensor.
- O.K. ↓

CHECK COMPONENT
(Secondary throttle position sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-209.)

- N.G. → Replace secondary throttle position sensor.
- O.K. ↓

Ⓐ

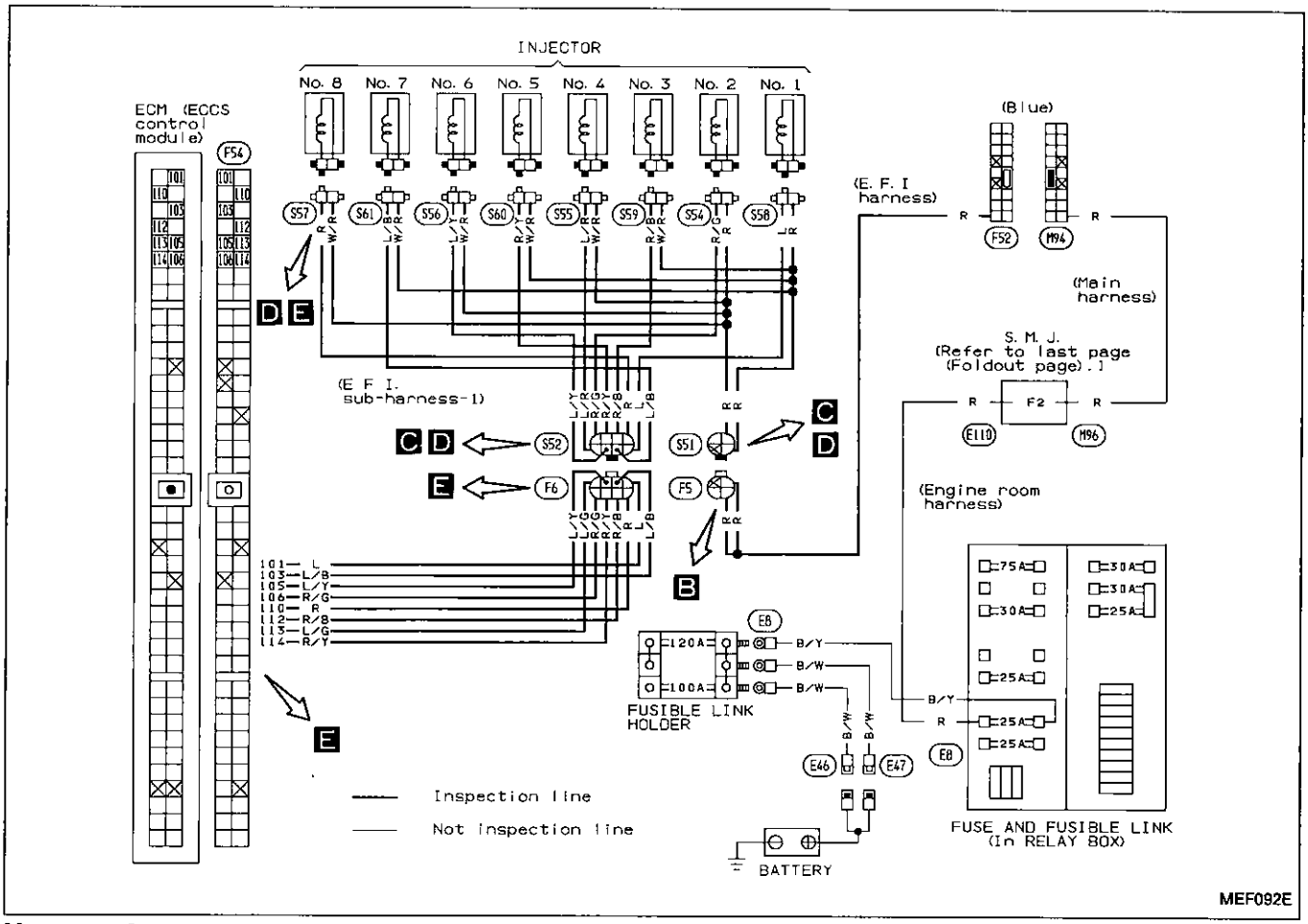
SECONDARY THROTTLE POSITION SENSOR (Diagnostic trouble code No. 46): TCS models



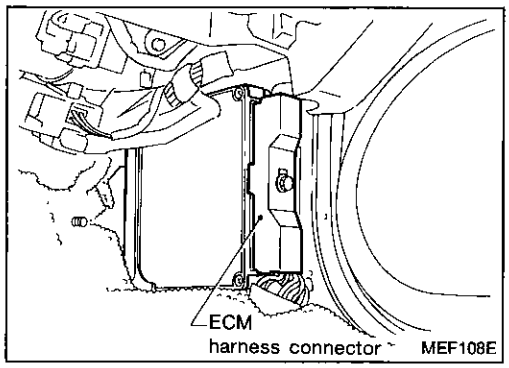
Perform FINAL CHECK by the following procedure after repair is completed.

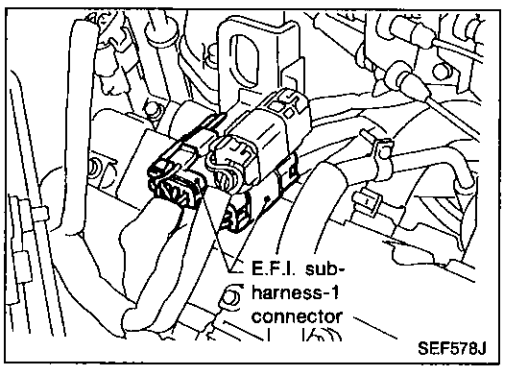
Diagnostic Procedure 16

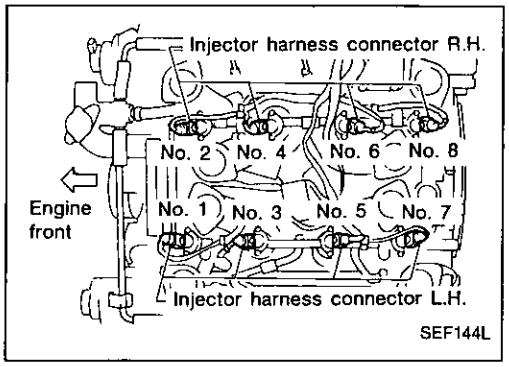
INJECTOR (Diagnostic trouble code No. 51) CHECK (Malfunction indicator lamp item): California models



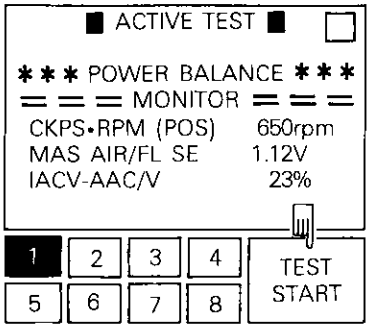
Harness layout





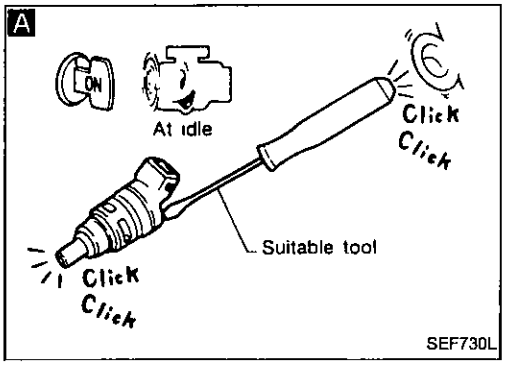


A



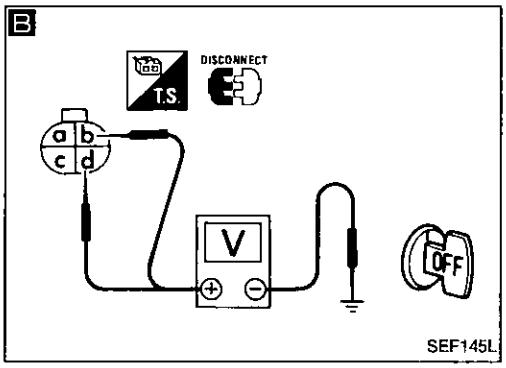
MEF141E

A



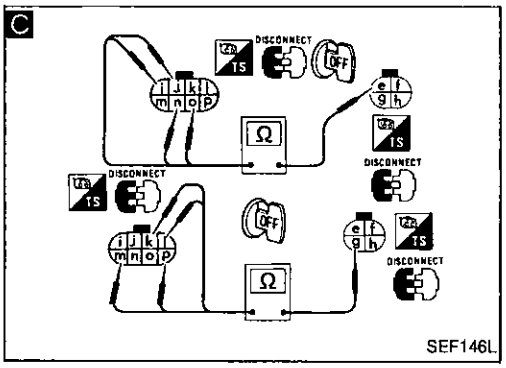
SEF730L

B



SEF145L

C



SEF146L

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

INSPECTION START

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

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.

Case 1:
When either cylinders Nos. 1, 3, 5 and 7 or Nos. 2, 4, 6 and 8 are all N.G.

B

CHECK POWER SUPPLY-I.
1) Turn ignition switch "OFF".
2) Disconnect E.F.I. sub-harness-1 connector (F5).
3) Check voltage between terminals (b), (d) and ground with CONSULT or tester.
Voltage: Battery voltage

O.K. ← | → N.G.

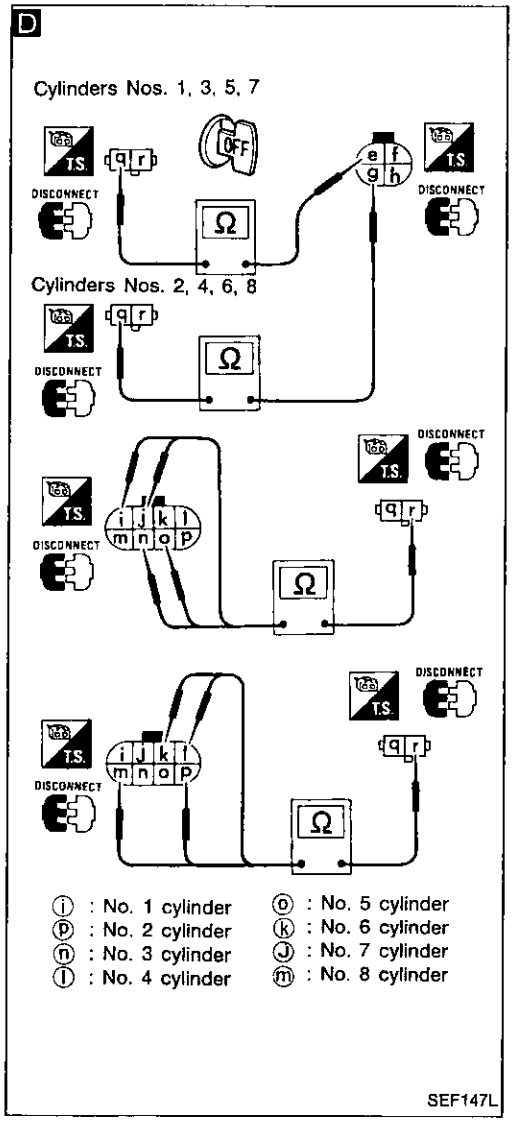
Check the following.
- Harness connector (F52), (M94)
- Harness continuity between E.F.I. sub-harness-1 connector (F5) and harness connector (F52).

If N.G., repair harness or connectors.

Case 2:
Except case 1

Ⓐ

D



ⓘ : No. 1 cylinder
ⓟ : No. 2 cylinder
ⓝ : No. 3 cylinder
ⓛ : No. 4 cylinder
ⓞ : No. 5 cylinder
ⓚ : No. 6 cylinder
Ⓙ : No. 7 cylinder
ⓜ : No. 8 cylinder

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

Ⓐ

C

CHECK POWER SUPPLY-II.
1) Turn ignition switch "OFF".
2) Disconnect E.F.I. sub-harness-1 connectors.
3) Check circuit continuity between the following terminals.
- ⓔ and ⓘ
- ⓔ and Ⓙ
- ⓔ and ⓝ
- ⓔ and ⓞ
- ⓖ and ⓚ
- ⓖ and ⓘ
- ⓖ and ⓜ
- ⓖ and ⓟ

Continuity should exist.

N.G.

D

Check the following.
1) Disconnect injector harness connectors.
2) Check harness continuity between the following terminals.
- ⓠ and ⓔ
- ⓠ and ⓖ
- ⓘ and ⓡ
- Ⓙ and ⓡ
- ⓚ and ⓡ
- ⓛ and ⓡ
- ⓜ and ⓡ
- ⓝ and ⓡ
- ⓞ and ⓡ
- ⓟ and ⓡ

Continuity should exist.

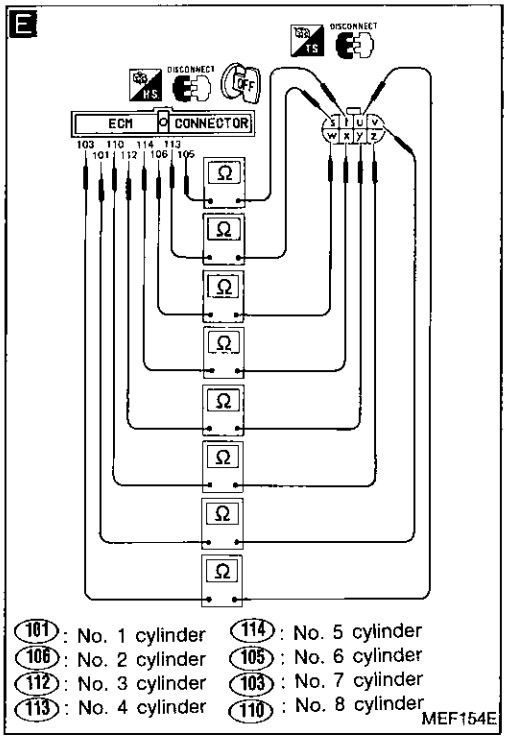
If N.G., repair harness or connectors.

O.K.

CHECK COMPONENT (Injector).
Refer to "Electrical Components Inspection".
(See page EF & EC-210.)
If N.G. replace injector.

O.K.

Ⓑ



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

Ⓑ

E

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check continuity between the following terminals.
- Ⓢ and (113)
- Ⓣ and (105)
- Ⓤ and (103)
- Ⓥ and (101)
- Ⓦ and (106)
- Ⓧ and (114)
- Ⓨ and (112)
- Ⓩ and (110)

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 diagnostic test mode II (Self-diagnostic results) again.

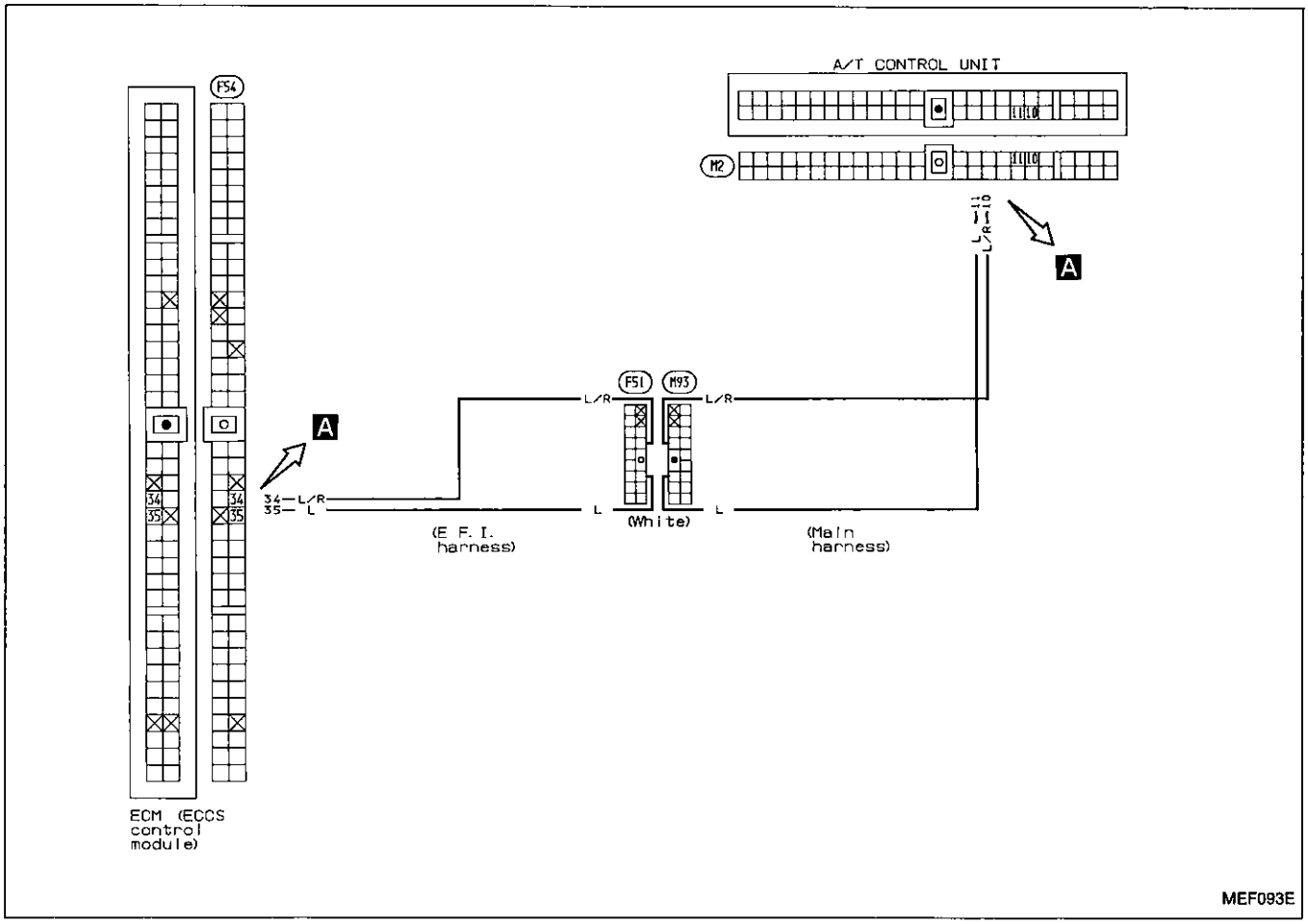
N.G. → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

O.K. ↓

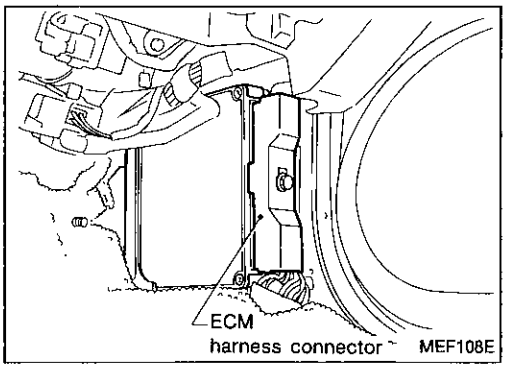
INSPECTION END

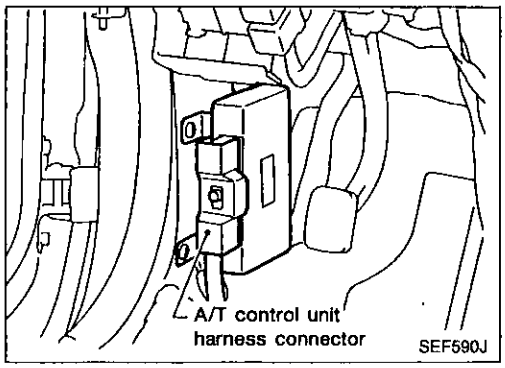
Diagnostic Procedure 17

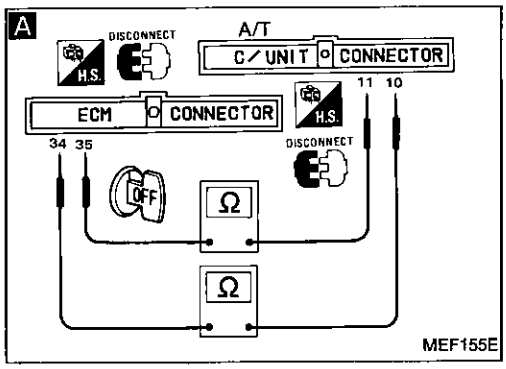
A/T CONTROL (Diagnostic trouble code No. 54)



Harness layout







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

INSPECTION START

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

O.K. → INSPECTION END

N.G.

A

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector and A/T control unit harness connector.
3) Check harness continuity between ECM terminal ㉞ and terminal ⑩, ECM terminal ㉟ and terminal ⑪.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F51), (M93)
- 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 diagnostic test mode II (Self-diagnostic results) again.

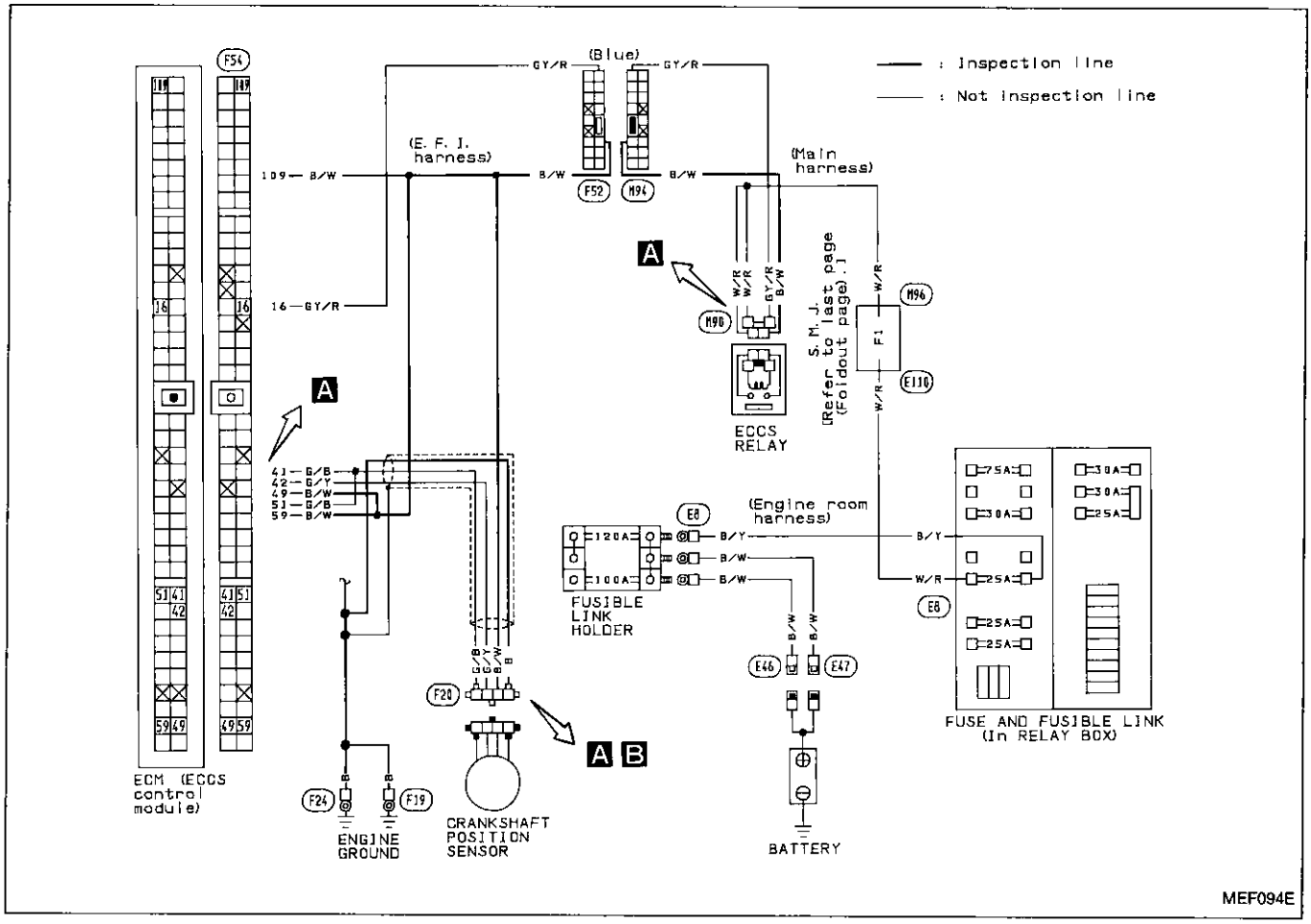
N.G. → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

O.K.

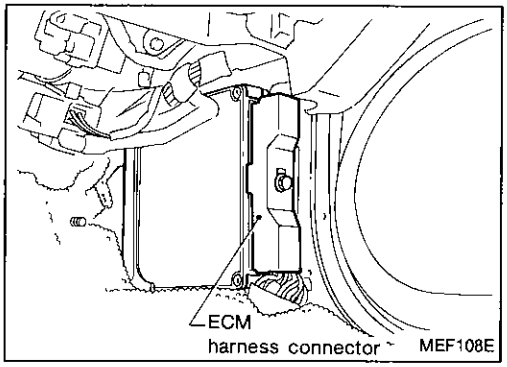
INSPECTION END

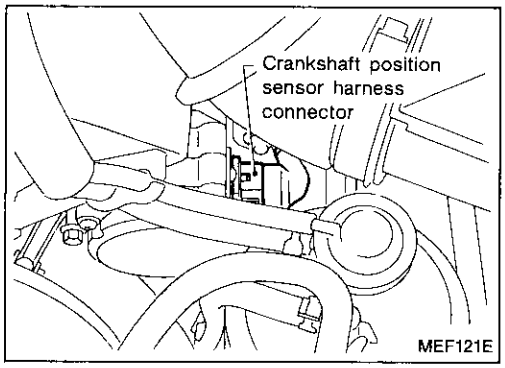
Diagnostic Procedure 18

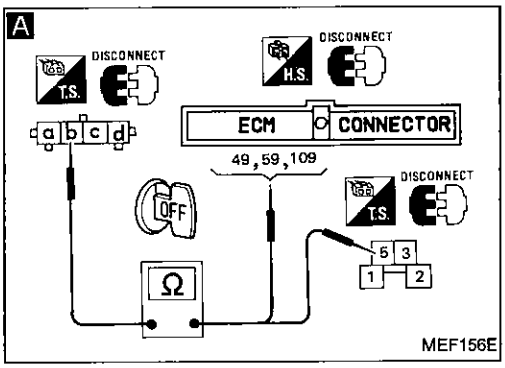
CRANKSHAFT POSITION SENSOR (Not self-diagnostic item)

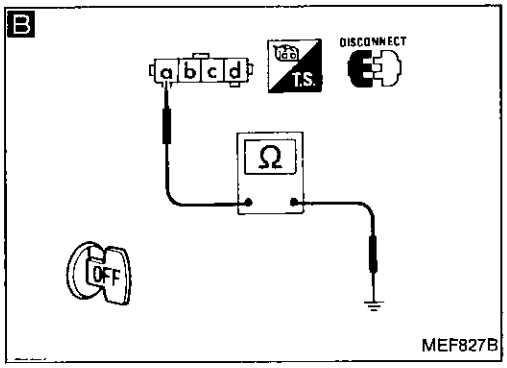


Harness layout









CRANKSHAFT POSITION SENSOR (Not self-diagnostic item)

INSPECTION START

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect crankshaft position sensor harness connector.
3) Disconnect ECM harness connector and ECCS relay.
4) Check harness continuity between terminal ⓑ and terminal ⑤, ECM terminals ㊾, ㊾, ㉒ .
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F52), (M94)
- Harness continuity between crankshaft position sensor and ECCS relay
- Harness continuity between crankshaft position sensor and ECM

If N.G., repair harness or connectors.

O.K.

CHECK GROUND CIRCUIT.
1) Check harness continuity between terminal ⓐ and engine ground.
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-202.)

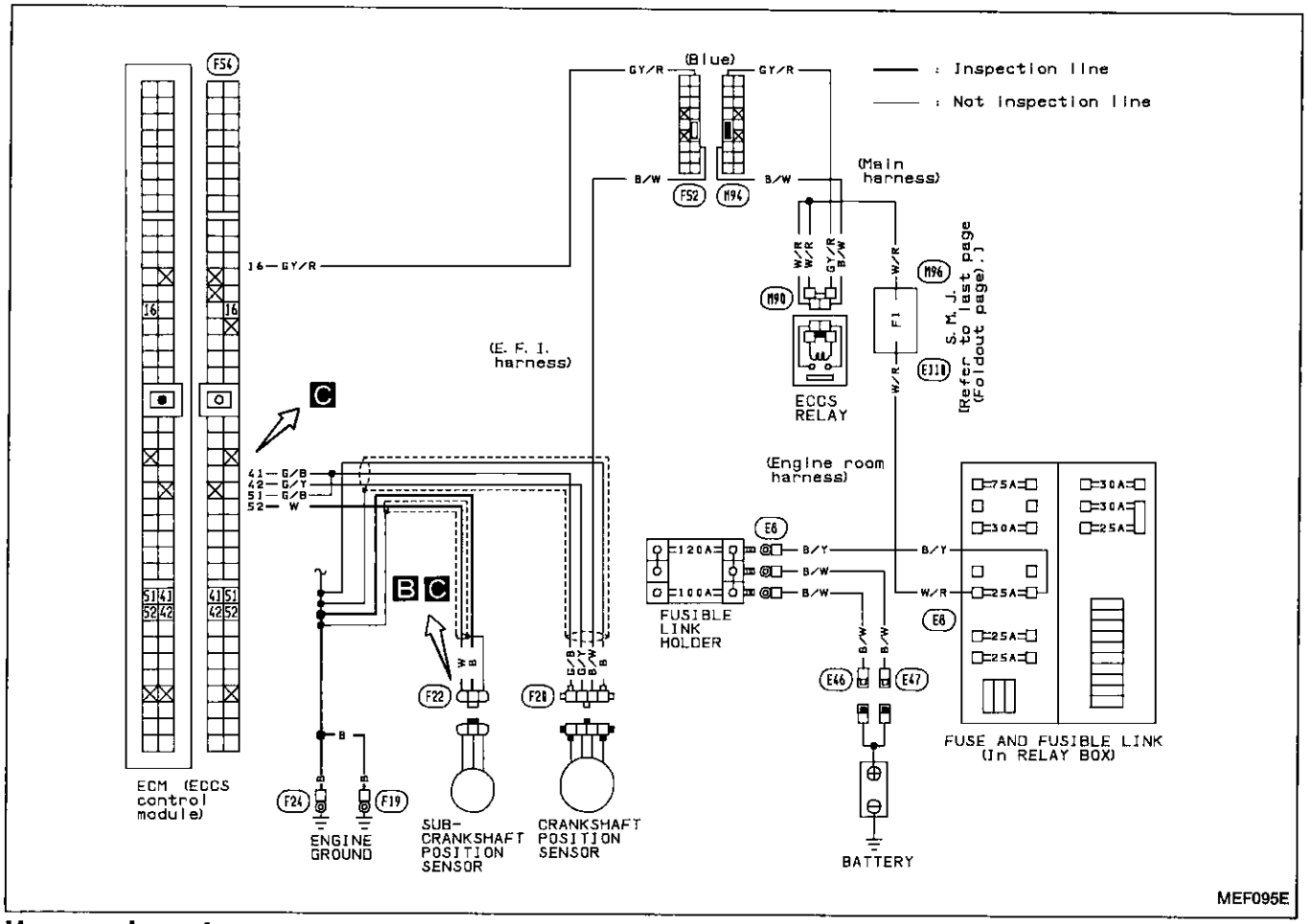
N.G. → Replace crankshaft position sensor.

O.K.

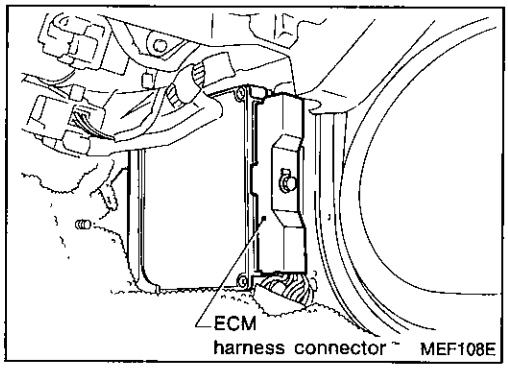
INSPECTION END

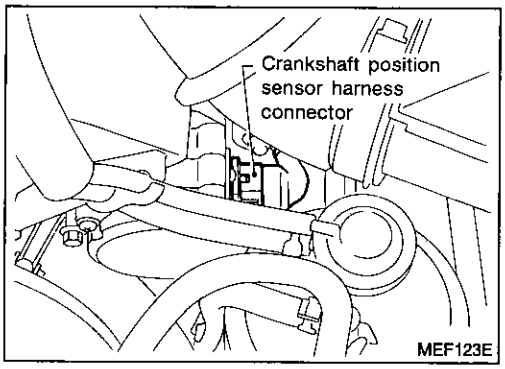
Diagnostic Procedure 19

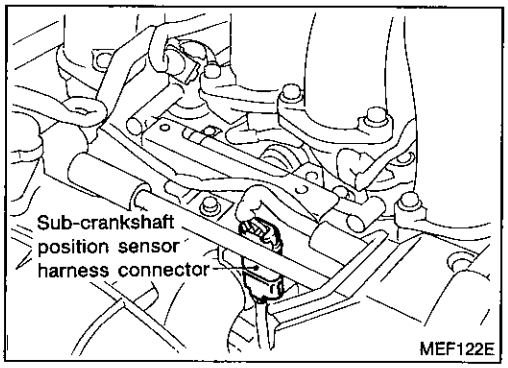
SUB-CRANKSHAFT POSITION SENSOR (Not self-diagnostic item)



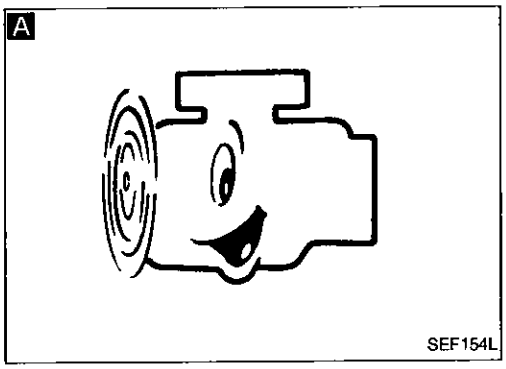
Harness layout

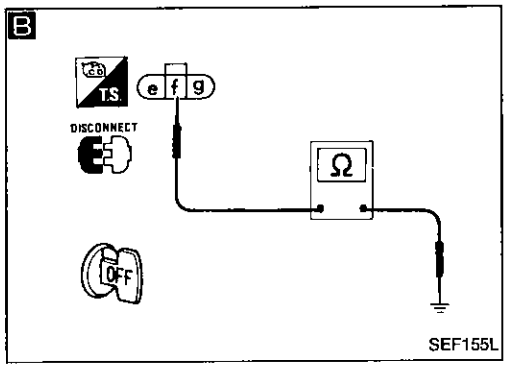


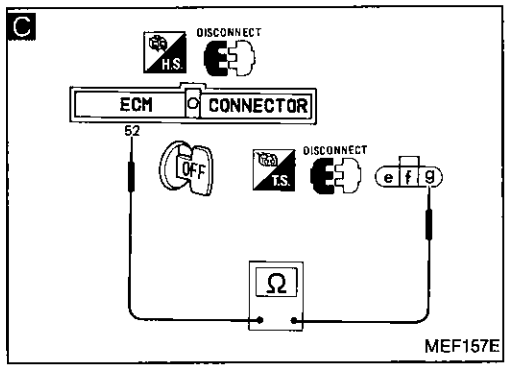




SUB-CRANKSHAFT POSITION SENSOR (Not self-diagnostic item)







INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Disconnect crankshaft position sensor harness connector.
2) Turn ignition switch "START".
Is engine running ?

Yes → INSPECTION END

No

B

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect sub-crankshaft position sensor harness connector.
3) Check harness continuity between terminal ⓕ and engine ground.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

C

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between terminal ⓖ and ECM terminal ㊷ (90° signal).
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT (Sub-crankshaft position sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-202.)

N.G. → Replace sub-crankshaft position sensor.

O.K.

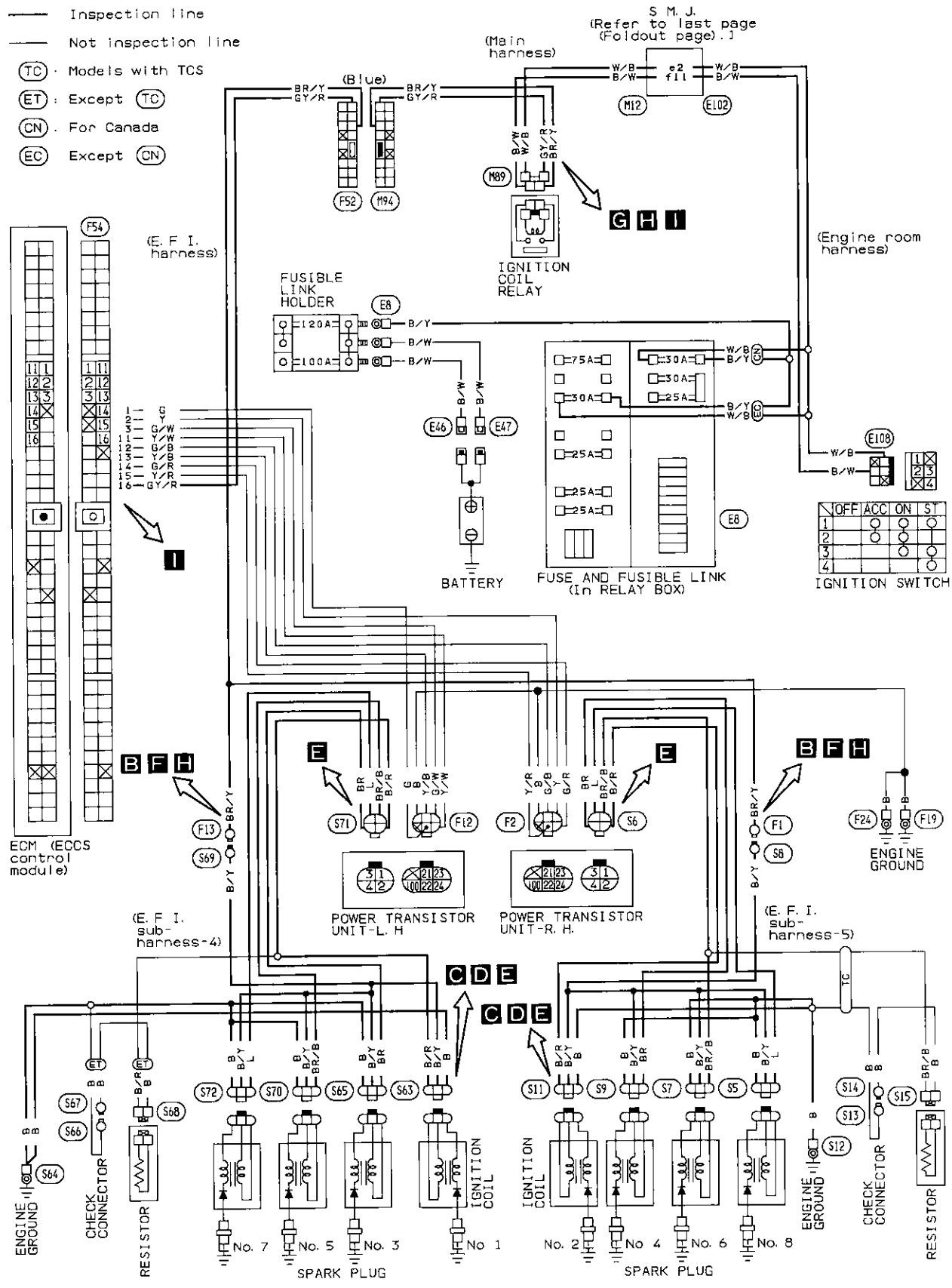
Check ECM pin terminals for damage or the connection of ECM harness connector.

Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure Diagnostic trouble code No. 55 is displayed in Diagnostic Test Mode II (Self-diagnostic results).

INSPECTION END

Diagnostic Procedure 20

IGNITION SIGNAL (Not self-diagnostic item)

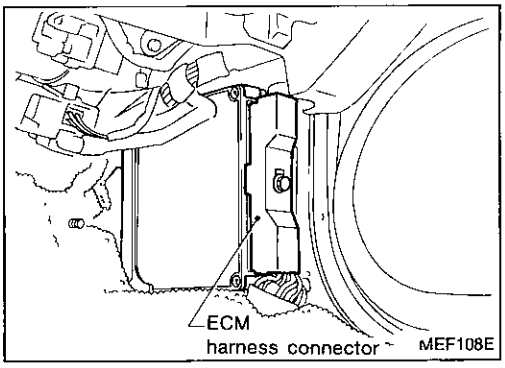


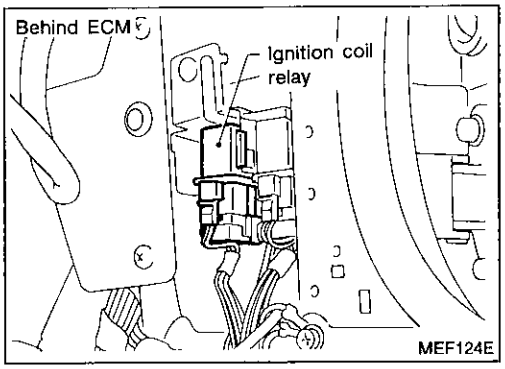
MEF096E

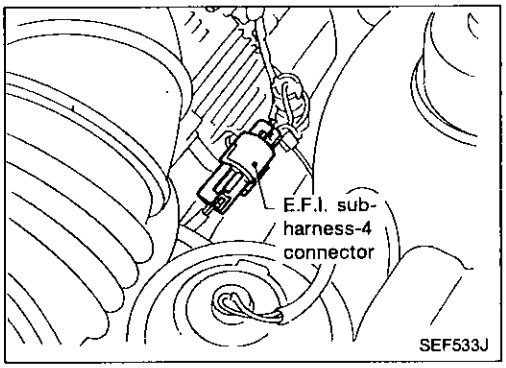
Diagnostic Procedure 20 (Cont'd)

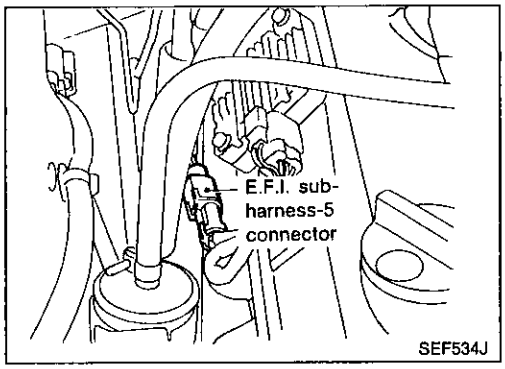
IGNITION SIGNAL (Not self-diagnostic item)

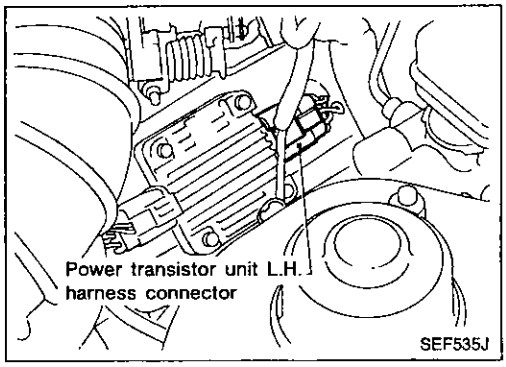
Harness layout

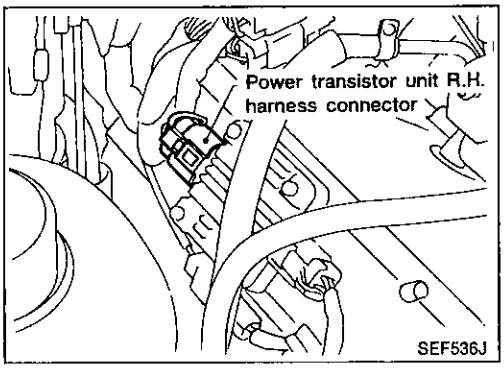


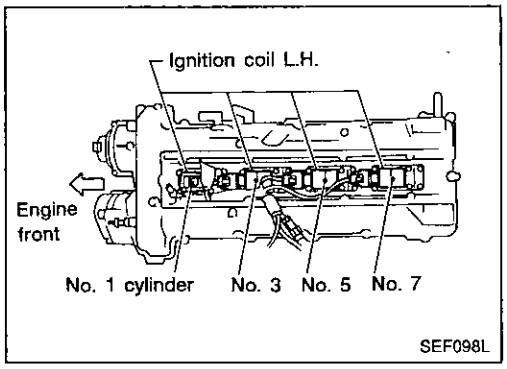


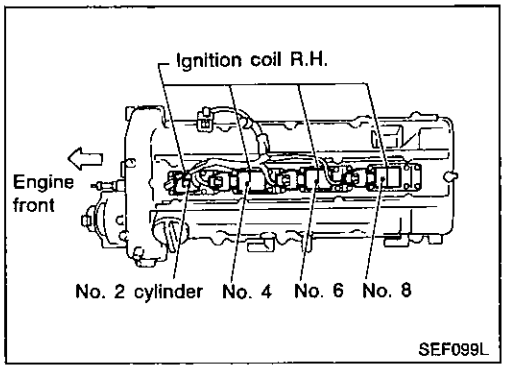




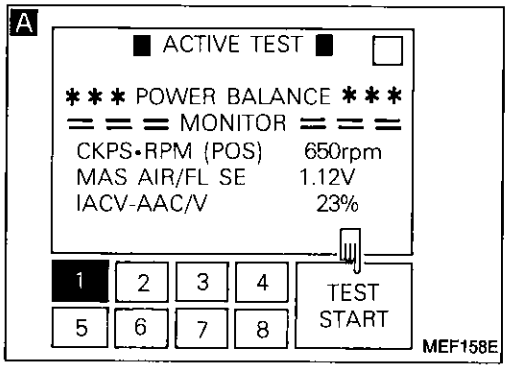


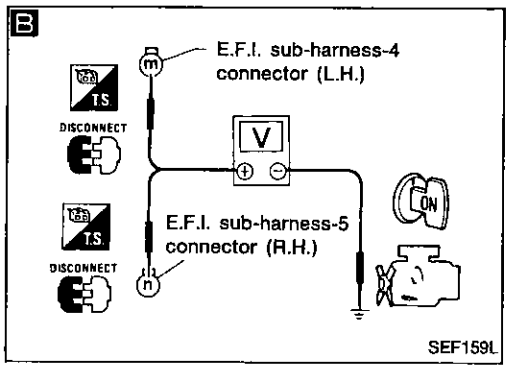


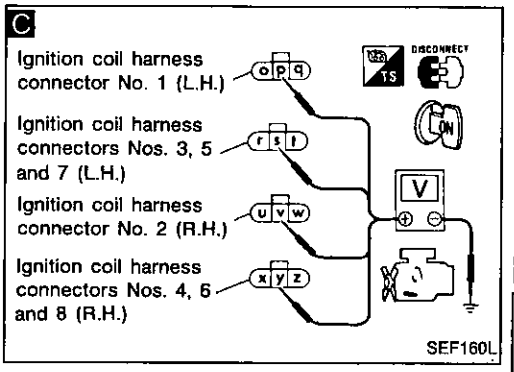


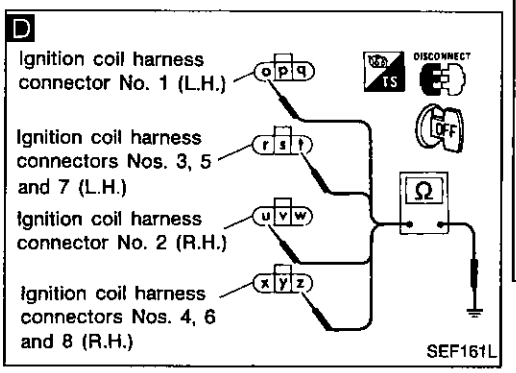


IGNITION SIGNAL (Not self-diagnostic item-I)









INSPECTION START

CHECK OVERALL FUNCTION.
1) Turn ignition switch "START".
2) 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.

Case 1: When either four cylinders Nos. 1, 3, 5 and 7 or Nos. 2, 4, 6 and 8 are ignited.

Case 2: Except case 1

B

CHECK POWER SUPPLY-I.
1) Turn ignition switch "OFF".
2) Disconnect multiport fuel injection system sub-harness-4 or 5 connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓜ and ground or terminal ⓝ and ground with CONSULT or tester.
Voltage: Battery voltage
5) Turn ignition switch "OFF".
6) Reconnect multiport fuel injection system sub-harness-4 or 5 connector.

N.G. → Go to "IGNITION SIGNAL (Not self-diagnostic item-II)".

C

CHECK POWER SUPPLY-II.
1) Turn ignition switch "OFF".
2) Disconnect ignition coil harness connectors.
3) Turn ignition switch "ON".
4) Check voltage between the following terminals and ground with CONSULT or tester.
- ⓟ and ground
- ⓢ and ground
- ⓥ and ground
- ⓨ and ground

Voltage: Battery voltage

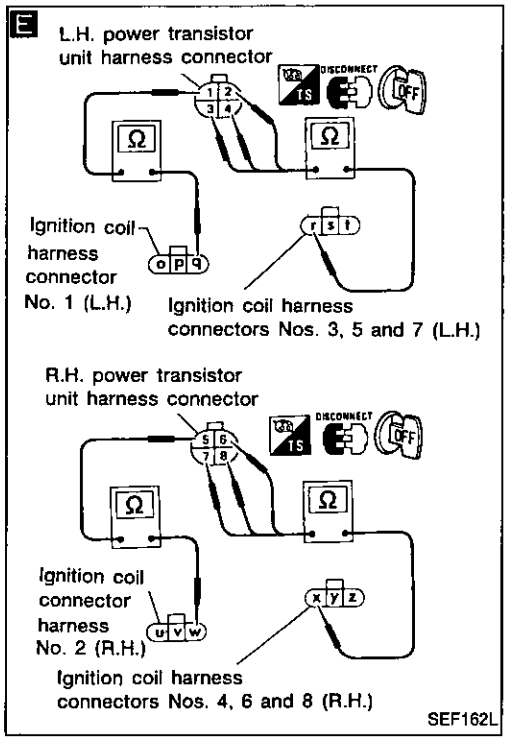
O.K. → B

N.G. → Check the following.
- Harness connectors (S69), (S8)
- Harness continuity between ignition coil and E.F.I. sub-harness connectors (S69), (S8)

If N.G., repair harness or connectors.

O.K. → Ⓐ

E



IGNITION SIGNAL (Not self-diagnostic item-I)

Ⓐ

D

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between the following terminals and ground.
- ⓞ and ground
- ⓣ and ground
- ⓤ and ground
- ⓩ and ground

Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

E

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect power transistor unit harness connector.
2) Check harness continuity between the following terminals.
- ⓠ and ①
- ⓡ and ②
- ⓡ and ③
- ⓡ and ④
- ⓦ and ⑤
- ⓧ and ⑥
- ⓧ and ⑦
- ⓧ and ⑧

Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

CHECK COMPONENTS
(Power transistor unit and ignition coil).
Refer to "Electrical Components Inspection".
(See pages EF & EC-203.)

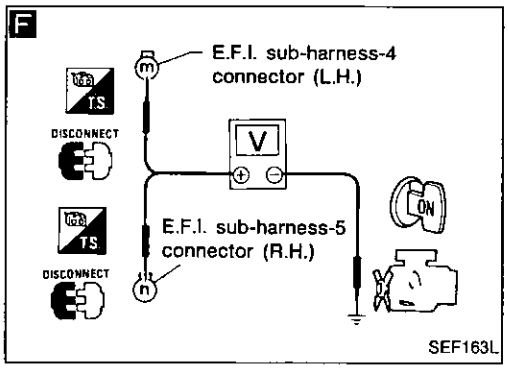
N.G. → Replace malfunctioning component(s).

O.K. ↓

INSPECTION END

IGNITION SIGNAL (Not self-diagnostic item-II)

F



From "IGNITION SIGNAL (Not self-diagnostic item-I)".

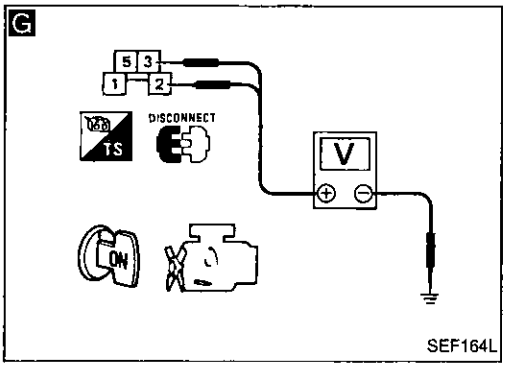
F

CHECK OVERALL FUNCTION.
1) Turn ignition switch "OFF".
2) Disconnect E.F.I. sub-harness-4 and 5 connectors.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓜ and ground, terminal ⓝ and ground with CONSULT or tester.
Voltage: Battery voltage

O.K. → Go to "CHECK POWER SUPPLY-II" in "IGNITION SIGNAL (Not self-diagnostic item-I)".

N.G.

G



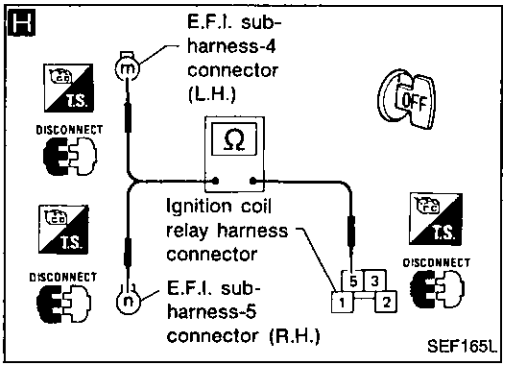
CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect ignition coil relay.
3) Turn ignition switch "ON".
4) Check voltage between terminals ②, ③ and ground with CONSULT or tester.
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (M12), (E102)
- 30A fusible link
- 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.

H



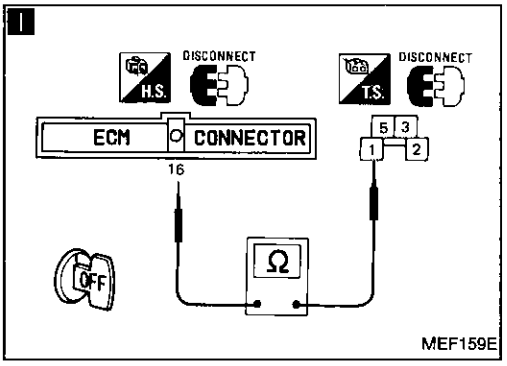
CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal ⓜ and terminal ⑤, or terminal ⓝ and terminal ⑤.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F52), (M94)
- Harness continuity between ignition coil relay and E.F.I. sub-harness-4 or 5

If 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 ⑯ and terminal ①.
Continuity should exist.

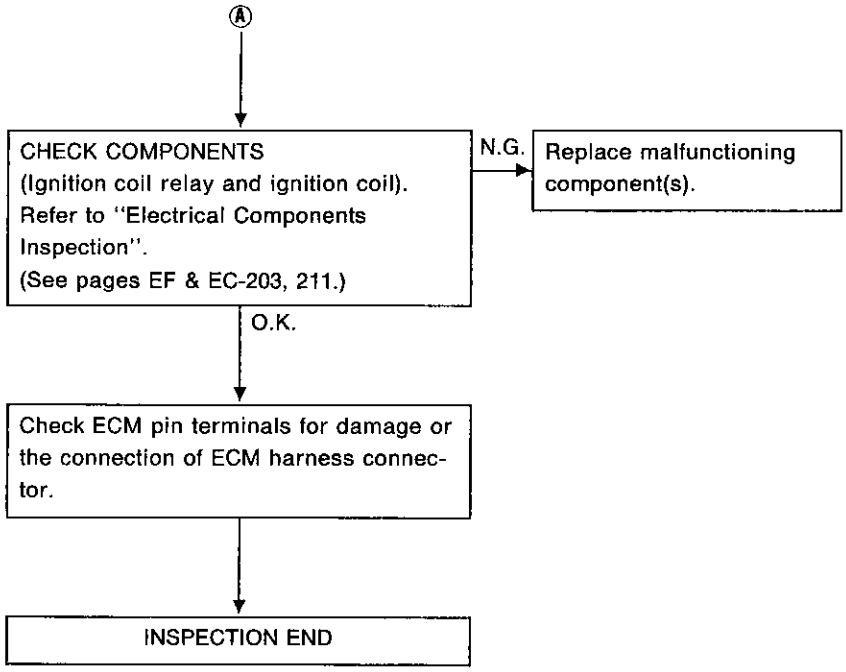
N.G. → Check the following.
- Harness connectors (F52), (M94)
- Harness continuity between ECM and ignition coil relay

If N.G., repair harness or connectors.

O.K.

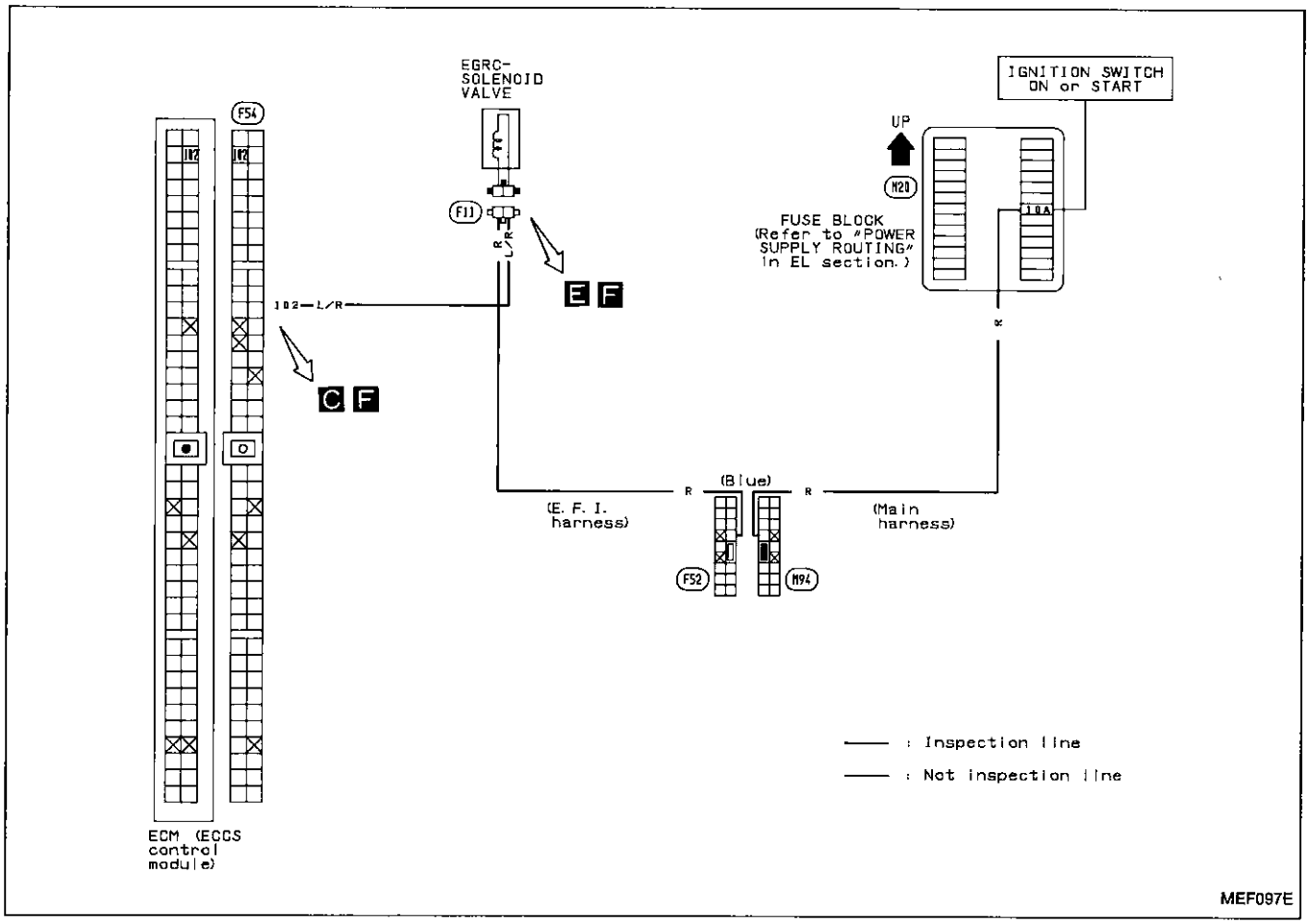
Ⓐ

IGNITION SIGNAL (Not self-diagnostic item-II)

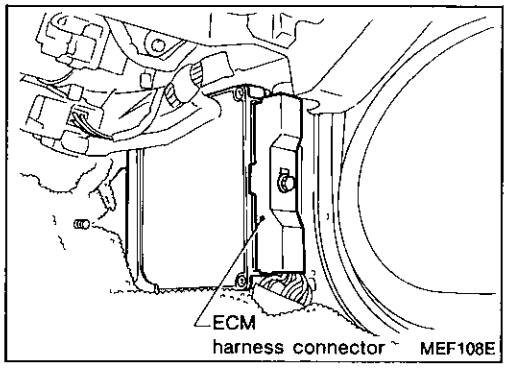


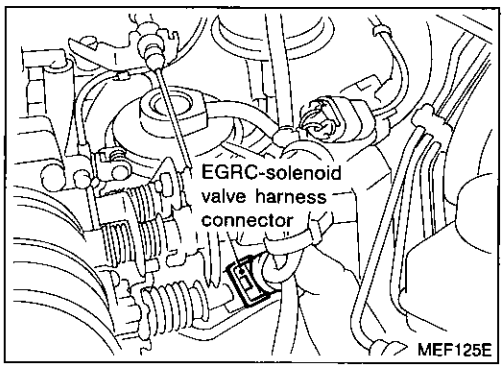
Diagnostic Procedure 21

EGR CONTROL (Not self-diagnostic item)

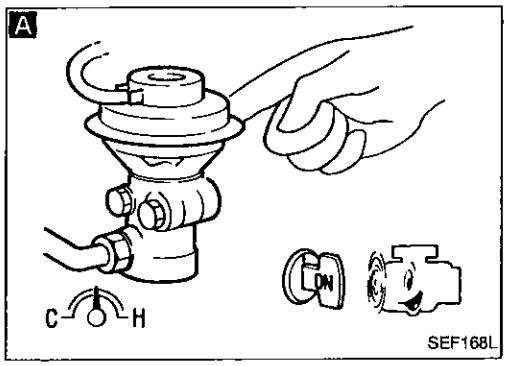


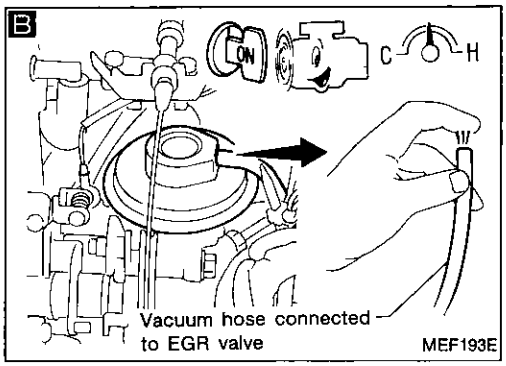
Harness layout

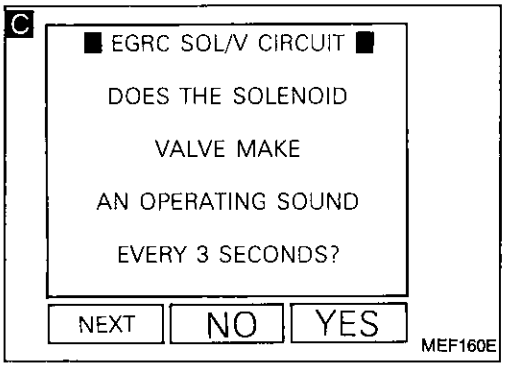


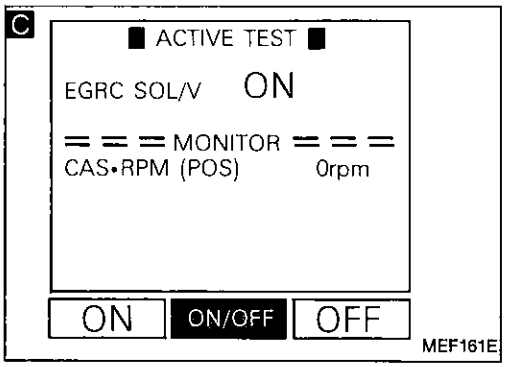


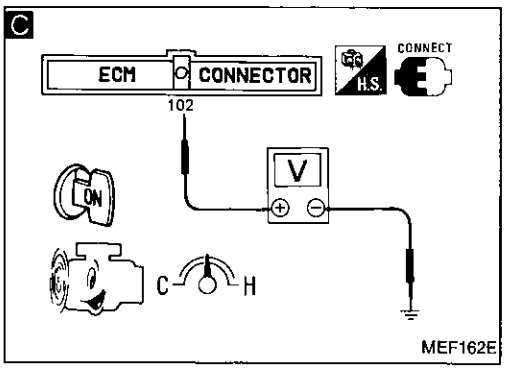
EGR CONTROL (Not self-diagnostic item)











INSPECTION START

Non-California models / California models

A

CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Perform diagnostic test mode II (Self-diagnostic results) with ECM (Refer to page EF & EC-50.).
Make sure that diagnostic trouble code No. 11 and 12 are not displayed.
3) Make sure that EGR valve spring is lifted up and down when racing engine (2,000 rpm).
(Use your finger.)

Is lifted up and down. → 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 with CONSULT or tester.
At idle:
Vacuum should not exist.
Engine speed is about 2,000 rpm:
Vacuum should exist.

O.K. → CHECK COMPONENTS (EGR valve and EGRC-BPT valve).
Refer to "Electrical Components Inspection".
(See page EF & EC-206.)

N.G. → Replace malfunctioning component(s).

N.G.

C

CHECK CONTROL FUNCTION.

1) Stop engine.
2) Turn ignition switch "ON".
3) Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

— OR —

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

— OR —

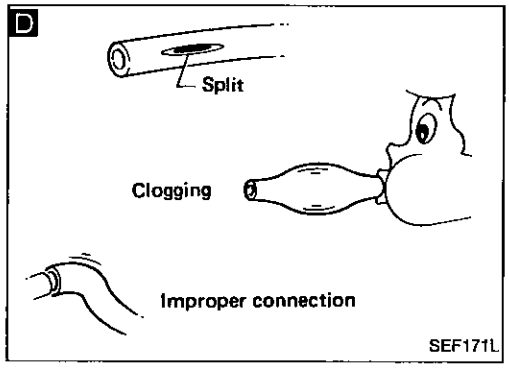
1) Check voltage between ECM terminal (102) and ground under the following conditions with CONSULT or tester.
Voltage:
At idle
Approximately 0V
Engine speed is about 2,000 rpm.
Battery voltage

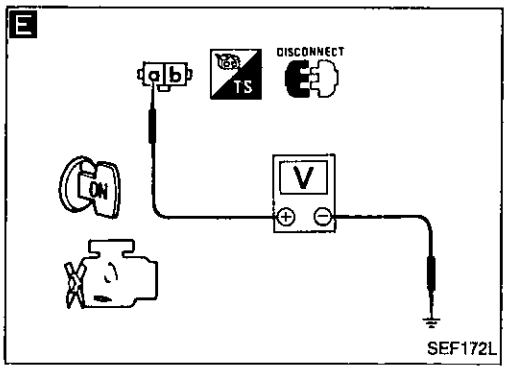
O.K. → **D** (Non-California models)
CHECK VACUUM HOSE.
1) Check vacuum hose for clogging, cracks and proper connection.

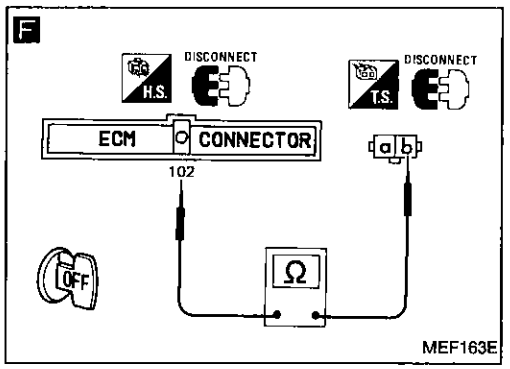
(California models)
Go to "CHECK COMPONENT (EGRC-solenoid valve)".

N.G. → Ⓐ

EGR 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 (F52), (M94)
- 10A fuse
- Harness continuity between EGRC-solenoid valve and fuse

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. ↓

CHECK COMPONENT
(EGRC-solenoid valve).
Refer to "Electrical Components Inspection".
(See page EF & EC-206.)

N.G. → Replace EGRC-solenoid valve.

O.K. ↓

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

California models ↓

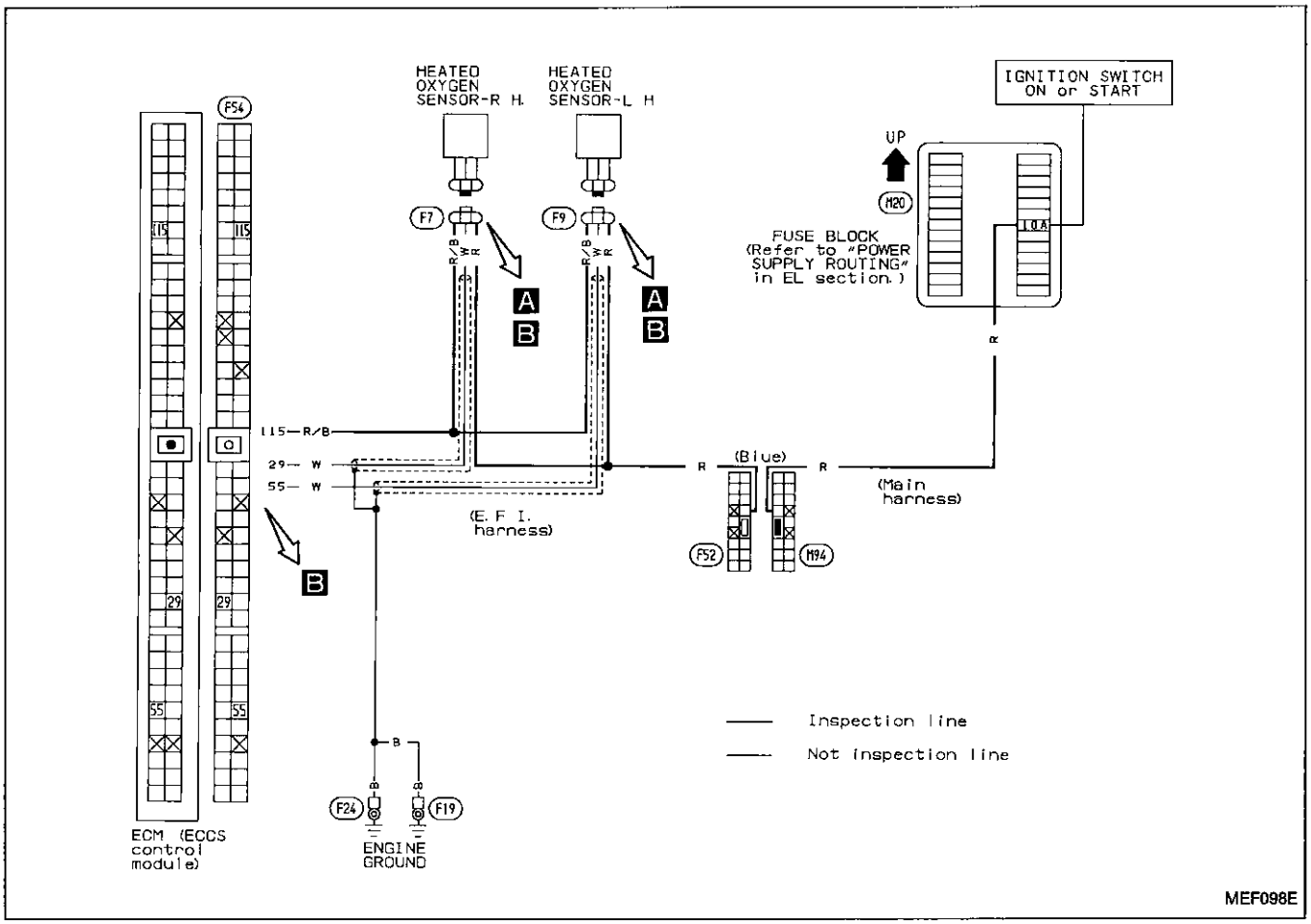
Check resistance of EGR temperature sensor.
(See page EF & EC-207.)

Non-California models ↓

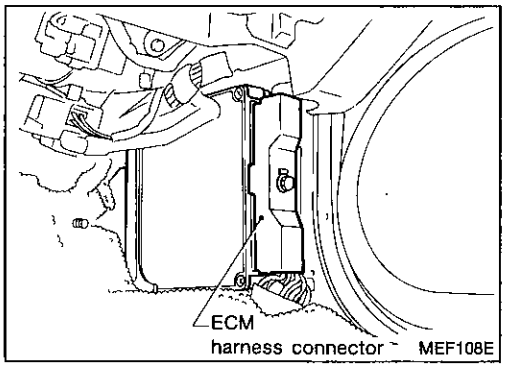
INSPECTION END

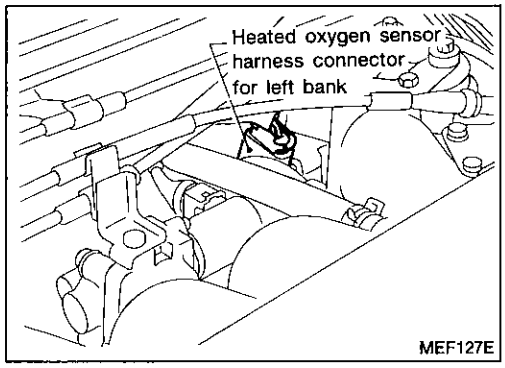
Diagnostic Procedure 22

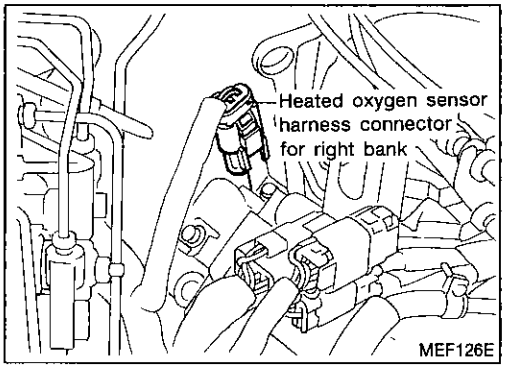
HEATED OXYGEN SENSOR HEATER L.H. and R.H. (Not self-diagnostic item)

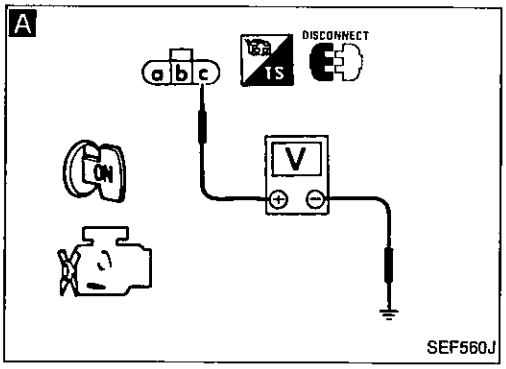


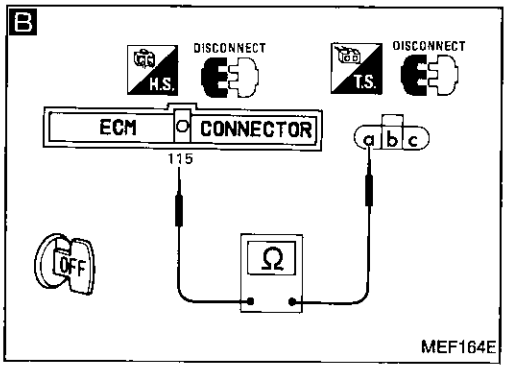
Harness layout











HEATED OXYGEN SENSOR HEATER L.H. and R.H.
(Not self-diagnostic item)

INSPECTION START

A

CHECK POWER SUPPLY.
1) Disconnect heated oxygen sensor harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓒ and ground.
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (F52), (M94)
- 10A fuse
- Harness continuity between heated oxygen sensor and fuse

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-206.)

N.G. → Replace heated oxygen sensor.

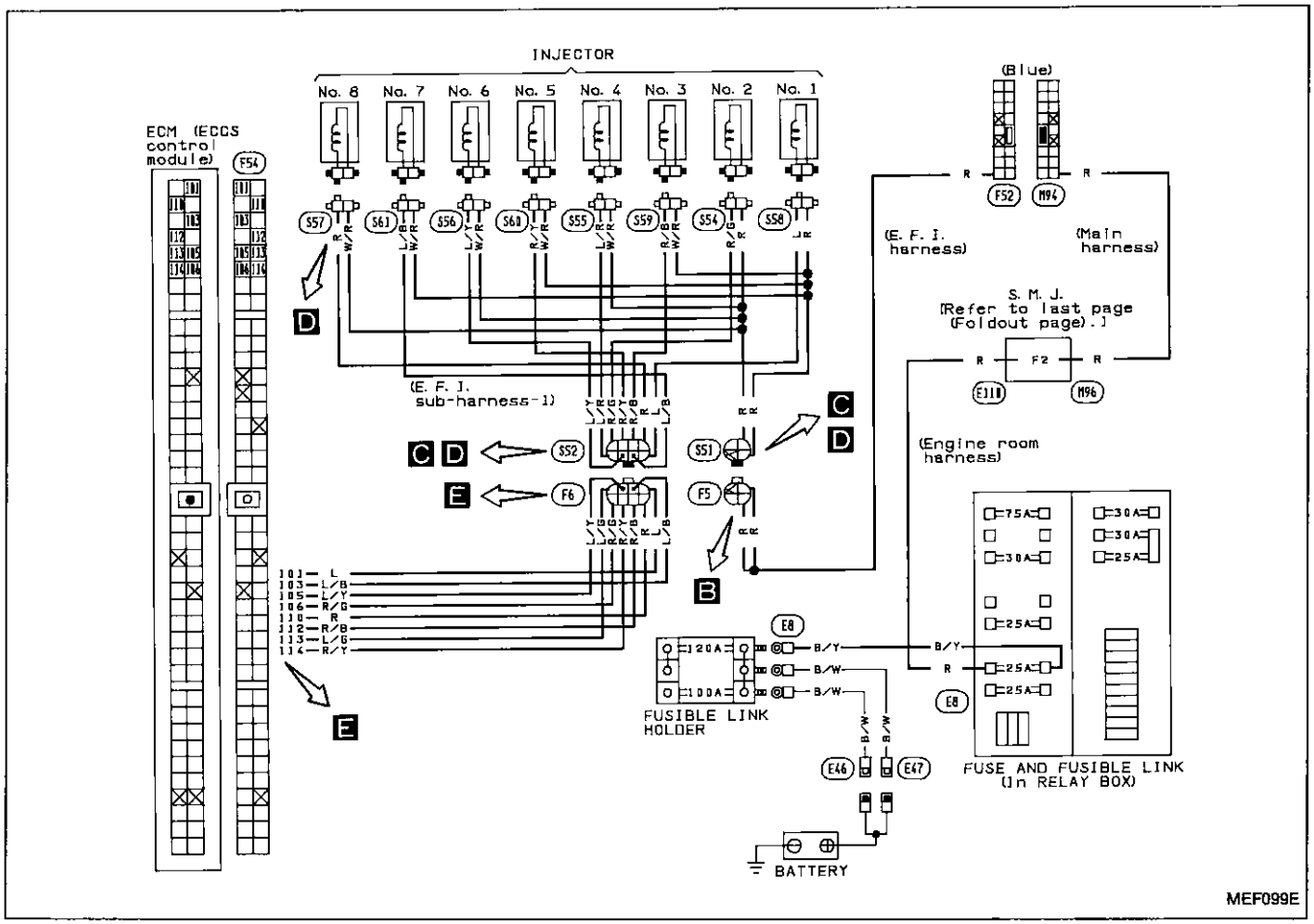
O.K.

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

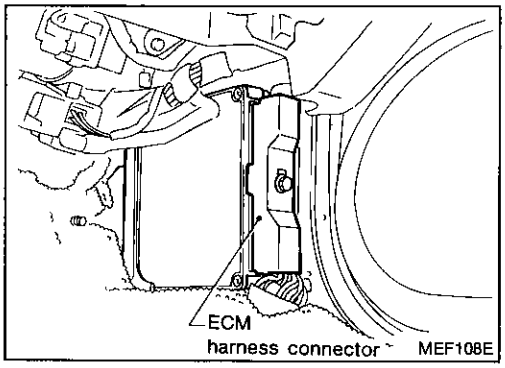
INSPECTION END

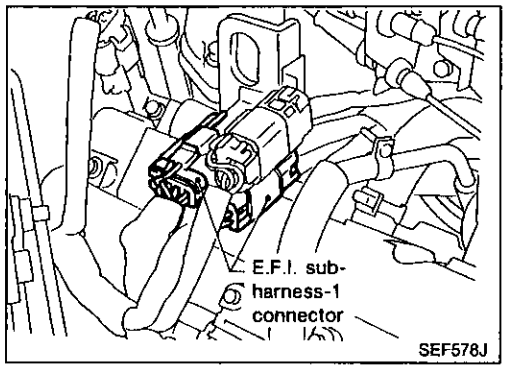
Diagnostic Procedure 23

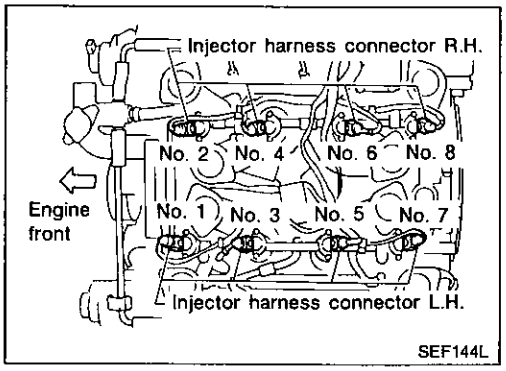
INJECTOR (Not self-diagnostic item-I)

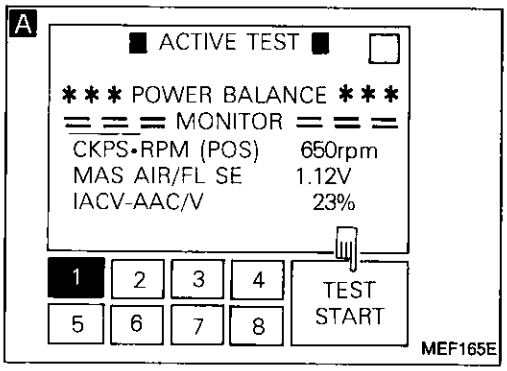


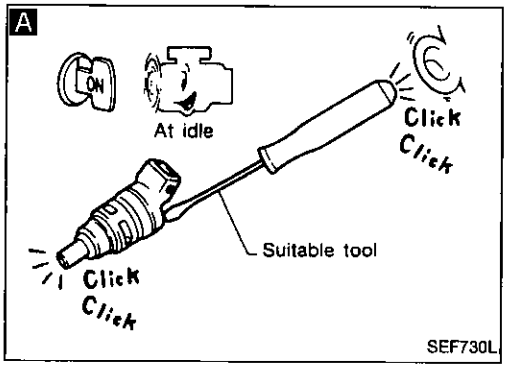
Harness layout

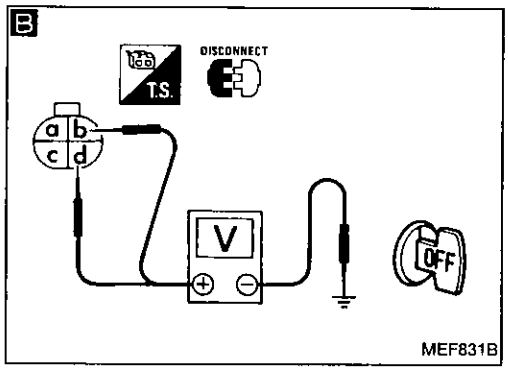


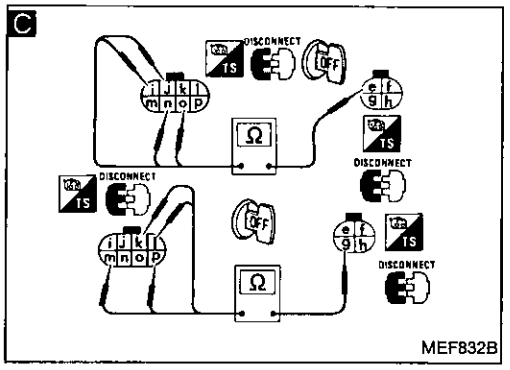












INJECTOR (Not self-diagnostic item-I)

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.

All cylinders are O.K.

INSPECTION END

Case 1: When either cylinders Nos. 1, 3, 5 and 7 or Nos. 2, 4, 6 and 8 are all N.G., or no ignition occurs in any cylinder.

B

CHECK POWER SUPPLY-I.
1) Turn ignition switch "OFF".
2) Disconnect E.F.I. sub-harness-1 connector (F5).
3) Check voltage between terminals (b), (d) and ground with CONSULT or tester.
Voltage: Battery voltage

O.K.

N.G.

Check the following.
- Harness connectors (F52), (M94)
- Harness connectors (M96), (E110)
- 25A fusible link
- Fusible link holder
- Harness continuity between E.F.I. sub-harness-1 connector and battery.

If N.G., repair harness or connectors.

Case: 2
Except case 1

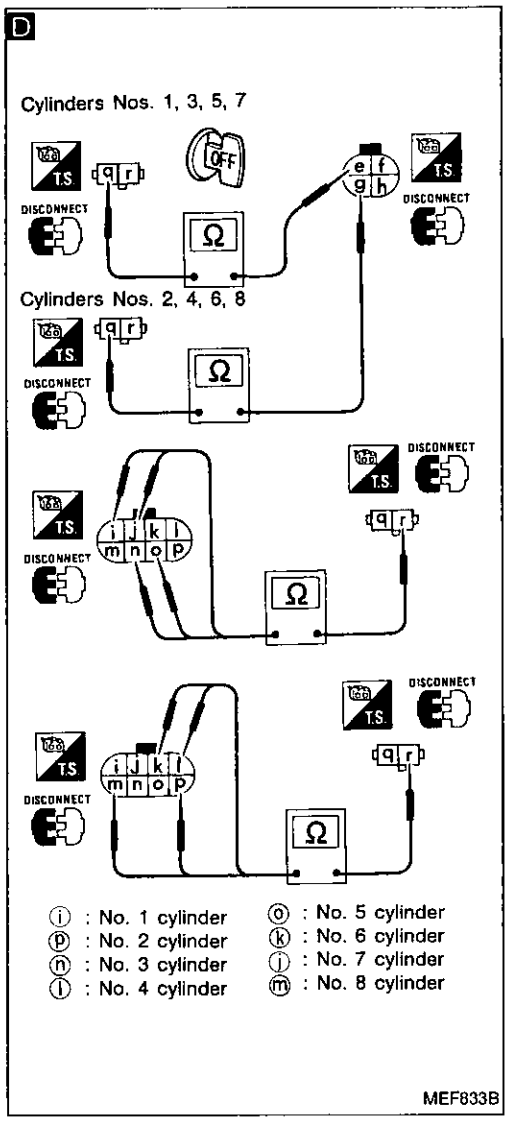
Ⓐ

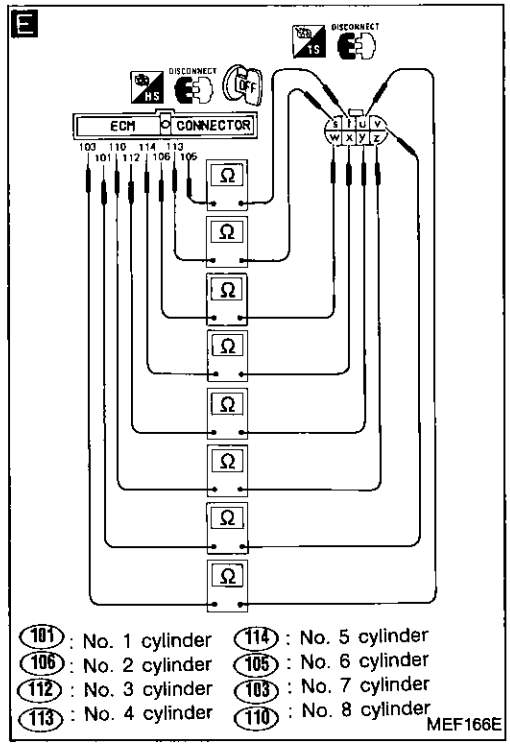
California models

INSPECTION START

Go to "CHECK POWER SUPPLY-I".

INJECTOR (Not self-diagnostic item-I)





Ⓐ

C

CHECK POWER SUPPLY-II.
1) Turn ignition switch "OFF".
2) Disconnect E.F.I. sub-harness-1 connectors.
3) Check circuit continuity between the following terminals.
   - ⓔ and ⓘ
   - ⓔ and ⓙ
   - ⓔ and ⓝ
   - ⓔ and ⓞ
   - ⓖ and ⓚ
   - ⓖ and ⓛ
   - ⓖ and ⓜ
   - ⓖ and ⓟ

   Continuity should exist.

N.G. →

D

Check the following.
1) Disconnect injector harness connectors.
2) Check harness continuity between the following terminals.
   - ⓠ and ⓔ
   - ⓠ and ⓖ
   - ⓘ and ⓡ
   - ⓙ and ⓡ
   - ⓚ and ⓡ
   - ⓛ and ⓡ
   - ⓜ and ⓡ
   - ⓝ and ⓡ
   - ⓞ and ⓡ
   - ⓟ and ⓡ

   Continuity should exist.

If N.G., repair harness or connectors.

O.K. ↓

CHECK COMPONENT (Injector).
Refer to "Electrical Components Inspection". (See page EF & EC-210.)
If N.G. replace injector.

O.K. ↓

E

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check continuity between the following terminals.
   - ⓢ and (113)
   - ⓛ and (105)
   - ⓤ and (103)
   - ⓥ and (101)
   - ⓦ and (106)
   - ⓧ and (114)
   - ⓨ and (112)
   - ⓩ and (110)

   Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

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

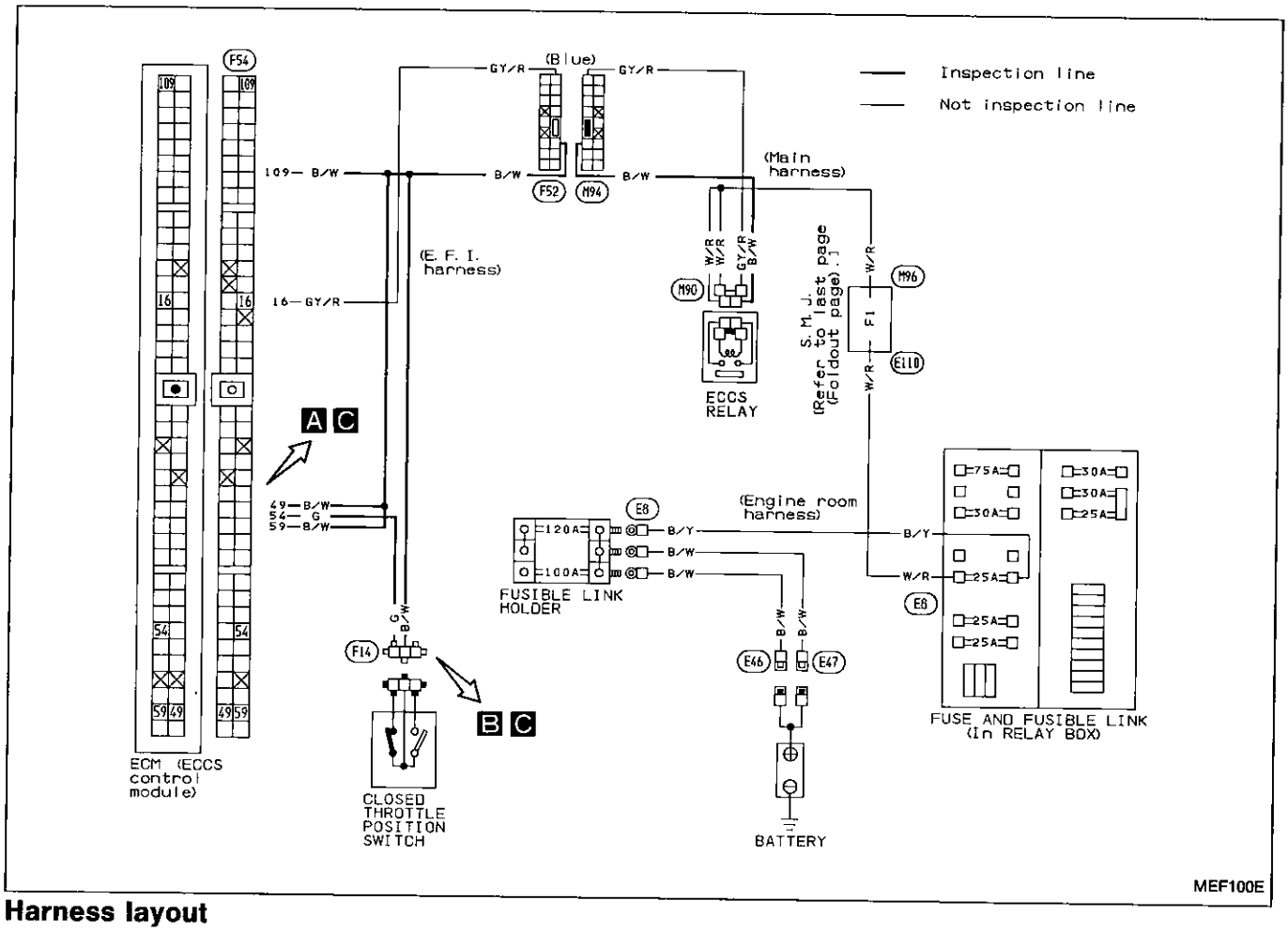
↓

INSPECTION END*

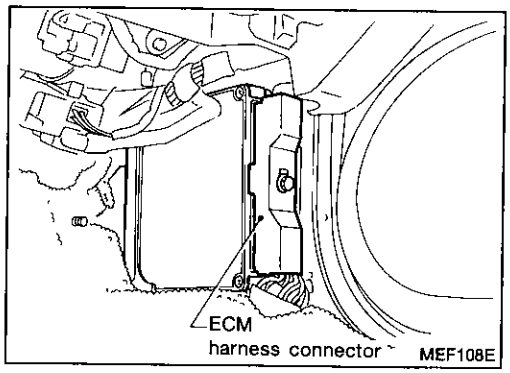
***: For California models, go to "CHECK OVERALL FUNCTION" if idle is still unstable. Then, perform "CHECK POWER SUPPLY-III" in "Diagnostic Procedure 1" (See page EF & EC-76.) after repair is completed.**

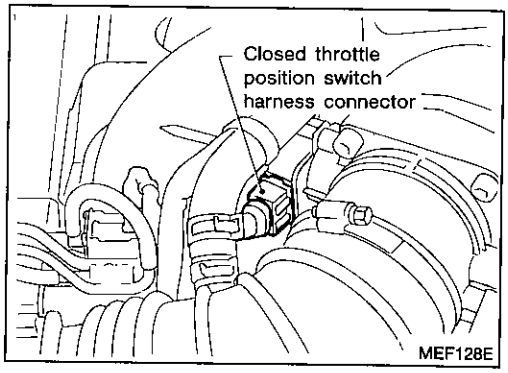
Diagnostic Procedure 24

THROTTLE POSITION SWITCH (Not self-diagnostic item)

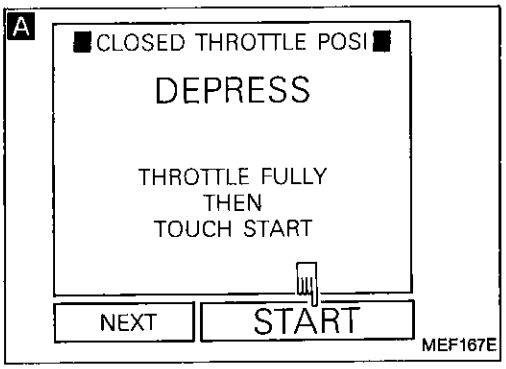


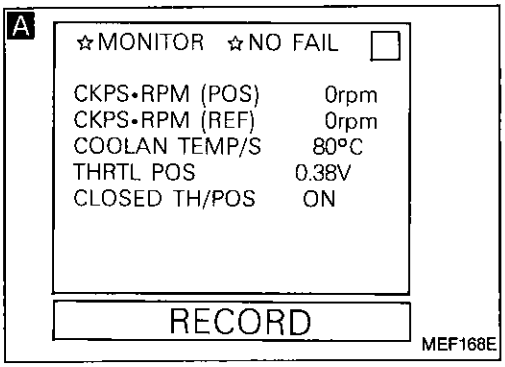
Harness layout

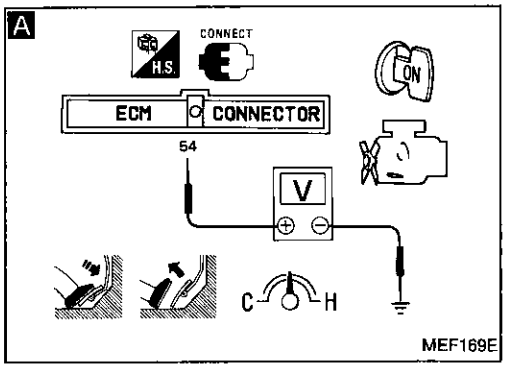




THROTTLE POSITION SWITCH (Not self-diagnostic item)







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 throttle position:
Accelerator pedal is released ... ON
Accelerator pedal is depressed ... OFF

OR

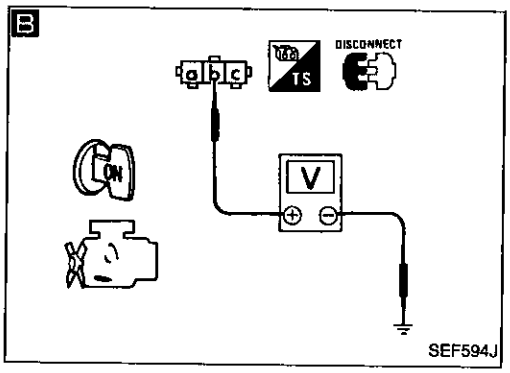
3) Turn ignition switch "ON".
4) Check voltage between ECM terminal ⑭ and ground with CONSULT or tester under the following conditions.
Voltage:
Accelerator pedal is released
Battery voltage
Accelerator pedal is depressed
Approximately 0V

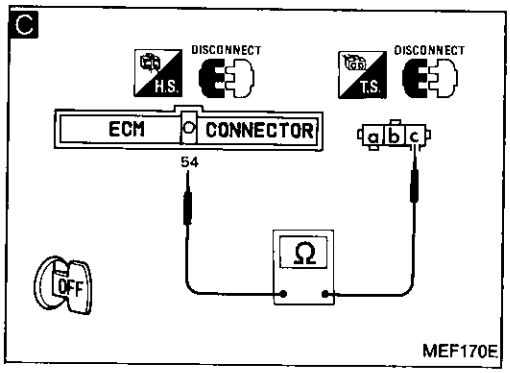
N.G.

Ⓐ

GI MA EM LC EF & EC FE AT PD FA RA BR ST BF HA EL

THROTTLE POSITION SWITCH (Not self-diagnostic item)





Ⓐ

B

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect throttle position switch 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 (F52), (M94)
- Harness continuity between throttle position switch and ECCS relay
- Harness continuity between throttle position switch and ECM

If N.G., repair harness or connectors.

O.K. ↓

C

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (54) and terminal ⓒ.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

CHECK COMPONENT
(Throttle position switch).
Refer to "Electrical Components Inspection".
(See page EF & EC-207.)

N.G. → Replace throttle position switch.

O.K. ↓

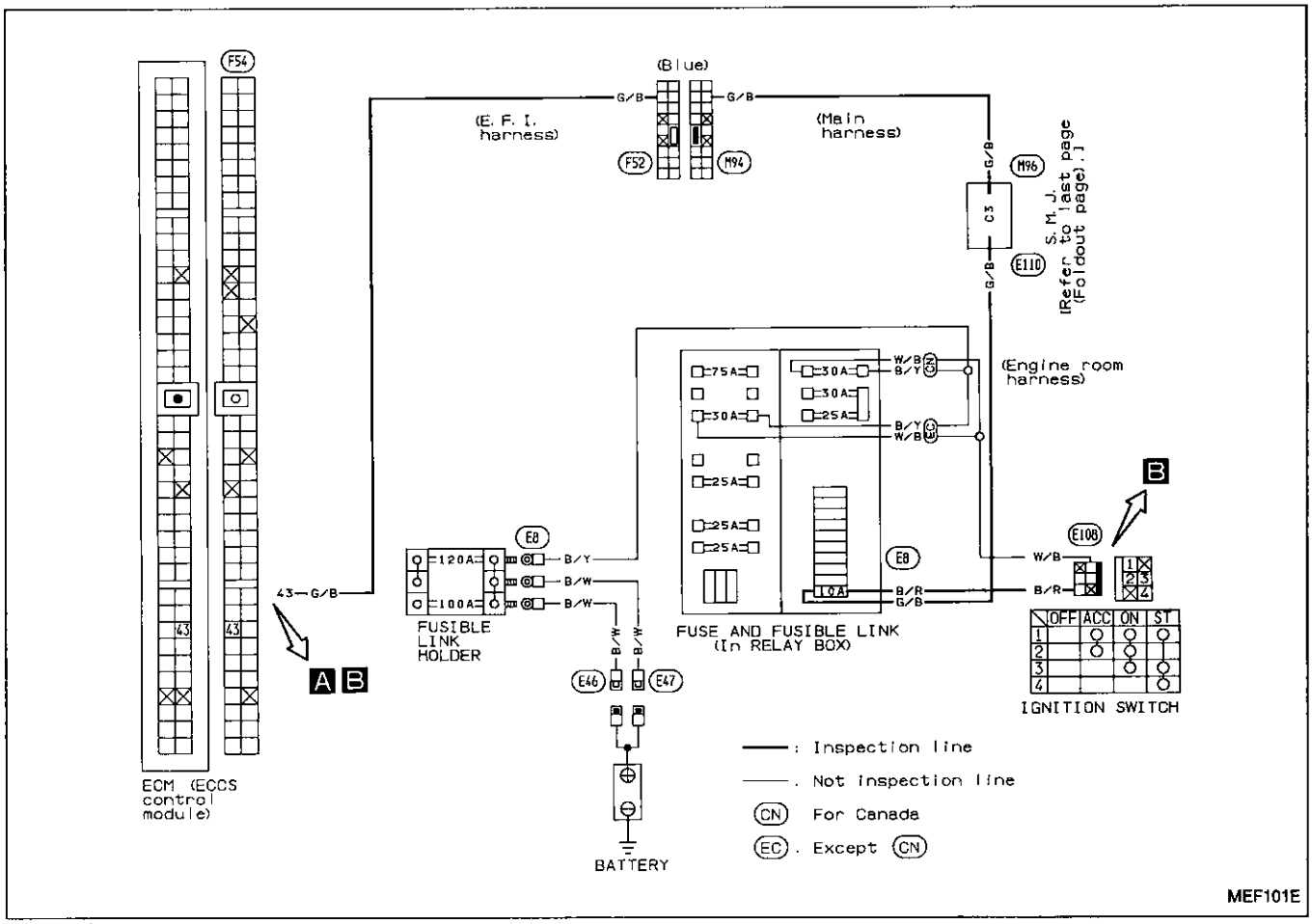
Check ECM pin terminals for damage or the connection of ECM harness connector.

↓

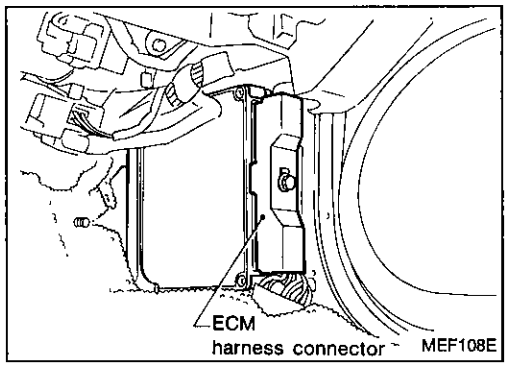
INSPECTION END

Diagnostic Procedure 25

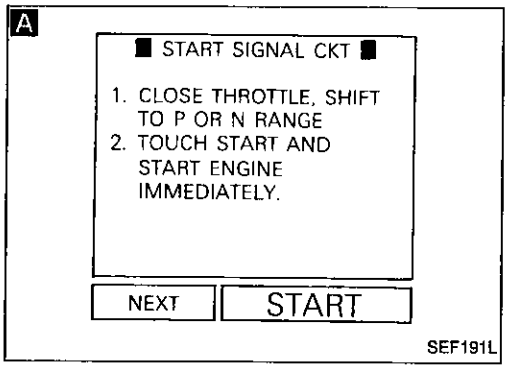
START SIGNAL (Not self-diagnostic item)

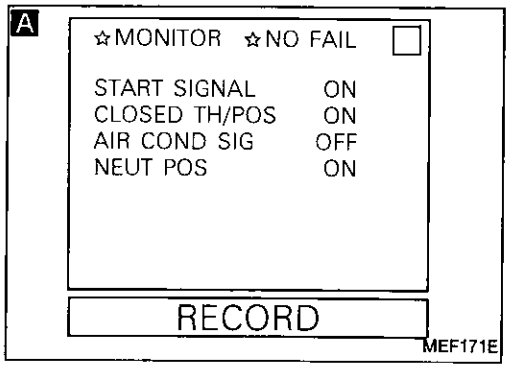


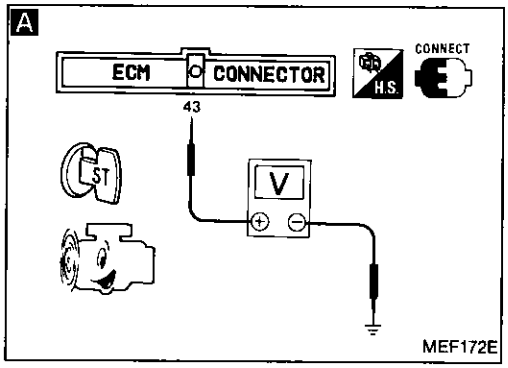
Harness layout

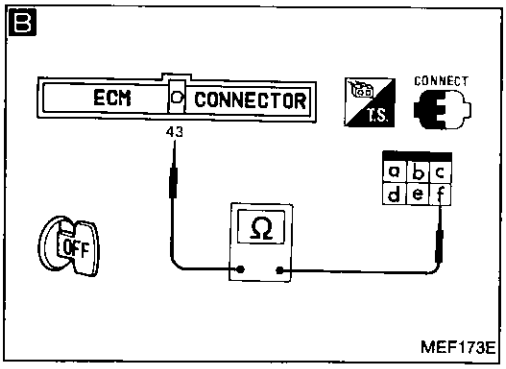


START SIGNAL (Not self-diagnostic item)









INSPECTION START

A

CHECK OVERALL FUNCTION.

1) Turn ignition switch "ON".
2) Perform "START SIGNAL CIRCUIT" 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 ①.

Continuity should exist.

N.G. → Check the following.
- Harness connectors (F52), (M94)
- Harness connectors (M96), (E110)
- 10A fuse
- Harness continuity between ECM and ignition switch

If N.G., repair harness or connectors.

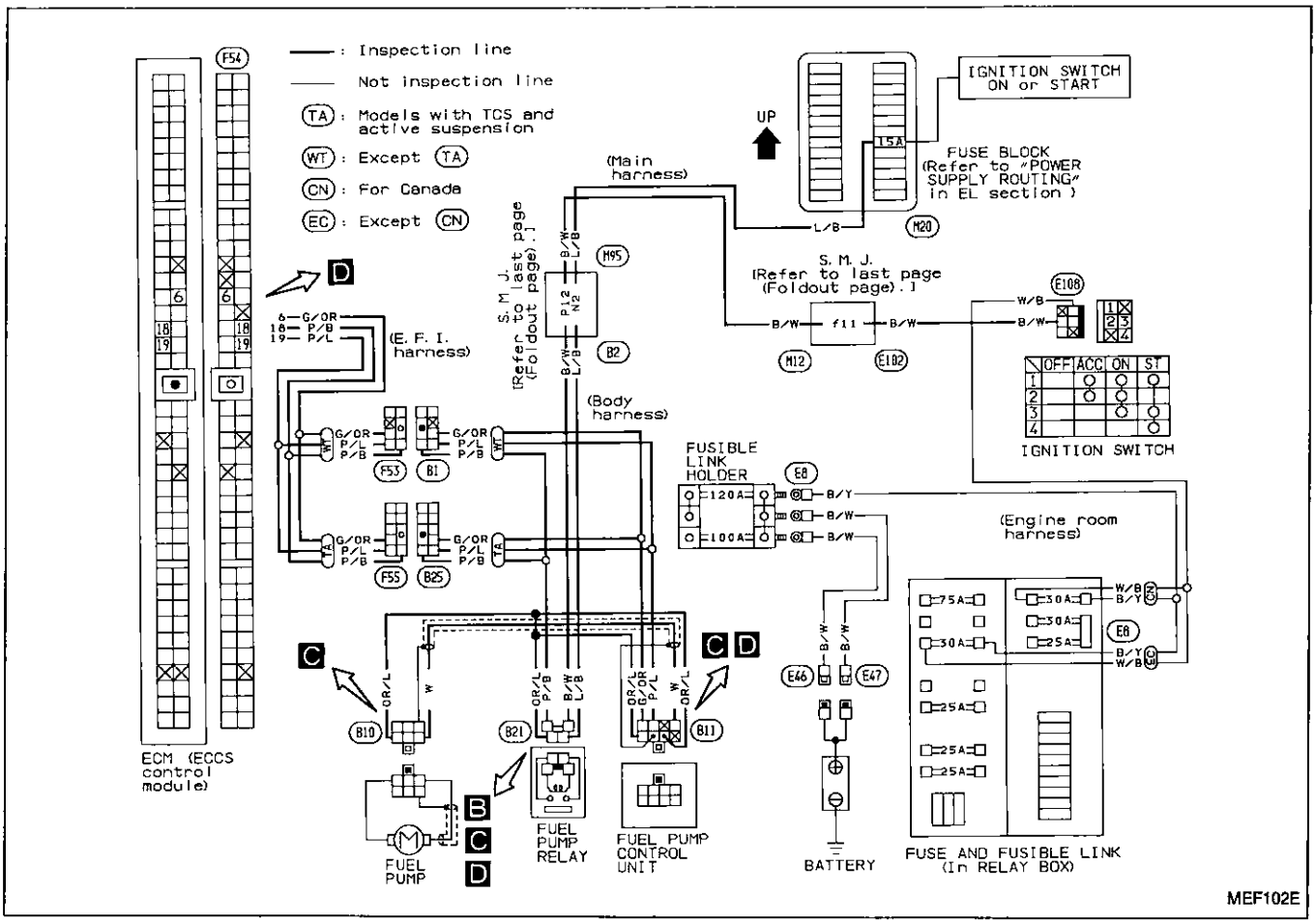
O.K.

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

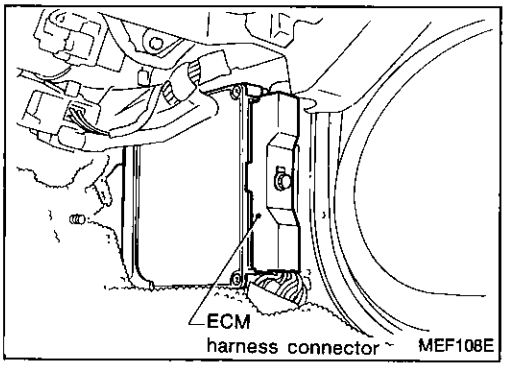
INSPECTION END

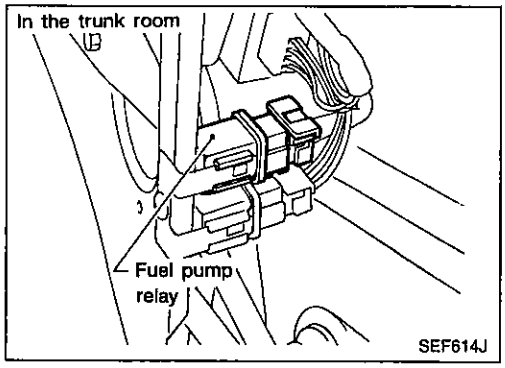
Diagnostic Procedure 26

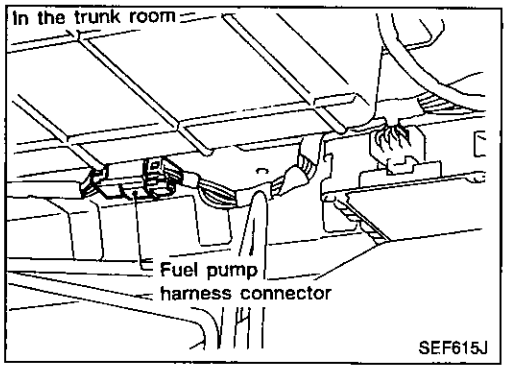
FUEL PUMP CONTROL (Not self-diagnostic item)

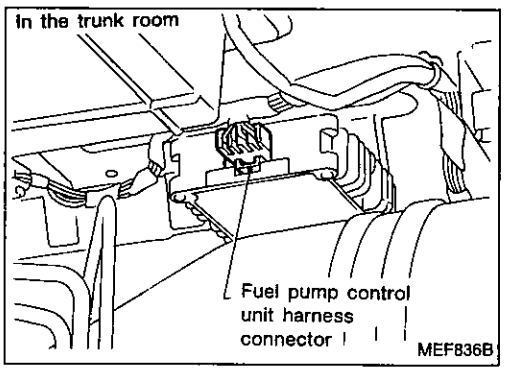


Harness layout

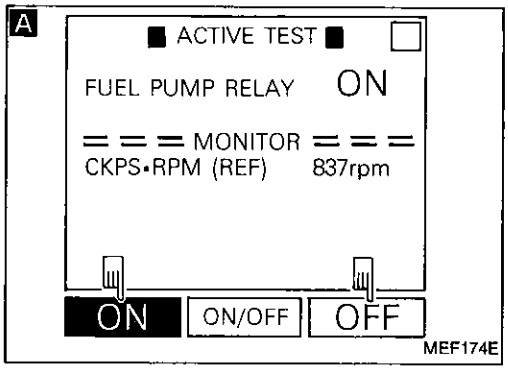


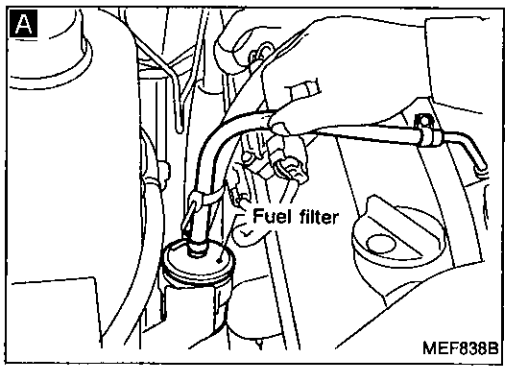


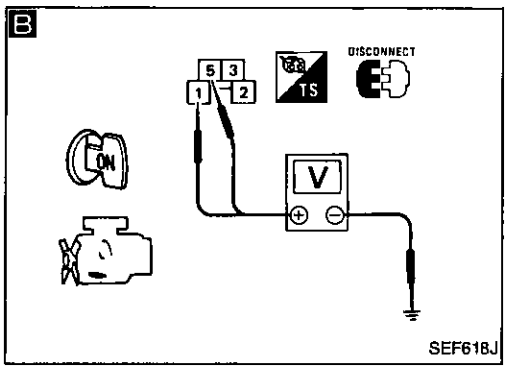


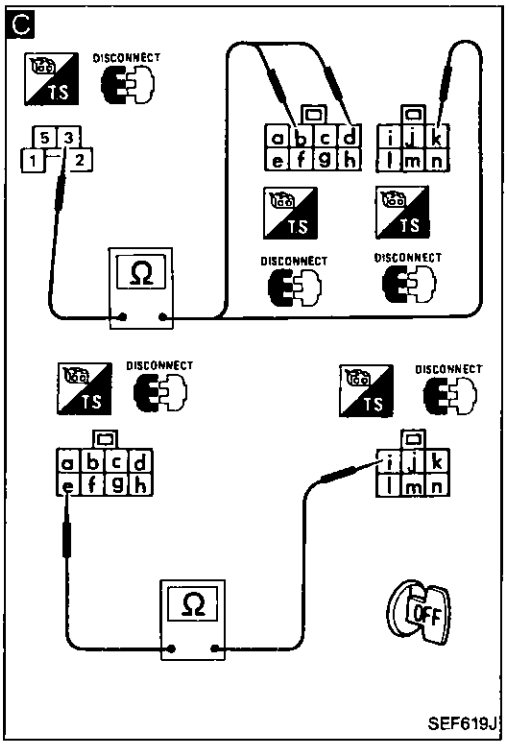


FUEL PUMP CONTROL (Not self-diagnostic item)









INSPECTION START

A

CHECK OVERALL FUNCTION.
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.

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. → *INSPECTION END

* If fuel pump noise is greater than normal during idling after completing warm-up, then go to "CHECK GROUND CIRCUIT".

N.G.

B

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump relay.
3) Turn ignition switch "ON".
4) Check voltage between terminals ①, ⑤ and ground with CONSULT or tester.
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (B2), (M95)
- Harness connectors (M12), (E102)
- 15A fuse
- Harness continuity between fuel pump relay and fuse
- Harness continuity between fuel pump relay and ignition switch

If N.G., repair harness or connectors.

O.K.

C

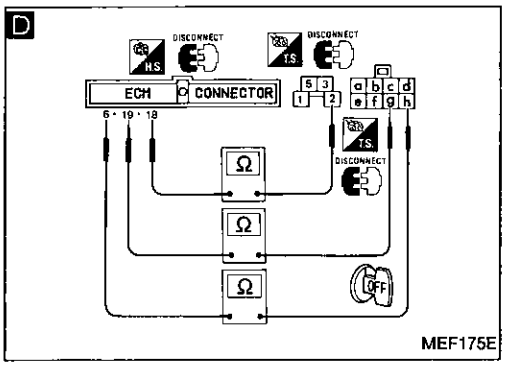
CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump harness connector and fuel pump control unit harness connector.
3) Check harness continuity between terminal ③ and ⓑ, ⓓ, ⓚ, terminal ⓔ and ⓘ.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

Ⓐ

FUEL PUMP CONTROL (Not self-diagnostic item)



Ⓐ

D

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between
ECM terminal ⑱ and terminal ②,
ECM terminal ⑥ and terminal ⓗ,
ECM terminal ⑲ and terminal ⓖ.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F55), (B25)
- Harness connectors (F53), (B1)
- Harness continuity between ECM and fuel pump relay
- Harness continuity between ECM and fuel pump control unit

If N.G., repair harness or connectors.

O.K. ↓

CHECK COMPONENT
(Fuel pump relay).
Refer to "Electrical Components Inspection".
(See page EF & EC-211.)

N.G. → Replace fuel pump relay.

O.K. ↓

CHECK COMPONENT
(Fuel pump control unit).
Refer to "Electrical Components Inspection".
(See page EF & EC-204.)

N.G. → Replace fuel pump control unit.

O.K. ↓

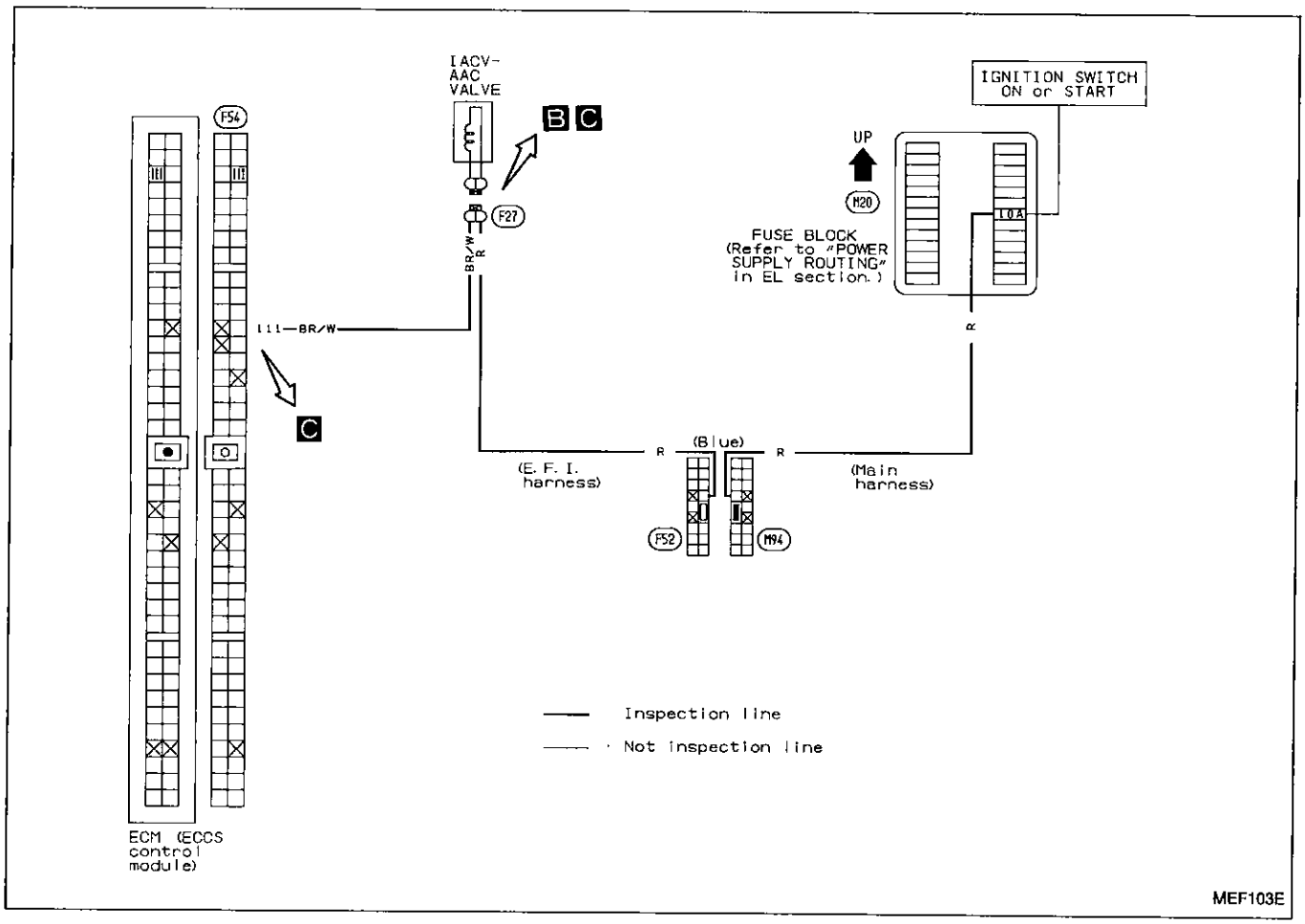
Check ECM pin terminals for damage or the connection of ECM harness connector.

↓

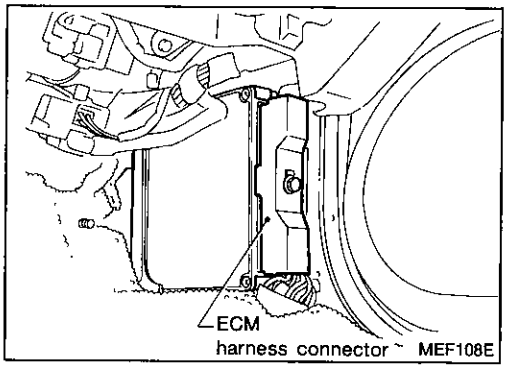
INSPECTION END

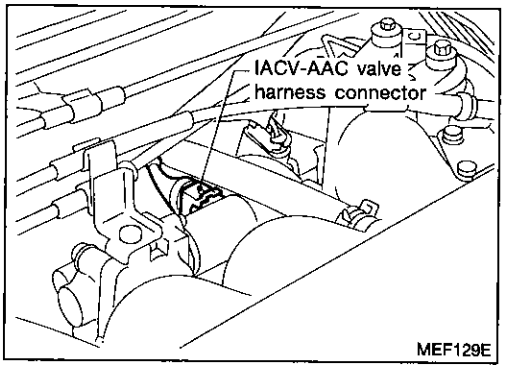
Diagnostic Procedure 27

IACV-AAC VALVE (Not self-diagnostic item)

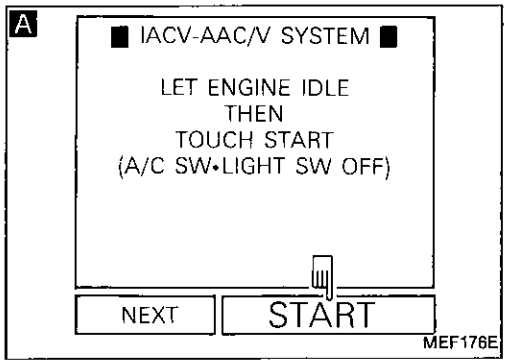


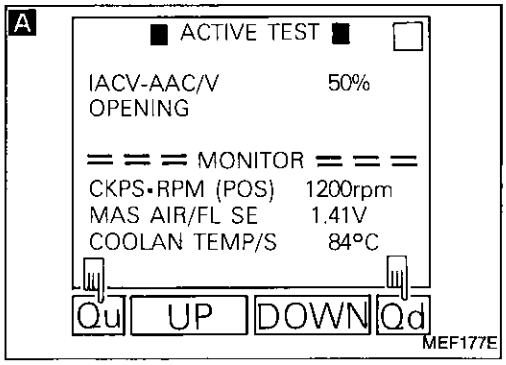
Harness layout

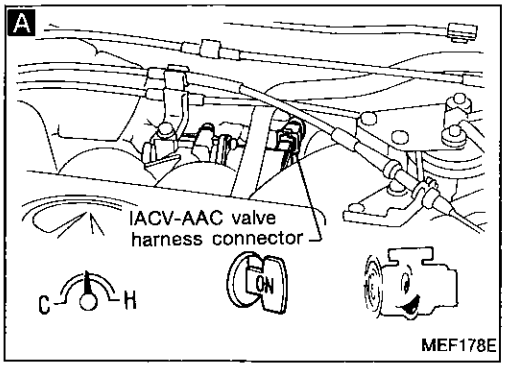


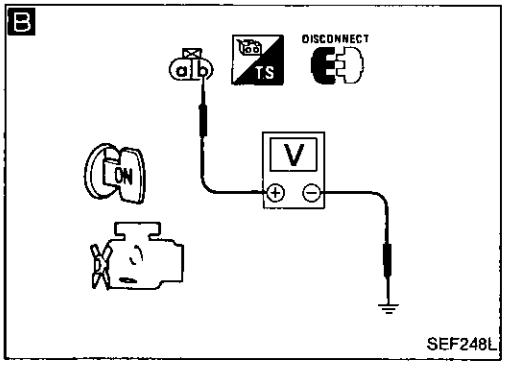


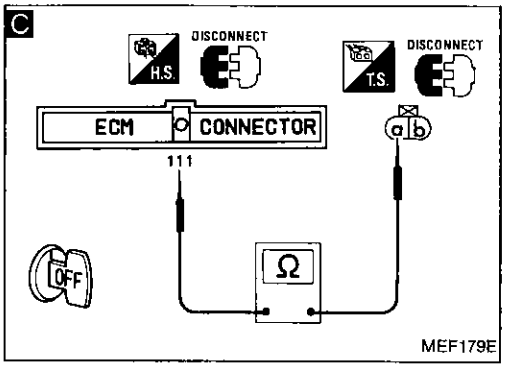
IACV-AAC VALVE (Not self-diagnostic item)











INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Check idle speed.
650±50 rpm
(A/T in "N" position)
3) Perform "IACV-AAC VALVE SYSTEM" in "FUNCTION TEST" mode with CONSULT.

OR

3) Select "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.

O.K. → INSPECTION END

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 (F52), (M94)
- 10A fuse
- Harness continuity between IACV-AAC valve and fuse

If N.G., repair harness or connectors.

O.K.

C

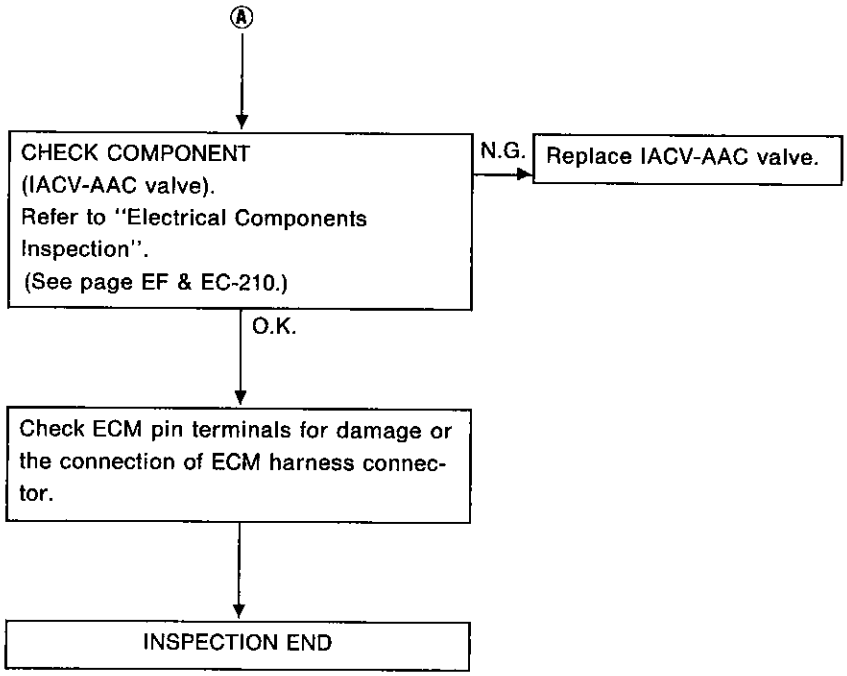
CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (111) and terminal ⓐ.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

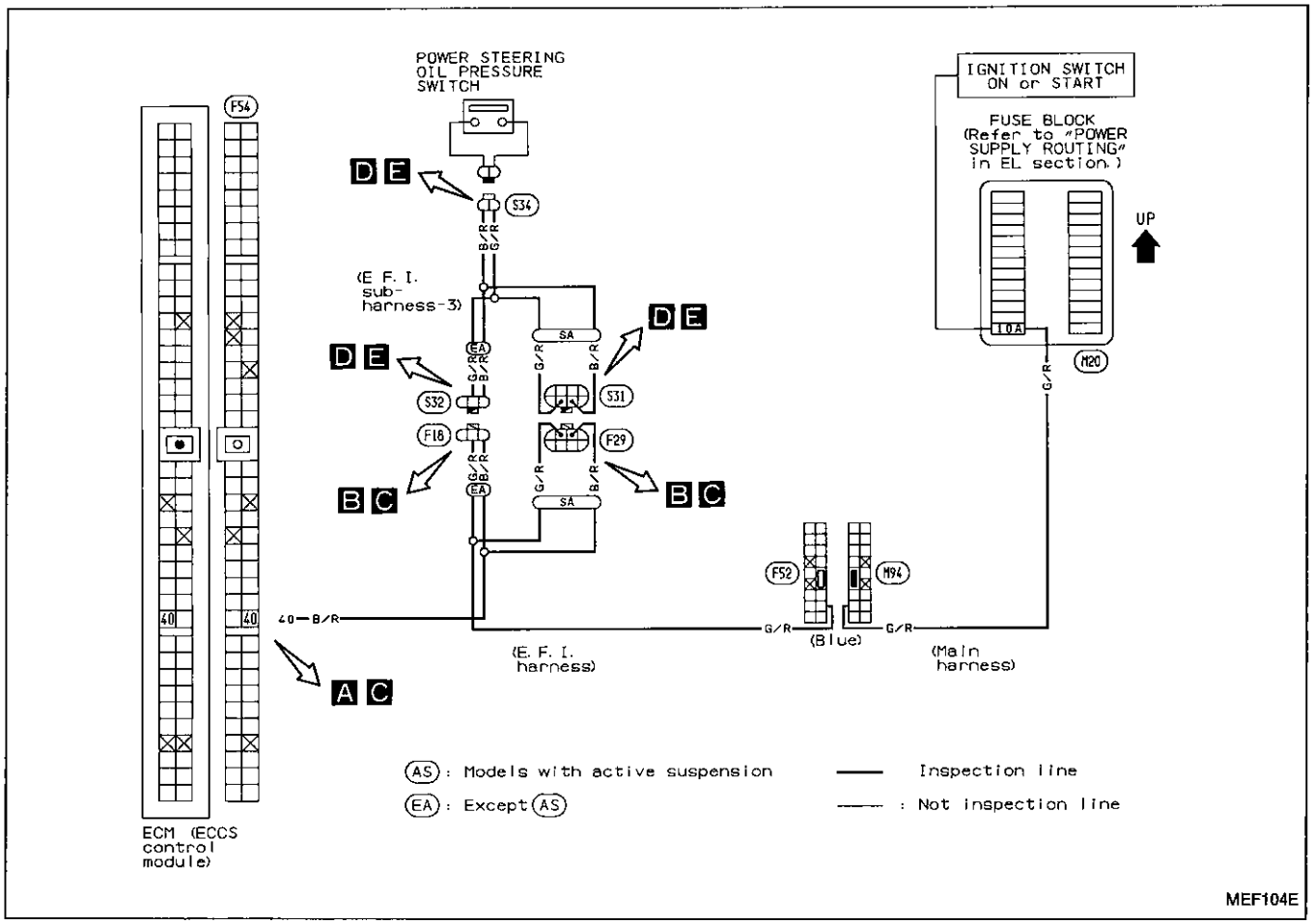
Ⓐ

IACV-AAC VALVE (Not self-diagnostic item)

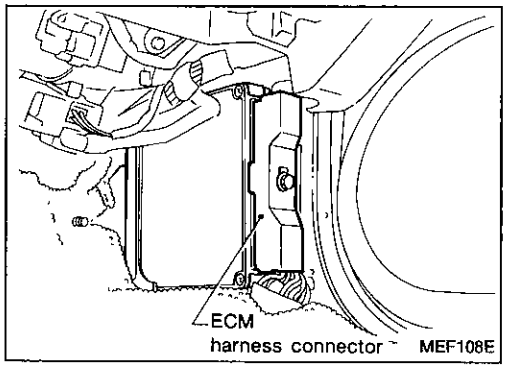


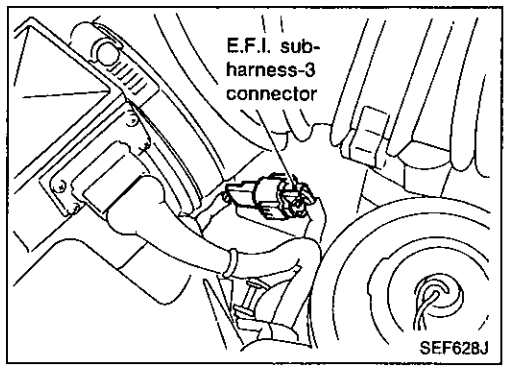
Diagnostic Procedure 28

POWER STEERING OIL PRESSURE SWITCH (Not self-diagnostic item)

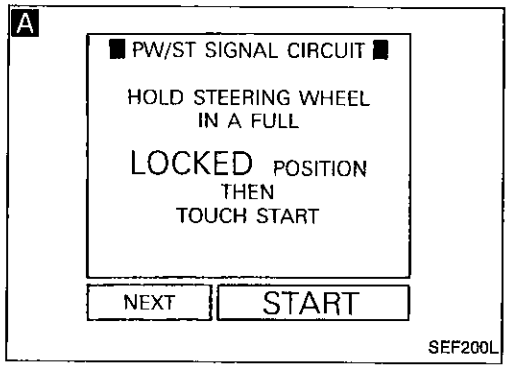


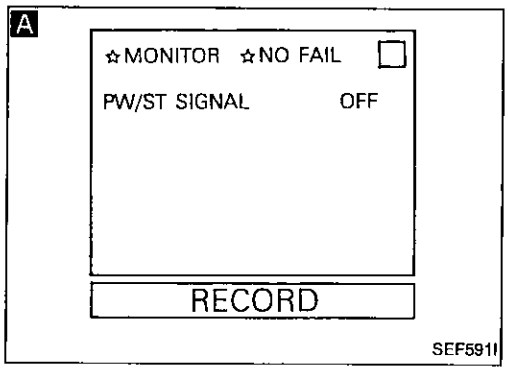
Harness layout

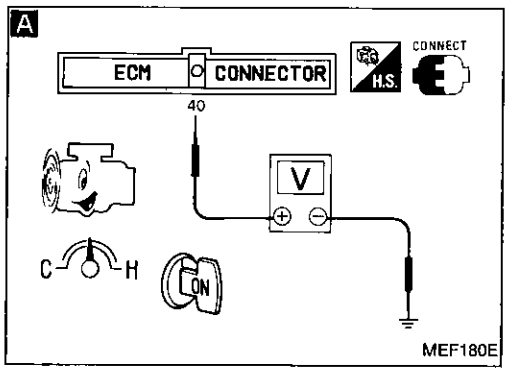


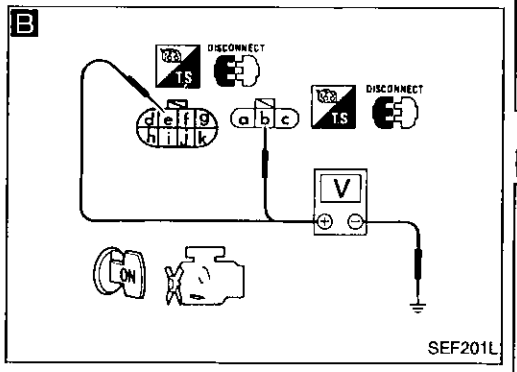


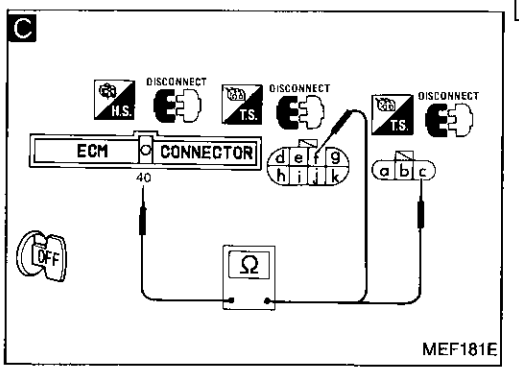
POWER STEERING OIL PRESSURE SWITCH (Not self-diagnostic item)











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: OFF
Steering is turned: ON

OR

1) Start engine.
2) Check voltage between ECM terminal ㊵ and ground with CONSULT or tester.
Voltage:
When steering wheel is turned quickly.
Battery voltage
Except above
Approximately 0V

N.G.

B

CHECK POWER SUPPLY-I.
1) Stop engine.
2) Disconnect E.F.I. sub-harness-3 connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓑ or ⓔ and ground with CONSULT or tester.
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (F52), (M94)
- 10A fuse
- Harness continuity between E.F.I. sub-harness-3 connector and fuse

If N.G., repair harness or connectors.

O.K.

C

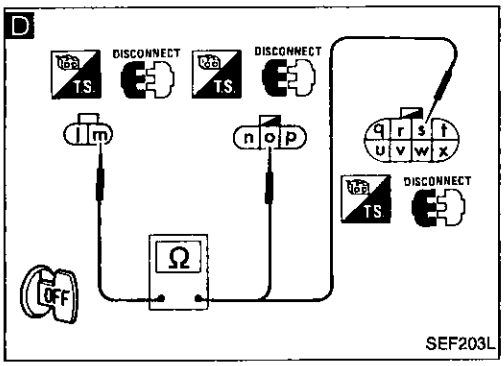
CHECK INPUT SIGNAL CIRCUIT-I.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal ㊵ and terminal ⓒ or ⓕ.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

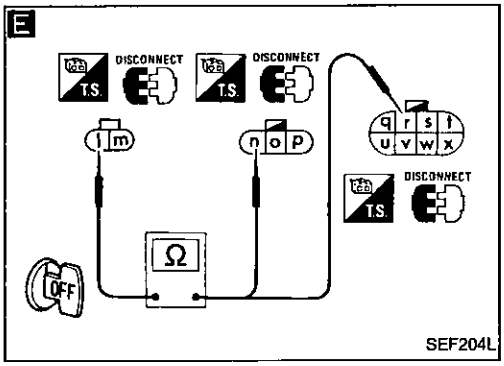
Ⓐ

D



SEF203L

E



SEF204L

POWER STEERING OIL PRESSURE SWITCH (Not self-diagnostic item)

Ⓐ

D

CHECK POWER SUPPLY-II.
1) Disconnect power steering oil pressure switch harness connector.
2) Check harness continuity between terminal ⓜ and terminal ⓞ or ⓢ.
Continuity should exist.

N.G. → Check the following.
- Harness continuity between E.F.I. sub-harness-3 connector and power steering oil pressure switch.

If N.G., repair harness or connectors.

O.K. ↓

E

CHECK INPUT SIGNAL CIRCUIT-II.
1) Check harness continuity between terminal ⓘ and terminal ⓝ or ⓡ.
Continuity should exist.

N.G. → (Check the following. / If N.G., repair harness or connectors.)

O.K. ↓

CHECK COMPONENT
(Power steering oil pressure switch).
Refer to "Electrical Components Inspection".
(See page EF & EC-212.)

N.G. → Replace power steering oil pressure switch.

O.K. ↓

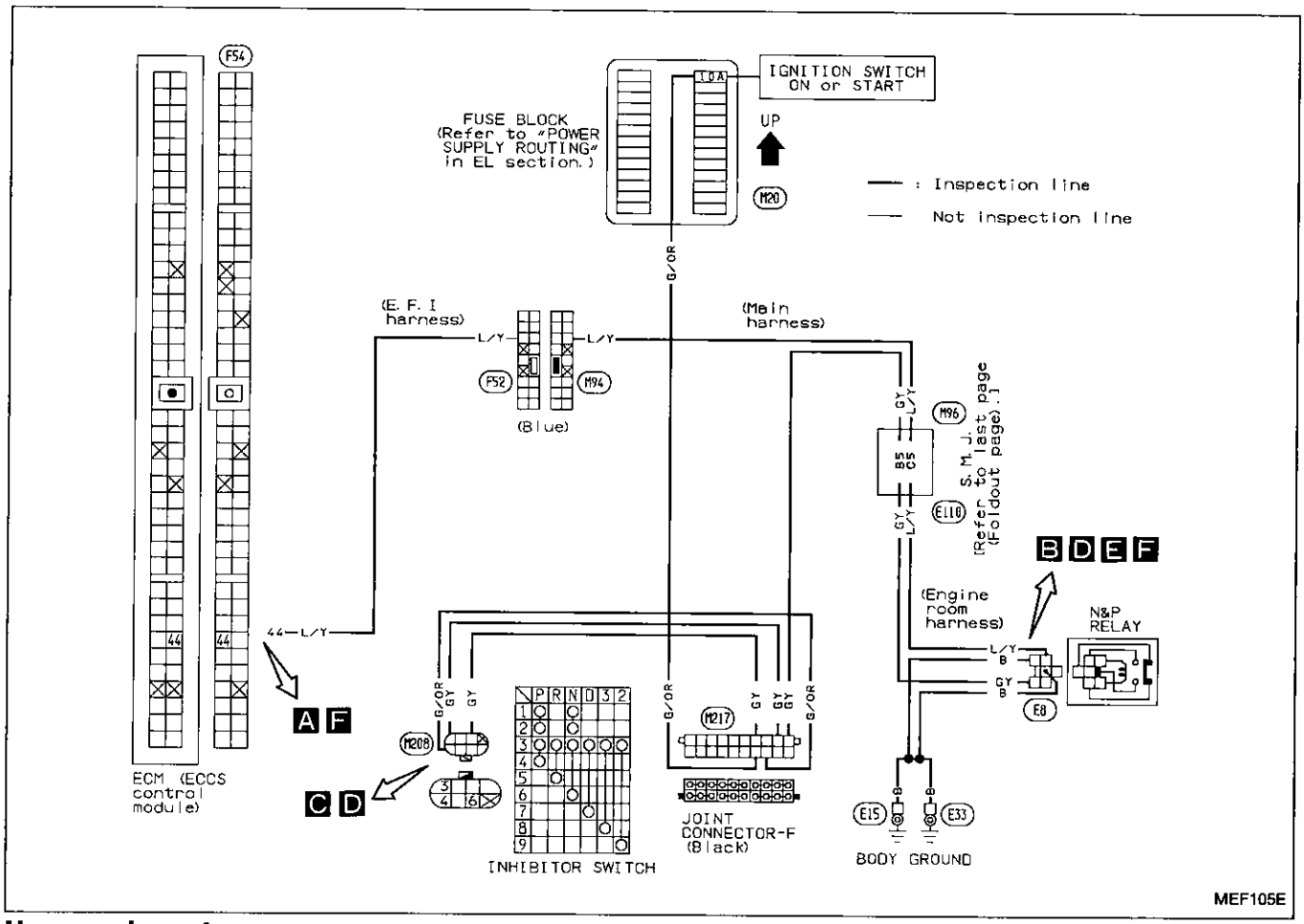
Check ECM pin terminals for damage or the connection of the ECM harness connector.

↓

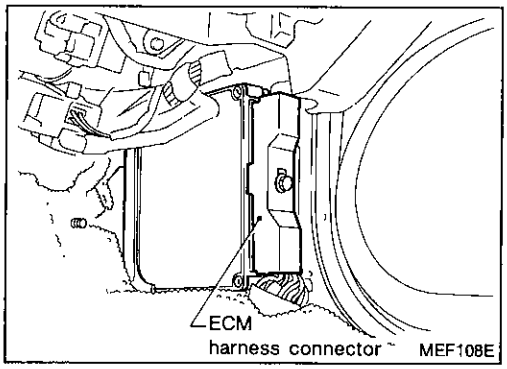
INSPECTION END

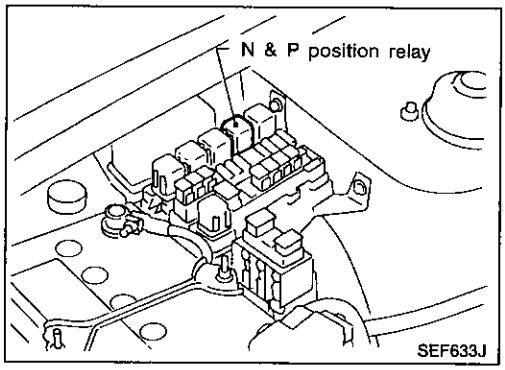
Diagnostic Procedure 29

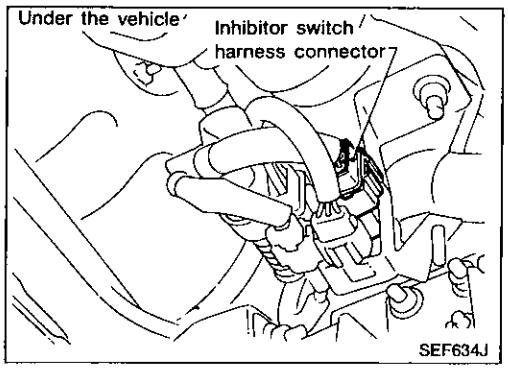
INHIBITOR SWITCH (Not self-diagnostic item)



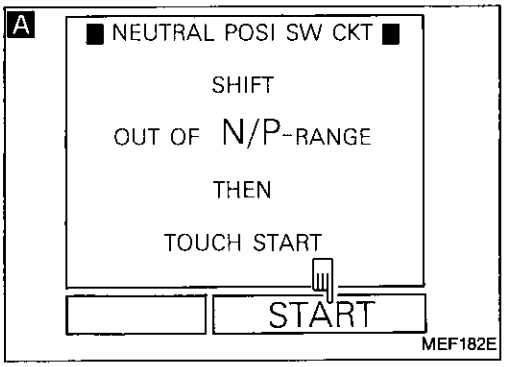
Harness layout

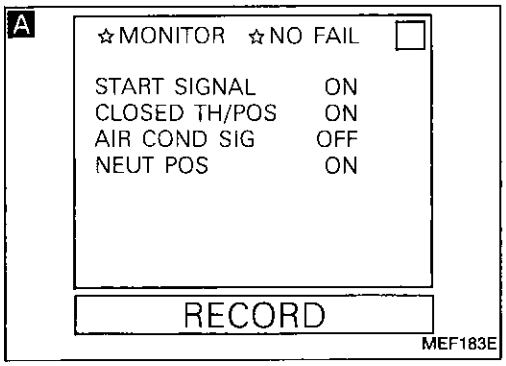


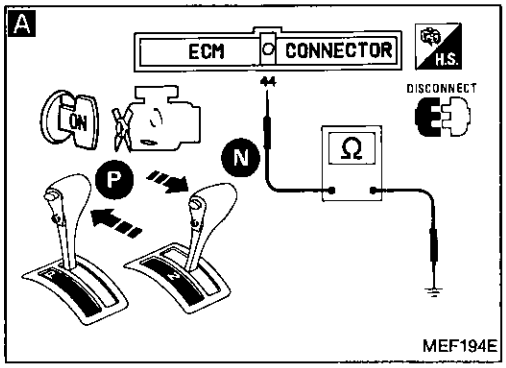


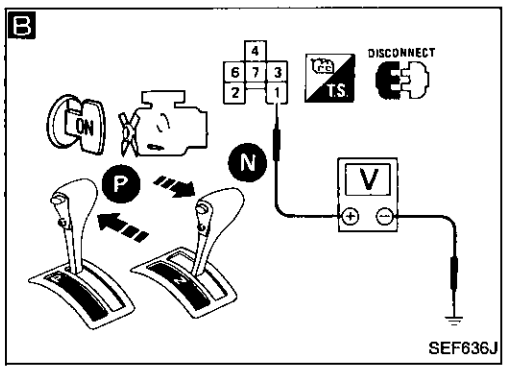


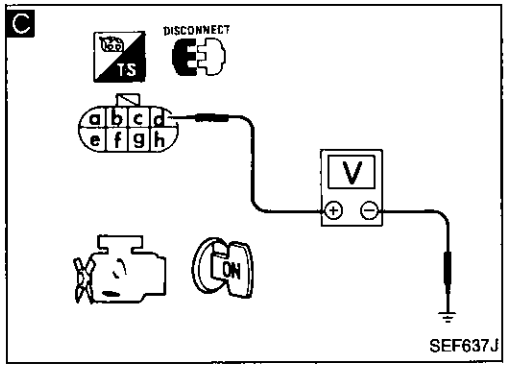
INHIBITOR SWITCH (Not self-diagnostic item)











INSPECTION START

A

CHECK OVERALL FUNCTION.

1) Turn ignition switch "ON".
2) Perform "NEUTRAL POSITION SW CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

— OR —

1) Turn ignition switch "ON".
2) Perform "NEUTRAL POSITION SW" in "DATA MONITOR" mode with CONSULT.
"N" or "P" position: ON
Except above: OFF

— OR —

1) Shift selector lever to "P" position.
2) Disconnect ECM harness connector.
3) Turn ignition switch "ON".
4) Check harness continuity between ECM terminal ㊹ and body ground.
Continuity should exist.
5) Shift selector lever to "N" position.
6) Check harness continuity between ECM terminal ㊹ and body ground.
Continuity should exist.

O.K. → INSPECTION END

N.G. ↓

B

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect N & P position relay.
3) Make sure that selector lever is in "N" position.
4) Turn ignition switch "ON".
5) Check voltage between terminal ① and ground with CONSULT or tester.
Voltage: Battery voltage
6) Shift selector lever into "P" position.
7) Check voltage between terminal ① and ground with CONSULT or tester.
Voltage: Battery voltage

N.G. →

Check the following.

C CHECK HARNESS CONTINUITY BETWEEN INHIBITOR SWITCH AND BATTERY.
1) Turn ignition switch "OFF".
2) Disconnect inhibitor switch harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓓ and ground with CONSULT or tester.
Voltage: Battery voltage
If N.G., check the following.
- Joint connector M217
- 10A fuse
- Harness continuity between fuse and inhibitor switch

If N.G., repair harness or connectors.

D CHECK HARNESS CONTINUITY BETWEEN INHIBITOR SWITCH AND N & P RELAY.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal ① and ⓕ ("N" position), terminal ① and ⓗ ("P" position).
Continuity should exist.
If N.G., check the following.
- Joint connector M217
- Harness connectors M96, E110
- Harness continuity between inhibitor switch and N & P position relay

If N.G., repair harness or connectors.

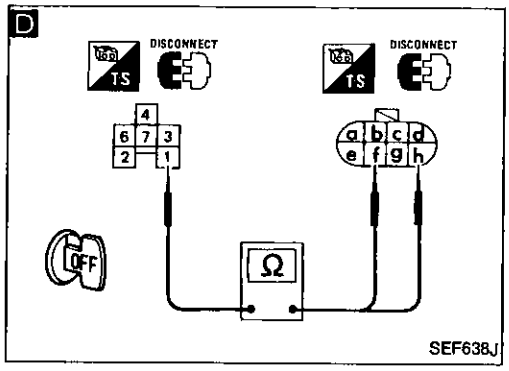
CHECK COMPONENT (Inhibitor switch).
Refer to "Electrical Components Inspection".
(See page EF & EC-211.)

O.K. ↓

Ⓐ

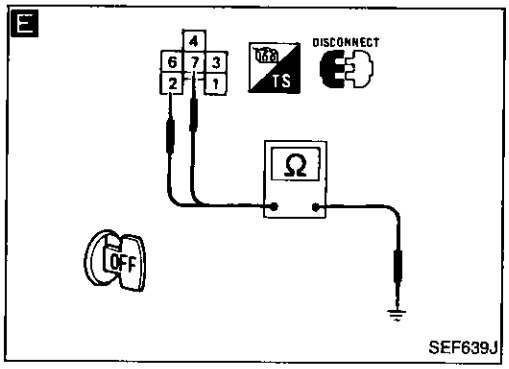
INHIBITOR SWITCH (Not self-diagnostic item)

D



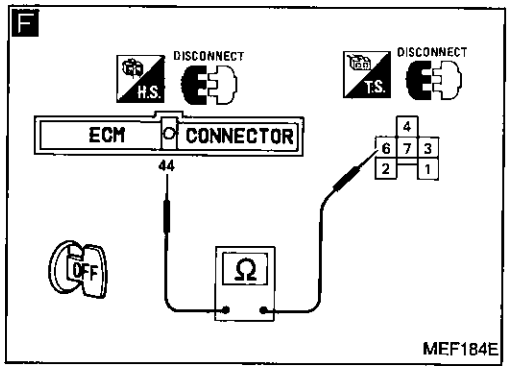
SEF638J

E



SEF639J

F



MEF184E

Ⓐ

E

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminals ②, ⑦ and body ground.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

F

CHECK INPUT SIGNAL CIRCUIT.
1) Check harness continuity between ECM terminal ㊹ and terminal ⑥.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F52), (M94)
- Harness connectors (CM96), (E110)
- Harness continuity between ECM and N & P relay

If N.G., repair harness or connectors.

O.K.

CHECK COMPONENT
(N & P position relay).
Refer to "Electrical Components Inspection".
(See page EF & EC-211.)

N.G. → Replace N & P position relay.

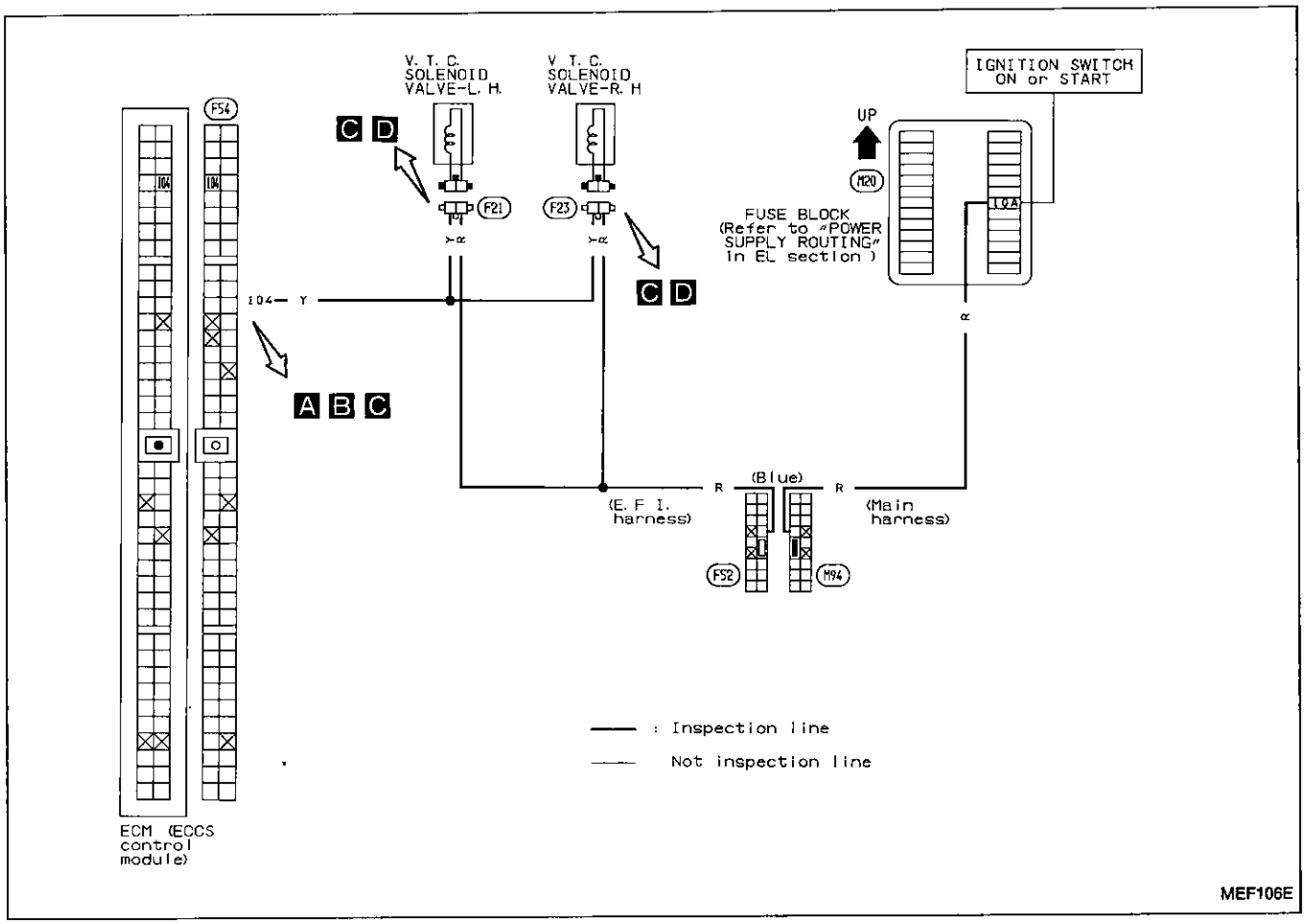
O.K.

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

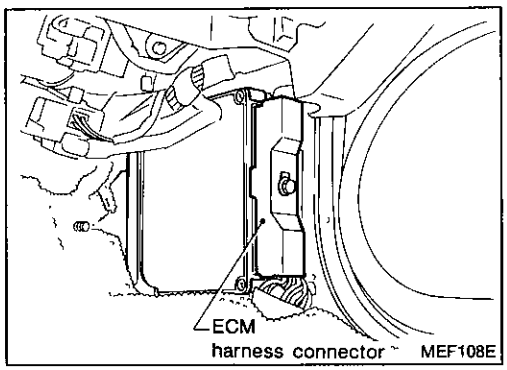
INSPECTION END

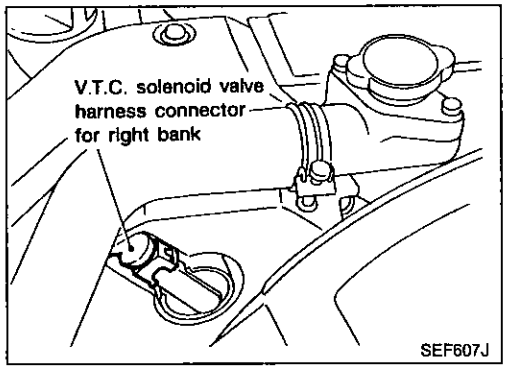
Diagnostic Procedure 30

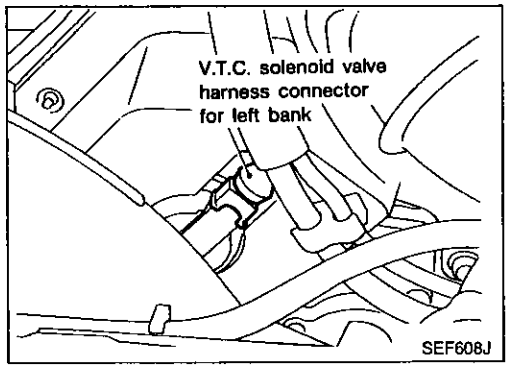
VALVE TIMING CONTROL (Not self-diagnostic item)



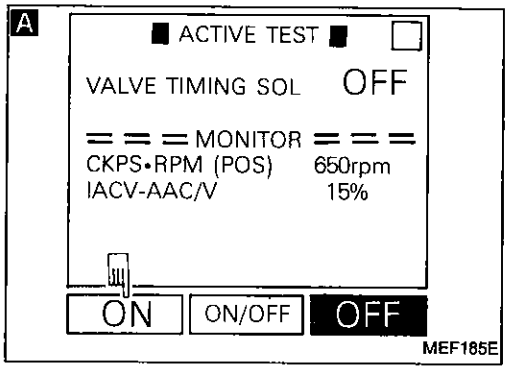
Harness layout

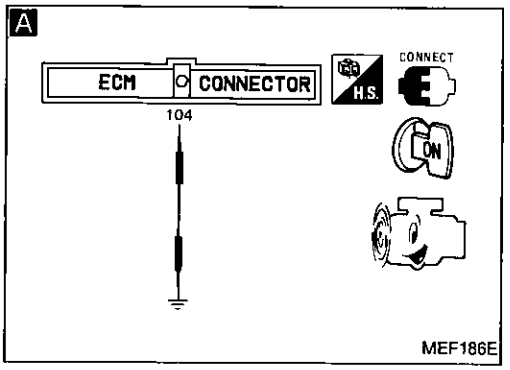


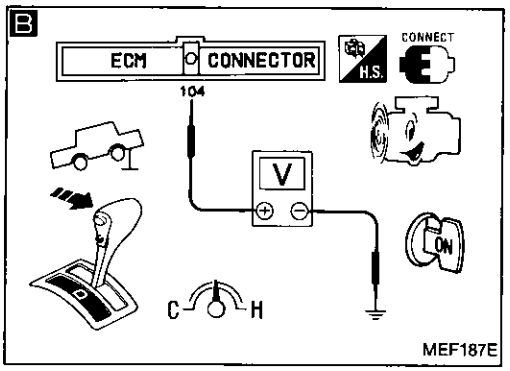


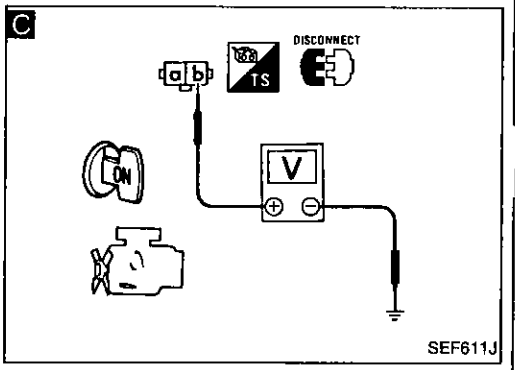


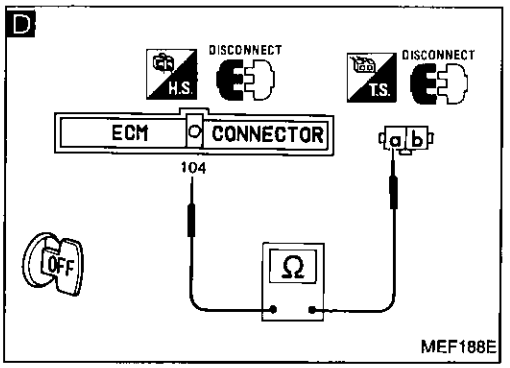
VALVE TIMING CONTROL (Not self-diagnostic item)











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.

Occurs → INSPECTION END

OR

1) Connect a suitable jumper wire between ECM terminal (104) and body ground.
2) Start engine and make sure that improper idle condition occurs.

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 selector lever to any position except "N" or "P" position.
5) Check voltage between ECM terminal (104) and ground under the following conditions with CONSULT or tester.

Voltage:

Quickly depress accelerator pedal, then quickly release it.
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-210, 211.)

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 (b) and ground with CONSULT or tester.

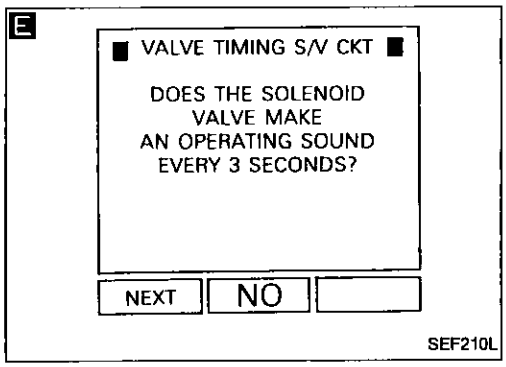
Voltage: Battery voltage

N.G. → Check the following.
- Harness connectors (F52), (M94)
- 10A fuse
- Harness continuity between V.T.C. solenoid valve and fuse

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 (104) and terminal (8).
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-210.)

N.G. → Replace V.T.C. solenoid valve.

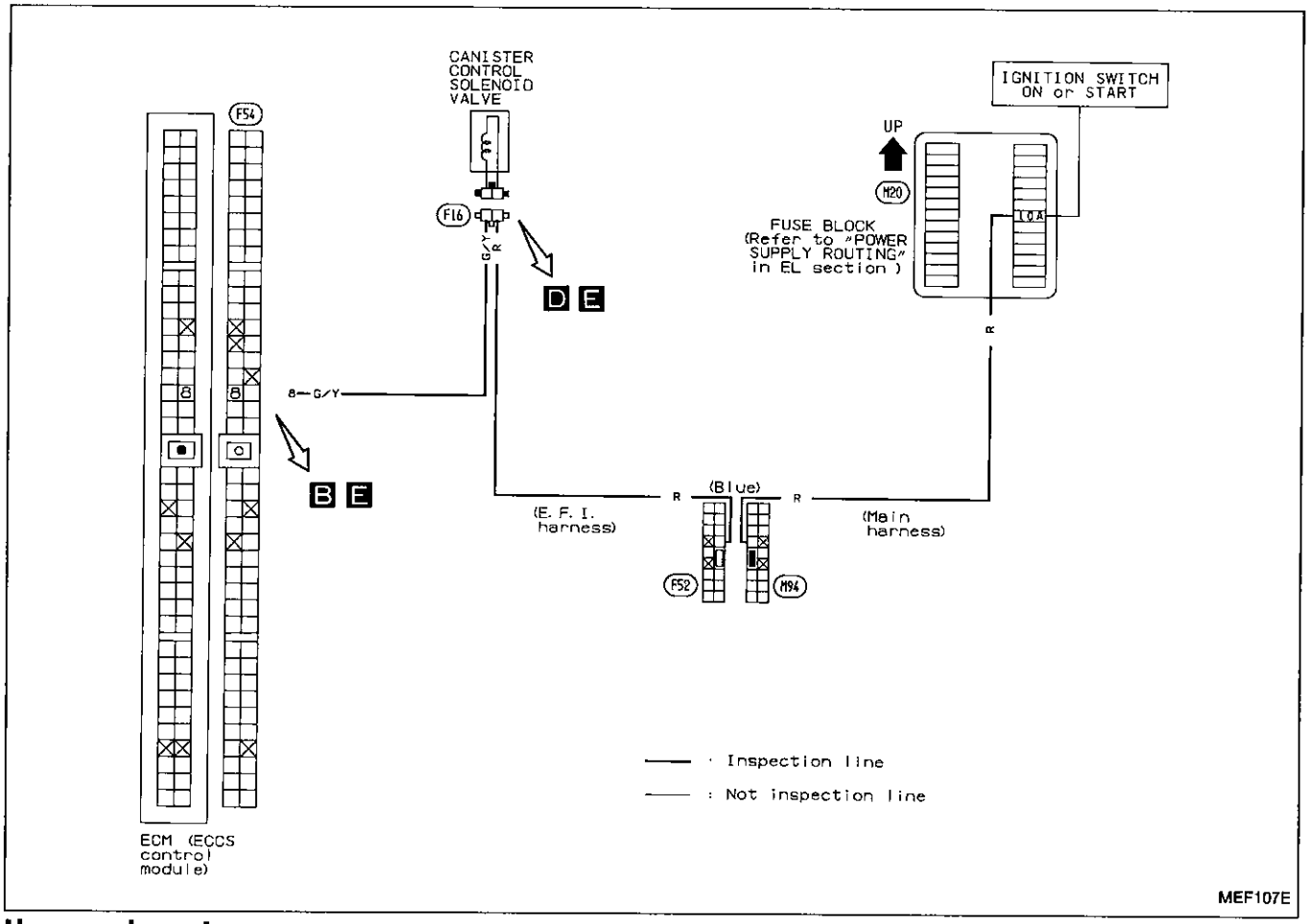
O.K.

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

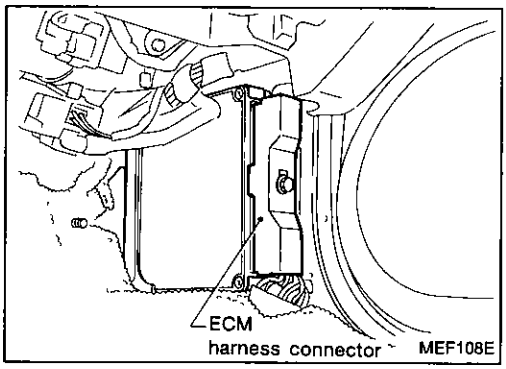
INSPECTION END

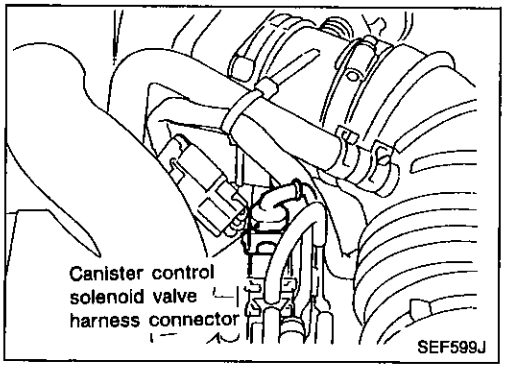
Diagnostic Procedure 31

CANISTER PURGE CONTROL (Not self-diagnostic item)

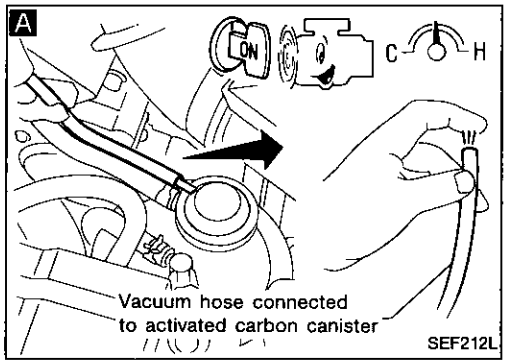


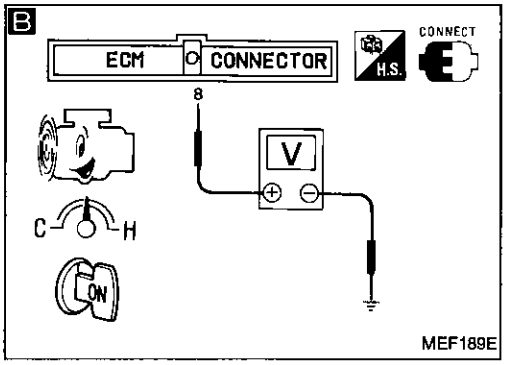
Harness layout

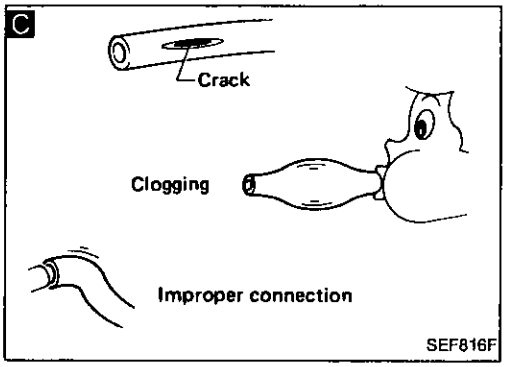


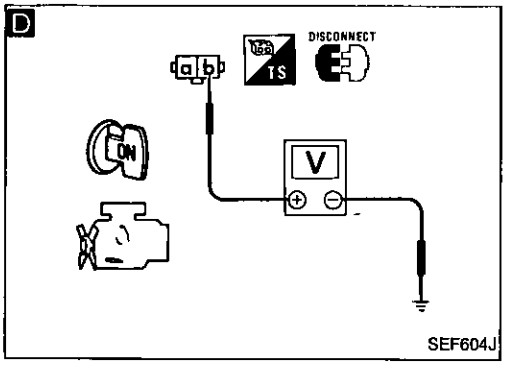


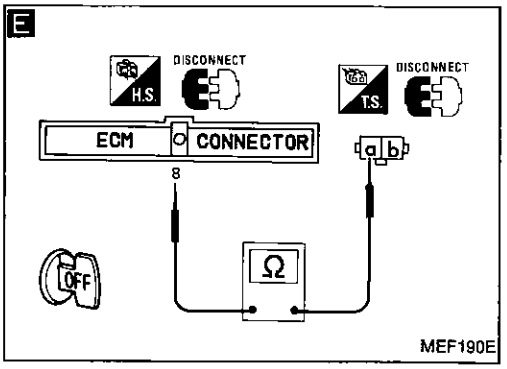
CANISTER PURGE CONTROL (Not self-diagnostic item)











INSPECTION START

A

CHECK VACUUM SOURCE TO ACTIVATED CARBON CANISTER.
1) Start engine and warm it up sufficiently.
2) Perform diagnostic test mode II (Self-diagnostic results). Make sure that diagnostic trouble code No. 11 and 12 are not displayed.
3) Stop engine and jack up drive wheels.
4) Disconnect vacuum hose to activated carbon canister and restart engine.
5) Make sure that vacuum exists under the following conditions.

At idle:
Vacuum should not exist.
Engine speed is about 2,000 rpm (In "1" range)
Vacuum should exist.

O.K. → CHECK COMPONENT. (Activated carbon canister) (See page EF & EC-217.) If N.G., replace activated carbon canister.

N.G.

B

CHECK CONTROL FUNCTION.
1) Check voltage between ECM terminal ⑧ and ground with CONSULT or tester under the following conditions.

Voltage:
At idle
Approximately 0V
Engine speed is about 2,000 rpm (In "1" range)
Battery voltage

O.K. → **C** Check vacuum hose for clogging, cracks and proper connection.

N.G.

D

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect canister control solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓑ and ground with CONSULT or tester.

Voltage: Battery voltage

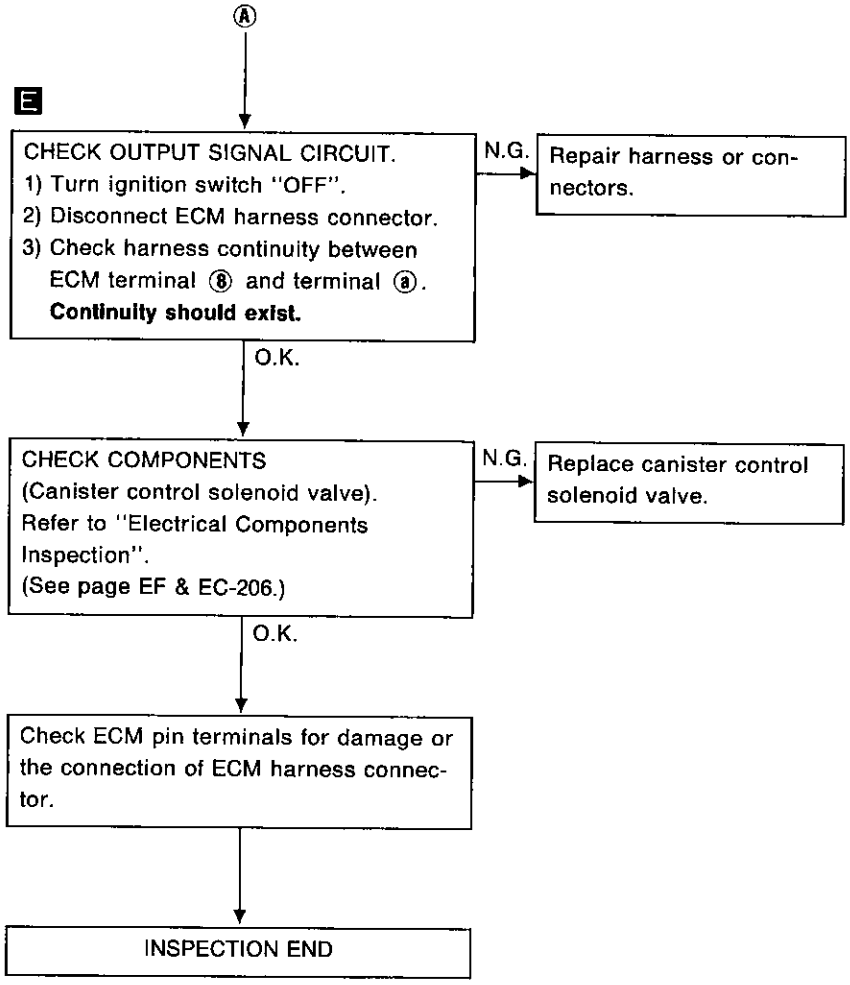
N.G. → Check the following.
- Harness connectors (F52), (M94)
- 10A fuse
- Harness continuity between canister control solenoid valve and fuse

If N.G., repair harness or connectors.

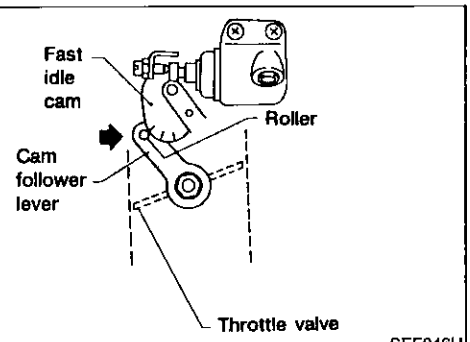
O.K.

Ⓐ

CANISTER PURGE CONTROL (Not self-diagnostic item)



1



SEF046H

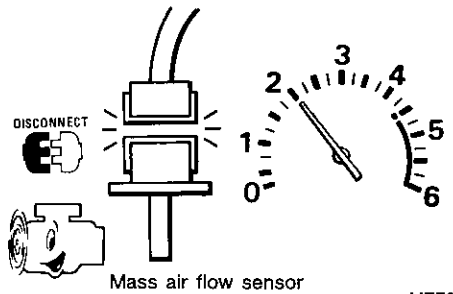
2

ACTIVE TEST	
SELF-LEARN CONTROL	100% R100%
MONITOR	
CKPS•RPM(POS)	650rpm
COOLAN TEMP/S	77°F
O2 SEN	0.16V
O2 SEN-R	0.17V
A/F ALPHA	92%
A/F ALPHA-R	96%

CLEAR

MEF685D

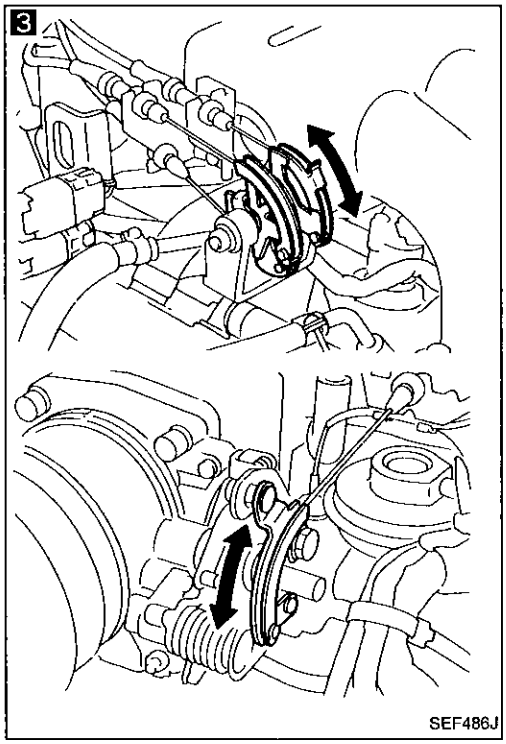
2



Mass air flow sensor

MEF686D

3



SEF486J

Diagnostic Procedure 32 — Symptom — High Idling after Warm-up

CHECK FAST IDLE CAM.
Does fast idle cam keep cam follower lever released?

No → Check fast idle cam adjustment. (See page EF & EC-212.)

Yes ↓

1

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 mass air flow sensor harness connectors.
2. After starting and running engine for at least 30 seconds at 2,000 rpm, does the engine speed drop?

No ↓

3

CHECK THROTTLE LINKAGE.

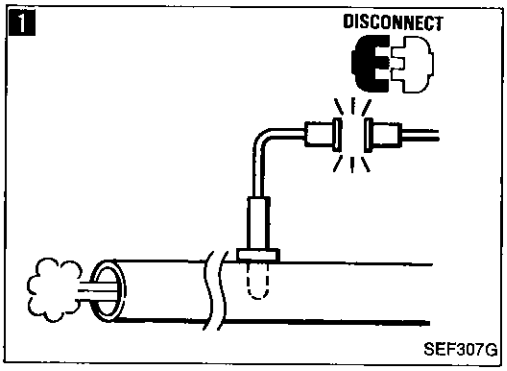
1. Check that throttle linkage moves smoothly.
2. Confirm that throttle valve both fully opens and fully closes.

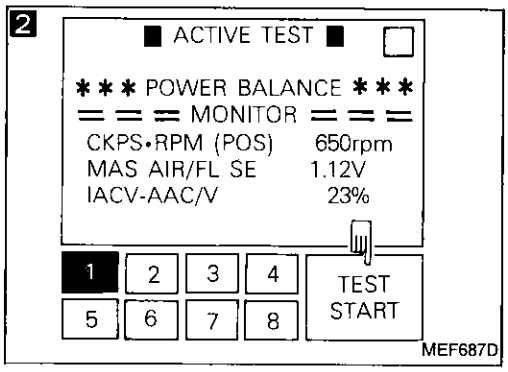
N.G. → Repair throttle linkage or sticking of throttle valve.

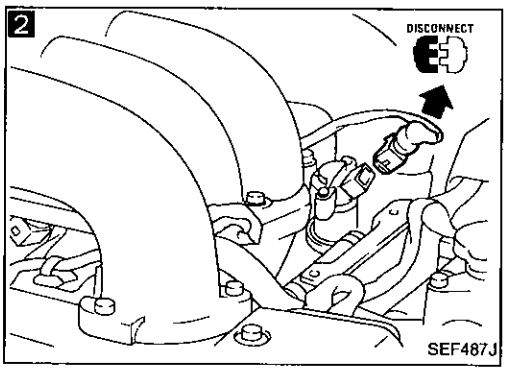
O.K. ↓

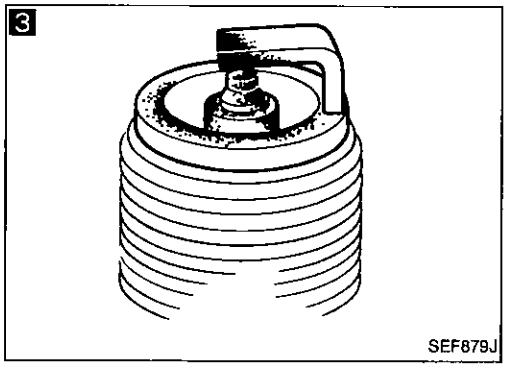
INSPECTION END

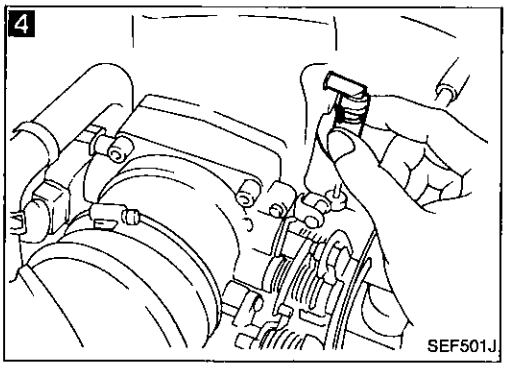
Diagnostic Procedure 33 — Symptom — Hunting











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-100, 135.)

No ↓

2

PERFORM POWER BALANCE TEST.

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

— OR —

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

No → Go to **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. ↓

4

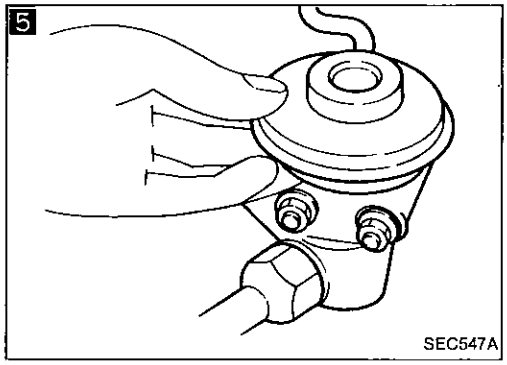
CHECK FOR INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

Yes → Discover air leak location and repair.

No ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 33 — Symptom — Hunting (Cont'd)



Ⓐ

5

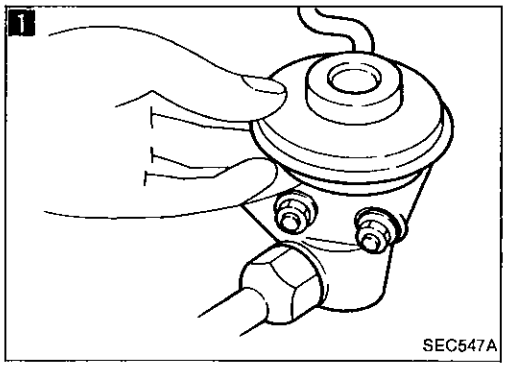
CHECK EGR VALVE.
Check EGR valve for sticking.

N.G. → Repair or replace.

O.K. ↓

INSPECTION END

Diagnostic Procedure 34 — Symptom — Unstable Idle

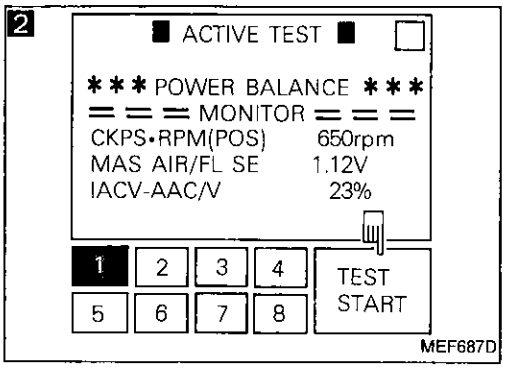


1

CHECK EGR VALVE.
Check EGR valve for sticking.

N.G. → Repair or replace.

O.K. ↓



2

PERFORM POWER BALANCE TEST.

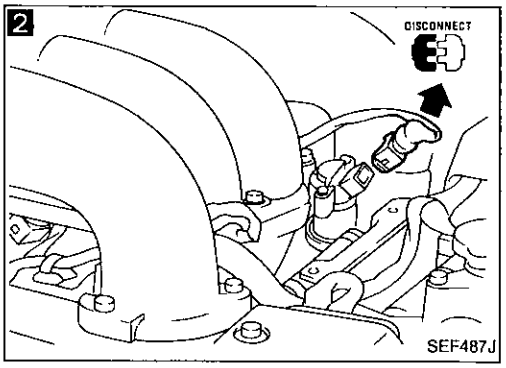
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

No → 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?

Yes ↓



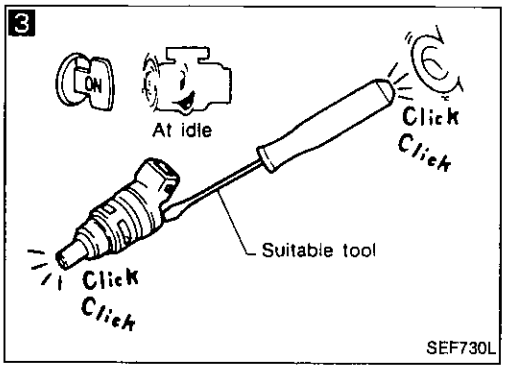
3

CHECK INJECTOR.
Does each injector make an operating sound at idle?

No → Check injector(s) and circuit(s).

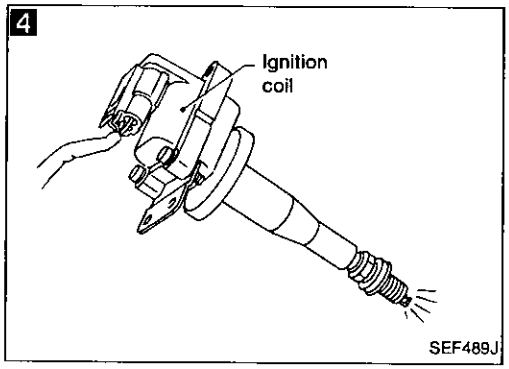
Yes ↓

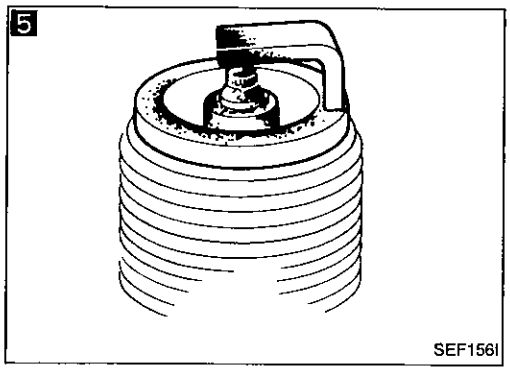
(Go to Ⓐ on next page.)

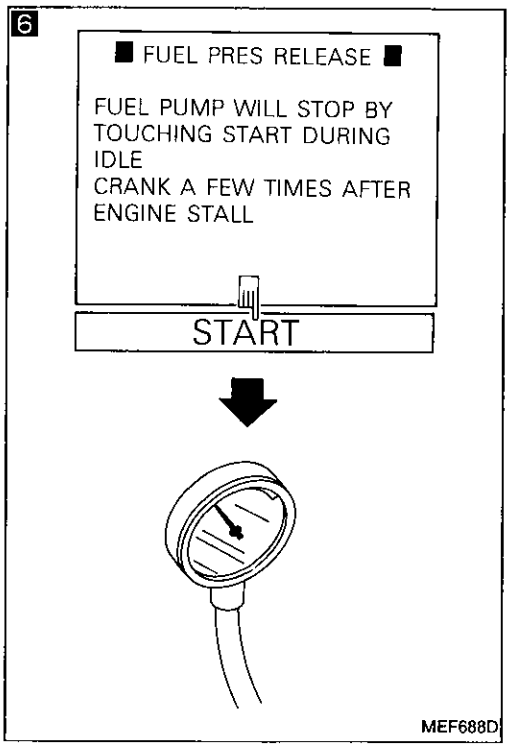


GI MA EM LC EF & EC FE AT PD FA RA BR ST BF HA EL

Diagnostic Procedure 34 — Symptom — Unstable Idle (Cont'd)







Ⓐ

4

CHECK IGNITION SPARK.
1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-93, 126.)

O.K.

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. 235 kPa (2.4 kg/cm², 34 psi)

N.G. → Check fuel pump and circuit.

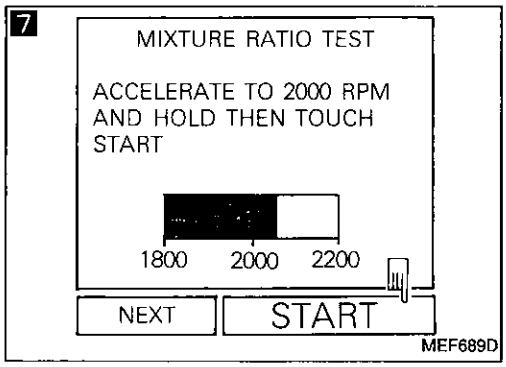
OR

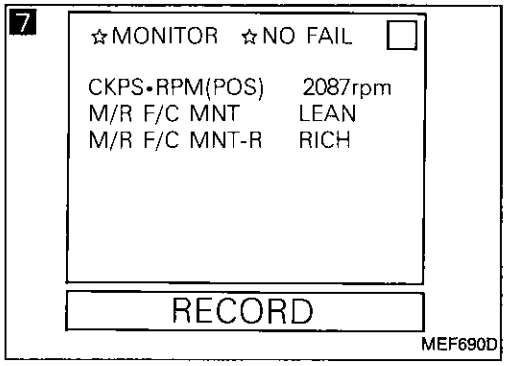
1. Release fuel pressure to zero. (Refer to page EF & EC-215.)
2. Install fuel pressure gauge and check fuel pressure.

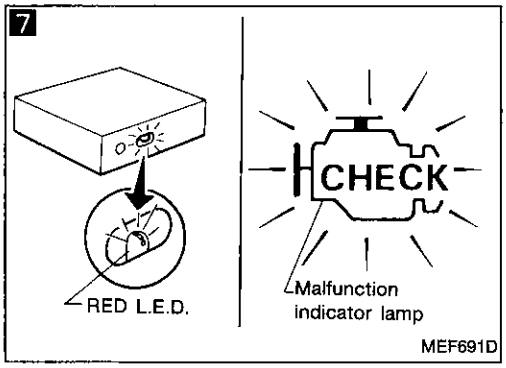
O.K.

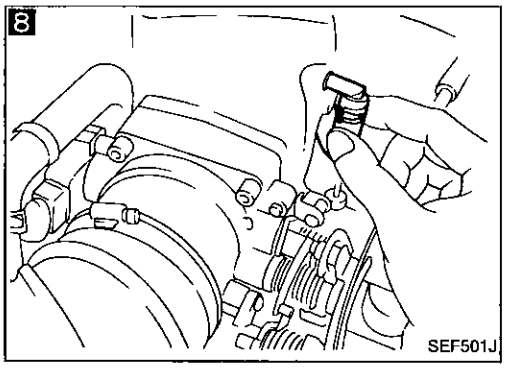
(Go to Ⓑ on next page.)

Diagnostic Procedure 34 — Symptom — Unstable Idle (Cont'd)









Ⓑ

7

CHECK HEATED OXYGEN SENSOR.

1. Start engine and warm it up sufficiently.
2. Perform "MIXTURE RATIO TEST" in "FUNCTION TEST" mode.

N.G. → Replace heated oxygen sensor(s).

OR

2. See "M/R F/C MNT (right and left sides)" in "Data monitor" mode.
3. Maintaining engine at 2,000 rpm under no-load (engine is warmed up sufficiently.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.

RICH→LEAN→RICH→
1 time 2 times
LEAN→RICH.....

OR

2. Set "Heated oxygen sensor monitor" in Diagnostic Test Mode II. (See page EF & EC-52.)
3. Maintaining engine at 2,000 rpm under no-load, check to make sure that malfunction indicator lamp and RED LED on the ECM go 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?

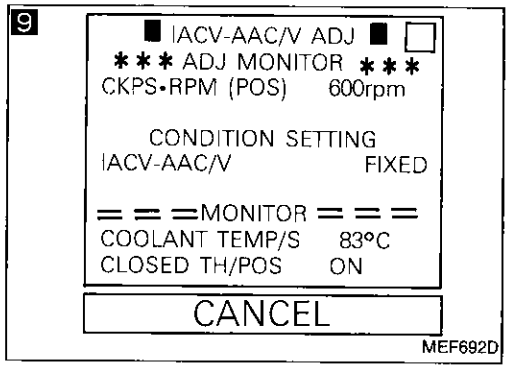
Yes → Discover air leak location and repair.

No

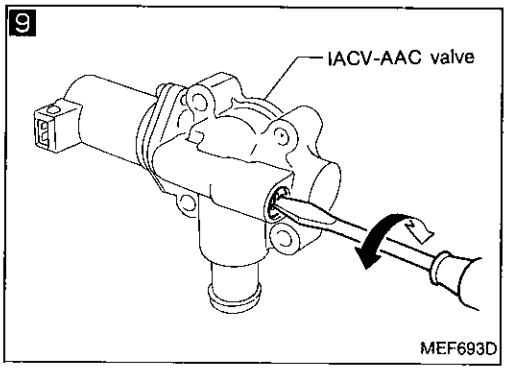
(Go to Ⓒ on next page.)

Diagnostic Procedure 34 — Symptom — Unstable Idle (Cont'd)

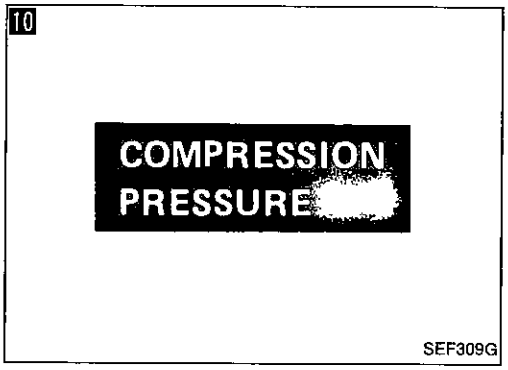
9



9



10



Ⓒ

9 **CHECK IDLE ADJ. SCREW CLOGGING.**

1. Perform "IACV-AAC VALVE ADJ" in "WORK SUPPORT" mode.
2. Can you set engine speed at 600±25 rpm (A/T in "N" position) by turning idle adjusting screw?

No → Check for IACV-AAC valve clogging or throttle valve clogging.

OR

1. Disconnect IACV-AAC valve harness connector.
2. Can you set engine speed at 600±25 rpm (A/T in "N" position) by turning idle adjusting screw?

Yes ↓

10 **CHECK COMPRESSION PRESSURE.**

- Check compression pressure.

Standard: kPa (kg/cm², psi)/300 rpm
1,275 (13.0, 185)
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. ↓

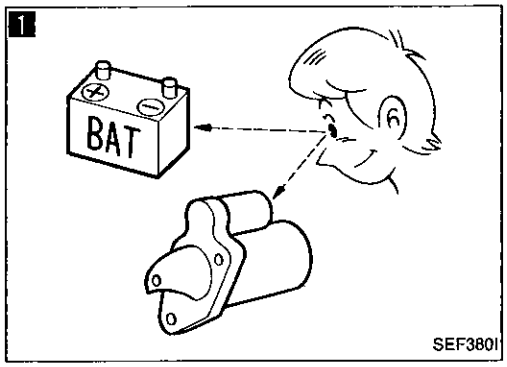
12 **TRY A KNOWN GOOD ECM***

↓

INSPECTION END

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

Diagnostic Procedure 35 — Symptom — Hard to Start or Impossible to Start when the Engine is Cold

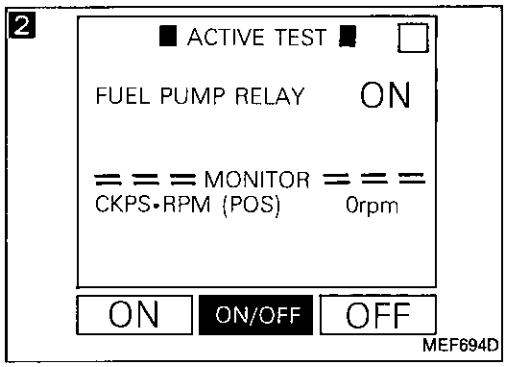


1

CHECK BATTERY AND STARTER.
Check battery and starter condition.
(Refer to EL section.)

N.G. → Repair or replace.

O.K. ↓



2

CHECK FUEL PRESSURE.

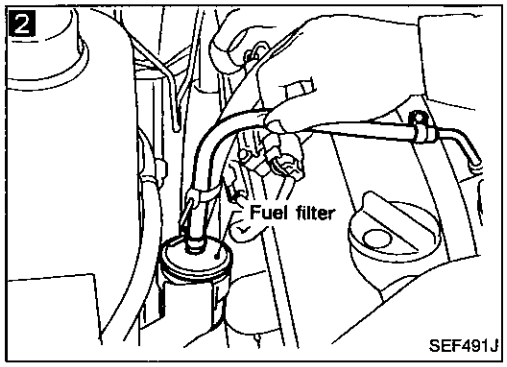
1. Turn ignition switch "ON".
2. Perform "FUEL PUMP RELAY" in "ACTIVE TEST" mode.
3. Pinch fuel feed hose with fingers.

Is fuel pressure pulsation felt on the fuel feed hose?

No → Check fuel pump and circuit. (See page EF & EC-145.)

OR

1. Pinch fuel feed hose with fingers.
2. When cranking the engine, is there any pressure on the fuel feed hose?



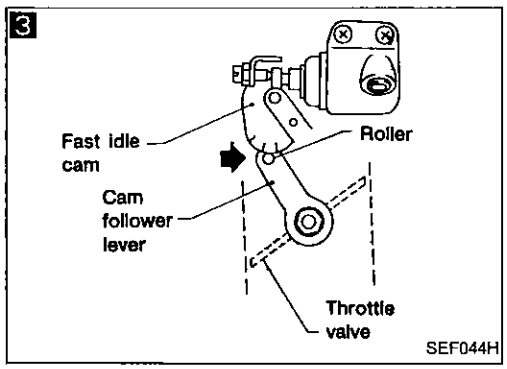
Yes ↓

3

CHECK FAST IDLE CAM.
When the engine is cold, does fast idle cam keep cam follower lever in position?

No → Check fast idle cam adjustment. (See page EF & EC-212.)

Yes ↓

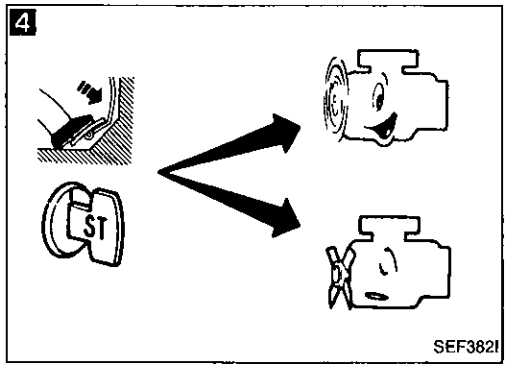


4

CHECK IACV-AAC VALVE.
When pressing accelerator pedal fully, can you start the engine.

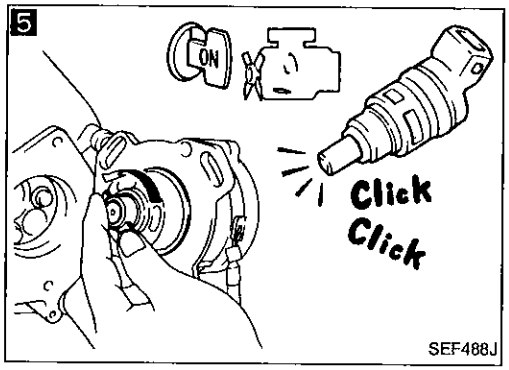
Yes → Check IACV-AAC valve and circuit. (See page EF & EC-148.)

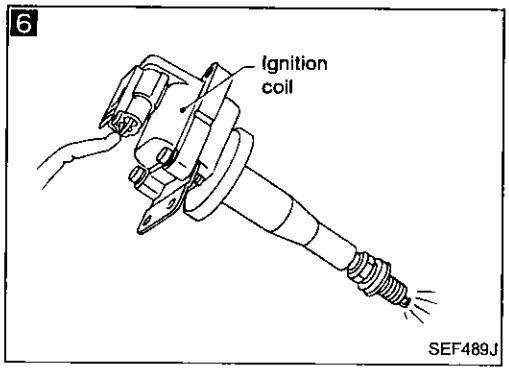
No ↓

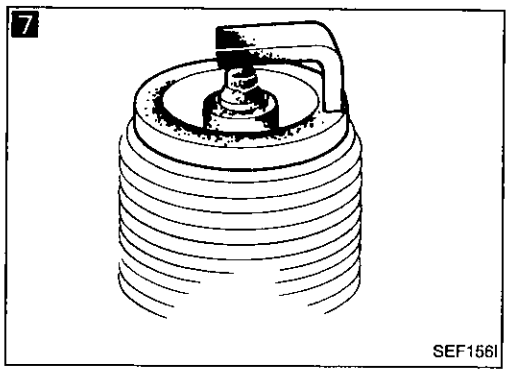


(Go to Ⓐ on next page.)

Diagnostic Procedure 35 — Symptom — Hard to Start or Impossible to Start when the Engine is Cold (Cont'd)







Ⓐ

5 **CHECK INJECTOR.**
1. Remove crankshaft position sensor from engine. (Harness connector should remain connected.)
2. Disconnect power transistor harness connector.
3. Turn ignition switch ON. (Do not start engine.)
4. When rotating crankshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s).

Yes

6 **CHECK IGNITION SPARK.**
1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-93, 126.)

O.K.

7 **CHECK SPARK PLUGS.**
Remove the spark plugs and check for fouling, etc.

N.G. → Repair or replace spark plug(s).

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-76.

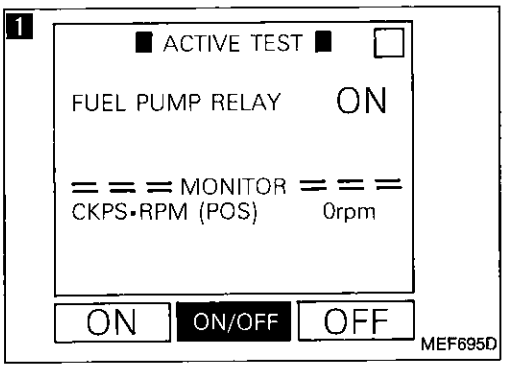
N.G. → Repair or replace.

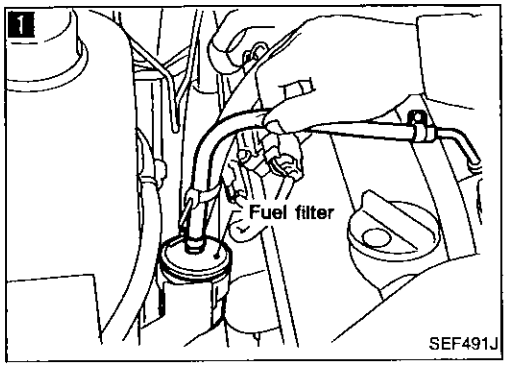
O.K.

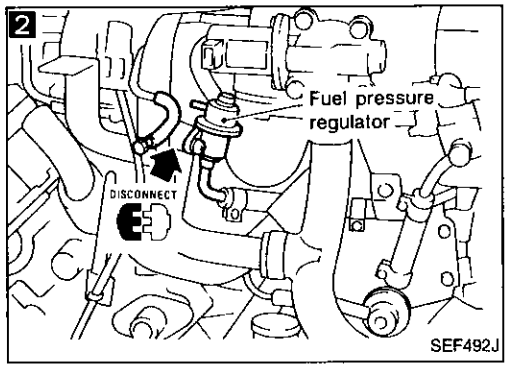
10 **TRY A KNOWN GOOD ECM***

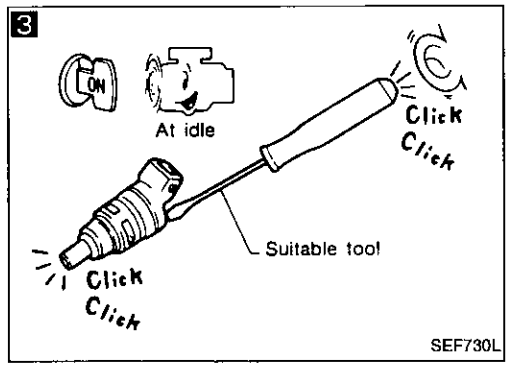
INSPECTION END

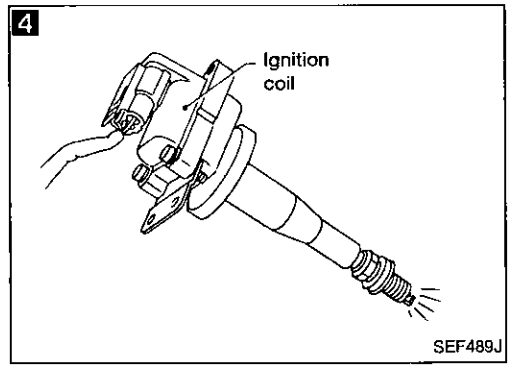
*: ECM may be the cause of a problem, but this is rarely the case.











Diagnostic Procedure 36 — Symptom — Hard to Start or Impossible to Start when the Engine is Hot

1

CHECK FUEL PRESSURE.

1. Turn ignition switch "ON".
2. Perform "FUEL PUMP RELAY" in "ACTIVE TEST" mode.
3. Pinch fuel feed hose with fingers.

Is fuel pressure pulsation felt on the fuel feed hose?

No → Check fuel pump and circuit. (See page EF & EC-145.)

OR

1. Pinch fuel feed hose with fingers.
2. When cranking the engine, is there any pressure on the fuel feed hose?

Yes

2

CHECK FUEL VAPOR.

1. Disconnect fuel pressure regulator vacuum hose and plug hose.
2. Can you start engine?

Yes → Check fuel properties.

No

3

CHECK INJECTOR.

Does each injector make an operating sound at idle?

No → Check injector(s) and circuit(s).

Yes

4

CHECK IGNITION SPARK.

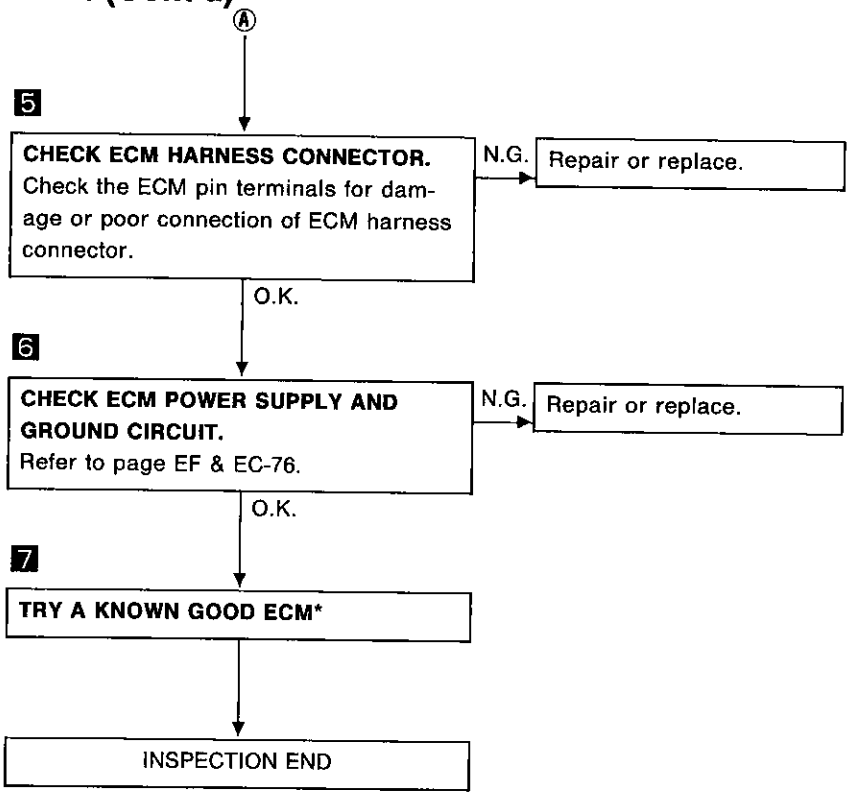
1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-93, 126.)

O.K.

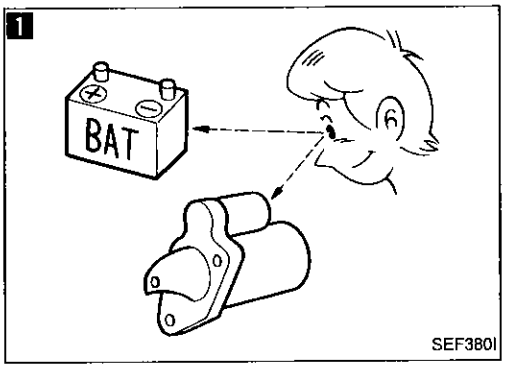
(Go to Ⓐ on next page.)

Diagnostic Procedure 36 — Symptom — Hard to Start or Impossible to Start when the Engine is Hot (Cont'd)



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

Diagnostic Procedure 37 — Symptom — Hard to Start or Impossible to Start under Normal Conditions

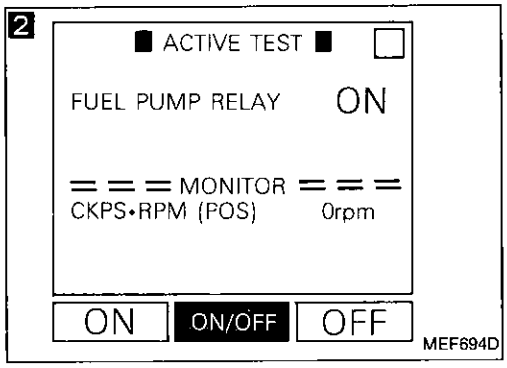


1

CHECK BATTERY AND STARTER.
Check battery and starter operation.
(Refer to EL section.)

N.G. → Repair or replace.

O.K. ↓



2

CHECK FUEL PRESSURE.

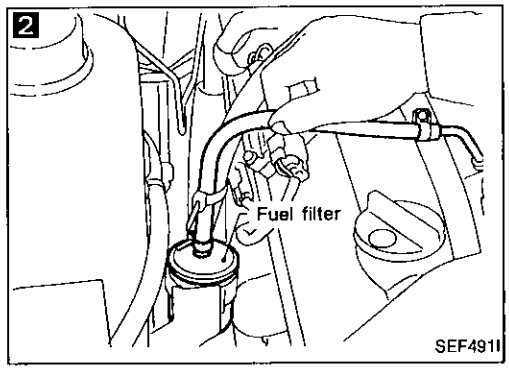
1. Turn ignition switch "ON".
2. Perform "FUEL PUMP RELAY" in "ACTIVE TEST" mode.
3. Pinch fuel feed hose with fingers.

Is fuel pressure pulsation felt on the fuel feed hose?

No → Check fuel pump and circuit. (See page EF & EC-145.)

OR

1. Pinch fuel feed hose with fingers.
2. When cranking the engine, is there any pressure on the fuel feed hose?



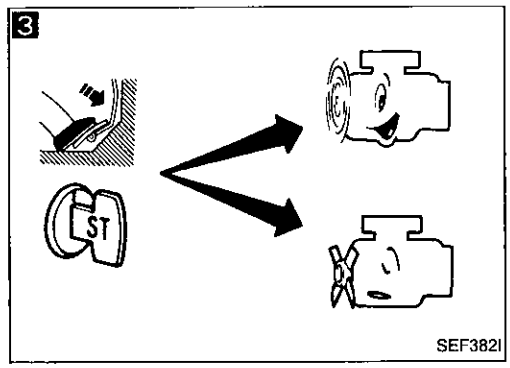
Yes ↓

3

CHECK INJECTOR FOR LEAKAGE.
When pressing accelerator pedal fully, can you start the engine.

Yes → Check injector(s) for leakage.

No ↓



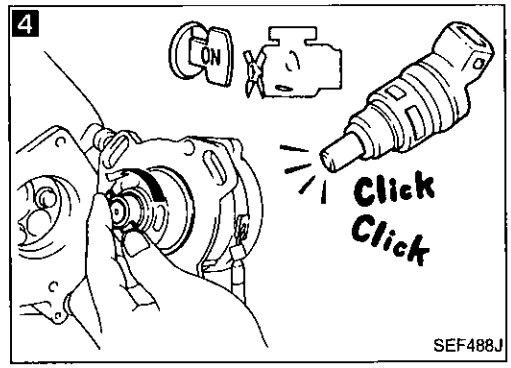
4

CHECK INJECTOR.

1. Remove crankshaft position sensor from engine. (Harness connector should remain connected.)
2. Disconnect power transistor harness connector.
3. Turn ignition switch ON. (Do not start engine.)
4. When rotating crankshaft position sensor shaft, does each injector make an operating sound?

No → Check injectors and circuits.

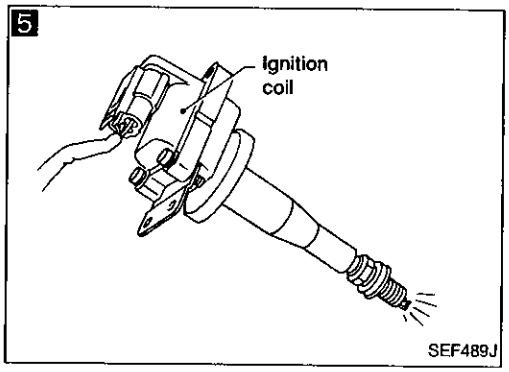
Yes ↓



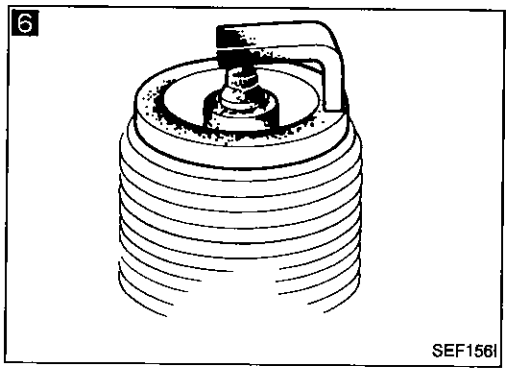
(Go to Ⓐ on next page.)

Diagnostic Procedure 37 — Symptom — Hard to Start or Impossible to Start under Normal Conditions (Cont'd)

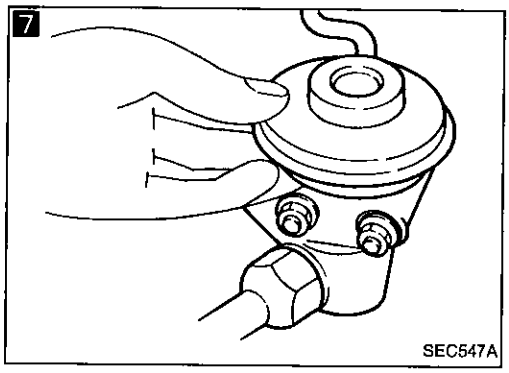
5



6



7



Ⓐ

5

CHECK IGNITION SPARK.
1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-93, 126.)

O.K. ↓

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-76.

N.G. → Repair or replace.

O.K. ↓

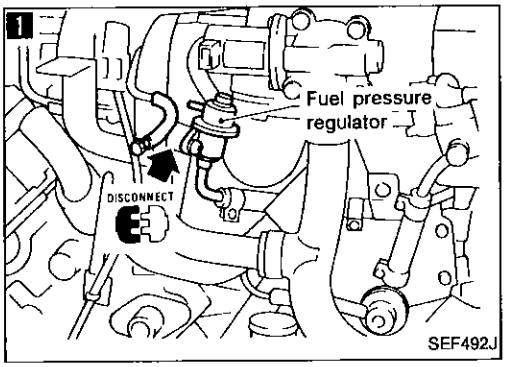
10

TRY A KNOWN GOOD ECM*

↓

INSPECTION END

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



Diagnostic Procedure 38 — Symptom — Hesitation when the Engine is Hot

1

CHECK FUEL VAPOR.
1. Disconnect fuel pressure regulator vacuum hose and plug hose.
2. Perform cruise test.
3. Does the hesitation disappear?

Yes → Check fuel properties.

No ↓

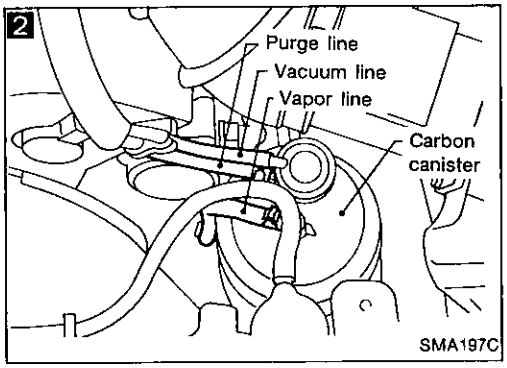
2

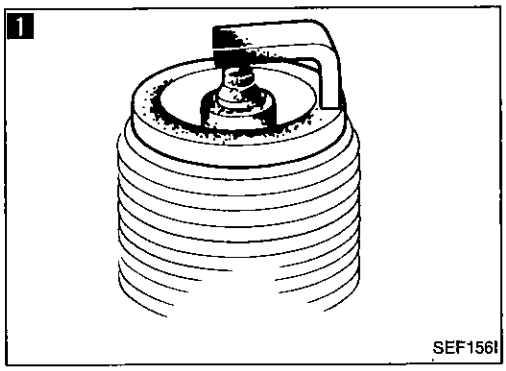
CHECK CANISTER PURGE.
1. Disconnect canister purge line hose and plug hose.
2. Perform cruise test.
3. Does the hesitation disappear?

Yes → Check purge and vacuum lines.

No ↓

INSPECTION END





Diagnostic Procedure 39 — Symptom — 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 ↓

Trouble is fixed.

3

TRY A KNOWN GOOD MASS AIR FLOW SENSOR.

→ Replace mass air flow sensor.

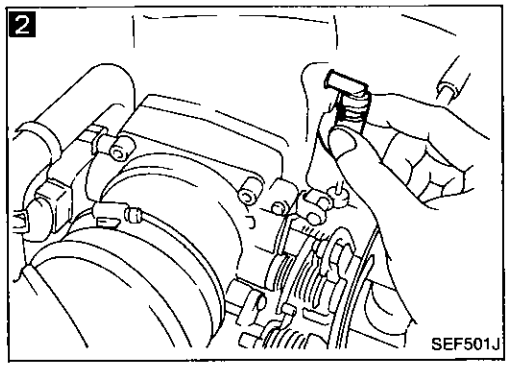
Trouble is not fixed. ↓

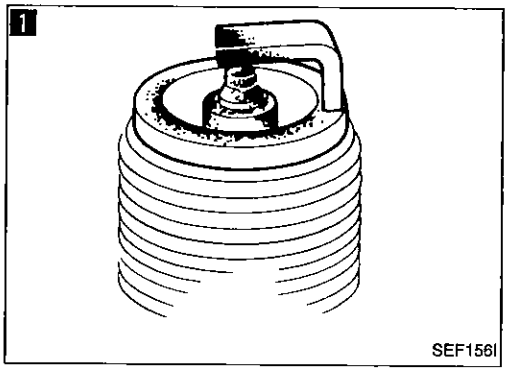
4

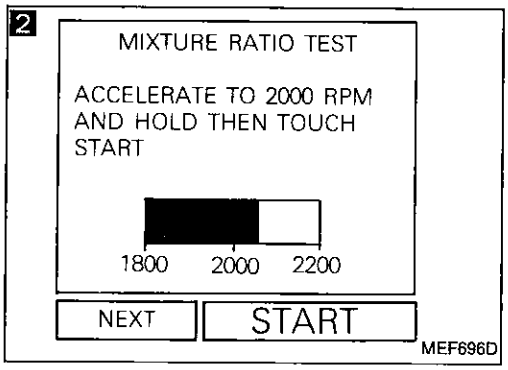
CHECK FOR INTAKE VALVE DEPOSITS.
If there are deposits on intake valves, remove them.

↓

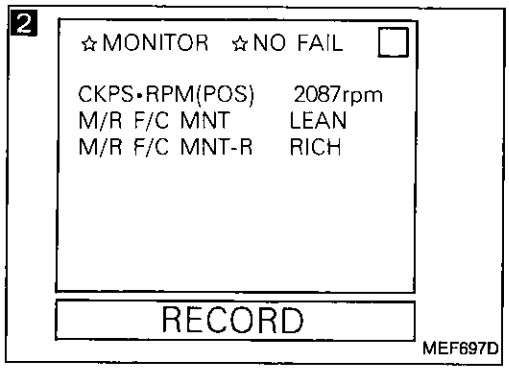
INSPECTION END



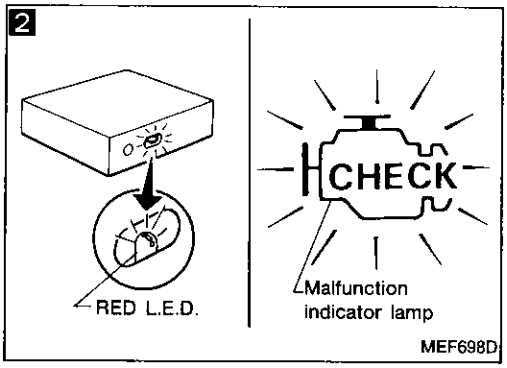

SEF156I



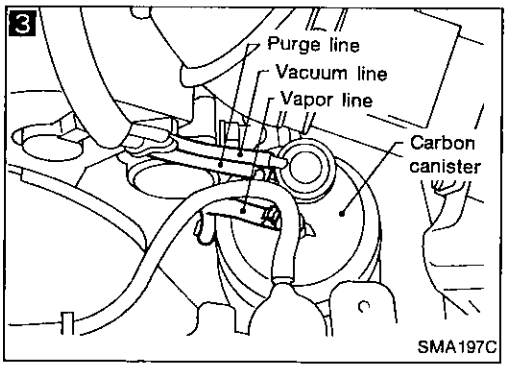
MEF696D



MEF697D



MEF698D



SMA197C

Diagnostic Procedure 40 — Symptom — Hesitation under Normal Conditions

1

CHECK SPARK PLUGS.
Remove spark plugs and check for fouling, etc.

N.G. → Repair or replace spark plug(s).

O.K. ↓

2

CHECK HEATED OXYGEN SENSOR.
1. Start engine and warm it up sufficiently.
2. Perform "MIXTURE RATIO TEST " in "FUNCTION TEST" mode.

Yes → Replace heated oxygen sensor(s).

OR

2. See "M/R F/C MNT (right and left sides)" in "DATA MONITOR" mode.
3. Maintaining engine at 2,000 rpm under no-load (with engine warmed up sufficiently.), check to make sure that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.

RICH→LEAN→RICH→
1 time 2 times
LEAN→RICH.....

OR

2. Set "Heated oxygen sensor monitor" in Diagnostic Test Mode II. (See page EF & EC-55.)
3. Maintaining engine at 2,000 rpm under no load, check that malfunction indicator lamp and RED LED on the ECM go ON and OFF more than 5 times during 10 seconds.

No ↓

3

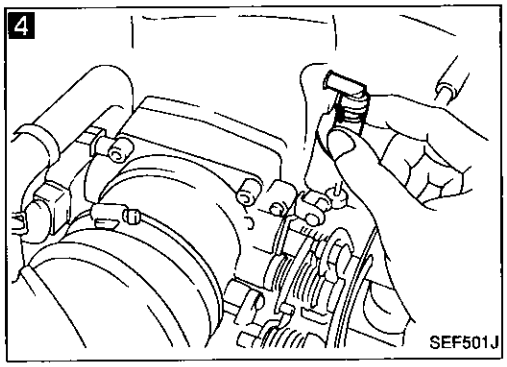
CHECK CANISTER PURGE.
1. Disconnect canister purge line hose and plug hose.
2. Perform cruise test.
3. Does the hesitation disappear?

Yes → Check purge and vacuum lines.

No ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 40 — Symptom — Hesitation under Normal Conditions (Cont'd)



Ⓐ

4

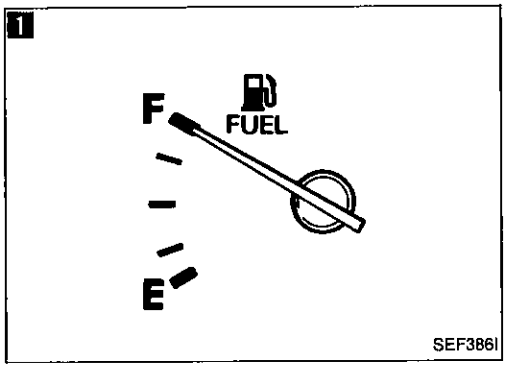
CHECK FOR INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

Yes → Discover air leak location and repair.

No ↓

INSPECTION END

Diagnostic Procedure 41 — Symptom — Engine Stalls when Turning

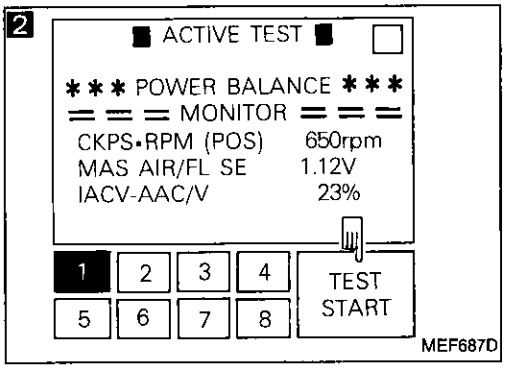


1

CHECK FUEL LEVEL.
Check to see that there is enough fuel in tank.

N.G. → Fill fuel tank with fuel.

O.K. ↓



2

PERFORM POWER BALANCE TEST.

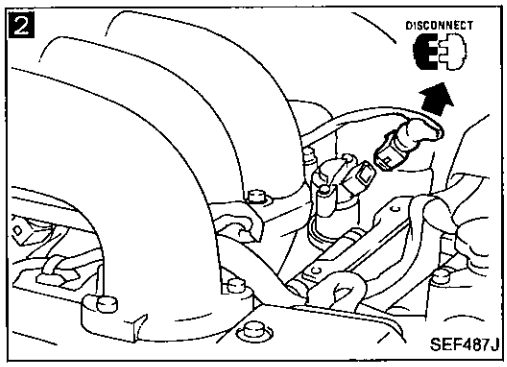
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

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 ↓



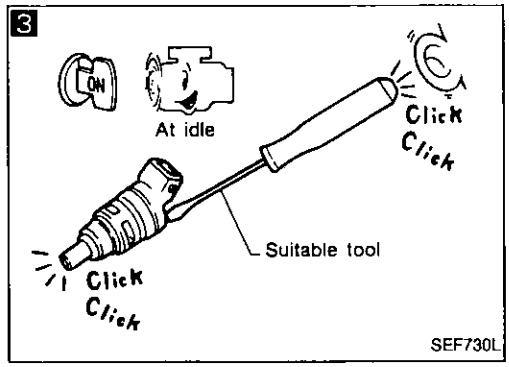
3

CHECK INJECTOR.
Does each injector make an operating sound at idle?

No → Check injector(s) and circuit(s).

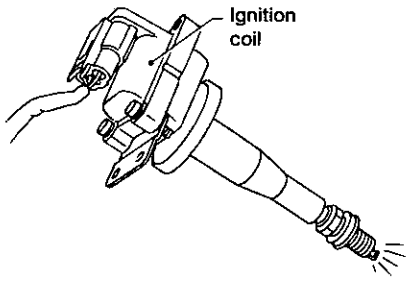
Yes ↓

(Go to Ⓐ on next page.)



Diagnostic Procedure 41 — Symptom — Engine Stalls when Turning (Cont'd)

4



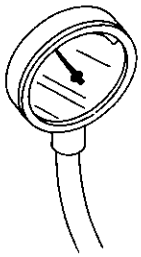
SEF489J

5

■ FUEL PRES RELEASE ■

FUEL PUMP WILL STOP BY TOUCHING START DURING IDLE.
CRANK A FEW TIMES AFTER ENGINE STALL.

START



MEF699D

Ⓐ

4 **CHECK IGNITION SPARK.**

1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-93, 126.)

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. 235 kPa (2.4 kg/cm², 34 psi)
   The moment throttle valve is fully open:
   approx. 294 kPa (3.0 kg/cm², 43 psi)

N.G. → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-215.)
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-76.

N.G. → Repair or replace.

O.K. ↓

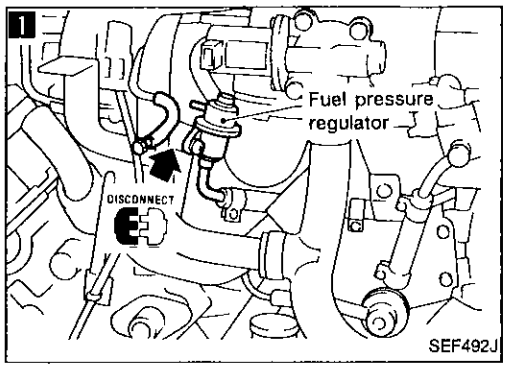
8 **TRY A KNOWN GOOD ECM***

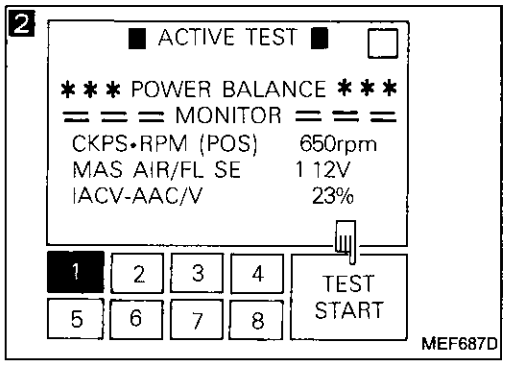
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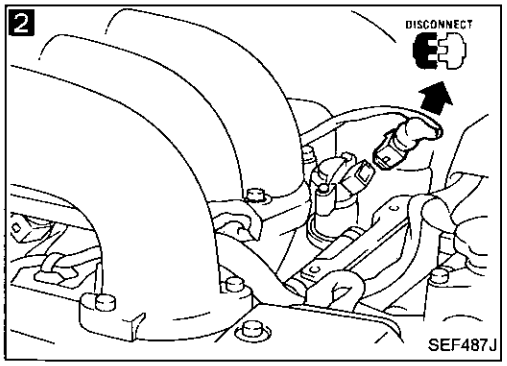
INSPECTION END

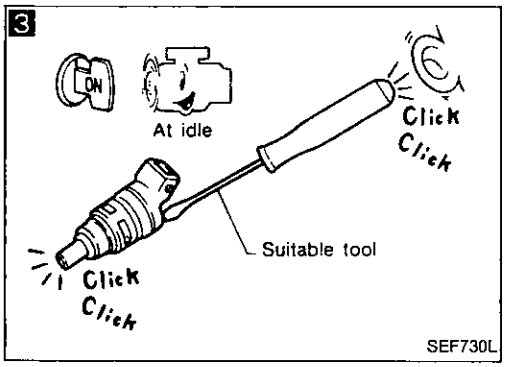
*: ECM may be the cause of a problem, but this is rarely the case.

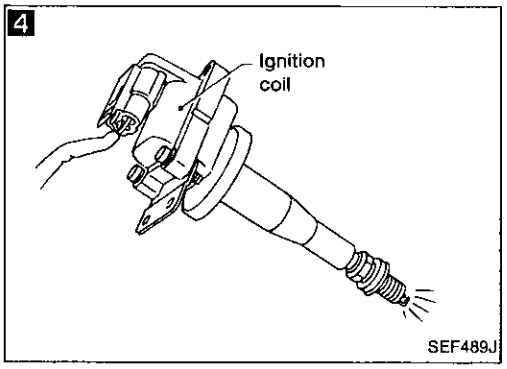
Diagnostic Procedure 42 — Symptom — Engine Stalls when the Engine is Hot











1

CHECK FUEL VAPOR.
1. Disconnect fuel pressure regulator vacuum hose and plug hose.
2. Perform cruise test.
3. Does the engine stall disappear?

Yes → Check fuel properties.

No ↓

2

PERFORM POWER BALANCE TEST.
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

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.
Does each injector make an operating sound at idle?

No → Check injector(s) and circuit(s).

Yes ↓

4

CHECK IGNITION SPARK.
1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-93, 126.)

O.K. ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 42 — Symptom — Engine Stalls when the Engine is Hot (Cont'd)

5

■ FUEL PRES RELEASE ■

FUEL PUMP WILL STOP BY TOUCHING START DURING IDLE.
CRANK A FEW TIMES AFTER ENGINE STALL

START



MEF699D

Ⓐ

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. 235 kPa (2.4 kg/cm², 34 psi)
   The moment throttle valve is fully open:
   approx. 294 kPa (3.0 kg/cm², 43 psi)

N.G. → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-215.)
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-76.

N.G. → Repair or replace.

O.K. ↓

8

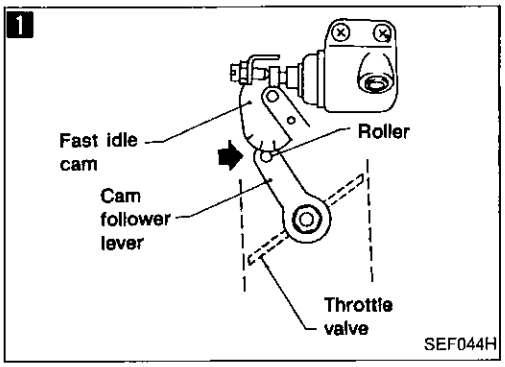
TRY A KNOWN GOOD ECM*.

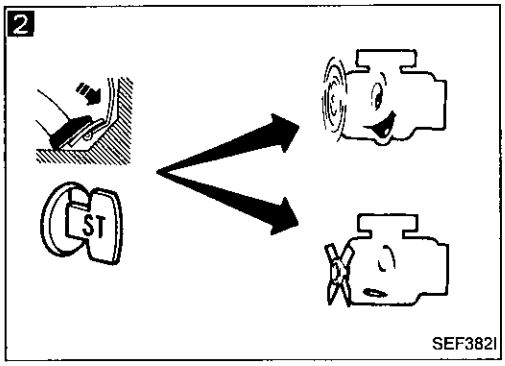
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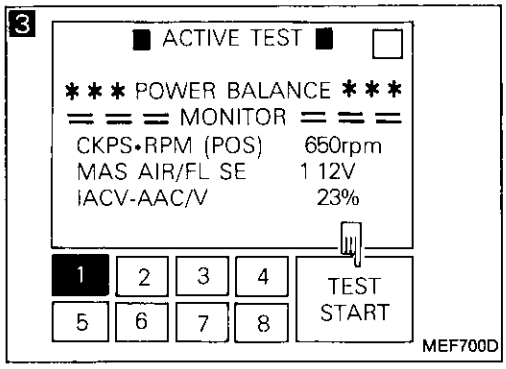
INSPECTION END

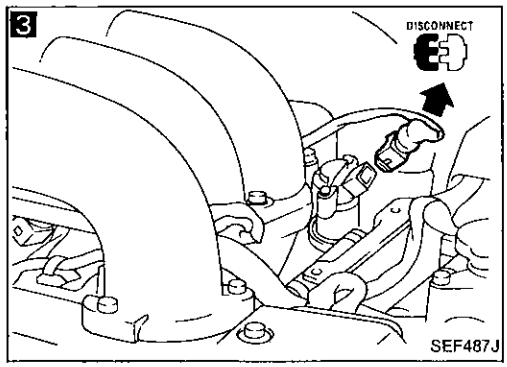
*: ECM may be the cause of a problem, but this is rarely the case.

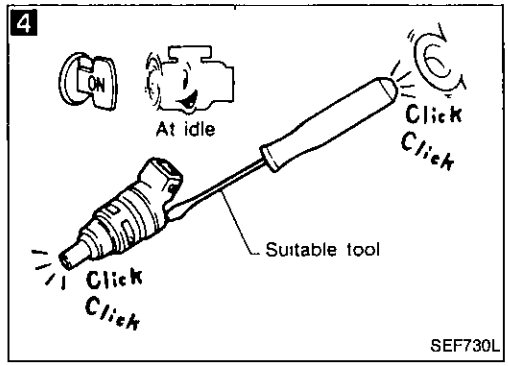
Diagnostic Procedure 43 — Symptom — Engine Stalls when the Engine is Cold











1

CHECK FAST IDLE CAM.
When the engine is cold, does fast idle cam keep cam follower lever in position?

No → Check fast idle cam adjustment. (See page EF & EC-212.)

Yes ↓

2

CHECK IACV-AAC VALVE.
When the engine is cold, can you start the engine when pressing accelerator pedal fully?

Yes → Check IACV-AAC valve and circuits. (See page EF & EC-148.)

No ↓

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?

N.G. → Go to **7** .

O.K. ↓

4

CHECK INJECTOR.
Does each injector make an operating sound at idle?

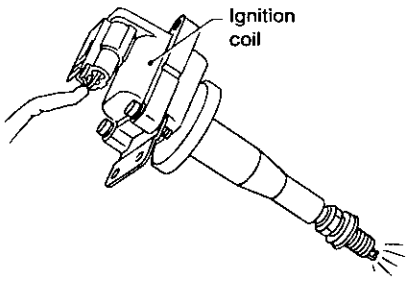
N.G. → Check injector(s) and circuit(s).

O.K. ↓

(Go to Ⓐ on next page.)

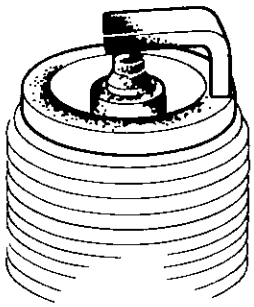
Diagnostic Procedure 43 — Symptom — Engine Stalls when the Engine is Cold (Cont'd)

5



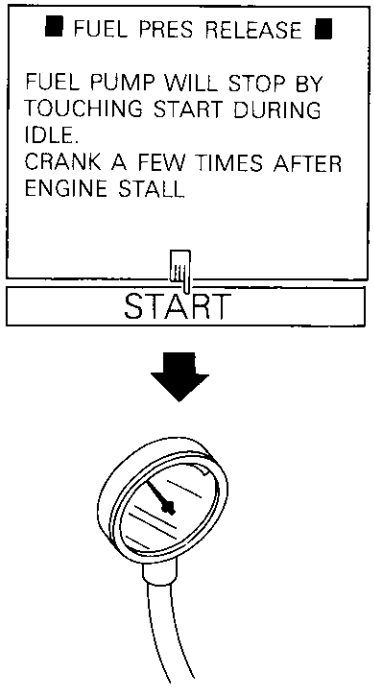
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6



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7



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Ⓐ

5 **CHECK IGNITION SPARK.**
1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-93, 126.)

O.K. ↓

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 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. 235 kPa (2.4 kg/cm², 34 psi)
   The moment throttle valve is fully open:
   approx. 294 kPa (3.0 kg/cm², 43 psi)

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-215.)
2. Install fuel pressure gauge and check fuel pressure.

N.G. → Check fuel pressure regulator diaphragm.

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-76.

N.G. → Repair or replace.

O.K. ↓

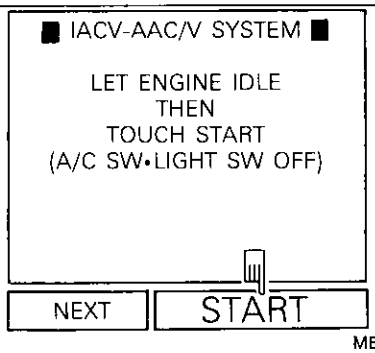
10 **TRY A KNOWN GOOD ECM***

↓

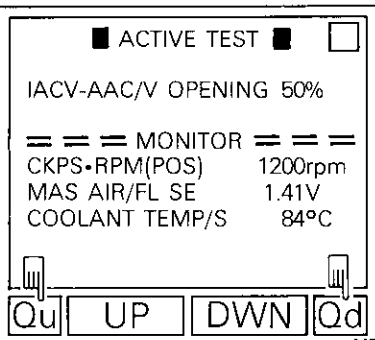
INSPECTION END

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

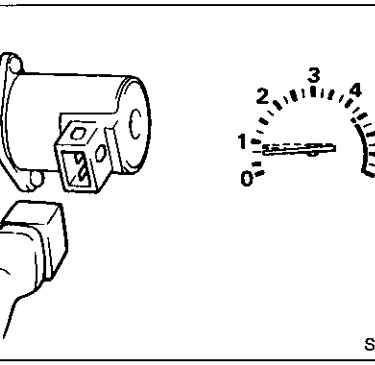
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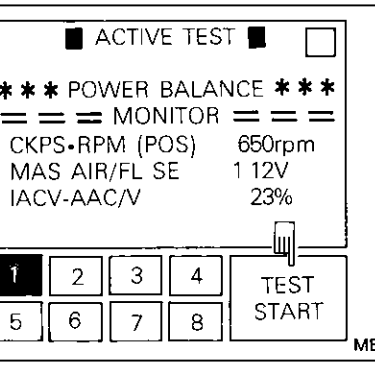
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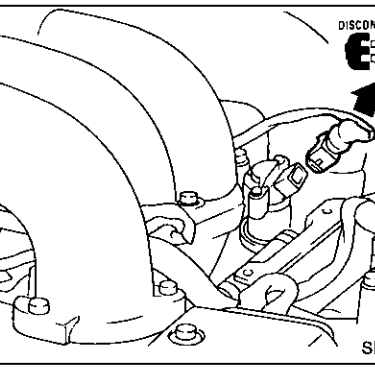
1



2



2



Diagnostic Procedure 44 — Symptom — Engine Stalls when Stepping on the Accelerator Momentarily

1

CHECK IACV-AAC VALVE.

1. Start engine and warm it up sufficiently.
2. Perform "IACV-AAC VALVE SYSTEM " in "FUNCTION TEST" mode.

OR

1. Select "IACV-AAC VALVE 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-148.)

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?

OR

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

No → Go to **5** .

Yes

3

CHECK INJECTOR.

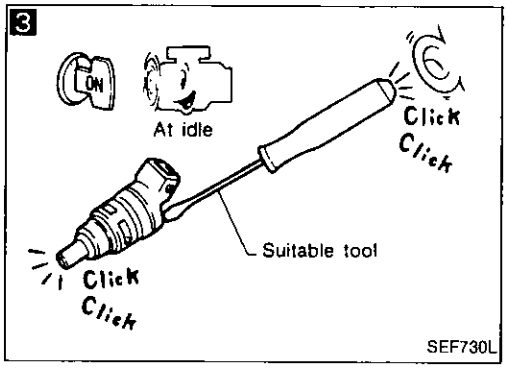
Does each injector make an operating sound at idle?

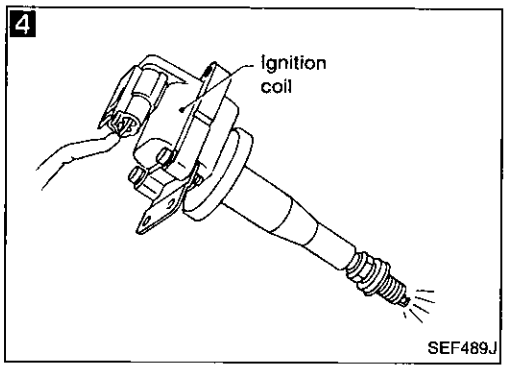
No → Check injector(s) and their circuit(s).

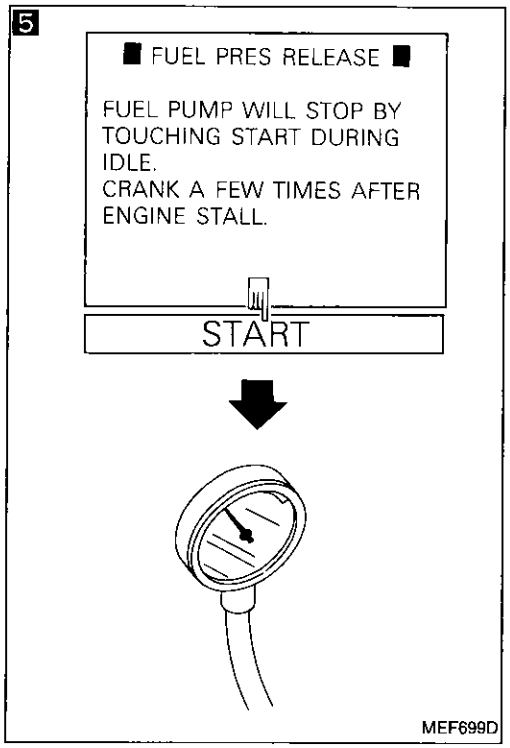
Yes

(Go to Ⓐ on next page.)

Diagnostic Procedure 44 — Symptom — Engine Stalls when Stepping on the Accelerator Momentarily (Cont'd)







Ⓐ

4

CHECK IGNITION SPARK.
1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against an earth point with engine cranking.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-93, 126.)

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. 235 kPa (2.4 kg/cm², 34 psi)
   The moment throttle valve is fully open:
   approx. 294 kPa (3.0 kg/cm², 43 psi)

N.G. → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-215.)
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-76.

N.G. → Repair or replace.

O.K. ↓

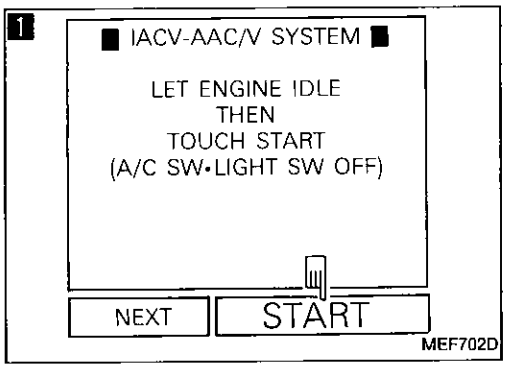
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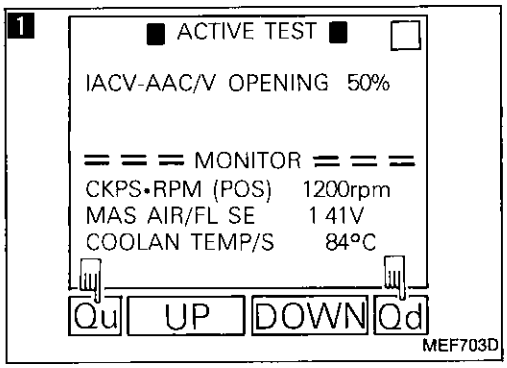
TRY A KNOWN GOOD ECM*

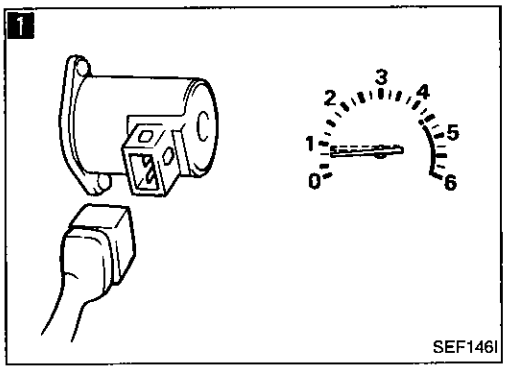
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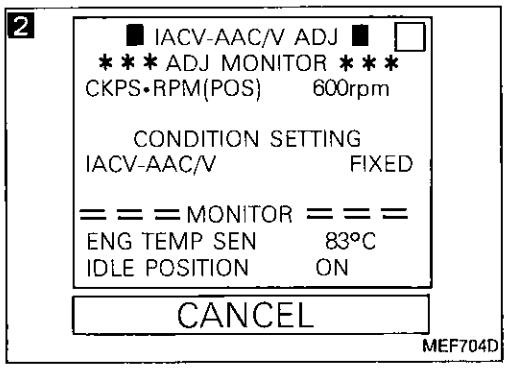
INSPECTION END

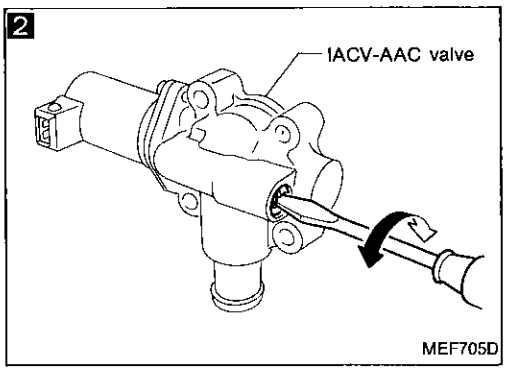
*: ECM may be the cause of a problem, but this is rarely the case.











Diagnostic Procedure 45 — Symptom — Engine Stalls after Decelerating

1

CHECK IACV-AAC VALVE.

1. Start engine and warm it up sufficiently.
2. Perform "IACV-AAC VALVE SYSTEM" in "FUNCTION TEST" mode.

OR

1. Select "IACV-AAC VALVE 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-148.)

Yes

2

CHECK IDLE ADJ. SCREW CLOGGING.

1. Perform "IACV-AAC VALVE ADJ" in "WORK SUPPORT" mode.
2. Can you set engine speed at 600±25 rpm (A/T in "N" position) by turning idle adjusting screw?

OR

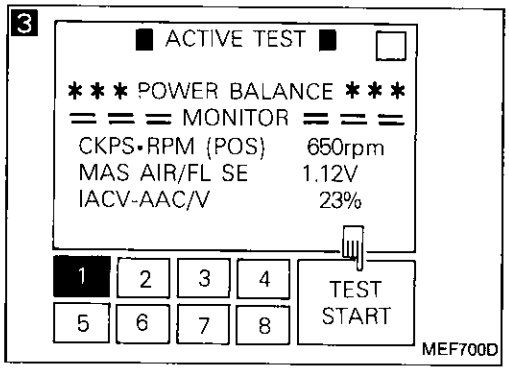
1. Disconnect IACV-AAC valve harness connector.
2. Can you set engine speed at 600±25 rpm (A/T in "N" position) by turning idle adjusting screw?

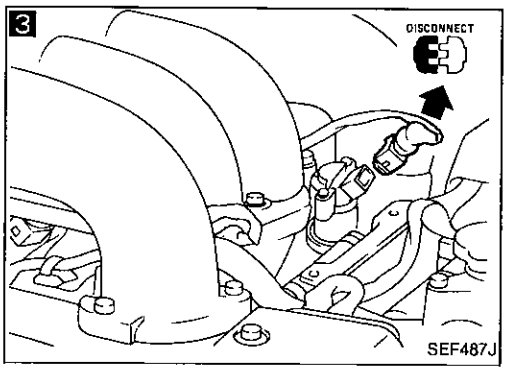
No → Check for IACV-AAC valve clogging or throttle body clogging.

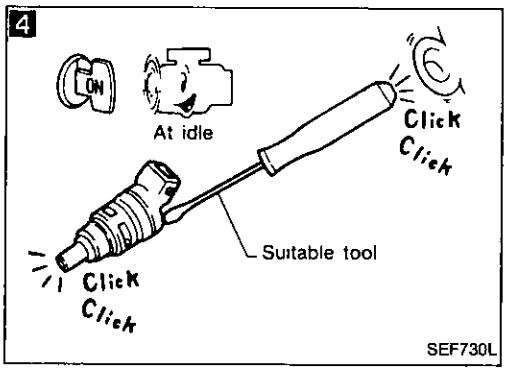
Yes

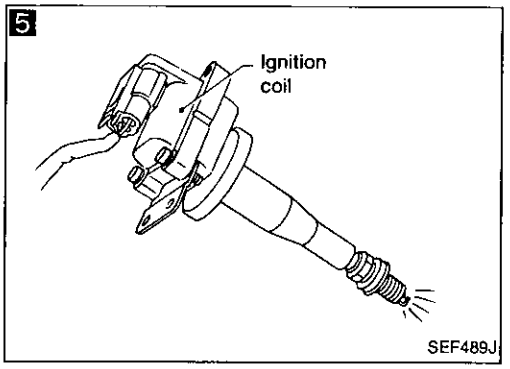
(Go to Ⓐ on next page.)

Diagnostic Procedure 45 — Symptom — 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?

No → 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?

Yes ↓

4

CHECK INJECTOR.

1. Does each injector make an operating sound at idle?

No → Check injector(s) and circuit(s).

Yes ↓

5

CHECK IGNITION SPARK.

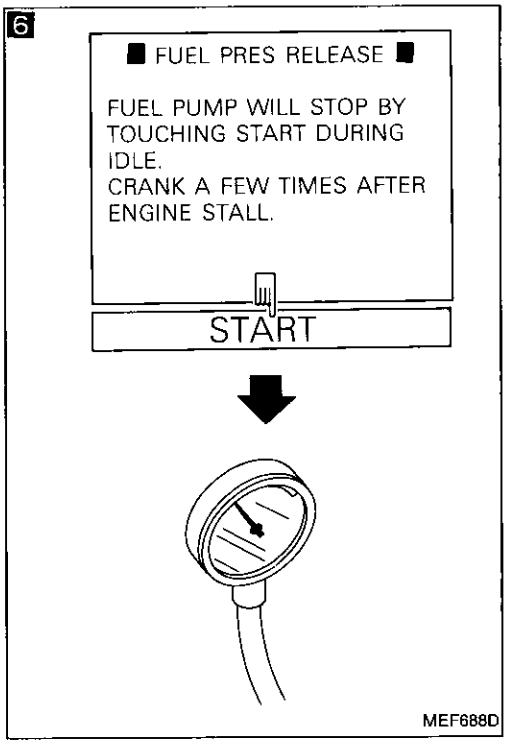
1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

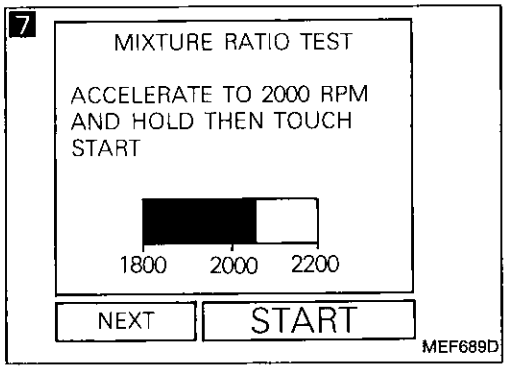
N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-93, 126.)

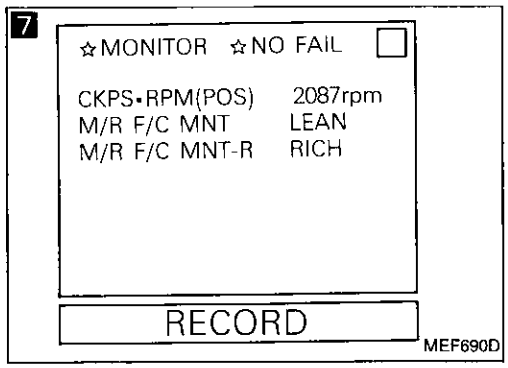
O.K. ↓

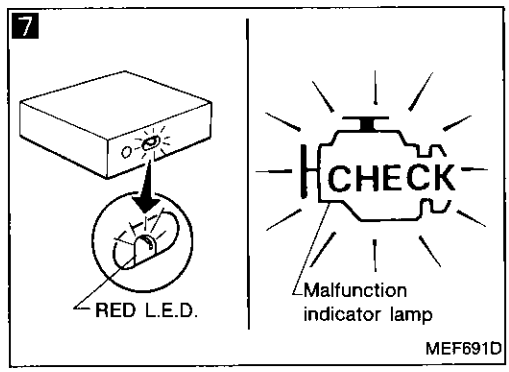
(Go to Ⓑ on next page.)

Diagnostic Procedure 45 — Symptom — 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. 235 kPa (2.4 kg/cm², 34 psi)
   The moment throttle valve is fully open:
   approx. 294 kPa (3.0 kg/cm², 43 psi)

N.G. → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-215.)
2. Install fuel pressure gauge and check fuel pressure.

O.K.

7

CHECK HEATED OXYGEN SENSOR.

1. Start engine and warm it up sufficiently.
2. Perform "MIXTURE RATIO TEST" in "FUNCTION TEST" mode.

N.G. → Replace heated oxygen sensor(s).

OR

2. See "M/R F/C MNT (right and left sides)" in "DATA MONITOR" mode.
3. Maintaining engine at 2,000 rpm under no-load (with engine warmed up sufficiently.), check to make sure that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.
   RICH→LEAN→RICH→ (1 time) (2 times) LEAN→RICH.....

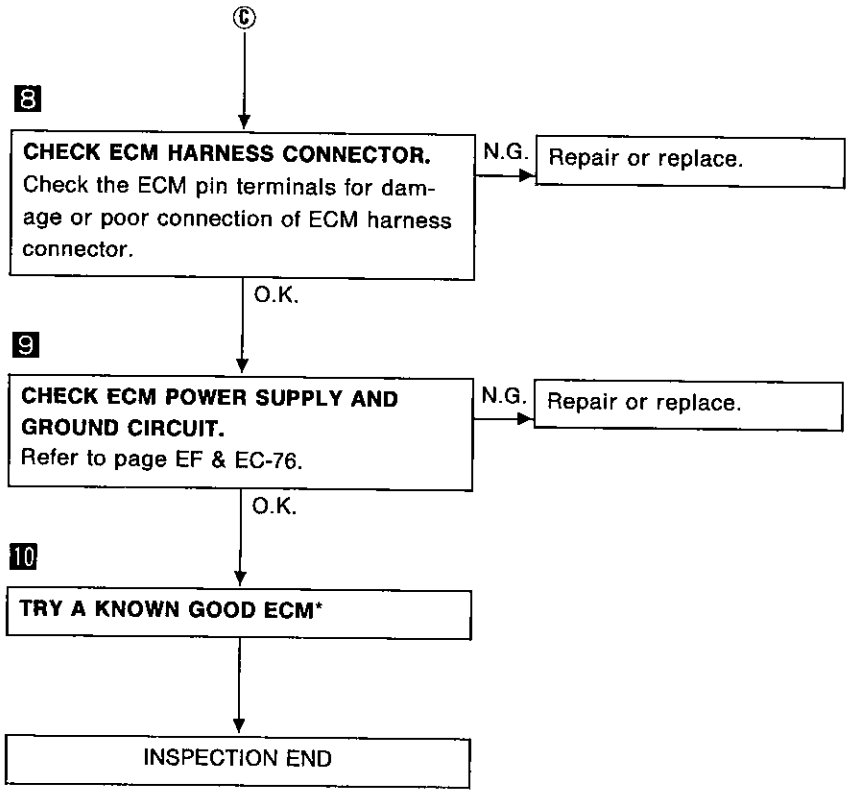
OR

2. Set "Heated oxygen sensor monitor" in Diagnostic Test Mode II. (See page EF & EC-52.)
3. Maintaining engine at 2,000 rpm under no-load, check that malfunction indicator lamp and RED LED on the ECM go ON and OFF more than 5 times during 10 seconds.

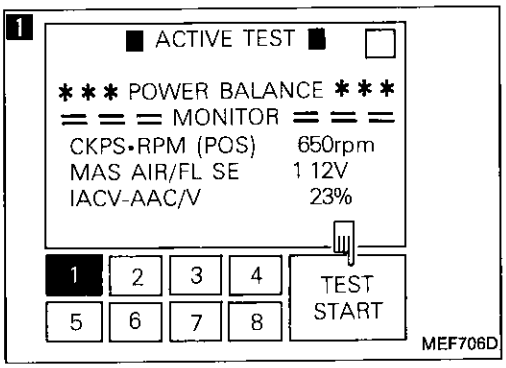
O.K.

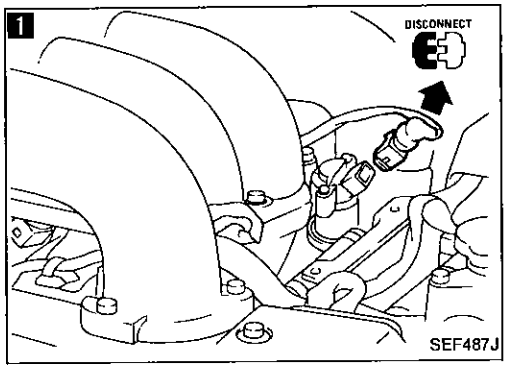
(Go to Ⓒ on next page.)

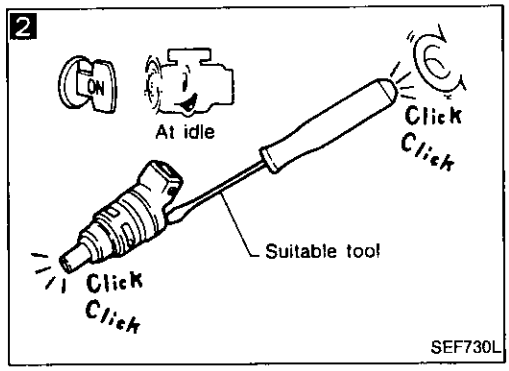
Diagnostic Procedure 45 — Symptom — Engine Stalls after Decelerating (Cont'd)

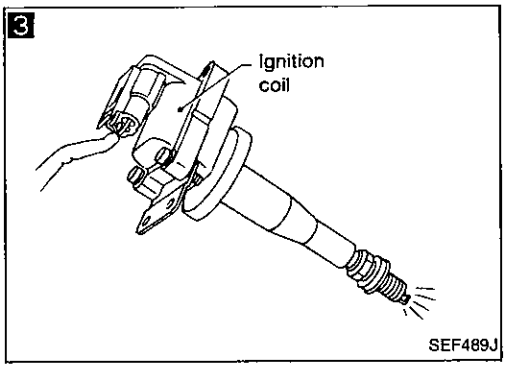


*: ECM may be the cause of a problem, but this is rarely the case.









Diagnostic Procedure 46 — Symptom — Engine Stalls when Accelerating or when Driving at Constant Speed

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.

Does each injector make an operating sound at idle?

No → Check injector(s) and circuit(s).

Yes ↓

3

CHECK IGNITION SPARK.

1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-93, 126.)

O.K. ↓

(Go to Ⓐ on next page.)

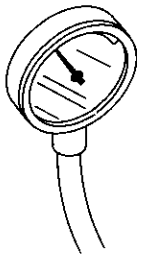
Diagnostic Procedure 46 — Symptom — Engine Stalls when Accelerating or when Driving at Constant Speed (Cont'd)

4

■ FUEL PRES RELEASE ■

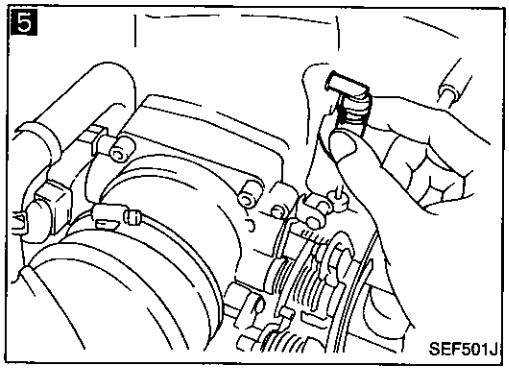
FUEL PUMP WILL STOP BY TOUCHING START DURING IDLE.
CRANK A FEW TIMES AFTER ENGINE STALL.

START



MEF707D

5



SEF501J

Ⓐ

4 **CHECK FUEL PRESSURE.**

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.
   At idle approx. 235 kPa (2.4 kg/cm², 34 psi)
   The moment throttle valve is fully open:
   approx. 294 kPa (3.0 kg/cm², 43 psi)

N.G. → Check fuel pump, circuit and fuel pressure regulator.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-215.)
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

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-76.

Yes → Repair or replace.

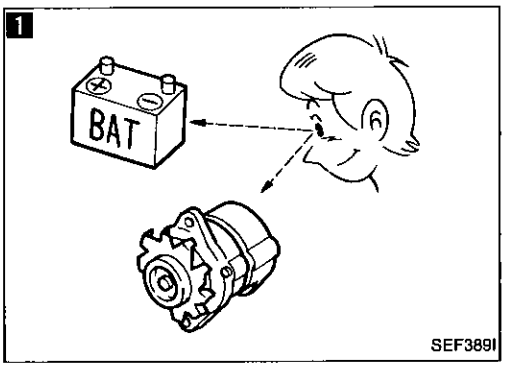
No

8 **TRY A KNOWN GOOD ECM***

INSPECTION END

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

Diagnostic Procedure 47 — Symptom — Engine Stalls when the Electrical Load is Heavy

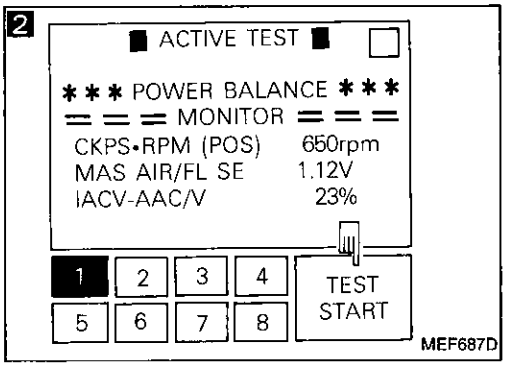


1

CHECK BATTERY AND ALTERNATOR.
Check battery and alternator condition. (Refer to EL section.)

N.G. → Repair or replace.

O.K. ↓



2

PERFORM POWER BALANCE TEST.

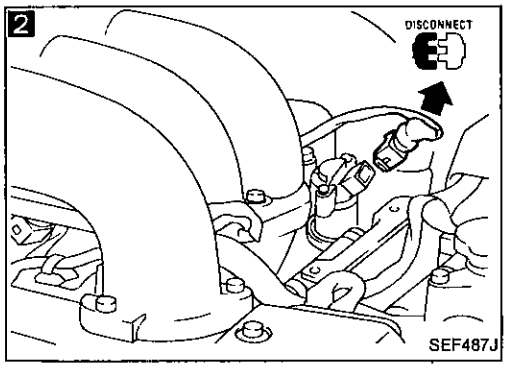
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

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 ↓

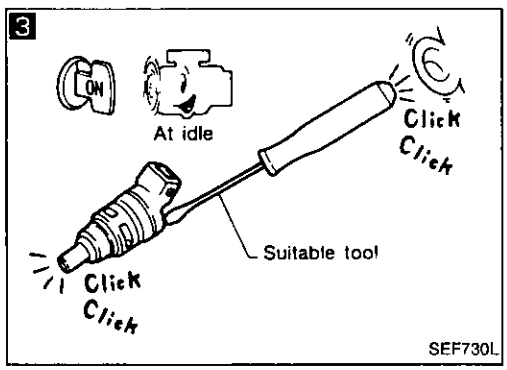


3

CHECK INJECTOR.
Does each injector make an operating sound at idle?

No → Check injector(s) and circuit(s).

Yes ↓



4

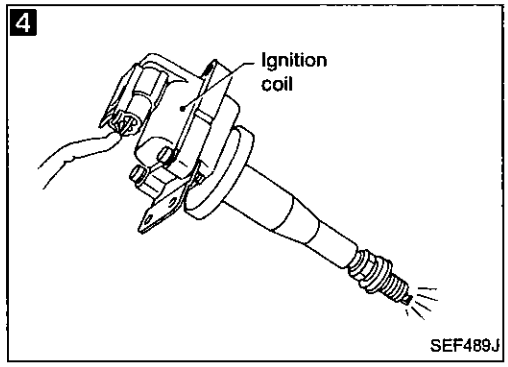
CHECK IGNITION SPARK.

1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-93, 126.)

O.K. ↓

(Go to Ⓐ on next page.)



Diagnostic Procedure 47 — Symptom — Engine Stalls when the Electrical Load is Heavy (Cont'd)

5

■ FUEL PRES RELEASE ■

FUEL PUMP WILL STOP BY TOUCHING START DURING IDLE.
CRANK A FEW TIMES AFTER ENGINE STALL

START



MEF699D

Ⓐ

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. 235 kPa (2.4 kg/cm², 34 psi)
   The moment throttle valve is fully open:
   approx. 294 kPa (3.0 kg/cm², 43 psi)

N.G. → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-215.)
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-76.

N.G. → Repair or replace.

O.K.

8

TRY A KNOWN GOOD ECM*

INSPECTION END

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

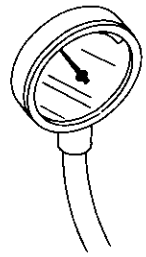
Diagnostic Procedure 48 — Symptom — Lack of Power and Stumble

1

■ FUEL PRES RELEASE ■

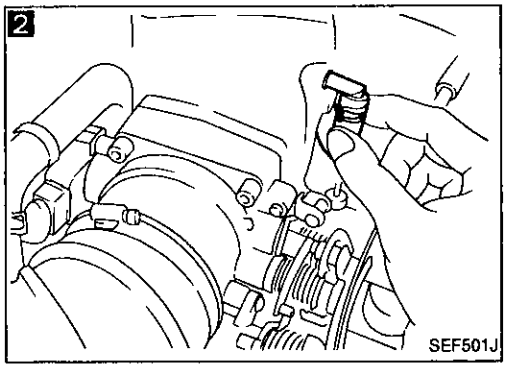
FUEL PUMP WILL STOP BY TOUCHING START DURING IDLE.
CRANK A FEW TIMES AFTER ENGINE STALL.

START



MEF708D

2



SEF501J

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. 235 kPa (2.4 kg/cm², 34 psi)
   The moment throttle valve is fully open:
   approx. 294 kPa (3.0 kg/cm², 43 psi)

N.G. → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-215.)
2. Install fuel pressure gauge and check fuel pressure.

O.K.

2

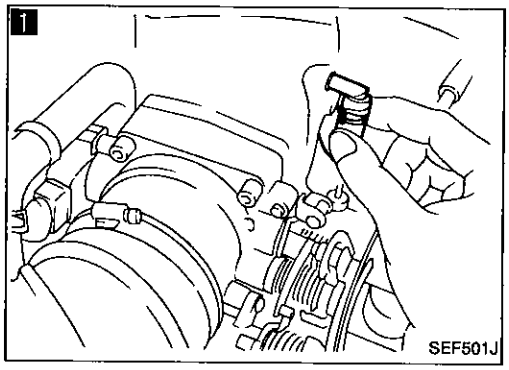
CHECK FOR INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

Yes → Discover air leak location and repair.

No

INSPECTION END

Diagnostic Procedure 49 — Symptom — Knock

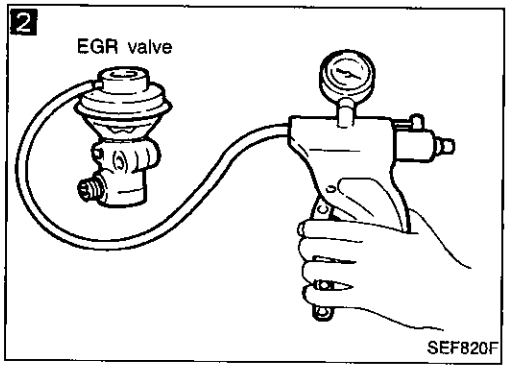


1

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 ↓

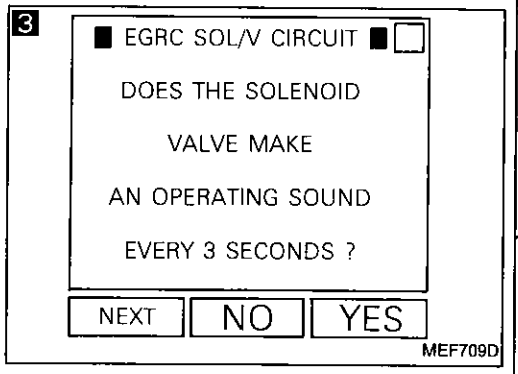


2

CHECK EGR OPERATION.
1. Apply vacuum directly to the EGR valve using a handy vacuum pump.
2. Check to see that the engine runs rough or dies.

No → Check EGR valve for sticking.

Yes ↓



3

CHECK EGRC-SOLENOID VALVE.

1. Turn ignition switch "ON".
2. Perform "EGRC S/V CIRCUIT" in "FUNCTION TEST" mode.

— OR —

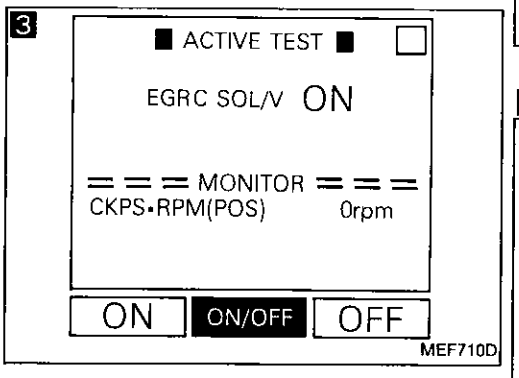
1. Turn ignition switch "ON".
2. Select "EGRC SOL VALVE" in "ACTIVE TEST" mode.
3. Turn EGRC-solenoid valve ON and OFF.
4. Check operating sound.

— OR —

1. Disconnect EGRC-solenoid valve harness connector.
2. Supply EGRC-solenoid valve terminals with battery current and check operating sound.

N.G. → Check solenoid valve and circuit.

O.K. ↓

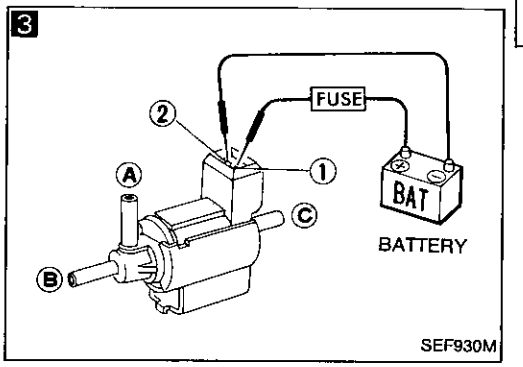


4

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.

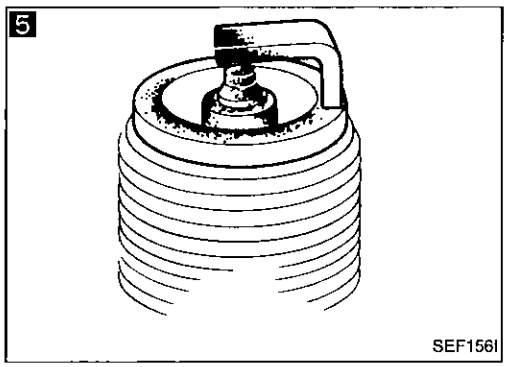
N.G. → Repair or replace.

O.K. ↓



(Go to Ⓐ on next page.)

Diagnostic Procedure 49 — Symptom — Knock (Cont'd)


SEF156I

Ⓐ

5

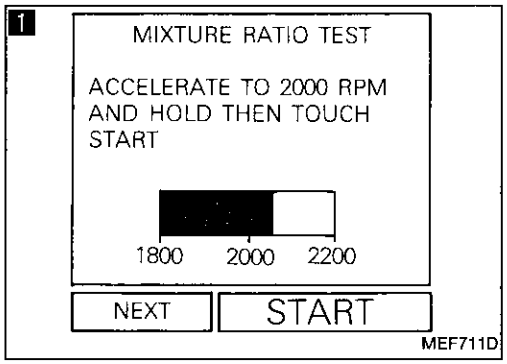
CHECK FOR OIL LEAK TO COMBUSTION CHAMBER.
Remove spark plugs and check for fouling with oil.

Yes → Check pistons, piston rings, valves, valve seats, valve oil seal, engine oil level, etc.

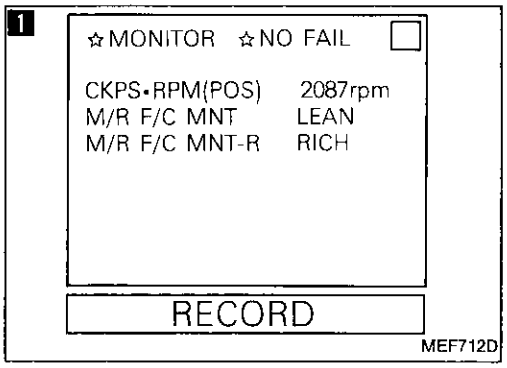
No ↓

INSPECTION END

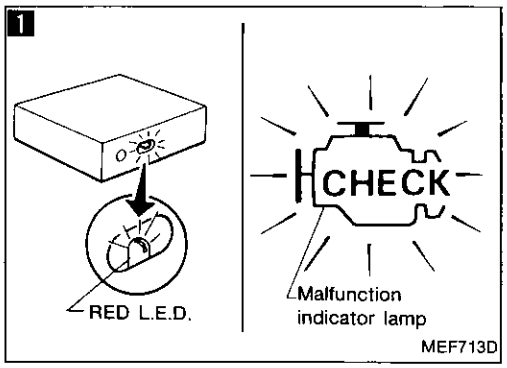
Diagnostic Procedure 50 — Symptom — Surge



MEF711D



MEF712D



MEF713D

1

CHECK HEATED OXYGEN SENSOR.
1. Start engine and warm it up sufficiently.
2. Perform "MIXTURE RATIO TEST" in "FUNCTION TEST" mode.

OR

2. See "M/R F/C MNT (right and left sides)" in "DATA MONITOR" mode.
3. Maintaining engine at 2,000 rpm under no-load (with engine warmed up sufficiently.), check to make sure that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.
   RICH→LEAN→RICH→ (1 time, 2 times)
   LEAN→RICH.....

OR

2. Set "Heated oxygen sensor monitor" in Diagnostic Test Mode II. (See page EF & EC-55.)
3. Maintaining engine at 2,000 rpm under no-load, check that malfunction indicator lamp and RED LED on the ECM go ON and OFF more than 5 times during 10 seconds.

N.G. → Replace heated oxygen sensor(s).

O.K. ↓

2

CHECK EGR VALVE.
Check EGR valve for sticking.

N.G. → Repair or replace.

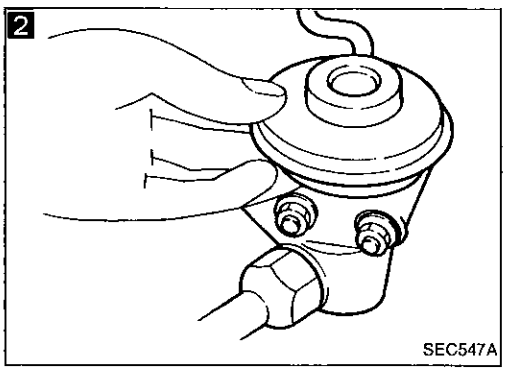
O.K. ↓

3

TRY A KNOWN GOOD ECM*

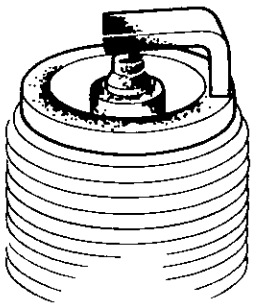
O.K. ↓

INSPECTION END


SEC547A

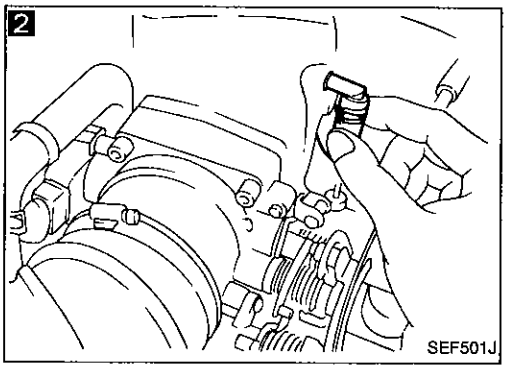
*: ECM may be the cause of a problem, but this is rarely the case.

1



SEF156I

2



SEF501J

Diagnostic Procedure 51 — Symptom — 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

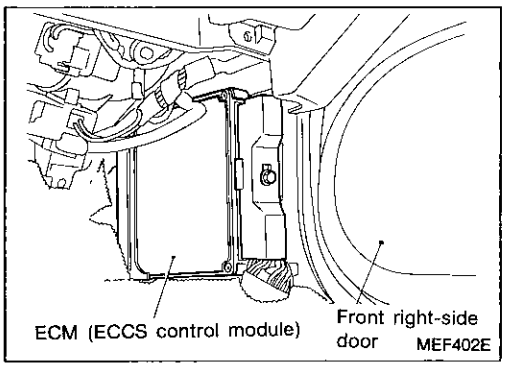
Diagnostic Procedure 52 — Symptom — Backfire through the Exhaust

CHECK ENGINE COOLANT TEMPERATURE SENSOR.
Check engine coolant temperature sensor and its circuit. (See page EF & EC-86.)

N.G. → Replace or repair.

O.K. ↓

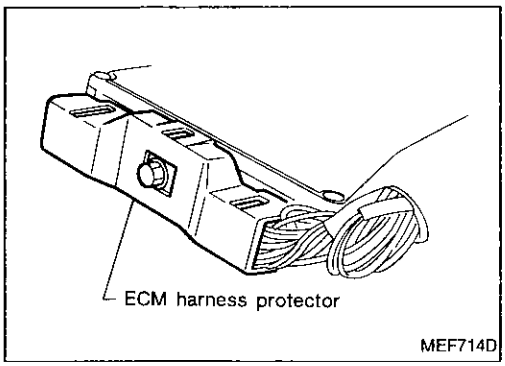
INSPECTION END



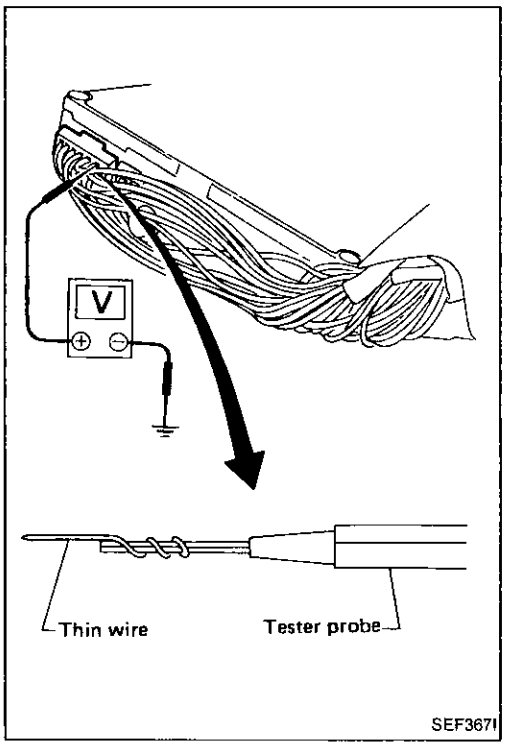
Electrical Components Inspection

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.

Electrical Components Inspection (Cont'd)

ECM inspection table

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
1 2 3 11 12 13 14 15	Ignition signal	Engine is running. └ Idle speed	Approximately 70 mV
		Engine is running. └ Engine speed is 2,000 rpm.	Approximately 0.14V
6 19	Fuel pump voltage control	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON"	Approximately 1.9V
		Ignition switch "ON" └ 5 seconds after turning ignition switch "ON"	Approximately 0V
		Engine is running. (Warm-up condition) └ Idle speed	1.9 - 2.0V
7	Tachometer	Engine is running. └ Idle speed	Approximately 1.5V
		Engine is running. └ Engine speed is 2,000 rpm.	Approximately 3.1V
8	Canister vacuum control solenoid valve	Ignition switch "ON" Engine is running. └ Idle speed	Approximately 0.8V
		Engine is running. (Warm-up condition) └ Engine speed is about 2,000 rpm. In "1" position	BATTERY VOLTAGE (11 - 14V)
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	ECCS relay (Self-shut off)	Engine is running. ↓ Ignition switch "OFF" └ For 6 seconds after turning ignition switch "OFF".	0 - 1V
		Ignition switch "OFF" └ In 6 seconds after turning ignition switch "OFF".	BATTERY VOLTAGE (11 - 14V)

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
18	Fuel pump relay	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON".	Approximately 0.8V
		Ignition switch "ON" └ 5 seconds after turning ignition switch "ON".	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Idle speed	Approximately 0.9V
23 24	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
36*	TCS signal	Ignition switch "ON"	Approximately 9V
		Ignition switch "ON" ├ Disconnect throttle motor harness connector. └ Fully close secondary throttle valve by hand.	Approximately 0V
37*	Secondary throttle position sensor	Ignition switch "ON" └ Approximately 3 seconds after ignition switch "ON"	Approximately 3.4V
		Ignition switch "ON" ├ Disconnect throttle motor harness connector. └ Fully close secondary throttle valve by hand.	Approximately 0.4V
38	Throttle position sensor	Engine is running. (Warm-up condition)	Approximately 0.4 - 4V Output voltage varies with the throttle valve opening angle.

***WARNING:**
Before touching the secondary throttle valve, be sure to disconnect the throttle motor connector; otherwise, injury may occur due to accidental actuation of the valve.

Electrical Components Inspection (Cont'd)

*Data are reference values.

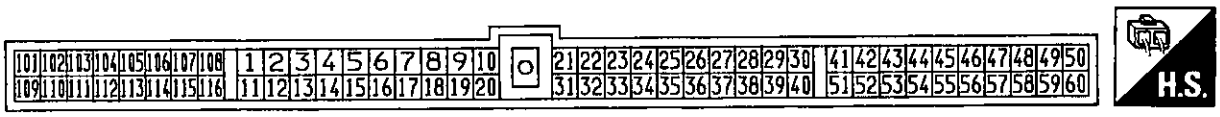
TERMINAL NO.	ITEM	CONDITION	*DATA
39	EGR temperature sensor	Engine is running. (Warm-up condition) └ Idle speed	Less than 4.5V
		Engine is running. (Warm-up condition) └ EGR system is operating.	0 - 1.0V
40	Power steering oil pressure switch	Engine is running. └ Steering wheel is in the "straight ahead" position.	Approximately 0V
		Engine is running. └ Steering wheel is turned.	BATTERY VOLTAGE (11 - 14V)
41 51	Crankshaft position sensor (Reference signal)	Engine is running. Do not run engine at high speed under no-load.	0.8 - 1.0V
42	Crankshaft position sensor (Position signal)	Engine is running. Do not run engine at high speed under no-load.	2.4 - 2.7V Output voltage varies slightly with engine speed.
43	Start signal	Ignition switch "ON"	Approximately 0V
		Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)
44	Inhibitor switch	Ignition switch "ON" └ Gear position is "N" or "P" position.	Approximately 0V
		Ignition switch "ON" └ Except the above gear position	8 - 10V
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".	0.5 - 0.7V
		Engine is running. └ A/C switch is "OFF".	7 - 10V
48	Power source for sensors	Ignition switch "ON"	Approximately 5V
49 59	Power supply	Ignition switch "ON" └ Engine is running.	BATTERY VOLTAGE (11 - 14V)
52	Sub-crankshaft position sensor	Engine is running. Do not run engine at high speed under no-load.	0 - Approximately 10 mV
54	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
56	Throttle position signal	Ignition switch "ON"	0.3 - Approximately 3.3V Output voltage varies with the throttle valve opening angle.

Electrical Components Inspection (Cont'd)

*Data are reference values.

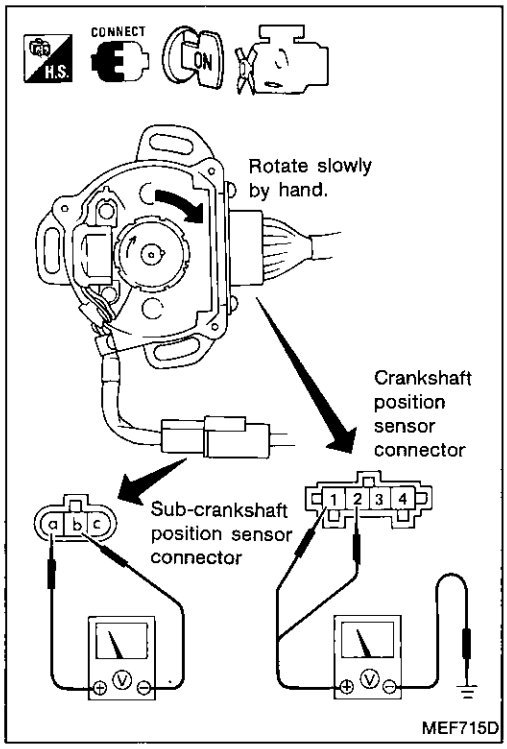
TERMINAL NO.	ITEM	CONDITION	*DATA
58	Battery	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
101 103 105 106 110 112 113 114	Injectors	Engine is running.	BATTERY VOLTAGE (11 - 14V)
102	EGR vacuum control solenoid valve	Engine is running. (Warm-up condition) └ Idle speed	Approximately 0V
		Engine is running. (Warm-up condition) └ Engine speed is about 2,000 rpm.	BATTERY VOLTAGE (11 - 14V)
104	Valve timing control solenoid valve	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Quickly depress accelerator pedal, then quickly release it.	Approximately 0V
111	IACV-AAC valve	Engine is running. └ Idle speed	10 - 11V
		Engine is running. — Steering wheel is being turned. — Air conditioner is operating. — Rear defogger is "ON". └ Head lamps are in high position.	6 - 9V
115	Heated oxygen sensor heater	Engine is running. └ Engine speed is below 2,250 rpm.	Approximately 0V
		Engine is running. └ Engine speed is above 2,250 rpm.	BATTERY VOLTAGE (11 - 14V)

ECM HARNESS CONNECTOR TERMINAL LAYOUT



SEC250B

Electrical Components Inspection (Cont'd)



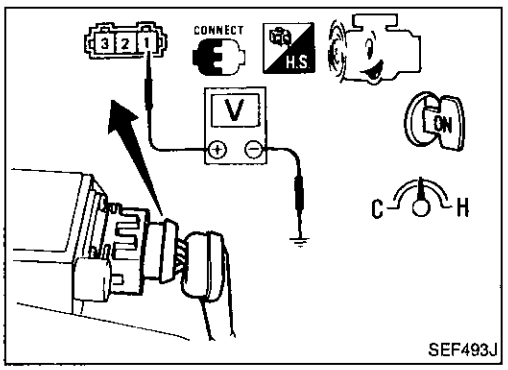
CRANKSHAFT POSITION SENSOR AND SUB-CRANKSHAFT POSITION SENSOR

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
① (90° signal)	Voltage fluctuates between 5V and 0V.
② (1° signal)	

4. Rotate crankshaft position sensor shaft slowly by hand and check voltage between terminals ⓐ and ⓑ ground.
   Measure with circuit tester set in 100 mV range, AC.
   Tester pointer deflects: O.K.
   Tester pointer does not deflect: N.G.
   If N.G., replace crankshaft position sensor.

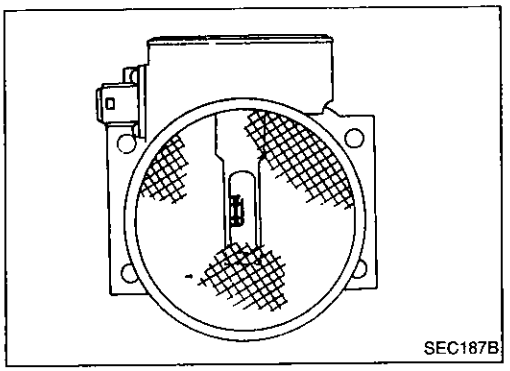
After this inspection, diagnostic trouble code No. 11 might be displayed though the crankshaft position sensor is functioning properly. In this case erase the stored memory.



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 ① and ground.

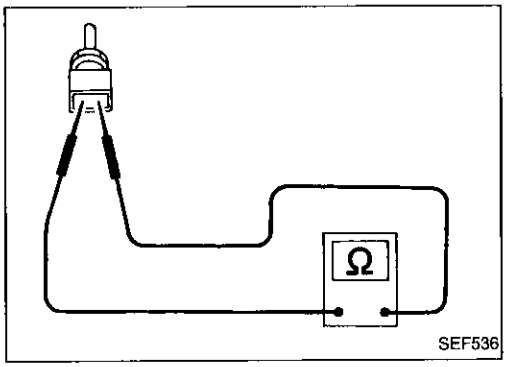
Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Approximately 0.2
Idle speed (Engine is warmed-up sufficiently.)	Approximately 1.0 - 1.4



5. If N.G., remove mass air flow sensor from air duct. Check hot film for damage or dust.

Electrical Components Inspection (Cont'd)

ENGINE COOLANT TEMPERATURE SENSOR

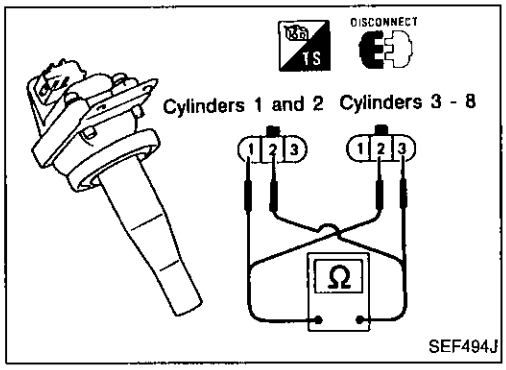


1. Disconnect engine coolant temperature sensor harness connector.
2. Check resistance as shown in the figure.

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.

IGNITION COIL

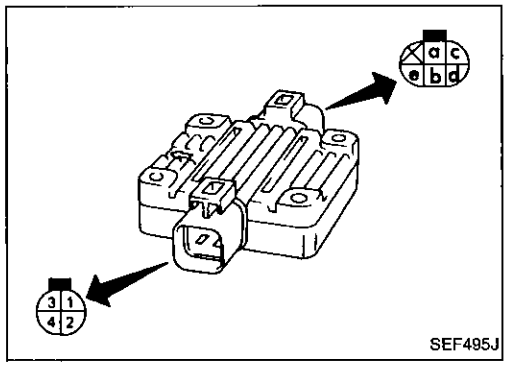


1. Disconnect ignition coil harness connector.
2. Check resistance as shown in the figure.

Cylinder No.	Terminal	Resistance
1, 2	① - ②	Approximately 0.7Ω
3 - 8	② - ③	

If N.G., replace ignition coil.

POWER TRANSISTOR

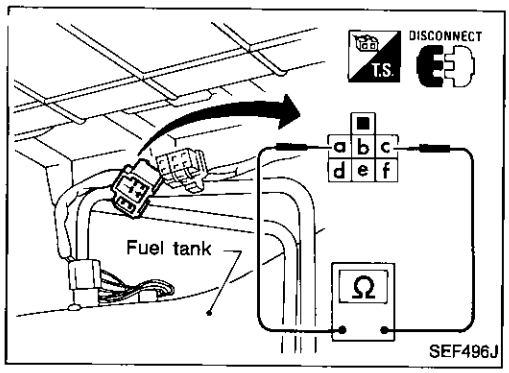


1. Disconnect power transistor harness connector.
2. Check power transistor continuity between terminals with analog tester as shown in the figure.

Terminal combination				Tester polarity	Continuity	Tester polarity	Continuity
e 1	e 2	e 3	e 4	⊕ ⊖	No	⊖ ⊕	Yes
e a	e b	e c	e d	⊕ ⊖	Yes	⊖ ⊕	Yes
1 a	2 b	3 c	4 d	⊕ ⊖	Yes	⊖ ⊕	No

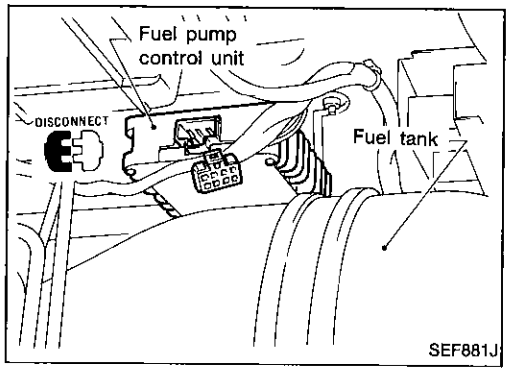
If N.G., replace power transistor.

Electrical Components Inspection (Cont'd)



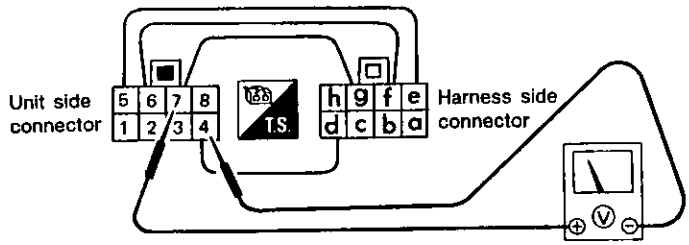
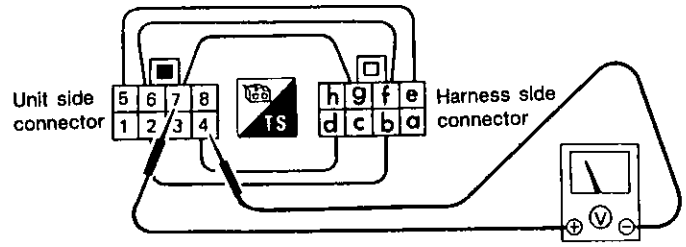
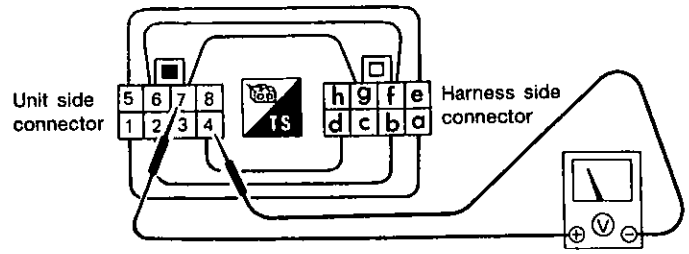
FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals ⓐ and ⓒ.
   Resistance: Approximately 0.5Ω
   If N.G., replace fuel pump.

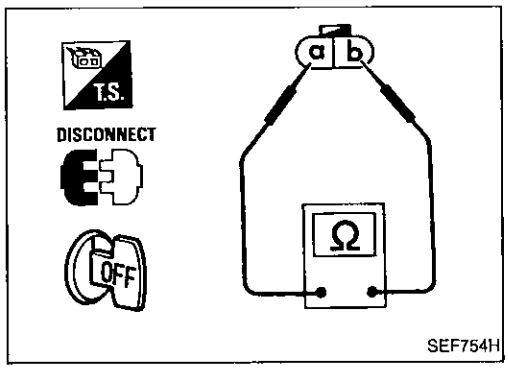


FUEL PUMP CONTROL UNIT

1. Turn off engine and disconnect fuel pump control unit harness connector.
2. Connect proper wires between the fuel pump control unit harness terminals.
3. Start engine and check voltage between terminal ⑦ and terminal ④ on fuel pump control unit.

Connected terminal connections and measured terminals	Voltage
 SEF882J	Battery voltage
 SEF883J	7.5 - 8.1V
 SEF884J	5.4 - 5.8V

If N.G., replace fuel pump control unit.



SEF754H

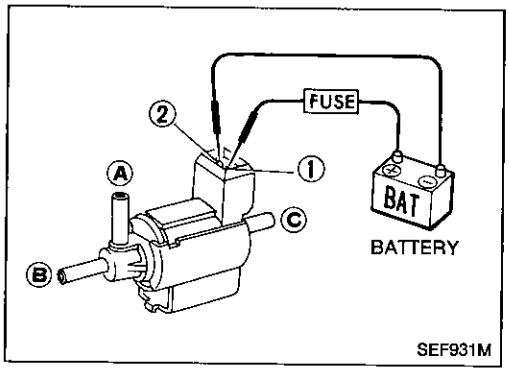
VEHICLE SPEED SENSOR

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.

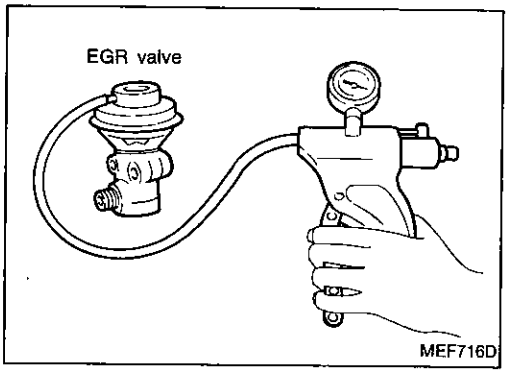
Electrical Components Inspection (Cont'd)



EGRC-SOLENOID VALVE AND CANISTER CONTROL SOLENOID VALVE

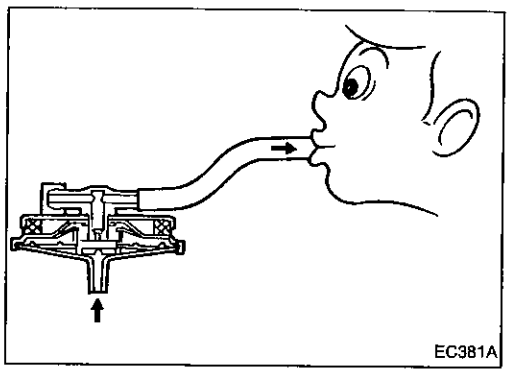
Check air passage continuity.

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



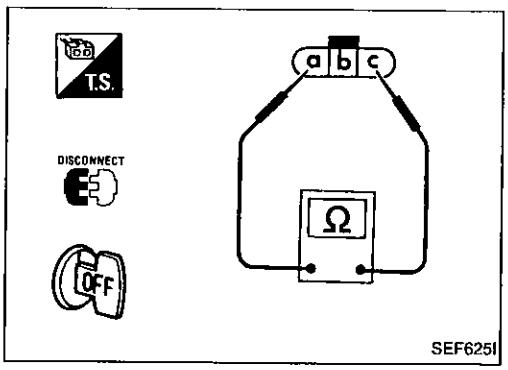
EGR VALVE

Apply vacuum to E.G.R. vacuum port with a hand vacuum pump.
EGR valve spring should lift.
If N.G., replace EGR valve.



EGRC-BPT VALVE

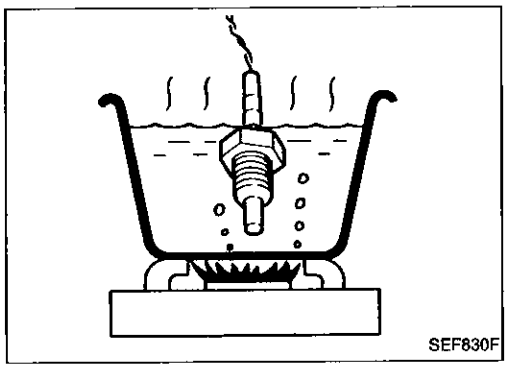
Plug one of two ports of EGRC-BPT valve.
Apply a pressure above 0.490 kPa (50 mmH_2O, 1.97 inH_2O) to check for leakage. If a leak is noted, replace valve.



HEATED OXYGEN SENSOR HEATER

Check resistance between terminals ⓐ and ⓒ.
Resistance: 3 - 1,000Ω
If N.G., replace heated oxygen sensor.

Electrical Components Inspection (Cont'd)



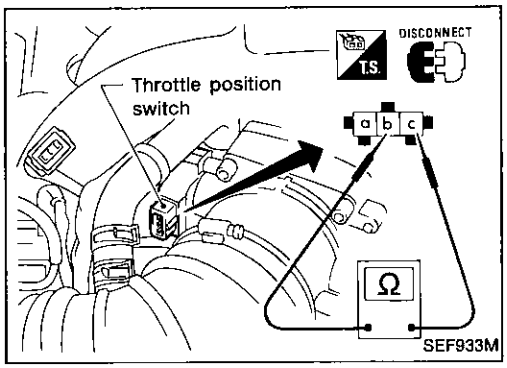
EGR TEMPERATURE SENSOR

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.

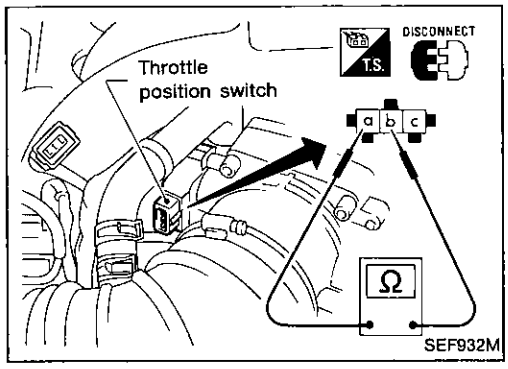


THROTTLE POSITION SWITCH (Wide open throttle position switch)

1. Warm up engine sufficiently.
- Make sure fast idle cam holds cam follower lever released.
2. Disconnect throttle position switch harness connector.
3. Check continuity between terminals ⓑ and ⓒ.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes

If N.G., replace throttle position switch.



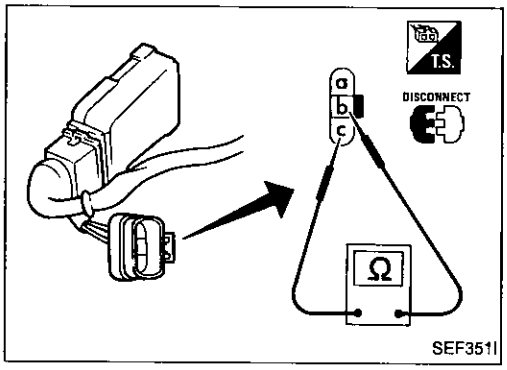
THROTTLE POSITION SWITCH (Closed throttle position switch)

1. Warm up engine sufficiently.
- Make sure fast idle cam holds cam follower lever released.
2. Disconnect throttle position switch harness connector.
3. Check continuity between terminals ⓐ and ⓑ.

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

If N.G., replace throttle position switch.

Electrical Components Inspection (Cont'd)



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 condition	Resistance kΩ
Completely released	Approximately 0.7
Partially released	0.7 - 5
Completely depressed	Approximately 5

If N.G., replace throttle position sensor.

Adjustment for throttle position sensor and throttle position switch

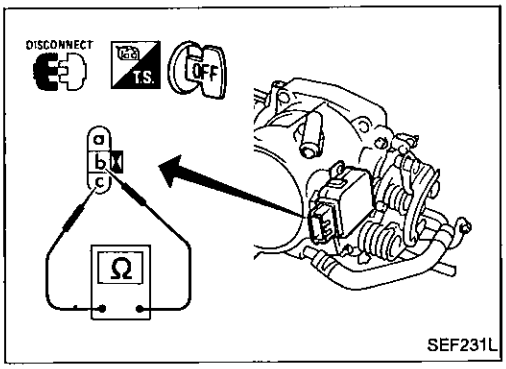
If throttle position sensor or throttle position switch is replaced or removed, it is necessary to install it in the proper position, by following the procedure as shown below:

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. Disconnect throttle position switch harness connector.
5. Check closed throttle position switch OFF → ON speed with circuit tester, closing throttle valve manually.

Closed throttle position switch OFF → ON speed:
A/T: Engine speed in "N" position
810 ± 150 rpm

Electrical Components Inspection (Cont'd)

SECONDARY THROTTLE POSITION SENSOR



SEF231L

1. Turn ignition switch "OFF".
2. Disconnect secondary throttle position sensor harness connector.
3. Make sure that resistance between terminals ⓑ and ⓒ changes when closing secondary throttle valve by hand.

Secondary throttle valve condition	Resistance (kΩ)
Fully open	Approximately 3.0 - 5.8
Partially open	0.8 - 5.8
Fully closed	Approximately 0.8

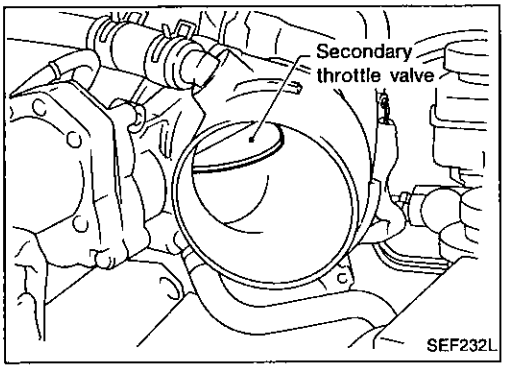
If N.G., replace secondary throttle position sensor.

Adjustment for secondary throttle position sensor

WARNING:

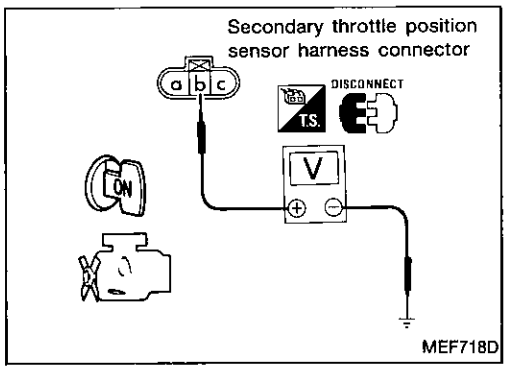
Before touching the secondary throttle valve, be sure to disconnect the throttle motor connector; otherwise, injury may occur due to accidental actuation of the valve.

If secondary throttle position sensor is replaced or removed, it is necessary to install it in the proper position, by following the procedure shown below:



SEF232L

1. Disconnect rubber air duct.
2. Install secondary throttle position sensor body in throttle body.
   Do not tighten bolts.
3. Disconnect throttle motor harness connector.
4. Connect secondary throttle position sensor harness connector.
5. Turn ignition switch "ON".

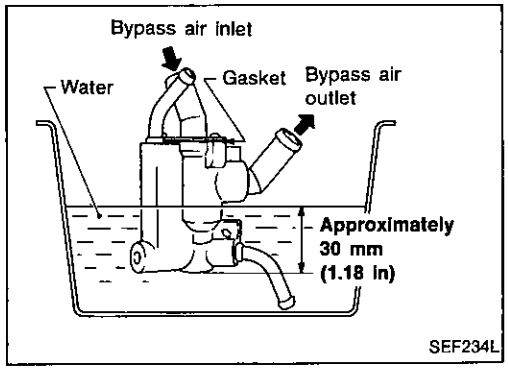


MEF718D

6. Make sure that voltage between terminal ⓑ and ground changes when closing secondary throttle valve by hand.

Secondary throttle valve condition	Voltage (V)
Fully open	4.4 - 4.6
Partially open	0.4 - 4.6
Fully closed	0.4 or more

AIR CUT VALVE



SEF234L

1. Remove air cut valve from engine.
2. Immerse air cut valve in cold or hot water as shown, and check air flow.

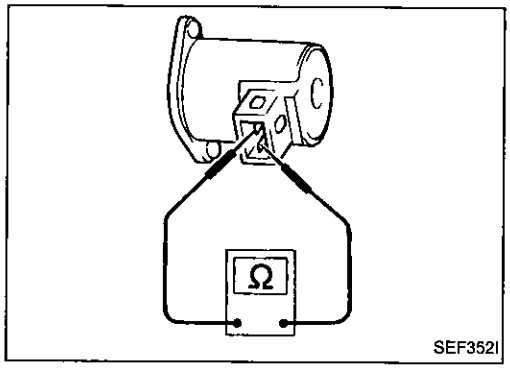
- Do not wet gasket portion or air chamber.

Water temperature	When blowing from portion Ⓐ
0°C (32°F)	Air flows
Above 50°C (122°F)	Almost no air flows

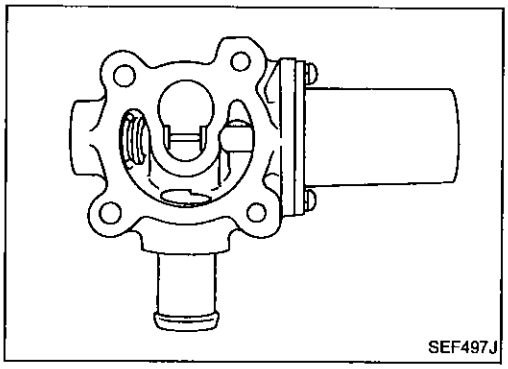
If N.G., replace air cut valve.

Electrical Components Inspection (Cont'd)

IACV-AAC VALVE

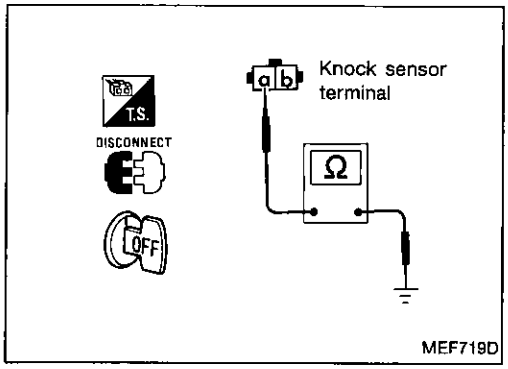


- Check IACV-AAC valve resistance.
  Resistance:
  Approximately 10Ω



- Check plunger for seizing or sticking.
- Check for broken spring.

KNOCK SENSOR

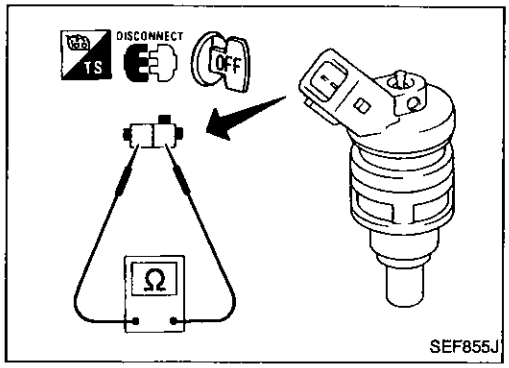


1. Disconnect knock sensor sub-harness connector.
2. Check continuity between terminal ⓐ and ground.

Continuity should exist.

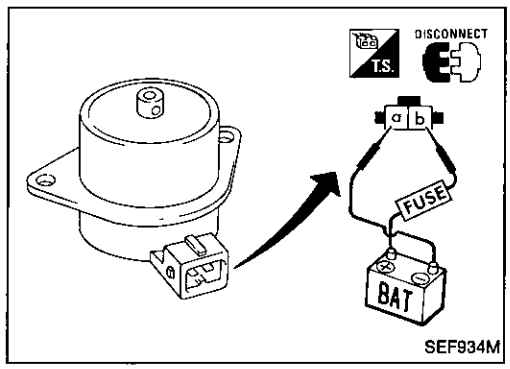
- It is necessary to use an ohmmeter which can measure more than 10 MΩ.

INJECTOR



1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.
   Resistance: 10 - 14Ω
   If N.G., replace injector.

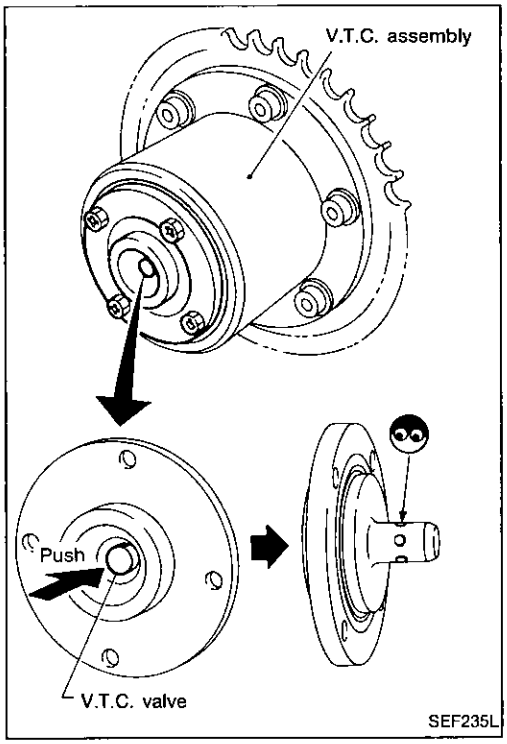
VALVE TIMING CONTROL (V.T.C.) SOLENOID VALVE



Check valve timing control solenoid valve for normal operation by supplying it with battery voltage between terminals ⓐ and ⓑ.

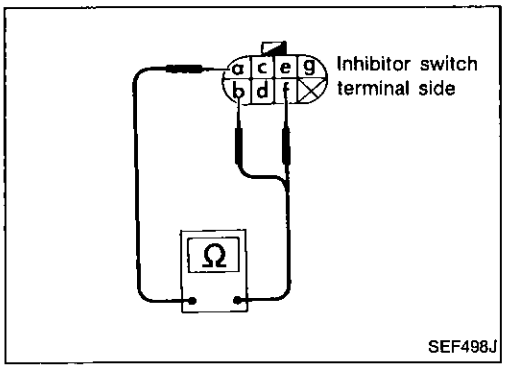
If N.G., replace solenoid valve.

Electrical Components Inspection (Cont'd)



VALVE TIMING CONTROL (V.T.C.) VALVE

1. Remove V.T.C. valve.
2. Press V.T.C. valve to check for smooth operation.
3. Check V.T.C. valve hole for foreign matter.
   If N.G., repair or replace V.T.C. valve.

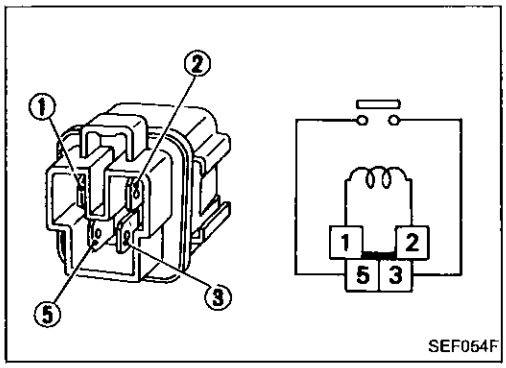


INHIBITOR SWITCH

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" positions	No	No

If N.G., replace inhibitor switch.

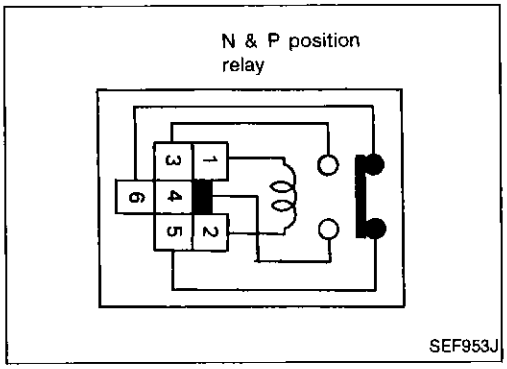


ECCS RELAY, FUEL PUMP RELAY AND IGNITION COIL RELAY

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.



N & P POSITION RELAY

Check continuity between terminals ③ and ④.

Conditions	Continuity
12V direct current supply between terminals ① and ②.	Yes
No current supply	No

If N.G., replace relay.

Electrical Components Inspection (Cont'd)

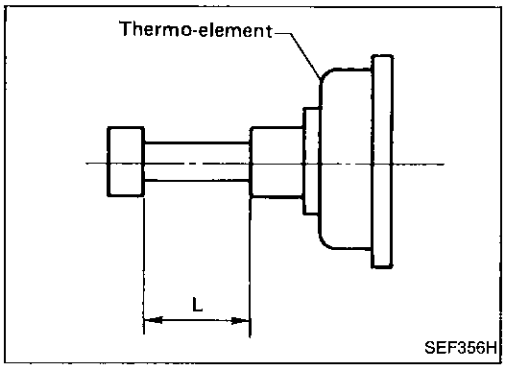
POWER STEERING OIL PRESSURE SWITCH

1. Disconnect power steering oil pressure switch harness connector.
2. Check continuity between terminals.

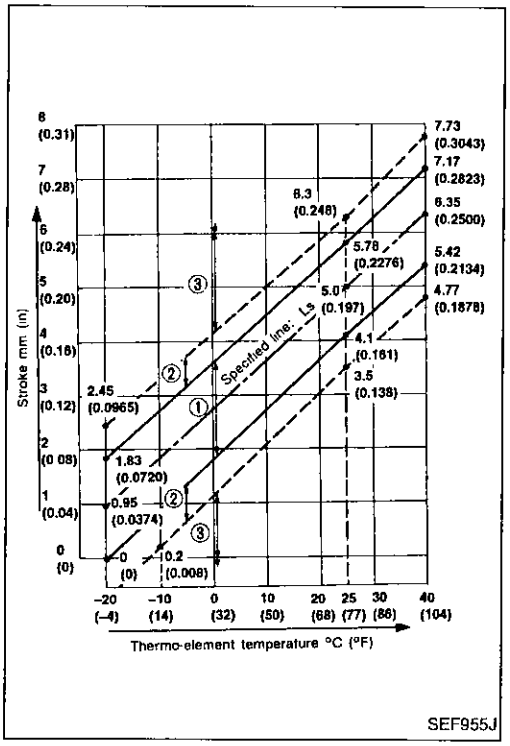
Conditions	Continuity
Steering wheel is being turned	Yes
Steering wheel is not being turned	No

Fast Idle Cam (F.I.C.) Inspection and Adjustment

1. Remove throttle body from engine.
2. Wait for at least 3 hours.
   (This step is necessary to bring the temperature of the thermo-element to the room temperature.



3. Measure thermo-element stroke (L) and room temperature.



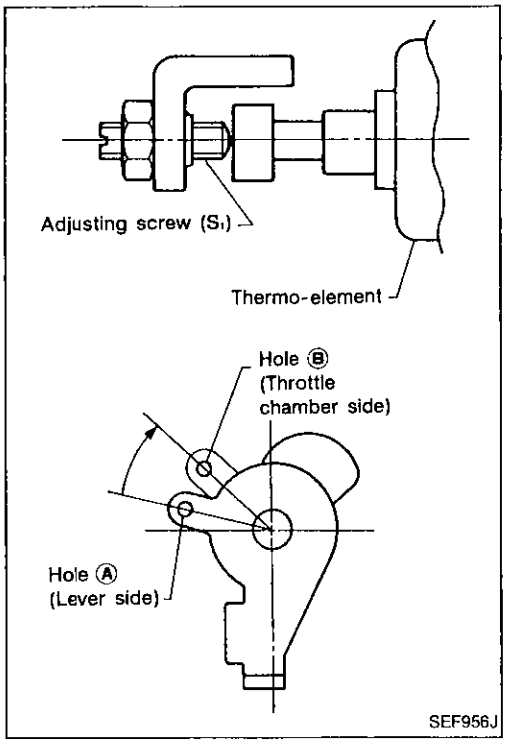
4. Check thermo-element stroke (L) as shown in the figure.

L: Thermo-element stroke	①	②	③
Go to step	—*	5	2**

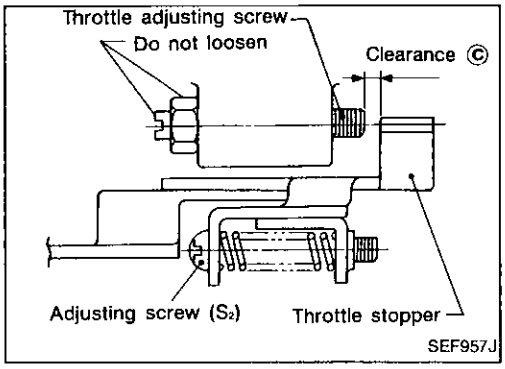
*: No adjustment is needed.

**: Thermo-element is malfunctioning. Replace thermo-element, and perform inspection beginning with step 2.

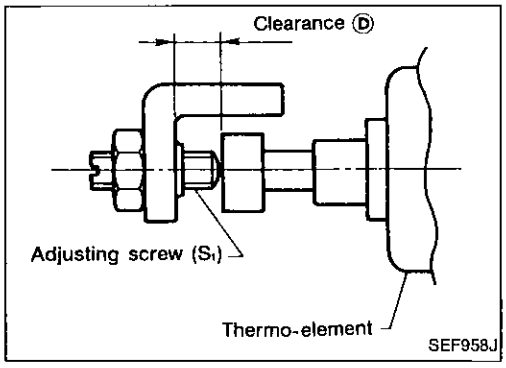
Fast Idle Cam (F.I.C.) Inspection and Adjustment (Cont'd)



5. Align hole Ⓐ with hole Ⓑ by turning adjusting screw (S_1), and insert pin through holes Ⓐ and Ⓑ so that the position of hole Ⓐ will not be changed.



6. Adjust clearance Ⓒ between throttle stopper and throttle adjusting screw to specification by turning adjusting screw (S_2).
   Clearance Ⓒ:
   0.62 - 0.74 mm (0.0244 - 0.0291 in)
7. Remove pin from holes Ⓐ and Ⓑ.



8. Adjust clearance Ⓓ to the specified value by turning adjusting screw (S_1).
   Clearance Ⓓ:
   3.8 mm (0.150 in)

Fast Idle Cam (F.I.C.) Inspection and Adjustment (Cont'd)

9. Rotate adjusting screw (S_1) clockwise or counterclockwise by Z turns according to the following equation, then tighten the adjusting screw lock nut.

$$Z = \frac{L\ (mm) - LS^*\ (mm)}{0.50\ (mm)} \quad / \quad Z = \frac{L\ (in) - LS^*\ (IN)}{0.0197\ (in)}$$

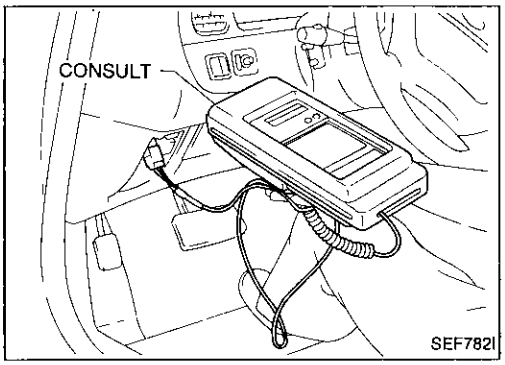
*: Value of the specified line (Ls) at the temperature of thermo-element actually measured.

- Direction of adjusting screw (S_1) rotation

(1) Positive (+) Z: Counterclockwise
(2) Negative (−) Z: Clockwise

For example:

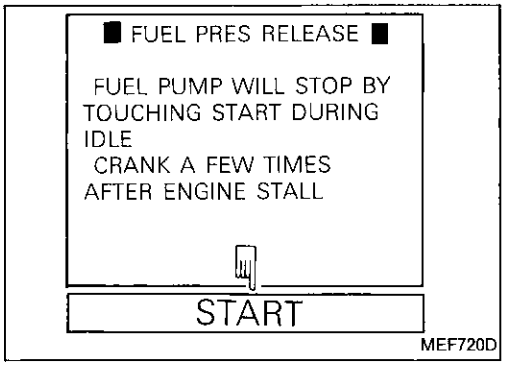
	Case I	Case II
Thermo-element temperature °C (°F)	25 (77)	0 (32)
Thermo-element specified stroke (Ls) mm (in)	5.0 (0.197)	2.75 (0.1083)
Thermo-element stroke (L) mm (in)	5.5 (0.217)	2.00 (0.0787)
Revolutions of adjusting screw (Z) mm /in	$Z = \frac{5.5 - 5.0}{0.50} = 1.0$ / $\frac{0.217 - 0.197}{0.0197} = 1.0$	$Z = \frac{2.00 - 2.75}{0.50} = -1.5$ / $\frac{0.0787 - 0.1083}{0.0197} = -1.5$
Direction of revolution	Counterclockwise	Clockwise



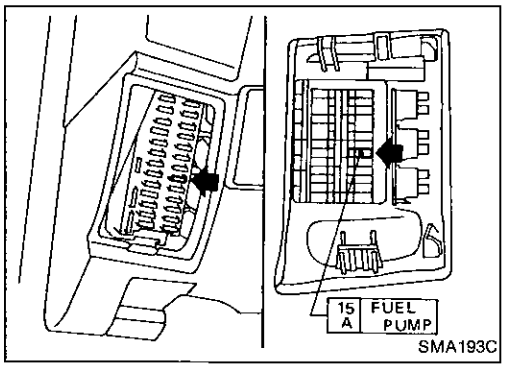
Releasing Fuel Pressure

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 relay.
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.

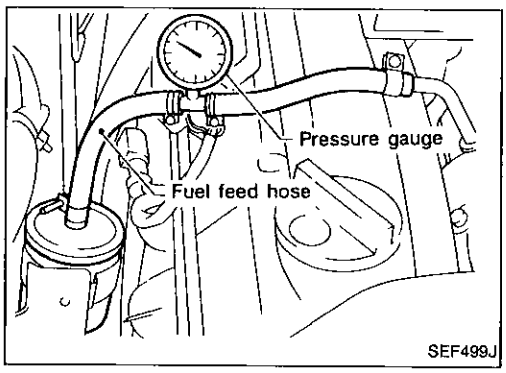


Fuel Pressure Check

a. Make sure that clamp screw does not contact adjacent parts.
b. Use a torque driver to tighten clamps.
c. Use Pressure Gauge to check fuel pressure.
d. Do not perform fuel pressure check while fuel pressure regulator control system is operating; otherwise, fuel pressure gauge might indicate incorrect readings.

1. Release fuel pressure to zero.
2. Disconnect fuel hose between fuel filter and fuel tube (engine side).
3. Install pressure gauge between fuel filter and fuel tube.
4. Start engine and check for fuel leakage.

Fuel Pressure Check (Cont'd)



5. Read the indication of fuel pressure gauge.

At idling:

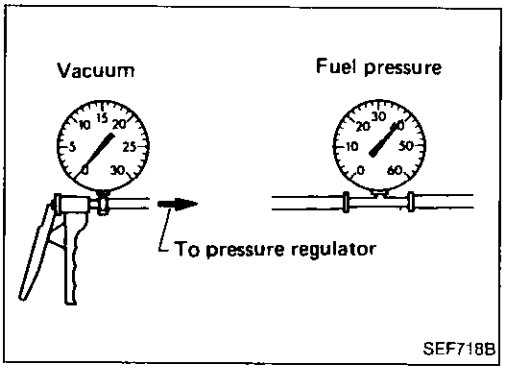
When fuel pressure regulator valve vacuum hose is connected.

Approximately 235 kPa (2.4 kg/cm^2, 34 psi)

When fuel pressure regulator valve vacuum hose is disconnected.

Approximately 299.1 kPa(3.05 kg/cm^2, 43.4 psi)

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.



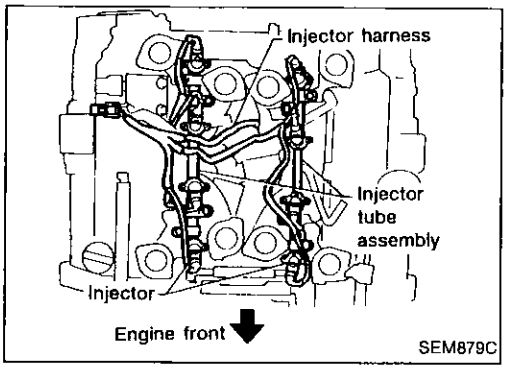
9. Start engine and read indication of fuel pressure gauge as vacuum is changed.

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
- EGR valve
- Intake manifold collector



4. Remove injectors from injector tube assembly.
5. Install injectors as follows:

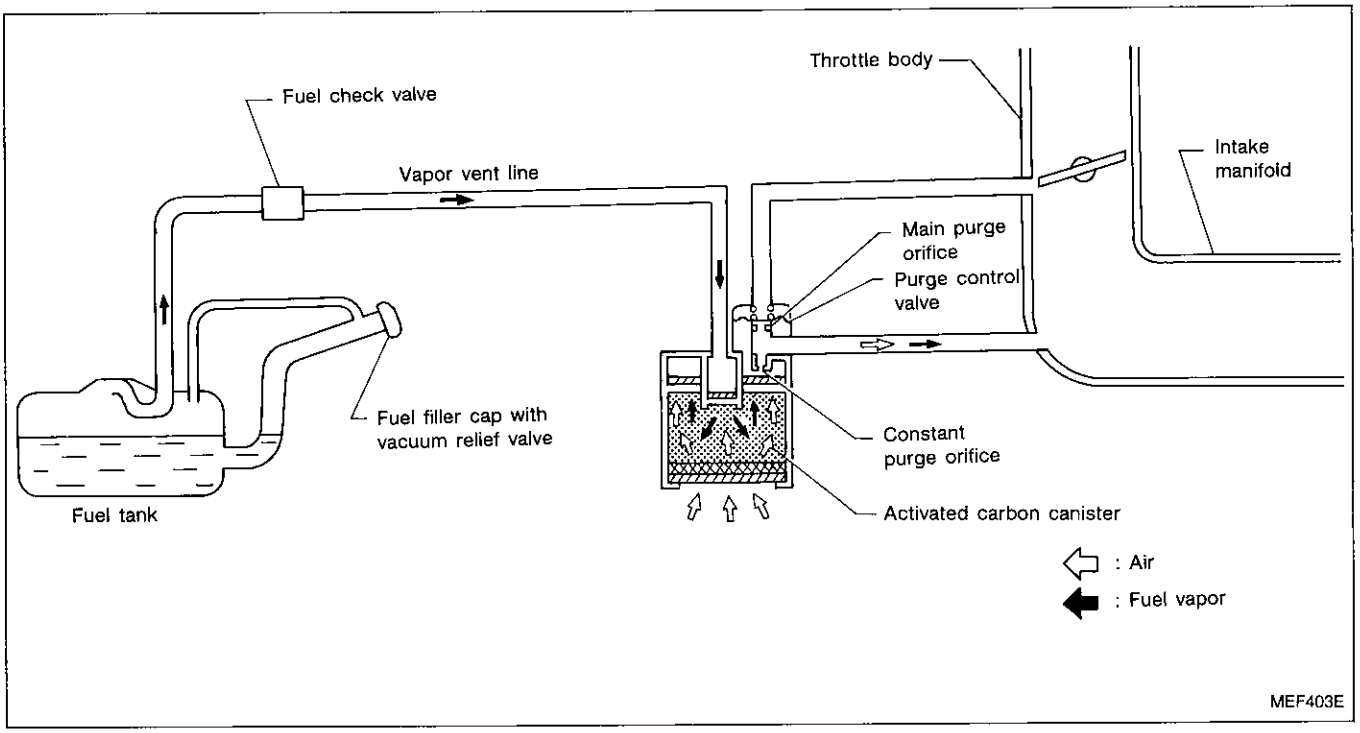
1) Clean exterior of injector tail piece.
2) Use new O-rings

CAUTION:

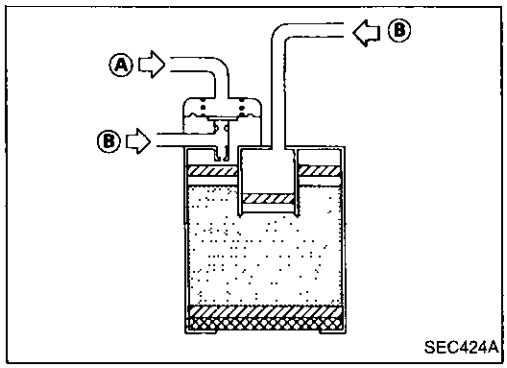
After properly connecting injectors to fuel tube assembly, check connections for fuel leakage.

6. Assemble injectors to injector tube assembly.

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.

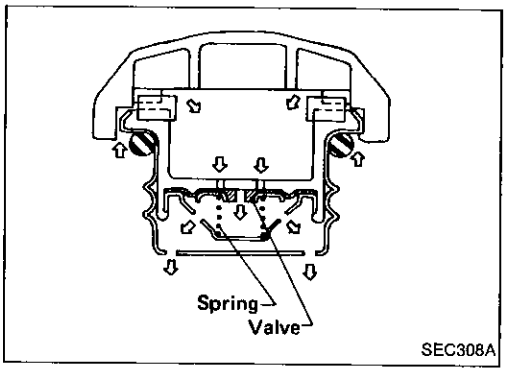


Inspection

ACTIVATED CARBON CANISTER

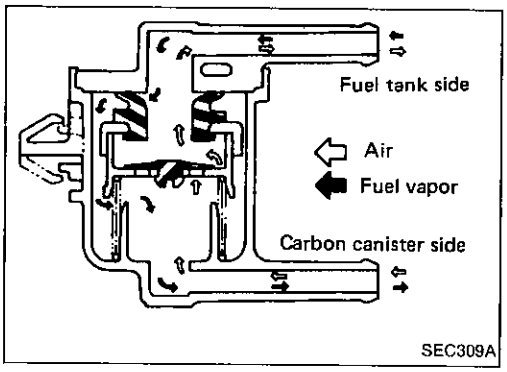
Check carbon canister as follows:
Ⓐ : Blow air and ensure that there is no leakage.
Ⓑ : Blow air and ensure that there is leakage.

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.

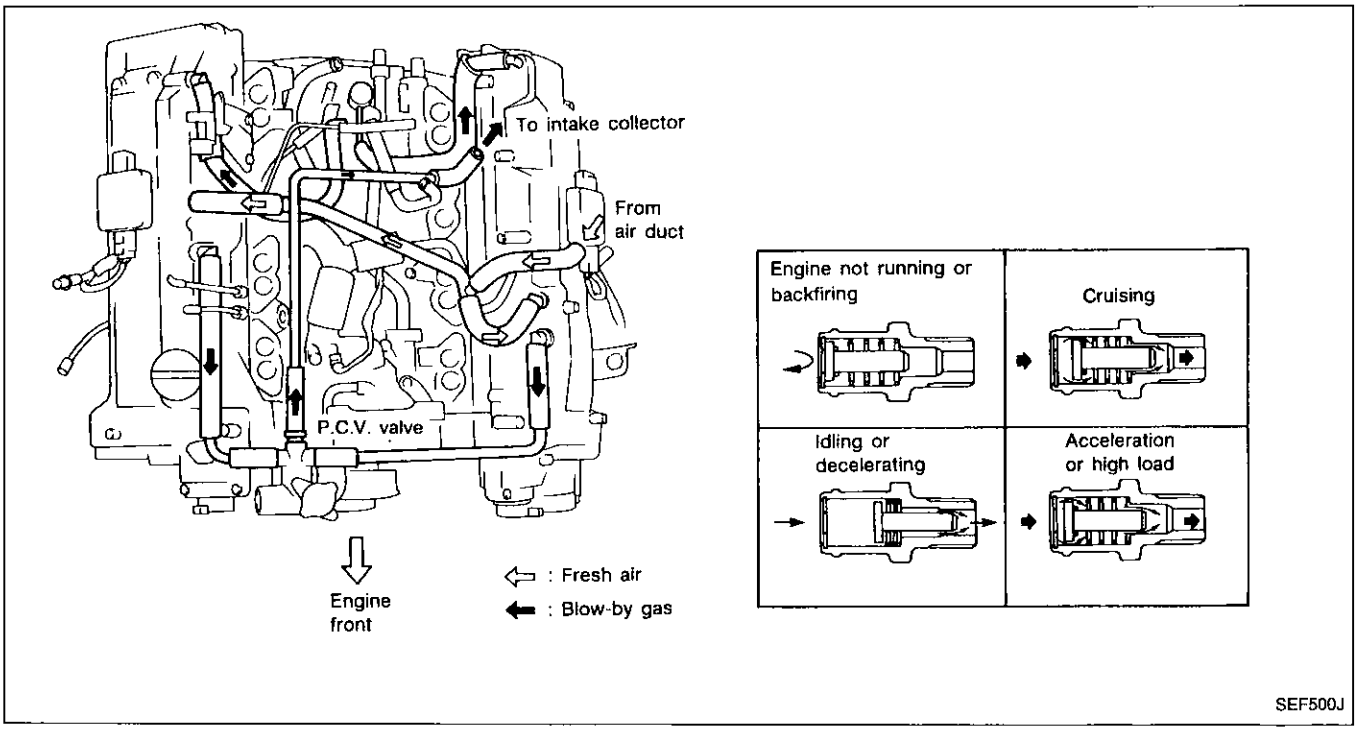


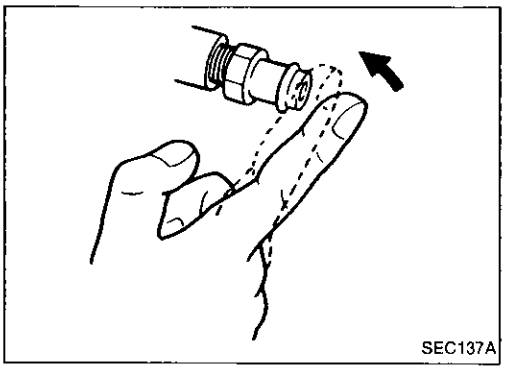
FUEL CHECK VALVE

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 the intake collector.
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 duct, 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 intake collector under all conditions.

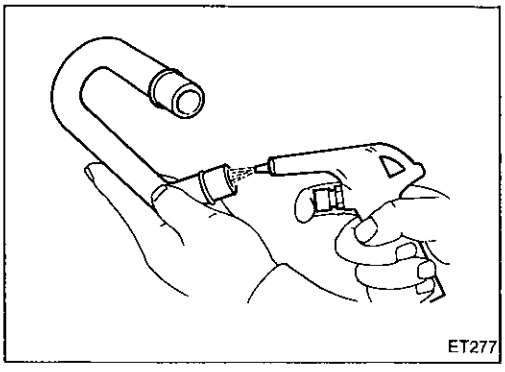




Inspection

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	
Fuel pressure at idling kPa (kg/cm^2, psi)	
Vacuum hose is connected	Approximately 235 (2.4, 34)
Vacuum hose is disconnected	Approximately 299.1 (3.05, 43.4)

Inspection and Adjustment

Idle speed*1 rpm	
No-load*2	
A/T (in "N" position)	650 ± 50
Air conditioner: ON	
A/T (in "N" position)	650 ± 50
Ignition timing	15° ± 2° B.T.D.C.

*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 0.7
Secondary resistance [at 20°C (68°F)]	kΩ	Approximately 8

ENGINE COOLANT TEMPERATURE SENSOR

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
80 (176)	0.30 - 0.33

FUEL PUMP

Resistance	Ω	Approximately 0.5

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 0.7
Partially released	0.7 - 5
Completely depressed	Approximately 5

ACCELERATOR CONTROL, FUEL & EXHAUST SYSTEMS

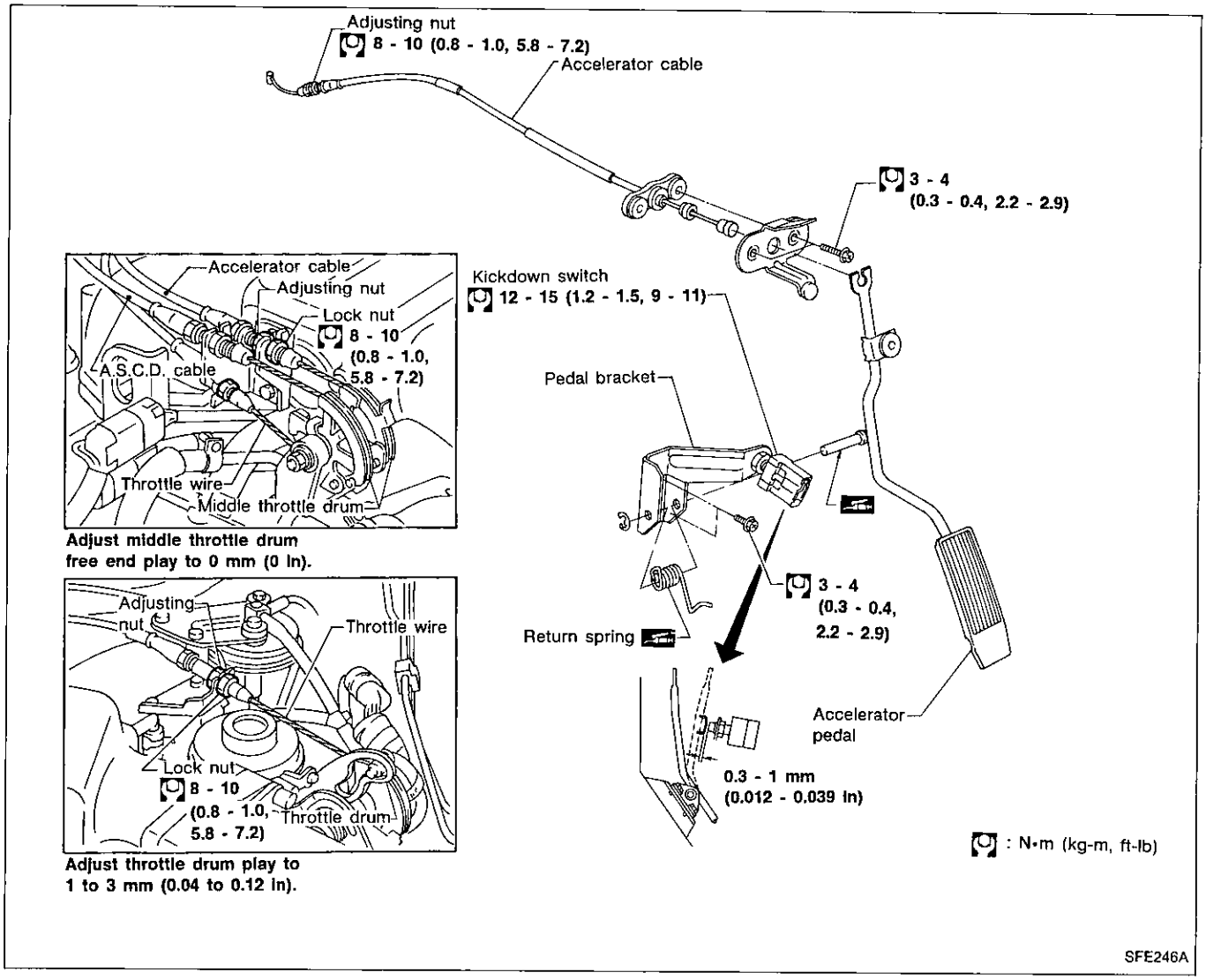
SECTION FE

CONTENTS

ACCELERATOR CONTROL SYSTEM 2
Adjusting Accelerator Cable 2
FUEL SYSTEM 3
EXHAUST SYSTEM 4

CAUTION:

- **When removing accelerator cable, make a mark to indicate lock nut's initial position.**
- **Check that throttle valve opens fully 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 EL section for A.S.C.D. cable adjustment.**



Adjusting Accelerator Cable

MIDDLE THROTTLE DRUM ADJUSTMENT

1. Loosen lock nut, and tighten adjusting nut until middle throttle drum starts to move.
2. Fasten adjusting nut with lock nut.

THROTTLE DRUM ADJUSTMENT

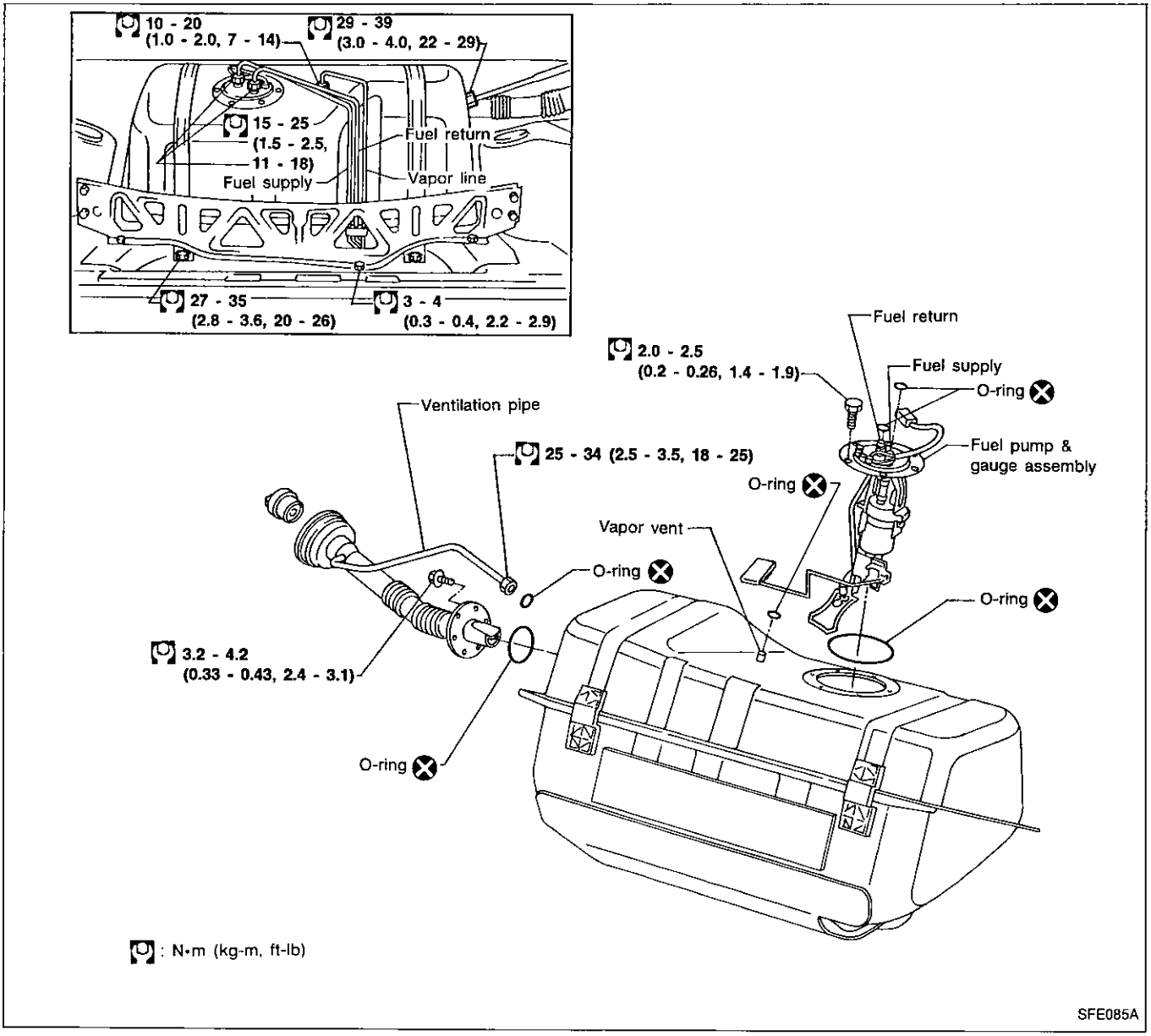
1. Loosen lock nut, and tighten adjusting nut until throttle drum starts to move.
2. From that position turn back adjusting nut 15 to 2 turns, and fasten it with lock nut.

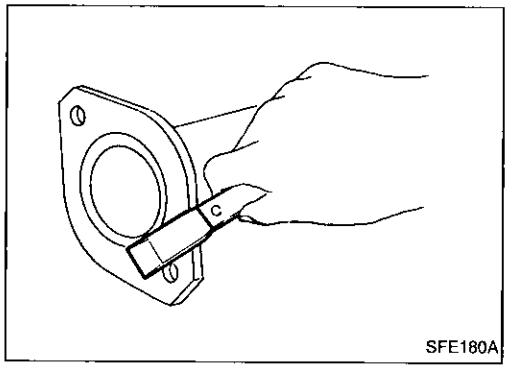
WARNING:
When replacing fuel line parts, be sure to observe the following:

- **Put a "CAUTION: INFLAMMABLE" sign in workshop.**
- **Be sure to furnish workshop with a CO_2 fire extinguisher.**
- **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.**
- **Drain fuel from Fuel Tank and put drained fuel in an explosion-proof container and put lid on securely.**

CAUTION:

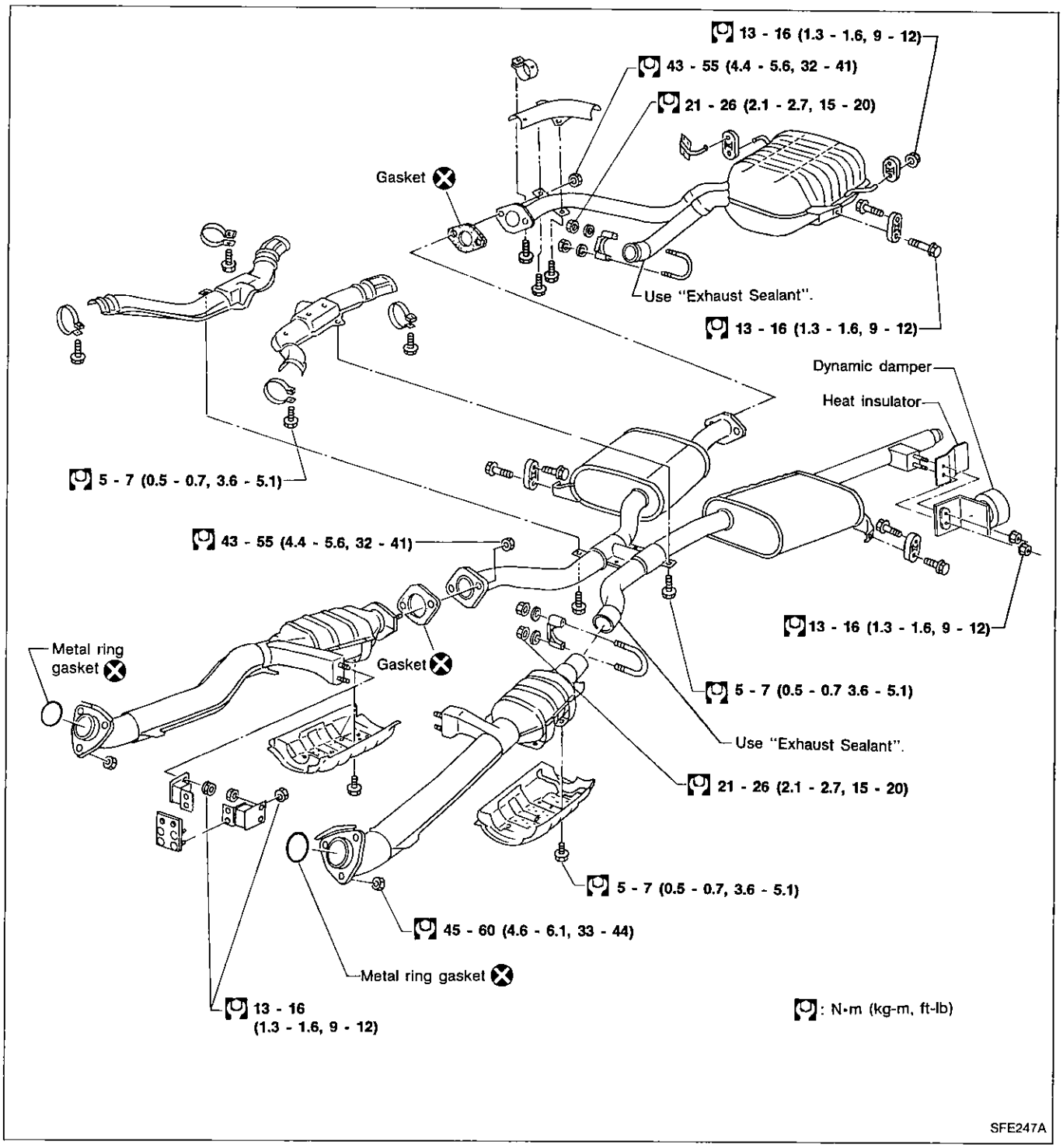
- **Before disconnecting fuel hose, release fuel pressure from fuel line. Refer to "Changing Fuel Filter" in MA section.**
- **Do not disconnect any fuel line unless absolutely necessary.**
- **Plug hose and pipe openings to prevent entry of dust or dirt.**
- **Always replace O-ring and clamps with new ones.**
- **Do not kink or twist hose and tube when they are installed.**
- **Do not tighten hose clamps excessively to avoid damaging hoses.**
- **Tighten bolts to specified torque.**
- **When installing fuel check valve, be careful of its designated direction. (Refer to section EF & EC.)**
- **After installation, run engine and check for fuel leaks at connections.**





CAUTION:

- **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 insulators 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

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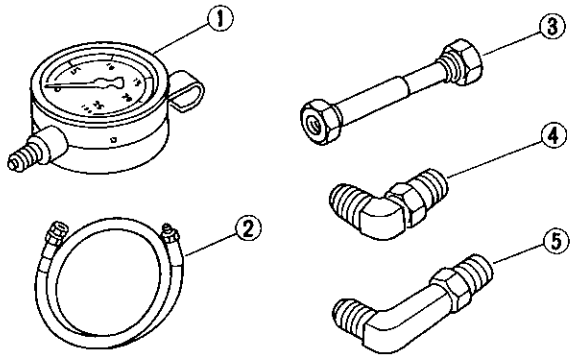
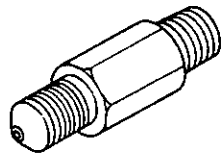
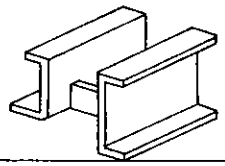
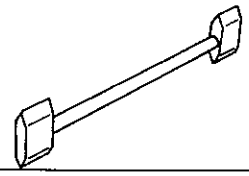
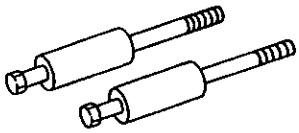
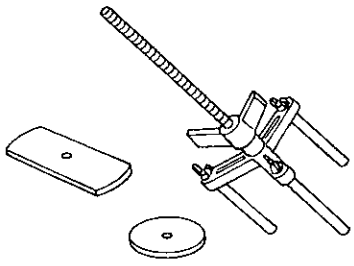
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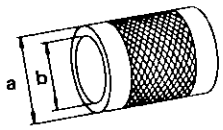
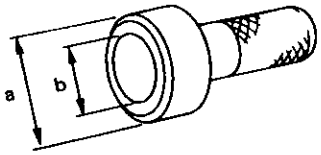
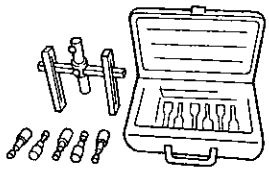
When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".

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
KV31101201 (—) Oil pressure gauge 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

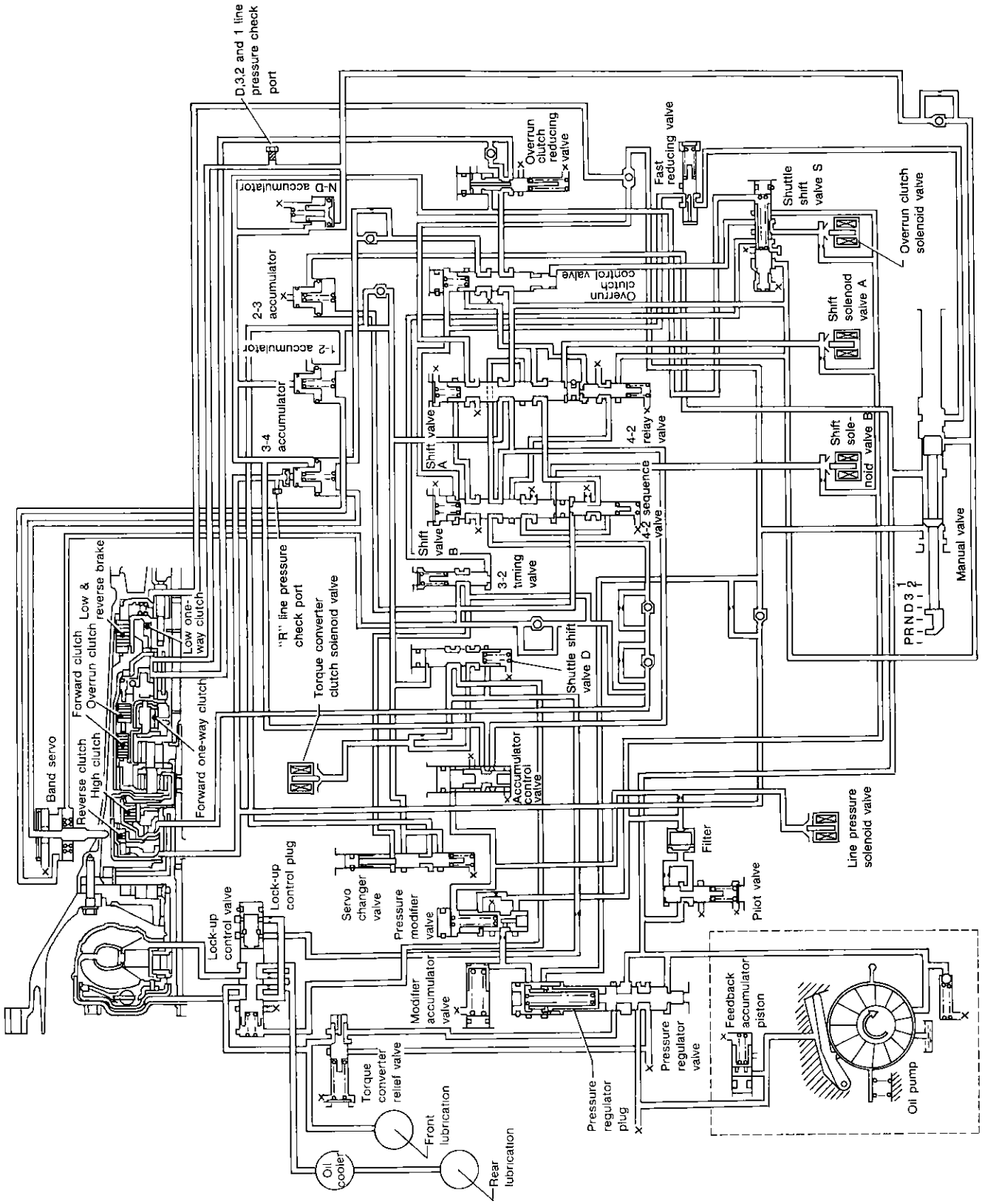
Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
ST33200000 (J26082) Drift	 **a: 60 mm (2.36 in) dia.** **b : 44.5 mm (1.752 in) dia.**	Installing oil pump housing oil seal Installing rear oil seal
ST30720000 (J34331) Drift	 **a: 77 mm (3.03 in) dia.** **b : 55.5 mm (2.185 in) dia.**	Installing rear oil seal
(J34291) Shim setting gauge set		Selecting oil pump cover bearing race and oil pump thrust washer

Precautions

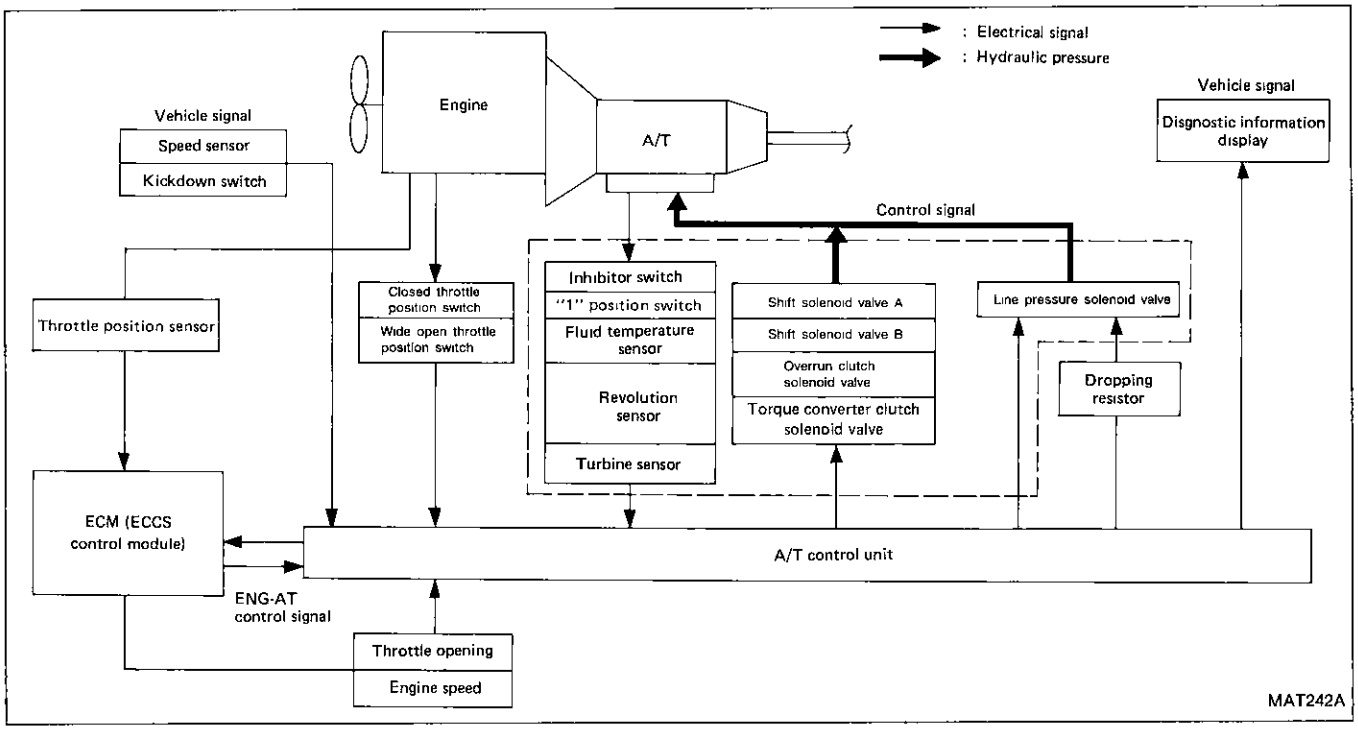
- Before proceeding with disassembly, thoroughly clean the outside of the transmission. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. 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.

Hydraulic Control Circuits



SAT668G

Electrical Control Chart

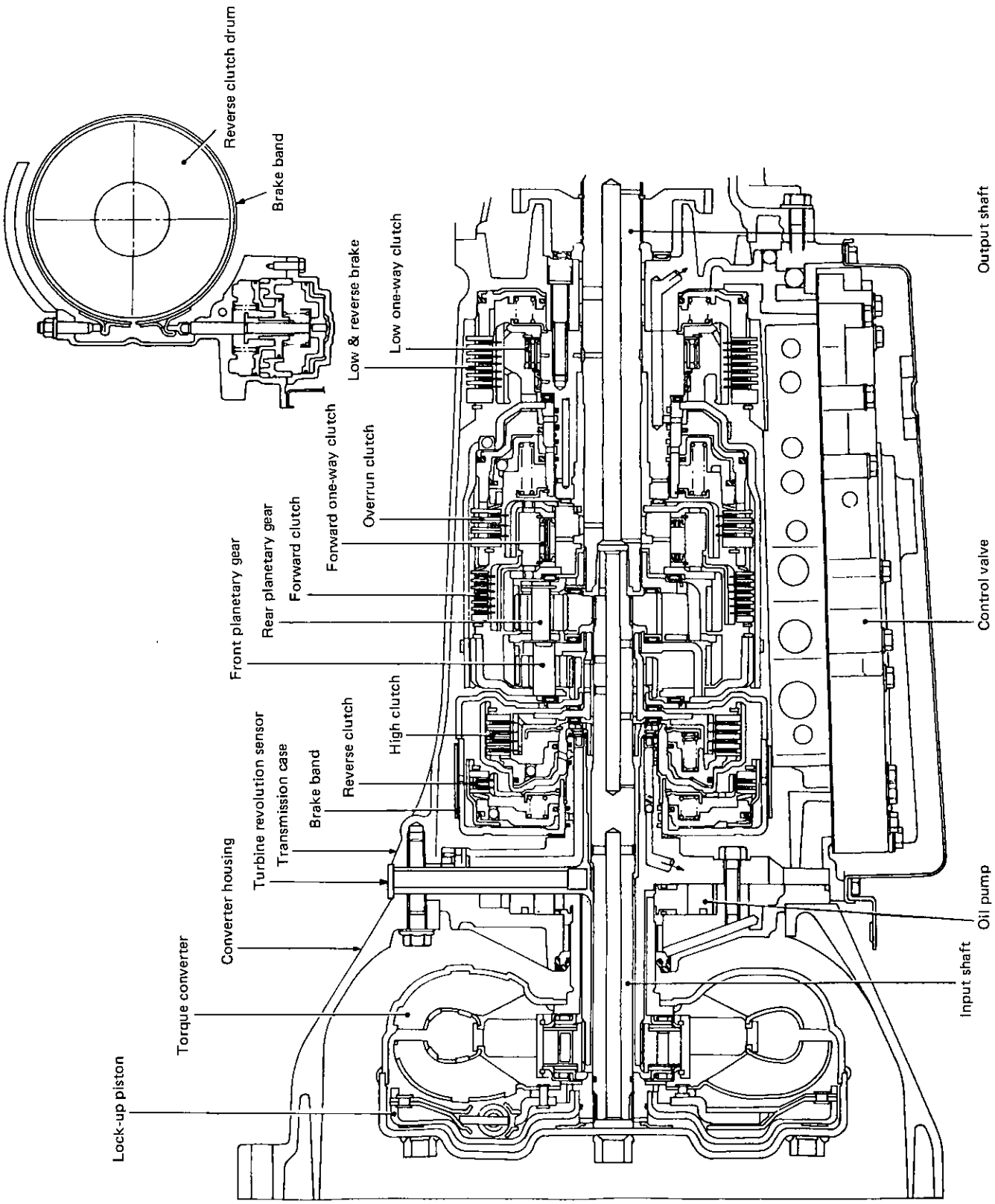


Mechanical Operation

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 POSITION
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 2 ← 3
1	1st			○	○				●		○	Locks in 1st speed 1 ← 2
	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

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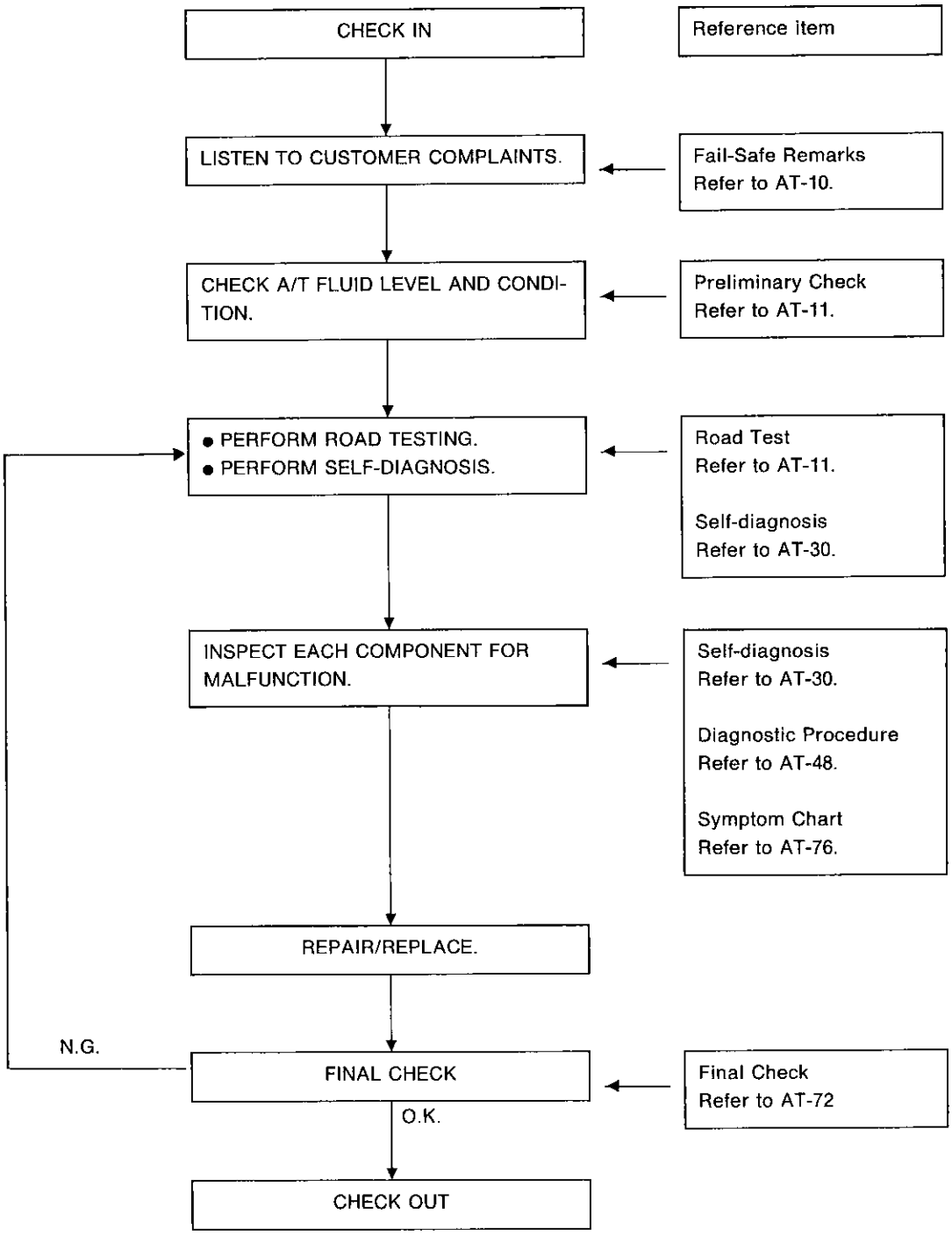
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How to Perform Trouble Diagnoses for Quick and Accurate Repair

WORK FLOW



Fail-Safe Remarks

The A/T control unit has an electronic Fail-Safe (limp home mode) to allow the vehicle to be driven even in the event of damage of a major electrical input or output device circuit.
In this condition, the vehicle runs in third gear in positions 1, 2 or D and will not upshift. Customer may say "Sluggish, poor acceleration".
When Fail-safe operation occurs the next time the key is turned to the ON position, the diagnostic information display will display "Transmission malfunction". (For diagnosis, refer to AT-30.)

Remarks

If the vehicle is driven under extreme conditions such as excessive wheel spinning and emergency braking suddenly after, Fail-Safe may be activated even if all electrical circuits are undamaged.
In this case, normal shift pattern can be returned by turning key OFF for 3 seconds and then back ON.
The indication by the diagnostic information display will appear only once and be cleared. The customer may resume normal driving conditions by chance.
Always follow the "WORK FLOW" (see the previous page).
The SELF-DIAGNOSIS results will be as follows:

The first SELF-DIAGNOSIS will indicate the damage of the vehicle speed sensor or the revolution sensor.

During the next SELF-DIAGNOSIS performed after checking the sensor, no damages will be indicated.

Preliminary Check

A/T FLUID CHECK

Fluid leakage check

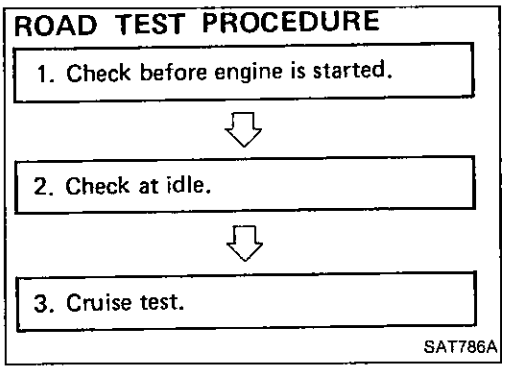
1. Clean area suspected of leaking, — for example, mating surface of converter housing and transmission case.
2. Start engine, apply foot brake, place selector lever in "D" position and wait a few minutes.
3. Stop engine.
4. Check for fresh leakage.

Fluid condition check

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.

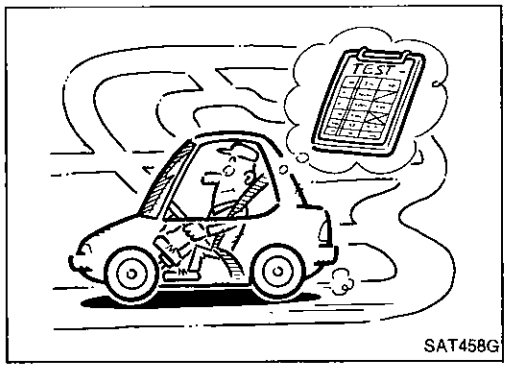
ROAD TESTING



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:

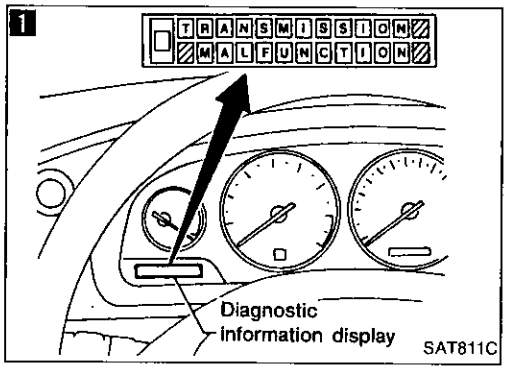
1. Check before engine is started
2. Check at idle
3. Cruise test



- 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. Turn ignition switch to "OFF" position.
3. Move selector lever to "P" position.
4. Turn ignition switch to "ON" position. (Do not start engine.)
5. Is the judgement "Transmission malfunction" displayed on diagnoses information display?

Yes → Perform self-diagnosis. — Refer to SELF-DIAGNOSIS PROCEDURE.

No ↓

1 Turn ignition switch to "OFF" position.
2. Perform self-diagnosis. — Refer to SELF-DIAGNOSIS PROCEDURE and note N.G. items.
3. Go to "ROAD TESTING — 2. Check at idle".

2. Check at idle

1. Park vehicle on flat surface.
2. Turn ignition switch to "OFF" position.

↓

3. Move selector lever to "P" or "N" position.
4. Turn ignition switch to "START" position.
5. Is engine started?

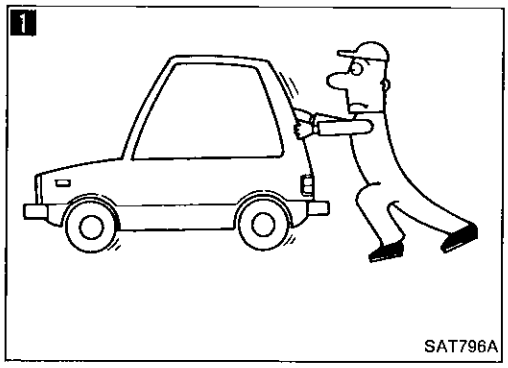
No → Go to Diagnostic Procedure 1.

Yes ↓

1. Turn ignition switch to "OFF" position.
2. Move selector lever to "D", "1", "2", "3" or "R" position.
3. Turn ignition switch to "START" position.
4. Is engine started?

Yes → Go to Diagnostic Procedure 1.

No ↓



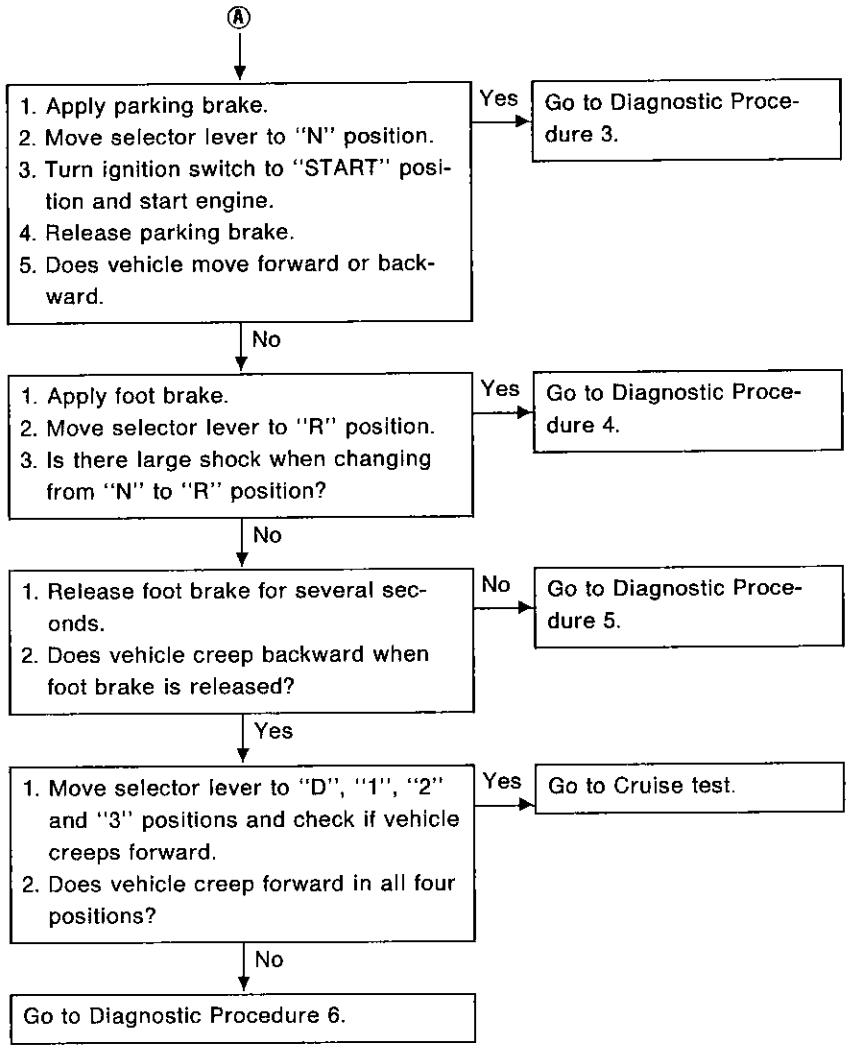
1. Turn ignition switch to "OFF" position.
2. Move selector lever to "P" position.
3. Release parking brake.
4. Push vehicle forward or backward.
5. Does vehicle move when it is pushed forward or backward?

Yes → Go to Diagnostic Procedure 2.

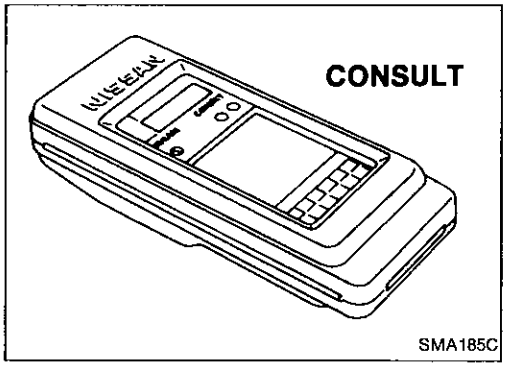
No ↓

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Preliminary Check (Cont'd)



Preliminary Check (Cont'd)



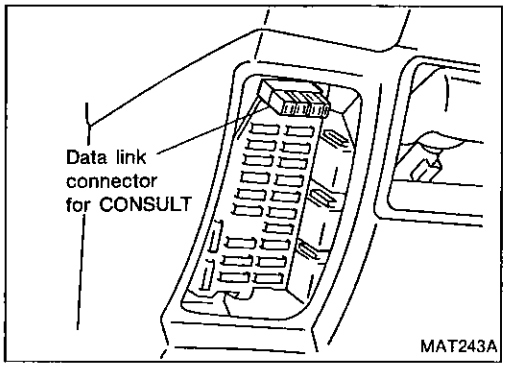
3. Cruise test

With CONSULT

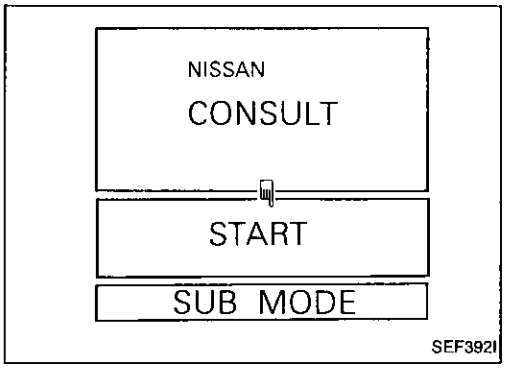
- Using CONSULT, conduct a cruise test and record the result.
- Print the result and ensure that shifts and lock-ups take place as per "Shift Schedule."
- Check all items listed in Parts 1 through 3.

CONSULT setting procedure

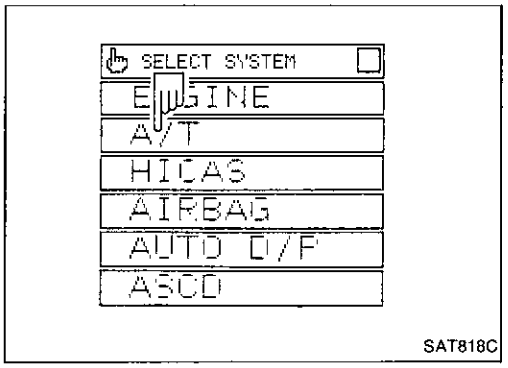
1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector for CONSULT. (Data link connector for CONSULT is located in the fuse box.)



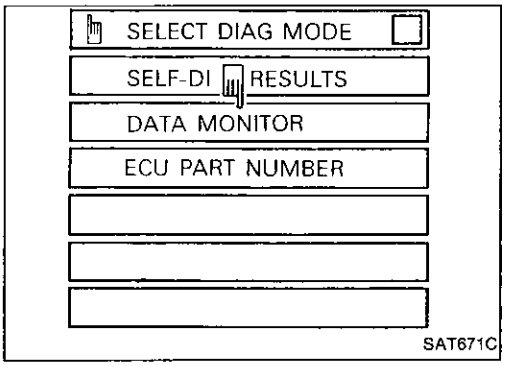
3. Turn on ignition switch.
4. Touch "START".



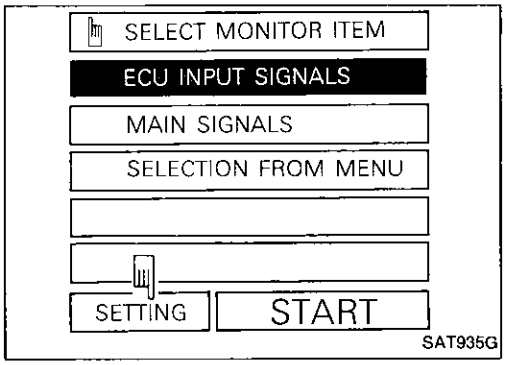
5. Touch "A/T".



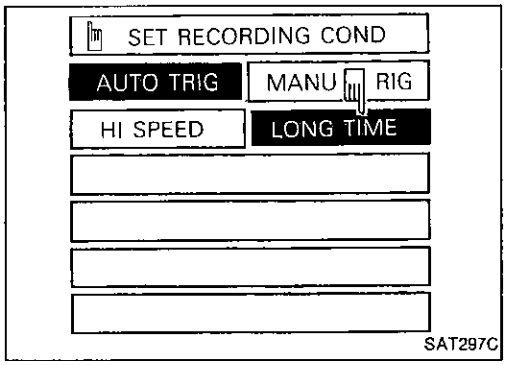
6. Touch "DATA MONITOR".



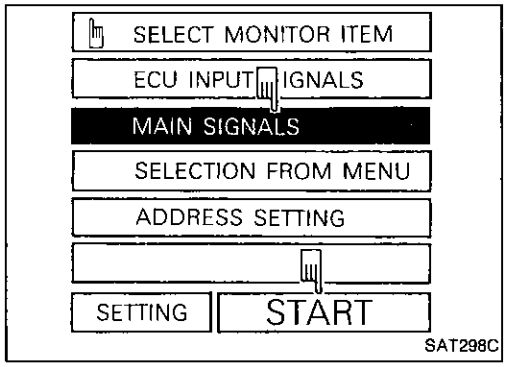
Preliminary Check (Cont'd)



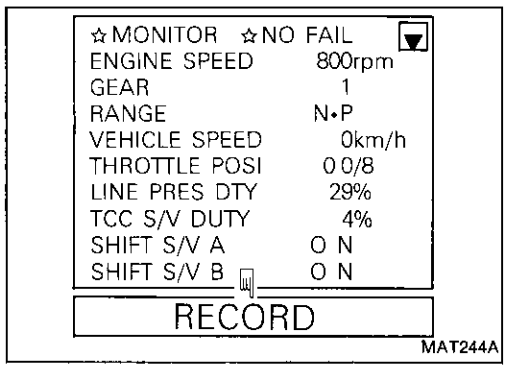
7. Touch "SETTING" to set recording condition.



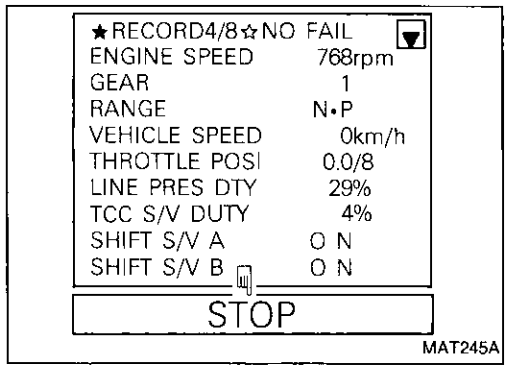
8. Touch "LONG TIME" and "ENTER" key.



9. Go back to SELECT MONITOR ITEM and touch "MAIN SIGNALS".
10. Touch "START".

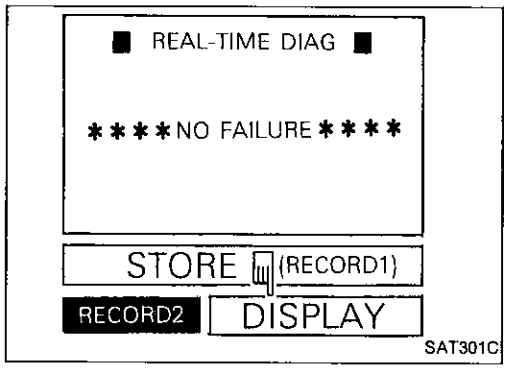


11. When performing cruise test, touch "RECORD".

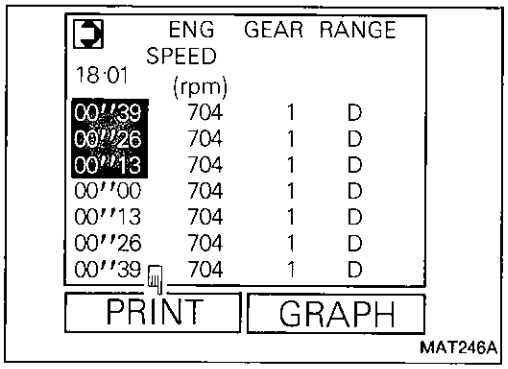


12. After finishing cruise test part 1, touch "STOP".

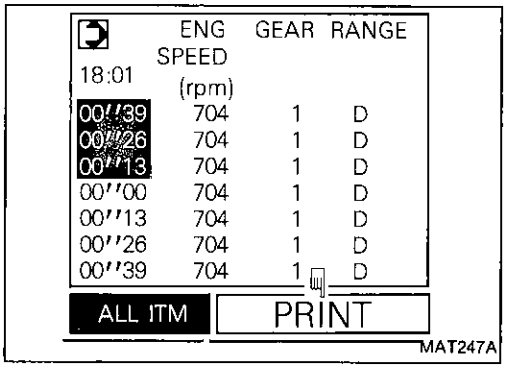
Preliminary Check (Cont'd)



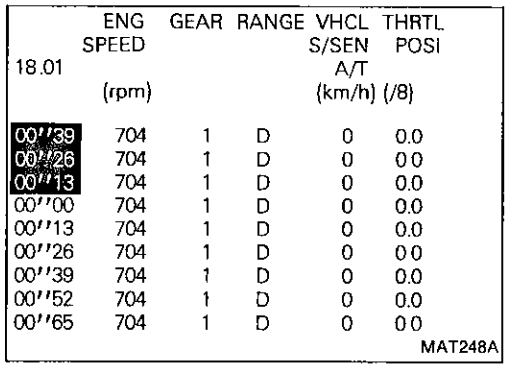
13. Touch "DISPLAY".



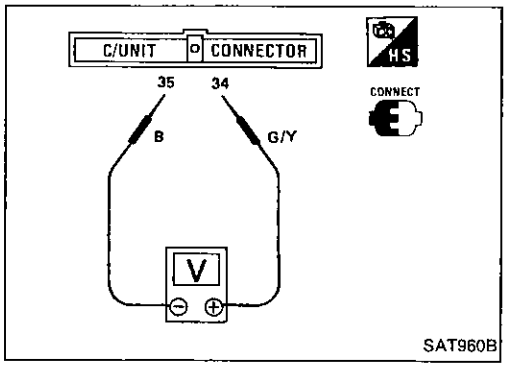
14. Touch "PRINT".



15. Touch "PRINT" again.



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

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)

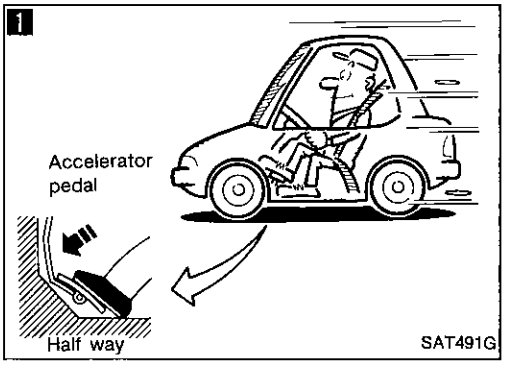
1

1. Park vehicle on flat surface.
2. Move selector lever to "P" position.
3. Turn ignition switch to "ON" position and start engine.
4. Move selector lever to "D" position.
5. Accelerate vehicle to half throttle.
6. Does vehicle start from D_1?

Read gear position.

No → Go to Diagnostic Procedure 7.

Yes



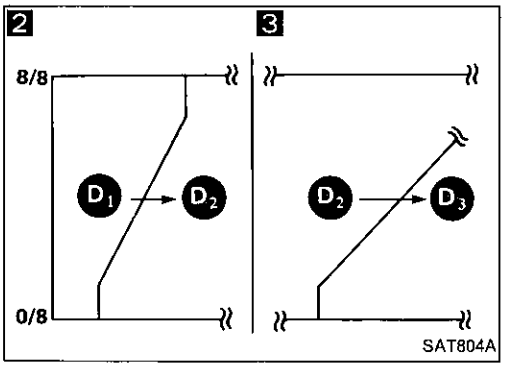
2

Does A/T shift from D_1 to D_2 at the specified speed?

Read gear position, throttle opening and vehicle speed.
Specified speed when shifting from D_1 to D_2:
Refer to Shift schedule.

No → Go to Diagnostic Procedure 8.

Yes



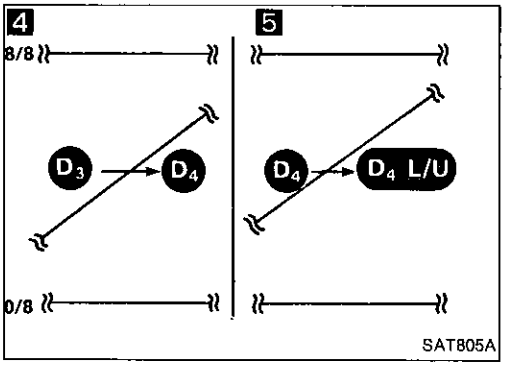
3

Does A/T shift from D_2 to D_3 at the specified speed?

Read gear position, throttle opening and vehicle speed.
Specified speed when shifting from D_2 to D_3:
Refer to Shift schedule.

No → Go to Diagnostic Procedure 9.

Yes



4

Does A/T shift from D_3 to D_4 at the specified speed?

Read gear position, throttle opening and vehicle speed.
Specified speed when shifting from D_3 to D_4:
Refer to Shift schedule.

No → Go to Diagnostic Procedure 10.

Yes

Ⓐ

GI MA EM LC EF & EC FE AT PD FA RA BR ST BF HA EL

Preliminary Check (Cont'd)

Ⓐ

5

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 11.

Yes

Does A/T hold lock-up condition for more than 30 seconds?

No → Go to Diagnostic Procedure 12.

Yes

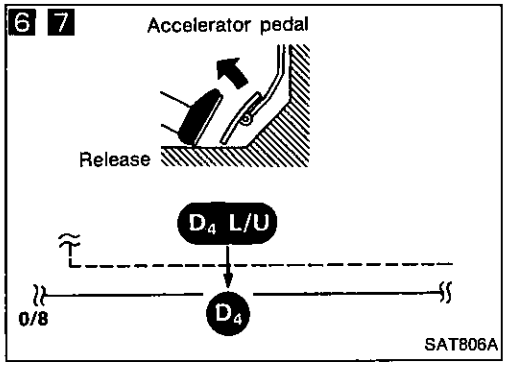
6 **7**

1. Release accelerator pedal.
2. Is lock-up released when accelerator pedal is released?

No → Go to Diagnostic Procedure 13.

Yes

6 **7**



8 **9**

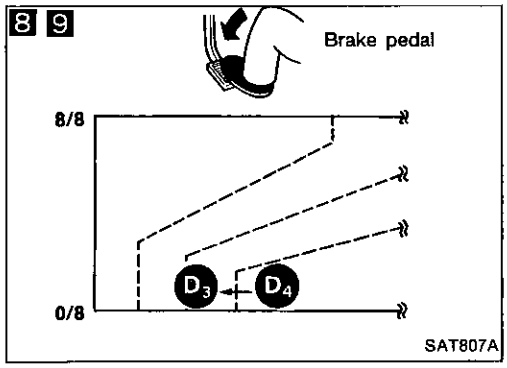
1. Decelerate vehicle by applying foot brake lightly.
2. Does engine speed return to idle smoothly when A/T is shifted from D_4 to D_3?

Read gear position and engine speed.

No → Go to Diagnostic Procedure 14.

Yes

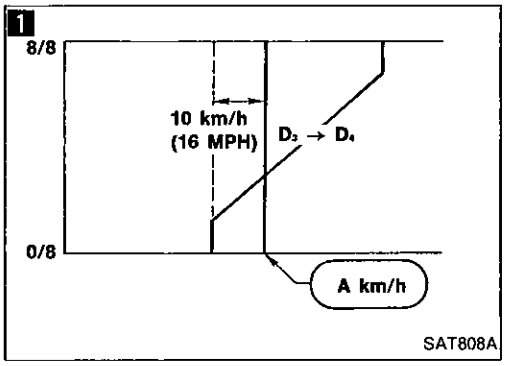
8 **9**



1. Stop vehicle.
2. Go to "Cruise test — Part 2".

Preliminary Check (Cont'd)

Cruise test — Part 2

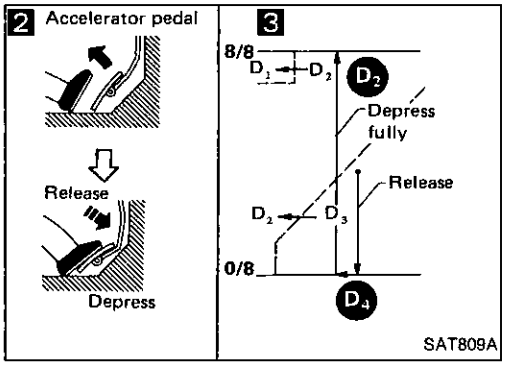


1. Confirm selector lever is in "D" position.
2. Accelerate vehicle to half throttle again.
3. Does vehicle start from D_1?

Read gear position.

No → Go to Diagnostic Procedure 15.

Yes

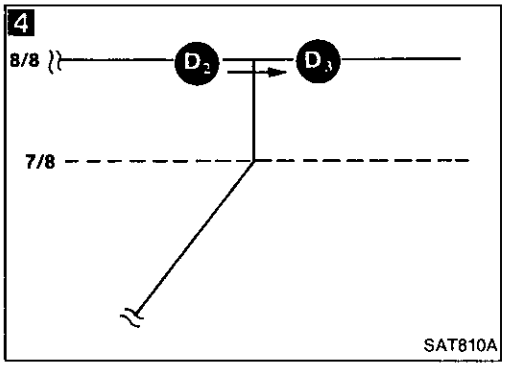


1. Accelerate vehicle to A km/h as shown in illustration.
2. Release accelerator pedal and then quickly depress it fully.
3. Does A/T shift from D_4 to D_2 as soon as accelerator pedal is depressed fully?

Read gear position and throttle opening.

No → Go to Diagnostic Procedure 16.

Yes



Does A/T shift from D_2 to D_3 at the specified speed?

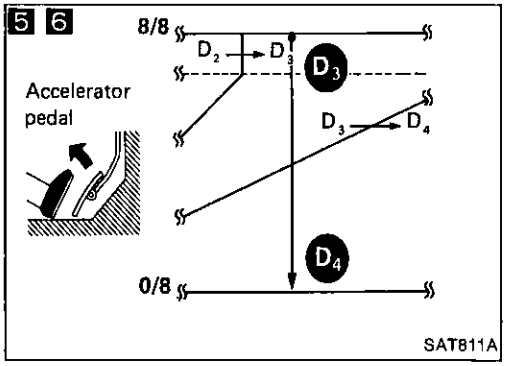
Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D_2 to D_3:

Refer to Shift schedule.

No → Go to Diagnostic Procedure 9.

Yes

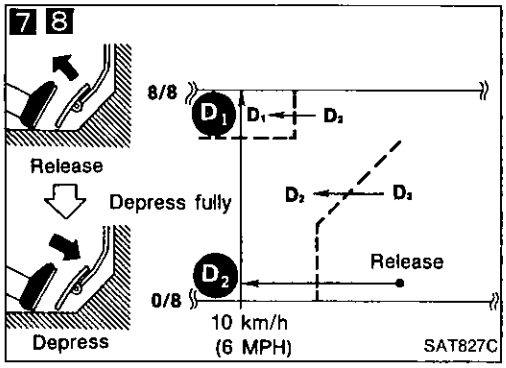


1. Release accelerator pedal after shifting from D_2 to D_3.
2. Does A/T shift from D_3 to D_4 and does vehicle decelerate by engine brake?

Read gear position, throttle opening and vehicle speed.

No → Go to Diagnostic Procedure 10.

Yes



1. Decelerate to 10 km/h (6 MPH) with accelerator pedal released and then quickly depress it fully.
2. Does A/T shift from D_2 to D_1 as soon as accelerator pedal is depressed fully?

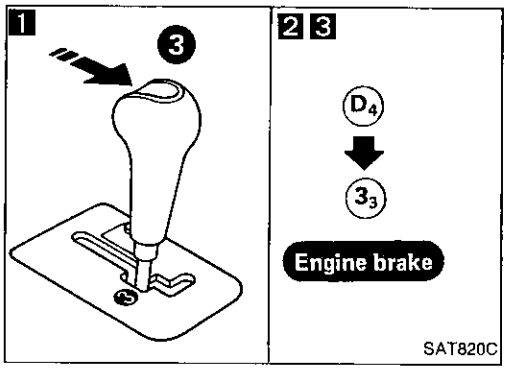
No → Go to Diagnostic Procedure 17.

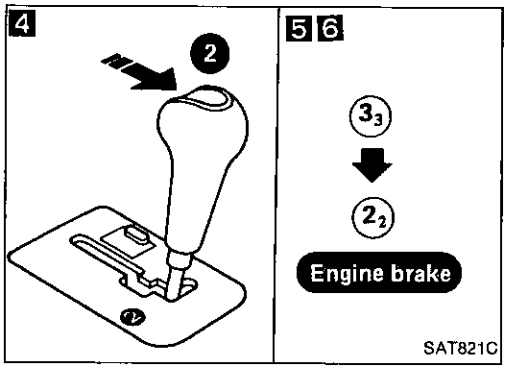
Yes

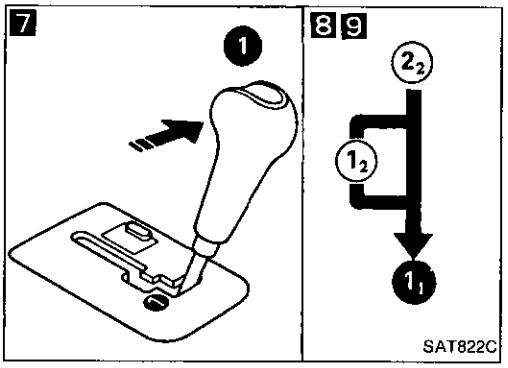
1. Stop vehicle.
2. Go to "Cruise test — Part 3".

Preliminary Check (Cont'd)

Cruise test — Part 3







1 2

1. Confirm selector lever is in "D" position.
2. Accelerate vehicle, using half throttle, to D_4.
3. Release accelerator pedal.
4. Move selector lever to "3" position.
5. Does A/T shift from D_4 to 3_3?

Read gear position and vehicle speed.

No → Go to Diagnostic Procedure 18.

Yes ↓

3

Does vehicle decelerate by engine brake?

No → Go to Diagnostic Procedure 14.

Yes ↓

4 5

Move selector lever from "3" to "2" position while driving in 3_3.
Does A/T shift from 3_3 to 2_2?

Read gear position.

No → Go to Diagnostic Procedure 19.

Yes ↓

6

Does vehicle decelerate by engine brake?

No → Go to Diagnostic Procedure 14.

Yes ↓

7 8

Move selector lever from "2" to "1" position while driving in 2_2.
Does A/T shift from 2_2 (1_2) to 1_1 position?

Read gear position.

No → Go to Diagnostic Procedure 20.

Yes ↓

9

Does vehicle decelerate by engine brake?

No → Go to Diagnostic Procedure 21.

Yes ↓

1. Stop vehicle.
2. Perform self-diagnosis. — Refer to SELF-DIAGNOSIS PROCEDURE.

Preliminary Check (Cont'd)

Vehicle speed when shifting gears

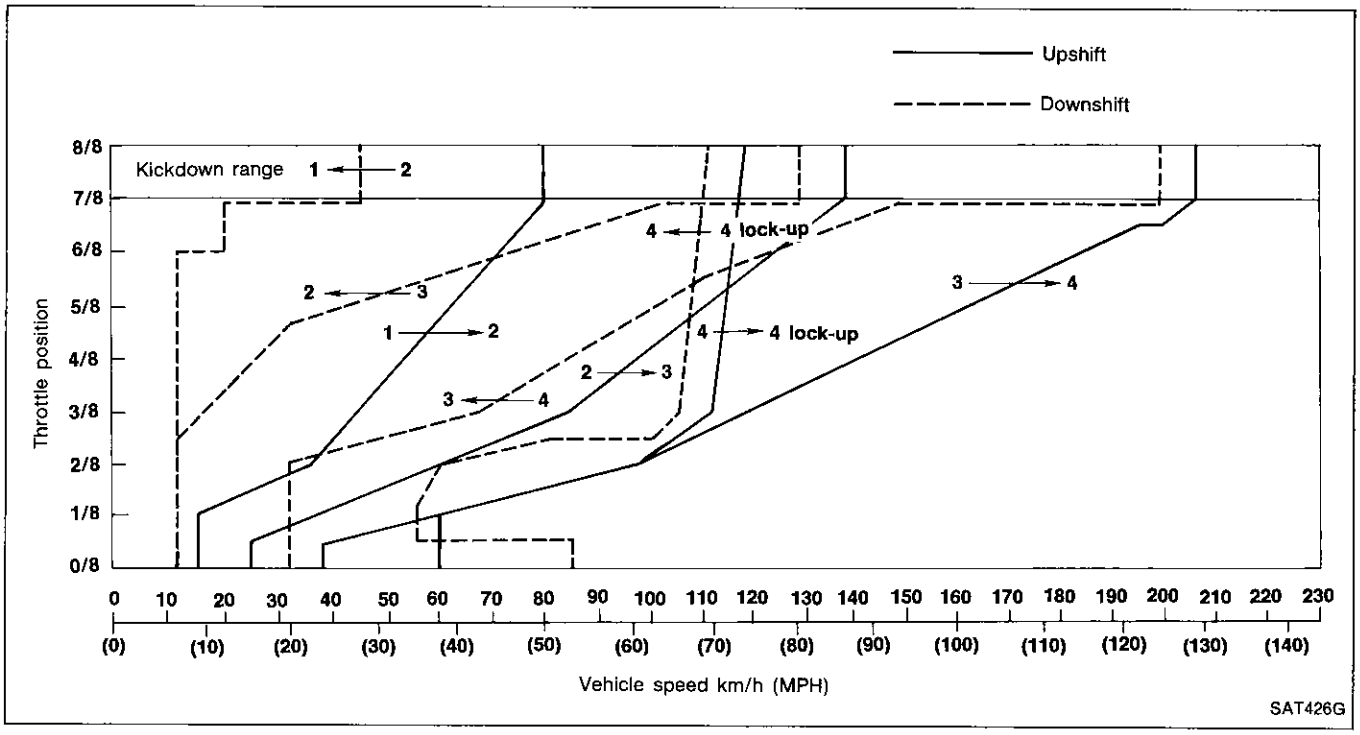
Throttle position	Vehicle speed km/h (MPH)						
	$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$	$1_2 \rightarrow 1_1$
Full throttle	78 - 82 (48 - 51)	135 - 143 (84 - 89)	201 - 211 (125 - 131)	194 - 204 (121 - 127)	125 - 133 (78 - 83)	43 - 47 (27 - 29)	53 - 57 (33 - 35)
Half throttle	13 - 17 (8 - 11)	52 - 56 (32 - 35)	137 - 147 (85 - 91)	79 - 89 (49 - 55)	22 - 28 (14 - 17)	—	53 - 57 (33 - 35)

Vehicle speed when performing and releasing lock-up

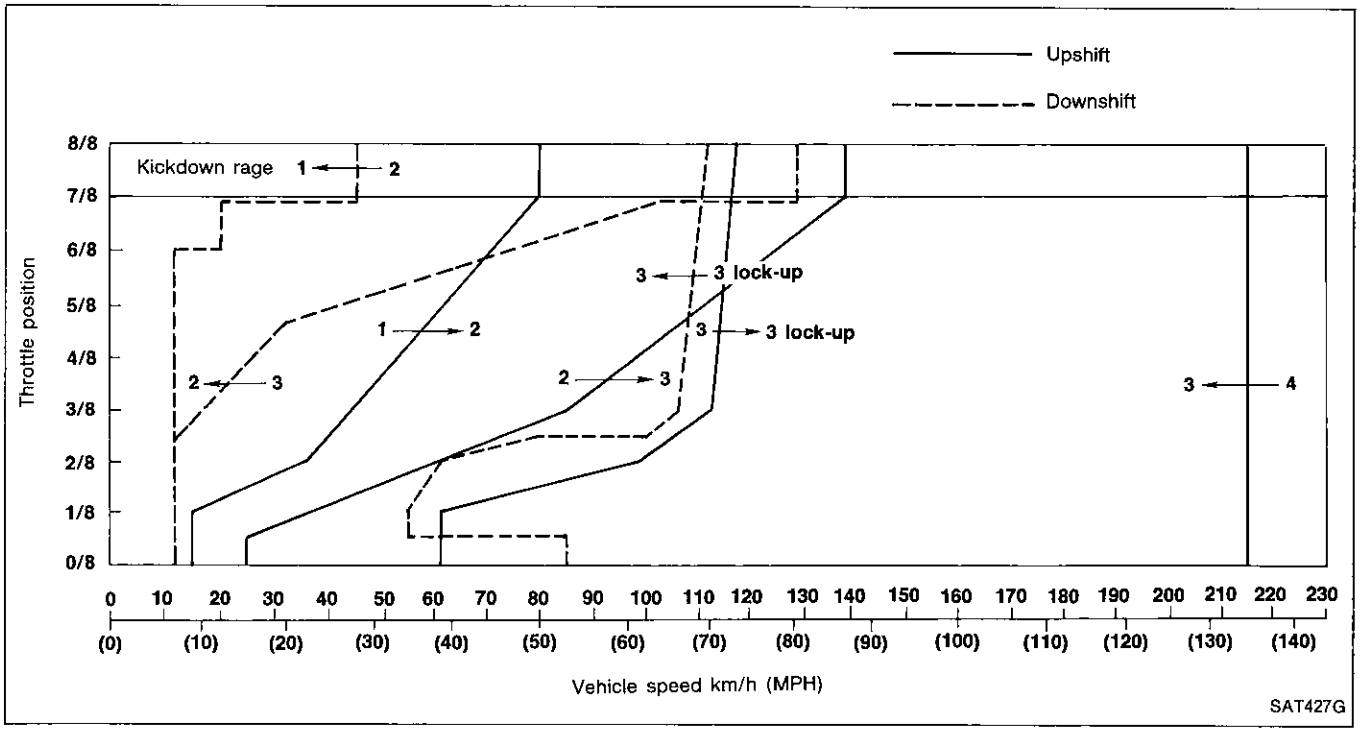
Throttle position	Selector lever position [Shift position]	Vehicle speed km/h (MPH)	
		Lock-up "ON"	Lock-up "OFF"
Full throttle	D [D_4]	202 - 210 (126 - 130)	195 - 203 (121 - 126)
	3 [3_3]	114 - 122 (71 - 76)	108 - 116 (67 - 72)
Half throttle	D [D_4]	138 - 146 (86 - 91)	103 - 111 (64 - 69)
	3 [3_3]	108 - 116 (67 - 72)	102 - 110 (63 - 68)

Preliminary Check (Cont'd)

Shift schedule (D position)

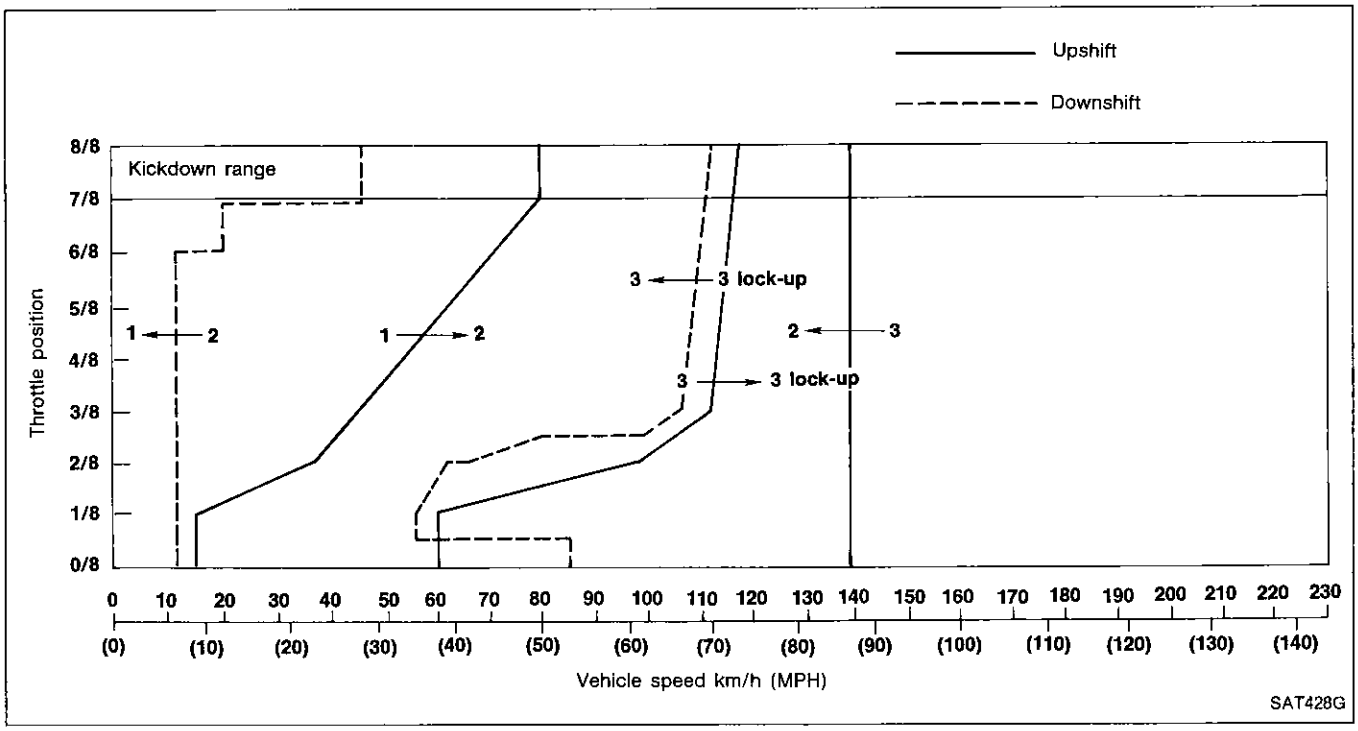


Shift schedule (Standard pattern in 3 position)

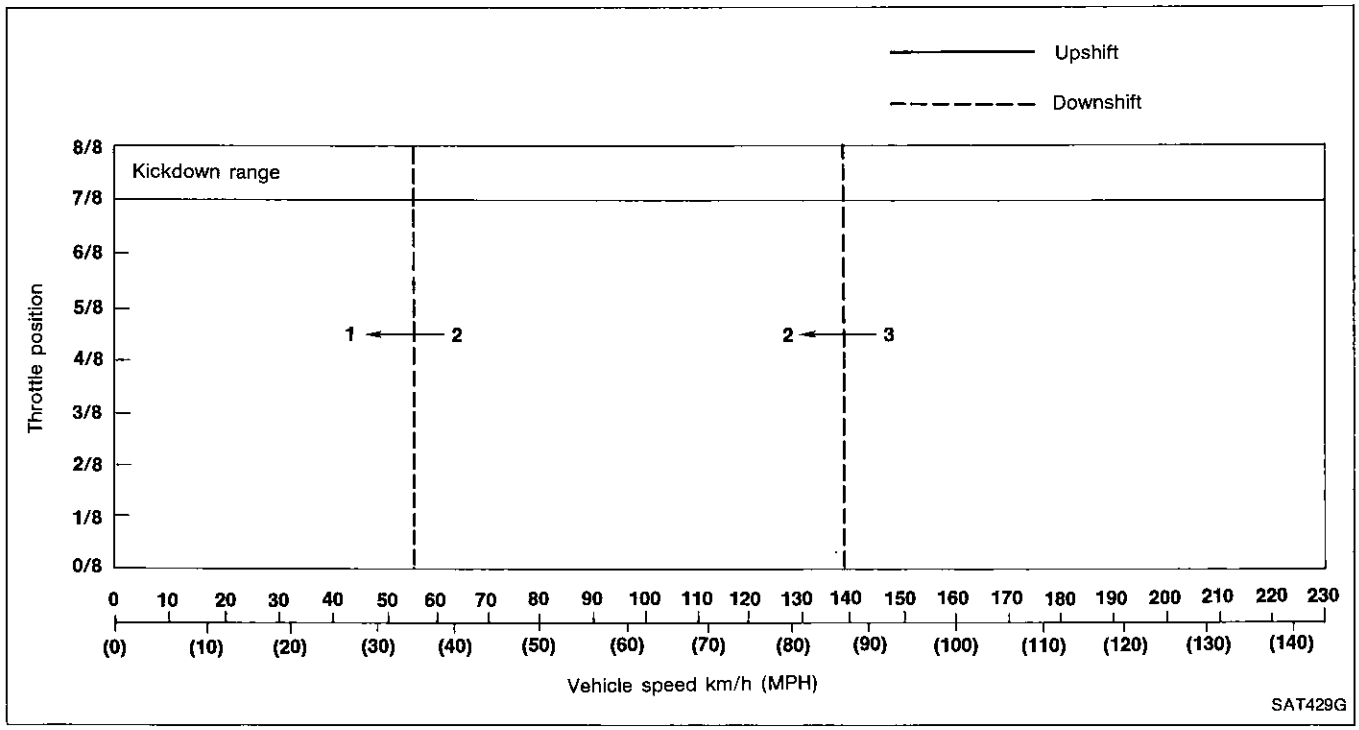


Preliminary Check (Cont'd)

Shift schedule (2 position)



Shift schedule (1 position)



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 start, 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 valve	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
N 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

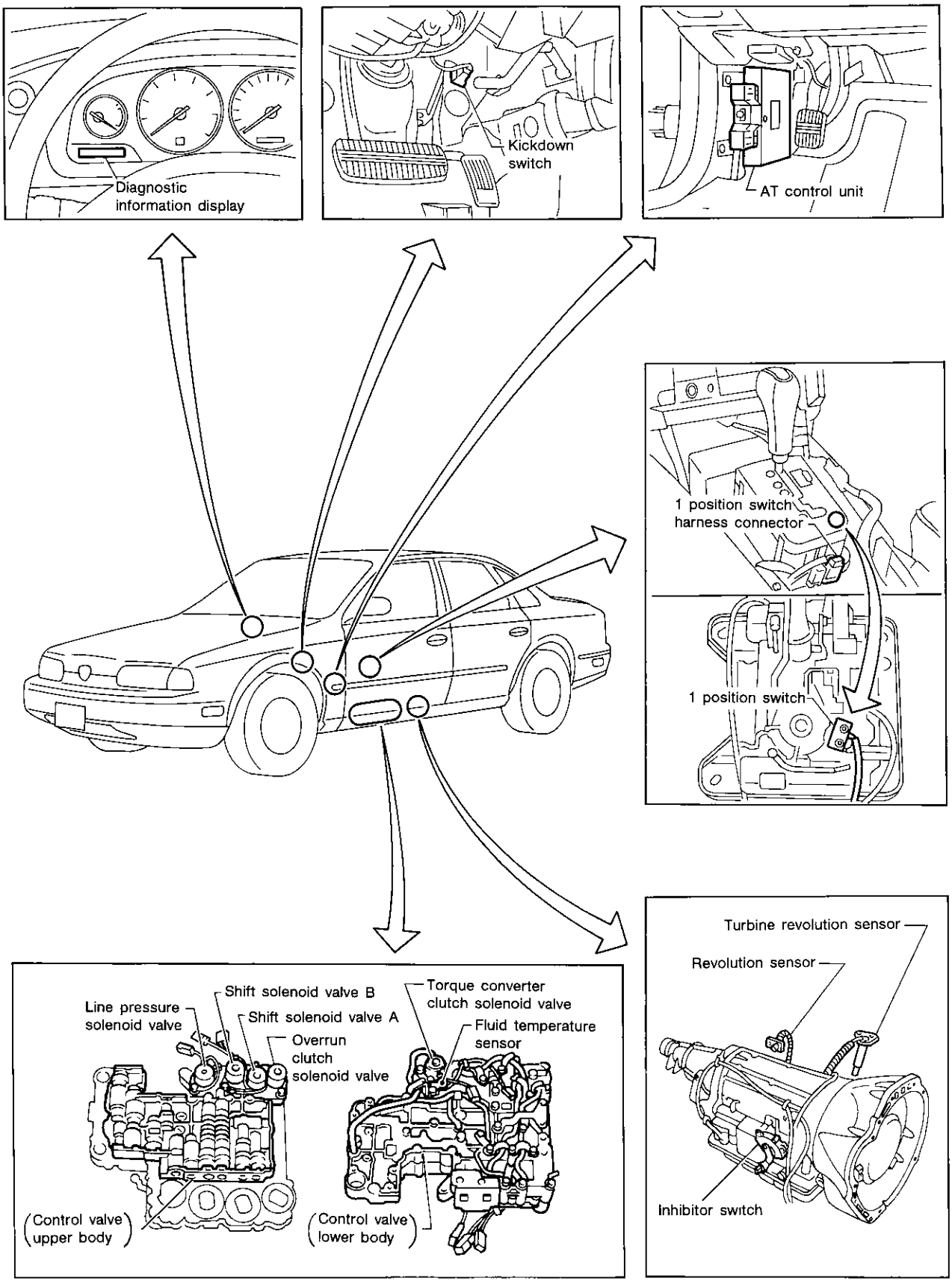
X: Applicable —: Not applicable

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)]

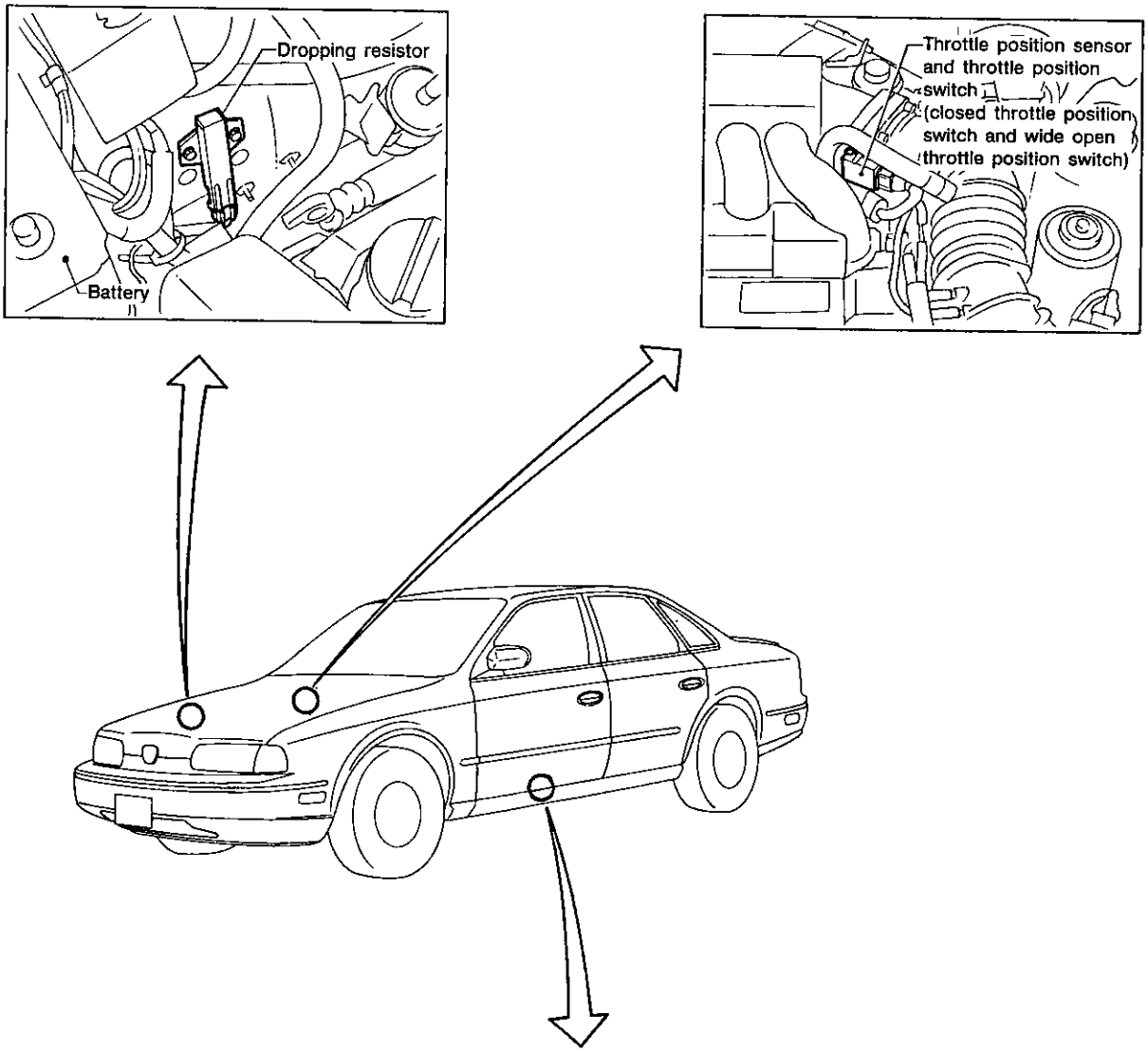
Gear position	1	2	3	4
Shift solenoid valve A	ON	OFF	OFF	ON
Shift solenoid valve B	ON	ON	OFF	OFF

A/T Electrical Parts Location



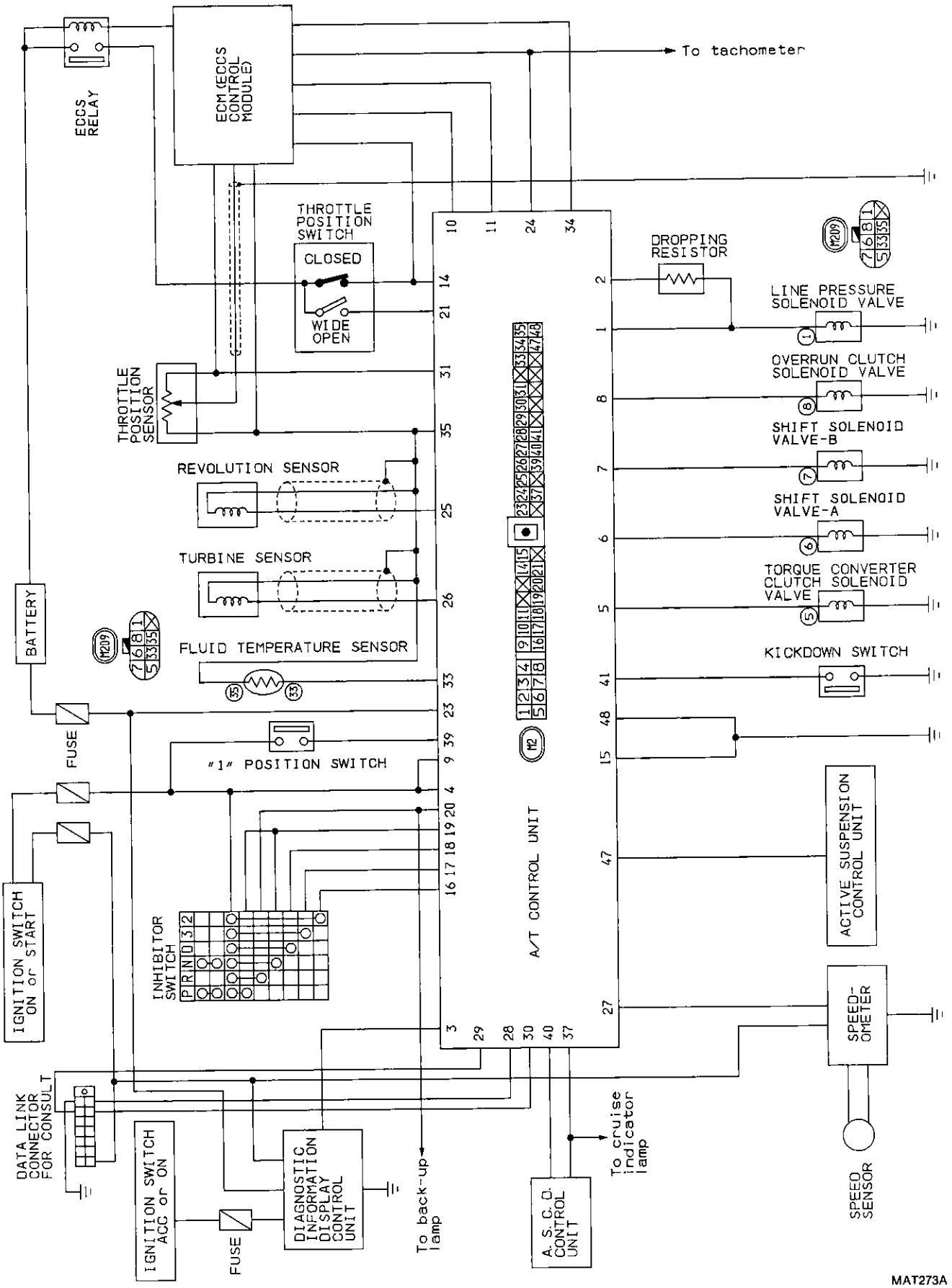
MAT249A

A/T Electrical Parts Location (Cont'd)



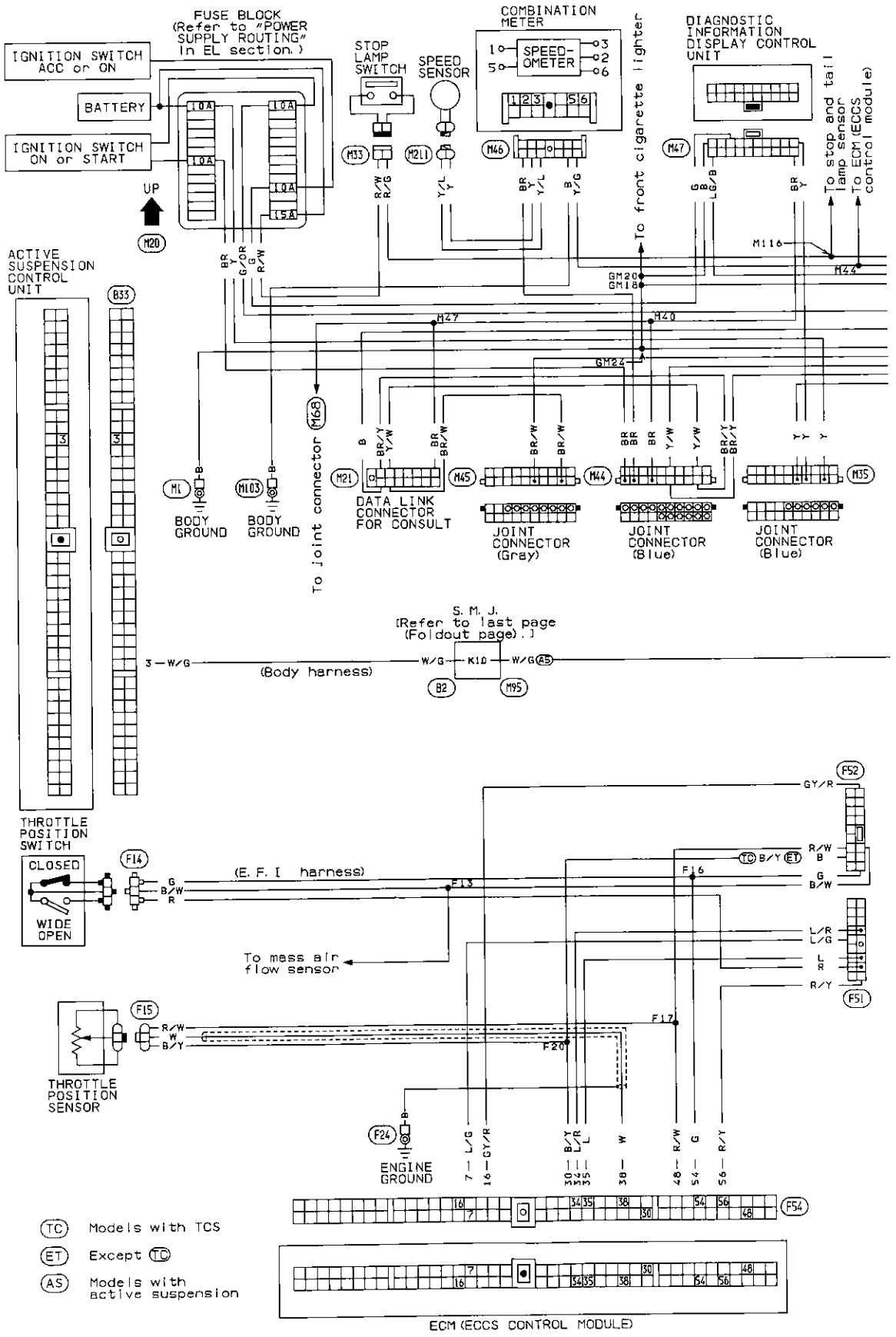
MAT250A

Circuit Diagram for Quick Pinpoint Check

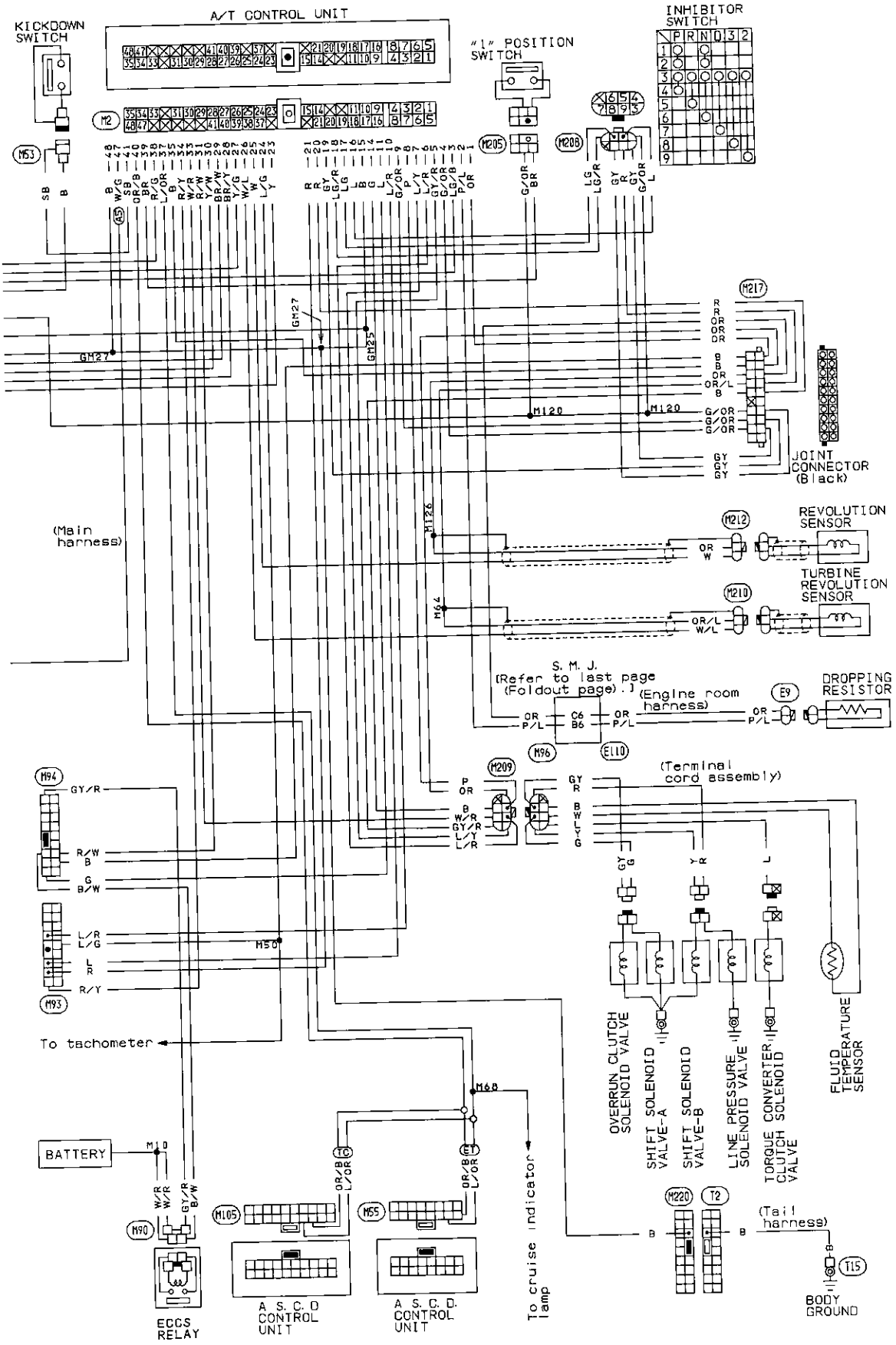


MAT273A

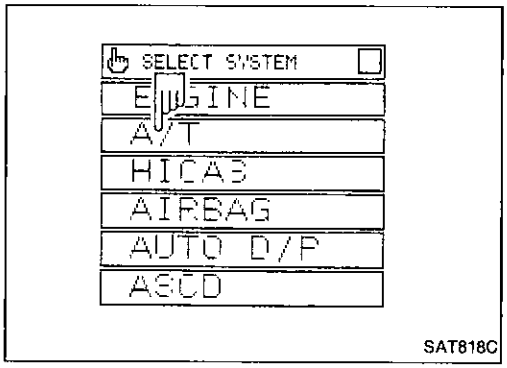
Wiring Diagram



Wiring Diagram (Cont'd)



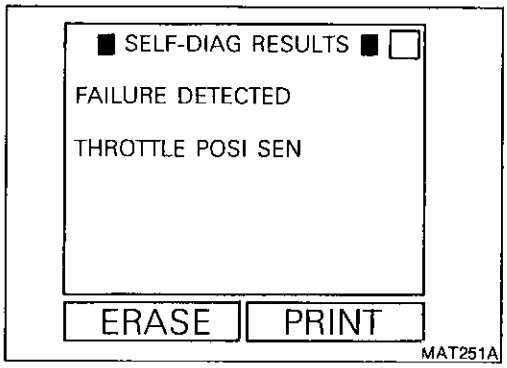
MAT274A



Self-diagnosis

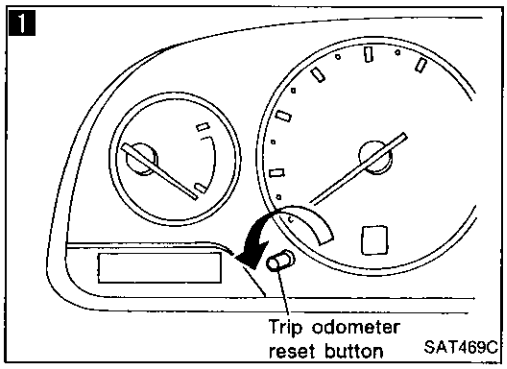
SELF-DIAGNOSTIC PROCEDURE (With CONSULT)

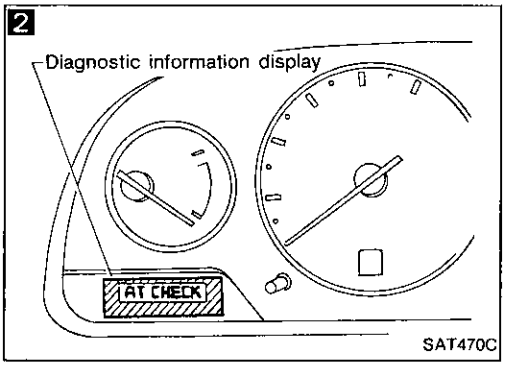
1. Turn on CONSULT.
2. Touch "A/T".

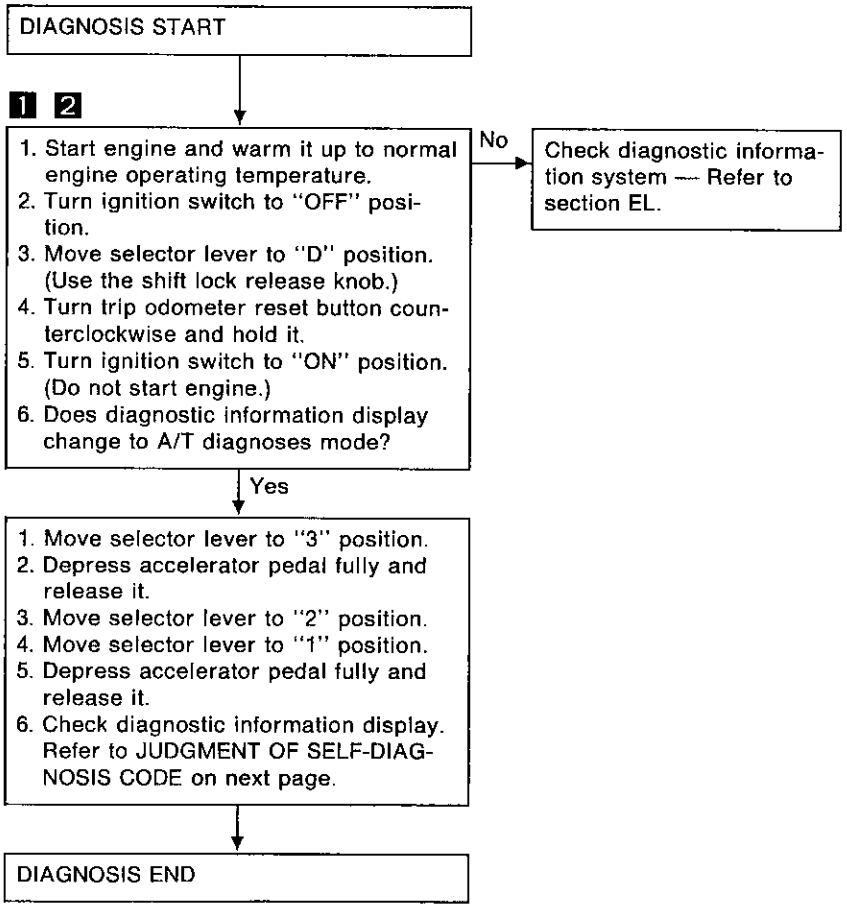


3. Touch "SELF-DIAGNOSIS".
   CONSULT performs REAL-TIME SELF-DIAGNOSIS.

SELF-DIAGNOSTIC PROCEDURE (Without CONSULT)

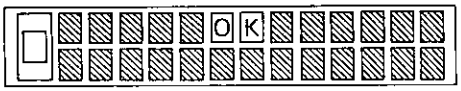
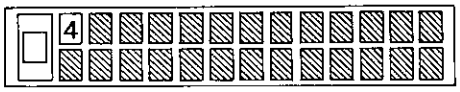
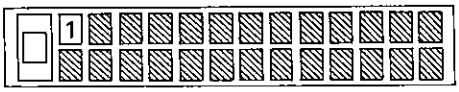
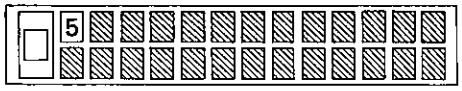
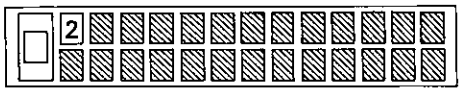
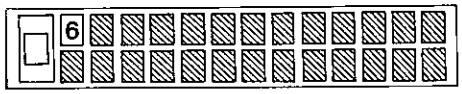
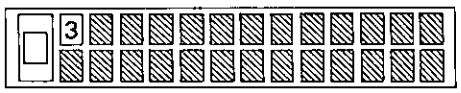
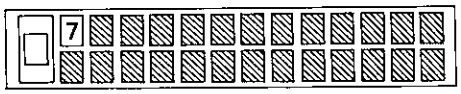




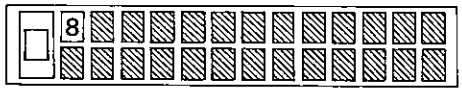
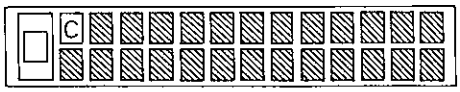
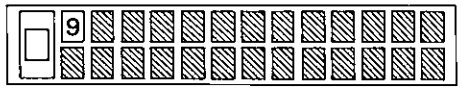
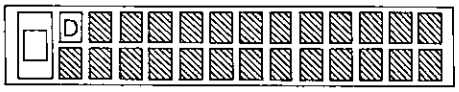
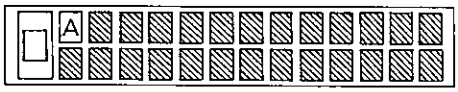
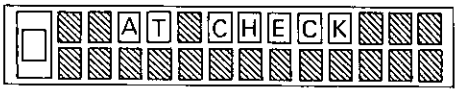
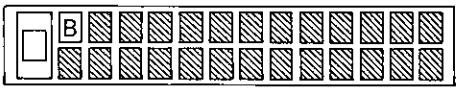


Self-diagnosis (Cont'd)

JUDGMENT OF SELF-DIAGNOSIS CODE

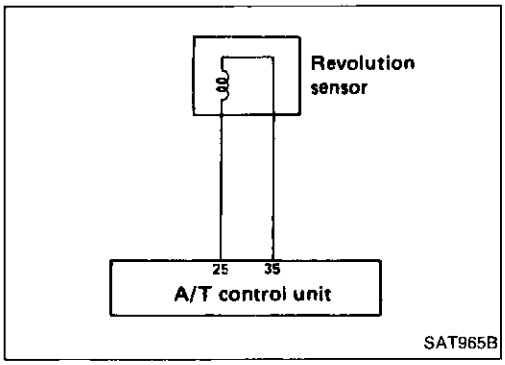
Diagnostic information display	Damaged circuit
The judgment is "OK".  All circuits that can be confirmed by self-diagnosis are O.K. SAT432G	The judgment is "4".  Shift solenoid valve A circuit is short-circuited or disconnected. ➡ **Go to shift solenoid valve A circuit check.** SAT436G
The judgment is "1".  Revolution sensor circuit is short-circuited or disconnected. ➡ **Go to revolution sensor circuit check.** SAT433G	The judgment is "5".  Shift solenoid valve B circuit is short-circuited or disconnected. ➡ **Go to shift solenoid valve B circuit check.** SAT437G
The judgment is "2".  Speed sensor circuit is short-circuited or disconnected. ➡ **Go to speed sensor circuit check.** SAT434G	The judgment is "6".  Overrun clutch solenoid valve circuit is short-circuited or disconnected. ➡ **Go to overrun clutch solenoid valve circuit check.** SAT438G
The judgment is "3".  Throttle position sensor circuit is short-circuited or disconnected. ➡ **Go to throttle position sensor circuit check.** SAT435G	The judgment is "7".  Torque converter clutch solenoid valve circuit is short-circuited or disconnected. ➡ **Go to torque converter clutch solenoid valve circuit check.** SAT439G

Self-diagnosis (Cont'd)

Diagnostic information display	Damaged circuit
The judgment is "8".  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.** SAT440G	The judgment is "C".  Engine control circuit between A/T control unit and ECM (ECCS control module) is short-circuited or disconnected. ➡**Go to engine control circuit check.** SAT444G
The judgment is "9".  Engine speed signal circuit is short-circuited or disconnected. ➡**Go to engine speed signal circuit check.** SAT441G	The judgment is "D".  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.) SAT445G
The judgment is "A".  Turbine revolution sensor circuit is short-circuited or disconnected. ➡**Go to turbine revolution sensor circuit check.** SAT442G	The judgment is "AT CHECK".  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.** SAT446G
The judgment is "B".  Line pressure solenoid valve circuit is short-circuited or disconnected. ➡**Go to line pressure solenoid valve circuit check.** SAT443G	

Self-diagnosis (Cont'd)

REVOLUTION SENSOR CIRCUIT CHECK



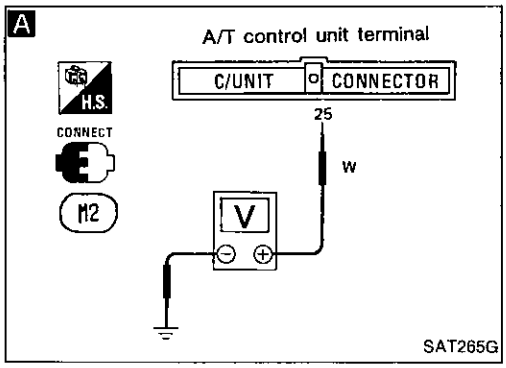
A

☆MONITOR	☆NO FAIL
VHCL/S SE•A/T	0km/h
VHCL/S SE•MTR	5km/h
THRTL POS SEN	0.5V
FLUID TEMP SE	1.4V
BATTERY VOLT	10.6V
ENGINE SPEED	256rpm
TURBINE REV	288rpm
SLCT LEVER SW	O N
R POSITION SW	OFF

RECORD

SAT448G

A



CHECK REVOLUTION SENSOR. — Refer to "Electrical Components Inspection".

N.G. → Repair or replace revolution sensor.

O.K. ↓

A

CHECK INPUT SIGNAL.

1. Turn ignition switch to "START" position and start engine.
2.
   - Select "ECU INPUT SIGNALS".
   - Read out the value of "VHCL/S SE·A/T" while driving.
   - Check the value changes according to driving speed.

N.G. → Check harness continuity between A/T control unit and revolution sensor.

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.)

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.

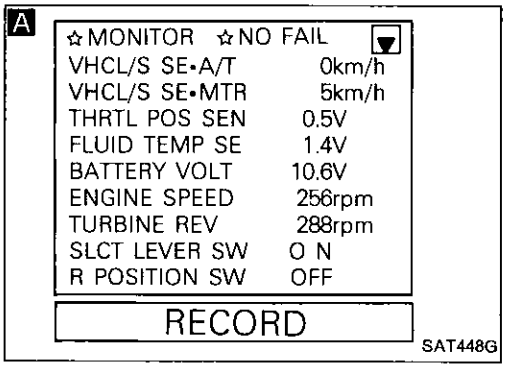
O.K. ↓

INSPECTION END

GI MA EM LC EF & EC FE AT PD FA RA BR ST BF HA EL

Self-diagnosis (Cont'd)

SPEED SENSOR CIRCUIT CHECK



A

CHECK INPUT SIGNAL.

1. Turn ignition switch to "START" position and start engine.
2. ● Select "ECU INPUT SIGNALS".
   ● Read out the value of "VHCL/S SE-MTR" 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

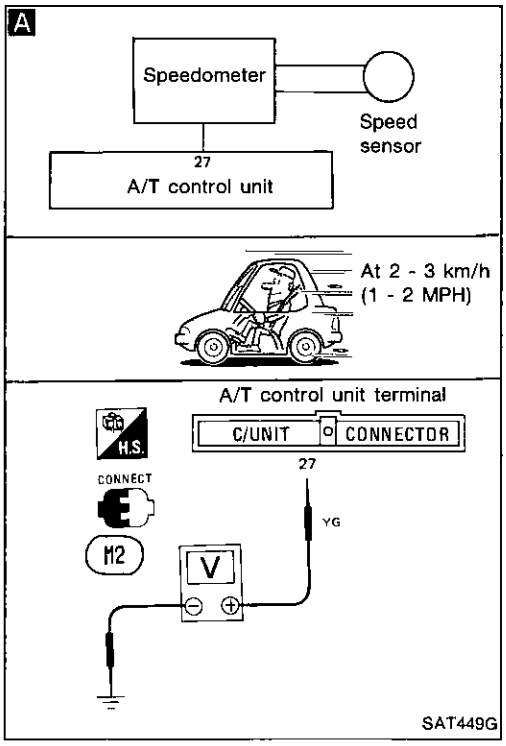
O.K. ↓

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.

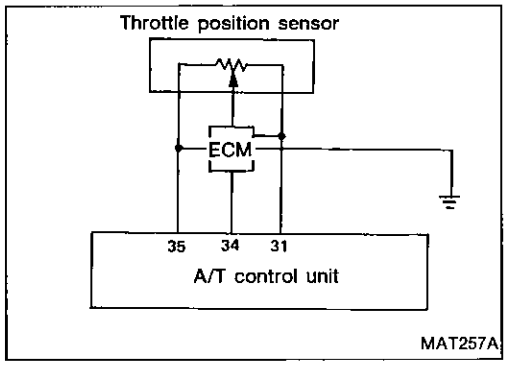
O.K. ↓

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. Turn ignition switch to "ON" position. (Do not start engine.)
2. ● Select "ECU INPUT SIGNALS".
   ● Read out the value of "THRTL POS SEN".

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

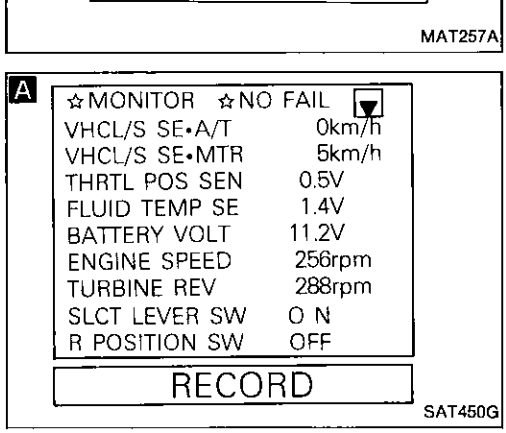
● Check voltage between A/T control unit terminals ㉞ and ㉟ while accelerator pedal is depressed slowly.

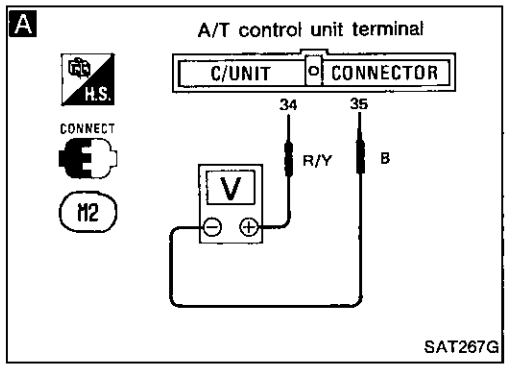
Voltage:

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.

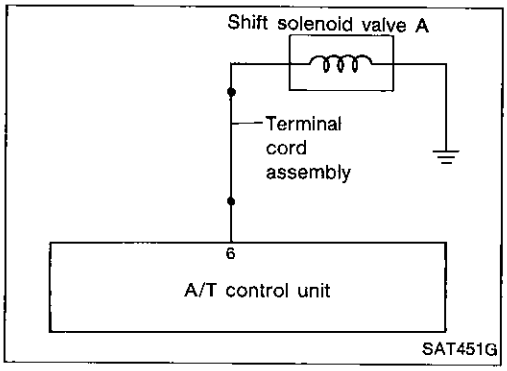
O.K.

INSPECTION END

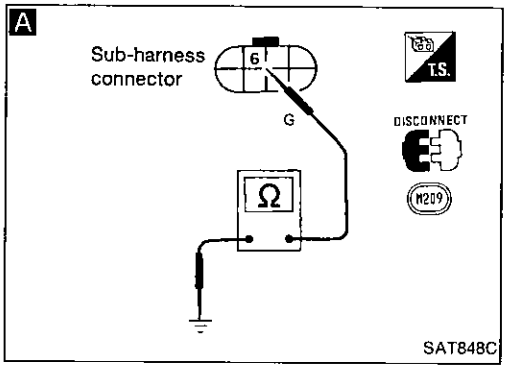
GI MA EM LC EF & EC FE AT PD FA RA BR ST BF HA EL

Self-diagnosis (Cont'd)

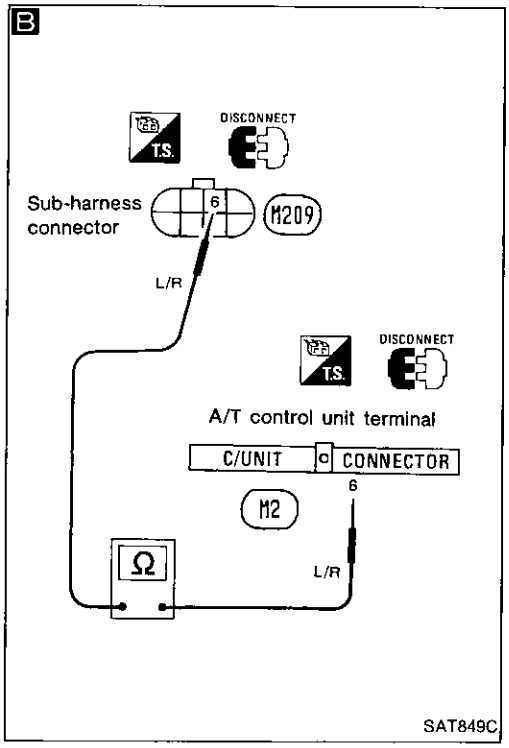
SHIFT SOLENOID VALVE A CIRCUIT CHECK



A



B



A

CHECK GROUND CIRCUIT.

1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector at the end of A/T assembly.
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. Turn ignition switch to "OFF" position.
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.

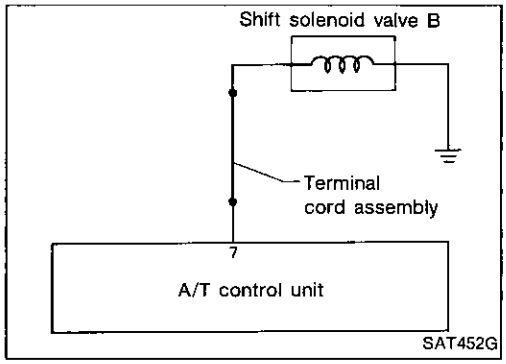
N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

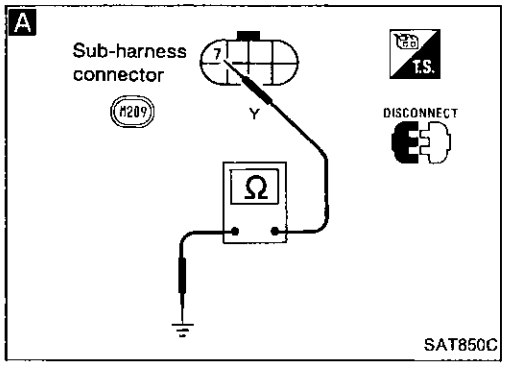
O.K. ↓

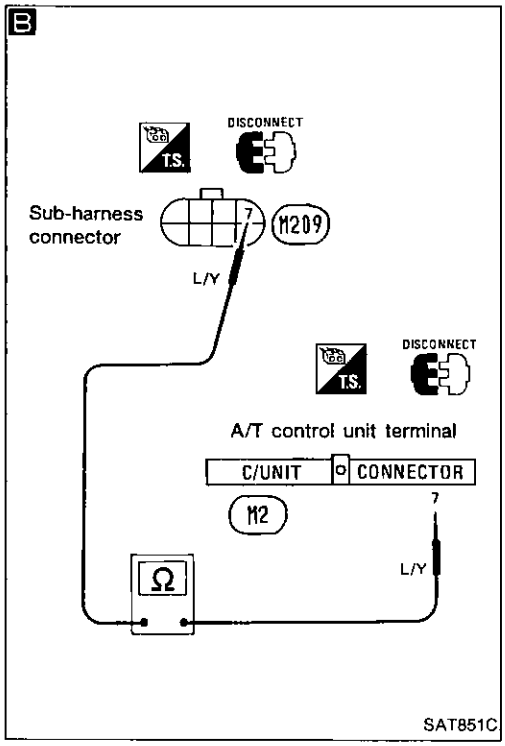
INSPECTION END

Self-diagnosis (Cont'd)

SHIFT SOLENOID VALVE B CIRCUIT CHECK







A

CHECK GROUND CIRCUIT.
1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector at the end of A/T assembly.
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. Turn ignition switch to "OFF" position.
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.

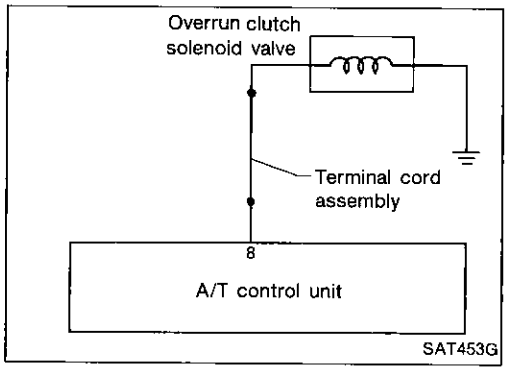
N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

INSPECTION END

Self-diagnosis (Cont'd)

OVERRUN CLUTCH SOLENOID VALVE CIRCUIT CHECK



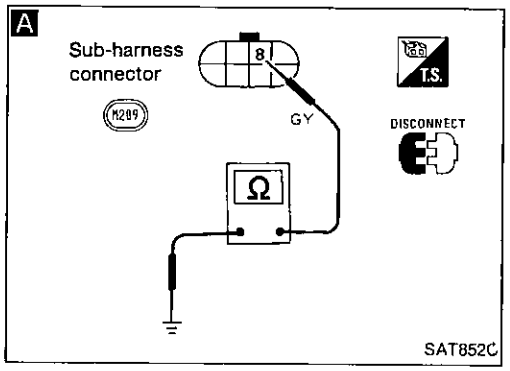
A

CHECK GROUND CIRCUIT.

1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector at the end of A/T assembly.
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. ↓



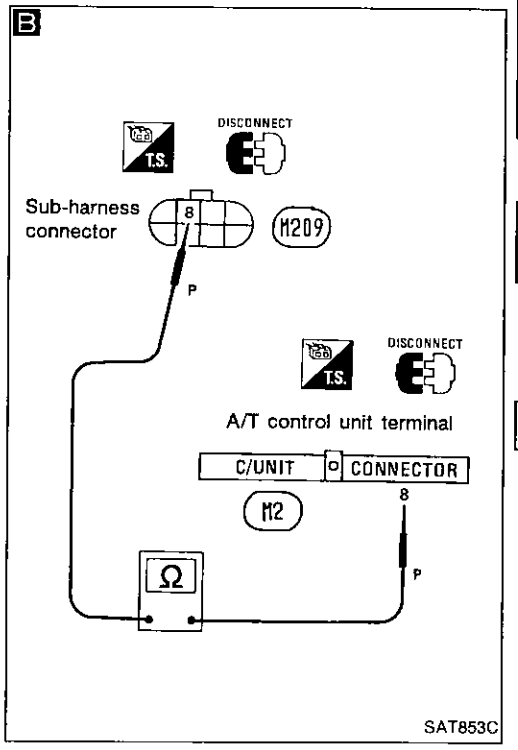
B

CHECK POWER SOURCE CIRCUIT.

1. Turn ignition switch to "OFF" position.
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.

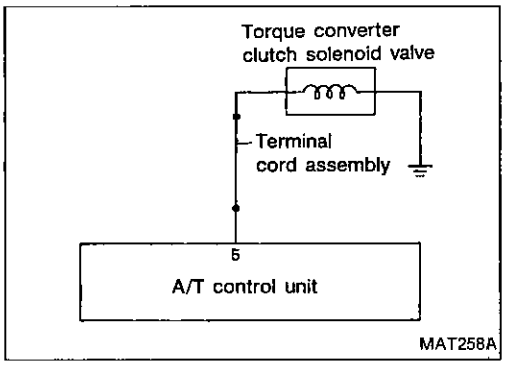
N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

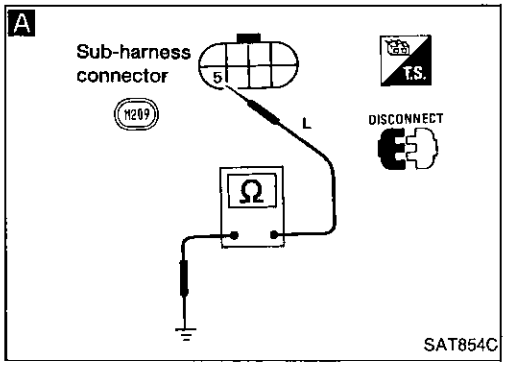
O.K. ↓

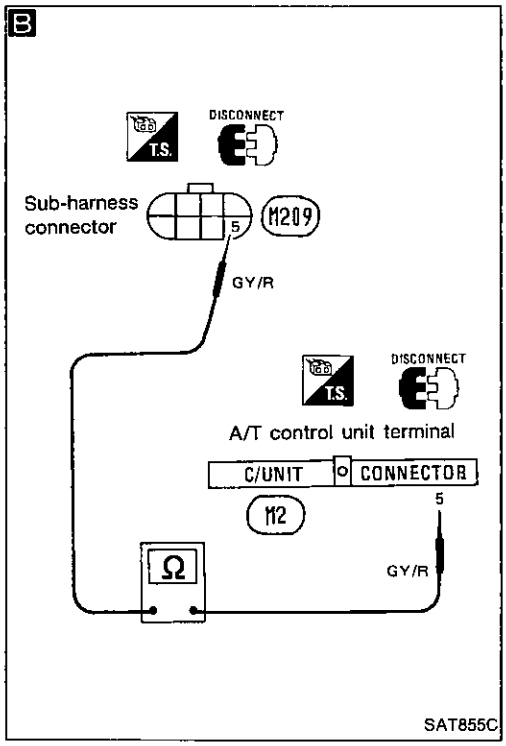
INSPECTION END

Self-diagnosis (Cont'd)

TORQUE CONVERTER CLUTCH SOLENOID VALVE CIRCUIT CHECK







A

CHECK GROUND CIRCUIT.
1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector at the end of A/T assembly.
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. Turn ignition switch to "OFF" position.
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.

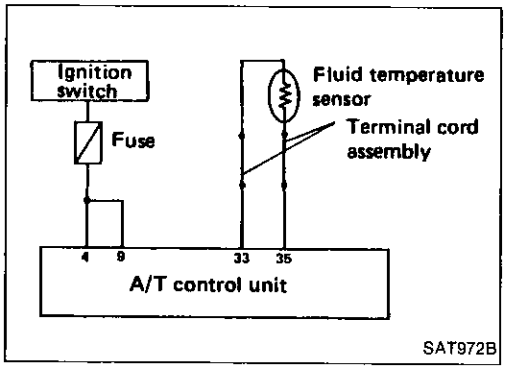
N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

INSPECTION END

Self-diagnosis (Cont'd)

FLUID TEMPERATURE SENSOR CIRCUIT AND A/T CONTROL UNIT POWER SOURCE CIRCUIT CHECKS

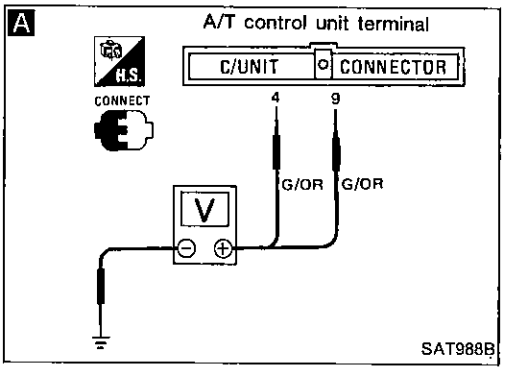


A

CHECK A/T CONTROL UNIT POWER SOURCE.
1. Turn ignition switch to "ON" position. (Do not start engine.)
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. ↓

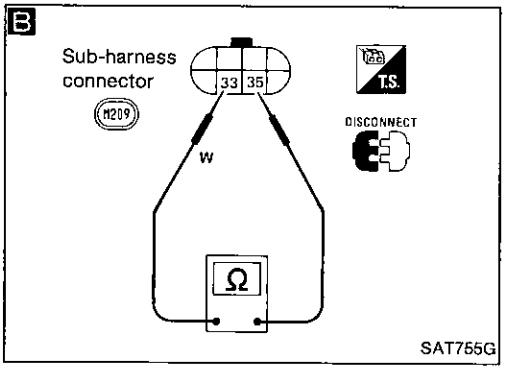


B

CHECK FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY.
1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector at the end of A/T assembly.
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. ↓



C

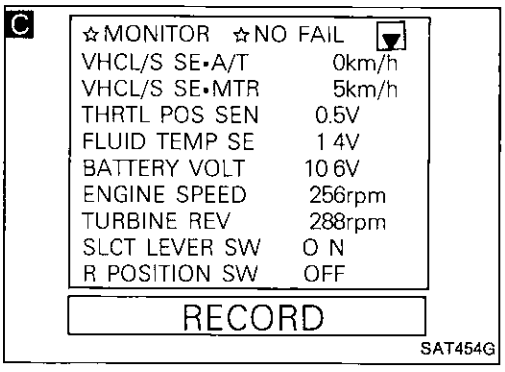
CHECK INPUT SIGNAL OF FLUID TEMPERATURE SENSOR.
1. Turn ignition switch to "ON" position and start engine.
2.
- Select "ECU INPUT SIGNALS".
- Read out the value of "FLUID TEMPERATURE SENSOR".
Voltage:
Cold [20°C (68°F)] →
Hot [80°C (176°F)]:
Approximately 1.5V → 0.5V

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. ↓

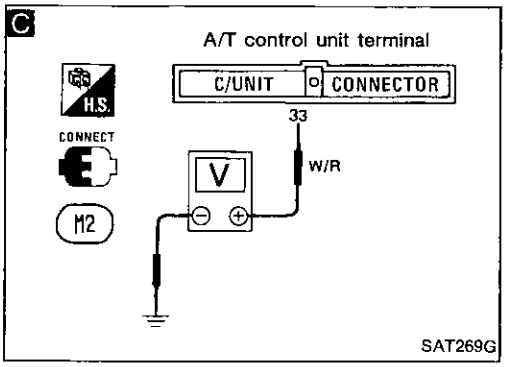


Perform self-diagnosis after driving for a while.

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.

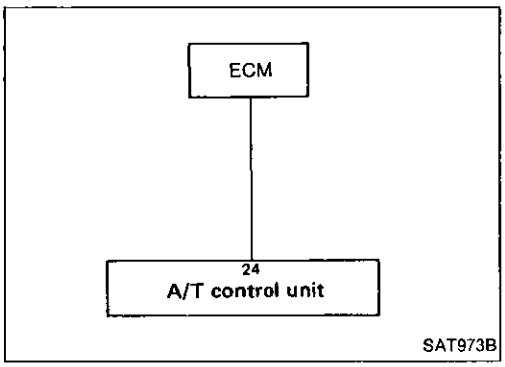
O.K. ↓

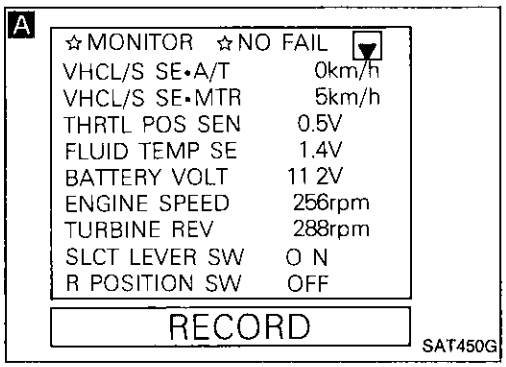
INSPECTION END

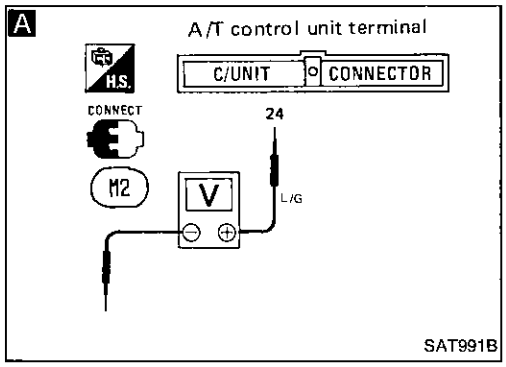


Self-diagnosis (Cont'd)

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. Turn ignition switch to "ON" position and start engine.
2.
- Select "ECU INPUT SIGNALS".
- Read out the value of "ENGINE SPEED".
- Check engine speed changes according to throttle opening.

OR

- Check voltage between A/T control unit terminal ㉔ and ground.
  Voltage: 0.9 - 4.5V

N.G. → Check harness continuity between A/T control unit and ECM (ECCS control module).

O.K. ↓

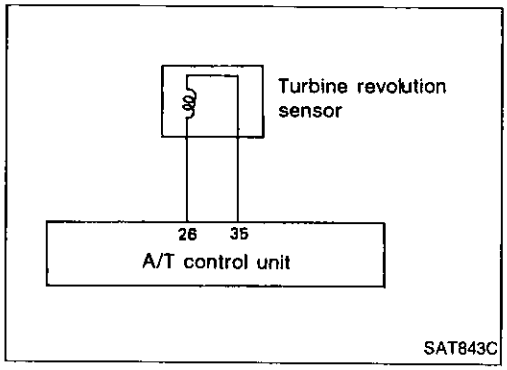
Perform self-diagnosis again after driving for a while.
N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

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

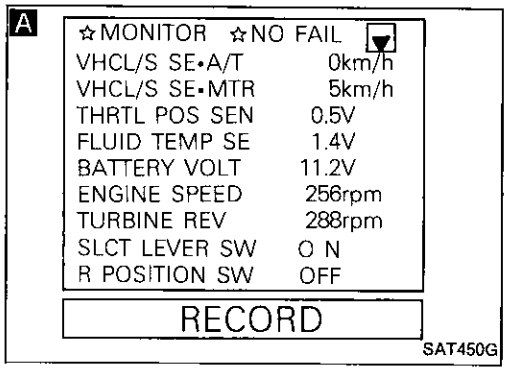
CHECK INPUT SIGNAL.

1. Turn ignition switch to "START" position and start engine.
2. Select "ECU INPUT SIGNALS".
   - Read out the value of "TURBINE REV".
   - Check the value changes according to engine speed.

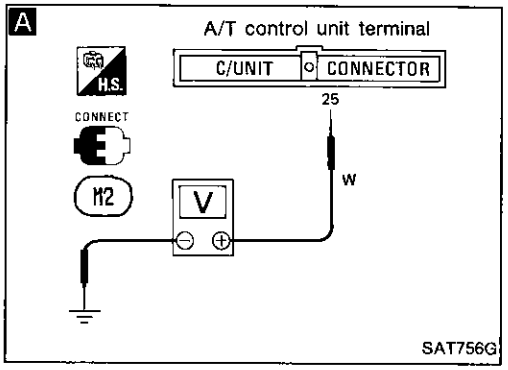
N.G. → Check harness continuity between A/T control unit and turbine revolution sensor.

— OR —

Check voltage between A/T control unit terminal ㉕ and ground. (Measure with AC position.)
Voltage: 0.3 - 4.5V



O.K. ↓



Perform self-diagnosis again after driving for a while.

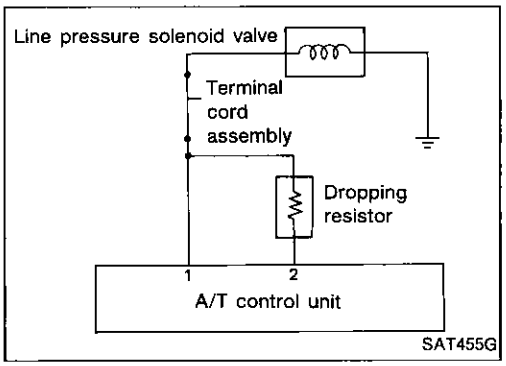
N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

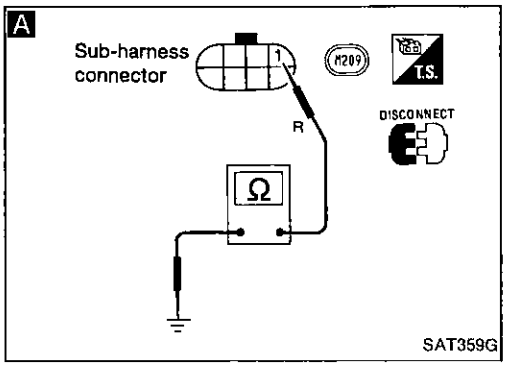
O.K. ↓

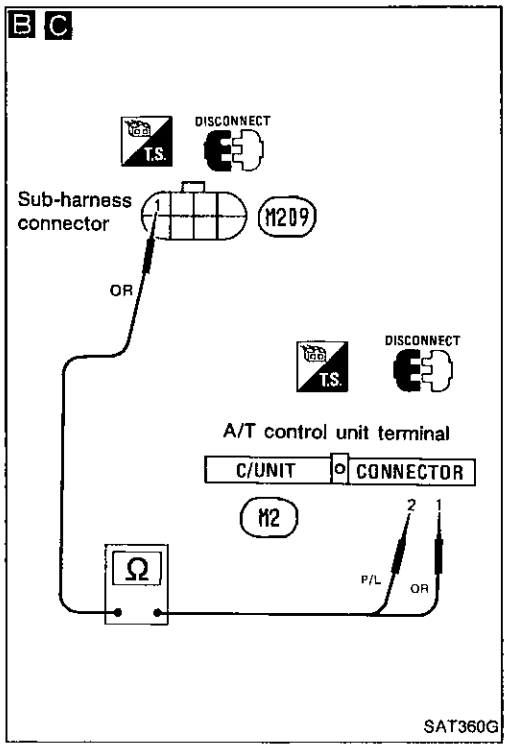
INSPECTION END

Self-diagnosis (Cont'd)

LINE PRESSURE SOLENOID VALVE CIRCUIT CHECK







A

CHECK GROUND CIRCUIT.
1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector at the end of A/T assembly.
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. Turn ignition switch to "OFF" position.
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. Turn ignition switch to "OFF" position.
2. Check resistance between terminal ① and A/T control unit terminal ①.
   Resistance:
   Approximately 0Ω
4. 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.

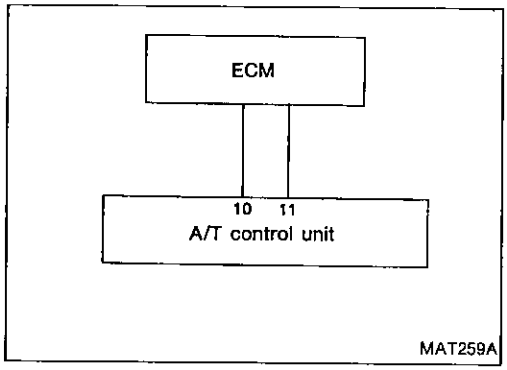
N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

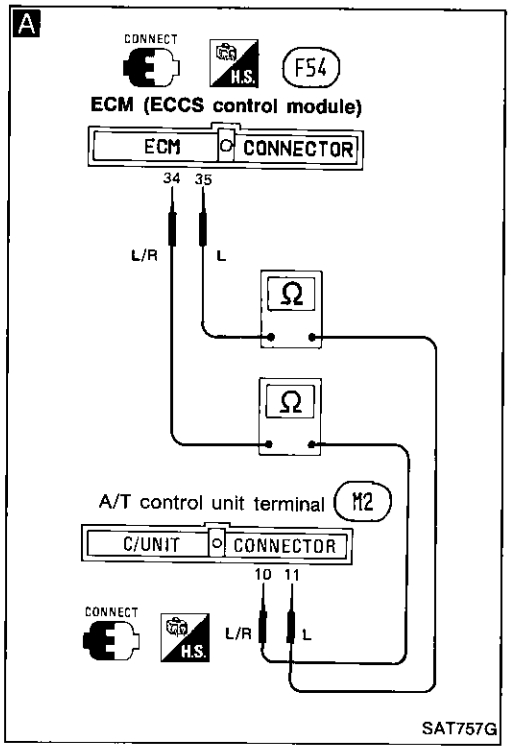
O.K. ↓

INSPECTION END

Self-diagnosis (Cont'd)

ENGINE CONTROL CIRCUIT CHECK





A

CHECK CIRCUIT BETWEEN A/T CONTROL UNIT AND ECM (ECCS CONTROL MODULE).

1. Turn ignition switch to "OFF" position.
2. Check continuity between A/T control unit terminal ⑩ and ECM (ECCS control module) terminal ㉞.
   Continuity should exist.
3. Check continuity between A/T control unit terminal ⑪ and ECM (ECCS control module) terminal ㉟.
   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.

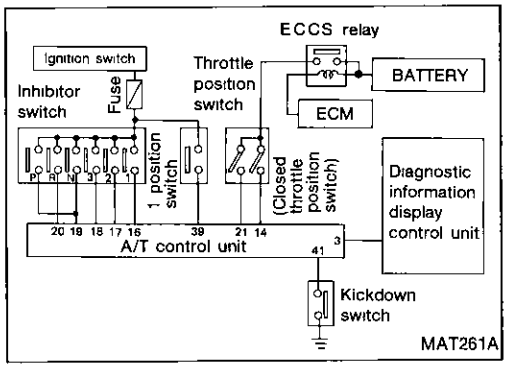
N.G. → If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

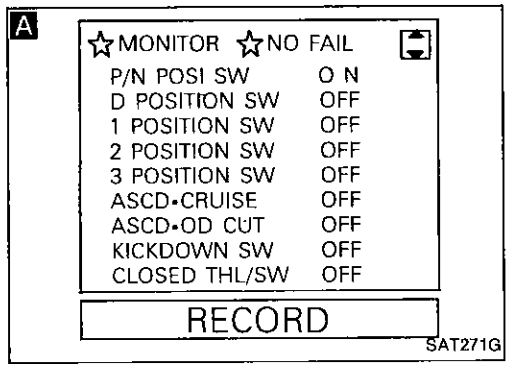
O.K. ↓

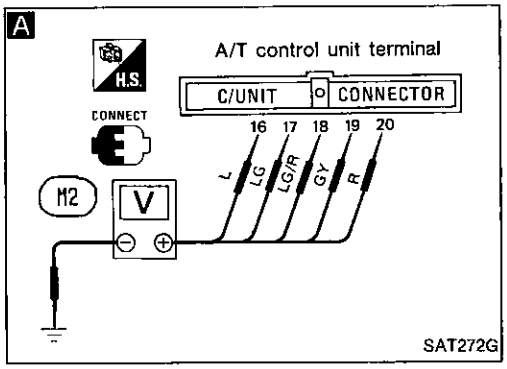
INSPECTION END

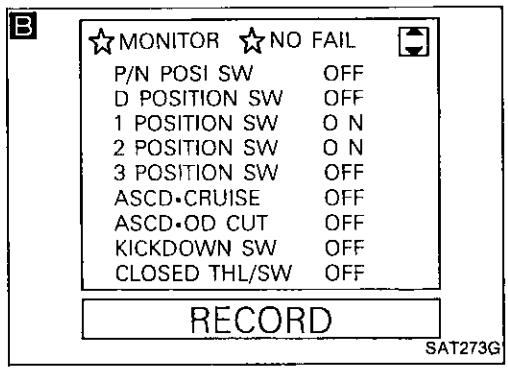
Self-diagnosis (Cont'd)

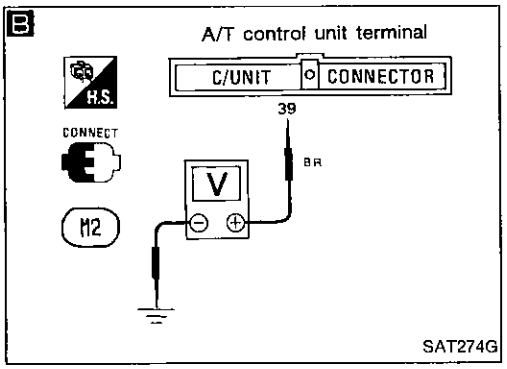
INHIBITOR SWITCH, 1 POSITION SWITCH, KICKDOWN SWITCH, CLOSED THROTTLE POSITION SWITCH AND DIAGNOSTIC INFORMATION DISPLAY CIRCUIT CHECKS











A

CHECK INHIBITOR SWITCH CIRCUIT.

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. ● Select "ECU 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.

— 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

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

O.K. ↓

B

CHECK 1 POSITION SWITCH CIRCUIT.

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. ● Select "ECU 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 position.

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)

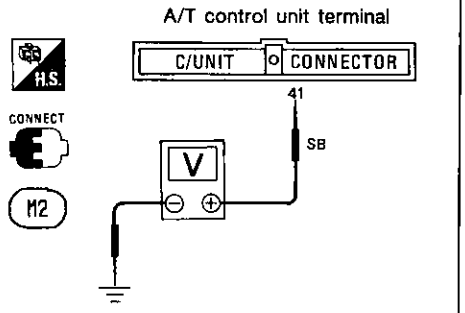
C

☆MONITOR	☆NO FAIL
P/N POSI SW	O N
D POSITION SW	OFF
1 POSITION SW	OFF
2 POSITION SW	OFF
3 POSITION SW	OFF
ASCD•CRUISE	OFF
ASCD•OD CUT	OFF
KICKDOWN SW	O N
CLOSED THL/SW	OFF

RECORD

SAT275G

C



SAT276G

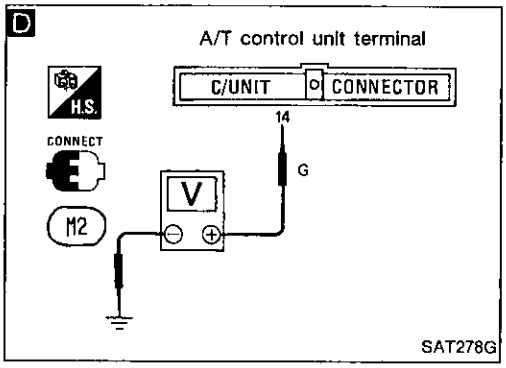
D

☆MONITOR	
P/N POSI SW	O N
D POSITION SW	OFF
1 POSITION SW	OFF
2 POSITION SW	OFF
3 POSITION SW	OFF
ASCD•CRUISE	OFF
ASCD•OD CUT	OFF
KICKDOWN SW	OFF
CLOSED THL/SW	O N

RECORD

SAT277G

D



SAT278G

Ⓐ

C

CHECK KICKDOWN SWITCH CIRCUIT.

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. • Select "ECU INPUT SIGNALS".
   • Read out "KICKDOWN SWITCH" depressing accelerator pedal fully.
   • Check kickdown switch position is indicated properly.

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

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

O.K.

D

CHECK CLOSED THROTTLE POSITION SWITCH CIRCUIT.

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. • Select "ECU INPUT SIGNALS".
   • Read out "CLOSED THROTTLE POSITION SWITCH" depressing and releasing accelerator pedal.
   • Check closed throttle position switch changes ON or OFF.

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.

OR

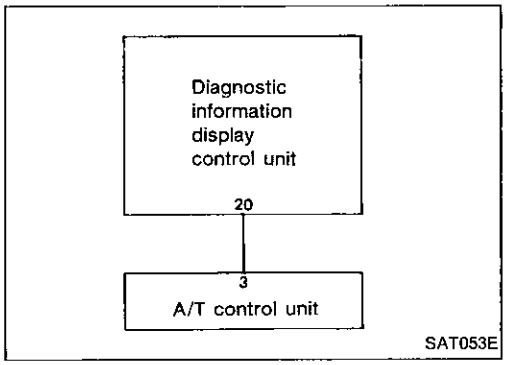
- Check voltage between A/T control unit terminal ⑭ and ground while depressing accelerator pedal slowly.

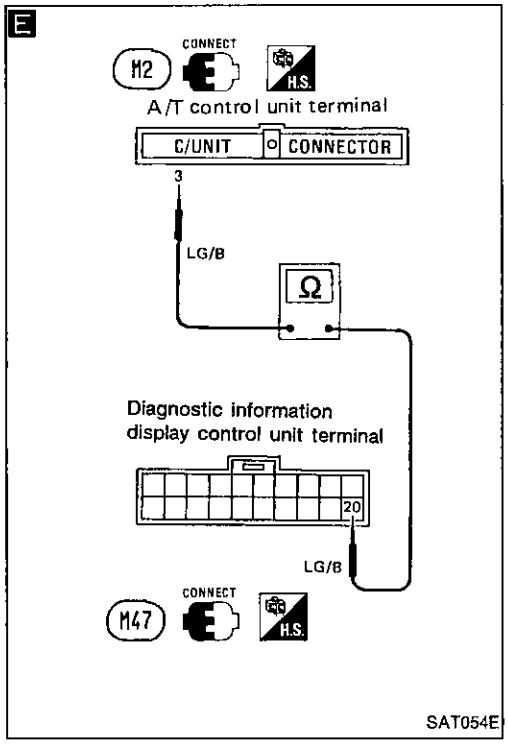
Voltage:
When releasing accelerator pedal:
8 - 15V
When depressing accelerator pedal fully:
1 V or less

O.K.

Ⓑ

Self-diagnosis (Cont'd)





Ⓑ

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.

E

CHECK DIAGNOSTIC INFORMATION DISPLAY CIRCUIT.
1. Turn ignition switch to "OFF" position.
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.

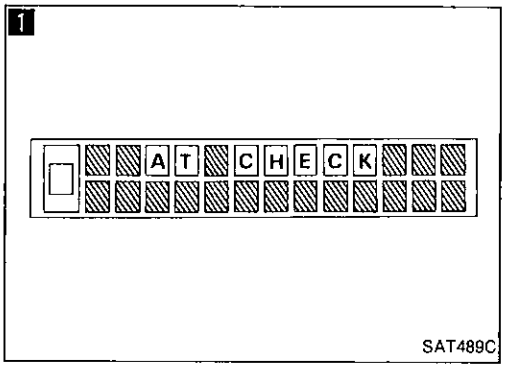
INSPECTION END

GI MA EM LC EF & EC FE AT PD FA RA BR ST BF HA EL

Diagnostic Procedure 1

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.

1



SAT489C

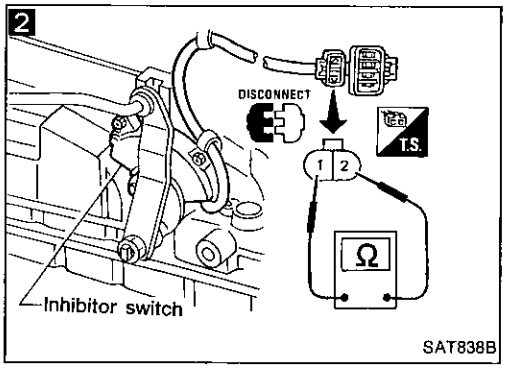
Does "ECU INPUT SIGNALS" show damage to inhibitor switch circuit? — Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis".

OR

Does self-diagnosis show damage to inhibitor switch circuit?

No

2



SAT838B

Check continuity of inhibitor switch 2-pin connector. — Refer to "Electrical Components Inspection". — N.G. → Repair or replace inhibitor switch.

O.K.

Check starting system. — Refer to section EL. — N.G. → Repair or replace damaged parts.

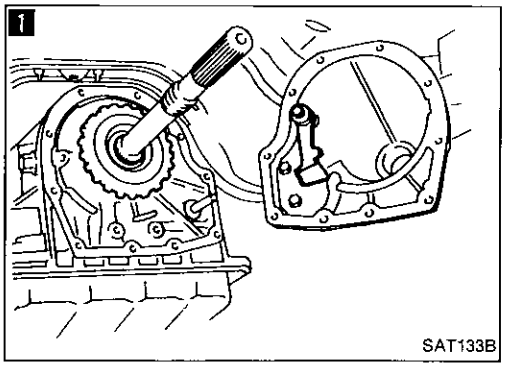
O.K.

INSPECTION END

Diagnostic Procedure 2

SYMPTOM: Vehicle moves when it is pushed forward or backward with selector lever in "P" position.

1


SAT133B

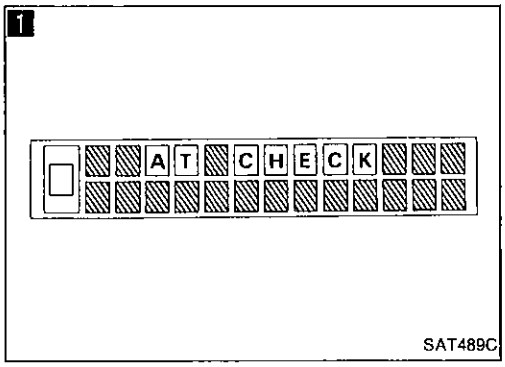
Check parking components. — Refer to "ON-VEHICLE SERVICE". — N.G. → Repair or replace damaged parts.

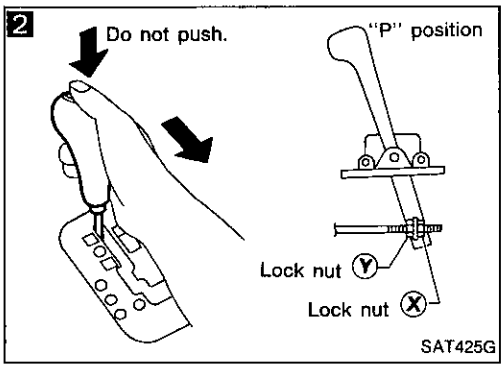
O.K.

INSPECTION END

Diagnostic Procedure 3

SYMPTOM: Vehicle moves forward or backward when selecting "N" position.





1

Does "ECU INPUT SIGNALS" show damage to inhibitor switch circuit? — Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis".

OR

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.

Check A/T fluid level again. — N.G. → Refill A.T.F.

O.K.

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 4

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 valve 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. ↓

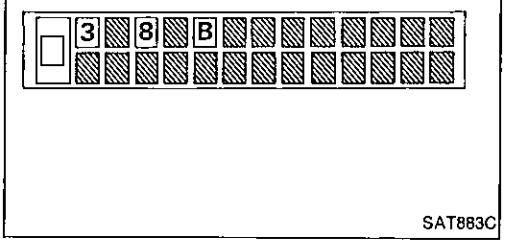
Check again.

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.

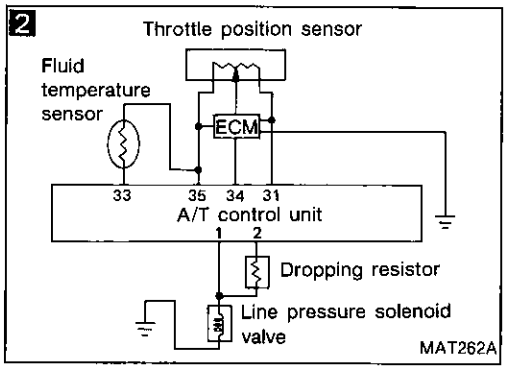
O.K. ↓

INSPECTION END

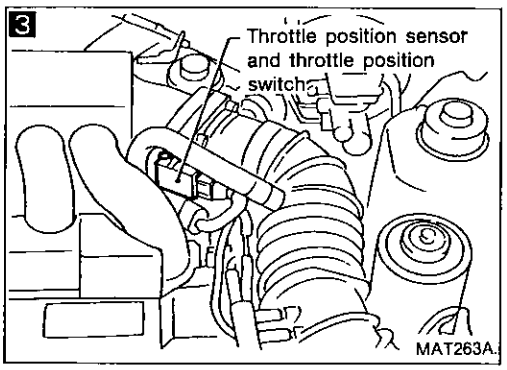
1



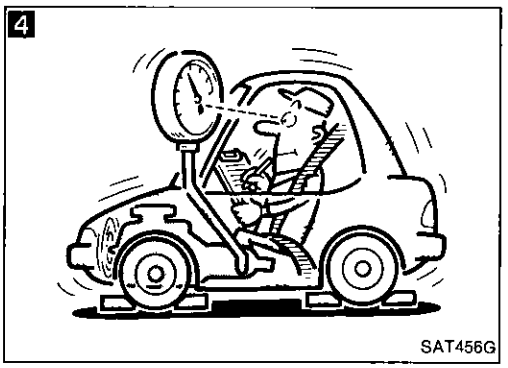
2



3

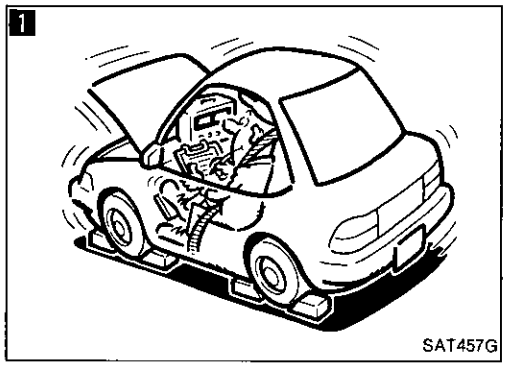


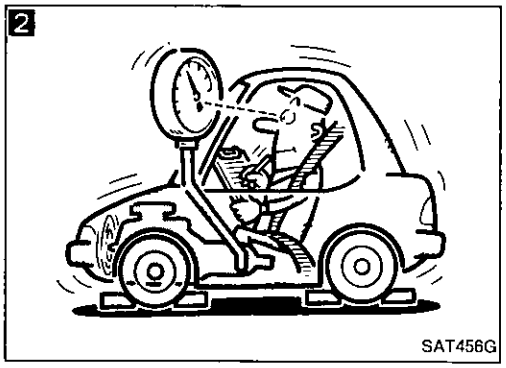
4



Diagnostic Procedure 5

SYMPTOM: Vehicle does not creep backward when selecting "R" position.





Check A/T fluid level again. — N.G. → Refill A.T.F.

O.K.

N.G. in both "1" and "R" position

1

Check stall revolution with selector lever in "1" and "R" position.

O.K.

O.K. in "1" position
N.G. in "R" position

2

Check line pressure at idle with selector lever in "R" 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, 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

O.K.

1. Remove oil pan.
2. Check 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 6

SYMPTOM: Vehicle does not creep forward when selecting "D", "3", "2" or "1" position.

Check A/T fluid level again. — N.G. → Refill A.T.F.

O.K.

1

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.

2

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.

1. Remove oil pan.
2. Check A/T fluid condition.

— N.G. →

- Forward clutch assembly
- Forward one-way clutch
- Low one-way clutch
- Low & reverse brake assembly
- Torque converter

O.K.

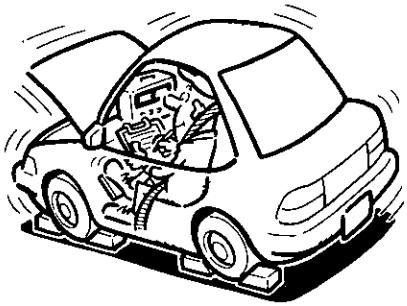
Check again. — N.G. →

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.

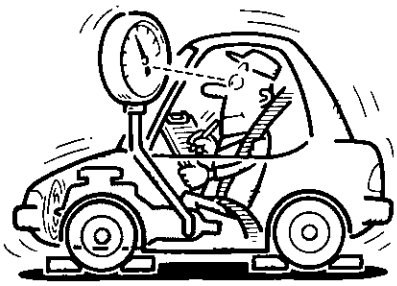
INSPECTION END

1



SAT457G

2



SAT456G

Diagnostic Procedure 7

SYMPTOM: Vehicle cannot be started from D_1 on Cruise test — Part 1.

Is Diagnostic Procedure 6 O.K.?
- No → Go to Diagnostic Procedure 6.
- Yes ↓

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 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
- O.K. ↓

1. Remove oil pan.
2. Check A/T fluid condition.
- O.K. → (Pilot filter)
- N.G. →
  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. (Forward one-way clutch)
O.K. (Low one-way clutch)

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. ↓

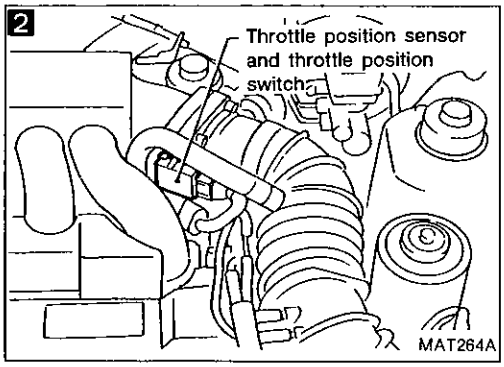
INSPECTION END

1

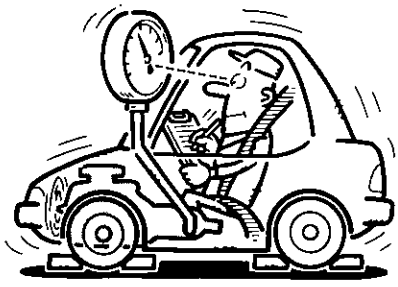


SAT885C

2



3

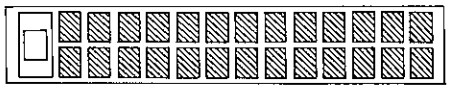


SAT456G

Diagnostic Procedure 8

SYMPTOM: A/T does not shift from D_1 to D_2 at the specified speed.
A/T does not shift from D_4 to D_2 when depressing accelerator pedal fully at the specified speed.

1



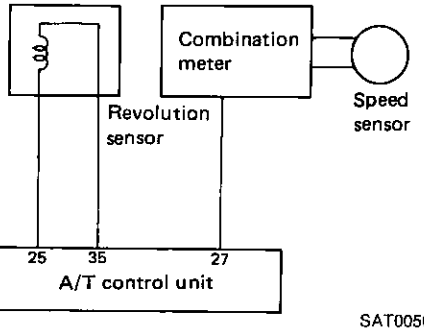
SAT146B

Are Diagnostic Procedures 6 and 7 O.K.?

No → Go to Diagnostic Procedure 6 or 7.

Yes ↓

2



SAT005C

Does "ECU INPUT SIGNALS" show damage to inhibitor switch circuit? → Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis".

OR

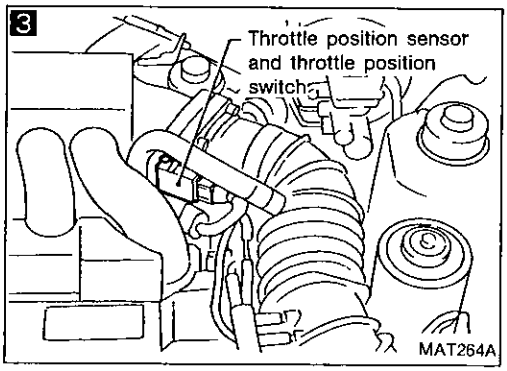
1 Does self-diagnosis show damage to inhibitor switch circuit?

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



MAT264A

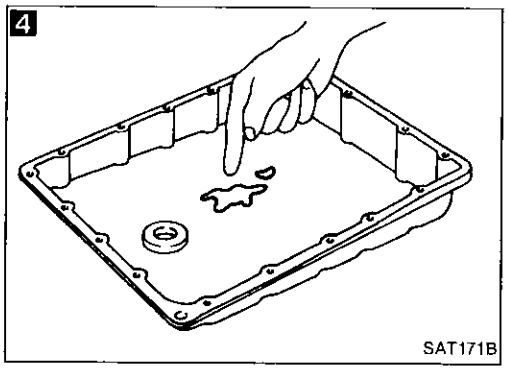
3 Check throttle position sensor. — Refer to section EF & EC. → N.G. → Repair or replace throttle position sensor.

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. ↓

4

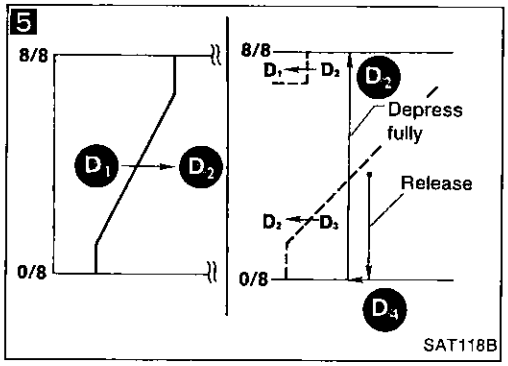


SAT171B

O.K. ↓

3. Disassemble A/T.
4. Check the following items.
- Servo piston assembly
- Brake band
- Oil pump assembly

5



SAT118B

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 9

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 "ECU 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 ↓

1

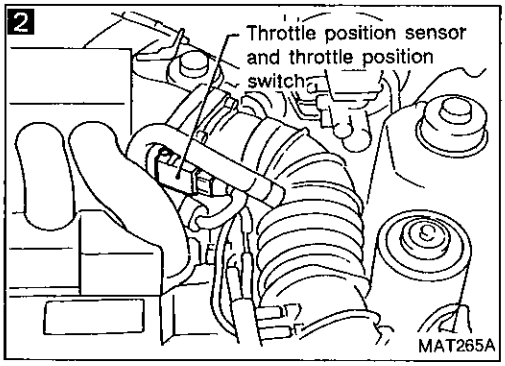


SAT489C

2 Check throttle position sensor. — Refer to section EF & EC. — N.G. → Repair or replace throttle position sensor.

O.K. ↓

2



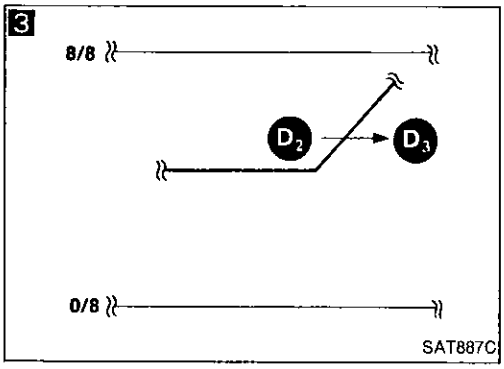
MAT265A

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

O.K. ↓

3



SAT887C

O.K. ↓

3. Disassemble A/T.
4. Check the following items.
- Servo piston assembly
- High clutch assembly
- Oil pump assembly

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

GI MA EM LC EF & EC FE AT PD FA RA BR ST BF HA EL

Diagnostic Procedure 10

SYMPTOM: A/T does not shift from D_3 to D_4 at the specified speed.

Are Diagnostic Procedures 6 and 7 O.K.?
- No → Go to Diagnostic Procedure 6 or 7.
- Yes ↓

1

Does self-diagnosis show damage to inhibitor switch, shift solenoid valve 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. ↓

1. Remove oil pan.
2. Check A/T fluid condition.

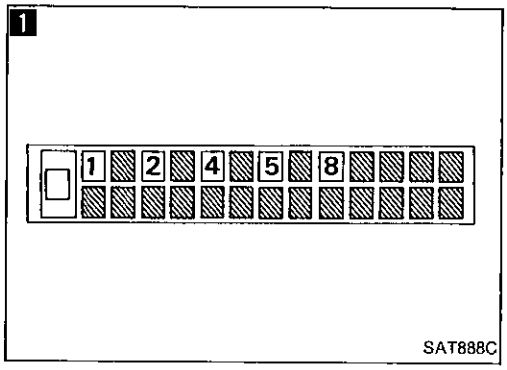
- N.G. →
  1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
  2. Check the following items.
     - Shift valve B
     - Overrun clutch control valve
     - Shift solenoid valve B
     - Pilot valve
     - Pilot filter
- O.K. ↓

3. Disassemble A/T.
4. Check the following items.
   - Servo piston assembly
   - Brake band
   - Torque converter
   - Oil pump assembly

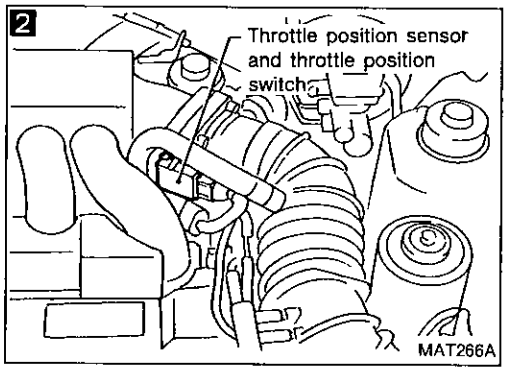
3

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. ↓

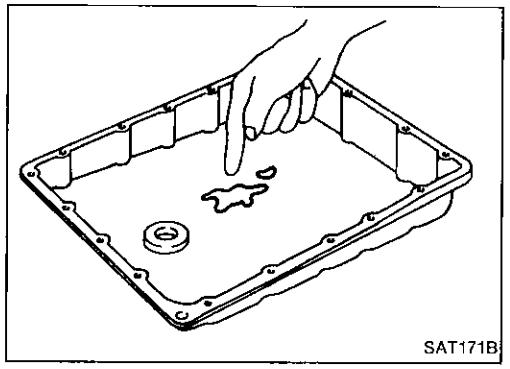
INSPECTION END

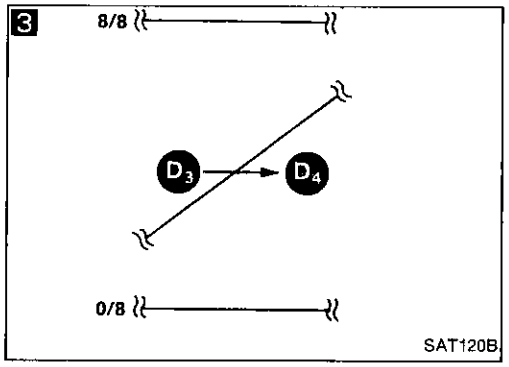


SAT888C



MAT266A

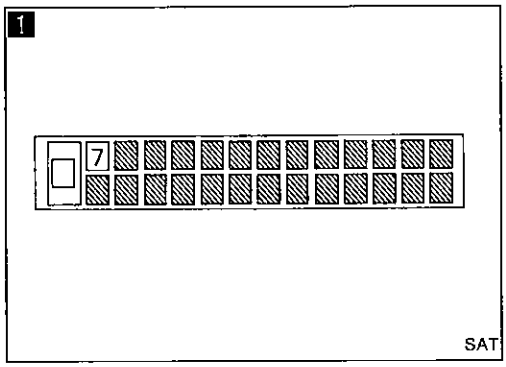

SAT171B

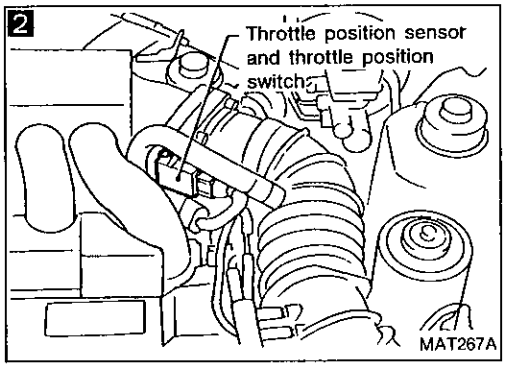


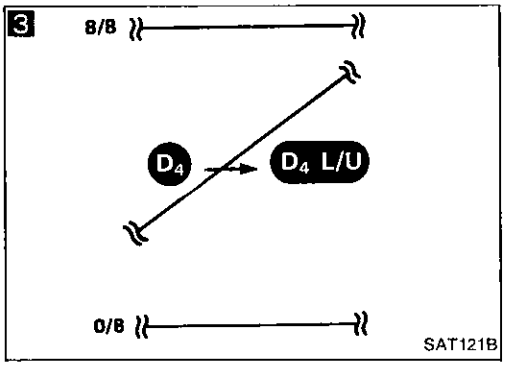
SAT120B

Diagnostic Procedure 11

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.

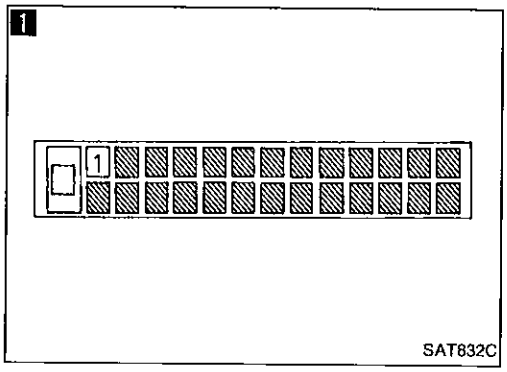
O.K. ↓

INSPECTION END

GI MA EM LC EF & EC FE AT PD FA RA BR ST BF HA EL

Diagnostic Procedure 12

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

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

O.K. →
- Pilot valve
- Pilot filter

3. Disassemble A/T.
4. Check torque converter and oil pump assembly.

O.K.

Check again.

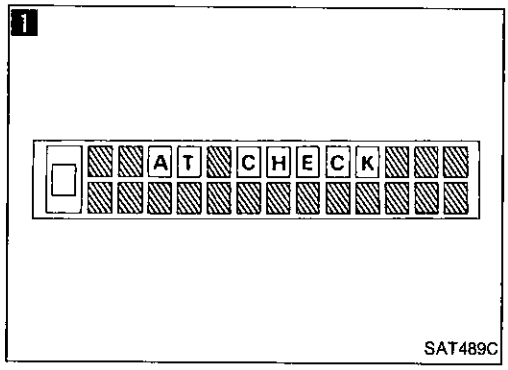
N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

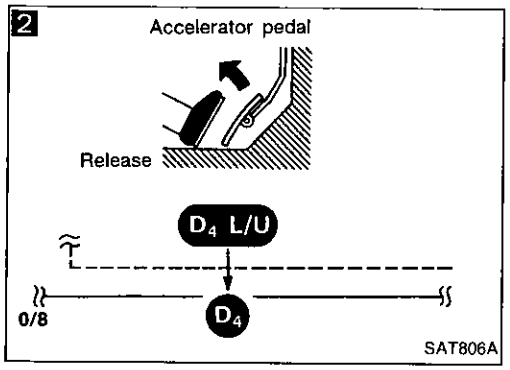
O.K.

INSPECTION END

Diagnostic Procedure 13

SYMPTOM: Lock-up is not released when accelerator pedal is released.





Does "ECU 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.

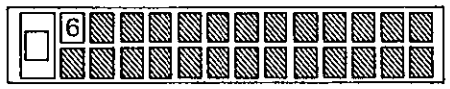
O.K.

INSPECTION END

Diagnostic Procedure 14

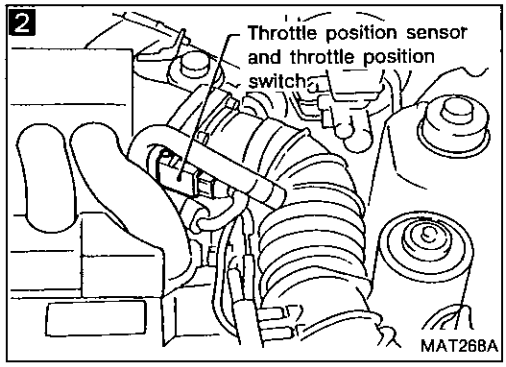
SYMPTOM: Engine speed does not return to idle smoothly when A/T is shifted from D_4 to D_3 with accelerator pedal released.
Vehicle does not decelerate by engine brake when changing selector lever from D to 3 position with accelerator pedal released.
Vehicle does not decelerate by engine brake when changing selector lever from "3" to "2" position with accelerator pedal released.

1



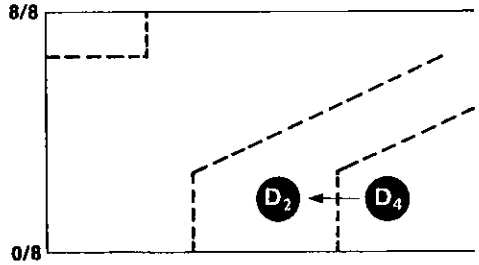
SAT837C

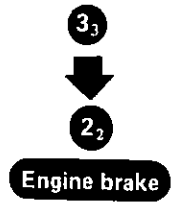
2



MAT268A

3





SAT889C

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.

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.

O.K. → 3. Disassemble A/T.
4. Check the following items.
- Overrun clutch assembly
- Oil pump assembly

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 15

SYMPTOM: Vehicle does not start from D_1 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 ↓

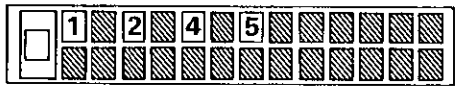
Check again.

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 7.

1



SAT885C

Diagnostic Procedure 16

SYMPTOM: A/T does not shift from D_4 to D_2 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 "ECU 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. ↓

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. ↓

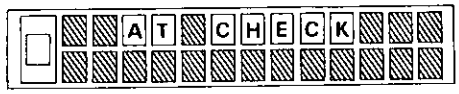
O.K. ↓ (from Pilot filter)

3. Disassemble A/T.
4. Check the following items.
- Servo piston assembly
- Brake band
- 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. ↓

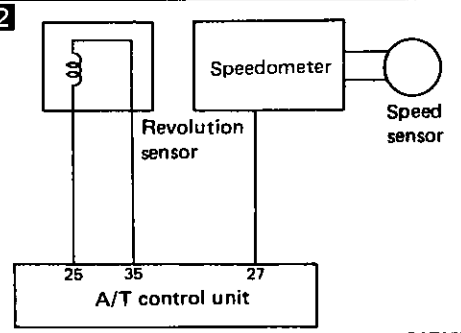
INSPECTION END

1



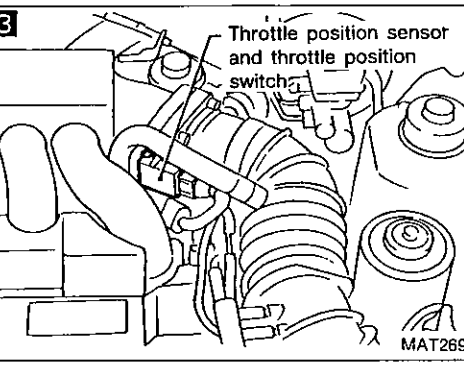
SAT489C

2



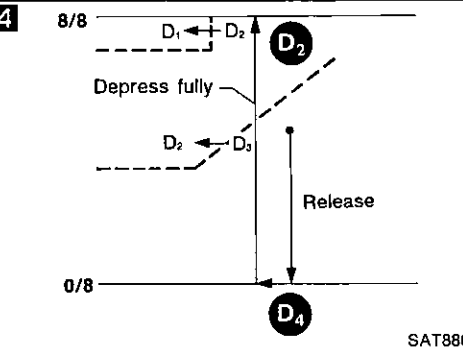
SAT055E

3



MAT269A

4



SAT886C

Diagnostic Procedure 17

SYMPTOM: A/T does not shift from D_2 to D_1 when depressing accelerator pedal fully at the specified speed.

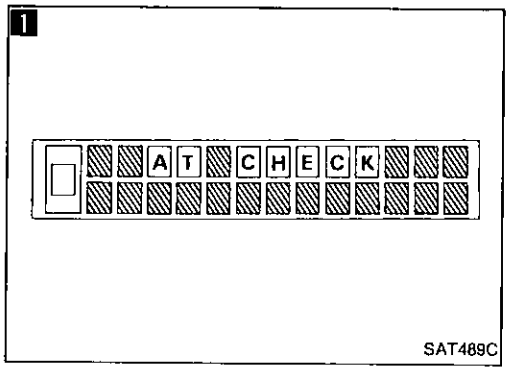
Are Diagnostic Procedures 6 and 7 O.K.?
- No → Go to Diagnostic Procedure 6 or 7.
- Yes ↓

Does "ECU 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

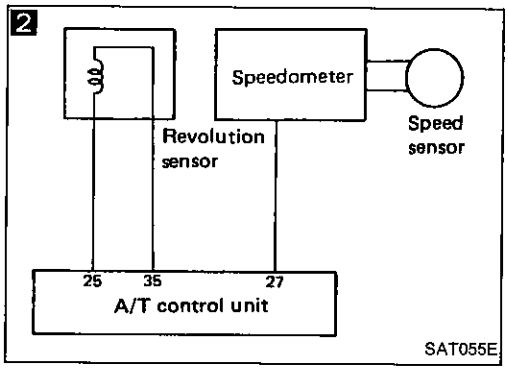
1 Does self-diagnosis show damage to inhibitor switch circuit?
- No ↓

1



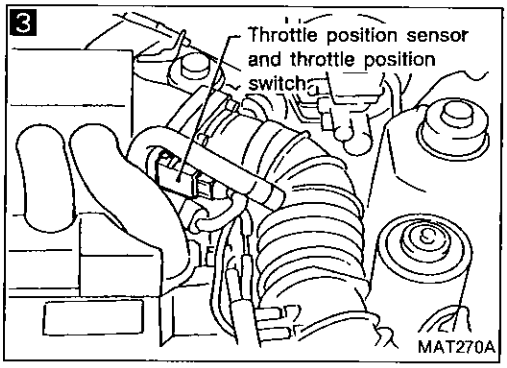
2 Check revolution sensor and speed sensor circuits. — Refer to "Self-diagnosis".
- N.G. → Repair or replace revolution sensor and speed sensor circuits.
- O.K. ↓

2



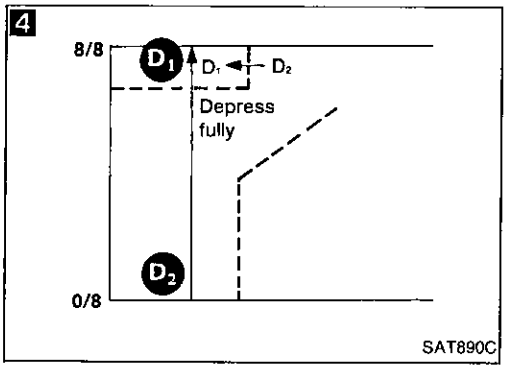
3 Check throttle position sensor. — Refer to section EF & EC.
- N.G. → Repair or replace throttle position sensor.
- O.K. ↓

3



1. Remove oil pan.
2. Check A/T fluid condition.
- N.G. → 1. Remove control valve. — Refer to "ON-VEHICLE SERVICE".
  2. Check the following items.
  - Shift valve A
  - Shift solenoid valve A
  - Pilot valve
  - Pilot filter
- O.K. ↓

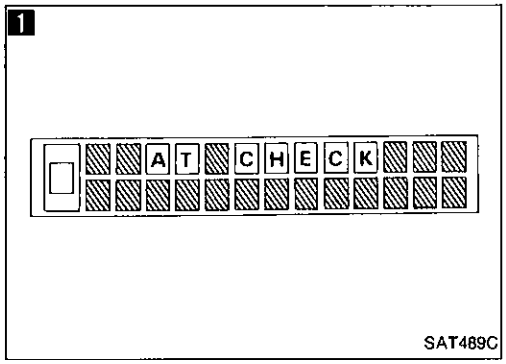
4



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

O.K. ← 3. Disassemble A/T.
4. Check the following items.
- Servo piston assembly
- Brake band
- Oil pump assembly



Diagnostic Procedure 18

SYMPTOM: A/T does not shift from D_4 to 3_3 when changing selector lever from "D" to "3" position.

Does "ECU INPUT SIGNALS" show damage to inhibitor switch circuit?

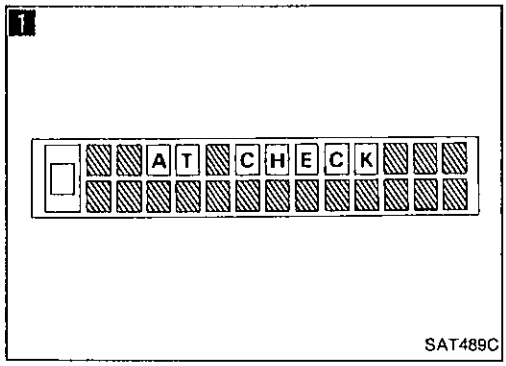
Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis".

OR

1

Does self-diagnosis show damage to inhibitor switch circuit?

No → Go to Diagnostic Procedure 8.



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 "ECU INPUT SIGNALS" show damage to inhibitor switch circuit?

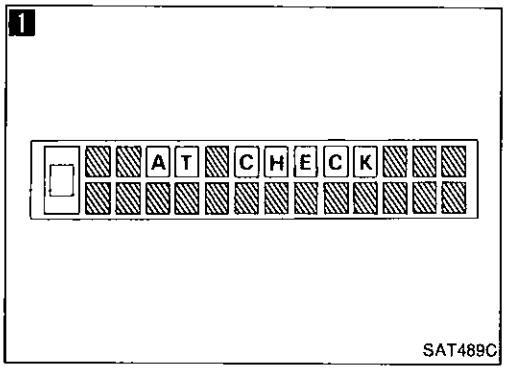
Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis".

OR

1

Does self-diagnosis show damage to inhibitor switch circuit?

No → Go to Diagnostic Procedure 15.



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 "ECU 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 ↓

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

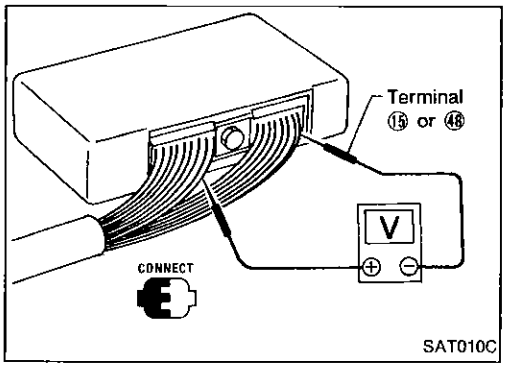
Diagnostic Procedure 21

SYMPTOM: Vehicle does not decelerate by engine brake when shifting from 2_2 (1_2) to 1_1.

Is diagnostic procedure 5 O.K.? — No → Go to Diagnostic Procedure 5.

Yes ↓

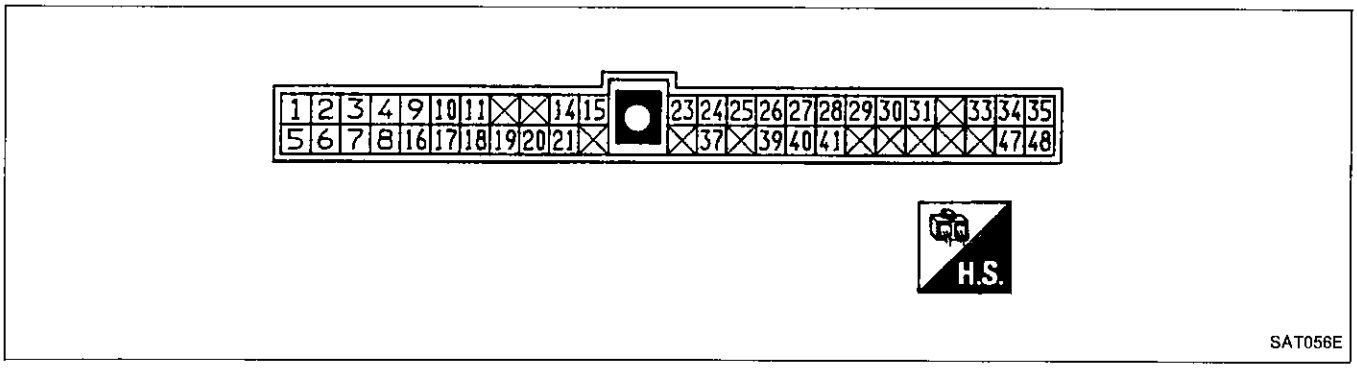
Go to Diagnostic Procedure 13.



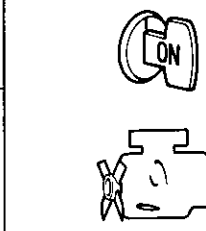
Electrical Components Inspection

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.

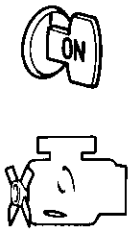


A/T CONTROL UNIT INSPECTION TABLE
(Data are reference values.)

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 warning signal (Self-diagnoses result)		When electrical parts are not damaged.	Batter voltage
			When the judgment "TRANSMISSION MALFUNCTION" is displayed on diagnostic information display.	1.2V or less
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

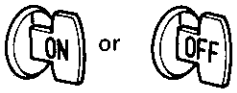
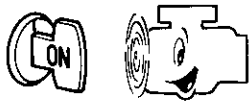
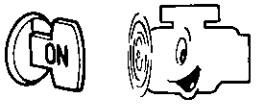
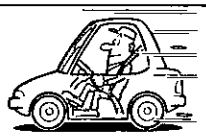
Electrical Components Inspection (Cont'd)

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	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	—	—	—



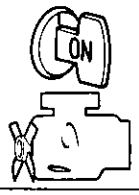
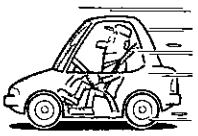
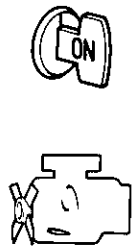
*: These terminals are connected to the ECM (ECCS control module).

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 3.7V
25	Revolution sensor (Measure in AC position)		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	—		—	—

**: These terminals are connected to the data link connector for CONSULT.

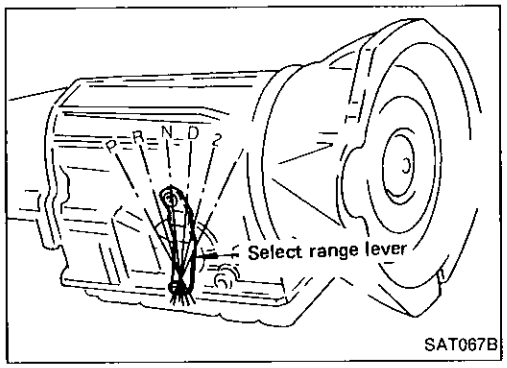
Electrical Components Inspection (Cont'd)

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 position 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		—	—

☆: This terminal is connected to the Active Suspension control unit.

Electrical Components Inspection (Cont'd)

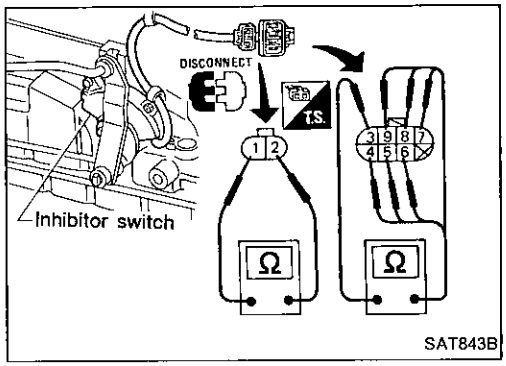
INHIBITOR SWITCH



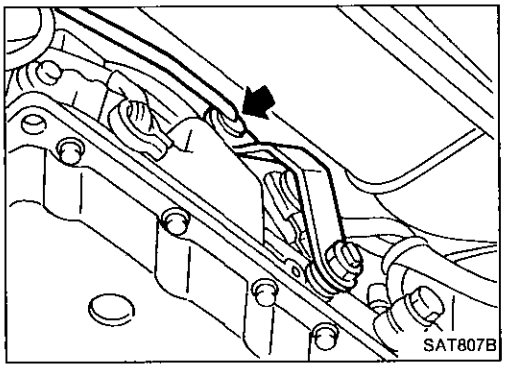
SAT067B

1. Check continuity between terminals ① and ② and between terminals ③ and ④, ⑤, ⑥, ⑦, ⑧, ⑨ while moving selector lever through each position.

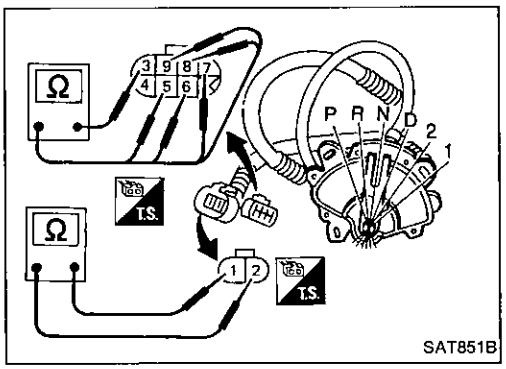
Lever position	Terminal No.								
	①	②	③	④	⑤	⑥	⑦	⑧	⑨
P	○	○	○	○					
R			○		○				
N	○	○	○			○			
D			○				○		
3			○					○	
2, 1			○						○



SAT843B


SAT807B

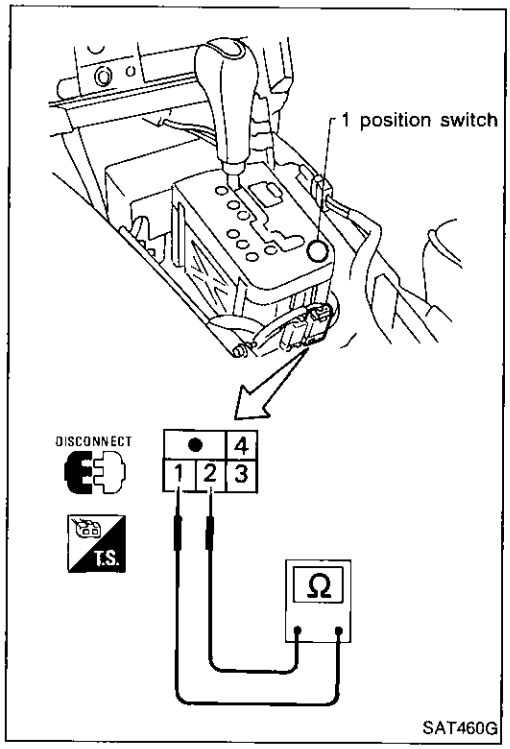
2. If N.G., check again with manual control linkage disconnected from manual shaft of A/T assembly. — Refer to step 1.
3. If O.K. on step 2, adjust manual control linkage. — Refer to "ON-VEHICLE SERVICE".



SAT851B

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.

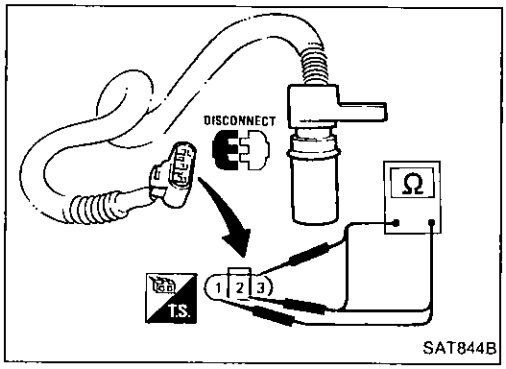
Electrical Components Inspection (Cont'd)



1 POSITION SWITCH

- Check continuity between terminals ① and ② of 1 position switch harness connector.

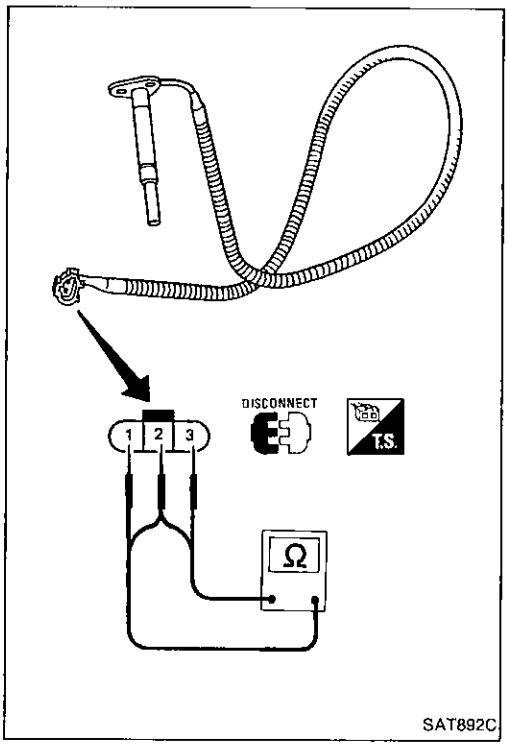
Condition	Continuity
When selector lever is set in "1" position.	Yes
When selector lever is set in any position except "1".	No



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

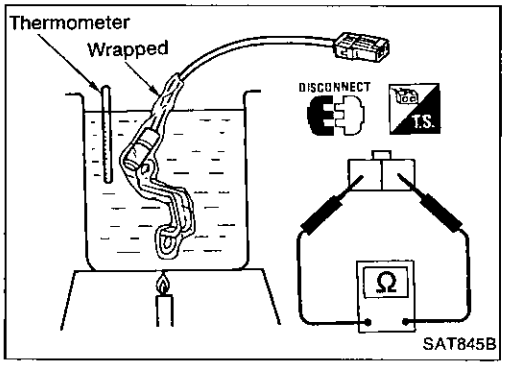


TURBINE REVOLUTION SENSOR

- 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

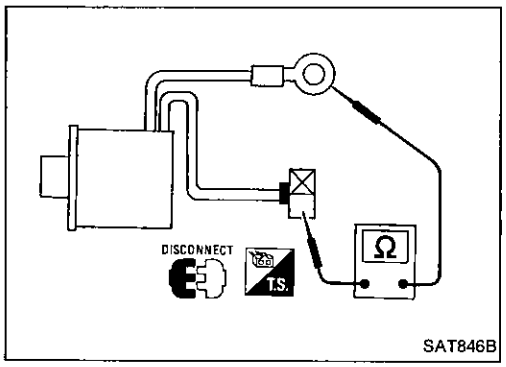
Electrical Components Inspection (Cont'd)



FLUID TEMPERATURE SENSOR

- For removal and installation, refer to "ON-VEHICLE SERVICE".
- Check resistance between two terminals while changing temperature as shown at left.

Temperature °C (°F)	Resistance
20 (68)	Approximately 2.5 kΩ
80 (176)	Approximately 0.3 kΩ

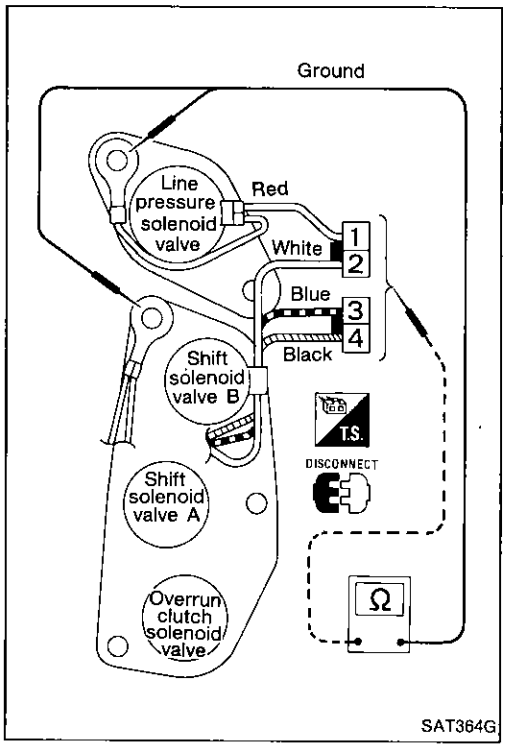


TORQUE CONVERTER CLUTCH SOLENOID VALVE

- For removal and installation, refer to "ON-VEHICLE SERVICE".
- Check resistance between two terminals.

Resistance:

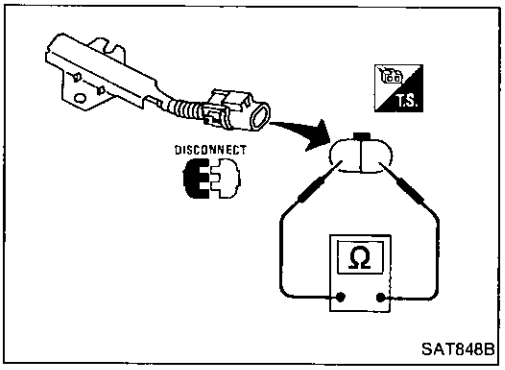
Torque converter clutch solenoid valve 10 - 20Ω



3-UNIT SOLENOID ASSEMBLY (Shift solenoid valves 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.

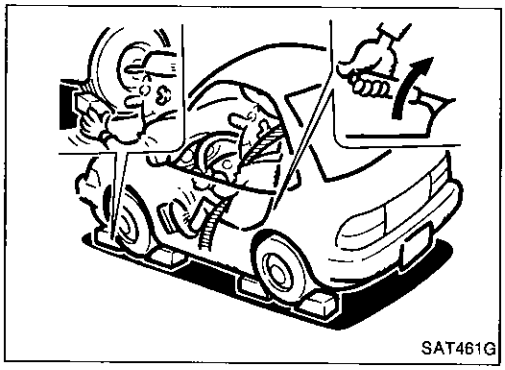
Solenoid	Terminal No.		Resistance
Shift solenoid valve A	③	Ground terminal	20 - 40Ω
Shift solenoid valve B	②		
Overrun clutch solenoid valve	④		
Line pressure solenoid valve	①		2.5 - 5Ω

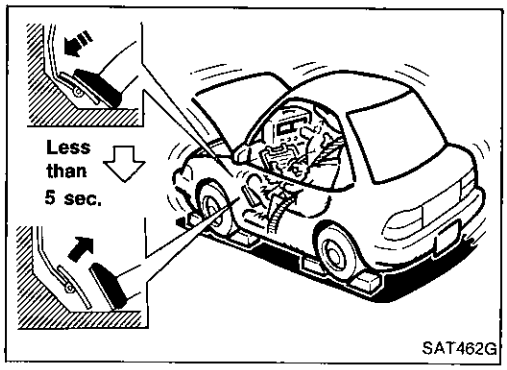


DROPPING RESISTOR

- Check resistance between two terminals.

Resistance: 11.2 - 12.8Ω


SAT461G



SAT462G

Final Check

STALL TESTING

Stall 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. 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.**

5. Start engine, apply foot brake, and place selector lever in "D" position.
6. Accelerate to wide-open throttle gradually while applying foot brake.
7. Quickly note the engine stall revolution and immediately release throttle.

- **During test, never hold throttle wide-open for more than 5 seconds.**

   Stall revolution:
   2,100 - 2,300 rpm

8. Shift selector lever to "N".
9. Cool off A.T.F.

- **Run engine at idle for at least one minute.**

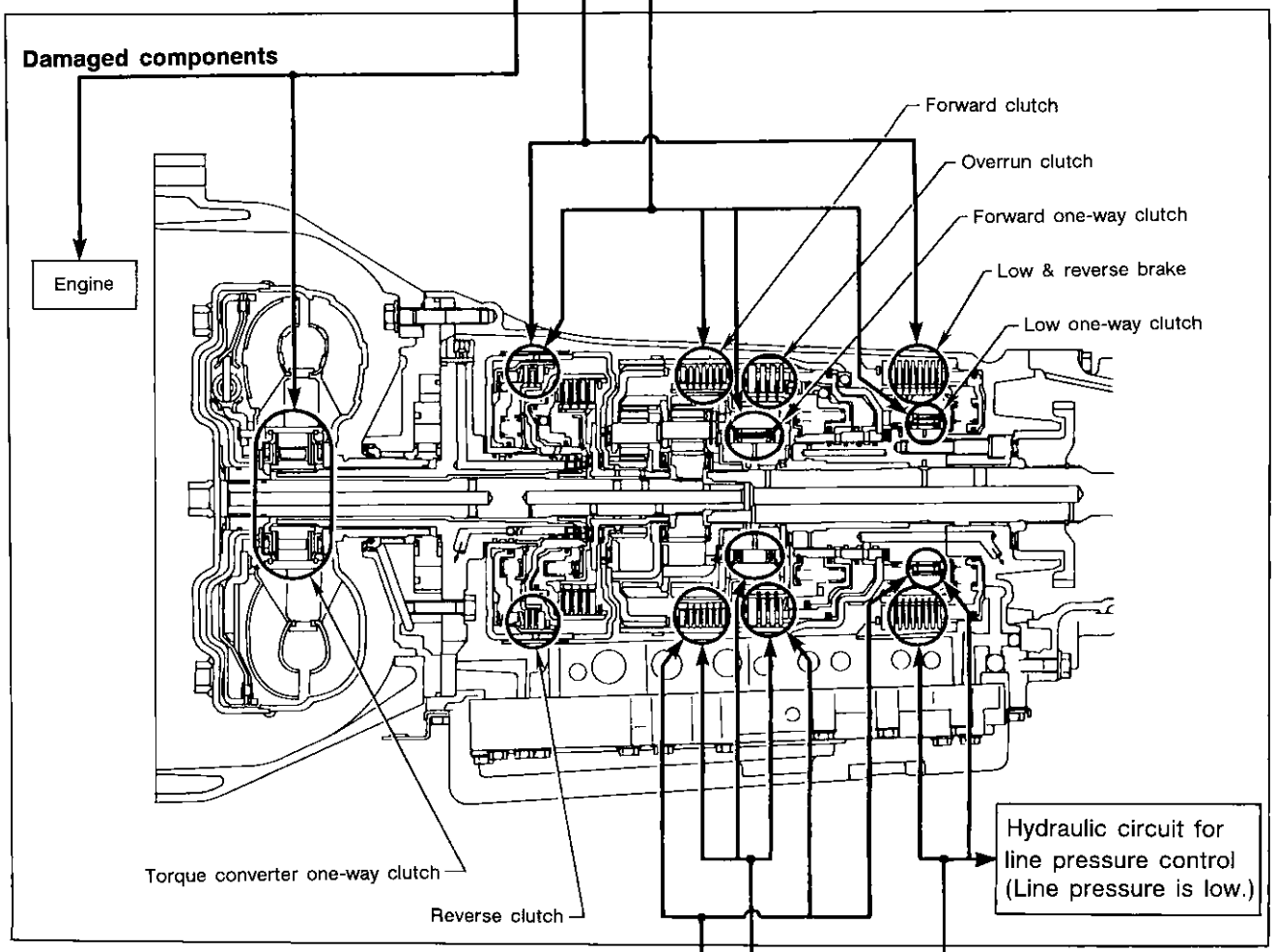
10. Perform stall tests in the same manner as in steps 5 through 9 with selector lever in "2", "1" and "R", respectively.

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.

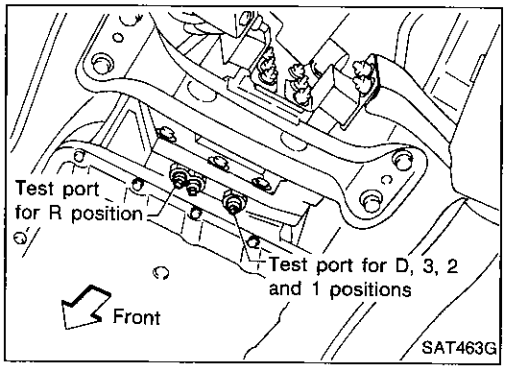


Selector lever position	Judgement			
D	H	H	H	O
3	H	H	H	O
2	H	H	H	O
1	O	H	H	O
R	O	O	H	O

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.)

SAT107B

Final Check (Cont'd)



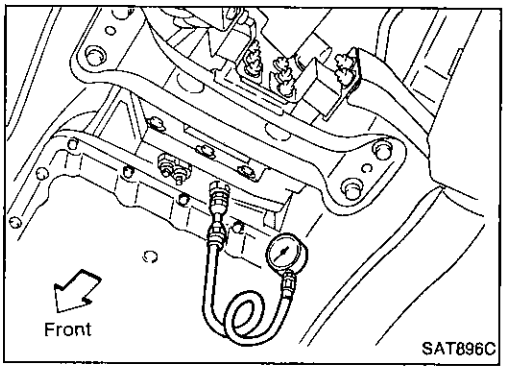
PRESSURE TESTING

- 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

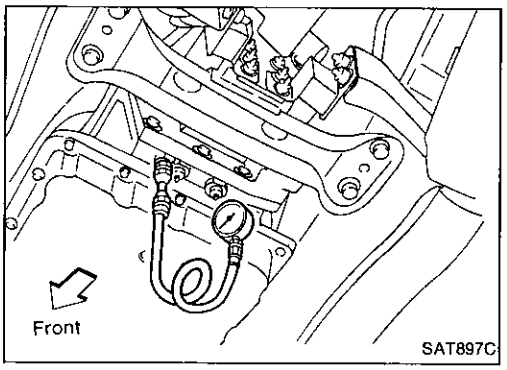
1. Check A/T and engine fluid levels. If necessary, add.
2. Warm up engine until engine oil and A.T.F. reach operating temperature after vehicle has been driven approx. 10 minutes.

   A.T.F. operating temperature:
   50 - 80°C (122 - 176°F)



3. Install pressure gauge to line pressure port.

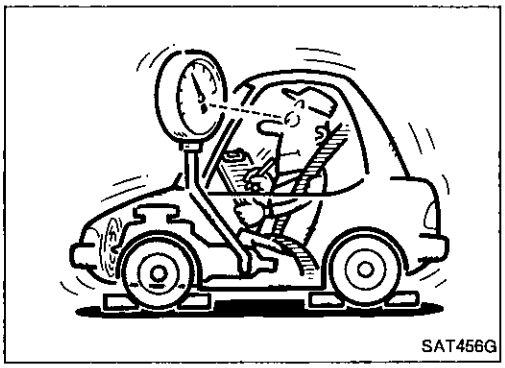
— D, 3, 2 and 1 positions —



— 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)


SAT456G

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	451 - 490 (4.6 - 5.0, 65 - 71)	628 - 667 (6.4 - 6.8, 91 - 97)
Stall	1,020 - 1,098 (10.4 - 11.2, 148 - 159)	1,422 - 1,510 (14.5 - 15.4, 206 - 219)

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										OFF vehicle					
		11	69	70	74	71, 122	71	71	71, 95	95	95	106, 118	136, 140	142, 152	142, 150	146, 154	70, 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 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	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
48	Engine does not start in "N", "P" positions	2	3								1						
48	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					
48	Vehicle moves when changing into "P" position or parking gear does not disengage when shifted out of "P" position.	1															②
49	Vehicle runs in "N" position.	1									4		③	②	⑤		
51	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		
52	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 ②	⑩	⑨		⑪	
—	Excessive creep.				1												
51-52	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							⑤	
54-55	Too high a gear change point from "D_1" 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					
		11	69	70	74	71, 122	71	71	71, 95	95	95	106, 118	136, 140	142, 152	142, 150	146, 154	70, 158
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—	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 position.	1 2			3		4					⑨ ⑤	⑥			⑧ ⑦	⑩
—	Transmission noise in "D", "3", "2", "1" and "R" positions.	1										②					

GI MA EM LC EF & EC FE AT PD FA RA BR ST BF HA EL

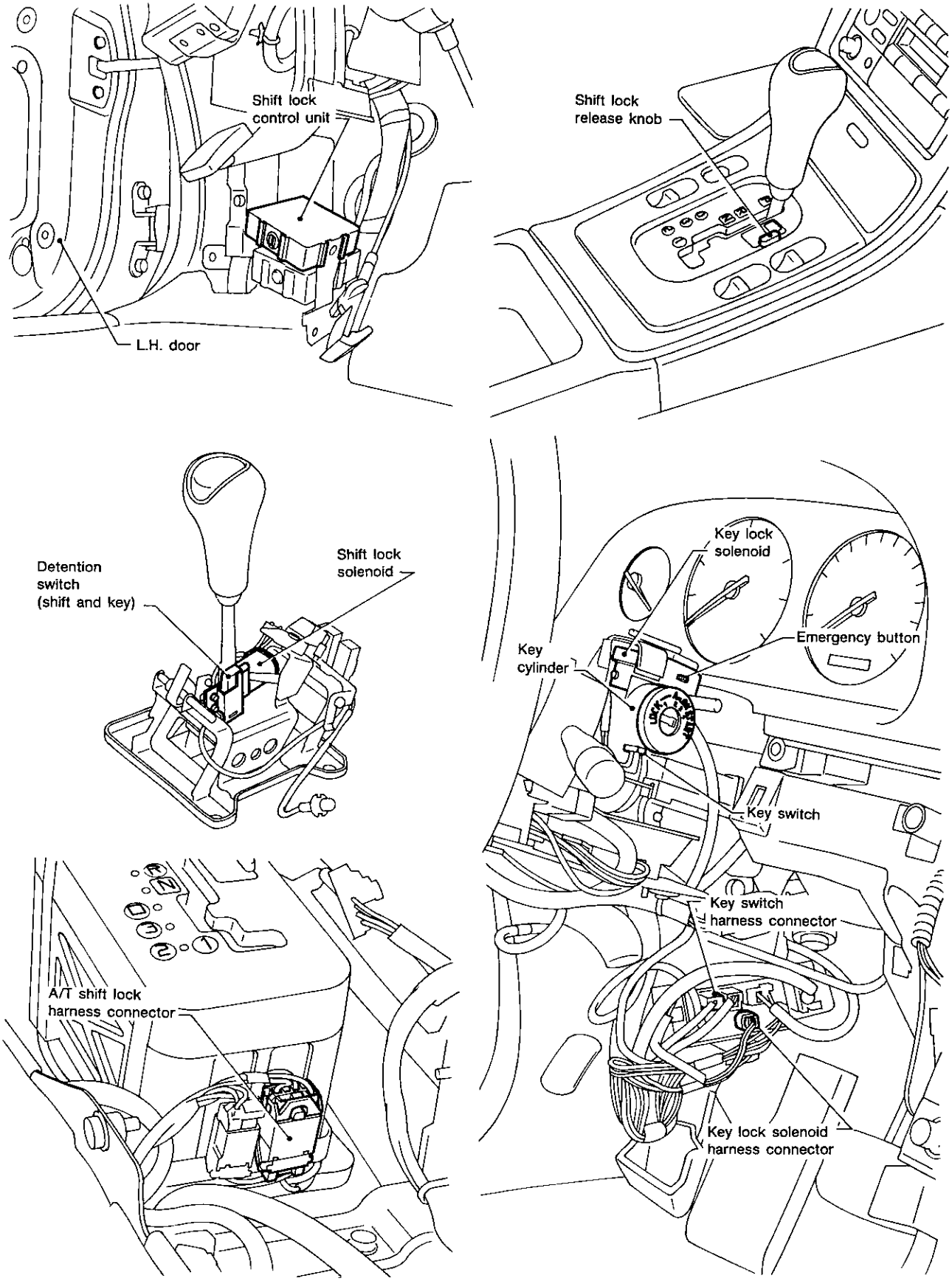
Symptom Chart (Cont'd)

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63	Failure to change from "3_3" to "2_2" then 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														
64	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					⑭⑦	⑧⑨	⑪	⑫	⑬⑩	
—	A.T.F. shoots out during operation. White smoke emitted from exhaust pipe during operation.	1											②③	⑤	⑥	⑦④	
—	Offensive smell at fluid charging pipe.	1										②③	④⑤	⑦	⑧	⑨⑥	
—	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					
57	Lock-up point is extremely high or low.		1	2		4		3									
—	A/T does not shift to "D_4" when driving with selector lever set in D position.		2 1	3	8	6 4		5	7						⑩	⑨	
—	Engine is stopped at "R", "D", "3", "2" and "1" positions.	1				5 4	3	2									

Contents

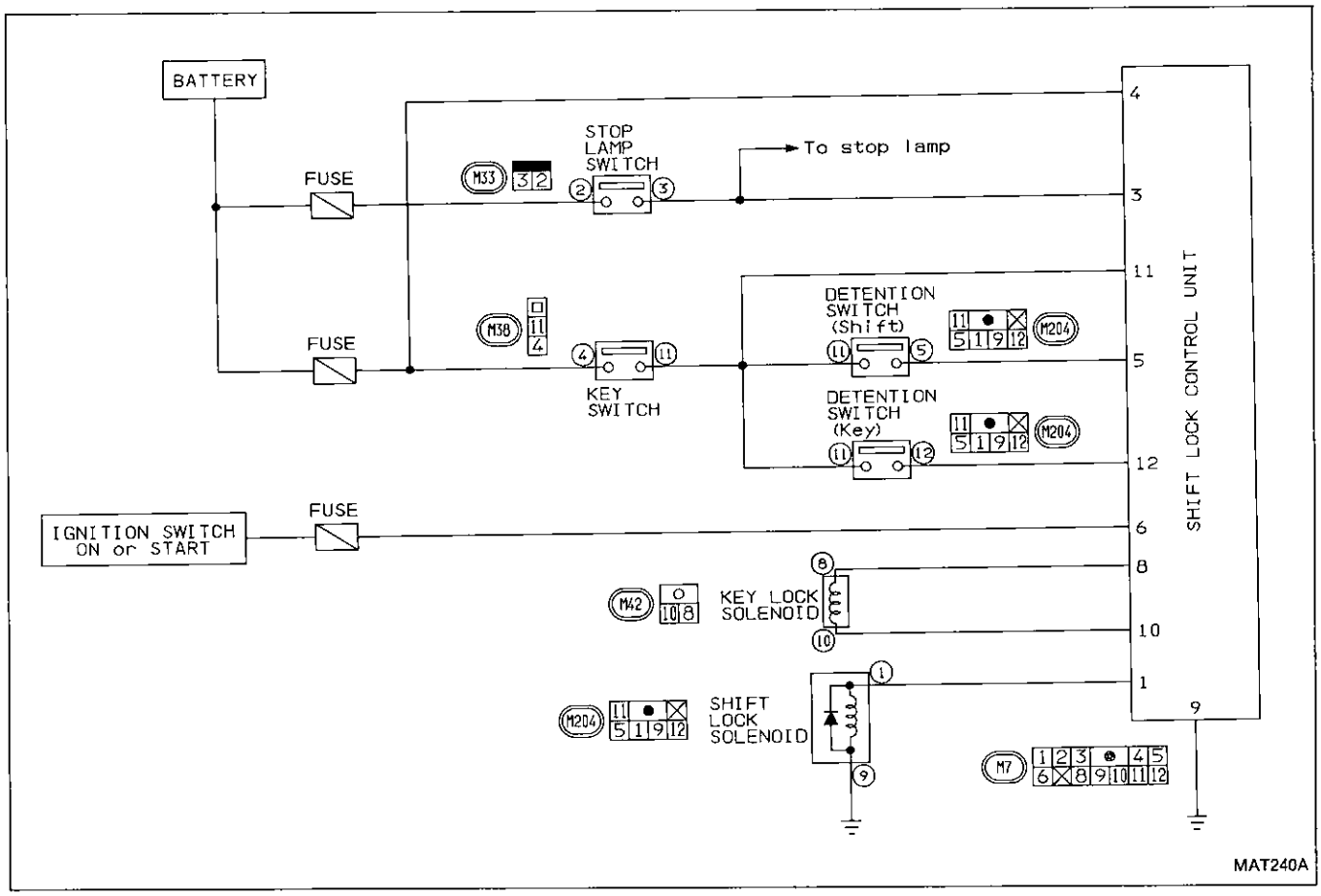
Shift Lock Electrical Parts Location AT-80
Circuit Diagram for Quick Pinpoint Check AT-81
Wiring Diagram AT-82
Diagnostic Procedure 1 ..... AT-83
SYMPTOM: Selector lever cannot be moved from "P" position when applying brake pedal or can be moved when releasing brake pedal.
Selector lever can be moved from "P" position when key is removed from key cylinder.
Diagnostic Procedure 2 ..... AT-87
SYMPTOM: 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".
Shift Lock Control Unit Inspection AT-91
Shift Lock Control Unit Inspection Table AT-92
Component Check AT-93

Shift Lock Electrical Parts Location

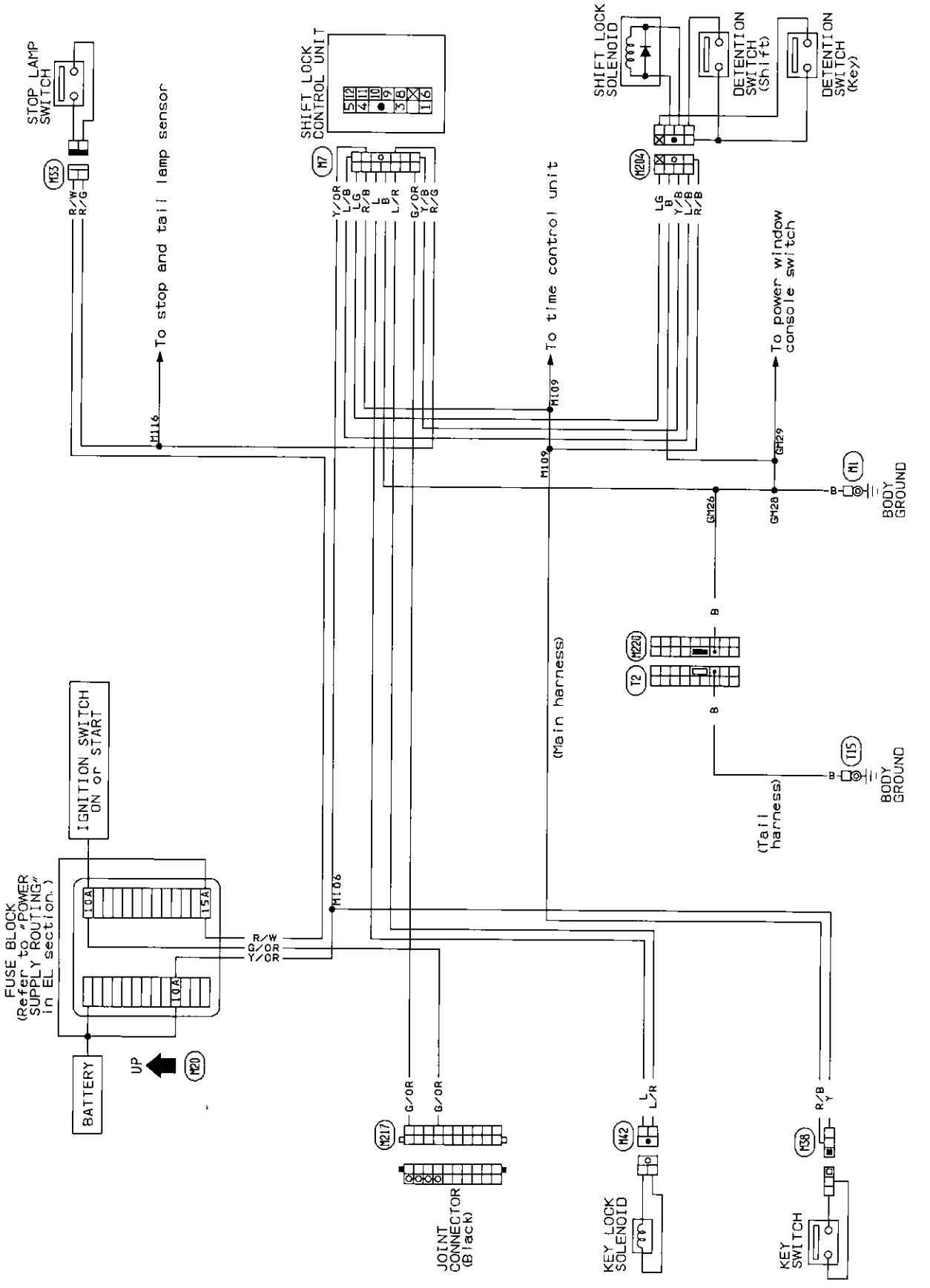


SAT790C

Circuit Diagram for Quick Pinpoint Check



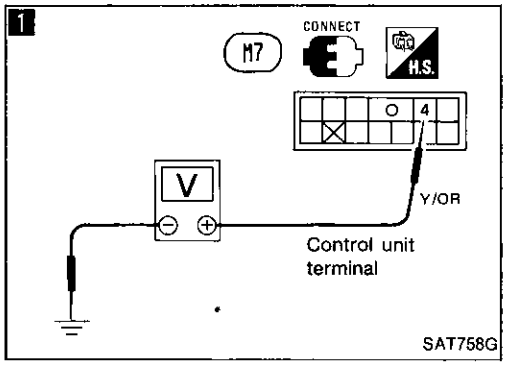
Wiring Diagram

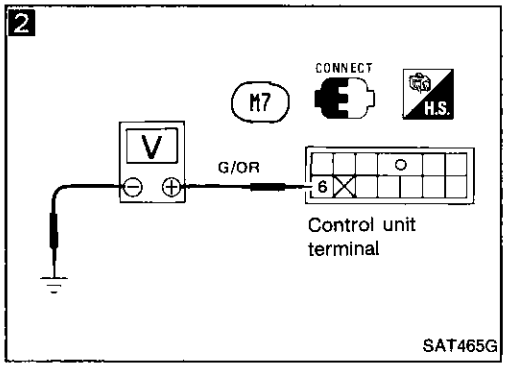


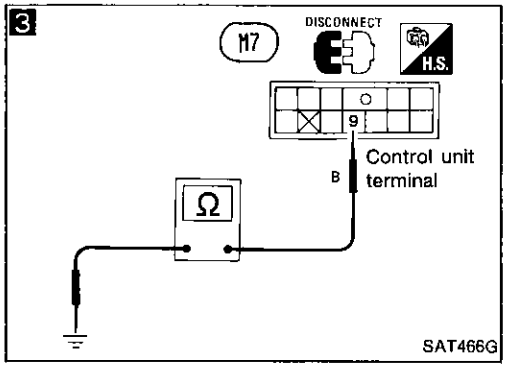
MAT241A

Diagnostic Procedure 1

SYMPTOM:
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.







1

CHECK POWER SOURCE.
1. Turn ignition switch to "OFF" position.
2. Check voltage between control unit harness terminal ④ and ground.
   Battery voltage should exist.

N.G. → Check the following items:
1. Harness continuity between battery and control unit harness terminal ④
2. Fuse

O.K. ↓

2

CHECK IGNITION SIGNAL.
1. Turn ignition switch to "OFF" position.
2. Check voltage between control unit harness terminal ⑥ and ground.
   0V
3. Turn ignition switch from "OFF" to "ON" position.
   (Do not start engine.)
4. Check voltage between control unit harness terminal ⑥ and ground.
   Battery voltage should exist.

N.G. → Check the following items:
1. Harness continuity between battery and control unit harness terminal ⑥
2. Fuse
3. Ignition switch

O.K. ↓

3

CHECK GROUND CIRCUIT FOR CONTROL UNIT.
1. Turn ignition switch from "ON" to "OFF" position.
2. Disconnect control unit harness connector.
3. Check continuity between control unit harness terminal ⑨ and ground.
   Continuity should exist.

N.G. → Repair harness or connector.

O.K. ↓

Ⓐ

Diagnostic Procedure 1 (Cont'd)

Ⓐ

4

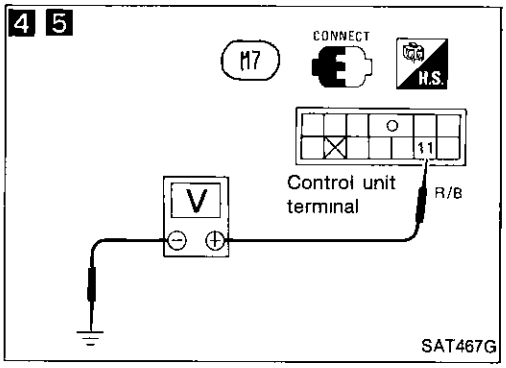
CHECK INPUT SIGNAL (KEY SWITCH).
1. Reconnect control unit harness connector.
2. Remove key from ignition switch.
3. Check voltage between control unit terminal ⑪ and ground.

0V

N.G. → Check key switch. (Refer to "COMPONENT CHECK".)

O.K. ↓

4 **5**



5

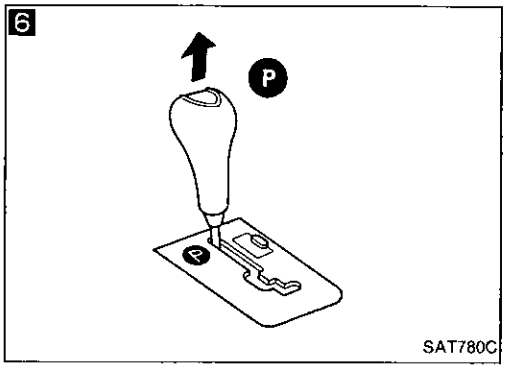
1. Insert key into ignition switch.
2. Check voltage between control unit harness terminal ⑪ and ground.

Battery voltage should exist.

N.G. → Check the following items:
1. Harness continuity between control unit harness terminal ⑪ and key switch harness terminal ⑪.
2. Harness continuity between key switch harness terminal ④ and fuse
3. Key switch (Refer to "COMPONENT CHECK".)

O.K. ↓

6



6 **7**

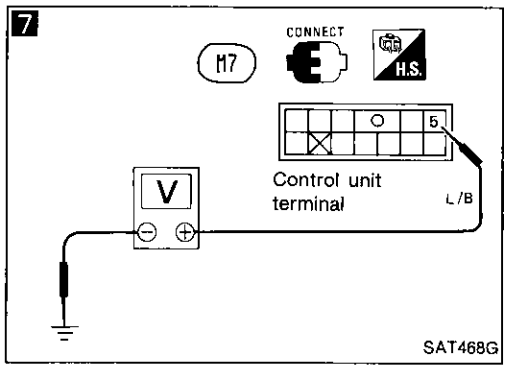
CHECK INPUT SIGNAL (DETENTION SWITCH-SHIFT).
1. Turn ignition switch from "OFF" to "ON" position (Do not start engine.)
2. Set selector lever in "P" position and release selector lever button.
3. Check voltage between control unit harness terminal ⑤ and ground.

0V

N.G. → Check detention switch —shift. (Refer to "COMPONENT CHECK".)

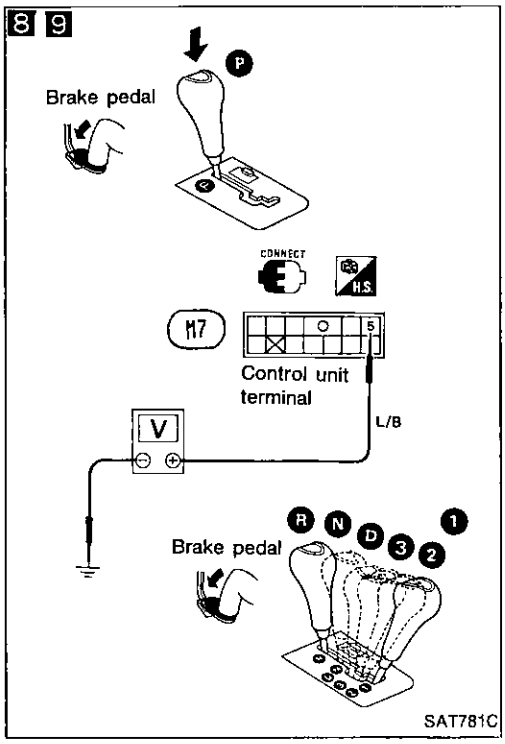
O.K. ↓

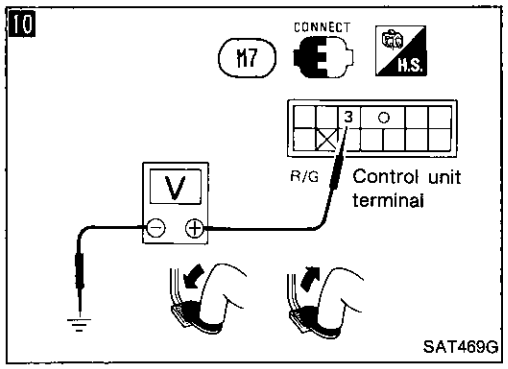
7

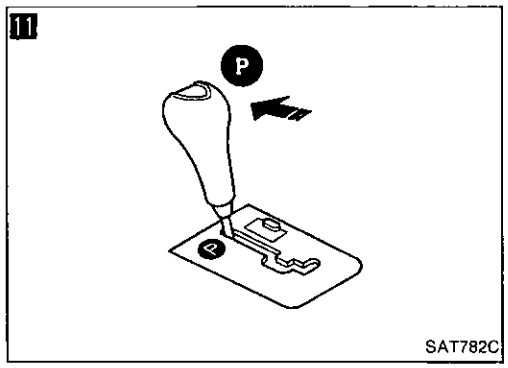


Ⓑ

Diagnostic Procedure 1 (Cont'd)







Ⓑ

8 9

CHECK INPUT SIGNAL (DETENTION SWITCH-SHIFT).

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Check voltage between control unit harness terminal ⑤ and ground with brake pedal depressed and selector lever button pushed.
   Battery voltage should exist.
3. Check voltage between control unit harness terminal ⑤ and ground with selector lever set in any position except "P".
   When selector lever cannot be moved from "P" position with brake pedal depressed, push shift lock release knob.
   Battery voltage should exist.

N.G. →

Check the following items:
1. Harness continuity between control unit harness terminal ⑤ and detention switch harness terminal ⑤
2. Harness continuity between detention switch harness terminal 1 and key switch harness terminal ⑪
3. Detention switch—shift (Refer to "COMPONENT CHECK".)

O.K. ↓

10

CHECK INPUT SIGNAL (STOP LAMP SWITCH).

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

- Check voltage between control unit harness terminal ③ and ground.

Brake pedal	Voltage
Depressed	Battery voltage
Released	0V

N.G. →

Check the following items:
1. Harness continuity between control unit harness terminal ③ and stop lamp switch harness terminal ③
2. Harness continuity between stop lamp switch harness terminal ② and fuse
3. Stop lamp switch (Refer to "COMPONENT CHECK".)

O.K. ↓

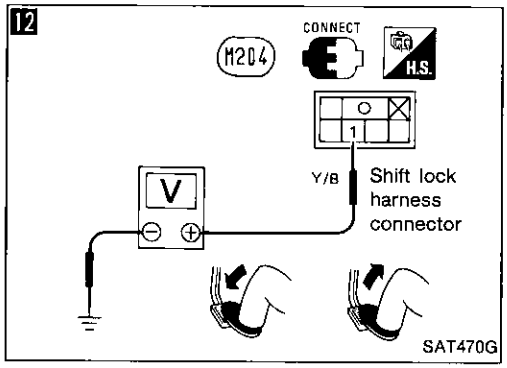
11

Set selector lever in "P" position.

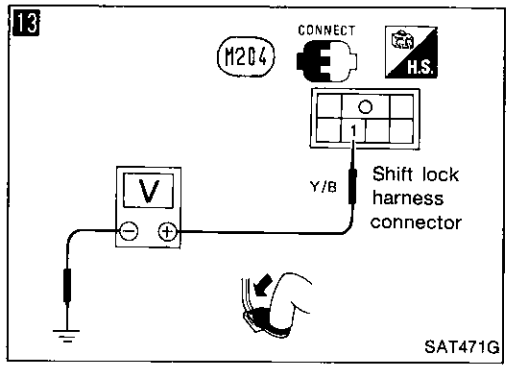
Ⓒ

Diagnostic Procedure 1 (Cont'd)

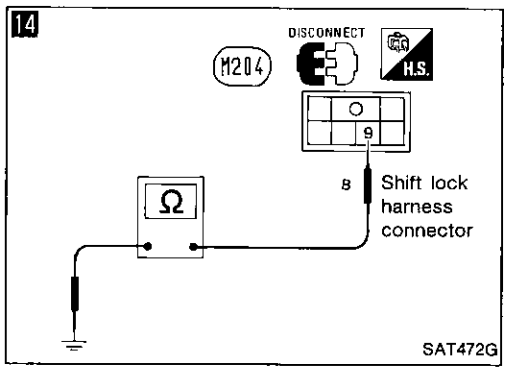
12



13



14



Ⓒ

12 13

CHECK OUTPUT SIGNAL (SHIFT LOCK SOLENOID).

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Check voltage between shift lock harness connector terminal ① and body ground.

Brake pedal	Voltage
Depressed	Battery voltage
Released	0V

3. Turn ignition switch from "ON" to "OFF" position.
4. Check voltage between shift lock harness connector terminal ① and ground with brake pedal depressed.
   0V

N.G. → Check harness continuity between control unit harness terminal ① and shift lock solenoid harness terminal ①.

O.K. ↓

14

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. ↓

1. Reconnect shift lock harness connector.
2. Turn ignition switch from "OFF" to "ON" position. (Do not start engine.)
3. Recheck shift lock operation.

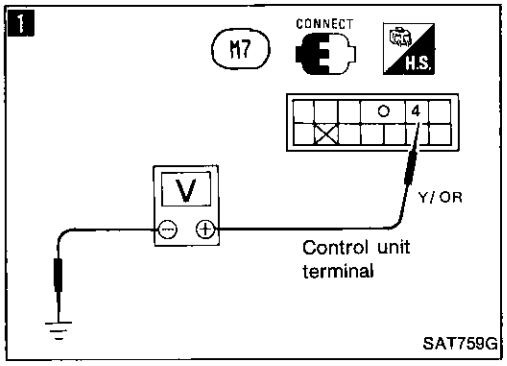
N.G. →
1. Perform control unit input/output signal inspection test.
2. If N.G., recheck harness connector connection.

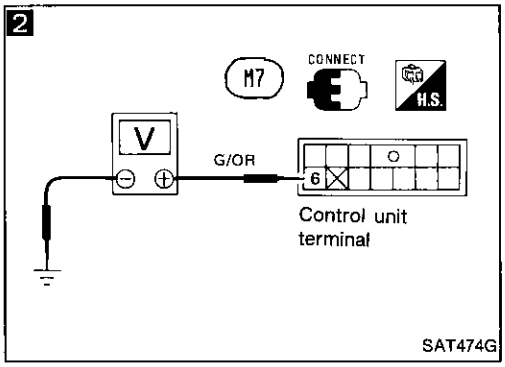
O.K. ↓

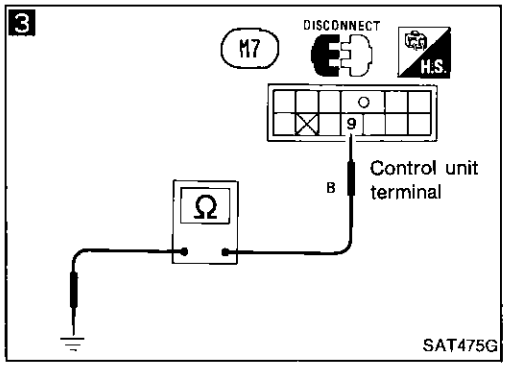
INSPECTION END

Diagnostic Procedure 2

SYMPTOM:
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".







1

CHECK POWER SOURCE.
1. Turn ignition switch to "OFF" position.
2. Check voltage between control unit harness terminal ④ and ground.
   Battery voltage should exist.

N.G. → Check the following items:
1. Harness continuity between battery and control unit harness terminal ④
2. Fuse

O.K. ↓

2

CHECK IGNITION SIGNAL.
1. Turn ignition switch to "OFF" position.
2. Check voltage between control unit harness terminal ⑥ and ground.
   0V
3. Turn ignition switch "OFF" to "ON" position.
   (Do not start engine.)
4. Check voltage between control unit harness terminal ⑥ and ground.
   Battery voltage should exist.

N.G. → Check the following items:
1. Harness continuity between battery and control unit harness terminal ⑥
2. Fuse
3. Ignition switch

O.K. ↓

3

CHECK GROUND CIRCUIT FOR CONTROL UNIT.
1. Turn ignition switch from "ON" to "OFF" position.
2. Disconnect control unit harness connector.
3. Check continuity between control unit harness terminal ⑨ and ground.
   Continuity should exist.

N.G. → Repair harness or connector.

O.K. ↓

Ⓐ

Diagnostic Procedure 2 (Cont'd)

Ⓐ

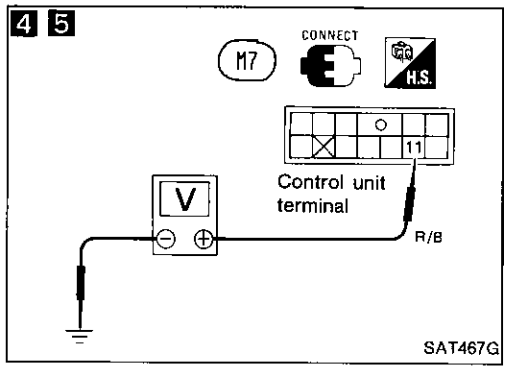
4

CHECK INPUT SIGNAL (KEY SWITCH).
1. Reconnect control unit harness connector.
2. Remove key from ignition switch.
   When ignition key cannot be removed, even if selector lever is in "P" position, use emergency button.
3. Check voltage between control unit terminal ⑪ and ground.
   0V

N.G. → Check key switch. (Refer to "COMPONENT CHECK".)

O.K. ↓

4 **5**



SAT467G

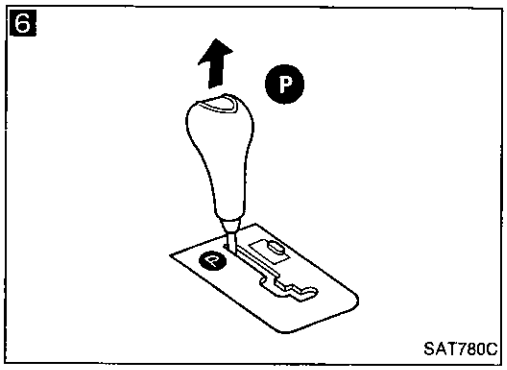
5

1. Insert key into ignition switch.
2. Check voltage between control unit harness terminal ⑪ and ground.
   Battery voltage should exist.

N.G. → Check the following items:
1. Harness continuity between control unit harness terminal ⑪ and key switch harness terminal ⑪.
2. Harness continuity between key switch harness terminal ④ and fuse
3. Key switch (Refer to "COMPONENT CHECK".)

O.K. ↓

6



SAT780C

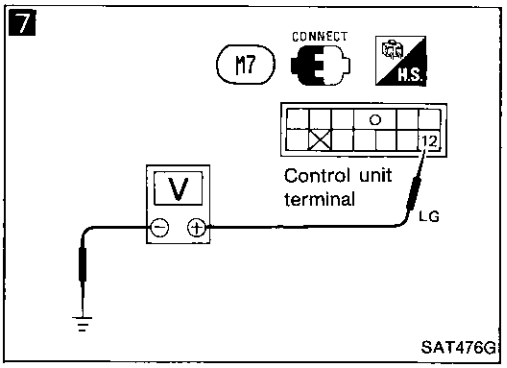
6 **7**

CHECK INPUT SIGNAL (DETENTION SWITCH—KEY).
1. Turn ignition switch from "OFF" to "ON" position.
   (Do not start engine.)
2. Set selector lever in "P" position and release selector lever button.
3. Check voltage between control unit harness terminal ⑫ and ground.
   0V

N.G. → Check detention switch —key. (Refer to "COMPONENT CHECK".)

O.K. ↓

7

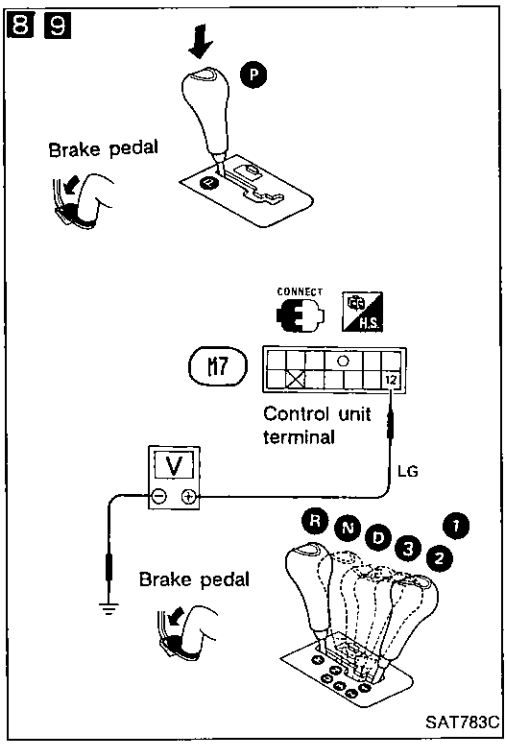


SAT476G

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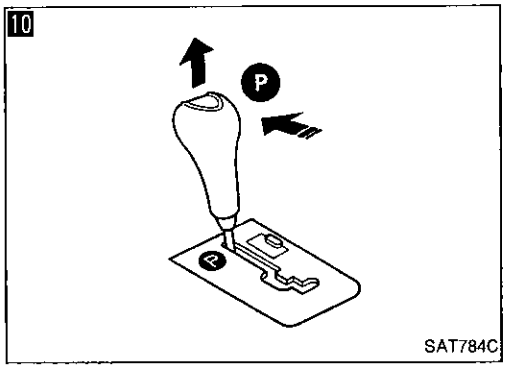
Diagnostic Procedure 2 (Cont'd)

8 9



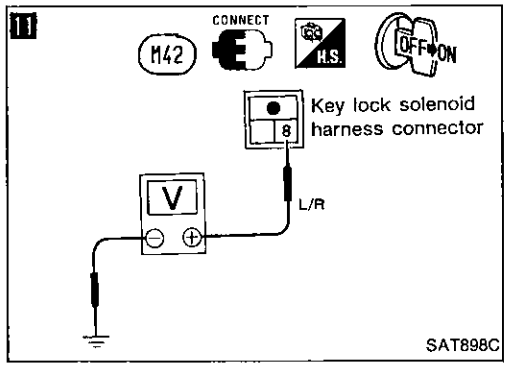
SAT783C

10



SAT784C

11



SAT898C

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8 9

CHECK INPUT SIGNAL (DETENTION SWITCH-KEY).

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Check voltage between control unit harness terminal ⑫ and ground with brake pedal depressed and selector lever button pushed. **Battery voltage should exist.**
3. Check voltage between control unit harness terminal ⑫ 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 ⑫ and detention switch harness terminal ⑫
2. Harness continuity between detention switch harness terminal ⑪ and key switch harness terminal ⑪
3. Detention switch—key (Refer to "COMPONENT CHECK".)

O.K. ↓

10 11

1. Set selector lever in "P" position and release selector lever button.
2. Turn ignition switch from "ON" to "OFF" position.

CHECK OUTPUT SIGNAL (KEY LOCK SIGNAL).

3. Turn ignition switch from "OFF" to "ON" position. (Do not start engine.)
4. Check voltage between key lock solenoid harness terminal ⑧ and ground at the moment ignition key is turned from OFF to ON. **Battery voltage should exist for approximately 0.1 seconds.**

N.G. → Check harness continuity between shift lock solenoid harness terminal ⑧ and control unit harness terminal ⑧.

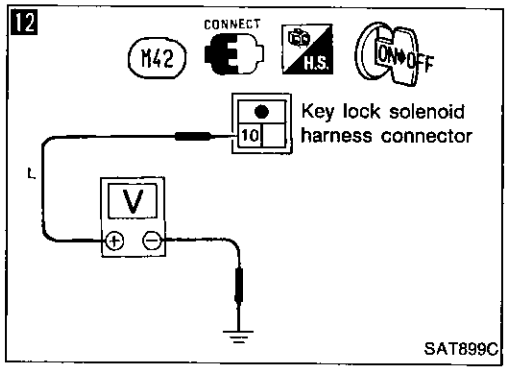
O.K. → Replace control unit.

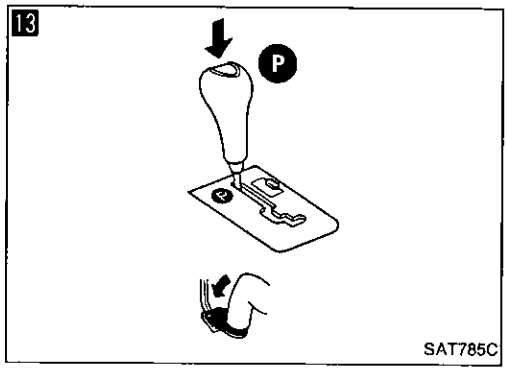
N.G. → Repair harness or connector.

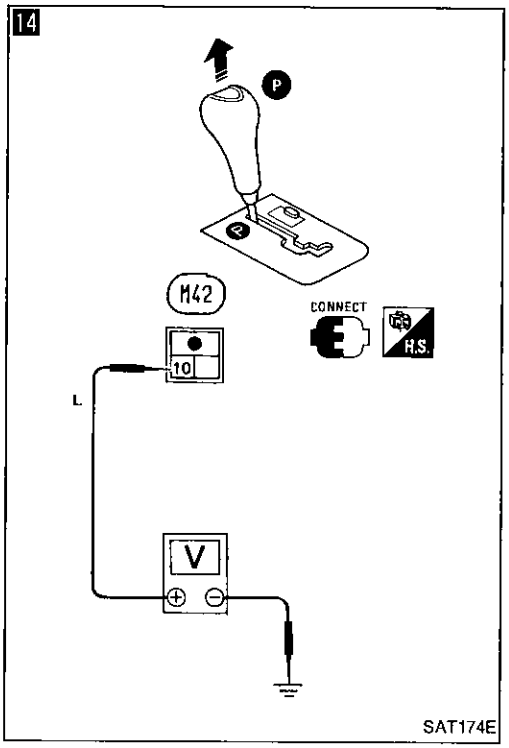
O.K. ↓

Ⓒ

Diagnostic Procedure 2 (Cont'd)







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12

CHECK OUTPUT SIGNAL (KEY UNLOCK SIGNAL CAUSED BY IGNITION SIGNAL).
1. Turn ignition switch from "ON" to "OFF" position.
2. Check voltage between key lock solenoid harness terminal ⑩ and ground at the moment ignition key is turned from ON to OFF.
Battery voltage should exist for approximately 0.1 seconds.

N.G. → Check harness continuity between shift lock solenoid harness terminal ⑩ and control unit harness terminal ⑩.
- O.K. → Replace control unit.
- N.G. → Repair harness or connector.

O.K. ↓

13 **14**

1. Turn ignition switch from "OFF" to "ON" position. (Do not start engine.)
2. Push selector lever button with brake pedal depressed.
3. Turn ignition switch from "ON" to "OFF" position.
When turning ignition key, keep selector lever button pushed and brake pedal depressed.

CHECK OUTPUT SIGNAL (KEY UNLOCK SIGNAL CAUSED BY DETENTION SWITCH—KEY).
4. Turn ignition switch to "OFF" position.
5. Check voltage between key lock solenoid harness terminal ⑩ and ground at the moment selector lever button is released.
Battery voltage should exist for approximately 0.1 seconds.

N.G. → Replace control unit.

O.K. ↓

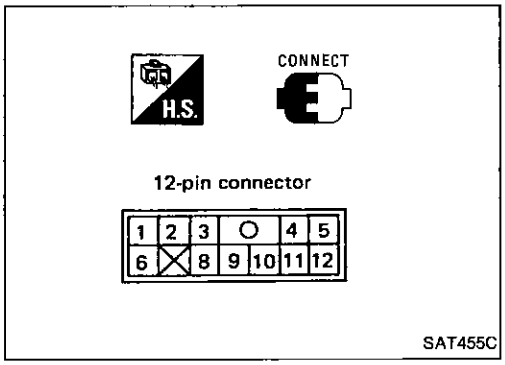
Check key lock solenoid. (Refer to "COMPONENT CHECK".)
- N.G. → Replace key lock solenoid.

O.K. ↓

Recheck key 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



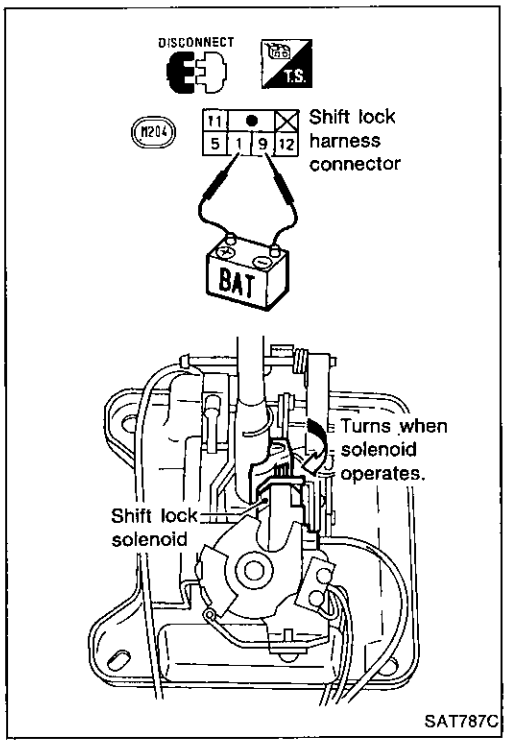
Shift Lock Control Unit Inspection

- Measure voltage between each terminal by following "SHIFT LOCK CONTROL UNIT INSPECTION TABLE".
- Pin connector terminal layout.

Shift Lock Control Unit Inspection Table

(Data are reference values.)

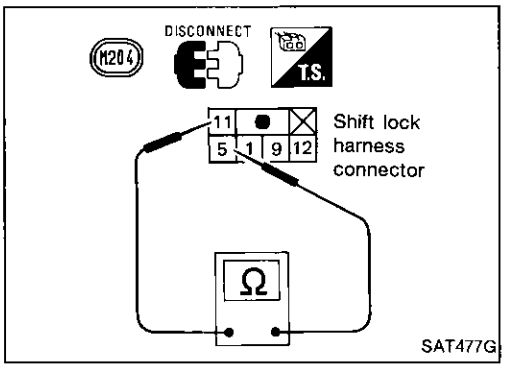
Terminal No. ⊕	Terminal No. ⊖	Item	Condition	Judgment standard
1	9	Shift lock signal	 When selector lever is set in "P" position and brake pedal is depressed	Battery voltage
			Except above	0V
2		Power source		Battery voltage
3		Stop lamp switch	When brake pedal is depressed	Battery voltage
			When brake pedal is released	0V
4		Power source		Battery voltage
5		Detention switch (Shift)	• When key is inserted into key cylinder and selector lever is set in "P" position with selector lever button pushed • When selector lever is set in any position except "P".	Battery voltage
			Except above	0V
6		Ignition signal		Battery voltage
8	10	Key lock signal	When ignition switch is turned from LOCK, OFF or ACC to ON.	Battery voltage (Approximately 0.1 seconds)
			Except above	0V
9	—	Ground	—	—
10	8	Key unlock signal	When selector lever is set in "P" position and ignition key is turned from ON to LOCK, OFF or ACC with selector lever button released.	Battery voltage (Approximately 0.1 seconds)
			Except above	0V
11	9	Key switch	When key is inserted into key cylinder	Battery voltage
			When key is removed from key cylinder	0V
12		Detention switch (Key)	• When key is inserted into key cylinder and selector lever is set in "P" position with selector lever button pushed • When selector lever is set in any position except "P"	Battery voltage
			Except above	0V



Component Check

SHIFT LOCK SOLENOID

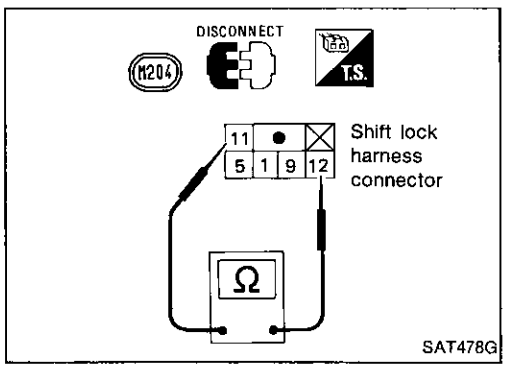
- Check operation by applying battery voltage to shift lock harness connector.



DETENTION SWITCH

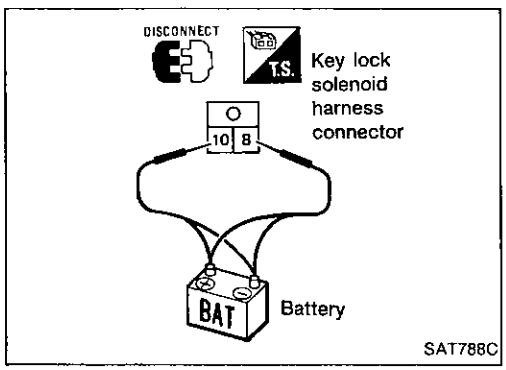
- Check continuity between terminals ⑤ and ⑪ of shift lock harness connector.

Condition	Continuity
When selector lever is set in "P" position with selector ever button pushed or selector lever is set in any position except 'P".	Yes
Except the above	No



- Check continuity between terminals ⑪ and ⑫ of shift lock harness connector.

Condition	Continuity
When selector lever is set in "P" position with selector ever button pushed or selector lever is set in any position except 'P".	Yes
Except the above	No

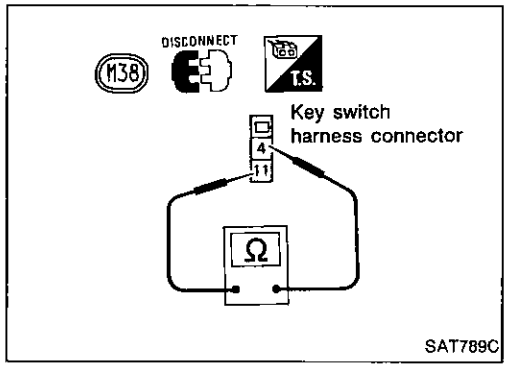


KEY LOCK SOLENOID

- Check operation by applying battery voltage to key lock solenoid harness connector.

Operating sound must be emitted.

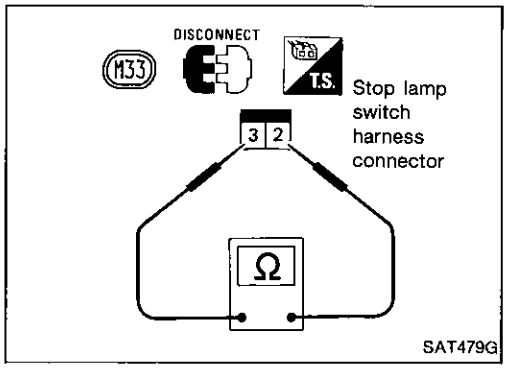
Component Check (Cont'd)



KEY SWITCH

- Check continuity between terminals ④ and ⑪ of key switch harness connector.

Condition	Continuity
When key is inserted into key cylinder	Yes
When key is removed from key cylinder	No

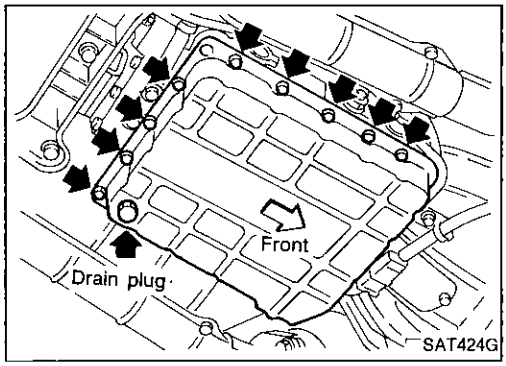


STOP LAMP SWITCH

- Check continuity between terminals ② and ③ of stop lamp witch harness connector.

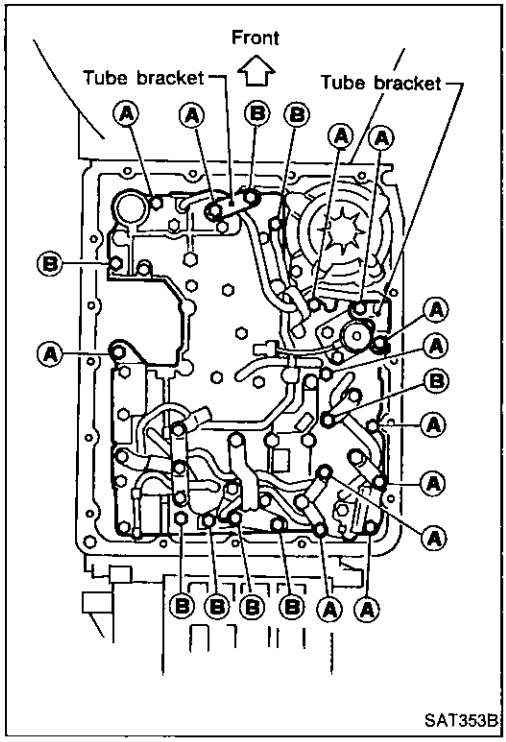
Condition	Continuity
When brake pedal is depressed	Yes
When brake pedal is released	No

Check stop lamp switch after adjusting brake pedal — Refer to section BR.



Control Valve Assembly and Accumulators Inspection

1. Remove oil pan and gasket and drain A.T.F.
2. Remove oil strainer.

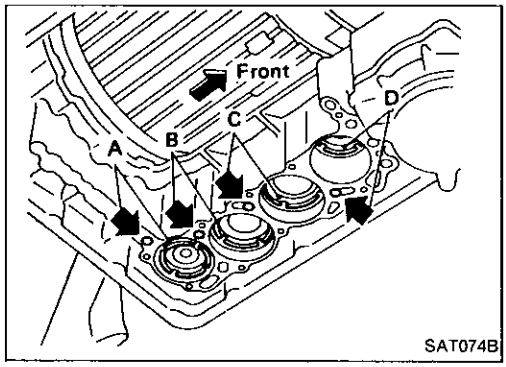


3. Remove control valve assembly by removing fixing bolts and disconnecting harness connector.

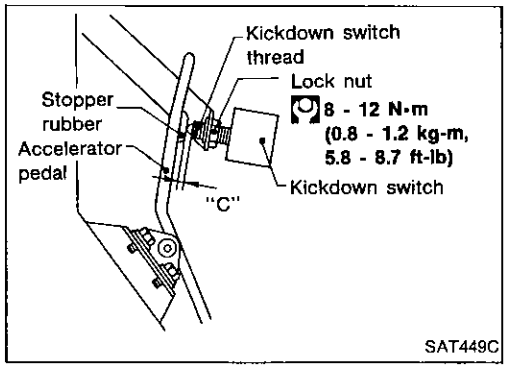
Bolt length and location

Bolt symbol	ℓ mm (in)
Ⓐ	33 (1.30)
Ⓑ	45 (1.77)

4. Remove solenoids and valves from valve body if necessary.
5. Remove terminal cord assembly if necessary.



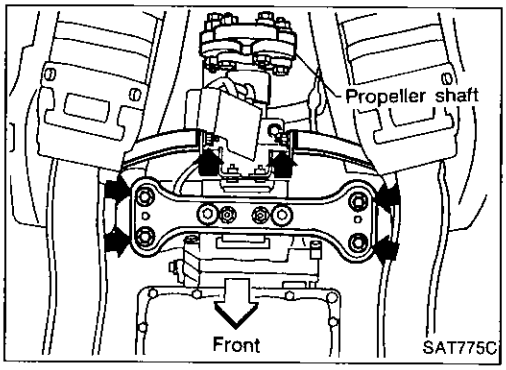
6. Remove accumulators A, B, C and D by applying compressed air if necessary.
- **Hold each piston with rag.**
7. Reinstall any part removed.
- **Always use new sealing parts.**



Kickdown Switch Adjustment

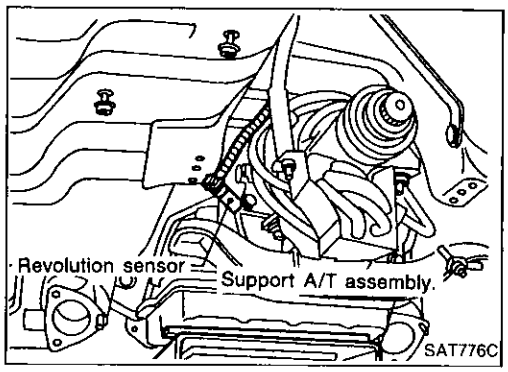
1. Adjust accelerator cable — Refer to section FE.
2. Adjust clearance "C" between stopper rubber and end of kickdown switch thread while depressing accelerator pedal fully.

Clearance "C": 0.3 - 1.0 mm (0.012 - 0.039 in)



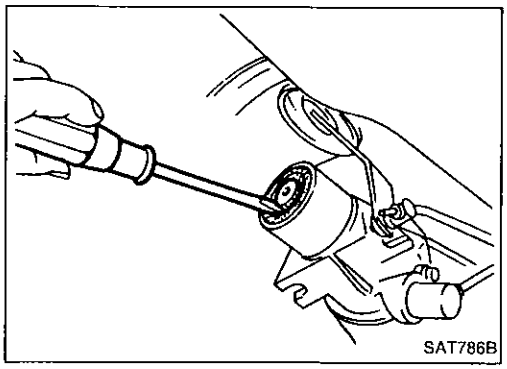
Revolution Sensor Replacement

1. Remove exhaust tube.
2. Remove propeller shaft from vehicle. — Refer to section PD.
3. Remove rear mounting member from body while supporting A/T with a jack.



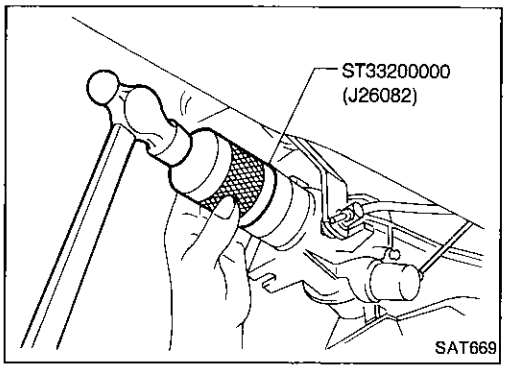
4. Remove revolution sensor from A/T assembly.
5. Reinstall any part removed.

- **Always use new sealing parts.**



Rear Oil Seal Replacement

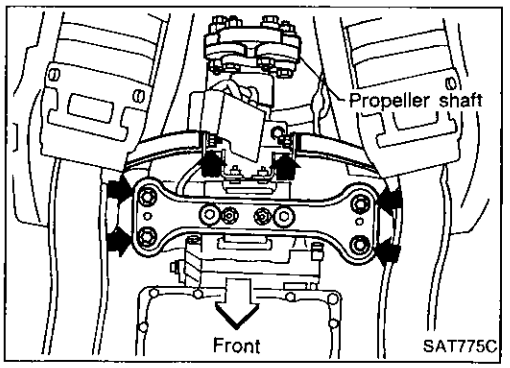
1. Remove exhaust tube.
2. Remove propeller shaft from vehicle. — Refer to section PD.
3. Remove rear oil seal.



4. Install rear oil seal.

- **Apply A.T.F. before installing.**

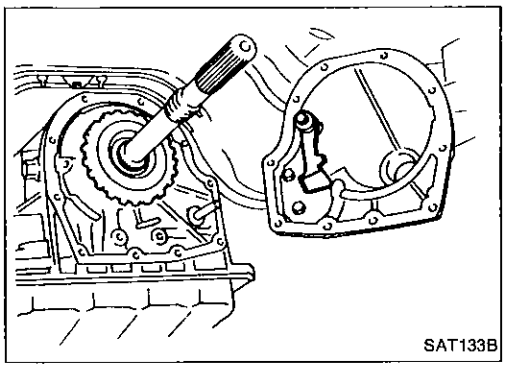
5. Reinstall any part removed.



Parking Components Inspection

1. Remove exhaust tube.
2. Remove propeller shaft from vehicle. — Refer to section PD.
3. Remove rear engine mounting member from A/T assembly while supporting A/T with a jack.

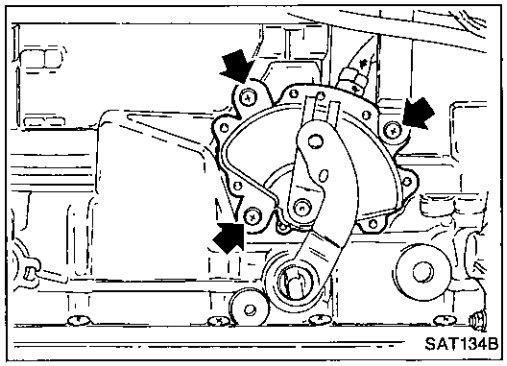
Parking Components Inspection (Cont'd)


SAT133B

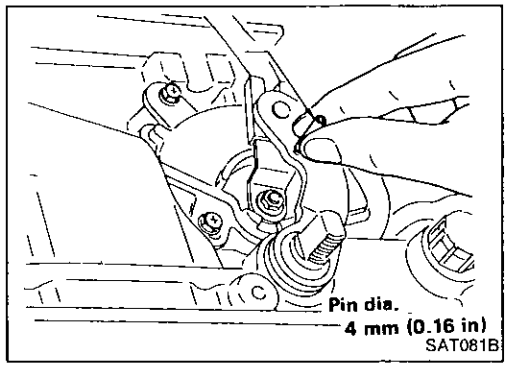
4. Remove rear extension from transmission case.
5. Replace parking components if necessary.
6. Reinstall any part removed.

- **Always use new sealing parts.**

Inhibitor Switch Adjustment


SAT134B

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.

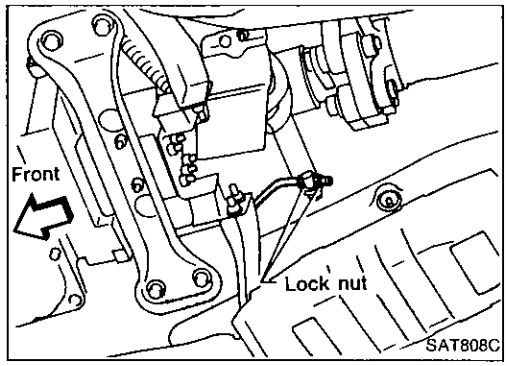


SAT081B

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".

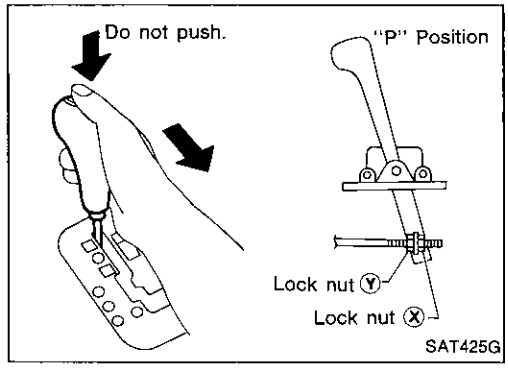
Manual Control Linkage Adjustment

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.



SAT808C

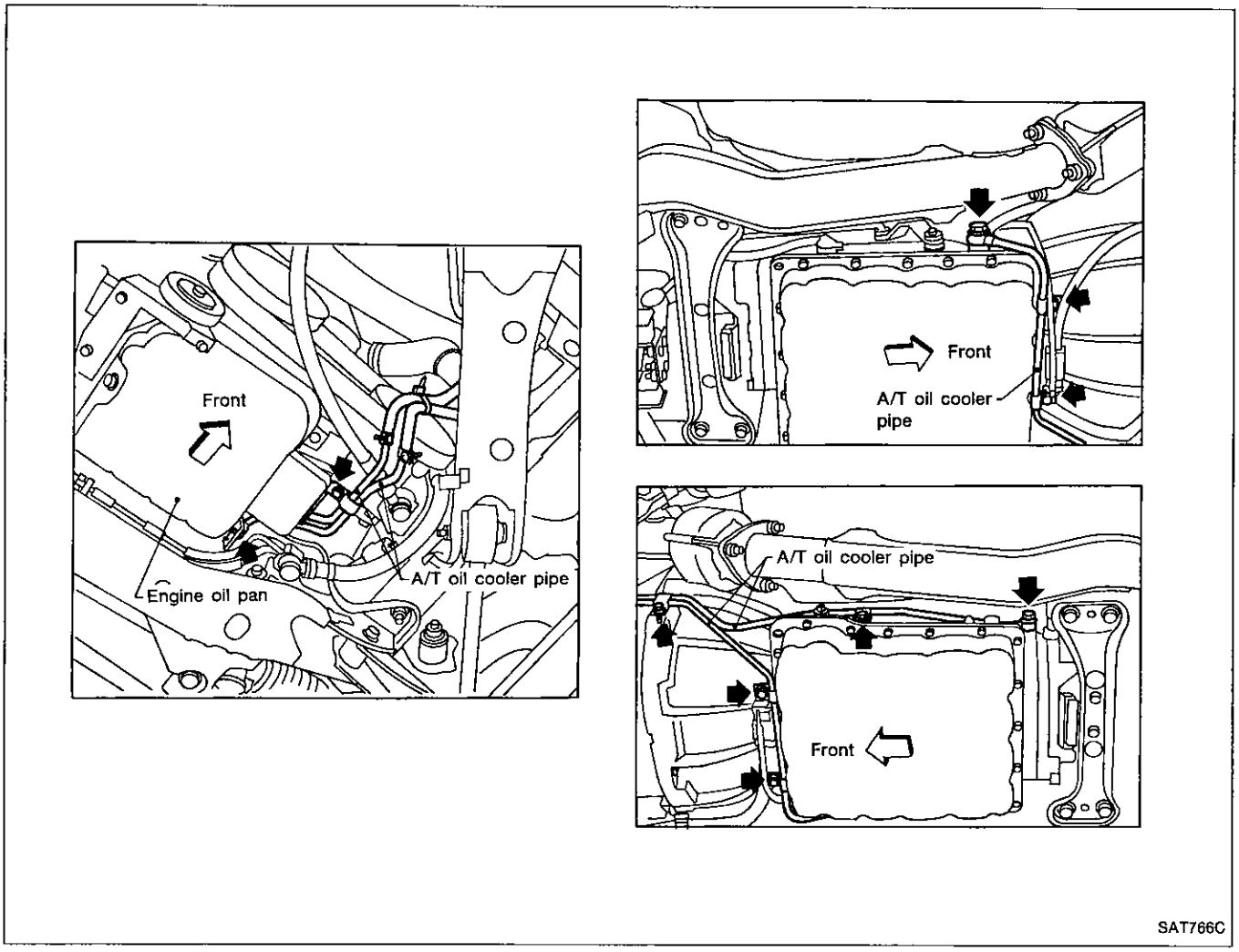
1. Place selector lever in "P" position.
2. Loosen lock nuts.



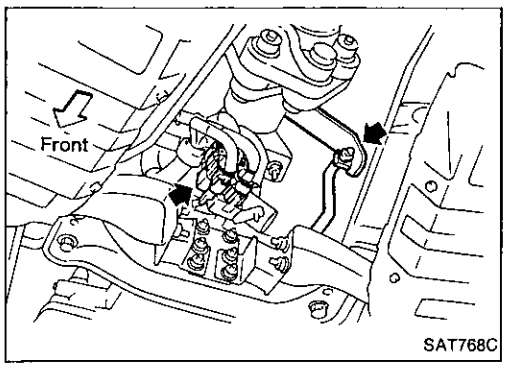
SAT425G

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.

Removal

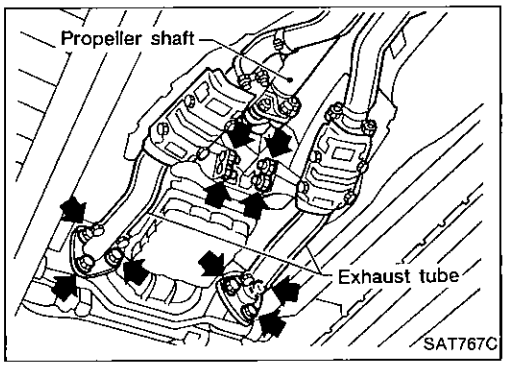


- Remove fluid charging pipe from A/T assembly.
- Remove oil cooler pipe clamps.
- Remove oil cooler pipe from A/T assembly.

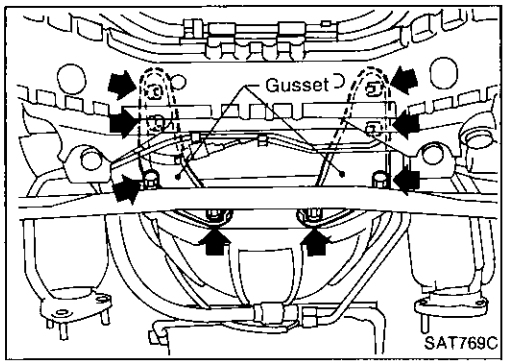


- Disconnect A/T harness connectors and speed sensor harness connector.
- Remove control linkage from selector lever.
- Plug up openings such as the oil charging pipe hole, etc.

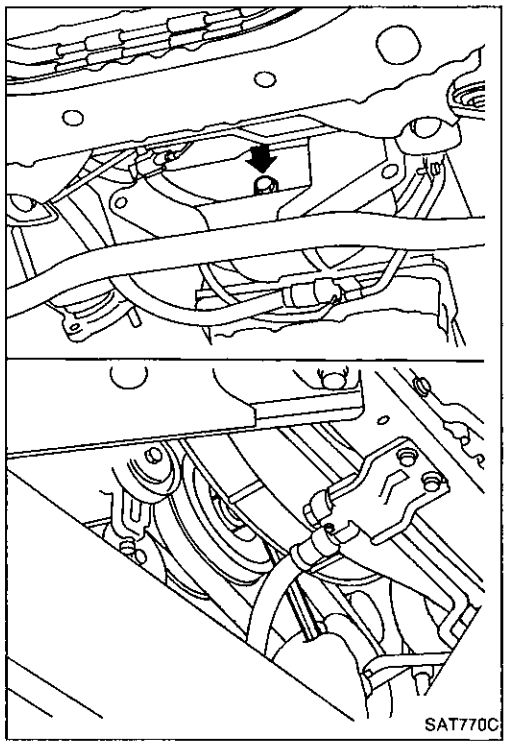
Removal (Cont'd)



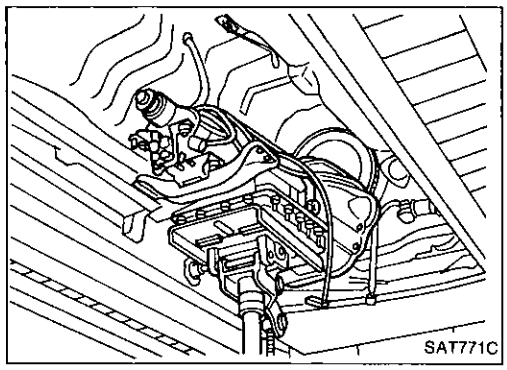
- Remove exhaust tube.
- Remove propeller shaft — Refer to section PD.
- **Insert plug into rear oil seal after removing propeller shaft.**
- **Be careful not to damage spline, sleeve yoke and rear oil seal, when removing propeller shaft.**



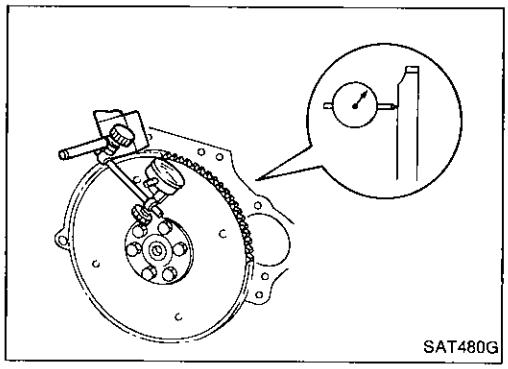
- Remove gusset securing engine to A/T assembly.



- Remove bolts securing torque converter to drive plate.
- **Remove the bolts by turning crankshaft.**

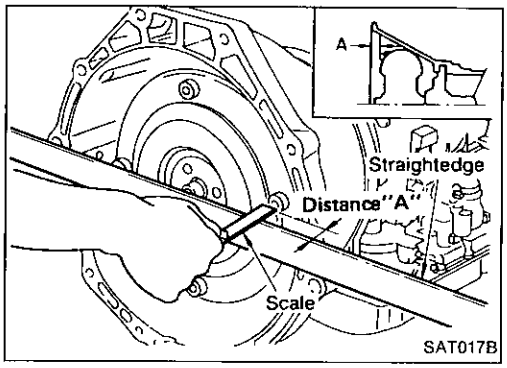


- Support A/T assembly by placing a jack under oil pan.
- Remove rear mounting bracket from body.
- Remove bolts securing A/T assembly to engine.
- Lower A/T assembly.

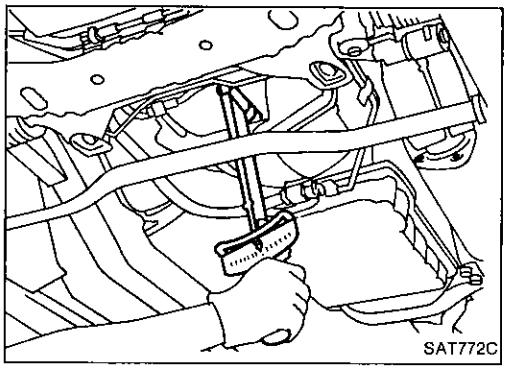


Installation

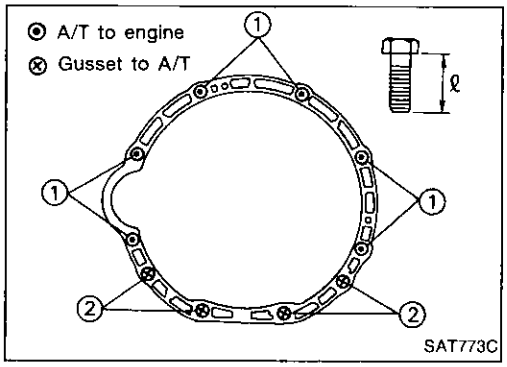
- Drive plate runout
  Maximum allowable runout:
  0.5 mm (0.020 in)
  If this runout is out of specification, replace drive plate with ring gear.



- When connecting torque converter to transmission, measure distance "A" to be certain that they are correctly assembled.
  Distance "A":
  22.0 mm (0.866 in) or more



- Install bolts securing converter to drive plate.
- **After converter is installed to drive plate, rotate crankshaft several turns and check to be sure that transmission rotates freely without binding.**



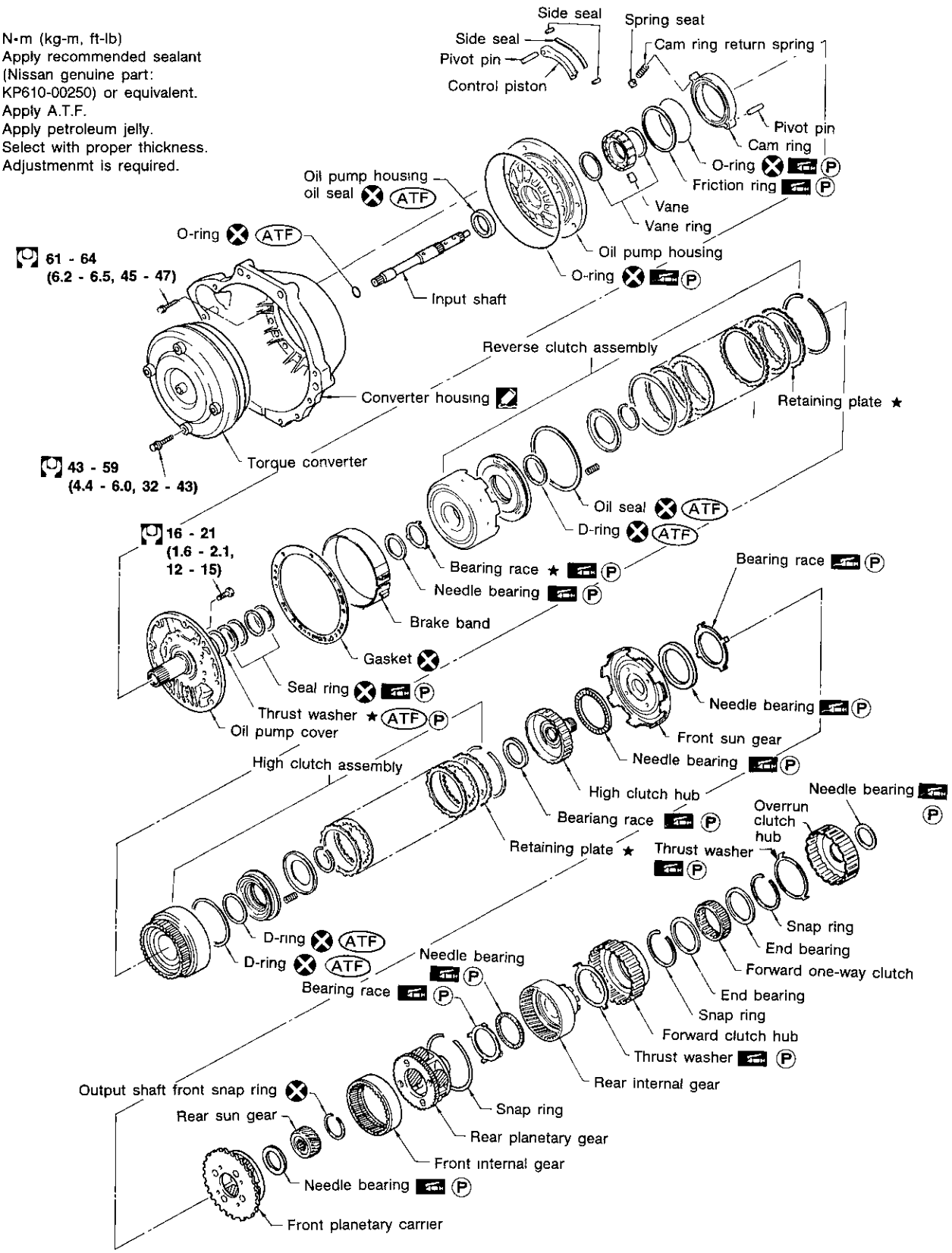
- Tighten bolts securing transmission to engine.

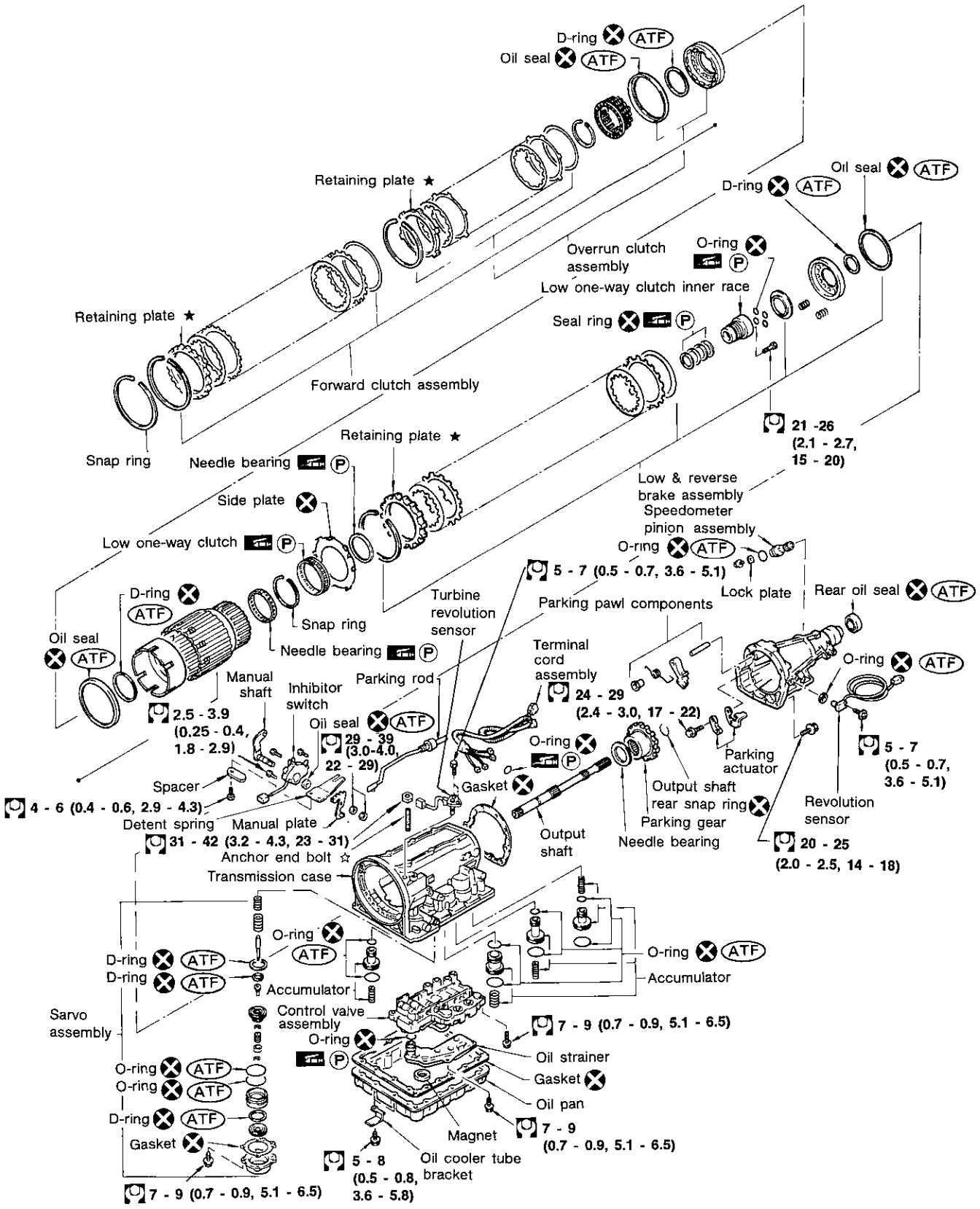
Bolt No.	Tightening torque N·m (kg-m, ft-lb)	Bolt length "ℓ" mm (in)
①	108 - 118 (11.0 - 12.0, 80 - 87)	70 (2.76)
②	69 - 78 (7.0 - 8.0, 51 - 58)	30 (1.18)
Gusset to engine	69 - 78 (7.0 - 8.0, 51 - 58)	30 (1.18)

- 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 thorough "N" to "D", to "3" 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".

NOTE

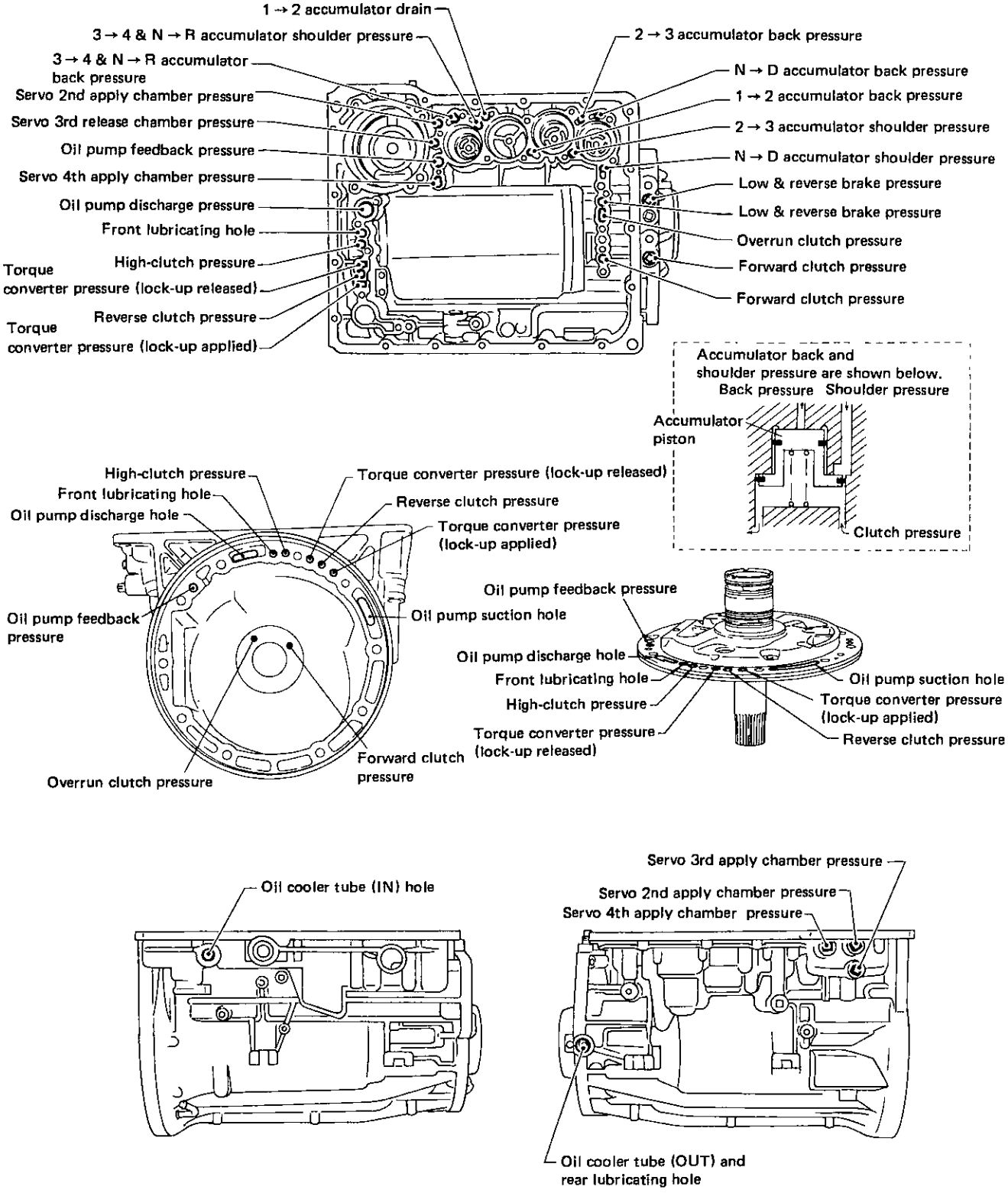
: N·m (kg-m, ft-lb)
: Apply recommended sealant (Nissan genuine part: KP610-00250) or equivalent.
ATF: Apply A.T.F.
P: Apply petroleum jelly.
★: Select with proper thickness.
☆: Adjustmenmt is required.




D-ring ATF
Oil seal ATF
Retaining plate ★
Oil seal ATF
D-ring ATF
Overrun clutch assembly
O-ring P
Low one-way clutch inner race
Retaining plate ★
Seal ring P
Forward clutch assembly
21 -26 (2.1 - 2.7, 15 - 20)
Snap ring
Needle bearing P
Retaining plate ★
Low & reverse brake assembly
Side plate
Speedometer pinion assembly
Low one-way clutch P
O-ring ATF
5 - 7 (0.5 - 0.7, 3.6 - 5.1)
Lock plate
Rear oil seal ATF
D-ring ATF
Oil seal ATF
Snap ring
Turbine revolution sensor
Parking pawl components
Needle bearing P
Terminal cord assembly
O-ring ATF
Manual shaft
Inhibitor switch
Parking rod
24 - 29 (2.4 - 3.0, 17 - 22)
2.5 - 3.9 (0.25 - 0.4, 1.8 - 2.9)
Oil seal ATF
29 - 39 (3.0-4.0, 22 - 29)
O-ring P
Parking actuator
5 - 7 (0.5 - 0.7, 3.6 - 5.1)
Spacer
Gasket
Output shaft rear snap ring
4 - 6 (0.4 - 0.6, 2.9 - 4.3)
Detent spring
Manual plate
Parking gear
Revolution sensor
31 - 42 (3.2 - 4.3, 23 - 31)
Output shaft
Needle bearing
20 - 25 (2.0 - 2.5, 14 - 18)
Anchor end bolt ☆
Transmission case
O-ring ATF
D-ring ATF
D-ring ATF
Accumulator
O-ring ATF
Accumulator
Sarvo assembly
Control valve assembly
7 - 9 (0.7 - 0.9, 5.1 - 6.5)
O-ring P
Oil strainer
O-ring ATF
O-ring ATF
Gasket
D-ring ATF
Oil pan
Magnet
7 - 9 (0.7 - 0.9, 5.1 - 6.5)
Gasket
5 - 8 (0.5 - 0.8, 3.6 - 5.8)
Oil cooler tube bracket
7 - 9 (0.7 - 0.9, 5.1 - 6.5)

SAT742G

Oil Channel



SAT611B

Locations of Needle Bearings, Thrust Washers and Snap Rings

Outer diameter of snap rings

Item number	Outer diameter mm (in)
②, ⑤	164.0 (6.46)
③	176.0 (6.93)
⑥	172.0 (6.77)

Thrust washers

Item number	Color
①	Black
④	White

Outer diameter of bearing races

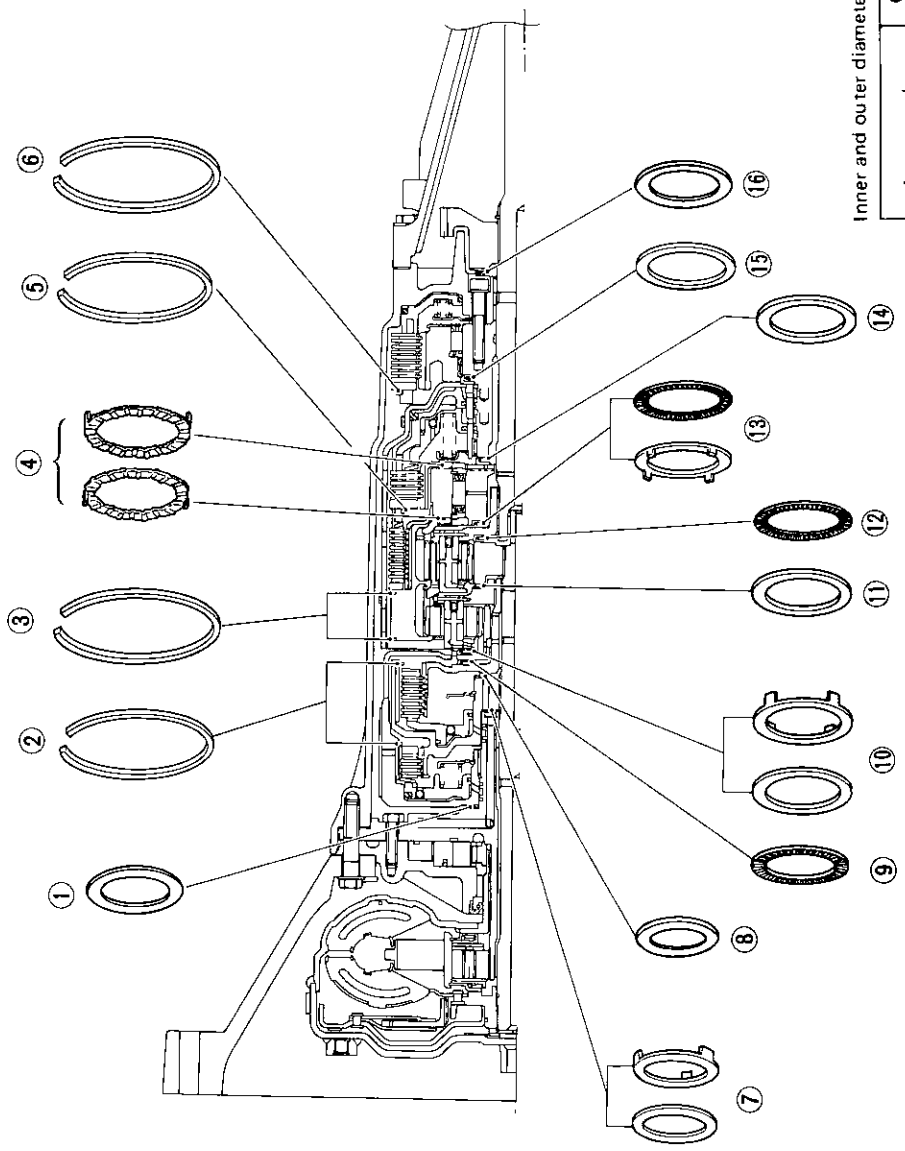
Item number	Outer diameter mm (in)
⑦	43.5 (1.713)
⑩	82.0 (3.228)
⑬	63.2 (2.488)

Installation of one-piece bearings

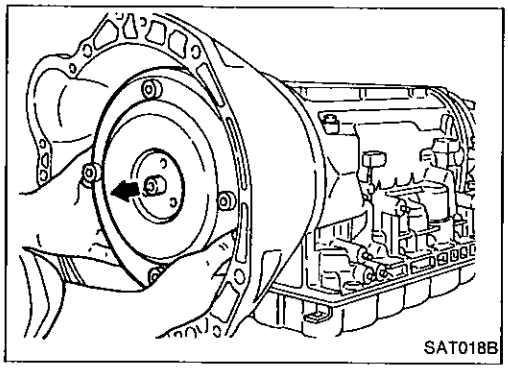
Item number	Bearing race (black) location
⑮	Rear side
⑯	Rear side

Inner and outer diameter of needle bearings

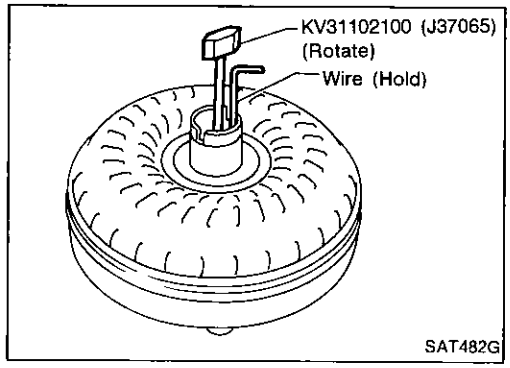
Item number	Outer diameter mm (in)	Inner diameter mm (in)	Number of needles
⑦	47.0 (1.850)	30.0 (1.181)	–
⑧	53.0 (2.087)	35.1 (1.382)	–
⑨, ⑩	85.0 (3.346)	62.7 (2.468)	–
⑪, ⑫	64.0 (2.520)	45.0 (1.772)	52
⑬	64.0 (2.520)	45.0 (1.772)	50
⑭	59.5 (2.343)	38.0 (1.496)	34
⑮	78.1 (3.075)	–	–
⑯	64.0 (2.520)	–	–



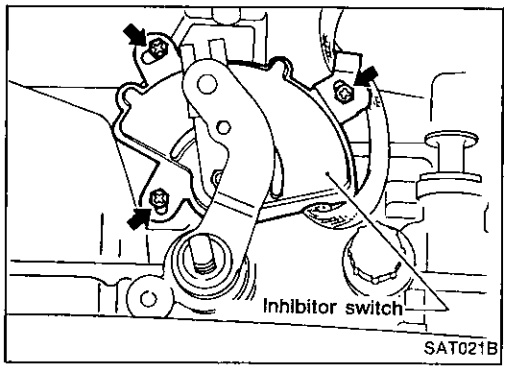
SAT636C



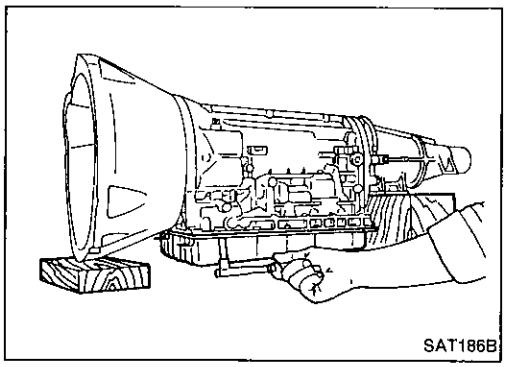
1. Remove torque converter by holding it firmly and turning while pulling straight out.



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.

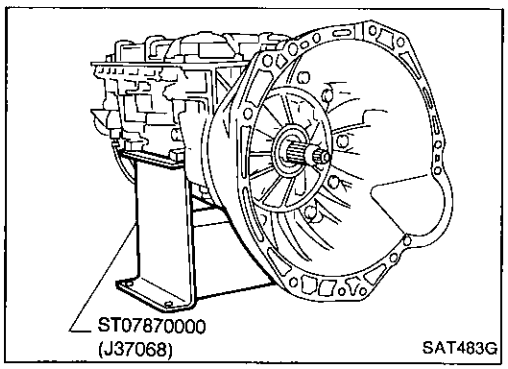


3. Remove inhibitor switch from transmission case.



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.**

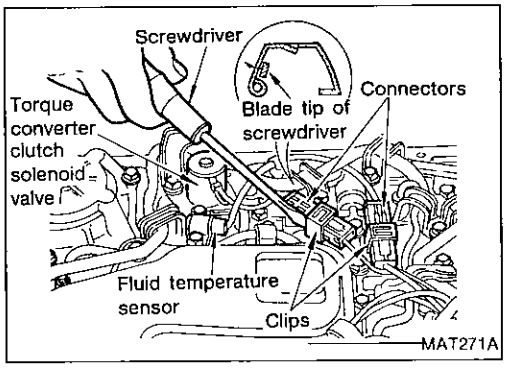


5. Place transmission into Tool with the control valve facing up.

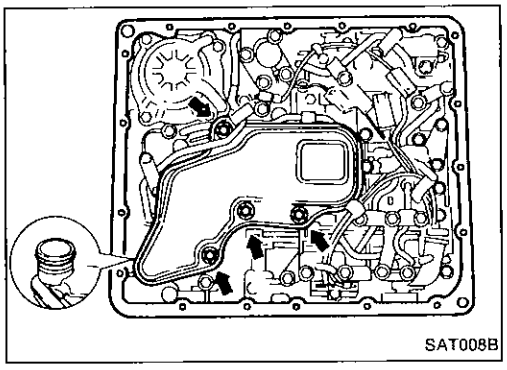
(Cont'd)

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.

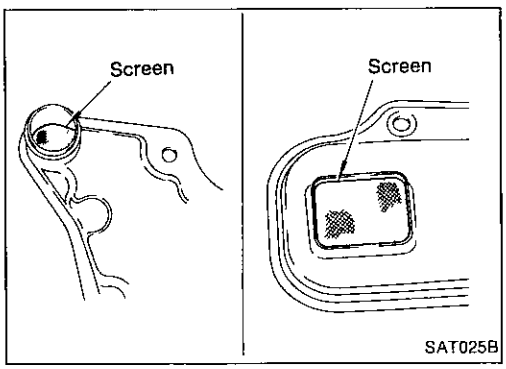
In above cases, replace torque converter and check unit for cause of particle accumulation.



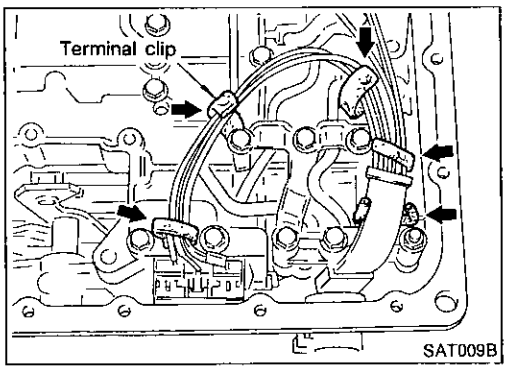
7. Remove torque converter clutch solenoid valve and fluid temperature sensor connectors.
- **Be careful not to damage connector.**



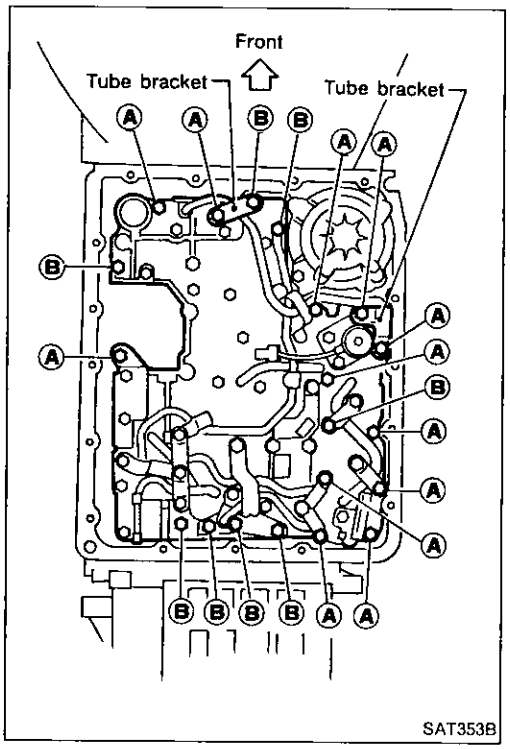
8. Remove oil strainer.
a. Remove oil strainer from control valve assembly. Then remove O-ring from oil strainer.



b. Check oil strainer screen for damage.

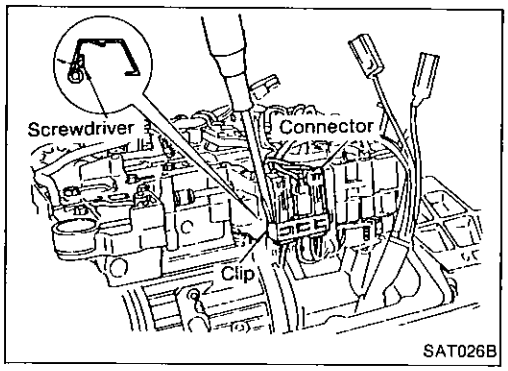


9. Remove control valve assembly.
a. Straighten terminal clips to free terminal cords then remove terminal clips.



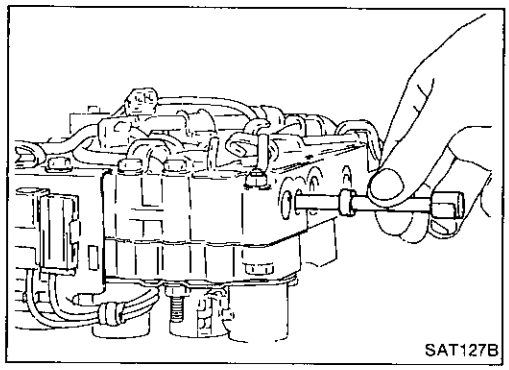
b. Remove bolts Ⓐ and Ⓑ, and remove control valve assembly from transmission.

Bolt	ℓ mm (in)
Ⓐ	33 (1.30)
Ⓑ	45 (1.77)

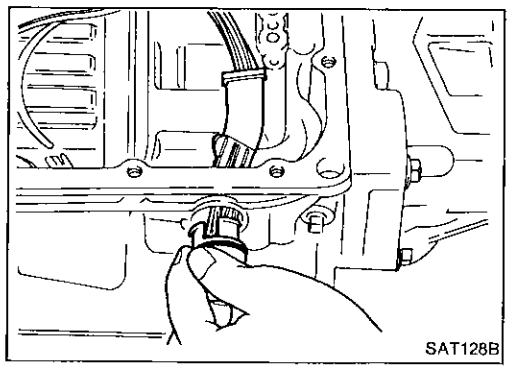


c. Remove solenoid connector.

- **Be careful not to damage connector.**

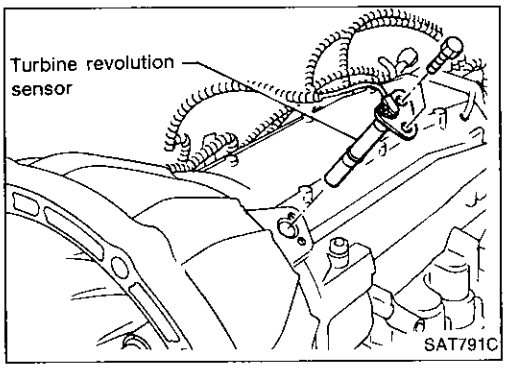


d. Remove manual valve from control valve assembly.

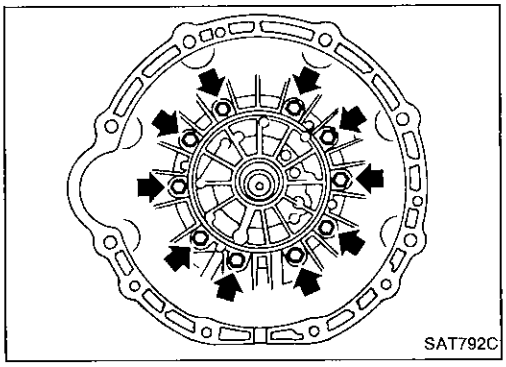


10. Remove terminal cord assembly from transmission case while pushing on stopper.

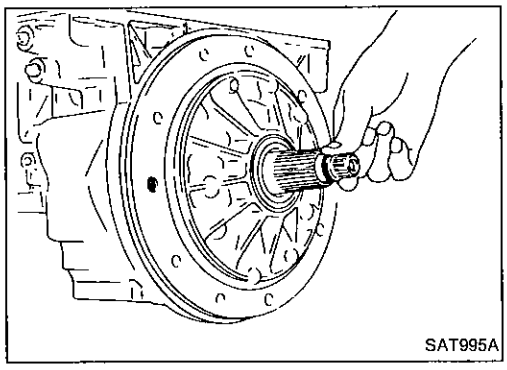
- **Be careful not to damage cord.**
- **Do not remove terminal cord assembly unless it is damaged.**



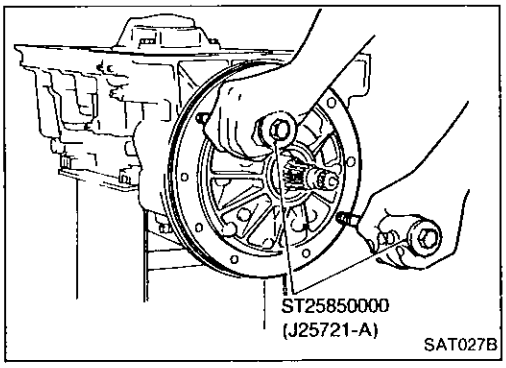
11. Remove turbine revolution sensor.



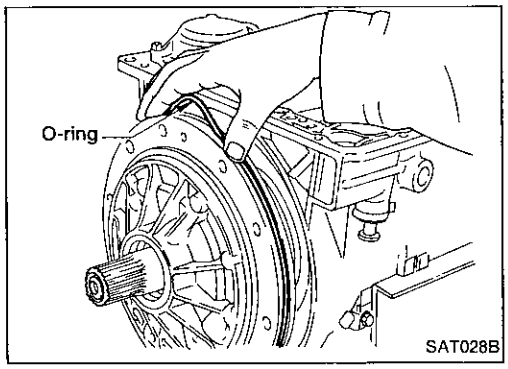
12. Remove converter housing.
a. Remove converter housing from transmission case.
b. Remove traces of sealant
- **Be careful not to scratch converter housing.**



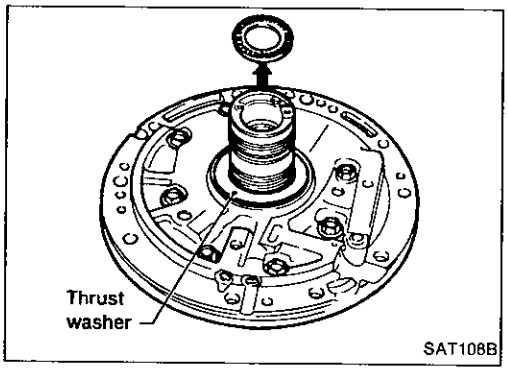
13. Remove O-ring from input shaft.



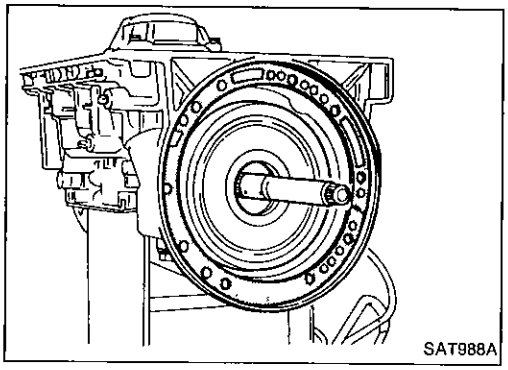
14. Remove oil pump assembly.
a. Attach Tool to oil pump assembly and extract it evenly from transmission case.



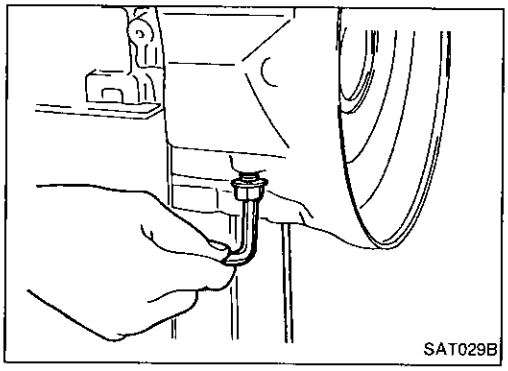
b. Remove O-ring from oil pump assembly.
c. Remove traces of sealant from oil pump housing.
- **Be careful not to scratch pump housing.**



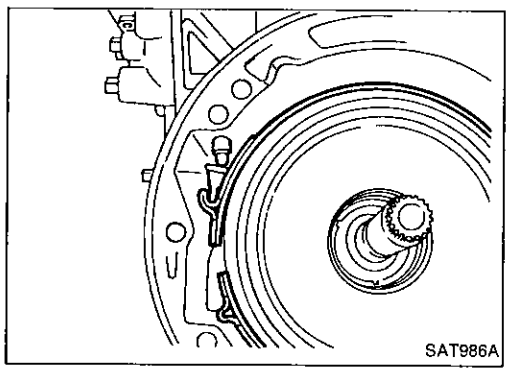
d. Remove needle bearing and thrust washer from oil pump assembly.



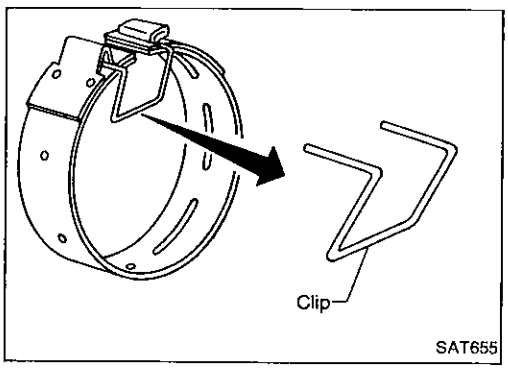
15. Remove input shaft and oil pump gasket.



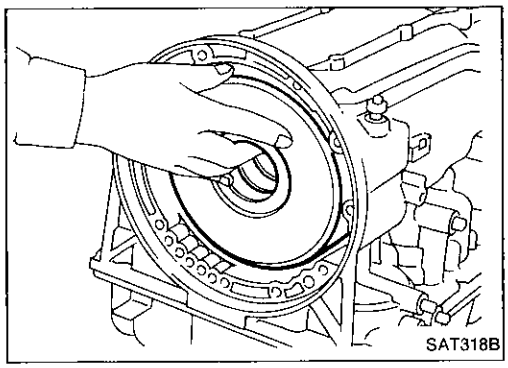
16. Remove brake band and band strut.
a. Loosen lock nut and remove band servo anchor end pin from transmission case.



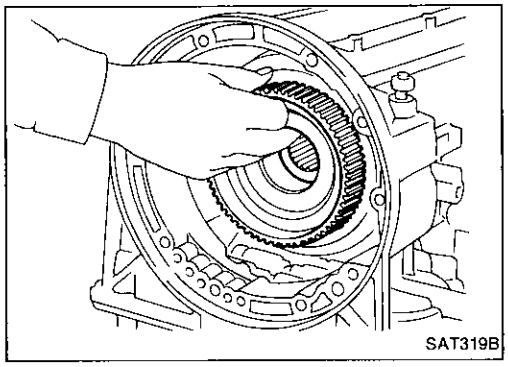
b. Remove brake band and band strut from transmission case.



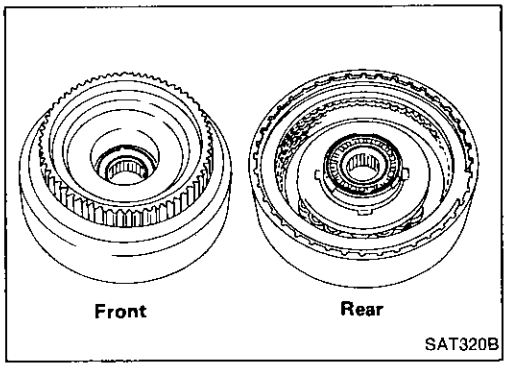
c. Hold brake band in a circular shape with clip.


SAT318B

17. Remove front side clutch and gear components.
a. Remove reverse clutch assembly from transmission case.

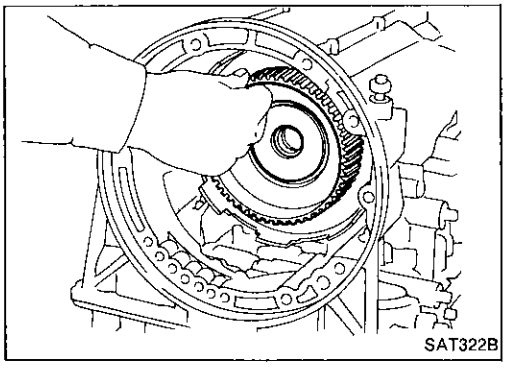

SAT319B

b. Remove high clutch assembly from transmission case.

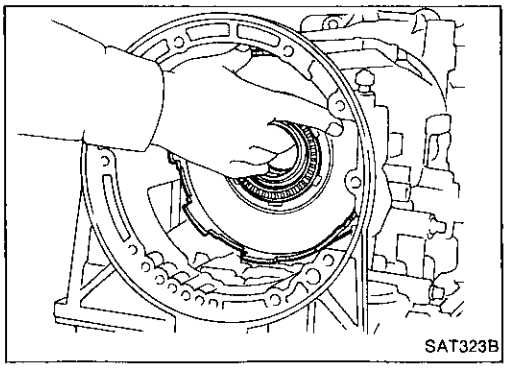


SAT320B

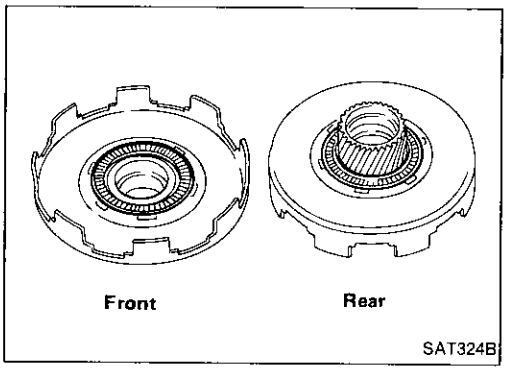
c. Remove front bearing race from high clutch assembly.
d. Remove rear needle bearing from high clutch assembly.


SAT322B

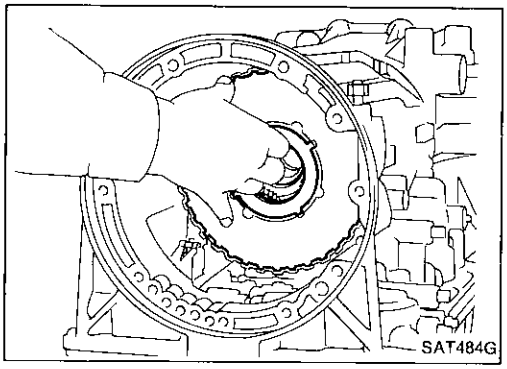
e. Remove high clutch hub from transmission case.


SAT323B

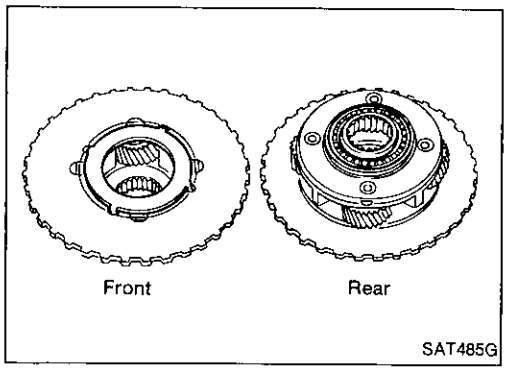
f. Remove front sun gear from transmission case.



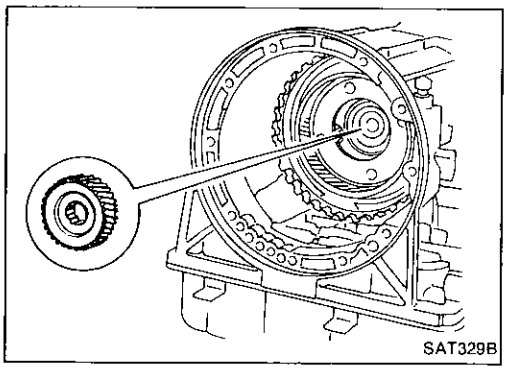
g. Remove front needle bearing from front sun gear.
h. Remove rear needle bearing from front sun gear.



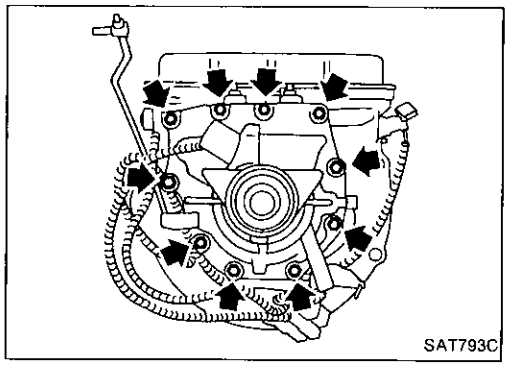
i. Remove front planetary carrier from transmission case.



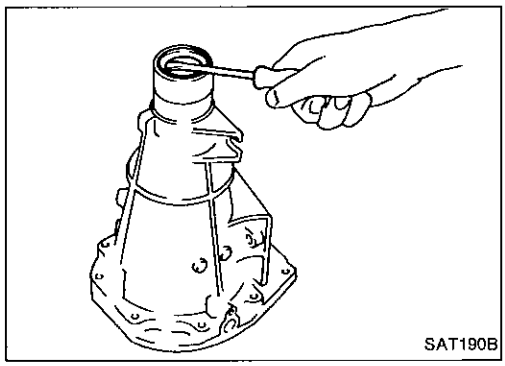
j. Remove front bearing race from front planetary carrier.
k. Remove rear needle bearing from front planetary carrier.



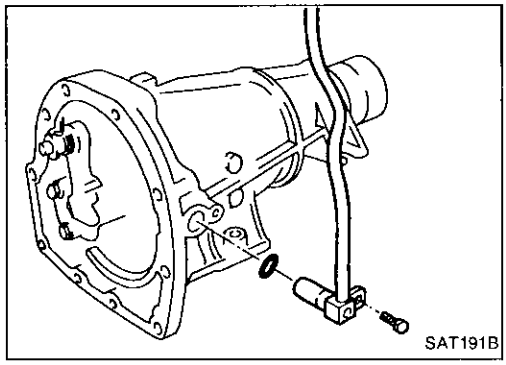
l. Remove rear sun gear from transmission case.



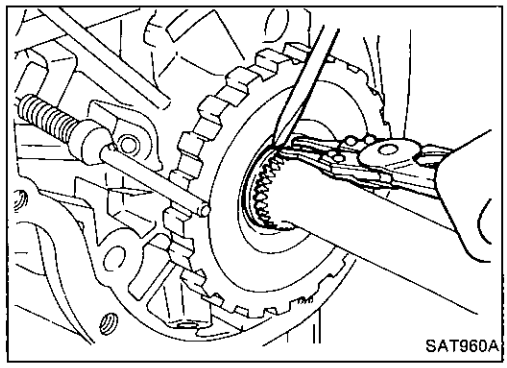
18. Remove rear extension.
a. Remove rear extension from transmission case.
b. Remove rear extension gasket from transmission case.


SAT190B

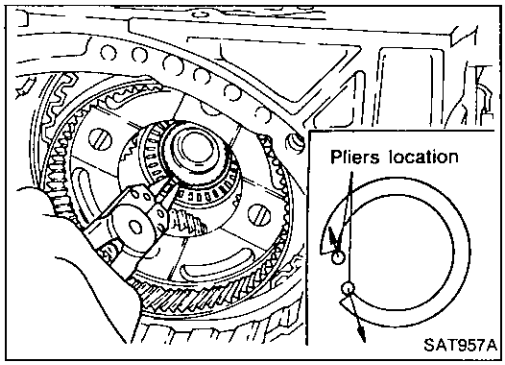
c. Remove oil seal from rear extension.
- **Do not remove oil seal unless it is to be replaced.**


SAT191B

d. Remove revolution sensor from rear extension.
e. Remove O-ring from revolution sensor.


SAT960A

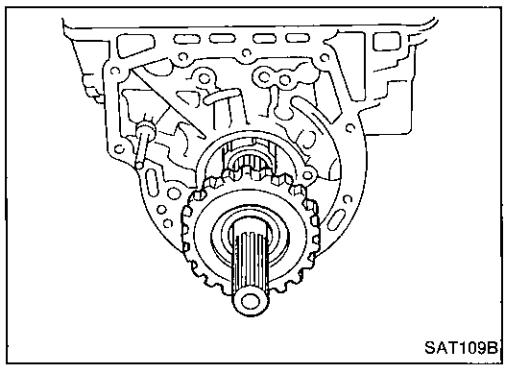
19. Remove output shaft and parking gear.
a. Remove rear snap ring from output shaft.



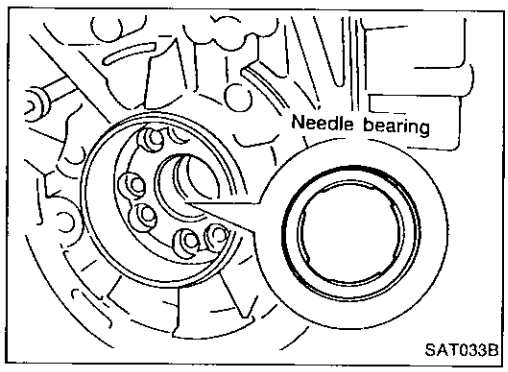
SAT957A

b. Slowly push output shaft all the way forward.
- **Do not use excessive force.**

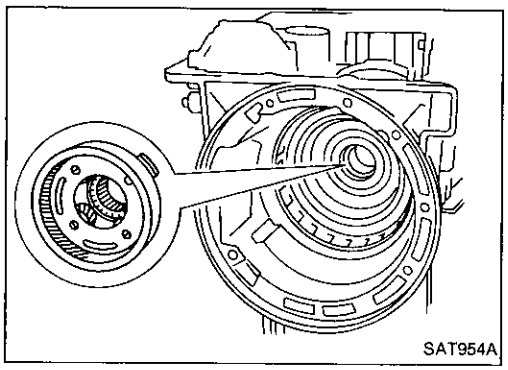
c. Remove snap ring from output shaft.


SAT109B

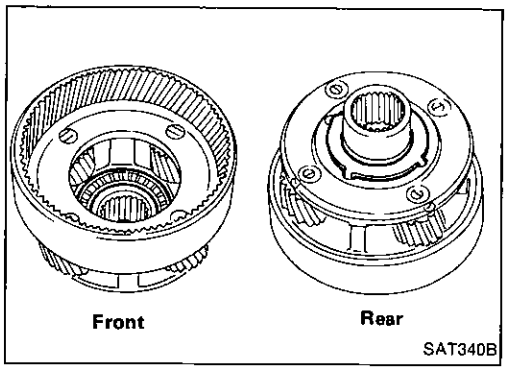
d. Remove output shaft and parking gear as a unit from transmission case.
e. Remove parking gear from output shaft.



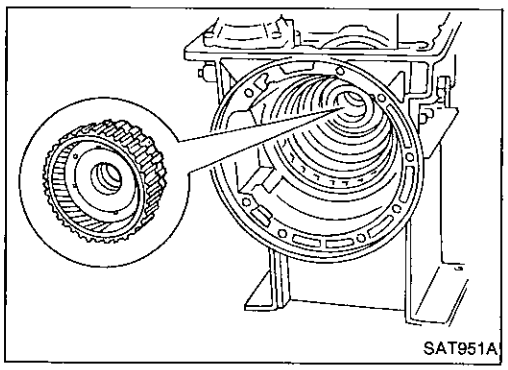
f. Remove needle bearing from transmission case.



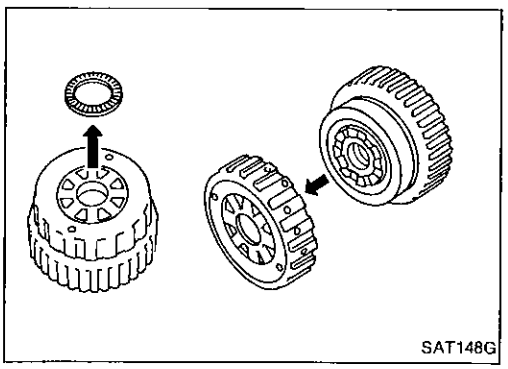
20. Remove rear side clutch and gear components.
a. Remove front internal gear.



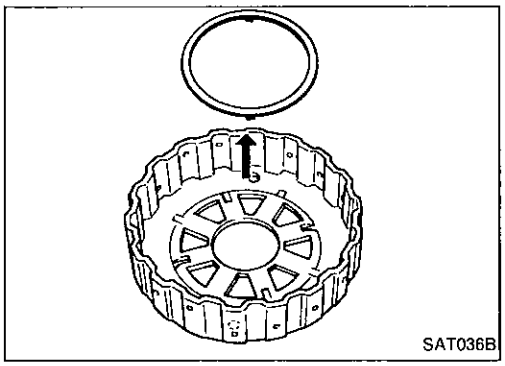
b. Remove front needle bearing from front internal gear.
c. Remove rear bearing race from front internal gear.



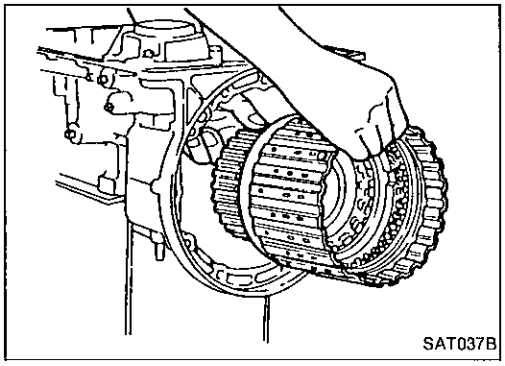
d. Remove rear internal gear, forward clutch hub and overrun clutch hub as a set from transmission case.



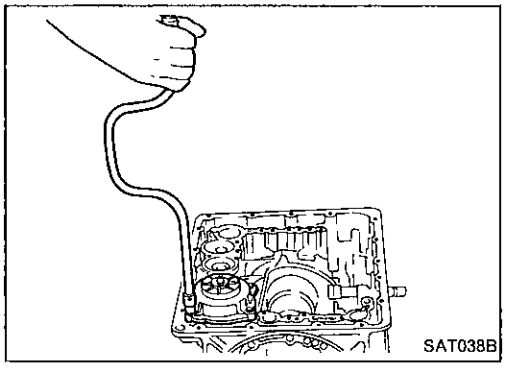
e. Remove needle bearing from overrun clutch hub.
f. Remove overrun clutch hub from rear internal gear and forward clutch hub.


SAT036B

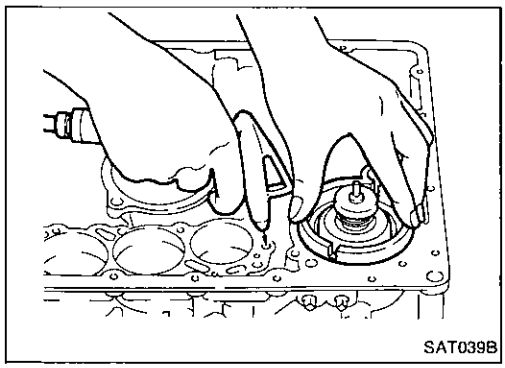
g. Remove thrust washer from overrun clutch hub.


SAT037B

h. Remove forward clutch assembly from transmission case.

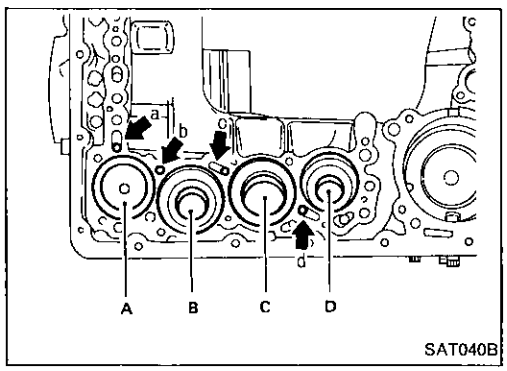

SAT038B

21. Remove band servo and accumulator components.
a. Remove band servo retainer from transmission case.


SAT039B

b. Apply compressed air to oil hole until band servo piston comes out of transmission case.
- **Hold piston with a rag and gradually direct air to oil hole.**

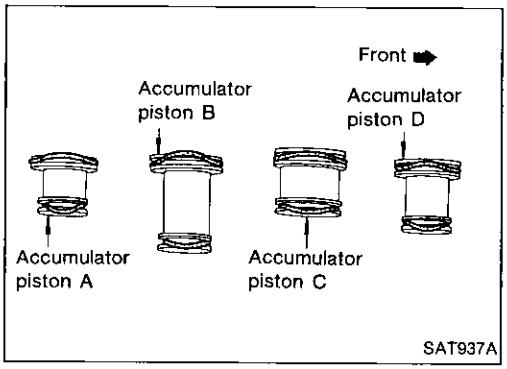
c. Remove return springs.



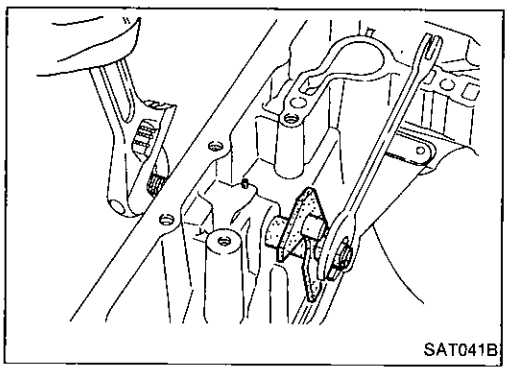
SAT040B

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.**

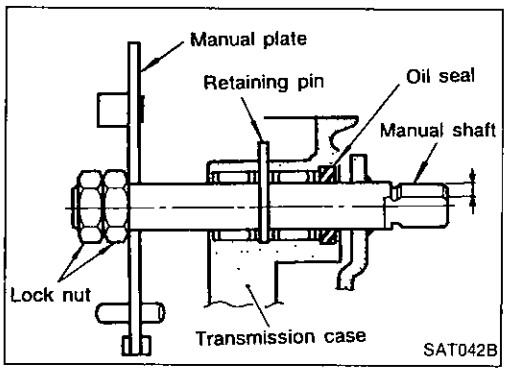
Identification of accumulator pistons	A	B	C	D
Identification of oil holes	a	b	c	d



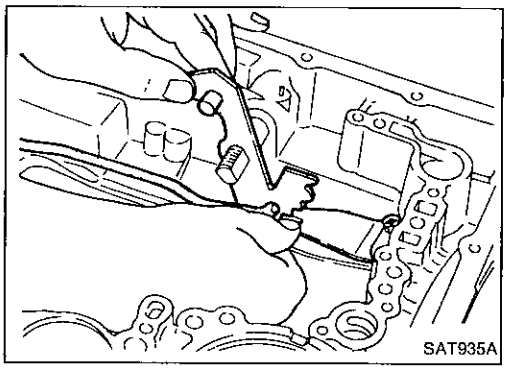
f. Remove O-ring from each piston.



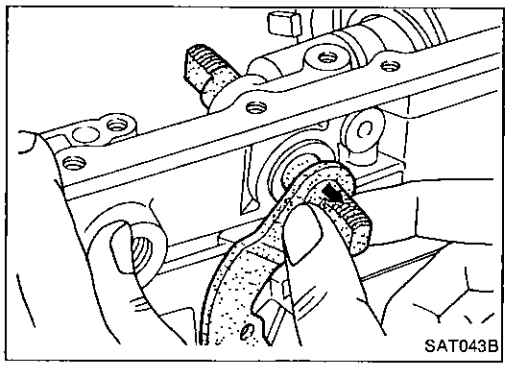
22. Remove manual shaft components, if necessary.
a. Hold width across flats of manual shaft (outside the transmission case) and remove lock nut from shaft.



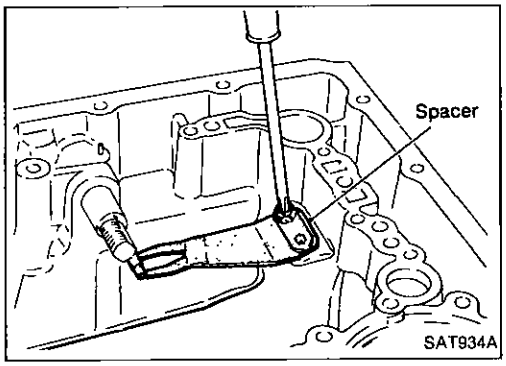
b. Remove retaining pin from transmission case.



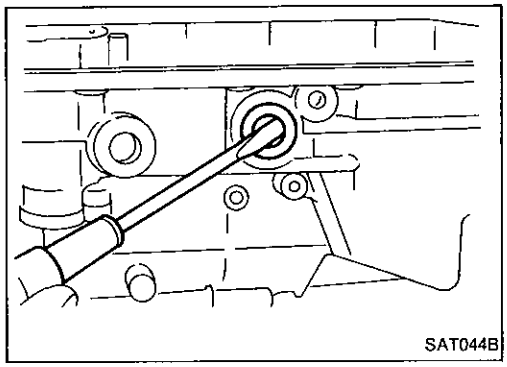
c. While pushing detent spring down, remove manual plate and parking rod from transmission case.



d. Remove manual shaft from transmission case.

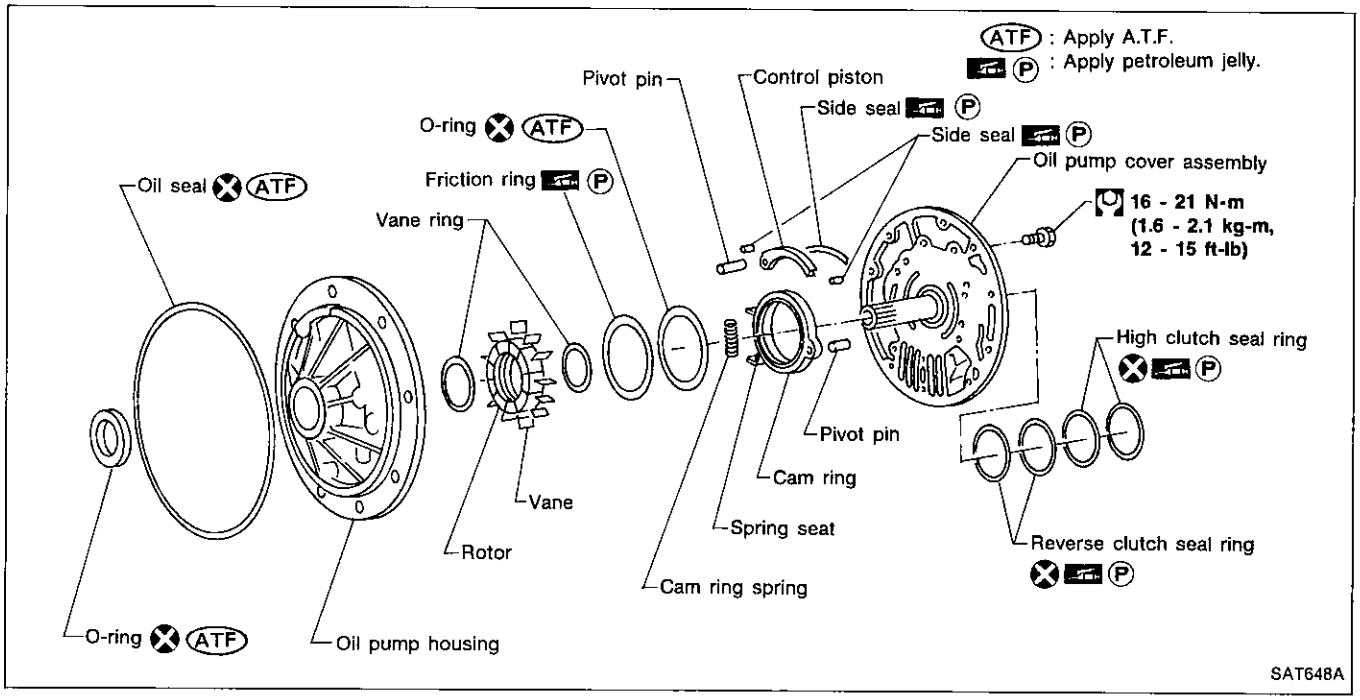


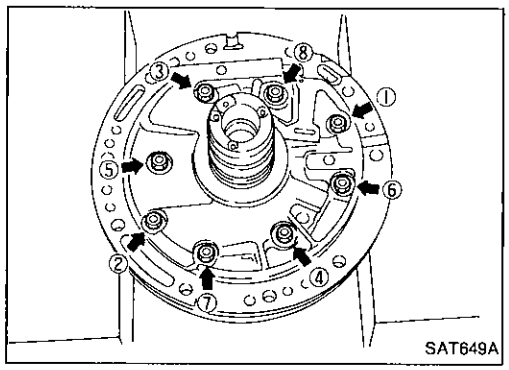
e. Remove spacer and detent spring from transmission case.



f. Remove oil seal from transmission case.

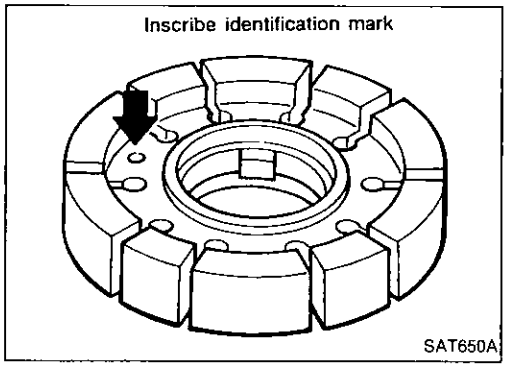
Oil Pump



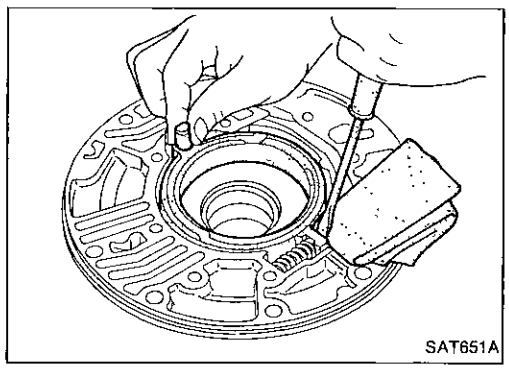


DISASSEMBLY

1. Loosen bolts in numerical order and remove oil pump cover.

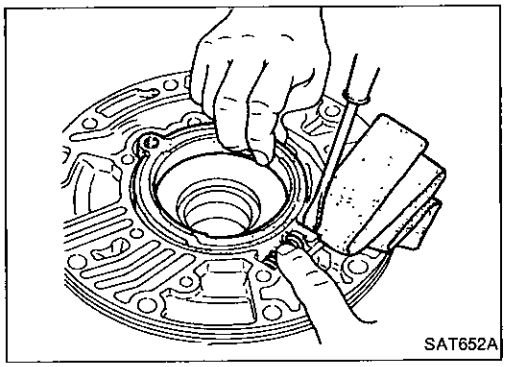


2. Remove rotor, vane rings and vanes.
- **Inscribe a mark on back of rotor for identification of fore-aft direction when reassembling rotor. Then remove rotor.**

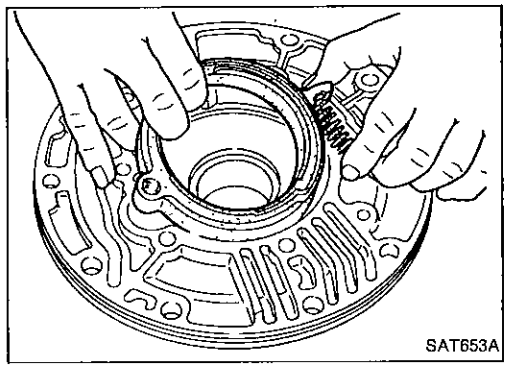


3. While pushing on cam ring remove pivot pin.
- **Be careful not to scratch oil pump housing.**

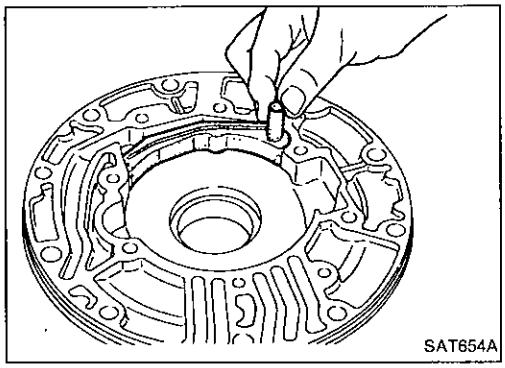
Oil Pump (Cont'd)


SAT652A

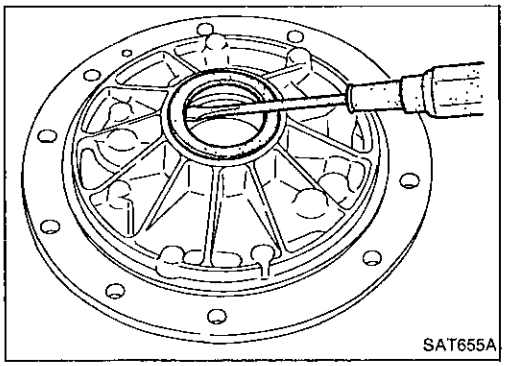
4. While holding cam ring and spring lift out cam ring spring.
- **Be careful not to damage oil pump housing.**
- **Hold cam ring spring to prevent it from jumping.**


SAT653A

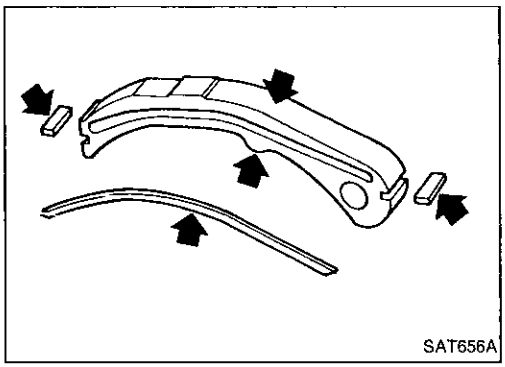
5. Remove cam ring and cam ring spring from oil pump housing.


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.**

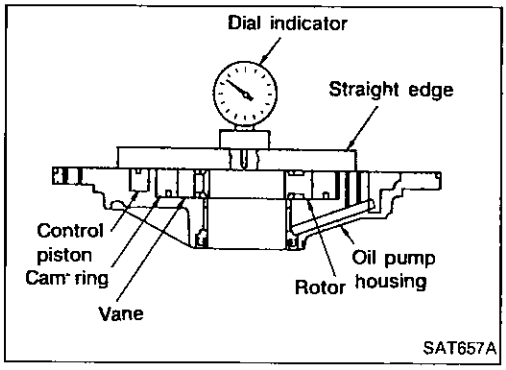

SAT656A

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.**

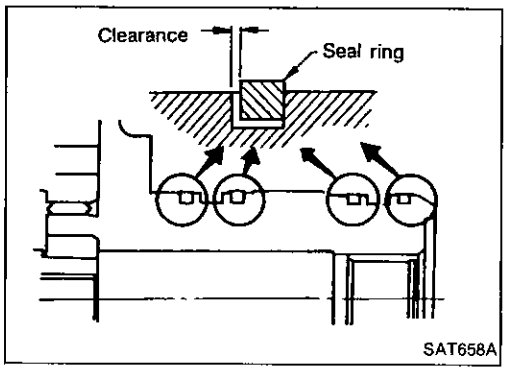
  Standard clearance:

  Cam ring

  0.01 - 0.024 mm (0.0004 - 0.0009 in)

  Rotor, vanes, control piston

  0.03 - 0.044 mm (0.0012 - 0.0017 in)
- If not within standard clearance, replace oil pump assembly except oil pump cover assembly.



Seal ring clearance

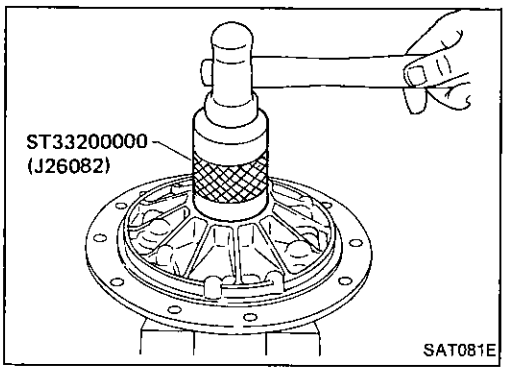
- Measure clearance between seal ring and ring groove.

  Standard clearance:

  0.10 - 0.25 mm (0.0039 - 0.0098 in)

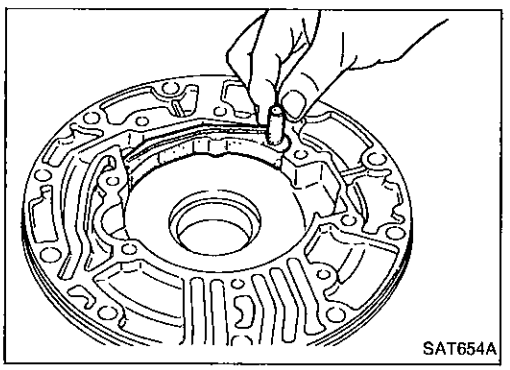
  Wear limit:

  0.25 mm (0.0098 in)
- If not within wear limit, replace oil pump cover assembly.



ASSEMBLY

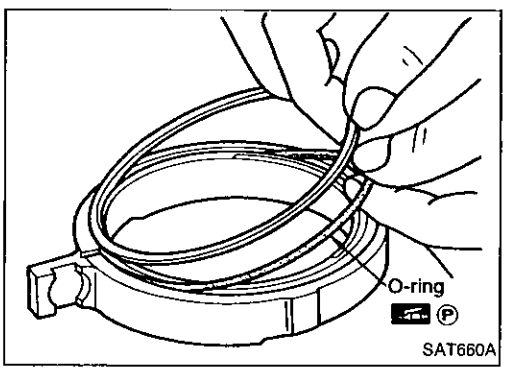
1. Drive oil seal into oil pump housing.
- **Apply A.T.F. to outer periphery and lip surface.**



2. Install cam ring in oil pump housing by the following steps.

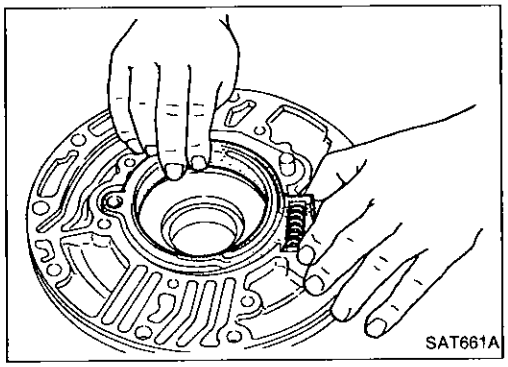
a. Install side seal on control piston.
- **Pay attention to its direction — Black surface goes toward control piston.**
- **Apply petroleum jelly to side seal.**

b. Install control piston on oil pump.

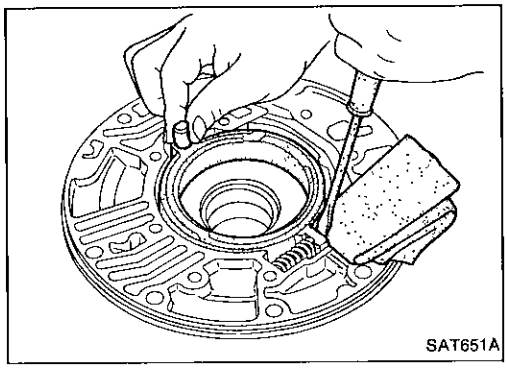


c. Install O-ring and friction ring on cam ring.
- **Apply petroleum jelly to O-ring.**

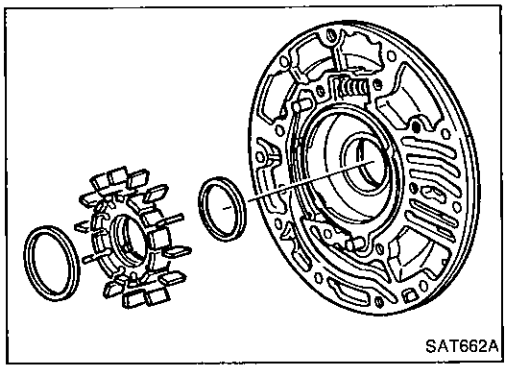
Oil Pump (Cont'd)


SAT661A

d. Assemble cam ring, cam ring spring and spring seat. Install spring by pushing it against pump housing.

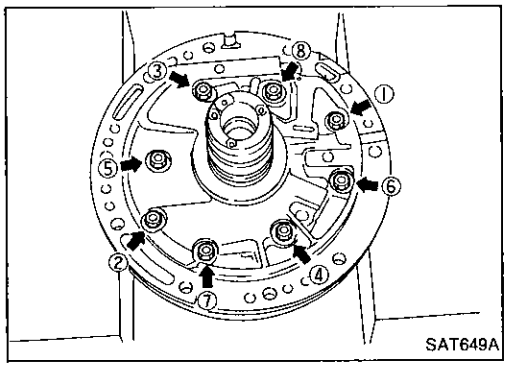

SAT651A

e. While pushing on cam ring install pivot pin.


SAT662A

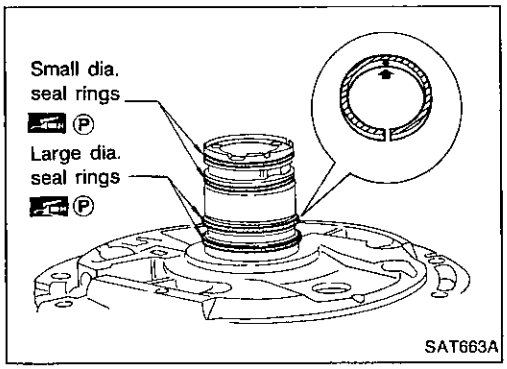
3. Install rotor, vanes and vane rings.

- **Pay attention to direction of rotor.**



SAT649A

4. Install oil pump housing and oil pump cover.
a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly in oil pump housing assembly, then remove masking tape.
b. Tighten bolts in a criss-cross pattern.

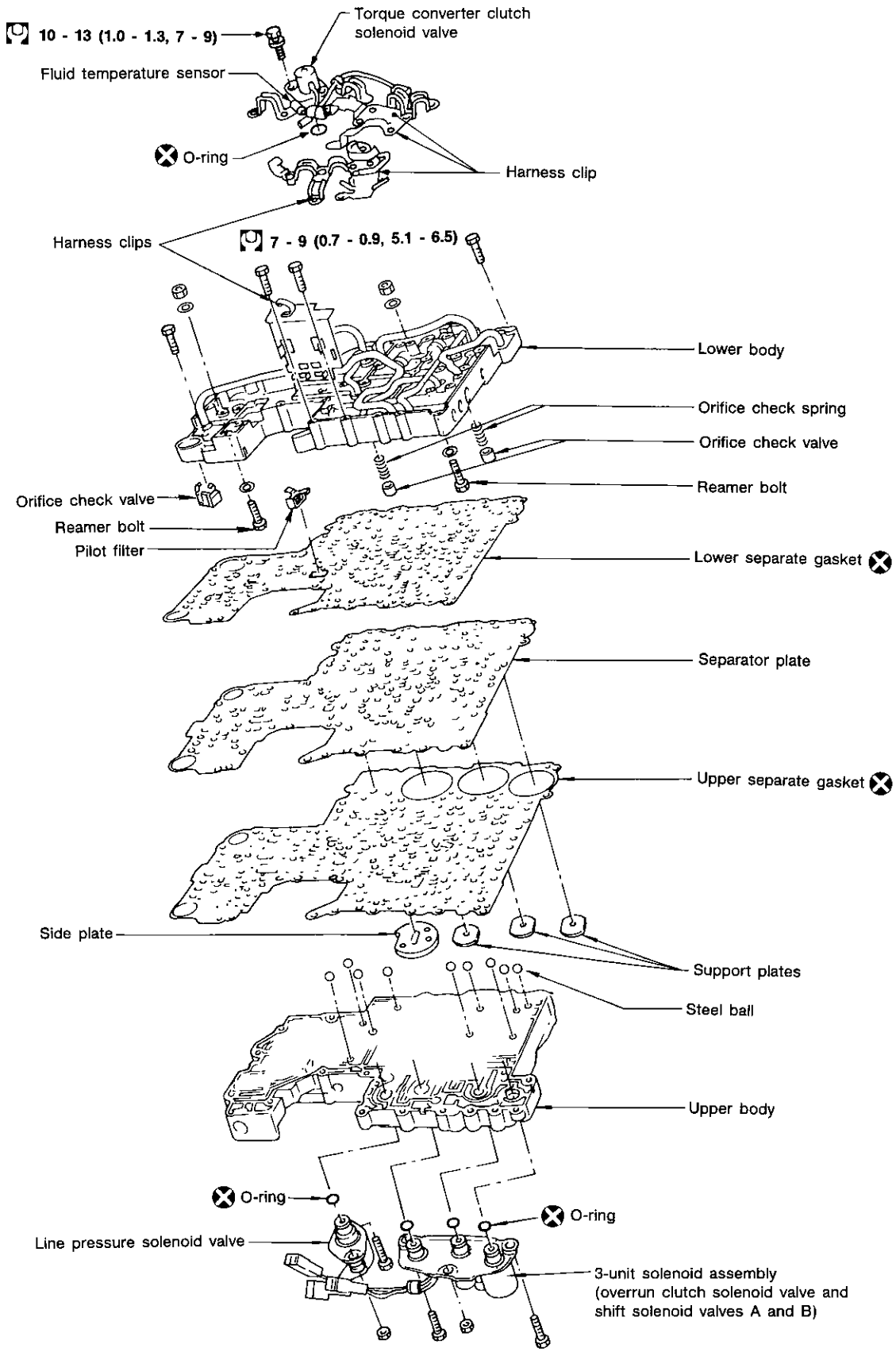


SAT663A

5. Install 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.**

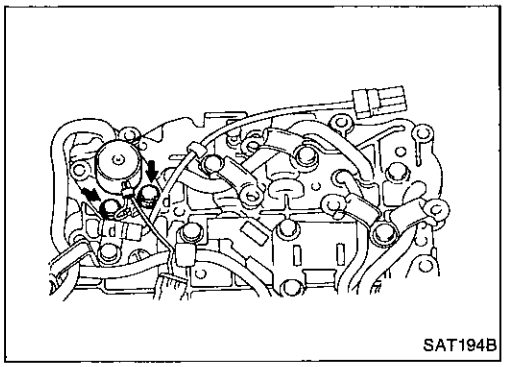
Control Valve Assembly



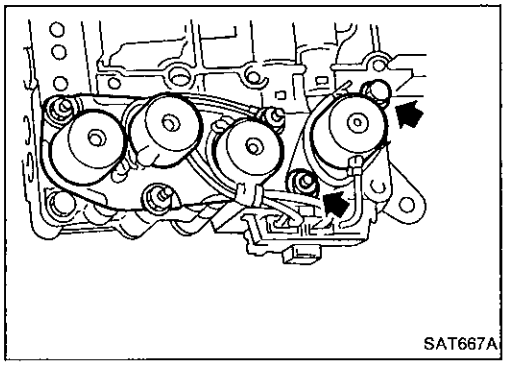
SAT486G

Control Valve Assembly (Cont'd)

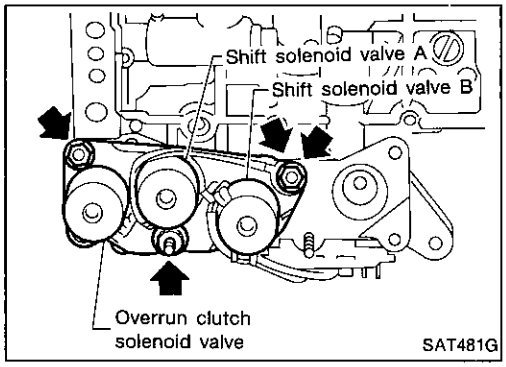
DISASSEMBLY


SAT194B

1. Remove solenoids.
a. Remove torque converter clutch solenoid valve and side plate from lower body.
b. Remove O-ring from solenoid.

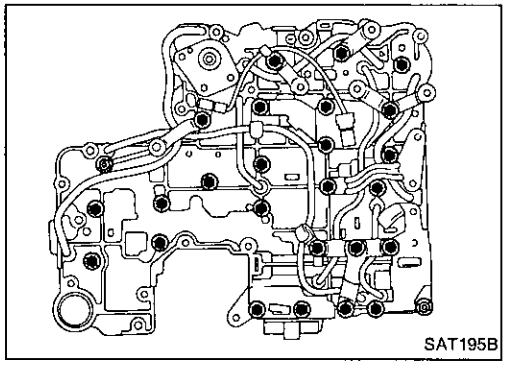

SAT667A

c. Remove line pressure solenoid valve from upper body.
d. Remove O-ring from solenoid.



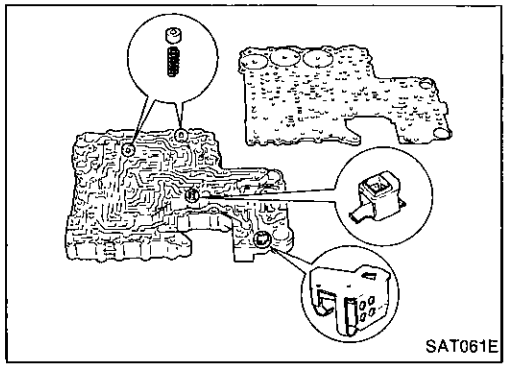
SAT481G

e. Remove 3-unit solenoid assembly from upper body.
f. Remove O-rings from solenoids.


SAT195B

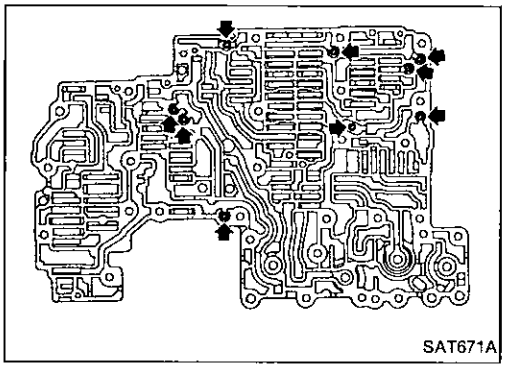
2. Disassemble upper and lower bodies.
a. Place upper body facedown, and remove bolts, reamer bolts and support plates.
b. Remove lower body, separator plate and separate gasket as a unit from upper body.

- **Be careful not to drop pilot filter, orifice check valve, spring and steel balls.**


SAT061E

c. Place lower body facedown, and remove separate gasket and separator plate.
d. Remove pilot filter, orifice check valves and orifice check springs.

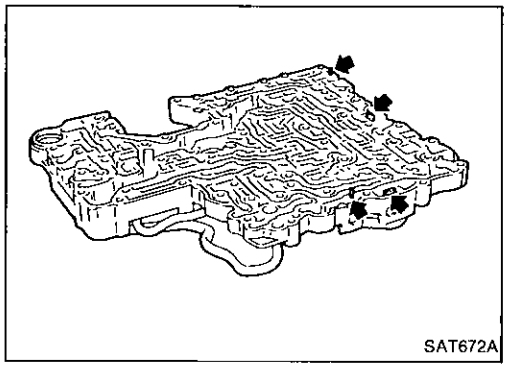
Control Valve Assembly (Cont'd)


SAT671A

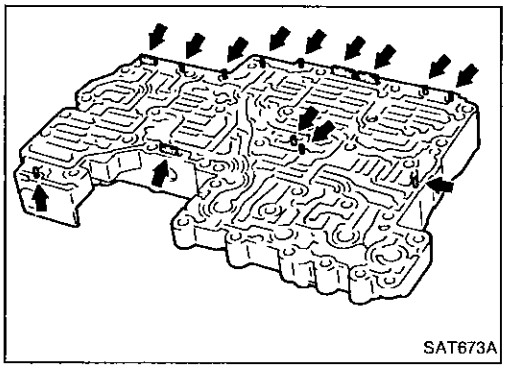
e. Check to see that steel balls are properly positioned in upper body and then remove them from upper body.

INSPECTION

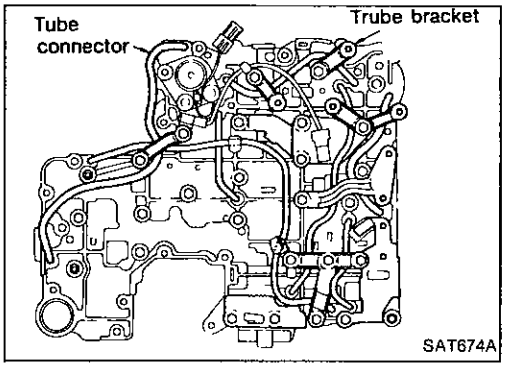
Lower and upper bodies


SAT672A

- Check to see that there are pins and retainer plates in lower body.

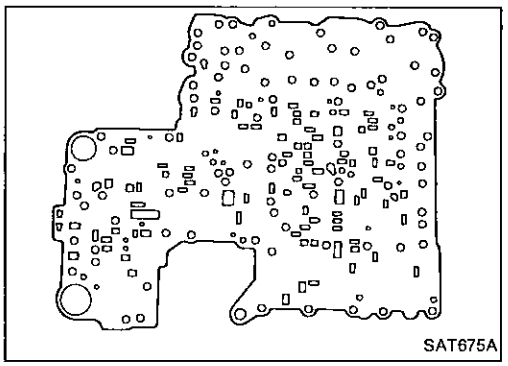

SAT673A

- Check to see that there are pins and retainer plates in upper body.
- **Be careful not to lose these parts.**



SAT674A

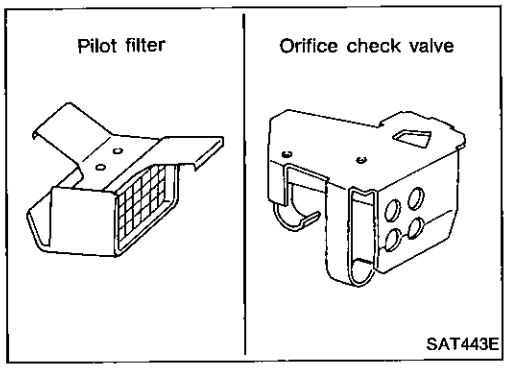
- Check to make sure that oil circuits are clean and free from damage.
- Check tube brackets and tube connectors for damage.


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)

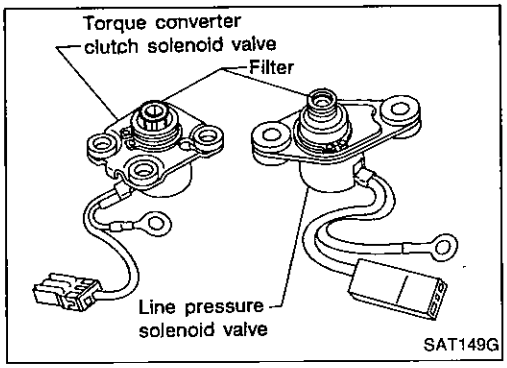


Pilot filter

- Check to make sure that filter is not clogged or damaged.

Orifice check valve

- Check that orifice check valve is not damaged.

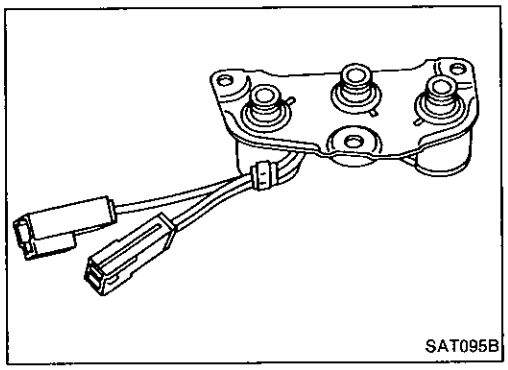


Torque converter clutch solenoid valve

- Check that filter is not clogged or damaged.
- Measure resistance. — Refer to "Electrical Components Inspection".

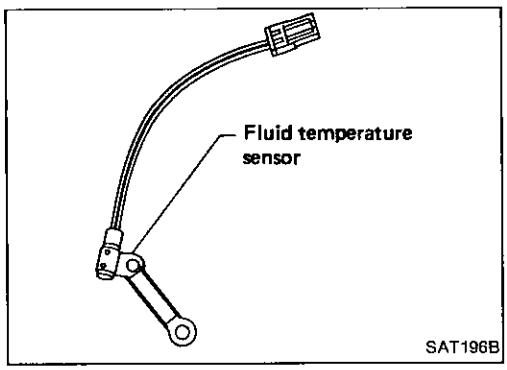
Line pressure solenoid valve

- Check that filter is not clogged or damaged.
- Measure resistance. — Refer to "Electrical Components Inspection".



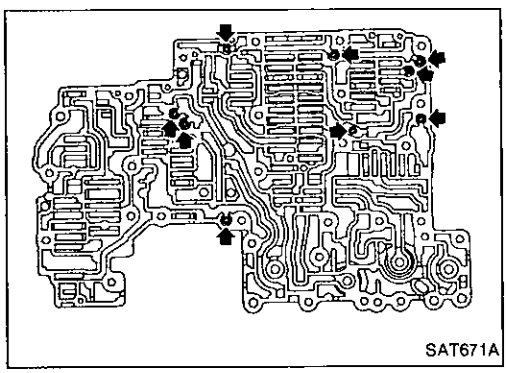
3-unit solenoid assembly (Overrun clutch solenoid valve and shift solenoid valves A and B)

- Measure resistance of each solenoid. — Refer to "Electrical Components Inspection".



Fluid temperature sensor

- Measure resistance. — Refer to "Electrical Components Inspection".

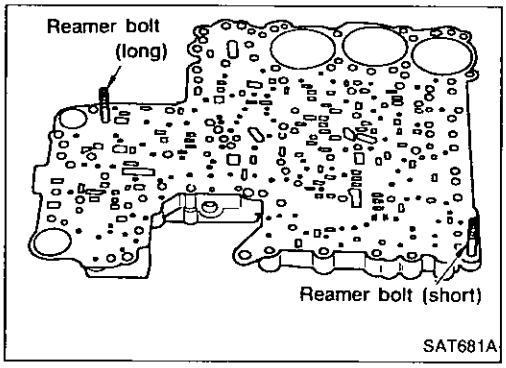


ASSEMBLY

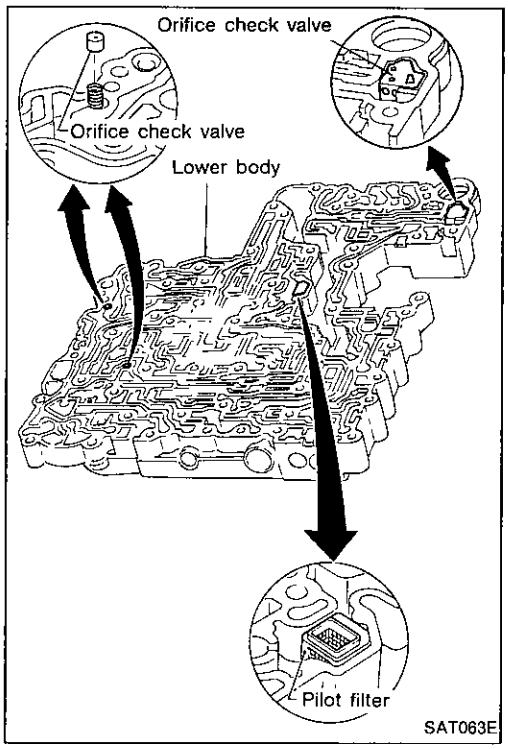
1. Install upper and lower bodies.

a. Place oil circuit of upper body face up. Install steel balls in their proper positions.

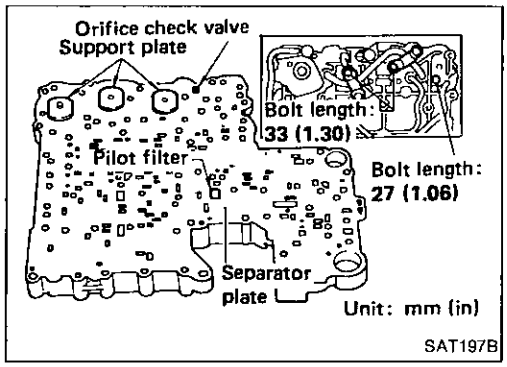
Control Valve Assembly (Cont'd)



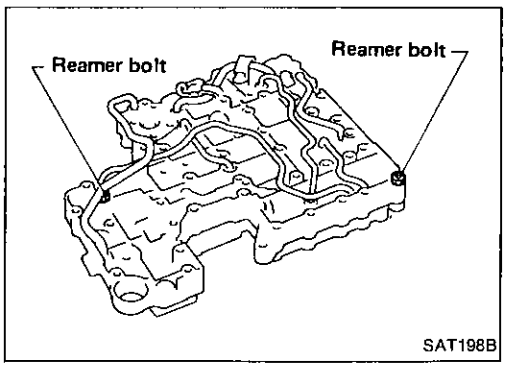
b. Install reamer bolts from bottom of upper body and install separate gaskets.



c. Place oil circuit of lower body face up. Install orifice check springs, orifice check valves and pilot filter.



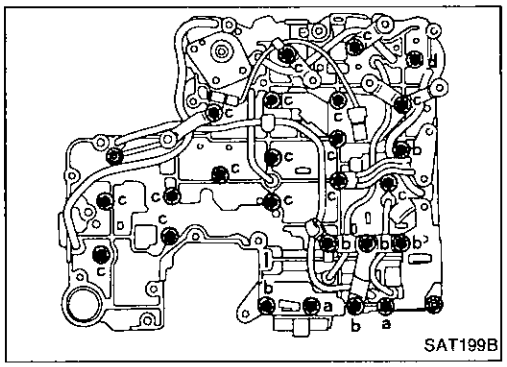
d. Install lower separate gaskets and separator plates on lower body.
e. Install and temporarily tighten support plates, fluid temperature sensor and tube brackets.



f. Temporarily assemble lower and upper bodies, using reamer bolt as a guide.

- **Be careful not to dislocate or drop steel balls, orifice check spring, orifice check valve and pilot filter.**

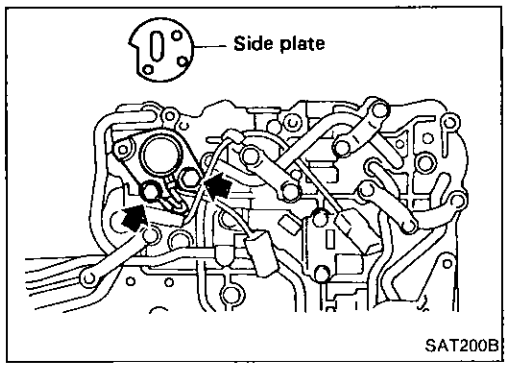
Control Valve Assembly (Cont'd)


SAT199B

g. Install and temporarily tighten bolts and tube brackets in their proper locations.

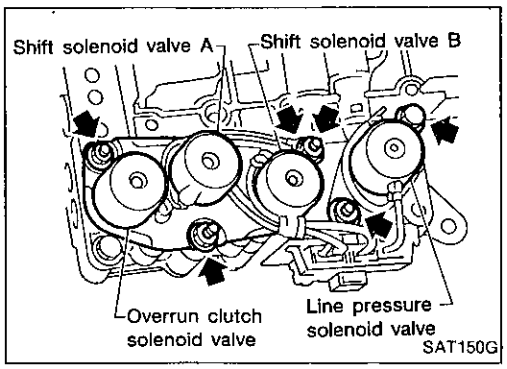
Bolt length and location:

Item		Bolt symbol			
		a	b	c	d
Bolt length	mm (in)	70 (2.76)	50 (1.97)	33 (1.30)	27 (1.06)



SAT200B

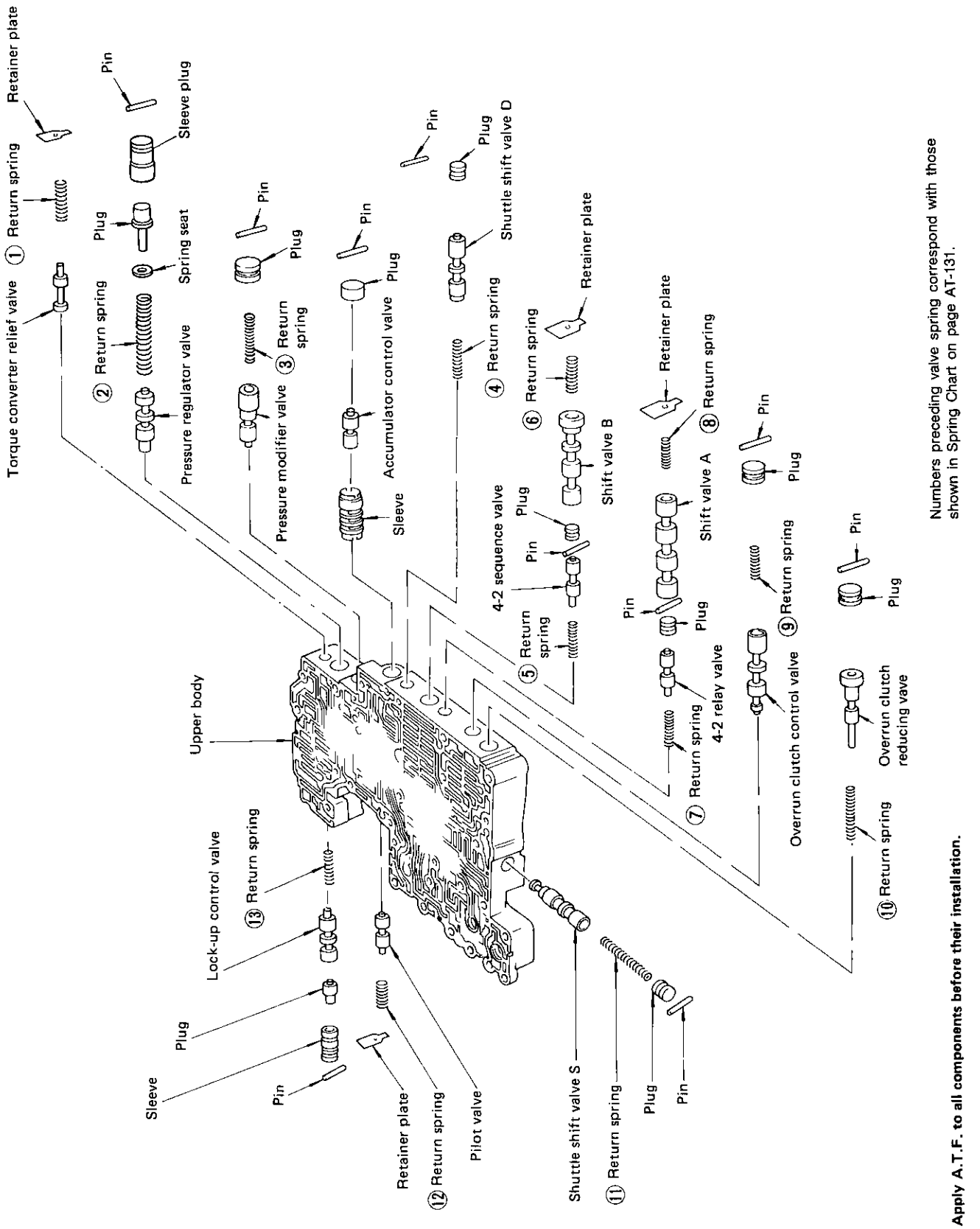
2. Install solenoids.
a. Attach O-ring and install torque converter clutch solenoid valve and side plates onto lower body.



SAT150G

b. Attach O-rings and install 3-unit solenoids assembly onto upper body.
c. Attach O-ring and install line pressure solenoid valve onto upper body.
3. Tighten all bolts.

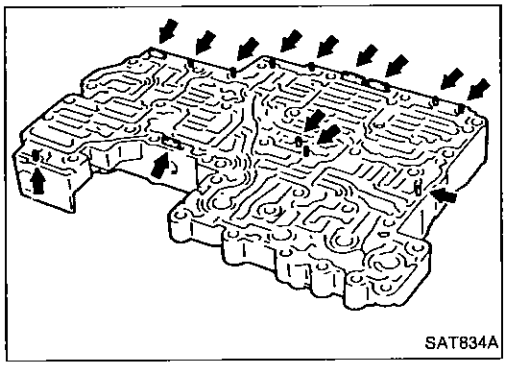
Control Valve Upper Body



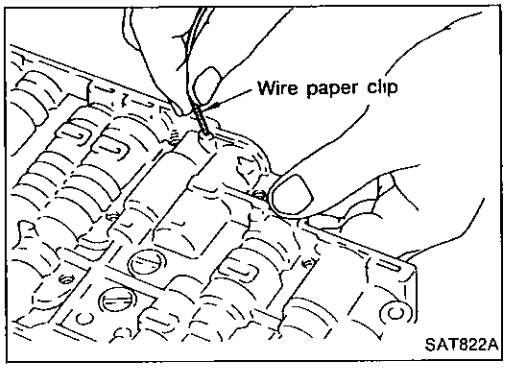
SAT743G

Control Valve Upper Body (Cont'd)

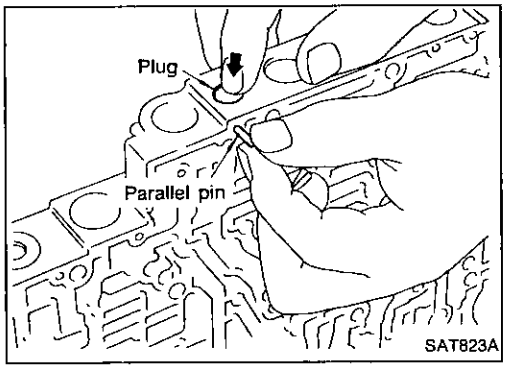
DISASSEMBLY



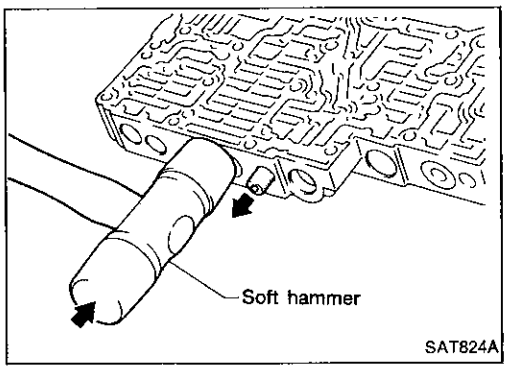
1. Remove valves at parallel pins.
- **Do not use a magnetic hand.**



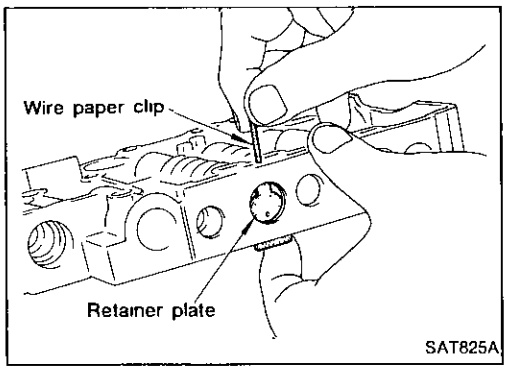
a. Use a wire paper clip to push out parallel pins.



b. Remove parallel pins while pressing their corresponding plugs and sleeves.
- **Remove plug slowly to prevent internal parts from jumping out.**

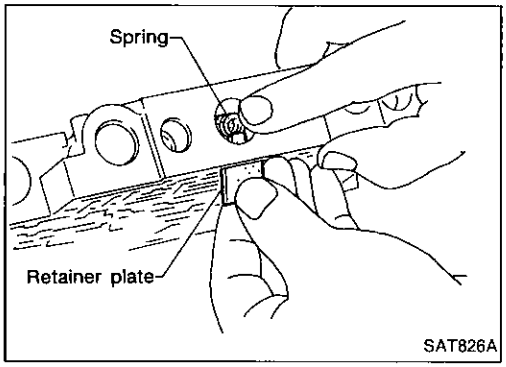


c. Place mating surface of valve facedown, and remove internal parts.
- **If a valve is hard to remove, place valve body facedown and lightly tap it with a soft hammer.**
- **Be careful not to drop or damage valves and sleeves.**

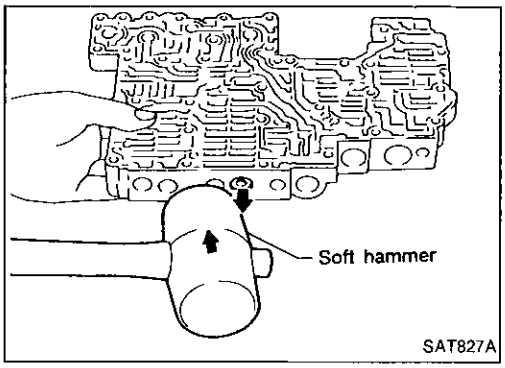


2. Remove valves at retainer plates.
a. Pry out retainer plate with wire paper clip.

Control Valve Upper Body (Cont'd)

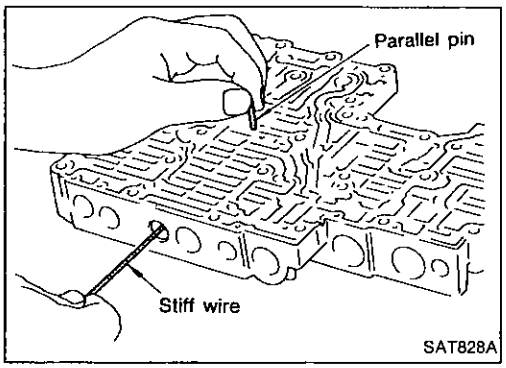


b. Remove retainer plates while holding spring.



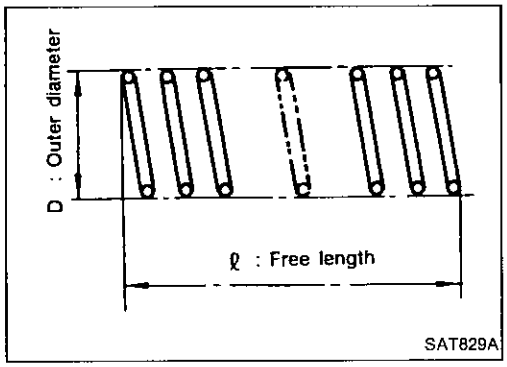
c. Place mating surface of valve facedown, and remove internal parts.

- **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.**

Control Valve Upper Body (Cont'd)



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-128.

Inspection standard

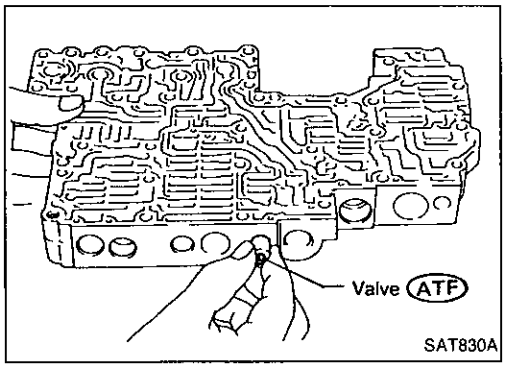
Unit: mm (in)

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	31742-41X14	38.9 (1.531)	7.0 (0.276)
⑪	Shuttle shift valve S spring	31762-41X04	51.0 (2.008)	5.65 (0.2224)
⑫	Pilot valve spring	31742-41X13	25.7 (1.012)	9.1 (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.

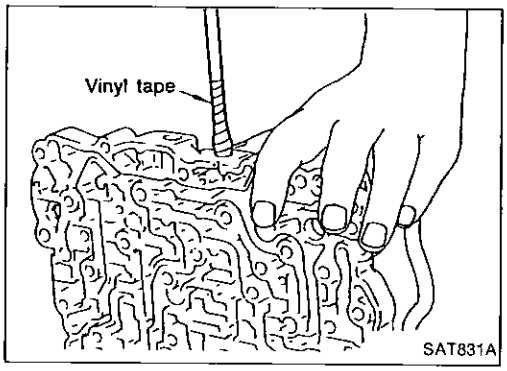


ASSEMBLY

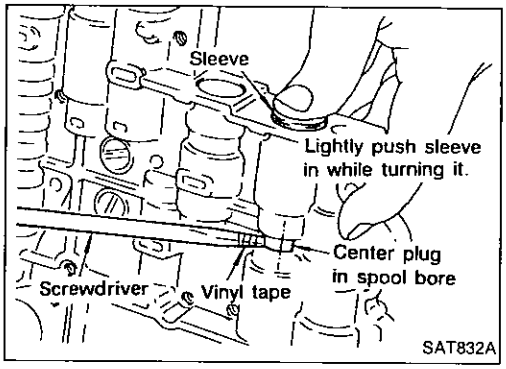
1. Lubricate the control valve body and all valves with A.T.F. Install control valves by sliding them carefully into their bores.

- **Be careful not to scratch or damage valve body.**

Control Valve Upper Body (Cont'd)

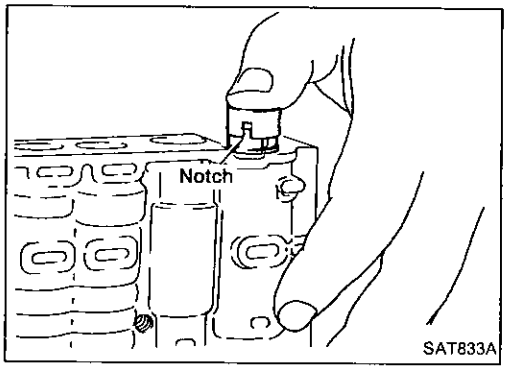


- Wrap a small screwdriver with vinyl tape and use it to insert the valves into proper position.



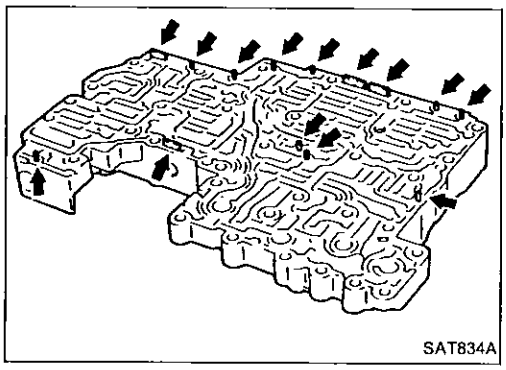
Pressure regulator valve

- If pressure regulator plug is not centered properly, sleeve cannot be inserted into bore in upper body.
  If this happens, use vinyl tape wrapped screwdriver to center sleeve until it can be inserted.
- Turn sleeve slightly while installing.

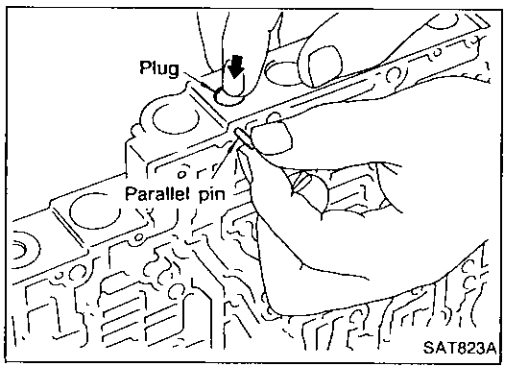


Accumulator control plug

- Align protrusion of accumulator control sleeve with notch in plug.
- Align parallel pin groove in plug with parallel pin, and install accumulator control valve.

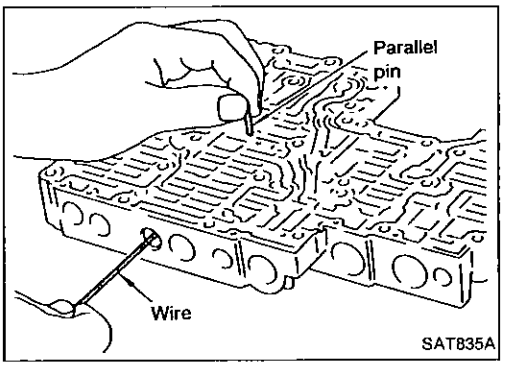


2. Install parallel pins and retainer plates.



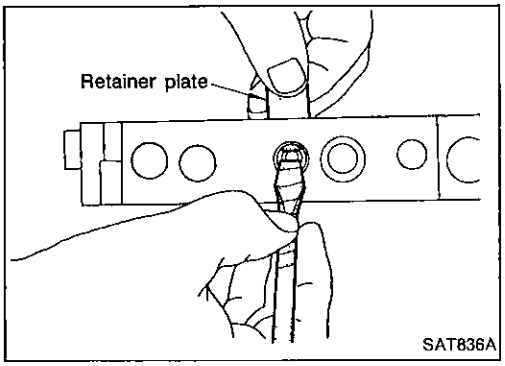
- **While pushing plug, install parallel pin.**

Control Valve Upper Body (Cont'd)



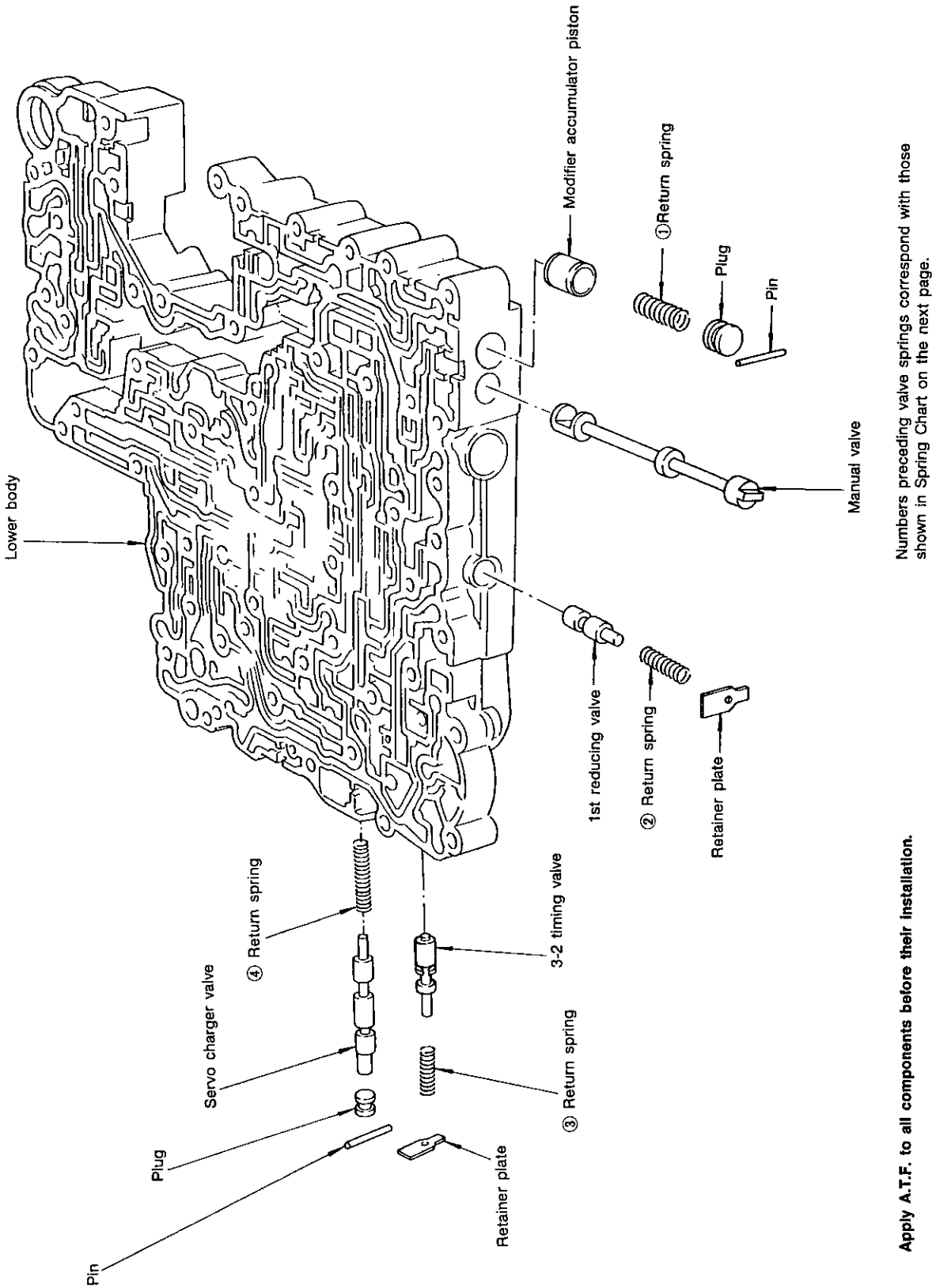
4-2 sequence valve and relay valve

- 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

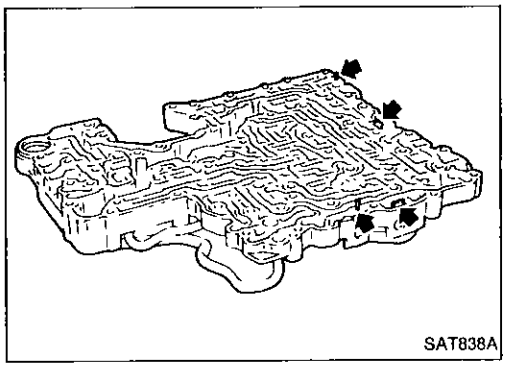


Numbers preceding valve springs correspond with those shown in Spring Chart on the next page.

Apply A.T.F. to all components before their installation.

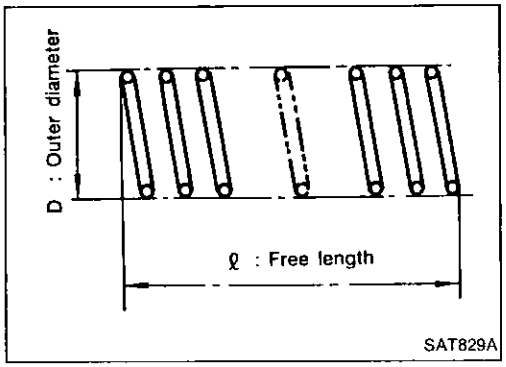
SAT064E

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-134.

Inspection standard:

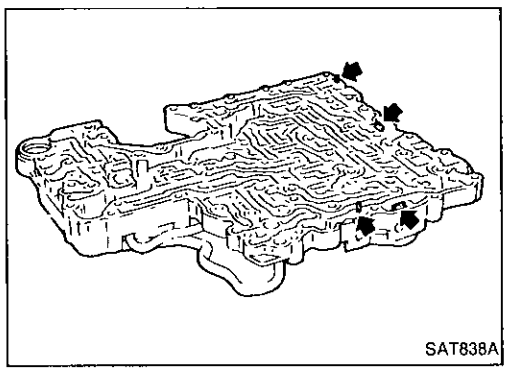
Unit: mm (in)

Parts		Item		
		Part No.	ℓ	D
①	Modifier accumulator piston spring	31742-27X70	31.4 (1.236)	7.0 (0.276)
②	1st reducing valve spring	31756-60X00	29.5 (1.161)	7.0 (0.276)
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

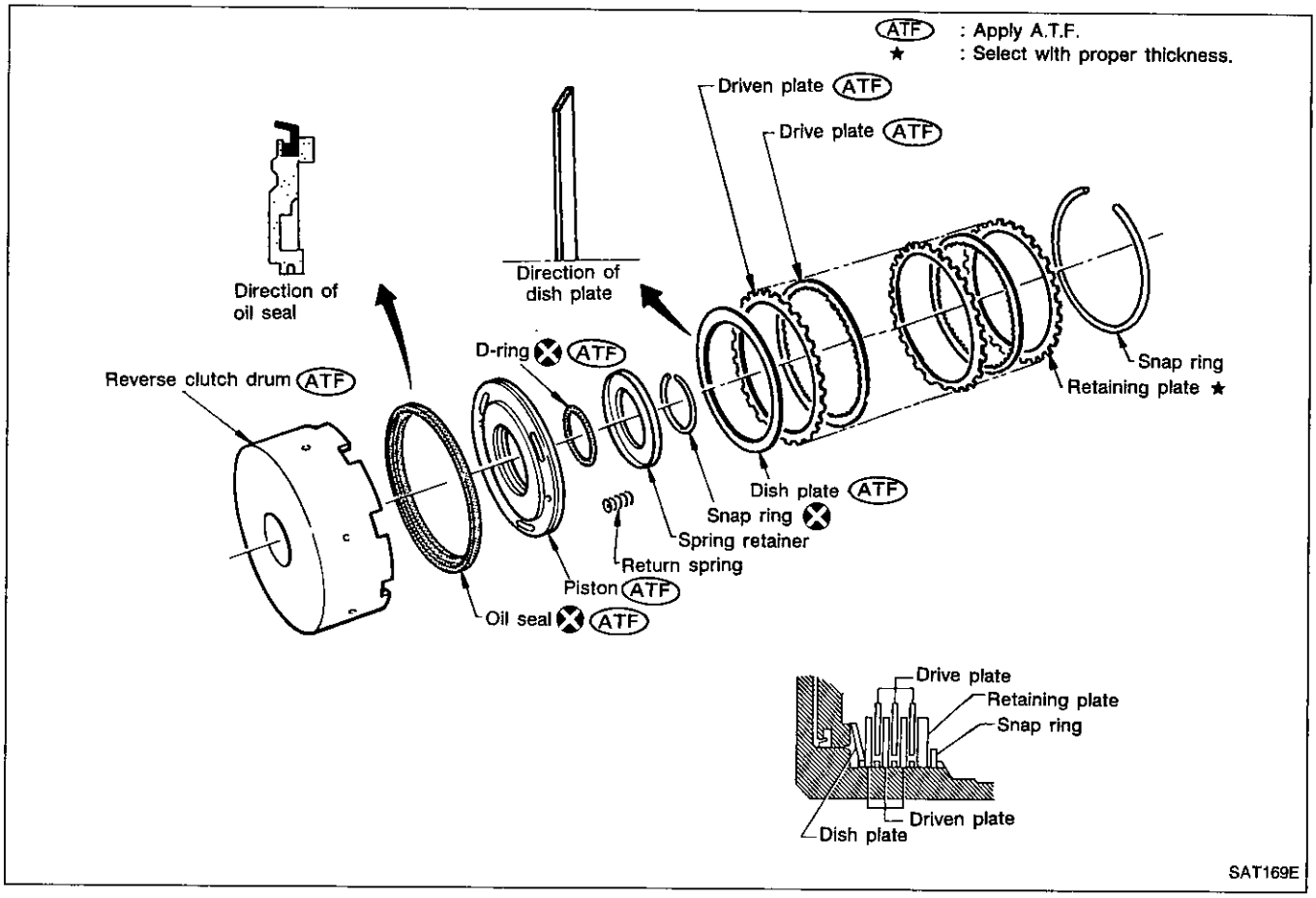
- Check sliding surfaces of control valves, sleeves and plugs for damage.

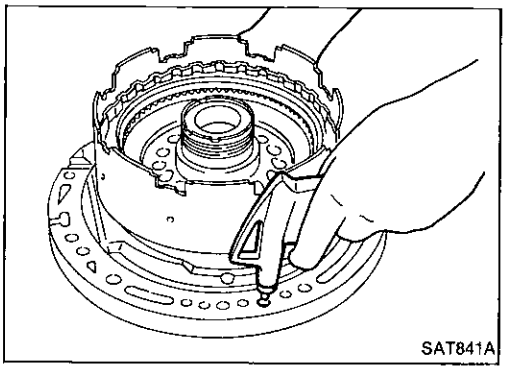

SAT838A

ASSEMBLY

- Install control valves.
  For installation procedures, refer to "ASSEMBLY" of Control Valve Upper Body.

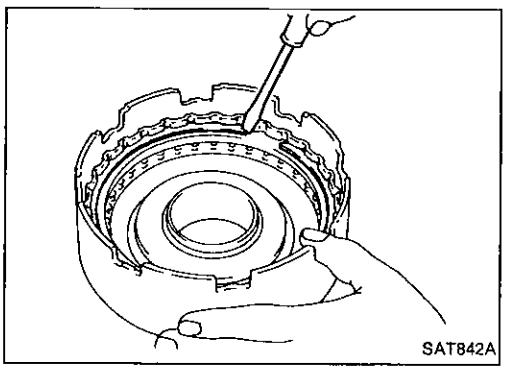
Reverse Clutch





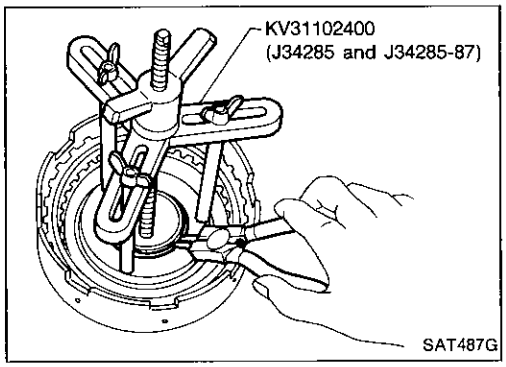
DISASSEMBLY

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.

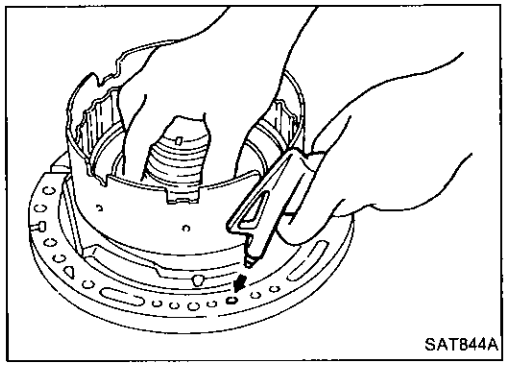


2. Remove drive plates, driven plates, retaining plate, dish plate and snap ring.

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.

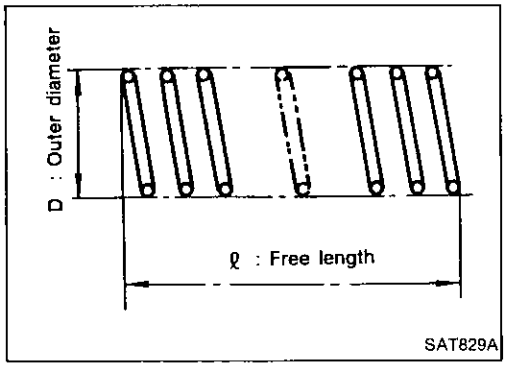


5. Install seal ring onto oil pump cover and install reverse clutch drum. While holding piston, gradually apply compressed air to oil hole until piston is removed.
- **Do not apply compressed air abruptly.**
6. Remove D-ring and oil seal from piston.

INSPECTION

Reverse clutch snap ring and spring retainer

- Check for deformation, fatigue or damage.



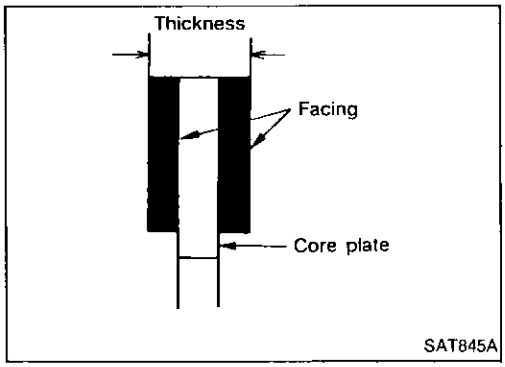
Reverse clutch return springs

- Check for deformation or damage. Also measure free length and outside diameter.

Inspection standard:

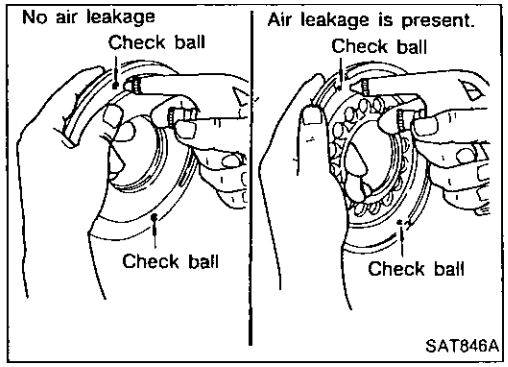
Unit: mm (in)

Parts	Part No.	ℓ	D
Spring	31505-51X00	37.8 (1.488)	14.8 (0.583)



Reverse clutch drive plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Standard value: 1.90 - 2.05 mm (0.0748 - 0.0807 in)
  Wear limit: 1.8 mm (0.071 in)
- If not within wear limit, replace.



Reverse clutch dish plate

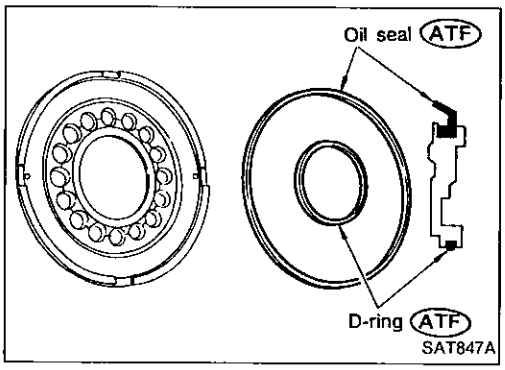
- Check for deformation or damage.

Reverse clutch piston

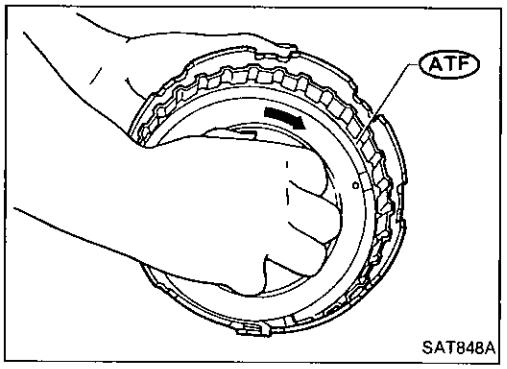
- Shake piston to assure that balls are not seized.
- Apply compressed air to check ball oil hole opposite the return spring to assure that there is no air leakage.
- Also apply compressed air to oil hole on return spring side to assure that air leaks past ball.

Reverse Clutch (Cont'd)

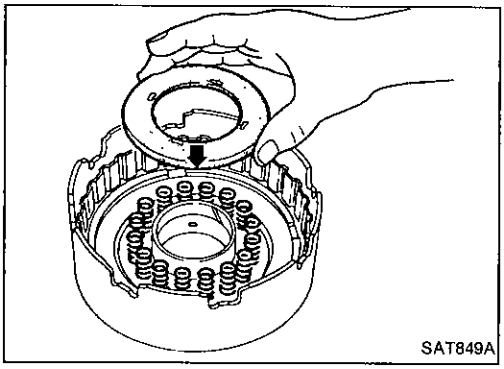
ASSEMBLY



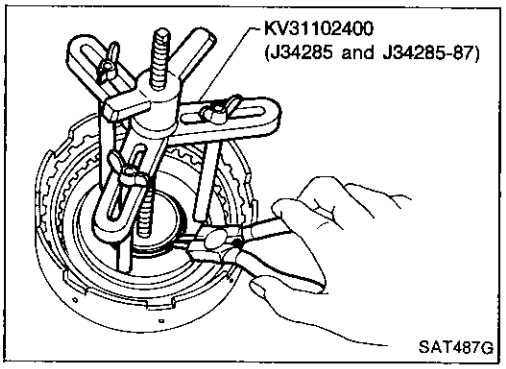
1. Install D-ring and oil seal on piston.
- **Apply A.T.F. to both parts.**



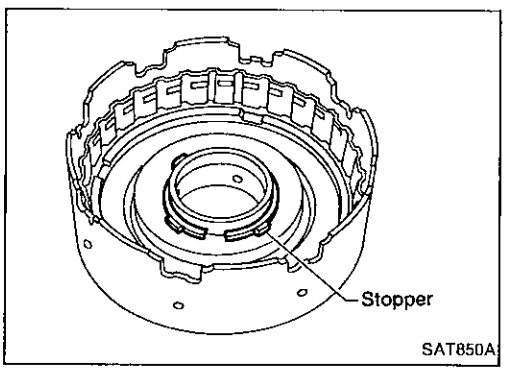
2. Install piston assembly by turning it slowly and evenly.
- **Apply A.T.F. to inner surface of drum.**



3. Install return springs and spring retainer.

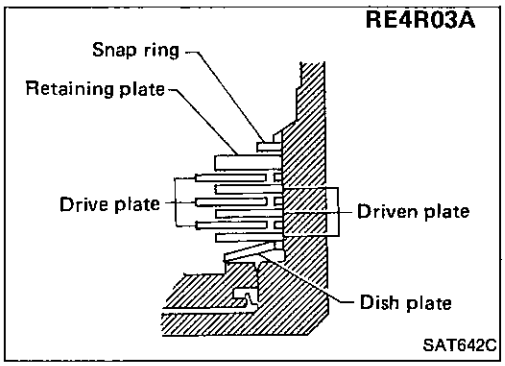


4. Install snap ring while compressing clutch springs.

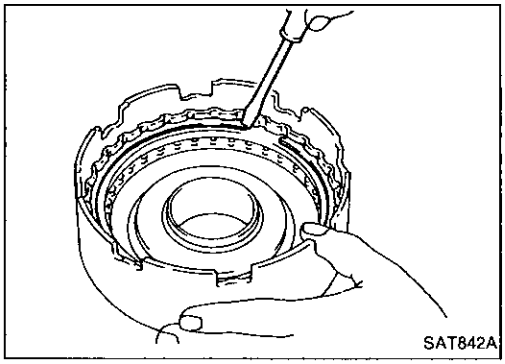


- **Do not align snap ring gap with spring retainer stopper.**

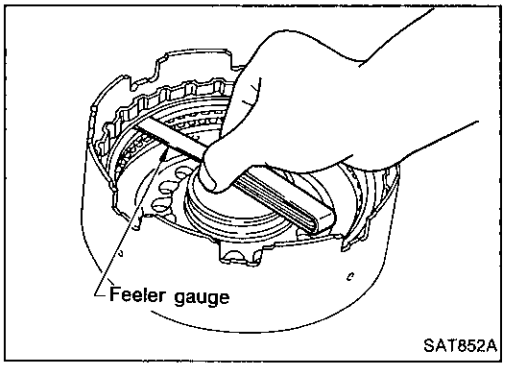
Reverse Clutch (Cont'd)



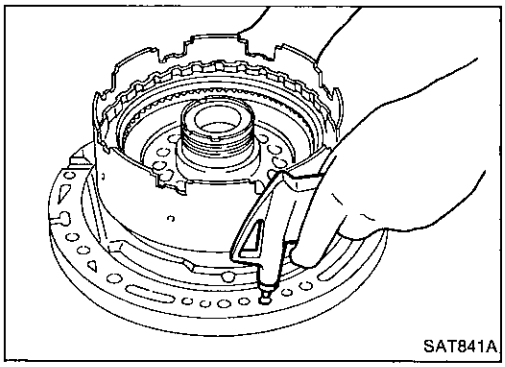
5. Install drive plates, driven plates, retaining plate and dish plate.



6. Install snap ring.

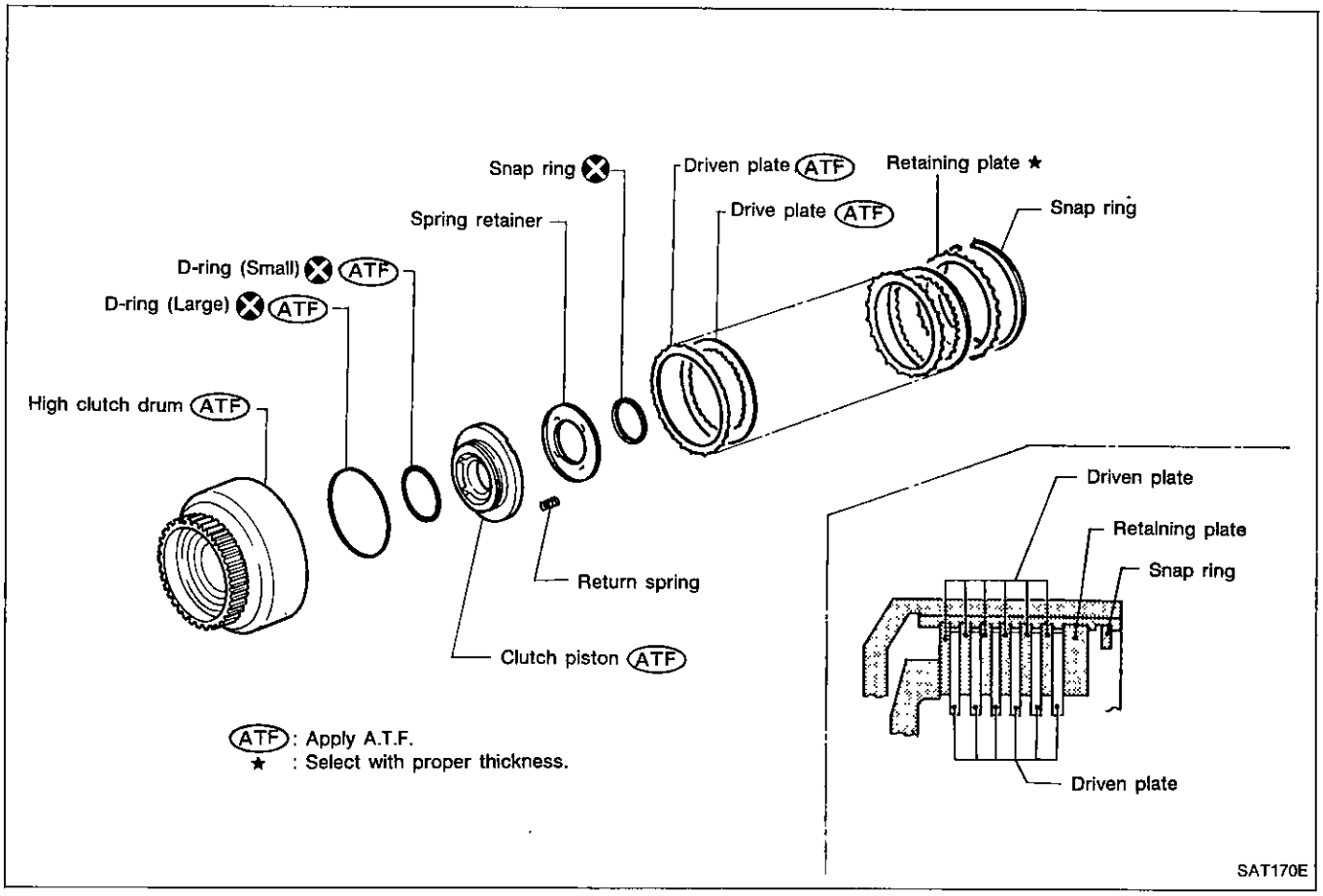


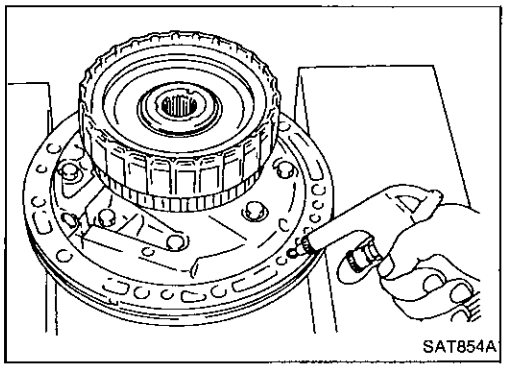
7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.
   Specified clearance:
   Standard
   0.6 - 0.9 mm (0.024 - 0.035 in)
   Allowable limit
   1.4 mm (0.055 in)
   Retaining plate:
   Refer to S.D.S.



8. Check operation of reverse clutch.
   Refer to "DISASSEMBLY" of Reverse Clutch.

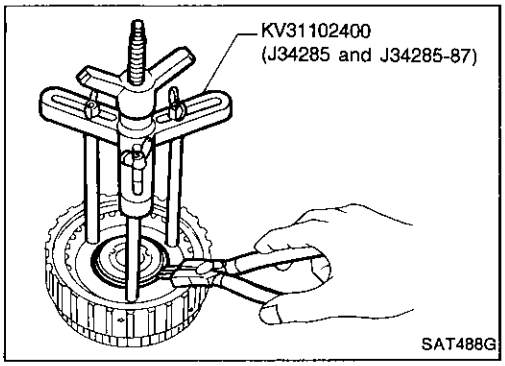
High Clutch





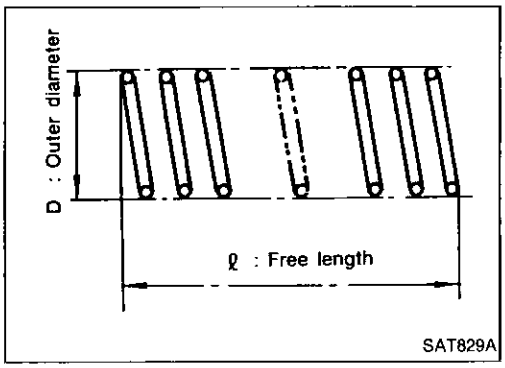
Service procedures for high clutch are essentially the same as those for reverse clutch, with the following exception:

- Check of high clutch operation



- Removal and installation of return spring

High Clutch (Cont'd)

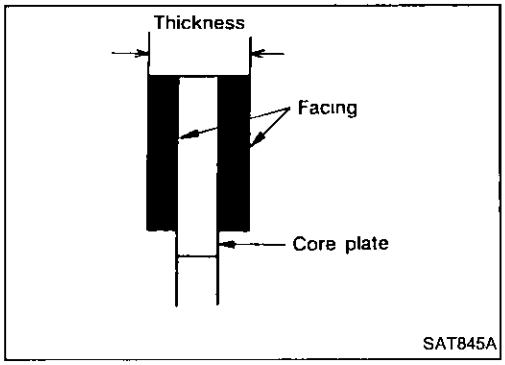


- Inspection of high clutch return springs

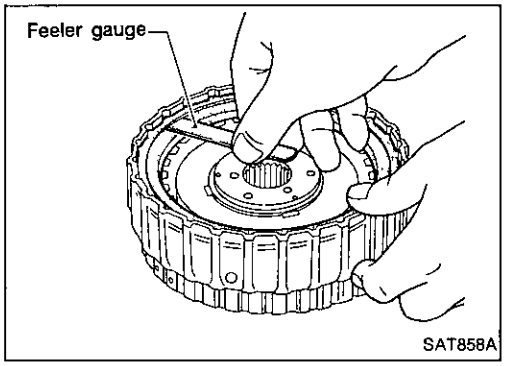
Inspection standard:

Unit: mm (in)

Part No.	ℓ	D
31505-21X03	22.06 (0.8685)	11.6 (0.457)



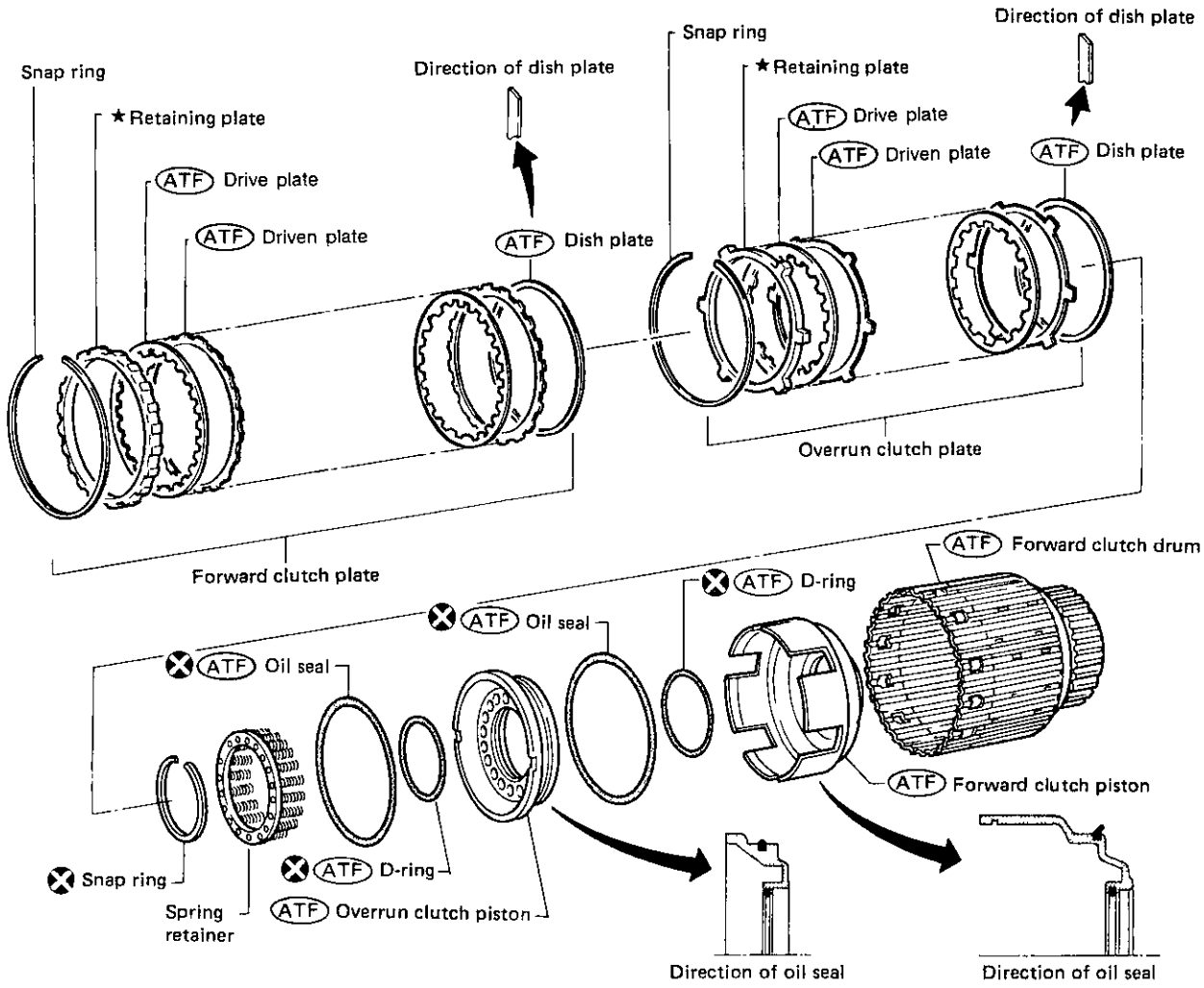
- Inspection of high clutch drive plate
  - **Thickness of drive plate:**
    - **Standard**
      - **1.52 - 1.67 mm (0.0598 - 0.0657 in)**
    - **Wear limit**
      - **1.4 mm (0.055 in)**

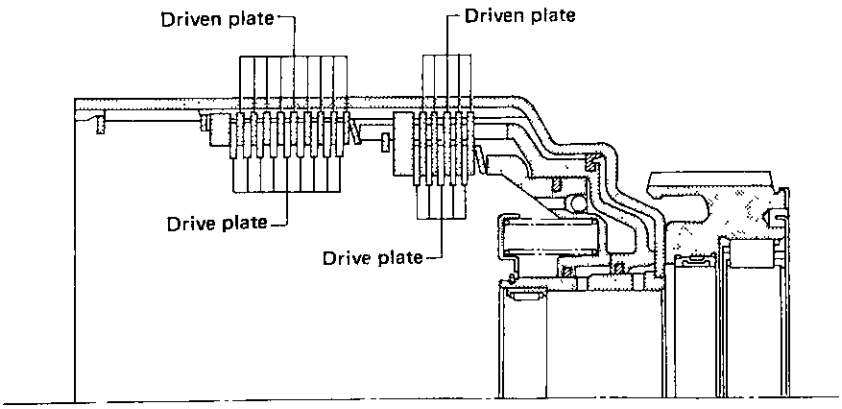


- Measurement of clearance between retaining plate and snap ring
  - **Specified clearance:**
    - **Standard**
      - **1.8 - 2.2 mm (0.071 - 0.087 in)**
    - **Allowable limit**
      - **3.4 mm (0.134 in)**
  - **Retaining plate:**
    - **Refer to S.D.S.**

Forward and Overrun Clutches

For the number of clutch sheets (drive plate and driven plate), refer to the below cross-section.

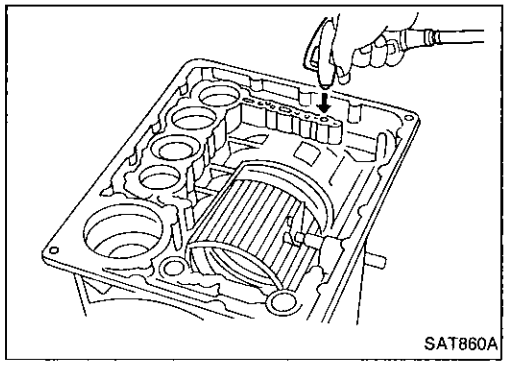




ATF : Apply A.T.F.
★ : Select with proper thickness.

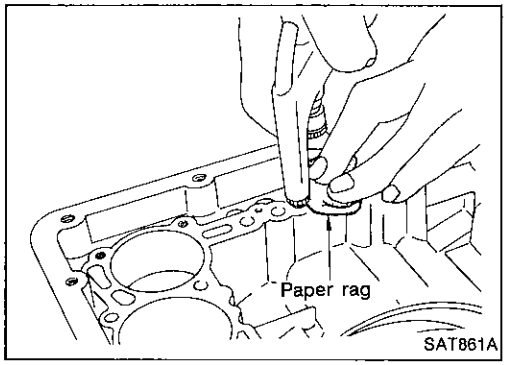
SAT171E

Forward and Overrun Clutches (Cont'd)


SAT860A

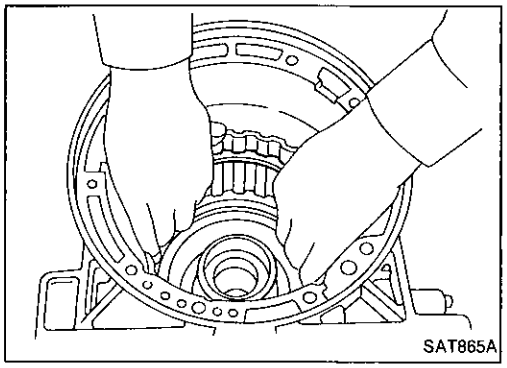
Service procedures for forward and overrun clutches are essentially the same as those for reverse clutch, with the following exception:

- Check of forward clutch operation.



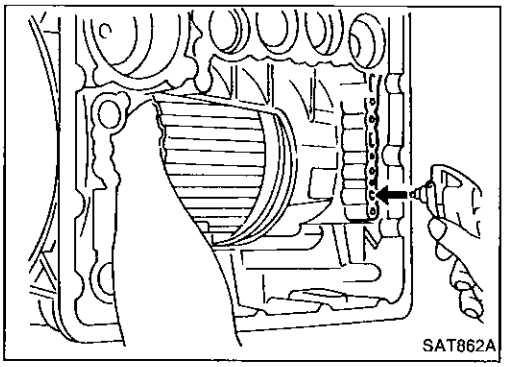
SAT861A

- Check of overrun clutch operation.


SAT865A

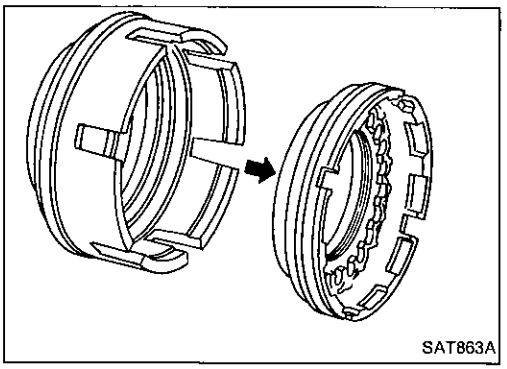
- Removal of forward clutch drum

Remove forward clutch drum from transmission case by holding snap ring.


SAT862A

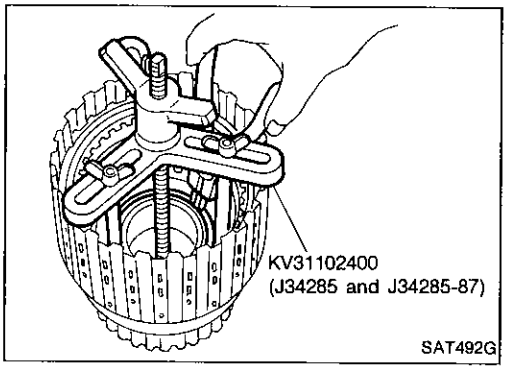
- Removal of forward clutch and overrun clutch pistons

1. While holding overrun clutch piston, gradually apply compressed air to oil hole.

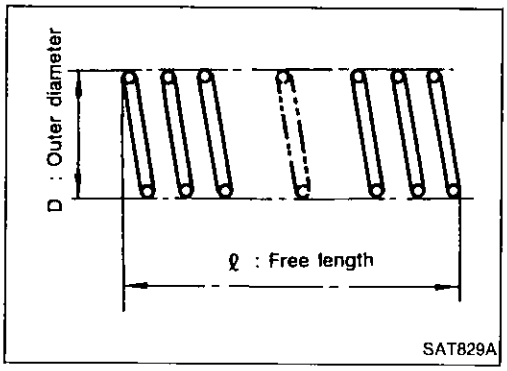

SAT863A

2. Remove overrun clutch from forward clutch.

Forward and Overrun Clutches (Cont'd)



- Removal and installation of return springs

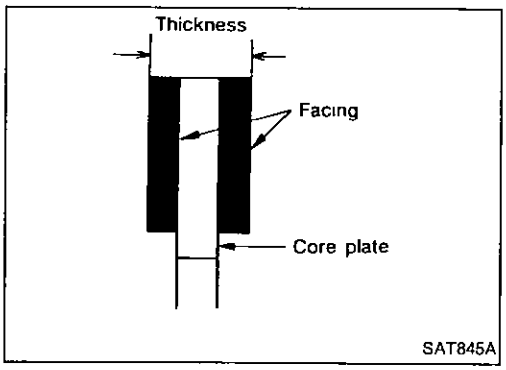


- Inspection of forward clutch and overrun clutch return springs

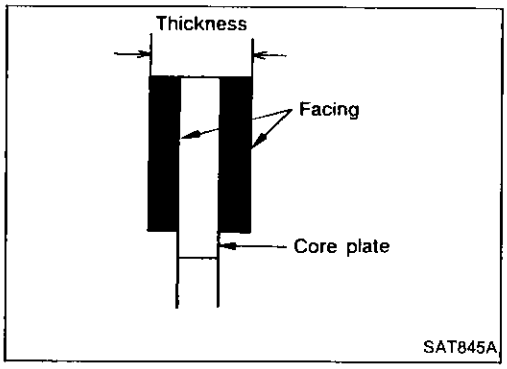
Inspection standard:

Unit: mm (in)

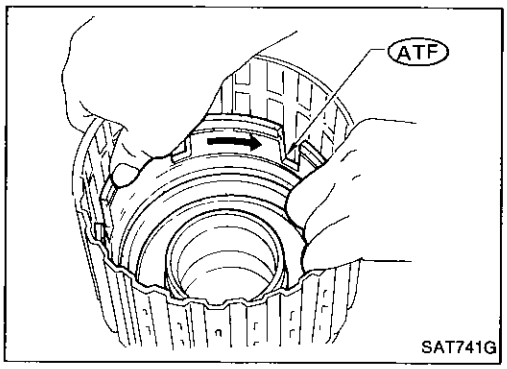
Part No.	ℓ	D
31505-51X04	36.8 (1.449)	9.8 (0.386)



- Inspection of forward clutch drive plates
  Thickness of drive plate:
  Standard
  1.90 - 2.05 mm (0.0748 - 0.0807 in)
  Wear limit
  1.8 mm (0.071 in)



- Inspection of overrun clutch drive plates
  Thickness of drive plate:
  Standard
  1.52 - 1.67 mm (0.0598 - 0.0657 in)
  Wear limit
  1.4 mm (0.055 in)

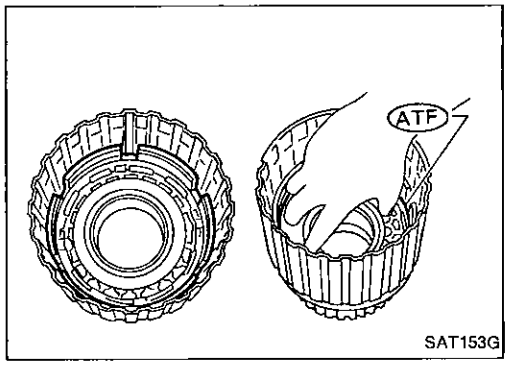


- Installation of forward clutch piston and overrun clutch piston

1. Install forward clutch piston by turning it slowly and evenly.

- **Apply A.T.F. to inner surface of clutch drum.**

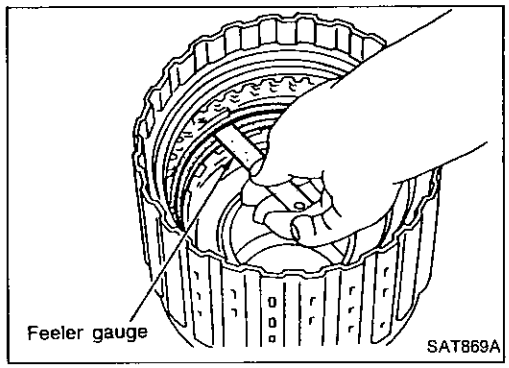
Forward and Overrun Clutches (Cont'd)



- **Align notch in forward clutch piston with groove in forward clutch drum.**

2. Install overrun clutch by turning it slowly and evenly.

- **Apply A.T.F. to inner surface of forward clutch piston.**



- Measurement of clearance between retaining plate and snap ring of overrun clutch

Specified clearance:

Standard

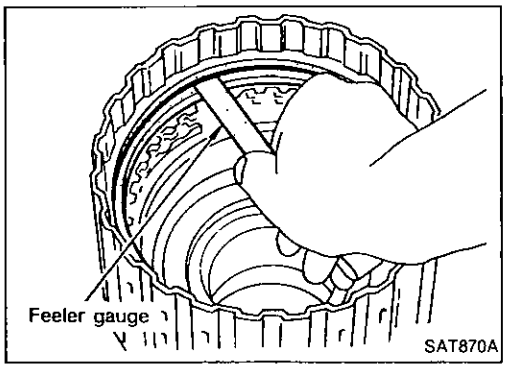
1.0 - 1.4 mm (0.039 - 0.055 in)

Allowable limit

2.4 mm (0.094 in)

Retaining plate:

Refer to S.D.S.



- 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)

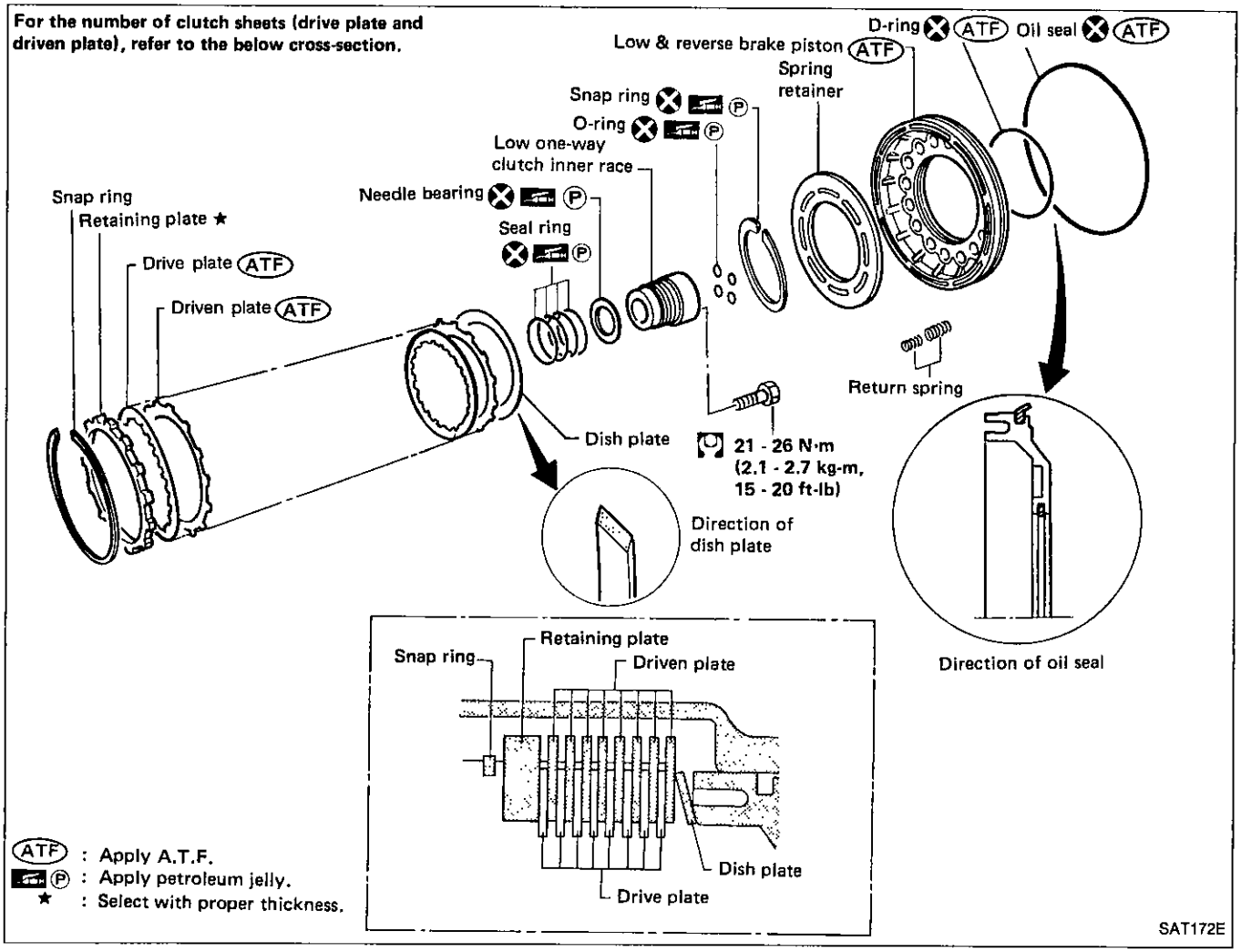
Allowable limit

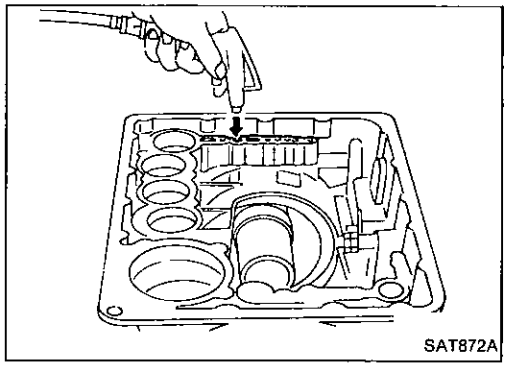
2.2 mm (0.087 in)

Retaining plate:

Refer to S.D.S.

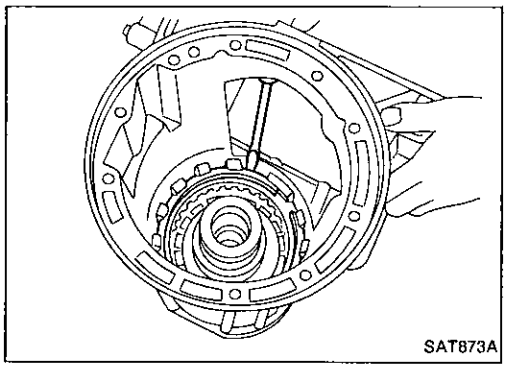
Low & Reverse Brake





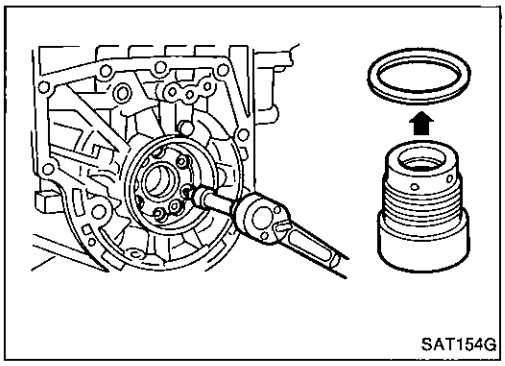
DISASSEMBLY

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.

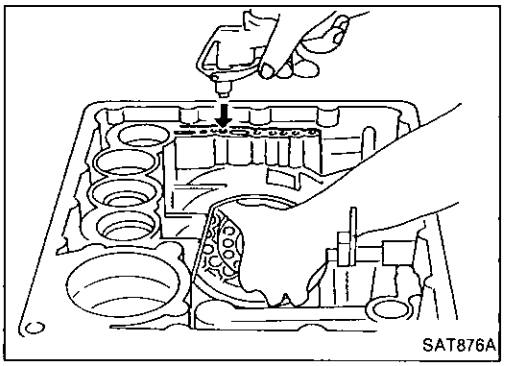


2. Remove snap ring, low and reverse brake drive plates, driven plates and dish plate.

Low & Reverse Brake (Cont'd)


SAT154G

3. Remove low one-way clutch inner race, spring retainer and return spring from transmission case.
4. Remove seal rings from low one-way clutch inner race.
5. Remove needle bearing from low one-way clutch inner race.

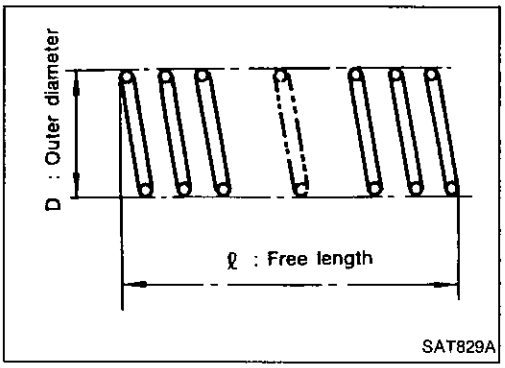

SAT876A

6. Remove low and reverse brake piston using compressed air.
7. Remove oil seal and D-ring from piston.

INSPECTION

Low and reverse brake snap ring and spring retainer

- Check for deformation, or damage.



SAT829A

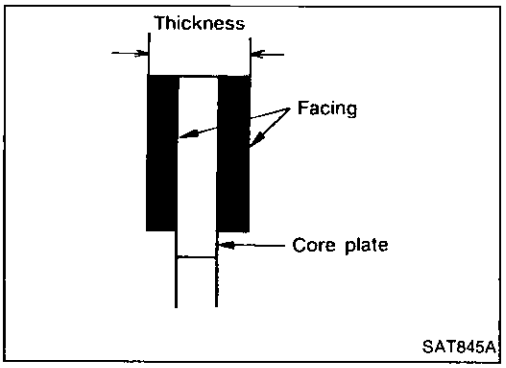
Low and reverse brake return springs

- Check for deformation or damage. Also measure free length and outside diameter.

Inspection standard:

Unit: mm (in)

Part No.		ℓ	D
Inner spring	31505-51X06	20.43 (0.8043)	10.3 (0.406)
Outer spring	31505-51X05	20.35 (0.8012)	13.0 (0.512)

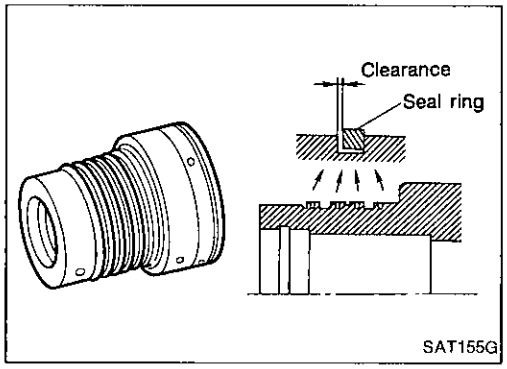


SAT845A

Low and reverse brake drive plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Standard value
  1.52 - 1.67 mm (0.0598 - 0.0657 in)
  Wear limit
  1.4 mm (0.055 in)
- If not within wear limit, replace.

Low & Reverse Brake (Cont'd)



Low one-way clutch inner race

- Check frictional surface of inner race for wear or damage.
- Install 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.

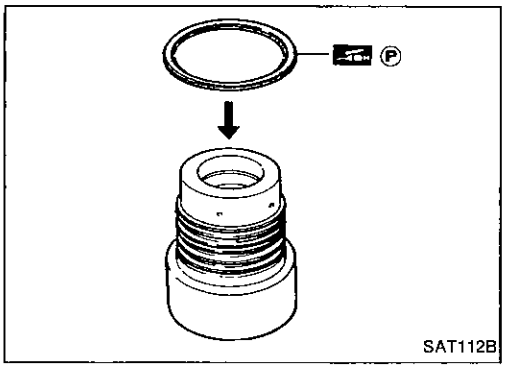
  Inspection standard:

  Standard value

  0.10 - 0.25 mm (0.0039 - 0.0098 in)

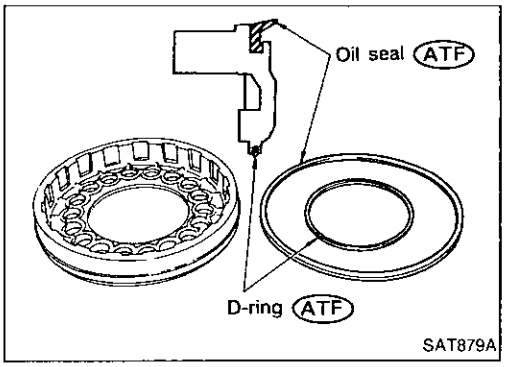
  Allowable limit

  0.25 mm (0.0098 in)
- If not within allowable limit, replace low one-way clutch inner race.

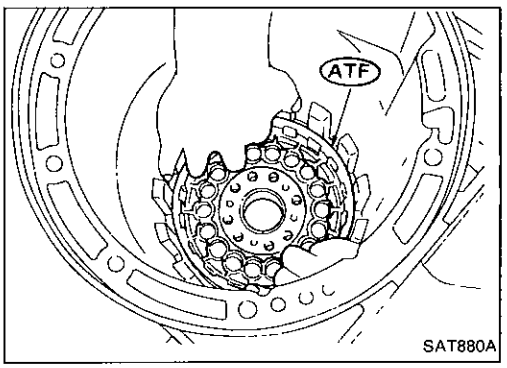


ASSEMBLY

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.**

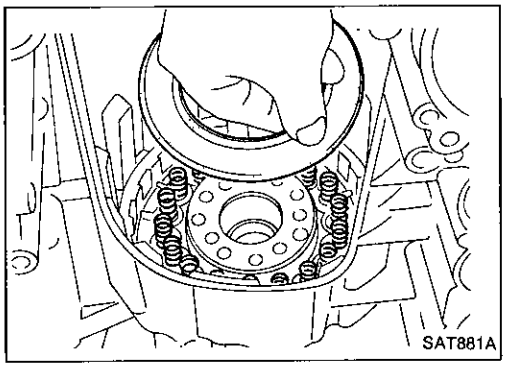


2. Install oil seal and D-ring onto piston.
- **Apply A.T.F. to oil seal and D-ring.**

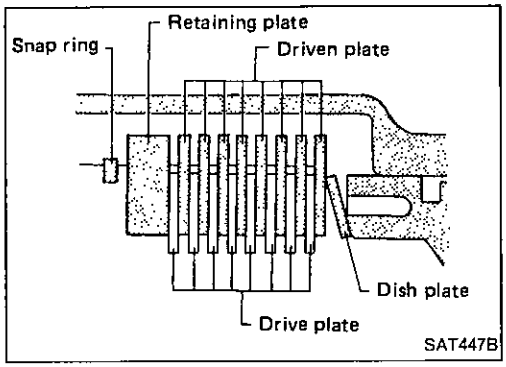


3. Install piston by rotating it slowly and evenly.
- **Apply A.T.F. to inner surface of transmission case.**

Low & Reverse Brake (Cont'd)

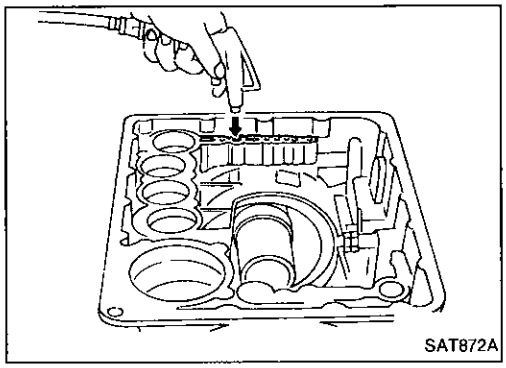

SAT881A

4. Install return springs, spring retainer and low one-way clutch inner race onto transmission case.

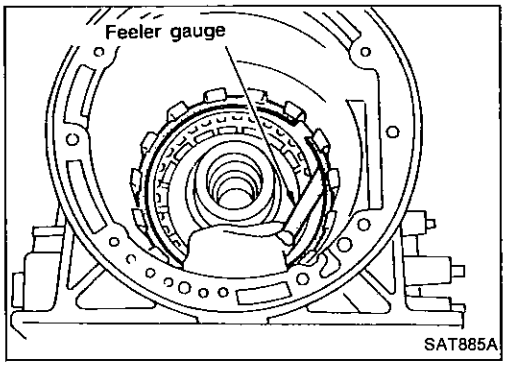


SAT447B

5. Install dish plate, low and reverse brake drive plates, driven plates and retaining plate.
6. Install snap ring on transmission case.

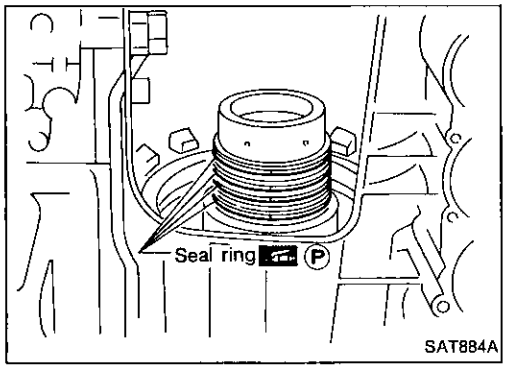

SAT872A

7. Check operation of low and reverse brake clutch piston. Refer to "DISASSEMBLY".



SAT885A

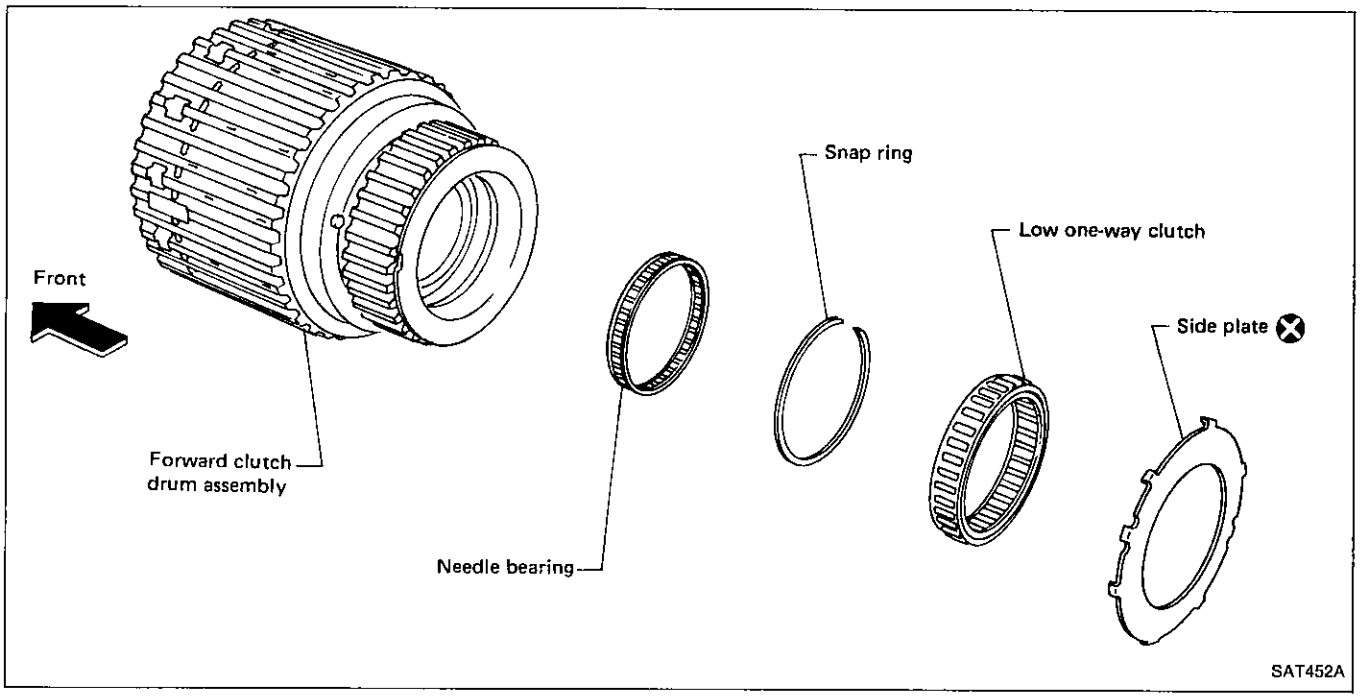
8. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.
   Specified clearance:
   Standard
   0.5 - 0.8 mm (0.020 - 0.031 in)
   Allowable limit
   2.4 mm (0.094 in)
   Retaining plate:
   Refer to S.D.S.

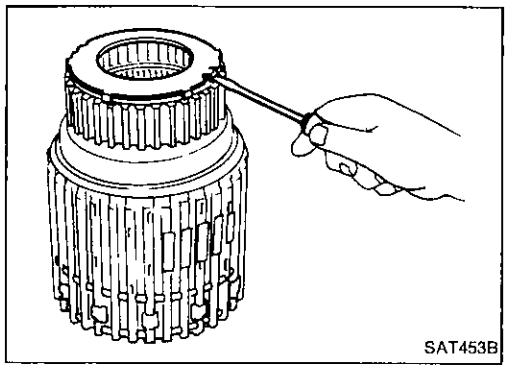


SAT884A

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.**

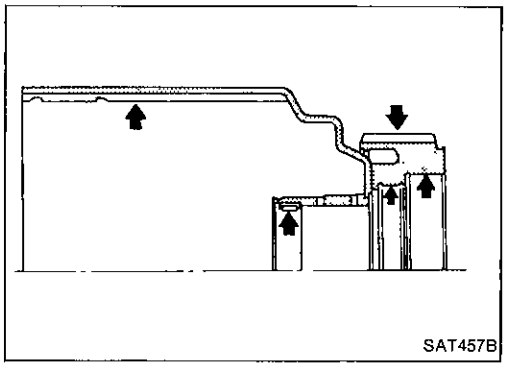
Forward Clutch Drum Assembly





DISASSEMBLY

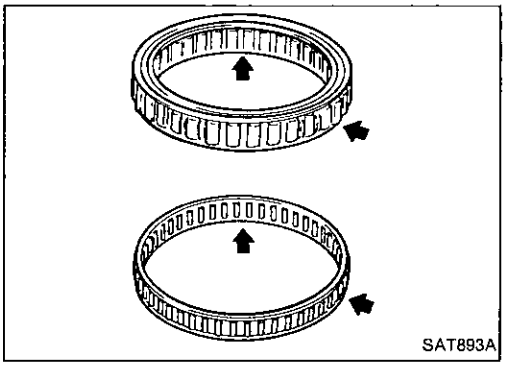
1. Remove side plate from forward clutch drum.
2. Remove low one-way clutch from forward clutch drum.
3. Remove snap ring from forward clutch drum.
4. Remove needle bearing from forward clutch drum.



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.

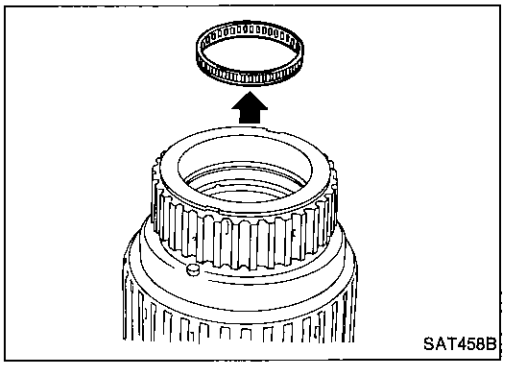


Needle bearing and low one-way clutch

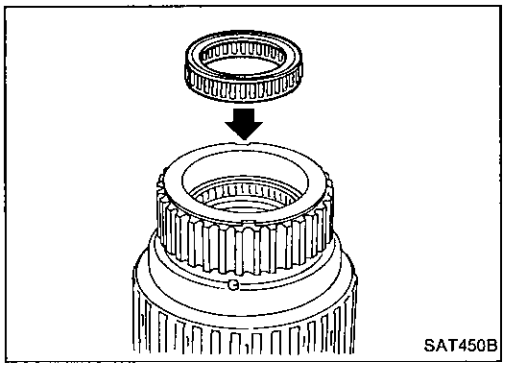
- Check frictional surface for wear or damage.

Forward Clutch Drum Assembly (Cont'd)

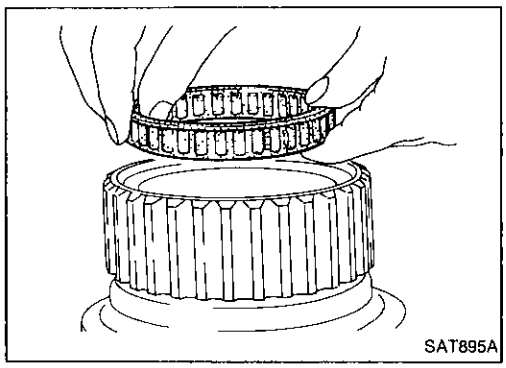
ASSEMBLY


SAT458B

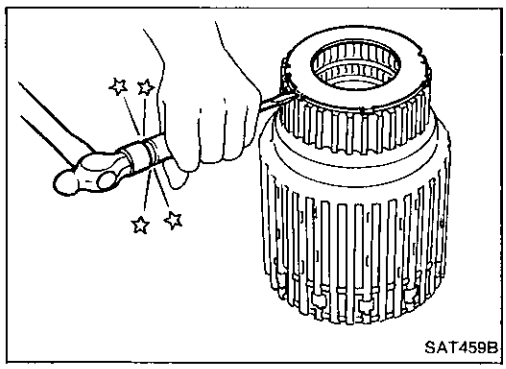
1. Install needle bearing in forward clutch drum.
2. Install snap ring onto forward clutch drum.


SAT450B

3. Install low one-way clutch onto forward clutch drum by pushing the roller in evenly.

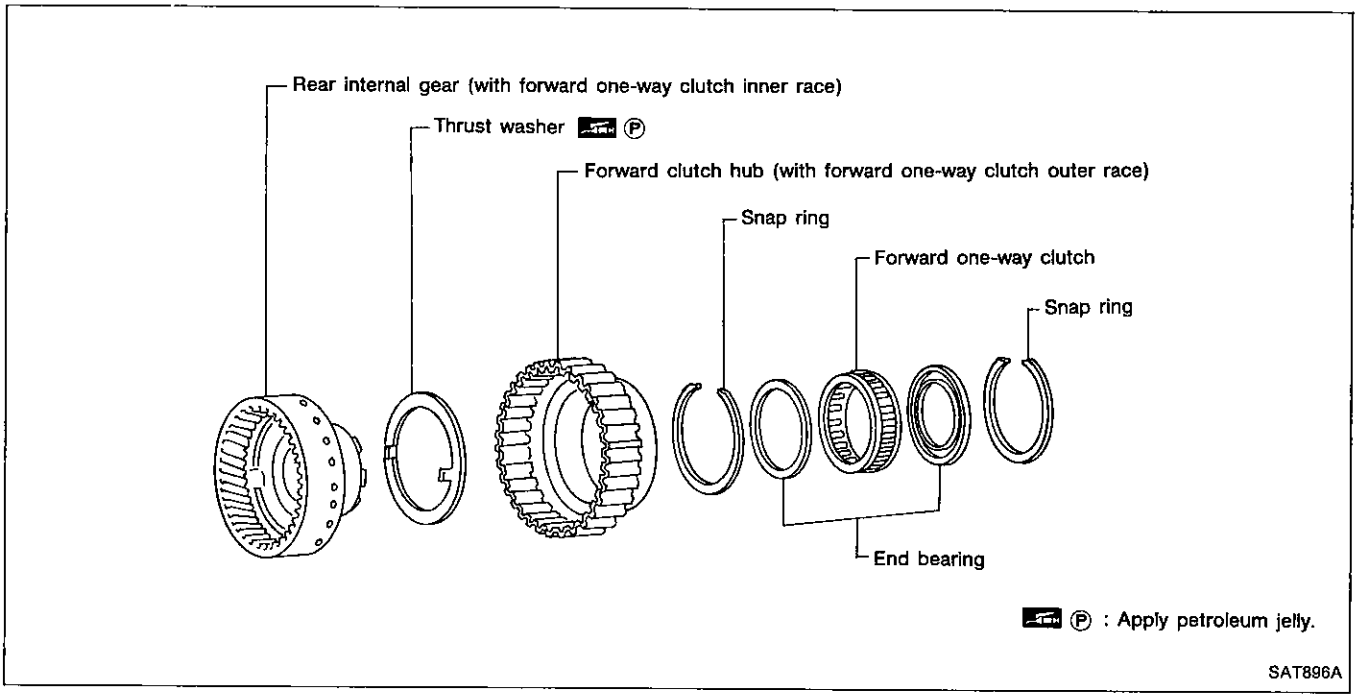

SAT895A

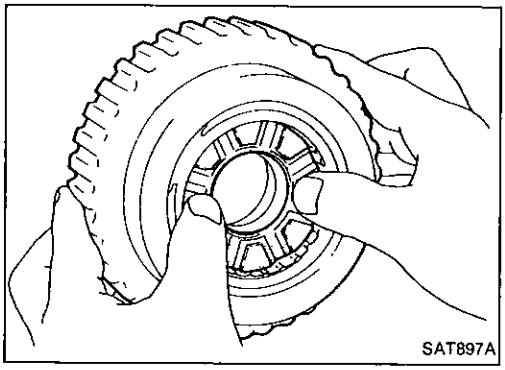
- **Install low one-way clutch with flange facing rearward.**


SAT459B

4. Install side plate onto forward clutch drum.

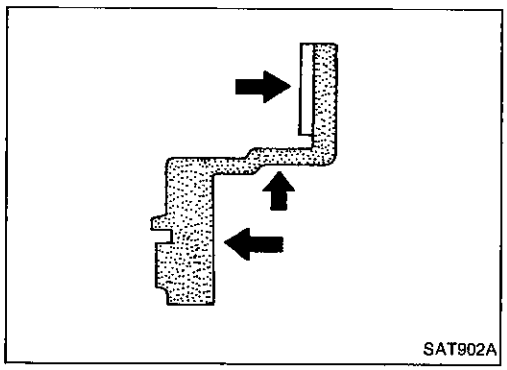
Rear Internal Gear and Forward Clutch Hub





DISASSEMBLY

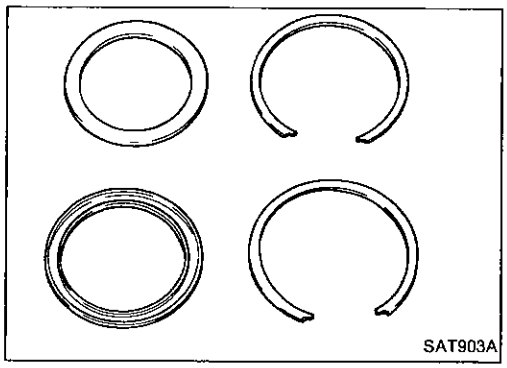
1. Remove rear internal gear by pushing forward clutch hub forward.
2. Remove thrust washer from rear internal gear.
3. Remove snap ring from forward clutch hub.
4. Remove end bearing.
5. Remove forward one-way clutch and end bearing as a unit from forward clutch hub.
6. Remove snap ring from forward clutch hub.



INSPECTION

Rear internal gear and forward clutch hub

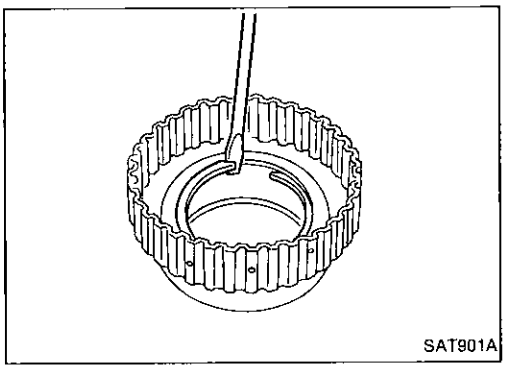
- Check gear for excessive wear, chips or cracks.
- Check frictional surfaces of forward one-way clutch and thrust washer for wear or damage.
- Check spline for wear or damage.



Snap ring and end bearing

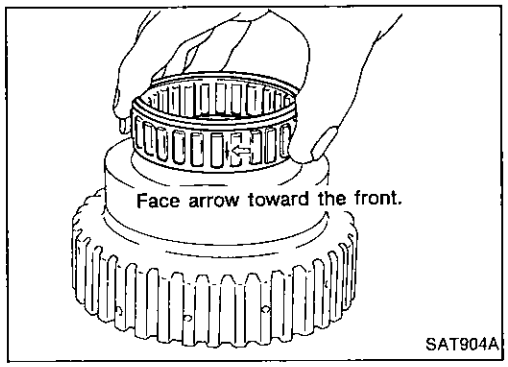
- Check for deformation or damage.

Rear Internal Gear and Forward Clutch Hub (Cont'd)


SAT901A

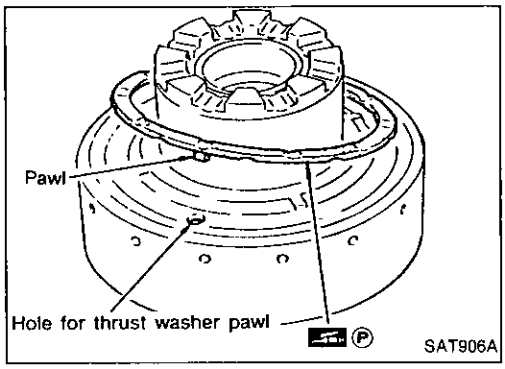
ASSEMBLY

1. Install snap ring onto forward clutch hub.
2. Install end bearing.



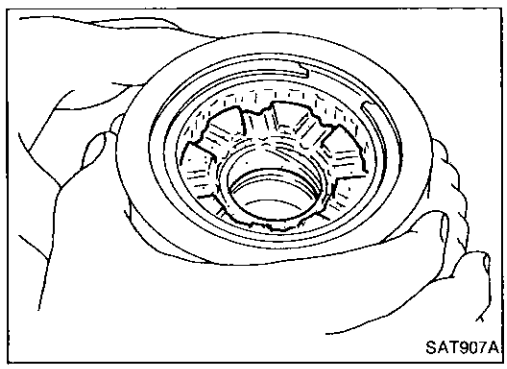
SAT904A

3. Install forward one-way clutch onto clutch hub.
- **Install forward one-way clutch with flange facing rearward.**
4. Install end bearing.
5. Install snap ring onto forward clutch hub.

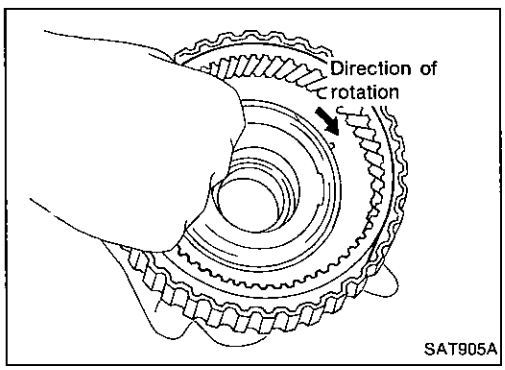


SAT906A

6. Install thrust washer onto rear internal gear.
- **Apply petroleum jelly to thrust washer.**
- **Securely insert pawls of thrust washer into holes in rear internal gear.**


SAT907A

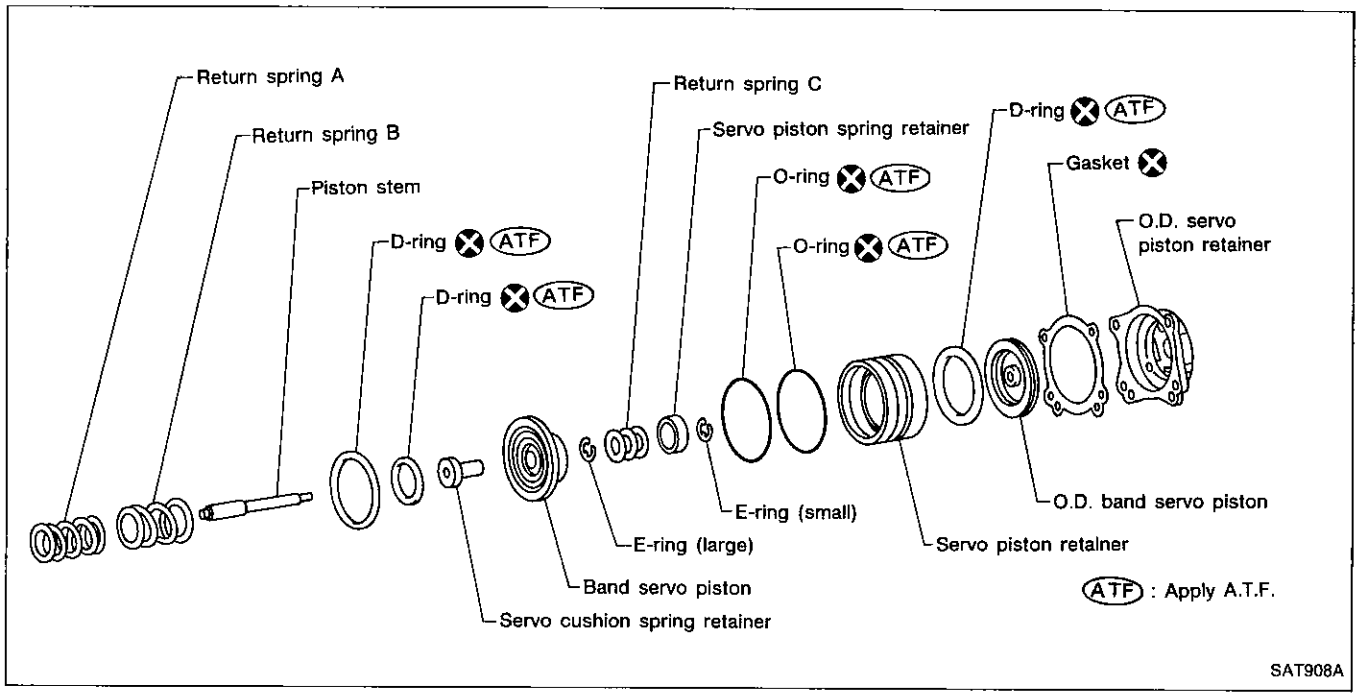
7. Position forward clutch hub in rear internal gear.

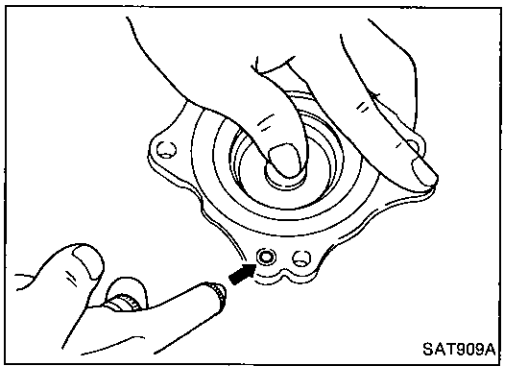


SAT905A

8. After installing, check to assure that forward clutch hub rotates clockwise.

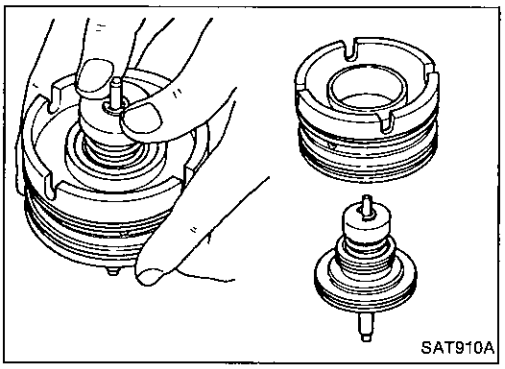
Band Servo Piston Assembly



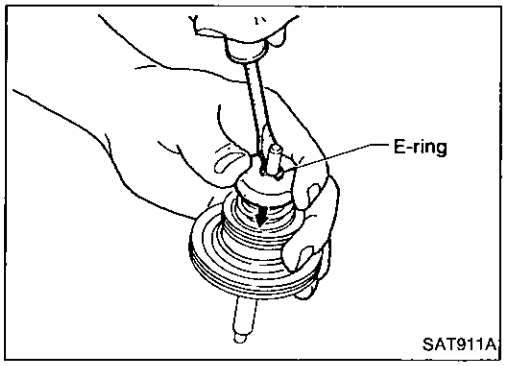


DISASSEMBLY

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.

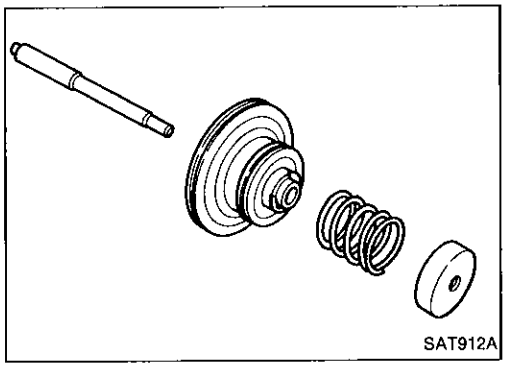


4. Remove band servo piston assembly from servo piston retainer by pushing it forward.

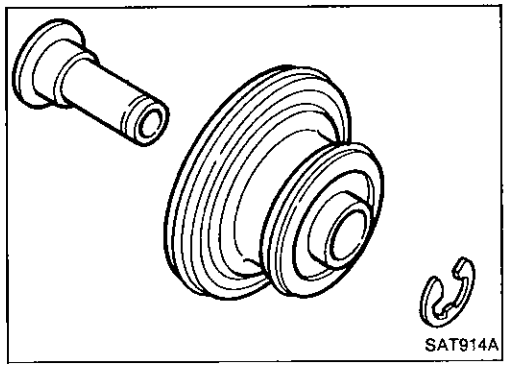


5. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.

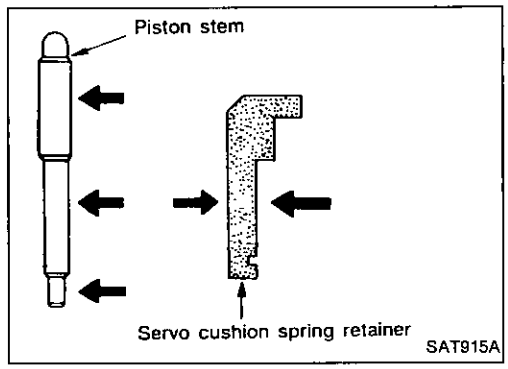
Band Servo Piston Assembly (Cont'd)


SAT912A

6. Remove servo piston spring retainer, return spring C and piston stem from band servo piston.
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.

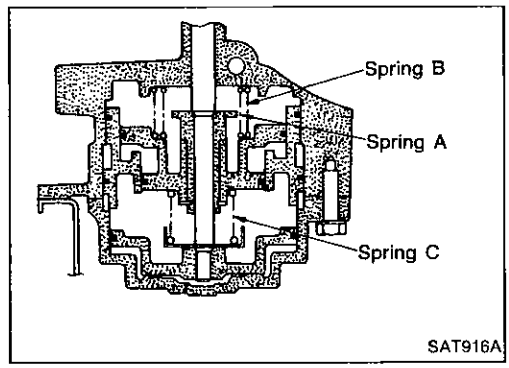


SAT915A

INSPECTION

Pistons, retainers and piston stem

- Check frictional surfaces for abnormal wear or damage.



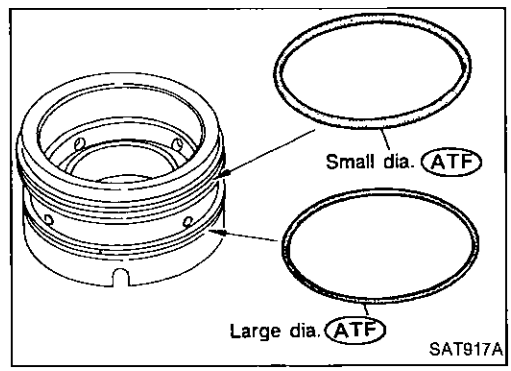
SAT916A

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	29.0 (1.142)	27.6 (1.087)



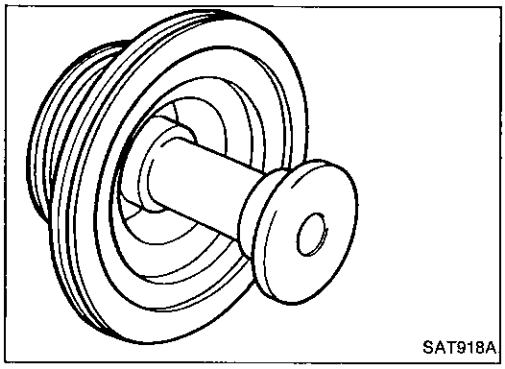
SAT917A

ASSEMBLY

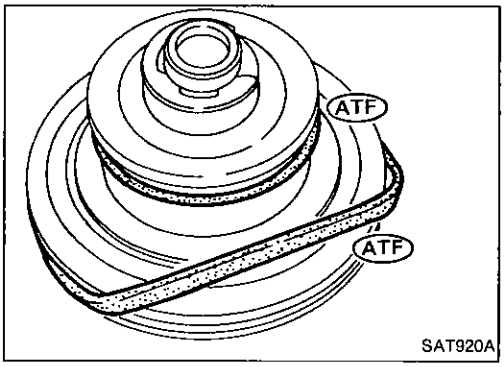
1. Install O-rings onto servo piston retainer.

- **Apply A.T.F. to O-rings.**
- **Pay attention to position of each O-ring.**

Band Servo Piston Assembly (Cont'd)


SAT918A

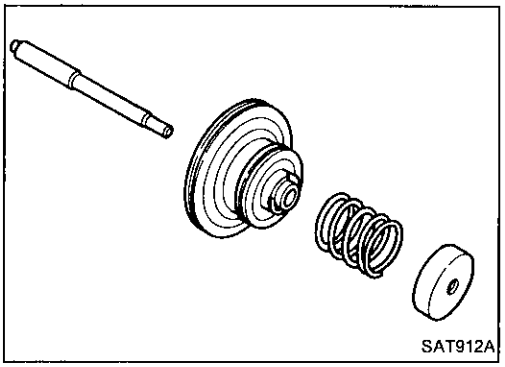
2. Install servo cushion spring retainer onto band servo piston.
3. Install E-ring onto servo cushion spring retainer.



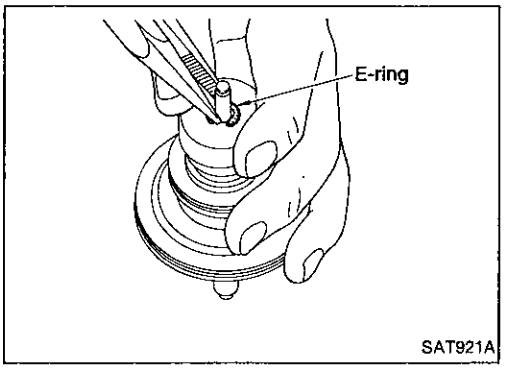
SAT920A

4. Install D-rings onto band servo piston.

- **Apply A.T.F. to D-rings.**

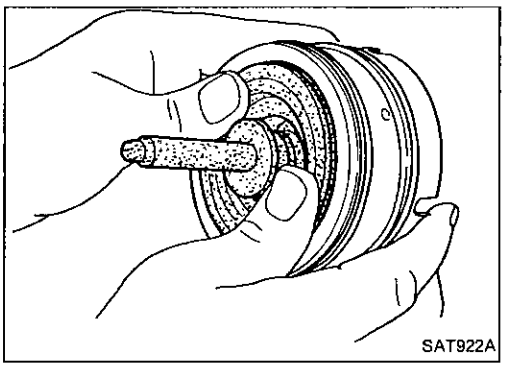

SAT912A

5. Install servo piston spring retainer, return spring C and piston stem onto band servo piston.



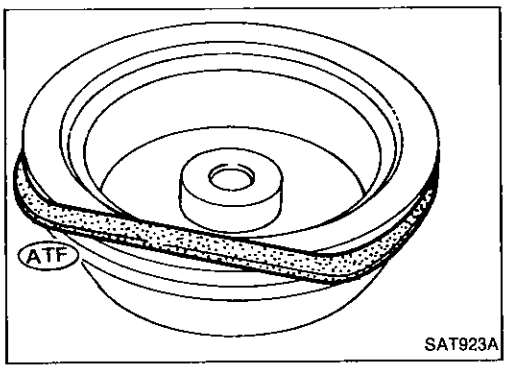
SAT921A

6. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.

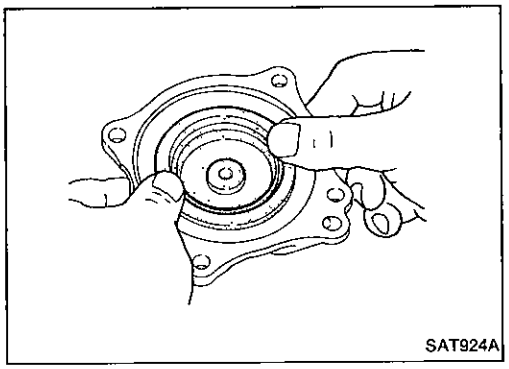

SAT922A

7. Install band servo piston assembly onto servo piston retainer by pushing it inward.

Band Servo Piston Assembly (Cont'd)

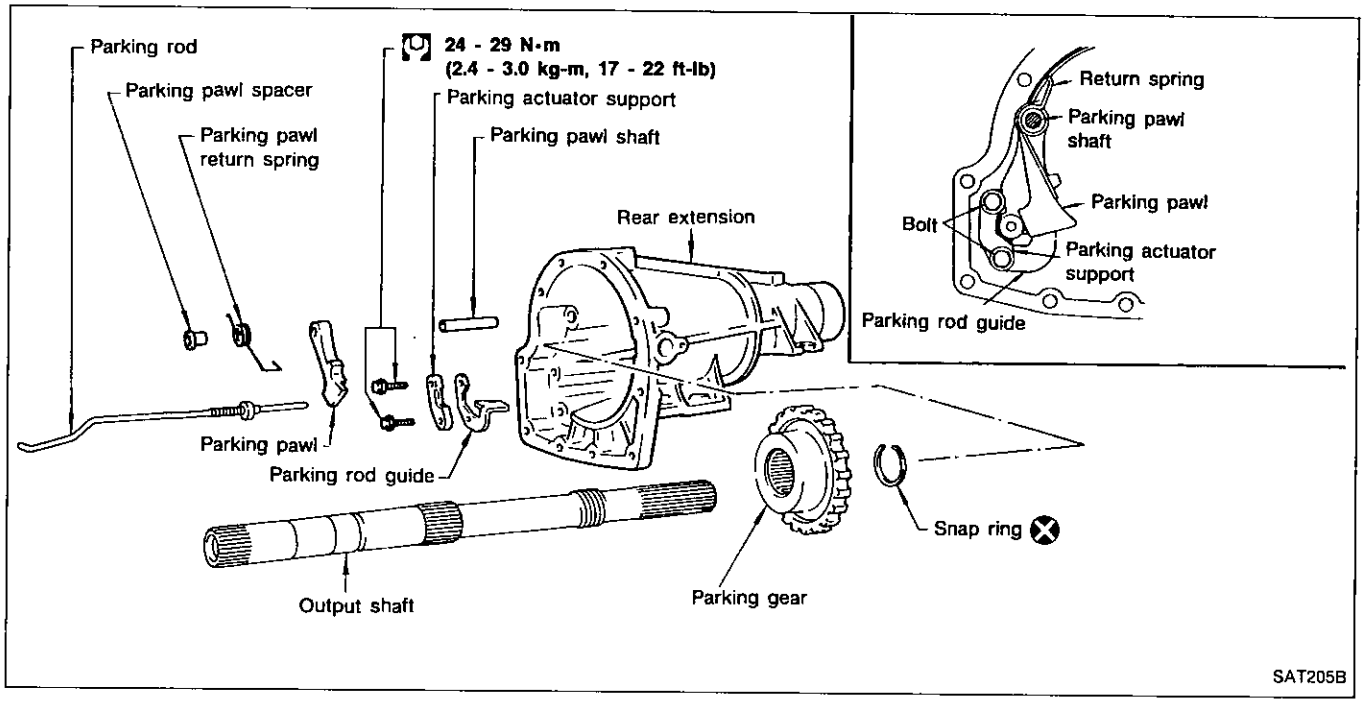


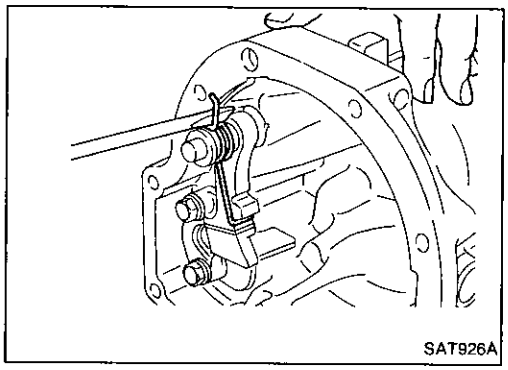
8. Install D-ring on O.D. band servo piston.
- **Apply A.T.F. to D-ring.**



9. Install O.D. band servo piston onto servo piston retainer by pushing it inward.

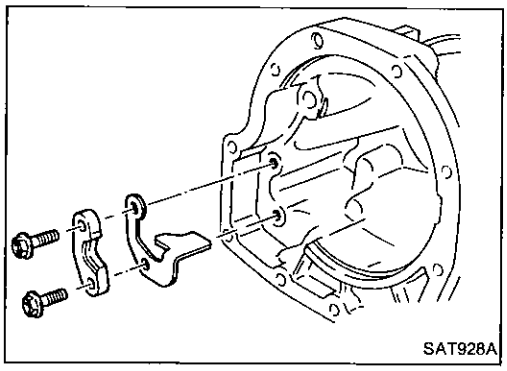
Parking Pawl Components



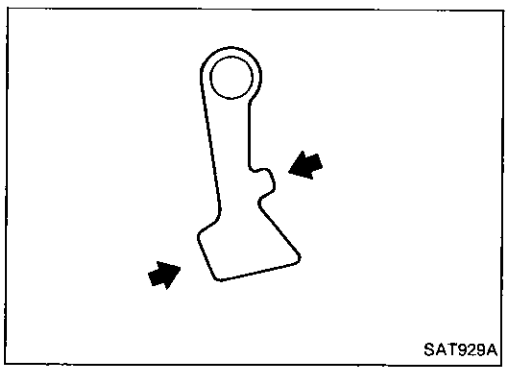


DISASSEMBLY

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.

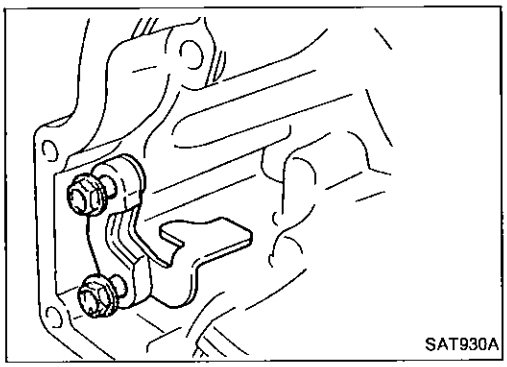


INSPECTION

Parking pawl and parking actuator support

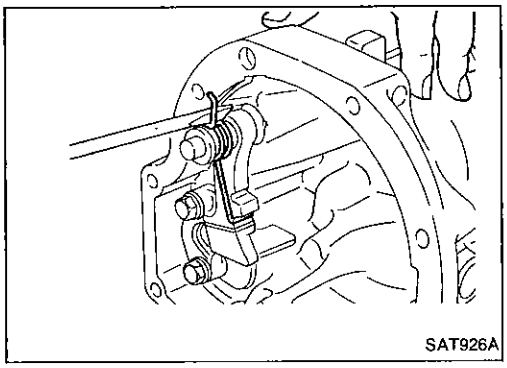
- Check contact surface of parking rod for wear.

Parking Pawl Components (Cont'd)

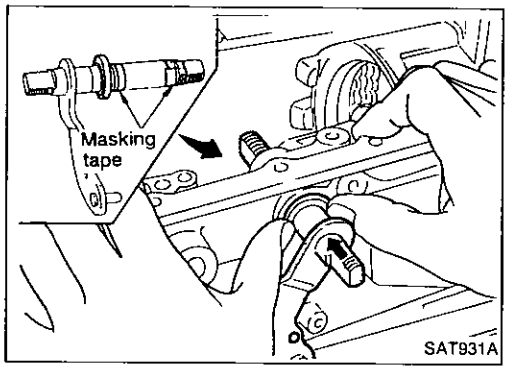

SAT930A

ASSEMBLY

1. Install rod guide and parking actuator support onto rear extension.
2. Insert parking pawl shaft into rear extension.
3. Install return spring, pawl spacer and parking pawl onto parking pawl shaft.


SAT926A

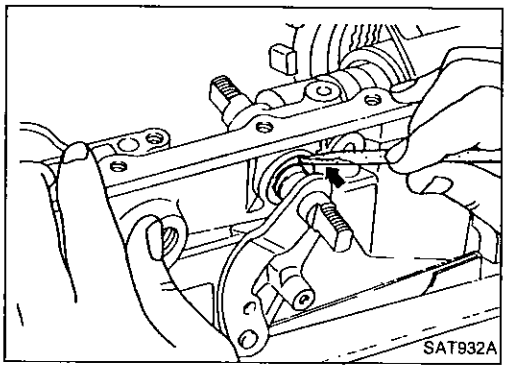
4. Bend return spring upward and install it onto rear extension.



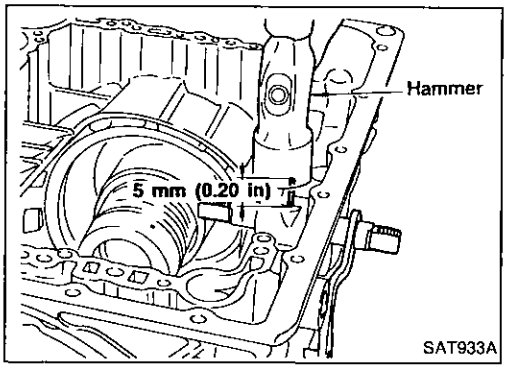
Assembly (1)

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.**

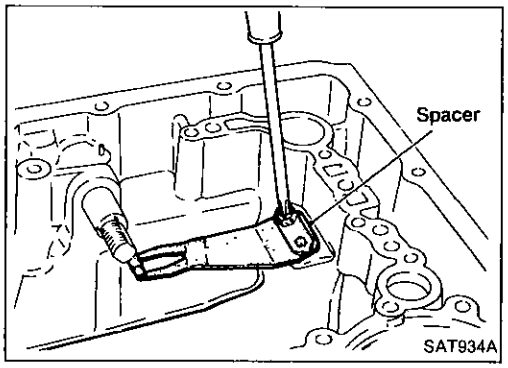
b. Insert manual shaft and oil seal as a unit into transmission case.
c. Remove masking tape.



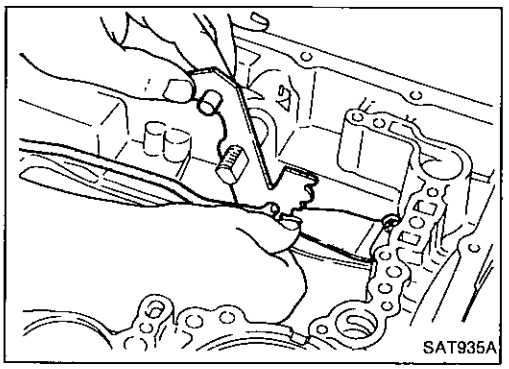
d. Push oil seal evenly and install it onto transmission case.



e. Align groove in shaft with drive pin hole, then drive pin into position as shown in figure at left.

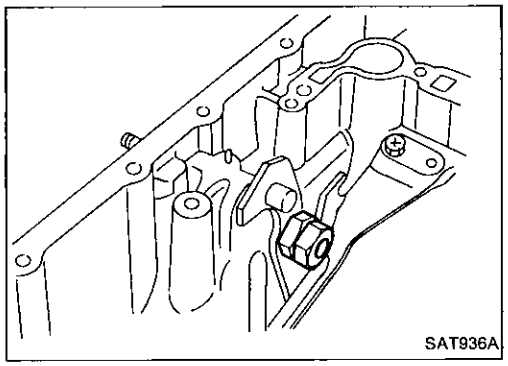


f. Install detent spring and spacer.

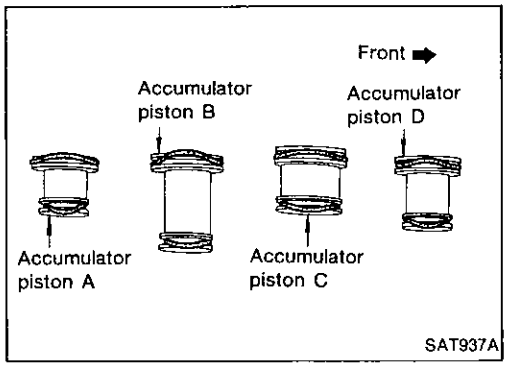


g. While pushing detent spring down, install manual plate onto manual shaft.

Assembly (1) (Cont'd)



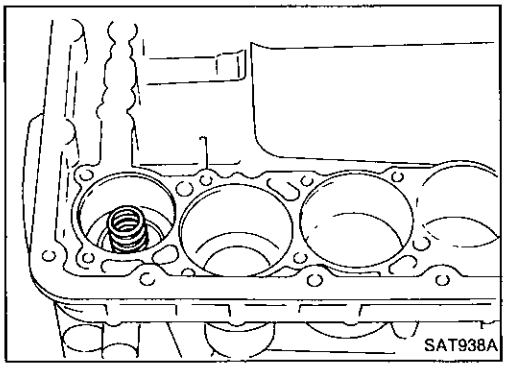
h. Install lock nuts onto manual shaft.



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)

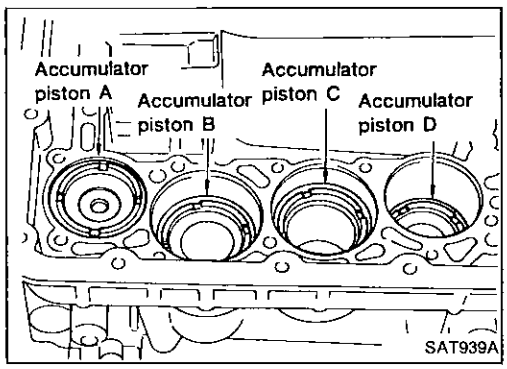
Accumulator	A	B	C	D
Small diameter end	29 (1.14)	32 (1.26)	45 (1.77)	29 (1.14)
Large diameter end	45 (1.77)	50 (1.97)	50 (1.97)	45 (1.77)



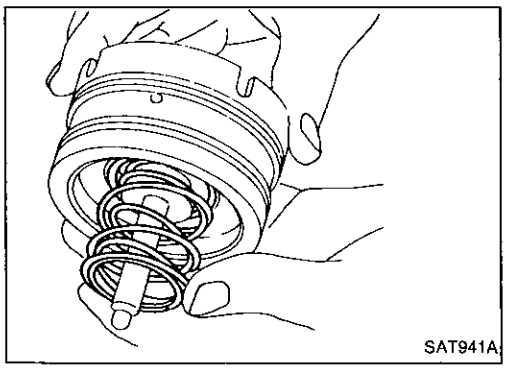
b. Install return spring for accumulator A onto transmission case.

Free length of return spring Unit: mm (in)

Accumulator	A
Free length	43.0 (1.693)

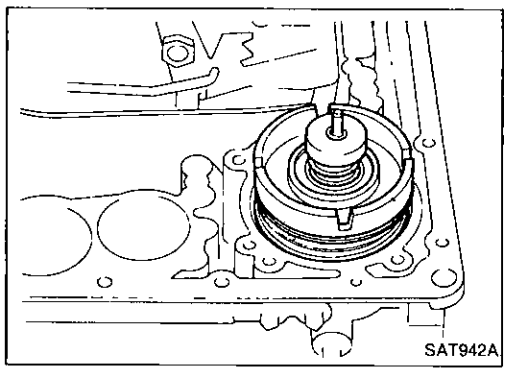


c. Install accumulator pistons A, B, C and D.
- **Apply A.T.F. to transmission case.**



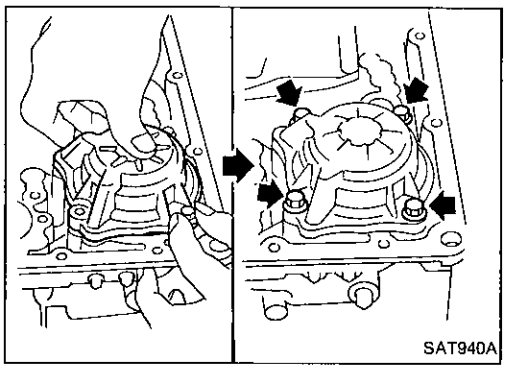
3. Install band servo piston.
a. Install return springs onto servo piston.

Assembly (1) (Cont'd)

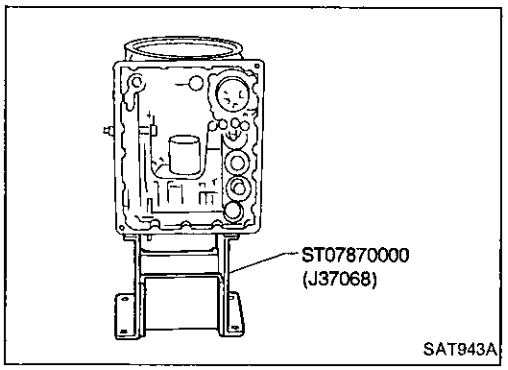


b. Install band servo piston onto transmission case.
- **Apply A.T.F. to O-ring of band servo piston and transmission case.**

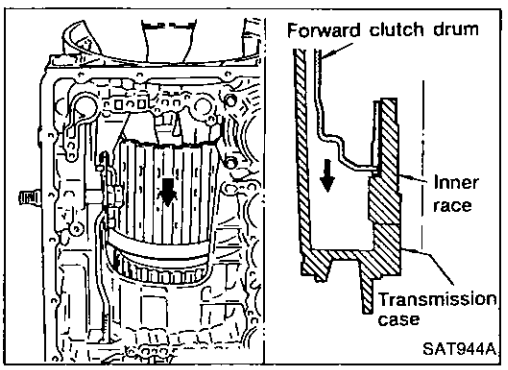
c. Install gasket for band servo onto transmission case.



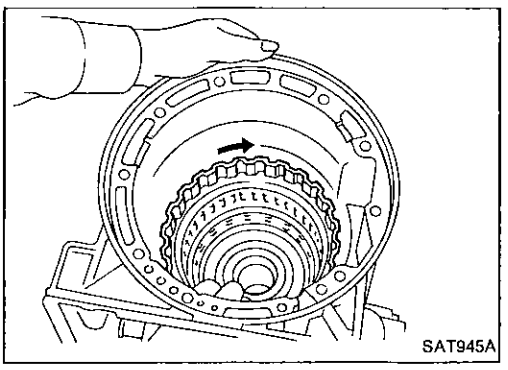
d. Install band servo retainer onto transmission case.



4. Install rear side clutch and gear components.
a. Place transmission case in vertical position.

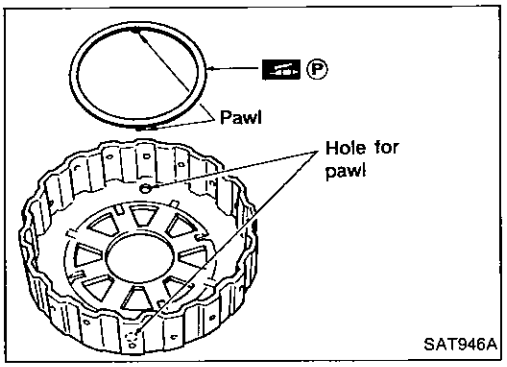


b. Slightly lift forward clutch drum assembly and slowly rotate it clockwise until its hub passes fully over the clutch inner race inside transmission case.

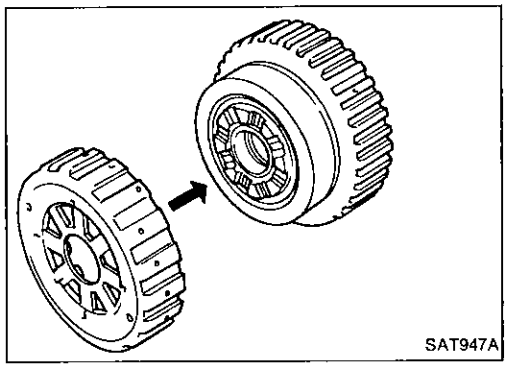


c. Check to be sure that rotation direction of forward clutch assembly is correct.

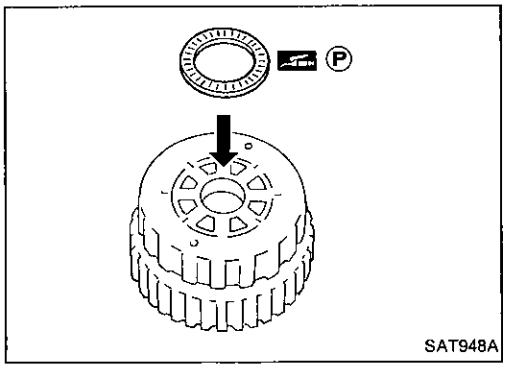
Assembly (1) (Cont'd)



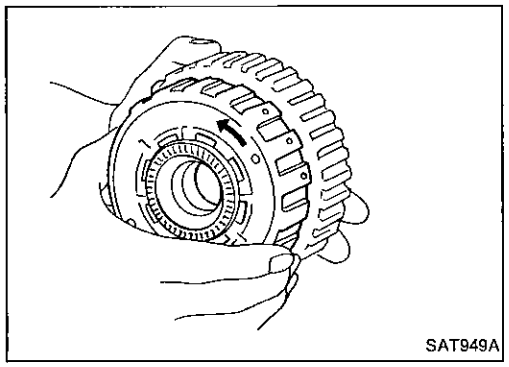
d. Install thrust washer onto front of overrun clutch hub.
- **Apply petroleum jelly to the thrust washer.**
- **Insert pawls of thrust washer securely into holes in overrun clutch hub.**



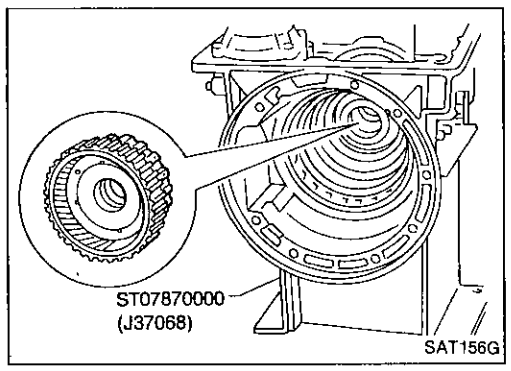
e. Install overrun clutch hub onto rear internal gear assembly.



f. Install needle bearing onto rear of overrun clutch hub.
- **Apply petroleum jelly to needle bearing.**

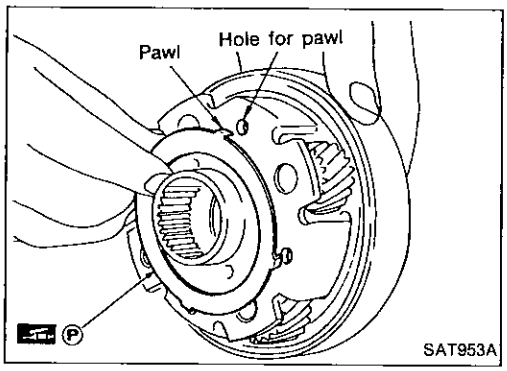


g. Check that overrun clutch hub rotates as shown while holding forward clutch hub.
h. Place transmission case into horizontal position.



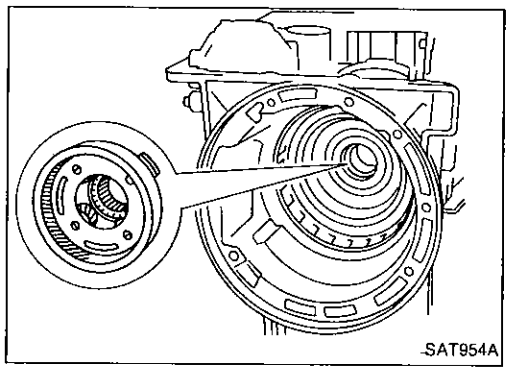
i. Install rear internal gear, forward clutch hub and overrun clutch hub as a unit onto transmission case.
j. Install needle bearing onto rear internal gear.
- **Apply petroleum jelly to needle bearing.**

Assembly (1) (Cont'd)



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.**

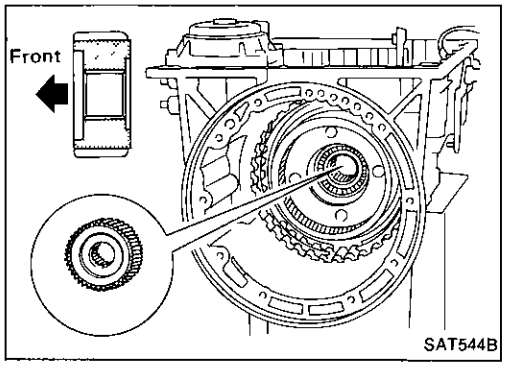


l. Install front internal gear on transmission case.

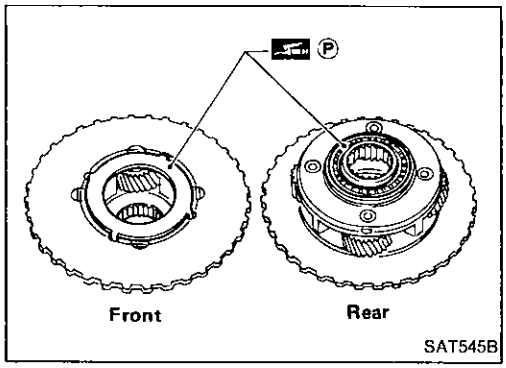
Adjustment

When any parts listed in the following table are replaced, total end play or reverse clutch end play must be adjusted.

Part name	Item	
	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	—	●



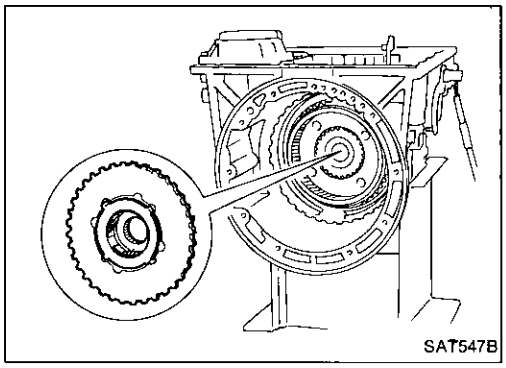
1. Install front side clutch and gear components.
a. Install rear sun gear on transmission case.
- **Pay attention to its direction.**



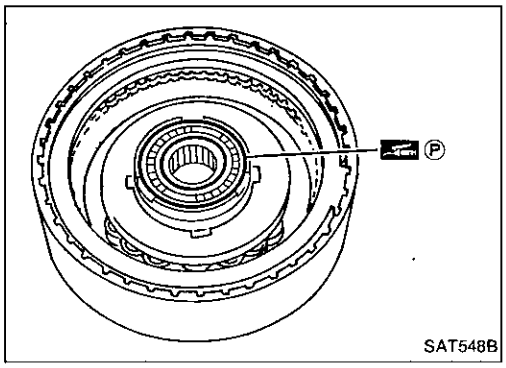
b. Install needle bearing race on front of front planetary carrier.
- **Apply petroleum jelly to needle bearing.**

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)

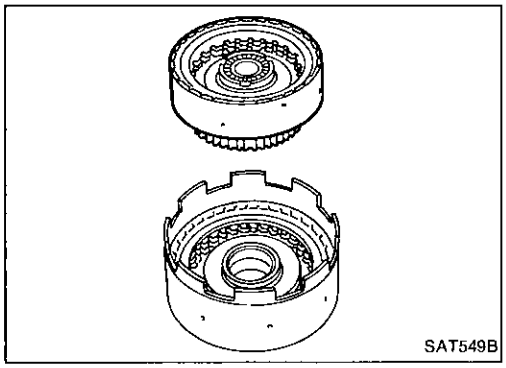

SAT547B

d. Install front planetary carrier on forward clutch drum.

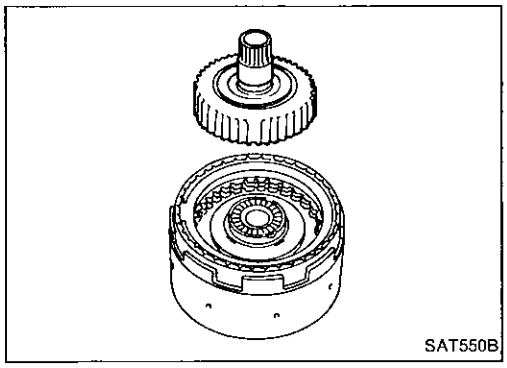


SAT548B

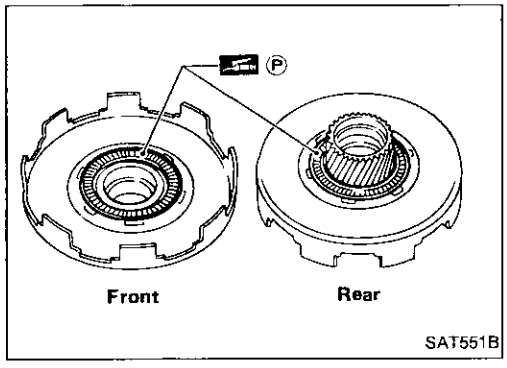
e. Install needle bearing on rear of high clutch.
- **Apply petroleum jelly to bearing.**


SAT549B

f. Install high clutch assembly onto reverse clutch assembly.


SAT550B

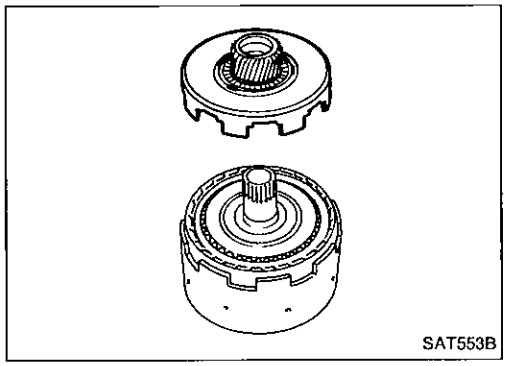
g. Install high clutch hub onto high clutch assembly.



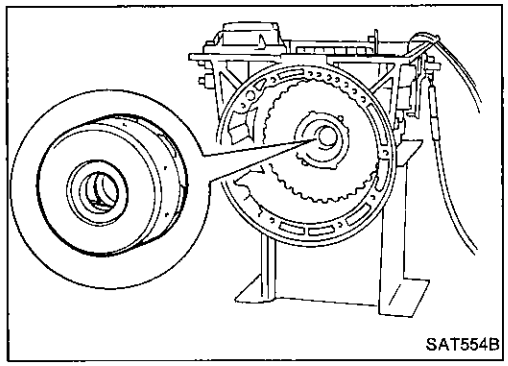
SAT551B

h. Install needle bearings onto front sun gear.
- **Apply petroleum jelly to needle bearings.**

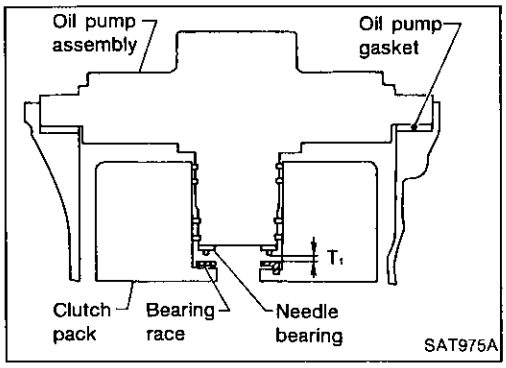
Adjustment (Cont'd)



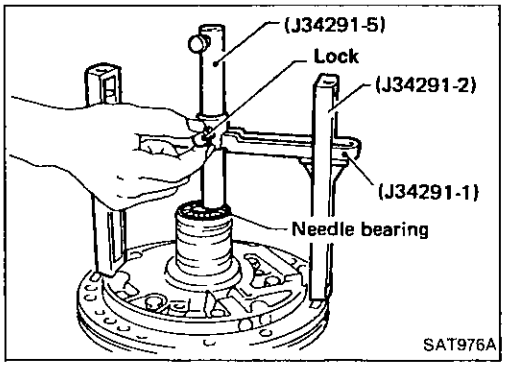
i. Install front sun gear onto reverse clutch assembly.



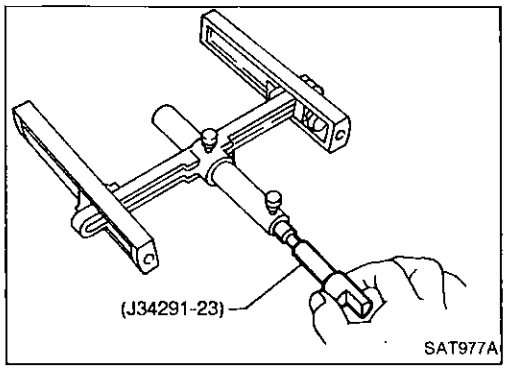
j. Install clutch pack into transmission case.



2. Adjust total end play.
   Total end play "T_1":
   0.25 - 0.55 mm (0.0098 - 0.0217 in)

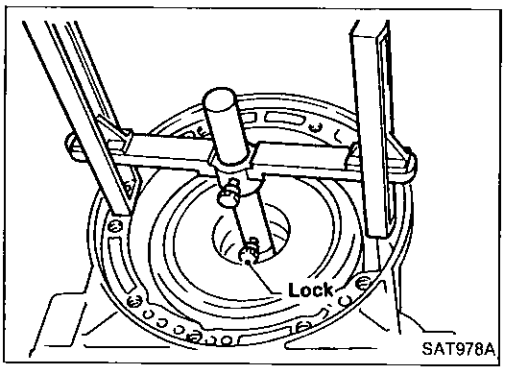


a. With needle bearing installed, place J34291-1 (bridge), J34291-2 (legs) and the J34291-5 (gauging cylinder) onto oil pump. The long ends of legs should be placed firmly on machined surface of oil pump assembly and gauging cylinder should rest on top of the needle bearing. Lock gauging cylinder in place with set screw.

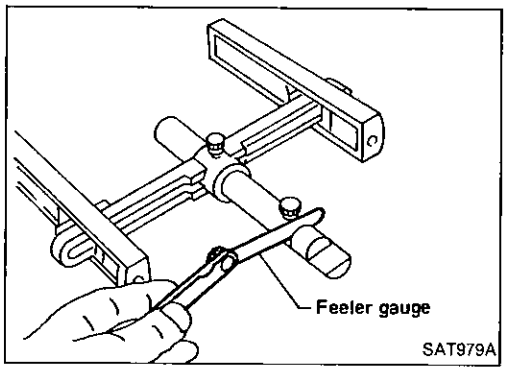


b. Install J34291-23 (gauging plunger) into gauging cylinder.

Adjustment (Cont'd)



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.

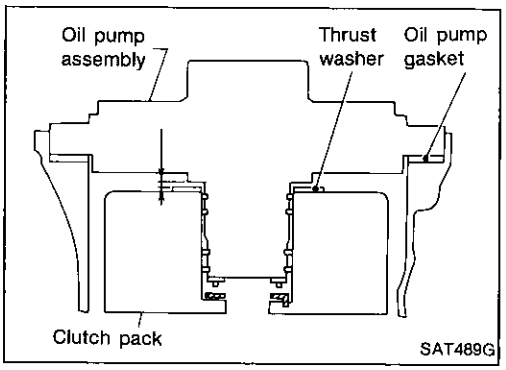
Total end play "T_1":

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:

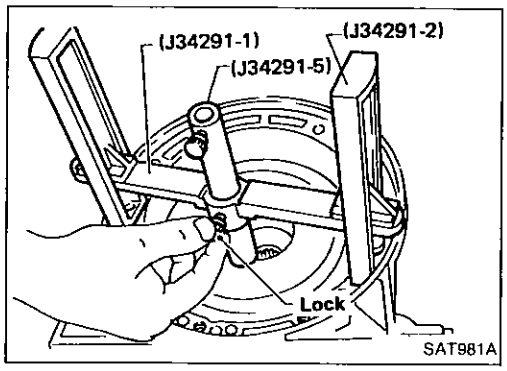
Refer to S.D.S.



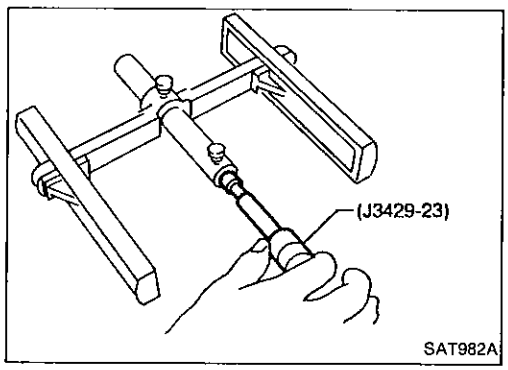
3. Adjust reverse clutch drum end play.

Reverse clutch drum end play "T_2":

0.55 - 0.90 mm (0.0217 - 0.0354 in)

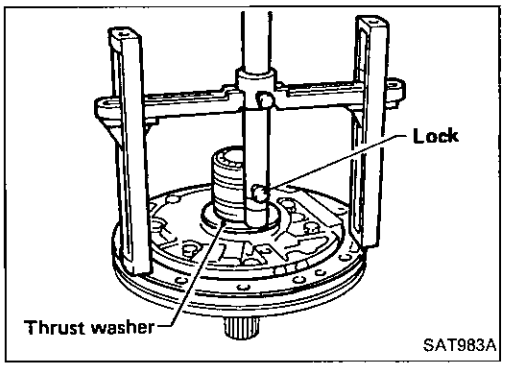


a. Place J34291-1 (bridge), J34291-2 (legs) and J34291-5 (gauging cylinder) on machined surface of transmission case (no gasket) and allow gauging cylinder to rest on front thrust surface of reverse clutch drum. Lock cylinder in place with set screw.

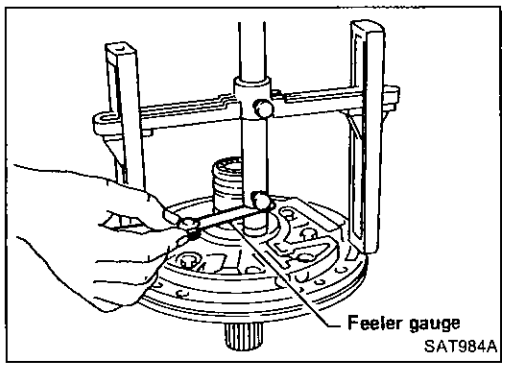


b. Install J34291-23 (gauging plunger) into gauging cylinder.

Adjustment (Cont'd)



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.

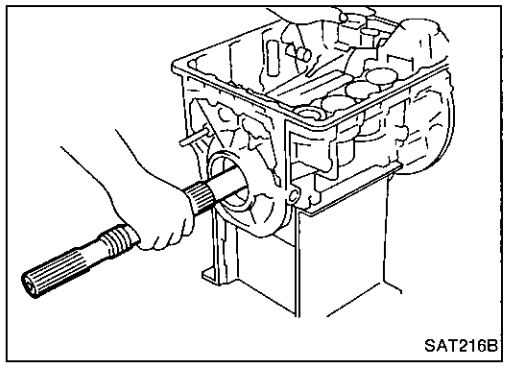


d. Use feeler gauge to measure gap between gauging plunger and gauging cylinder. This measurement should give you exact reverse clutch drum and play.

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.

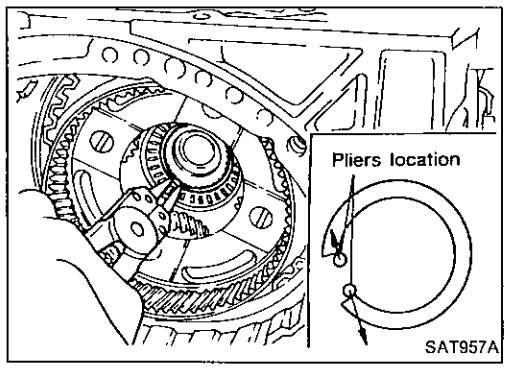


Assembly (2)

1. Install output shaft and parking gear.

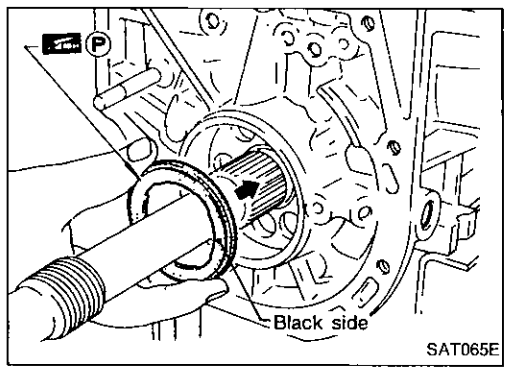
a. Insert output shaft from rear of transmission case while slightly lifting front internal gear.

- **Do not force output shaft against front of transmission case.**



b. Carefully push output shaft against front of transmission case. Install snap ring on front of output shaft.

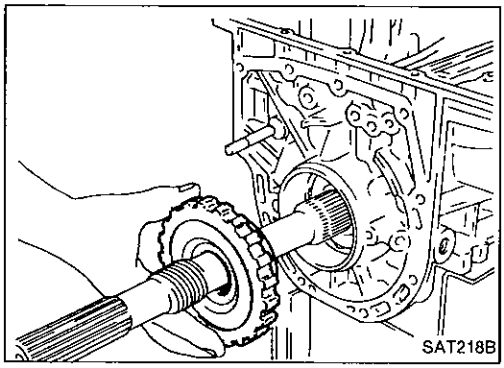
- **Check to be sure output shaft cannot be removed in rear direction.**



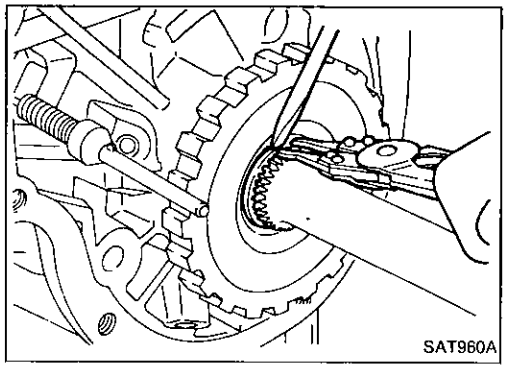
c. Install needle bearing on transmission case.

- **Pay attention to its direction — Black side goes to rear.**
- **Apply petroleum jelly to needle bearing.**

Assembly (2) (Cont'd)

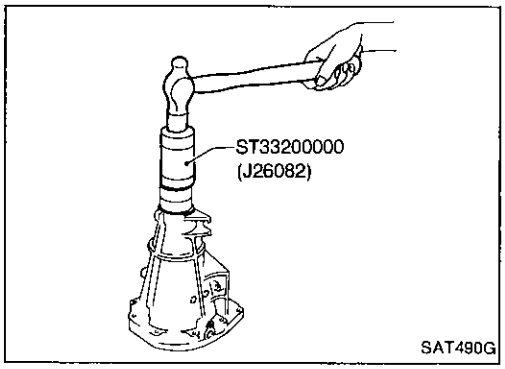


d. Install parking gear on transmission case.



e. Install snap ring on rear of output shaft.

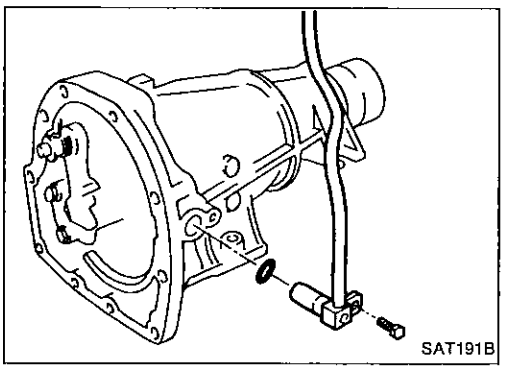
- **Check to be sure output shaft cannot be removed in forward direction.**



2. Install rear extension.

a. Install oil seal on rear extension.

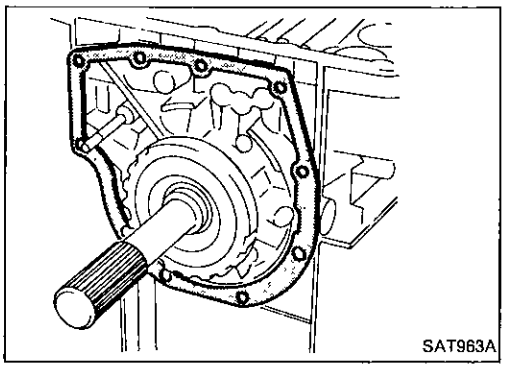
- **Apply A.T.F. to oil seal.**



b. Install O-ring on revolution sensor.

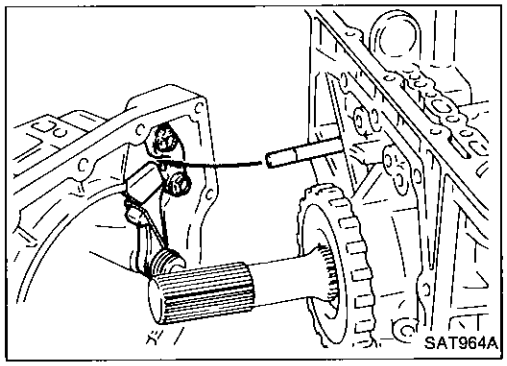
- **Apply A.T.F. to O-ring.**

c. Install revolution sensor on rear extension.

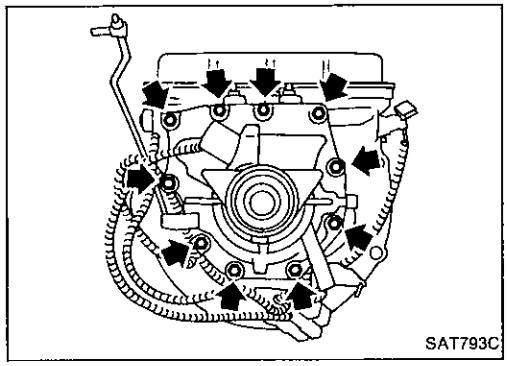


d. Install rear extension gasket on transmission case.

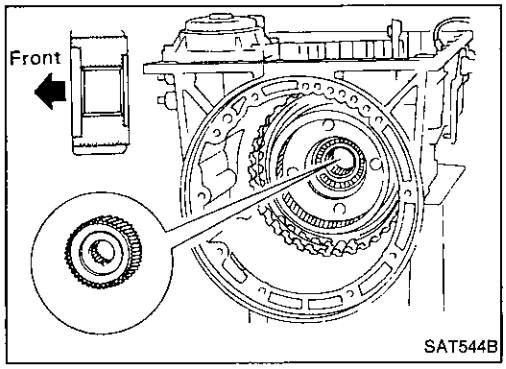
Assembly (2) (Cont'd)



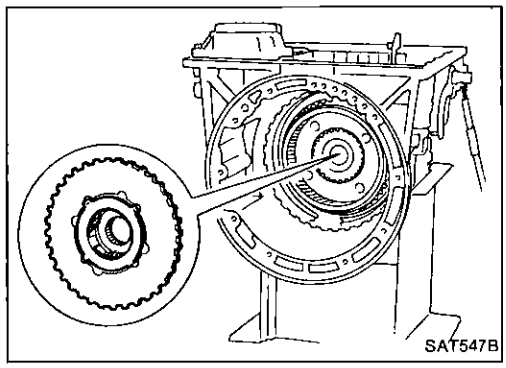
e. Install parking rod on transmission case.



f. Install rear extension on transmission case.



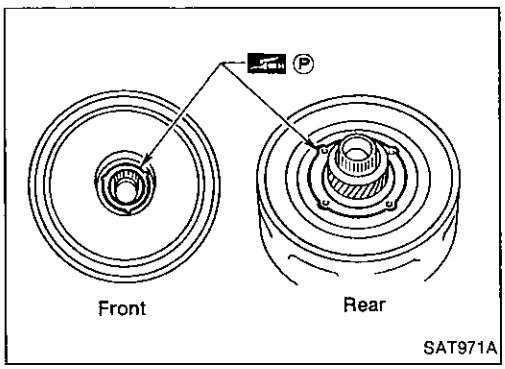
3. Install front side clutch and gear components.
a. Install rear sun gear on transmission case.
- **Pay attention to its direction.**



b. Make sure needle bearing is on front of front planetary carrier.
- **Apply petroleum jelly to needle bearing.**

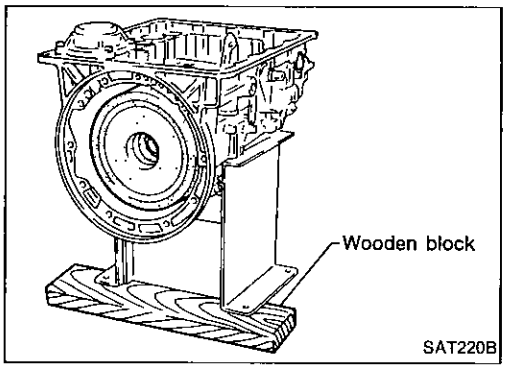
c. Make sure needle bearing is on rear of front planetary carrier.
- **Apply petroleum jelly to bearing.**
- **Pay attention to its direction — Black side goes to front.**

d. While rotating forward clutch drum clockwise, install front planetary carrier on forward clutch drum.

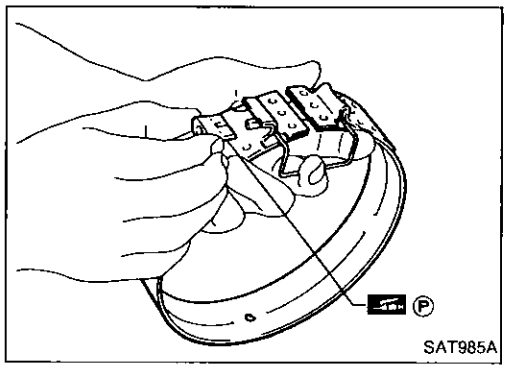


e. Make sure bearing races are on front and rear of clutch pack.
- **Apply petroleum jelly to bearing races.**
- **Securely engage pawls of bearing races with holes in clutch pack.**

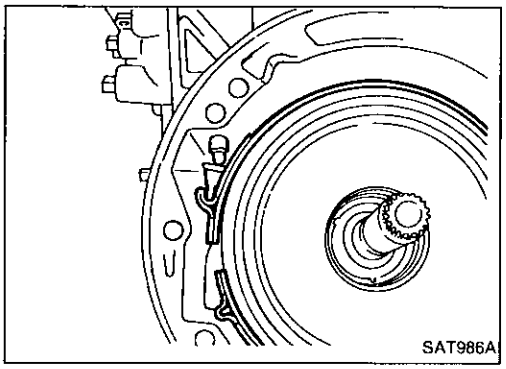
Assembly (2) (Cont'd)



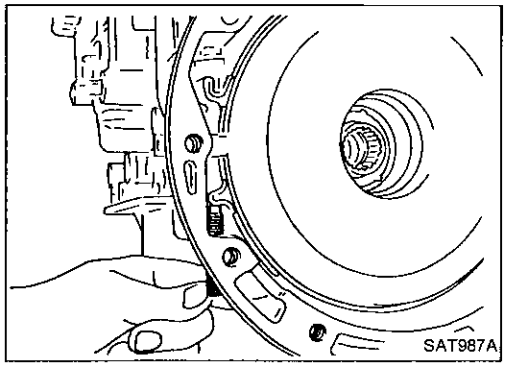
f. Install clutch pack into transmission case.



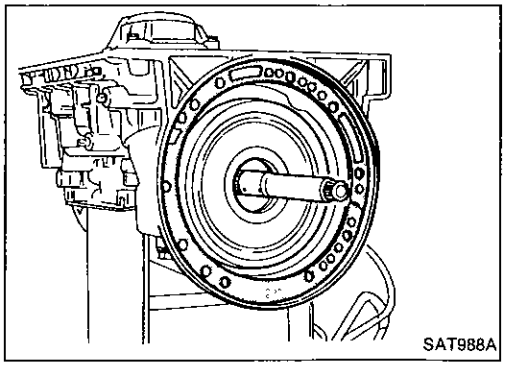
4. Install brake band and band strut.
a. Install band strut on brake band.
- **Apply petroleum jelly to band strut.**



b. Place brake band on periphery of reverse clutch drum, and insert band strut into end of band servo piston stem.

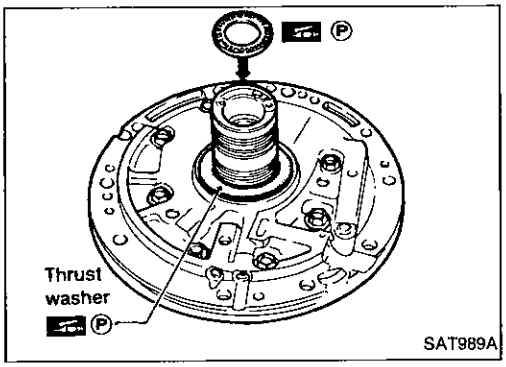


c. Install anchor end bolt on transmission case. Then, tighten anchor end bolt just enough so that reverse clutch drum (clutch pack) will not tilt forward.



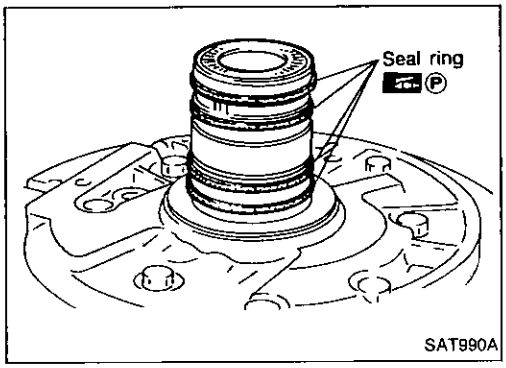
5. Install input shaft on transmission case.
- **Pay attention to its direction — O-ring groove side is front.**
6. Install gasket on transmission case.

Assembly (2) (Cont'd)

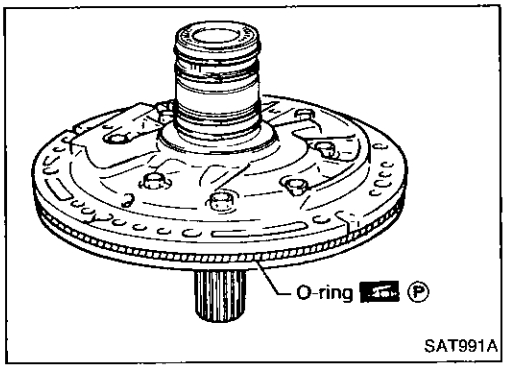


7. Install oil pump assembly.
a. Install needle bearing on oil pump assembly.
- **Apply petroleum jelly to the needle bearing.**

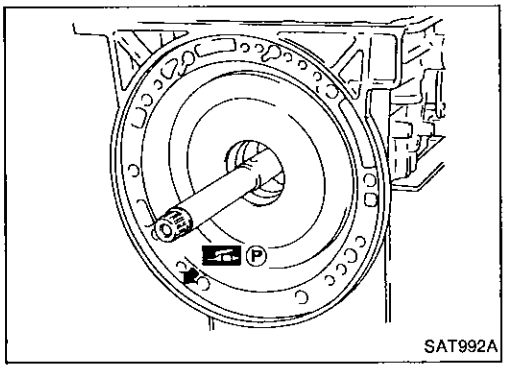
b. Install selected thrust washer on oil pump assembly.
- **Apply petroleum jelly to thrust washer.**



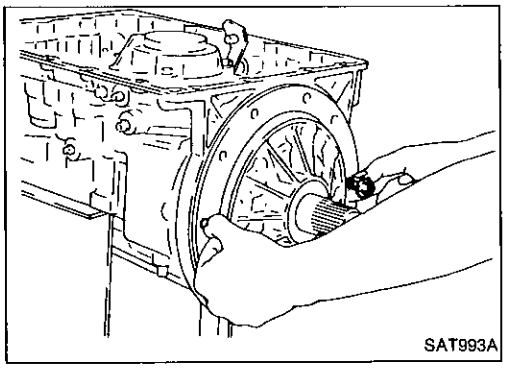
c. Carefully install seal rings into grooves and press them into the petroleum jelly so that they are a tight fit.



d. Install O-ring on oil pump assembly.
- **Apply petroleum jelly to O-ring.**

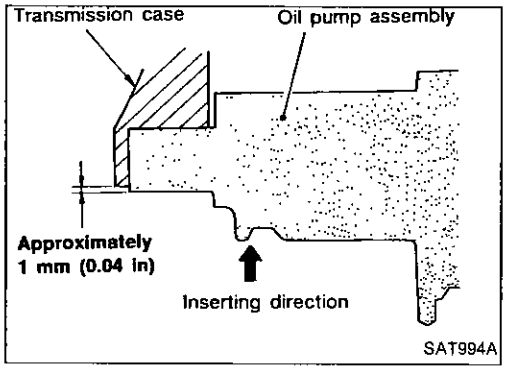


e. Apply petroleum jelly to mating surface of transmission case and oil pump assembly.

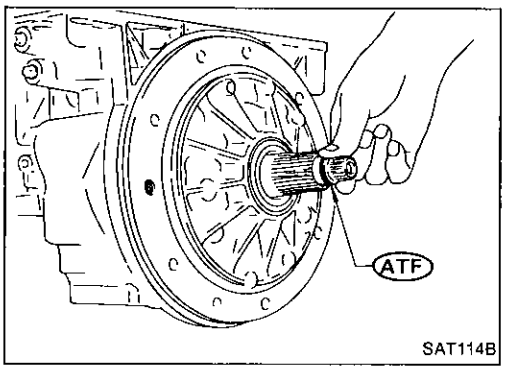


f. Install oil pump assembly.
- **Install two converter housing securing bolts in bolt holes in oil pump assembly as guides.**

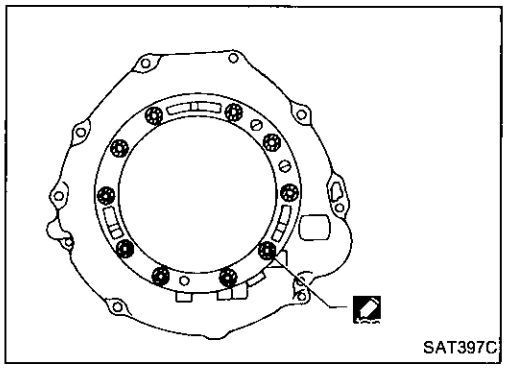
Assembly (2) (Cont'd)



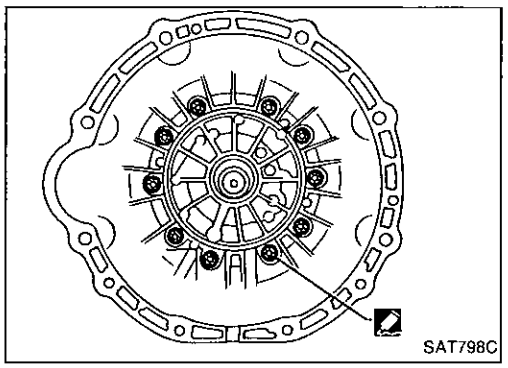
- **Insert oil pump assembly to the specified position in transmission, as shown at left.**



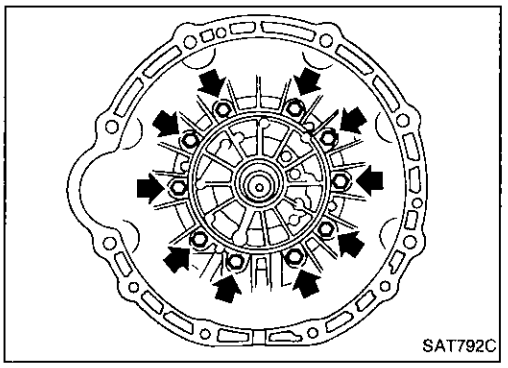
8. Install O-ring on input shaft.
- **Apply A.T.F. to O-rings.**



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.**

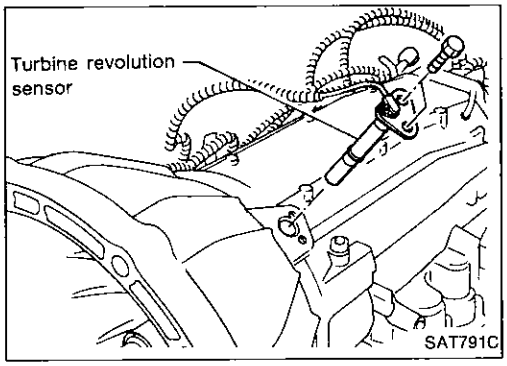


b. Apply recommended sealant (Nissan genuine part: KP610-00250 or equivalent) to seating surfaces of bolts that secure front of converter housing.

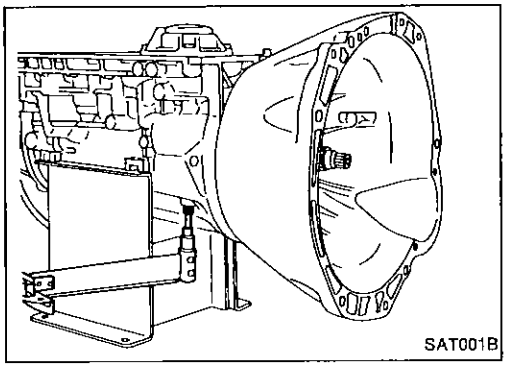


c. Install converter housing on transmission case.

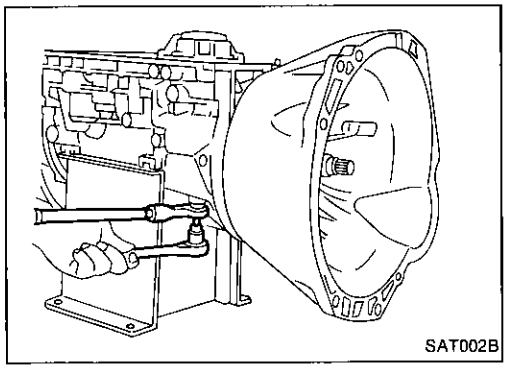
Assembly (2) (Cont'd)



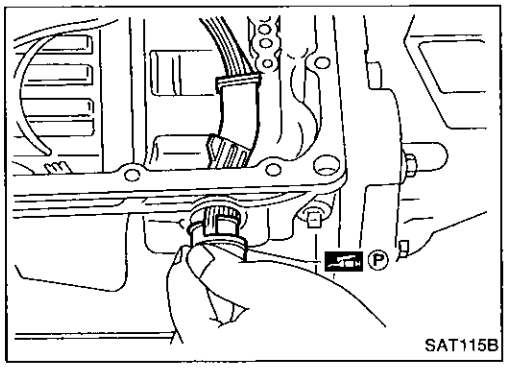
10. Install turbine revolution sensor.



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.

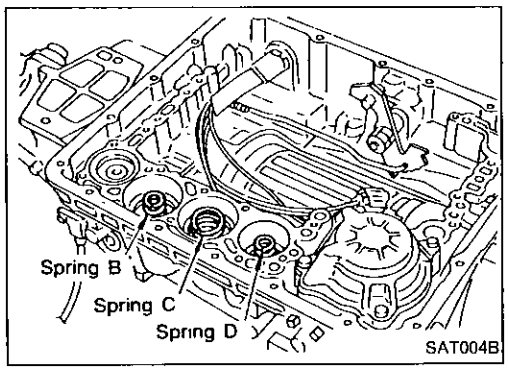


c. While holding anchor end pin, tighten lock nut.



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.



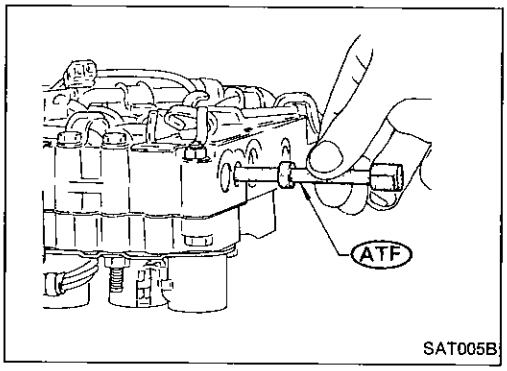
13. Install control valve assembly.
a. Install accumulator piston return springs B, C and D.

Free length of return springs:

Unit: mm (in)

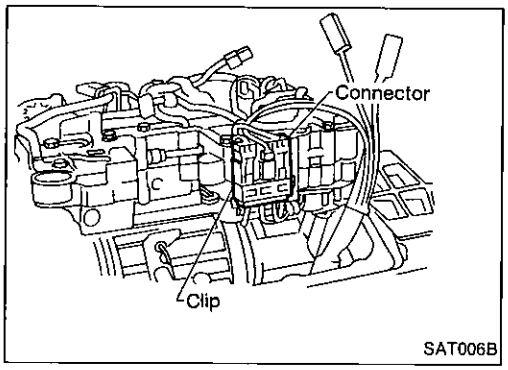
Item	Accumulator		
	B	C	D
Free length	66.0 (2.598)	45.0 (1.772)	58.4 (2.299)

Assembly (2) (Cont'd)

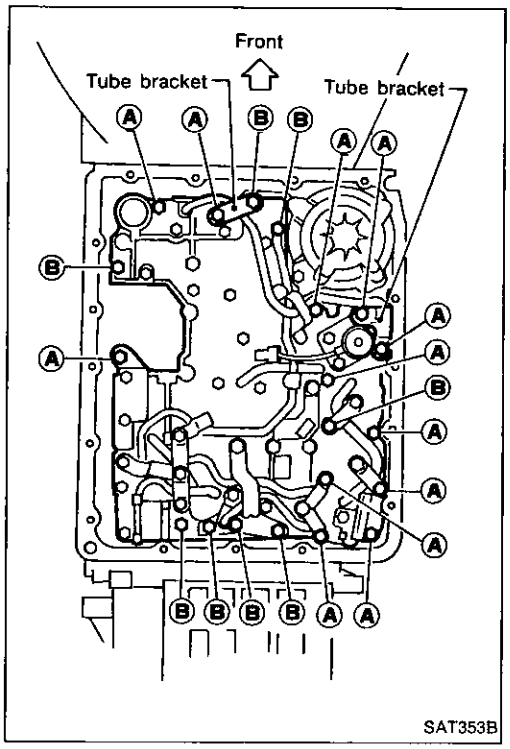


b. Install manual valve on control valve.

- **Apply A.T.F. to manual valve.**



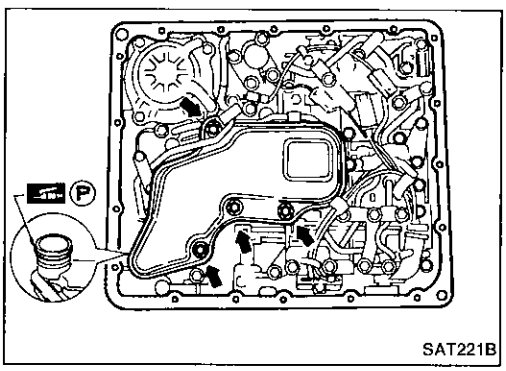
c. Place control valve assembly on transmission case. Connect solenoid connector for upper body.
d. Install connector clip.



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	ℓ mm (in)
Ⓐ	33 (1.30)
Ⓑ	45 (1.77)

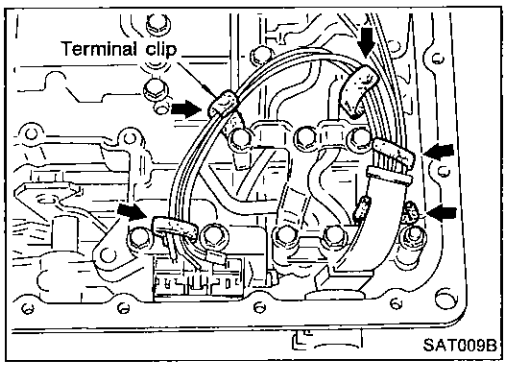


g. Install O-ring on oil strainer.

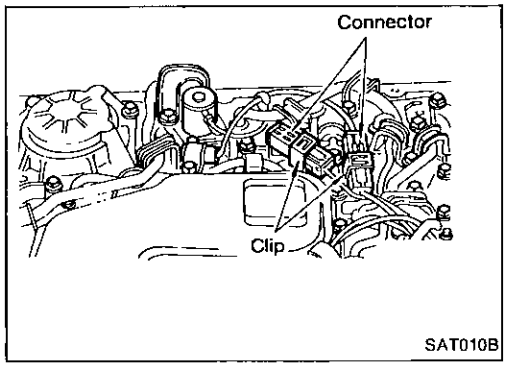
- **Apply petroleum jelly to O-ring.**

h. Install oil strainer on control valve.

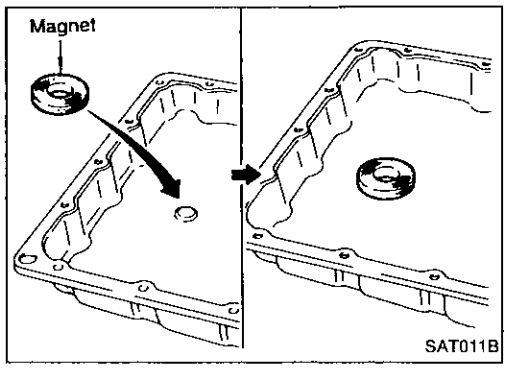
Assembly (2) (Cont'd)



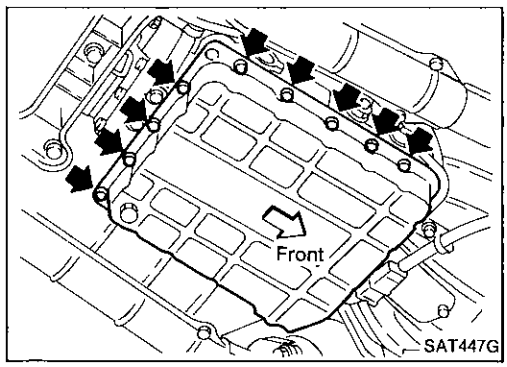
i. Securely fasten terminal harness with clips.



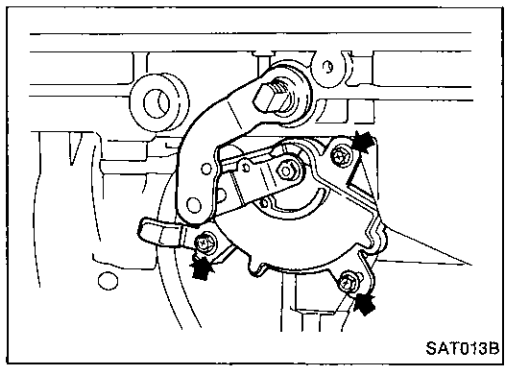
j. Install torque converter clutch solenoid valve and fluid temperature sensor connectors.



14. Install oil pan.
a. Attach a magnet to oil pan.

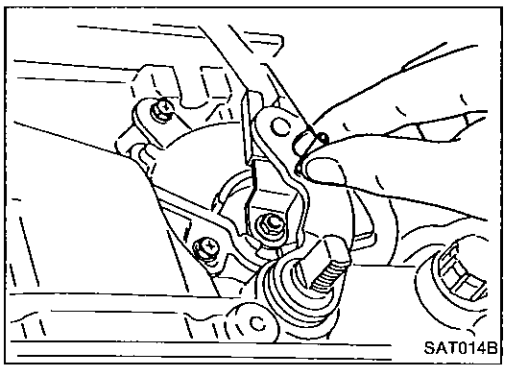


b. Install oil pan gasket on transmission case.
c. Install oil pan and bracket on transmission case.
- **Tighten four bolts in a criss-cross pattern to prevent dislocation of gasket.**

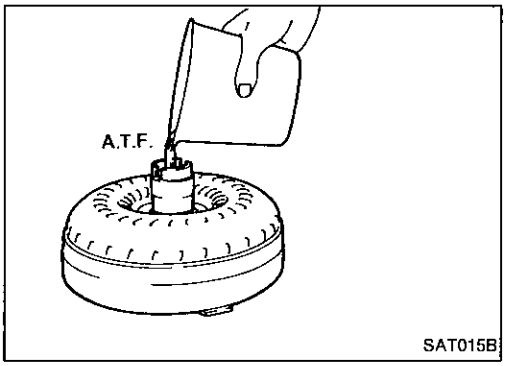


15. Install inhibitor switch.
a. Check that manual shaft is in "1" position.
b. Temporarily install inhibitor switch on manual shaft.
c. Move manual shaft to "N".

Assembly (2) (Cont'd)

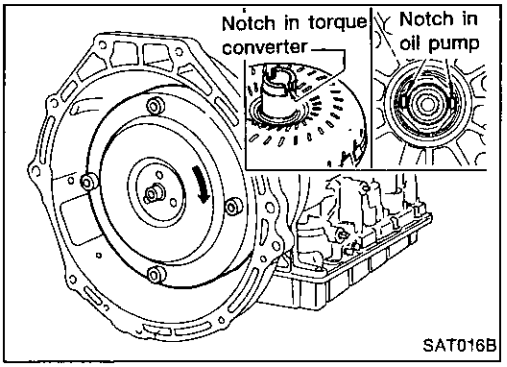


d. Tighten bolts while inserting 4.0 mm (0.157 in) dia. pin vertically into locating holes in inhibitor switch and manual shaft.

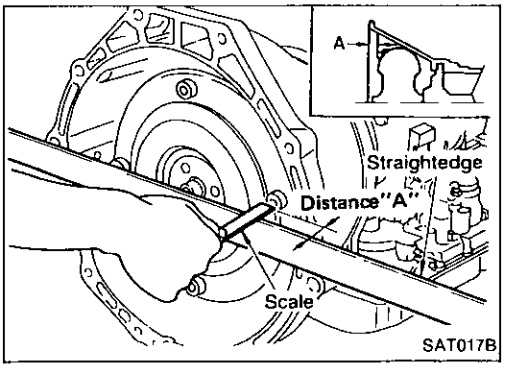


16. Install torque converter.
a. Pour A.T.F. into torque converter.

- **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":

22 mm (0.87 in) or more

General specifications

Engine	VH45DE
Automatic transmission model	RE4R03A
Transmission model code number	51X63
Stall torque ratio	2.0 : 1
Transmission gear ratio	
1st	2.569
2nd	1.479
Top	1.000
O.D.	0.694
Reverse	2.275
Recommended oil	Genuine Nissan ATF or equivalent type DEXRON™ II
Oil capacity ℓ (US qt, Imp qt)	10.2 (10-3/4, 9)

Specifications and Adjustment

VEHICLE SPEED WHEN SHIFTING GEARS

Throttle position	Vehicle speed km/h (MPH)						
	$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$	$1_2 \rightarrow 1_1$
Full throttle	78 - 82 (48 - 51)	135 - 143 (84 - 89)	201 - 211 (125 - 131)	194 - 204 (121 - 127)	125 - 133 (78 - 83)	43 - 47 (27 - 29)	53 - 57 (33 - 35)
Half throttle	13 - 17 (8 - 11)	52 - 56 (32 - 35)	137 - 147 (85 - 91)	79 - 89 (49 - 55)	22 - 28 (14 - 17)	—	53 - 57 (33 - 35)

VEHICLE SPEED WHEN PERFORMING AND RELEASING LOCK-UP

Throttle position	Selector lever position [Shift position]	Vehicle speed km/h (MPH)	
		Lock-up "ON"	Lock-up "OFF"
Full throttle	D [D_4]	202 - 210 (126 - 130)	195 - 203 (121 - 126)
	3 [3_3]	114 - 122 (71 - 76)	108 - 116 (67 - 72)
Half throttle	D [D_4]	138 - 146 (86 - 91)	103 - 111 (64 - 69)
	3 [3_3]	108 - 116 (67 - 72)	102 - 110 (63 - 68)

STALL REVOLUTION

Stall revolution rpm
2,100 - 2,300

LINE PRESSURE

Engine speed rpm	Line pressure kPa (kg/cm², psi)	
	D, 3, 2 and 1 positions	R position
Idle	451 - 490 (4.6 - 5.0, 65 - 71)	628 - 667 (6.4 - 6.8, 91 - 97)
Stall	1,020 - 1,098 (10.4 - 11.2, 148 - 159)	1,422 - 1,510 (14.5 - 15.4, 206 - 219)

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 sprig	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	31742-41x14	38.9 (1.531)	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	31742-27X70	31.4 (1.236)	7.0 (0.276)
		1st reducing valve spring	31756-60X00	29.5 (1.161)	7.0 (0.276)
		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	31505-51X00	37.8 (1.488)	14.8 (0.583)
High clutch		16 pcs	31505-21X03	22.06 (0.8685)	11.6 (0.457)
Forward clutch (Overrun clutch)		20 pcs	31505-51X04	36.8 (1.449)	9.8 (0.386)
Low & reverse brake		Inner spring 16 pcs	31505-51X06	20.43 (0.8043)	10.3 (0.406)
		Outer spring 16 pcs	31505-51X05	20.35 (0.8012)	13.0 (0.512)
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	29.0 (1.142)	27.6 (1.087)
Accumulator		Accumulator A	31605-41X02	43.0 (1.693)	18 (0.71)
		Accumulator B	31605-41X10	66.0 (2.598)	18.8 (0.740)
		Accumulator C	31605-51X01	45.0 (1.772)	29.3 (1.154)
		Accumulator D	31605-41X06	58.4 (2.299)	17.3 (0.681)

Specifications and Adjustment (Cont'd)

ACCUMULATOR O-RING

Accumulator	Diameter mm (in)			
	A	B	C	D
Small diameter end	29 (1.14)	32 (1.26)	45 (1.77)	29 (1.14)
Large diameter end	45 (1.77)	50 (1.97)	50 (1.97)	45 (1.77)

CLUTCHES AND BRAKES

Reverse clutch

Number of drive plates	3
Number of driven plates	3
Thickness of drive plate mm (in)	
Standard	1.90 - 2.05 (0.0748 - 0.0807)
Wear limit	1.8 (0.071)
Clearance mm (in)	
Standard	0.6 - 0.9 (0.024 - 0.035)
Allowable limit	1.4 (0.055)

Thickness of retaining plate	Thickness mm (in)	Part number
	4.4 (0.173)	31537-51X61
	4.6 (0.181)	31537-51X00
	4.8 (0.189)	31537-51X01
	5.0 (0.197)	31537-51X02

High clutch

Number of drive plates	6
Number of driven plates	6
Thickness of drive plate mm (in)	
Standard	1.52 - 1.67 (0.0598 - 0.0657)
Wear limit	1.4 (0.055)
Clearance mm (in)	
Standard	1.8 - 2.2 (0.071 - 0.087)
Allowable limit	3.4 (0.134)

Thickness of retaining plate	Thickness mm (in)	Part number
	4.4 (0.173)	31537-51X61
	4.6 (0.181)	31537-51X00
	4.8 (0.189)	31537-51X01
	5.0 (0.197)	31537-51X02
	5.2 (0.205)	31537-51X03
	5.4 (0.213)	31537-51X04

Forward clutch

Number of drive plates	9
Number of driven plates	9
Thickness of drive plate mm (in)	
Standard	1.90 - 2.05 (0.0748 - 0.0807)
Wear limit	1.8 (0.071)
Clearance mm (in)	
Standard	0.45 - 0.85 (0.0177 - 0.0335)
Allowable limit	2.2 (0.087)

Thickness of retaining plate	Thickness mm (in)	Part number
	4.2 (0.165)	31537-51X67
	4.4 (0.173)	31537-51X05
	4.6 (0.181)	31537-51X06
	4.8 (0.189)	31537-51X07
	5.0 (0.197)	31537-51X08
	5.2 (0.205)	31537-51X09
	5.4 (0.213)	31537-51X10

Overrun clutch

Number of drive plates	5
Number of driven plates	5
Thickness of drive plate mm (in)	
Standard	1.52 - 1.67 (0.0598 - 0.0657)
Wear limit	1.4 (0.055)
Clearance mm (in)	
Standard	1.0 - 1.4 (0.039 - 0.055)
Allowable limit	2.4 (0.094)

Thickness of retaining plate	Thickness mm (in)	Part number
	4.0 (0.157)	31537-51X12
	4.2 (0.165)	31537-51X13
	4.4 (0.173)	31537-51X14
	4.6 (0.181)	31537-51X15
	4.8 (0.189)	31537-51X64
	5.0 (0.197)	31537-51X65
	5.2 (0.205)	31537-51X66

Specifications and Adjustment (Cont'd)

Low & reverse brake		
Number of drive plates	8	
Number of driven plates	8	
Thickness of drive plate mm (in)		
Standard	1.52 - 1.67 (0.0598 - 0.0657)	
Wear limit	1.4 (0.055)	
Clearance mm (in)		
Standard	0.5 - 0.8 (0.020 - 0.031)	
Allowable limit	2.4 (0.094)	
Thickness of retaining plate	Thickness mm (in)	Part number
	4.2 (0.165)	31667-51X10
	4.4 (0.173)	31667-51X00
	4.6 (0.181)	31667-51X01
	4.8 (0.189)	31667-51X02
	5.0 (0.197)	31667-51X03
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 clutch housing and torque converter	22.0 mm (0.866 in) or more
Drive plate runout limit	0.5 mm (0.020 in)

PROPELLER SHAFT & DIFFERENTIAL CARRIER

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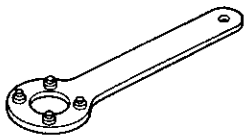
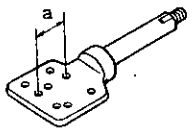
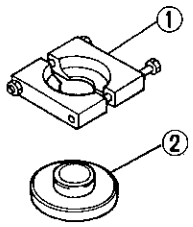
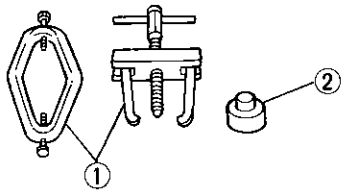
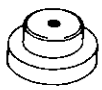
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- Tooth Contact 22

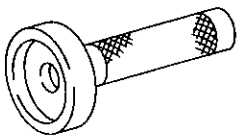
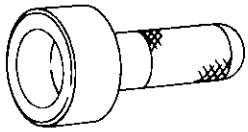
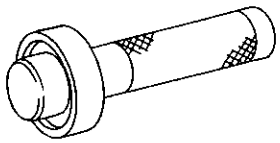
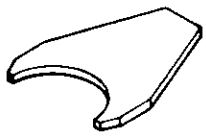
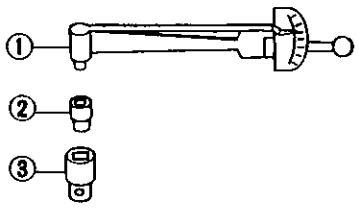
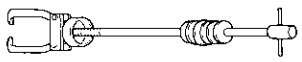
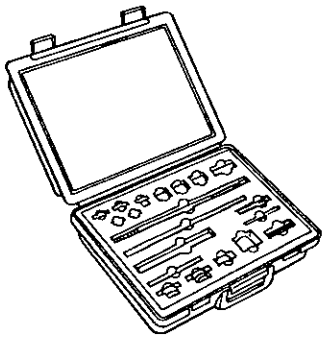
ASSEMBLY 24
- Differential Case 24
- Differential Carrier 25

SERVICE DATA AND SPECIFICATIONS (S.D.S.) 29
- Propeller Shaft 29
- Final Drive 29

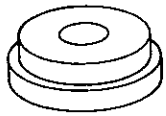
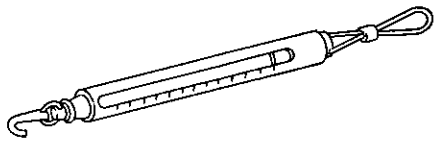
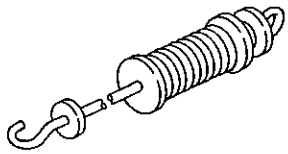
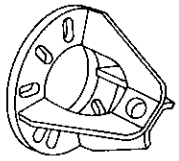
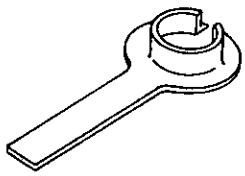
Special Service Tools

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		Mounting final drive (To use, make a new hole.) **a: 156 mm (6.14 in)**
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

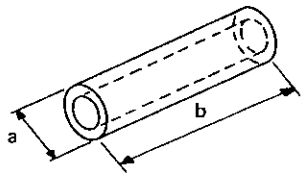
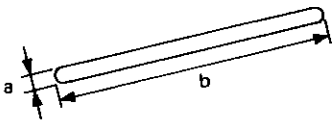
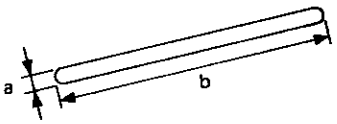
Special Service Tools (Cont'd)

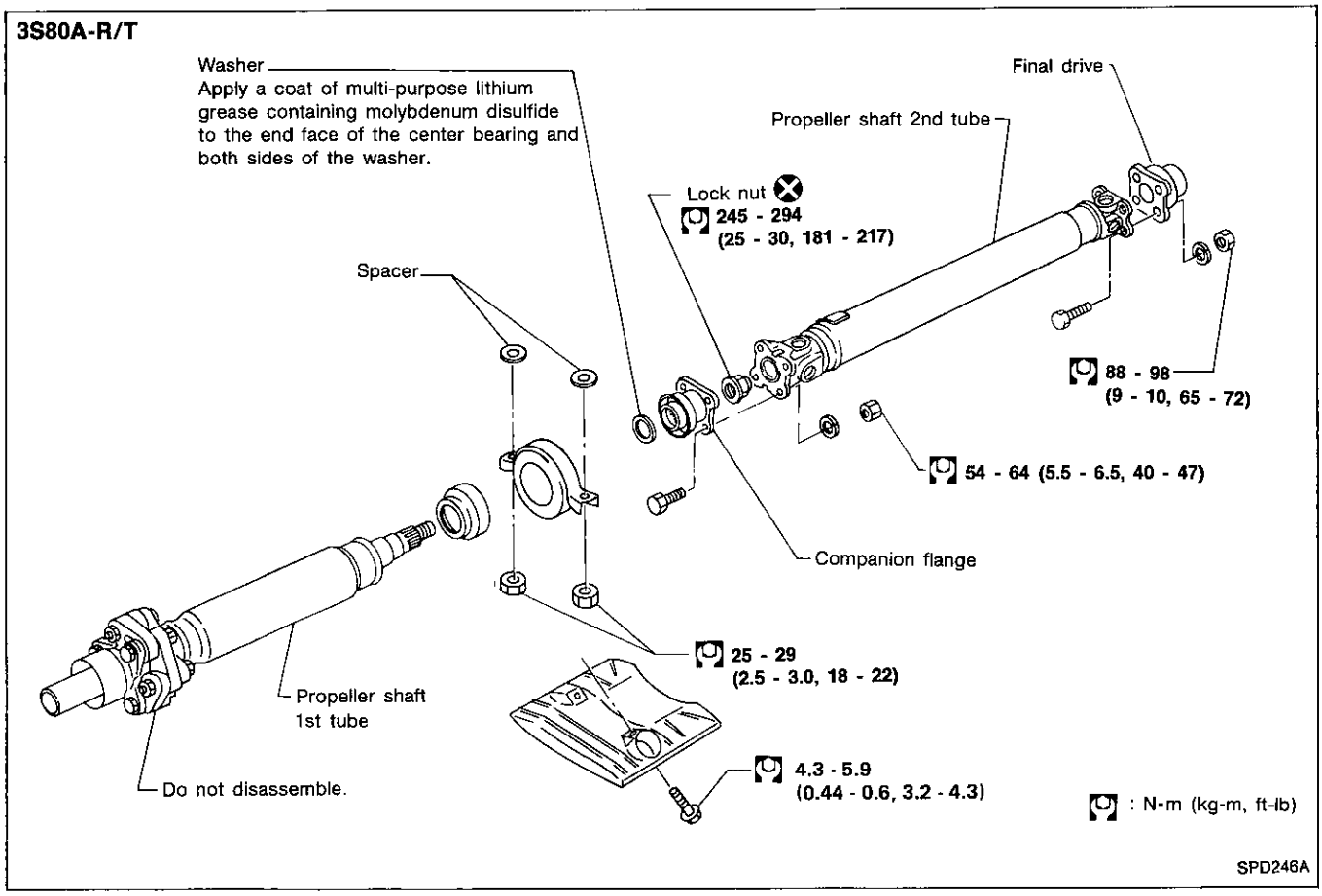
Tool number (Kent-Moore No.) Tool name	Description	
KV38100200 (J26233) Gear carrier side oil seal drift		Installing side oil seal
KV38100500 (—) Gear carrier front oil seal drift		Installing front oil seal
KV38100300 (J25523) Differential side bearing inner cone		Installing side bearing inner cone
KV38100600 (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

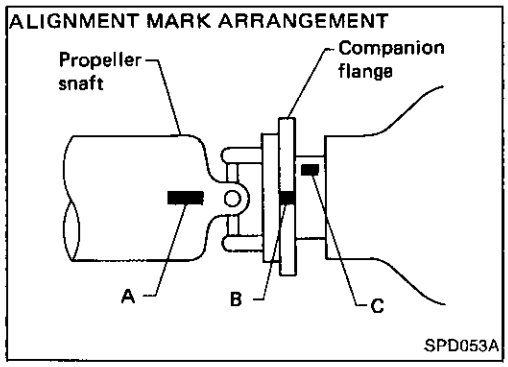
Special Service Tools (Cont'd)

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
ST36230000 (J25840-A) Sliding hammer		Removing final drive side flange
KV40104100 (—) Axle stand		Removing final drive side flange
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

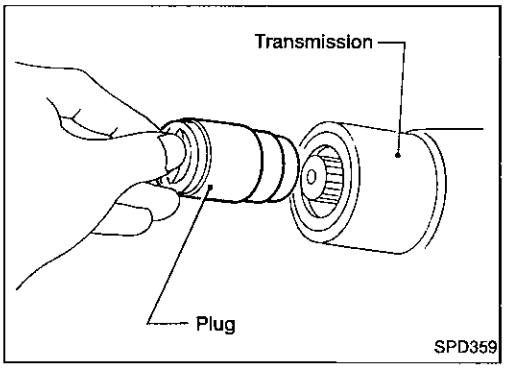
If vibration is present at high speed, check mounting between propeller shaft and companion flange.

Make sure alignment marks A and B are located as close to each other as possible.

If not, change mounting as indicated in "Installation".

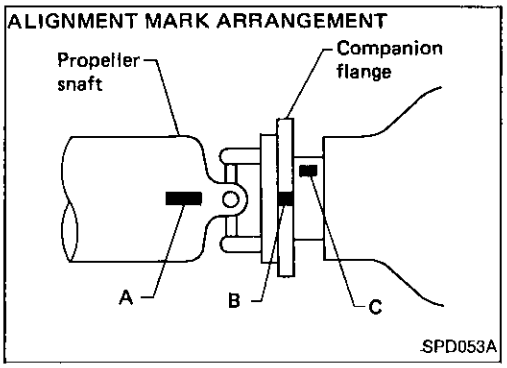
APPEARANCE CHECKING

- 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.



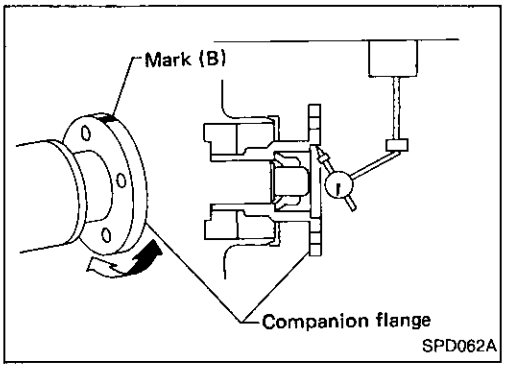
Removal

- Draw out propeller shaft from transmission and plug up rear end of transmission rear extension housing.

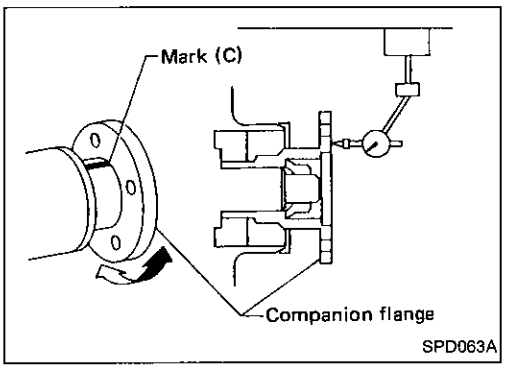


Installation

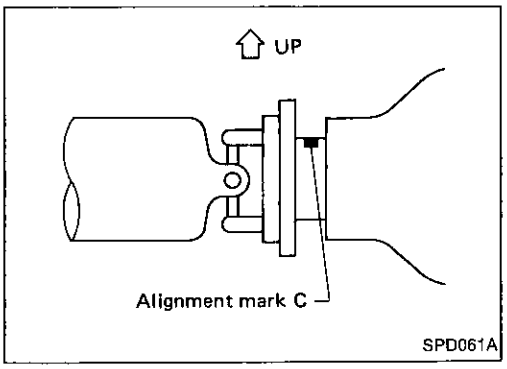
If companion flange has been removed, put new alignment marks B and C on it before reassembling using the following procedure. (When final drive and propeller shaft are separated from each other or when either part is replaced with a new one, perform step 4.)



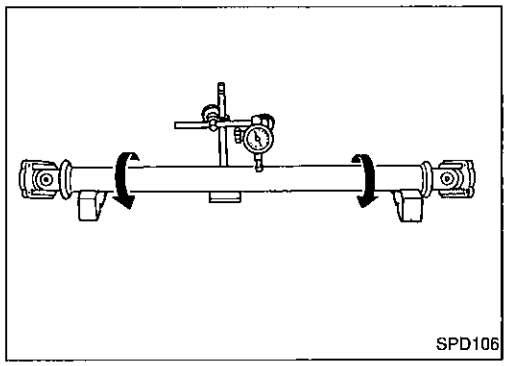
1. Erase original marks B and C from companion flange with suitable solvent.
2. Mark (B)
   A. Measure companion flange vertical runout.
   B. Determine the position where maximum runout is read on dial gauge. Put mark (shown by B in figure at left) on flange perimeter corresponding to maximum runout 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.

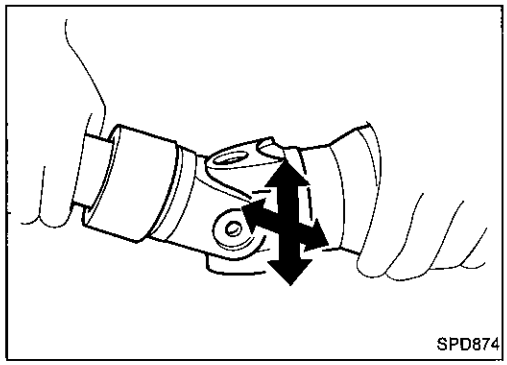


4. Position companion flange and propeller shaft so that alignment marks A and B are as close to each other as possible. Temporarily attach bolts and nuts.
5. While pressing down propeller shaft with alignment mark C facing upward, tighten the lower nut to specified torque.
6. Tighten remaining nuts to specified torque.


SPD106

Inspection

- Inspect propeller shaft runout. If runout exceeds specifications, replace propeller shaft assembly.
  Runout limit: 0.6 mm (0.024 in)

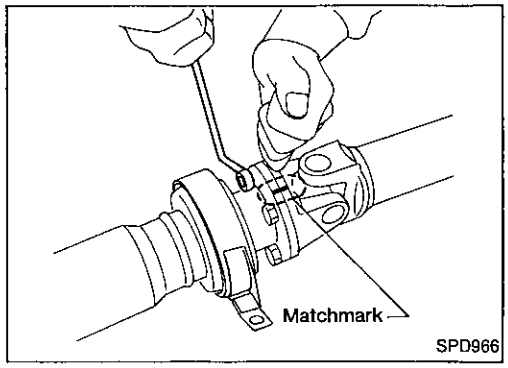

SPD874

- Inspect journal axial play.
  If the play exceeds specifications, replace propeller shaft assembly.
  Journal axial play:
  0 mm (0 in)

Disassembly

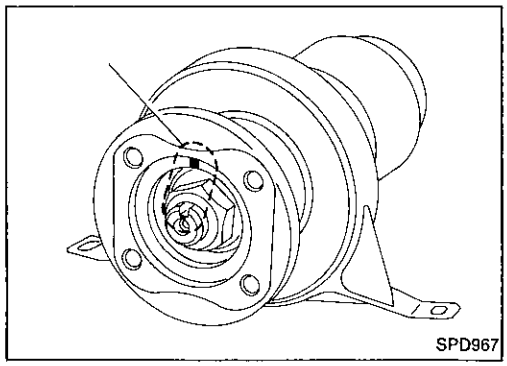
CENTER BEARING

1. Put matchmarks on flanges, and separate 2nd tube from 1st tube.

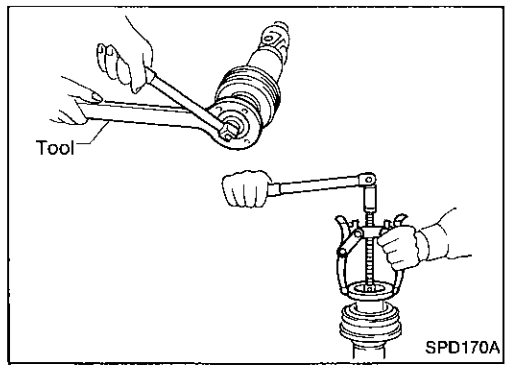


SPD966

2. Put matchmarks on the flange and shaft.

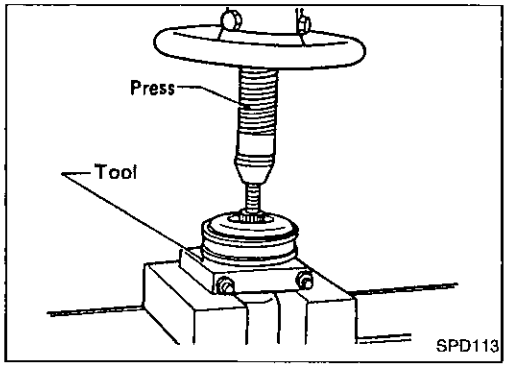

SPD967

3. Remove locking nut with Tool.
   Tool number:
   ST38060002 (J34311)
4. Remove companion flange with puller.



SPD170A

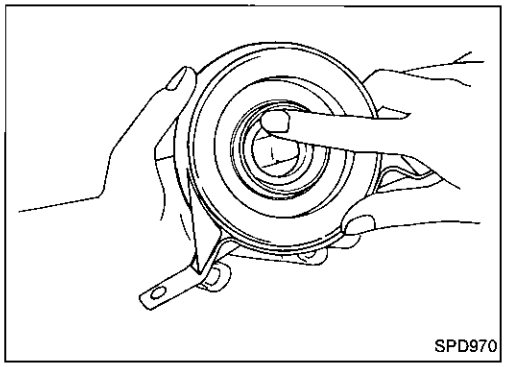
Disassembly (Cont'd)



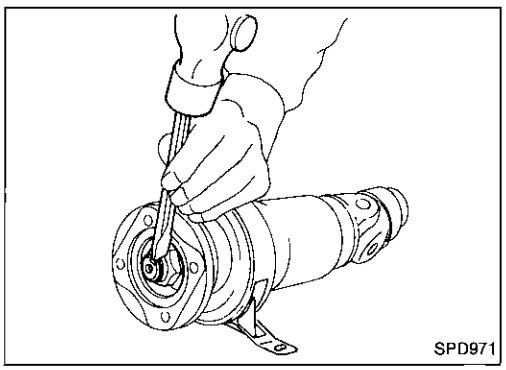
5. Remove center bearing with Tool and press.
   Tool number: ST30031000 (J22912-01)

Assembly

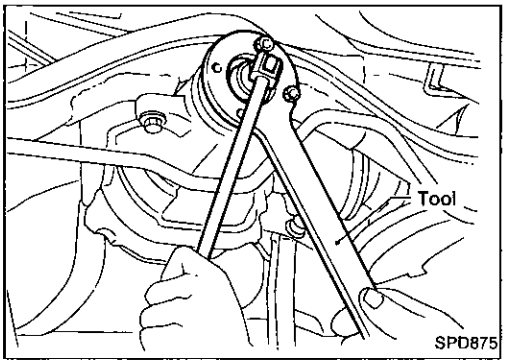
CENTER BEARING



- Install center bearing with insulator's protrusion side facing 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.**

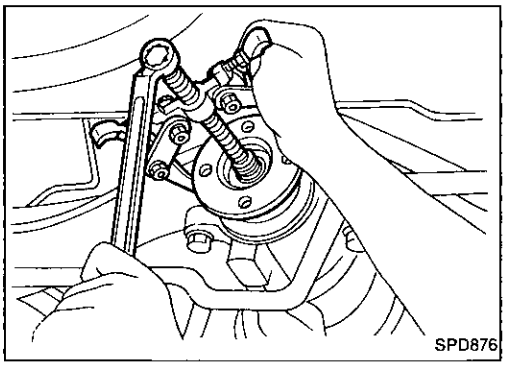


- Stake the nut. Always use new one.
- Align matchmarks when assembling tubes.

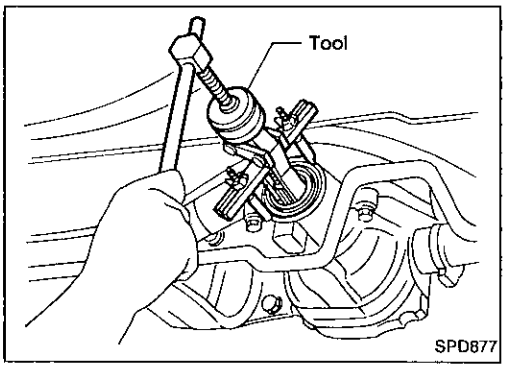


Front Oil Seal Replacement

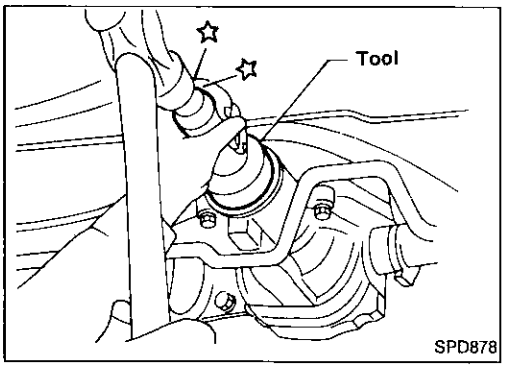
1. Remove propeller shaft.
2. Loosen drive pinion nut with Tool.
   Tool number: ST38060002 (J34311)



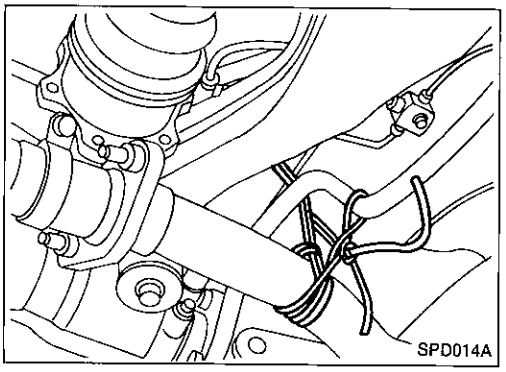
3. Remove companion flange.



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.



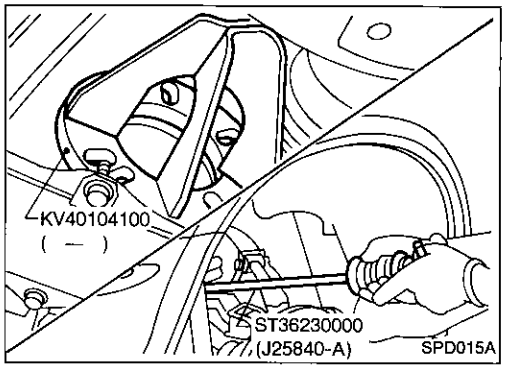
Side Oil Seal Replacement

CAUTION:

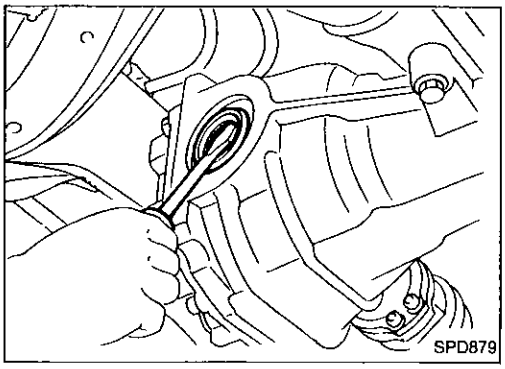
- **Do not damage drive shaft rubber boots with final drive side flange.**
- **Do not tap brake back plate with sliding hammer.**

1. Disconnect final drive side flange and drive shaft flange and suspend drive shaft flange with wire.

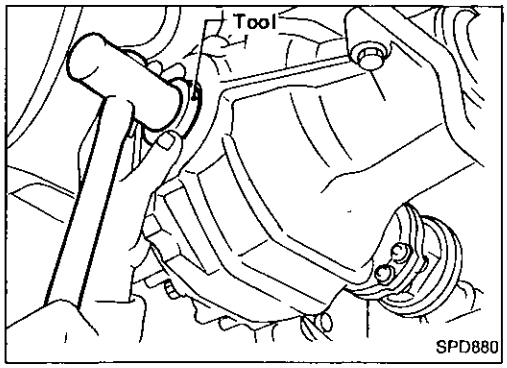
Side Oil Seal Replacement (Cont'd)



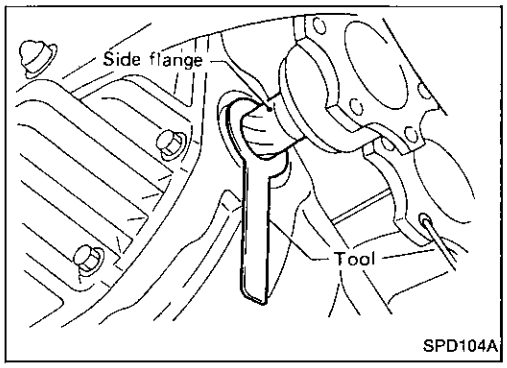
2. Remove final drive side flange with sliding hammer.



3. Remove oil seal.

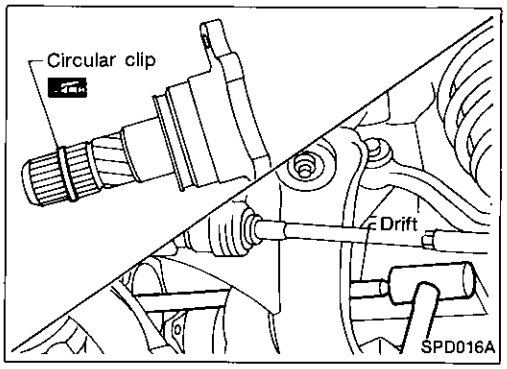


4. Apply multi-purpose grease to sealing lips of new oil seal. Press-fit oil seal into carrier with Tool.
   Tool number: KV38100200 (J26233)



SIDE FLANGE INSTALLATION

Use Tool to prevent side oil seal from being damaged by spline portion of side flange.
Tool number: KV38107900 (J39352)

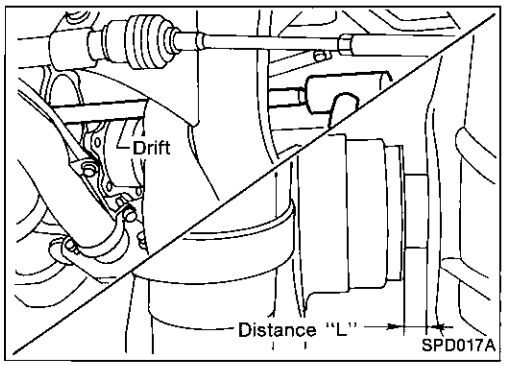


— FOR LEFT SIDE —

5. Centralize circular clip to flange shaft and hold it in place with grease. Then press-fit side flange.
- **Place drift in center of side flange.**
- **Do not hit strut with hammer.**

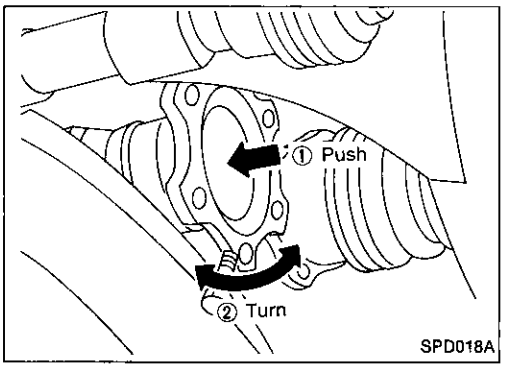
6. Connect side flange and drive shaft with bolts. For details, refer to section RA.

Side Oil Seal Replacement (Cont'd)

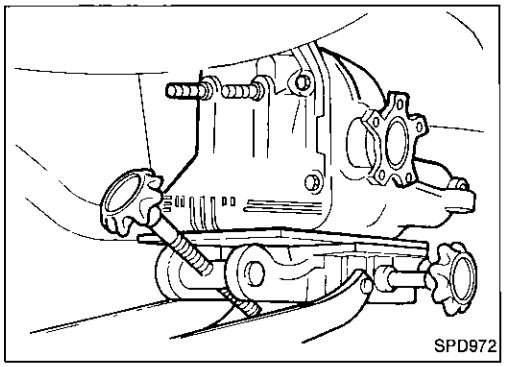


— FOR RIGHT SIDE —

5. Press-fit side flange until distance "L" is approximately 12 mm (0.47 in).
   - **Place drift in center of side flange.**
   - **Do not hit strut with hammer.**



6. Push side flange and turn it by hand until it cannot be turned.
7. Press-fit side flange again.
8. Connect side flange and drive shaft with bolts. For details, refer to section RA.



Removal

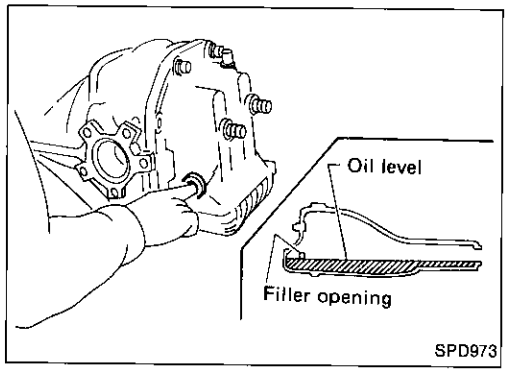
- Remove exhaust tube.
- Remove propeller shaft.

Plug up rear end of transmission rear extension housing.

- Remove drive shafts.
  Refer to RA section.
- Remove sensor.
- Remove nuts securing final drive rear cover to suspension member.
- Support weight of final drive using jack.
- Remove final drive mounting member from front of final drive.
- Move final drive forward together with jack. Remove rear cover stud bolts from suspension member.
- Lower final drive using jack. Remove jack from rear of vehicle.

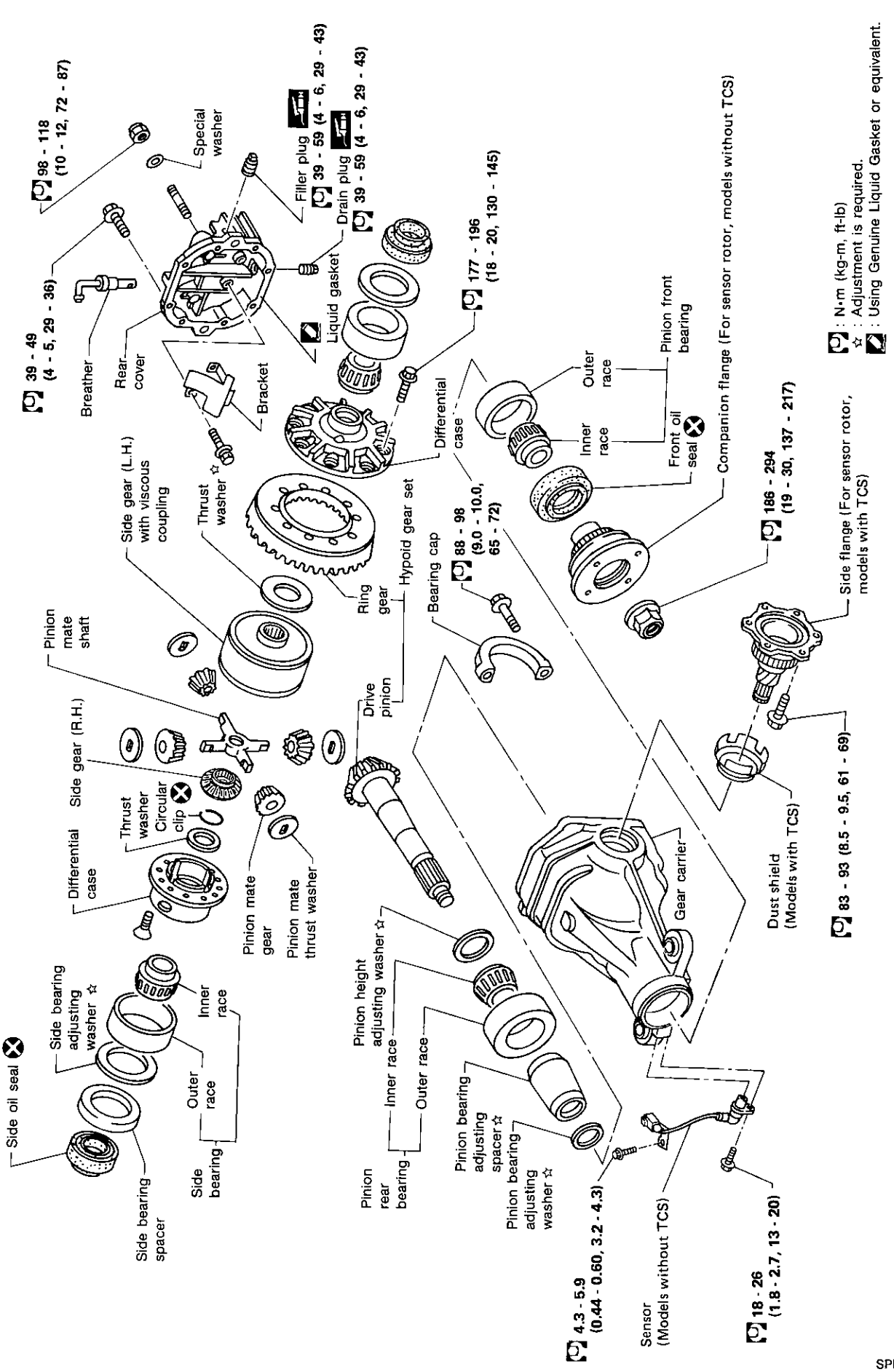
CAUTION:

- **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.**

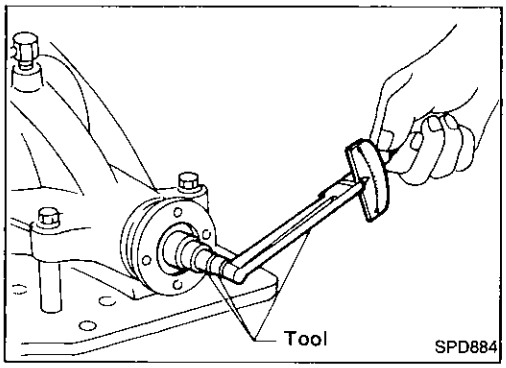


Installation

- Fill final drive with recommended gear oil.


98 - 118 (10 - 12, 72 - 87)
Special washer
Filler plug
39 - 59 (4 - 6, 29 - 43)
Drain plug
39 - 59 (4 - 6, 29 - 43)
39 - 49 (4 - 5, 29 - 36)
Breather
Rear cover
Liquid gasket
Bracket
177 - 196 (18 - 20, 130 - 145)
Outer race
Pinion front bearing
Inner race
Front oil seal
Companion flange (For sensor rotor, models without TCS)
Differential case
Thrust washer ☆
Side gear (L.H.) with viscous coupling
Hypoid gear set
Ring gear
Bearing cap
88 - 98 (9.0 - 10.0, 65 - 72)
186 - 294 (19 - 30, 137 - 217)
Side flange (For sensor rotor, models with TCS)
Pinion mate shaft
Drive pinion
Side gear (R.H.)
Thrust washer
Circular clip
Differential case
Pinion mate gear
Pinion mate thrust washer
Dust shield (Models with TCS)
83 - 93 (8.5 - 9.5, 61 - 69)
Gear carrier
Side oil seal
Side bearing adjusting washer ☆
Inner race
Outer race
Side bearing
Side bearing spacer
Pinion height adjusting washer ☆
Inner race
Outer race
Pinion rear bearing
Pinion bearing adjusting spacer ☆
Pinion bearing adjusting washer ☆
4.3 - 5.9 (0.44 - 0.60, 3.2 - 4.3)
Sensor (Models without TCS)
18 - 26 (1.8 - 2.7, 13 - 20)
: N·m (kg-m, ft-lb)
☆ : Adjustment is required.
: Using Genuine Liquid Gasket or equivalent.

SPD235A

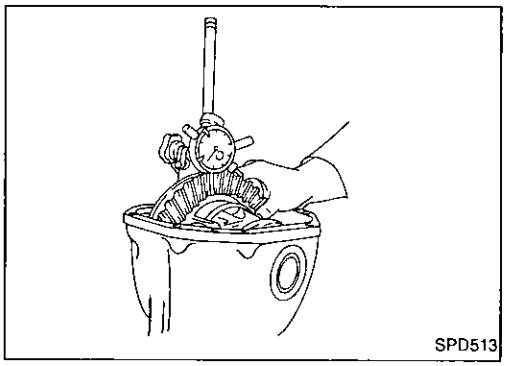


Pre-inspection

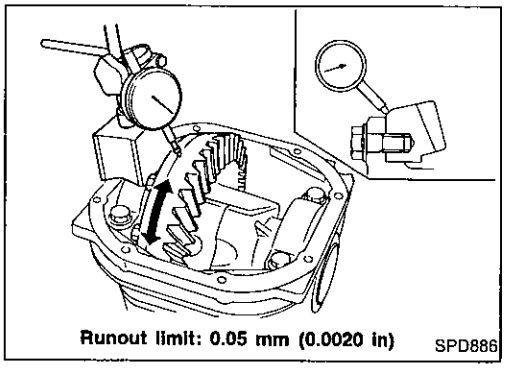
Before disassembling final drive, perform the following inspection.

- Total preload

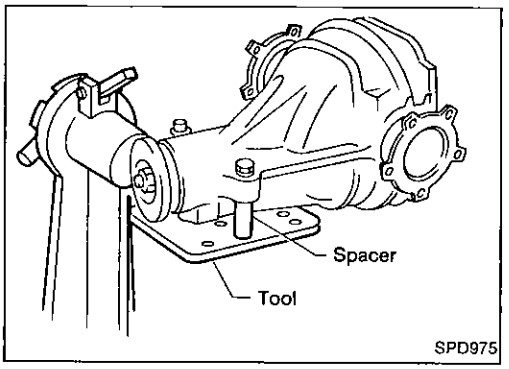
1) Turn drive pinion in both directions several times to set bearing rollers.
2) Check total preload with Tool.
   Tool number: ST3127S000 (See J25765-A)
   Total preload:
   2.5 - 4.8 N·m (25 - 49 kg-cm, 22 - 43 in-lb)



- Ring gear to drive pinion backlash
  Check ring gear to drive pinion backlash with a dial indicator at several points.
  Ring gear to drive pinion backlash:
  0.10 - 0.15 mm (0.0039 - 0.0059 in)

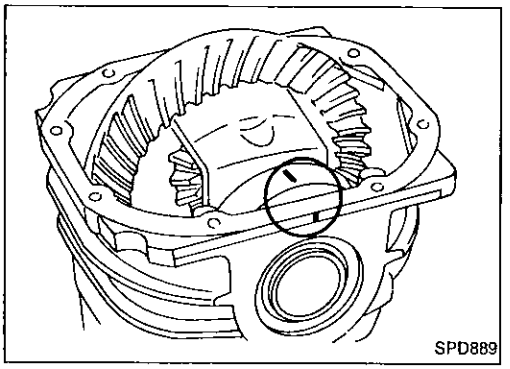


- Ring gear runout
  Check runout of ring gear with a dial indicator.
  Runout limit:
  0.05 mm (0.0020 in)
- Tooth contact
  Check tooth contact. (Refer to Adjustment.)



Differential Carrier

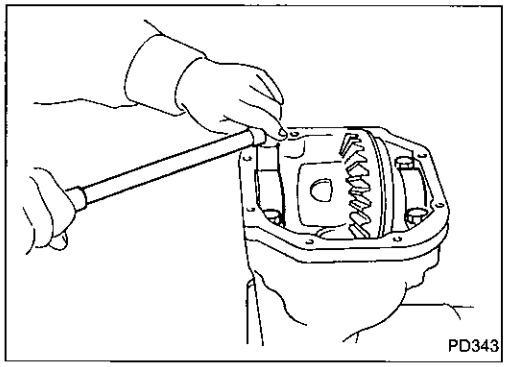
1. Using two 45 mm (1.77 in) spacers, mount carrier on Tool.
   Tool number: KV38100800 (—)



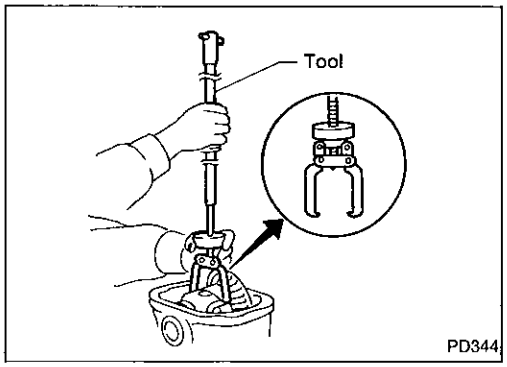
2. Paint or punch matchmarks on one side of the side bearing cap so it can be properly reinstalled.

Bearing caps are line-bored during manufacture. Replace them in their proper positions.

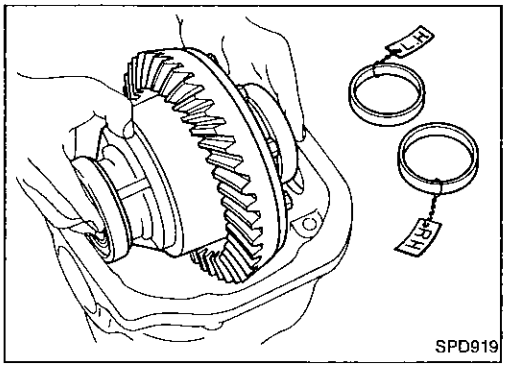
Differential Carrier (Cont'd)



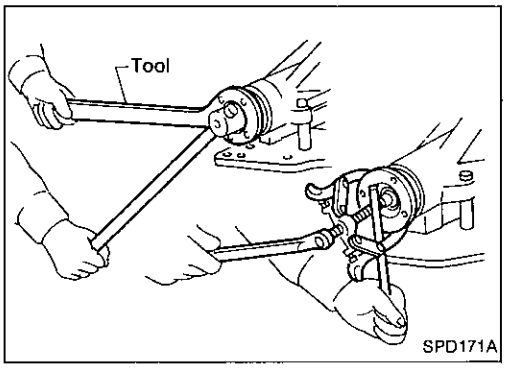
3. Remove side bearing caps.



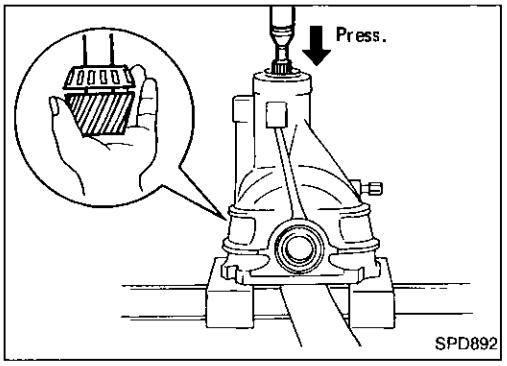
4. Lift differential case assembly out with Tool.
   Tool number: HT72400000 (—)



Keep the side bearing outer races together with inner cone — do not mix them up.

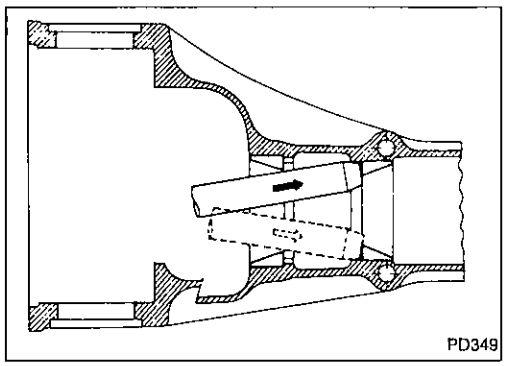


5. Loosen drive pinion nut and pull off companion flange.

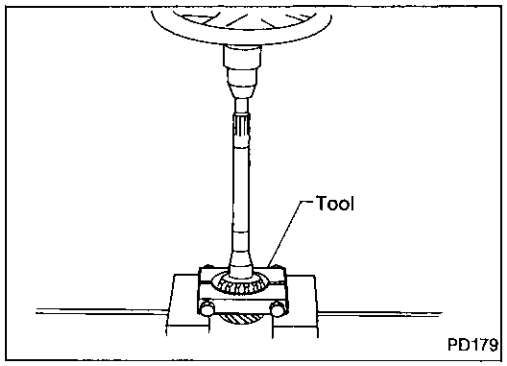


6. Take out drive pinion (together with rear bearing inner race, bearing spacer and adjusting washer).
7. Remove oil seal.
8. Remove front bearing inner race.
9. Remove side oil seal.

Differential Carrier (Cont'd)


PD349

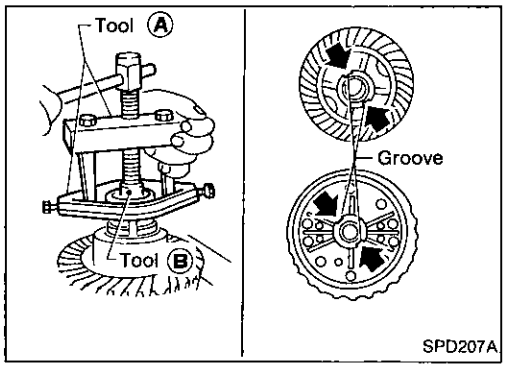
10. Remove pinion bearing outer races with a brass drift.



PD179

11. Remove pinion rear bearing inner race and drive pinion height adjusting washer with Tool.
    Tool number: ST30031000

Differential Case

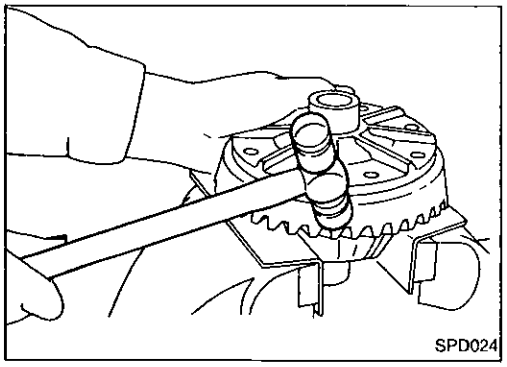


SPD207A

1. Remove side bearing inner cones.

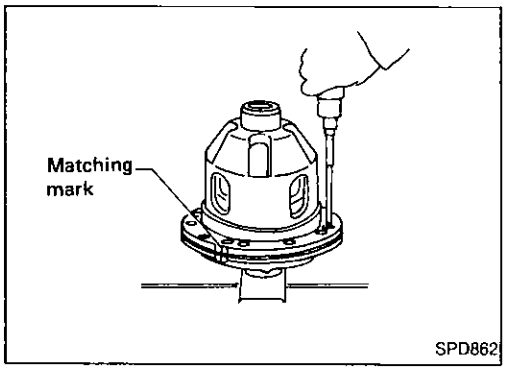
To prevent damage to bearing, engage puller jaws in groove.
Tool number:
Ⓐ ST33051001 (—)
Ⓑ ST33061000 (J8107-2)

Be careful not to mix up the right and left bearing parts. Keep bearing and bearing race together for each side.


SPD024

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.

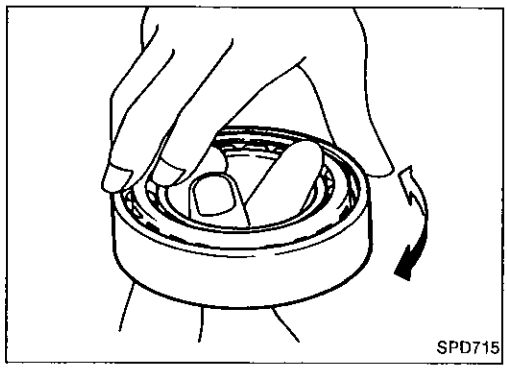


SPD862

4. Loosen screws on differential cases A and B.
5. Separate differential cases A and B.

Ring Gear and Drive Pinion

Check gear teeth for scoring, cracking or chipping. If any part is damaged, replace ring gear and drive pinion as a set (hypoid gear set).

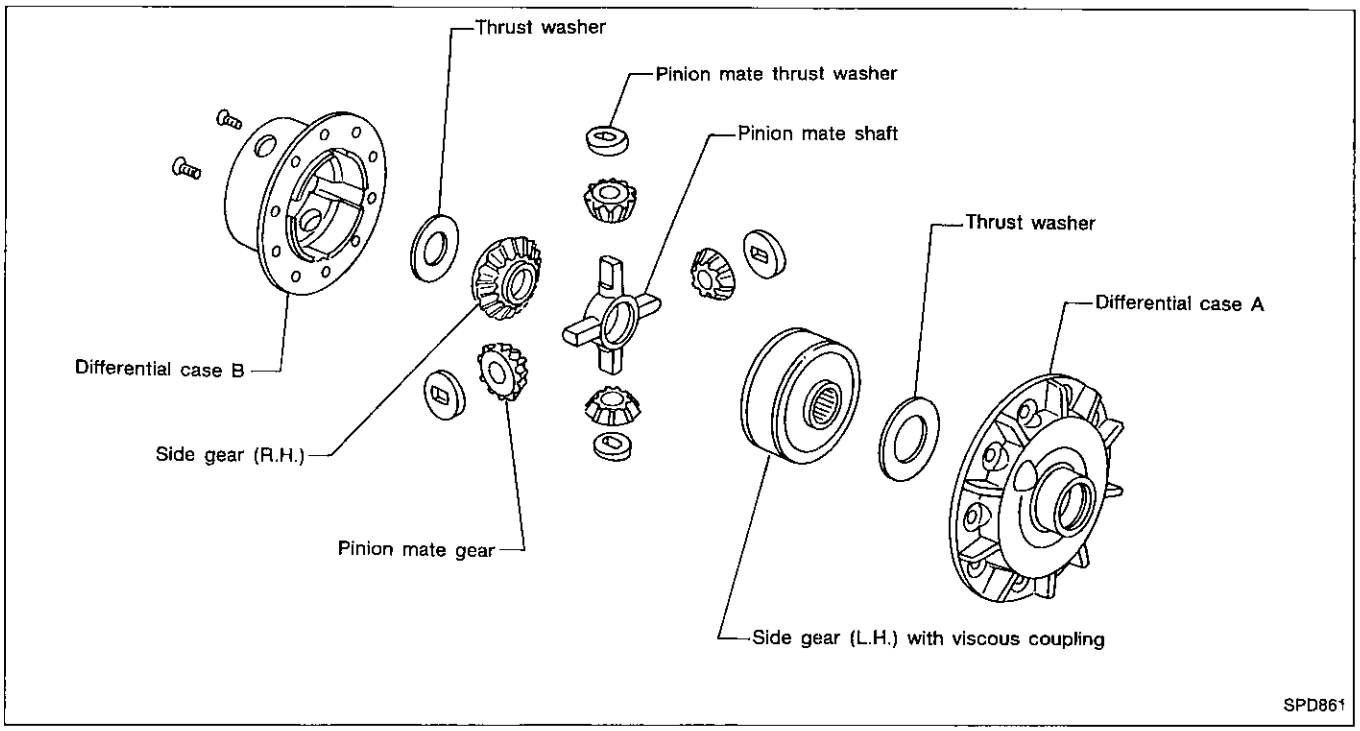


Bearing

1. Thoroughly clean bearing.
2. Check bearings for wear, scratches, pitting or flaking. Check tapered roller bearing for smooth rotation. If damaged, replace outer race and inner cone as a set.

Differential Case Assembly

- Check mating surfaces of differential case, side gears, pinion mate gears, pinion mate shaft and thrust washers.
- Check viscous coupling for oil leakage. If necessary, replace it with new one.

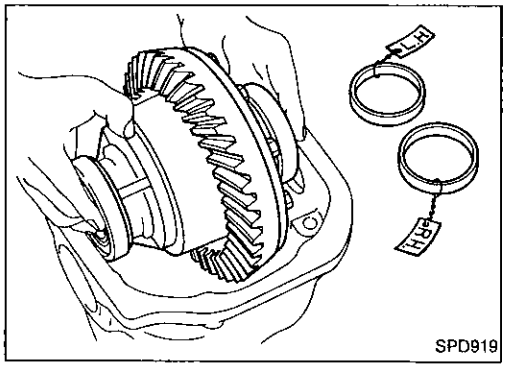


For quiet and reliable final drive operation, the following five adjustments must be made correctly.

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

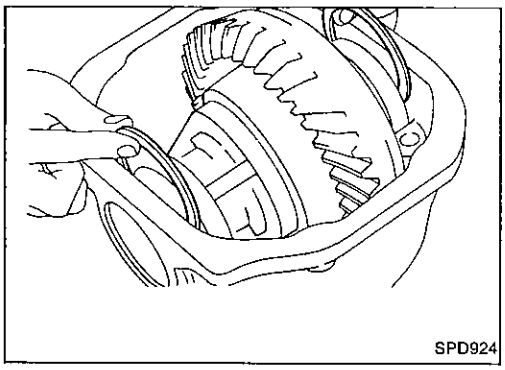
Side Bearing Preload

A selection of carrier side bearing preload shims is required for successful completion of this procedure.

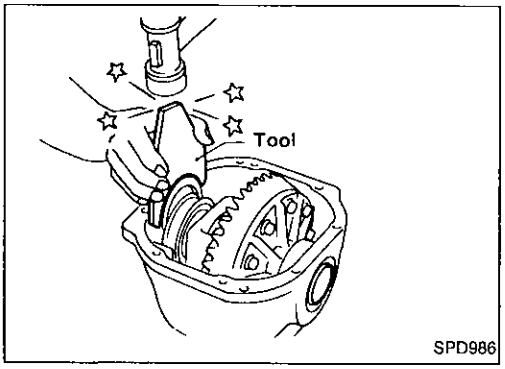


SPD919

1. Make sure all parts are clean and that the bearings are well lubricated with light oil or DEXRON™ II type automatic transmission fluid.
2. Place the differential carrier, with side bearings and bearing races installed, into the final drive housing.


SPD924

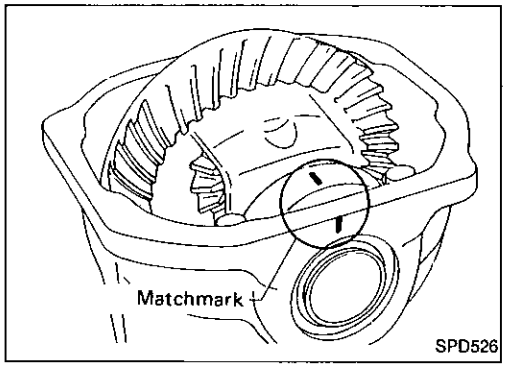
3. Put the side bearing spacer in place on the ring gear end of the carrier.



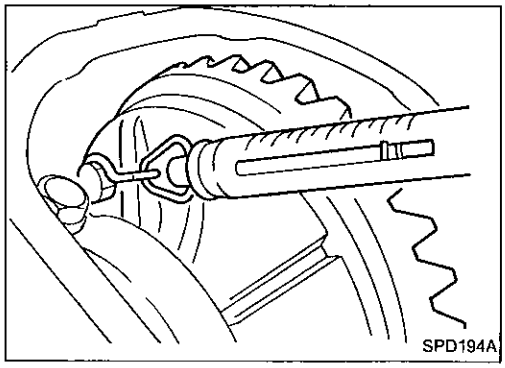
SPD986

4. Using the J25267 side bearing spacer drift, place both of the original carrier side bearing preload shims on the carrier end, opposite the ring gear.

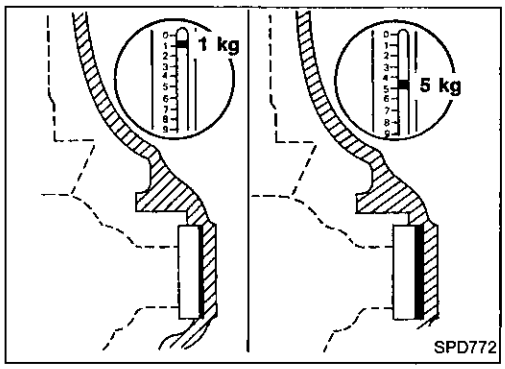
Side Bearing Preload (Cont'd)



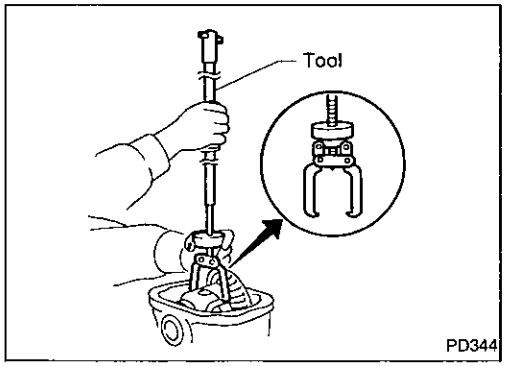
5. Install the side bearing caps in their correct locations and torque the bearing cap retaining bolts.
   Specification:
   88 - 98 N·m (9 - 10 kg-m, 65 - 72 ft-lb)
6. Turn the carrier several times to seat the bearings.



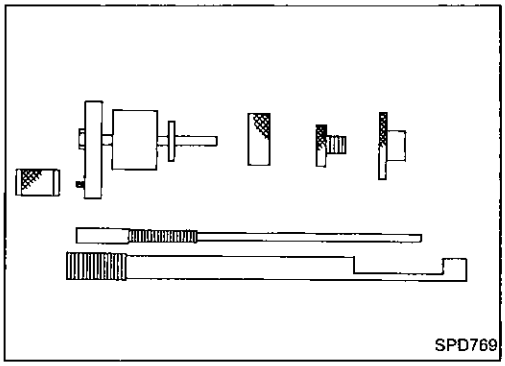
7. Measure the turning torque of the carrier at the ring gear retaining bolts with a spring gauge, J-8129.
   Specification:
   34.3 - 39.2 N (3.5 - 4 kg, 7.7 - 8.8 lb)
   of pulling force at the ring gear bolt



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.



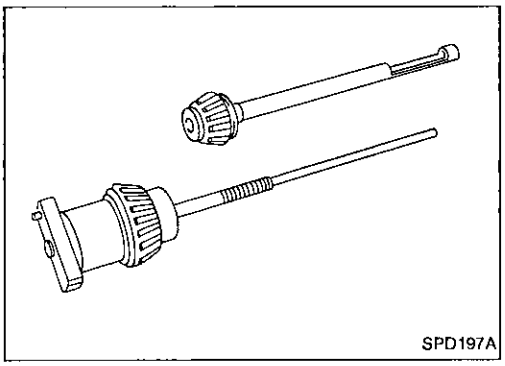
10. Remove the carrier from the final drive housing, saving the selected preload washers for later use during the assembly of the final drive unit.



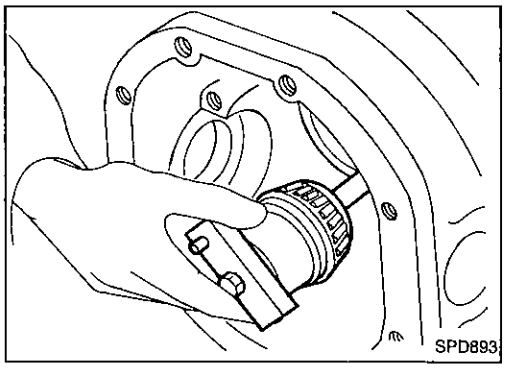
Pinion Gear Height and Pinion Bearing Preload

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, J34309.

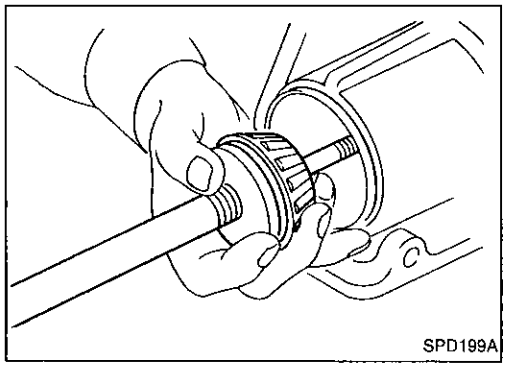
Pinion Gear Height and Pinion Bearing Preload (Cont'd)


SPD197A

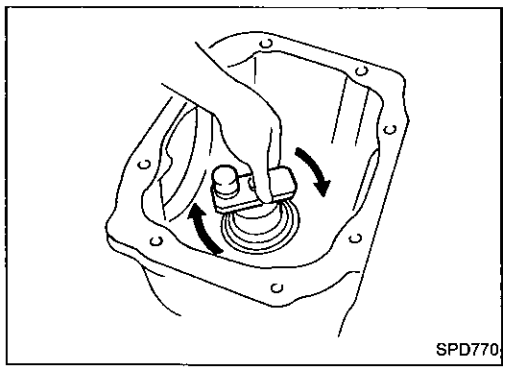
- **Front pinion bearing** — make sure the J34309-3 front pinion bearing seat is secured tightly against the J34309-2 gauge anvil. Then turn the front pinion bearing pilot, J34309-5, to secure the bearing in its proper position.
- **Rear pinion bearing** — the rear pinion bearing pilot, J34309-8, is used to center the rear pinion bearing only. The rear pinion bearing locking seat, J34309-4, is used to lock the bearing to the assembly.
- **Installation of J34309-9 and J34309-16** — place a suitable 2.5 mm (0.098 in) thick plain washer between J34309-9 and J34309-16. Both surfaces of J34309-9 and J34309-16 must be parallel with a clearance of 2.5 mm (0.098 in).


SPD893

3. Place the pinion preload shim selector Tool, J34309-1, gauge screw assembly with the pinion rear bearing inner cone installed into the final drive housing.

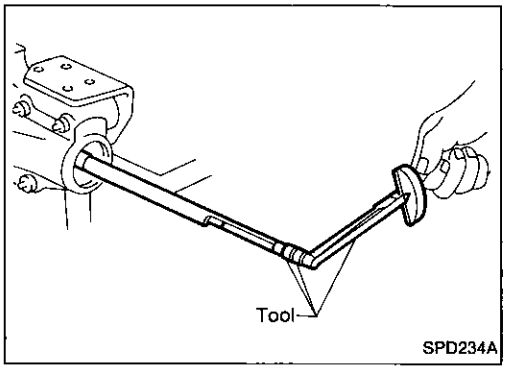

SPD199A

4. Assemble the front pinion bearing inner cone and the J34309-2 gauge anvil together with the J34309-1 gauge screw in the final drive housing. Make sure that the pinion height gauge plate, J34309-16, will turn a full 360 degrees, and tighten the two sections together by hand.

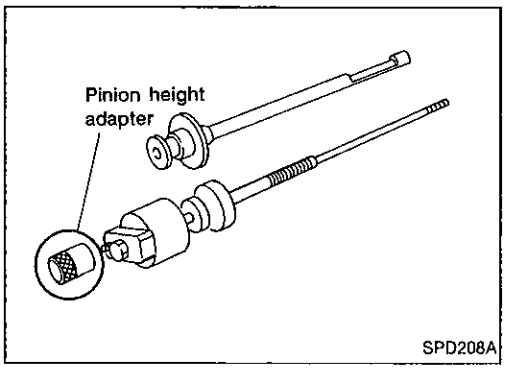

SPD770

5. Turn the assembly several times to seat the bearings.

Pinion Gear Height and Pinion Bearing Preload (Cont'd)

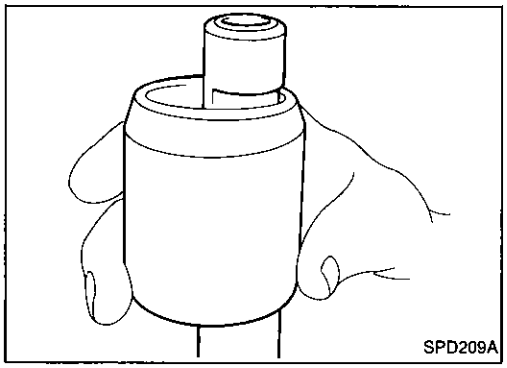


6. Measure the turning torque at the end of the J34309-2 gauge anvil using torque wrench J25765A.
   Turning torque specification:
   1.0 - 1.3 N·m (10 - 13 kg-cm, 8.7 - 11.3 in-lb)



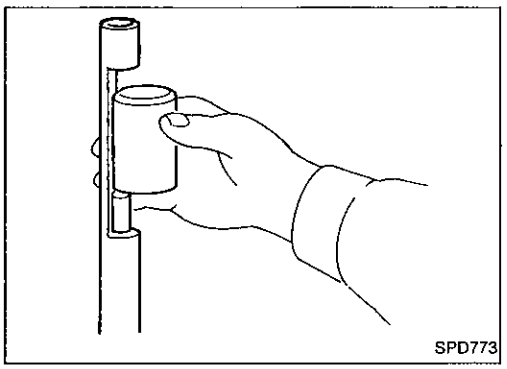
7. Place the J34309-11 "R200A" pinion height adapter onto the gauge plate and tighten it by hand.

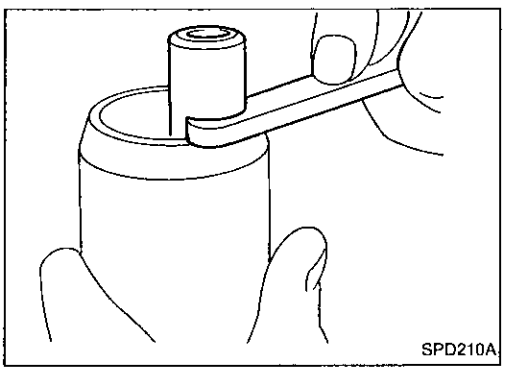
CAUTION:
Make sure all machined surfaces are clean.



— PINION BEARING PRELOAD WASHER SELECTION —

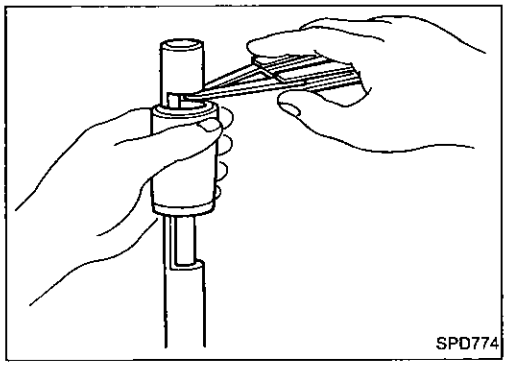
8. Place the solid pinion bearing spacer, small end first, over the J34309-2 gauge anvil and seat the small end squarely against the tip of the J34309-1 gauge screw in the tool recessed portion.





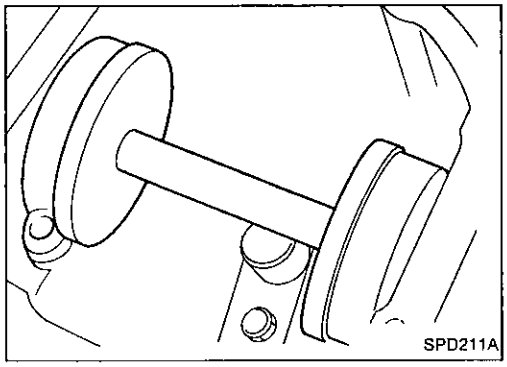
9. Select the correct thickness of pinion bearing preload adjusting washer using a standard gauge of 3.5 mm (0.138 in) and your J34309-101 feeler gauge. The exact measurement you get with your gauges is the thickness of the adjusting washer required. Select the correct washer.
   Drive pinion bearing preload adjusting washer:
   Refer to S.D.S.

Pinion Gear Height and Pinion Bearing Preload (Cont'd)

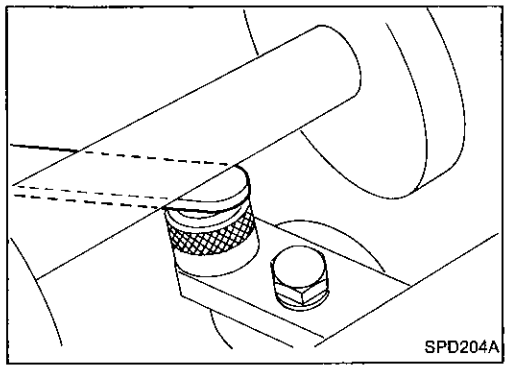

SPD774

10. Set your selected, correct pinion bearing preload adjusting washer aside for use when assembling the pinion gear and bearings into the final drive.

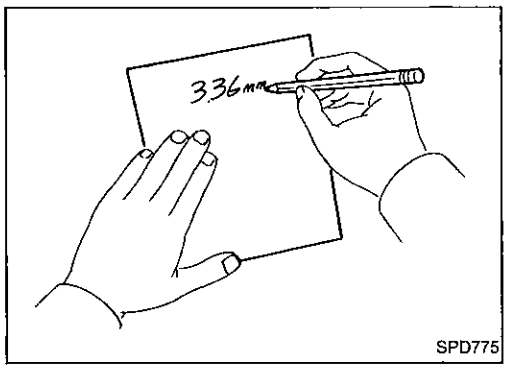
— PINION HEIGHT ADJUSTING WASHER SELECTION —


SPD211A

11. Now, position the side bearing discs, J25269-4, and arbor firmly into the side bearing bores.
    Install the side bearing caps and tighten the cap bolts to proper torque.

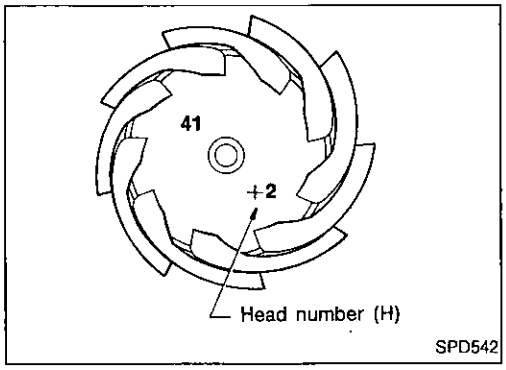

SPD204A

12. Select the correct standard pinion height adjusting washer thickness using a standard gauge of 3 mm (0.12 in) and your J34309-101 feeler gauge. Measure the distance between the J34309-11 pinion height adapter including the standard gauge and the arbor.



SPD775

13. Write down your exact measurement (the value of feeler gauge).



SPD542

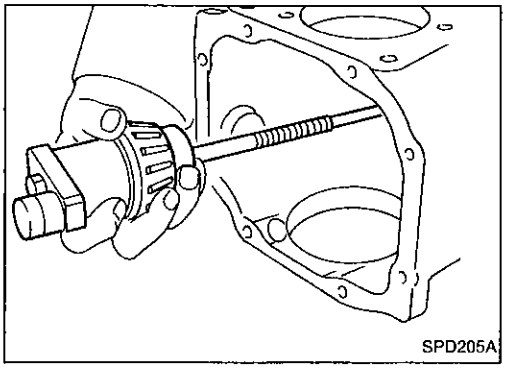
14. Correct the pinion height washer size by referring to the "pinion head number."

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)

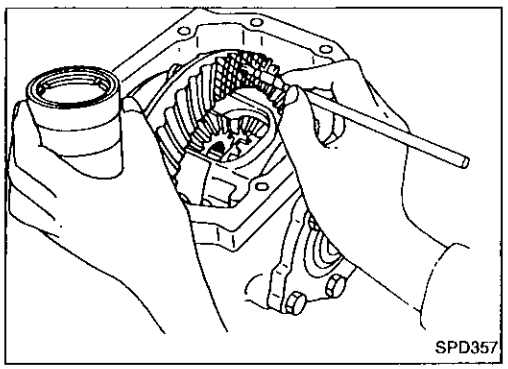
15. Select the correct pinion height washer from the following chart.
    Drive pinion height adjusting washer (R200):
    Refer to S.D.S.


SPD205A

16. Remove the J34309 pinion preload shim selector Tool from the final drive housing and disassemble to retrieve the pinion bearings.

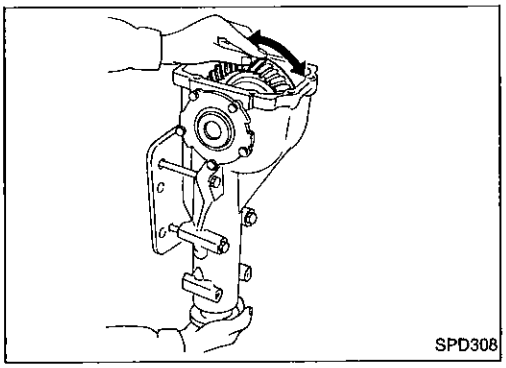
Tooth Contact

Checking gear tooth contact pattern is necessary to verify correct relationship between ring gear and drive pinion.
Hypoid gears which are 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.


SPD357

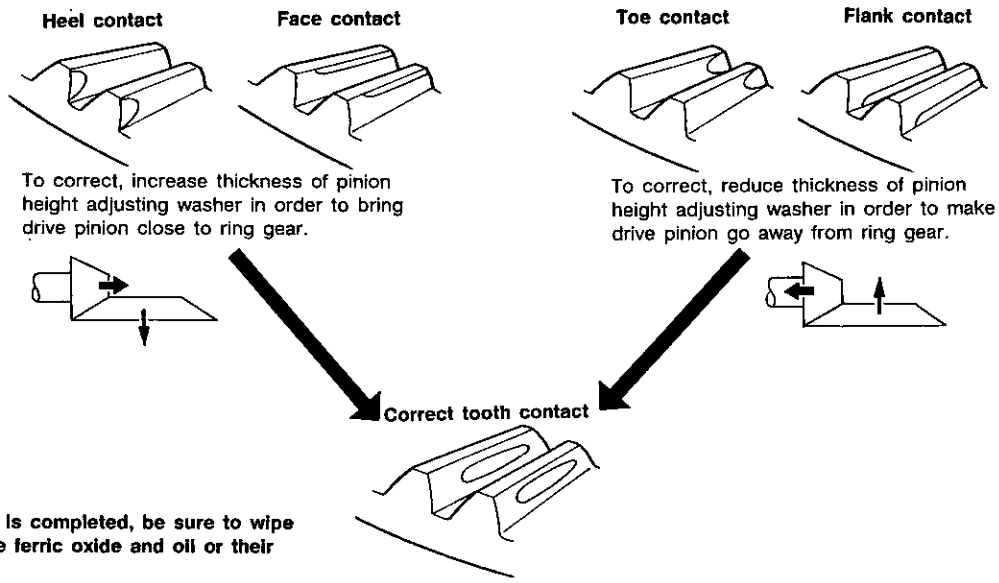
1. Thoroughly clean ring gear and drive pinion teeth.
2. Sparingly apply a mixture of powdered titanium oxide and oil or equivalent to 3 or 4 teeth of ring gear drive side.

Tooth Contact (Cont'd)


SPD308

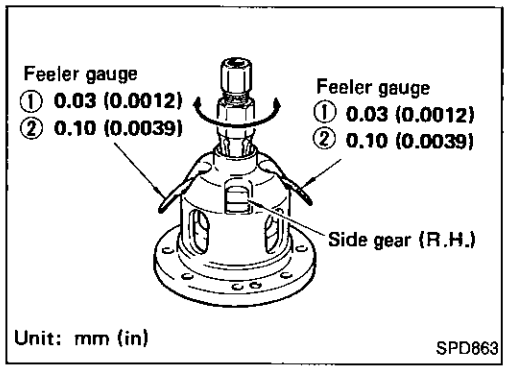
3. Hold companion flange steady by hand and rotate the ring gear in both directions.

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



Differential Case

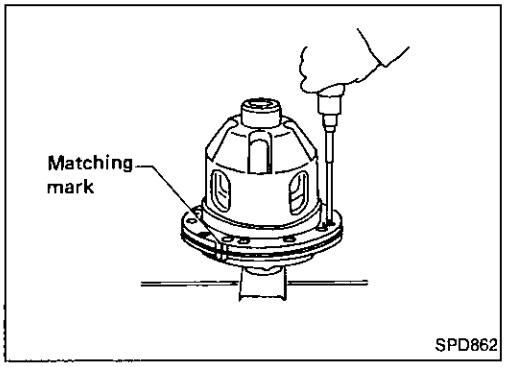
Whenever side gears or pinion mate gears are replaced, selection of thrust washers should be carried out.
Before selecting thrust washers, make sure all parts are clean and well lubricated with hypoid gear oil.

THRUST WASHER SELECTION

1. Install the previously removed thrust washer on right side gear. On left side gear, install a suitable thrust washer. Temporarily tighten differential cases using two screws.
2. Position differential assembly so that right side gear is on the upper side. Place two feeler gauges with thickness of 0.03 mm (0.0012 in) between right side gear and thrust washer as shown at left.

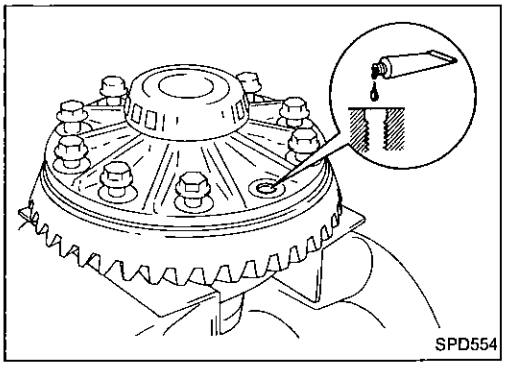
Do not insert feeler gauge in oil groove portion of differential case.

3. Rotate right side gear with a suitable tool attached to splines.
   If right side gear cannot be rotated, replace thrust washer used on left side gear with a thinner one.
4. Replace both 0.03 mm (0.0012 in) feeler gauges with 0.10 mm (0.0039 in) gauges. At this point, make sure right side gear does not rotate. If it does, replace thrust washer on left side gear with a thicker one so that right side gear does not rotate.



ASSEMBLY

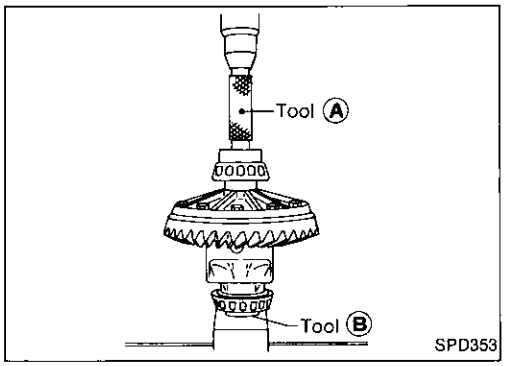
1. Install differential case A and B.



2. Place differential case on ring gear.
3. Apply locking sealant to ring gear bolts, and install them.

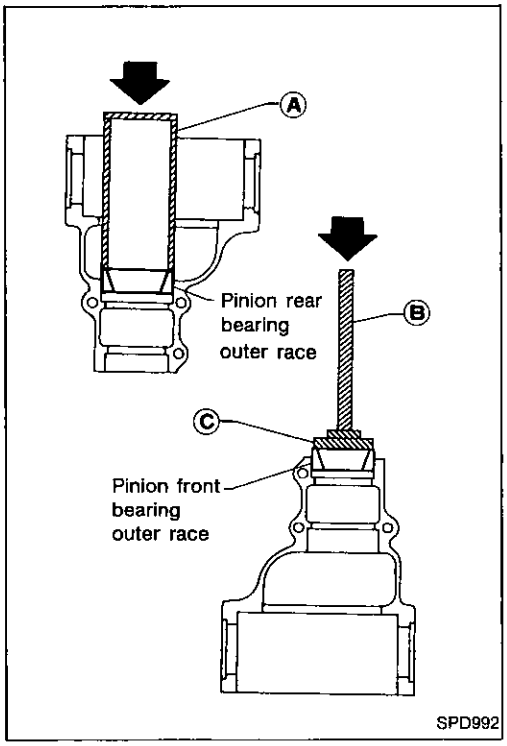
Tighten bolts in a criss-cross fashion, lightly tapping bolt head with a hammer.

Differential Case (Cont'd)

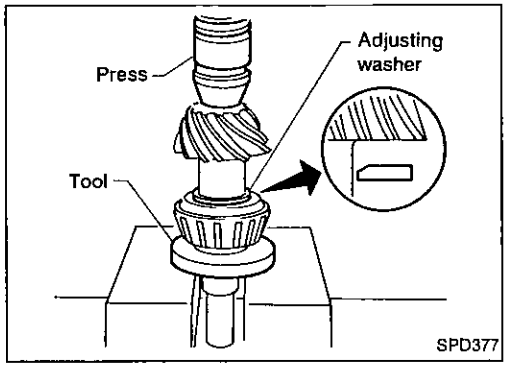


4. Press-fit side bearing inner cones on differential case with Tool.
   Tool number:
   Ⓐ KV38100300 (J25523)
   Ⓑ ST33061000 (J8107-2)

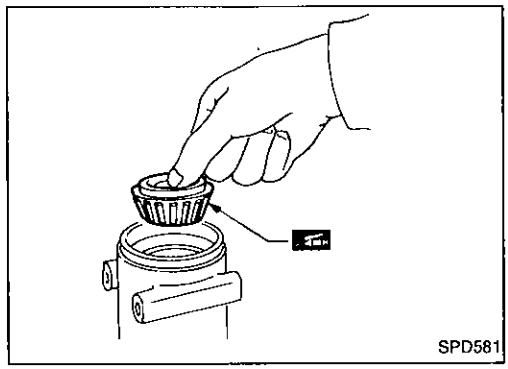
Differential Carrier



1. Press-fit front and rear bearing outer races with Tools.
   Tool number:
   Ⓐ Suitable tool
   Ⓑ ST30611000 (J25742-1)
   Ⓒ ST30613000 (J25742-3)
2. Select pinion bearing adjusting washer and drive pinion bearing spacer, referring to ADJUSTMENT.

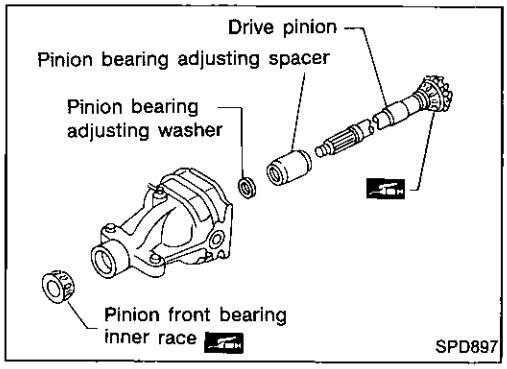


3. Install selected drive pinion height adjusting washer in drive pinion, and press-fit pinion rear bearing inner cone in it, using press and Tool.
   Tool number: ST30901000 (—)



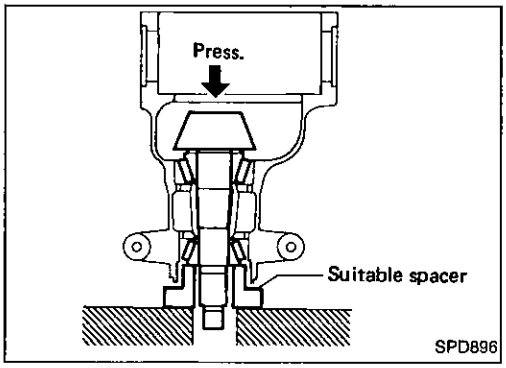
4. Place pinion front bearing inner cone in final drive housing.

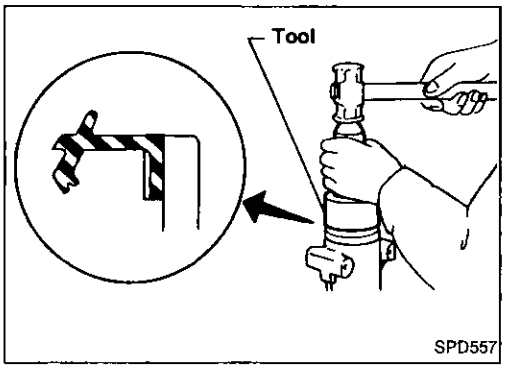
Differential Carrier (Cont'd)



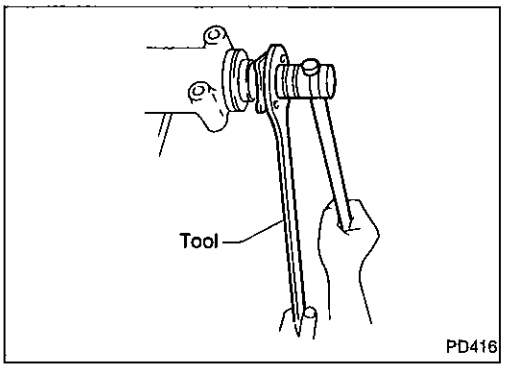
5. Set drive pinion assembly (as shown in figure at left) in differential carrier and install drive pinion, with press and suitable tool.

Stop when drive pinion touches bearing.
Apply multi-purpose grease to pinion rear bearing inner race, pinion front bearing inner race and front pilot bearing.



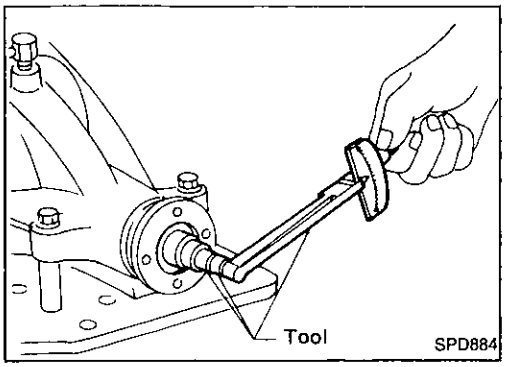


6. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install front oil seal with Tool.
   Tool number: KV38100500 (—)



7. Install companion flange, and tighten pinion nut to specified torque with Tool.

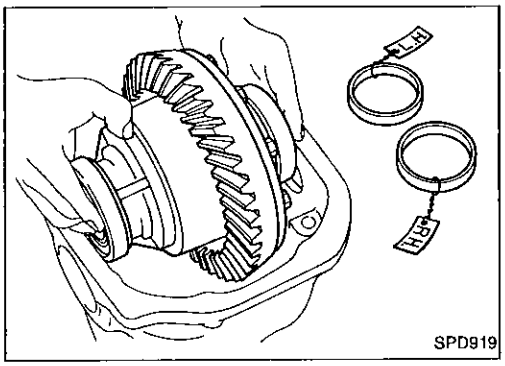
Make sure that threaded portion of drive pinion and pinion nut are free from oil or grease.
Tool number: ST38060002 (J34311)



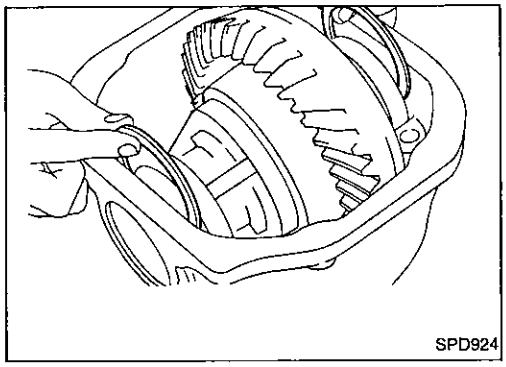
8. Turn drive pinion in both directions several times, and measure pinion bearing preload.
   Pinion bearing preload:
   1.1 - 1.7 N·m (11 - 17 kg-cm, 9.5 - 14.8 in-lb)

When pinion bearing preload is outside the specifications, replace pinion bearing adjusting washer and spacer with a different thickness.

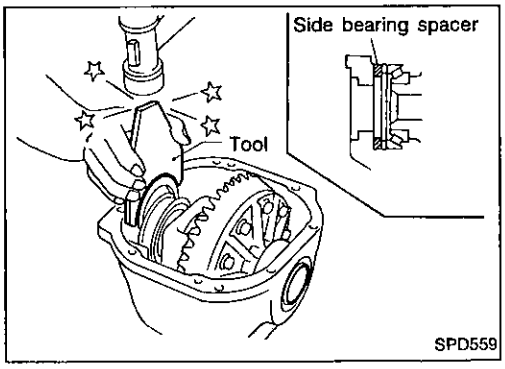
Differential Carrier (Cont'd)



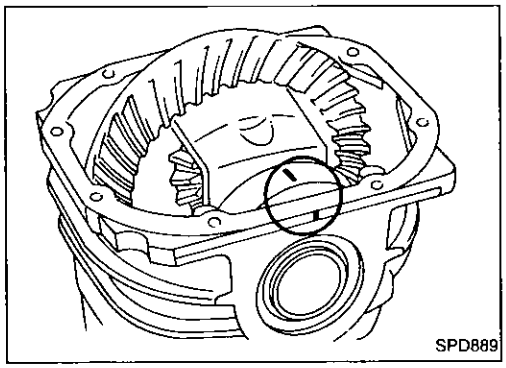
9. Select side bearing adjusting washer.
   Refer to ADJUSTMENT.
10. Install differential case assembly with side bearing outer races into gear carrier.



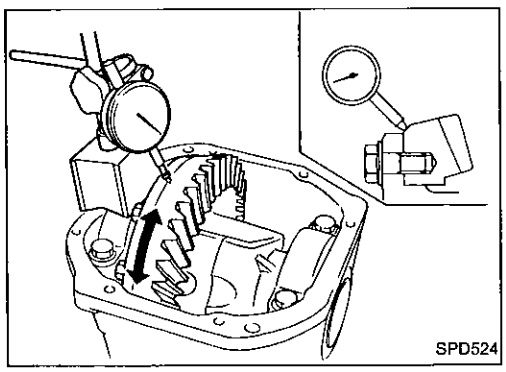
11. Insert left and right side bearing adjusting washers in place between side bearings and carrier.



12. Drive in side bearing spacer with Tool.
    Tool number: KV38100600 (J25267)
    Spacer location: Right side



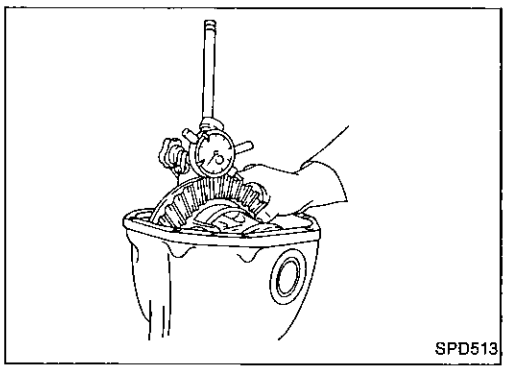
13. Align mark on bearing cap with that on gear carrier and install bearing cap on gear carrier.



14. Check runout of ring gear with a dial indicator.
    Runout limit:
    0.05 mm (0.0020 in)

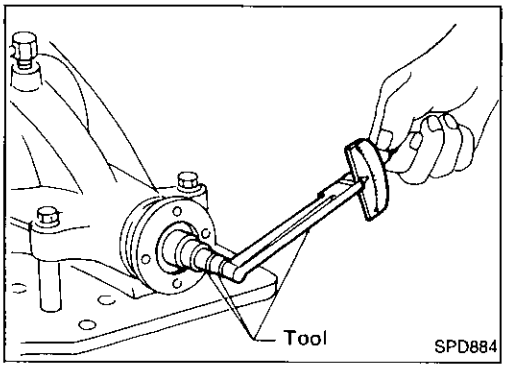
GI
MA
EM
LC
EF & EC
FE
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FA
RA
BR
ST
BF
HA
EL

Differential Carrier (Cont'd)


SPD513

15. Measure ring gear to drive pinion backlash with a dial indicator.
    Ring gear to drive pinion backlash:
    0.10 - 0.15 mm (0.0039 - 0.0059 in)
- If backlash is too small, 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.



SPD884

16. Check total preload with Tool.

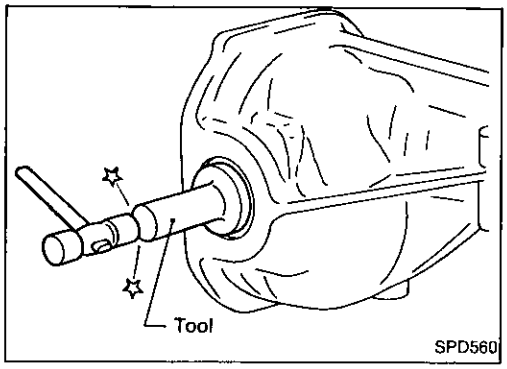
When checking preload, turn drive pinion in both directions several times to seat bearing rollers correctly.
Total preload:
Value 1.4 - 3.1 N·m (14 - 32 kg-cm, 12 - 28 in-lb)
added on measured value of drive pinion preload

- If preload is too great, remove the same amount of shim from each side.
- If preload is too small, add the same amount of shim to each side.

Never add or remove a different number of shims for each side as it will change ring gear to drive pinion backlash.

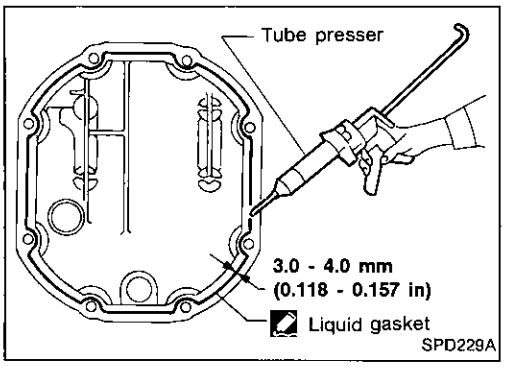
17. Recheck ring gear to drive pinion backlash because increase or decrease in thickness of shims will cause change of ring gear to pinion backlash.
- If backlash varies excessively in different places, foreign matter may be caught between the ring gear and the differential case.
- If the backlash varies greatly when the ring gear runout is within a specified range, replace the hypoid gear set or differential case.

18. Check tooth contact. Refer to ADJUSTMENT.



SPD560

19. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install side oil seal.
    Tool number: KV38100200 (J26233)



SPD229A

20. Install rear cover.

a. Remove all traces of liquid gasket from mating surface of rear cover and gear carrier using a scraper.
b. Apply a continuous bead of liquid gasket only to mating surface of rear cover.

- **Use Genuine Liquid Gasket or equivalent.**
- **Attaching should be done within 5 minutes after coating.**
- **Wait at least 1 hour before refilling gear oil.**
- **For the first 12 hours avoid abrupt acceleration or deceleration.**

Propeller Shaft

GENERAL SPECIFICATIONS

Unit: mm (in)

Propeller shaft model	3S80A-R/T
Number of joints	3
Coupling method with transmission	Sleeve type
Type of journal bearings	Shell type (Non-disassembly type)
Distance between yokes	80 (3.15)
Shaft length (Spider to spider)	
1st	575 (22.64)
2nd	
Without T.C.S.	803 (31.61)
With T.C.S.	818 (32.20)
Shaft outer diameter	
1st	82.6 (3.252)
2nd	
Outer	82.6 (3.252)
Inner	68.9 (2.713)

SPECIFICATIONS AND ADJUSTMENT

Unit: mm (in)

Propeller shaft model	3S80A-R/T
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	3.538
Number of teeth (Ring gear/Drive pinion)	46/13
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 - 1.7 (11 - 17, 9.5 - 14.8)

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
45.60 (1.7953)	38165-10V05
45.90 (1.8071)	38165-10V06
46.20 (1.8189)	38165-10V07
46.50 (1.8307)	38165-10V00
46.80 (1.8425)	38165-10V01

Total preload adjustment

Drive pinion to ring gear backlash mm (in)	0.10 - 0.15 (0.0039 - 0.0059)
Total preload	Value 1.4 - 3.1 N·m (14 - 32 kg-cm, 12 - 28 in-lb) added on measured value of drive pinion preload
Side bearing adjusting method	Adjusting washer

Available side bearing adjusting washers

Thickness mm (in)	Part number
2.00 (0.0787)	38453-N3100
2.05 (0.0807)	38453-N3101
2.10 (0.0827)	38453-N3102
2.15 (0.0846)	38453-N3103
2.20 (0.0866)	38453-N3104
2.25 (0.0886)	38453-N3105
2.30 (0.0906)	38453-N3106
2.35 (0.0925)	38453-N3107
2.40 (0.0945)	38453-N3108
2.45 (0.0965)	38453-N3109
2.50 (0.0984)	38453-N3110
2.55 (0.1004)	38453-N3111
2.60 (0.1024)	38453-N3112
2.65 (0.1043)	38453-N3113

FRONT AXLE & FRONT SUSPENSION

SECTION FA

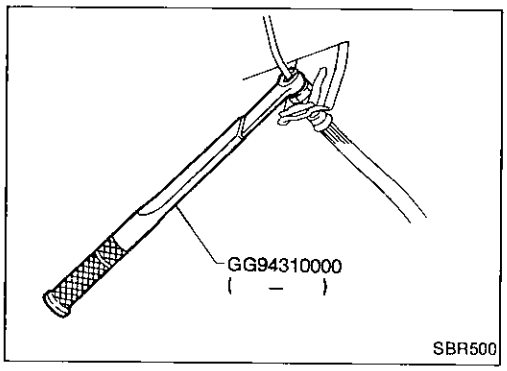
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Note: Refer to Foldout page for "FULL-ACTIVE SUSPENSION WIRING DIAGRAM".

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 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 lines.**

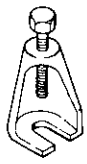
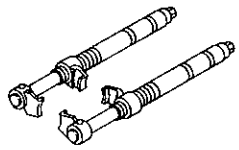
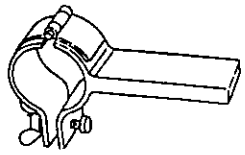
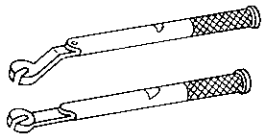
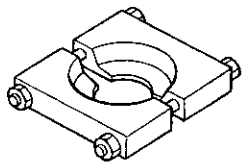
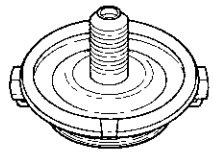
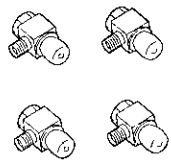
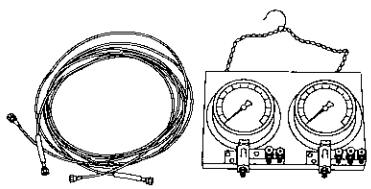
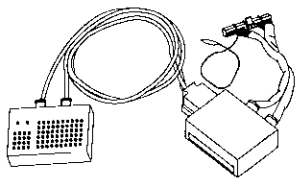
SPECIAL CAUTIONS FOR FULL-ACTIVE SUSPENSION

- Make the best use of CONSULT, the electronic diagnostic tester, during system checks or part replacement.
- Control unit retains self-diagnostic results in memory. Before disconnecting battery terminals or fuse (No. 17) check the self-diagnostic results. Failure to do this may clear important data.
- Do not allow foreign matter to enter any part of active suspensions while removing or installing parts. Carefully observe the following instructions:

(1) Select an area that is clean and free from dust or dirt.
(2) Wash your hands and work with bare hands.
(3) Do not remove plugs (if so equipped) until parts are ready for immediate replacement.

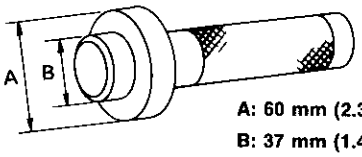
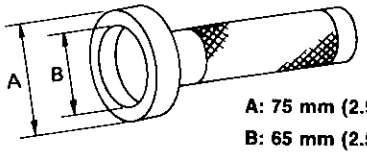
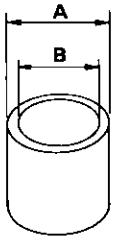
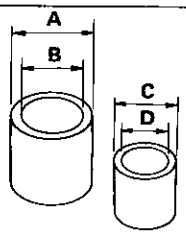
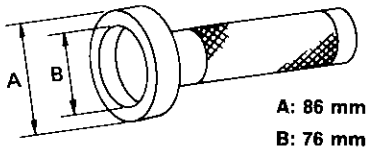
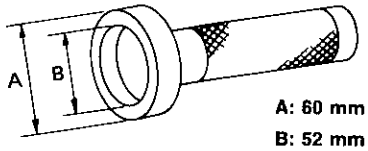
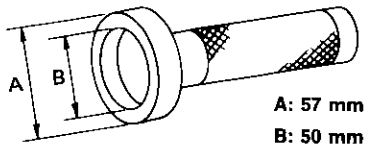
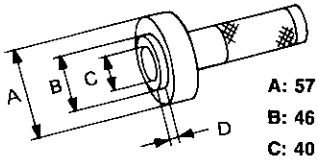
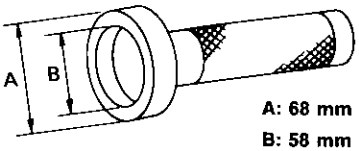
- Pipes are always filled with highly pressurized oil (regardless of ON-OFF engine operation). Be sure to relieve pressure before removing parts.
- Do not disconnect battery terminals nor remove fuses for at least 3 minutes after stopping engine. Doing this may cause vehicle height to change.
- Do not jack up vehicle while engine is operating or for approximately 3 minutes after stopping engine.
- Do not get under vehicle or start engine when lifting vehicle with only a jack.
- Lift vehicle with all wheels off ground and place on rigid racks before working under vehicle.
- When engine stops, vehicle height moves up and down slowly. Wait for at least 3 minutes before inserting your arm into wheelhouse, etc.
- Use only genuine "Fluid A-Active Suspension" in active suspension system.
- Fill reservoir tank with specified amount of fluid. Do not overfill as this may cause fluid to overflow from reservoir tank when oil pressure is relieved from hydraulic lines or before using vehicle after an extended period of time.
- Be extremely careful when opening multivalve unit bypass valve or pressure control unit bypass valve since this may cause vehicle height to decrease abruptly.
- Be extremely careful when loosening air vent bleeders on pressure control units and accumulators because of highly pressurized oil.
- Before disposing of main accumulator, pressure control units or actuators, closely observe instructions on caution labels and completely discharge nitrogen gas from accumulators.
  Each pressure control unit is equipped with a return accumulator and each actuator, with a sub-accumulator.
- Before disposing of pump or pump accumulators, slowly loosen safety plugs to completely discharge nitrogen gas from accumulators. Each gas chamber is filled with oil. Place a cloth around safety plug to prevent oil from spouting out before loosening safety plug.
  Pump is equipped with a small accumulator.

Special Service Tools

Tool number (Kent-Moore No.) Tool name	Description	
ST29020001 (J24319-01) Steering gear arm puller		Removing tie-rod ball joint and lower ball joint
HT71780000 (—) Spring compressor		Removing and installing coil spring
ST35652000 (—) Shock absorber attachment		Fixing shock absorber
GG94310000 (—) Flare nut torque wrench		Removing and installing brake piping
ST30031000 (J22912-01) Bearing inner race puller		Removing bearing inner race
KV99104300 (—) Filler cap adapter		Evacuating pump line
KV991044S0 (—) Oil pressure gauge adapter		Measuring actuator oil pressure
KV991V0010 (—) Brake fluid pressure gauge (Two sets are required)		Measuring actuator oil pressure
EG17710000 (—) Check adapter		Measuring input and output signals of control unit

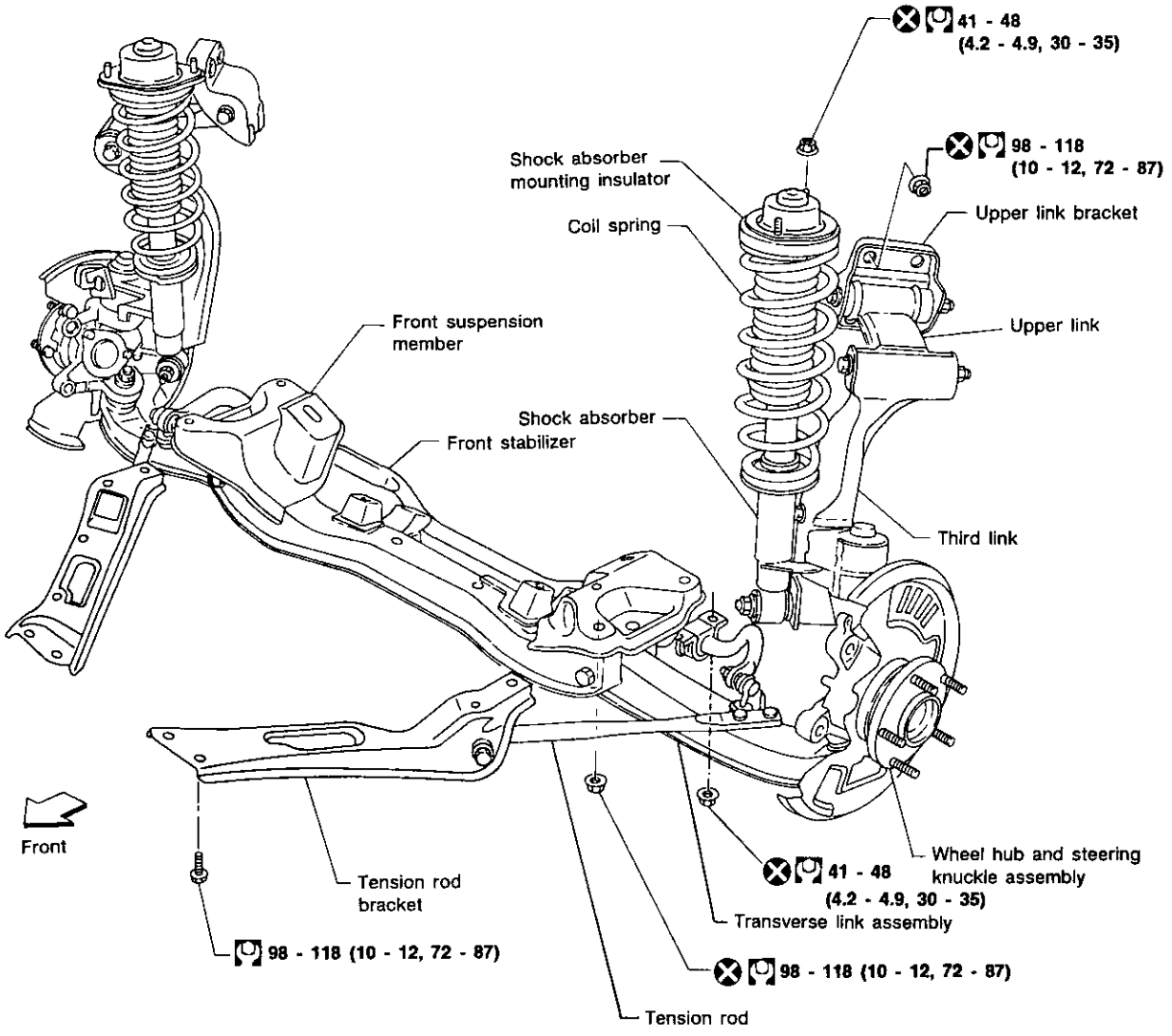
GI MA EM LC EF & EC FE AT PD FA RA BR ST BF HA EL

Commercial Service Tools

Tool name	Description	
Wheel bearing drift	 A: 60 mm (2.36 in) dia. B: 37 mm (1.46 in) dia.	Removing wheel bearing
Wheel bearing drift	 A: 75 mm (2.95 in) dia. B: 65 mm (2.56 in) dia.	Installing wheel bearing
Baffle plate drift	 A: 125 mm (4.92 in) dia. B: 106 mm (4.17 in) dia.	Installing baffle plate
Tension rod bushing drift	 A: 78 mm (3.07 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.	Removing and installing tension rod bushing
Grease seal drift	 A: 86 mm (3.39 in) dia. B: 76 mm (2.99 in) dia.	Installing wheel hub grease seal
Cap drift	 A: 60 mm (2.36 in) dia. B: 52 mm (2.05 in) dia.	Installing kingpin cap
Bearing drift	 A: 57 mm (2.24 in) dia. B: 50 mm (1.97 in) dia.	Installing kingpin lower bearing
Bearing drift	 A: 57 mm (2.24 in) dia. B: 46 mm (1.81 in) dia. C: 40 mm (1.57 in) dia. D: 2.5 mm (0.098 in)	Installing kingpin upper bearing
Grease seal drift	 A: 68 mm (2.68 in) dia. B: 58 mm (2.28 in) dia.	Installing kingpin grease seal

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.**



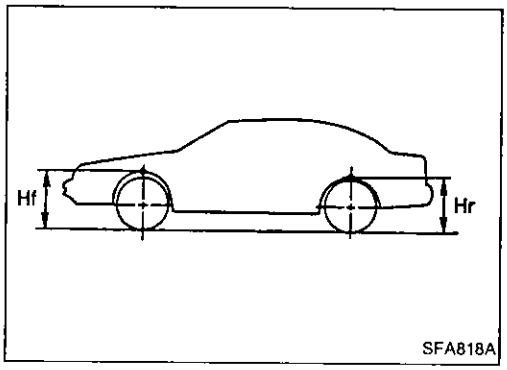
: N•m (kg-m, ft-lb)

SFA860A

Front Axle and Front Suspension Parts

Check front axle and front suspension parts for looseness, cracks, wear or other damage.

- Retighten all nuts and bolts to the specified torque.
  Tightening torque: Refer to FRONT SUSPENSION.
- Make sure that cotter pin is inserted.

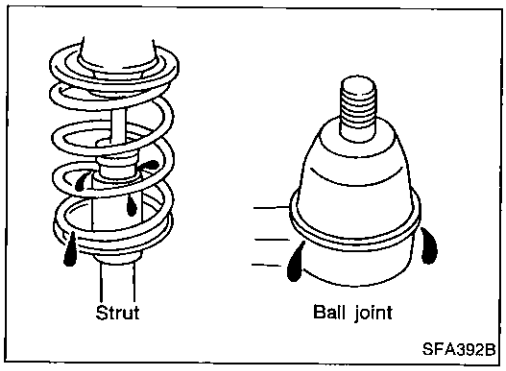


- Check spring height from the top of the wheelarch to the ground.

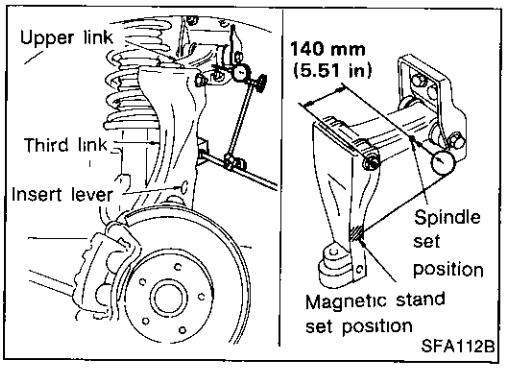
(1) Vehicle must be unladen*, parked on a level surface, and tires checked for proper inflation and wear (tread wear indicator must not be showing).
  * Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

(2) Bounce the vehicle up and down several times before measuring.
  Standard height:
    Conventional suspension models
      Front (Hf)
        706 mm (27.80 in)
      Rear (Hr)
        696 mm (27.40 in)
    Full-active suspension models
      Refer to FULL-ACTIVE SUSPENSION — Repair of Component Parts.

(3) Spring height is not adjustable. If out of specification, check for worn springs or suspension parts.



- Check shock absorber for oil leakage or other damage.
- Check suspension lower ball joint and tie-rod ball joint for grease leakage, and dust cover for cracks or other damage.



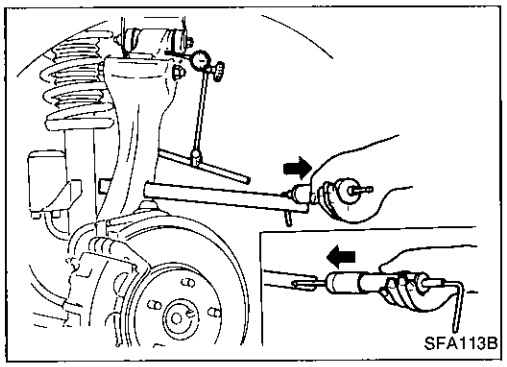
- Check upper link free play.

(1) Jack up front of vehicle and set stands.
(2) Set steering wheel in straight-forward direction and lock it using key lock.
(3) Remove front wheels.

Models with FULL-ACTIVE SUSPENSION
On axle side

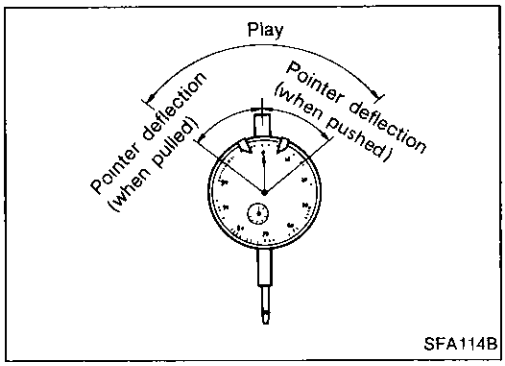
(4) Install dial gauge.
a. Install magnet stand on third link.
b. Set dial gauge in position.
  Set dial gauge spindle in contact with flat surface of upper link at 140 mm (5.51 in) measured directly from center of upper link retaining bolt on third link side. (Reset the dial gauge.)

Front Axle and Front Suspension Parts (Cont'd)



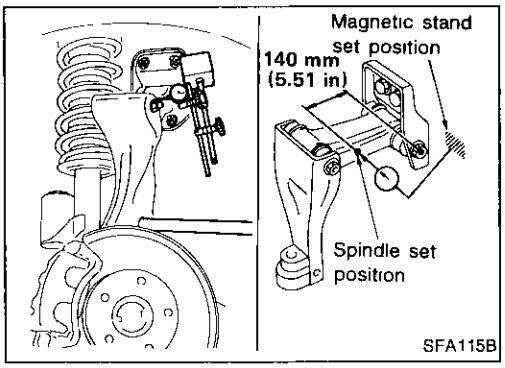
(5) Install lever and measure free play.
Insert lever [25 mm (0.98 in) wide, 350 mm (13.78 in) long, approx.] into the hole on third link. While applying a load of 147 to 196 N (15 to 20 kg, 33 to 44 lb) to lever using push-pull gauge, read dial gauge indication.
Free play = (Gauge pointer deflection when push-pull gauge is pulled) + (Gauge pointer deflection when push-pull gauge is pushed)

Allowable free play range:
5.0 mm (0.197 in), max.



On body side

(6) Install dial gauge.
a. Install magnet stand on hoodledge wheelhouse side.
b. Set dial gauge in position.
Set dial gauge spindle in contact with flat surface of upper link at 140 mm (5.51 in) measured directly from center of upper link retaining bolt on bracket side. (Reset the dial gauge.)



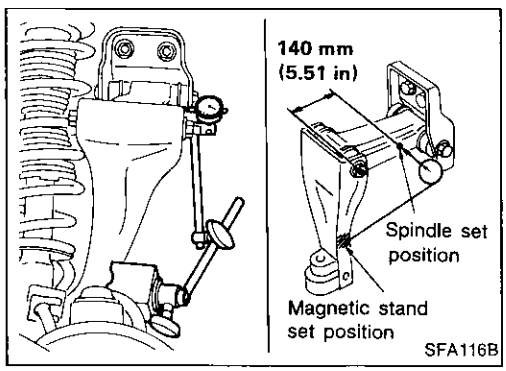
(7) Follow the same procedures for setting lever and measuring free play as those outlined under "On axle side" above.

Allowable free play range:
5.0 mm (0.197 in), max.

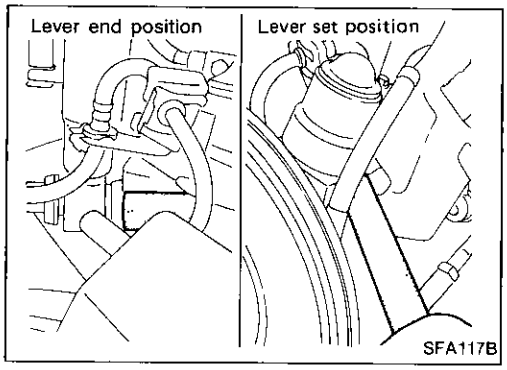
(8) If free play exceeds specifications, replace upper link assembly.

Models without FULL-ACTIVE SUSPENSION
On axle side

(4) Install dial gauge.
a. Install magnet stand on third link.
b. Set dial gauge in position.
Set dial gauge spindle in contact with flat surface of upper link at 140 mm (5.51 in) measured directly from center of upper link retaining bolt on third link side. (Reset the dial gauge.)

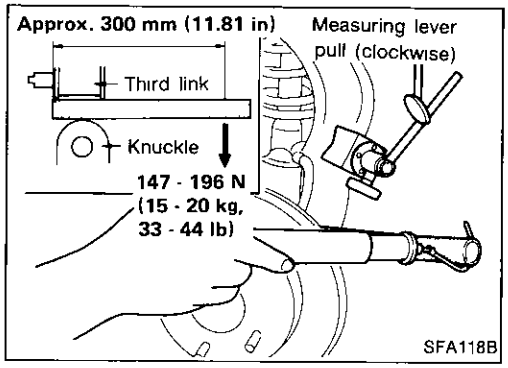


Front Axle and Front Suspension Parts (Cont'd)



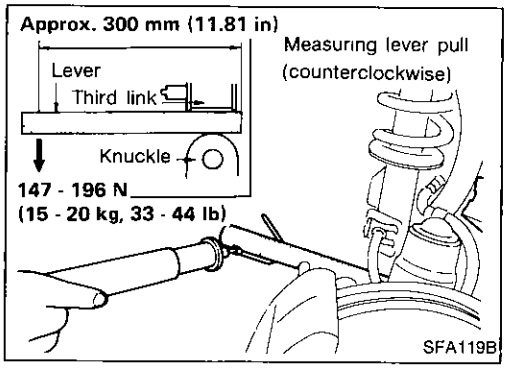
(5) Install lever.
Insert lever [30 mm (1.18 in) outside dia., 350 mm (13.78 in) long, approx.] between lower end of third link and kingpin location.

Make sure lever does not interfere with splash guard, brake hoses, etc., when set in position.



— Free play in direction "A" —

Attach spring scale to lever tip. Pull spring scale with a force of 147 to 196 N (15 to 20 kg, 33 to 44 lb) and then read dial gauge indication.

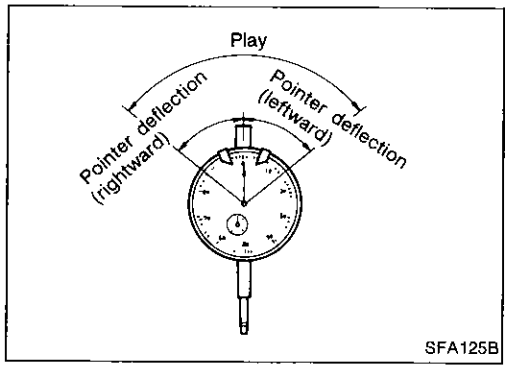


— Free play in direction "B" —

With dial gauge held in position, invert lever. Attach spring scale to lever tip. Pull spring scale with a force of 147 to 196 N (15 to 20 kg, 33 to 44 lb) and then read dial gauge indication.

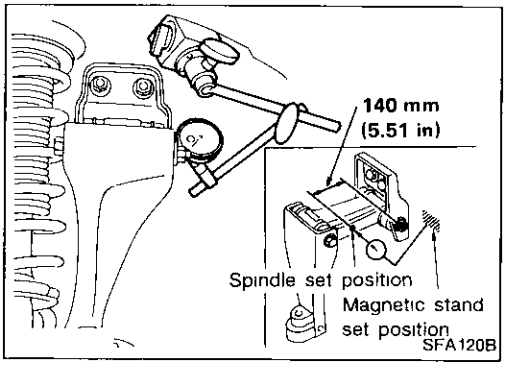
Free play = (Gauge pointer deflection in direction "A") + (Gauge pointer deflection in direction "B")

Allowable free play range:
5.0 mm (0.197 in), max.



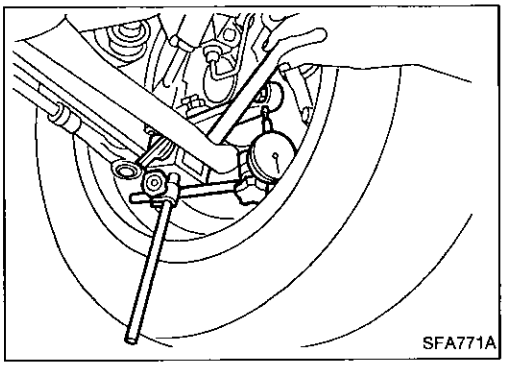
On body side

(6) Install dial gauge.
a. Install magnet stand on hoodledge wheelhouse side.
b. Set dial gauge in position.
Set dial gauge spindle in contact with flat surface of upper link at 140 mm (5.51 in) measured directly from center of retaining bolt on bracket side. (Reset the dial gauge.)



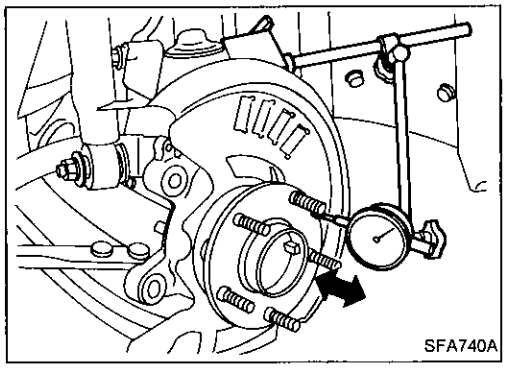
(7) Follow the same procedures for setting lever and measuring free play as those outlined under "On axle side" above.
Allowable free play range: 5.0 mm (0.197 in), max.
(8) If free play exceeds specifications, replace upper link assembly.

Front Axle and Front Suspension Parts (Cont'd)


SFA771A

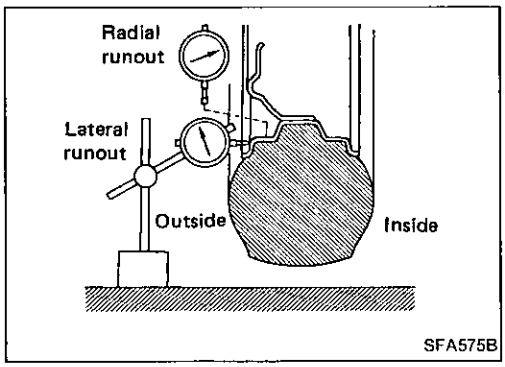
- Check suspension ball joint end play.

(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 pushing and releasing pry bar, observe maximum dial indicator value.
Vertical end play: 0 mm (0 in)
(6) If not to above specification, remove and recheck it.


SFA740A

Front 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 FRONT AXLE — Wheel Hub and Knuckle.



SFA575B

Front Wheel Alignment

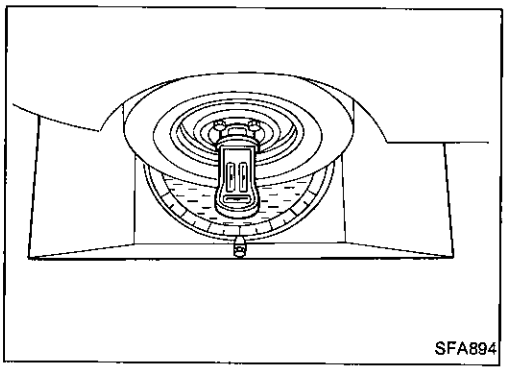
Before checking front wheel alignment, be sure to make a preliminary inspection.

PRELIMINARY INSPECTION

Make the following checks. Adjust, repair or replace if necessary.

- Check tires for wear and improper inflation.
- Check front wheel bearings for looseness.
- Check wheel runout.
Wheel runout:
Refer to S.D.S.
- Check front suspension for looseness.
- Check steering linkage for looseness.
- Check that front shock absorbers work properly.
- Check vehicle posture (Unladen).
("Unladen": Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.)

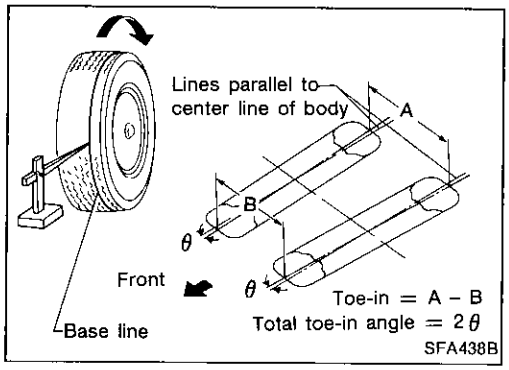
Front Wheel Alignment (Cont'd)


SFA894

CAMBER, CASTER AND KINGPIN INCLINATION

Camber, caster and kingpin inclination are preset at factory and cannot be adjusted.

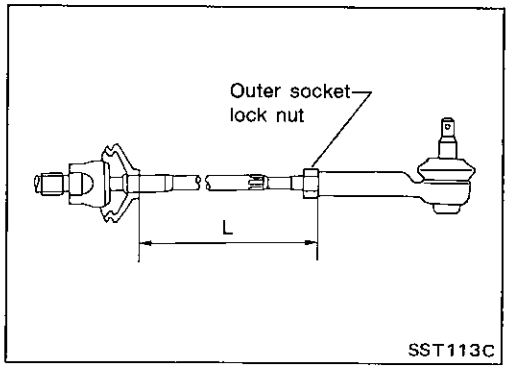
1. Measure camber, caster and kingpin inclination of both right and left wheels with a suitable alignment gauge.
   Camber, Caster and Kingpin inclination:
   Refer to S.D.S.
2. If camber, caster and kingpin inclination are not within specification, inspect and replace any damaged or worn front suspension parts.



SFA438B

TOE-IN

1. Draw a base line on tread surface of tires.
- After lowering front of vehicle, move it up and down to eliminate friction, and set wheels in straight-ahead position.
2. Measure toe-in.
- Measure distance "A" and "B" at same height as hub center.
   Total toe-in:
   Refer to S.D.S.

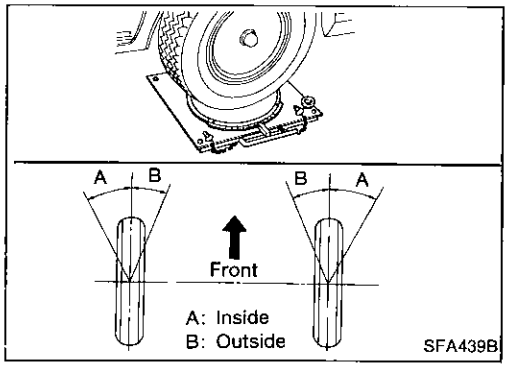


SST113C

3. Adjust toe-in by varying length of steering tie-rods.
(1) Loosen lock nuts.
(2) Adjust toe-in by turning tie-rod forward or backward.

Make sure both tie-rods are the same length.
Standard length "L":
153.6 mm (6.05 in)

(3) Tighten lock nuts to the specified torque.
[O]: 78 - 98 N·m
(8.0 - 10.0 kg-m, 58 - 72 ft-lb)



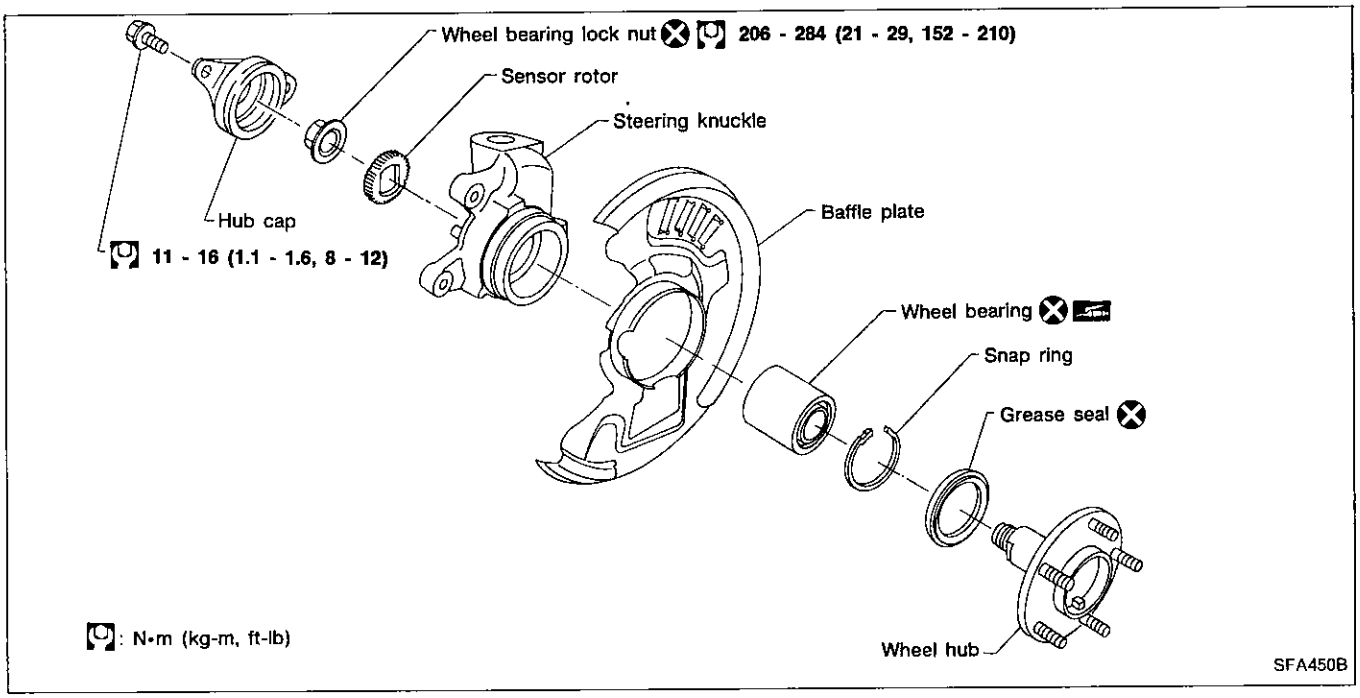
SFA439B

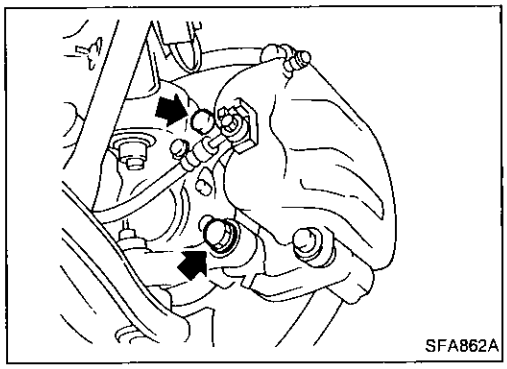
FRONT WHEEL TURNING ANGLE

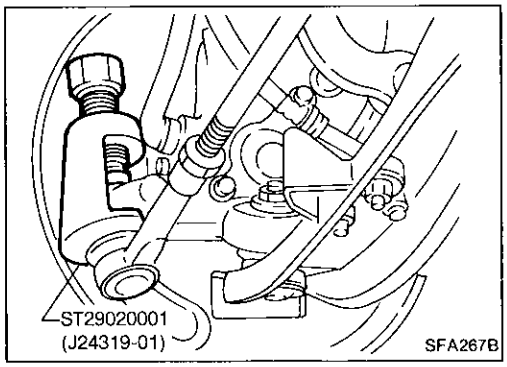
1. Set wheels in straight-ahead position and then move vehicle forward until front wheels rest on turning radius gauge properly.
2. Rotate steering wheel fully to the right or left; measure turning angle.

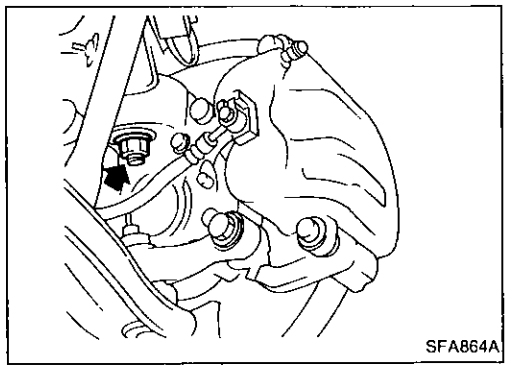
Wheel turning angle:

		Conventional suspension	Full-active suspension
Full turn	Inside wheel: A	35°30′ - 39°30′	35° - 39°
	Outside wheel: B	32°	32°









Wheel Hub and Steering Knuckle

REMOVAL

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 by hand.**
- Remove brake caliper assembly and rotor.

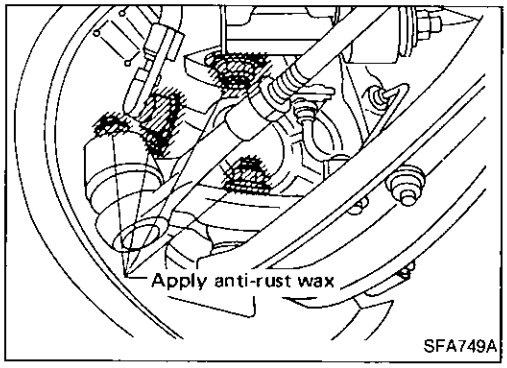
Brake line need not be disconnected from brake caliper. Be careful not to depress brake pedal, or piston will pop out. Do not pull or twist brake hose.

- Remove tie-rod ball joint and lower ball joint with Tool.

CAUTION:
Steering knuckle is made from aluminum alloy. Be careful not to hit steering knuckle.

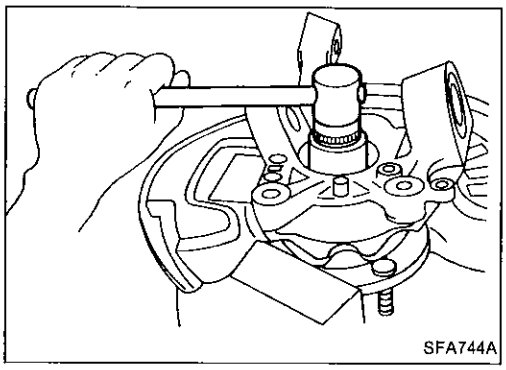
- Remove kingpin lower nut then remove steering knuckle assembly.

Wheel Hub and Steering Knuckle (Cont'd)



INSTALLATION

- Install steering knuckle assembly.
- Apply anti-rust wax as follows:
  - Portions around lower ball joint connections
  - Portions around tie-rod ball joint connections
  - Portions around kingpin lower nut location
  - Portions around ABS sensor connection

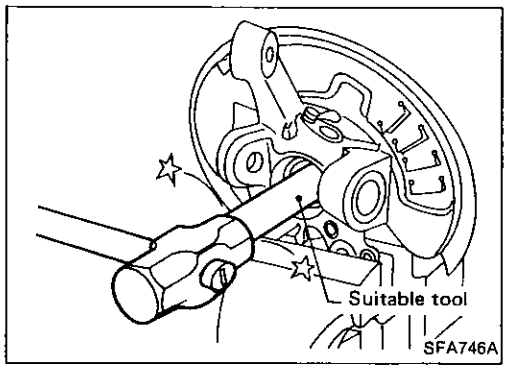


DISASSEMBLY

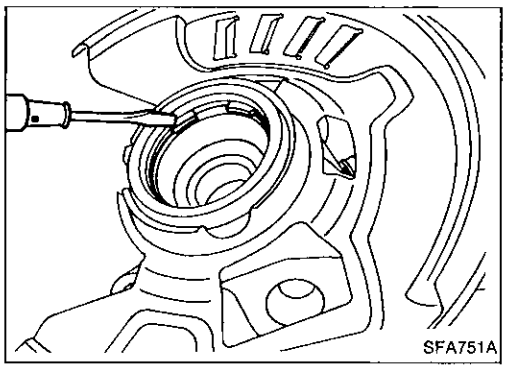
CAUTION:

When removing wheel bearing from steering knuckle, replace wheel bearing assembly (outer race, inner races and grease seal) with a new one.

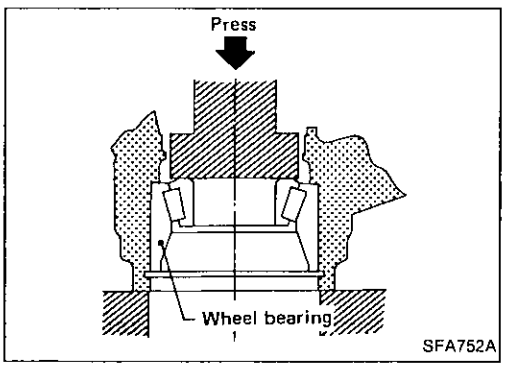
- Remove hub cap and wheel bearing lock nut.



- Remove wheel hub with a suitable tool.

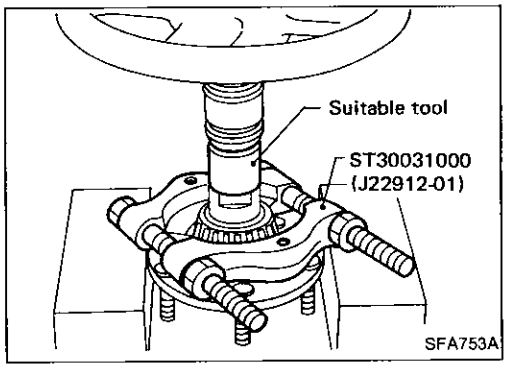


- Remove circular clip with a suitable tool.



- Press out wheel bearing assembly from steering knuckle.

Wheel Hub and Steering Knuckle (Cont'd)



- Drive out wheel bearing inner race (to outside) from wheel hub, then remove grease seal.

INSPECTION

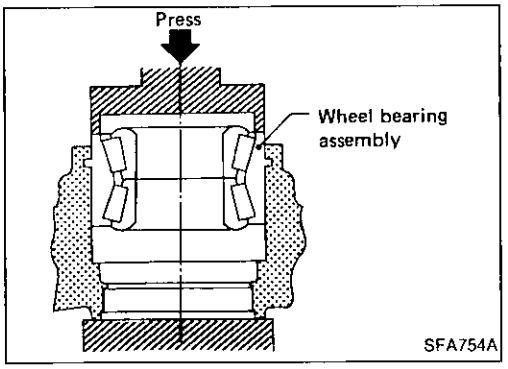
Wheel hub and steering knuckle

Check wheel hub and steering knuckle for any cracks.

Circular clip

Check circular clip for wear or cracks.
Replace if necessary.

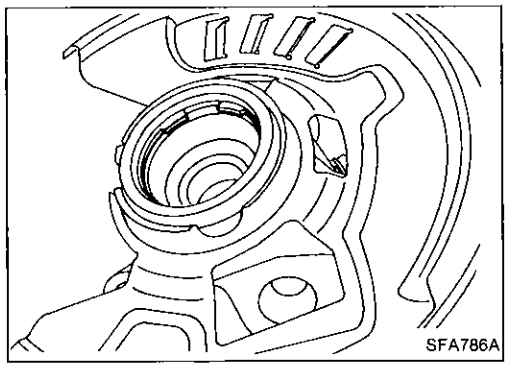
ASSEMBLY



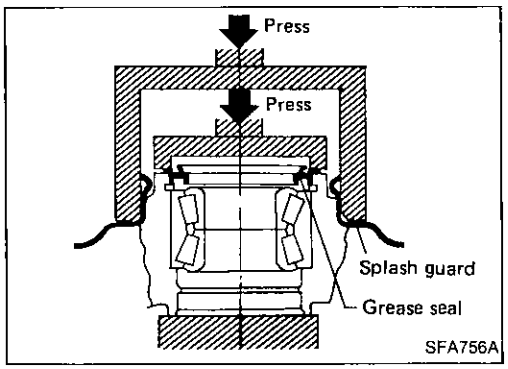
1. Press new wheel bearing assembly into steering knuckle from outside of steering knuckle.
   Maximum load P:
   34.3 kN (3.5 ton, 3.9 US ton, 3.44 Imp ton)

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.**

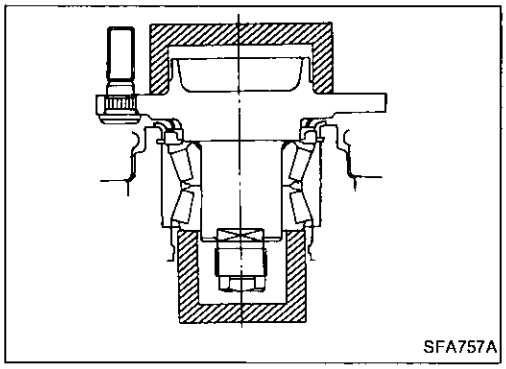


2. Install circular clip into groove of steering knuckle.

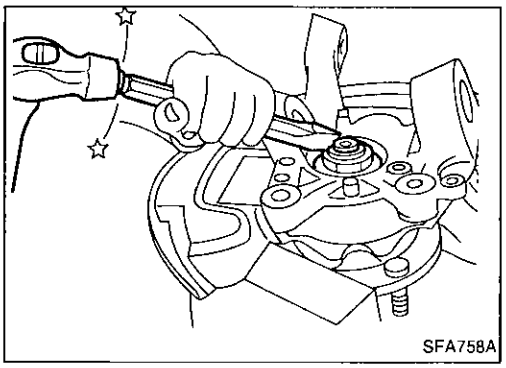


3. Apply multi-purpose grease to sealing lip.
4. Install grease seal.
   Maximum load P:
   10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)
5. Install splash guard.

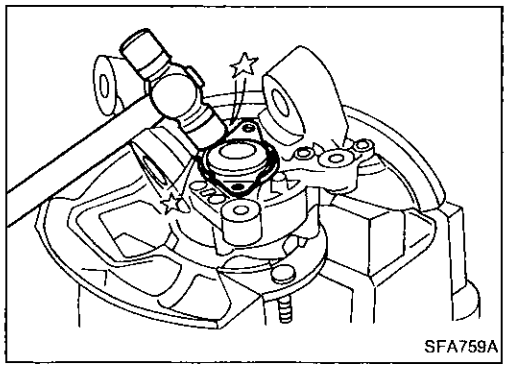
Wheel Hub and Steering Knuckle (Cont'd)


SFA757A

6. Press wheel hub into steering knuckle.
   Maximum load P:
   29 kN (3 ton, 3.3 US ton, 3.0 Imp ton)
7. Tighten wheel bearing lock nut to the specified torque.
   : 206 - 284 N·m (21 - 29 kg-m, 152 - 210 ft-lb)
8. Check that wheel bearings operate smoothly.


SFA758A

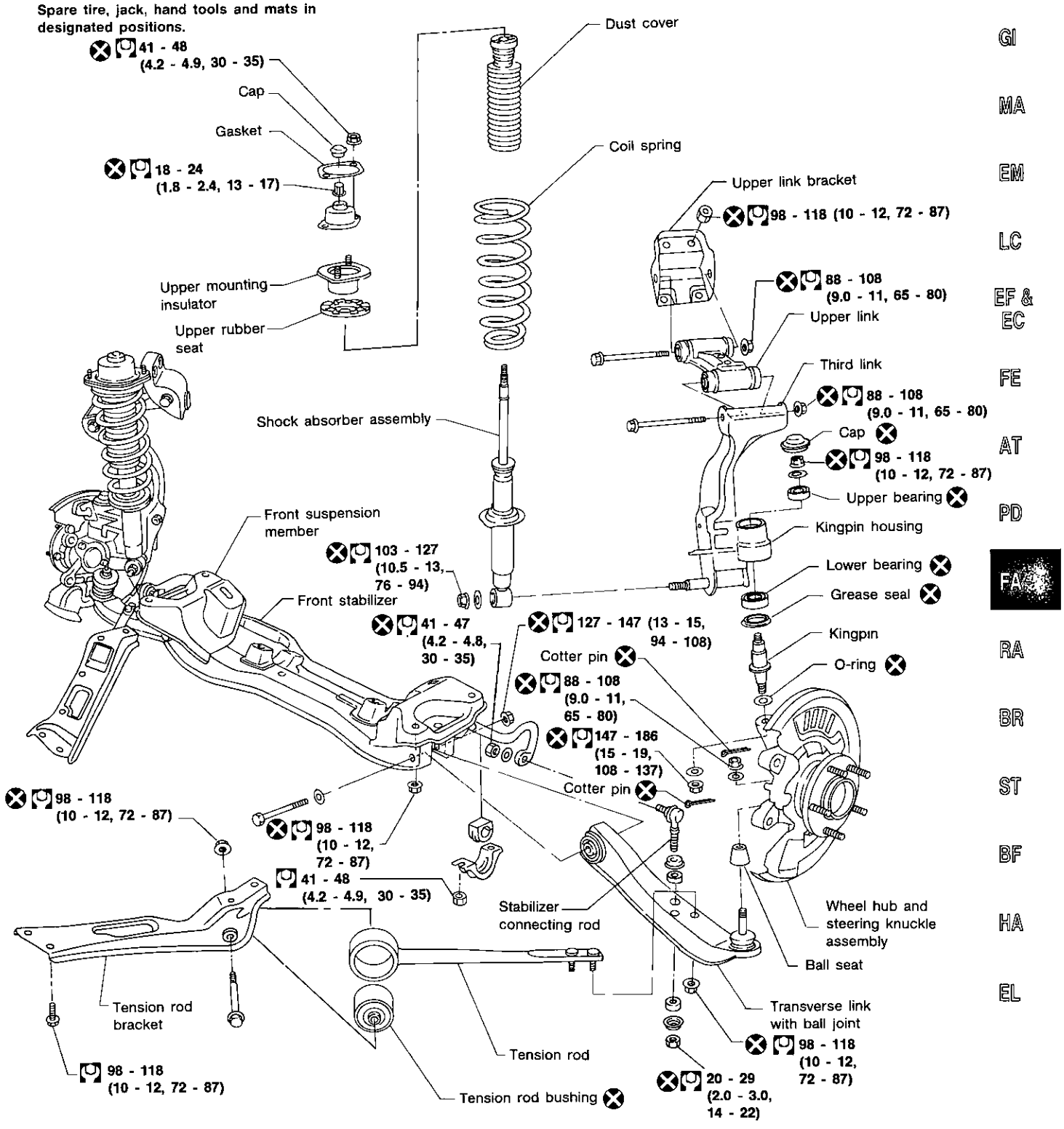
9. Stake wheel bearing lock nut.


SFA759A

10. Install hub cap.
    Drive hub cap onto steering knuckle by lightly tapping with a plastic hammer. After hub cap is in close contact with steering knuckle, tighten bolts.

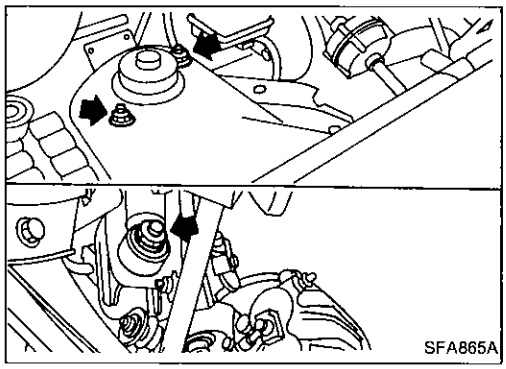
When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.

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



: N•m (kg-m, ft-lb)

SFA270B

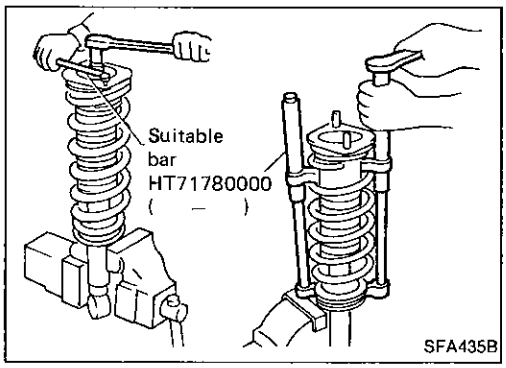

SFA865A

Coil Spring and Shock Absorber

REMOVAL

Remove shock absorber fixing nuts.

Do not remove piston rod lock nut.



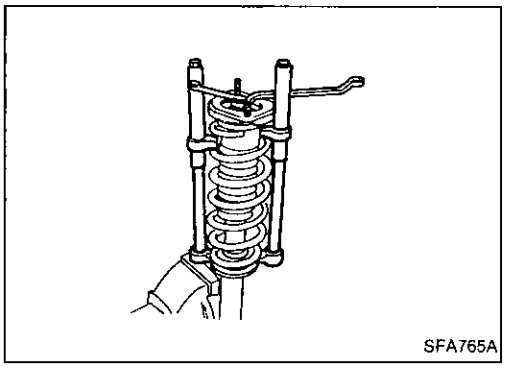
SFA435B

DISASSEMBLY

1. Set shock absorber on vise with Tool, then loosen piston rod lock nut.

Do not remove piston rod lock nut.

2. Compress spring with Tool so that shock absorber mounting insulator can be turned by hand.


SFA765A

3. Remove piston rod lock nut.

INSPECTION

Shock absorber assembly

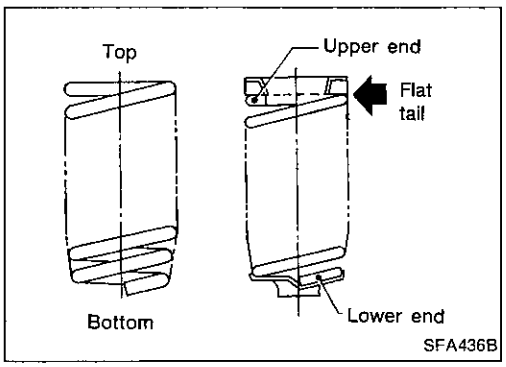
- Check for smooth operation through a full stroke, both compression and extension.
- Check for oil leakage occurring on welded or gland packing portions.
- Check piston rod for cracks, deformation or other damage. Replace if necessary.

Mounting insulator and rubber parts

Check cemented rubber-to-metal portion for separation or cracks. Check rubber parts for deterioration.
Replace if necessary.

Coil spring

Check for cracks, deformation or other damage. Replace if necessary.



SFA436B

ASSEMBLY

- When installing coil spring, be careful not to reverse top and bottom direction. (Top end is flat.)
- When installing coil spring on shock absorber, it must be positioned as shown in figure at left.

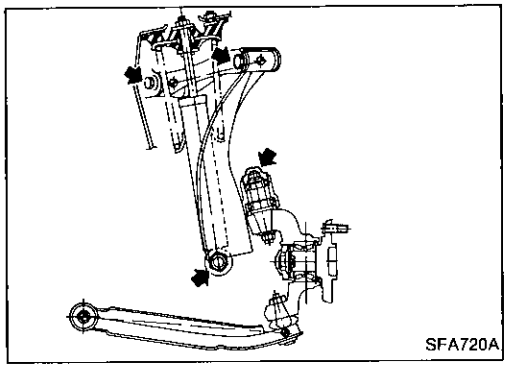
Third Link and Upper Link

REMOVAL

CAUTION:

Kingpin bearing usually does not require maintenance. If any of the following symptoms are noted, replace kingpin bearing assembly.

- **Growling noise is emitted from kingpin bearing during operation.**
- **Kingpin bearing drags or turns roughly when steering knuckle is turned by hand.**


SFA720A

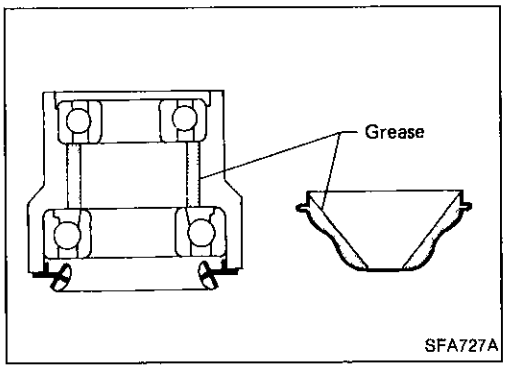
1. Remove cap and kingpin upper nut.

Do not remove kingpin lower nut.

2. Remove shock absorber fixing nut and upper link fixing bolts.
3. Remove third link and upper link.

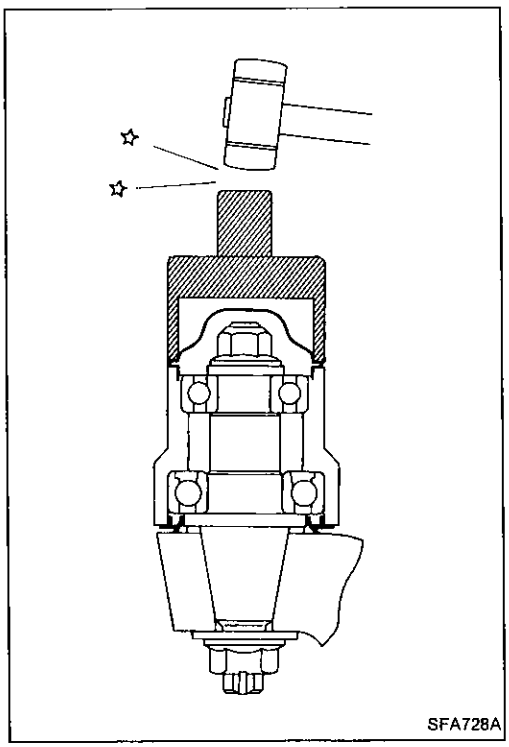
INSTALLATION

Third link



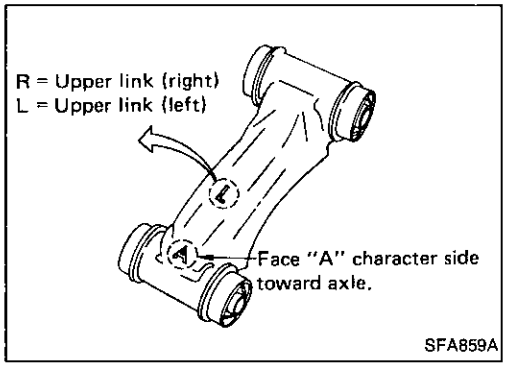
SFA727A

- Pack kingpin housing and cap with multi-purpose grease.
  Grease capacity:
  Kingpin housing: 10 g (0.35 oz)
  Cap: 5 g (0.18 oz)


SFA728A

- Install third link and cap.

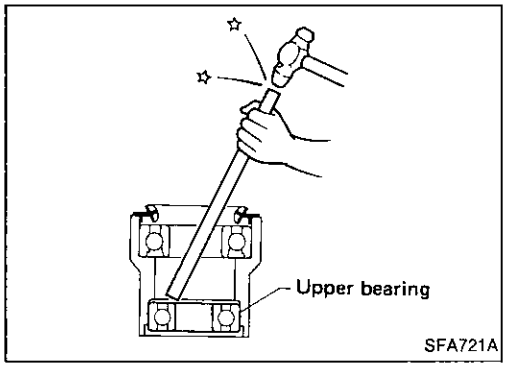
Third Link and Upper Link (Cont'd)



Upper link

- Upper link has characters "A" and "L" (or "R") on it as shown. Always install upper link with "A" side facing axle and side without a character facing vehicle body.

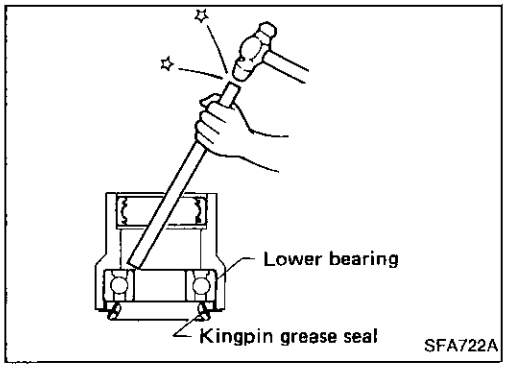
Upper link bushings cannot be disassembled.



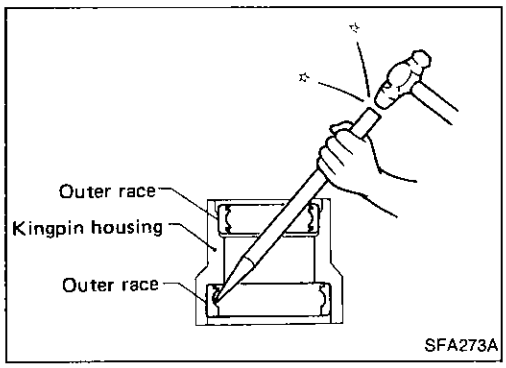
DISASSEMBLY

Third link

- Remove upper bearing (inner race and ball).

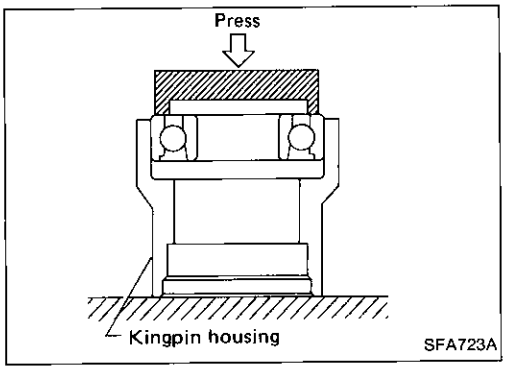


- Remove kingpin grease seal.
- Remove lower bearing (inner race and ball).



- Remove upper and lower outer race.

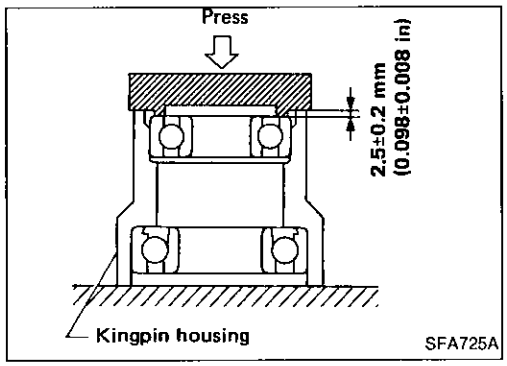
Be careful not to damage kingpin housing.



ASSEMBLY

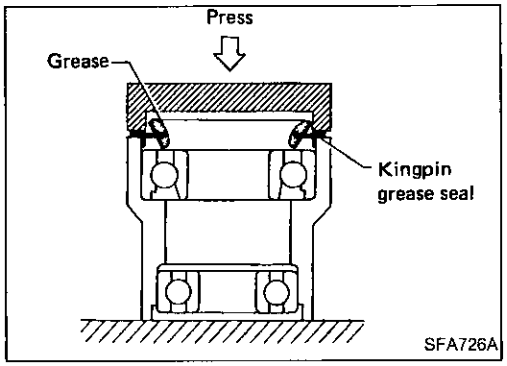
- Install lower bearing.

Third Link and Upper Link (Cont'd)



ASSEMBLY

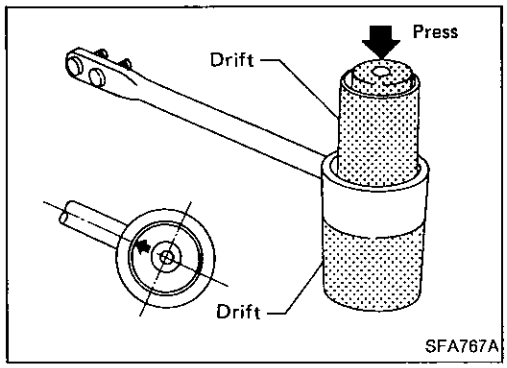
- Install upper bearing.



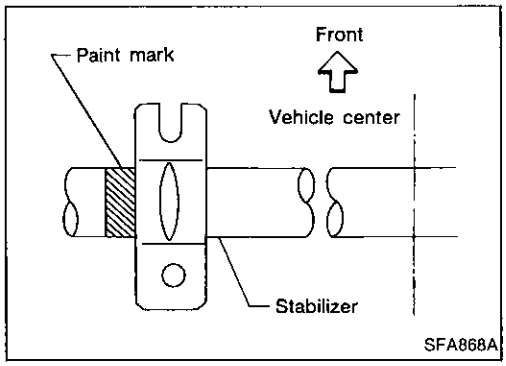
- Install lower oil seal.
- Apply multi-purpose grease to oil seal lip.

Tension Rod and Stabilizer Bar

REMOVAL AND INSTALLATION



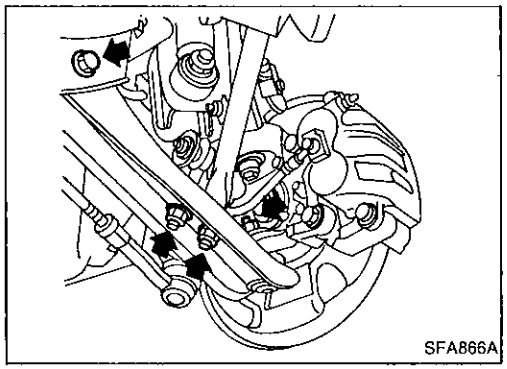
- Remove tension rod and stabilizer bar.
- When removing tension rod bushing, place one drift on lower side of bushing and the other on upper side, and press bushing out.
- Place arrow mark on bushing facing tension rod before installing bushing.



- When installing stabilizer, make sure that paint mark and clamp face in the correct direction.

Transverse Link and Lower Ball Joint

REMOVAL AND INSTALLATION



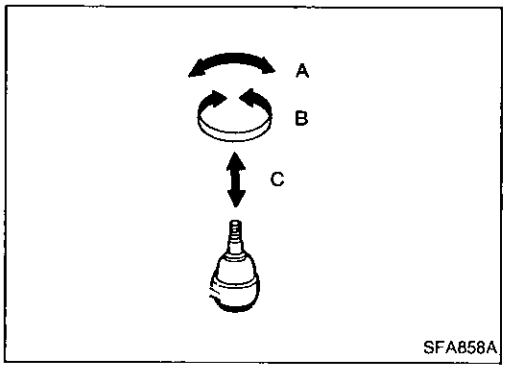
- Disconnect tension rod, stabilizer connecting rod and knuckle. Then remove transverse link assembly.
- During installation, final tightening must be done at curb weight with tires on ground.
- After installation, check wheel alignment.
  Refer to "Front Wheel Alignment" of ON-VEHICLE SERVICE.

Transverse Link and Lower Ball Joint (Cont'd)

INSPECTION

Transverse link

- Check transverse link for damage, cracks or deformation. Replace it if necessary.
- Check rubber bushing for damage, cracks and deformation. Replace transverse link if necessary.



Lower ball joint

Check ball joint for play. If ball stud is worn, play in axial direction is excessive or joint is hard to swing, replace transverse link assembly.

Swing force, turning torque and vertical end play

Before checking, turn ball joint at least 10 revolutions so that ball joint is properly broken in.

Swing force "A":
(measuring point: cotter pin hole of ball stud)
7.8 - 53.0 N (0.8 - 5.4 kg, 1.8 - 11.9 lb)
Turning torque "B":
0.49 - 3.43 N·m (5.0 - 35 kg-cm, 4.3 - 30.4 in-lb)
Vertical end play limit "C": 0 mm (0 in)

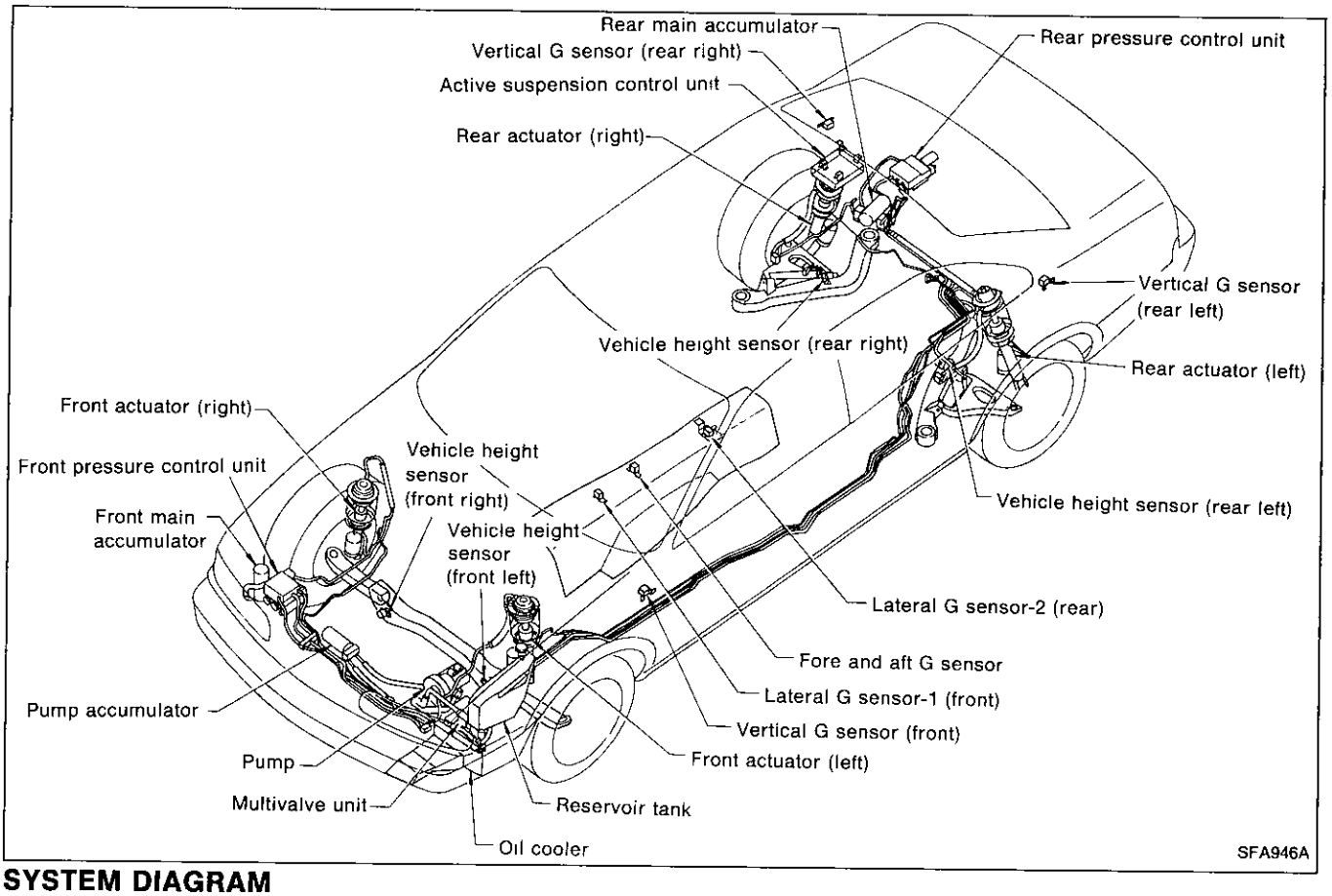
Outline

SPECIFICATIONS

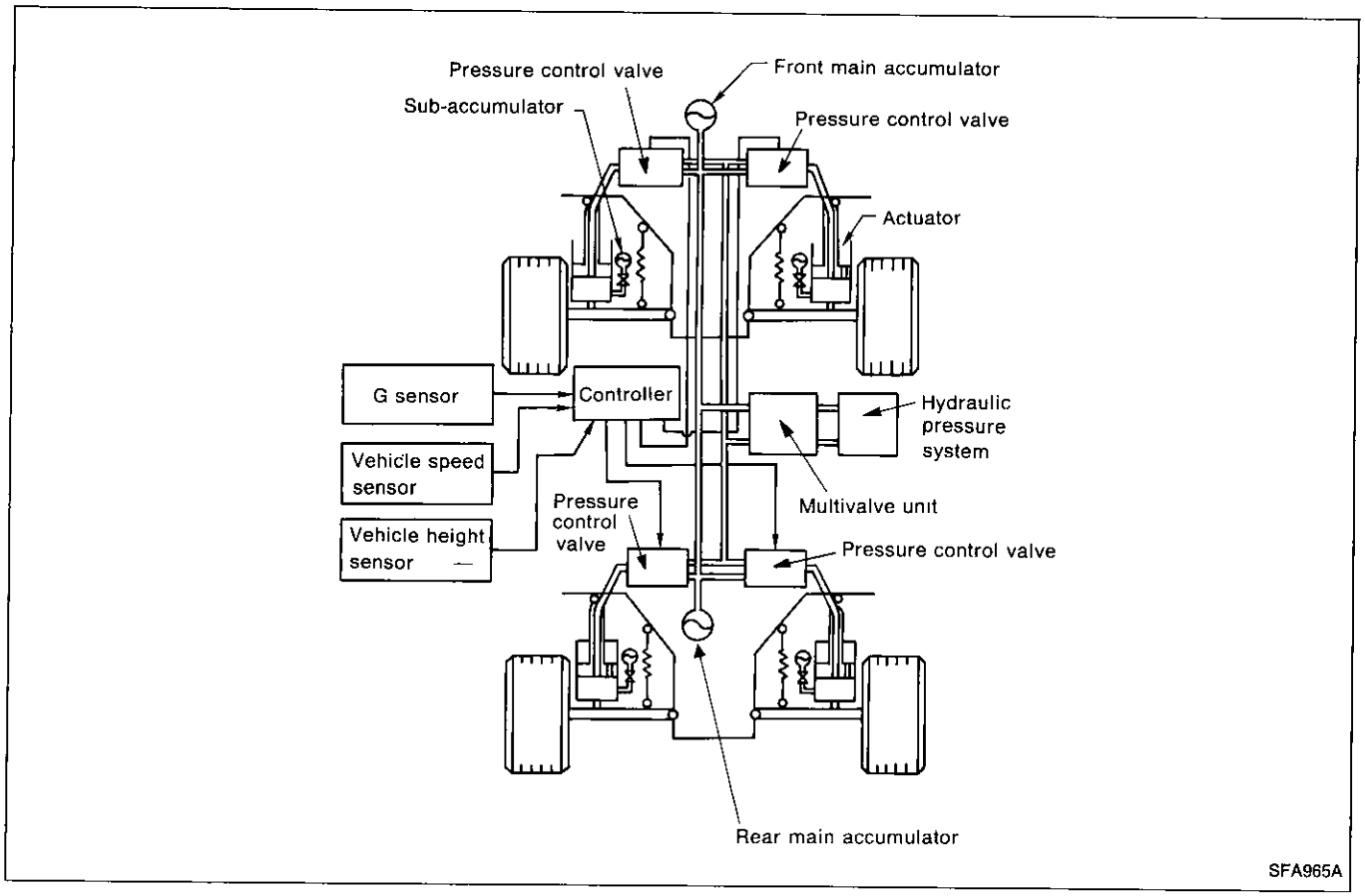
Item		Specifications	VH45DE	
			Front	Rear
Suspension			Multilink, independent type	
Wheel alignment (unloaded)	Toe-in	mm (in)	–1 to 1 (–0.04 to 0.04)	0 - 4 (0 - 0.16)
	Camber	(deg)	–1°40′ to –0°10′	–2°00′ to –1°00′
	Caster	(deg)	6°10′ - 7°40′	—
	Kingpin inclination	(deg)	12°10′ - 13°40′	—
Coil spring	Spring constant	N/mm (kg/mm, lb/in)	17.7 (1.8, 101)	14.7 (1.5, 84)
	Free length	mm (in)	369 (14.53)	280 (11.02)
	Coil center diameter	mm (in)	120 (4.72)	120 (4.72)
	Wire diameter	mm (in)	12 (0.47)	11 (0.43)
	No. of active coils		5.8	4.0
Power cylinder	Cylinder inside diameter	mm (in)	60 (2.36)	60 (2.36)
	Stroke	mm (in)	145.1 (5.71)	158.6 (6.24)
Tension rod outside diameter		mm (in)	20 (0.79)	—
Stabilizer outside diameter		mm (in)	28 (1.10) (Solid)	20 (0.79) (Hollow)
Pump	Type		6 + 6 spool, radial plunger type (combined with select valve) (arranged with power steering vane pump in tandem)	
Recommended fluid	Name		Genuine "Fluid A-Active Suspension"	
	Approx. quantity	ℓ (US qt, Imp qt)	5.7 (6, 5)	
Oil cooler radiation		kW (kcal/h, BTU/h)	2.559 (2,200, 8,730)	
Oil cooler fan motor power consumption		(W)	35	

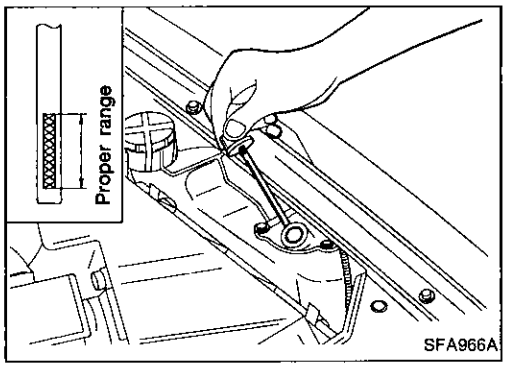
Outline (Cont'd)

FULL-ACTIVE SUSPENSION PARTS LOCATION



SYSTEM DIAGRAM





On-vehicle Service

CHECKING FLUID LEVEL

1. Put vehicle on level ground and set selector lever in "P".
2. Make sure that no passengers nor any cargo is in vehicle, and that necessary equipment, such as spare tire, jack, on-board tools, are provided.
3. Confirm vehicle height selector switch is in "NORMAL".
4. With CONSULT

a. Connect CONSULT.
b. Start engine.
c. Check oil temperature using CONSULT data monitor. Adjust oil temperature to 60±4°C (140±7.2°F) by racing engine.

4. Without CONSULT

a. Start engine, and warm up to raise active suspension fluid temperature about 60°C (140°F).
5. Remove reservoir level gauge, and make sure that level is in the proper range.

- Level gauge is a screw type, and level should be checked with the level gauge fitted securely.
- If level is too low, add specified fluid (genuine "Fluid A-Active Suspension") through filler. Add fluid until actual level is aligned with proper UPPER range mark.

CAUTION:

- **Never use a non-specified brand of fluid.**
- **If level is too high, suck out until proper level is reached; otherwise, fluid may overflow when releasing pressure.**
- **If fluid is spilled on nearby parts, be sure to wipe clean.**
- **If alarm lamp is ON indicating insufficient oil quantity, erase the CONSULT self-diagnosis result data.**

CHANGING FLUID

Every 96,000 km (60,000 miles) of operation, change fluid (genuine "Fluid A-Active Suspension").

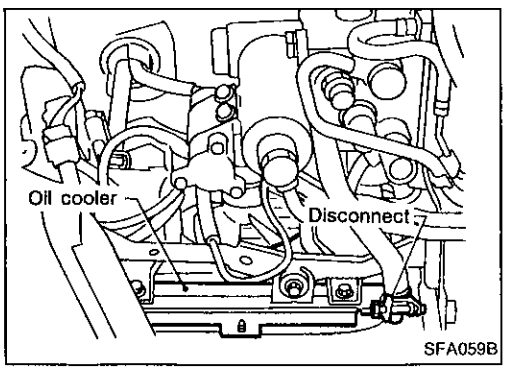
1. Make sure vehicle is located in clean area and free from foreign particles. Raise vehicle and support with a rigid jack.

Do not allow foreign particles to enter hydraulic system.

2. Open bypass valves of multivalve unit and pressure control unit as outlined under "RELIEVING PRESSURE, Repair of Component Parts".
3. Place a container under oil cooler to catch fluid. Disconnect rubber hose to multivalve unit (on lower side of oil cooler) and drain fluid into container.
4. Lower vehicle to ground. Reduce vehicle height and drain fluid from actuators as much as possible.
5. Raise vehicle again and reconnect rubber hose to its original position.

Discard old hose clamp; replace it with a new one.

6. Close multivalve unit bypass valve and pressure control unit bypass valves.
7. Refer to "Repair of Component Parts" and "Work Procedures by Unit", then start with evacuating hydraulic lines.



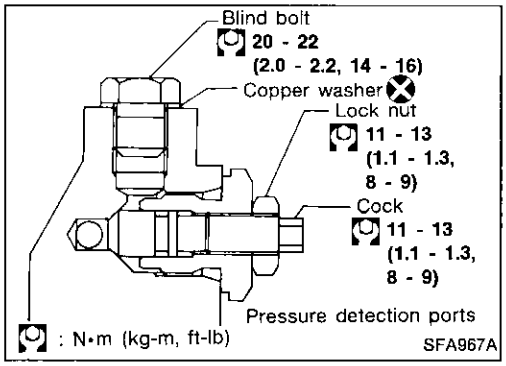
On-vehicle Service (Cont'd)

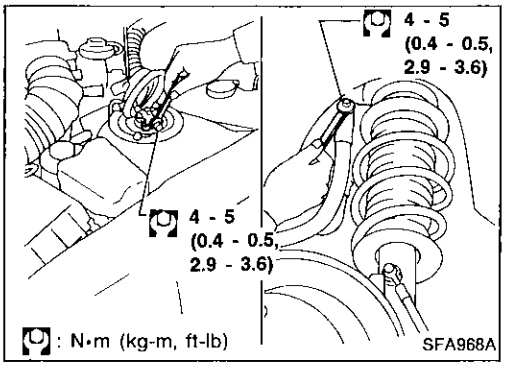
CHECKING FLUID LEAKAGE

Oil leak check

Genuine "Fluid A-Active Suspension" is clear and light yellow-green when it is new. After use, it will turn to light yellow. After locating leaking point using table below as a guide, wipe away oil completely and check that oil leaks at the same point again. Do not confuse "Fluid A-Active Suspension" oil used in other systems.

Location where oil leaks can occur	Fluid used near the same locations in systems other than active suspension system	Remarks
Inside front right fender protector	LLC (green), washer fluid (no color or blue)	—
Inside front left fender protector	—	If oil spills while replenishing reservoir tank fluid, it will flow out via oil cooler. Do not regard this as a leak of the oil cooler.
Inside undercover	LLC (green), power steering fluid (red), automatic transmission fluid (red), brake fluid (red), engine oil, etc.	Spilled oil may come in contact with front and/or rear of cover due to piping layout, unit locations, etc.
Inside wheelhouse	Brake fluid (red)	Oil may possibly leak at or around actuator, and hose and tube connections.
Inside rear pressure control unit protector	—	—
Inside pipe protector	—	Protector on outer side of left side member
Rear suspension member upper portion	Brake fluid (red), gasoline, etc.	—





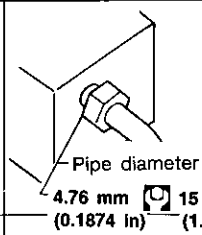
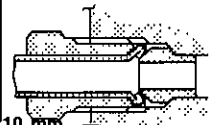
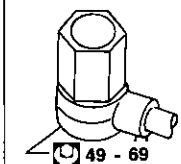
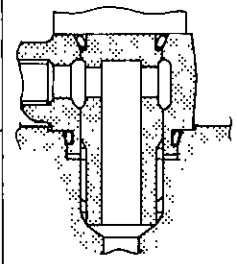
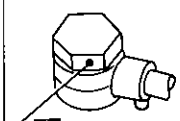
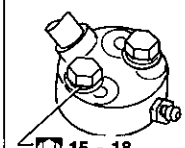
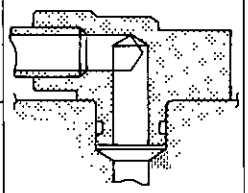
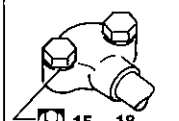
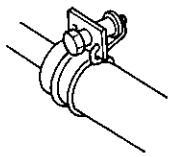
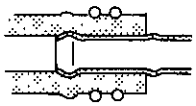
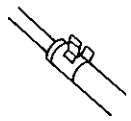
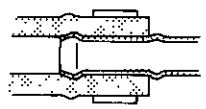
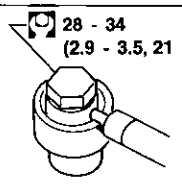
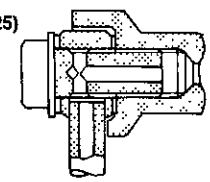
Corrective measures for oil leaks

When repairing oil leaks, or when removing piping or hydraulic parts, refer to "Repair of Component Parts" and perform required work associated with leak repair if instructed.

1. Leaks at pipe connections
   Refer to "Corrective measures for leaks at pipe connections".
2. Leaks at pressure detection ports
- Make sure cock is tightened to specified torque.
- Discard copper washer under blind bolt; replace it with a new one.
- If leakage is still present, replace faulty detection port.
3. Leaks at air bleeder
- Make sure that air bleeder is tightened to specified torque.
- If retightening air bleeder does not eliminate leaks, replace affected unit with a new one.
4. Leaks at other parts
   Replace affected unit with a new one.

On-vehicle Service (Cont'd)

Corrective measures for leaks at pipe connections

No.	Parts to check	External shape and tightening torque N·m (kg-m, ft-lb)	Internal construction	Remedy
1	Flare nut	 Pipe diameter 4.76 mm (0.1874 in) 15 - 18 (1.5 - 1.8, 11 - 13)	 10 mm (0.39 in) 39 - 49 (4 - 5, 29 - 36)	Retighten. → N.G. → Relieve pressure. → Replace tube.※ → N.G. → Retighten. → N.G. → Relieve pressure.※ → Replace unit. / O.K. → END / O.K.
2	"I" joint (large)	 49 - 69 (5 - 7, 36 - 51)		Check tightening torque. → N.G. → Retighten. → O.K. / O.K. → Relieve pressure. → N.G. / Check O-rings used with "I" bolt and tube. → N.G. → Replace "I" bolt assembly or tube's O-ring.※ → O.K. / O.K. → Relieve pressure. → N.G. → END / Replace tube.※ → N.G. → Relieve pressure. / O.K. → END / Replace unit.※
3	"I" joint (small)	 49 - 69 (5 - 7, 36 - 51)		
4	Flange joint (large)	 15 - 18 (1.5 - 1.8, 11 - 13)		Check tightening torque. → N.G. → Retighten. → O.K. / O.K. → Relieve pressure. → N.G. / Check O-ring at joint → N.G. → Replace O-ring.※ → O.K. / O.K. → Relieve pressure → N.G. → END / Replace tube.※ → N.G. → Relieve pressure. / O.K. → END / Replace unit.※
5	Flange joint (small)	 15 - 18 (1.5 - 1.8, 11 - 13)		
6	Hose clamp (spring)			Retighten. → N.G. → Replace hose and clamp. → N.G. → Replace tube or unit. / O.K. → END / O.K.
7	Hose clamp (screw)			Replace hose and clamp. → N.G. → Replace tube or unit. / O.K. → END
8	Copper washer "I" joint	28 - 34 (2.9 - 3.5, 21 - 25) 		Retighten. → N.G. → Replace two copper washers → N.G. → Replace hose. → N.G. / O.K. → END / O.K. / O.K. → Replace unit.

(1) *: Refers to items that require air bleeding.
(2) Refer to "Repair of Component Parts" for pressure relieving and air bleeding procedures.

SFA969A

Repair of Component Parts

WORK PROCEDURES BY UNIT

Work accompanied by removal and installation of hydraulic parts differs due to difference in pressure application method and air bleeding procedures. This section deals with work associated with removal or installation of hydraulic parts.
After associated work is selected from that indicated in table below, also use "Basic work flowchart" as a guideline and perform only required work.

Work associated with, and classified by, each unit

○: Work necessary, X: Work not necessary

Unit to remove or install		Associated work						
		Relieving pressure	Evacuating hydraulic line	Flushing (dust removal, etc.)	Air bleeding			Vehicle height adjustment
					Pressure control unit	Actuator	Multivalve unit	
Reservoir tank		X	○	X	○	○	○	X
Pump		○	○	X	○	○	○	X
Pump accumulator		○	X	X	○	○	○	X
Multivalve unit		○	X	○	○	○	○	X
Main accumulator		○	X	○	○	○	○	X
Pressure control unit		○	X	○	○	○	○	○
Actuator		○	X	X	○	○	○	○
Drain filter		X	X	X	○	○	○	X
Oil cooler		X	X	X	○	○	○	X
Piping	Reservoir tank to pump	X	○	X	○	○	○	X
	Pump to multivalve unit	○	X	△*2	○	○	○	X
	Multivalve to pressure control unit	○	X	○	○	○	○	X
	Pressure control unit to actuator*1	○	X	△*2	○	○	○	X
	Drain pipe	△*2	X	△*2	X	△*2	X	X
Oil replacement		○	○	○	○	○	○	○

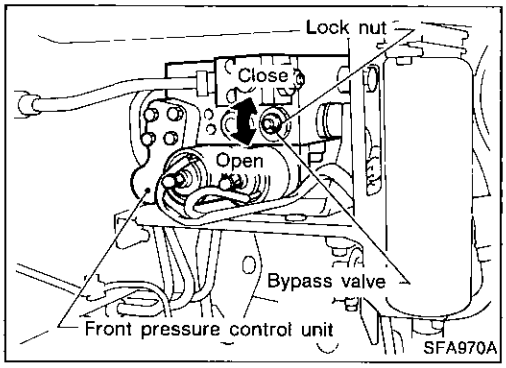
*1: Work includes pressure detection port servicing and associated piping.
*2: Except for concentrated piping units, associated work is not necessary.

Repair of Component Parts (Cont'd)

Basic work flowchart

Raise vehicle.	
Remove fender protectors, undercovers, etc. which hamper smooth repair work.	**Determine whether or not work (marked "*") needs to be performed by referring to "Work associated with, and classified by, each unit".**
Relieve pressure.*	Refer to "RELIEVING PRESSURE". FA-28
Replace parts.	Refer to "TIGHTENING TORQUE". FA-36
Evacuate system.*	Refer to "EVACUATION HYDRAULIC LINES". FA-28
Flush to remove foreign particles.*	Refer to "FLUSHING". FA-28
Bleed air from pressure control unit.*	Refer to "AIR BLEEDING". FA-30
Bleed air from actuator.*	Refer to "AIR BLEEDING". FA-30
Bleed air from multivalve unit.*	Refer to "AIR BLEEDING". FA-30
Check oil leakage.*	Refer to "OIL LEAK CHECK". FA-31
Install fender protectors, undercovers if removed.	Refer to "PROTECTOR INSTALLATION". FA-32
Lower vehicle to ground.	
Check and correct level.	Refer to "OIL LEVEL ADJUSTMENT". FA-32
Check system operation.	Refer to "SYSTEM OPERATION CHECK". FA-33
Adjust vehicle height.*	Refer to "VEHICLE HEIGHT ADJUSTMENT". FA-34
END	

Repair of Component Parts (Cont'd)



RELIEVING PRESSURE

Before relieving pressure from hydraulic parts, carefully read "Service Notice" and familiarize yourself with its contents.

- Move vehicle to lift-up position and stop engine. Wait for at least 3 minutes before lifting vehicle.
- Lift vehicle until all four wheels are completely off the ground.
- Remove left and right fender protectors and rear pressure control unit protectors.
- Loosen lock nuts on bypass valve for front and rear pressure control units. Slowly open bypass valve until they are fully open.

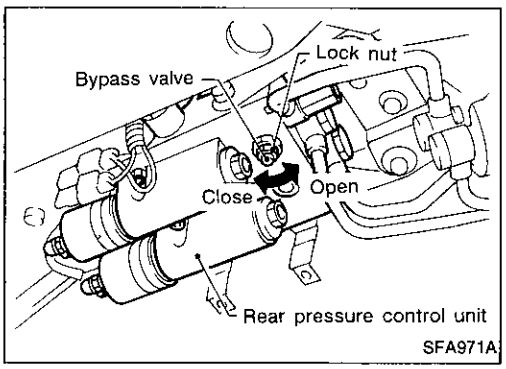
Always use a closed wrench to prevent slippage when loosening lock nuts [6 mm (0.24 in) across flats].

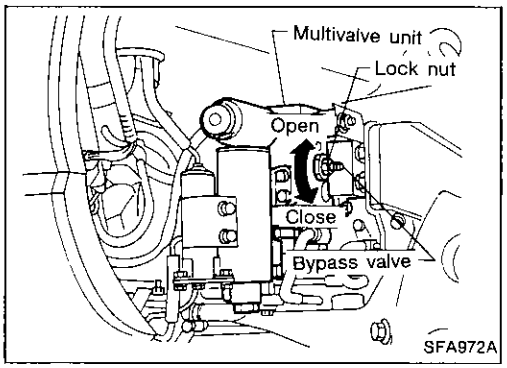
- Loosen lock nut bypass valve on multivalve unit, and slowly tighten cock until it is fully open.

CAUTION:
Multivalve unit bypass valve is opened when tightened.

- After replacing parts or flushing hydraulic lines, close all three bypass valves securely.

  Bypass valve:
  : 11 - 13 N·m (1.1 - 1.3 kg-m, 8 - 9 ft-lb)
  Lock nut:
  : 11 - 13 N·m (1.1 - 1.3 kg-m, 8 - 9 ft-lb)
  (Loosen Multivalve unit bypass valve completely.)



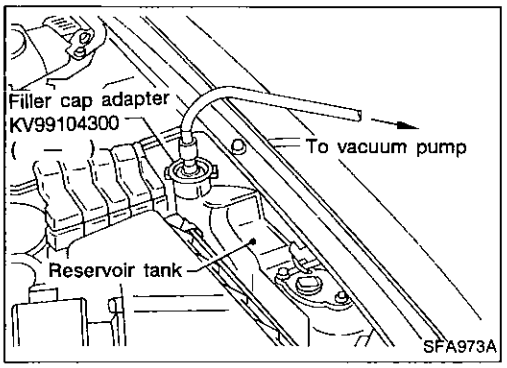


EVACUATING HYDRAULIC LINES

After pump, etc., is replaced, air may enter line between reservoir tank and pump, which in turn degrades oil discharge efficiency. To evacuate hydraulic line, proceed as follows:

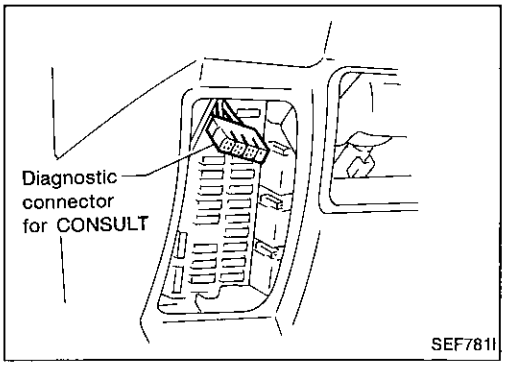
- After parts are replaced, make sure all pipe connections are tight and secure.
- Make sure oil level in reservoir tank is correct.
- Install oil level gauge securely.
- Remove filler cap from reservoir tank and install a filler cap adapter instead.
- Connect vacuum pump (used for air conditioning system) and vacuum hose to filler cap adapter, and evacuate for at least two minutes.

If possible, use a gauge manifold to check for complete evacuation.



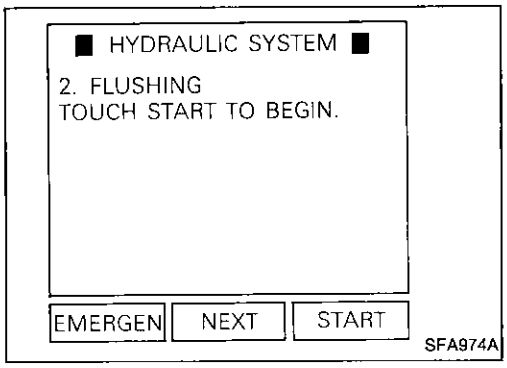
FLUSHING

Flushing is performed to forcefully remove foreign particles from oil lines after hydraulic parts are replaced. Bypass valves are opened fully to permit circulation of oil through entire circuit system, thereby removing foreign particles from oil into filters built into reservoir tank, multivalve unit and pressure control units.

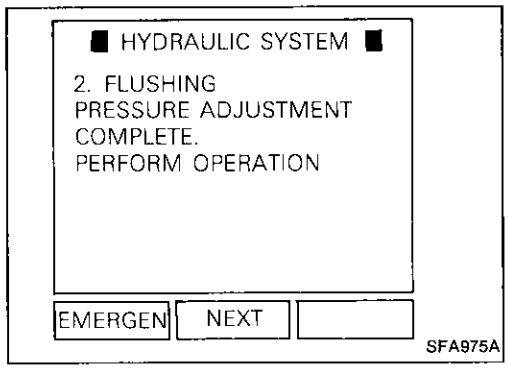


Repair of Component Parts (Cont'd)

- Turn ignition switch "OFF" and connect CONSULT.
- Check oil level in reservoir tank.
- Lift vehicle. Completely open front and rear pressure control unit bypass valves, as well as multivalve unit bypass valve. (Make sure multivalve unit bypass valve is tightened to open.)
- Lower vehicle until wheels are slightly off ground.
- Turn ignition switch "ON". Touch "START", "ACTIV SUS", "WORK SUPPORT", and "HYDRAULIC SYSTEM" on CONSULT display in that order.



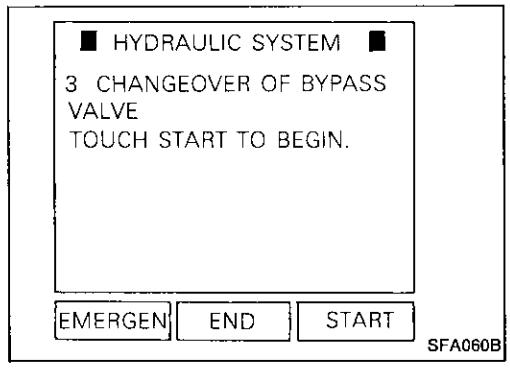
- When display shows "1. FILLING OIL", touch "NEXT" so that display shows "2. FLUSHING" image.
- Touch "START" and wait until flush setting is completed.



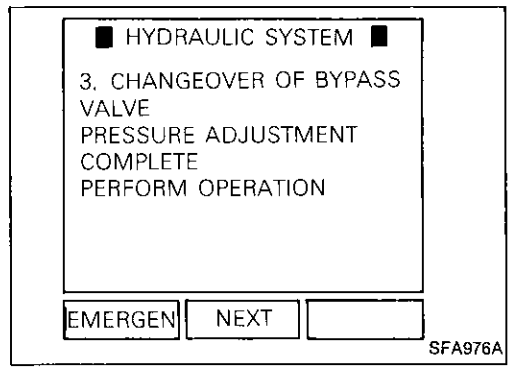
- Start engine. Idle for five minutes to execute flushing.

While flushing is being performed, both flow control and fail-safe valves are held open and control pressure is held at 4,609 kPa (47 kg/cm^2, 668 psi) (neutral pressure).

- After flushing is completed, stop engine.



- Turn ignition switch "ON". (Do not start engine.) Touch "NEXT" on CONSULT display. When display shows "3. CHANGEOVER OF BYPASS VALVE", touch "START".



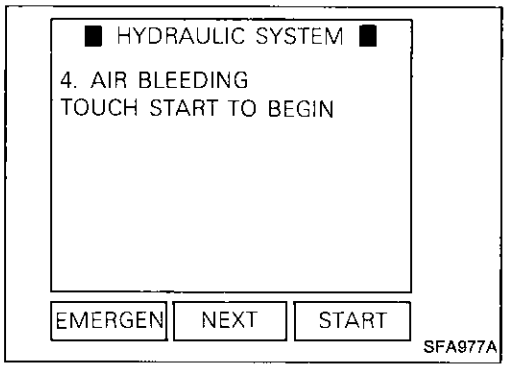
- After flush setting is completed, lift vehicle.
- Tighten both front pressure control unit bypass valve and rear pressure control unit bypass valve to specified torque and secure with lock nuts.
- Completely loosen multivalve unit bypass valve and secure with lock nut.

: Bypass valve 11 - 13 N·m (1.1 - 1.3 kg-m, 8 - 9 ft-lb)
: Lock nut 11 - 13 N·m (1.1 - 1.3 kg-m, 8 - 9 ft-lb)

Always use a box wrench to prevent slippage when loosening bypass valve [6 mm (0.24 in) across flats].

- Lower vehicle until wheels are slightly off ground.

Repair of Component Parts (Cont'd)



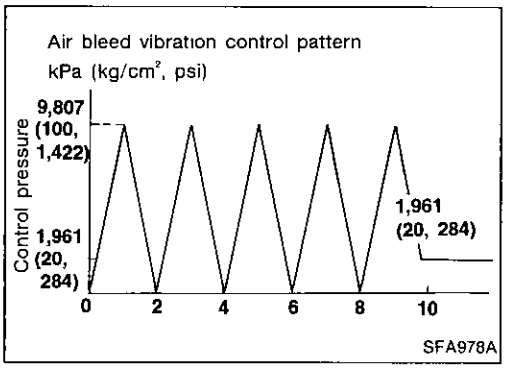
AIR BLEEDING

Air bleeding discharges air trapped in oil in hydraulic lines during part replacement. Bleeding air from oil and oil lines is accomplished by directing pulsating oil under pressure so that all air in line is forced to accumulate at actuator's upper section. It is then discharged into atmosphere through air bleeder located on actuator. When front or rear pressure control unit is replaced, bleed air from its interior.

- Lift vehicle until wheels are at least 50 mm (1.97 in) above ground. Start engine and idle it for approximately two minutes.
- With CONSULT set to "WORK SUPPORT" mode, call up "4. AIR BLEEDING" on display.

When "NEXT" is touched, followed by changeover of bypass valve operations, display will show "4. AIR BLEEDING".

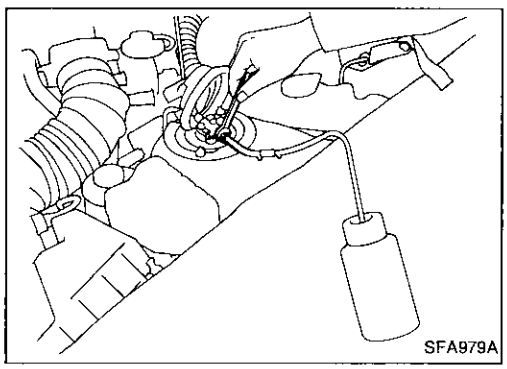
- Check oil level in reservoir tank and add oil so that it is slightly higher than specified level.



- Touch "START" on CONSULT display. Display will then show control pattern shown in figure at left and air bleed vibration will be executed.

While air bleed vibration is being executed, both flow control and fail-safe valves are held open.

- After making sure air bleed vibration is completed on display, stop engine.

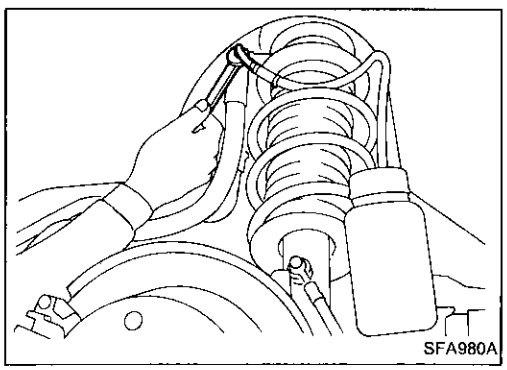


Bleeding air from actuators

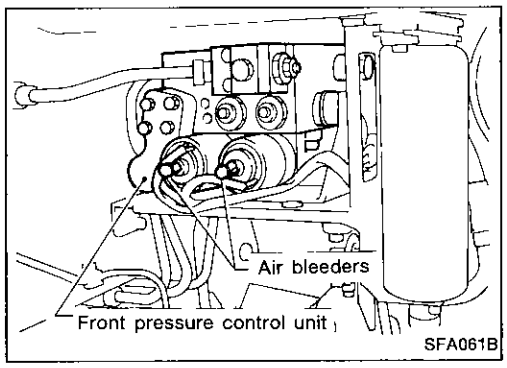
- Connect vinyl tube to air bleeder of actuator requiring air bleeding.
- Slowly loosen air bleeder, drain oil until air bubbles disappear. Tighten air bleeder.
- **While bleeding air, check oil level in reservoir tank occasionally, and add oil as needed.**
- **Be careful not to spill oil on adjacent body parts.**

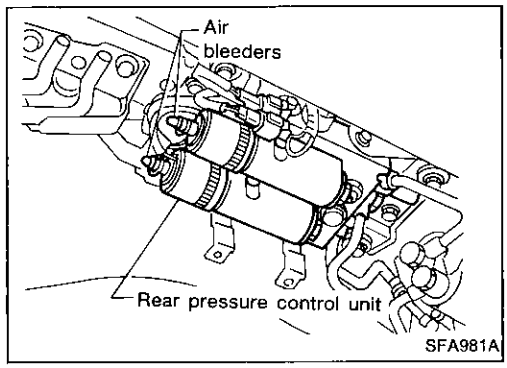
  Air bleeder:

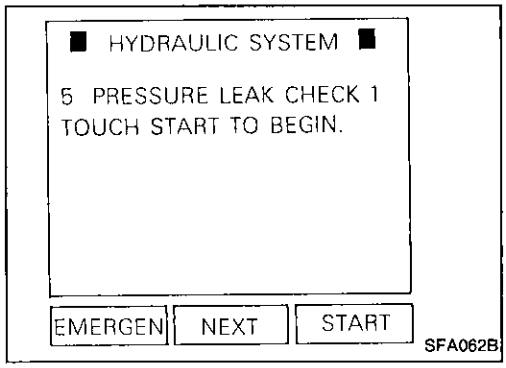
  : 6 - 8 N·m (0.6 - 0.8 kg-m, 4.3 - 5.8 ft-lb)
- If air is not completely bled from actuator, repeat air bleed vibration operation.



Repair of Component Parts (Cont'd)







Bleeding air from pressure control units

When noise is persistently produced or after any pressure control unit is replaced, bleed air from pressure control unit using same procedures as with actuators.

Each pressure control unit is provided with two air bleeders. Bleed air from both bleeders.

Bleeding air from multivalve unit

(1) Race engine, or drive vehicle until oil temperature rises to 60 to 70°C (140 to 158°F) (or, more specifically, until full-active suspension oil cooler motor fan operates).
(2) Connect CONSULT, and perform "4-wheel vibration" mode of work support to allow oil to be circulated through system.
(3) Sudden rise in oil pressure is required for testing. For this purpose, start engine with accelerator pedal depressed. Increase engine speed to approx. 4,000 rpm, and maintain this speed for 20 seconds. Stop engine, and leave as is for 3 minutes.
(4) Repeat step (3) above five to six times.
(5) If noise is still heard after completing these operations, leave vehicle for more than 30 minutes, and then perform steps (1) thru (4) again.

OIL LEAK CHECK

Neutral pressure leak check

- Start engine and idle it for approximately 2 minutes.
- Set CONSULT to "WORK SUPPORT" mode and call up "5. PRESSURE LEAK CHECK 1" on CONSULT display.

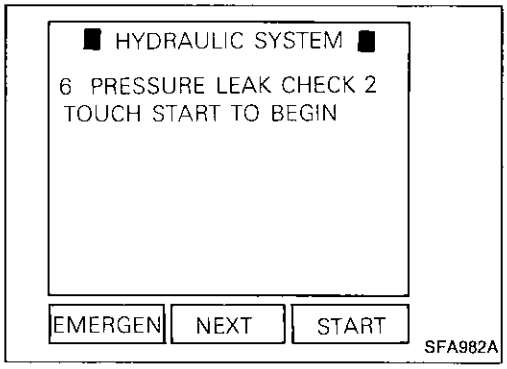
When "NEXT" is touched, followed by air bleeding operations, display will show "5. PRESSURE LEAK CHECK 1".

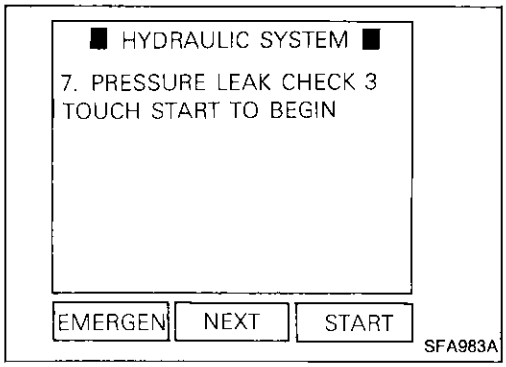
- Touch "START" to control actuator oil pressure at 4,609 kPa (47 kg/cm^2, 668 psi).

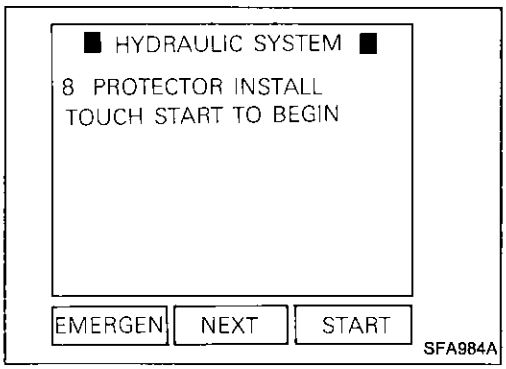
While neutral pressure leak check is being executed, both flow control and fail-safe valves are held open.

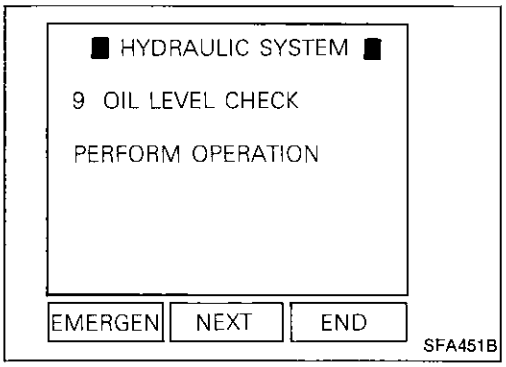
- After making sure neutral pressure control is completed on display, lift vehicle and hold it for at least 3 minutes.
- Check that leaks are not present at pipes and connections. Lower vehicle so that wheels are approximately 50 mm (1.97 in) above ground.

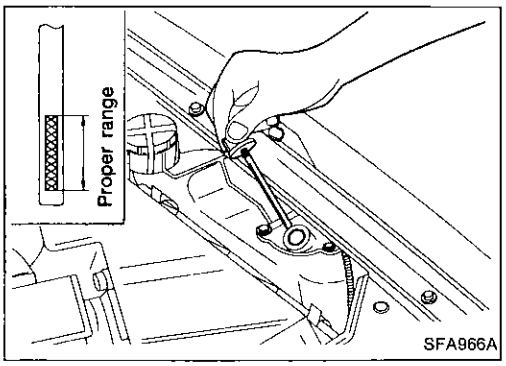
Repair of Component Parts (Cont'd)











High pressure leak check

- After completing neutral pressure leak checks, touch "NEXT" on CONSULT display. Display will then show "6. PRESSURE LEAK CHECK 2".
- Touch "START" on display. Actuator oil pressure is then controlled at 9,807 kPa (100 kg/cm^2, 422 psi) rather than at 4,609 kPa (47 kg/cm^2, 668 psi).

While high pressure leak check is being executed, both flow control and fail-safe valves are held open.

- After making sure high pressure leak check is completed on display, lift vehicle for at least three minutes.
- Check that leaks are not present at piping and connections. Lower vehicle so that wheels are still at least 50 mm (1.97 in) above ground.

Return line leak check

- After completing high pressure leak checks, touch "NEXT" on CONSULT display. Display now shows "7. PRESSURE LEAK CHECK 3".
- Touch "START" to control actuator oil pressure at 4,609 kPa (47 kg/cm^2, 668 psi) rather than at 9,807 kPa (100 kg/cm^2, 1,422 psi).

While return line leak check is being executed, both flow control and fail-safe valves are held open.

- After making sure return line leak check is completed on display, lift vehicle for at least three minutes.
- Check that leaks are not present at piping and connections.

PROTECTOR INSTALLATION

- Touch "NEXT" on CONSULT display. Display now shows "8. PROTECTOR INSTALL".
- Touch "START" to control actuator oil pressure at 0 kPa (0 kg/cm^2, 0 psi) and to open fail-safe valve.
- After making sure display is set to protector installation mode, stop engine.
- Re-install parts (fender protectors, undercover, etc.).

OIL LEVEL CHECK

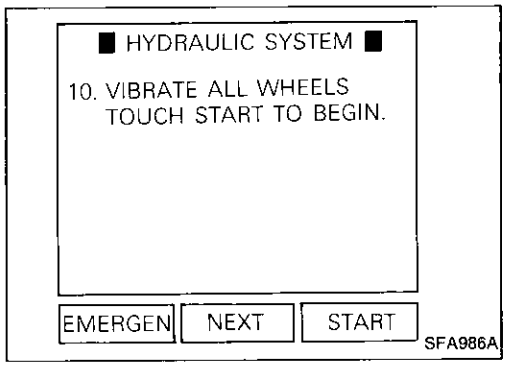
1. Lower vehicle onto flat floor.
2. Start engine. Touch "NEXT" on CONSULT display. Display will then show "9. OIL LEVEL CHECK".
3. Press "END" to exit from the work support mode.

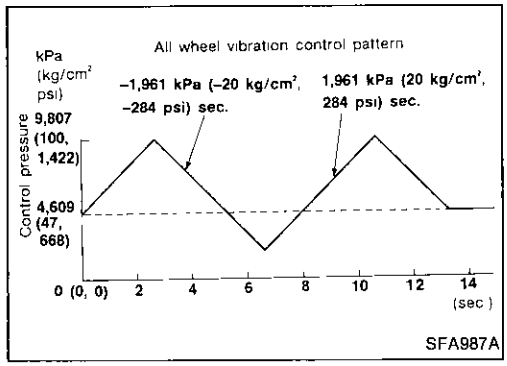
Note: The Consult does not support the inspection (oil level check) in this mode.
The work instruction is displayed on the Consult screen. Perform this operation (oil level check) after exiting the work support mode by touching "END".

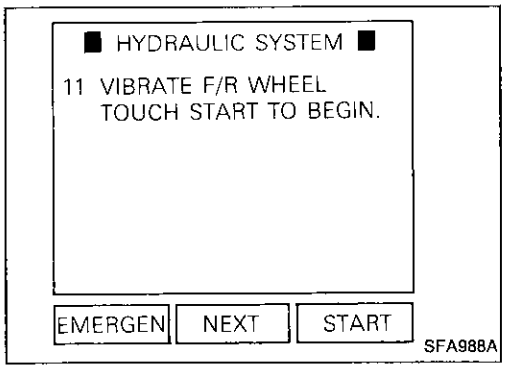
4. For oil level check refer to FA-23.

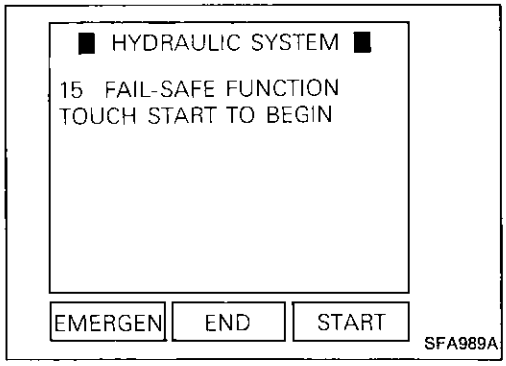
Repair of Component Parts (Cont'd)

SYSTEM OPERATION CHECK









The system operation check is to check for proper active suspension system operation. The active suspension system has three functions — a function that changes control pressure for all four wheels at the same time, a function that changes it for any one wheel, and a function that activates the fail-safe valve. Extreme care should be taken when conducting system operation checks since the vehicle moves up and down greatly.

All wheel vibration check

- Restart work support and skip to No. 10.

CAUTION:

Before conducting all wheel vibration check, make sure vehicle is placed on a flat surface with engine idling.

- Make sure there are no obstacles which may hamper the up-down vehicle movement.
- Release parking brakes to eliminate friction which may occur during vehicle height changes.

Make sure selector lever is set to "P" and foot brake is released.

- Touch "START" on CONSULT display. Display will then show control pattern like the one shown in figure at left, and all four wheels will vibrate simultaneously.

While all wheels are being vibrated, both flow control and fail-safe valves are held open.

- Make sure vehicle moves up and down smoothly without noise and vibration.
- After making sure wheel vibration control has been completed.

Single wheel vibration check

- When either "11. VIBRATE F/R WHEEL" through "14. VIBRATE R/L WHEEL" shown on CONSULT display is selected, only selected wheel can be vibrated in a pattern similar to all wheels vibration control pattern.

Fail-safe function check

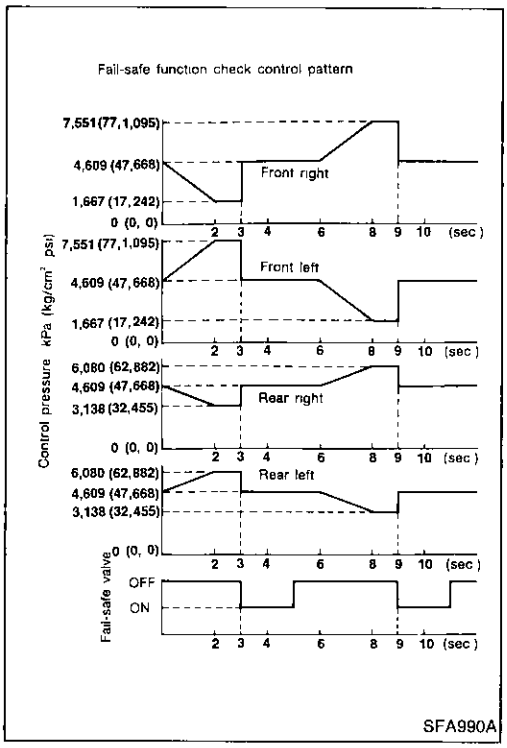
- Check that wheel vibration checks have been completed while observing CONSULT display.
- Call up "15. FAIL-SAFE FUNCTION" mode on CONSULT display.

Make sure engine is idling with vehicle on a flat surface.

- Make sure there are no obstacles that interfere with vehicle roll.
- Release parking brakes to remove friction which may occur while vehicle height changes.

Make sure selector lever is set to "P" and foot brake is released.

Repair of Component Parts (Cont'd)



SFA990A

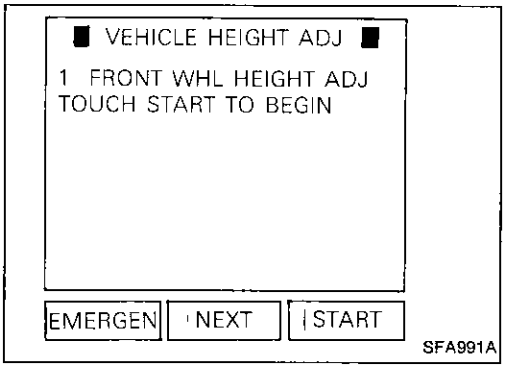
- Touch "START" on CONSULT display. Control pattern shown in figure at left will then appear, and each wheel and fail-safe valve is controlled.

Flow control valve is held "open" during fail-safe function checks.

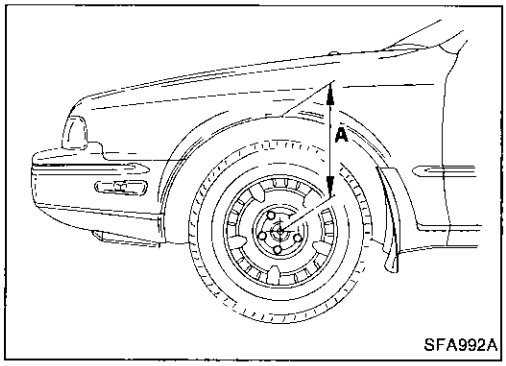
- Make sure vehicle rolls to right or left and quickly returns to level position after fail-safe valve is closed.

A sound is heard when fail-safe valve is opened or closed. This is normal.

- After completing fail-safe function checks, touch "END" on CONSULT display.



SFA991A



SFA992A

VEHICLE HEIGHT ADJUSTMENT

Front wheel height adjustment

- Set CONSULT to work support mode. Touch "VEHICLE HEIGHT ADJ." so that "1. FRONT WHL HEIGHT ADJ." appears on CONSULT display.

Make sure engine is idling, selector lever is set to "P", parking brake is "OFF", foot brake is "OFF", and vehicle is on a level surface.

- Touch "START" on CONSULT display and wait until CONSULT is ready for front wheel height adjustment.
- Set height control switch (located on center console) from "N" (Normal) to "H" (High) and then return to "N".
- Move vehicle 2 to 3 meters (7 to 10 ft) back and forth so that it settles down.

Make sure engine is idling, selector lever is set to "P",, parking brake is "OFF", and foot brake is "OFF".

- Measure distance "A" between center of one front wheel and lower end of fender molding. Similarly measure distance for the other front wheel. Determine distance difference between both measured values.

During front height adjustment, front wheels are controlled in response to output sent from vehicle height sensors and rear wheels are held at a neutral pressure of 4,609 kPa (47 kg/cm^2, 668 psi).

- Compare measured distances "A" with specifications indicated below. If either distance is outside specifications, loosen bolts on affected vehicle height sensor, and rotate height sensor to adjust vehicle height.

Specifications:

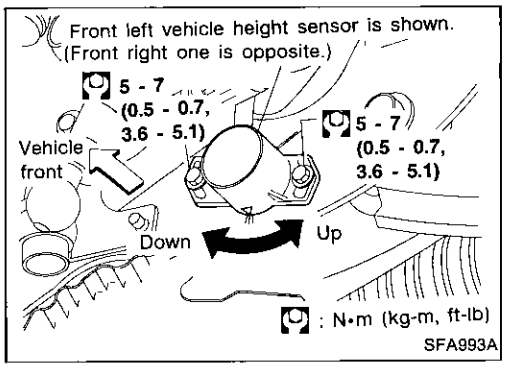
Distance "A"

375 - 395 mm (14.76 - 15.55 in)

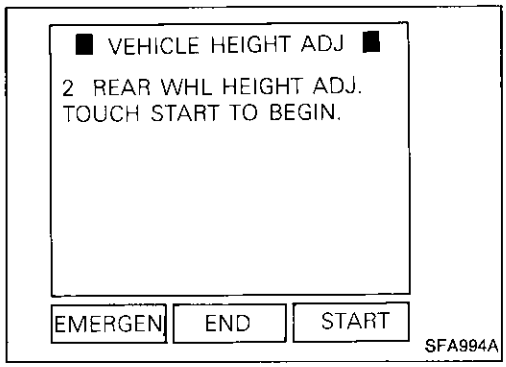
Distance difference between left and right front wheels

10 mm (0.39 in) or less

Repair of Component Parts (Cont'd)



- Turning left vehicle height sensor counterclockwise (when viewed from front side) by 1 graduation (5°) increases vehicle height 14 mm (0.55 in); Turning right vehicle height sensor 1 graduation clockwise increases vehicle height 14 mm (0.55 in).
- After height adjustment, tighten height sensor bolts to specified torque [5 to 7 N·m (0.5 to 0.7 kg-m, 3.6 to 5.1 ft-lb)].

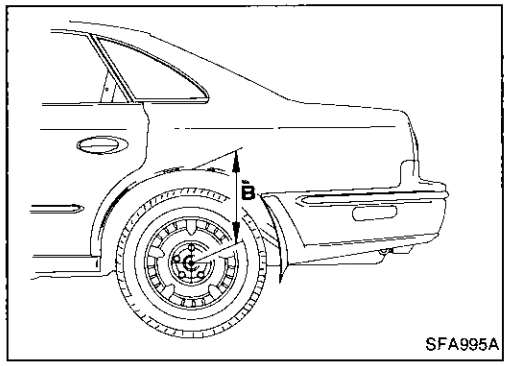


Rear wheel height adjustment

- Touch "NEXT" so that "2. REAR WHL HEIGHT ADJ." appears on CONSULT display.

Make sure engine is idling, selector lever is set "P", parking brake is "OFF", foot brake is "OFF" and wheel is on a flat surface.

- Touch "START" on CONSULT display and wait until CONSULT is ready for rear wheel height adjustment.



- Measure distance "B" between center of one rear wheel and lower end of fender molding. Similarly measure distance for the other rear wheel. Determine difference between both measured values.

Make sure front wheels are held at a neutral pressure of 4,609 kPa (47 kg/cm^2, 668 psi) during rear vehicle height adjustment. Rear wheels are controlled in response to output value of vehicle height sensors.

- Compare measured distance "B" with specifications indicated below. If either distance is outside specifications, loosen stopper nut on vehicle height sensor connecting rod and change rod length to adjust vehicle height.

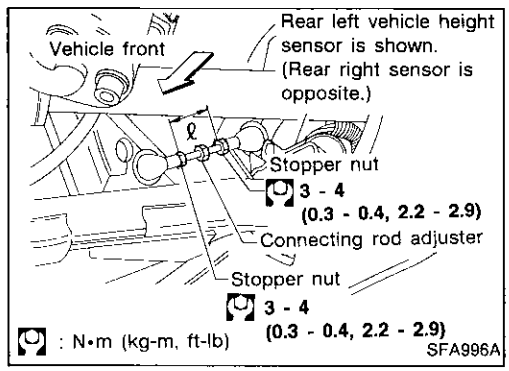
Specifications:

Distance "B"

351 - 371 mm (13.82 - 14.61 in)

Difference in distance "B" between left and rear wheels

10 mm (0.39 in) or less

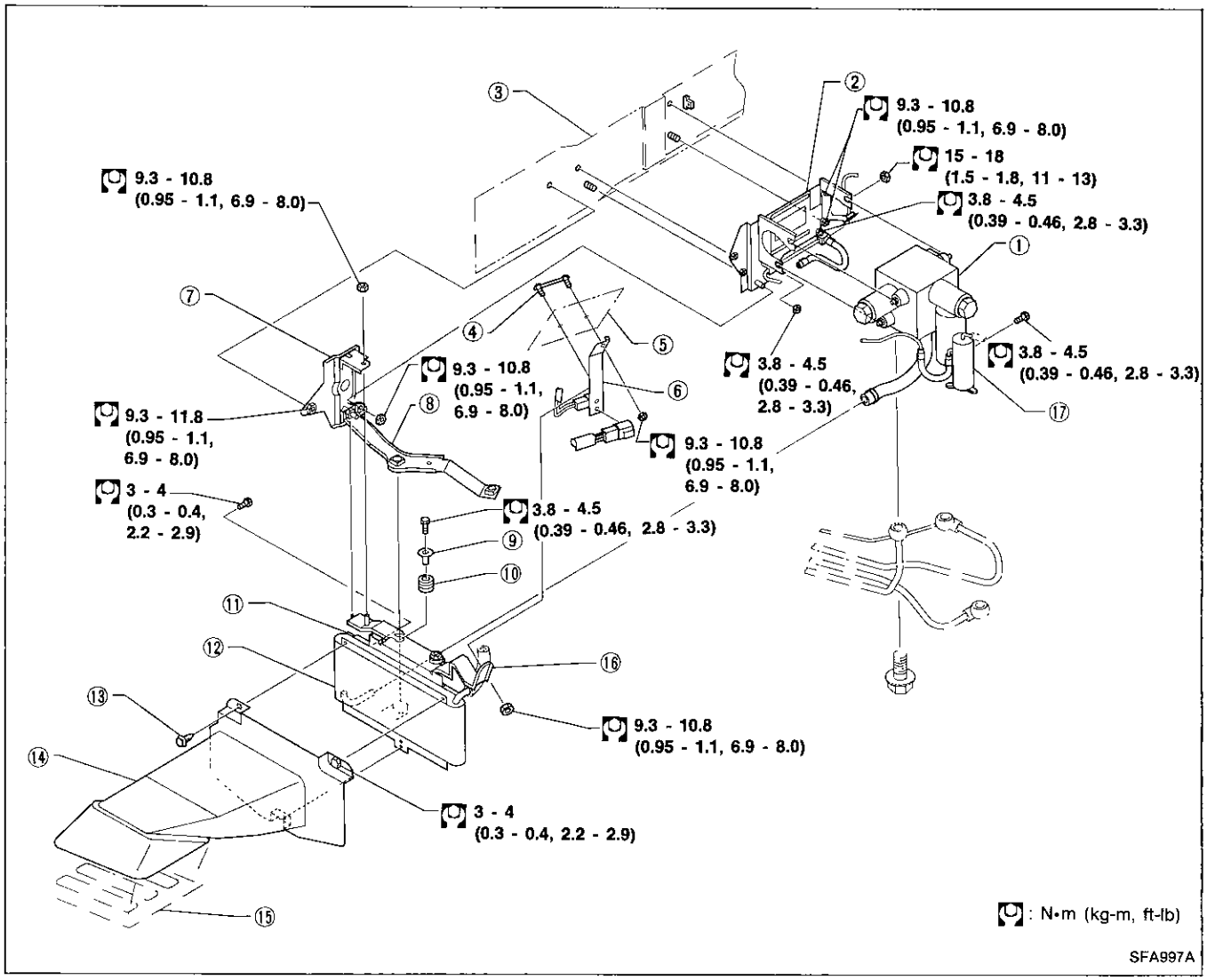


- Measure distance ℓ between stopper nuts seating surfaces.
- Turning connecting rod adjuster one complete rotation (1 pitch = 1.6 mm) causes vehicle height to increase by 7.5 mm (0.295 in).
- After adjusting connecting rod length, tighten stopper nut to specified torque [3 to 4 N·m (0.3 to 0.4 kg-m, 2.2 to 2.9 ft-lb)].
- Touch "END" on CONSULT display and stop engine.

Repair of Component Parts (Cont'd)

COMPONENT PART TIGHTENING TORQUE

Removal and installation of multivalve unit and oil cooler

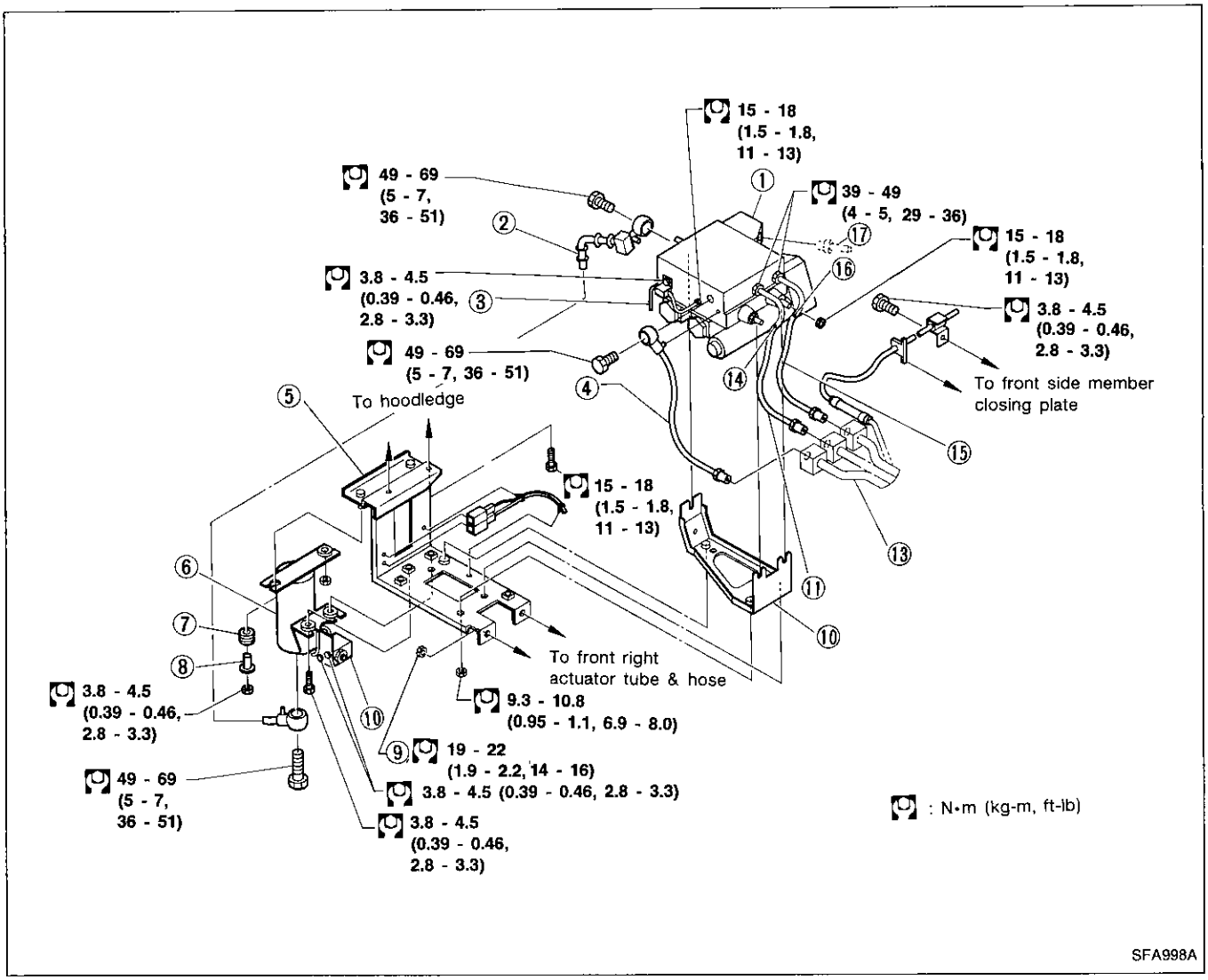


① Multivalve unit
② Multivalve unit bracket
③ Front side member closing plate
④ Bolt plate
⑤ Lower hoodledge
⑥ Connector bracket
⑦ Oil cooler side bracket
⑧ Oil cooler lower bracket
⑨ Insulator collar
⑩ Insulator
⑪ Oil cooler shroud
⑫ Oil cooler
⑬ Clip
⑭ Oil cooler duct
⑮ Bumper finisher
⑯ Oil cooler upper bracket
⑰ Drain filter

- Before removing oil cooler or multivalve unit, remove left and right front turn signal lamps and bumper finishers. Oil cooler or multivalve unit is now accessible for removal.
- Before removing or installing multivalve unit, make sure oil cooler is removed first.

Repair of Component Parts (Cont'd)

Removal and installation of front pressure control unit and front main accumulator



① Front pressure control unit
② Front main accumulator high pressure hose
③ Pressure detection tube
④ Front unit feed tube
⑤ Front pressure control unit bracket
⑥ Front main accumulator
⑦ Insulator
⑧ Insulator collar
⑨ Pressure detection connector
⑩ Front pressure control unit inner bracket
⑪ Front unit return tube
⑫ Front cross tube & hose set
⑬ Mark (white)
⑭ Front unit left tube
⑮ Mark (blue)
⑯ Front right actuator tube & hose

— Removal and installation of front pressure control unit —

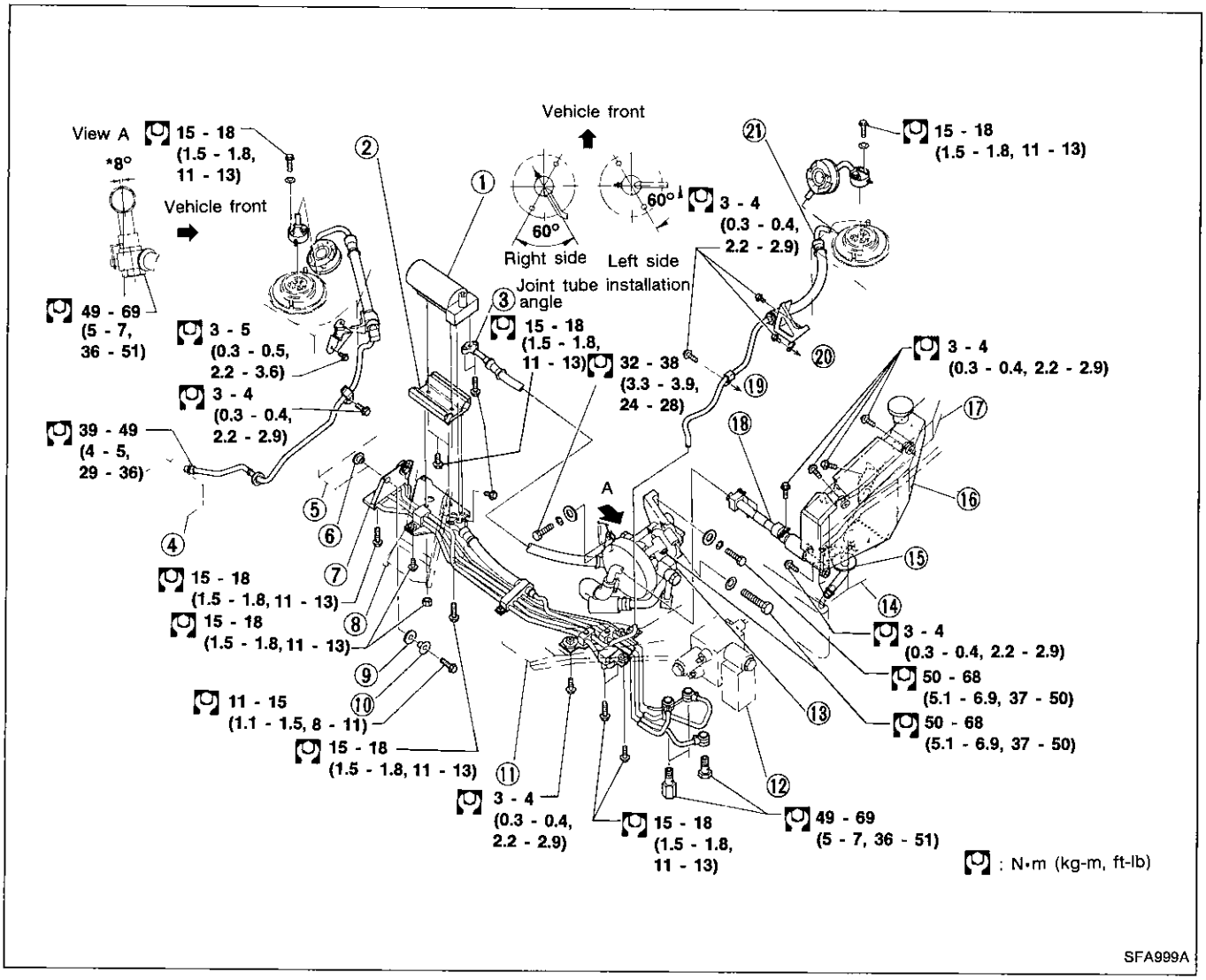
- Before removing or installing front pressure control unit, remove left and right front turn signal lamps and bumper finishers. Front pressure control unit will then be accessible.
- Before discarding front pressure control unit, drill holes in return accumulator to completely discharge nitrogen gas as instructed on caution label. Caution label is located on return accumulator of front pressure control unit.

— Disposal of front main accumulator —

Before discarding front main accumulator, drill holes in it to completely discharge nitrogen gas as instructed on caution label on main accumulator.

Repair of Component Parts (Cont'd)

Removal and installation of pump, pump accumulator, reservoir tank and piping (in engine compartment)



① Pump accumulator
② Accumulator mount insulator
③ Pump's high pressure hose
④ Front pressure control unit
⑤ Side member
⑥ Valve mount inner insulator
⑦ Tube bracket
⑧ Right tension rod bracket
⑨ Valve mount outer insulator
⑩ Insulator collar
⑪ Left tension rod bracket
⑫ Multivalve unit
⑬ Pump
⑭ Lower hoodledge
⑮ Tank return hose
⑯ Reservoir tank
⑰ Upper hoodledge
⑱ Suction hose
⑲ To power steering bracket
⑳ To strut housing
㉑ Front left actuator tube & hose

Repair of Component Parts (Cont'd)

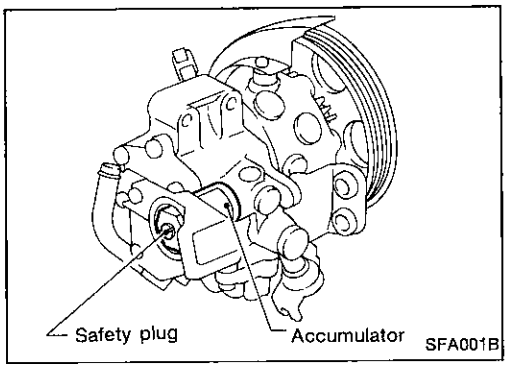
— Pump removal and installation —

- Before removing pump, remove pump pulley and proceed as follows:

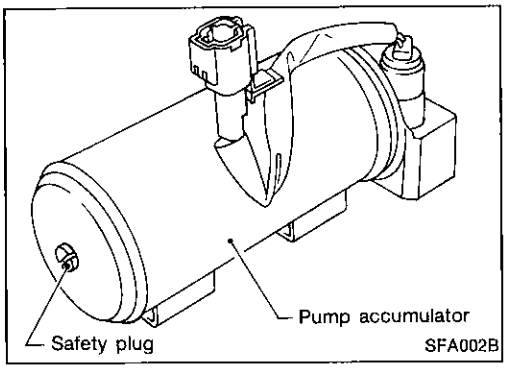
(1) Insert screwdriver in pulley hole (to prevent pulley from turning), and loosen pulley nut.
(2) Remove pulley.
(3) Remove pump.

- Tighten pulley nut to specified torque after installing pulley. Be sure to install pulley key.

  Pulley nut:
  [O]: 88 - 98 N·m (9.0 - 10.0 kg-m, 65 - 72 ft-lb)



- Before discarding pump, slowly loosen safety plug on accumulator (a part of pump) to discharge nitrogen gas and then loosen it completely.

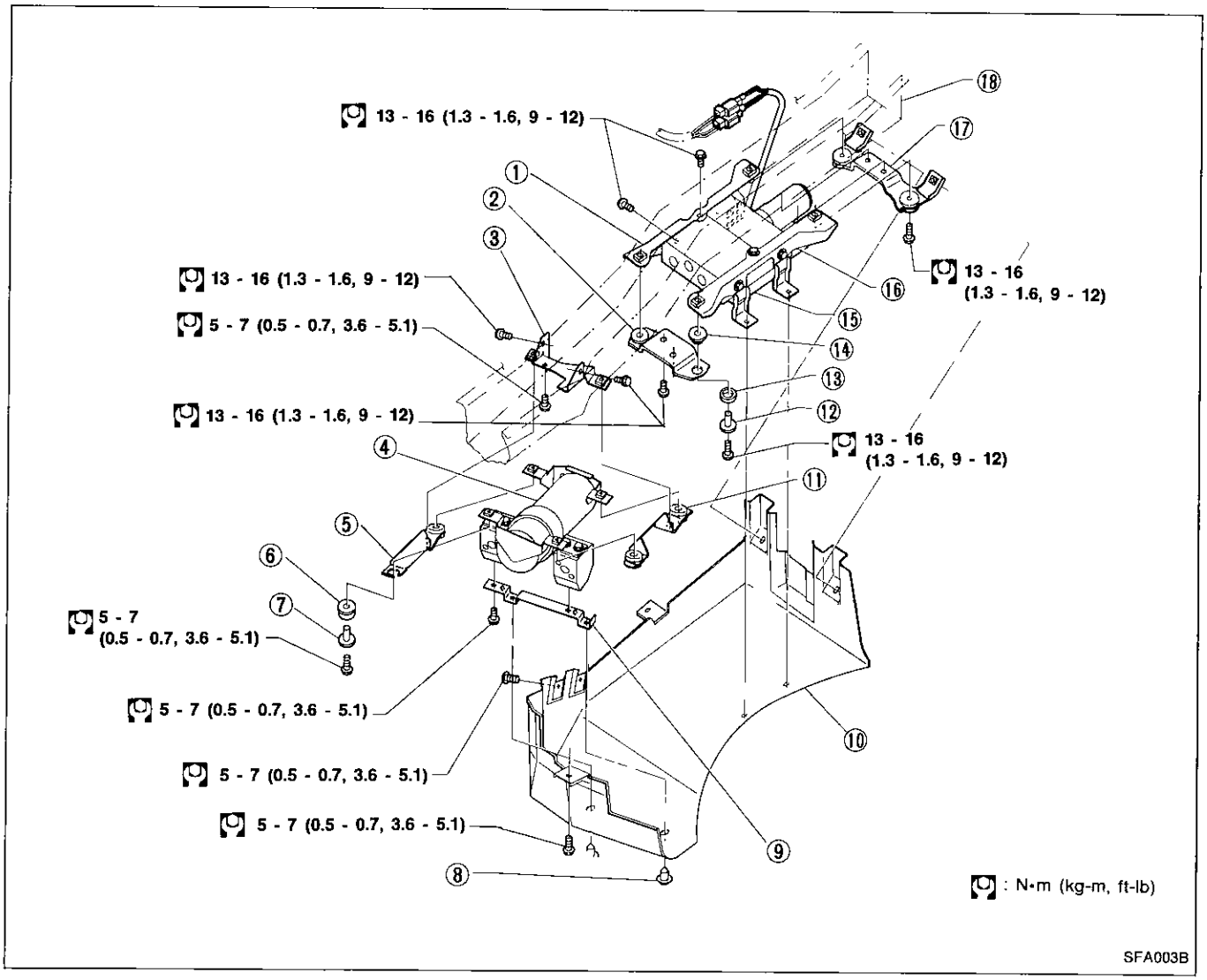


— Disposal of pump accumulator —

Before disposing of pump accumulator, slowly loosen safety plug to discharge nitrogen gas and then loosen it completely.

Repair of Component Parts (Cont'd)

Removal and installation of rear pressure control unit and rear main accumulator



① Control unit bracket C
② Control unit bracket A
③ Accumulator bracket C
④ Rear main accumulator
⑤ Accumulator bracket A
⑥ Insulator
⑦ Insulator collar
⑧ Clip
⑨ Control unit protector stay
⑩ Control unit protector
⑪ Accumulator bracket B
⑫ Insulator collar
⑬ Mount outer insulator
⑭ Mount inner insulator
⑮ Rear pressure control unit
⑯ Control unit bracket D
⑰ Control unit bracket B
⑱ Side member

— Disposal of rear pressure control unit —

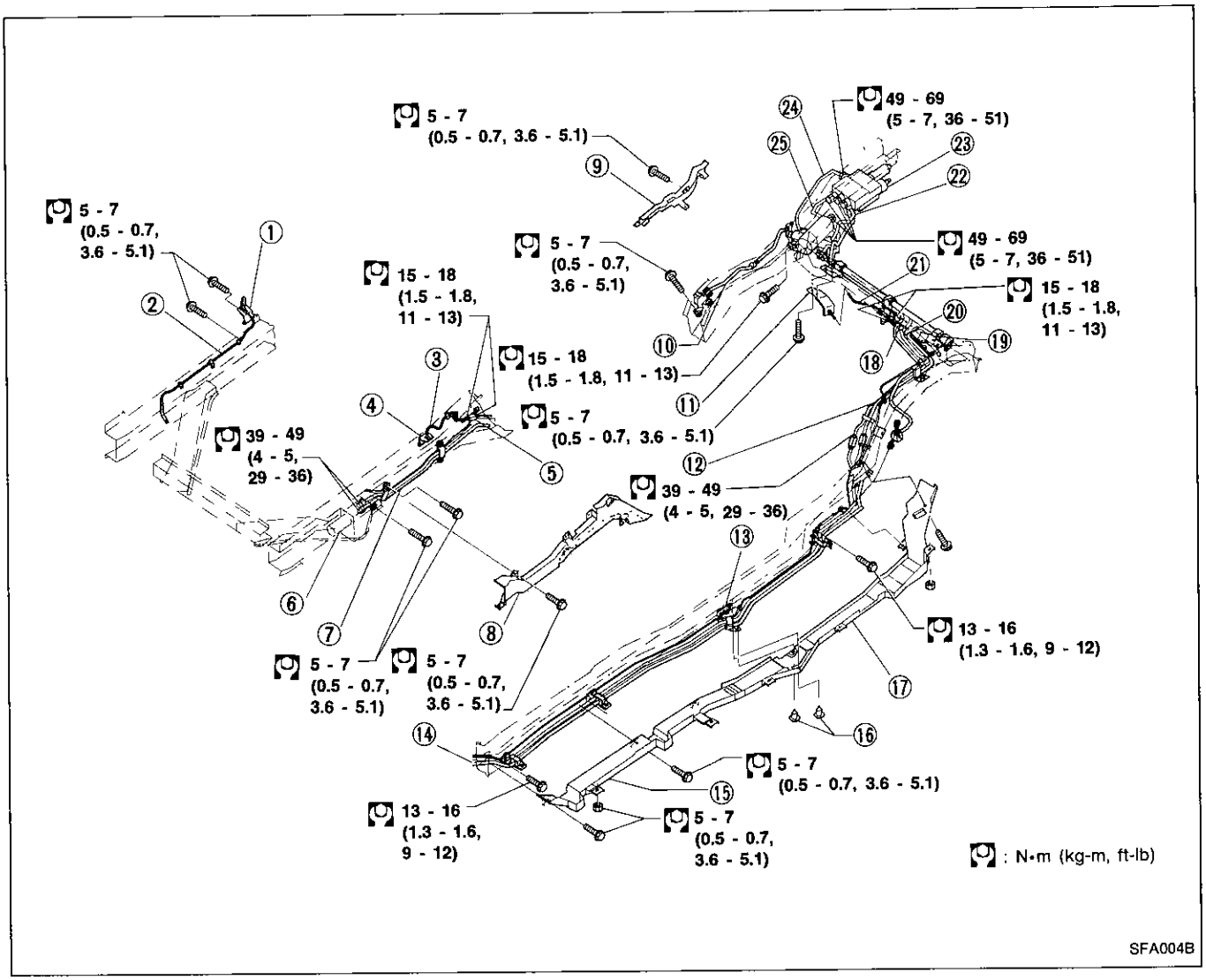
Before discarding rear pressure control unit, drill holes in accumulator to completely discharge nitrogen gas as instructed on caution label. Caution label is located on return accumulator of pressure control unit.

— Disposal of rear main accumulator —

Before discarding rear main accumulator, drill holes in accumulator to completely discharge nitrogen gas as instructed on accumulator caution label.

Repair of Component Parts (Cont'd)

Removal and installation of underfloor piping

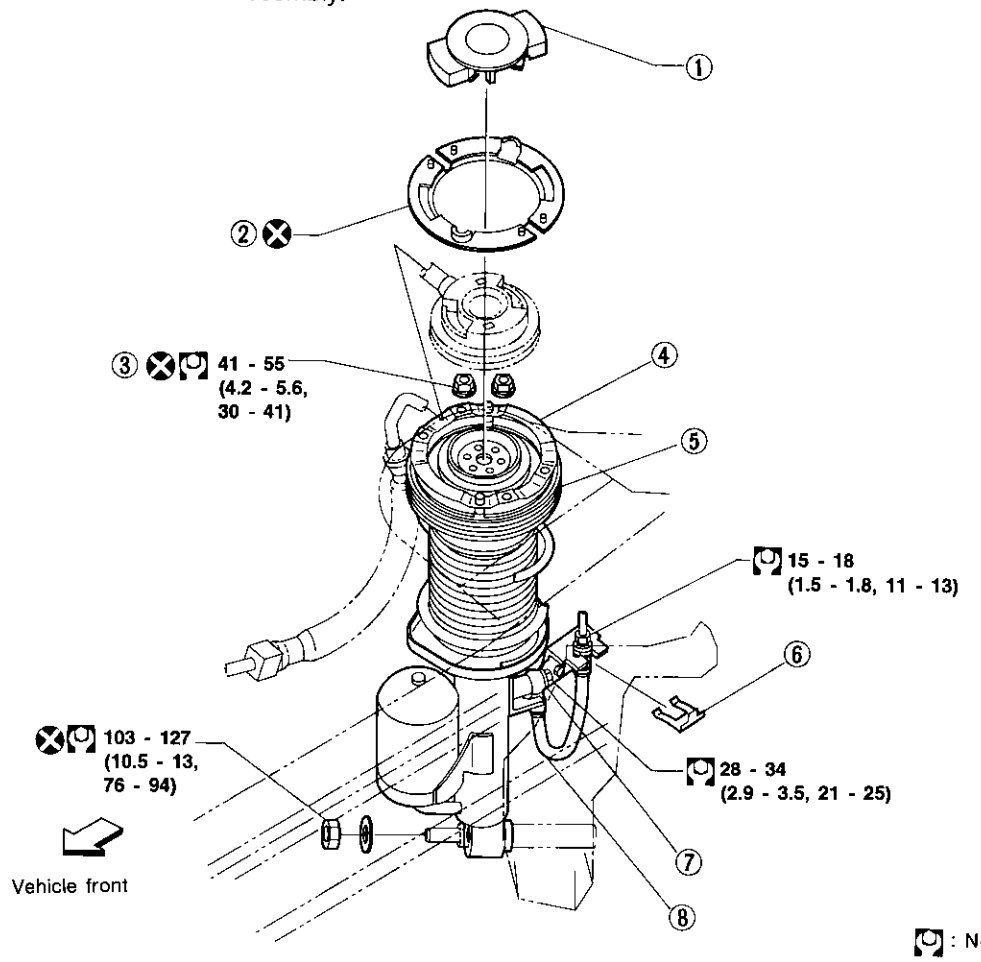


① Drain tube bracket
② Front right suspension drain tube
③ Front left suspension drain tube
④ Drain tube bracket
⑤ Drain tube connector
⑥ Multivalve unit
⑦ Front floor tube assembly
⑧ Front left tube protector
⑨ Rear right tube protector
⑩ Rear right actuator tube
⑪ Drain tube bracket
⑫ Rear floor tube assembly
⑬ Tube bracket
⑭ Front floor tube assembly
⑮ Front floor tube protector
⑯ Clip
⑰ Rear floor tube protector
⑱ Rear right floor drain tube
⑲ Drain tube bracket
⑳ Rear left suspension drain tube
㉑ Rear right suspension drain tube
㉒ Pressure detection tube C
㉓ Rear pressure control unit
㉔ Rear unit connecting tube
㉕ Pressure detection tube B

Repair of Component Parts (Cont'd)

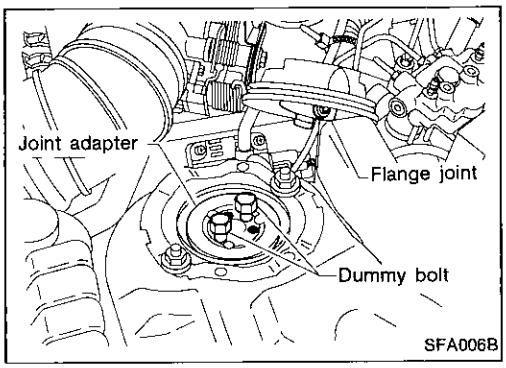
Removal and installation of front actuator

Figure shows front left actuator assembly.



① Air filter
② Insulator cap clip
③ Nut
④ Insulator cap seat
⑤ Actuator assembly
⑥ Drain hose lock spring
⑦ Drain hose gasket
⑧ Front drain hose

Repair of Component Parts (Cont'd)



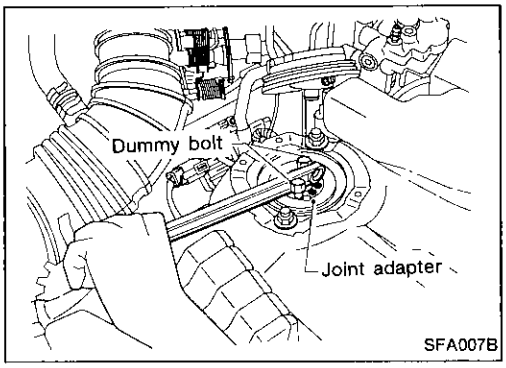
— Removal and installation of actuator assembly —

1. Removal

- Except for pipes, use same removal procedures outlined for vehicles which are not equipped with active suspensions. To facilitate disassembly of actuator assembly, loosen joint adapter first:

(1) Disconnect flange joint from upper side of actuator.
(2) Install two dummy bolts [approximately 15 mm (0.59 in) thread size] in bolt holes used to connect joint adapter flange joint.

- **Do not use flange joint bolts in place of dummy bolts.**
- **Do not allow foreign particles to enter oil hole in center of joint adapter.**



(3) Attach suitable rod (e.g., ratchet handle) to dummy bolt, and loosen joint adapter.

Loosen joint adapter just enough so that it can be easily removed after removing actuator assembly.

2. Installation

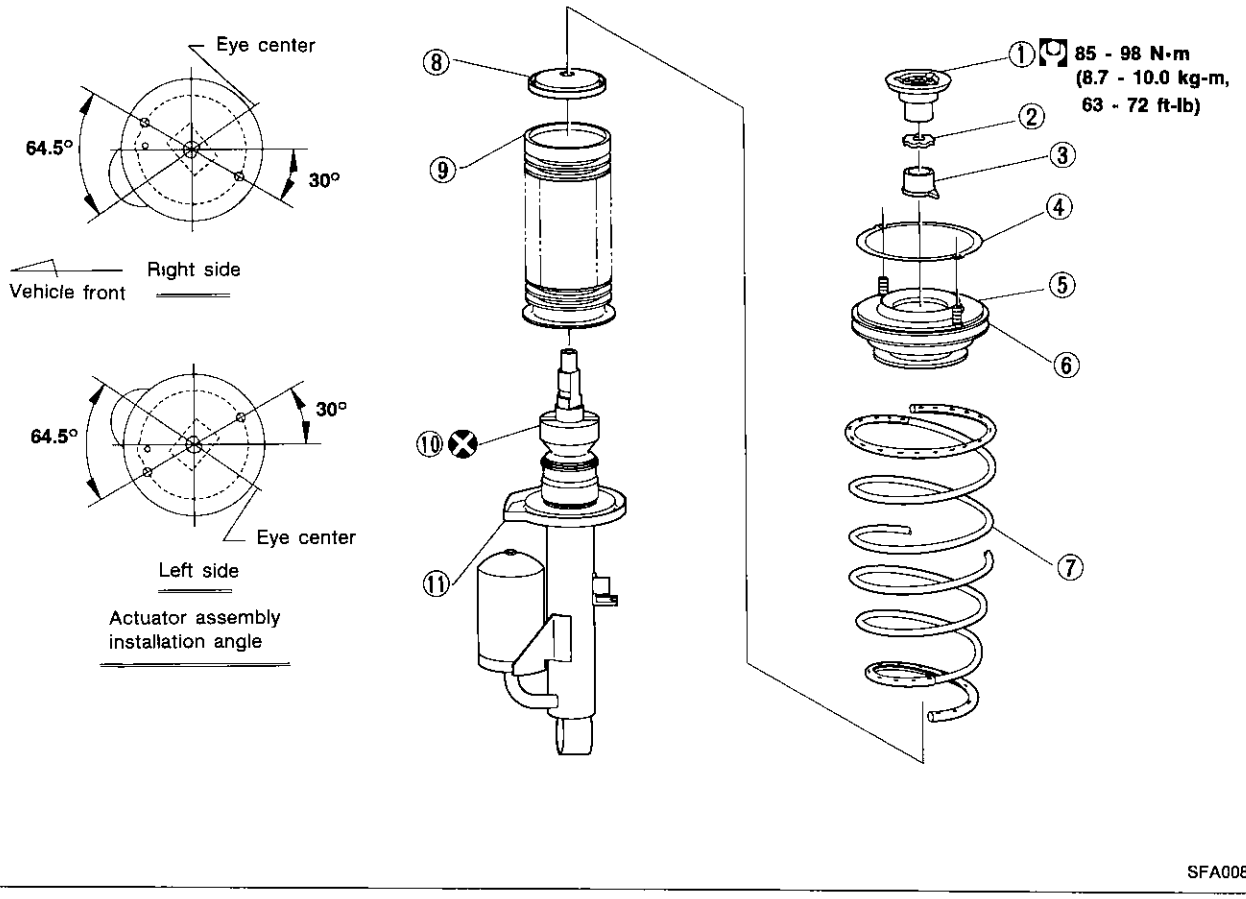
Install actuator assembly and tighten joint adapter to specified torque.

CAUTION:
Make sure dust boot is not twisted or deformed.

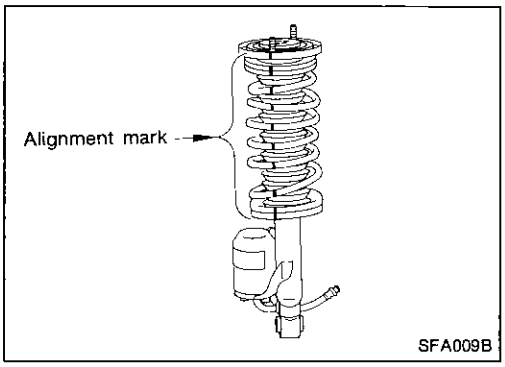
Repair of Component Parts (Cont'd)

Disassembly and reassembly of front actuator

Figure shows front left actuator.



① Joint adapter
② Wave washer
③ Spool lock washer
④ Insulator spacer
⑤ Rebound insulator stopper
⑥ Mount insulator
⑦ Coil spring
⑧ Bumper rubber seat
⑨ Front actuator dust cover
⑩ Bound bumper
⑪ Front actuator

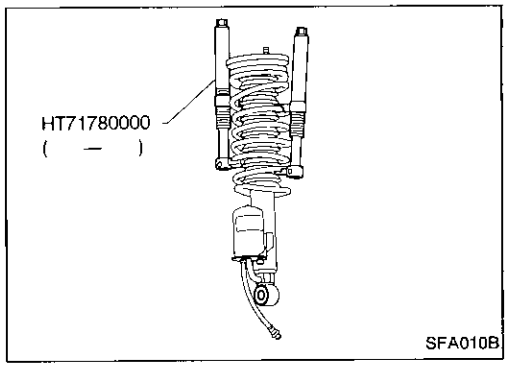


— Disassembly and reassembly of actuator assembly —

1. Disassembly

- Scribe alignment marks on actuator, coil spring and mount insulator before disassembling.

Repair of Component Parts (Cont'd)



- Compress coil spring using Tool.
- Loosen joint adapter and disassemble actuator assembly.

2. Reassembly

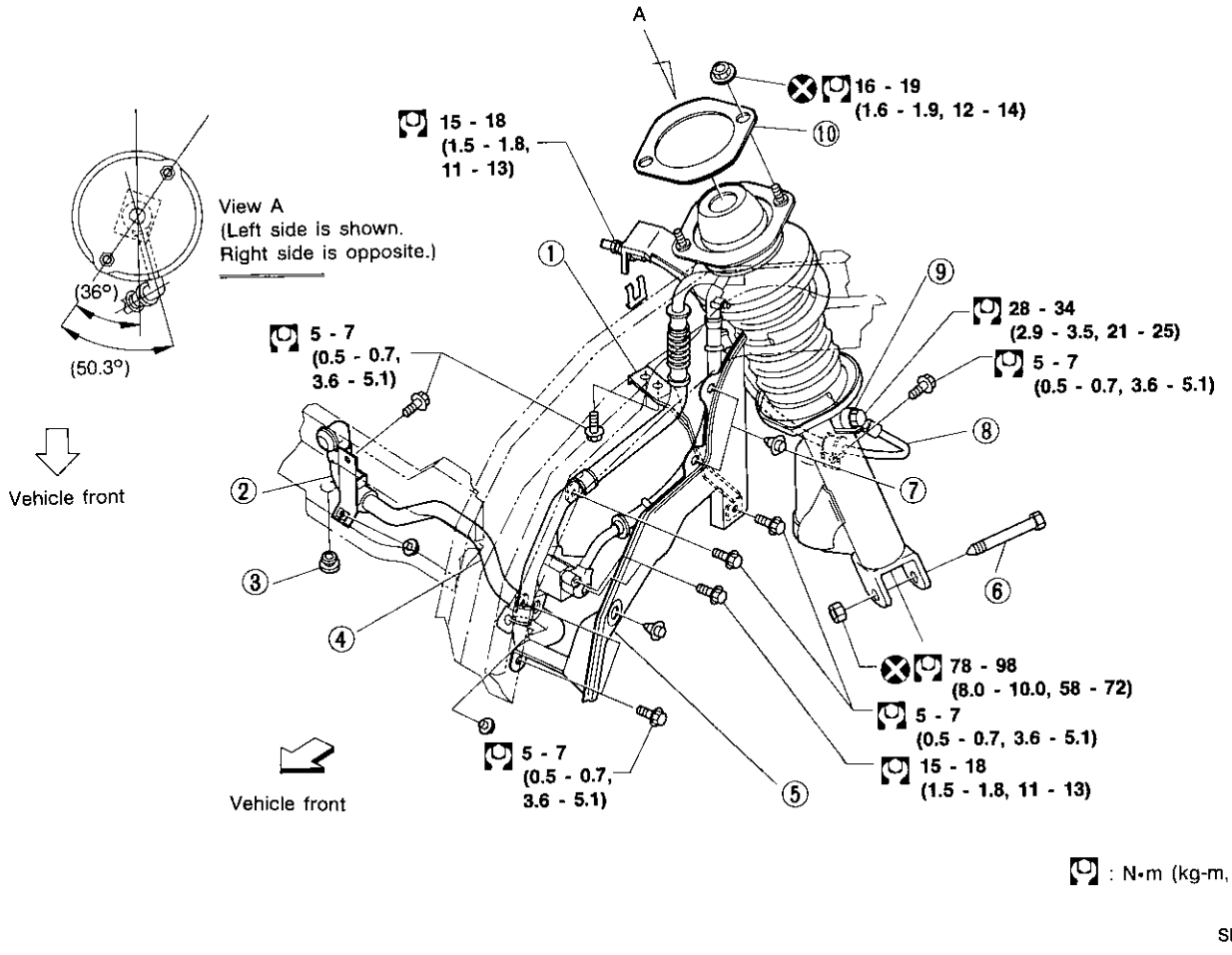
Reassemble all parts by aligning alignment marks.

— Disposal of front actuator —

Before discarding actuator, drill holes in accumulator to completely discharge nitrogen gas as instructed on caution label on sub-accumulator (a part of actuator).

Removal and installation of rear actuator

Figure shows rear left actuator assembly.

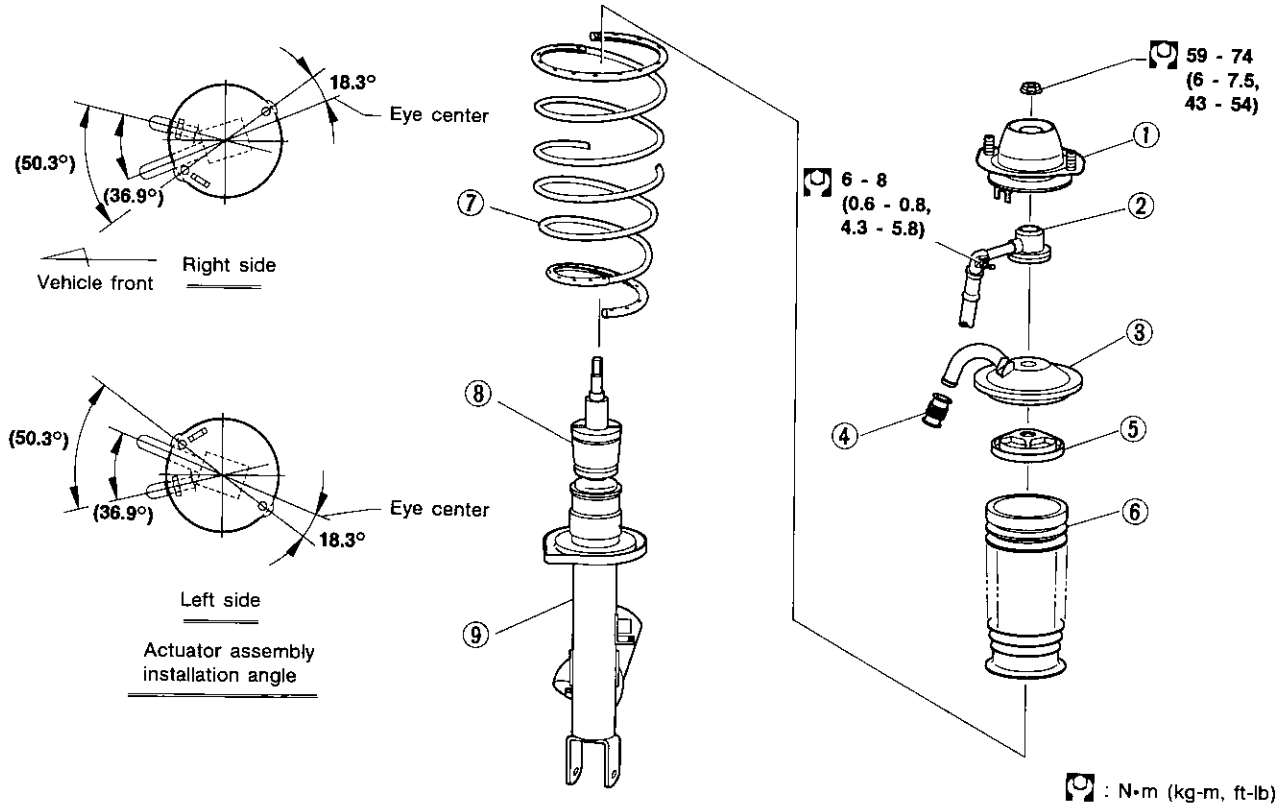


① Rear joint hose protector bracket
② Tube bracket
③ Plug
④ Air tube
⑤ Rear joint hose protector
⑥ Rear actuator lower pin
⑦ Clip
⑧ Rear drain hose
⑨ Drain hose gasket
⑩ Actuator mount seal

Repair of Component Parts (Cont'd)

Disassembly of rear actuator

Figure shows rear left actuator.



① Mount insulator
② Rear joint hose
③ Spring upper seat
④ Air tube connector
⑤ Bound bumper cover
⑥ Rear actuator dust cover
⑦ Coil spring
⑧ Bound bumper
⑨ Rear actuator

— Removal and installation of coil spring —

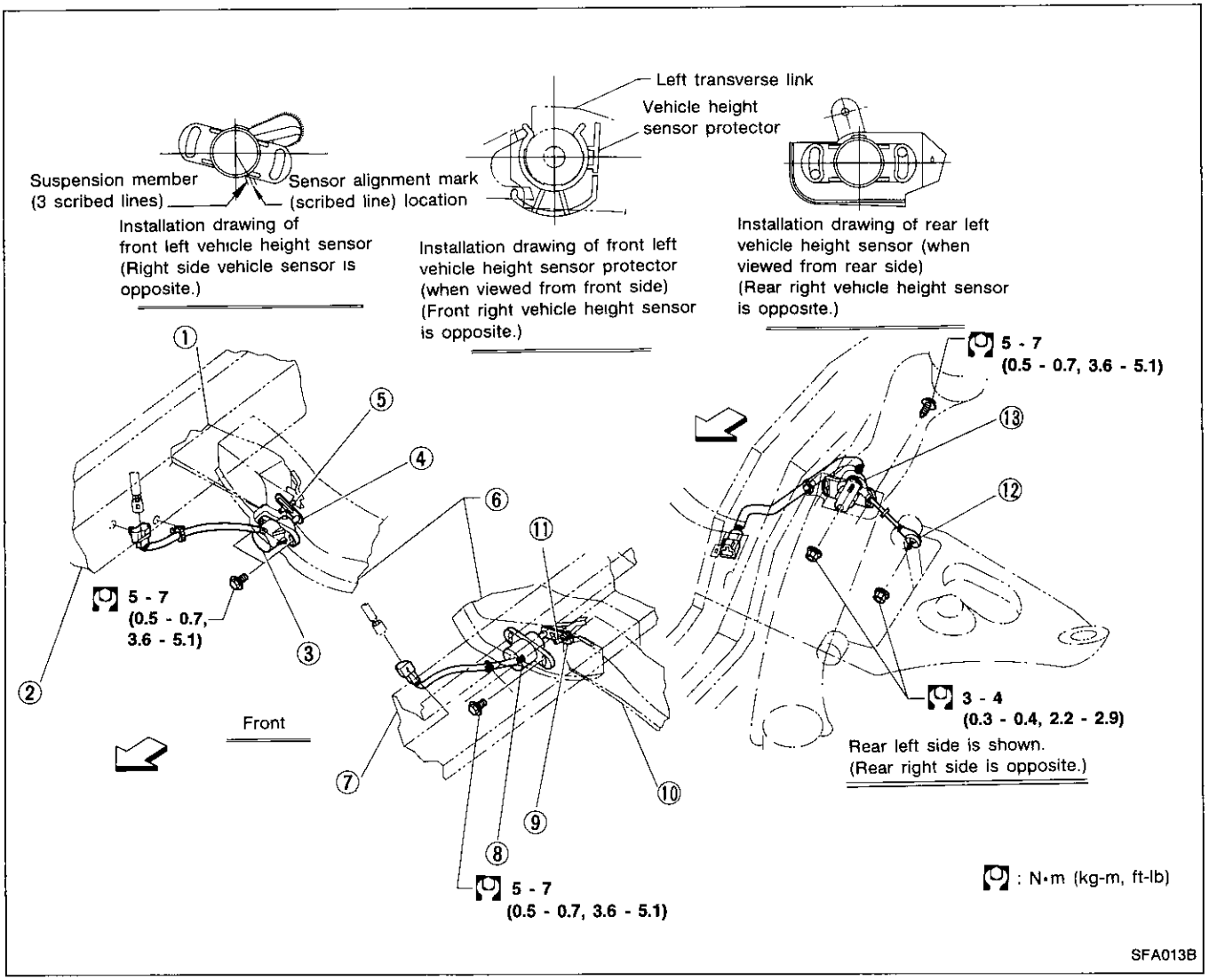
Use same procedures outlined for vehicles which are not equipped with active suspensions.

— Installation and disposal of rear actuator —

- Be careful not to twist or deform dust boot when installing actuator assembly.
- Before discarding actuator, drill holes in accumulator to completely discharge nitrogen gas as instructed on caution label on sub-accumulator (a part of actuator).

Repair of Component Parts (Cont'd)

Removal and installation of vehicle height sensor



① Right transverse link
② Right side member
③ Front right vehicle height sensor
④ Sensor arm
⑤ Clevis pin
⑥ Suspension member
⑦ Left side member
⑧ Front left vehicle height sensor
⑨ Sensor arm
⑩ Left transverse link
⑪ Clevis pin
⑫ Sensor connecting rod
⑬ Rear left vehicle height sensor

NOTE

Contents

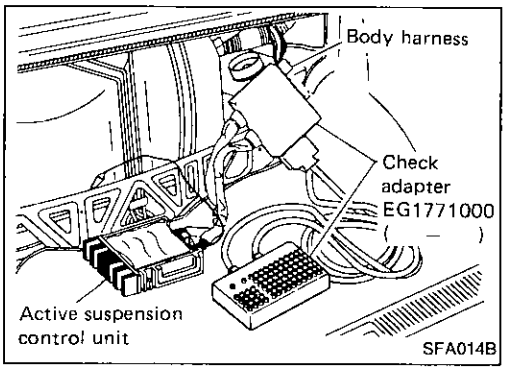
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Preliminary Check ..... FA- 56
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Component Parts and Harness Connector Locations ..... FA- 57
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Diagnostic Procedure 11
SYMPTOM: Abnormalities in driving stability and riding comfort FA-102
Diagnostic Procedure 12
SYMPTOM: Noise FA-104

Note: Refer to foldout page for "FULL-ACTIVE SUSPENSION WIRING DIAGRAM".

How to Perform Diagnoses for Quick and Accurate Repair

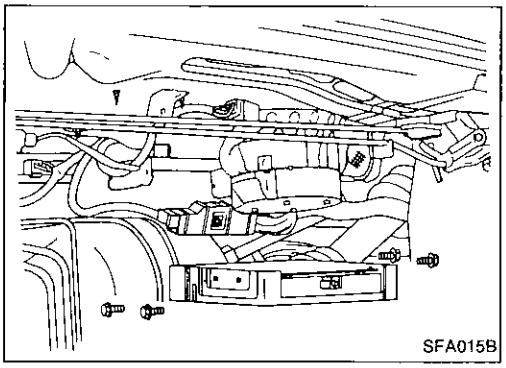
INTRODUCTION

- Before attempting to diagnose any part of the active suspension, refamiliarize yourself with instructions outlined under "Precaution" (FA-2).
- Trouble is usually caused by a faulty part in either the electrical or hydraulic system. However, it sometimes occurs due to a combination of problems in both systems. For this reason, reproduction tests are a must in determining the cause of the trouble.
- As a result of the diagnosis, if trouble is due to faulty hydraulic component parts, refer to "WORK PROCEDURES BY UNIT" in "Repair of Component Parts" (FA-26), and perform required operations (such as relieving pressure, bleeding air, etc.) associated with repair work.



- When voltage or resistance is measured at active suspension control unit connector terminals, always use a check adapter (EG17710000). If no abnormalities are found through this inspection, check with CONSULT set to FIELD TEST mode and attempt to record data concerning faults (difficult to reproduce) which occur occasionally.

For operation of CONSULT's FIELD TEST mode, refer to CONSULT OPERATION MANUAL INTRODUCTION & SUB MODE, which is issued separately.

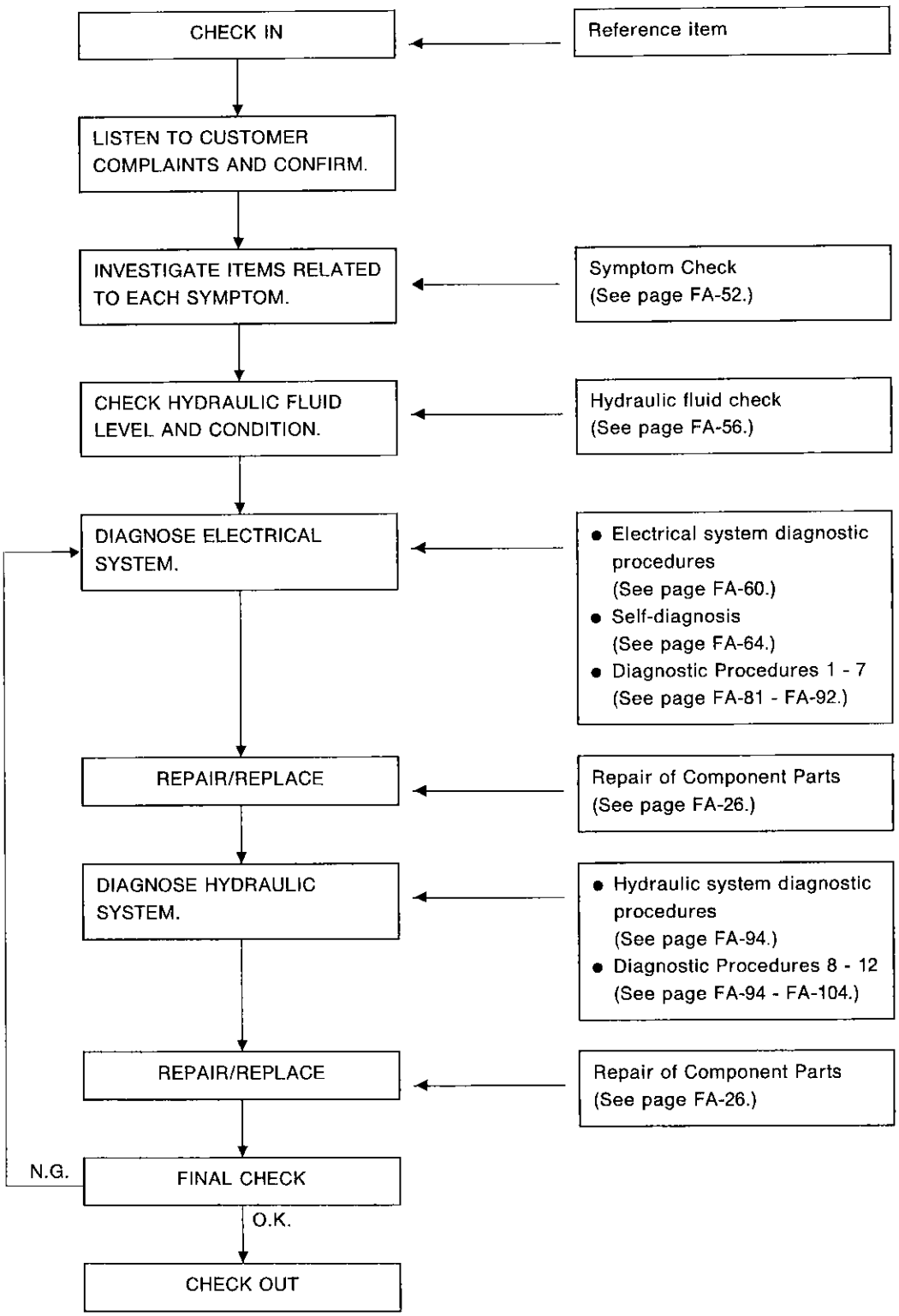


- When control unit is determined to be faulty, recheck with CONSULT set to self-diagnostic mode for confirmation. It is advisable to record numerals (C/U MALFUNCTION 1 through 5) indicated on CONSULT display on old control unit so that cause of trouble can be analyzed for future reference. Replace only control unit, not bracket.

Control unit bracket is secured to upper side of parcel shelf. Do not attempt to press control unit upper lid since this may damage PC boards.

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

WORK FLOW



Symptom Chart

PROCEDURE				Preliminary check		Diagnostic procedure												Main power supply and ground circuit check	
REFERENCE (FA-)				56	56	81	82	83	86	86	91	92	94	96	98	102	104	—	—
SYMPTOM				Preliminary check 1	Preliminary check 2	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	Control unit	Fuse
No warning lamp comes on when ignition switch is turned "ON".						①												○	
System is not set in self-diagnosis mode.							①											○	○
Electrical system problems	Abnormalities when starting engine (1) Abrupt rise in vehicle height (2) Tilting of vehicle			①	②			③											
	Abnormalities when stopping engine			①	②				③										
	Abnormal vehicle height control			①	②					③									
	Abnormal roll control			①	②						③								
	Abnormal pitch control			①	②							③							
Hydraulic system problems	Abnormalities when starting engine												④*						
	Abnormalities when stopping engine													④*					
	Abnormal vehicle height control														④*				
	Steering or riding comfort irregularities															④*			
	Noise																④*		
Self-diagnostic results	Self-diagnosis code No	Diagnosed part	CONSULT indication																
	11	Car speedometer sensor system is faulty.	CAR SPEED SEN1·MTR																
	12	A/T output shaft revolution sensor system is faulty	CAR SPEED SEN2																
	13	Fore and aft G sensor system is faulty.	FOR&AFT G SENSOR																
	14	Lateral G sensor system (1) or (2) is faulty.	LATERAL G SEN 1·2																
	—	Lateral G sensor system 1 is faulty.	LATERAL G SENSOR 1																
	—	Lateral G sensor system 2 is faulty.	LATERAL G SENSOR 2																
	15	Vertical G sensor system (front) is faulty.	VERT1 G SENSOR F																
	16	Vertical G sensor system (rear right) is faulty.	VERT1 G SENSOR R/R																
	17	Vertical G sensor system (rear left) is faulty	VERT1 G SENSOR R/L																

* Troubleshooting of the hydraulic system must be started after solving electrical system problems.

Symptom Chart (Cont'd)

Electrical component inspection

68	68	69	70	70	72	73	75	76	76	77	77	78	78	79	79	80	80	88	89	90	91
Car speed sensor 1 (meter)	Car speed sensor 2 (A/T)	Fore and aft G sensor	Lateral G sensor 1·2	Lateral G sensor 1 (or 2)	Vertical G sensor	Height sensor	Height control switch	Height sensor power supply	Pressure control valve	Flow control valve	Fail-safe valve	Pump solenoid	Oil temperature sensor	Oil warning	Ignition signal	Engine revolution signal	G sensor power supply	Stop lamp switch	Parking brake switch	Door switch	Neutral range switch
																		○	○	○	○
①																					
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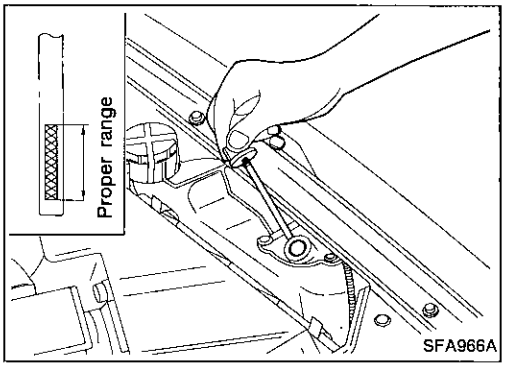
Symptom Chart (Cont'd)

PROCEDURE				Preliminary check		Diagnostic procedure												Main power supply and ground circuit check	
REFERENCE (FA-)				56	56	81	82	83	86	86	91	92	94	96	98	102	104	—	—
SYMPTOM				Preliminary check 1	Preliminary check 2	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	Control unit	Fuse
Self-diagnostic results	21	Vehicle height sensor system (front right) is faulty.	HEIGHT SENSOR F/R																
	22	Vehicle height sensor system (front left) is faulty.	HEIGHT SENSOR F/L																
	23	Vehicle height sensor system (rear right) is faulty.	HEIGHT SENSOR R/R																
	24	Vehicle height sensor system (rear left) is faulty.	HEIGHT SENSOR R/L																
	25	Height control switch system is faulty.	HEIGHT SWITCH																
	26	Height sensor power supply system is faulty	H SEN POWER SUPPLY																
	31	Pressure control valve (front right) is faulty.	PRES CONT VALV																
	32	Pressure control valve (front left) is faulty.	PRES CONT VALV																
	33	Pressure control valve system (rear right) is faulty.	PRES CONT VALV																
	34	Pressure control valve system (rear left) is faulty.	PRES CONT VALV																
	35	Flow control valve system is faulty.	FLOW CONTROL VALVE																
	36	Fail-safe valve system is faulty.	FAIL-SAFE VALVE																
	41	Pump or pressure switch system is faulty.	PUMP																
	42	Oil temperature sensor system is faulty.	OIL TEMP SENSOR																
	43	Oil temperature is too high.	WARN OIL TEMP																
	44	Pump solenoid-1 system is faulty.	PUMP SOLENOID 1																
	45	Oil level is too low.	WARN OIL SHORTAGE																
	46	Ignition power supply system is faulty.	IGN·ON PWR SUPPLY																
	51	Engine stops during driving	WARN ENGINE STALL																
	52	G sensor power supply system is faulty.	G·SEN POWER SUPPLY																
	53	Control unit is malfunctioning internally.	C/U MALFUNCTION 1-5															①	
	54	Pump solenoid-2 system is faulty.	PUMP SOLENOID 2																

Symptom Chart (Cont'd)

Electrical component inspection

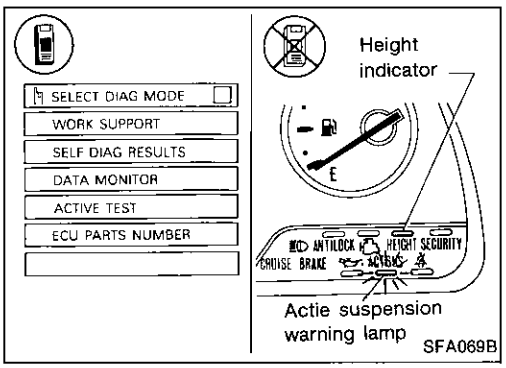
68	68	69	70	71	72	73	75	76	76	77	77	78	78	79	79	80	80	88	89	90	91
Car speed sensor 1 (meter)	Car speed sensor 2 (A/T)	Fore and aft G sensor	Lateral G sensor 1·2	Lateral G sensor 1 (or 2)	Vertical G sensor	Height sensor	Height control switch	Height sensor power supply	Pressure control valve	Flow control valve	Fail-safe valve	Pump solenoid	Oil temperature sensor	Oil warning	Ignition signal	Engine revolution signal	G sensor power supply	Stop lamp switch	Parking brake switch	Door switch	Neutral range switch
						①															
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Preliminary Check

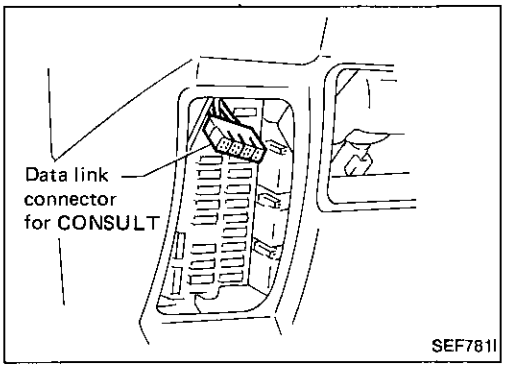
CHECK 1

Check hydraulic fluid level and condition. Refer to "FULL-ACTIVE SUSPENSION — On-vehicle Service". FA-23



CHECK 2

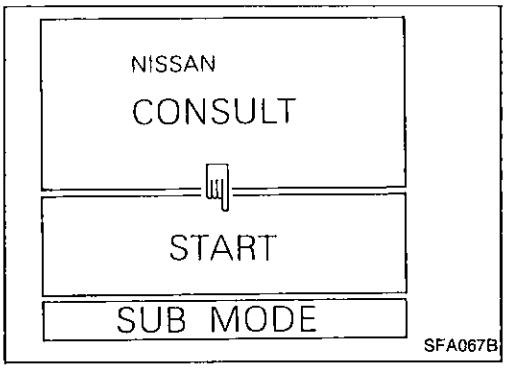
Perform self-diagnosis.
Refer to "Self-diagnosis". FA-64



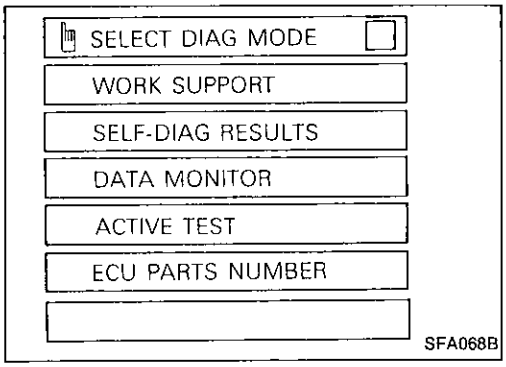
Diagnosis by CONSULT

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.



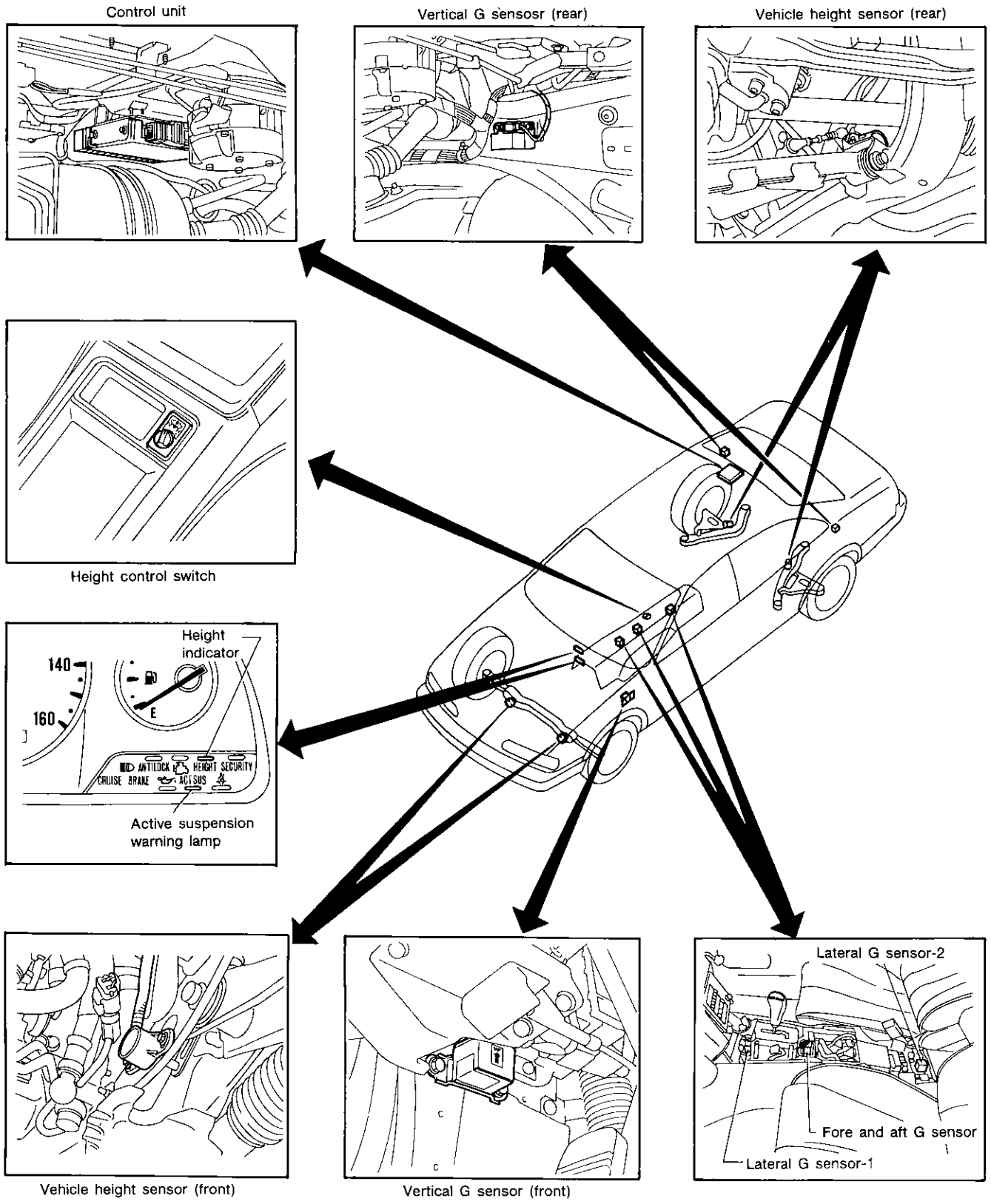
4. Touch "START".
5. Touch "ACTIV SUS".



6. Perform each diagnostic mode.

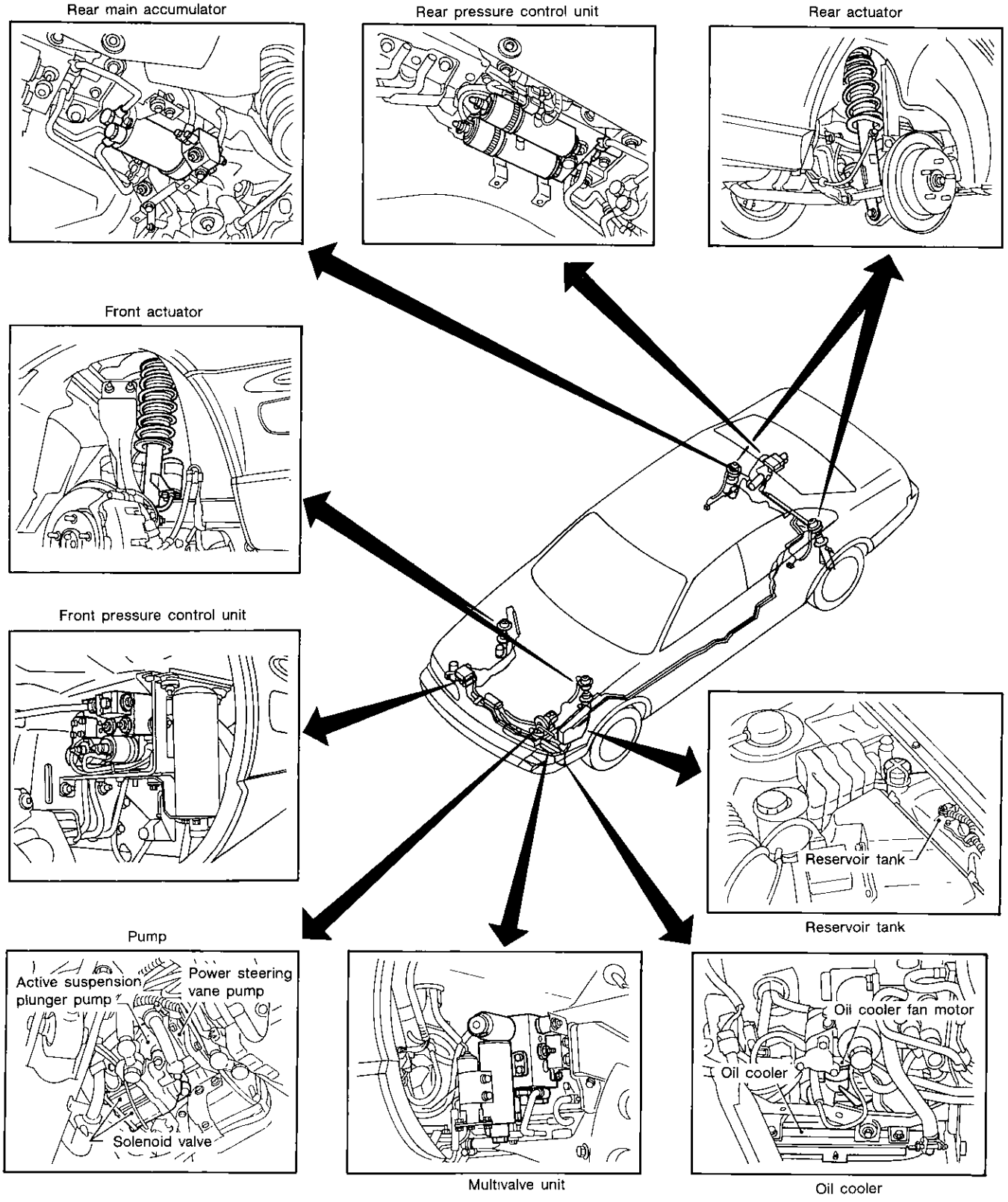
Refer to CONSULT Operation Manual "FULL-ACTIVE SUSPENSION" for details.

Component Parts and Harness Connector Locations



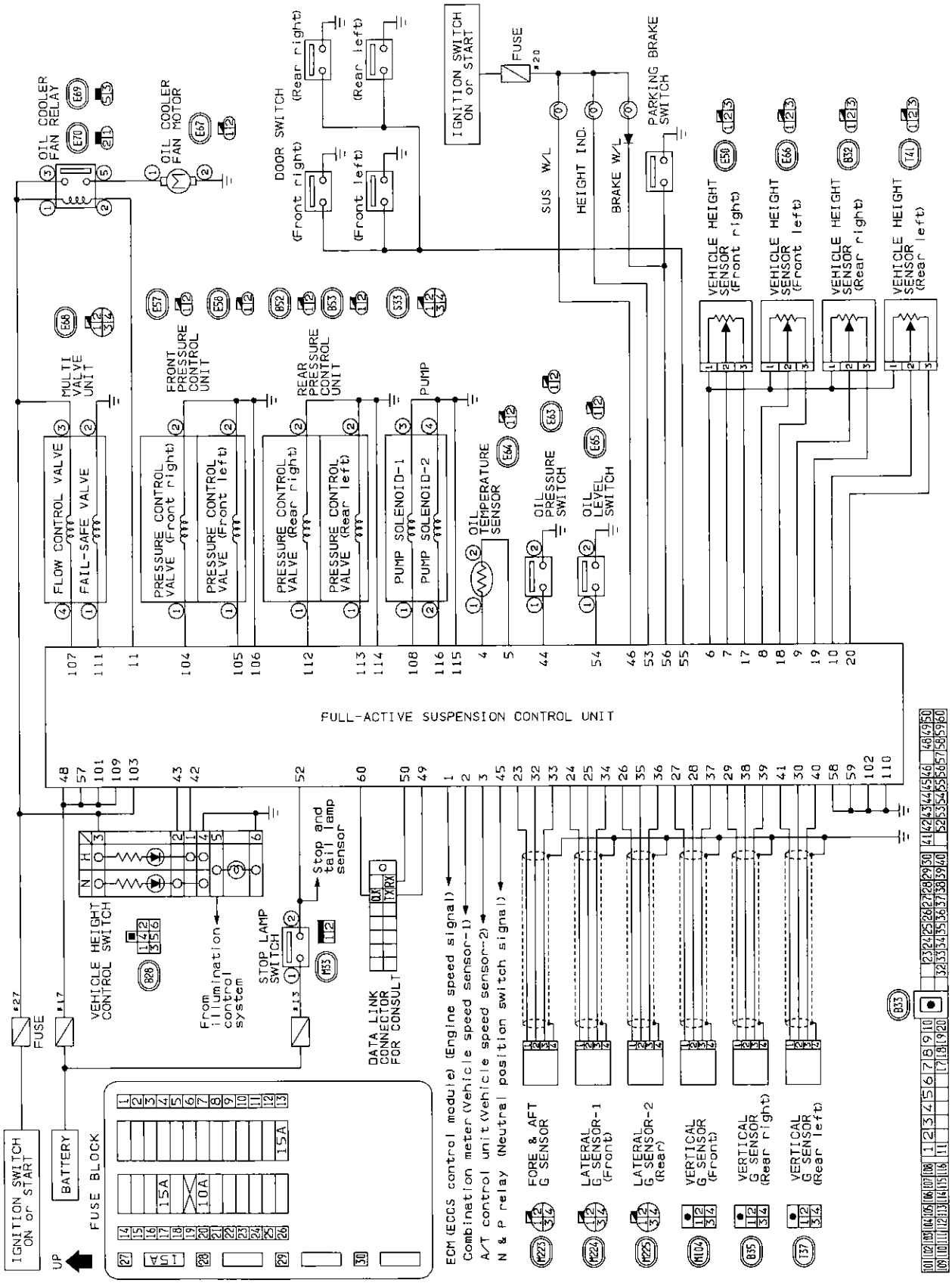
SFA017B

Component Parts and Harness Connector Locations (Cont'd)



SFA018B

Circuit Diagram for Quick Pinpoint Check

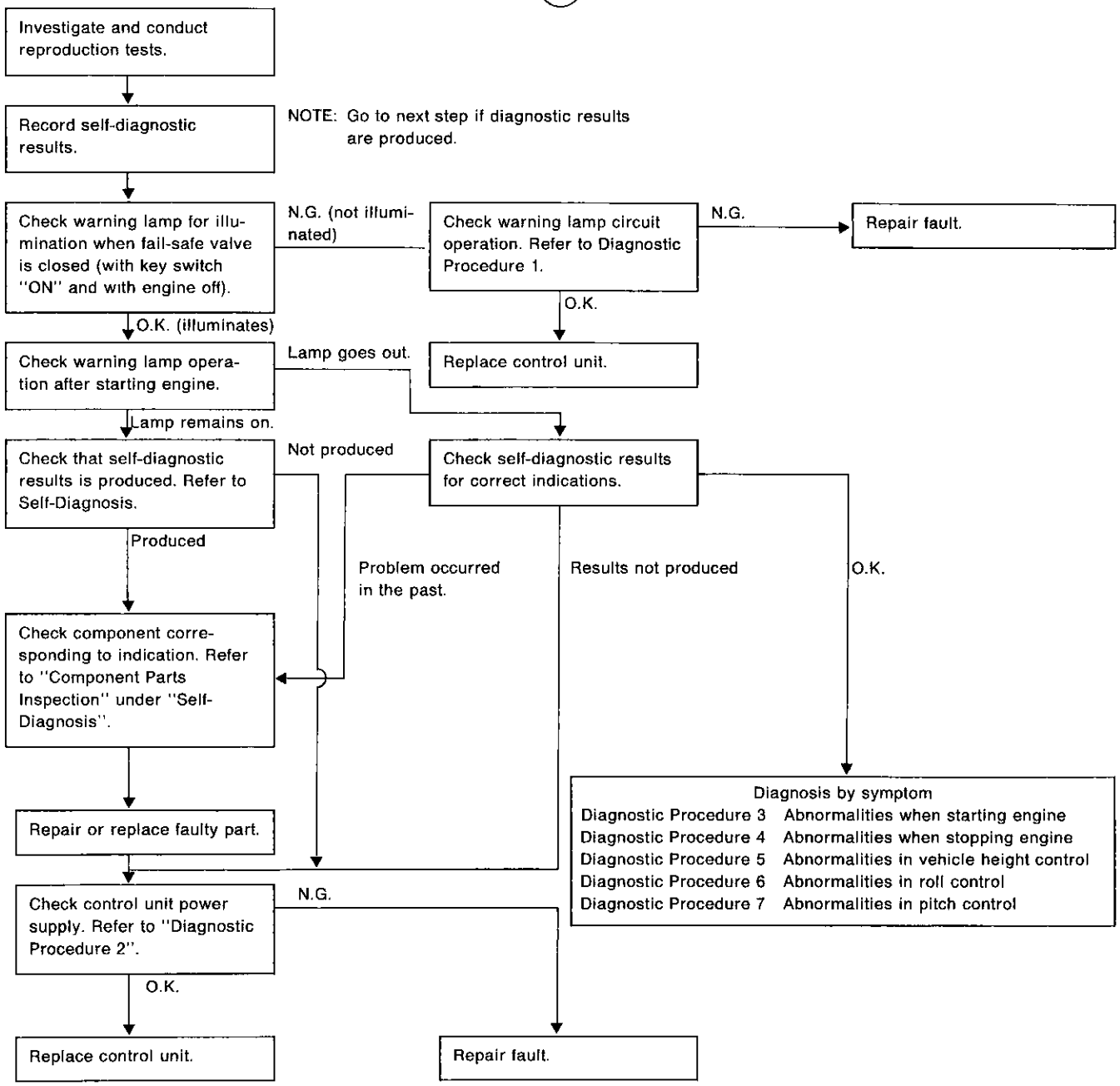


Note: Refer to foldout page for "FULL-ACTIVE SUSPENSION WIRING DIAGRAM."

MFA010A

Electrical System Diagnostic Procedures

Diagnose affected parts using flowcharts below:



NOTE

Items to Be Controlled in Relation to Abnormalities

Abnormalities	Items or parts to be controlled								
	Vehicle behavior during engine starts	Vehicle behavior when engine is off	Vehicle height control (Height maintained constantly)	Roll control (Vehicle posture control during turns)	Pitch control (Vehicle posture control during starts/ stoppage)	Bounce control (Damping of vertical vibration)	Variable pump control	Fan motor	Height indicator
Ignition signal	○								
Engine revolution signal	○	○	○ During engine operation	○ During engine operation	○ During engine operation	○ During engine operation	○	○	
Car speed sensor-1 (meter)			○	○		○	○		
Car speed sensor-2 (A/T)			○	○		○	○		
Fore-and-aft G sensor			○		○				
Lateral G sensor-1 (front)			○	○		○	○		
Lateral G sensor-2 (rear)			○	○		○	○		
Vertical G sensor (front)						○			
Vertical G sensor (rear right)						○			
Vertical G sensor (rear left)						○			
Vehicle height sensor (front right)			○				○		
Vehicle height sensor (front left)			○				○		
Vehicle height sensor (rear right)			○				○		
Vehicle height sensor (rear left)			○				○		
Stop lamp switch			○						
Parking switch			○						
Door switch			○						
Neutral range switch					○				
Height control switch			○						○
Oil temperature sensor							○	○	
Oil level switch									
Pressure switch									
Pressure control valve	○		○	○	○	○			
Flow control valve									

NOTE: All standard values (or indications) except those for vehicle height sensors, pressure control valves and flow control valve are shown on CONSULT display.

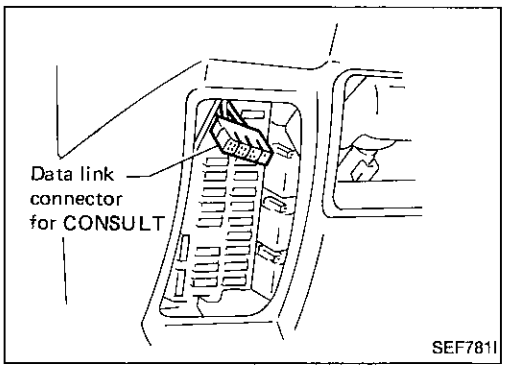
Items to Be Controlled in Relation to Abnormalities (Cont'd)

When to monitor			Parts operated upon detection of problem		Data monitor (monitor available or possible)	Standard values (or indication shown on display) under normal conditions
Key switch "OFF" with engine at rest	Key switch "ON" with engine at rest	During engine operation	Warning light "ON"	Fail-safe valve closed		
○		○	○			
		○	○		○	"RUN" (above 400 rpm); "STOP" (below 400 rpm)
		○	○		○	Same as speedometer reading
		○	○		○	Same as above
		○	○		○	±0.15G (with vehicle on a flat surface)
		○	○	○	○	Same as above
		○	○	○	○	Same as above
		○	○		○	Same as above
		○	○		○	Same as above
		○	○		○	Same as above
		○	○		○	385 ± 10 mm (15.16 ± 0.39 in) (wheel center-to-wheel arch distance with vehicle set at "N" (normal) height)
		○	○		○	Same as above
		○	○		○	361 ± 10 mm (14.21 ± 0.39 in) (wheel center-to-wheel arch distance with vehicle set at "N" (normal) height)
		○	○		○	Same as above
					○	"ON" (foot brake depressed); "OFF" (foot brake released)
					○	"ON" (parking brake applied); "OFF" (parking brake released)
					○	"OPEN" (any one of four doors opened); "SHUT" (all doors closed)
					○	"ON" is indicated when gear position N or P. "OFF" is indicated when gear position not N or P.
	○	○	○		○	"NORM" (vehicle set at normal position); "HI" (vehicle set at high position)
○	○	○	○		○	Oil temperature shown in one of the following indications: LOW, 50°C (122°F), 52°C (126°F) - [at increments of 2°C (3.6°F)] - 68°C (154°F), 70°C (158°F), 75°C (167°F), 90°C (194°F), 110°C (230°F) and HIGH.
	○	○	○		○	"OK" (correct oil level); "LOW" (replenishment required)
		○	○		○	"HI" [above 2,452 kPa (25 kg/cm^2, 356 psi) oil pressure]; "LOW" [below 2,452 kPa (25 kg/cm^2, 356 psi)]
○	○	○	○	○	○	4 - 7Ω (resistance)
		○	○	○	○	9 - 16Ω (resistance)

Self-diagnosis

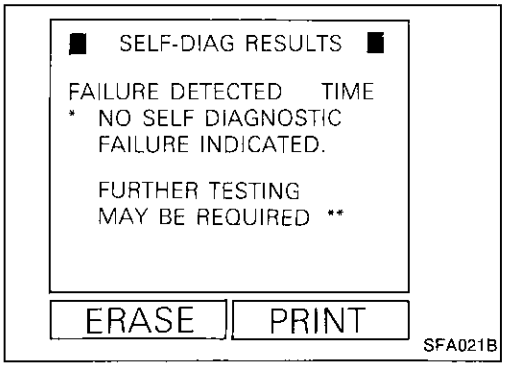
SELF-DIAGNOSTIC PROCEDURES

Two self-diagnostic methods can be used to check the condition of the various active suspension units or components. In one method, letters are shown on the display, with CONSULT set in the self-diagnostic mode designed, to accurately locate a problem. In the other method, the active suspension warning lamp flashes a trouble code when the height control switch (on floor console) is operated.
Except for some lateral G sensors, all other system lines can be basically checked using either of the two self-diagnostic methods. In addition, CONSULT can show on its display a numeral which indicates the number of times the ignition switch was turned "ON" after a problem occurred in the past. When using the active suspension warning lamp method, note that only one problem can be indicated even if two or more problems occurred. When performing diagnosis, use of the "self-diagnosis result" mode of CONSULT is therefore recommended.



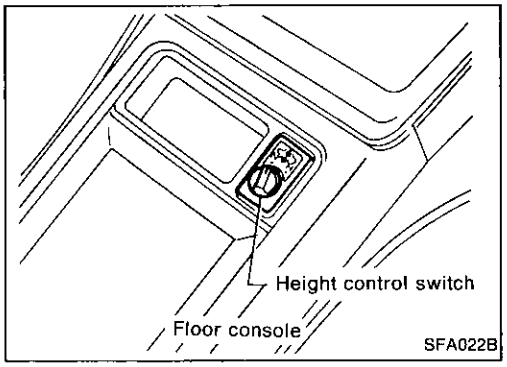
When CONSULT is used:

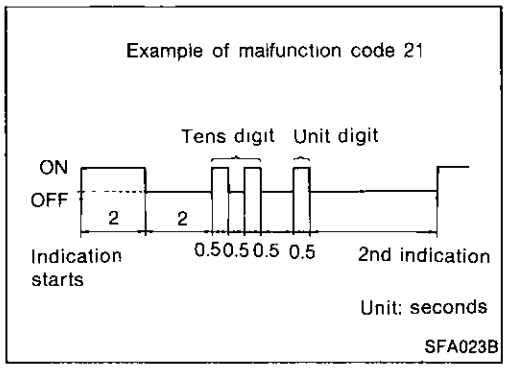
- Turn ignition switch "OFF".
- Connect CONSULT connector to data link connector located on fuse box, at lower left side of instrument panel.
- Start engine.
- Touch "START", "ACTIV SUS" and "SELF-DIAG RESULTS" on CONSULT display in that order.



- A self-diagnostic result is shown on display.
  Refer to CONSULT operation manual "FULL-ACTIVE SUSPENSION" for details.

After a faulty system line has been repaired, be sure to clear self-diagnostic result memory.





When CONSULT is not used:

(1) Procedures

- Turn ignition switch "ON". (Do not start engine.)
- Set height control switch (on floor console) from "N" (normal) to "H" (high). Repeat above operation at least ten times within ten seconds after turning ignition switch "ON", and return height control switch to "N".
- After all self-diagnostic requirements are met, the active suspension warning lamp flashes and self-diagnosis starts.

If more than two system lines are faulty, only one of the faulty system lines is indicated in order of priority. The warning lamp may remain on depending upon types of abnormalities (such as those in control unit, etc.). In this case, conduct self-diagnosis using CONSULT.

(2) How to read self-diagnostic indications

- Read both ten's and unit digits from number of flashes on active suspension warning lamp. (Refer to figure at left.)
- Determine location of fault in accordance with Malfunction Code table below.

All fault detection requirements are the same as those outlined under "When CONSULT is used:".

Self-diagnosis (Cont'd)

(3) Malfunction code table

Malfunction code No.	Description
11	Car speedometer sensor system is faulty.
12	A/T output shaft revolution sensor system is faulty.
13	Fore and aft G sensor system is faulty.
14	Lateral G sensor system (1) or (2) is faulty.
15	Vertical G sensor system (front) is faulty.
16	Vertical G sensor system (rear right) is faulty.
17	Vertical G sensor system (rear left) is faulty.
21	Vehicle height sensor system (front right) is faulty.
22	Vehicle height sensor system (front left) is faulty.
23	Vehicle height sensor system (rear right) is faulty.
24	Vehicle height sensor system (rear left) is faulty.
25	Height control switch system is faulty.
26	Height sensor power supply system is faulty.
31	Pressure control valve (front right) is faulty.
32	Pressure control valve (front left) is faulty.
33	Pressure control valve system (rear right) is faulty.
34	Pressure control valve system (rear left) is faulty.
35	Flow control valve system is faulty.
36	Fail-safe valve system is faulty.
41	Pump or pressure switch system is faulty.
42	Oil temperature sensor system is faulty.
43	Oil temperature is too high.
44	Pump solenoid-1 system is faulty.
45	Oil level is too low.
46	Ignition power supply system is faulty.
51	Engine stops during driving.
52	G sensor power supply system is faulty.
53	Control unit is internally malfunctioning.
54	Pump solenoid-2 system is faulty.
55	NORMAL

(4) Clearing self-diagnostic mode

Self-diagnostic modes can be cleared using one of the following methods:

a. Set height control switch from "N" (normal) to "H" (high) while a self-diagnosis is being conducted.
b. Wait approximately five minutes after setting in the self- diagnosis mode.
c. Turn ignition switch "OFF".

(5) Clearing self-diagnostic results

A faulty system indication is not cleared even after the faulty system has been repaired. To clear the indication, use one of the following methods:

- Set the self-diagnostic mode. Refer to "(1) Procedures" above.
- Repeatedly depress and release (ON-OFF operation) foot brake at least five times within ten seconds.
- Self-diagnostic results will then be cleared.

In cases where more than two system lines are faulty, repaired system indications will be cleared. However, any other faulty system will be indicated when self-diagnosis is performed again.

Self-diagnosis (Cont'd)

FAIL-SAFE FUNCTION

When a malfunction occurs in the following parts, the fail-safe system activates to illuminate the active suspension warning lamp, cut off the current to the fail-safe valve and/or regulate the pressure control valve operation. This gradually changes the oil pressure (applied to the actuators for the four wheels) to a uniform pressure so that the vehicle can continue to be driven.

NOTES:

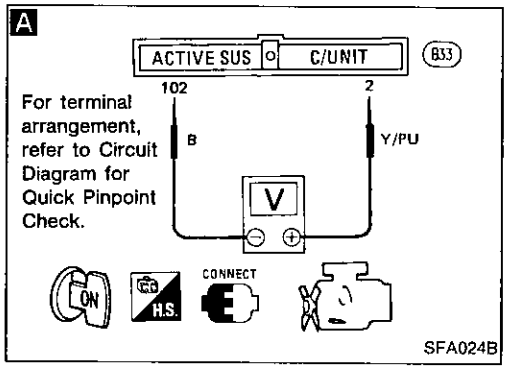
- A sound is produced when the fail-safe valve operates. This is not an indication of a problem since the fail-safe valve serves to close normal oil passages and, at the same time, link the supply pressure line [9,807 kPa (100 kg/cm^2, 1,422 psi)] with the return pressure line [0 kPa (0 kg/cm^2, 0 psi)].
- When the pressure control valve function stops, the control current flowing to the solenoid is cut off (0 amperes), so vehicle height might change briefly.

Major malfunctioning parts and fail-safe operations

Malfunctioning parts	Fail-safe operation		
	Active suspension warning lamp (ON)	Fail-safe valve closed (No current flow)	Other control functions
Internal parts of control unit	○	○	Control stopped
Engine stalls while driving	○	○	—
Car speed sensor	○	—	Control is accomplished by signal sent from any sensor which detects higher car speeds than the other sensors.
Fore and aft G sensor	○	—	—
Lateral G sensor	○	○	Control stopped
Vertical G sensor	○	—	Vertical G sensor control is stopped.
Pressure control valve	○	○	Control stopped
Flow control valve	○	○	Control stopped
Fail-safe valve	○	○	Control stopped
Insufficient oil level	○	—	Normal control
Height control switch	○	—	Vehicle is set to normal height.
Power supply to G sensors	○	○	Control stopped
Power supply to height sensors	○	○	Control stopped
Height sensor	○	—	Height control stopped
Pump	○	—	Normal control
Oil temperature sensor	○	—	Normal control

Self-diagnosis (Cont'd)

CAR SPEED SENSOR 1 (METER) CIRCUIT CHECK



Check speedometer indication.
- N.G. → Check speedometer itself.
- O.K. ↓

Jack up rear wheels.

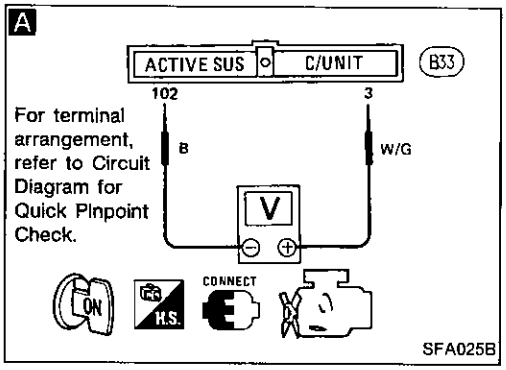
A

CHECK INPUT SIGNAL.
Measure voltage across control unit terminals ② and (102) while slowly rotating rear wheels with ignition switch "ON". Do not start engine.
Voltage must change between 0 and 5V.

- N.G. (Does not change from 5V) → Open harness circuit or faulty speedometer.
- N.G. (Does not change from 0V) → Shorted harness circuit or faulty control unit.
- O.K. ↓

Replace control unit.

CAR SPEED SENSOR 2 (A/T) CIRCUIT CHECK



Check A/T control unit operation.
- N.G. → Check A/T control unit. Refer to "A/T TROUBLE DIAGNOSES".
- O.K. ↓

Jack up rear wheels.

A

CHECK INPUT SIGNAL.
Measure voltage across control unit terminals ③ and (102) while slowly rotating rear wheels with ignition switch "ON". Do not start engine.
Voltage must change between 0 and 5V.

- N.G. (Does not change from 5V) → Open harness circuit.
- N.G. (Does not change from 0V) → Shorted harness circuit or faulty control unit.
- O.K. ↓

Replace control unit.

Self-diagnosis (Cont'd)

FORE AND AFT G SENSOR CIRCUIT CHECK

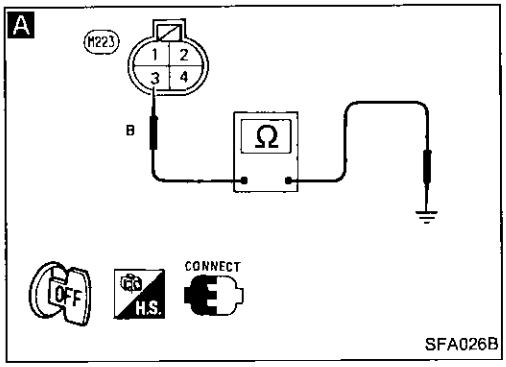
A

☆ MONITOR	★ FAILURE
SPEED SE1•MTR	0km/h
SPEED SE2	0km/h
LATER G SE1	RO.01G
LATER G SE2	LO.01G
FOR&AFT G SEN	–0.01G
VERTI G SE F	U0.03G
VERTI G SE RR	0.00G
VERTI G SE RL	D0.01G
HEIGHT SEN FR	–2mm

RECORD

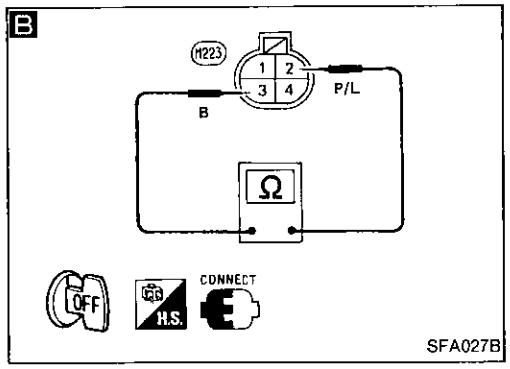
SFA063B

A



SFA026B

B



SFA027B

- Start engine and wait for at least 2 seconds.
- Move vehicle to a flat surface and stop engine.
- Connect CONSULT and turn ignition switch "ON". Do not start engine.

A

Check fore and aft G sensor's output with CONSULT set in data monitor mode.

Greater than 1.0G → B

B

CHECK GROUND CIRCUIT.
Check continuity between G sensor connector terminal ③ and GND (body metal) with ignition switch "OFF".
Continuity should exist.

O.K. → Replace fore and aft G sensor.

N.G. → Open harness circuit. Check and repair harness between control unit and fore and aft G sensor.

Less than 1.0G

Check fore and aft G sensor output with CONSULT set in data monitor mode.

Less than –1.0G → C

C

CHECK CONTINUITY.
Turn ignition switch "OFF" and check continuity between fore and aft G sensor connector terminals ② and ③.
Continuity should exist.

N.G. → Open harness circuit or fore and aft G sensor.

O.K. → Shorted harness circuit. Check and repair harness between control unit and fore and aft G sensor.

Less than –1.0G

Check fore and aft G sensor output with CONSULT set in data monitor mode.

Outside ±0.15G → Faulty fore and aft G sensor. Replace.

Within ±0.15G → O.K. (See NOTE below.)

NOTE: Also check with CONSULT set in field test mode as needed.

Self-diagnosis (Cont'd)

LATERAL G SENSOR 1·2 CIRCUIT CHECK

When "LATERAL G SEN 1·2" appears on the display with CONSULT set in the self-diagnostic mode, it indicates that both lateral G sensor 1 and 2 deviate from the specified output characteristics. Output characteristic deviations are measured both statically and dynamically. Static characteristics occur while the vehicle is at a standstill and dynamic characteristics occur while the vehicle is operating. It is therefore necessary to investigate the cause, when the active suspension warning lamp is illuminated, by determining how the vehicle was being driven when the lamp activated. Reproduction tests should also be conducted to double-check the results.

With CONSULT set in the self-diagnostic mode, a numeral which indicates when a problem occurred appears on the display. It refers to the number of times the ignition switch was turned ON and OFF after a problem occurred and is helpful in pinpointing the time when it occurred.

A

☆ MONITOR ☆	FAILURE
SPEED SE1•MTR	0km/h
SPEED SE2	0km/h
LATER G SE1	RO.01G
LATER G SE2	LO.01G
FOR&AFT G SEN	–0.01G
VERTI G SE F	U0.03G
VERTI G SE RR	0.00G
VERTI G SE RL	D0.01G
HEIGHT SEN FR	–2mm

RECORD

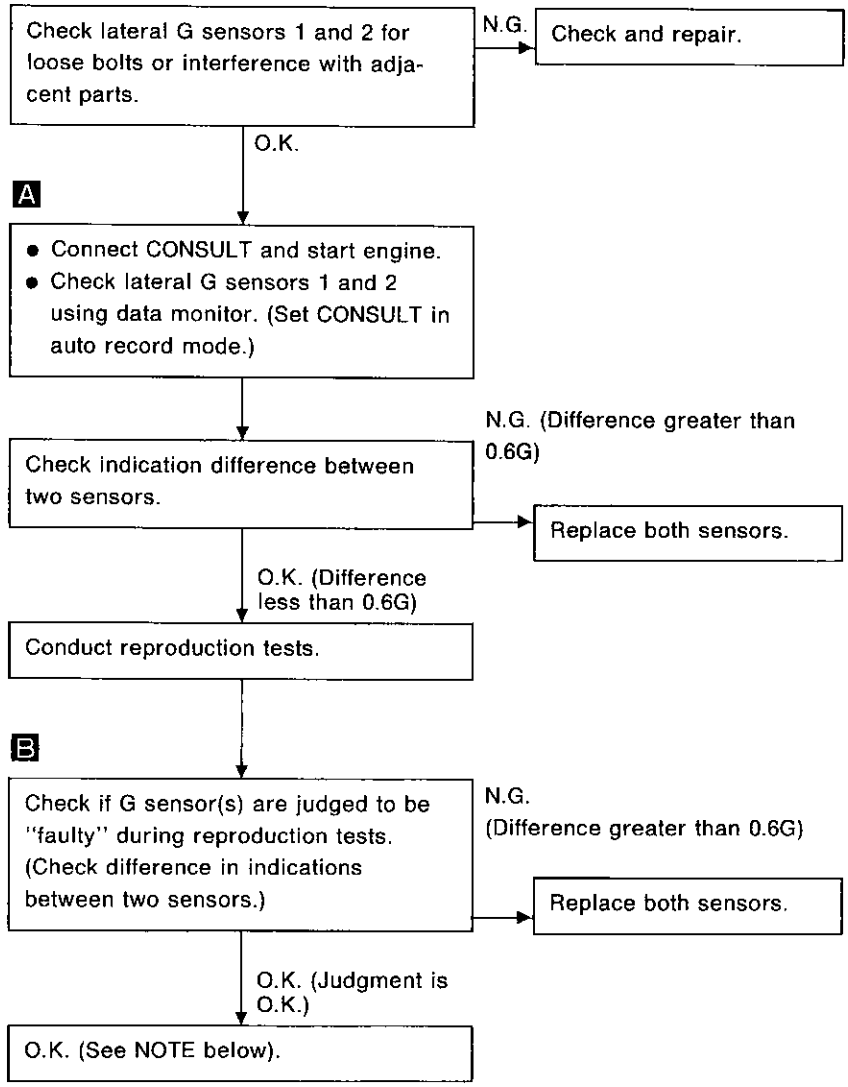
SFA063B

B

	SPEED SEN2	LATER G SEN 1	LATER G SEN 2
13:57	(km/h)	(G)	(G)
01″33	0	RO.00	0.00
00″89	0	RO.00	0.00
00″44	0	LO.01	LO.01
00″00	0	RO.00	0.00
**** VERTI G SE F ****			
00″46	0	LO.01	LO.01
**** VERTI G SE F ****			

PRINT GRAPH

SFA029B



NOTE: Also check with CONSULT set in field test mode as needed.

Self-diagnosis (Cont'd)

LATERAL G SENSOR 1 (OR 2) CIRCUIT CHECK

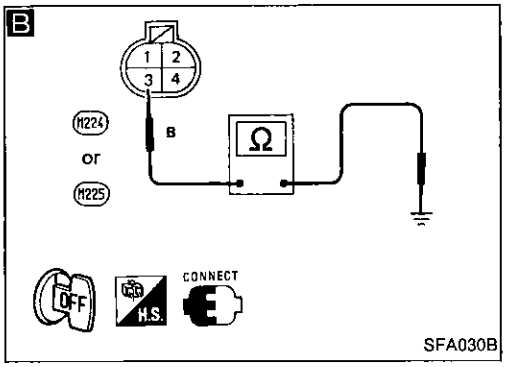
A

☆ MONITOR	★ FAILURE
SPEED SE1•MTR	0km/h
SPEED SE2	0km/h
LATER G SE1	RO.01G
LATER G SE2	LO 01G
FOR&AFT G SEN	-0.01G
VERTI 'G SE F	U0 03G
VERTI G SE RR	0.00G
VERTI G SE RL	D0.01G
HEIGHT SEN FR	-2mm

RECORD

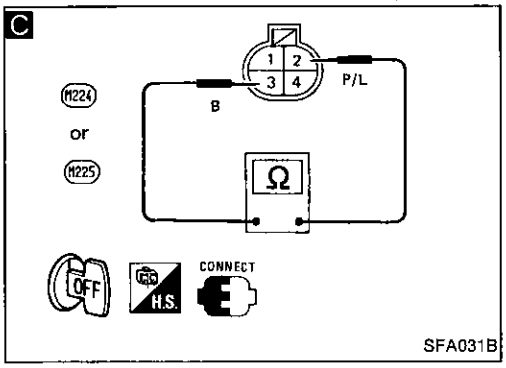
SFA063B

B



SFA030B

C



SFA031B

- Place vehicle on a flat surface and stop engine.
- Connect CONSULT and turn ignition switch "ON". (Do not start engine.)

A

Check output of lateral G sensor 1 or 2 using CONSULT data monitor.

Greater than 1.5G → B

B

CHECK GROUND CIRCUIT.
Turn ignition switch "OFF".
Check continuity between lateral sensor 1 (or 2) connector ③ and GND (body metal).
Continuity should exist.

O.K. → Replace lateral sensor 1 (or 2). See Note 1 below.

N.G. → Open harness circuit. Check and repair harness between control unit and lateral G sensor.

Less than 1.5G

Check output of lateral G sensor 1 (or 2) using CONSULT data monitor.

Less than -1.5G → C

C

CHECK CONTINUITY.
Turn ignition switch "OFF".
Check resistance between lateral G sensor 1 (or 2) connector terminals ② and ③ .
Continuity should exist.

N.G. → Open harness circuit or faulty lateral G sensor 1 (or 2). Replace. See NOTE 1 below.

O.K. → Shorted harness circuit Check and repair harness between control unit and lateral G sensor.

Greater than -1.5G

Check output of lateral G sensor 1 (or 2) using CONSULT data monitor.

Outside ±0.15G → Replace lateral G sensor 1 (or 2). See NOTE 1 below.

Within ±0.15G → O.K. See NOTE 2.

NOTES:

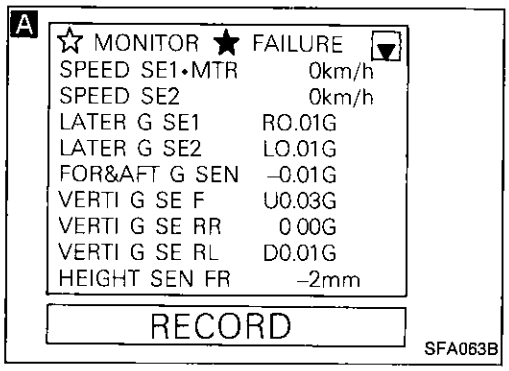
(1) When one lateral G sensor is found to be "faulty", replace both G sensors.

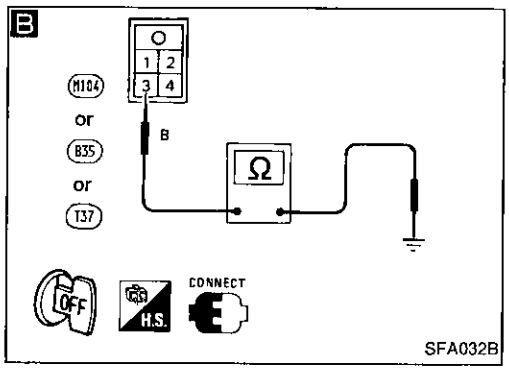
(2) Also check with CONSULT set to field test mode as needed.

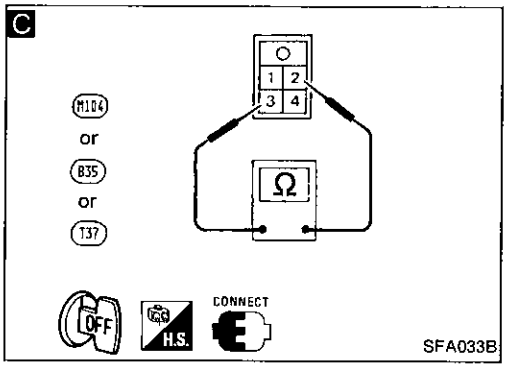
Self-diagnosis (Cont'd)

VERTICAL G SENSOR CIRCUIT CHECK

When "VERTI G SENSOR (F, R/R, R/L)" appears on the display with CONSULT set to the self-diagnostic mode, the problem may be due to either abnormal sensor output or no-output variation from "0G". No-output variation can only be determined while the vehicle is driven.







- Start engine and wait for at least two seconds.
- Place vehicle on a flat surface and stop engine.
- Connect CONSULT and turn ignition switch "ON". (Do not start engine.)

A

Check vertical G sensor output using CONSULT data monitor.

Less than 1.5G

Check vertical G sensor output using CONSULT data monitor.

Greater than –1.5G

Ⓐ

Greater than 1.5G B

CHECK GROUND CIRCUIT.
Turn ignition switch "OFF".
Check continuity between vertical G sensor connector ③ and GND (body metal).
Continuity should exist.

O.K. → Replace vertical G sensor.

N.G. → Open harness circuit. Check and repair harness between control unit and vertical G sensor.

Less than –1.5G C

CHECK CONTINUITY.
Turn ignition switch "OFF".
Check continuity between vertical G sensor connectors ② and ③.
Continuity should exist.

N.G. → Open harness circuit or vertical G sensor.

O.K. → Shorted harness circuit Check and repair harness between control unit and vertical G sensor.

Self-diagnosis (Cont'd)

Ⓐ

Check vertical G sensor output using CONSULT data monitor.

Outside ±0.15G → Replace vertical G sensor.

Within ±0.15G

Start engine. Allow vehicle to run more than 2 km/h (1MPH) and ride over an obstacle to check changes in vertical G sensor output.

Does not change → Replace vertical G sensor.

Changes (not faulty)

OK (See NOTE below.)

NOTE: Also check with CONSULT set to field test mode as needed.

A

☆MONITOR	☆NO FAIL
SPEED SE1•MTR	0km/h
SPEED SE2	0km/h
LATER G SEN 1	0.00G
LATER G SEN 2	L0.01G
FOR & AFT G SEN	+0.01G
VERTI G SE F	U0.01G
VERTI G SE RR	0.00G
VERTI G SE RL	D0.01G
HEIGHT SEN FR	−1mm

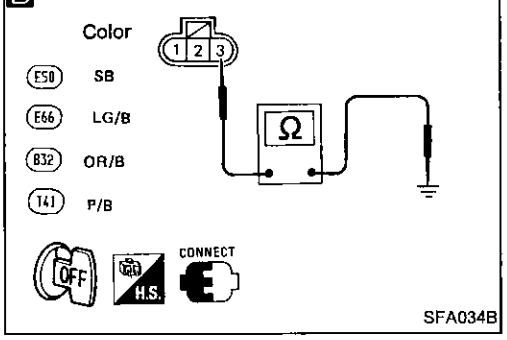
RECORD

☆MONITOR	☆NO FAIL
HEIGHT SEN FL	−7mm
HEIGHT SEN RR	16mm
HEIGHT SEN RL	17mm
OIL TEMP SEN	LOW°C
HEIGHT SWITCH	NORM
STOP LAMP SW	OFF
PRES SW•PUMP	LOW
OIL LEVEL SW	OK
DOOR SW	SHUT

RECORD

SFA124B

B



SFA034B

HEIGHT SENSOR CIRCUIT CHECK

- Start engine and wait for at least 1 second.
- Place vehicle on a flat surface and stop engine.
- Connect CONSULT and turn ignition switch "ON". (Do not start engine.)

A

Check height sensor output using CONSULT data monitor.

Greater than 100 mm (3.94 in) → B

CHECK GROUND CIRCUIT.
Turn ignition switch "OFF".
Check continuity between height sensor connector ③ and GND (body metal).
Continuity should exist.

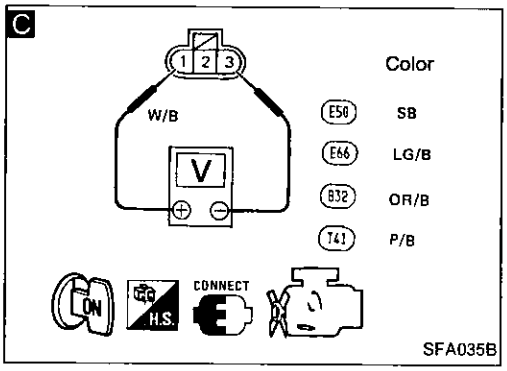
O.K. → Replace height sensor.

N.G. → Open harness circuit.
Check and repair harness between control unit and height sensor.

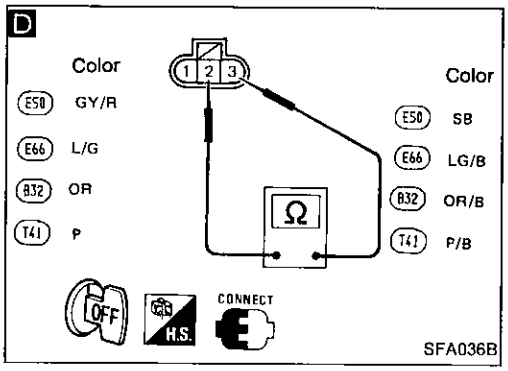
Less than 100 mm (3.94 in) → Ⓐ

Self-diagnosis (Cont'd)

C



D



Ⓐ

Check height sensor output using CONSULT data monitor.

Less than −100 mm (−3.94 in)

Greater than −100 mm (−3.94 in)

O.K. (See NOTE below.)

C

CHECK OUTPUT SIGNAL.
Measure voltage across positive terminal ① and ground terminal ③ of height sensor connector.
Voltage: Approx. 5V

O.K.

N.G.

Open harness circuit
Check and repair harness between control unit and height sensor.

D

CHECK CONTINUITY.
Turn ignition switch "OFF".
Check continuity between height sensor connector terminals ② and ③.
Continuity should exist.

N.G.

Open harness circuit or faulty height sensor.

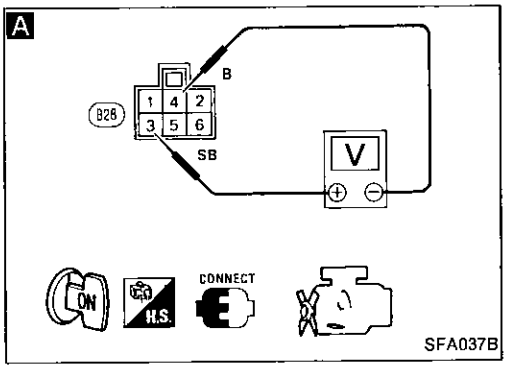
O.K.

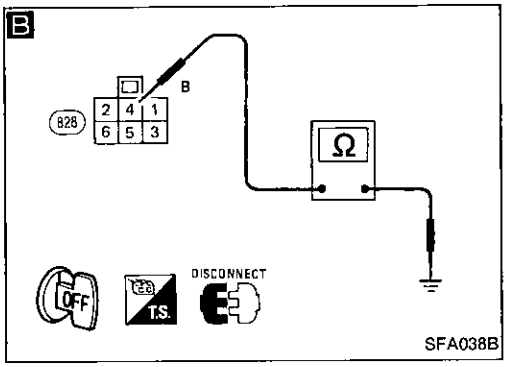
Shorted harness circuit
Check and repair harness between control unit and height sensor.

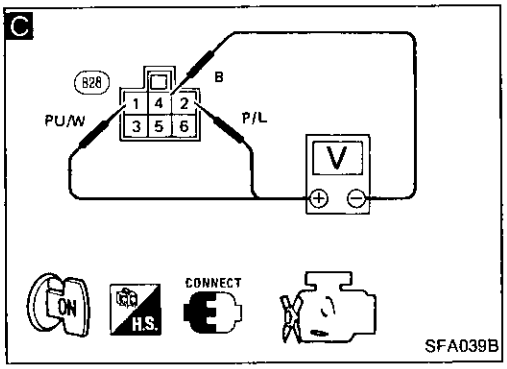
NOTE: Also check with CONSULT set to field test mode.

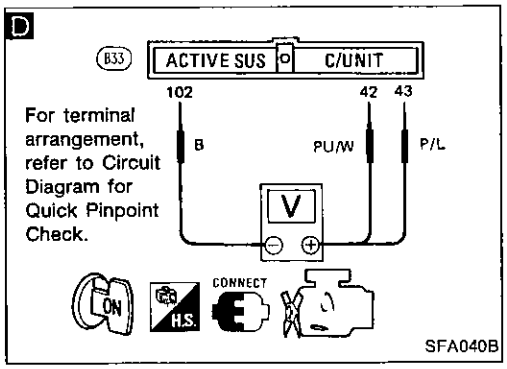
Self-diagnosis (Cont'd)

HEIGHT CONTROL SWITCH CIRCUIT CHECK









A

CHECK POWER SUPPLY.
Turn ignition switch "ON". Measure voltage across height control switch terminals ③ and ④.
Battery voltage should exist.

N.G. → Check height control switch power supply

O.K. ↓

B

CHECK GROUND CIRCUIT.
Turn ignition switch "OFF". Disconnect height control switch connector, and check continuity between connector ④ (body side) and GND (body metal).
Continuity should exist.

N.G. → Open harness circuit. Check and repair harness between control unit and height control switch.

O.K. ↓

C

CHECK CONTINUITY IN HEIGHT CONTROL SWITCH CIRCUIT.
Turn ignition switch "ON". Measure voltage across switch terminals ① and ④ or ② and ④.

Switch position	① - ④	② - ④
Normal (N)	Battery voltage	0V
High (H)	0V	Battery voltage

N.G. → Replace height control switch.

O.K. ↓

D

CHECK HEIGHT CONTROL SWITCH CIRCUIT.
Turn ignition switch "ON". Measure voltage across control unit terminals ㊷ and (102) or ㊸ and (102).

Switch position	㊷ - (102)	㊸ - (102)
Normal (N)	Battery voltage	0V
High (H)	0V	Battery voltage

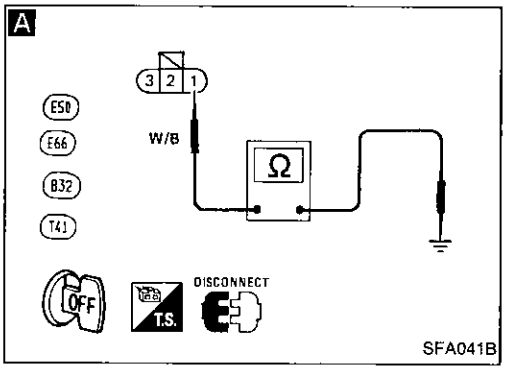
N.G. → Open harness circuit. Check and repair harness between control unit and height control switch.

O.K. ↓

O.K.

Self-diagnosis (Cont'd)

HEIGHT SENSOR POWER SUPPLY CIRCUIT CHECK



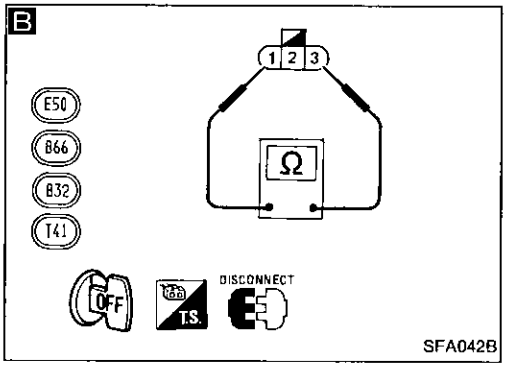
- Turn ignition switch "OFF".
- Disconnect four height sensor connectors and control unit connector.

A

CHECK GROUND CIRCUIT.
Check continuity between height sensor connector ① and ground.
Continuity should exist.

O.K. → Shorted harness circuit
Check and repair harness between control unit and height sensor.

N.G.



B

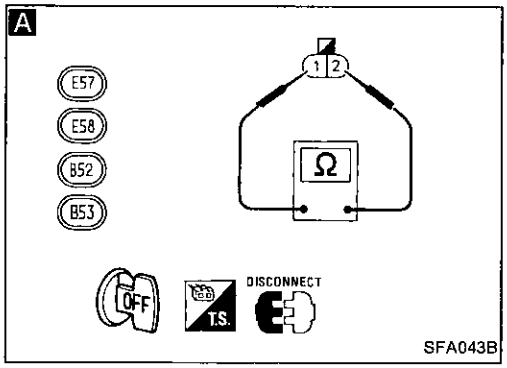
CHECK HEIGHT SENSOR.
Disconnect height sensor connector and check continuity between sensor terminal ① and ③. (Check all four sensors.)
Resistance: Approx. 2 kΩ

N.G. (when any one of the sensors shows approx. 0Ω) → Replace sensors.

O.K. (All sensors)

Replace control unit.

PRESSURE CONTROL VALVE CIRCUIT CHECK

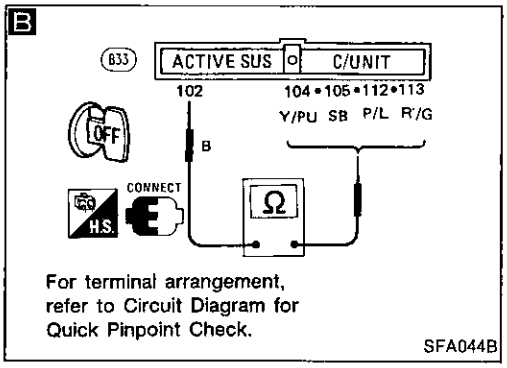


A

CHECK PRESSURE CONTROL VALVE.
Turn ignition switch "OFF". Disconnect affected pressure control valve connector, and measure resistance between terminals ① and ②.
Resistance: 4 - 7Ω

0Ω or infinity → Faulty control valve.
Replace pressure control unit.

O.K.



B

CHECK PRESSURE CONTROL VALVE CIRCUIT.
Turn ignition switch "OFF". Measure resistance between control unit terminal (102) and either terminal (104), (105), (112) or (113).
Resistance: 4 - 7Ω

0Ω or infinity → Check and repair harness between control unit and pressure control valve.

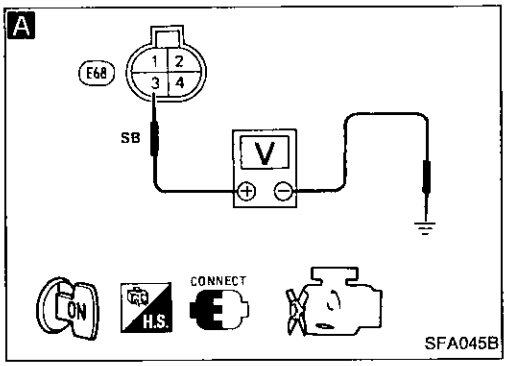
(104) : Pressure control valve (front right)
(105) : Pressure control valve (front left)
(112) : Pressure control valve (rear right)
(113) : Pressure control valve (rear left)

O.K.

Replace control unit.

Self-diagnosis (Cont'd)

FLOW CONTROL VALVE CIRCUIT CHECK

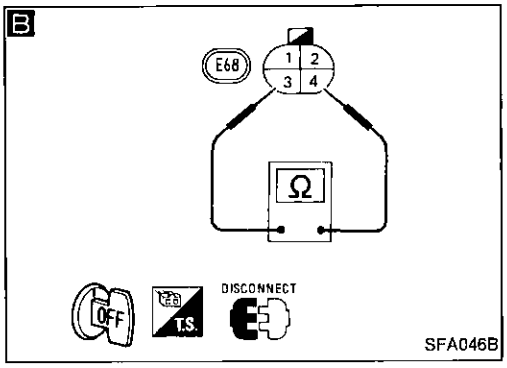


A

CHECK POWER SUPPLY.
Turn ignition switch "ON". Measure voltage across multivalve connector terminal ③ and ground.
Battery voltage should exist.

N.G. → Check and repair harness between battery and flow control valve.

O.K. ↓

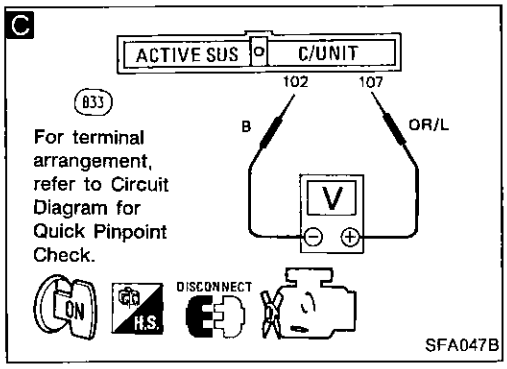


B

CHECK FLOW CONTROL VALVE.
Turn ignition switch "OFF". Disconnect multivalve unit connector and measure resistance between connector terminals ③ and ④.
Resistance: 9 - 16Ω

N.G. (0Ω or infinity) → Faulty flow control valve. Replace multivalve unit.

O.K. ↓



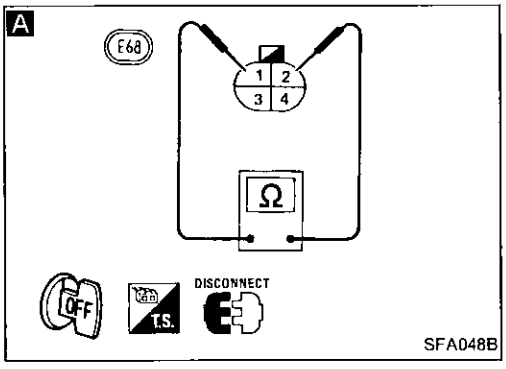
C

CHECK CIRCUIT FLOW CONTROL VALVE
Disconnect control unit connector. Turn ignition switch "ON". Measure voltage across control unit's connector terminals (107) and (102).
Battery voltage should exist.

N.G. → Check and repair harness between control unit and flow control valve.

O.K. ↓

Replace control unit.



FAIL-SAFE VALVE CIRCUIT CHECK

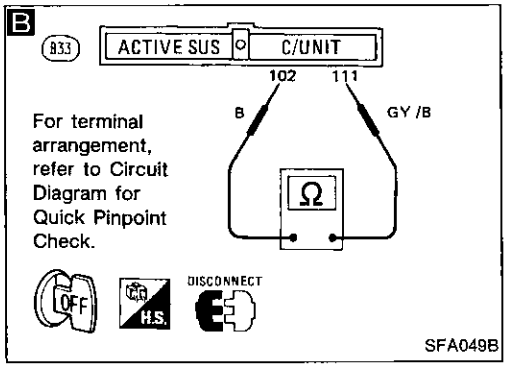
When "FAIL-SAFE VALVE" appears on the display with CONSULT set to the self-diagnostic mode, the fail-safe valve circuit may be open or shorted. Fail-safe valve self-diagnosis is performed when the ignition switch is "ON" with the engine at rest.

A

CHECK FAIL-SAFE VALVE.
Turn ignition switch "OFF". Disconnect multivalve unit connector and measure resistance between terminals ① and ②.
Resistance: 9 - 16Ω

N.G. (0Ω or infinity) → Replace fail-safe valve.

O.K. ↓



B

CHECK FAIL-SAFE VALVE CIRCUIT.
Turn ignition switch "OFF". Measure resistance between terminals (111) and (102) of control unit connector.
Resistance: 9 - 16Ω

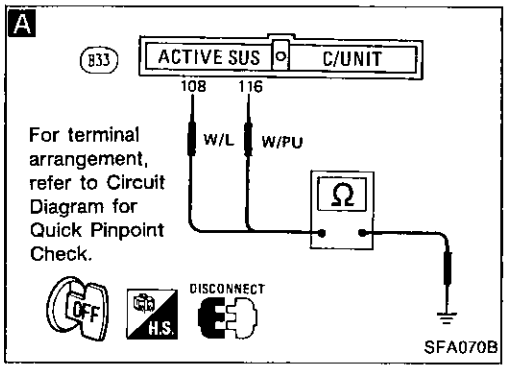
N.G. (0Ω or infinity) → Check and repair harness between control unit and fail-safe valve.

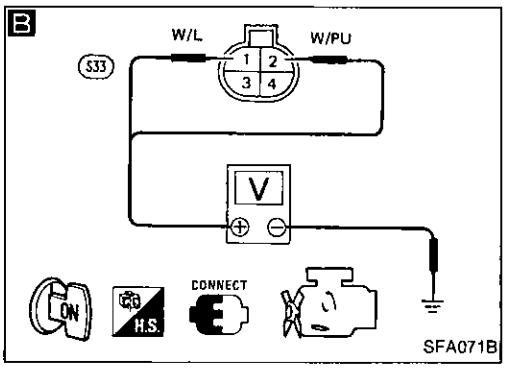
O.K. ↓

Replace control unit.

Self-diagnosis (Cont'd)

PUMP SOLENOID CIRCUIT CHECK





A

CHECK PUMP SOLENOID.
Disconnect C/U connector.
Check resistance between terminal (108) and ground, and between terminal (116) and ground.
Resistance: 6 - 20Ω

No (0Ω or infinity) → Check and repair harness between control unit and pump solenoid.

O.K. ↓

B

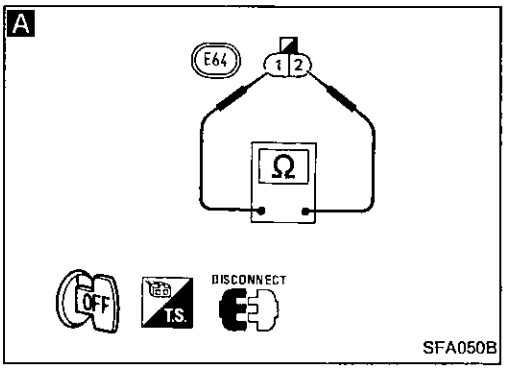
CHECK PUMP SOLENOID.
Connect C/U connector.
Measure voltage across pump solenoid terminals ① and ② by energizing solenoid in active test mode.
Using monitor, make sure that fail-safe valve is not operating.
Battery voltage should exist.

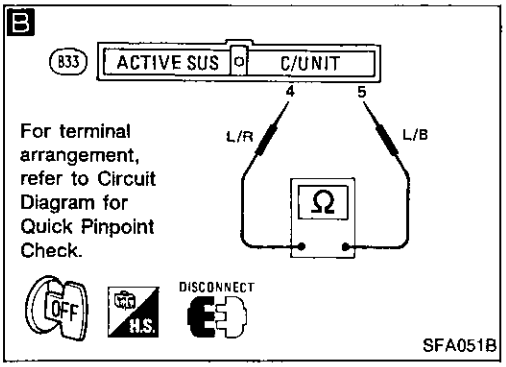
N.G. → Replace control unit.

O.K. ↓

Normal

OIL TEMPERATURE SENSOR CIRCUIT CHECK





A

CHECK OIL TEMPERATURE SENSOR.
Turn ignition switch "OFF". Disconnect oil temperature sensor connector. Measure resistance between connector terminals ① and ②.
Resistance: 100Ω - 50 kΩ

N.G.
(Less than 100Ω or greater than 50 kΩ) → Replace oil temperature sensor.

O.K. ↓

B

CHECK OIL TEMPERATURE SENSOR CIRCUIT.
Turn ignition switch "OFF". Disconnect control unit connector, and measure resistance between body connector terminals ④ and ⑤.
Resistance: 100Ω - 50 kΩ

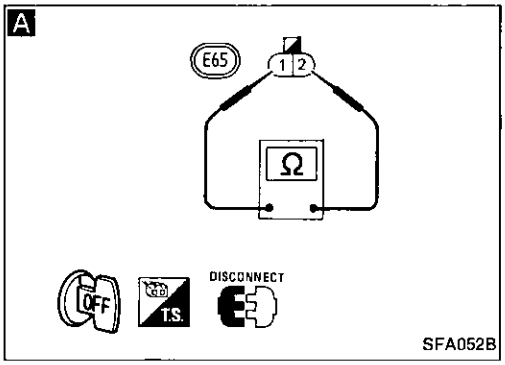
N.G.
(Less than 100Ω or greater than 50 kΩ) → Check and repair harness between control unit and oil temperature sensor.

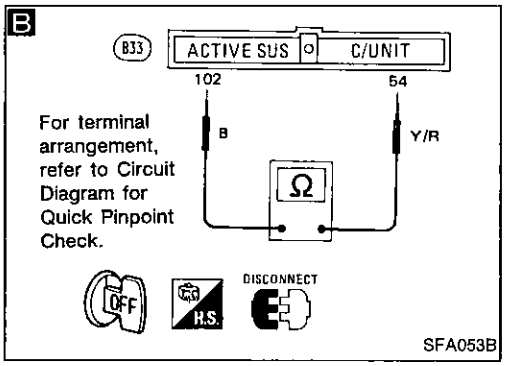
O.K. ↓

Replace control unit.

Self-diagnosis (Cont'd)

OIL WARNING CIRCUIT CHECK





Check fluid level in reservoir tank. → N.G. → Add fulid.

O.K. ↓

A

CHECK CONTINUITY IN OIL LEVEL SWITCH CIRCUIT.
Turn ignition switch "OFF". Disconnect oil level switch connector, and check continuity between terminals ① and ② (switch side).
Continuity should exist.

→ N.G. → Replace oil level switch.

O.K. ↓

B

CHECK OIL LEVEL SWITCH CIRCUIT.
Turn ignition switch "OFF". Disconnect control unit connector and check continuity between terminals ⑭ and ⑩②.
Continuity should exist.

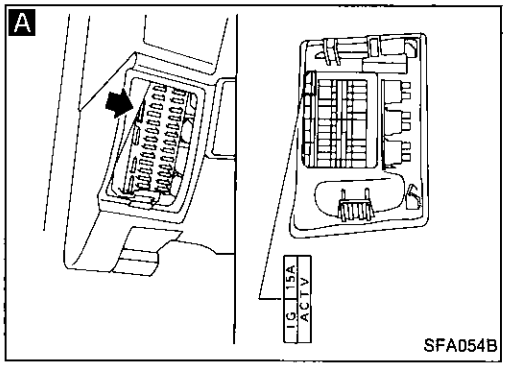
→ N.G. → Check and repair harness between control unit and oil level switch.

O.K. ↓

Replace control unit.

IGNITION POWER SUPPLY CIRCUIT CHECK

When "IGN·ON PWR SUPPLY" appears on the display with CONSULT set to the self-diagnostic mode, either the 15-ampere IGN fuse (#27) may be burned out or the control unit may be faulty.



A

Check 15A IGN fuse (#27) condition. → N.G. → Replace fuse.

O.K. ↓

Turn ignition switch "OFF" and wait for at least 3 minutes. Then disconnect battery terminal and leave it disconnected for at least 30 seconds.*

↓

Connect battery terminal. Start engine and check again. → N.G. → Replace control unit.

O.K. ↓

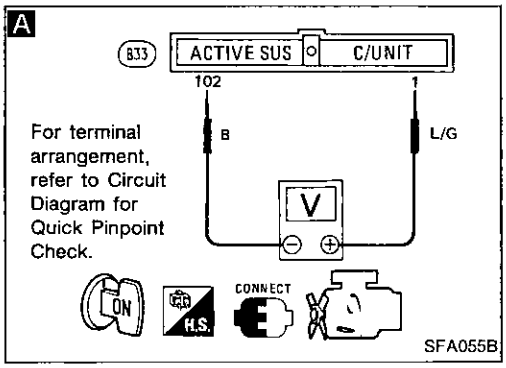
Normal

- **Be careful since vehicle height abruptly changes when battery terminal is disconnected immediately after ignition switch is turned "OFF".**
- **After fuse is replaced, always perform operation marked "*" since active suspension warning lamp remains on although system is in good order. (Auto "turn-off" function does not activate.)**

Self-diagnosis (Cont'd)

ENGINE STALL WARNING CIRCUIT CHECK

When "WARN ENGINE STALL" appears on the display with CONSULT set in the self-diagnostic mode, it indicates that the engine is running at speeds less than 400 rpm while the vehicle is operating, it is at rest with the ignition "ON" or the engine revolution signal line to the ECCS control unit is open. If CONSULT judges the problem to be an "engine stall", the active suspension warning lamp will illuminate and, at the same time, the fail-safe valve will be deenergized. The result is a fail-safe condition (control is stopped) which may cause vehicle posture to change while vehicle is operating.



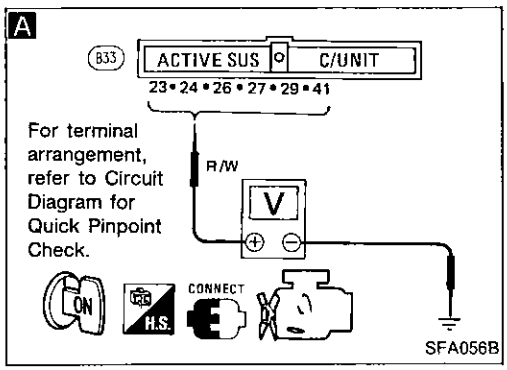
Start engine and check for rotation.
- N.G. → Damaged engine system
- O.K. ↓

Check active suspension warning lamp. It should illuminate.
- N.G. → Poor harness and/or connector connection
- O.K. ↓

A

CHECK INPUT SIGNAL.
Turn ignition switch "ON". (Do not start engine.) Measure voltage across control unit connector terminals ① and (102).
Voltage: Approx. 5V
- N.G. → Shorted harness circuit or shorted/damaged control unit
- O.K. ↓

Open harness circuit or damaged E.C.C.S. control unit



G SENSOR POWER SUPPLY CIRCUIT CHECK

A

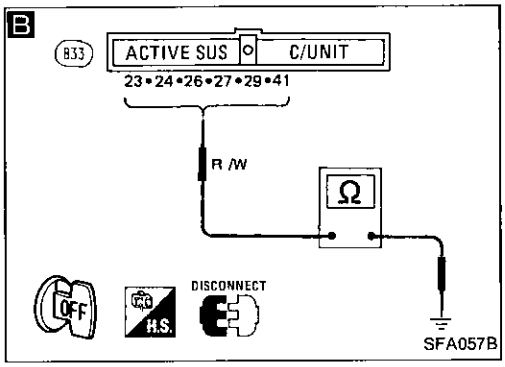
CHECK INPUT SIGNAL TO G SENSOR.
Turn ignition switch "ON". Measure voltage across any one of the control unit connector terminals ㉓, ㉔, ㉖, ㉗, ㉙ or ㊶ and ground.
Voltage: 0V
- N.G. (Almost no voltage.) → Disconnect connectors from sensors, one at a time, starting with the one most easily accessible.
- O.K. ↓

Check for presence of normal 8 volts.
- O.K. ↓
- N.G. → Disconnect connectors from sensors, one at a time, starting with the one most easily accessible.

Replace G sensor.

Ⓐ

Self-diagnosis (Cont'd)



Ⓐ

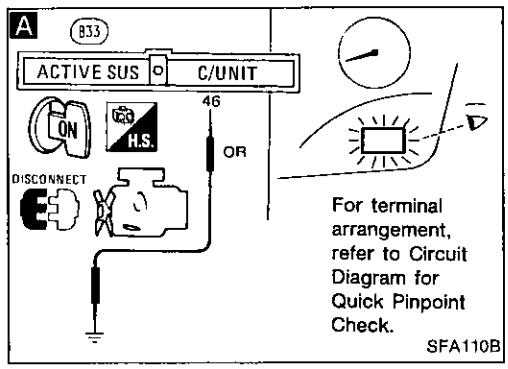
B

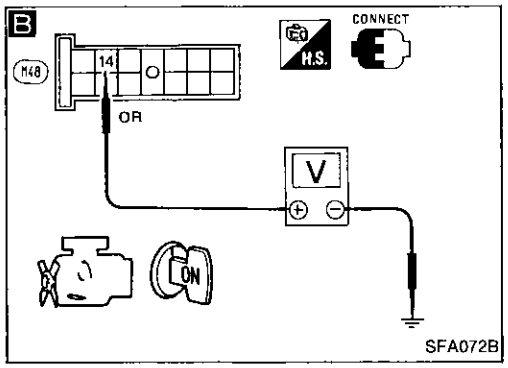
CHECK G SENSOR CIRCUIT.
Disconnect control unit connector. Measure resistance between one of the connector terminals ㉓, ㉔, ㉖, ㉗, ㉙ or ㊶ and GND (body metal).
Resistance: Greater than 8Ω

N.G. → Shorted harness circuit or faulty G sensor.

O.K. ↓

Replace control unit.





Diagnostic Procedure 1

SYMPTOM:
No warning lamp comes on when ignition switch is turned "ON".

A

CHECK WARNING LAMP INPUT SIGNAL.
Disconnect C/U connector, and ground terminal ㊻ of vehicle side connector with ignition switch ON. Check whether active suspension warning lamp is ON.
Lamp ON when grounded

O.K. → Replace control unit.

N.G. ↓

B

CHECK WARNING LAMP CIRCUIT.
Remove combination meter, and check voltage between vehicle side connector terminal ⑭ and body ground with ignition switch ON.
Battery voltage should exist.

N.G. → Check and repair harness between control unit and combination meter.

O.K. ↓

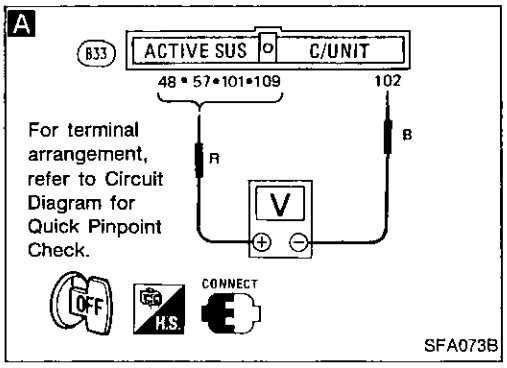
CHECK WARNING LAMP BULB.
Check if active suspension warning lamp is burned out.

N.G. → Replace bulb.

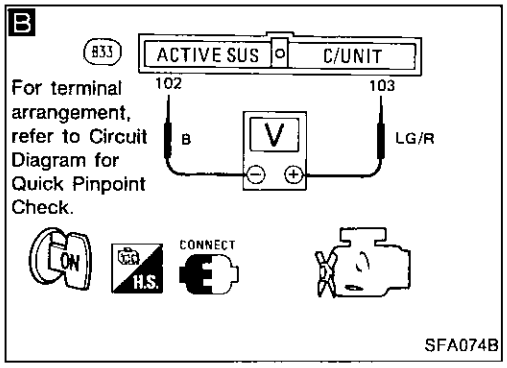
O.K. ↓

Check harness or meter board for open-circuit.

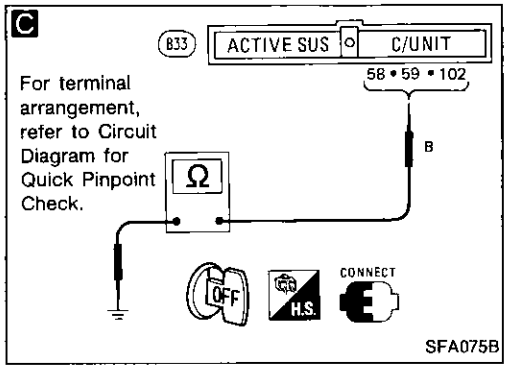
A



B



C



Diagnostic Procedure 2

SYMPTOM:

System is not set in self-diagnosis mode.

A

CHECK POWER SUPPLY (BATTERY).
With ignition switch OFF, check voltage between each C/U connector terminal (48), (57), (101), (109) and terminal (102).
Battery voltage should exist.

N.G. → Damaged battery power supply harness

O.K. ↓

B

CHECK POWER SUPPLY (IGNITION)
With ignition switch ON, check voltage between C/U connector terminals (103) and (102).
Battery voltage should exist.

N.G. → Damaged ignition power supply harness

O.K. ↓

C

CHECK GROUND CIRCUIT
With ignition switch OFF, check continuity between each C/U connector terminal (58), (59), (102) and body ground.
Continuity should exist.

N.G. → Check and repair harness between control unit and ground.

O.K. ↓

Replace control unit.

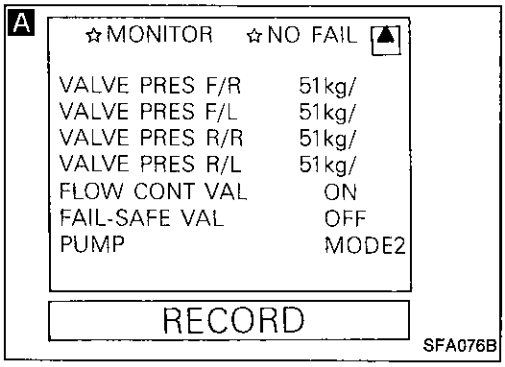
Diagnostic Procedure 3

SYMPTOM:
Abnormalities when starting engine

Note:
When engine is started, the flow control valve is energized for approx. 10 seconds changing the vehicle height gradually. After this period, the flow control valve is de-energized, and the vehicle height is gradually controlled to a level according to the signals from the G sensor and vehicle height sensor.
Accordingly, possible troubles when starting the engine include 1) abrupt rise in vehicle height (malfunctioning flow control valve), 2) tilting of vehicle (difference in outputs of G sensors), and 3) abnormal control signal from control unit.

1) ABRUPT RISE IN VEHICLE HEIGHT

Note:
If the flow control valve is seized in the de-energized position, the vehicle may raise immediately after starting the engine. This indicates that, because the control level of the pressure control valve is set at 5,002 kPa (51 kg/cm^2, 725 psi) for about 10 seconds after starting up the engine, a sudden change in the supply pressure also causes the control pressure to be increased abruptly to 5,002 kPa (51 kg/cm^2, 725 psi).
Similar behavior may occur if a disconnection occurs in the flow control valve circuit. In this case, however, the fail-safe function prevents the trouble from occurring.



- Park vehicle on level ground, and stop engine.
- Connect CONSULT, and set ignition switch to ON. (Engine is OFF.)

A

- Set CONSULT data monitor to flow control valve position.
- Start engine, and check that flow control valve display turns from ON to OFF about 10 seconds after engine starts.

N.G. → Check flow control valve circuit. Refer to self-diagnosis FLOW CONTROL VALVE CIRCUIT CHECK FA-77.

O.K. ↓

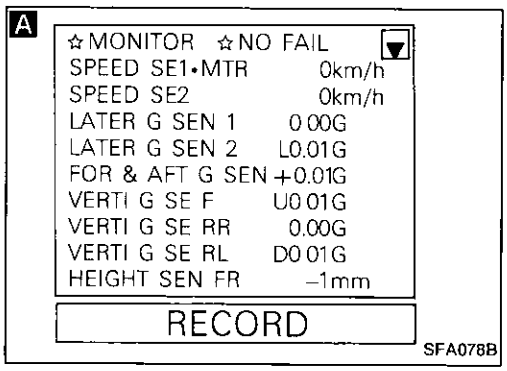
Flow control valve is seized. Replace multi-valve unit.

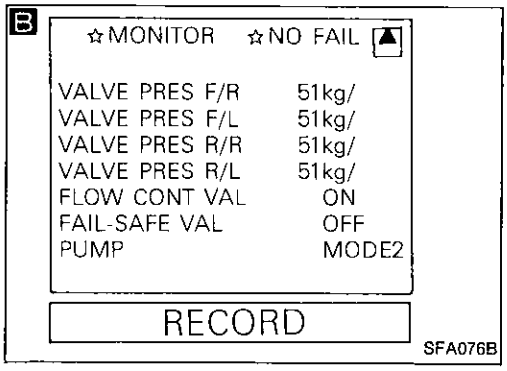
Diagnostic Procedure 3 (Cont'd)

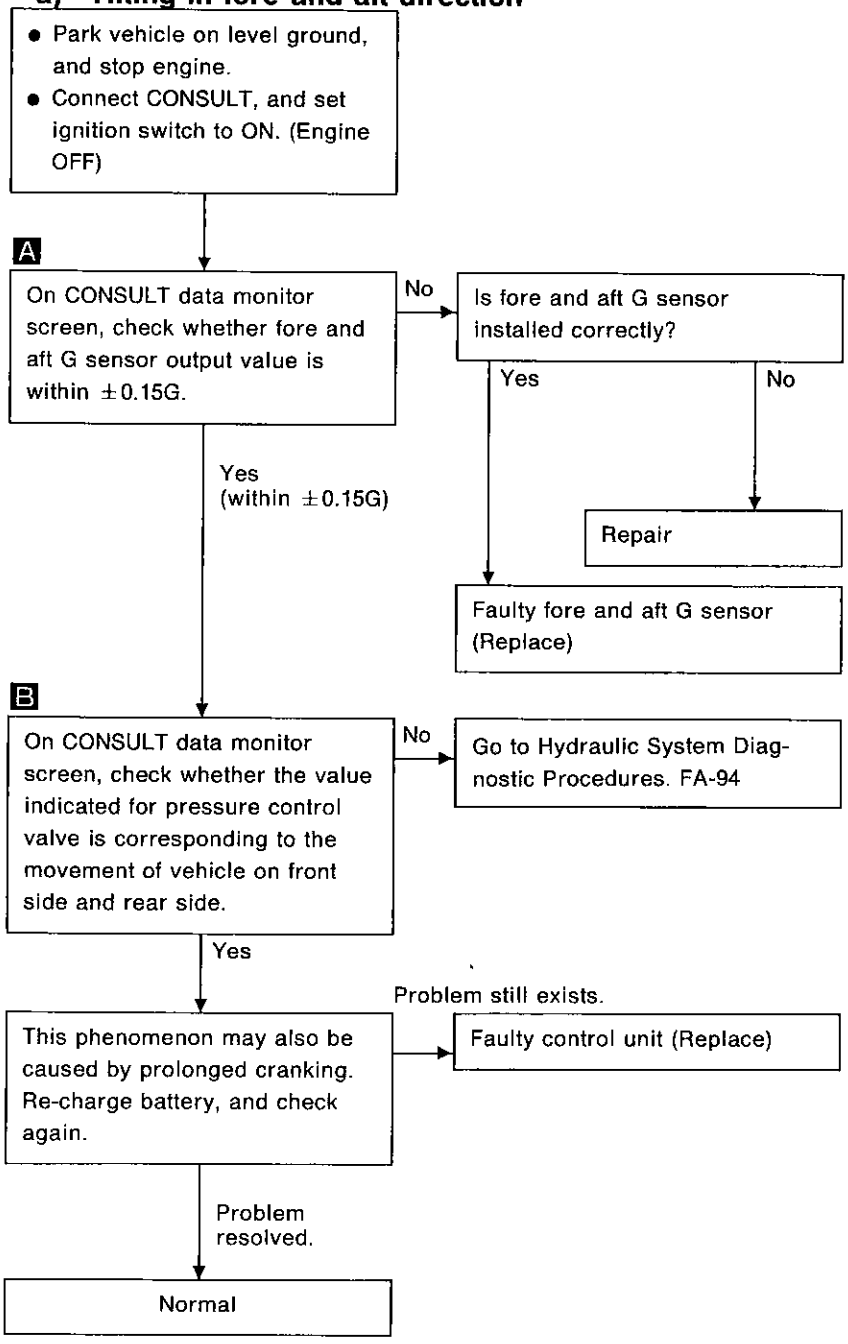
2) TILTING OF VEHICLE

Note:
If outputs from front and rear G sensors or lateral G sensors are different, the vehicle position may tilt approx. 10 seconds after starting the engine. After some time, the vehicle may recover its level position. This is because, if the outputs of the G sensors are not equal, the difference in output causes a change in vehicle position after which the amount of control is increased gradually to bring the vehicle to the normal level.

a) Tilting in fore and aft direction







Diagnostic Procedure 3 (Cont'd)

b) Tilting in lateral direction

A

☆MONITOR	☆NO FAIL
SPEED SE1•MTR	0km/h
SPEED SE2	0km/h
LATER G SEN 1	0.00G
LATER G SEN 2	L0.01G
FOR & AFT G SEN	+0.01G
VERTI G SE F	U0.01G
VERTI G SE RR	0.00G
VERTI G SE RL	D0.01G
HEIGHT SEN FR	−1mm

RECORD

SFA078B

B

☆MONITOR	☆NO FAIL
VALVE PRES F/R	51kg/
VALVE PRES F/L	51kg/
VALVE PRES R/R	51kg/
VALVE PRES R/L	51kg/
FLOW CONT VAL	ON
FAIL-SAFE VAL	OFF
PUMP	MODE2

RECORD

SFA076B

- Park vehicle on level ground, and stop engine.
- Connect CONSULT, and set ignition switch to ON. (Engine OFF)

↓

A

On CONSULT data monitor screen, check whether outputs of lateral G sensor 1 (front) and lateral G sensor 2 (rear) are within ±0.15G.

One is not within ±0.15G. → Is lateral G sensor installed correctly?

- Yes → Faulty lateral G sensor (Replace both lateral G sensors as a set.)
- No → Repair

Within ±0.15G ↓

B

On CONSULT data monitor screen, check whether the value indicated for pressure control valve is corresponding to vehicle movement on both left and right sides.

No → Go to "Hydraulic System Diagnostic Procedures". FA-94

Yes ↓

This phenomenon may be caused by prolonged cranking. Re-charge battery, and check again.

Problem still exists. → Faulty control unit (Replace)

Problem resolved. ↓

Normal

Diagnostic Procedure 4

SYMPTOM:

Abnormalities when stopping engine

Note:

When engine is stopped, the system operates to maintain system pressure at a fixed level (charged balancing pressure). First, the pump stops, eliminating the pump discharge pressure, which causes the main check valve to close. At the same time, the control level of the pressure control valve is gradually changed to the neutral pressure [5,002 kPa (51 kg/cm^2, 725 psi)]. Because no oil is fed from the pump, the supply pressure flows out to the return pressure side via the pressure control valve. As a result, the supply pressure lowers gradually. When the pressure lowers to 5,002 kPa (51 kg/cm^2, 725 psi), the operation check valve closes, shutting off the return pressure outlet. After the operation check valve closes, the supply pressure and return pressure gradually become equal (charged balancing pressure). Approximately 3 minutes after stopping the engine, the fail-safe valve and pressure control valve are de-energized, and no longer operational.

During the above-mentioned operation, some mismatching may occur between the operation of the hydraulic system and the electrical units due to the ambient temperature, and the status of control existing at the time the engine stopped. Such a minor mismatching should not be regarded as a problem. It is requested to fully understand the conditions and situations under which such mismatch occurs.

(1) If either battery terminal is disconnected or the active suspension fuse (No. 17) is removed within 3 minutes after stopping the engine, the vehicle height may change. This is normal. However, care should be taken when performing maintenance near the vehicle.
(2) Depending on the ambient temperature and pressure control valve status when the engine was stopped, some mismatching may occur between the operation of the hydraulic system and the electrical units, creating a jerk of the vehicle body. This is normal.
(3) When ambient temperature is very low, vehicle height may drop a little about 3 minutes after stopping the engine. This is normal.
(4) When jacking up the vehicle, be sure to wait about 3 minutes after stopping the engine. The vehicle body may jerk a little after stopping the engine.
(5) If the engine is started again soon after stopping, the vehicle body may jerk a little depending on the ambient temperature and loaded condition of the vehicle. This, however, is normal.

A

☆MONITOR	☆NO FAIL
SPEED SE1•MTR	0km/h
SPEED SE2	0km/h
LATER G SEN 1	0.00G
LATER G SEN 2	L0 01G
FOR & AFT G SEN	+0 01G
VERTI G SE F	U0.01G
VERTI G SE RR	0.00G
VERTI G SE RL	D0 01G
HEIGHT SEN FR	−1mm

RECORD

☆MONITOR	☆NO FAIL
HEIGHT SEN FL	−7mm
HEIGHT SEN RR	16mm
HEIGHT SEN RL	17mm
OIL TEMP SEN	LOW°C
HEIGHT SWITCH	NORM
STOP LAMP SW	OFF
PRES SW•PUMP	LOW
OIL LEVEL SW	OK
DOOR SW	SHUT

RECORD

SBR453B

Diagnostic Procedure 5

SYMPTOM:

Abnormalities in vehicle height control

Note:

The vehicle height controller causes the vehicle height to change, but its changing speed [2 to 3 mm (0.08 to 0.12 in)/sec] is slower than that caused by the G sensor. If the vehicle height changes at an abnormally slow speed, it is attributable to a malfunction of the vehicle height controller.

A

Does the difference between vehicle height measured value and reference value agree with the value displayed on CONSULT data monitor screen to within a range of ±10mm (±0.39 in)? mm (in)

Vehicle height reference value	Front (A)	385 (15.16)
	Rear (B)	361 (14.21)

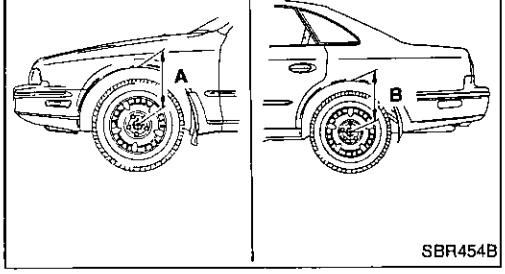
N.G. → Go to "Vehicle height adjustment". Refer to FULL-ACTIVE SUSPENSION — Repair of Components Parts. FA-34

O.K. ↓

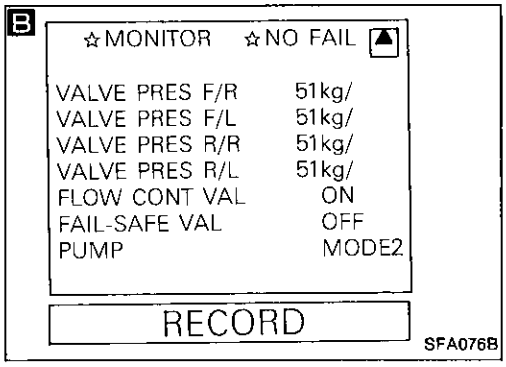
Ⓐ

Diagnostic Procedure 5 (Cont'd)

A



B



Ⓐ

B

Does control pressure of each wheel agree with vehicle position on CONSULT data monitor screen?

N.G. → Go to "Abnormalities in vehicle height control (hydraulic system)". Refer to Diagnostic Procedure 10. FA-98

O.K.

Does vehicle height change normally when pressure to all four wheels is changed using CONSULT active test function?

N.G. → Go to "Abnormalities in vehicle height control (hydraulic system)". Refer to Diagnostic Procedure 10. FA-98

O.K.

Check G sensor and vehicle height sensor.
Refer to Self-diagnosis G sensor and height sensor. FA-69

1) FAULTY PHENOMENA AND SENSORS REQUIRING INSPECTION

Symptom	Sensors requiring inspection
Vehicle will not level even if parked on level ground for a long time.	Vehicle height sensors (for four wheels) (Note 1) Stop lamp switch (Note 2) Parking brake switch (Note 2) Door switch (Note 2)
Vehicle tilts while driving.	
Vehicle height will not change even if height control switch is operated.	Above-listed items and height control switch (Note 3)

The following phenomena are related to a normal system.

- When the parking brake or foot brake is applied, the braking force creates a stress in the suspension system. In this condition, the height of all four wheels may not change uniformly when the height control switch is operated.
- If a wheel is mounted on the shoulder of a road or on a large curb [approx. 100 mm (3.94 in) in height], the system automatically stops its vehicle height control function, hence the vehicle remains in the tilted position.
- As long as the active suspension warning lamp is ON, the vehicle height control function is inactive, and the vehicle may not level itself.

Notes:

(1) A vehicle height sensor is connected to each wheel. If any one of them should fail, or its neutral position become incorrect, height change will occur not only in the affected wheel but in the other wheels also. To adjust vehicle height using the vehicle height sensor, refer to "Full-active suspension — Repair of Components: Vehicle height adjustment", and use the vehicle height adjustment mode of the CONSULT work support mode.

(2) For inspection of the stop lamp switch, parking brake switch and door switch, refer to "2) Inspection of other sensors".

(3) For inspection of the height control switch, refer to "Self- diagnosis HEIGHT CONTROL SWITCH CIRCUIT CHECK. FA-75".

Diagnostic Procedure 5 (Cont'd)

2) INSPECTION OF OTHER SENSORS

ⓐ Stop lamp switch

Turn OFF ignition switch.
Connect CONSULT, and set ignition switch to ON.

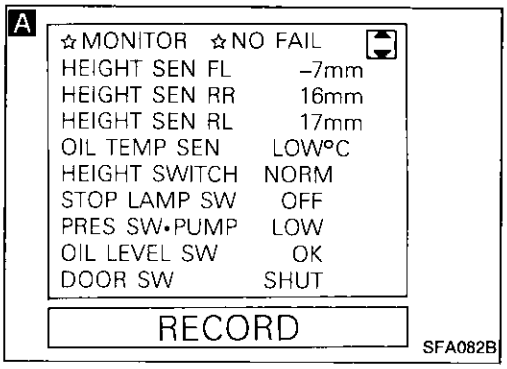
A

CHECK ON-OFF OPERATION OF STOP LAMP SWITCH.
Depress and release foot brake pedal several times. Check whether stop lamp switch display is normal on CONSULT data monitor screen.

Foot brake operation	CONSULT display
Depressed	ON
Released	OFF

O.K. → Normal

N.G.



Set ignition switch to OFF.
Depress and release foot brake pedal several times. Check whether brake lamp operation is normal.

N.G. → Check brake lamp circuit.

O.K.

B

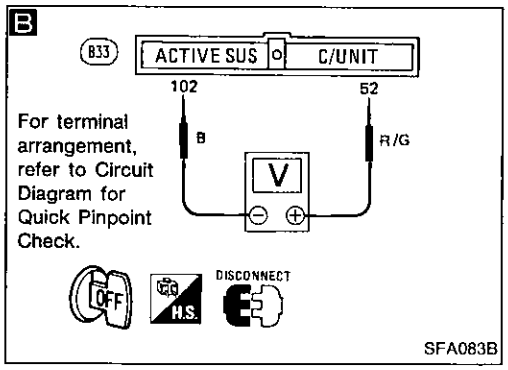
CHECK STOP LAMP CIRCUIT.
Disconnect C/U connector, and depress and release foot brake pedal several times. Check whether voltage between vehicle side connector terminals ⑤② and ⑩② is normal (ignition switch: OFF).

Foot brake operation	Voltage
Depressed	Battery voltage
Released	0 V

N.G. → Check and repair harness between control unit and stop lamp switch.

O.K.

Damaged control unit
(Replace)



Diagnostic Procedure 5 (Cont'd)

ⓑ Parking brake switch

Turn OFF ignition switch.
Connect CONSULT, and set ignition switch to ON.

A

CHECK ON-OFF OPERATION OF PARKING BRAKE LAMP SWITCH.
Apply and release parking brake several times. Check whether parking brake lamp switch display is normal on CONSULT data monitor screen.

Parking brake operation	CONSULT display
Applied	ON
Released	OFF

O.K. → Normal

N.G.

Set ignition switch to OFF.
Apply and release parking brake several times. Check whether brake warning lamp operation is normal.

N.G. → Check and repair brake warning lamp circuit.

O.K.

B

CHECK PARKING BRAKE LAMP CIRCUIT.
Disconnect C/U connector, and apply and release parking brake several times. Check whether voltage between vehicle side connector terminals ⑤⑥ and ⑩② is normal (ignition switch: OFF).

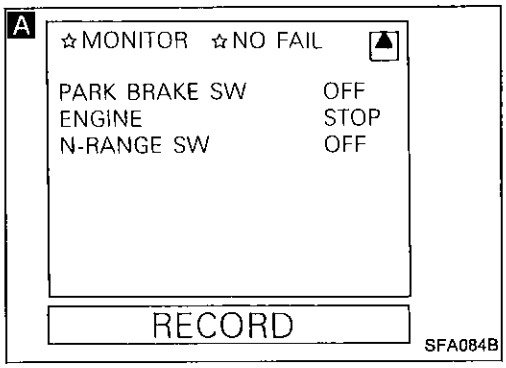
Parking brake operation	Voltage
Applied	0 V
Released	Battery voltage

N.G. → Check and repair harness between control unit and parking brake switch.

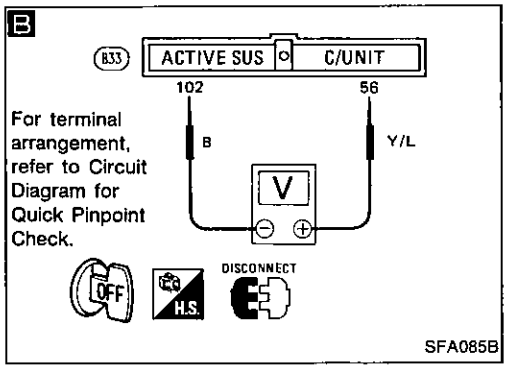
O.K.

Damaged control unit
(Replace)

A



B



Diagnostic Procedure 5 (Cont'd)

© Door switch

Turn OFF ignition switch.
Connect CONSULT and set ignition switch to ON.

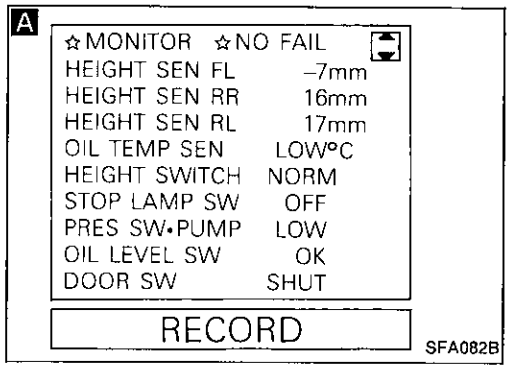
A

CHECK ON-OFF OPERATION OF DOOR SWITCH.
Open and close doors several times.
Check whether door switch displayed is normal on CONSULT data monitor screen.
(Room lamp switch: DOOR)

Door position	CONSULT display
All doors are closed	SHUT
One or more doors are open	OPEN

O.K. → Normal

N.G.



Set ignition switch to OFF.
Open and close doors several times.
Check whether room lamp lights normally. (Room lamp switch: DOOR)

N.G. → Check and repair room lamp circuit.

O.K.

B

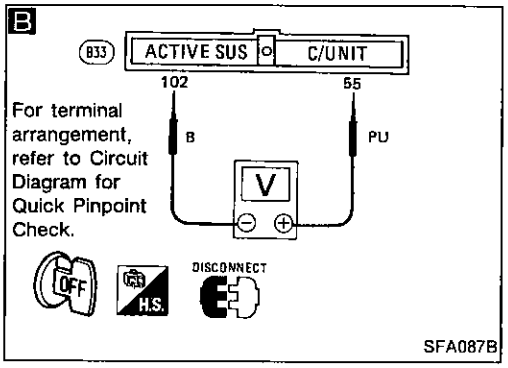
Disconnect C/U connector, and open and close doors several times. Check whether voltage between vehicle side connector terminal (55) and terminal (102) is normal. (Room lamp switch: DOOR, ignition switch: OFF)

Door position	Voltage
All doors are closed	0 V
One or more doors are open	Approx. 12 V

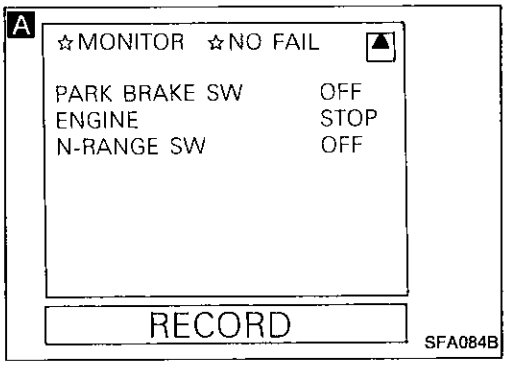
N.G. → Check and repair harness between control unit and door switch.

O.K.

Damaged control unit
(Replace)



Diagnostic Procedure 5 (Cont'd)



ⓓ Neutral range switch

A

Observe neutral range switch ON-OFF operation displayed on CONSULT data monitor screen.
Display should agree with operation.

N.G. → Refer to "TROUBLE DIAGNOSES" in AT section.

O.K. ↓

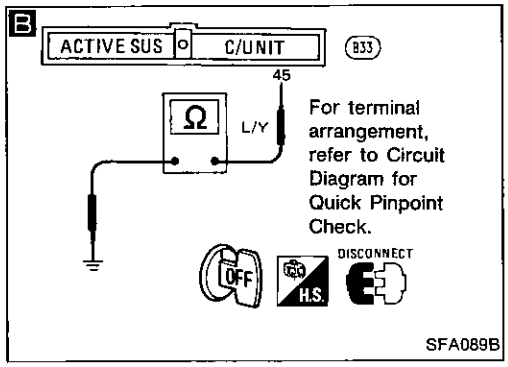
B

CHECK HARNESS BETWEEN NP RELAY AND C/U.
Check whether resistance between C/U connector terminal ㊺ and GND changes in NP range.

N.G. → Check and repair harness between control unit and NP relay.

O.K. ↓

Replace control unit.



Diagnostic Procedure 6

SYMPTOM:
Abnormalities in roll control

1) The vehicle body moved in the roll direction while parking. The vehicle body rolled (moved sideways) after starting the engine, but it gradually returned level.

- Park vehicle on level ground, and stop engine.
- Connect CONSULT, and set ignition switch to ON. (Engine OFF)

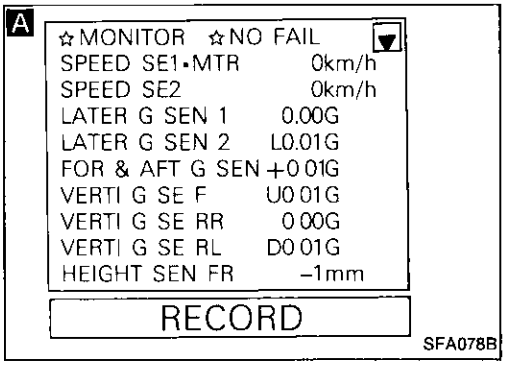
A

Check output signal on CONSULT data monitor screen. Are output values of lateral G sensors 1 and 2 within ±0.15G?
Gravity ±0.15G

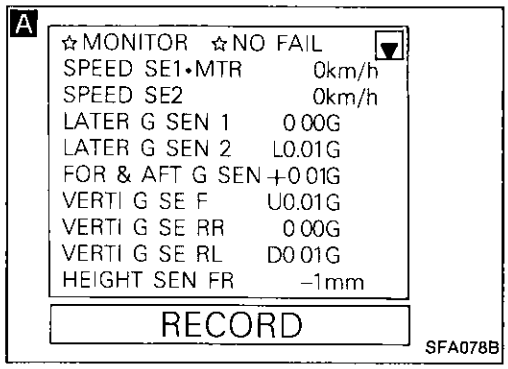
N.G. → Damaged lateral G sensor 1 or 2 (Replace both sensors as a set.)

O.K. ↓

Go to "Hydraulic System Diagnostic Procedures".
Refer to Diagnostic Procedures 8 to 12.
FA-94



Diagnostic Procedure 6 (Cont'd)



2) The vehicle body moved in the roll direction while driving. The vehicle body rolled, but gradually returned level.

- Park vehicle on level ground, and stop engine.
- Connect CONSULT, and set ignition switch to ON. (Engine OFF)

↓

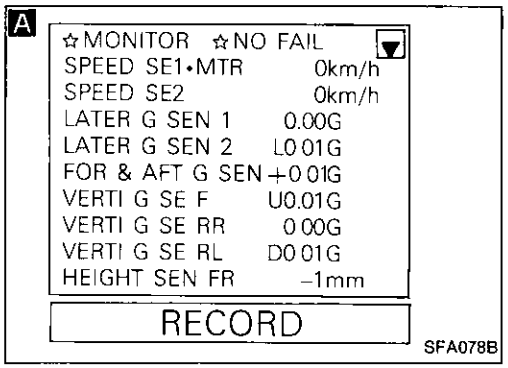
A

Check output signal on CONSULT data monitor screen. Are output values of lateral G sensors 1 and 2 and vertical G sensors (rear right and rear left) within ±0.15G?
Gravity ±0.15G

N.G. → Damaged G sensor (Replace)

↓ O.K.

Go to "Hydraulic System Diagnostic Procedures".
Refer to Diagnostic Procedures 8 to 12.
FA-94



Diagnostic Procedure 7

SYMPTOM:

Abnormalities in pitch control

1) The vehicle body moved in the pitch direction while parked. After starting the engine, the vehicle body moved in the pitch direction (tilted forward or backward), but it gradually returned level.

- Park vehicle on level ground, and stop engine.
- Connect CONSULT, and set ignition switch to ON. (Engine OFF)

↓

A

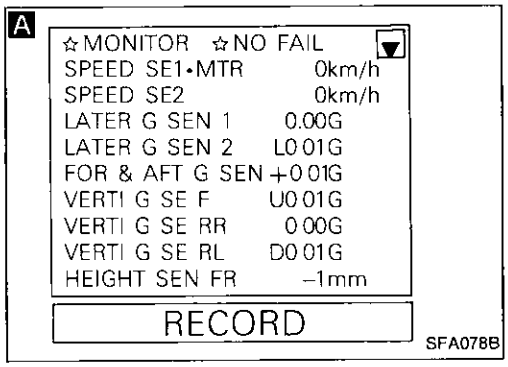
Check output signal on CONSULT data monitor screen.
Is output of fore and aft G sensor within ±0.15G?
Gravity ±0.15G

N.G. → Damaged fore and aft G sensor (Replace)

↓ O.K.

Go to "Hydraulic System Diagnostic Procedures"
Refer to Diagnostic Procedures 8 to 12.
FA-94

Diagnostic Procedure 7 (Cont'd)



2) While driving, the vehicle body moved in the pitch direction. The vehicle body moved in the pitch direction, but it gradually returned level.

- Park vehicle on level ground, and stop engine.
- Connect CONSULT, and set ignition switch to ON. (Engine OFF)

↓

A

Check output signal on CONSULT data monitor screen.
Are outputs of fore and aft G sensor and vertical G sensor (front) within ±0.15G?
Gravity ±0.15G

N.G. → Damaged fore and aft G sensor or vertical G sensor (Replace)

O.K. ↓

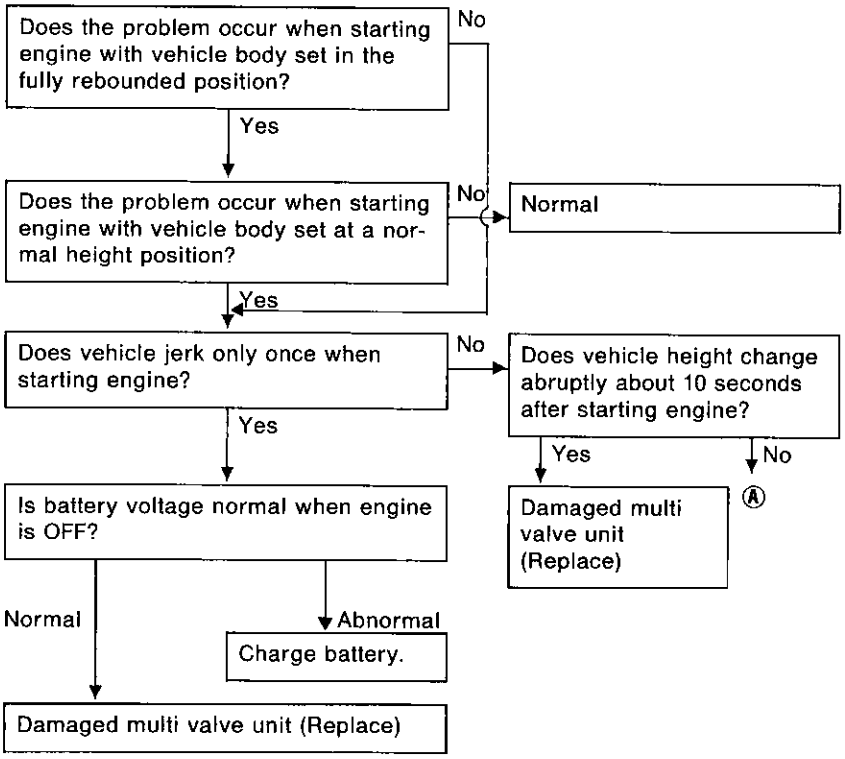
Go to "Hydraulic System Diagnostic Procedures"
Refer to Diagnostic Procedures 8 to 12.
FA-94

Hydraulic System Diagnostic Procedures

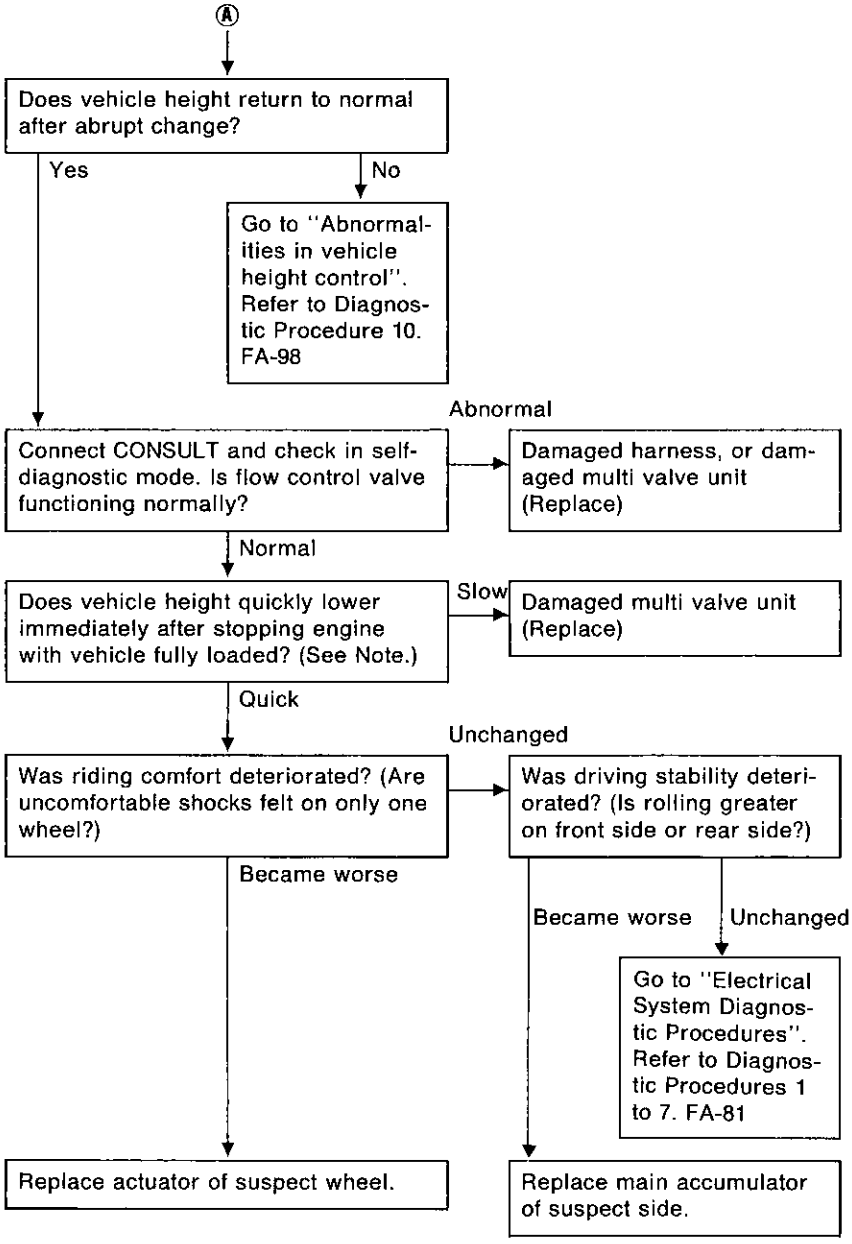
Troubleshooting of the hydraulic system must be started after solving electrical system problems, referring to "Electrical System Diagnostic Procedures".

Diagnostic Procedure 8

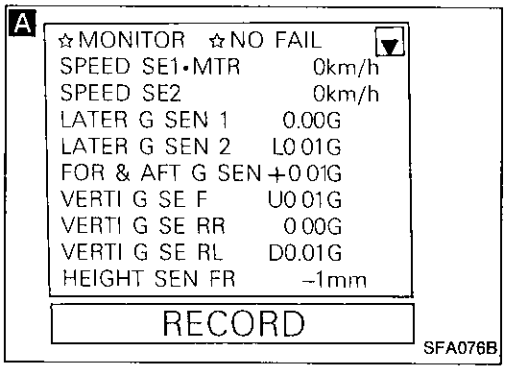
SYMPTOM:
Abnormalities when starting engine



Diagnostic Procedure 8 (Cont'd)



Note: Fully loaded state means five adults [68 kg (150 lb) each] and cargo [68 kg (150 lb)].



Diagnostic Procedure 9

SYMPTOM: Abnormalities when engine is off.

Does vehicle height drop within 3 minutes after stopping engine?
- No → Does vehicle height lower within scores of minutes after stopping engine?
  - Yes → Does vehicle height drop abruptly about 3 minutes after stopping engine?
  - No → Ⓐ
- Yes → Does vehicle height drop abruptly about 3 minutes after stopping engine?

Does vehicle height drop abruptly about 3 minutes after stopping engine?
- No → Is heavy cargo loaded on vehicle?
- Yes → Is bypass valve tightened to specified torque [11 to 13 N·m (1.1 to 1.3 kg-m, 8 to 9 ft-lb)]?

Is heavy cargo loaded on vehicle?
- Not loaded → Ⓐ
- Loaded → Is normal vehicle height recovered when unloaded?

Is normal vehicle height recovered when unloaded?
- No → Is bypass valve tightened to specified torque [11 to 13 N·m (1.1 to 1.3 kg-m, 8 to 9 ft-lb)]?
- Yes → Normal

Is bypass valve tightened to specified torque [11 to 13 N·m (1.1 to 1.3 kg-m, 8 to 9 ft-lb)]?
- No → Is problem corrected when bypass valve is tightened to specified torque?
- Yes → Damaged multi valve unit (Replace).

Is problem corrected when bypass valve is tightened to specified torque?
- No (Unchanged) → Damaged multi valve unit (Replace)
- Yes → Normal

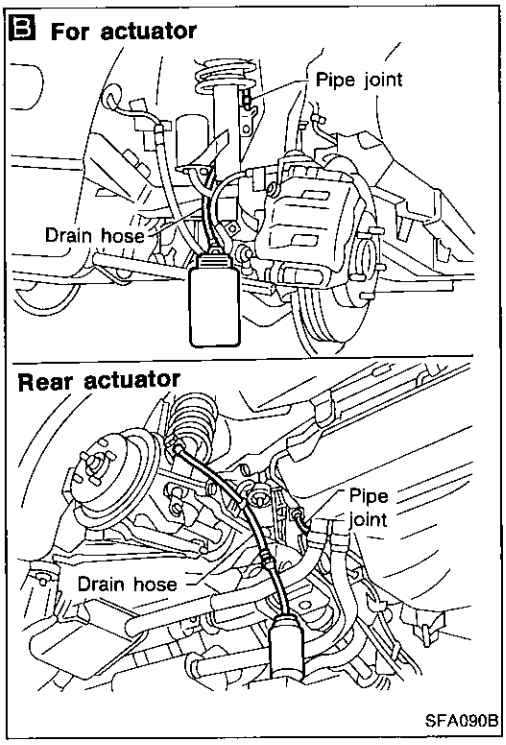
Ⓐ

CHECK VALVE PRESSURE. Connect CONSULT, and start engine. Read control pressure indicated on data monitor screen after vehicle height stabilizes. (Unladen vehicle with gasoline tank full).

Valve pressure:
Front
Below 4,904 kPa (50 kg/cm², 711 psi)
Rear
Below 4,609 kPa (47 kg/cm², 668 psi)

- O.K. → Damaged multi valve unit (Replace).
- N.G. → Weak coil spring (Replace).

Diagnostic Procedure 9 (Cont'd)



Ⓐ

Does vehicle height lower more than 30 mm (1.18 in) in a week?
- No → Is oil leaking?
- Yes → Was any operation causing an abnormal rise in oil temperature made before stopping engine?

Was any operation causing an abnormal rise in oil temperature made before stopping engine?
- No → Is oil leaking?
- Yes → Does vehicle height rise when starting engine?

Is oil leaking?
- No → Was riding comfort deteriorated? (Are uncomfortable shocks felt on only one wheel?)
- Yes → Is any oil-charged unit leaking?

Is any oil-charged unit leaking?
- No (Repair) → Was riding comfort deteriorated? (Are uncomfortable shocks felt on only one wheel?)
- Yes → Repair or replace leaking unit.

Does vehicle height rise when starting engine?
- Yes → Normal
- No → Go to "Abnormalities in vehicle height control". Refer to Diagnostic Procedure 10. FA-98

Was riding comfort deteriorated? (Are uncomfortable shocks felt on only one wheel?)
- No (Unchanged) → Was driving stability deteriorated? (Is rolling greater on front side or rear side?)
- Yes (Deteriorated) → Oil leakage is large. → Replace actuator of affected wheel.

Was driving stability deteriorated? (Is rolling greater on front side or rear side?)
- Yes (Deteriorated) → Replace main accumulator of suspect side.
- No (Unchanged) → B

B

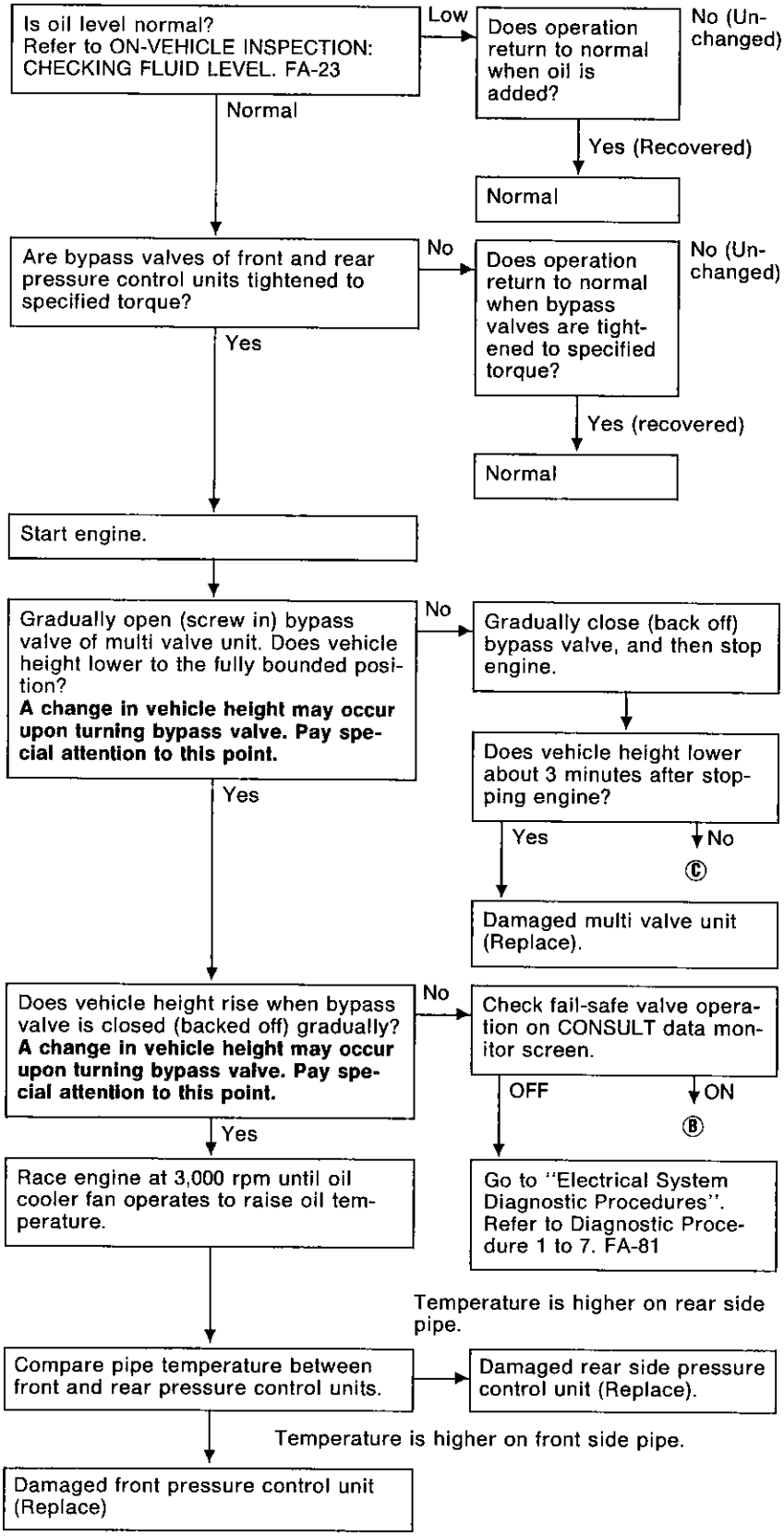
Is oil leak from actuator drain hose normal? Check amount of oil leakage from actuator power cylinder seal.
- Park vehicle on level ground, and stop engine.
- Separate front and rear actuator drain hoses from four wheels at positions.
- Hang open end of actuator side drain hose down, and leave it for more than 5 minutes to thoroughly drain oil.
- Put open end of hose in a can, and leave overnight, then check the amount of oil leakage.
- If oil leakage of an actuator is very large, the actuator seal must be judged as faulty; replace the actuator.

→ Replace actuator of affected wheel.

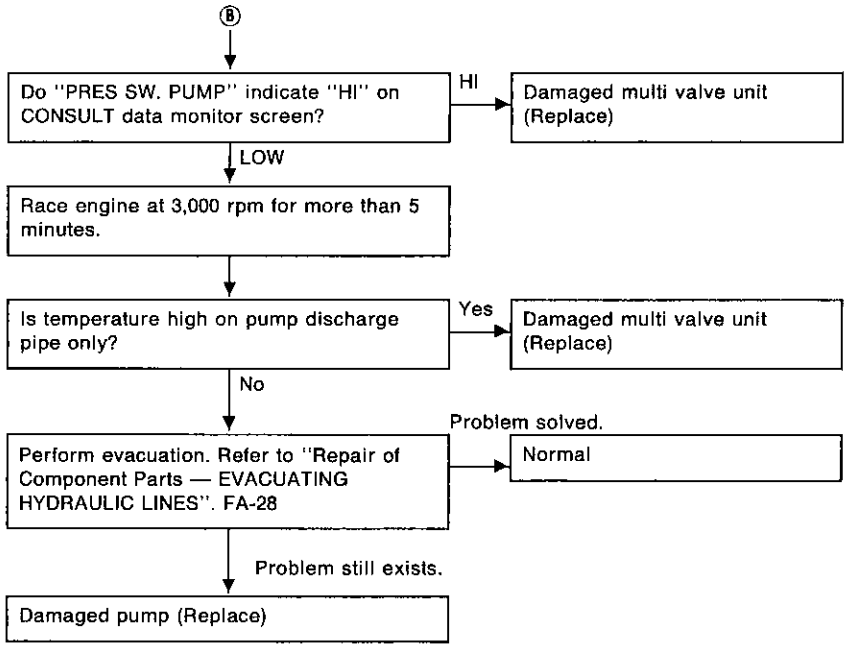
Oil leakage is small. → Damaged multi valve unit (Replace).

Diagnostic Procedure 10

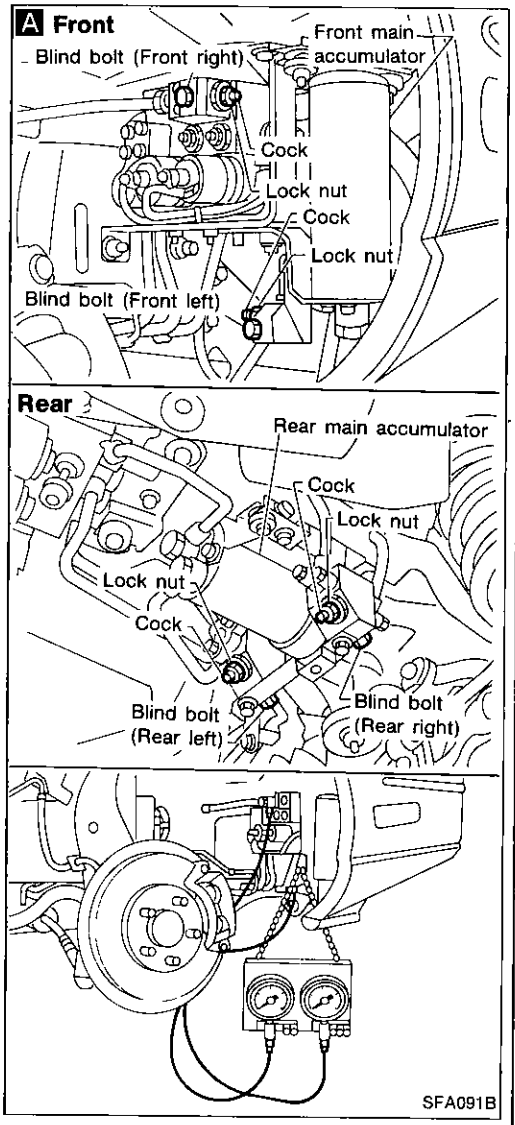
SYMPTOM:
Abnormalities in vehicle height control



Diagnostic Procedure 10 (Cont'd)



Diagnostic Procedure 10 (Cont'd)



Ⓒ

Using CONSULT active test mode, change control pressure of four wheels from 1,765 to 9,807 kPa (18 to 100 kg/cm^2, 256 to 1,422 psi). Do all four wheels move smoothly up and down?

Movement of some wheels is not smooth.

→ Pressure control unit of affected wheel is faulty (Replace).

All four wheels move smoothly.

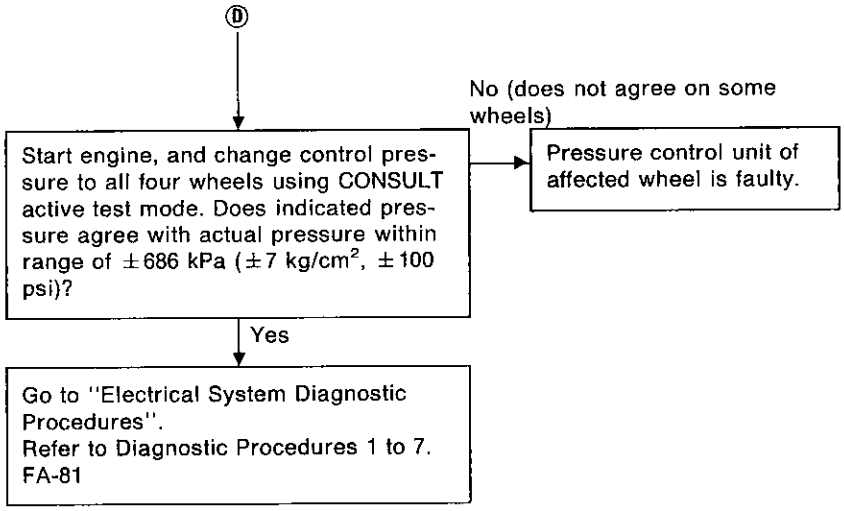
Ⓐ

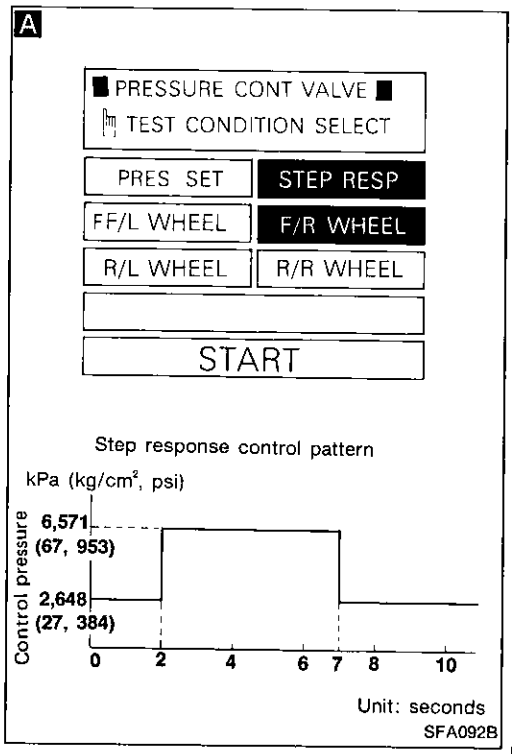
MEASURE CONTROL PRESSURE:

- With engine stopped, lift up vehicle until all four wheels are completely off the ground.
- Remove front right fender protector and rear pressure control unit protector.
- Loosen lock nut on each pressure detection port cock, and check that each cock is tightened to specified torque. Temporarily tighten each lock nut.
- Remove blind bolt.
  Be sure to loosen this bolt very carefully. Oil may spout out if cock is faulty.
- Install oil pressure gauge adapter (special tool) and brake pressure tester to each wheel.
  Securely tighten each joint. Do not forget to fit copper washer to adapter joint.
- Gradually loosen pressure detection port cock to the fully open position while making sure no oil is leaking out from any joint.
- Connect vinyl tube to air bleeder of brake fluid pressure tester. Loosen air bleeder gradually to allow air to bleed out completely, then tighten air bleeder.
  (1) Take care to prevent oil from getting on vehicle body when bleeding air.
  (2) After completing measurement, securely tighten each cock, and release residual pressure from air bleeder tester before disconnecting joints.
  (3) Do not forget to install blind bolts.

Ⓓ

Diagnostic Procedure 10 (Cont'd)





Diagnostic Procedure 11

SYMPTOM:

Abnormalities in driving stability and riding comfort

Driving stability or riding comfort deteriorated.

Any problem in vehicle height control? — Yes → Go to "Abnormalities of vehicle height control". Refer to Diagnostic Procedure 10. FA-98

No

Stop engine, and connect brake fluid pressure tester to pressure detection port. For connection of brake fluid pressure tester, refer to Diagnostic Procedure 10. FA-98

A

CHECK CONTROL PRESSURE STEP RESPONSE.

- Connect CONSULT, and start engine. After vehicle height stabilizes, select "PRESSURE CONTROL VALVE STEP RESPONSE" mode of CONSULT active test. This will cause actuator control pressure to be regulated to 2,648 kPa (27 kg/cm², 384 psi) for all wheels.
- Under this condition, touch "START" key on CONSULT screen. This will cause control pressure of selected wheel to vary as shown at left. Check whether actual oil pressure follows this change in control value.

Normal	Go to "Electrical System Diagnostic Procedures". Refer to Diagnostic Procedures 1 to 7. FA-81
Oil pressure change is abnormal on only one wheel.	Replace affected pressure control unit.
Oil pressure change is abnormal on both front wheels, or on both rear wheels.	Ⓔ
Oil pressure change is abnormal on all four wheels.	

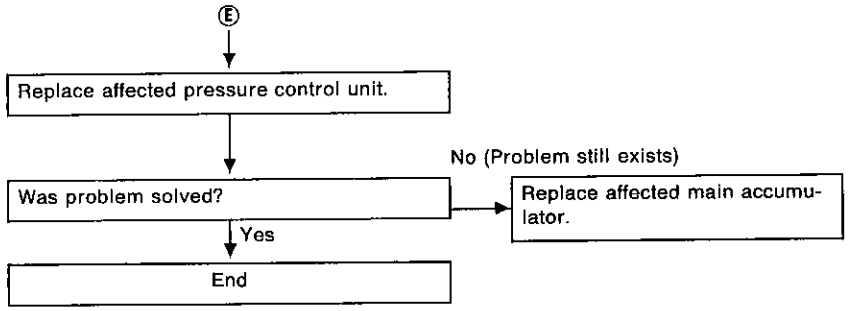
Ⓔ → Was problem solved? — No (Problem still exists). → Replace affected actuator.

Was problem solved? — Yes → END

Is flow control valve operation normal on CONSULT data monitor screen? — No (Abnormal) → Go to "Electrical System Diagnostic Procedures". Refer to Diagnostic Procedures 1 to 7. FA-81

Yes (Normal) → Replace multi valve unit.

Diagnostic Procedure 11 (Cont'd)



Diagnostic Procedure 12

SYMPTOM: Noise

No.	Noise and features	Occurrence	Phenomenon accompanying noise	Check method and remedy
1	Thudding noise As if vehicle floor is being hit with a boulder	Heard directly after starting engine, or during cranking, or directly after cranking. Sometimes heard within 3 minutes after stopping engine.	Warning lamp illuminates due to drop in voltage	Open and close fail-safe valve using CONSULT. → Similar noise is not heard. → Check other causes. ↓ Similar noise is heard. Charge or replace battery. ↓ Re-check for noise. → No noise is heard. → END ↓ Noise is heard. Replace multi valve.
2	Clicking noise As if floor is being hit with pebbles	1.5 to 2 seconds after starting engine		Re-start engine more than 3 minutes after stopping. → No noise is heard. → Check other causes. ↓ Noise is heard after starting engine. Check return pipes of front and rear pressure control valves for vibration when noise is heard. ↓ Replace unit where the greater vibration is felt.
3	Booming noise Like a steam whistle of a steamboat	Heard when driving on bad roads at low speeds and low engine rpm, or when suspension is continuously caused to oscillate largely. (When oil temperature is high)	Vibration of floor	Check by using method (a) or (b), preferably method (a). a Drive vehicle with CONSULT set in fail-safe mode. → *1 Noise is heard. → Check other causes. ↓ No noise is heard. Replace pump accumulator. ↓ Re-check for noise during driving. → No noise is heard. → END ↓ Noise is heard. Replace pump assembly. b When oil temperature rises to 60°C (140°F) or higher, simultaneously move all four wheels up and down using CONSULT active test mode. → Noise is heard when wheels are moving up. ↓ No noise is heard. Check other cause.

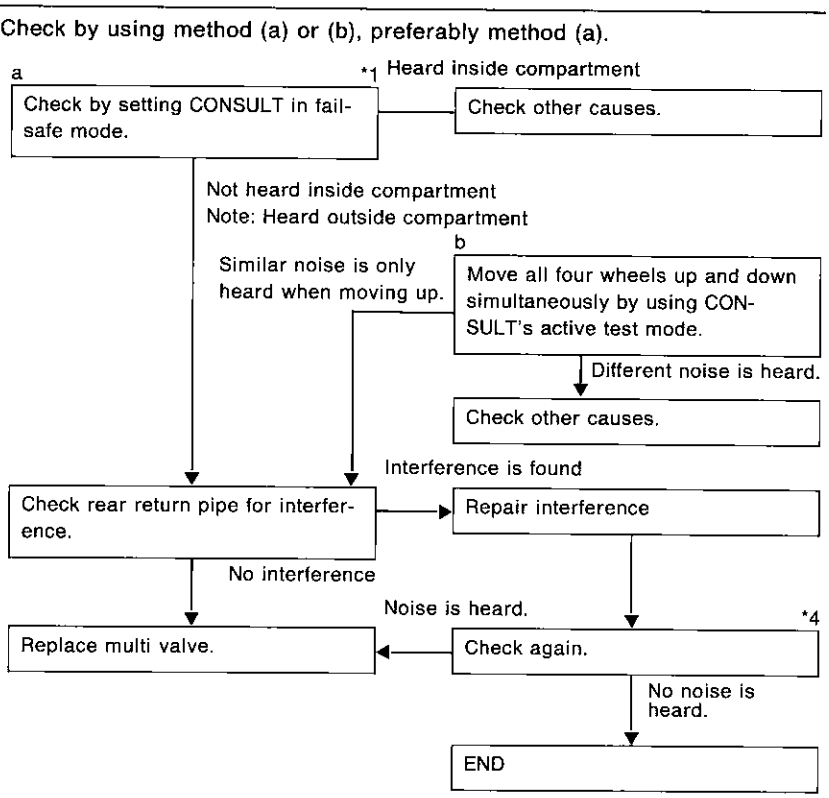
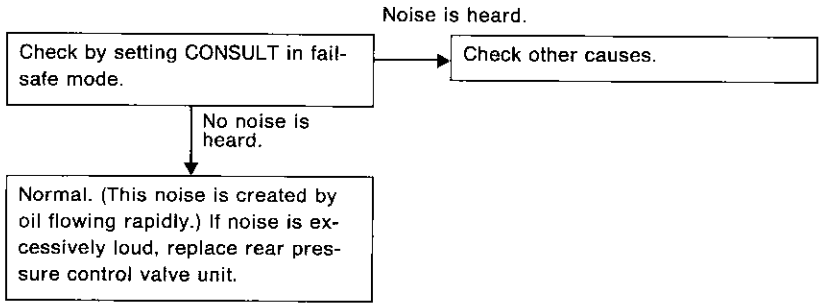
Notes: *1: Note that the maximum vehicle speed is less than 30 km/h (19 MPH) when fail-safe valve is closed by CONSULT.
*2: This noise resembles A/T pump noise, but pitch is lower than that of A/T pump noise.
*3: Note that rattling noise can also be heard from engine. Rattling noise originating from pump will be heard distinctly at the inner side of front left tire house.
*4: The term "re-check" means inspection under normal condition (not in the CONSULT fail-safe mode, etc.).

Diagnostic Procedure 12 (Cont'd)

No.	Noise and features	Occurrence	Phenomenon accompanying noise	Check method and remedy
4	Creaking noise Like the noise heard when underfloor plumbing is vibrating	Heard when suspension oscillates slowly and broadly up and down, particularly during its compression stroke. Front side or rear side is the source of noise.	Often accompanied by noise of No. 5	Check by using methods (a) or (b), preferably method (a). a Drive vehicle with CONSULT set in fail-safe mode. *1 Noise is heard. → Check other causes. No noise is heard. Bleed air from suspect pressure control unit. Noise is heard. b Move all four wheels up and down simultaneously using CONSULT's active test mode. No noise is heard. → Check other causes. Check again during driving. No noise is heard. → END Noise is heard. Replace pressure control unit.
5	Squeaking noise Like short, abrupt repetition of a whistle	Heard when suspension is abruptly caused to oscillate up and down during driving. Front side or rear side is the source of noise.	Accompanied by noise No. 4	*1 Noise is heard. Drive vehicle with CONSULT set in fail-safe mode. → Check other causes. No noise is heard. Replace suspect pressure control unit.

Notes: *1: Note that the maximum vehicle speed is less than 30 km/h (19MPH) when fail-safe valve is closed by CONSULT.
*2: This noise resembles A/T pump noise, but pitch is lower than that of A/T pump noise.
*3: Note that rattling noise can also be heard from engine. Rattling noise originating from pump will be heard distinctly at the inner side of front left tire house.
*4: The term "re-check" means inspection under normal condition (not in the CONSULT fail-safe mode, etc.).

Diagnostic Procedure 12 (Cont'd)

No.	Noise and features	Occurrence	Phenomenon accompanying noise	Check method and remedy
6	Hissing noise (Heard from multi valve and surrounding portion) Like a breath escaping from between the teeth	Continuously heard while parked with engine idling, or when driving on a smooth road at low speeds.	—	
7	Intermittent hissing noise Like short, intermittent version of (6)	Heard while parked with engine idling and vehicle is oscillated up and down (by passenger getting on or out of rear seat, or other reason). Heard particularly on rear right side outside vehicle.	—	

Notes: *1: Note that the maximum vehicle speed is less than 30 km/h (19MPH) when fail-safe valve is closed by CONSULT.
*2: This noise resembles A/T pump noise, but pitch is lower than that of A/T pump noise.
*3: Note that rattling noise can also be heard from engine. Rattling noise originating from pump will be heard distinctly at the inner side of front left tire house.
*4: The term "re-check" means inspection under normal condition (not in the CONSULT fail-safe mode, etc.).

Diagnostic Procedure 12 (Cont'd)

No.	Noise and features	Occurrence	Phenomenon accompanying noise	Check method and remedy
8	Whining noise A noise like a rotating motor sound	Intermittently heard at intervals of one to two minutes while parked with engine idling. This noise is heard only when oil temperature is high. It is heard from front left side on outside of vehicle.	Air is sucked from opening on left side of front bumper.	Turn oil cooler fan ON and OFF using CONSULT active test mode. → No noise is heard when turning ON. → Check other causes. ↓ Noise is heard when turning ON. Normal (Oil cooler fan operating noise)
9	Clacking noise A noise like the one emitted when a relay is broken	Heard only once from rear side of rear seat about 1 to 3 minutes after stopping engine.	—	Is noise accompanied by large change in vehicle height when oil temperature is normal? → No → Normal (Relay noise) ↓ Yes Replace multi valve.
10	Crashing noise A big bang as if the body bottom is hitting the ground	Heard when front wheel drives down a curb of 100 mm (3.94 in) or higher at speeds of 15 km/h (9 MPH) or higher.	—	Check by setting CONSULT in active test mode, with 9,807 kPa (100 kg/cm^2, 1,422 psi) applied to all four wheels. → Noise is heard. → Check other causes. ↓ No noise is heard. • Normal, if this noise is heard when driving down from a height of 100 mm (3.94 in) or higher at speeds of 15 km/h (9 MPH) or higher. • If this noise is heard when the curb height is lower than 100 mm (3.94 in) and speed is lower than 15 km/h (9 MPH), then replace front actuator.

Notes: *1: Note that the maximum vehicle speed is less than 30 km/h (19MPH) when fail-safe valve is closed by CONSULT.
*2: This noise resembles A/T pump noise, but pitch is lower than that of A/T pump noise.
*3: Note that rattling noise can also be heard from engine. Rattling noise originating from pump will be heard distinctly at the inner side of front left tire house.
*4: The term "re-check" means inspection under normal condition (not in the CONSULT fail-safe mode, etc.).

Diagnostic Procedure 12 (Cont'd)

No.	Noise and features	Occurrence	Phenomenon accompanying noise	Check method and remedy
11	Groaning noise Whirring sound like a fuel pump operating	Heard when vehicle body is swung back while braking at low speeds (especially when oil temperature is high)	—	Move vehicle up and down using CONSULT active test mode. Does noise occur when vehicle height is changed? No → Check other causes. Yes → Change vehicle height one wheel at a time, and bleed air from pressure control unit of suspect wheel. → Re-check. (*4) No noise is heard. → END Noise is heard. → If noise is still heard, bleed air from pressure control unit of other wheels. → Re-check. (*4) No noise is heard. → END Noise is heard. → Replace pressure control unit.
12	Tapping noise, or vibrating noise As if the suspension is being hit and vibrated	Heard from front or rear part of vehicle directly after driving over a small step or while driving on a bad road.	—	Check with CONSULT set in fail-safe mode. (*1) Noise is heard. → Check other causes. No noise is heard. → Check pressure control valve return pipe for interference. Interference → Repair interference. No interference → Replace pressure control unit of suspect side. Noise is heard. → Re-check. (*4) No noise is heard → END

Notes: *1: Note that the maximum vehicle speed is less than 30 km/h (19MPH) when fail-safe valve is closed by CONSULT.
*2: This noise resembles A/T pump noise, but pitch is lower than that of A/T pump noise.
*3: Note that rattling noise can also be heard from engine. Rattling noise originating from pump will be heard distinctly at the inner side of front left tire house.
*4: The term "re-check" means inspection under normal condition (not in the CONSULT fail-safe mode, etc.).

Diagnostic Procedure 12 (Cont'd)

No.	Noise and features	Occurrence	Phenomenon accompanying noise	Check method and remedy
13	Humming*2 noise Pumping noise like when power steering is operated with the vehicle stopped	Heard in compartment when engine speed is within range from idling to 1,300 rpm.	Sometimes accompanied by floor vibration	Check pipes for interference. → Interference → Repair piping. No interference → Replace pump assembly. Re-check. *4 ← Noise is heard. ← Replace pump assembly. No noise is heard → END Re-check. *4 Noise is heard. → Replace pump accumulator.
14	Rattling*3 noise	Heard in compartment when engine is idling and still cold.	—	Does noise level lower when oil temperature rises? → No → Check other causes. Yes → Replace pump assembly.
15	Buzzing noise	Heard on outside of vehicle (left front part) when engine is still cold	—	Does noise level lower when oil temperature rises? → No → Check other causes. Yes → Replace pump assembly.
16	Creaking noise	Heard when starting engine, or when driving on a bad road at low engine rpms, or when suspension oscillates largely while driving (especially when oil temperature is low).	—	Check by setting CONSULT in fail-safe mode. *1 Noise is heard. → Check other causes. No noise is heard. → Bleed air from multi valve. Re-check. *4 Noise is heard. → Replace multi valve. No noise is heard. → END

Notes: *1: Note that the maximum vehicle speed is less than 30 km/h (19MPH) when fail-safe valve is closed by CONSULT.
*2: This noise resembles A/T pump noise, but pitch is lower than that of A/T pump noise.
*3: Note that rattling noise can also be heard from engine. Rattling noise originating from pump will be heard distinctly at the inner side of front left tire house.
*4: The term "re-check" means inspection under normal condition (not in the CONSULT fail-safe mode, etc.).

Diagnostic Procedure 12 (Cont'd)

No.	Noise and features	Occurrence	Phenomenon accompanying noise	Check method and remedy
17	Heavy creaking noise	Heard when suspension oscillates largely.	—	Apply grease to rear active suspension upper side spring seat. → Re-check. → *4 Noise is heard. → Check other causes. / No noise is heard. → END
18	Rumbling noise	Heard when engine is idling or running at 1,500 rpm or higher.	—	Does noise level change if CONSULT pump mode is changed from I to II? → No → Check other causes. / Yes → Replace pump assembly.
19	Whizzing or rushing noise	Heard on left outside of vehicle for a few seconds after stopping engine.	—	Check operation during suspect period indicated at left. → No noise is heard. → Check other causes. / Noise is heard during indicated period. → • Normal (noise caused by rapid oil flow) • If noisy, even in compartment, replace multi valve.

Notes: *1: Note that the maximum vehicle speed is less than 30 km/h (19MPH) when fail-safe valve is closed by CONSULT.
*2: This noise resembles A/T pump noise, but pitch is lower than that of A/T pump noise.
*3: Note that rattling noise can also be heard from engine. Rattling noise originating from pump will be heard distinctly at the inner side of front left tire house.
*4: The term "re-check" means inspection under normal condition (not in the CONSULT fail-safe mode, etc.).

General Specifications

COIL SPRING

Applied model	Conventional suspension	Full-active suspension
Wire diameter mm (in)	12 (0.47)	
Coil center diameter mm (in)	110 (4.33)	120 (4.72)
Free length mm (in)	429 (16.89)	369 (14.53)
Identification color	Yellow x 2	White

SHOCK ABSORBER

Applied model	Conventional suspension	Full-active suspension
Piston rod diameter mm (in)	12.5 (0.492)	25 (0.98)

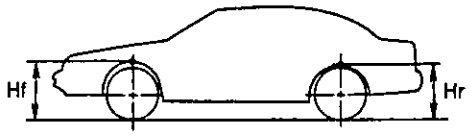
FRONT STABILIZER BAR

Applied model	With HICAS and full-active suspension	Without HICAS
Stabilizer diameter mm (in)	28 (1.10)	29 (1.14)

TENSION ROD

Applied model	All
Rod diameter mm (in)	20.0 (0.787)

WHEELARCH HEIGHT (Unladen*1)



SFA818A

Applied model	Conventional suspension	Full-active suspension	
		Engine running *2	Reference (Engine stopped*3)
Front (Hf) mm (in)	706 (27.80)	687 (27.05)	694 (27.32)
Rear (Hr) mm (in)	696 (27.40)	667 (26.26)	679 (26.73)

*1: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.
*2: Unladen, engine running and height control switch in normal (N) position.
*3: • The data obtained when engine is stopped are reference values. For standard values, use the data obtained by running engine.
• Conditions when engine is stopped:
Unladen, full-active fluid temperature 60 ± 4°C (140 ± 7.2°F).
Ignition switch "OFF" after driver gets out of the vehicle.
• For wheelarch height measurement, wait at least 3 minutes after engine has stopped:

Inspection and Adjustment

WHEEL ALIGNMENT (Unladen*1)

Applied model	Conventional suspension	Full-active suspension	
		Engine running*3	Reference (Engine stopped*4)
Camber degree	−1°35′ to −0°05′	−1°40′ to −0°10′	−1°35′ to −0°05′
Caster degree	5°45′ - 7°15′	6°10′ - 7°40′	5°55′ - 7°25′
Kingpin inclination degree	12°00′ - 13°30′	12°10′ - 13°40′	
Toe-in			
A − B mm (in)	0 - 2 (0 - 0.08)	−1 to 1 (−0.04 to 0.04)	
Total angle 2θ degree	0′ - 10′	−5′ to 5′	
Front wheel turning angle			
Full turn*2 degree			
Inside	35°30′ - 39°30′	35° - 39°	
Outside	32°	32°	

*1: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.
*2: On power steering models, wheel turning force (at circumference of steering wheel) of 98 to 147 N (10 to 15 kg, 22 to 33 lb) with engine idle.
*3: Unladen, engine running and height control switch in normal (N) position.
*4: • The data obtained when engine is stopped are reference values. For standard values, use the data obtained by running engine.
• Conditions when engine is stopped:
Unladen, full-active fluid temperature 60 ± 4°C (140 ± 7.2°F).
Ignition switch "OFF" after driver gets out of the vehicle.
• For alignment measurement, wait at least 3 minutes after engine has stopped:

WHEEL BEARING

Wheel bearing axial end play limit mm (in)	0.05 (0.0020)
Wheel bearing lock nut tightening torque N·m (kg-m, ft-lb)	206 - 284 (21 - 29, 152 - 210)

LOWER BALL JOINT

Swing force (Measuring point: cotter pin hole of ball stud) N (kg, lb)	7.8 - 53.0 (0.8 - 5.4, 1.8 - 11.9)
Turning torque N·m (kg-cm, in-lb)	0.49 - 3.43 (5.0 - 35, 4.3 - 30.4)
Vertical end play mm (in)	0 (0)

WHEEL RUNOUT (Radial and lateral)

Unit: mm (in)

Wheel type	Aluminum wheel
Radial runout limit	0.3 (0.012)
Lateral runout limit	0.3 (0.012)

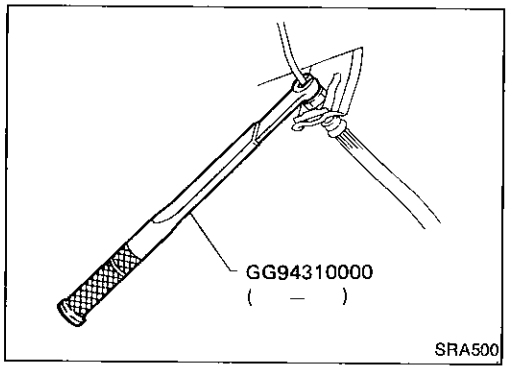
REAR AXLE & REAR SUSPENSION

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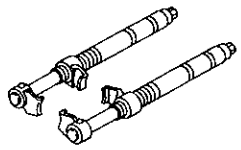
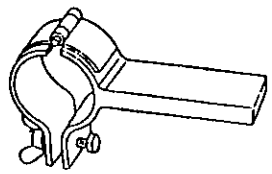
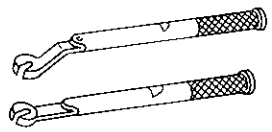
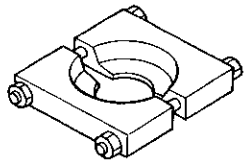
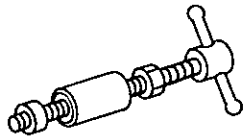
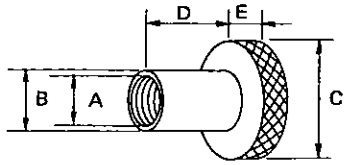
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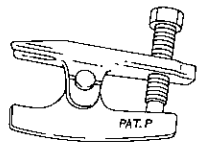
Precautions

- **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.**

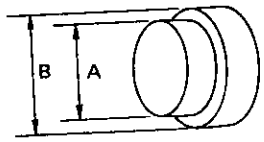
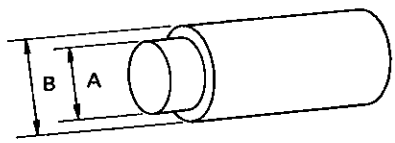
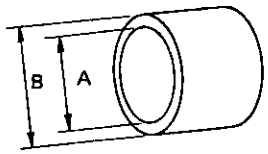
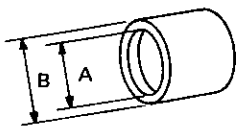
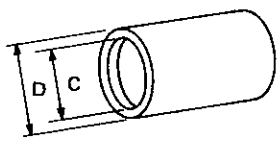
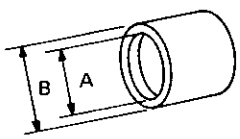
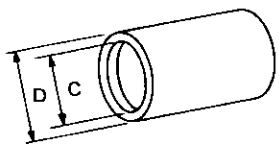
Special Service Tools

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
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)

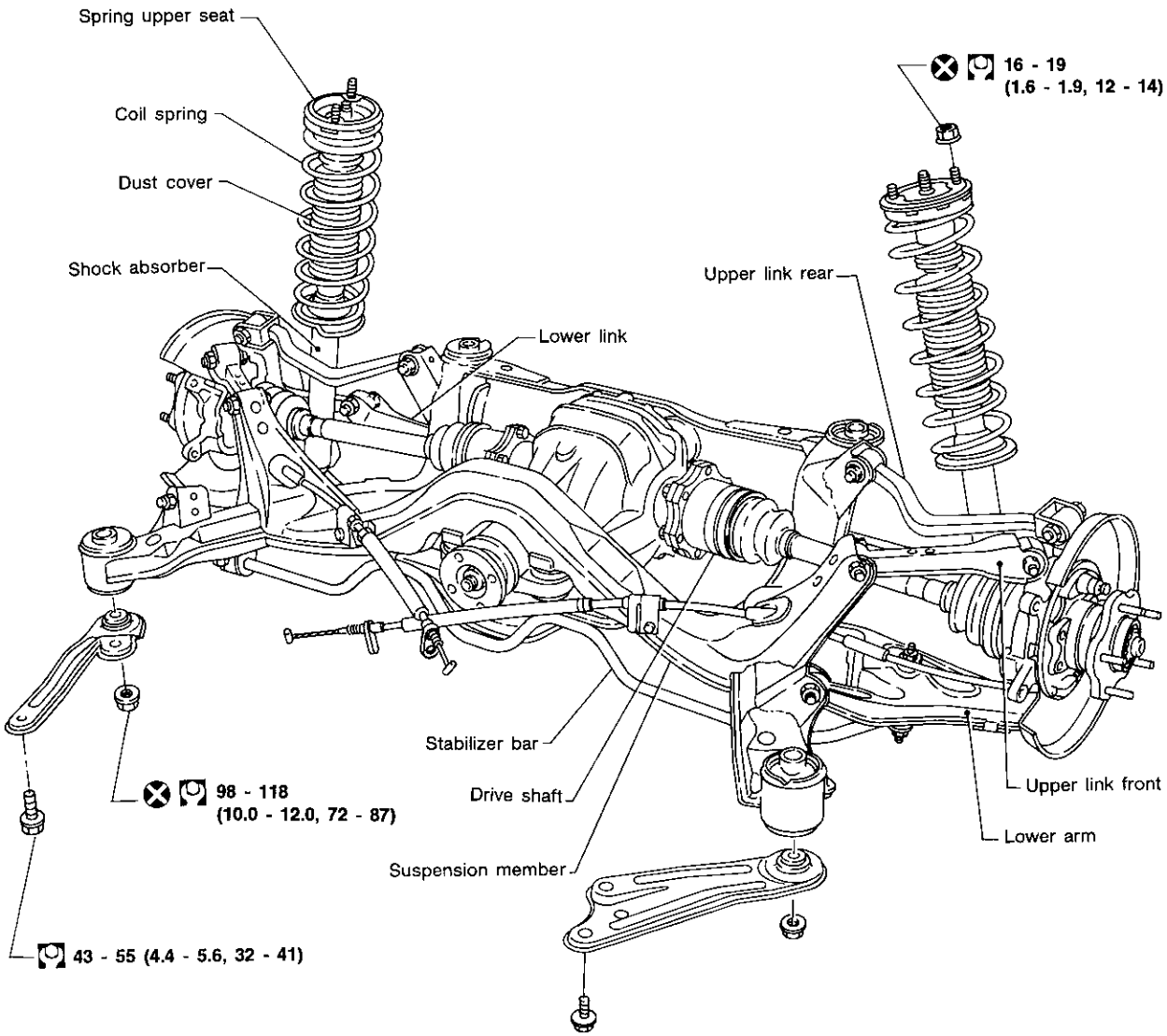
Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
HT72520000 (J25730-A) Ball joint remover		Removing tie-rod outer end and lower ball joint

Commercial Service Tools

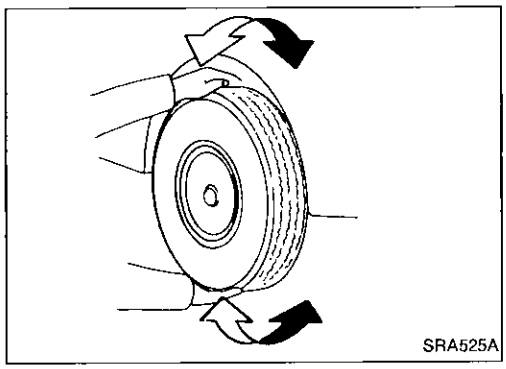
Tool name	Description	
Rear wheel hub drift		Installing wheel bearing **A: 41 mm (1.61 in) dia.** **B: 49 mm (1.93 in) dia.**
Wheel bearing drift		Removing rear wheel hub **A: 26 mm (1.02 in) dia.** **B: 40 mm (1.57 in) dia.**
Rear drive shaft plug seal drift		Installing rear drive shaft plug seal **A: 67 mm (2.64 in) dia.** **B: 85 mm (3.35 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".
For models equipped with ACTIVE SUSPENSION system, refer to "FULL-ACTIVE SUSPENSION" in FA section.



: N•m (kg-m, ft-lb)

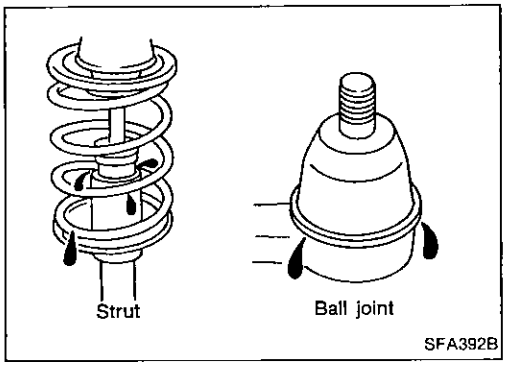
SRA381A


SRA525A

Rear Axle and Rear Suspension Parts

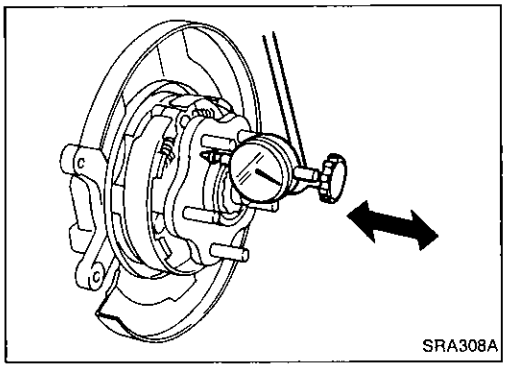
Check axle and suspension parts for looseness, wear or damage.

- Shake each rear wheel to check for excessive play.
- Retighten all nuts and bolts to the specified torque.
  Tightening torque:
  Refer to drawing in REAR SUSPENSION.
- Make sure that cotter pin is inserted.



SFA392B

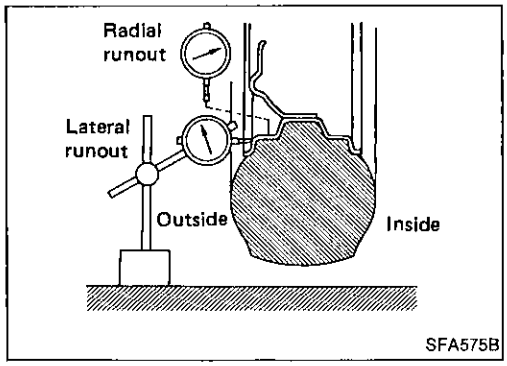
- Check shock absorber for oil leakage or other damage.
- Check wheelarch height. Refer to section FA.
- Check suspension ball joint for grease leakage and ball joint dust cover for cracks or other damage.


SRA308A

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.



SFA575B

Rear Wheel Alignment

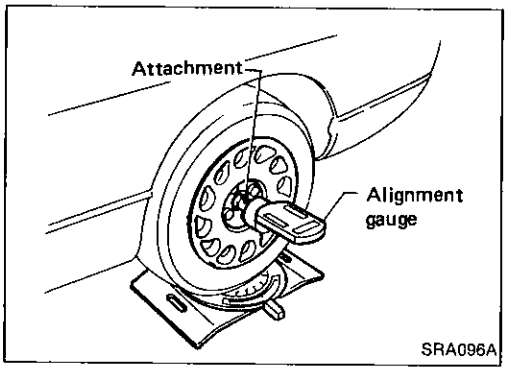
Before checking rear wheel alignment, be sure to make a preliminary inspection.

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.)

Rear Wheel Alignment (Cont'd)

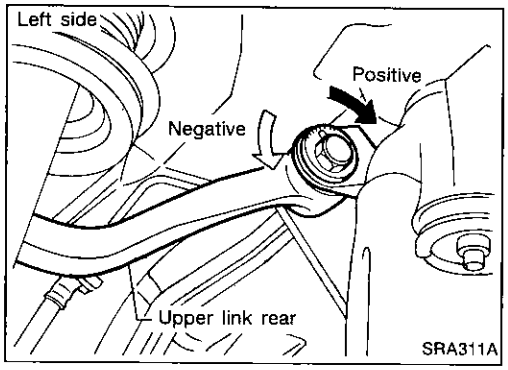


CAMBER

- **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.

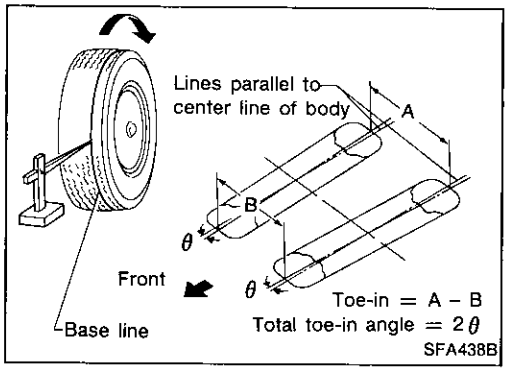
(1) Turn the adjusting bolt to adjust.

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)



TOE-IN

1. Draw a base line across the tread.

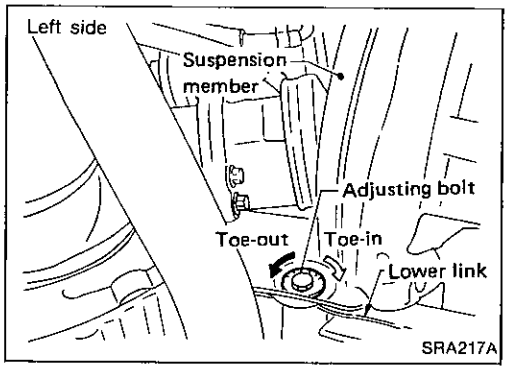
After lowering rear of vehicle, move it up and down to eliminate friction.

2. Measure toe-in.

Measure distance "A" and "B" at the same height as hub center.

Toe-in:

Refer to S.D.S.



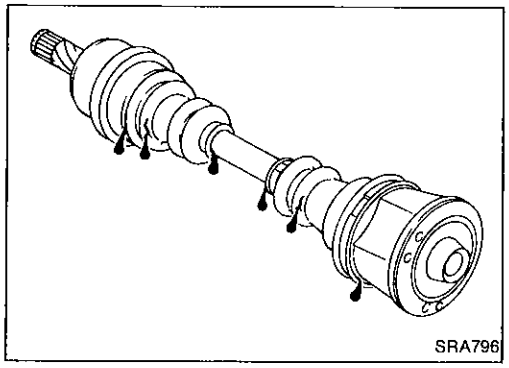
3. Adjust toe-in by turning adjusting bolts. For models equipped with SUPER HICAS system, refer to SUPER HICAS.

Toe changes about 1.5 mm (0.059 in) [One side] with each graduation of the adjusting bolt.

4. Tighten to the specified torque.

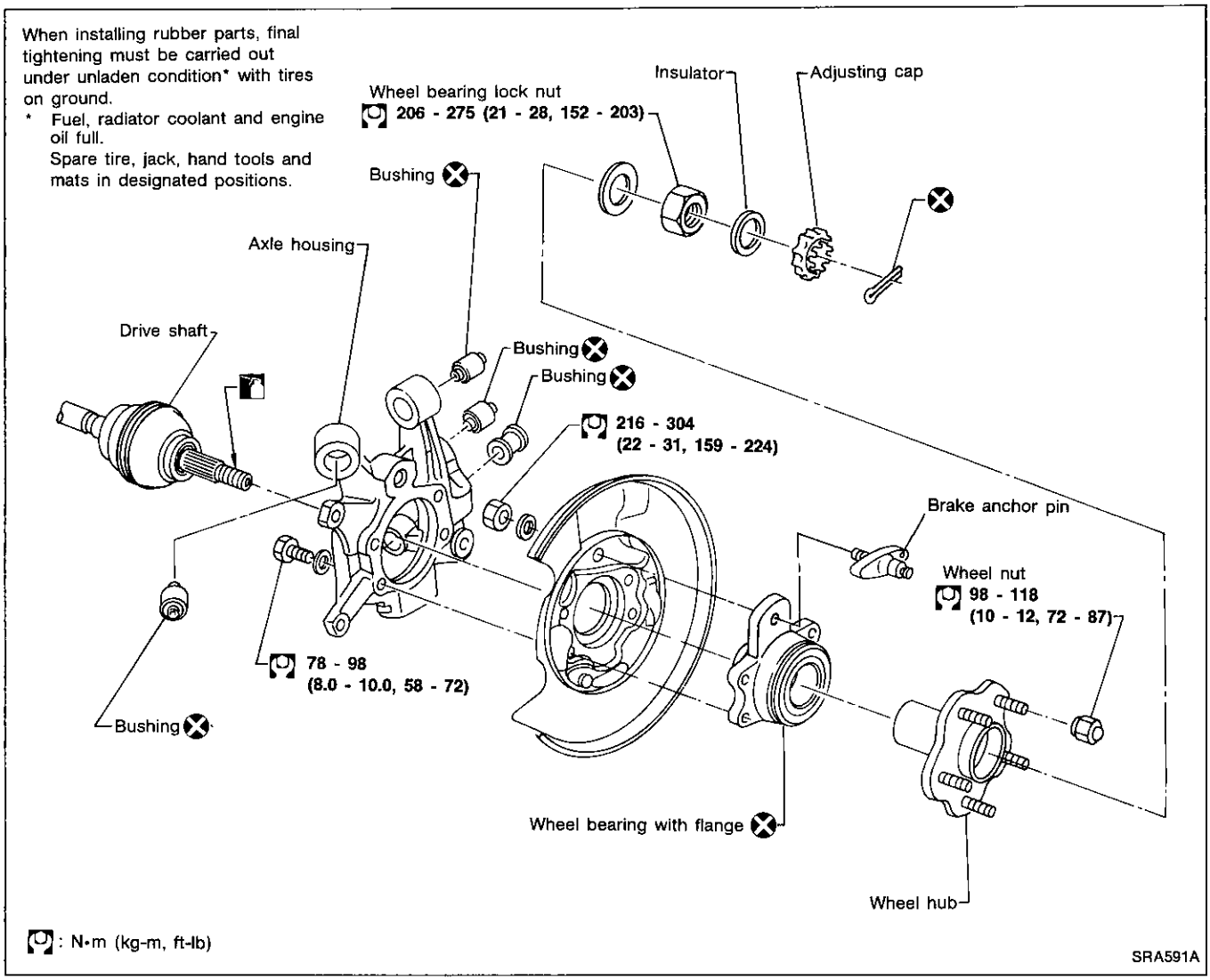
: 69 - 88 N·m

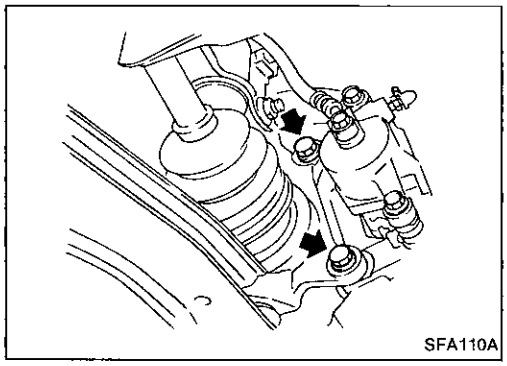
(7.0 - 9.0 kg-m, 51 - 65 ft-lb)

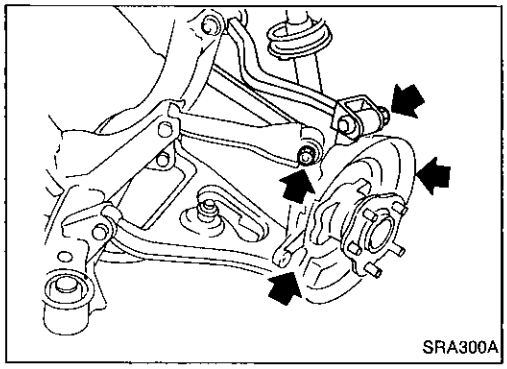


Drive Shaft

Check boot and drive shaft for cracks, wear, damage or grease leakage.







Removal

- Remove wheel bearing lock nut.
- Separate drive shaft from axle housing by lightly tapping it. If it is hard to remove use puller.

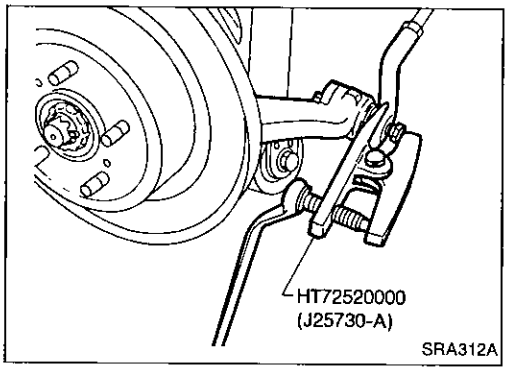
When removing drive shaft, cover boots with shop towel to prevent them from being damaged.

- 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.

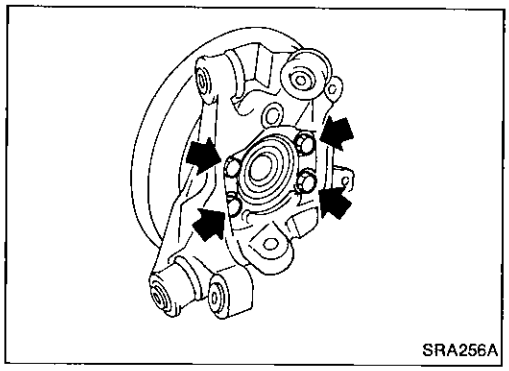
- Remove axle housing. For models equipped with SUPER HICAS system, refer to SUPER HICAS.

Removal (Cont'd)

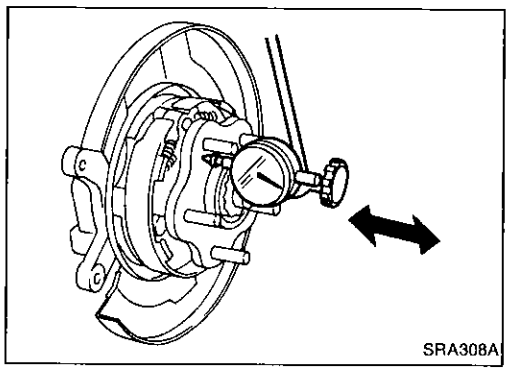


- Disconnect ball joint with Tool.

Do not remove nut completely while using Tool.



- Remove wheel bearing with flange, and wheel hub from axle housing.



Wheel Hub and Axle Housing

INSTALLATION

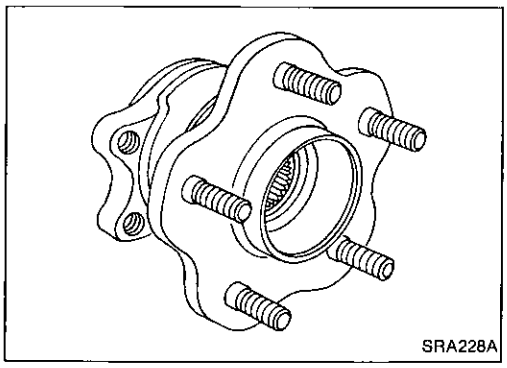
- Install axle housing with wheel hub.
- Tighten wheel bearing lock nut.
  : 206 - 275 N·m
  (21 - 28 kg-m, 152 - 203 ft-lb)
- Check wheel bearing axial end play.
  Axial end play: 0.05 mm (0.0020 in) or less
- Make sure that wheel bearings operate smoothly.
- Check toe-in — Refer to ON-VEHICLE SERVICE.

DISASSEMBLY

CAUTION:

Wheel bearing with flange usually does not require maintenance. If any of the following symptoms are noted, replace wheel bearing assembly (including flange, and inner and outer seals).

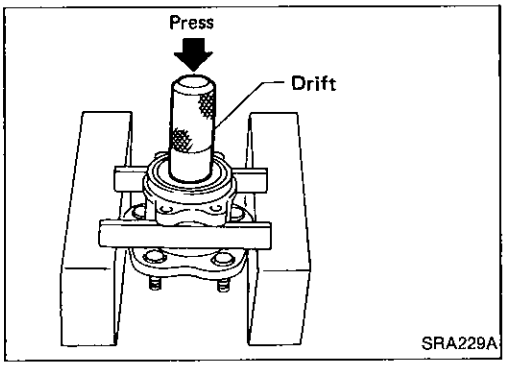
- **Growling noise is emitted from wheel bearing during operation.**
- **Wheel bearing drags or turns roughly when hub is turned with your hand after bearing lock nut is tightened to specified torque.**
- **After wheel bearing is removed from hub.**



Wheel hub

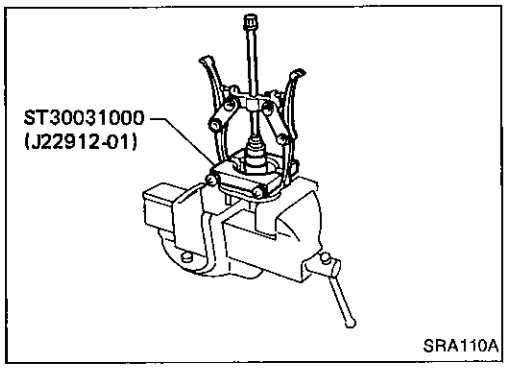
Remove wheel bearing (with flange) and wheel hub as one unit from axle housing before disassembling.

Wheel Hub and Axle Housing (Cont'd)



Wheel bearing

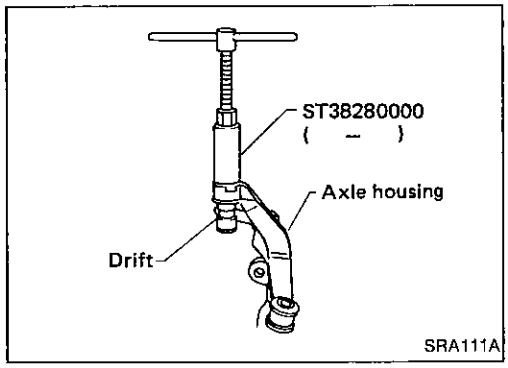
- Using a press and drift as shown in figure at left, press wheel bearing out.
- Discard old wheel bearing assembly. Replace with a new one.



- Remove inner race from hub using a bearing replacer/ puller.

CAUTION:

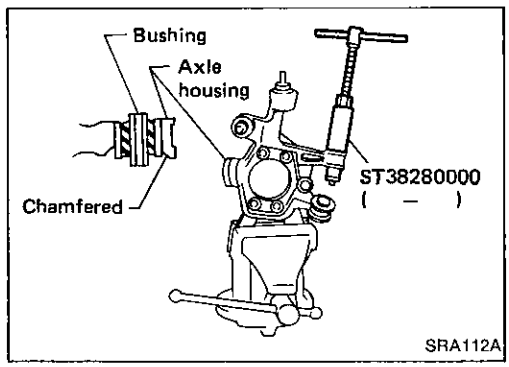
- **Do not reuse old inner race although it is of the same brand as the bearing assembly.**
- **Do not replace grease seals as single parts.**



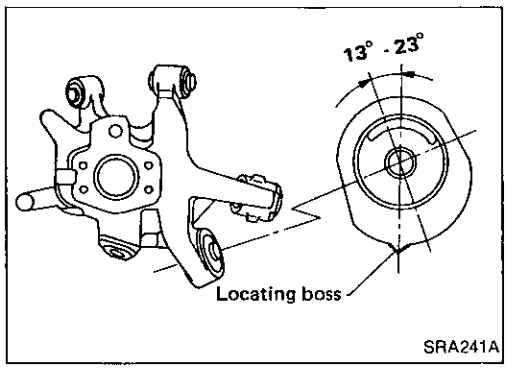
Axle housing

- 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.



- 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.

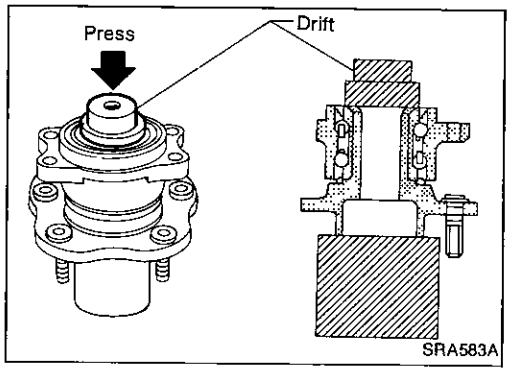
Wheel Hub and Axle Housing (Cont'd)

INSPECTION

Wheel hub and axle housing

- Check wheel hub and axle housing for cracks by using a magnetic exploration or dyeing test.
- Check wheel bearing for damage, seizure, rust or rough operation.
- Check rubber bushing for wear or other damage.

Replace if necessary.

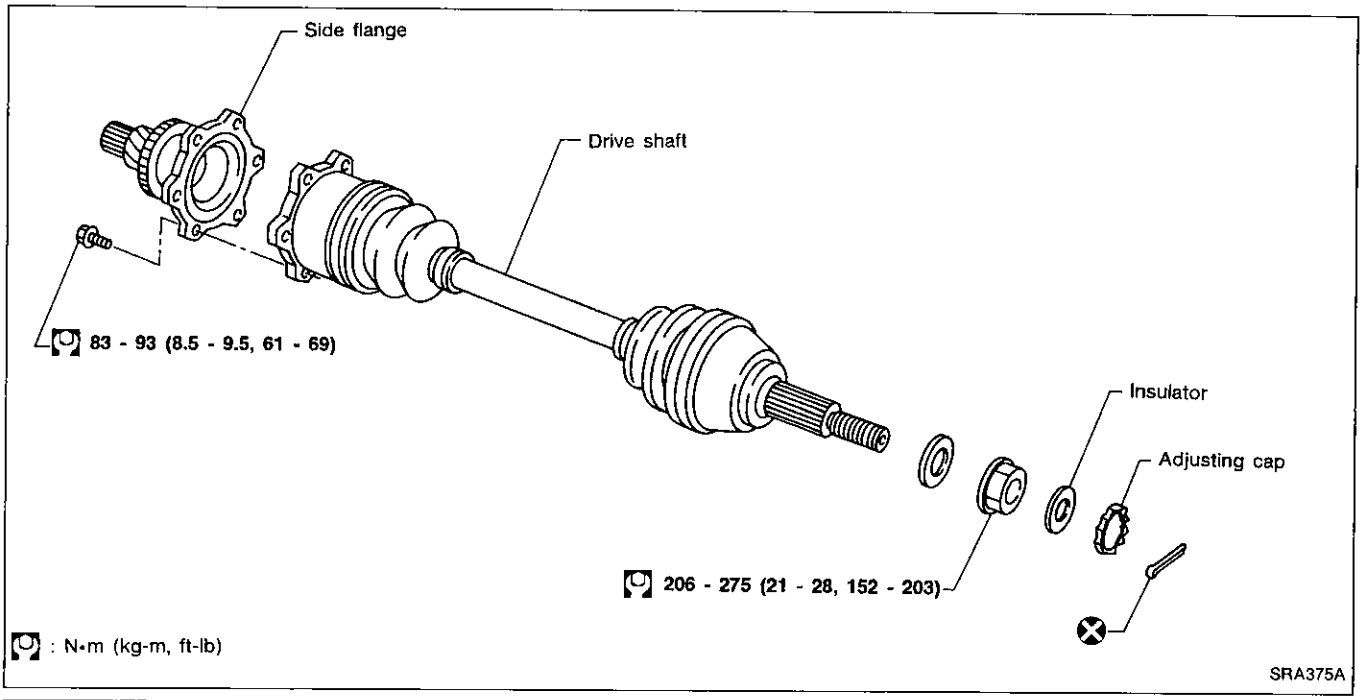


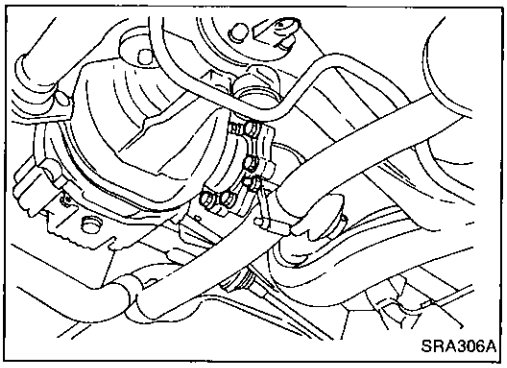
ASSEMBLY

Place hub on a block. Attach a drift to inner race of wheel bearing and press it into hub as shown in figure at left.

Be careful not to damage grease seal.

Drive Shaft





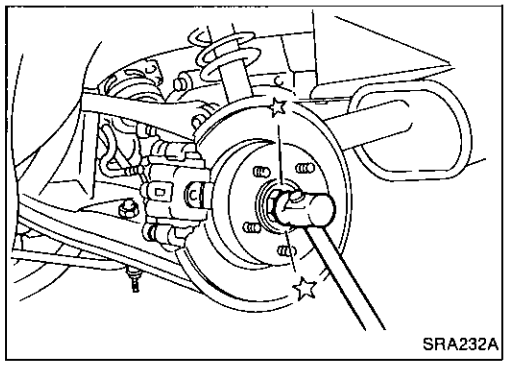
REMOVAL

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.

Drive Shaft (Cont'd)


SRA232A

Wheel side

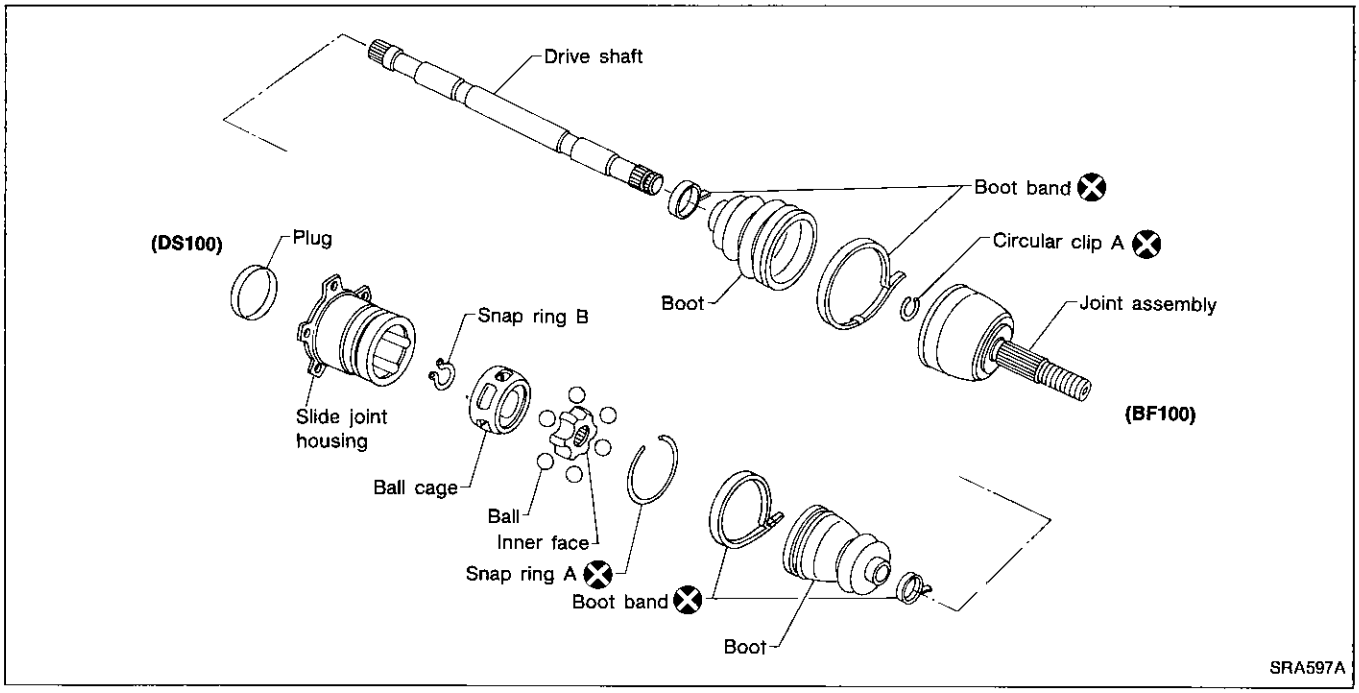
Remove drive shaft by lightly tapping it with a copper hammer. If it is hard to remove, use puller.

To avoid damaging threads of drive shaft, install a nut while removing drive shaft.

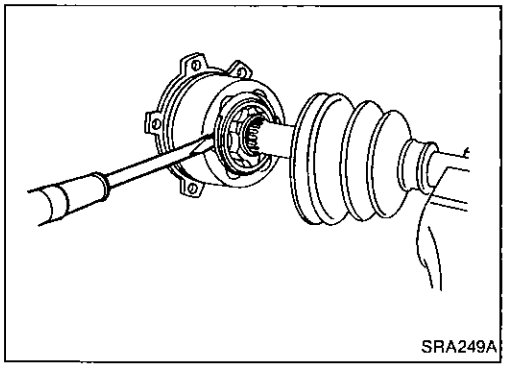
INSTALLATION

- 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



SRA597A

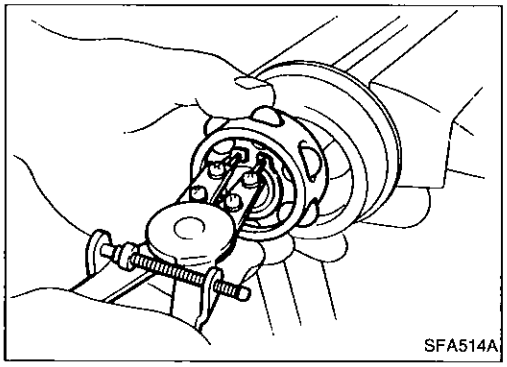

SRA249A

DISASSEMBLY

Final drive side

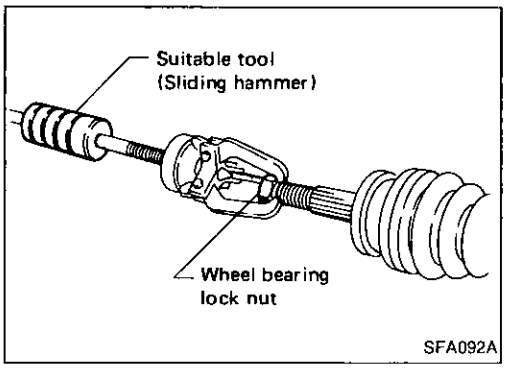
1. Remove boot bands.
2. Put matchmarks on slide joint housing and inner race, before separating joint assembly.
3. Pry off snap ring "A" with a screwdriver, and pull out slide joint housing.

Drive Shaft (Cont'd)


SFA514A

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.



SFA092A

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.

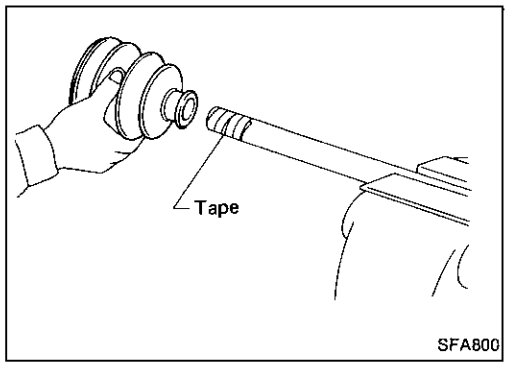
Joint assembly (Wheel side)

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.**

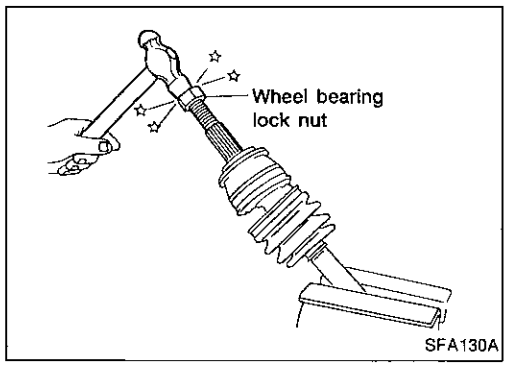
Drive Shaft (Cont'd)



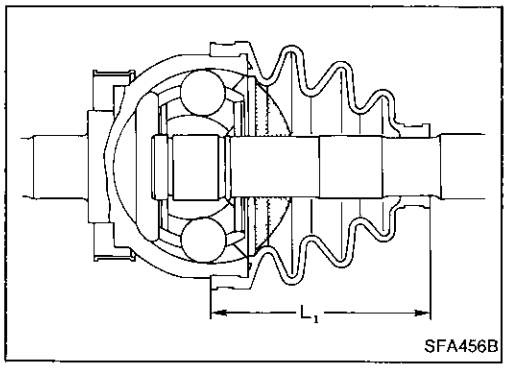
Wheel side

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.



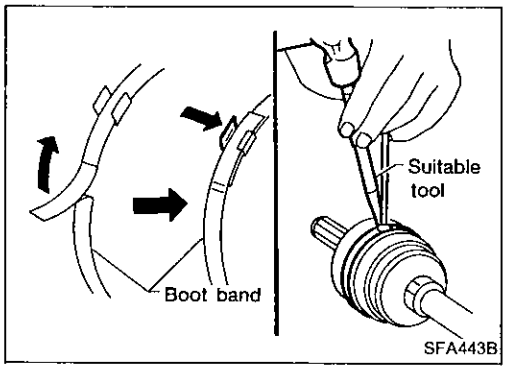
2. Set joint assembly onto drive shaft by lightly tapping it. Install joint assembly securely, ensuring marks which were made during disassembly are properly aligned.



3. Pack drive shaft with specified amount of grease.
   Specified amount of grease:
   170 - 190 g (6.00 - 6.70 oz)
4. Set boot so that it does not swell and deform when its length is "L_1".

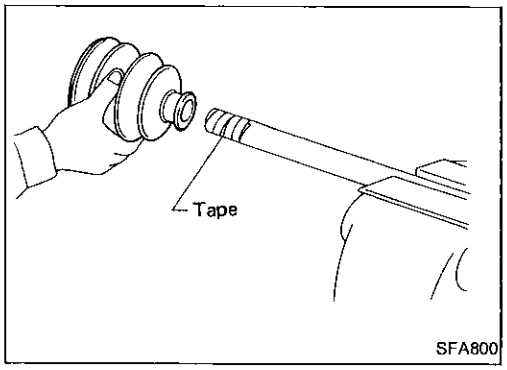
Make sure that boot is properly installed on the drive shaft groove.

Length "L_1":
101 - 103 mm (3.98 - 4.06 in)



5. Lock new larger and smaller boot bands securely with a suitable tool.

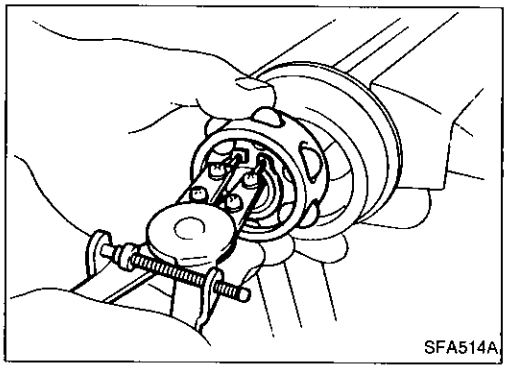
Final drive side



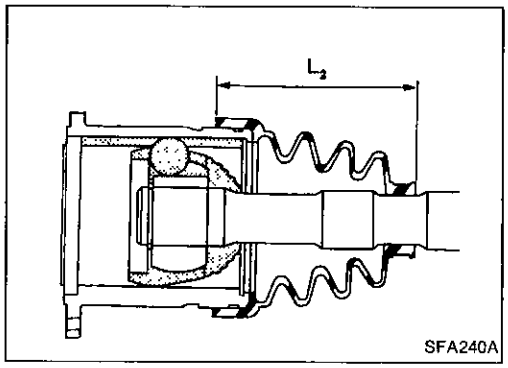
1. Install boot and new small boot band on drive shaft.

Cover drive shaft serration with tape so as not to damage boot during installation.

Drive Shaft (Cont'd)


SFA514A

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".

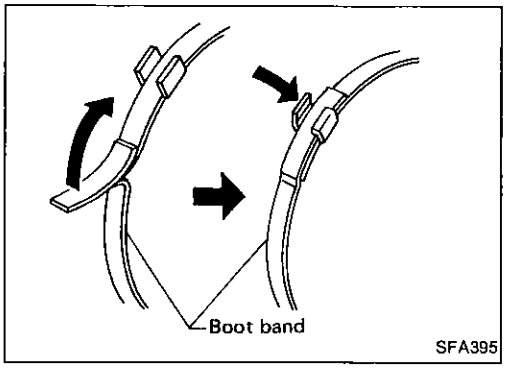


SFA240A

4. Pack drive shaft with specified amount of grease.
   Specified amount of grease:
   180 - 200 g (6.35 - 7.05 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.

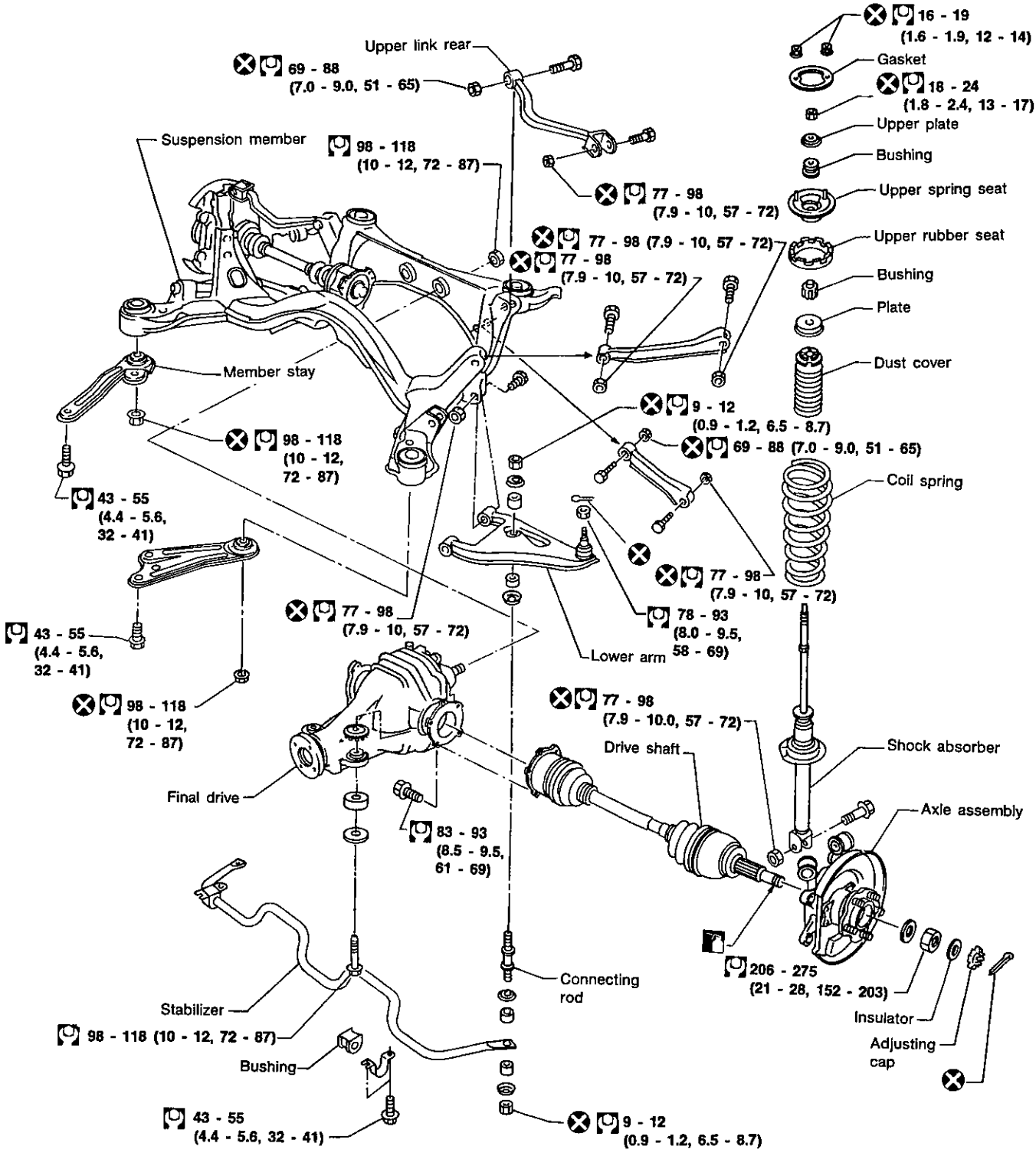
Length "L_2":
102.5 - 104.5 mm (4.04 - 4.11 in)



SFA395

7. Lock new larger and smaller boot bands securely with a suitable tool.

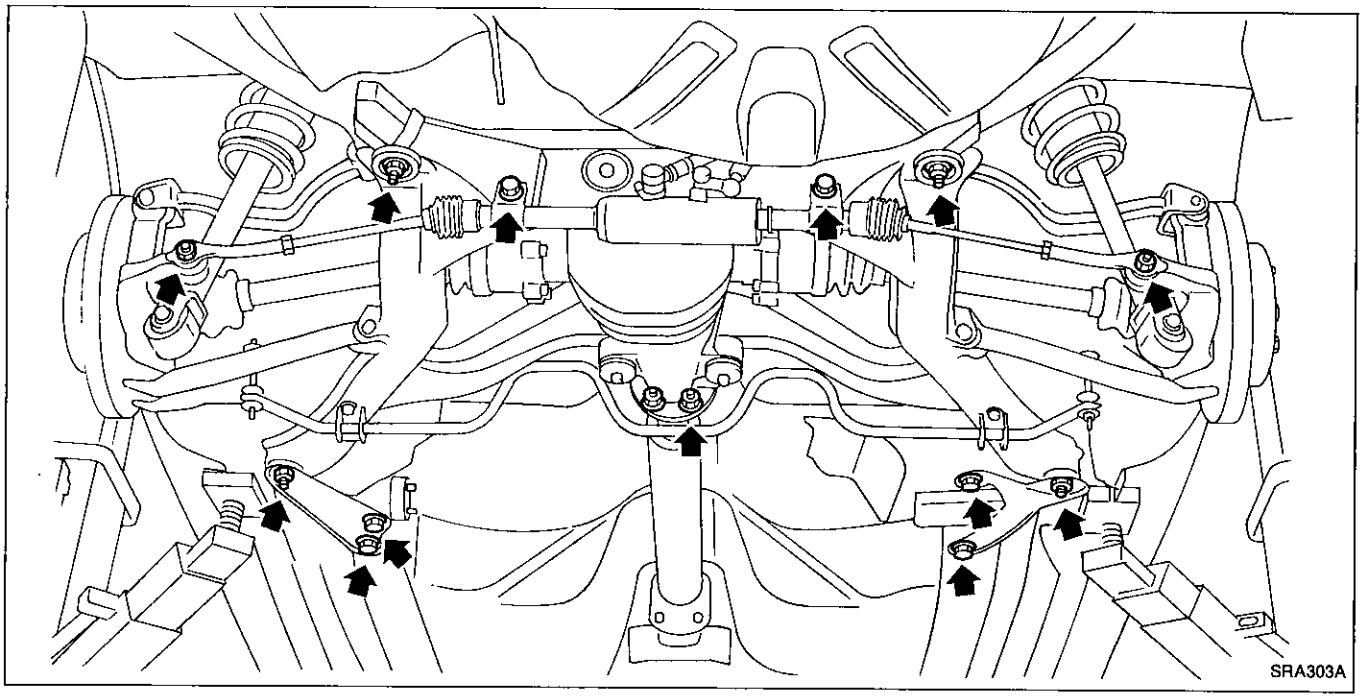
CAUTION:
Do not jack up at lower arm.
When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.
*** Fuel, radiator coolant and engine oil full.**
Spare tire, jack, hand tools and mats in designated positions.
For models equipped with SUPER HICAS system, refer to "SUPER HICAS".
For models equipped with FULL-ACTIVE SUSPENSION system, refer to "FULL-ACTIVE SUSPENSION" in FA section.

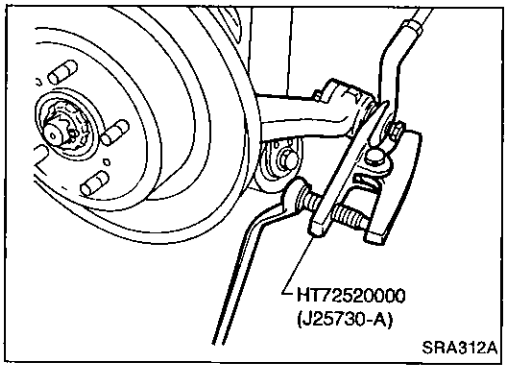


: N·m (kg-m, ft-lb)

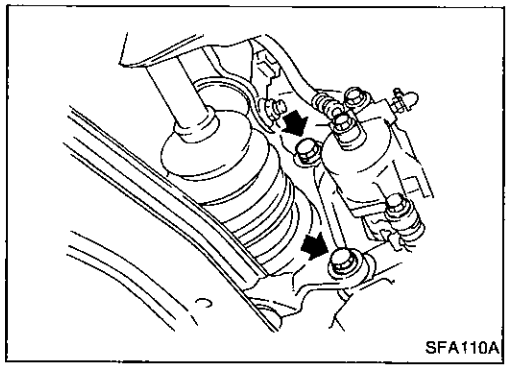
SRA382A

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.

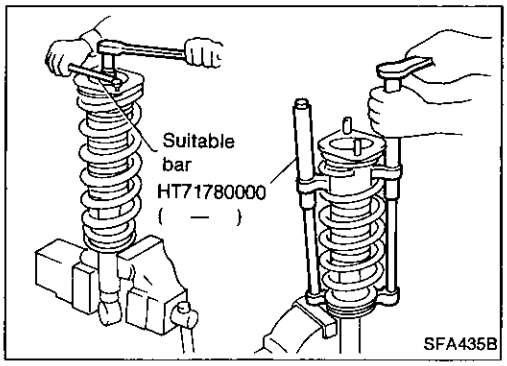
Coil Spring and Shock Absorber

REMOVAL

Remove shock absorber upper and lower fixing nuts.

Do not remove piston rod lock nut on vehicle.

Coil Spring and Shock Absorber (Cont'd)

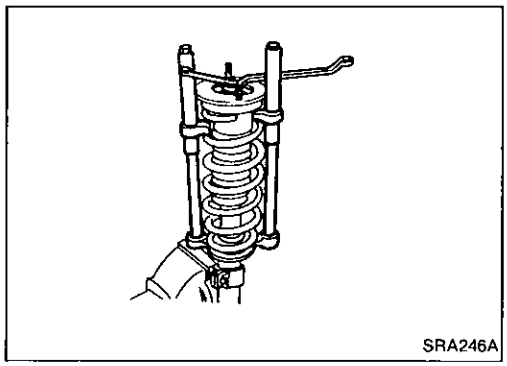


DISASSEMBLY

1. Set shock absorber on vise with attachment, then loosen piston rod lock nut.

Do not remove piston rod lock nut.

2. Compress spring with Tool so that the strut upper spring seat can be turned by hand.



3. Remove piston rod lock nut.

INSPECTION

Shock absorber assembly

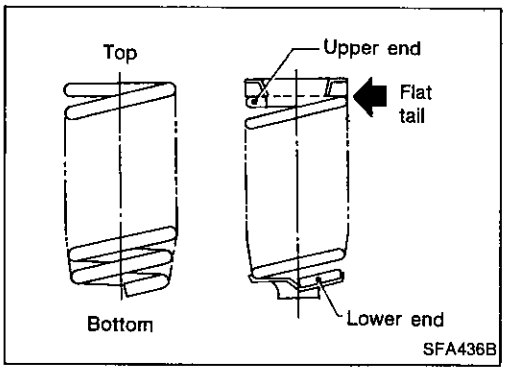
- Check for smooth operation through a full stroke, both compression and extension.
- Check for oil leakage occurring on welded or gland packing portions.
- Check piston rod for cracks, deformation or other damage. Replace if necessary.

Upper rubber seat and bushing

Check rubber parts for deterioration or cracks.
Replace if necessary.

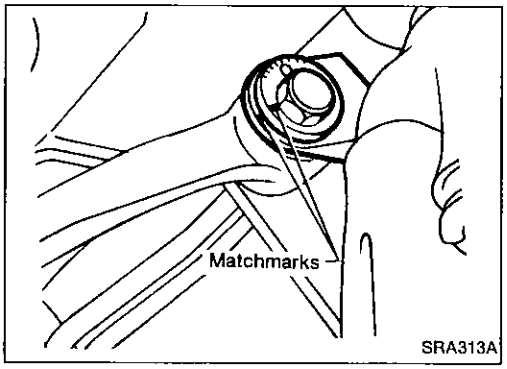
Coil spring

Check for cracks, deformation or other damage. Replace if necessary.



ASSEMBLY

- When installing coil spring, be careful not to reverse top and bottom direction. (Top end is flat.)
- When installing coil spring on strut, it must be positioned as shown in figure at left.



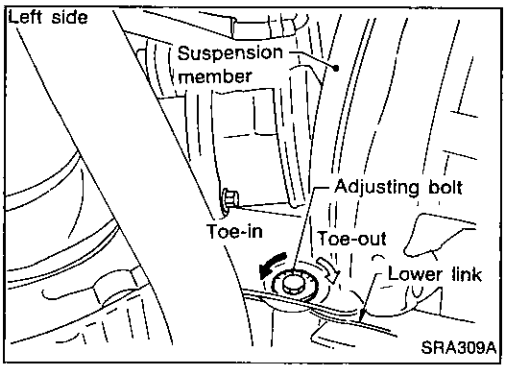
Multi-link and Lower Ball Joint

REMOVAL AND INSTALLATION

- Refer to Removal and Installation in REAR SUSPENSION.

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.



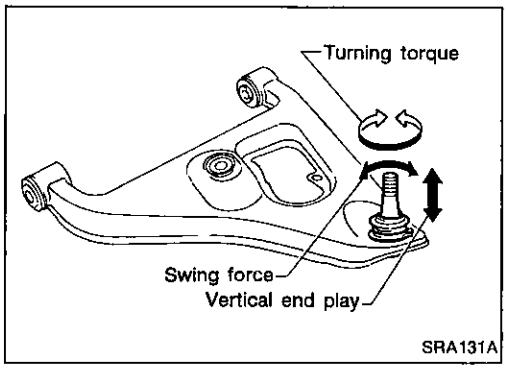
INSPECTION

Rear suspension member

Replace suspension member assembly if cracked or deformed or if any part (insulator, for example) is damaged.

Upper and lower links

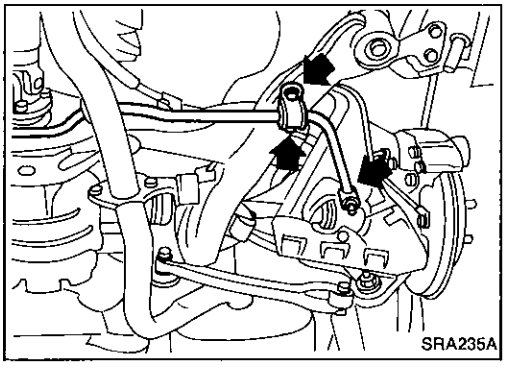
Replace upper or lower link as required if cracked or deformed or if bushing is damaged.



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.

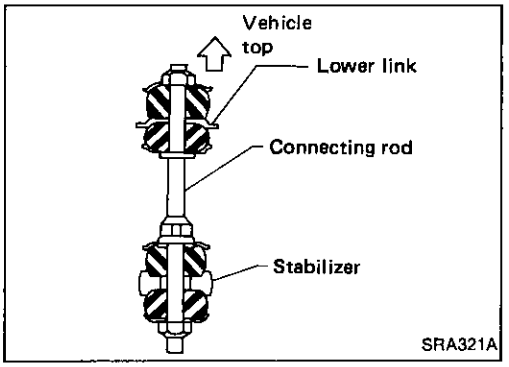
Ball joint specifications	Swing force	7.8 - 54.9 N (0.8 - 5.6 kg, 1.8 - 12.3 lb)
	Turning torque	0.5 - 3.4 N·m (5 - 35 kg-cm, 4.3 - 30.4 in-lb)
	Vertical end play	0 mm (0 in)



Stabilizer Bar

REMOVAL

Remove connecting rod and clamp.

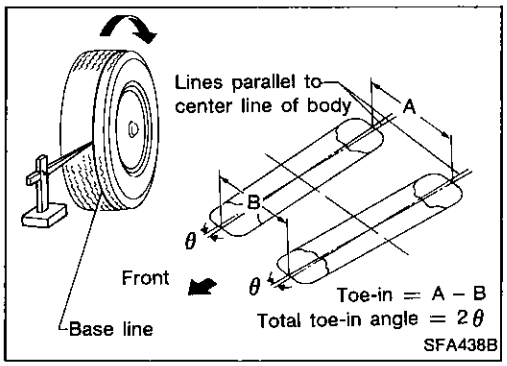


INSPECTION

- Check stabilizer bar for deformation or cracks. Replace if necessary.
- Check rubber bushings for deterioration or cracks. Replace if necessary.

INSTALLATION

When installing connecting rod, make sure direction is correct (as shown at left).



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.

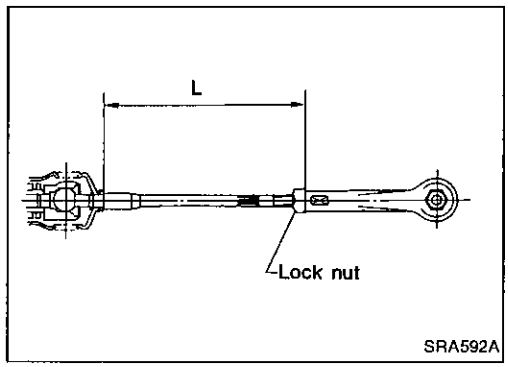
3. Adjust toe-in by varying length of power cylinder lower links.
(1) Loosen lock nuts.
(2) Adjust toe-in by turning lower links forward or backward.

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.
[O]: 37 - 46 N·m
(3.8 - 4.7 kg-m, 27 - 34 ft-lb)

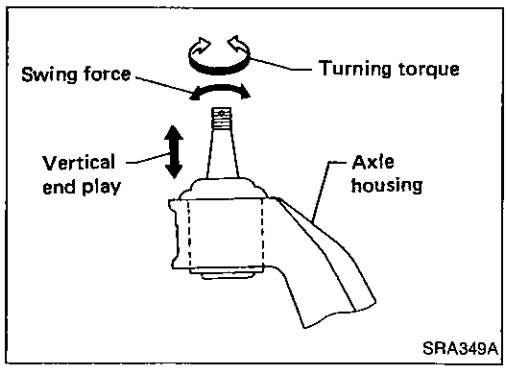
- Refer to ON-VEHICLE SERVICE for other procedures.



Rear Axle Housing Lower Ball Joint

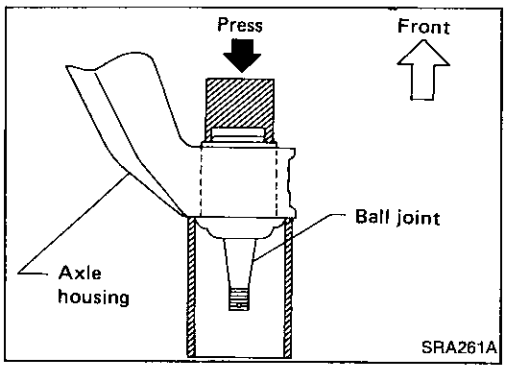
INSPECTION

- 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.



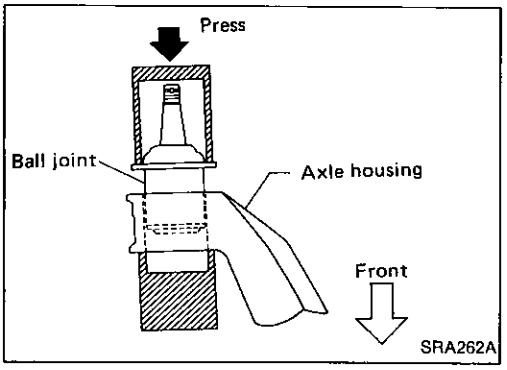
Ball joint specifications	Swing force*	6.9 - 68.6 N (0.7 - 7.0 kg, 1.5 - 15.4 lb)
	Turning torque	0.3 - 2.9 N·m (3 - 30 kg-cm, 2.6 - 26.0 in-lb)
	Vertical end play	0 mm (0 in)

*Measuring point: Cotter pin hole of ball stud.



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		Conventional suspension	Active suspension
Wire diameter	mm (in)	12 (0.47)	11 (0.43)
Average coil diameter	mm (in)	115 (4.53)	120 (4.72)
Free length	mm (in)	425 (16.73)	280 (11.02)
Identification color		Purple x 2, White x 1	Green x 1, Pink x 1

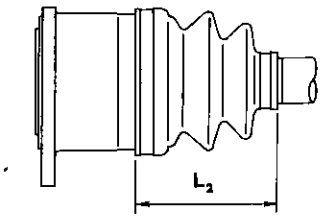
SHOCK ABSORBER

Applied model		Conventional suspension	Active suspension
Piston rod diameter	mm (in)	12.5 (0.492)	25 (0.98)

DRIVE SHAFT

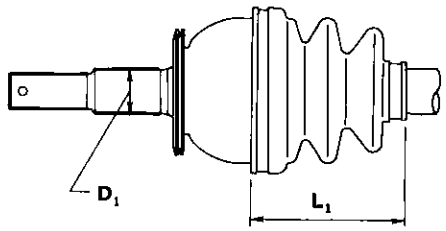
Applied model	All
Joint type	
Final drive side	DS100
Wheel side	BF100
Diameter mm (in)	
Wheel side D_1	33 (1.30)
Grease	
Quality	Nissan genuine grease or equivalent
Specified amount of grease g (oz)	
Final drive side	180 - 200 (6.35 - 7.05)
Wheel side	170 - 190 (6.00 - 6.70)
Boot length mm (in)	
Final drive side (L_2)	102.5 - 104.5 (4.04 - 4.11)
Wheel side (L_1)	101 - 103 (3.98 - 4.06)

Final drive side



SRA598A

Wheel drive side



SRA599A

REAR STABILIZER BAR

Applied model		Conventional suspension	Active suspension
Stabilizer diameter	mm (in)		
Outer		15.9 (0.626)	20 (0.79)
Inner		12.3 (0.484)	15.4 (0.606)

Inspection and Adjustment

WHEEL ALIGNMENT (Unladen*1)

Applied model	Conventional suspension	Full-active suspension	
		Engine running*2	Reference (Engine stopped*3)
Camber degree	−1°35′ to −0°35′	−2°00′ to −1°00′	−1°50′ to −0°50′
Toe-in			
A − B mm (in)	0 - 4 (0 - 0.16)		
Total angle 2θ degree	0′ - 22″		

*1 Fuel, radiator coolant and engine oil full.
Spare tire, jack, hand tools and mats in designated positions.
*2 Unladen, engine running and height control switch in normal (N) position.
*3 ● The data obtained when engine is stopped are reference values.
For standard values, use the data obtained by running engine.
● Conditions when engine is stopped:
Unladen, full-active fluid temperature 60 ± 4°C (140 ± 7.2°F).
Ignition switch "OFF" after driver gets out of the vehicle.
● For alignment measurement, wait at least 3 minutes after engine has stopped.

WHEEL BEARING

Wheel bearing axial end play limit mm (in)	0.05 (0.0020)
Wheel bearing lock nut Tightening torque N·m (kg-m, ft-lb)	206 - 275 (21 - 28, 152 - 203)

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

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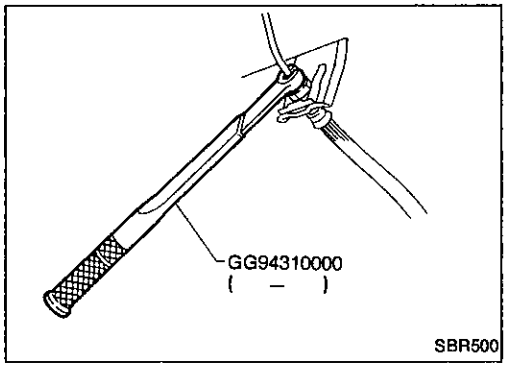
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Precautions

- **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.**

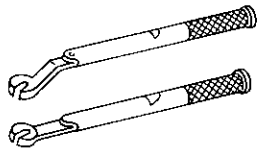
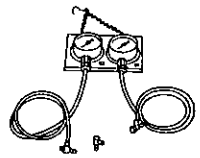
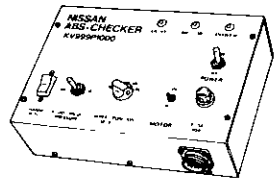
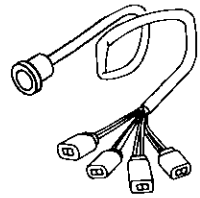


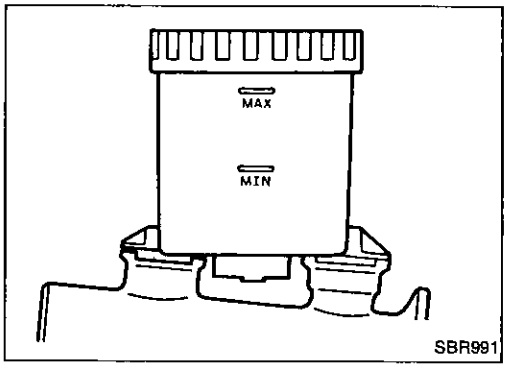
- **Use Tool when removing and installing brake tube.**

WARNING:

- **Clean brake pads and shoes with a vacuum dust collector to minimize the hazard of airborne asbestos or other materials.**

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
KV999P1000 (—) ABS checker		Checking brake fluid pressure of ABS actuator
KV999P1010 (—) ABS checker adapter harness	 SBR338C	Checking brake fluid pressure of ABS actuator



Checking Brake Fluid Level

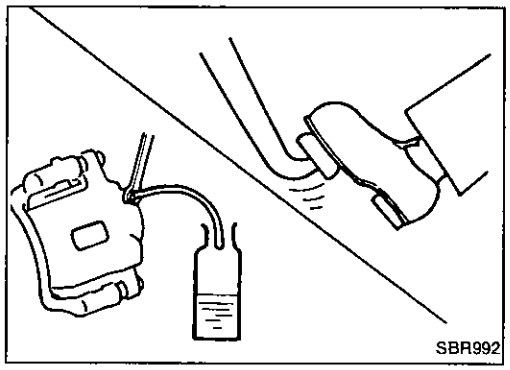
- Check fluid level in reservoir tank. It should be between Max. and Min. lines on reservoir tank.
- If fluid level is extremely low, check brake system for leaks.
- When brake warning lamp comes on even when parking brake lever is released, check brake system for leaks.

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.

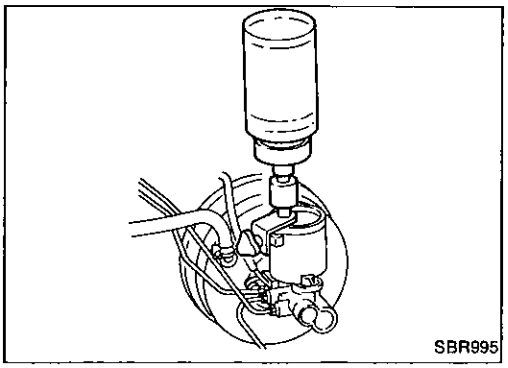


Changing Brake Fluid

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 Brake System".

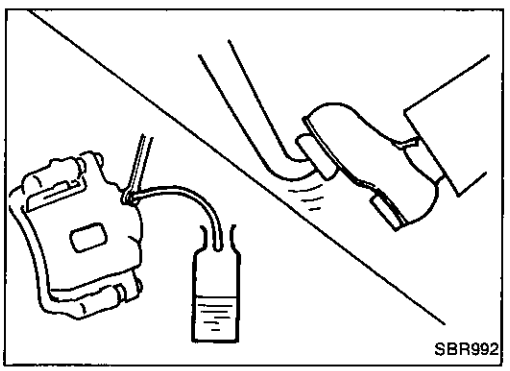


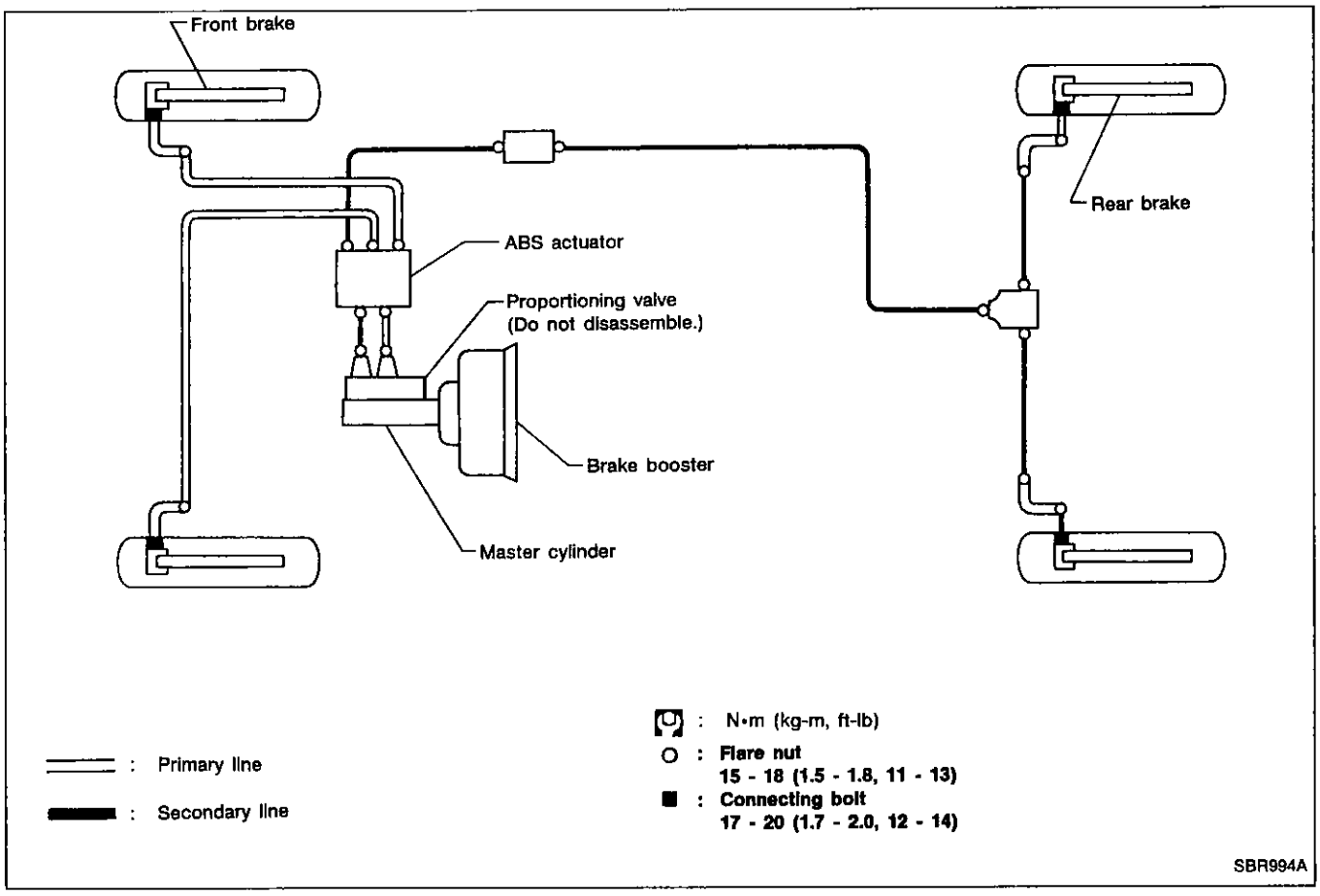
Bleeding Brake System

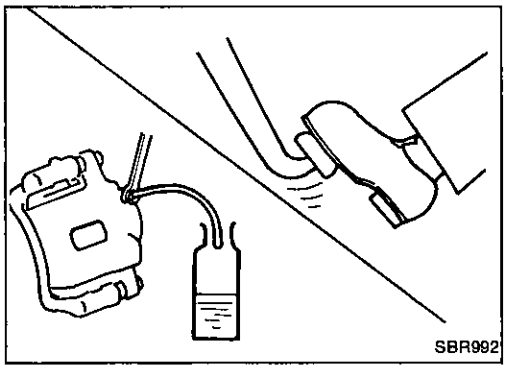
CAUTION:

- **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.**
- Bleed air in the following order.
  1. Left rear caliper
  2. Right rear caliper
  3. Left front caliper
  4. Right front caliper
  5. Front side air bleeder on ABS actuator
  6. Rear side air bleeder on ABS actuator

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.







Removal

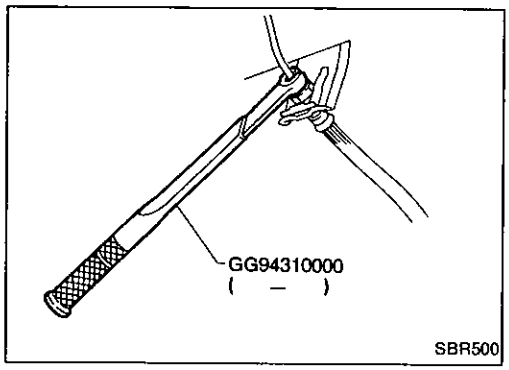
CAUTION:

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 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.
5. All hoses must be free from excessive bending, twisting and pulling.

Inspection

Check brake lines (tubes and hoses) for cracks, deterioration or other damage. Replace any damaged parts.

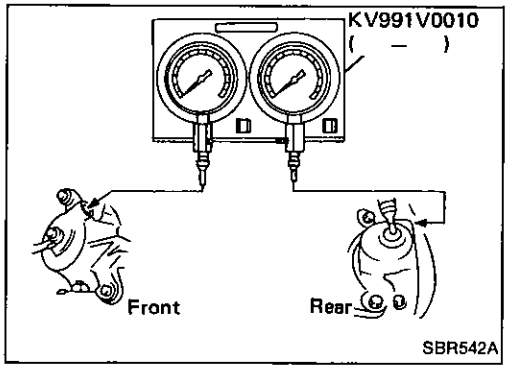


Installation

CAUTION:

- **Refill with new brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**

1. Tighten all flare nuts and connecting bolts.
   Specification:
   Flare nut
   15 - 18 N·m
   (1.5 - 1.8 kg-m, 11 - 13 ft-lb)
   Connecting bolt
   17 - 20 N·m
   (1.7 - 2.0 kg-m, 12 - 14 ft-lb)
2. Refill until new brake fluid comes out of each air bleeder valve.
3. Bleed air. Refer to "Bleeding Brake System".



Proportioning Valve

INSPECTION

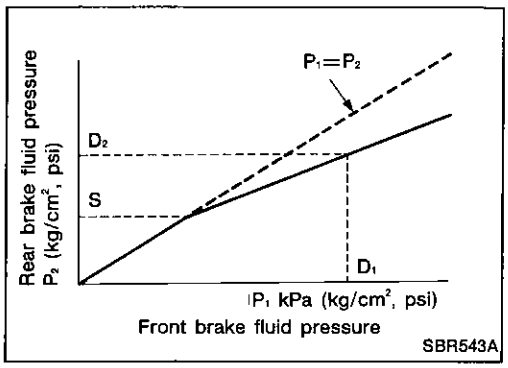
CAUTION:

- **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.**
- **Disconnect harness connectors from ABS actuator before checking.**

1. Connect tool to air bleeders of front and rear brakes on either L.H. and R.H. side.
   Tool number: KV991V0010 (—)
2. Bleed air from Tool.
3. Check fluid pressure by depressing brake pedal.

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

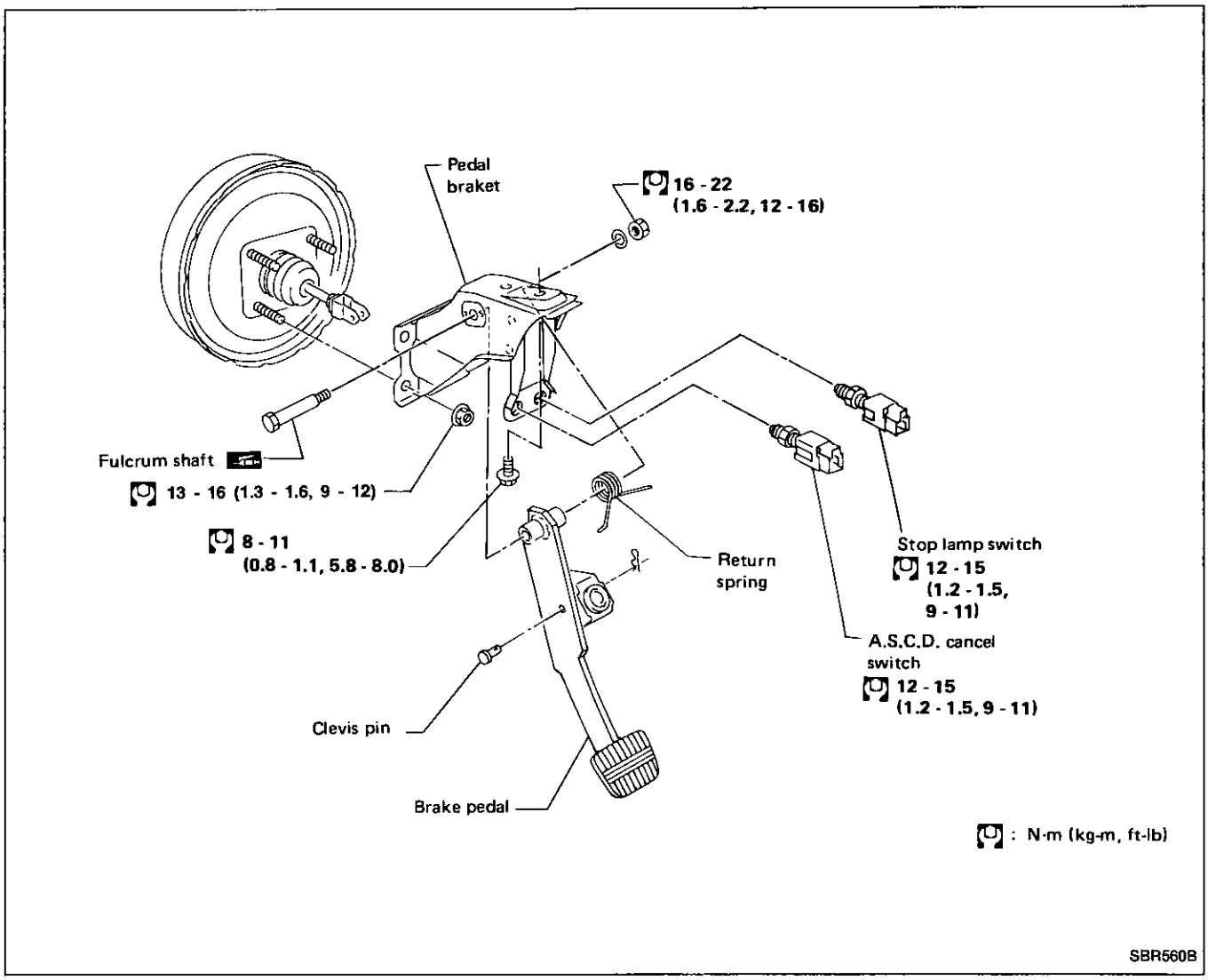
Applied pressure (Front brake)	D_1	7,355 (75, 1,067)
Output pressure (Rear brake)	D_2	5,100 - 5,492 (52 - 56, 739 - 796)

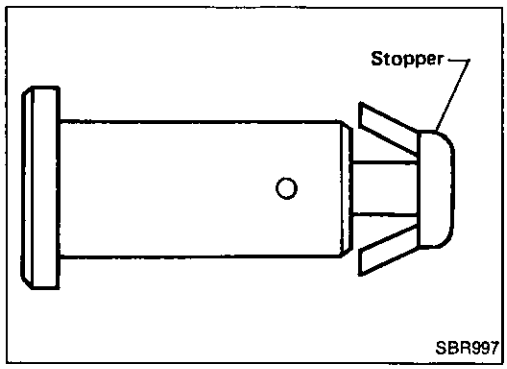


If output pressure is out of specifications, replace master cylinder assembly.

4. Bleed air after disconnecting Tool. Refer to "Bleeding Brake System".

Removal and Installation

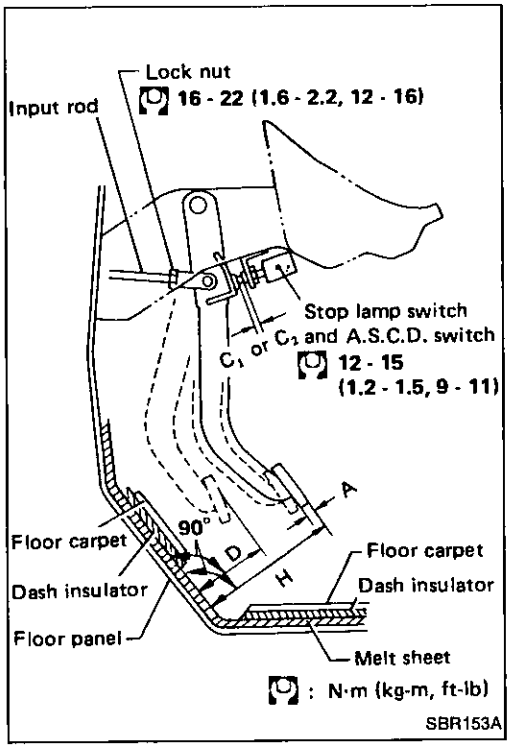




Inspection

Check brake pedal for following items.

- Brake pedal bend
- Crack of any welded portion
- Clevis pin deformation
- Crack or deformation of clevis pin stopper



Adjustment

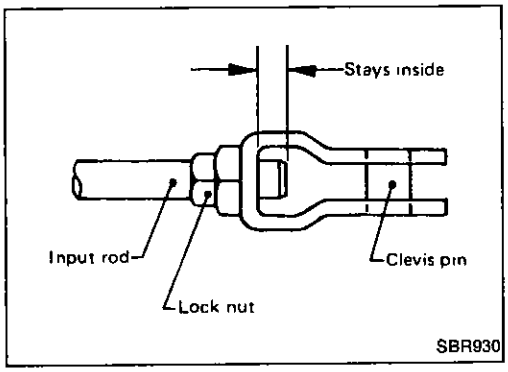
Check brake pedal free height from dash reinforcement panel. Adjust if necessary.

H: Free height
184 - 194 mm (7.24 - 7.64 in)

D: Depressed height
100 - 110 mm (3.94 - 4.33 in)
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)



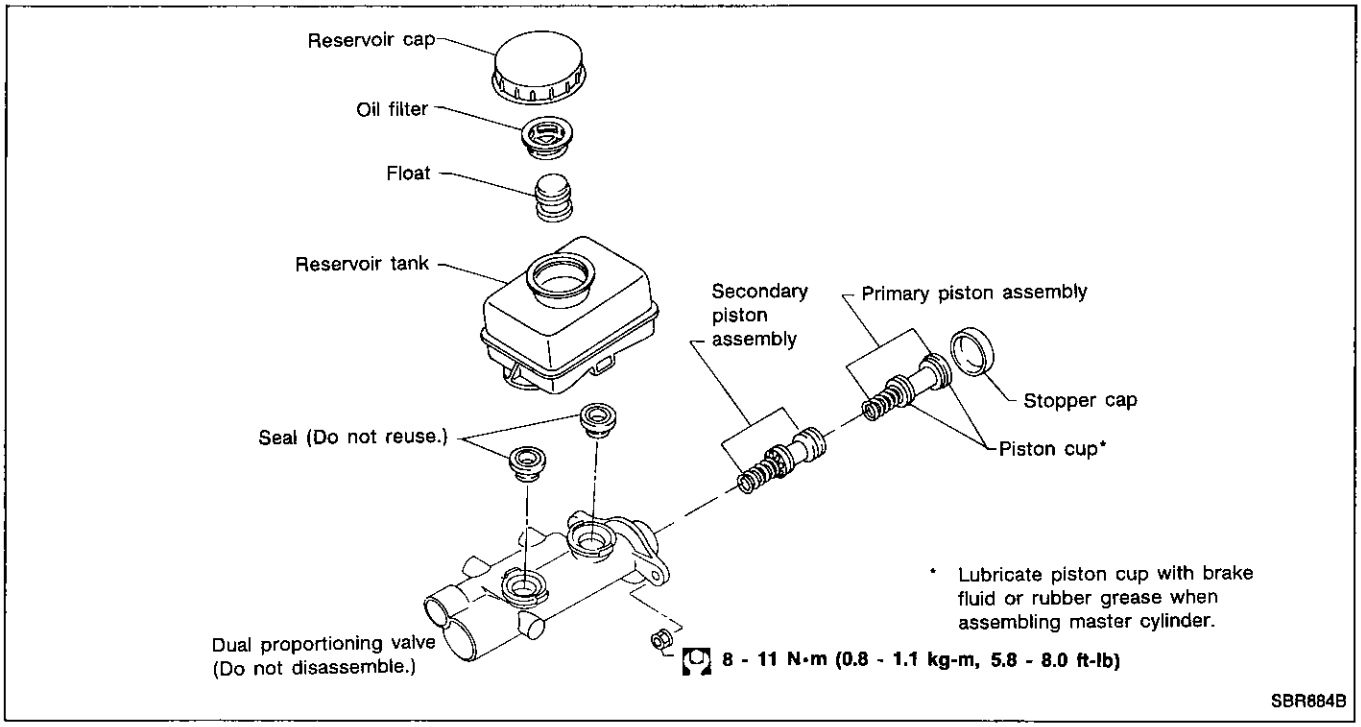
1. Loosen lock nut and adjust pedal free height by turning brake booster input rod. Then tighten lock nut.

Make sure that tip of input rod stays inside.

2. 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, wheel cylinder, etc.); then make necessary repairs.

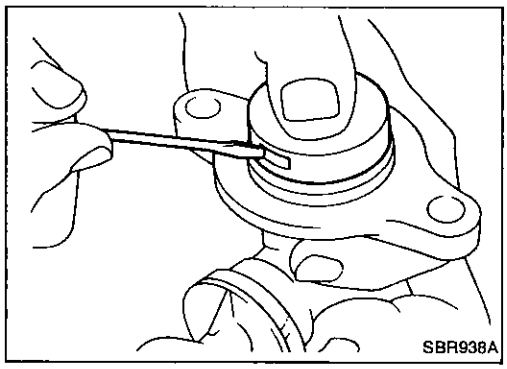


Removal

CAUTION:

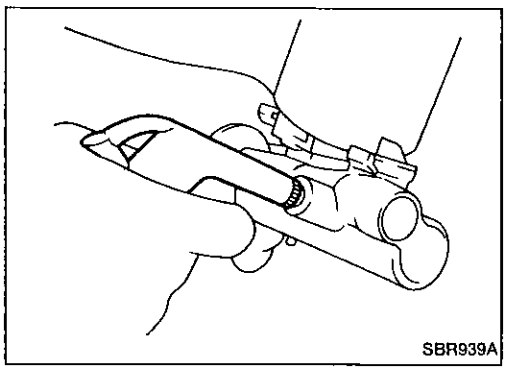
- **Be careful not to splash brake fluid on painted areas; it may cause of paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**

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. Remove valve stopper while pushing valve into cylinder lightly.
2. Bend claws of stopper cap outward.



3. Remove piston assemblies.

If it is difficult to remove secondary piston assembly, gradually apply compressed air through fluid outlet.

4. Draw out reservoir tank.

Inspection

Check for the following items.

Replace any part if damaged.

Master cylinder:

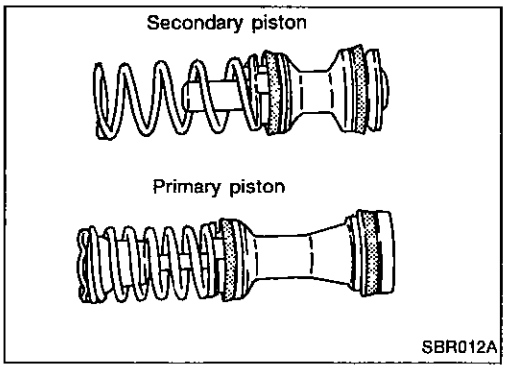
- Pin holes or scratches on inner wall.

Piston:

- Deformation of or scratches on piston cups.

Stopper cap:

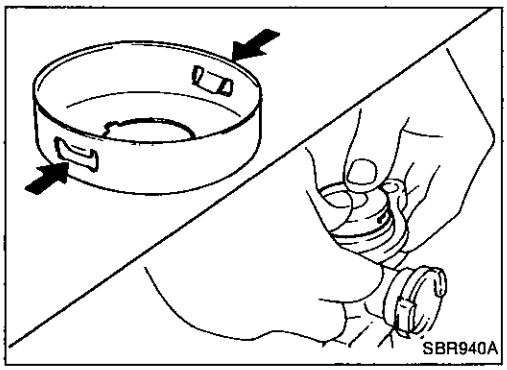
- Damage or excessive deformation of claws.



Assembly

Pay attention to direction of piston cups in figure at left. Also, insert pistons squarely to avoid scratches on cylinder bore.

1. Lightly push pistons in and assemble valve stopper.



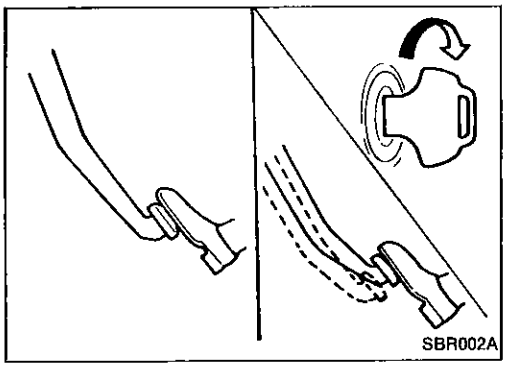
2. Bend claws inward.
3. Install stopper cap.
4. Install reservoir tank oil seals.
5. Push reservoir tank into master cylinder.

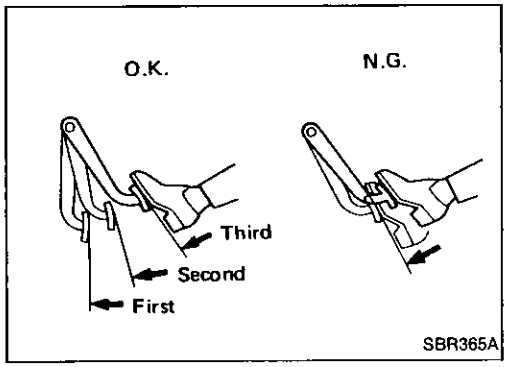
Installation

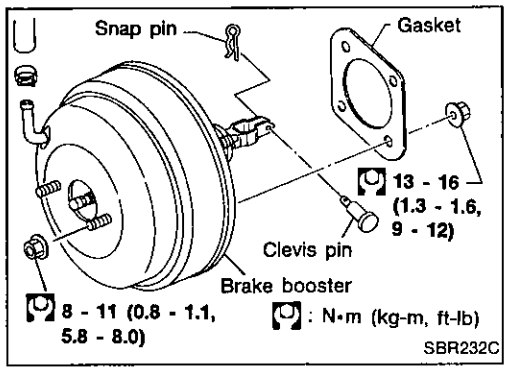
CAUTION:

- **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. Torque mounting nuts.
   Specification:
   8 - 11 N·m
   (0.8 - 1.1 kg-m, 5.8 - 8.0 ft-lb)
4. Torque flare nuts.
   Specification:
   15 - 18 N·m
   (1.5 - 1.8 kg-m, 11 - 13 ft-lb)
5. Bleed air. Refer to "Bleeding Brake System".







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

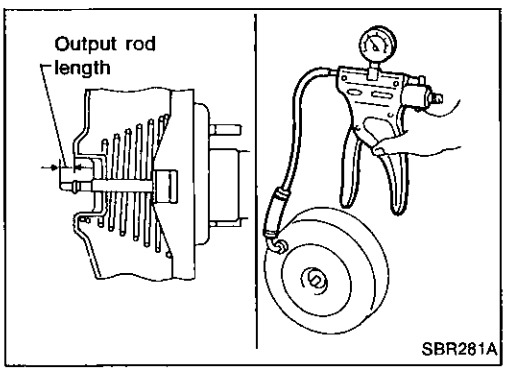
- Start engine, and stop it after one or two minutes. Depress brake pedal several times slowly. If pedal goes further down the first time and gradually rises after second or third time, booster is airtight.
- Depress brake pedal while engine is running, and stop engine with pedal depressed. If there 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 paint areas, wash it away with water immediately.**
- **Be careful not to deform or bend brake pipes, during removal of booster.**

1. Remove master cylinder. Refer to "Removal" in "MASTER CYLINDER".
2. Remove clevis pin (brake pedal to booster input rod).
3. Remove mounting nuts (brake pedal bracket to booster).
4. Draw out booster assembly.



Inspection

OUTPUT ROD LENGTH CHECK

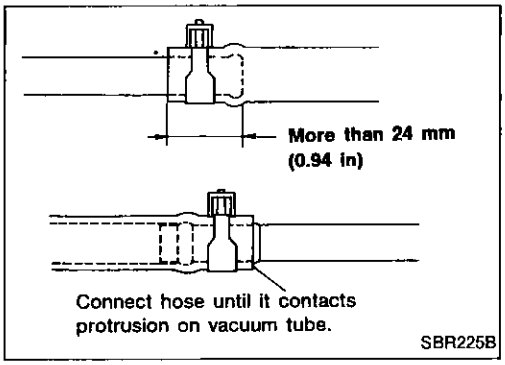
1. Apply vacuum of –66.7 kPa (–500 mmHg, –19.69 inHg) to brake booster with a handy vacuum pump.
2. Check output rod length.
   Specified length:
   10.275 - 10.525 mm (0.4045 - 0.4144 in)

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.**

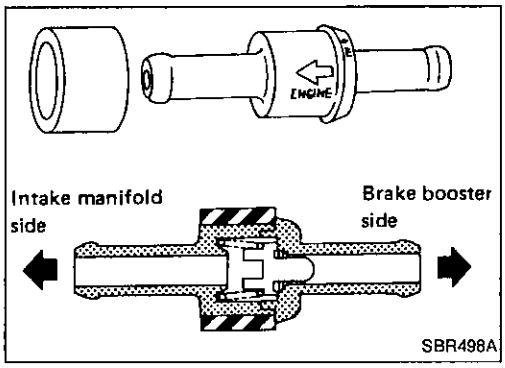
1. Fit booster, then secure mounting nuts (brake pedal bracket to master cylinder) lightly.
2. Connect brake pedal and booster input rod with clevis pin.
3. Secure mounting nuts.
   Specification: 8 - 11 N·m (0.8 - 1.1 kg-m, 5.8 - 8.0 ft-lb)
4. Install master cylinder. Refer to "Installation" in "MASTER CYLINDER".
5. Adjust brake pedal if necessary. Refer to "Adjustment" in "BRAKE PEDAL AND BRACKET".



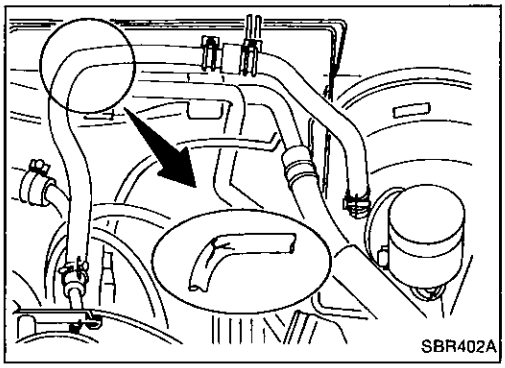
Removal and Installation

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 more than 24 mm (0.94 in).**



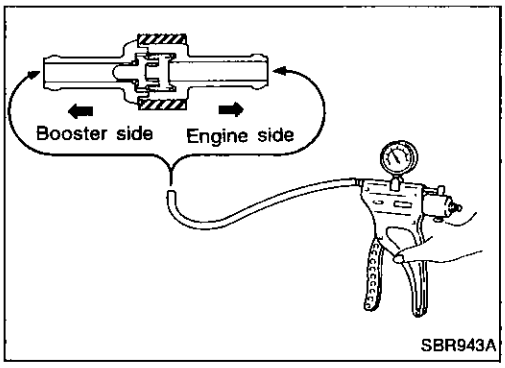
- **Install check valve, paying attention to its direction.**



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.

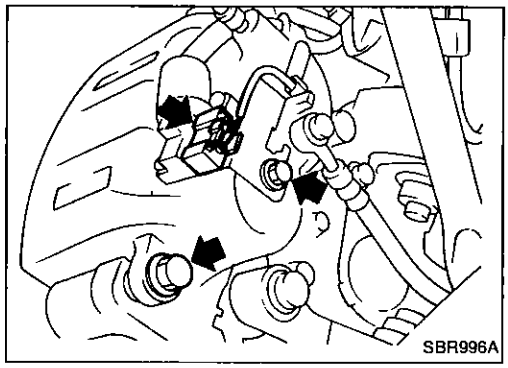
Pad Replacement

WARNING:

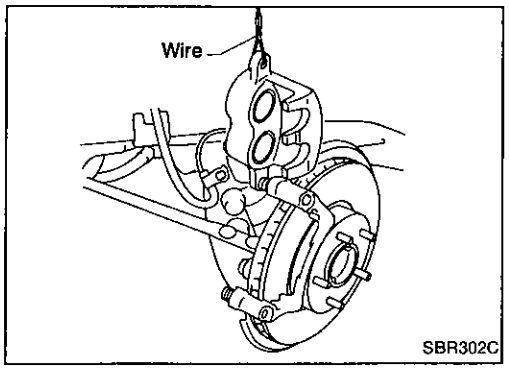
Clean brakes with a vacuum dust collector to minimize the hazard of airborne asbestos or other materials.

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 in 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.**


SBR996A

1. Remove master cylinder reservoir cap.
2. On right brake, disconnect sensor harness by pushing connector pin and pulling connector. Remove bracket from cylinder body.
3. Remove lower pin bolt.

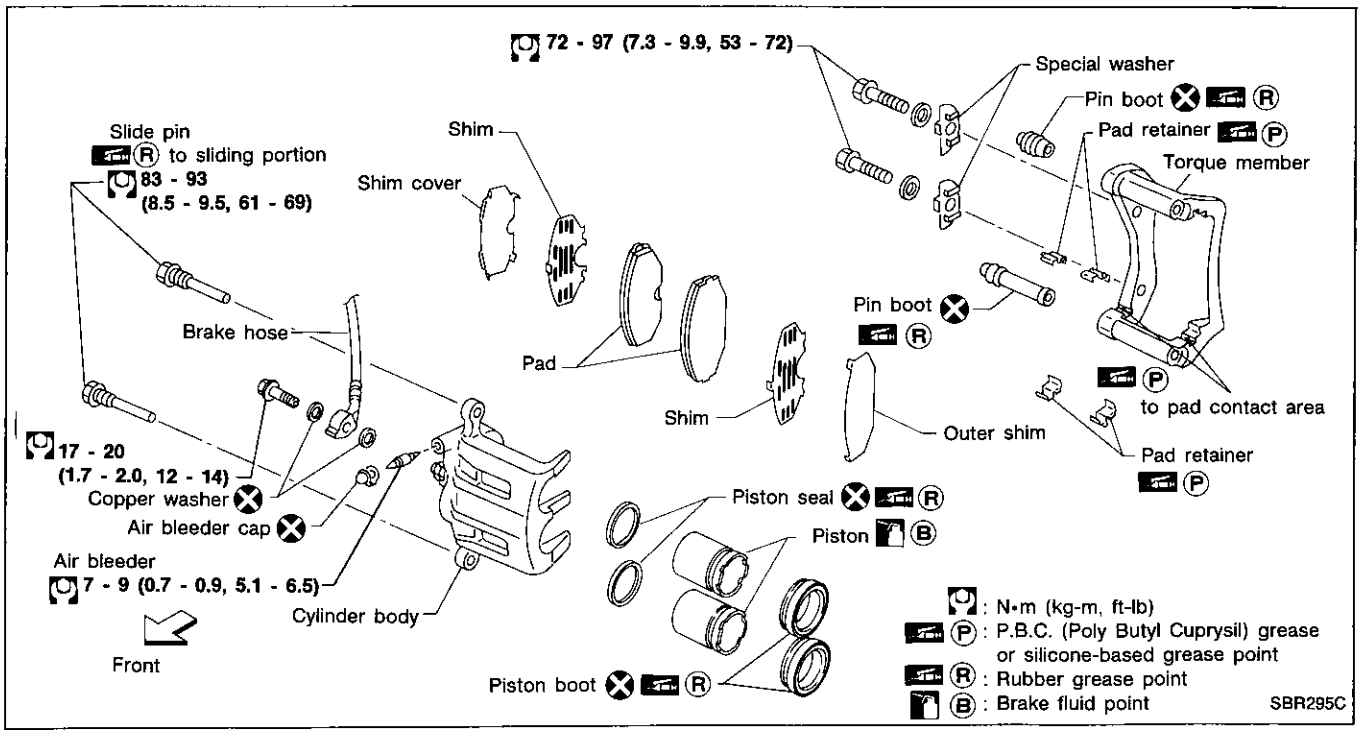


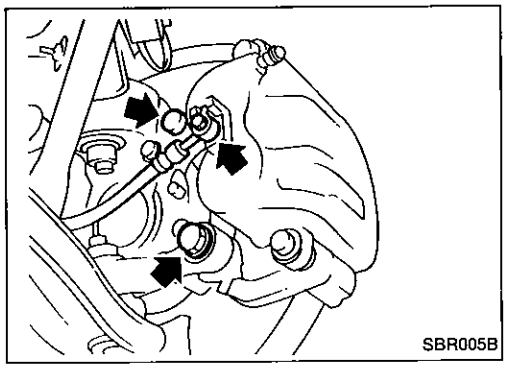
SBR302C

4. Open cylinder body upward. Then remove pad retainers, and inner and outer shims.

   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.**
- **Replace brake pad sensor with a new one when brake pads are replaced.**
- **Check diagnostic information display does not indicate brake replacement by performing road test.**



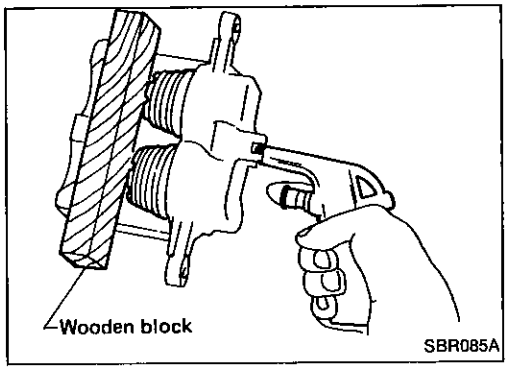

SBR005B

Removal

WARNING:
Clean brakes with a vacuum dust collector to minimize the hazard of airborne asbestos or other materials.

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.



SBR085A

Disassembly

WARNING:
Do not place your fingers in front of piston.

CAUTION:
Do not scratch or score cylinder wall.

1. Push out piston and piston boot 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 materials. If any of the above conditions are observed, replace cylinder body.
- Minor damage from rust or foreign materials may be eliminated by polishing surface with a fine emery paper. Replace cylinder body if necessary.

CAUTION:
Use brake fluid to clean. Never use mineral oil.

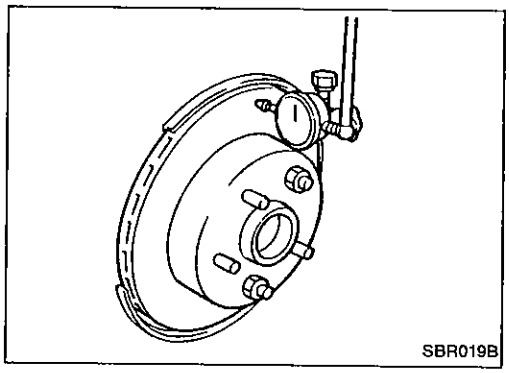
PISTON

CAUTION:
Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign materials are stuck to sliding surface.

Check piston for score, rust, wear, damage or presence of foreign materials. Replace if any of the above conditions are observed.

SLIDE PIN, PIN BOLT AND PIN BOOT

Check for wear, cracks or other damage. Replace if any of the above conditions are observed.


SBR019B

Inspection — Rotor

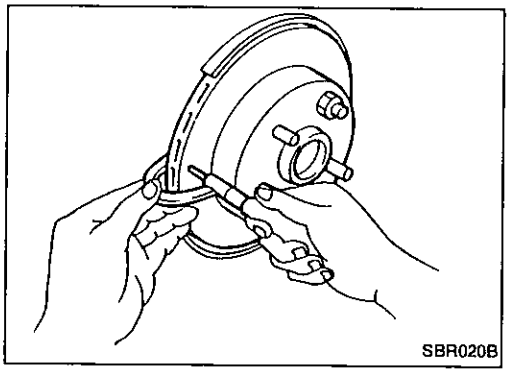
RUNOUT

1. Secure rotor to wheel hub with at least two nuts (M12 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 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).

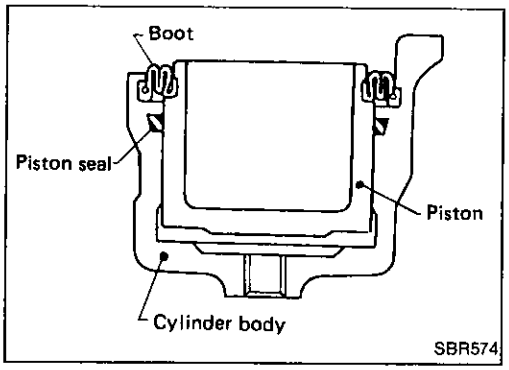

SBR020B

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.

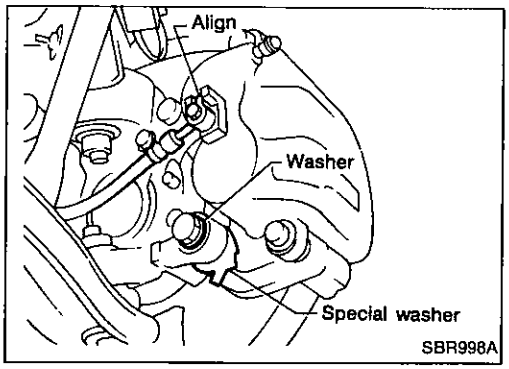
Rotor repair limit:
26.0 mm (1.024 in)



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.



SBR998A

Installation

CAUTION:

- **Refill with new brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**

1. Install caliper assembly.

Do not forget to install washers.

2. Install brake hose to caliper securely.
3. Install all parts and secure all bolts.
4. Bleed air. Refer to "Bleeding Brake System".

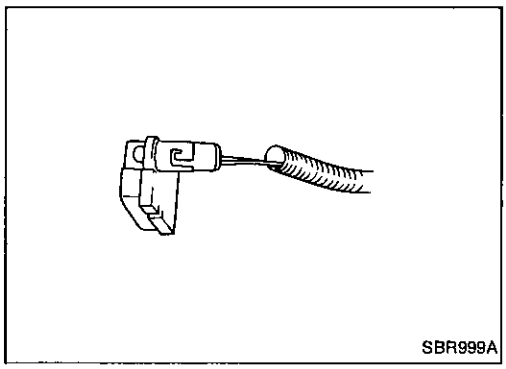
Pad Replacement

WARNING:

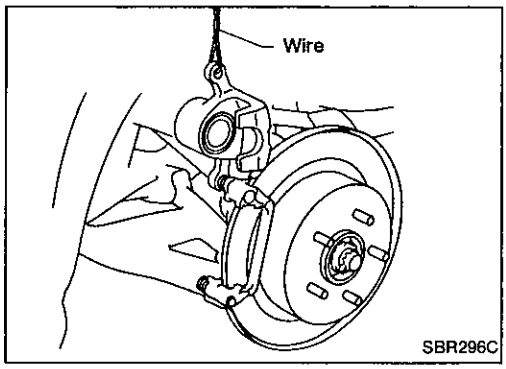
Clean brakes with a vacuum dust collector to minimize the hazard of airborne asbestos or other materials.

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 in replacing pads.**
- **If shims are rusted or show peeling of rubber coat, replace them with new shims.**
- **It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend cylinder body with wire so as not to stretch brake hose.**


SBR999A

1. Remove master cylinder reservoir cap.
2. On right brake, remove wire harness by pushing it toward pad and turning it counterclockwise. Then pull it out.



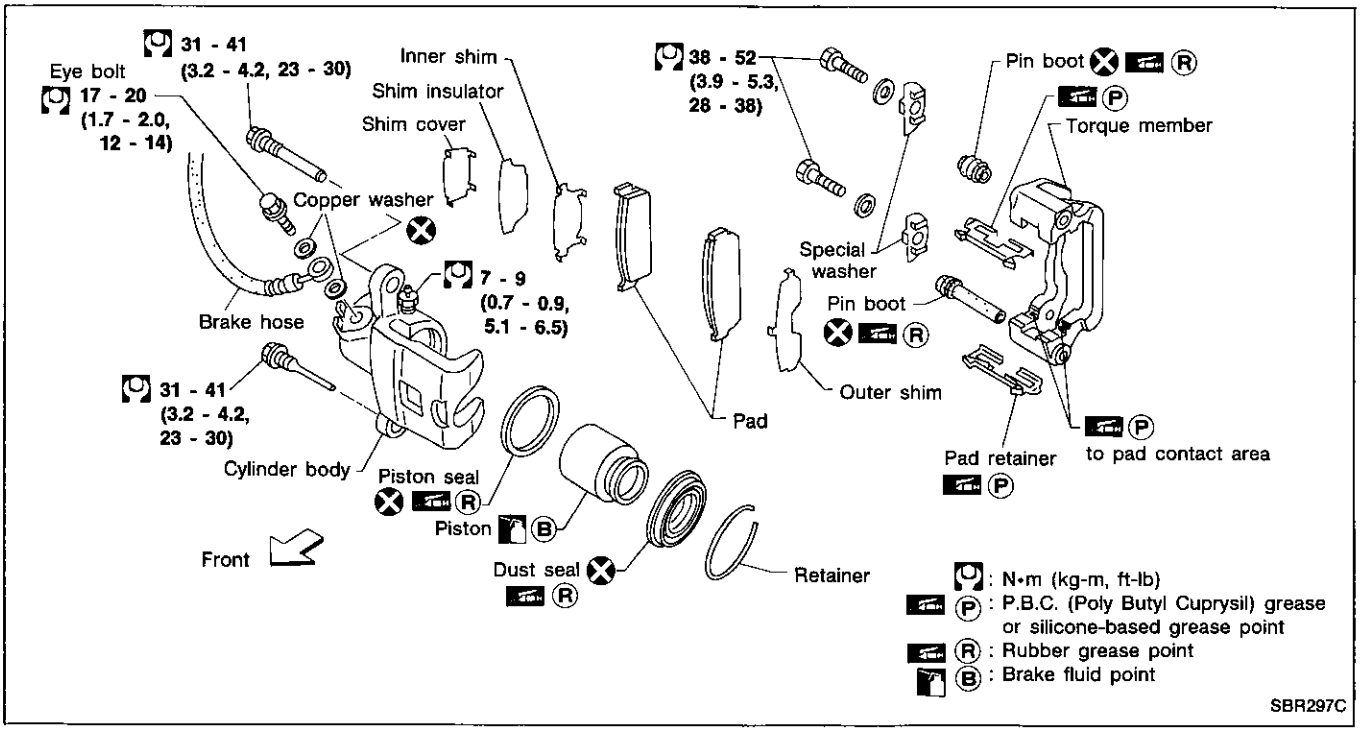
SBR296C

3. Remove lower pin bolt.
4. Open cylinder body upward. Then remove pad retainers, and inner and outer shims.

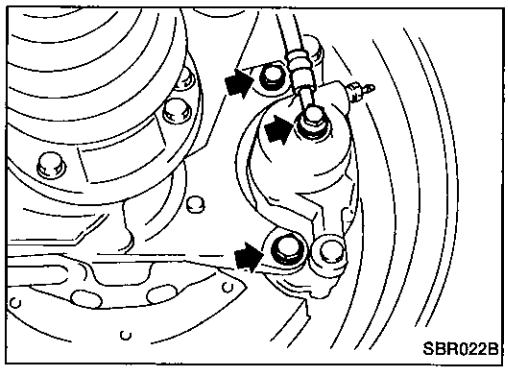
   Pad wear limit:

   2.0 mm (0.079 in)

- **Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston.**
- **Replace brake pad sensor with a new one when brake pads are replaced.**
- **Check diagnostic information display does not indicate brake replacement by performing road test.**



SBR297C

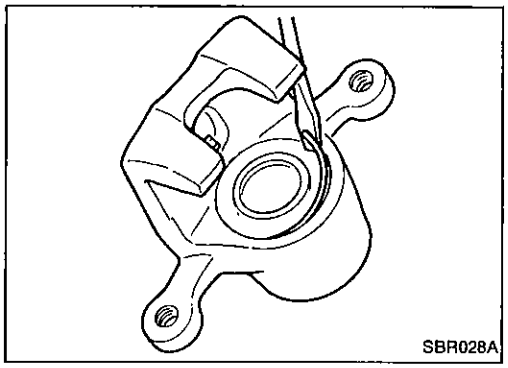

SBR022B

Removal

WARNING:
Clean brakes with a vacuum dust collector to minimize the hazard of airborne asbestos or other materials.

Remove torque member fixing bolts and connecting bolt.
On right brake, disconnect sensor harness.

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.

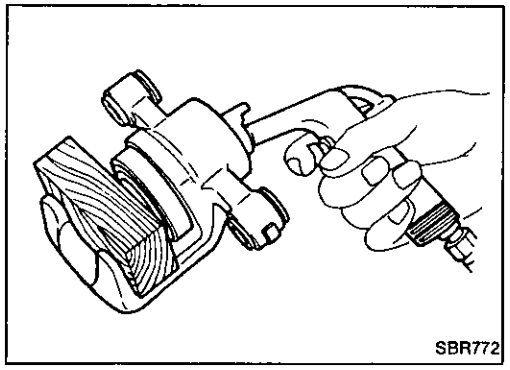

SBR028A

Disassembly

WARNING:
Do not place your fingers in front of piston.

CAUTION:
Do not scratch or score cylinder wall.

1. Remove dust cover retainer with a screwdriver.


SBR772

2. Push out piston and dust seal 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 materials. If any of the above conditions are observed, replace cylinder body.
- Minor damage from rust or foreign materials may be eliminated by polishing surface with a fine emery paper. Replace cylinder body if necessary.

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 materials are stuck to sliding surface.

Check piston for score, rust, wear, damage or presence of foreign materials. Replace if any of the above conditions are observed.

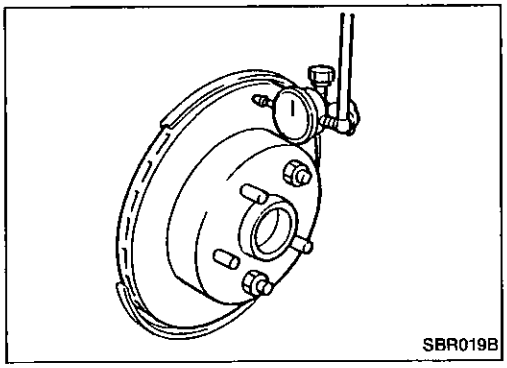
SLIDE PIN, PIN BOLT AND PIN BOOT

Check for wear, cracks or other damage. Replace if any of the above conditions are observed.

Inspection — Rotor

RUBBING SURFACE

Check rotor for roughness, cracks or chips.



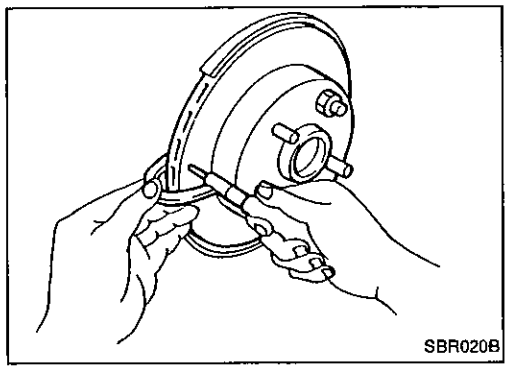
RUNOUT

1. Secure rotor to wheel hub with two nuts (M12 x 1.25).
2. Check runout using a dial indicator.

Make sure that axial end play is within the specifications before measuring. Refer to section RA.

3. Change relative positions of rotor and wheel hub so that runout is minimized.

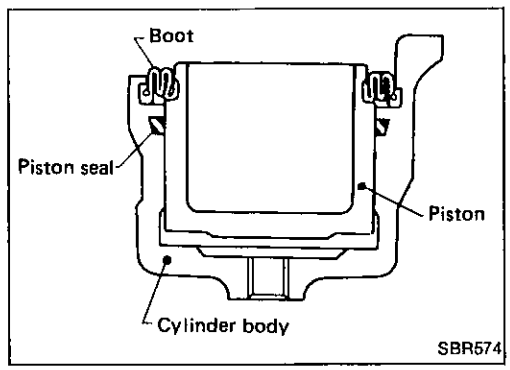
Maximum runout 0.07 mm (0.0028 in)



THICKNESS

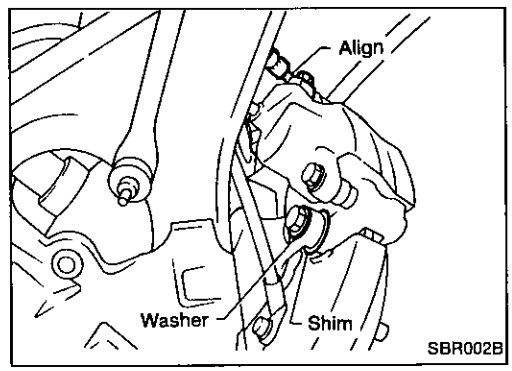
Rotor repair limit: Minimum thickness
8.0 mm (0.315 in)

Replace rotor if any of the above did 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:

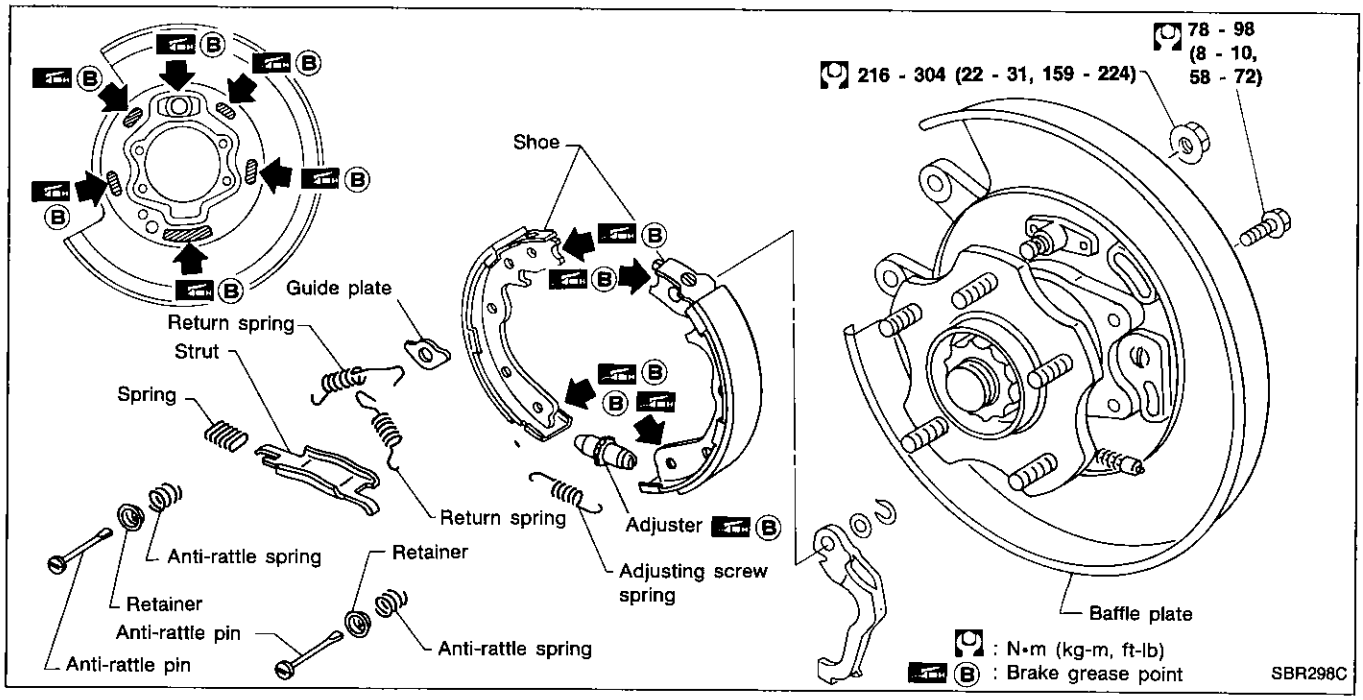
- **Refill with new brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**

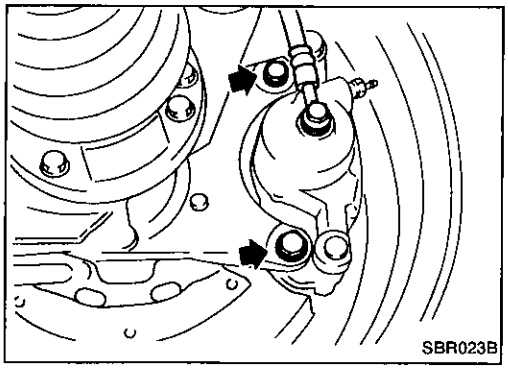
1. Install caliper assembly.

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 Brake System".

Parking Drum Brake





REMOVAL

WARNING:

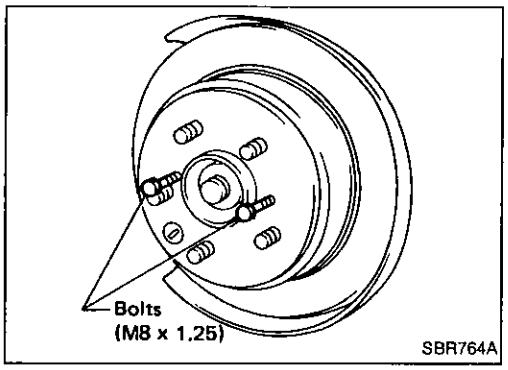
Clean brakes with a vacuum dust collector to minimize the hazard of airborne asbestos or other materials.

CAUTION:

Make sure parking brake lever is released completely.

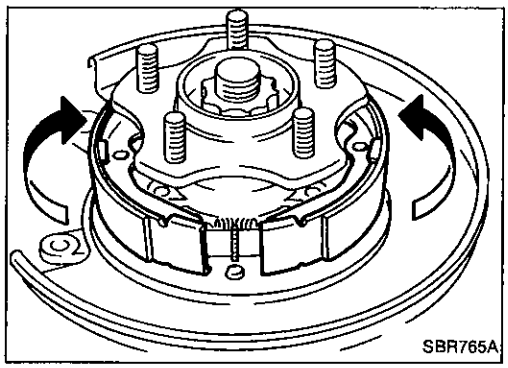
1. Remove torque member fixing bolts (Rear disc brake assembly mounting bolts).

Suspend caliper assembly with wire so as not to stretch brake hose.



2. Remove disc rotor (With parking drum brake).

Tighten two bolts gradually if disc rotor is hard to remove.

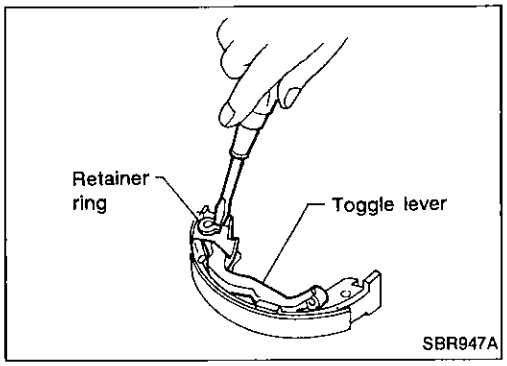


3. After removing retainer, remove spring by rotating shoes.

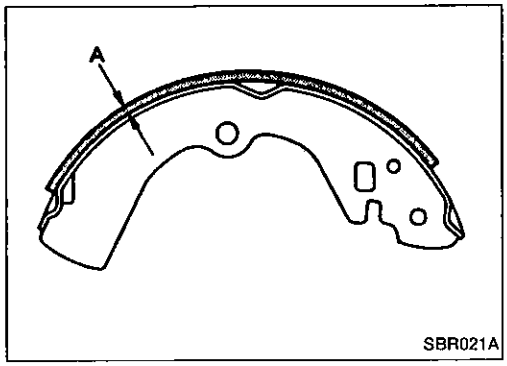
Be careful not to damage parking brake cable when separating it.

4. Remove adjuster.
5. Remove strut.
6. Disconnect parking brake cable from toggle lever.

Parking Drum Brake (Cont'd)



7. Remove retainer ring with a suitable tool. Then separate toggle lever and brake shoe.

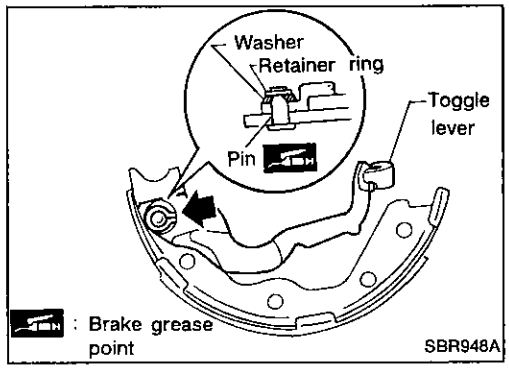


INSPECTION

Check lining thickness.

Lining wear limit (A): 1.5 mm (0.059 in)

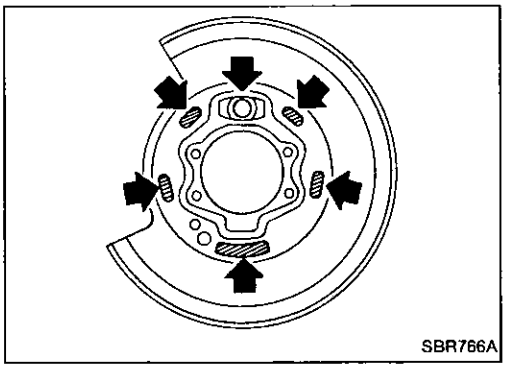
Replace brake shoes if lining is worn beyond wear limit.



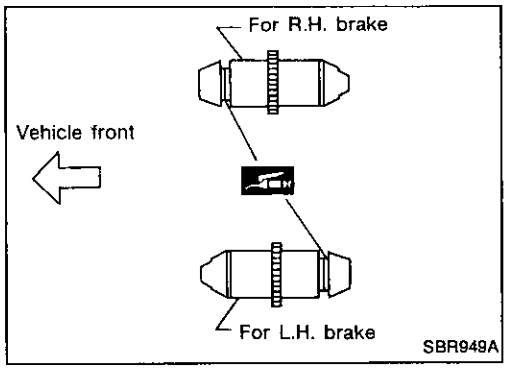
INSTALLATION

1. Fit toggle lever to brake shoe with retainer ring.

Pay attention to retainer ring direction.



2. Apply brake grease to the contact areas shown at left.

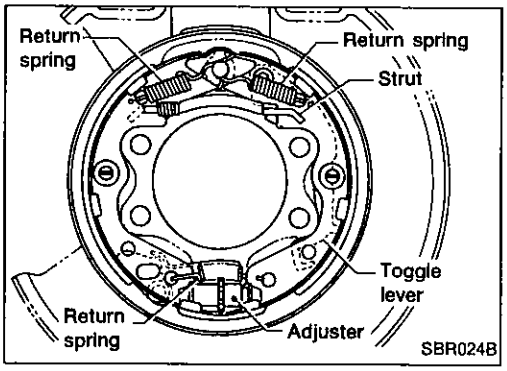


3. Shorten adjuster by rotating it.

Pay attention to direction of adjuster.

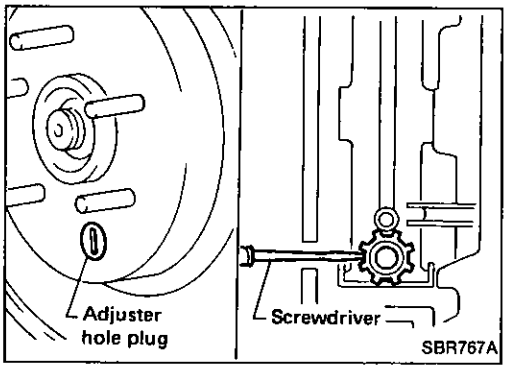
4. Connect parking brake cable to toggle lever.
5. Install all parts.

Parking Drum Brake (Cont'd)



6. Check all parts are installed properly.

Pay attention to direction of adjuster.



SHOE CLEARANCE ADJUSTMENT

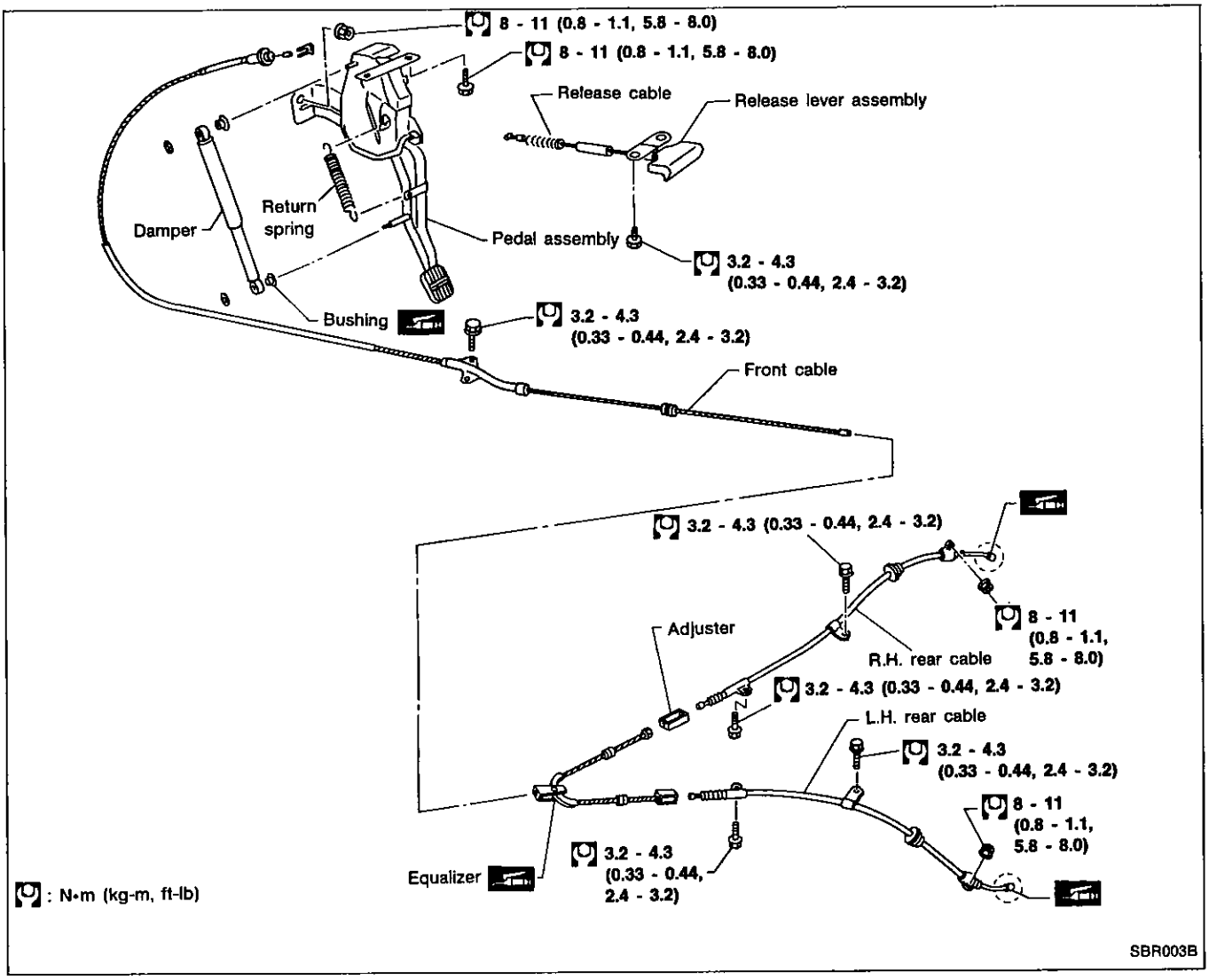
1. Remove adjuster hole plug, and turn down adjuster wheel with a screwdriver until brake is locked.

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".

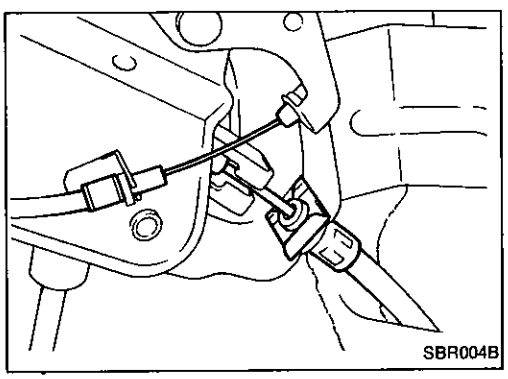
BREAKING IN DRUM AND LINING

1. Using either low or 2nd transmission speed, drive the unloaded vehicle on a safe, level and dry road.
2. Depress parking brake pedal with a force of 147 N (15 kg, 33 lb).
3. While depressing the pedal, continue to drive the vehicle forward 100 m (328 ft) at approximately 35 km/h (22 MPH).
4. While depressing the pedal, drive the vehicle in reverse 10 m (33 ft) at approximately 10 km/h (6 MPH).
5. Repeat steps 1 through 3 three times and then repeat only step 4 one more time.



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.

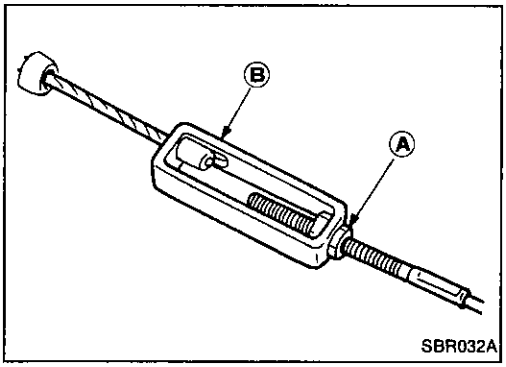
Inspection

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 found deformed or damaged, replace.

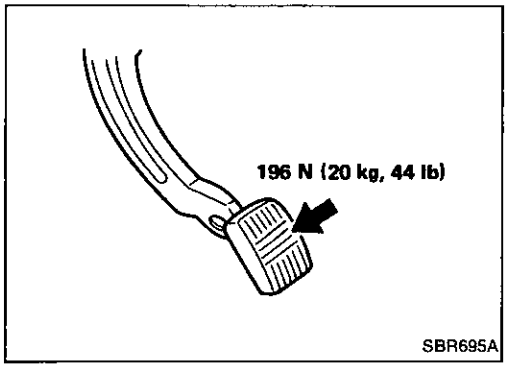
Adjustment

Adjust control lever stroke as follows.

On models equipped with parking drum brake, perform shoe clearance adjustment before adjusting control lever stroke.



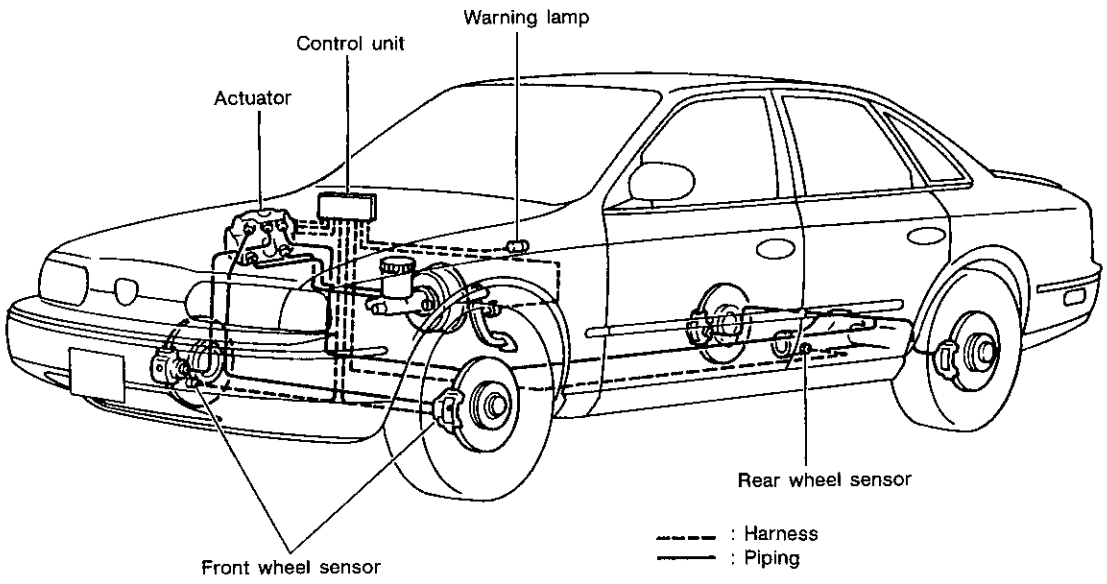
1. Loosen lock nut Ⓐ, rotate adjuster Ⓑ.
2. Tighten lock nut Ⓐ.



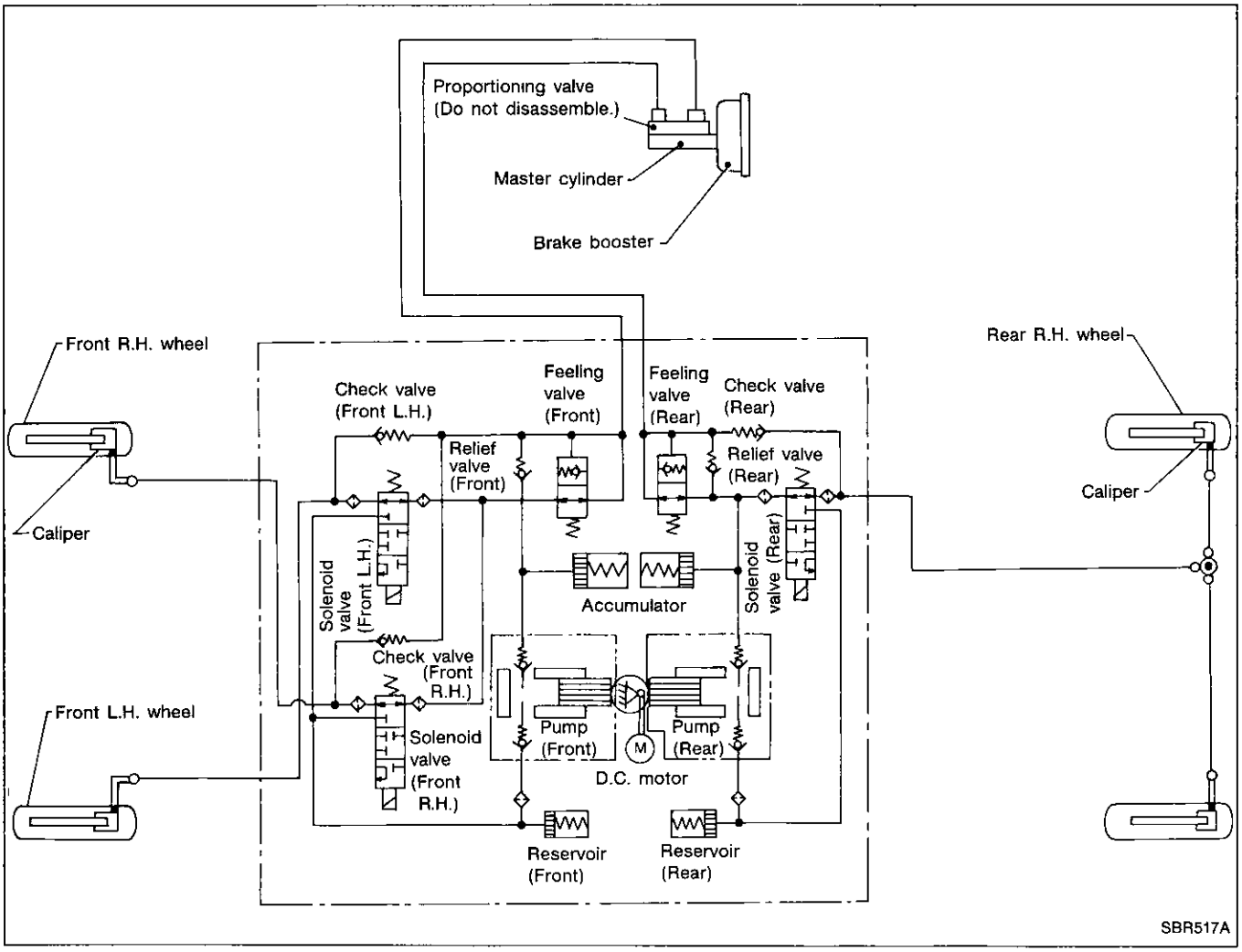
3. Depress parking brake pedal with specified amount of force. Check pedal stroke and ensure smooth operation.
   Pedal stroke:
   90 - 105 mm (3.54 - 4.13 in)

4. Bend parking brake warning lamp switch plate so that brake warning lamp goes on when parking brake pedal is depressed "A" mm ("A" in).
   "A": 20 mm (0.79 in) or less

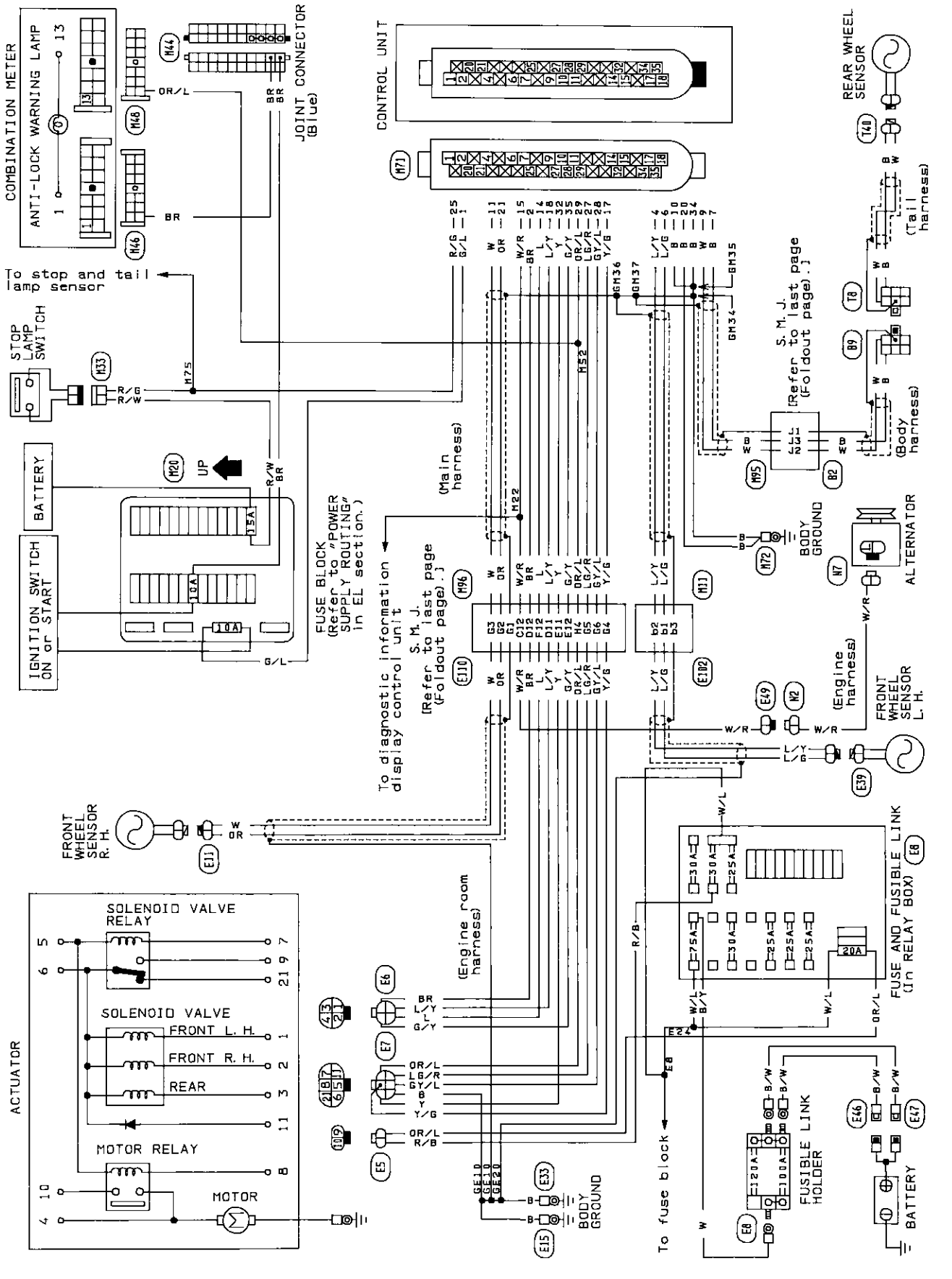
System Components



Hydraulic Circuit



Wiring Diagram

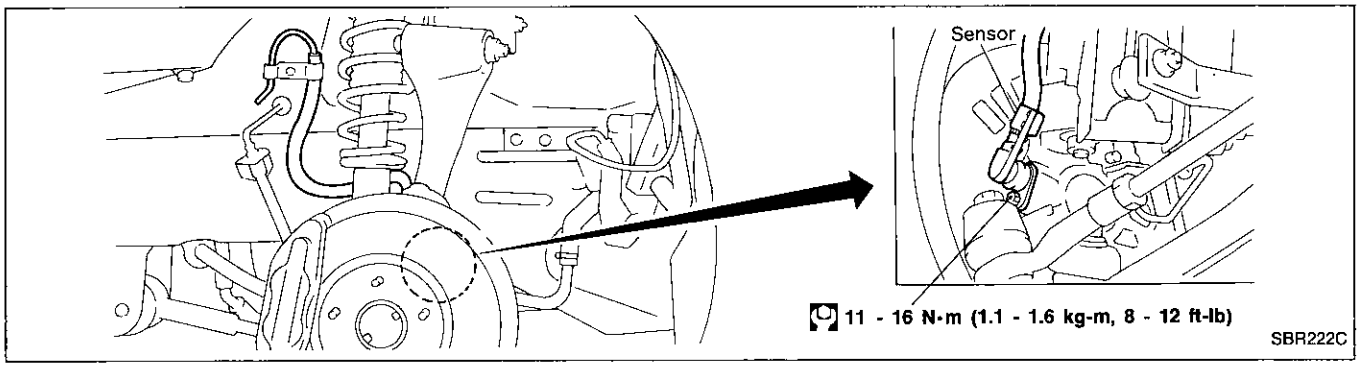


MBR015A

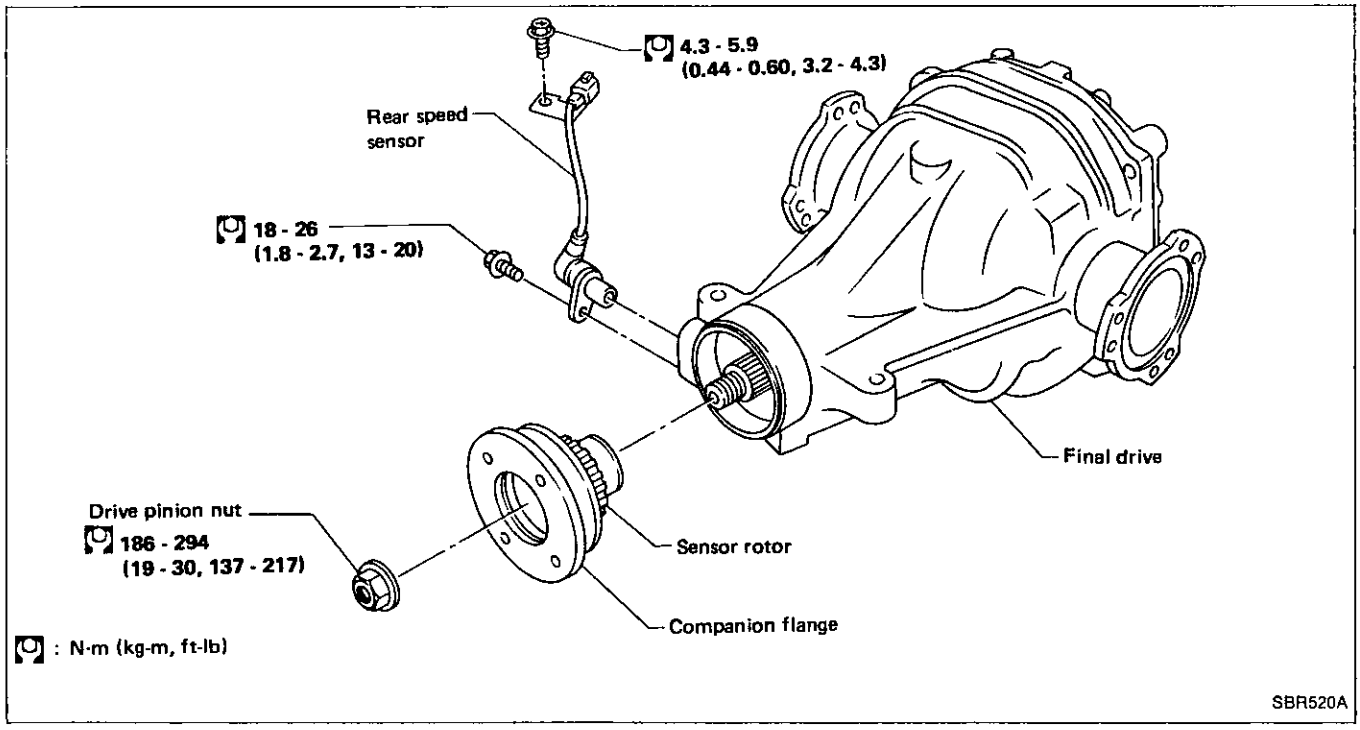
Removal and Installation

CAUTION:
Be careful not to damage sensor edge and sensor rotor teeth.

FRONT WHEEL SENSOR

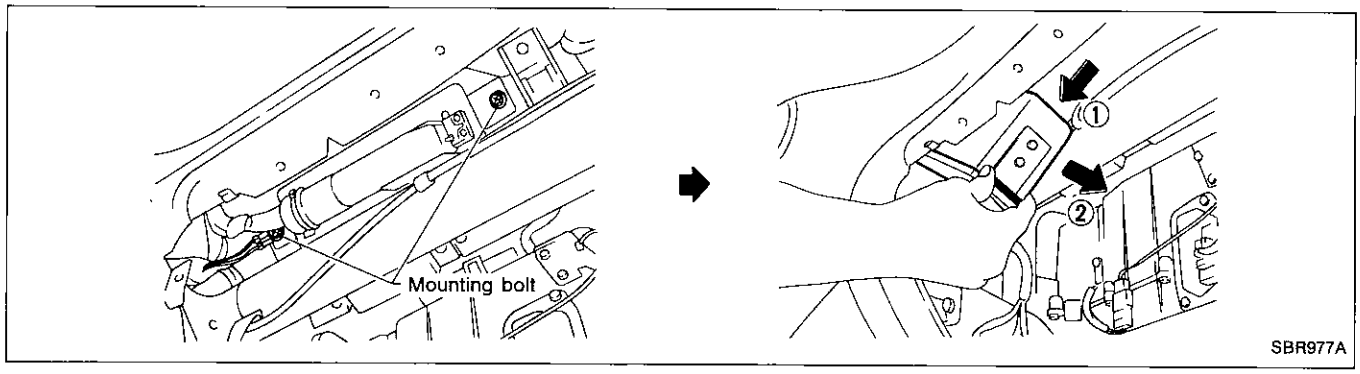


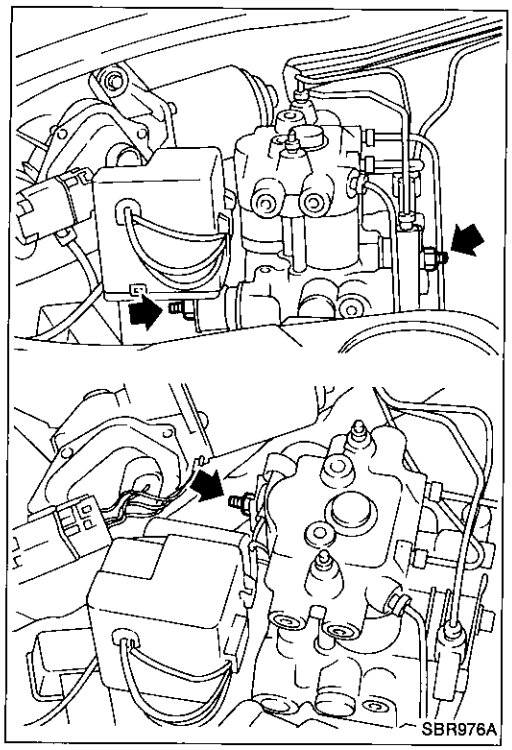
REAR WHEEL SENSOR



Removal and Installation (Cont'd)

CONTROL UNIT





ACTUATOR

Removal

1. Disconnect battery cable.
2. Drain brake fluid. Refer to "Changing Brake Fluid" in "CHECK AND ADJUSTMENT".
3. Disconnect connectors, brake pipes and remove fixing nuts.

Installation

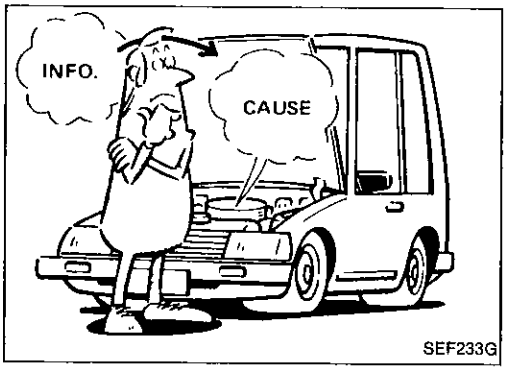
CAUTION:

After installation, refill brake fluid. Then bleed air. Refer to "CHECK AND ADJUSTMENT".

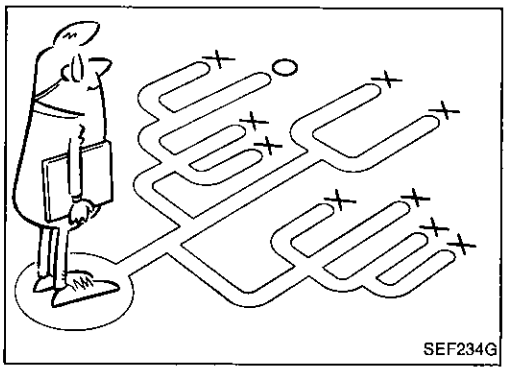
1. Connect brake pipes temporarily.
2. Secure fixing nuts.
3. Torque brake pipes.
4. Connect connectors and battery cable.

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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.

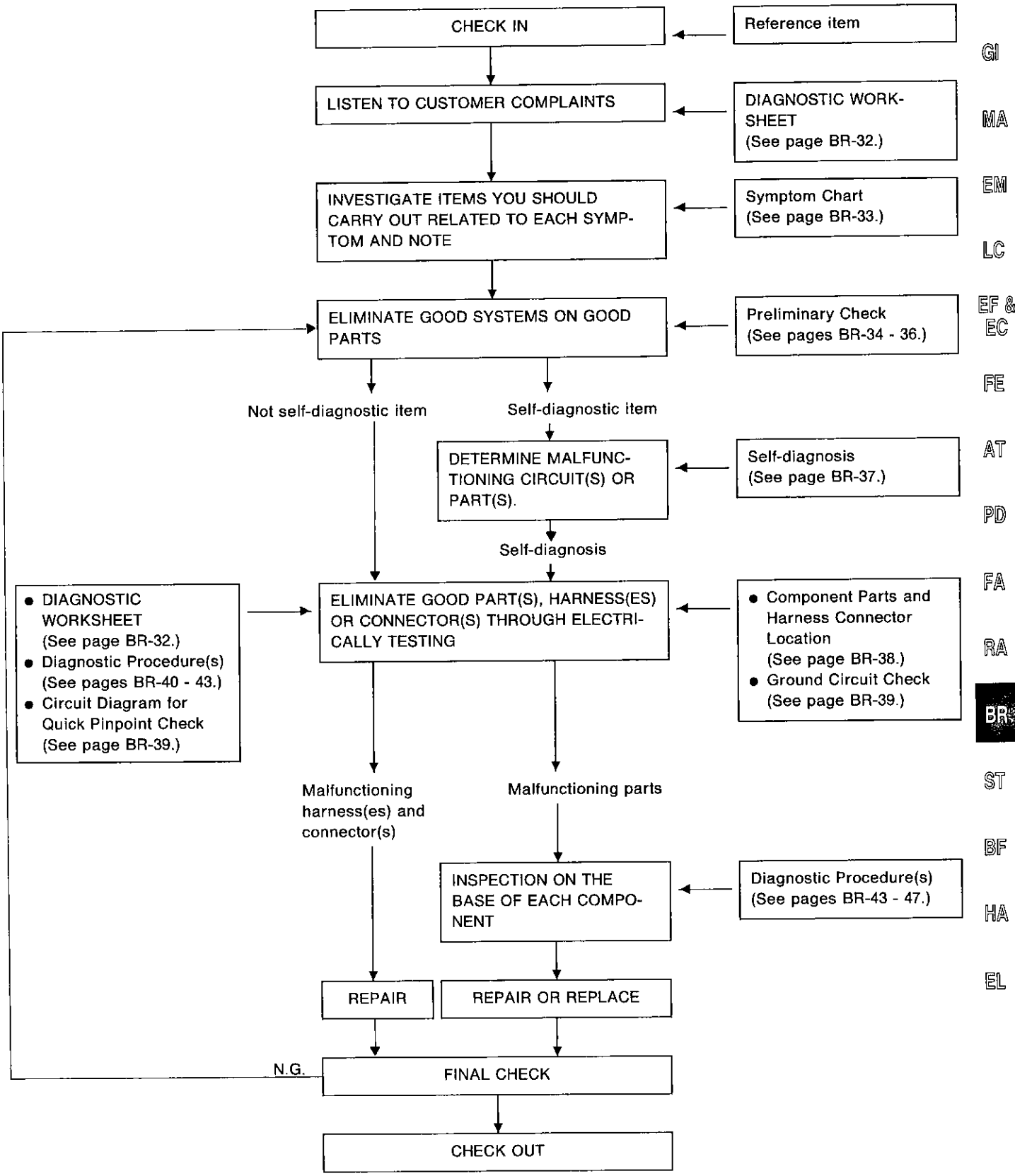
A visual check only may not find the cause of the problems, so a road test should be performed.

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.

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

WORK FLOW



KEY POINTS

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

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

DIAGNOSTIC WORKSHEET

There are many kinds of operating conditions that lead to customer complaints, even if the system is normal.
A good grasp of such conditions can make trouble-shooting faster and more accurate.
In general, feelings for a problem depend on each customer's information. It is therefore 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

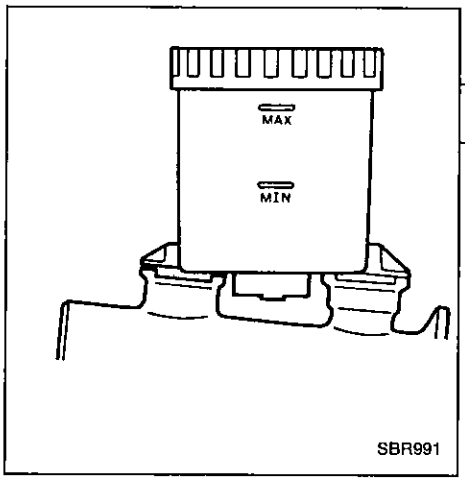
Customer name MR/MS		Model & Year			VIN		
Engine #		Trans.			Mileage		
Incident Date		Manuf. Date			In Service Date		
Symptoms	☐ Pedal vibration and noise	☐ Warning activates	☐ Long stopping distance	☐ Abnormal pedal action	☐ ABS doesn't work	☐ ABS works but warning activates	☐ ABS works frequently
Engine conditions		☐ When starting ☐ After starting ☐ Engine speed: 5,000 rpm or more					
Road conditions		☐ Low friction road (☐ Snow ☐ Gravel ☐ Other) ☐ Protrusion					
Driving conditions		☐ High speed cornering ☐ Vehicle speed: Greater than 10 km/h (6 MPH) ☐ Vehicle speed: 10 km/h (6 MPH) or less ☐ Vehicle is stopped					
Applying brake conditions		☐ Suddenly ☐ Gradually					
Other conditions		☐ Operation of electrical equipment ☐ Large pedal stroke ☐ Operation of clutch					

Symptom Chart

PROCEDURE	REFERENCE PAGE	SYMPTOM	Pedal vibration & noise	Warning activates	Long stopping distance	Abnormal pedal action	ABS doesn't work	ABS works but warning activates
Electrical Components Inspection	BR-53	Actuator Inspection					○	
Ground Circuit Check	BR-39	Motor ground					○	
	BR-39	Control unit ground					○	
Diagnostic Procedure (Select inspection with L.E.D. flashing No.)	BR-47	Diagnostic Procedure 11	○	○	○	○	○	○
	BR-47	Diagnostic Procedure 10	○	○	○	○	○	○
	BR-46	Diagnostic Procedure 9	○	○	○	○	○	○
	BR-45	Diagnostic Procedure 8	○	○	○	○	○	○
	BR-44	Diagnostic Procedure 7	○	○	○	○	○	○
	BR-43	Diagnostic Procedure 6	○	○	○	○	○	○
Diagnostic Procedure	BR-43	Diagnostic Procedure 5						○
	BR-42	Diagnostic Procedure 4					○	
	BR-42	Diagnostic Procedure 3				○		
	BR-41	Diagnostic Procedure 2			○			
	BR-41	Diagnostic Procedure 1	○					
Preliminary Check	BR-36	Preliminary Check 4	○	○	○	○	○	○
	BR-36	Preliminary Check 3	○	○				
	BR-35	Preliminary Check 2		○			○	
	BR-34	Preliminary Check 1			○	○		

Preliminary Check 1

CHECK

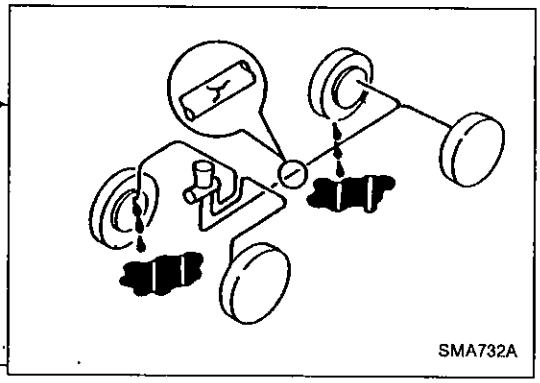


Check brake fluid level in reservoir tank.

N.G. → Fill up brake fluid

O.K.

CHECK

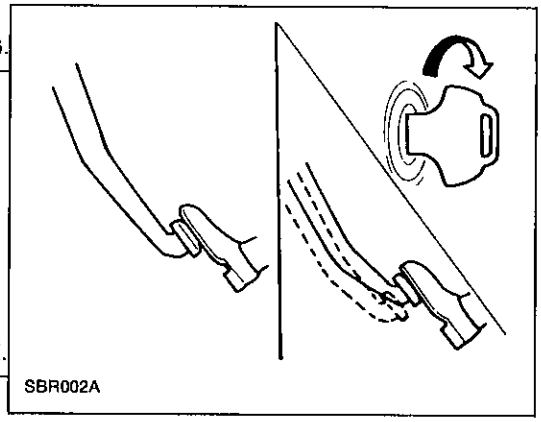


Check brake system.
Refer to CHECK AND ADJUSTMENT.

N.G. ← Repair brake system.

O.K.

CHECK

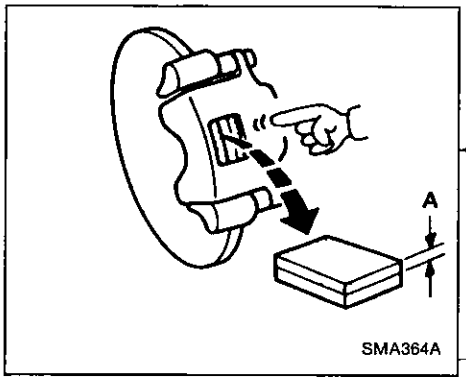


Check brake booster operation and airtightness.
Refer to "Inspection" of BRAKE BOOSTER.

N.G. ← Repair or replace booster system.

O.K.

CHECK

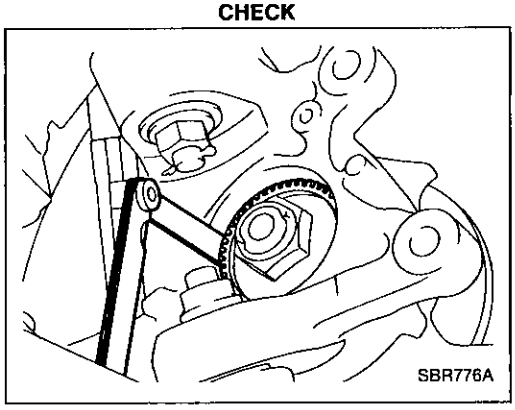


Check brake pads and rotor.
Refer to "Inspection" of FRONT and REAR DISC BRAKE.

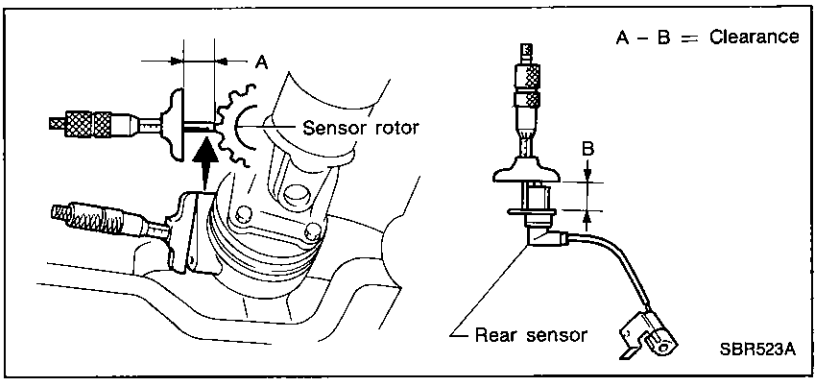
N.G. → Replace malfunctioning parts.

Preliminary Check 2

CHECK



CHECK

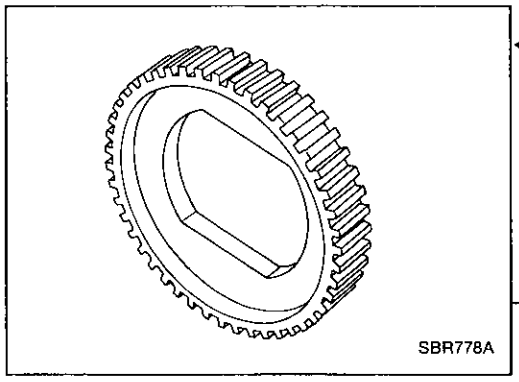


Check sensor clearance.

	Clearance mm (in)
Front wheel sensor	0.21 - 0.71 (0.0083 - 0.0280)
Rear sensor	0.35 - 0.625 (0.0138 - 0.0246)

N.G. → Check sensor for the following items:
- Dust, foreign materials, etc., at fastening portion
- Improper installation
- Breakage

O.K. → CHECK



Check sensor rotor for teeth damage.

O.K. → Repair or replace malfunctioning sensor.

N.G. → Replace sensor rotor with wheel hub or companion flange as a set.

Preliminary Check 3, 4

Preliminary Check 3

CHECK

See page BR-41.

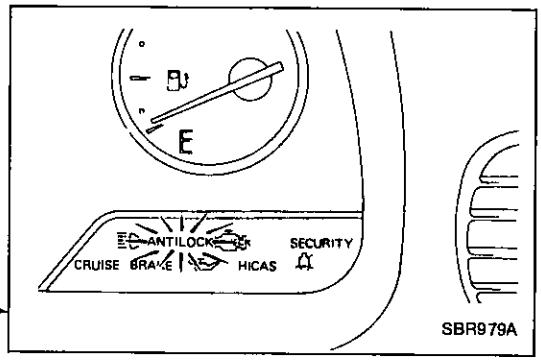
N.G. → Replace.

O.K.

Measure each sensor resistance.
0.8 - 1.2 kΩ

Preliminary Check 4

CHECK

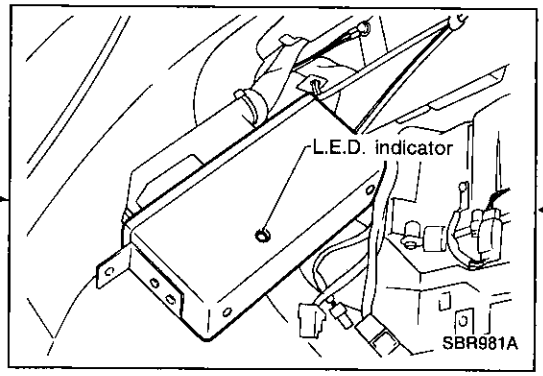


Check warning lamp activation.
When ignition switch is turned on, warning lamp turns on.

O.K. ↓

N.G. → Check fuse.
Check bulb condition and remedy.

CHECK

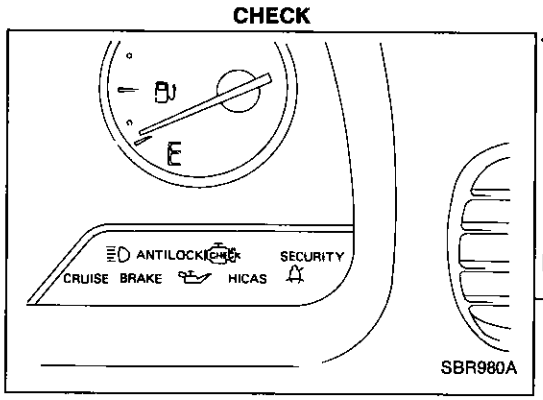


- Keep engine on and running.
- Count the number of L.E.D. flashes during 5 to 10 second "OFF" period.

↓

Go to Self-diagnosis.
(See next page.)

CHECK

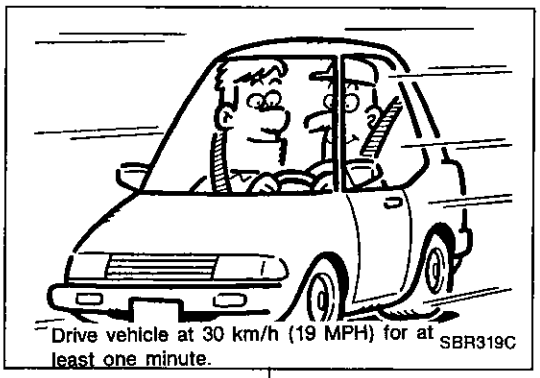


Check warning lamp for deactivation.
When engine starts, warning lamp deactivates.

N.G. →

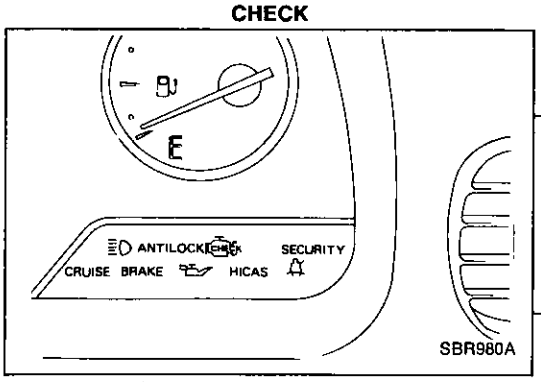
↓ O.K.

DRIVE



Drive vehicle at 30 km/h (19 MPH) for at least one minute.

CHECK



Ensure warning lamp remains off while driving.

N.G. → (to L.E.D. indicator)

O.K. → If Preliminary Check 2 is not performed and there is abnormal ABS operation, perform Preliminary Check 2.

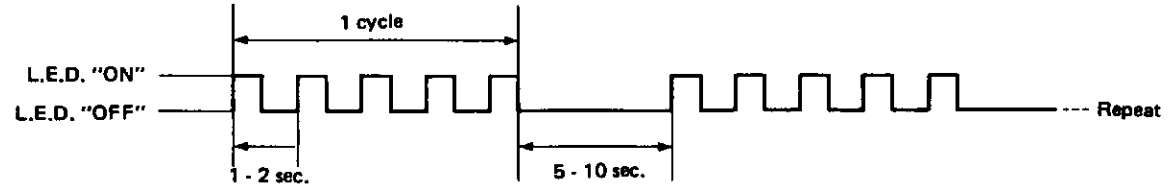
Self-diagnosis

CHECKING THE NUMBER OF L.E.D. FLASHES

When a problem occurs in the ABS, the warning light on the instrument panel comes on. As shown in the Table, the control unit performs self-diagnosis.
To obtain satisfactory self-diagnosing results, the vehicle must be driven above 30 km/h (19 MPH) for at least one minute before the self-diagnosis is performed. After the vehicle is stopped, the number of L.E.D. flashes is counted while the engine is running.
The L.E.D. is located on the control unit, identifying a malfunctioning part or unit by the number of flashes. Both the warning light and the L.E.D. persistently activate, even after a malfunctioning part or unit has been repaired, unless the ignition switch is turned "OFF". After repairs, turn the ignition switch "OFF". Then start the engine and drive the vehicle over 30 km/h (19 MPH) for at least one minute to ensure that the malfunctioning part or unit has been repaired properly.
If more than two circuits malfunction at the same time, the L.E.D. will flash to indicate one of the malfunctioning circuits. After the circuit has been repaired, the L.E.D. will then flash to indicate that the other circuit is malfunctioning.

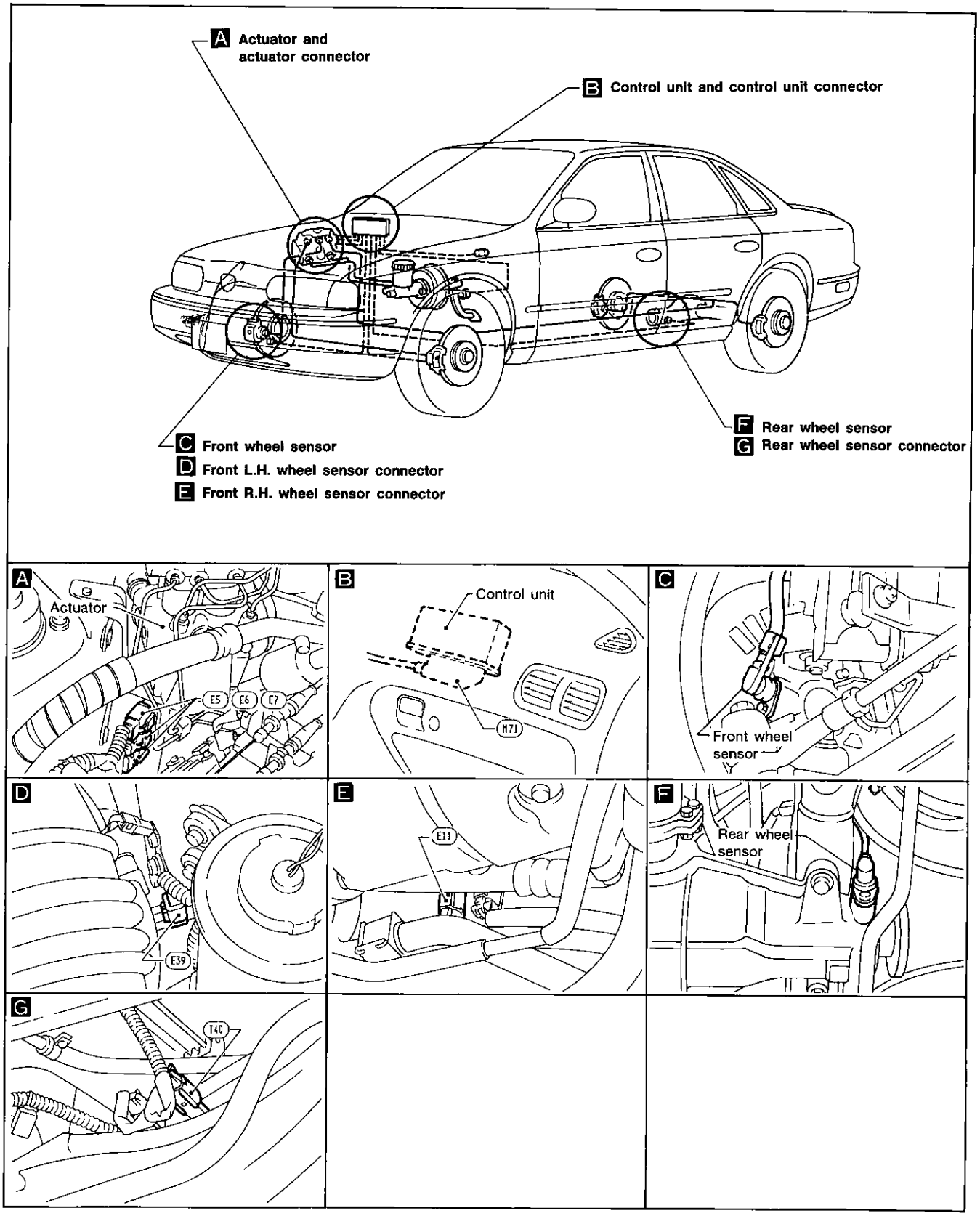
No. of L.E.D. flashes	Malfunctioning part or unit	Diagnostic Procedure
1	Left front actuator solenoid circuit	Diagnostic Procedure 6
2	Right front actuator solenoid circuit	
3 or 4	Rear actuator solenoid circuit	
5	Left front wheel sensor circuit	Diagnostic Procedure 7
6	Right front wheel sensor circuit	
7 or 8	Rear wheel sensor circuit	
9	Motor and motor relay	Diagnostic Procedure 8
10	Solenoid valve relay	Diagnostic Procedure 9
16 or continuous	Control unit	Diagnostic Procedure 10
Warning activates and L.E.D. "OFF"	Power supply or ground circuit for control unit	Diagnostic Procedure 11

Example
Improper operation of left front rotor sensor circuit

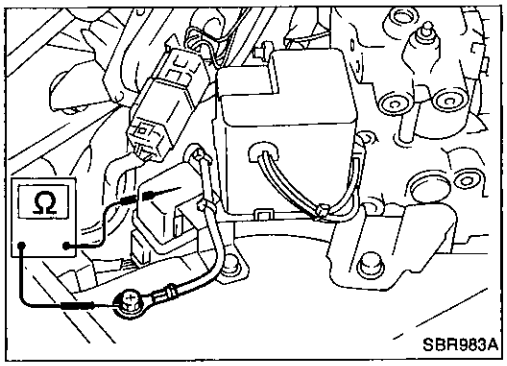


SBR531A

Component Parts and Connector Locations



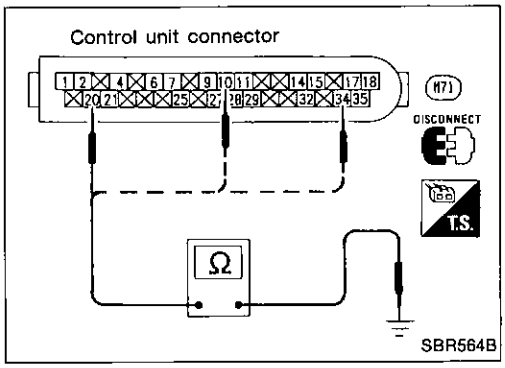
SBR563B



Ground Circuit Check

ACTUATOR MOTOR GROUND

- Check resistance between both terminals.
  Resistance: 0Ω

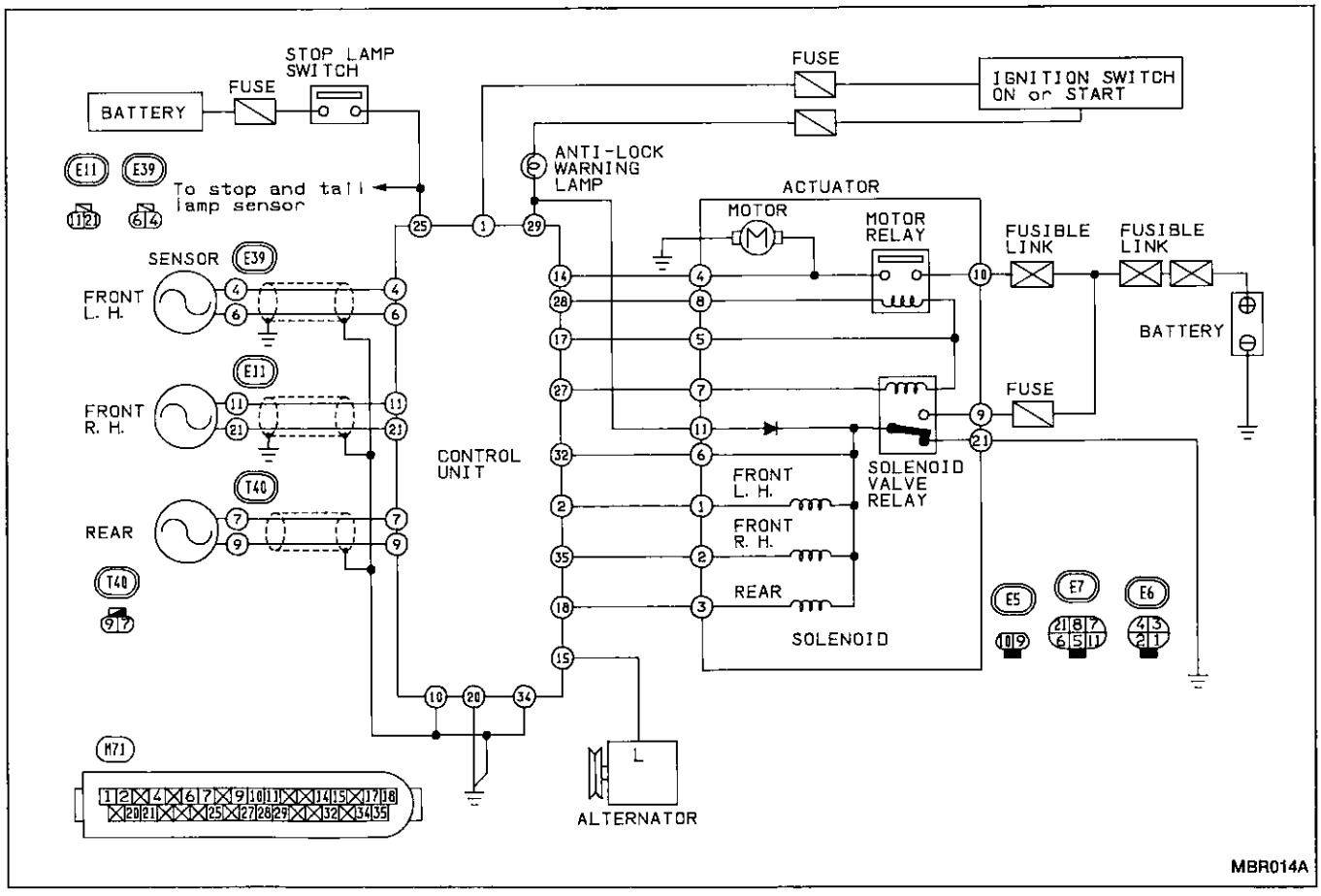


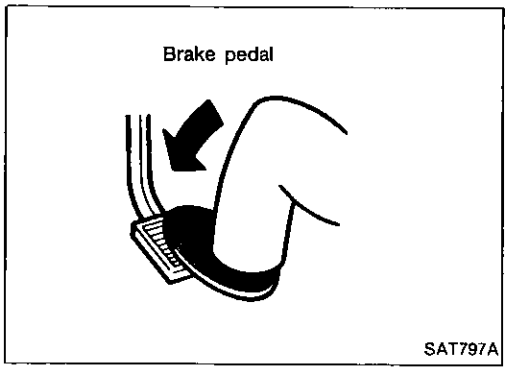
CONTROL UNIT GROUND

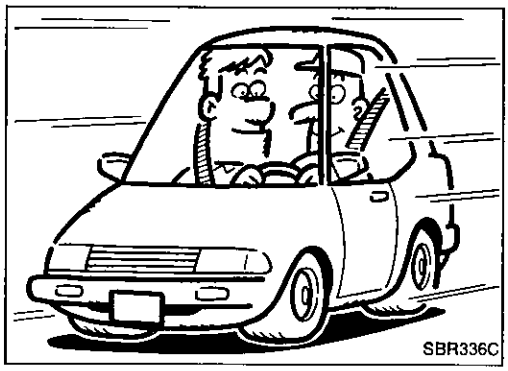
- Check resistance between both terminals.
  Resistance: 0Ω

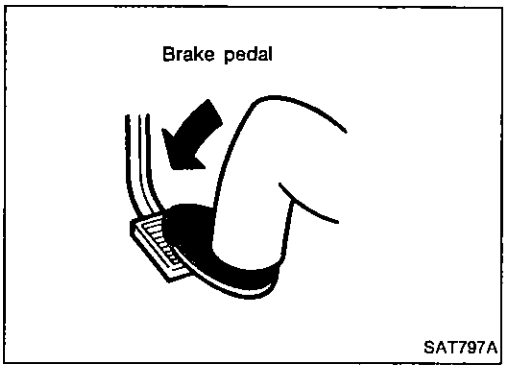
Circuit Diagram for Quick Pinpoint Check

- 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

SYMPTOM: Pedal vibration and noise

Refer to worksheet result.

Check whether the symptom appears only when brake is applied suddenly.
- Yes → When brake is normally applied, ABS works and produces pedal vibration or noise.
- No ↓

Check whether the symptom appears only when engine is started.
- Yes → Refer to Preliminary Check 4 result.
- No ↓

Check whether the symptom appears only when the vehicle speed is within 10 km/h (6 MPH) after starting engine.
- Yes → Check whether the symptom disappears within 5 seconds.
  - No → Ⓐ
  - Yes → ABS may sometimes operate when load is high and voltage is low due to insufficient alternator output.
- No ↓

Check whether the symptom appears while the vehicle is being driven.
- Yes ↓
- No → Ⓐ

No (Appears when brake is not applied.)

Check whether the symptom appears when brake is applied gradually.
- Yes ↓
- No → Check if there are any conditions, among those listed below, when symptom appears.
  - Shifting
  - Operating clutch
  - Passing protrusion

  → No → Ⓑ
  → Yes → Under these conditions individual wheel speed can change suddenly. This may sometimes cause the ABS to operate.

Check if there are any conditions, among those listed below, when symptom appears.
- Low friction road
- High speed cornering
- Passing protrusion

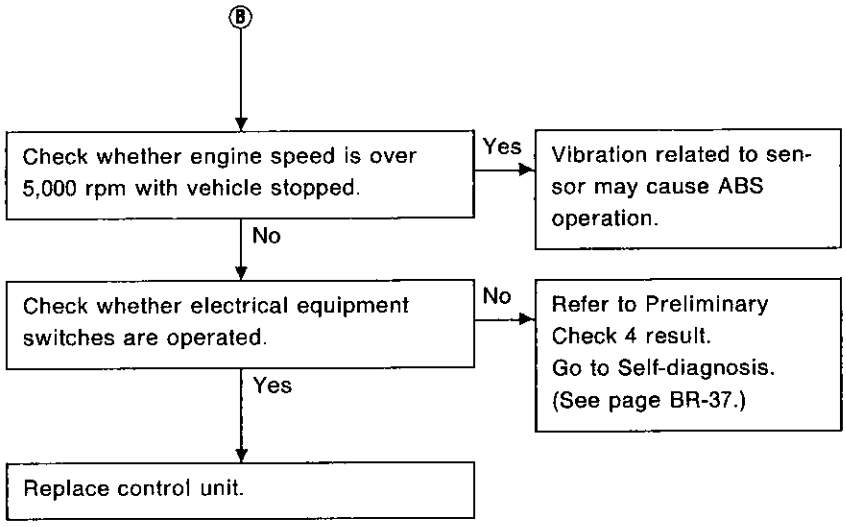
→ Yes → For such conditions, if wheel speed is considerably different between front and rear or left and right, ABS will work normally.

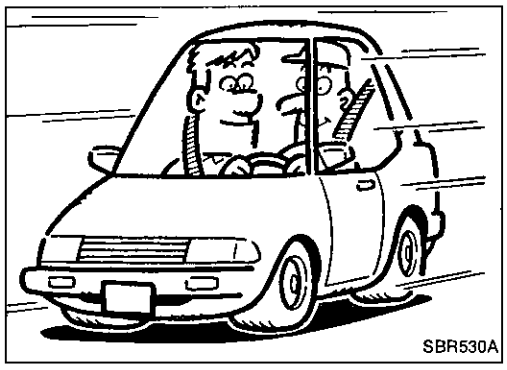
No ↓

Ⓐ

Ⓑ

Diagnostic Procedure 1 (Cont'd)

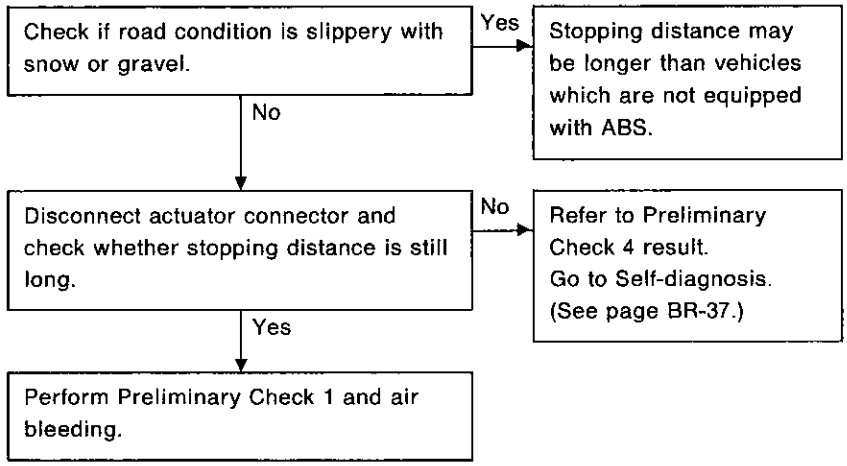


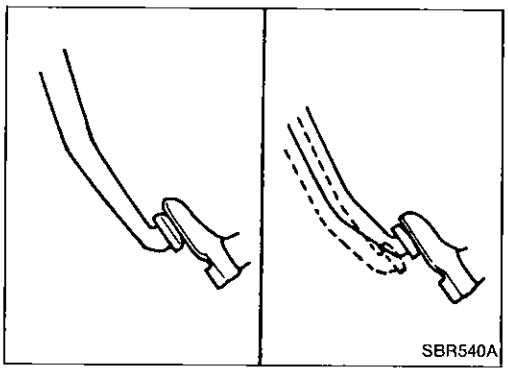


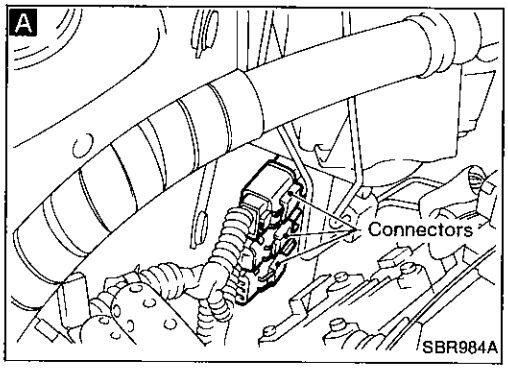
Diagnostic Procedure 2

SYMPTOM: Long stopping distance

Refer to worksheet results.







Diagnostic Procedure 3

SYMPTOM: Abnormal pedal action

Refer to worksheet results.

Check whether brake pedal stroke is abnormally large.
- Yes → Vehicle equipped with ABS may have a tendency for large pedal strokes.
- No ↓

Check that brake pedal force is firm but brake is effective.
- Yes → Normal condition.
- No ↓

A

Disconnect actuator connector and check whether brake is effective.
- Yes → Refer to Preliminary Check 4 result. Go to Self-diagnosis. (See page BR-37.)
- No ↓

Perform Preliminary Check 1.

Diagnostic Procedure 4

SYMPTOM: ABS doesn't work.

Refer to worksheet results.

Check whether warning activates.
- Yes → Refer to Preliminary Check 4 result. Go to Self-diagnosis. (See page BR-37.)
- No ↓

Check whether vehicle speed is under 10 km/h (6 MPH).
- Yes → ABS doesn't work in this condition.
- No ↓

Refer to Preliminary Check 3 result.

O.K. but ABS still doesn't work. ↓

Check actuator by referring to Electrical Components Inspection — ACTUATOR. (See page BR-53.)

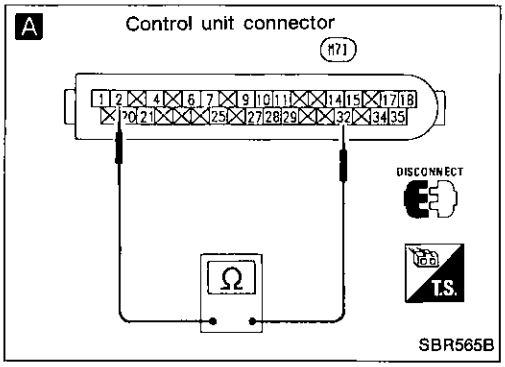
Diagnostic Procedure 5

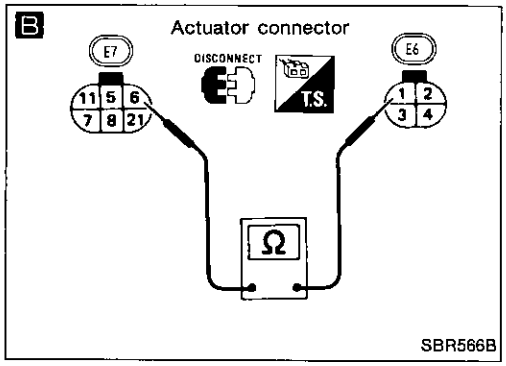
SYMPTOM: ABS works but warning activates.

Check whether alternator produces proper output.
Refer to EL section.
→ No → Remedy.
↓ Yes

Check whether battery has enough voltage.
Refer to EL section.
→ No → Remedy.
↓ Yes

Refer to Preliminary Check 4 result.
Go to Self-diagnosis. (See page BR-37.)





Diagnostic Procedure 6

ACTUATOR SOLENOID (L.E.D. flashing number 1 - 4)

Remove battery negative terminal connector.
↓

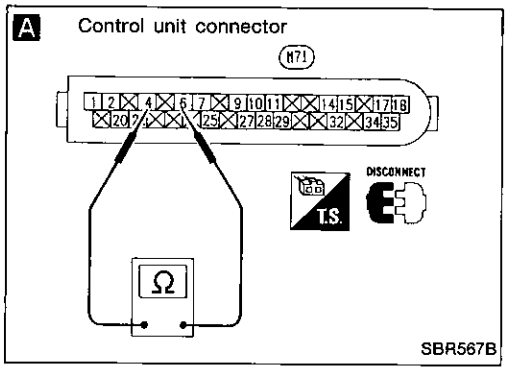
A

CHECK SOLENOID VALVE RESISTANCE.
Disconnect control unit connector.
Check resistance between control unit connector (vehicle side) terminals shown below.
Flashing number 1: ㉜ and ②
Flashing number 2: ㉜ and ㉟
Flashing number 3 or 4: ㉜ and ⑱
Resistance: 0.7 - 1.6Ω
→ O.K. → Replace control unit.
↓ N.G.

B

Disconnect actuator connector.
Check resistance between actuator connector (actuator side) terminals shown below.
Flashing number 1: ⑥ and ①
Flashing number 2: ⑥ and ②
Flashing number 3 or 4: ⑥ and ③
Resistance: 0.7 - 1.6Ω
→ O.K. → Repair harness between actuator connector and control unit connector.
↓ N.G.

Replace actuator.



Diagnostic Procedure 7

WHEEL SPEED SENSOR (L.E.D. flashing number 5 - 8)

Remove battery negative terminal connector.

↓

A

CHECK SPEED SENSOR RESISTANCE.
Disconnect control unit connector.
Check resistance between control unit connector (vehicle side) terminals shown below.
Flashing number 5: ④ and ⑥
Flashing number 6: ⑪ and ㉑
Flashing number 7 or 8: ⑦ and ⑨
Resistance: 0.8 - 1.2kΩ

O.K. → Replace control unit.

↓ N.G.

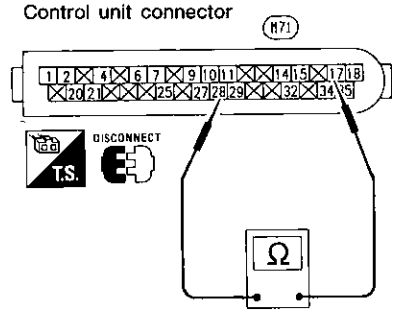
Refer to Preliminary Check 3 result.
Check whether sensor has 0.8 - 1.2 kΩ resistance.

N.G. → Replace sensor.

↓ O.K.

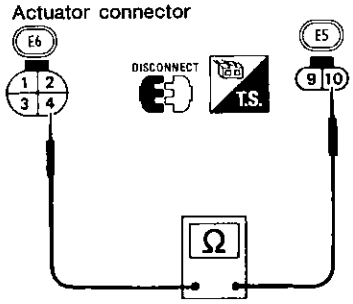
Repair harness between sensor connector and control unit connector.

A Control unit connector



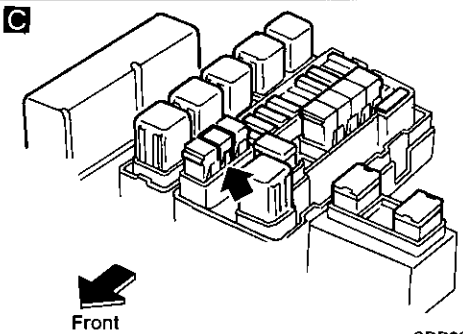
SBR568B

B Actuator connector



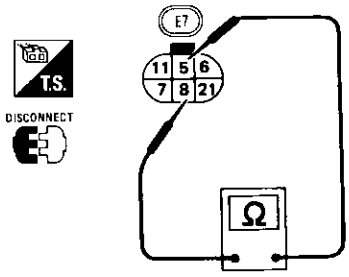
SBR569B

C



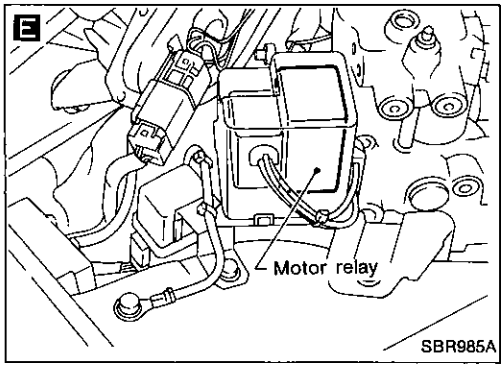
SBR986A

D



SBR570B

E



SBR985A

Diagnostic Procedure 8

ACTUATOR MOTOR RELAY (L.E.D. flashing number 9)

Remove battery negative terminal connector.

A

CHECK MOTOR RELAY SOLENOID RESISTANCE.
Disconnect control unit connector.
Check resistance between control unit connector (vehicle side) terminals ⑰ and ㉘.
Resistance: 45 - 55Ω

N.G. → **D**

Disconnect actuator connector.
Check resistance between actuator connector (actuator side) terminals ⑧ and ⑤.
Resistance: 45 - 55Ω

O.K. → **B**

N.G. → **E**

Replace motor relay.

O.K. → Repair harness between actuator and control unit.

B

CHECK MOTOR RELAY DEACTIVATION.
Disconnect actuator connector.
Check continuity between actuator connector (actuator side) terminals ④ and ⑩.

Yes → **E**

Replace motor relay.

No → **C**

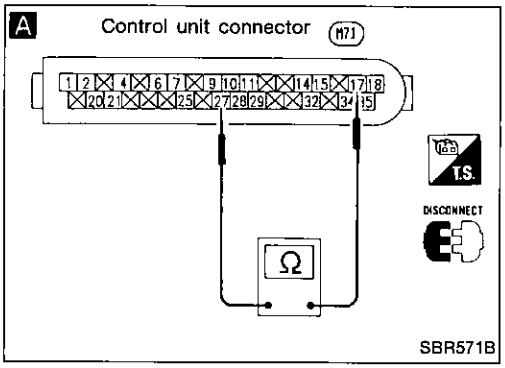
Check if motor's fusible link is blown.

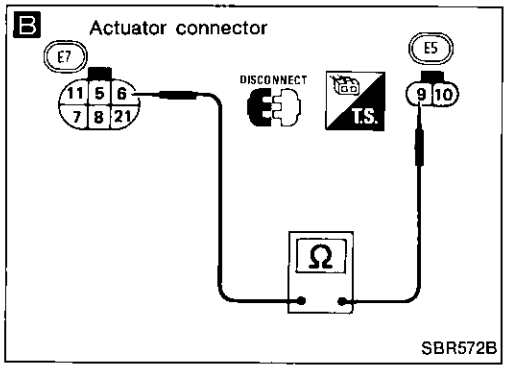
No → Perform Electrical Components Inspection — ACTUATOR. (See page BR-48.)

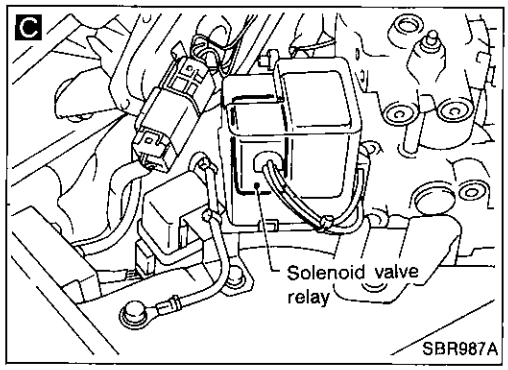
O.K. → Replace control unit.

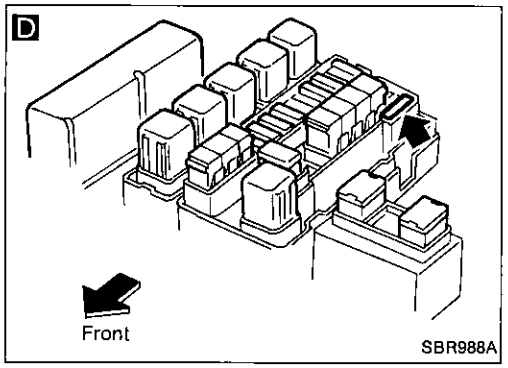
N.G. → Replace actuator.

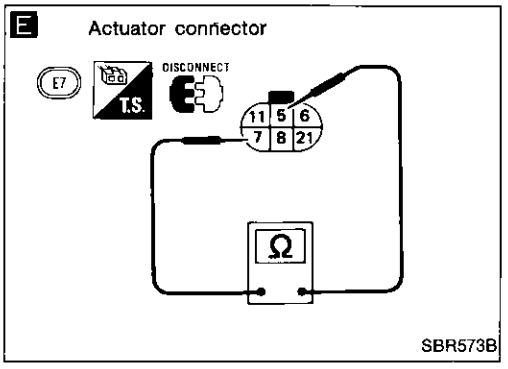
Yes → Replace fusible link.











Diagnostic Procedure 9

ACTUATOR SOLENOID VALVE RELAY (L.E.D. flashing number 10)

Remove battery negative terminal connector.

A

CHECK SOLENOID VALVE RELAY RESISTANCE.
Disconnect control unit connector.
Check resistance between control unit connector (vehicle side) terminals ㉗ and ⑰.
Resistance: 80 - 90Ω

N.G. → **E**

Check resistance between actuator connector (actuator side) terminals ⑦ and ⑤.
Resistance: 80 - 90Ω

O.K. → Repair harness between actuator and control unit.

N.G. → **C**

Replace solenoid valve relay.

O.K. →

B

CHECK SOLENOID VALVE RELAY MOVEMENT.
Disconnect actuator connector.
Check continuity between actuator connector (actuator side) terminals ⑥ and ⑨.

Yes → **C**

Replace solenoid valve relay.

No →

D

Check if solenoid valve relay fuse is blown.

No → Perform Electrical Components Inspection — ACTUATOR.
(See page BR-48.)

N.G. → Replace actuator.

O.K. → Replace control unit.

Yes → Replace fuse.

Diagnostic Procedure 10

CONTROL UNIT (L.E.D. flashing number 16)

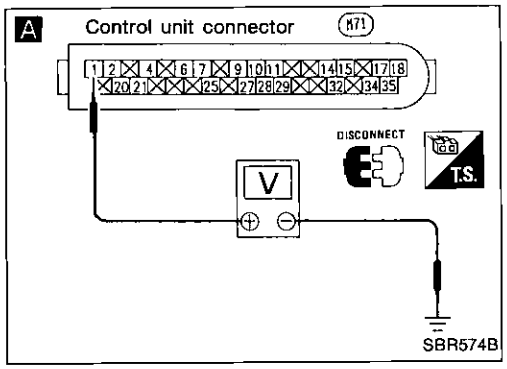
Control unit malfunction.

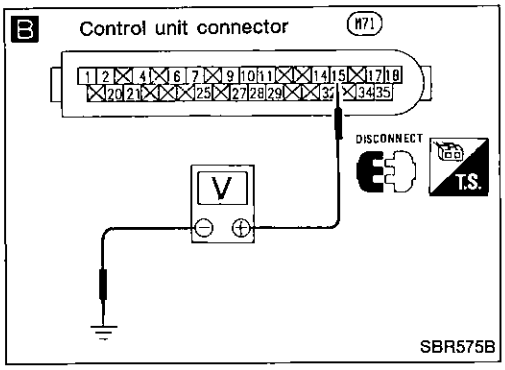
↓

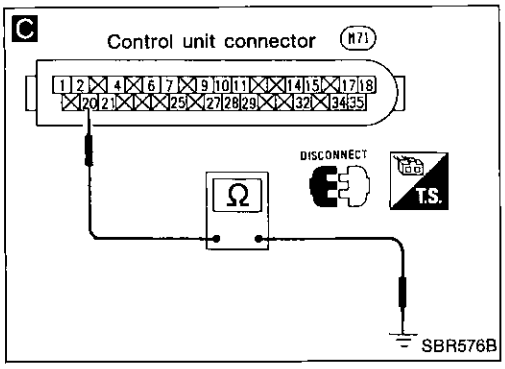
Replace control unit.

Diagnostic Procedure 11

CONTROL UNIT OR POWER SUPPLY AND GROUND CIRCUIT (Warning activates but L.E.D. comes off.)







A

CHECK CONTROL UNIT POWER SUPPLY.
Disconnect control unit connector.
Check voltage between control unit connector (vehicle side) terminal ① and body ground with ignition switch turned on.

N.G. → Check if control unit "10A" fuse is blown.

- Yes → Replace fuse.
- No → Repair power supply harness.

O.K. ↓

B

CHECK ALTERNATOR L TERMINAL VOLTAGE.
Disconnect control unit connector.
Check voltage between control unit connector (vehicle side) terminal ⑮ and body ground after engine starting.
Voltage: 6V or more

N.G. → Check if other warnings activate.

- Yes → Repair harness between alternator and control unit.
- No → Malfunctioning alternator.

O.K. ↓

C

Check continuity between control unit connector (vehicle side) terminal ⑳ and body ground with ignition switch "OFF".

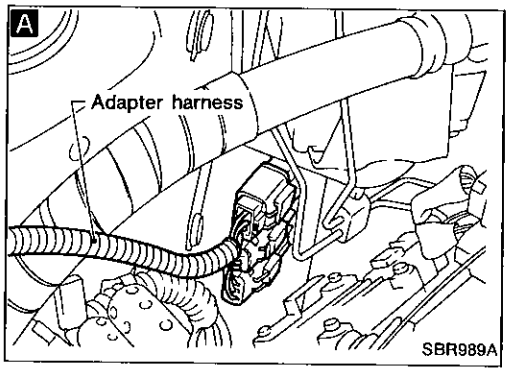
N.G. → Repair ground harness.

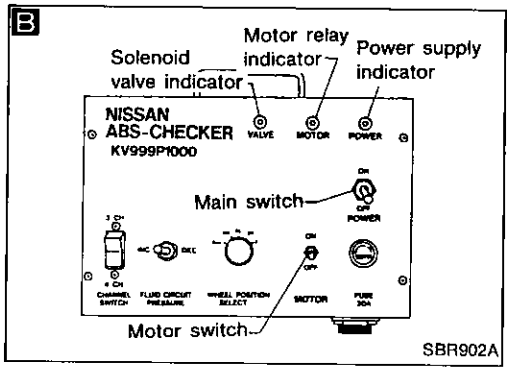
O.K. ↓

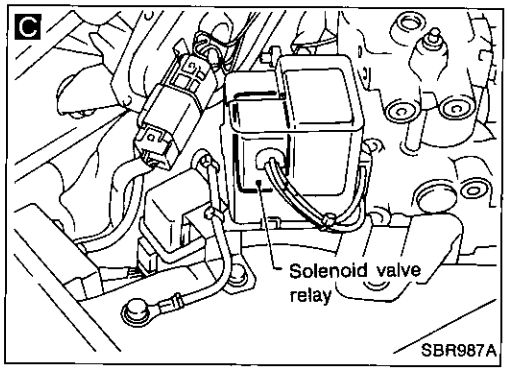
Replace control unit.

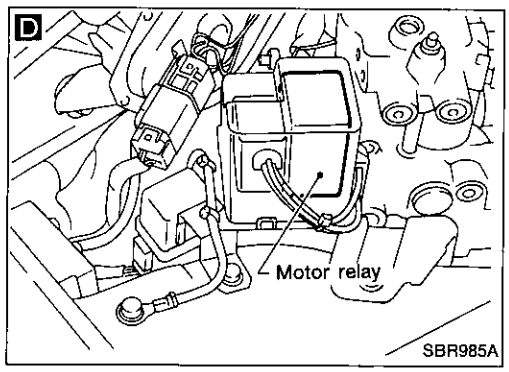
Electrical Components Inspection

ACTUATOR (Not self-diagnostic item)









A

Connect ABS checker to actuator connector and vehicle harness with battery terminal connected and all checker switches turned off.
Use harness for 3 channel.
Set channel select switch to 3 channel.

B

Turn checker main switch on.
Check power supply indicator for coming on.

No → Replace battery with fully charged new one, if checker connection is correct.

Yes

B

Check checker valve relay indicator for coming on.

No → **C** Replace solenoid valve relay, if checker connection is correct.

Yes

B Step Ⓐ

Select one valve — FL, FR or RR. (valves corresponding to each wheel position.)
Select brake circuit pressure decreasing position by switch then turn motor switch on.
Select pressure increasing position.

B

Check motor relay indicator for coming on while motor switch is turned on.

No → **D** Replace motor relay, if checker connection is correct.

Yes

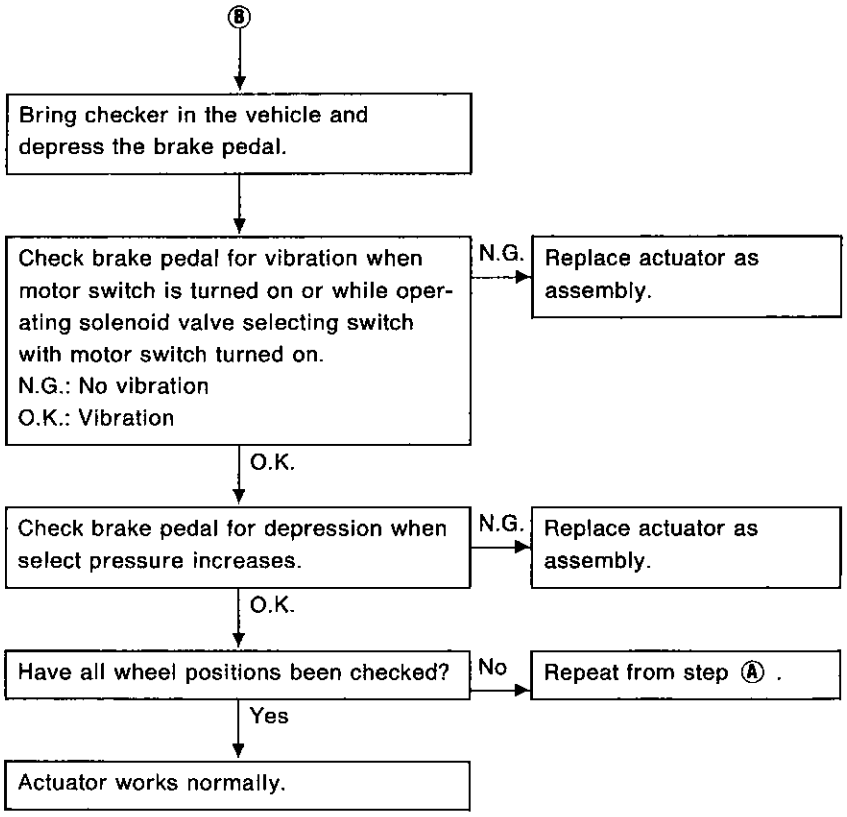
Check motor for operational sound beside the actuator in a quiet place.

No → Replace actuator as assembly, if Diagnostic Procedures 6 - 11 are already performed and checker connection is correct.

Yes

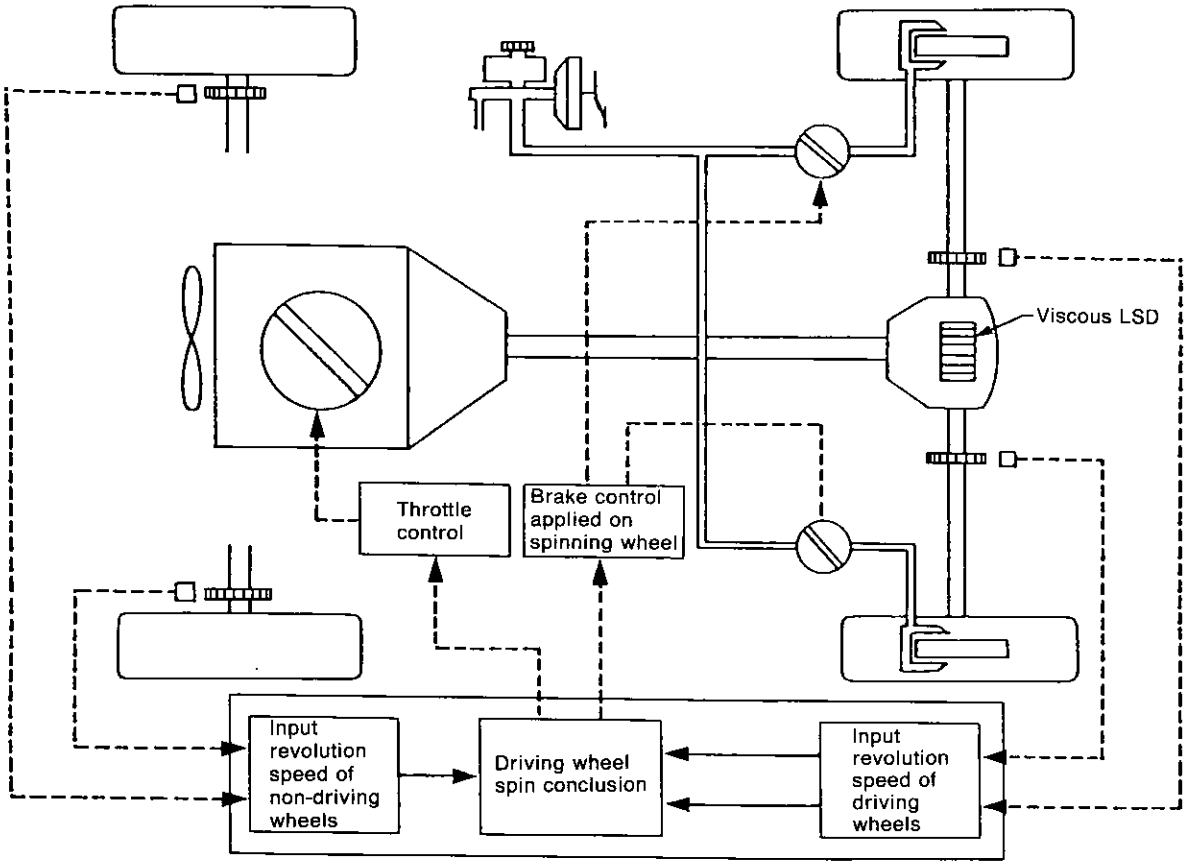
Ⓑ

Electrical Components Inspection (Cont'd)



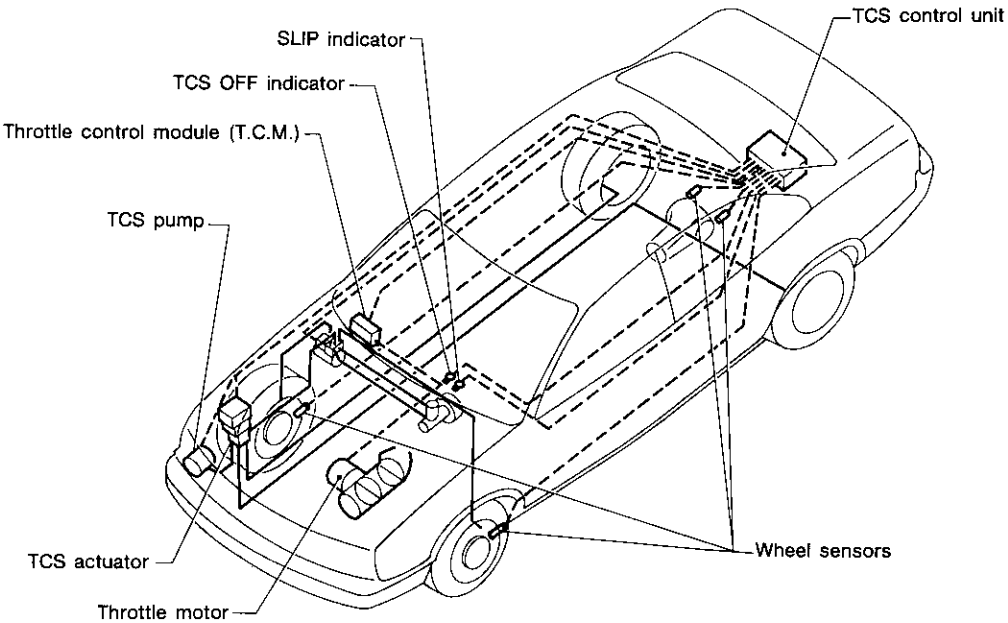
CAUTION:
Do not set checker at pressure decrease position for more than 5 seconds at a time. Actuator solenoid valve may be damaged.

Purpose of TCS



If a driver accelerates hard on a snowy or otherwise slippery road, the driving wheels will start to spin, the degree of acceleration will decrease and the vehicle's stability will be reduced.
With the TCS, all this is replaced with a stable feeling of safety — a car that is easier to drive thanks to the added functionality of TCS.
The TCS uses engine throttle control as well as an advanced system for individual control of the rear left and right brakes. It simply puts an appropriate amount of brake force on the spinning wheel, thus forcing the spin to end. On top of this, there is also Rear Viscous LSD, which neutralizes wheel spin occurring on uneven surfaces or when accelerating while turning. One doesn't need to mention the importance of the stability this renders to the driving wheels.
If both rear wheels should spin at the same time, the system prevents further torque from being applied by the engine by closing the throttle.
As a result of the TCS — the combination of Rear Viscous LSD and TCS — new levels of cornering performance and traction are achieved. This, combined with improved control of the driving wheels, is a vital factor in relieving the driver of stress — while the driver retains firm control of the car.

System Components



This system consists of the following components: 1) Wheel sensors 2) TCS control unit 3) Throttle control module (T.C.M.) 4) Throttle motor 5) TCS actuator 6) SLIP indicator 7) TCS OFF indicator.

1. Wheel speed sensors

These are positioned on all four wheels where they measure the individual speed of each wheel.

2. TCS control unit

On the basis of input signals from the wheel sensors and other sources, this control unit evaluates factors such as wheel slip and road and driving conditions. After evaluation, it sends control signals to the TCS actuator and the throttle control module. This is the heart of this optimal traction control system.
This control unit possesses both self-diagnosis and fail-safe functions. When an abnormality is detected, the system releases its control over the throttle and brakes and returns everything to normal.
In addition, this unit possesses an ABS function.

3. Throttle control module (T.C.M.)

This module receives the signal from the TCS control unit, whereupon it immediately alerts the throttle motor, which in turn optimally controls the degree of opening of the secondary throttle.
Here, again, a fail-safe device will operate if something is found to be out of the ordinary. In such a case, the TCS control unit is alerted and control of the throttle function is immediately released.

4. Throttle motor

The secondary throttle, positioned upstream of the throttle, the latter being controlled by the driver, opens and shuts in accordance with the throttle control module (T.C.M.) signals, thereby regulating engine drive torque.

5. TCS actuator

According to the signal from the TCS control unit, the degree of wheel spin is optimally controlled by increasing, holding or decreasing the individual brake fluid pressure of the left and right rear brakes.

6. SLIP indicator

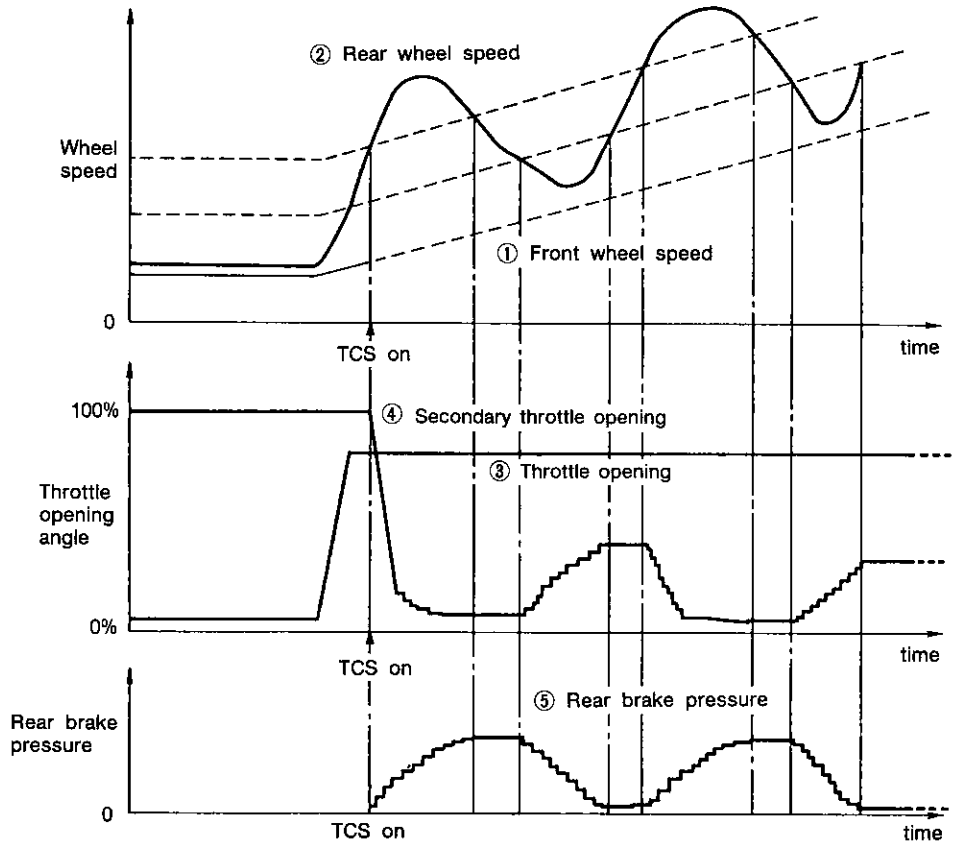
This indicator will light when the TCS system is operating, thus alerting the driver to the fact that the road surface is slippery and informing the driver of when the vehicle is nearing its limits of stability.

7. TCS OFF indicator

When the TCS cancel switch is turned ON, this indicator will light and the TCS will not operate.

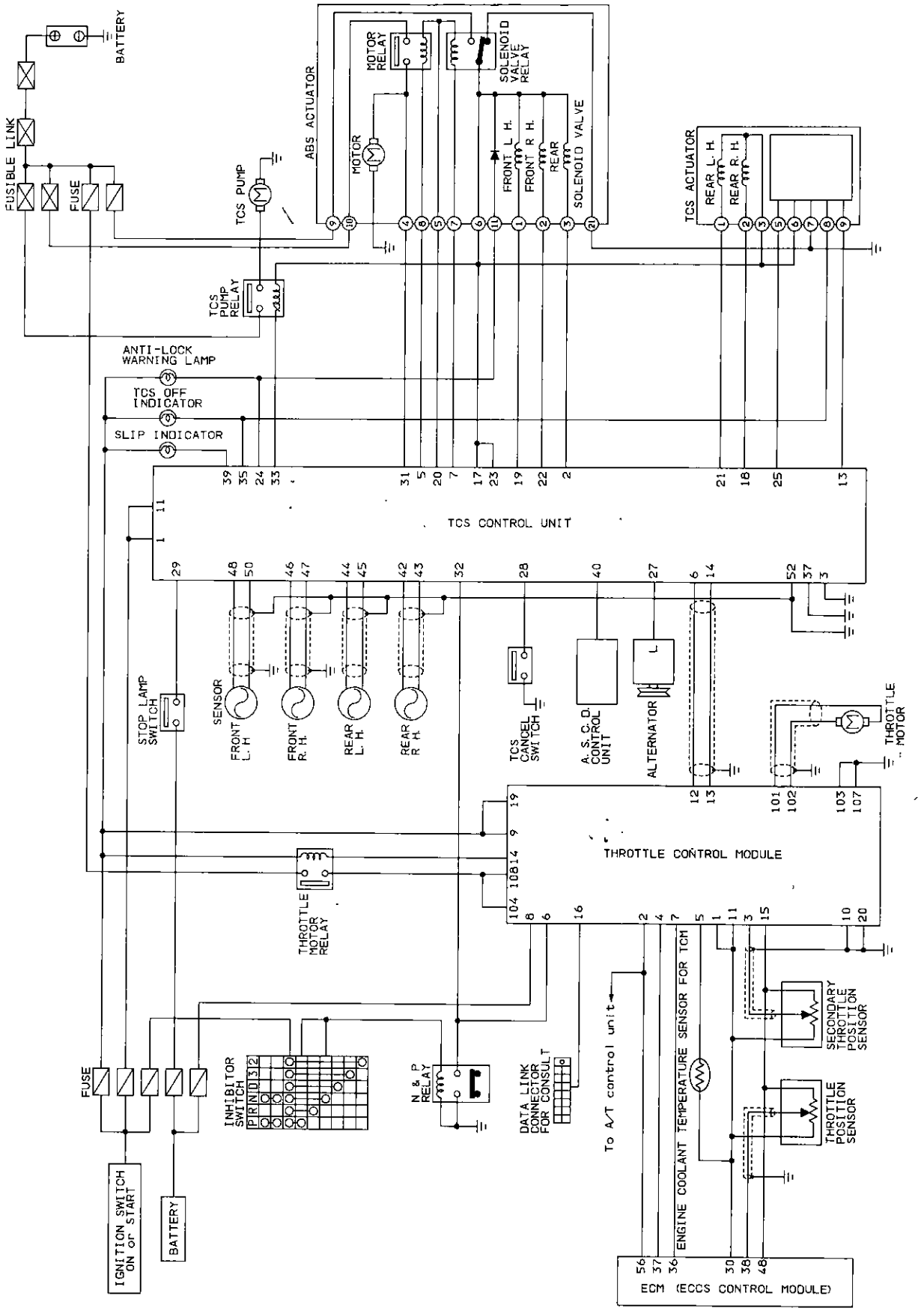
In addition, when an abnormality is detected, this system will enter fail-safe. At this time, the SLIP indicator and the TCS OFF indicator will light, and/or the ABS warning lamp will light.

TCS Functions

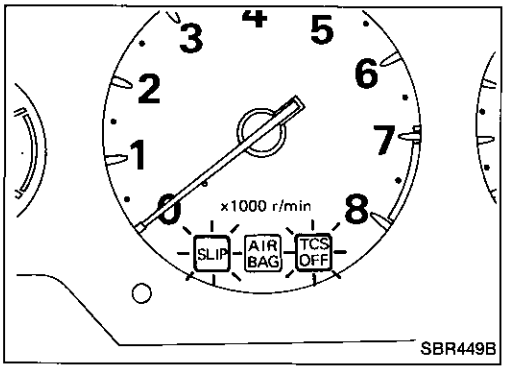


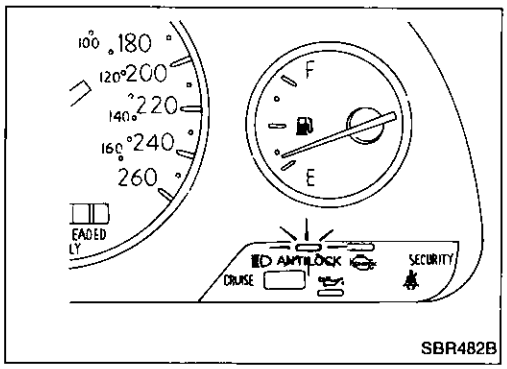
1. Taking the average speed of the front wheels as a base ①, the wheel speed of the rear (driving) wheels ② is continuously monitored and compared.
2. The driver opens the throttle ③ and the speed of the rear wheels increases as a result. When the wheel speed exceeds a preset TCS ON threshold, the TCS turns itself on. The secondary throttle ④ closes as the rear brake oil pressure is increased ⑤.
3. When the rear wheel speed decreases to a level between the thresholds of TCS ON and TCS OFF, the throttle position and brake oil pressure level are held.
4. Finally, when the rear wheel speed drops below the TCS OFF threshold, the system switches itself off, opening the throttle and decreasing the brake oil pressure.
5. Until all tendencies have completely disappeared, steps 2—4 are repeated.

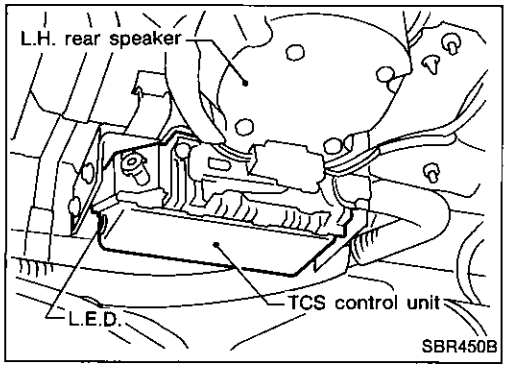
Circuit Diagram



MBR054A







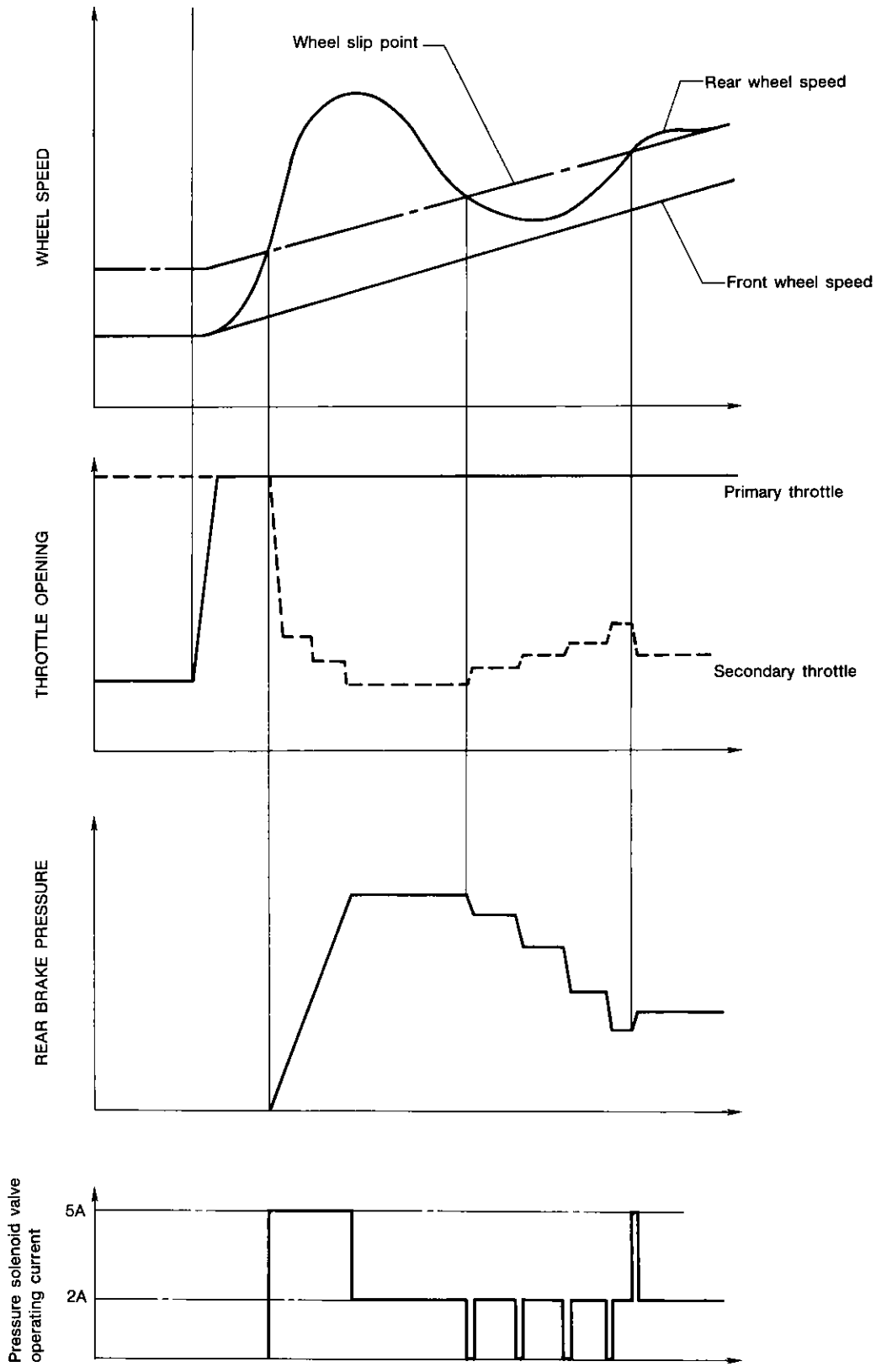
Components for TCS Brake System

TCS CONTROL UNIT

The control unit computes the rotating speed of each wheel using the signal current sent from the sensor. When the unit judges the "SLIP" for the driven wheel(s), it supplies a DC current of about 5A, about 2A or 0A to the TCS actuator pressure solenoid valve provided for each rear brake, and/or it sends the secondary throttle valve opening signal to the throttle control module (T.C.M.). The TCS control unit also has anti-lock braking system (ABS) control functions.

If an electrically detectable malfunction should occur in the system, the control unit causes the SLIP and TCS OFF indicators, and/or ABS warning lamp to light up, and the L.E.D. indicator to flash the number of times which corresponds to the malfunction location. In this condition, the TCS and/or ABS will be deactivated by the control unit.

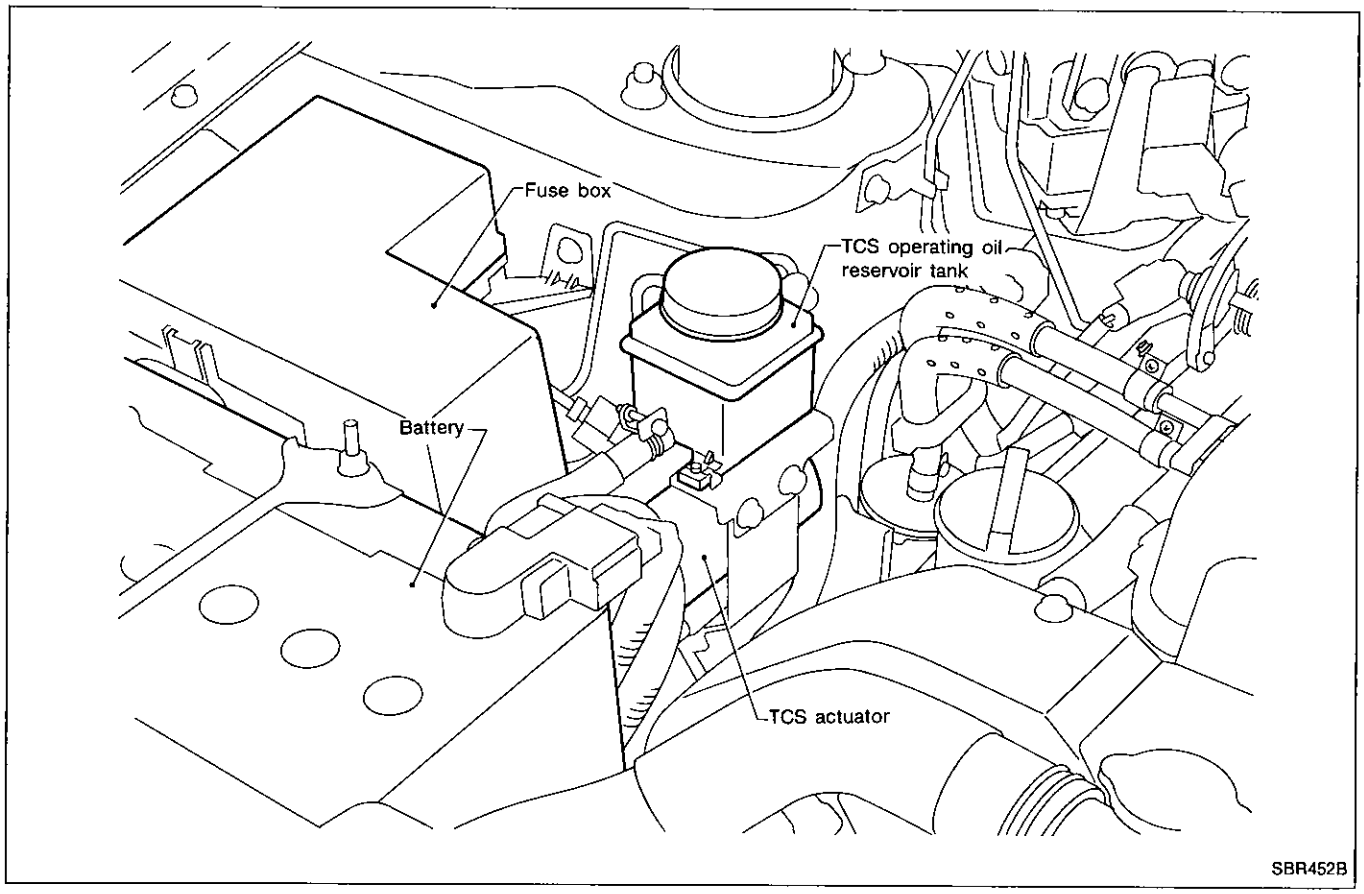
Components for TCS Brake System (Cont'd)



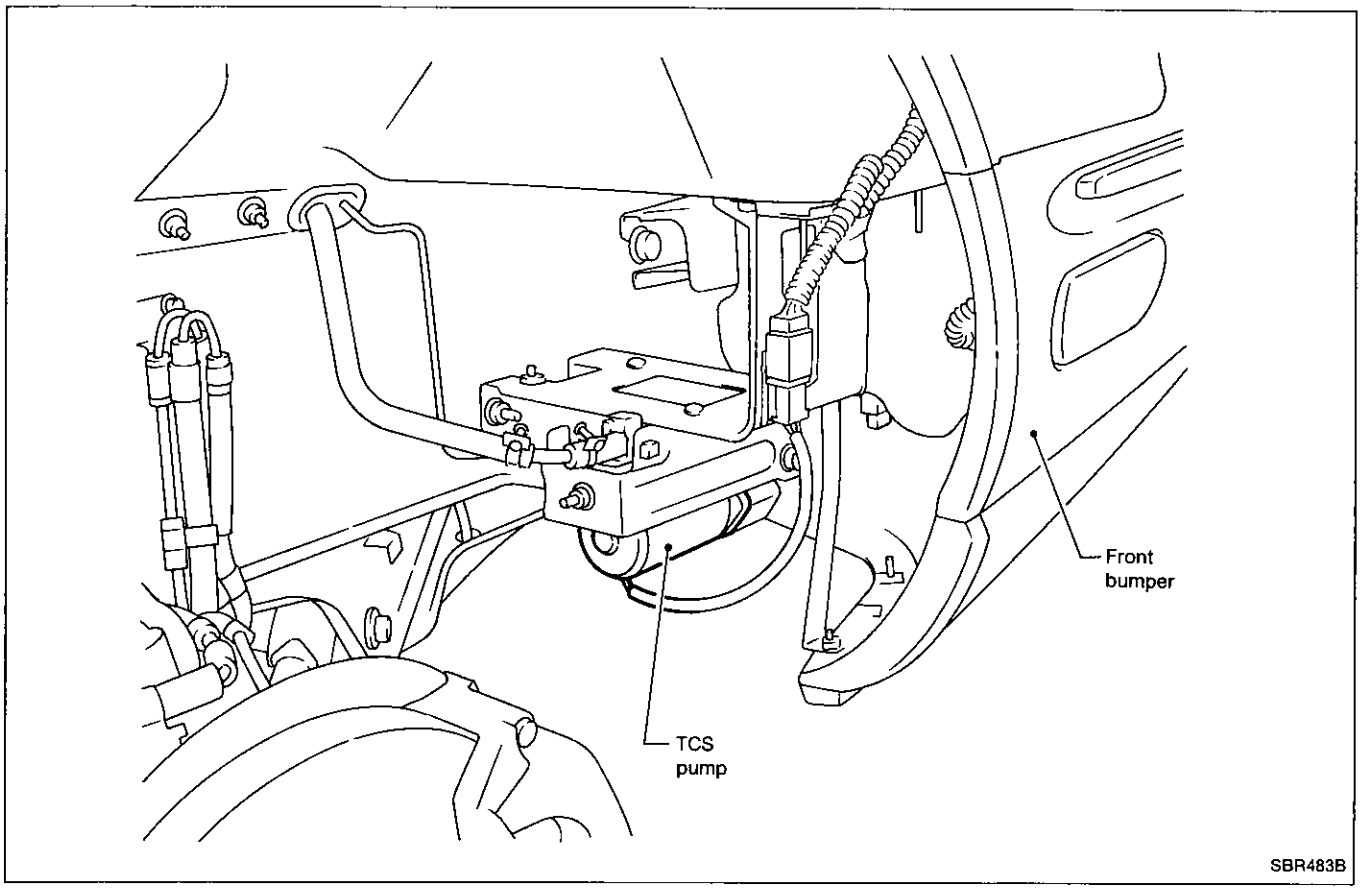
SBR451B

Components for TCS Brake System (Cont'd)

TCS ACTUATOR



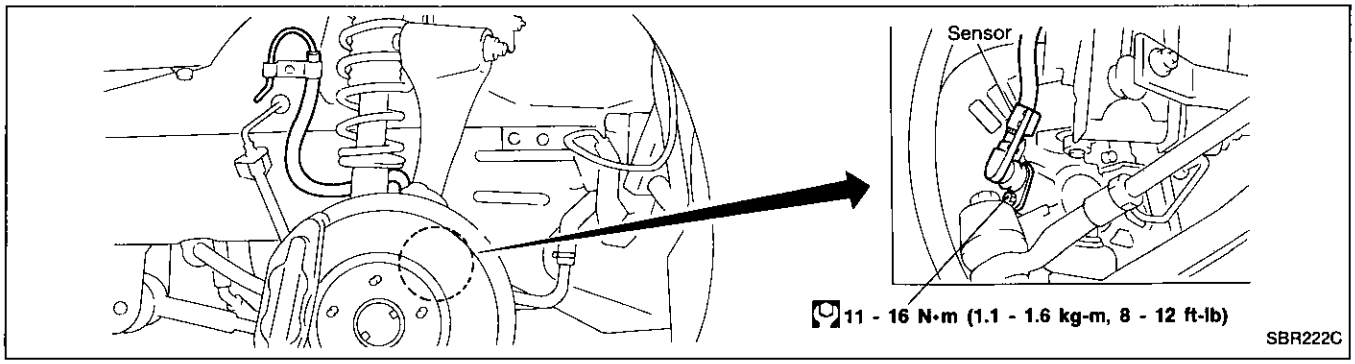
TCS PUMP



Components for TCS Brake System (Cont'd)

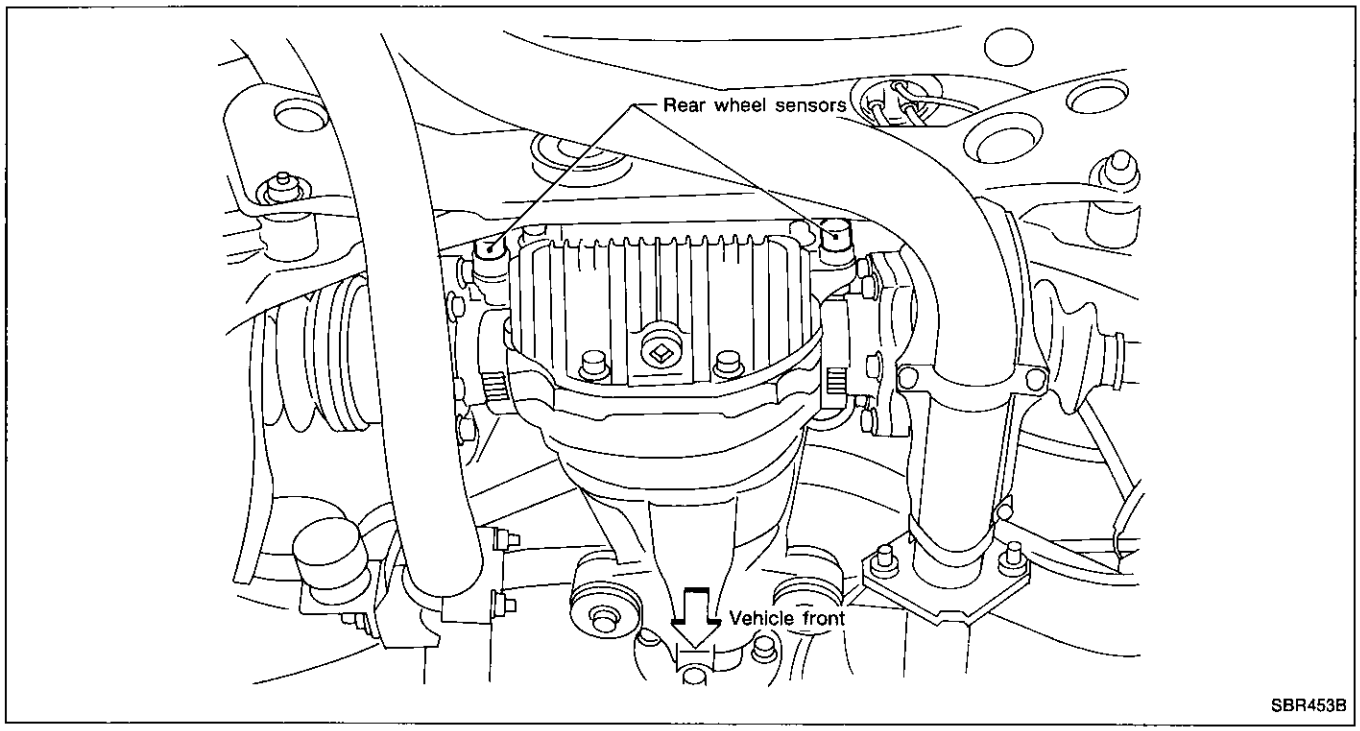
FRONT WHEEL SENSOR

The front wheel sensors are the same as the ones for the ABS.



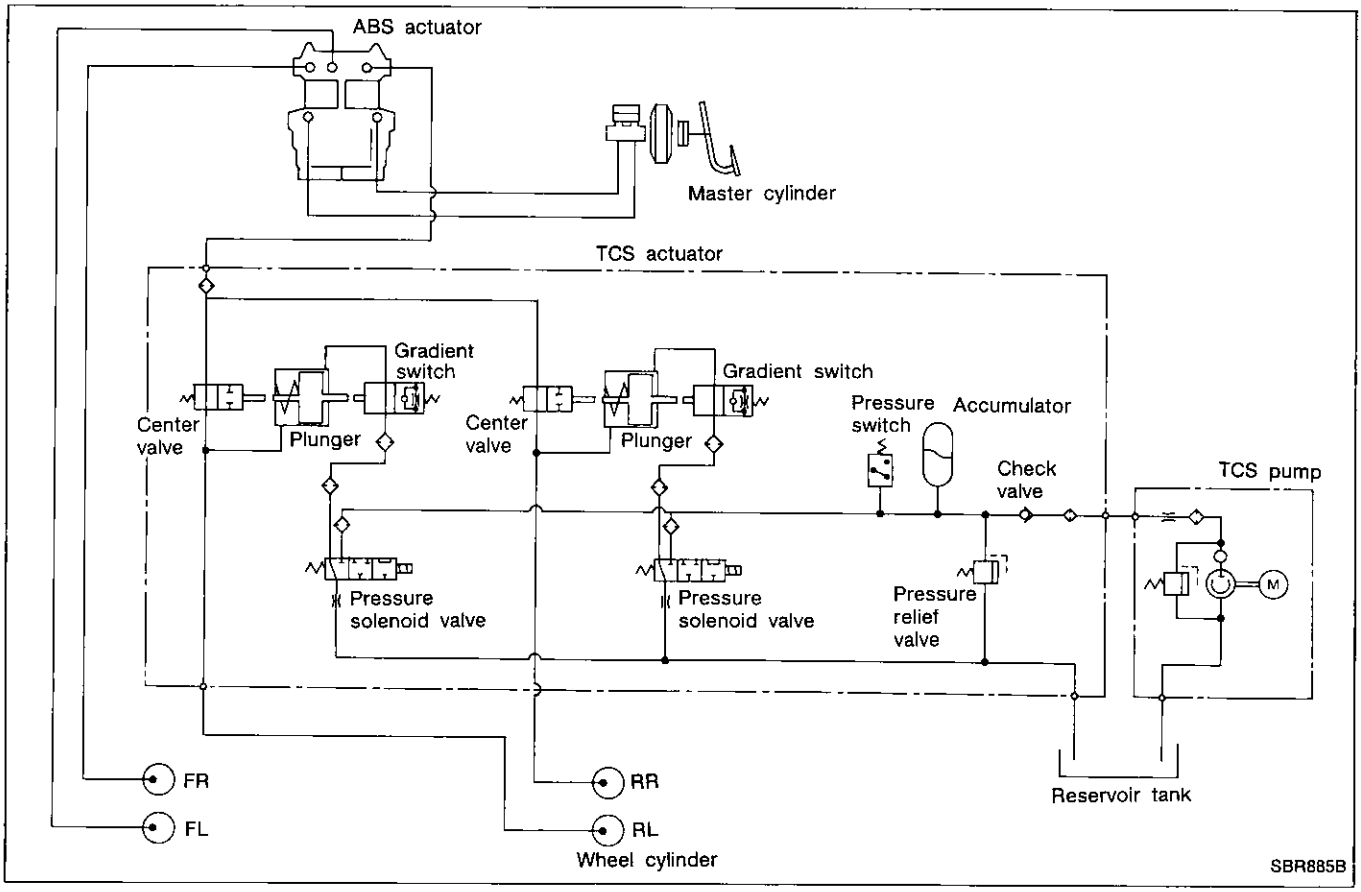
REAR WHEEL SENSOR

2 wheel sensors are located on both the left and right side flanges individually.

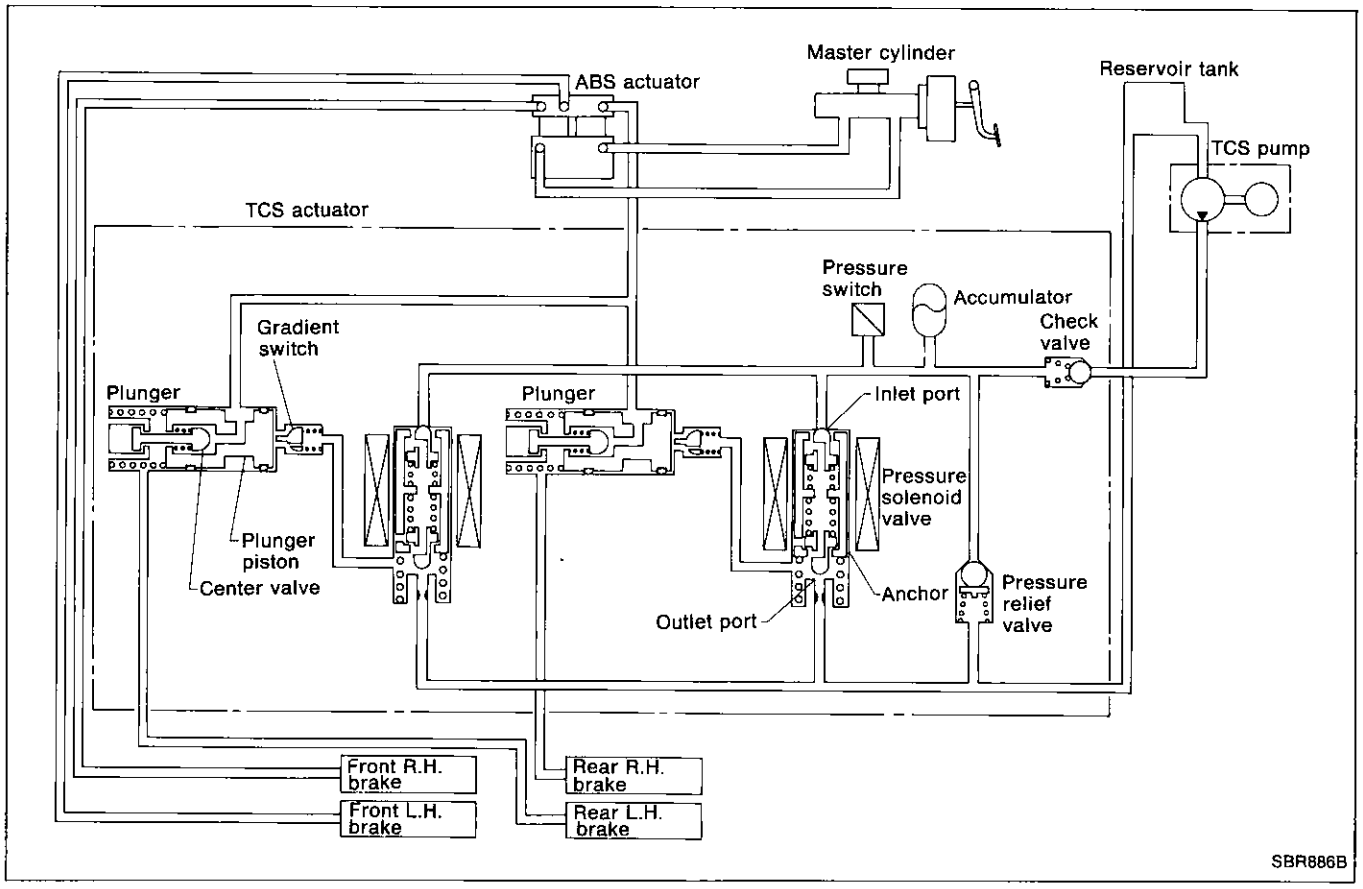


Components for TCS Brake System (Cont'd)

TCS ACTUATOR HYDRAULIC CIRCUIT DIAGRAM

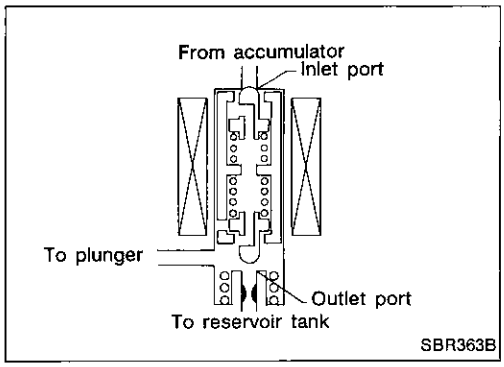


TCS HYDRAULIC CIRCUIT OPERATION



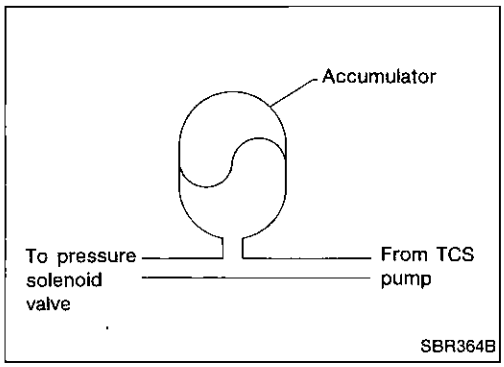
Components for TCS Brake System (Cont'd)

Component parts and their functions



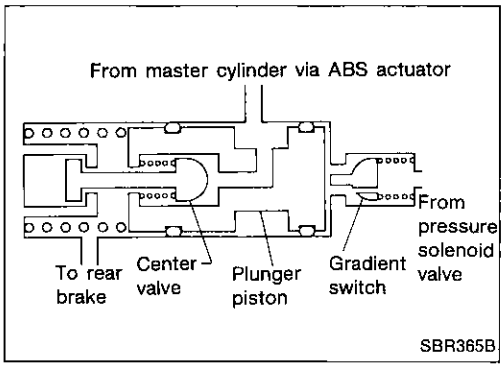
1. Pressure solenoid valve

Current flowing through the solenoid controls the anchor position. Thus, the required ports open or close so that the pressure to the plunger piston is adjusted properly.



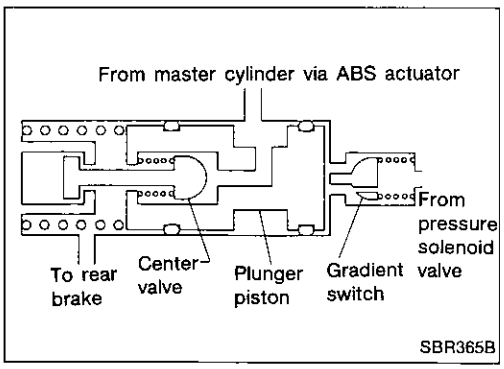
2. Accumulator

The accumulator stores high pressure TCS operating oil delivered from the pump, as TCS-operating oil pressure.



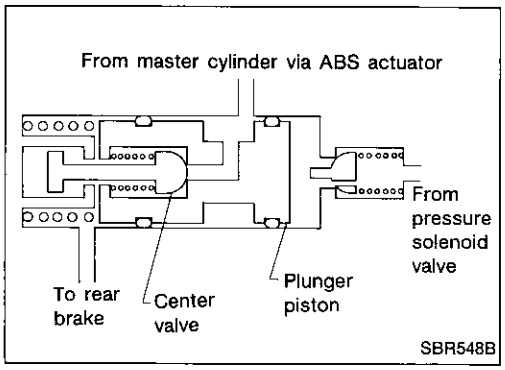
3. Plunger

The plunger consists of a center valve, plunger piston and gradient switch.
The primary chamber (fluid passage from the master cylinder to the rear brake) and secondary chamber (oil passage from the pressure solenoid valve) are separated by a plunger piston.



a. Normal brake operation (TCS does not operate.)

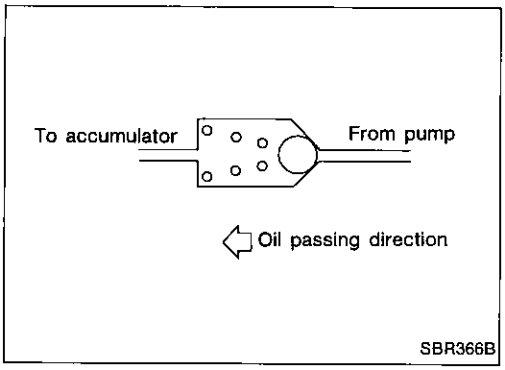
TCS-operating oil pressure is not applied to the plunger piston so that the plunger piston is pushed back by the spring as shown. Therefore, brake operating fluid pressure from the master cylinder is applied to the rear brake through the opening of the center valve.



b. TCS operation

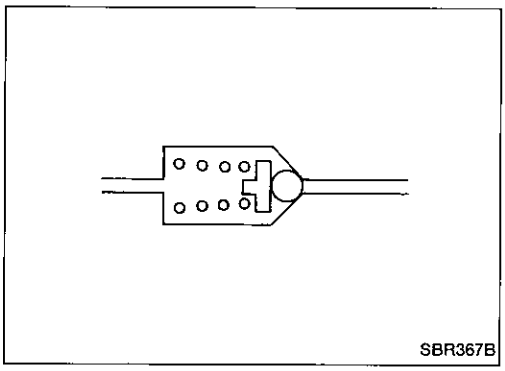
TCS-operating oil pressure from the pressure solenoid valve is applied to the plunger piston through the gradient switch. At this time the primary chamber is shut by the center valve. Therefore, brake operating fluid pressure is produced by moving the plunger piston to the left side as shown.

Components for TCS Brake System (Cont'd)



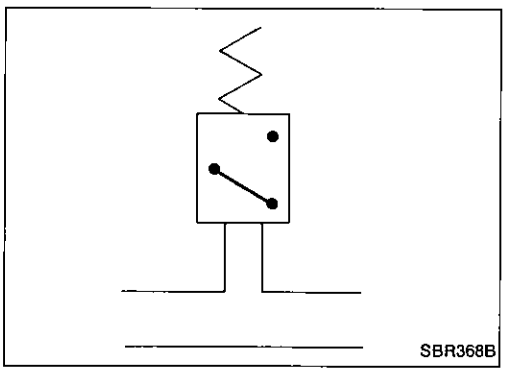
4. Bypass check valve

This valve operates as a one-way valve to prevent returning TCS operating oil pressure to the pump.



5. Pressure relief valve

To prevent the pressure in the accumulator from becoming abnormally high, TCS-operating oil returns to the reservoir tank through this valve.



6. Pressure switch

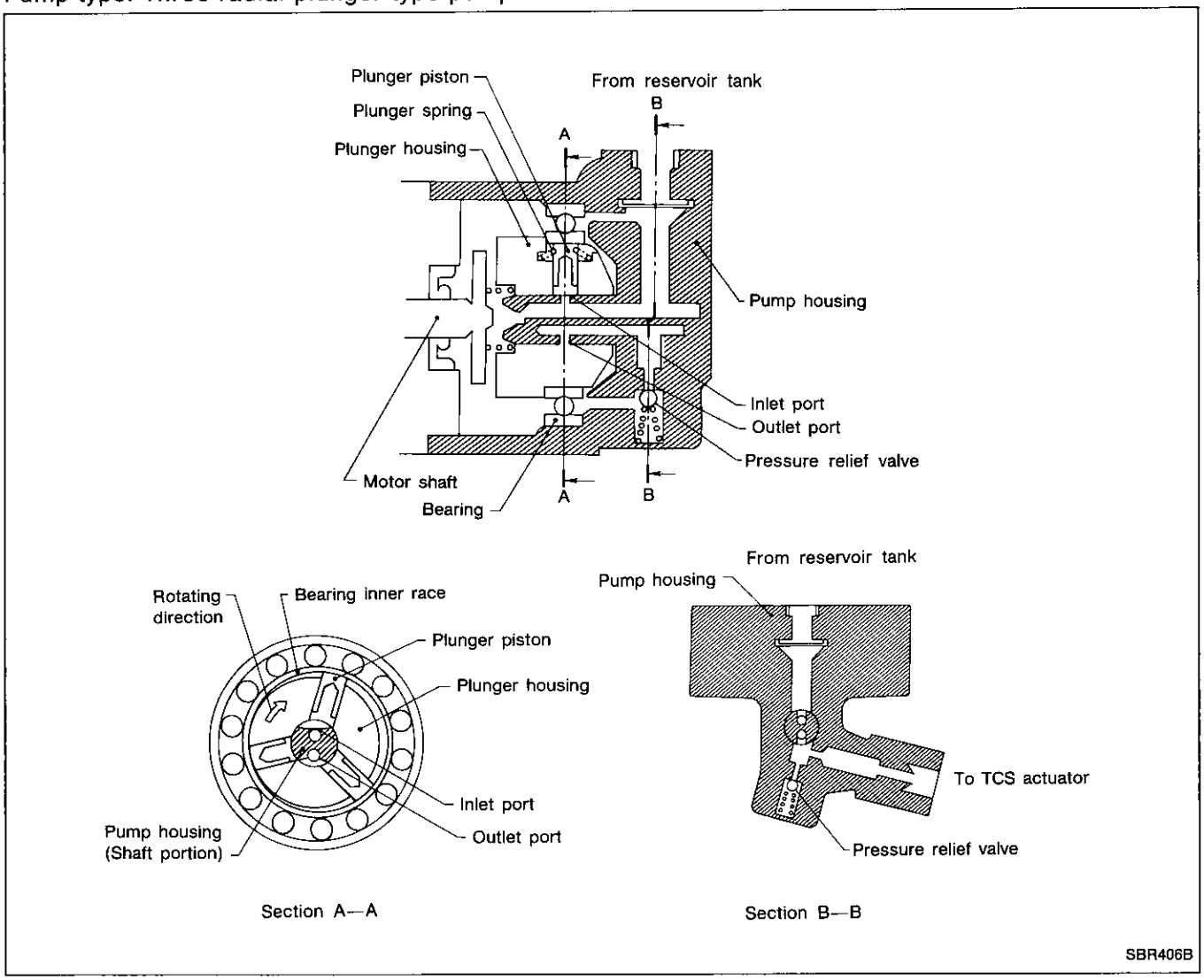
TCS-operating oil pressure which is stored in the accumulator is decreased by operating the TCS, so that this pressure switch is turned "on". As a result of this, the TCS pump is operated to restore TCS-operating oil pressure.

Components for TCS Brake System (Cont'd)

7. Pump (Separated from TCS actuator)

TCS-operating oil pressure is produced by the motor-driven pump. This pump is separated from the TCS actuator.

Pump type: Three radial plunger type pump.



- **Pump operation**

(1) TCS operating oil is sent to the inlet port from the reservoir tank through the oil passage drilled in the shaft of the pump housing.

(2) The plunger piston is pushed outward (toward the bearing inner race) by the plunger spring. Since the bearing is off-center from the plunger housing, the plunger piston moving along the inlet port is expanded outward due to rotation of the plunger housing. This causes the oil to be sucked into the plunger piston.

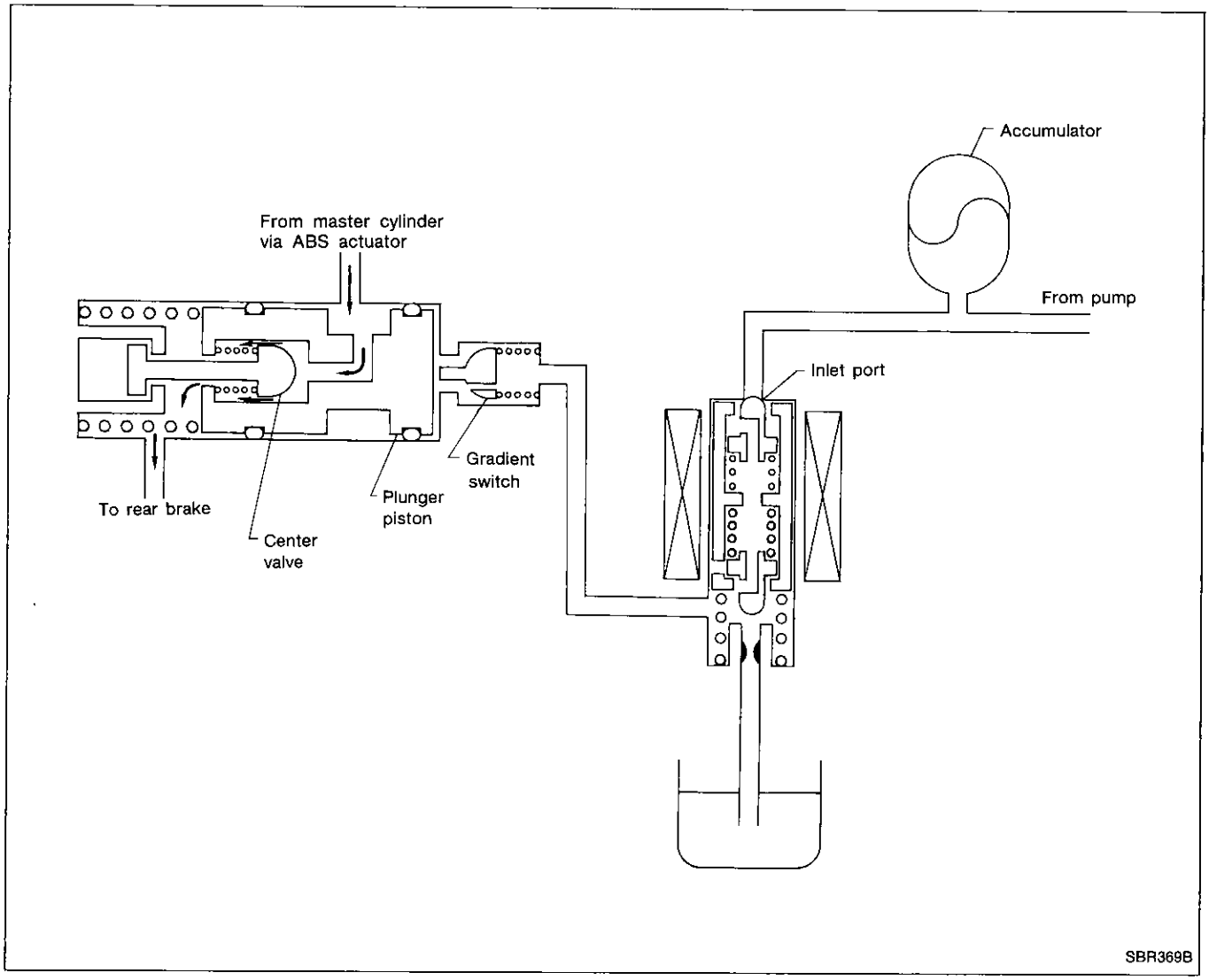
(3) As the plunger housing rotates further, the inlet port is closed, and the plunger piston moves inward (toward the center of rotation of the plunger housing) along the bearing inner race. At this time, the oil inside the plunger piston is pressurized.

(4) When the plunger housing rotates further from step (3) above, the outlet port opens, and pressurized oil in the plunger piston is discharged to the outlet port.

(5) The pressure relief valve frees excess pressure to the inlet port side, thereby maintaining the pump discharge pressure at a constant level.

Components for TCS Brake System (Cont'd)

NORMAL BRAKE OPERATION (TCS is not operating)



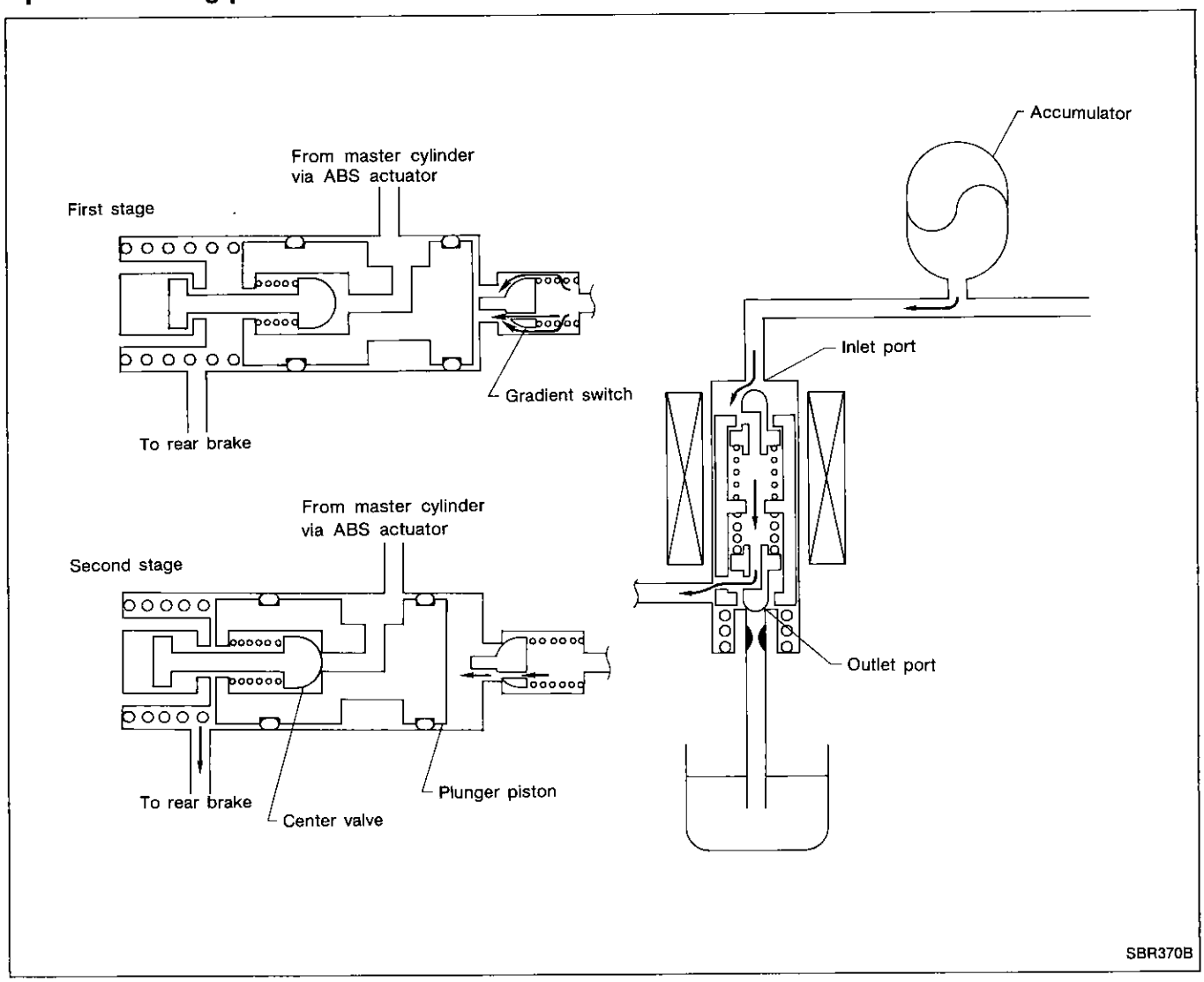
- **Description**

Electric current to the pressure solenoid valve ..... 0 [A]

1. Magnetic force is not produced at the pressure solenoid valve, so the anchor is not moved to open the inlet port of this valve.
2. TCS-operating oil pressure which is produced by the pump and stored by the accumulator is not applied to the plunger piston.
3. The plunger piston pushes on the gradient switch side with a spring so that the center valve opens.
4. Brake-operating fluid pressure passes from the master cylinder through the ABS actuator and is directly transmitted to the rear brake.

TCS OPERATION

Operation during pressure "Increase"



- **Description**

Electric current to the pressure solenoid valve ..... 5 [A]

1. Magnetic force, produced by a current of "5 [A]", moves the valve to a position where the inlet port is opened and the outlet port is closed.
2. TCS-operating oil pressure which is stored in the accumulator is applied to the plunger piston through the gradient switch.
3. At the same time, the center valve is closed.

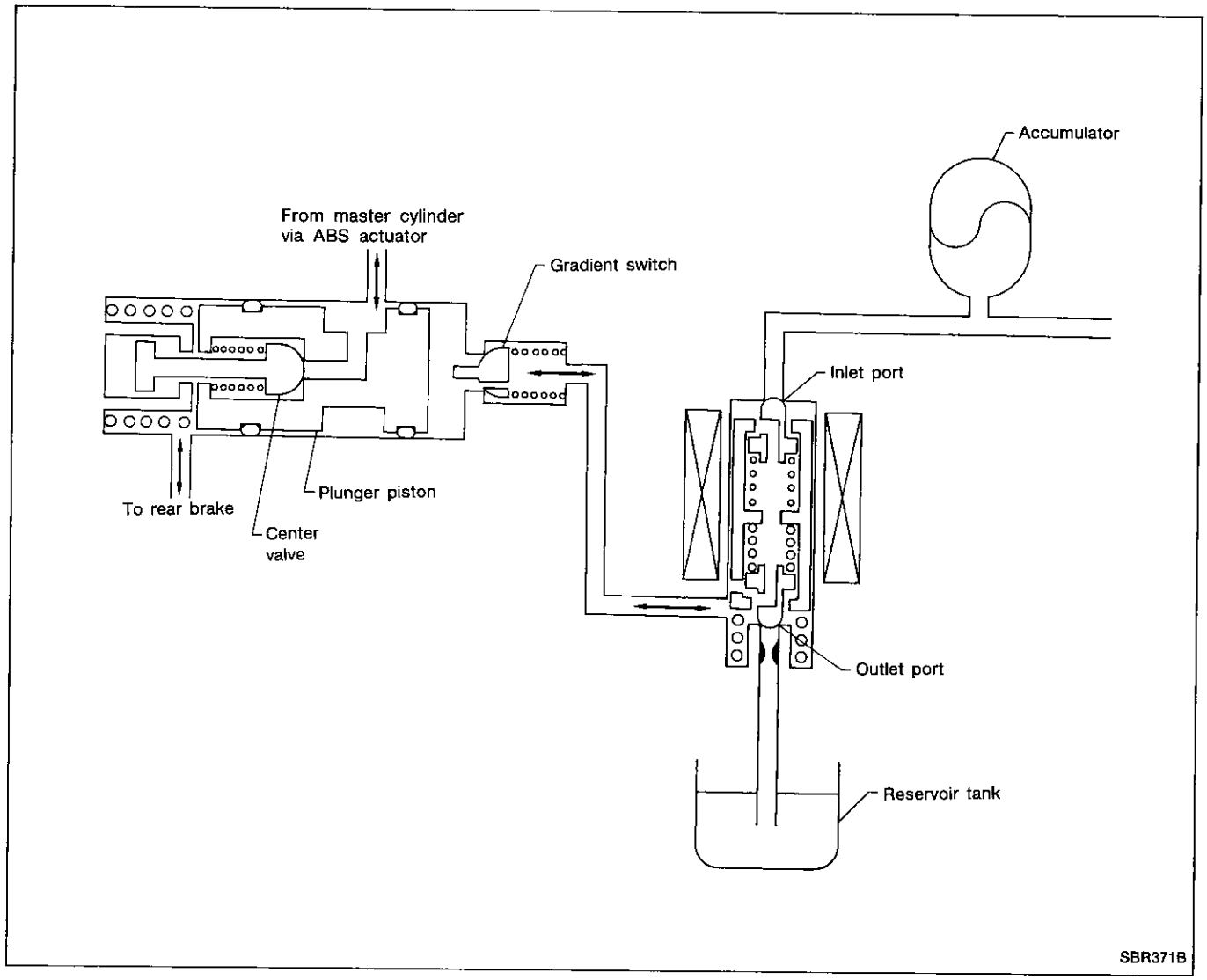
4-1. At the first stage, TCS-operating oil pressure is fully applied to the plunger piston through the opening of the gradient switch and the housing, so that the plunger piston moves rapidly.

4-2. At the second stage, this pressure is applied to the plunger piston directly through the passage of the gradient switch so that the plunger piston moves gradually.

5. The rear brake is operated smoothly by operation of the gradient switch.

Components for TCS Brake System (Cont'd)

Operation during pressure "Hold"



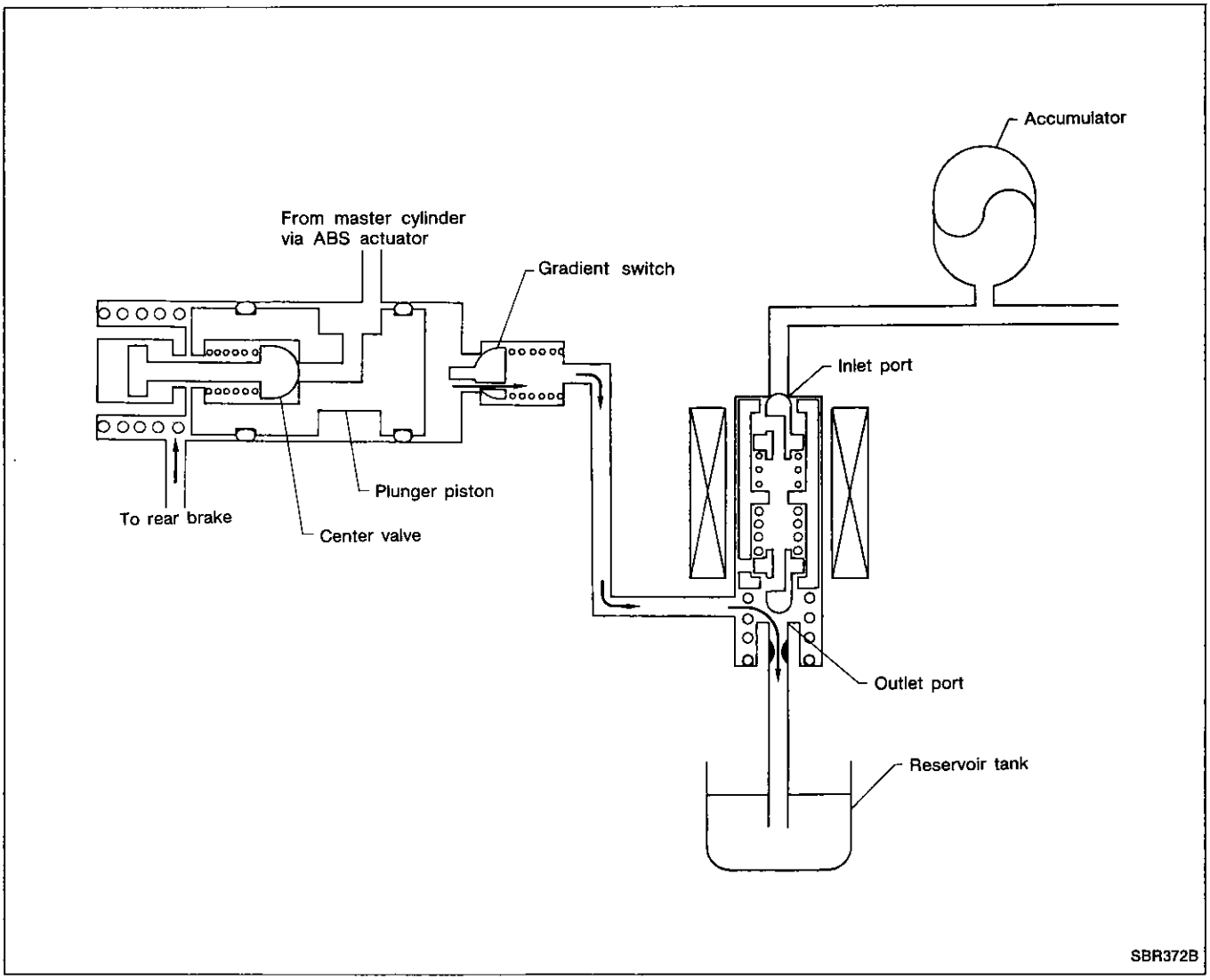
- **Description**

Electric current to the pressure solenoid valve ..... 2 [A]

1. Magnetic force, produced by a current of "2 [A]", moves the valve to a position where the inlet and out- let ports are closed.
2. TCS-operating oil pressure which is stored in the accumulator does not enter the pressure solenoid valve due to closing of the inlet port.
3. TCS-operating oil pressure which was transmitted to the plunger piston during the pressure "Increase" operation is not released to the reservoir tank due to closing of the outlet port.
4. The plunger piston is kept so that brake-operating fluid pressure is held constant.

Components for TCS Brake System (Cont'd)

Operation during pressure "Decrease"



- **Description**

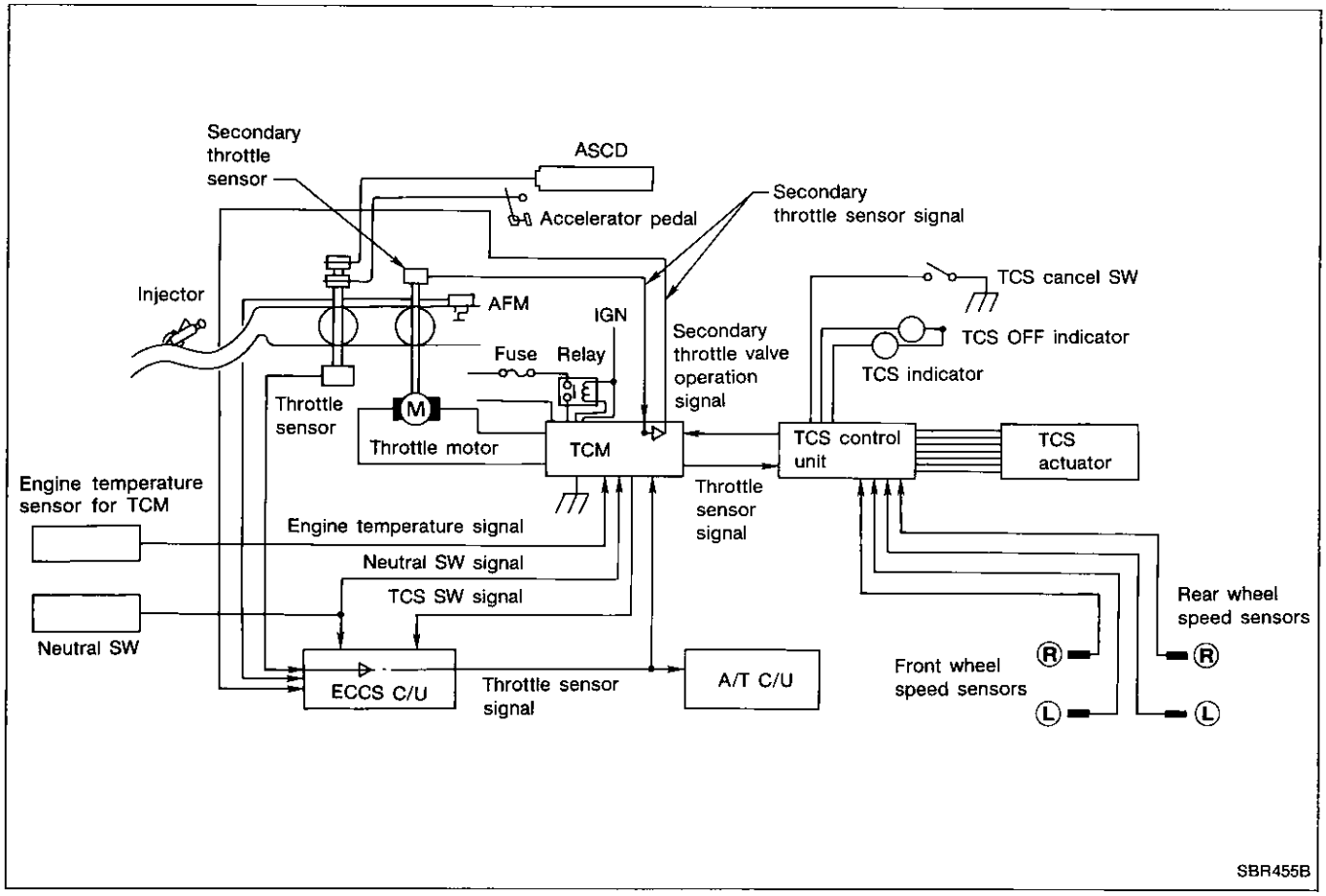
Electric current to the pressure solenoid valve ..... 0 [A]

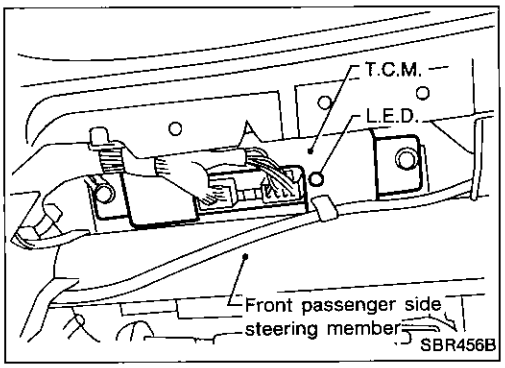
1. Magnetic force is eliminated at the pressure solenoid valve so the anchor is moved, closing the inlet port and opening the outlet port.
2. TCS-operating oil pressure which was applied to the plunger piston is released to the reservoir tank through the outlet port.
3. The plunger piston is returned so that brake-operating fluid pressure is released.

Throttle Valve Control System for TCS

In addition to the primary throttle valve linked to the accelerator pedal, this system has a secondary throttle valve which is opened/closed by a throttle motor. The opening angle of this valve is feed-back controlled by the secondary throttle sensor.
The secondary throttle valve is normally kept in the fully opened position. When a slip of the drive wheels is detected by the wheel sensor, the TCS control unit controls braking operation, and also determines the optimum opening position of the secondary throttle valve. The T.C.M. then closes the secondary throttle valve to the correct position according to this information, which reduces the engine output torque, and so avoids occurrence of slip. The TCS control unit needs the primary throttle valve position signal to determine the secondary throttle valve opening position. The TCM receives the throttle sensor signal through the E.C.C.S. control unit, and the T.C.M. sends the signal to the TCS control unit.
If the T.C.M. detects trouble in the throttle valve control system, it de-energizes a relay located up-stream of the throttle motor power supply. The secondary throttle valve is then opened fully by means of a return spring. In this case, ordinary vehicle operation is assured by the functioning of the primary throttle valve. At the same, the T.C.M. stops sending the throttle sensor signal to the TCS control unit which informs the TCS control unit of the abnormality.

Engine + Brake TCS System Configuration

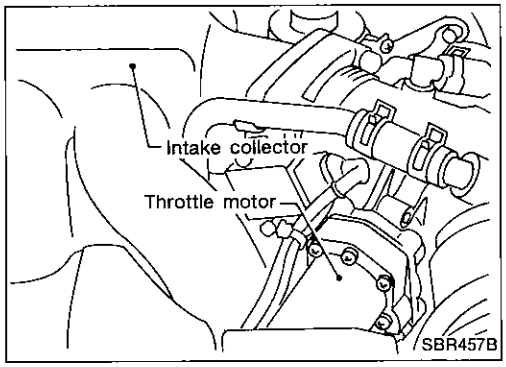




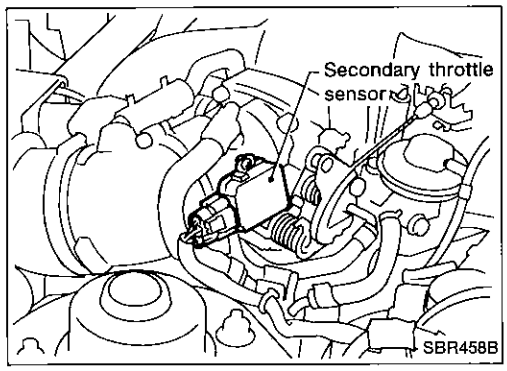
Component

T.C.M. (Throttle Control Module)

The T.C.M. is mounted on the front passenger side steering member.



THROTTLE MOTOR



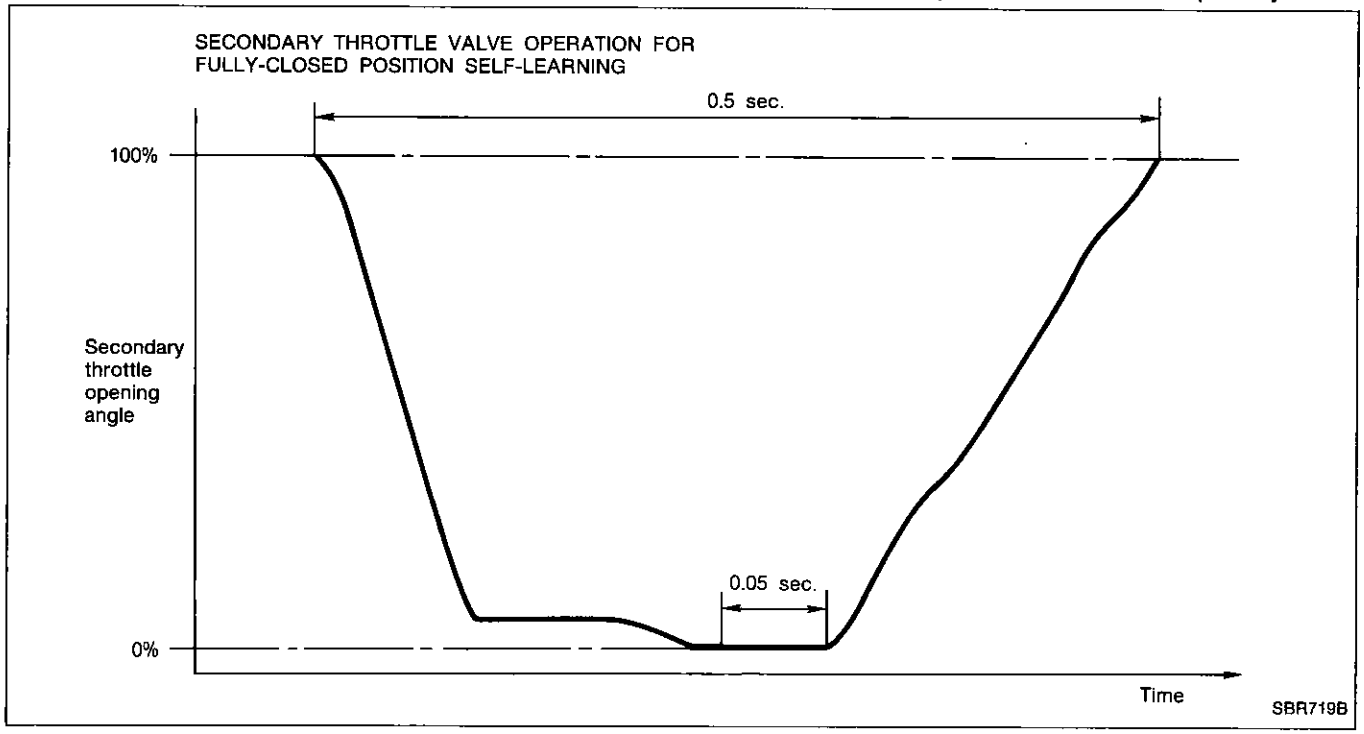
SECONDARY THROTTLE SENSOR

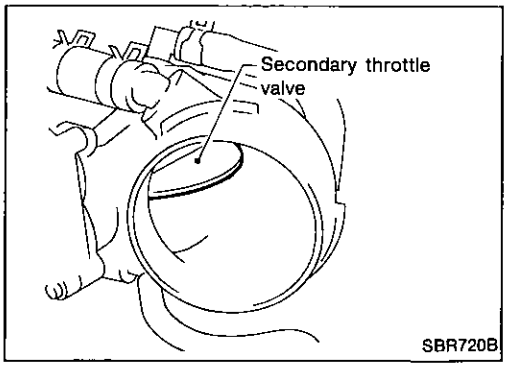
Throttle Memory Function

The secondary throttle valve does not fully open even when the TCS is turned off by the cancel switch or by the TCS itself. The secondary throttle valve opens wider than the primary throttle valve by the specified opening amount. Because the secondary throttle valve opens wider than the primary throttle valve, no adverse effect is caused during ordinary driving.
The secondary throttle valve opening is smaller than the primary throttle valve only when the TCS is operating.

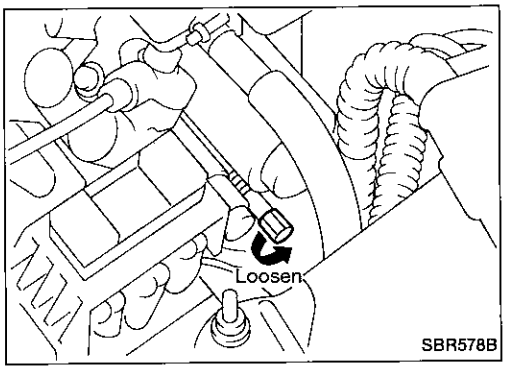
Secondary Throttle Fully-closed Position Self-learning Control

When a certain condition is met with the ignition switch ON, the T.C.M. checks for operation of the throttle control system by fully closing the secondary throttle and then opening it fully. At the same time, the T.C.M. reads the secondary throttle sensor output values at both the fully closed and fully opened positions. This data is used for self-diagnosing the secondary throttle driving system and also for improving the control accuracy of the secondary throttle.
This learning control is performed at the moment when the ignition switch is turned ON with the automatic transmission set in the "N" or "P" position and the accelerator pedal released completely.





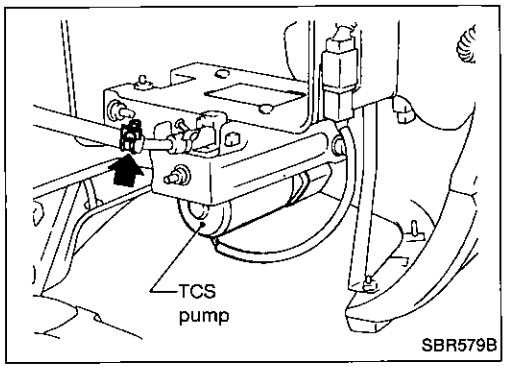
WARNING:
Before touching the secondary throttle valve, be sure to disconnect the throttle valve motor connector; otherwise, injury may occur due to accidental actuation of the valve.



Removal and Installation of TCS Actuator

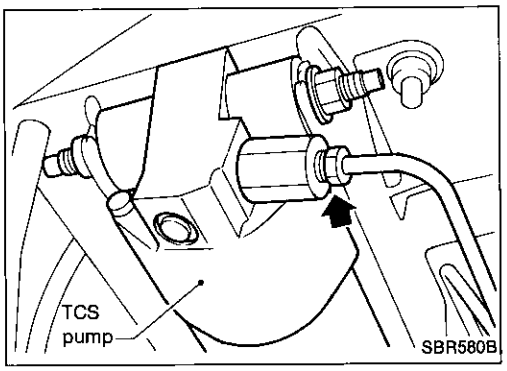
WARNING:

Loosen bleeder of TCS actuator before disconnecting TCS operating oil circuit. This prevents any injury by pressurized oil stored in TCS actuator.



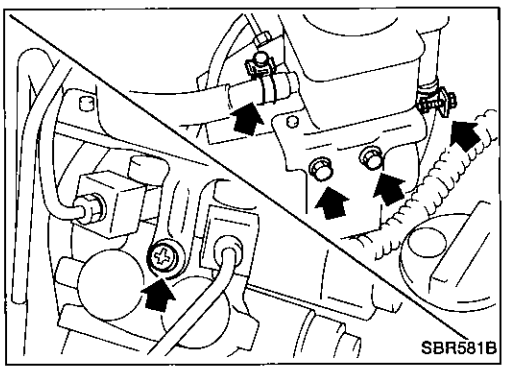
CAUTION:

- **Bleed air not only from TCS operating oil circuit but also from brake fluid line.**
- **Be careful not to splash brake fluid and TCS operating oil on painted areas; it may cause paint damage. If either fluid is splashed on painted areas, wash it away with water immediately.**

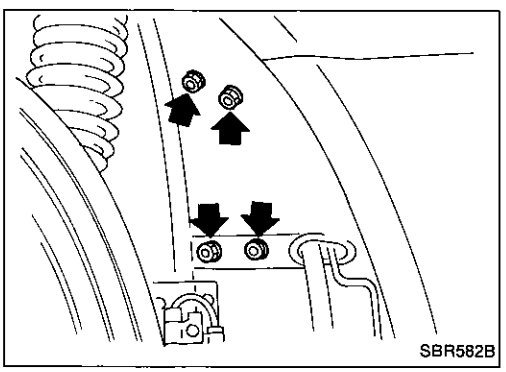


REMOVAL

1. Loosen bleeder for TCS actuator.
2. Drain brake fluid from each rear brake air bleeder valve.
3. Drain TCS operating oil from hose and tube connecting portion, and from outlet of TCS pump as shown.



4. Remove battery and relay box.
5. Remove bolts and hose, and take away reservoir tank with bracket.



6. Disconnect connectors from TCS actuator.
7. Disconnect brake tube (4 portions) from TCS actuator.
8. Remove mounting nuts as shown.
9. Take away TCS actuator with bracket.

Removal and Installation of TCS Actuator (Cont'd)

INSTALLATION

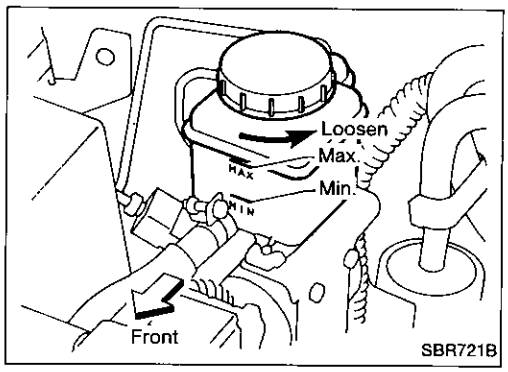
CAUTION:

- **Refill with new brake fluid "DOT 3".**
- **Use new brake fluid "DOT 3" for TCS operating oil.**
- **Bleed air from brake fluid line and TCS operating oil circuit.**

Installation procedures are in reverse order of removal.

Tightening torque for M8 nut:

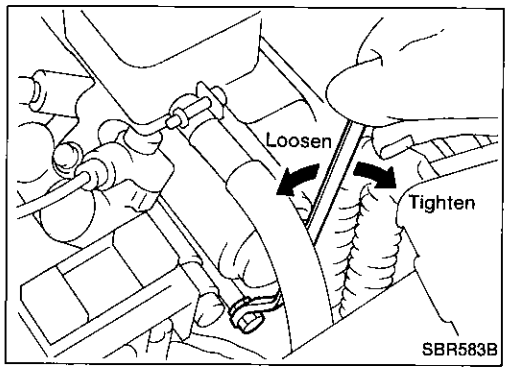
8 - 11 N·m (0.8 - 1.1 kg-m, 5.8 - 8.0 ft-lb)



Air Bleeding for TCS

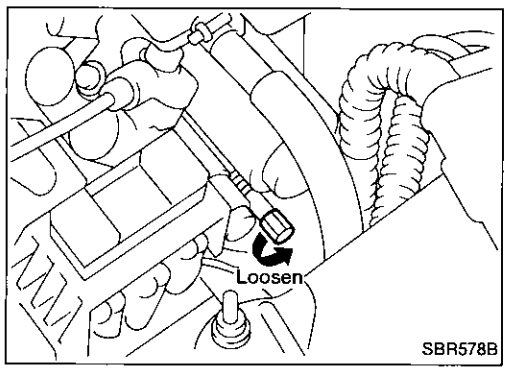
CAUTION:

- **Use new brake fluid "DOT 3" for TCS operating oil.**
- **Pay attention so as not to damage battery cable and hose for TCS during air bleeding.**
- **After bleeding air from TCS operating oil circuit, oil level in reservoir tank will be slightly lower. In such a case, do NOT add oil; it may cause oil leaks from reservoir tank.**



1. Loosen bleeder of TCS actuator.
2. Refill oil up to MAX. on reservoir tank, but do not fasten cap.
3. Start engine. (at this time, TCS pump operates.)
4. Tighten bleeder by nearly specified torque, and 3 to 5 seconds later (TCS pump has stopped), stop engine.
5. Start engine again and loosen bleeder. At this time, watch oil in reservoir tank.
6. Repeat steps 4 and 5 until oil returning to reservoir tank does not contain air bubbles.
7. Tighten bleeder to specified torque.

: 12.0 - 15.9 N·m (1.22 - 1.62 kg-m, 8.8 - 11.7 ft-lb)



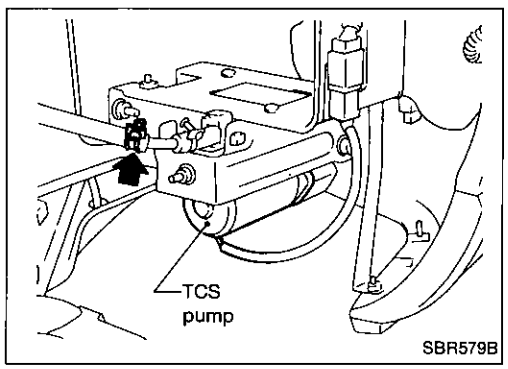
Removal and Installation of TCS pump

WARNING:

Loosen bleeder of TCS actuator before disconnecting TCS operating oil circuit. This prevents any injury by pressurized oil stored in TCS actuator.

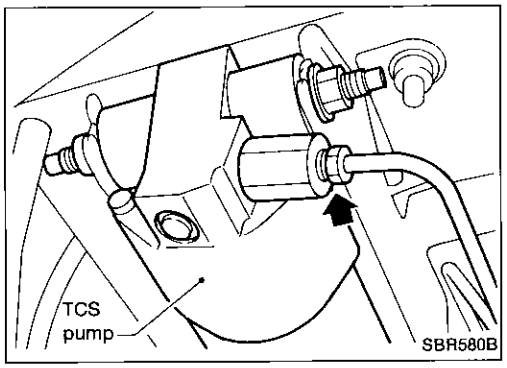
CAUTION:

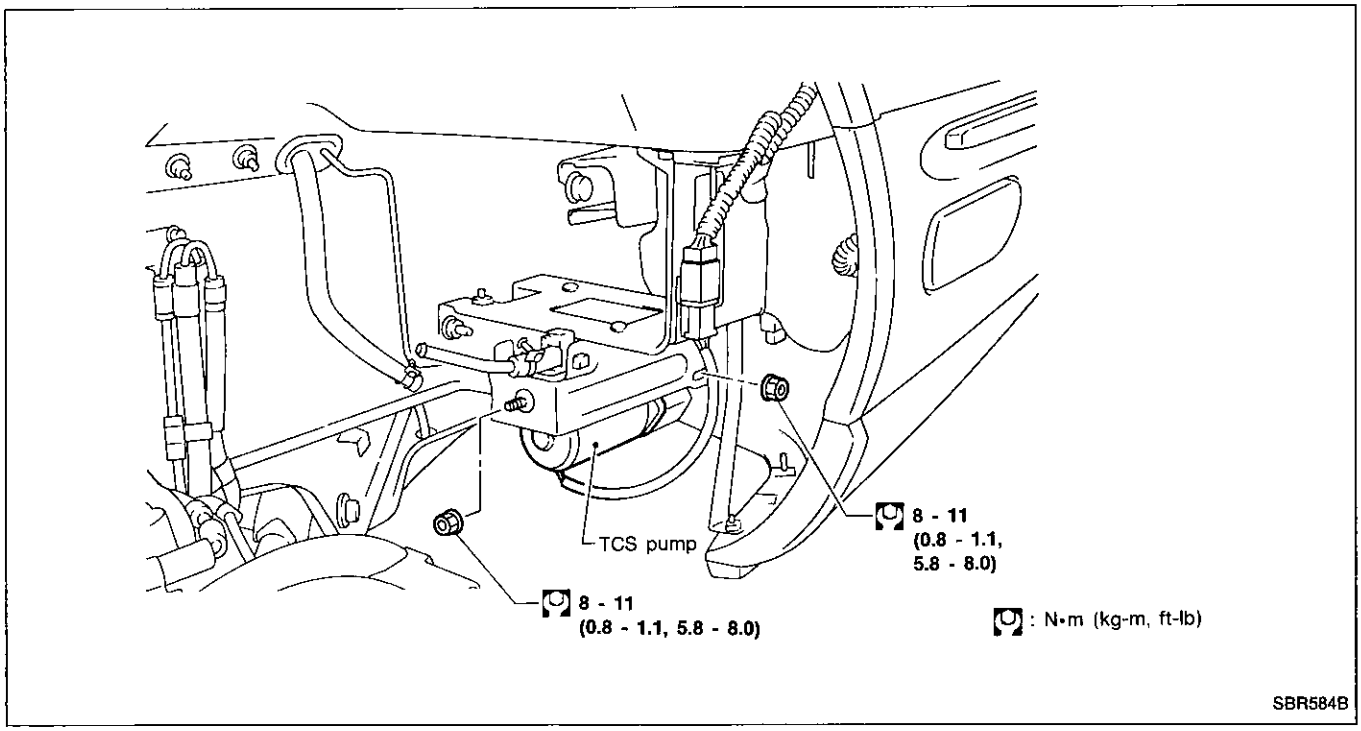
Be careful not to splash TCS operating oil on painted areas; it may cause paint damage. If TCS operating oil is splashed on painted areas, wash it away with water immediately.

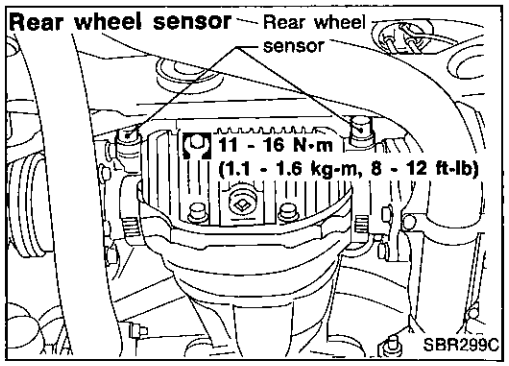


1. Drain TCS operating oil as shown.
2. After installation, bleed air from TCS operating oil circuit.

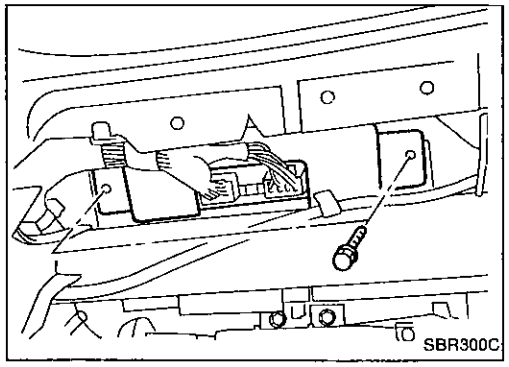
Removal and Installation of TCS pump (Cont'd)





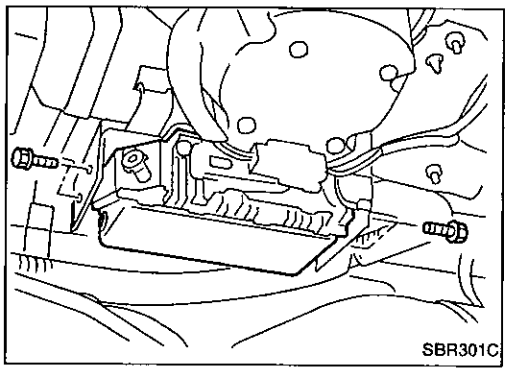


Removal and Installation of Rear Wheel Sensor



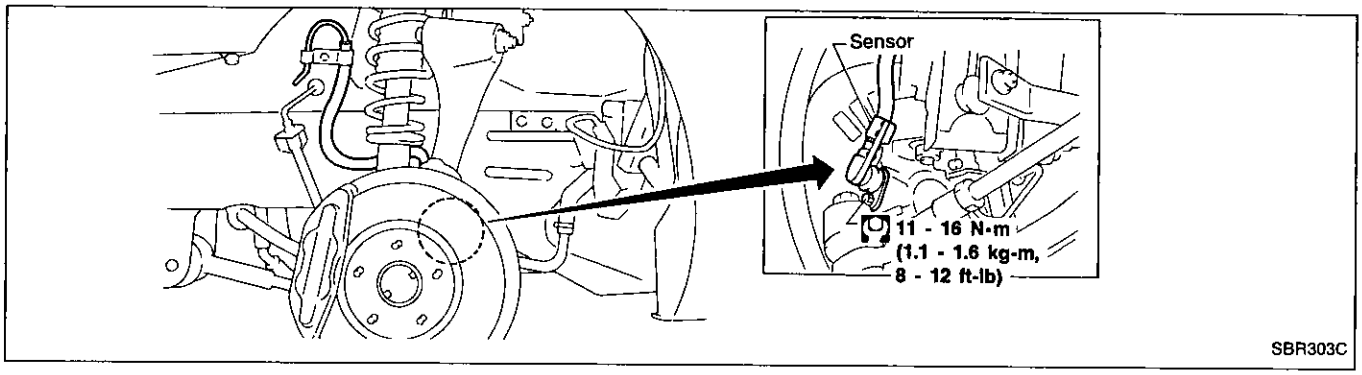
Removal and Installation of T.C.M.

Remove glove box and cover. Then remove T.C.M.



Removal and Installation of TCS Control Unit

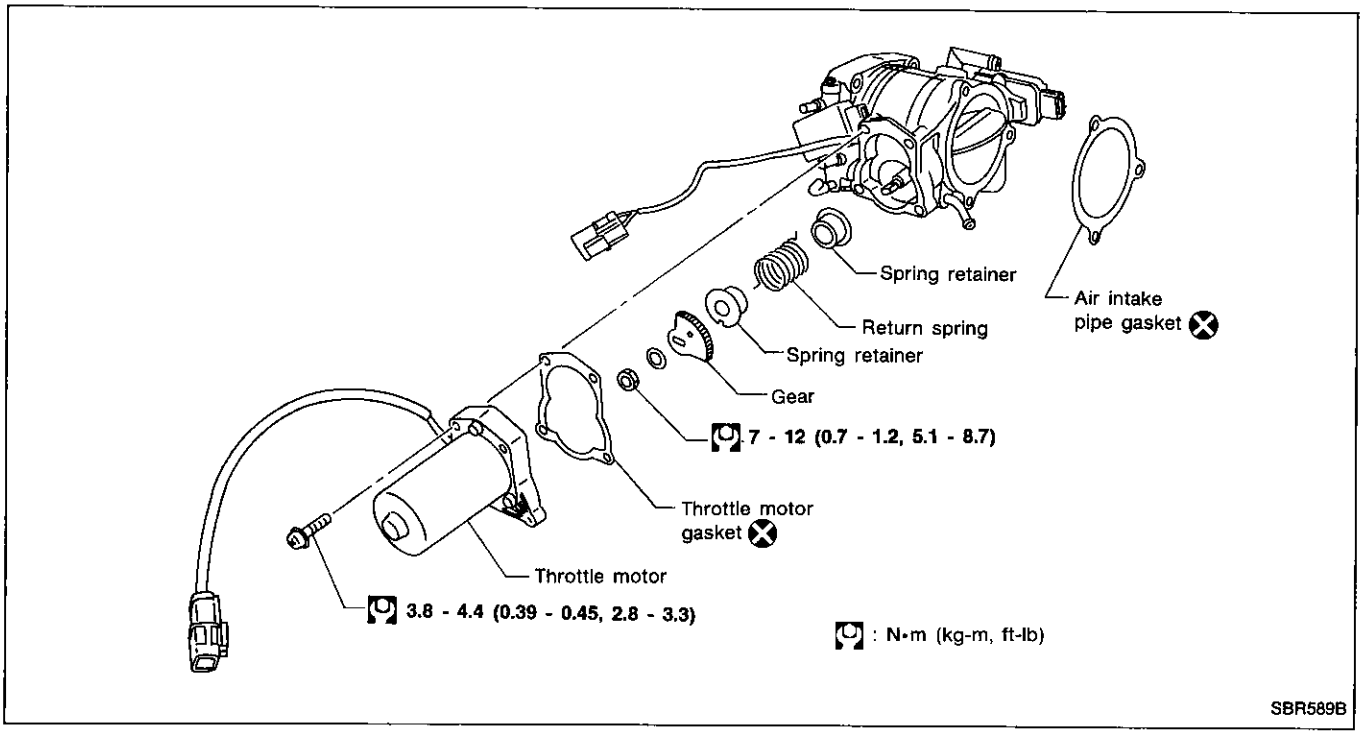
Removal and Installation of Front Wheel Sensor



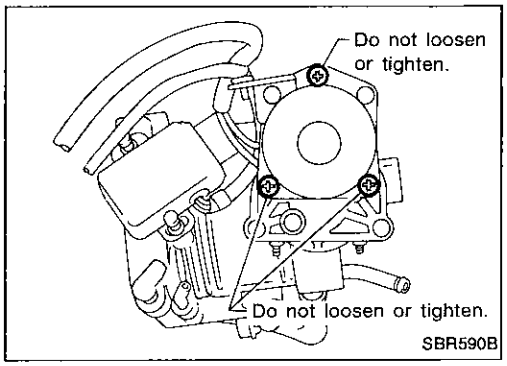
Removal and Installation of ABS Actuator

Refer to "ANTI-LOCK BRAKING SYSTEM".

Removal and Installation of Throttle Motor



Removal and Installation of Throttle Motor (Cont'd)

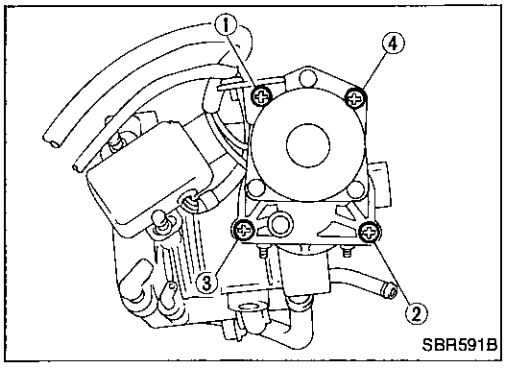


WARNING:

Before touching the secondary throttle valve, be sure to disconnect the throttle valve motor connector; otherwise, injury may occur due to accidental actuation of the valve.

CAUTION:

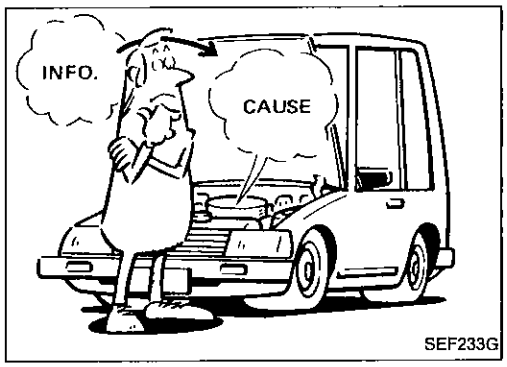
- **Always replace throttle chamber gasket with a new one.**
- **Never loosen or tighten painted screws as shown.**



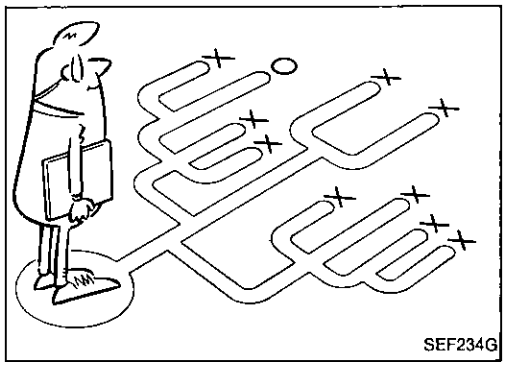
- **Tighten throttle chamber mounting bolts in numerical order.**

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SEF233G


SEF234G

How to Perform Trouble Diagnoses for Quick and Accurate Repair

INTRODUCTION

The TCS has two electronic control units. One is called the TCS control unit and is used to control the functions for applying the left and right rear brakes individually, and for the ABS. The other is the throttle control module (T.C.M.) which is used to control the throttle opening. The control units accept input signals from sensors and instantly drive 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 oil leaks in the TCS operating oil circuits, lack of brake fluid, or other problems with the brake system.

It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or faulty wiring. In this case, careful checking of suspicious circuits may help prevent the replacement of good parts.

A visual check only may not find the cause of the problems, so a road test should be carried out.

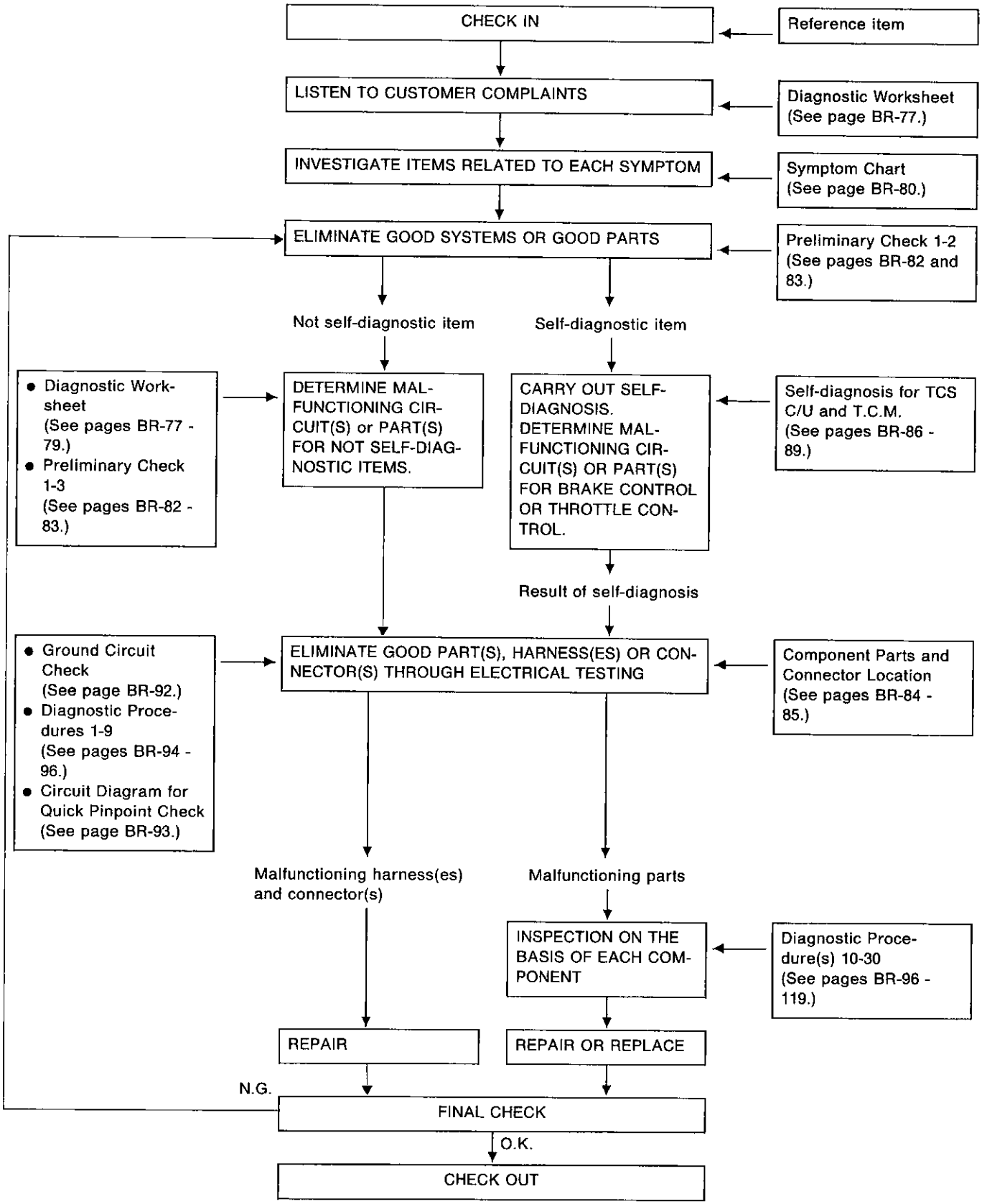
Before undertaking actual checks, take just a few minutes to talk with a customer who approaches with a TCS complaint. The customer is a very good source of information on such problems; especially intermittent ones. Through the talks with the customer, find out what symptoms are present and under what conditions they occur.

Start your diagnosis by looking for "conventional" problems first. This is one of the best ways to troubleshoot brake problems on a TCS controlled vehicle.

It is strongly recommended that the TCS control unit be checked for electrical problems first, followed by a check of the T.C.M.

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

WORK FLOW



KEY POINTS

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

SBR339B

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

DIAGNOSTIC WORKSHEET

There are many kinds of operating conditions that lead to customer complaints, even if the system is normal.
A good grasp of such conditions can make trouble-shooting faster and more accurate.
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	☐ Noise and vibration (from engine compartment) ☐ Noise and vibration (from axle)	☐ Warning/Indicator activate	☐ Firm pedal operation ☐ Large stroke pedal operation
	☐ TCS does not work (Rear wheels slip when accelerating)	☐ ABS does not work. (wheels slip when braking)	☐ Lock of sense of acceleration
Engine conditions	☐ When starting ☐ After starting		
Road conditions	☐ Low friction road (☐ Snow ☐ Gravel ☐ Other) ☐ Bumps/potholes		
Driving conditions	☐ Full-acceleration ☐ High speed cornering ☐ Vehicle speed: Greater than 10 km/h (6 MPH) ☐ Vehicle speed: 10 km/h (6 MPH) or less ☐ Vehicle is stopped		
Applying brake conditions	☐ Suddenly ☐ Gradually		
Other conditions	☐ Operation of electrical equipment ☐ Shift change ☐ Other descriptions		

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

When a customer drives a TCS equipped vehicle for the first time, he may feel somewhat uneasy about the following phenomena as compared to driving a non-TCS vehicle. However, these phenomena are normal, and should not be considered as signs of trouble. The TCS may also be activated while certain service operations are performed.

Phenomenon	Explanation of phenomenon	Result
Motor operating sound	The TCS and ABS actuators are linked to motors, so motor operating sound may be heard during activation of the TCS and ABS.	Normal
Sound from suspension area	During operation of the TCS or ABS, wheels are braked and released repeatedly, which may cause some sound from suspension area.	Normal
Activation of the TCS (SLIP indicator lights up.)	When shifting automatic transmission gears, or when the vehicle is being driven on a surface where the friction coefficient changes largely (such as gravel, potholes, bumps, ice, puddles), and if the wheel speed changes abruptly due to wide-open-throttle, for example, then the TCS may be activated.	Normal
	When the position of the AT shift lever is other than N or P and the engine speed is increased, the TCS may be activated even if the vehicle is stopping. (When checking automatic transmission)	Normal (When checking automatic transmission, it is necessary to cancel the TCS function using the TCS cancel switch.)
	The TCS is activated when a chassis dynamometer is used. With the type of chassis dynamometer which locks the front wheels, the TCS will be activated, and vehicle speed cannot be increased (In case of service inspection). This is because locking the front wheels with the rear wheels rotating is detected by the system as a slip.	Normal (When using a chassis dynamometer, it is necessary to cancel the TCS function using the TCS cancel switch.)
ABS activation	When shifting automatic transmission gears, or when driving over bumps, and if an abrupt change is caused in the wheel rotation speed, the ABS may be activated even if the brake is not applied. This phenomenon, however, is normal, and will not cause any problems.	Normal
	When driving partially over low friction surfaces (such as frozen surfaces, potholes), or when making a turn at high speeds, and if the front and rear or right and left wheel speeds are different, then the ABS may be activated even when the brake is applied gradually. In this case, automatic activation of the ABS provides safer operation.	Normal
Long stopping distance	The stopping distance of an ABS equipped vehicle may become longer on low friction surfaces such as a snowy road and graveled road. It is necessary to advise the driver to reduce speed when driving on such roads to ensure safe driving.	Normal
Inactivation of the ABS	The ABS is not activated by abrupt braking at low vehicle speeds [10 km/h (6 MPH) or less].	Normal
Unexpected brake pedal feel	There is little difference of the brake pedal feel between the TCS equipped and non-TCS equipped vehicles. Some drivers may sense the following: • Large stroke • Hard pedal	Normal To make sure, check the following: • Brake pedal depressed height. • Air bleeding from brake line.

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

Phenomenon	Explanation of phenomenon	Result
Unexpected acceleration feel	The TCS controls the engine and brake operation to provide optimum traction on any road surface by eliminating wheel slip. This may cause the driver to feel the acceleration is insufficient, depending on circumstances.	Normal

Symptom Chart

PROCEDURE			—	—	Prelimi-nary check			—	Diagnostic Procedures																		
									Not self-diagnostic items									Self-diagnostic result of TCS C/U									
REFERENCE PAGE (BR-xx)			—	77	82	83	83	92	94	94	94	95	95	95	95	95	95	96	97	98	99	101	102	102	103	104	105
SYMPTOM			Priority for T.C.M.*1	Diagnostic Work Sheet	Preliminary Check 1	Preliminary Check 2	Preliminary Check 3	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
Noise & vibration				○																							
Unexpected TCS or ABS operation				○	○	○																					
Long stopping distance				○	○																						
Unexpected pedal action				○	○																						
Warning activates, but self-diagnosis does not work.							○	○	○	○	○	○	○	○	○	○	○										
TCS cannot be cancelled by TCS cancel switch																	○										
SELF-DIAGNOSTIC RESULT	TCS C/U	Code No. 1, 2, 3, 4																○									
		Code No. 5, 6, 7, 8				○													○								
		Code No. 9																		○							
		Code No. 10																			○						
		Code No. 13																				○					
		Code No. 14, 15																					○				
		Code No. 16																						○			
		Code No. 17																							○		
		Code No. 18			○																					○	
		Code No. 19			○																						○
	T.C.M.	No code indication	—																								
		Code No. 11	❸																								
		Code No. 12	❸																								
		Code No. 13	❸															○	○	○	○	(○)	○	○	○	○	○
		Code No. 14	❸																								
		Code No. 21, 22	❸																								
		Code No. 23	❷																								
		Code No. 24	❷																								
		Code No. 32	❸																								
		Code No. 33	❸																								
		Code No. 34	❶																								

*1: T.C.M. displays several malfunction codes at once. Therefore, when performing trouble diagnoses, follow the diagnostic procedure according to the priority.

*2: For Electrical Component Inspection of Secondary Throttle Sensor, refer to section EF & EC.

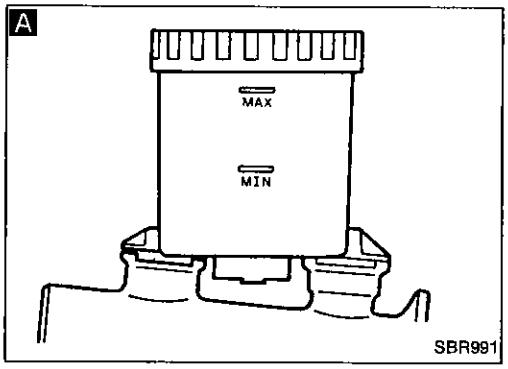
Symptom Chart (Cont'd)

PROCEDURE		—	Diagnostic Procedures											Electrical Component Inspection												
			Self-diagnostic result of T.C.M.																							
REFERENCE PAGE (BR-xx)		—	108	109	110	111	112	113	114	115	117	117	119	121	121	121	122	122	122	122	122	122	123	123	120	*2
SYMPTOM		Priority for T.C.M.*1	Diagnostic Procedure 20	Diagnostic Procedure 21	Diagnostic Procedure 22	Diagnostic Procedure 23	Diagnostic Procedure 24	Diagnostic Procedure 25	Diagnostic Procedure 26	Diagnostic Procedure 27	Diagnostic Procedure 28	Diagnostic Procedure 29	Diagnostic Procedure 30	TCS Cancel Switch	Wheel Sensor	ABS Actuator Motor Relay	ABS Actuator Solenoid Valve Relay	TCS Pump Relay	Throttle Motor Relay	TCS Pump	Engine Temperature Sensor for TCM	N & P Relay	Inhibitor Switch	Throttle Motor	T.C.M.	Secondary Throttle Sensor
Noise & vibration																										
Unexpected TCS or ABS operation															○											
Long stopping distance																										
Unexpected pedal action																										
Warning activates, but self-diagnosis does not work.																										
TCS cannot be cancelled by TCS cancel switch														○												
SELF-DIAGNOSTIC RESULT	TCS C/U	Code No. 1, 2, 3, 4																								
		Code No. 5, 6, 7, 8													○											
		Code No. 9														○										
		Code No. 10															○									
		Code No. 13		○	○	○	○		○	○	○	○		○												
		Code No. 14, 15																								
		Code No. 16																								
		Code No. 17																○								
		Code No. 18																								
		Code No. 19																○		○						
	T.C.M.	No code indication	—	○																					○	
		Code No. 11	❸		○																				○	
		Code No. 12	❸			○																			○	○
		Code No. 13	❸				(○)																			
		Code No. 14	❸					○														○				
		Code No. 21, 22	❸						○											○					○	○
		Code No. 23	❷							○										○						○
		Code No. 24	❷								○									○						○
		Code No. 32	❸									○														
		Code No. 33	❸										○									○	○			
		Code No. 34	❶											○											○	

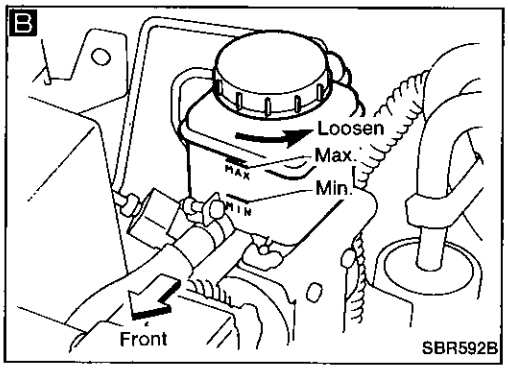
*1: T.C.M. displays several malfunction codes at once. Therefore, when performing trouble diagnoses, follow the diagnostic procedure according to the priority.

*2: For Electrical Component Inspection of Secondary Throttle Sensor, refer to section EF & EC.

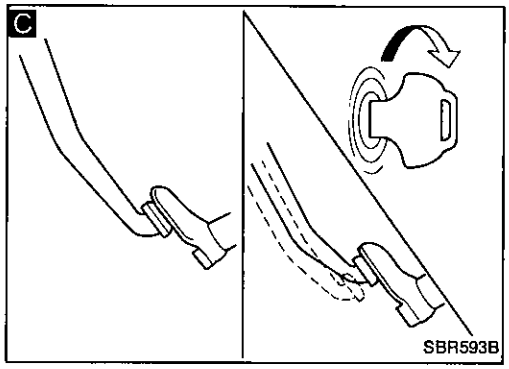
A



B



C



Preliminary Check 1

A

Check fluid level in reservoir tank. (Brake fluid)

N.G. → Ⓐ

O.K. ↓

B

Check TCS operating oil level in TCS reservoir tank.

N.G. → Ⓐ

O.K. ↓

C

Check brake booster operation and air-tightness.
Refer to "On-vehicle Service" of BRAKE BOOSTER.

N.G. → Repair or replace brake booster.

O.K. ↓

Check brake pads and rotor.
Refer to FRONT and REAR DISC BRAKE.

Ⓐ ↓

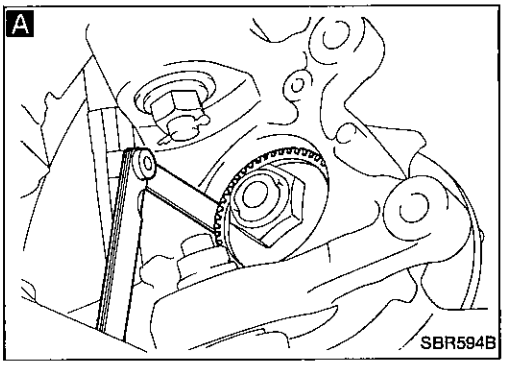
Check fluid and/or TCS operating oil leakage.

N.G. → Repair hydraulic line.

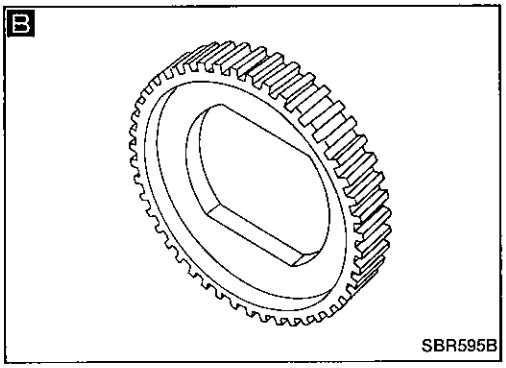
O.K. ↓

Refill fluid and check again.

A



B



Preliminary Check 2

A

Check clearance between sensor and top of rotor.
Clearance should be:
Front
0.21 - 0.71 mm
(0.0083 - 0.0280 in)
Rear
0.33 - 0.93 mm
(0.0130 - 0.0366 in)

N.G. → Clean fastening portion of sensor, or replace sensor.

O.K. ↓

B

Check rotor for teeth damage and number of teeth.
Number of teeth should be:
Front 48
Rear 48

N.G. → Replace rotor.

O.K. ↓

Check wheel bearing play.
Refer to sections FA and RA.

Primary Check 3

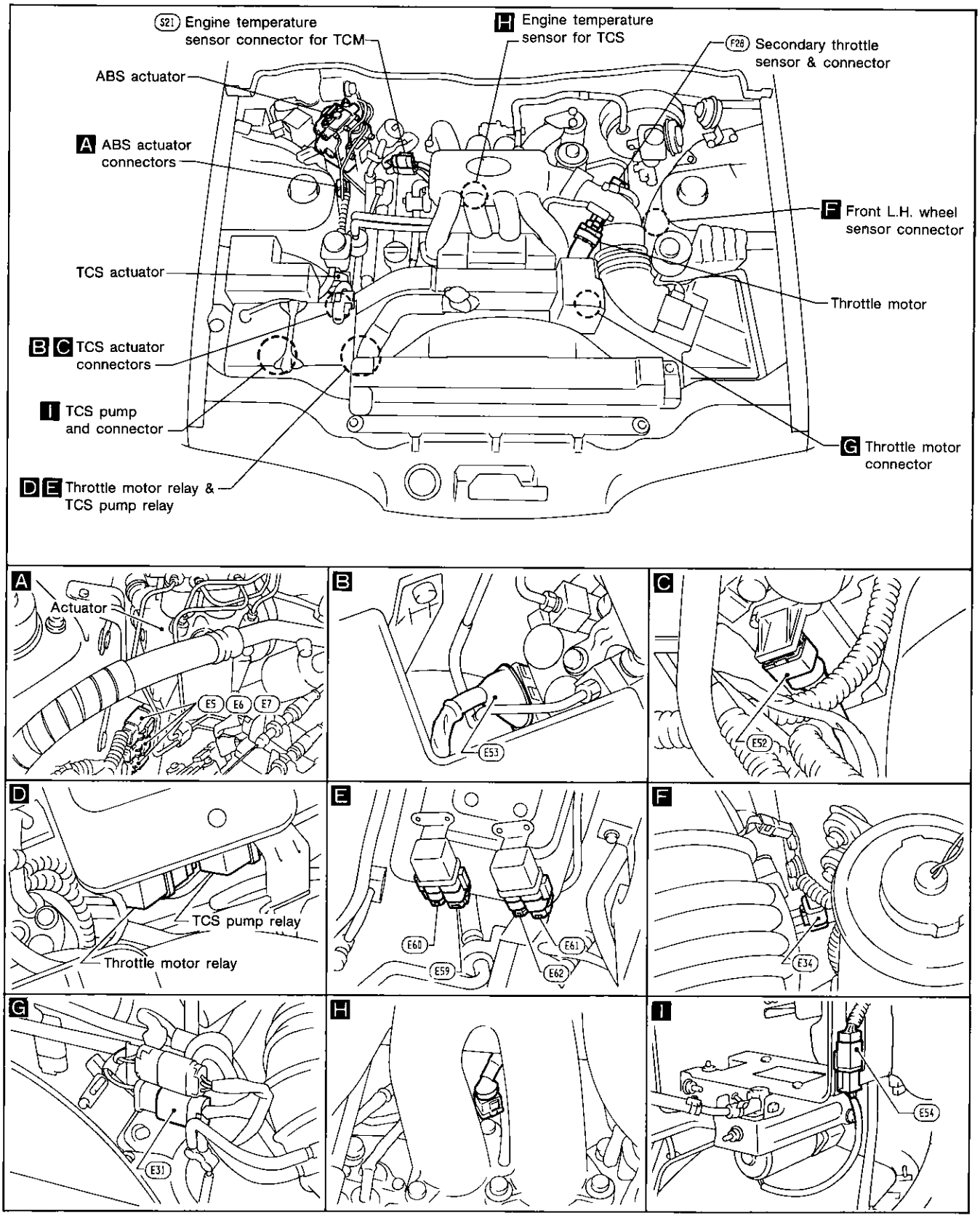
Check indicator/warning lamp operation for not self-diagnostic items as follows:

Ignition switch is turned "ON"			After starting engine			Diagnostic procedure
SLIP indicator	TCS OFF indicator	ABS warning lamp	SLIP indicator	TCS OFF indicator	ABS warning lamp	
*1 OFF	ON	ON	*1 OFF	ON	ON	1
ON	ON	ON	*2 ON	*2 ON	*2 ON	2
OFF	OFF	OFF	OFF	ON	ON	3, 4, 5
OFF	ON	ON	OFF	OFF	OFF	3
ON	OFF	ON	OFF	OFF	OFF	4
ON	ON	OFF	OFF	OFF	OFF	5
ON	ON	ON	ON	OFF	OFF	6
ON	ON	ON	OFF	ON	OFF	7
ON	ON	ON	OFF	OFF	ON	8

Note *1: Lamp may light dimly depending on circumstances.
*2: L.E.D. of TCS control unit does not indicate code No.

Component Parts and Connector Location

ENGINE ROOM

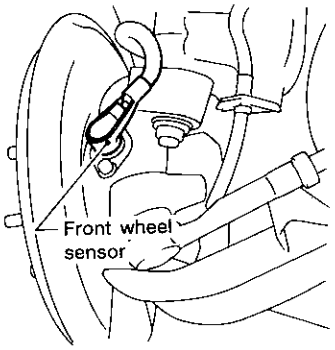


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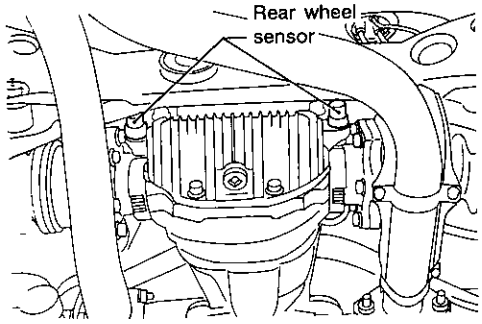
Component Parts and Connector Location (Cont'd)

UNDER BODY

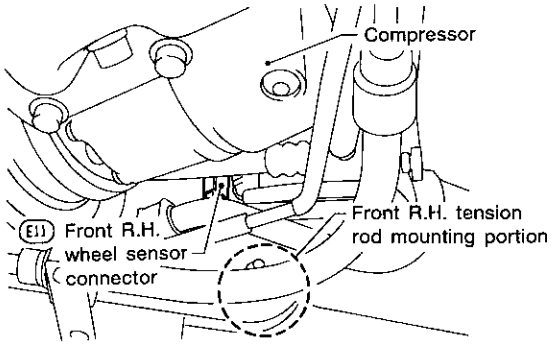
Front wheel sensor



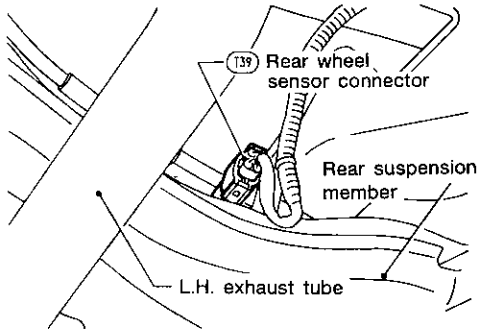
Rear wheel sensor



Front R.H. wheel sensor connector

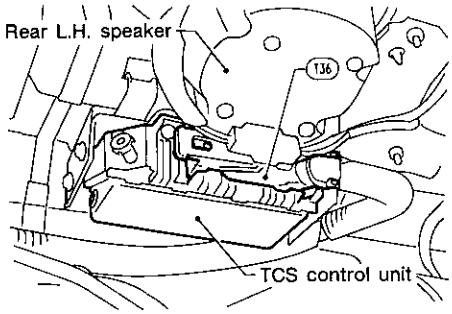


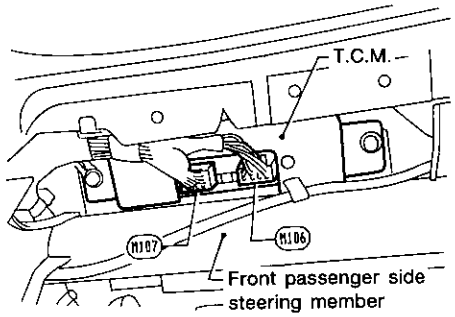
Rear wheel sensor connector

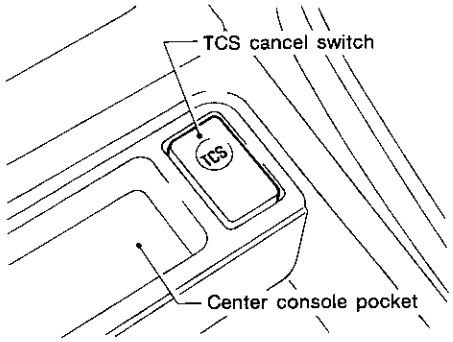


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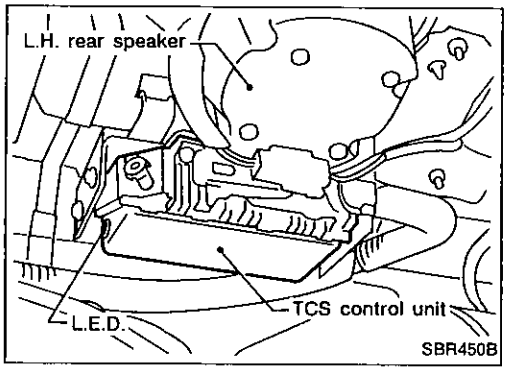
INSTRUMENT PANEL AND TRUNK ROOM







SBR598B



Self-diagnosis for TCS Control Unit

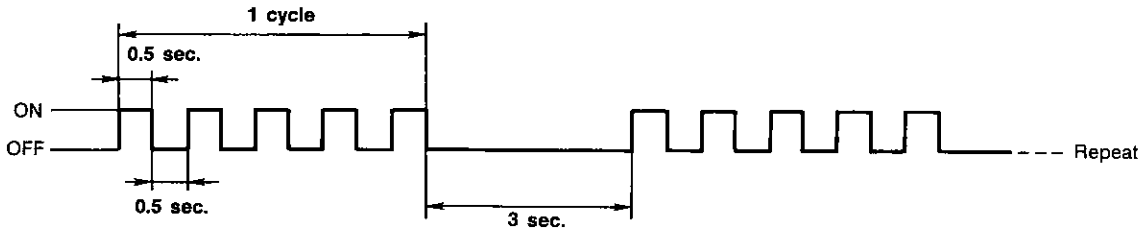
TCS CONTROL UNIT L.E.D.

The TCS control unit has one L.E.D.

Description

Self-diagnosis is functioning as long as the engine is running. To obtain complete self-diagnosis results, the vehicle must be driven above 30 km/h (19 MPH) for at least one minute, then the malfunction code read while the engine is running. The malfunction code is indicated by the number of flashes of the L.E.D. as shown below.

Example: Code No. 5



For example, the L.E.D. flashes five times for 0.5 seconds. This indicates the number "5", and refers to a malfunction in the front left wheel sensor circuit. In this way, the problems are classified by their code numbers.

Code No.	Malfunction
1	Front left solenoid valve circuit for ABS actuator
2	Front right solenoid valve circuit for ABS actuator
3 or 4	Rear solenoid valve circuit for ABS actuator
5	Front left wheel sensor circuit
6	Front right wheel sensor circuit
7	Rear right wheel sensor circuit
8	Rear left wheel sensor circuit
9	ABS actuator motor circuit open or short, or ABS actuator motor relay abnormal
10	ABS actuator solenoid valve relay circuit malfunction
13	Secondary throttle opening signal circuit open, throttle signal circuit open or fail-safe for T.C.M.
14	Left side pressure solenoid valve circuit for TCS actuator
15	Right side pressure solenoid valve circuit for TCS actuator
16	TCS control unit
17	TCS pump relay coil circuit open
18	TCS operating oil pressure in TCS actuator abnormal
19	TCS operating oil pressure circuit for TCS actuator

NOTE:

If TCS control unit displays code No. 13, refer to throttle control module (T.C.M.) for self-diagnosis.

If more than two circuits should malfunction at the same time, the L.E.D. flashes to indicate one of the malfunctioning circuits. After the circuit has been repaired, the L.E.D. will flash the other code number when self-diagnosis is carried out again properly.

Self-diagnosis for TCS c/u (Cont'd)

Code No.	Indicator			Detected items	Malfunction is detected when ...	Check item
	SLIP	TCS OFF	ABS			
1	ON	ON	ON	Front left solenoid for ABS actuator	Front left solenoid circuit for ABS actuator is open.	• Harness and connector • ABS actuator
2	ON	ON	ON	Front right solenoid for ABS actuator	Front right solenoid circuit for ABS actuator is open.	• Harness and connector • ABS actuator
3 or 4	ON	ON	ON	Rear solenoid for ABS actuator	Rear solenoid circuit for ABS actuator is open.	• Harness and connector • ABS actuator
5	ON	ON	ON	Front left wheel sensor	Front left wheel sensor circuit is malfunctioning.	• Harness and connector • Front left wheel sensor
6	ON	ON	ON	Front right wheel sensor	Front right wheel sensor circuit is malfunctioning.	• Harness and connector • Front right wheel sensor
7	ON	ON	ON	Rear right wheel sensor	Rear right wheel sensor circuit is malfunctioning.	• Harness and connector • Rear right wheel sensor
8	ON	ON	ON	Rear left wheel sensor	Rear left wheel sensor circuit is malfunctioning.	• Harness and connector • Rear left wheel sensor
9	ON	ON	ON	ABS motor and motor relay	• ABS motor circuit is open or shorted. • ABS motor relay is not operated normally.	• Harness and connector • Motor relay • Motor
10	ON	ON	ON	ABS solenoid valve relay	• ABS solenoid valve relay circuits is malfunctioning.	• Harness and connector • Solenoid valve relay
13	ON	ON	OFF	Secondary throttle opening signal	• Secondary throttle opening signal (from TCS c/u to TCM) circuit is open.	• Harness and connector
	ABS is operative even if TCS is inoperative.			Throttle sensor signal	• TCM is entered fail-safe mode. • Throttle sensor signal (from TCM to TCS c/u) circuit is open.	• TCM • Harness and connector
14	ON	ON	ON	Left side pressure solenoid for TCS actuator	• Left side pressure solenoid circuit for TCS actuator is open.	• Harness and connector • TCS actuator
15	ON	ON	ON	Right side pressure solenoid for TCS actuator	• Right side pressure solenoid circuit for TCS actuator is open.	• Harness and connector • TCS actuator
0 or 16	ON	ON	ON	TCS c/u	• TCS c/u is out of order.	• TCS c/u
17	ON	ON	OFF	TCS pump relay	• TCS pump relay coil circuit is open.	• Harness and connector • TCS pump relay
	ABS is operative even if TCS is inoperative.					
18	ON	ON	OFF	TCS actuator pressure module	• TCS-operating oil pressure in actuator (accumulator) is abnormally decreased.	• TCS pump • TCS actuator
	ABS is operative even if TCS is inoperative.					
19	ON	ON	OFF	TCS actuator pressure module	• Pressure switch circuit for TCS pump operation is open. • Warning switch circuit for TCS-operating oil pressure is open.	• Harness and connector • TCS actuator • TCS pump relay
	ABS is operative even if TCS is inoperative.					

Self-diagnosis for TCS c/u (Cont'd)

Code No.	Indicator			Detected items	Malfunction is detected when ...	Check item
	SLIP	TCS OFF	ABS			
—	OFF*	ON	ON	Main power supply for TCS c/u	• Main power supply circuit for TCS c/u is open.	• Harness and connector
				TCS c/u	• TCS c/u is out of order.	• TCS c/u
	ON	ON	ON	Alternator circuit	• Alternator output circuit is open.	• Harness and connector
	ABS is operative even if all lamps go on.					

*: Lamp may light dimly depending on circumstances.

Retention of diagnostic results

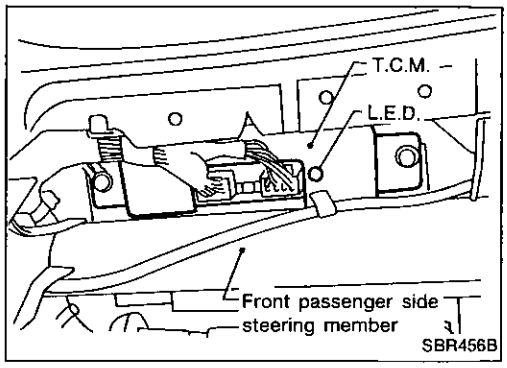
This control unit does not have a memory for self-diagnostic results.
Therefore, the malfunction code number is erased each time the ignition switch is turned OFF.

TCS fail-safe

Self-diagnosis item		Fail-safe condition	
Code No.	Malfunction	Type Ⓐ	Type Ⓑ
1	Front left solenoid valve circuit for ABS actuator	X	—
2	Front right solenoid valve circuit for ABS actuator	X	—
3 or 4	Rear solenoid valve circuit for ABS actuator	X	—
5	Front left wheel sensor circuit	X	—
6	Front right wheel sensor circuit	X	—
7	Rear right wheel sensor circuit	X	—
8	Rear left wheel sensor circuit	X	—
9	ABS actuator motor circuit open or shorted, or ABS actuator motor relay abnormal	X	—
10	ABS actuator solenoid valve relay circuit malfunction	X	—
13	Secondary throttle opening signal circuit open or throttle signal circuit open, or fail-safe for T.C.M.	—	X
14	Left side pressure solenoid valve circuit for TCS actuator	X	—
15	Right side pressure solenoid valve circuit for TCS actuator	X	—
0 or 16	TCS control unit	X	—
17	TCS pump relay coil circuit open	—	X
18	TCS operating oil pressure in TCS actuator abnormal	—	X
19	TCS operating oil pressure circuit for TCS actuator	—	X

X: Available
—: Not available

Type Ⓐ: TCS control unit does not control both ABS and TCS functions.
Type Ⓑ: TCS control unit does not control TCS functions. However, TCS control unit does control ABS functions.



Self-diagnosis for T.C.M.

T.C.M. L.E.D.

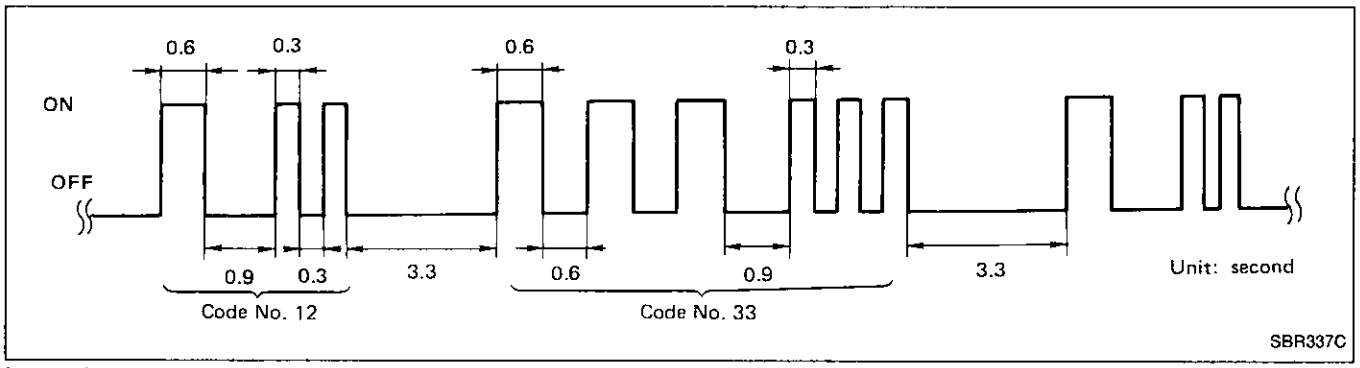
The T.C.M. has only one L.E.D.

Description

Self-diagnosis is always functioning as long as the ignition switch is set in the "ON" or "START" position.

The malfunction code is indicated by the number of flashes of the L.E.D. as shown below:

Example: Code No. 12 and Code No. 33



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 L.E.D. flashes once for 0.6 seconds and then it flashes twice for 0.3 seconds. This indicates the number "12" and refers to a malfunction in the secondary throttle sensor circuit. In this way, all the problems are classified by their code numbers.

Code No.	Malfunction
11	Throttle sensor circuit
12	Secondary throttle sensor circuit
13	Secondary throttle valve operating signal circuit
14	Engine temperature sensor for TCM circuit
21	Throttle motor circuit (Operation and open circuit check)
22	Throttle motor circuit (Short circuit check)
23	Throttle motor relay circuit (Short)
24	Throttle motor relay circuit (Open)
32	Secondary throttle valve return spring broken
33	Neutral switch circuit
34	Power supply circuit (for sensor)
55	No malfunction in the above circuits

Self-diagnosis for T.C.M. (Cont'd)

Code No.	Detected items	Malfunction is detected when ...	Check item (remedy)
11	Throttle sensor circuit	• The throttle sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Throttle sensor
12	Secondary throttle sensor circuit	• The secondary throttle sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Secondary throttle sensor
13	Secondary throttle valve operating signal circuit	• TCS control unit is in fail-safe condition or harness is abnormal.	• Harness and connector • TCS control unit
14	Engine temperature sensor for TCM circuit	• The engine temperature sensor circuits is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Engine temperature sensor
21	Throttle motor circuit (Operation and open circuit check)	• The throttle motor does not operate normally when the TCS is operating.	• Harness and connector • Throttle motor
22	Throttle motor circuit (Short circuit check)	• The throttle motor circuit is shorted.	• Harness and connector • Throttle motor
23	Throttle motor relay circuit (Short)	• The throttle motor relay is shorted.	• Harness and connector • Throttle motor relay
24	Throttle motor relay circuit (Open)	• The throttle motor relay is open.	• Harness and connector • Throttle motor relay
32	Secondary throttle valve return spring broken	• Secondary throttle valve does not fully open when current is not supplied to the motor.	• Secondary throttle valve return spring
33	Neutral switch circuit	• Neutral switch circuit is open. • Neutral switch circuit is shorted.	• Harness and connector • Neutral switch
34	Power supply circuit (for sensor)	• Power supply circuit is open.	• Harness and connector

Retention of diagnostic results

Most of the diagnostic results will remain in the T.C.M. memory
The T.C.M. memory concerning the following three items is erased after a normal signal is issued.

Code No.	Malfunction
13	Secondary throttle valve operating signal circuit
14	Engine temperature sensor for TCM circuit
33	Neutral switch circuit

Self-diagnosis for T.C.M. (Cont'd)

How to erase self-diagnostic results

The self-diagnostic results stored in the T.C.M. can be erased by any of the following three methods.

(1) Depress the accelerator fully (1st throttle) and set the neutral switch to OFF (automatic transmission is in other than "P" and "N" positions). In this state, turn ON the ignition key (engine need not be started). After this, set the neutral switch to ON, and release the accelerator. This will erase the diagnostic results of all items.

(2) If diagnostic judgment on a particular item remains OK and no NG judgment is made while the ignition key is turned ON 50 times, the diagnostic results on that item are erased.

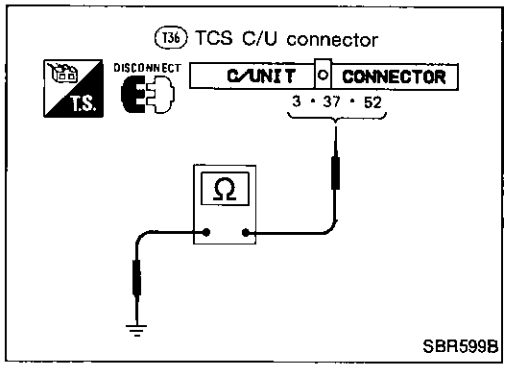
(3) If the backup power supply is disconnected for more than one minute, the diagnostic results on all items are erased. In addition, the values learned by the system are also erased.

T.C.M. fail-safe

Self-diagnosis item		Fail-safe condition		
Code No.	Malfunction	Type Ⓐ	Type Ⓑ	Type Ⓒ
11	Throttle sensor circuit	—	X	—
12	Secondary throttle sensor circuit	X	—	—
13	Secondary throttle valve operating signal circuit	—	X	—
14	Engine temperature sensor for TCM circuit	—	—	—
21	Throttle motor circuit (Operation and open circuit check)	X	—	—
22	Throttle motor circuit (Short circuit check)	X	—	—
23	Throttle motor relay circuit (Short)	X	—	—
24	Throttle motor relay circuit (Open)	X	—	—
32	Secondary throttle valve return spring broken	—	—	X
33	Neutral switch circuit	—	—	—
34	Power supply circuit (for sensor)	X	—	—
55	No malfunction in the above circuits	—	—	—

X: Available
—: Not available

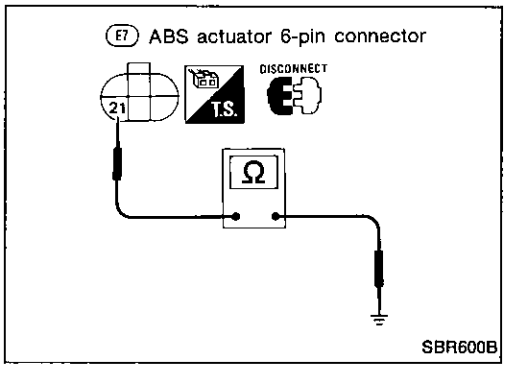
Type Ⓐ: T.C.M. does not supply power for throttle motor and secondary throttle valve is fully opened by return spring.
Type Ⓑ: Secondary throttle valve is slowly opened by throttle motor.
Type Ⓒ: Secondary throttle valve is quickly opened by throttle motor.



Ground Circuit Check

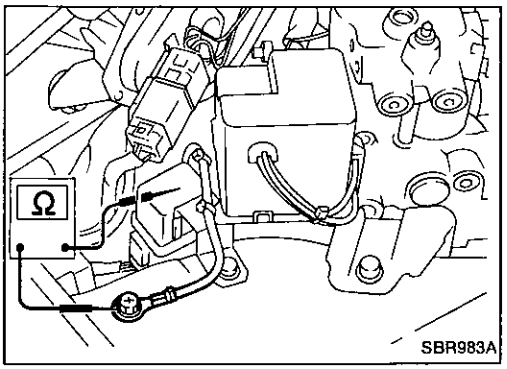
TCS CONTROL UNIT

Continuity should exist.



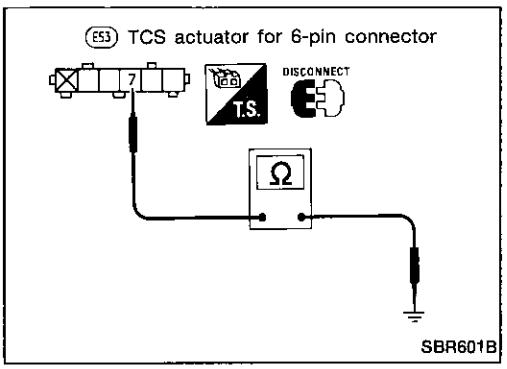
ABS ACTUATOR

Continuity should exist.



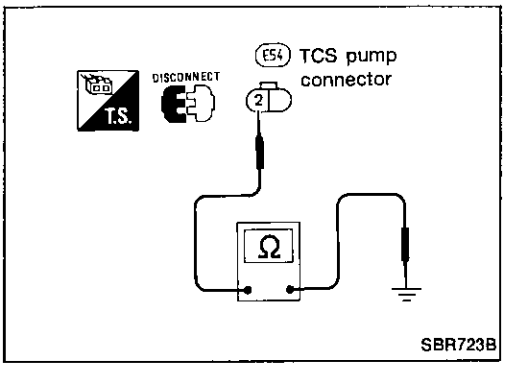
ACTUATOR MOTOR GROUND

Continuity should exist.



TCS ACTUATOR

Continuity should exist.

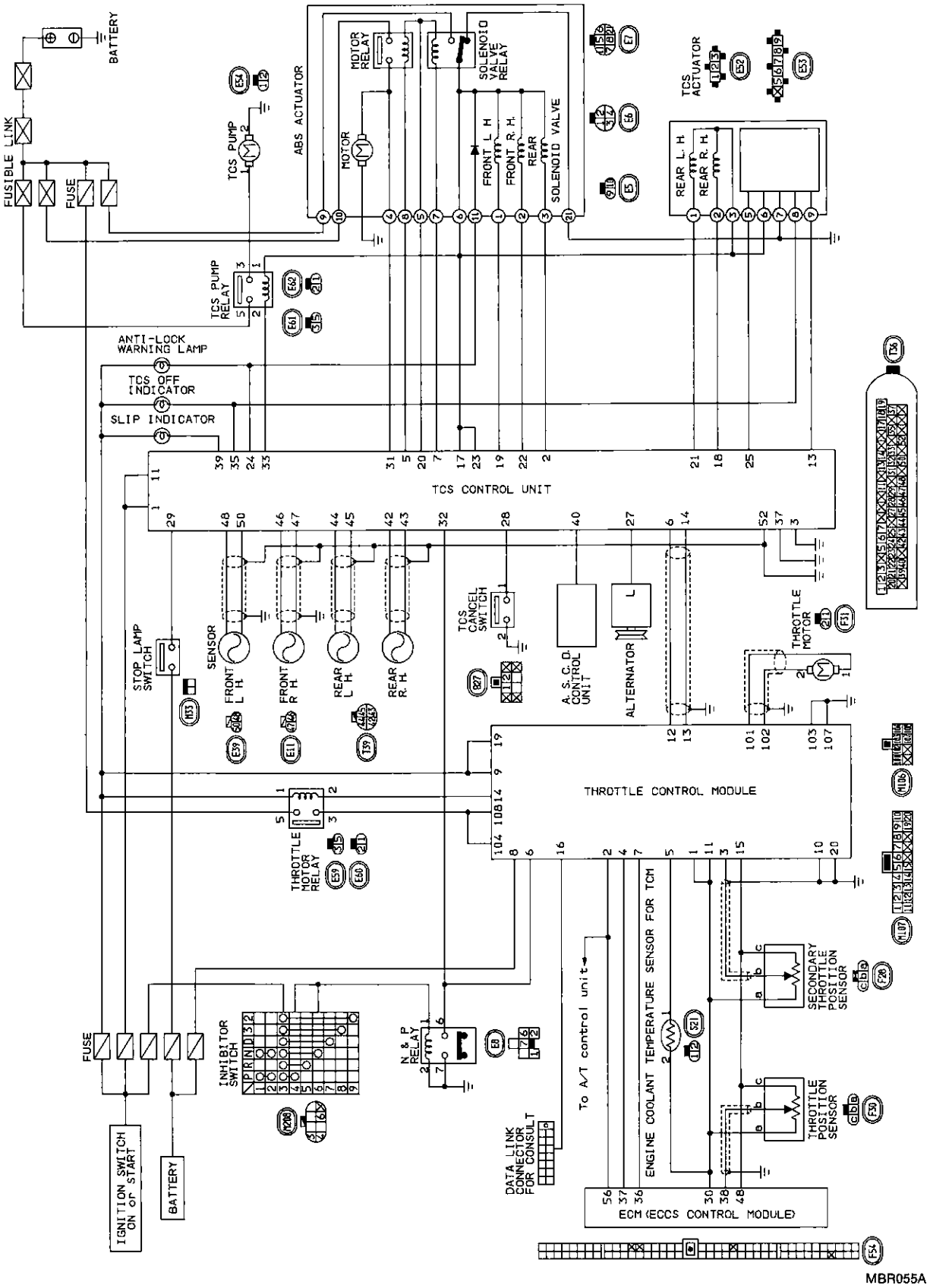


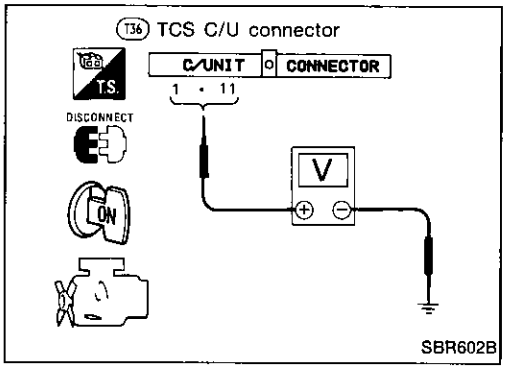
TCS PUMP

Continuity should exist.

Circuit Diagram for Quick Pinpoint Check

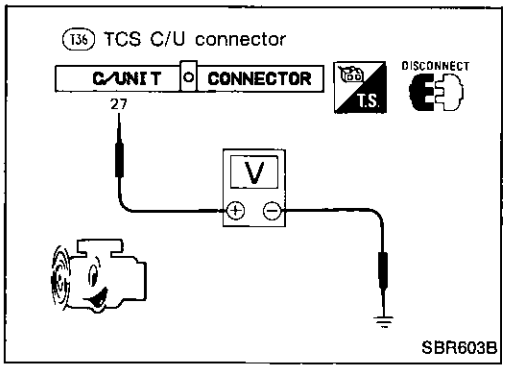
- The unit side connectors with a double circle "◯" are connected to the harness side connectors shown in the "Component Parts and Connector Location". (See page BR-84.)
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle " ○ ".





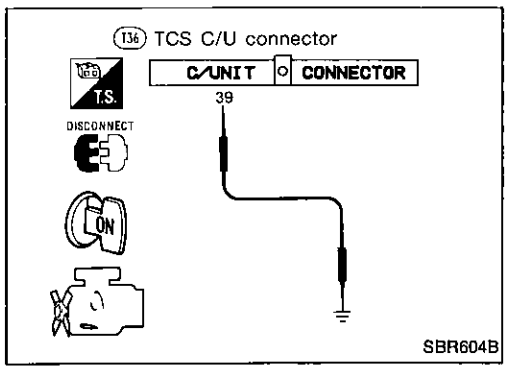
Diagnostic Procedure 1

POWER SUPPLY CIRCUIT FOR TCS C/U	N.G.	Repair harness and connectors.
Check voltage between TCS C/U terminal ① and ground, and ⑪ and ground. **Battery voltage should exist.**		



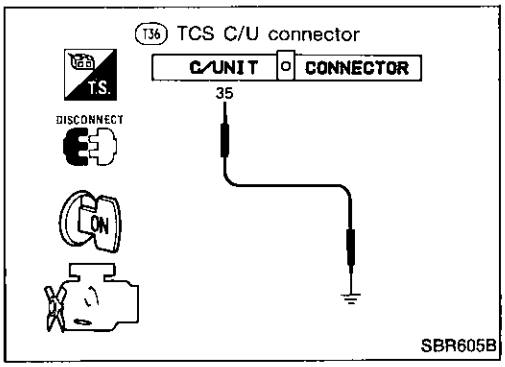
Diagnostic Procedure 2

ALTERNATOR OUTPUT SIGNAL FOR TCS C/U	N.G.	Repair harness and connectors.
Check voltage between TCS C/U terminal ㉗ and ground with engine running. **12V or more**		
O.K.		
Carry out Diagnostic Procedures 6 through 8.	N.G.	Repair harness and connectors.
O.K.		
TRY SELF-DIAGNOSIS AGAIN.		
Does TCS C/U display code No. "0" even if all indicators/ warnings are activated? ("0" means no indication.)	Yes	Replace TCS C/U.
No		
Inspect system referring to displayed code No.		



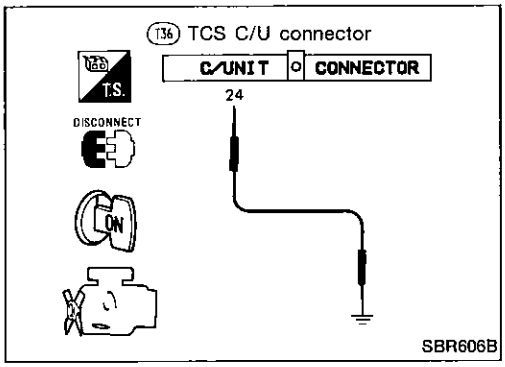
Diagnostic Procedure 3

SLIP INDICATOR CIRCUIT	N.G.	• Repair harness and connectors. or • Replace bulb.
Check SLIP indicator by grounding TCS C/U terminal ㊴. **TCS indicator should be lit.**		



Diagnostic Procedure 4

TCS OFF INDICATOR CIRCUIT • Disconnect 6-pin connector from TCS actuator. • Check TCS OFF indicator by grounding TCS C/U terminal (35). **TCS OFF indicator should be lit.**	N.G. →	• Repair harness and connectors. or • Replace bulb.



Diagnostic Procedure 5

ABS WARNING LAMP CIRCUIT • Remove solenoid valve relay from ABS actuator. • Check ABS warning lamp by grounding TCS C/U terminal (24). **ABS warning lamp should be lit.**	N.G. →	• Repair harness and connectors. or • Replace bulb.

Diagnostic Procedure 6

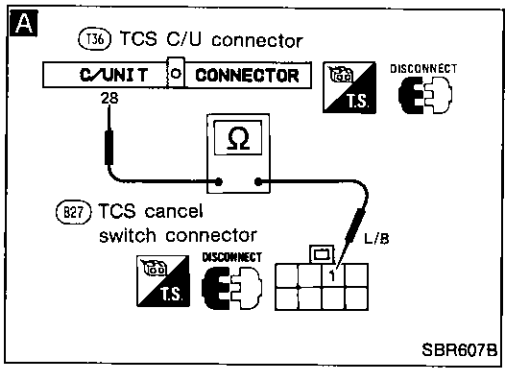
SLIP INDICATOR CIRCUIT Disconnect connector from TCS C/U and turn ignition switch "ON". **TCS indicator should not be lit.**	N.G. →	Repair harness and connector between SLIP indicator bulb and TCS C/U terminal (39).

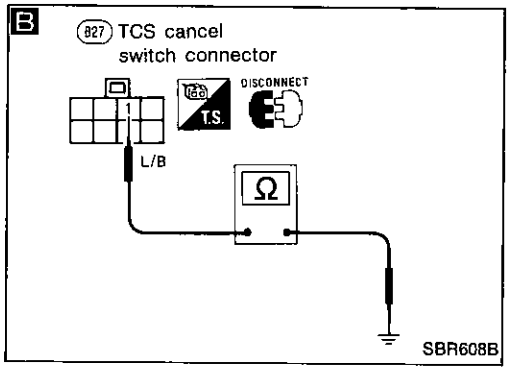
Diagnostic Procedure 7

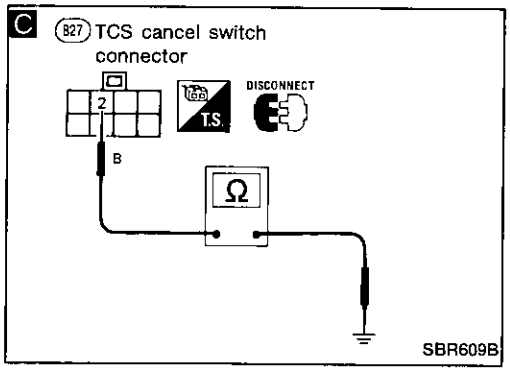
TCS OFF INDICATOR CIRCUIT • Disconnect 6-pin connector from TCS actuator. • Disconnect connector from TCS C/U and turn ignition switch "ON". **TCS OFF indicator should not be lit.**	N.G. →	• Repair harness and connectors between TCS OFF indicator bulb and TCS C/U terminal (35). or • Repair harness and connector between TCS OFF indicator bulb and TCS actuator terminal (9).

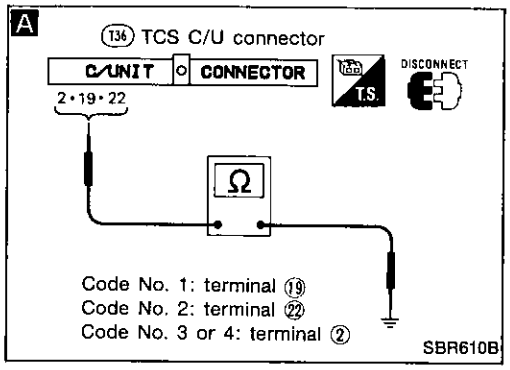
Diagnostic Procedure 8

ABS WARNING LAMP CIRCUIT • Remove solenoid valve relay from ABS actuator. • Disconnect connector from TCS C/U and turn ignition switch "ON". **ABS warning lamp should not be lit.**	N.G. →	• Repair harness and connectors between ABS warning bulb and TCS C/U terminal (24). or • Repair harness and connectors between ABS warning bulb and ABS actuator terminal (11).









Diagnostic Procedure 9

INOPERATIVE TCS CANCEL SWITCH

CHECK TCS CANCEL SWITCH.
Refer to TCS CANCEL SWITCH in Electrical Components Inspection.
N.G. → Replace TCS cancel switch.
O.K. ↓

A

- Disconnect connector from TCS C/U.
- Check continuity between terminal (28) for TCS C/U connector and terminal (1) for TCS cancel switch connector.

Continuity should exist.

N.G. → Repair harness and connectors.
O.K. ↓

B

- Check continuity between terminal (1) for TCS cancel switch connector and ground.

Continuity should not exist.

N.G. → Repair harness and connectors.
O.K. ↓

C

- Check continuity between terminal (2) for TCS cancel switch connector and ground.

Continuity should exist.

N.G. → Repair harness and connectors.
O.K. ↓

Final check

Diagnostic Procedure 10

SOLENOID CIRCUIT FOR ABS ACTUATOR (Code No. 1, 2, 3 or 4)

A

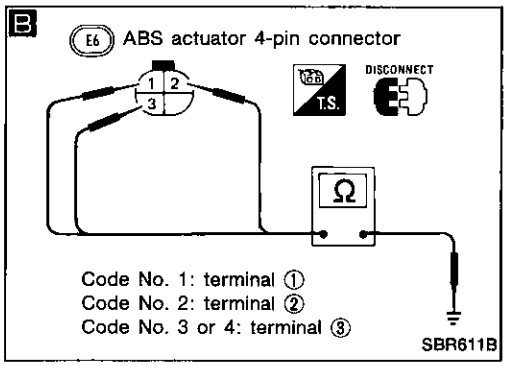
SOLENOID CIRCUIT FOR ABS ACTUATOR
O.K. → Replace TCS C/U.

Check resistance between TCS C/U connector terminals and ground.
Code No. 1: Terminal (19) and ground
Code No. 2: Terminal (22) and ground
Code No. 3 or 4: Terminal (2) and ground
Resistance: 0.8 - 1.2Ω

N.G. ↓

Ⓐ

Diagnostic Procedure 10 (Cont'd)



Ⓐ

B

- Disconnect 4-pin connector from ABS actuator.
- Check resistance between ABS actuator connector (actuator side) terminals and ground.
  Code No. 1: Terminal ① and ground
  Code No. 2: Terminal ② and ground
  Code No. 3 or 4: Terminal ③ and ground
  Resistance: 0.8 - 1.2Ω

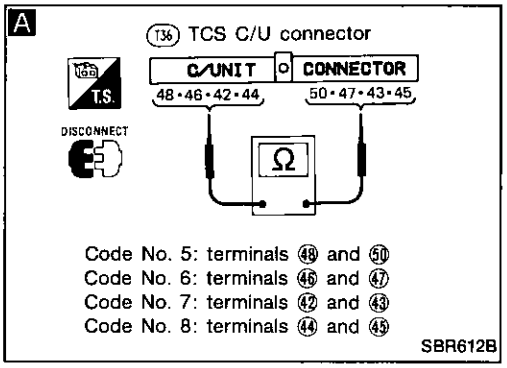
N.G. → Replace actuator.

O.K. ↓

Repair harness and connectors between actuator connector and TCS C/U connector.

Diagnostic Procedure 11

WHEEL SENSOR CIRCUIT (Code No. 5, 6, 7 or 8)



A

WHEEL SENSOR CIRCUIT

Check resistance between TCS C/U connector terminals.
Code No. 5: Terminals ㊽ and ㊿
Code No. 6: Terminals ㊻ and ㊼
Code No. 7: Terminals ㊷ and ㊸
Code No. 8: Terminals ㊹ and ㊺
Resistance: 0.9 - 1.1 kΩ

O.K. → Carry out Preliminary Check 2. (See page BR-83.)

N.G. → Repair or replace relevant part(s).

O.K. → Ⓐ

N.G. ↓

Ⓐ ↓

Replace TCS C/U.

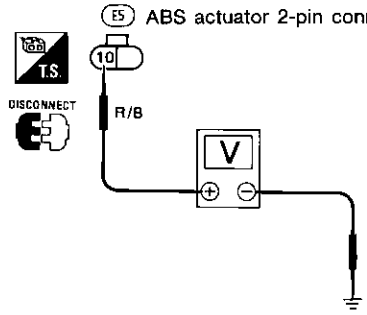
CHECK WHEEL SENSOR.
Refer to WHEEL SENSOR in Electrical Components Inspection.

N.G. → Repair harness or replace wheel sensor.

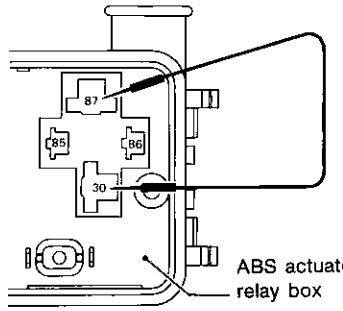
O.K. ↓

Repair harness and connectors between wheel sensor connector and TCS C/U connector.

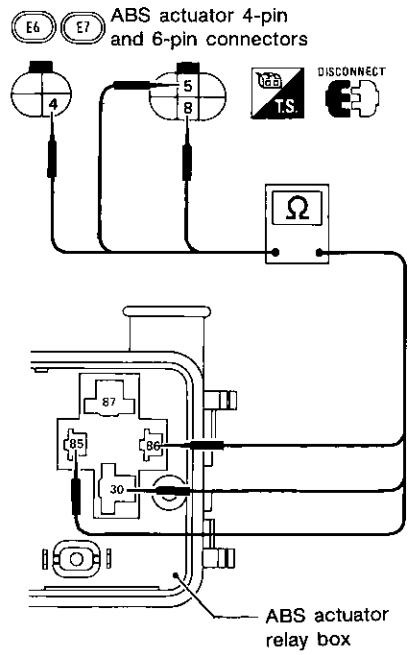
A



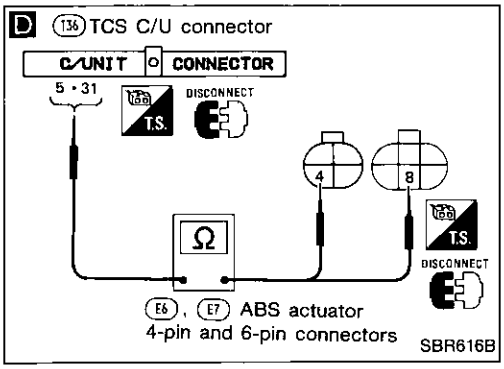
B



C



D



Diagnostic Procedure 12
ABS ACTUATOR MOTOR AND MOTOR RELAY CIRCUIT (Code No. 9)

A

POWER SUPPLY CIRCUIT FOR ABS ACTUATOR MOTOR

Check voltage between 2-pin ABS actuator connector terminal ⑩ and ground.
Battery voltage should exist.

N.G. → ● Repair harness and connectors. or ● Replace fusible link.

O.K.

B

ABS ACTUATOR MOTOR OPERATION

- Connect connector to ABS actuator and remove ABS actuator motor relay.
- Check ABS actuator motor operation using a jumper cable.
  Do NOT connect jumper cable for more than 5 seconds to prevent motor damage.
  Motor should be operated.

N.G. → ● Repair cable from ABS actuator relay box to motor. or ● Replace ABS actuator.

O.K.

CHECK ABS ACTUATOR MOTOR RELAY.
Refer to ABS ACTUATOR MOTOR RELAY in Electrical Component Inspection.

N.G. → Replace ABS actuator motor relay.

O.K.

C

- Disconnect connectors from ABS actuator.
- Check continuity between connector terminals (actuator side) and motor relay terminals.
  ④ to ㉚, ⑤ to ㊻, ⑧ to ㊺
  Continuity should exist.

N.G. → Replace ABS actuator.

O.K.

D

- Disconnect connector from TCS C/U.
- Check continuity between TCS C/U connector terminals and ABS actuator connector terminals.
  ㉛ to ④, ⑤ to ⑧
  Continuity should exist.

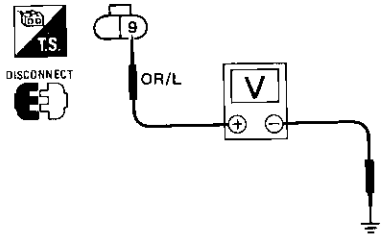
N.G. → Repair harness and connectors.

O.K.

Replace TCS C/U.

A

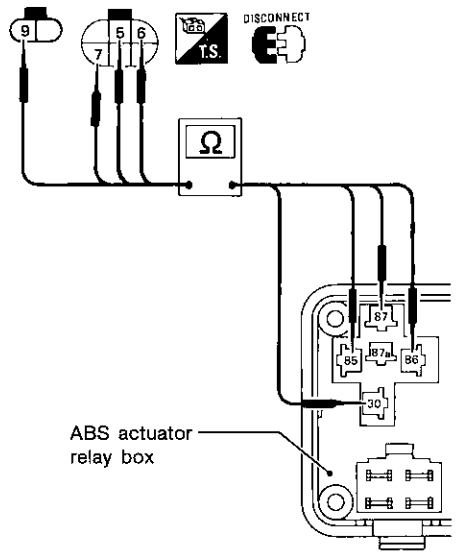
(E5) ABS actuator 2-pin connector



SBR617B

B

(E5), (E7) ABS actuator 2-pin and 6-pin connectors

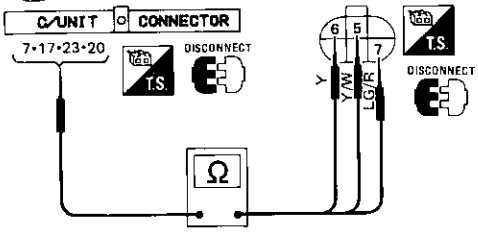


SBR618B

C

(T36) TCS C/U connector

(E7) ABS actuator 6-pin connector



SBR619B

Diagnostic Procedure 13

ABS ACTUATOR SOLENOID VALVE RELAY CIRCUIT (Code No. 10)

POWER SUPPLY CIRCUIT FOR ABS ACTUATOR SOLENOID VALVE

Check fuse No. 43.
For fuse layout, refer to foldout page Circuit Diagram.

N.G. → Ⓐ

O.K. ↓

A

- Disconnect 2-pin connector from ABS actuator.
- Check voltage between terminal ⑨ and ground.
  Battery voltage should exist.

N.G. → Repair harness and connector.

O.K. ↓

CHECK ABS ACTUATOR SOLENOID VALVE RELAY.
Refer to ABS ACTUATOR SOLENOID VALVE RELAY in Electrical Component Inspection.

N.G. → Replace ABS actuator solenoid valve relay.

O.K. ↓

B

- Disconnect 6-pin connector from ABS actuator.
- Check continuity between connector terminals (actuator side) and solenoid valve relay terminals.
  ⑨ to ⑧⑦, ⑦ to ⑧⑤, ⑥ to ③⓪, ⑤ to ⑧⑥
  Continuity should exist.

N.G. → Replace ABS actuator.

O.K. ↓

C

- Disconnect connector from TCS C/U.
- Check continuity between TCS C/U connector terminals and ABS actuator connector terminals.
  ⑦ to ⑦, ⑰ to ⑥, ㉓ to ⑥, ⑳ to ⑤
  Continuity should exist.

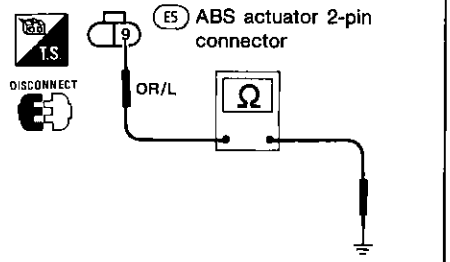
N.G. → Repair harness and connector.

O.K. ↓

Replace TCS C/U.

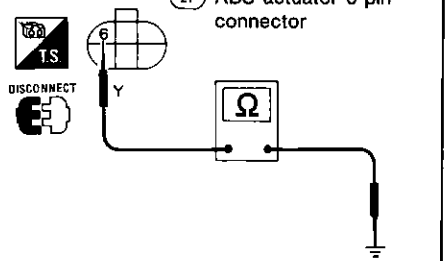
Diagnostic Procedure 13 (Cont'd)

D



SBR620B

E



SBR622B

Ⓐ

- Replace fuse No. 43.
  For fuse layout, refer to foldout page of Circuit Diagram.
- Carry out self-diagnosis.
- Does TCS C/U display code No. 10 again?

No → Inspection End

Yes

D

GROUND SHORT FOR POWER SUPPLY CIRCUIT FOR ABS ACTUATOR SOLENOID VALVE

- Disconnect 2-pin connector from ABS actuator.
- Check continuity between terminal ⑨ and ground before replacing with No. 43 fuse. For fuse layout, refer to foldout page of Circuit Diagram.
  Continuity should not exist.

N.G. → Repair harness between fuse box and ABS actuator connector.

O.K.

E

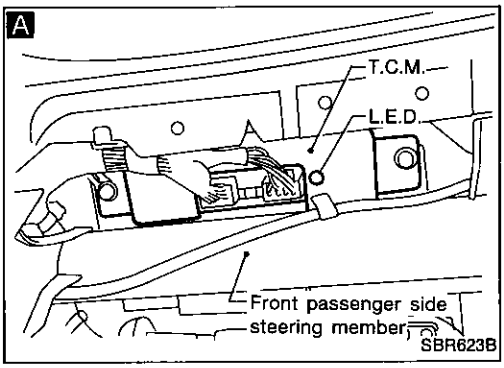
- Disconnect connectors from TCS and ABS actuators.
- Disconnect connector from TCS C/U.
- Disconnect connector from TCS pump relay.
- Check continuity between terminal ⑥ for ABS actuator connector and ground.
  Continuity should not exist.

N.G. → Repair harness and connectors among as follows:
TCS C/U connector ⑰ and ㉓
TCS actuator ③ and ⑥
TCS pump relay ①
ABS actuator ⑥

O.K.

Replace ABS actuator.

A



Diagnostic Procedure 14

SECONDARY THROTTLE OPENING SIGNAL CIRCUIT OR THROTTLE SIGNAL CIRCUIT (Code No. 13)

A

Check diagnostic code for T.C.M.
Does T.C.M. also display code No. 13, 14, 33 or 55?

No → Go to self-diagnosis for T.C.M. (See page BR-86.)

Yes ↓

B

- Turn ignition switch OFF.
- Remove battery negative cable.
- Disconnect connectors from TCS C/U and T.C.M.
- Check continuity between connector terminals.

TCS C/U	T.C.M.
⑥	⑫
⑭	⑬

Continuity should exist.

N.G. → Repair harness and connectors.

O.K. ↓

C

- Check continuity between terminal and ground.
  - ⑫ to ground
  - ⑬ to ground

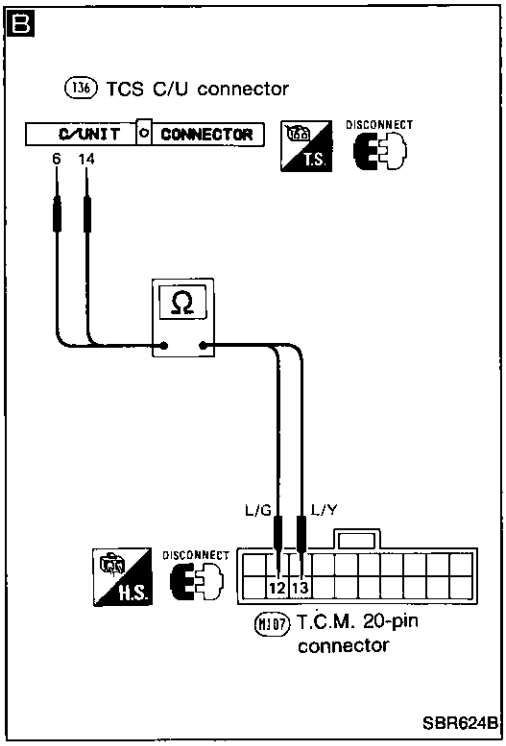
Continuity should not exist.

N.G. → Repair harness and connectors.

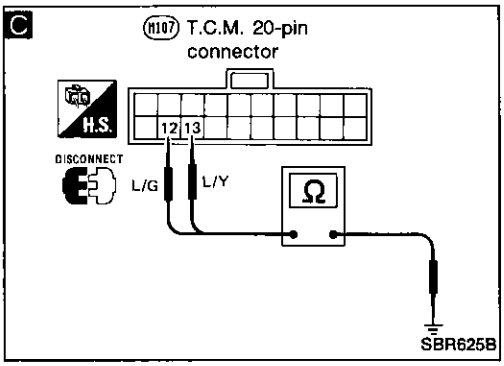
O.K. ↓

Final check

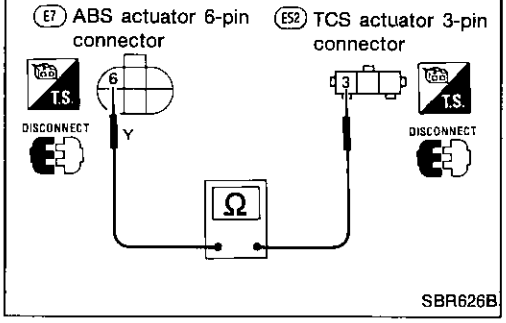
B



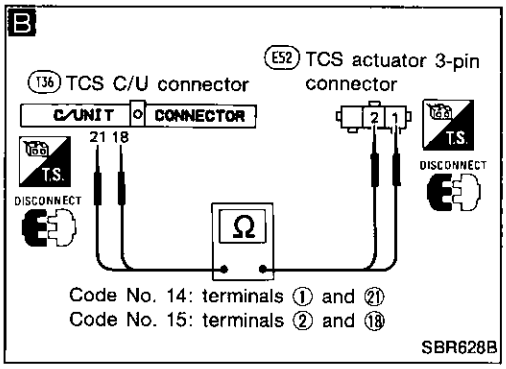
C



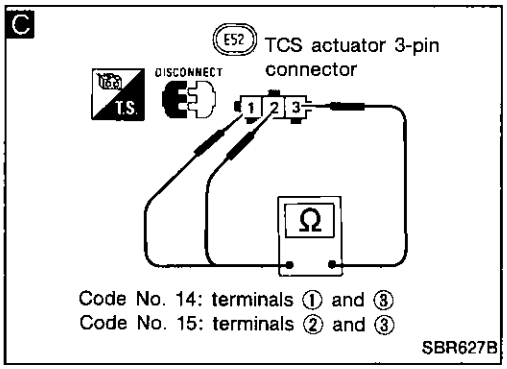
A



B



C



Diagnostic Procedure 15

SOLENOID CIRCUIT FOR TCS ACTUATOR (Code No. 14 or 15)

A

- Remove battery.
- Disconnect 6-pin connector from ABS actuator.
- Disconnect 3-pin connector from TCS actuator.
- Check continuity between terminal ⑥ for ABS actuator connector and terminal ③ for TCS actuator connector.

Continuity should exist.

N.G. → Repair harness and connectors.

O.K. ↓

B

- Disconnect connector from TCS C/U.
- Check continuity between TCS C/U connector terminals and TCS actuator connector terminals.

Code No. 14: ① and ㉑
Code No. 15: ② and ⑱

Continuity should exist.

N.G. → Repair harness and connectors.

O.K. ↓

C *

- Check resistance between terminals (TCS actuator side).

Code No. 14: ① and ③
Code No. 15: ② and ③

Resistance: 1.0 - 1.8Ω

N.G. → Replace TCS actuator.

Note *: It is better to remove TCS actuator in advance for accurate measurements.

O.K. ↓

- Replace TCS C/U.

Diagnostic Procedure 16

TCS C/U (Code No. 0 or 16)

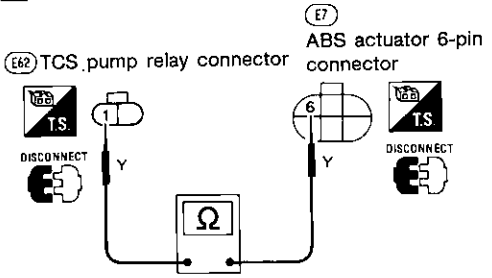
Carry out self-diagnosis again.
Does TCS C/U display Code No. 0 or 16 again?

Yes → Replace TCS C/U.

No ↓

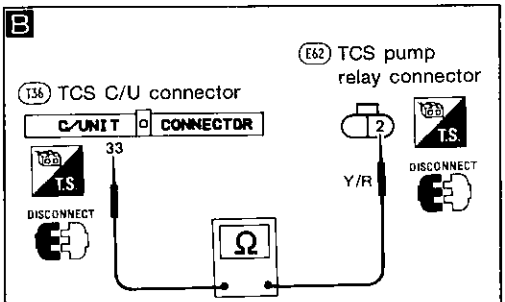
Inspect system again referring to displayed code No.

A



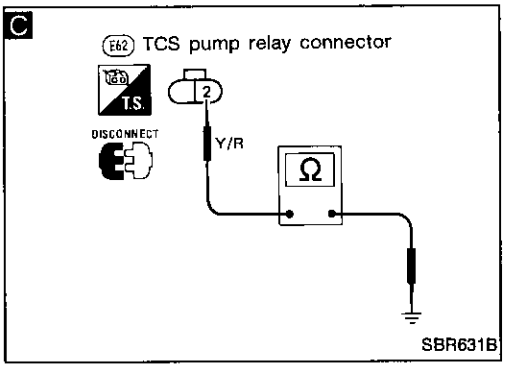
SBR629B

B



SBR630B

C



SBR631B

Diagnostic Procedure 17

TCS PUMP RELAY CIRCUIT (Code No. 17)

TCS PUMP RELAY CIRCUIT

- Remove battery.
- Remove TCS pump relay.

↓

CHECK TCS PUMP RELAY.
Refer to TCS PUMP RELAY in Electrical Component Inspection.

N.G. → Replace TCS pump relay.

O.K. ↓

A

- Disconnect 6-pin connector from ABS actuator.
- Check continuity between terminal ⑥ for ABS actuator connector and terminal ① for TCS pump relay connector.
  Continuity should exist.

N.G. → Repair harness and connectors.

O.K. ↓

B

- Disconnect connector from TCS C/U.
- Check continuity between terminal ㉝ for TCS C/U connector and terminal ② for TCS pump relay connector.
  Continuity should exist.

N.G. → Repair harness and connector.

O.K. ↓

C

- Check continuity between terminal ② for TCS pump relay connector and ground.
  Continuity should not exist.

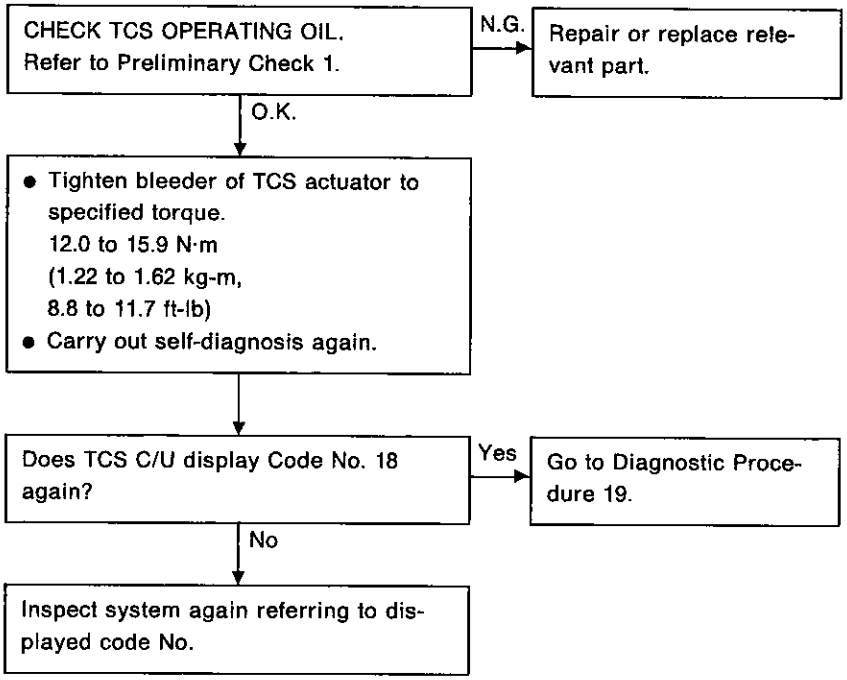
N.G. → Repair harness and connector.

O.K. ↓

Replace TCS C/U.

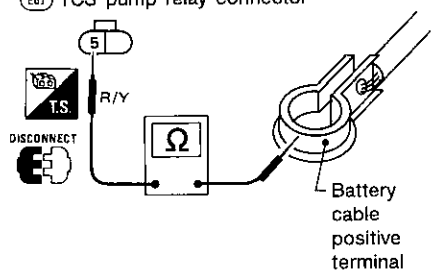
Diagnostic Procedure 18

TCS OPERATING OIL PRESSURE (Code No. 18)



A

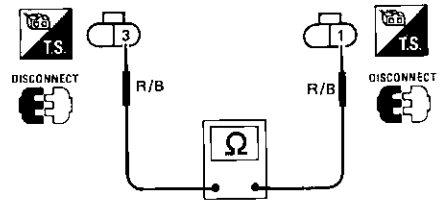
(E61) TCS pump relay connector



SBR632B

B

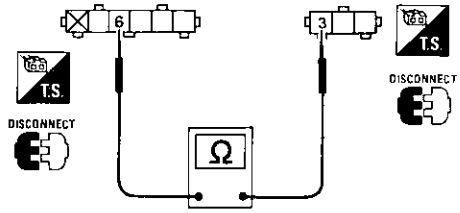
(E61) TCS pump relay connector (E54) TCS pump connector



SBR633B

C

(E53) (E52) TCS actuator connectors



SBR634B

Diagnostic Procedure 19

TCS MOTOR CIRCUIT AND TCS ACTUATOR (Code No. 19)

Does TCS pump operate while engine is running? — Yes → Ⓐ

No ↓

TCS MOTOR CIRCUIT — N.G. → Ⓑ

- Check 30A fusible link.

O.K. ↓

- Remove battery.
- Remove TCS pump relay.

O.K. ↓

CHECK TCS PUMP RELAY.
Refer to TCS PUMP RELAY in Electrical Component Inspection. — N.G. → Replace TCS pump relay.

O.K. ↓

A

- Check continuity between positive terminal for battery cable and terminal ⑤ for TCS pump relay connector.
  Continuity should exist.

N.G. → Repair harness and connector.

O.K. ↓

CHECK TCS PUMP.
Refer to TCS PUMP in Electrical Component Inspection. — N.G. →
- Repair TCS pump harness.
  or
- Replace TCS pump.

O.K. ↓

B

- Check continuity between terminal ③ for TCS pump relay connector and terminal ① for TCS pump connector.
  Continuity should exist.

N.G. → Repair harness and connectors.

O.K. ↓

C

- Disconnect connectors from TCS actuator.
- Check continuity between terminals ③ and ⑥ for TCS connectors.
  Continuity should exist.

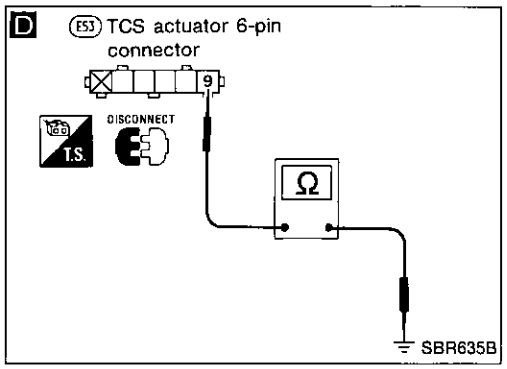
N.G. → Repair harness and connectors.

O.K. ↓

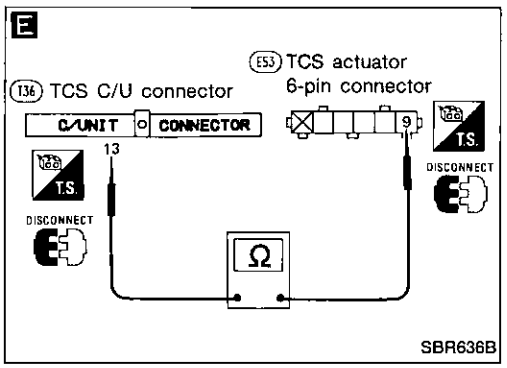
Ⓐ

Diagnostic Procedure 19 (Cont'd)

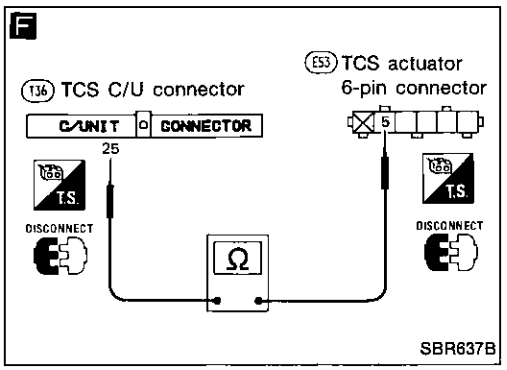
D



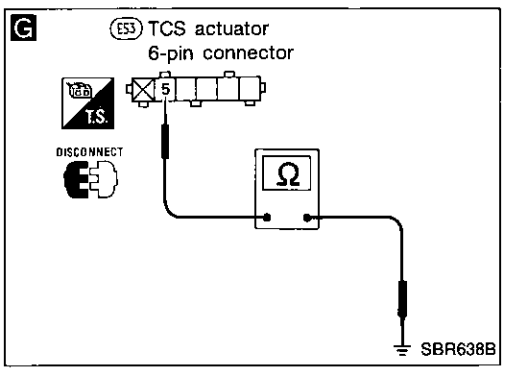
E



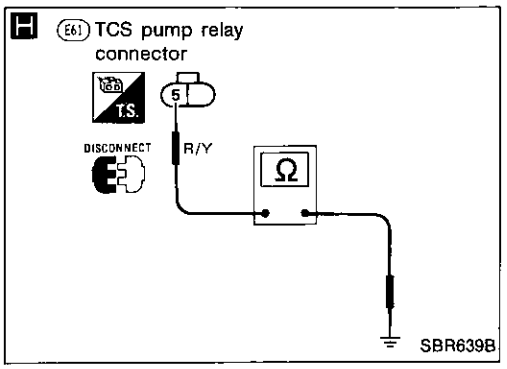
F



G



H



Ⓐ

D

- Disconnect connector from TCS C/U.
- (● Disconnect 6-pin connector from TCS actuator.)
- Check continuity between terminal ⑨ for TCS actuator connector and ground.

Continuity should not exist.

N.G. → Repair harness and connectors between terminal ⑨ for TCS actuator connector and terminal ⑬ for TCS C/U connector.

O.K.

E

- Check continuity between terminal ⑨ for TCS actuator connector and terminal ⑬ for TCS C/U connector.

Continuity should exist.

N.G. → Repair harness and connectors.

O.K.

F

- Check continuity between terminal ⑤ for TCS actuator connector and terminal ㉕ for TCS C/U connector.

Continuity should exist.

N.G.

O.K.

G

- Check continuity between terminal ⑤ for TCS actuator connector and ground.

Continuity should not exist.

N.G. → Repair harness and connectors.

O.K.

Ⓑ

H

- (● Remove battery.)
- (● Remove TCS pump relay.)
- (● Disconnect connector from TCS motor.)
- Check continuity between terminal ⑤ for TCS pump relay connector and ground.

Continuity should not exist.

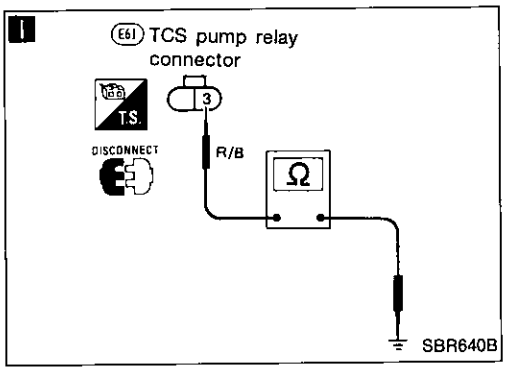
N.G. → Repair harness and connectors between terminal ⑤ for TCS pump relay connector and fuse box.

O.K.

Ⓒ

Diagnostic Procedure 19 (Cont'd)

I



Ⓒ

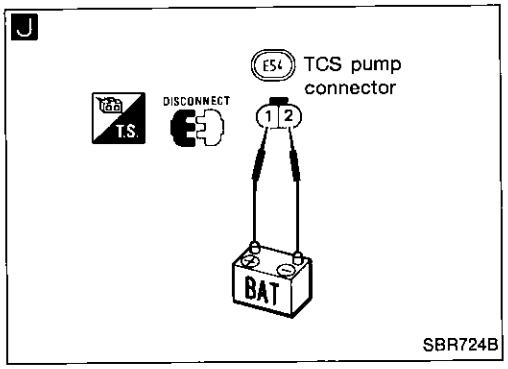
I

- Check continuity between terminal ③ for TCS pump relay connector and ground.
  Continuity should not exist.

N.G. → Repair harness between terminal ③ for TCS pump relay connector and terminal ① for TCS pump connector.

O.K.

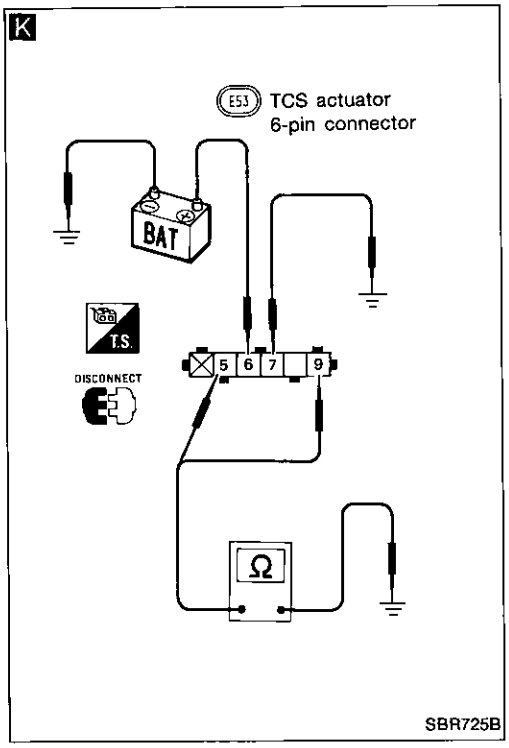
J



J

- Tighten bleeder of TCS actuator to specified torque.
  12.0 to 15.9 N·m
  (1.22 to 1.62 kg-m,
  8.8 to 11.7 ft-lb)
- Apply battery voltage to TCS pump for 10 seconds only.
  Pay attention to the polarity.

K



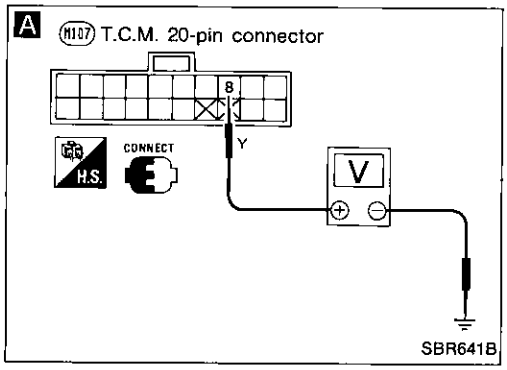
K

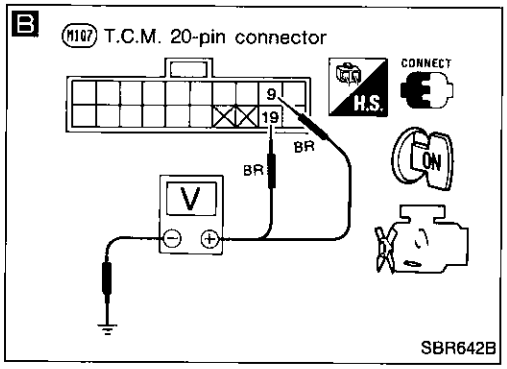
- Apply battery voltage to terminal ⑥ for TCS actuator with suitable wire.
- Connect terminal ⑦ for TCS actuator and ground with a suitable wire.
  Pay attention so as not to short circuit for both wires.
- Check continuity between terminals ⑤ and ⑨ for TCS actuator and ground under the following conditions.
  Before loosening bleeder of TCS actuator:
  Continuity should not exist.
  After loosening bleeder of TCS actuator:
  Continuity should exist.

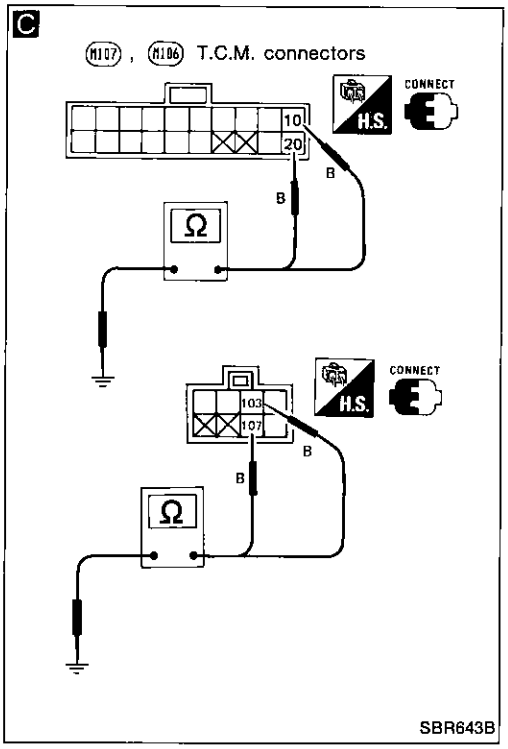
N.G. → Replace TCS actuator.

O.K.

Final check







Diagnostic Procedure 20

POWER SUPPLY AND GROUND CIRCUIT FOR T.C.M. (Code No. 0 ... L.E.D. does not blink)

A

POWER SUPPLY AND GROUND CIRCUIT FOR T.C.M.

- Check voltage between terminal ⑧ and ground.
  Battery voltage should exist.

N.G. → Repair harness and connectors.

O.K. ↓

B

- Check voltage between terminals ⑨, ⑲ and ground when ignition switch is turned ON.
  Battery voltage should exist.

N.G. → Repair harness and connectors.

O.K. ↓

C

- Check continuity between terminals ⑩, ⑳, (103), (107) and ground.
  Continuity should exist.

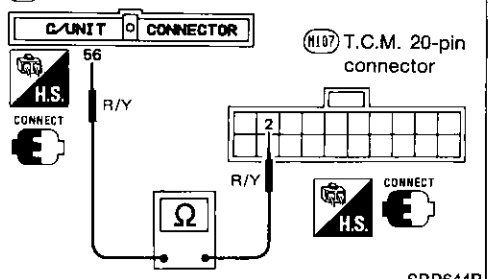
N.G. → Repair harness and connectors.

O.K. ↓

Replace T.C.M.

A

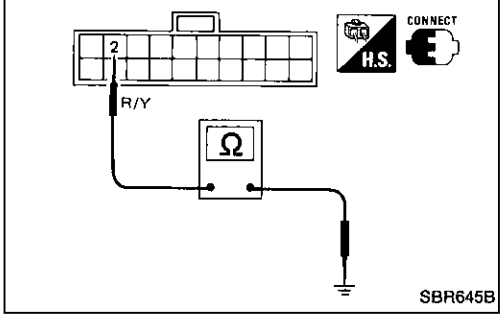
(F54) E.C.C.S. C/U connector



SBR644B

B

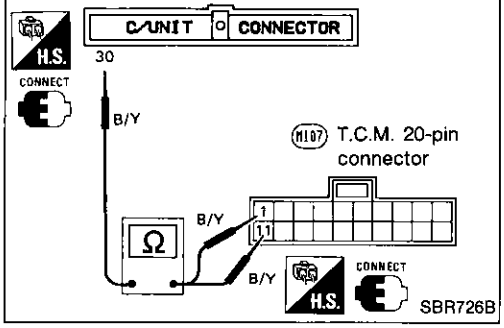
(M107) T.C.M. 20-pin connector



SBR645B

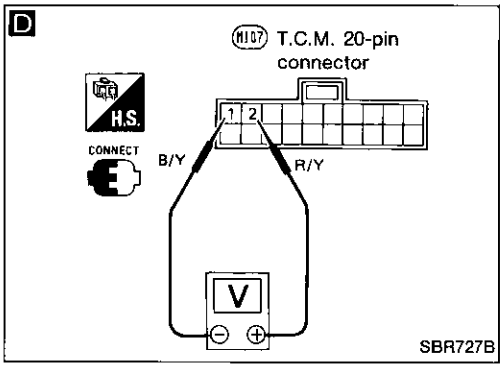
C

(F54) E.C.C.S. C/U connector



SBR726B

D



SBR727B

Diagnostic Procedure 21

THROTTLE SENSOR SIGNAL INPUT CIRCUIT (Code No. 11)

Does TCS C/U display code No. 13? — No → Inspect system referring to code No. displayed by TCS C/U.

Yes ↓

Does E.C.C.S. C/U display code No. 43? — Yes → Check E.C.C.S. Refer to section EF & EC.

No ↓

A

THROTTLE SENSOR SIGNAL INPUT CIRCUIT — N.G. → Repair harness and connectors.

- Check continuity between terminal ② for T.C.M. and terminal ⑯ for E.C.U.
  Continuity should exist.

O.K. ↓

B

- Check continuity between terminal ② for T.C.M. and ground.
  Continuity should not exist. — N.G. → Repair harness and connectors.

O.K. ↓

C

Check continuity between terminals ①, ⑪ for T.C.M. and terminal ㉚ for E.C.C.S. C/U.
Continuity should exist. — N.G. → Repair harness and connector.

O.K. ↓

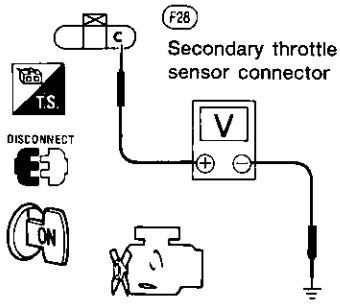
D

Check voltage between terminal ② and terminal ① for T.C.M.
0.3V to 3.3V should exist depending on accelerator position. — N.G. → Replace E.C.C.S. control unit.

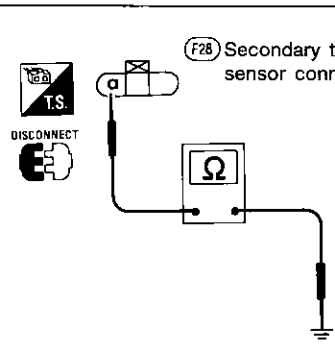
O.K. ↓

Replace T.C.M.

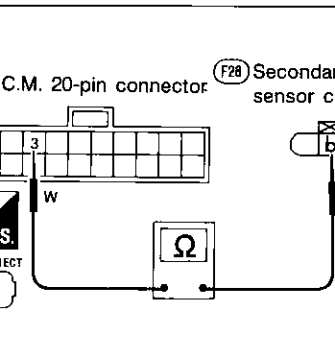
A



B



C



Diagnostic Procedure 22

SECONDARY THROTTLE SENSOR SIGNAL INPUT CIRCUIT (Code No. 12)

A

POWER SUPPLY FOR SECONDARY THROTTLE SENSOR

Check voltage between terminal ⓒ for secondary throttle sensor connector and ground when ignition switch is turned ON.
Voltage: Approx. 5V

N.G. → Repair harness and connectors between terminal ⑮ for T.C.M. connector, ㊽ for E.C.C.S. C/U connector and terminal ⓒ.

O.K. ↓

B

GROUND CIRCUIT

Check continuity between terminal ⓐ for secondary throttle sensor connector and ground when ignition switch is turned OFF.
Continuity should exist.

N.G. → Repair harness and connectors between terminals ①, ⑪ for T.C.M. connector, ㉚ for E.C.C.S. C/U connector and terminal ⓐ.

O.K. ↓

C

- Disconnect 20-pin connector from T.C.M.
- Check continuity between terminal ③ for T.C.M. connector and terminal ⓑ for secondary throttle sensor connector.
  Continuity should exist.

N.G. → Repair harness and connector.

O.K. ↓

CHECK SECONDARY THROTTLE SENSOR.
Refer to SECONDARY THROTTLE SENSOR in section EF & EC.

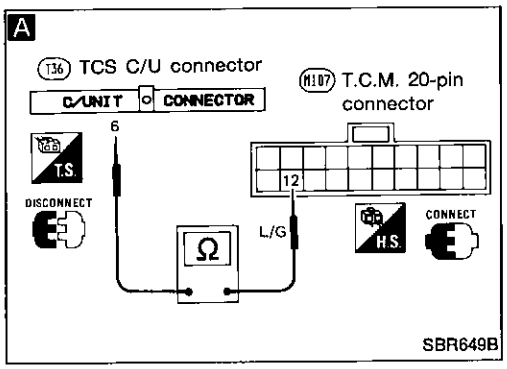
N.G. → Replace secondary throttle sensor.

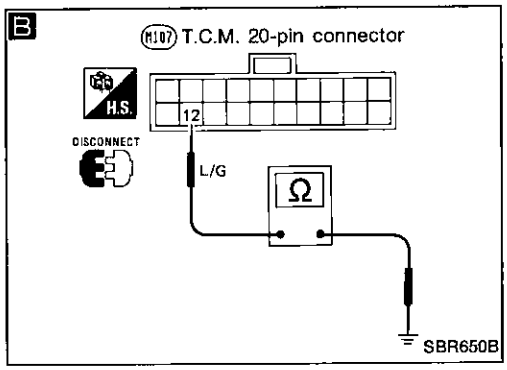
O.K. ↓

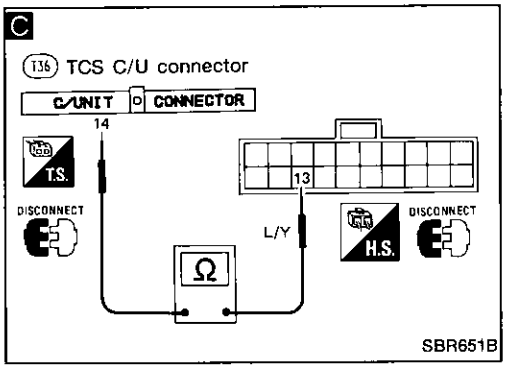
Final check

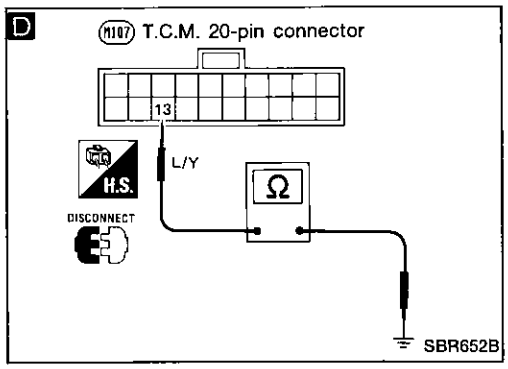
Diagnostic Procedure 23

SECONDARY THROTTLE VALVE OPERATING SIGNAL CIRCUIT AND THROTTLE VALVE OPENING SIGNAL CIRCUIT (Code No. 13)









Does TCS C/U display code No. 13?

No → Inspect system referring to code No. displayed by TCS C/U.

Yes

A SECONDARY THROTTLE VALVE OPERATING SIGNAL CIRCUIT

- Disconnect connector from TCS C/U.
- Check continuity between terminal ⑥ for TCS C/U connector and terminal ⑫ for T.C.M. connector.
  Continuity should exist.

N.G. → Repair harness and connectors.

O.K.

B

- Disconnect 20-pin connector from T.C.M.
- Check continuity between terminal ⑫ for T.C.M. connector and ground.
  Continuity should not exist.

N.G. → Repair harness and connectors.

O.K.

C THROTTLE VALVE OPENING SIGNAL CIRCUIT

- Check continuity between terminal ⑭ for TCS C/U connector and terminal ⑬ for T.C.M. connector.
  Continuity should exist.

N.G. → Repair harness and connectors.

O.K.

D

- Check continuity between terminal ⑬ for T.C.M. connector and ground.
  Continuity should not exist.

N.G. → Repair harness and connectors.

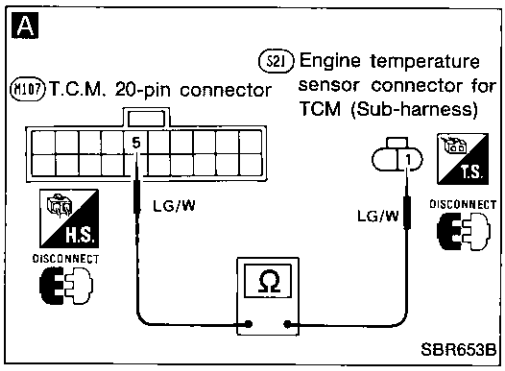
O.K.

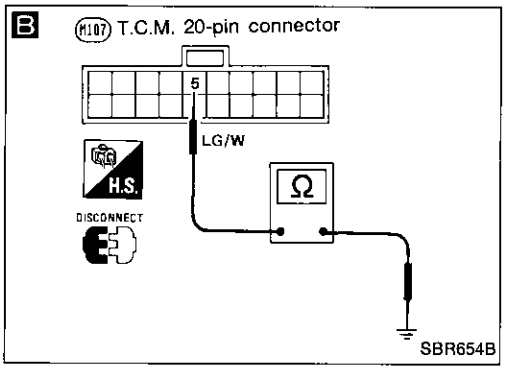
TRY A KNOWN GOOD T.C.M.
TRY SELF-DIAGNOSIS AGAIN.
Does T.C.M. display code No. 13 again?

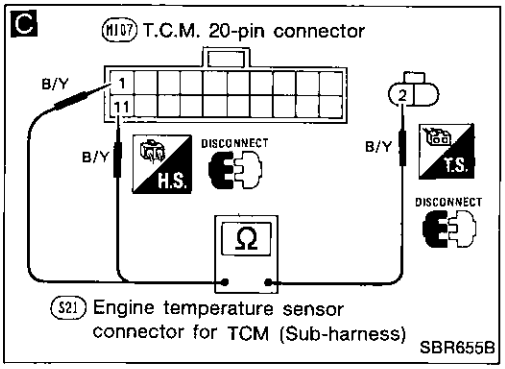
No → Replace T.C.M.

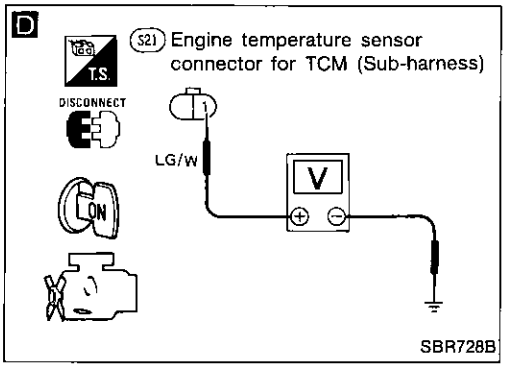
Yes

Replace TCS C/U.









Diagnostic Procedure 24

ENGINE TEMPERATURE SENSOR FOR TCM CIRCUIT (Code No. 14)

A

ENGINE TEMPERATURE SENSOR FOR TCM CIRCUIT

- Disconnect connector from engine temperature sensor for TCM and 20-pin connector from T.C.M.
- Check continuity between terminal ① for engine temperature sensor connector for TCM and terminal ⑤ for T.C.M. connector.
  Continuity should exist.

N.G. → Repair harness and connectors.

O.K. ↓

B

Check continuity between terminal ⑤ for T.C.M. connector and ground.
Continuity should not exist.

N.G. → Repair harness and connectors.

O.K. ↓

C

Check continuity between terminal ② for engine temperature sensor connector for TCM, terminals ① and ⑪ for T.C.M. connector.
Continuity should exist.

N.G. → Repair harness and connectors.

O.K. ↓

CHECK ENGINE TEMPERATURE SENSOR FOR TCM.
Refer to ENGINE TEMPERATURE SENSOR FOR TCM in Electrical Component Inspection.

N.G. → Replace engine temperature sensor for TCM.

O.K. ↓

D

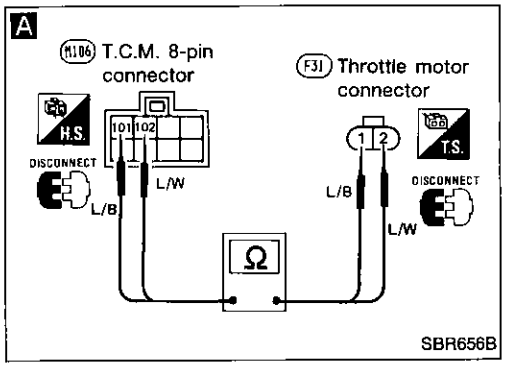
- Connect connector to T.C.M.
- Turn ignition switch ON.
- Check voltage between terminal ① for engine temperature sensor for TCM and ground.
  Voltage: Approx. 4.8V

O.K. → Final check

N.G. ↓

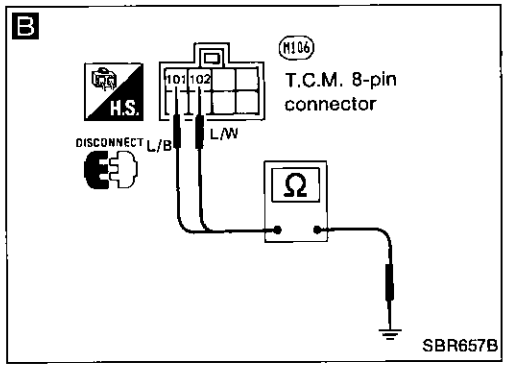
Replace T.C.M.

A



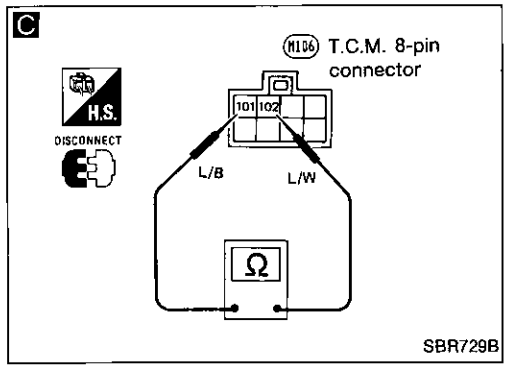
SBR656B

B



SBR657B

C



SBR729B

Diagnostic Procedure 25

THROTTLE MOTOR CIRCUIT (Code No. 21 and 22)

A

THROTTLE MOTOR CIRCUIT FOR OPEN

- Disconnect 8-pin connector from T.C.M. and connector from throttle motor.
- Check continuity.

T.C.M.	Motor
101	1
102	2

Continuity should exist.

N.G. → Repair harness and connectors.

O.K. ↓

B

THROTTLE MOTOR CIRCUIT FOR SHORT

- Check continuity between terminals 101, 102 for T.C.M. connector and ground.

Continuity should not exist.

N.G. → Repair harness and connectors.

O.K. ↓

C

- Disconnect connector from throttle motor.
- Check continuity between terminals 101 and 102 for T.C.M. connector.

Continuity should not exist.

N.G. → Repair harness and connectors.

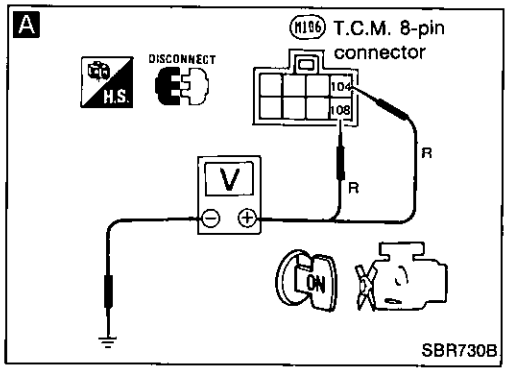
O.K. ↓

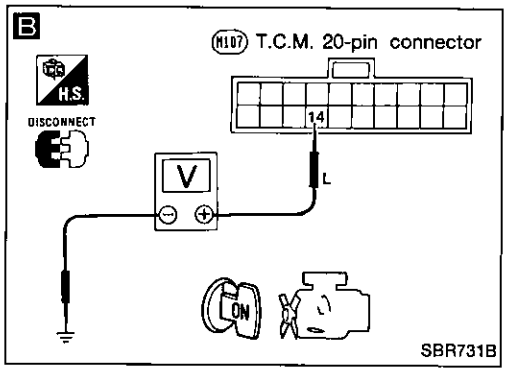
CHECK THROTTLE MOTOR.
Refer to THROTTLE MOTOR in Electrical Component Inspection.

N.G. → Replace throttle motor.

O.K. ↓

Final Check





Diagnostic Procedure 26

THROTTLE MOTOR RELAY CIRCUIT FOR SHORT CIRCUIT (Code No. 23)

A

- Disconnect connectors from T.C.M.
- Check voltage between terminals (104) or (108) for T.C.M. connector and ground when IGN sw is turned ON.

Battery voltage should not exist.

O.K. → Final check

N.G. ↓

B

- Check voltage between terminal (14) and ground when IGN sw is turned ON.

Battery voltage should exist.

N.G. → Repair harness and connector between terminal (2) for throttle motor relay connector and terminal (14) for T.C.M. connector.

O.K. ↓

CHECK THROTTLE MOTOR RELAY
- Refer to THROTTLE MOTOR RELAY in Electrical Component Inspection.

N.G. → Replace throttle motor relay.

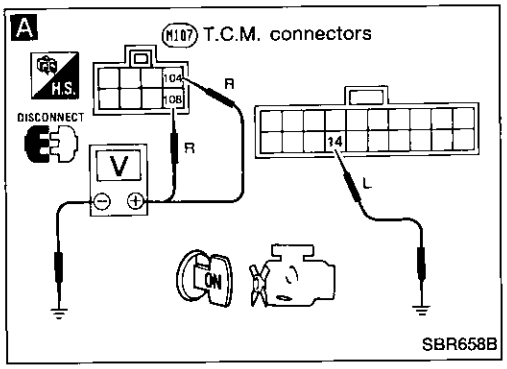
O.K. ↓

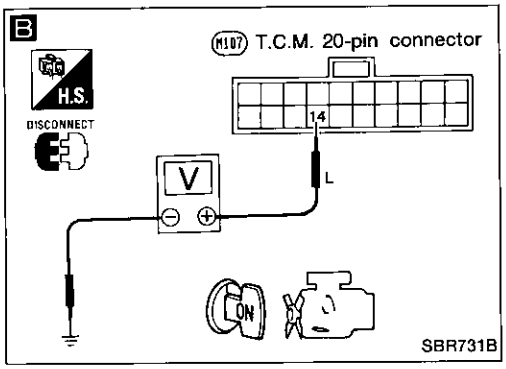
Inspect throttle motor relay connector harness for short circuit.

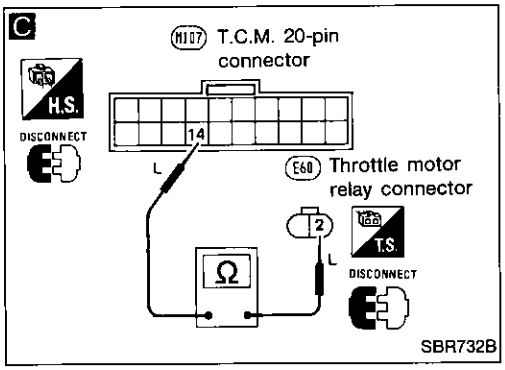
N.G. → Repair harness and connector.

O.K. ↓

Final check







Diagnostic Procedure 27

THROTTLE MOTOR RELAY CIRCUIT FOR OPEN CIRCUIT (Code No. 24)

A

THROTTLE MOTOR RELAY CIRCUIT

- Disconnect connectors from T.C.M.
- Turn ignition switch ON.
- Check voltage between the following terminals by grounding terminal ⑭.

⊕	⊖
⑩④	Ground
⑩⑧	Ground

Battery voltage should exist.

O.K. → Final check

N.G.

B

Check voltage between terminal ⑭ for T.C.M. connector and ground.
Battery voltage should exist.

O.K. → Ⓐ

N.G.

CHECK THROTTLE MOTOR RELAY.

- Remove battery.
- Remove throttle motor relay.
- Refer to THROTTLE MOTOR RELAY in Electrical Component Inspection.

N.G. → Replace throttle motor relay.

O.K.

C

- Check continuity between terminal ⑭ for T.C.M. connector and terminal ② for throttle motor relay connector.
Continuity should exist.

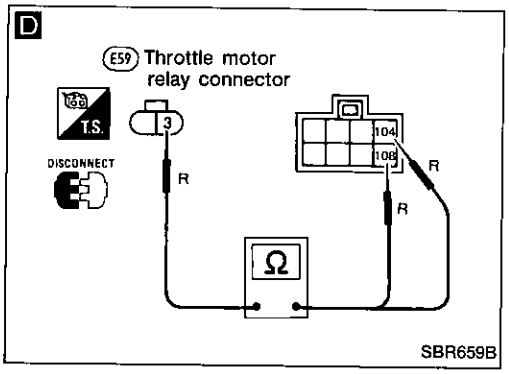
N.G. → Repair harness and connectors.

O.K.

Repair harness and connector between terminal ① for throttle motor relay connector and right side terminal of fuse No. 20 in fuse box.
For fuse layout, refer to foldout page of Circuit Diagram.

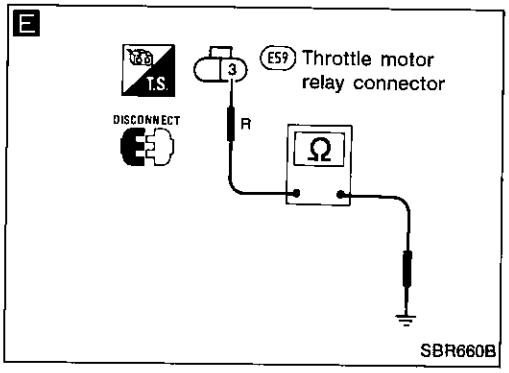
Diagnostic Procedure 27 (Cont'd)

D



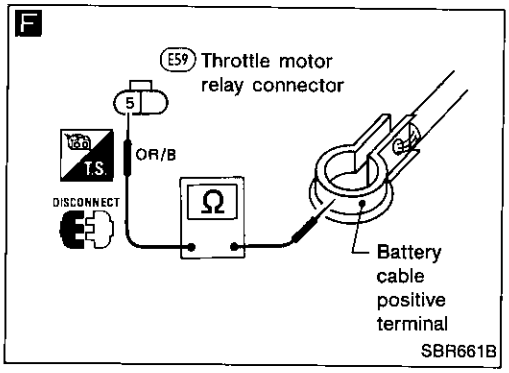
SBR659B

E



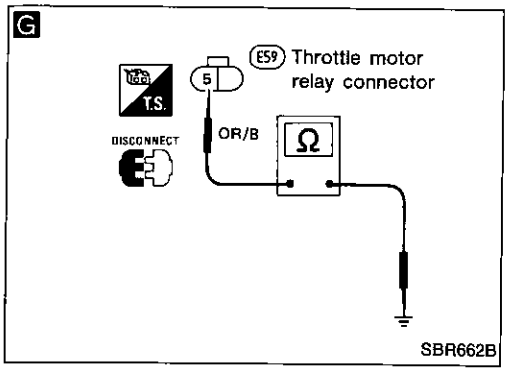
SBR660B

F



SBR661B

G



SBR662B

Ⓐ

Is this the first time?

Yes → If fuse No. 42 is blown, replace fuse and check first step again. If fuse No. 42 is not blown, follow the next step. For fuse layout, refer to foldout page of Circuit Diagram.

No

CHECK THROTTLE MOTOR RELAY.
- Remove battery.
- Remove throttle motor relay.
- Refer to THROTTLE MOTOR RELAY in Electrical Component Inspection.

N.G. → Replace throttle motor relay.

O.K.

D

- Check continuity between terminal ③ for throttle motor relay connector and terminals (104) and (108) for T.C.M. connector.
  Continuity should exist.

N.G.

O.K.

E

- Check continuity between terminal ③ for throttle motor relay connector and ground.
  Continuity should not exist.

N.G. → Repair harness and connectors.

O.K.

F

- Replace fuse No. 43 if fuse is blown. For fuse layout, refer to foldout page of Circuit Diagram.
- Check continuity between terminal ⑤ for throttle motor relay connector and positive terminal for battery cable.
  Continuity should exist.

N.G.

O.K.

G

- Check continuity between terminal ⑤ for throttle motor relay connector and ground.
  Continuity should not exist.

N.G. → Repair harness and connectors.

O.K.

Final check

Diagnostic Procedure 28

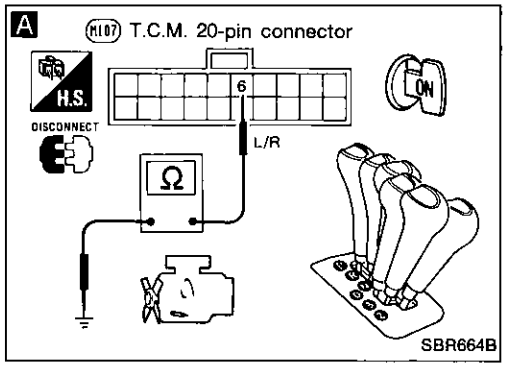
SECONDARY THROTTLE RETURN SPRING (Code No. 32)

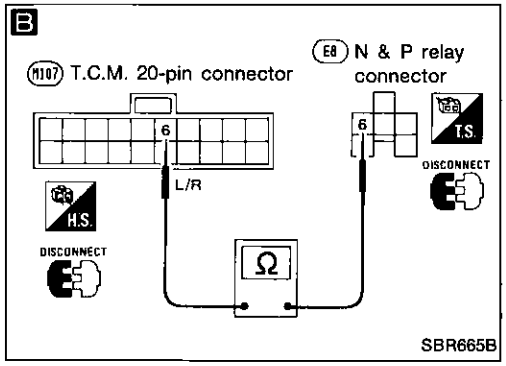
Erase self-diagnosis results from T.C.M. memory.
TRY SELF-DIAGNOSIS AGAIN.
Does T.C.M. display code No. 32 again?

No → Inspect system again referring displayed code No.

Yes ↓

Replace secondary throttle return spring. (See page BR-72.)





Diagnostic Procedure 29

NEUTRAL SWITCH CIRCUIT (Code No. 33)

Does T.C.M. display code No. 33 still when shifting selector lever to all positions with ignition switch ON?

No → INSPECTION END

Yes ↓

A

- Disconnect 20-pin connector from T.C.M.
- Turn ignition switch ON.
- Check continuity between terminal ⑥ and ground when shifting select lever to all positions.
  Continuity should exist when shifting to "P" and "N".
  Continuity should not exist when shifting to other than "P" and "N".

O.K. → INSPECTION END

N.G. ↓

B

- Turn ignition switch OFF.
- Remove N & P relay.
- Check continuity between terminal ⑥ for T.C.M. connector and terminal ⑥ for N & P relay connector.
  Continuity should exist.

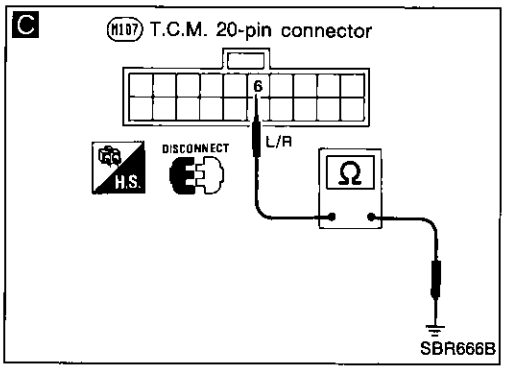
N.G. → Repair harness and connectors.

O.K. ↓

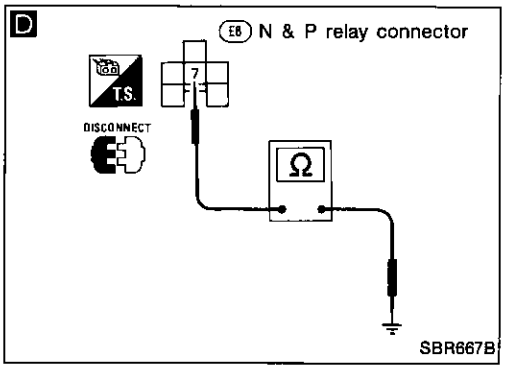
Ⓐ

Diagnostic Procedure 29 (Cont'd)

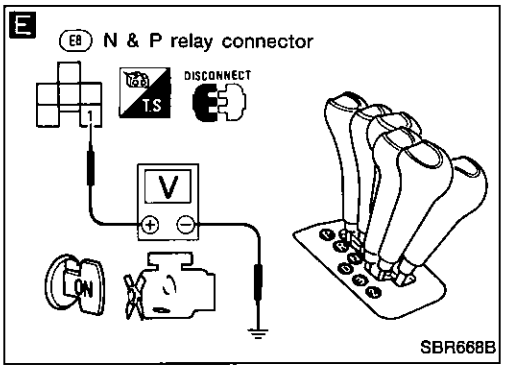
C



D



E



Ⓐ

C

Check continuity between terminal ⑥ for T.C.M. connector and ground.
Continuity should exist.

N.G. → Repair harness and connectors.

O.K.

D

Check continuity between terminal ⑦ and ground.
Continuity should exist.

N.G. → Repair harness and connectors.

O.K.

CHECK N & P RELAY.
Refer to N & P RELAY in Electrical Component Inspection.

N.G. → Replace N & P relay.

O.K.

E

- Turn ignition switch ON.
- Check voltage between terminal ① for N & P relay connector and ground when shifting select lever to "P" & "N".

Battery voltage should exist.

O.K. → Repair harness and connectors between terminal ② for N & P relay connector and ground.

N.G.

CHECK INHIBITOR SWITCH.
Refer to INHIBITOR SWITCH in Electrical Component Inspection.

N.G. → Replace inhibitor switch.

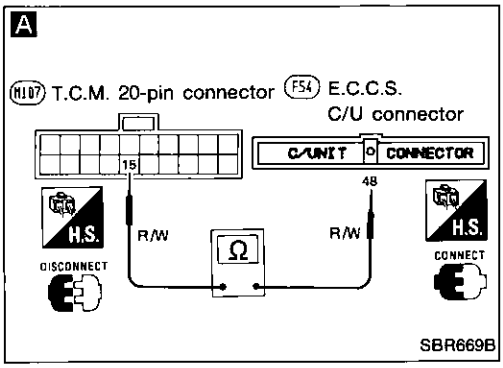
O.K.

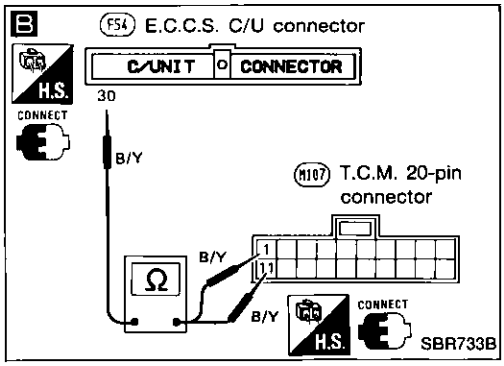
Check continuity between terminals ④ and ⑥ for inhibitor switch connector and terminal ① for N & P relay connector.

N.G. → Repair harness and connectors.

O.K.

Repair harness and connectors between terminal ③ for inhibitor switch connector and fuse block.
or
Check No. 1 fuse. For fuse layout, refer to foldout page of Circuit Diagram.





Diagnostic Procedure 30

POWER SUPPLY CIRCUIT FOR SENSOR (Code No. 34)

A

- Disconnect 20-pin connector from T.C.M.
- Disconnect connector from secondary throttle sensor.
- Check continuity between terminal ⑮ for T.C.M. connector and terminal ㊽ for E.C.C.S. C/U connector.

Continuity should exist.

N.G. → Repair harness and connectors.

O.K. ↓

B

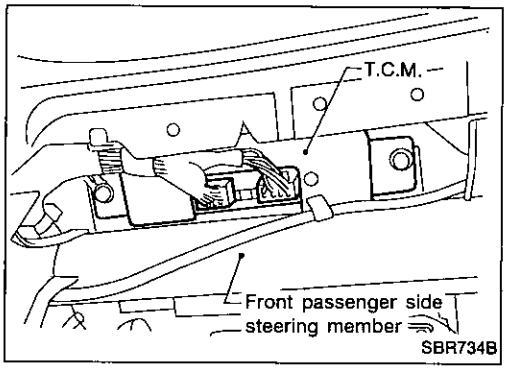
Check continuity between terminals ①, ⑪ for T.C.M. and terminal ㉚ for E.C.C.S. C/U.

Continuity should exist.

N.G. → Repair harness and connectors.

O.K. ↓

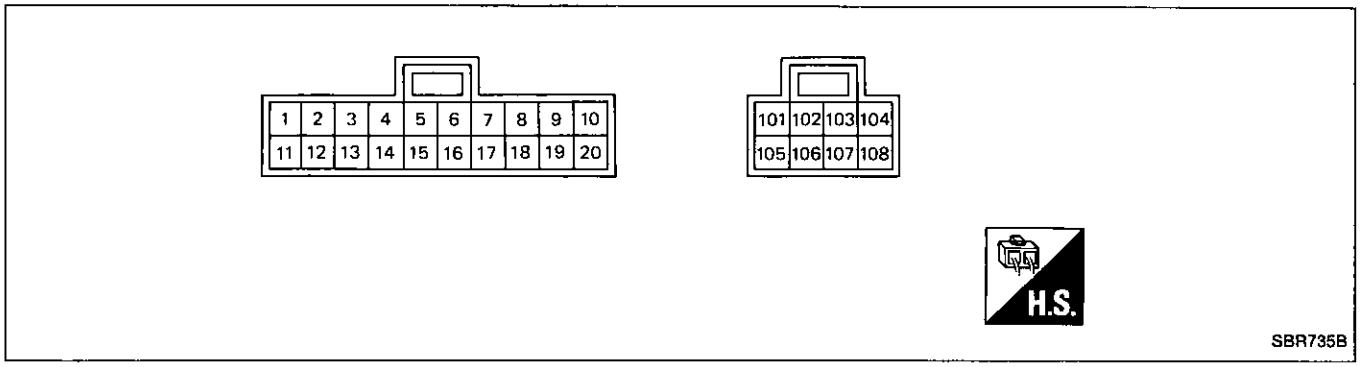
Final check



Electrical Component Inspection

INSPECTION OF T.C.M.

- Measure voltage between each terminal and terminal ⑩ or ⑳ by following "T.C.M. INSPECTION TABLE".
- Pin connector terminal layout.

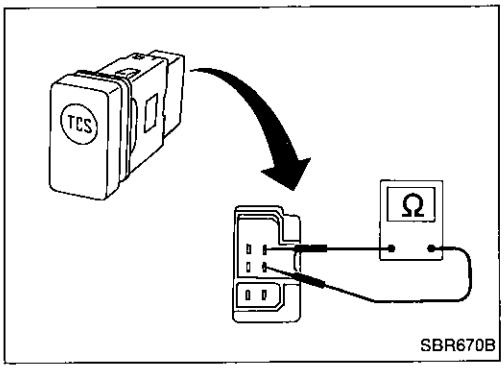


T.C.M. Inspection table

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
2	Throttle opening signal	Ignition switch "ON"	Approximately 0.3 - 3.3V Voltage varies with the throttle valve opening angle.
3	Secondary throttle sensor	Vehicle is running	Approximately 0.4 - 4.4V Voltage varies with the secondary throttle valve opening angle.
4	Secondary throttle signal	Vehicle is running	Approximately 0.3 - 3.3V
5	Engine temperature sensor for TCM	Engine is running	Approximately 0 - 5V Voltage varies with the engine temperature.
7	TCS SW	Ignition switch "ON"	Approximately 10V
14	Throttle motor relay	Ignition switch "ON"	Approximately 1.5V
15	Power supply for sensor	Ignition switch "ON"	Approximately 5V

Electrical Component Inspection (Cont'd)

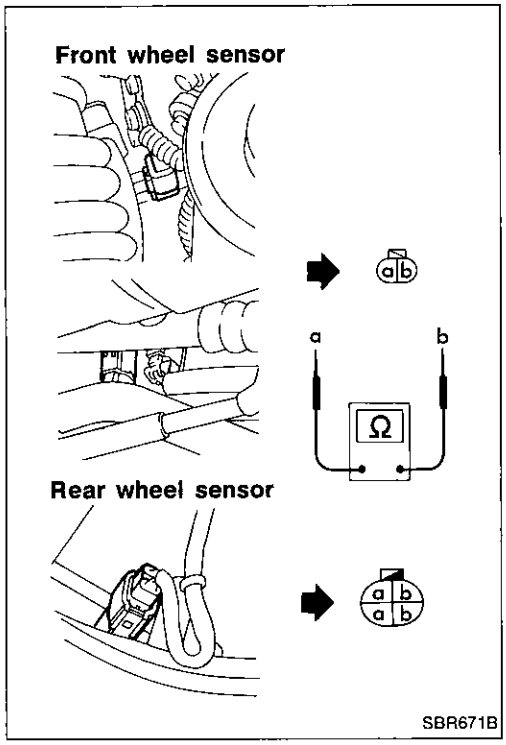


SBR670B

TCS CANCEL SWITCH

Check continuity between terminals as shown.

SWITCH condition	Continuity existence
Pushed	Yes
Released	No

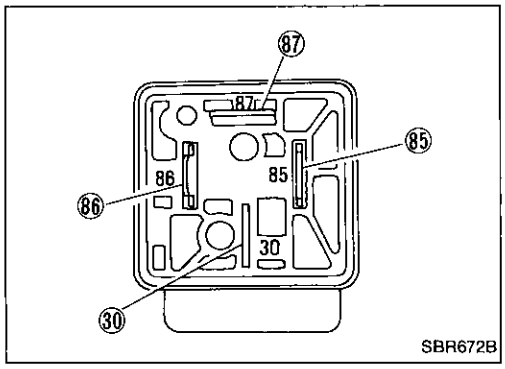


SBR671B

WHEEL SENSOR

Check resistance between terminals ⓐ and ⓑ.

Resistance: 0.9 - 1.1 kΩ

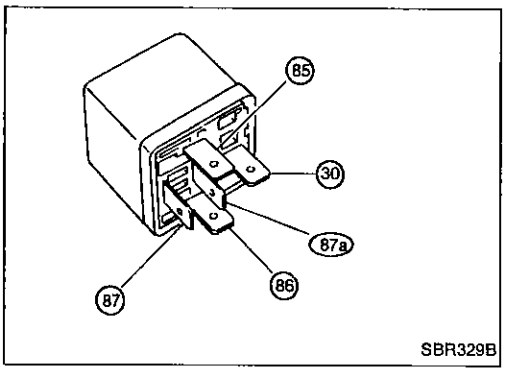


SBR672B

ABS ACTUATOR MOTOR RELAY

Condition	Continuity existence between terminals ㉚ and ㉗
Battery voltage not applied between terminals ㉕ and ㉖.	No
Battery voltage applied between terminals ㉕ and ㉖.	Yes

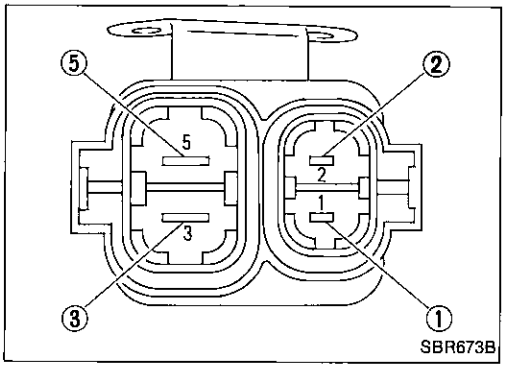
Electrical Component Inspection (Cont'd)



SBR329B

ABS ACTUATOR SOLENOID VALVE RELAY

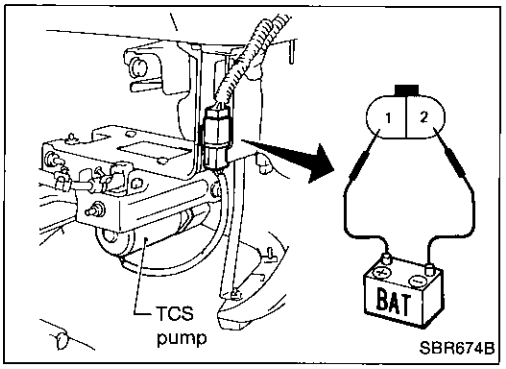
Condition	Continuity existence between terminals 30 and 87a	Continuity existence between terminals 30 and 87
Battery voltage not applied between terminals 85 and 86.	Yes	No
Battery voltage applied between terminals 85 and 86.	No	Yes



SBR673B

TCS PUMP RELAY AND THROTTLE MOTOR RELAY

Condition	Continuity existence between terminals 3 and 5
Battery voltage not applied between terminals 1 and 2.	No
Battery voltage applied between terminals 1 and 2.	Yes



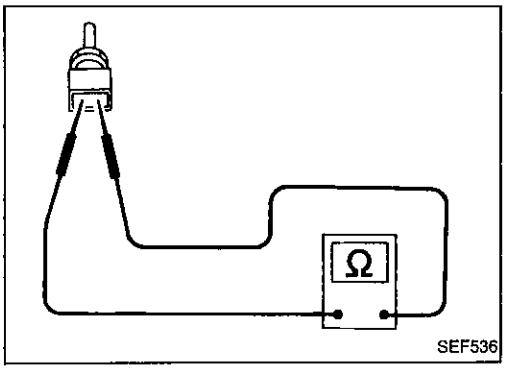
SBR674B

TCS PUMP

TCS pump (motor) should operate when battery voltage is applied.

CAUTION:

Do not apply battery voltage for more than 5 seconds.

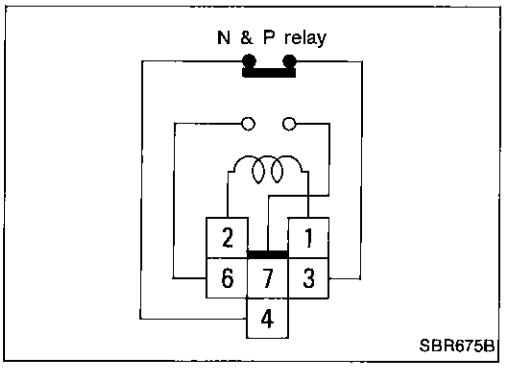


SEF536

ENGINE TEMPERATURE SENSOR FOR TCM

1. Disconnect engine 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



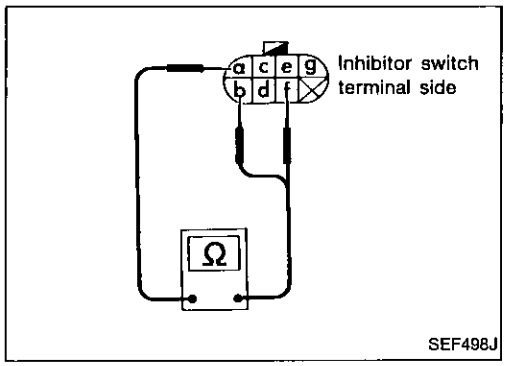
SBR675B

N & P RELAY

Check continuity between terminals 6 and 7

Condition	Continuity
12V direct current supply between terminals 1 and 2.	Yes
No current supply	No

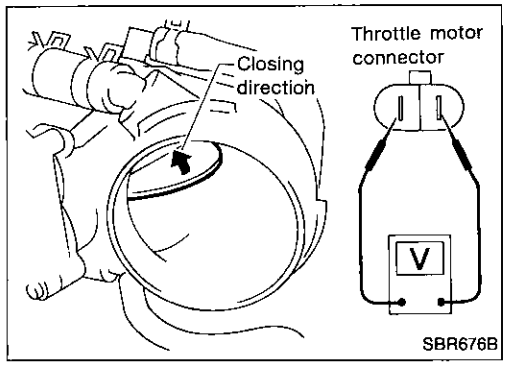
Electrical Component Inspection (Cont'd)



INHIBITOR SWITCH

Check continuity between terminals ⓐ and ⓑ, ⓕ.

Condition	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



THROTTLE MOTOR

WARNING:

Before touching the secondary throttle valve, be sure to disconnect the throttle valve motor connector; otherwise, injury may occur due to accidental actuation of the valve.

Check voltage produced by motor by opening/closing secondary throttle valve as quickly as possible.

Use needle type voltmeter.

Needle should fluctuate.

Make sure throttle valve moves smoothly from fully closed to fully open position without binding.

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	AD11B 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 9 (11.50 x 0.35)

Parking brake	
Brake model	DS17HD 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	3,923 (40, 569) 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

TRACTION CONTROL SYSTEM — TCS —

TCS operating oil	Brake fluid "DOT 3"

Inspection and Adjustment

DISC BRAKE

Unit: mm (in)

Location	Front	Rear
Brake model	CL28VF	AD11B
Lining wear limit		
Minimum thickness	2.0 (0.079)	
Rotor repair limit		
Minimum thickness	26.0 (1.024)	8.0 (0.315)

DRUM BRAKE

Unit: mm (in)

Location	Rear
Brake model	DS17HD
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]	100 - 110 (3.94 - 4.33)
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)]	90 - 105 (3.54 - 4.13)
Pedal stroke when warning switch comes on	20 (0.79) or less

SECTION ST

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When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".

Precautions

SUPPLEMENTAL RESTRAINT SYSTEM "AIR BAG"

The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury to the driver in a frontal collision. The Supplemental Restraint System consists of an air bag (located in the center of the steering wheel), sensors, a diagnosis unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **section BF** of this Service Manual.

WARNING:

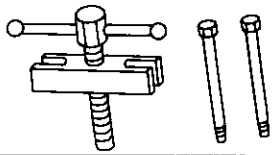
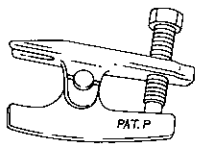
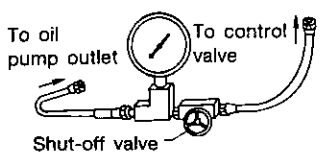
- **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal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

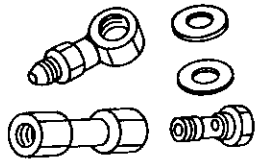
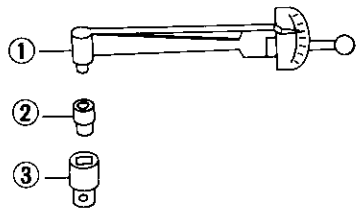
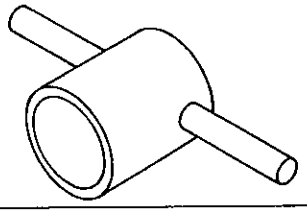
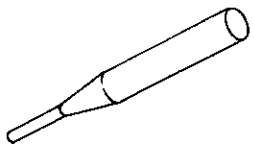
- **Before disassembly, thoroughly clean the outside of the unit.**
- **Disassembly should be done in a clean work area. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.**
- **When disassembling parts, be sure to place them in order in a parts 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**

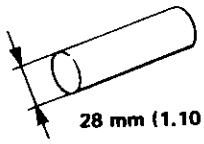
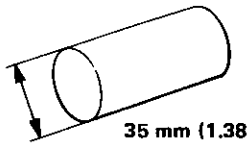
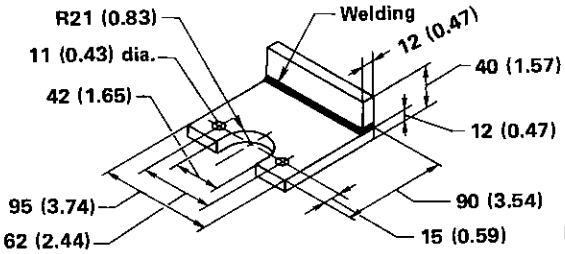
Special Service Tools

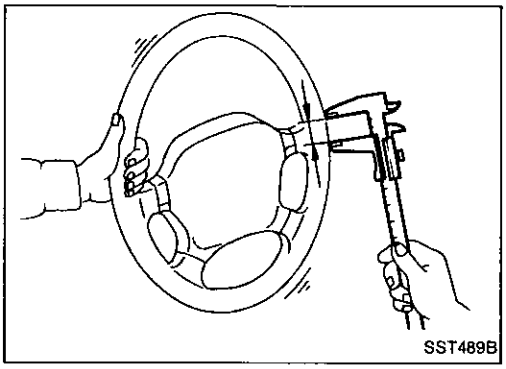
Tool number (Kent-Moore No.) Tool name	Description	
KV48100700 (J26364) Torque adapter		Measuring pinion rotating torque
ST27180001 (J25726-A) Steering wheel puller		Removing steering wheel
HT72750000 (J24319-01) Ball joint remover		Removing ball joint
ST27091000 (J26357) Pressure gauge		Measuring oil pressure

Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description
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 

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  Unit: mm (in)


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.

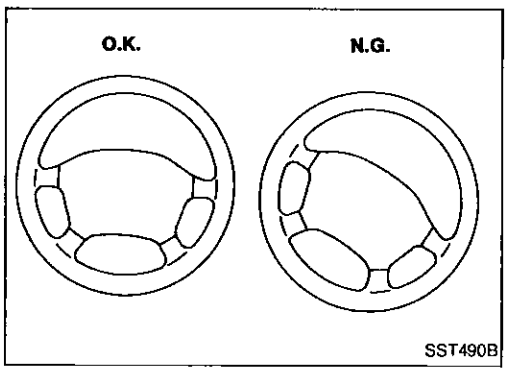
Checking Neutral Position on Steering Wheel

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

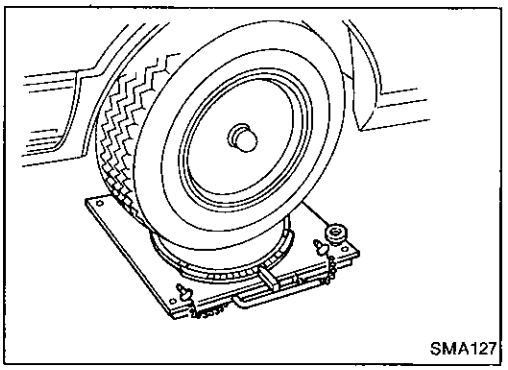
1. Check that the steering wheel is in the neutral position when driving straight ahead.
2. If it is not in the neutral position, remove the steering wheel and reinstall it correctly.
3. If the neutral position is between two serrated teeth, loosen tie-rod lock nut and move tie-rod in the opposite direction by the same amount on both left and right sides to compensate for error in the neutral position.

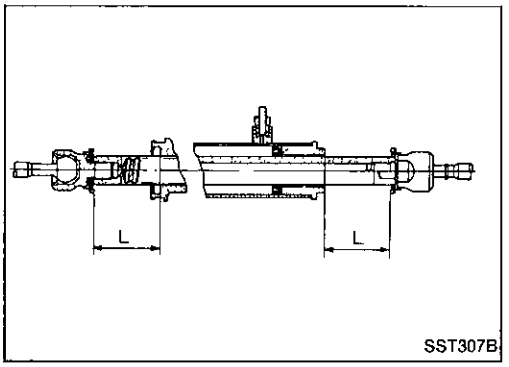


SST490B

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.
2. If it is not within specification, check rack stroke.
   Rack stroke "L":
   Refer to S.D.S.

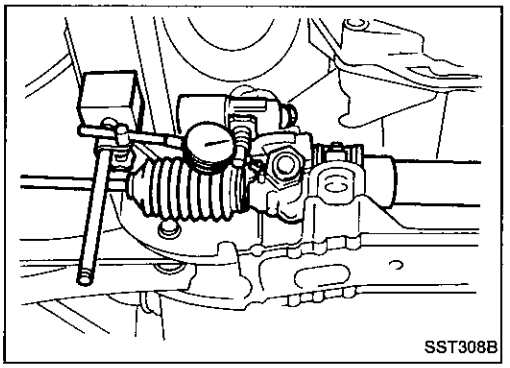

SMA127

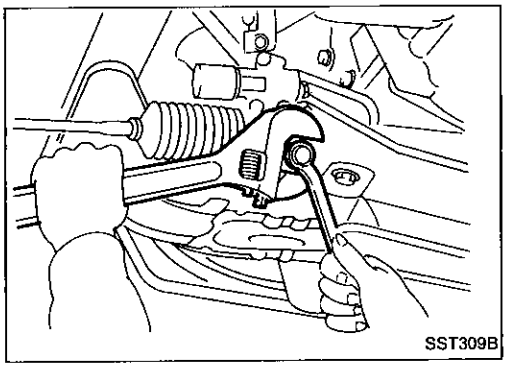


SST307B

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.


SST308B

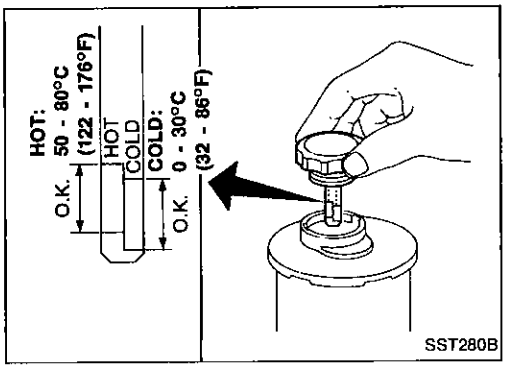

SST309B

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.



SST280B

Checking and Adjusting Drive Belts

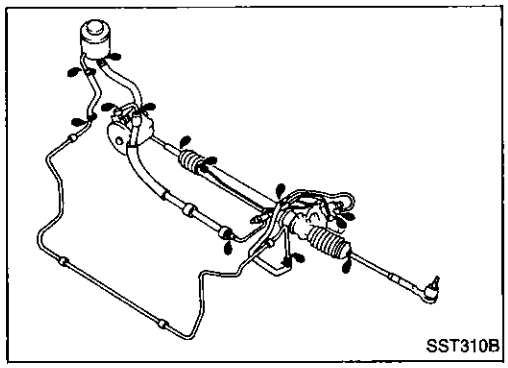
Refer to Drive Belt Inspection in section MA.

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 "Type DEXRON™ II" or equivalent.**


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.

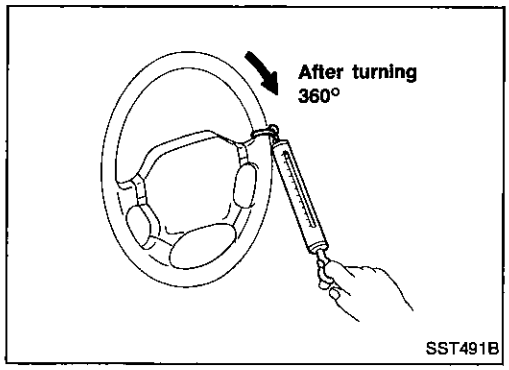
Bleeding Hydraulic System

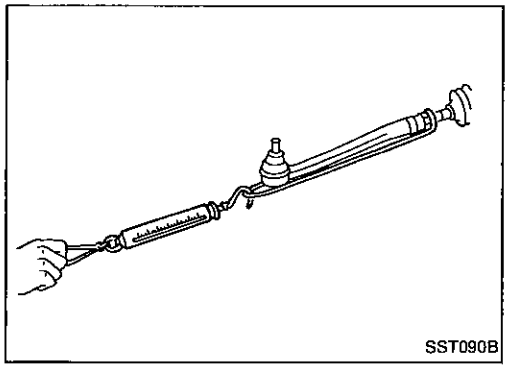
1. Raise front end of vehicle until wheels clear ground.
2. Add fluid into oil tank to specified level. Meanwhile, quickly turn steering wheel fully to right and left and lightly touch steering stoppers.
   Repeat steering wheel operation until fluid level no longer decreases.
3. Start engine.
   Repeat step 2 above.

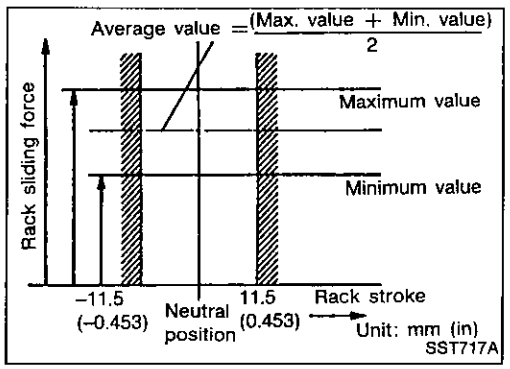
- Incomplete air bleeding will cause the following to occur. When this happens, bleed air again.

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

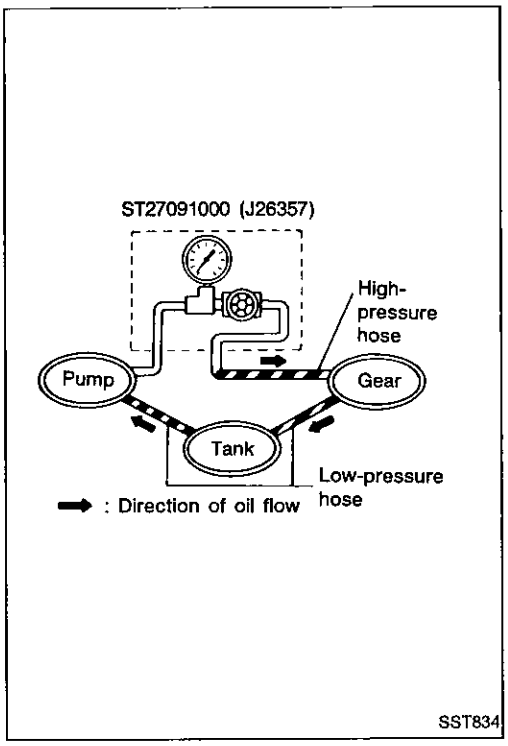
1. Park vehicle on a level, dry surface and set parking brake.
2. Start engine.
3. Bring power steering fluid up to adequate operating temperature. [Make sure temperature of fluid is approximately 60 to 80°C (140 to 176°F).]

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:
   167 - 226 N (17 - 23 kg, 37 - 51 lb)
   Maximum force deviation:
   39 N (4 kg, 9 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:

Main

7,649 - 8,238 kPa
(78 - 84 kg/cm^2, 1,109 - 1,194 psi)

Sub

6,375 - 6,865 kPa
(65 - 70 kg/cm^2, 924 - 995 psi)

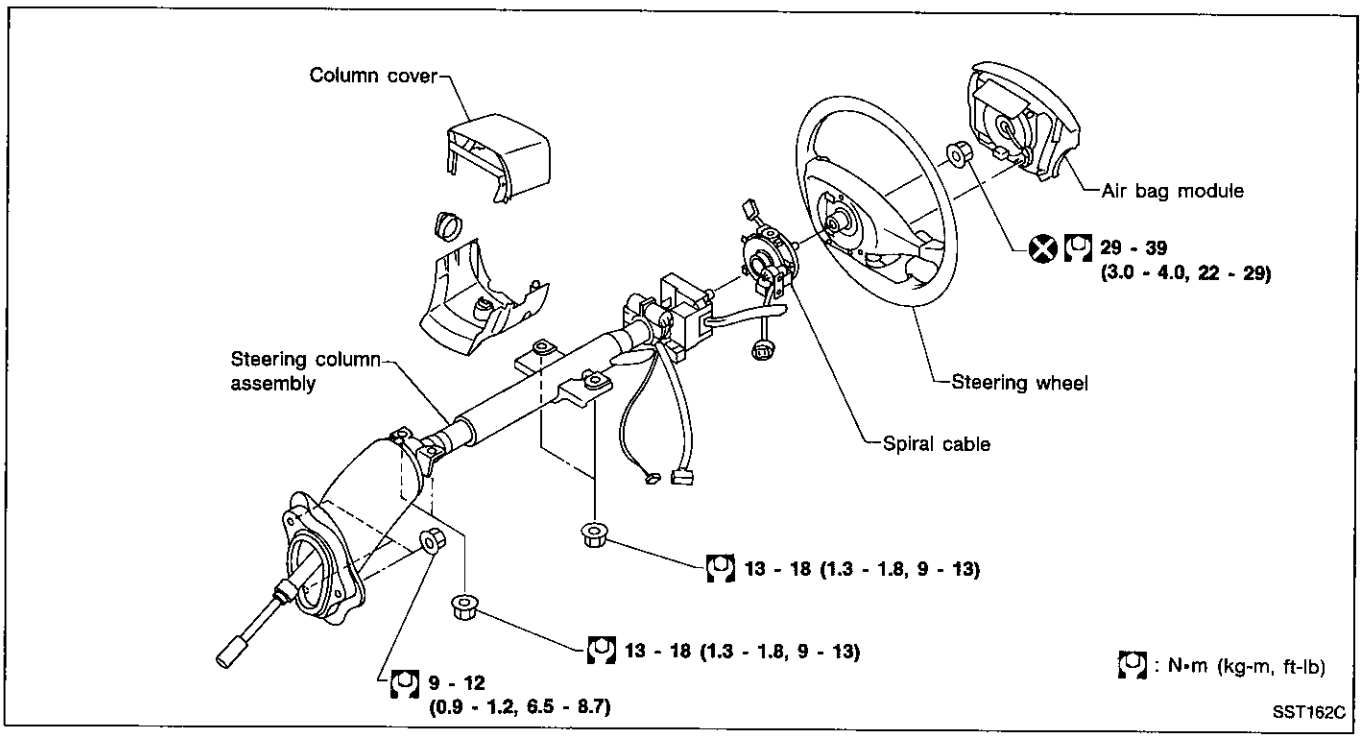
4. If oil pressure is below the standard pressure, slowly close shut-off valve and check pressure.

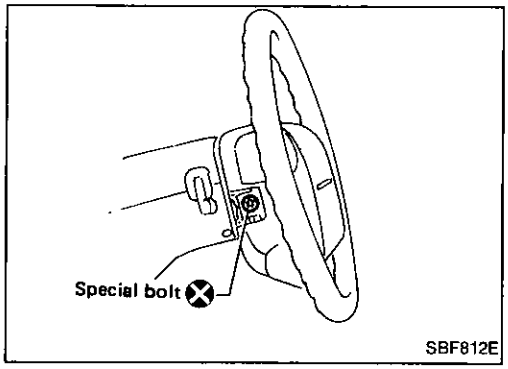
- When pressure reaches standard pressure, gear is damaged.
- When pressure remains below standard pressure, pump is damaged.

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.

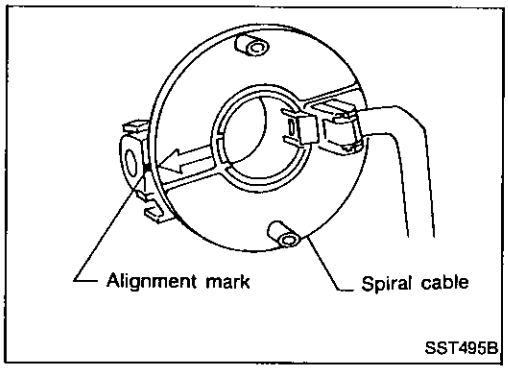




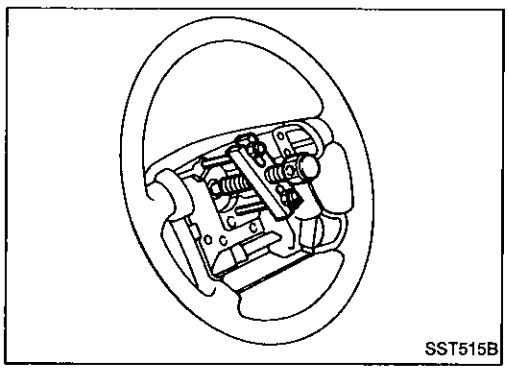
Removal and Installation

STEERING WHEEL

- 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.

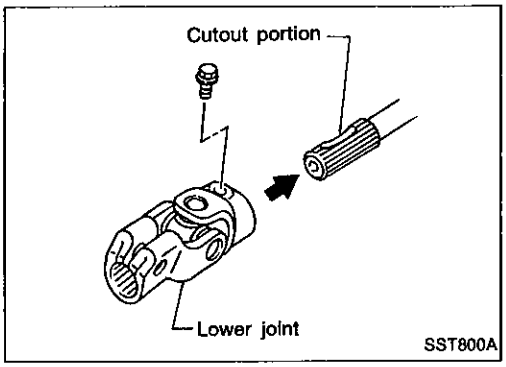


- Align spiral cable correctly when installing steering wheel.



- Remove steering wheel with Tool.

Removal and Installation (Cont'd)



STEERING COLUMN

- When installing steering column, fingertighten all lower bracket and clamp retaining bolts; then tighten them securely. Do not apply undue stress to steering column.
- When attaching coupling joint, be sure tightening bolt faces cutout portion.

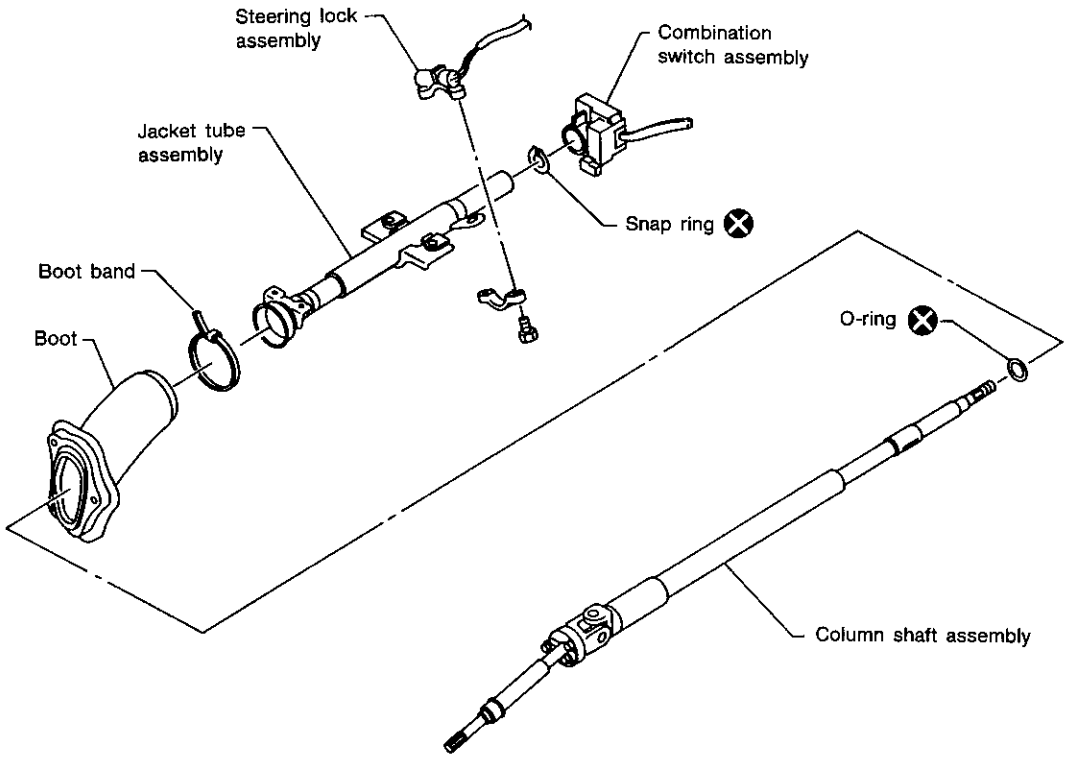
CAUTION:

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.

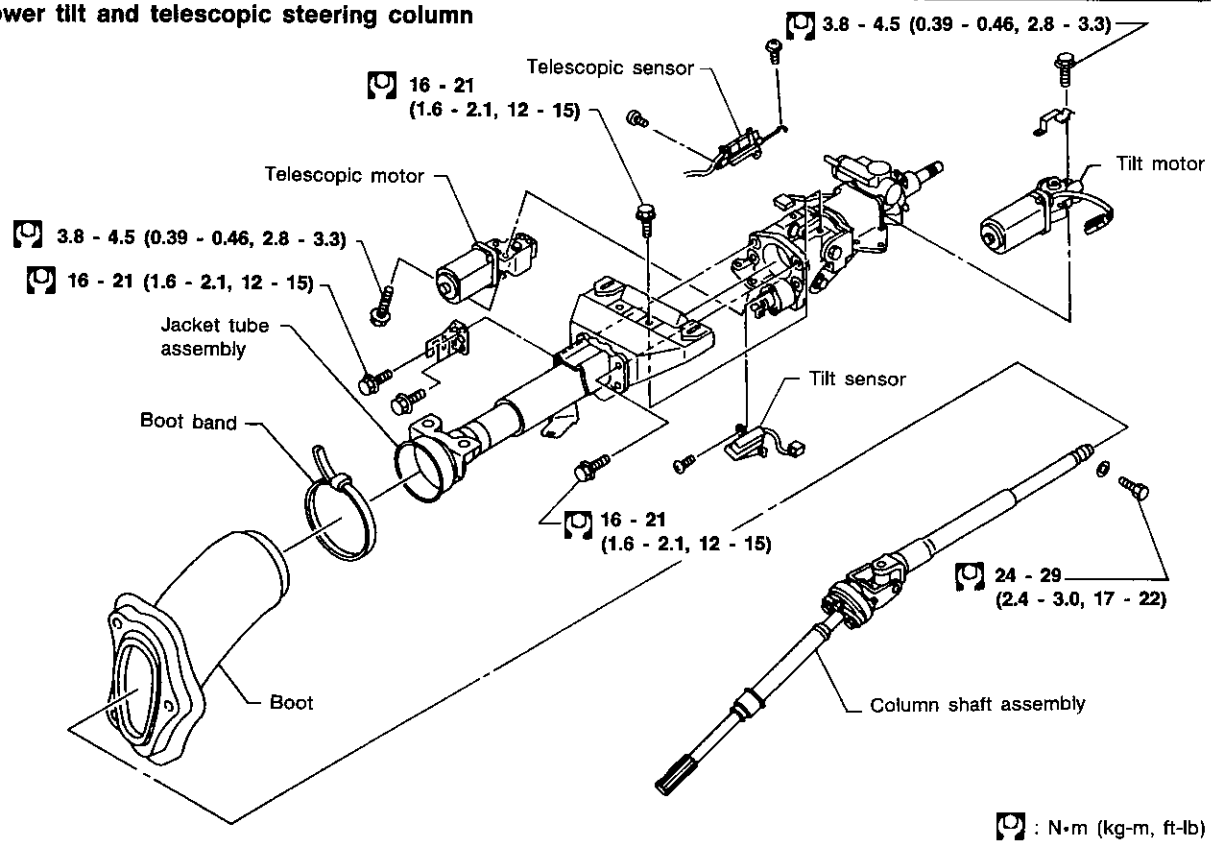
Disassembly and Assembly

Non-tilt steering column



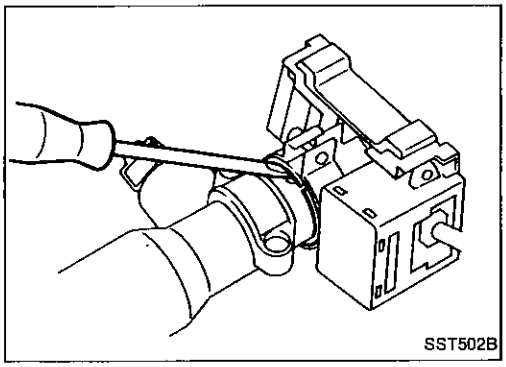
SST175C

Power tilt and telescopic steering column

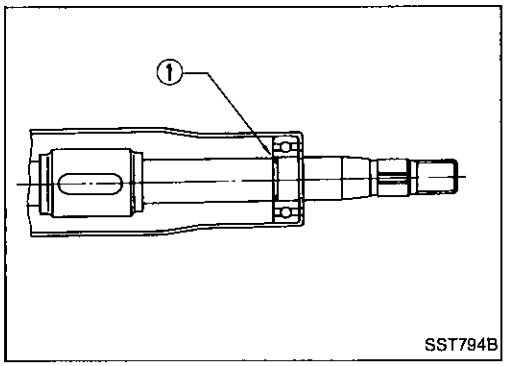


SST176C

Disassembly and Assembly (Cont'd)

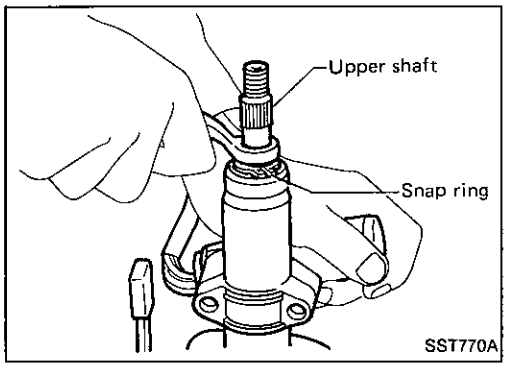

SST502B

- When disassembling and assembling, unlock steering lock with key.
- To remove combination switch, insert a suitable tool between mating portion. Lift switch bracket and pull it out.



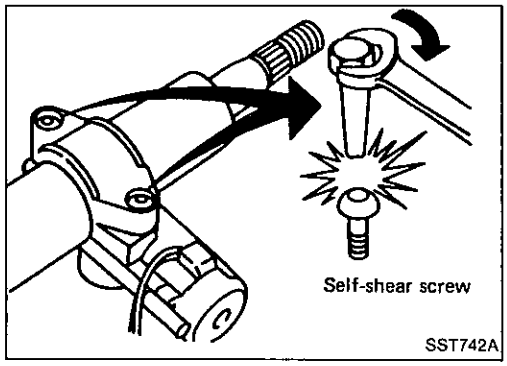
SST794B

- Install O-ring ① before inserting column shaft into jacket tube. (For non-tilt type).



SST770A

- Install snap ring on upper shaft with a suitable tool.

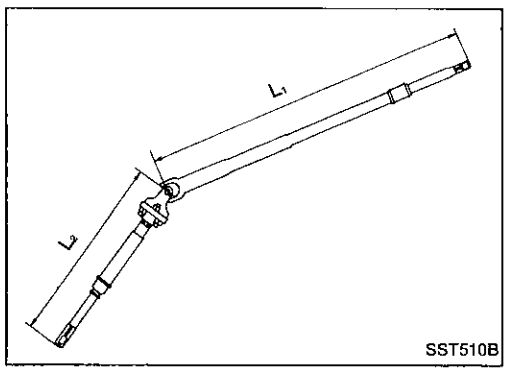


SST742A

- 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.



SST510B

Inspection

- When steering wheel can not be rotated smoothly, check the steering column for the following matters and replace damaged parts.

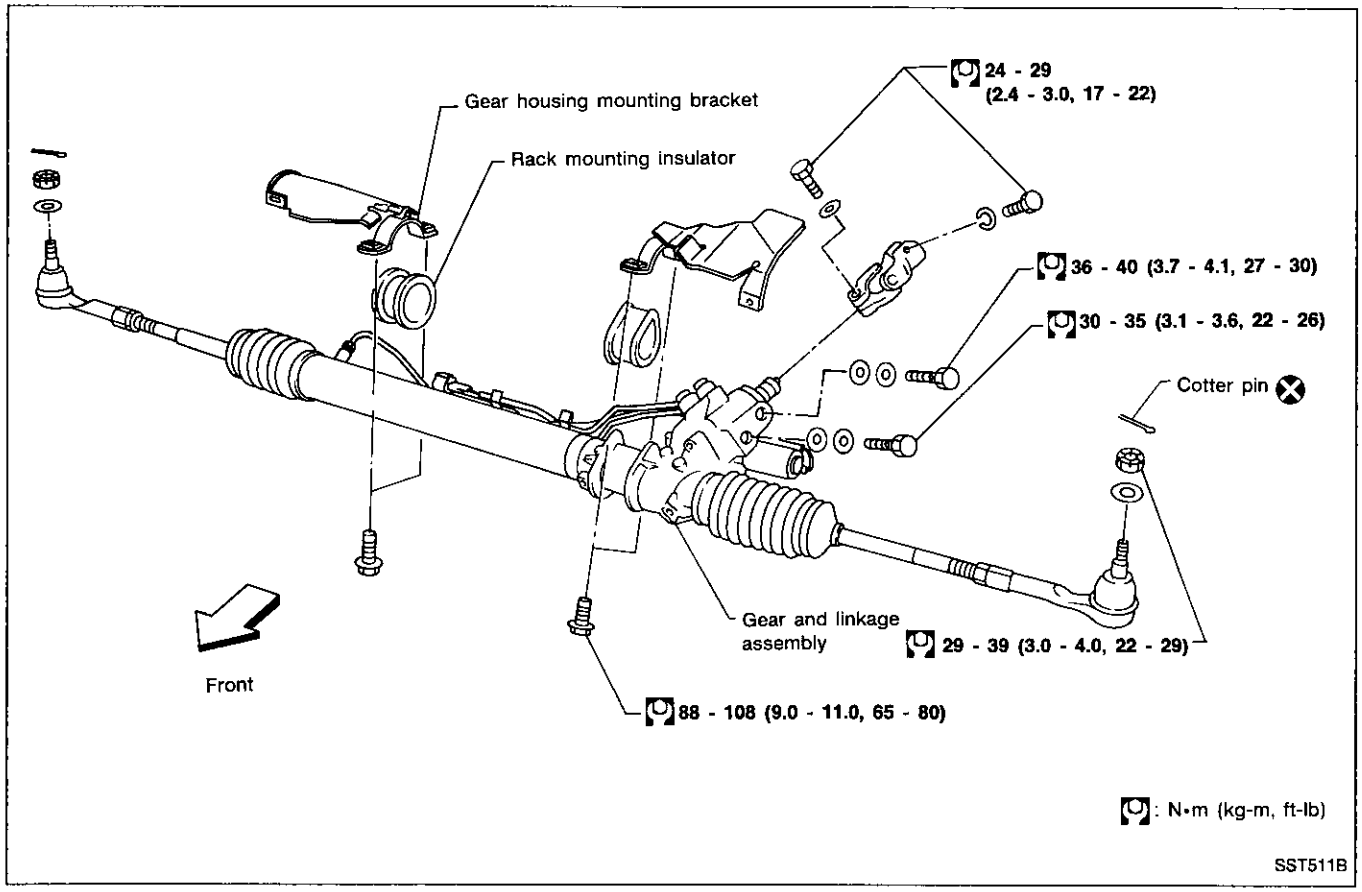
a. Check column bearings for damage or unevenness. Lubricate with recommended multi-purpose grease or replace steering column as an assembly, if necessary.

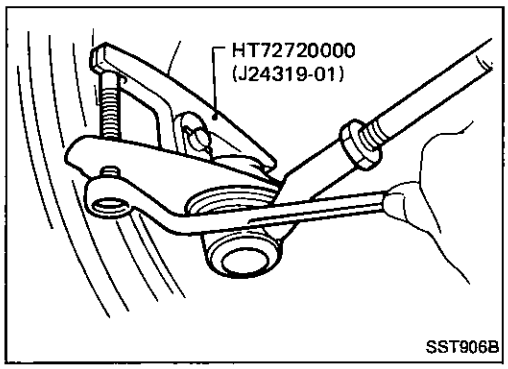
b. Check steering column lower shaft for deformation or breakage. Replace if necessary.

- 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":
618.7 - 620.3 mm (24.36 - 24.42 in)
Steering column lower shaft length "L_2":
356.8 - 358.4 mm (14.05 - 14.11 in)

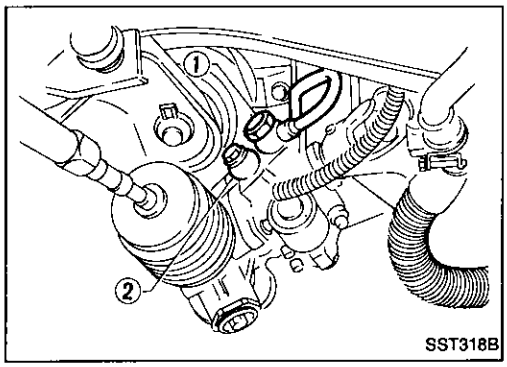
Removal and Installation





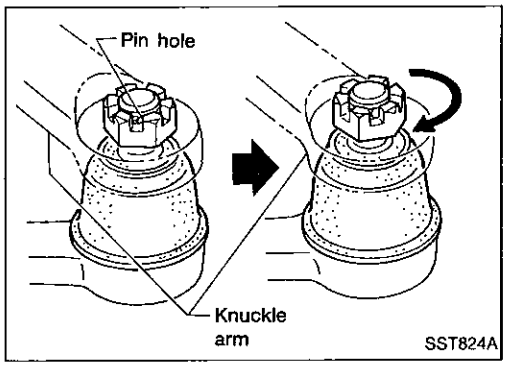
CAUTION:
The rotation of the spiral cable (SRS "Airbag" component part) is limited. If the steering gear must be removed, set the front wheels in the straight-ahead direction. Do not rotate the steering column while the steering gear is removed.

- Detach tie-rod outer sockets from knuckle arms with Tool.



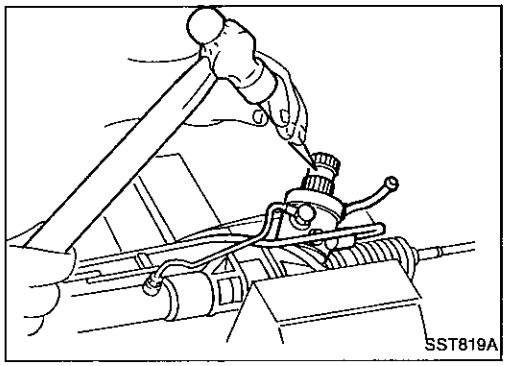
- Install pipe connector.
  - ① Low-pressure side
    : 36 - 40 N·m (3.7 - 4.1 kg-m, 27 - 30 ft-lb)
  - ② High-pressure side
    : 30 - 35 N·m (3.1 - 3.6 kg-m, 22 - 26 ft-lb)
- Observe specified tightening torque when tightening high-pressure and low-pressure pipe connectors. Excessive tightening can damage connector threads or 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.

Removal and Installation (Cont'd)

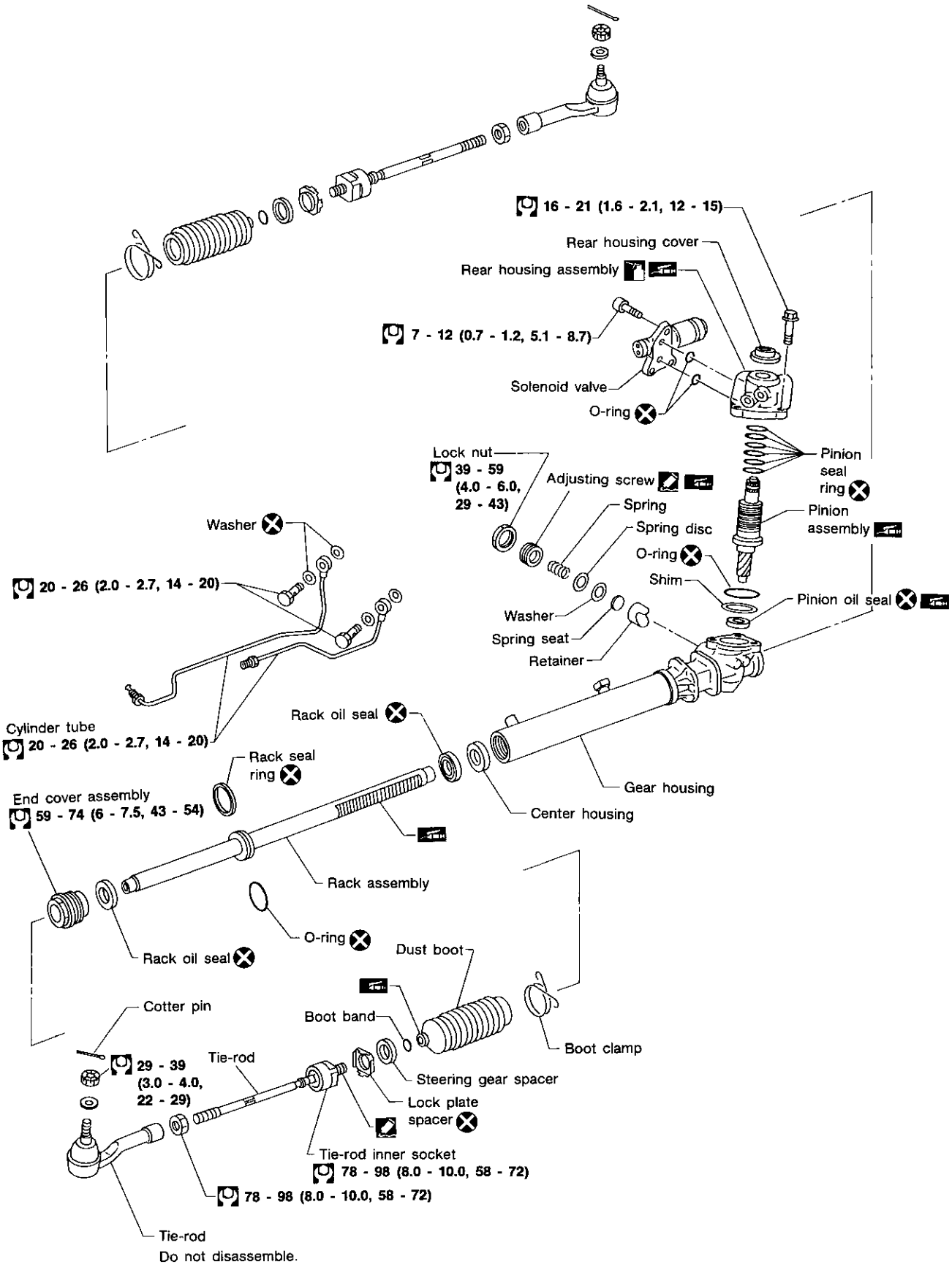


- Initially, tighten nut on tie-rod outer socket and knuckle arm to 29 to 39 N·m (3 to 4 kg-m, 22 to 29 ft-lb). Then tighten further to align nut groove with first pin hole so that cotter pin can be installed.

CAUTION:
Tightening torque must not exceed 49 N·m (5 kg-m, 36 ft-lb).

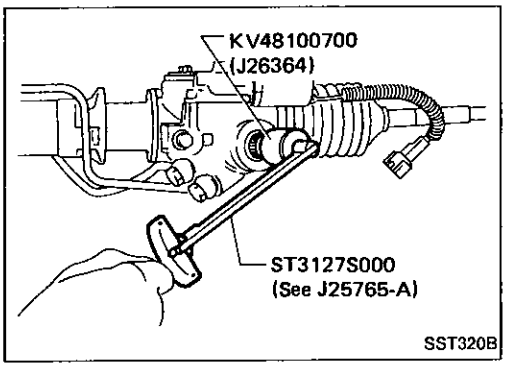


- Before removing lower joint from gear, set gear in neutral (wheels in straight-ahead position). After removing lower joint, put matchmarks on pinion shaft and pinion housing to record neutral position of gear.
- To install, set left and right dust boots to equal deflection, and attach lower joint by aligning matchmarks of pinion shaft and pinion housing.



: N•m (kg-m, ft-lb)

SST552B



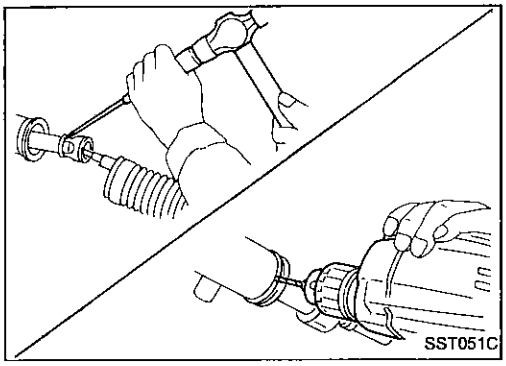
Disassembly

1. Prior to disassembling, measure pinion rotating torque. Record the pinion rotating torque as a reference.

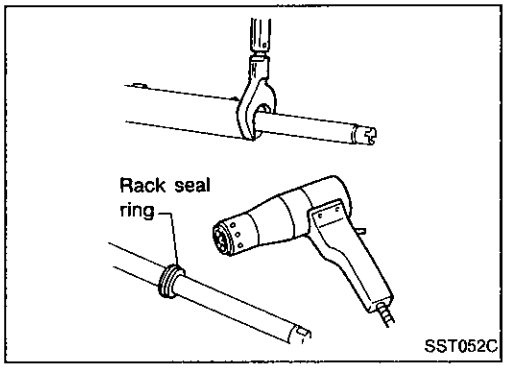
- **Before measuring, disconnect cylinder tube and drain fluid.**
- **Use soft jaws when holding steering gear housing. Handle gear housing carefully, as it is made of aluminum. Do not grip cylinder in a vise.**

2. Remove pinion gear.

- **Be careful not to damage pinion gear when removing pinion seal ring.**



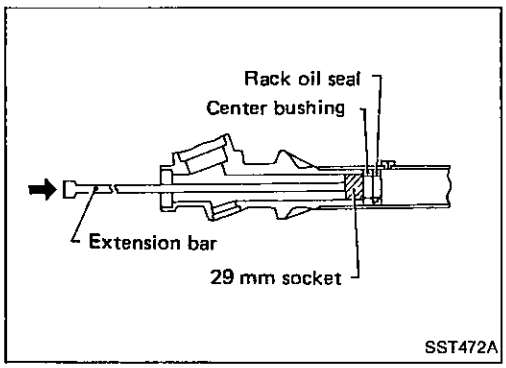
3. Remove tie-rod outer sockets and boots.
4. Loosen tie-rod inner socket by prying up staked portion, and remove socket.
5. Remove retainer.
6. Remove pinion assembly.
7. Drill staked portion of cylinder end cover with drill of 2 to 2.5 mm (0.079 to 0.098 in) diameter, until the staking is eliminated.



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.



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 "Type DEXRON™ II" or equivalent, and blow dry with compressed air, if available.

BOOT

Check condition of boot. If cracked excessively, replace it.

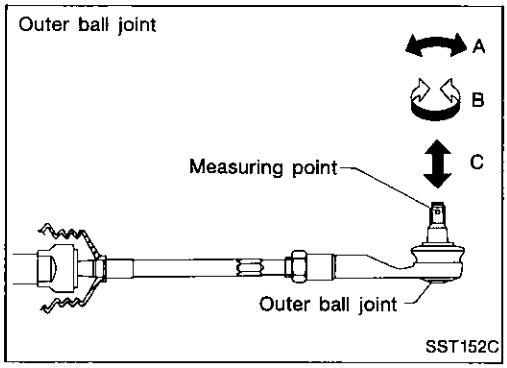
RACK

Thoroughly examine rack gear. If damaged, cracked or worn, replace it.

PINION ASSEMBLY

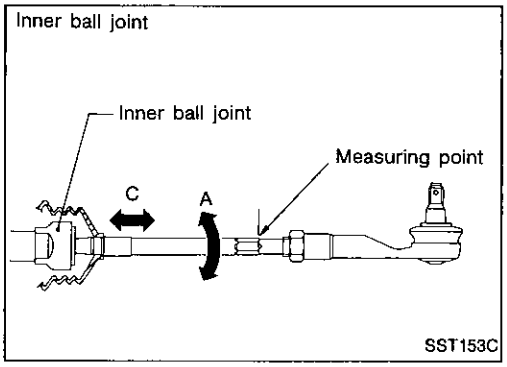
- Thoroughly examine pinion gear. If pinion gear is damaged, cracked or worn, replace it.
- Inspect bearings to see that they roll freely and are free from cracked, pitted, or worn balls, rollers and races. Replace if necessary.

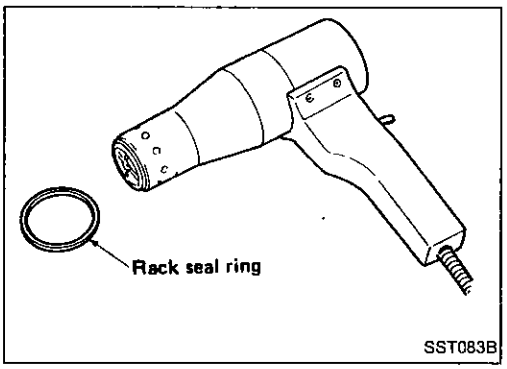
Inspection (Cont'd)



TIE ROD OUTER AND INNER SOCKETS

- Check ball joints for swinging force.
  Tie-rod outer and inner ball joints swinging force "A":
  Refer to S.D.S.
- Check ball joint for rotating torque.
  Tie-rod outer ball joint rotating torque "B":
  Refer to S.D.S.
- Check ball joints for axial end play.
  Tie-rod outer and inner ball joints axial end play "C":
  Refer to S.D.S.
- Check condition of dust cover. If cracked excessively, replace.



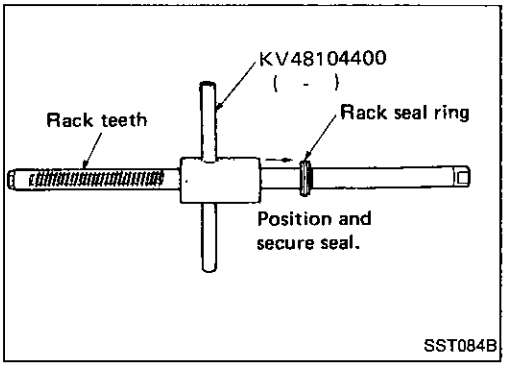


CYLINDER TUBES

Check cylinder tubes for scratches or other damage. Replace if necessary.

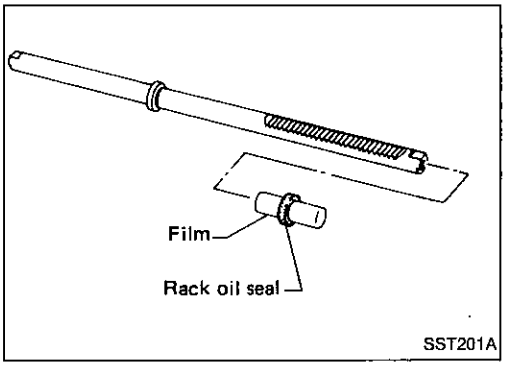
Assembly

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.

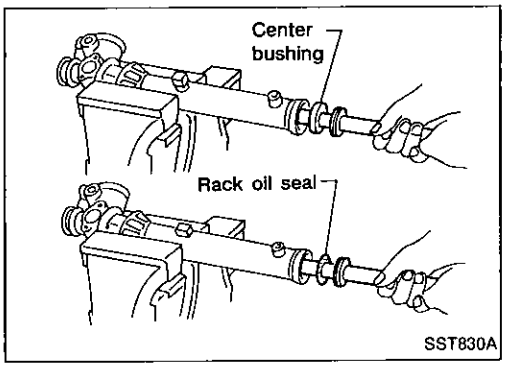
Always insert the tool from the rack gear side.



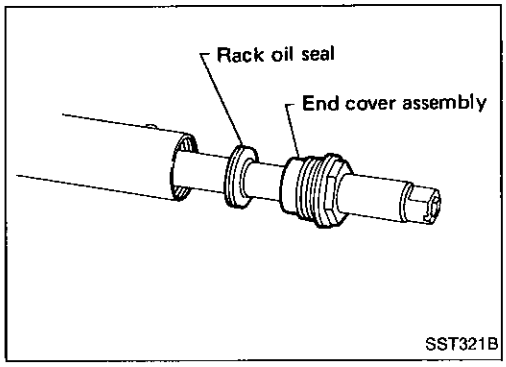
2. Insert rack oil seal.

- **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.**

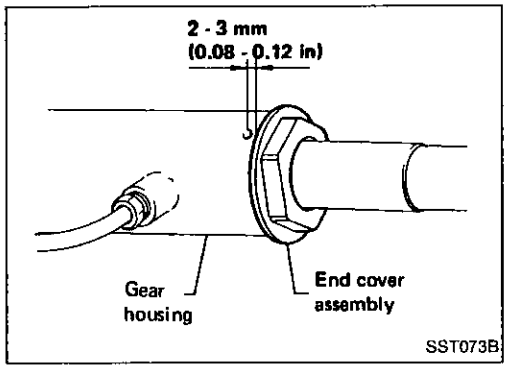
Assembly (Cont'd)



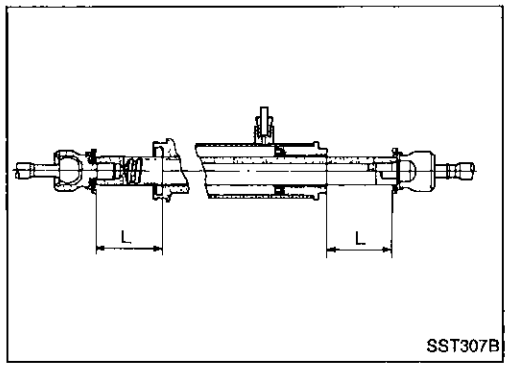
3. Install center bushing and rack oil seal with rack assembly.



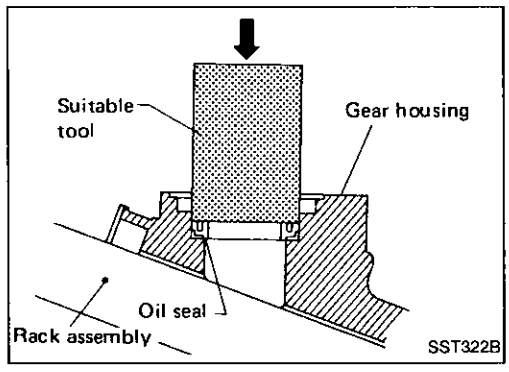
4. Insert rack oil seal and end cover assembly to rack then tighten end cover assembly.



5. Fasten cylinder end cover assembly to gear housing by staking.

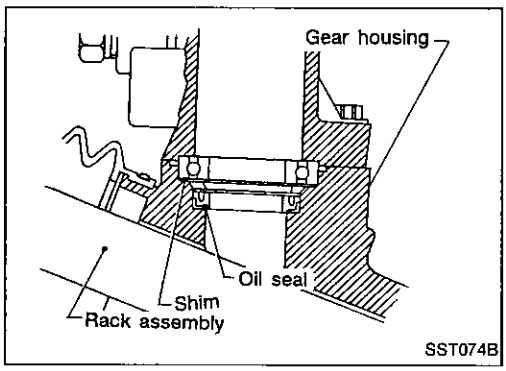


6. Set rack gear in neutral position.
   Rack stroke "L":
   Refer to S.D.S.

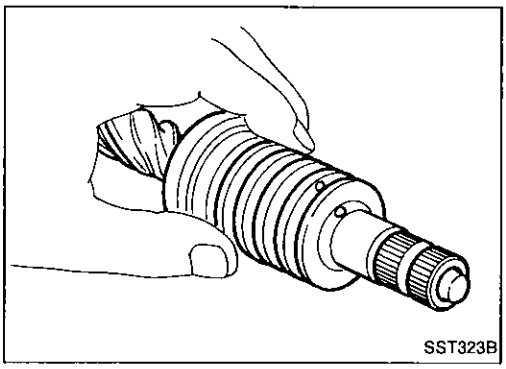


7. Coat seal lip of oil seal with multi-purpose grease and install new pinion oil seal to pinion housing with a suitable tool.
- Make sure lip of oil seal faces up when installed.

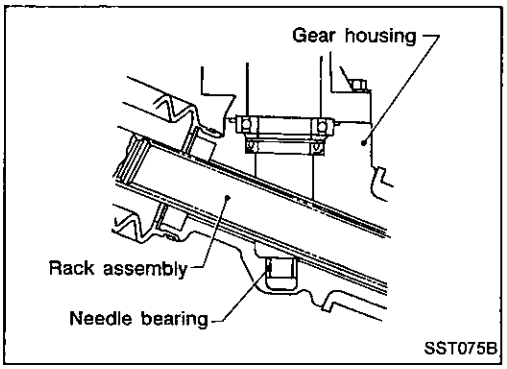
Assembly (Cont'd)



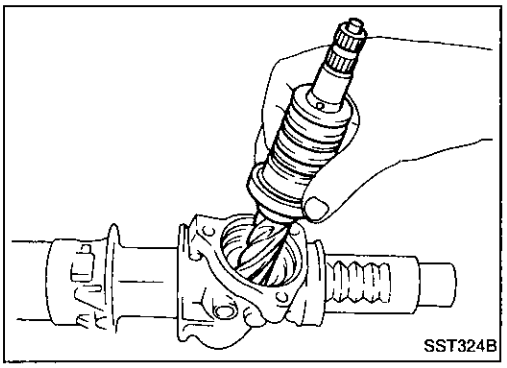
8. Install pinion bearing adjusting shim(s).
- Whenever pinion assembly, gear housing and rear housing are disassembled, replace shim(s) with new ones. Always use the same number of shim(s) when replacing.



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.

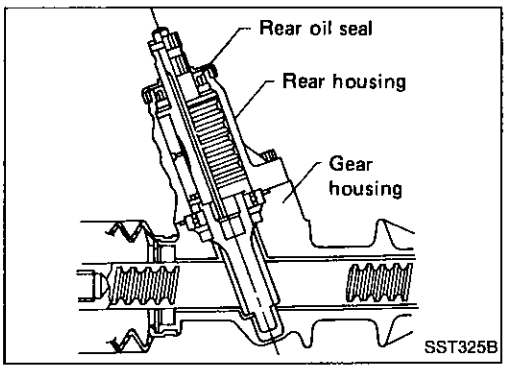


10. Apply a coat of multi-purpose grease to needle bearing roller and oil seal lip before installing pinion assembly in gear housing.



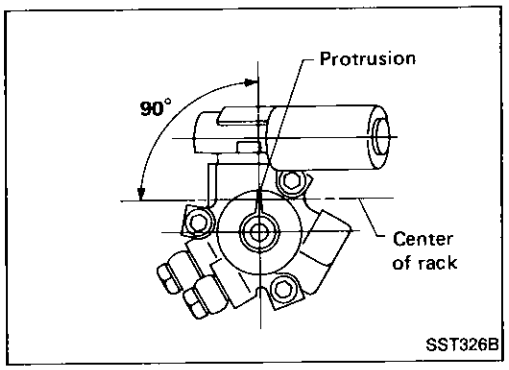
11. Install pinion assembly to pinion housing.

Be careful not to damage pinion oil seal.



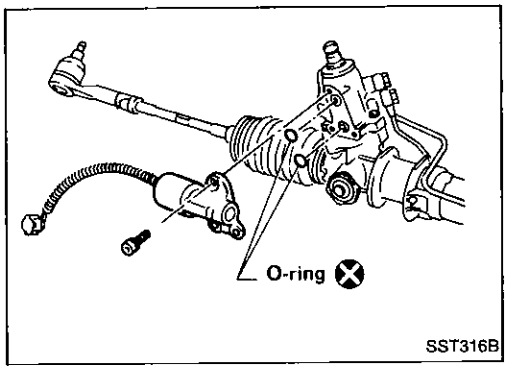
12. Apply a coat of multi-purpose grease to rear oil seal lip before installing rear housing.

Assembly (Cont'd)

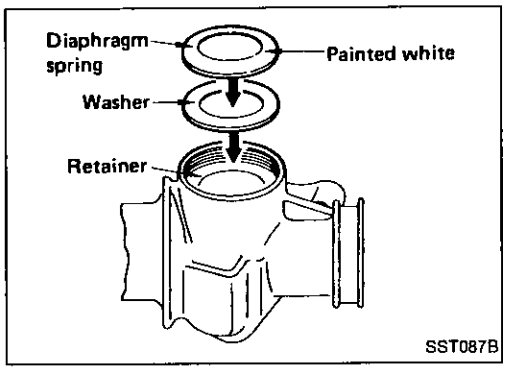


13. Install rear cover cap so that protrusion of rear housing cover is positioned as shown in figure at left.

Be careful not to damage worm ring and oil seal.

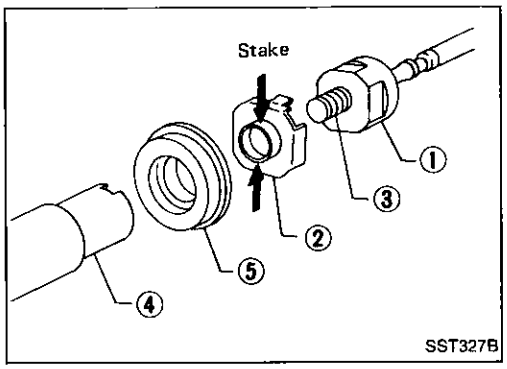


14. Install solenoid valve.

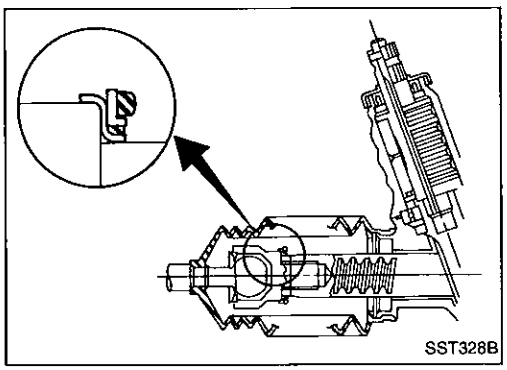


15. Install diaphragm spring at retainer.
- Always install retainer, spring washer and diaphragm spring in that order.
- Make sure convex end (painted white) of diaphragm spring faces outward when installing.

16. Install retainer spring and adjusting screw temporarily.

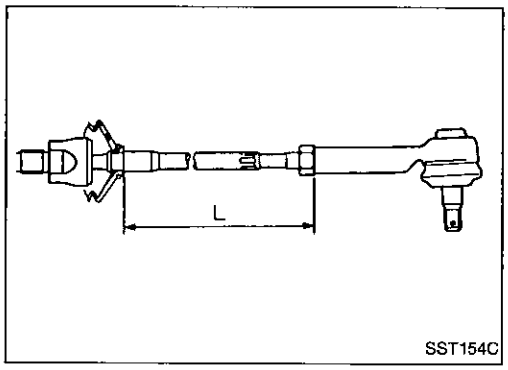


CAUTION:
Ensure steering gear spacer is installed with rubber side facing rack.
- Attach lock plate ② to side rod inner socket ①.
- Insert steering gear spacer ⑤ to rack ④.
- Apply locking sealant to inner socket threads ③.Screw inner socket into rack ④ and tighten to specified torque.
- Stake lock plate at two places.

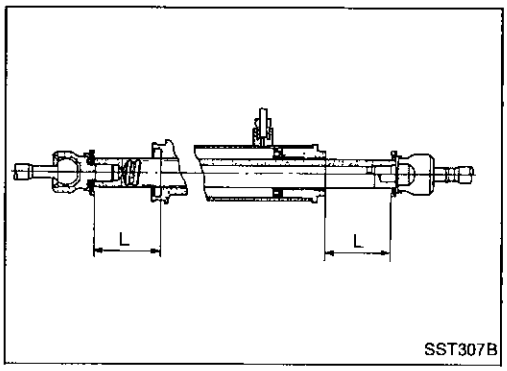


17. Install steering gear spacer ⑤ to lock plate ②.

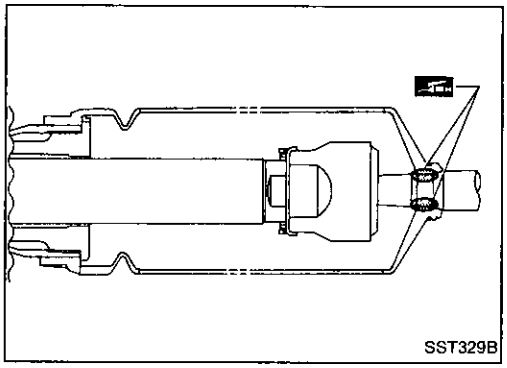
Assembly (Cont'd)



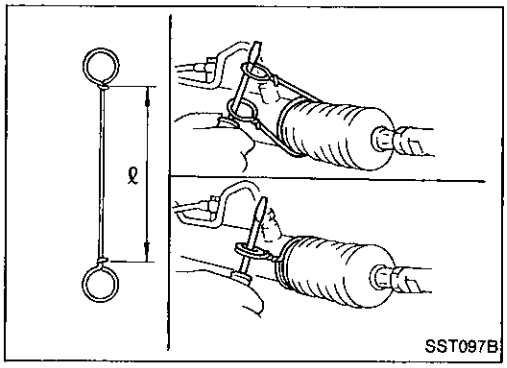
18. Tighten outer socket lock nut.
    Tie-rod length "L":
    Refer to S.D.S.



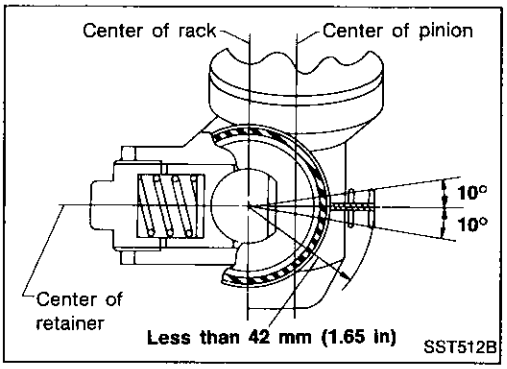
19. Measure rack stroke.
    Stroke "L":
    Refer to S.D.S.



20. Before installing boot, coat the contact surfaces between boot and tie-rod with grease.

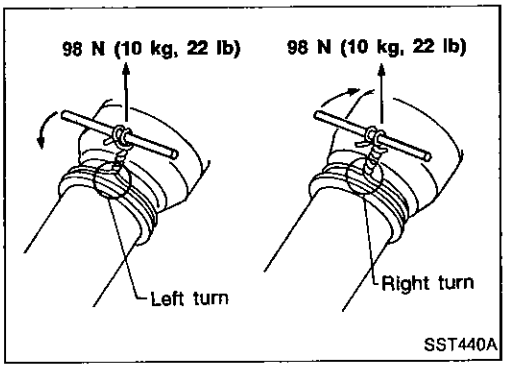


21. Install boot clamps.
- To install, wrap boot clamp around boot groove twice. Tighten clamp by twisting rings at both ends 4 to 4-1/2 turns with screwdriver while pulling with a force of approx. 98 N (10 kg, 22 lb).

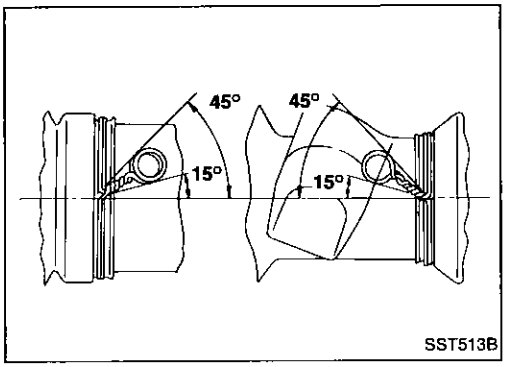


- Install boot clamp so that clamped portion will be behind the gear when gear housing is attached to the vehicle. (This will prevent interference with other parts.)

Assembly (Cont'd)

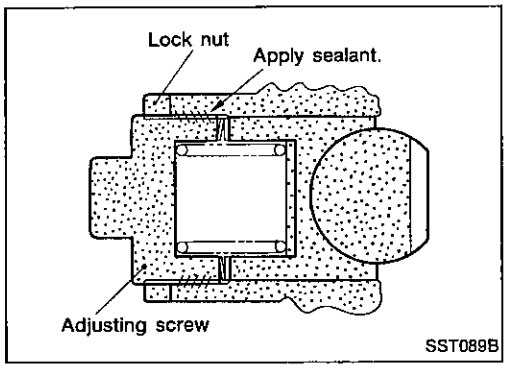


- Twist boot clamp in the direction shown in figure at left.



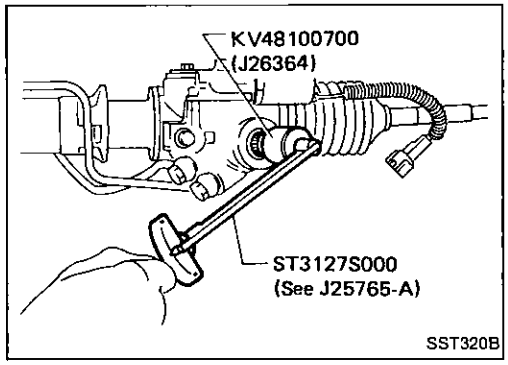
- After twisting boot clamp, bend twisted and diagonally so it does not contact boot.

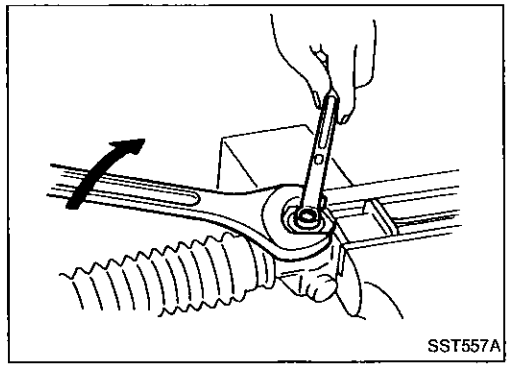
Adjustment



Adjust pinion rotating torque as follows:

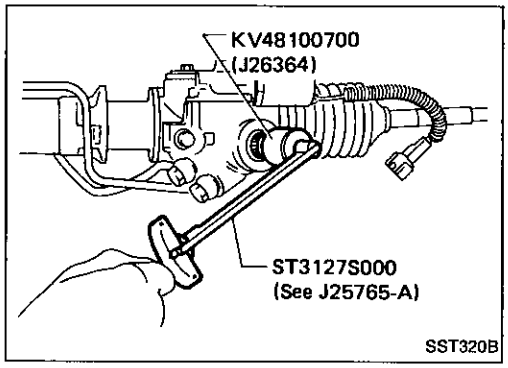
1. Set gears to Neutral without fluid in the gear.
2. Coat the adjusting screw with locking sealant and screw it in.
3. Lightly tighten lock nut.
4. Tighten adjusting screw to a torque of 4.9 to 5.9 N·m (50 to 60 kg-cm, 43 to 52 in-lb).
5. Loosen adjusting screw, then retighten it to 0.05 to 0.20 N·m (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 60° to 100°.





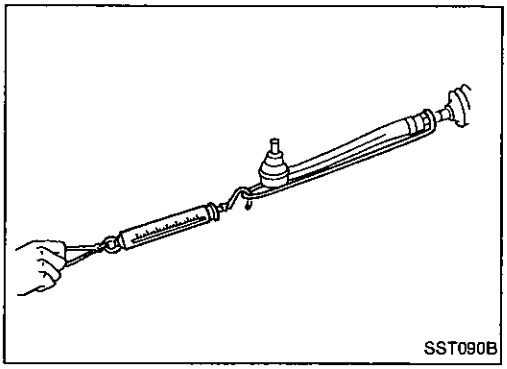
10. Prevent adjusting screw from turning, and tighten lock nut to specified torque.

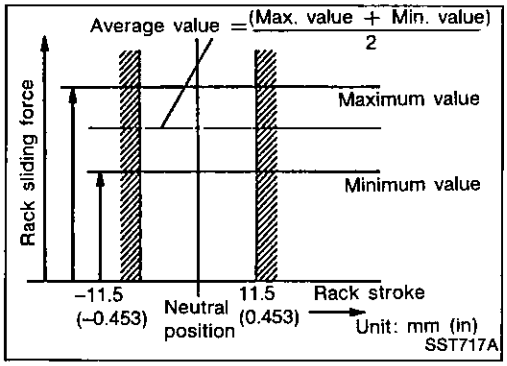
Adjustment (Cont'd)



11. 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 deviation:
    Less than 0.4 N·m (4 kg-cm, 3.5 in-lb)
    Measure pinion rotating torque except for above mentioned measuring range.
    Maximum rotating torque:
    1.9 N·m (19 kg-cm, 16 in-lb)
    Maximum torque deviation:
    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.

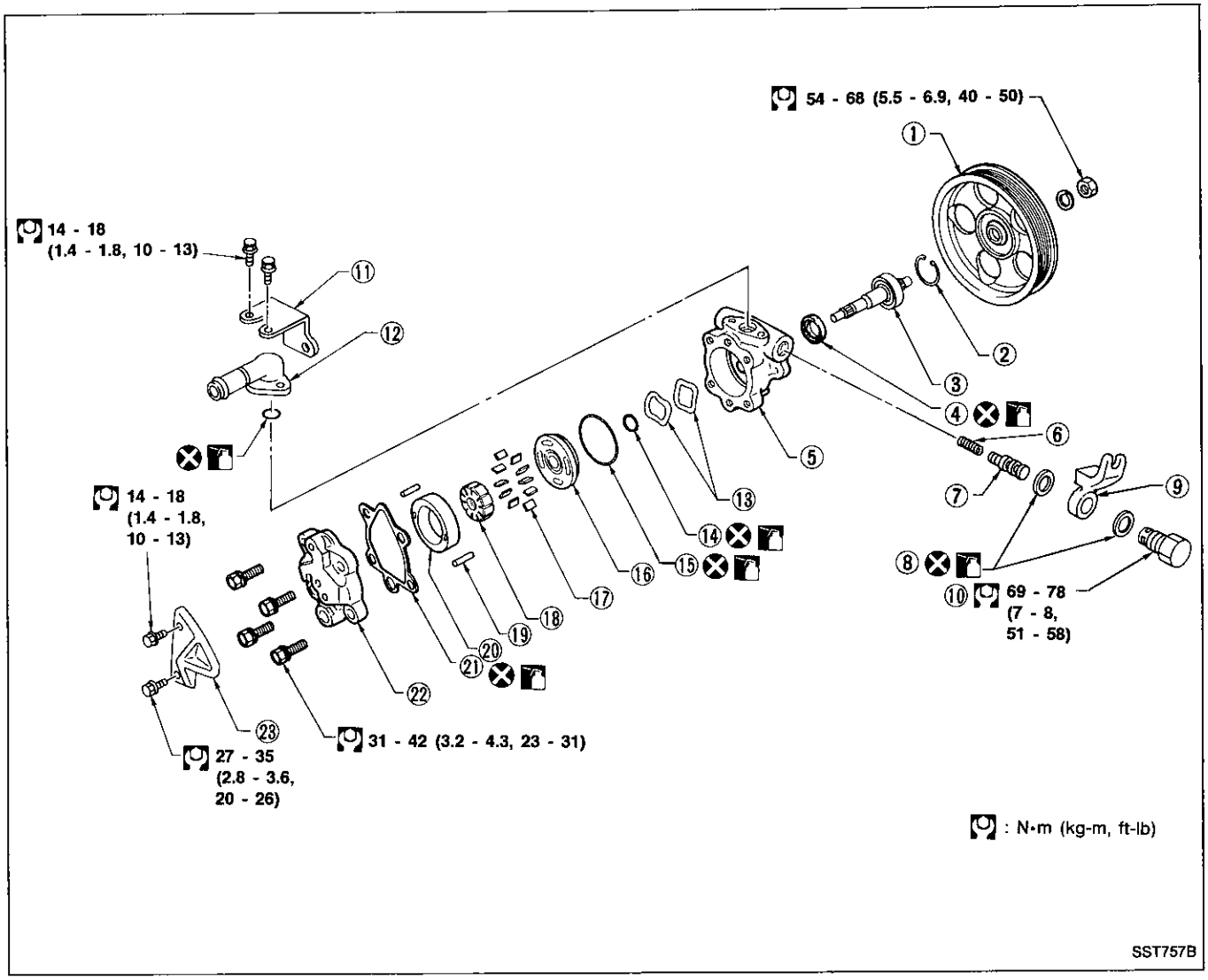




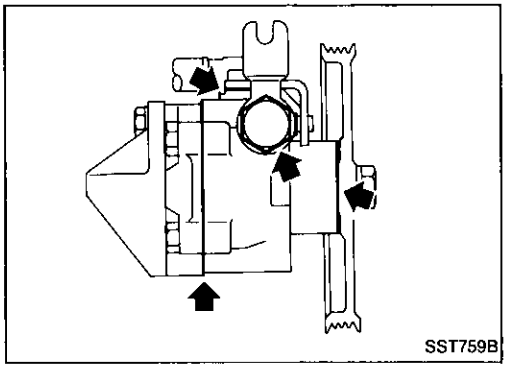
12. Check rack sliding force on vehicle as follows:
a. Install steering gear onto vehicle, but do not connect tie-rod to knuckle arm.
b. Connect all piping and fill with steering fluid.
c. Start engine and bleed air completely.
d. Disconnect steering column lower joint from the gear.
e. Keep engine at idle and make sure steering fluid has reached normal operating temperature.
f. 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:
    167 - 226 N (17 - 23 kg, 37 - 51 lb)
    Maximum force deviation: 39 N (4 kg, 9 lb)
g. Check sliding force outside above range.
    Maximum rack sliding force:
    Not more than 39 N (4 kg, 9 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.

Disassembly and Assembly



① Pulley
② Snap ring
③ Drive shaft
④ Oil seal
⑤ Front housing
⑥ Spring
⑦ Control valve
⑧ Copper washer
⑨ Joint
⑩ Connector bolt
⑪ Bracket
⑫ Suction pipe
⑬ Wave washer
⑭ O-ring (Inner)
⑮ O-ring (Outer)
⑯ Front side plate
⑰ Vane
⑱ Rotor
⑲ Pin
⑳ Cam ring
㉑ Gasket
㉒ Rear housing
㉓ Bracket



Pre-disassembly Inspection

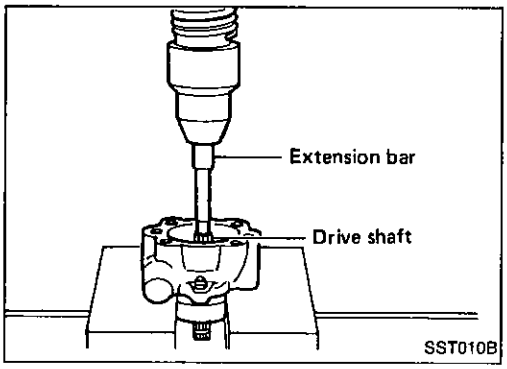
Disassemble the power steering oil pump only if the following items are found.

- Oil leak from any point shown in the figure.
- Deformed or damaged pulley.
- Poor performance

Disassembly

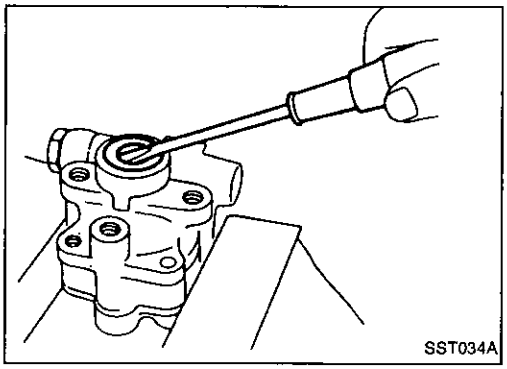
CAUTION:

- **Parts which can be disassembled are strictly limited. Never disassemble parts other than those specified.**
- **Disassemble in as clean a place as possible.**
- **Clean your hands before disassembly.**
- **Do not use rags; use nylon cloths or paper towels.**
- **Follow the procedures and cautions in the Service Manual.**
- **When disassembling and reassembling, do not let foreign matter enter or contact the parts.**



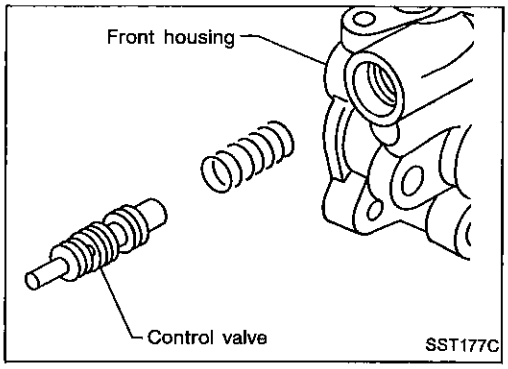
- Remove snap ring, then draw drive shaft out.

Be careful not to drop drive shaft.



- Remove oil seal.

Be careful not to damage front housing.

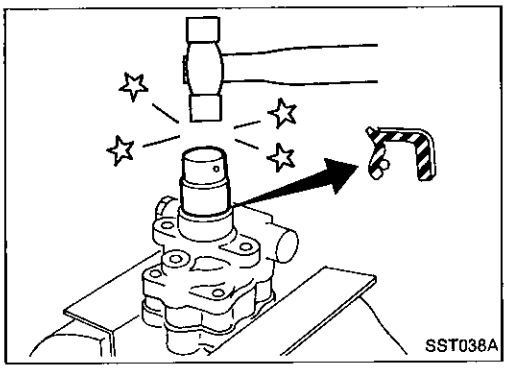


- Remove connector.

Be careful not to drop control valve.

Inspection

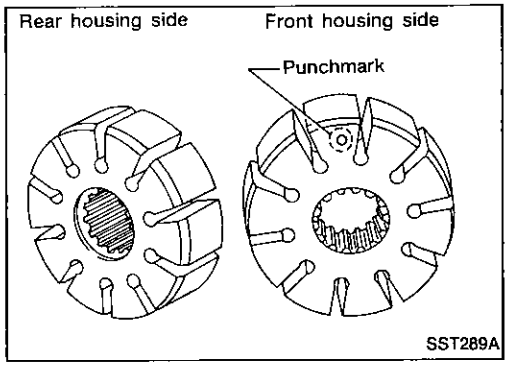
Inspect each component part for wear, deformation, scratches, and cracks. If damage is found, replace the part.



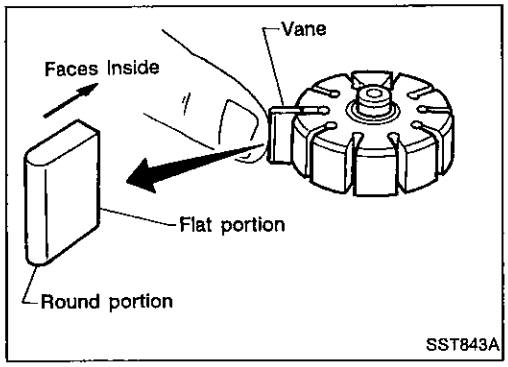
Assembly

Assemble oil pump, noting the following instructions.

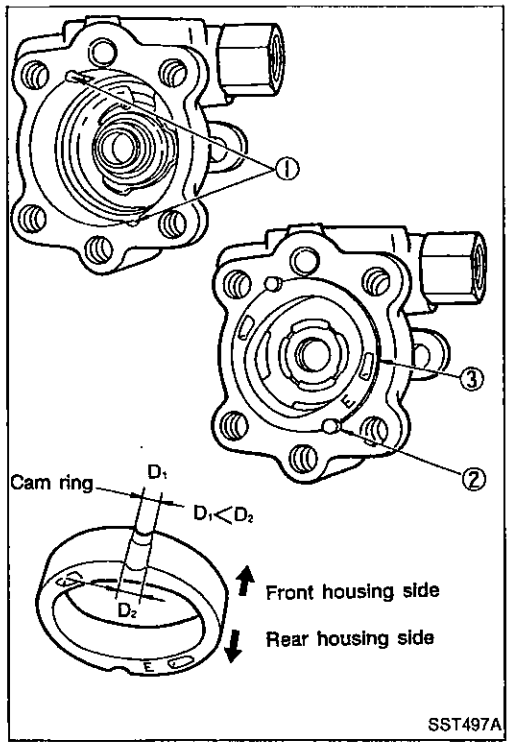
- Make sure O-rings and oil seal are properly installed.
- Always install new O-rings and oil seal.
- Be careful of oil seal direction.
- Cam ring, rotor and vanes must be replaced as a set if necessary.
- Coat each part with A.T.F. when assembling.



- Pay attention to rotor direction.

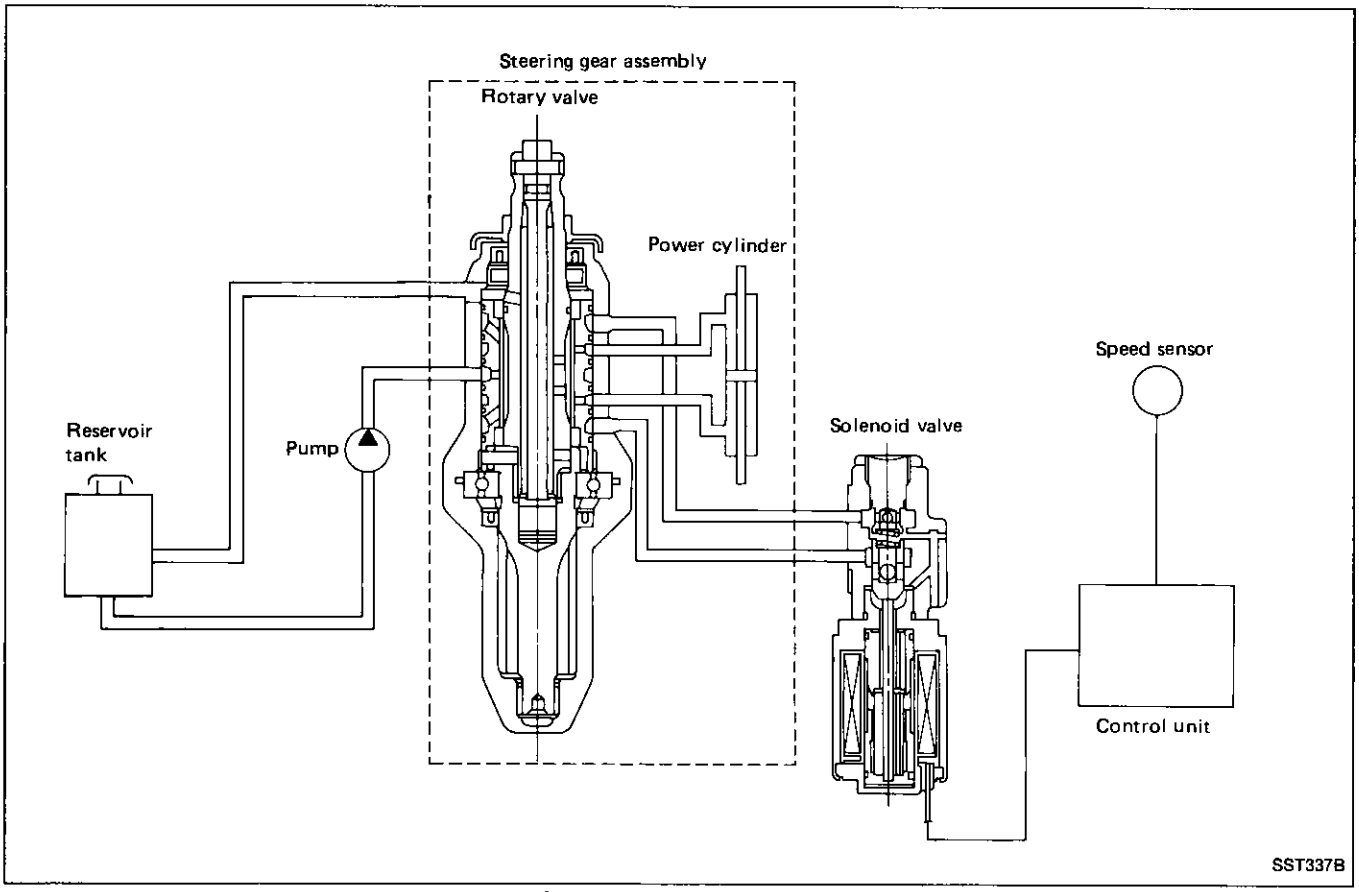


- When assembling vanes to rotor, rounded surfaces of vanes must face cam ring side.

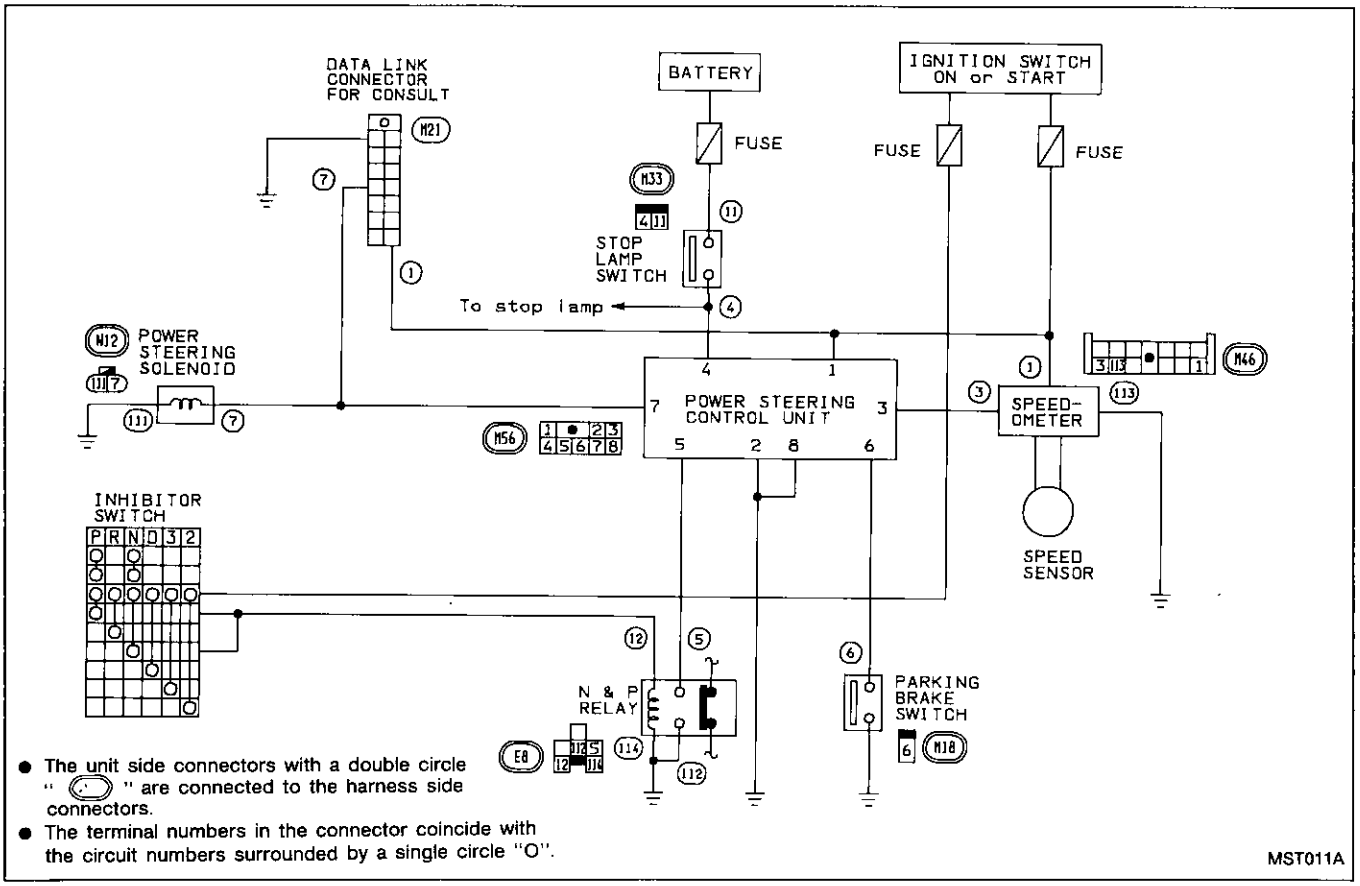


- Insert pin ② into pin groove ① of front housing and front side plate. Then install cam ring ③ as shown at left.

Hydraulic Circuit

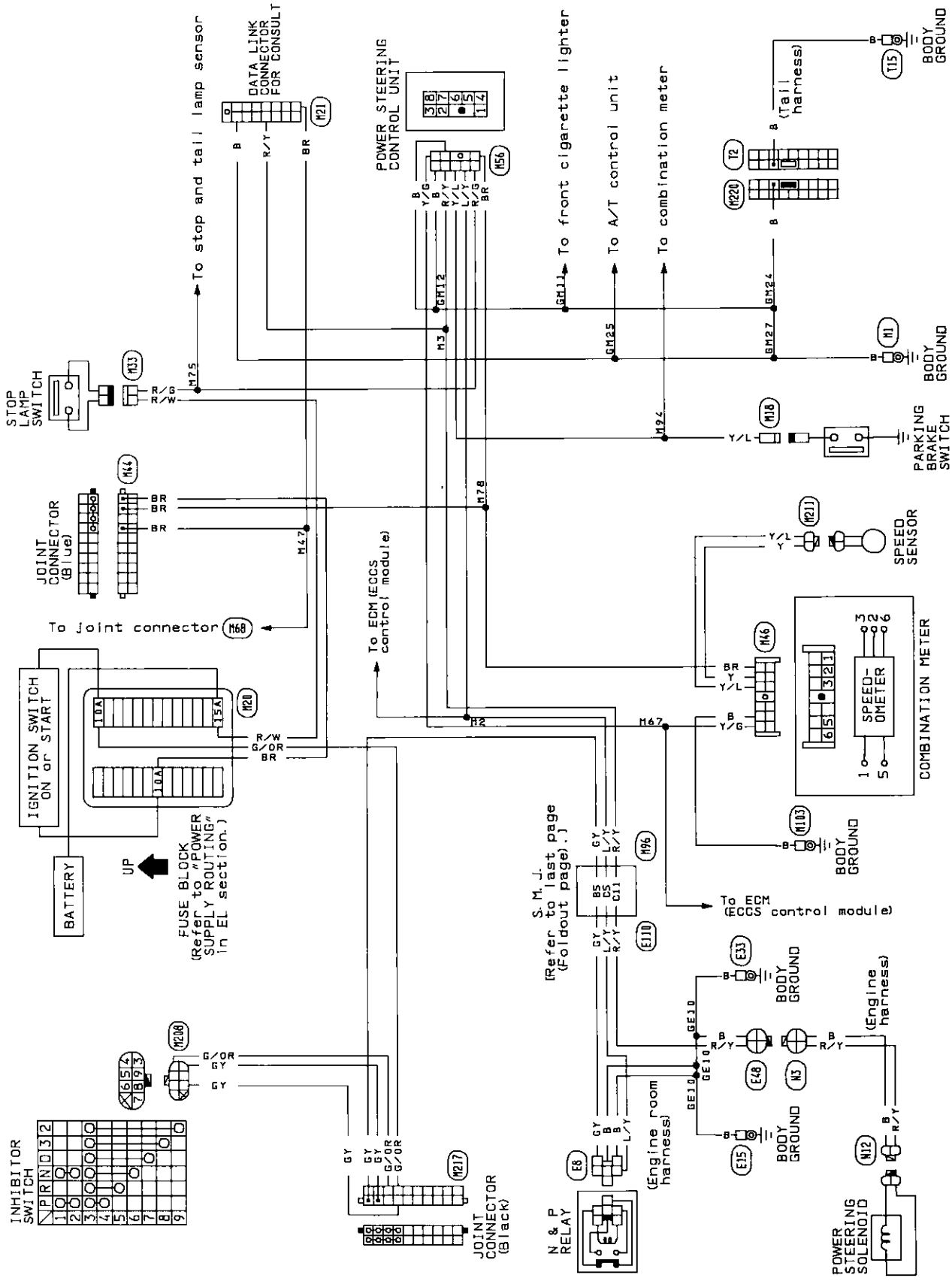


Schematic



- The unit side connectors with a double circle " ◎ " are connected to the harness side connectors.
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle "O".

Wiring Diagram



MST012A

Trouble Diagnoses

PRECAUTIONS

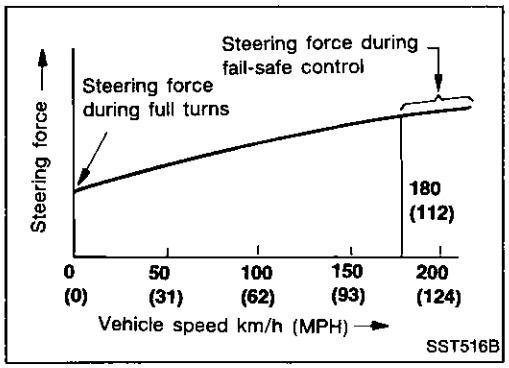
Before diagnosing the power steering system, ensure that:

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 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".

Trouble Diagnoses (Cont'd)

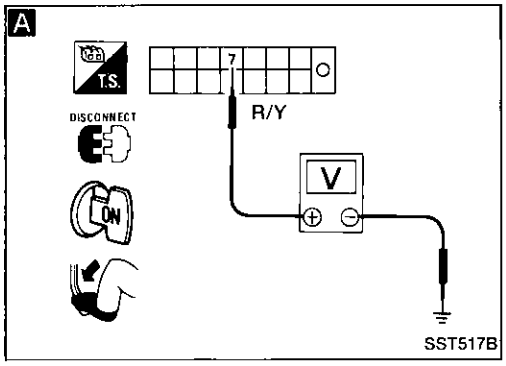
DIAGNOSTIC PROCEDURE 1

SYMPTOM:

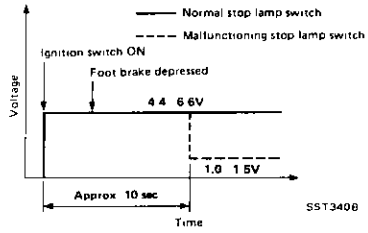
Heavy steering operation during stationary turns

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



Depress brake pedal and check solenoid valve voltage between "diagnostic" connector terminal ⑦ and body metal (ground).



Voltage:
4.4 - 6.6V (constant)

Yes → Go to 2) CHECK PARKING BRAKE SIGNAL.

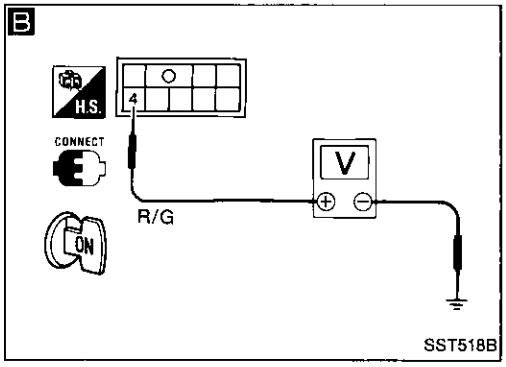
No

Check if terminal voltage drops to 1 - 1.5V range approx. 10 seconds after ignition switch is turned ON.

No → Go to 5) CHECK POWER STEERING CONTROL UNIT FOR PROPER OPERATION.

Yes

B



Check if stop lamp switch signal is present at power steering control unit terminal ④ and body metal (ground).
Voltage:
Approx. 12V
(Brake pedal depressed.)

No → Malfunctioning stop lamp switch system

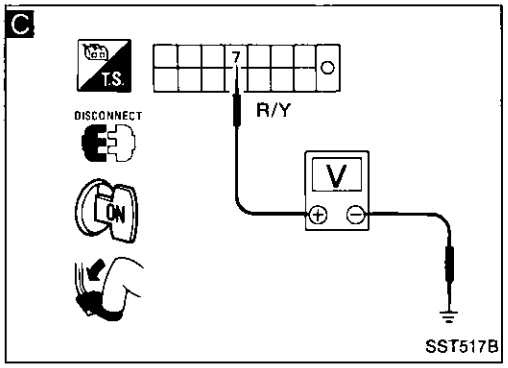
Yes

Ensure that power steering control unit connector is connected properly.

Ⓐ

GI MA EM LC EF & EC FE AT PD FA RA BR ST BF HA EL

Trouble Diagnoses (Cont'd)



Ⓐ

C

After ignition switch is turned "ON", depress brake pedal and check solenoid valve voltage between "diagnostic" connector terminal ⑦ and body metal (ground).
4.4 - 6.6V (constant)

No → Malfunctioning power steering control unit.

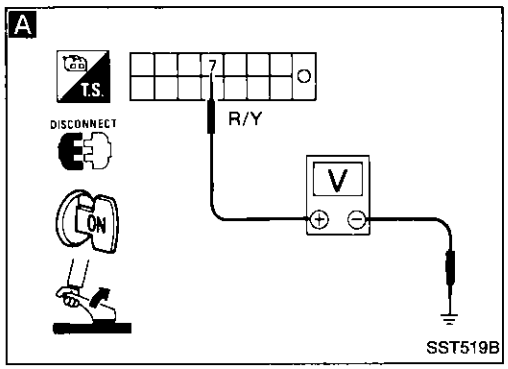
Yes

Check if heavy steering operation occurs during stationary turns.

Yes → Go to 4) CHECK POWER STEERING SOLENOID VALVE FOR PROPER OPERATION.

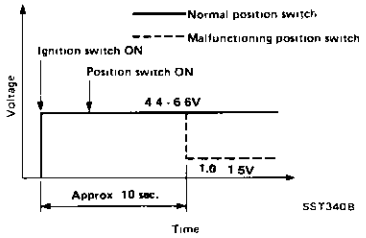
No

END



A

2) CHECK PARKING BRAKE SIGNAL.
Release foot brake pedal and apply parking brake lever.
Check solenoid valve voltage between "diagnostic" connector terminal ⑦ and body metal (ground).



Voltage:
4.4 - 6.6V (constant)

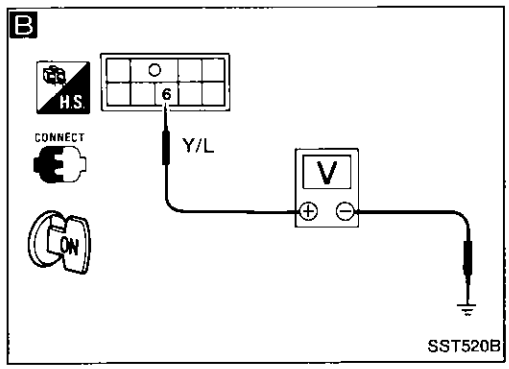
Yes → Go to 3) CHECK NEUTRAL POSITION SIGNAL.

No

Check if terminal voltage drops to 1.0 - 1.5V range approx. 10 seconds after ignition switch is turned ON.

No → Go to 5) CHECK POWER STEERING CONTROL UNIT FOR PROPER OPERATION.

Yes



B

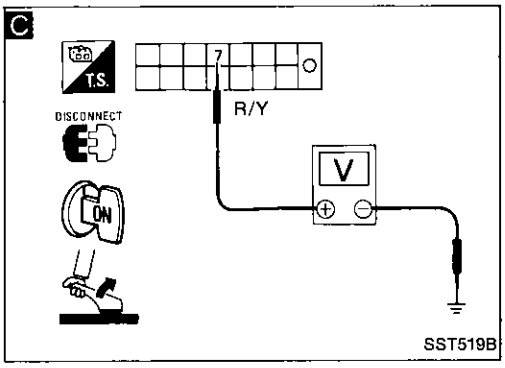
Check if parking brake switch signal is present at power steering control unit terminal ⑥ and body metal (ground).
Voltage: 0V
(Parking brake applied.)

No → Malfunctioning parking brake system

Yes

Ⓐ

Trouble Diagnoses (Cont'd)



Ⓐ

Ensure that power steering control unit connector is connected properly.

C

Turn ignition switch ON and apply parking brake lever.
Check solenoid valve voltage between "diagnostic" connector terminal ⑦ and body metal (ground).
Voltage: 4.4 - 6.6V (constant)

No → Malfunctioning power steering control unit

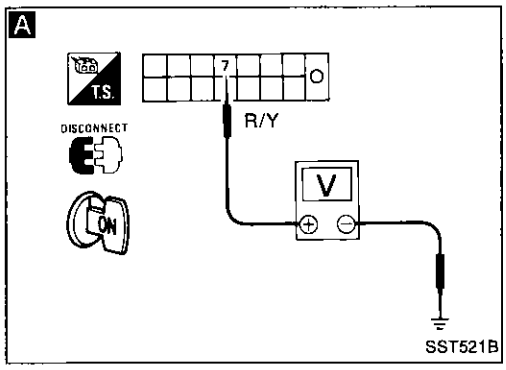
Yes

Check if heavy steering operation occurs during stationary turns.

Yes → Go to 4) CHECK POWER STEERING SOLENOID VALVE FOR PROPER OPERATION.

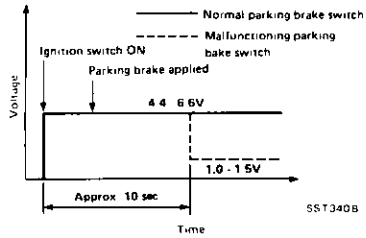
No

END



A

3) CHECK NEUTRAL POSITION SIGNAL.
Release parking brake lever.
Move shift lever to Neutral. Check solenoid valve voltage between "diagnostic" connector terminal ⑦ and body metal (ground).



Voltage: 4.4 - 6.6V (constant)

Yes → A

Move shift lever to "P".
Check solenoid valve voltage between "diagnostic" connector terminal ⑦ and body metal (ground).
Voltage: 4.4 - 6.6V (constant)

No

Yes

Go to 4) CHECK POWER STEERING SOLENOID VALVE FOR PROPER OPERATION.

No

Check if terminal voltage drops to 1.0 - 1.5V range approx. 10 seconds after ignition switch is turned ON.

No → Go to 5) CHECK POWER STEERING CONTROL UNIT FOR PROPER OPERATION.

Yes

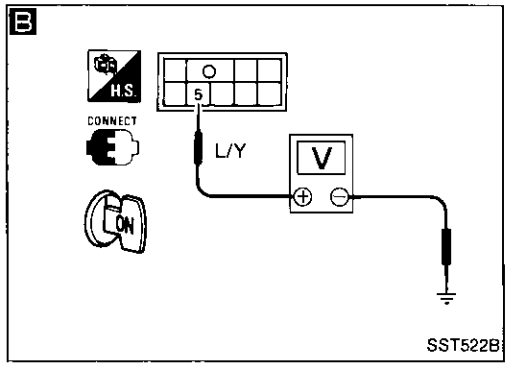
B

Check if position switch signal is present at power steering control unit terminal ⑤ and body metal (ground).
Voltage: 0V
(When position switch is ON.)

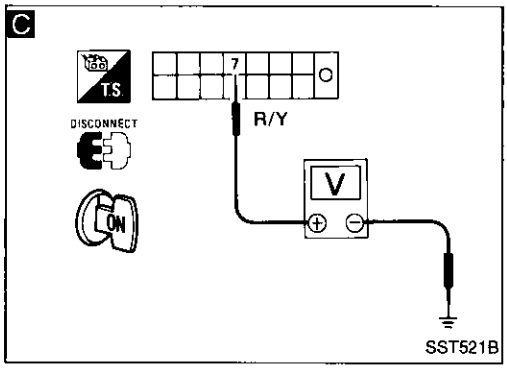
No → Malfunctioning position switch system

Yes

Ⓒ



Trouble Diagnoses (Cont'd)



Ⓒ

Ensure that power steering control unit connector is connected properly.

C

Turn ignition switch ON and move shift lever to "P".
Check solenoid valve voltage between "diagnostic" connector terminal ⑦ and body metal (ground).
Voltage:
4.4 - 6.6V (constant)

No → Malfunctioning power steering control unit

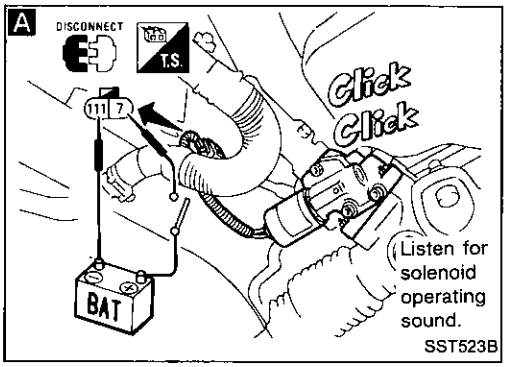
Yes

Check if heavy steering operation occurs during stationary turns.

Yes → Go to 1) CHECK STOP LAMP SIGNAL.

No

END



A

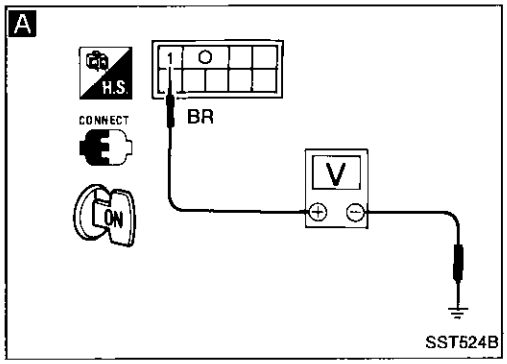
4) CHECK POWER STEERING SOLENOID VALVE.
Disconnect solenoid valve connector.
Check if plunger clicks when voltage is applied between connector terminals (on solenoid valve side) ⑦ and (111).

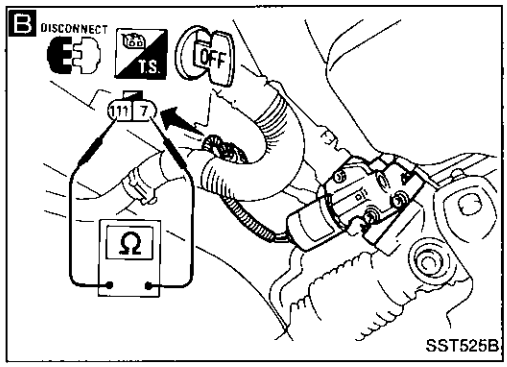
No → Malfunctioning power steering solenoid valve

Yes

- Malfunctioning steering gear assembly
- Malfunctioning oil pump

Trouble Diagnoses (Cont'd)





A

5) CHECK POWER STEERING CONTROL UNIT.
Check if power voltage is present at power steering control unit terminal ① and body metal (ground).
Voltage: 12V

No → Malfunctioning ignition power circuit

Yes

B

Disconnect solenoid valve connector, and check resistance between connector terminals (on solenoid valve side) ⑦ and (111).
Resistance: 4 - 6 ohms

No → Malfunctioning solenoid valve system

Yes

Ensure that power steering control unit connector is connected properly.

Yes

Check if heavy steering operation occurs during stationary turns.

No → Malfunctioning power steering control unit

Yes

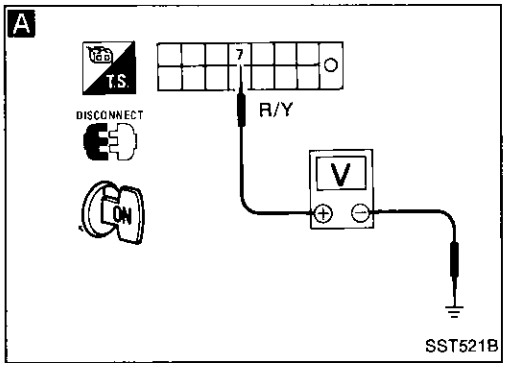
END

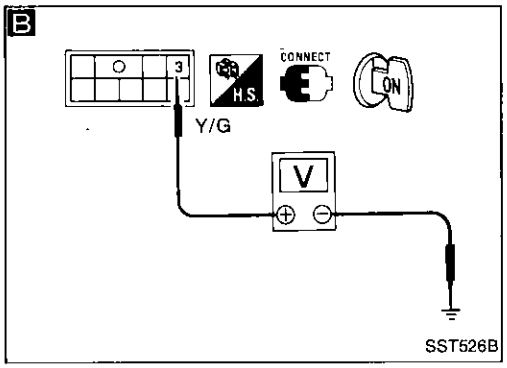
Trouble Diagnoses (Cont'd)

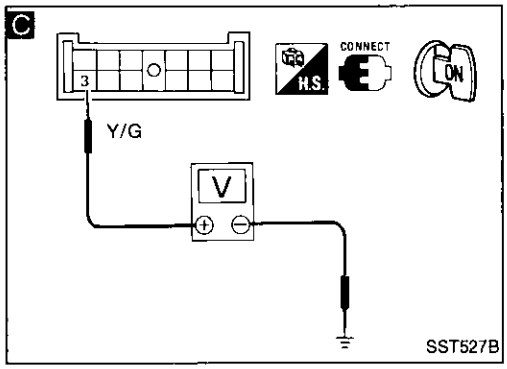
DIAGNOSTIC PROCEDURE 2

SYMPTOM:

Light steering operation during high-speed driving







Raise rear wheels off ground and start engine.

A

Check solenoid valve voltage between "diagnostic" connector terminal ⑦ and body metal (ground) while driving vehicle from 0 to 100 km/h (0 to 62 MPH).
Voltage:
0 km/h (0 MPH): 4.4 - 6.6V
100 km/h (62 MPH): 1.8 - 2.8V

Yes → Ⓒ

No

Check speedometer.

N.G. → Malfunctioning vehicle speed sensor or speedometer

O.K.

C

Check A.S.C.D. and vehicle speed-sensing door lock for proper operation.

N.G. → Check if vehicle speed signal is present at speedometer.
Disconnect speedometer from vehicle to facilitate work. Reconnect wiring.
Check voltage between speedometer terminal ③ and ground while driving vehicle at very slow speeds.
1 volt (Min.) and 5 volts (Max.) are alternately repeated

Yes → B

No → Malfunctioning speedometer

O.K.

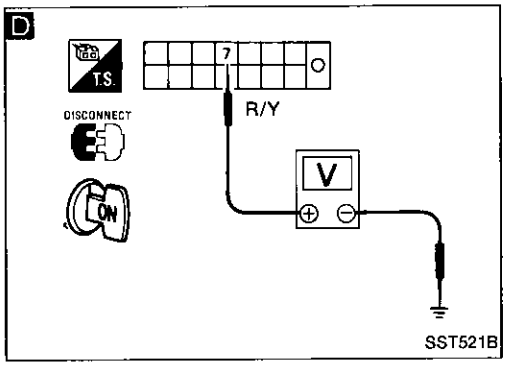
B

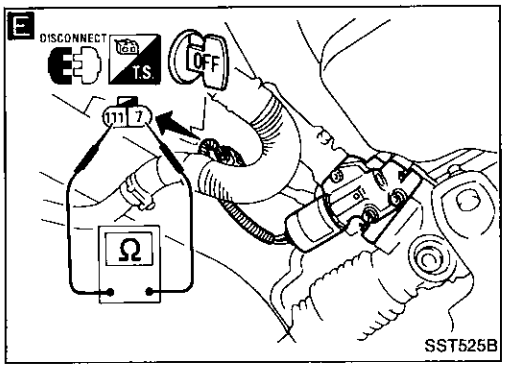
Check if vehicle speed signal is present at power steering control unit.
While driving at very slow speeds, connect power steering unit connector.
Measure voltage between power steering control unit terminal ③ and ground.
1 volt (Min.) and 5 volts (Max.) are alternately repeated

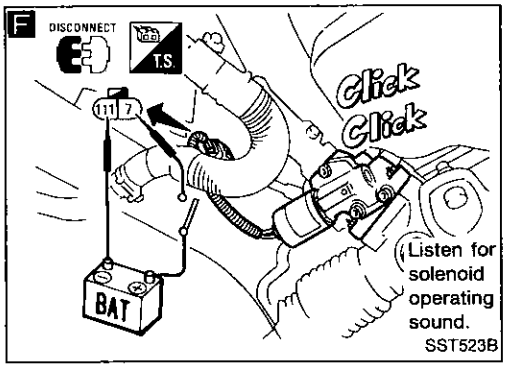
No → Improper connection between speedometer and power steering control unit

Yes → Ⓐ

Trouble Diagnoses (Cont'd)







Ⓐ

Ensure that power steering control unit connector is connected properly.

D

Check solenoid valve voltage between "diagnostic" connector terminal ⑦ and ground while driving vehicle from 0 to 100 km/h (0 to 62 MPH).

Voltage:

0 km/h (0 MPH): 4.4 - 6.6V

100 km/h (62 MPH): 1.8 - 2.8V

Yes → Check if steering operation is heavy during high-speed driving.

No → E

Yes → END

E

Disconnect solenoid valve connector, and check resistance between connector terminals ⑦ and (111) (on solenoid valve side).

Resistance: 4 - 6 ohms

No → F

Yes → Malfunctioning power steering control unit

F

Disconnect solenoid valve connector.
Apply voltage between connector terminals ⑦ and (111) (on solenoid valve side) and check if solenoid valve clicks.

No → Malfunctioning solenoid valve

Yes → Ⓒ

Ⓒ

- Malfunctioning steering gear assembly
- Malfunctioning oil pump

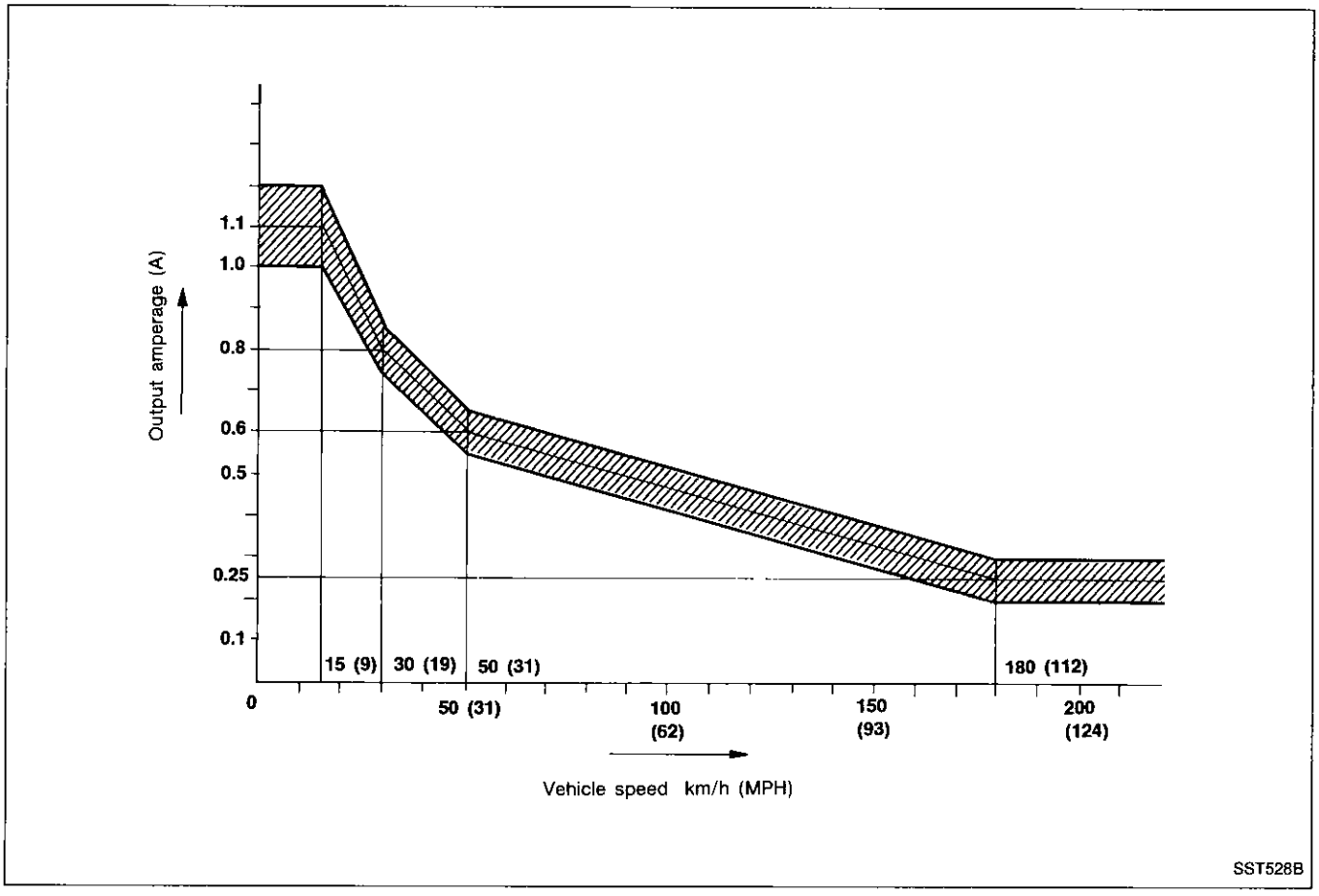
Trouble Diagnoses (Cont'd)

CONTROL UNIT INSPECTION TABLE

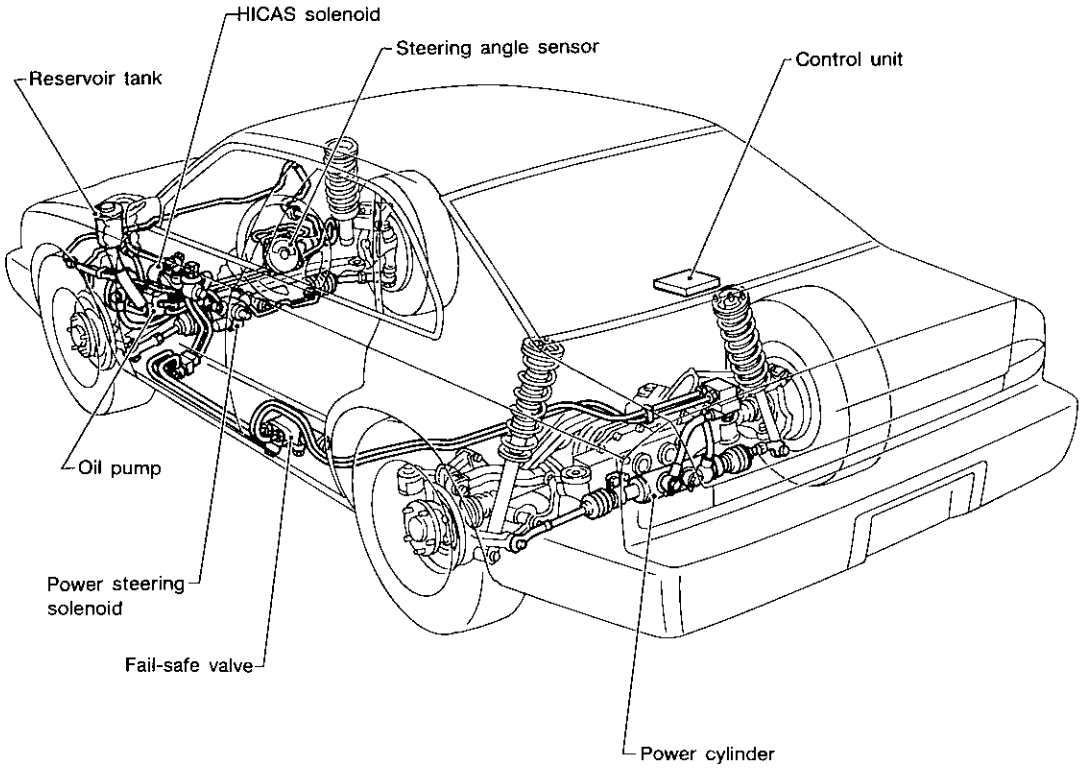
The standard values (voltage), measured with an analog tester in contact with the control unit terminal, are shown below:

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") 4 - 5V (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 1.8 - 2.8V Fail-safe 1.0 - 1.5V
8	Ground	0V

PERFORMANCE OF CONTROLLER

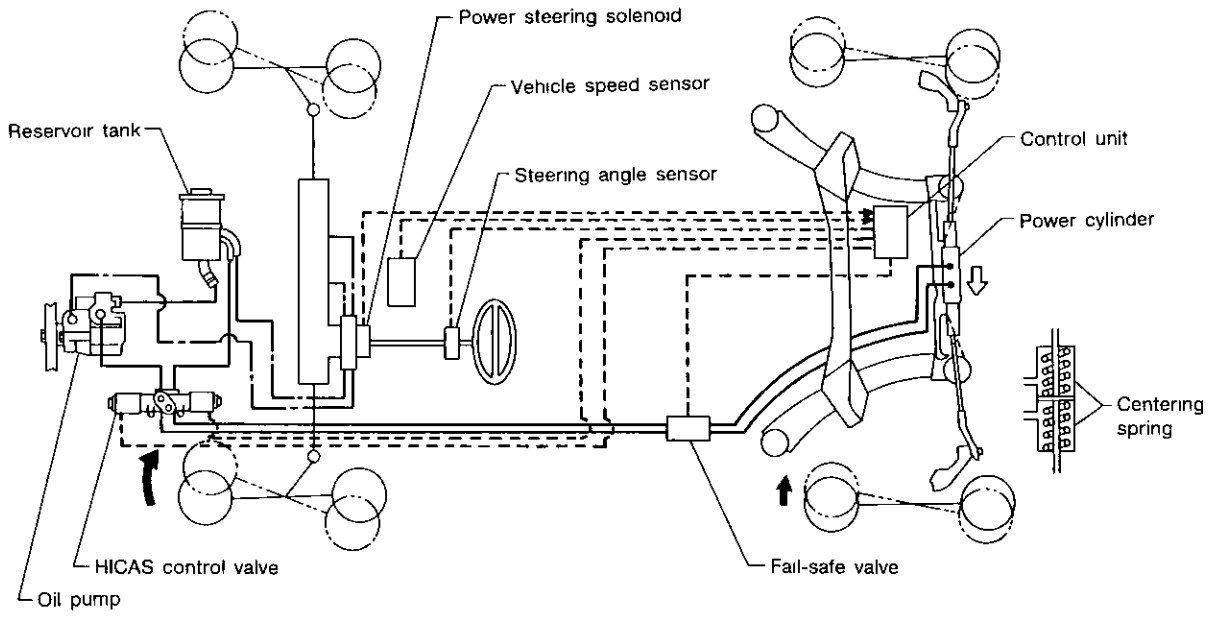


HICAS Component Parts Location

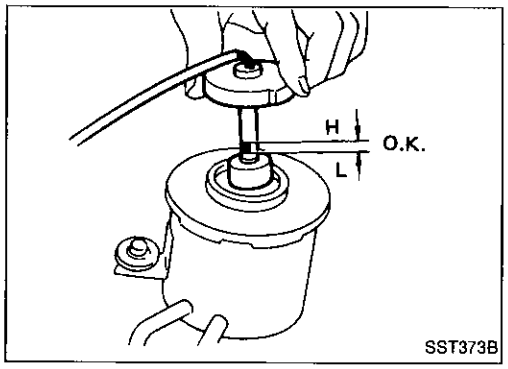


SST456B

System Diagram



SST457B



On-vehicle Service

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 normal.

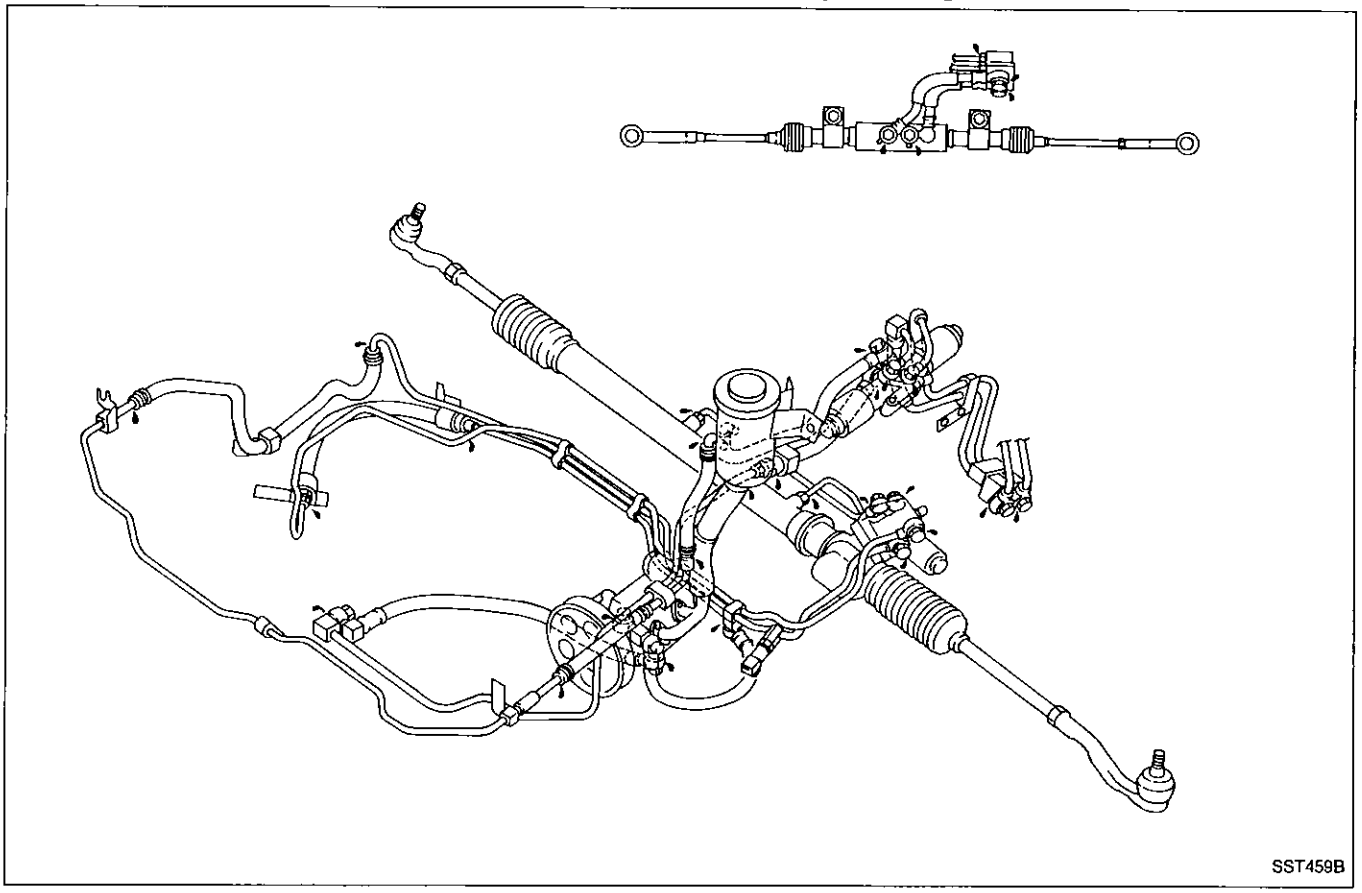
CAUTION:

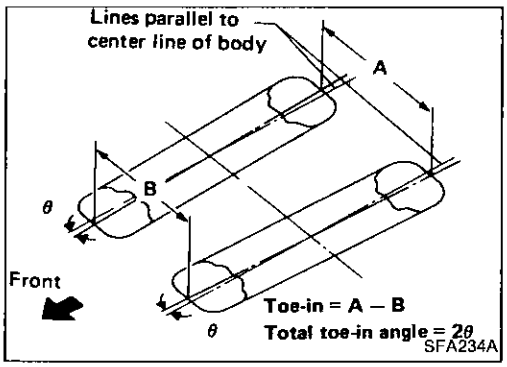
- **Do not overfill.**
- **Recommended fluid is Automatic Transmission Fluid "DEXRON™ II" type or equivalent.**

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 TOE-IN

Measure distance "A" and "B" at the same height as hub center.

Toe-in:

Refer to S.D.S. in section RA.

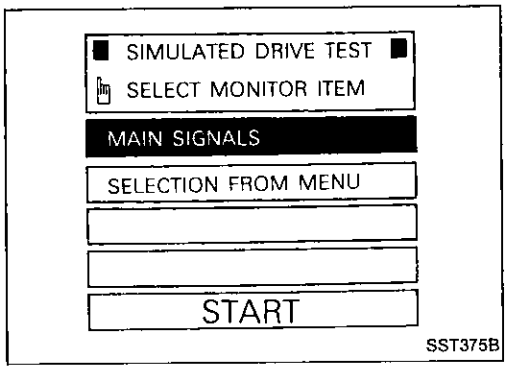
On-vehicle Service (Cont'd)

INSPECTION OF HICAS SYSTEM OPERATION

CAUTION:
Ensure that shift lever is set to "P" position before checking HICAS system operation.

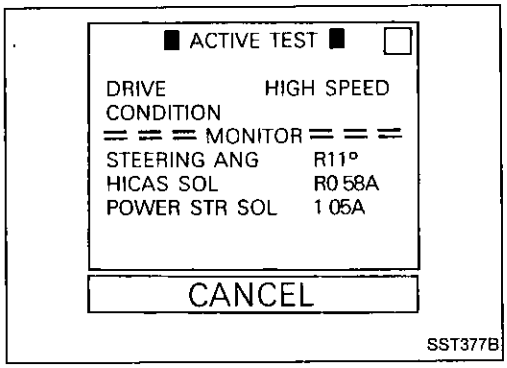
When CONSULT is used:

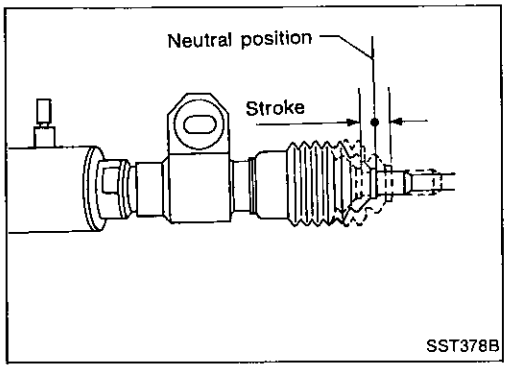
1. Have a helper sit in the driver's compartment and raise vehicle.
   (Use a two-pole lift or a center pole lift so that the four wheels are free to rotate.)
2. Connect CONSULT unit to diagnostic connector and start engine.
3. Touch "START" on CONSULT display.
4. Touch "HICAS", "ACTIVE TEST" and "SIMULATED 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".





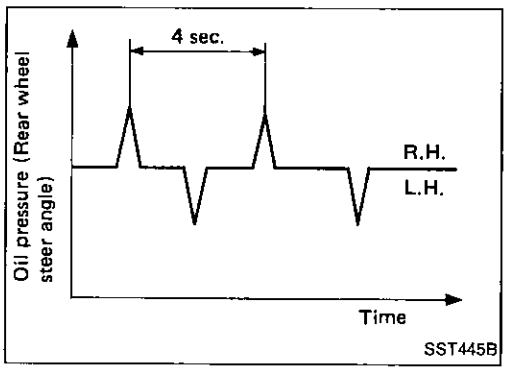
7. Operate engine at speeds greater than 2,000 rpm, and turn steering wheel 180° in one direction from the neutral position. Measure extension value of one power cylinder rod and retraction value of the other. Then, turn steering wheel 180° in the other direction from the neutral position, and measure 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:

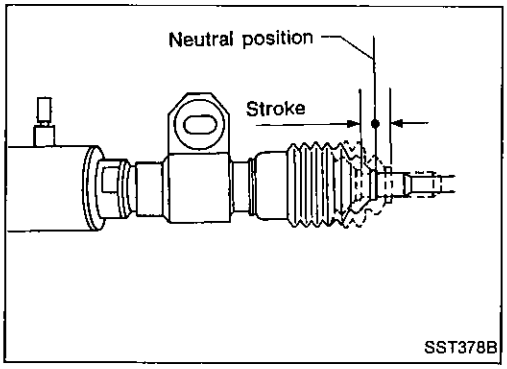
When turned to the right
3 mm (0.12 in)
When turned to the left
3 mm (0.12 in)
Total stroke
6 mm (0.24 in)

On-vehicle Service (Cont'd)



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.



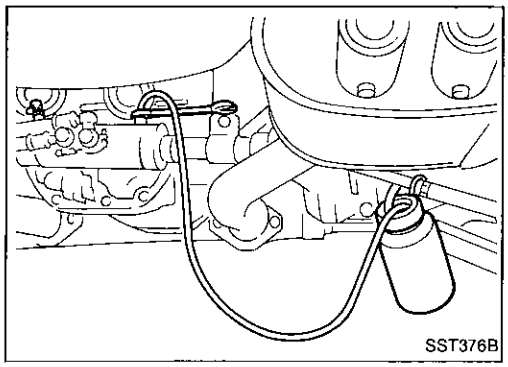
4. Operate engine at speeds greater than 2,000 rpm, and turn steering wheel 180° in one direction from the neutral position. Measure extension value of one power cylinder rod and retraction value of the other. Then, turn steering wheel 180° in the other direction from the neutral position, and measure 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)

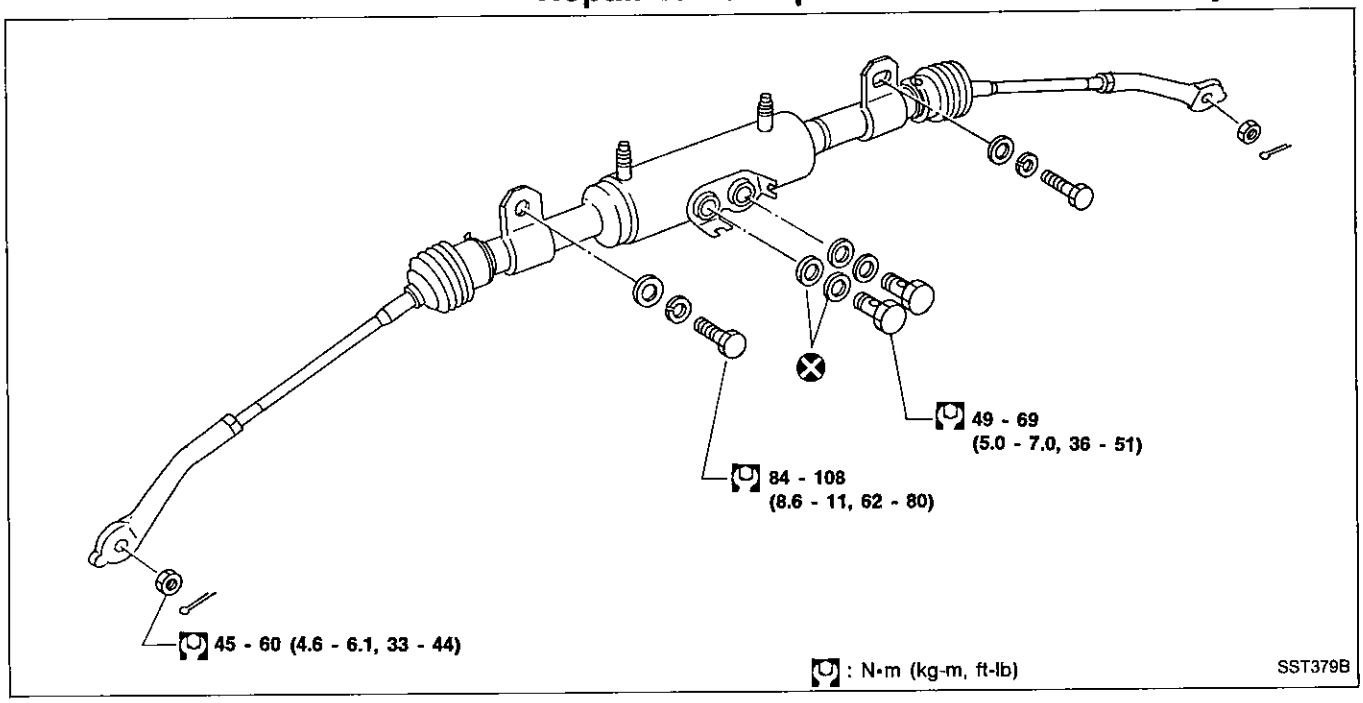
Do not depress foot brake pedal during operation check, otherwise the operation will be stopped.

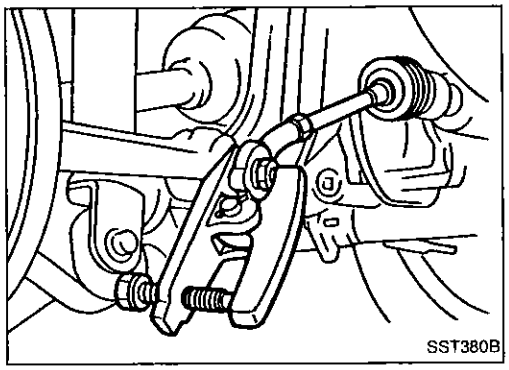


BLEEDING HYDRAULIC SYSTEM

Before bleeding air from the HICAS system, be sure to bleed air from the power steering system.
Refer to "SUPER HICAS SYSTEM — Repair for Component Parts".

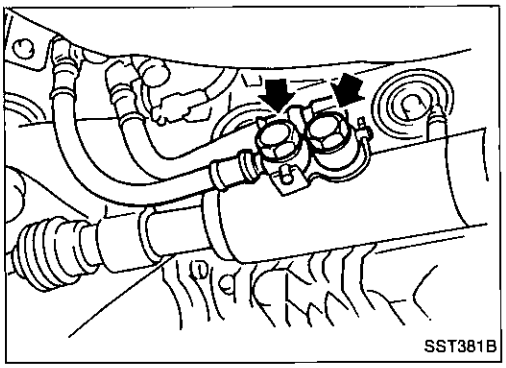
Repair for Component Parts — Power Cylinder





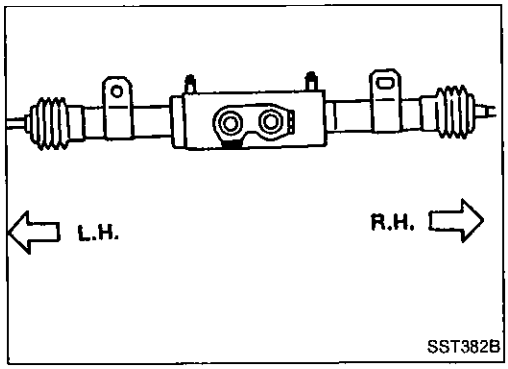
REMOVAL

- 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.

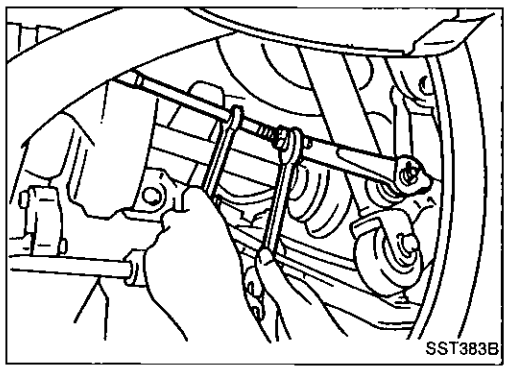


INSTALLATION

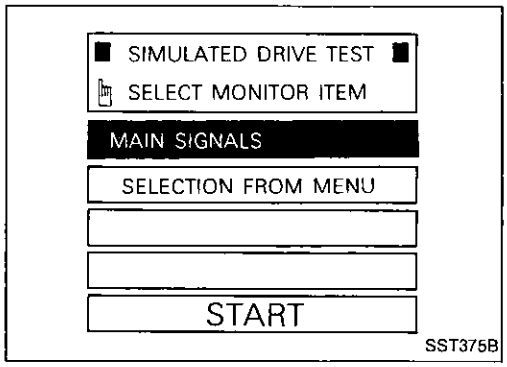
1. Before installing power cylinder on suspension member, wipe power cylinder bracket and mating surface on suspension member. Using the left side of the bracket as a reference point, locate the right side (oblong hole side) and install power cylinder.

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.

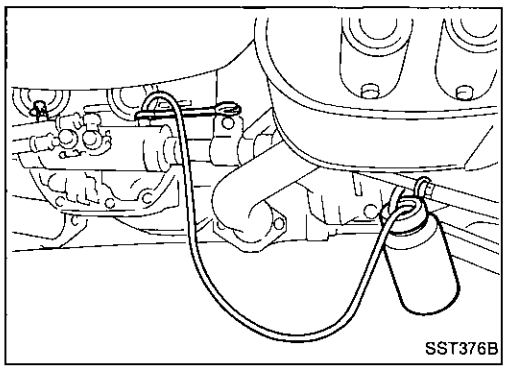
Repair for Component Parts — Power Cylinder (Cont'd)


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.



SST375B


SST376B

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.

When CONSULT is used:

1. Connect CONSULT unit to diagnostic 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.

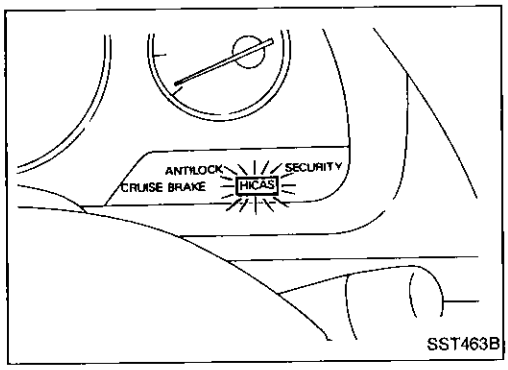
6. Touch "START".
7. Operate engine at speeds greater than 2,000 rpm, and turn steering wheel 180° to the right from the neutral position. Loosen right power cylinder bleeder valve to bleed air, then retighten. Return steering wheel to the neutral position.
8. Operate engine at speeds greater than 2,000 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.

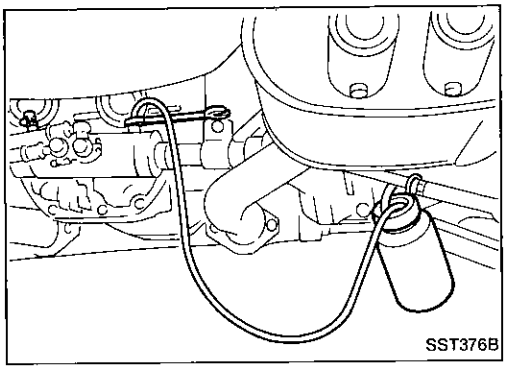
When CONSULT is not used:

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.

Repair for Component Parts — Power Cylinder (Cont'd)

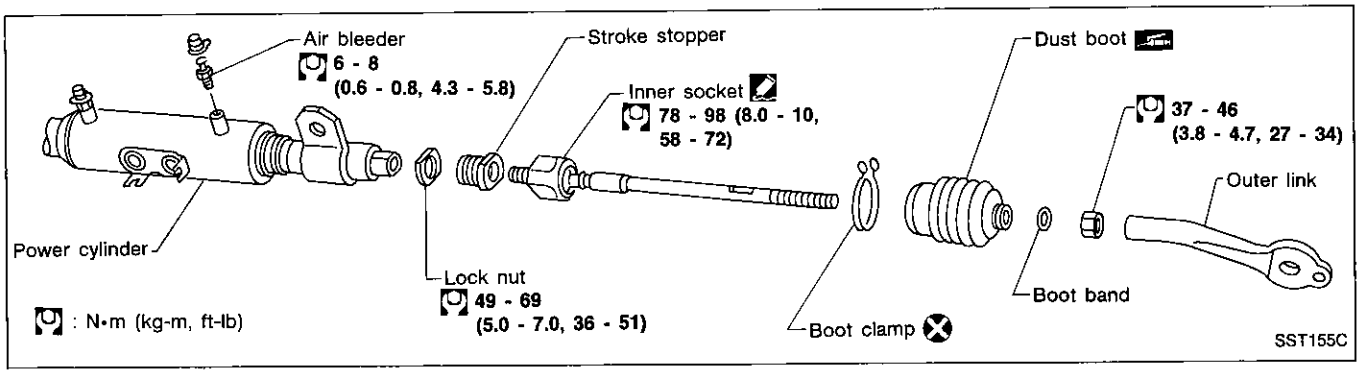


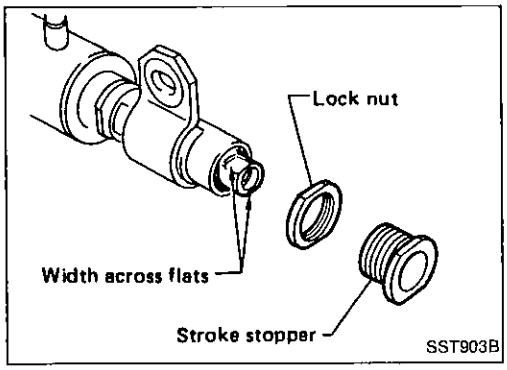


2. Set HICAS system in self-diagnosis mode.
(1) Turn ignition switch "OFF".
(2) Set shift lever to "P" or "N" position.
(3) Turn ignition switch "ON".
(4) Immediately start engine.
(5) Turn steering wheel from left to right (at least 20° from the neutral position) 5 times or more, then depress foot brake 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 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.
5. 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.
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 cannot be disassembled. When it is malfunctioning, replace power cylinder as an assembly.

DISASSEMBLY AND ASSEMBLY

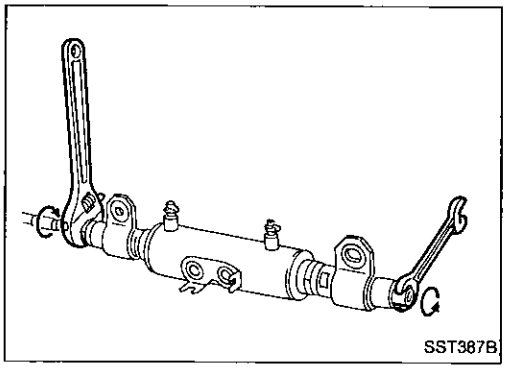




DISASSEMBLY

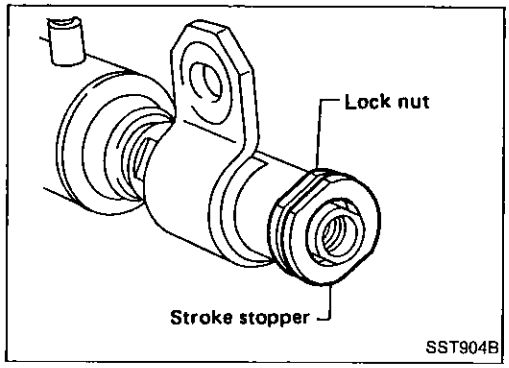
1. Remove clamps from left and right dust boots, and move dust boots toward outer links.
2. Attach wrenches to left and right ball joint sockets, and turn in directions that loosen lower links. Remove one of loosened lower link assemblies.
3. Loosen stroke stopper lock nut from which lower link assembly was removed, and remove stroke stopper.

Repair for Component Parts — Power Cylinder (Cont'd)


SST387B

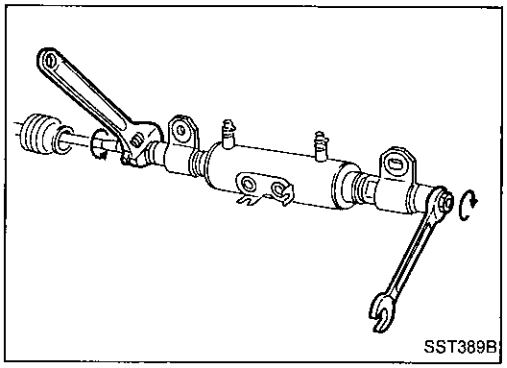
- While attaching a wrench to "width across flats" section of rod end from which stroke stopper was removed, remove the other lower link assembly.

ASSEMBLY

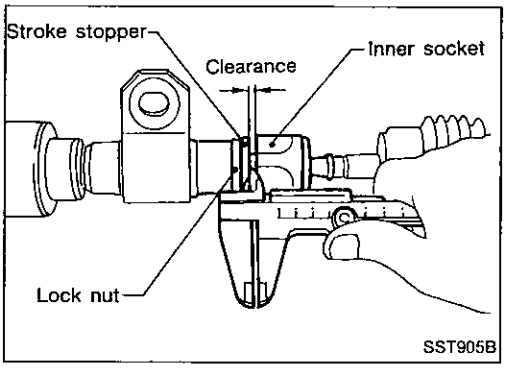


SST904B

1. Install stroke stopper and lock nut on the lower link assembly to be assembled.


SST389B

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.



SST905B

3. After installing stroke stopper and lock nut 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.

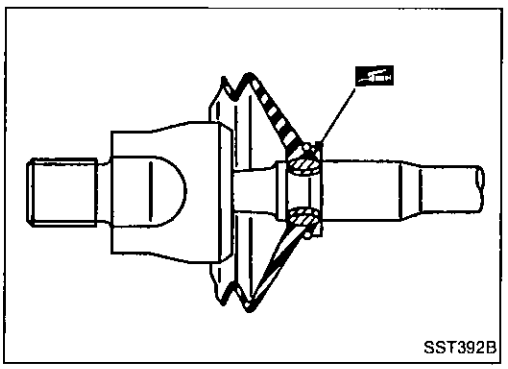
   Inner socket:

   78 - 98 N·m (8 - 10 kg-m, 58 - 72 ft-lb)

4. Adjust clearance between inner socket and stroke stopper by turning stroke stopper, then tighten lock nuts to the specified torque.

   Clearance:

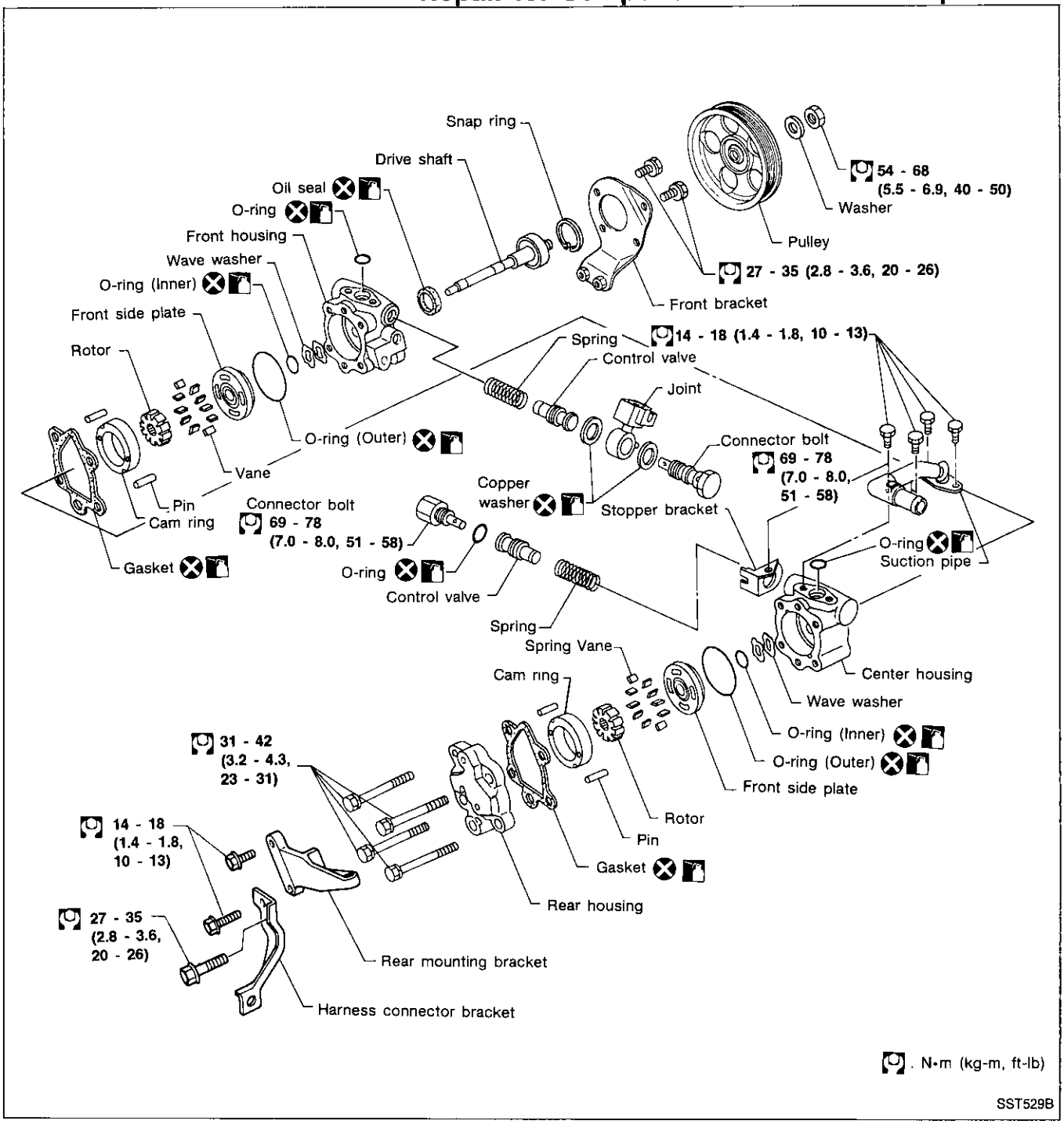
   2.9 - 3.1 mm (0.114 - 0.122 in)

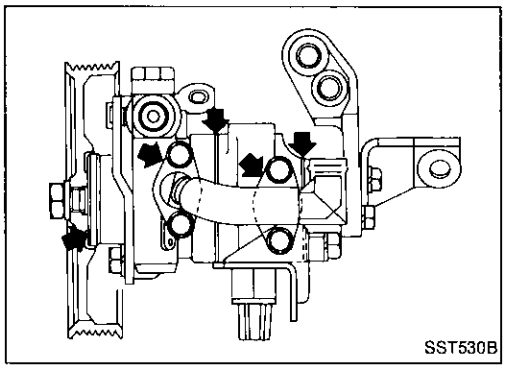

SST392B

5. Install dust boot using new boot band and clamp.

- **Apply a coat of grease to grooves at boot location.**

Repair for Component Parts — Oil Pump





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.

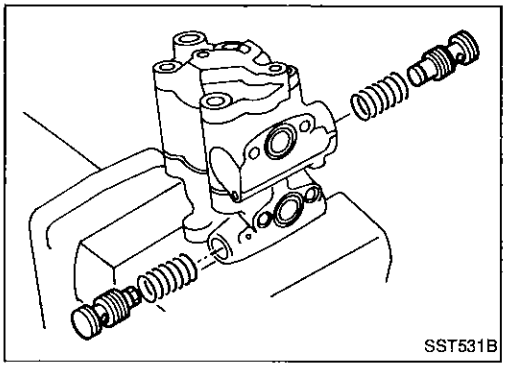
Procedures for disassembly and assembly are the same as those for the power steering oil pump.

Repair for Component Parts — Oil Pump (Cont'd)

DISASSEMBLY

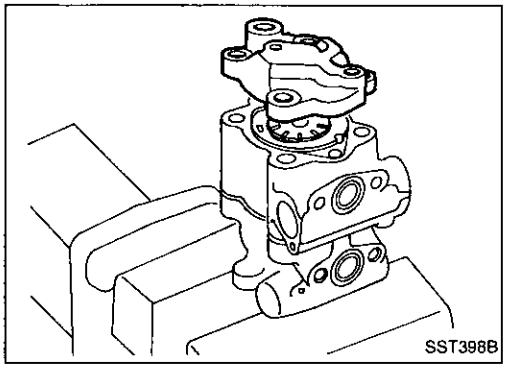
CAUTION:

- **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.**

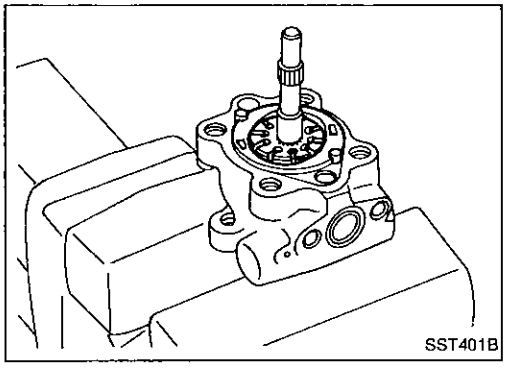

SST531B

1. Remove connector.

Be careful not to drop control valve.
Be careful not to confuse main side with sub side.

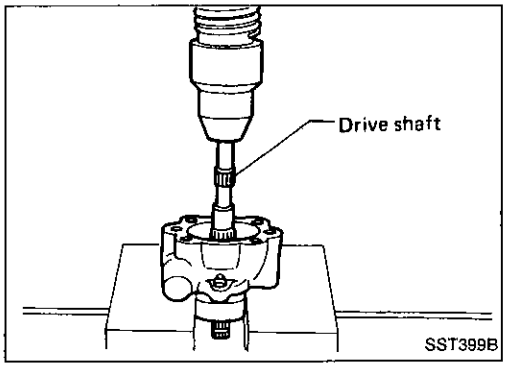

SST398B

2. Remove rear housing.
3. Remove center housing.
4. Remove cam ring, rotor and other parts from center housing.


SST401B

5. Remove cam ring, rotor and other parts from front housing.

Be careful not to confuse main side with sub side.

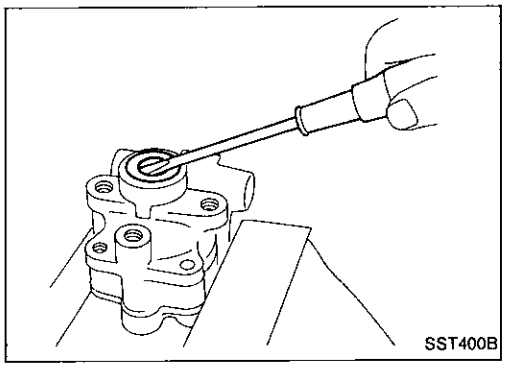


SST399B

6. Remove snap ring, then draw drive shaft out.

Be careful not to drop drive shaft.

Repair for Component Parts — Oil Pump (Cont'd)


SST400B

7. Remove oil seal.

Be careful not to damage front housing.

INSPECTION

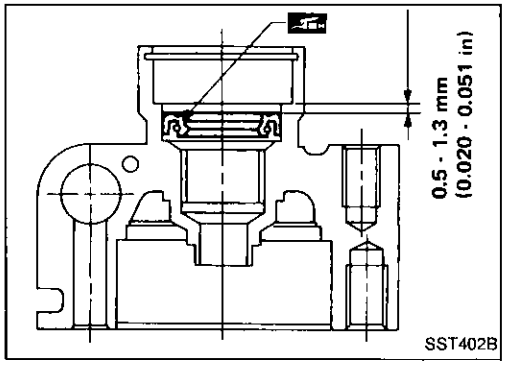
If any of the following parts are scratched or damaged, replace oil pump assembly.

- 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

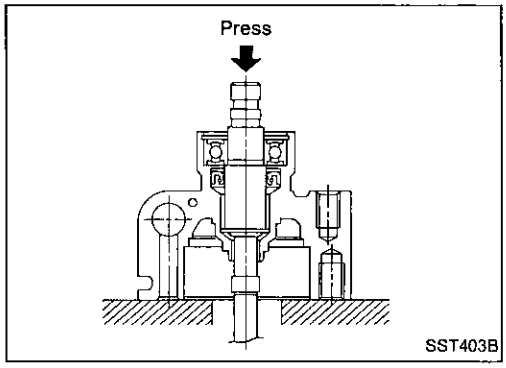
Assemble oil pump in the reverse order of disassembly, noting the following instructions.

- 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.



SST402B

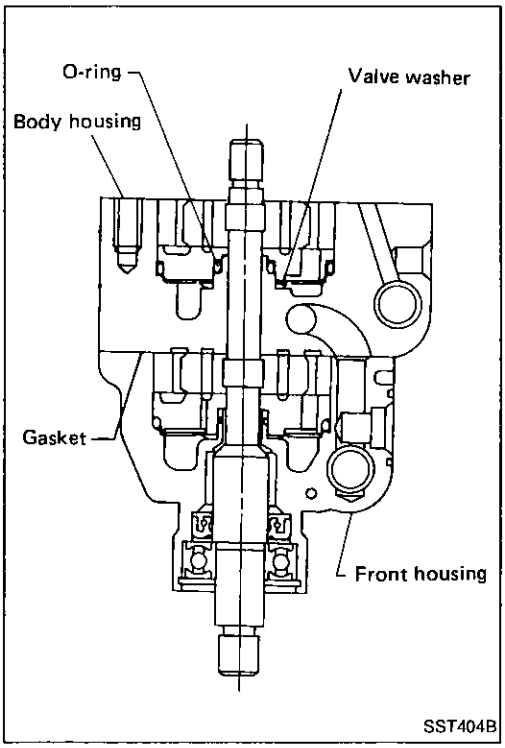
1. Press oil seal into front housing and apply grease to sealing lips.



SST403B

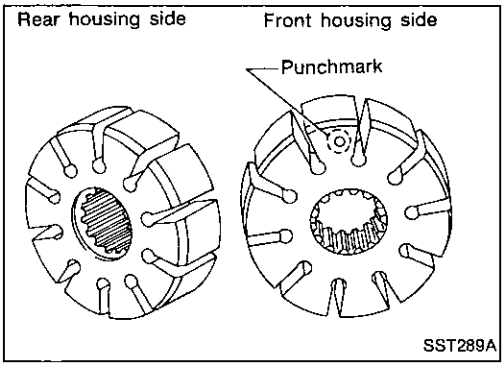
2. Press shaft assembly into front housing and install snap ring.

Repair for Component Parts — Oil Pump (Cont'd)

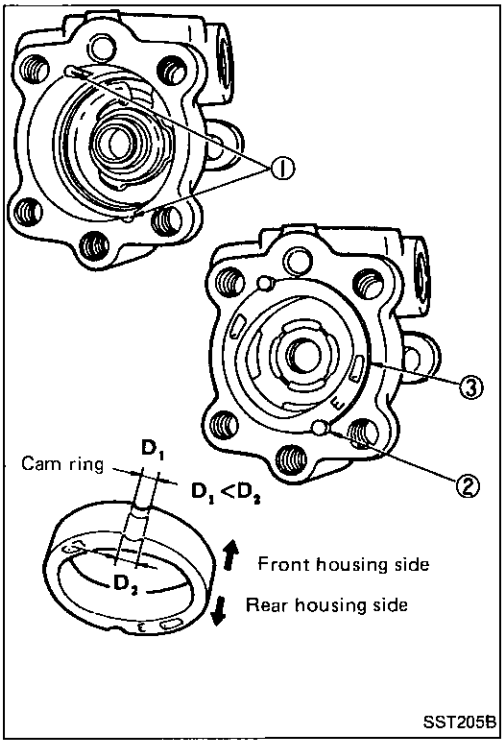


3. Install component parts on front housing in the order indicated below:
1) O-ring x 2
2) Wave washer
3) Side plate
4) Rotor
5) Vane
6) Pin
7) Cam ring
4. Place packing on front housing and position center housing on the packing. In the manner similar to step 3. above, install component parts on front housing.

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.**

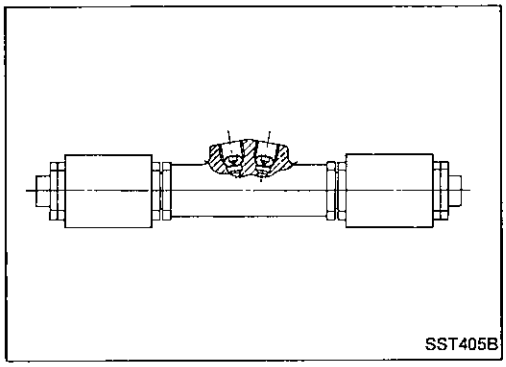


- Pay attention to rotor direction.



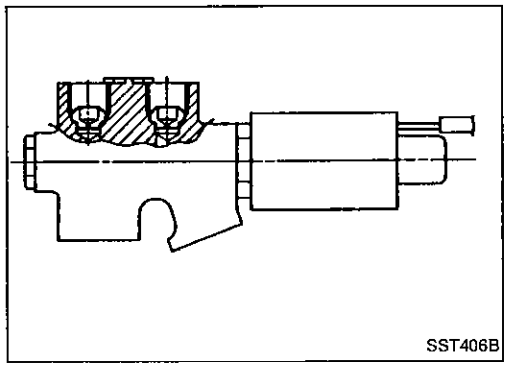
- Pay attention to cam ring direction.

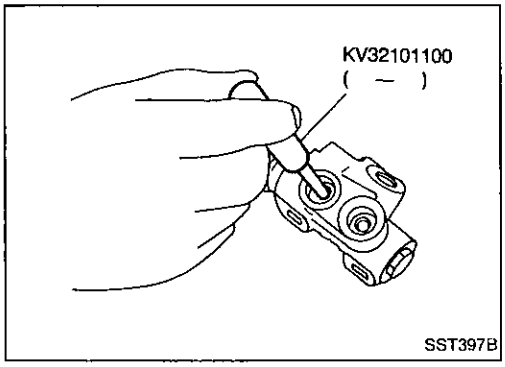
Repair for Component Parts — Oil Pump (Cont'd)


SST405B

HICAS SOLENOID AND FAIL-SAFE VALVE

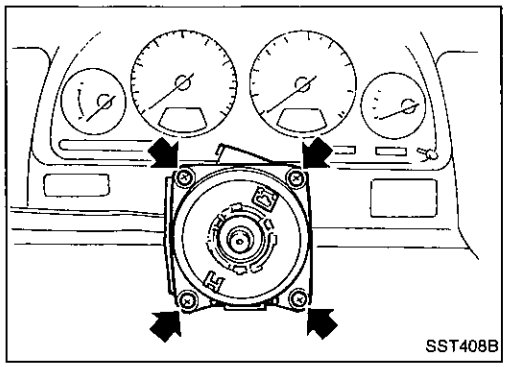
- Do not loosen lock nut which secures solenoid since HICAS solenoid fail-safe valves are of types that should not be disassembled.
- If any part is found to be malfunctioning, always replace as a valve assembly.


SST406B



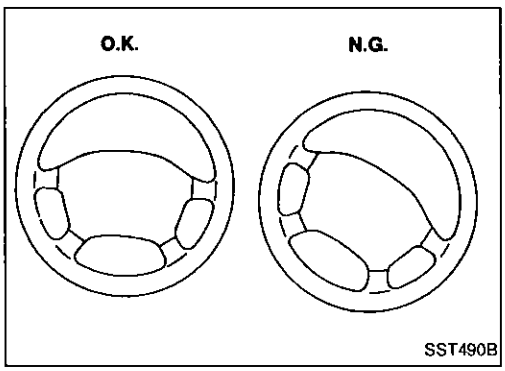
SST397B

- Whenever tubes are disconnected, check tube seat for scratches or damage. A scratched or cracked tube seat may cause oil leakage. Replace it using pin punch.


SST408B

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.



SST490B

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.

Trouble Diagnoses

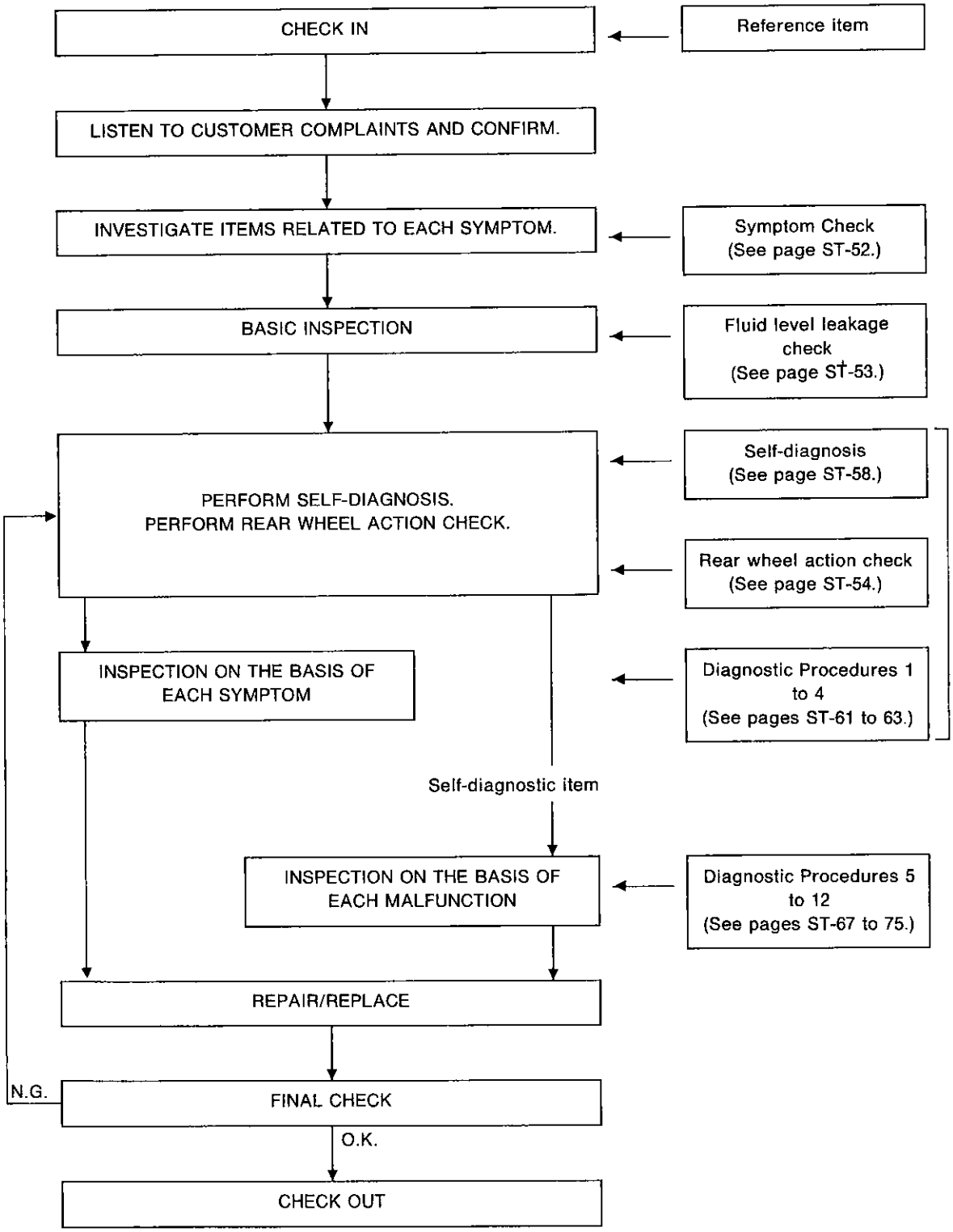
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CONTROL UNIT INSPECTION TABLE ST-76

Trouble Diagnoses (Cont'd)

HOW TO PERFORM TROUBLE DIAGNOSES FOR QUICK AND ACCURATE REPAIR

Work flow



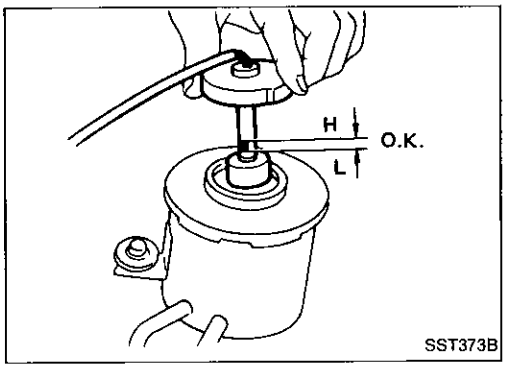
Trouble Diagnoses (Cont'd)

SYMPTOM CHART

Diagnostic table

PROCEDURE				Preliminary Check			Diagnostic Procedure											
REFERENCE PAGE (ST-)				53	53	53	61	61	62	63	67	68	69	70	71	72	74	75
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.	CAR 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.	—															○

Trouble Diagnoses (Cont'd)

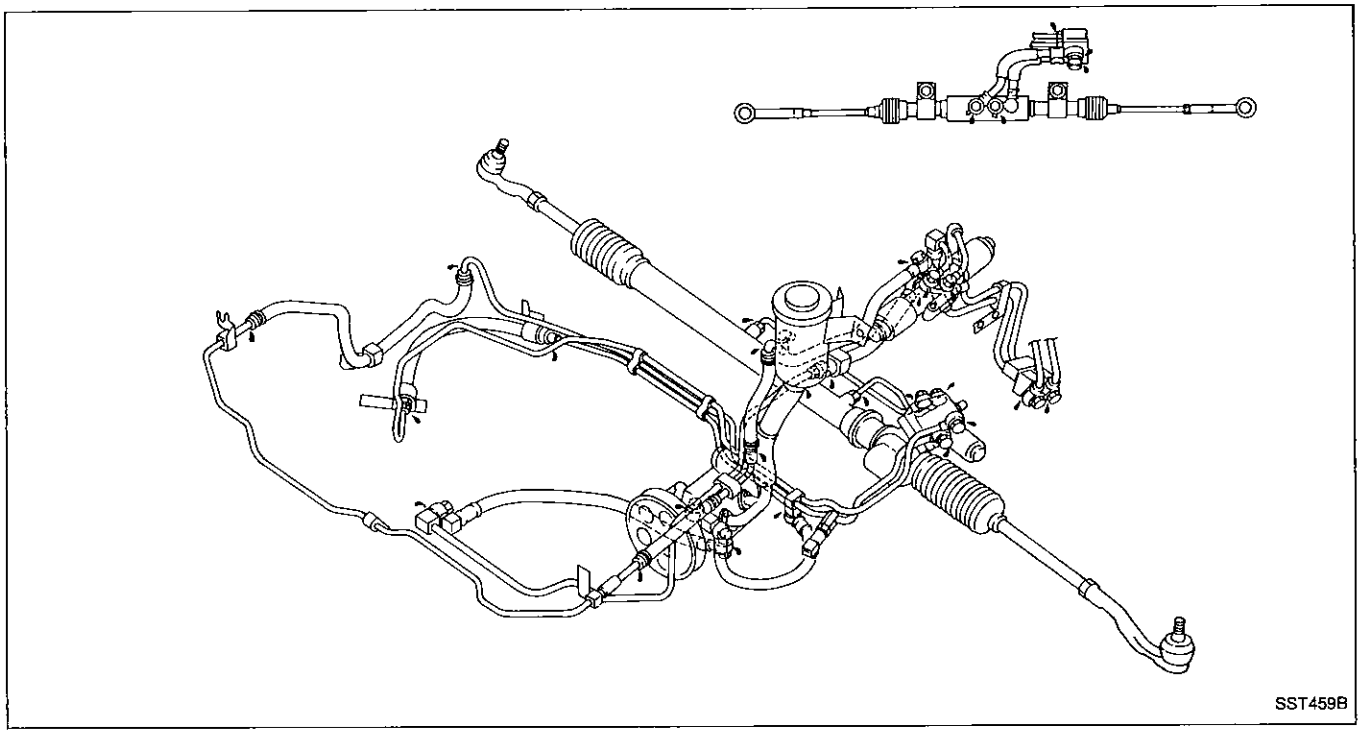


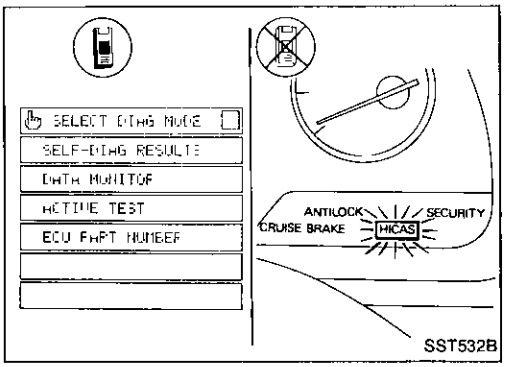
PRELIMINARY CHECK

Check 1

Checking fluid level and fluid leakage

Refer to "SUPER HICAS SYSTEM — On-vehicle Service".

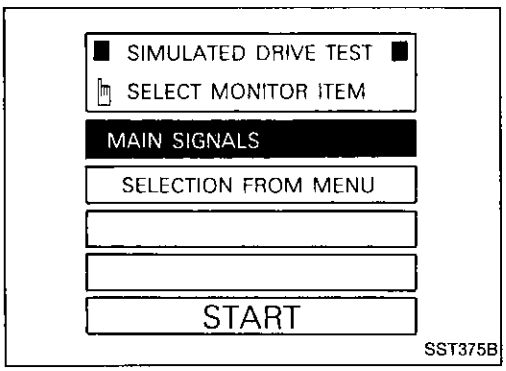




Check 2

Perform self-diagnosis.

Refer to "Self-diagnosis" on page ST-58.



Check 3

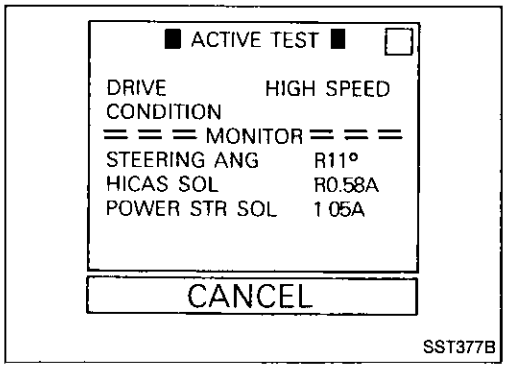
Perform rear wheel action check.

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.)

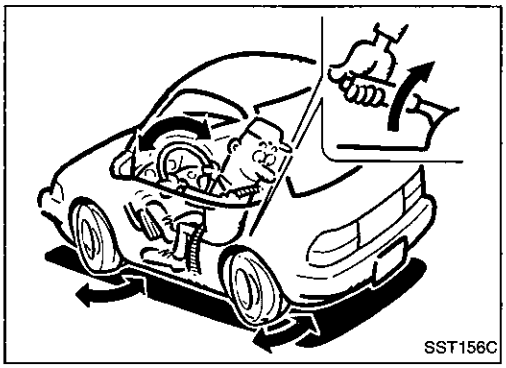
Trouble Diagnoses (Cont'd)

2. Connect CONSULT unit to diagnostic 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.

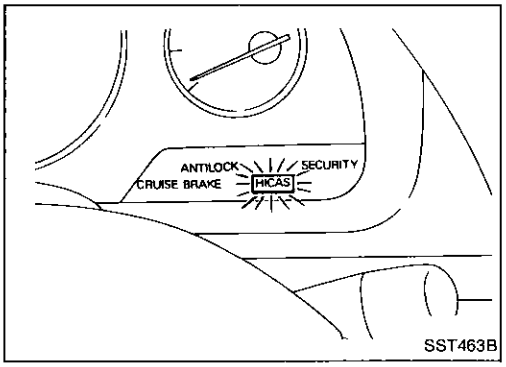


6. Touch "START."

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".

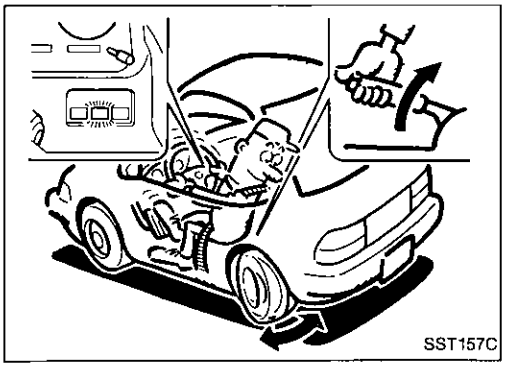


7. While running engine at speeds greater than 2,000 rpm, turn steering wheel 180° to the left and right from the neutral position. Ensure that rear wheels steer in response to rotation of steering wheel.



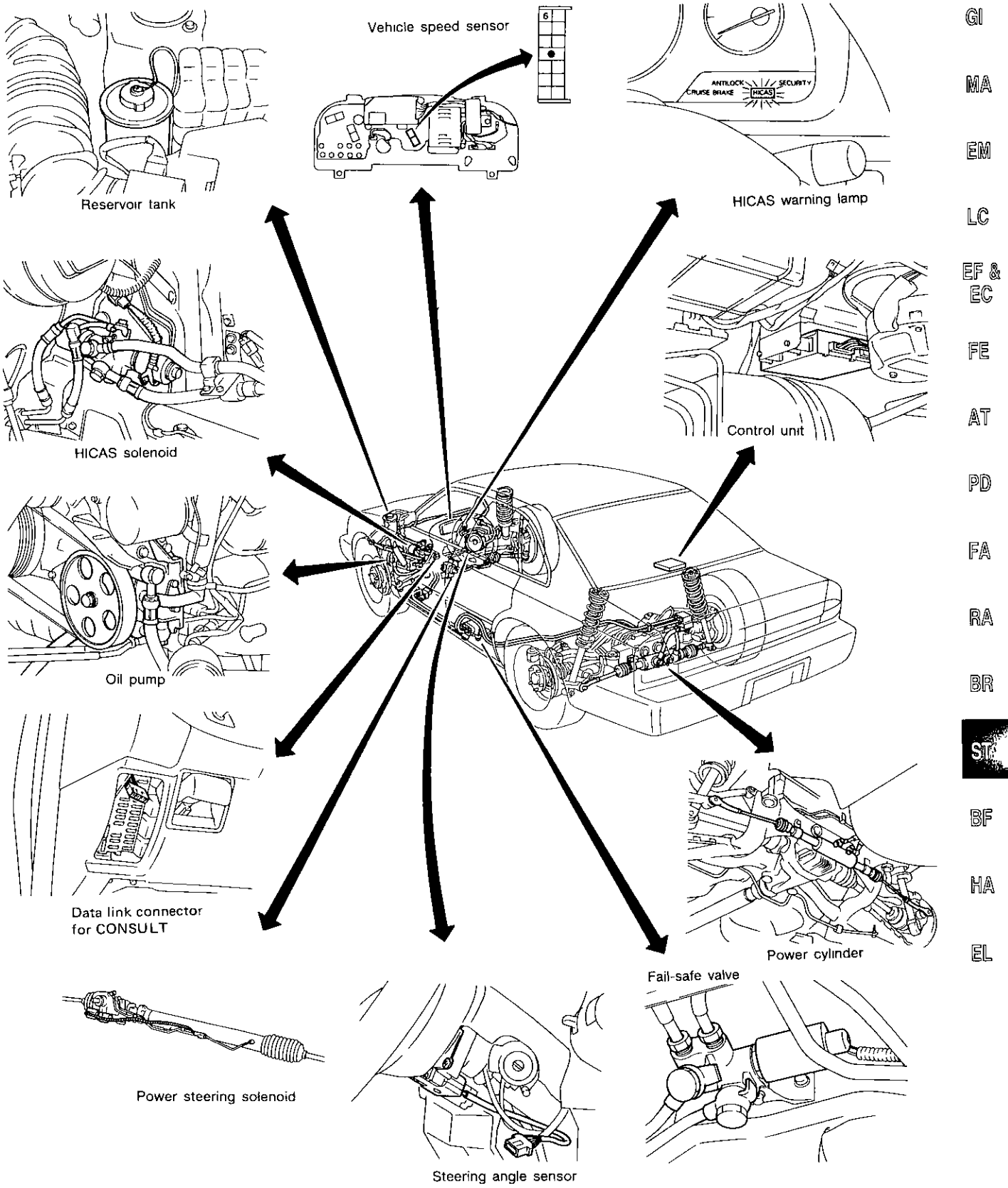
When CONSULT is not used:

1. Turn key switch OFF.
2. Set 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.



Trouble Diagnoses (Cont'd)

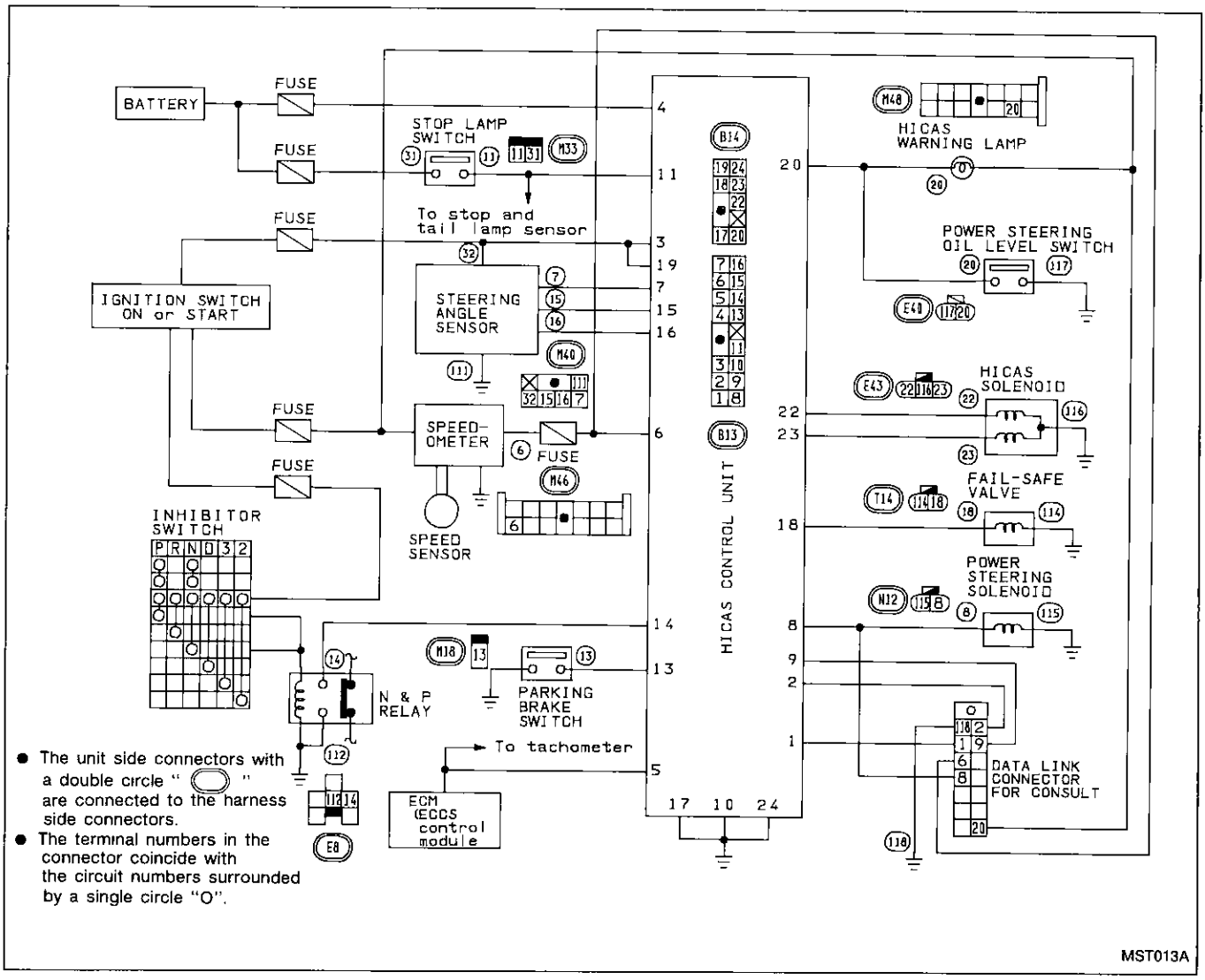
COMPONENT PARTS AND HARNESS CONNECTOR LOCATIONS



SST765B

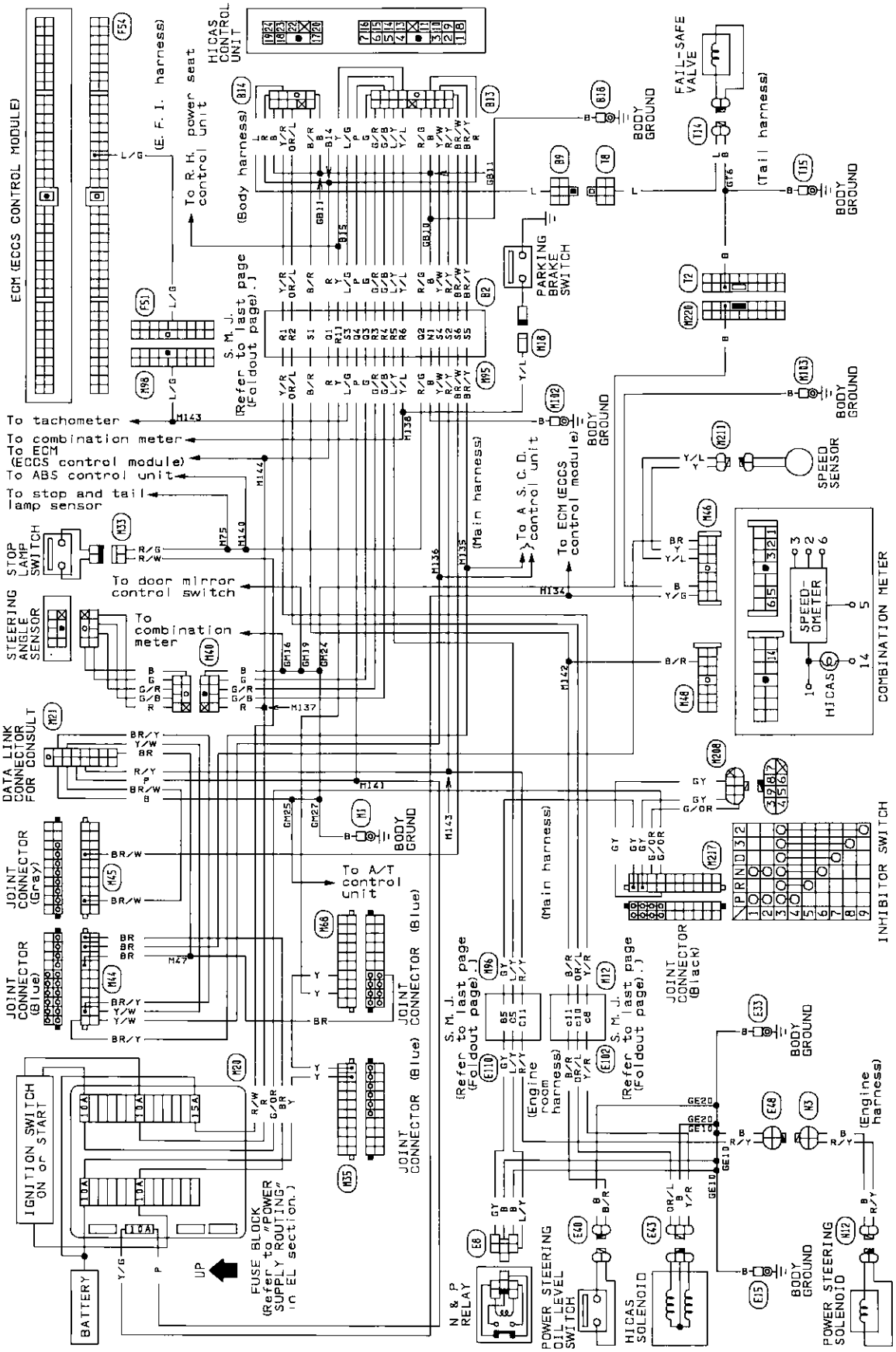
Trouble Diagnoses (Cont'd)

CIRCUIT DIAGRAM FOR QUICK PINPOINT CHECK



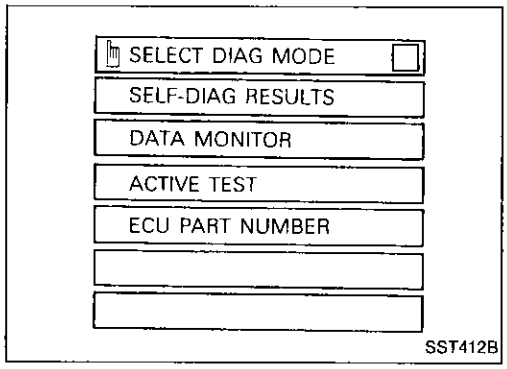
Trouble Diagnoses (Cont'd)

WIRING DIAGRAM



MST014A

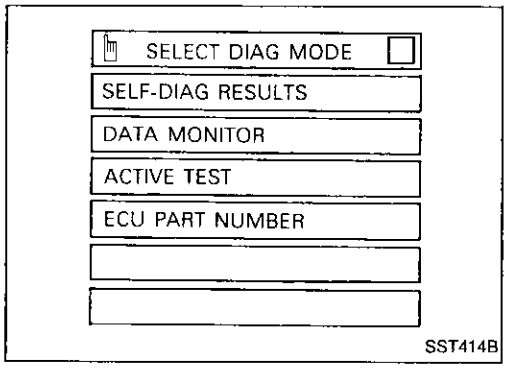
Trouble Diagnoses (Cont'd)



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

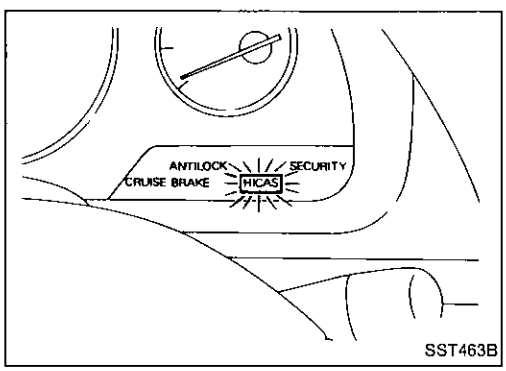
- Start engine.
- Touch START (on CONSULT display).
- Touch HICAS.
- Touch DATA MONITOR.

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.

Trouble Diagnoses (Cont'd)

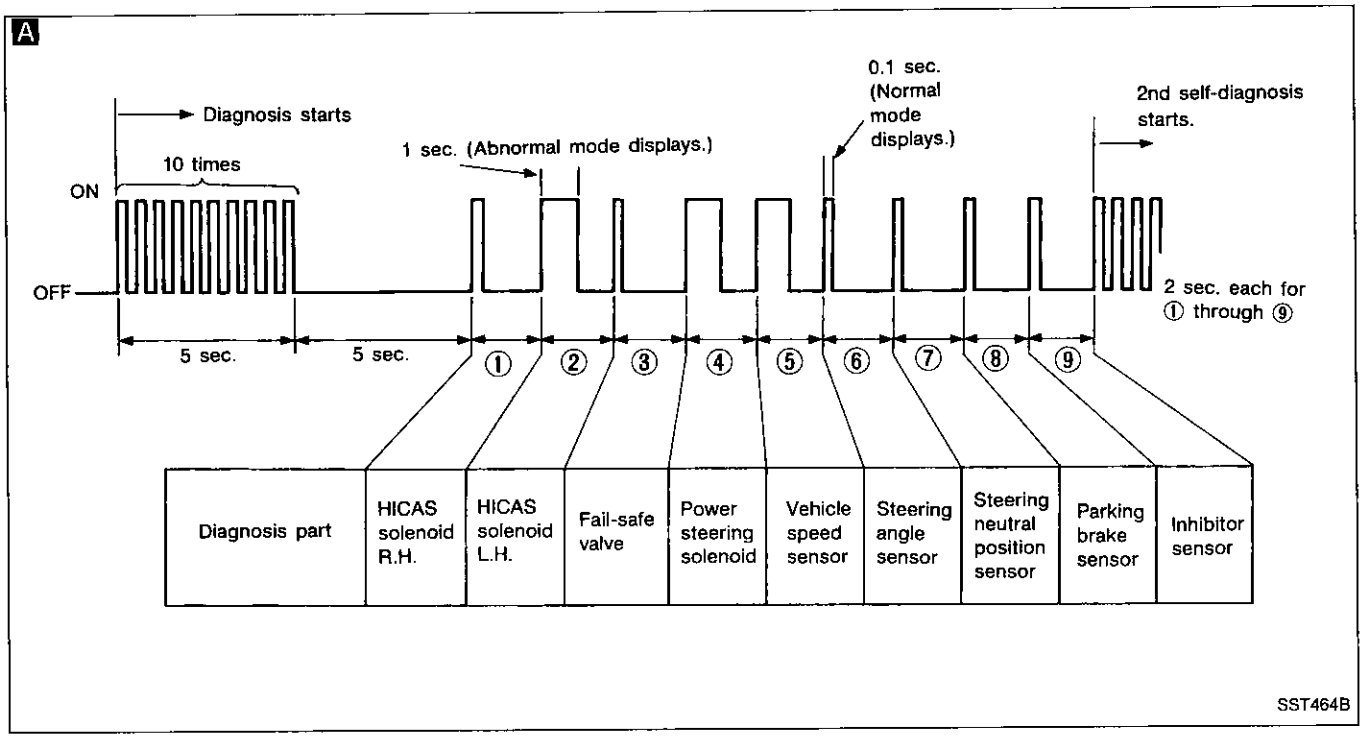
When there is a system malfunction:

Example: When ② HICAS solenoid LH, ④ power steering solenoid and ⑤ vehicle speed sensor experienced malfunction.

The warning lamp displays abnormal mode (1 sec. ON).

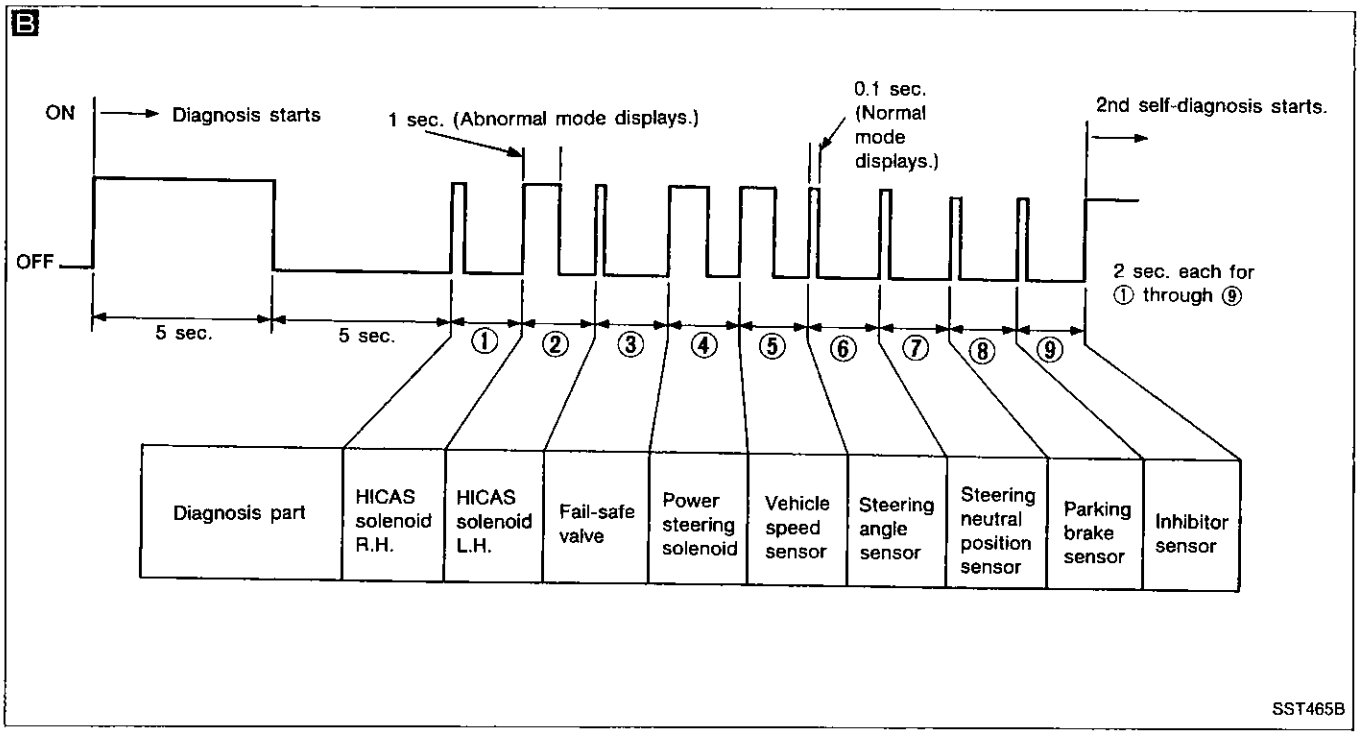
A If fail-safe system was operated (fail-safe valve is operating) when key switch was OFF for the last time, fail-safe items will be displayed in numerical order in modes indicated. After all items are displayed, display is repeated again.

- **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.**



Trouble Diagnoses (Cont'd)

B If fail-safe system was not operated when key switch was 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.

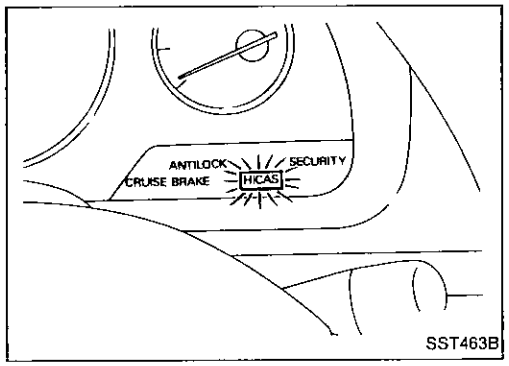


Canceling the self-diagnosis function

There are three methods for canceling the self-diagnosis function, as described below:

- The self-diagnosis system is canceled by turning ignition switch "OFF".
- After the 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.

Trouble Diagnoses (Cont'd)



SST463B

DIAGNOSTIC PROCEDURE 1

SYMPTOM:

No warning lamp comes on when ignition switch is turned "ON".

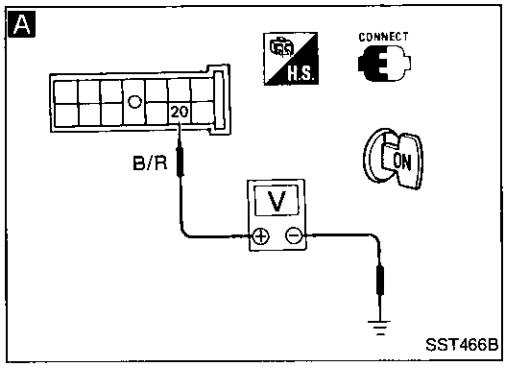
A

CHECK WARNING LAMP POWER SUPPLY.
1) Turn ignition switch "ON".
2) Check voltage across warning lamp connector terminal ⑳ and ground.
Voltage:
Approximately 12V

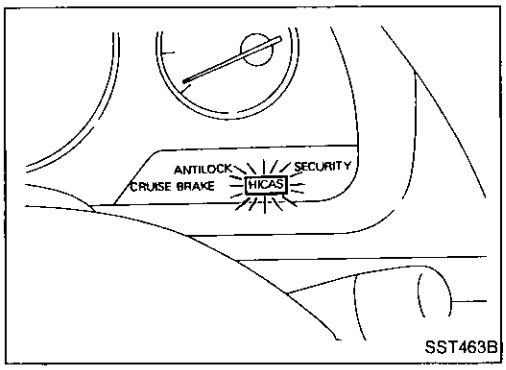
No → Check and repair wiring.

Yes ↓

Replace warning lamp.



SST466B



SST463B

DIAGNOSTIC PROCEDURE 2

SYMPTOM (A):

Warning lamp comes on during operation.

A

Check in self-diagnosis mode.
Refer to page ST-58.

↓

Repair malfunctioning part detected by self-diagnosis.
Refer to Diagnostic Procedures 5 to 12.

O.K. → END

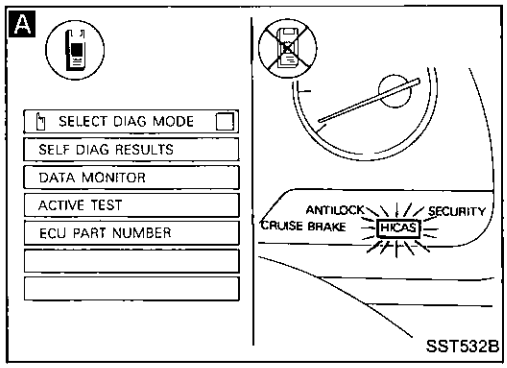
N.G. ↓

Check connectors for improper contact.

O.K. → END

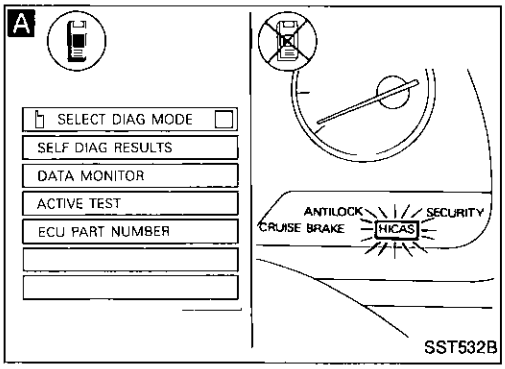
N.G. ↓

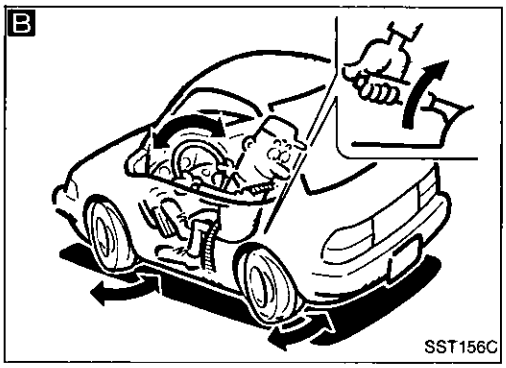
Check steering neutral position.
Refer to page ST-49.



SST532B

Trouble Diagnoses (Cont'd)





SYMPTOM (B):
Warning lamp comes on when ignition switch is turned ON; however, it does not go out after engine start.

A

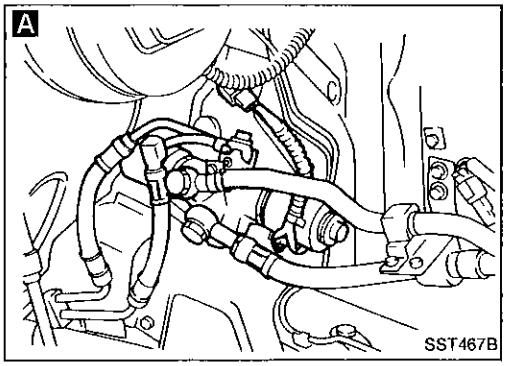
Check in self-diagnosis mode. Refer to page ST-58. → O.K. → No engine revolution signal is entered. → Ⓐ

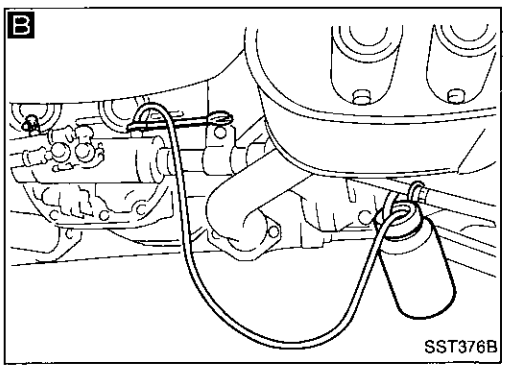
Warning lamp remains ON. → N.G. → Repair malfunctioning part detected by self-diagnosis. Refer to Diagnostic Procedures 5 to 12. → Ⓐ

B

Check rear wheel action. Left and right rear wheels are turned in response to rotation of steering wheel. Refer to page ST-53.
- No → No power is supplied to control unit.
- Yes → Insufficient oil quantity.

Replace fluid level sensor (on reservoir tank) if warning lamp remains on during engine operation. ← Ⓐ





DIAGNOSTIC PROCEDURE 3

SYMPTOM:
Abnormal noise occurs.

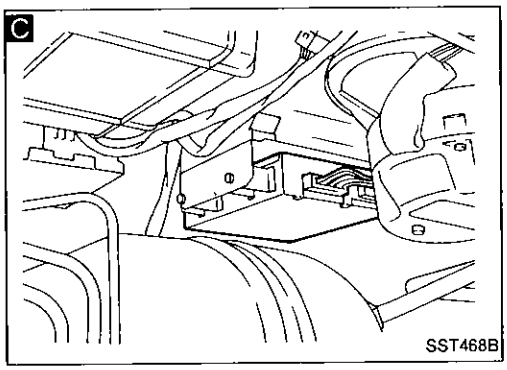
A

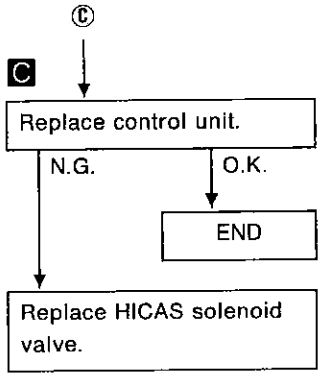
Disconnect HICAS solenoid connector and check noise for changes.
- Yes → Noise stops. → B
- No → Noise occurs in any system other than HICAS. → Locate and repair.

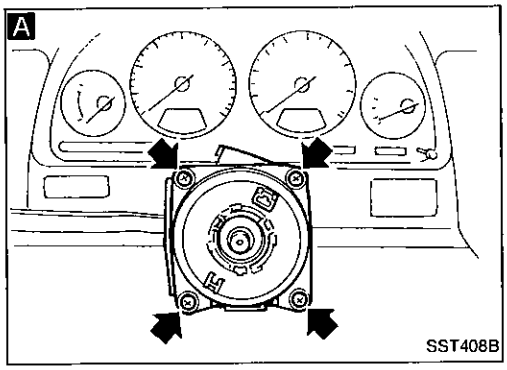
B

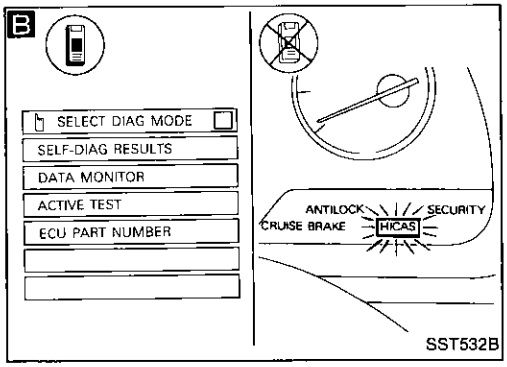
Bleed air from hydraulic system. Refer to page ST-42.
- N.G. → Ⓒ
- O.K. → END

Trouble Diagnoses (Cont'd)









DIAGNOSTIC PROCEDURE 4

SYMPTOM:

Vehicle behavior is abnormal. (Vehicle sways or jerks.)

A

Check steering wheel neutral position for misalignment and steering angle sensors for looseness.
Refer to page ST-49.

O.K. → END

N.G.

B

Check in self-diagnosis mode.
Refer to page ST-58.

N.G. → Repair malfunctioning system detected by self-diagnosis.
Refer to Diagnostic Procedures 5 to 12.

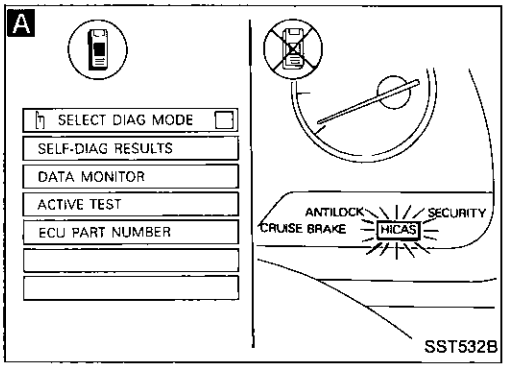
O.K.

Check static HICAS characteristic performance.
Refer to flow chart A on page ST-64.

Check dynamic HICAS characteristic performance.
Refer to flow chart B on page ST-66.

Trouble Diagnoses (Cont'd)

A. Static HICAS characteristic performance check



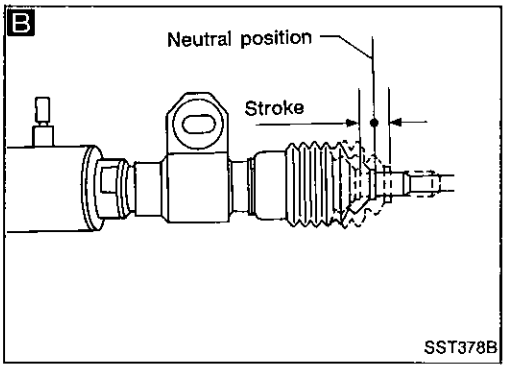
A

Set CONSULT in ACTIVE TEST mode.

OR

Set self-diagnosis mode.
Refer to page ST-58.

B

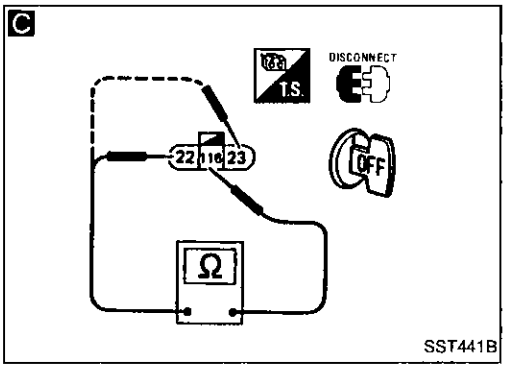


- Run engine at speeds less than 2,000 rpm.
- Turn steering wheel approximately 180° to the left or right.

CHECK POWER CYLINDER STROKES.
Each stroke from neutral position:
2.9 - 3.1 mm
(0.114 - 0.122 in)
Refer to page ST-39.

Yes → END → Ⓑ

No

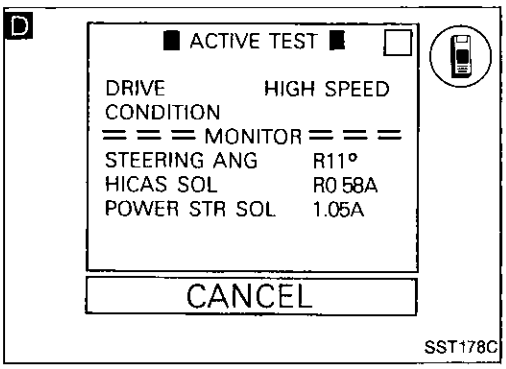


C

CHECK HICAS SOLENOID VALVE.
Stop engine and disconnect HICAS solenoid valve.
Measure resistance between HICAS solenoid connector terminals ㉒ and 23, and 116 .
Resistance:
4 - 6Ω

No → Replace HICAS solenoid valve. → Ⓑ

Yes



D

CHECK CONTROL UNIT.

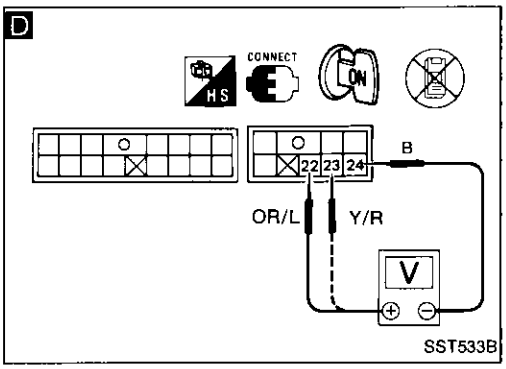
Set CONSULT in ACTIVE TEST mode.
HICAS solenoid valve output amperes: 1.1 - 1.2A

OR

Set self-diagnosis mode.
- Run engine at speeds more than 2,000 rpm.
- Turn steering wheel approximately 180°.
- Check voltage across control unit connector terminals ㉒ and 23, and ㉔ .
Output voltage: More than 4.4V

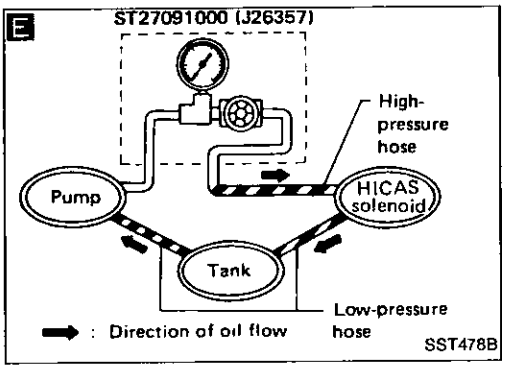
No → Replace control unit. → Ⓑ

Yes → Ⓐ



Trouble Diagnoses (Cont'd)

E



Ⓐ

E

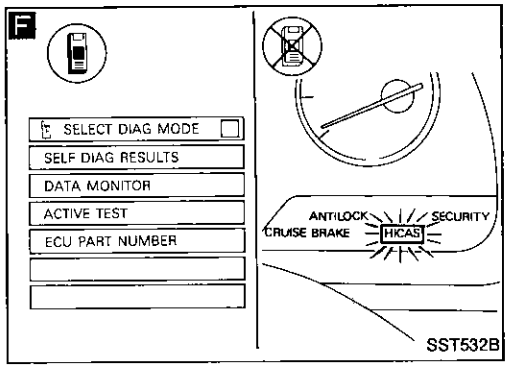
CHECK HICAS OIL PUMP.
- Cancel self-diagnosis mode.
- Check HICAS oil pump relief pressure with engine running at a speed of more than 2,000 rpm.

Relief pressure:
More than 5,884 kPa
(60 kg/cm², 853 psi)

No → Replace oil pump. → Ⓑ

Yes ↓

F



F

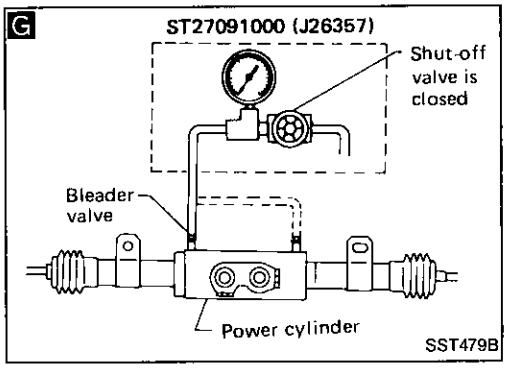
CHECK OIL PRESSURE AT FAIL-SAFE VALVE.

Set CONSULT in ACTIVE TEST mode.

— OR —

Set self-diagnosis mode.

G



G

- Run engine at speeds 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)

No → Replace HICAS solenoid valve.

Yes ↓

Replace power cylinder.

H

CHECK POWER CYLINDER STROKE.

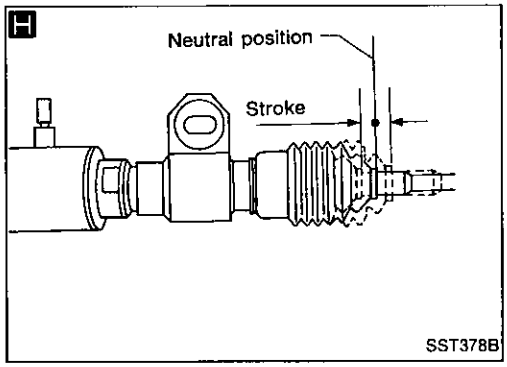
Each stroke from neutral position:
2.9 - 3.1 mm
(0.114 - 0.122 in)

Refer to page ST-39.

No → Replace fail-safe valve.

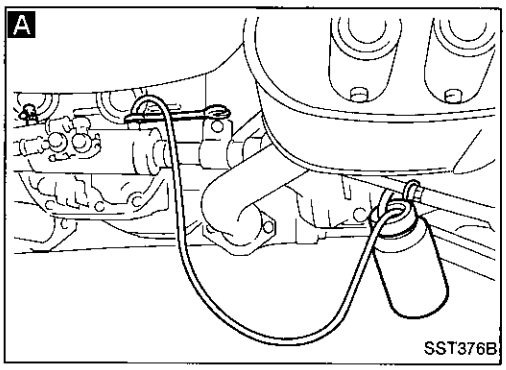
Yes → Ⓑ

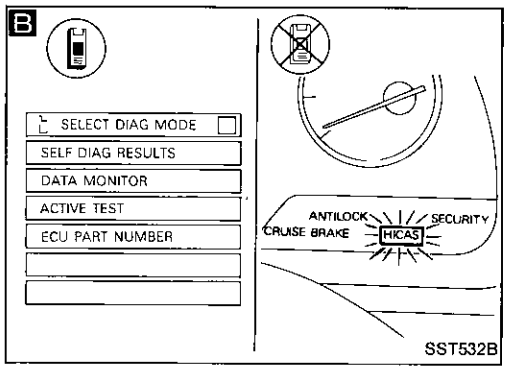
H

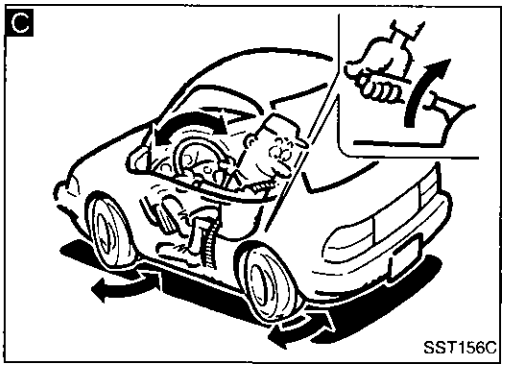


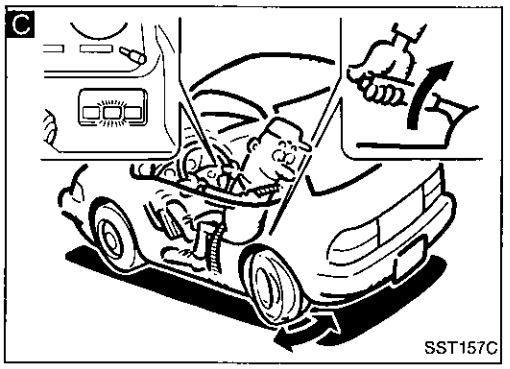
Trouble Diagnoses (Cont'd)

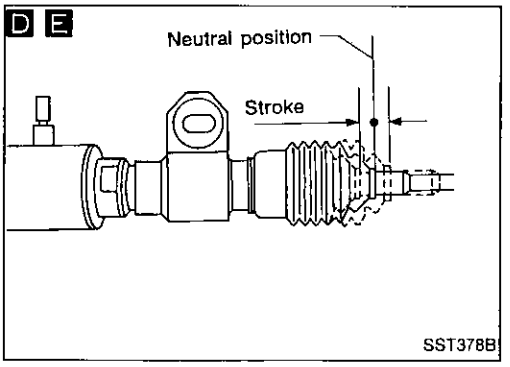
B. Dynamic HICAS characteristic performance check











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-42.

B

Set CONSULT in ACTIVE TEST mode.

OR

Set in self-diagnosis mode. Refer to page ST-58.

Run engine at speeds of more than 2,000 rpm.

C

CHECK REAR WHEELS.

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)

No → Replace power cylinder.

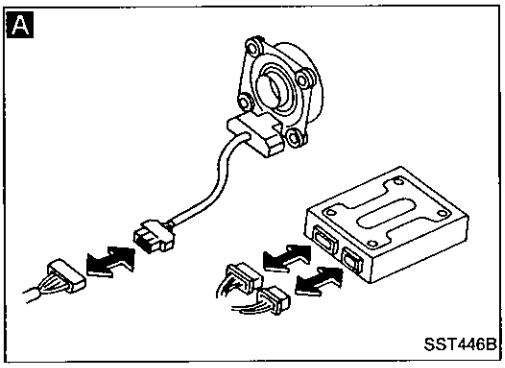
Yes

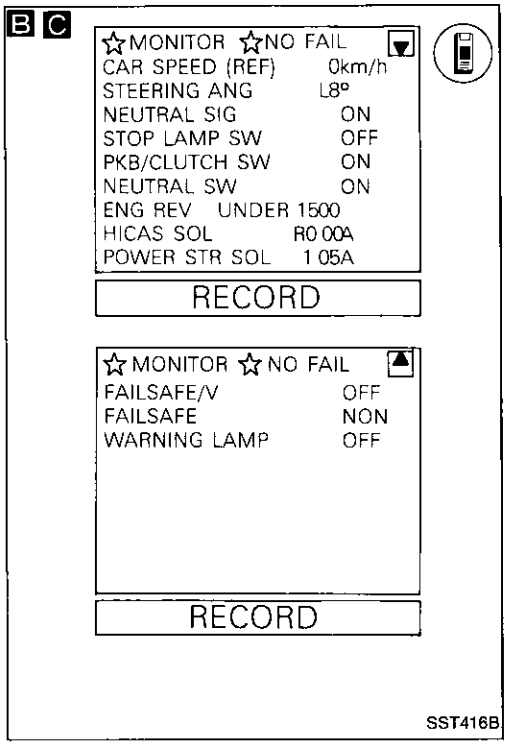
END

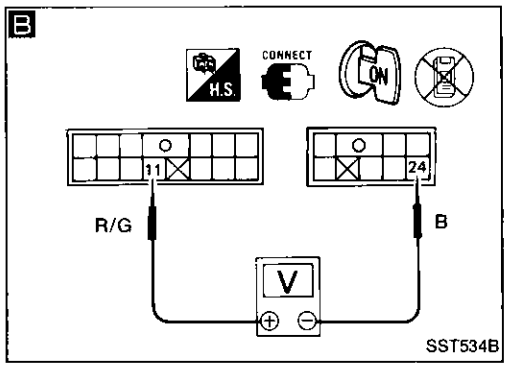
Trouble Diagnoses (Cont'd)

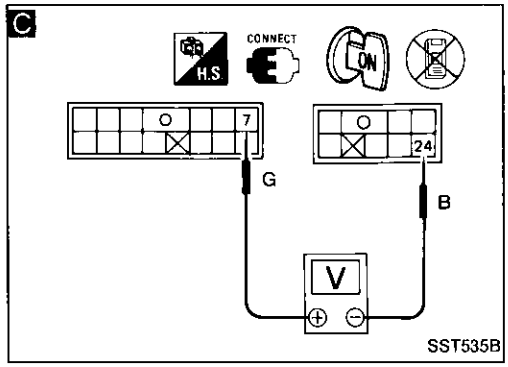
DIAGNOSTIC PROCEDURE 5

SYMPTOM:
System is not set in self-diagnosis mode.









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

— OR —

Check that stop lamp input is present at control unit.
Brake ON:
Approximately 12V
Brake OFF:
0V

N.G. → Malfunctioning stop lamp switch system

O.K. ↓

C

CHECK STEERING NEUTRAL POSITION SENSOR INPUT SIGNAL.
Set CONSULT in DATA MONITOR mode.
ON-OFF display

— OR —

Check that steering neutral input it 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

O.K. → Replace control unit.

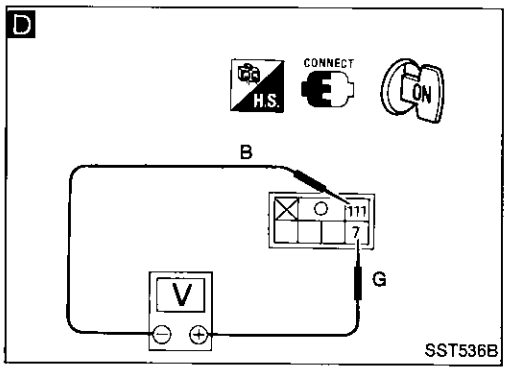
N.G. ↓

Ⓐ

GI MA EM LC EF & EC FE AT PD FA RA BR ST BF HA EL

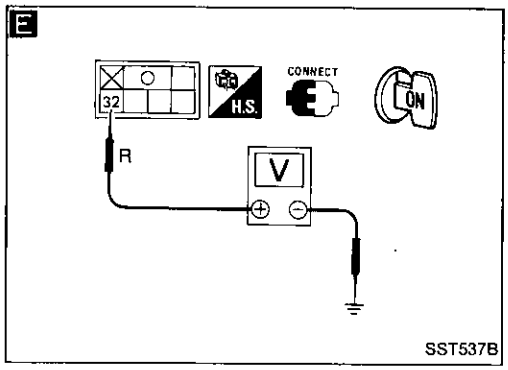
Trouble Diagnoses (Cont'd)

D



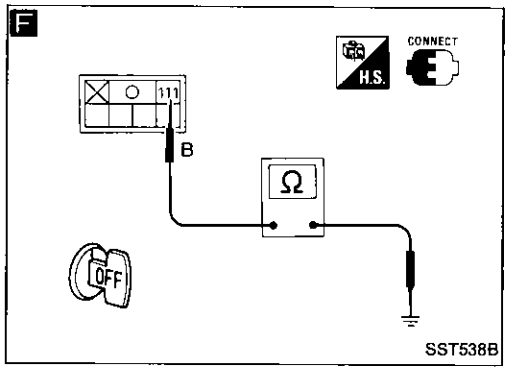
SST536B

E



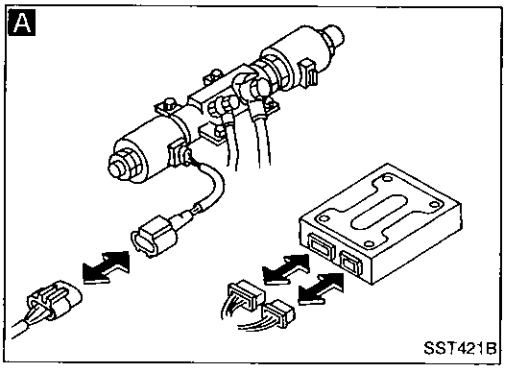
SST537B

F

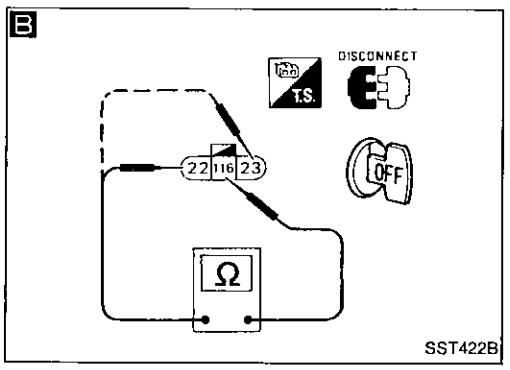


SST538B

A


SST421B

B



SST422B

Ⓐ

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

Yes → Repair or replace harness between control unit and steering angle sensor.

No ↓

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

Yes → Replace steering angle sensor.

F CHECK STEERING ANGLE SENSOR GROUND CIRCUIT.
Check continuity between steering angle sensor terminal (111) and body metal (ground).
Continuity should exist.

No ↓

Check and repair power supply harness or ground harness.

DIAGNOSTIC PROCEDURE 6

SYMPTOM:
HICAS solenoid (left and right) output is not present.

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 LEFT AND RIGHT HICAS SOLENOIDS (on solenoid side).
1) Disconnect HICAS solenoid connector.
2) Check resistance between HICAS solenoid connector terminals (22) and (23), and (116). **Resistance: 4 - 6Ω**

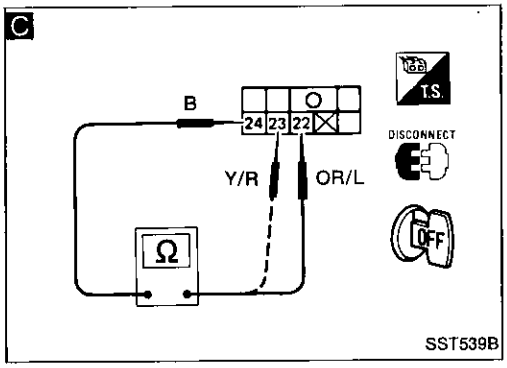
No → Replace HICAS solenoid

Yes ↓

Ⓐ

Trouble Diagnoses (Cont'd)

C



Ⓐ

C

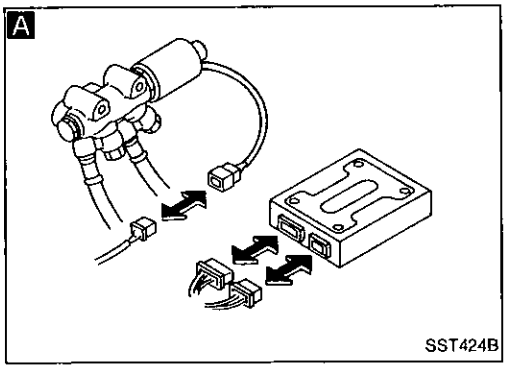
CHECK RESISTANCE OF LEFT AND RIGHT HICAS SOLENOIDS (on control unit side).
1) Disconnect control unit connector.
2) Check resistance between body connector terminals ㉒ and ㉓, and ㉔.
Resistance: 4 - 6Ω

Yes → Replace control unit.

No ↓

Repair or replace harness between control unit and HICAS solenoid.

A



DIAGNOSTIC PROCEDURE 7

SYMPTOM:
Fail-safe valve output is not present.

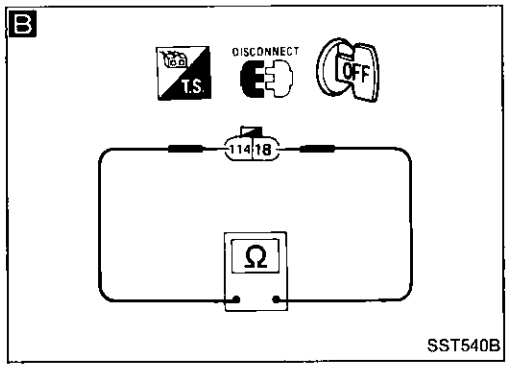
A

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

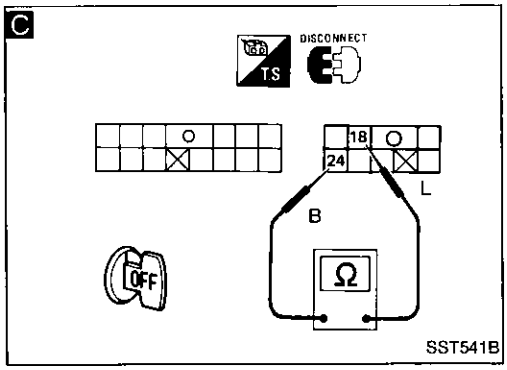


CHECK FAIL-SAFE VALVE (on fail-safe valve side).
1) Disconnect fail-safe valve connector.
2) Check resistance between connector terminals ⑱ and ⑭.
Resistance: 13 - 17Ω

No → Replace fail-safe valve.

Yes ↓

C



CHECK RESISTANCE OF FAIL-SAFE VALVE (on control unit side).
1) Disconnect control unit connector.
2) Check resistance between body connector terminals ⑱ and ㉔.
Resistance: 13 - 17Ω

Yes → Replace control unit.

No ↓

Repair or replace harness between control unit and fail-safe valve.

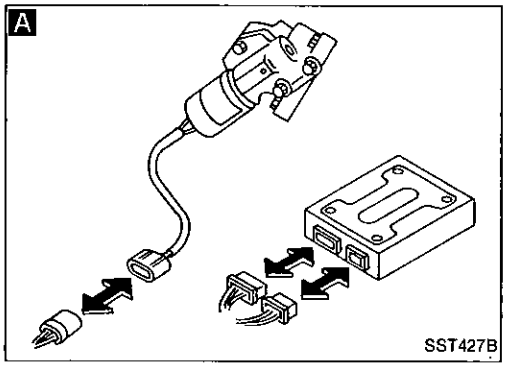
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 8

SYMPTOM:

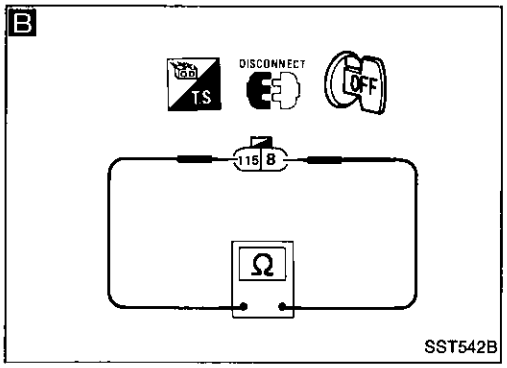
Power steering solenoid output is not present.

A



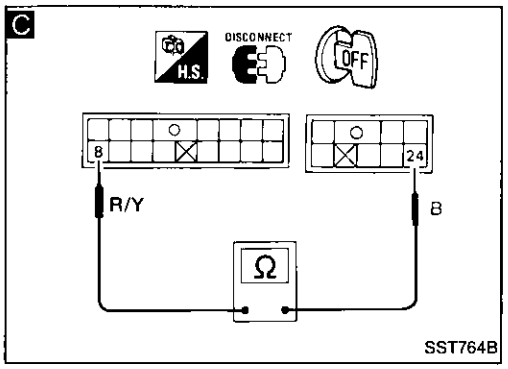
SST427B

B



SST542B

C



SST764B

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 POWER STEERING SOLENOID (on solenoid side).
1) Disconnect power steering solenoid connector.
2) Check resistance between solenoid connector terminals ⑧ and ⑪⑤.
Resistance: 4 - 6Ω

No → Replace power steering solenoid.

Yes ↓

C

CHECK POWER STEERING SOLENOID (on control unit side).
1) Disconnect control unit connector.
2) Check resistance between body connector terminals ⑧ and ㉔.
Resistance: 4 - 6Ω

Yes → Replace control unit.

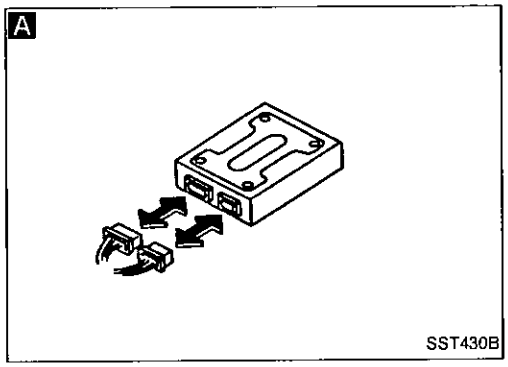
No ↓

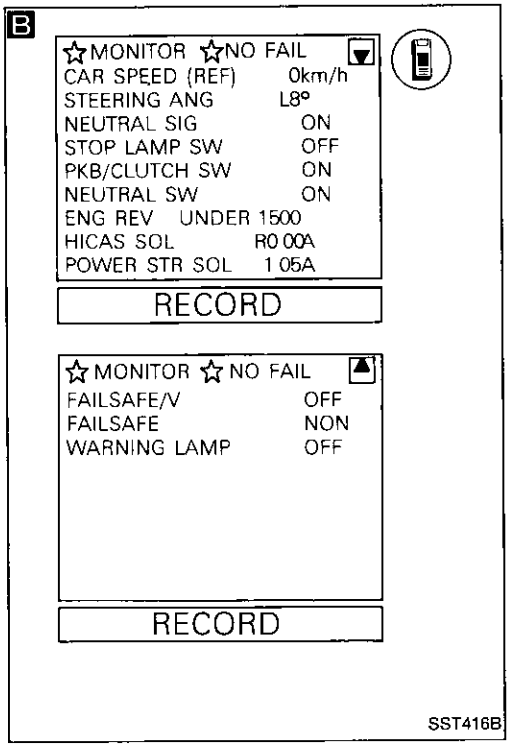
Repair or replace harness between control unit and power steering solenoid.

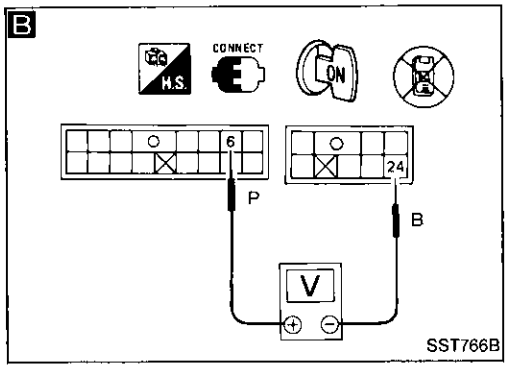
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 9

SYMPTOM:
Vehicle speed signal is not present.







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)

OR

2) Check voltage variations between control unit connector terminals ⑥ and ㉔ while slowly rotating rear wheels using your hand.
Voltage must change between 0 and 5V.

O.K. → Replace control unit.

N.G. ↓

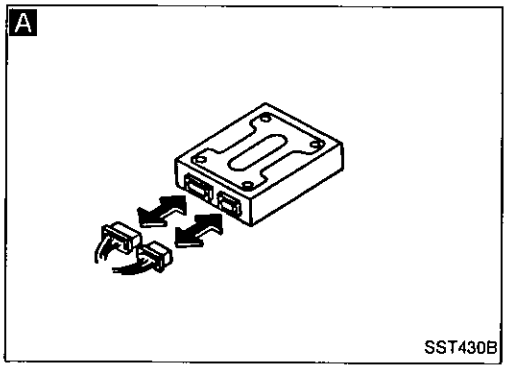
Repair or replace harness between speed sensor or control unit and speedometer.

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 10

SYMPTOM:

Steering angle sensor input is not present.

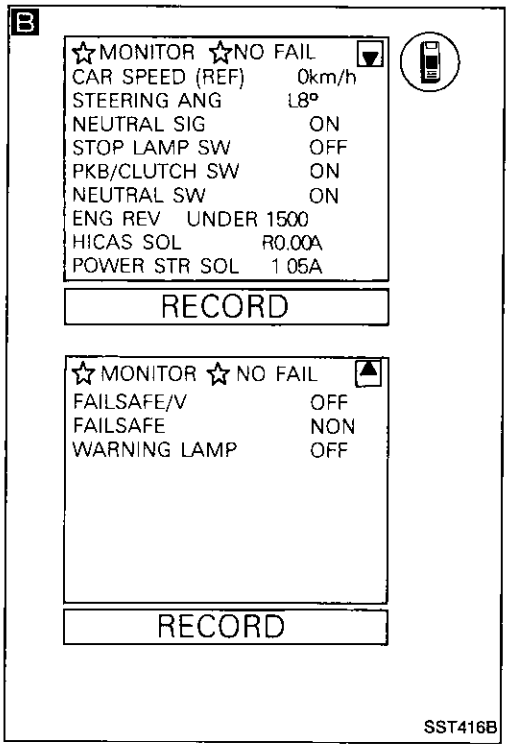


A

CHECK CONNECTOR CONTINUITY.
Disconnect control unit connector and reconnect it firmly. Conduct self-diagnosis.

O.K. → Poor connector connection

N.G.



B

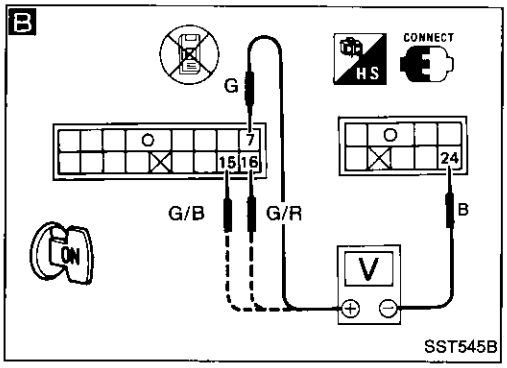
CHECK CONTROL UNIT INPUT SIGNAL.
1) Turn ignition switch "ON".
2) Set CONSULT in DATA MONITOR mode.
Steering angle deg.
Neutral signal ON-OFF

OR

2) Check 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 approximately 0 to at least 5V.

O.K. → Replace control unit.

N.G.

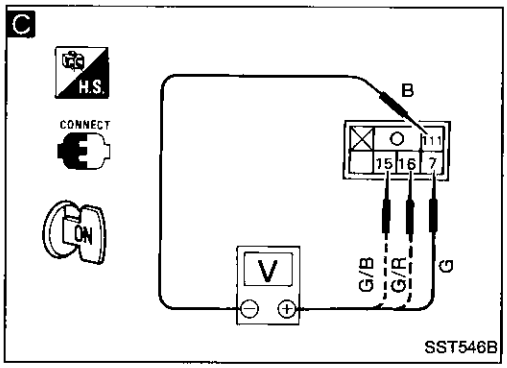


C

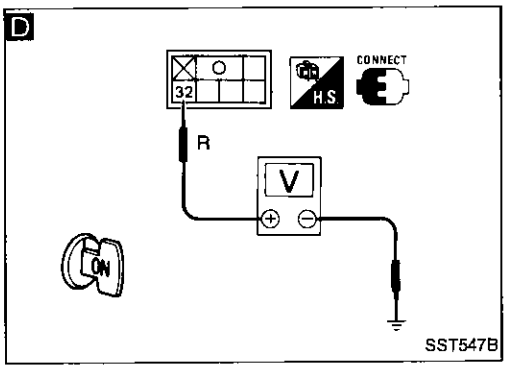
CHECK STEERING ANGLE SENSOR OUTPUT SIGNAL.
1) Turn signal switch "ON".
2) Check voltage variations between steering angle sensor connector terminals ⑦, ⑮ and ⑯, and ⑪⑪.
Voltage must change from approximately 0 to at least 5V.

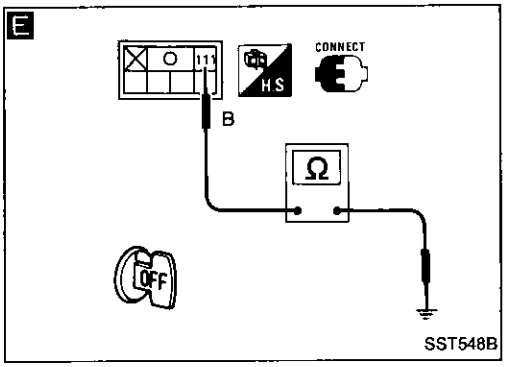
Yes → Repair or replace harness between control unit and steering angle sensor.

No → Ⓐ



Trouble Diagnoses (Cont'd)





Ⓐ

D CHECK STEERING ANGLE SENSOR POWER SUPPLY.

1) Turn ignition switch "ON".
2) Check voltage across steering angle sensor connector terminal ㉜ 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 (111) and ground.

Continuity should exist.

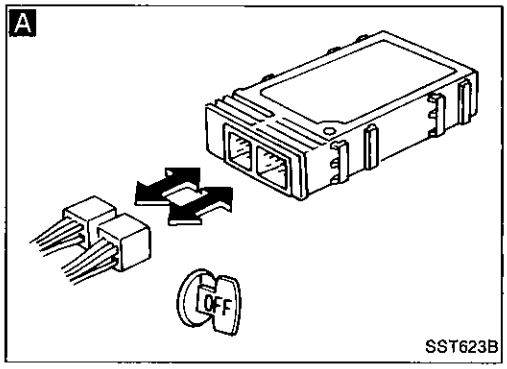
N.G. → Repair or replace power supply harness or ground harness.

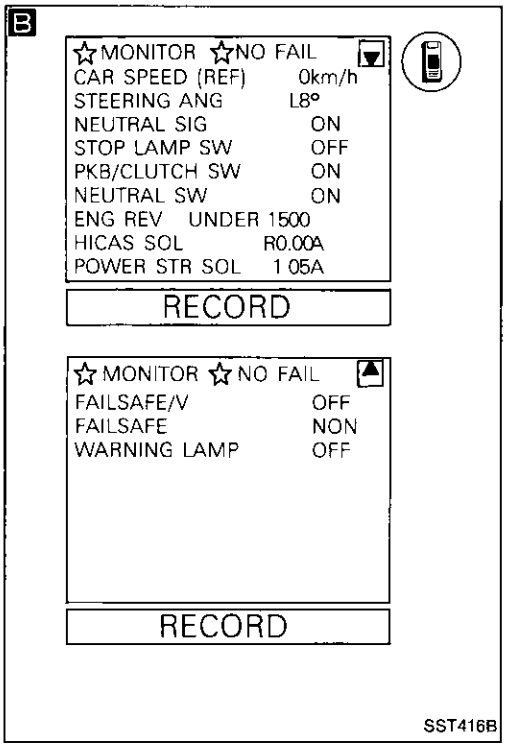
Trouble Diagnoses (Cont'd)

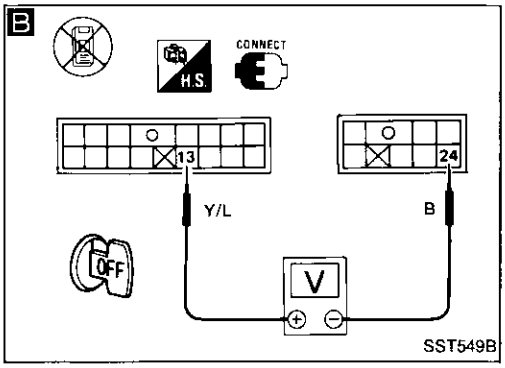
DIAGNOSTIC PROCEDURE 11

SYMPTOM:

Parking brake input is not present.







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 —

Check 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 and harness.

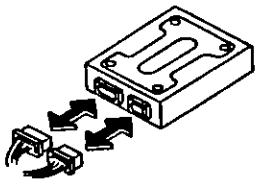
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 12

SYMPTOM:

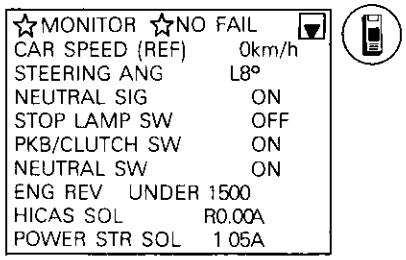
Inhibitor switch input is not present.

A



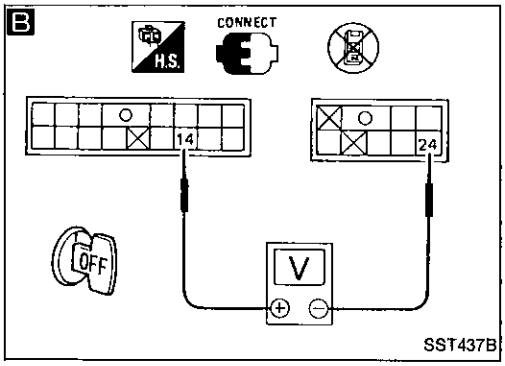
SST430B

B



SST416B

B



SST437B

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

Check 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 and harness.

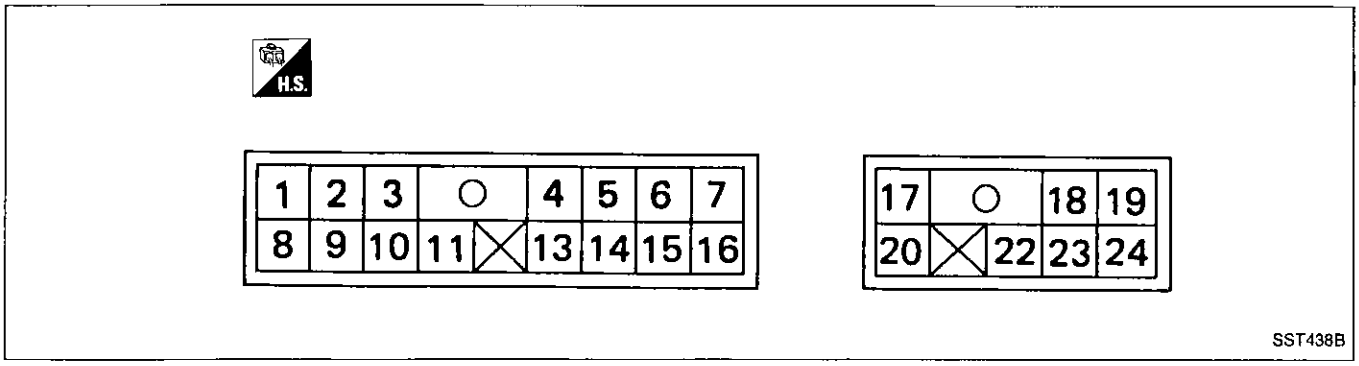
GI MA EM LC EF & EC FE AT PD FA RA BR ST BF HA EL

Trouble Diagnoses (Cont'd)

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: Approx. 12V Key switch in other position: 0V
4	Battery	Approx. 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	Approx. 5V (Neutral position)
8	Resistance of power steering solenoid	4 - 6Ω
9	Service support TX output (Transmission from CONSULT)	(Not specified serial pulse data)
10	Ground	0V
11	Stop lamp switch signal	Brake ON: Approx. 12V Brake OFF: 0V
13	Parking brake signal	Parking brake engaged: Approx. 12V
14	Inhibitor signal	Shift lever in any position other than parking: Approx. 12V
15	Steering angle sensor-1 signal	Steering wheel turned 0 ←→ approx. 5V, intermittent
16	Steering angle sensor-2 signal	Steering wheel turned 0 ←→ approx. 5V, intermittent
17	Ground	0V
18	Resistance of fail-safe valve	13 - 17Ω
19	IGN power supply	Ignition switch ON: Approx. 12V Ignition switch in other position: 0V
20	HICAS warning lamp	Lamp ON: 0V Lamp OFF: Approx. 12V
22	Resistance of HICAS solenoid (R.H.)	4 - 6Ω (Voltage can be varied with steering operation.)
23	Resistance of HICAS solenoid (L.H.)	4 - 6Ω (Voltage can be varied with steering operation.)
24	Ground	0V



General Specifications

Steering model	Electronically controlled power steering
Steering gear type	PR26SE
Steering overall gear ratio	15.1
Turn of steering wheel (Lock to lock)	2.6
Steering column type	Collapsible

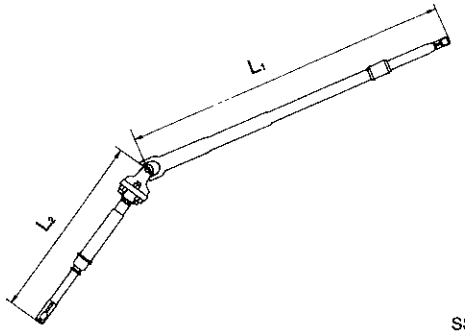
Inspection and Adjustment

GENERAL

Steering wheel axial play mm (in)	0 (0)
Steering wheel play mm (in)	35 (1.38) or less
Movement of gear housing mm (in)	±2 (±0.08) or less

STEERING COLUMN

Steering column length "L_1" mm (in)	618.7 - 620.3 (24.36 - 24.42)
Steering column lower shaft length "L_2" mm (in)	356.8 - 358.4 (14.05 - 14.11)

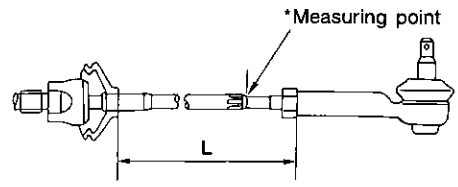


SST510B

STEERING GEAR AND LINKAGE

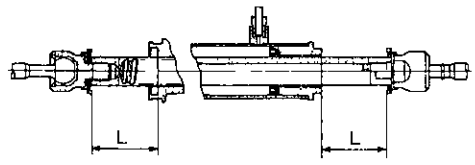
Steering gear type	PR26SE
Tie-rod outer ball joint "A"	
Swinging force (at cotter pin hole) N (kg, lb)	4.9 - 46.1 (0.5 - 4.7, 1.1 - 10.4)
Rotating torque "B" N·m (kg-cm, in-lb)	0.3 - 2.9 (3 - 30, 2.6 - 26.0)
Axial end play "C" mm (in)	0 (0)
Tie-rod inner ball joint	
Swinging force* "A" N (kg, lb)	8.8 - 78.5 (0.9 - 8.0, 2.0 - 17.6)
Axial end play "C" mm (in)	0 (0)
Tie-rod standard length "L" mm (in)	152.9 (6.02)

*: Measuring point



SST161C

Rack stroke "L" mm (in)	66 (2.60)



SST307B

Inspection and Adjustment (Cont'd)

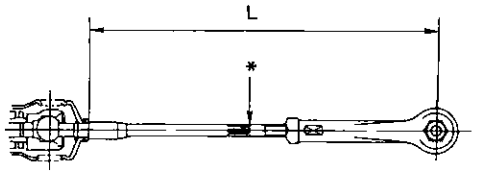
POWER STEERING

	Without SUPER HICAS	With SUPER HICAS
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 N·m (kg-cm, in-lb)	0.2 (2, 1.7)	
Tightening torque after gear has settled N·m (kg-cm, in-lb)	4.9 (50, 43)	
Returning angle degree	60° - 100°	
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)	
Rack sliding force N (kg, lb)		
Under normal operating oil pressure		
Range within ±11.5 mm (±0.453 in) from the neutral position		
Average rack sliding force	167 - 226 (17 - 23, 37 - 51)	
Maximum force deviation	39 (4, 9)	
Except above range	Not more than 39 (4, 9) beyond above value	
Maximum steering wheel turning force N (kg, lb) (Measured at one full turn from the neutral position)	39 (4, 9)	
Fluid capacity (Approximate) ℓ (US qt, Imp qt)	1.2 (1-1/4, 1-1/8)	2.2 (2-3/8, 2)
Oil pump maximum pressure kPa (kg/cm^2, 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)	309.4 (12.18)
Power cylinder stroke	mm (in)	3.0 (0.118)

*: Measuring point



SST486B

SECTION BF

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When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".

Precautions

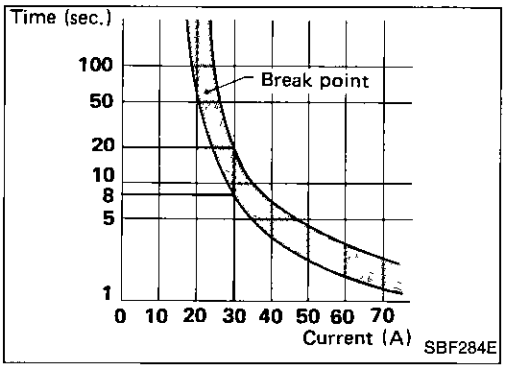
- When removing or installing various parts, place a cloth or padding onto the vehicle body to prevent scratches.
- Handle trim, molding, instruments, grille, etc. carefully during removing or installation. Be careful not to soil or damage them.
- Apply sealing compound where necessary when installing 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"

The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury to the driver in a frontal collision. The Supplemental Restraint System consists of an air bag (located in the center of the steering wheel), sensors, a diagnosis 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:

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".**



Circuit Breaker Inspection

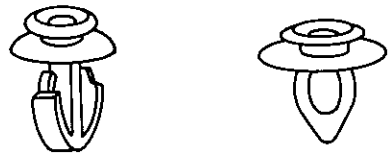
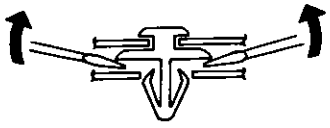
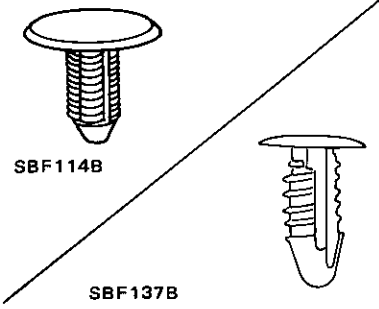
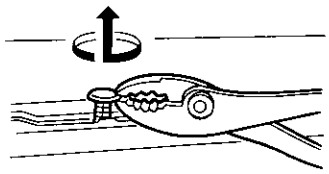
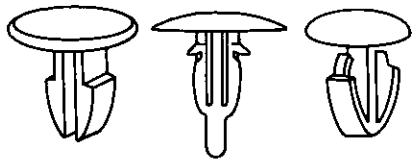
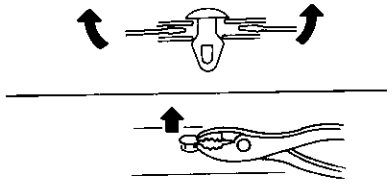
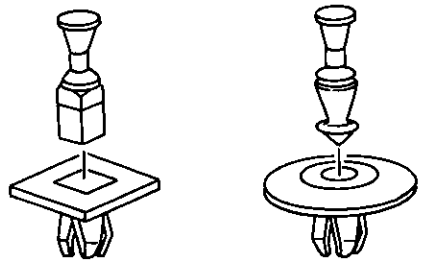
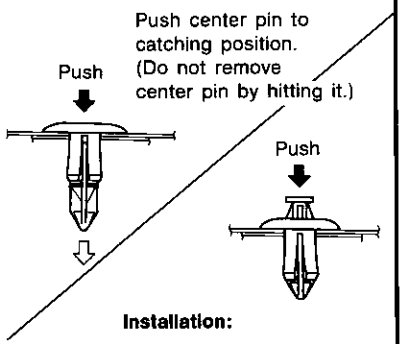
For example, when current is 30A, the circuit is broken within 8 to 20 seconds.

Circuit breakers are used in the following systems.

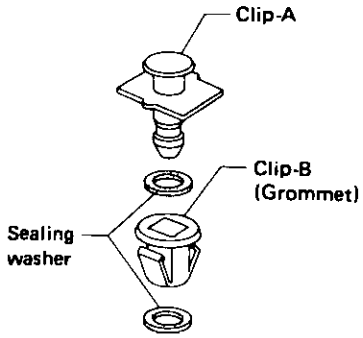
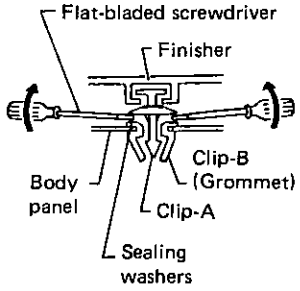
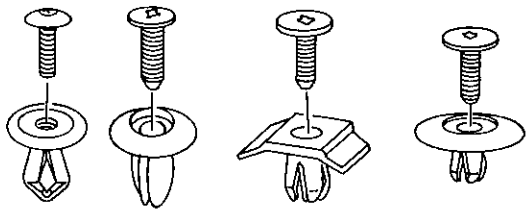
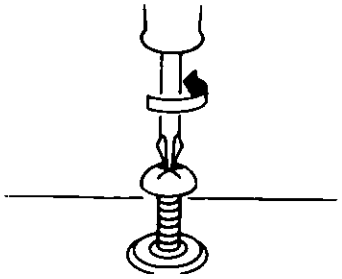
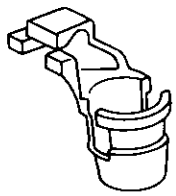
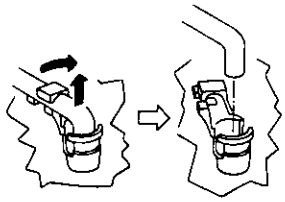
- Power window & power door lock
- Power seat
- Power sun roof
- Automatic drive positioner

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	 SBF256G	**Removal:** Remove by bending up with flat-bladed screwdrivers.  SBF367B
C102	 SBF114B SBF137B	 **Removal:** Pull up by rotating. SBF115B
C103	 SBF257G	**Removal:** Remove with a flat-bladed screwdriver or pliers.  SBF292C
C203	 SBF258G	Push center pin to catching position. (Do not remove center pin by hitting it.) Push Push  **Installation:** SBF708E

Clip and Fastener (Cont'd)

Symbol No.	Shapes	Removal & Installation
CF118 	 SBF151D	**Removal:**  SBF259G
CS101 	 SBF260G	**Removal:** Screw out with a Phillips screwdriver.  SBF140B
CR103	 SBF768B	**Removal:** Holder portion of clip must be spread out to remove rod.  SBF770B

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.

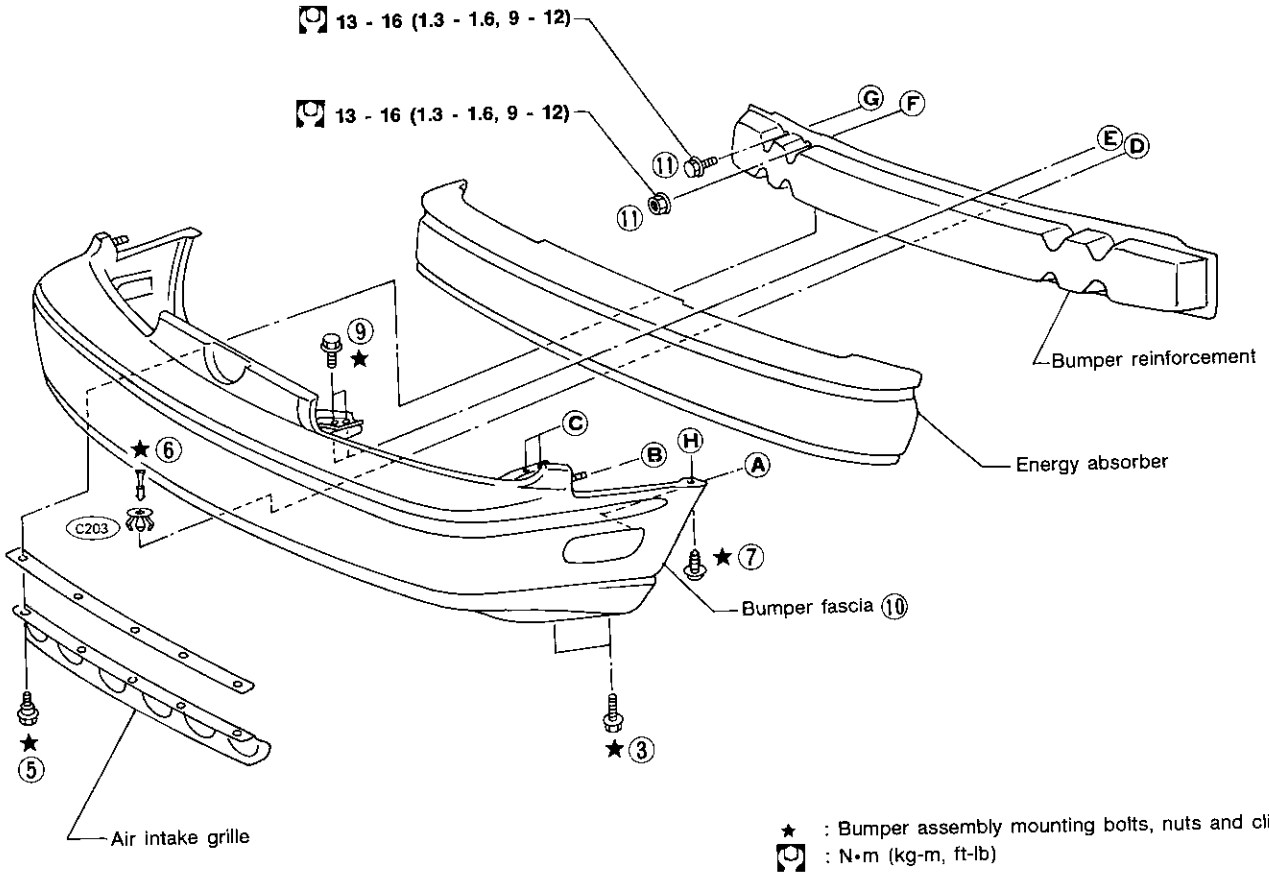
b. The contents of the hood stay are under pressure. Do not take apart, puncture, apply heat or allow fire near it.

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 (S101) securing left, right and center air guides; remove air guides.
② Remove left and right front combination lamps.
③ Remove bolts securing left and right fender protectors to spoiler.
④ Remove screws securing left and right side stays to bumper fascia.
⑤ Remove air intake grille.
⑥ Remove clips (C203) from lower side of apron at opening of bumper fascia.
⑦ Remove screws located at wheel opening. Remove bumper fascia and fender.
⑧ Remove nuts securing bumper fascia to fender.
⑨ Remove two bolts securing left fender bracket, and two bolts securing left headlamp stay. Similarly, remove right fender bracket and headlamp stay.
⑩ Pull bumper fascia out. Disconnect left and right side marker lamp harness connectors.
⑪ Remove bolts and nuts from bumper stays and detach reinforcement.
⑫ Remove bumper stays. Remove washer tank (on the right side).



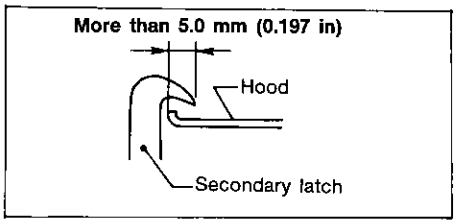
★ : Bumper assembly mounting bolts, nuts and clips
: N•m (kg-m, ft-lb)

Body Front End (Cont'd)

Hood lock adjustment

- Adjust hood so that hood primary lock meshes at a position 1 to 1.5 mm (0.039 to 0.059 in) lower than fender.
- After hood lock adjustment, adjust bumper rubber.
- When securing hood lock, ensure it does not tilt. Striker must be positioned at the center of hood primary lock.
- After adjustment, ensure that hood primary and secondary lock operate properly.

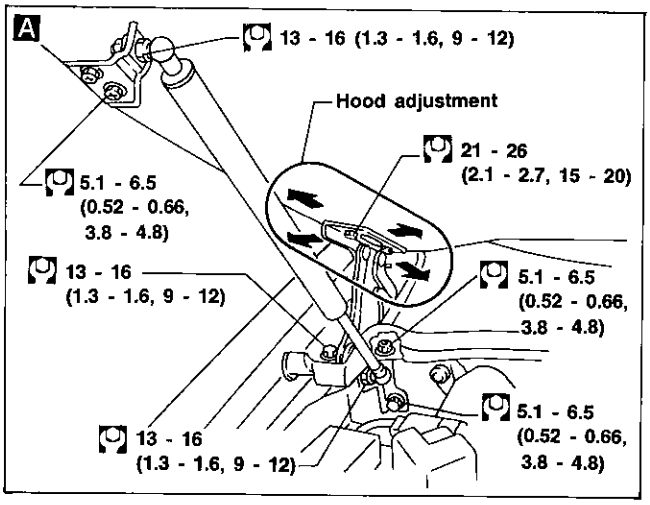
Hood lock secondary latch hooking length

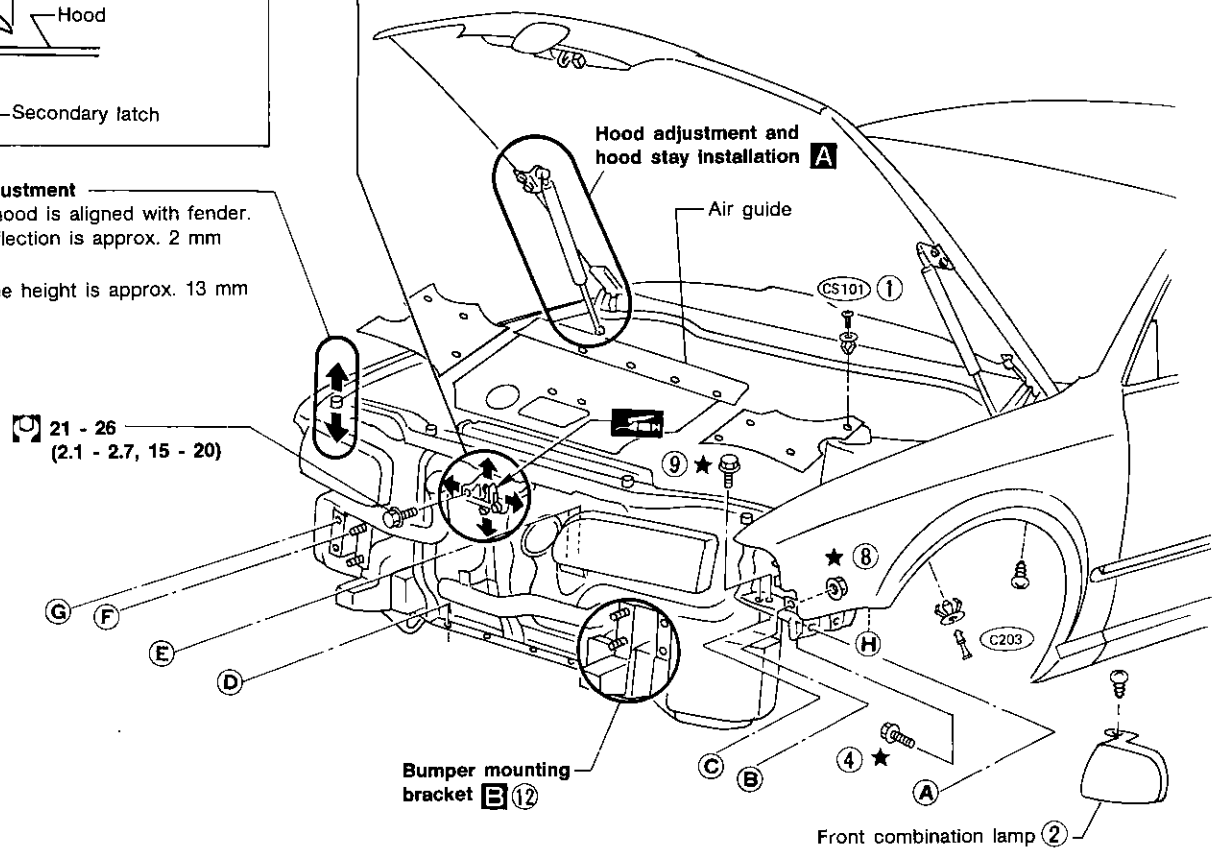


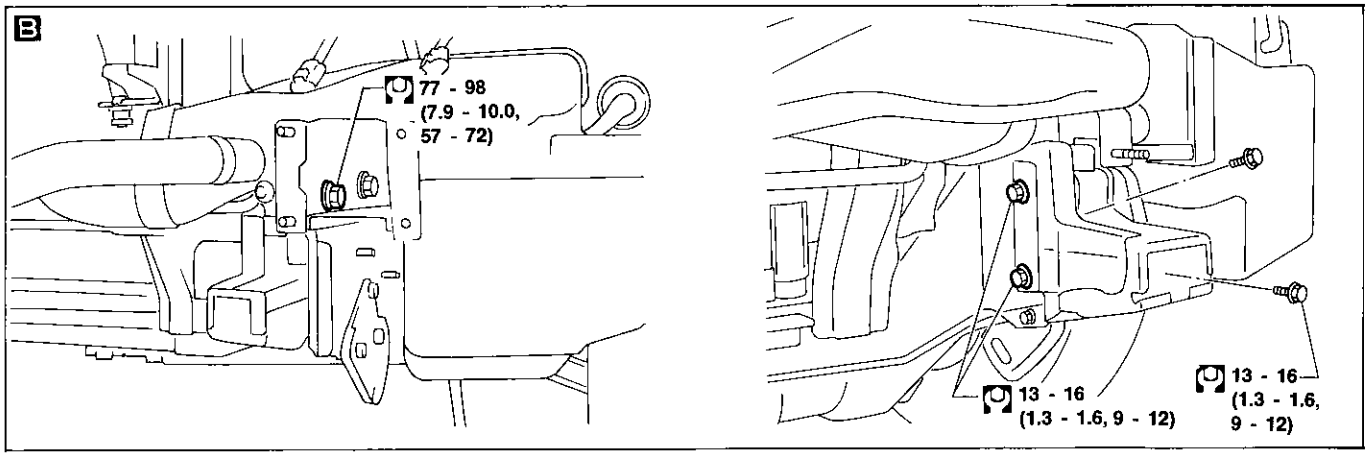
Bumper rubber adjustment

- Adjust so that hood is aligned with fender. At that time deflection is approx. 2 mm (0.08 in).

[Bumper rubber free height is approx. 13 mm (0.51 in).]







MBF790A

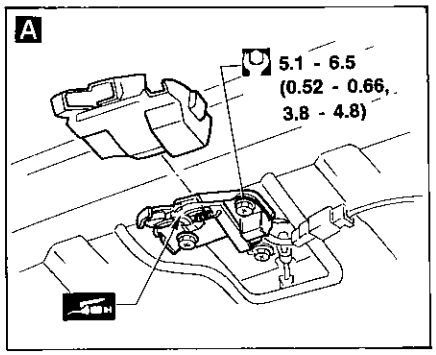
Body Rear End and Opener

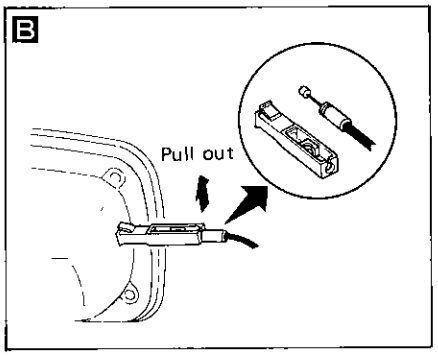
- Trunk lid adjustment: Adjust at hinge-trunk lid portion for proper trunk lid fit.
- Trunk lid lock system adjustment: Adjust striker so that it is in the center of the lock. After adjustment, check trunk lid lock operation.
- Opener cable: Do not attempt to bend cable using excessive force.
- After installation, make sure that trunk lid and fuel filler lid open smoothly.

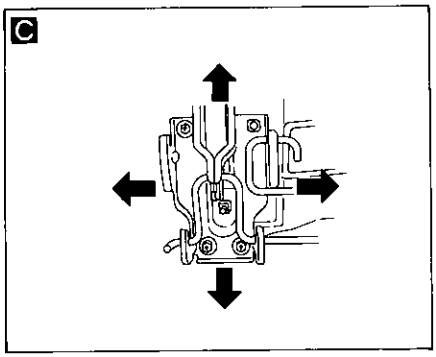
CAUTION:
Do not touch reinforcement with bare hands. Wear leather working gloves, since reinforcement surface is covered with fiberglass.

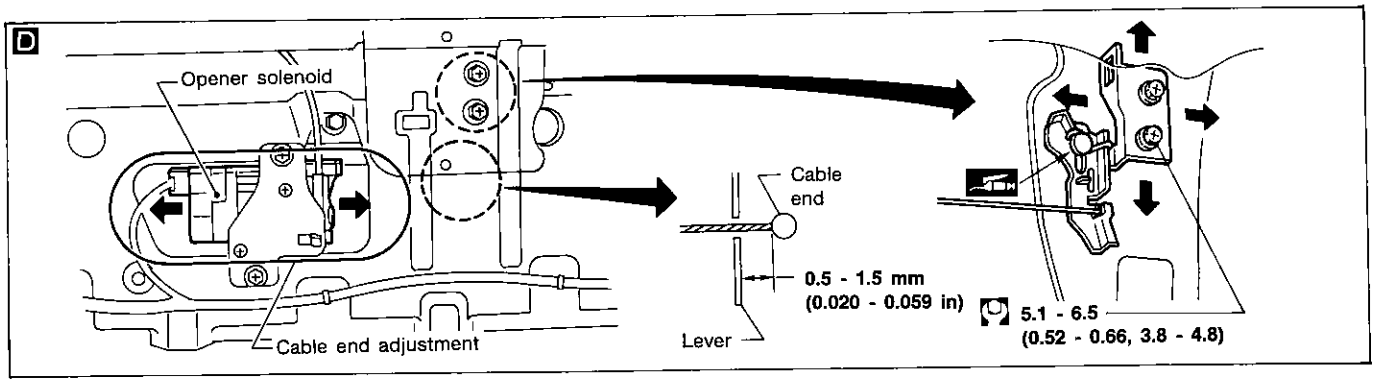
REMOVAL — Rear bumper assembly

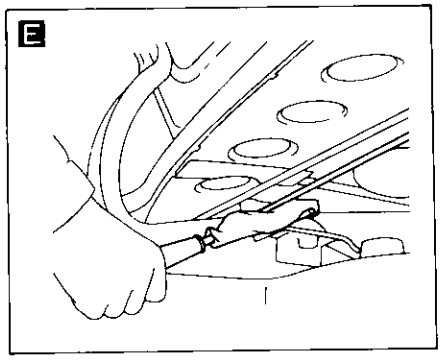
① Remove license plate.
② Remove eight bolts from lower side of rear bumper.
③ Remove two screws from lower side of each side bumper.
④ Remove trunk trim. Refer to "LUGGAGE COMPARTMENT TRIM" in "Interior" for details.
⑤ Working inside trunk, remove three bolts securing each bumper side to fender.
⑥ Working inside trunk, remove three nuts securing each corner of bumper fascia.
⑦ Also remove ten nuts from center of trunk compartment.
⑧ Remove screws securing wheelarch to each bumper side.
⑨ Pull bumper fascia out. Remove side marker lamp and license lamp harness connectors.
⑩ Remove bumper stays. Working inside trunk, remove left and right plugs from floor, then remove bolts.

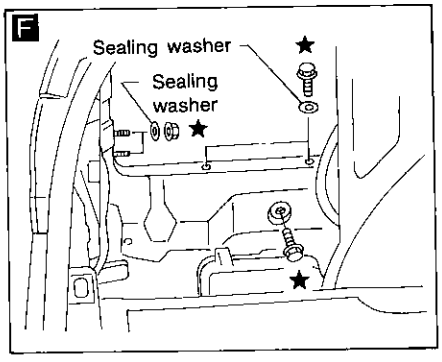




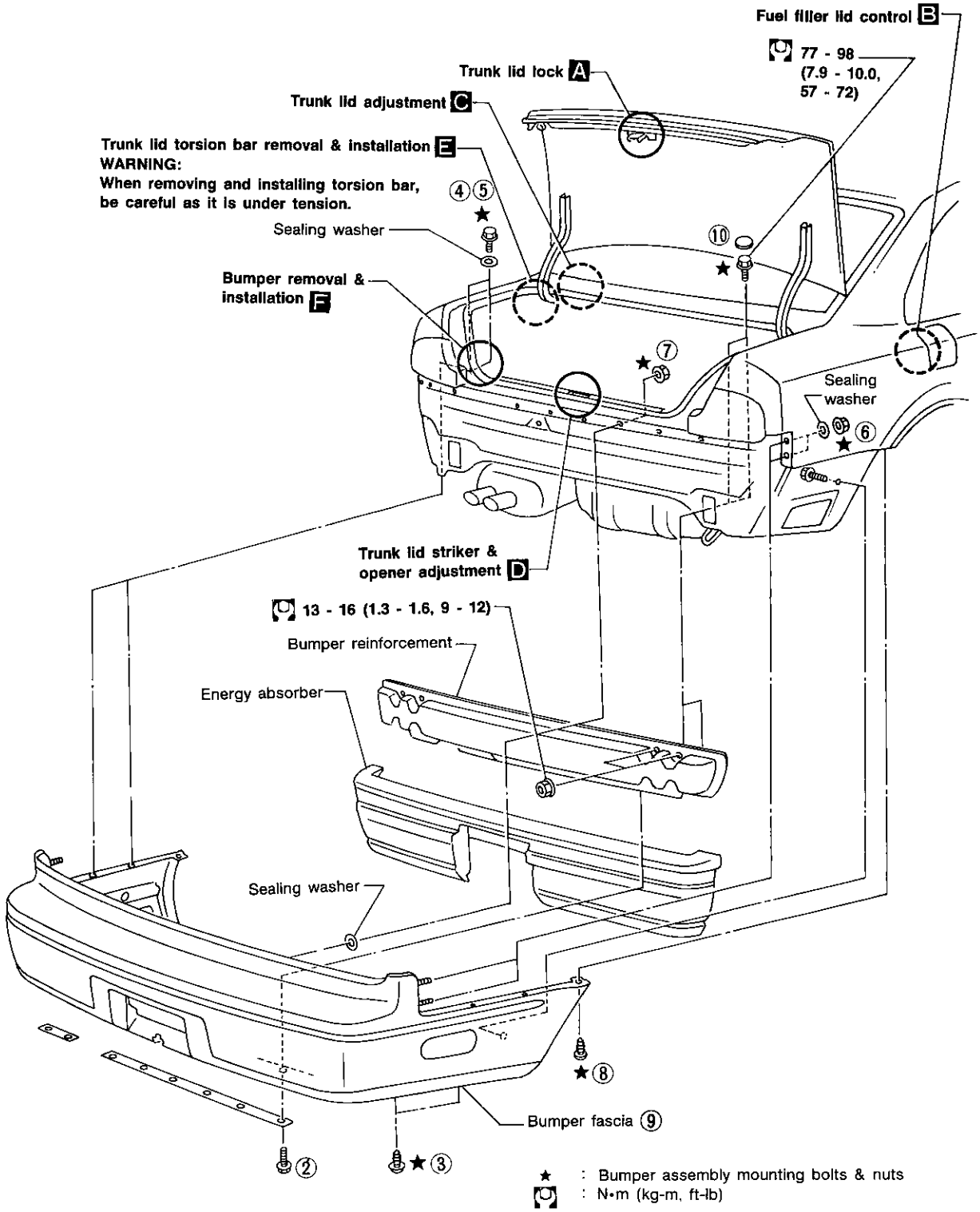








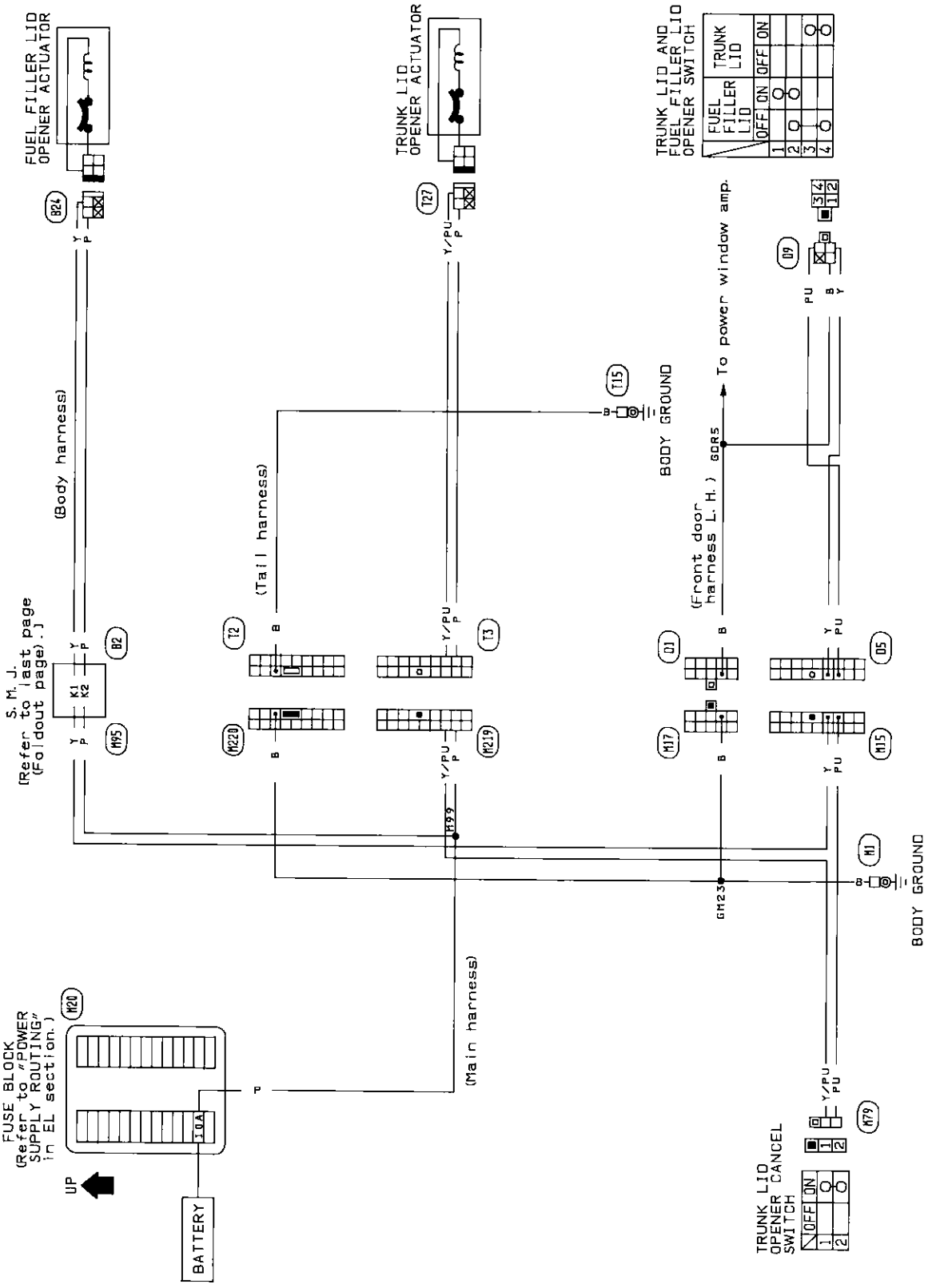
Body Rear End and Opener (Cont'd)



SBF177F

Body Rear End and Opener (Cont'd)

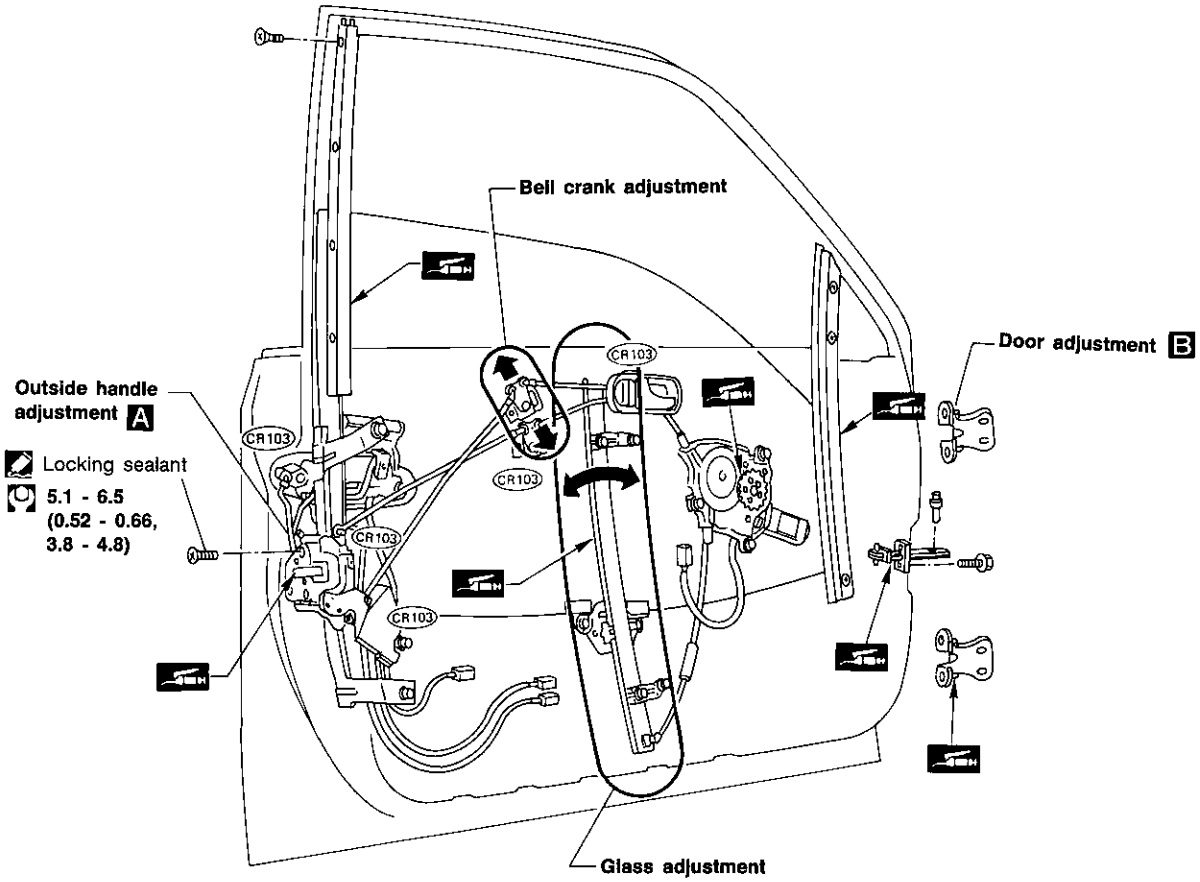
TRUNK LID AND FUEL FILLER LID OPENER/WIRING DIAGRAM



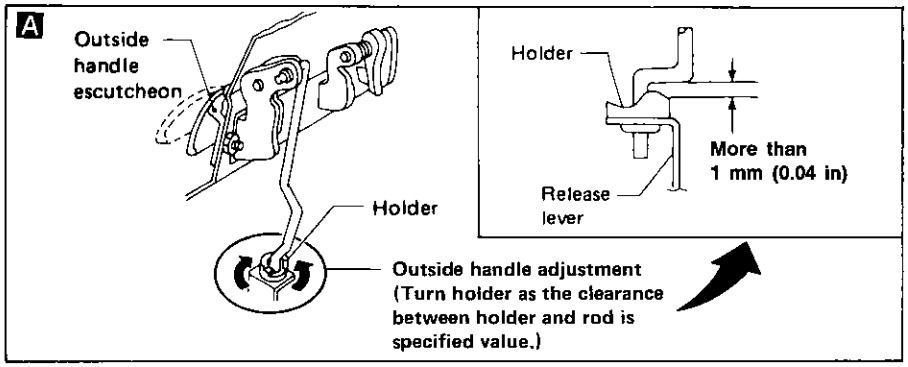
MBF223A

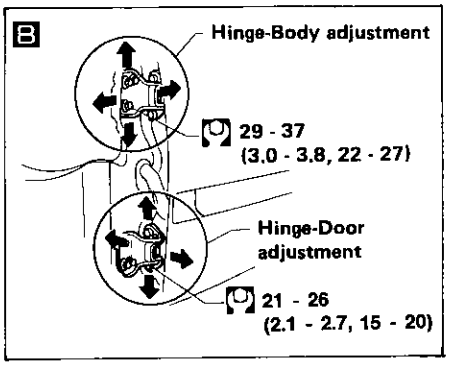
Front Door

- After adjusting door or door lock, check door lock operation.

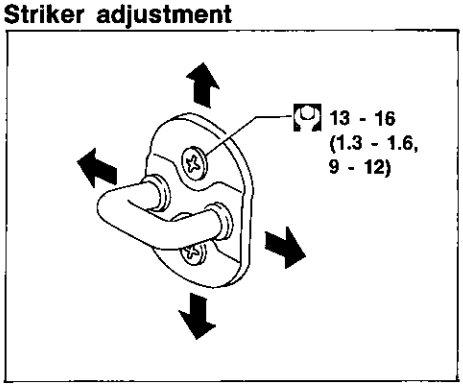


: N•m (kg-m, ft-lb)



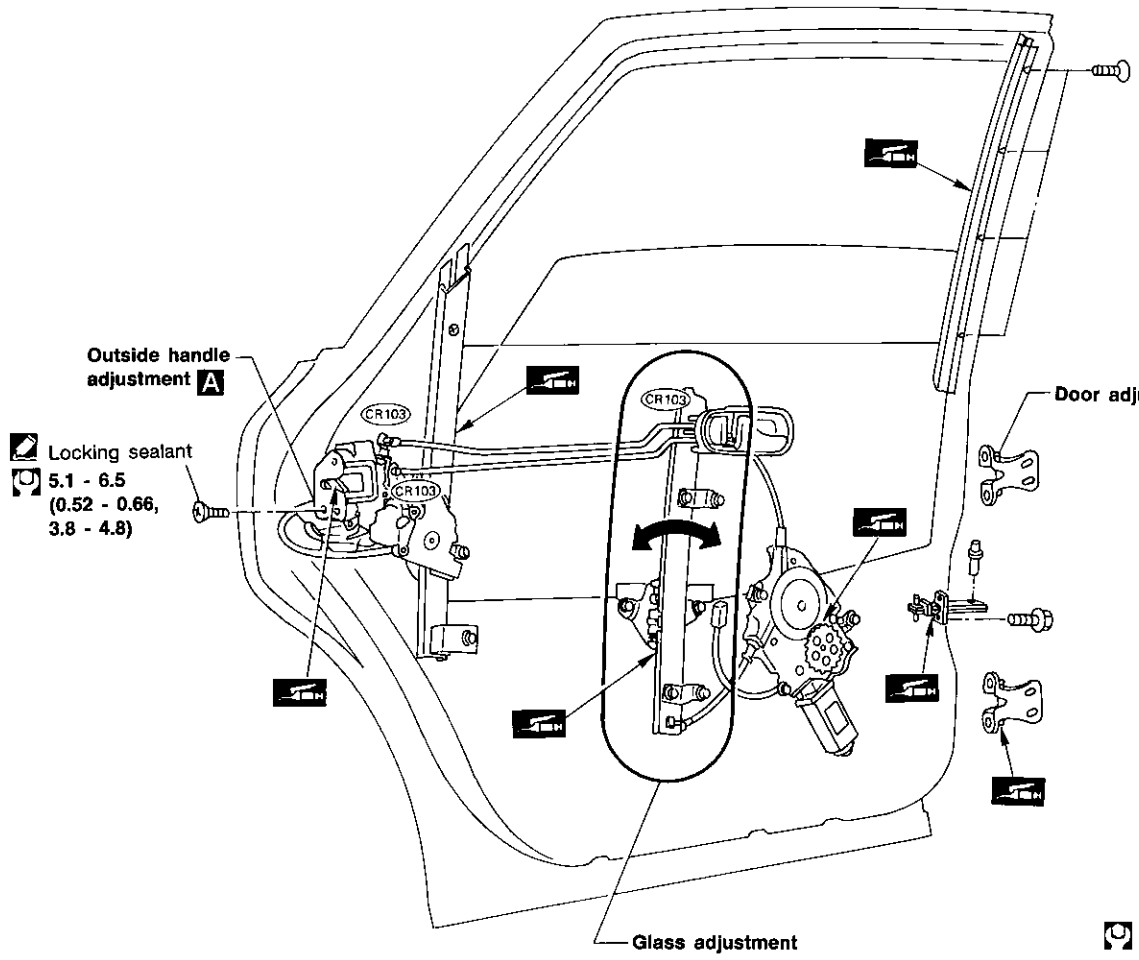


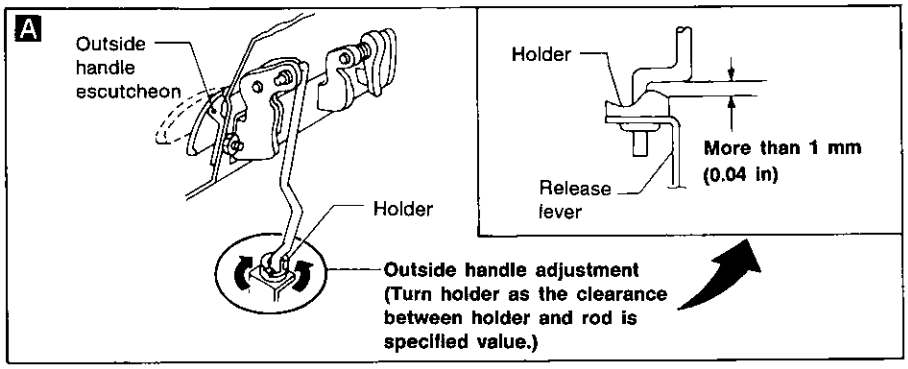
Striker adjustment

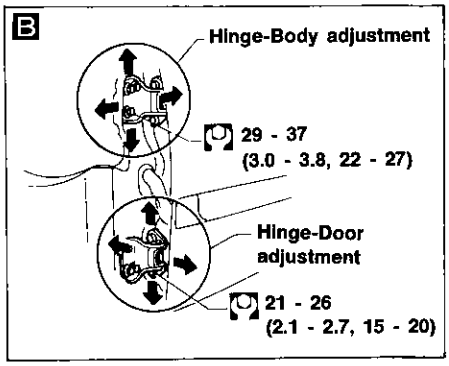


SBF178F

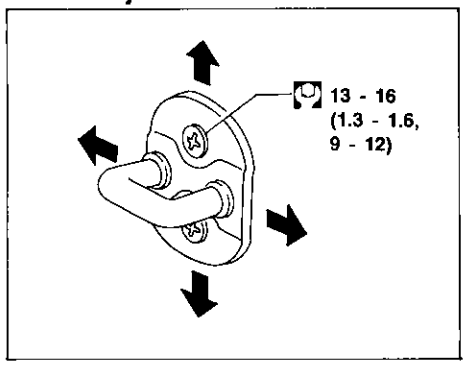
Rear Door







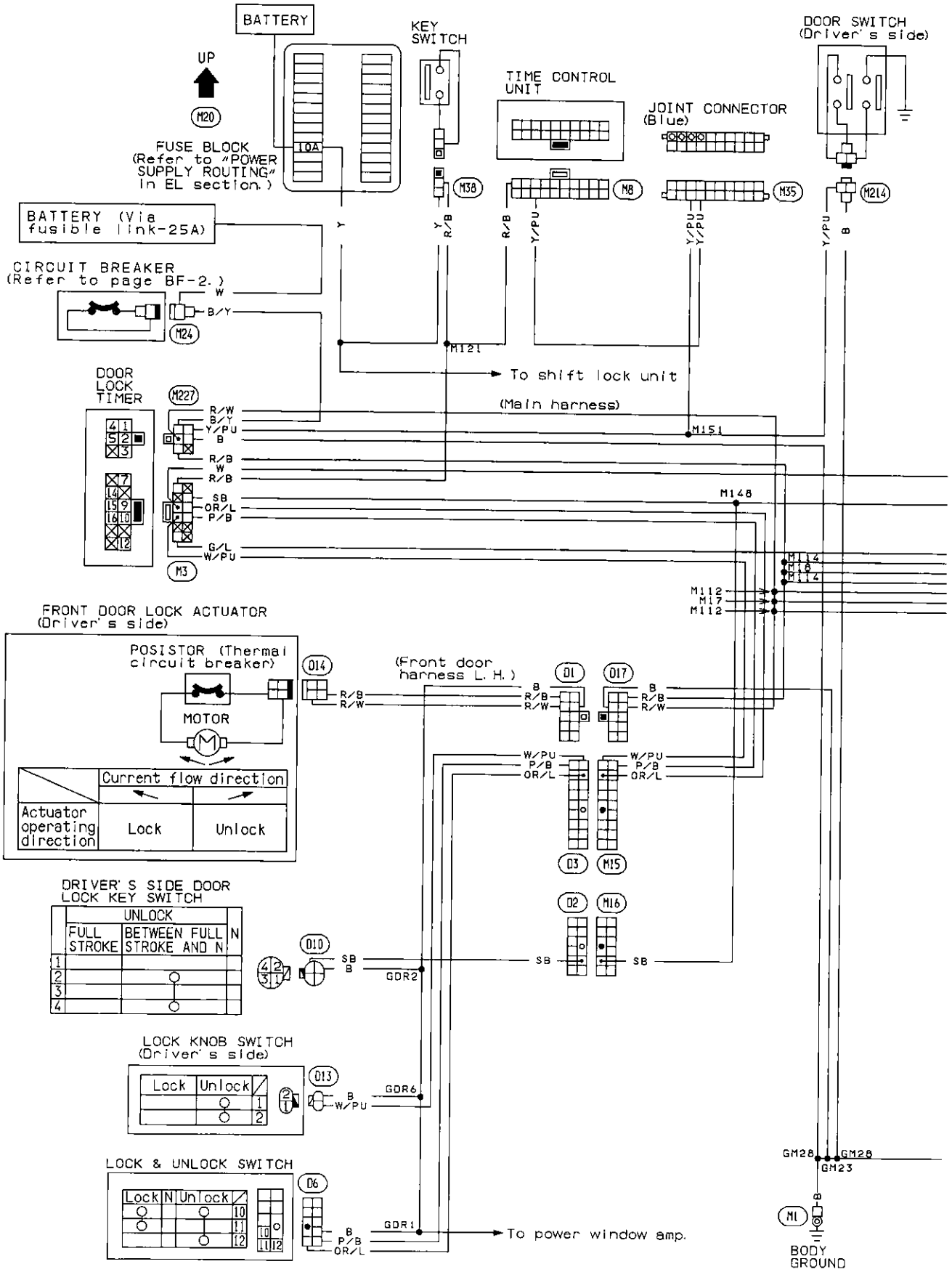
Striker adjustment



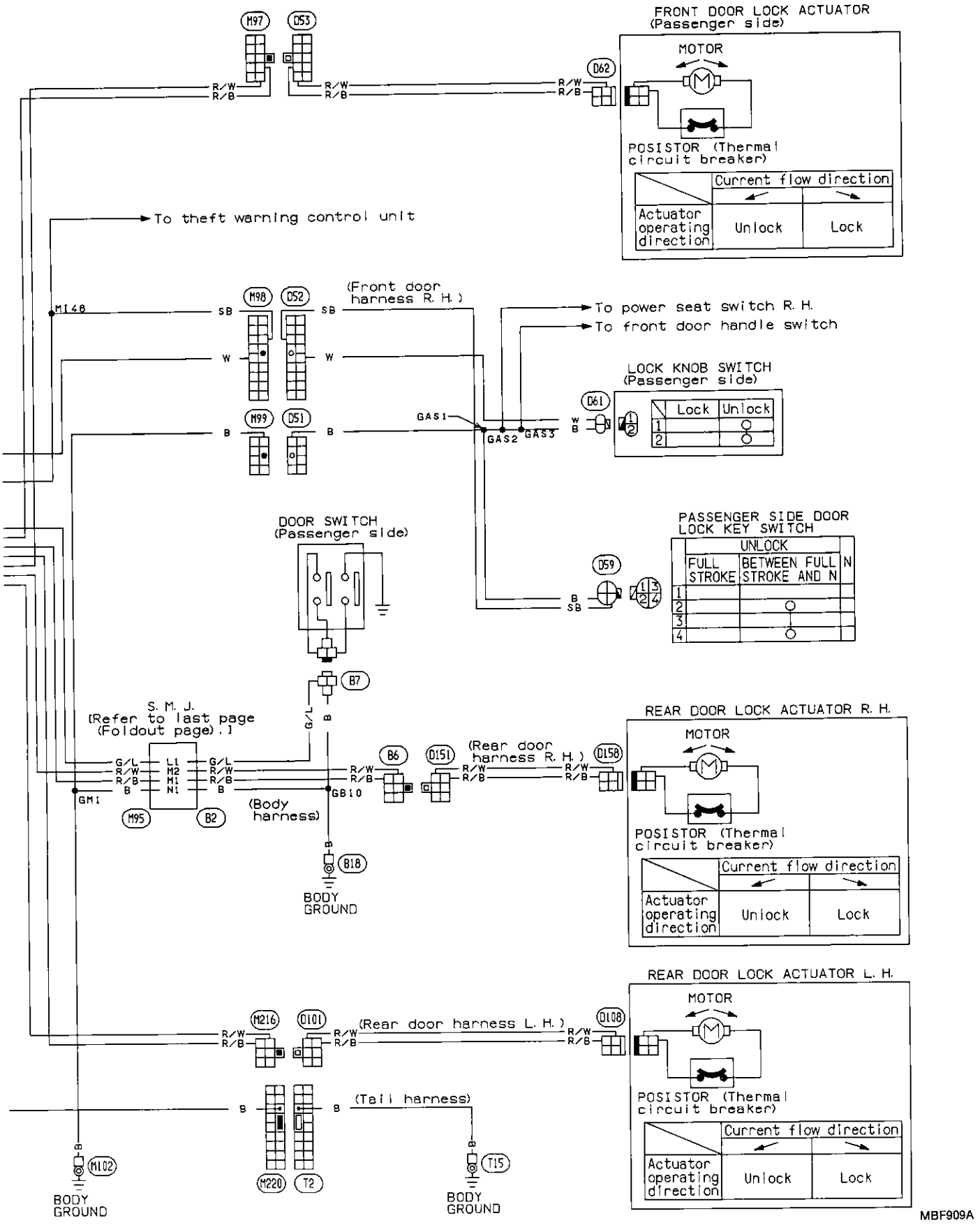
SBF179F

Power Window

WIRING DIAGRAM



Power Window (Cont'd)

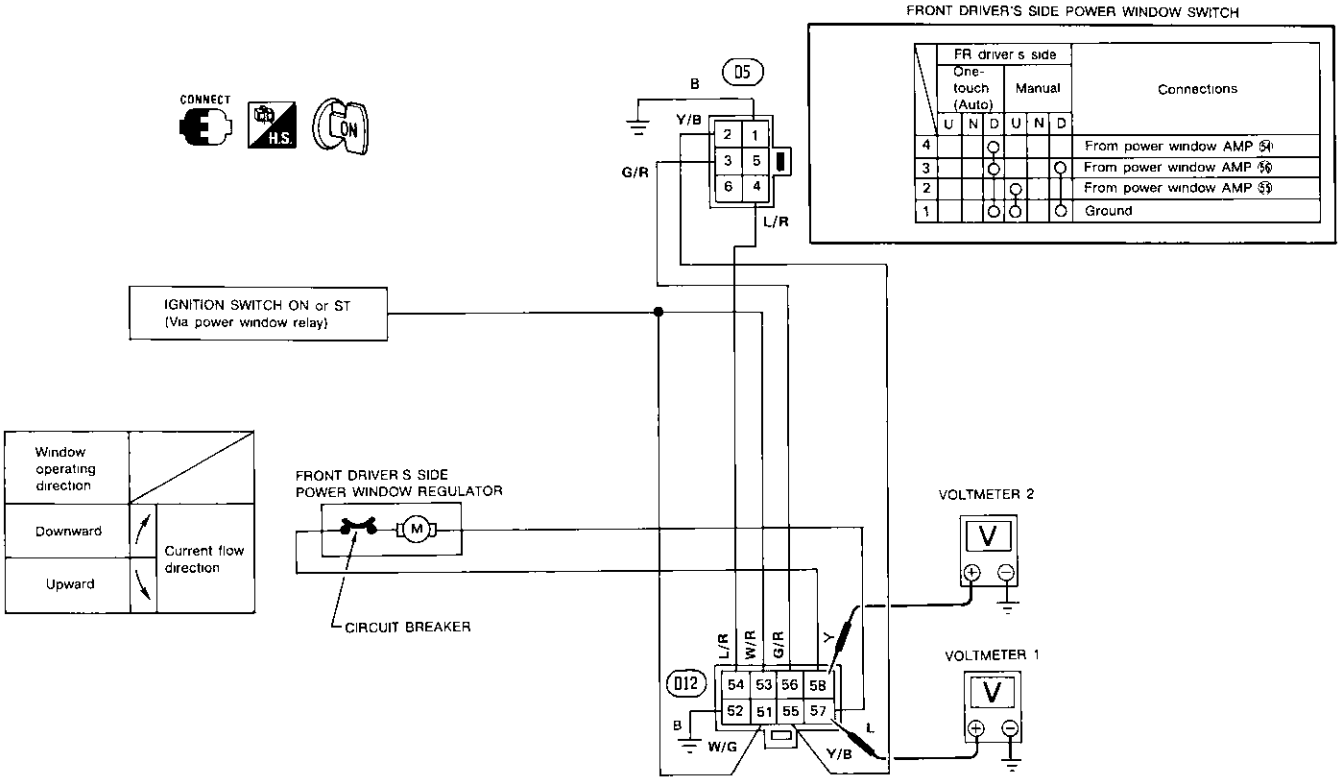


Power Window (Cont'd)

POWER WINDOW AMP. INSPECTION

Carry out the inspections below.

(1) Power source and ground: Battery voltage should exist between terminals ㊶ and ㊷.
(2) Input signals: Battery voltage should exist between terminal ㊸ and ground (IGN "ON" or "ST"). Continuity should exist between terminal ㊹, ㊺ or ㊻ and ground in "ON" condition, and should not exist in "OFF" condition.
(3) Output signals: Battery voltage shown in the chart should exist.



AMP OPERATION

		Connections	Operations					
			Manual operation			One-touch (Auto) operation		
			N	UP	Down	N	Down →	N
51		Power source (IGN)	12V	12V	12V	12V	12V	12V
52		Ground	Ground	Ground	Ground	Ground	Ground	Ground
53	Input signal	From ignition SW (ON or ST)	12V	12V	12V	12V	12V	12V
54	Input signal	To FR driver's side power window SW (AUTO) 4	OFF	OFF	OFF	OFF	ON	OFF
55	Input signal	To FR driver s side power window SW (UP) 2	OFF	ON	OFF	OFF	OFF	OFF
56	Input signal	To FR driver s side power window SW (DOWN) 3	OFF	OFF	ON	OFF	ON	OFF
57	Output signal	FR driver's side regulator (Upward power source) VOLTMETER 1	Approx 0V	Approx over 9V	Approx 0V	Approx 0V	Approx 0V	Approx 0V
58	Output signal	FR driver's side regulator (Downward power source) VOLTMETER 2	Approx 0V	Approx 0V	Approx. over 9V	Approx 0V	Approx over 9V	Approx over 9V

Regulator Operating Condition	Stop	Upward operation	Down ward operation	Stop	Starting	Keeping operation until fully open, then stops automatically
					Downward operation	

Carry out the operation check in this chart from left to right continuously

POWER WINDOW AMP — Driver s side door

SBF973F

Power Door Lock

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

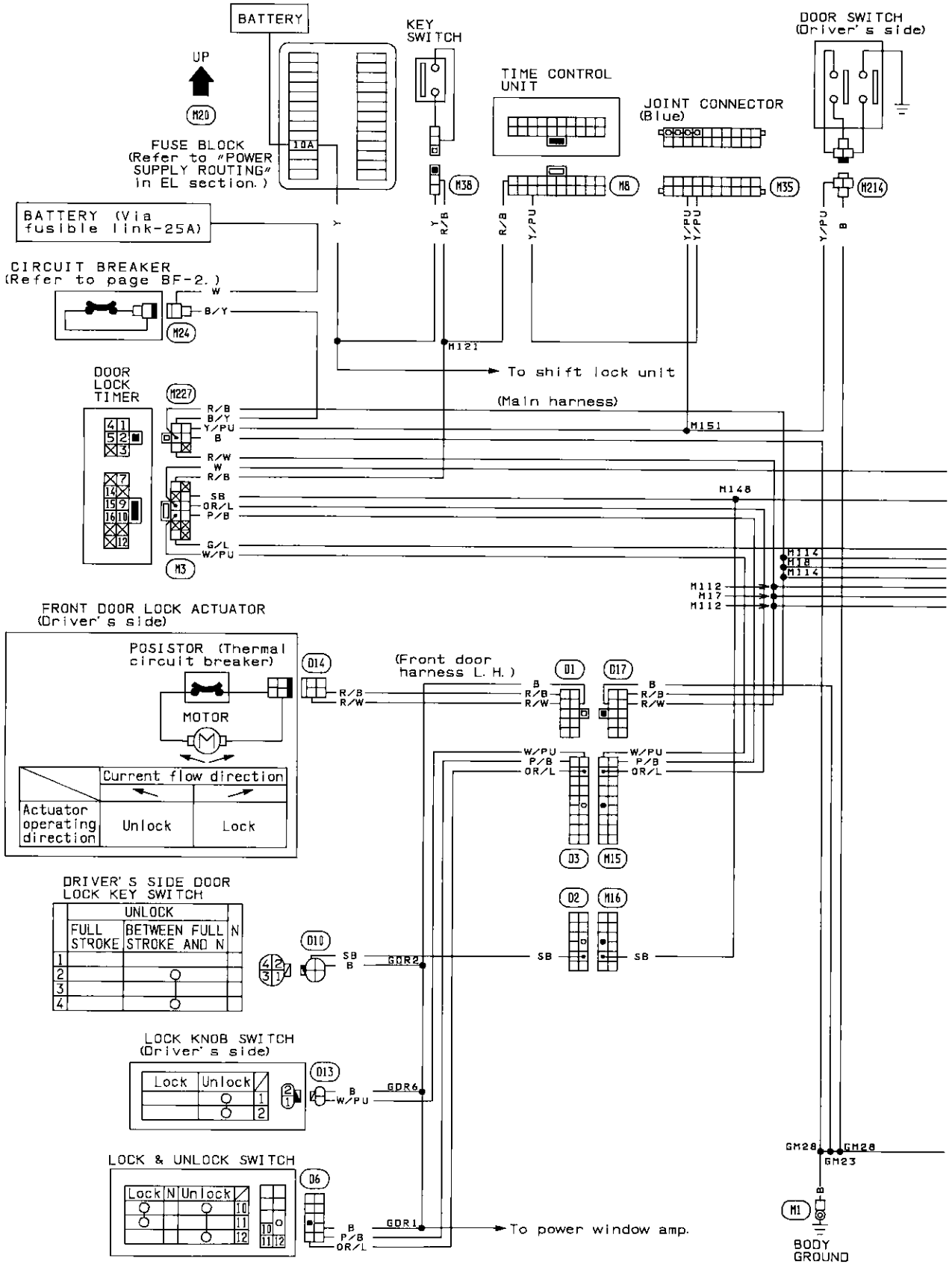
(The voltages are approximate values.)

	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.)

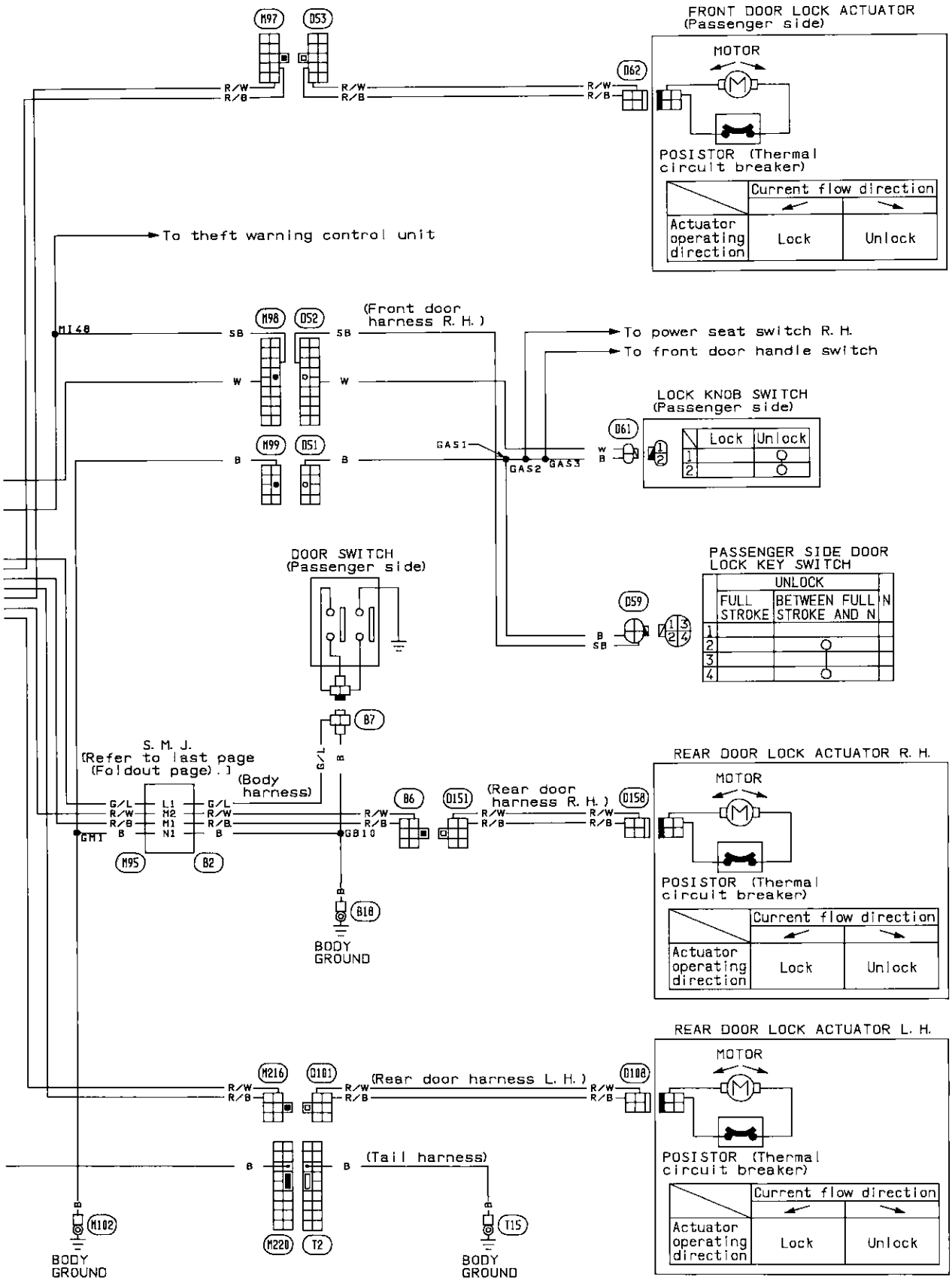
- Operation of lock knob switch R.H. is the same as L.H.

Power Door Lock (Cont'd)

WIRING DIAGRAM



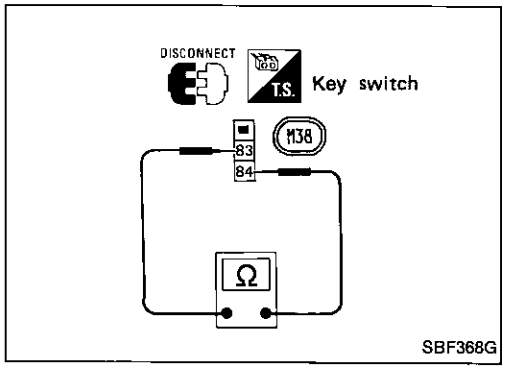
Power Door Lock (Cont'd)



MBF501A

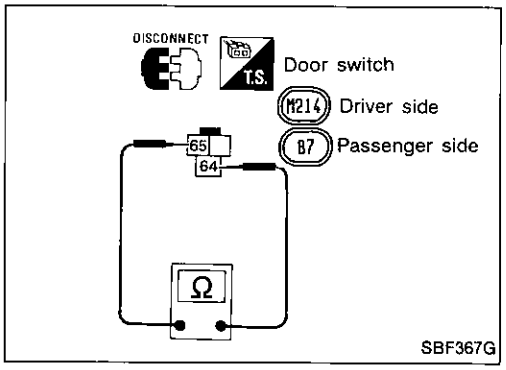
Power Door Lock (Cont'd)

ELECTRICAL COMPONENTS INSPECTION



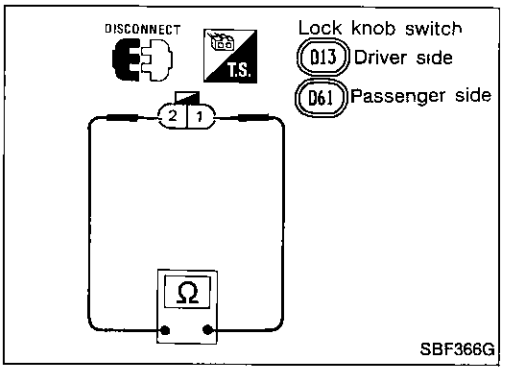
Key switch

Terminals	Condition	Continuity
⑧③ - ⑧④	Key is in the ignition.	Yes
	Key is not in the ignition.	No



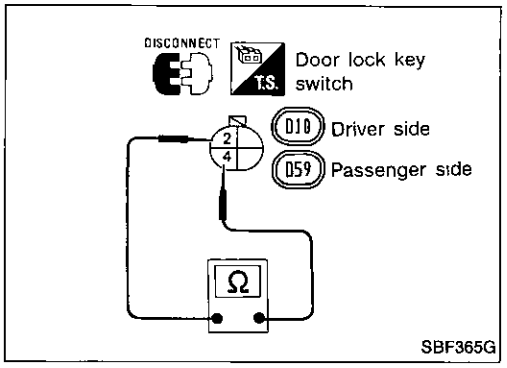
Door switch

Terminals	Condition	Continuity
⑥④ - ⑥⑤	Door is closed.	No
	Door is open.	Yes



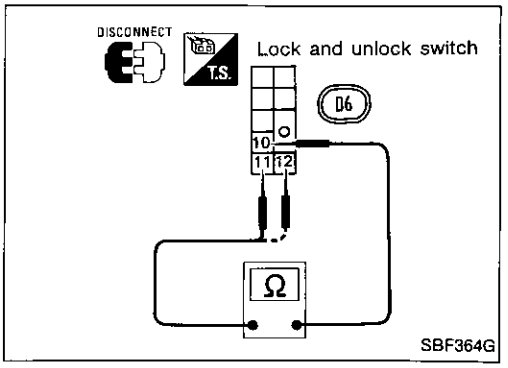
Lock knob switch

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

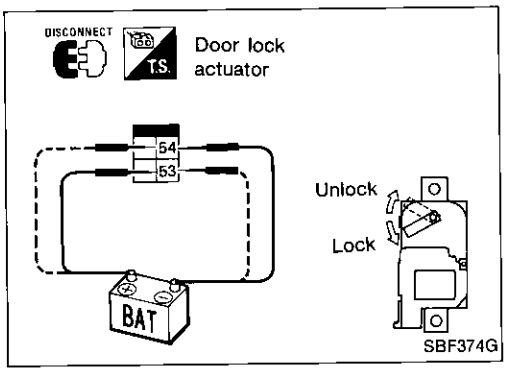


Lock and unlock switch

Terminals	Operation	Continuity
⑩ - ⑪	Lock	Yes
	Neutral and unlock	No
⑩ - ⑫	Unlock	Yes
	Neutral and unlock	No

Power Door Lock (Cont'd)

Door lock actuator

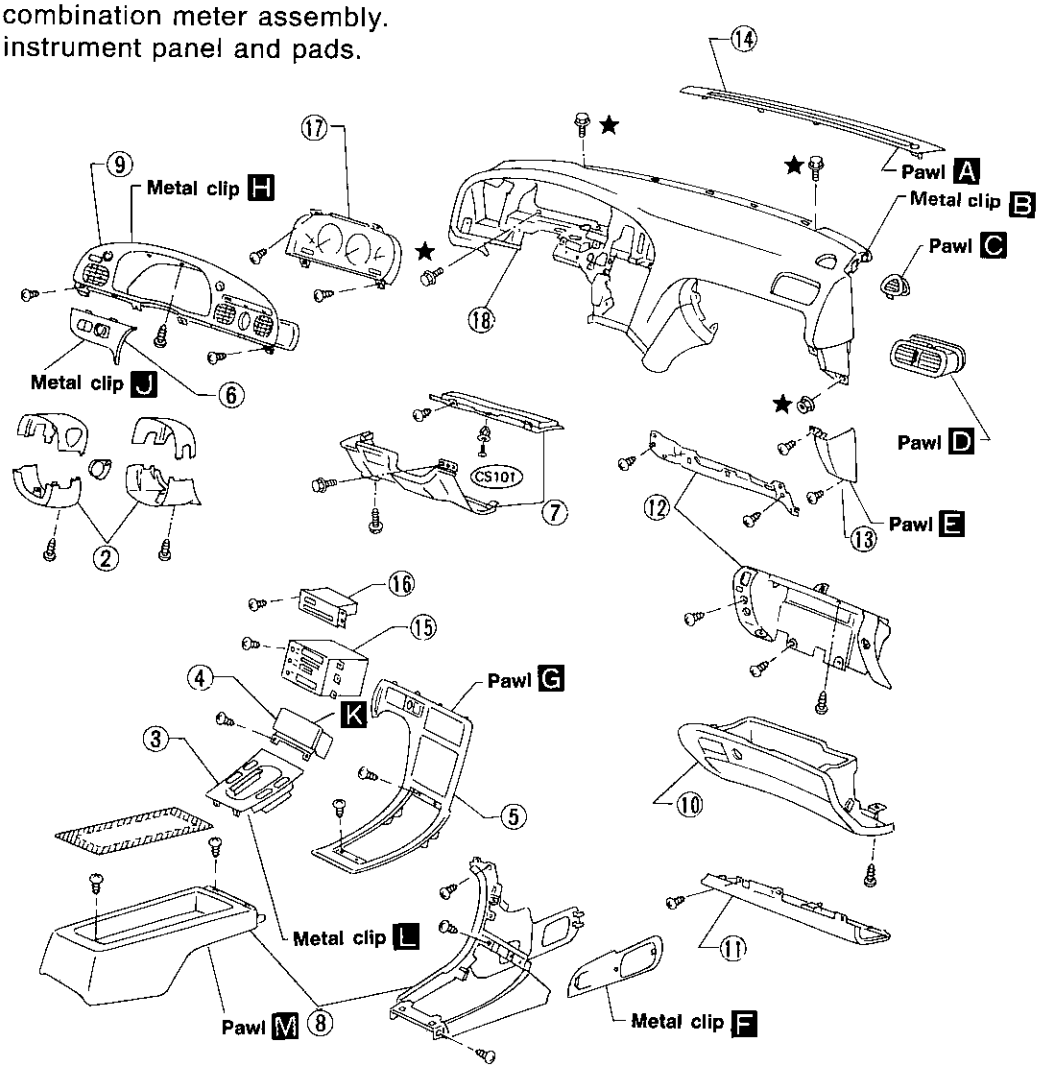


Terminals		Operation
⊕	⊖	
㊸	㊹	Lock
㊹	㊸	Unlock

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.

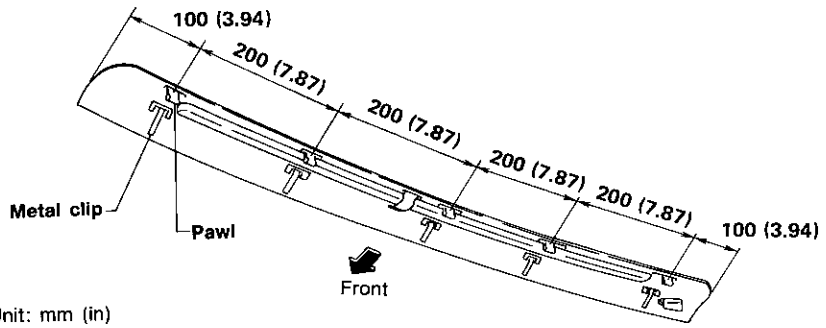
REMOVAL — Instrument panel assembly

① Remove steering wheel. Disengage air bag system in advance.
② Remove steering column cover.
③ Remove A/T finisher.
④ Remove ash tray assembly.
⑤ Remove cluster lid C.
⑥ Remove cluster lid D.
⑦ Remove lower instrument cover on driver side.
⑧ Remove front floor console assembly and rear floor console assembly.
⑨ Remove cluster lid A.
⑩ Remove glove box.
⑪ Remove lower instrument cover on passenger side.
⑫ Remove glove box cover.
⑬ Remove instrument finisher.
⑭ Remove defroster grille.
⑮ Remove radio.
⑯ Remove A/C or heater control.
⑰ Remove combination meter assembly.
⑱ Remove instrument panel and pads.



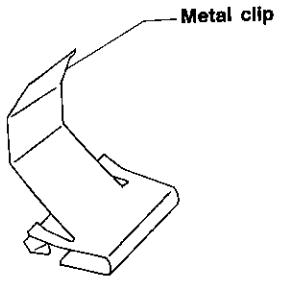
★ : Instrument panel assembly mounting bolts and nuts
▨ : Double-faced adhesive tape

A Wrap screwdriver tip with a cloth before removing instrument panel.

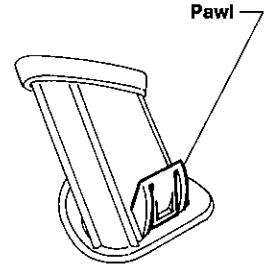


Unit: mm (in)

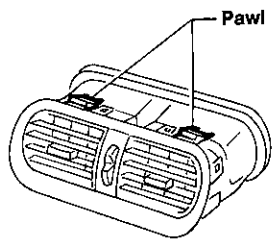
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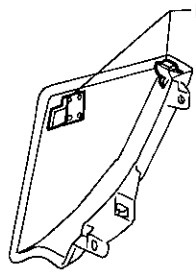
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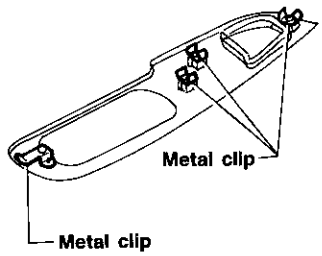
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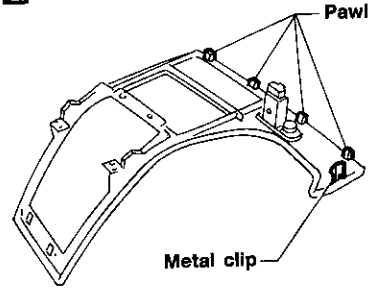
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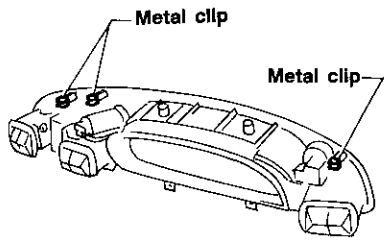
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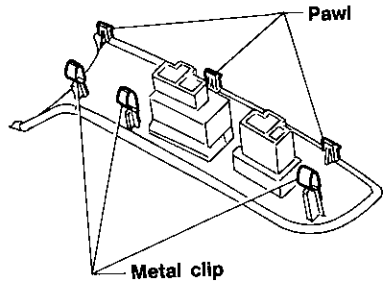
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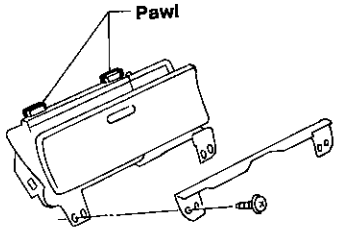
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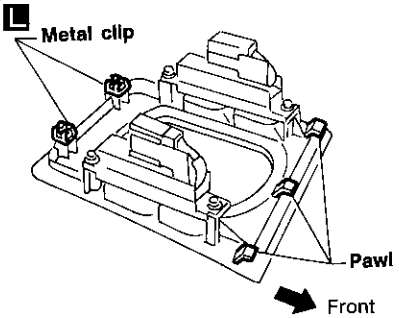
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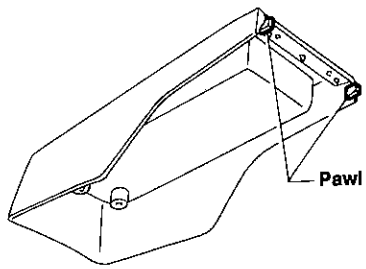
K



L



M



SBF318G

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 Ⓐ.

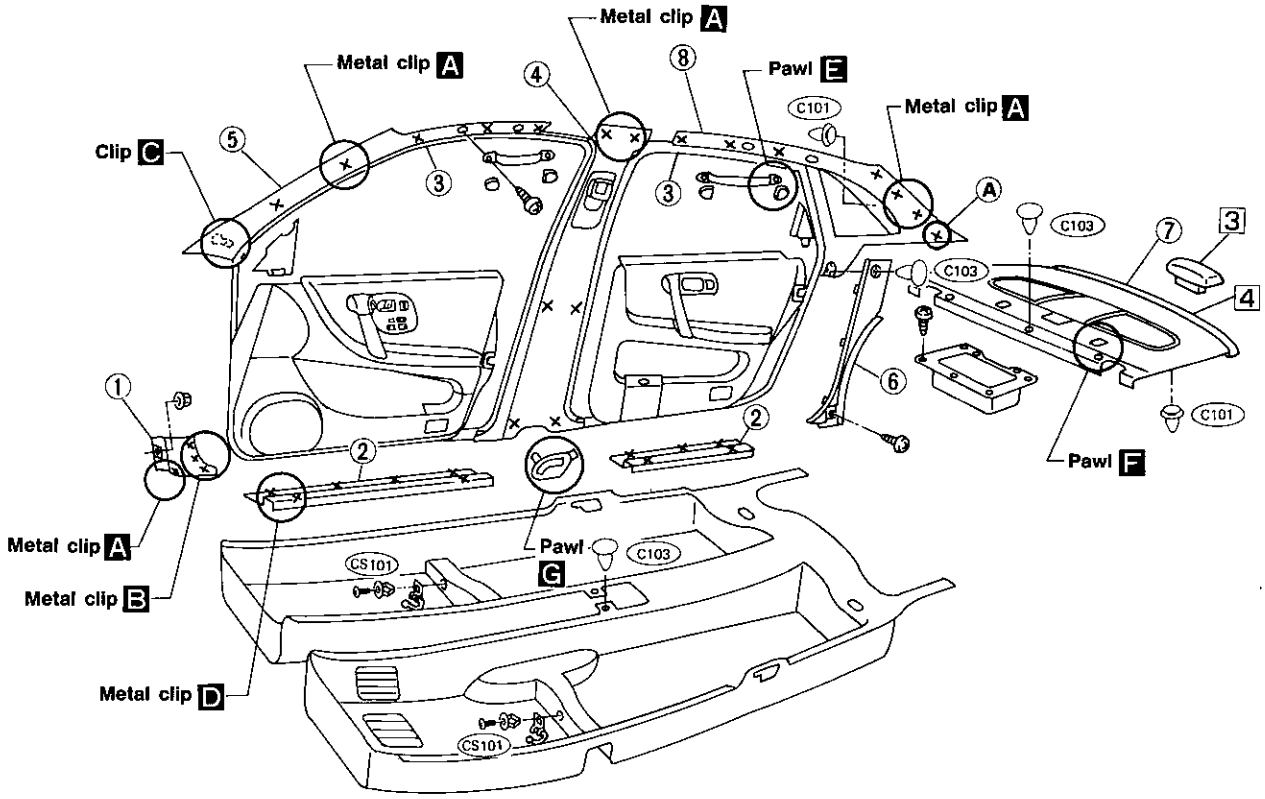
b. Wrap the tip of flat-bladed screwdriver with a cloth when removing metal clips from garnishes.

Removal — Body side trim

① Remove dash side finisher.
② Remove front and rear kicking plates.
③ Remove front and rear body side welts.
④ Remove center pillar garnish.
⑤ Remove front pillar garnish.
⑥ Remove rear wheelhouse garnish.
⑦ Remove rear parcel shelf.
⑧ Remove rear pillar finisher.

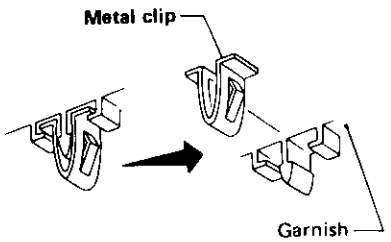
Removal — Rear parcel shelf finisher

1 Remove rear seat cushion. For details, refer to "Rear Seat" in "SEAT".
2 Remove rear seatback. For details, refer to "Rear Seat" in "SEAT".
3 Remove high-mount stop lamp assembly. (Not equipped with rear air spoiler model)
4 Remove rear parcel shelf finisher.

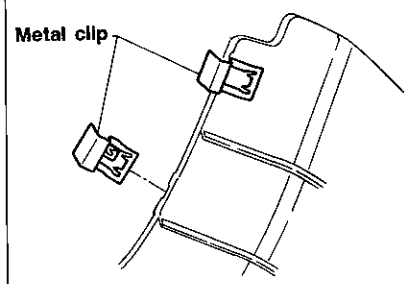


Interior (Cont'd)

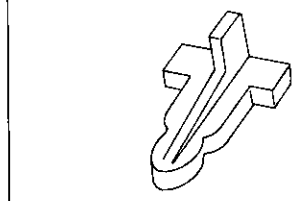
A



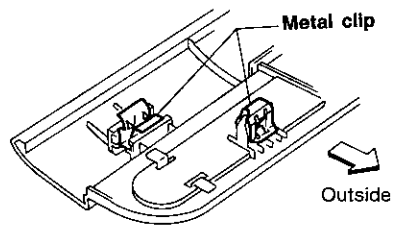
B



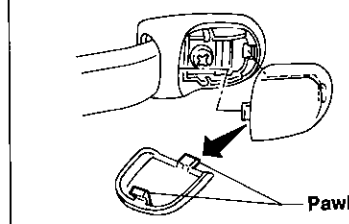
C



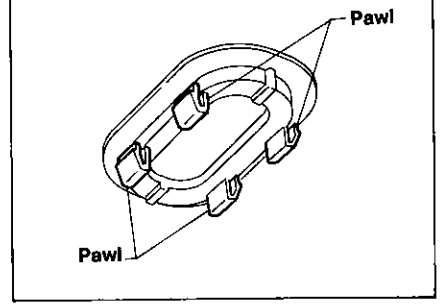
D



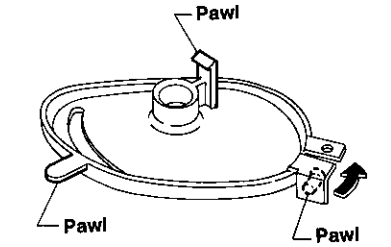
E Be careful not to scratch cap during removal.



F



G



SBF319G

ROOF TRIM

CAUTION:

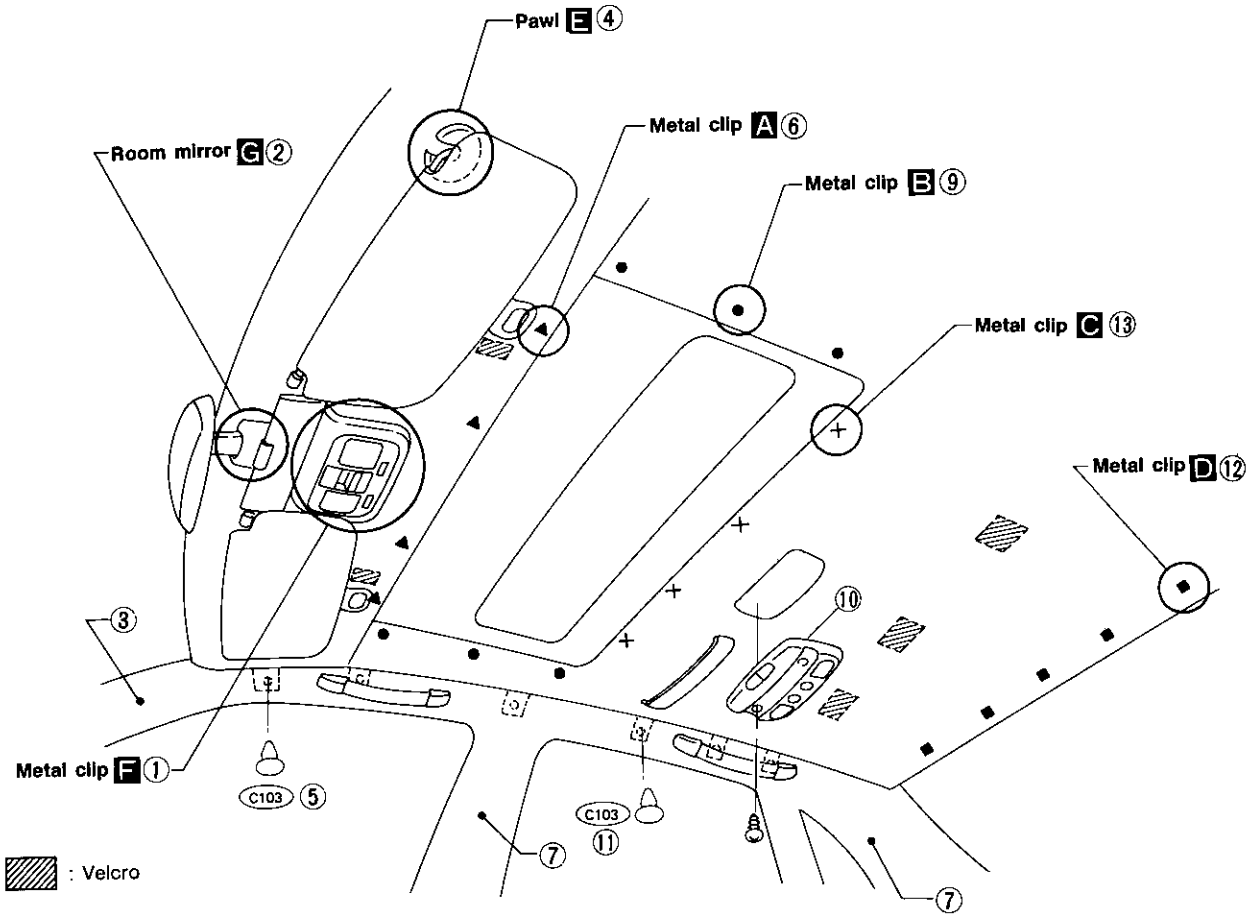
a. Front garnish is heavy. Always support each side of sun visor firmly when removing or installing front garnish.
b. Remove metal clip from rear of front garnish by pulling it toward rear of vehicle.
c. Headlining metal clip removal
1) Remove retainer from sun roof side.
2) Remove rear metal clip by pulling it straight down.
3) Remove metal clip from rear of sun roof by pulling it toward front of vehicle.

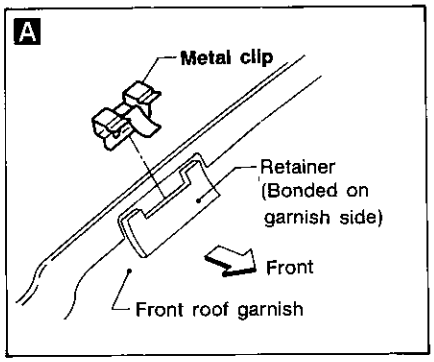
Removal — Front roof garnish

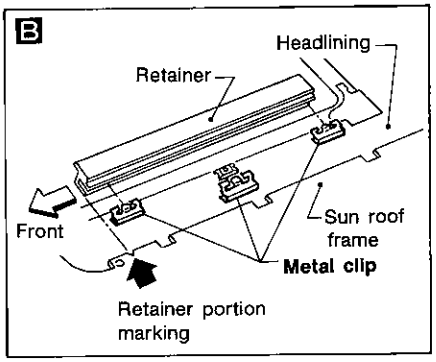
① Remove sun roof control switch assembly.
② Remove inside mirror assembly.
③ Remove front pillar garnish. Refer to "Removal — Body side trim" for details.
④ Remove three screws securing each sun visor.
⑤ Remove the clip (C103) from each front roof garnish.
⑥ While pulling front roof garnish backward, remove the metal clip from roof panel. Disconnect sun visor harness connector.

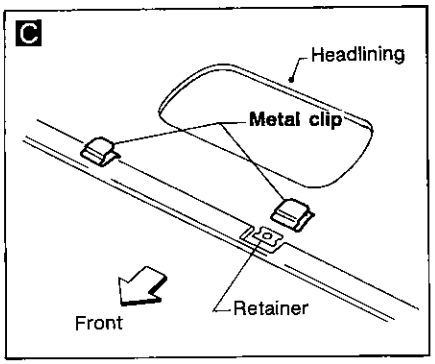
Removal — Headlining

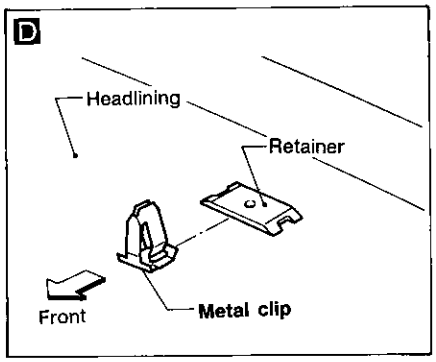
⑦ Remove body side trim. Refer to "Removal — Body side trim" for details.
⑧ Remove front roof garnish. Refer to "Removal — Front roof garnish" for details.
⑨ Remove side headlining retainers from sun roof opening.
⑩ Remove interior lamp assembly.
⑪ Remove clips (C103) securing each side of headlining.
⑫ Remove metal clips securing rear of headlining. Lower headlining.
⑬ While moving entire headlining forward, remove four metal clips at rear of sun roof opening.

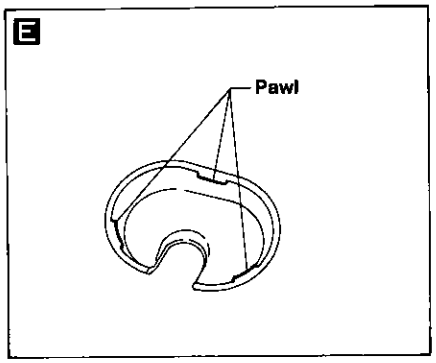


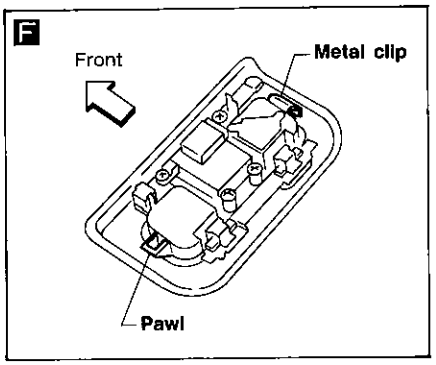


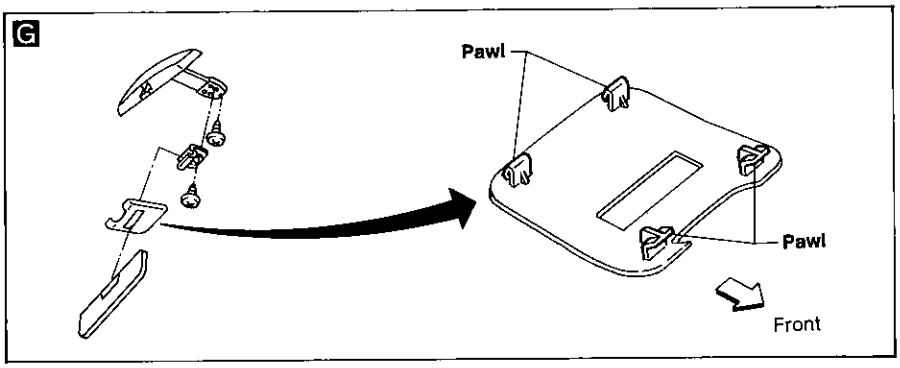












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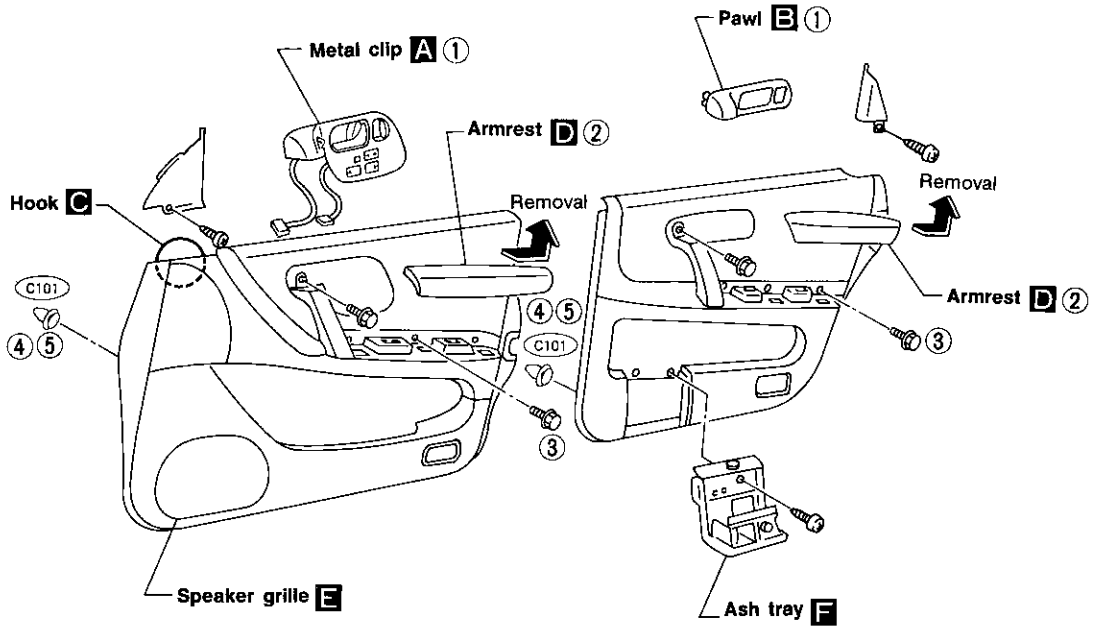
Interior (Cont'd)

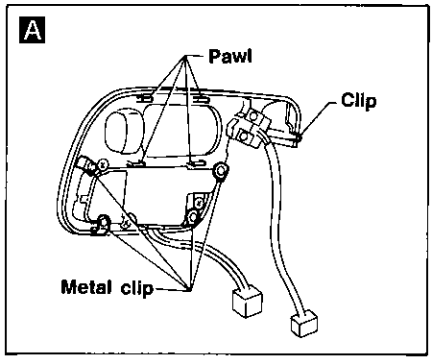
DOOR TRIM

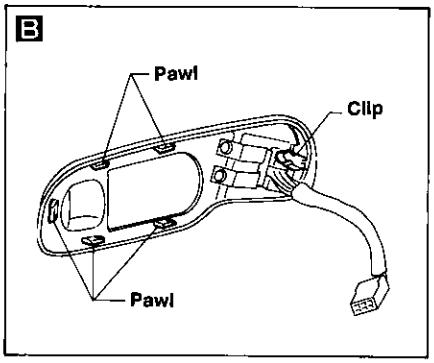
Removal — Door trim

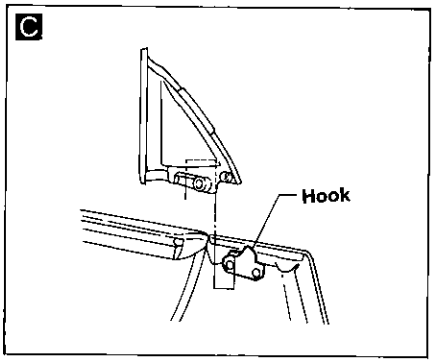
① Remove inside handle escutcheon.
② Remove door armrest by pulling it backward.
③ Remove four bolts.
④ Remove clips securing door finisher.
⑤ Lift out door finisher. Disconnect main and door harnesses.

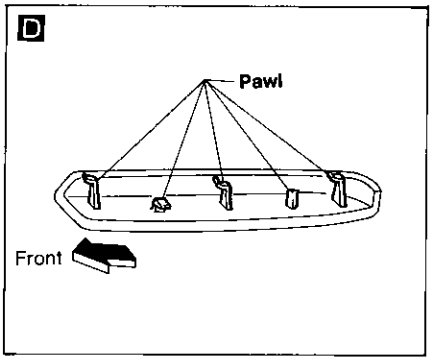
Remove ash tray before detaching rear door trim.

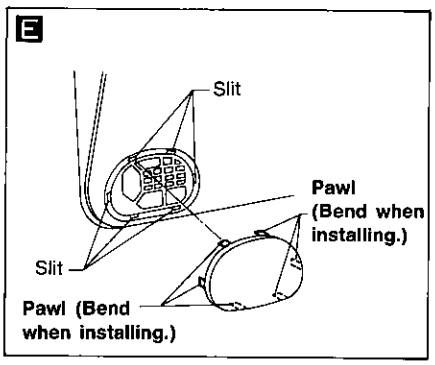


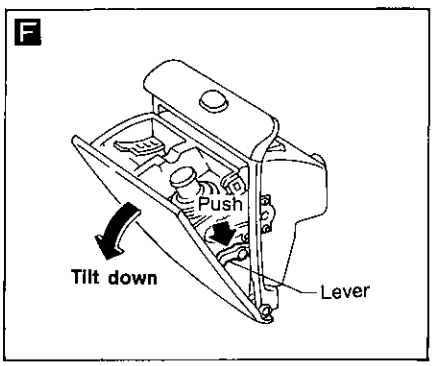






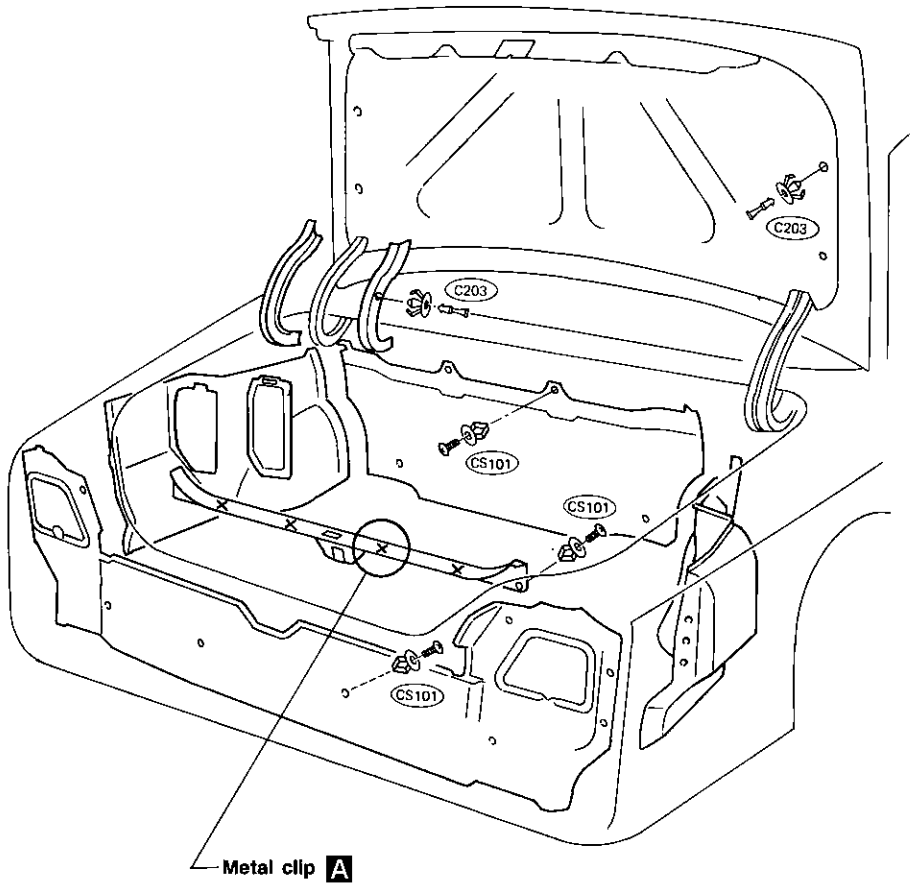


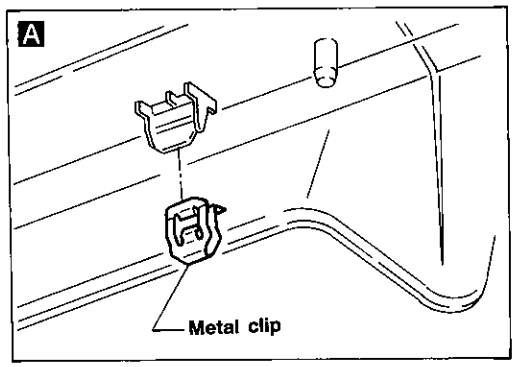




MBF240A

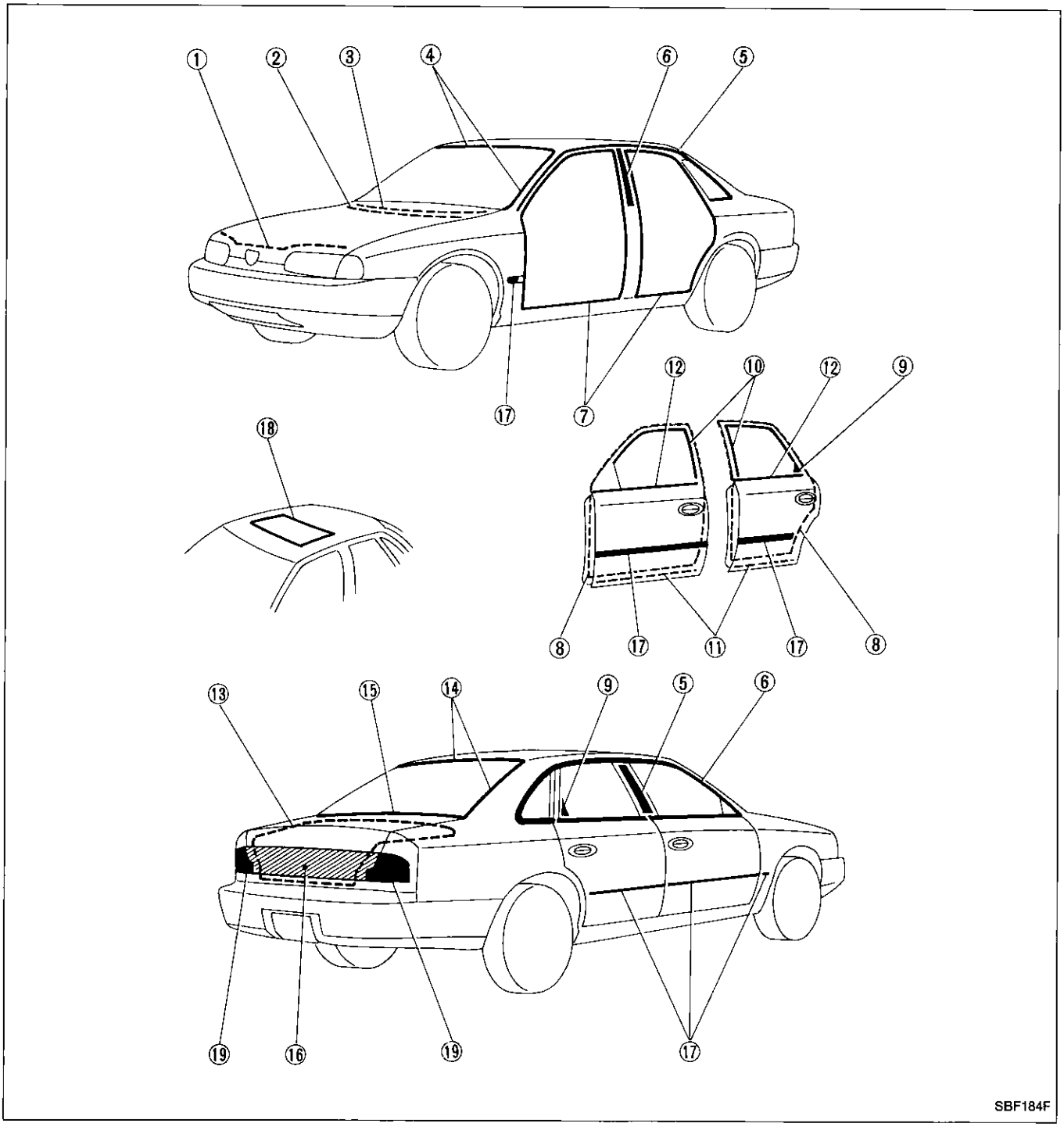
LUGGAGE COMPARTMENT TRIM — Trunk space





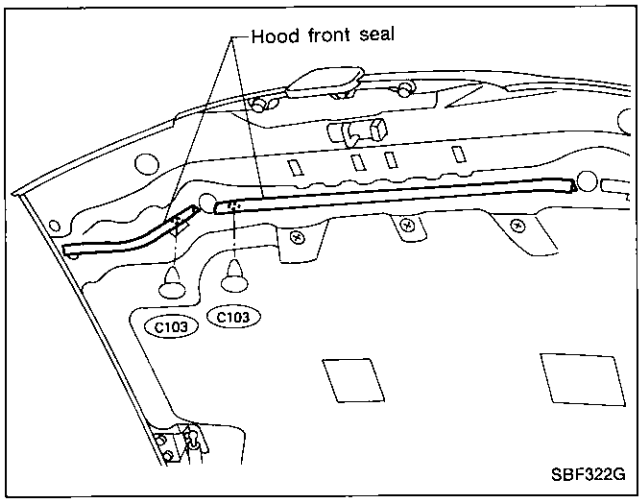
SBF321G

Exterior

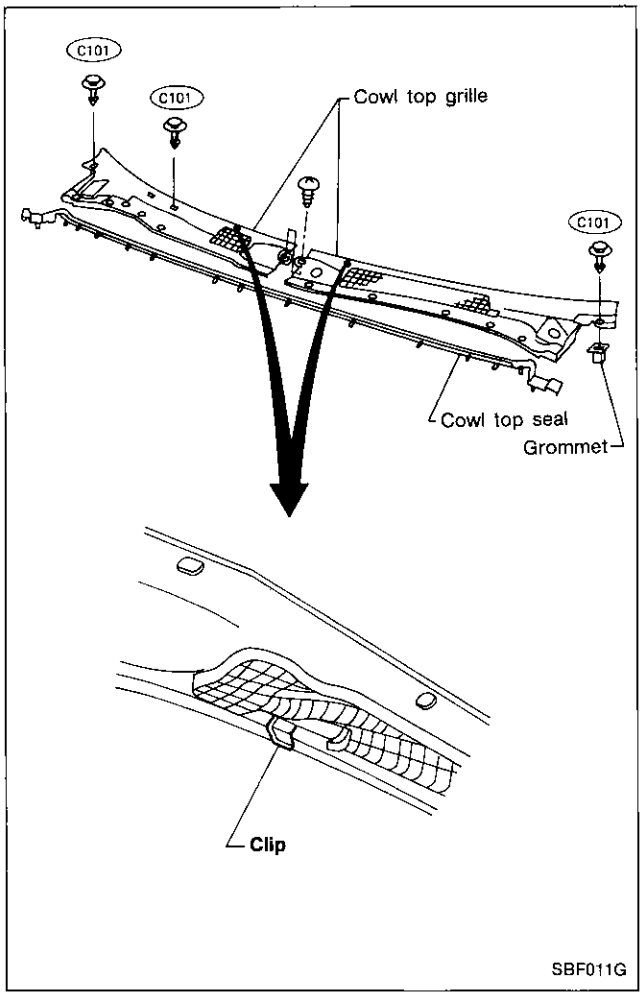

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SBF184F

Exterior (Cont'd)

① Hood front seal



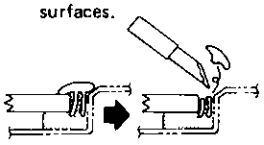
② ③ Cowl top seal and cowl top grille



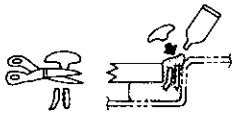
④ Windshield upper molding and side molding

Method 1

Cut off top portion of molding and clean glass and panel surfaces.



Apply sealant to top portion of molding.



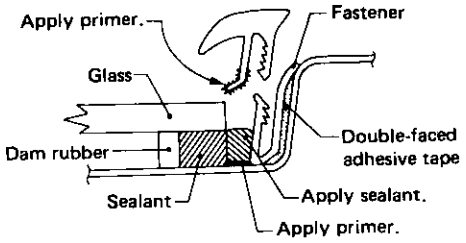
Cut off lower portion of new molding.



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.

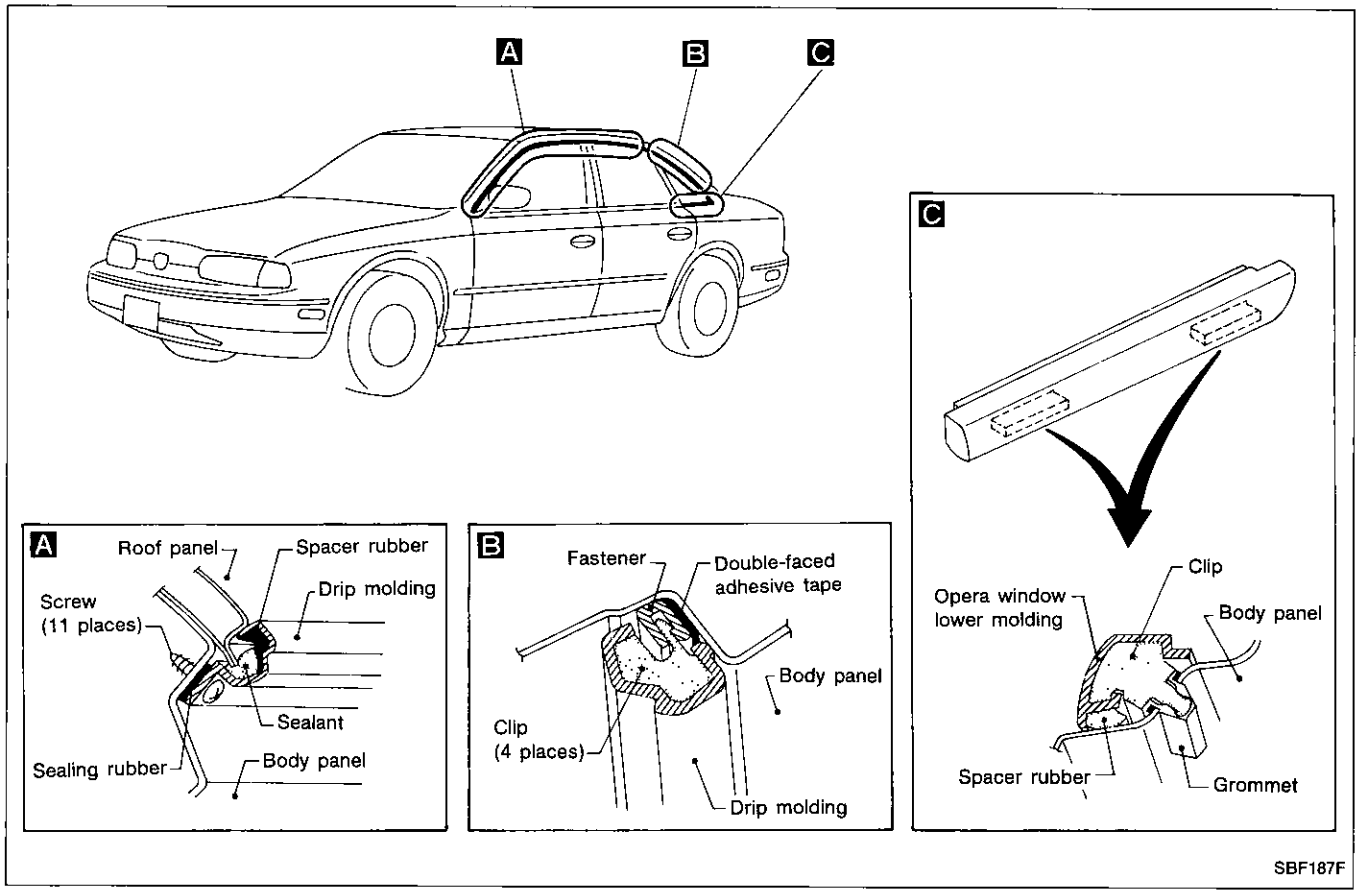


4. Install molding by aligning the molding mark located on center with vehicle center.
   Be sure to install tightly so that there is no gap around the corner.

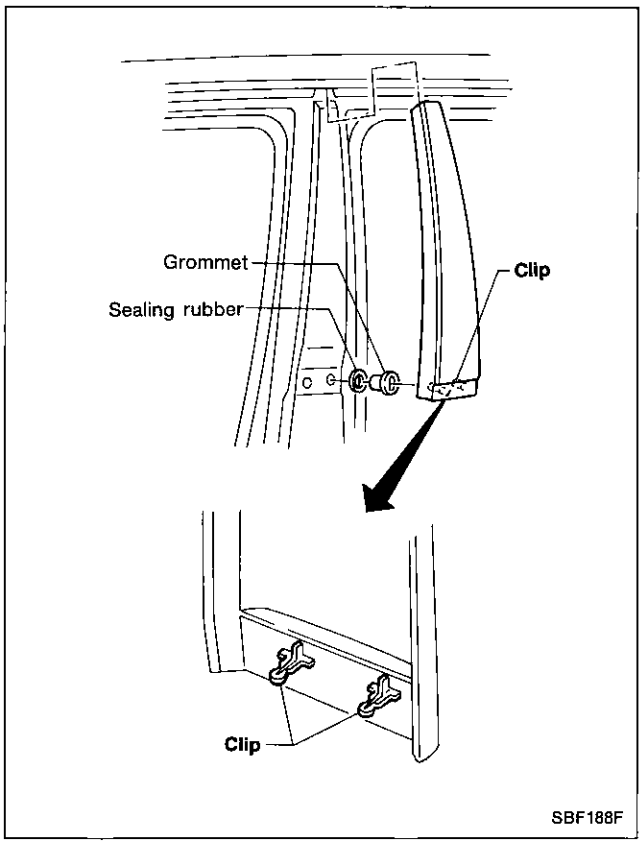
SBF161E

Exterior (Cont'd)

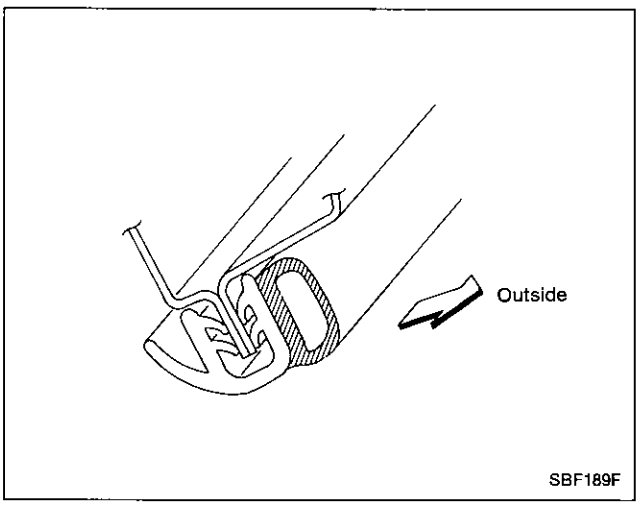
⑤ Drip molding and opera window lower molding



⑥ Center pillar cover

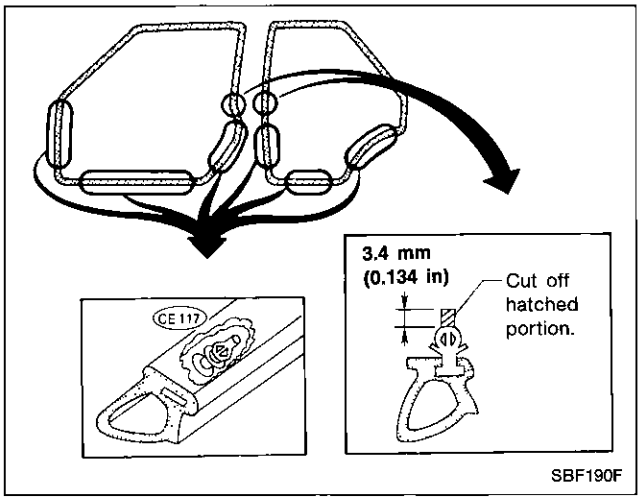


⑦ Body side welt

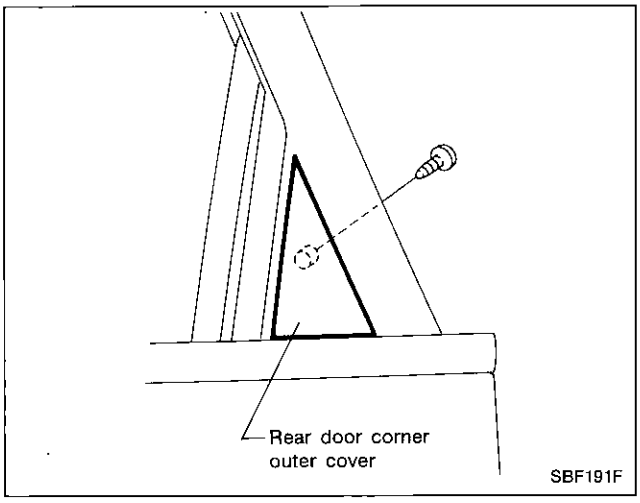


Exterior (Cont'd)

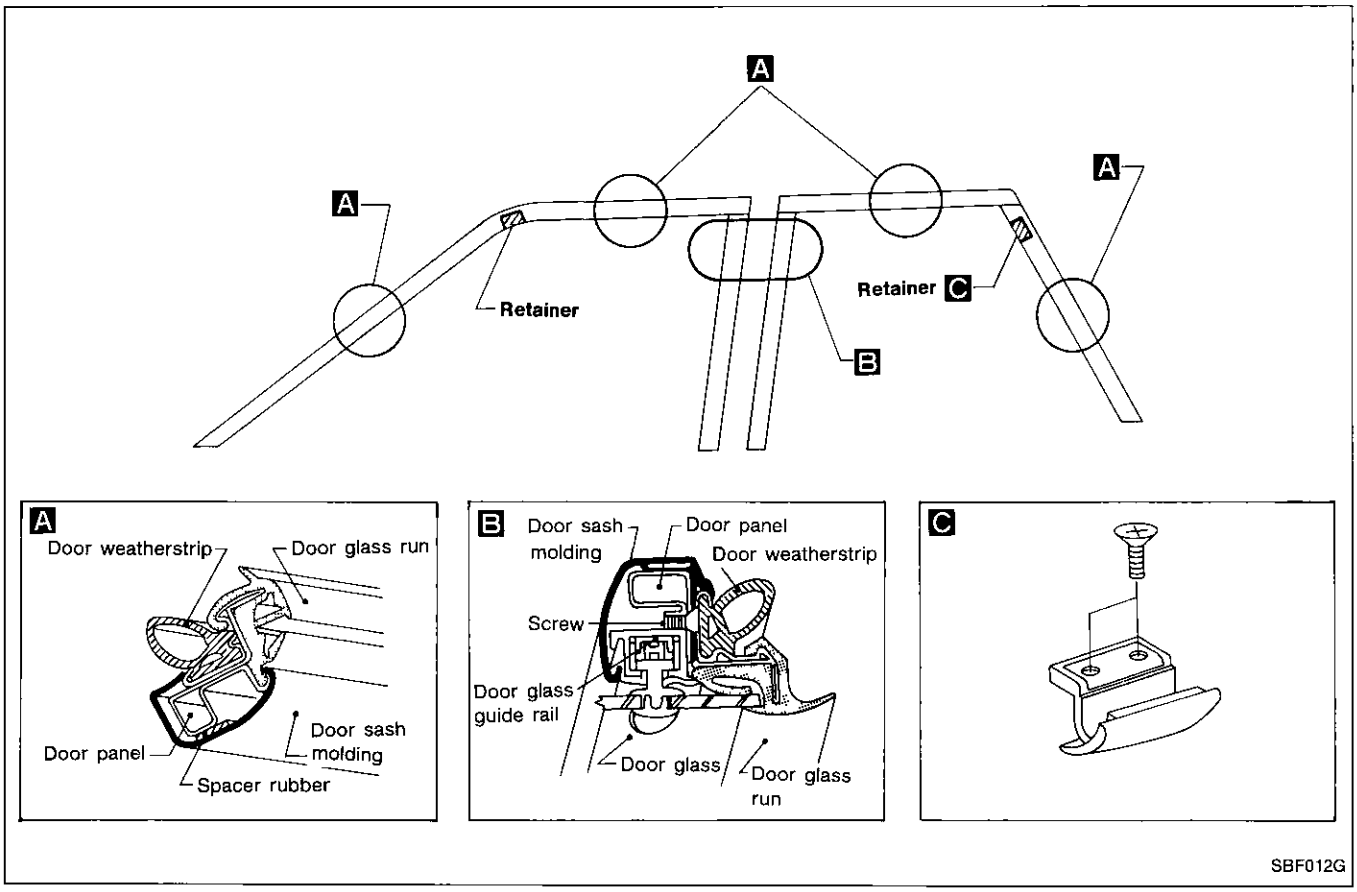
⑧ Door weatherstrip



⑨ Rear door corner outer cover

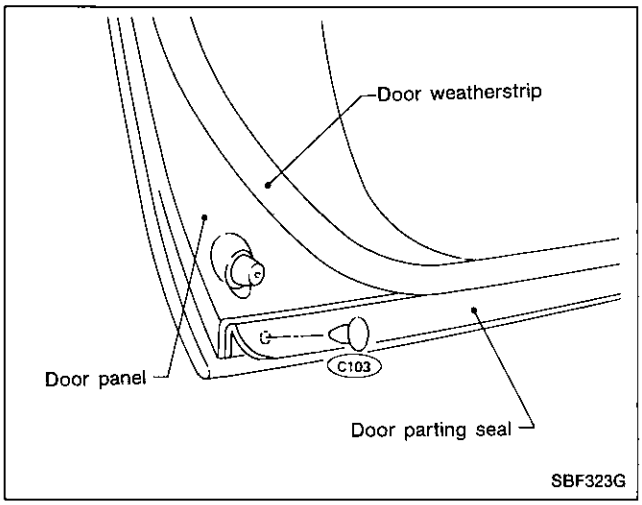


⑩ Door sash molding

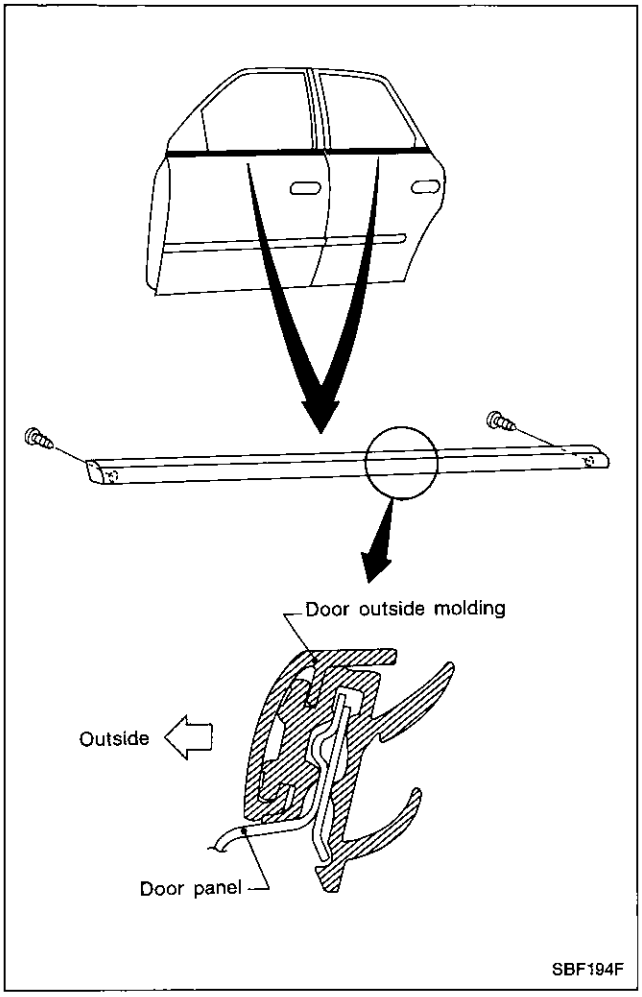


Exterior (Cont'd)

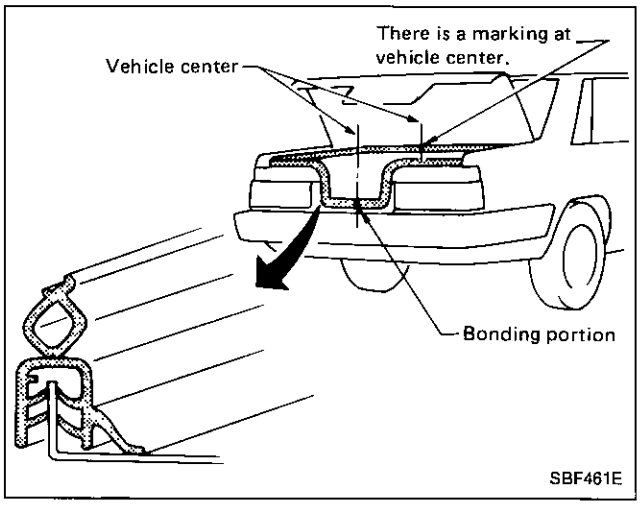
⑪ Door parting seal



⑫ Door outside molding



⑬ Trunk lid weatherstrip



⑭ Rear window upper molding and side molding

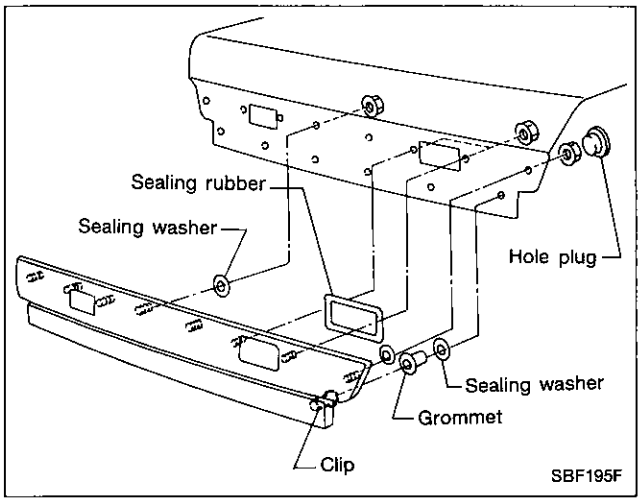
Basically the same as windshield upper molding and side molding.

Refer to ④ Windshield upper molding and side molding.

⑮ Rear window lower molding

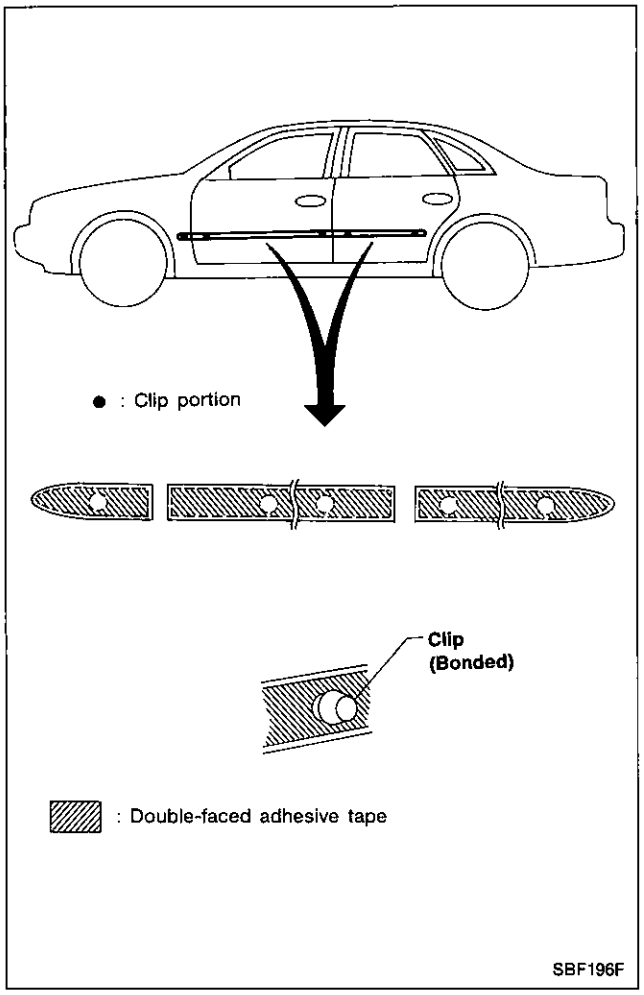
Mounted with screws.

⑯ Trunk lid finisher

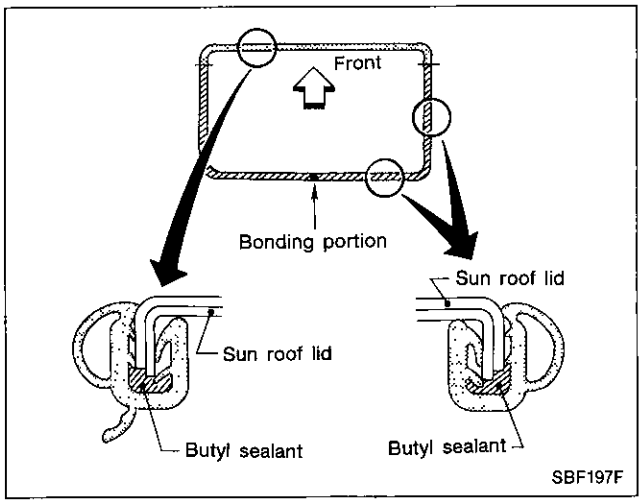


Exterior (Cont'd)

⑰ Side guard molding

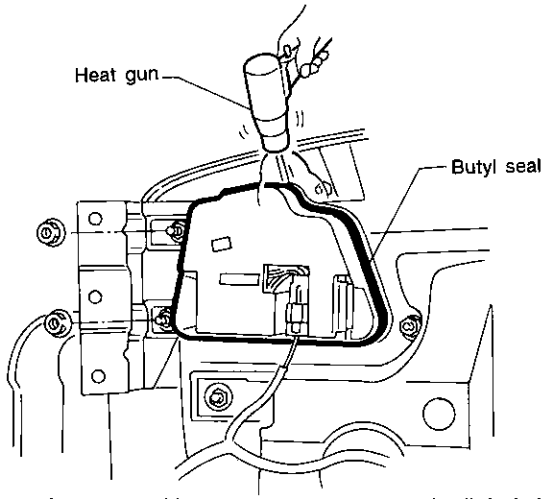


⑱ Sun roof weatherstrip

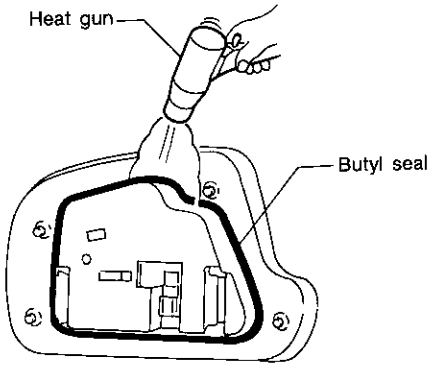


⑲ Rear combination lamp

● Rear combination lamps are installed with nuts and butyl seal.



● **Warm up lamp assembly area to a temperature of a little below 60°C (140°F).**

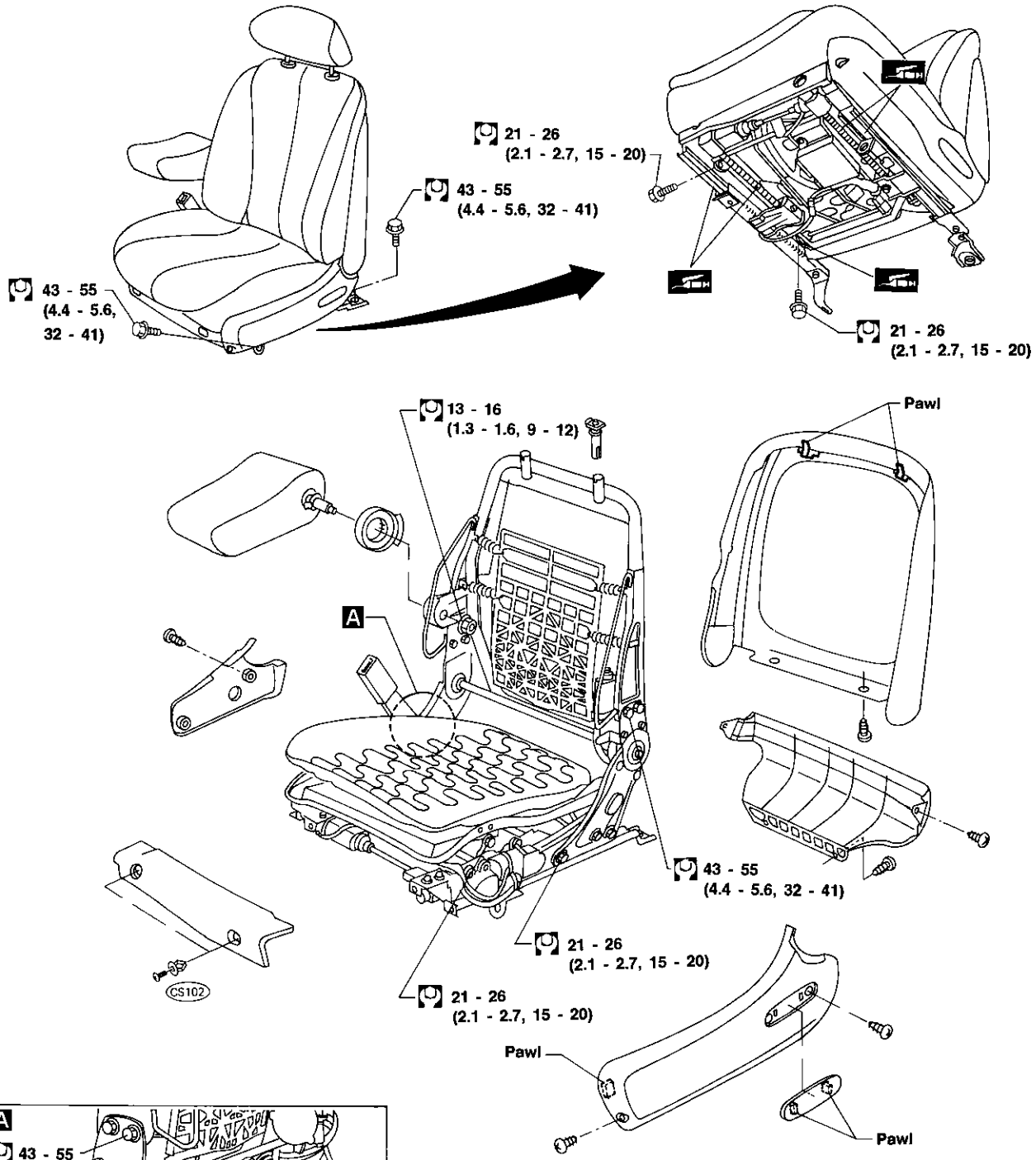


● **Apply butyl seal evenly as it tends to become thin in the corners.**
● **Warm up lamp assembly area to a temperature of a little below 60°C (140°F).**

SBF198F

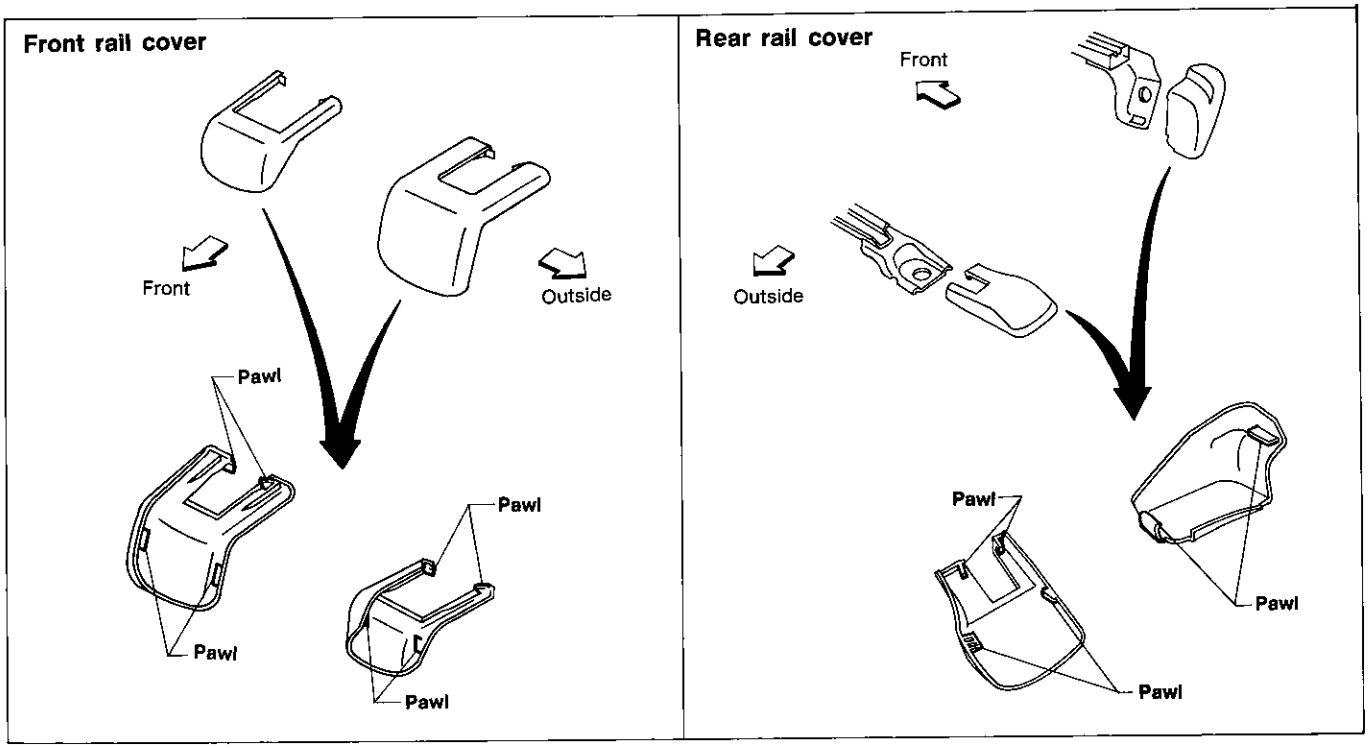
- When removing or installing the seat trim, carefully handle it to keep dirt out and avoid damage.

Front Seat



: N•m (kg-m, ft-lb)

Front Seat (Cont'd)

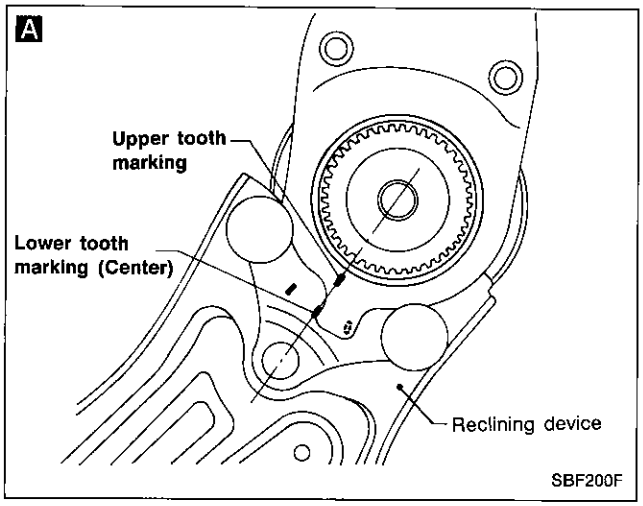


SBF199F

Front Seat (Cont'd)

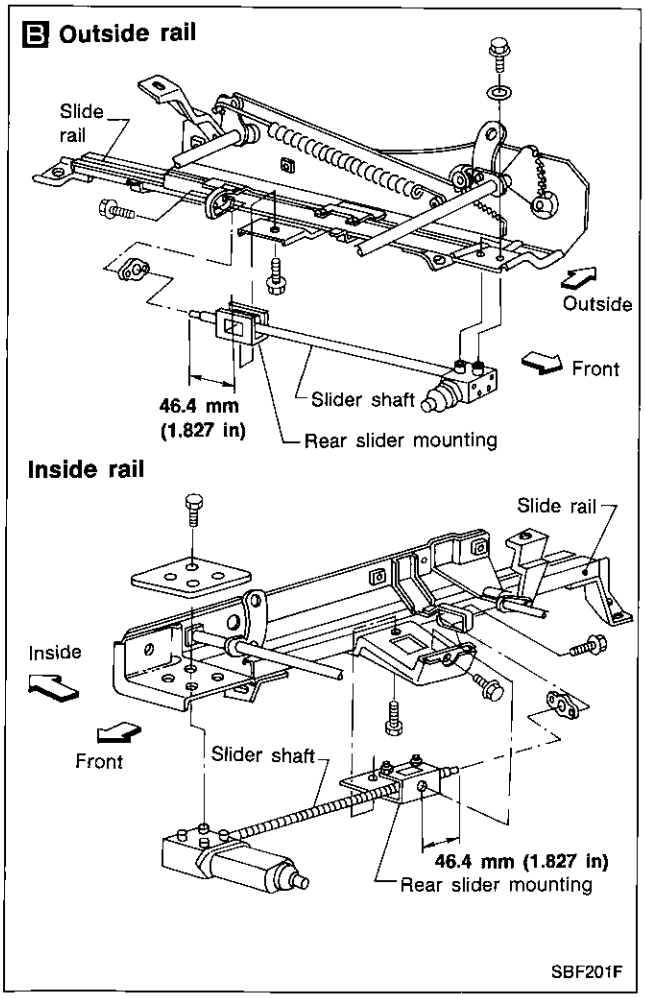
POWER SEAT MOTOR INSTALLATION

- Disconnect ground cable from battery while installing motors.
- Check that all motors function properly after installation.
- Check that trim and padding are removed from driver's seat.
- Install motors on passenger's seat side using the same procedures outlined from the driver's seat side.



A Reclining motor

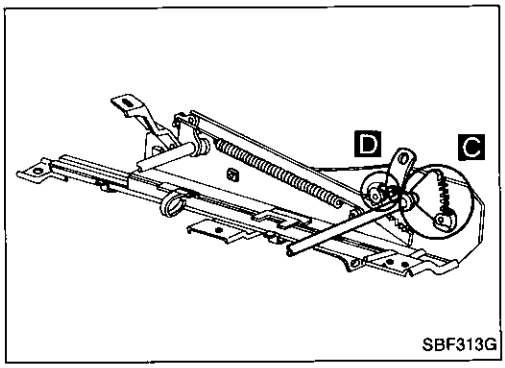
1. Align upper toe mark on outside reclining device with lower toe mark on inside reclining device.
2. Install reclining motor.



B Sliding motor

1. Move both inside and outside slide rails to the rear-end position. (Seat assembly is then set at the front-end position.)
2. Adjust distance between rear end of slider shaft and the center of rear slider mounting to 46.4 mm (1.827 in).
3. Install sliding assembly and sliding motor.

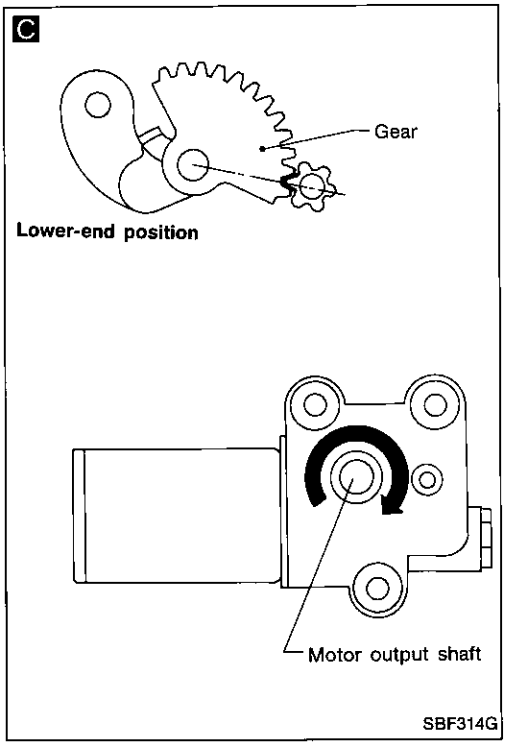
Front Seat (Cont'd)



SBF313G

C Front lifting motor (Driver's side only)

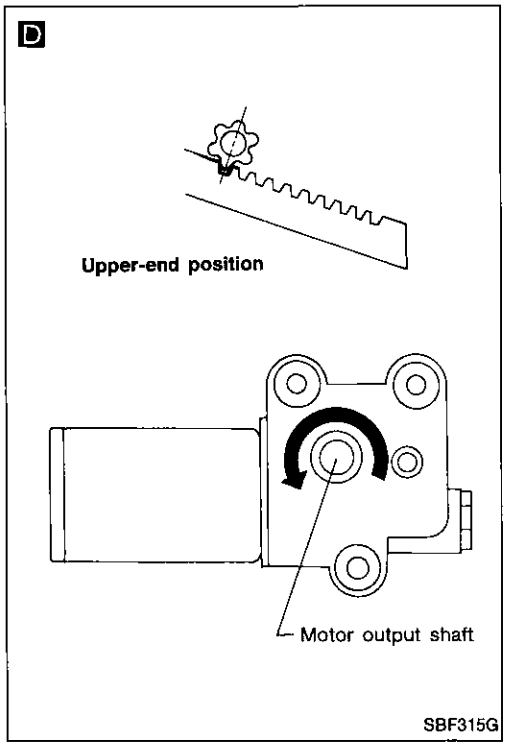
1. Set front lifter to the lower-end position.
2. Connect motor assembly connector to power seat harness connector. (At this point, motor assembly is not installed on seat.)
3. Connect power seat harness connector to main harness connector.
4. Connect battery ground terminal. Set power seat switch so that front lifter move in the lower direction.
5. Lifting motor rotates in direction shown by arrow until it stops automatically at limit switch.
6. Disconnect battery ground terminal. Install front lifting motor.



SBF314G

D Rear lifting motor (Driver's side only)

1. Move rear lifter to the upper-end position. (Spring will set rear lifter at this position.)
2. Connect motor assembly connector to power seat harness connector. (At this point, motor assembly is not installed on seat.)
3. Connect power seat harness connector to main harness connector.
4. Connect battery ground terminal. Set power seat switch so that rear lifter moves in the upper direction.
5. Motor rotates in direction shown by arrow and stops automatically at limit switch.
6. Disconnect battery ground terminal. Install front lifting motor.

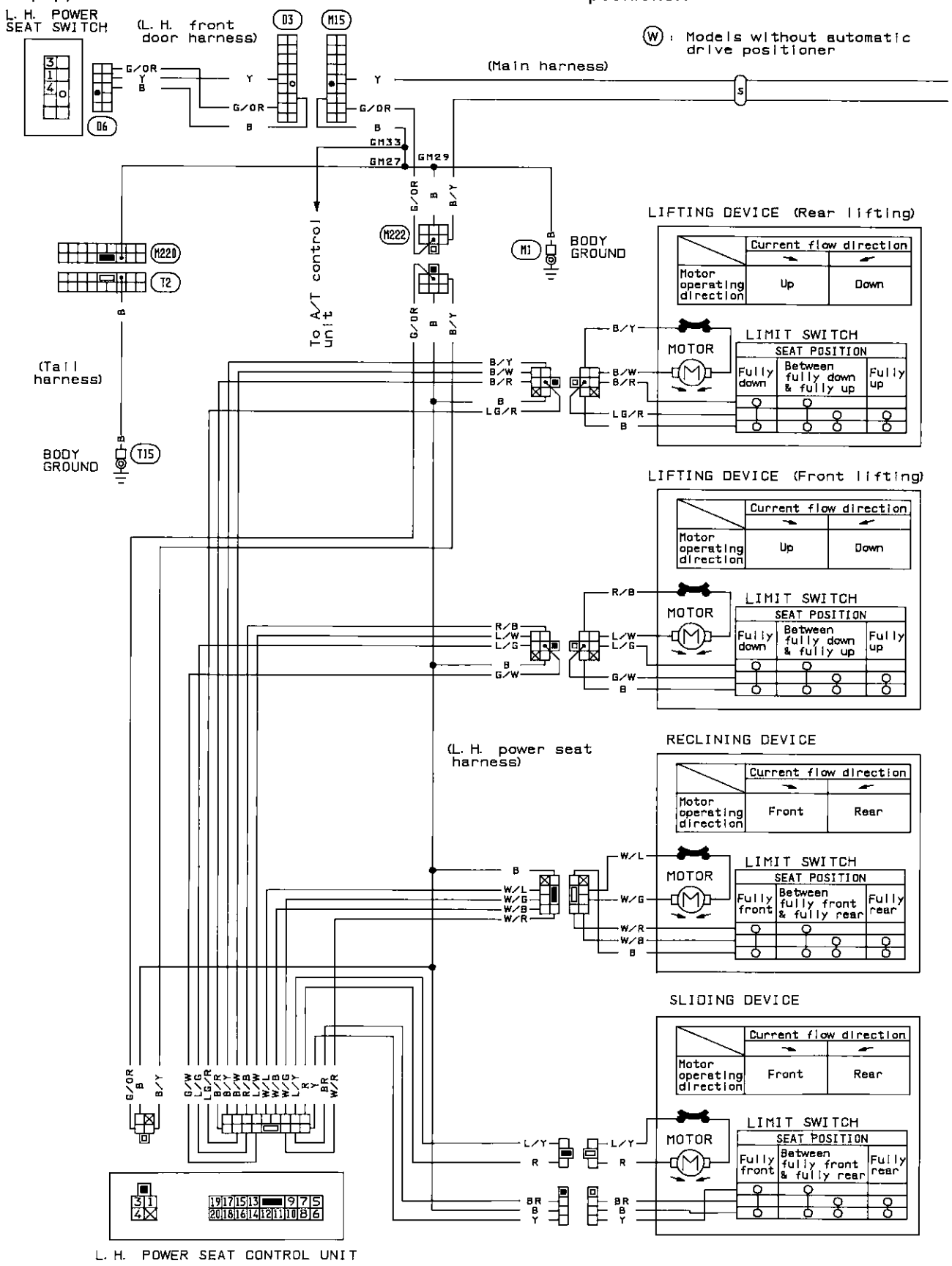


SBF315G

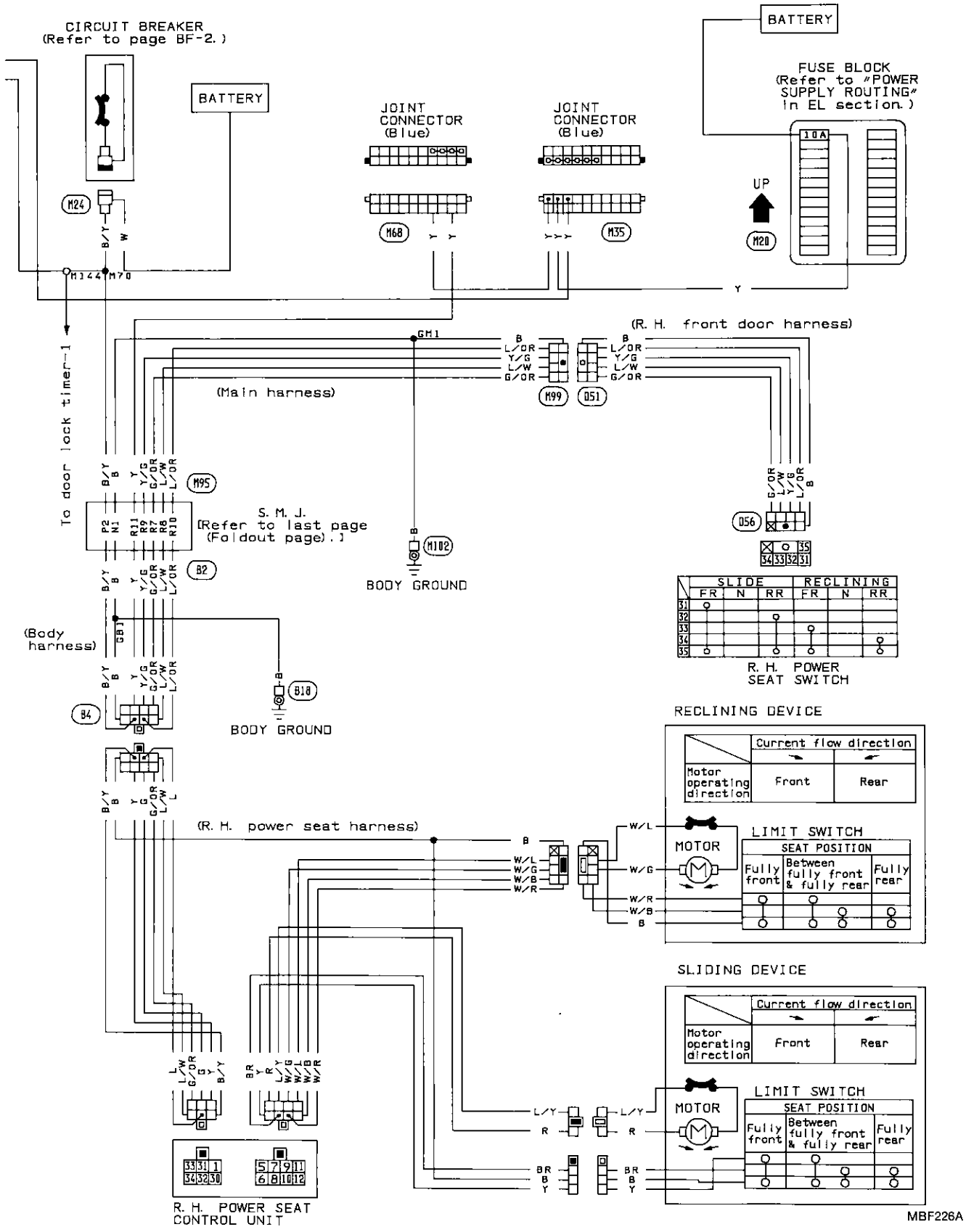
Front Seat (Cont'd)

POWER SEAT/WIRING DIAGRAM

- For wiring diagram of driver's seat equipped with automatic drive positioner, refer to "AUTOMATIC DRIVE POSITIONER".
- For passenger's seat wiring diagram, there is no difference between the automatic drive positioner equipped model and the model without the automatic drive positioner.

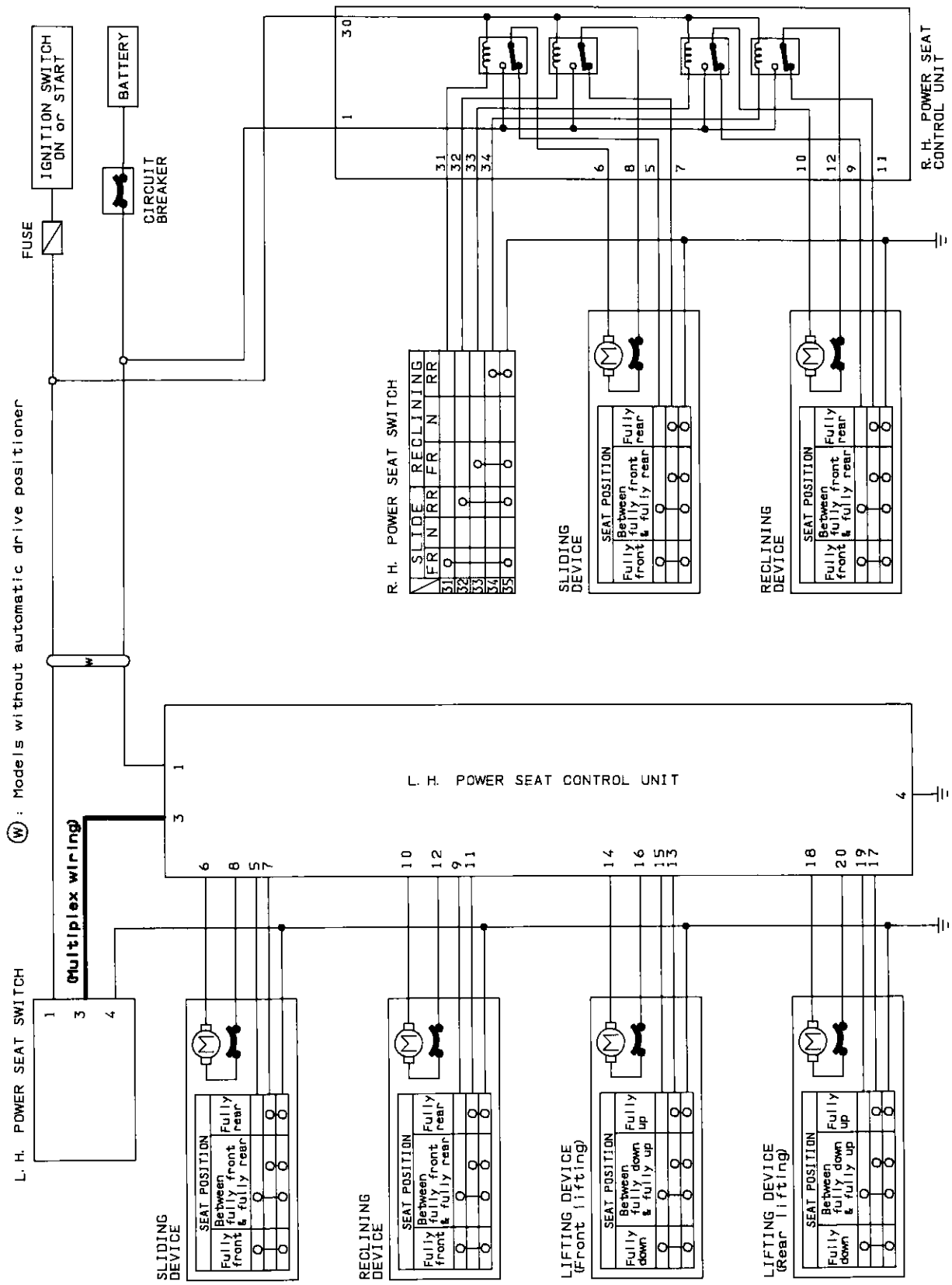


Front Seat (Cont'd)



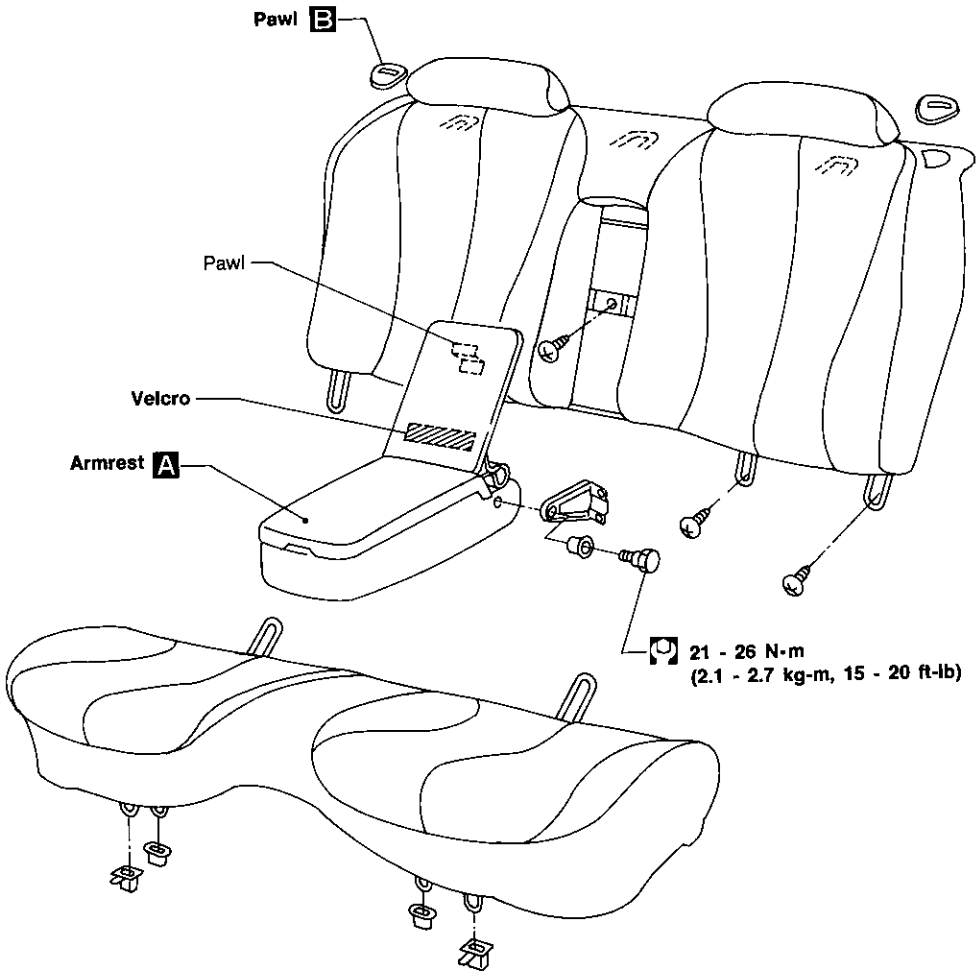
Front Seat (Cont'd)

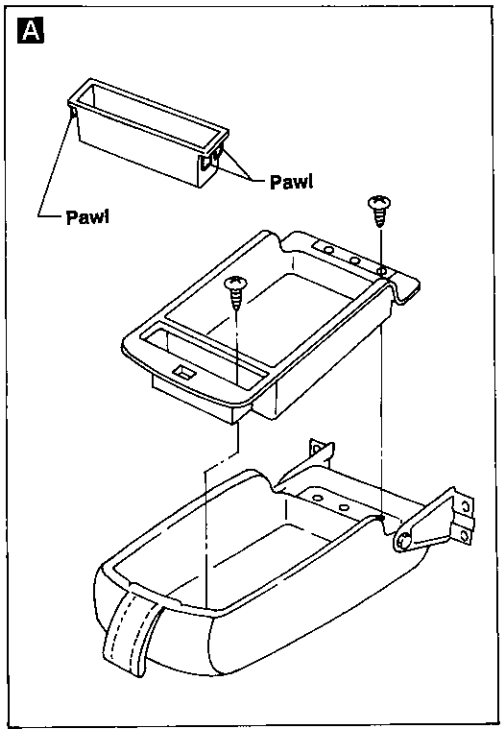
POWER SEAT/SCHEMATIC

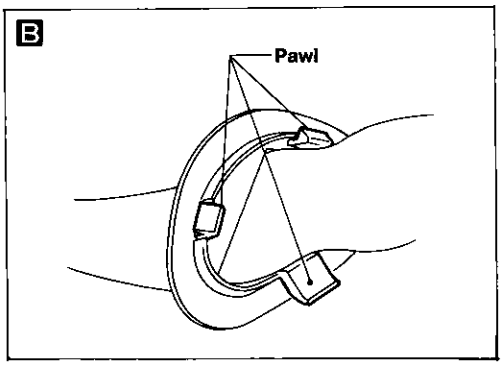


SBF490F

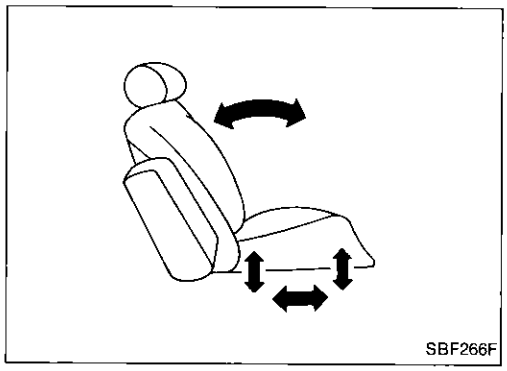
Rear Seat







SBF204F

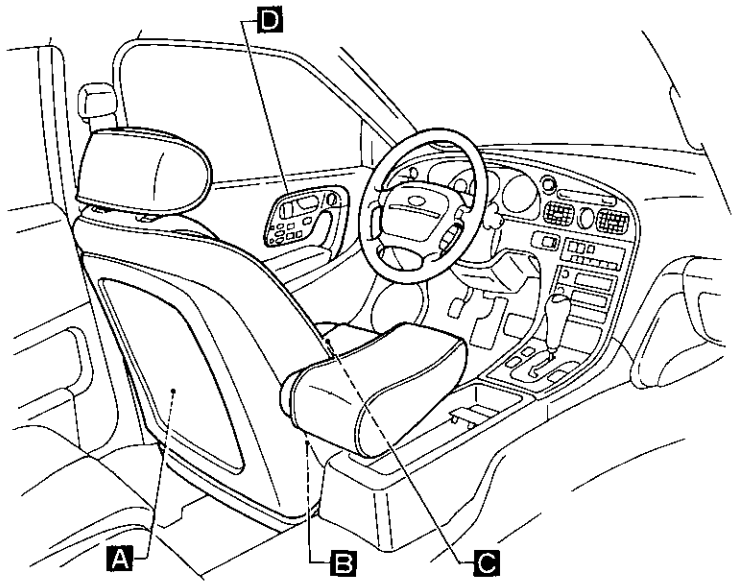

SBF266F

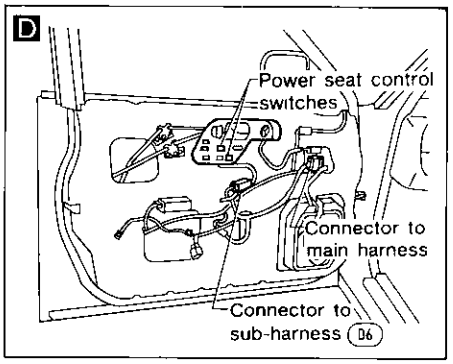
Preliminary Check and Symptom Chart

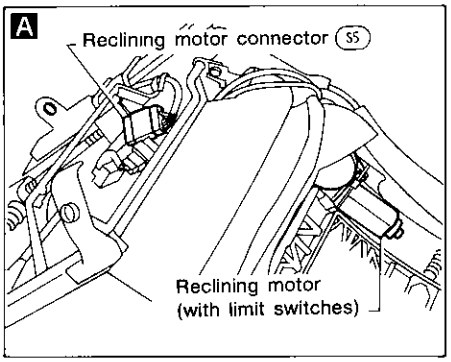
- Check sliding, reclining, front lifting and rear lifting operations using power seat control switches.

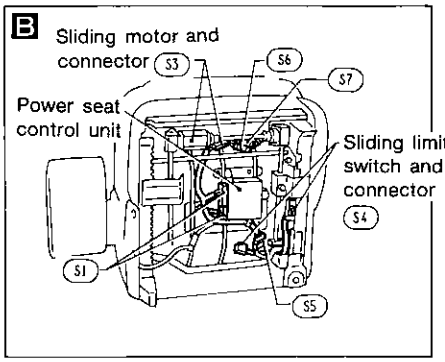
Symptom	Go to
Front driver's seat does not operate at all.	Diagnostic Procedure 1 (BF-46)
Only front driver's seat sliding device does not operate.	Diagnostic Procedure 2 (BF-48)
Only front driver's seat reclining device does not operate.	Diagnostic Procedure 3 (BF-50)
Only front driver's seat front lifting device does not operate.	Diagnostic Procedure 4 (BF-51)
Only front driver's seat rear lifting device does not operate.	Diagnostic Procedure 5 (BF-53)

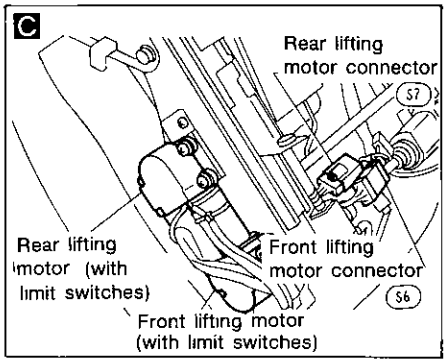
Harness Layout





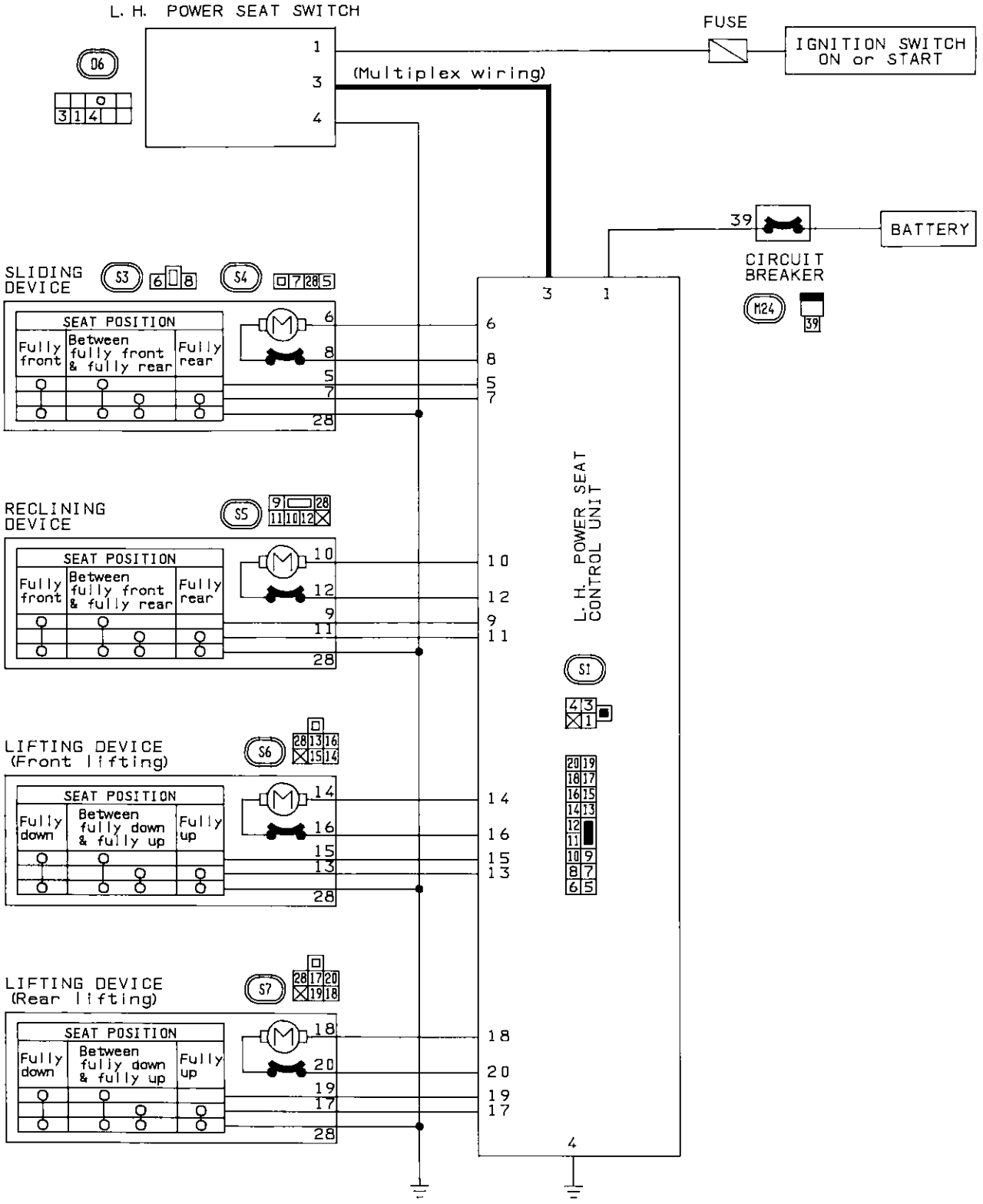






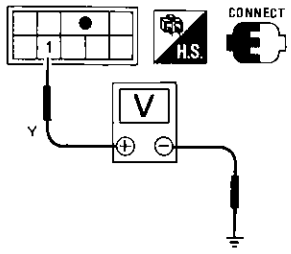
SBF976F

Circuit Diagram for Quick Pinpoint Check



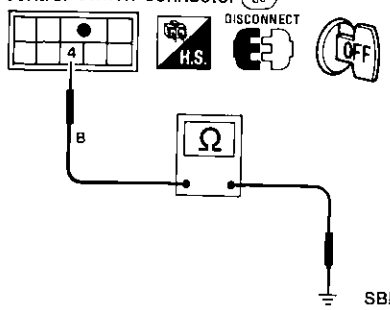
SBF463F

A Driver's side power seat control switch connector (D6)



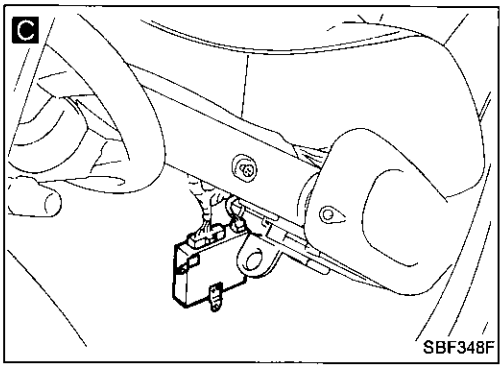
SBF369F

B Driver's side power seat control switch connector (D6)



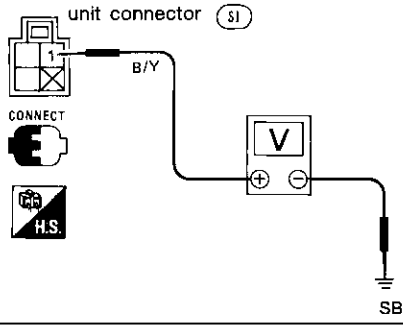
SBF464F

C



SBF348F

D Power seat control unit connector (S1)



SBF365F

Diagnostic Procedure 1

SYMPTOM: Front driver's seat does not operate at all.

CHECK POWER SOURCE FOR DRIVER'S SIDE POWER SEAT SWITCH.
1) Remove driver's side power seat control switch with harness connected.
2) Remove armrest.
3) Remove door trim with harness connected.

A 4) Check voltage between driver's side power seat control switch harness terminal ① and body ground.
Battery voltage should exist.

N.G. → CHECK THE FOLLOWING;
- Fuse
- Harness continuity between driver's side power seat control switch harness terminal ① and fuse.

O.K. ↓

B Note

CHECK GROUND CIRCUIT FOR DRIVER'S SIDE POWER SEAT CONTROL SWITCH.
1) Disconnect driver's side power seat control switch harness connector (D6).
2) Check continuity between driver's side power seat control switch harness terminal ④ and body ground.
Continuity should exist.

O.K. ↓

C
1) Remove driver's side seat mounting bolts and lay the seat down in the vehicle protecting it with a cloth.
2) Remove power seat control unit's mounting screws.

D

CHECK POWER SOURCE FOR POWER SEAT CONTROL UNIT.
Check voltage between power seat control unit harness terminal ① and body ground.
Battery voltage should exist.

N.G. →
- Check harness between power seat control unit harness terminal ① and circuit breaker harness terminal ㊴.
- Check circuit breaker.

O.K. ↓

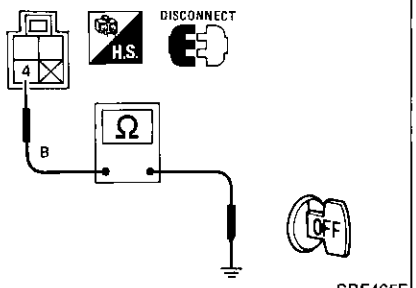
Ⓐ

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Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

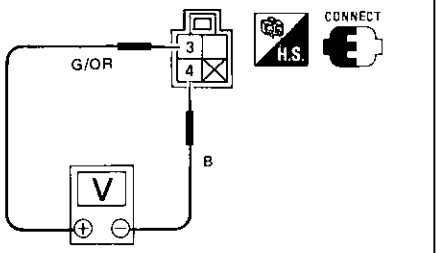
Diagnostic Procedure 1 (Cont'd)

E Driver's side power seat control unit connector (S1)



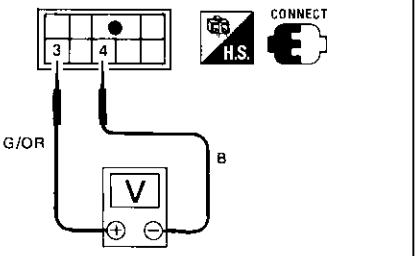
SBF465F

F Power seat control unit connector (S1)



SBF367F

G Driver's side power seat control switch connector (D6)



SBF373F

Ⓐ

E Note

CHECK GROUND CIRCUIT FOR POWER SEAT CONTROL UNIT.
1) Disconnect power seat control unit harness connector (S1).
2) Check harness continuity between power seat control unit harness terminal (4) and body ground.
Continuity should exist.

O.K.

Reconnect power seat control unit harness connector (S1) and driver's side power seat control switch harness connector (D6).

F

CHECK MULTIPLEX SIGNAL.
Check voltage between power seat control unit harness terminals (3) and (4).
Approximately 1.0 to 1.6V should exist when any one of driver's side power seat control switches is turned ON.
Note: Do not use a digital type voltmeter.

N.G.

G

CHECK MULTIPLEX SIGNAL.
Check voltage between driver's side power seat control switch harness terminal (3) and (4).
Approximately 1.0 to 1.6V should exist when any one of driver's side power seat control switches is turned ON.
Note: Do not use a digital type voltmeter.

O.K.

Note

- CHECK THE POWER SEAT CONTROL UNIT PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE POWER SEAT CONTROL UNIT HARNESS CONNECTOR (S1).

O.K.

Replace power seat control unit.

O.K.

Note

Repair harness between driver's side power seat control switch harness terminal (3) and driver's side power seat control unit harness terminal (3).

N.G.

Note

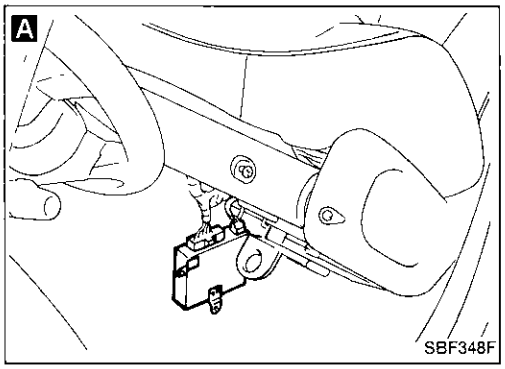
- CHECK THE DRIVER'S SIDE POWER SEAT CONTROL SWITCH PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE DRIVER'S SIDE POWER SEAT CONTROL SWITCH HARNESS CONNECTOR (D6).

O.K.

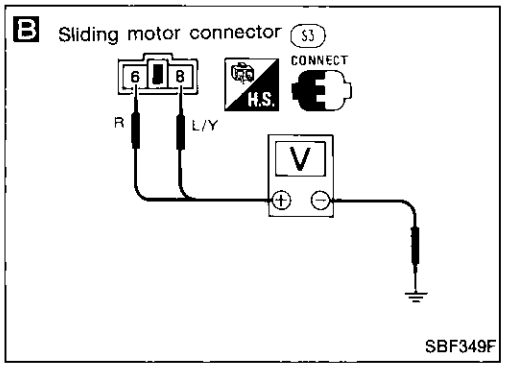
Replace driver's side power seat control switch.

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

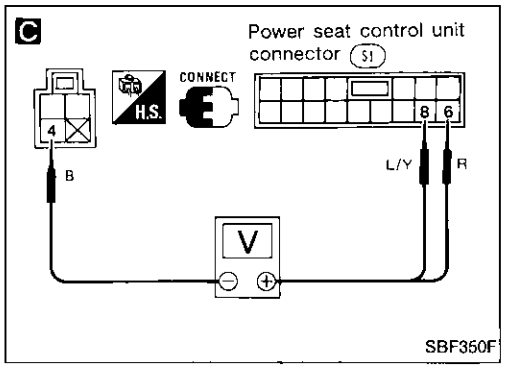
A



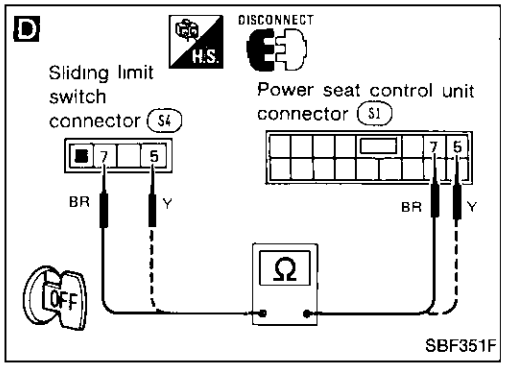
B Sliding motor connector (S3)



C Power seat control unit connector (S1)



D Sliding limit switch connector (S4)



Diagnostic Procedure 2

SYMPTOM: Only front driver's seat sliding device does not operate.

A

1) Remove driver's side seat mounting bolts and lay the seat down in the vehicle protecting it with a cloth.
2) Remove power seat control unit mounting screws.

B

CHECK POWER SOURCE FOR SLIDING MOTOR.
Check voltage between sliding motor harness terminals ⑥, ⑧ and body ground.

Sliding switch		Terminal	Voltage
Frontward	ON	⑥	Battery voltage
	OFF		Less than 0.5V
Rearward	ON	⑧	Battery voltage
	OFF		Less than 0.5V

N.G. → **C**

C

CHECK POWER SEAT CONTROL UNIT POWER SUPPLY FOR SLIDING MOTOR.
Check voltage between power seat control unit harness terminals ⑥, ⑧ and ④.

Sliding switch		Terminal ⊕	Terminal ⊖	Voltage
Frontward	ON	⑥	④	Battery voltage
	OFF			Less than 0.5V
Rearward	ON	⑧		Battery voltage
	OFF			Less than 0.5V

O.K. → Repair harness between power seat control unit harness terminal(s) ⑥, ⑧ and sliding motor harness terminal(s) ⑥, ⑧.

N.G. → Note

D

CHECK HARNESS.
1) Disconnect power seat control unit harness connector S1 and sliding limit switch harness connector S4.
2) Check harness continuity between power seat control unit harness terminals ⑤, ⑦ and sliding limit switch harness terminals ⑤, ⑦.
Continuity should exist.

O.K. → Ⓐ

(Go to next page.)

O.K. → Note

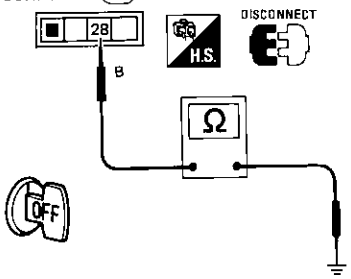
CHECK THE CONNECTION AT THE SLIDING MOTOR HARNESS CONNECTOR (S3).

O.K. → Replace sliding motor.

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

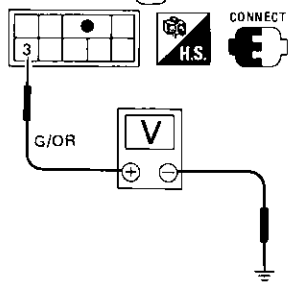
Diagnostic Procedure 2 (Cont'd)

E Sliding limit switch connector (S4)



SBF352F

F Driver's side power seat control switch connector (D6)



SBF466F

Ⓐ

E Note

CHECK GROUND CIRCUIT FOR SLIDING LIMIT SWITCH.
Check harness continuity between sliding limit switch harness terminal (28) and body ground.
Continuity should exist.

O.K.

CHECK SLIDING LIMIT SWITCH.
(Refer to Electrical Components Inspection.)

N.G. → Replace sliding limit switch.

O.K.

Reconnect power seat control unit harness connector (S1) and sliding limit switch harness connector (S4).

CHECK MULTIPLEX SIGNAL FROM DRIVER'S SIDE POWER SEAT CONTROL SWITCH.

1) Remove driver's side power seat control switch with harness connected.
2) Remove armrest.
3) Remove door trim with harnesses connected.
F 4) Check voltage between driver's side power seat control switch harness terminal (3) and body ground while turning sliding switch ON and OFF.

Control switch	Voltage
Sliding switch ON	Approximately 1.0 - 1.6V
All switches OFF	0V

Note: Do not use a digital type voltmeter.

N.G. → Replace driver's side power seat control switch.

O.K.

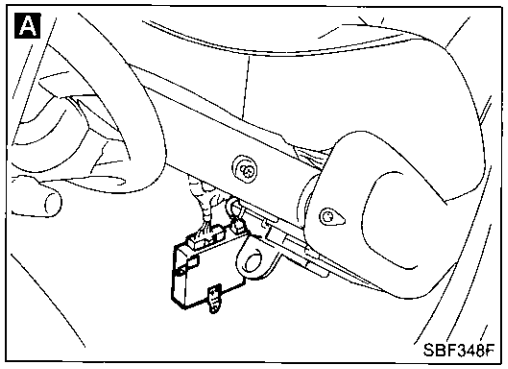
Replace driver's side power seat control unit.

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 3

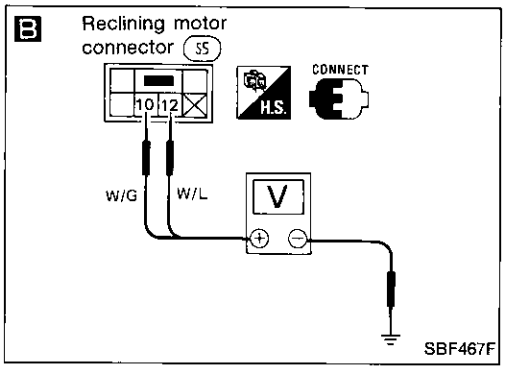
SYMPTOM: Only front driver's seat reclining device does not operate.

A


SBF348F

1) Remove driver's side seat mounting bolts and lay the seat down in the vehicle protecting it with a cloth.
2) Remove power seat control unit mounting screws.

B



SBF467F

CHECK POWER SOURCE FOR RECLINING MOTOR.
Check voltage between reclining motor harness terminals ⑩, ⑫ and body ground.

Reclining switch		Terminal	Voltage
Forward	ON	⑩	Battery voltage
	OFF		Less than 0.5V
Rearward	ON	⑫	Battery voltage
	OFF		Less than 0.5V

N.G. →

O.K. ↓

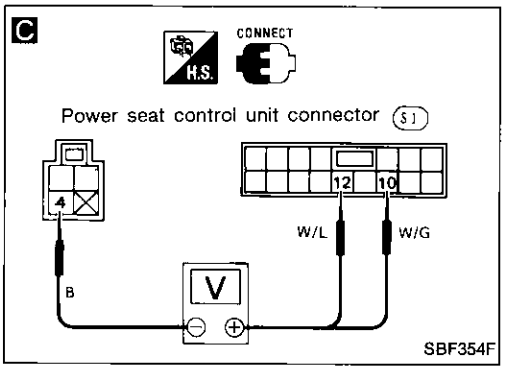
Note

CHECK THE CONNECTION AT THE RECLINING MOTOR HARNESS CONNECTOR (S5).

O.K. ↓

Replace reclining motor.

C



SBF354F

CHECK POWER SEAT CONTROL UNIT POWER SUPPLY FOR RECLINING MOTOR.
Check voltage between power seat control unit harness terminals ⑩, ⑫ and ④.

Reclining switch		Terminal ⊕	Terminal ⊖	Voltage
Forward	ON	⑩	④	Battery voltage
	OFF			Less than 0.5V
Rearward	ON	⑫		Battery voltage
	OFF			Less than 0.5V

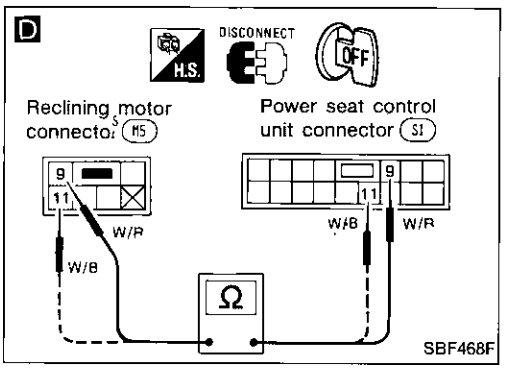
O.K. ↓

Repair harness between power seat control unit harness terminal(s), ⑩, ⑫ and reclining motor harness terminal(s) ⑩, ⑫.

N.G. ↓

Note

D



SBF468F

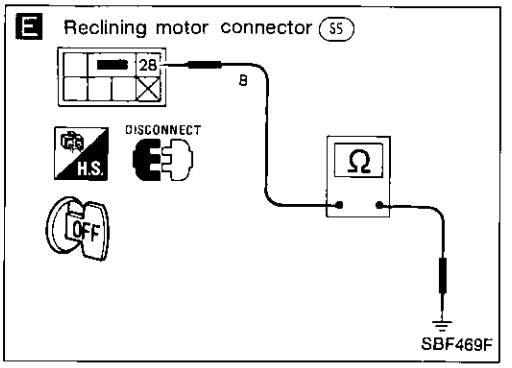
CHECK HARNESS.
1) Disconnect power seat control unit harness connector (S1) and reclining motor harness connector (S5).
2) Check harness continuity between power seat control unit harness terminals ⑨, ⑪ and reclining motor harness terminals ⑨, ⑪.

Continuity should exist.

O.K. ↓

E

Note



SBF469F

CHECK GROUND CIRCUIT FOR RECLINING LIMIT SWITCH.
Check harness continuity between reclining motor harness terminal ㉘ and body ground.

Continuity should exist.

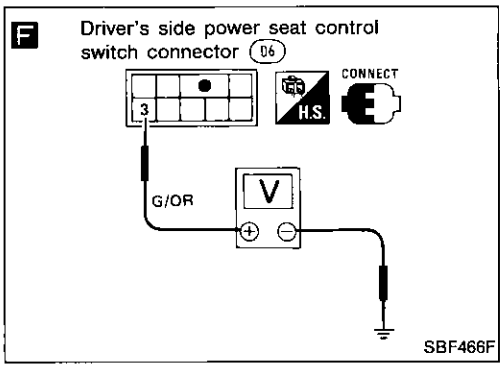
O.K. ↓

Ⓐ

(Go to next page.)

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 3 (Cont'd)



Ⓐ

Reconnect power seat control unit harness connector (S1) and reclining motor harness connector (S5)

CHECK MULTIPLEX SIGNAL FROM DRIVER'S SIDE POWER SEAT CONTROL SWITCH.

1) Remove driver's side power seat control switch with harness connected.
2) Remove armrest.
3) Remove door trim with harness connected.

F 4) Check voltage between driver's side power seat control switch harness terminal (3) and body ground while turning switch ON and OFF.

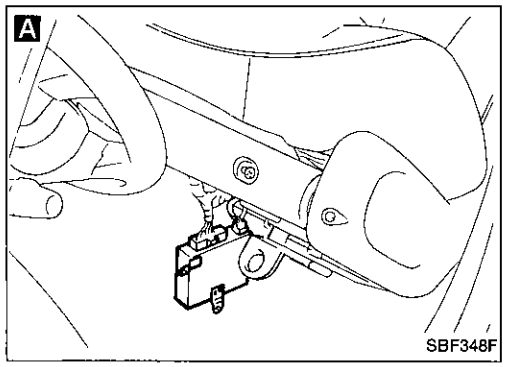
Control switch	Voltage
Reclining switch ON	Approximately 1.0 - 1.6V
All switches OFF	0V

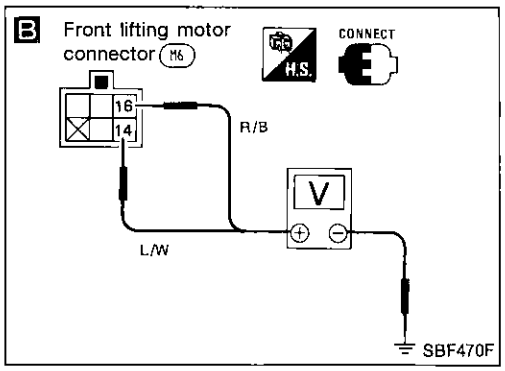
Note: Do not use a digital type voltmeter.

N.G. → Replace driver's side power seat control switch.

O.K. ↓

Replace driver's side power seat control unit.





Diagnostic Procedure 4

SYMPTOM: Only front driver's seat front lifting device does not operate.

A

1) Remove driver's side seat mounting bolts and lay the seat down in the vehicle protecting it with a cloth.
2) Remove power seat control unit mounting screws.

B CHECK POWER SOURCE FOR FRONT LIFTING MOTOR.

Check voltage between front lifting motor harness terminals (14), (16) and body ground.

Front lifting switch		Terminal	Voltage
Upward	ON	(14)	Battery voltage
	OFF		Less than 0.5V
Downward	ON	(16)	Battery voltage
	OFF		Less than 0.5V

N.G. → Ⓑ

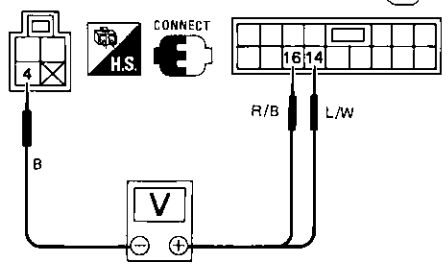
O.K. ↓

Ⓐ

Diagnostic Procedure 4 (Cont'd)

C

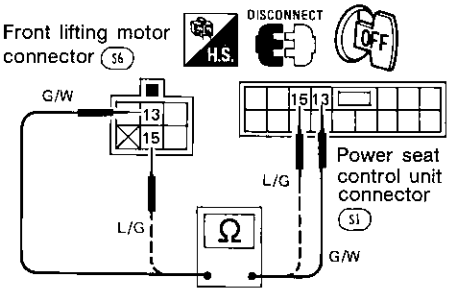
Power seat control unit connector (S1)



SBF358F

D

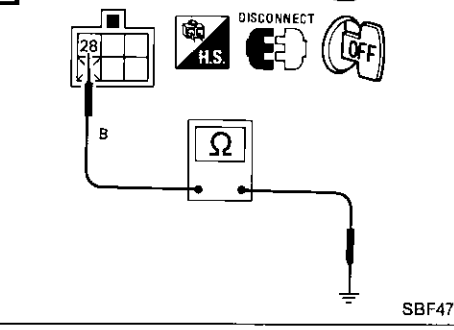
Front lifting motor connector (S6)



SBF471F

E

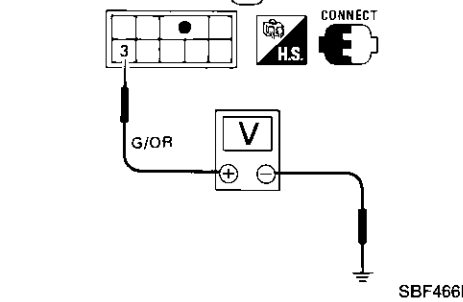
Front lifting motor connector (S6)



SBF472F

F

Driver's side power seat control switch connector (D6)



SBF466F

C (B)

CHECK POWER SEAT CONTROL UNIT POWER SUPPLY FOR FRONT LIFTING MOTOR.
Check voltage between power seat control unit harness terminals (14), (16) and (4).

Front lifting switch		Terminal ⊕	Terminal ⊖	Voltage
Upward	ON	(14)	(4)	Battery voltage
	OFF			Less than 0.5V
Downward	ON	(16)		Battery voltage
	OFF			Less than 0.5V

O.K. → Repair harness between power seat control unit harness terminals, (14), (16) and front lifting motor harness terminals (14), (16).

N.G. → Note

D

CHECK HARNESS.
1) Disconnect power seat control unit harness connector (S1) and front lifting motor harness connector (S6).
2) Check harness continuity between power seat control unit harness terminals (13), (15) and front lifting motor harness terminals (13), (15).
Continuity should exist.

O.K. →

E Note

CHECK GROUND CIRCUIT FOR FRONT LIFTING LIMIT SWITCH.
Check harness continuity between front lifting motor harness terminal (28) and body ground.
Continuity should exist.

O.K. → (D)

(Go to (D) above.)

(A) Note

CHECK THE CONNECTION AT THE FRONT LIFTING MOTOR HARNESS CONNECTOR (S6).

O.K. → Replace front lifting motor.

(D)

Reconnect power seat control unit harness connector (S1) and front lifting motor harness connector (S6).

CHECK MULTIPLEX SIGNAL FROM DRIVER'S SIDE POWER SEAT CONTROL SWITCH.
1) Remove driver's side power seat control switch with harness connected.
2) Remove armrest.
3) Remove door trim with harness connected.

F 4) Check voltage between driver's side power seat control switch harness terminal (3) and body ground while turning switch ON and OFF.

Control switch	Voltage
Front lifting switch ON	Approximately 1.0 - 1.6V
All switches OFF	0V

Note: Do not use a digital type voltmeter.

O.K. → Replace driver's side power seat control unit.

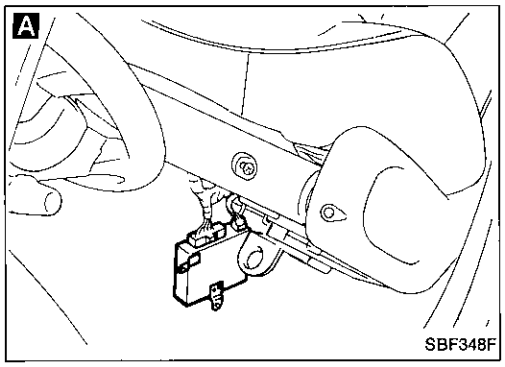
N.G. → Replace driver's side power seat control switch.

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 5

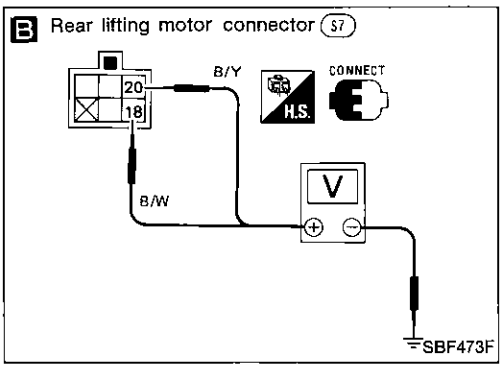
SYMPTOM: Only front driver's seat rear lifting device does not operate.

A


SBF348F

1) Remove driver's side seat mounting bolts and lay the seat down in the vehicle protecting it with a cloth.
2) Remove power seat control unit mounting screws.

B



CHECK POWER SOURCE FOR REAR LIFTING MOTOR.
Check voltage between rear lifting motor harness terminals (18), (20) and body ground.

Rear lifting switch		Terminal	Voltage
Upward	ON	(18)	Battery voltage
	OFF		Less than 0.5V
Downward	ON	(20)	Battery voltage
	OFF		Less than 0.5V

N.G. → **C**

O.K.

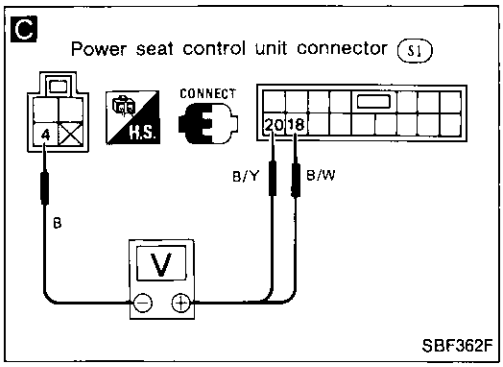
Note

CHECK THE CONNECTION AT THE REAR LIFTING MOTOR HARNESS CONNECTOR (S7).

O.K.

Replace rear lifting motor.

C



CHECK POWER SEAT CONTROL UNIT POWER SUPPLY FOR REAR LIFTING MOTOR.
Check voltage between power seat control unit harness terminals (18), (20) and (4).

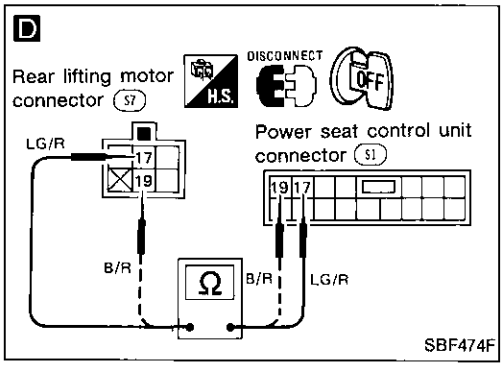
Rear lifting switch		Terminal ⊕	Terminal ⊖	Voltage
Upward	ON	(18)	(4)	Battery voltage
	OFF			Less than 0.5V
Downward	ON	(20)		Battery voltage
	OFF			Less than 0.5V

O.K. → Repair harness between power seat control unit harness terminal(s), (18), (20) and rear lifting motor harness terminal(s) (18), (20).

N.G. → **D**

Note

D

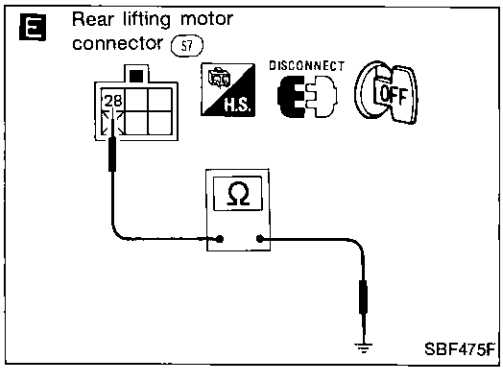


CHECK HARNESS.
1) Disconnect power seat control unit harness connector (S1) and rear lifting motor harness connector (S7).
2) Check harness continuity between power seat control unit harness terminals (17), (19) and rear lifting motor harness terminals (17), (19).
Continuity should exist.

O.K.

E

Note



CHECK GROUND CIRCUIT FOR REAR LIFTING LIMIT SWITCH.
Check harness continuity between rear lifting motor harness terminal (28) and body ground.
Continuity should exist.

O.K.

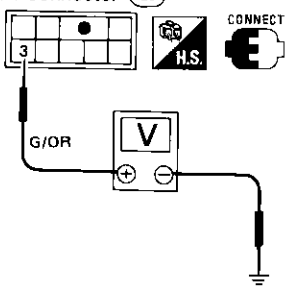
Ⓐ

(Go to next page.)

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 5 (Cont'd)

F Driver's side power seat control switch connector (D6)



SBF466F

Ⓐ

Reconnect power seat control unit harness connector (S1) and rear lifting motor harness connector (S7)

CHECK MULTIPLEX SIGNAL FROM DRIVER'S SIDE POWER SEAT CONTROL SWITCH.

1) Remove driver's side power seat control switch with harness connected.
2) Remove armrest.
3) Remove door trim with harness connected.

F 4) Check voltage between driver's side power seat control switch harness terminal ③ and body ground while turning switch ON and OFF.

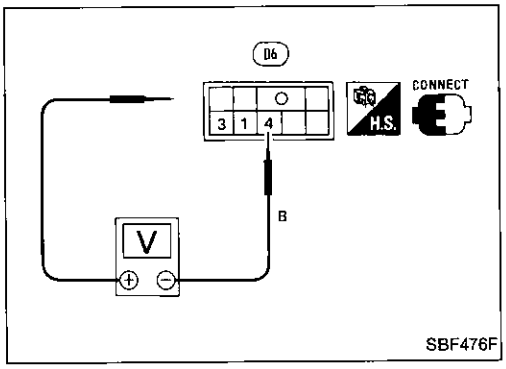
Control switch	Voltage
Rear lifting switch ON	Approximately 1.0 - 1.6V
All switches OFF	0V

Note: Do not use a digital type voltmeter.

N.G. → Replace driver's side power seat control switch.

O.K. ↓

Replace driver's side power seat control unit.



Electrical Components Inspection

DRIVER'S SIDE POWER SEAT CONTROL SWITCH

Harness connector terminal layout

- Measure voltage between each terminal and terminal ④ by following **Driver's side power seat control switch inspection table.**

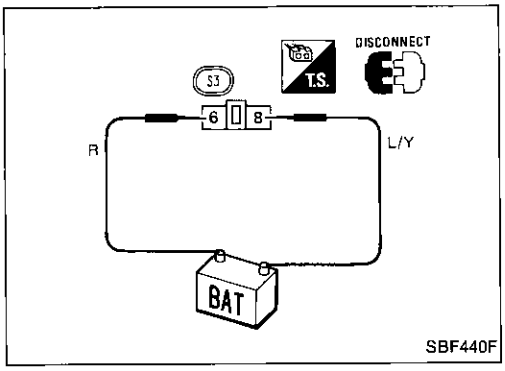
Do not use a digital type voltmeter when measuring terminal ③.

Driver's side power seat control switch inspection table **(Data are reference values.)**

Terminal No.	Harness color	Item	Condition	Standard value
①	Y	Power source (Battery)	—	Battery voltage
③	G/OR	Multiplex signal to ADPCU	One driver's side power seat control switch is turned ON.	Approximately 1.0 - 1.6V
			All driver's side power seat control switches are turned OFF.	0V

L.H. POWER SEAT CONTROL UNIT

- Refer to "L.H. POWER SEAT CONTROL UNIT" described in "Electrical Components Inspection" in "TROUBLE DIAGNOSES — Automatic Drive Positioner".
- The only difference between L.H. POWER SEAT CONTROL UNIT with Automatic Drive Positioner and that without Automatic Drive Positioner is the harness color of terminal ③ as follows;
  Without Automatic Drive Positioner: G/OR
  With Automatic Drive Positioner: G



SLIDING MOTOR

Check motor.

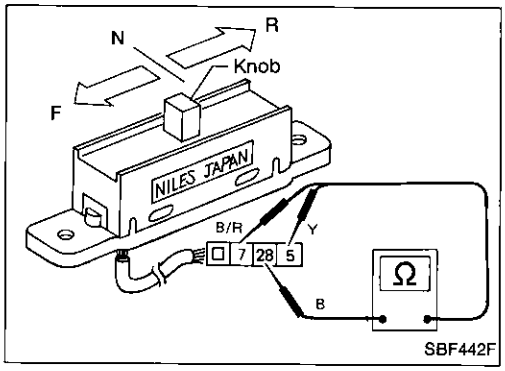
1. Disconnect sliding motor harness connector S3.
2. Check sliding device operation with battery voltage supplied to terminals.

⊕	⊖	Sliding device operation
⑥	⑧	Forward
⑧	⑥	Backward

3. If the result is N.G., replace sliding motor assembly.

When installing sliding motor assembly, refer to "POWER SEAT MOTOR INSTALLATION" described in "Front Seat" in "SEAT" section.

Electrical Components Inspection (Cont'd)

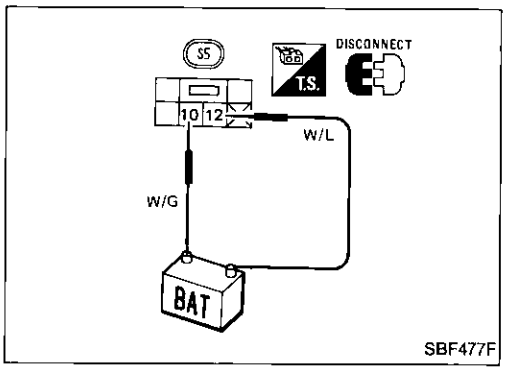


SBF442F

SLIDING LIMIT SWITCH

1. Remove sliding limit switch from sliding device.
2. Check continuity between sliding limit switch terminals ⑤, ⑦ and ㉘ at each knob position.

Knob position / Terminal	F	N	R
⑤	○	○	
⑦	○	○	○
㉘	○	○	○



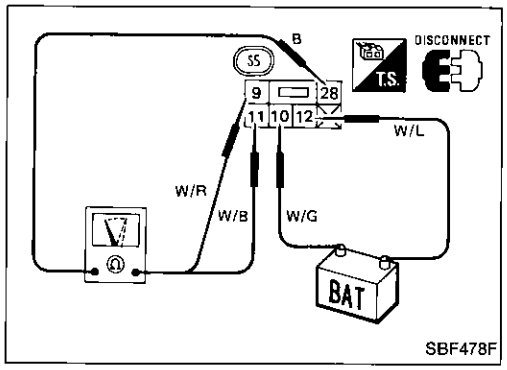
SBF477F

RECLINING MOTOR

Check motor.

1. Disconnect reclining motor harness connector Ⓢ5.
2. Check reclining device operation with battery voltage supplied to terminals.

⊕	⊖	Reclining device operation
⑩	⑫	Forward
⑫	⑩	Backward



SBF478F

Check reclining limit switch.

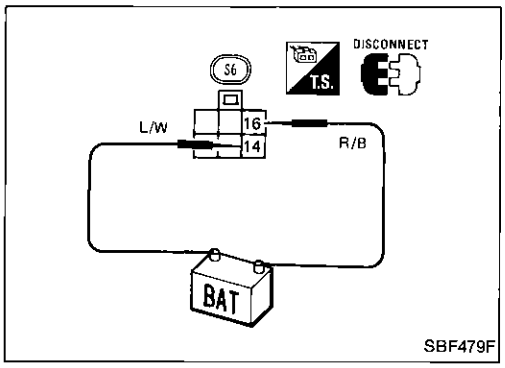
3. Check continuity between terminals ㉘ and ⑨, ⑪ with battery voltage supplied to terminals ⑩ and ⑫.

⊕	⊖	Ohmmeter	
⑩	⑫	⑪	㉘
⑫	⑩	⑨	

The needle of the ohmmeter should swing.

4. If any one of the results of 2 and 3 above is N.G., replace reclining motor.

When installing reclining motor, refer to "POWER SEAT MOTOR INSTALLATION" described in "Front Seat" in "SEAT" section.



SBF479F

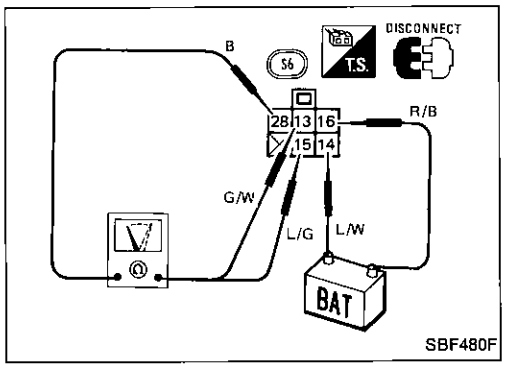
FRONT LIFTING MOTOR

Check motor.

1. Disconnect front lifting motor connector Ⓢ6.
2. Check front lifting device operation with battery voltage supplied to terminals.

⊕	⊖	Front lifting device operation
⑭	⑯	Upward
⑯	⑭	Downward

Electrical Components Inspection (Cont'd)



SBF480F

Check front lifting limit switch.

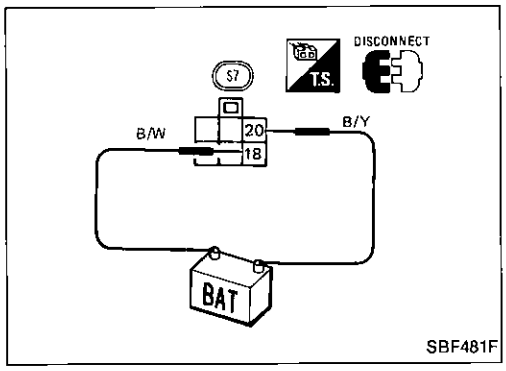
3. Check continuity between terminals ㉘ and ⑬, ⑮ with battery voltage supplied to terminals ⑭ and ⑯.

⊕	⊖	Ohmmeter	
⑭	⑯	⑮	㉘
⑯	⑭	⑬	

The needle of the ohmmeter should swing.

4. If any one of the results of 2 and 3 above is N.G., replace front lifting motor.

When installing front lifting motor, refer to "POWER SEAT MOTOR INSTALLATION" described in "Front Seat" in "SEAT" section.



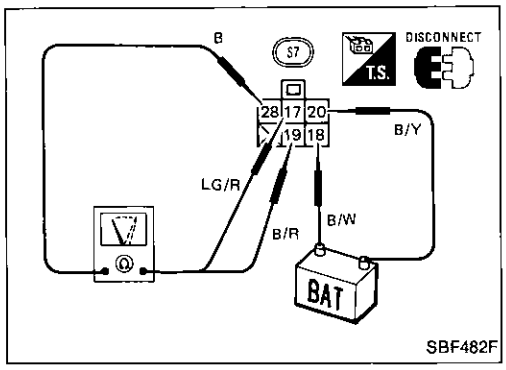
SBF481F

REAR LIFTING MOTOR

Check motor.

1. Disconnect rear lifting motor connector Ⓢ7.
2. Check rear lifting device operation with battery voltage supplied to terminals.

⊕	⊖	Front lifting device operation
⑱	⑳	Upward
⑳	⑱	Downward



SBF482F

Check rear lifting limit switch.

3. Check continuity between terminals ㉘ and ⑰, ⑲ with battery voltage supplied to terminals ⑱ and ⑳.

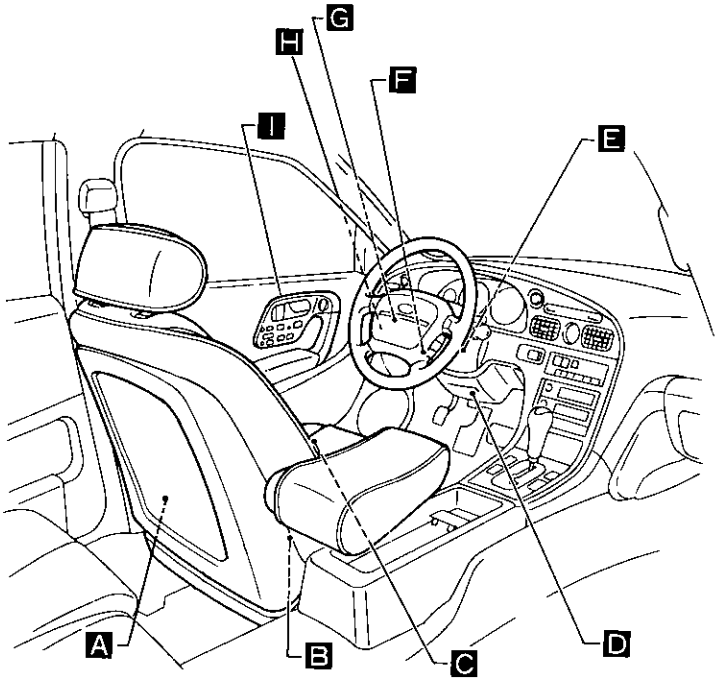
⊕	⊖	Ohmmeter	
⑱	⑳	⑲	㉘
⑳	⑱	⑰	

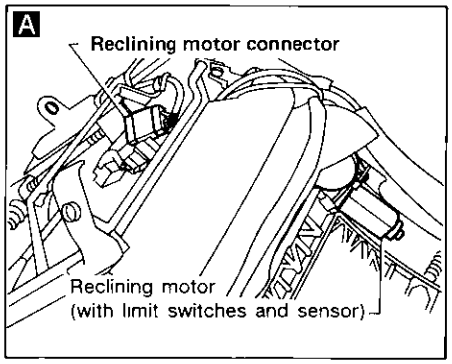
The needle of the ohmmeter should swing.

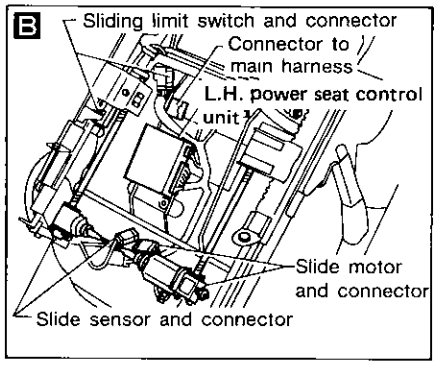
4. If any one of the results of 2 and 3 above is N.G., replace rear lifting motor.

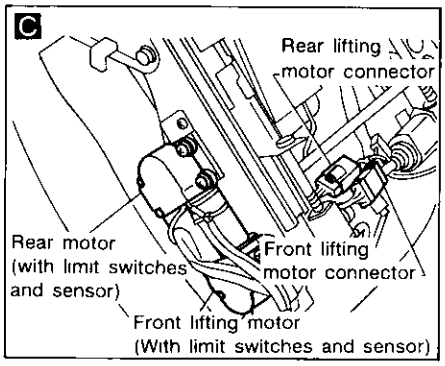
When installing rear lifting motor, refer to "POWER SEAT MOTOR INSTALLATION" described in "Front Seat" in "SEAT" section.

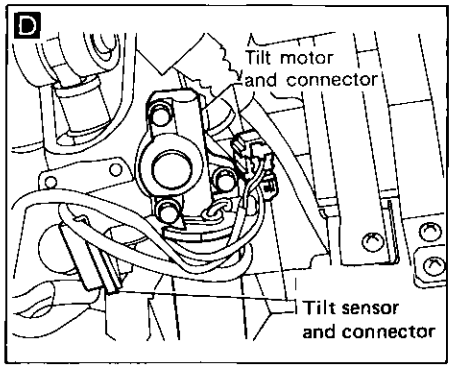
Component Parts Location

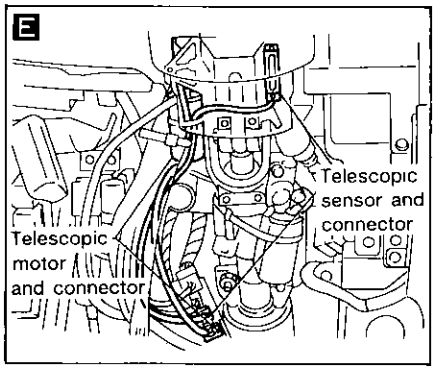


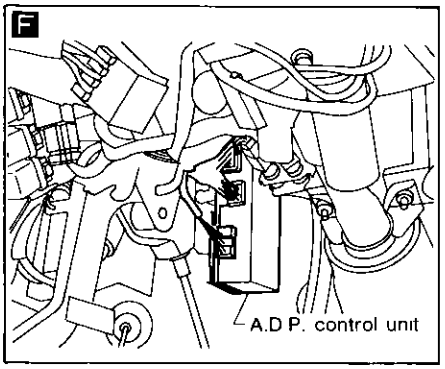


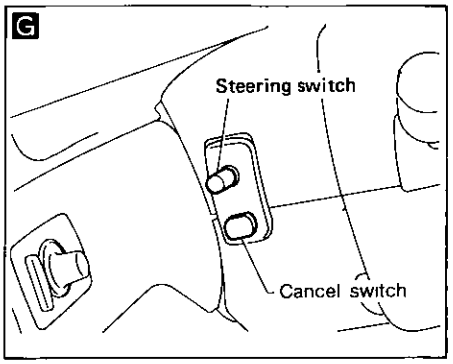


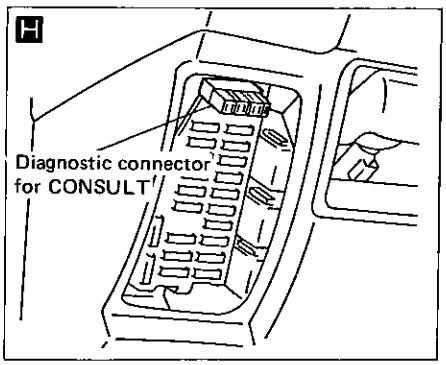


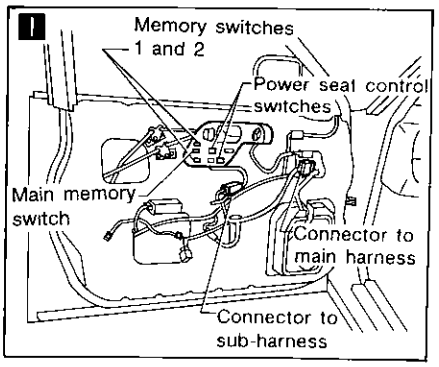






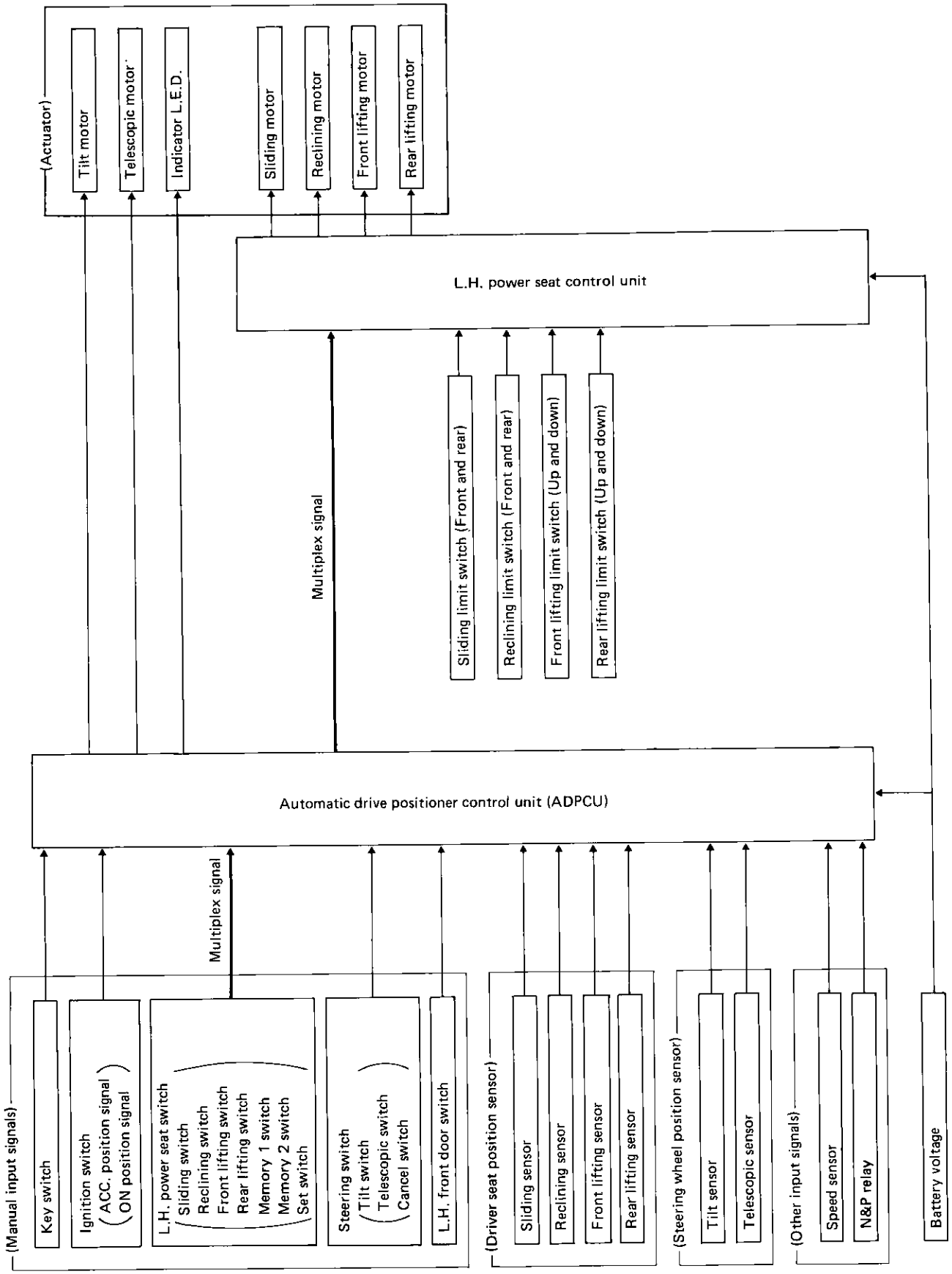






SBF977F

System Chart

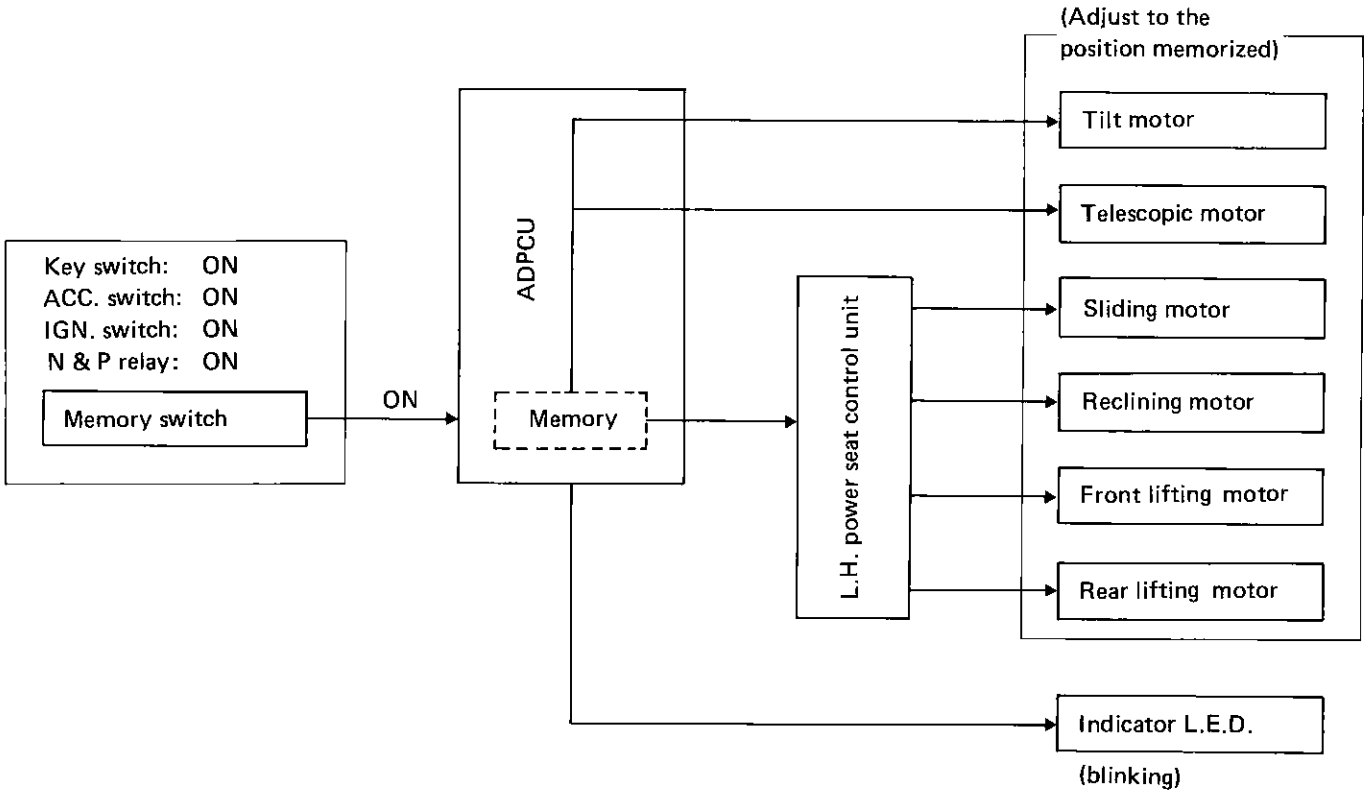


System Operation

The Automatic Drive Positioner (A.D.P.) can be operated in 2 ways, manually and automatically. During manual operation, the driver can adjust the position of the driver's seat with the L.H. power seat switch, and the position of the steering column with the steering switch.
The driver's seat can be adjusted for rake, front cushion height, rear cushion height and pedal reach. The steering column can be adjusted for tilt and reach.
During automatic operation, the driver's seat and the steering column are adjusted to the proper positions for the driver, automatically, in 4 different ways:

MODE 1 (MEMORY AUTOMATIC RETURN)

When either memory switch 1 or 2 is touched, with the ignition key turned-on, the driver's seat and the steering wheel are automatically adjusted to the position memorized by the Automatic Drive Positioner Control Unit (ADPCU).



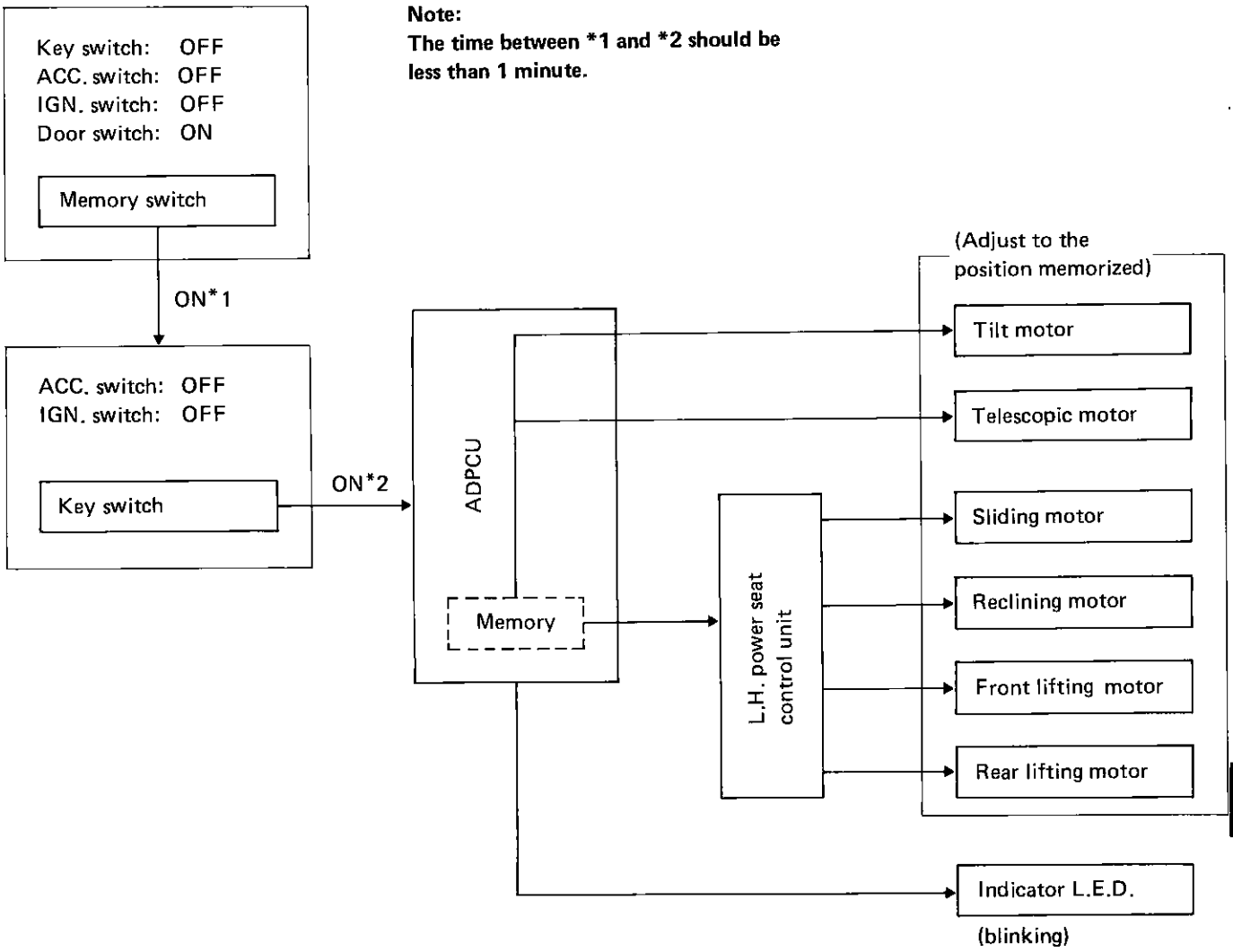
System Operation (Cont'd)

MODE 2 (PRE-SET AUTOMATIC RETURN)

The driver's seat and the steering wheel are automatically adjusted to the position memorized by the ADPCU when proper operations are conducted after either memory switch 1 or 2 is touched. There are 3 kinds of operational patterns.

Pattern A

If either memory switch 1 or 2 is touched with the driver's door open and then the ignition key is inserted into the ignition switch within approximately 1 minute, the driver's seat and the steering column are automatically adjusted to the position memorized by the ADPCU.

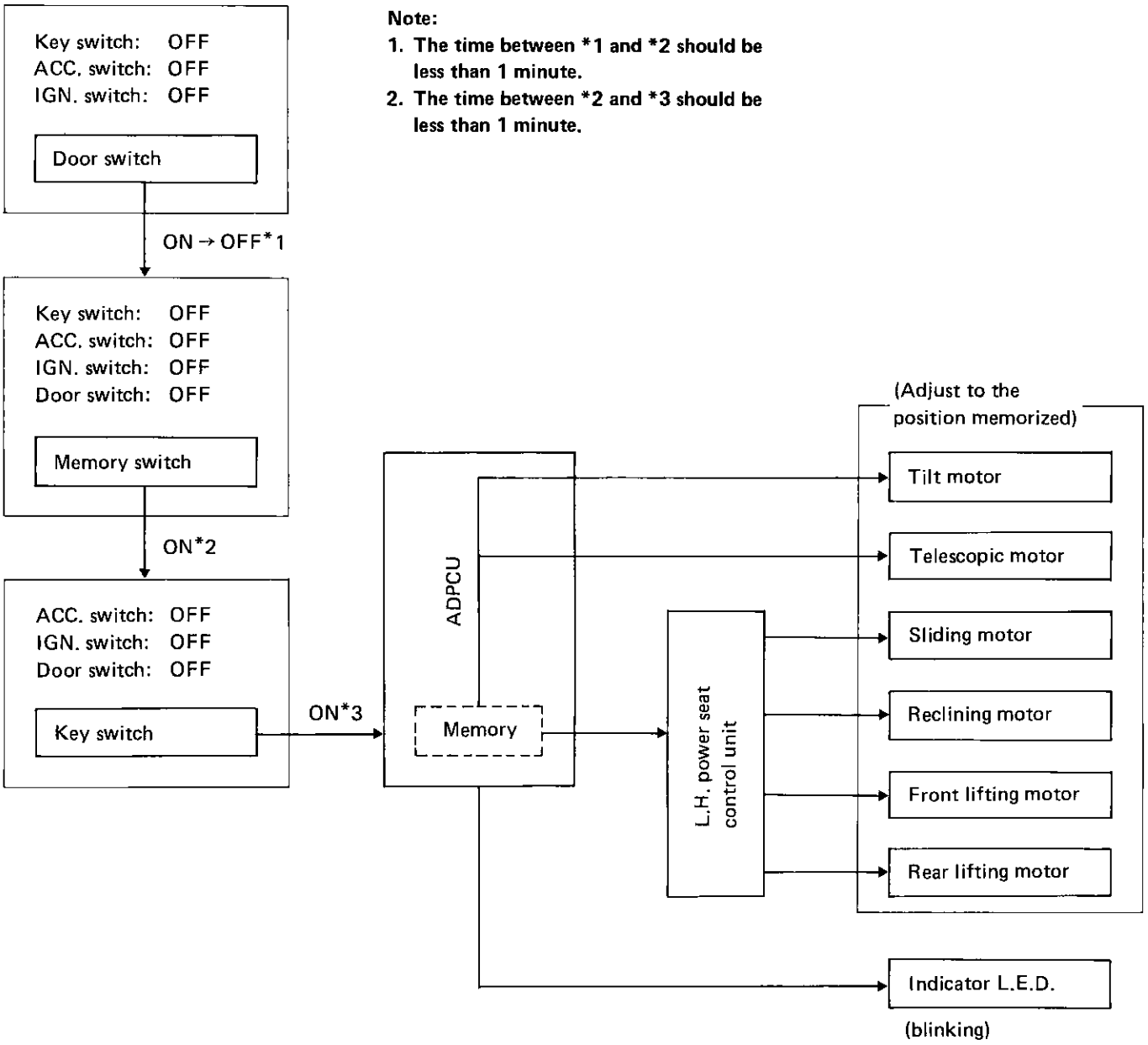


Note:
The time between *1 and *2 should be less than 1 minute.

System Operation (Cont'd)

Pattern B

If either memory switch 1 or 2 is touched within approximately 1 minute after the driver's door is closed and then the ignition key is inserted to the ignition switch within approximately 1 minute after the memory key is touched, the driver's seat and the steering column are automatically adjusted to the position memorized by the ADPCU.



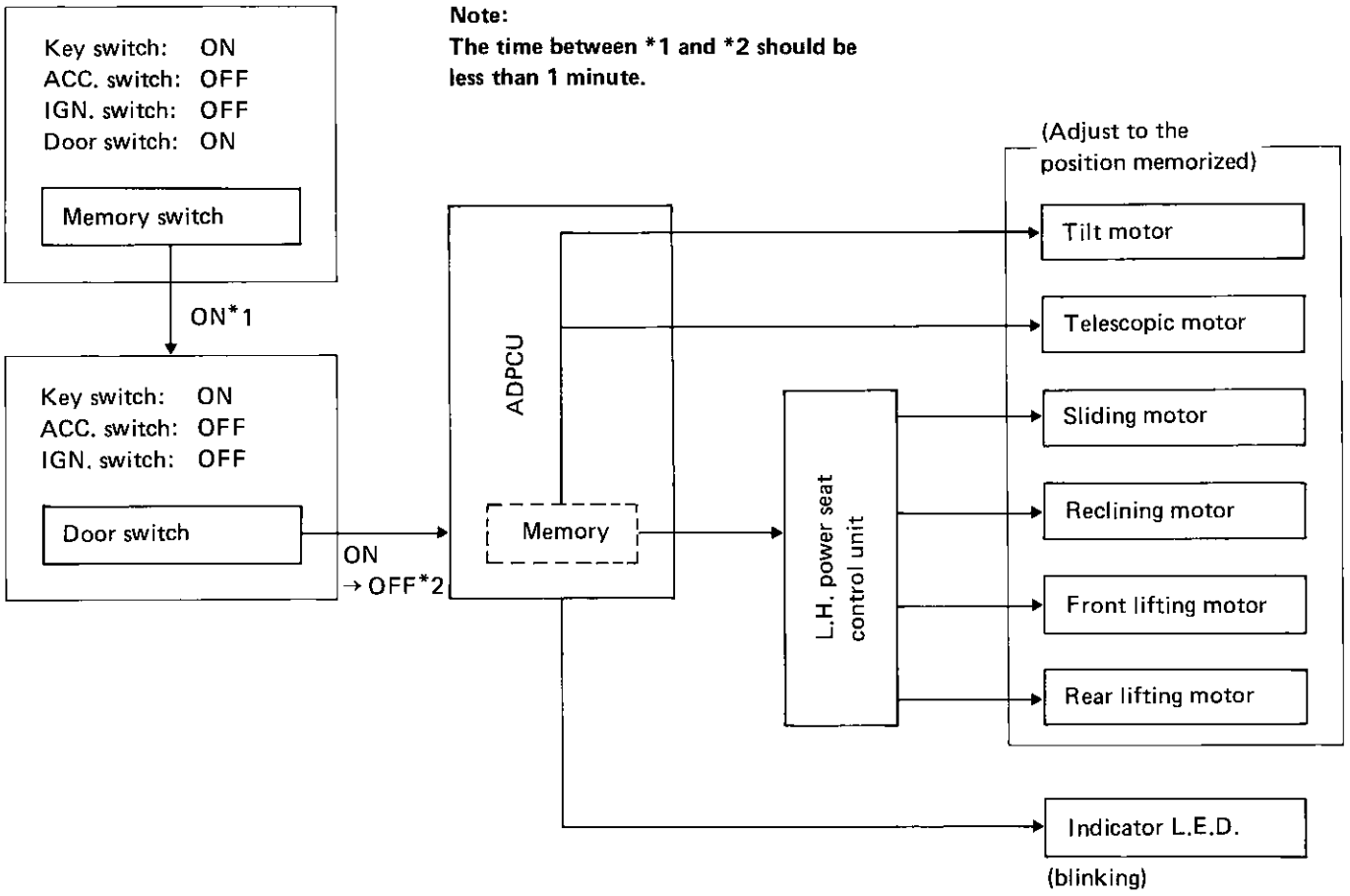
Note:

1. **The time between *1 and *2 should be less than 1 minute.**
2. **The time between *2 and *3 should be less than 1 minute.**

System Operation (Cont'd)

Pattern C

If either memory switch 1 or 2 is touched with the driver's door open and the ignition key inserted into the ignition switch and then the door is closed within approximately 1 minute after the memory switch is touched, the driver's seat and the steering column are adjusted to the position memorized by the ADPCU.



Note:
The time between *1 and *2 should be less than 1 minute.

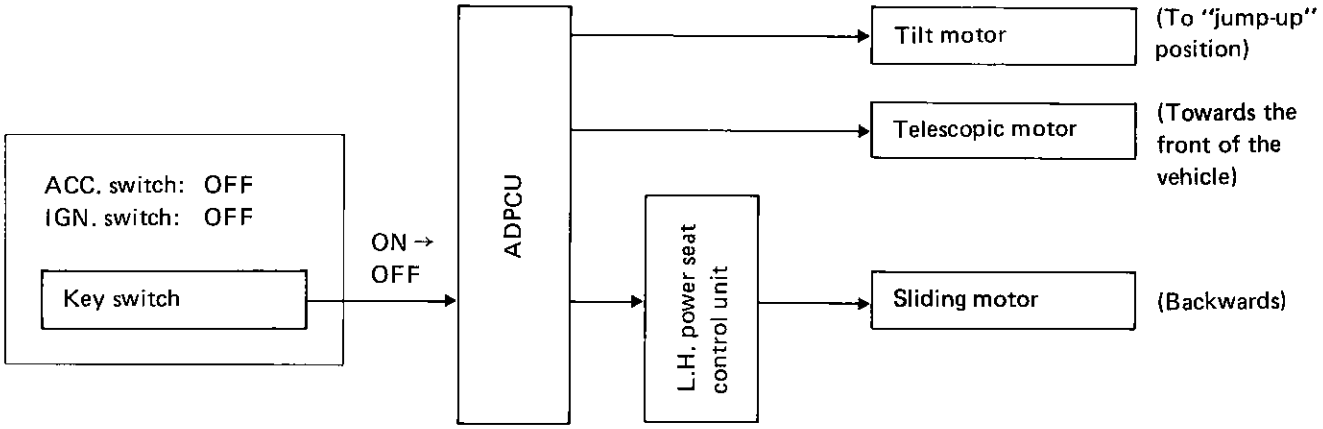
System Operation (Cont'd)

MODE 3 (AUTOMATIC EXITING SETTING)

The driver's seat and the steering column are automatically moved to the proper position so that the driver can easily get in and out of the driver's compartment, when one of the following 3 operational patterns is conducted.

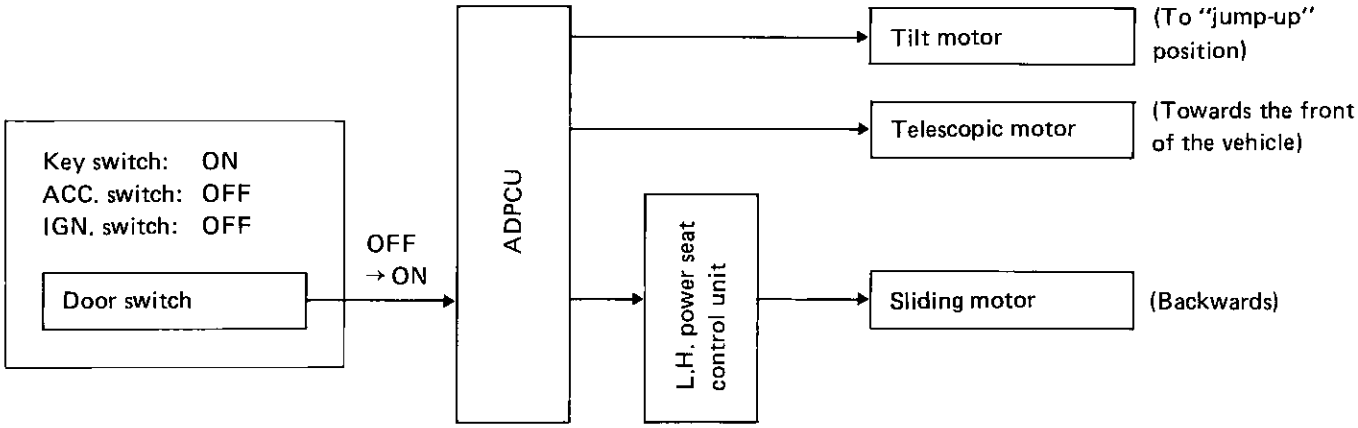
Pattern A

When the ignition key is removed from the ignition switch.



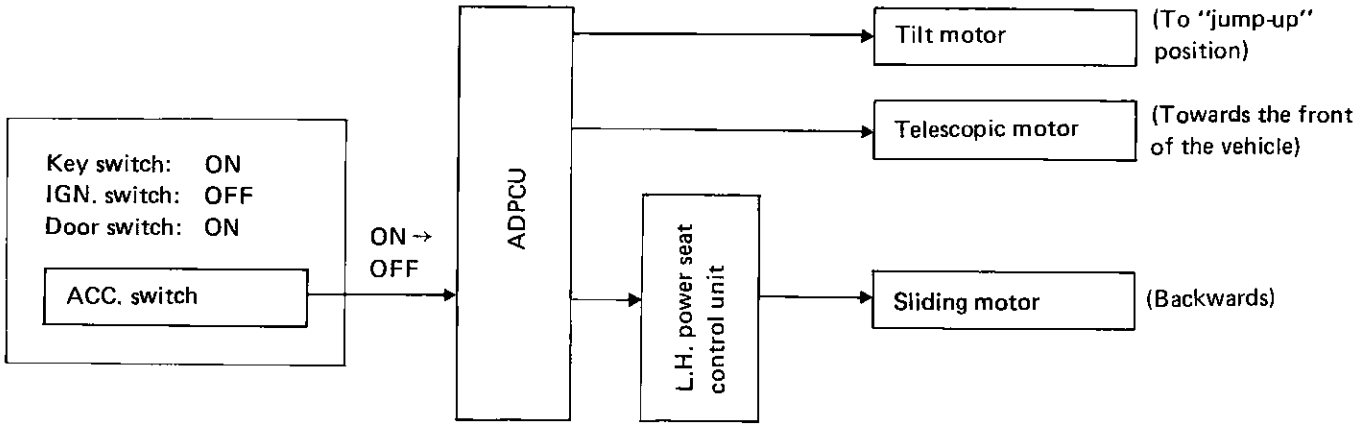
Pattern B

When the driver's door is opened.



Pattern C

When the ignition key is turned from "ACC." to "Lock".



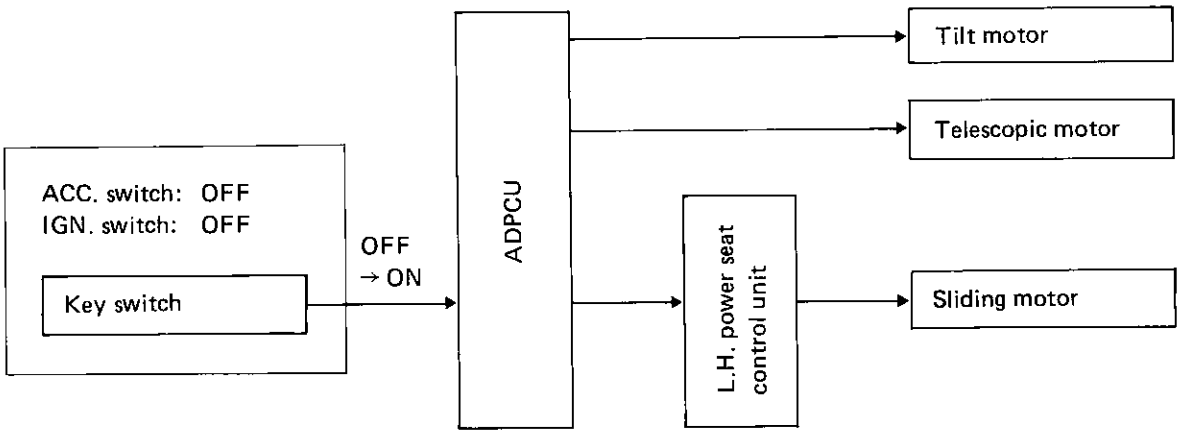
System Operation (Cont'd)

MODE 4 (AUTOMATIC RETURN)

The driver's seat and the steering column are automatically moved back to the positions they were in before Mode 3 was performed, when one of the following 2 operational patterns is conducted. However, if either the driver's seat or the steering column is moved by the manual switches after Mode 3 is performed, Mode 4 is canceled.

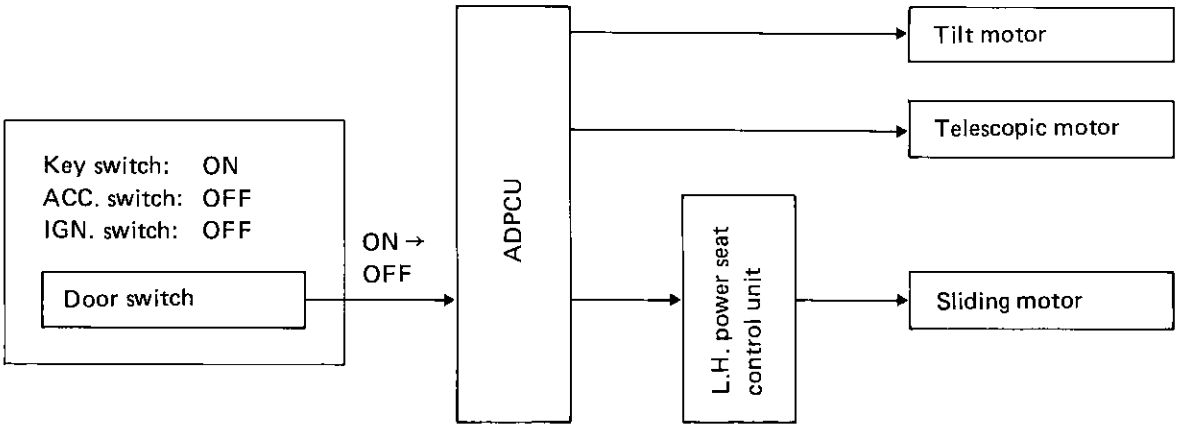
Pattern A

When the ignition key is inserted into the ignition switch.



Pattern B

When the door is closed.



System Operation (Cont'd)

CONDITIONS INHIBITING AUTOMATIC OPERATION

The 4 automatic operations are inhibited under the following conditions:

- When the vehicle speed is above 7 km/h (4 MPH).
- When one of the position switches for the driver's seat or the steering column is turned on.
- When the cancel switch is ON.
- When the tilt or telescopic sensor circuit is damaged.

PROCEDURE FOR MEMORIZING THE DESIRED POSITIONS

The ADPCU can memorize 2 desired position patterns.
The procedure for memorizing these is as follows:

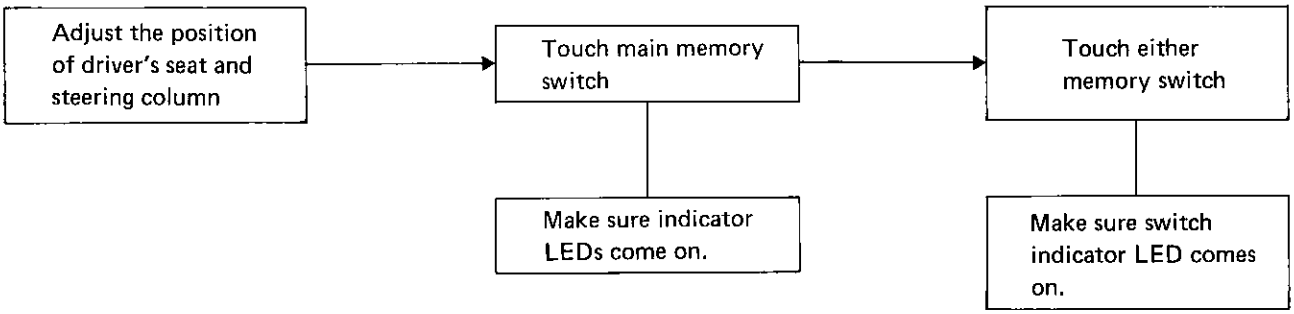
1. Move the driver's seat and the steering column to the proper positions using the position switches.
2. With the ignition switch "ON", touch the main memory switch.

- **When the memory has stored the position in the ADPCU, the indicator L.E.D. comes on for approximately 5 sec. after the main memory switch is touched.**
- **If the memory has not stored the position in the ADPCU, the indicator L.E.D. comes on for approximately 0.5 sec. after the main memory switch is touched.**

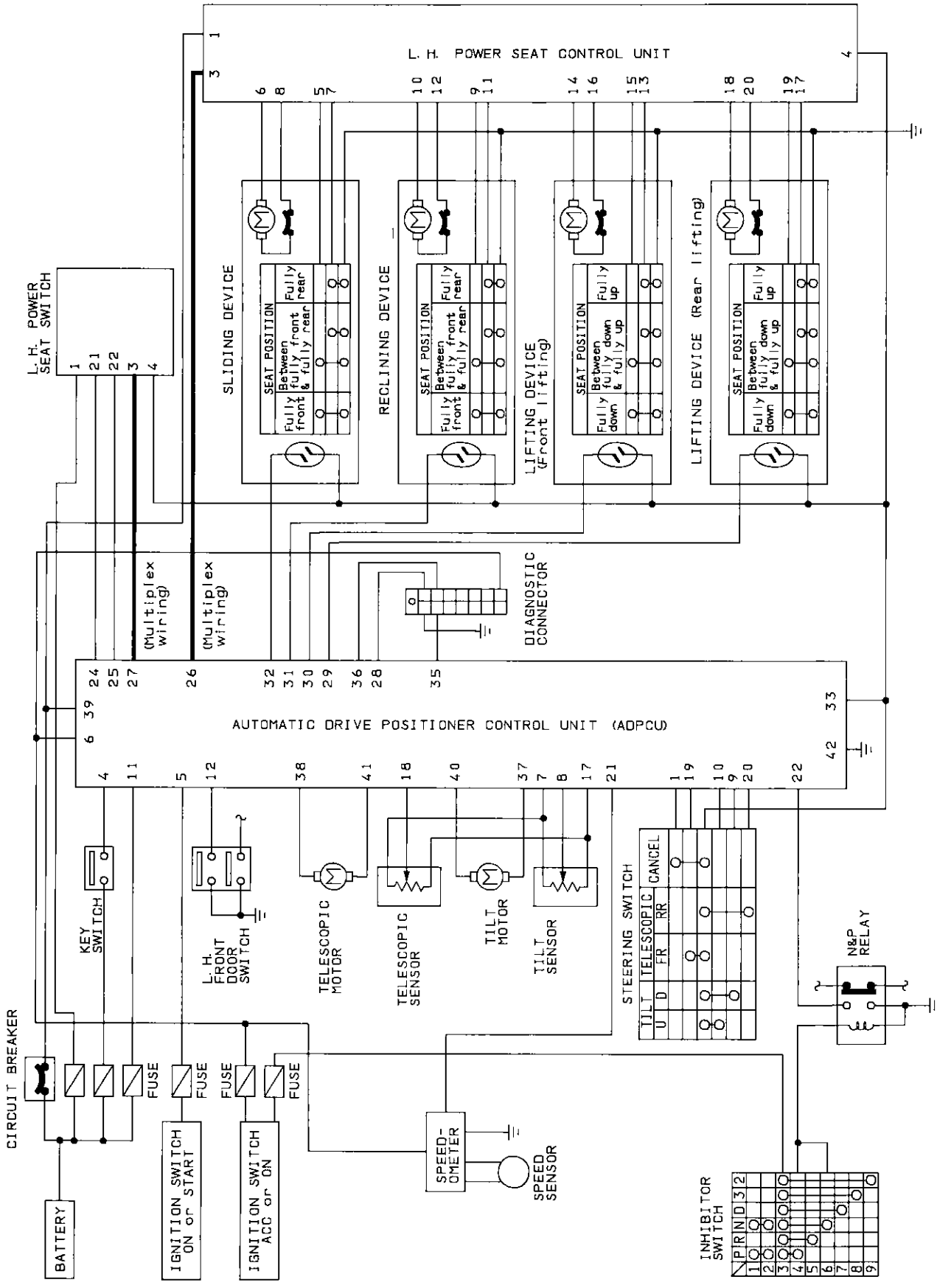
3. Touch the memory switch you wish to use within 5 sec. after touching the set switch.

- **Make sure the indicator L.E.D. for the memory switch which you use comes on for approximately 5 sec. after the switch is touched.**

Procedure for memorizing the desired position

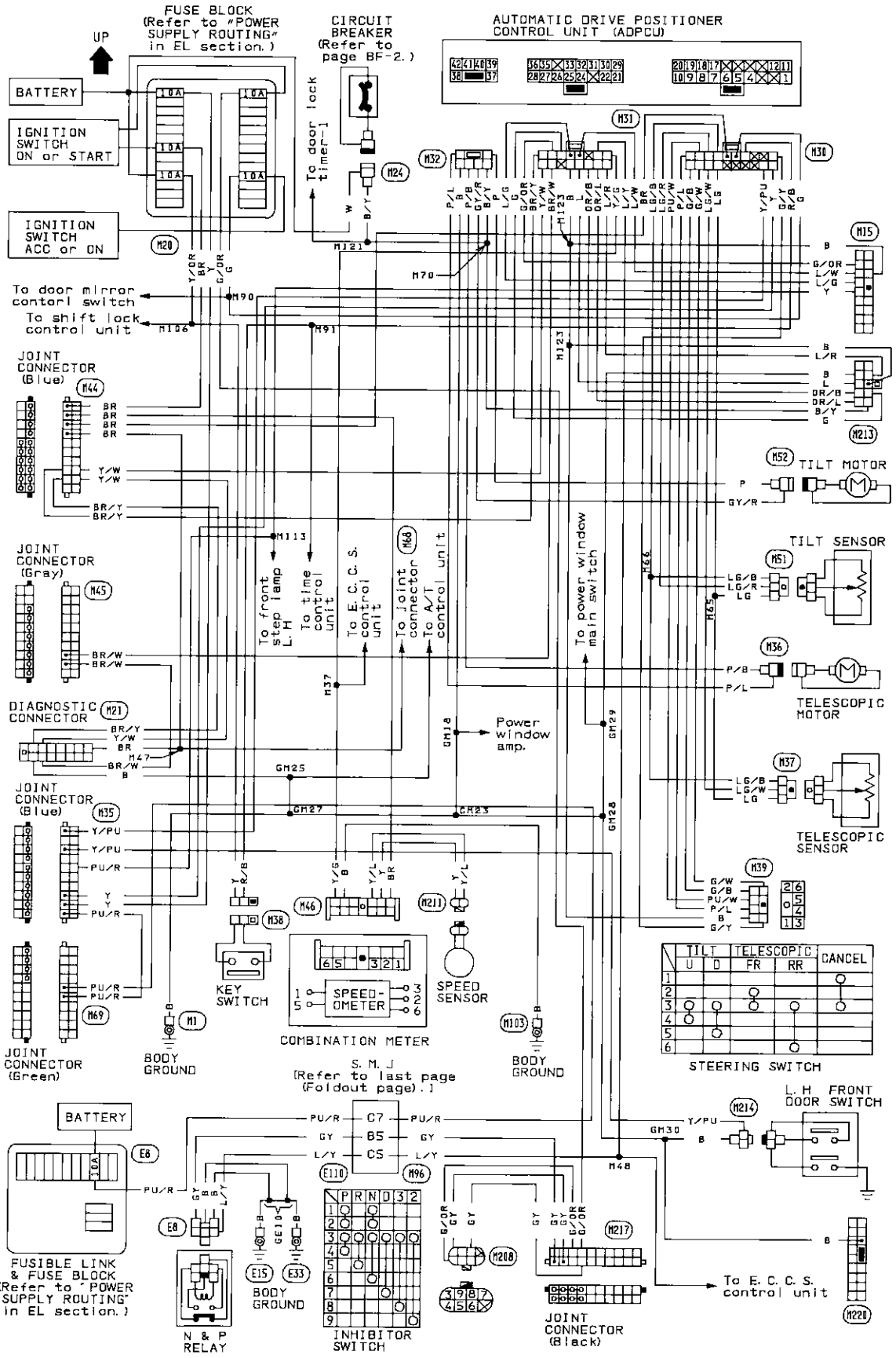


Schematic

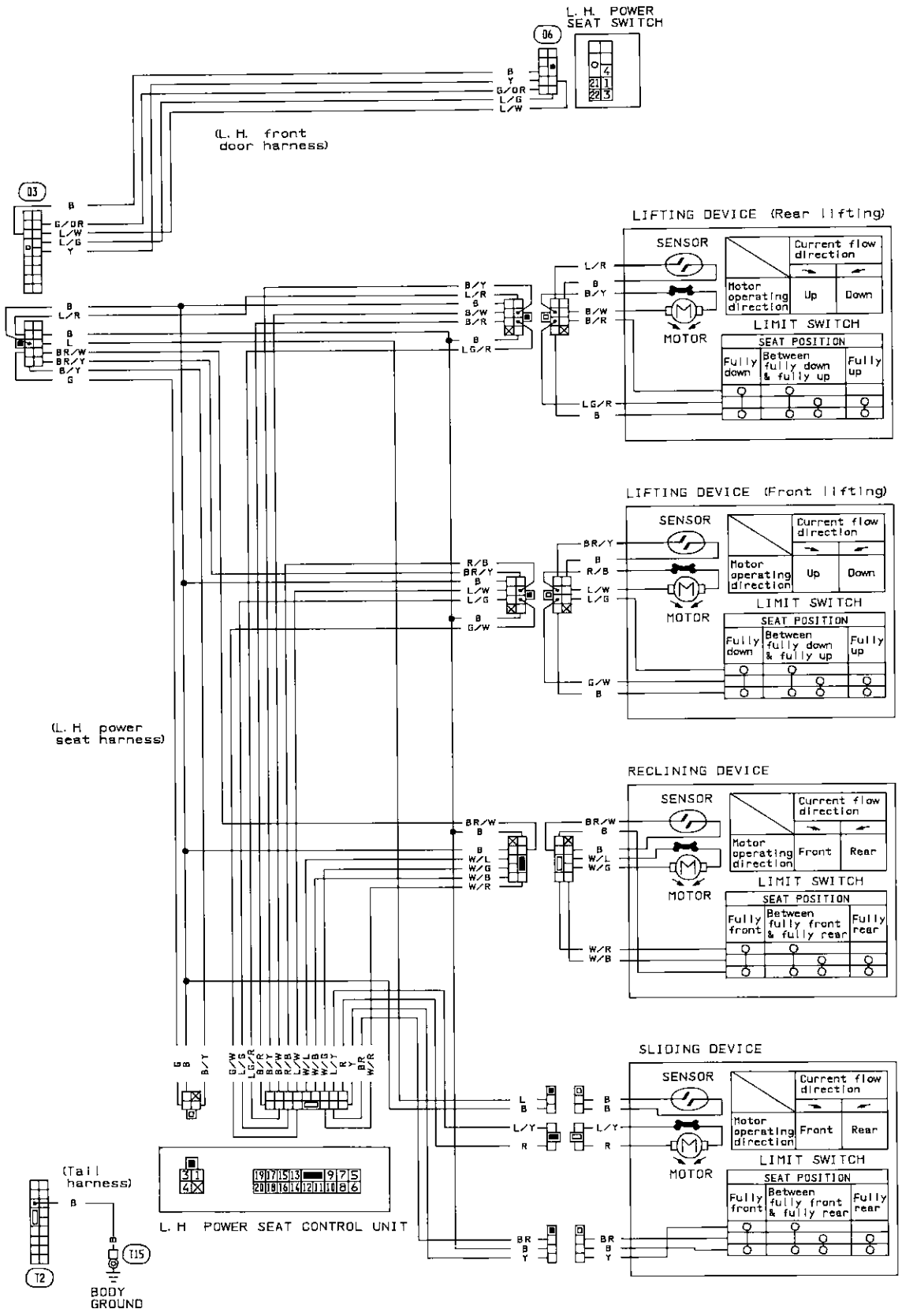


MBF227A

Wiring Diagram



Wiring Diagram (Cont'd)



MBF228A

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Diagnostic Procedure 1 ..... BF-86
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)
1 : All manual operations of driver's seat are O.K.
4 : Both manual operations of steering column are O.K.
8 : One L.E.D. does not come on correctly when setting memory.
10 : All circuits that can be confirmed by self-diagnosis are O.K.
Diagnostic Procedure 1-1: L.E.D. for memory switch 1 does not come on correctly when setting memory. BF-86
Diagnostic Procedure 1-2: L.E.D. for memory switch 2 does not come on correctly when setting memory. BF-87
Diagnostic Procedure 2 ..... BF-88
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)
1 : All manual operations of driver's seat are O.K.
4 : Both manual operations of steering column are O.K.
9 : Neither L.E.D. comes on correctly when setting memory.
11 : Can not perform self-diagnosis.
Diagnostic Procedure 2-1: Procedure without CONSULT. BF-88
Diagnostic Procedure 2-2: Procedure with CONSULT BF-89
Diagnostic Procedure 3 ..... BF-90
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)
1 : All manual operations of driver's seat are O.K.
4 : Both manual operations of steering column are O.K.
9 : Neither L.E.D. comes on correctly when setting memory.
13 : Both circuits for steering column system are judges N.G. by self-diagnosis.
Diagnostic Procedure 3-1: Procedure without CONSULT BF-90
Diagnostic Procedure 3-2: Procedure with CONSULT BF-91

Contents (Cont'd)

Diagnostic Procedure 4 ..... BF-94
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)
1 : All manual operations of driver's seat are O.K.
4 : Both manual operations of steering column are O.K.
9 : Neither L.E.D. comes on correctly when setting memory.
15 : One of the circuits for the steering column system (tilt or telescopic device circuit) is judged N.G. by self-diagnosis.
Diagnostic Procedure 4-1: Procedure without CONSULT when steering tilt device circuit is judged N.G. by self-diagnosis. BF-94
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Diagnostic Procedure 5 ..... BF-98
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)
1 : All manual operations of driver's seat are O.K.
5 : One of the manual operations (tilt or telescopic) is malfunctioning.
7 : Both L.E.D.s come on correctly when setting memory.
10 : All circuits that can be confirmed by self-diagnosis are O.K.
Diagnostic Procedure 5-1: Procedure without CONSULT when steering column manual tilt operation is malfunctioning. BF-98
Diagnostic Procedure 5-2: Procedure without CONSULT when steering column manual telescopic operation is malfunctioning. BF-99
Diagnostic Procedure 5-3: Procedure with CONSULT when one of the manual operations (tilt or telescopic) is malfunctioning. BF-100

Diagnostic Procedure 6 ..... BF-101
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)
1 : All manual operations of driver's seat are O.K.
5 : One of the manual operations (tilt or telescopic) is malfunctioning.
7 : Both L.E.D.s come on correctly when setting memory.
15 : One of the circuits for the steering column system (tilt or telescopic device circuit) is judged N.G. by self-diagnosis.
Diagnostic Procedure 6-1: When steering tilt manual operation is malfunctioning and tilt device circuit is judged N.G. by self-diagnosis. BF-101
Diagnostic Procedure 6-2: When steering telescopic manual operation is malfunctioning and tilt device circuit is judged N.G. by self-diagnosis. BF-102

Diagnostic Procedure 7 ..... BF-103
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)
1 : All manual operations of driver's seat are O.K.
5 : One of the manual operations (tilt or telescopic) is malfunctioning.
9 : Neither L.E.D. comes on correctly when setting memory.
10 : Can not perform self-diagnosis.
Diagnostic Procedure 7-1: Procedure without CONSULT when steering column manual tilt operation is malfunctioning. BF-103
Diagnostic Procedure 7-2: Procedure without CONSULT when steering column manual telescopic operation is malfunctioning. BF-104
Diagnostic Procedure 7-3: Procedure with CONSULT when one of the manual operations (tilt or telescopic) is malfunctioning. BF-105

Diagnostic Procedure 8 ..... BF-106
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)
1 : All manual operations of driver's seat are O.K.
6 : Both manual operations of steering column are malfunctioning.
7 : Both L.E.D.s come on correctly when setting memory.
10 : All circuits that can be confirmed by self-diagnosis are O.K.

Contents (Cont'd)

Diagnostic Procedure 9 ..... BF-107
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)
[1] : All manual operations of driver's seat are O.K.
[6] : Both manual operations of steering column are malfunctioning.
[7] : Both L.E.D.s come on correctly when setting memory.
[13] : Both circuits of steering column system are judged N.G. by self-diagnosis.

Diagnostic Procedure 10 ..... BF-107
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)
[2] : One or some of manual operations (sliding, reclining, front lifting or rear lifting) are malfunctioning.
[4] : Both manual operations of steering column are O.K.
[7] : Both L.E.D.s come on correctly when setting memory.
[10] : All circuits that can be confirmed by self-diagnosis are O.K.

Diagnostic Procedure 11 ..... BF-108
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)
[2] : One or some of manual operations (sliding, reclining, front lifting or rear lifting) are malfunctioning.
[4] : Both manual operations of steering column are O.K.
[7] : Both L.E.D.s come on correctly when setting memory.
[14] : One or some circuits of driver's seat system (sliding device, reclining device, front lifting device or rear lifting device circuits) are judged N.G. by self-diagnosis.
Diagnostic Procedure 11-1: When manual sliding operation is malfunctioning and judged N.G. by self-diagnosis. BF-108
Diagnostic Procedure 11-2: When manual reclining operation is malfunctioning and judged N.G. by self-diagnosis. BF-109
Diagnostic Procedure 11-3: When manual front lifting operation is malfunctioning and judged N.G. by self-diagnosis. BF-110
Diagnostic Procedure 11-4: When manual rear lifting operation is malfunctioning and judged N.G. by self-diagnosis. BF-111

Diagnostic Procedure 12 ..... BF-112
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)
[3] : All manual operations of driver's seat are malfunctioning.
[4] : Both manual operations of steering column are O.K.
[7] : Both L.E.D.s come on correctly when setting memory.
[12] : All circuits for driver's seat system are judged N.G. by self-diagnosis.

Diagnostic Procedure 13 ..... BF-114
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)
[3] : All manual operations of driver's seat are malfunctioning.
[4] : Both manual operations of steering column are O.K.
[9] : Neither L.E.D. comes on correctly when setting memory.
[11] : Can not perform self-diagnosis.

Diagnostic Procedure 14 ..... BF-116
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)
[1] : All manual operations of driver's seat are O.K.
[4] : Both manual operations of steering column are O.K.
[7] : Both L.E.D.s come on correctly when setting memory.
[11] : Can not perform self-diagnosis.

Contents (Cont'd)

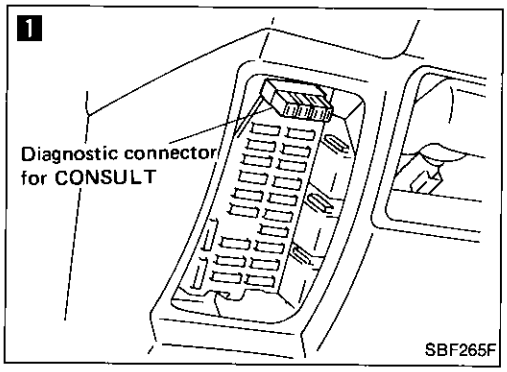
Diagnostic Procedure 15 ..... BF-117
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)
1 : All manual operations of driver's seat are O.K.
4 : Both manual operations of steering column are O.K.
7 : Both L.E.D.s come on correctly when setting memory.
14 : One or more circuits for driver's seat system (sliding device, reclining device, front lifting device, or rear lifting device circuit) are judged N.G. by self-diagnosis.
Diagnostic Procedure 15-1: When sliding device circuit is judged N.G. by self-diagnosis. BF-117
Diagnostic Procedure 15-2: When reclining device circuit is judged N.G. by self-diagnosis. BF-118
Diagnostic Procedure 15-3: When front lifting device circuit is judged N.G. by self-diagnosis. BF-119
Diagnostic Procedure 15-4: When rear lifting device circuit is judged N.G. by self-diagnosis. BF-120
Diagnostic Procedure 16 ..... BF-121
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)
1 : All manual operations of driver's seat are O.K.
4 : Both manual operations of steering column are O.K.
7 : Neither L.E.D. comes on correctly when setting memory.
16 : Vehicle speed sensor circuit is judged N.G. by self-diagnosis.
Diagnostic Procedure 17 ..... BF-122
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)
1 : All manual operations of driver's seat are O.K.
4 : Both manual operations of steering column are O.K.
7 : Both L.E.D.s come on correctly when setting memory.
10 : All circuits that can be confirmed by self-diagnosis are O.K.
Diagnostic Procedure 17-1: Pre-set Memory Automatic Return (Mode 2) does not function even though all results of preliminary checks are O.K. and despite Memory Automatic Return (Mode 1) functioning normally. BF-122
Diagnostic Procedure 17-2: Neither Memory Automatic Return (Mode 1) or Pre-set Memory Automatic Return (Mode 2) function even though all results of preliminary checks are O.K. BF-123
Diagnostic Procedure 17-3: Neither Automatic Exiting Setting (Mode 3) or Automatic Return (Mode 4) function even though all results of preliminary checks are O.K. BF-125
Diagnostic Procedure 17-4: Can not cancel automatic operations (Mode 1 - 4). BF-126
Electrical Components Inspection BF-127

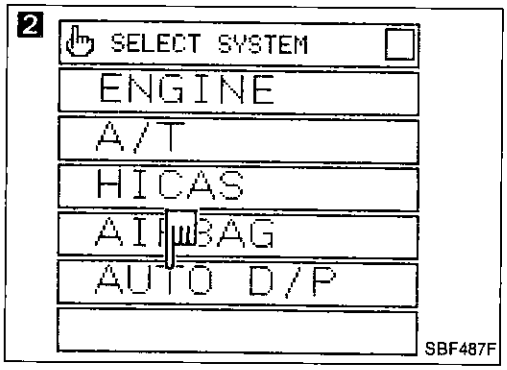
Self-diagnosis

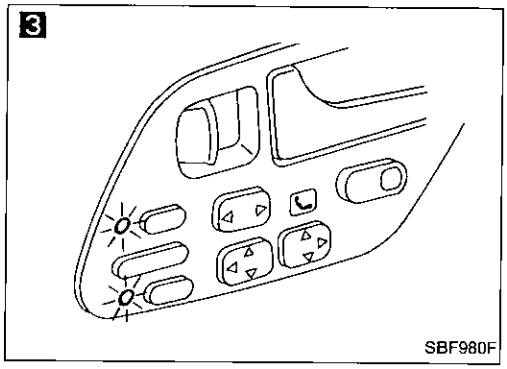
- **The automatic drive positioner system is capable of judging whether or not input signals sent from the driver's seat- and steering column-sensors are correct during self-diagnosis.**
- **When self-diagnosis starts, the driver's seat automatically slides back and forth, reclines, or raises. The steering column also tilts or moves in and out. if a particular sensor operates at values less than specifications during self-diagnosis, the system corresponding with the sensor will be determined as malfunctioning.**
- **If the car speed sensor judges that vehicle speed is below 7 km/h (4 MPH) [although the vehicle is being driven at speeds greater than 7 km/h (4 MPH)] within 15 seconds after self-diagnosing the operation of the driver's seat and steering column, it will be detected as malfunctioning.**

Self-diagnosis with CONSULT

SELF-DIAGNOSTIC PROCEDURE







DIAGNOSIS START

1

Connect CONSULT to vehicle.



Touch "START".

Can "AUTO D/P" be selected? — No → ● Check harness and connector. ● If O.K., go to Preliminary Check. (BF - 87-89)

Yes

2

Touch "AUTO D/P".

Touch "SELF-DIAG RESULTS" and then touch "START".

3

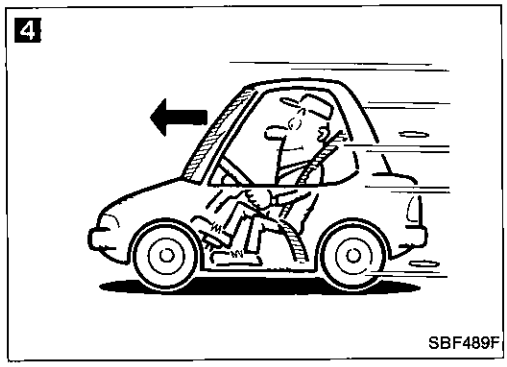
Do 2 indicator LEDs come on for about 2 seconds? (At the same time, driver's seat and steering column move automatically.) — No → Go to Preliminary Check. (BF-87 - 89)

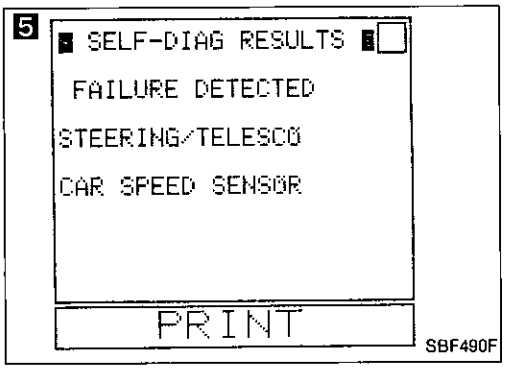
Yes

Ⓐ

(Go to next page.)

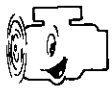
Self-diagnosis with CONSULT (Cont'd)





Ⓐ

As soon as LEDs go out, start engine.



*1 4

Accelerate vehicle up to 7 km/h (4 MPH) and stop it.
Do not stop engine.

5

Print out "SELF-DIAG RESULT".



DIAGNOSIS END

Note:
***1 should be less than 15 seconds.**

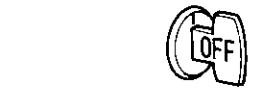
SELF-DIAGNOSTIC RESULTS

Diagnostic item	Description
**** NO SELF DIAGNOSTIC FAILURE ****	• No failure has been detected.
SEAT/SLIDE	• Value change of input signal from sliding sensor is below specified value.
SEAT/RECLINING	• Value change of input signal from reclining sensor is below specified value.
SEAT/LIFTER-FR	• Value change of input signal from front lifting sensor is below specified value.
SEAT/LIFTER-RR	• Value change of input signal from rear lifting sensor is below specified value.
STEERING/TELESCO	• Value change of input signal from telescopic sensor is below specified value.
STEERING/TILT	• Value change of input signal from tilt sensor is below specified value.
CAR SPEED SENSOR	• Car speed sensor judges that vehicle speed is below 7 km/h (4 MPH).

Self-diagnosis without CONSULT

SELF-DIAGNOSTIC PROCEDURE

DIAGNOSIS START



Set A/T selector lever in "P" range.



1 Push main memory switch and 2 memory switches at the same time for more than 2 sec.

Note:
***1 should be less than 5 seconds.**

2 Do 2 indicator LEDs come on for about 2 sec.?
(At the same time, driver's seat and steering column move automatically.)

No → Go to Preliminary Check. (BF-87 - 89)

Seat and steering column move,
but LEDs do not come on. → Go to Preliminary Check. (BF-87 - 89)

Yes

As soon as LEDs go out, start engine.



3 Accelerate vehicle up to 7 km/h (4 MPH) and stop it.
Do not stop engine.

Note:
***2 should be less than 15 seconds.**

Check condition of indicator LEDs.

4 Do they flicker?

No → All circuits that can be confirmed by self-diagnosis are O.K.

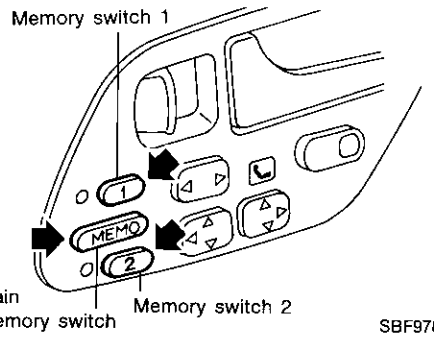
Yes

Confirm the damaged circuit by JUDGMENT OF SELF- DIAGNOSIS CODE on next page.



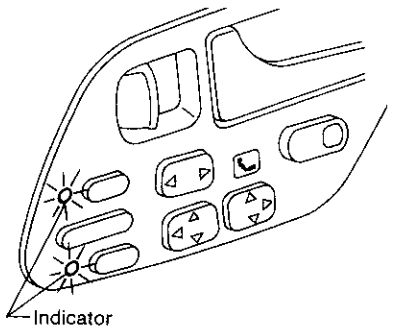
DIAGNOSIS END

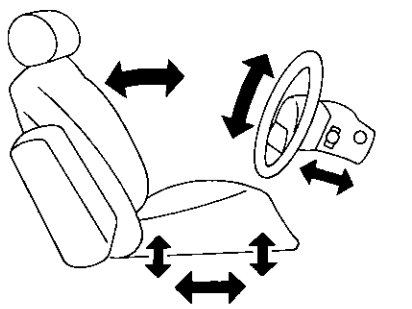
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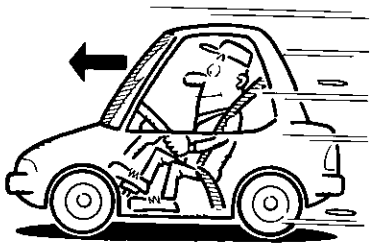
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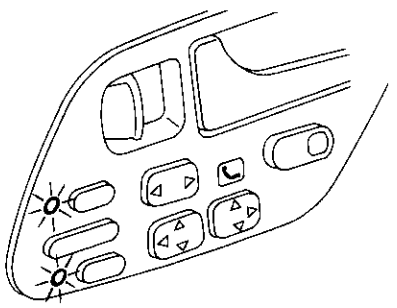
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3



SBF485F

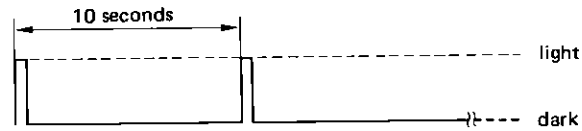
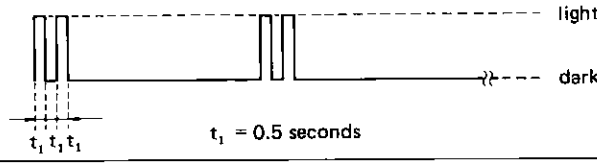
4



SBF980F

Self-diagnosis without CONSULT (Cont'd)

JUDGMENT OF SELF-DIAGNOSIS CODE

Indicator LEDs	Damaged circuit
LEDs do not come on. 	All circuits that can be confirmed by self-diagnosis are O.K.
LEDs flicker once in one cycle. 	Driver's seat sliding device circuit
LEDs flicker twice in one cycle. 	Driver's seat reclining device circuit
LEDs flicker 3 times in one cycle. 	Driver's seat front lifting device circuit
LEDs flicker 4 times in one cycle. 	Driver's seat rear lifting device circuit
LEDs flicker 5 times in one cycle. 	Steering column telescopic device circuit
LEDs flicker 6 times in one cycle. 	Steering column tilt device circuit
LEDs flicker 7 times in one cycle. 	Vehicle speed sensor circuit

Data Monitor

In the data monitor mode, the following input signals can be shown on the CONSULT display screen. For details, refer to the "CONSULT OPERATION MANUAL".

DATA MONITOR APPLICATION CHART

X: Applicable
—: Not applicable

Item		Application
Input	KEY SWITCH	X
	IGNITION SWITCH — ACC POSITION SIGNAL	X
	IGNITION SWITCH — ON POSITION SIGNAL	X
	SLIDING SWITCH — FORWARD SIGNAL	X
	SLIDING SWITCH — BACKWARD SIGNAL	X
	RECLINING SWITCH — FORWARD SIGNAL	X
	RECLINING SWITCH — BACKWARD SIGNAL	X
	FRONT LIFTING SWITCH — UPWARD SIGNAL	X
	FRONT LIFTING SWITCH — DOWNWARD SIGNAL	X
	REAR LIFTING SWITCH — UPWARD SIGNAL	X
	REAR LIFTING SWITCH — DOWNWARD SIGNAL	X
	MEMORY 1 SWITCH	X
	MEMORY 2 SWITCH	X
	SET SWITCH	X
	TILT SWITCH — UPWARD SIGNAL	X
	TILT SWITCH — DOWNWARD SIGNAL	X
	TELESCOPIC SWITCH — FORWARD SIGNAL	X
	TELESCOPIC SWITCH — BACKWARD SIGNAL	X
	CANCEL SWITCH	X
	L.H. FRONT DOOR SWITCH	X
	SLIDING SENSOR	—
	RECLINING SENSOR	—
	FRONT LIFTING SENSOR	—
	REAR LIFTING SENSOR	—
	TILT SENSOR	X
	TELESCOPIC SENSOR	X
	SPEED SENSOR	X
	N & P RELAY	X
	BATTERY VOLTAGE	—
Output	SLIDING MOTOR — FORWARD	—
	SLIDING MOTOR — BACKWARD	—
	RECLINING MOTOR — FORWARD	—
	RECLINING MOTOR — BACKWARD	—
	FRONT LIFTING MOTOR — UPWARD	—
	FRONT LIFTING MOTOR — DOWNWARD	—
	REAR LIFTING MOTOR — UPWARD	—
	REAR LIFTING MOTOR — DOWNWARD	—
	TILT MOTOR — UPWARD	—
	TILT MOTOR — DOWNWARD	—
	TELESCOPIC MOTOR — FORWARD	—
	TELESCOPIC MOTOR — BACKWARD	—
	INDICATOR LED 1	—
	INDICATOR LED 2	—

Data Monitor (Cont'd)

MONITORED ITEM

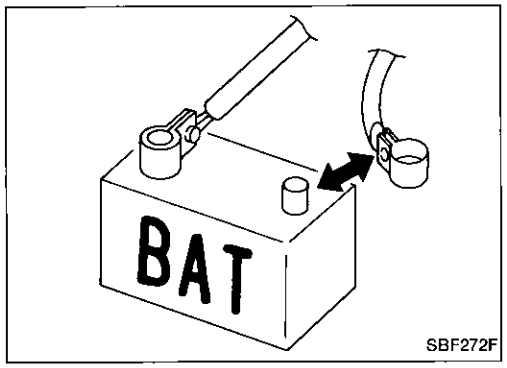
Monitored item [Unit]	Description	Remarks
TELESCO SW-FR [ON/OFF]	• Indicates [ON/OFF] condition of telescopic switch on steering column cover, used to move steering column forward.	
TELESCO SW-RR [ON/OFF]	• Indicates [ON/OFF] condition of telescopic switch on steering column cover, used to move steering column backward.	
TILT SW-UP [ON/OFF]	• Indicates [ON/OFF] condition of tilt switch on steering column cover, used to move steering column upward.	
TILT SW-DOWN [ON/OFF]	• Indicates [ON/OFF] condition of tilt switch on steering column cover, used to move steering column downward.	
MEMORY SW 1 [ON/OFF]	• Indicates [ON/OFF] condition of memory switch 1 on driver's door trim.	
MEMORY SW 2 [ON/OFF]	• Indicates [ON/OFF] condition of memory switch 2 on driver's door trim.	
N&P RELAY [ON/OFF]	• Indicates [ON/OFF] condition of N&P relay.	• When A/T select lever is placed in "N" or "P" range, N&P relay contacts.
SLIDE SW-FR [ON/OFF]	• Indicates [ON/OFF] condition of sliding switch on driver's door trim, used to move driver's seat forward.	
SLIDE SW-RR [ON/OFF]	• Indicates [ON/OFF] condition of sliding switch on driver's door trim, used to move driver's seat backward.	
RECLN SW-FR [ON/OFF]	• Indicates [ON/OFF] condition of reclining switch on driver's door trim, used to recline driver's seatback forward.	
RECLN SW-RR [ON/OFF]	• Indicates [ON/OFF] condition of reclining switch on driver's door trim, used to recline driver's seatback backward.	
LIFT FR SW-UP [ON/OFF]	• Indicates [ON/OFF] condition of front lifting switch on driver's door trim, used to move front end of driver's seat upward.	
LIFT FR SW-DW [ON/OFF]	• Indicates [ON/OFF] condition of front lifting switch on driver's door trim, used to move front end of driver's seat downward.	
LIFT RR SW-UP [ON/OFF]	• Indicates [ON/OFF] condition of rear lifting switch on driver's door trim, used to move rear end of driver's seat upward.	
LIFT RR SW-DW [ON/OFF]	• Indicates [ON/OFF] condition of rear lifting switch on driver's door trim, used to move rear end of driver's seat downward.	
SET SW [ON/OFF]	• Indicates [ON/OFF] condition of main memory switch on driver's door trim.	
IGN SW [ON/OFF]	• Indicates [ON/OFF] condition of ignition switch.	• When ignition key is turned to "ON" position, ignition switch contacts.
ACC SW [ON/OFF]	• Indicates [ON/OFF] condition of ACC switch.	• When ignition key is turned to "ACC" or "ON" position, ACC switch contacts.

Data Monitor (Cont'd)

Monitored item [Unit]	Description	Remarks
IGN KEY SW [ON/OFF]	• Indicates [ON/OFF] condition of key switch.	• When ignition key is inserted into key hole, key switch contacts.
DOOR SW [ON/OFF]	• Indicates [ON/OFF] condition of door switch.	• When driver's door is opened, door switch contacts.
CANCEL SW [ON/OFF]	• Indicates [ON/OFF] condition of cancel switch on steering column cover.	
DESTINATION [DOM/USA]	• Indicates destination of ADPCU.	• Display for North America model is "USA".
CAR SPEED SEN [OVER/UNDER]	• Indicates whether input signal from vehicle speed sensor shows over 7 km/h (4 MPH) or under 7 km/h (4 MPH).	
TELESCO SEN [Step]	• Indicates input signal from telescopic sensor.	• The more forward the position of the steering column is, the more the number of steps displayed increases.
TILT SEN [Step]	• Indicates input signal from tilt sensor.	• The more downward the position of the steering column is, the more the number of steps displayed increases.
VOLTAGE [V]	• Voltage measured by the voltage probe.	
PULSE [msec] or [Hz] or [%]	• Pulse width, frequency or duty cycle measured by the pulse probe.	• Only "#" is displayed if item is unable to be measured. • Figures with "#"s are temporary ones. They are the same as figures from an actual piece of data just measured.

Preliminary Check

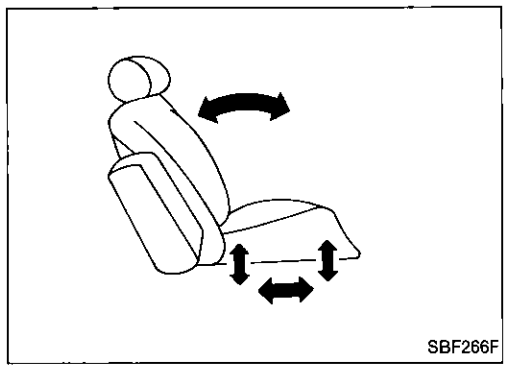
- **The following PRELIMINARY CHECKS are functional checks to make sure that the symptoms are really occurring in the Automatic Drive Positioner system.**
- **Note the result of each PRELIMINARY CHECK before referring to the Diagnostic Procedures.**
- **The combination of the results of each of the PRELIMINARY CHECKS 1, 2, 3 and 4 eliminates good system, parts and circuits when performing trouble diagnoses.**
- **Before referring to PRELIMINARY CHECKS, perform the following PREPARATION to cancel memories.**



SBF272F

PREPARATION

1) Disconnect battery cable and keep it disconnected for more than 1 minute.
2) Reconnect battery cable.
3) Open and close driver's side door more than 2 times with key inserted (key switch ON) and ignition switch OFF.


SBF266F

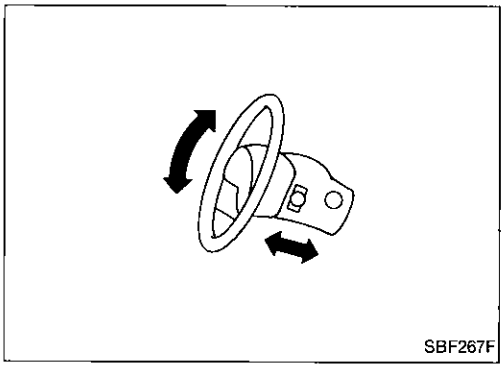
PRELIMINARY CHECK 1 — FUNCTIONAL CHECK FOR DRIVER'S SEAT MANUAL OPERATION

4) Check sliding, reclining, front lifting and rear lifting operations using power seat control switches.

Result:

Symptom No.	Symptom
1	All manual operations of driver's seat are O.K.
2	One or more manual operations (sliding, reclining, front lifting or rear lifting) are malfunctioning.
3	All manual operations of driver's seat are malfunctioning.

Preliminary Check (Cont'd)

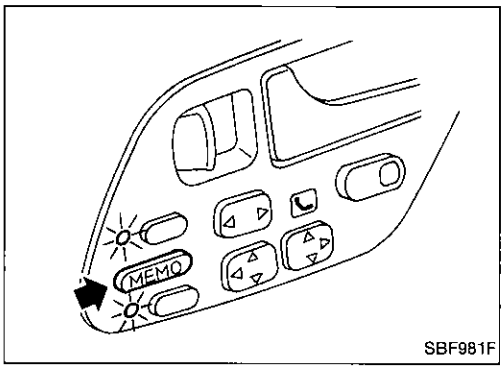

SBF267F

PRELIMINARY CHECK 2 — FUNCTIONAL CHECK FOR STEERING COLUMN MANUAL OPERATION

5) Check tilt and telescopic operations using steering switch.

Result:

Symptom No.	Symptom
4	Both manual operations of steering column are O.K.
5	One of the manual operations (tilt or telescopic) is malfunctioning.
6	Both manual operations of the steering column are malfunctioning.

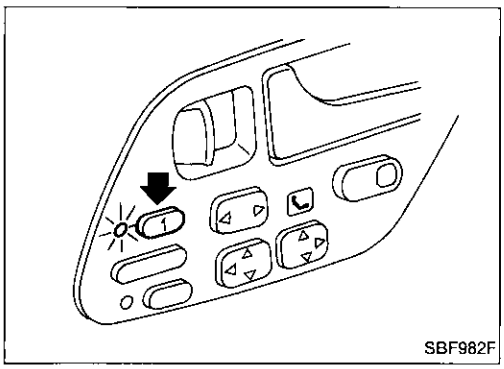


SBF981F

PRELIMINARY CHECK 3 — FUNCTIONAL CHECK FOR MEMORY SETS

6) With the ignition switch "ON", touch the main memory switch.

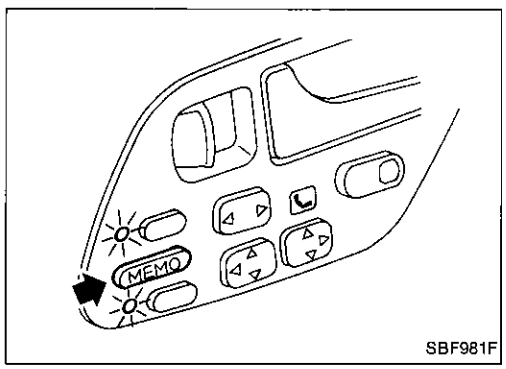
The indicator L.E.D.s come on for approximately 0.5 sec. after the main memory switch is touched.



SBF982F

7) Touch memory switch 1 within 5 sec. after touching main memory switch.

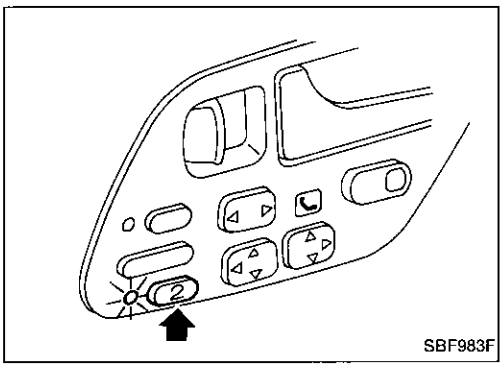
Make sure indicator L.E.D. for memory switch 1 comes on for approximately 5 sec. after memory switch 1 is touched.
In this case, memory 1 is set.



SBF981F

8) Move the driver's seat and the steering column to the proper position using power seat control switches and steering switch. If driver's seat or steering column does not move at all, go to next step 9).
9) With the ignition switch "ON", touch the main memory switch.

The indicator L.E.D. for memory switch 2 comes on for approximately 0.5 sec. after main memory switch is touched.



Preliminary Check (Cont'd)

10) Touch memory switch 2 within 5 sec. after touching main memory switch.

Make sure indicator L.E.D. for memory switch 2 comes on for approximately 5 sec. after memory switch 2 is touched. In this case, memory 2 is set.

Result:

Symptom No.	Symptom
7	Both L.E.D.s come on correctly when setting memory.
8	One L.E.D. does not come on correctly when setting memory.
9	Neither L.E.D. comes on correctly when setting memory.

PRELIMINARY CHECK 4 — SELF-DIAGNOSIS WITHOUT CONSULT

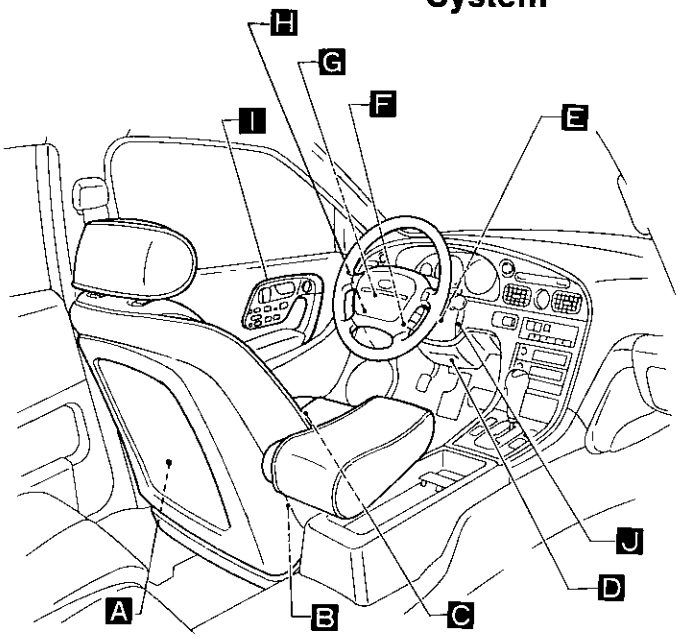
11) Perform self-diagnosis without CONSULT. (Refer to pages BF-80 and 81.)

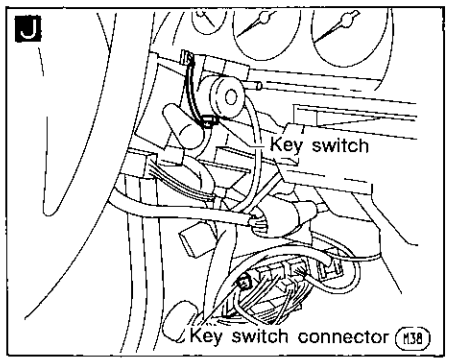
Do not perform self-diagnosis with CONSULT in this instance.

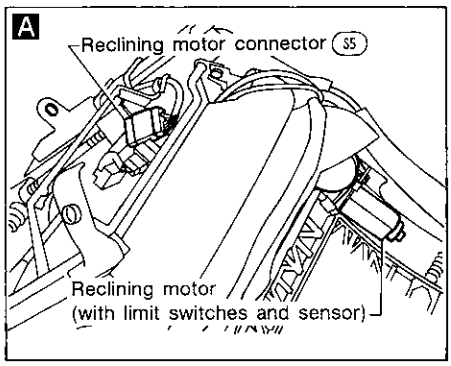
Result:

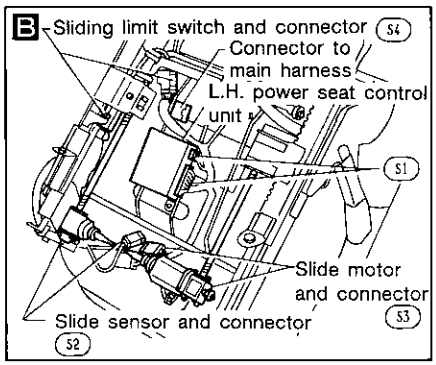
Symptom No.	Symptom (Judgment of self-diagnosis)
10	All circuits that can be confirmed by self-diagnosis are O.K.
11	Can not perform self-diagnosis.
12	All circuits for driver's seat system are N.G.
13	Both circuits for steering column system are N.G.
14	One or more circuits for driver's seat system (sliding device, reclining device, front lifting or rear lifting device circuits) are N.G.
15	One circuit for steering column system (tilt or telescopic device circuit) is N.G.
16	Vehicle speed sensor circuit is N.G.

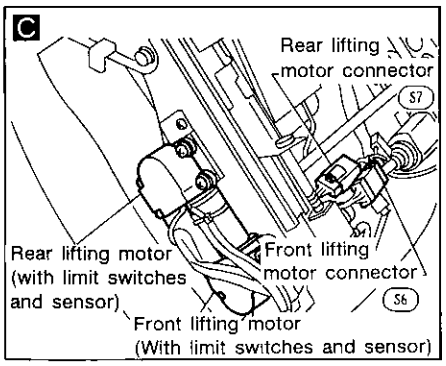
Harness Layout for Automatic Drive Positioner System

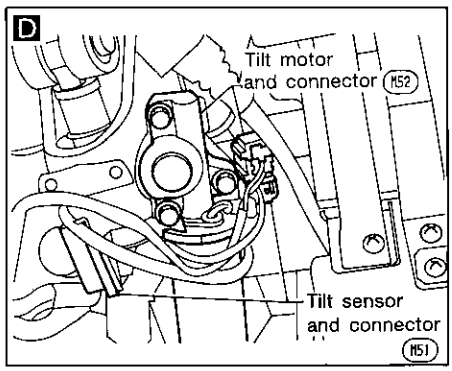


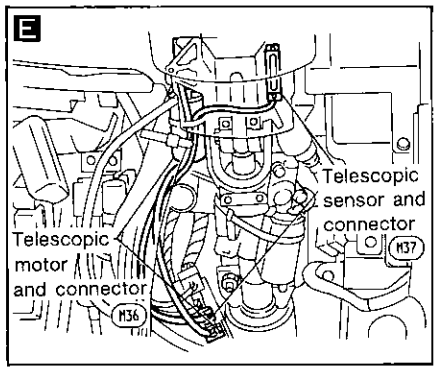


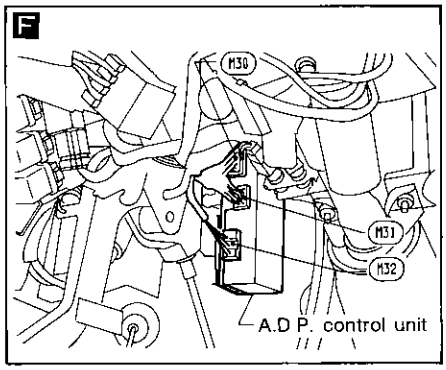


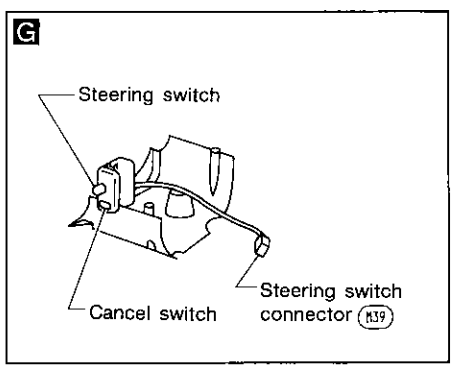


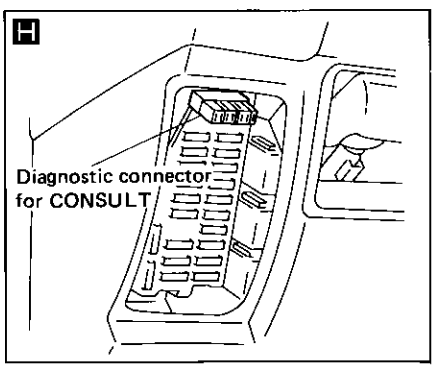


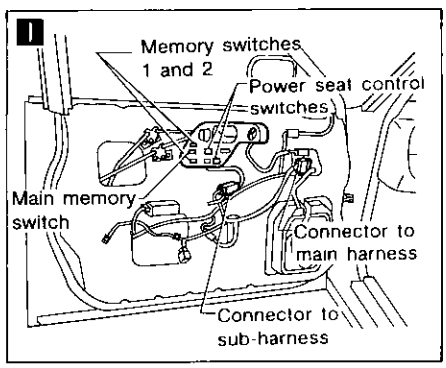






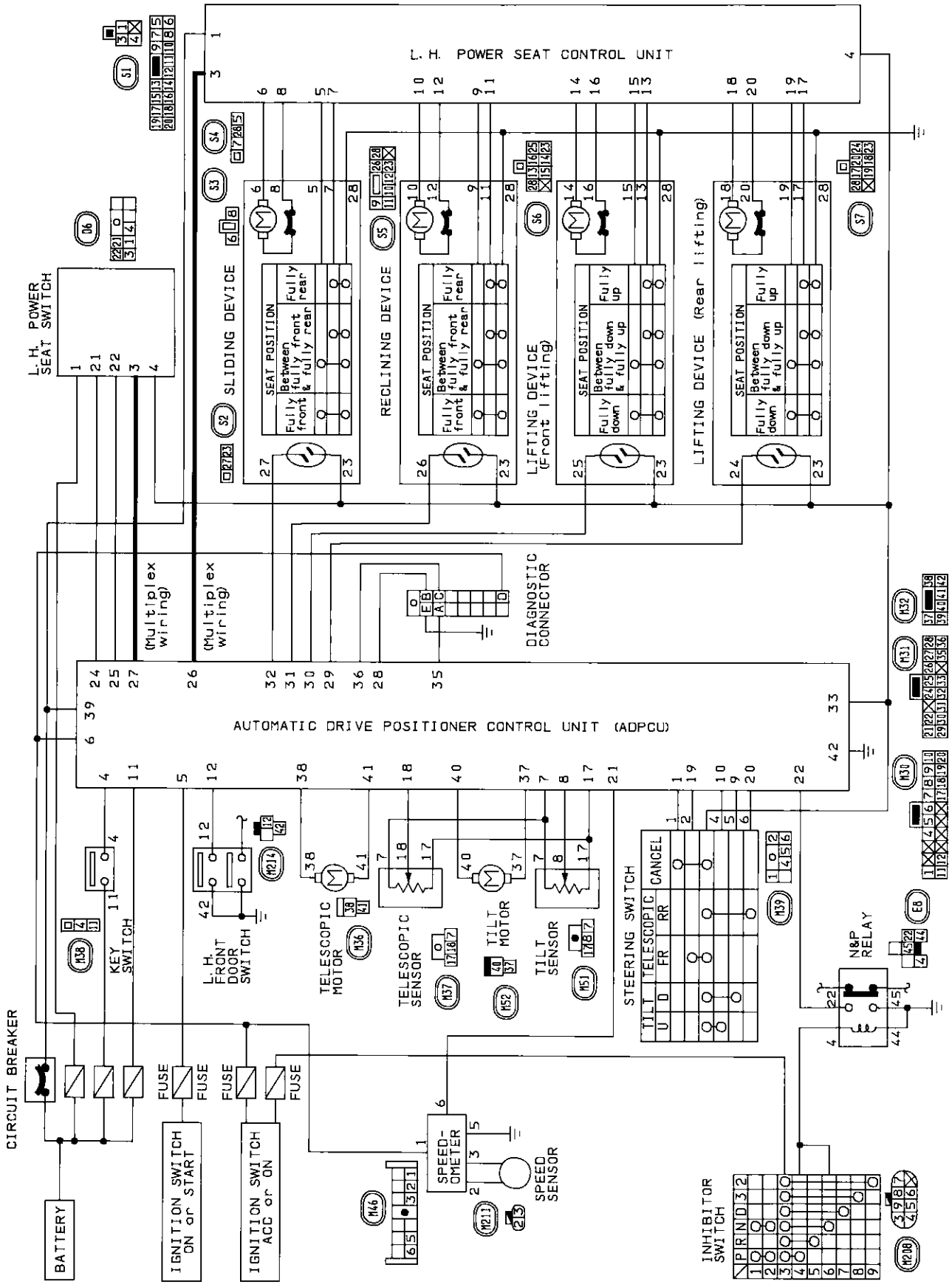






SBF984F

Circuit Diagram for Quick Pinpoint Check



SBF229A

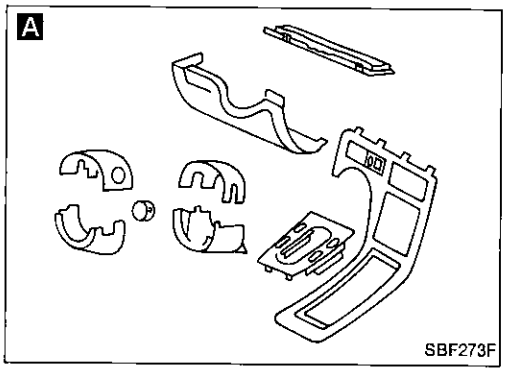
Diagnostic Procedure 1

SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)

1 : All manual operations of driver's seat are O.K.
4 : Both manual operations of steering column are O.K.
8 : One L.E.D. does not come on correctly when setting memory.
10 : All circuits that can be confirmed by self-diagnosis are O.K.

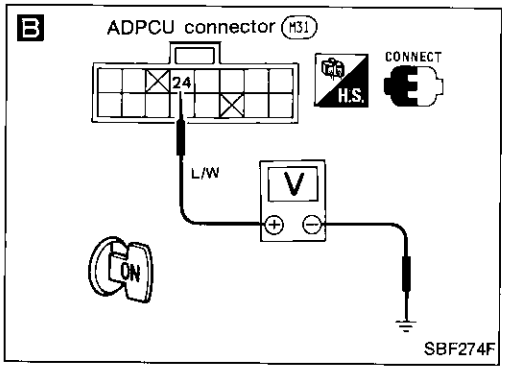
Diagnostic Procedure 1-1: L.E.D. for memory switch 1 does not come on correctly when setting memory.

A



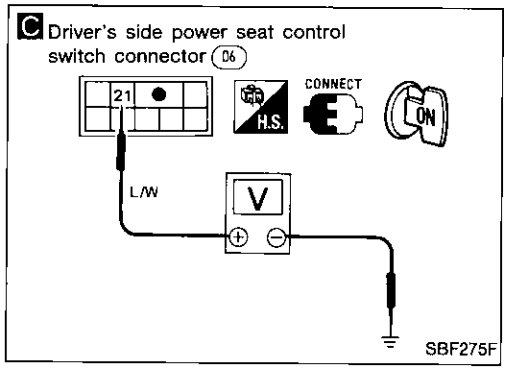
SBF273F

B ADPCU connector (M31)



SBF274F

C Driver's side power seat control switch connector (D6)



SBF275F

CHECK OUTPUT SIGNAL OF ADPCU FOR L.E.D.
A 1) Remove steering column covers, A/T finisher, cluster lid C and lower instrument covers.
B 2) Check voltage between ADPCU harness terminal (24) and body ground without pushing main memory switch.
Battery voltage should exist.

N.G. → CHECK OUTPUT SIGNAL OF DRIVER'S SIDE POWER SEAT SWITCH FOR L.E.D.
1) Remove driver's side power seat control switch with harness connected.
2) Remove armrest.
3) Remove door trim with harness connected.
C 4) Check voltage between driver's side power seat control switch harness terminal (21) and body ground without pushing main memory switch.
Battery voltage should exist.

O.K. ↓

Note
- CHECK ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK CONNECTION AT ADPCU HARNESS CONNECTOR (M31).

O.K. ↓

Replace ADPCU.

O.K. ↓

Repair harness between ADPCU harness terminal (24) and driver's side power seat control switch harness terminal (21).

N.G. ↓

Note
- CHECK DRIVER'S SIDE POWER SEAT CONTROL SWITCH PIN TERMINALS FOR DAMAGE.
- CHECK CONNECTION AT DRIVER'S SIDE POWER SEAT CONTROL SWITCH HARNESS CONNECTOR (D6).

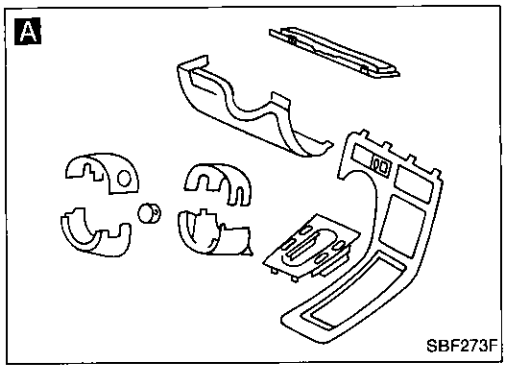
O.K. ↓

Replace driver's side power seat control switch.

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 1 (Cont'd)

Diagnostic Procedure 1-2: L.E.D. for memory switch 2 does not come on correctly when setting memory.



CHECK OUTPUT SIGNAL OF ADPCU FOR L.E.D.

A 1) Remove steering column covers, A/T finisher, cluster lid C and lower instrument covers.

B 2) Check voltage between ADPCU harness terminal (25) and body ground without pushing main memory switch.

Battery voltage should exist.

N.G. →

CHECK OUTPUT SIGNAL OF DRIVER'S SIDE POWER SEAT SWITCH FOR L.E.D.

1) Remove driver's side power seat control switch with harness connected.
2) Remove armrest.
3) Remove door trim with harness connected.

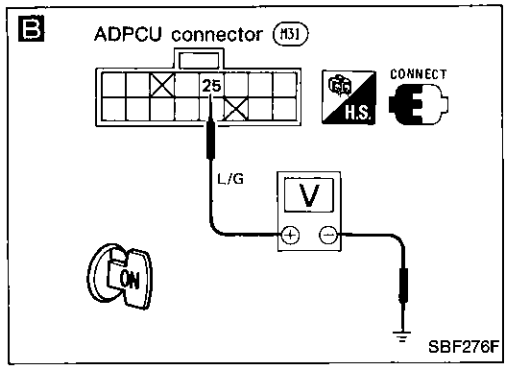
C 4) Check voltage between driver's side power seat control switch harness terminal (22) and body ground without pushing main memory switch.

Battery voltage should exist.

O.K. ↓

N.G. →

Repair harness between ADPCU harness terminal (25) and driver's side power seat control switch harness terminal (22).



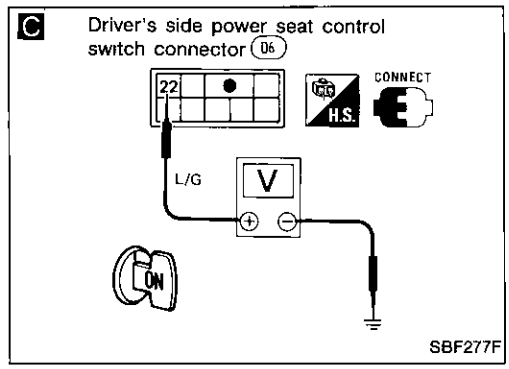
O.K. ↓

Note

- CHECK ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK CONNECTION AT ADPCU HARNESS CONNECTOR (M31).

O.K. ↓

Replace ADPCU.



Note

- CHECK DRIVER'S SIDE POWER SEAT CONTROL SWITCH PIN TERMINALS FOR DAMAGE.
- CHECK CONNECTION AT DRIVER'S SIDE POWER SEAT CONTROL SWITCH HARNESS CONNECTOR (D6).

O.K. ↓

Replace driver's side power seat control switch.

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

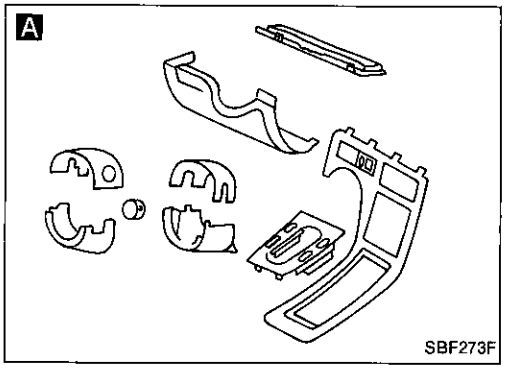
Diagnostic Procedure 2

SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)

1 : All manual operations of driver's seat are O.K.
4 : Both manual operations of steering column are O.K.
9 : Neither L.E.D. comes on correctly when setting memory.
11 : Can not perform self-diagnosis.

Diagnostic Procedure 2-1: Procedure without CONSULT.

A



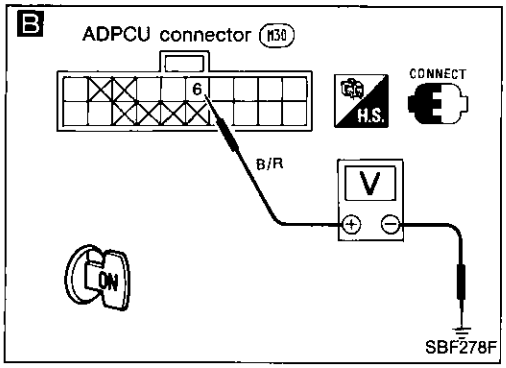
CHECK IGNITION SIGNAL FOR ADPCU.
A 1) Remove steering column covers, A/T finisher, cluster lid C and lower instrument covers.
B 2) Check voltage between ADPCU harness terminal ⑥ and body ground without pushing main memory switch.
Battery voltage should exist.

N.G. → CHECK THE FOLLOWING:
- Fuse
- Harness continuity between ADPCU harness terminal ⑥ and fuse

O.K. ↓

C

B



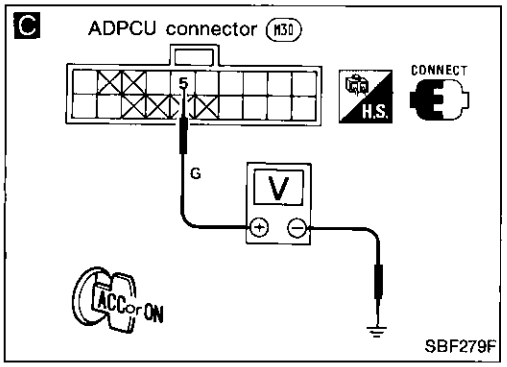
CHECK ACC SIGNAL FOR ADPCU.
Check voltage between ADPCU harness terminal ⑤ and body ground.
Battery voltage should exist.

N.G. → CHECK THE FOLLOWING:
- Fuse
- Harness continuity between ADPCU harness terminal ⑤ and fuse

O.K. ↓

D

C



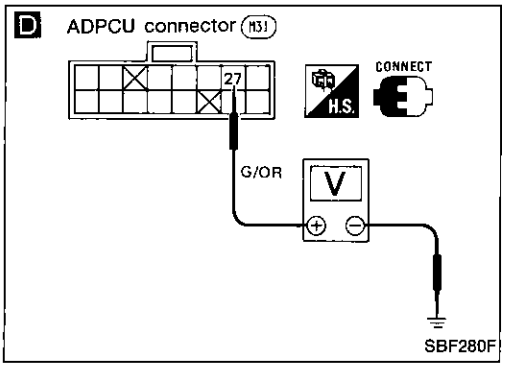
CHECK MAIN MEMORY SWITCH, MEMORY SWITCH 1 AND MEMORY SWITCH 2.
Check voltage between ADPCU harness terminal ㉗ and body ground when pushing main memory switch, memory switch 1 and 2.
Do not use digital type voltmeter.
Voltage should increase slightly when pushing switches.

N.G. → Replace driver's side power seat control switch.

O.K. ↓

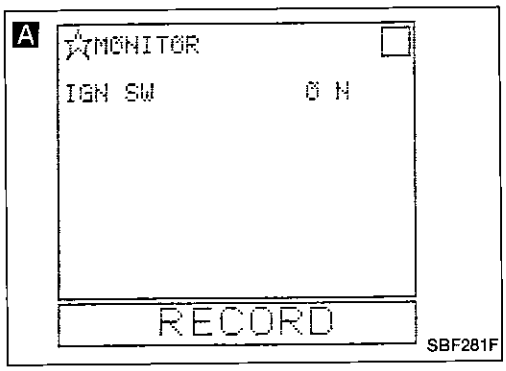
Replace ADPCU.

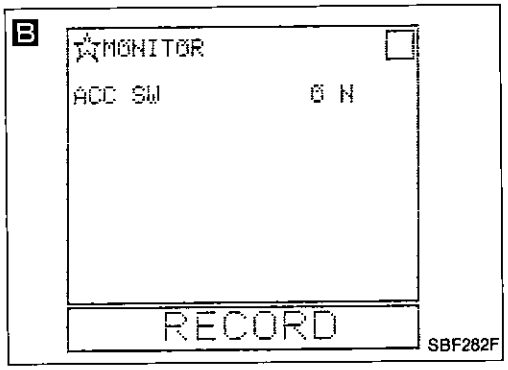
D

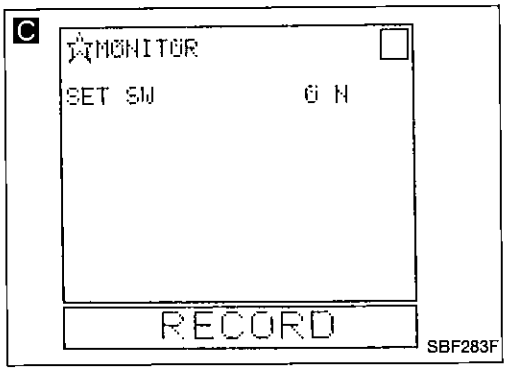


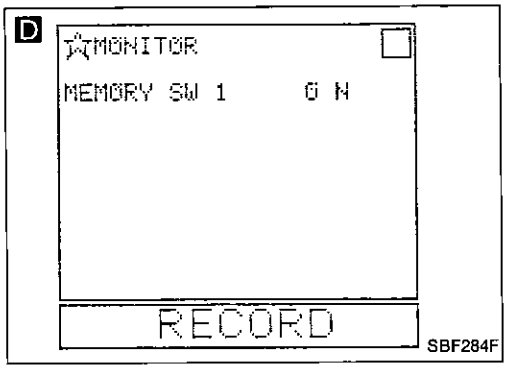
Diagnostic Procedure 2 (Cont'd)

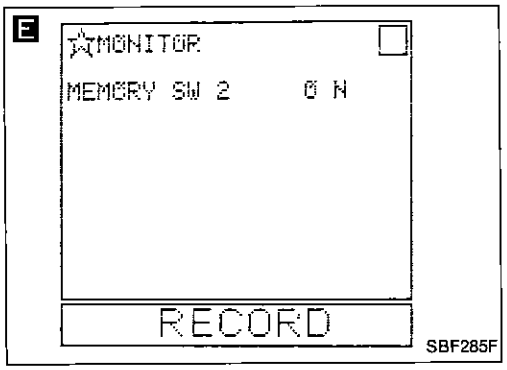
Diagnostic Procedure 2-2: Procedure with CONSULT











Connect CONSULT to vehicle.



A

CHECK IGNITION SIGNAL FOR ADPCU.
See "IGN SW" in DATA MONITOR mode.
"IGN SW" should be "ON".

N.G. → CHECK THE FOLLOWING:
- Fuse
- Harness continuity between ADPCU harness terminal (6) and fuse

O.K.

B

CHECK ACC SIGNAL FOR ADPCU.
See "ACC SW" in DATA MONITOR mode.
"ACC SW" should be "ON".

N.G. → CHECK THE FOLLOWING:
- Fuse
- Harness continuity between ADPCU harness terminal (5) and fuse

O.K.

C

CHECK MAIN MEMORY SWITCH.
See "SET SW" in DATA MONITOR mode.
"SET SW" should change from "OFF" to "ON" when pushing main memory switch.

N.G. → Replace driver's side power seat control switch.

O.K.

D

CHECK MEMORY SWITCH 1.
See "MEMORY SW 1" in DATA MONITOR mode.
"MEMORY SW 1" should change from "OFF" to "ON" when pushing memory switch 1.

N.G. → Replace driver's side power seat control switch.

O.K.

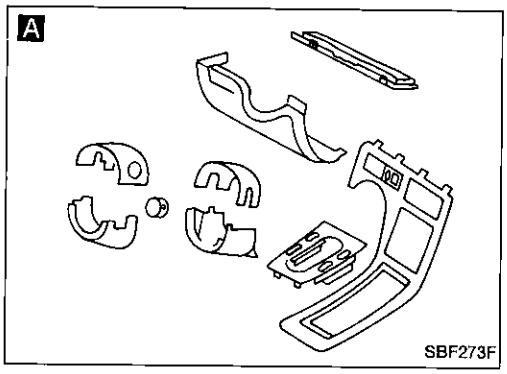
E

CHECK MEMORY SWITCH 2.
See "MEMORY SW 2" in DATA MONITOR mode.
"MEMORY SW 2" should change from "OFF" to "ON" when pushing memory switch 2.

N.G. → Replace driver's side power seat control switch.

O.K.

INSPECTION END

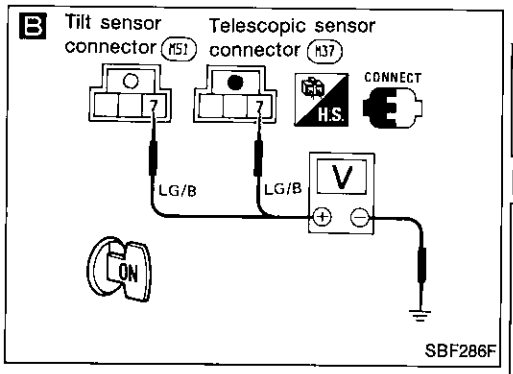


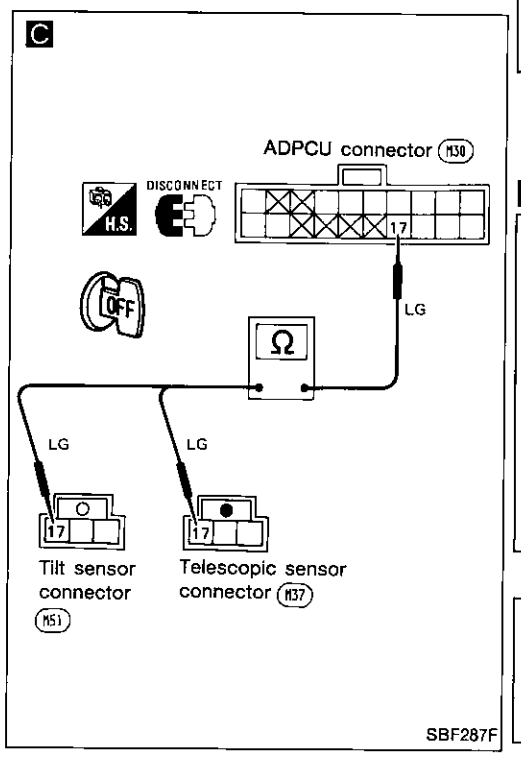
Diagnostic Procedure 3

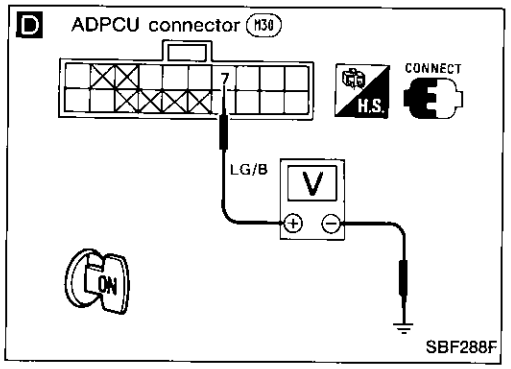
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)

1 : All manual operations of driver's seat are O.K.
4 : Both manual operations of steering column are O.K.
9 : Neither L.E.D. comes on correctly when setting memory.
13 : Both circuits for steering column system are judges N.G. by self-diagnosis.

Diagnostic Procedure 3-1: Procedure without CONSULT







A

Remove steering column covers, A/T finisher, cluster lid C and lower instrument covers.

B

CHECK POWER SOURCE FOR TILT AND TELESCOPIC SENSORS.
Check voltage between tilt sensor harness terminal ⑦ and telescopic sensor harness terminal ⑦, and body ground.
Approximately 5 volts should exist.

N.G. → D

O.K. ↓

C

Note

CHECK TILT AND TELESCOPIC SENSOR HARNESSES.
1) Disconnect tilt, telescopic harness connectors and ADPCU harness connector M30.
2) Check harness continuity between ADPCU harness terminal ⑰ and harness terminal ⑰ of both tilt sensor and telescopic sensor.
Continuity should exist.

O.K. ↓

CHECK TILT SENSOR AND TELESCOPIC SENSOR.
(Refer to Electrical Components Inspection.)

N.G. → Replace tilt/telescopic sensor.

O.K. ↓

Replace ADPCU.

D

CHECK POWER SOURCE FOR TILT AND TELESCOPIC SENSORS AT ADPCU.
1) Check voltage between ADPCU harness terminal ⑦ and body ground.
Approximately 5 volts should exist.

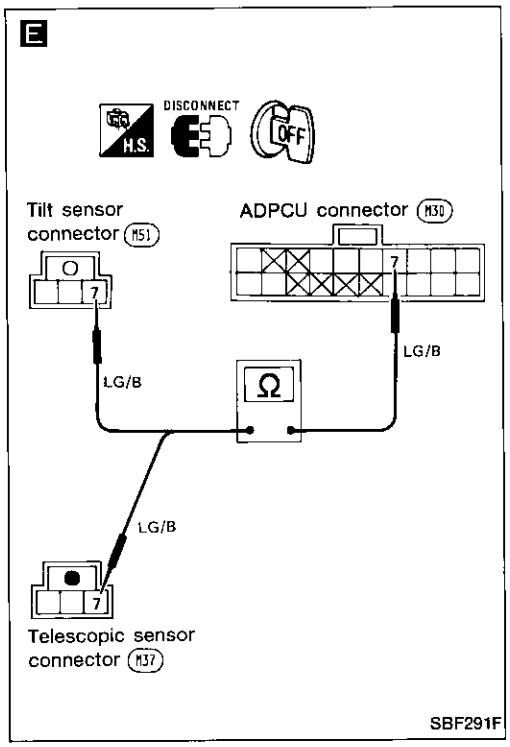
O.K. → Repair harness between ADPCU harness terminal ⑦ and tilt and telescopic sensor harness terminal ⑦.

N.G. → Ⓐ

(Go to next page.)

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 3 (Cont'd)



Ⓐ

E

Note

CHECK TILT AND TELESCOPIC SENSOR HARNESSES.

1) Disconnect tilt, telescopic harness connectors and ADPCU harness connector (M30).
2) Check harness continuity between ADPCU harness terminal (7) and harness terminal (7) of both tilt sensor and telescopic sensor.
   Continuity should exist.

O.K.

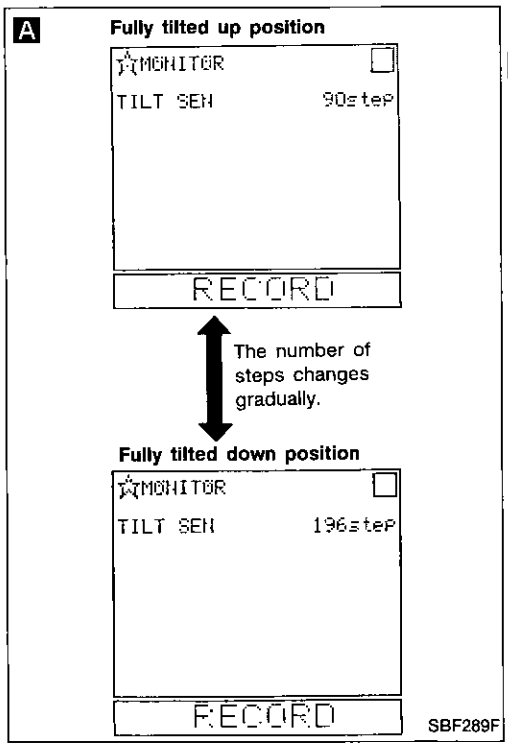
Note

- CHECK THE ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE ADPCU HARNESS CONNECTOR (M30).

O.K.

Replace ADPCU.

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.



Diagnostic Procedure 3-2: Procedure with CONSULT

Connect CONSULT to vehicle.

OFF → ON

A

CHECK TILT SENSOR SIGNALS FOR ADPCU.
See "TILT SEN" in DATA MONITOR mode.

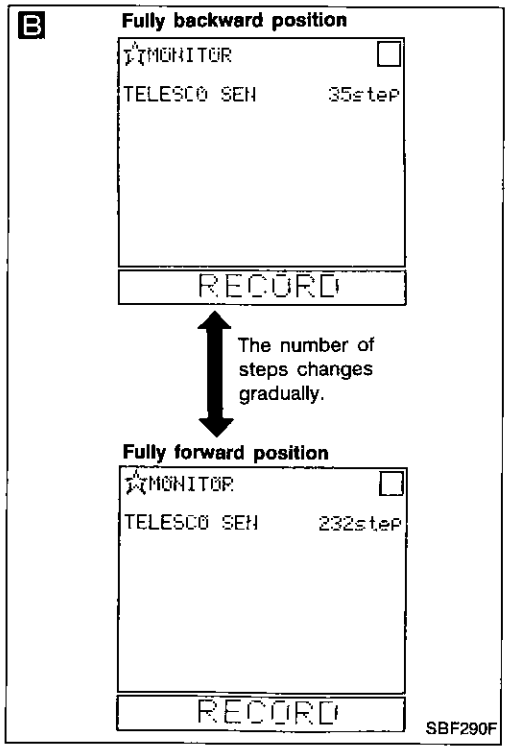
- **The more downward the position of the steering column, the more the number of steps displayed increases.**
- **The more upward the position of the steering column, the more the number of steps displayed decreases.**

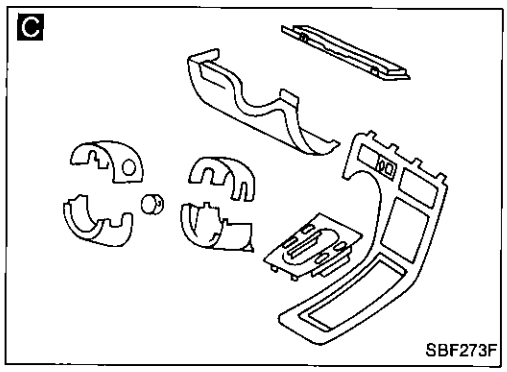
N.G. → Ⓑ (Go to next page.)

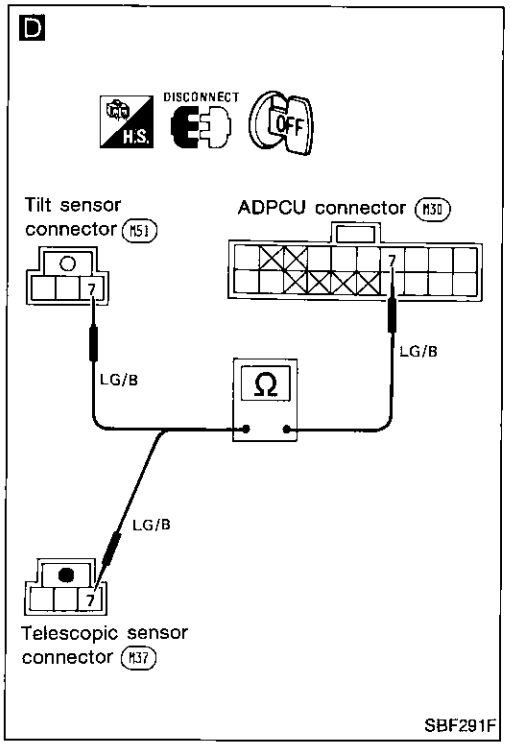
O.K.

Ⓐ

Diagnostic Procedure 3 (Cont'd)







Ⓐ

B

CHECK TELESCOPIC SENSOR SIGNALS FOR ADPCU.
See "TELESCO SEN" in DATA MONITOR mode.
- **The more forward the position of the steering column, the more the number of steps displayed increases.**
- **The more backward the position of the steering column, the more the number of steps displayed decreases.**

N.G. → Ⓑ (Go to Ⓑ below.)

O.K. ↓

INSPECTION END

Ⓑ

C

Remove steering column covers, A/T finisher, cluster lid C and lower instrument covers.

D

Note

CHECK TILT AND TELESCOPIC SENSOR HARNESSES.
1) Disconnect tilt, telescopic harness connectors and ADPCU harness connector (M30).
2) Check harness continuity between ADPCU harness terminal (7) and harness terminal (7) of both tilt sensor and telescopic sensor.
Continuity should exist.

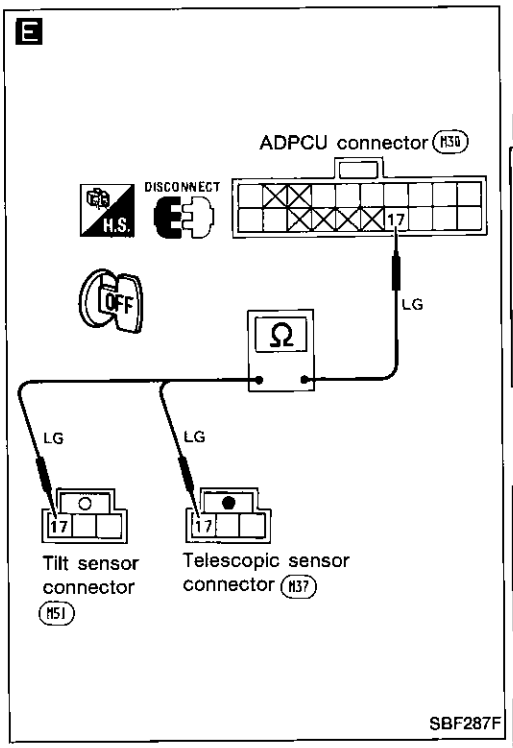
O.K. ↓

Ⓒ

(Go to next page.)

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 3 (Cont'd)



Ⓒ

E

CHECK TILT AND TELESCOPIC SENSOR HARNESSES.
Check harness continuity between ADPCU harness terminal ⑰ and harness terminal ⑰ of both tilt sensor and telescopic sensor.
Continuity should exist.

Note

O.K.

Note
- CHECK THE ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE ADPCU HARNESS CONNECTOR (M30).

O.K.

CHECK TILT SENSOR AND TELESCOPIC SENSOR.
(Refer to Electrical Components Inspection.)

N.G. → Replace tilt or telescopic sensor.

O.K.

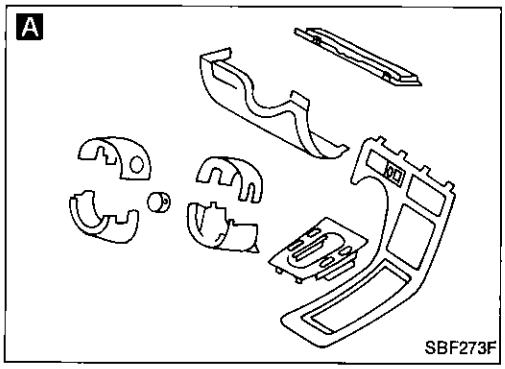
Replace ADPCU.

Diagnostic Procedure 4

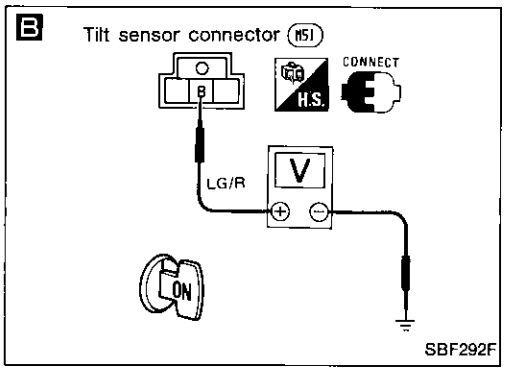
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)

1 : All manual operations of driver's seat are O.K.
4 : Both manual operations of steering column are O.K.
9 : Neither L.E.D. comes on correctly when setting memory.
15 : One of the circuits for the steering column system (tilt or telescopic device circuit) is judged N.G. by self-diagnosis.

A



B



Diagnostic Procedure 4-1: Procedure without CONSULT when steering tilt device circuit is judged N.G. by self-diagnosis.

A

Remove steering column covers, A/T finisher, cluster lid C and lower instrument covers.

B

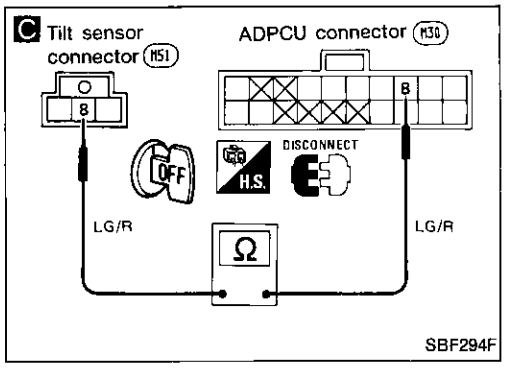
CHECK TILT SENSOR OUTPUT SIGNAL FOR ADPCU.
Check voltage between tilt sensor harness terminal ⑧ and body ground.

Steering column position	Voltage
Fully tilted up	Approximately 1.0 - 1.5V
Fully tilted down	Approximately 4.5V

N.G. → CHECK TILT SENSOR. (Refer to Electrical Components Inspection.)
O.K. → Go to Ⓐ on next page.
N.G. → Replace tilt sensor.

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 4 (Cont'd)



Ⓐ

C

Note

CHECK TILT SENSOR HARNESS.

1) Disconnect ADPCU harness connector M30 and tilt sensor harness connector M51.
2) Check harness continuity between ADPCU harness terminal ⑧ and tilt sensor harness terminal ⑧.

Continuity should exist.

O.K.

Note

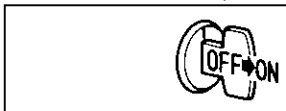
- CHECK THE ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE ADPCU HARNESS CONNECTOR M30.

O.K.

Replace ADPCU.

Diagnostic Procedure 4-2: Procedure with CONSULT when steering tilt device circuit is judged N.G. by self-diagnosis.

Connect CONSULT to vehicle.



A

CHECK TILT SENSOR SIGNALS FOR ADPCU.

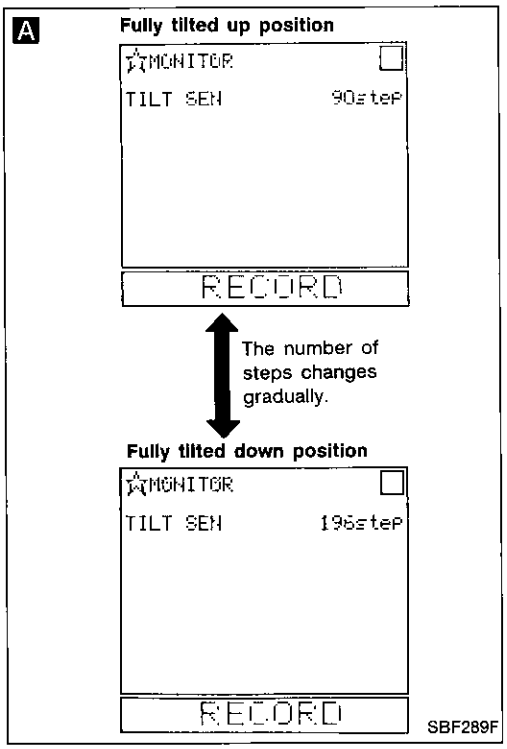
See "TILT SEN" in DATA MONITOR mode.

- **The more downward the position of the steering column, the more the number of steps displayed increases.**
- **The more upward the position of the steering column, the more the number of steps displayed decreases.**

N.G. → Go to **Diagnostic Procedure 4-1.**

O.K.

INSPECTION END



Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 4 (Cont'd)

Diagnostic Procedure 4-3: Procedure without CONSULT when steering telescopic device circuit is judged N.G. by self-diagnosis.

A

Remove steering column covers, A/T finisher, cluster lid C and lower instrument covers.

B

CHECK TILT SENSOR OUTPUT SIGNAL FOR ADPCU.
Check voltage between telescopic sensor harness terminal ⑱ and body ground.

Steering column position	Voltage
Fully backward	Approximately 0V
Fully forward	Approximately 5.0V

N.G. → CHECK TELESCOPIC SENSOR. (Refer to Electrical Components Inspection.)

O.K. → **C**

N.G. → Replace telescopic sensor.

C

CHECK TILT SENSOR HARNESS.
1) Disconnect ADPCU harness connector (M30) and telescopic sensor harness connector (M37).
2) Check harness continuity between ADPCU harness terminal ⑱ and tilt sensor harness terminal ⑱.
Continuity should exist.

Note

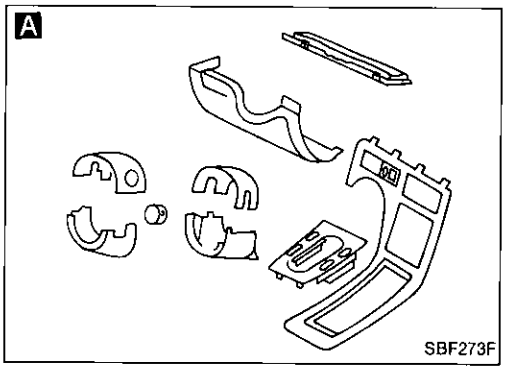
O.K.

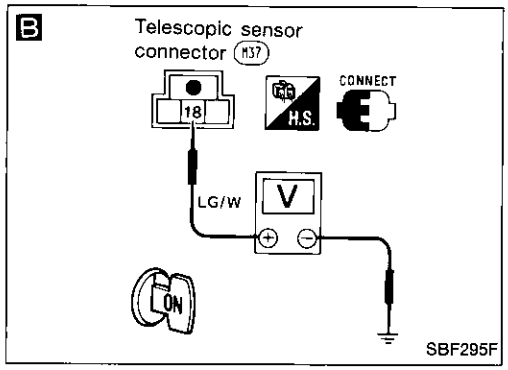
Note
- CHECK THE ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE ADPCU HARNESS CONNECTOR (M30).

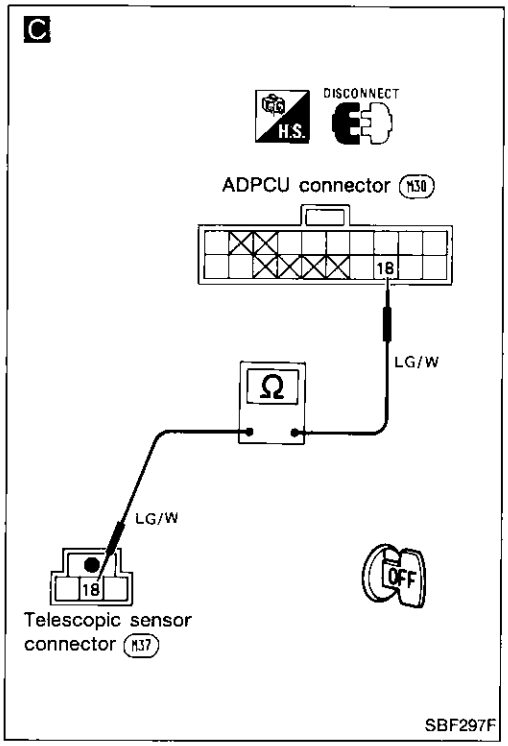
O.K.

Replace ADPCU.

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

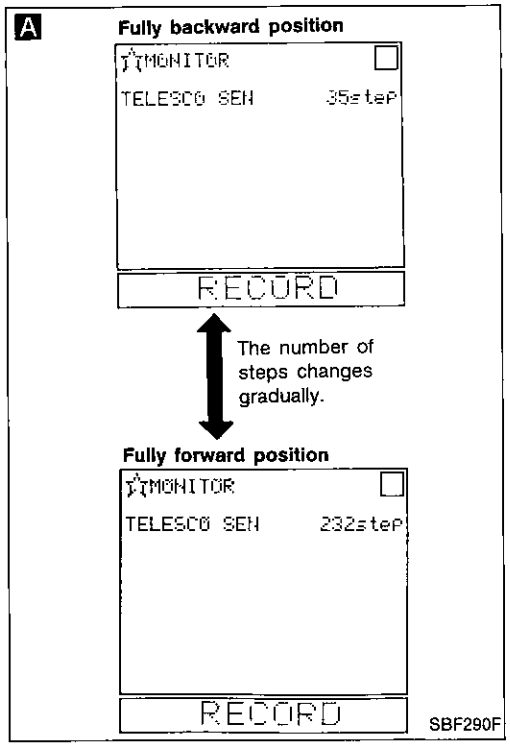






Diagnostic Procedure 4 (Cont'd)

Diagnostic Procedure 4-4: Procedure with CONSULT when steering telescopic device circuit is judged N.G. by self-diagnosis.



Connect CONSULT to vehicle.



A

CHECK TELESCOPIC SENSOR SIGNALS FOR ADPCU.
See "TELESCOPIC SEN" in DATA MONITOR mode.
- **The more forward the position of the steering column, the more the number of steps displayed increases.**
- **The more backward the position of the steering column, the more the number of steps displayed decreases.**

N.G. → Go to **Diagnostic Procedure 4-3.**

O.K.

INSPECTION END

Diagnostic Procedure 5

SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)

1 : All manual operations of driver's seat are O.K.

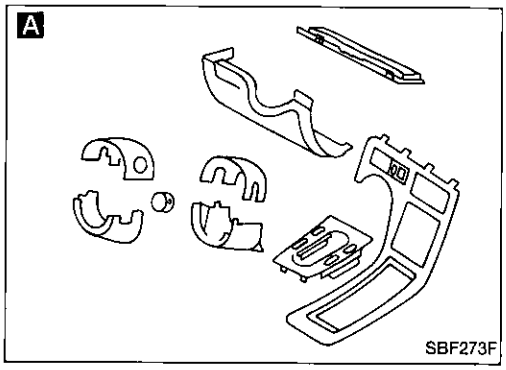
5 : One of the manual operations (tilt or telescopic) is malfunctioning.

7 : Both L.E.D.s come on correctly when setting memory.

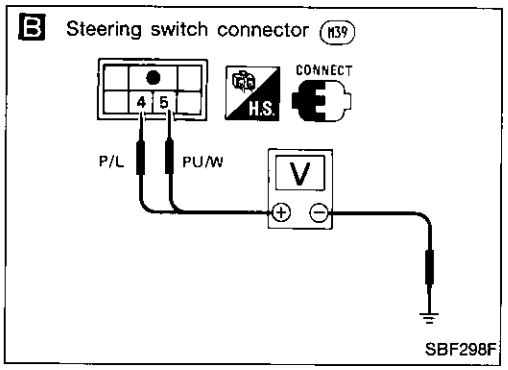
10 : All circuits that can be confirmed by self-diagnosis are O.K.

Diagnostic Procedure 5-1: Procedure without CONSULT when steering column manual tilt operation is malfunctioning.

A

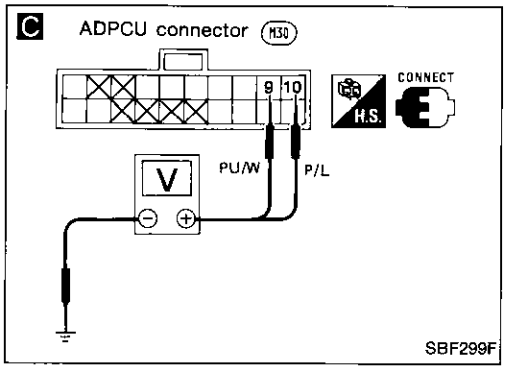

SBF273F

B Steering switch connector (M39)



SBF298F

C ADPCU connector (M30)



SBF299F

A

Remove steering column covers, A/T finisher, cluster lid C and lower instrument covers.

B

CHECK TILT SWITCH HARNESS.
Check voltage between steering switch harness terminals (4), (5) and body ground.

Tilt switch		Terminal	Voltage
Tilt up	ON	(4)	Less than 0.3 volts
	OFF		Battery voltage
Tilt down	ON	(5)	Less than 0.3 volts
	OFF		Battery voltage

N.G. →

C

CHECK TILT SWITCH INPUT SIGNAL FOR ADPCU.
Check voltage between ADPCU harness terminals (10), (9) and body ground.

Tilt switch		Terminal	Voltage
Tilt up	ON	(10)	Less than 0.3 volts
	OFF		Battery voltage
Tilt down	ON	(9)	Less than 0.3 volts
	OFF		Battery voltage

O.K. ↓

Note
- CHECK THE CONNECTION AT THE STEERING SWITCH HARNESS CONNECTOR (M39).

O.K. ↓

CHECK STEERING SWITCH.
(Refer to Electrical Components Inspection.)

O.K. ↓ / N.G. → Replace steering switch.

INSPECTION END

O.K. ↓ / N.G. →

- Repair harness between ADPCU harness terminals (10), (9) and steering switch harness terminals (4), (5).

Note
- CHECK THE ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE ADPCU HARNESS CONNECTOR (M30).

O.K. ↓

Replace ADPCU.

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 5 (Cont'd)

Diagnostic Procedure 5-2: Procedure without CONSULT when steering column manual telescopic operation is malfunctioning.

A

Remove steering column covers, A/T finisher, cluster lid C and lower instrument covers.

B

CHECK TILT SWITCH HARNESS.
Check voltage between steering switch harness terminals ②, ⑥ and body ground.

Telescopic switch		Terminal	Voltage
Forward	ON	②	Less than 0.3 volts
	OFF		Battery voltage
Rearward	ON	⑥	Less than 0.3 volts
	OFF		Battery voltage

N.G. → **C**

CHECK TILT SWITCH INPUT SIGNAL FOR ADPCU.
Check voltage between ADPCU harness terminals ⑲, ⑳ and body ground.

Tilt switch		Terminal	Voltage
Forward	ON	⑲	Less than 0.3 volts
	OFF		Battery voltage
Rearward	ON	⑳	Less than 0.3 volts
	OFF		Battery voltage

O.K.

Note
- CHECK THE CONNECTION AT THE STEERING SWITCH HARNESS CONNECTOR (M39).

O.K.

CHECK STEERING SWITCH.
(Refer to Electrical Components Inspection.)

O.K. → INSPECTION END

N.G. → Replace steering switch.

O.K.

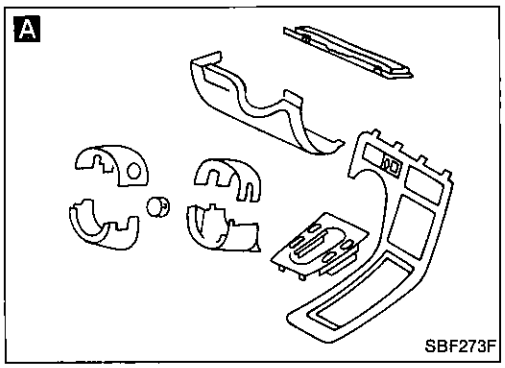
- Repair harness between ADPCU harness terminals ⑲, ⑳ and steering switch harness terminals ②, ⑥.

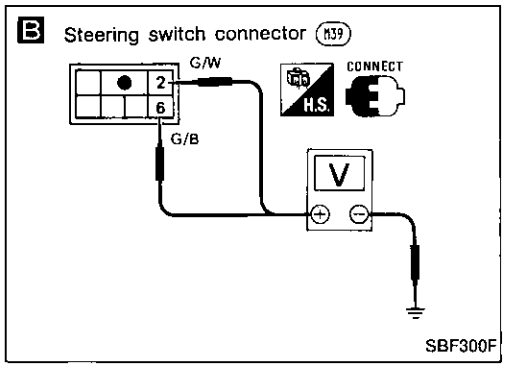
N.G.

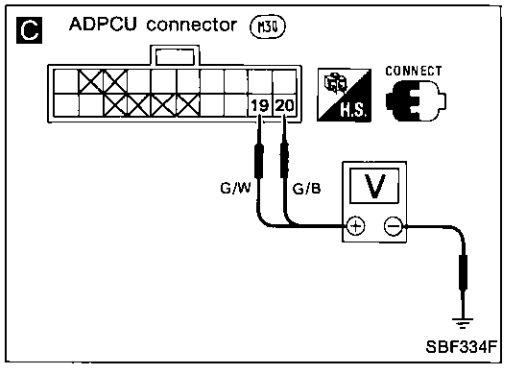
Note
- CHECK THE ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE ADPCU HARNESS CONNECTOR (M30).

O.K.

Replace ADPCU.





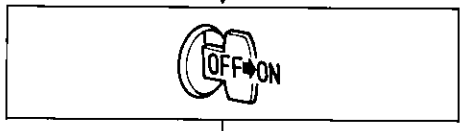


Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 5 (Cont'd)

Diagnostic Procedure 5-3: Procedure with CONSULT when one of the manual operations (tilt or telescopic) is malfunctioning.

Connect CONSULT to vehicle.



A

CHECK TILT UP SWITCH.
See "TILT SW-UP" in DATA MONITOR mode.
"TILT SW-UP" should change from "OFF" to "ON" when tilt up switch is turned ON.

N.G. → Go to **Diagnostic Procedure 5-1.**

O.K.

B

CHECK TILT DOWN SWITCH.
See "TILT SW-DW" in DATA MONITOR mode.
"TILT SW-DW" should change from "OFF" to "ON" when tilt down switch is turned ON.

N.G. → Go to **Diagnostic Procedure 5-1.**

O.K.

C

CHECK TELESCOPIC FRONT SWITCH.
See "TELESCO SW-FR" in DATA MONITOR mode.
"TELESCO SW-FR" should change from "OFF" to "ON" when telescopic front switch is turned ON.

N.G. → Go to **Diagnostic Procedure 5-2.**

O.K.

D

CHECK TELESCOPIC REAR SWITCH.
See "TELESCO SW-RR" in DATA MONITOR mode.
"TELESCO SW-RR" should change from "OFF" to "ON" when telescopic rear switch is turned ON.

N.G. → Go to **Diagnostic Procedure 5-2.**

O.K.

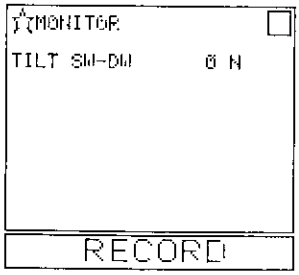
INSPECTION END

A



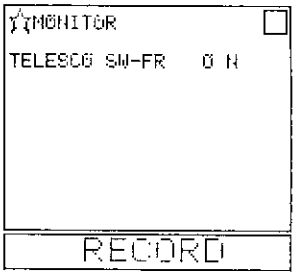
SBF302F

B



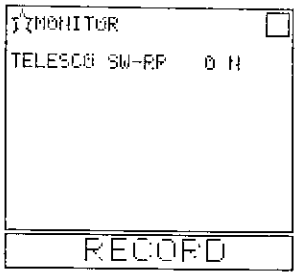
SBF303F

C



SBF304F

D



SBF305F

Diagnostic Procedure 6

SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)

1 : All manual operations of driver's seat are O.K.

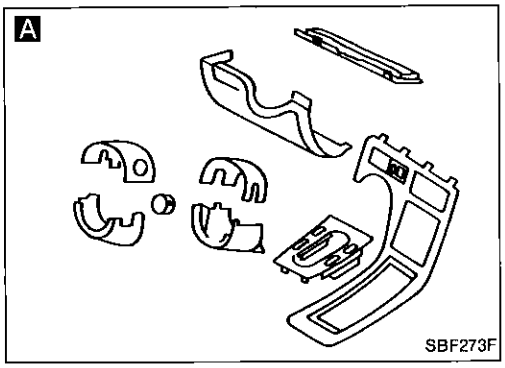
5 : One of the manual operations (tilt or telescopic) is malfunctioning.

7 : Both L.E.D.s come on correctly when setting memory.

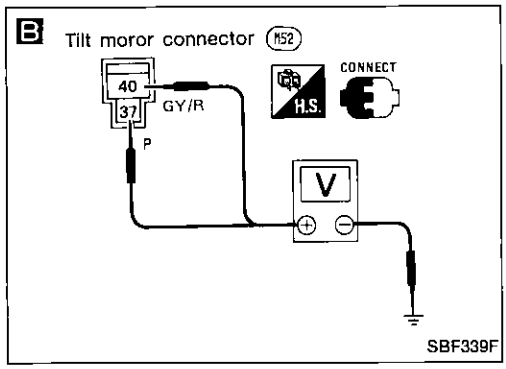
15 : One of the circuits for the steering column system (tilt or telescopic device circuit) is judged N.G. by self-diagnosis.

Diagnostic Procedure 6-1: When steering tilt manual operation is malfunctioning and tilt device circuit is judged N.G. by self-diagnosis.

A

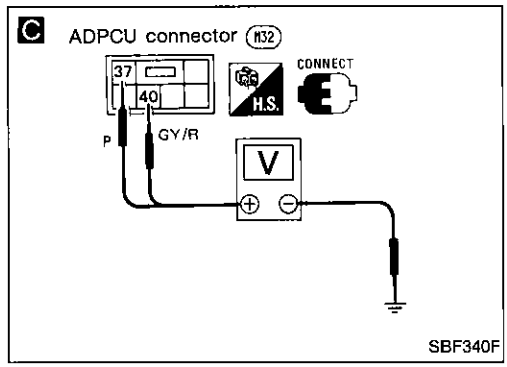

SBF273F

B Tilt moror connector (M52)



SBF339F

C ADPCU connector (M32)



SBF340F

A

Remove steering column covers, A/T finisher, cluster lid C and lower instrument covers.

B

CHECK POWER SOURCE FOR TILT MOTOR.
Check voltage between tilt motor harness terminals (37), (40) and body ground.

Tilt switch		Terminal	Voltage
Tilt down	ON	(37)	Battery voltage
	OFF		0V
Tilt up	ON	(40)	Battery voltage
	OFF		0V

N.G. →

C

CHECK ADPCU POWER SUPPLY FOR TILT MOTOR.
Check voltage between ADPCU harness terminals (37), (40) and body ground.

Tilt switch		Terminal	Voltage
Tilt down	ON	(37)	Battery voltage
	OFF		0V
Tilt up	ON	(40)	Battery voltage
	OFF		0V

O.K. ↓

Note

CHECK THE CONNECTION AT THE TILT MOTOR HARNESS CONNECTOR (M52).

O.K. ↓

Replace tilt motor.

O.K. ↓

Repair harness between ADPCU harness terminals (37), (40) and tilt motor harness terminals (37), (40).

N.G. ↓

Note

- CHECK THE ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE ADPCU HARNESS CONNECTOR (M32).

O.K. ↓

Replace ADPCU.

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 6 (Cont'd)

Diagnostic Procedure 6-2: When steering telescopic manual operation is malfunctioning and tilt device circuit is judged N.G. by self-diagnosis.

A

Remove steering column covers, A/T finisher, cluster lid C and lower instrument covers.

B

CHECK POWER SOURCE FOR TELESCOPIC MOTOR.
Check voltage between tilt motor harness terminals ㊳, ㊶ and body ground.

Telescopic switch		Terminal	Voltage
Forward	ON	㊳	Battery voltage
	OFF		0V
Rearward	ON	㊶	Battery voltage
	OFF		0V

N.G. → C

O.K. ↓

Note

CHECK THE CONNECTION AT THE TELESCOPIC MOTOR HARNESS CONNECTOR.

O.K. ↓

Replace telescopic motor.

C

CHECK ADPCU POWER SUPPLY FOR TELESCOPIC MOTOR.
Check voltage between ADPCU harness terminals ㊳, ㊶ and body ground.

Telescopic switch		Terminal	Voltage
Forward	ON	㊳	Battery voltage
	OFF		0V
Rearward	ON	㊶	Battery voltage
	OFF		0V

O.K. ↓

Repair harness between ADPCU harness terminals ㊳, ㊶ and telescopic motor harness terminals ㊳, ㊶.

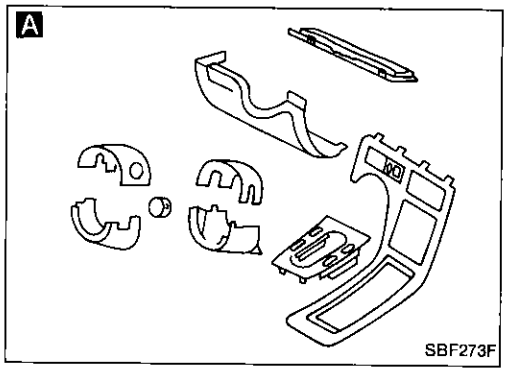
N.G. ↓

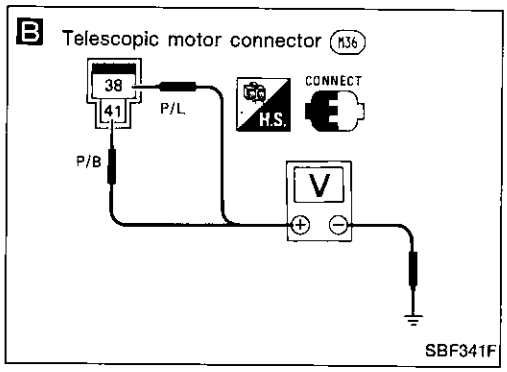
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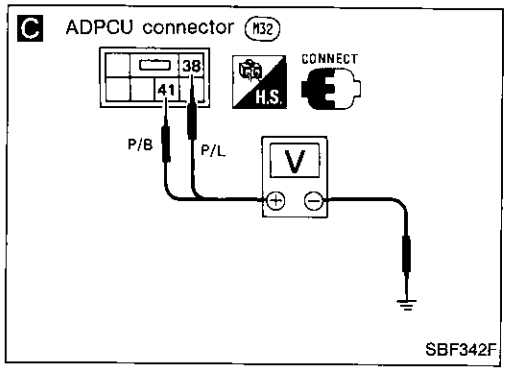
- CHECK THE ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE ADPCU HARNESS CONNECTOR (M32).

O.K. ↓

Replace ADPCU.







Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 7

SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)

1 : All manual operations of driver's seat are O.K.

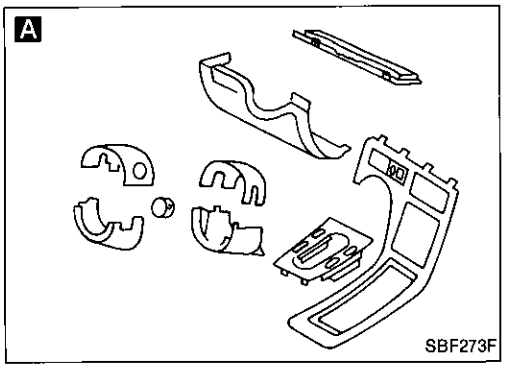
5 : One of the manual operations (tilt or telescopic) is malfunctioning.

9 : Neither L.E.D. comes on correctly when setting memory.

10 : Can not perform self-diagnosis.

Diagnostic Procedure 7-1: Procedure without CONSULT when steering column manual tilt operation is malfunctioning.

A



SBF273F

Remove steering column covers, A/T finisher, cluster lid C and lower instrument covers.

B

CHECK TILT SWITCH HARNESS.
Check voltage between steering switch harness terminals ④, ⑤ and body ground.

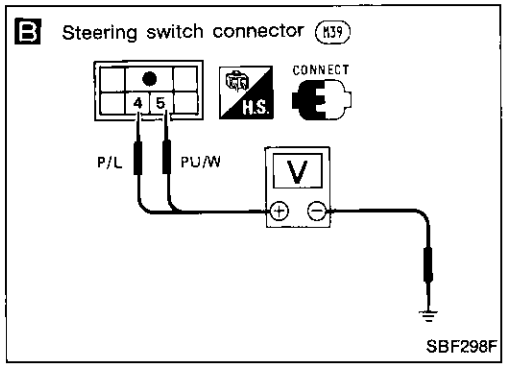
Tilt switch		Terminal	Voltage
Tilt up	ON	④	Less than 0.3 volts
	OFF		Battery voltage
Tilt down	ON	⑤	Less than 0.3 volts
	OFF		Battery voltage

N.G.

O.K.

INSPECTION END

B Steering switch connector M39



SBF298F

C

CHECK TILT SWITCH HARNESS.
1) Disconnect ADPCU harness connector.
2) Check harness continuity between ADPCU harness terminals ⑩, ⑨ and body ground with tilt switch OFF.
Continuity should not exist.

O.K. (Continuity does not exist.)

N.G. (Continuity exists.)

Replace ADPCU.

CHECK STEERING SWITCH.
(Refer to Electrical Components Inspection.)

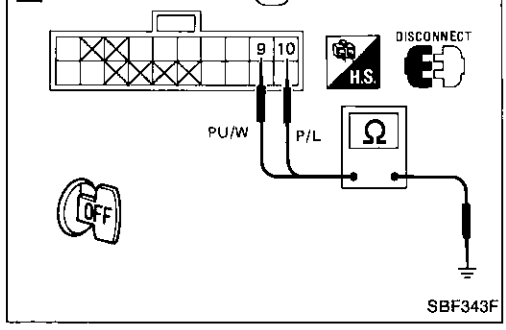
O.K.

N.G.

Replace steering switch.

Repair short circuit of the harness between ADPCU harness terminals ⑩, ⑨ and steering switch harness terminals ④, ⑤.

C ADPCU connector M30



SBF343F

Diagnostic Procedure 7 (Cont'd)

Diagnostic Procedure 7-2: Procedure without CONSULT when steering column manual telescopic operation is malfunctioning.

A

Remove steering column covers, A/T finisher, cluster lid and C lower instrument covers.

B

CHECK TILT SWITCH HARNESS.
Check voltage between steering switch harness terminals ②, ⑥ and body ground.

Telescopic switch		Terminal	Voltage
Forward	ON	②	Less than 0.3 volts
	OFF		Battery voltage
Rearward	ON	⑥	Less than 0.3 volts
	OFF		Battery voltage

N.G. →

O.K. ↓

INSPECTION END

C

CHECK TILT SWITCH HARNESS.
1) Disconnect ADPCU harness connector.
2) Check harness continuity between ADPCU harness terminals ⑲, ⑳ and body ground with tilt switch OFF.
Continuity should not exist.

O.K. (Continuity does not exist.) ↓

Replace ADPCU.

N.G. (Continuity exists.) ↓

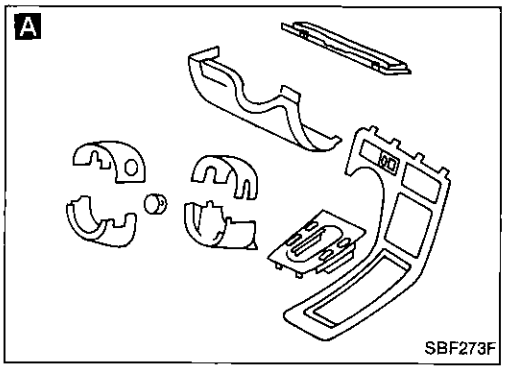
CHECK STEERING SWITCH.
(Refer to Electrical Components Inspection.)

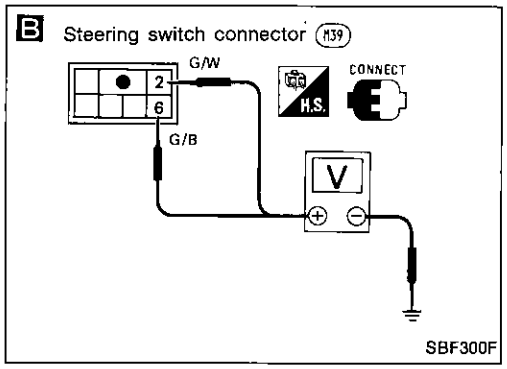
O.K. ↓

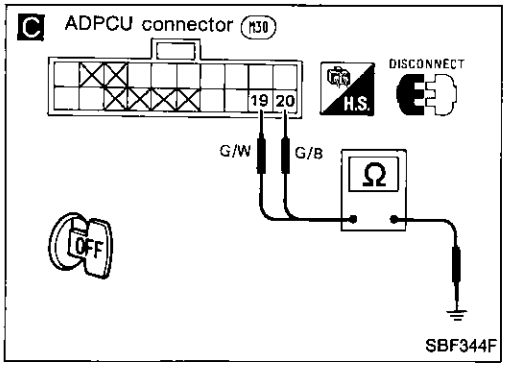
Repair short circuit of the harness between ADPCU harness terminals ⑲, ⑳ and steering switch harness terminals ②, ⑥.

N.G. ↓

Replace steering switch.

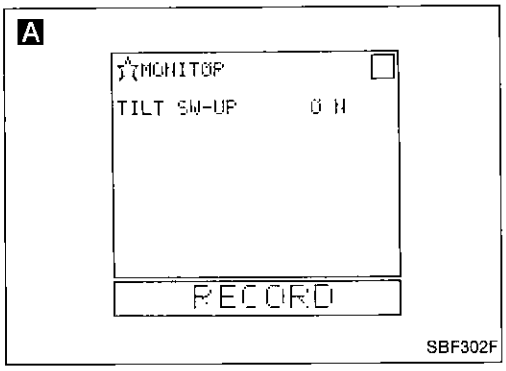


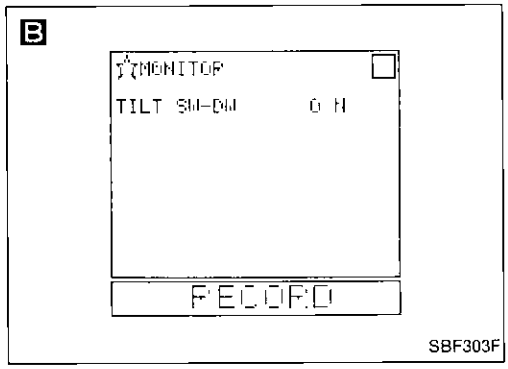


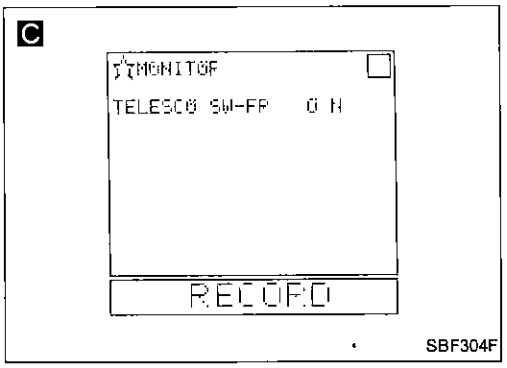


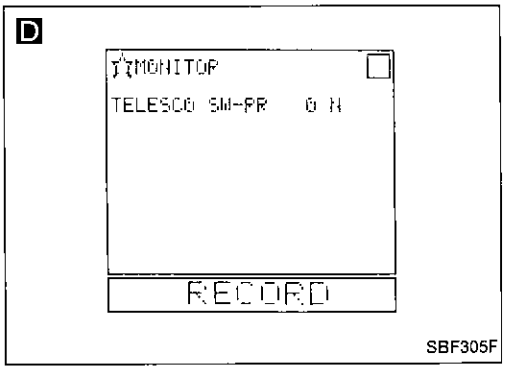
Diagnostic Procedure 7 (Cont'd)

Diagnostic Procedure 7-3: Procedure with CONSULT when one of the manual operations (tilt or telescopic) is malfunctioning.









Connect CONSULT to vehicle.

↓



↓

A

CHECK TILT UP SWITCH.
See "TILT SW-UP" in DATA MONITOR mode.
"TILT SW-UP" should change from "OFF" to "ON" when tilt up switch is turned ON.

N.G. → Go to **Diagnostic Procedure 7-1.**

O.K. ↓

B

CHECK TILT DOWN SWITCH.
See "TILT SW-DW" in DATA MONITOR mode.
"TILT SW-DW" should change from "OFF" to "ON" when tilt down switch is turned ON.

N.G. → Go to **Diagnostic Procedure 7-1.**

O.K. ↓

C

CHECK TELESCOPIC FRONT SWITCH.
See "TELESCO SW-FR" in DATA MONITOR mode.
"TELESCO SW-FR" should change from "OFF" to "ON" when telescopic front switch is turned ON.

N.G. → Go to **Diagnostic Procedure 7-2.**

O.K. ↓

D

CHECK TELESCOPIC REAR SWITCH.
See "TELESCO SW-RR" in DATA MONITOR mode.
"TELESCO SW-RR" should change from "OFF" to "ON" when telescopic rear switch is turned ON.

N.G. → Go to **Diagnostic Procedure 7-2.**

O.K. ↓

INSPECTION END

Diagnostic Procedure 8

SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)

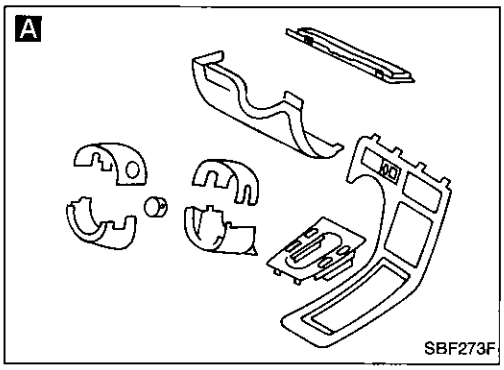
1 : All manual operations of driver's seat are O.K.

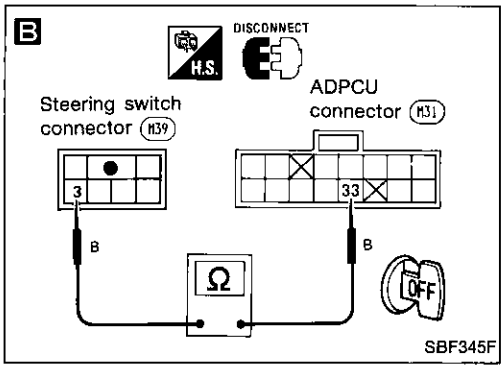
6 : Both manual operations of steering column are malfunctioning.

7 : Both L.E.D.s come on correctly when setting memory.

10 : All circuits that can be confirmed by self-diagnosis are O.K.

A





Remove steering column covers, A/T finisher, cluster lid C and lower instrument covers.

↓

B

Note

CHECK GROUND CIRCUIT OF STEERING SWITCH.

1) Disconnect steering switch harness connector and ADPCU harness connector M31.
2) Check harness continuity between steering switch harness terminal ③ and ADPCU harness terminal ㉝.

Continuity should exist.

↓ O.K.

Note

CHECK THE CONNECTION AT THE STEERING SWITCH HARNESS CONNECTOR.

↓ O.K.

CHECK STEERING SWITCH.
(Refer to Electrical Components Inspection.)

N.G. → Replace steering switch.

↓ O.K.

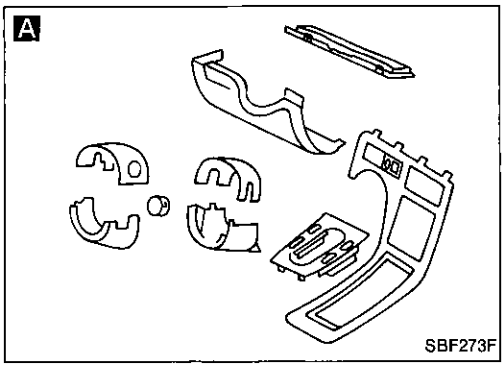
INSPECTION END

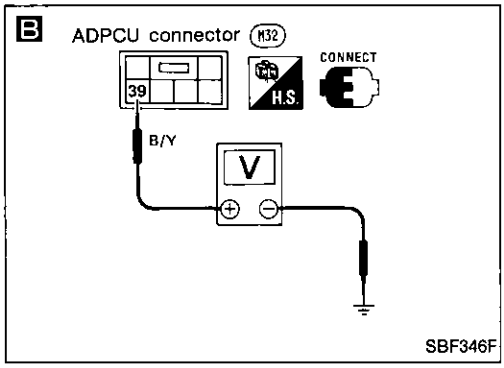
Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

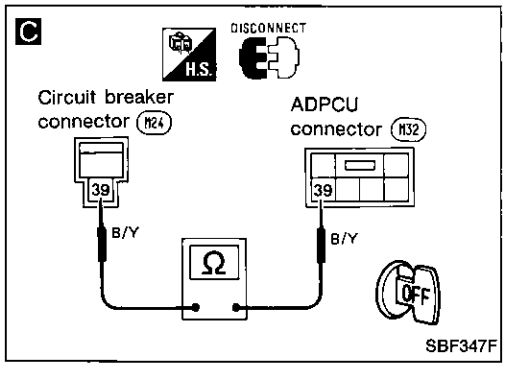
Diagnostic Procedure 9

SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)

- 1 : All manual operations of driver's seat are O.K.
- **6 : Both manual operations of steering column are malfunctioning.**
- 7 : Both L.E.D.s come on correctly when setting memory.
- **13 : Both circuits of steering column system are judged N.G. by self-diagnosis.**







A

Remove steering column covers, A/T finisher, cluster lid C and lower instrument covers.

B

CHECK POWER SOURCE FOR ADPCU.
Check voltage between ADPCU harness terminal 39 and body ground.
Battery voltage should exist.

N.G. → C

Note

CHECK HARNESS.
1) Disconnect ADPCU harness connector M32 and circuit breaker harness connector M24.
2) Check harness continuity between ADPCU harness terminal 39 and circuit breaker harness terminal 39.
Continuity should exist.

O.K. ↓

Note

- CHECK THE ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE ADPCU HARNESS CONNECTOR M32.

O.K. ↓

Replace ADPCU.

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 10

SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)

- **2 : One or some of manual operations (sliding, reclining, front lifting or rear lifting) are malfunctioning.**
- 4 : Both manual operations of steering column are O.K.
- 7 : Both L.E.D.s come on correctly when setting memory.
- 10 : All circuits that can be confirmed by self-diagnosis are O.K.
- In this case, driver's side power seat control switch is malfunctioning. Replace power seat control switch.

Diagnostic Procedure 11

SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)

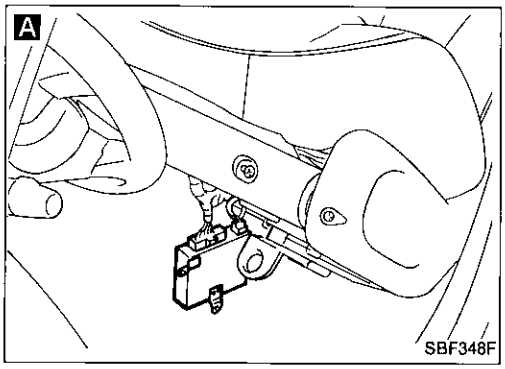
2 : **One or some of manual operations (sliding, reclining, front lifting or rear lifting) are malfunctioning.**

4 : Both manual operations of steering column are O.K.

7 : Both L.E.D.s come on correctly when setting memory.

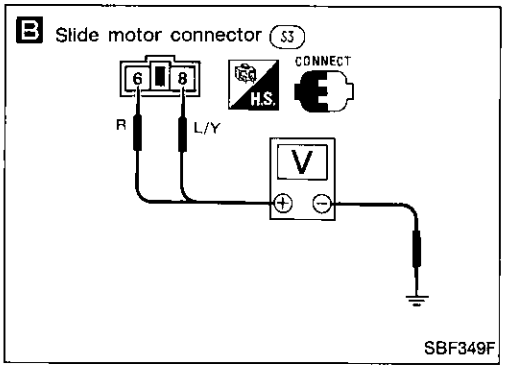
14 : **One or some circuits of driver's seat system (sliding device, reclining device, front lifting device or rear lifting device circuits) are judged N.G. by self-diagnosis.**

Diagnostic Procedure 11-1: When manual sliding operation is malfunctioning and judged N.G. by self-diagnosis.



A

1) Remove driver's side seat mounting bolts and lay the seat down in the vehicle protecting it with a cloth.
2) Remove power seat control unit's mounting screws.



B

CHECK POWER SOURCE FOR SLIDING MOTOR.
Check voltage between sliding motor harness terminals ⑥, ⑧ and body ground.

Sliding switch		Terminal	Voltage
Front	ON	⑥	Battery voltage
	OFF		Less than 0.5V
Rear	ON	⑧	Battery voltage
	OFF		Less than 0.5V

N.G. →

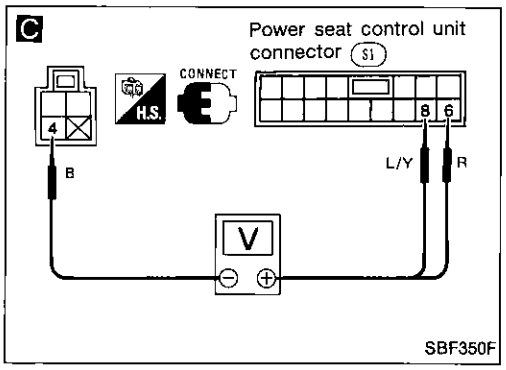
O.K. ↓

Note

CHECK THE CONNECTION AT THE SLIDING MOTOR HARNESS CONNECTOR S3.

O.K. ↓

Replace sliding motor.



C

CHECK POWER SEAT CONTROL UNIT POWER SUPPLY FOR SLIDING MOTOR.
Check voltage between power seat control unit harness terminals ⑥, ⑧ and ④.

Sliding switch		Terminal ⊕	Terminal ⊖	Voltage
Front	ON	⑥	④	Battery voltage
	OFF			Less than 0.5V
Rear	ON	⑧		Battery voltage
	OFF			Less than 0.5V

O.K. ↓

Repair harness between power seat control unit harness terminals ⑥, ⑧ and slide motor harness terminals ⑥, ⑧.

N.G. ↓

Note

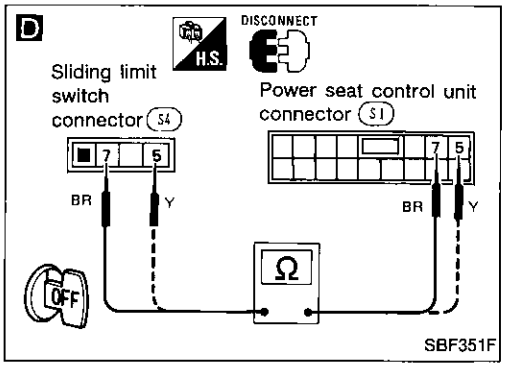
D

CHECK HARNESS.
1) Disconnect power seat control unit harness connector S1 and sliding limit switch harness connector S4.
2) Check harness continuity between power seat control unit harness terminals ⑤, ⑦ and sliding limit switch harness terminals ⑤, ⑦.
Continuity should exist.

N.G. ↓

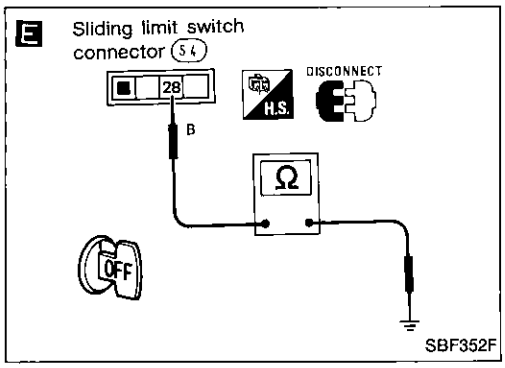
Ⓐ

(Go to next page.)



Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 11 (Cont'd)



Ⓐ

E Note

CHECK GROUND CIRCUIT FOR SLIDING LIMIT SWITCH.
Check harness continuity between sliding limit switch harness terminal (28) and body ground.
Continuity should exist.

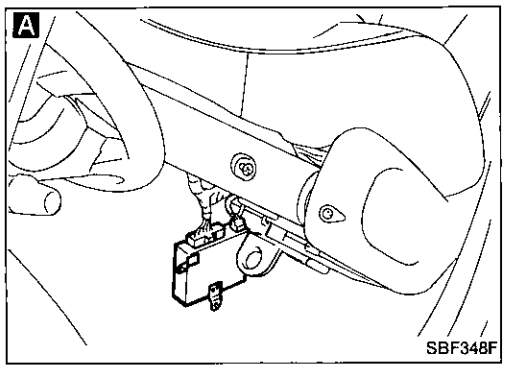
O.K.

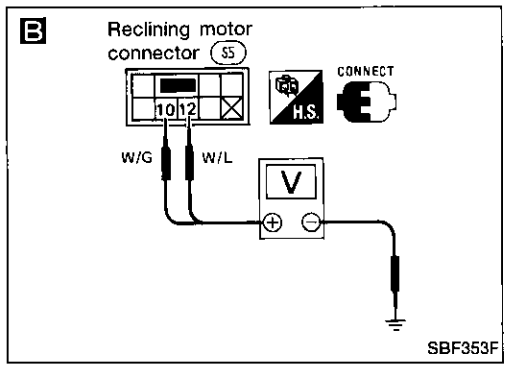
CHECK SLIDING LIMIT SWITCH.
(Refer to Electrical Components Inspection.)

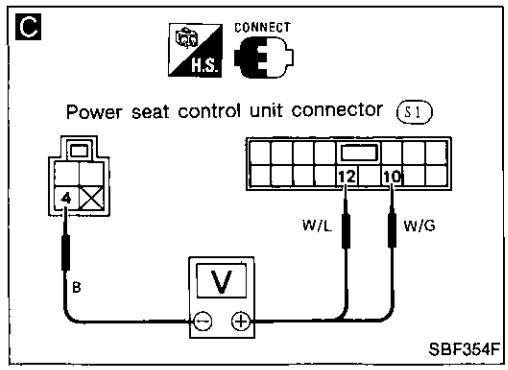
N.G. → Replace sliding limit switch.

O.K.

Replace driver side power seat control unit.







Diagnostic Procedure 11-2: When manual reclining operation is malfunctioning and judged N.G. by self-diagnosis.

A

1) Remove driver's side seat mounting bolts and lay the seat down in the vehicle protecting it with a cloth.
2) Remove power seat control unit mounting screws.

B

CHECK POWER SOURCE FOR RECLINING MOTOR.
Check voltage between reclining motor harness terminals (10), (12) and body ground.

Reclining switch		Terminal	Voltage
Forward	ON	(10)	Battery voltage
	OFF		Less than 0.5 volts
Rearward	ON	(12)	Battery voltage
	OFF		Less than 0.5 volts

N.G. → **C**

CHECK POWER SEAT CONTROL UNIT POWER SUPPLY FOR RECLINING MOTOR.
Check voltage between power seat control unit harness terminals (10), (12) and (4).

Reclining switch		Terminal ⊕	Terminal ⊖	Voltage
Forward	ON	(10)	(4)	Battery voltage
	OFF			Less than 0.5V
Rearward	ON	(12)		Battery voltage
	OFF			Less than 0.5V

O.K. → Repair harness between power seat control unit harness terminals (10), (12) and reclining motor harness terminals (10), (12).

N.G. → Ⓐ (Go to next page.)

O.K.

Note

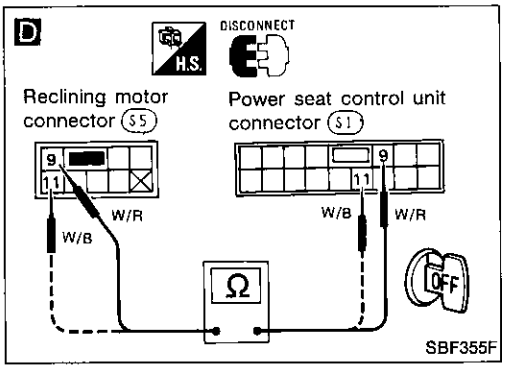
CHECK THE CONNECTION AT THE RECLINING MOTOR HARNESS CONNECTOR (S5).

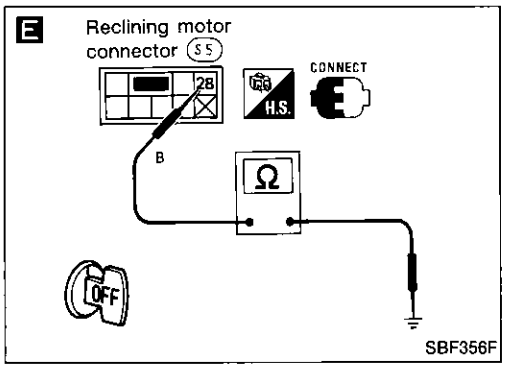
O.K.

Replace reclining motor.

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 11 (Cont'd)





Ⓐ

D Note

CHECK HARNESS.
1) Disconnect power seat control unit harness connector S1 and reclining motor harness connector S5.
2) Check harness continuity between power seat control unit harness terminals ⑨, ⑪ and reclining motor harness terminals ⑨, ⑪.
Continuity should exist.

O.K.

E Note

CHECK GROUND CIRCUIT FOR RECLINING LIMIT SWITCH.
Check harness continuity between reclining motor harness terminal ㉘ and body ground.
Continuity should exist.

O.K.

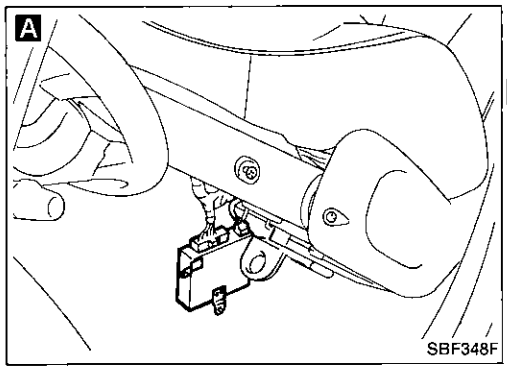
CHECK LIMIT SWITCH BUILT INTO RECLINING MOTOR.
(Refer to Electrical Components Inspection.)

O.K.

Replace driver's side power seat control unit.

N.G.

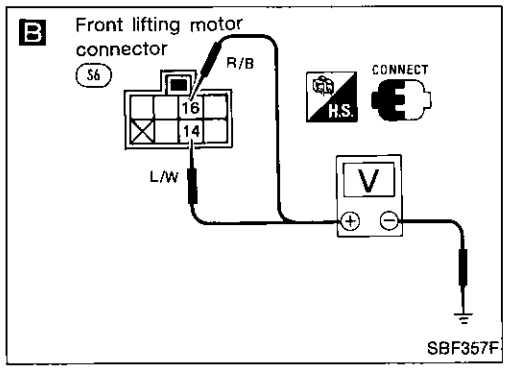
Replace reclining motor.



Diagnostic Procedure 11-3: When manual front lifting operation is malfunctioning and judged N.G. by self-diagnosis.

A

1) Remove driver's side seat mounting bolts and lay the seat down in the vehicle protecting it with a cloth.
2) Remove power seat control unit's mounting screws.



B

CHECK POWER SOURCE FOR FRONT LIFTING MOTOR.
Check voltage between front lifting motor harness terminals ⑭, ⑯ and body ground.

Front lifting switch		Terminal	Voltage
Upward	ON	⑭	Battery voltage
	OFF		Less than 0.5V
Downward	ON	⑯	Battery voltage
	OFF		Less than 0.5V

N.G.

C

CHECK POWER SEAT CONTROL UNIT POWER SUPPLY FOR FRONT LIFTING MOTOR.
Check voltage between power seat control unit harness terminals ⑭, ⑯ and ④.

Front lifting switch		Terminal ⊕	Terminal ⊖	Voltage
Upward	ON	⑭	④	Battery voltage
	OFF			Less than 0.5V
Downward	ON	⑯		Battery voltage
	OFF			Less than 0.5V

O.K.

Repair harness between power seat control unit harness terminals ⑭, ⑯ and front lifting motor harness terminals ⑭, ⑯.

N.G.

Ⓐ

(Go to next page.)

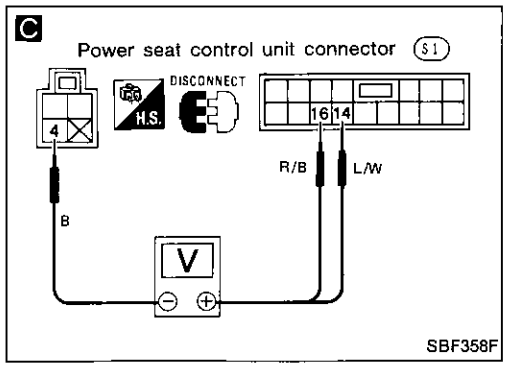
O.K.

Note

CHECK THE CONNECTION AT THE FRONT LIFTING MOTOR HARNESS CONNECTOR S6.

O.K.

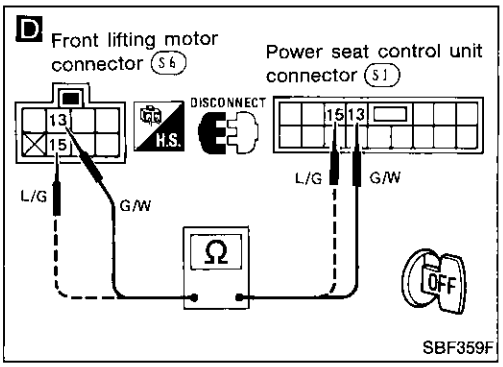
Replace front lifting motor.



Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

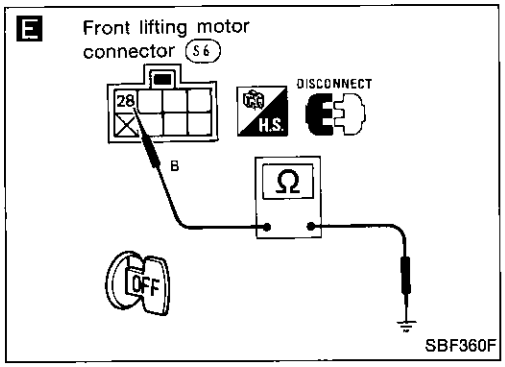
Diagnostic Procedure 11 (Cont'd)

D



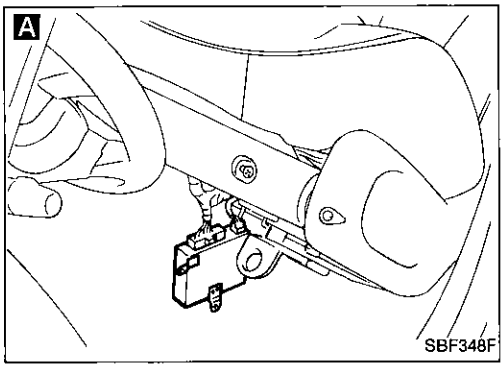
SBF359F

E

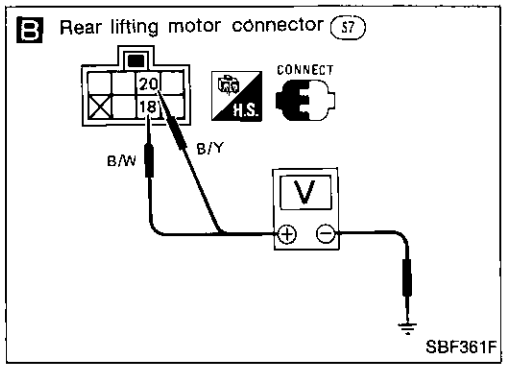


SBF360F

A

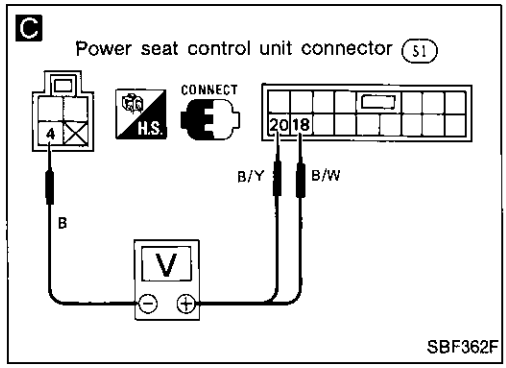

SBF348F

B



SBF361F

C



SBF362F

Ⓐ

D Note

CHECK HARNESS.
1) Disconnect power seat control unit harness connector S1 and front lifting motor harness connector S6.
2) Check harness continuity between power seat control unit harness terminals ⑬, ⑮ and front lifting motor harness terminals ⑬, ⑮.
Continuity should exist.

O.K.

E Note

CHECK GROUND CIRCUIT FOR FRONT LIFTING LIMIT SWITCH.
Check harness continuity between front lifting motor harness terminal ㉘ and body ground.
Continuity should exist.

O.K. → Replace driver's side power seat control unit.

CHECK LIMIT SWITCH BUILT INTO FRONT LIFTING MOTOR.
(Refer to Electrical Components Inspection.)

O.K. → Replace front lifting motor.

N.G. → Replace front lifting motor.

Diagnostic Procedure 11-4: When manual rear lifting operation is malfunctioning and judged N.G. by self-diagnosis.

A

1) Remove driver's side seat mounting bolts and lay the seat down in the vehicle protecting it with a cloth.
2) Remove power seat control unit's mounting screws.

B

CHECK POWER SOURCE FOR REAR LIFTING MOTOR.
Check voltage between rear lifting motor harness terminals ⑱, ⑳ and body ground.

Rear lifting switch		Terminal	Voltage
Upward	ON	⑱	Battery voltage
	OFF		Less than 0.5V
Downward	ON	⑳	Battery voltage
	OFF		Less than 0.5V

N.G. → **C**

O.K.

C

CHECK POWER SEAT CONTROL UNIT POWER SUPPLY FOR REAR LIFTING MOTOR.
Check voltage between power seat control unit harness terminals ⑱, ⑳ and ④.

Rear lifting switch		Terminal ⊕	Terminal ⊖	Voltage
Upward	ON	⑱	④	Battery voltage
	OFF			Less than 0.5V
Downward	ON	⑳		Battery voltage
	OFF			Less than 0.5V

O.K. → Repair harness between power seat control unit harness terminals ⑱, ⑳ and rear lifting motor harness terminals ⑱, ⑳.

N.G. → Ⓐ (Go to next page.)

O.K.

Note

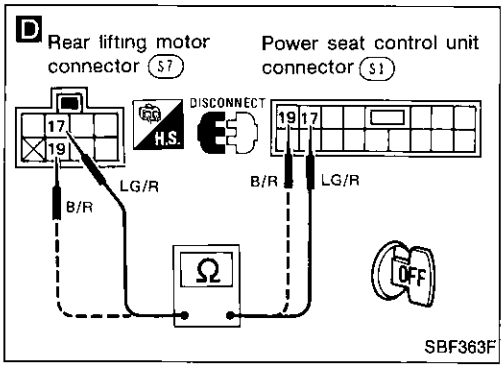
CHECK THE CONNECTION AT THE REAR LIFTING MOTOR HARNESS CONNECTOR S7.

O.K. → Replace rear lifting motor.

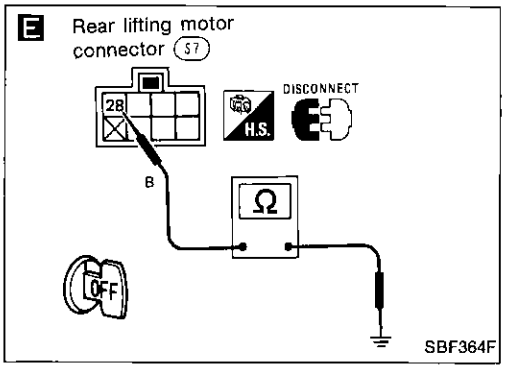
Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 11 (Cont'd)

D



E



Ⓐ

D Note

CHECK HARNESS.
1) Disconnect power seat control unit harness connector (S1) and rear lifting motor harness connector (S7).
2) Check harness continuity between power seat control unit harness terminals ⑰, ⑲ and rear lifting motor harness terminals ⑰, ⑲.
Continuity should exist.

O.K.

E Note O.K.

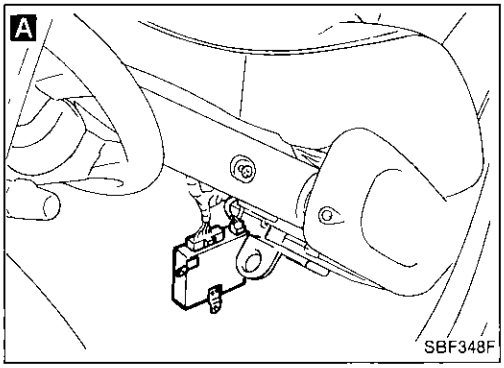
CHECK GROUND CIRCUIT FOR REAR LIFTING LIMIT SWITCH.
Check harness continuity between rear lifting motor harness terminal ㉘ and body ground.
Continuity should exist.

CHECK LIMIT SWITCH BUILT INTO REAR LIFTING MOTOR.
(Refer to Electrical Components Inspection.)

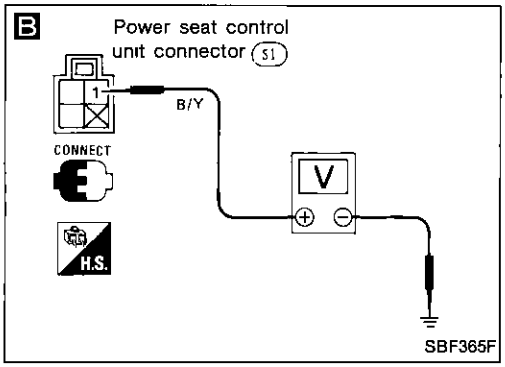
O.K. — Replace driver's side power seat control unit.

N.G. — Replace rear lifting motor.

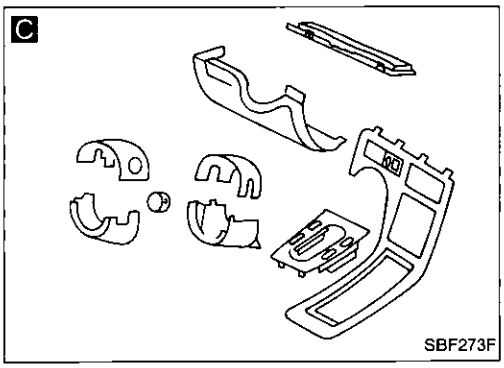
A



B



C



Diagnostic Procedure 12

SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)

- **3 : All manual operations of driver's seat are malfunctioning.**
- 4 : Both manual operations of steering column are O.K.
- 7 : Both L.E.D.s come on correctly when setting memory.
- **12 : All circuits for driver's seat system are judged N.G. by self-diagnosis.**

A

1) Remove driver's side seat mounting bolts and lay the seat down in the vehicle protecting it with a cloth.
2) Remove power seat control unit mounting screws.

B

CHECK POWER SOURCE FOR POWER SEAT CONTROL UNIT.
Check voltage between power seat control unit harness terminal ① and body ground.
Battery voltage should exist.

N.G. — Repair harness between power seat control unit harness terminal ① and circuit breaker harness terminal ㊴.

O.K.

C

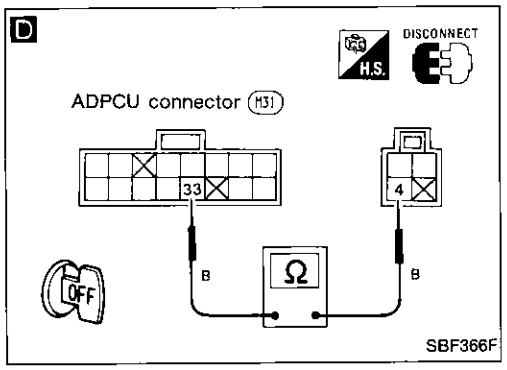
Remove steering column covers, A/T finisher, cluster lid C and lower instrument covers.

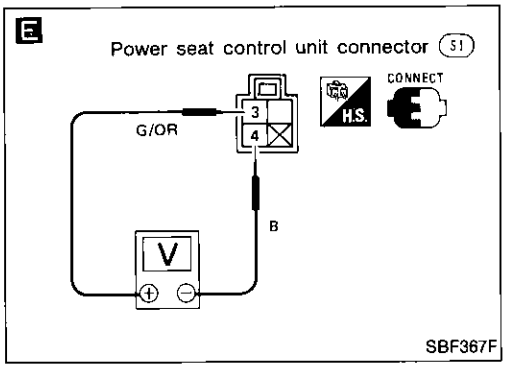
Ⓐ

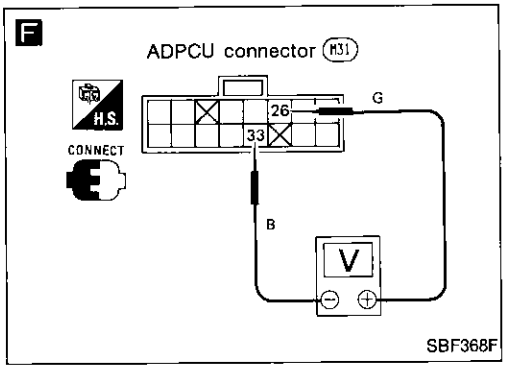
(Go to next page.)

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 12 (Cont'd)







Ⓐ

D Note

CHECK GROUND CIRCUIT FOR POWER SEAT CONTROL UNIT.

1) Disconnect power seat control unit harness connector S1 and ADPCU harness connector M31.
2) Check harness continuity between power seat control unit harness terminal ④ and ADPCU harness terminal ㉝.

Continuity should exist.

O.K.

Reconnect power seat control unit harness connector S1 and ADPCU harness connector M31.

E

CHECK MULTIPLEX SIGNAL.

Check voltage between power seat control unit harness terminals ③ and ④.

Approximately 1.0 to 1.6V should exist when any one of the driver's side power seat control switches is turned ON.

Note: Do not use a digital type voltmeter.

N.G.

F

CHECK MULTIPLEX SIGNAL.

Check voltage between ADPCU control unit harness terminals ㉖ and ㉝.

Approximately 1.0 to 1.6V should exist when any one of the driver's side power seat control switches is turned ON.

Note: Do not use a digital type voltmeter.

O.K.

Note

- CHECK THE POWER SEAT CONTROL UNIT PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE POWER SEAT CONTROL UNIT HARNESS CONNECTOR S1.

O.K.

Replace power seat control unit.

O.K.

Note

Repair harness between ADPCU harness terminal ㉖ and driver's side power seat control unit harness terminal ③.

N.G.

Note

- CHECK THE ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE POWER SEAT CONTROL UNIT HARNESS CONNECTOR M31.

O.K.

Replace ADPCU.

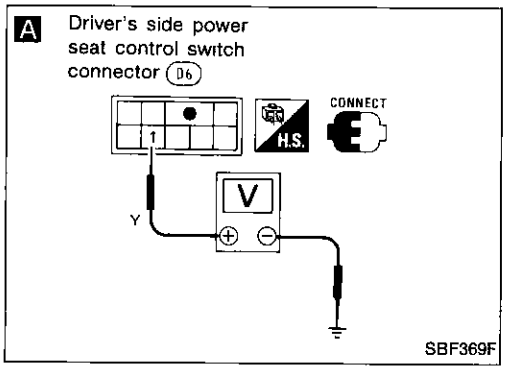
Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 13

SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)

- **3** : **All manual operations of driver's seat are malfunctioning.**
- 4 : Both manual operations of steering column are O.K.
- **9** : **Neither L.E.D. comes on correctly when setting memory.**
- **11** : **Can not perform self-diagnosis.**

A



CHECK POWER SOURCE FOR DRIVER'S SIDE POWER SEAT SWITCH.

1) Remove driver's side power seat control switch with harness connected.
2) Remove armrest.
3) Remove door trim with harness connected.

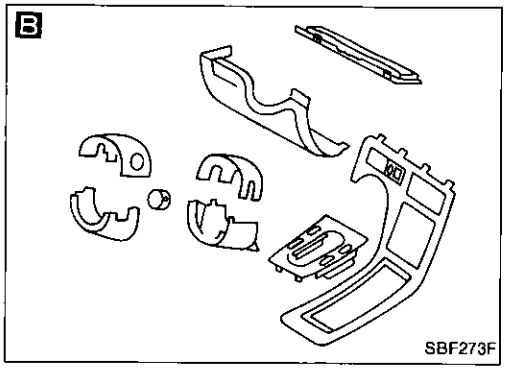
A 4) Check voltage between driver's side power seat control switch harness terminal ① and body ground.

Battery voltage should exist.

N.G. → CHECK THE FOLLOWING;
- Fuse
- Harness continuity between driver's side power seat control switch harness terminal ① and fuse.

O.K. ↓

B



CHECK POWER SOURCE FOR ADPCU.

B 1) Remove steering column covers, A/T finisher, cluster lid C and lower instrument cover.

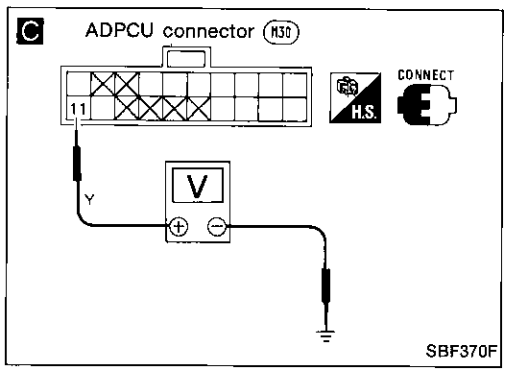
C 2) Check voltage between ADPCU harness terminal ⑪ and body ground.

Battery voltage should exist.

N.G. → CHECK THE FOLLOWING;
- Fuse
- Harness continuity between ADPCU harness terminal ⑪ and fuse.

O.K. ↓

C



D Note

CHECK GROUND CIRCUIT FOR DRIVER'S SIDE POWER SEAT CONTROL SWITCH.

1) Disconnect ADPCU harness connector M31 and driver's side power seat control switch harness connector D6.
2) Check continuity between driver's side power seat control switch harness terminal ④ and ADPCU harness terminal ㉝.

Continuity should exist.

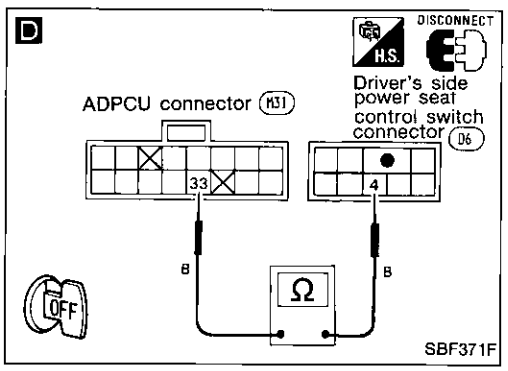
Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

O.K. ↓

Ⓐ

(Go to next page.)

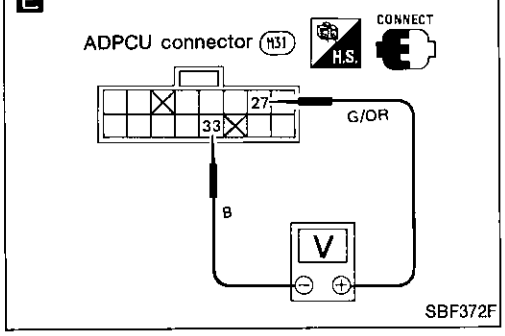
D



Diagnostic Procedure 13 (Cont'd)

E

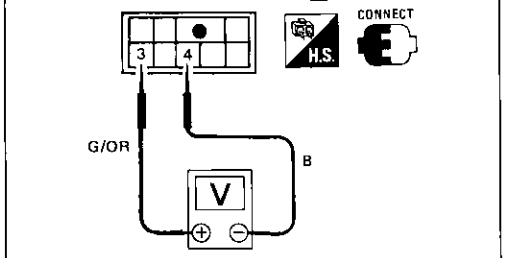
ADPCU connector (M31)



SBF372F

F

Driver's side power seat control switch connector (D6)



SBF373F

Ⓐ

Reconnect driver's side power seat control switch harness connector (D6) and ADPCU harness connector (M31).

E

CHECK MULTIPLEX SIGNAL.
Check voltage between ADPCU harness terminal (27) and (33).
Approximately 1.0 to 1.6V should exist when any one of the driver's side power seat control switches is turned ON.
Note: Do not use a digital type voltmeter.

N.G.

F

CHECK MULTIPLEX SIGNAL.
Check voltage between driver's side power seat control switch harness terminals (3) and (4).
Approximately 1.0 to 1.6V should exist when any one of the driver's side power seat control switches is turned ON.
Note: Do not use a digital type voltmeter.

O.K.

Note

- CHECK THE ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE ADPCU HARNESS CONNECTOR (M31).

O.K.

Replace ADPCU.

O.K.

Note

Repair harness between ADPCU harness terminal (27) and driver's side power seat control unit harness terminal (3).

N.G.

Note

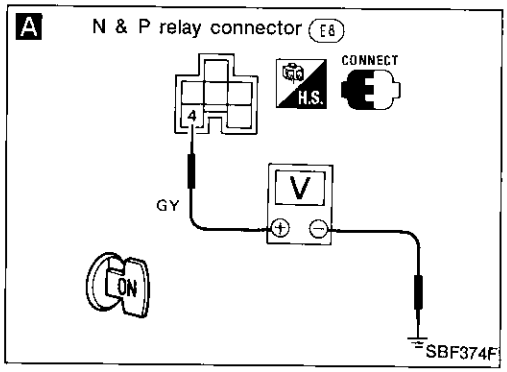
- CHECK THE DRIVER'S SIDE POWER SEAT CONTROL SWITCH PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE DRIVER'S SIDE POWER SEAT CONTROL SWITCH HARNESS CONNECTOR (D6).

O.K.

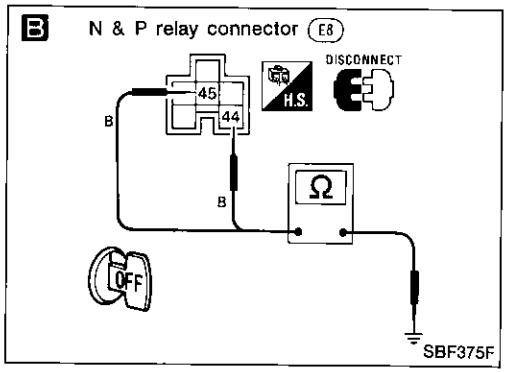
Replace driver's side power seat control switch.

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

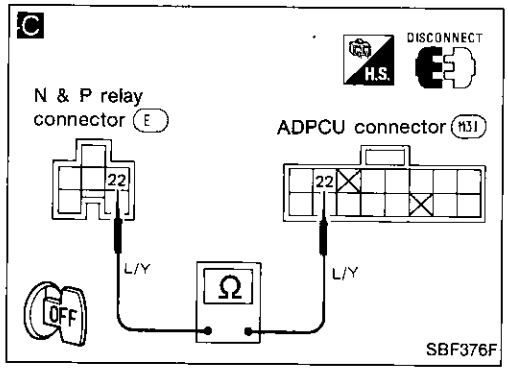
A



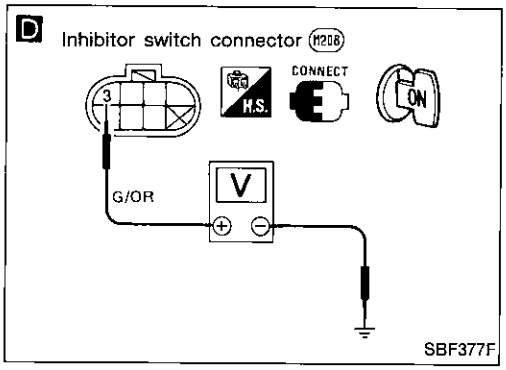
B



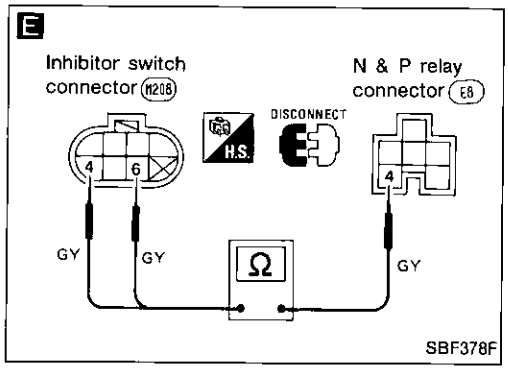
C



D



E



Diagnostic Procedure 14

SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)

1 : All manual operations of driver's seat are O.K.
4 : Both manual operations of steering column are O.K.
7 : Both L.E.D.s come on correctly when setting memory.
11 : **Can not perform self-diagnosis.**

CHECK INHIBITOR SWITCH CIRCUITS.
1) Set A/T selector lever in "P" position.
A 2) Check voltage between N & P relay harness terminal ④ and body ground.
Battery voltage should exist.

N.G. → D

O.K. ↓

B Note
CHECK GROUND CIRCUIT FOR N & P RELAY.
1) Disconnect N & P relay harness connector E8.
2) Check harness continuity between N & P relay harness terminals ㊹, ㊺ and body ground.
Continuity should exist.

O.K. ↓

C Note
CHECK HARNESS BETWEEN ADPCU AND N & P RELAY.
1) Disconnect ADPCU harness connector M31.
2) Check harness continuity between ADPCU harness terminal ㉒ and N & P relay harness terminal ㉒.
Continuity should exist.

O.K. ↓

CHECK N & P RELAY.
(Refer to Electrical Components Inspection.)

N.G. → Replace N & P relay.

O.K. ↓

Replace ADPCU.

D
CHECK POWER SOURCE FOR N & P RELAY.
Check voltage between inhibitor switch harness terminal ③ and body ground.
Battery voltage should exist.

O.K. ↓

E Note
CHECK HARNESS BETWEEN INHIBITOR SWITCH AND N & P RELAY.
1) Disconnect inhibitor switch harness connector M208 and N & P relay harness connector E8.
2) Check harness continuity between inhibitor switch harness terminals ④, ⑥ and N & P relay harness terminal ④.
Continuity should exist.

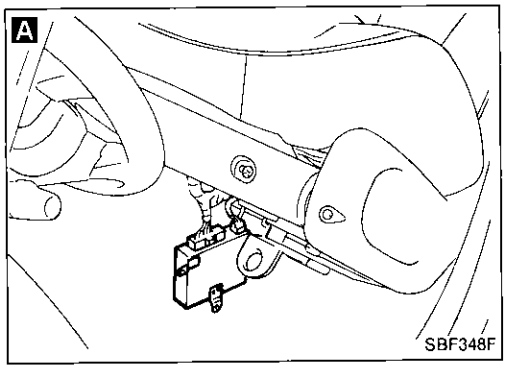
O.K. ↓

CHECK INHIBITOR SWITCH.
(Refer to AT section.)

N.G. ↓

CHECK THE FOLLOWING;
- Fuse
- Harness continuity between inhibitor switch harness terminal ③ and fuse.

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

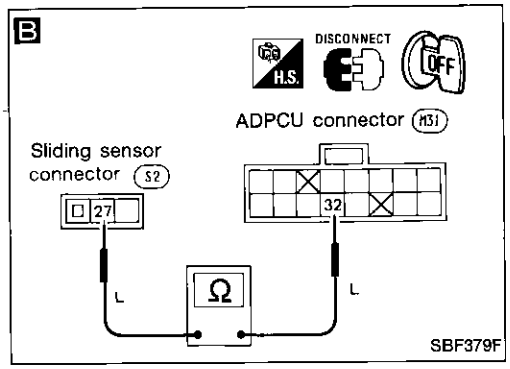


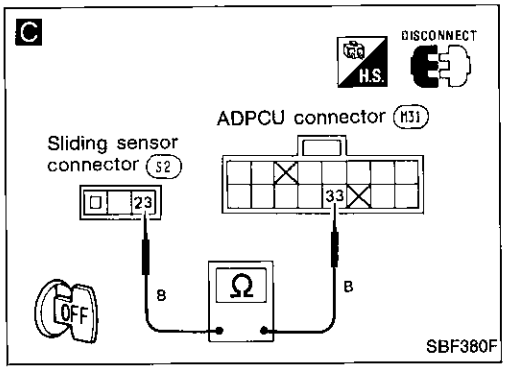
Diagnostic Procedure 15

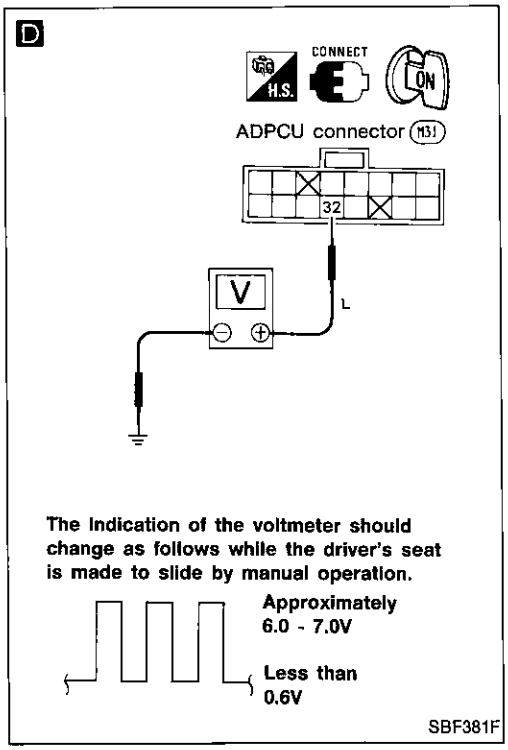
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)

1 : All manual operations of driver's seat are O.K.
4 : Both manual operations of steering column are O.K.
7 : Both L.E.D.s come on correctly when setting memory.
14 : **One or more circuits for driver's seat system (sliding device, reclining device, front lifting device, or rear lifting device circuit) are judged N.G. by self-diagnosis.**

Diagnostic Procedure 15-1: When sliding device circuit is judged N.G. by self-diagnosis.







A
1) Remove driver's side seat mounting bolts and lay the seat down in the vehicle protecting it with a cloth.
2) Remove power seat control unit mounting screws.

↓

B Note
CHECK SLIDING SENSOR HARNESS.
1) Disconnect sliding sensor harness connector S2.
2) Remove driver's side instrument front lower cover.
3) Disconnect ADPCU harness connector M31.
4) Check harness continuity between ADPCU harness terminal 32 and sliding sensor harness terminal 27.
Continuity should exist.

↓ O.K.

C Note
CHECK SLIDING SENSOR GROUND CIRCUIT.
Check harness continuity between sliding sensor harness terminal 23 and ADPCU harness terminal 33.
Continuity should exist.

↓ O.K.

CHECK SLIDING SENSOR. (Refer to Electrical Components Inspection.)

O.K. → Note
- CHECK THE ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE ADPCU HARNESS CONNECTOR M31.

↓ O.K.

D
CHECK ADPCU.
1) Reconnect ADPCU harness connector M31 and sliding sensor harness terminal S2.
2) Check voltage between ADPCU harness terminal 32 and body ground while moving driver's seat by manual sliding operation.

O.K. → INSPECTION END

N.G. → Replace ADPCU.

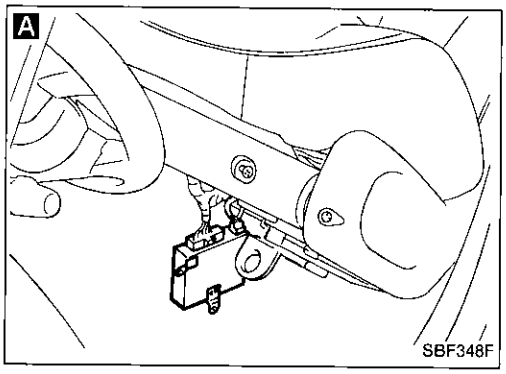
N.G. → Replace sliding motor.

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 15 (Cont'd)

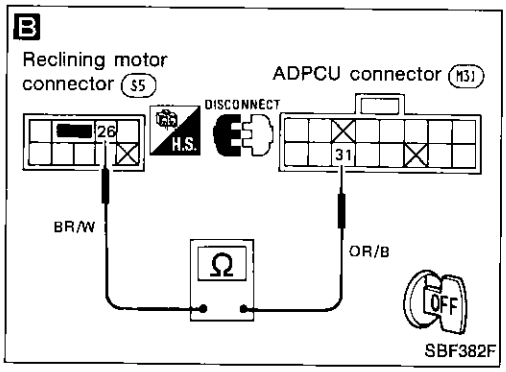
Diagnostic Procedure 15-2: When reclining device circuit is judged N.G. by self-diagnosis.

A



1) Remove driver's side seat mounting bolts and lay the seat down in the vehicle protecting it with a cloth.
2) Remove power seat control unit mounting screws.

B



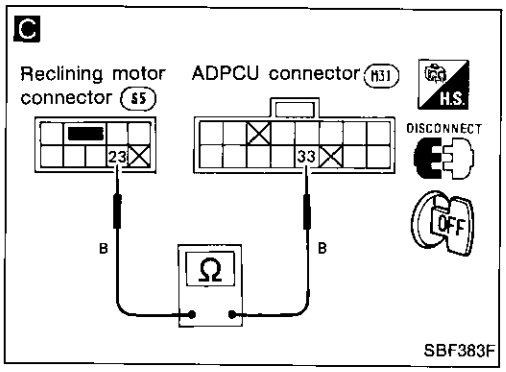
Note

CHECK RECLINING SENSOR HARNESS.
1) Disconnect reclining motor harness connector (S5).
2) Remove driver's side instrument front lower cover.
3) Disconnect ADPCU harness connector (M31).
4) Check harness continuity between ADPCU harness terminal (31) and reclining motor harness terminal (26).

Continuity should exist.

O.K.

C



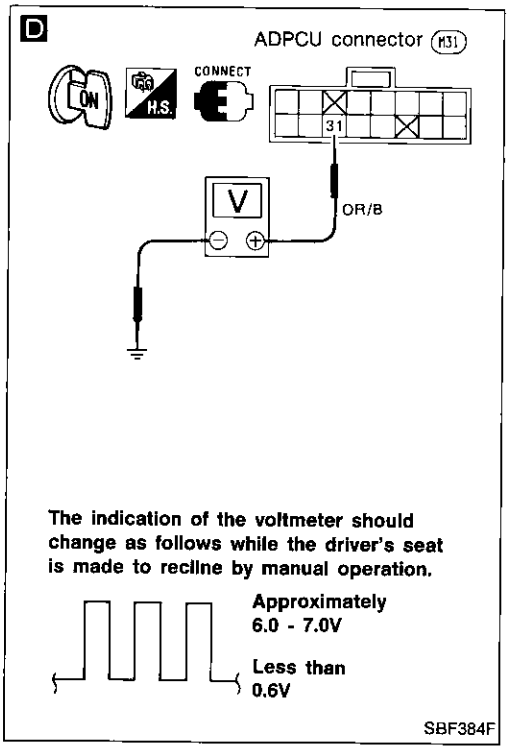
Note

CHECK RECLINING SENSOR GROUND CIRCUIT.
Check harness continuity between reclining motor harness terminal (23) and ADPCU harness terminal (33).

Continuity should exist.

O.K.

D



CHECK RECLINING SENSOR.
(Refer to Electrical Components Inspection.)

O.K. — N.G.

Replace reclining motor.

Note

- CHECK THE ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE ADPCU HARNESS CONNECTOR (M31).

O.K.

D

CHECK ADPCU.
1) Reconnect ADPCU harness connector (M31) and reclining motor harness terminal (S5).
2) Check voltage between ADPCU harness terminal (31) and body ground while moving driver's seat by manual reclining operation.

O.K. — N.G.

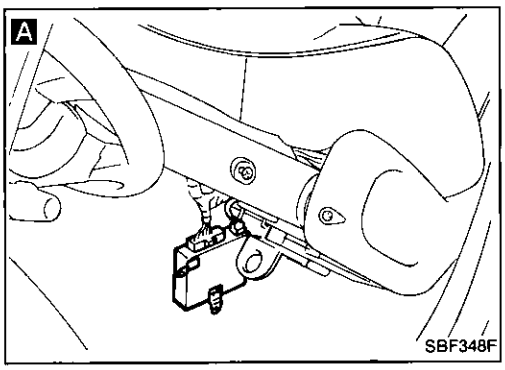
Replace ADPCU.

INSPECTION END

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

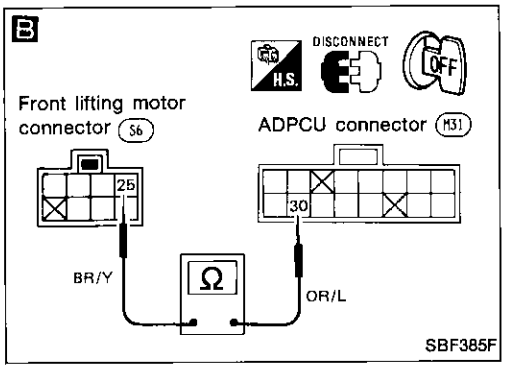
Diagnostic Procedure 15 (Cont'd)

Diagnostic Procedure 15-3: When front lifting device circuit is judged N.G. by self-diagnosis.



A

1) Remove driver's side seat mounting bolts and lay the seat down in the vehicle protecting it with a cloth.
2) Remove power seat control unit mounting screws.



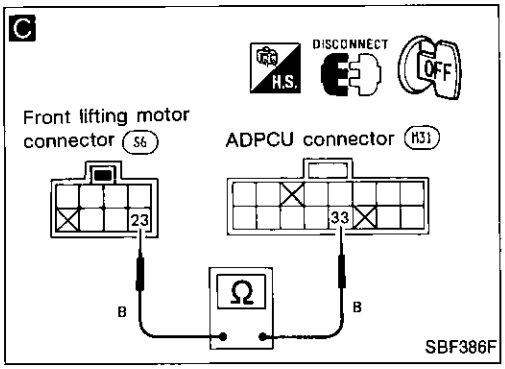
B Note

CHECK FRONT LIFTING SENSOR HARNESS.

1) Disconnect front lifting motor harness connector S6.
2) Remove driver's side instrument front lower cover.
3) Disconnect ADPCU harness connector M31.
4) Check harness continuity between ADPCU harness terminal 30 and front lifting motor harness terminal 25.

Continuity should exist.

O.K.



C Note

CHECK FRONT LIFTING SENSOR GROUND CIRCUIT.

Check harness continuity between front lifting motor harness terminal 23 and ADPCU harness terminal 33.

Continuity should exist.

O.K.

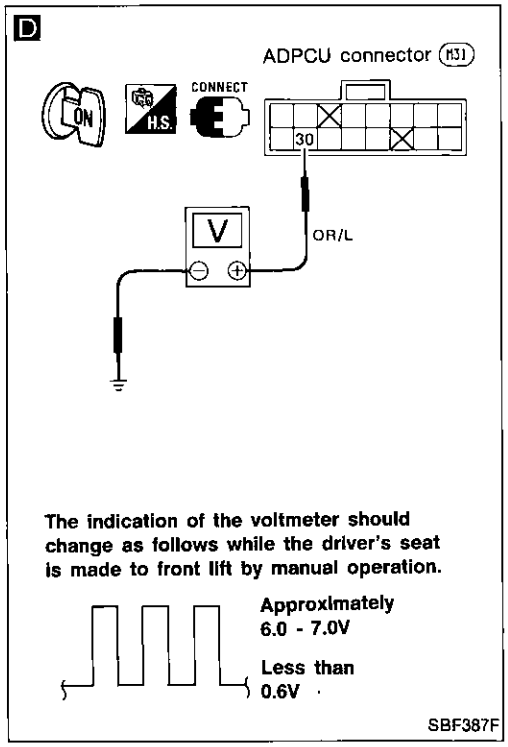
CHECK FRONT LIFTING SENSOR. (Refer to Electrical Components Inspection.)

O.K. — Note

- CHECK THE ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE ADPCU HARNESS CONNECTOR M31.

O.K.

N.G. → Replace front lifting motor.



D

CHECK ADPCU.

1) Reconnect ADPCU harness connector M31 and front lifting motor harness terminal S6.
2) Check voltage between ADPCU harness terminal 30 and body ground while moving driver's seat by manual front lifting operation.

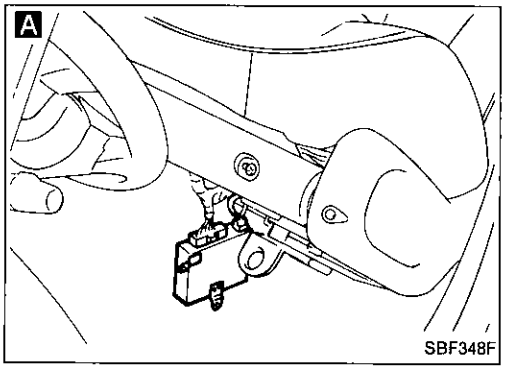
O.K. → INSPECTION END

N.G. → Replace ADPCU.

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 15 (Cont'd)

Diagnostic Procedure 15-4: When rear lifting device circuit is judged N.G. by self-diagnosis.



A

1) Remove driver's side seat mounting bolts and lay the seat down in the vehicle protecting it with a cloth.
2) Remove power seat control unit mounting screws.

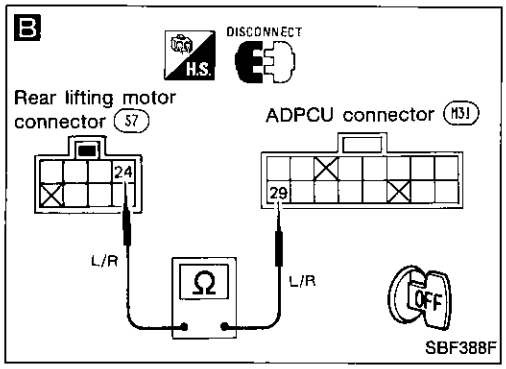
↓

B Note

CHECK REAR LIFTING SENSOR HARNESS.

1) Disconnect rear lifting motor harness connector (S7).
2) Remove driver's side instrument front lower cover.
3) Disconnect ADPCU harness connector (M31).
4) Check harness continuity between ADPCU harness terminal (29) and rear lifting motor harness terminal (24).

Continuity should exist.



O.K.

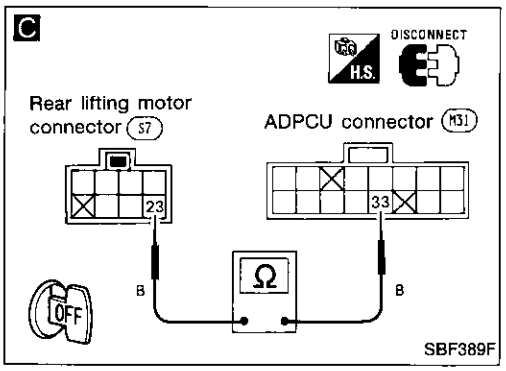
↓

C Note

CHECK REAR LIFTING SENSOR GROUND CIRCUIT.

Check harness continuity between rear lifting motor harness terminal (23) and ADPCU harness terminal (33).

Continuity should exist.



O.K.

↓

CHECK REAR LIFTING SENSOR. (Refer to Electrical Components Inspection.)

O.K. ↓ — N.G. → Replace rear lifting motor.

↓

Note

- CHECK THE ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE ADPCU HARNESS CONNECTOR (M31).

O.K.

↓

D

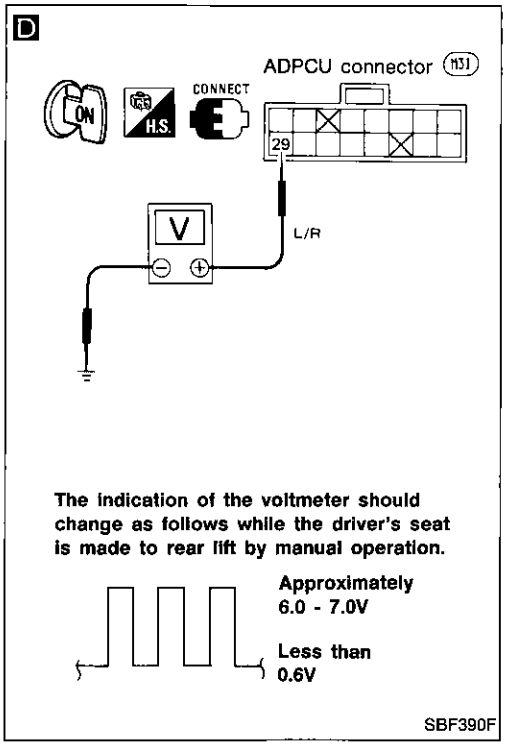
CHECK ADPCU.

1) Reconnect ADPCU harness connector (M31) and rear lifting motor harness terminal (S7).
2) Check voltage between ADPCU harness terminal (29) and body ground while moving driver's seat by manual rear lifting operation.

O.K. ↓ — N.G. → Replace ADPCU.

↓

INSPECTION END

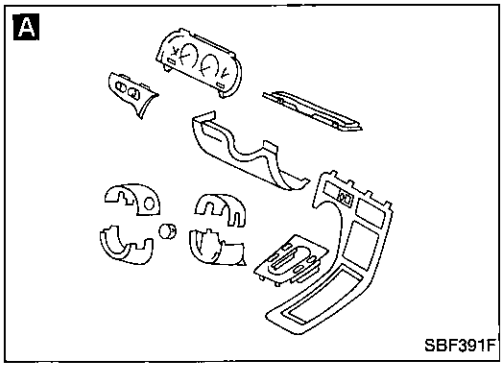


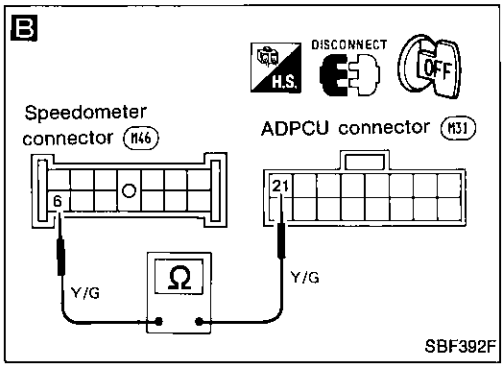
Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 16

SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)

1 : All manual operations of driver's seat are O.K.
4 : Both manual operations of steering column are O.K.
7 : Neither L.E.D. comes on correctly when setting memory.
16 : **Vehicle speed sensor circuit is judged N.G. by self- diagnosis.**





A

Remove steering column covers, A/T finisher, cluster lid C, cluster D, lower instrument covers and combination meter.

↓

B Note

CHECK HARNESS BETWEEN SPEEDOMETER AND ADPCU.
1) Disconnect speedometer harness connector M46 and ADPCU harness connector M31.
2) Check harness continuity between ADPCU harness terminal 21 and speedometer harness terminal 6.
Continuity should exist.

↓ O.K.

CHECK SPEED SENSOR CIRCUITS. (Refer to METER AND GAUGES in EL section.)

N.G. → Repair speedometer circuits.

↓ O.K.

Replace ADPCU.

Diagnostic Procedure 17

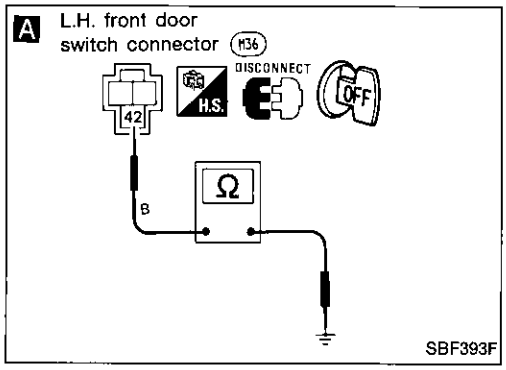
SYMPTOM (THE RESULTS OF PRELIMINARY CHECKS ARE;)

1 : All manual operations of driver's seat are O.K.
4 : Both manual operations of steering column are O.K.
7 : Both L.E.D.s come on correctly when setting memory.
10 : All circuits that can be confirmed by self-diagnosis are O.K.

Diagnostic Procedure 17-1: Pre-set Memory Automatic Return (Mode 2) does not function even though all results of preliminary checks are O.K. and despite Memory Automatic Return (Mode 1) functioning normally.

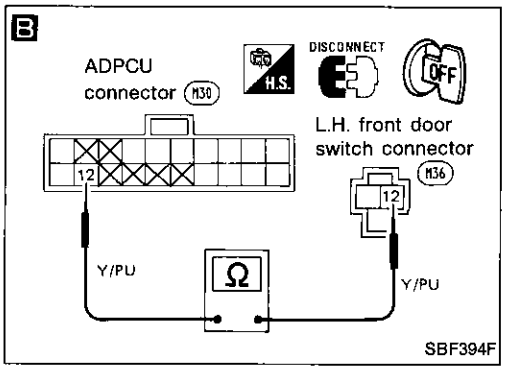
- **Before starting inspection, make sure that cancel switch is turned OFF. If cancel switch is turned ON, this system may not be malfunctioning.**

A



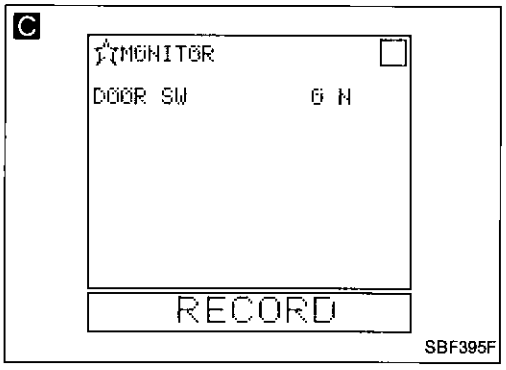
SBF393F

B



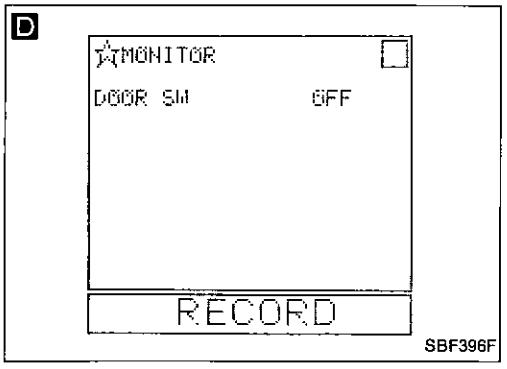
SBF394F

C



SBF395F

D



SBF396F

INSPECTION START

A Note

CHECK GROUND CIRCUIT FOR L.H. FRONT DOOR SWITCH.
1) Remove L.H. front door switch and disconnect connector M214.
2) Check harness continuity between L.H. front door switch harness terminal 42 and body ground.
Continuity should exist.

N.G. → INSPECTION START → Connect CONSULT to vehicle. → OFF→ON → CHECK L.H. FRONT DOOR SWITCH SIGNAL.
See "DOOR SW" in DATA MONITOR mode.

	L.H. front door	"DOOR SW"
C	Open	"ON"
D	Closed	"OFF"

O.K. → INSPECTION END

O.K.

B Note

CHECK HARNESS BETWEEN ADPCU AND L.H. FRONT DOOR SWITCH.
1) Remove front lower instrument cover on driver's side.
2) Disconnect ADPCU harness connector M30.
3) Check harness continuity between ADPCU harness terminal 12 and L.H. front door switch harness terminal 12.
Continuity should exist.

O.K.

CHECK L.H. FRONT DOOR SWITCH.
(Refer to Electrical Components Inspection.)

O.K. → Note
- CHECK THE ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE ADPCU HARNESS CONNECTOR M30.

O.K. → Replace ADPCU.

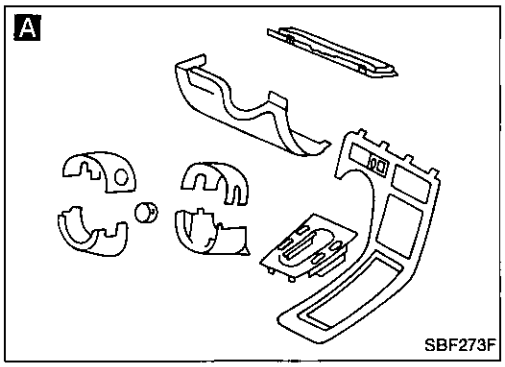
N.G. → Replace L.H. front door switch.

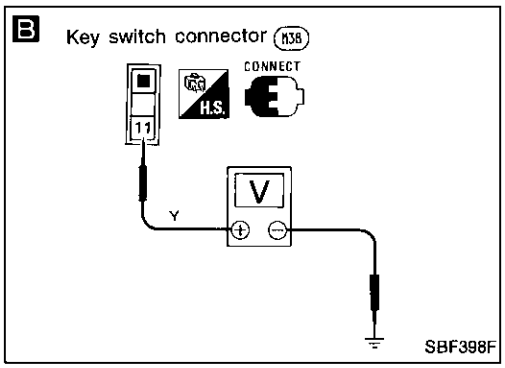
Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 17 (Cont'd)

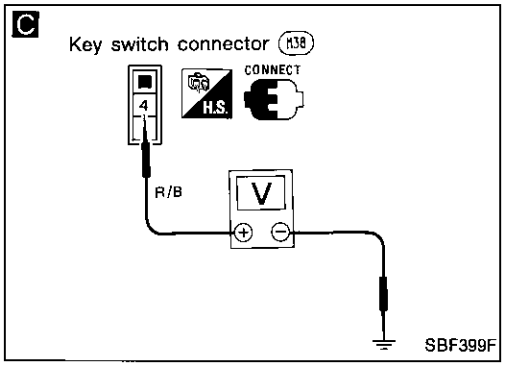
Diagnostic Procedure 17-2: Neither Memory Automatic Return (Mode 1) or Pre-set Memory Automatic Return (Mode 2) function even though all results of preliminary checks are O.K.

- **Before starting inspection, make sure that cancel switch is turned OFF. If cancel switch is turned ON, this system may not be malfunctioning.**

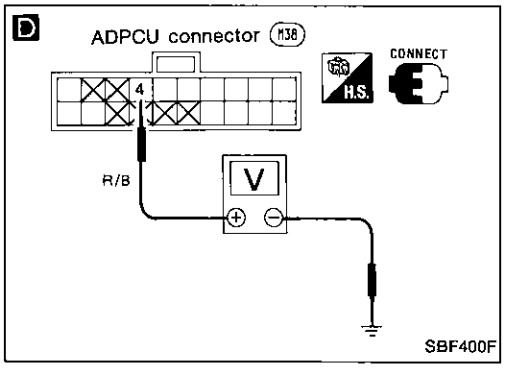

SBF273F



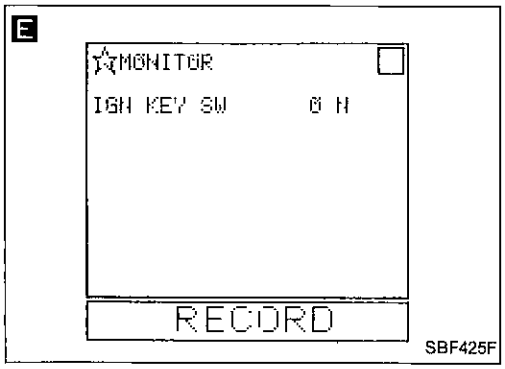
SBF398F



SBF399F



SBF400F



SBF425F

INSPECTION START

A

Remove steering column covers, A/T finisher, cluster lid C and lower instrument covers.

B

CHECK POWER SOURCE FOR KEY SWITCH.
Check voltage between key switch harness terminal (11) and body ground.
Battery voltage should exist.

O.K.

N.G. → Repair harness between key switch harness terminal (11) and fuse.

C

CHECK KEY SWITCH.
Check voltage between key switch harness terminal (4) and body ground.
Battery voltage should exist.

N.G. → Replace key switch.

O.K.

D

CHECK HARNESS BETWEEN KEY SWITCH AND ADPCU.
Check voltage between ADPCU harness terminal (4) and body ground.
Battery voltage should exist.

N.G. → Repair harness between key switch harness terminal (4) and ADPCU harness terminal (4).

O.K.

(A) (Go to next page.)

INSPECTION START

Connect CONSULT to vehicle.

OFF → ON

E

CHECK KEY SWITCH SIGNAL.
See "IGN KEY SW" in DATA MONITOR mode.
"IGN KEY SW" should be "ON".

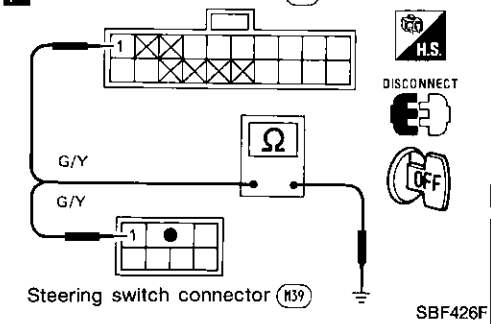
N.G. → Repair harness between key switch harness terminal (11) and fuse.

O.K.

(B) (Go to next page.)

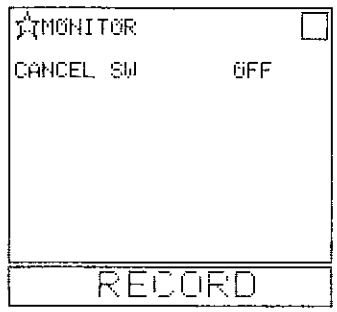
Diagnostic Procedure 17 (Cont'd)

F



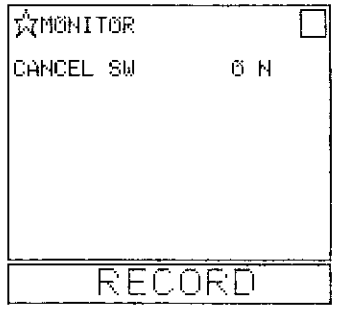
SBF426F

G



SBF427F

H



SBF428F

Ⓐ

Note



N.G.

CHECK HARNESS BETWEEN ADPCU AND CANCEL SWITCH.

1) Disconnect ADPCU harness connector M30 and steering switch harness connector M39.
2) Check harness continuity between ADPCU harness terminal ①, steering switch harness terminal ① and body ground.

Continuity should not exist.

O.K.

CHECK STEERING SWITCH.
(Refer to Electrical Components Inspection.)

N.G. → Replace steering switch.

O.K.

Note

- CHECK THE ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE ADPCU HARNESS CONNECTOR M30.

O.K.

Replace ADPCU.

Ⓑ

CHECK CANCEL SWITCH SIGNAL.
See "CANCEL SW" in DATA MONITOR mode.

	Cancel switch	CANCEL SW
G	OFF	"OFF"
H	ON	"ON"

O.K.

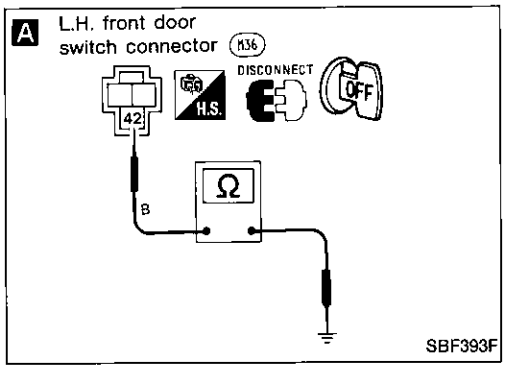
INSPECTION END

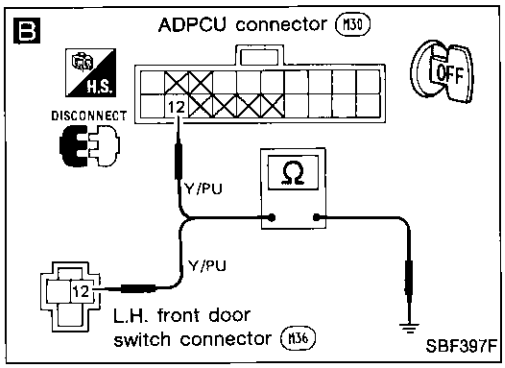
Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

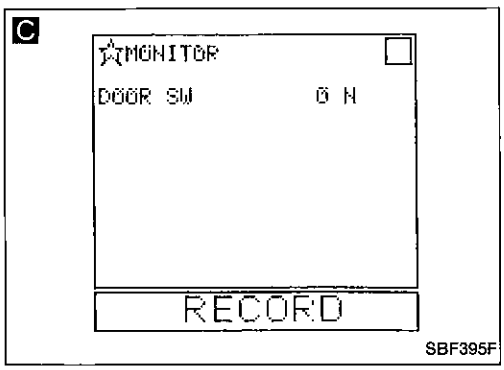
Diagnostic Procedure 17 (Cont'd)

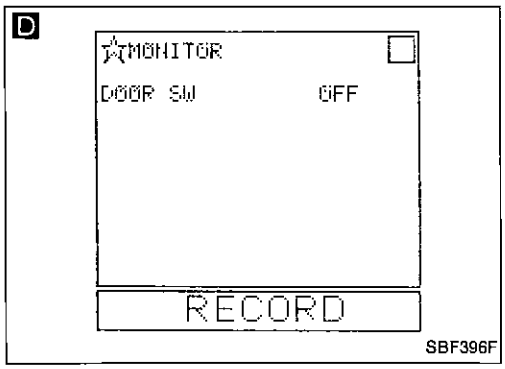
Diagnostic Procedure 17-3: Neither Automatic Exiting Setting (Mode 3) or Automatic Return (Mode 4) function even though all results of preliminary checks are O.K.

- **Before starting inspection, make sure that cancel switch is turned OFF. If cancel switch is turned ON, this system may not be malfunctioning.**









INSPECTION START

A Note

CHECK GROUND CIRCUIT FOR L.H. FRONT DOOR SWITCH.

1) Remove L.H. front door switch and disconnect connector M214.
2) Check harness continuity between L.H. front door switch harness terminal 42 and body ground.

Continuity should exist.

O.K.

B Note

CHECK HARNESS BETWEEN ADPCU AND L.H. FRONT DOOR SWITCH.

1) Remove front lower instrument cover on driver's side.
2) Disconnect ADPCU harness connector M30.
3) Check harness continuity between ADPCU harness terminal 12, L.H. front door switch harness terminal 12 and body ground.

Continuity should not exist.

O.K.

Ⓐ

(Go to previous page.)

INSPECTION START

Connect CONSULT to vehicle.

OFF → ON

CHECK L.H. FRONT DOOR SWITCH SIGNAL. See "DOOR SW" in DATA MONITOR mode.

	L.H. front door	"DOOR SW"
C	Open	"ON"
D	Closed	"OFF"

N.G.

O.K.

Ⓑ

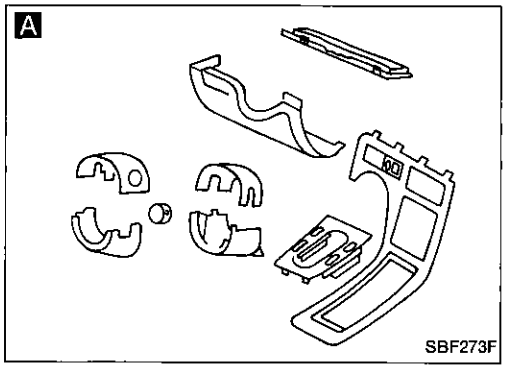
(Go to previous page.)

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.

Diagnostic Procedure 17 (Cont'd)

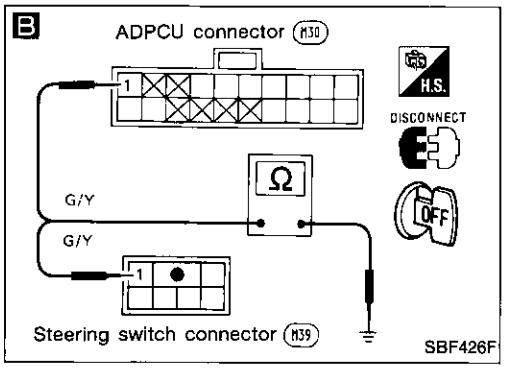
Diagnostic Procedure 17-4: Can not cancel automatic operations (Mode 1 - 4).

A



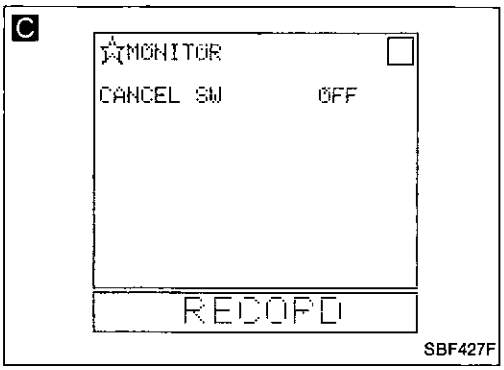
SBF273F

B



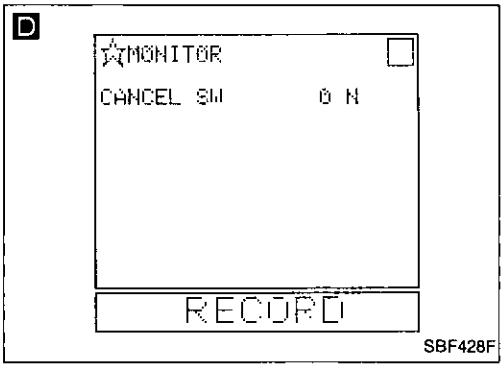
SBF426F

C



SBF427F

D



SBF428F

INSPECTION START

Remove steering column covers, A/T finisher, cluster lid C and lower instrument covers.

Note

CHECK HARNESS BETWEEN ADPCU AND CANCEL SWITCH.

1) Disconnect ADPCU harness connector M30 and steering switch harness connector M39.
2) Check harness continuity between ADPCU harness terminal ①, steering switch harness terminal ① and body ground.

Continuity should not exist.

N.G. ← CHECK CANCEL SWITCH SIGNAL.
See "CANCEL SW" in DATA MONITOR mode.

	Cancel switch	"CANCEL SW"
C	OFF	"OFF"
D	ON	"ON"

O.K.

INSPECTION END

O.K.
(continuity does not exist.)

CHECK STEERING SWITCH.
(Refer to Electrical Components Inspection.)

N.G. ← Replace steering switch.

O.K.

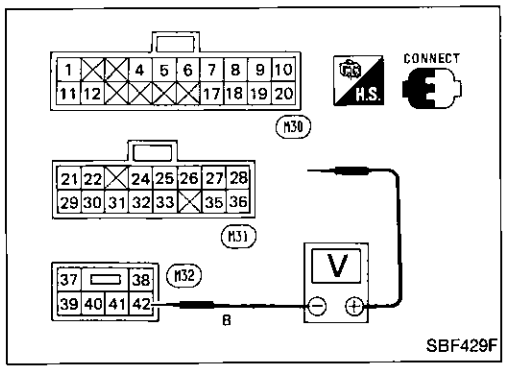
Note

- CHECK THE ADPCU PIN TERMINALS FOR DAMAGE.
- CHECK THE CONNECTION AT THE ADPCU HARNESS CONNECTOR M30.

O.K.

Replace ADPCU.

Note:
If the result is N.G. after checking, repair harness, terminals or connectors.



Electrical Components Inspection

AUTOMATIC DRIVE POSITIONER CONTROL UNIT (ADPCU)

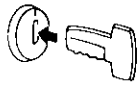
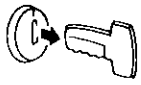
Harness connector terminal layout

- Measure voltage between each terminal and terminal ㊷ by following **ADPCU inspection table.**

Do not use a digital type voltmeter when measuring terminals ㉖ and ㉗.

ADPCU inspection table

(Data are reference values.)

Terminal No.	Harness color	Item	Condition		Judgment standard	
①	G/Y	Cancel switch		Cancel switch ON 	Less than 0.3V	
				Cancel switch OFF 	Approximately 5.0V	
④	R/B	Key switch		Key switch ON	Battery voltage	
				Key switch OFF	Less than 1.0V	
⑤	G	ACC switch			Battery voltage	
					Less than 1.0V	
⑥	BR	Ignition switch			Battery voltage	
					Less than 1.0V	
⑦	LG/B	Power source for tilt and telescopic sensors			Approximately 5.0V	
⑧	LG/R	Tilt sensor		Fully tilted up	Approximately 1.5V	Output voltage varies with steering column position.
				Fully tilted down	Approximately 4.5V	
⑨	PU/W	Tilt down switch	ON		Less than 0.3V	
			OFF		Battery voltage	
⑩	P/L	Tilt up switch	ON		Less than 0.3V	
			OFF		Battery voltage	
⑪	Y	Power source (Battery)	—		Battery voltage	

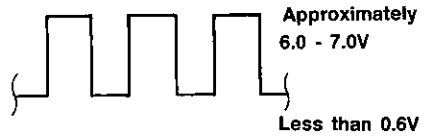
Electrical Components Inspection (Cont'd)

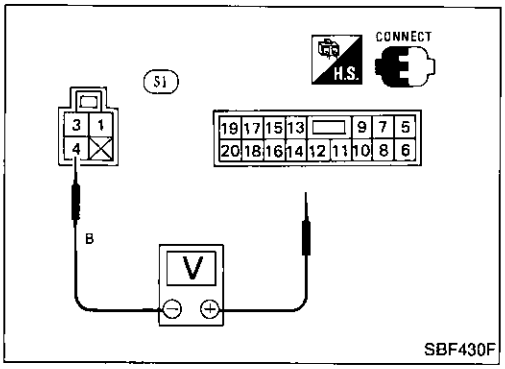
(Data are reference values.)

Terminal No.	Harness color	Item	Condition		Judgment standard	
⑫	Y/PU	L.H. front door switch		L.H. front door switch ON (Door open)	Less than 1.0V	
				L.H. front door switch OFF (Door closed)	Battery voltage	
⑰	LG	Power source for tilt and telescopic sensors	—		0V	
⑱	LG/W	Telescopic sensor		Fully forward	Approximately 5.0V	Output voltage varies with steering column position.
				Fully backward	Approximately 0V	
⑲	G/W	Telescopic front switch	ON		Less than 0.3V	
			OFF		Battery voltage	
⑳	G/B	Telescopic rear switch	ON		Less than 0.3V	
			OFF		Battery voltage	
㉑	Y/G	Speed sensor		Vehicle is stopped.	0V or Battery voltage	
㉒	L/Y	N & P relay		A/T selector lever is in "P" or "N" position.	Less than 1.0V	
				A/T selector lever is not in "P" or "N" position.	Battery voltage	
㉔	L/W	L.E.D. for memory switch 1		Set switch is pushed and L.E.D. is ON.	Less than 1.5V (Approximately 0.5 or 5.0 seconds)	
				L.E.D. is OFF.	Battery voltage	
㉕	L/G	L.E.D. for memory switch 2		Set switch is pushed and L.E.D. is ON.	Less than 1.5V (Approximately 0.5 or 5.0 seconds)	
				L.E.D. is OFF.	Battery voltage	
㉖	G	Multiplex signal to L.H. power seat control unit	One driver's side power seat control switch is turned ON.		Approximately 1.0 - 1.6V	
			All driver's side power seat control switches are turned OFF.		0V	
㉗	G/OR	Multiplex signal from driver's side power seat control switch	One driver's side power seat control switch is turned ON.		Approximately 1.0 - 1.6V	
			All driver's side power seat control switches are turned OFF.		0V	
㉘	BR/Y	For service support (CONSULT)	CONSULT is disconnected.		Battery voltage	

Electrical Components Inspection (Cont'd)

(Data are reference values.)

Terminal No.	Harness color	Item	Condition		Judgment standard
㉙	L/R	Rear lifting sensor		While rear lifting device is operating.	 Approximately 6.0 - 7.0V / Less than 0.6V
㉚	OR/L	Front lifting sensor		While front lifting device is operating.	
㉛	OR/B	Reclining sensor		While reclining device is operating.	
㉜	L	Sliding sensor		While sliding device is operating.	
㉝	B	Ground	—		0V
㉟	BR/W	For service support (CONSULT)	CONSULT is disconnected.		0V
㊱	Y/W				
㊲	P	Tilt motor (Power source for downward operation)	While tilt motor is operating downward.		Battery voltage
			Stopped		0V
㊳	P/L	Telescopic motor (Power source for forward operation)	While telescopic motor is operating forward.		Battery voltage
			Stopped		0V
㊴	B/Y	Power source	—		Battery voltage
㊵	GY/R	Tilt motor (Power source for upward operation)	While tilt motor is operating upward.		Battery voltage
			Stopped		0V
㊶	P/B	Telescopic motor (Power source for rearward operation)	While telescopic motor is operating rearward.		Battery voltage
			Stopped		0V
㊷	B	Ground	—		0V



Electrical Components Inspection (Cont'd)

L.H. POWER SEAT CONTROL UNIT

Harness connector terminal layout

- Measure voltage between each terminal and terminal ④ by following **L.H. power seat control unit inspection table.**

Do not use a digital type voltmeter when measuring terminal ③.

L.H. power seat control unit inspection table

(Data are reference values.)

Terminal No.	Harness color	Item	Condition		Judgment standard
①	Y	Power source (Battery)	—		Battery voltage
③	G	Multiplex signal from ADPCU	One driver's side power seat control switch is turned ON.		Approximately 1.0 - 1.6V
			All driver's side power seat control switches are turned OFF.		Less than 0.5V
⑥	R	Sliding motor (Power source for forward operation)	Sliding switch OFF	Sliding device is at rear end.	Less than 0.5V
				Sliding device is between front and rear end.	
			Sliding front switch ON		Battery voltage
⑧	L/Y	Sliding motor (Power source for backward operation)	Sliding switch OFF	Sliding device is at front end.	Less than 0.5V
				Sliding device is between front and rear end.	
			Sliding rear switch ON		Battery voltage
⑤	Y	Sliding limit switch (rear)	Sliding device is sliding or at any position except at rear end.		Less than 0.5V
			Sliding back switch ON when sliding device is at rear end.		Battery voltage
⑦	BR	Sliding limit switch (front)	Sliding device is sliding or at any position except at front end.		Less than 0.5V
			Sliding front switch ON when sliding device is at front end.		Battery voltage
⑩	W/G	Reclining motor (Power source for forward operation)	Reclining switch OFF	Reclining device is fully reclined.	Less than 0.5V
				Reclining device is between upright and fully reclined.	
			Reclining front switch ON		Battery voltage

Electrical Components Inspection (Cont'd)

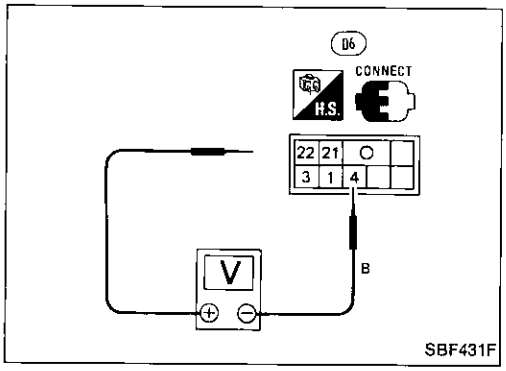
(Data are reference values.)

Terminal No.	Harness color	Item	Condition		Judgment standard
⑫	W/L	Reclining motor (Power source for backward operation)	Reclining switch OFF	Reclining device is upright.	Less than 0.5V
				Reclining device is between upright and fully reclied.	
			Reclining rear switch ON		Battery voltage
⑨	W/R	Reclining limit switch (rear)	Reclining device is reclining or at any position except fully reclined.		Less than 0.5V
			Reclining rear switch ON when reclining device is fully reclined.		Battery voltage
⑪	W/B	Reclining limit switch (front)	Reclining device is reclining or at any position except upright.		Less than 0.5V
			Reclining front switch ON when reclining device is upright.		Battery voltage
⑭	L/W	Front lifting motor (Power source for upward operation)	Front lifting switch OFF	Front lifting device is fully lowered.	Less than 0.5V
				Front lifting device is between raised and lowered.	
			Front lifting up switch ON		Battery voltage
⑯	R/B	Front lifting motor (Power source for downward operation)	Front lifting switch OFF	Front lifting device is fully raised.	Less than 0.5V
				Front lifting device is between raised and lowered.	
			Front lifting down switch ON		Battery voltage
⑬	G/W	Front lifting limit switch (down)	Front lifting device is lifting or at any position except fully lowered.		Less than 0.5V
			Front lifting down switch ON when front lifting device is fully lowered.		Battery voltage
⑮	L/G	Front lifting limit switch (up)	Front lifting device is lifting or at any position except fully raised.		Less than 0.5V
			Front lifting up switch ON when front lifting device is fully raised.		Battery voltage
⑱	B/W	Rear lifting motor (Power source for upward operation)	Rear lifting switch OFF	Rear lifting device is fully lowered.	Less than 0.5V
				Rear lifting device is between raised and lowered.	
			Rear lifting up switch ON		Battery voltage
⑳	B/Y	Rear lifting motor (Power source for downward operation)	Rear lifting switch OFF	Rear lifting device is fully raised.	Less than 0.5V
				Rear lifting device is between raised and lowered.	
			Rear lifting down switch ON		Battery voltage

Electrical Components Inspection (Cont'd)

(Data are reference values.)

Terminal No.	Harness color	Item	Condition	Judgment standard
⑰	LG/R	Rear lifting limit switch (down)	Rear lifting device is lifting or at any position except fully lowered.	Less than 0.5V
			Rear lifting down switch ON when rear lifting device is fully lowered.	Battery voltage
⑲	B/R	Rear lifting limit switch (up)	Rear lifting device is lifting or at any position except fully raised.	Less than 0.5V
			Rear lifting up switch ON when rear lifting device is fully raised.	Battery voltage



DRIVER'S SIDE POWER SEAT CONTROL SWITCH

Harness connector terminal layout

- Measure voltage between each terminal and terminal ④ by following **Driver's side power seat control switch inspection table.**

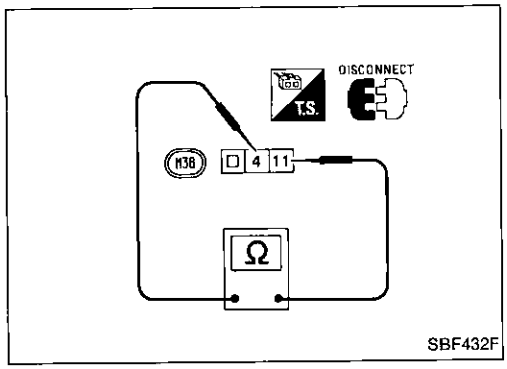
Do not use a digital type voltmeter when measuring terminal ③.

Driver's side power seat control switch inspection table

(Data are reference values.)

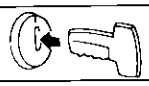
Terminal No.	Harness color	Item	Condition		Standard value
①	Y	Power source (Battery)	—		Battery voltage
③	G/OR	Multiplex signal to ADPCU	One driver's side power seat control switch is turned ON.		Approximately 1.0 - 1.6V
			All driver's side power seat control switches are turned OFF.		0V
㉑	L/W	L.E.D. for memory switch 1		Set switch is pushed and L.E.D. is ON.	Less than 1.5V (Approximately 0.5 or 5.0 seconds)
				L.E.D. is OFF.	Battery voltage
㉒	L/G	L.E.D. for memory switch 2		Set switch is pushed and L.E.D. is ON.	Less than 1.5V (Approximately 0.5 or 5.0 seconds)
				L.E.D. is OFF.	Battery voltage

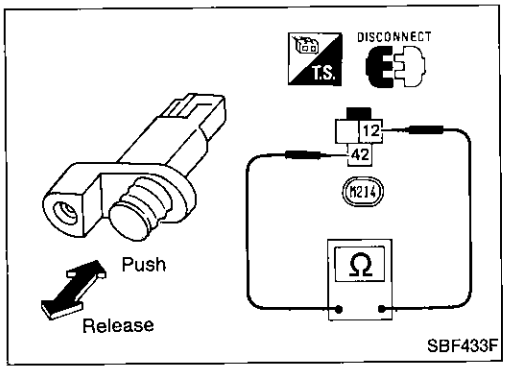
Electrical Components Inspection (Cont'd)



KEY SWITCH

1. Disconnect key switch harness connector (M38).
2. Check continuity between terminal (4) and (11).

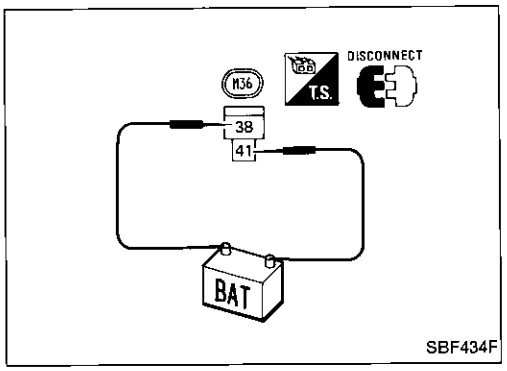
Key	Continuity
	should exist.
	should not exist.



L.H. FRONT DOOR SWITCH

1. Disconnect L.H. front door switch harness connector (M214).
2. Check continuity between terminal (12) and (42).

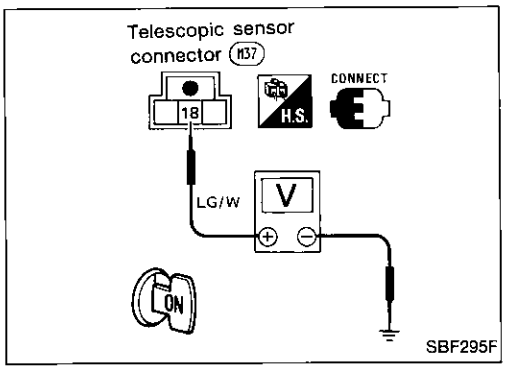
Door switch	Continuity
Pushed (Door closed)	should not exist.
Released (Door open)	should exist.



TELESCOPIC MOTOR

1. Disconnect telescopic motor harness connector (M36).
2. Check steering column operation by supplying battery voltage to terminals (38) and (41).

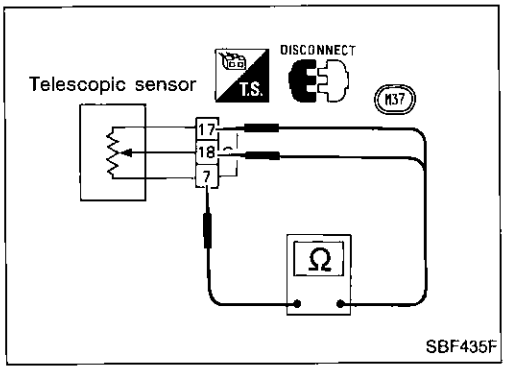
⊕	⊖	Steering column operation
(38)	(41)	Forward
(41)	(38)	Backward



TELESCOPIC SENSOR

1. Check voltage between telescopic sensor harness terminal (18) and body ground.

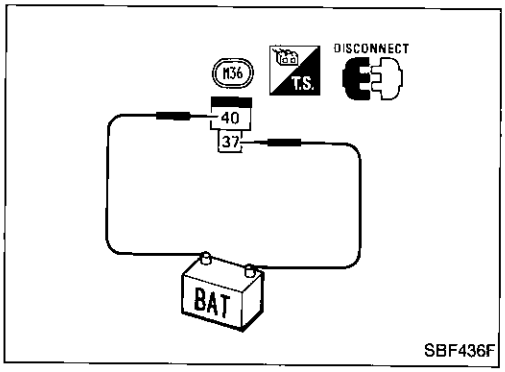
Steering column position	Voltage
Fully backward	Approximately 0V
Fully forward	Approximately 5.0V



2. Disconnect telescopic sensor harness connector (M37).
3. Check continuity between terminals (17) and (18), and (7).

Continuity should exist.

Electrical Components Inspection (Cont'd)

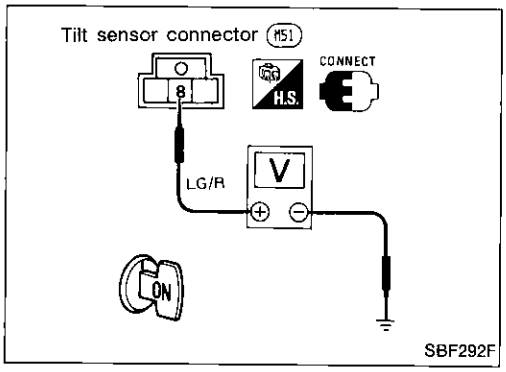


SBF436F

TILT MOTOR

1. Disconnect tilt motor harness connector (M52).
2. Check steering column operation by supplying battery voltage to terminals ㊲ and ㊵.

⊕	⊖	Steering column operation
㊲	㊵	Downward
㊵	㊲	Upward

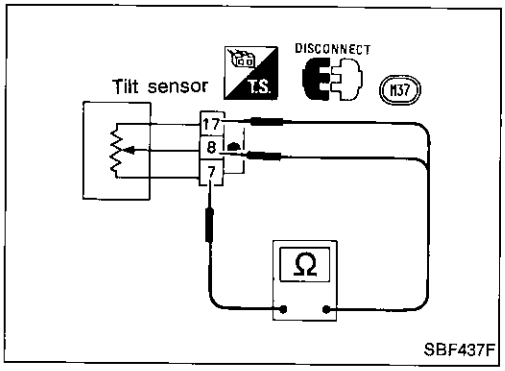


SBF292F

TILT SENSOR

1. Check voltage between tilt sensor harness terminal ⑧ and body ground.

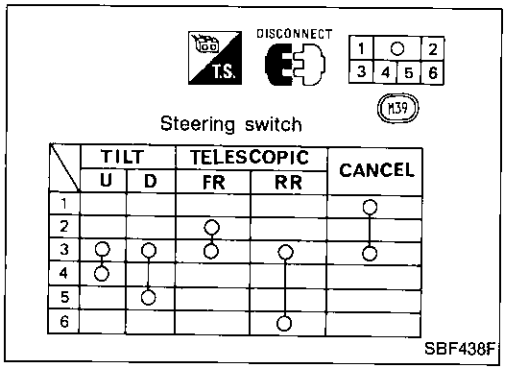
Steering column position	Voltage
Fully tilted up	Approximately 1.0 - 1.5V
Fully tilted down	Approximately 4.5V



SBF437F

2. Disconnect tilt sensor harness connector (M51).
3. Check continuity between terminals ⑰ and ⑧, and ⑦.

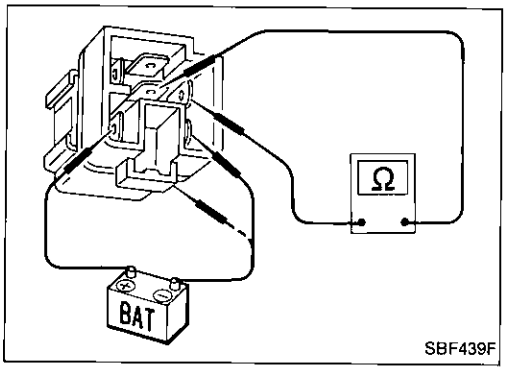
Continuity should exist.



SBF438F

STEERING SWITCH

1. Disconnect steering switch harness connector (M39).
2. Check continuity between terminals at each switch position.



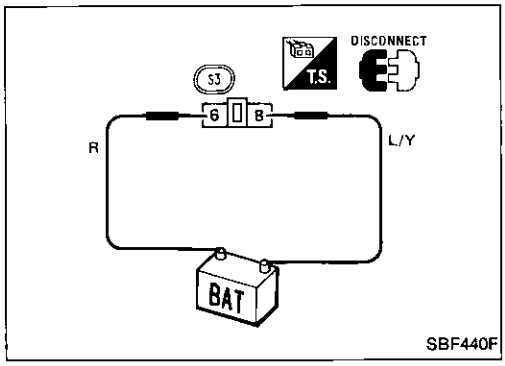
SBF439F

N & P RELAY

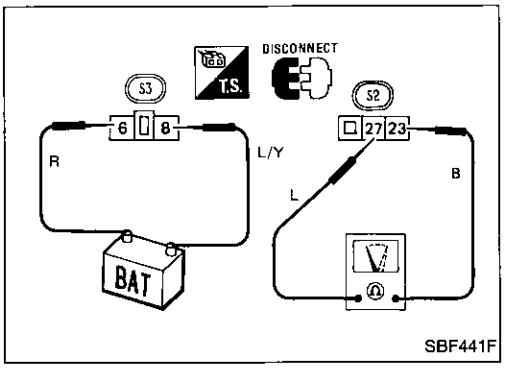
1. Disconnect N & P relay.
2. Check circuit continuity between terminals.

When supplying battery voltage:
Continuity should exist.
When not supplying battery voltage:
Continuity should not exist.

Electrical Components Inspection (Cont'd)



SBF440F



SBF441F

SLIDING MOTOR

Check motor.

1. Disconnect sliding motor harness connector (S3).
2. Check sliding device operation with battery voltage supplied to terminals.

⊕	⊖	Sliding device operation
6	8	Forward
8	6	Backward

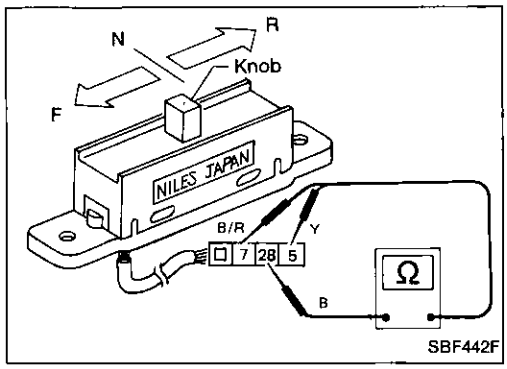
Check sliding sensor.

3. Disconnect sliding sensor harness connector (S2).
4. Check continuity between sliding sensor terminals 27 and 23 with battery voltage supplied to sliding motor terminals 6 and 8.

The needle of the ohmmeter should swing.

5. If any one of the results of 2 and 4 above is N.G., replace sliding motor.

When installing sliding motor assembly, refer to "POWER SEAT MOTOR INSTALLATION" described in "Front seat" in "SEAT" section.



SBF442F

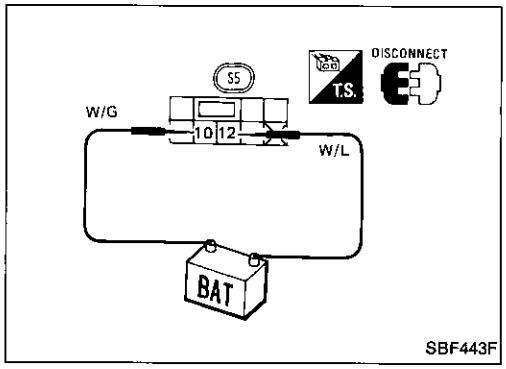
SLIDING LIMIT SWITCH

1. Remove sliding limit switch from sliding device.
2. Check continuity between sliding limit switch terminals 5, 7 and 28 at each knob position.

Knob direction / Terminal	F	N	R
5	○	○	
7	○	○	○
28	○	○	○

Electrical Components Inspection (Cont'd)

RECLINING MOTOR

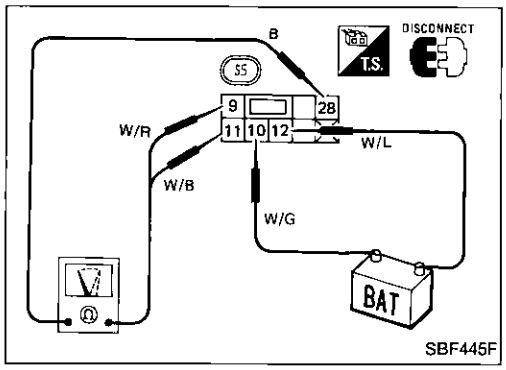


SBF443F

Check motor.

1. Disconnect reclining motor harness connector (S5).
2. Check reclining device operation with battery voltage supplied to terminals.

⊕	⊖	Reclining device operation
⑩	⑫	Forward
⑫	⑩	Backward

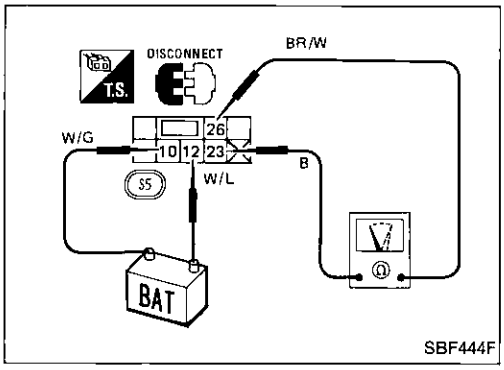


SBF445F

Check reclining limit switch.

3. Check continuity between terminals ㉘ and ⑨, ⑪ with battery voltage supplied to terminals ⑩ and ⑫ .

⊕	⊖	Ohmmeter	
⑩	⑫	⑪	㉘
⑫	⑩	⑨	



SBF444F

Check reclining sensor.

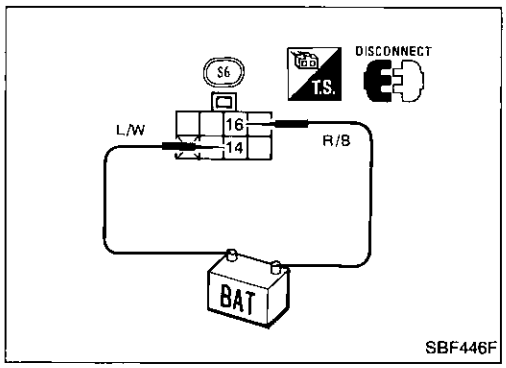
4. Check continuity between terminals ㉖ and ㉓ with battery voltage supplied to terminals ⑩ and ⑫ .

The needle of the ohmmeter should swing.

5. If any one of the results of inspections 2, 3 and 4 above is N.G., replace reclining motor.

When installing reclining motor, refer to "POWER SEAT MOTOR INSTALLATION" described in "Front Seat" in "SEAT" section.

FRONT LIFTING MOTOR



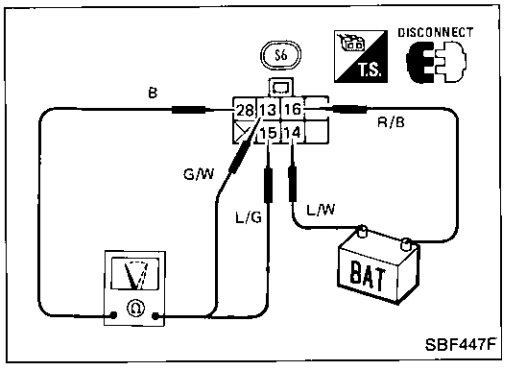
SBF446F

Check motor.

1. Disconnect front lifting motor connector (S6).
2. Check front lifting device operation with battery voltage supplied to terminals.

⊕	⊖	Front lifting device operation
⑭	⑯	Upward
⑯	⑭	Downward

Electrical Components Inspection (Cont'd)



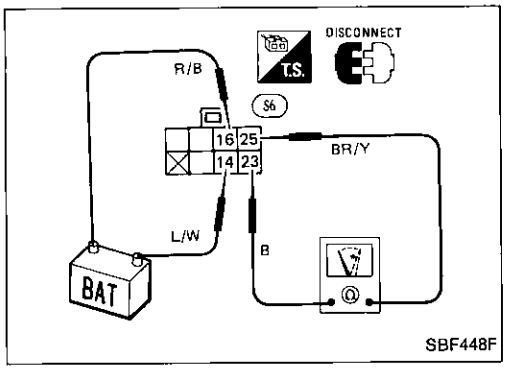
SBF447F

Check front lifting limit switch.

3. Check continuity between terminals ㉘ and ⑬, ⑮ with battery voltage supplied to terminals ⑭ and ⑯.

⊕	⊖	Ohmmeter	
⑭	⑯	⑮	㉘
⑯	⑭	⑬	

The needle of the ohmmeter should swing.



SBF448F

Check front lifting sensor.

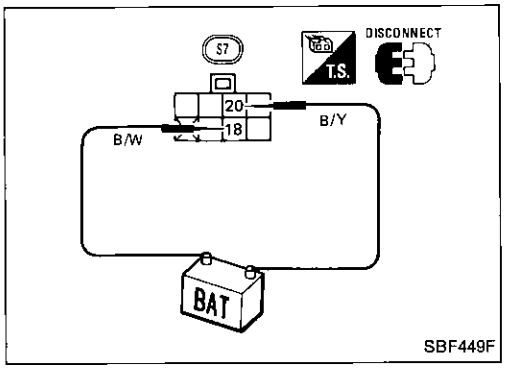
4. Check continuity between terminals ㉕ and ㉓ with battery voltage supplied to terminals ⑭ and ⑯.

The needle of the ohmmeter should swing.

5. If any one of the results of inspections 2, 3 and 4 above is N.G., replace front lifting motor.

When installing front lifting motor, refer to "POWER SEAT MOTOR INSTALLATION" described in "Front Seat" in "SEAT" section.

REAR LIFTING MOTOR

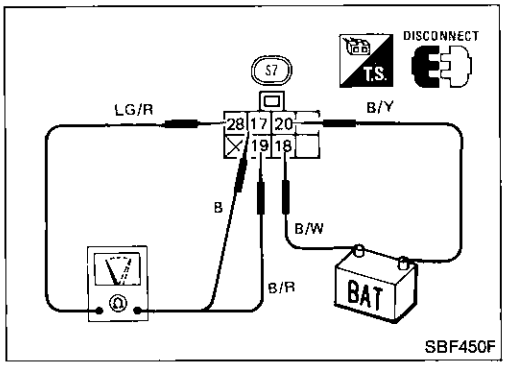


SBF449F

Check motor.

1. Disconnect rear lifting motor connector Ⓢ7.
2. Check rear lifting device operation while supplying battery voltage to terminals.

⊕	⊖	Front lifting device operation
⑱	⑳	Upward
⑳	⑱	Downward



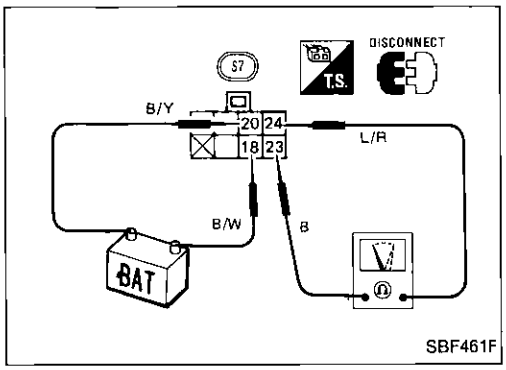
SBF450F

Check rear lifting limit switch.

3. Check continuity between terminals ㉘ and ⑰, ⑲ while supplying battery voltage to terminals ⑱ and ⑳.

⊕	⊖	Ohmmeter	
⑱	⑳	⑲	㉘
⑳	⑱	⑰	

The needle of the ohmmeter should swing.



SBF461F

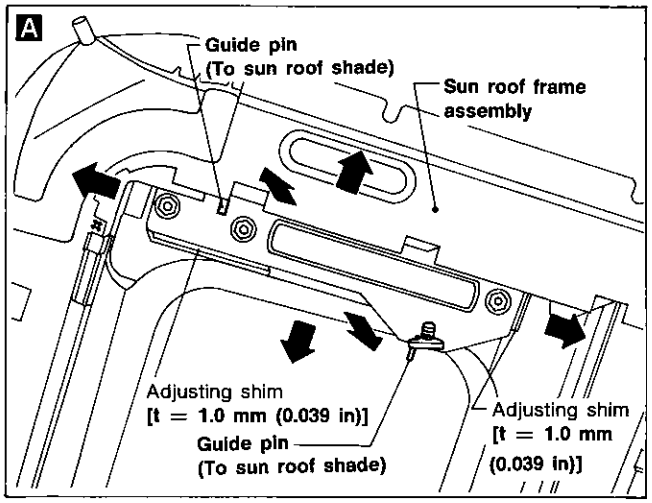
Check front lifting sensor.

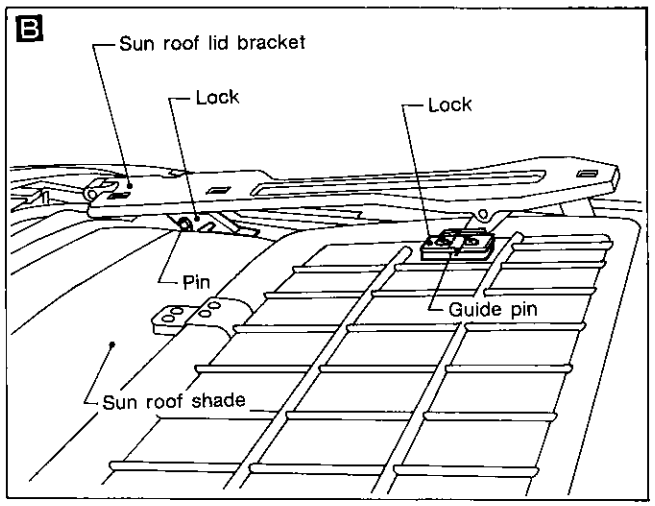
4. Check continuity between terminals ㉔ and ㉓ while supplying battery voltage to terminals ⑱ and ⑳.

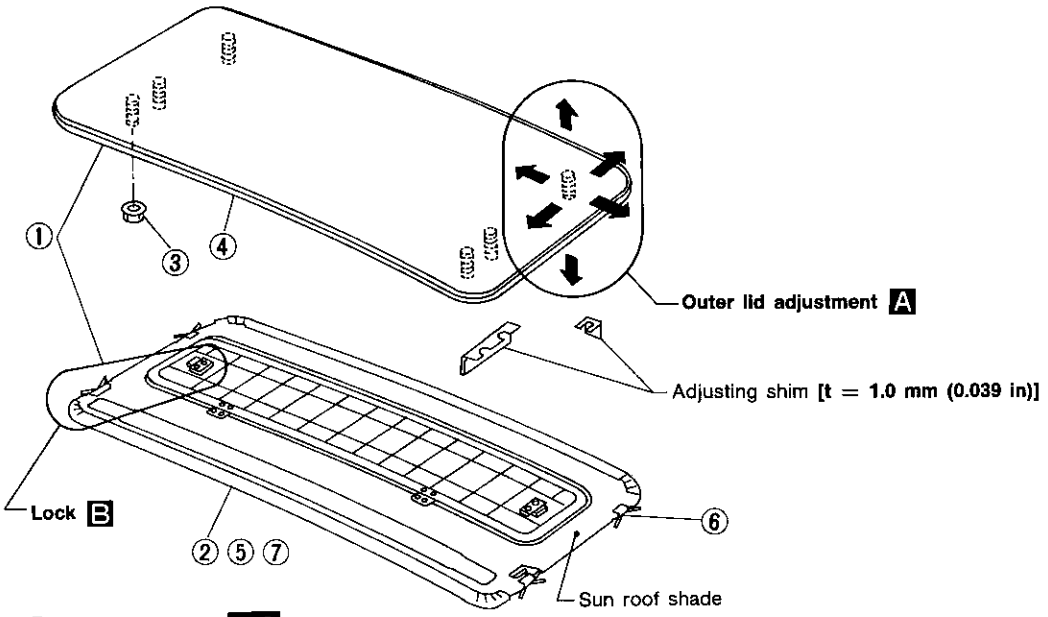
The needle of the ohmmeter should swing.

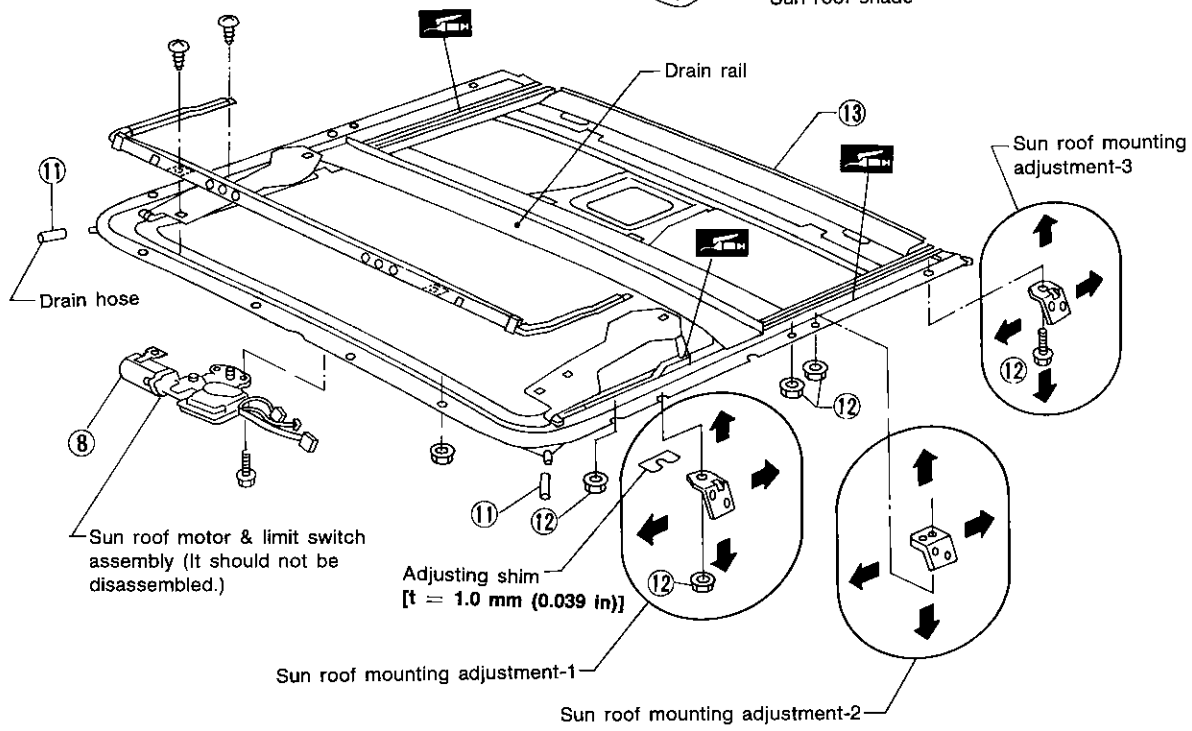
5. If any one of the above 2, 3 and 4 results is N.G., replace rear lifting motor.

When installing rear lifting motor, refer to "POWER SEAT MOTOR INSTALLATION" described in "Front Seat" in "SEAT" section.


A
Guide pin
(To sun roof shade)
Sun roof frame assembly
Adjusting shim
[t = 1.0 mm (0.039 in)]
Guide pin
(To sun roof shade)
Adjusting shim
[t = 1.0 mm
(0.039 in)]

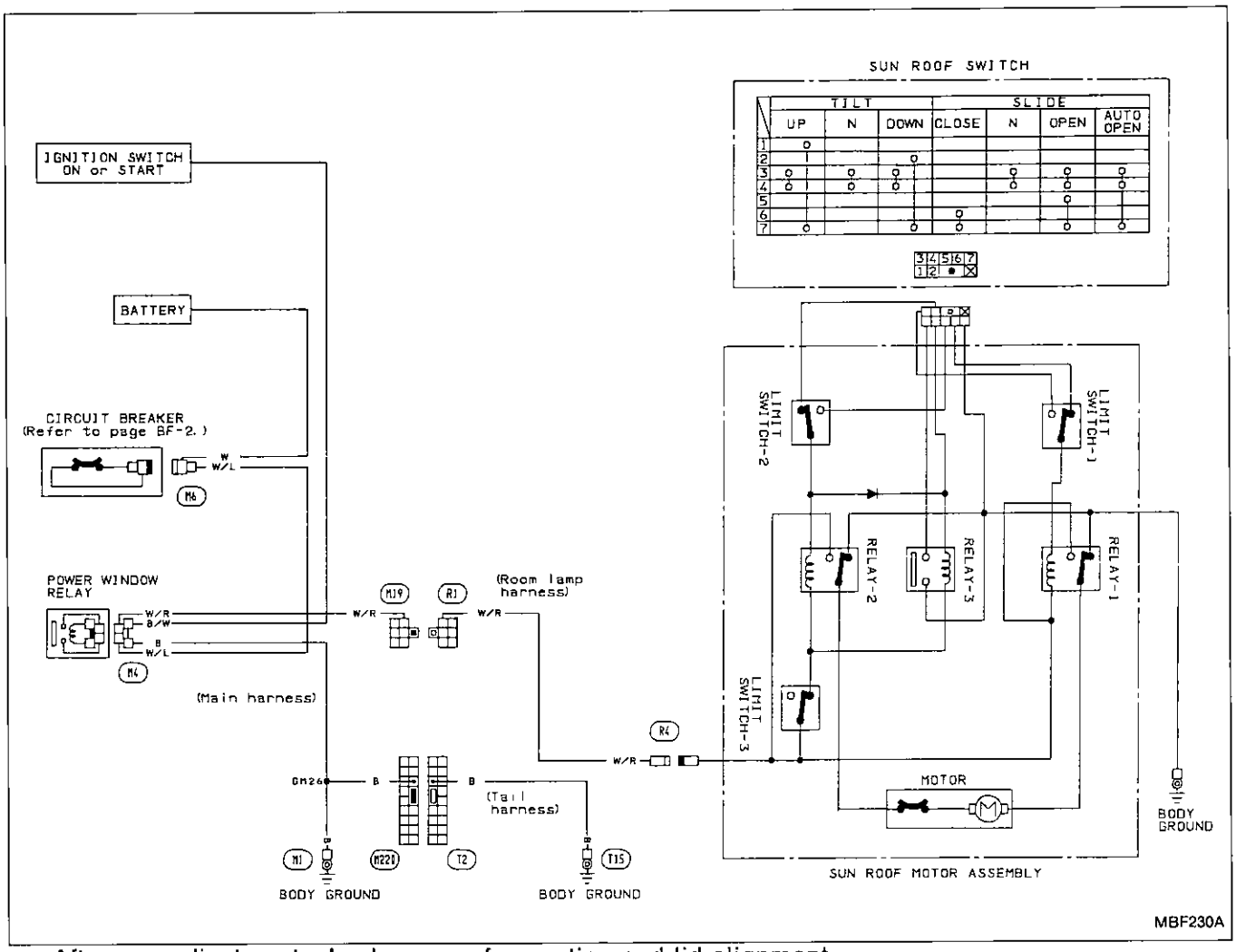

B
Sun roof lid bracket
Lock
Lock
Pin
Guide pin
Sun roof shade


Outer lid adjustment A
Adjusting shim [t = 1.0 mm (0.039 in)]
Lock B
Sun roof shade


Drain rail
Sun roof mounting adjustment-3
Drain hose
Sun roof motor & limit switch assembly (It should not be disassembled.)
Adjusting shim
[t = 1.0 mm (0.039 in)]
Sun roof mounting adjustment-1
Sun roof mounting adjustment-2

SBF205F

Wiring Diagram



- After any adjustment, check sun roof operation and lid alignment.
- Handle finisher plate and glass lid with care so not to damage it.
- It is desirable for easy installation to mark each point before removal.

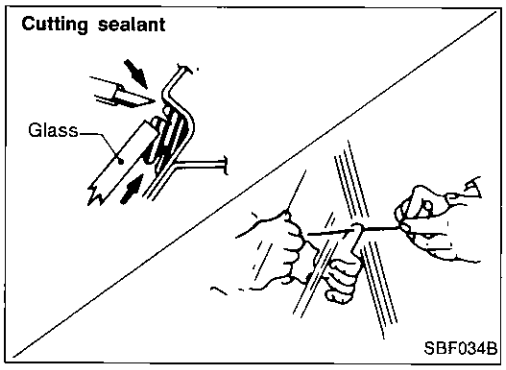
CAUTION:

a. Always work with a helper.

b. Remove sun roof frame from rear door opening.

REMOVAL — Sun roof assembly

① Open sun roof lid to approximately 2/3 of full-open position. Remove locks and pins through clearance between sun roof lid and sun roof shade.
② Push in sun roof shade backward so that sun roof is held closed.
③ Close sun roof lid, and remove six nuts from back of sun roof lid.
④ Lift out sun roof away from roof.
⑤ Pull sun roof shade forward.
⑥ Remove four shade locks located beside sun roof shade.
⑦ Remove sun roof shade.
⑧ Remove sun roof motor assembly.
⑨ Remove driver's and passenger's seats. For details, refer to "Front Seat" in "SEAT".
⑩ Disconnect interior lamp harness.
⑪ Disconnect front and rear drain hoses.
⑫ Remove nuts and bolts securing sun roof rails.
⑬ Remove sun roof rail assembly.



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 installing the glass, the vehicle should remain stationary until the sealant hardens.**

WARNING :

Keep heat and open flames away as primers are flammable.

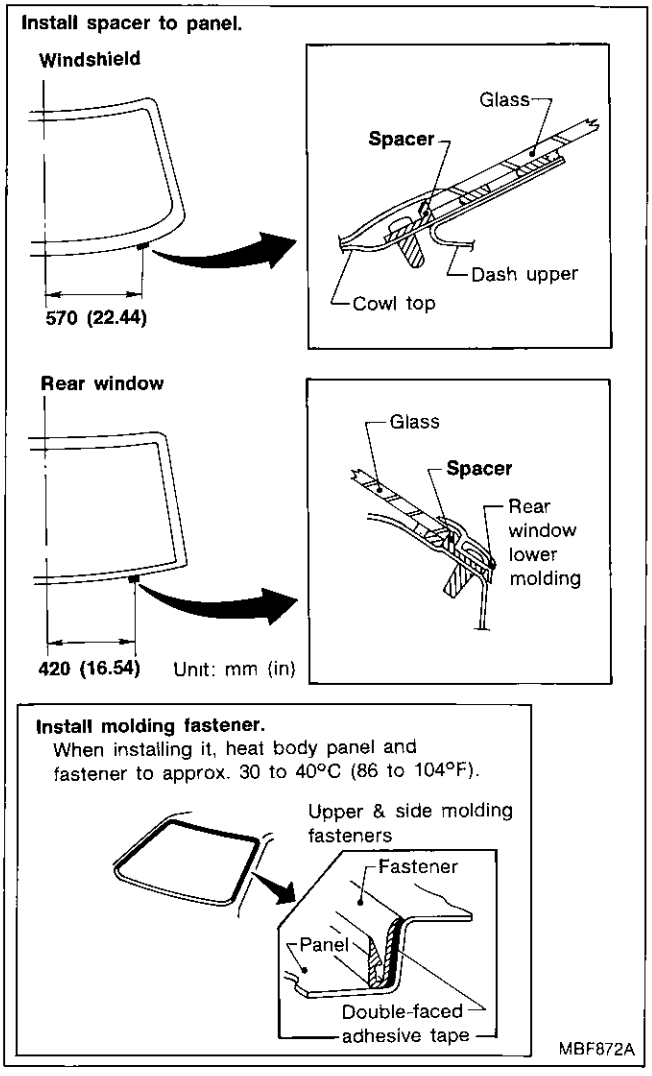
CAUTION:

Advise the user of the fact that vehicle should not be driven on rough roads or surfaces until sealant has properly vulcanized.

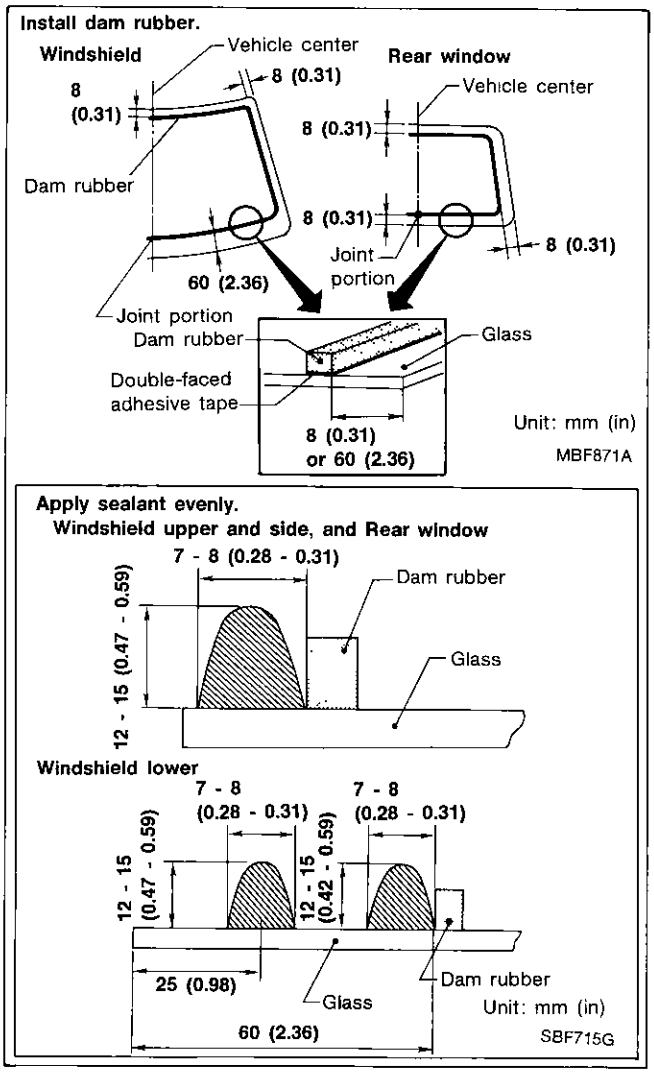
- **Do not use sealant which is past its usable term.**
- **Do not leave cartridge unattended with its cap open.**
- **Keep primers and sealant in a cool, dry place. Ideally, they should be stored in a refrigerator.**
- **Molding must be installed securely so that it is in position and leaves no gap.**

Windshield and Rear window

BODY SIDE



GLASS SIDE



Windshield and Rear window (Cont'd)

REPAIRING WATER LEAKS FOR WINDSHIELD AND REAR WINDOW

Leaks can be repaired without removing and reinstalling glass.

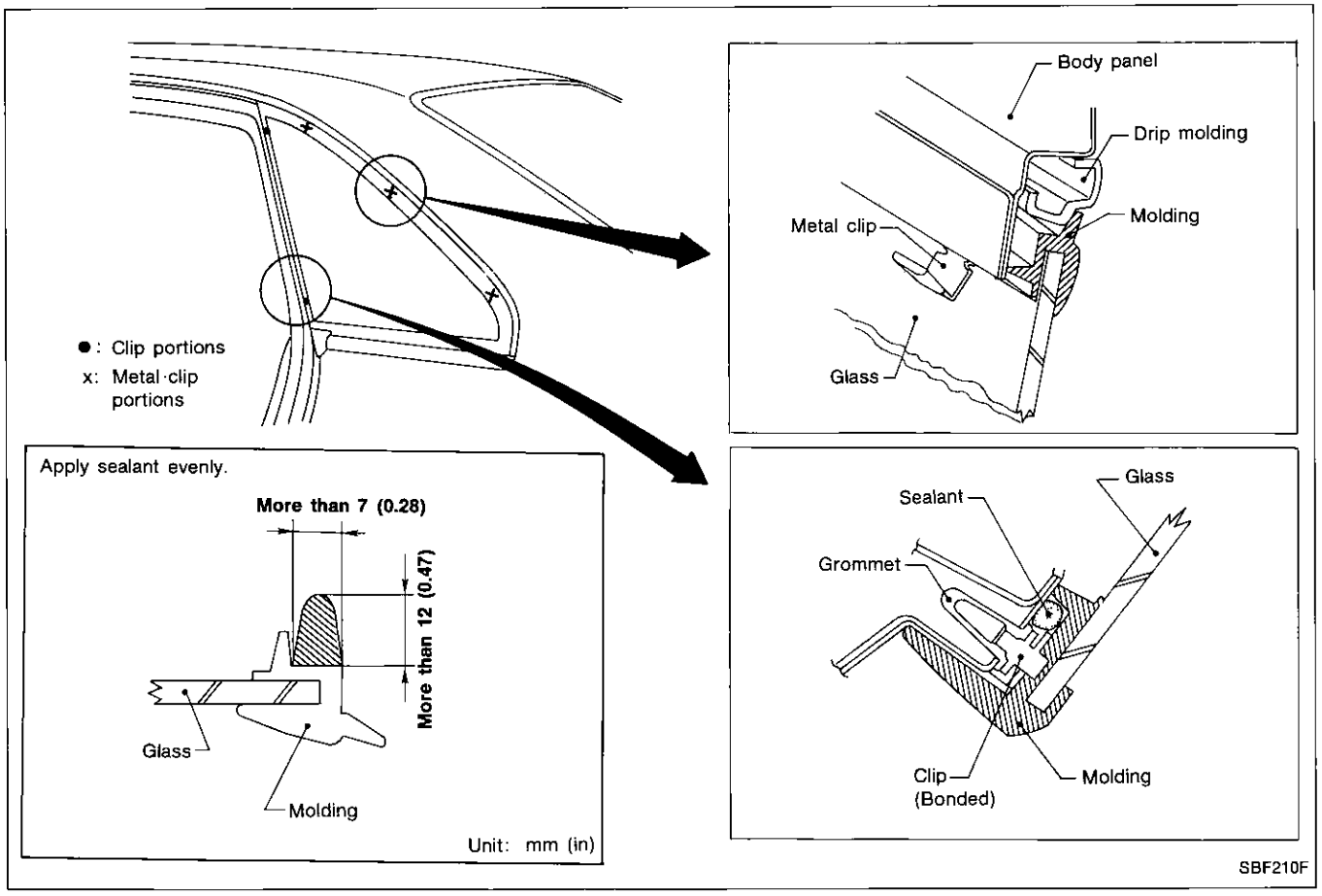
If water is leaking between caulking material and body or between glass and caulking material, determine the extent of the leak by applying water while pushing glass outward.

To stop the leak, apply primer and then sealant to the leak point.

Opera Window

Molded type window

During removal, be careful not to scratch molding when cutting sealant. If molding is scratched, repair.

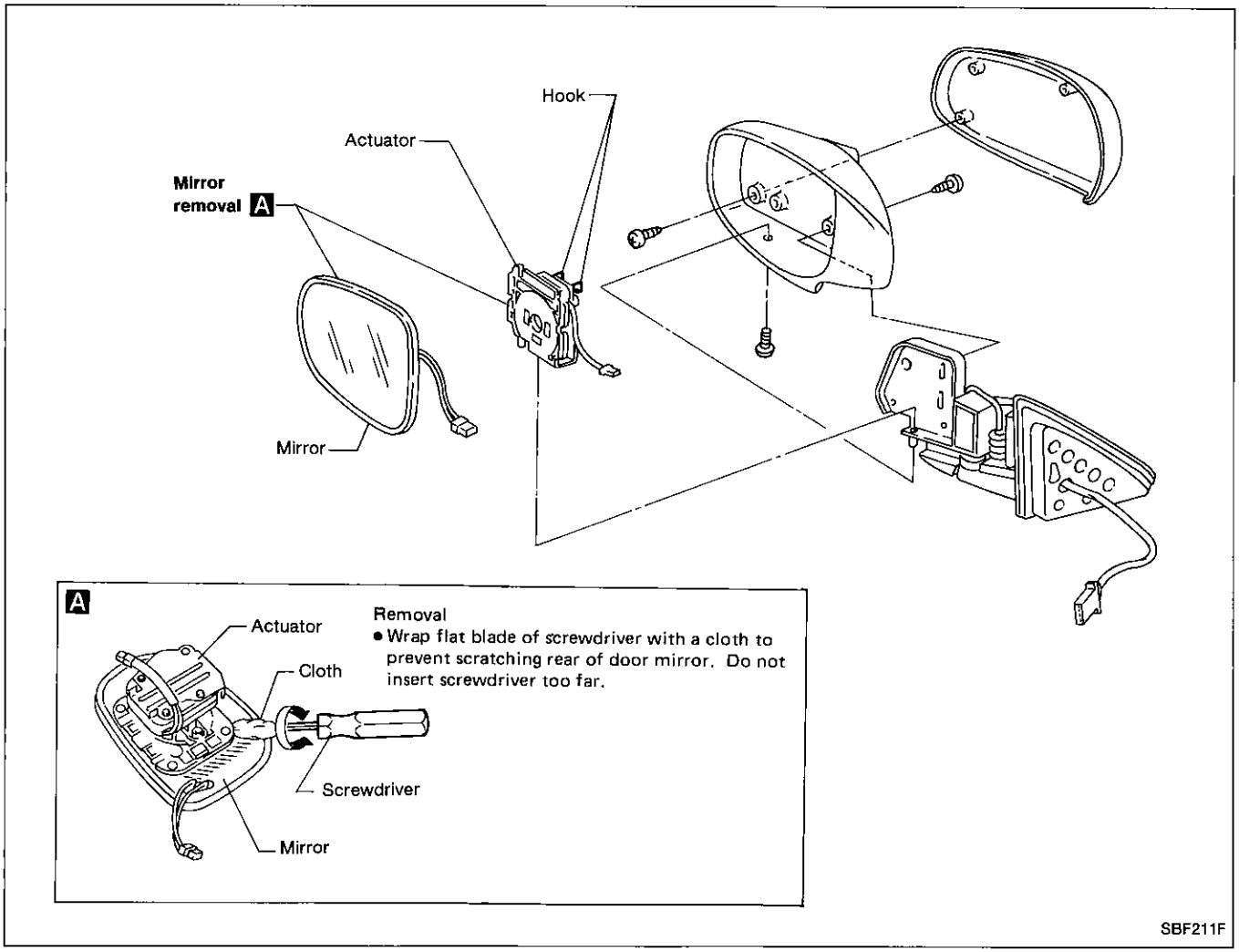


Door Mirror

CAUTION:
Be careful not to scratch door rearview mirror body.

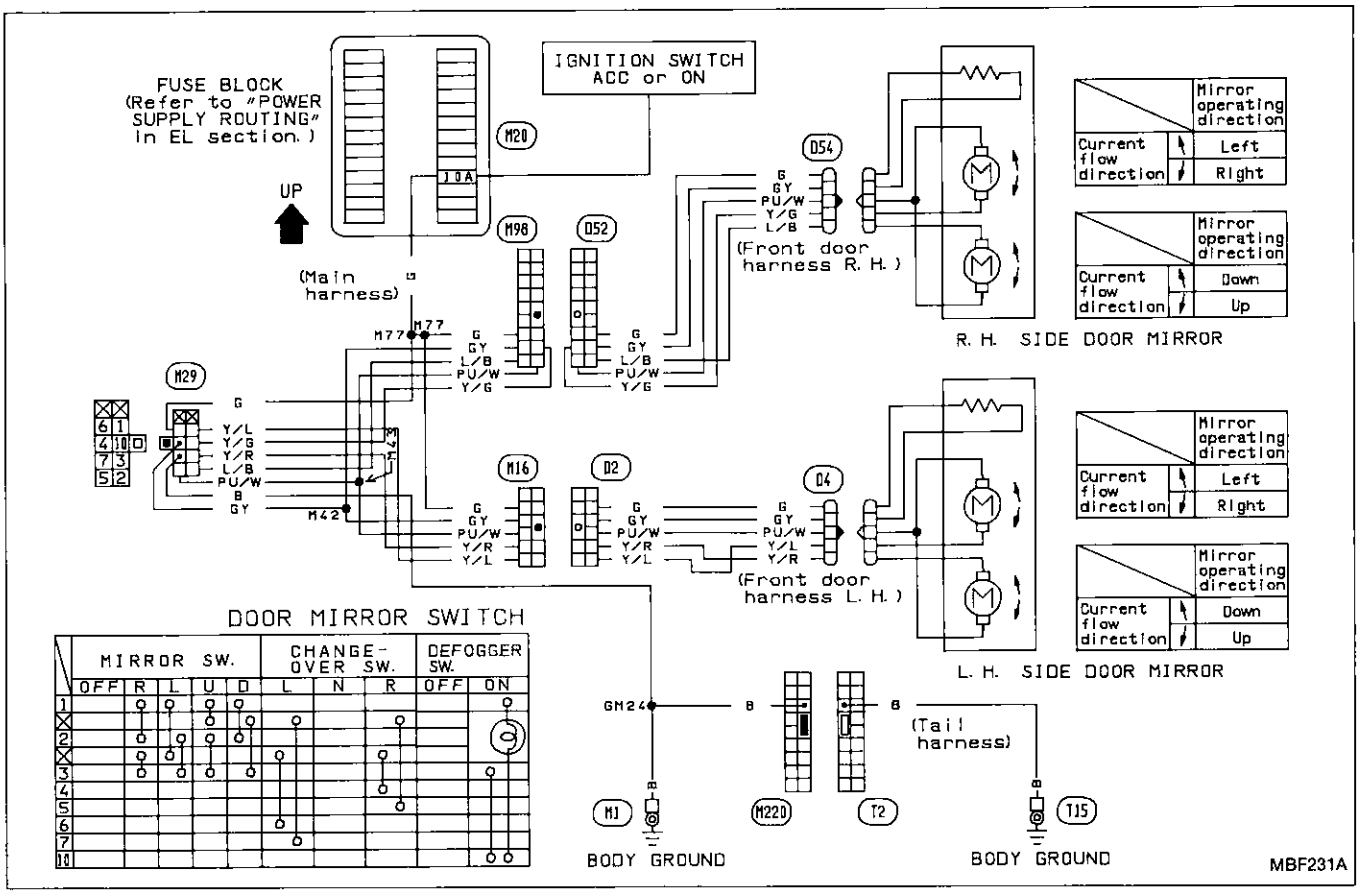
REMOVAL — Door mirror

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.



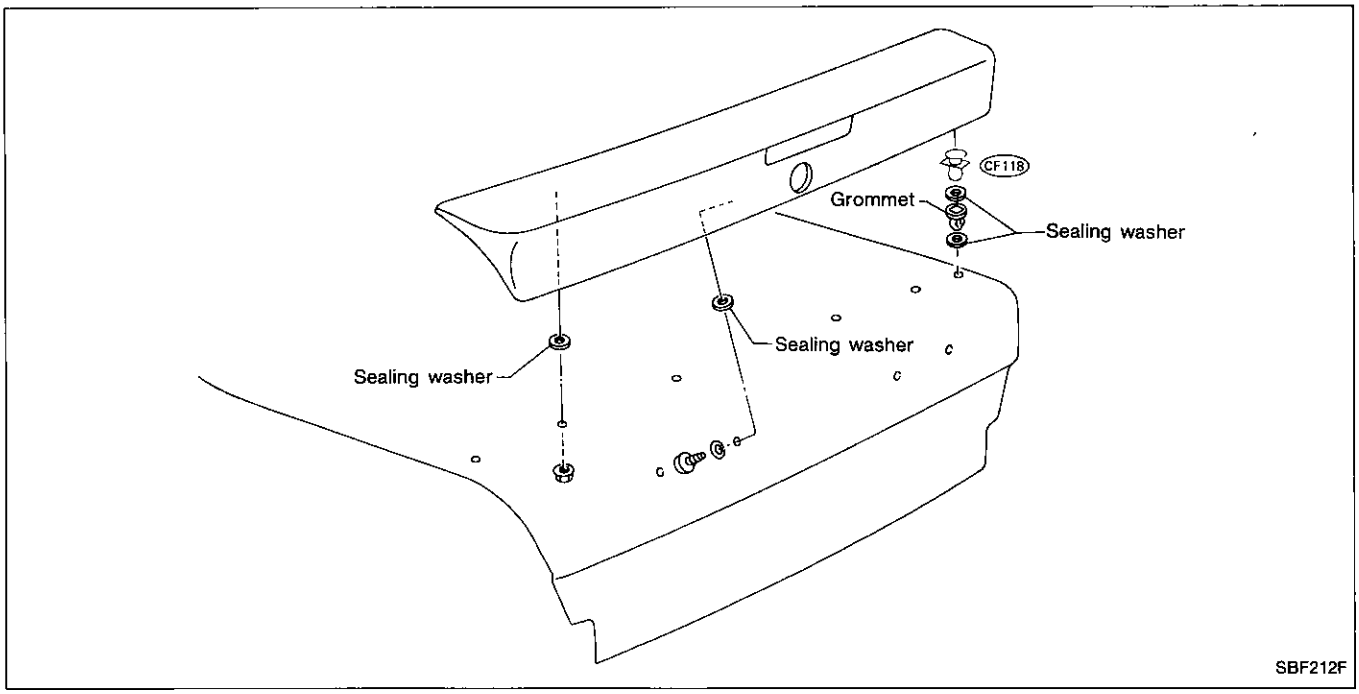
Door Mirror (Cont'd)

WIRING DIAGRAM

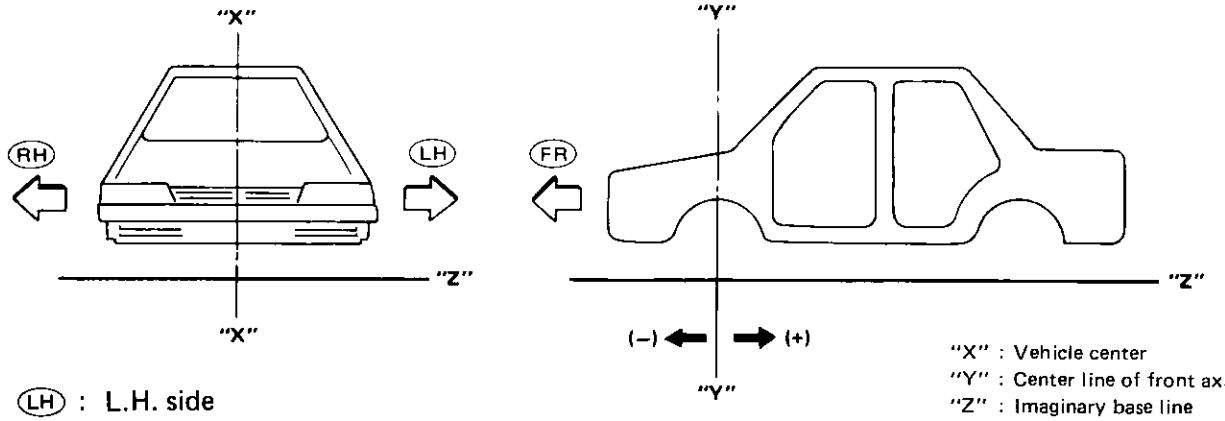


Rear Air Spoiler

- When installing, make sure that there are not gaps or waves at ends of air spoiler.
- Before installing spoiler, clean and remove oil from surface where spoiler will be mounted.



- 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".

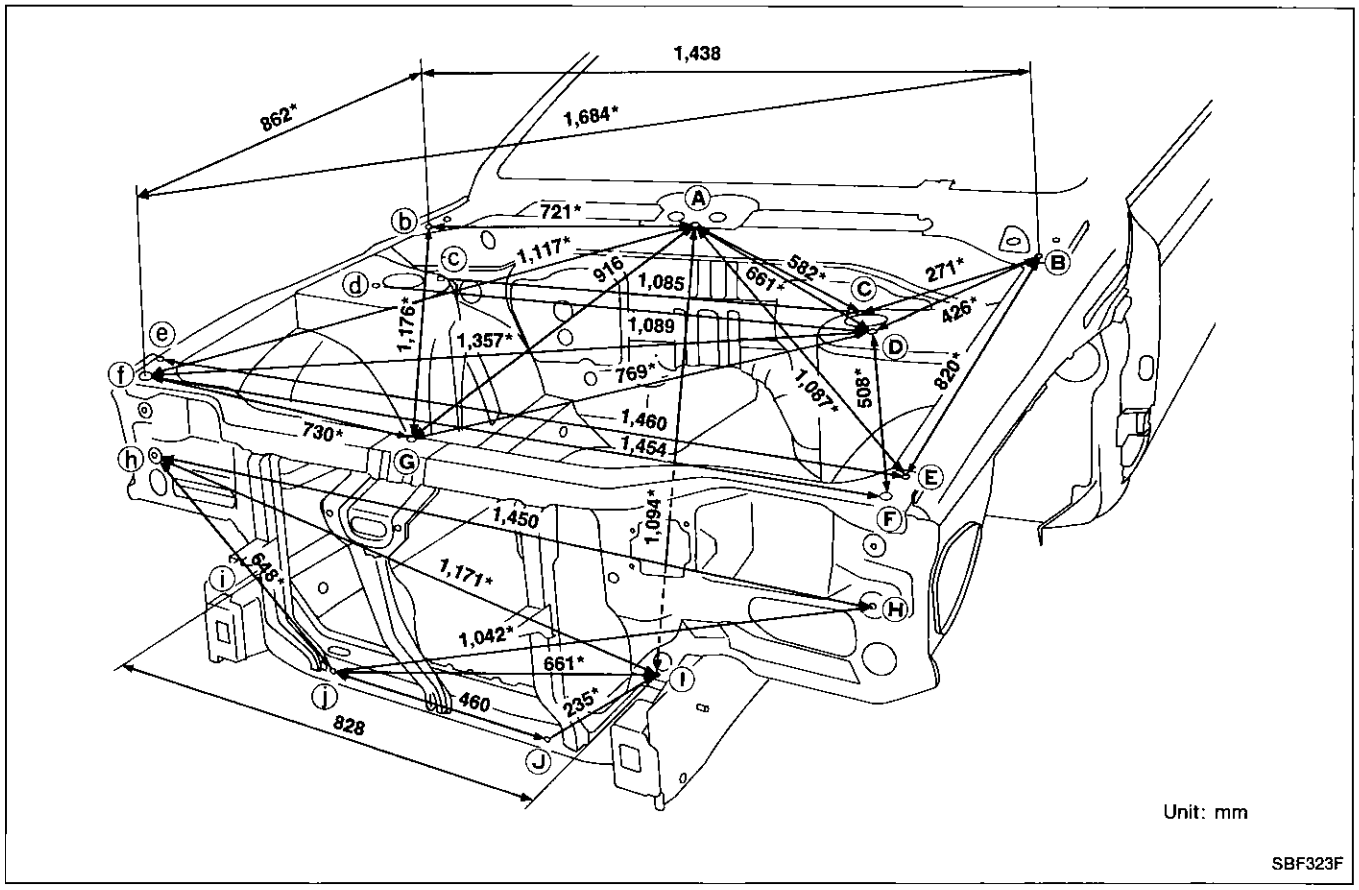


(LH) : L.H. side
(RH) : R.H. side

"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

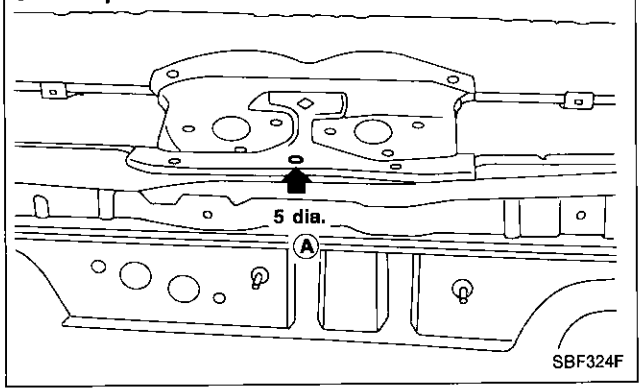


Engine Compartment (Cont'd)

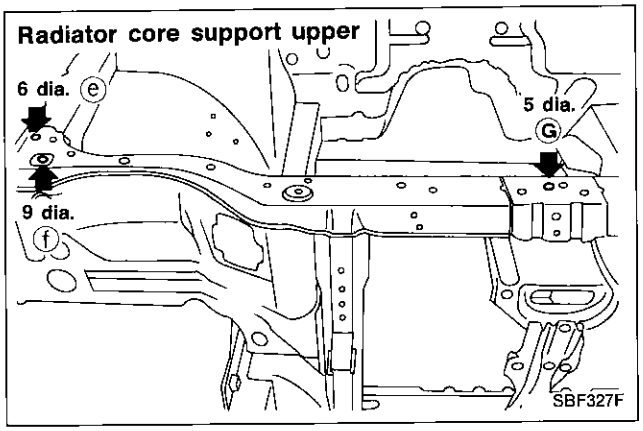
Unit: mm

MEASUREMENT POINTS

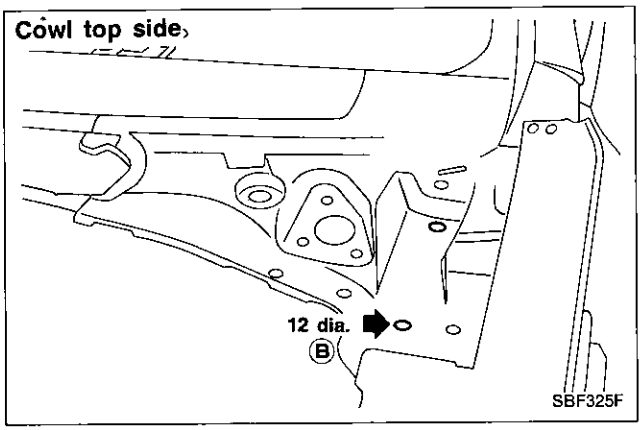
Cowl top center



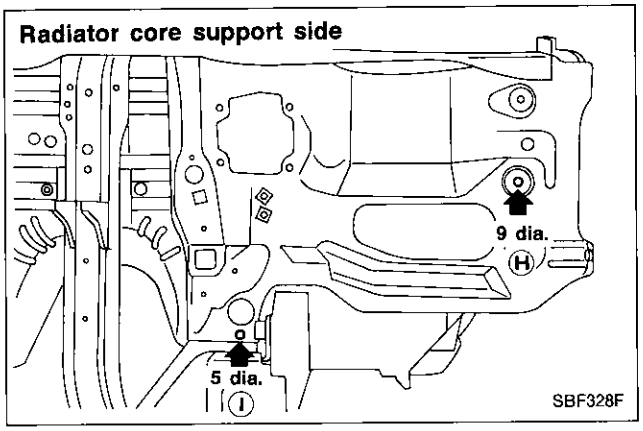
Radiator core support upper



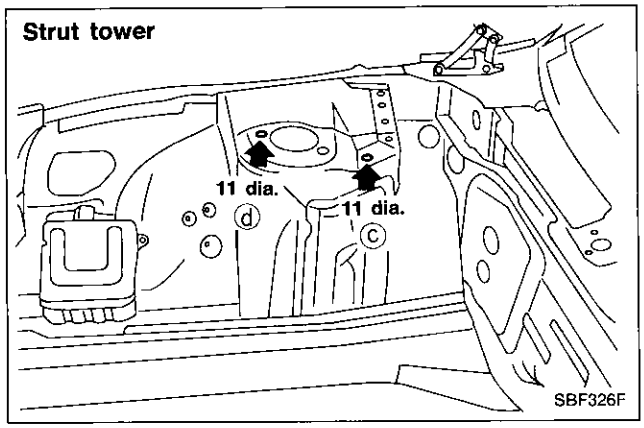
Cowl top side



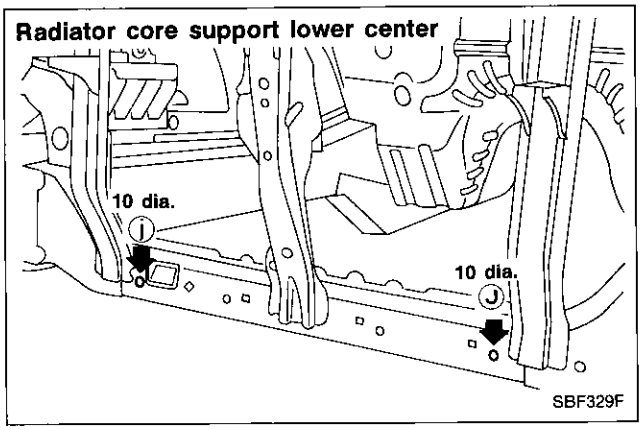
Radiator core support side



Strut tower

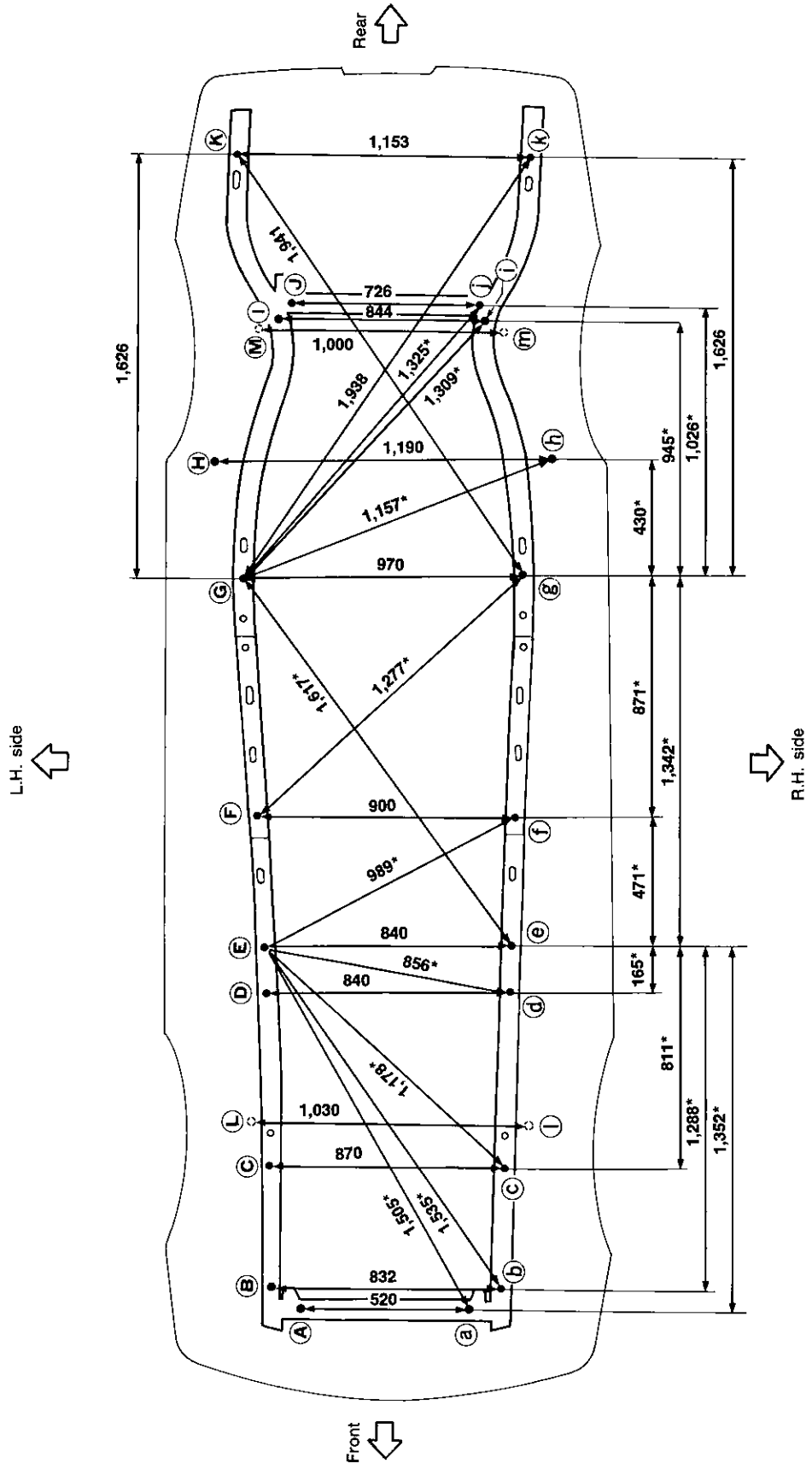


Radiator core support lower center



Underbody

MEASUREMENT

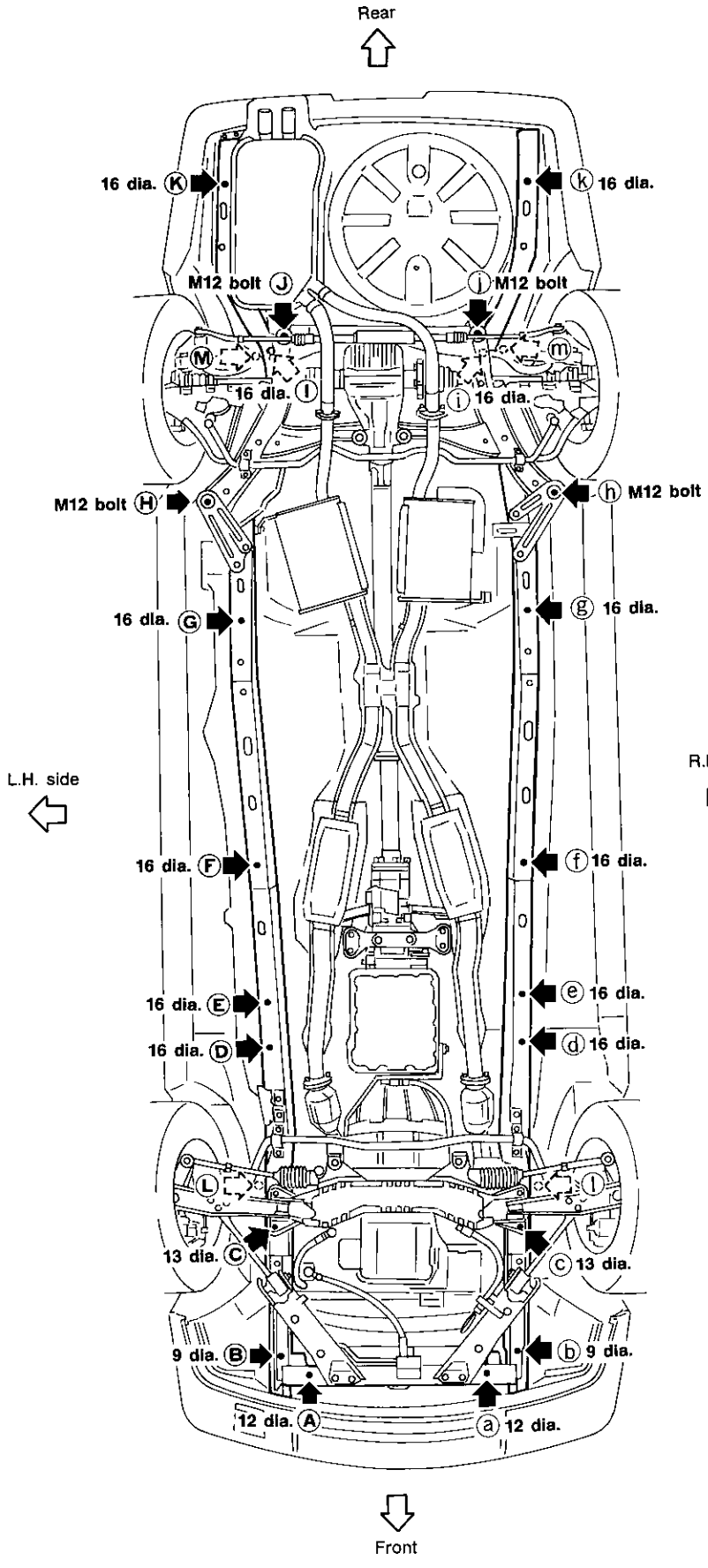


All dimensions indicated in this figure are actual ones.
(There are no projected dimensions.)

Unit: mm

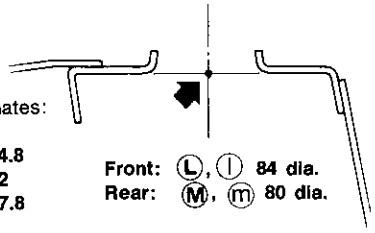
SBF321F

MEASUREMENT POINTS



Front coordinates:	Rear coordinates:
Ⓐ , ⓐ X : 260 Y : –634 Z : 237.5	Ⓖ , ⓖ X : 485 Y : 2,040 Z : 84.6
Ⓑ , ⓑ X : 416 Y : –582 Z : 211.2	Ⓗ , ⓗ X : 595 Y : 2,455 Z : 99.2
Ⓒ , ⓒ X : 435 Y : –100 Z : 220	Ⓘ , ⓘ X : 422 Y : 2,935 Z : 382.6
Ⓓ , ⓓ X : 420 Y : 535 Z : 88.6	Ⓙ , ⓙ X : 363 Y : 3,045 Z : 249.3
Ⓔ , ⓔ X : 420 Y : 700 Z : 90.4	Ⓚ X : 580 Y : 3,650 Z : 291.5
Ⓕ , ⓕ X : 450 Y : 1,170 Z : 92	ⓚ X : 573 Y : 3,650 Z : 291.5

Front and rear strut tower centers



Coordinates:

Ⓛ , Ⓘ
X : 514.8
Y : –42
Z : 747.8

Front: Ⓛ, Ⓘ 84 dia.
Rear: Ⓜ, ⓜ 80 dia.

Ⓜ , ⓜ
X : 500
Y : 2,925
Z : 641.5

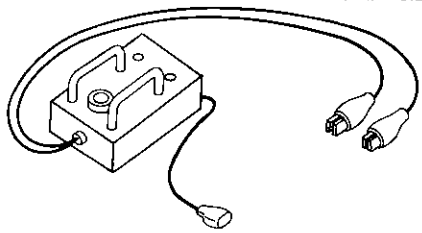
Unit: mm

MBF791A

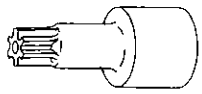
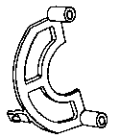
Precautions for SRS "Air Bag" Service

- 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.

Special Service Tool

Tool number Tool name	Description	
KV999R0011 (J38381) Deployment tool		Disposing of air bag module

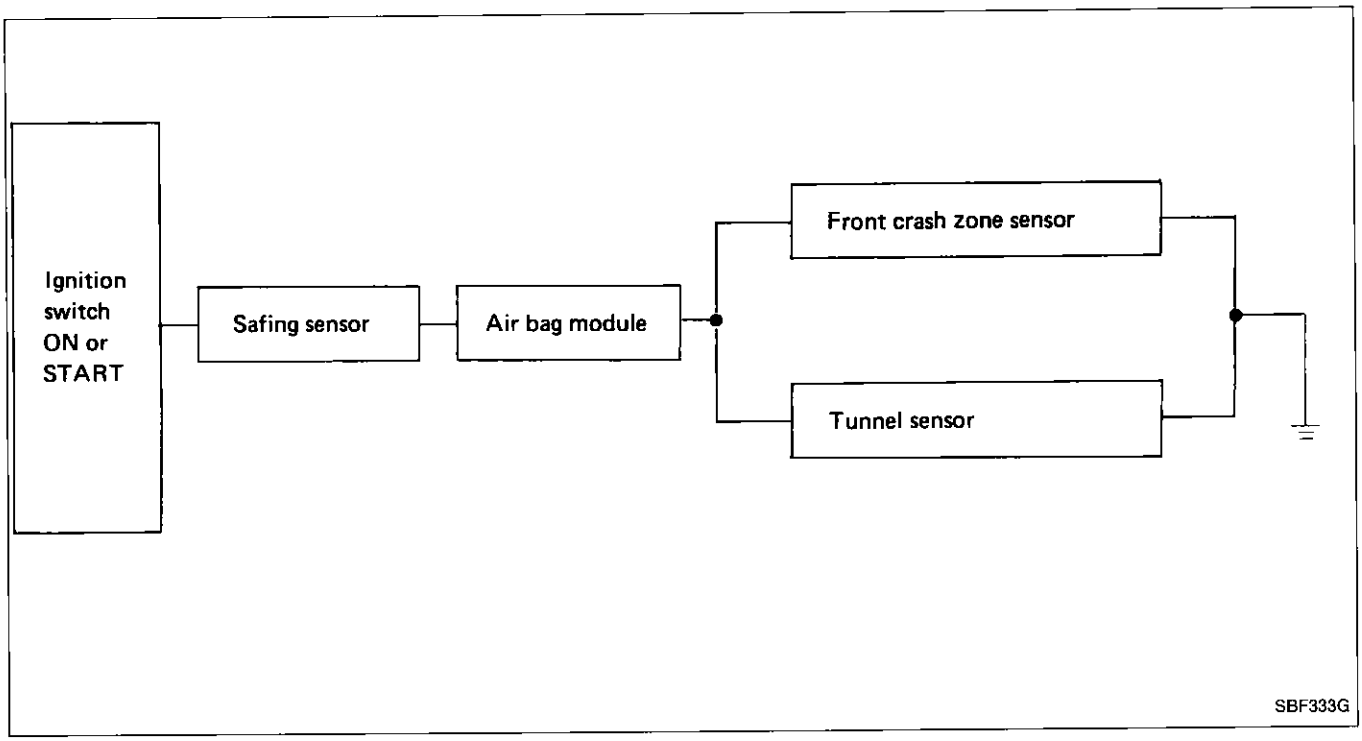
Commercial Service Tools

Tool name	Description	
Special torx bit		Use for special bolts (tamper resistant screw)
Spiral cable stopper		Avoiding unexpected spiral cable rotation

Description

The air bag deploys when any of the two sensors (crash zone sensor or tunnel sensor) and the safing sensor simultaneously activate while the ignition switch is "ON".

Ignition	Crash zone sensor	Tunnel sensor	Safing sensor	Air bag signal
ON	ON		ON	ON
ON		ON	ON	ON

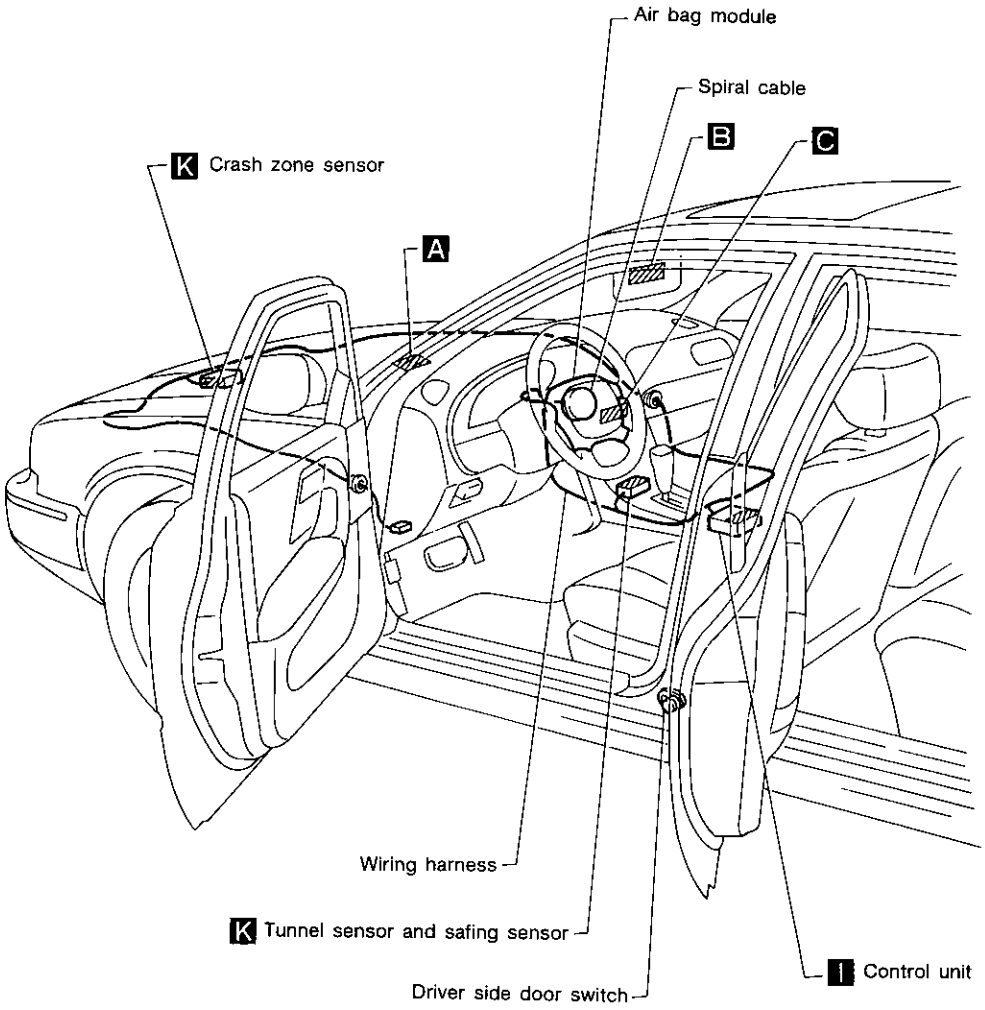


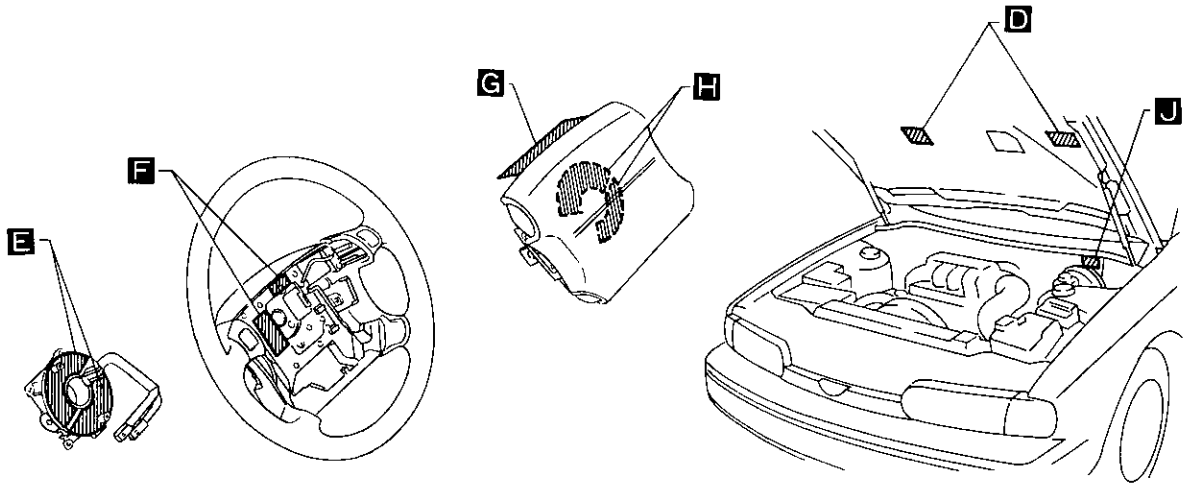
Self-diagnosis

The control unit (diagnostic unit) diagnoses the SRS circuit. 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.

Caution Labels and SRS Component Parts Location

The CAUTION LABELS are important when servicing air bags in the field. If they are dirty or damaged, replace them with new ones.





SBF688G

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 THE DRIVER IN A FRONTAL COLLISION.
- ALWAYS WEAR YOUR SEAT BELT.
- 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 A DRIVER AIR BAG AS A SUPPLEMENT TO THE SEAT BELT.
- ALWAYS WEAR YOUR SEAT BELT.
- READ THE INFORMATION ON THE REVERSE SIDE.

D

WARNING SRS AIRBAG

- THIS CAR IS EQUIPPED WITH A DRIVER AIR BAG 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 BAG 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.

J

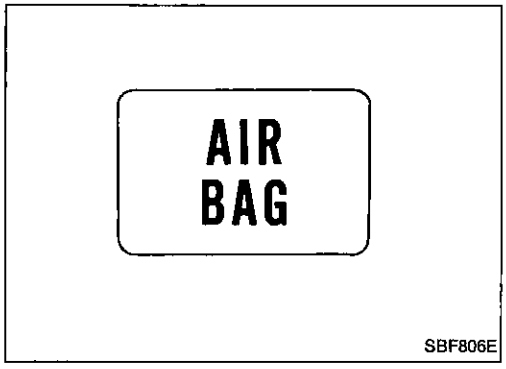
CAUTION SRS AIRBAG

- 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.



SBF806E

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.

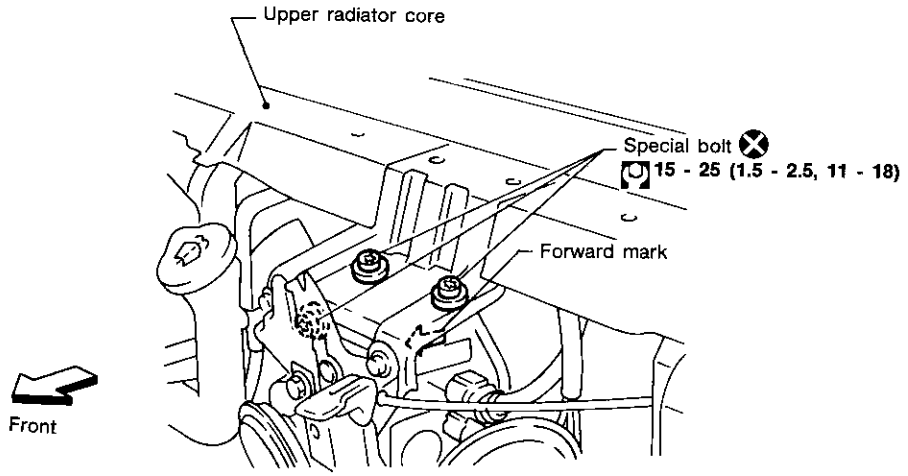
CAUTION:
Replace previously used screws with new ones.

Removal and Installation — Control Unit and Sensors

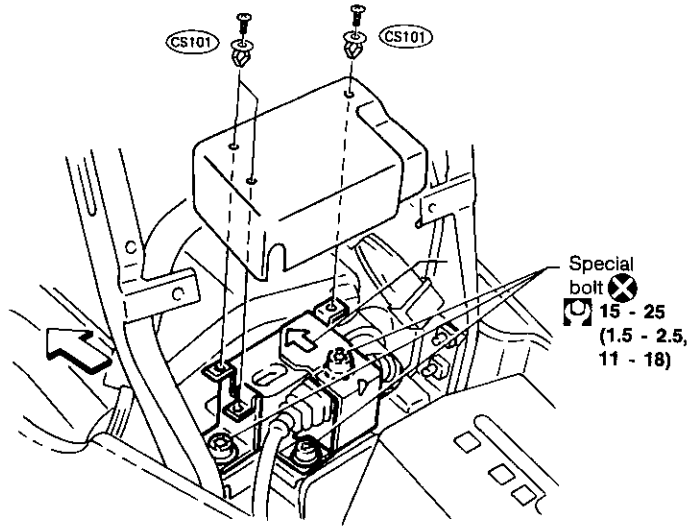
CAUTION:

- **Before servicing SRS, turn the ignition switch off, disconnect battery ground cable and wait for at least 10 minutes.**
- **The special bolts are coated with bonding agent. Discard old ones after removal; replace with new ones.**
- Check 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.

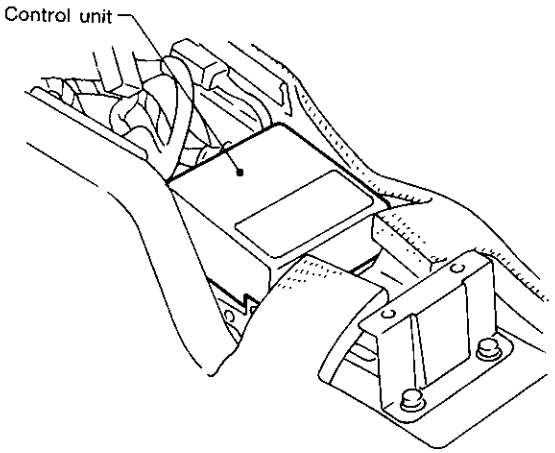
Crash zone sensor



Tunnel and safing sensor



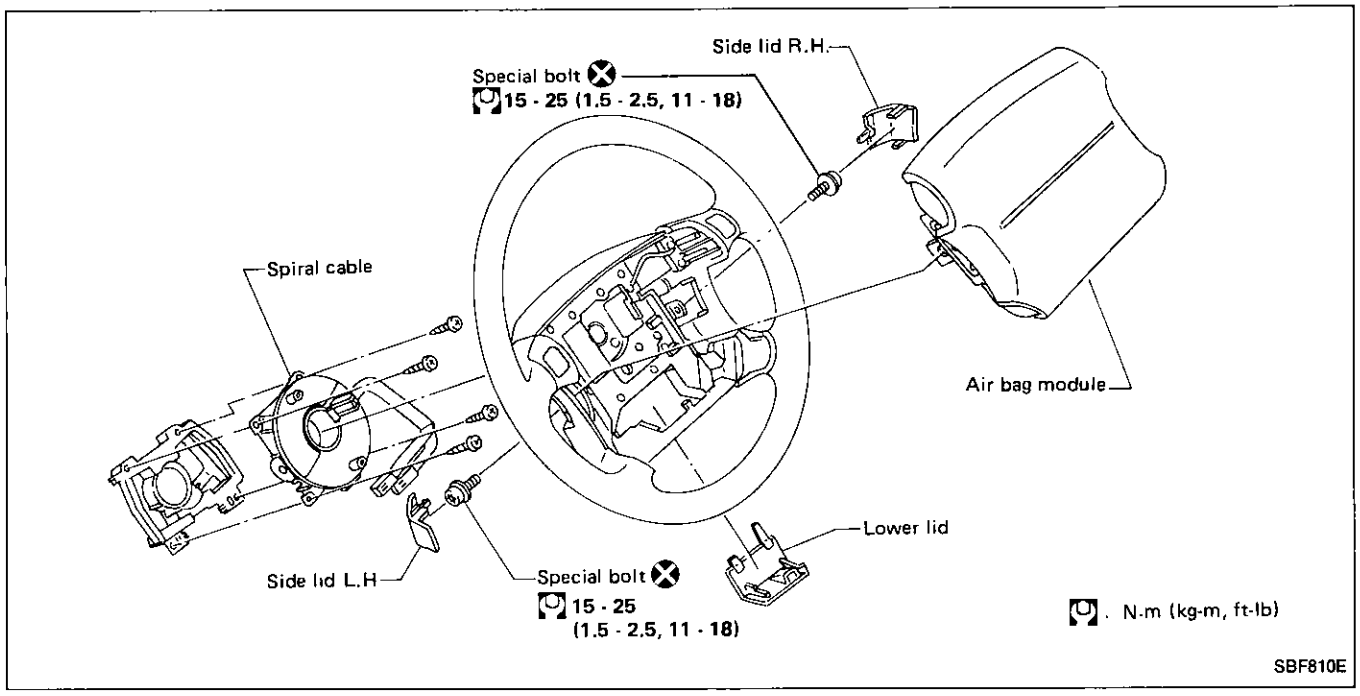
Control unit

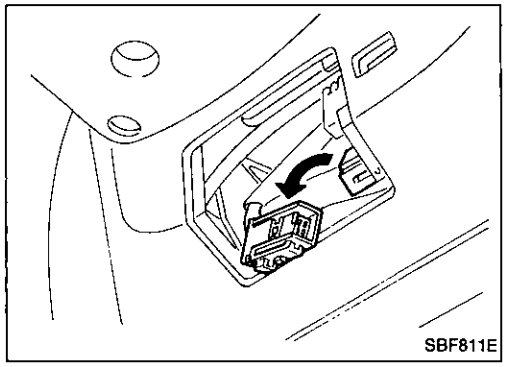


: N•m (kg-m, ft-lb)

SBF690G

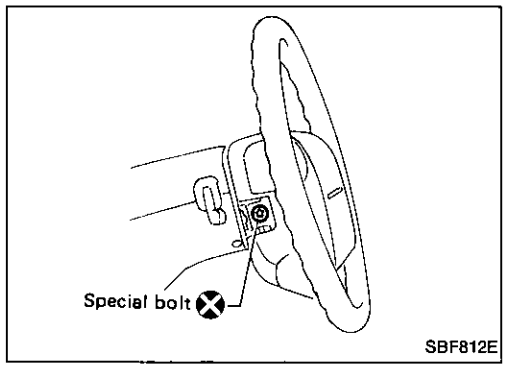
Removal — Air Bag Module and Spiral Cable



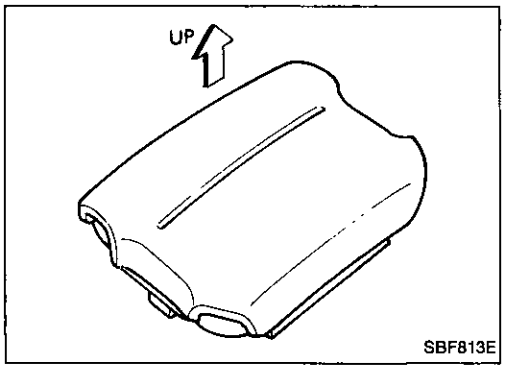


CAUTION:
Before servicing SRS, turn the ignition switch off, disconnect battery ground cable and wait for at least 10 minutes.

1. Remove lower lid from steering wheel, and disconnect air bag module connector.

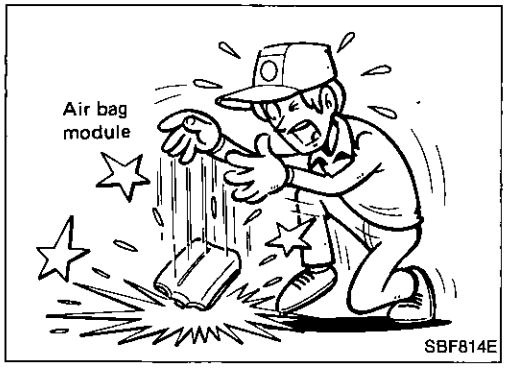


2. Remove side lid. Using the T50H torx bit, remove left and right special bolts. Air bag module can then be removed.



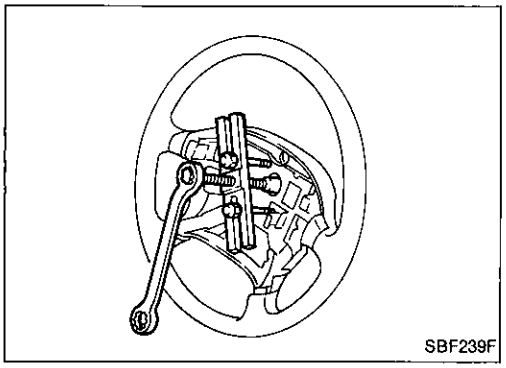
CAUTION:
- **Always place air bag module with pad side facing upward.**
- **Do not attempt to disassemble air bag module.**
- **The special bolts are coated with bonding agent. Discard old ones after removal; replace with new ones.**

Removal — Air Bag Module and Spiral Cable (Cont'd)

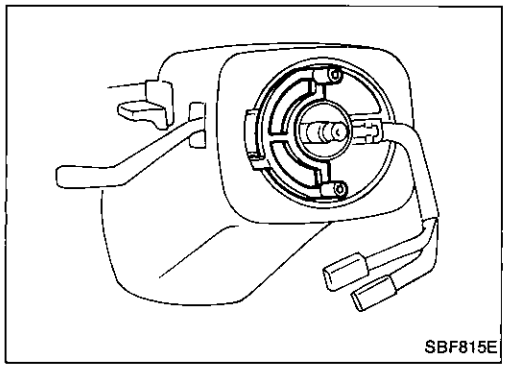


SBF814E

- **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

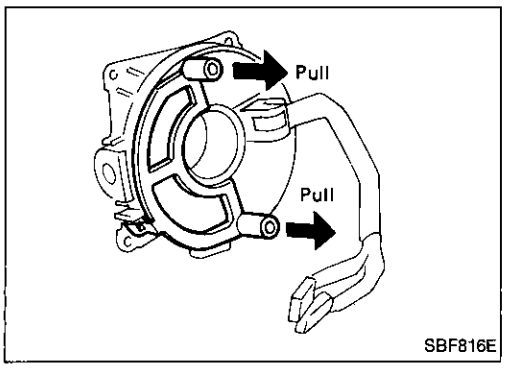
3. Set steering wheel in the neutral position.
4. Disconnect horn connector and remove nuts.
5. Using steering wheel puller, remove steering wheel. Be careful not to over-tighten puller bolt on steering wheel.


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

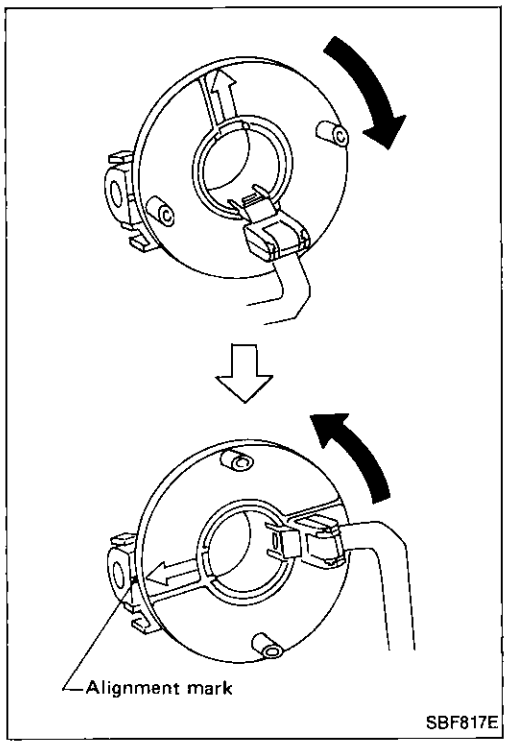
1. Connect spiral cable connector and tighten with screws. Install steering column cover.



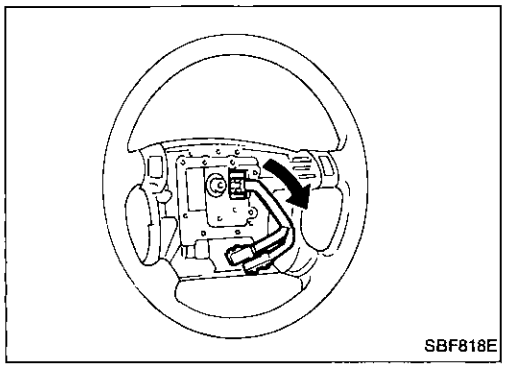
SBF816E

2. Remove stopper by pulling two pin guides.

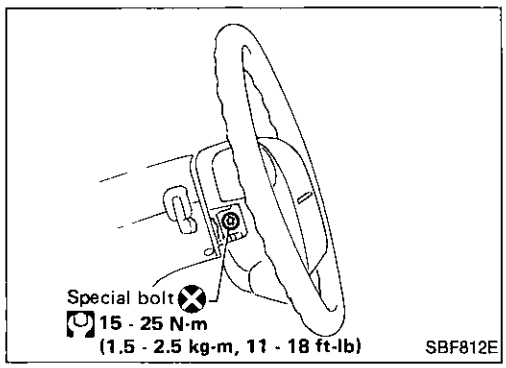
Installation — Air Bag Module and Spiral Cable (Cont'd)



- 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.

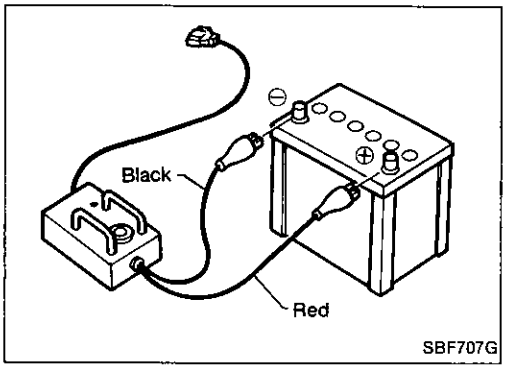


3. Install steering wheel setting spiral cable pin guides, and pull spiral cable through.
4. Connect horn connector and engage spiral cable with pawls in steering wheel.
5. Tighten nuts.



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.)



Scrapping the Air Bag

Before scrapping an air bag module or a vehicle equipped with an SRS air bag, be sure to deploy air bag.

CONNECTING TO BATTERY

- Place the vehicle outdoors in such a way that it is surrounded on all sides by at least 6 m (20 ft) of open space.
- Use a voltmeter to make sure the vehicle battery is fully charged.

CAUTION:

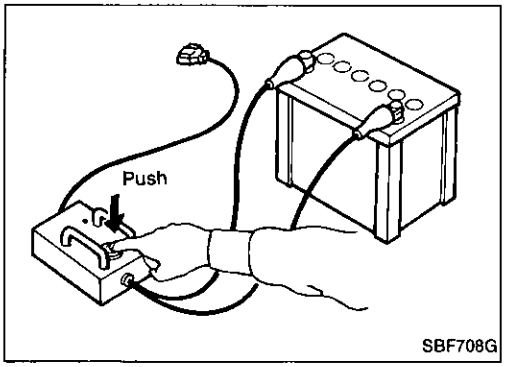
The battery must show voltage of 9.6V or more.

Remove the battery from the vehicle and place it on dry wood blocks approximately 5 m (16 ft) away from the vehicle.

- Wait 10 to 12 minutes after the vehicle battery is disconnected before proceeding.
- Connect deployment tool to the battery.

CAUTION:

Make sure the polarity is correct. The right side lamp in the tool, marked "deployment tool power", should glow with a green light. If the right side lamp glows red, reverse the connections to the battery.



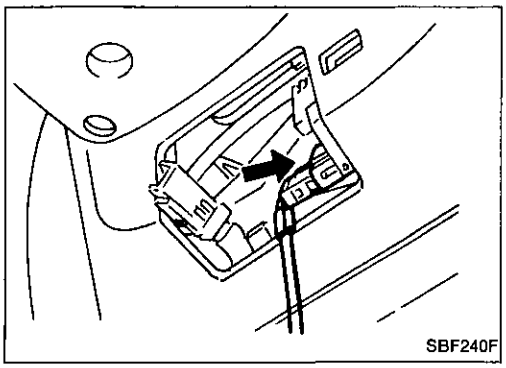
DEPLOYMENT TOOL CHECK

Press the deployment tool switch to the "ON" position. The left side lamp in the tool, marked "air bag connector voltage" should illuminate. If it does not illuminate, replace the tool.

AIR BAG DEPLOYMENT TOOL LAMP ILLUMINATION CHART (Battery connected)

Switch operation	Left side lamp,green* "AIR BAG CONNECTOR VOLTAGE"	Right side lamp, green* "DEPLOYMENT TOOL POWER"
OFF	OFF	ON
ON	ON	ON

*: If this lamp glows red, the tool is connected to the battery incorrectly. Reverse the connections and make sure the lamp glows green.



CONNECTING TO AIR BAG

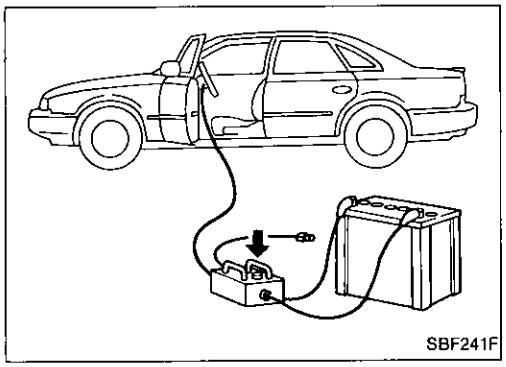
- Remove lower lid from steering wheel and disconnect air bag module connector.
- Connect deployment tool connector.

CAUTION:

Make sure the deployment tool is disconnected from the battery before you make this connection.

- Reconnect the battery cable to the prepared battery.
- The lamp on the right side of the tool, marked "deployment tool power", should glow green, not red.

Scrapping the Air Bag (Cont'd)


SBF241F

DEPLOYMENT

Press the button on the deployment tool. The left side lamp on the tool, marked "air bag connector voltage", will illuminate and the air bag will deploy.

DISPOSAL

- Remove steering wheel side lids. Use the special "torx"bit to remove the air bag module from the steering wheel. Place it into a sealed vinyl bag for disposal.

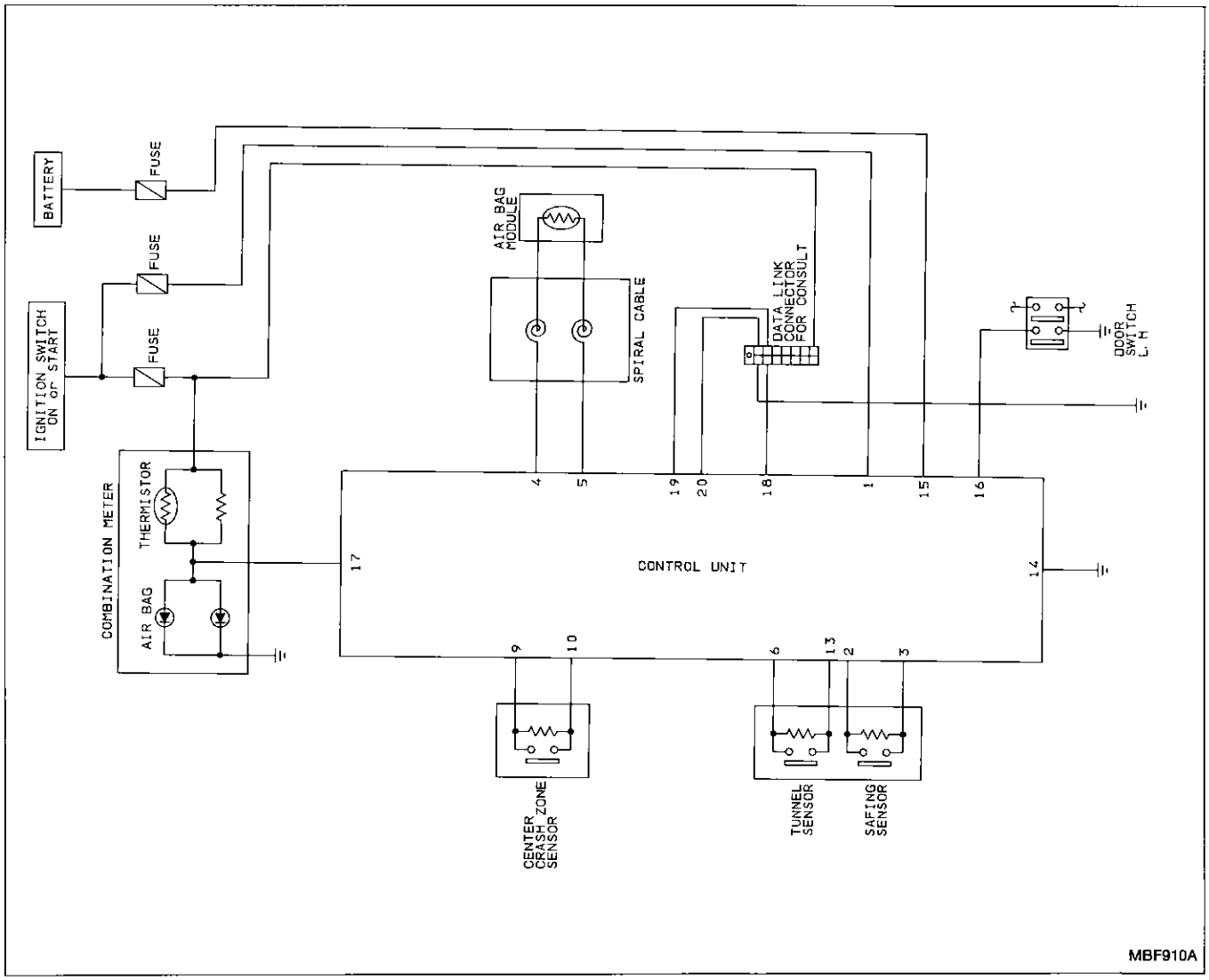
CAUTION:

- **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 after air bag deployment.**
- **Do not attempt to disassemble air bag module.**
- **Air bag module can not be re-used.**
- **Never apply water to a deployed air bag module.**
- **Be sure to wear gloves when handling a deployed air bag module.**

Contents

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Diagnostic Procedure 2 ..... BF-167
SYMPTOM: Warning lamp does not come on.
Diagnostic Procedure 3 ..... BF-168
SYMPTOM: Warning lamp does not go off.
Collision Diagnosis BF-169

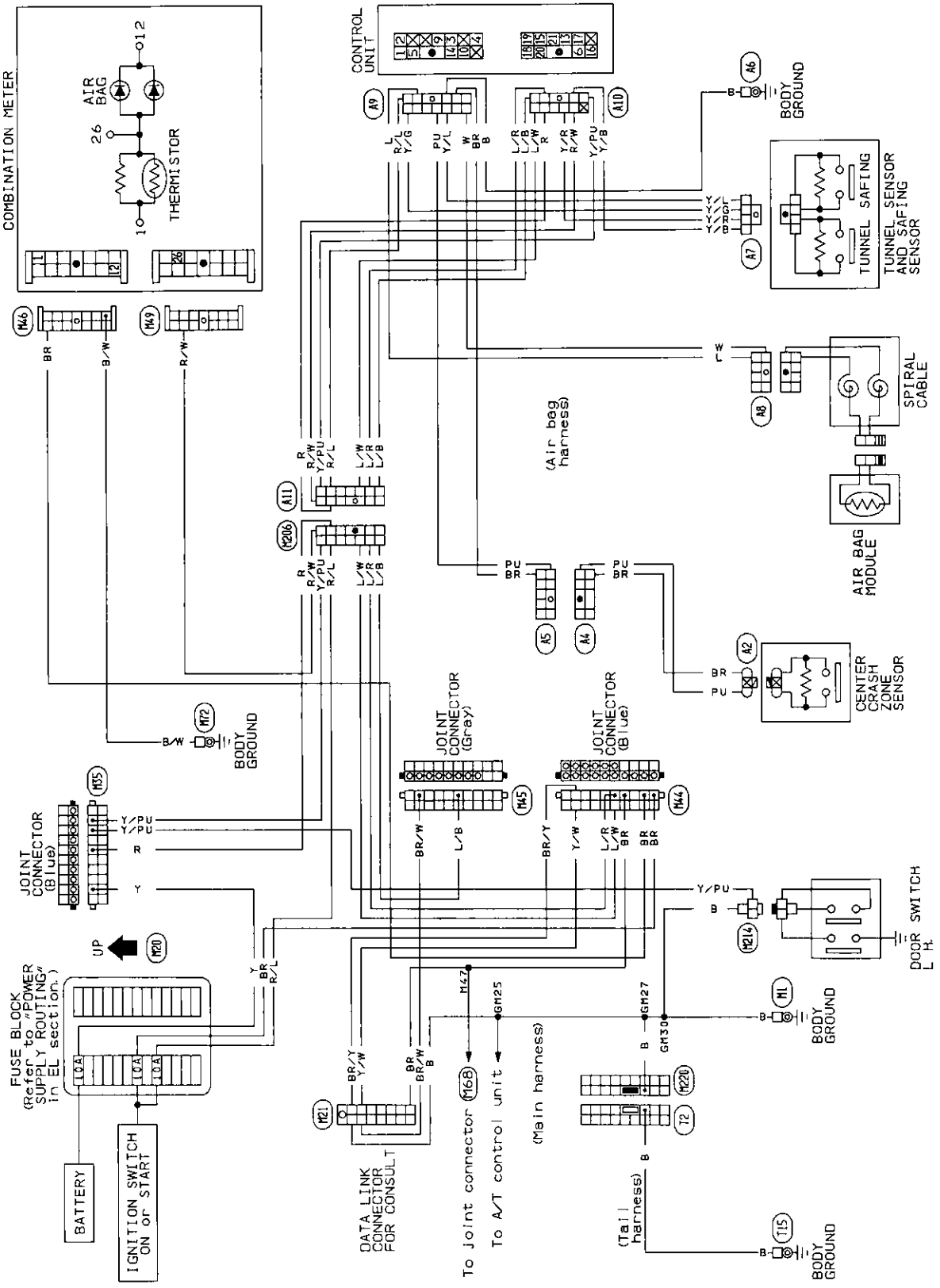
Schematic

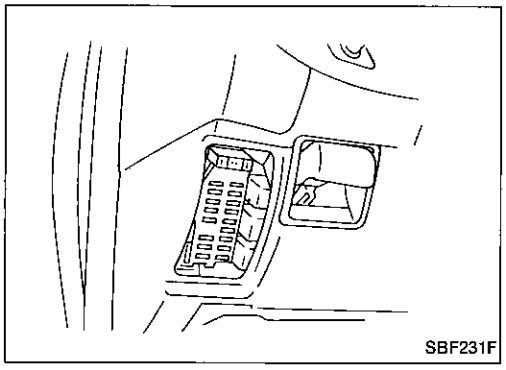


Wiring Diagram

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.**




SBF231F

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.

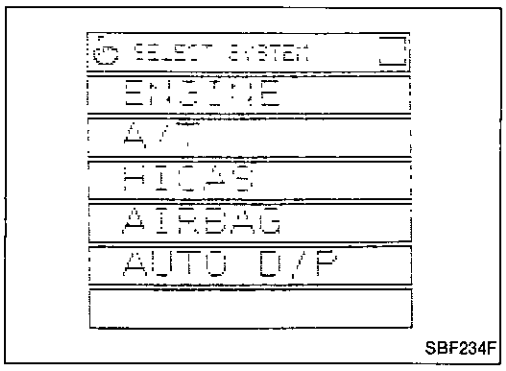
5. Touch "SELF DIAG RESULTS" to read self-diagnosis results.

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.**



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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

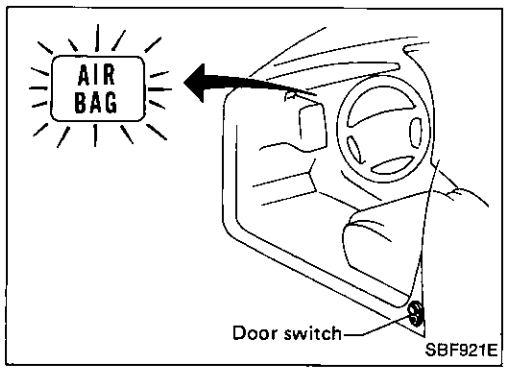
Self-diagnosis results

Failure parts group [Present] and [Initial]	Explanation	Repair order * Recheck SRS at each replacement.
**** NO SELF DIAGNOSTIC FAILURE ****	Normal. The SRS "Air Bag" is in good order.	—
SAFING SENSOR [OPEN/LWR-GND-SHORT]	The circuit for the safing sensor is open or the wire from the safing sensor to the control unit (terminal No. 3) is shorted.	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/LWR-VB-SHORT]	Both the wires for the safing sensor are shorted or the wire from the safing sensor to the control unit (terminal No. 3) is shorted to some power supply circuit.	
AIRBAG MODULE [OPEN]	The circuit for the air bag module is open. (including the spiral cable)	1. Visually check the wiring harness connections. 2. Replace the spiral cable. 3. Replace the 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 the air bag module is shorted to some power supply circuit. (including the spiral cable)	
AIRBAG MODULE [GND-SHORT]	The circuit for the air bag module is shorted. (including the spiral cable)	
TUNNEL SENSOR [OPEN/UPR-VB-SHORT]	The circuit for the tunnel sensor is open or the wire from the control unit (terminal No. 6) 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]	The circuits for the tunnel sensor are shorted to each other.	
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 for the crash zone sensor: No. 9) 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]	The circuits for the crash zone sensor are shorted to each other.	
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	A problem which cannot be spedified occurs because more than two parts 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 module. 5. Replace the main harness.

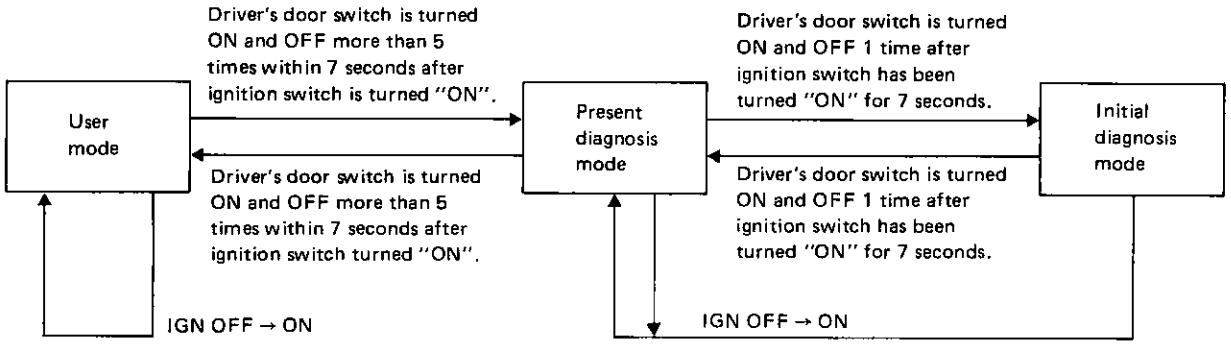
Self-diagnosis (Cont'd)

USING THE WARNING LAMP

Self-diagnosis results can be also read by using the "AIR BAG" warning lamp.
The "Air bag" warning lamp operates as shown below:



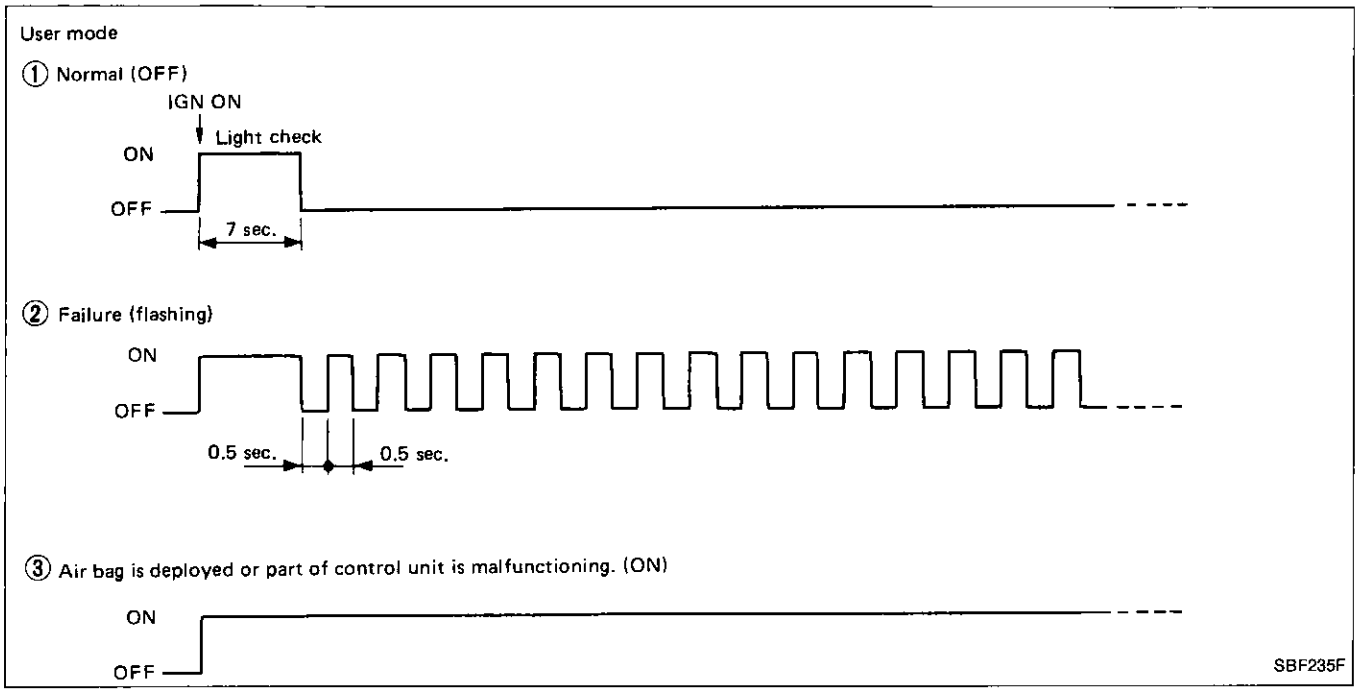
How to alternate self-diagnosis



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.

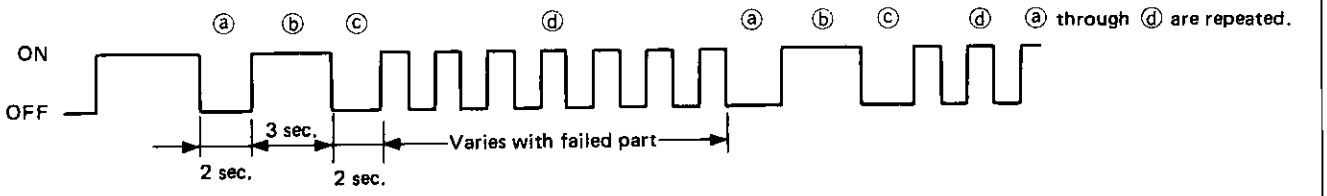
- **After repairing malfunctioning part, attempt to clear self-diagnosis results from memory.**
- **If a malfunctioning part is not completely repaired, information stored in memory will not be cleared.**



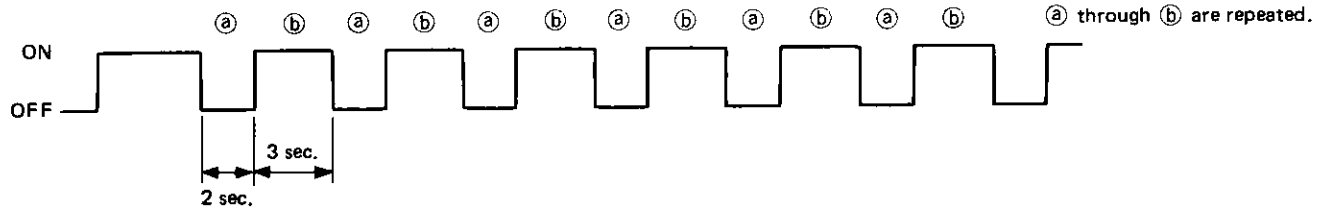
Self-diagnosis (Cont'd)

Present diagnosis mode (self-diagnosis result 1)

ⓑ Start signal; Start signal identifies display modes.



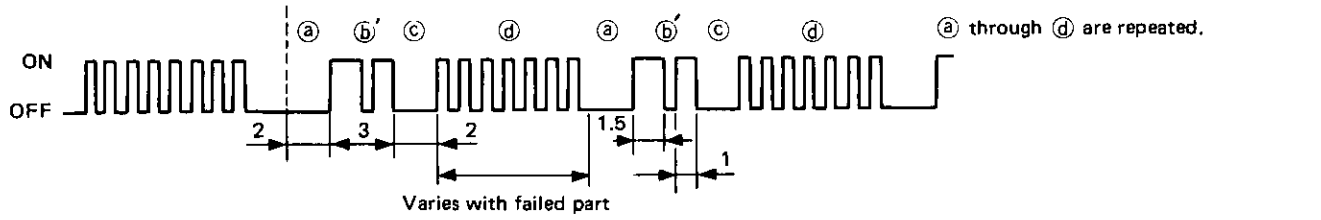
- No failure (or intermittent failure/repair completion)



SBF236F

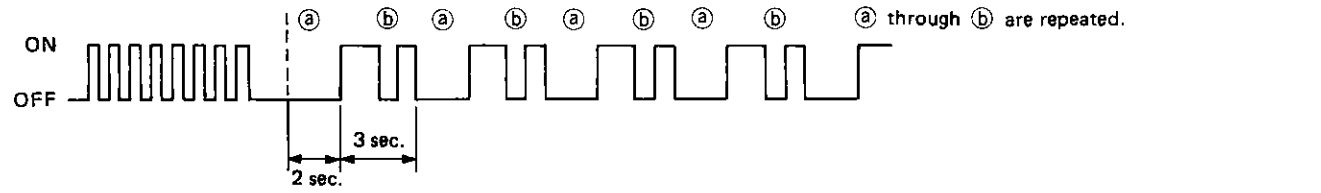
Initial diagnosis mode (self-diagnosis result 2)

ⓑ Start signal; Start signal identifies display modes.



Unit: sec.

- No failure



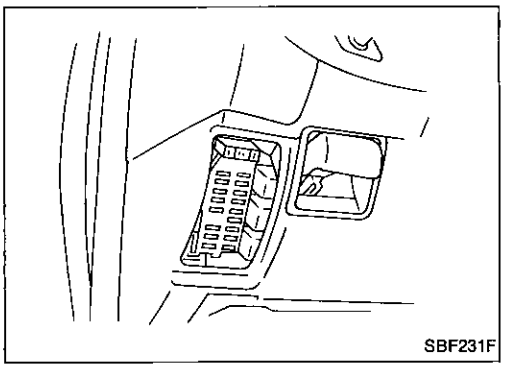
SBF237F

Self-diagnosis results in present- and initial-diagnosis modes can be identified by number of flashes ⓓ. Refer to Table on next page for failed parts.

Self-diagnosis (Cont'd)

Warning lamp flashing times and repair

Flash code ⓓ (# of flashes)	Explanation	Repair order * Recheck SRS at each replacement.
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 air bag module is out of order.	1. Visually check the wiring harness connections. 2. Replace the spiral cable. 3. Replace the 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 crash zone sensor is out of order.	1. Visually check the wiring harness connections. 2. Replace the 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	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.


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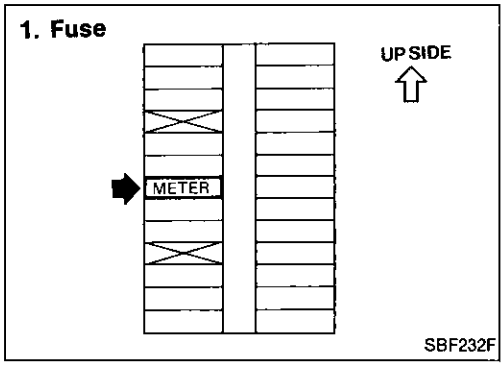
Diagnostic Procedure 1

SYMPTOM: Warning lamp flashes.

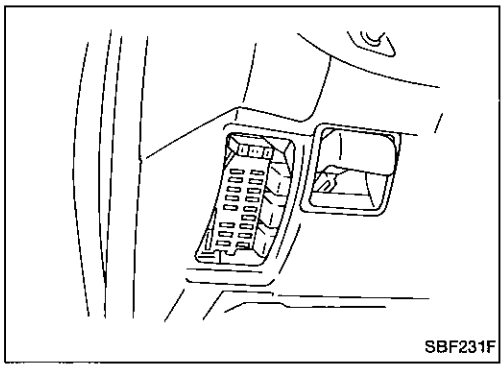
Connect the CONSULT and operate it. Read the SELF-DIAGNOSIS RESULTS 1 and 2.
→ Refer to SELF-DIAGNOSIS RESULTS and repair.

OR

Refer to warning lamp self-diagnosis.
→ Refer to the number of warning lamp flashes. Repair as necessary.



SBF232F


SBF231F

Diagnostic Procedure 2

SYMPTOM: Warning lamp does not come on.

1. Check the warning lamp fuse.
N.G. → Replace the fuse.
O.K. ↓

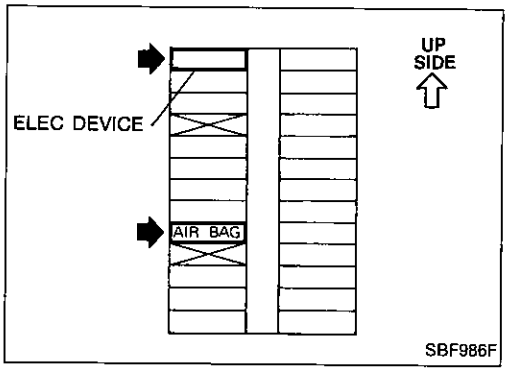
2. Connect the CONSULT unit and begin diagnosis.
● Is "AIR BAG" displayed on the CONSULT screen?
N.G. → Replace the control unit.
O.K. ↓

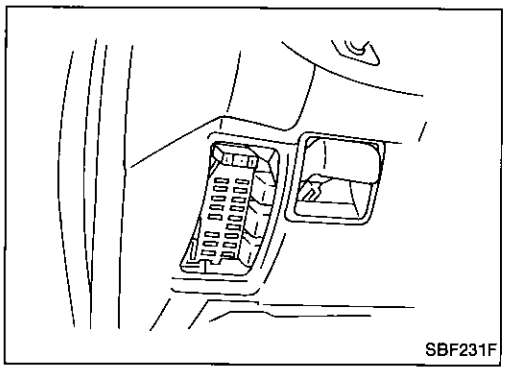
3. Read the SELF- DIAGNOSIS RESULTS 1 and 2.
N.G. → Refer to SELF-DIAGNOSIS RESULTS and repair.
O.K. ↓

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. Is the air bag module deployed?
   - Yes → Replace the air bag module.
   - 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 "AIR BAG", 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 module.

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 "AIR BAG" warning lamp to ensure entire SRS operates properly except open circuit of air bag module.

⑤ Install new air bag module.

	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 module	Replace air bag module.	(1) Remove air bag module from steering wheel. Check harness cover and connectors for damage, terminals for deformities, and harness for binds. (2) Install air bag module to steering wheel to check fit or alignment with the wheel. (3) Replace 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

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When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".

Supplemental Restraint System "AIR BAG"

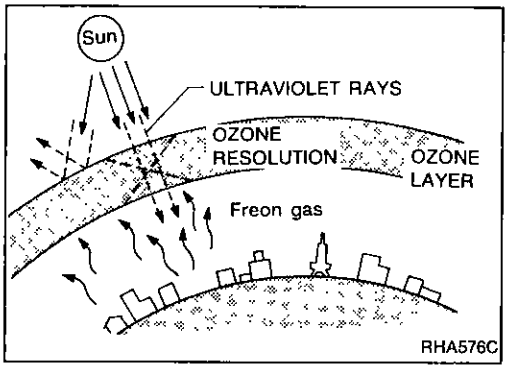
The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity injury to the driver in a frontal collision. The Supplemental Restraint System consists of an air bag (located in the center of the steering wheel), sensors, a diagnosis unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **BF section** of this Service Manual.

WARNING:

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.**

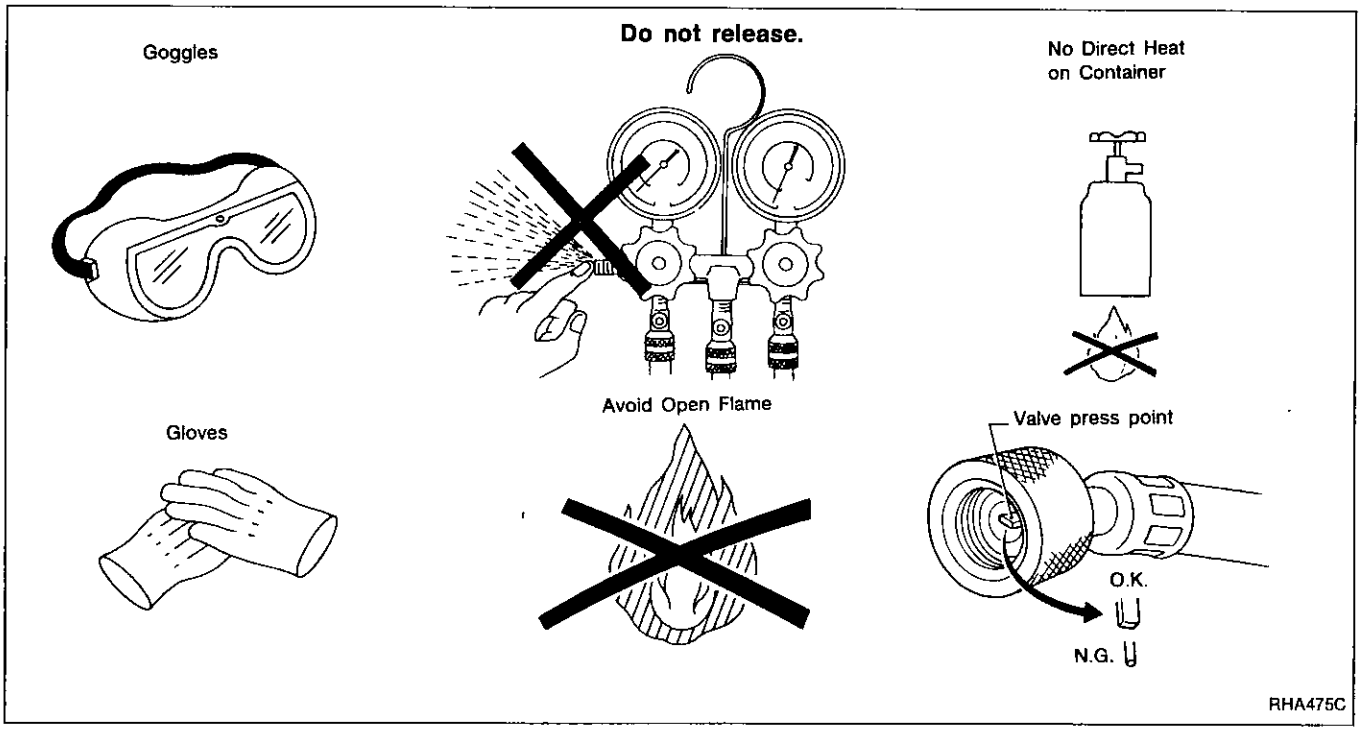
c. **All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS "Air Bag".**



Precautions for the Handling of Refrigerant

WARNING:

- **Do not release refrigerant into the air. Use your refrigerant recycling equipment to capture the refrigerant every time you need to discharge an air conditioning system.**
- **The release of refrigerant into the air can cause damage to the Earth's ozone layer.**



- **Always wear eye protection when working around the system.**
- **Always be careful that refrigerant does not come in contact with your skin.**
- **Keep refrigerant containers stored below 40°C (104°F) and never drop from high places.**
- **Work in well-ventilated area because refrigerant gas evaporates quickly and breathing may become difficult due to the lack of oxygen.**
- **Keep refrigerant away from open flames because poisonous gas will be produced if it burns.**
- **Do not increase can temperature beyond 40°C (104°F) in charging.**
- **Do not heat refrigerant container with an open flame. There is a danger that container will explode.**

Precautions for the Handling of Refrigerant (Cont'd)

CAUTION:

- **Do not use steam to clean surface of condenser or evaporator. Be sure to use cold water or compressed air.**
- **Do not use compressed air to clean out a contaminated A/C tube or hose. Shake the line over a clean, white paper towel. If it contains obvious moisture or contaminants, replace it. Do not blow out the line with refrigerant.**
- **Do not use manifold gauge set whose press point shape is different from that shown. Otherwise, insufficient evacuating may occur.**
- **Do not over-tighten service valve cap.**
- **Follow the manufacturer's instructions for discharging into your refrigerant recycling equipment.**

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 lubrication 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.**

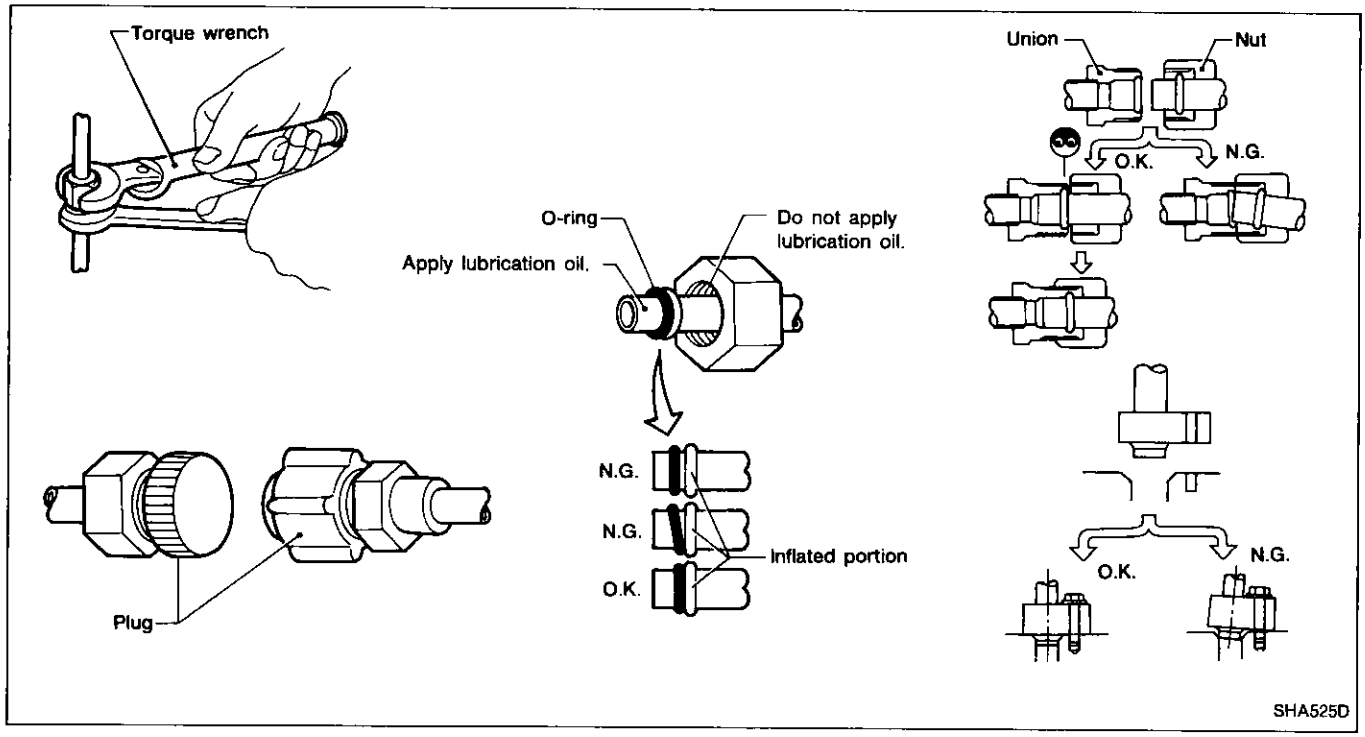
CAUTION:

- **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.**
- **Before installing any air conditioner component that has been stored in a cool location to a vehicle that has been exposed to the hot sun, leave the component as it is for some time in a hot location with its seal cap unremoved.**

This step is necessary to prevent condensation of moisture inside the cold component.

- **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.
- 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 Refrigerant Connection (Cont'd)



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 or repairing 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.**
- **When the compressor magnet clutch has been replaced, be sure to check the magnet clutch for normal operation by applying voltage to the clutch.**

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 to prevent compressor damage in very cold ambient temperatures.

Recirculation switch

When RECIRC switch is pressed, intake door is fixed at RECIRC position.

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: Set temperature trimmer.

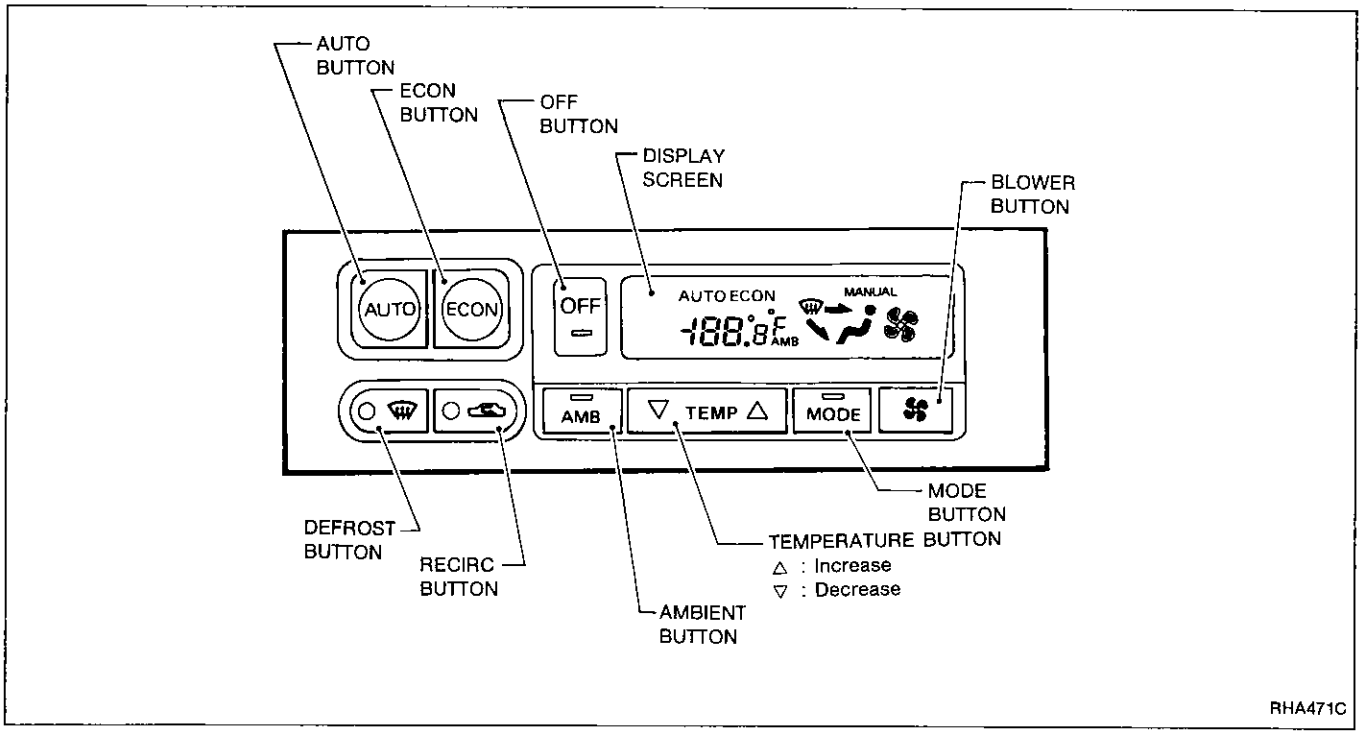
Memory function

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-11 for the description of the refrigeration cycle.

Control Operation



DISPLAY SCREEN
Displays the operational status of the system.

AUTO BUTTON
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 BUTTON
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 BUTTON
Increases or decreases the set temperature.

OFF BUTTON
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 (70% foot and 30% 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 BUTTON
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 BUTTON
Manual control of the air discharge outlets. There selections are available (as shown on the display screen):
face , bi-level , foot , foot/defroster

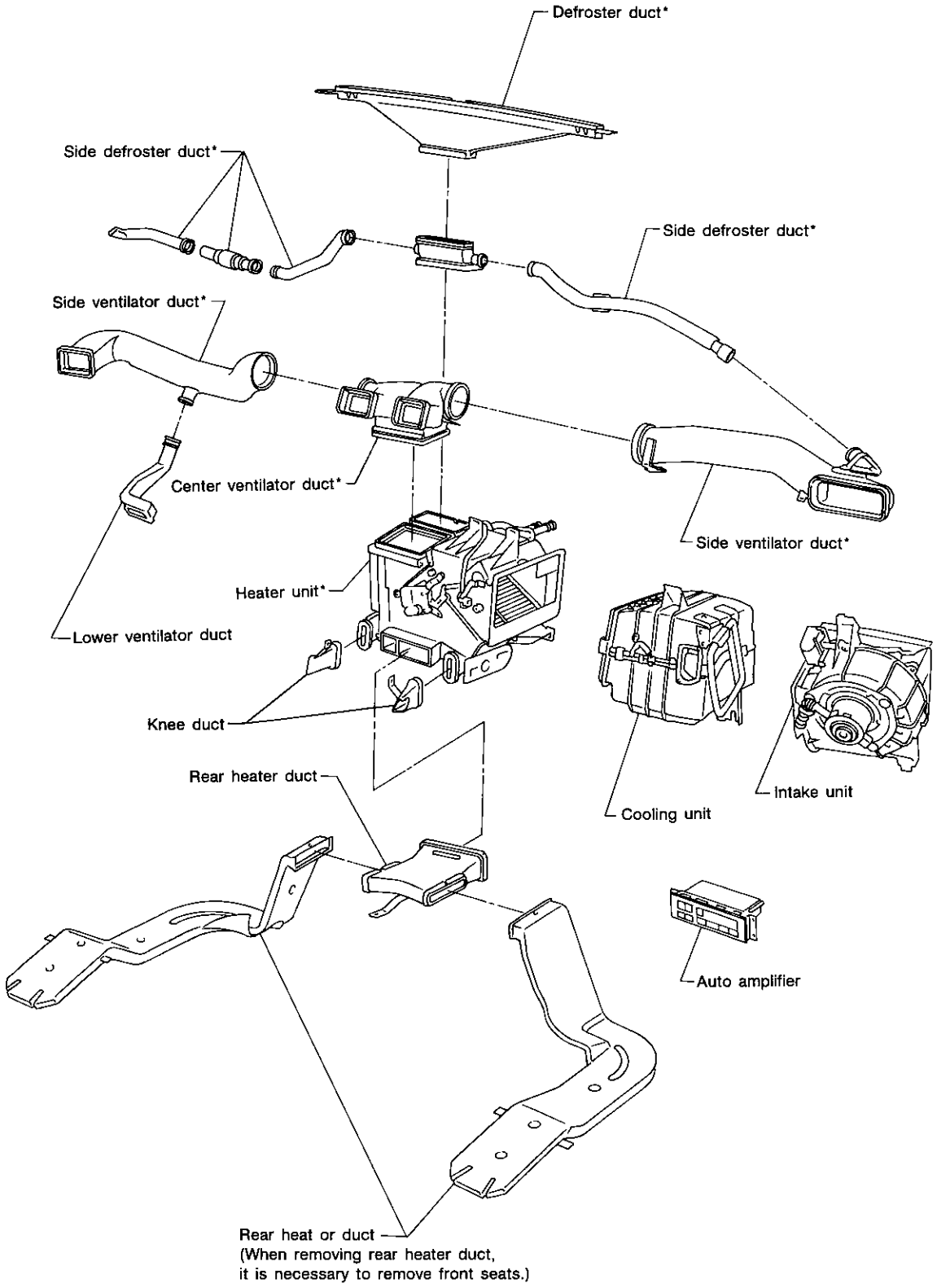
Control Operation (Cont'd)

AMBIENT BUTTON 
Shows the ambient (outside) air temperature on the display screen for 5 seconds.

RECIRC BUTTON 
Positions the air inlet door to the recirculation position.

DEFROST BUTTON 
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. 6°C (43°F) or above.

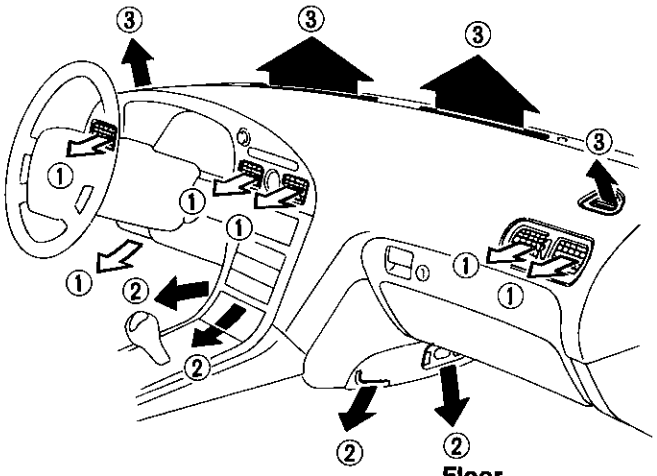
Component Layout



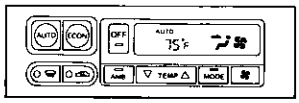
*: For removal, it is necessary to remove instrument assembly.

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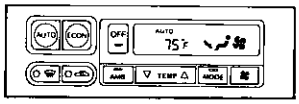
Air Flow

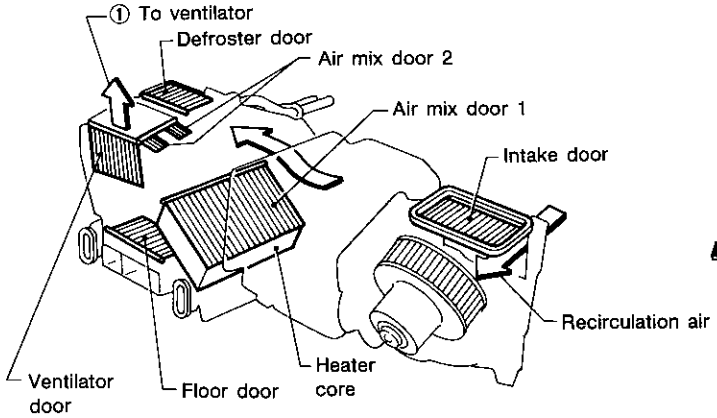


Ventilation

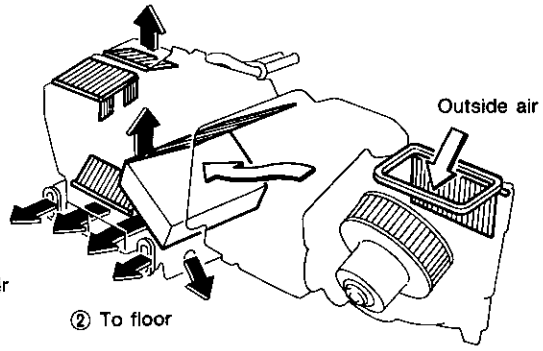


Floor



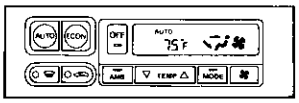


③ To defroster

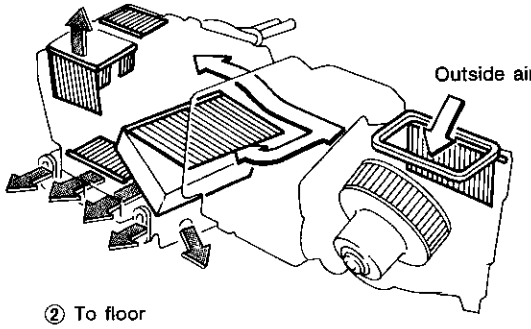


② To floor

Bi-level

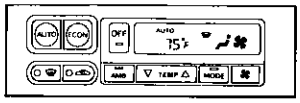


① To ventilator

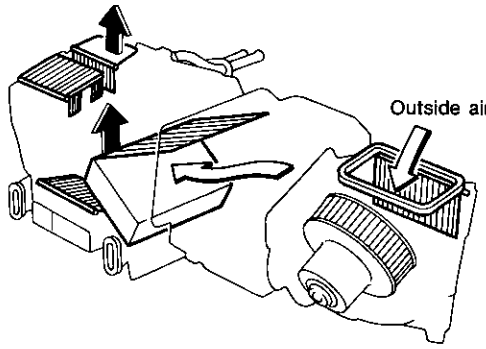


② To floor

Defroster



③ To defroster



: Air passed through heater core

: Mixed air (+)

: Air not passed through heater core

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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-5 variable displacement compressor to prevent freeze up.

REFRIGERANT SYSTEM PROTECTION

Dual-pressure switch

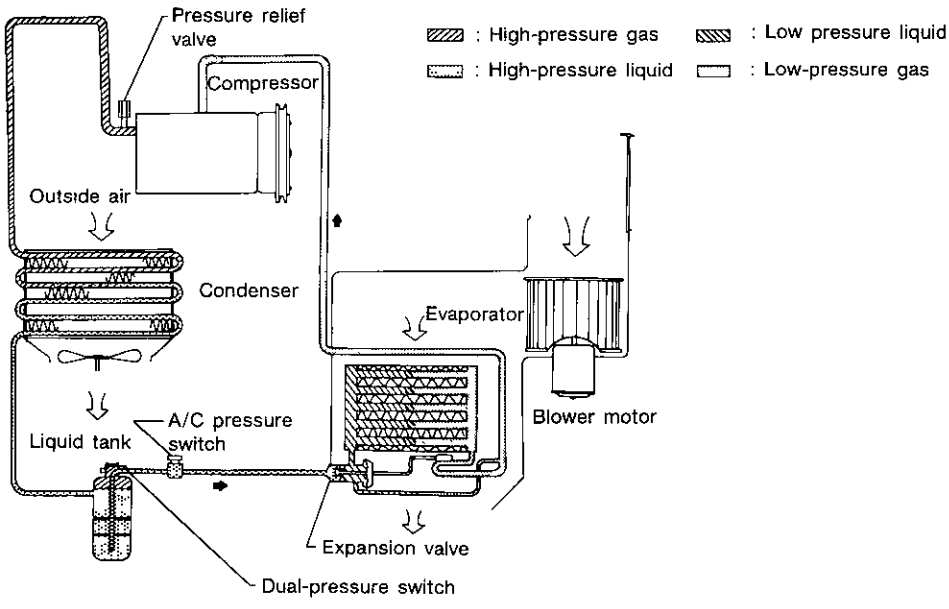
The refrigerant system is protected against excessively high or low pressures by the dual-pressure switch, located on the liquid tank. If the system pressure rises above, or falls below the specifications, the dual-pressure switch opens to interrupt the compressor operation.

Pressure relief valve

The refrigerant system is also protected by a pressure relief valve, located on the end of high flexible hose near 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.

A/C pressure switch

The refrigerant system is protected against excessively high pressure by the A/C pressure switch located in the high-pressure side line. If the system pressure rises above specifications the A/C pressure switch closes to operate the condenser fan motor. The condenser fan motor operates at "LOW" as controlled by condenser fan relay-1.



V-5 Variable Displacement Compressor

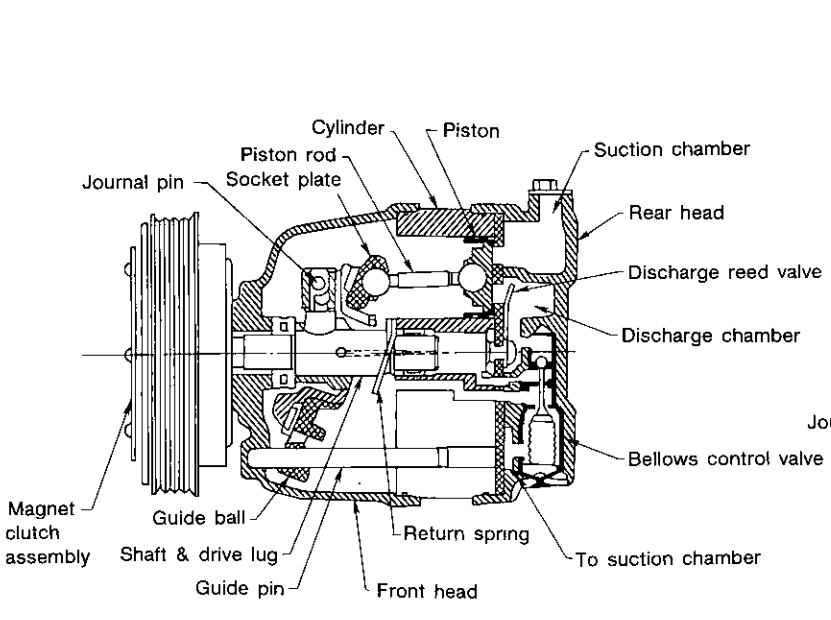
GENERAL INFORMATION

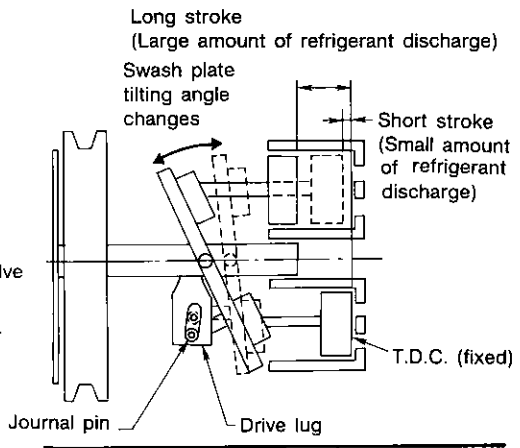
1. The V-5 variable compressor differs from previous units in that the vent temperatures do not drop too far below 5°C (41°F) at an evaporator intake air temperature of less than 20°C (68°F) while the engine is running at speeds less than 1,500 rpm. This is because the V-5 compressor provides a means of "capacity" control.
2. The V-5 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. Vapor bubbles in the sight glass also may not disappear. However, these are not symptoms of a problem. When charging the refrigerant, always use an accurate refrigerant measuring device. Extreme care should be taken not to charge the refrigerant excessively. Do not charge the system by the sight glass.
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-5 compressor, the clutch remains engaged unless the system main switch, fan switch or ignition switch is turned OFF. When ambient (outside) temperatures are low or when the amount of refrigerant is insufficient, the clutch is disengaged to protect the compressor.
5. A constant range of suction pressure is maintained when engine speed is greater than a certain value. It normally ranges from 147 to 177 kPa (1.5 to 1.8 kg/cm^2, 21 to 26 psi) under varying conditions.
   In previous compressors, however, suction pressure was reduced with increases in engine speed.

DESCRIPTION

General

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 3 to 146 cm^3 (0.18 to 8.91 cu in).





Discharge control	Discharge capacity cm^3 (cu in)/rev.	Piston stroke length mm (in)
Minimum	3 (0.18)	0.6 (0.024)
Maximum	146 (8.91)	28.6 (1 126)

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V-5 Variable Displacement Compressor (Cont'd)

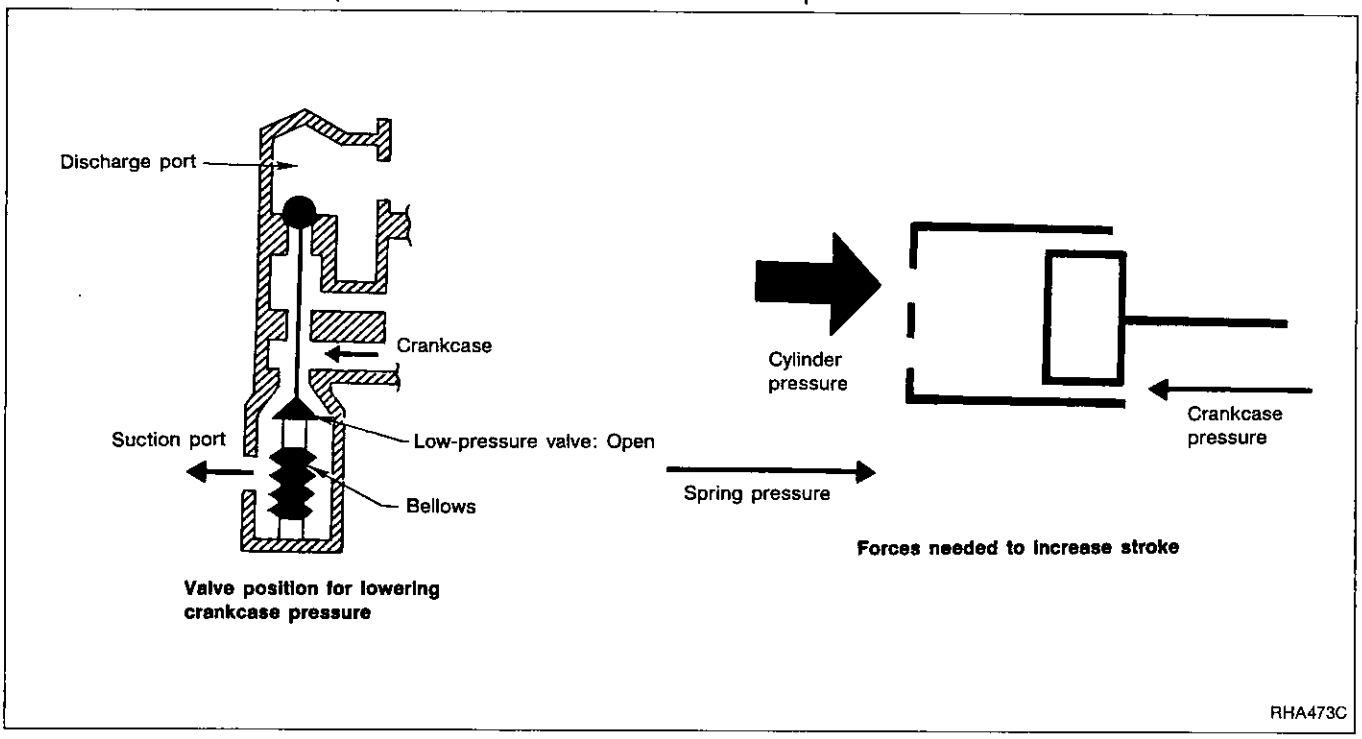
Operation

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.

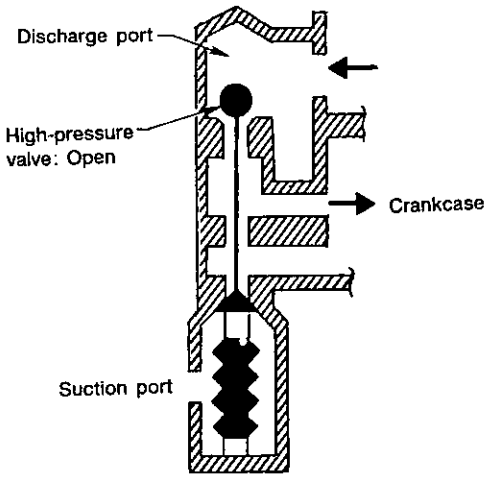
2. Maximum cooling

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.

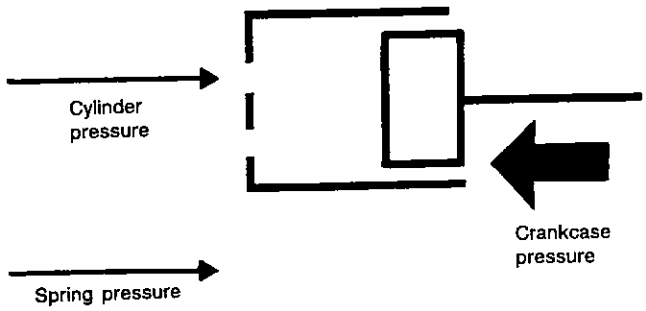


3. Capacity control

- 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.

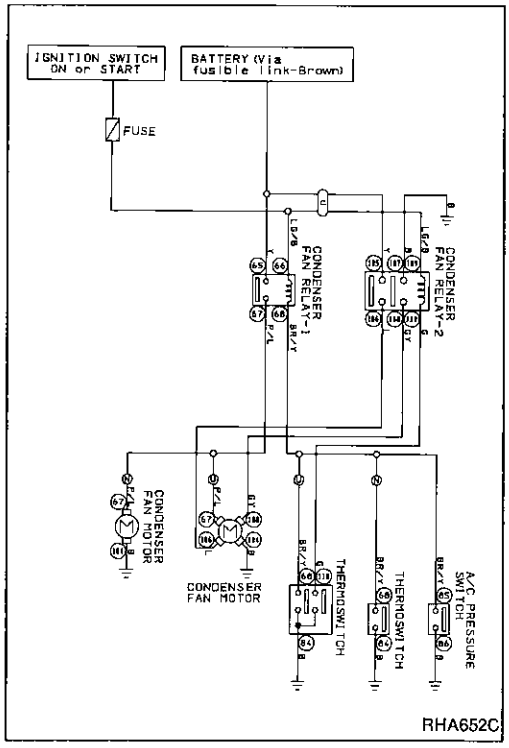


Valve position for raising crankcase pressure



Forces needed to decrease stroke

RHA474C



Condenser Fan Motor Operation System

The condenser fan motor is controlled according to A/C system pressure and water temperature.

OPERATION

A/C system pressure

High-pressure side line pressure kPa (kg/cm^2, psi)	Condenser fan	Condenser fan control relay	
Decreasing to 1,226 - 1,324 (12.5 - 13.5, 178 - 192)	OFF	Relay-1	OFF
Increasing to 1,422 - 1,520 (14.5 - 15.5, 206 - 220)	LOW		ON

Water temperature

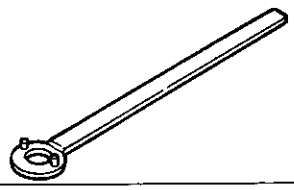
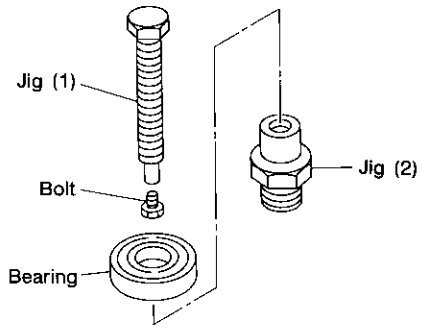
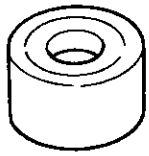
FOR U.S.A. MODELS

Water temperature °C (°F)	Condenser fan	Condenser fan control relay	
Decreasing to 80 - 86 (176 - 187)	OFF	Relay-1	OFF
		Relay-2	OFF
Between 87 (189) and 101 (214)	LOW	Relay-1	ON
		Relay-2	OFF
Increasing to 102 - 108 (216 - 226)	HIGH	Relay-1	ON
		Relay-2	ON

FOR CANADA MODELS

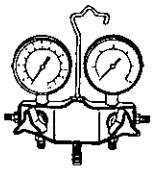
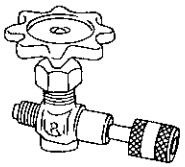
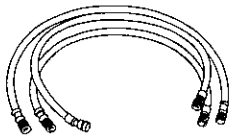
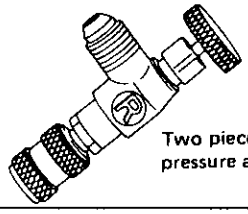
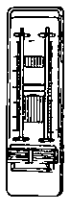
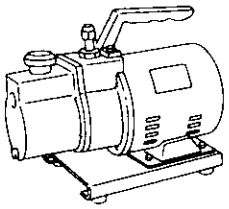
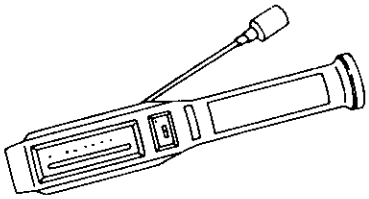
Water temperature °C (°F)	Condenser fan	Condenser fan control relay	
Decreasing to 80 - 86 (176 - 187)	OFF	Relay-1	OFF
Increasing to 87 - 93 (189 - 199)	LOW		ON

Special Service Tools

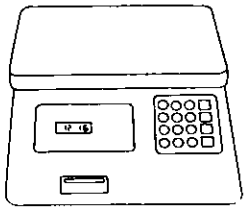
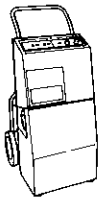
Tool number (Kent-Moore number) Tool name	Description
KV99845991 (J39072) Clutch disc wrench	Removing center nut 
(J39073-3) Clutch disc puller set* KV99859981 (J39073-4) Clutch jig (1) KV99845982 (J33013-1) Clutch jig (2) KV99845992 (J33013-3) Bolt KV99845993 (J33013-1) Bearing	Removing/Installing armature plate 
KV99845972 (J39073-2) Pulley pressing jig*	Installing pulley 
KV99845971 (J39073-1) Coil pressing jig*	Installing magnet clutch coil 

* Coil pressing jig (J39073-1), Pulley pressing jig (J39073-2) and Clutch disc puller set (J39073-3) are provided as Clutch and coil Service set (J39073).

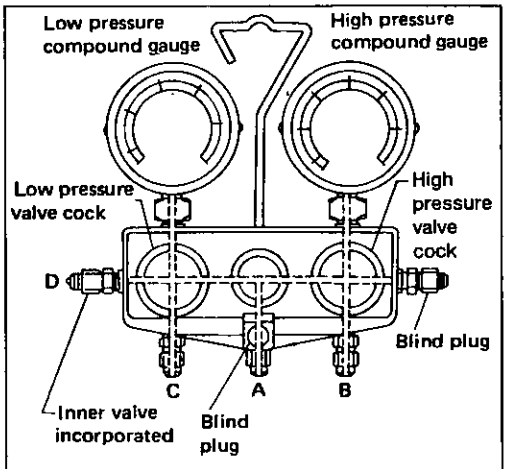
Commercial Service Tools

Tool name	Description	
Manifold gauge	 SHA899C	Discharging, evacuating and charging refrigerant
Additional valve	 SHA898C	Discharging, evacuating and charging refrigerant
Charging hose	 SHA897C	Discharging, evacuating and charging refrigerant
Adapter valve	 Two pieces on each high pressure and low pressure line RHA573B	Discharging, evacuating and charging refrigerant
Thermometer and hygrometer	  Etched-stem type thermometer SHA900C	Checking temperature and humidity
Vacuum pump	 RHA575B	Evacuating
Gas leak detector	 RHA577B	Checking refrigerant leaks

Commercial Service Tools (Cont'd)

Tool name	Description	
Charging cylinder	 RHA578B	Checking amount of refrigerant and charging refrigerant
Weight scale	 RHA579B	Checking amount of refrigerant
Refrigerant recycling equipment	 SHA813D	Capturing and recycling refrigerant

For details of such handling methods, refer to the Instruction Manual attached to each of the service tools.



Center joint (A):
Use for evacuating.
High pressure side joint (B):
Connect to high pressure side service valve of refrigerating system.
Low pressure side joint (C):
Connect to low pressure side service valve of refrigerating system.
Refrigerant joint (D):
Use for charging refrigerant.

SHA044D

HANDLING METHOD AND STRUCTURE

Manifold gauge

The manifold gauge is used to measure the operating pressure accurately in the high pressure and low pressure lines of the refrigerating system.
The high pressure gauge measures from –101.3 kPa (–760 mmHg, –29.92 inHg) to 2,942 kPa (30 kg/cm^2, 427 psi), and the low pressure gauge measures generally from –101.3 kPa (–760 mmHg, –29.92 inHg) to 1,471 kPa (15 kg/cm^2, 213 psi).

CAUTION:

- **When installing the gauge to the refrigerating system, use utmost care not to mistake high pressure and low pressure line connections. (Wrong connections will lead to a damaged gauge.)**
- **Before evacuating, confirm that the gauge has a negative pressure scale. (If not, the gauge will be damaged.)**

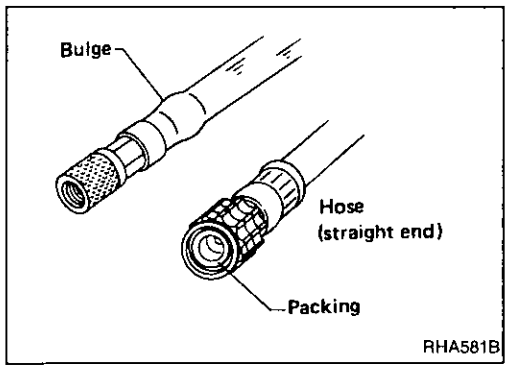
Commercial Service Tools (Cont'd)

Charging hose

1. Completely tighten the high pressure valve, low pressure valve and vacuum pump valve cocks of the gauge manifold.
2. Connect the charging hoses to the high and low pressure lines.
3. Connect the charging hose fitted with a valve core to the refrigerant canister.
4. Connect the charging hose to the vacuum pump.

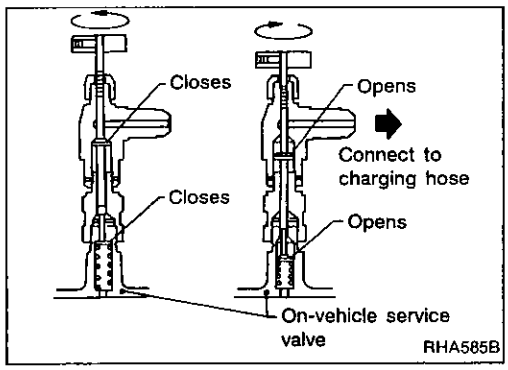
The high and low pressure hoses are color coded to prevent wrong connection.

High pressure line hose	Red
Low pressure line hose	Yellow
Refrigerant canister hose	Blue or green (with valve core)
Vacuum pump hose	Blue or green



CAUTION:

- **Check each hose for cracks. If found, discard the hose.**
- **Do not use any hose if bulges are found.**
- **Check the rubber packing. If any deterioration or cracks are found, replace it with a new one.**



Installing the adapter valve

Install the adapter valve to each of the high pressure and low pressure service valves so that air purging from the charging hose can be omitted. This also ensures that refrigerant leakage upon disconnection of the hose can be prevented.

1. Before connecting the adapter valve to the on-vehicle service valve, turn the adapter valve handle fully counterclockwise to retract the pin.

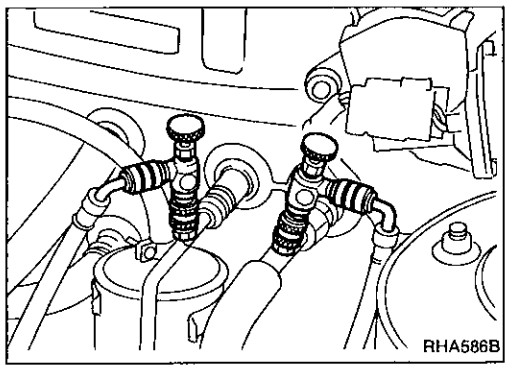
CAUTION:

Check the packing for any sign of deterioration or cracks. If any abnormality is found, replace it with a new one.

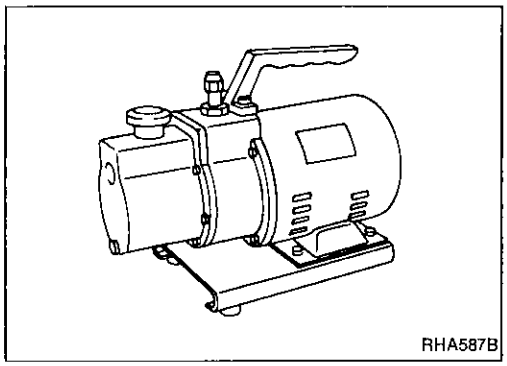
2. Connect the charging hose to the adapter valve.

Turning the handle clockwise will cause the on-vehicle service valve pin to be pushed open by the adapter valve pin, thus opening the refrigerant passage.

Turning the handle counterclockwise will close the passage. Before removing the adapter valve from the on-vehicle service valve, be sure to fully turn the handle counterclockwise to shut off the refrigerant passage.



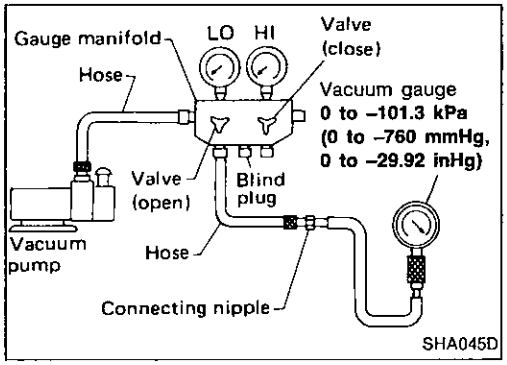
Commercial Service Tools (Cont'd)


RHA587B

Vacuum pump

The vacuum pump is used to purge air and moisture from the inside of the refrigeration system by evacuation, thereby ensuring proper functioning of the air conditioner system.

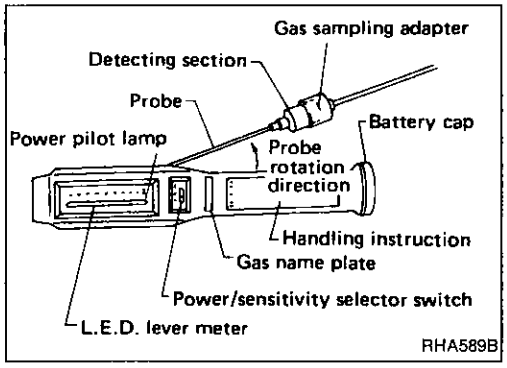
Check the vacuum pump to see that the vacuum pump capacity is greater than –100.0 kPa (–750 mmHg, –29.53 inHg).



SHA045D

Vacuum pump performance check procedure

1. Connect the vacuum gauge to the system.
2. Run the vacuum pump, and check to see that the needle pointers of the gauge manifold and vacuum gauge move smoothly, indicating a similar value.
3. After running the vacuum pump for two or three minutes, read the vacuum gauge. The measured value indicates the capacity of the vacuum pump.



RHA589B

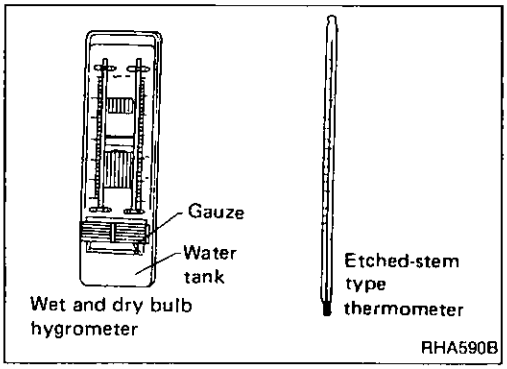
Gas leak detector

The gas leak detector is used to check whether the refrigeration system is leaking. The features of this gas leak detector are listed on the next page.

Type		Detection ability	Features
Electrical	Discharge type (Suction type)	3 - 50 g (0.11 - 1.76 oz)/year	• Easy handling • Medium sensitivity • Each point needs tow or more seconds for detection.
	Positive ion emission type (Suction type)	2 g (0.07 oz)/year	• High sensitivity • High price • Warm-up time is needed because a heater is incorporated.
Other simple checking method: Change in vacuum when evacuating		1 kg (2 lb)/month; if 13.3 kPa (100 mmHg, 3.94 inHg) change in vacuum is detected in 10 minutes.	• Can be used easily in refrigerant charging operation. • Detection ability is very low with vacuum gauge in gauge manifold.

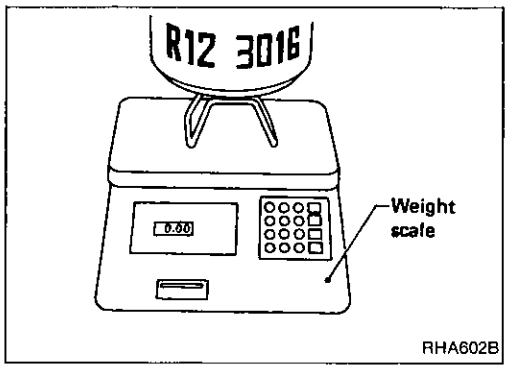
- **Leakage inspection of a refrigeration system needs a sensitivity greater than 20 g (0.71 oz)/year.**
- **The actual amount of leak is estimated at 5 to 10 times the detected amount.**
- **Insufficient cooling may be felt if leakage exceeds 150 to 200 g (5.29 to 7.05 oz).**

Commercial Service Tools (Cont'd)



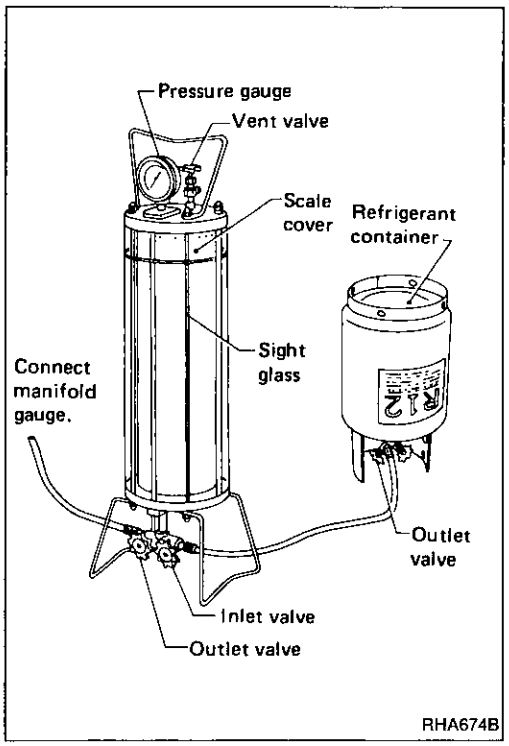
Temperature gauge

Use to check the air conditioner performance. An etched stem type thermometer may be used. A hygrometer must also be used because the air conditioner performance depends on the humidity.



Scale

Measure the weight of the refrigerant to determine how much the refrigerant is charged.



Charging cylinder

The charging cylinder is used to correctly measure the amount of refrigerant to be charged.

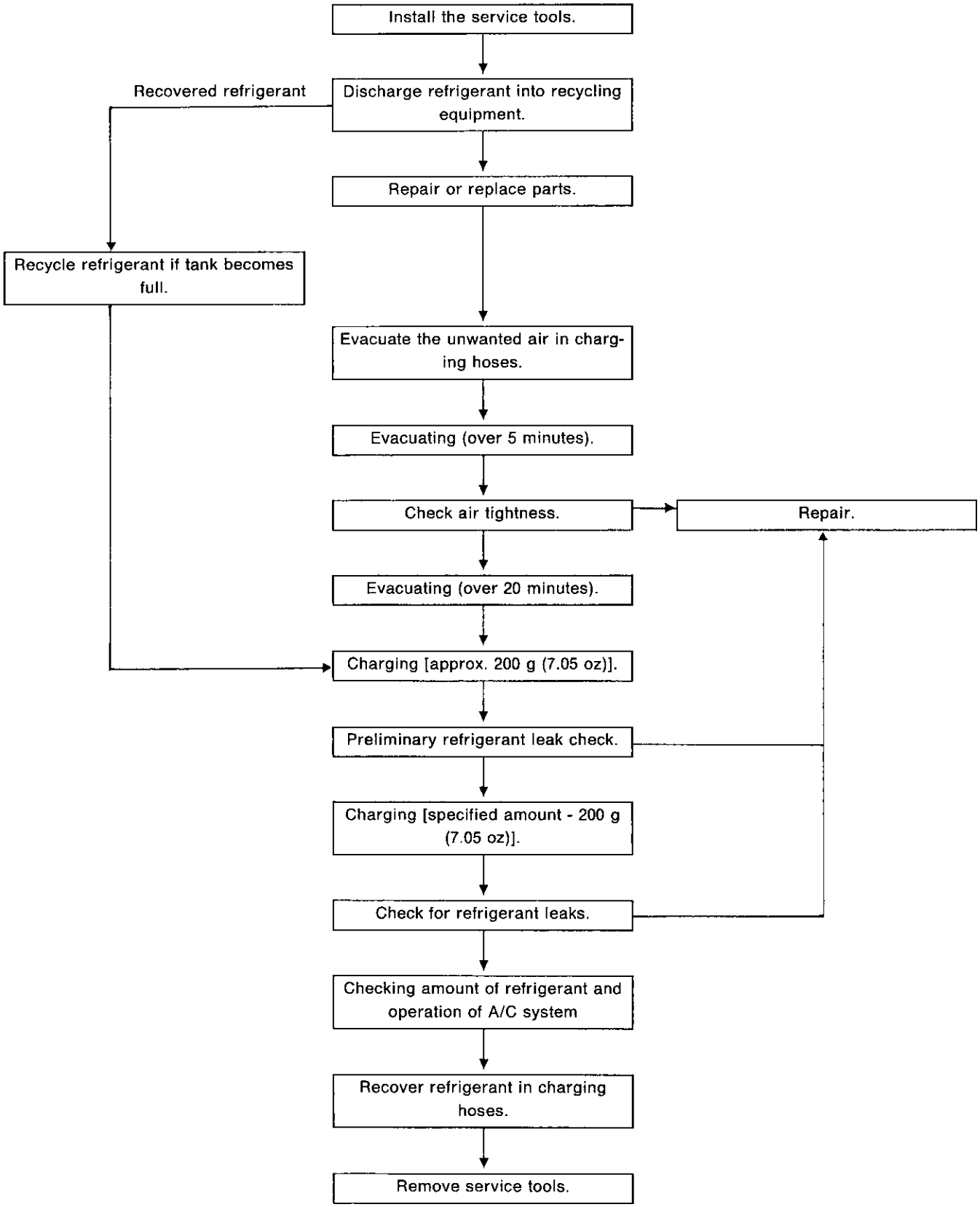
Features

- With the charging cylinder, the operator can measure correctly the amount of refrigerant to be charged into the system.
- Change in the refrigerant volume due to a change in temperature and pressure can be supplemented, and this ensures correct charging of refrigerant.

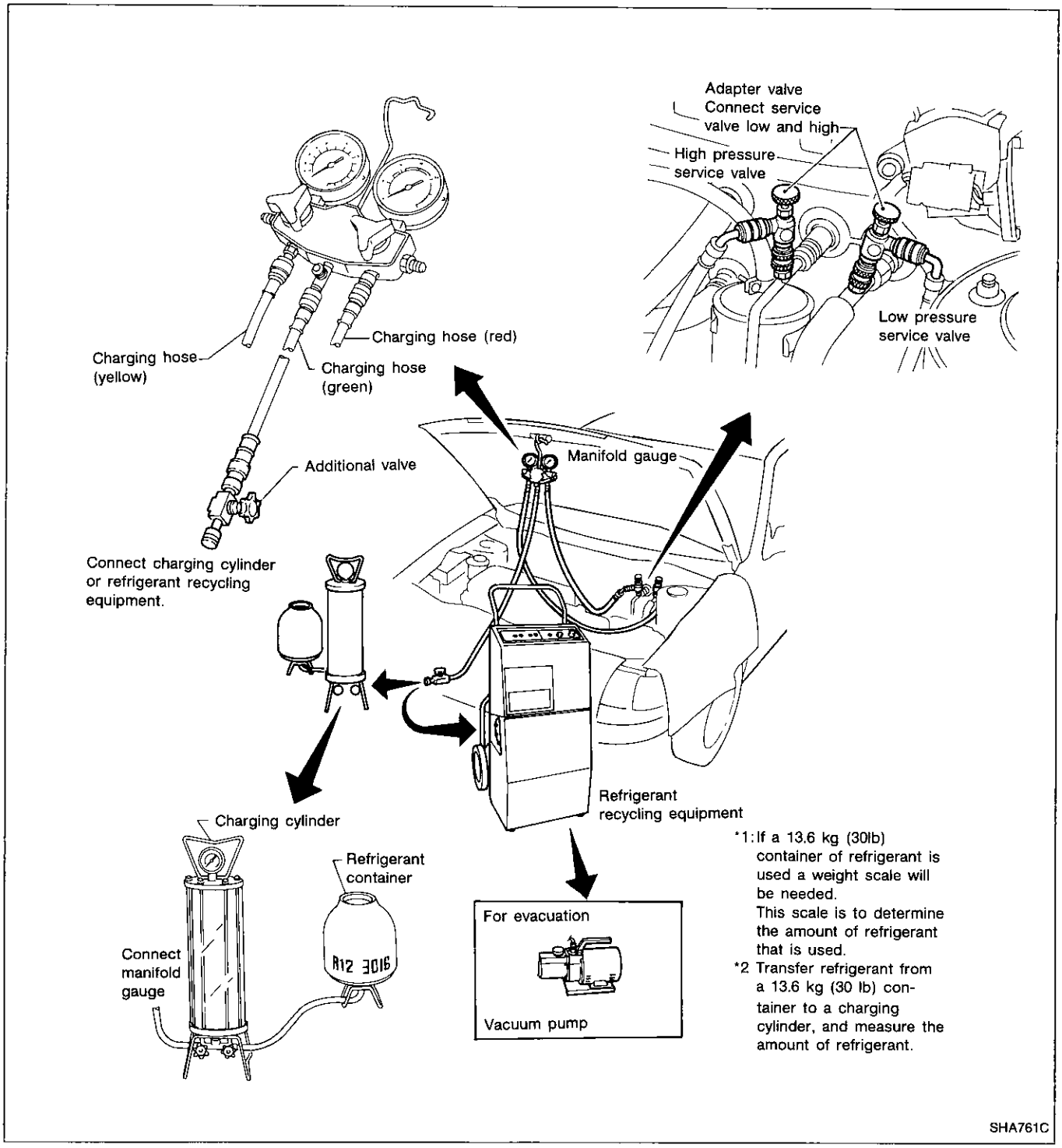
CAUTION:

- **Never attempt to carry the charging cylinder containing refrigerant.**
- **Do not put the charging cylinder in a hot place. If the temperature and pressure of the refrigerant in the cylinder increase, the safety valve will be pushed open and the refrigerant will be released into the atmosphere.**
- **Do not expose the cylinder to the direct sunlight.**
- **Do not over-charge the refrigerant so that it exceeds the maximum limit of the cylinder.**
- **Do not charge the cylinder with more refrigerant than is needed.**

Work Procedure

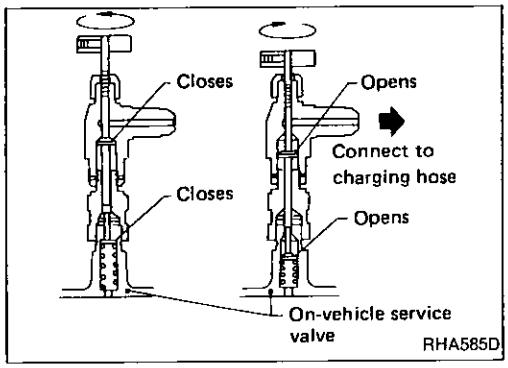


Setting of Commercial Service Tools



WARNING:
Discharge only into your recycling equipment. Do not release refrigerant into the air.

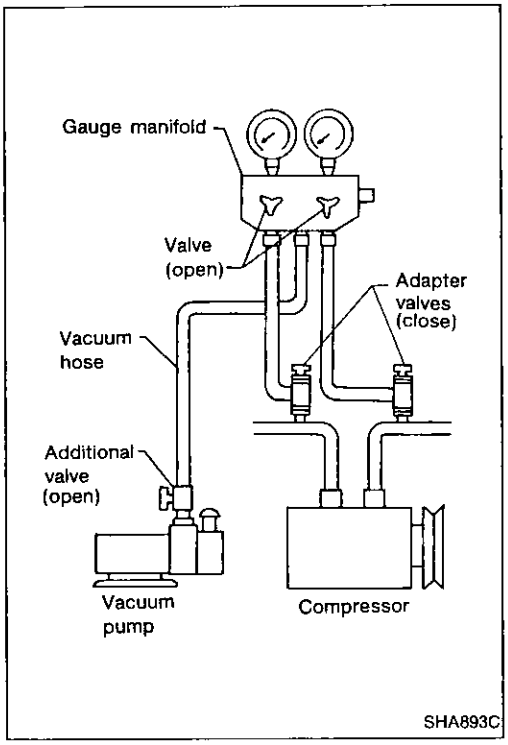
Setting of Commercial Service Tools (Cont'd)

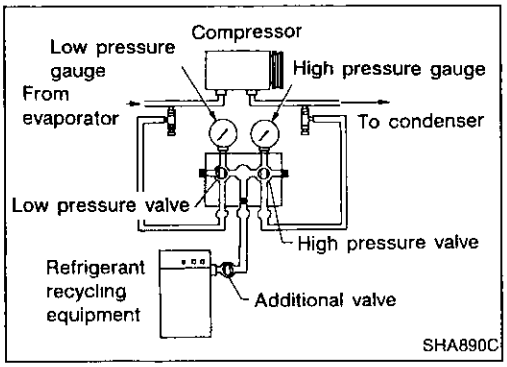


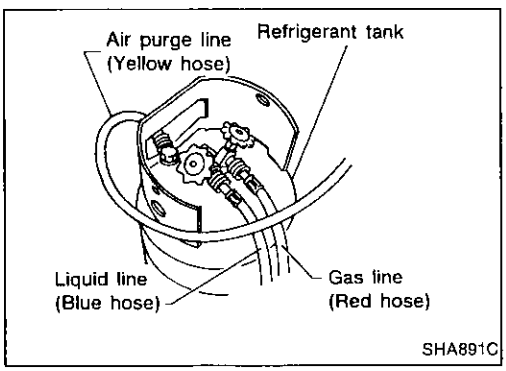
1. Install adapter valve to each of high pressure and low pressure service valves.

Before connecting adapter valve, turn adapter valve handle fully counterclockwise to retract pin.

2. Connect charging hoses to adapter valves and connect vacuum hose to vacuum pump.
3. Run vacuum pump and open additional valve and both valves on gauge manifold set.
4. After evacuating unwanted air in gauge set, close additional valve and stop vacuum pump.
5. Disconnect vacuum hose from vacuum pump and connect it to refrigerant recycling equipment.







Discharging

WARNING:

Discharge only into your recycling equipment.

Do not release refrigerant into the air.

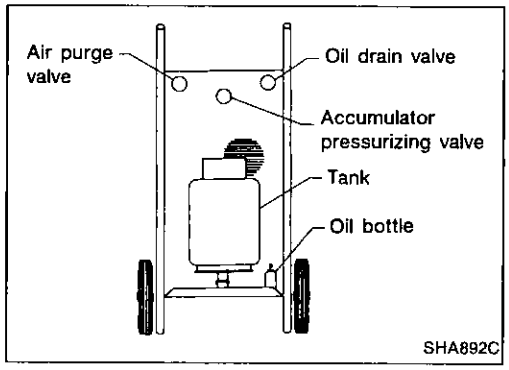
Use only authorized refillable refrigerant tanks for your recycling equipment.

Use of other tanks could cause personal injury.

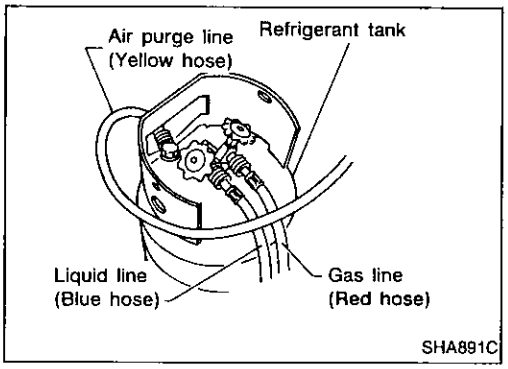
REFRIGERANT RECOVERY

1. Connect vacuum hose to refrigerant recycling equipment and open additional valve and adapter valves.
2. Open both valves of manifold gauge set. Make certain refrigerant tank "Gas" and "Liquid" valves are open.
3. Plug unit's power cord into a suitable AC outlet and turn on "Main Power" switch.
4. Turn on "Recovery" switch.
5. Depress "Start" switch. Compressor will start. Compressor will shut off automatically when recovery is complete. Watch for pressure rise to above 0 kPa (0 kg/cm^2, 0 psi) within two minutes. If this occurs, repeat this step.

Discharging (Cont'd)



6. To drain A/C system oil accumulator, open "Accumulator Pressurizing" valve for approximately 15 seconds to allow some compressor discharge pressure back into accumulator. Close "Accumulator Pressurizing" valve and open "Oil Drain" valve slowly and drain accumulator. Do not allow accumulator to completely depressurize. When oil stops draining, close "Oil Drain" valve. Be sure to replace oil in A/C system before servicing.
7. Turn off "Recovery" switch.
8. When recovery tank is full, trip switch at the bottom of weight platform will de-energize compressor and "Tank Full" light will come on. Recycle refrigerant in tank before removing.

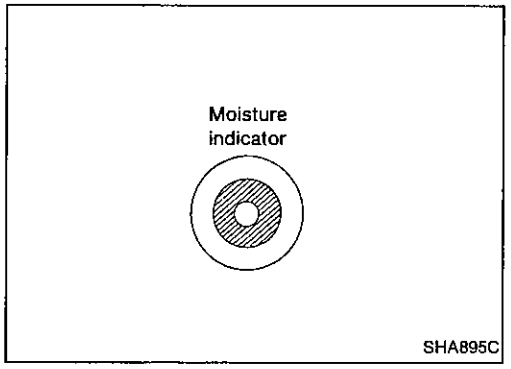


REFRIGERANT RECYCLING

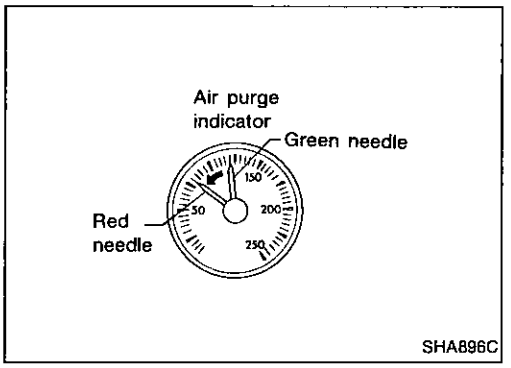
The recycling of reclaimed refrigerant is essential in order to assure that the refrigerant which meets the standards is re-used.

For maximum efficiency, full tanks of recovered refrigerant should be recycled. As required, tanks containing a minimum of 3.6 kg (8 lb) of refrigerant can be recycled.

For greatest efficiency, recycling full tanks of refrigerant is recommended.

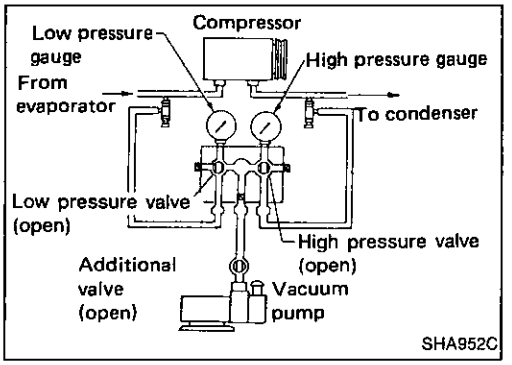


1. Make certain both valves on recovery tank are open.
2. Turn on "Recycling" switch. Recycling solenoid will be energized.
3. Depress start switch. Compressor will start, and "Recycling On" light will come. Refrigerant will be seen going through moisture indicator at start up. The sightglass will not completely fill with refrigerant.
4. Allow the station to operate until moisture indicator turns green. If moisture indicator does not turn green after 40 minutes, remove and replace filter.
5. After recycling for approximately 5 minutes, check air purge indicator. If green pointer on air purge indicator leads red pointer by more than 10 psi (2 small divisions), bleed tank through air purge valve on the back of unit until both pointers are equal. Repeat as necessary.



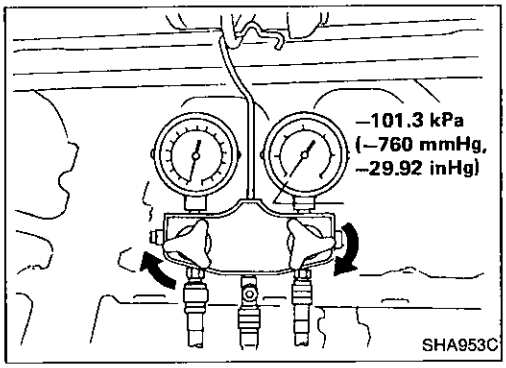
Evacuation

EVACUATION PROCEDURE

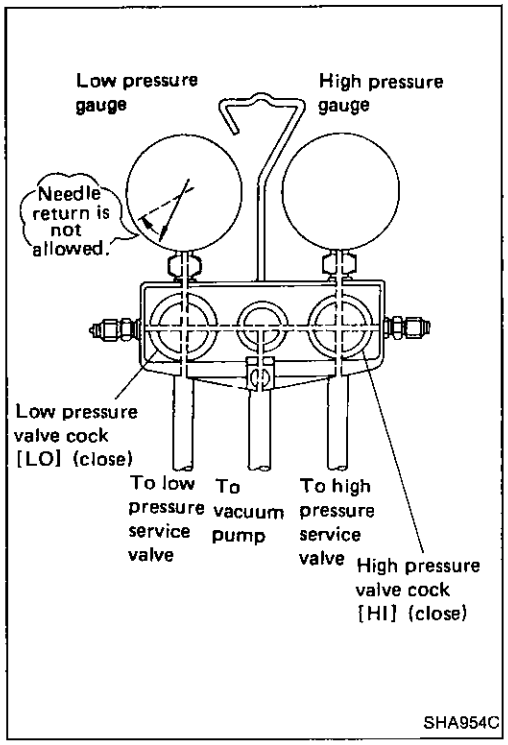


1. Connect vacuum hose to vacuum pump.
2. Open high and low pressure valves of manifold gauge set and additional valve.
3. Run vacuum pump.

Evacuation (Cont'd)



4. Perform evacuation for more than five minutes to stabilize the vacuum inside the system. Check to ensure that the low pressure gauge indicates –98.6 to –101.3 kPa (–740 to –760 mmHg, –29.13 to –29.92 inHg).
5. Shut off the high and low pressure valves and additional valve.



CHECKING AIRTIGHTNESS

1. Shut off high and low pressure valves and additional valve, and leave the system as it is for 5 to 10 minutes.
2. Make sure that the needle of low pressure gauge will not move back toward the atmospheric pressure side (gauge pressure 0).

If any reverse movement is noted, it indicates poor system airtightness. Service the system until airtightness is complete. If pressure changes approx. 13.3 kPa (100 mmHg, 3.94 inHg) in 10 minutes, the refrigerant in the system will be exhausted in about one month.

EVACUATION

If no abnormality is found during airtightness check, perform evacuation again for more than 20 minutes.

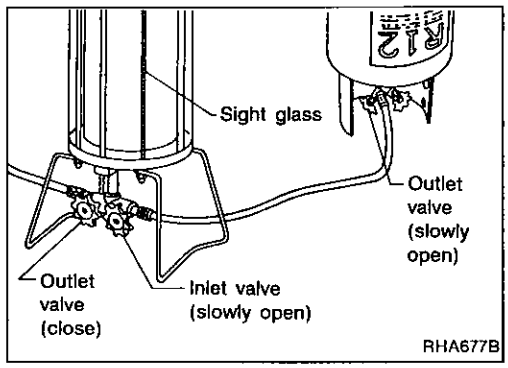
1. Run vacuum pump.
2. Open high and low pressure valve and additional valve.
3. Evacuate for more than 20 minutes.
4. Close high and low pressure valves and additional valve.

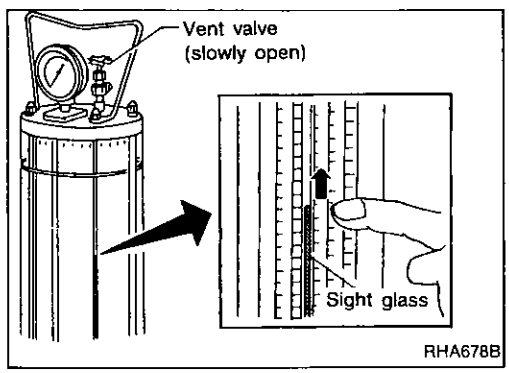
Charging Refrigerant

SETTING OF CHARGING CYLINDER

1. Make sure that inlet and outlet valves of charging cylinder are closed.
2. Slowly open liquid line valve of refrigerant tank.
3. Slowly open inlet valve of charging cylinder.

The refrigerant will flow into the sight glass of charging cylinder as inlet valve is opened.



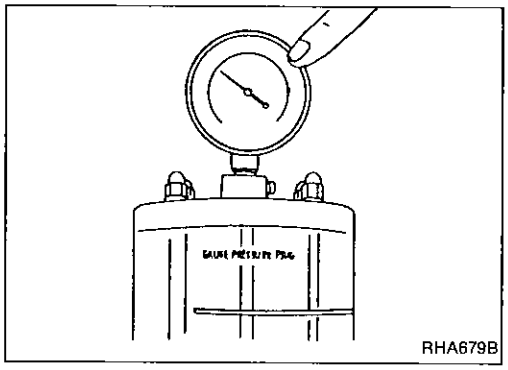


4. Slowly open upper vent valve to release pressure from charging cylinder. While doing so, continue charging until required amount of refrigerant is reached.

The refrigerant volume changes with temperature and pressure. It is necessary to charge refrigerant with a little more than required amount (indicated on sight glass).

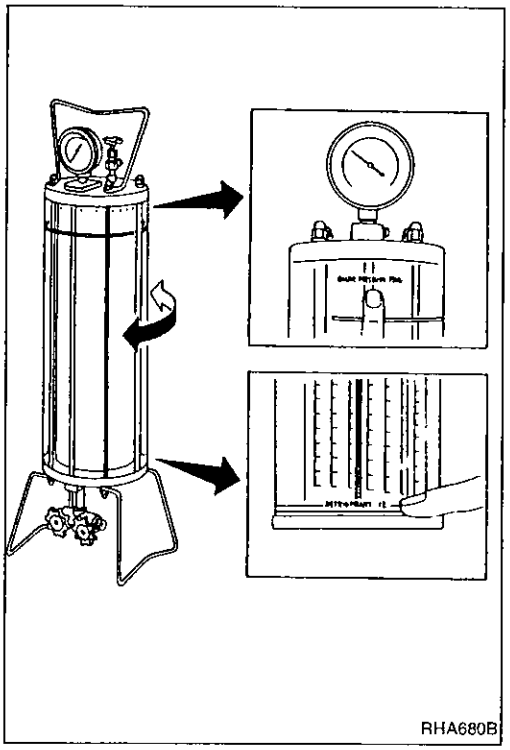
5. Close inlet valve and upper vent valve of charging cylinder.

Charging Refrigerant (Cont'd)


RHA679B

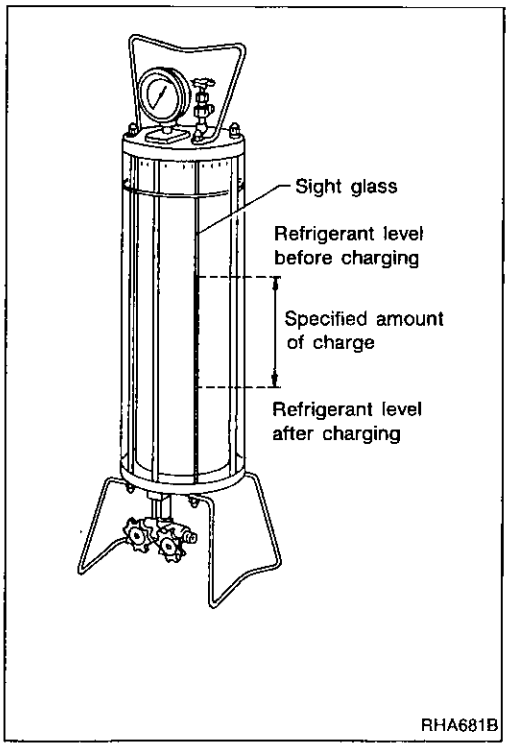
6. Turn on heater switch (charging cylinder is provided with a heater.)

The refrigerant charging time can be reduced by heating refrigerant to increase its pressure. In this case, do not allow the pressure in cylinder to rise higher than 1,030 kPa (10.5 kg/cm^2, 150 psi). (If pressure rises above this level, turn off the heater.) The pressure in the charging cylinder can be measured by upper pressure gauge.


RHA680B

SETTING OF FLOW METER

1. Rotate charging cylinder main body until scale for R12 is at the correct position on sight glass.
2. Read charging cylinder pressure gauge.
3. Rotate charging cylinder so that scale of charging cylinder agrees with pressure value indicated on pressure gauge.



RHA681B

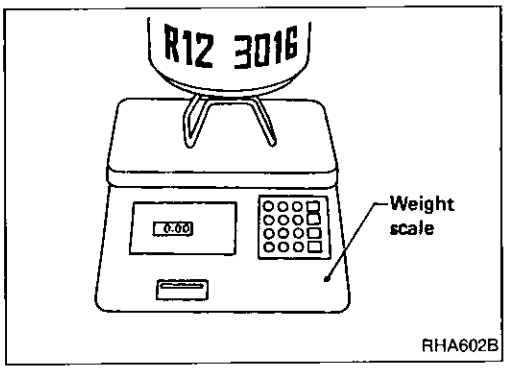
CALCULATING CHARGING AMOUNT OF REFRIGERANT

1. Record the amount of refrigerant in the sight glass before charging.
2. Subtract the required amount of refrigerant (charge quantity specified for the vehicle) from the amount of refrigerant recorded in step 1. Charge refrigerant into the system until the remaining value equals to the value indicated on the sight glass.

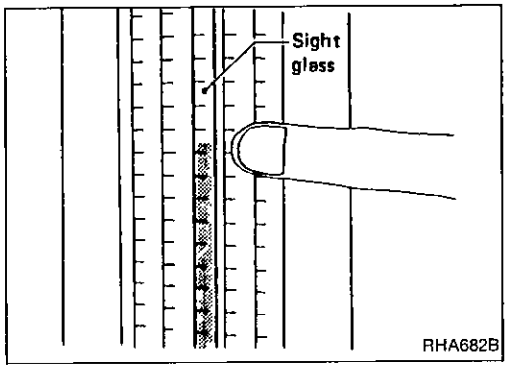
Example:

Level in sight glass: 3 lb 8 oz
Charge specification (from Service Manual) 2.0 - 2.4 lb.
Calculate charge quantity into lb and oz as follows: 1 lb = 16 oz, and 0.1 lb = 1.6 oz, so that 2.0 lb = 32 oz, 2.4 lb = 32 + (4 x 1.6) = 32 + 6.4 = 38.4, round off to 38. Therefore our charge quantity will be between 32 and 38 oz, or 2 lb 0 oz to 2 lb 6 oz.
Subtract 2 lb 6 oz from level in sight glass (3 lb 8 oz) = 1 lb 2 oz.
This will be our ending point.

Charging Refrigerant (Cont'd)



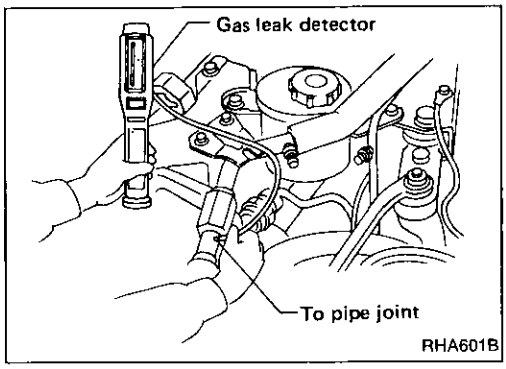
If a flow meter is not available, the amount of charged refrigerant also can be determined by subtracting the weight of the container measured after charging from its weight measured before charging.



PRELIMINARY CHARGING OF REFRIGERANT

1. Open outlet valve of charging cylinder.
2. Slowly open high pressure side valve of manifold gauge to charge refrigerant from the high pressure side.
3. Close high pressure valve after charging approx. 200 g (7.05 oz) refrigerant.

CAUTION:
The refrigerant in charging cylinder is kept in liquid state, so the refrigerant should be charged from high pressure side. Do not start engine with high pressure valve kept open.



PRELIMINARY CHECK FOR REFRIGERANT LEAKS

1. Make sure that the gauge manifold valve is closed.
2. Check for refrigerant leak from each connector in the system using the leak detector.

At this point, the pressure in the system is not high. Only large amounts of refrigerant leak due to loose pipe joints, etc. can be detected.

CHARGING REFRIGERANT

1. Slowly open high pressure valve of manifold gauge, and charge calculated amount of refrigerant in "CALCULATING CHARGING AMOUNT OF REFRIGERANT".

CAUTION:
The refrigerant in charging cylinder is kept in liquid state, so the refrigerant should be charged from high pressure side. Do not start engine with high pressure valve kept open.

2. Close high pressure valve of manifold gauge.
3. Make sure that the calculated amount of refrigerant remains in sight glass.
4. Close charging cylinder outlet valve.
5. Turn off heater if it is on (when using heater equipped type).

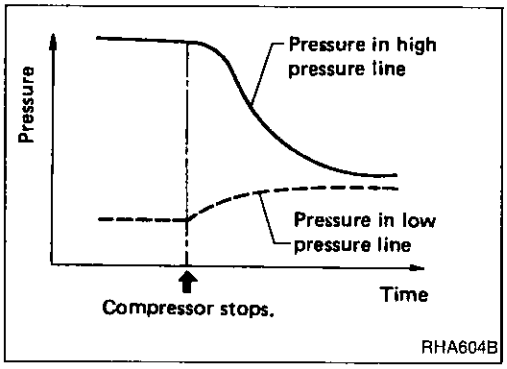
Inspection for Refrigerant Leaks

WORK PROCEDURE

To facilitate inspection for refrigerant leaks, establish the following conditions:

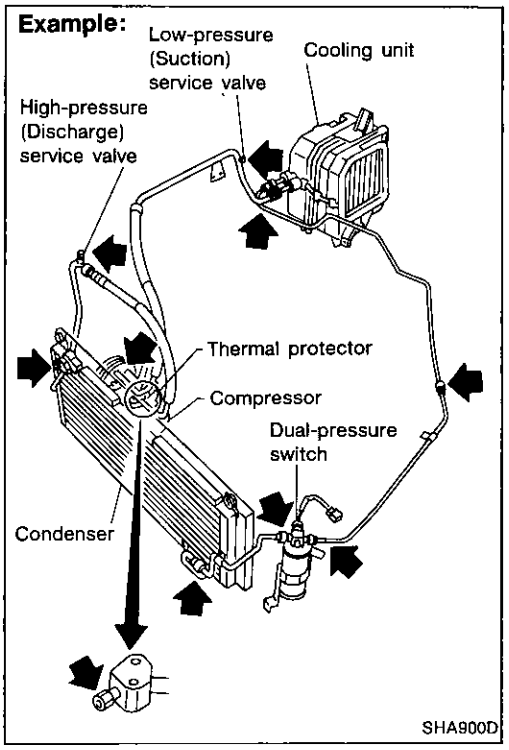
- Start engine.
- Run air conditioner.
- Set blower fan control to MAX.
- Set temperature control to FULL COLD.
- Run the refrigerant system for more than 5 minutes after setting the above-mentioned conditions (to circulate refrigerant through the system).

Inspection for Refrigerant Leaks (Cont'd)



Refrigerant leaks should be checked immediately after stopping engine, beginning with high pressure line, using a gas leak detector. This is because the pressure in high pressure line drops gradually after refrigerant circulation stops while the pressure in low pressure line rises gradually as shown in the graph at left. Leaks can be detected easily when pressure is high.

To prevent detecting errors, make sure that there is no refrigerant vapor or tobacco smoke in the vicinity of vehicle. It is also necessary to shield vehicle from wind so that leaking refrigerant is not blown away.



INSPECTION POINTS

Check carefully each of tube joints. To check, wipe the portion to be checked with waste cloth, and move tester probe all around the joint.

Compressor

Check shaft seals and bolt holes, and also around magnet clutch.

Liquid tank

Check pressure valve, safety valve and fusible plug mounts.

Service valve

Check all around service valves.
Ensure that valve core is not loose.
Service valve caps must be attached to valves (to prevent leak).
Also check that there are no foreign objects inside the cap.

Inside of cooling unit

To check, insert leak tester probe into drain hose immediately after stopping engine. (Keep probe inserted for more than 10 seconds.)

Sight Glass Inspection for System with V-5 Variable Displacement Compressor

As previously stated, the inspection characteristics of the sight glass on a system equipped with the V-5 compressor are different from a system using a fixed displacement compressor. Refer to the information below:

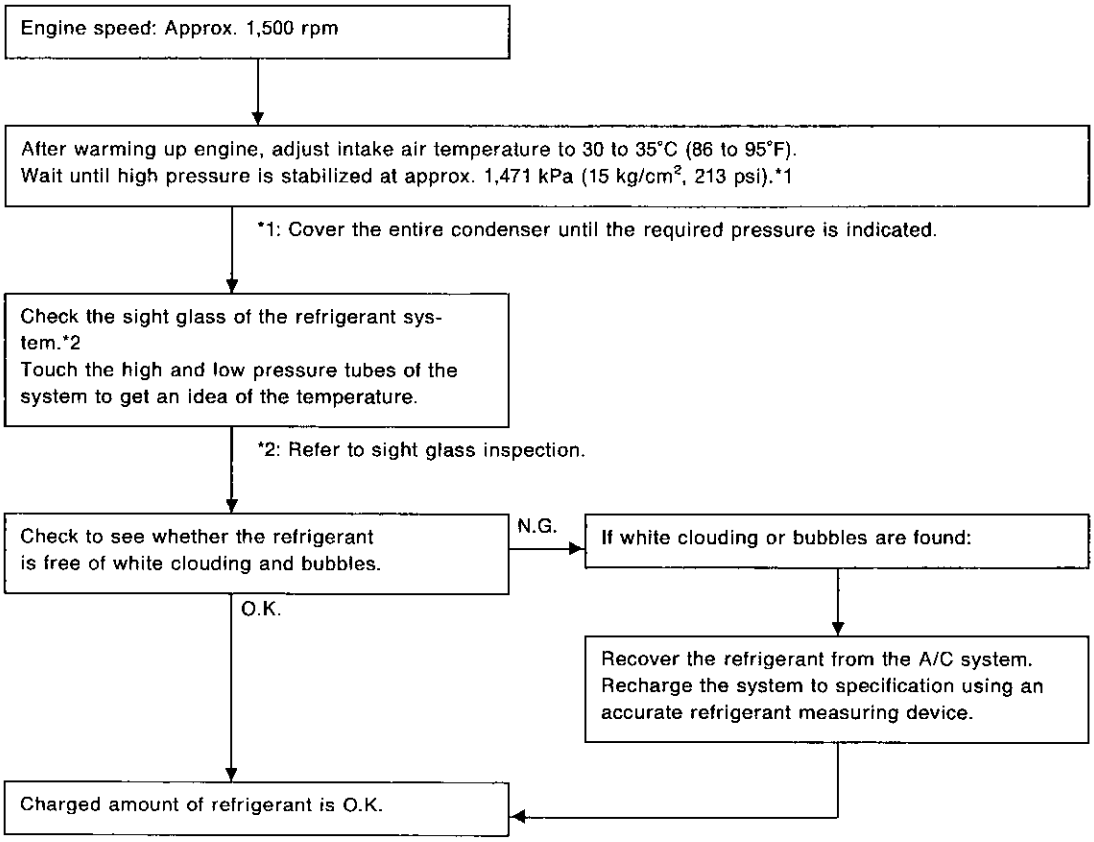
Inspection conditions

1. Operate the engine at approximately 1,500 rpm.
2. Open the door windows.
3. Set the fan switch to the "MAX" position.
4. Turn the AUTO switch "ON".
5. Ensure that compressor discharge pressure is at least 588 kPa (6 kg/cm^2, 85 psi).

When discharge pressure does not reach 588 kPa (6 kg/cm^2, 85 psi) in areas where outside air temperature is low, proceed as follows:

- Set the P.T.C. to "full-hot".
- Set the REC switch to the recirculation position.
- Close the door windows completely.
- Increase the compartment temperature so that discharge pressure reaches at least 588 kPa (6 kg/cm^2, 85 psi).

WORK PROCEDURE



Sight Glass Inspection for System with V-5 Variable Displacement Compressor (Cont'd)

REFRIGERANT CHARGE AMOUNT CHECKING

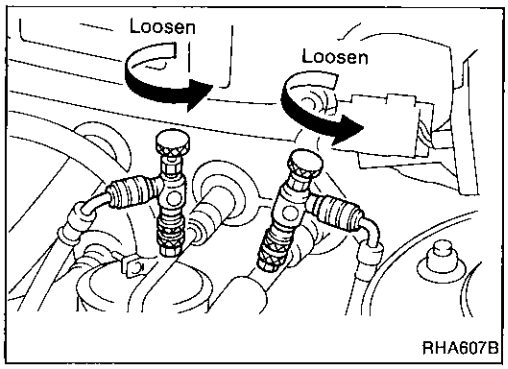
Check the refrigerant charge amount using the following table as a guide.

Item to check	Adequate	Insufficient	Almost no refrigerant	Too much refrigerant
State in sight glass	CLEAR Air bubbles sometimes appear when engine speed is increased or decreased.	FOAMY or BUBBLY Air bubbles always appear.	FROSTY Frost appears.	NO FOAM No air bubbles appear.
Temperature of high and low pressure lines	High-pressure side is hot while low-pressure side is cold. (A big temperature difference between high and low-pressure side.)	High-pressure side is warm and low-pressure side is slightly cold. (Not so large a temperature difference between high and low-pressure side.)	There is almost no temperature difference between high and low-pressure side.	High-pressure is hot and low-pressure side is slightly warm. (Slight temperature difference between high and low-pressure side.)
Pressure of system	Both pressures on high and low-pressure sides are normal.	Both pressures on high and low-pressure sides are slightly low.	High-pressure side is abnormally low.	Both pressure on high and low-pressure sides are abnormally high.

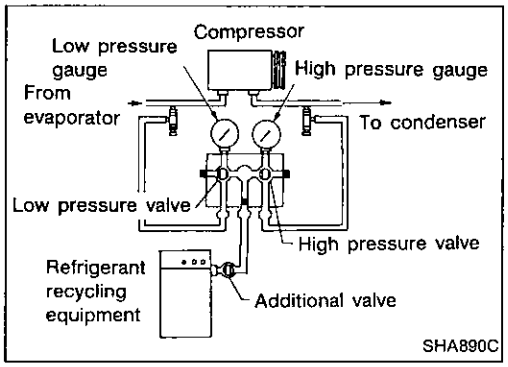
RHA264B

NOTE:

The condition of the vapor bubbles in the sight glass, temperatures, and pressures are affected by ambient temperature and relative humidity.



RHA607B



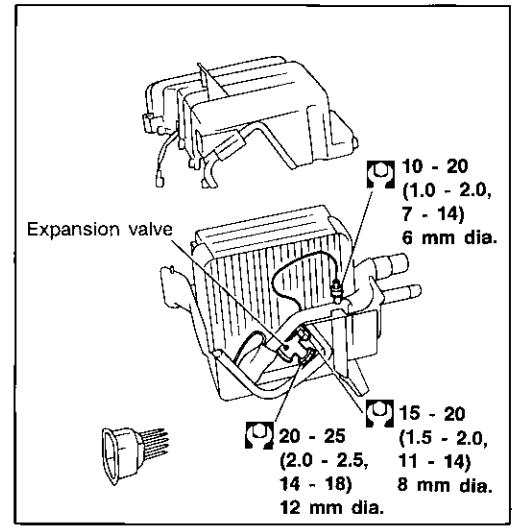
SHA890C

Removal of Commercial Service Tools

1. Completely loosen adapter valves of low pressure and high pressure lines.
2. Close additional valve and remove center hose from charging cylinder.
3. Connect center hose to refrigerant recycling equipment.
4. Open additional valve and both valves on gauge manifold.
5. Capture refrigerant in charging system.
6. After recovering refrigerant, remove adapter valves from on-car service valves.

Refrigerant Lines

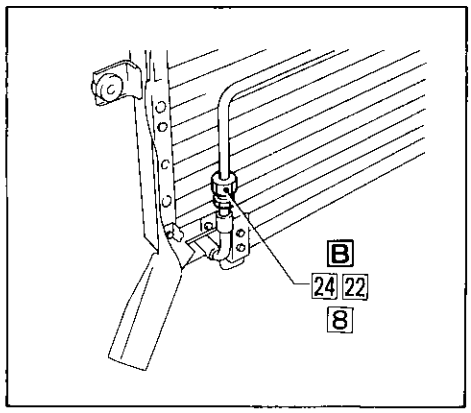
- **Refer to page HA-3 regarding "Precautions for Refrigerant Connection".**

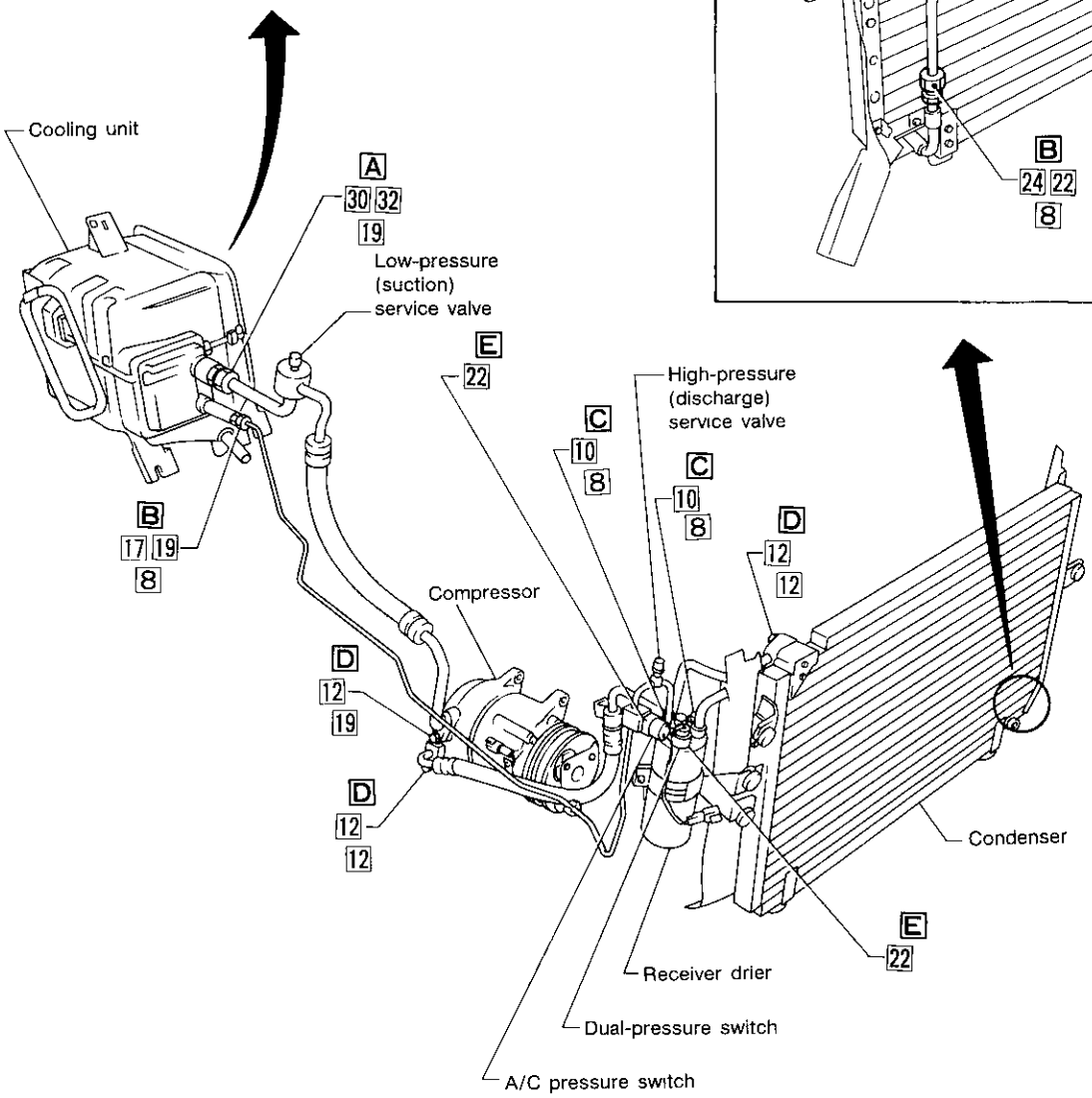


(Tightening torque)
(Wrench size)
(O-ring size)

A : 25 - 34 (2.5 - 3.5, 18 - 25)
B : 10 - 20 (1.0 - 2.0, 7 - 14)
C : 3 - 4 (0.3 - 0.4, 2.2 - 2.9)
D : 8 - 11 (0.8 - 1.1, 5.8 - 8.0)
E : 10 - 12 (1.0 - 1.2, 7 - 9)

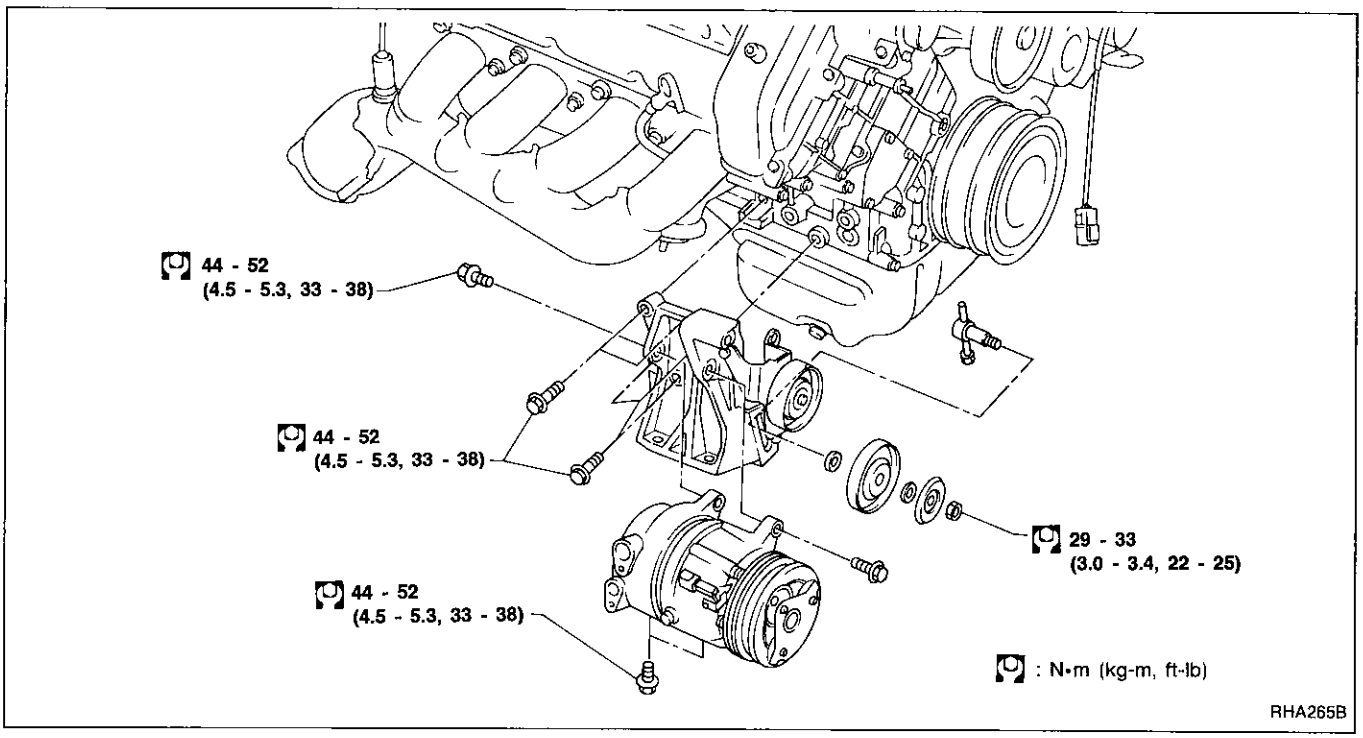
: N·m (kg-m, ft-lb)





SHA978C

Compressor Mounting



Belt Tension

- **Refer to MA section.**

Fast Idle Control Device (F.I.C.D.)

- **Refer to EF & EC section.**

Lubrication oil

SUNISO 5GS or equivalent

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 raise 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 → 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 → Ⓐ (Go to next page.)

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	45 - 75 (1.5 - 2.5, 1.6 - 2.6)	30	—
Condenser	30 - 50 (1.0 - 1.7, 1.1 - 1.8)	20	—
Liquid tank	15 - 25 (0.5 - 0.8, 0.5 - 0.9)	10	Add if compressor is not replaced.*1
In case of refrigerant leak	30 - 50 (1.0 - 1.7, 1.1 - 1.8)	—	Large leak
	—	—	Small leak*2

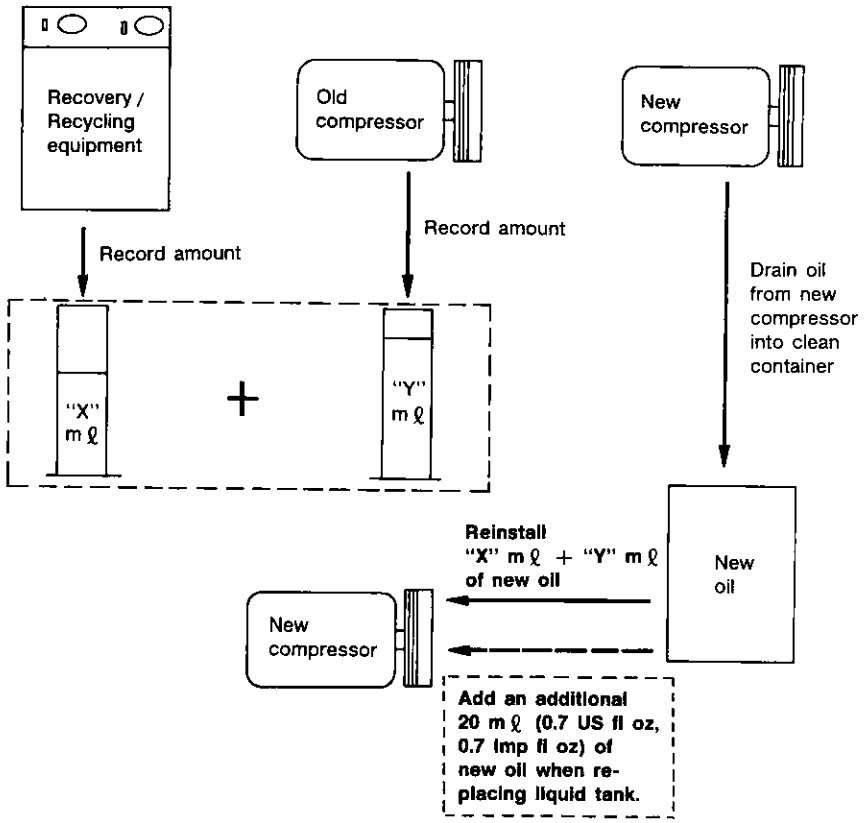
*1: If compressor is replaced, addition of oil is included in the flow chart.
*2: If refrigerant leak is small, no addition of oil is needed. "Ratio" in this table indicated the ratio of added oil to the overall amount of oil needed in the system.

No → Carry out the A/C performance test.

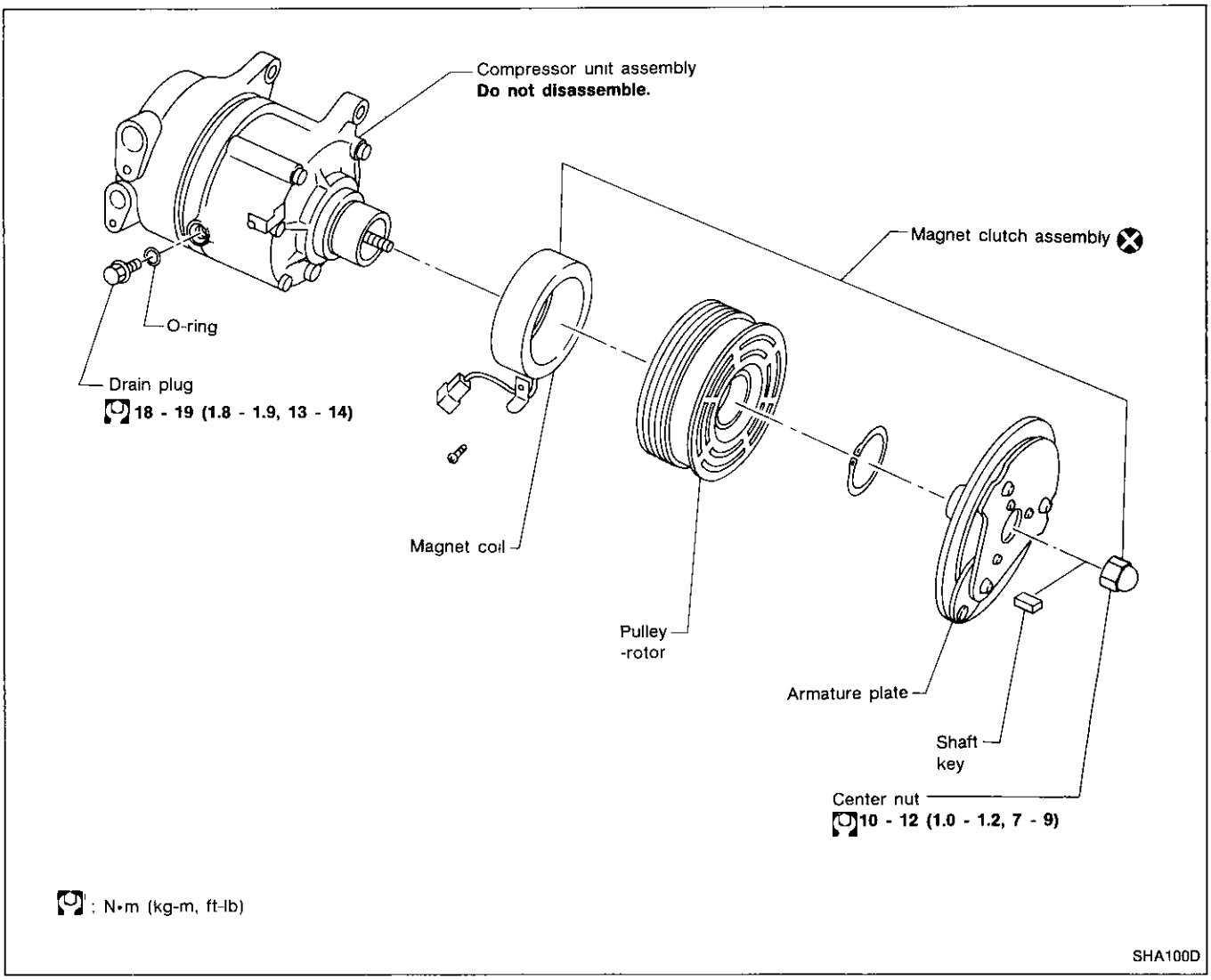
Checking and Adjusting (Cont'd)

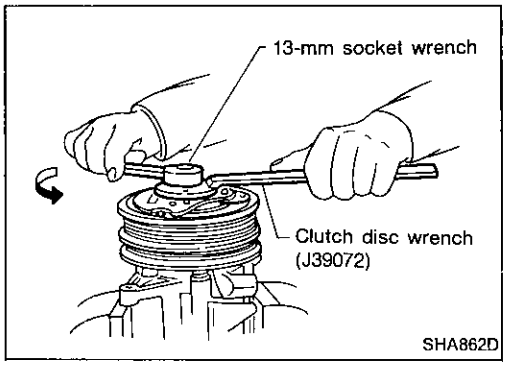
Ⓐ

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, V-6 or 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 20 mℓ (0.7 US fl oz, 0.7 Imp fl oz) of oil at this time.
   Do not add this 20 mℓ (0.7 US fl oz, 0.7 Imp fl oz) of oil if only replacing the compressor.



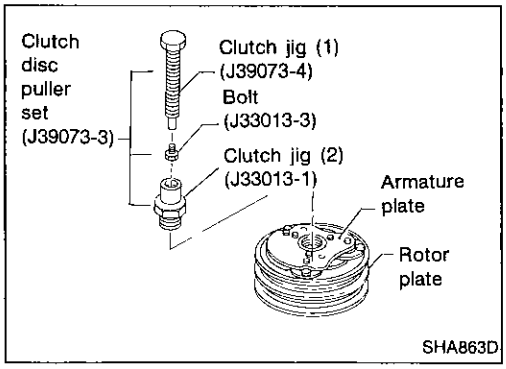
SHA856D





Removing Magnet Clutch Assembly

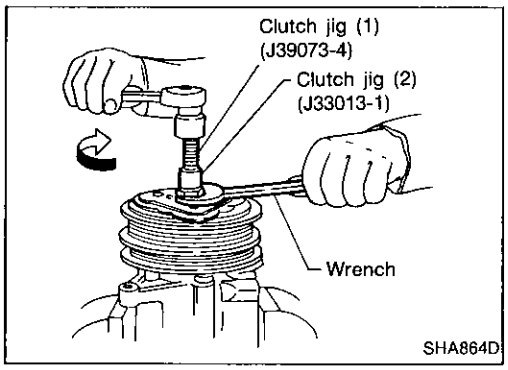
- Remove center nut while holding armature plate with clutch disc wrench.

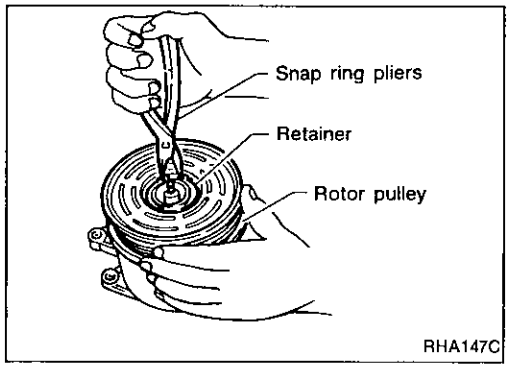


- Install jigs in the sequence shown, and tighten clutch jig (1) while holding clutch jig (2) with wrench. This will cause armature plate to be removed.

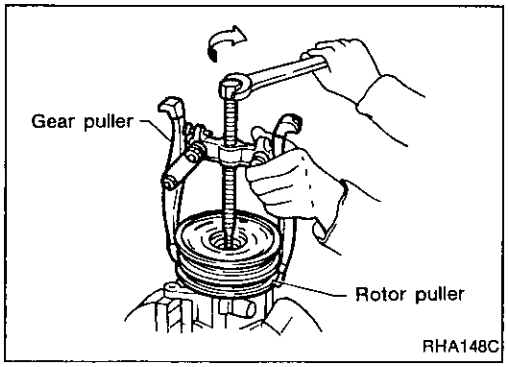
Fit a bolt to the tip of the clutch jig, and attach the jig to the clutch.

Removing Magnet Clutch Assembly (Cont'd)

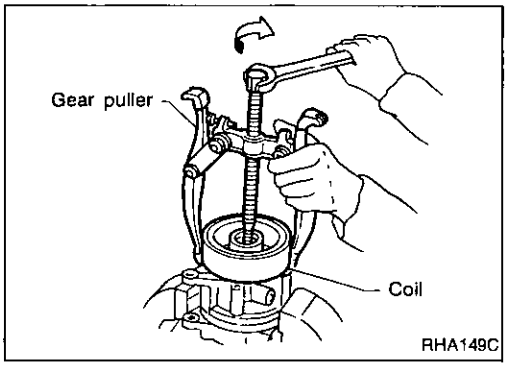




- Remove retainer using snap ring pliers.

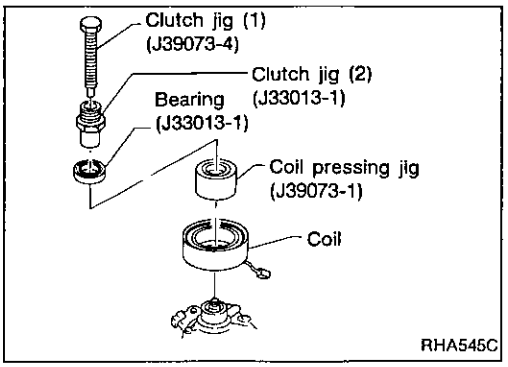


- Remove pulley using gear puller.



- Remove lead wire fixing screw, and remove coil.

When removing the coil, pay attention so as not to damage the lead and grounding wire with gear puller jaws.

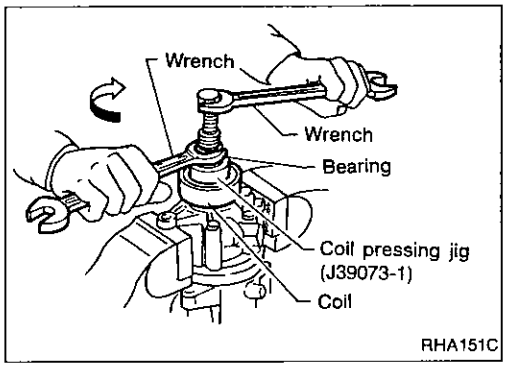


Installation of Magnet Clutch Assembly

- Remove bolt from the tip of the clutch jig (1), and attach jigs in the sequence shown.

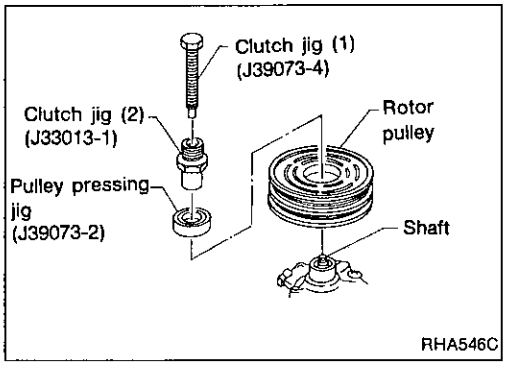
Tighten clutch jig (1) to shaft securely.

Installation of Magnet Clutch Assembly (Cont'd)



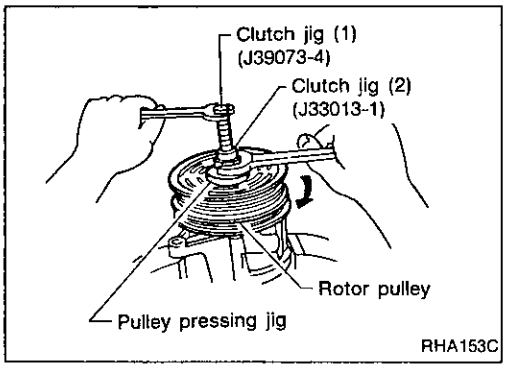
- Press fit the coil into compressor main body by tightening clutch jig (2) while holding clutch jig (1) with wrench.

Arrange coil lead and lead (connector) of compressor on the same side before press fitting the coil.

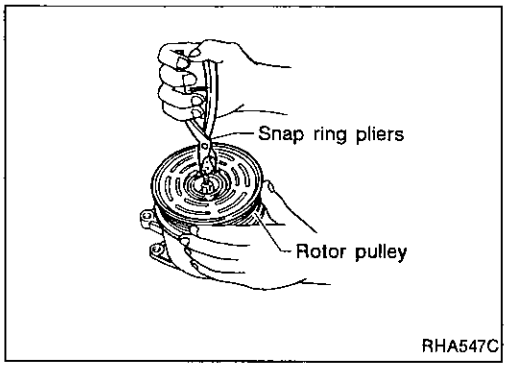


- Install jigs in the sequence shown.

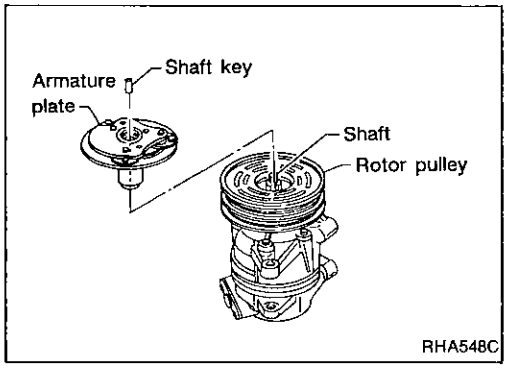
Tighten clutch jig (1) to shaft.



- Press fit the rotor pulley by tightening clutch jig (2) while holding clutch jig (1) with wrench.



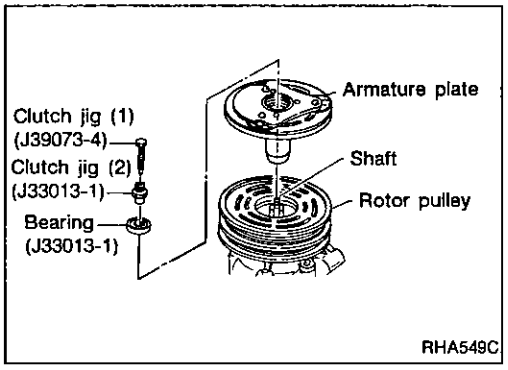
- Fit retainer using snap ring pliers.
- **Do not reuse retainer. Be sure to use a new one.**
- **Pay attention so as not to damage the bearing seal when fitting the retainer.**
- **Fit the retainer with its taper facing up.**



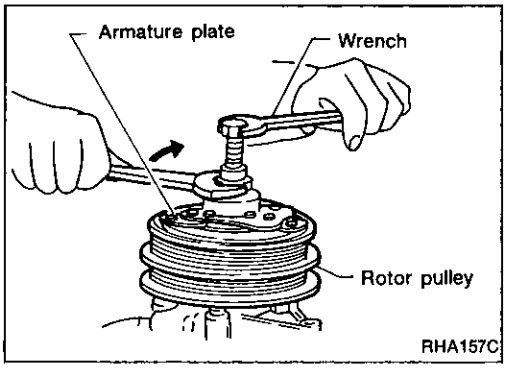
- Insert shaft key by aligning shaft key groove with groove of armature plate.

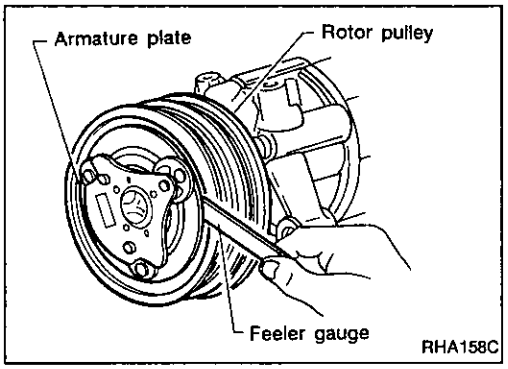
Do not reuse a shaft key. Be sure to use a new one.

Installation of Magnet Clutch Assembly (Cont'd)

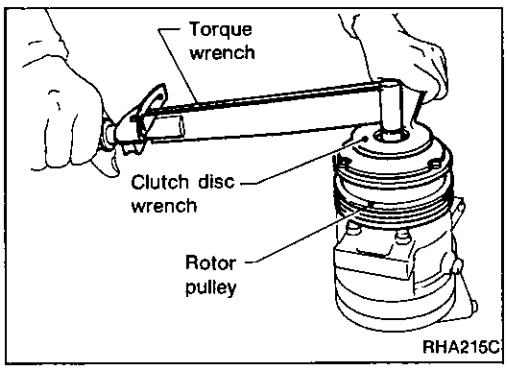


- Install jigs in the sequence shown. Press fit armature plate while observing the gap from rotor pulley. To press fit, tighten clutch jig (2) while holding clutch jig (1) with wrench.





Standard gap: 0.3 - 0.6 mm (0.012 - 0.024 in)



- Install center nut using clutch disc wrench.

Do not reuse the nut. Be sure to use a new one.

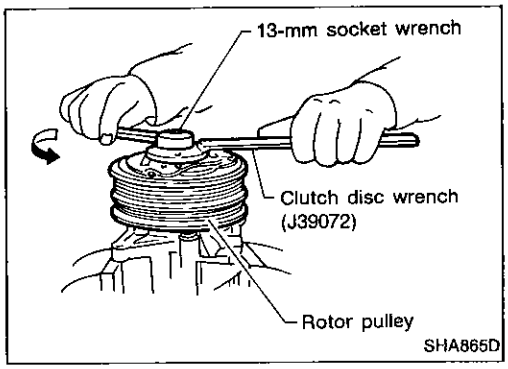
Nut tightening torque:

: 0.10 - 0.12 N·m

(1.0 - 1.2 kg-cm, 0.87 - 1.04 in-lb)

After assembling, rotate rotor pulley by hand, and check for smooth rotation without interference noise.

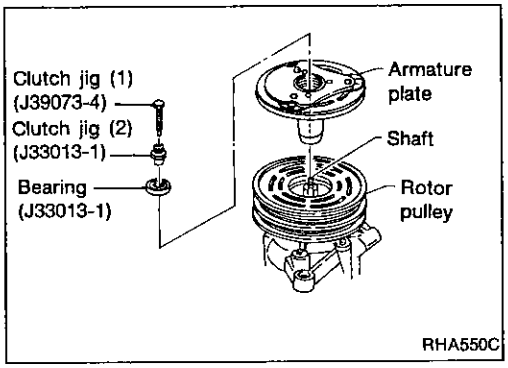
- Operation check procedure:
  Apply battery voltage to magnet clutch coil, and check several times for normal clutch ON/OFF operation.
- Rotate compressor shaft more than five turns in both directions by hand to equalize oil distribution inside compressor, then run compressor for about one hour by idling engine.



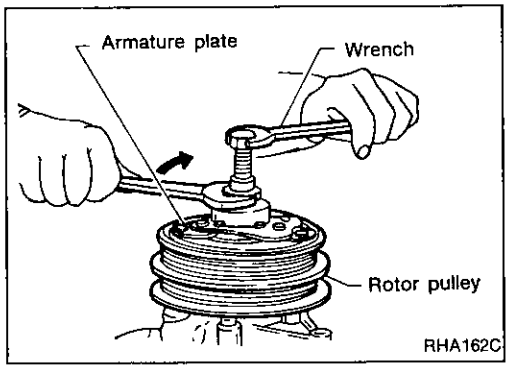
Gap Adjusting Procedure

WHEN GAP IS LARGE

- Remove center nut while holding armature plate.



- Install clutch jigs in the sequence shown.



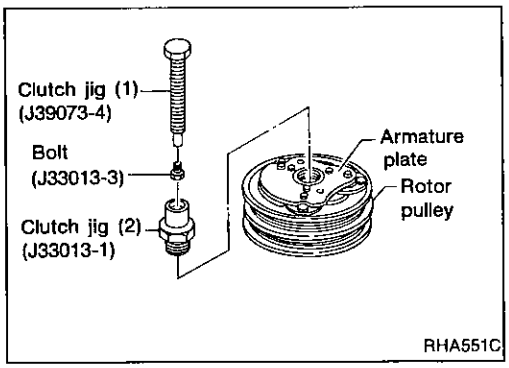
- Press fit the armature plate by tightening clutch jig (2) while holding clutch jig (1) with wrench.

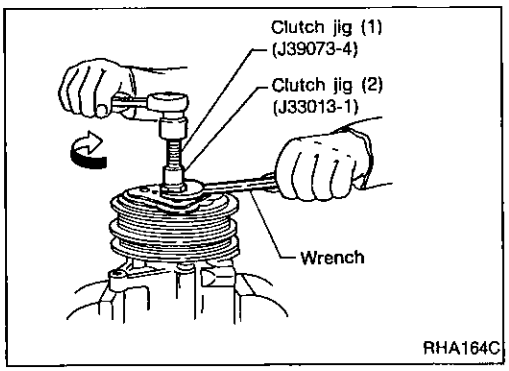
Tighten clutch jig (1) into shaft.

- Measure the gap again.
  After achieving the specified gap, install center nut using clutch disc wrench.

WHEN GAP IS SMALL

- Install jigs as shown.



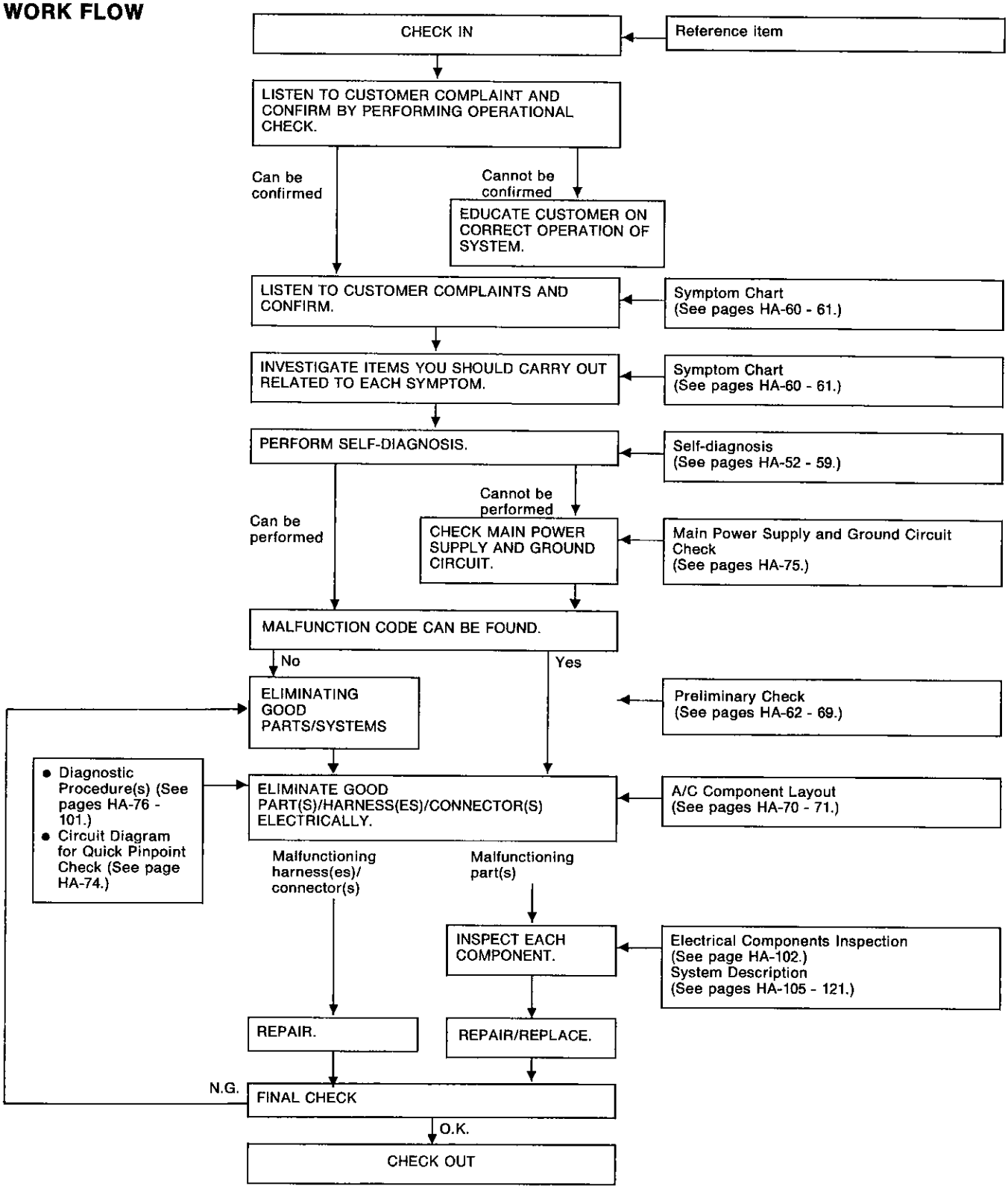


- Expand the gap by lifting up armature plate. To lift up armature plate, tighten clutch jig (1) while holding clutch jig (2) with wrench.

Center nut need not be removed when expanding the gap.

How to Perform Trouble Diagnoses for Quick and Accurate Repair

WORK FLOW

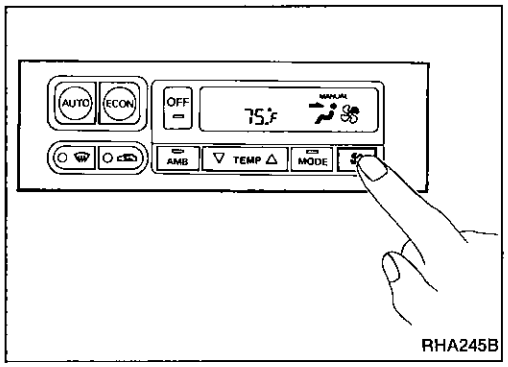


Operational Check

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.

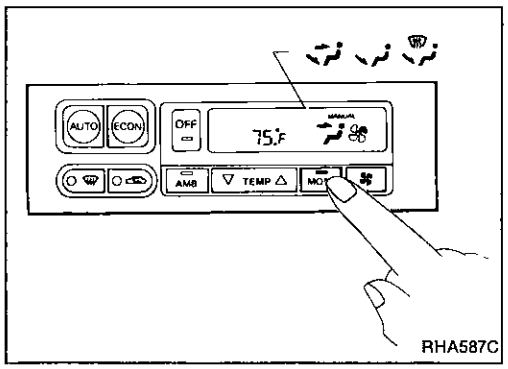


RHA245B

PROCEDURE:

1. Check blower

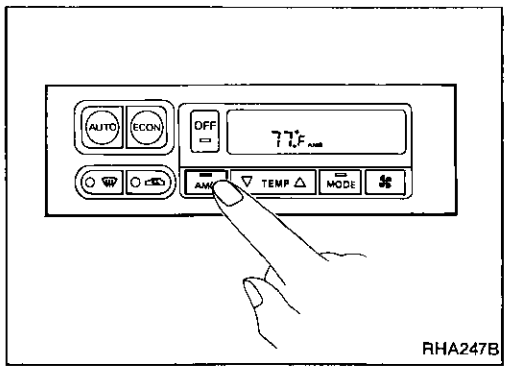
1) Press FAN button one time.
   MANUAL should appear on the display.
   Blower should operate on low speed, and the fan symbol should have one blade lit ( ).
2) Press FAN button one more time.
3) Continue checking blower speed and fan symbol until all four speeds have been checked.
4) Leave blower on high speed.



RHA587C

2. Check discharge air

1) Press the MODE button one time.
   Display should show air to the face ( ).
2) Confirm that all discharge air comes out the face vents.
3) Press MODE button one more time.
   Display should show air to face and foot (bi-level) ( )
4) Confirm that discharge air comes out the face and foot vents.
5) Press MODE button one more time.
   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 MODE button one more time.
   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.
9) Leave the system in the foot/defrost mode.

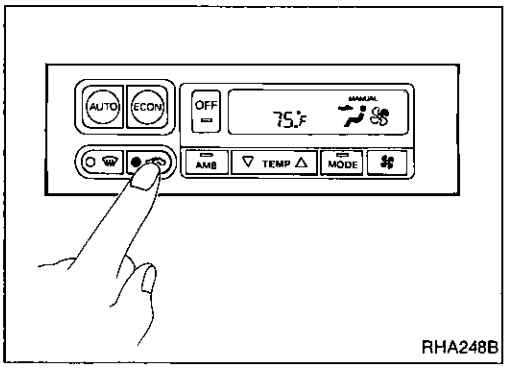


RHA247B

3. Check ambient display

Press the AMB button.
Display should show the outside (ambient) temperature for approximately 5 seconds.

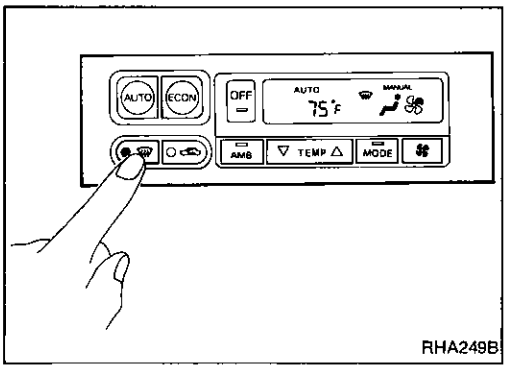
Operational Check (Cont'd)



RHA248B

4. Check recirc

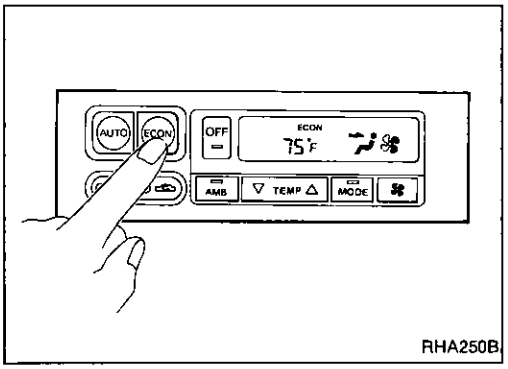
1) Press RECIRC button.
   RECIRC indicator should light.
2) Listen for intake door position change (you should hear blower sound change slightly).



RHA249B

5. Check defrost

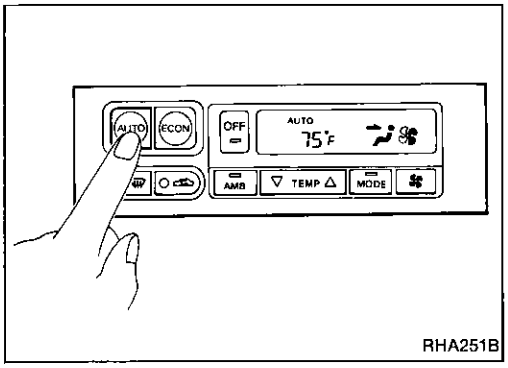
1) Press defrost button.
2) Check that RECIRC is canceled.
   The discharge air should be coming only from the defrost vents.
3) Confirm that the compressor clutch is engaged (visual inspection).
   The display should indicate AUTO, MANUAL, and defrost ( ).



RHA250B

6. Check ECON mode

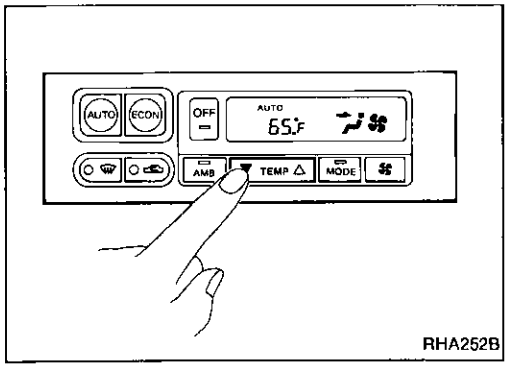
1) Press ECON button.
   Defrost should be canceled.
   Discharge air outlet will depend on ambient, in-vehicle, and set temperatures.
   Display should indicate ECON (no AUTO, no MANUAL).
2) Confirm that the compressor clutch is not engaged (visual inspection).



RHA251B

7. Check AUTO mode

1) Press AUTO button.
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).

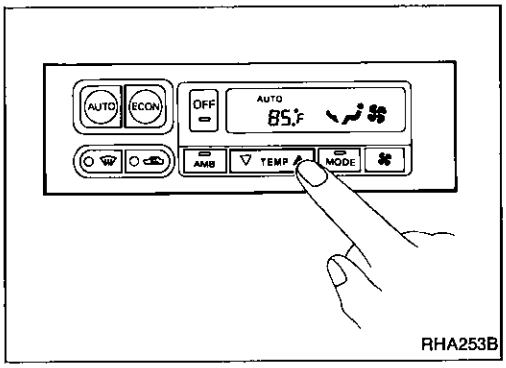


RHA252B

8. Check temperature decrease

1) Press the temperature decrease button until 18°C (65°F) is displayed.
2) Check for cold air at discharge air outlets.

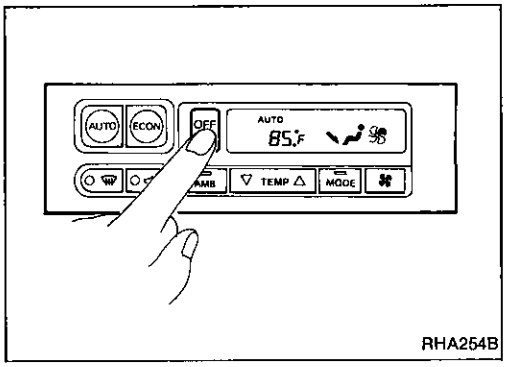
Operational Check (Cont'd)



RHA253B

9. Check temperature increase

1) Press the temperature increase button 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.



RHA254B

10. Check memory function

1) Press off button.
2) Turn the ignition off.
3) Wait 15 seconds.
4) Turn the ignition on.
5) Press the AUTO button.
6) Confirm that the set temperature remained at 32°C (85°F).

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 (Front driver side only)
Hood: Open
(AUTO) switch: ON
(▼) switch (P.T.C.): Max. COLD set
(MODE) (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

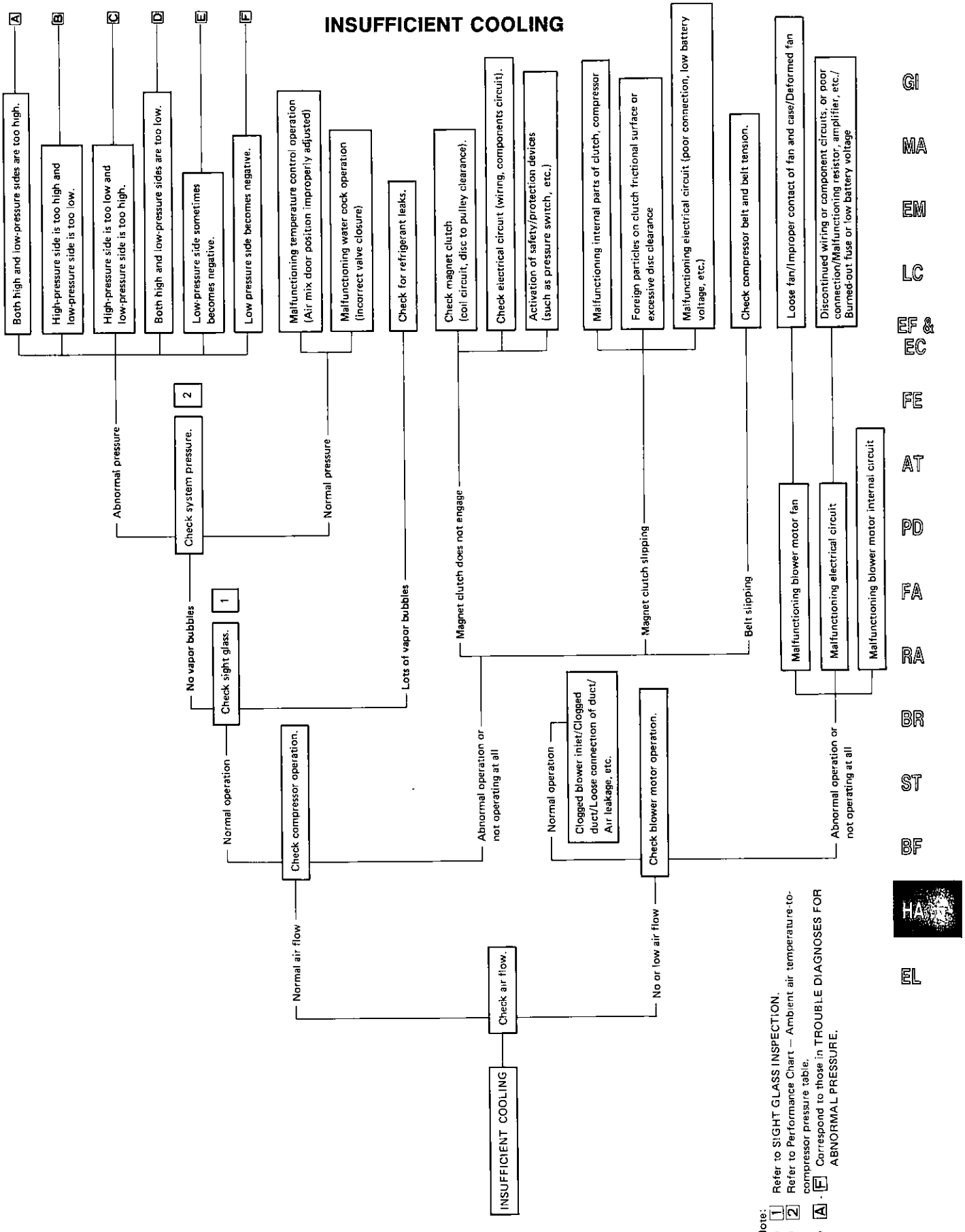
Inside air (Recirculating air) at blower assembly inlet		Discharge air temperature at center ventilator °C (°F)
Relative humidity %	Air temperature °C (°F)	
50 - 60	25 (77)	7.5 - 9.8 (46 - 50)
	30 (86)	10.3 - 12.9 (51 - 55)
	35 (95)	13.0 - 15.9 (55 - 61)
	40 (104)	15.8 - 19.0 (60 - 66)
60 - 70	25 (77)	9.8 - 12.0 (50 - 54)
	30 (86)	12.9 - 15.4 (55 - 60)
	35 (95)	15.9 - 18.8 (61 - 66)
	40 (104)	19.0 - 22.3 (66 - 72)

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)	657 - 814 (6.7 - 8.3, 95 - 118)	186 - 226 (1.9 - 2.3, 27 - 33)
	25 (77)	814 - 1,010 (8.3 - 10.3, 118 - 146)	186 - 226 (1.9 - 2.3, 27 - 33)
	30 (86)	981 - 1,196 (10.0 - 12.2, 142 - 173)	186 - 226 (1.9 - 2.3, 27 - 33)
	35 (95)	1,147 - 1,393 (11.7 - 14.2, 166 - 202)	186 - 226 (1.9 - 2.3, 27 - 33)
	40 (104)	1,304 - 1,589 (13.3 - 16.2, 189 - 230)	191.2 - 235.4 (1.95 - 2.4, 27.7 - 34.1)

Performance Test Diagnoses

INSUFFICIENT COOLING

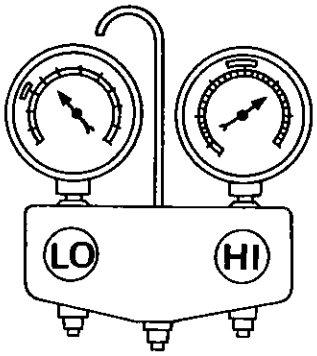


Note:
- 1 Refer to SIGHT GLASS INSPECTION.
- 2 Refer to Performance Chart — Ambient air temperature-to-compressor pressure table.
- A - F Correspond to those in TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE.

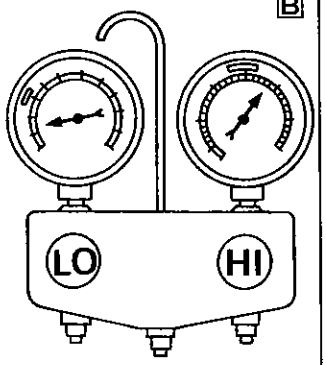
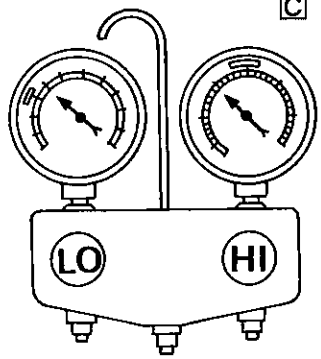
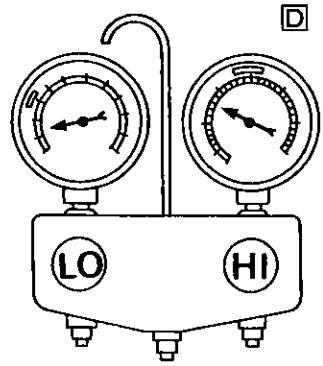
Performance Test Diagnoses (Cont'd)

TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE

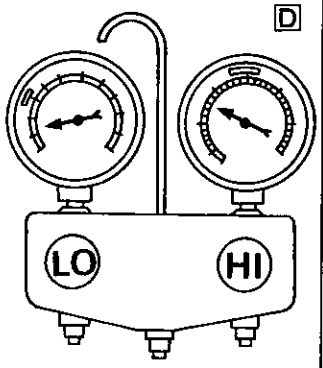
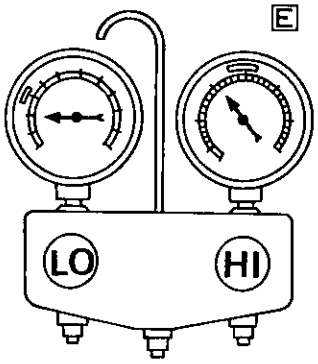
Whenever abnormal pressure of high and/or low sides of the system is noted, diagnosis must be conducted by using a manifold gauge. The large-line zone on the gauge scale (see illustrations.) shown in the following table refers to the standard (normal) pressure range for the corresponding pressure side (high or low). Since the standard (normal) pressure, however, differs from vehicle to vehicle, refer to the "Ambient Temperature-Pressure Characteristics" chart.

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Both high and low-pressure sides are too high.  AC359A	• Pressure is reduced soon after water is splashed on condenser. • No air bubbles appear in sight glass when pressure is reduced.	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.

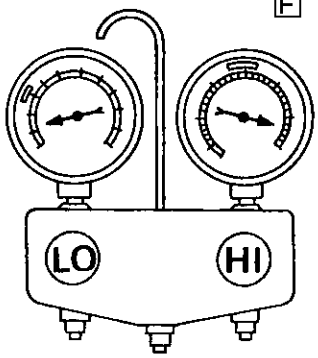
Performance Test Diagnoses (Cont'd)

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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(26 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.) ..... HA- 81
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SYMPTOM: Ambient sensor circuit is shorted.
(-21 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.) ..... HA- 82

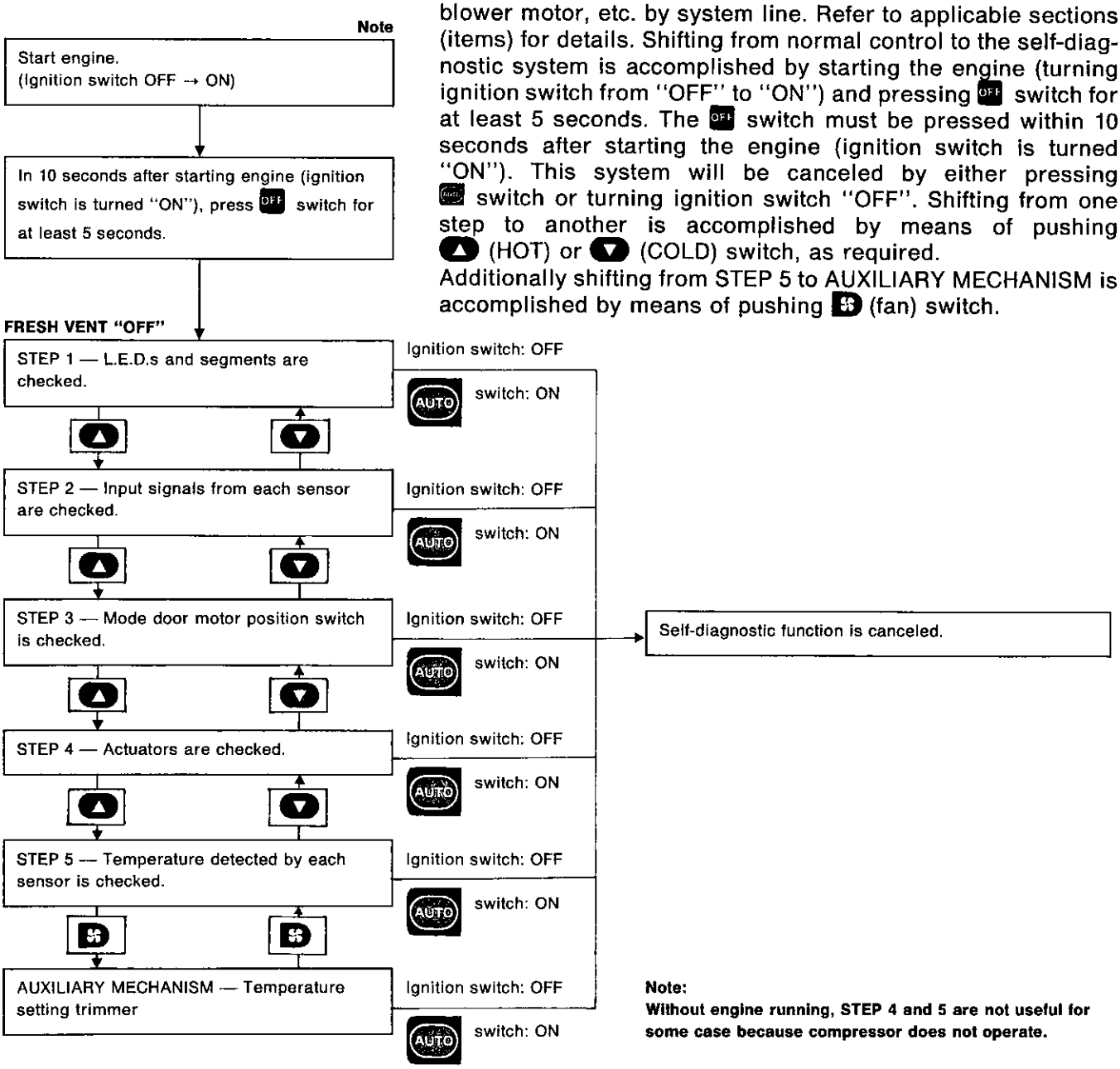
Contents (Cont'd)

Diagnostic Procedure 8
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(-22 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.) ..... HA- 82
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Self-diagnosis

INTRODUCTION AND GENERAL DESCRIPTION

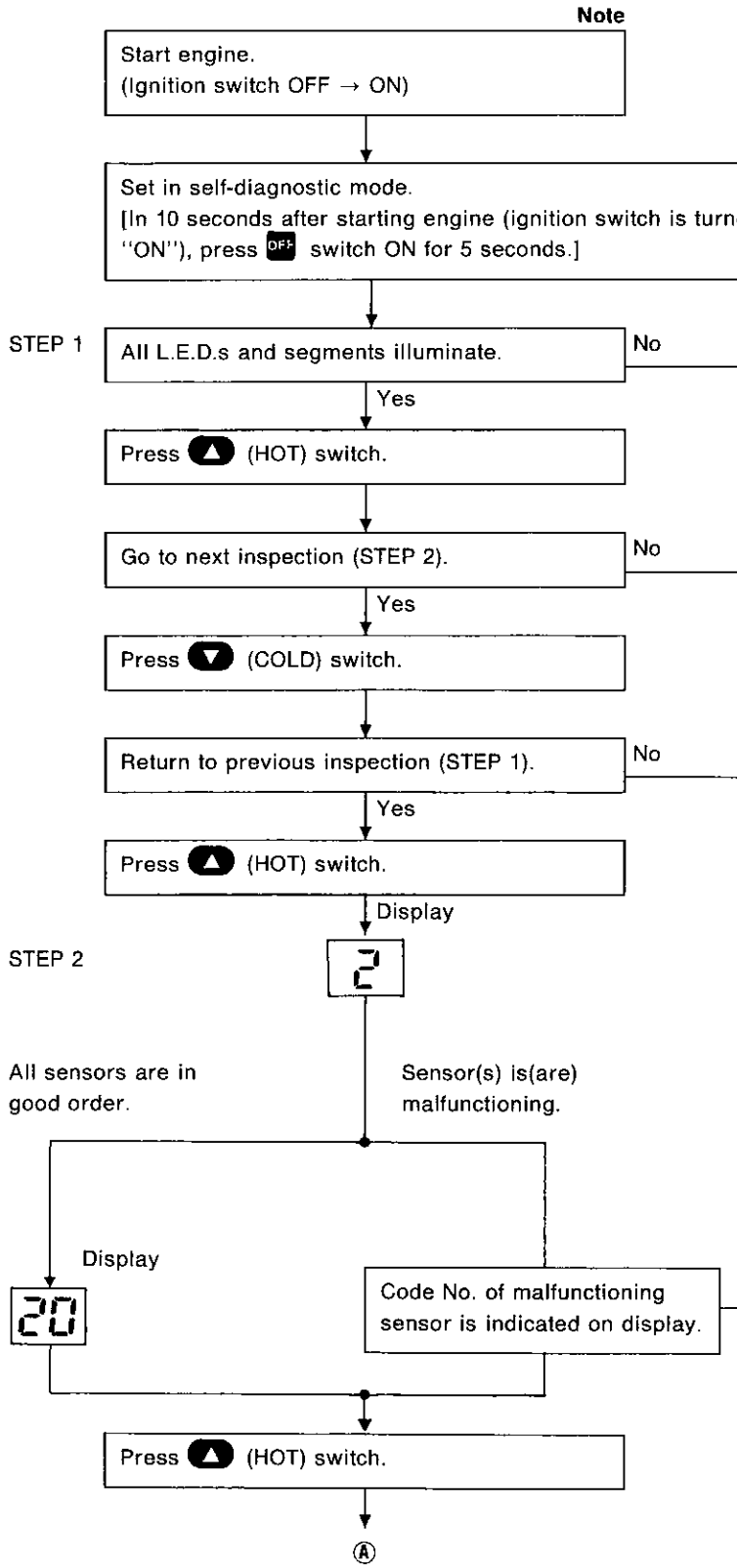
The self-diagnostic system diagnoses sensors, door motors, blower motor, etc. by system line. Refer to applicable sections (items) for details. Shifting from normal control to the self-diagnostic system is accomplished by starting the engine (turning ignition switch from "OFF" to "ON") and pressing OFF switch for at least 5 seconds. The OFF switch must be pressed within 10 seconds after starting the engine (ignition switch is turned "ON"). This system will be canceled by either pressing AUTO switch or turning ignition switch "OFF". Shifting from one step to another is accomplished by means of pushing ▲ (HOT) or ▼ (COLD) switch, as required.
Additionally shifting from STEP 5 to AUXILIARY MECHANISM is accomplished by means of pushing (fan) switch.



Note:
Without engine running, STEP 4 and 5 are not useful for some case because compressor does not operate.

Self-diagnosis (Cont'd)

STEP BY STEP PROCEDURE

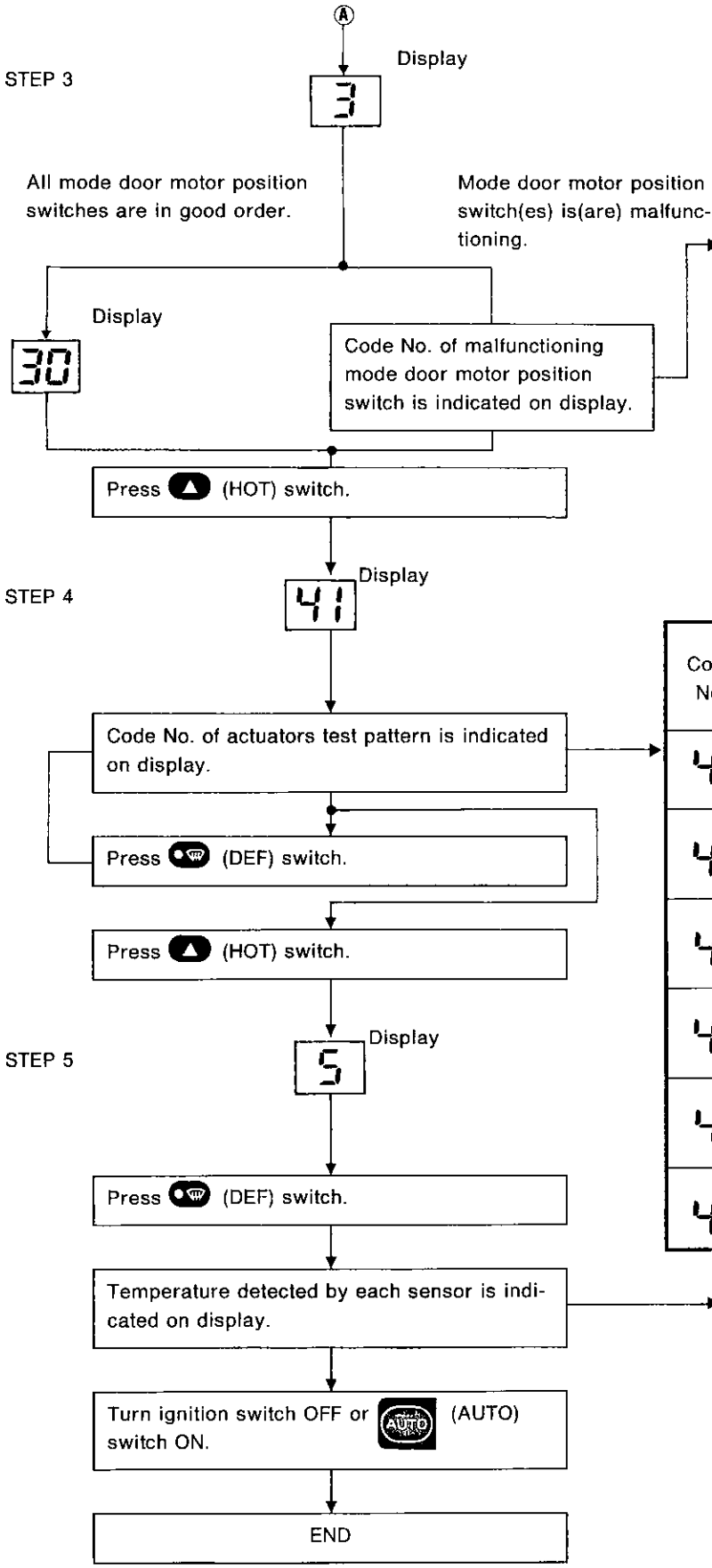


***1: Conduct self-diagnosis STEP 2 under sunshine.**
When conducting indoors, direct light (more than 60W) at sunload sensor or Code No. 25 will indicate despite that sunload sensor is functioning properly.

Code No.	Malfunctioning sensor (including circuits)
21	Ambient sensor
22	In-vehicle sensor
23	Water temperature sensor
24	Intake sensor
25	Sunload sensor*1
26	P.B.R.

Note:
Without engine running, STEP 4 and 5 are not useful for some case because compressor does not operate.

Self-diagnosis (Cont'd)



Code No.	Malfunctioning mode door motor position switch (including circuits)
31	VENT
32	B/L 1
33	B/L 2
34	FOOT/DEF 1
35	FOOT/DEF 2
36	DEF

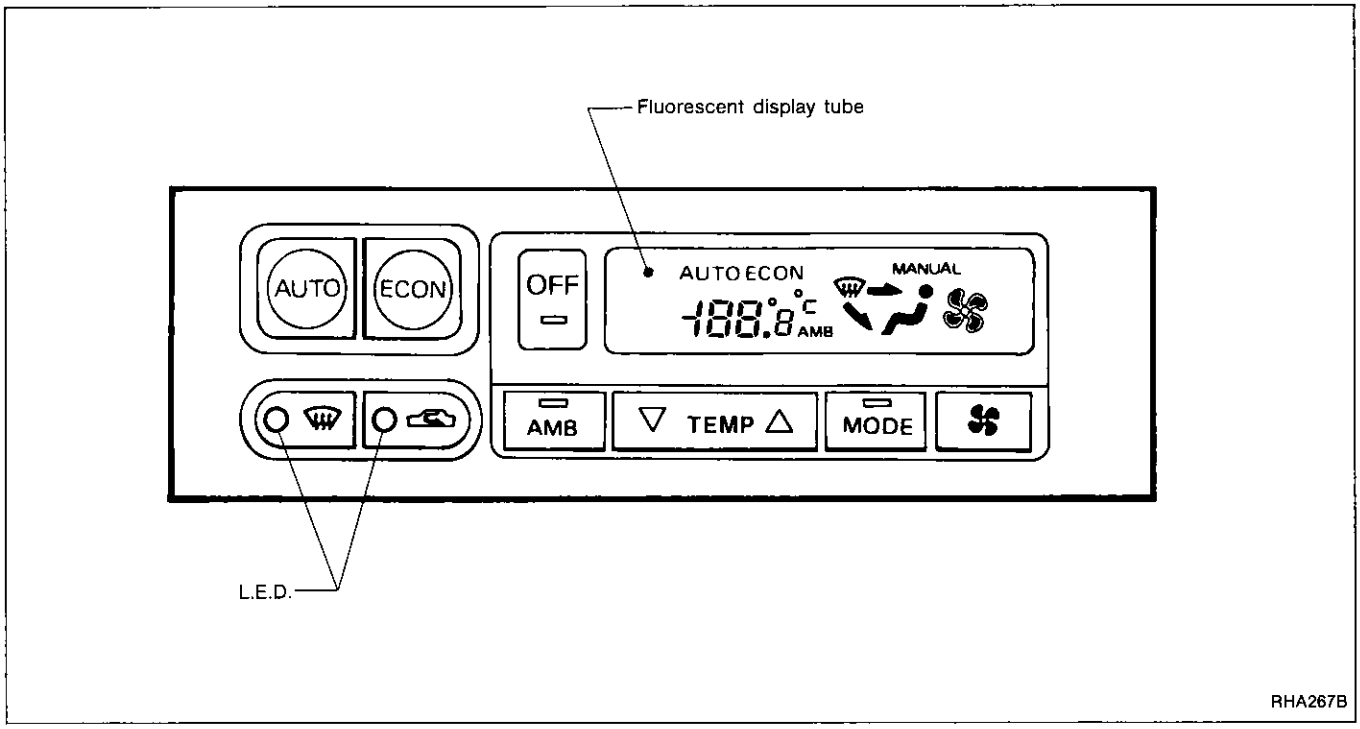
Code No.	Actuators test pattern				
	Mode door	Intake door	Air mix door	Blower motor	Compressor
41	VENT	REC	Full Cold	4 - 5V	ON
42	B/L 1	REC	Full Cold	9 - 11V	ON
43	B/L 2	20% FRE	Full Hot	7 - 9V	ON
44	D/F 1	FRE	Full Hot	7 - 9V	OFF
45	D/F 2	FRE	Full Hot	7 - 9V	OFF
46	DEF	FRE	Full Hot	10 - 12V	ON

Self-diagnosis (Cont'd)

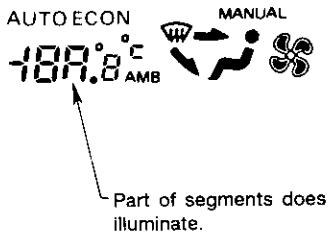
HOW TO INTERPRET THE RESULTS

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.

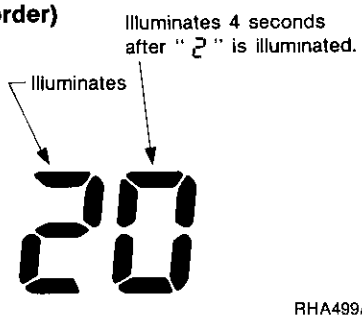


Display malfunction



If L.E.D.s or segments malfunction, L.E.D. does not come on or display shows incomplete segment.

Display (when all sensors are in good order)

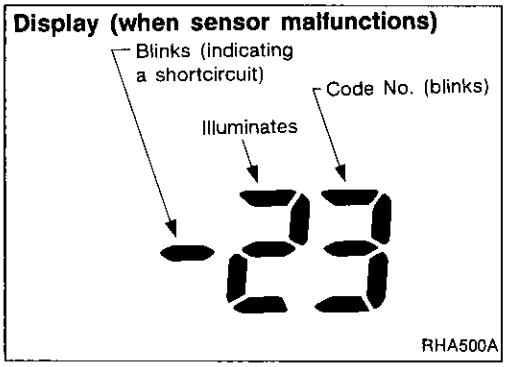


STEP 2: Checks each sensor circuit for open or short circuit

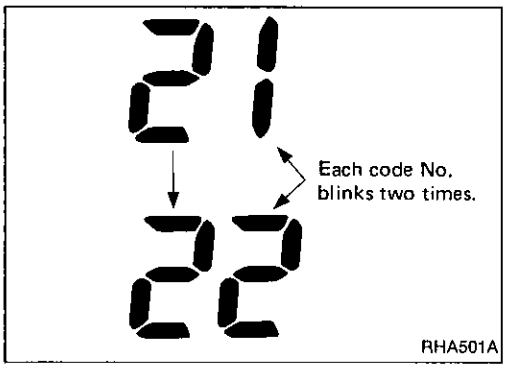
Display shows " 2 " in STEP 2 mode.
When all sensors are in good order, display shows "20".
It takes approximately 4 seconds to check all sensors.

Self-diagnosis (Cont'd)

Display (when sensor malfunctions)



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

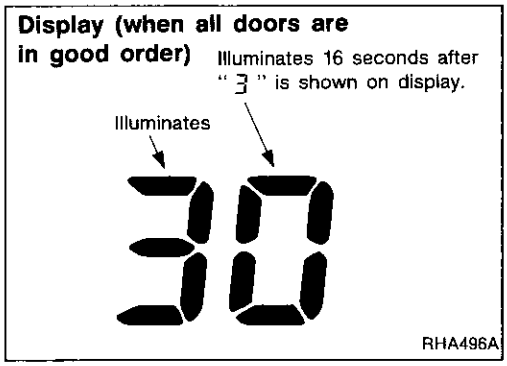
If a circuit is opened or shorted, display shows its code No. when input corresponds with any of following conditions.

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	Water temperature sensor	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 0.0319 mA	Greater than 1.147 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.

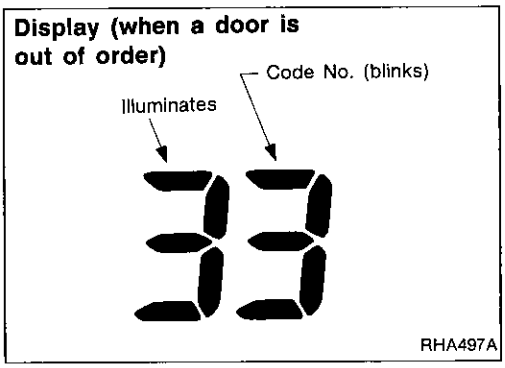
Display (when all doors are in good order)



STEP 3: Checks mode door position

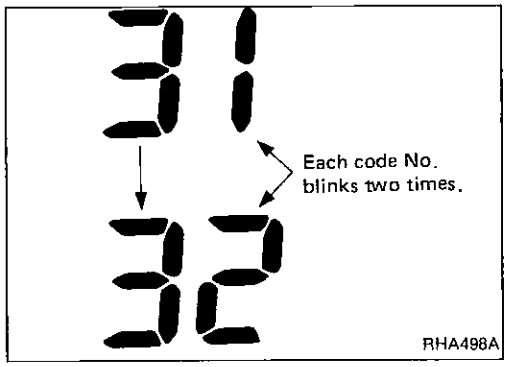
Display shows "3 " in STEP 3 mode.
When all doors are in good order, display will then show "30".
It takes approximately 16 seconds to check all mode doors.

Self-diagnosis (Cont'd)



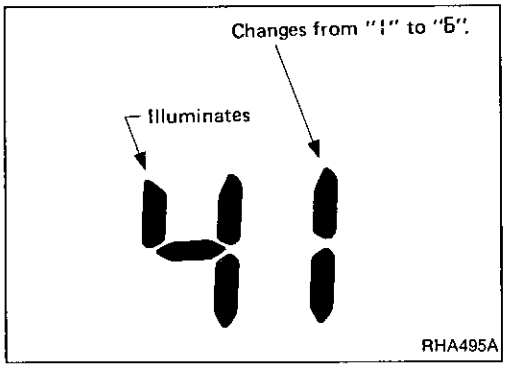
When abnormalities are detected, display shows a code No. corresponding with malfunctioning part.

Code No.	31	32	33	34	35	36
Malfunctioning part	VENT	B/L 1	B/L 2	F/D 1	F/D 2	DEF



If two or more mode doors are out of order, corresponding code numbers respectively blink two times.

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".

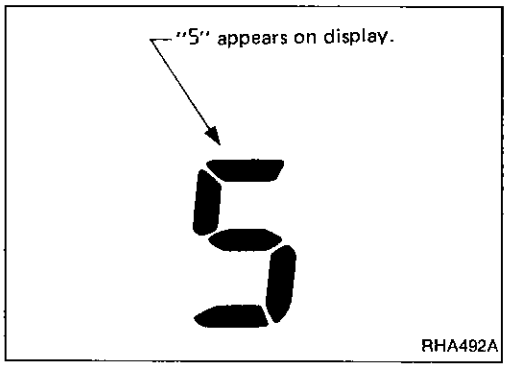
During inspection in STEP 4 mode, auto amplifier will forcefully transmit an output to the affected actuators in response to code No. shown on display, as indicated in table below.

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 1	B/L 2	F/D 1	F/D 2	DEF
Intake door	REC	REC	20% FRE	FRE	FRE	FRE
Air mix door	Full Cold	Full Cold	Full Hot	Full Hot	Full Hot	Full Hot
Blower motor	4 - 5 V	9 -11 V	7 - 9 V	7 - 9 V	7 - 9 V	10 - 12 V
Compressor	ON	ON	ON	OFF	OFF	ON

Operating condition of each actuator cannot be checked by indicators.

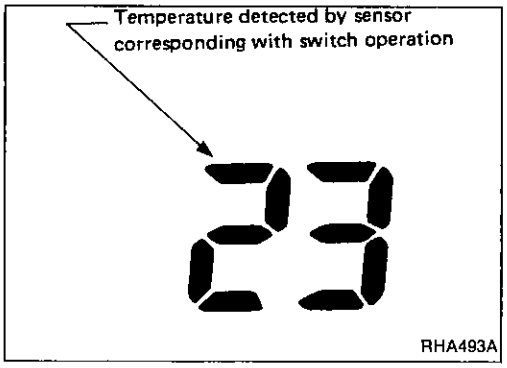
Self-diagnosis (Cont'd)

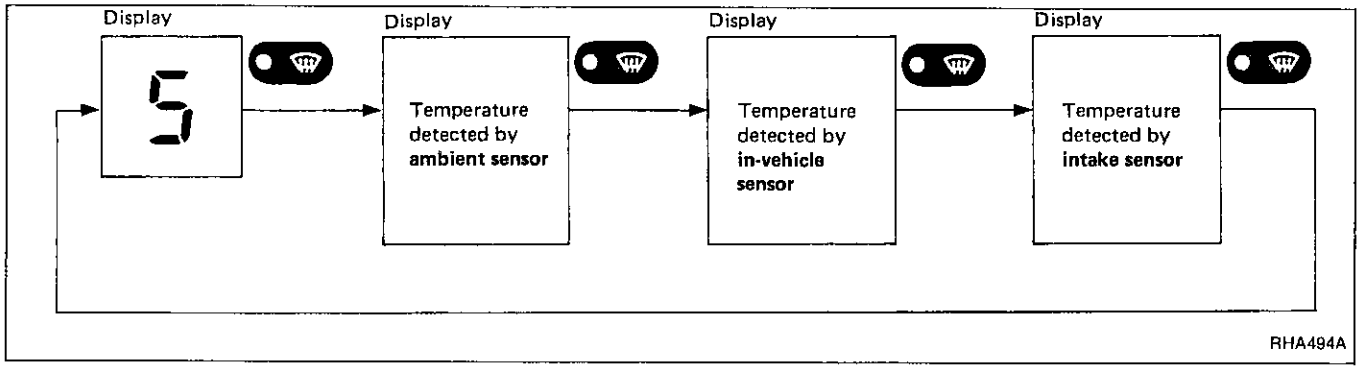


STEP 5: Checks temperature detected by sensors

Display shows "5 " in STEP 5 mode.

- When (DEF) switch is pressed one time, display shows temperature detected by ambient sensor.
- When (DEF) switch is pressed second time, display shows temperature detected by in-vehicle sensor.
- When (DEF) switch is pressed third time, display shows temperature detected by intake sensor.
- When (DEF) switch is pressed fourth time, display returns to original presentation "5 ".





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**.

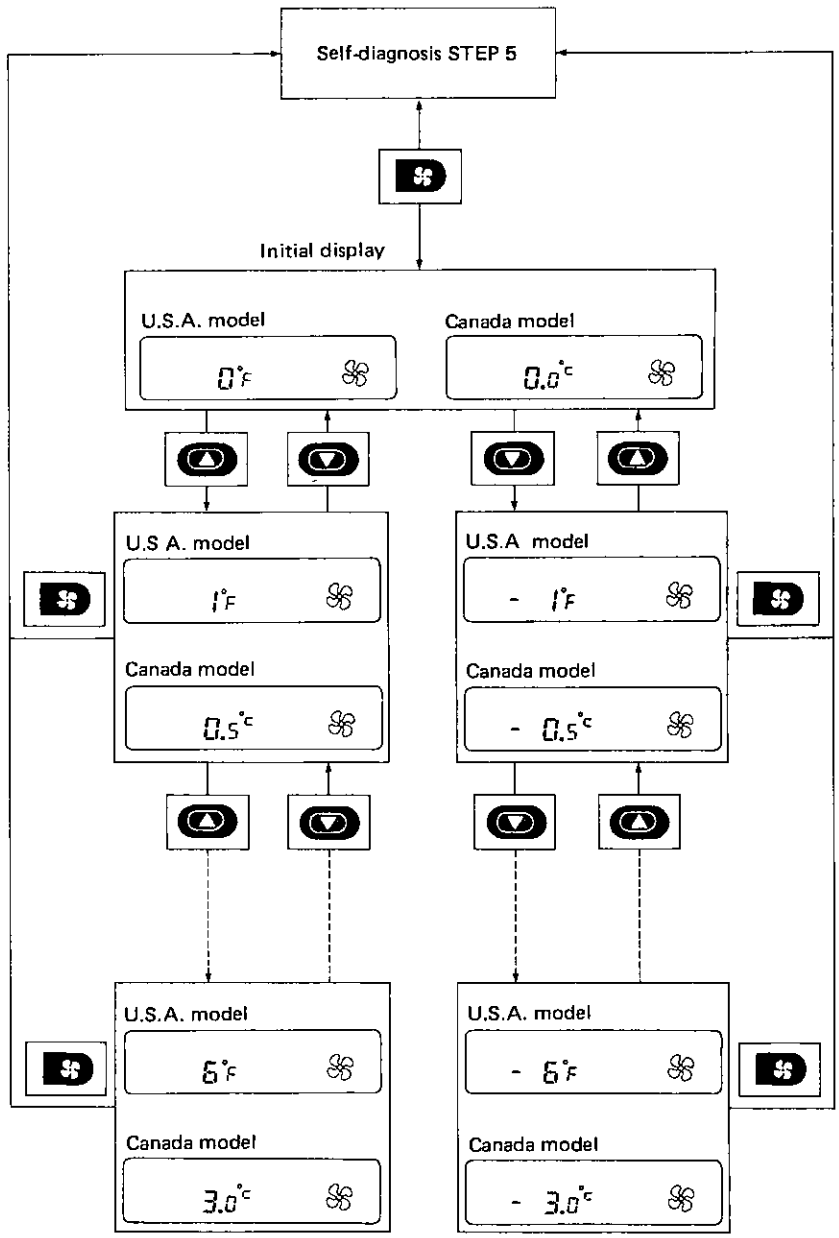
Self-diagnosis (Cont'd)

AUXILIARY MECHANISM: Temperature setting trimmer

This trimmer compensates for differences between temperature setting (displayed digitally) and temperature felt by driver in a range of ±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. Then, press either (HOT) or (COLD) switch as desired. Temperature will change at a rate of 0.5°C (1°F) each time a switch is pressed.



RHA491A

When battery cable is disconnected, trimmer operation is canceled and temperature set becomes that of initial condition i.e. 0°C (0°F).

Symptom Chart

DIAGNOSTIC TABLE

PROCEDURE			Self-diagnosis						Preliminary Check								Diagnostic Procedure												
SYMPTOM			STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	AUXILIARY MECHANISM	Preliminary Check 1	Preliminary Check 2	Preliminary Check 3	Preliminary Check 4	Preliminary Check 5	Preliminary Check 6	Preliminary Check 7	Preliminary Check 8	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
Air outlet does not change.			❶	❷	○	○	○		❸								○	○		○	○	○	○	○		○	○	○	
Intake door does not change.			❶	❷		○	○			❸							○	○		○	○	○	○	○		○	○	○	
Insufficient cooling			○	○	○	○	○	○	○	○	❶		○	○	○		○	○		○	○	○	○	○		○	○	○	○
Insufficient heating			○	○	○	○	○	○	○	○		❶	○		○		○	○		○	○	○	○	○		○	○	○	○
Blower motor operation is malfunctioning.			❶	❷		○	○						❸				○	○	○	○	○	○	○	○	○	○	○		
Magnet clutch does not engage.			❶	❷		○	○							❸			○	○		○	○	○	○	○		○	○	○	
Discharged air temperature does not change.			❶	❷		○	○								❸		○	○		○	○	○	○	○		○	○	○	○
Noise																❶													
Result of self-diagnosis STEP 2	21	Ambient sensor circuit is open.	❶	❷			❸										❹												
	22	In-vehicle sensor circuit is open.	❶	❷			❸											❹											
	23	Water temperature circuit is open.	❶	❷															❸										
	24	Intake sensor circuit is open.	❶	❷			❸													❹									
	25	Sunload sensor circuit is open.	❶	❷																	❸								
	26	P.B.R. circuit is open.	❶	❷																		❸							
	-21	Ambient sensor circuit is shorted.	❶	❷			❸																❹						
	-22	In-vehicle sensor circuit is shorted	❶	❷			❸																	❹					
	-23	Water temperature sensor circuit is shorted.	❶	❷																					❸				
	-24	Intake sensor circuit is shorted.	❶	❷			❸																			❹			
	-25	Sunload sensor circuit is shorted.	❶	❷																							❸		
	-26	P.B.R. circuit is shorted.	❶	❷																								❸	
Condenser fan motor does not operate.																													❶
Mode door motor does not operate normally.			❶	❷	❸	❹	○										○	○		○	○	○	○	○		○	○	○	
Intake door motor does not operate normally.			❶	❷		❸	○										○	○		○	○	○	○	○		○	○	○	
Air mix door motor does not operate normally			❶	❷		❸	○										○	○		○	○	○	○	○		○	○	○	
Blower motor operation is malfunctioning under out of Starting Fan Speed Control.			❶	❷		○	○						❸				○	○	○	○	○	○	○	○	○	○	○		
Magnet clutch does not operate after performing Preliminary Check 6.			❶	❷		○	○							❸			○			○									
Self-diagnosis cannot be performed.																													

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						Electrical Components Inspection																					
Diagnostic Procedure 14	Diagnostic Procedure 15	Diagnostic Procedure 16	Diagnostic Procedure 17	Diagnostic Procedure 18	Diagnostic Procedure 19	Auto amp.	10A Fuse #23	15A Fuses #4 and #5	10A Fuse #10	10A Fuse #20	Ambient sensor	In-vehicle sensor	Water temperature sensor	Intake sensor	Sunload sensor	P.B.R.	Air mix door motor	Mode door motor	Intake door motor	Blower motor	Fan control amp.	Blower high relay	A/C relay	Dual-pressure switch	Magnet clutch (Compressor)	Water cock solenoid valve	Auto amp.	ECM (ECCS control module)	Condenser fan motor	Condenser fan relay	Thermoswitch	A/C pressure switch	Harness
○						○	○	○		○	○	○		○	○	○	○		○									○						○
	○					○	○	○		○	○	○		○	○	○	○			○								○						○
○	○	○	○	○		○	○	○	○	○	○	○		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
						○	○	○		○	○	○		○	○	○	○		○	○	○	○	○				○	○						○
			○			○	○	○		○	○	○	○	○	○	○					○	○	○					○	○					○
				○		○	○	○	○	○	○			○										○	○	○		○	○					○
		○				○	○	○		○	○	○		○	○	○	○										○	○						○
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					❶	❷																						○						○

Preliminary Check

PRELIMINARY CHECK 1

Air outlet does not change.

- **Perform Self-diagnosis STEP 1 before referring to the flow chart.**

CHECK SENSOR CIRCUIT.
Set up Self-diagnosis STEP 2.
Is each sensor circuit normal?
Code No. 20 should be indicated on the display after approx. 4 seconds.

N.G. →

CHECK SENSOR CIRCUIT IN DETAIL ACCORDING TO THE DIAGNOSTIC PROCEDURE BELOW CORRESPONDING TO EACH CODE NO.

Code No.	How to repair	Reference page
21	Go to Diagnostic Procedure 1.	HA-76
22	Go to Diagnostic Procedure 2.	HA-77
23	Go to Diagnostic Procedure 3.	HA-78
24	Go to Diagnostic Procedure 4.	HA-79
25	Go to Diagnostic Procedure 5.	HA-80
26	Go to Diagnostic Procedure 6.	HA-81
-21	Go to Diagnostic Procedure 7.	HA-82
-22	Go to Diagnostic Procedure 8.	HA-82
-23	Go to Diagnostic Procedure 9.	HA-83
-24	Go to Diagnostic Procedure 10.	HA-83
-25	Go to Diagnostic Procedure 11.	HA-84
-26	Go to Diagnostic Procedure 12.	HA-85

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 Procedures.

O.K. ↓

CHECK MODE DOOR MOTOR.
Set up Self-diagnosis STEP 3.
Is mode door motor operating normally?
Code No. 30 should be indicated on the display after approx. 16 seconds.

N.G. → Go to **Diagnostic Procedure 14.**

O.K. ↓

CHECK MODE DOOR OPERATION.
Set up Self-diagnosis STEP 4.
Does air outlet change according to each code No.?

41	42	43	44	45	46
VENT	B/L 1	B/L 2	F/D1	F/D2	DEF

Refer to AIR DISTRIBUTION.

N.G. → CHECK SIDE LINK MECHANISM.
Refer to DOOR CONTROL.

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.

- **Perform Self-diagnosis STEP 1 before referring to the following flow chart.**

CHECK SENSOR CIRCUIT.
Set up Self-diagnosis STEP 2.
Is each sensor circuit normal?
Code No. 20 should be indicated on the display after approx. 4 seconds later.

N.G. →

CHECK SENSOR CIRCUIT IN DETAIL ACCORDING TO THE DIAGNOSTIC PROCEDURE BELOW CORRESPONDED TO EACH CODE NO.

Code No.	How to repair	Reference page
21	Go to Diagnostic Procedure 1.	HA-76
22	Go to Diagnostic Procedure 2.	HA-77
23	Go to Diagnostic Procedure 3.	HA-78
24	Go to Diagnostic Procedure 4.	HA-79
25	Go to Diagnostic Procedure 5.	HA-80
26	Go to Diagnostic Procedure 6.	HA-81
-21	Go to Diagnostic Procedure 7.	HA-82
-22	Go to Diagnostic Procedure 8.	HA-82
-23	Go to Diagnostic Procedure 9.	HA-83
-24	Go to Diagnostic Procedure 10.	HA-83
-25	Go to Diagnostic Procedure 11.	HA-84
-26	Go to Diagnostic Procedure 12.	HA-85

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 Procedures.

O.K. ↓

CHECK INTAKE DOOR MOTOR OPERATION.
Set up Self-diagnosis STEP 4.
Does intake air change according to each code No.?

41	42	43	44	45	46
REC	REC	20% FRE	FRE	FRE	FRE

N.G. → CHECK INTAKE DOOR ROD or LEVER MECHANISM.
Refer to DOOR CONTROL.

N.G. → Repair or adjust.

O.K. ↓

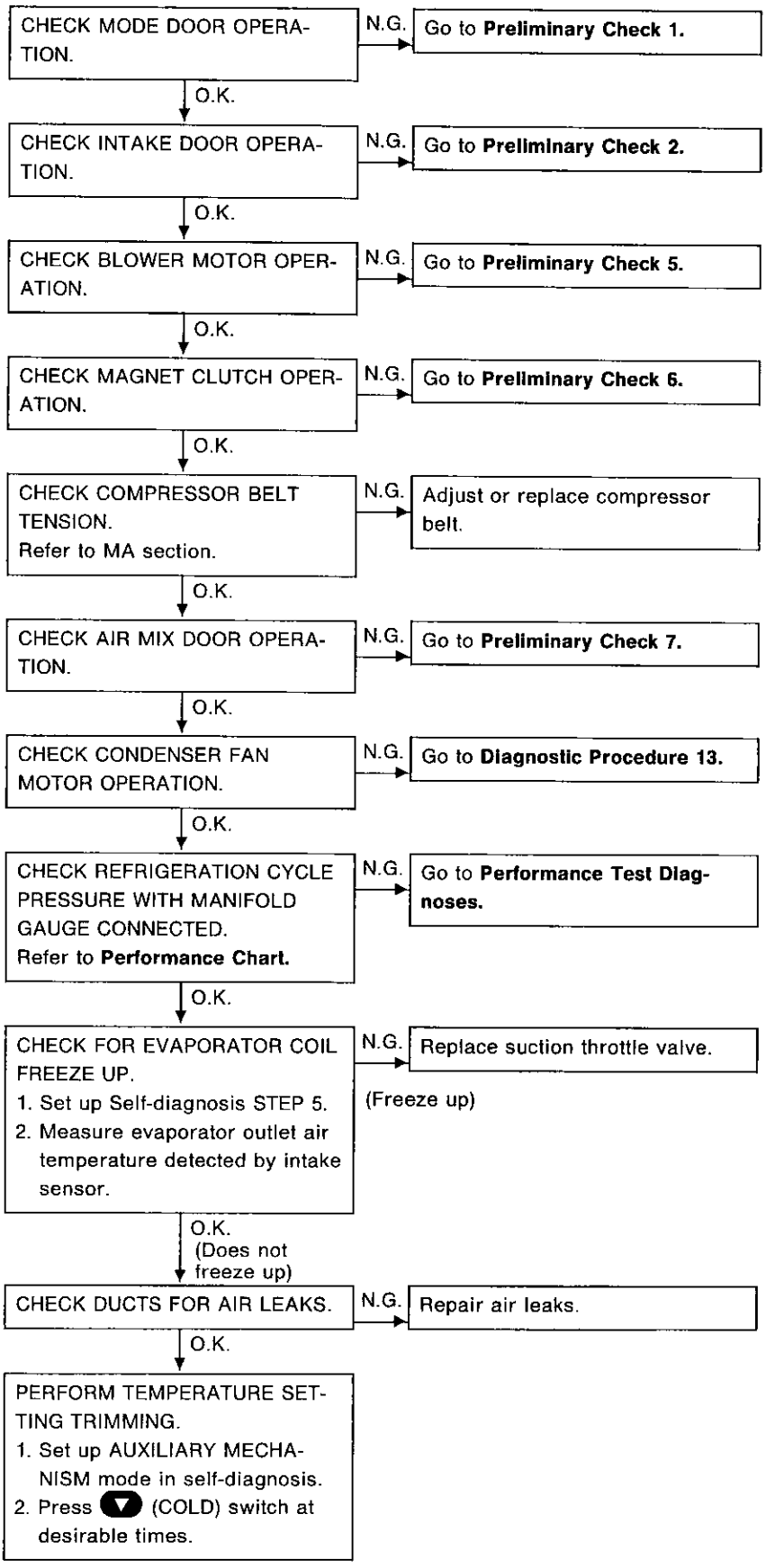
Go to **Diagnostic Procedure 15.**

O.K. ↓

Intake door control system is normal.
Refer to **Intake door control specification.**

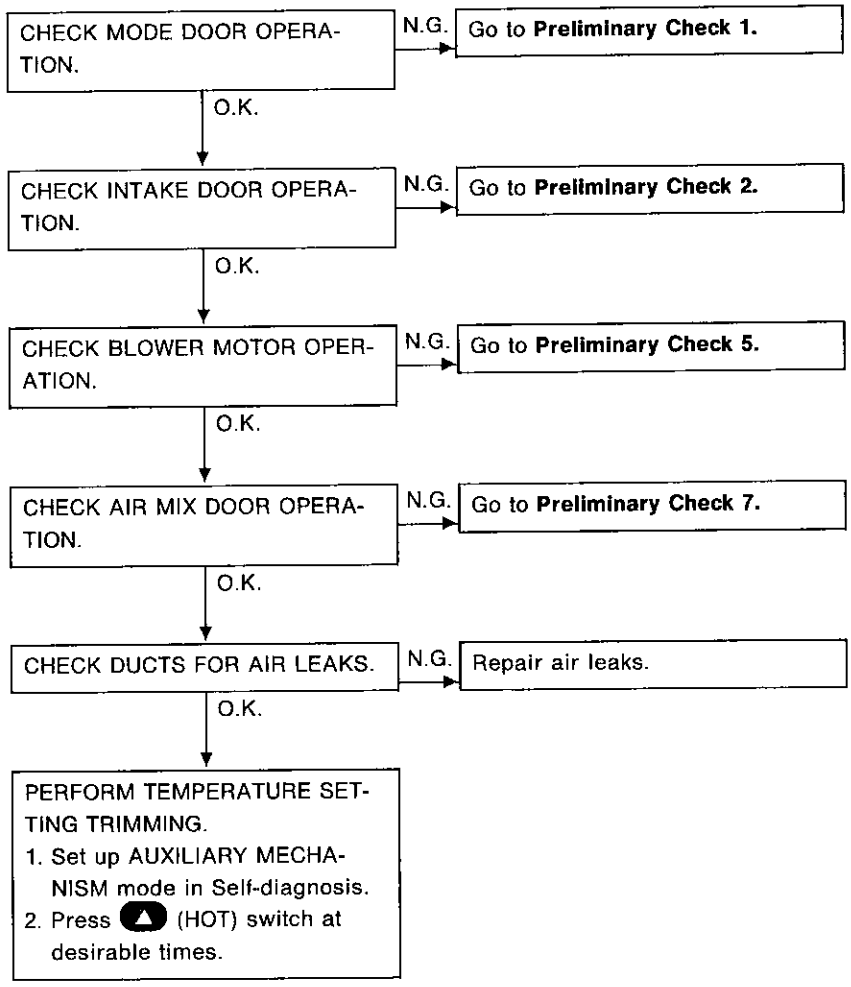
PRELIMINARY CHECK 3

Insufficient cooling



PRELIMINARY CHECK 4

Insufficient heating



PRELIMINARY CHECK 5

Blower motor operation is malfunctioning.

- **Perform Self-diagnosis STEP 1 before referring to the following flow chart.**

CHECK SENSOR CIRCUIT.
Set up Self-diagnosis STEP 2.
Is each sensor circuit normal?
Code No. 20 should be indicated on the display after approx. 4 seconds.

N.G. →

CHECK SENSOR CIRCUIT IN DETAIL ACCORDING TO THE DIAGNOSTIC PROCEDURE BELOW CORRESPONDING TO EACH CODE NO.

Code No.	How to repair	Reference page
21	Go to Diagnostic Procedure 1.	HA-76
22	Go to Diagnostic Procedure 2.	HA-77
23	Go to Diagnostic Procedure 3.	HA-78
24	Go to Diagnostic Procedure 4.	HA-79
25	Go to Diagnostic Procedure 5.	HA-80
26	Go to Diagnostic Procedure 6.	HA-81
-21	Go to Diagnostic Procedure 7.	HA-82
-22	Go to Diagnostic Procedure 8.	HA-82
-23	Go to Diagnostic Procedure 9.	HA-83
-24	Go to Diagnostic Procedure 10.	HA-83
-25	Go to Diagnostic Procedure 11.	HA-84
-26	Go to Diagnostic Procedure 12.	HA-85

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 Procedures.

O.K. ↓

CHECK BLOWER MOTOR OPERATION.
Set up Self-diagnosis STEP 4.
Does blower speed change according to each code No.?

Code No.	41	42	43	44	45	46
Blower motor speed	Low	Middle high	Middle low			High

N.G. → Go to **Diagnostic Procedure 17.**

O.K. ↓

Is engine coolant temperature below 50°C (122°F) and ambient temperature below 15°C (59°F)?

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 (Cont'd)

PRELIMINARY CHECK 6

Magnet clutch does not engage.
Perform Self-diagnosis STEP 1 before referring to the following flow chart.

CHECK SENSOR CIRCUIT.
Set up Self-diagnosis STEP 2.
Is each sensor circuit normal?
Code No. 20 should be indicated on the display after approx. 4 seconds.

N.G. →

CHECK SENSOR CIRCUIT IN DETAIL ACCORDING TO THE DIAGNOSTIC PROCEDURE BELOW CORRESPONDED TO EACH CODE NO.

Code No.	How to repair	Reference page
21	Go to Diagnostic Procedure 1.	HA-76
22	Go to Diagnostic Procedure 2.	HA-77
23	Go to Diagnostic Procedure 3.	HA-78
24	Go to Diagnostic Procedure 4.	HA-79
25	Go to Diagnostic Procedure 5.	HA-80
26	Go to Diagnostic Procedure 6.	HA-81
-21	Go to Diagnostic Procedure 7.	HA-82
-22	Go to Diagnostic Procedure 8.	HA-82
-23	Go to Diagnostic Procedure 9.	HA-83
-24	Go to Diagnostic Procedure 10.	HA-83
-25	Go to Diagnostic Procedure 11.	HA-84
-26	Go to Diagnostic Procedure 12.	HA-85

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 Procedures.

O.K. ↓

CHECK MAGNET CLUTCH OPERATION.
Set up Self-diagnosis STEP 4.
Does magnet clutch operate according to each code No.?

Code No. / Actuator	41	42	43	44	45	46
Compressor	ON	ON	ON	OFF	OFF	ON

N.G. → CHECK REFRIGERANT.
Connect manifold gauge, then check system pressure.

N.G. → Check refrigerant leaks.

O.K. ↓

Go to **Diagnostic Procedure 18.**

O.K. ↓

Magnet clutch control system is normal.
Refer to MAGNET CLUTCH CONTROL.

CHECK AIR MIX DOOR OPERATION.
Set up Self-diagnosis STEP 4.
Does discharged air temperature change according to each code No.?

41	42	43	44	45	46
Full cold		Full hot			

O.K.

Air mix door control system is normal.
Refer to **Specification of air mix door control.**

N.G.

CHECK AIR MIX DOOR MECHANISM.
Repair to DOOR CONTROL.

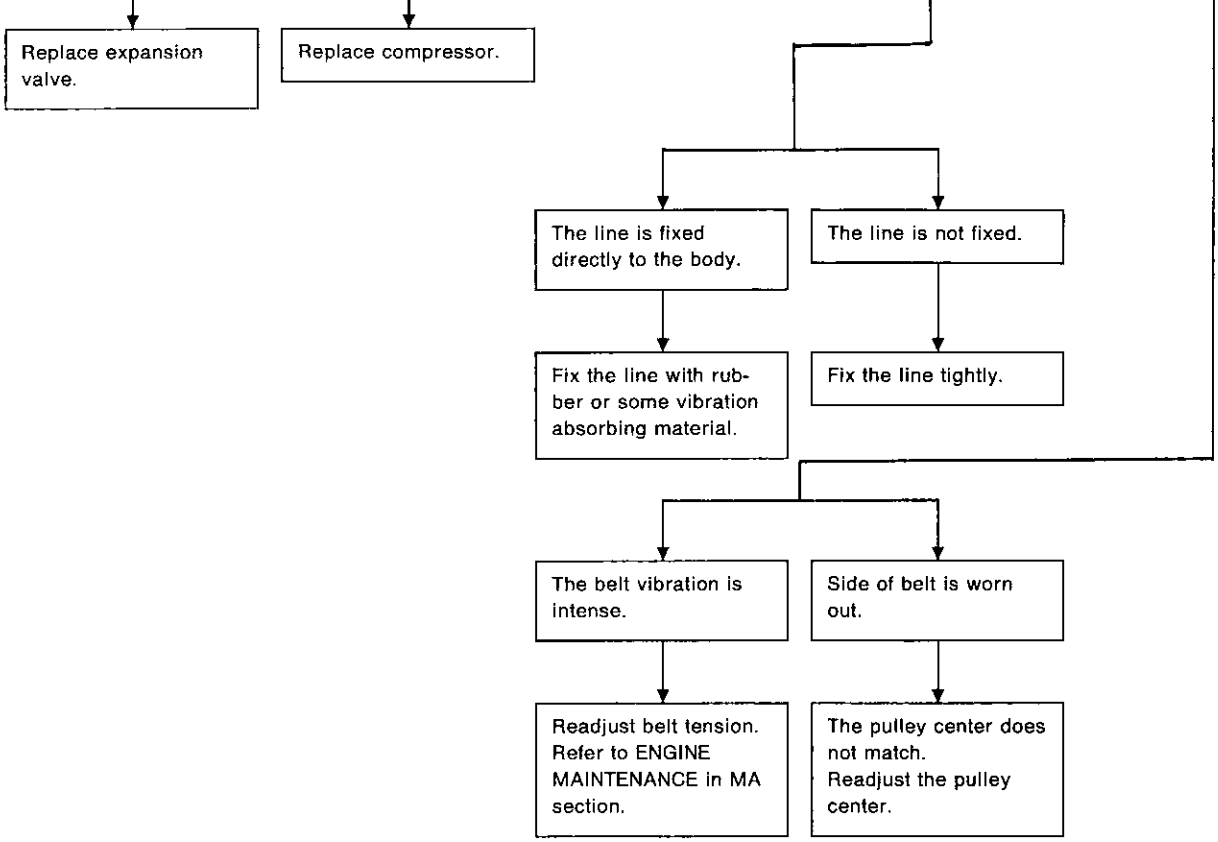
N.G. → Repair or adjust.

O.K.

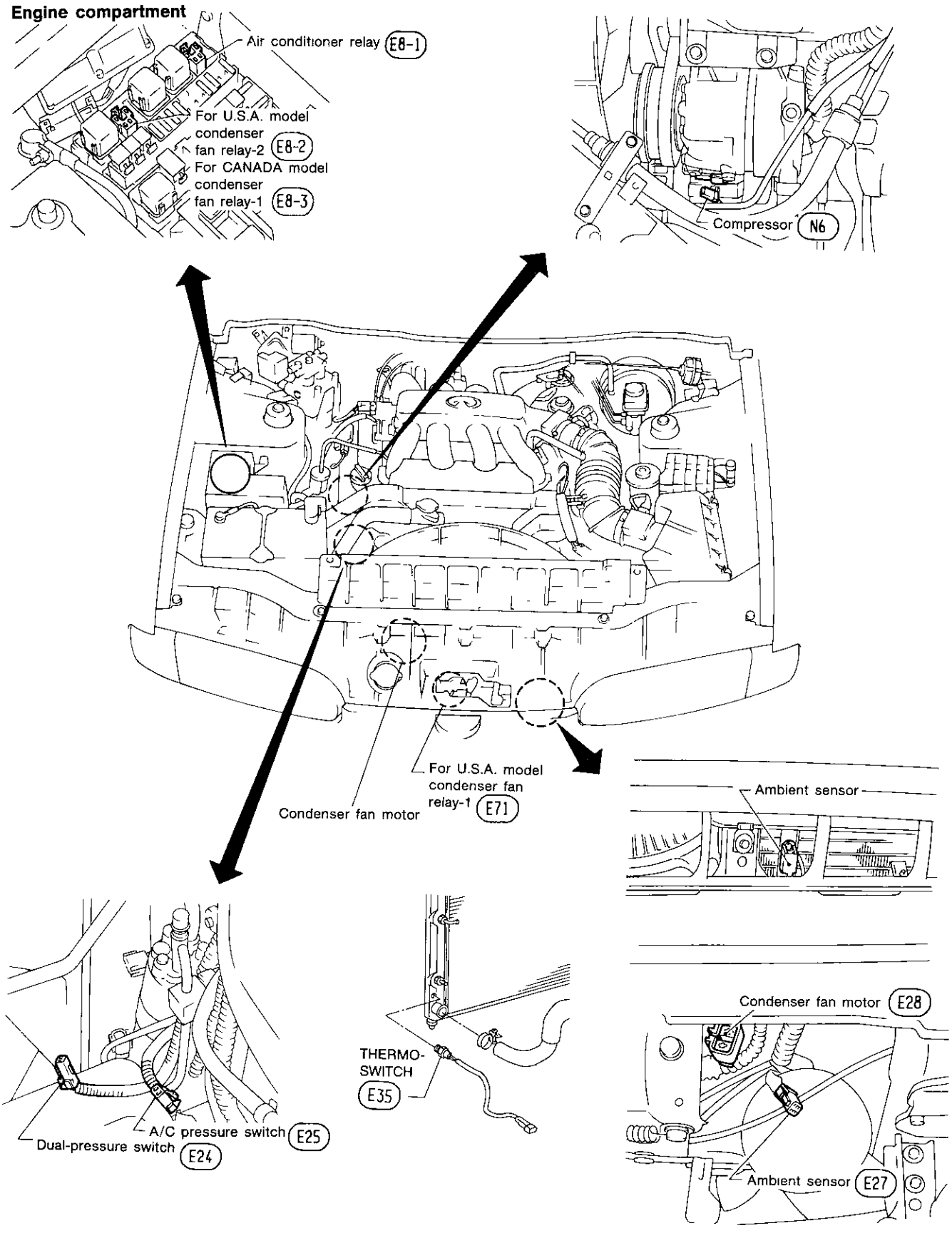
Go to **Diagnostic Procedure 16.**

22	Go to Diagnostic Procedure 2.	HA-77
23	Go to Diagnostic Procedure 3.	HA-78
24	Go to Diagnostic Procedure 4.	HA-79
25	Go to Diagnostic Procedure 5.	HA-80
26	Go to Diagnostic Procedure 6.	HA-81
-21	Go to Diagnostic Procedure 7.	HA-82
-22	Go to Diagnostic Procedure 8.	HA-82
-23	Go to Diagnostic Procedure 9.	HA-83
-24	Go to Diagnostic Procedure 10.	HA-83
-25	Go to Diagnostic Procedure 11.	HA-84
-26	Go to Diagnostic Procedure 12.	HA-85

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 Procedures.


Replace expansion valve.
Replace compressor.
The line is fixed directly to the body.
The line is not fixed.
Fix the line with rubber or some vibration absorbing material.
Fix the line tightly.
The belt vibration is intense.
Side of belt is worn out.
Readjust belt tension. Refer to ENGINE MAINTENANCE in MA section.
The pulley center does not match. Readjust the pulley center.

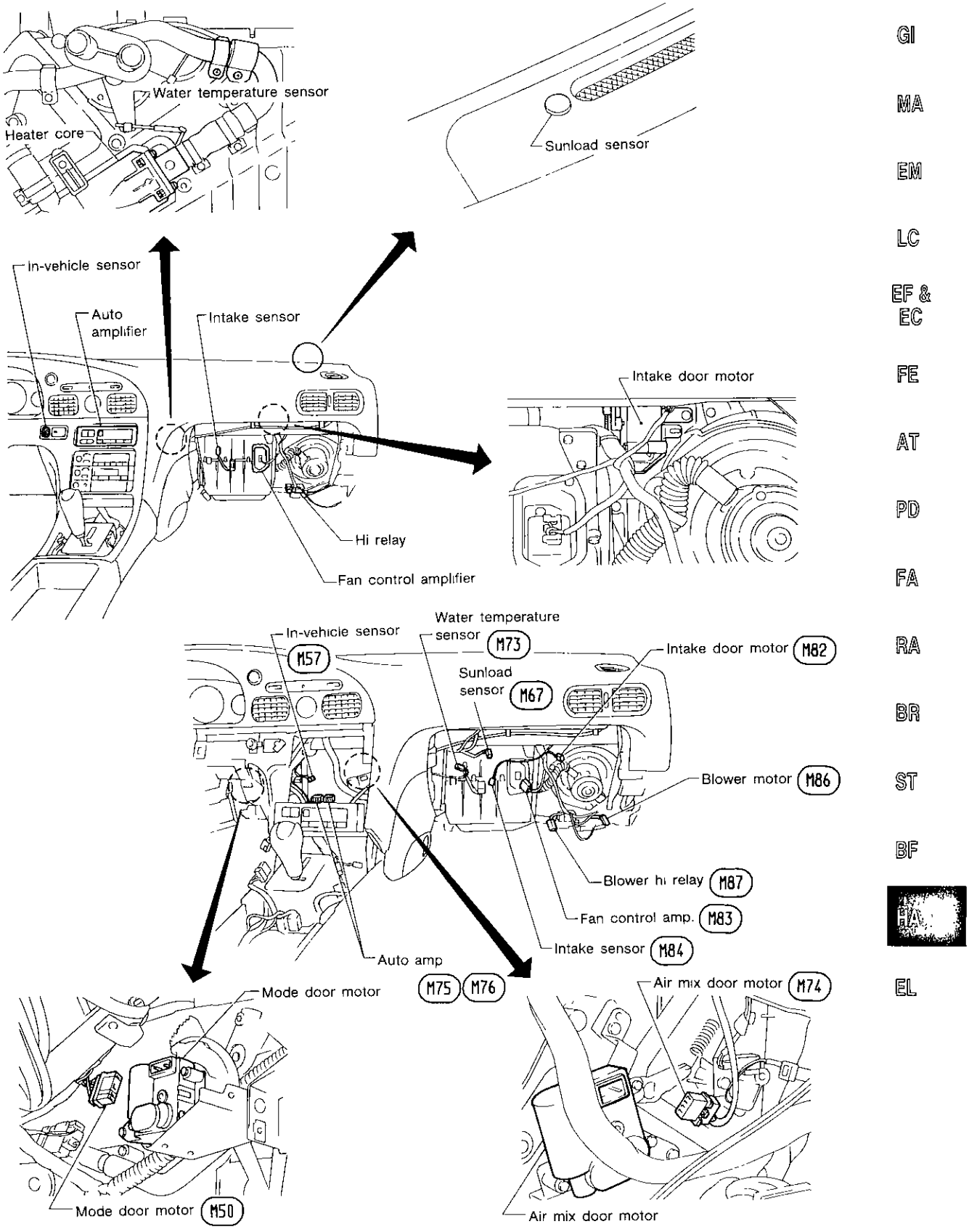
A/C Component Layout



RHA516D

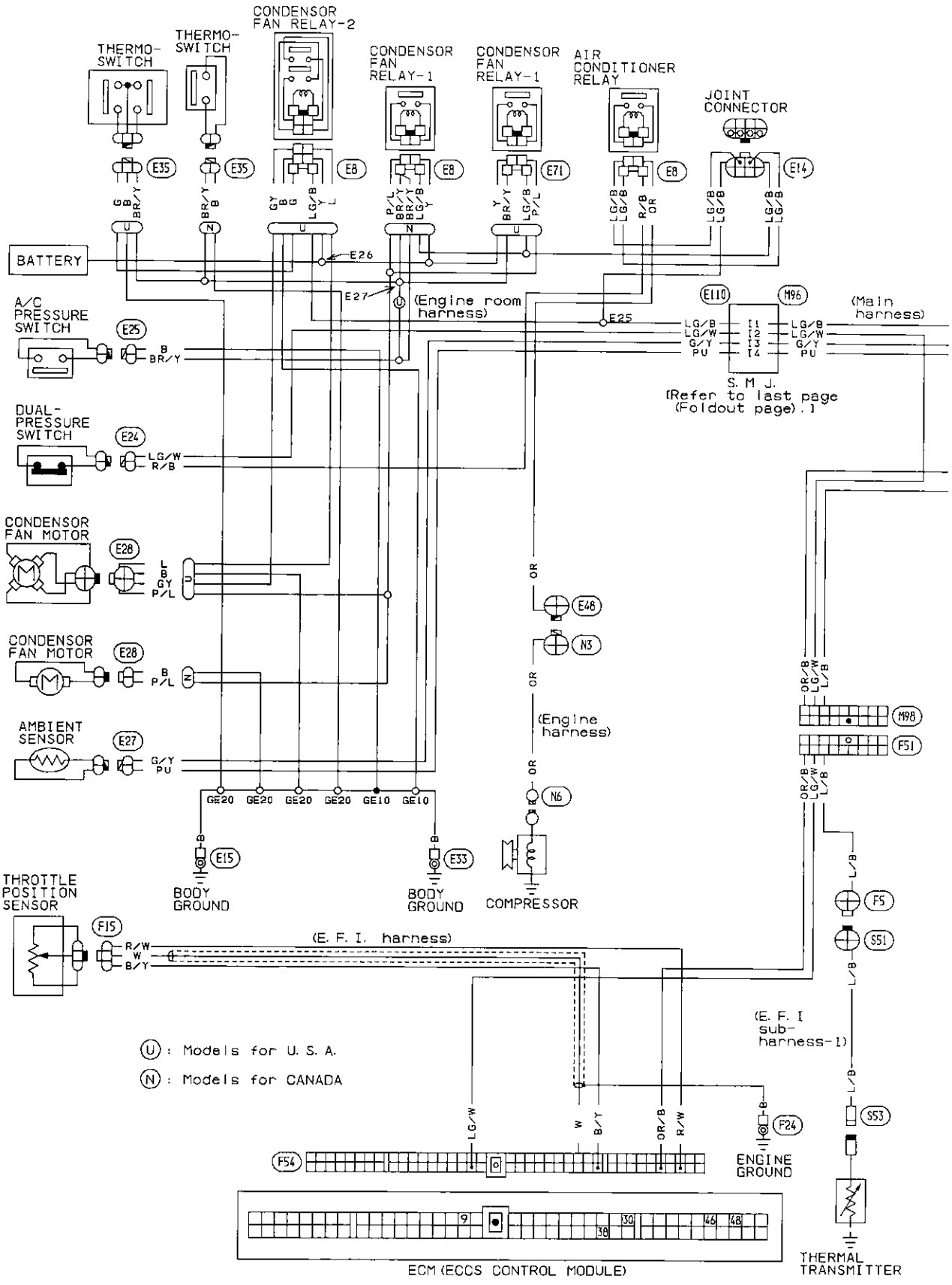
A/C Component Layout (Cont'd)

Passenger compartment

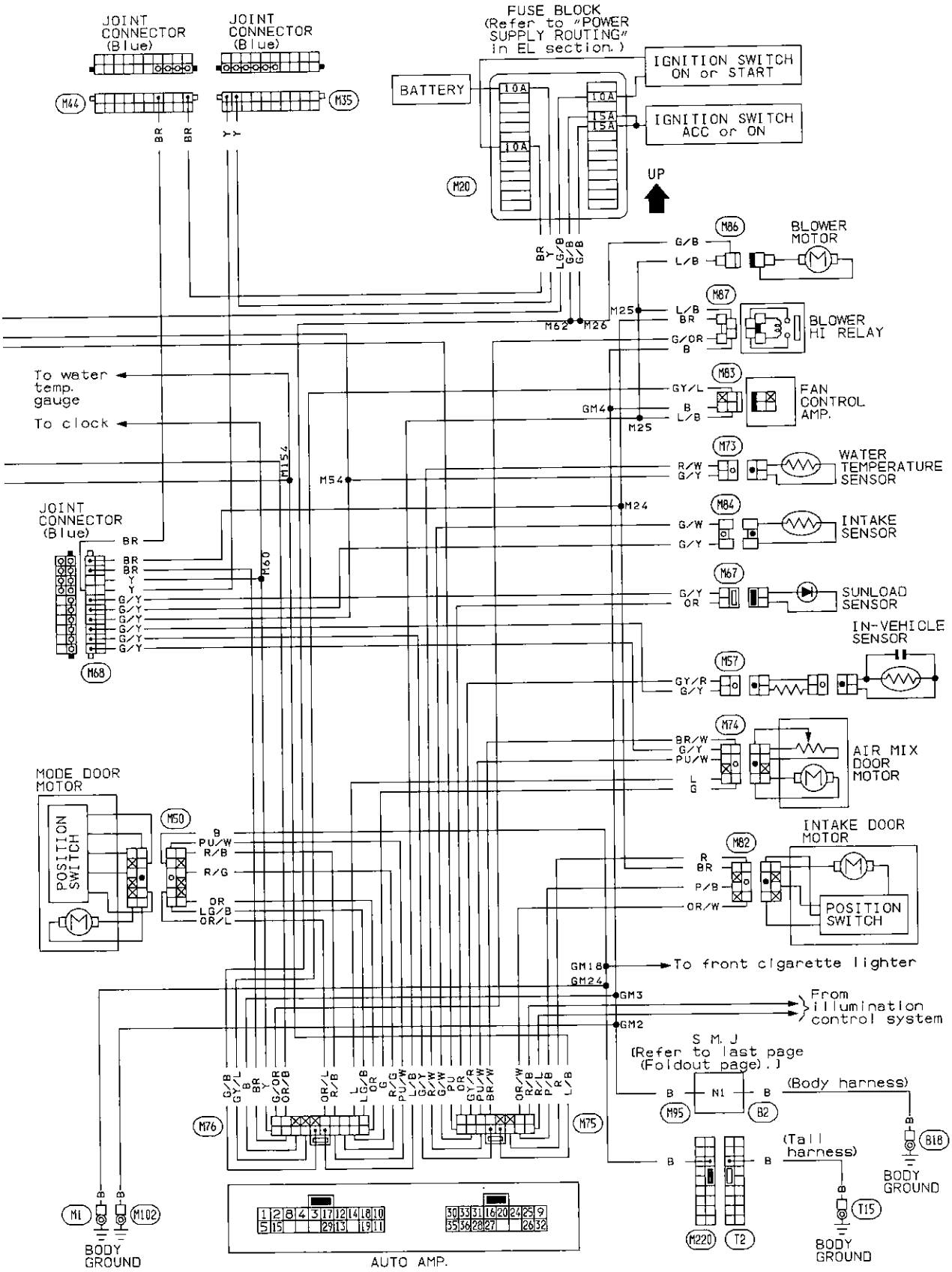


SHA924D

Wiring Diagram

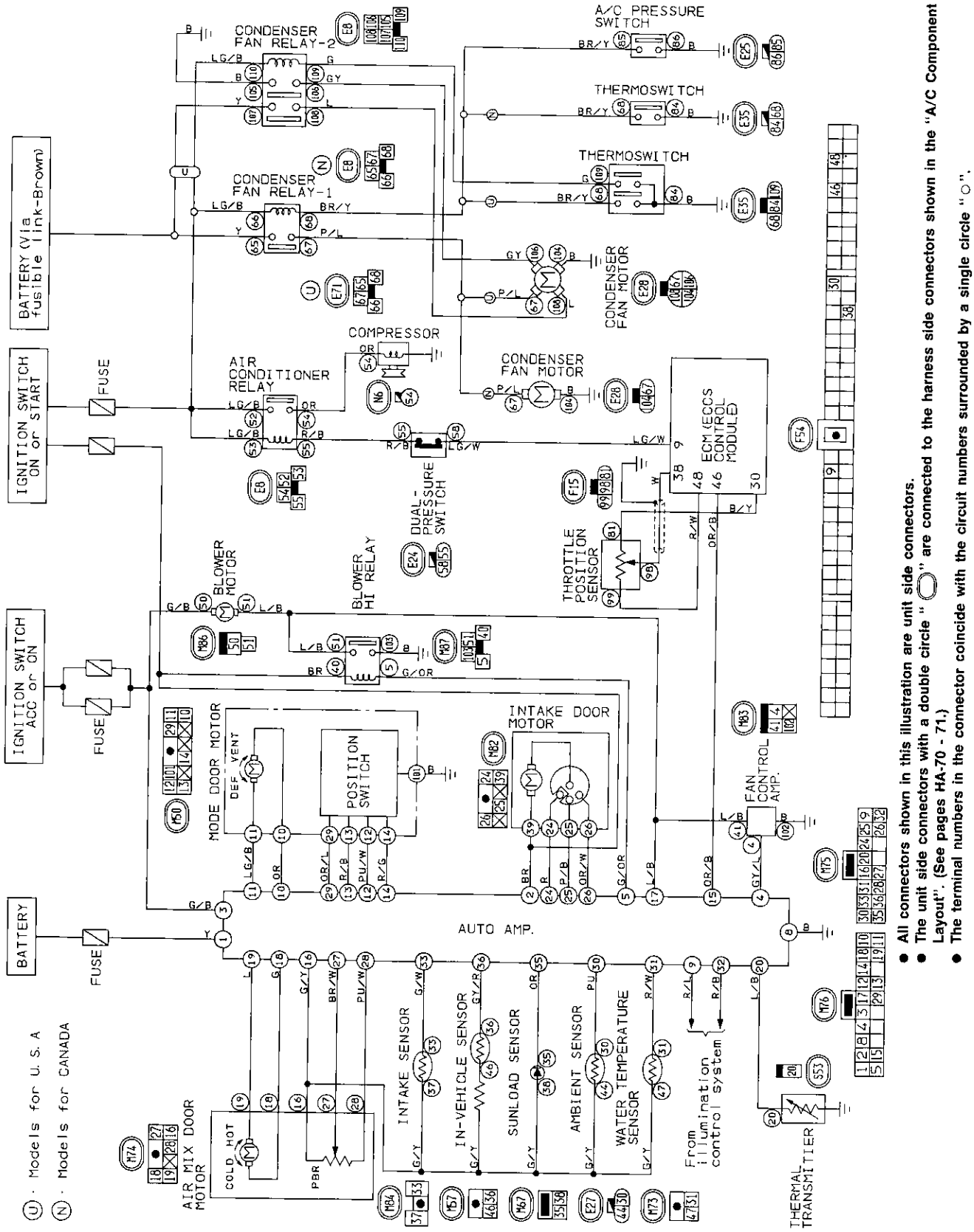


Wiring Diagram (Cont'd)



MHA146A

Circuit Diagram for Quick Pinpoint Check



- All connectors shown in this illustration are unit side connectors.
- The unit side connectors with a double circle "◎" are connected to the harness side connectors shown in the "A/C Component Layout". (See pages HA-70 - 71.)
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle "○".

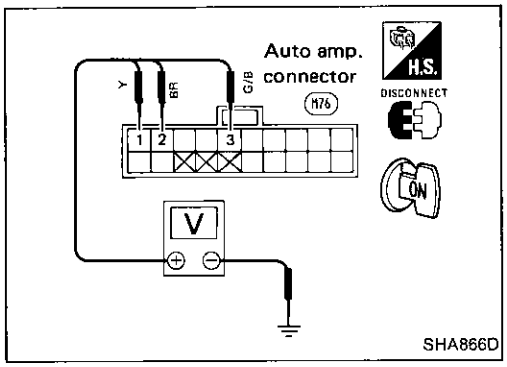
MHA147A

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.

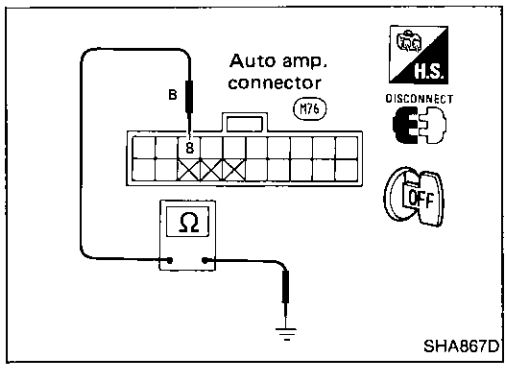


AUTO AMP. CHECK

Check power supply circuit for auto amp. with ignition switch ON.

1. Disconnect auto amp. harness connector.
2. Connect voltmeter from harness side.
3. Measure voltage across terminal No. ①, ②, ③ and body ground.

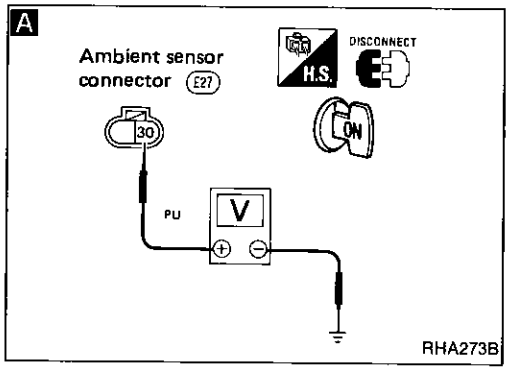
Voltmeter terminal		Voltage
⊕	⊖	
①	Body ground	Approx. 12V
②		
③		

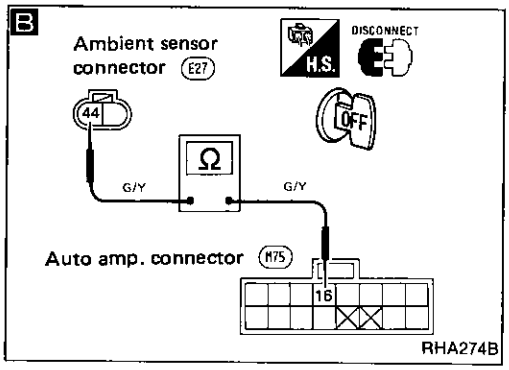


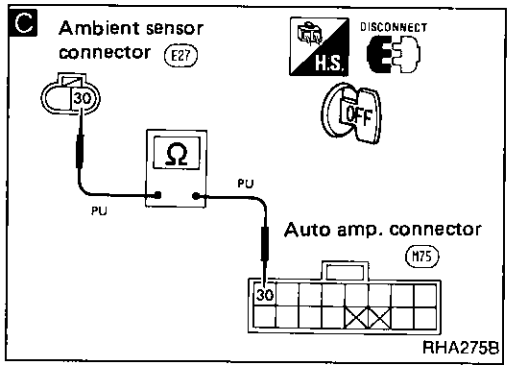
Check body ground circuit for auto amp. with ignition switch OFF.

1. Disconnect auto amp. harness connector.
2. Connect ohmmeter from harness side.
3. Check for continuity between terminal No. ⑧ and body ground.

Ohmmeter terminal		Continuity
⊕	⊖	
⑧	Body ground	Yes







Diagnostic Procedure 1

SYMPTOM: Ambient sensor circuit is open. (2) is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)

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. 30 and body ground?

N.G. → Disconnect auto amp. harness connector.

C

Note

Check circuit continuity between ambient sensor harness terminal No. 30 and auto amp. harness terminal No. 30.

O.K. → Replace auto amp.

O.K. → Disconnect auto amp. harness connector.

B

Note

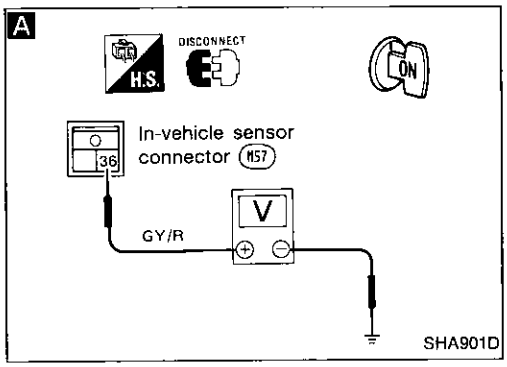
Check circuit continuity between ambient sensor harness terminal No. 44 and auto amp. harness terminal No. 16.

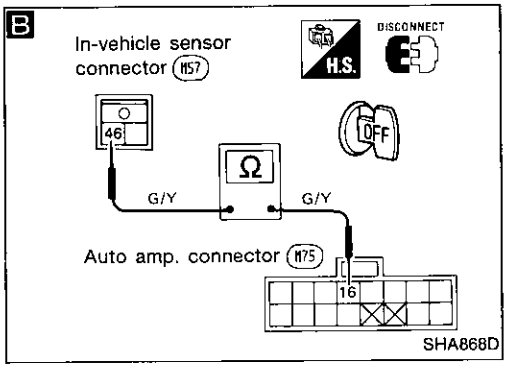
O.K. → CHECK AMBIENT SENSOR. (Refer to Control System Input Components.)

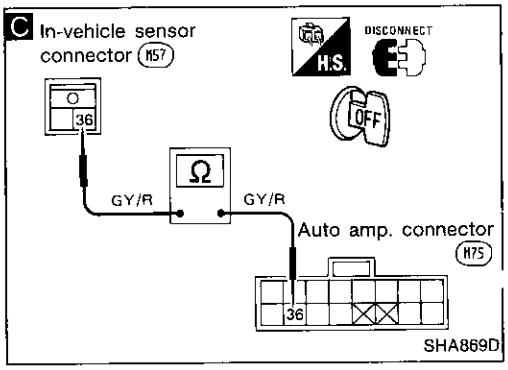
N.G. → Replace ambient sensor.

O.K. → Replace auto amp.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.







Diagnostic Procedure 2

SYMPTOM: In-vehicle sensor circuit is open. (22 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)

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. 36 and body ground?

N.G. → Disconnect auto amp. harness connector.

C

Note

Check circuit continuity between in-vehicle sensor harness terminal No. 36 and auto amp. harness terminal No. 36.

O.K. → Replace auto amp.

O.K. → Disconnect auto amp. harness connector.

B

Note

Check circuit continuity between in-vehicle sensor harness terminal No. 46 and auto amp. harness terminal No. 16.

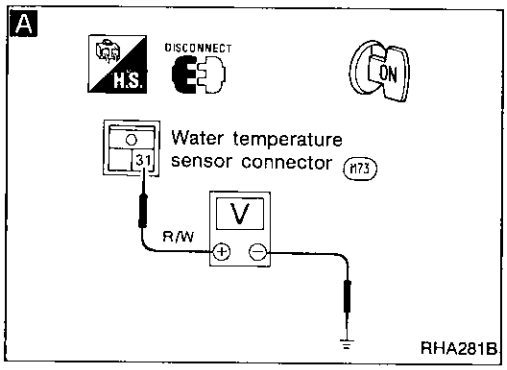
O.K. →

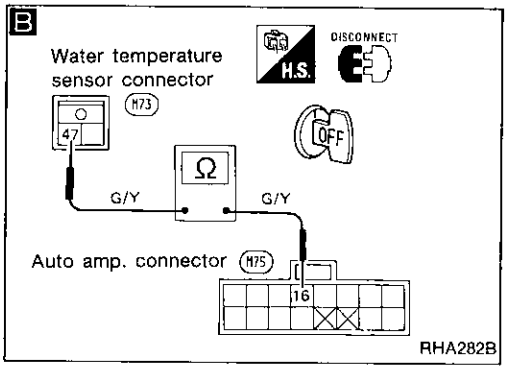
CHECK IN-VEHICLE SENSOR.
(Refer to Control System Input Components.)

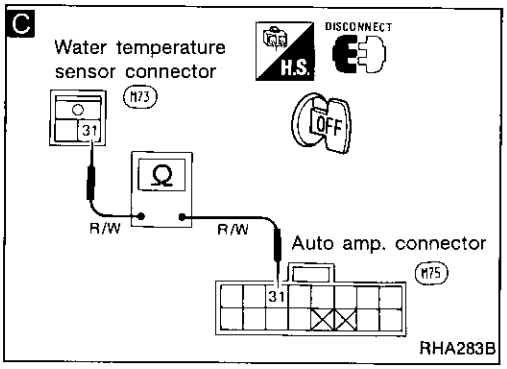
N.G. → Replace in-vehicle sensor.

O.K. → Replace auto amp.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.







Diagnostic Procedure 3

SYMPTOM: Water temperature sensor circuit is open. (23 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)

A

CHECK WATER TEMPERATURE SENSOR CIRCUIT BETWEEN WATER TEMPERATURE SENSOR AND AUTO AMP.
Disconnect water temperature sensor harness connector.
Do approx. 5 volts exist between water temperature sensor harness terminal No. 31 and body ground?

N.G. → Disconnect auto amp. harness connector.

C

Note

Check circuit continuity between water temperature 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 water temperature sensor harness terminal No. 47 and auto amp. harness terminal No. 16.

O.K. ↓

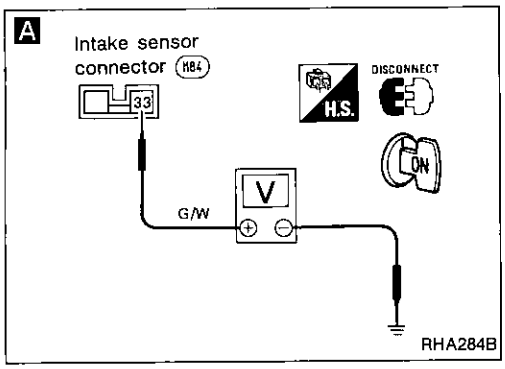
CHECK WATER TEMPERATURE SENSOR.
(Refer to Control System Input Components.)

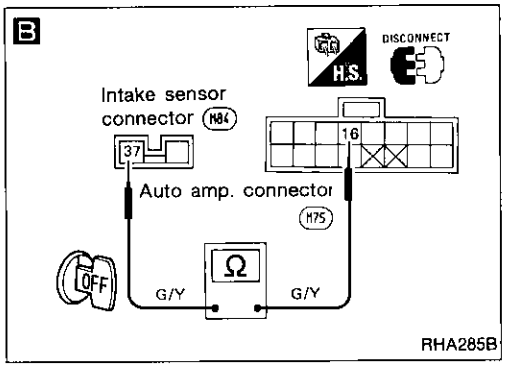
N.G. → Replace water temperature sensor.

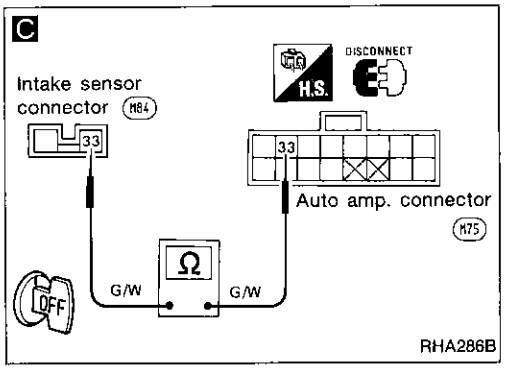
O.K. ↓

Replace auto amp.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.







Diagnostic Procedure 4

SYMPTOM: Intake sensor circuit is open. (24 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)

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. 33 and body ground?

N.G. → Disconnect auto amp. harness connector.

C Note

Check circuit continuity between intake sensor harness terminal No. 33 and auto amp. harness terminal No. 33.

O.K. → Replace auto amp.

O.K. → Disconnect auto amp. harness connector.

B Note

Check circuit continuity between intake sensor harness terminal No. 37 and auto amp. harness terminal No. 16.

O.K. →

CHECK INTAKE SENSOR.
(Refer to Control System Input Components.)

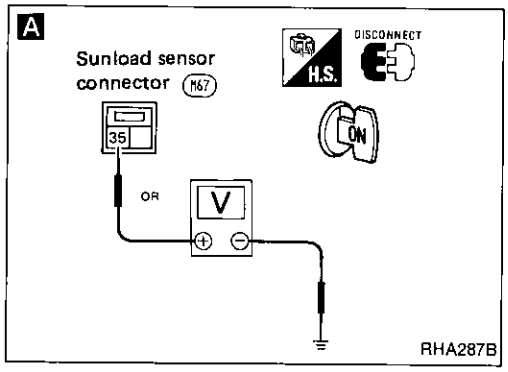
N.G. → Replace intake sensor.

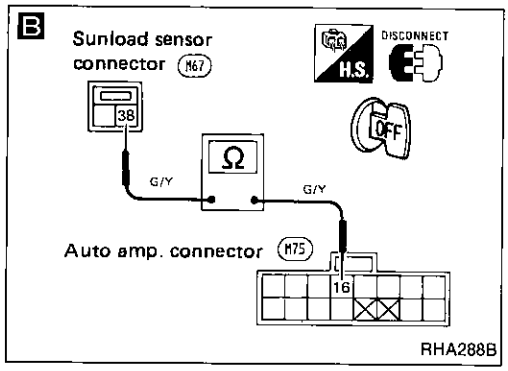
O.K. →

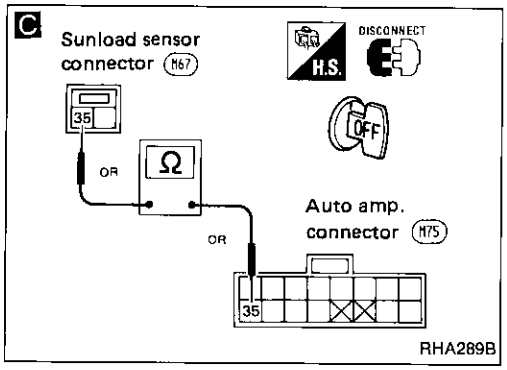
Replace auto amp.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

GI MA EM LC EF & EC FE AT PD FA RA BR ST BF HA EL







Diagnostic Procedure 5

SYMPTOM: Sunload sensor circuit is open. (25 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)

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. 35 and body ground?

N.G. → Disconnect auto amp. harness connector.

B

Note

Check circuit continuity between sunload sensor harness terminal No. 35 and auto amp. harness terminal No. 35.

O.K. → Replace auto amp.

O.K. → Disconnect auto amp. harness connector.

B

Note

Check circuit continuity between sunload sensor harness terminal No. 38 and auto amp. harness terminal No. 16

O.K. → CHECK SUNLOAD SENSOR.
(Refer to Control System Input Components.)

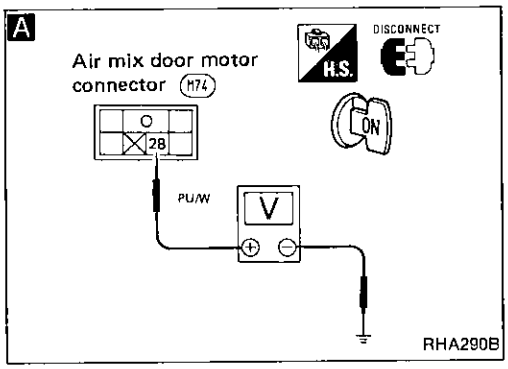
N.G. → Replace sunload sensor.

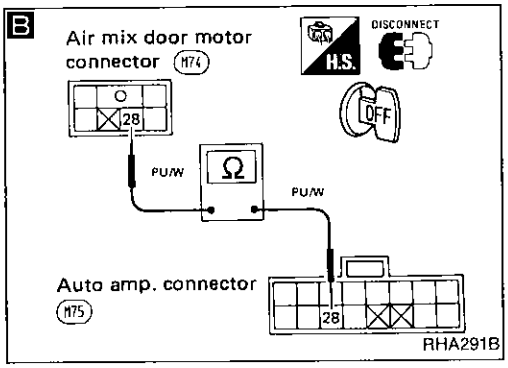
O.K. → Replace auto amp.

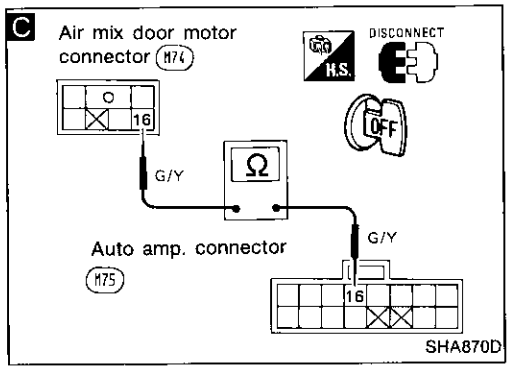
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

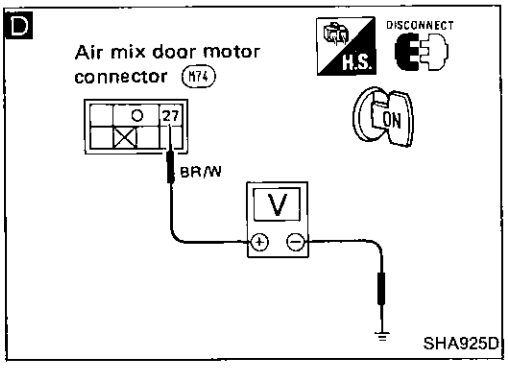
Diagnostic Procedure 6

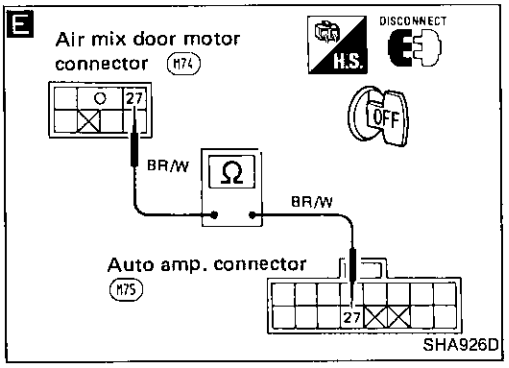
SYMPTOM: P.B.R. circuit is open. (25 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)











A

CHECK P.B.R. CIRCUIT BETWEEN P.B.R. AND AUTO AMP.
Disconnect air mix door motor harness connector.
Do approx. 5 volts exist between air mix door motor harness terminal No. 28 and body ground?

N.G. → Disconnect auto amp. harness connector.

Note: Check circuit continuity between air mix door motor harness terminal No. 28 and auto amp. harness terminal No. 28 .

O.K. → Replace auto amp.

O.K. → Disconnect auto amp. harness connector.

C

Note: Check circuit continuity between air mix door motor harness terminal No. 16 and auto amp. harness terminal No. 16 .

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 air mix door motor harness terminal No. 27 and body ground?

N.G. → Disconnect auto amp. harness connector.

E

Note: Check circuit continuity between air mix door motor harness terminal No. 27 and auto amp. harness terminal No. 27 .

O.K. → Replace auto amp.

O.K.

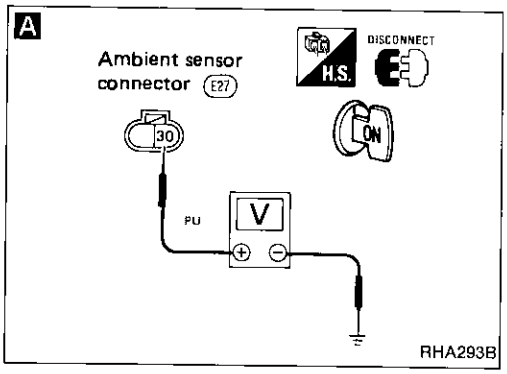
CHECK P.B.R.
(Refer to Control System Output Components.)

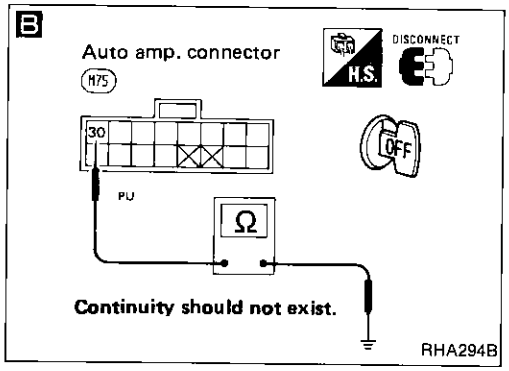
N.G. → Replace air mix door motor (P.B.R.).

O.K.

Replace auto amp.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.





Diagnostic Procedure 7

SYMPTOM: Ambient sensor circuit is shorted. (-21 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)

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. 30 and body ground?

N.G. → Disconnect auto amp. harness connector.

B

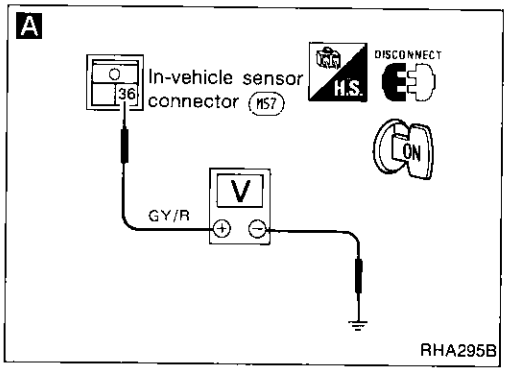
Note: Check circuit continuity between auto amp. harness terminal No. 30 and body ground.

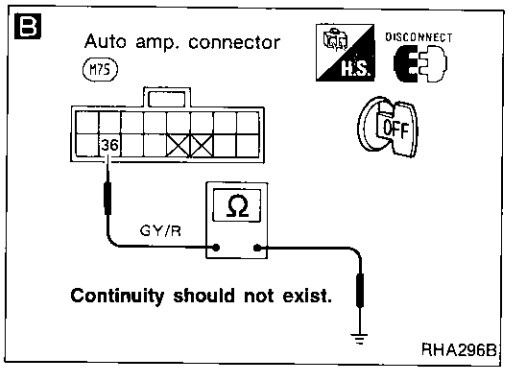
O.K. → Replace auto amp.

O.K. → CHECK AMBIENT SENSOR. (Refer to Control System Input Components.)

N.G. → Replace ambient sensor.

O.K. → Replace auto amp.





Diagnostic Procedure 8

SYMPTOM: In-vehicle sensor circuit is shorted. (-22 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)

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. 36 and body ground?

N.G. → Disconnect auto amp. harness connector.

B

Note: Check circuit continuity between auto amp. harness terminal No. 36 and body ground.

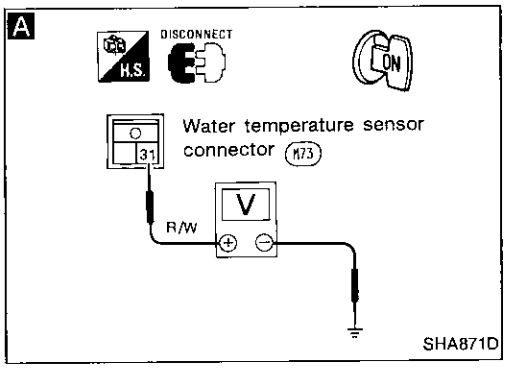
O.K. → Replace auto amp.

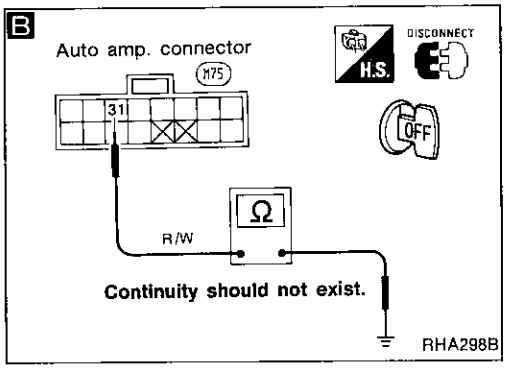
O.K. → CHECK IN-VEHICLE SENSOR. (Refer to Control System Input Components.)

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 short.





Diagnostic Procedure 9

SYMPTOM: Water temperature sensor circuit is shorted. (-23 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)

A

CHECK WATER TEMPERATURE SENSOR CIRCUIT BETWEEN WATER TEMPERATURE SENSOR AND AUTO AMP.
Disconnect water temperature sensor harness connector.
Do approx. 5 volts exist between water temperature sensor harness terminal No. 31 and body ground?

N.G. → Disconnect auto amp. harness connector.

B

Note

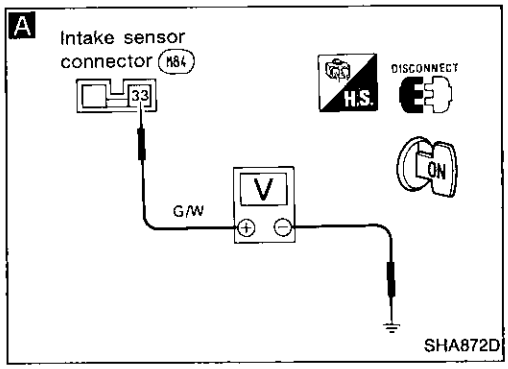
Check circuit continuity between auto amp. harness terminal No. 31 and body ground.

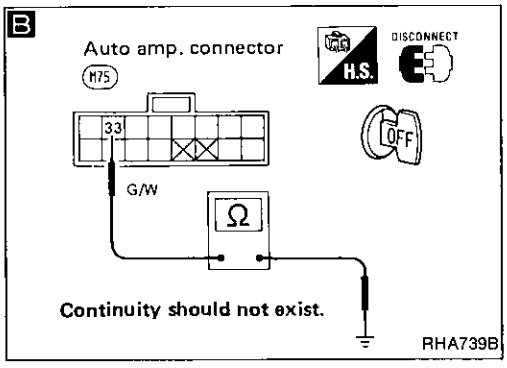
O.K. → Replace auto amp.

O.K. → CHECK WATER TEMPERATURE SENSOR. (Refer to Control System Input Components.)

N.G. → Replace water temperature sensor.

O.K. → Replace auto amp.





Diagnostic Procedure 10

SYMPTOM: Intake sensor circuit is shorted. (-24 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)

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. 33 and body ground?

N.G. → Disconnect auto amp. harness connector.

B

Note

Check circuit continuity between auto amp. harness terminal No. 33 and body ground.

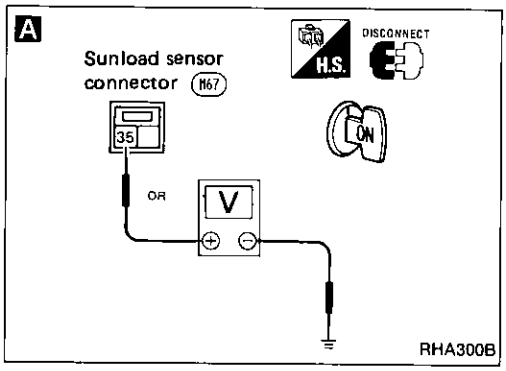
O.K. → Replace auto amp.

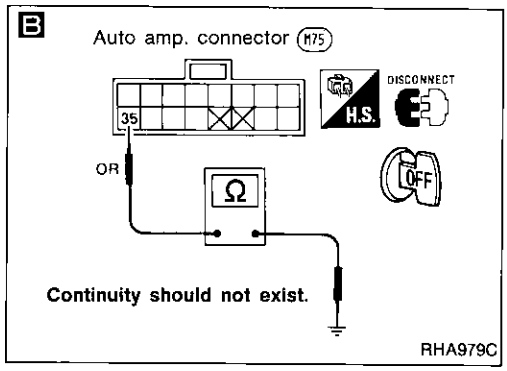
O.K. → CHECK INTAKE SENSOR. (Refer to Control System Input Components.)

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 short.





Diagnostic Procedure 11

SYMPTOM: Sunload sensor circuit is shorted. (-25 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)

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. 35 and body ground?

N.G. → Disconnect auto amp. harness connector.

B

Check circuit continuity between auto amp. harness terminal No. 35 and body ground.

Note

O.K. → Replace auto amp.

O.K. →

CHECK SUNLOAD SENSOR.
(Refer to Control System Input Components.)

N.G. → Replace sunload sensor.

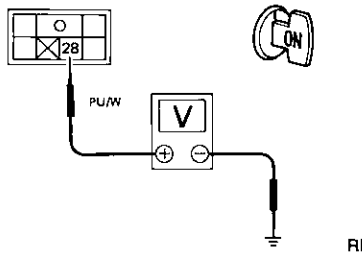
O.K. →

Replace auto amp.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector short.

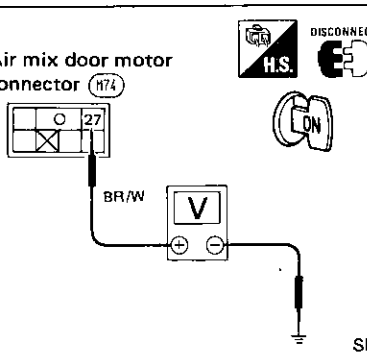
A

Air mix door motor connector (M74)



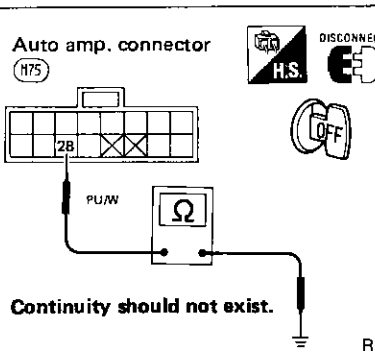
B

Air mix door motor connector (M74)



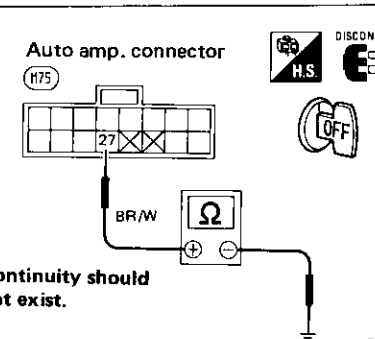
C

Auto amp. connector (M75)



D

Auto amp. connector (M75)



Diagnostic Procedure 12

SYMPTOM: P.B.R. circuit is shorted. (-26 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)

A

CHECK P.B.R. CIRCUIT BETWEEN P.B.R. AND AUTO AMP.
Disconnect air mix door motor harness connector.
Do approx. 5 volts exist between air mix door motor harness terminal No. (28) and body ground?

N.G. → Disconnect auto amp. harness connector.

C

Note: Check circuit continuity between auto amp. harness terminal No. (28) and body ground.

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 air mix door motor harness terminal No. (27) and body ground?

N.G. → Disconnect auto amp. harness connector.

D

Note: Check circuit continuity between auto amp. harness terminal No. (27) and body ground.

O.K. → Replace auto amp.

O.K.

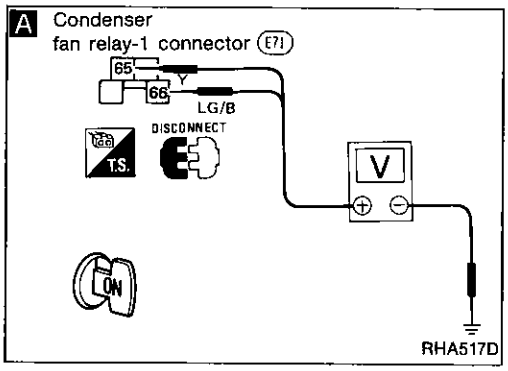
CHECK P.B.R.
(Refer to Control System Output Components.)

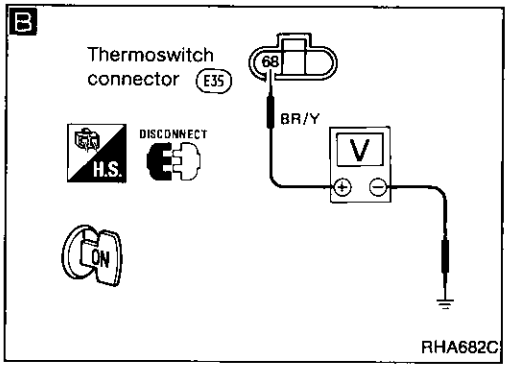
O.K. → INSPECTION END

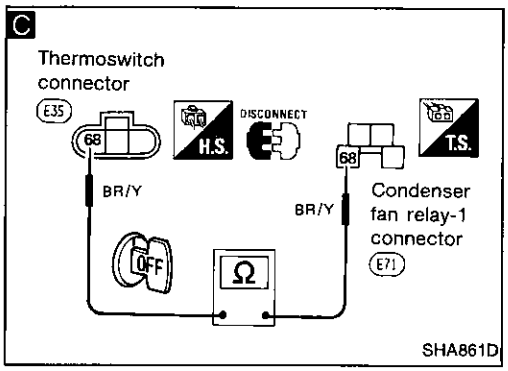
N.G. → Replace air mix door motor.

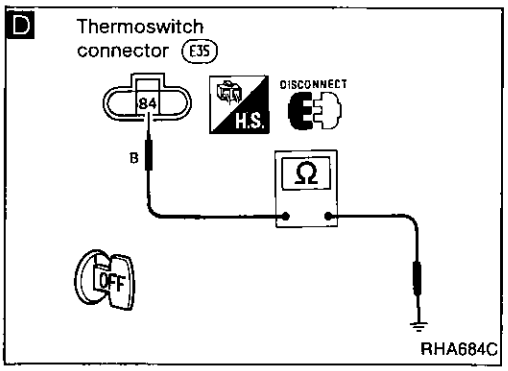
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector short.

GI MA EM LC EF & EC FE AT PD FA RA BR ST BF HA EL









Diagnostic Procedure 13

SYMPTOM: Condenser for motor does not operate normally. Condenser fan motor does not rotate at low speed when A/C system pressure is normal. — For U.S.A. models

A

CHECK POWER SUPPLY FOR CONDENSER FAN RELAY-1.
Disconnect condenser fan relay-1.
Do approx. 12 volts exist between condenser fan relay-1 harness terminal No. 65, 66 and body ground?

N.G. → CHECK POWER SUPPLY CIRCUIT AND 10A FUSE AT FUSE BLOCK. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

O.K. ↓

CHECK CONDENSER FAN RELAY-1 AFTER DISCONNECTING IT. (Refer to Electrical Components Inspection.)

N.G. → Replace condenser fan relay-1.

O.K. ↓

Reconnect condenser fan relay-1 harness connector and disconnect thermoswitch harness connector.

B

CHECK COIL SIDE CIRCUIT OF CONDENSER FAN RELAY-1.
Do approx. 12 volts exist between thermoswitch harness terminal No. 68 and body ground?

N.G. → Disconnect condenser fan relay-1 harness connector.

C Note

Check circuit continuity between condenser fan relay-1 harness terminal No. 68 and thermoswitch harness terminal No. 68.

O.K. ↓

D Note

Check circuit continuity between thermoswitch harness terminal No. 84 and body ground?

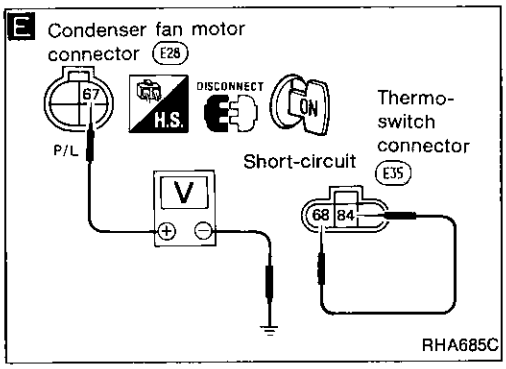
O.K. ↓

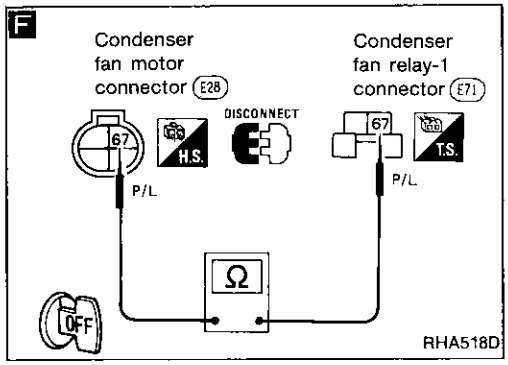
Ⓐ

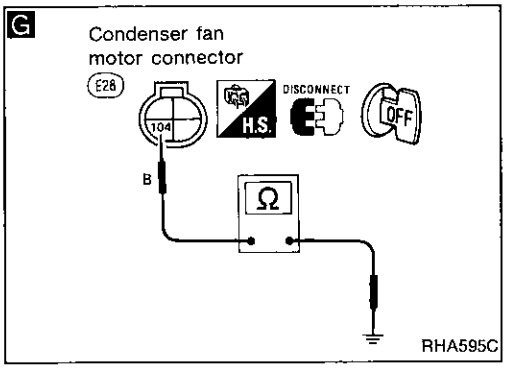
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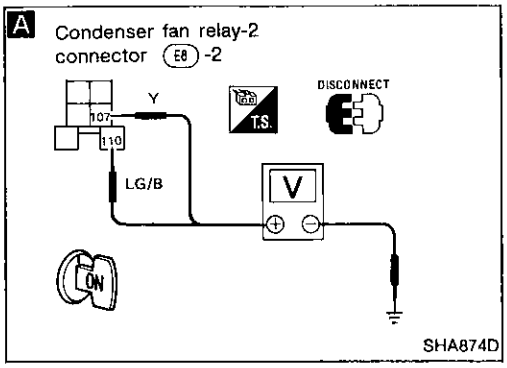
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 13 (Cont'd)









Ⓐ

CHECK THERMOSWITCH.
(Refer to Electrical Components Inspection.)

N.G. → Replace thermoswitch.

O.K.

E

CHECK POWER SUPPLY FOR CONDENSER FAN MOTOR.
Disconnect thermoswitch harness connector and connect terminals No. 68 and 84 with a jumper cable.
Do approx. 12 volts exist between condenser fan motor harness terminal No. 67 and body ground?

N.G. → Disconnect condenser fan relay-1 harness connector.

F

Note

Check circuit continuity between condenser fan relay-1 harness terminal No. 67 and condenser fan motor harness terminal No. 67.

O.K.

G

Note

Check circuit continuity between condenser fan motor harness terminal No. 104 and body ground.

O.K.

Replace condenser fan motor.

Condenser fan motor does not rotate at high speed. — For U.S.A. models

A

CHECK POWER SUPPLY FOR CONDENSER FAN RELAY-2.
Disconnect condenser fan relay-2.
Do approx.12 volts exist between condenser fan relay-2 harness terminal No. 105 109 and body ground?

N.G. → CHECK POWER SUPPLY FOR CIRCUIT AND 10A FUSE AT FUSE BLOCK. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

O.K.

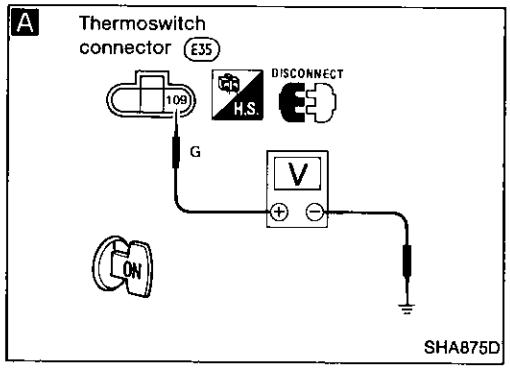
Ⓐ

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Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 13 (Cont'd)

A



Ⓐ

CHECK CONDENSER FAN RELAY-2 AFTER DISCONNECTING IT.
(Refer to Electrical Components Inspection.)

N.G. → Replace condenser fan relay-2.

O.K. ↓

Reconnect condenser fan relay-2 harness connector and disconnect thermoswitch harness connector.

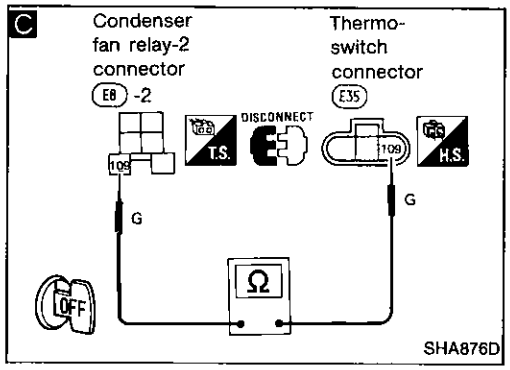
B

CHECK COIL SIDE CIRCUIT OF CONDENSER FAN RELAY-2.
Do approx. 12 volts exist between thermoswitch harness terminal No. 109 and body ground?

N.G. → Disconnect condenser fan relay-2 harness connector.

O.K. ↓

C



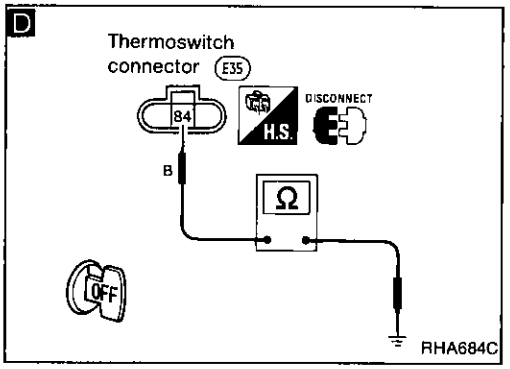
D

Note

Check circuit continuity between thermoswitch harness terminal No. 84 and body ground.

O.K. ↓

D

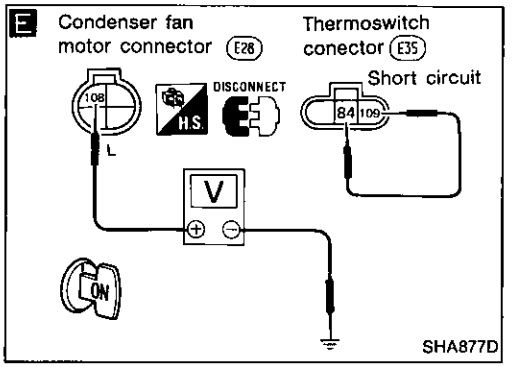


CHECK THERMOSWITCH.
(Refer to Electrical Components Inspection.)

N.G. → Replace thermoswitch.

O.K. ↓

E



CHECK POWER SUPPLY FOR CONDENSER FAN MOTOR.
Disconnect thermoswitch harness connector and connect terminals No. 109 and 84 with a jumper cable.
Do approx.12 bolts exist between condenser fan motor harness terminal No. 108 and body ground?

N.G. → Disconnect condenser fan relay-2 harness connector

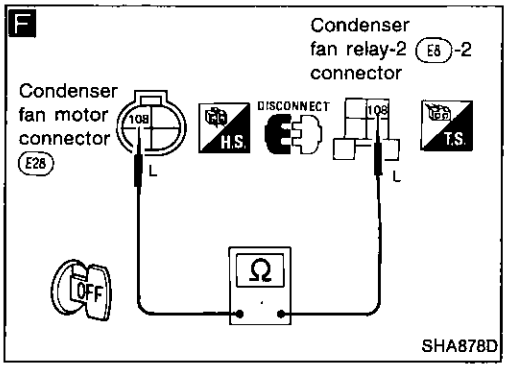
O.K. ↓

F

Note

Check circuit continuity between condenser fan relay-2 harness terminal No. 108 and condenser fan motor harness terminal No. 108.

F



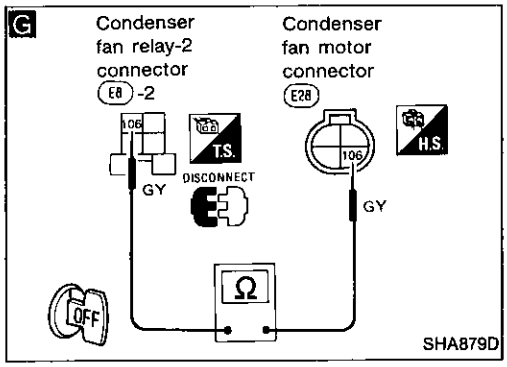
Ⓑ

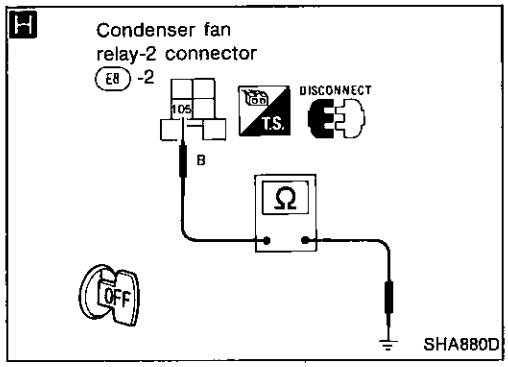
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Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 13 (Cont'd)





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↓

Disconnect condenser fan relay-2 and condenser fan motor harness connector.

↓

G Note

Check circuit continuity between condenser fan motor harness terminal No. (106) and condenser fan relay-2 harness terminal No. (106).

↓ O.K.

H Note

CHECK BODY GROUND CIRCUIT FOR CONDENSER FAN RELAY-2.
Does continuity exist between condenser fan relay-2 harness terminal No. (105) and body ground?

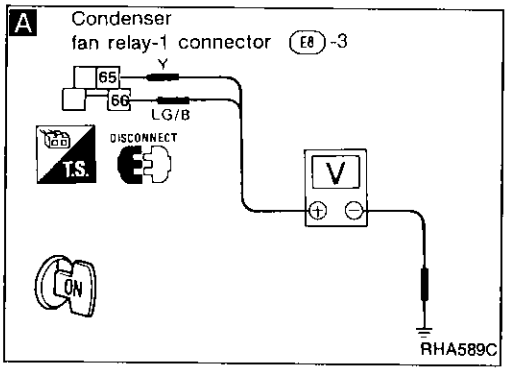
↓ O.K.

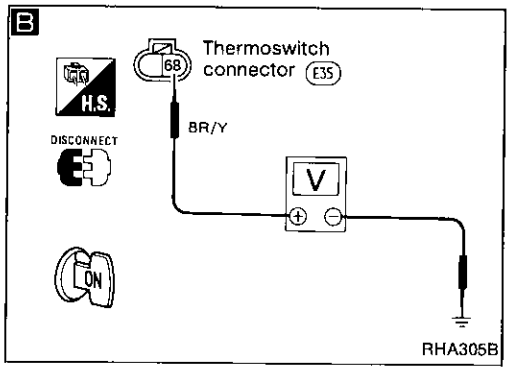
Replace condenser fan motor.

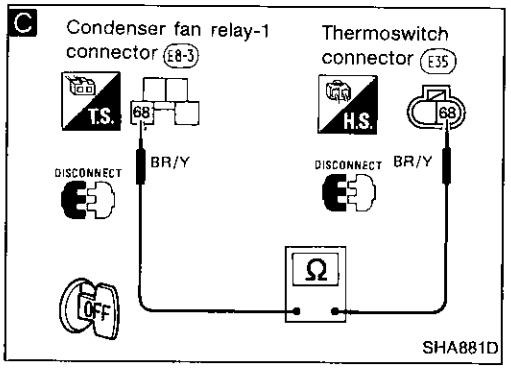
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

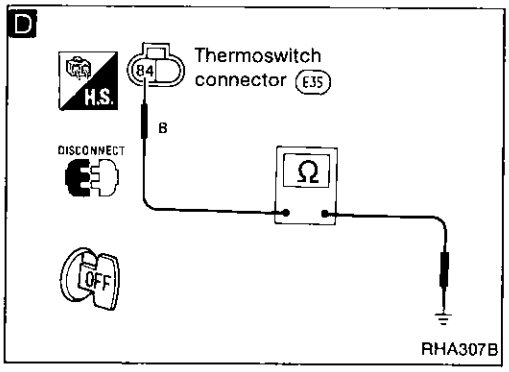
Diagnostic Procedure 13 (Cont'd)

SYMPTOM: Condenser fan motor does not operate normally. — For CANADA models









A

CHECK POWER SUPPLY FOR CONDENSER FAN RELAY-1.
Disconnect condenser fan relay.
Do approx. 12 volts exist between condenser fan relay harness terminal No. 65, 66 and body ground?

N.G. → CHECK POWER SUPPLY CIRCUIT AND 10A FUSE AT FUSE BLOCK. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

O.K. ↓

CHECK CONDENSER FAN RELAY-1 AFTER DISCONNECTING IT. (Refer to Electrical Components Inspection.)

N.G. → Replace condenser fan relay-1

O.K. ↓

Reconnect condenser fan relay-1 harness connector and disconnect thermoswitch harness connector.

B

CHECK COIL SIDE CIRCUIT OF CONDENSER FAN RELAY-1.
Do approx. 12 volts exist between thermoswitch harness terminal No. 68 and body ground?

N.G. → Disconnect condenser fan relay-1 harness connector.

C

Check circuit continuity between condenser fan relay-1 harness terminal No. 68 and thermoswitch harness terminal No. 68.

Note

O.K. ↓

D

Check circuit continuity between thermoswitch harness terminal No. 84 and body ground?

Note

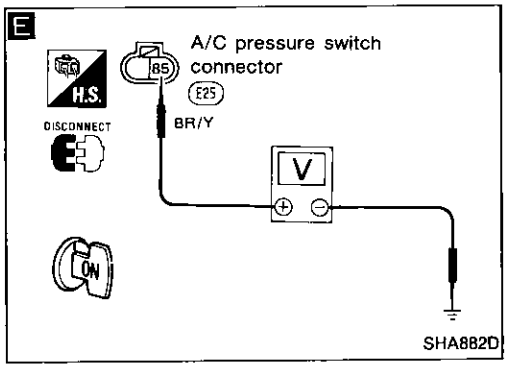
O.K. ↓

Ⓐ

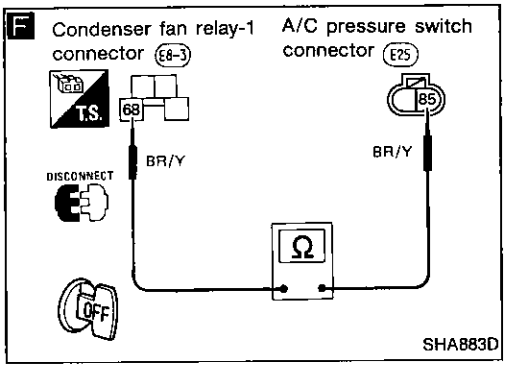
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 13 (Cont'd)

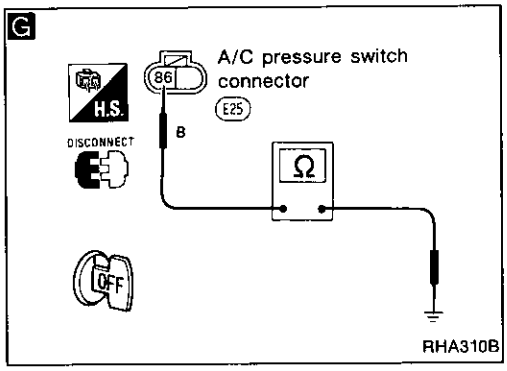
E



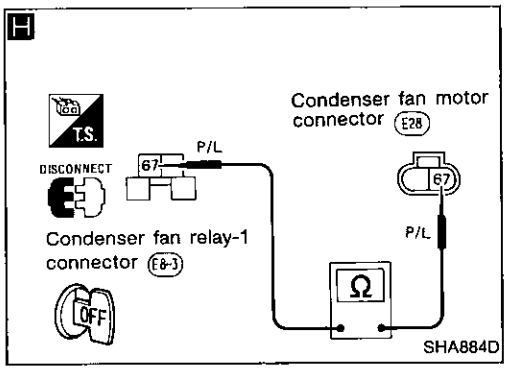
F



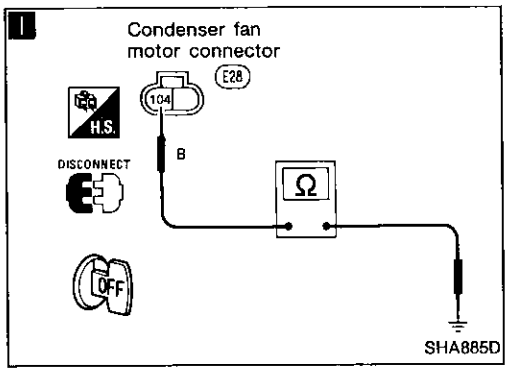
G



H



I



Ⓐ

CHECK THERMOSWITCH.
(Refer to Electrical Components Inspection.)

N.G. → Replace thermoswitch.

O.K.

E

CHECK COIL SIDE CIRCUIT OF CONDENSER FAN RELAY-1.
Disconnect A/C pressure switch harness connector.
Do approx. 12 volts exist between A/C pressure switch harness terminal No. 85 and body ground?

N.G. → Disconnect condenser fan relay-1 harness connector.

F

Note

Check circuit continuity between condenser fan relay-1 harness terminal No. 68 A/C pressure switch harness terminal No. 85.

O.K.

G

Note

Check circuit continuity between A/C pressure switch harness terminal No. 86 and body ground.

O.K.

CHECK A/C PRESSURE SWITCH
(Refer to Electrical Components Inspection.)

N.G. → Replace A/C pressure switch.

O.K.

Disconnect condenser fan relay-1 harness connector and condenser fan motor harness connector.

H

Note

Check circuit continuity between condenser fan relay-1 harness terminal No. 67 and condenser fan motor harness terminal No. 67.

O.K.

I

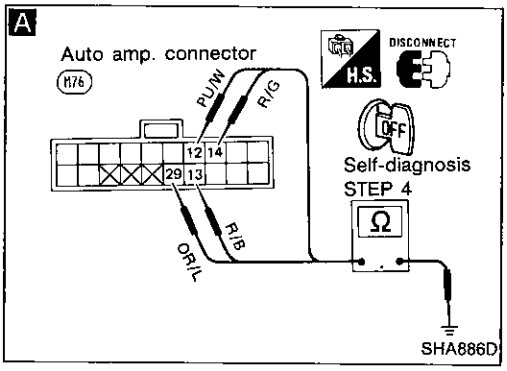
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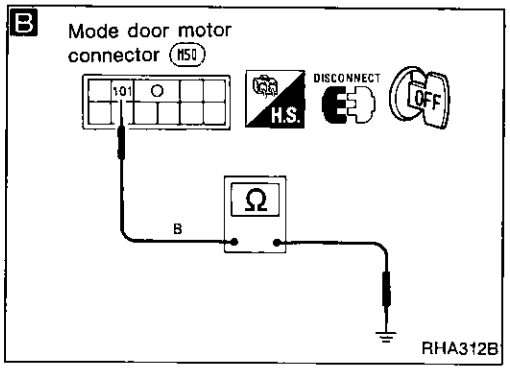
Check circuit continuity between condenser fan motor harness terminal No. 104 and body ground.

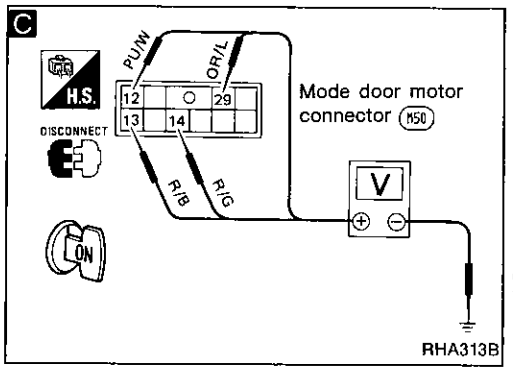
O.K.

Replace condenser fan 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 Self-diagnosis STEPS 1 to 4 before referring to the following flow chart.**

A

CHECK MODE DOOR MOTOR POSITION SWITCH.
1. 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. (12) or (14) of auto amp. harness connector and body ground.
4. Using above procedure, check for continuity in any other mode, as indicated in chart.

Code No.	Condition	Terminal No. ⊕	Terminal No. ⊖	Continuity
41	VENT	(29)	Body ground	Yes
42 or 43	B/L	(14)		
44	F/D 1	(13)		
45	F/D 2	(12) or (14) or (29)		
46	DEF	(12) or (13) or (14)		

N.G. → Disconnect mode door motor harness connector.

O.K. ↓

INSPECTION END

B

Note

CHECK BODY GROUND CIRCUIT FOR MODE DOOR MOTOR.
Does continuity exist between mode door motor harness terminal No. (101) 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 mode door motor harness terminals and body ground?

Terminal No. ⊕	Terminal No. ⊖	Voltage
(14)	Body ground	Approx. 5V
(12)		
(13)		
(29)		

O.K. ↓

Reconnect mode door motor harness connector.

Ⓐ

N.G. ↓

Ⓑ

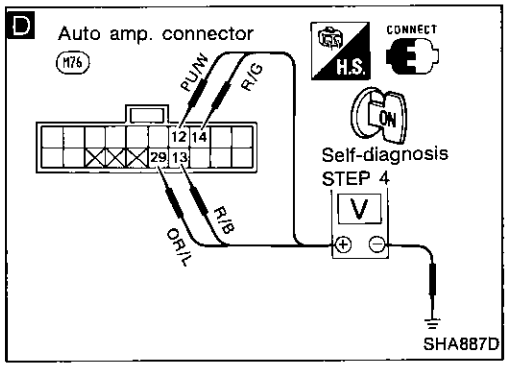
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Note:

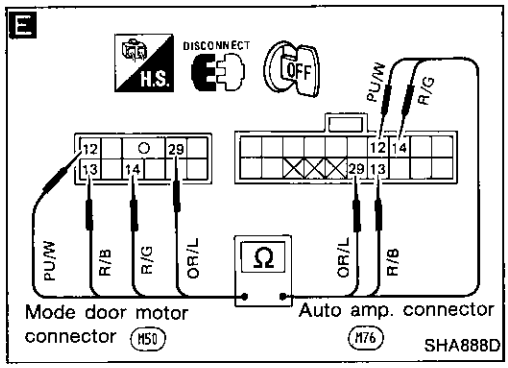
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 14 (Cont'd)

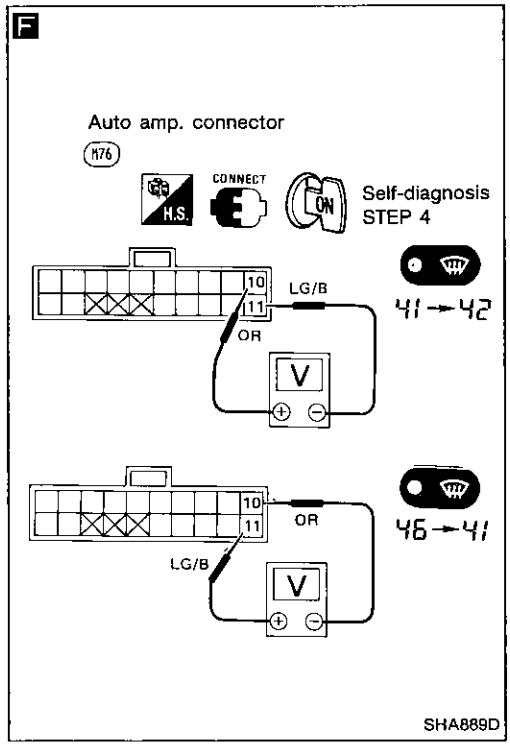
D



E



F



Ⓐ

A

CHECK MODE DOOR MOTOR POSITION SWITCH.
Set up Self-diagnosis STEP 4.
Measure voltage across auto amp. harness terminals and body ground.

Code No.	Condition	Terminal No. ⊕ ⑭	⑫	⑬	㉙	Terminal No. ⊖
41	VENT	5V	5V	5V	0V	Body ground
42	B/L1	0V	5V	5V	5V	
43	B/L2	5V	5V	0V	5V	
44	D/F 1	5V	0V	5V	5V	
45	D/F 2	0V	0V	5V	0V	
46	DEF	0V	0V	0V	5V	

0V: Approx. 0V
5V: Approx. 5V

O.K. ↓

N.G. →

Replace mode door motor.

Ⓑ

E Note

Check circuit continuity between each terminal on auto amp. and on mode door motor.

Terminal No. ⊕ Auto amp.	Terminal No. ⊖ Mode door motor	Continuity
㉙	㉙	Yes
⑬	⑬	
⑫	⑫	
⑭	⑭	

O.K. ↓

Replace auto amp.

F

CHECK FOR OUTPUT OF AUTO AMP.
Do approx. 10.5 volts exist between auto amp. harness terminals No. ⑩ and ⑪ when code No. is switched from "41" to "42" or when code No. is switched from "46" to "41"?

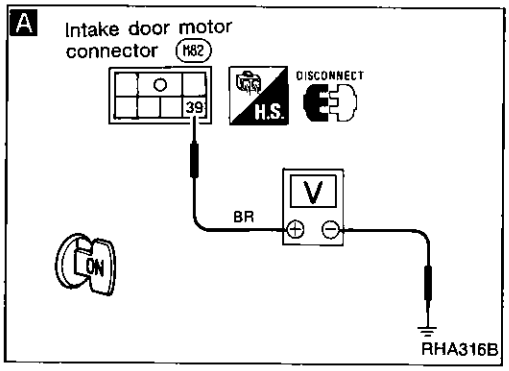
N.G. → Replace auto amp.

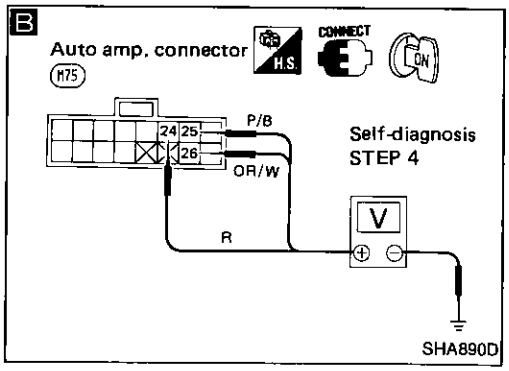
Code No.	Mode door motor operation	Terminal No. ⑩	⑪	Voltage V
41→42	VENT → B/L	⊕	⊖	Approx. 10.5
46→41	DEF → VENT	⊖	⊕	
–	Stop	⊖	⊖	0

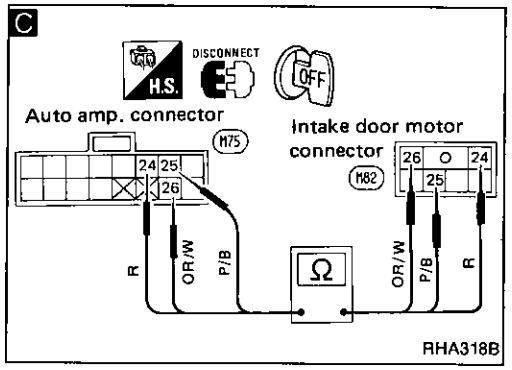
O.K. ↓

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 Self-diagnosis STEPS 1, 2 and 4 before referring to the following flow chart.**

A

CHECK POWER SUPPLY FOR INTAKE DOOR MOTOR.
Disconnect intake door motor harness connector.
Do approx. 12 volts exist between intake door motor harness terminal No. 39 and body ground?

N.G. → Check 10A fuse at fuse block. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

O.K. ↓

Reconnect intake door motor harness connector.

B

CHECK FOR OUTPUT OF AUTO AMP.
Set up Self-diagnosis STEP 4.
Measure voltage across auto amp. harness terminals and body ground.

N.G. → Disconnect auto amp. and intake door motor harness connectors.

Code No.	Terminal No. ⊕	Terminal No. ⊖	Condition	Voltage V
41, 42	24	Body ground	REC	0
Other				12
43	25		20% FRE	0
Other				12
44, 45, 46	26		FRE	0
Other				12

0V: Approx. 0V
12V: Approx. 12V

O.K. ↓

INSPECTION END

C Note

Check circuit continuity between each terminal on auto amp. and on intake door motor.

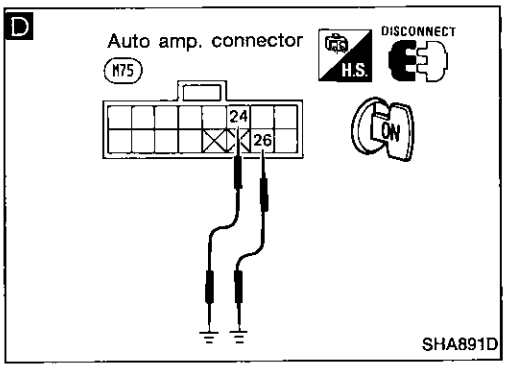
Terminal No. ⊕ (Auto amp.)	Terminal No. ⊖ (Intake door motor)	Continuity
24	24	Yes
25	25	
26	26	

O.K. ↓

Ⓐ
(Go to next page.)

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 15 (Cont'd)



Ⓐ

Reconnect intake door motor harness connector.

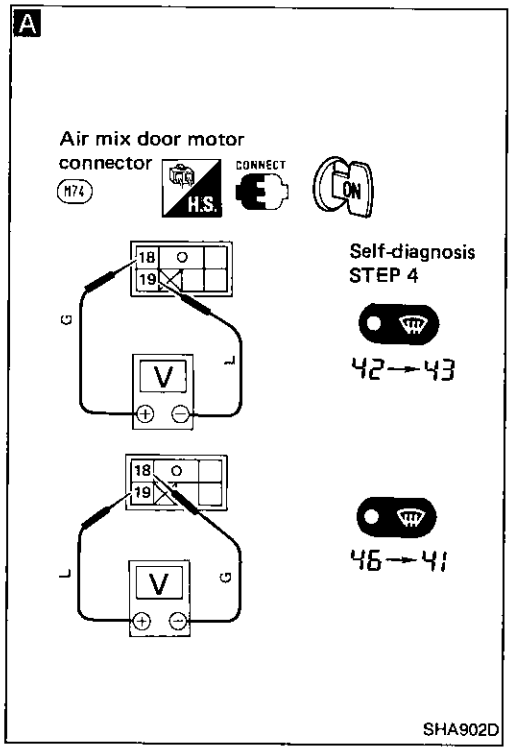
D

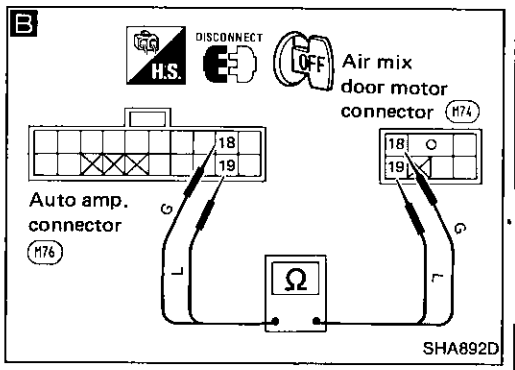
CHECK INTAKE DOOR MOTOR.
Does intake door move to "REC" position after connecting auto amp. harness terminal No. ㉔ and body ground with a jumper cable?
Then, does intake door move to "FRE" position after connecting auto amp. harness terminal No. ㉖ and body ground with a jumper cable?

N.G. → Replace intake door motor.

O.K.

Replace auto amp.





Diagnostic Procedure 16

SYMPTOM: Air mix door motor does not operate normally.

- **Perform Self-diagnosis STEPS 1, 2 and 4 before referring to the following flow chart.**

IS P.B.R. OPERATING NORMALLY?
Refer to Self-diagnoses STEP 2.

N.G. → CHECK P.B.R. CIRCUIT. Go to Diagnostic Procedure 5 or 10.

O.K. ↓

A

CHECK FOR OUTPUT OF AUTO AMP.
Set up Self-diagnosis STEP 4.
Do approx. 10.5 volt exist between air mix door motor harness terminals No. ⑱ and ⑲ 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 air mix door motor harness connectors.

Code No.	Air mix door operation	Terminal No. ⑱	Terminal No. ⑲	Voltage V
42 → 43	Cold → Hot	⊕	⊖	Approx. 10.5
46 → 41	Hot → Cold	⊖	⊕	
–	Stop	⊖	⊖	0

B

Note: Check circuit continuity between auto amp. harness terminal No. ⑱ (⑲) and air mix door motor harness terminal No. ⑱ (⑲).

O.K. ↓

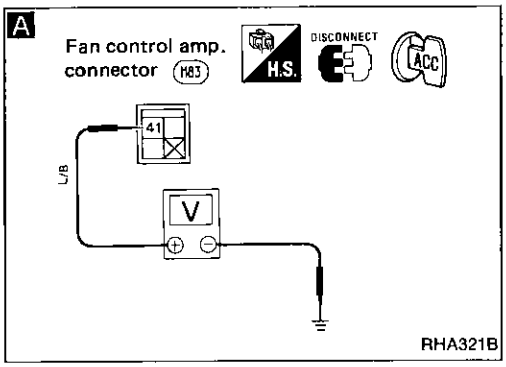
Replace auto amp.

O.K. ↓

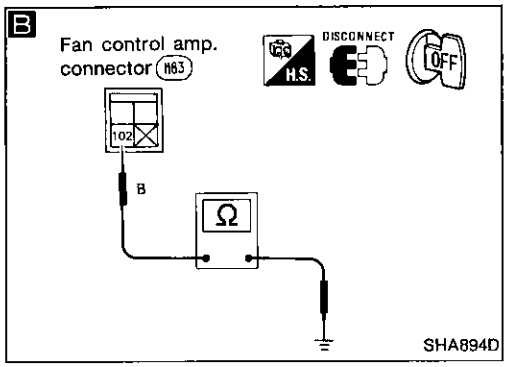
Replace air mix door motor.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

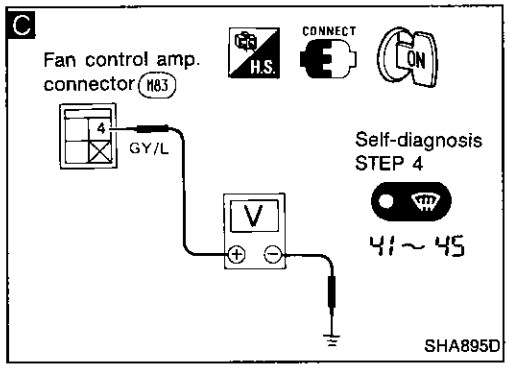
A



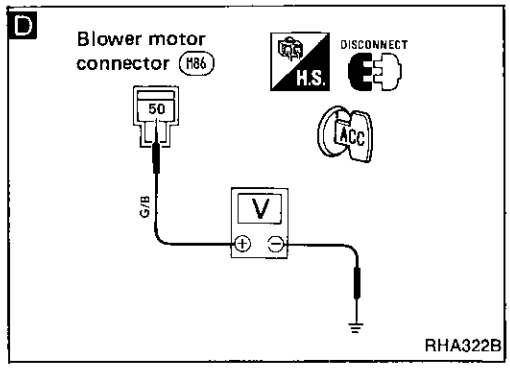
B



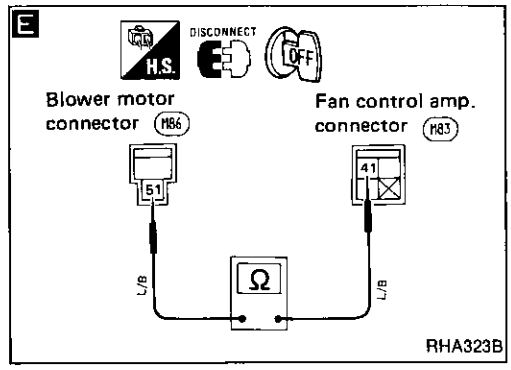
C



D



E



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. 41 and body ground?

N.G. → D

O.K. ↓

B

Note

CHECK BODY GROUND CIRCUIT FOR FAN CONTROL AMP.
Does continuity exist between fan control amp. harness terminal No. 102 and body ground?

O.K. ↓

Reconnect fan control amp. harness connector.

C

CHECK FOR OUTPUT OF AUTO AMP.
Set up Self-diagnosis STEP 4.
Measure voltage across fan control amp. harness terminal No. 4 and body ground.

Code No.	Terminal No. ⊕	Terminal No. ⊖	Voltage
41 → 45	4	Body ground	Approx. 1 - 3V

N.G. → Ⓐ (Go to next page.)

O.K. ↓

Replace fan control amp.

D

CHECK POWER SUPPLY FOR BLOWER MOTOR.
Disconnect blower motor harness connector.
Do approx. 12 volts exist between blower motor harness terminal No. 50 and body ground?

O.K. ↓

N.G. → Check 15A fuses at fuse block. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

E

Note

Check circuit continuity between blower motor harness terminal No. 51 and fan control amp. harness terminal No. 41.

O.K. ↓

CHECK BLOWER MOTOR. (Refer to Electrical Components Inspection.)

N.G. ↓

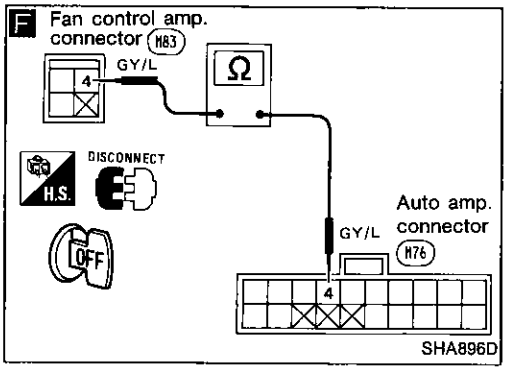
Replace blower motor.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

GI MA EM LC EF & EC FE AT PD FA RA BR ST BF HA EL

Diagnostic Procedure 17 (Cont'd)

F



Ⓐ

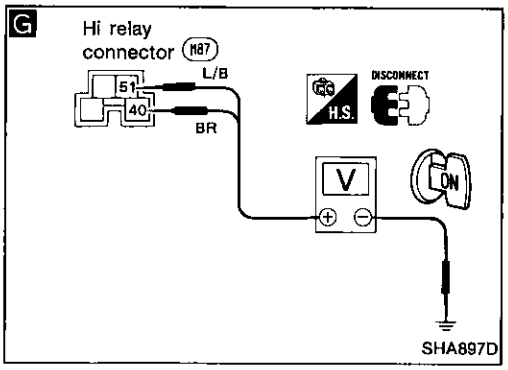
Disconnect auto amp. and fan control amp. harness connector.

F Note

Does continuity exist between auto amp. harness terminal No. ④ and fan control amp. harness terminal No. ④ ?

O.K.

G



CHECK POWER SUPPLY FOR HI RELAY.
Do approx. 12 volts exist between Hi relay harness terminals No. ㊵ , ㊶ and body ground?

N.G. → Check 10A or 15A fuses at fuse block.
(Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

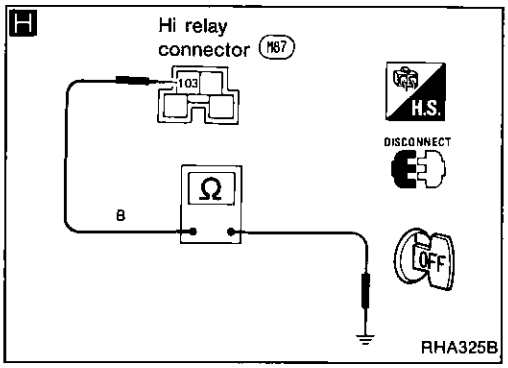
O.K.

H Note

CHECK BODY GROUND CIRCUIT FOR HI RELAY.
Does continuity exist between Hi relay harness terminal No. (103) and body ground?

O.K.

H



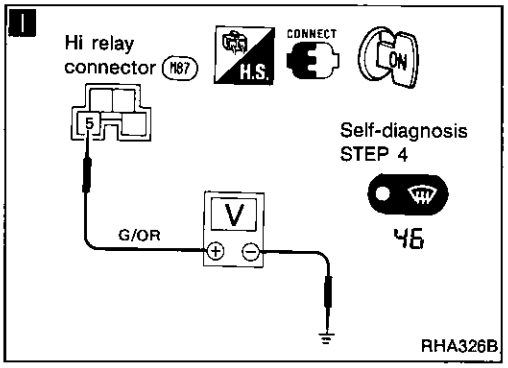
CHECK HI RELAY AFTER DISCONNECTING IT.
(Refer to Electrical Components Inspection.)

N.G. → Replace Hi relay.

O.K.

Reconnect Hi relay.

I



CHECK FOR OUTLET OF AUTO AMP.
Set up Self-diagnosis STEP 4.
Measure voltage across Hi relay harness terminal No. ⑤ and body ground.

Code No.	Terminal No. ⊕	Terminal No. ⊖	Voltage
46	⑤	Body ground	Less than approx. 1.5V

N.G. → Disconnect Hi relay and auto amp. harness connectors.

J Note

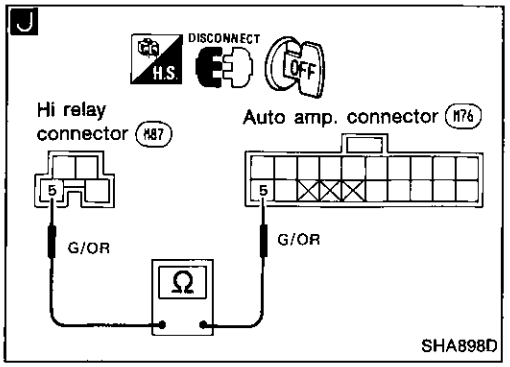
Does continuity exist between Hi relay harness terminal No. ⑤ and auto amp. harness terminal No. ⑤ ?

O.K. → Replace auto amp.

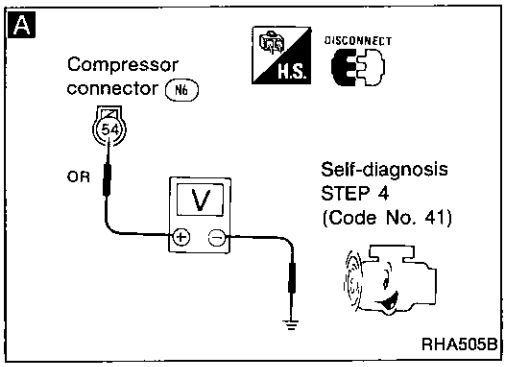
O.K.

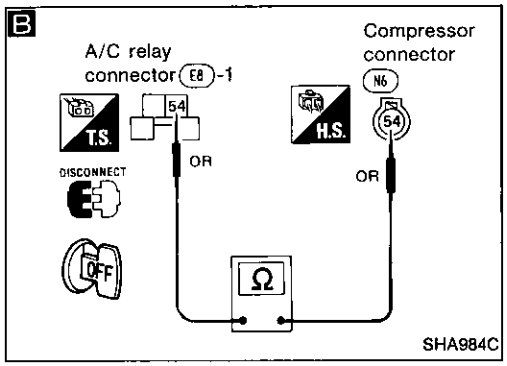
Replace blower motor.

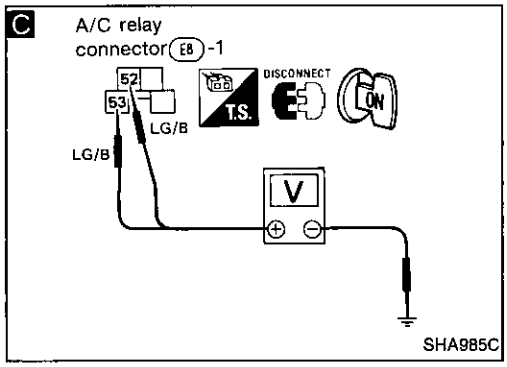
J



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 code No.41 in Self-diagnosis STEP 4.
3. Do approx. 12 volts exist between compressor harness terminal No. 54 and body ground?

N.G. → Disconnect A/C relay harness connector.

B

Note

Check circuit continuity between A/C relay harness terminal No. 54 and compressor harness terminal No. 54

O.K.

O.K. → Check magnet clutch.

N.G. → Replace compressor.

Turn ignition switch OFF to cancel Self-diagnosis STEP 4.

C

CHECK POWER SUPPLY FOR A/C RELAY.
Disconnect A/C relay.
Do approx. 12 volts exist between A/C relay harness terminal No. 52, 53 and body ground?

N.G. → CHECK POWER SUPPLY CIRCUIT AND 10A FUSE AT FUSE BLOCK. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

O.K.

CHECK A/C RELAY AFTER DISCONNECTING IT.
(Refer to Electrical Components Inspection.)

N.G. → Replace A/C relay.

O.K.

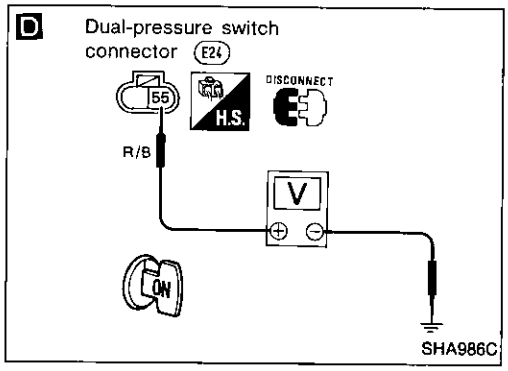
Reconnect A/C relay.

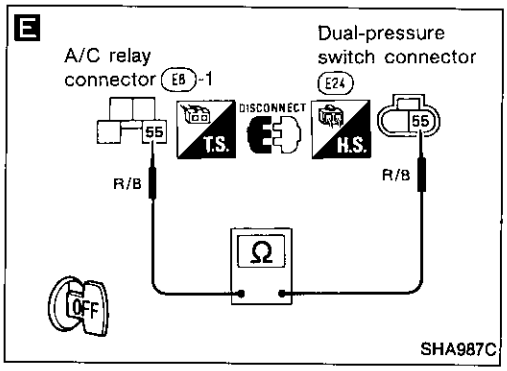
Ⓐ

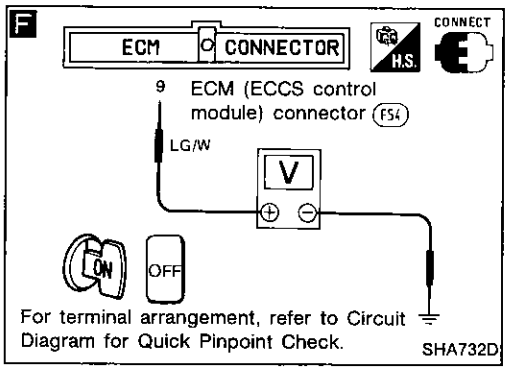
(Go to next page.)

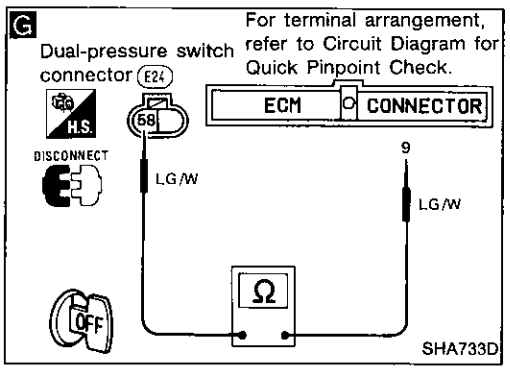
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 18 (Cont'd)









Ⓐ

D

CHECK DUAL-PRESSURE SWITCH CIRCUIT BETWEEN DUAL-PRESSURE SWITCH AND A/C RELAY
Disconnect dual-pressure switch harness connector.
Do approx. 12 volts exist between dual-pressure switch harness terminal No. ⑮ and body ground?

N.G. → Disconnect A/C relay harness connector.

E Note

Check circuit continuity between A/C relay harness terminal No. ⑮ and dual-pressure switch harness terminal No. ⑮.

O.K. ↓

CHECK DUAL-PRESSURE SWITCH.
(Refer to Electrical Components Inspection.)

N.G. → Replace dual-pressure switch.

O.K. ↓

Reconnect dual-pressure switch harness connector.

F

CHECK COIL SIDE CIRCUIT OF A/C RELAY.
Do approx. 12 volts exist between ECM (ECCS control module) harness terminal No. ⑨ and body ground?

O.K. → **G** Note

Check circuit continuity between dual-pressure switch harness terminal No. ⑱ and ECM (ECCS control module) harness terminal No. ⑨.

O.K. ↓

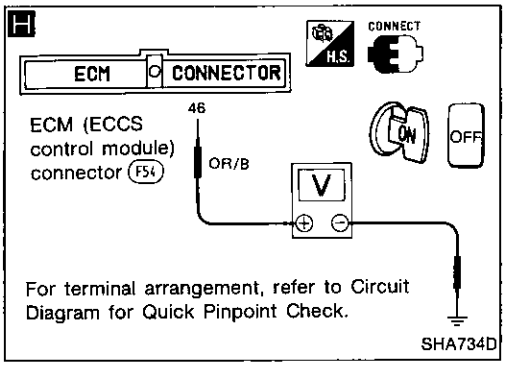
Reconnect ECM (ECCS control module) harness connector.

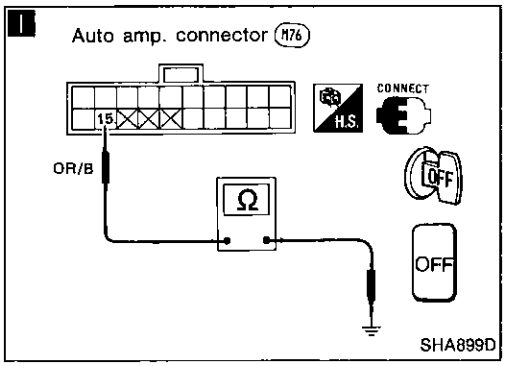
Ⓑ

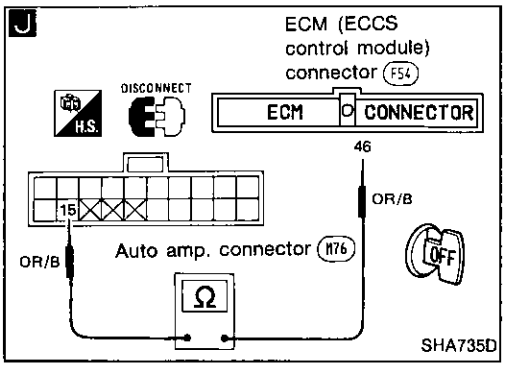
(Go to next page)

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 18 (Cont'd)







Ⓑ

H

CHECK COIL SIDE CIRCUIT OF A/C RELAY CONTROLLED BY ECM (ECCS CONTROL MODULE).
Do approx. 8 to 9 volts exist between ECM (ECCS control module) harness terminal No. 46 and body ground?

N.G. → CHECK ECM (ECCS CONTROL MODULE).
(Refer to EF & EC section.)

O.K. ↓

Disconnect auto amp. harness connector.

I

CHECK AUTO AMP. CIRCUIT BETWEEN ECM (ECCS CONTROL MODULE) AND AUTO AMP.
Do approx. 8 to 9 volts exist between auto amp. harness terminal No. 15 and body ground?

N.G. → **J** Note: Check circuit continuity between auto amp. harness terminal No. 15 and ECM (ECCS control module) 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

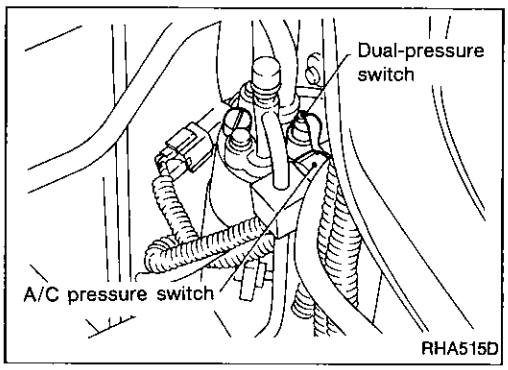
SYMPTOM: Self-diagnosis cannot be performed.

CHECK MAIN POWER SUPPLY AND GROUND CIRCUIT FOR AUTO AMP.
(Refer to page HA-75.)

N.G. → Repair Main Power Supply and Ground Circuit.

O.K. ↓

Replace auto amp.



Electrical Components Inspection

DUAL-PRESSURE SWITCH

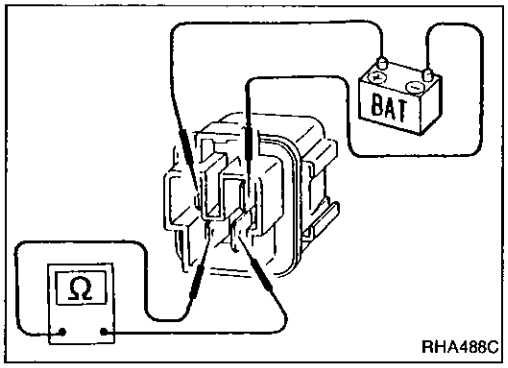
High-pressure side line pressure kPa (kg/cm^2, psi)	Operation	Continuity
Decreasing to 177 - 216 (1.8 - 2.2, 26 - 31) Increasing to 2,452 - 2,844 (25 - 29, 356 - 412)	Turn OFF	Does not exist
Increasing to 177 - 235 (1.8 - 2.4, 26 - 34) Decreasing to 1,863 - 2,256 (19 - 23, 270 - 327)	Turn ON	Exists

A/C PRESSURE SWITCH

High-pressure side line pressure kPa (kg/cm^2, psi)	Operation	Continuity
Decreasing to 1,226 - 1,324 (12.5 - 13.5, 178 - 192)	Turn OFF	Does not exist
Increasing to 1,422 - 1,520 (14.5 - 15.5, 206 - 220)	Turn ON	Exists

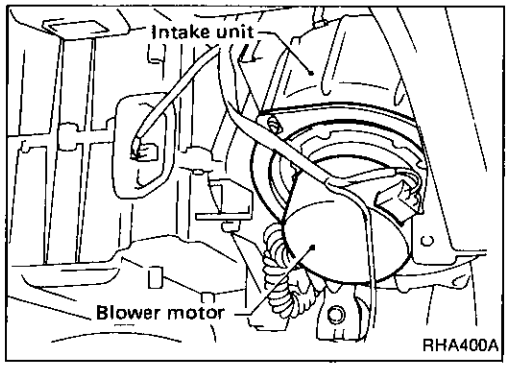
THERMOSWITCH

Water temperature °C (°F)	Operation	Continuity
Decreasing to 80 - 86 (176 - 187) 95 - 101 (203 - 214)	Turn OFF	Does not exist
Increasing to 87 - 93 (189 - 199) 102 - 108 (216 - 226)	Turn ON	Exists



A/C RELAY, CONDENSER FAN RELAYS AND BLOWER HIGH RELAY

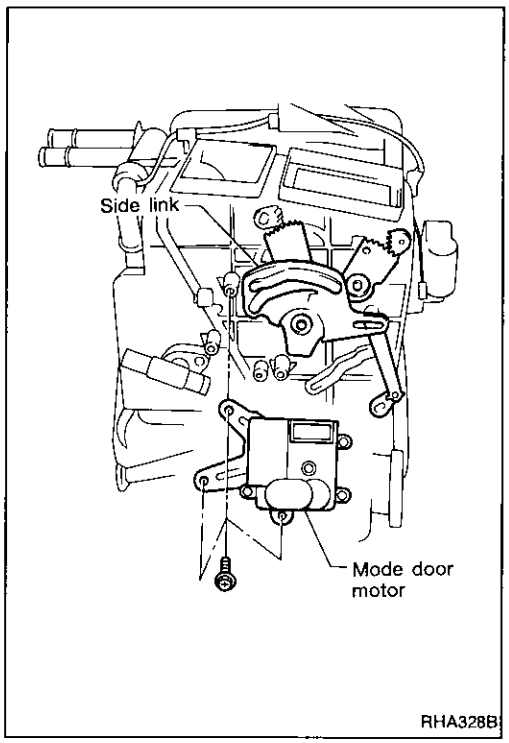
Check circuit continuity between terminals by supplying 12 volts to coil side terminals of relay.



BLOWER MOTOR

Confirm smooth rotation of the blower motor.

- Ensure that there are no foreign particles inside the intake unit.

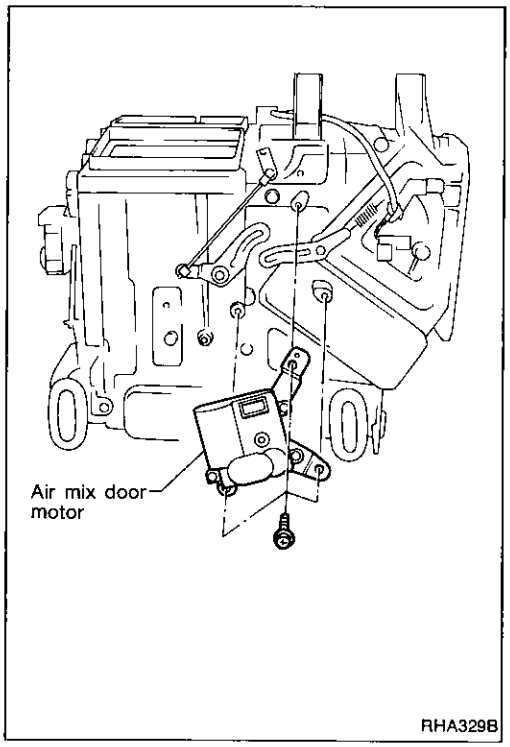


Control Linkage Adjustment

MODE DOOR

1. Install mode door motor on heater unit and connect it to body harness.
2. Set up code No. 41 in Self-diagnosis STEP 4.
3. Move side link by hand and hold mode door in VENT mode.
4. Attach mode door motor rod to side link rod holder.
5. Check mode door operates properly when changing code No. 41 to 46 by pushing (DEF) switch.

41	42	43	44	45	46
VENT	B/L	B/L	D/F1	D/F2	DEF

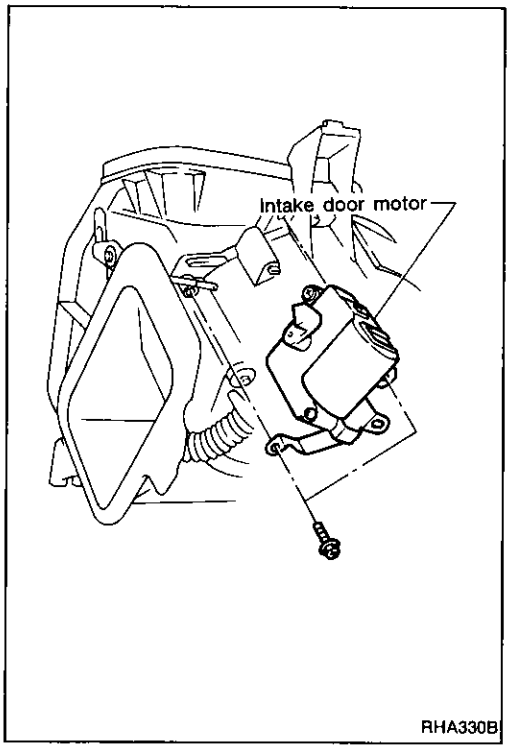


AIR MIX DOOR

1. Install air mix door motor on heater unit and connect it to body harness.
2. Set up code No. 41 in Self-diagnosis STEP 4.
3. Move air mix door lever by hand and hold it at full cold position.
4. Attach air mix door lever to rod holder.
5. Check air mix door operates properly when changing code No. 41 to 46 by pushing (DEF) switch.

41	42	43	44	45	46
Full Cold		Full Hot			

Control Linkage Adjustment (Cont'd)



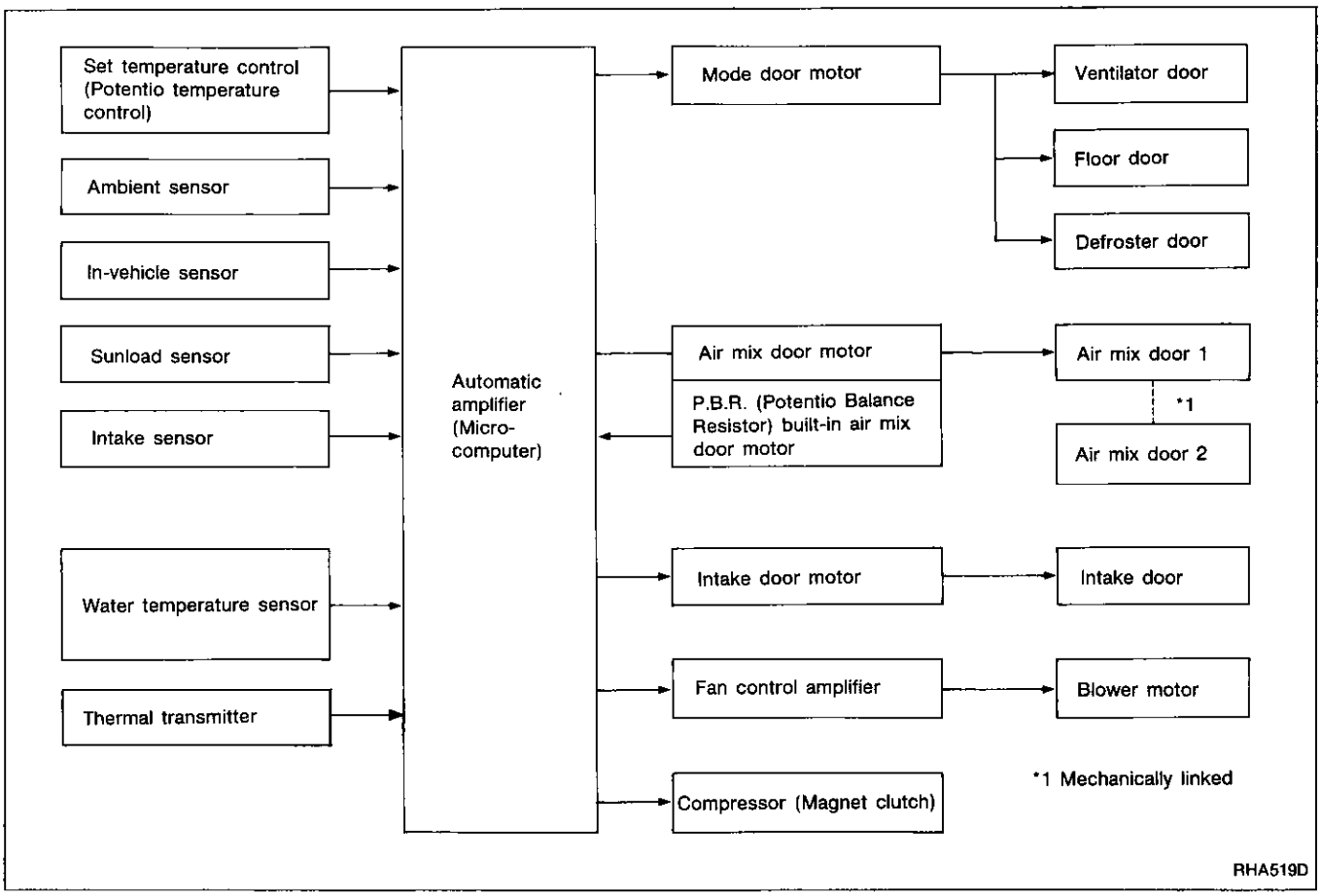
INTAKE DOOR

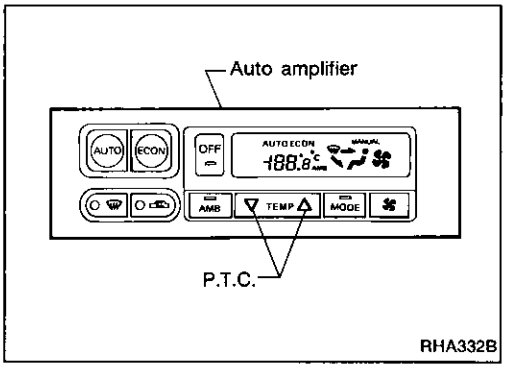
1. Install intake door motor on intake unit and connect it to body harness.
2. Set up code No. 41 in Self-diagnosis STEP 4.
3. Move intake door link by hand and hold it at REC position.
4. Attach intake door lever to rod holder.
5. Check intake door operates properly when changing code No. 41 to 46 by pushing (DEF) switch.

41	42	43	44	45	46
REC		20% FRE	FRE		

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:

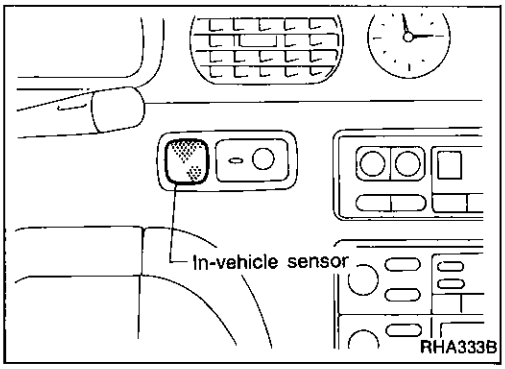




Control System Input Components

POTENTIO TEMPERATURE CONTROL (P.T.C.)

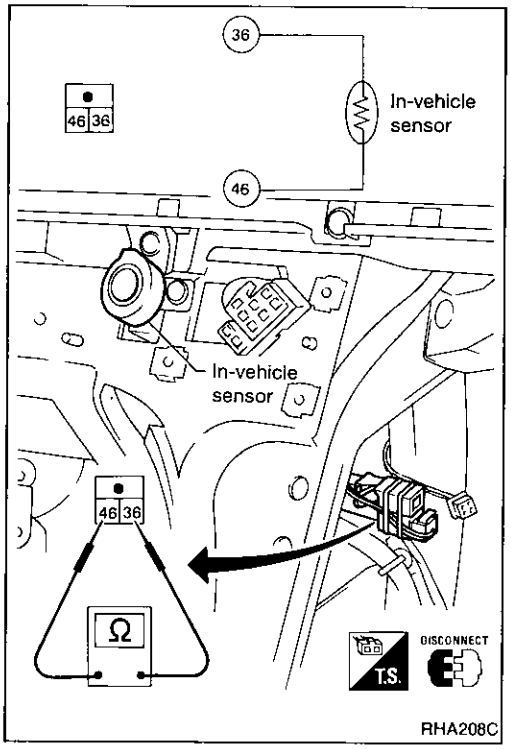
The P.T.C. is built into the auto amplifier. It can be set at an interval of 0.5°C (1.0°F) through both ▲ (HOT) and ▼ (COLD) control switches. Setting temperature is digitally displayed.



IN-VEHICLE SENSOR

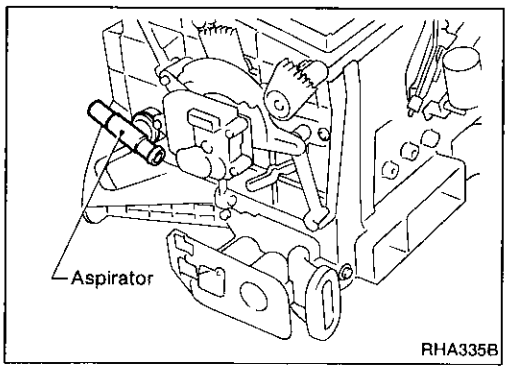
The in-vehicle sensor is attached to cluster lid C. It converts variations in temperature of compartment air drawn from the aspirator into a resistance value which is then input into the auto amplifier. (A more detailed description of the aspirator is shown on the following page.)

Control System Input Components (Cont'd)



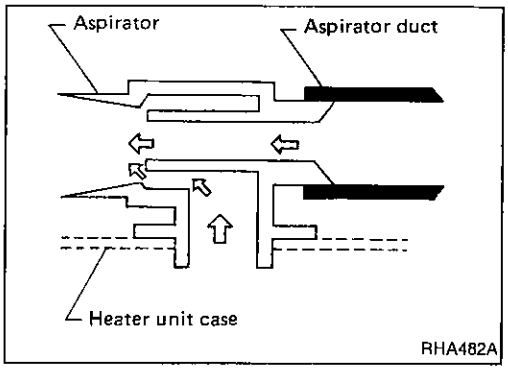
After disconnecting in-vehicle sensor harness connector, measure resistance between terminals ㊱ and ㊻ at sensor harness side, using the table below.

Temperature °C (°F)	Resistance kΩ
–35 (–31)	38.57
–30 (–22)	28.84
–25 (–13)	21.83
–20 (–4)	16.72
–15 (5)	12.95
–10 (14)	10.14
–5 (23)	8.02
0 (32)	6.41
5 (41)	5.17
10 (50)	4.21
15 (59)	3.46
20 (68)	2.87
25 (77)	2.41
30 (86)	2.03
35 (95)	1.73
40 (104)	1.49
45 (113)	1.29
50 (122)	1.13
55 (131)	0.99
60 (140)	0.88
65 (149)	0.79

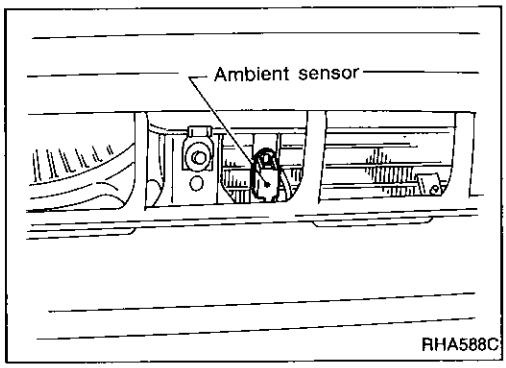


ASPIRATOR

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.



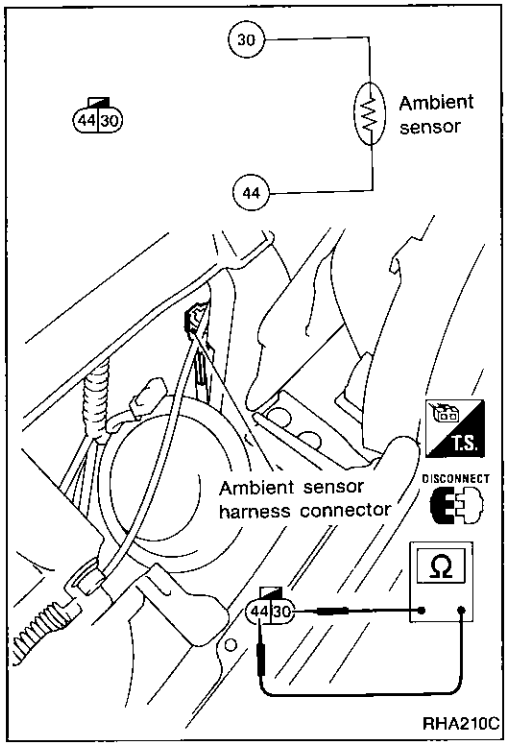
Control System Input Components (Cont'd)



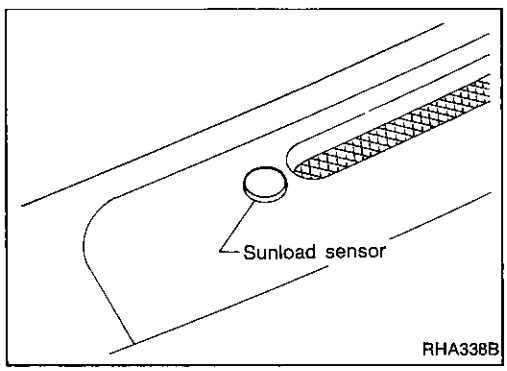
AMBIENT SENSOR

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 ㉚ and ㊹ at sensor harness side, using the table below.



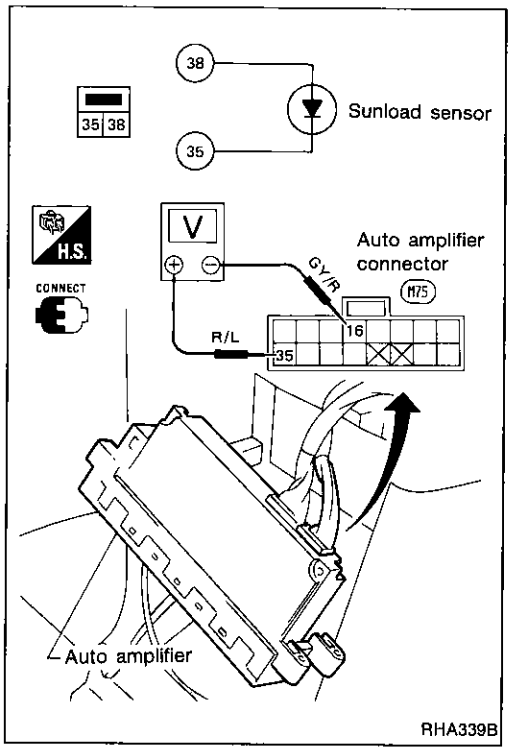
Temperature °C (°F)	Resistance kΩ
−35 (−31)	38.35
−30 (−22)	28.62
−25 (−13)	21.61
−20 (−4)	16.50
−15 (5)	12.73
−10 (14)	9.92
−5 (23)	7.80
0 (32)	6.19
5 (41)	4.95
10 (50)	3.99
15 (59)	3.24
20 (68)	2.65
25 (77)	2.19
30 (86)	1.81
35 (95)	1.51
40 (104)	1.27
45 (113)	1.07
50 (122)	0.91
55 (131)	0.77
60 (140)	0.66
65 (149)	0.57



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.

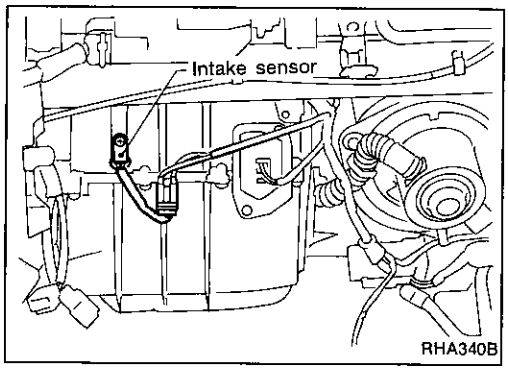
Control System Input Components (Cont'd)



Measure voltage between terminals ⑯ and ㉟ at vehicle harness side, using the table below.

Input current mA	Output voltage V
0	5.0
0.1	4.1
0.2	3.1
0.3	2.2
0.4	1.3
0.5	0.4

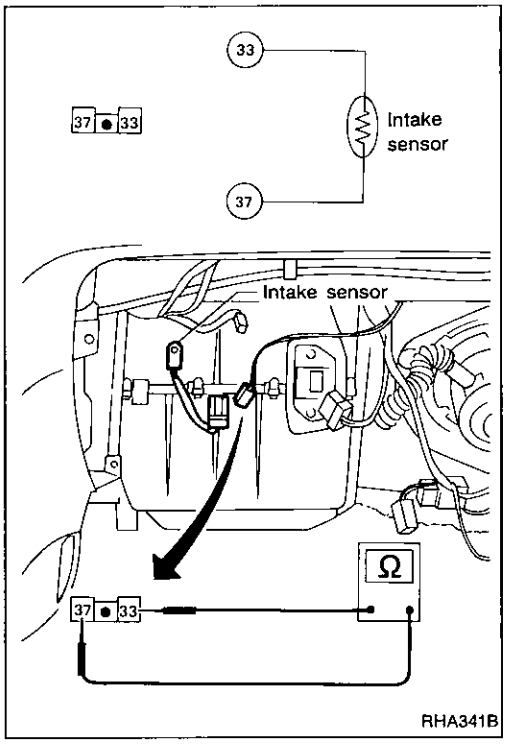
- **When checking sunload sensor, select a place where sun shines directly on it.**



INTAKE SENSOR

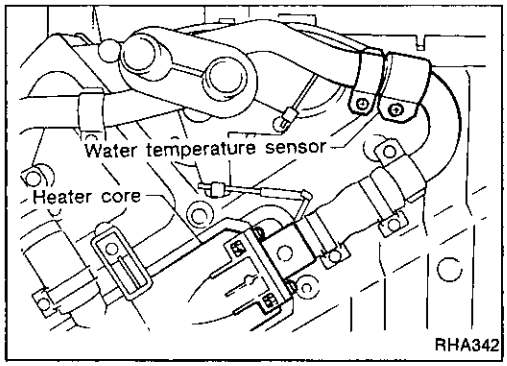
The intake sensor is located on the cooling unit. It converts temperature of air after it passes through the evaporator into a resistance value which is then input to the auto amplifier.

Control System Input Components (Cont'd)



After disconnecting intake sensor harness connector, measure resistance between terminals ㉝ and ㊲ at sensor harness side, using the table below.

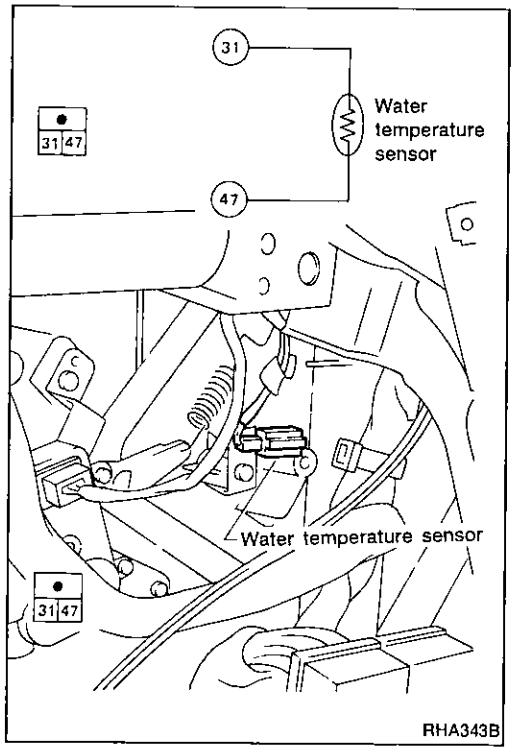
Temperature °C (°F)	Resistance kΩ
–35 (–31)	38.35
–30 (–22)	28.62
–25 (–13)	21.61
–20 (–4)	16.50
–15 (5)	12.73
–10 (14)	9.92
–5 (23)	7.80
0 (32)	6.19
5 (41)	4.95
10 (50)	3.99
15 (59)	3.24
20 (68)	2.65
25 (77)	2.19
30 (86)	1.81
35 (95)	1.51
40 (104)	1.27
45 (113)	1.07
50 (122)	0.91
55 (131)	0.77
60 (140)	0.66
65 (149)	0.57



WATER TEMPERATURE SENSOR

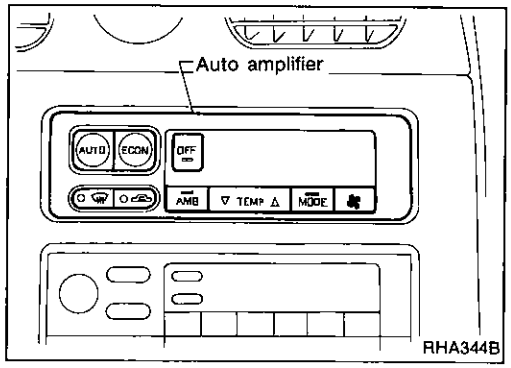
The water temperature sensor is attached to the heater unit. It converts the water temperature value at the heater core entrance into a resistance value. It inputs the voltage, that varies according to change in the resistance value, into the auto amp.

Control System Input Components (Cont'd)



After disconnecting water temperature sensor harness connector, measure resistance between terminals 31 and 47 at sensor harness side, using table below.

Temperature °C (°F)	Resistance kΩ
0 (32)	3.99
5 (41)	3.17
10 (50)	2.54
15 (59)	2.05
20 (68)	1.67
25 (77)	1.36
30 (86)	1.12
35 (95)	0.93
40 (104)	0.78
45 (113)	0.65
50 (122)	0.55
55 (131)	0.47
60 (140)	0.40
65 (149)	0.34
70 (158)	0.29
75 (167)	0.25
80 (176)	0.22



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, 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

INTAKE DOOR CONTROL

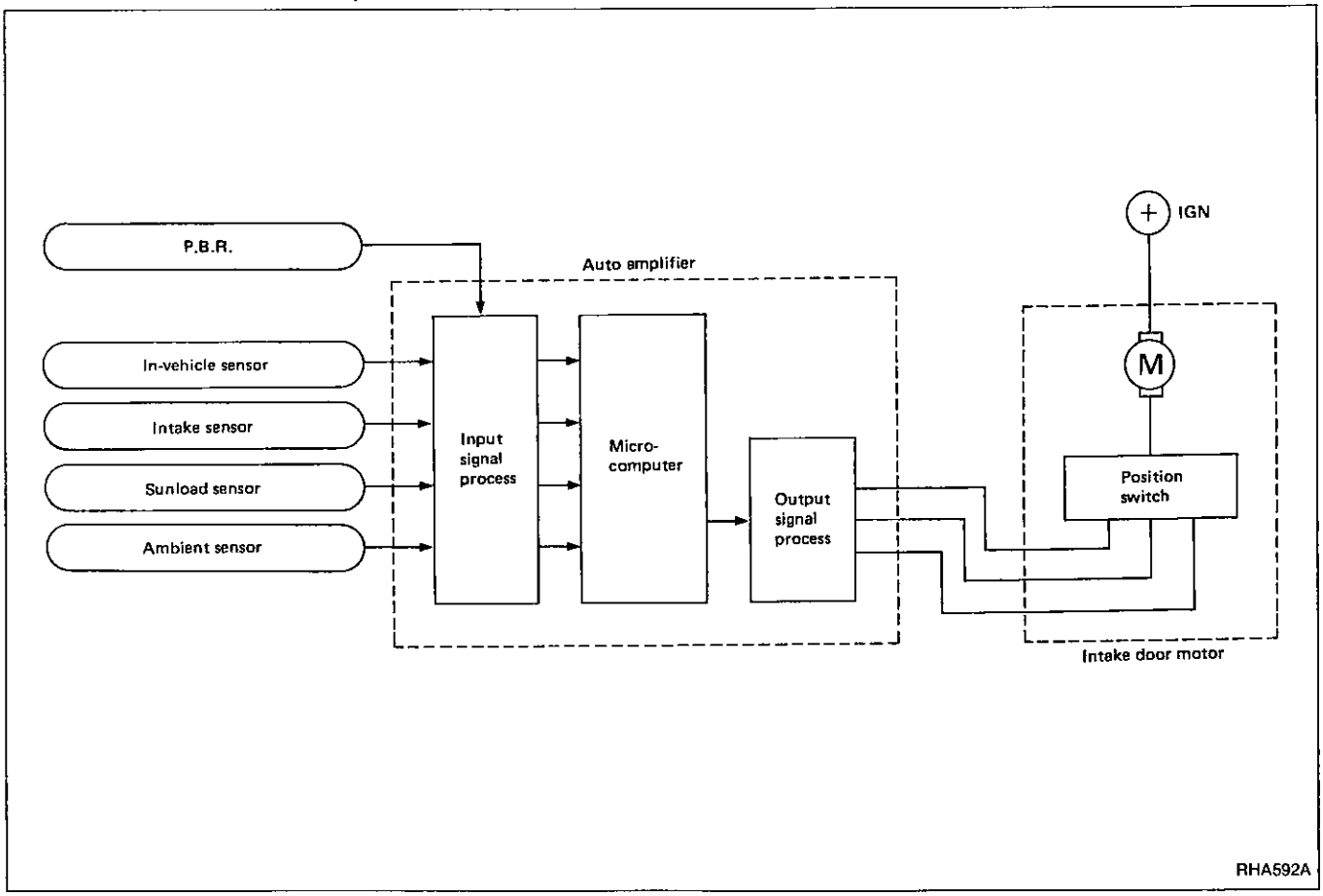
Components parts

Intake door control system components are:

1) Auto amplifier
2) Intake door motor
3) P.B.R.
4) In-vehicle sensor
5) Ambient sensor
6) Sunload sensor
7) Intake sensor

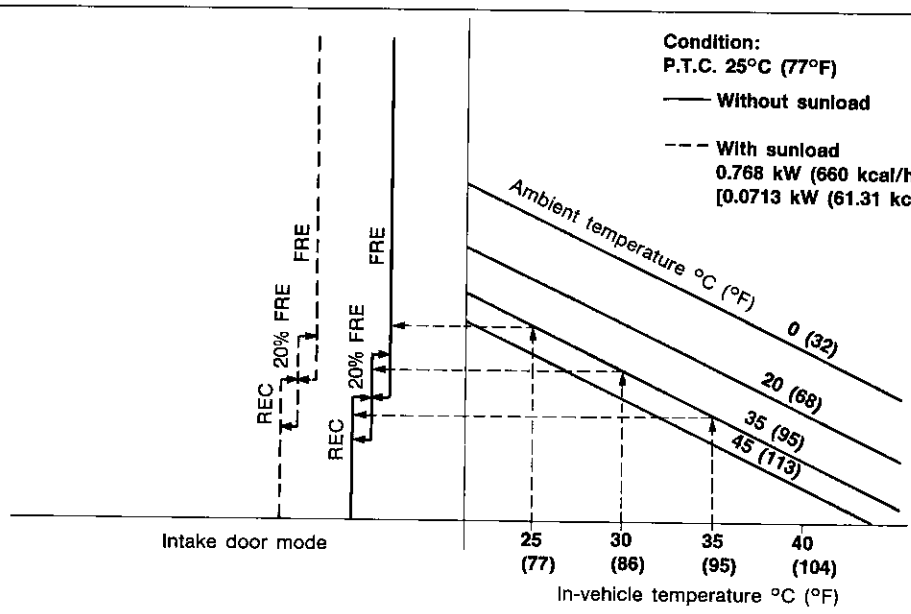
System operation

The intake door control determines intake door position based on the ambient temperature and the in-vehicle temperature. When the ECON, DEF, or OFF buttons are pushed, the auto amplifier sets the intake door at the "Fresh" position.



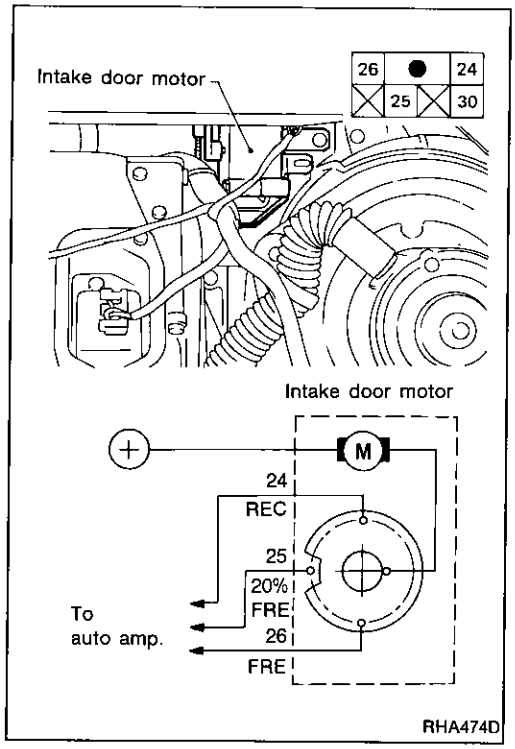
Control System Output Components (Cont'd)

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 are 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.** RHA473D



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

24	25	26	Intake door operation	Direction of lever rotation
CL	OP	OP	REC	Counter clockwise
OP	CL	OP	20% FRE	
OP	OP	CL	FRE	

OP: Open
CL: Close

Control System Output Components (Cont'd)

AIR MIX DOOR CONTROL (Automatic temperature control)

Component parts

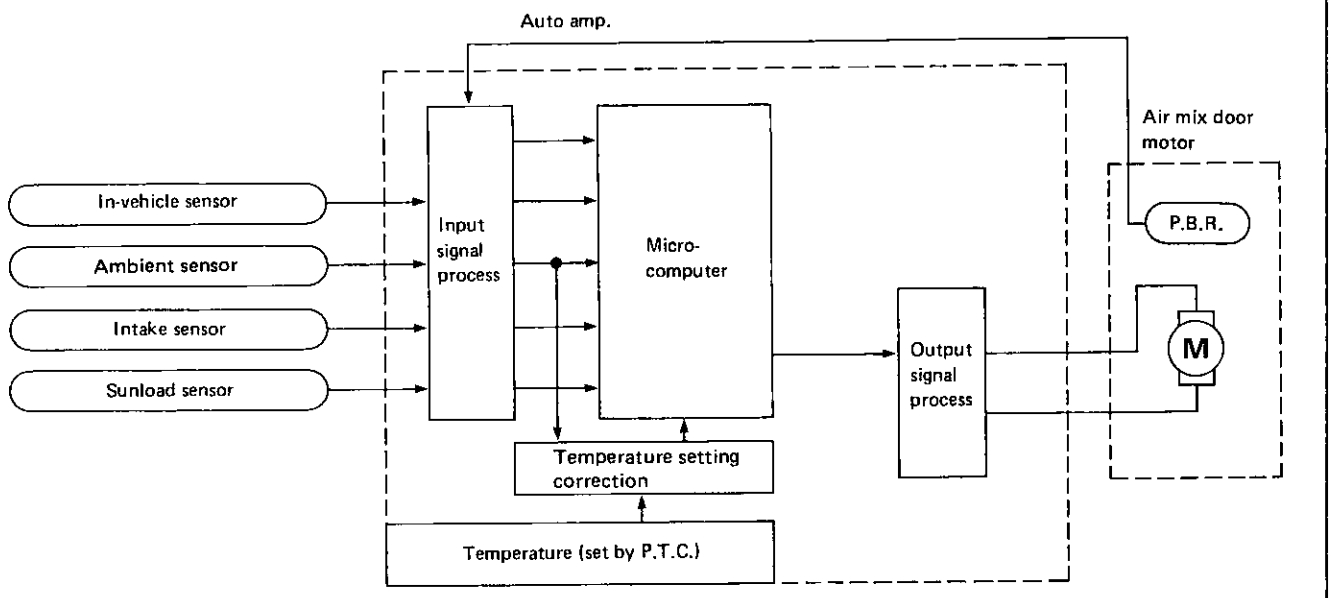
Air mix door control system components are:

1) Auto amplifier
2) Air mix door motor (P.B.R.)
3) In-vehicle sensor
4) Ambient sensor
5) Sunload sensor
6) Intake sensor

System operation

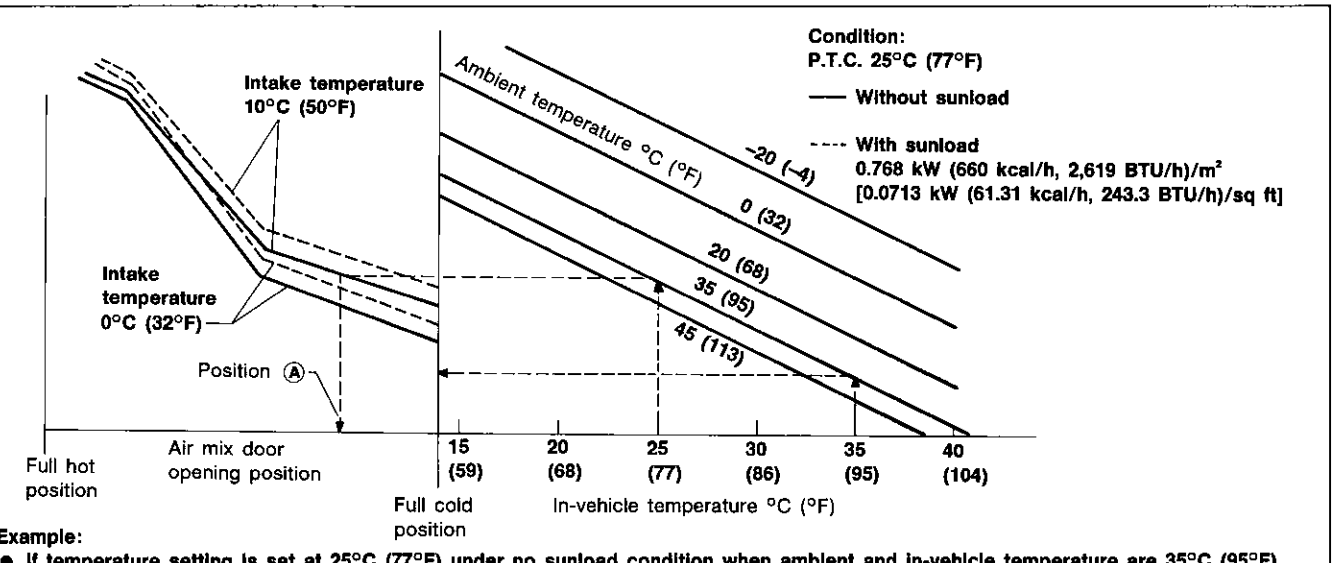
Temperature set by Potentio Temperature Control (P.T.C.) is compensated through setting temperature correction circuit to determine target temperature.

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).



RHA476A

Air mix door control specification



Example:

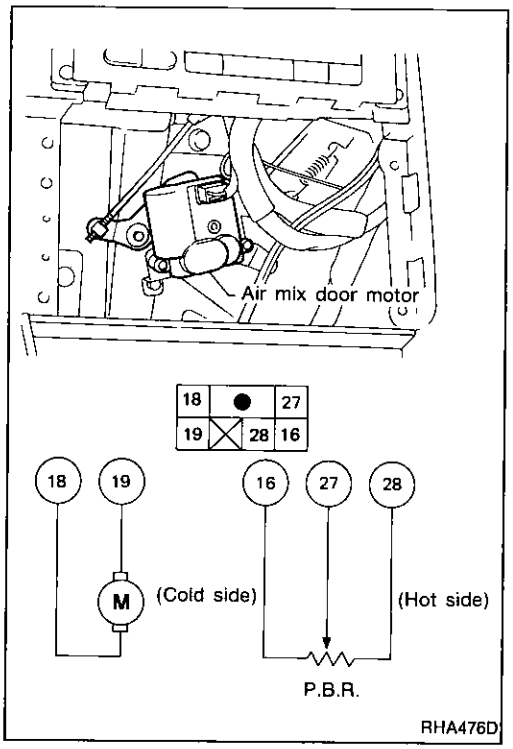
- **If temperature setting is set at 25°C (77°F) under no sunload condition when ambient and in-vehicle temperature are 35°C (95°F), air mix door is initially automatically set in full cold position.**
- **Within some period, in-vehicle temperature will lower towards the objective temperature, and the air mix door position will shift incrementally towards the hot side and finally stay in this position Ⓐ 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.

RHA475D

Control System Output Components (Cont'd)

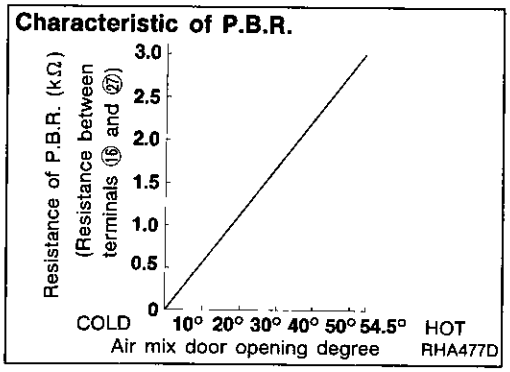
AIR MIX DOOR MOTOR

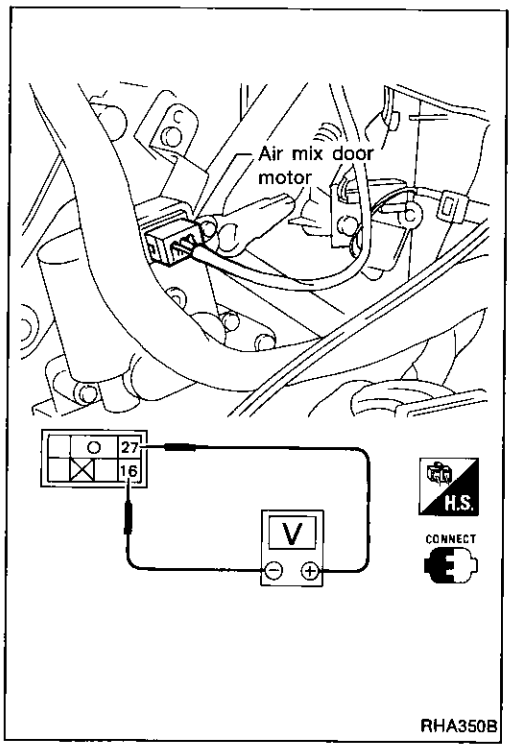
The air mix door motor is attached to the heater unit. It rotates so that the air mix door is opened to a position set by the auto amplifier. Motor rotation is then conveyed through a shaft and air mix door position is then fed back to the auto amplifier by P.B.R. built-in air mix door motor.



Air mix door motor operation

18	19	Air mix door operation	Direction of lever movement
⊕	⊖	COLD → HOT	Clockwise (Downward)
⊖	⊖	STOP	STOP
⊖	⊕	HOT → COLD	Counterclockwise (Upward)

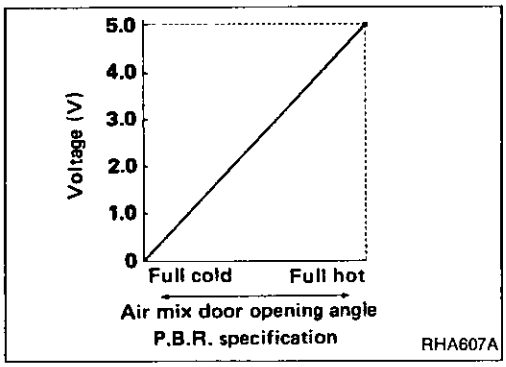




P.B.R.

Measure voltage between terminals ㉗ and ⑯ at vehicle harness side.

Control System Output Components (Cont'd)



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.

OUTLET DOOR CONTROL

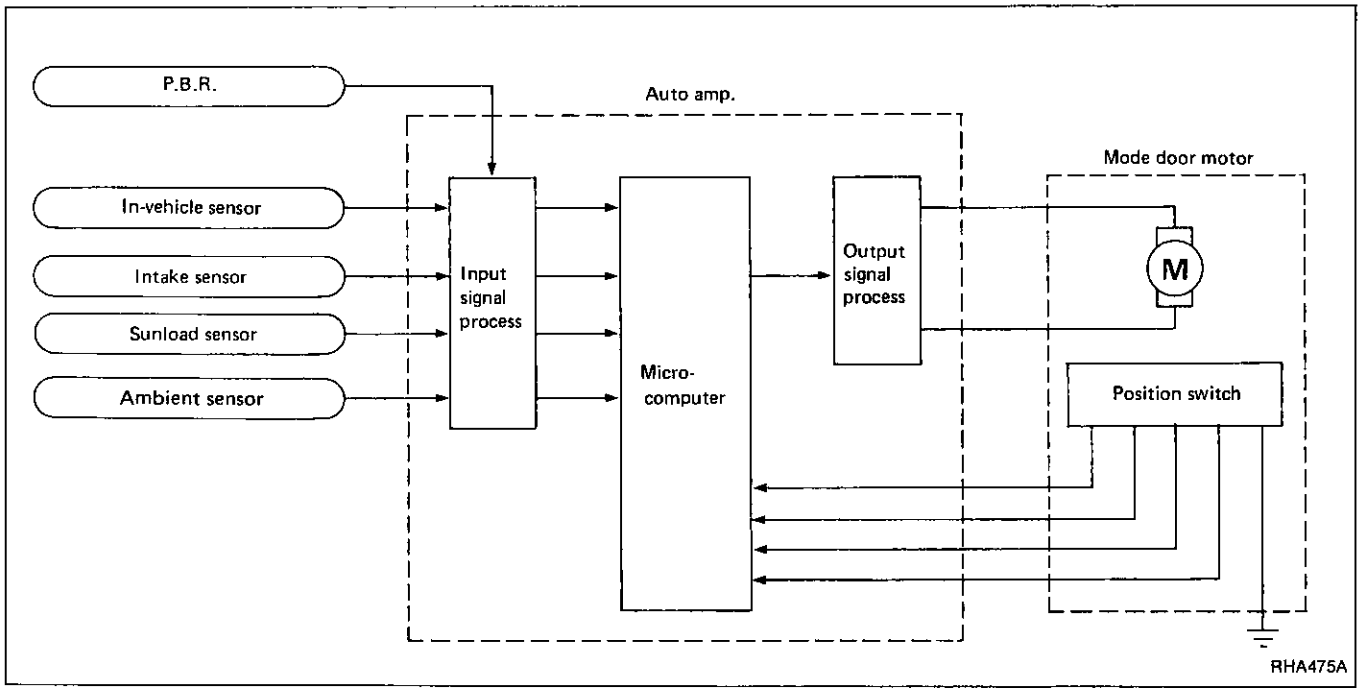
Component parts

Outlet door control system components are:

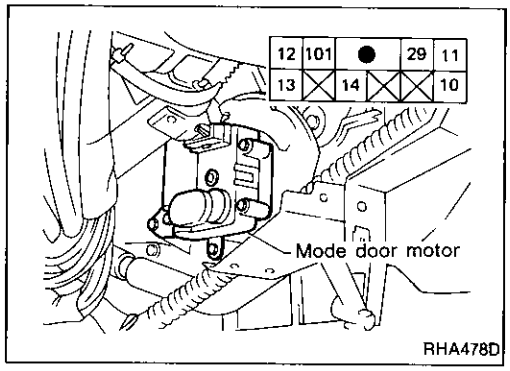
1) Auto amplifier
2) Mode door motor
3) P.B.R.
4) In-vehicle sensor
5) Ambient sensor
6) Sunload sensor
7) Intake sensor

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.



Control System Output Components (Cont'd)

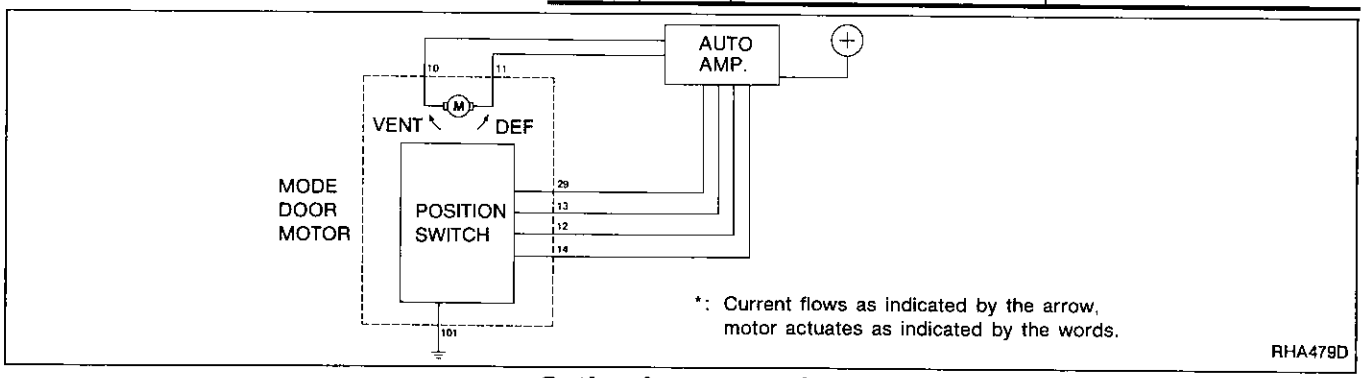


MODE DOOR MOTOR

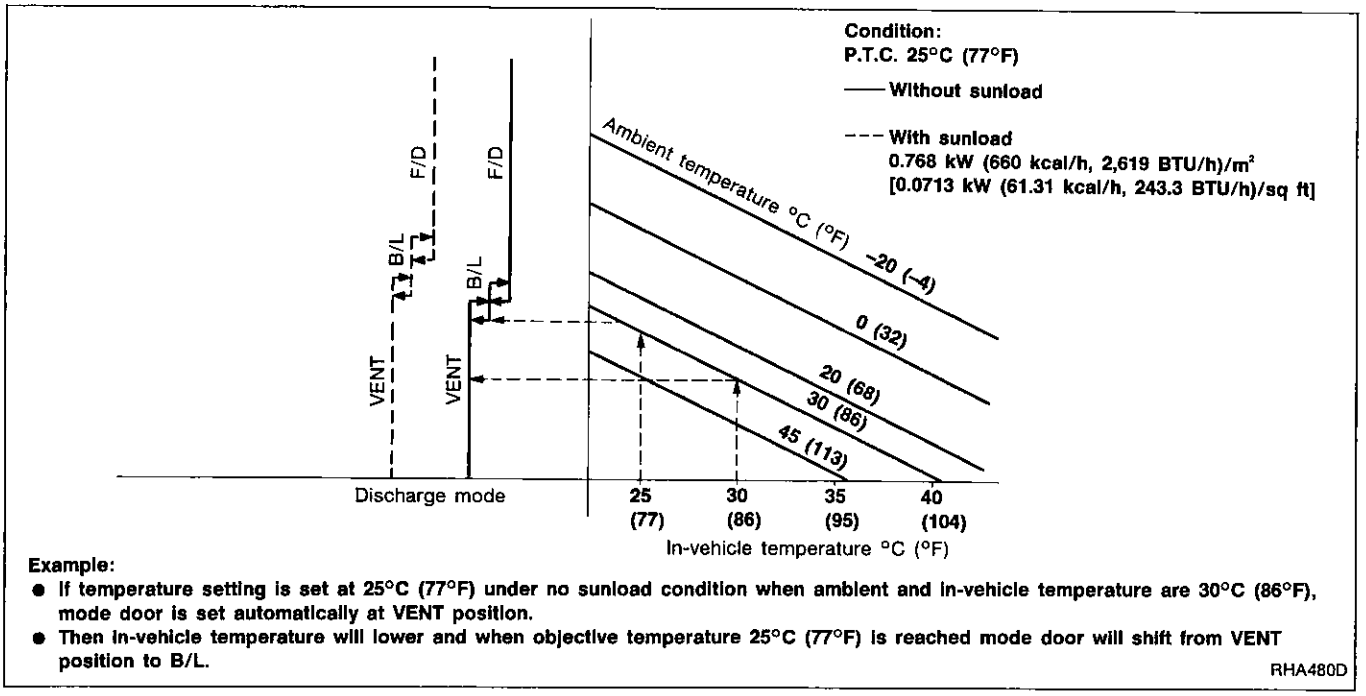
The mode door motor is attached to the heater unit. It rotates so that air is discharged from outlet set by the auto amplifier. Motor rotation is conveyed to a link which activates the mode door.

Mode door motor operation

10	11	Mode door operation	Direction of side link rotation
⊕	⊖	VENT → DEF	Counterclockwise
⊖	⊖	STOP	STOP
⊖	⊕	DEF → VENT	Clockwise



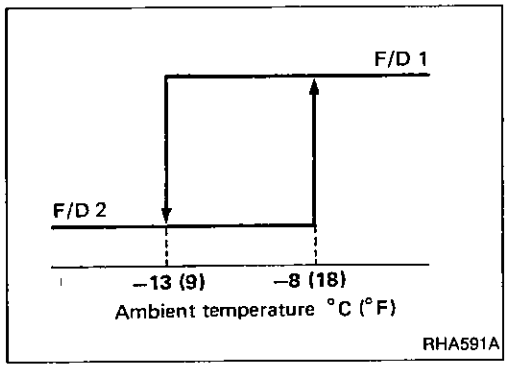
Outlet door control specification



Example:

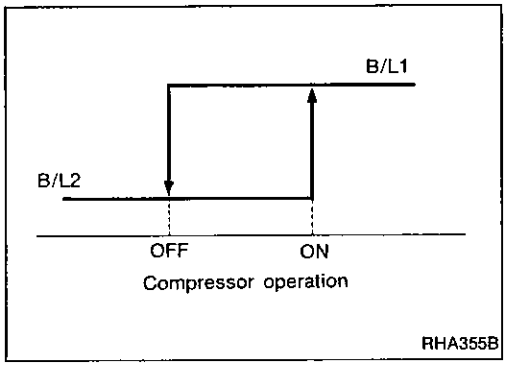
- **If temperature setting is set at 25°C (77°F) under no sunload condition when ambient and in-vehicle temperature are 30°C (86°F), mode door is set automatically at VENT position.**
- **Then in-vehicle temperature will lower and when objective temperature 25°C (77°F) is reached mode door will shift from VENT position to B/L.**

Control System Output Components (Cont'd)



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.



B/L mode specification

- When compressor turn ON, air outlet is changed from B/L2 to B/L1.
- When compressor turns OFF, air outlet is changed from B/L1 to B/L2.

FAN SPEED CONTROL

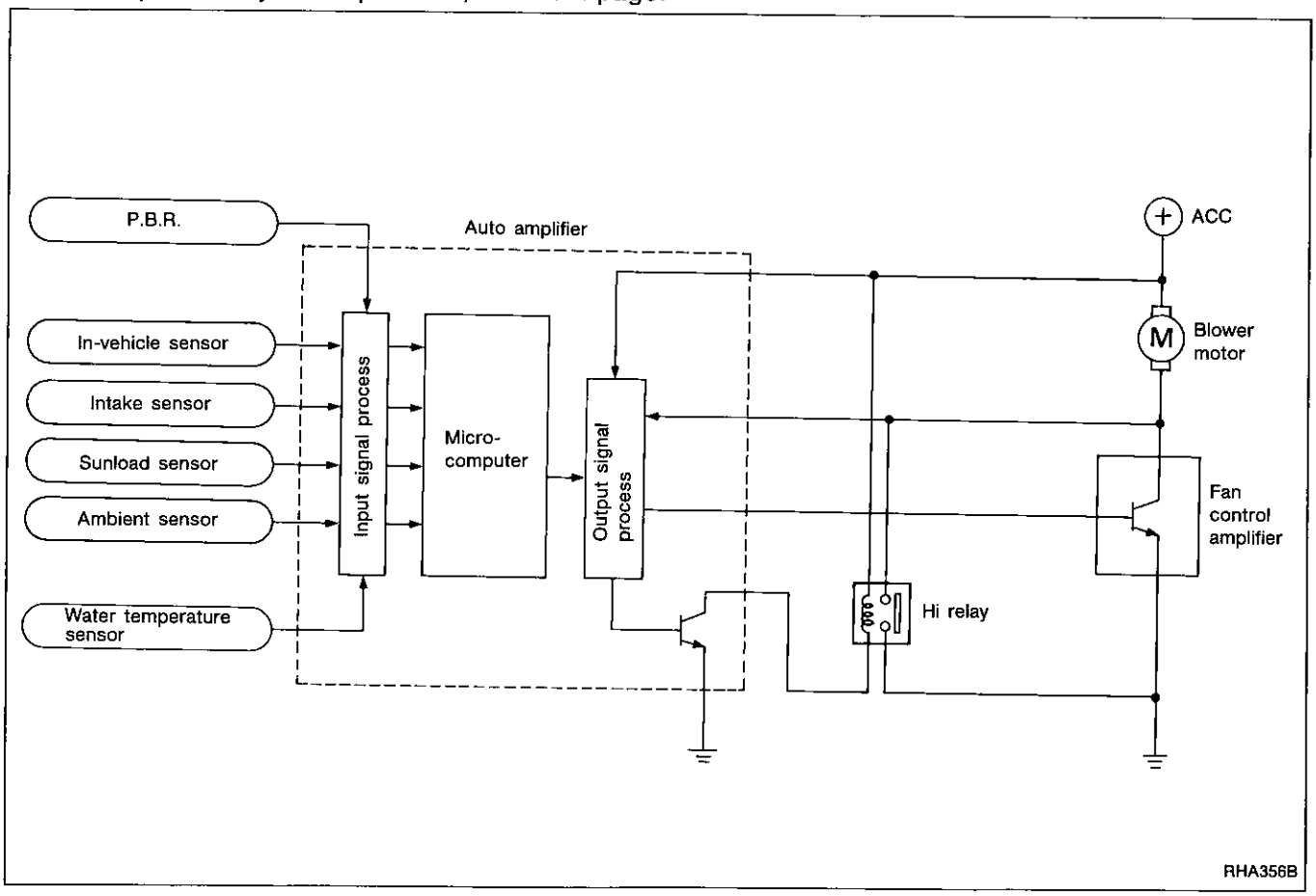
Component parts

Fan speed control system components are:

1) Auto amplifier
2) Fan control amplifier
3) P.B.R.
4) In-vehicle sensor
5) Ambient sensor
6) Sunload sensor
7) Intake sensor
8) Hi relay
9) Water temperature sensor

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 coolant temperature is below 32°C (90°F) and the ambient temperature is below 15°C (59°F), the blower will not operate for a short period of time (up to 90 seconds). The exact start delay time varies depending on the ambient and engine coolant temperature.
When the engine coolant temperature is between 32°C (90°F) and 35°C (95°F), and the ambient temperature below 15°C (59°F), the blower speed will gradually rise to the objective speed over a time period of 18 minutes or less (actual time depends on the objective blower speed). The exact start delay time varies depending on the ambient and engine coolant temperature.
In the most extreme case (very low ambient) the blower starting delay will be 90 seconds as described above. After this delay, the blower will operate at low speed until the engine coolant temperature rises above 32°C (90°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).

BLOWER SPEED COMPENSATION

Sunload

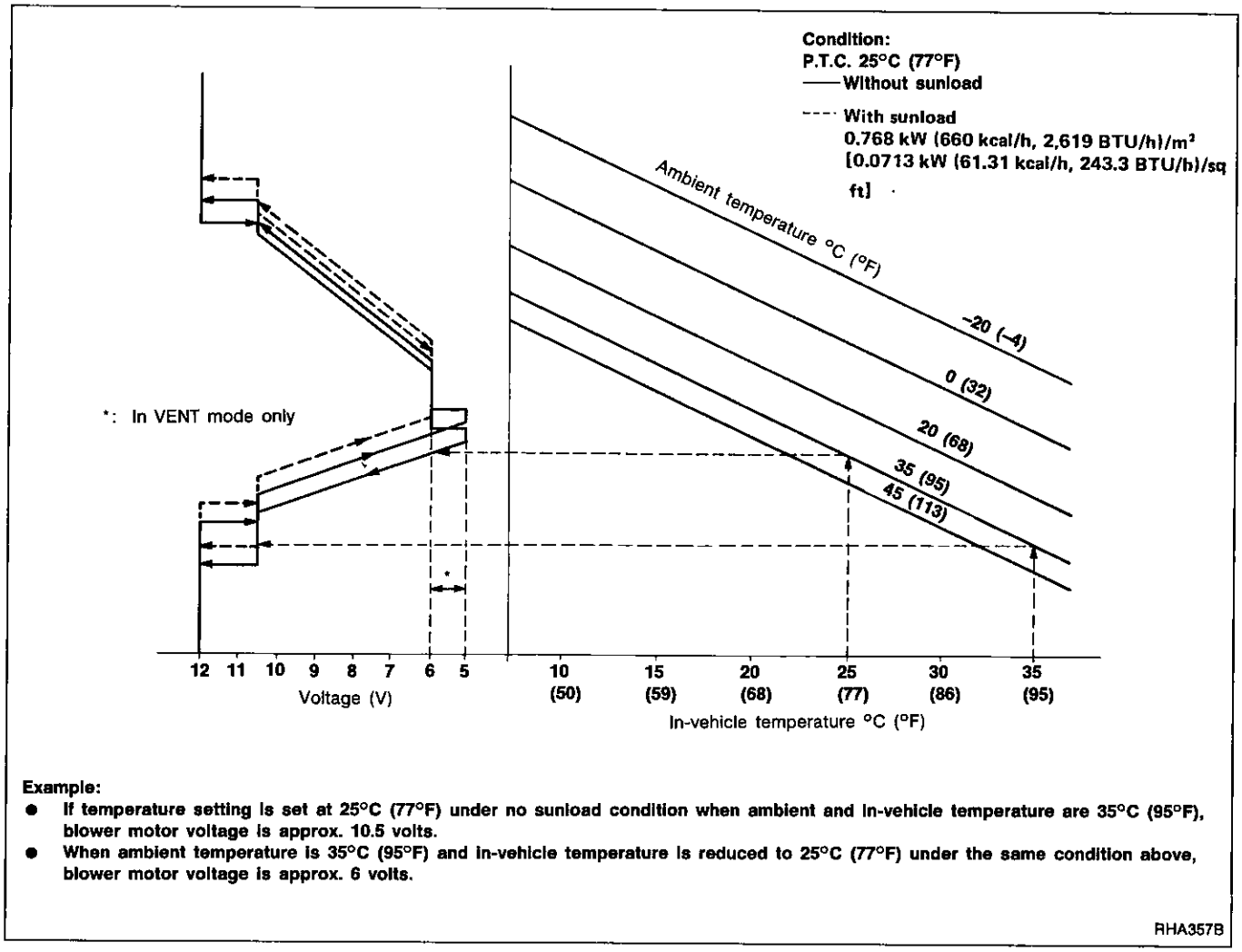
When the in-vehicle temperature and the set temperature are very close, the blower will be operating at low speed. The low speed will vary depending on the sunload. During conditions of high sunload, the blower low speed is "normal" low speed (approx. 6V). During low or no sunload conditions, the low 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)

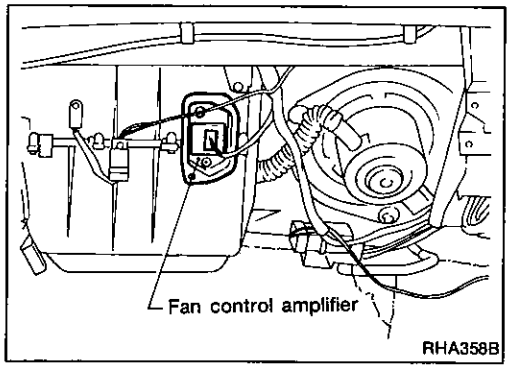
Fan speed control specification



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. 6 volts.**

RHA357B

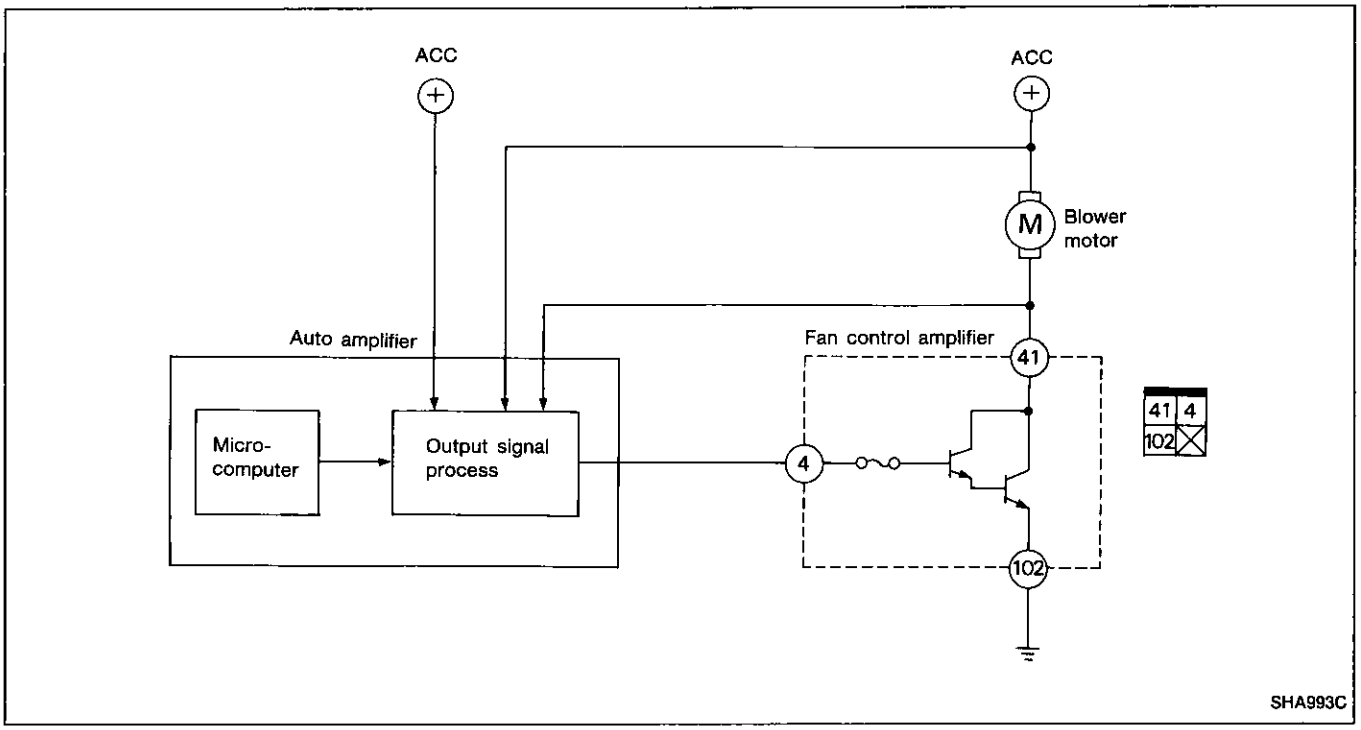


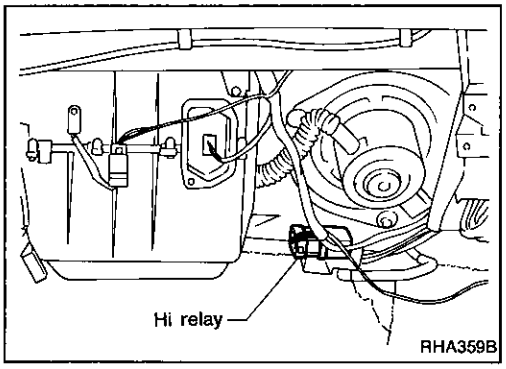
RHA358B

FAN CONTROL AMPLIFIER

The fan control amplifier is located on the cooling unit. It amplifies a 12-step base current flowing from the auto amplifier to change blower speed.

Control System Output Components (Cont'd)



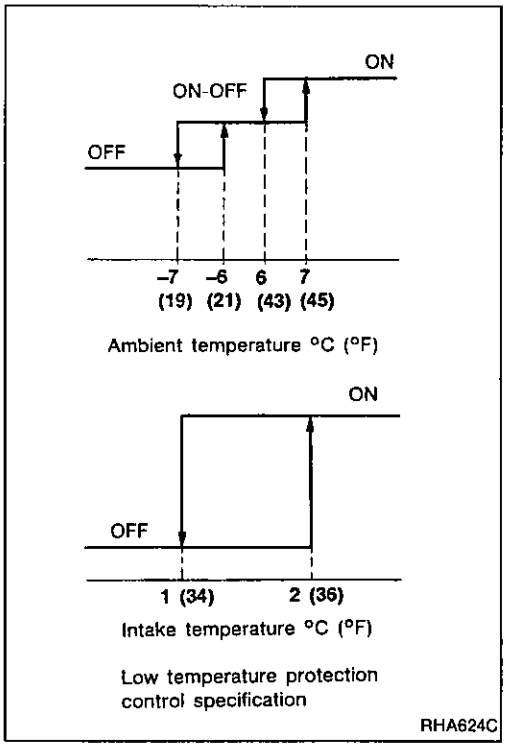


HI RELAY

The Hi relay is located on the heater 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 ECM (ECCS control module).



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 7°C (45°F), the compressor turns "ON". The compressor turns "OFF" when ambient temperatures are less than –7°C (19°F).

When ambient temperatures are between 7°C (45°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.

General Specifications

COMPRESSOR

Model	CALSONIC make V-5
Type	V-5 variable displacement
Displacement cm^3 (cu in)/rev.	
Max.	146 (8.91)
Min.	3 (0.18)
Cylinder bore x stroke mm (in)	36.1 (1.421) x [0.6 - 28.6 (0.024 - 1.126)]
Direction of rotation	Clockwise (viewed from drive end)
Drive belt	Poly V

LUBRICATION OIL

Model	CALSONIC make V-5
Type	SUNISO 5GS or equivalent
Capacity mℓ (US fl oz, Imp fl oz)	
Total in system	286 (9.7, 10.1)
Compressor (Service part) charging amount	286 (9.7, 10.1)

REFRIGERANT

Type	R-12
Capacity kg (lb)	1.1 - 1.2 (2.4 - 2.6)

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 diagram:
- Read GI section, "HOW TO READ WIRING DIAGRAMS".

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ANTI-LOCK BRAKING SYSTEM, TRACTION CONTROL SYSTEM ..... BR SECTION
SUPER HICAS SYSTEM, ELECTRONICALLY CONTROLLED POWER STEERING SYSTEM ..... ST SECTION
TRUNK LID AND FUEL FILLER LID OPENER, POWER WINDOW AND POWER DOOR LOCK, AUTOMATIC DRIVE POSITIONER, POWER SEAT, SUN ROOF, DOOR MIRROR, SRS "AIR BAG" ..... BF SECTION
HEATER AND AIR CONDITIONER ..... HA SECTION

Supplemental Restraint System "AIR BAG"

The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury to the driver in a frontal collision. The Supplemental Restraint System consists of an air bag (located in the center of the steering wheel), sensors, a diagnosis 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:

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".**

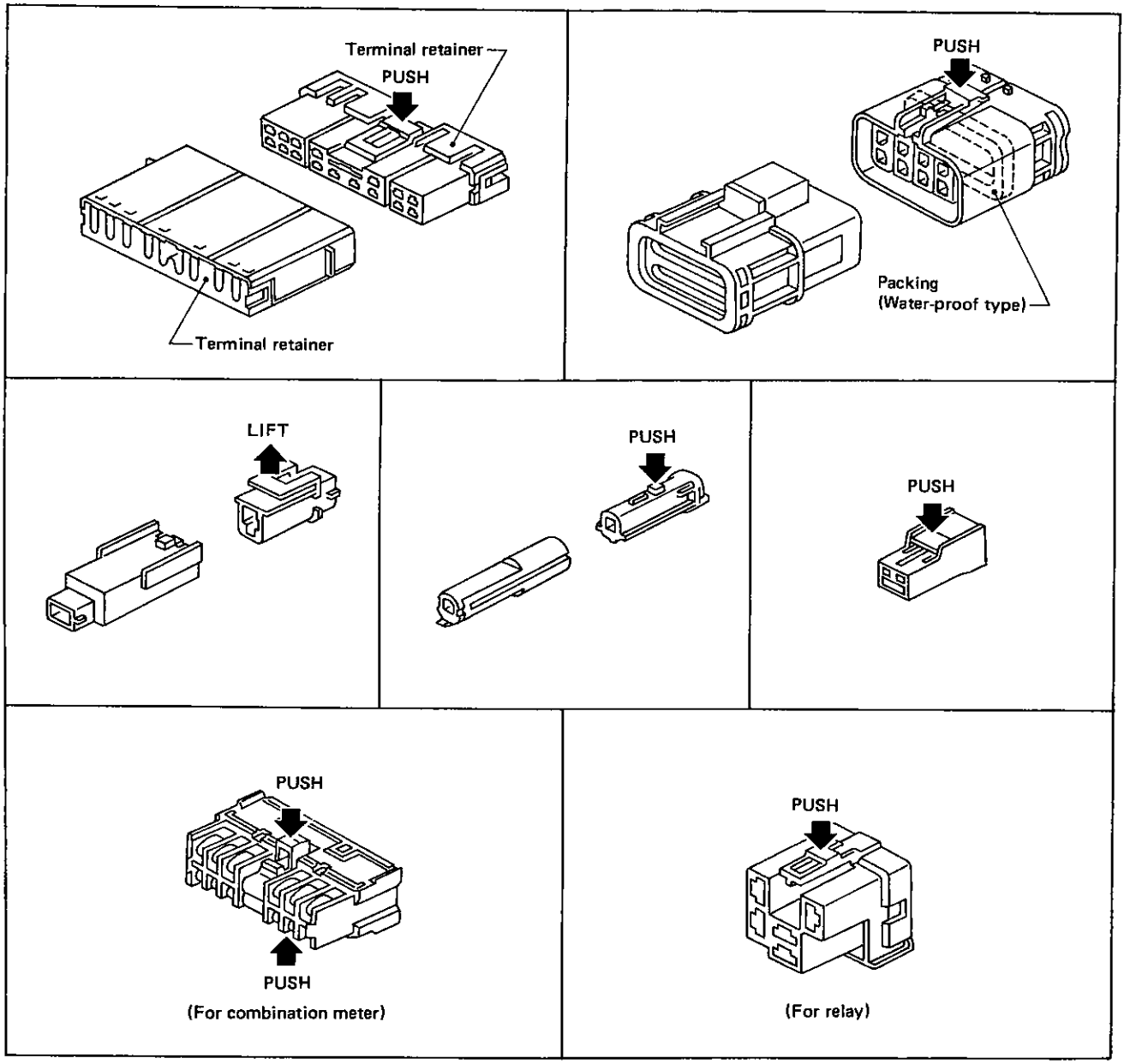
Description

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]

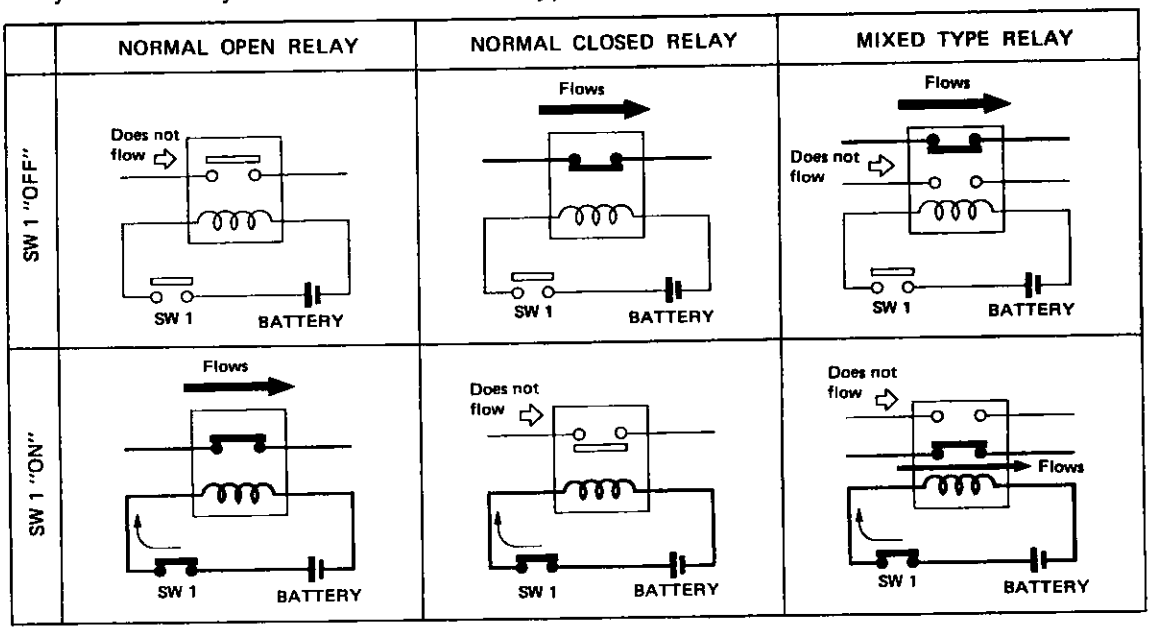


SEL769D

Description

NORMAL OPEN, NORMAL CLOSED AND MIXED TYPE RELAYS

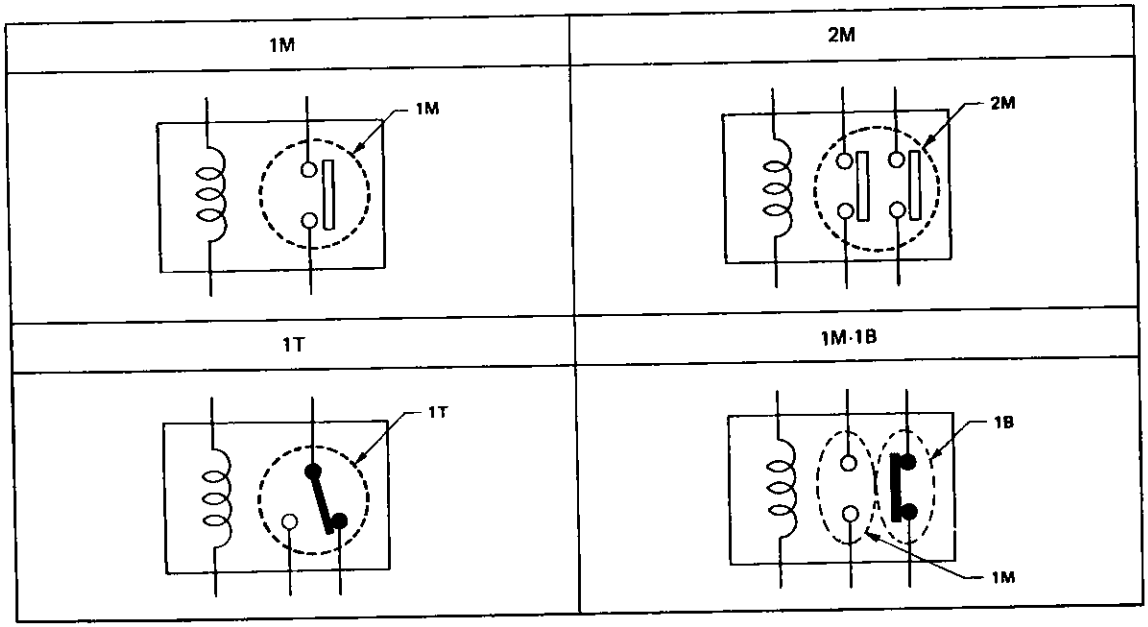
Relays can mainly be divided into three types: normal open, normal closed and mixed type relays.



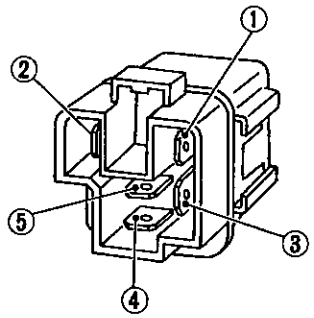
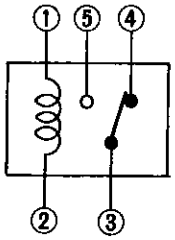
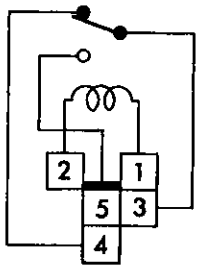
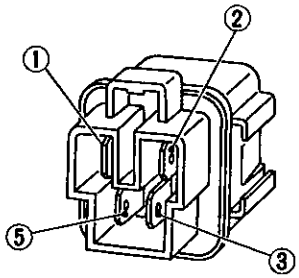
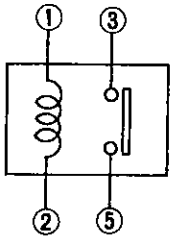
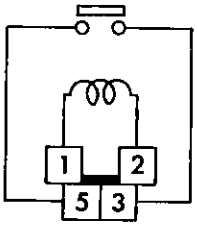
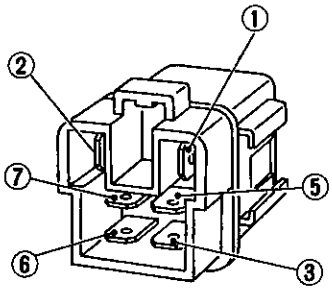
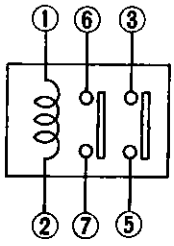
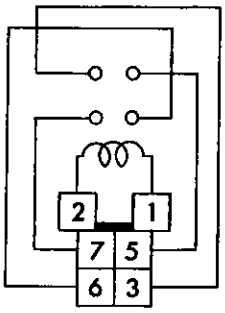
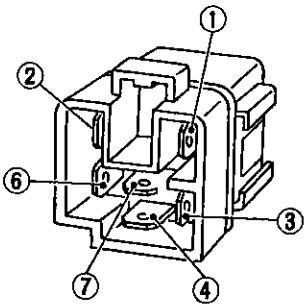
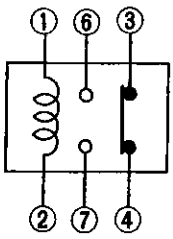
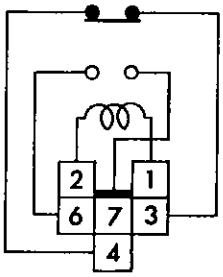
SEL881H

TYPE OF STANDARDIZED RELAYS

1M ..... 1 Make
1T ..... 1 Transfer
2M ..... 2 Make
1M·1B ..... 1 Make 1 Break



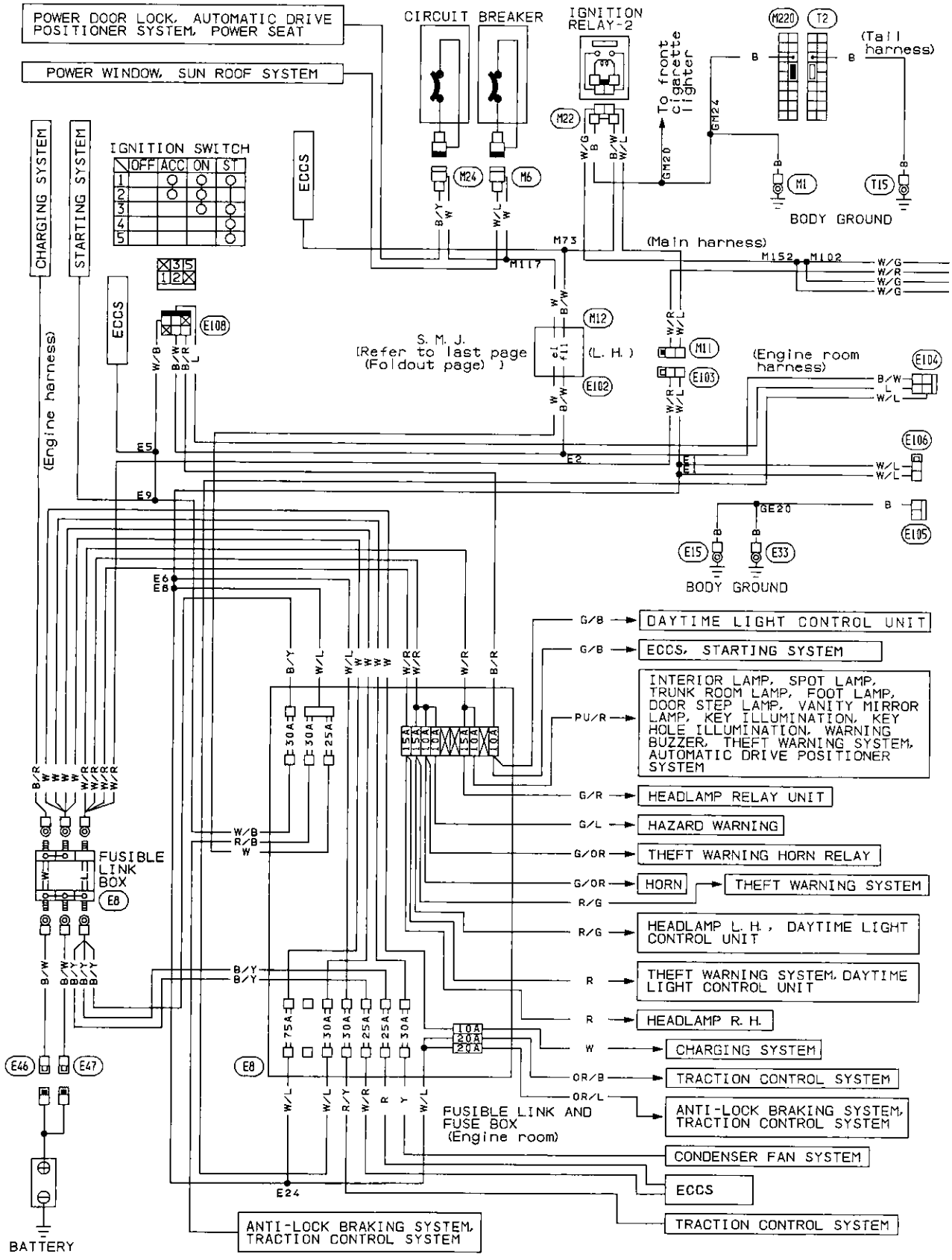
SEL882H

Type	Outer view	Circuit	Connector symbol and connection	Case color
1T				BLACK
1M				BLUE or GREEN
2M				BROWN
1M·1B				GRAY

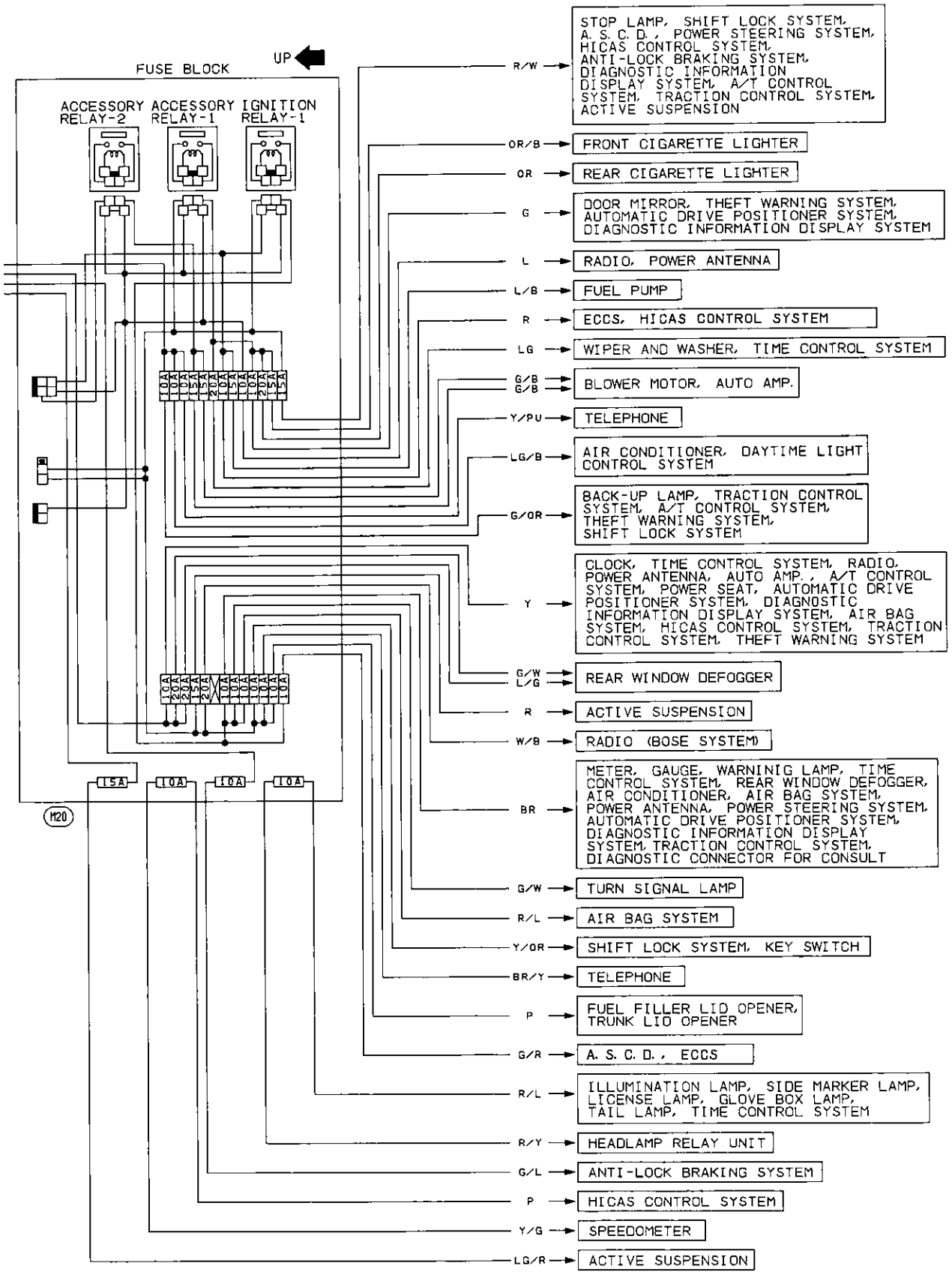
SEL883H

NOTE

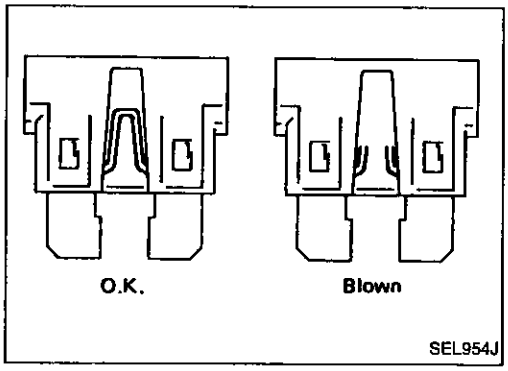
Wiring Diagram



Wiring Diagram (Cont'd)

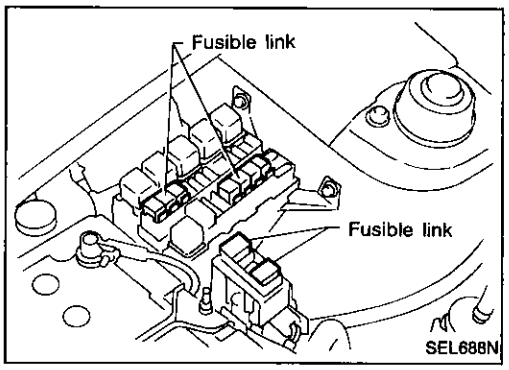


MEL783B



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

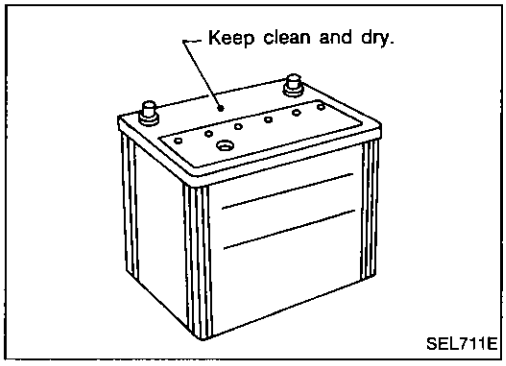
A melted fusible link can be detected either by visual inspection or by feeling with finger tip. If its condition is questionable, use circuit tester or test lamp.

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.

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.**
c. **Never add distilled water through the hole used to check specific gravity.**

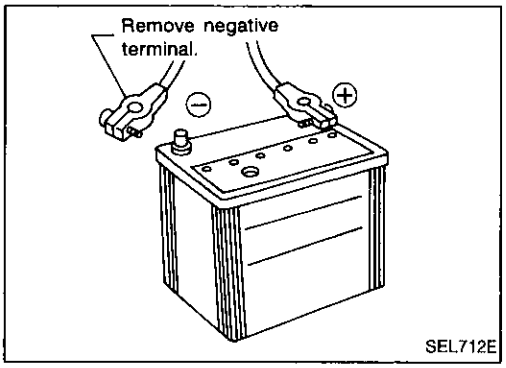


How to Handle Battery

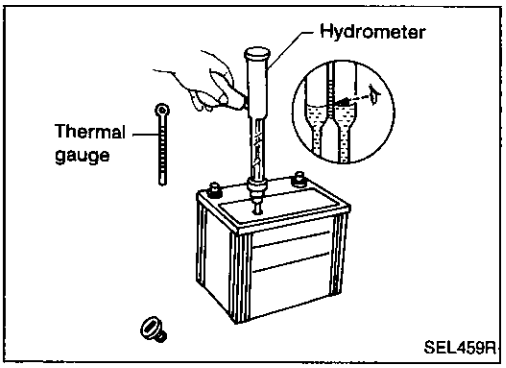
METHODS OF PREVENTING OVER-DISCHARGE

The following precautions must be taken to prevent over- discharging a battery.

- The battery surface (particularly its top) should always be kept clean and dry.
- The terminal connections should be clean and tight.
- At every routine maintenance, check the electrolyte level.



- When the vehicle is not going to be used over a long period of time, disconnect the negative battery terminal. (If the vehicle has an extended storage switch, turn it off.)



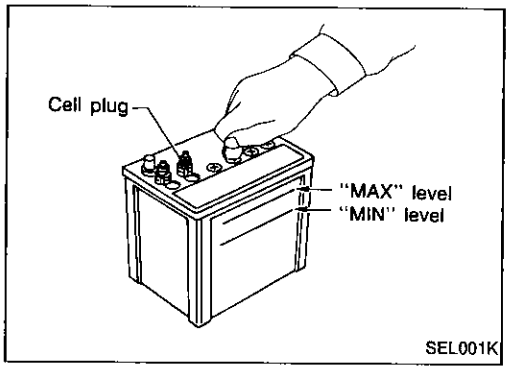
- Check the charge condition of the battery.
  Periodically check the specific gravity of the electrolyte. Keep a close check on charge condition to prevent overdischarge.

CHECKING ELECTROLYTE LEVEL

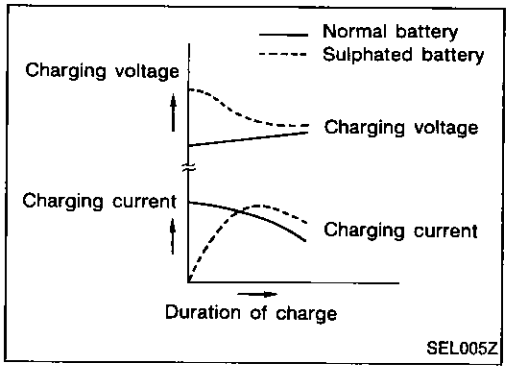
WARNING:

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.

How to Handle Battery (Cont'd)



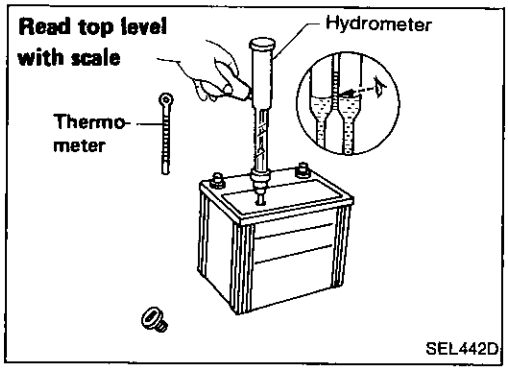
- Remove the cell plug using a suitable tool.
- Add distilled water up to the MAX level.



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

Read hydrometer and thermometer indications at eye level.

- Use the chart below to correct your hydrometer reading according to electrolyte temperature.

Hydrometer temperature correction

Battery electrolyte temperature °C (°F)	Add to specific gravity reading
71 (160)	0.032
66 (150)	0.028
60 (140)	0.024
54 (129)	0.020
49 (120)	0.016
43 (110)	0.012
38 (100)	0.008
32 (90)	0.004
27 (80)	0
21 (70)	−0.004
16 (60)	−0.008
10 (50)	−0.012
4 (39)	−0.016
−1 (30)	−0.020
−7 (20)	−0.024
−12 (10)	−0.028
−18 (0)	−0.032

How to Handle Battery (Cont'd)

Corrected specific gravity	Approximate charge condition
1.260 - 1.280	Fully charged
1.230 - 1.250	3/4 charged
1.200 - 1.220	1/2 charged
1.170 - 1.190	1/4 charged
1.140 - 1.160	Almost discharged
1.110- 1.130	Completely discharged

CHARGING THE BATTERY

CAUTION:

a. Do not "quick charge" a fully discharged battery.

b. Keep the battery away from open flame while it is being charged.

c. When connecting the charger, connect the leads first, then turn on the charger. Do not turn on the charger first, as this may cause a spark.

d. If battery electrolyte temperature rises above 60°C (140°F), stop charging. Always charge battery at a temperature below 60°C (140°F).

Charging rates:

Amps	Time
50	1 hour
25	2 hours
10	5 hours
5	10 hours

Do not charge at more than 50 ampere rate.

Note: The ammeter reading on your battery charger will automatically decrease as the battery charges. This indicates that the voltage of the battery is increasing normally as the state of charge improves. The charging amps indicated above refer to initial charge rate.

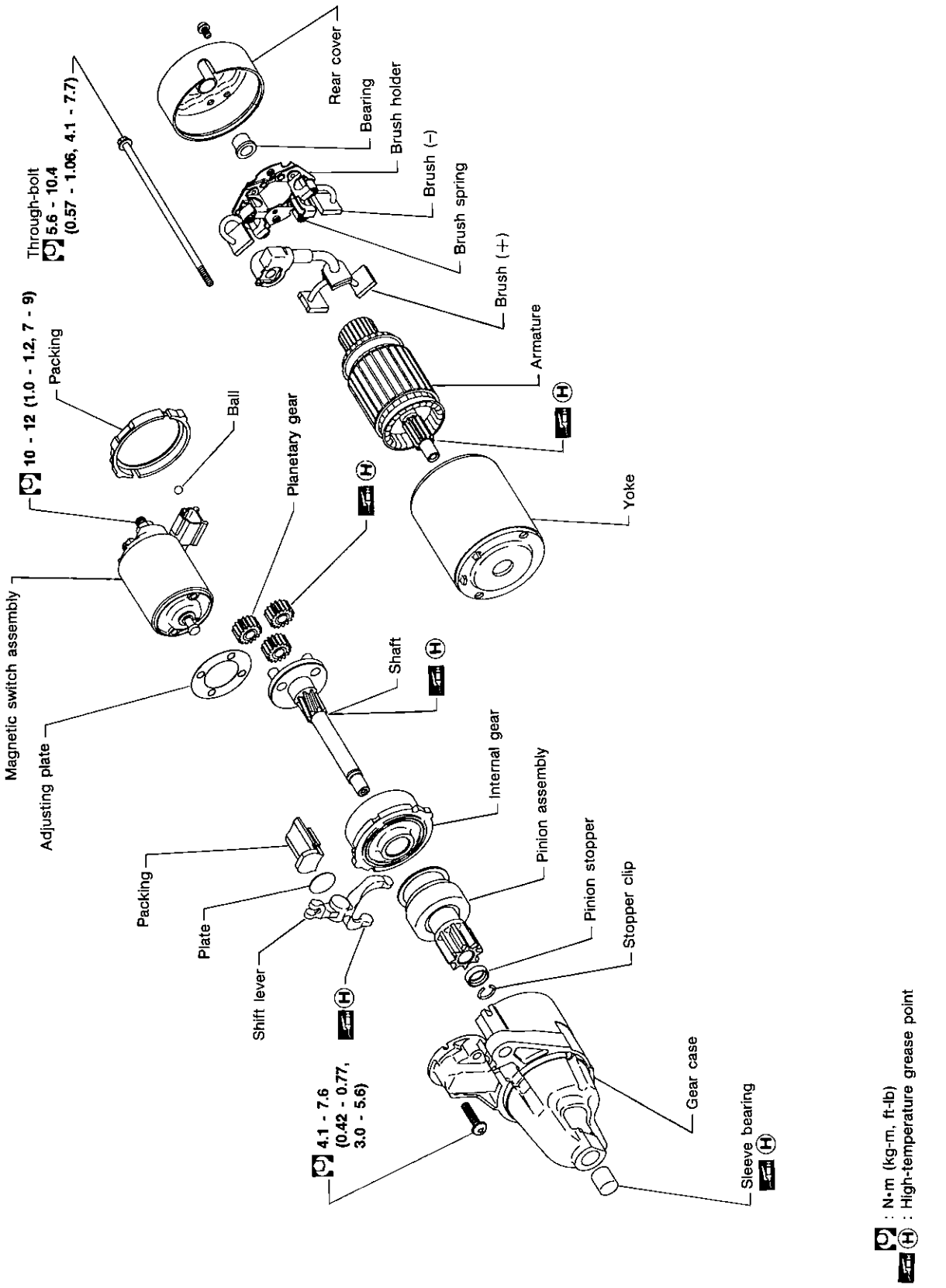
- **If, after charging, the specific gravity of any two cells varies more than .050, the battery should be replaced.**

Service Data and Specifications (S.D.S.)

Type		95D31R
Capacity	V-AH	12-80
Cold Cranking Current (For reference value)	A	622

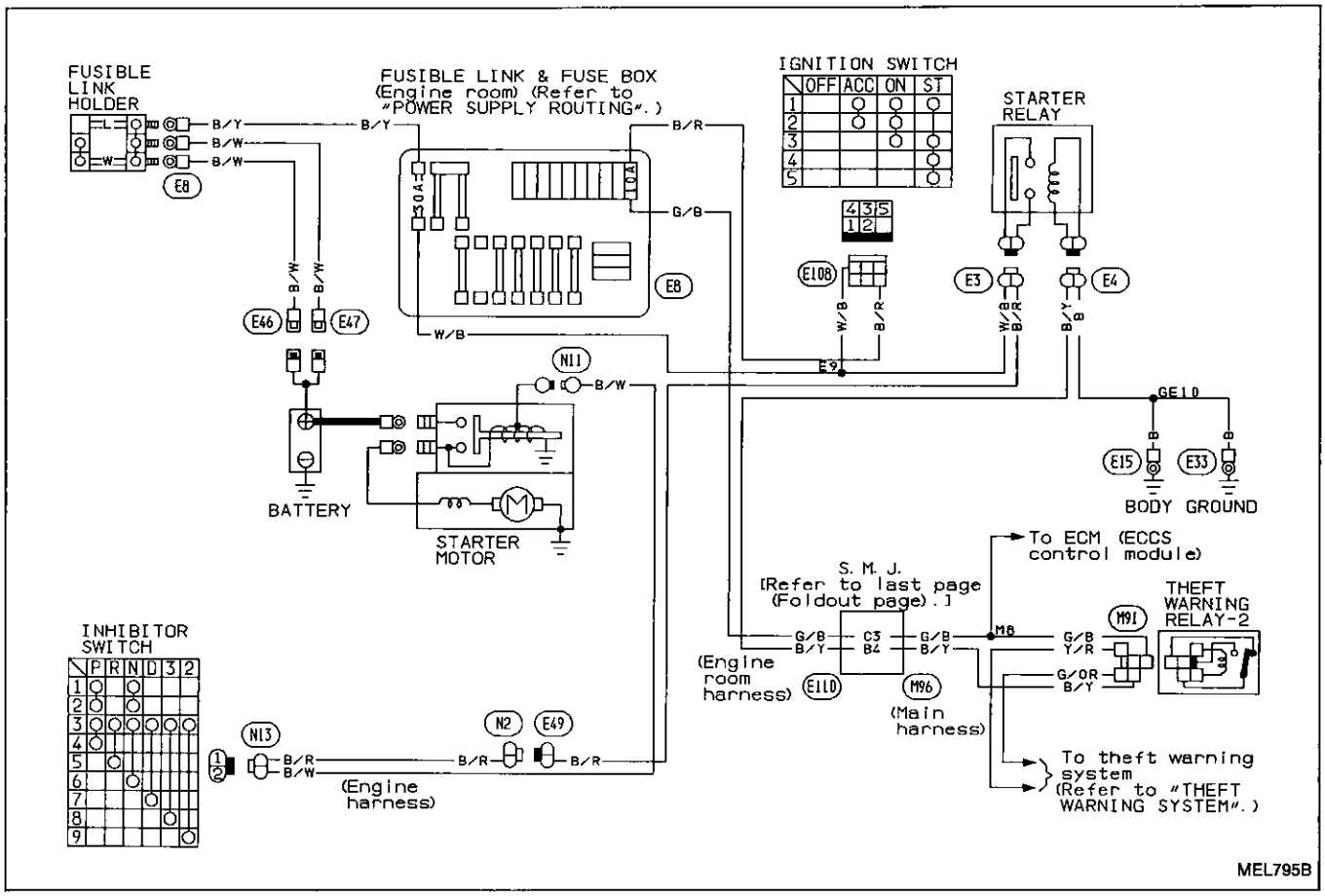
Construction

M1T74781



SEL664Q

Wiring Diagram

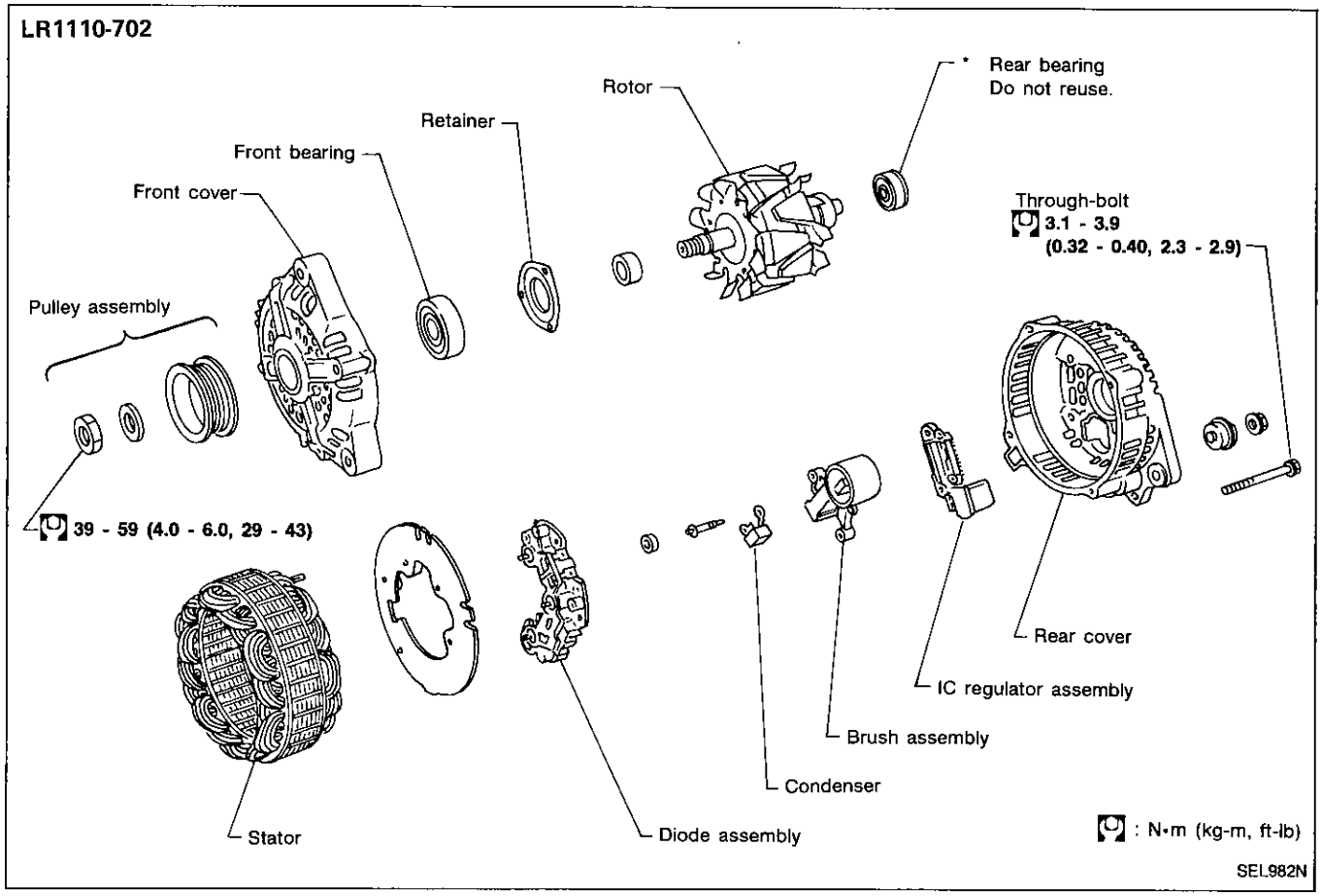


Service Data and Specifications (S.D.S.)

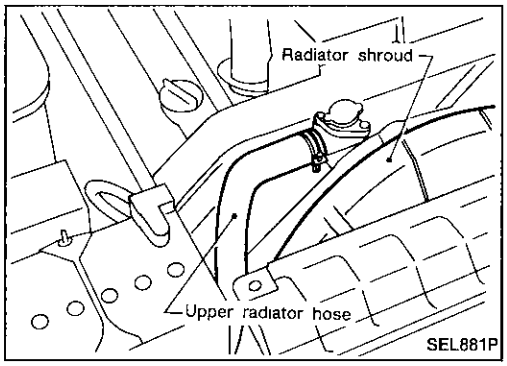
STARTER

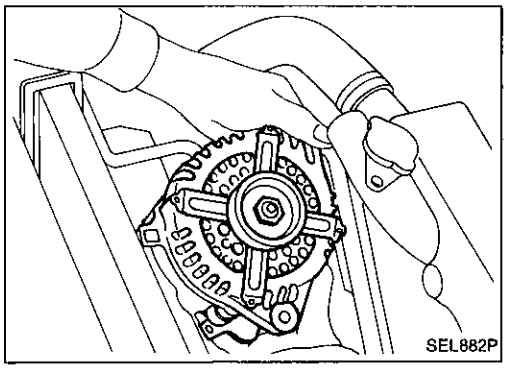
Type			M1T74781A
			MITSUBISHI make
			Reduction gear
System voltage		V	12
No-load	Terminal voltage	V	11.0
	Current	A	50 - 75
	Revolution	rpm	2,900 - 4,000
Minimum length of brush		mm (in)	12.0 (0.472)
Brush spring tension (With new brush)		N (kg, lb)	13.7 - 25.5 (1.4 - 2.6, 3.1 - 5.7)
Minimum diameter of commutator		mm (in)	28.8 (1.134)
Clearance between pinion front edge and pinion stopper		mm (in)	0.5 - 2.0 (0.020 - 0.079)
Clearance between bearing metal and armature shaft		mm (in)	Less than 0.2 (0.008)

Construction



***Rear bearing**
CAUTION:
Rear cover may be hard to remove because a ring is used to lock outer race of rear bearing. Be careful not to lose this ring during removal.





Removal and Installation

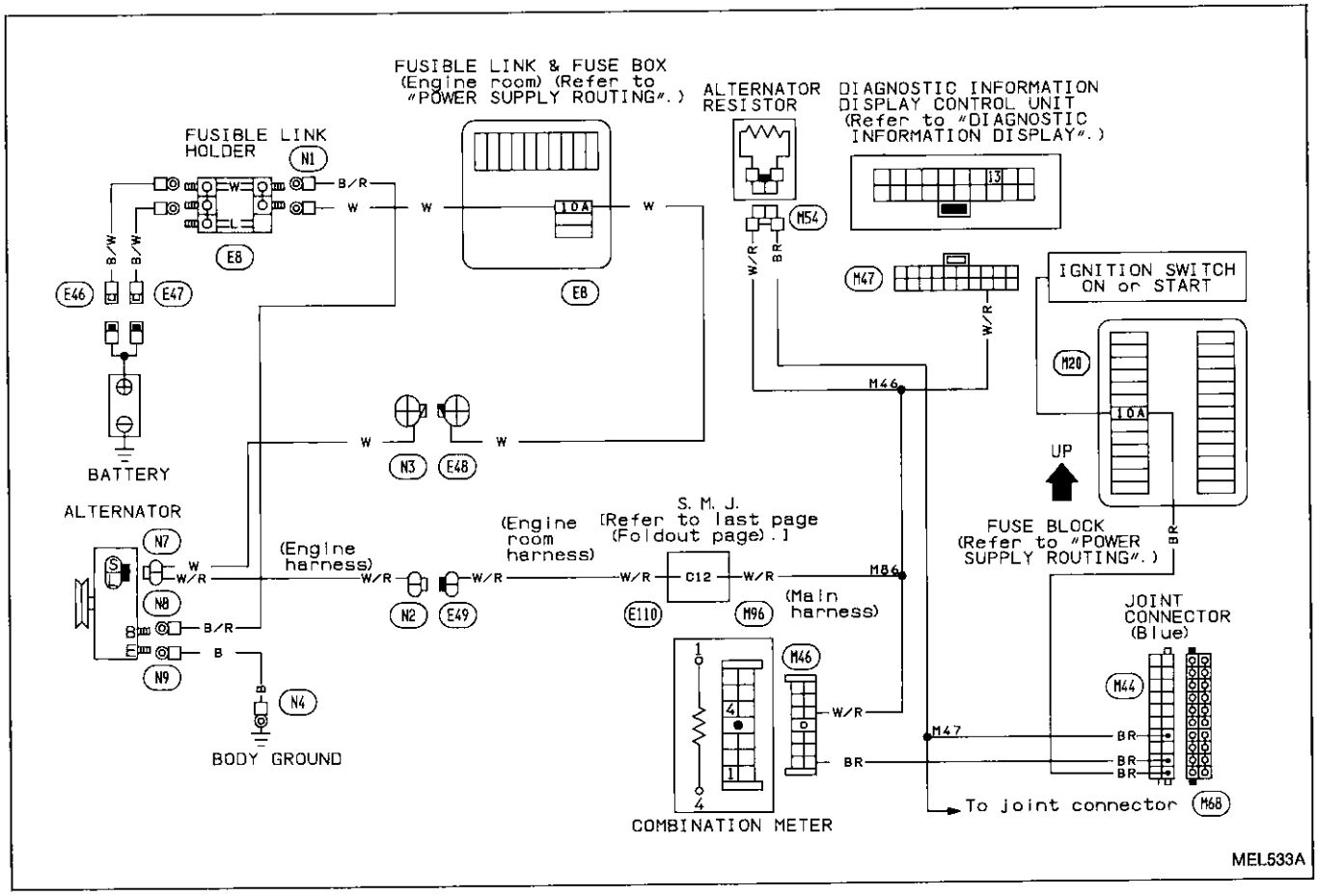
REMOVAL

1. Drain approximately one liter of coolant. Then remove radiator upper hose and radiator bracket.
2. Off set radiator, (Full-active suspension models) remove radiator shroud.
3. Remove cooling fan.
4. Remove alternator upper bracket.
5. Remove air conditioner pipe mounting bracket.
6. Remove idler pulley. Then remove belt.
7. Remove the two power steering cooler pipe mounting screws.
8. Remove alternator mounting bolt (through-bolt).
9. Remove harness heat shroud by pulling alternator to radiator side.

INSTALLATION

- Installation procedures is in reverse order of removal.

Wiring Diagram

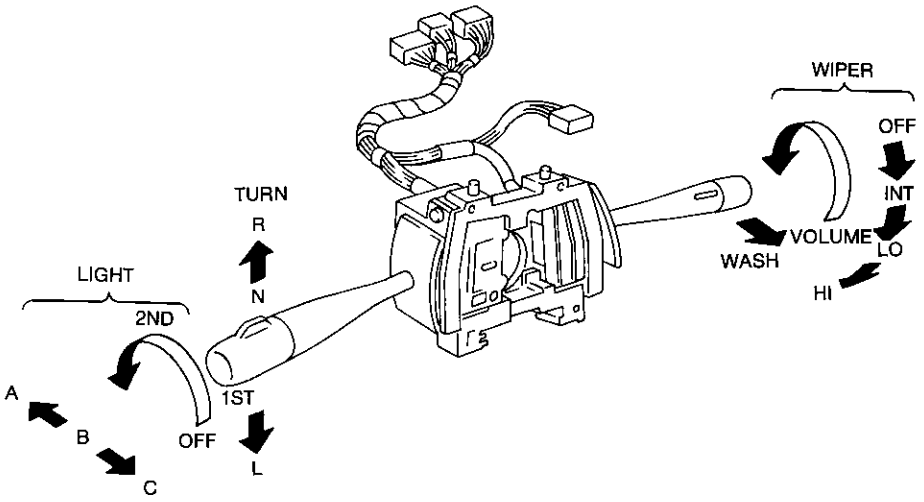


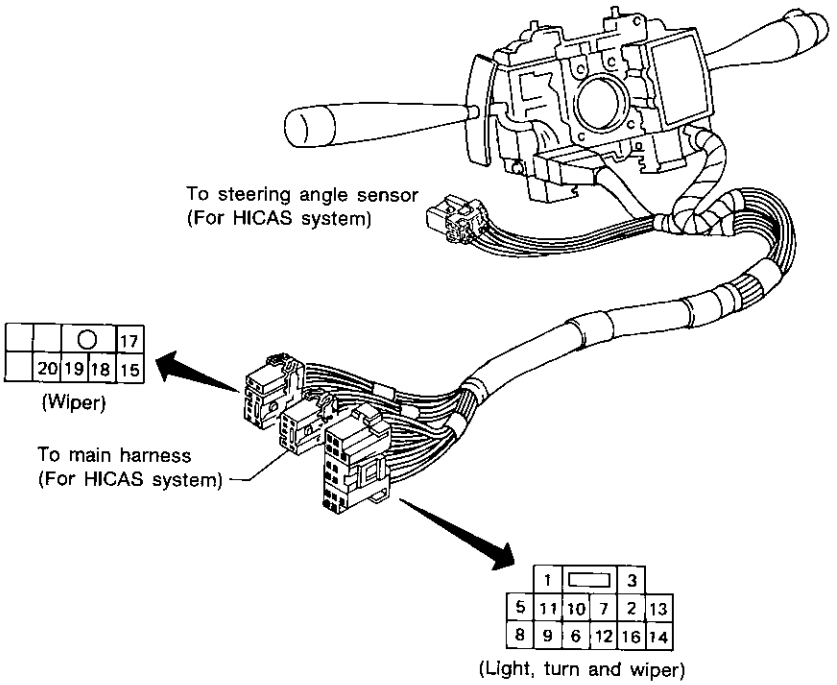
Service Data and Specifications (S.D.S.)

ALTERNATOR

Type		LR1110-702
		HITACHI make
Applied engine		VH45DE
Nominal rating	V-A	12-110
Ground polarity		Negative
Minimum revolution under no-load (when 13.5 volts is applied)	rpm	Less than 950
Hot output current	A/rpm	More than 34/1,300 More than 82/2,500 More than 105/5,000
Regulated output voltage	V	14.1 - 14.7
Minimum length of brush	mm (in)	More than 6 (0.24)
Slip ring minimum outer diameter	mm (in)	More than 30.6 (1.205)

Check





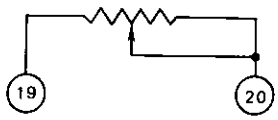
LIGHTING SWITCH

	OFF			1ST			2ND		
	A	B	C	A	B	C	A	B	C
5			○			○	○	○	○
6			○			○	○	○	○
7			○			○	○	○	○
8			○			○	○	○	○
9			○			○	○		○
10			○			○	○	○	○
11				○	○	○	○	○	○
12				○	○	○	○	○	○

WIPER SWITCH

	OFF	INT	LO	HI	WASH
13	○	○			
14	○	○	○		
15		○	○	○	
16				○	
17		○	○	○	○
18					○

INTERMITTENT WIPER VOLUME



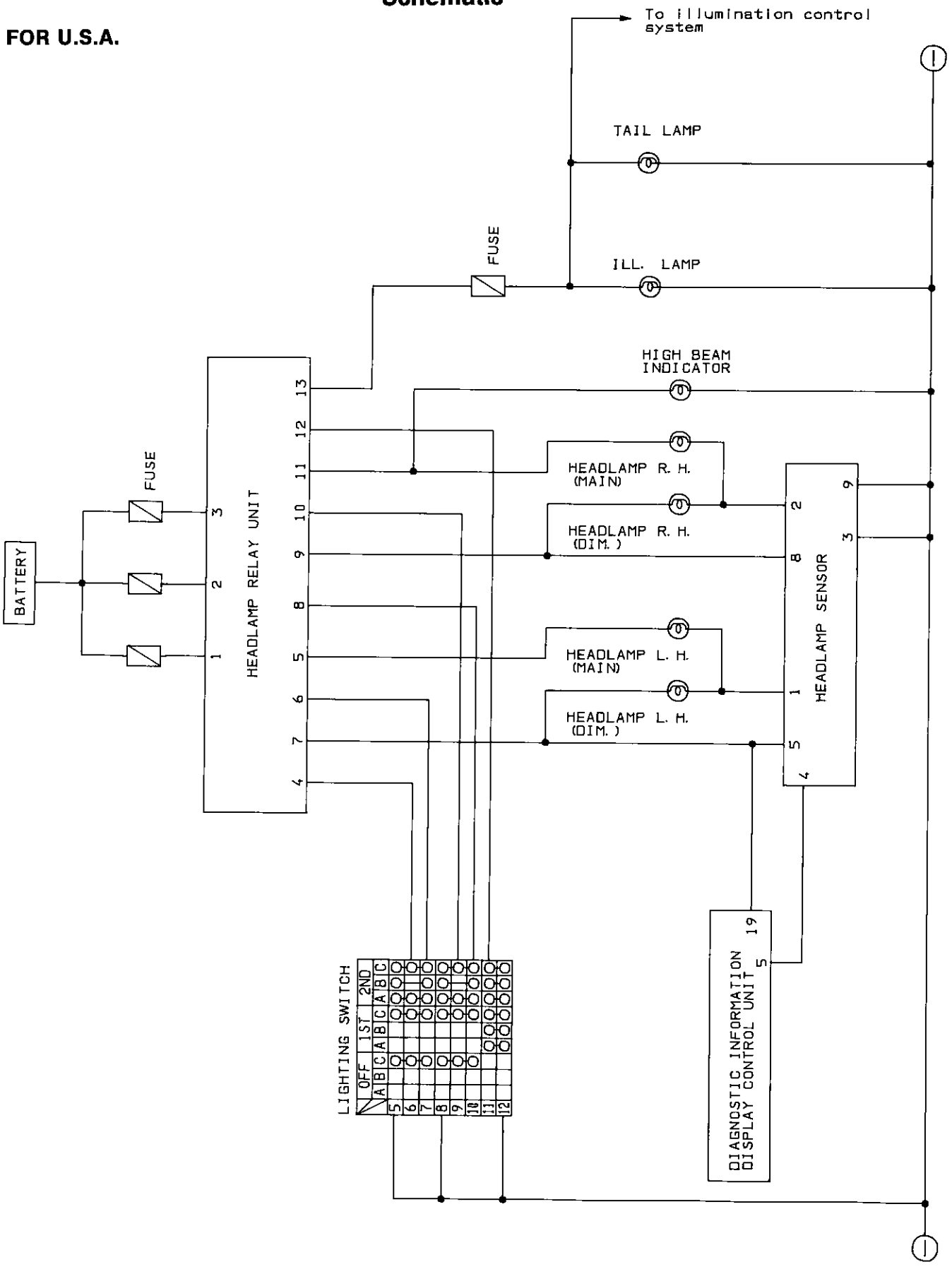
TURN SIGNAL SWITCH

	R	N	L
1	○		○
2	○		
3			○

SEL689N

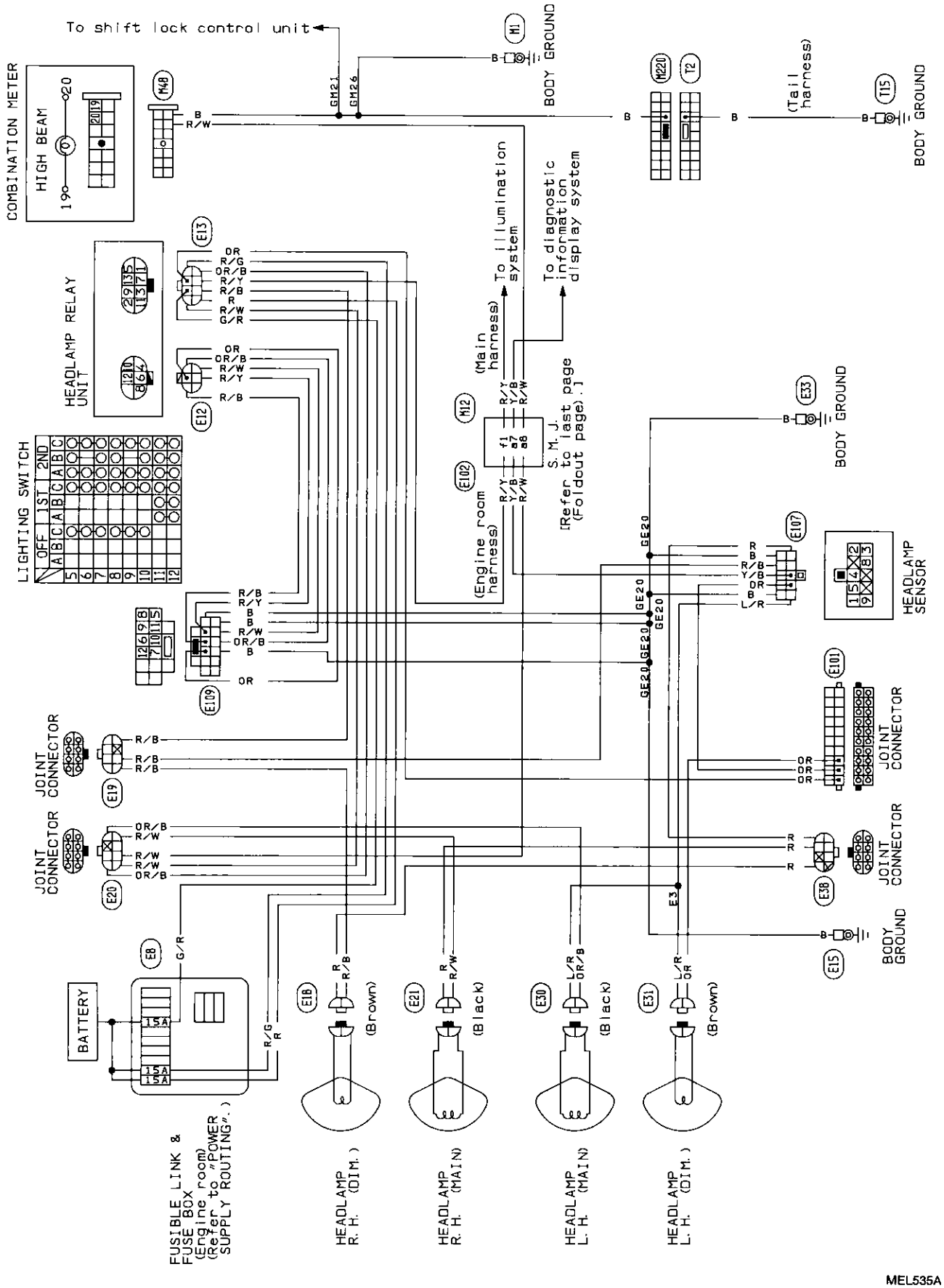
Schematic

FOR U.S.A.



Wiring Diagram

FOR U.S.A.



MEL535A

Operation (Daytime light system for Canada)

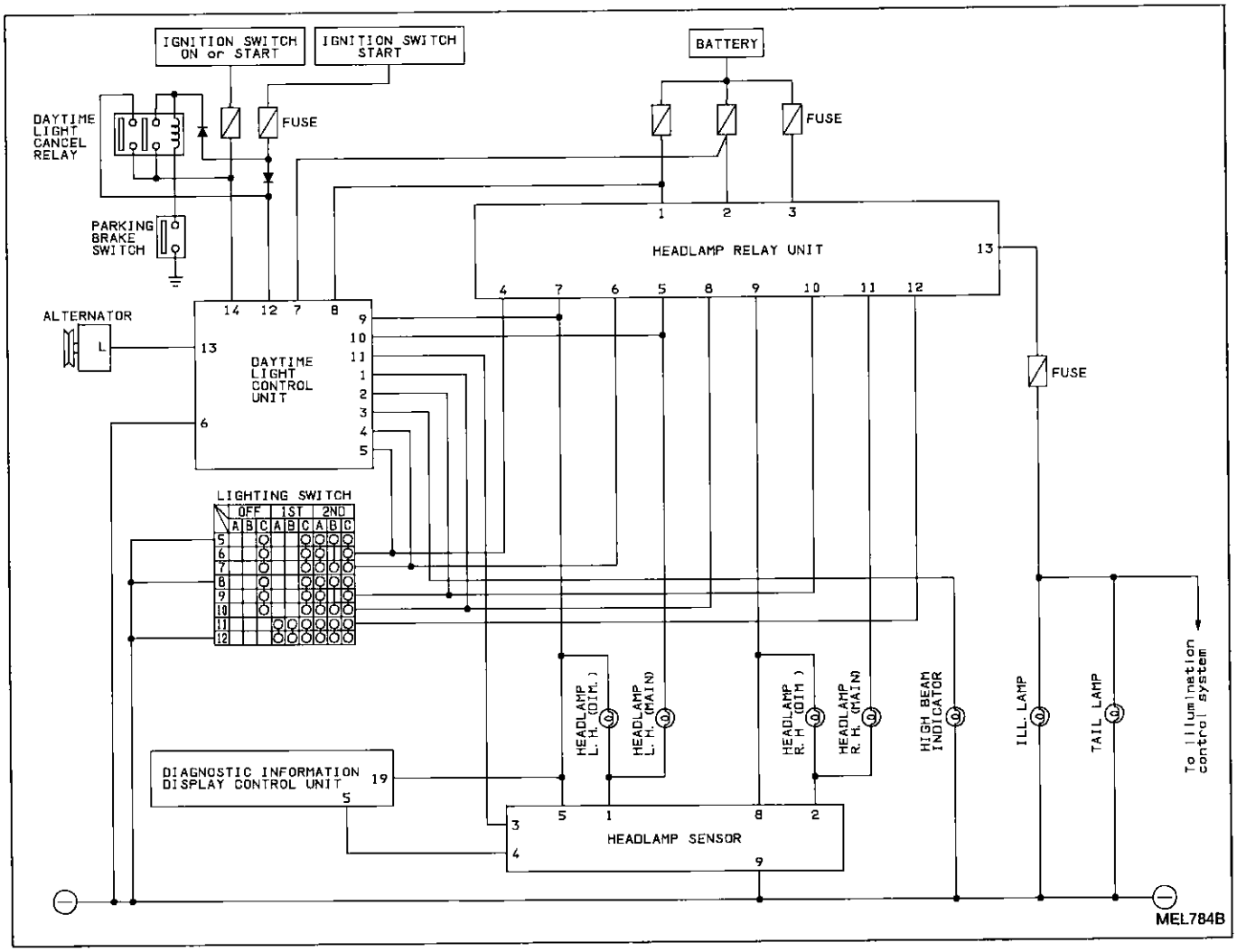
After starting the engine with the lighting switch in the "OFF" position or "1ST" position, the headlamp high beam automatically turns on. Lighting switch operations other than the above are the same as conventional light systems.

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	X	X	O	X	X	O	O	X	O	△*	△*	O	△	△	O	O	X	O
	Low beam	X	X	X	X	X	X	X	O	X	X	X	X	X	X	X	X	O	X
Clearance and tail lamp		X	X	X	O	O	O	O	O	O	X	X	X	O	O	O	O	O	O
License and instrument illumination lamp		X	X	X	O	O	O	O	O	O	X	X	X	O	O	O	O	O	O

O : Lamp "ON"
X : Lamp "OFF"
△ : Lamp dims.
* : When starting the engine with the parking brake released, the daytime lamp will come ON.
When starting the engine with the parking brake pulled, the daytime lamp won't come ON.

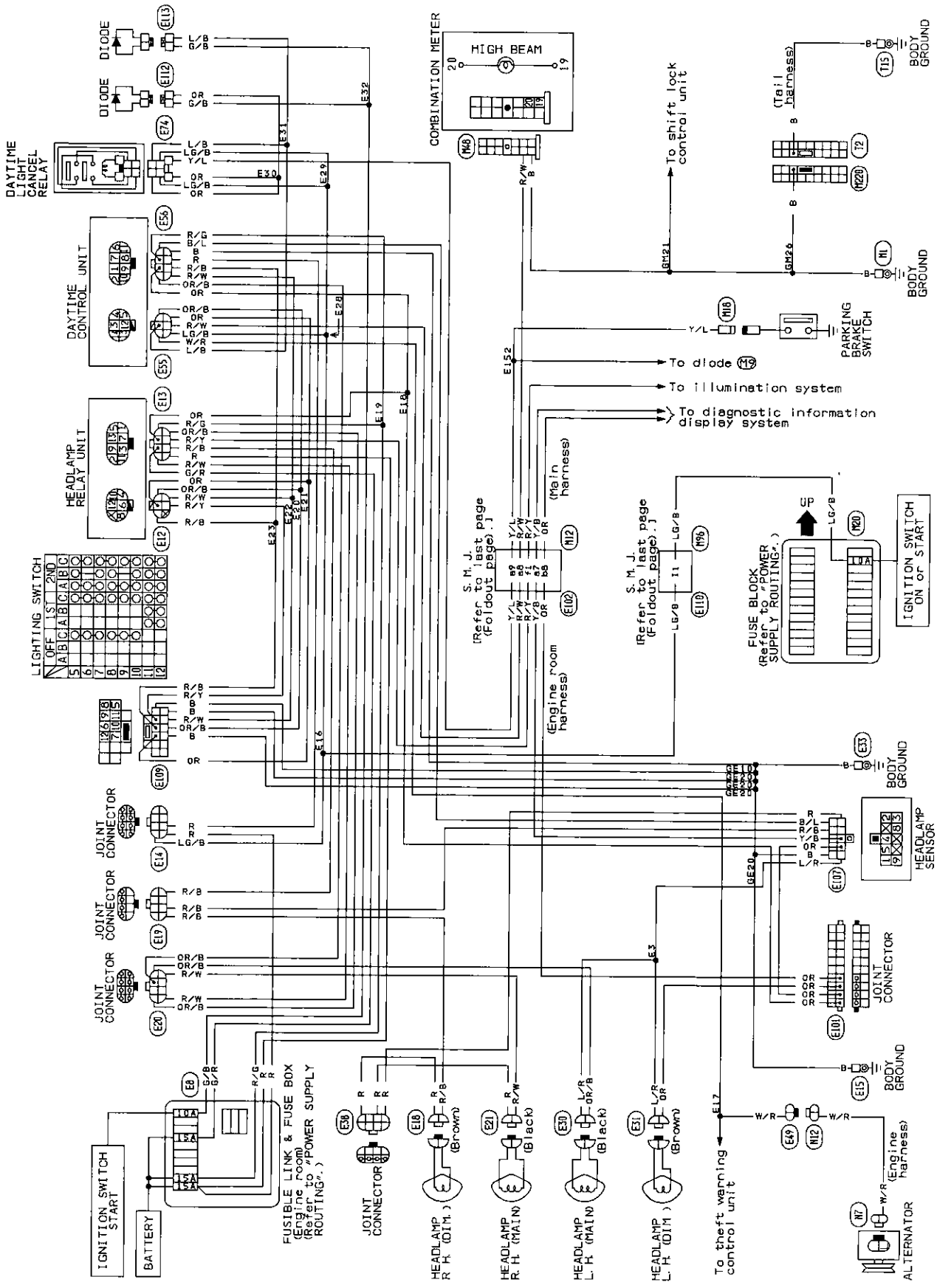
Schematic

FOR CANADA



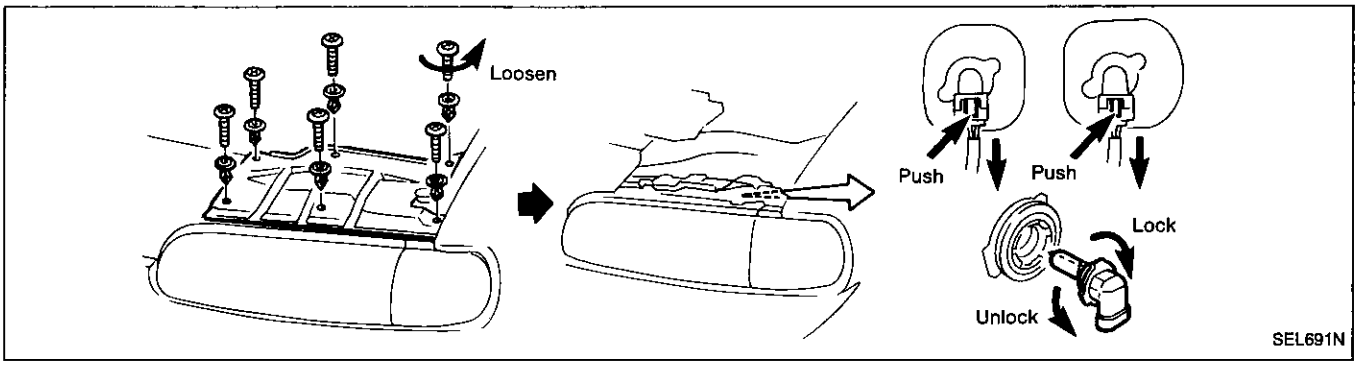
Wiring Diagram

FOR CANADA



MEL785B

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 battery negative cable.
2. Remove cover.
3. Disconnect harness connector from rear end of bulb.
4. Turn plastic base counterclockwise until it is free from headlamp reflector, then remove it.
5. Remove headlamp bulb. Do not shake or rotate bulb when removing it.
6. 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

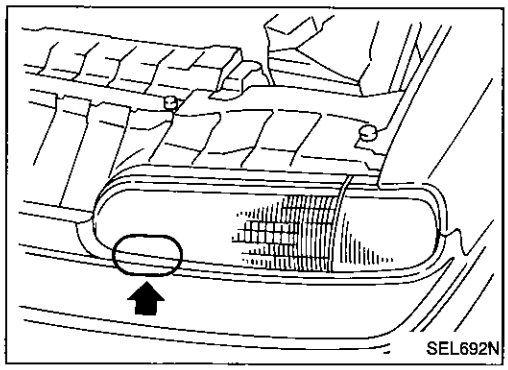
When performing headlamp aiming adjustment, use an aiming machine, aiming wall screen or headlamp tester. For operating instructions of any aimer, it should be in good repair, calibrated and used according to respective operation manuals supplied with the unit.

If any aimer is not available, aiming adjustment can be done as follows:

For details, refer to the regulations in your own country.

a. Keep all tires inflated to correct pressures.
b. Place vehicle and tester on one and same flat surface.
c. See that there is no-load in vehicle (coolant, engine oil filled up to correct level and full fuel tank) other than the driver (or equivalent weight placed in driver's position).

Aiming Adjustment (Cont'd)

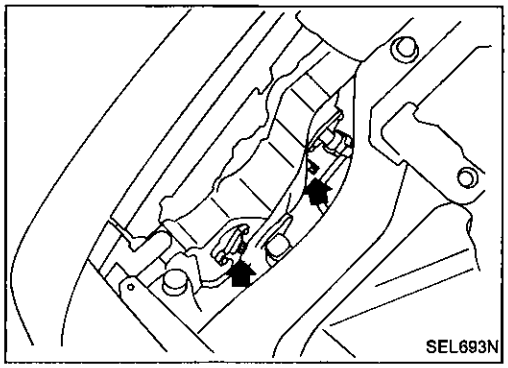


AIMER ADJUSTMENT MARK

When using a mechanical aimer, adjust adapter legs to the data marked on the headlamps.

Example: 4H2V

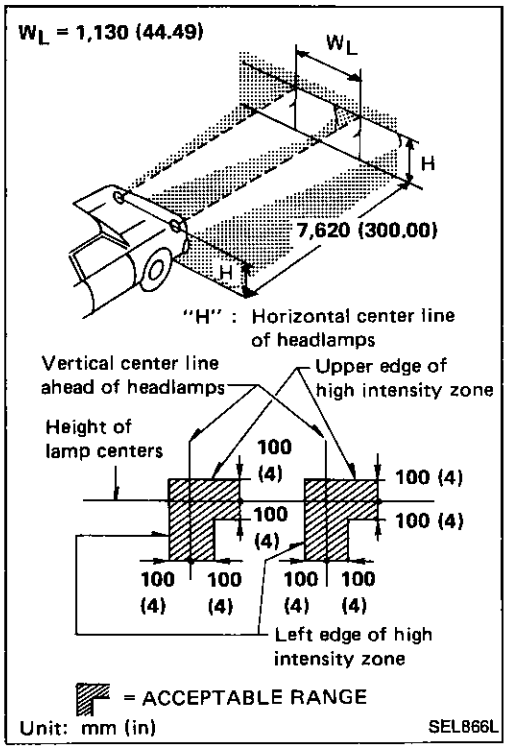
- 4H2V
  - Vertical side: 2
  - Horizontal side: 4



LOW BEAM

1. Turn headlamp low beam on.
2. Use adjusting screws to perform aiming adjustment.

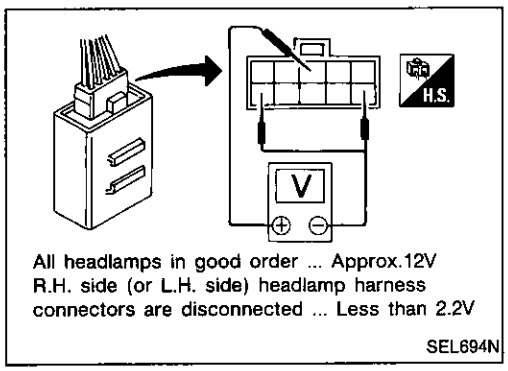
- **First tighten the adjusting screw all the way and then make adjustment by loosening the screw.**



- **Adjust headlamps so that upper edge and left edge of high intensity zone are within the acceptable range as shown at left.**
- **Dotted lines in illustration show center of headlamp.**

"H": Horizontal center line of headlamps

"W_L": Distance between each headlamp center

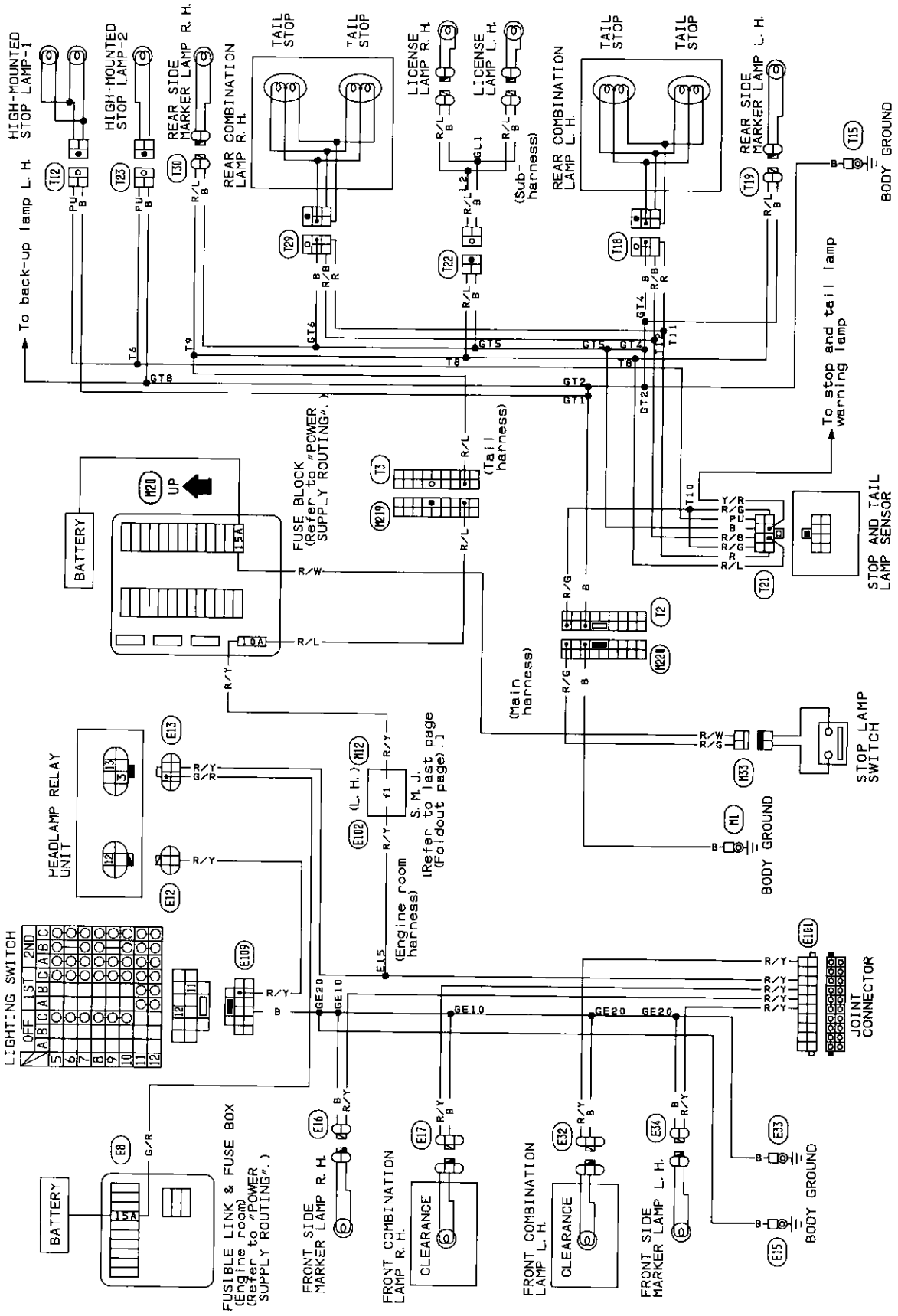


Headlamp Sensor Check

- Before checking, ensure that bulbs meet specifications.

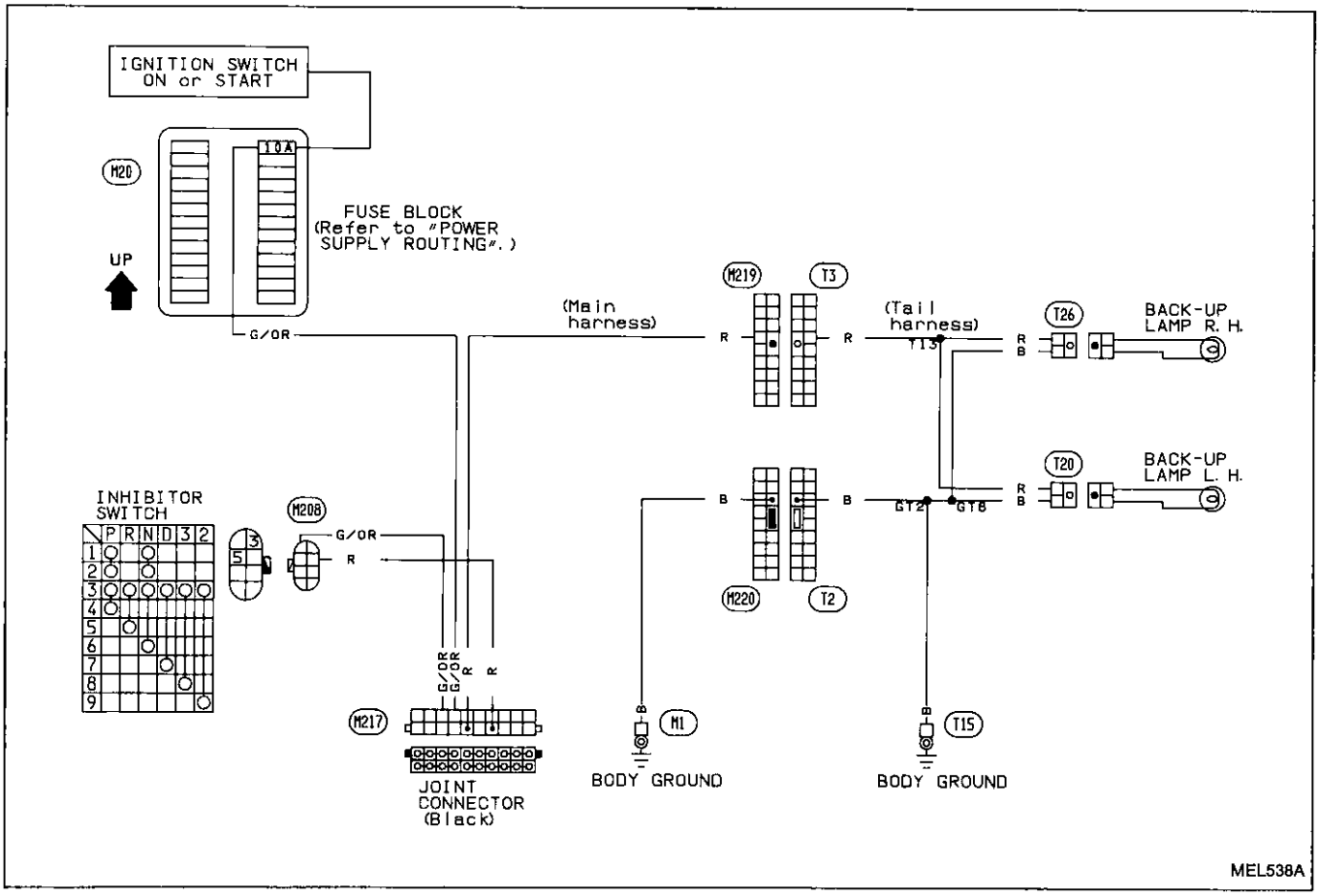
1. Start engine.
2. Turn headlamp high beam on.

Clearance, License, Tail and Stop Lamps/Wiring Diagram

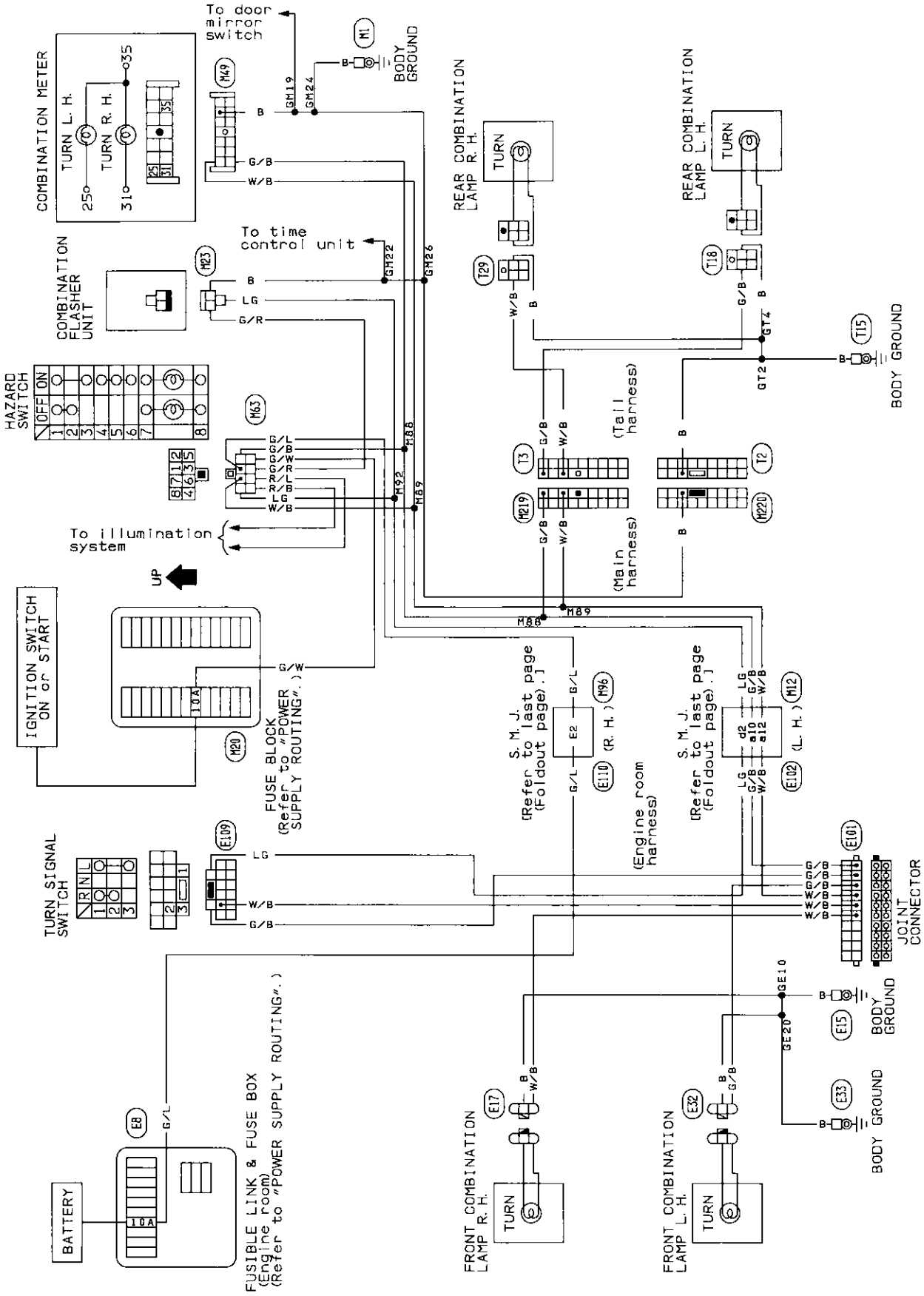


MEL537A

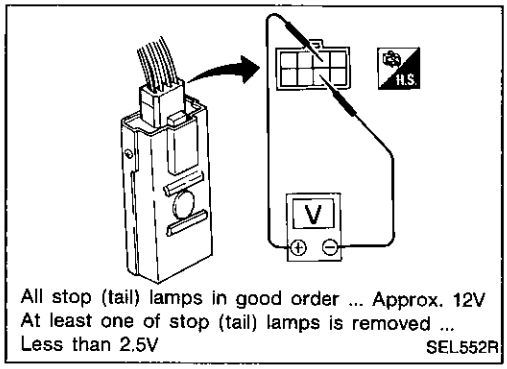
Back-up Lamp/Wiring Diagram



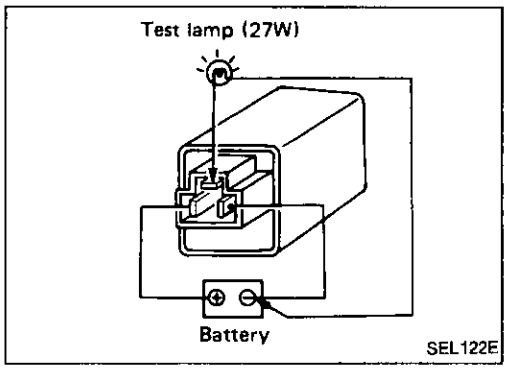
Turn Signal and Hazard Warning Lamps/Wiring Diagram



MEL539A



All stop (tail) lamps in good order ... Approx. 12V
At least one of stop (tail) lamps is removed ...
Less than 2.5V
SEL552R



SEL122E

Stop and Tail Lamp Sensor Check

- Before checking, ensure that bulbs meet specifications.

STOP LAMP

1. Start engine.
2. Turn stop lamp switch on.

TAIL LAMP

1. Start engine.
2. Turn lighting switch on.

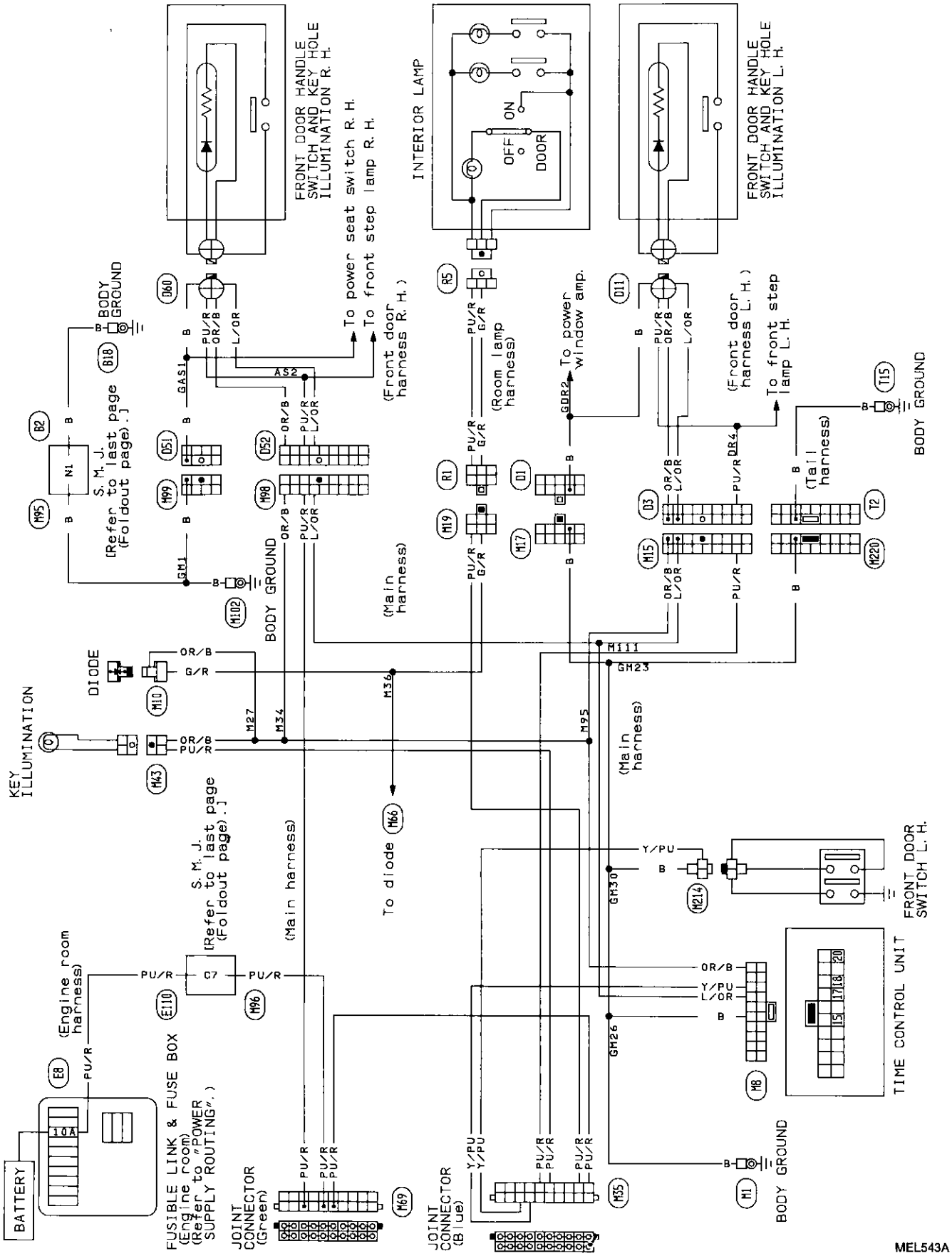
Combination Flasher Unit Check

- 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

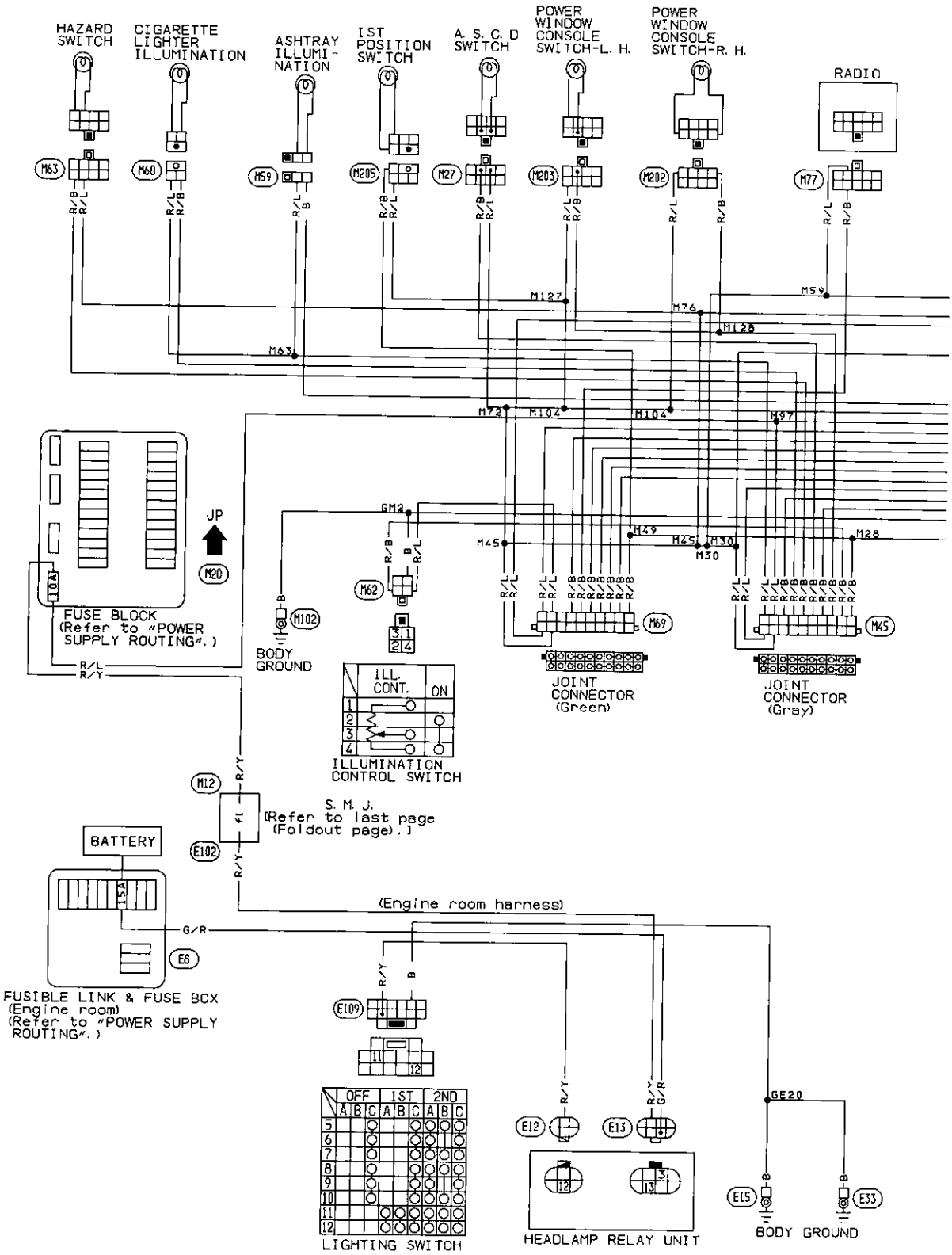
	Wattage (12 volt)	Bulb No.
Headlamp		
High beam (Inside)	65	9005
Low beam (Outside)	55	9006
Front combination lamp		
Turn signal/Clearance	27/8	1157NA
Front side marker lamp	3.8	194
Rear combination lamp		
Turn signal	27	1156
Stop/Tail	27/8	1157
Back-up lamp	27	1156
Rear side marker lamp	3.8	194
License 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	—

Illuminated Entry System and Key Illumination/Wiring Diagram

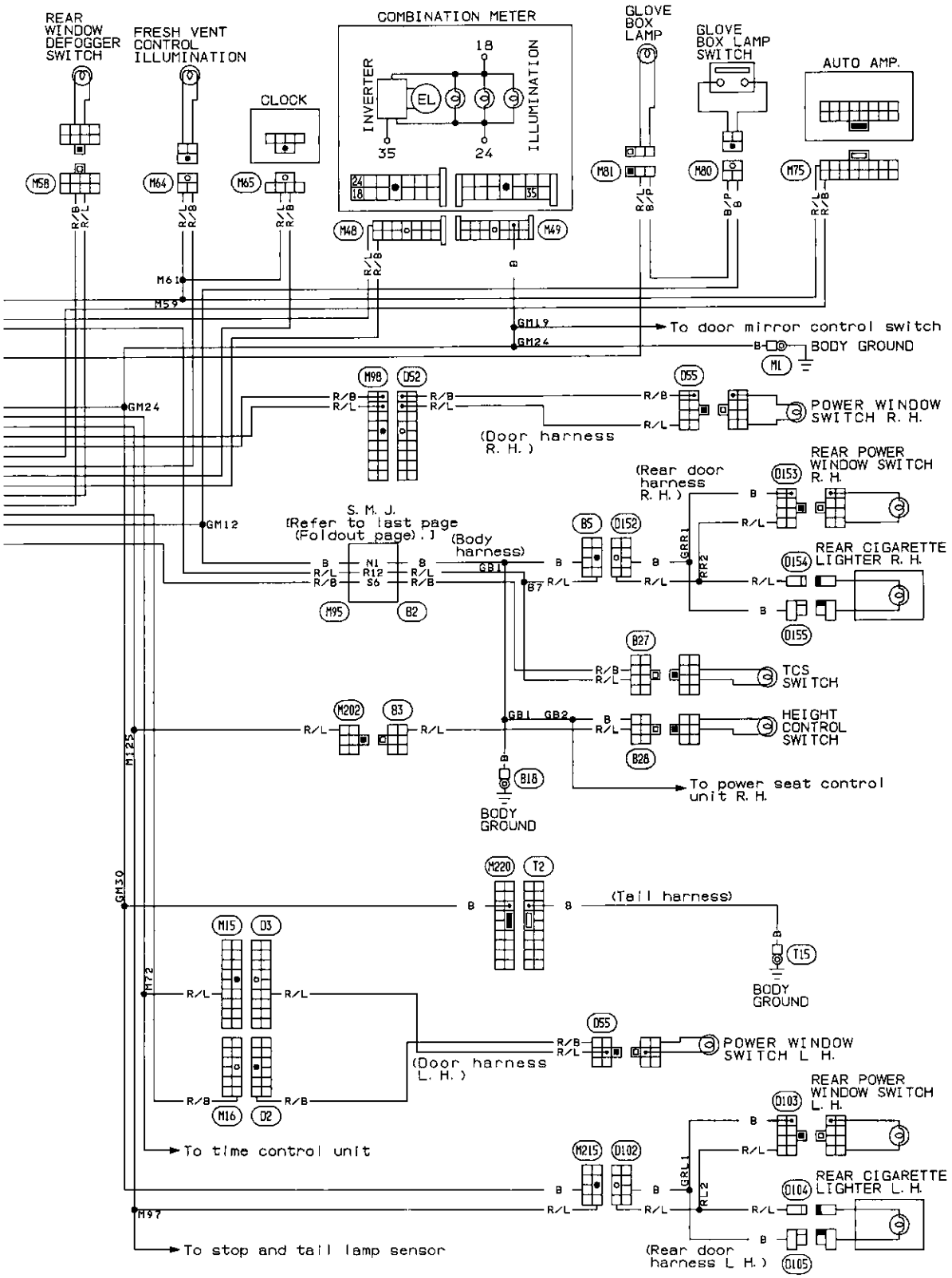


MEL543A

Illumination/Wiring Diagram

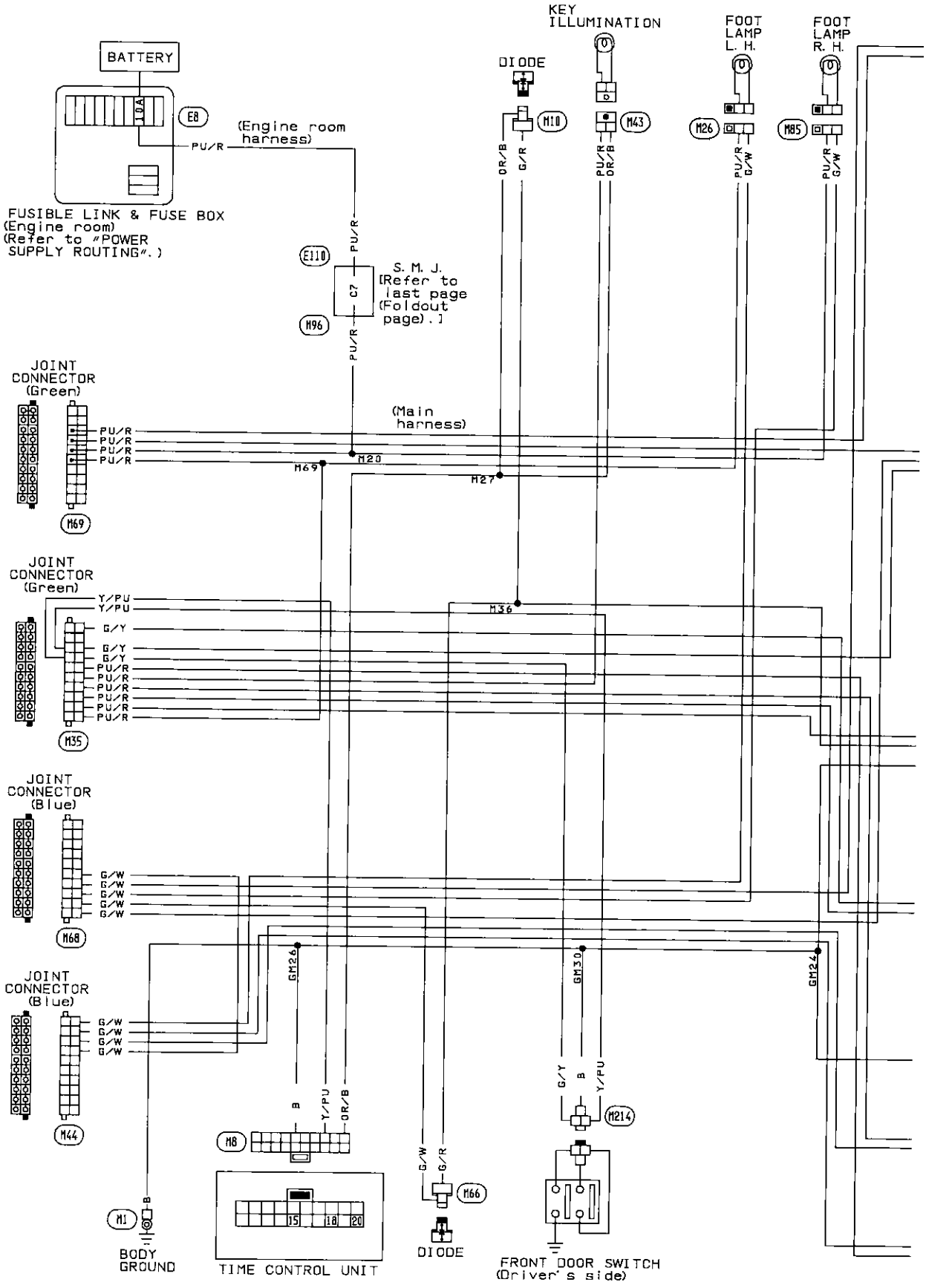


Illumination/Wiring Diagram (Cont'd)

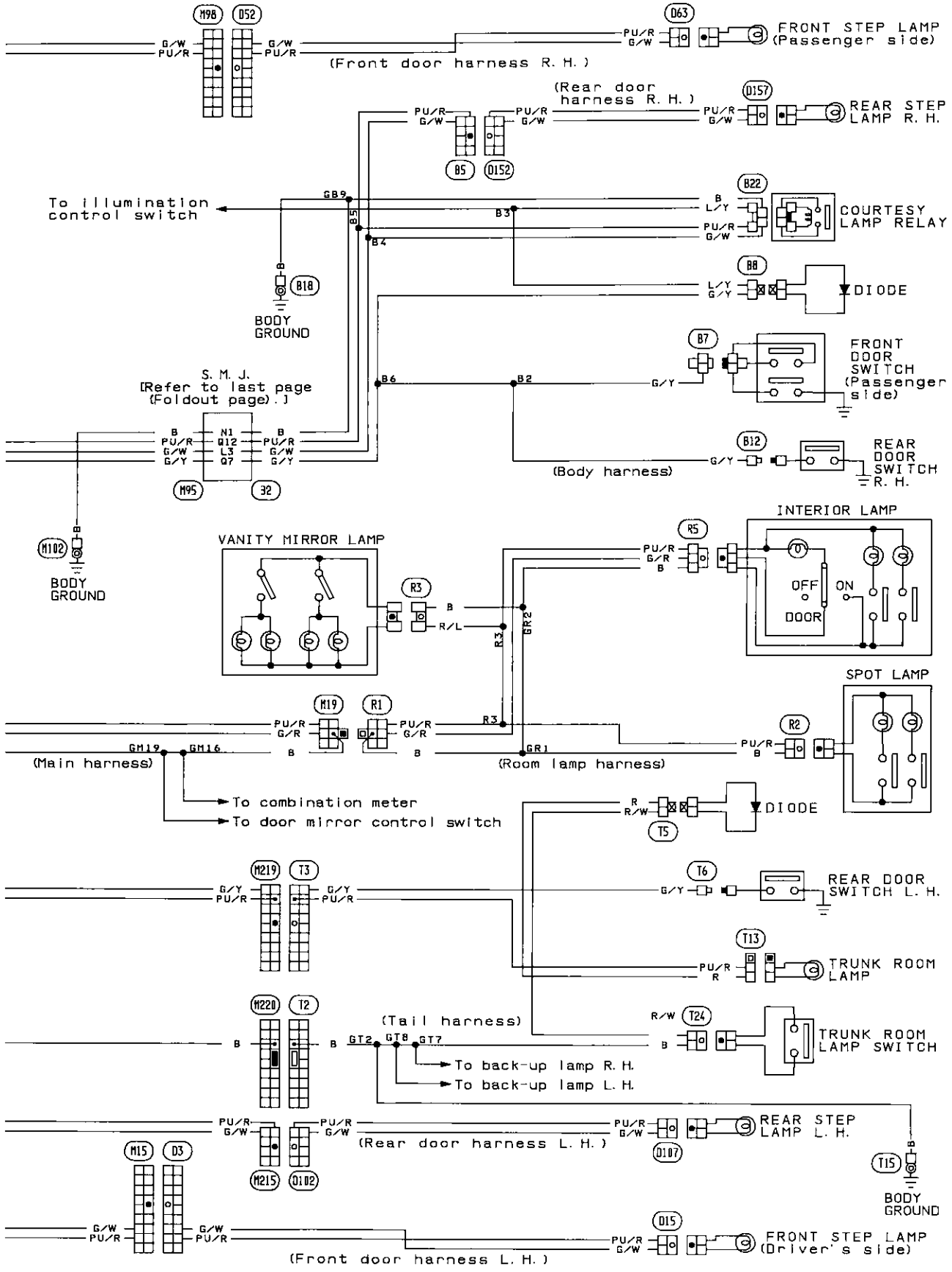


MEL808B

Interior, Spot, Step, Foot and Trunk Room Lamps/Wiring Diagram

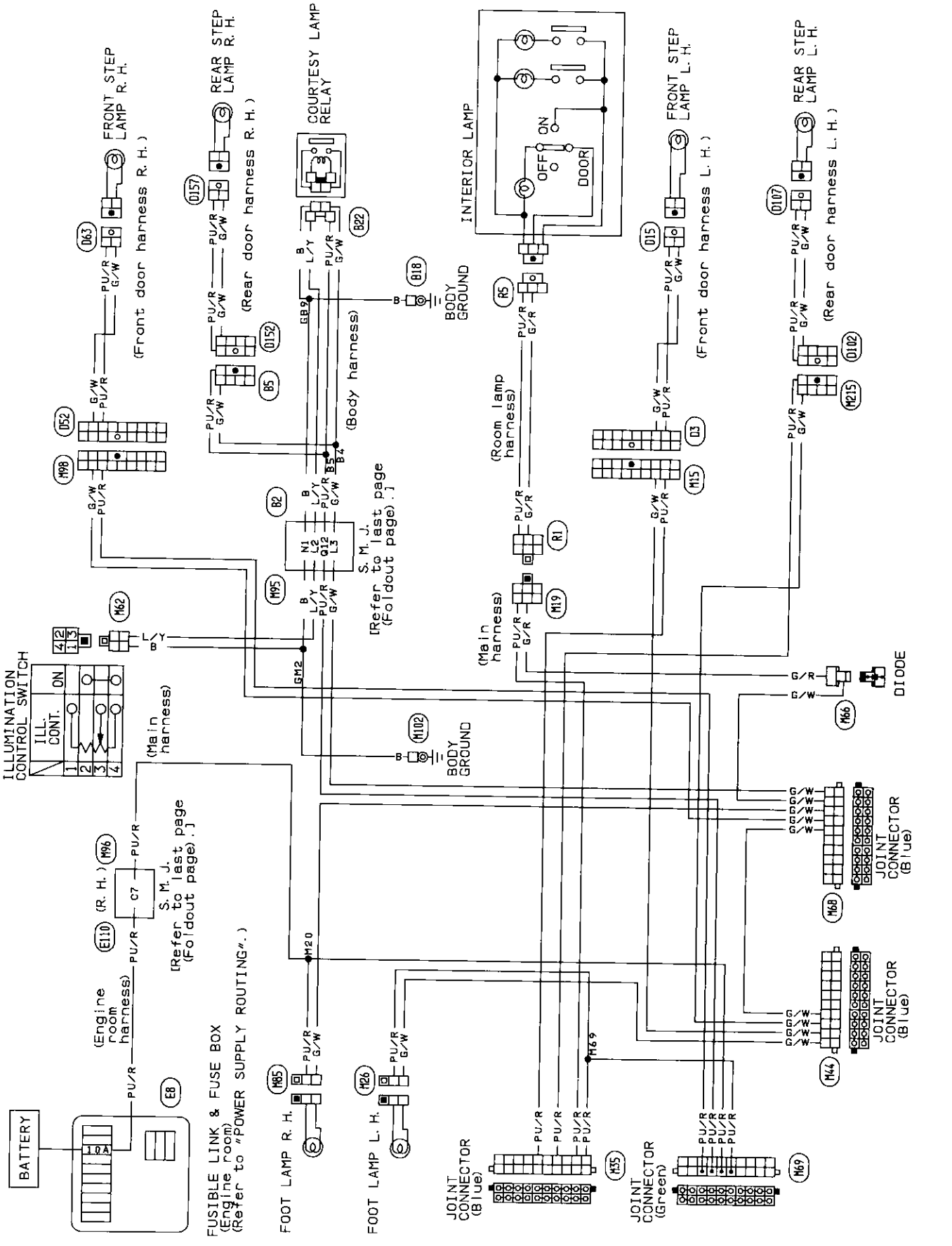


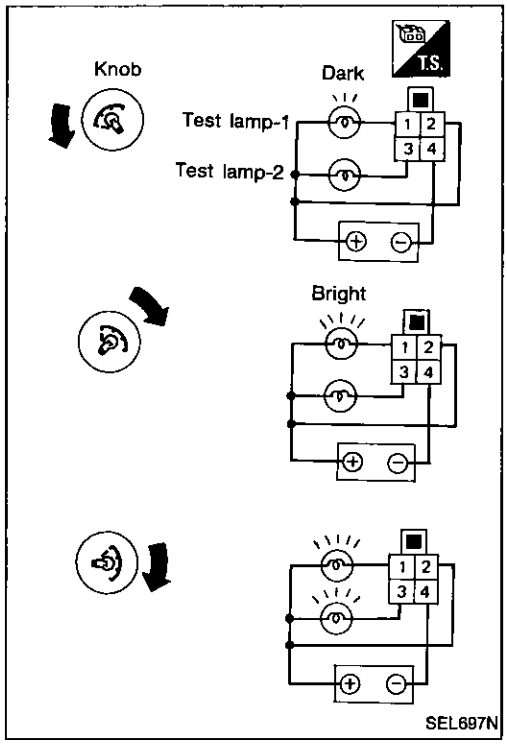
Interior, Spot, Step, Foot and Trunk Room Lamps/Wiring Diagram (Cont'd)



MEL096B

Courtesy Lamp/Wiring Diagram



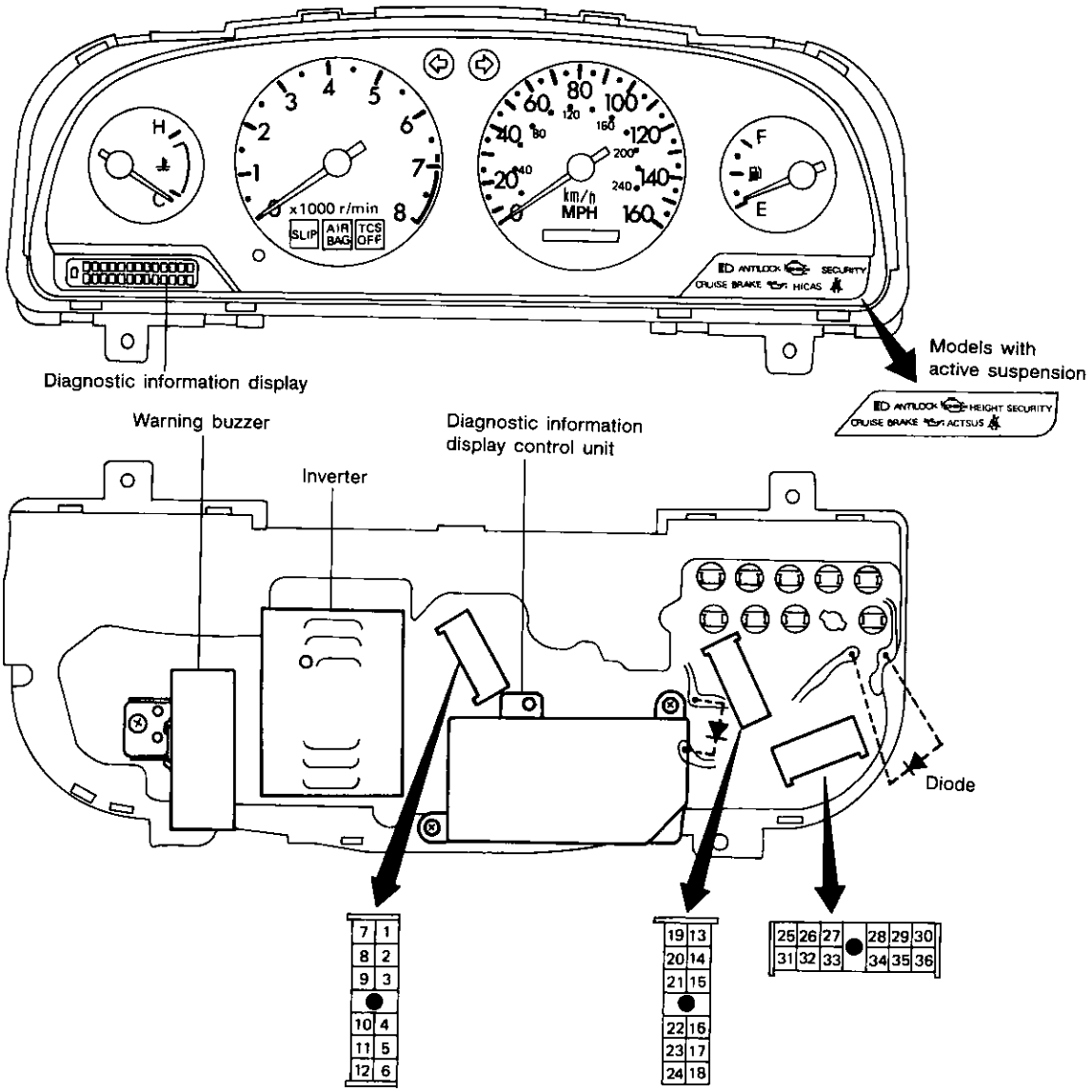


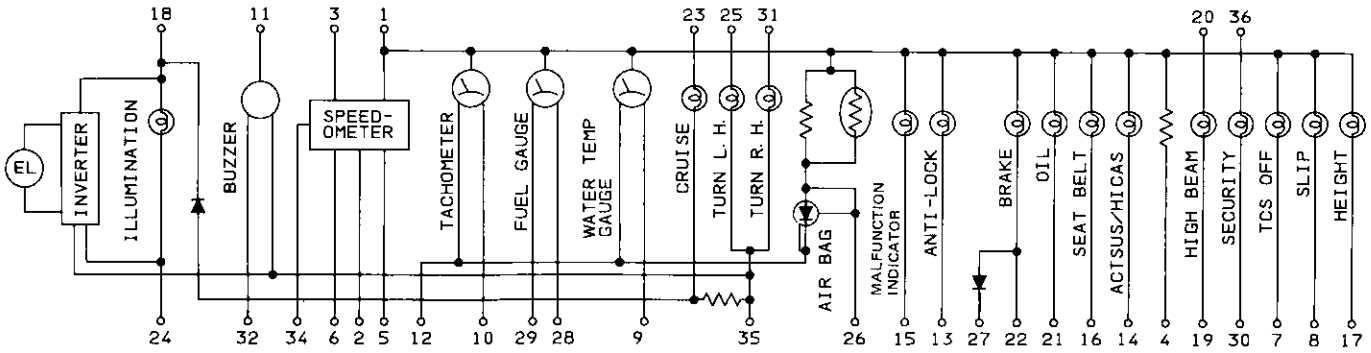
Illumination Control Switch Check

Connect as shown in figure at left.
Illumination control switch is in good order when test lamps activate as indicated below:

- When knob is turned counterclockwise or clockwise, test lamp-1 darkens or brightens accordingly. Turning knob clockwise further turns on switch and illuminates test lamp-2.

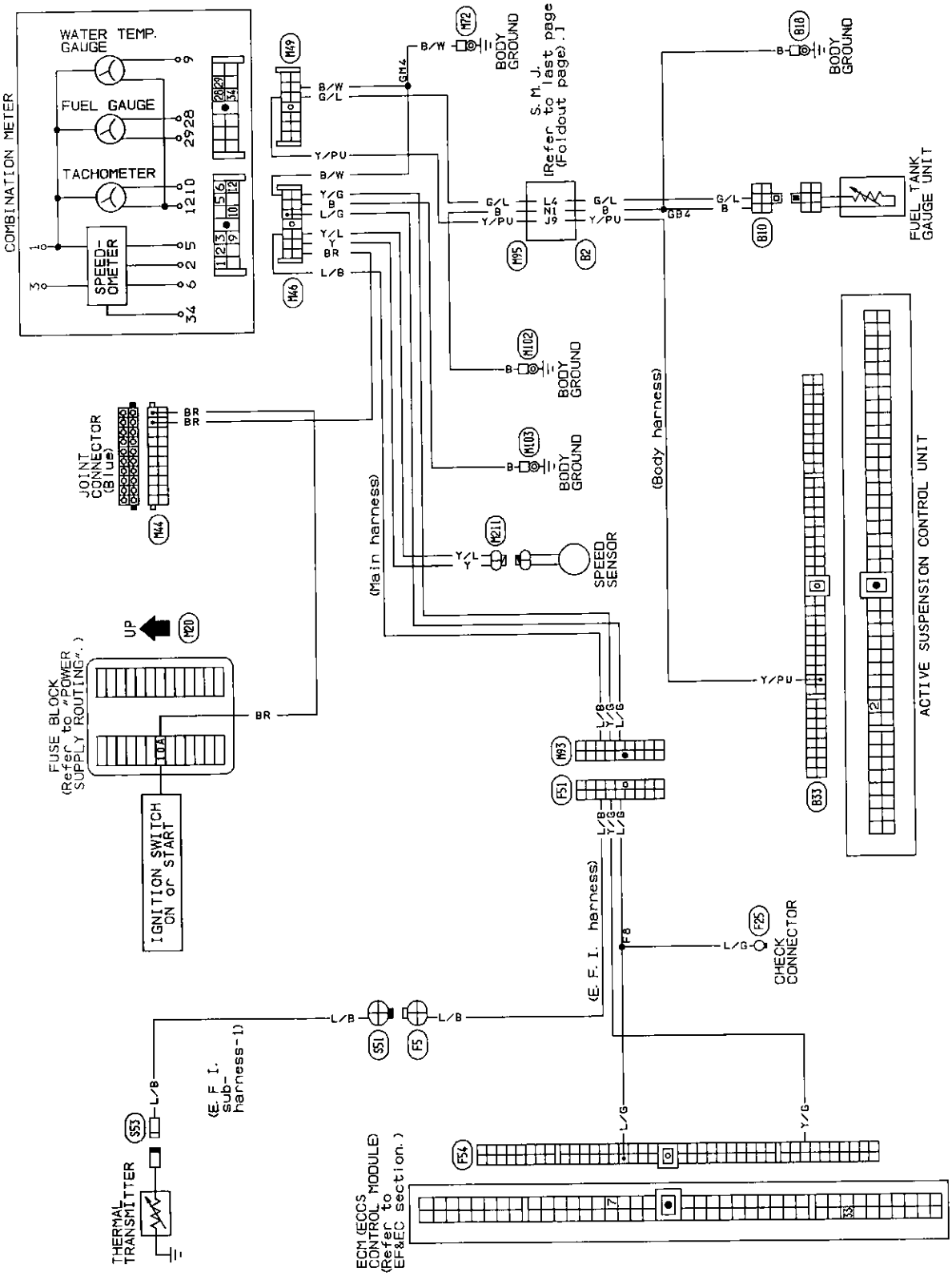
Combination Meter



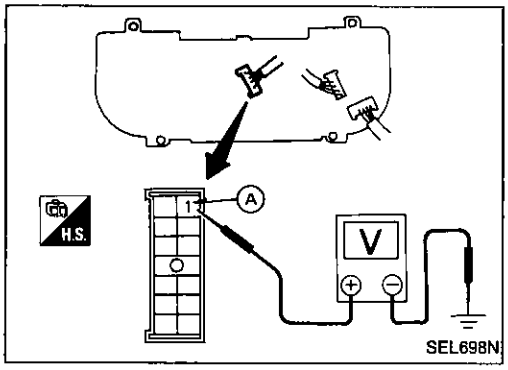


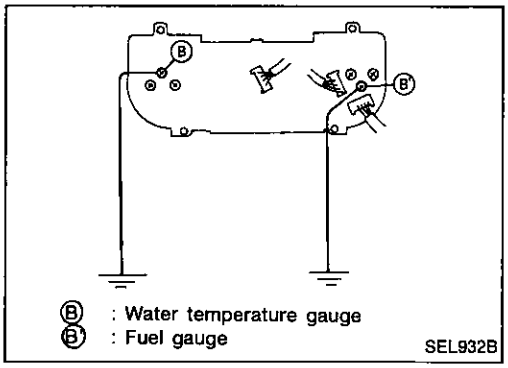
MEL544A

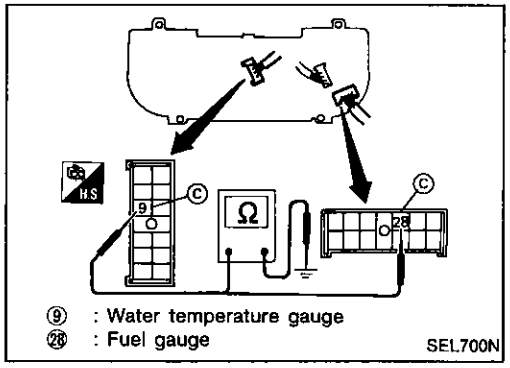
Speedometer, Tachometer, Temp. and Fuel Gauges/Wiring Diagram



MEL796B







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 Ⓑ (Temp.), Ⓑ' (Fuel) 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".

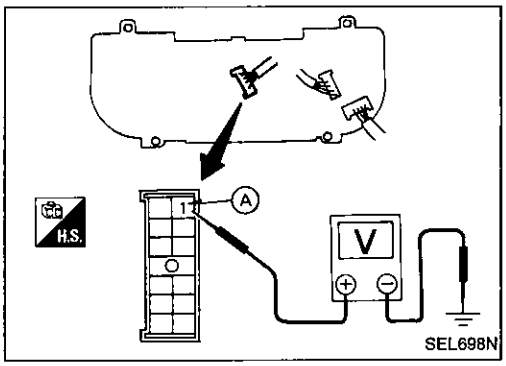
N.G. → Repair or replace.
Refer to FE section. (Fuel tank gauge unit)

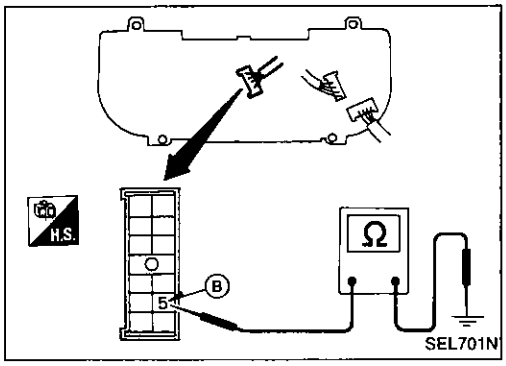
O.K.

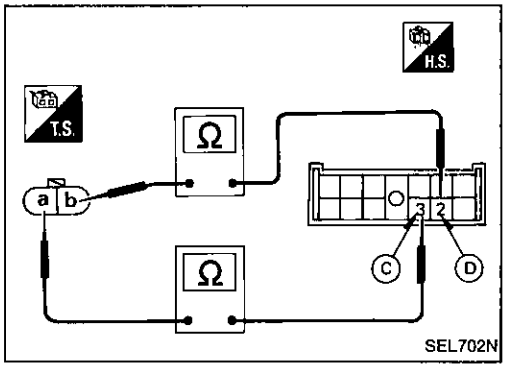
Reinstall any part removed.

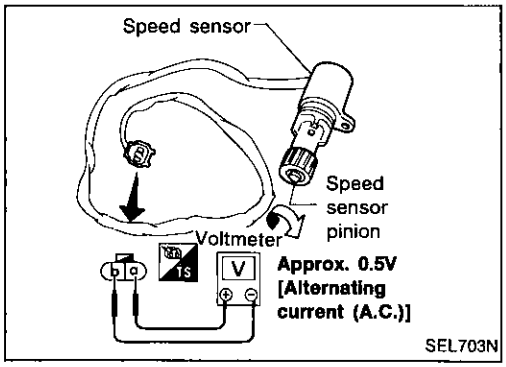
INSPECTION END

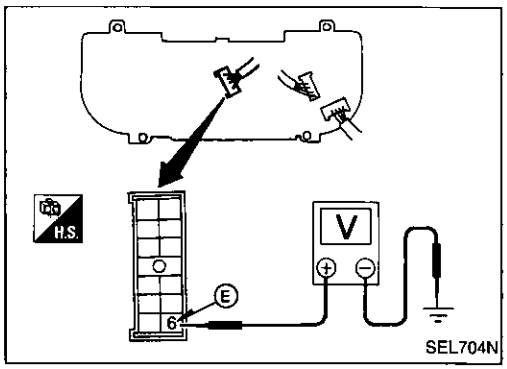
Inspection/Speed Sensor Signal Circuit











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 GROUND CIRCUIT.
Check harness continuity between terminal Ⓑ and body ground.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK INPUT SIGNAL CIRCUIT.
Check harness continuity between terminal Ⓒ, Ⓓ and speed sensor terminal ⓐ, ⓑ.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT.
1) Remove speed sensor from transmission.
Location: Refer to "Location of Electrical Units".
2) Turn speedometer pinion quickly and check voltage between terminal ⓐ and ⓑ.

N.G. → Replace speed sensor

O.K.

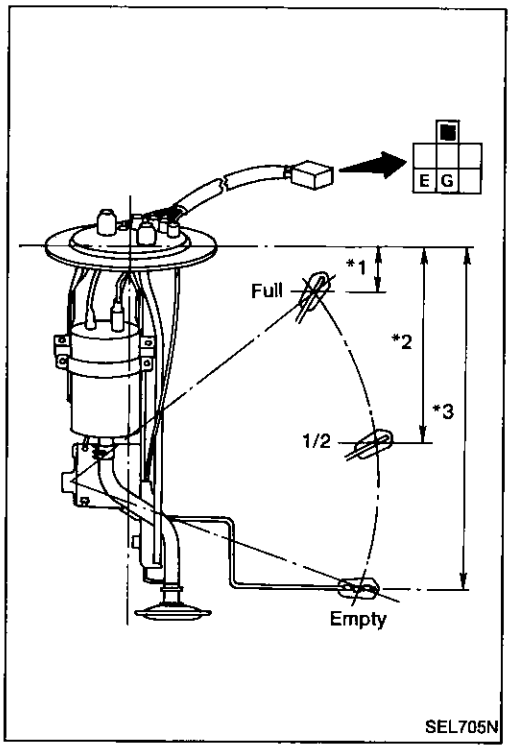
CHECK OUTPUT SIGNAL CIRCUIT.
1) Install speed sensor.
2) Jack up one rear wheel.
3) Turn ignition switch "ON".
4) Turn rear wheel by hand, make sure that needle of voltmeter swings between approx. 0V and approx. 5V.

N.G. → Replace speedometer.

O.K.

Reinstall any part removed.

INSPECTION END

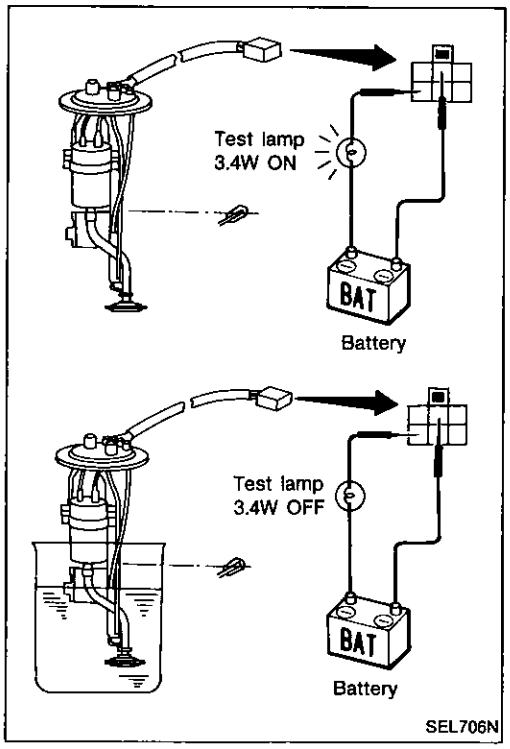


Fuel Tank Gauge Unit Check

- For removal, refer to FE section.

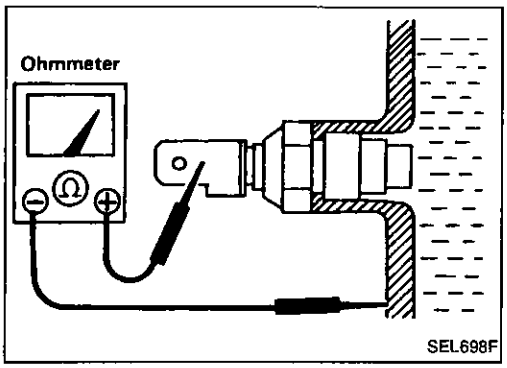
Check the resistance between terminals Ⓖ and Ⓔ.

Ohmmeter		Float position mm (in)			Resistance value (Ω)
(+)	(−)				
G	E	* 3	Full	42.8 (1.685)	Approx. 4.3 - 5.8
		* 2	1/2	185.0 (7.28)	Approx. 27.7 - 34.3
		* 1	Empty	308.7 (12.15)	Approx. 79.3 - 84.8



Fuel Warning Lamp Sensor Check

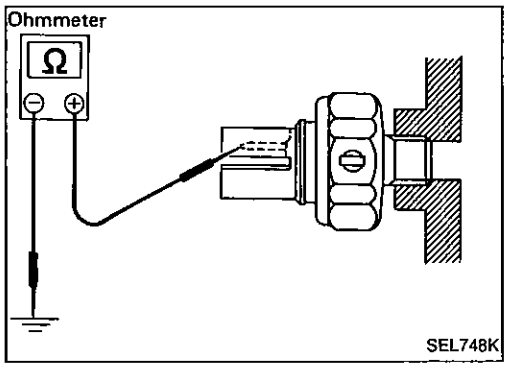
- It will take a short time for the bulb to light.



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

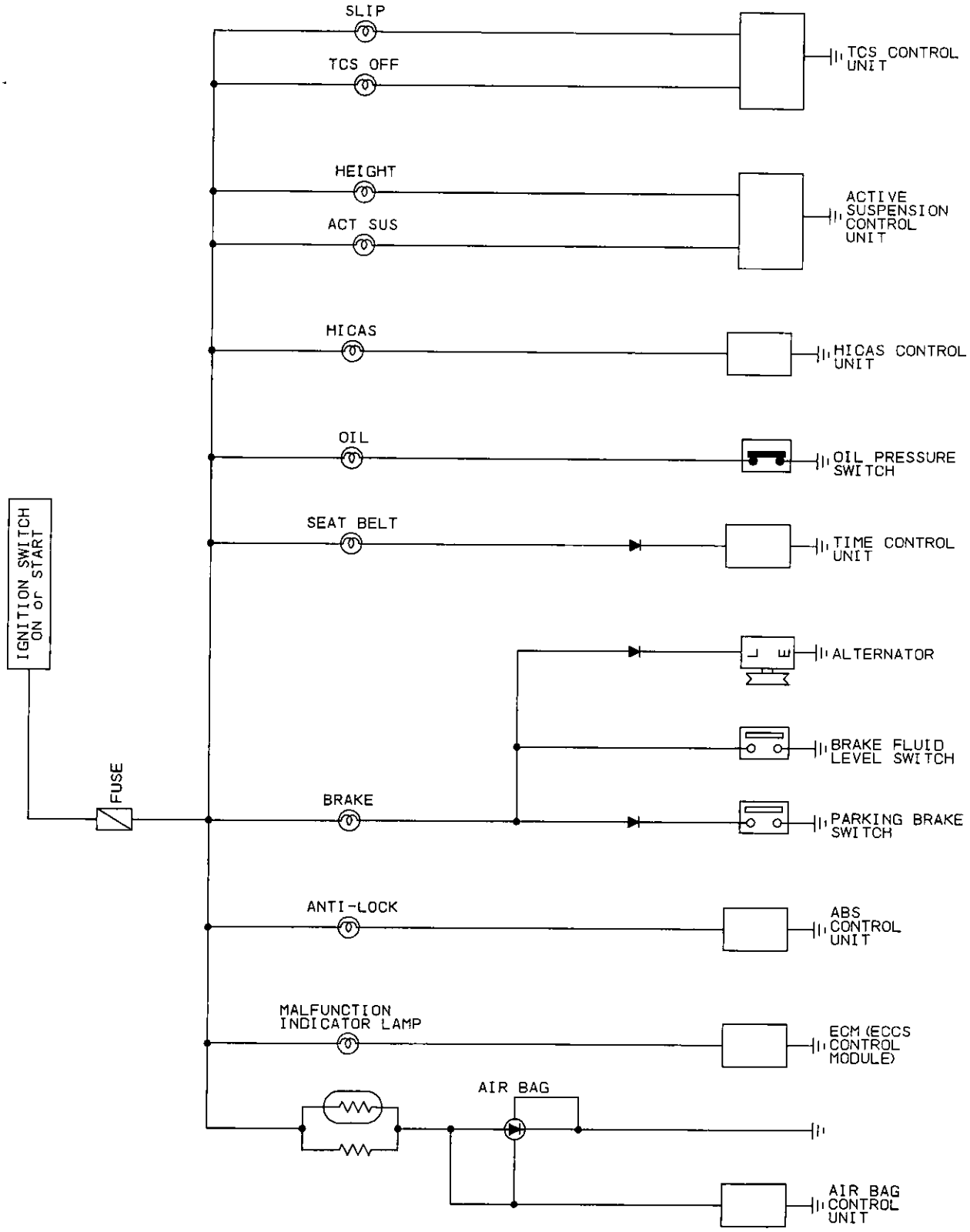


Oil Pressure Switch Check

Check the continuity between the terminals of oil pressure switch and body ground.

	Oil pressure kPa (kg/cm^2, 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

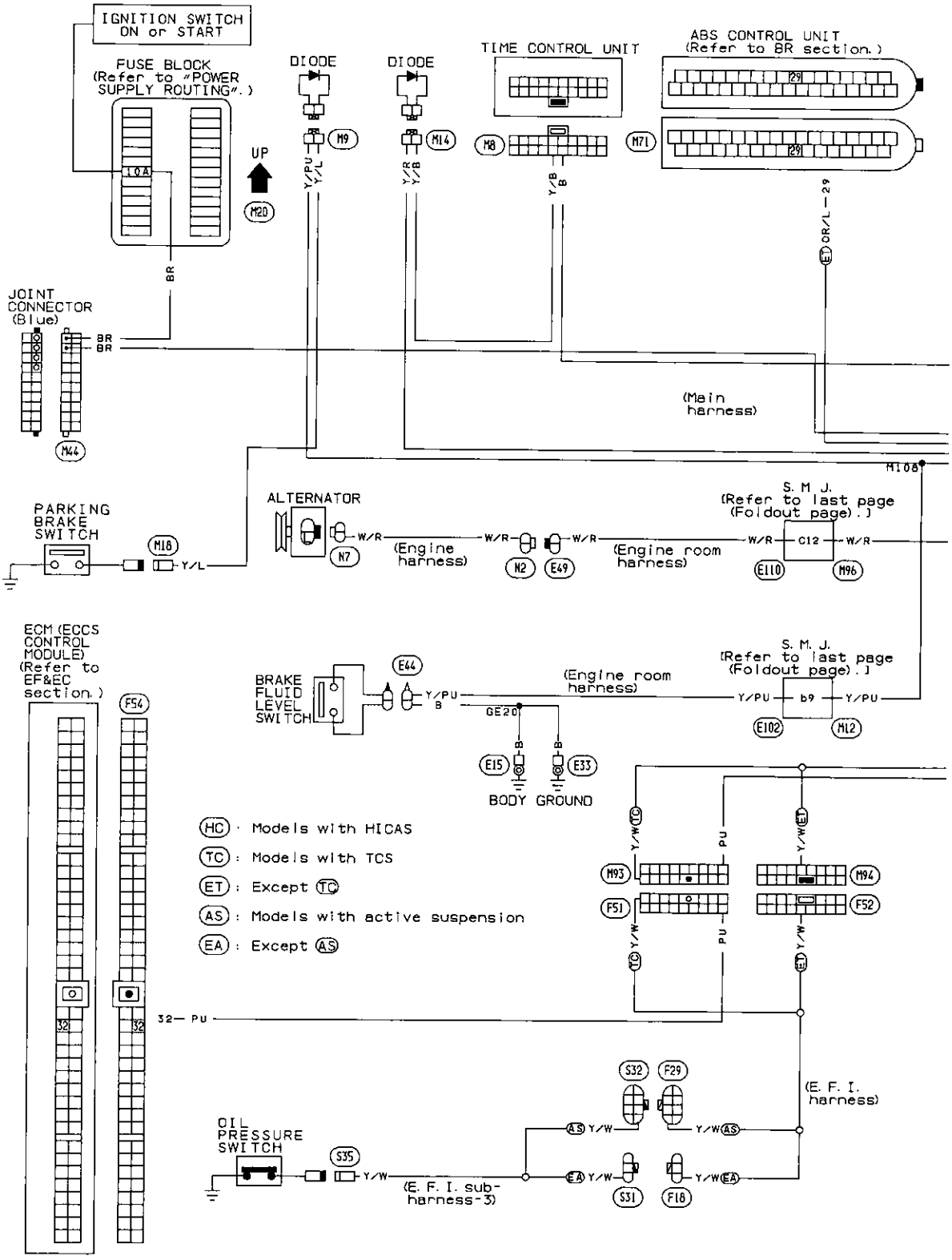
Warning Lamps/Schematic



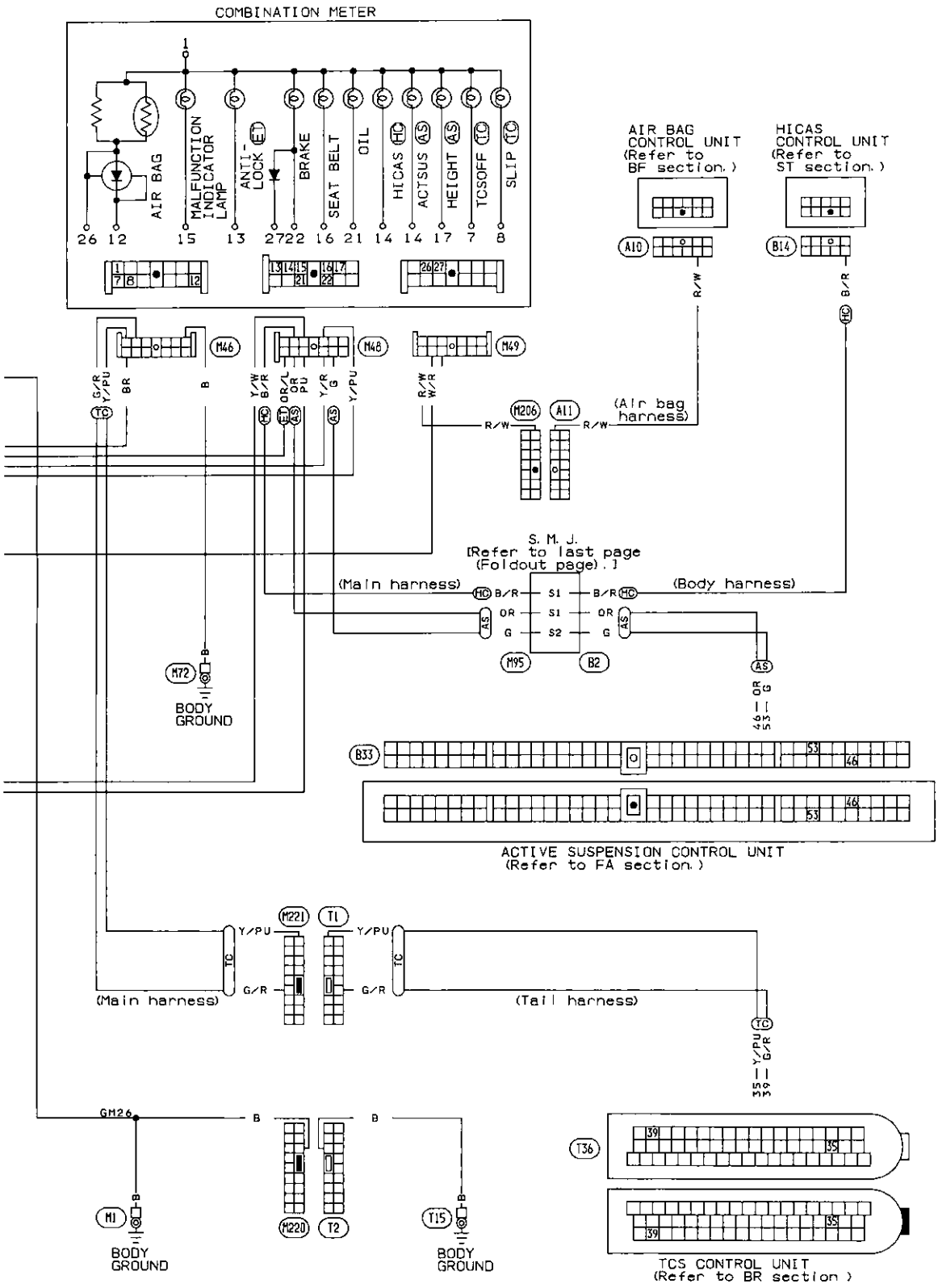
MEL797B

NOTE

Warning Lamps/Wiring Diagram

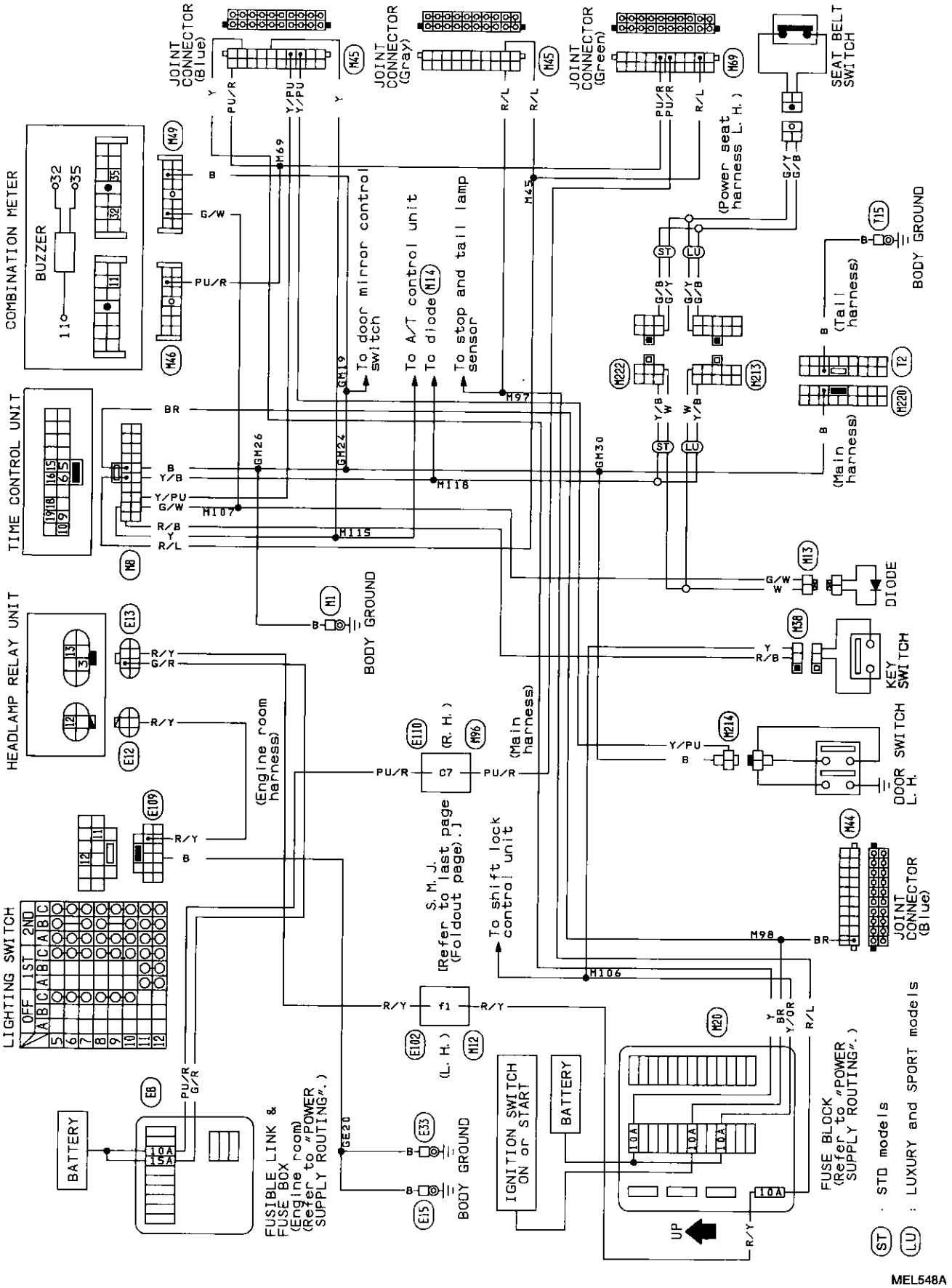


Warning Lamps/Wiring Diagram (Cont'd)

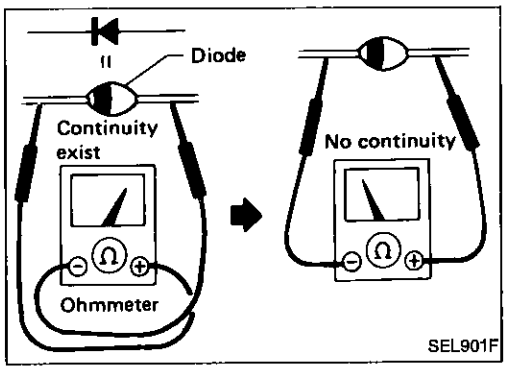


MEL798B

Warning Chime/Wiring Diagram

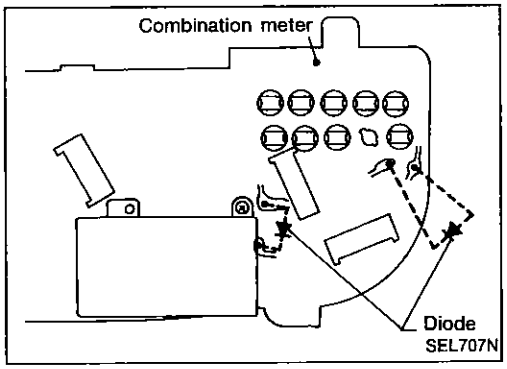


MEL548A



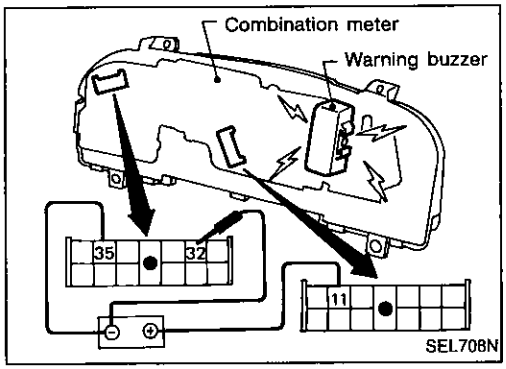
Diode Check

- 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 Buzzer Check

Description

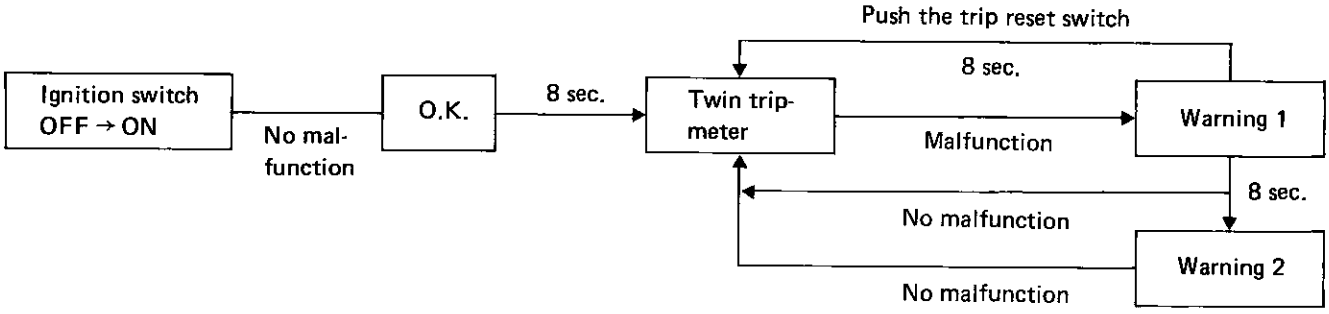
DISPLAY ITEM

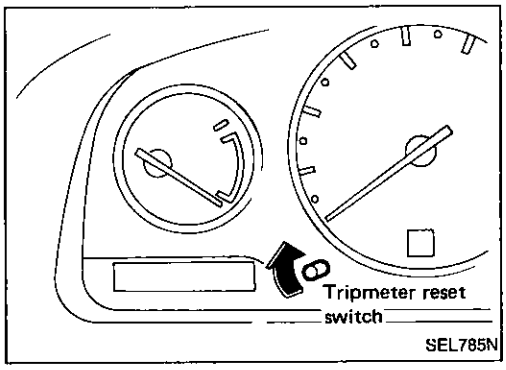
The display unit is made up of 13 × 2 L.C.D.s and the display messages are as follows:

Priority	Item	Display	Priority	Item	Display
—	(Starting message with no warning)	OK	5	Headlamp	HEADLAMP INOPERATIVE
	Twin tripmeter (Mile)	A; XXX. X MILE B; XXX. X MILE	6	Stop lamp	STOP LAMP INOPERATIVE
	Twin tripmeter (km)	A; XXX. X km B; XXX. X km	7	Tail lamp	TAIL LAMP INOPERATIVE
1	A/T	TRANSMISSION MALFUNCTION	8	Stop & Tail lamp system	TAIL/STOP LAMP INOPERATIVE
2	Doors	DOOR OPEN			
3	Washer liquid	A; XXX. X MILE LOW WASHER	9	Charging system	LOW BATTERY CHARGE
4	Fuel amount	A; XXX. X MILE LOW FUEL	10	Brake pads	BRAKE PADS WORN

OPERATION

When the ignition key is turned to "ON", if there is no malfunction in the monitored items, the display indicates "OK" for eight seconds. After that the twin tripmeter appears. The twin tripmeter ceases to appear if any warning signal is detected. Diagnostic information is shown instead. If more than one kind of warning is given, the messages appear in turn at intervals of eight seconds.
While a warning message is being displayed, the twin tripmeter indication can be obtained for eight seconds by pushing the trip reset switch momentarily.

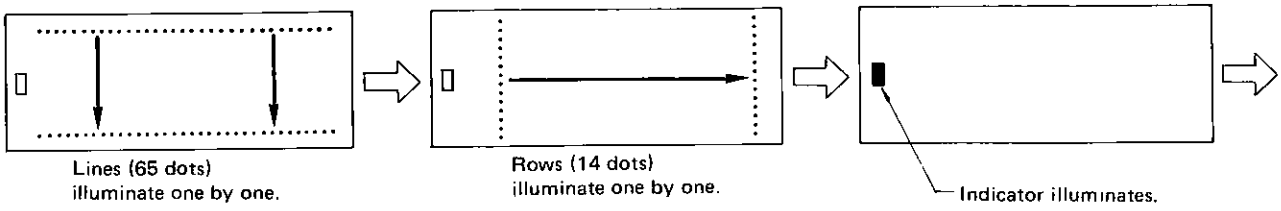




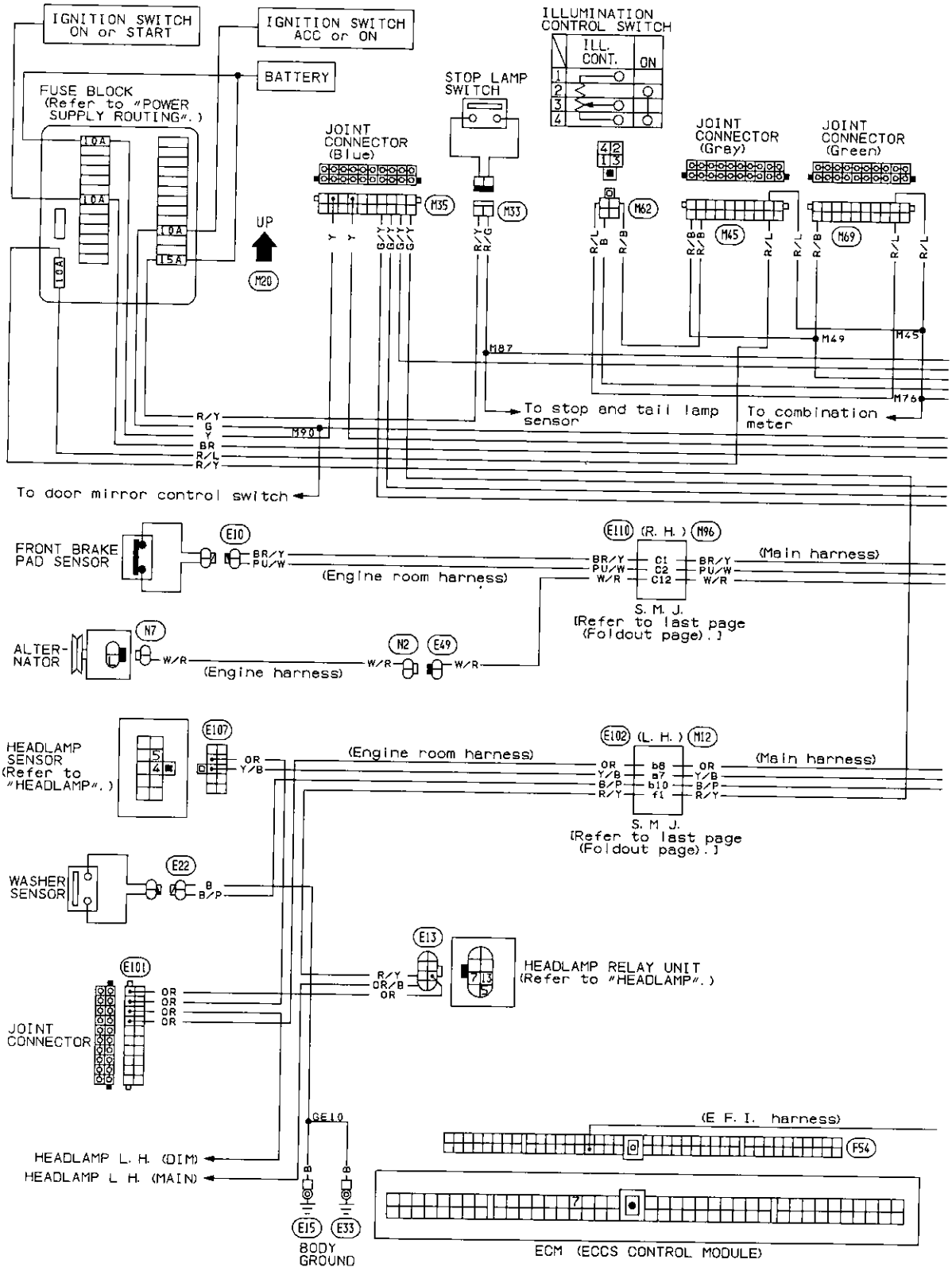
Self-check

SEGMENT CHECK

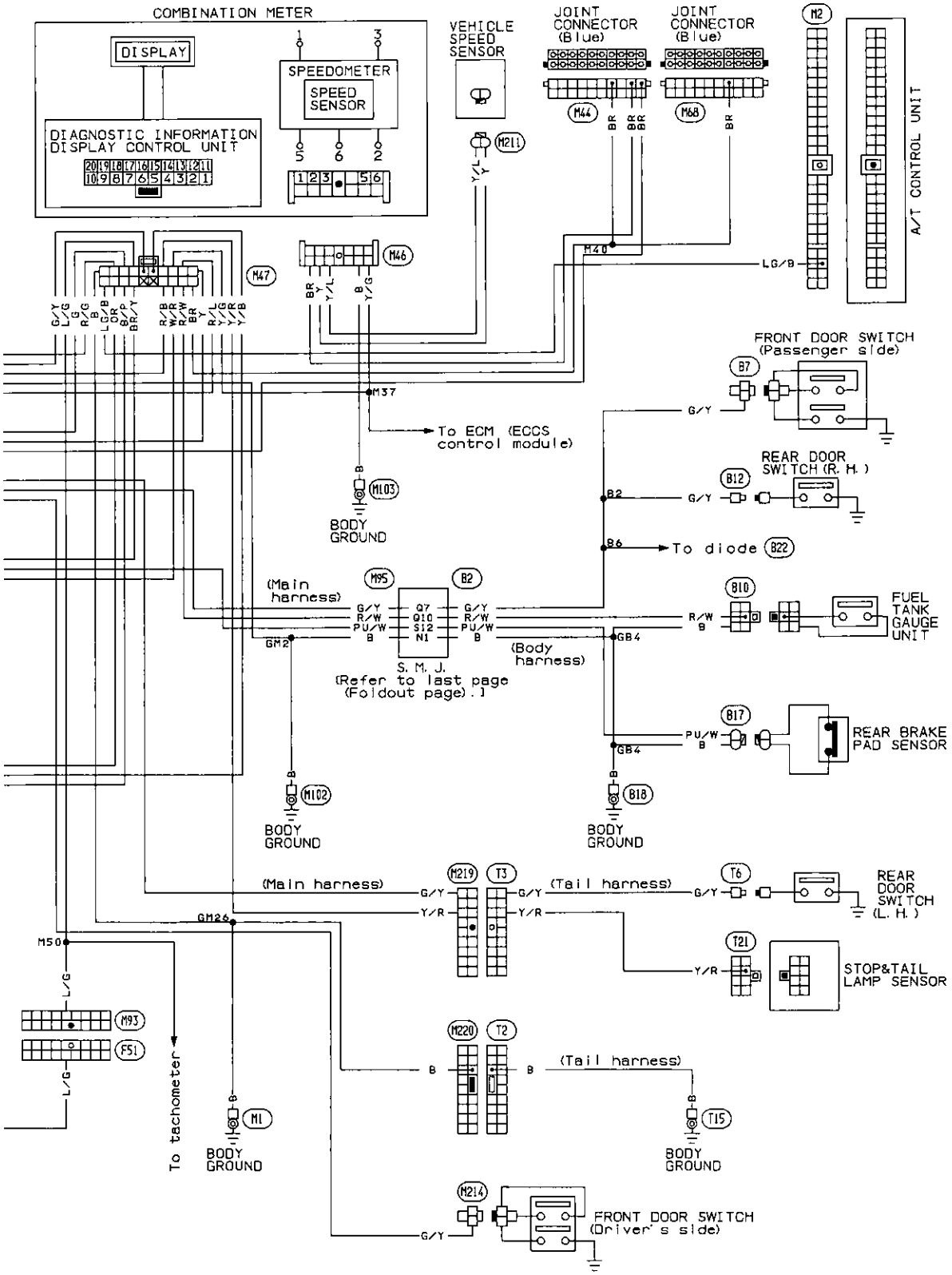
While turning the tripmeter reset switch to the right, turn the ignition switch from "OFF" to "ON". The display starts automatically.



Wiring Diagram



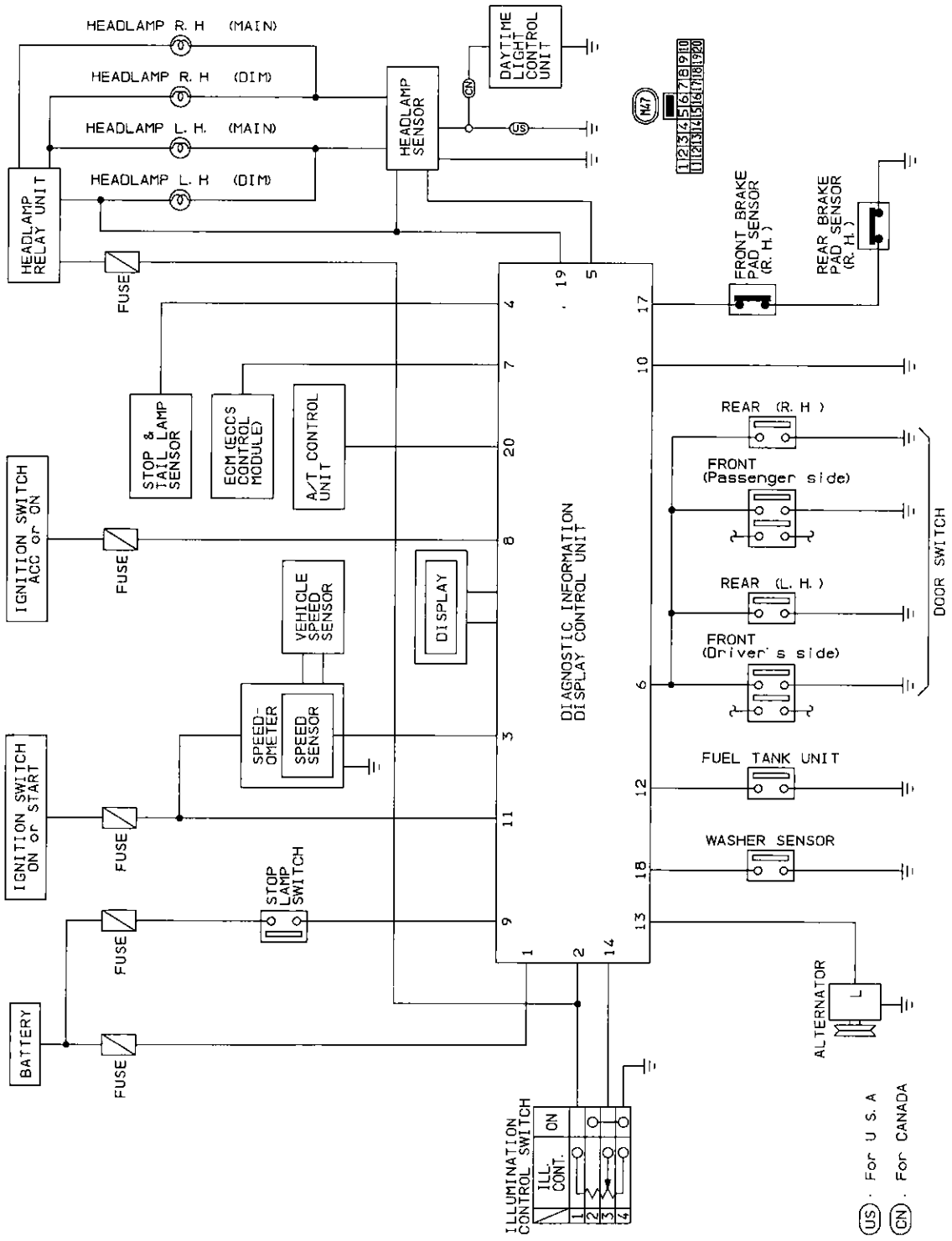
Wiring Diagram (Cont'd)



MEL799B

Trouble Diagnoses

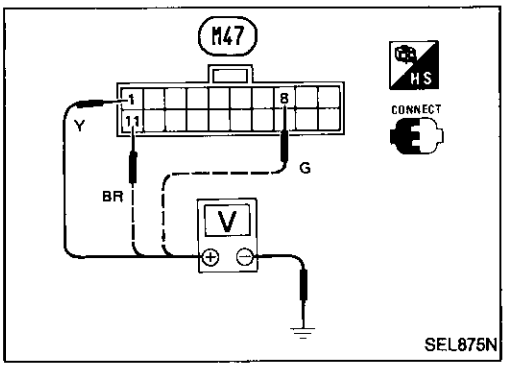
CIRCUIT DIAGRAM FOR QUICK PINPOINT CHECK



MEL800B

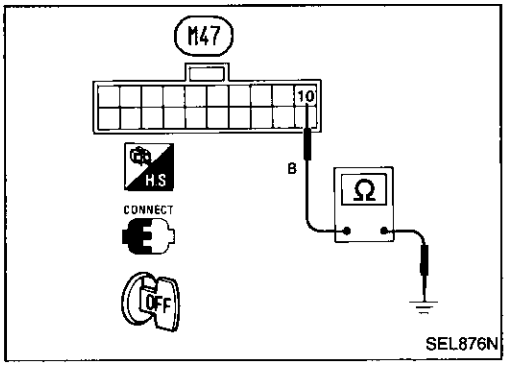
Trouble Diagnoses (Cont'd)

MAIN POWER SUPPLY AND GROUND CIRCUIT CHECK



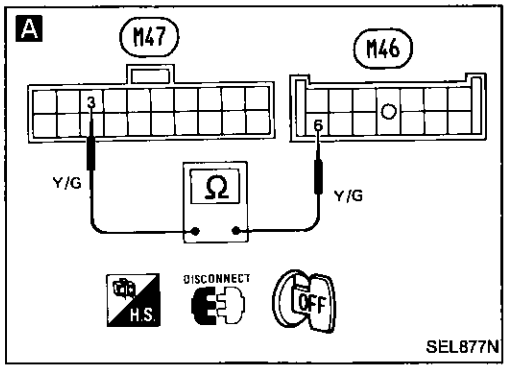
Main power supply

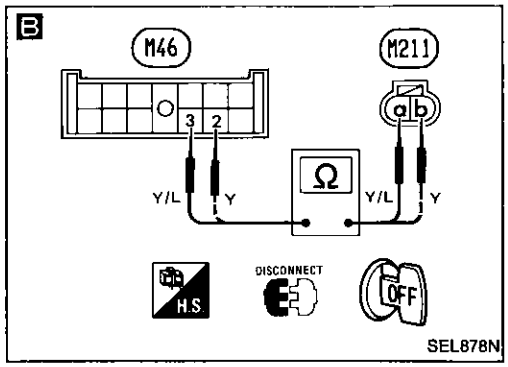
Terminals		Ignition switch		
(+)	(−)	OFF	ACC	ON
①	Ground	Battery voltage	Battery voltage	Battery voltage
⑧	Ground	0V	Battery voltage	Battery voltage
⑪	Ground	0V	0V	Battery voltage



Ground circuit

Terminal	Continuity
⑩ - Ground	Yes





SYMPTOM:
Twin tripmeter does not work. (Remains at "0" or some number and does not accumulate.)

Does speedometer work properly?

N.G. → B

O.K. ↓

A

SPEED SENSOR CIRCUIT CHECK (1)
Check continuity between control unit harness terminal and combination meter terminal.

Terminals		Continuity
Control unit	Combination meter	
③	⑥	Yes

O.K. ↓ Replace control unit.

N.G. → Repair harness or connector.

B

SPEED SENSOR CIRCUIT CHECK (2)
Check continuity between combination meter harness terminals and speed sensor.

Terminals		Continuity
Combination meter	Speed sensor	
③	ⓐ	Yes
②	ⓑ	

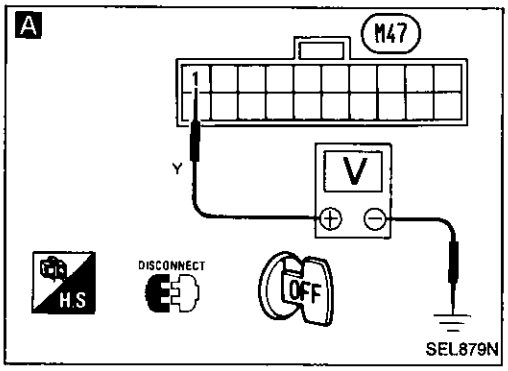
O.K. → Check speed sensor. Refer to "Speed Sensor Signal Check" in "METER AND GAUGES".

O.K. ↓ Repair harness or connector.

N.G. → Replace speed sensor.

N.G. ↓ Repair harness or connector.

Trouble Diagnoses (Cont'd)



SYMPTOM:
Twin trip meter is reset when ignition switch is turned off.

Does clock work properly? — N.G. → Check fuse.

O.K. ↓

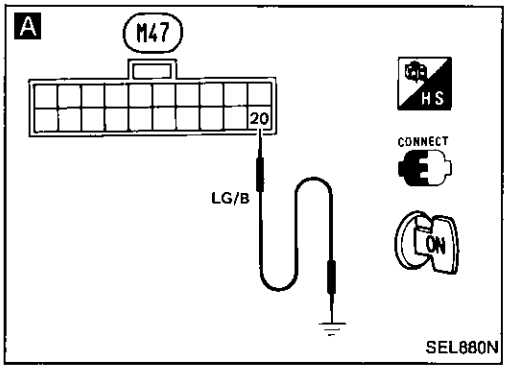
A

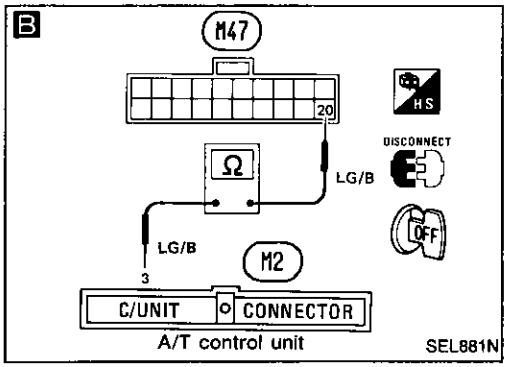
BACK-UP POWER SUPPLY CIRCUIT CHECK
Check voltage between control unit harness terminal ① and body ground.
Battery voltage should exist.

N.G. → Repair harness between control unit and fuse.

O.K. ↓

Replace control unit.





Warning Display: TRANSMISSION MALFUNCTION

A

A/T INPUT SIGNAL CHECK
Connect control unit harness terminal ⑳ and body ground to see if warning display appears.

N.G. → Replace control unit.

O.K. ↓

B

A/T CONTROL CIRCUIT CHECK
Check continuity between harness terminals ⑳ and ③.

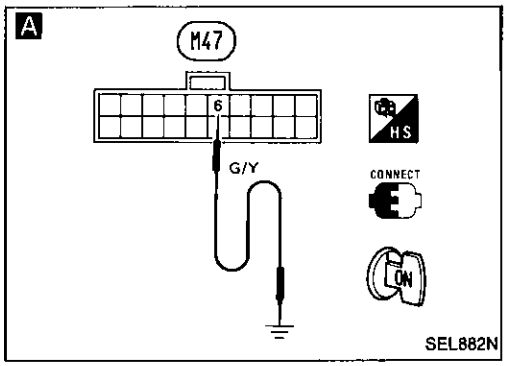
N.G. → Repair harness and connector.

O.K. ↓

Check A/T control unit.
Refer to AT section.

Trouble Diagnoses (Cont'd)

Warning Display: DOOR OPEN



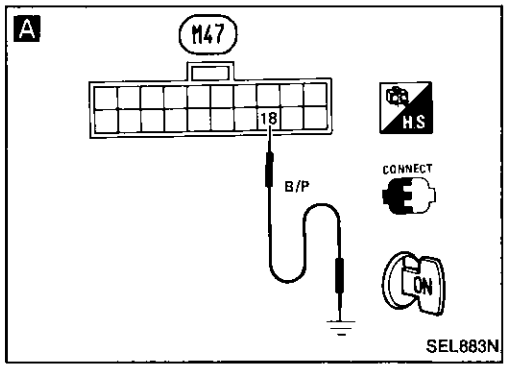
DOOR SWITCH CHECK
Check if interior lamp comes on when at least one of the doors is opened.
N.G. → Replace door switch.
O.K. ↓

A

DOOR SWITCH INPUT SIGNAL CHECK
Connect control unit harness terminal ⑥ and body ground to see if warning display appears.
N.G. → Replace control unit.
O.K. ↓

Repair harness and connector between control unit and door switch.

Warning Display: LOW WASHER



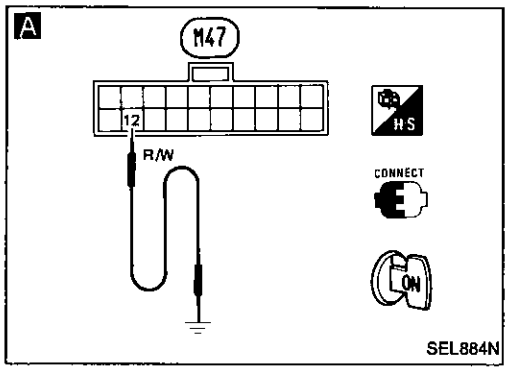
A

WASHER SENSOR INPUT SIGNAL CHECK
Connect control unit harness terminal ⑱ and body ground to see if warning display appears.
N.G. → Replace control unit.
O.K. ↓

WASHER SENSOR CHECK
Check washer sensor.
N.G. → Replace washer sensor.
O.K. ↓

Repair harness and connector.

Trouble Diagnoses (Cont'd)



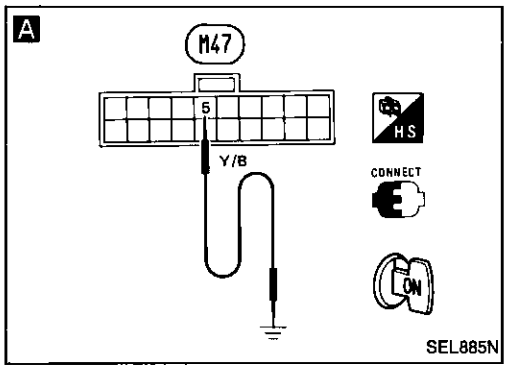
Warning Display: LOW FUEL

A

FUEL SENSOR INPUT SIGNAL CHECK
Connect control unit harness terminal ⑫ and body ground to see if warning display appears.
N.G. → Replace control unit.
O.K. ↓

Check fuel gauge unit.
Refer to" METER AND GAUGES."
N.G. → Replace fuel gauge unit.
O.K. ↓

Repair harness and connector.



Warning Display: HEADLAMP INOPERATIVE

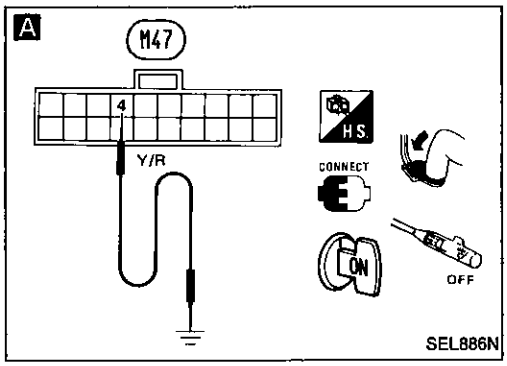
A

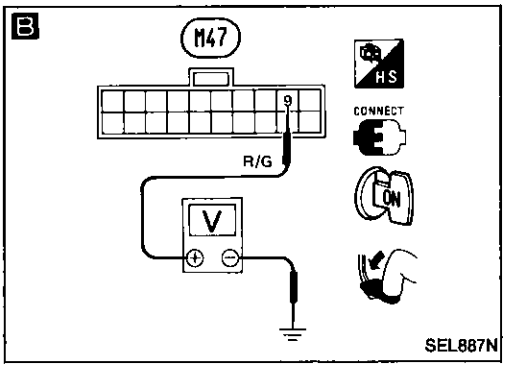
HEADLAMP INPUT SIGNAL CHECK
Connect control unit harness terminal ⑤ and body ground to see if warning display appears.
N.G. → Replace control unit.
O.K. ↓

Check headlamp sensor.
Refer to "HEADLAMP.".
N.G. → Replace headlamp sensor.
O.K. ↓

Repair harness and connector.

Trouble Diagnoses (Cont'd)





Warning Display: STOP LAMP INOPERATIVE

A

STOP LAMP INPUT SIGNAL CHECK
1) Light switch position is OFF.
2) Depress brake pedal.
3) Connect control unit harness terminal ④ and body ground to see if warning display appears.

N.G. → Replace control unit.

O.K. ↓

Check stop & tail lamp sensor.
Refer to "EXTERIOR LAMP".

N.G. → Replace stop & tail lamp sensor.

O.K. ↓

B

STOP LAMP CIRCUIT CHECK
Check if voltage across terminal ⑨ and body ground is battery voltage when brake pedal is depressed.

N.G. → Replace or repair stop lamp switch and harness.

O.K. ↓

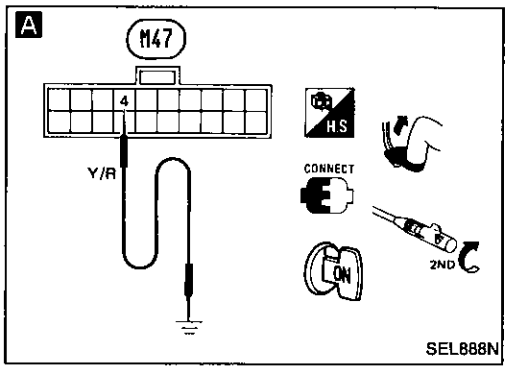
Check headlamp relay or illumination control switch.

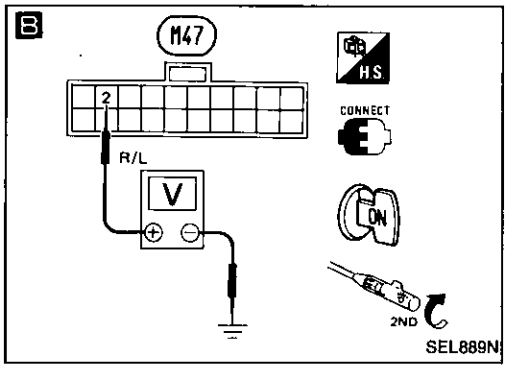
N.G. → Replace headlamp relay or illumination control switch.

O.K. ↓

Repair harness or connector.

Trouble Diagnoses (Cont'd)





Warning Display: TAIL LAMP INOPERATIVE

A

TAIL LAMP INPUT SIGNAL CHECK
1) Turn light switch from OFF to 2ND.
2) Release brake pedal.
3) Connect control unit harness terminal ④ and body ground to see if warning display appears.

N.G. → Replace control unit.

O.K. ↓

Check stop & tail lamp sensor.
Refer to "EXTERIOR LAMP".

N.G. → Replace stop & tail lamp sensor.

O.K. ↓

B

LIGHT SWITCH CIRCUIT CHECK
Check if voltage across terminal ② and body ground is battery voltage when light switch is turned from OFF to 2ND.

N.G. → Check headlamp relay or illumination control switch.

O.K. ↓

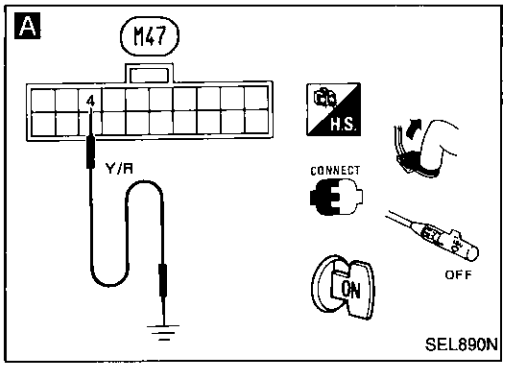
Check stop lamp switch.

N.G. → Replace stop lamp switch.

O.K. ↓

Repair harness or connector.

Trouble Diagnoses (Cont'd)



Warning Display: TAIL/STOP LAMP INOPERATIVE

A

TAIL & STOP LAMP INPUT SIGNAL CHECK
1) Light switch position is OFF.
2) Release brake pedal.
3) Connect control unit harness terminal ④ and body ground to see if warning display appears.

N.G. → Replace control unit.

O.K. ↓

Check stop & tail lamp sensor. Refer to "EXTERIOR LAMP".

N.G. → Replace stop & tail lamp sensor.

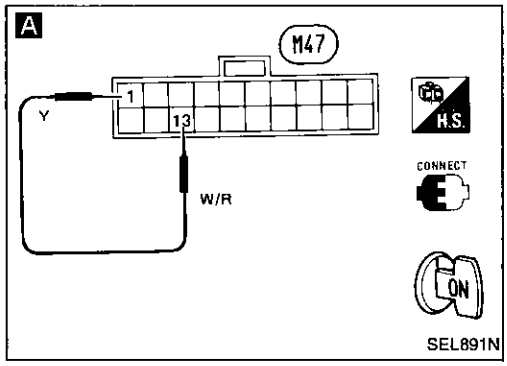
O.K. ↓

Check headlamp relay, illumination control switch or stop lamp switch.

N.G. → Replace headlamp, illumination control switch or stop lamp switch.

O.K. ↓

Repair harness or connector.



Warning Display: LOW BATTERY CHARGE

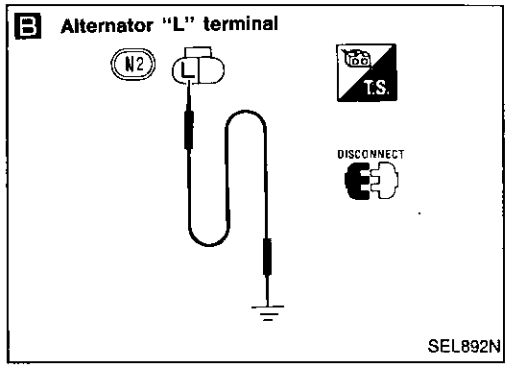
A

ALT. INPUT SIGNAL CHECK
Connect control unit harness terminals ⑬ and ① to see if warning display appears.

N.G. → Replace control unit.

O.K. ↓

B



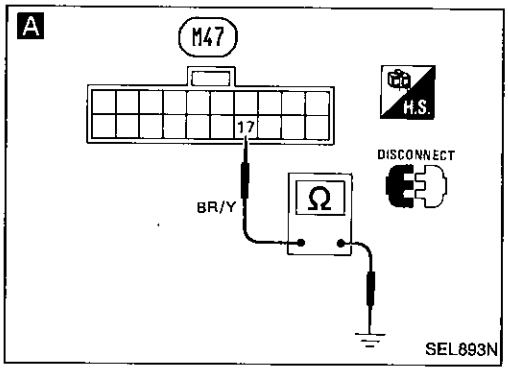
ALT. OUTPUT CHECK
Check if voltage across terminal Ⓛ and body ground is more than 8V when engine is running.

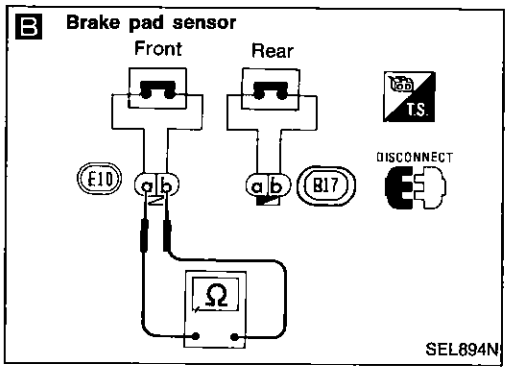
N.G. → Repair or replace alternator.

O.K. ↓

Repair harness and connector between ALT. and control unit.

Trouble Diagnoses (Cont'd)





Warning Display: BRAKE PADS WORN

A

BRAKE PAD SENSOR
Check continuity between control unit harness terminal ⑰ and body ground.
Continuity exists ... O.K.

O.K. → Replace control unit.

N.G. ↓

B

BRAKE PAD SENSOR CHECK
Check continuity between terminals ⓐ and ⓑ.
Continuity exists ... O.K.

N.G. → Replace brake pad sensor.

O.K. ↓

Repair harness or connector.

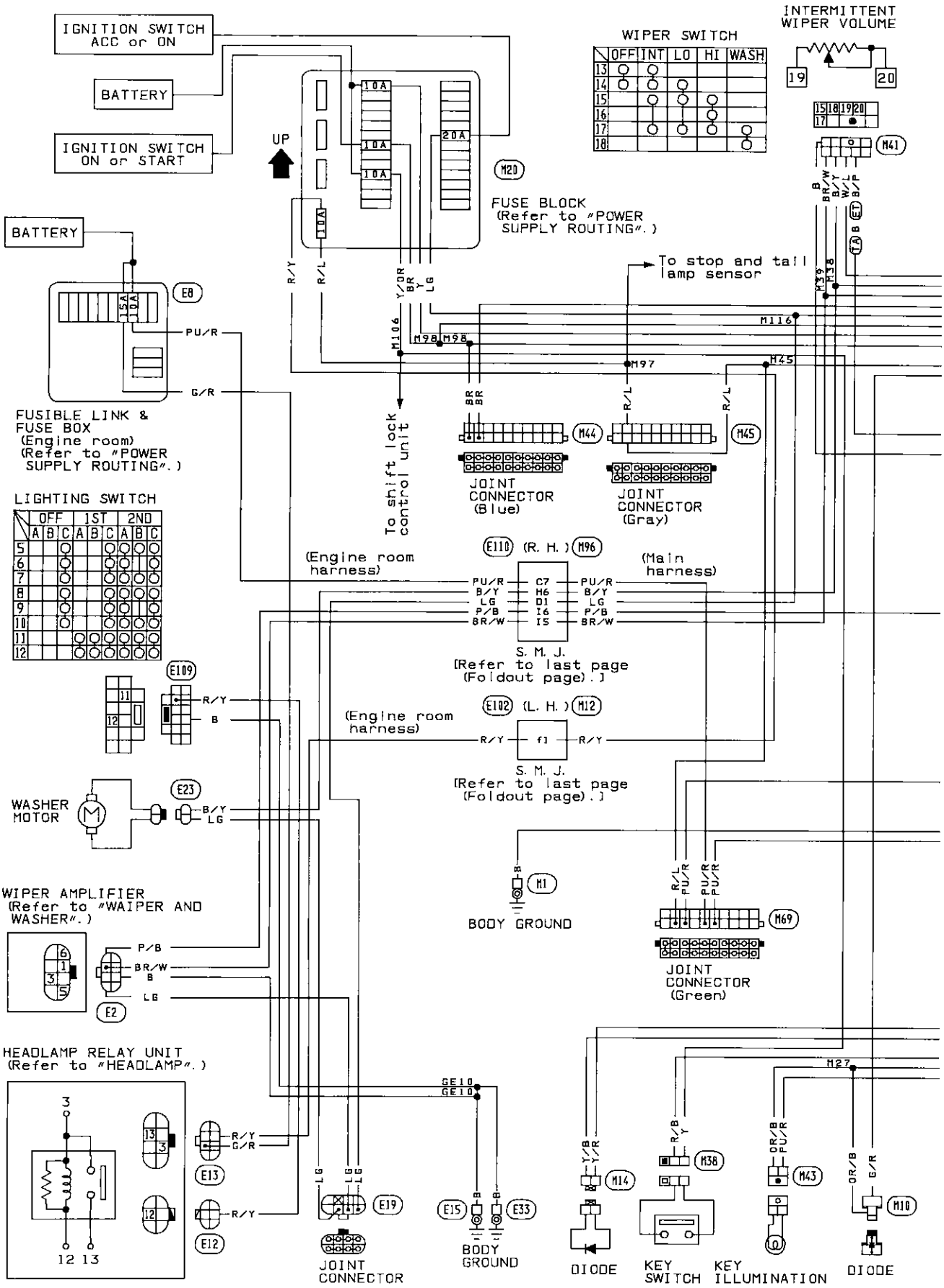
Description

FUNCTION

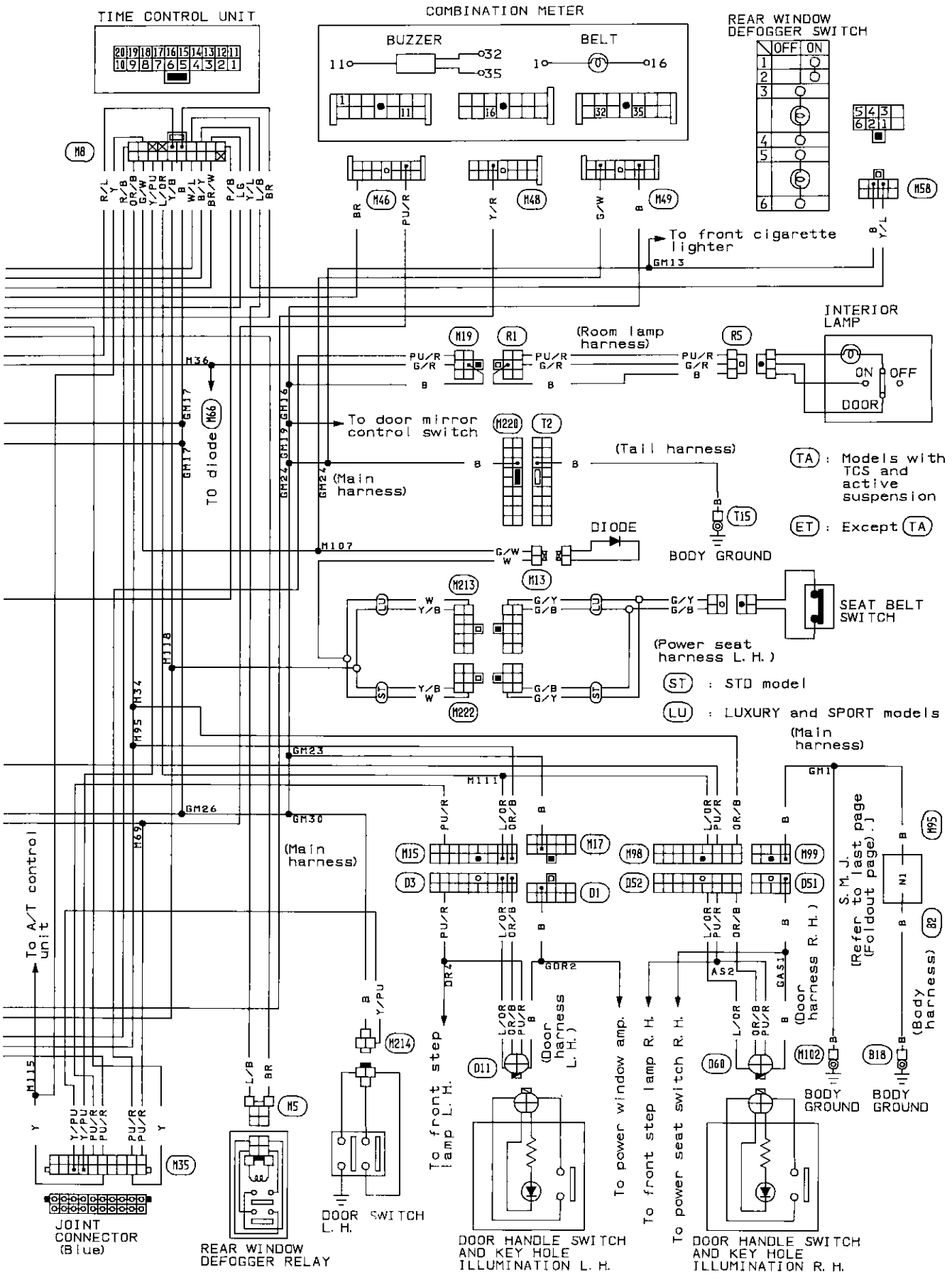
- Time control unit has the following functions.

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.

Wiring Diagram



Wiring Diagram (Cont'd)



Trouble Diagnoses

SYMPTOM CHART

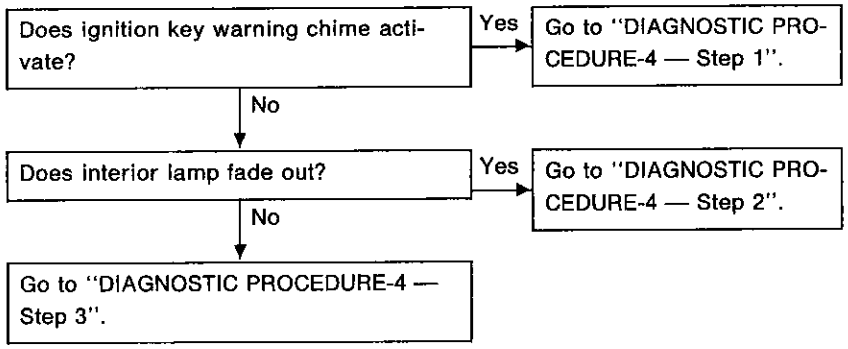
PROCEDURE		Preliminary Check			Main Power Supply and Ground Circuit Check	Diagnostic Procedure									
REFERENCE PAGE		EL-65	EL-65	EL-65	EL-67	EL-67	EL-68	EL-68	EL-69	EL-70	EL-71	EL-72	EL-72	EL-73	EL-73
SYMPTOM		Procedure 1	Procedure 2	Procedure 3	Main power supply and Ground circuit	Diagnostic Procedure 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

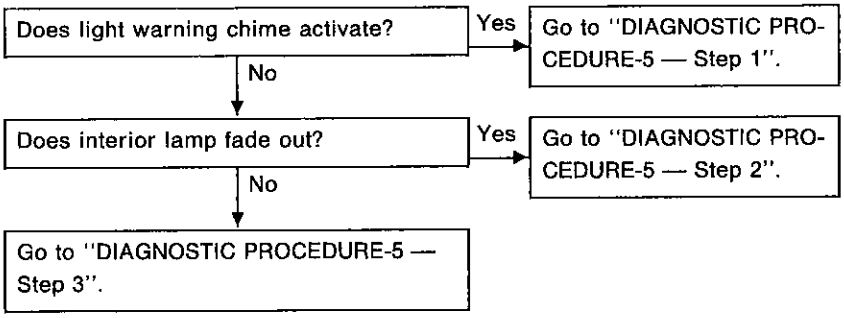
Procedure 1

- Light warning chime does not activate.



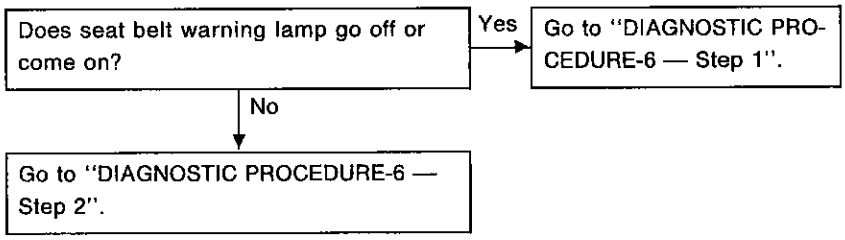
Procedure 2

- Ignition key warning chime dose not activate.



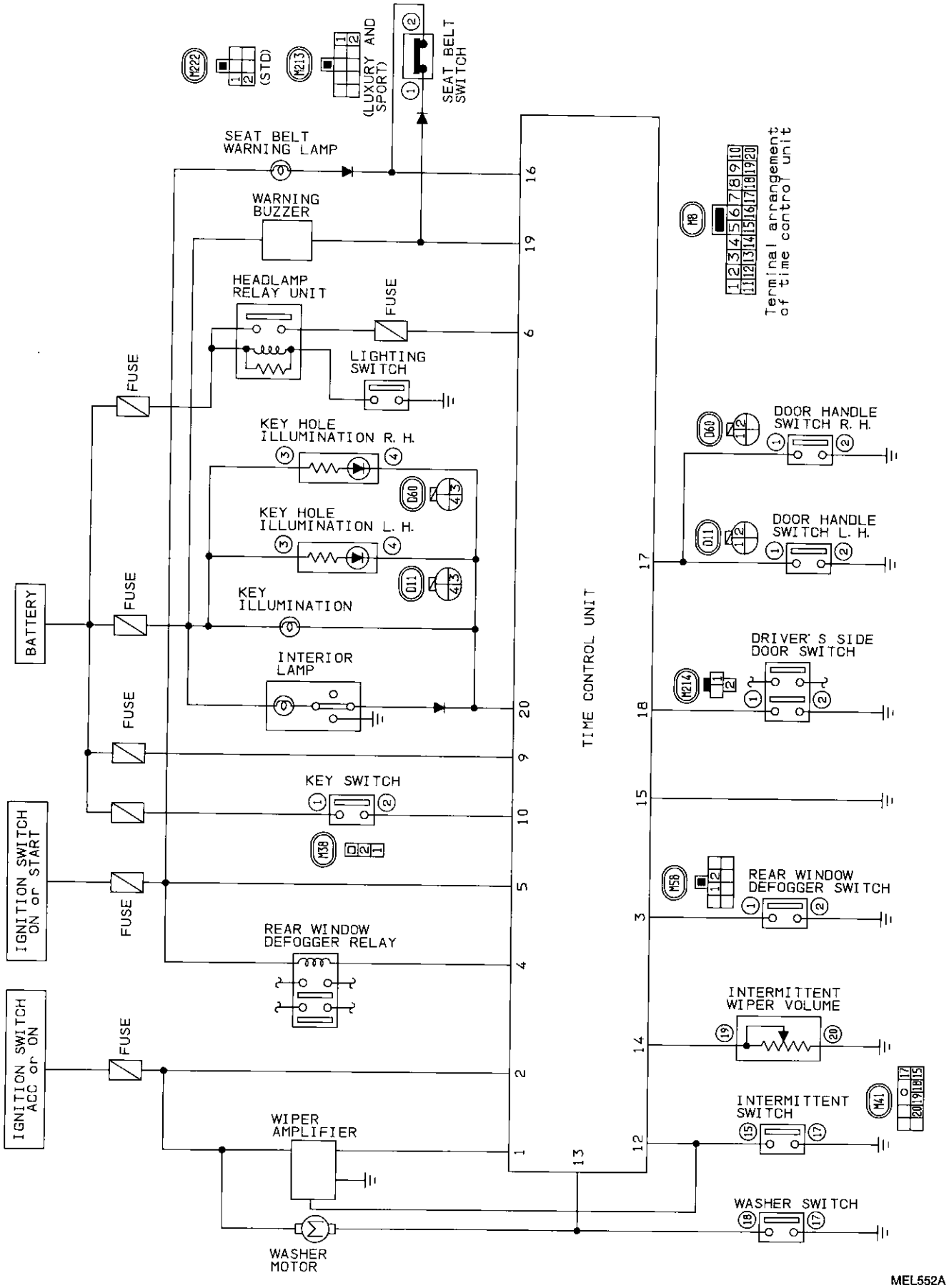
Procedure 3

- Seat belt warning chime does not activate.



Trouble Diagnoses (Cont'd)

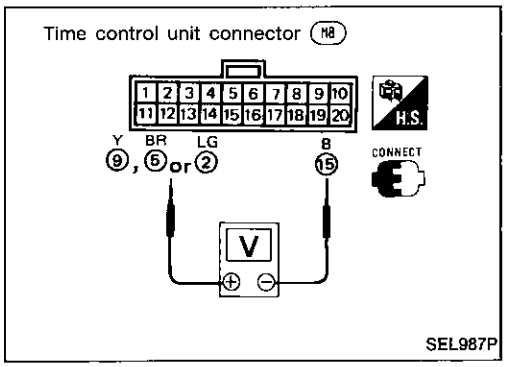
CIRCUIT DIAGRAM FOR QUICK PINPOINT CHECK



MEL552A

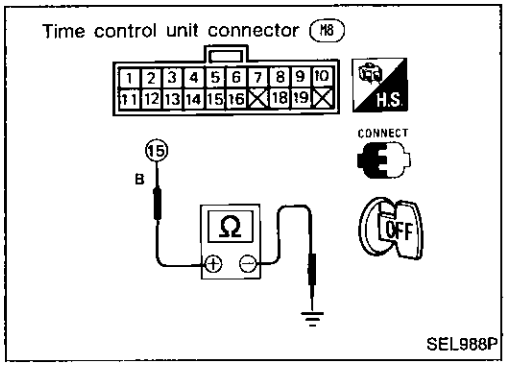
Trouble Diagnoses (Cont'd)

MAIN POWER SUPPLY AND GROUND CIRCUIT CHECK



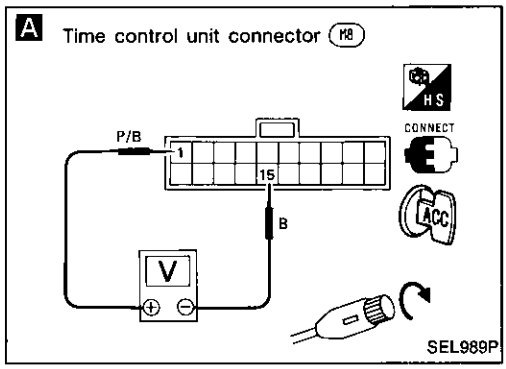
Main power supply

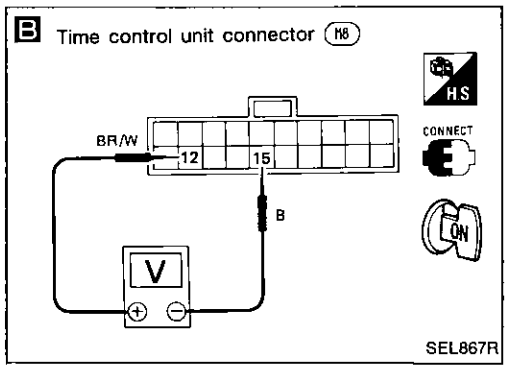
Terminals	Battery voltage existence condition		
	Ignition switch position		
	OFF	ACC	ON
⑨ - ⑮	Yes	Yes	Yes
⑤ - ⑮	No	No	Yes
② - ⑮	No	Yes	Yes



Ground circuit

Terminals	Continuity
⑮ - Ground	Yes





DIAGNOSTIC PROCEDURE 1

SYMPTOM: Intermittent wiper does not operate.

A

WIPER RELAY OUTPUT SIGNAL CHECK
1) Turn ignition switch to "ACC".
2) Turn wiper switch to "INT" or "OFF".
3) Measure voltage between control unit harness terminals ① and ⑮.

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 voltage between control unit harness terminals ⑫ and ⑮.

Condition of wiper switch	Voltage [V]
OFF	Approx. 12
INT	0

N.G. → Check wiper switch. Check harness continuity between T.C.U. and wiper switch.

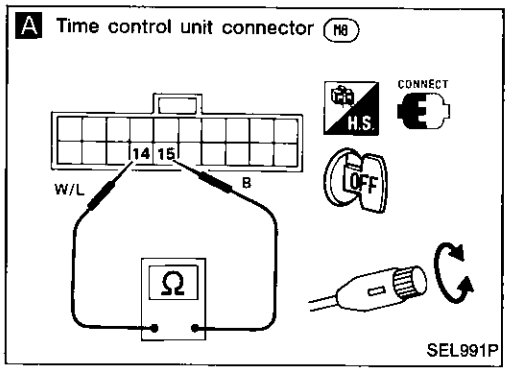
O.K. ↓

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 control unit harness terminals ⑭ and ⑮ while turning intermittent wiper volume.

Position of wiper knob	Resistance [Ω]
S	0
L	Approx. 1 k

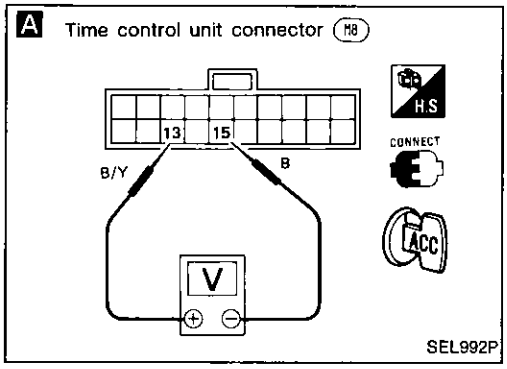
O.K. → Replace control unit.

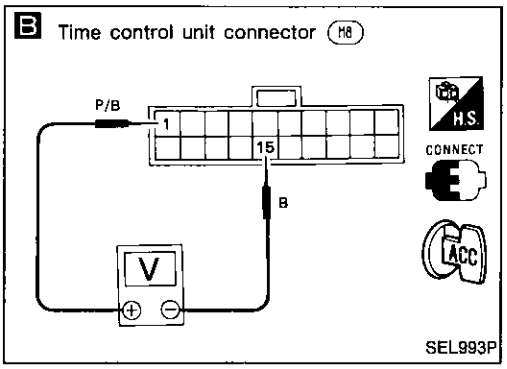
N.G. →

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 control unit harness terminals ⑬ and ⑮.

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

Measure voltage between control unit harness terminals ① and ⑮ after operating washer switch.

0V for approx. 3 seconds after washer has operated.

N.G. → Replace control unit.

O.K. ↓

Replace wiper relay.

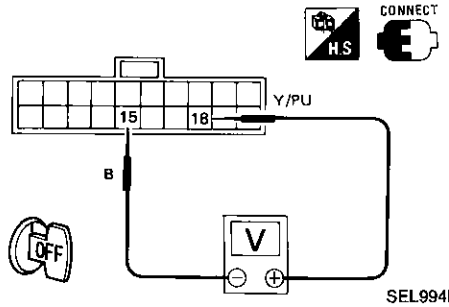
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 4

SYMPTOM: Light warning chime does not activate.

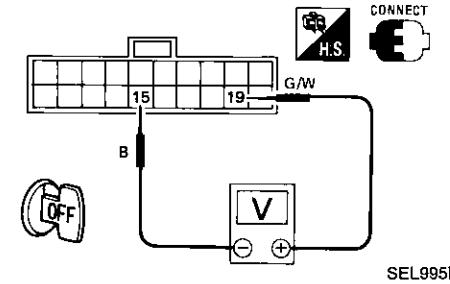
- Perform "PRELIMINARY CHECK — Procedure 1" before referring to the following flow chart.

A Time control unit connector (M8)



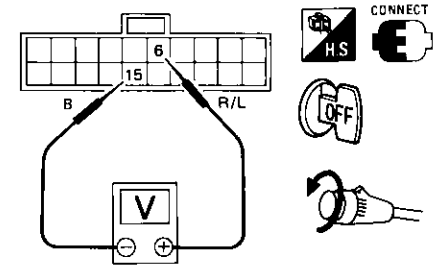
SEL994P

B Time control unit connector (M8)



SEL995P

C Time control unit connector (M8)



SEL996P

A Step 3

DOOR SWITCH INPUT SIGNAL CHECK
Measure voltage between control unit harness terminals ⑱ and ⑮.

Condition of driver's door	Voltage [V]
Door is closed	Approx. 12
Door is open	0

N.G. → Check door switch. Check harness continuity between T.C.U. and door switch.

O.K. ↓

B Step 2

CHIME OUTPUT SIGNAL CHECK
Measure voltage between control unit harness terminals ⑲ and ⑮.

Condition of driver's door	Voltage [V]
Door is closed	Approx. 12
Door is open	Pointer deflects intermittently

O.K. → Check chime. Check harness continuity between T.C.U. and chime.

N.G. ↓

C Step 1

LIGHT SWITCH INPUT SIGNAL CHECK
Measure voltage between control unit harness terminals ⑥ and ⑮.

Condition	Voltage [V]
Light switch is ON	Approx. 12
Light switch is OFF	0

N.G. → Check light switch. Check harness continuity between T.C.U. and light switch.

O.K. ↓

Replace control unit.

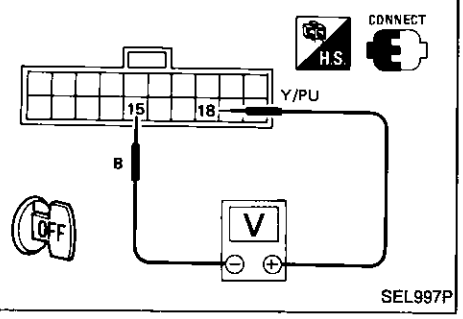
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 5

SYMPTOM: Ignition key warning chime does not activate.

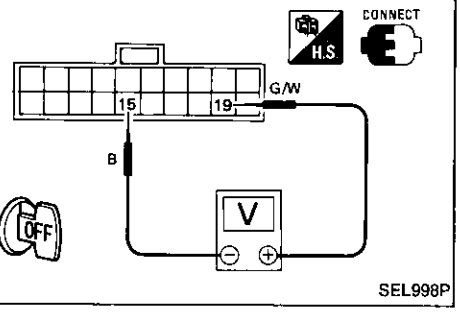
- Perform "PRELIMINARY CHECK — Procedure 2" before referring to the following flow chart.

A Time control unit connector (M8)



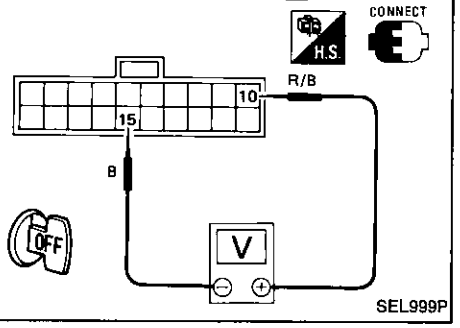
SEL997P

B Time control unit connector (M8)



SEL998P

C Time control unit connector (M8)



SEL999P

A

Step 3

DOOR SWITCH INPUT SIGNAL CHECK
Measure voltage between control unit harness terminals ⑱ and ⑮.

Condition of driver's door	Voltage [V]
Door is closed	Approx. 12
Door is open	0

N.G. → Check door switch. Check harness continuity between T.C.U. and door switch.

O.K.

B

Step 2

CHIME OUTPUT SIGNAL CHECK
Measure voltage between control unit harness between ⑲ and ⑮.

Condition of driver's door	Voltage [V]
Door is closed	Approx. 12
Door is open	Pointer deflects intermittently

O.K. → Check chime. Check harness continuity between T.C.U. and chime.

N.G.

C

Step 1

IGNITION KEY SWITCH INPUT SIGNAL CHECK
Measure voltage between control unit harness terminals ⑯ and ⑮.

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.

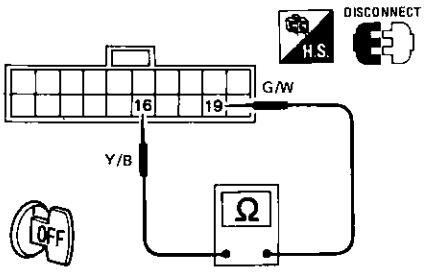
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 6

SYMPTOM: Seat belt warning chime does not activate.

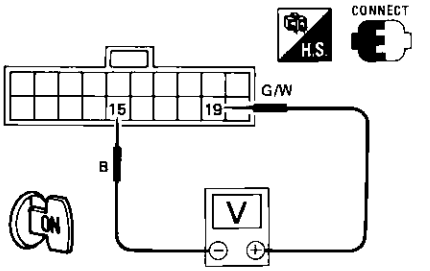
- Perform "PRELIMINARY CHECK — Procedure 3" before referring to the following flow chart.

A Time control unit connector (M8)



SEL001Q

B Time control unit connector (M8)



SEL002Q

A

Step 2

SEAT BELT SWITCH INPUT SIGNAL CHECK

Check continuity between control unit harness terminals ⑯ and ⑲.

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 OUTPUT SIGNAL CHECK

1) Connect T.C.U. harness connector.
2) Turn ignition switch "ON".
3) Measure voltage between control unit harness terminals ⑲ and ⑮.

Condition of seat belt	Voltage [V]
Unfastened	Pointer deflects intermittently
Fastened	Approx. 12

O.K. → Check chime. Check harness continuity between T.C.U. and chime.

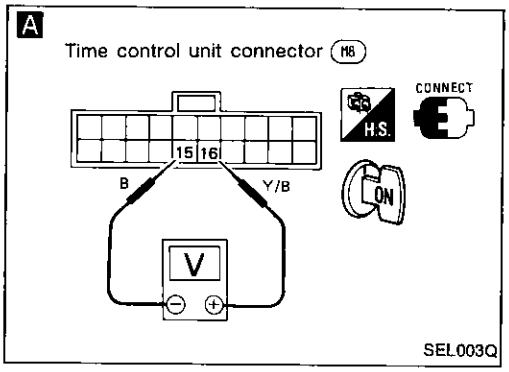
N.G. ↓

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

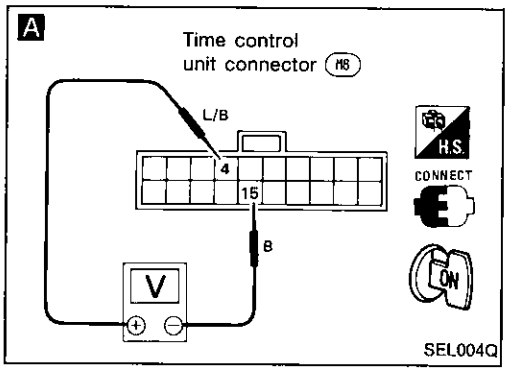
WARNING LAMP OUTPUT SIGNAL CHECK
1) Connect T.C.U. harness connector.
2) Turn ignition switch "ON", after connecting control unit harness terminals ⑯ and ⑮.
3) Does voltmeter needle keep swinging for about 7 seconds after ignition switch has been turned "ON"?

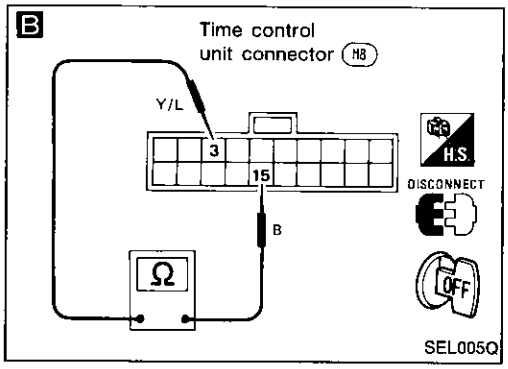
Yes → Check warning lamp. Check harness continuity between T.C.U. and warning lamp.

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 control unit harness ④ and ⑮.

Condition of defogger switch	Voltage [V]
Defogger switch is "OFF"	Approx. 12
Defogger switch is "ON"	0

O.K. → Check rear window defogger relay. Check rear window defogger circuit.

N.G. →

B

REAR WINDOW DEFOGGER SWITCH INPUT SIGNAL CHECK
1) Disconnect T.C.U. harness connector.
2) Check continuity between control unit harness terminals ③ and ⑮.

Condition of defogger switch	Continuity
Defogger switch is "OFF"	No
Defogger switch is "ON"	Yes

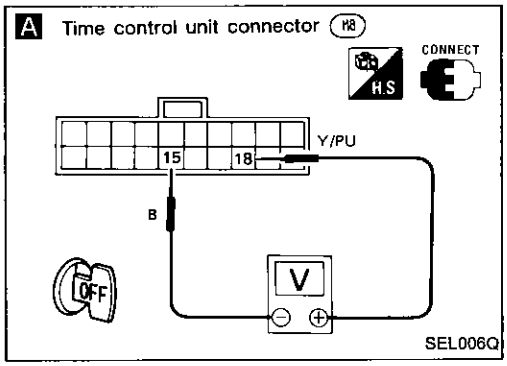
N.G. → Check rear window defogger switch. Check harness continuity between T.C.U. and rear window defogger switch.

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.



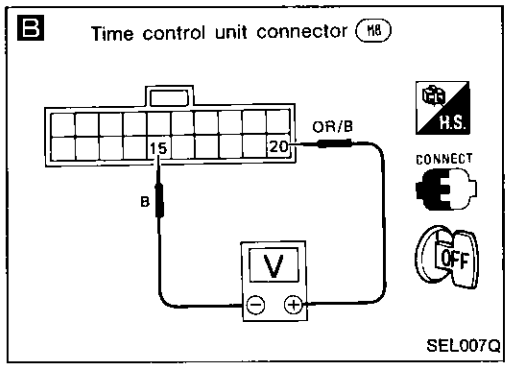
A

DOOR SWITCH INPUT SIGNAL CHECK
Measure voltage between control unit harness terminals ⑱ and ⑮.

Condition of driver's door	Voltage [V]
Door is closed	Approx. 12
Door is open	0

N.G. → Check door switch. Check harness continuity between T.C.U. and door switch.

O.K. ↓



B

INTERIOR LAMP SIGNAL CHECK
Measure voltage between control unit harness terminals ⑳ and ⑮.

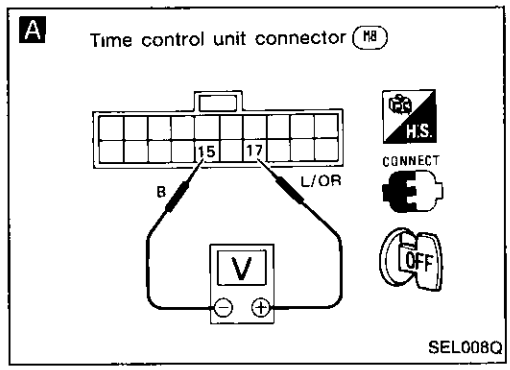
Condition of driver's door	Voltage [V]
Door is closed	0 → Approx. 12
Door is open	0

O.K. → Check interior lamp and harness between T.C.U. and interior lamp.

N.G. → Replace T.C.U.

DIAGNOSTIC PROCEDURE 10

SYMPTOM: Door key hole illumination does not come on even if door handle is pulled.



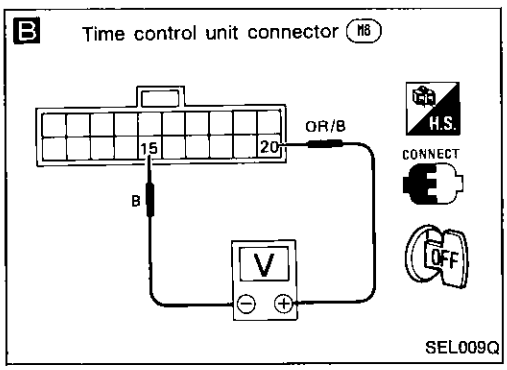
A

DOOR SWITCH INPUT SIGNAL CHECK
Measure voltage between control unit harness terminals ⑰ and ⑮.

Condition of driver's handle	Voltage [V]
Handle is pulled	0
Handle is released	Approx. 12

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 voltage between control unit harness terminals ⑳ and ⑮.

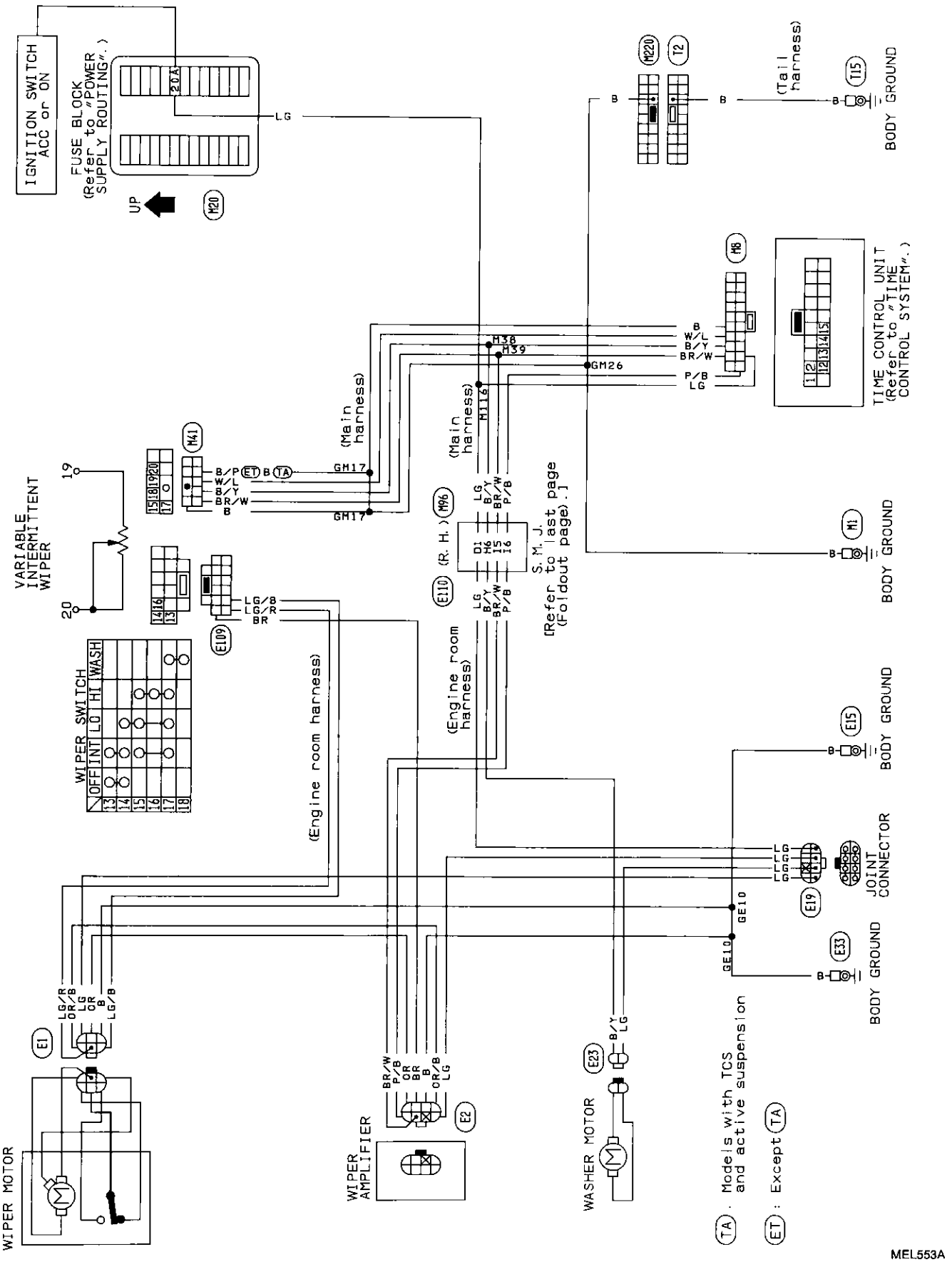
Condition of driver's door	Voltage [V]
Door is closed	0 → Approx. 12
Door is open	0

O.K. → Check key hole illumination and harness between T.C.U. and key hole illumination.

N.G. ↓

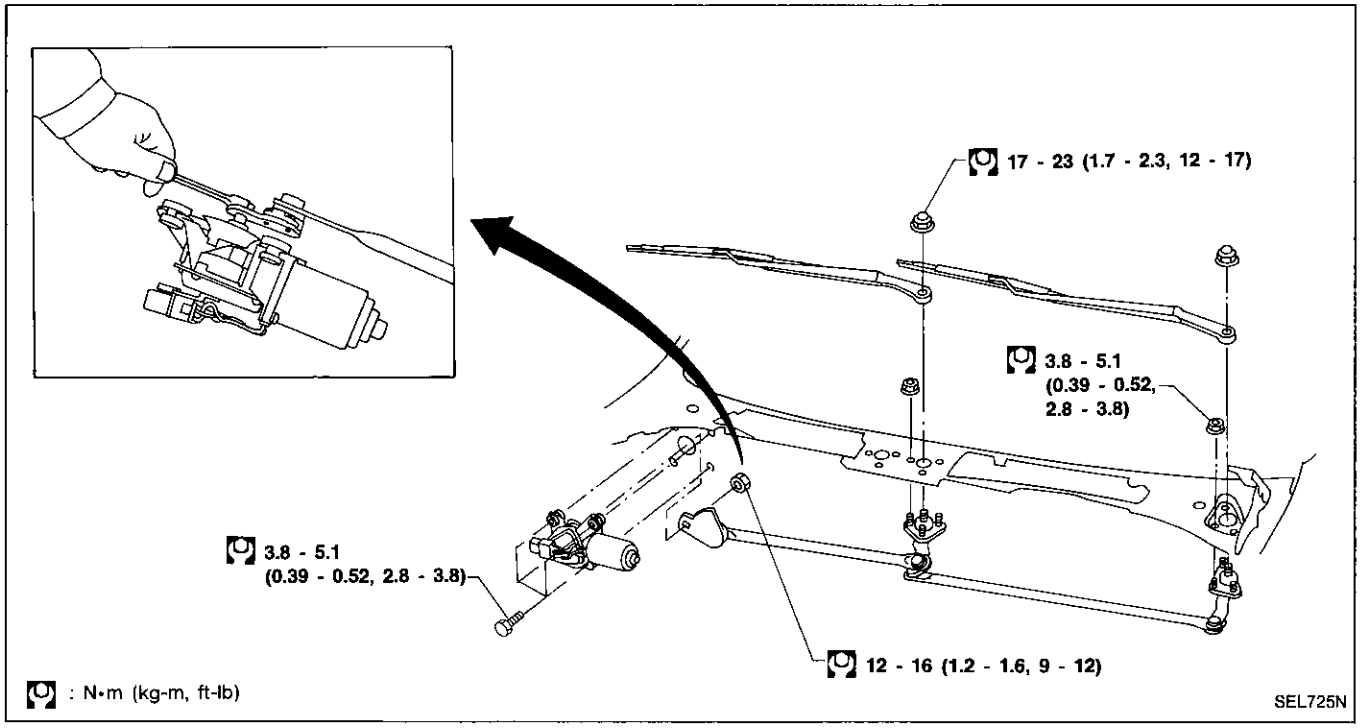
Replace T.C.U.

Front Wiper and Washer/Wiring Diagram



Wiper Removal and Installation

Before removing front wiper motor link, turn wiper switch OFF and disconnect motor leads at connectors.



Wiper Arm Installation

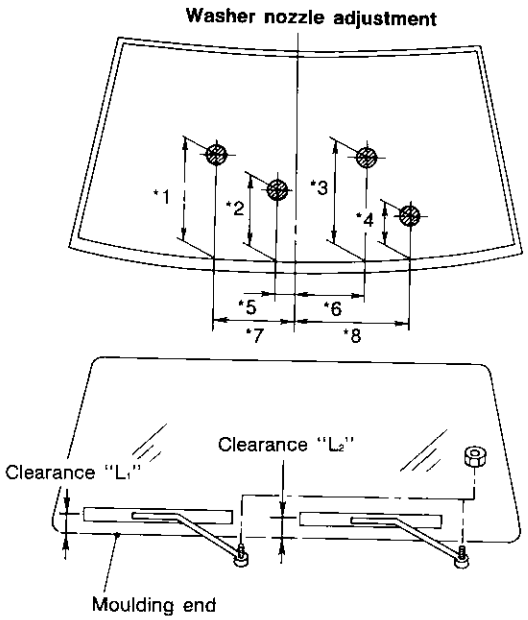
1. Prior to wiper arm installation, turn on wiper switch to operate wiper motor and then turn it "OFF" (Auto Stop).
2. Lift the blade up and then set it down onto glass surface to set the blade center to clearance "L_1" or "L_2" immediately before tightening nut.
3. Eject washer fluid. Turn on wiper 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": 0 - 10 mm (0 - 0.39 in)
   Clearance "L_2": 0 - 10 mm (0 - 0.39 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)

- **Before reinstalling wiper arm, clean up the pivot area. This will reduce possibility of wiper arm looseness.**

Wiper Arm Installation (Cont'd)

Windshield wiper and washer

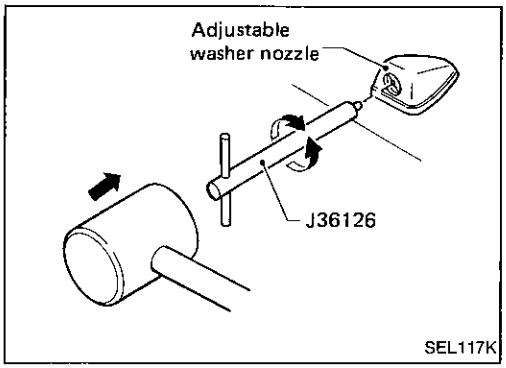


*1: 490 (19.29)
*2: 235 (9.25)
*3: 475 (18.70)
*4: 290 (11.42)
*5: 150 (5.91)
*6: 160 (6.30)
*7: 285 (11.22)
*8: 520 (20.47)

Unit: mm (in)

All the diameters of these circles are less than 80 (3.15).

SEL709N

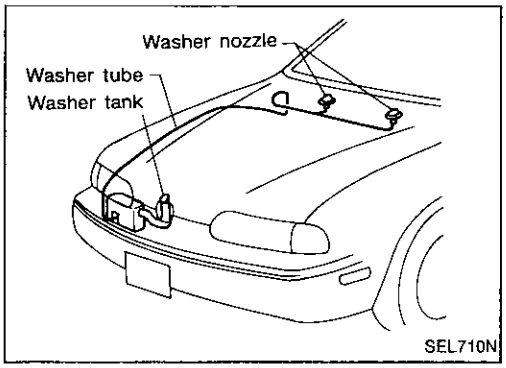


SEL117K

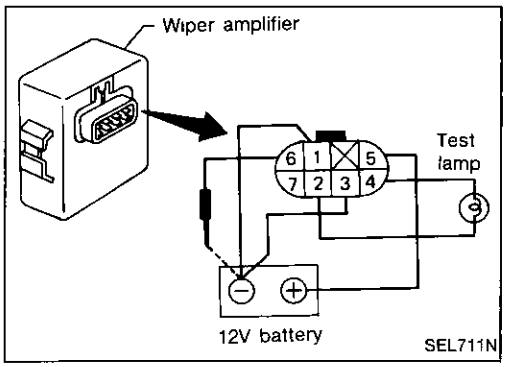
Washer Nozzle Adjustment

- Using washer nozzle adjusting tool (Tool number: J36126), adjust windshield washer nozzle to correct its spray pattern.

Before attempting to turn the nozzle, gently tap the end of Tool to free the nozzle.
This will prevent "rounding out" the small female square in the center of the nozzle.



SEL710N

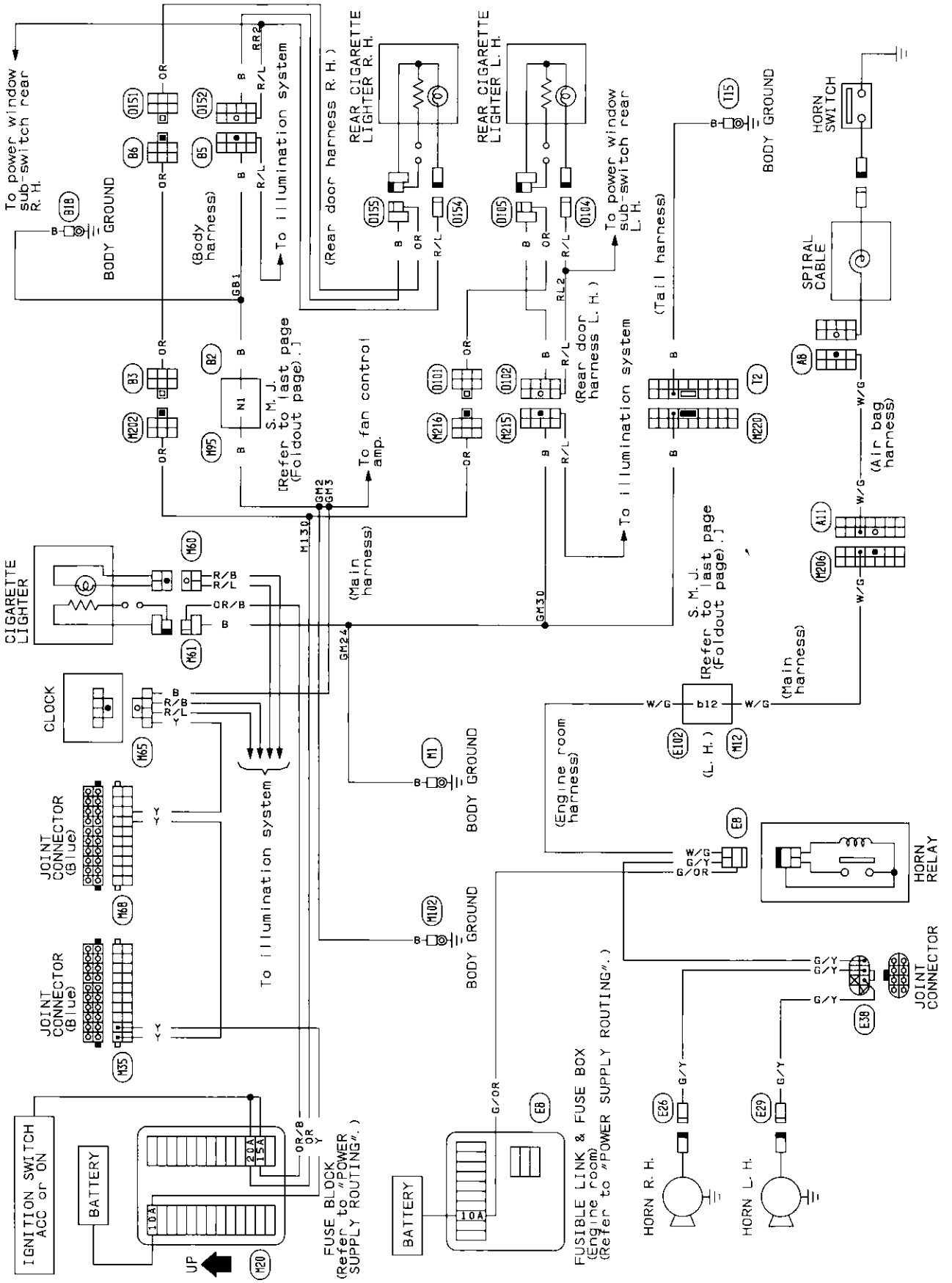


SEL711N

Wiper Amplifier Check

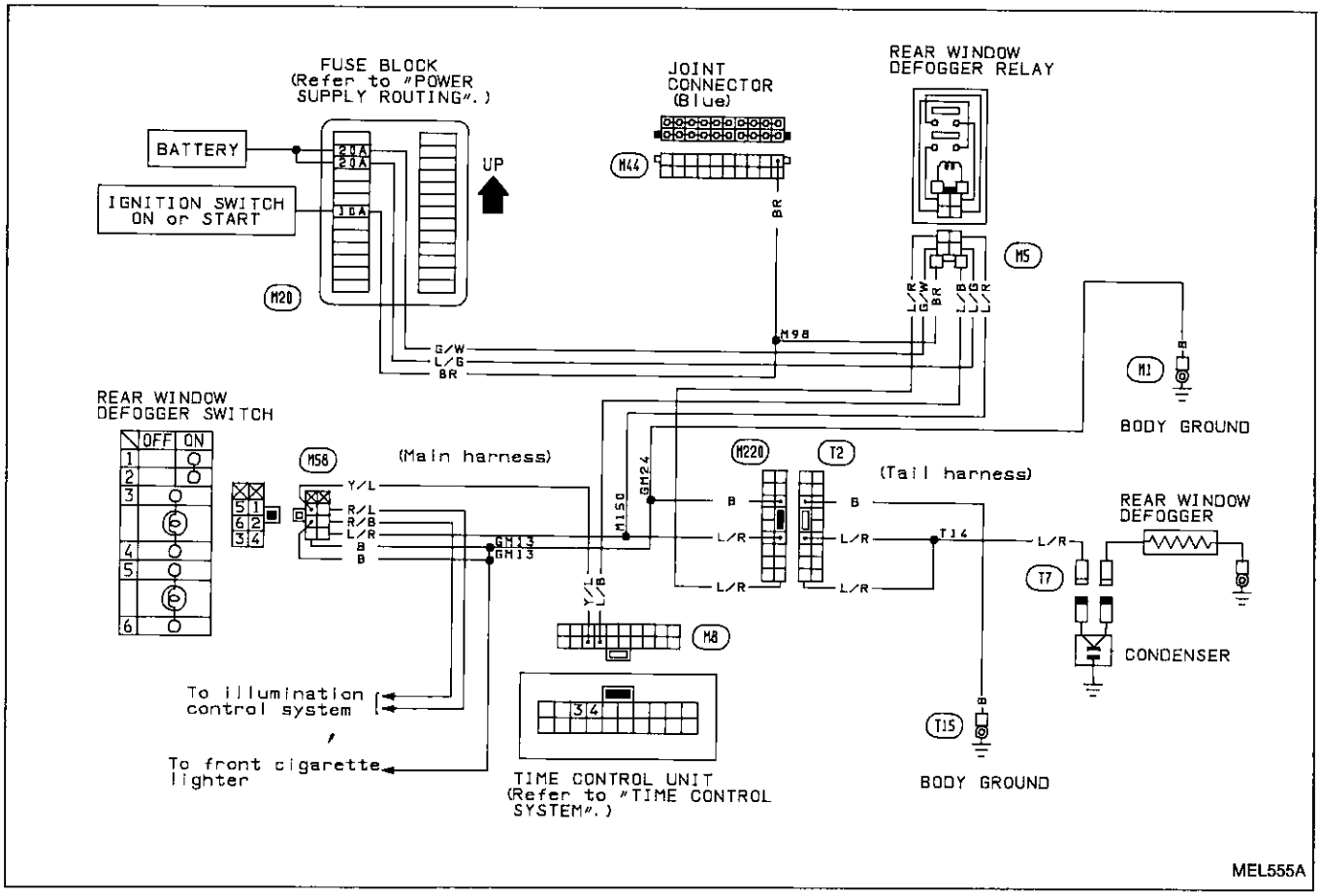
1. Connect as shown in the figure to the left.
2. If test lamp comes on when connect to terminal ⑥ and battery ground, wiper amplifier is normal.

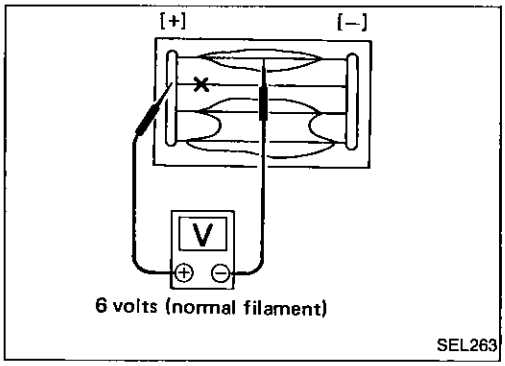
Wiring Diagram



MEL554A

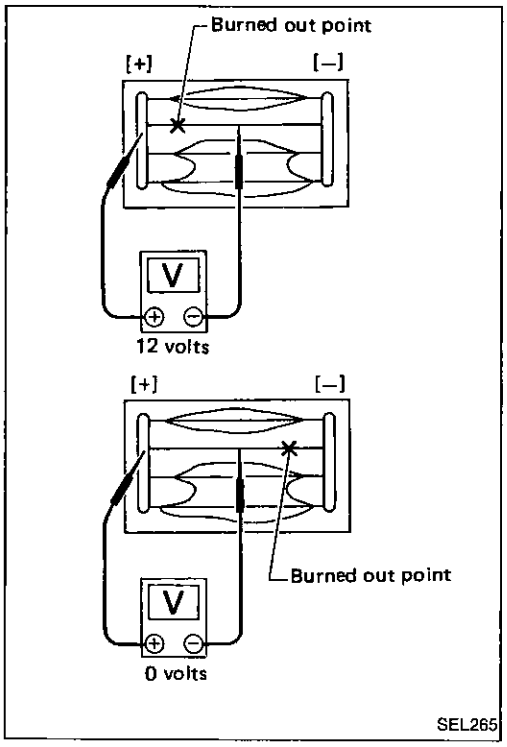
Wiring Diagram



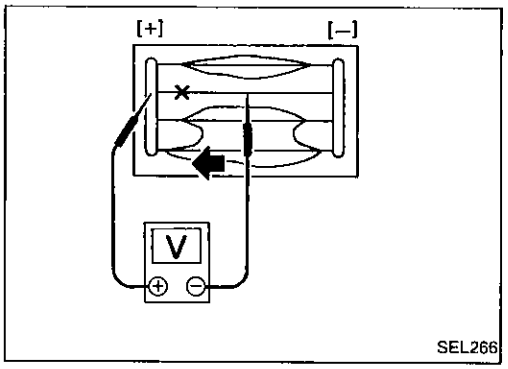


Filament Check

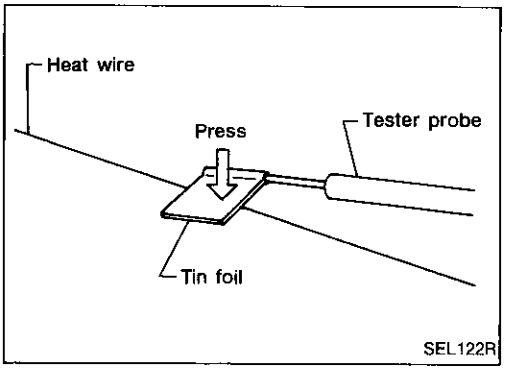
1. Attach probe circuit tester (in volt range) to middle portion of each filament.



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.

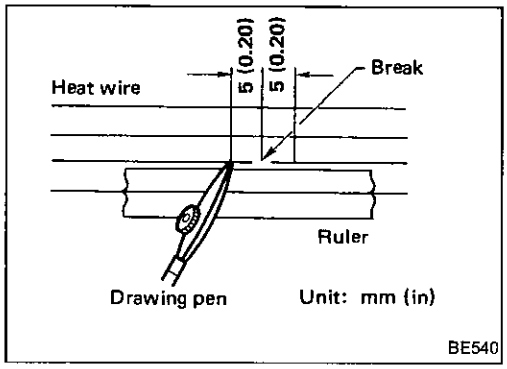


- **When measuring voltage, wind a piece of tin foil around the top of the negative probe and press the foil against the wire with your finger as shown.**

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

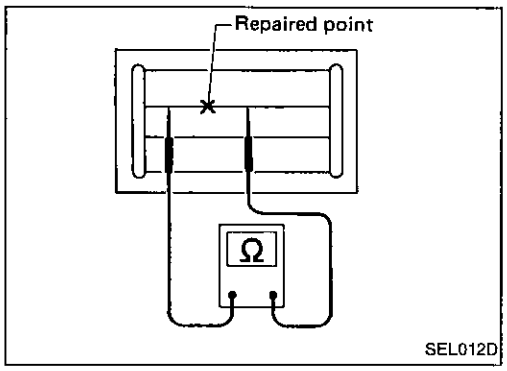


REPAIRING PROCEDURE

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.

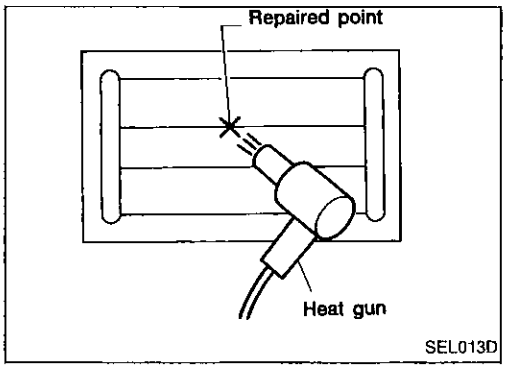
Shake silver composition container before use.

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.

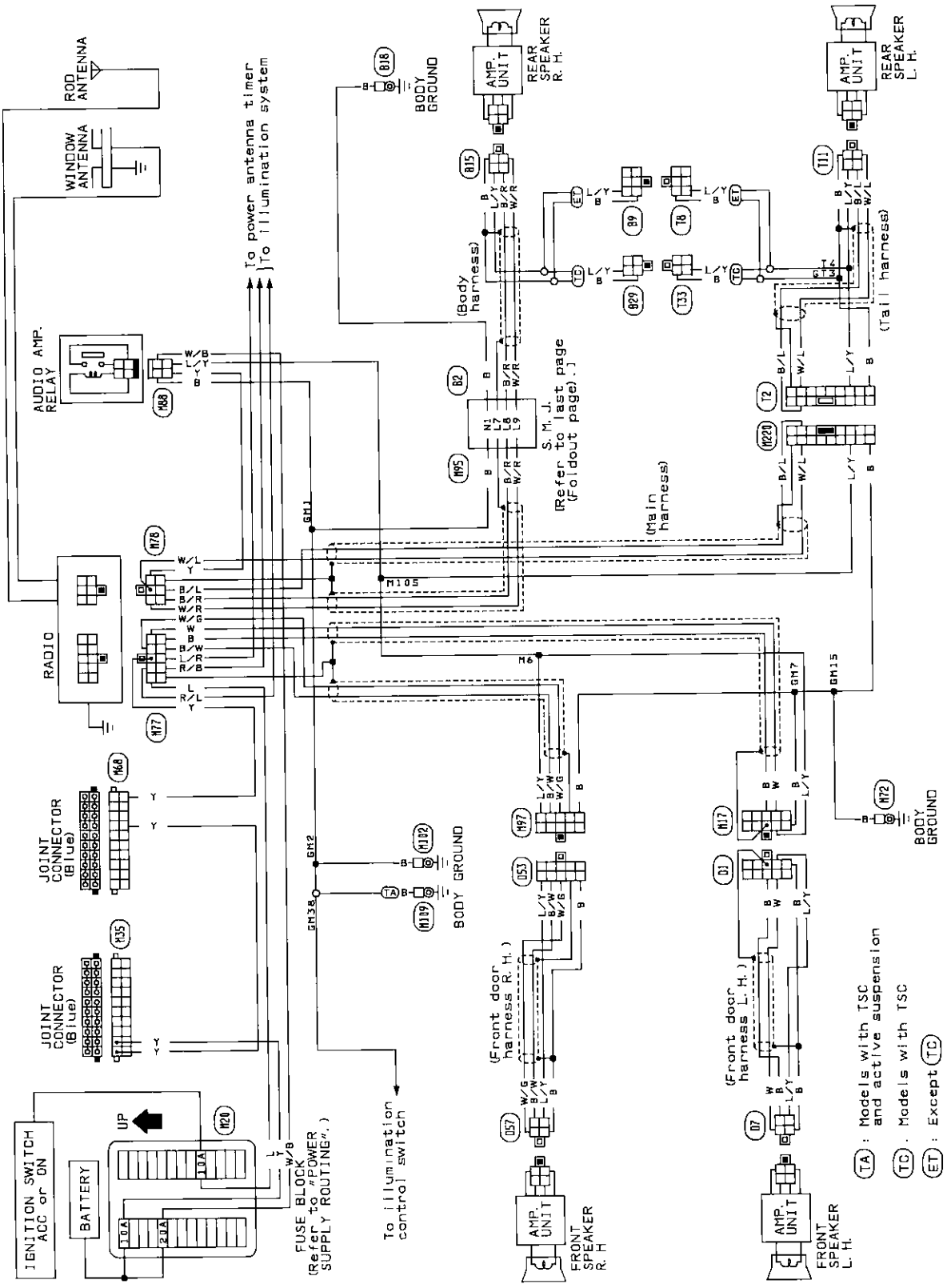
Do not touch repaired area while test is being conducted.



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

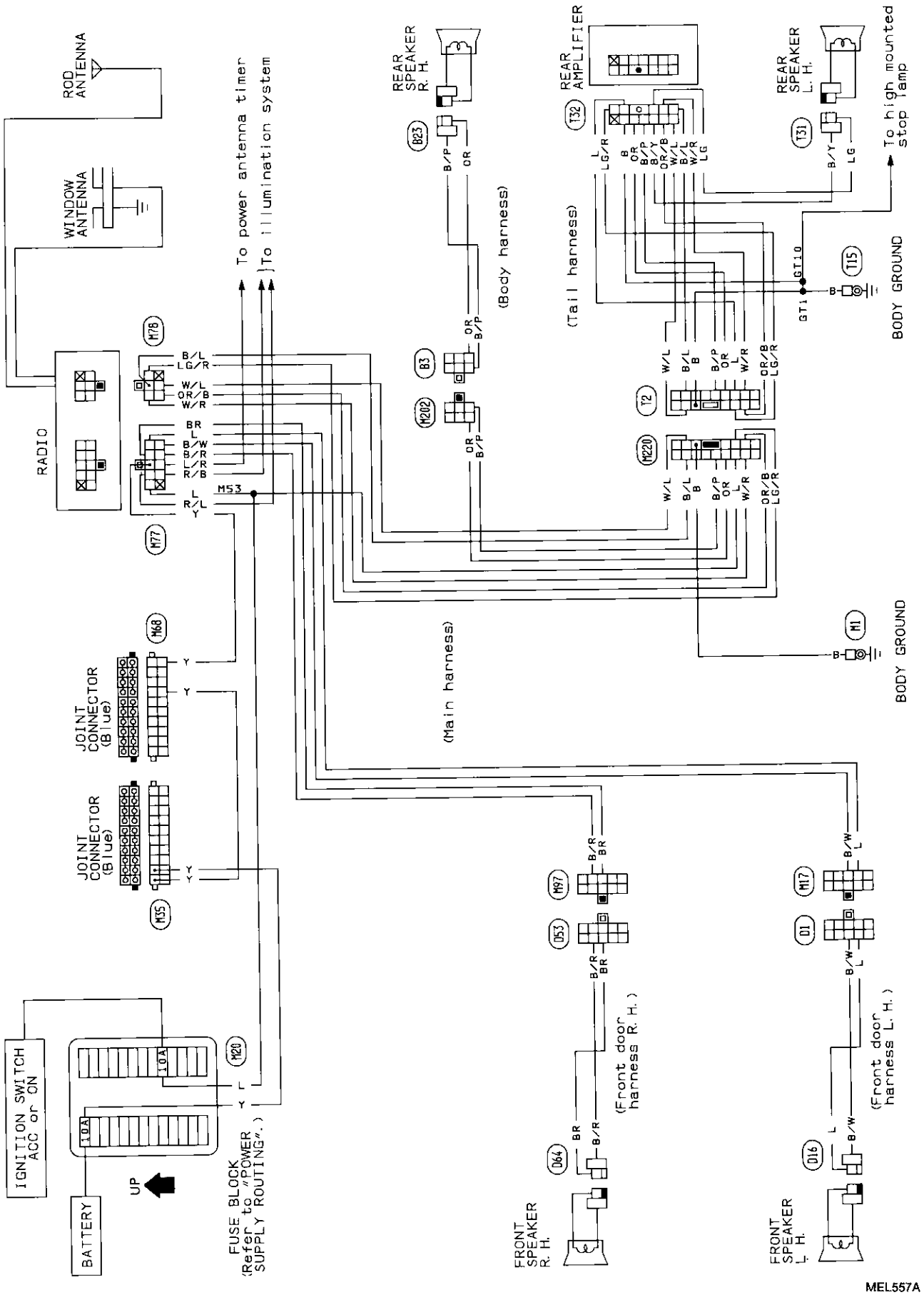
BOSE SYSTEM



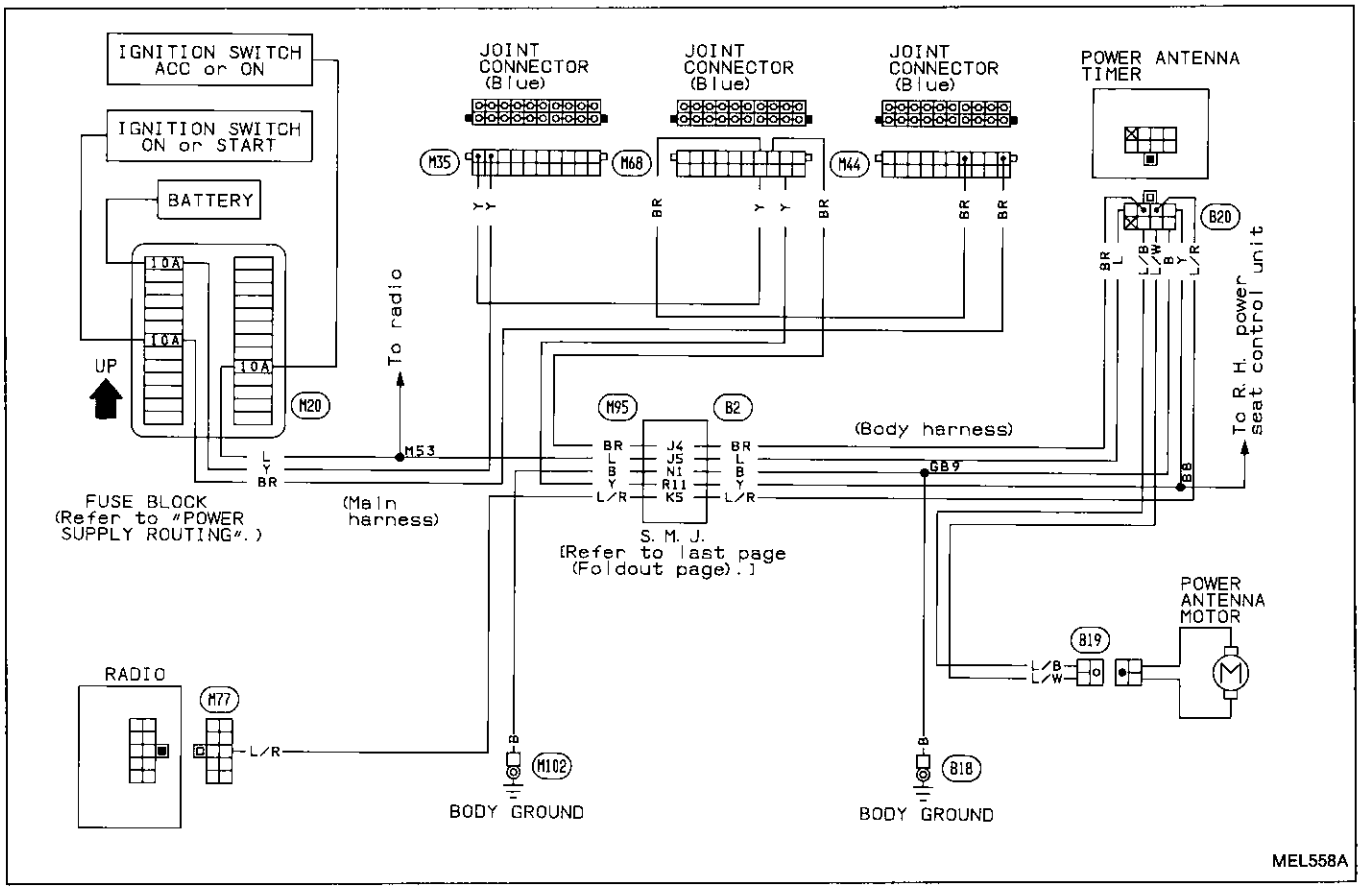
MEL099B

Audio/Wiring Diagram (Cont'd)

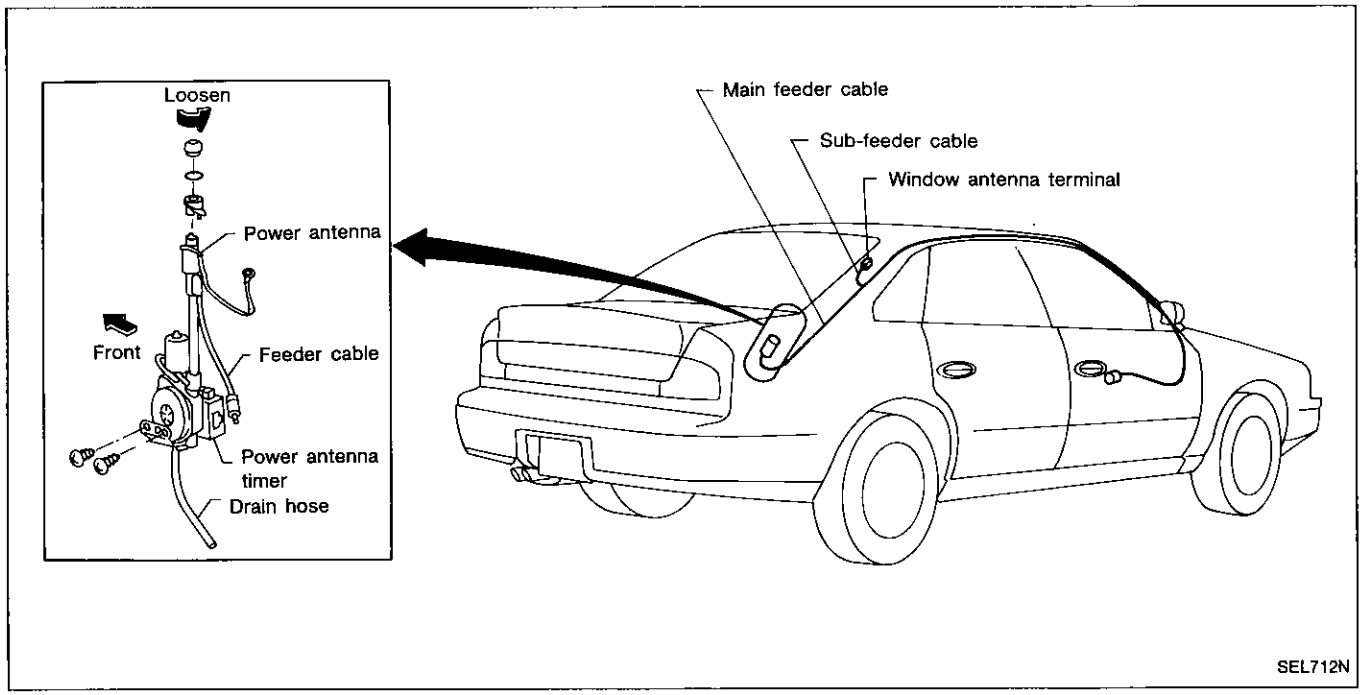
EXCEPT BOSE SYSTEM

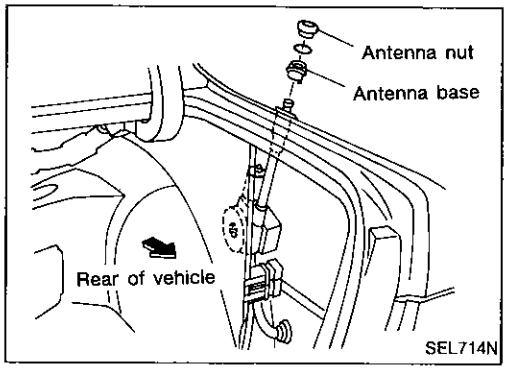


Power Antenna/Wiring Diagram



Location of Antenna

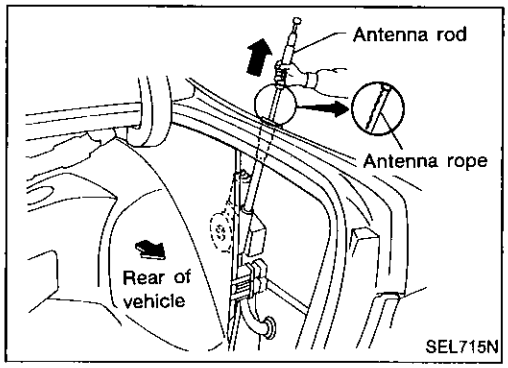




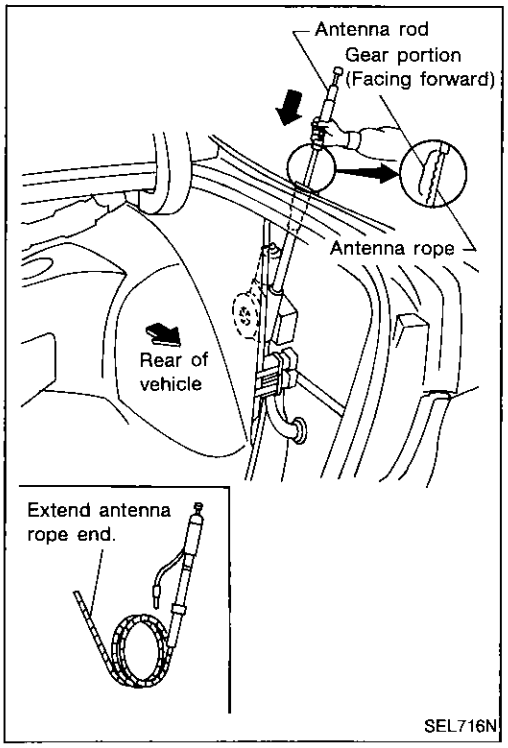
Antenna Rod Replacement

REMOVAL

1. Remove antenna nut and antenna base.

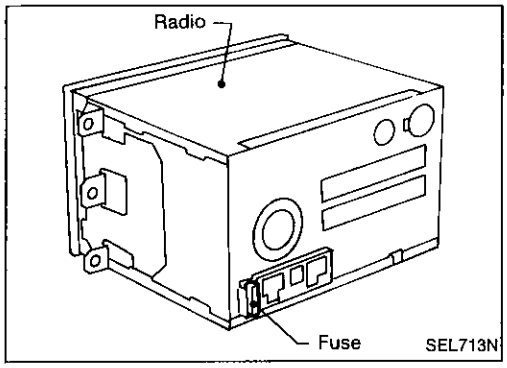


2. Withdraw antenna rod while raising it by operating antenna motor.

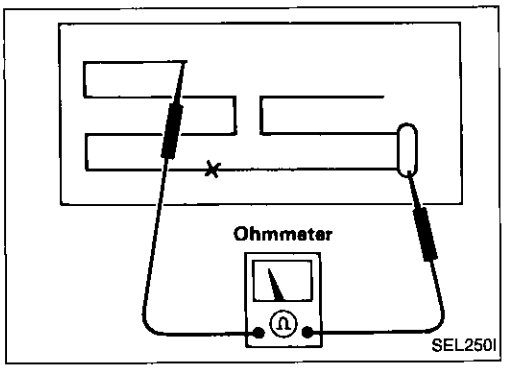


INSTALLATION

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.



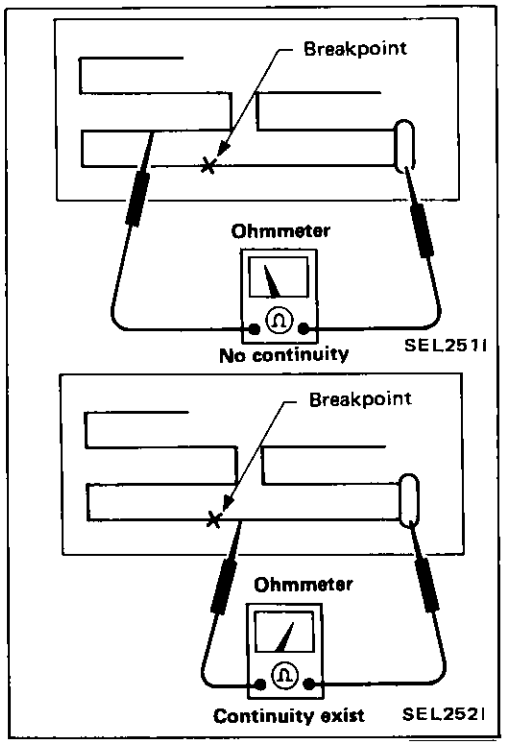
Radio Fuse Check



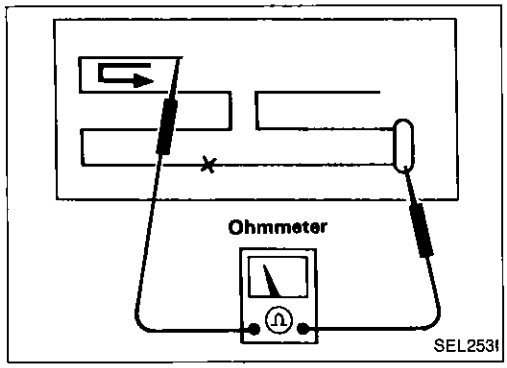
Window Antenna Repair

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.

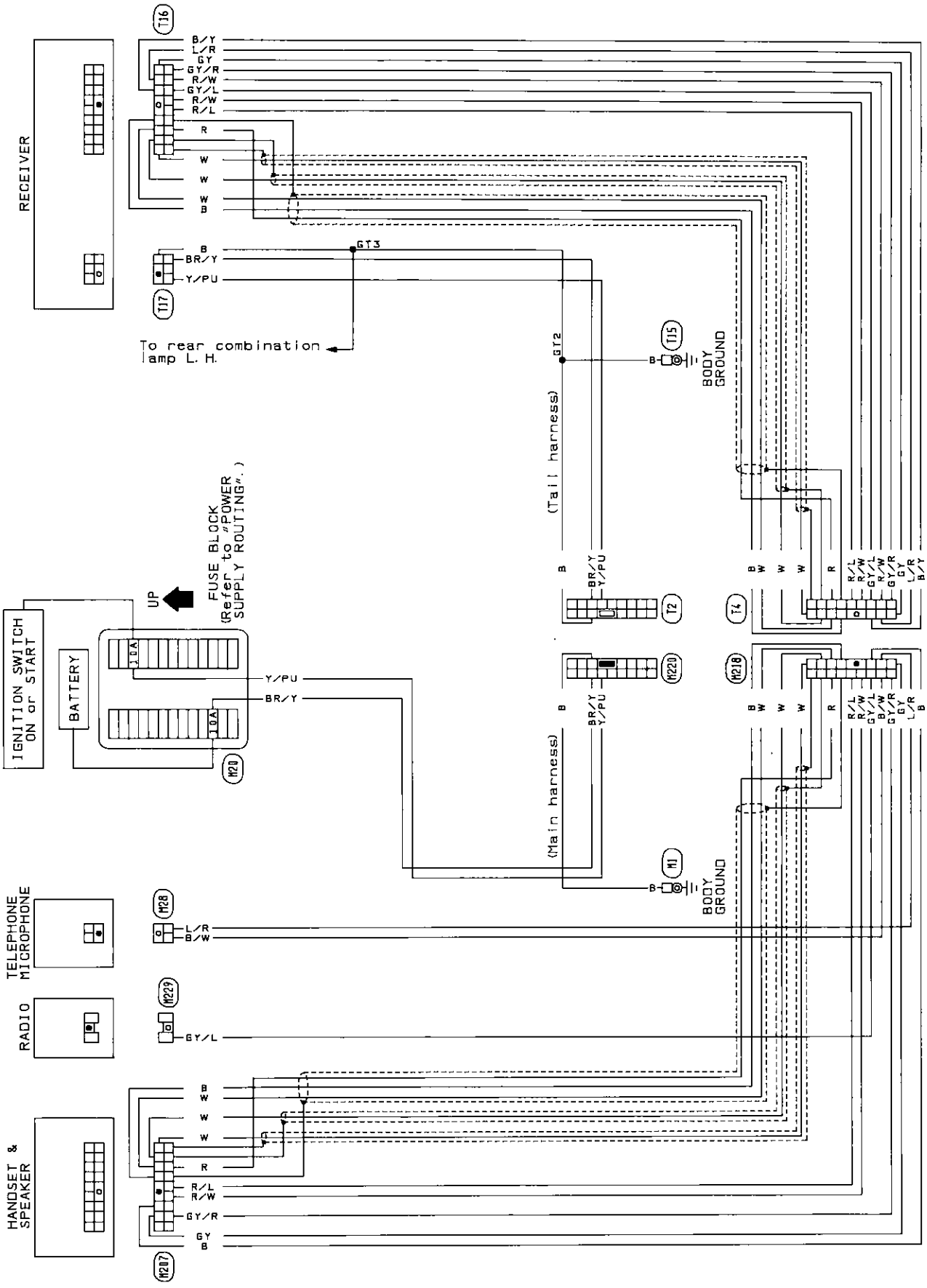


3. To locate broken point, move probe to left and right along element to determine point where tester needle swings abruptly.

ELEMENT REPAIR

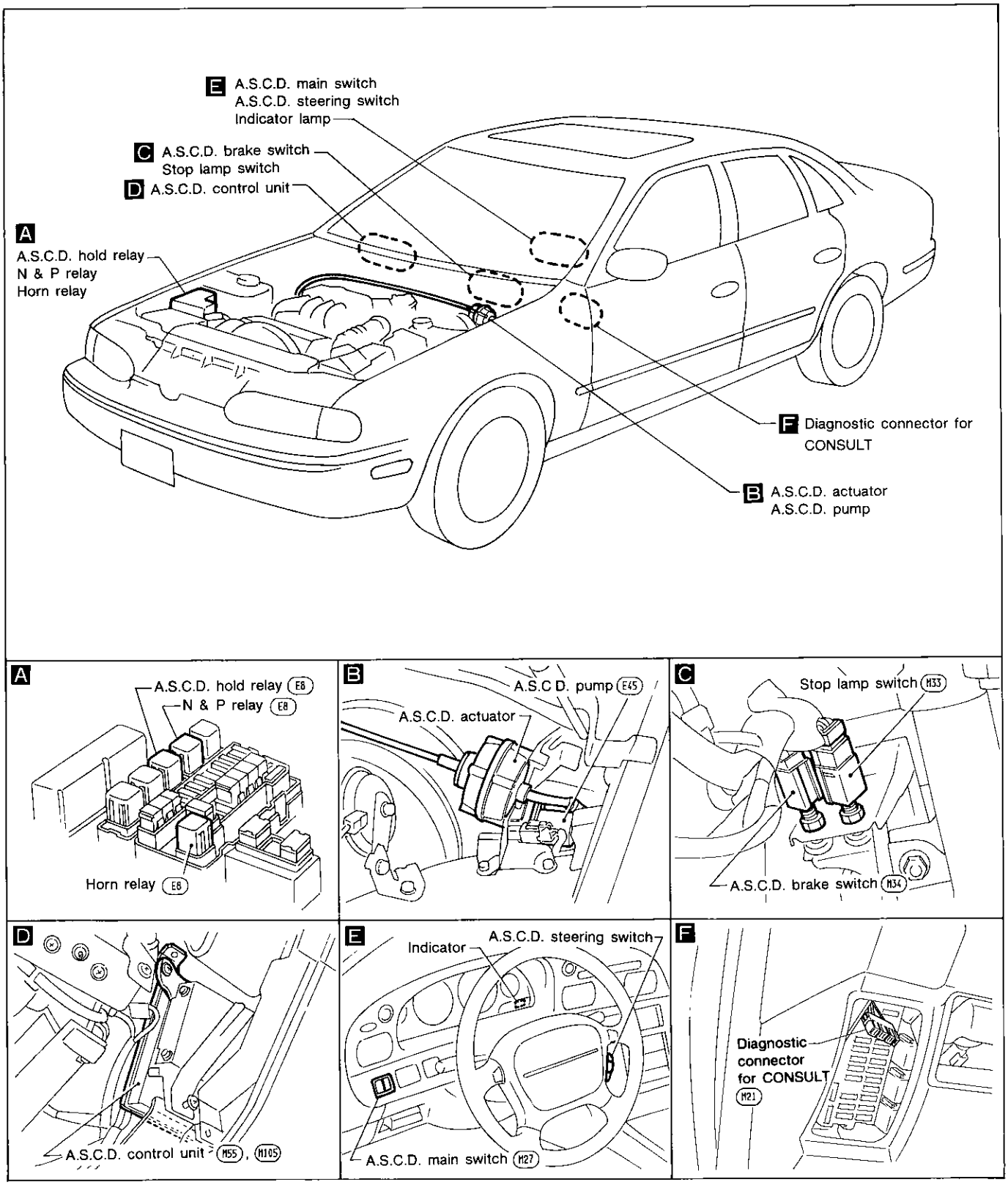
Refer to REAR WINDOW DEFOGGER "Filament Repair".

Telephone/Wiring Diagram



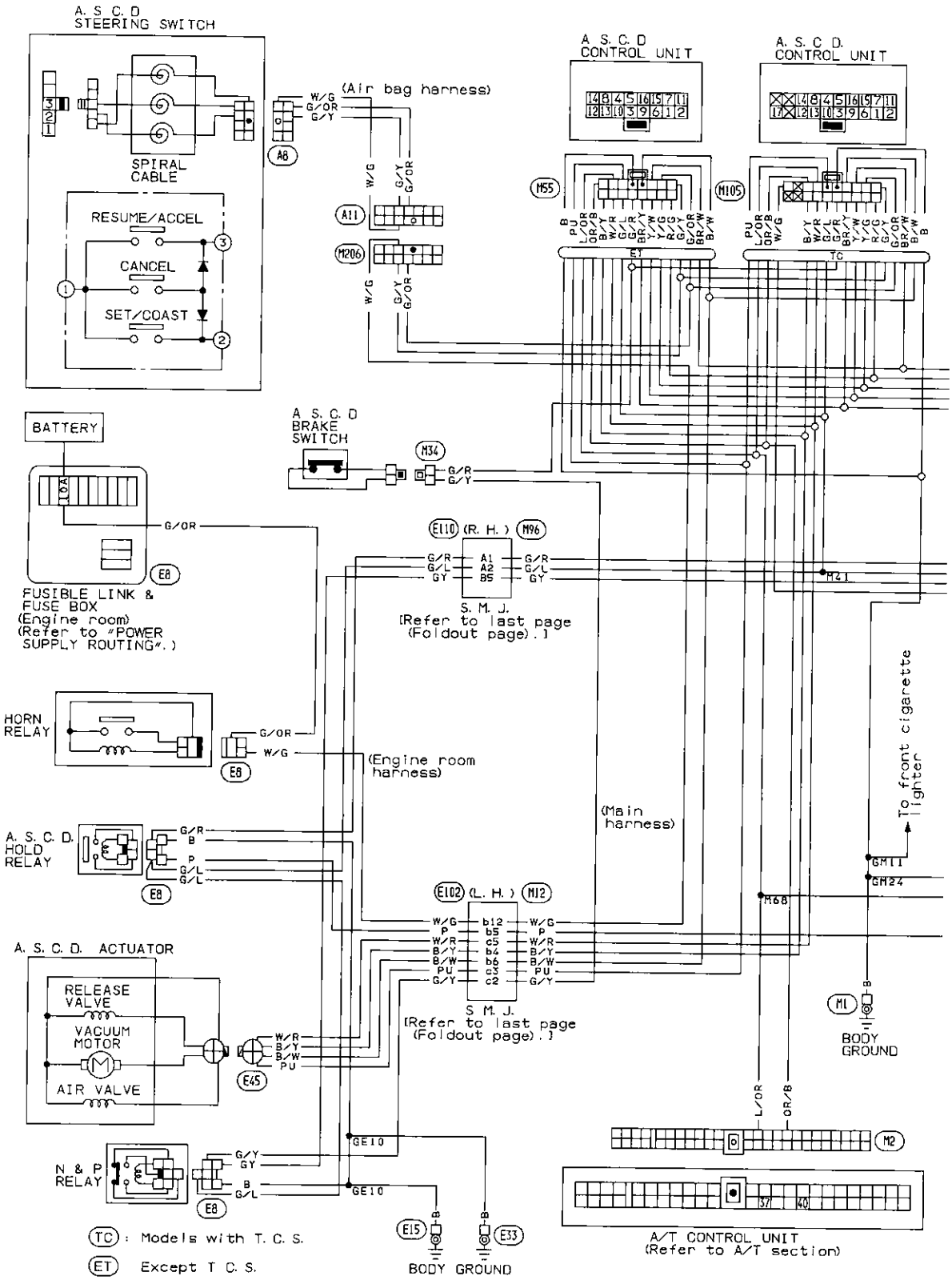
MEL100B

Component Parts and Harness Connector Location

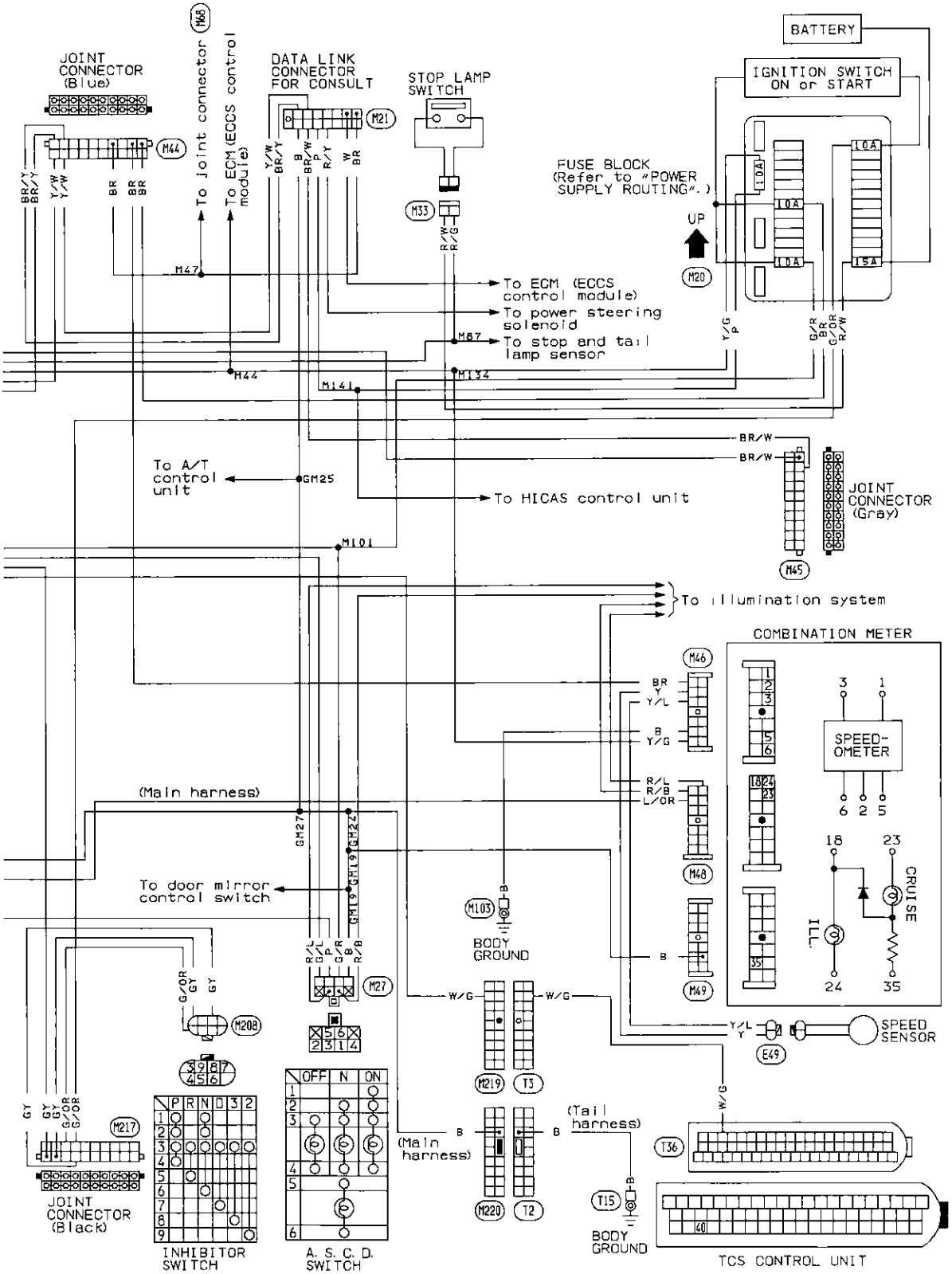


SEL945P

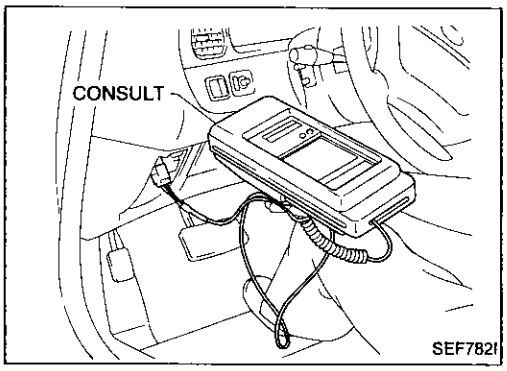
Wiring Diagram



Wiring Diagram (Cont'd)



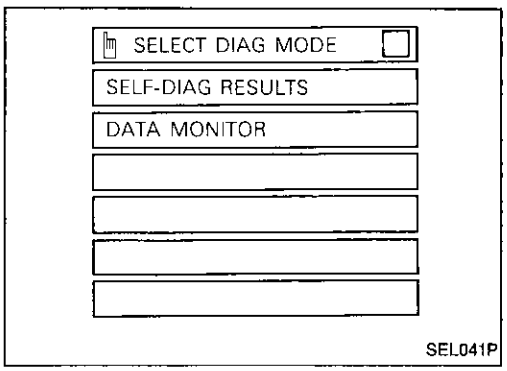
MEL801B



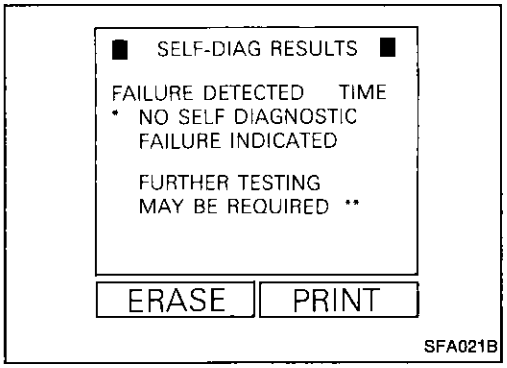
Trouble Diagnoses

CONSULT

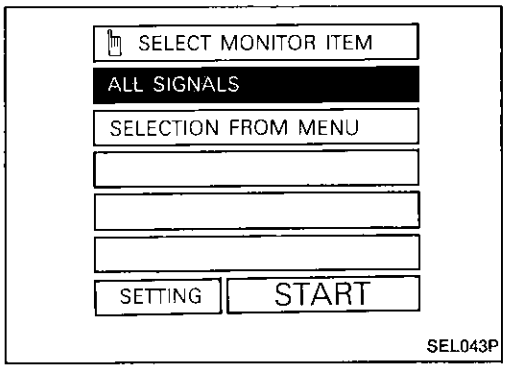
1. Turn off ignition switch.
2. Connect "CONSULT" to diagnostic connector.



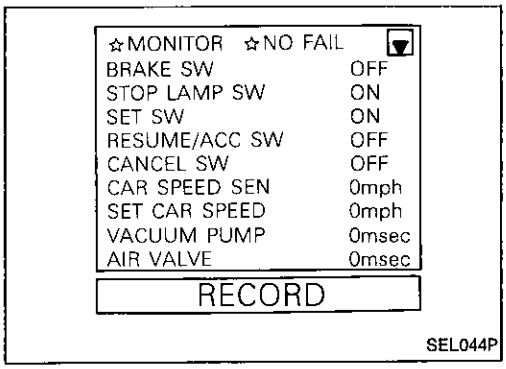
3. Turn on ignition switch.
4. Turn on A.S.C.D. main switch
5. Touch START (on CONSULT display).
6. Touch A.S.C.D.
7. Touch SELF-DIAG RESULTS.



- Self-diagnostic results are shown on display. Refer to table on the next page.



8. Touch DATA MONITOR.



- Touch START.
- Data monitor results are shown on display. Refer to table on the next page.

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 switch or stop lamp switch is malfunctioning.

Data monitor

Monitored item	Description
BRAKE SW	• Indicates [ON/OFF] condition of the brake 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.

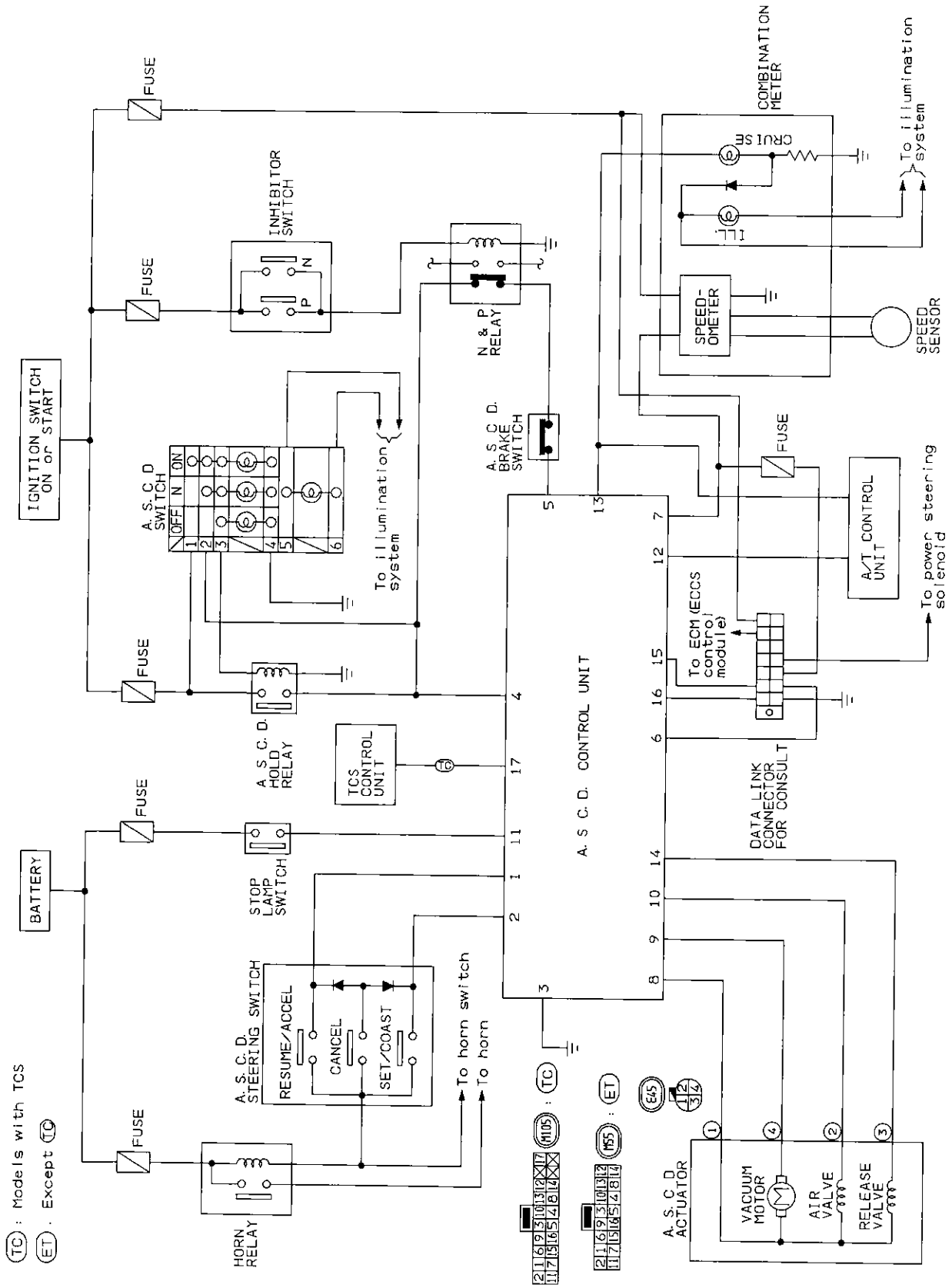
Trouble Diagnoses (Cont'd)

SYMPTOM CHART

PROCEDURE	Diagnostic Procedure								Electrical Components Inspection						
REFERENCE PAGE	EL-94	EL-97	EL-97	EL-98	EL-98	EL-99	EL-101	EL-103	EL-104	EL-105	EL-106	EL-106	EL-106	EL-106	EL-106
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

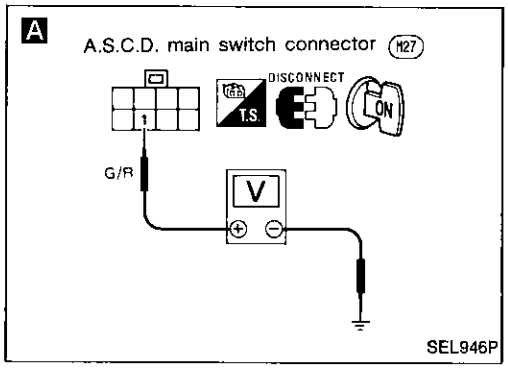


MEL802B

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.

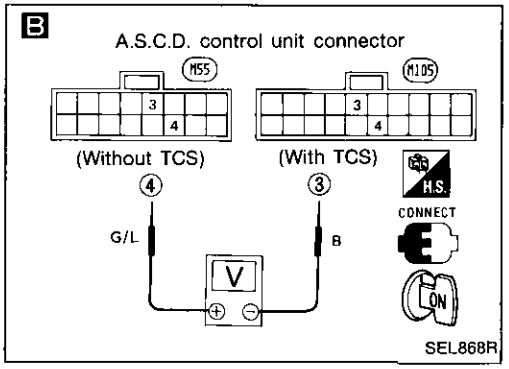
N.G. → A

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.

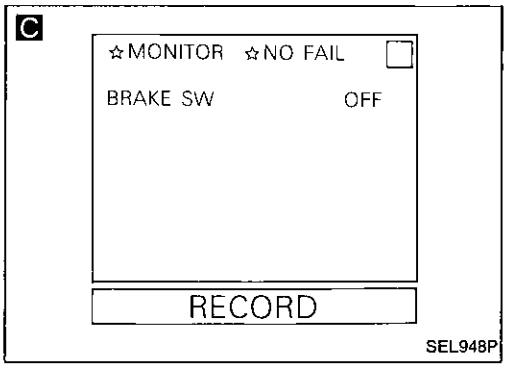
O.K.



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

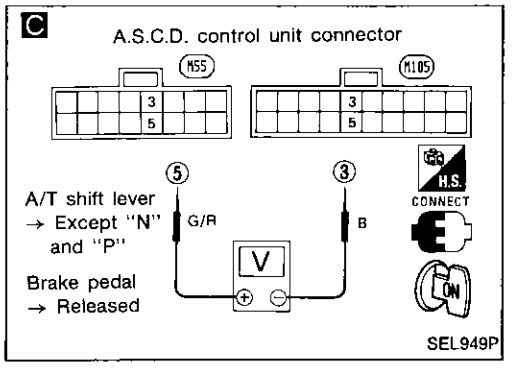
OR

Check voltage between control unit harness terminals ⑤ and ③.
Battery voltage should exist.

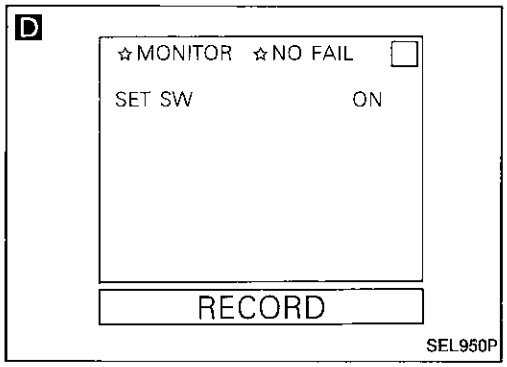
N.G. → CHECK A.S.C.D. BRAKE SWITCH AND INHIBITOR SWITCH.
Refer to "Electrical Components Inspection".
CHECK N & P RELAY.

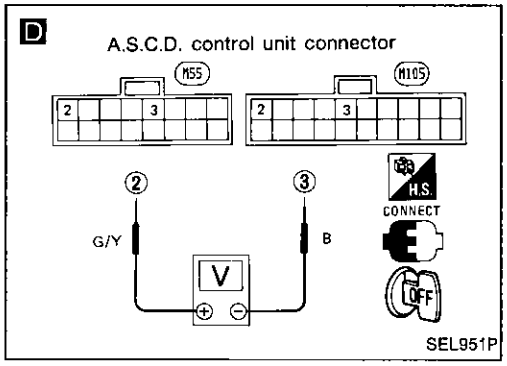
O.K.

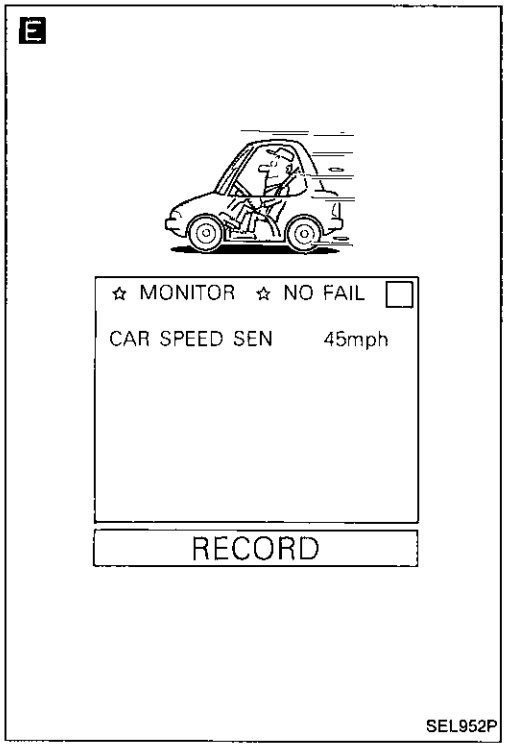
Ⓐ
(Next page)

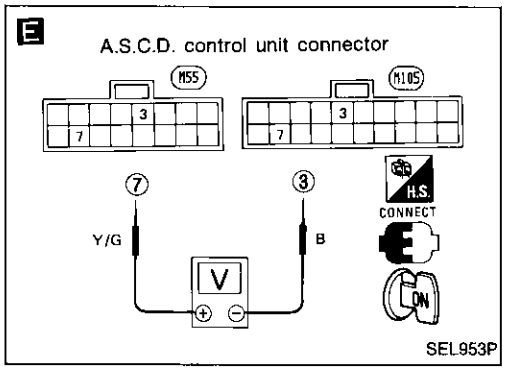


Trouble Diagnoses (Cont'd)









Ⓐ

D

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

— 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.

N.G. → Does horn work?

No → Check fuse and horn relay.

Yes → CHECK A.S.C.D. STEERING SWITCH.
Refer to "Electrical Components Inspection".

O.K. ↓

E

CHECK SPEED SENSOR CIRCUIT.

See "CAR SPEED SEN" in "Data monitor" mode while driving.

— 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.

N.G. → CHECK SPEED SENSOR.
Refer to "Electrical Components Inspection".

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

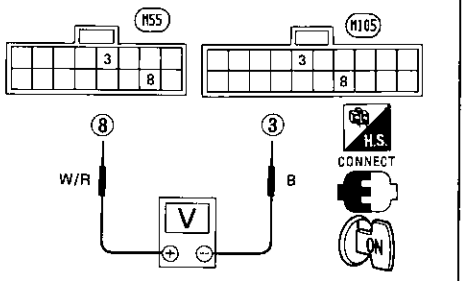
PW SUP-VALVE ON

RECORD

SEL954P

F

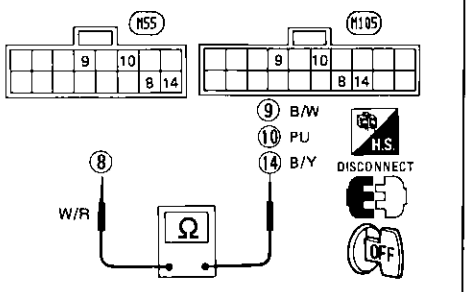
A.S.C.D. control unit connector



SEL955P

G

A.S.C.D. control unit connector



SEL956P

⑧

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.

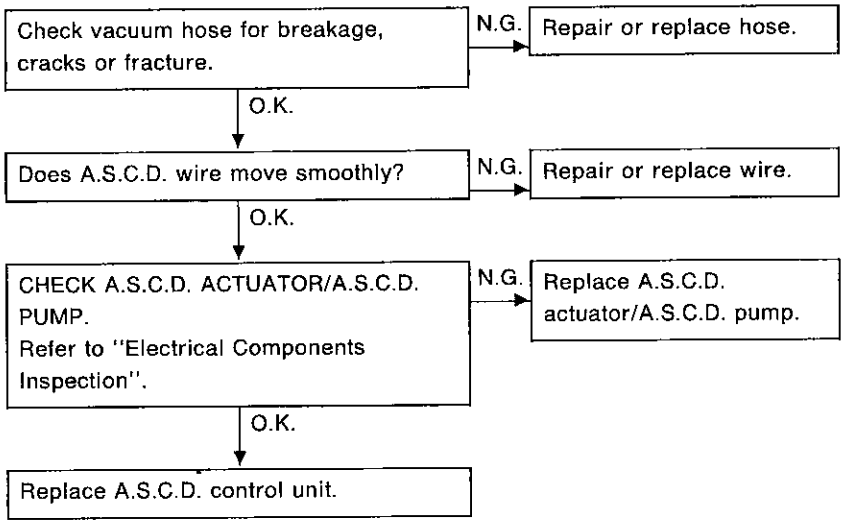
N.G.

Repair short or open circuit in A.S.C.D. actuator/A.S.C.D. pump harness.

Trouble Diagnoses (Cont'd)

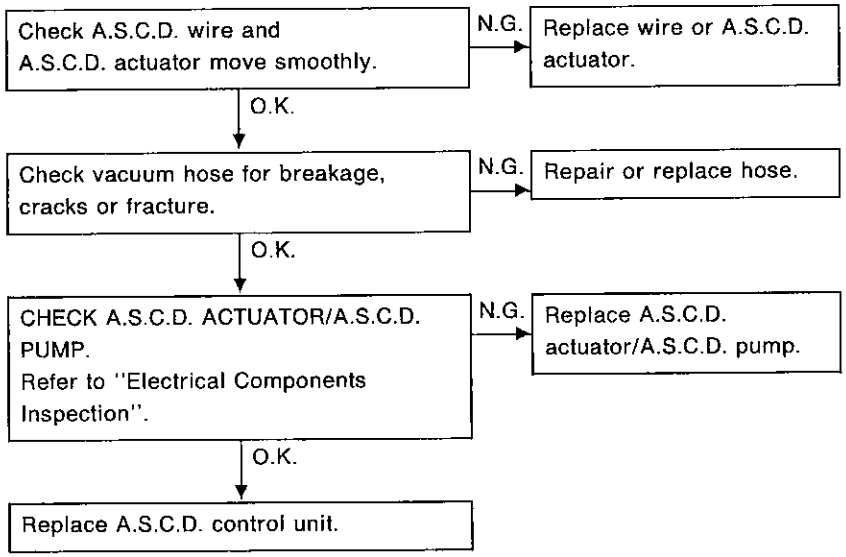
DIAGNOSTIC PROCEDURE 2

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.

Check tension of A.S.C.D. wire and that A.S.C.D. wire moves smoothly.
- N.G. → ADJUST OR REPLACE A.S.C.D. WIRE. Refer to "A.S.C.D. Wire Adjustment".
- O.K. ↓

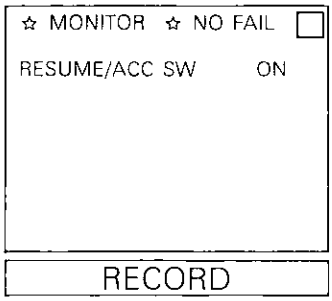
Check vacuum hose for breakage, cracks or fracture.
- N.G. → Repair or replace hose.
- O.K. ↓

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. ↓

Replace A.S.C.D. control unit.

A





SEL957P

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.
- 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

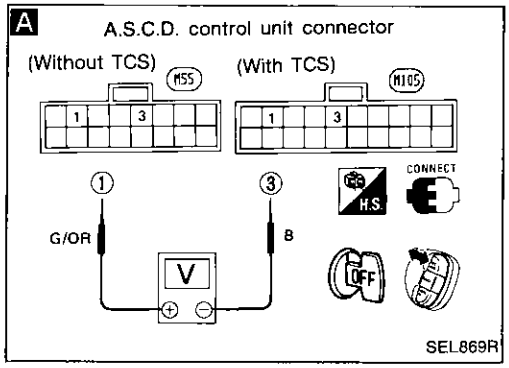
— OR —

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. ↓

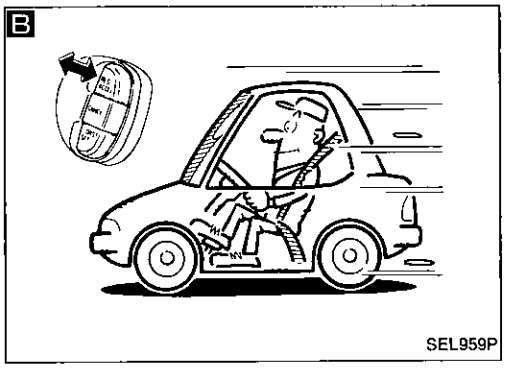
Ⓐ

A



SEL869R

Trouble Diagnoses (Cont'd)



Ⓐ

B

Does vehicle accelerate when RESUME/ACCEL switch is pressed? — No → Replace control unit.

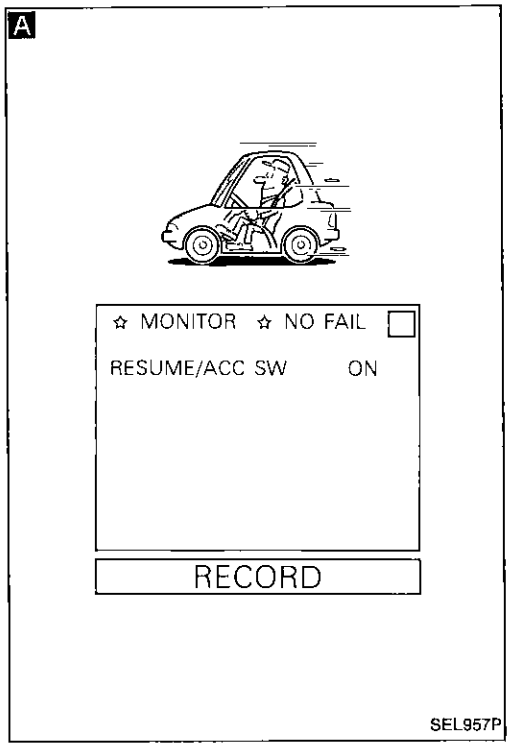
Yes

B

Does vehicle maintain the new (faster) speed when RESUME/ACCEL switch is released? — No → Replace control unit.

Yes

System is O.K.



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

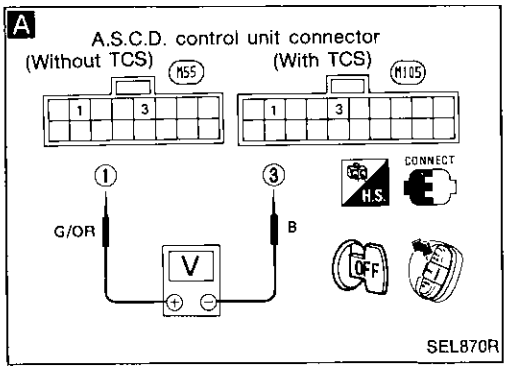
Check voltage between control unit harness terminals ① and ③.

- After pressing and holding RESUME/ACC switch.
  Battery voltage should exist.
- After releasing RESUME/ACC switch.
  Voltage is 0V.

O.K.

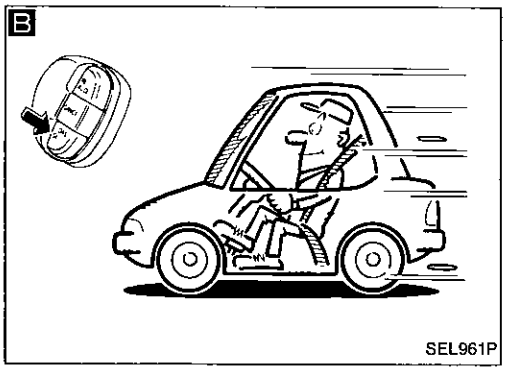
Ⓒ

(Next page)



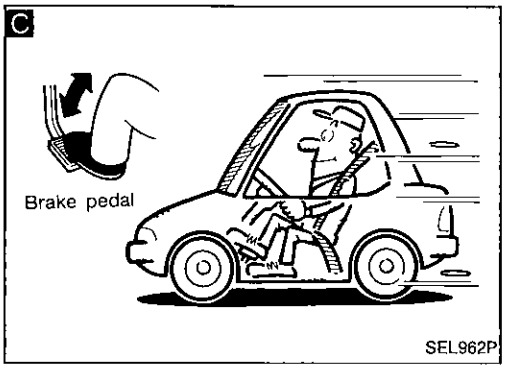
Trouble Diagnoses (Cont'd)

B



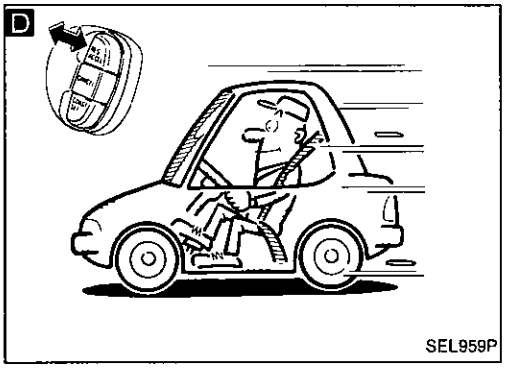
SEL961P

C



SEL962P

D



SEL959P

Ⓒ

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

D

Above 48 km/h (30 MPH), press and release RESUME/ACCEL switch.

O.K.

Does vehicle return to previously set speed [80 km/h (50 MPH)]?

No → Replace control unit.

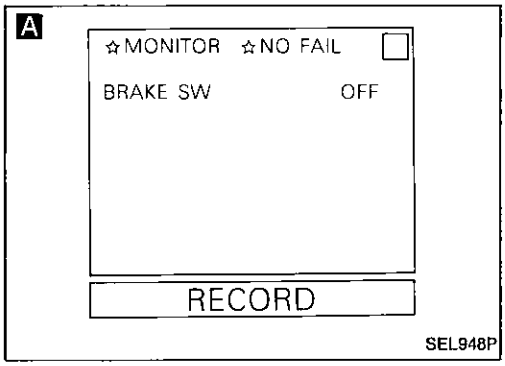
Yes

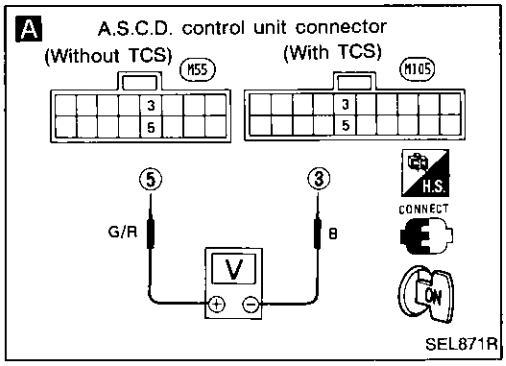
System is O.K.

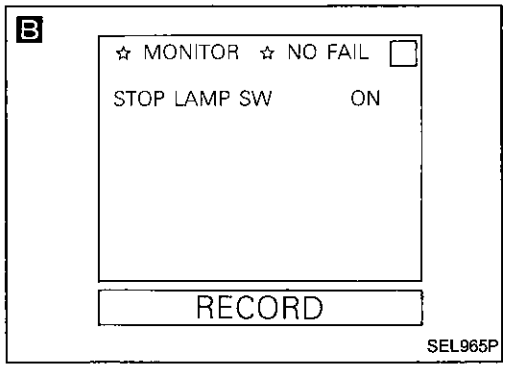
Trouble Diagnoses (Cont'd)

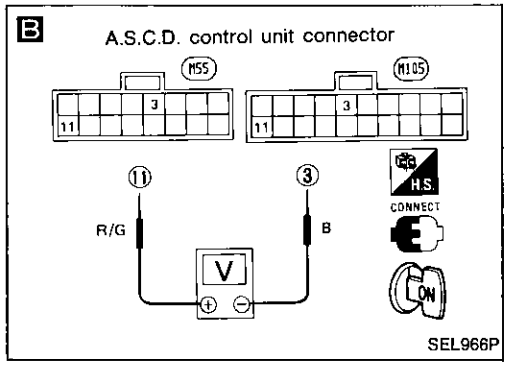
DIAGNOSTIC PROCEDURE 7

SYMPTOM: Set speed cannot be cancelled.









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

N.G. → CHECK A.S.C.D. BRAKE and INHIBITOR SWITCH. Refer to "Electrical Components Inspection".

OR

2. Check voltage between control unit harness terminals ⑤ and ③.

Conditions		Voltage [V]
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

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

N.G. → CHECK STOP LAMP SWITCH. Refer to "Electrical Components Inspection".

OR

Check voltage between control unit harness terminals ⑪ and ③.

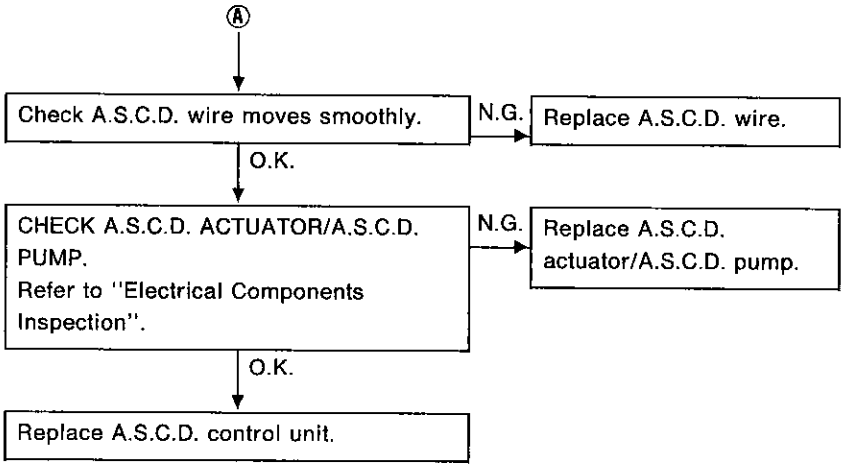
Condition		Voltage [V]
Stop lamp switch	Depressed	Approx. 12
	Released	0

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.

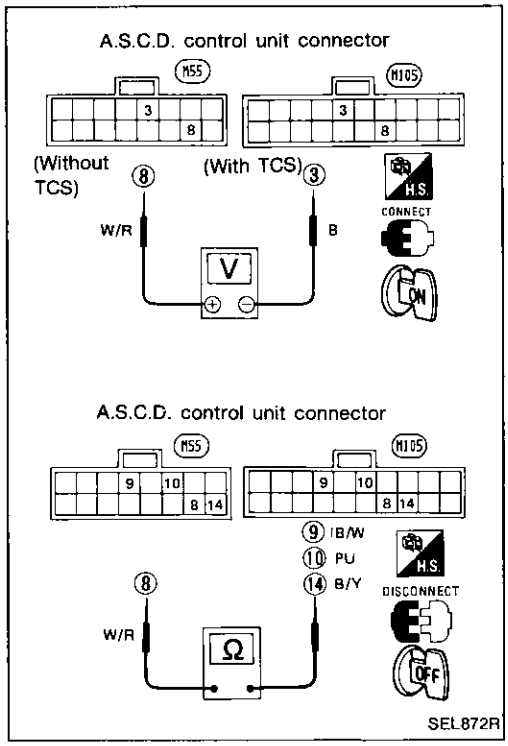
Does indicator lamp blink when brake pedal is depressed slowly?

No → CHECK A.S.C.D. STEERING SWITCH.
Refer to "Electrical Components Inspection".

N.G. → Replace A.S.C.D. steering switch.

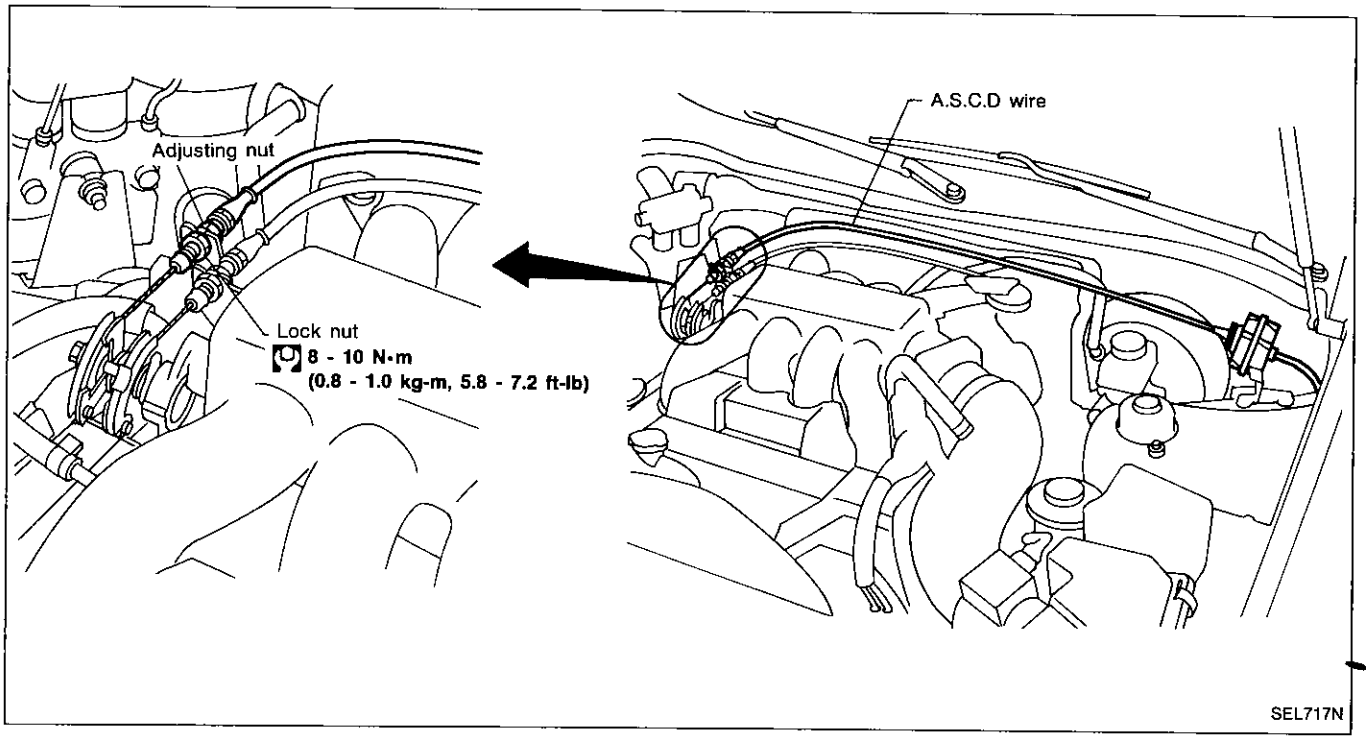
O.K. → Replace control unit.

Yes → Adjust installation of stop lamp switch and A.S.C.D. brake switch.
Refer to BR section.



Trouble Diagnoses (Cont'd)

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.

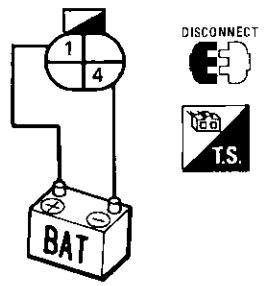
Trouble Diagnoses (Cont'd)

ELECTRICAL COMPONENTS INSPECTION

A.S.C.D. actuator/A.S.C.D. pump

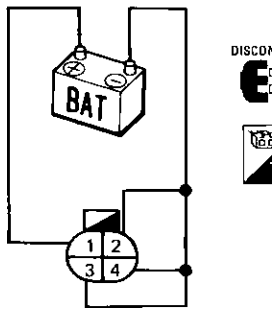
1. Disconnect A.S.C.D. actuator/A.S.C.D. pump connector.
2. Check A.S.C.D. actuator/A.S.C.D. pump operations as shown.

A A.S.C.D. pump connector E45



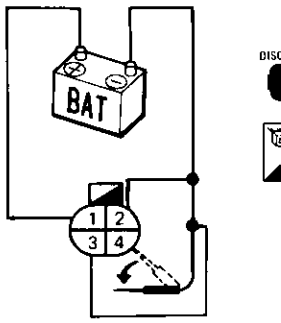
SEL967P

B



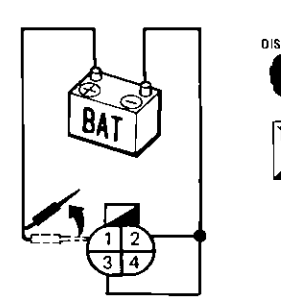
SEL701P

C



SEL702P

D



SEL703P

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. actuator.

O.K.

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

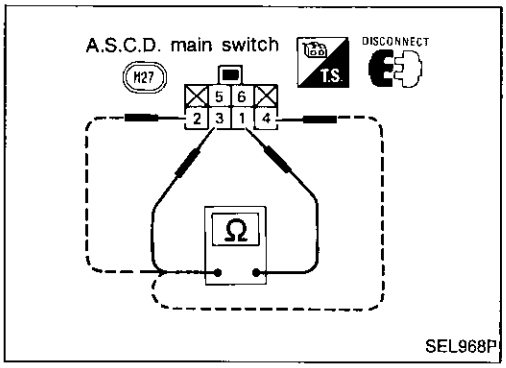
Disconnect lead from ① to see if A.S.C.D. wire returns immediately.

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.

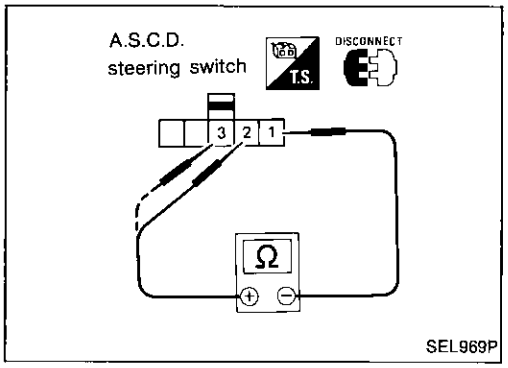
Trouble Diagnoses (Cont'd)



A.S.C.D. main switch

Check continuity between terminals by pushing switch to each position.

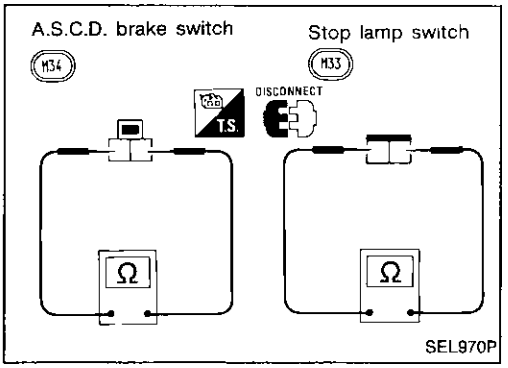
Switch position	Terminals					
	1	2	3	4	5	6
ON	○	○	○	○		
N		○	○	○	ILL. ○	○
OFF						



A.S.C.D. steering switch

Check continuity between terminals by pushing each button.

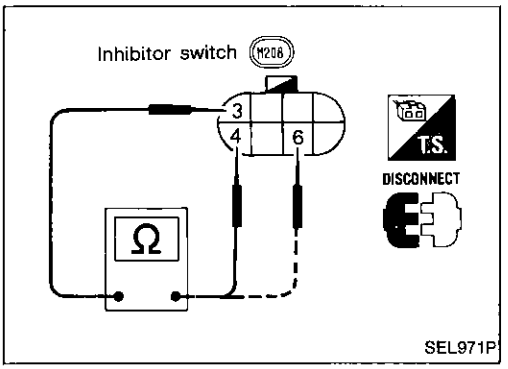
Button	Terminals		
	1	2	3
SET/COAST	○	○	
RESUME/ACCEL	○		○
CANCEL	○	▶|○	
	○	▶	○



A.S.C.D. brake switch and stop lamp switch

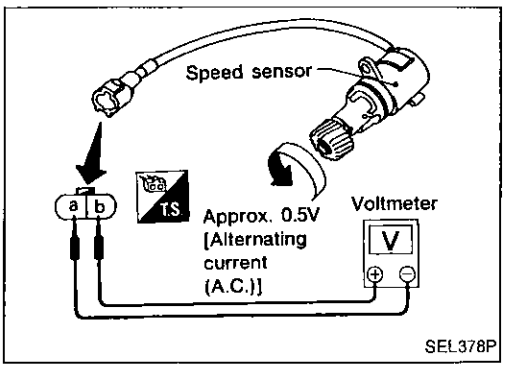
Condition	Continuity	
	A.S.C.D. brake switch	Stop lamp switch
When brake pedal is depressed	No	Yes
When brake pedal is released	Yes	No

Check each switch after adjusting brake pedal — refer to BR section.



Inhibitor switch

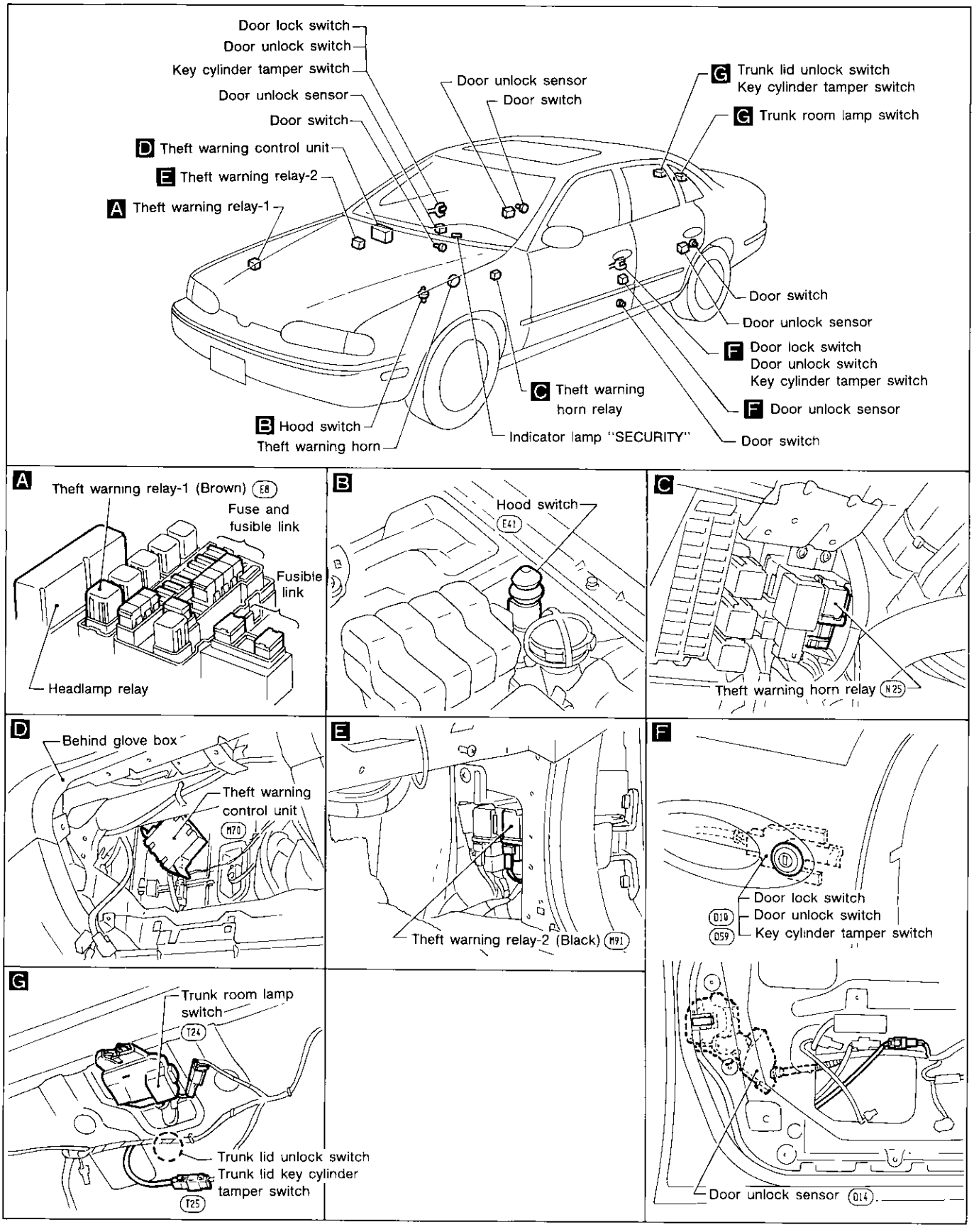
Condition	Continuity
When shift lever position is "N" or "P"	Yes
When shift lever position is any position except "N" or "P"	No



Speed sensor

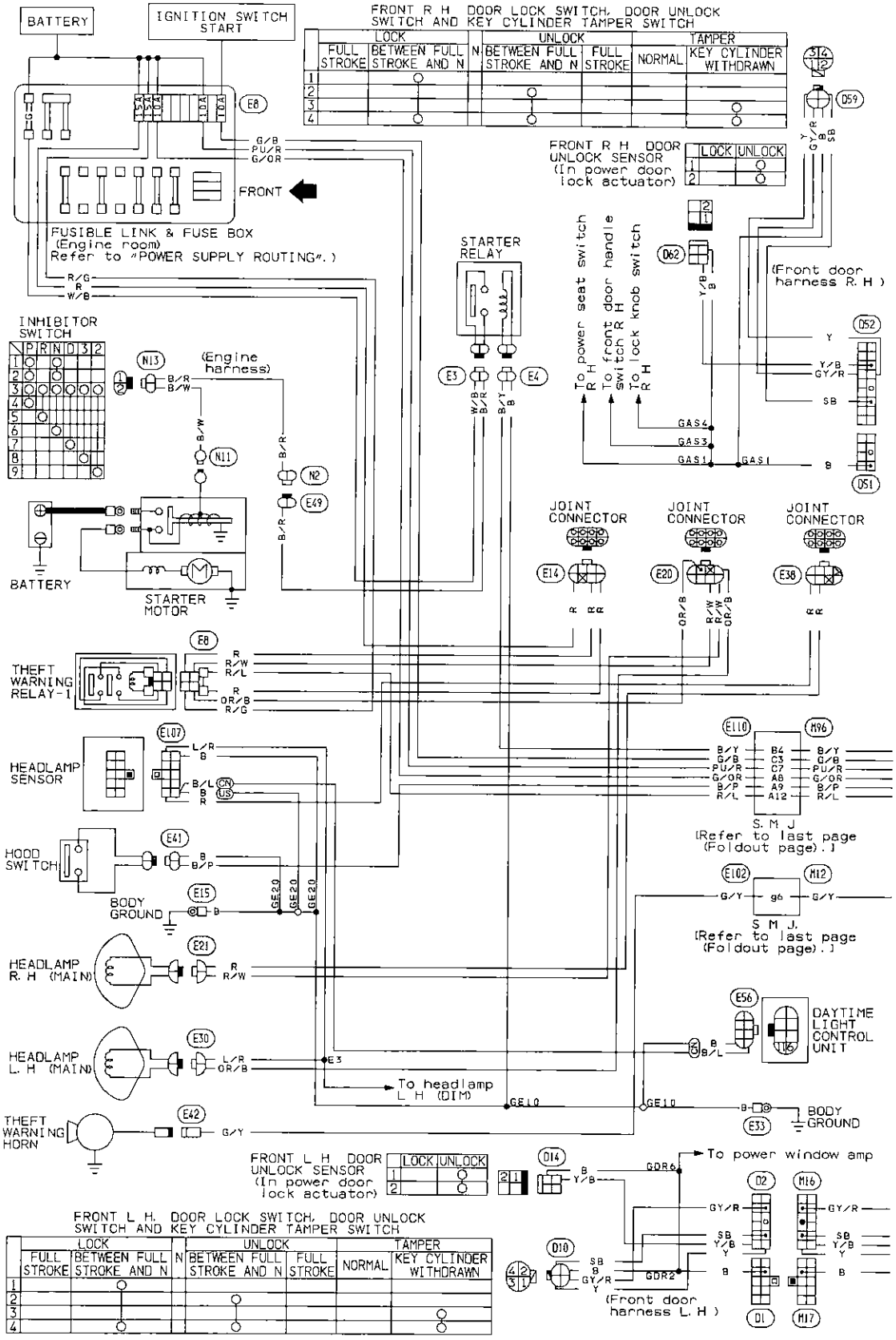
1. Remove speed sensor from transaxle.
2. Turn speedometer pinion quickly and measure voltage across ⓐ and ⓑ.

Component Parts and Harness Connector Location

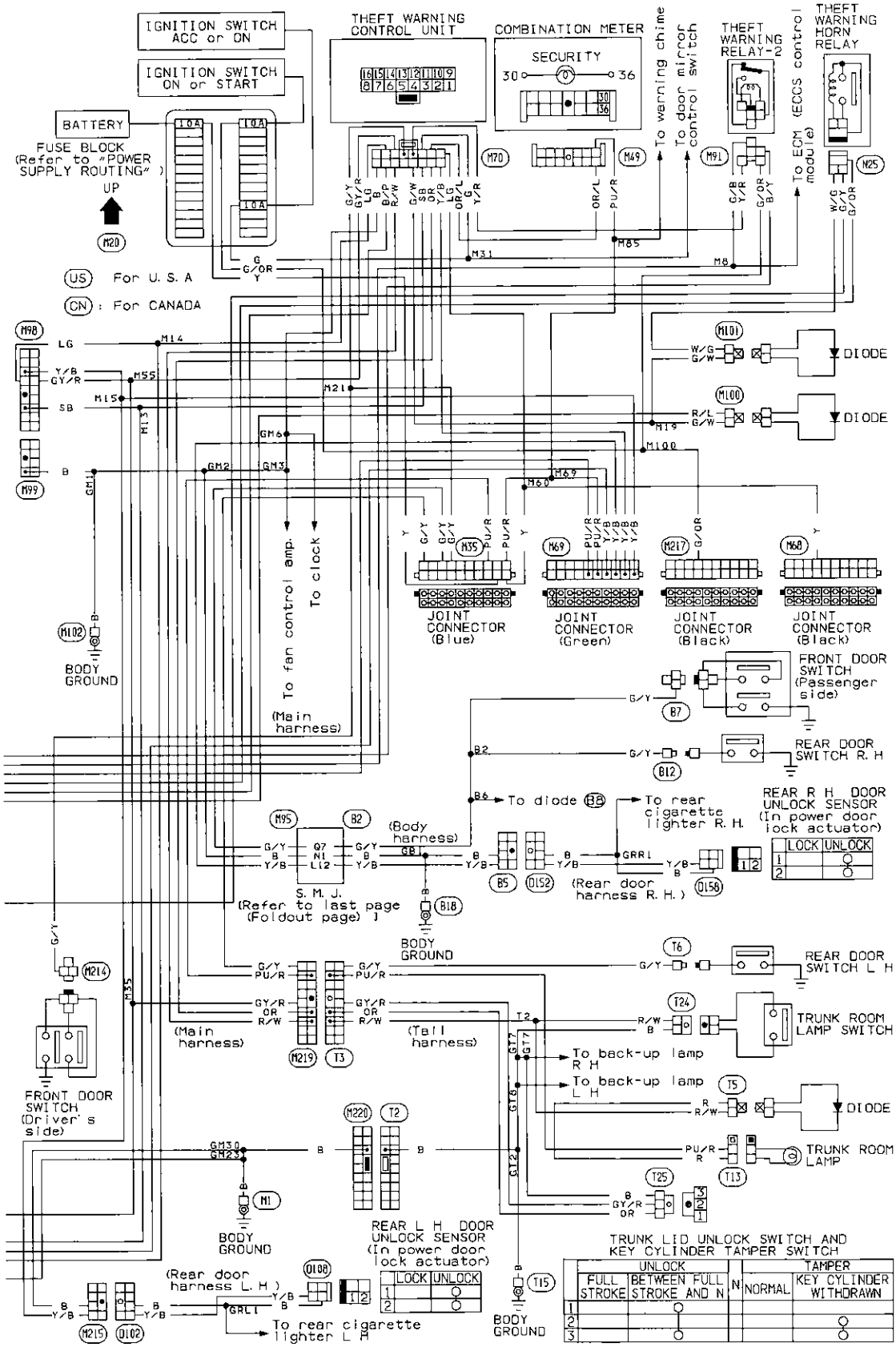


SEL972P

Wiring Diagram



Wiring Diagram (Cont'd)

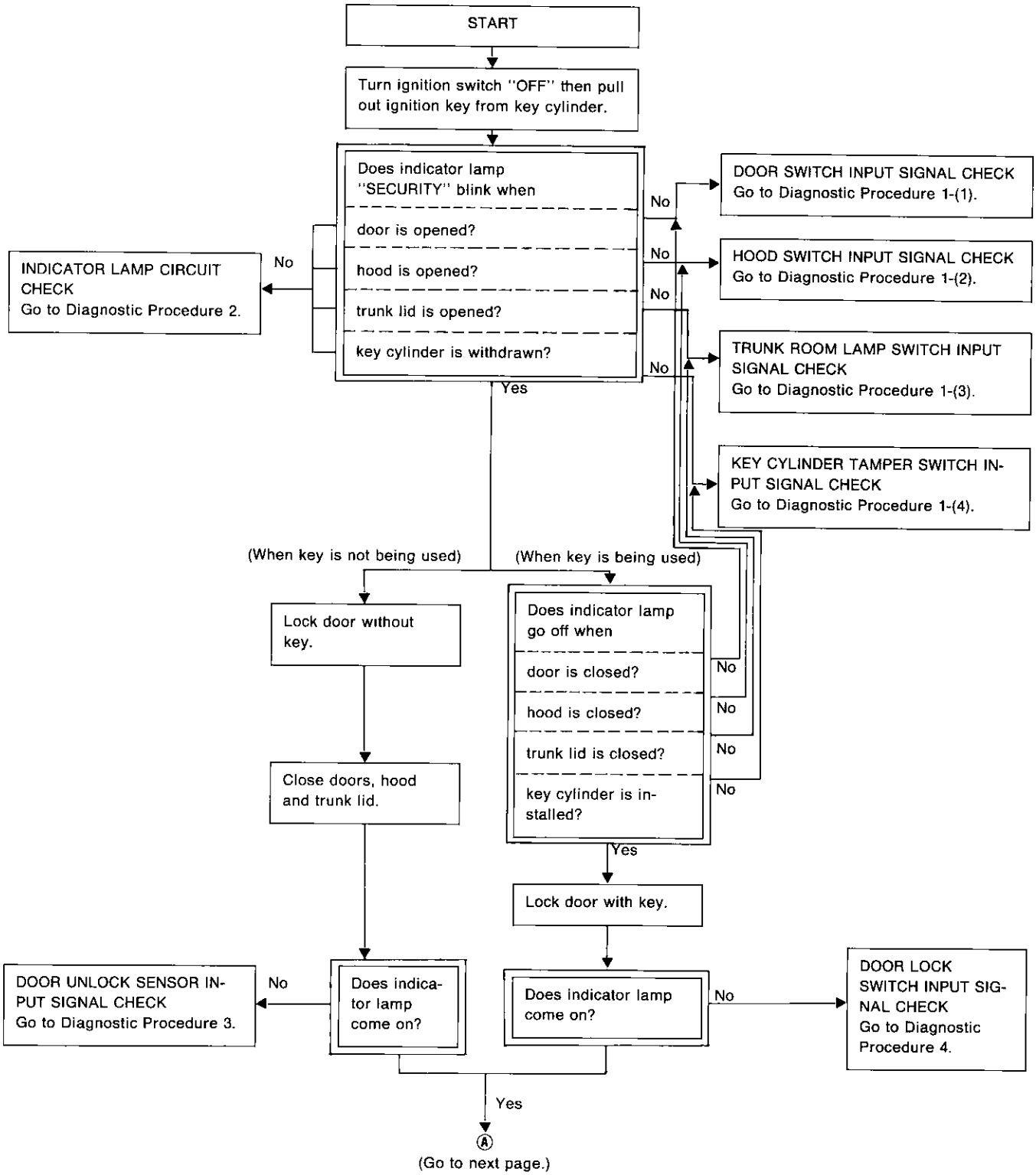


MEL786B

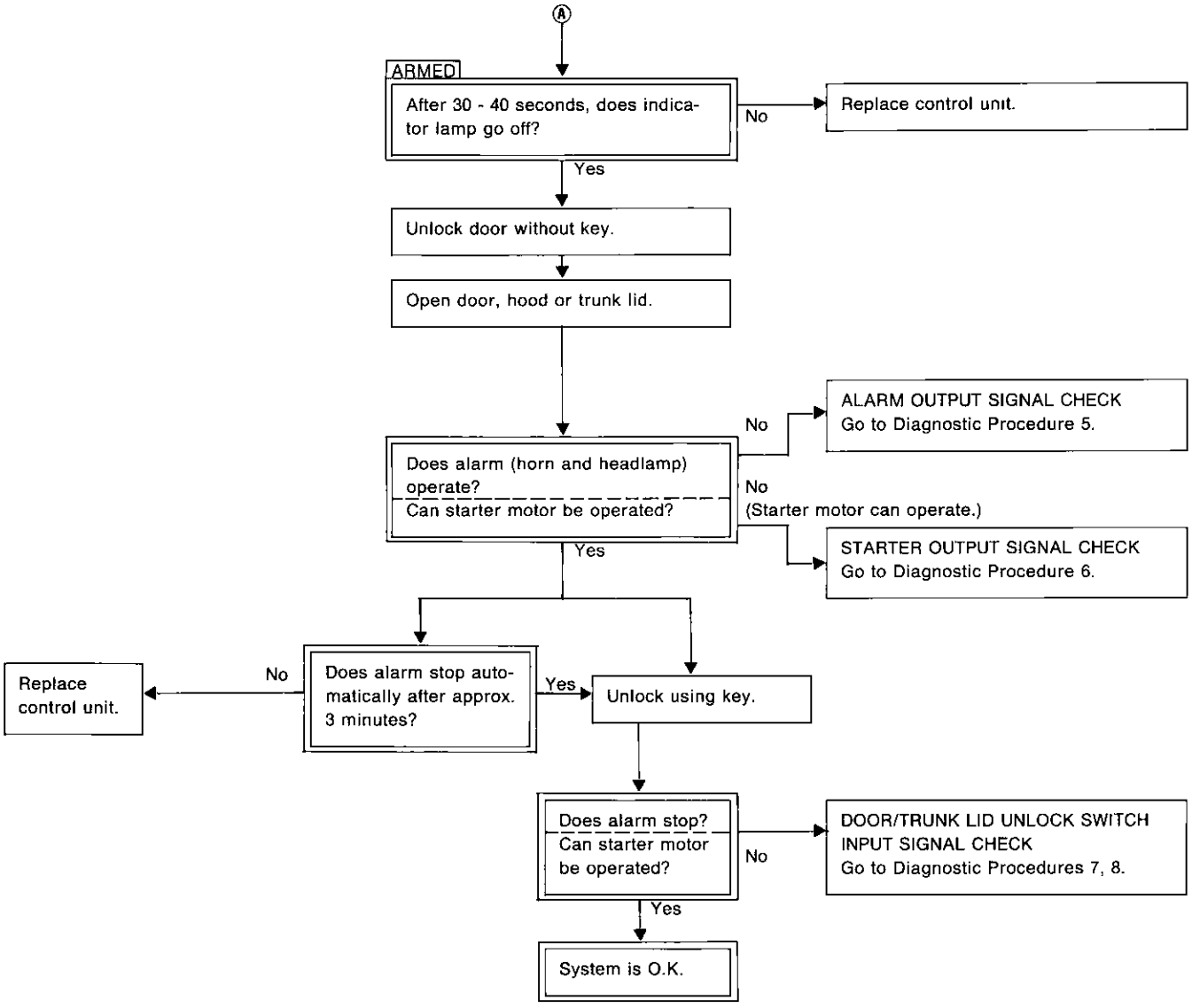
Trouble Diagnoses

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.

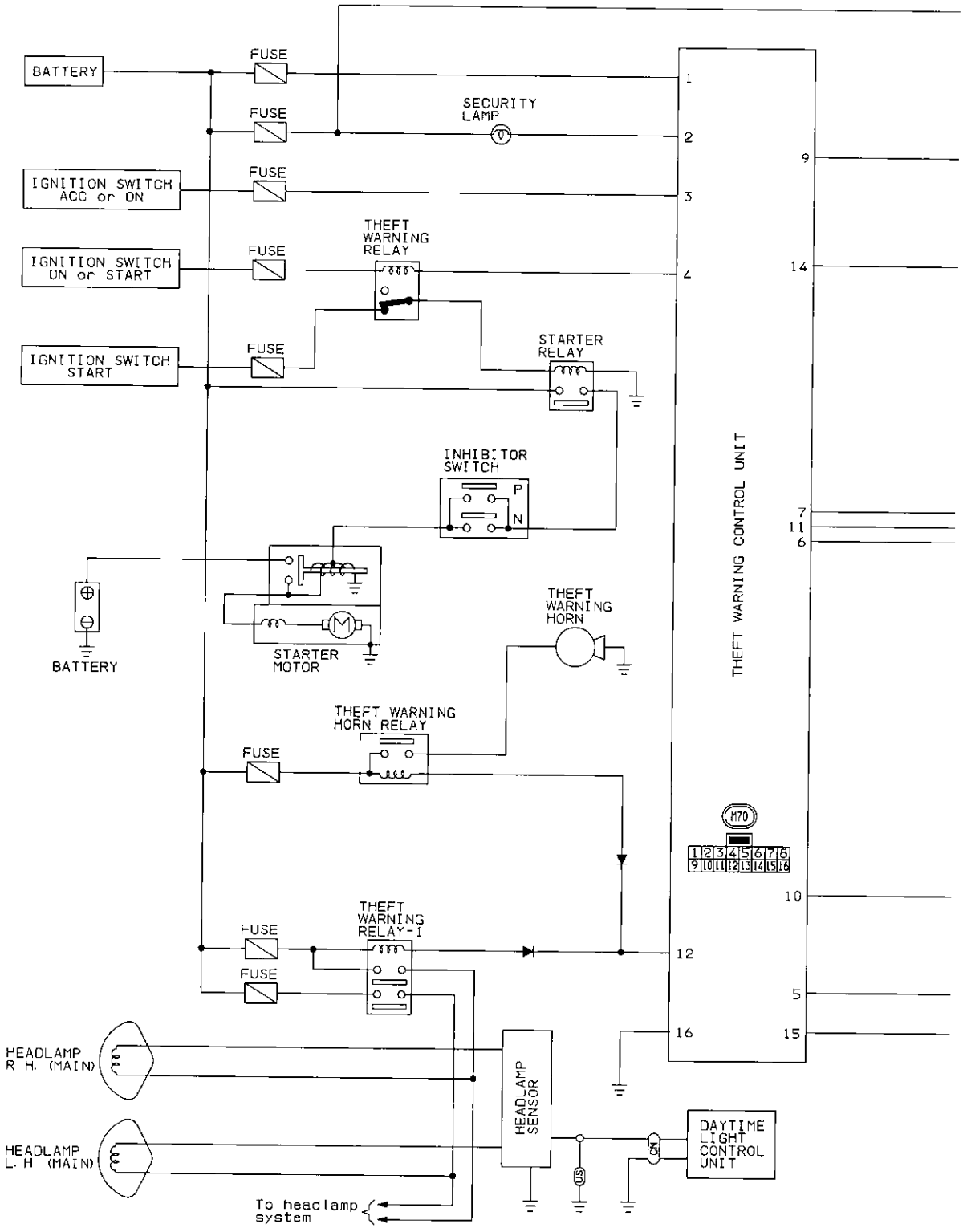


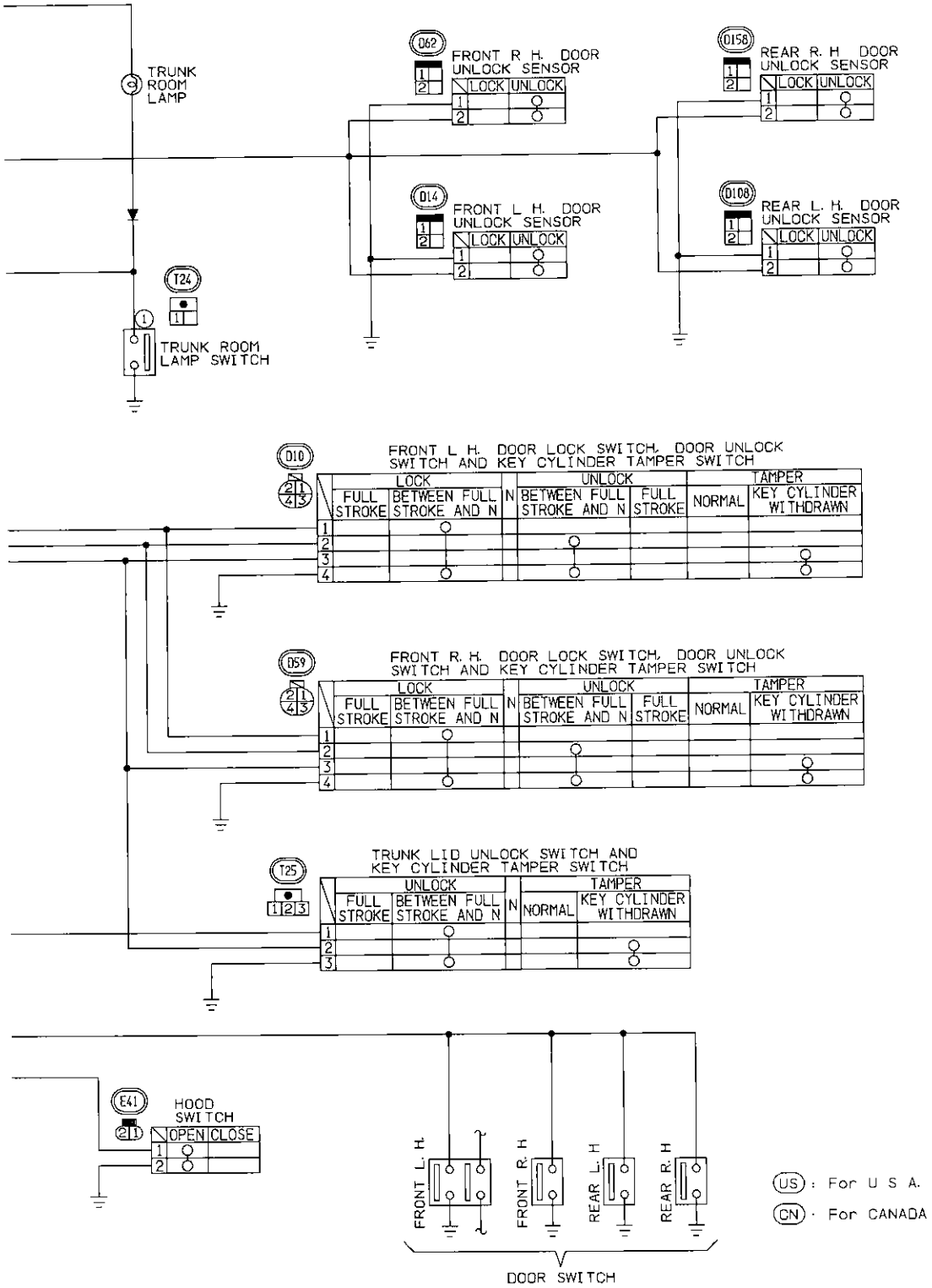
Trouble Diagnoses (Cont'd)



Trouble Diagnoses (Cont'd)

CIRCUIT DIAGRAM FOR QUICK PINPOINT CHECK

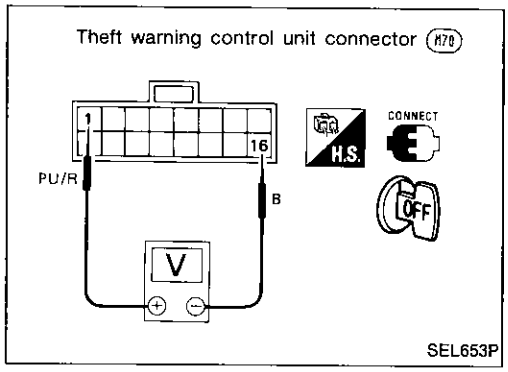



TRUNK ROOM LAMP
TRUNK ROOM LAMP SWITCH
D62
FRONT R. H. DOOR UNLOCK SENSOR
D14
FRONT L. H. DOOR UNLOCK SENSOR
D158
REAR R. H. DOOR UNLOCK SENSOR
D108
REAR L. H. DOOR UNLOCK SENSOR
LOCK UNLOCK
D10
FRONT L. H. DOOR LOCK SWITCH, DOOR UNLOCK SWITCH AND KEY CYLINDER TAMPER SWITCH
D59
FRONT R. H. DOOR LOCK SWITCH, DOOR UNLOCK SWITCH AND KEY CYLINDER TAMPER SWITCH
LOCK
UNLOCK
TAMPER
FULL STROKE
BETWEEN FULL STROKE AND N
N
BETWEEN FULL STROKE AND N
FULL STROKE
NORMAL
KEY CYLINDER WITHDRAWN
T25
TRUNK LID UNLOCK SWITCH AND KEY CYLINDER TAMPER SWITCH
E41
HOOD SWITCH
OPEN CLOSE
FRONT L. H.
FRONT R. H.
REAR L. H.
REAR R. H.
DOOR SWITCH
(US) : For U.S.A.
(CN) : For CANADA

MEL787B

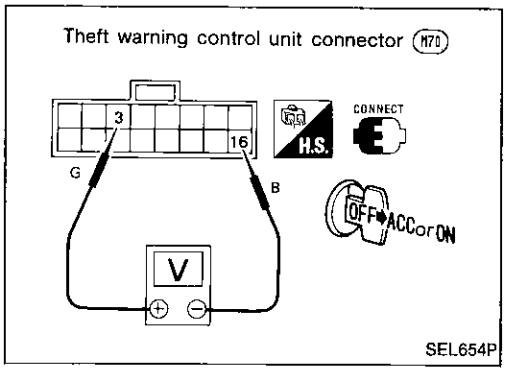
Trouble Diagnoses (Cont'd)

POWER SUPPLY AND GROUND CIRCUIT CHECK



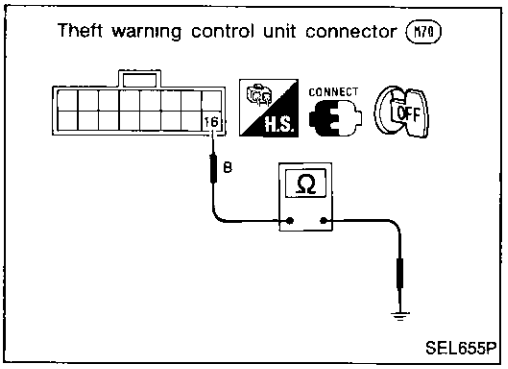
Main power supply circuit check

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

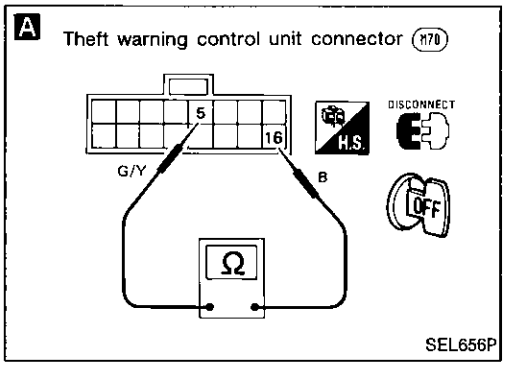
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 1

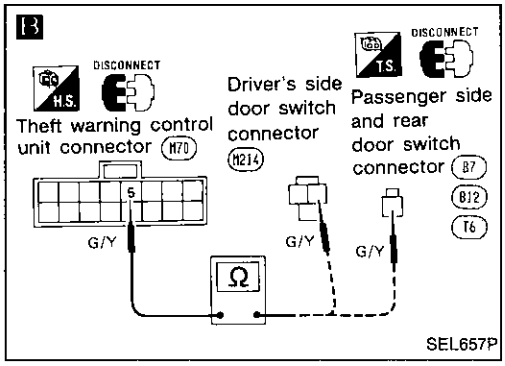
SYMPTOM:
- **Indicator lamp does not blink.**
- **Indicator lamp remains blinking.**

Diagnostic procedure 1-(1)

A



B



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 and door switch harness terminal.
Continuity should exist.

N.G. → Repair harness or connectors.

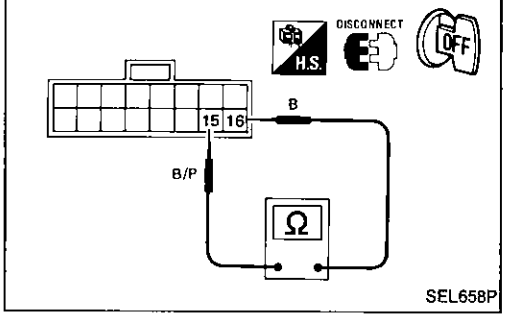
O.K.

CHECK THE CONNECTIONS AT EACH CONNECTOR.

Trouble Diagnoses (Cont'd)

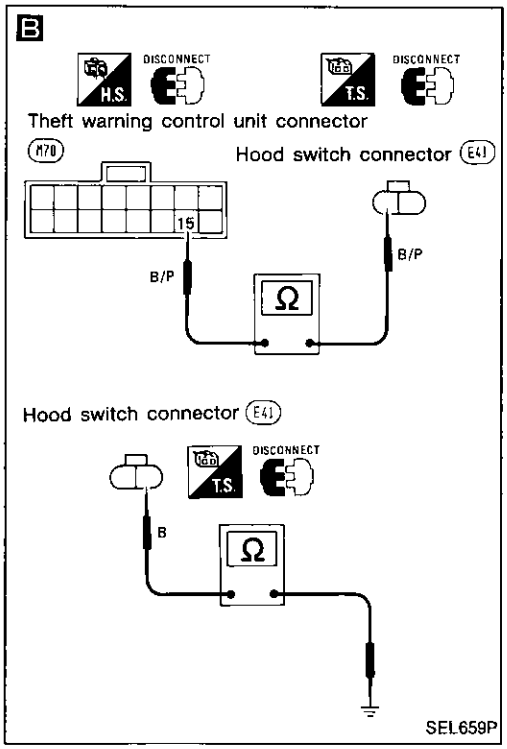
Diagnostic procedure 1-(2)

A Theft warning control unit connector (M70)



SEL658P

B



SEL659P

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.

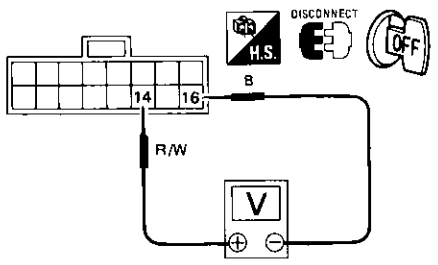
O.K.

CHECK THE CONNECTIONS AT EACH CONNECTOR.

Trouble Diagnoses (Cont'd)

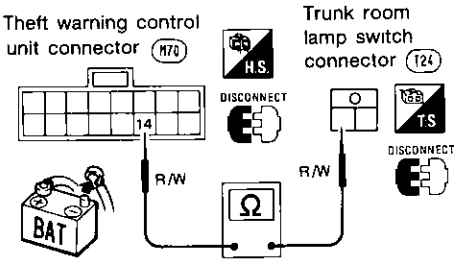
Diagnostic procedure 1-(3)

A Theft warning control unit connector (H70)



SEL660P

B



SEL973P

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. → B

N.G. ↓

Replace trunk room lamp switch.

B

TRUNK ROOM LAMP SWITCH CIRCUIT CHECK
Check harness continuity between control unit harness terminal ⑭ and trunk room lamp harness terminal.

O.K. ↓

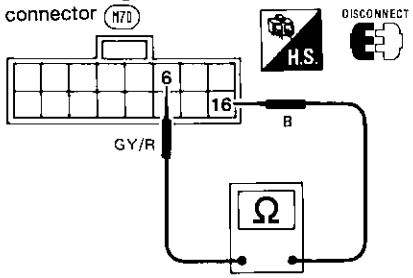
CHECK THE CONNECTIONS AT EACH CONNECTOR.

Trouble Diagnoses (Cont'd)

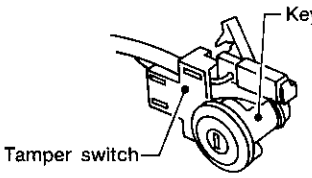
Diagnostic procedure 1-(4)

A

Theft warning control unit connector (M70)

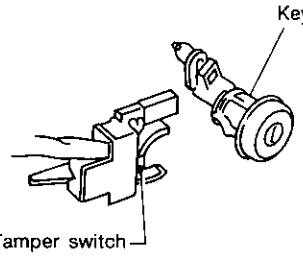


[Example]



No continuity ... O.K.

[Example]

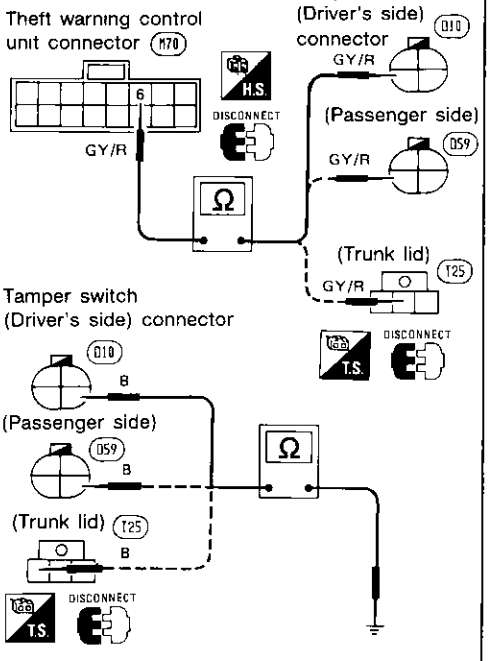


Read switch turns on when key cylinder is removed.

Continuity exists ... O.K.

SEL662P

B



SEL974P

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.

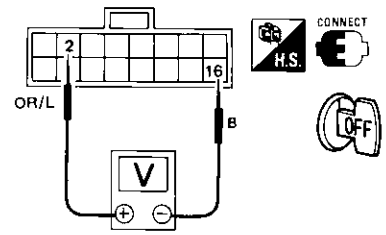
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 2

SYMPTOM: Indicator lamp does not blink.

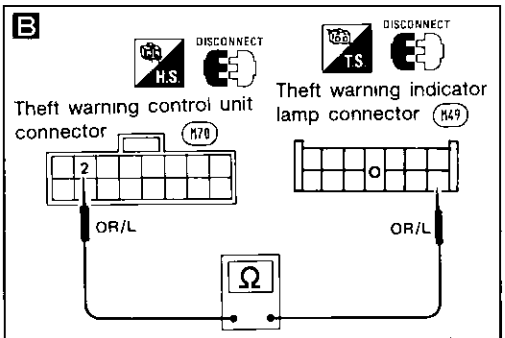
A

Theft warning control unit connector (M70)



SEL664P

B



SEL975P

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.

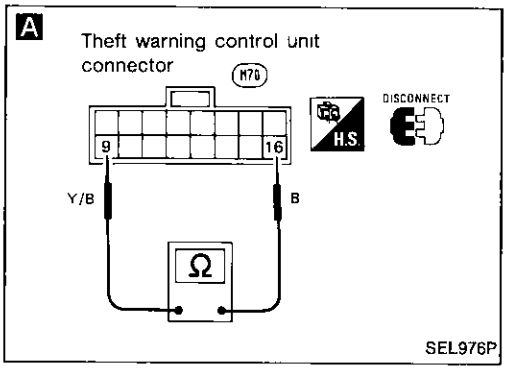
O.K. ↓

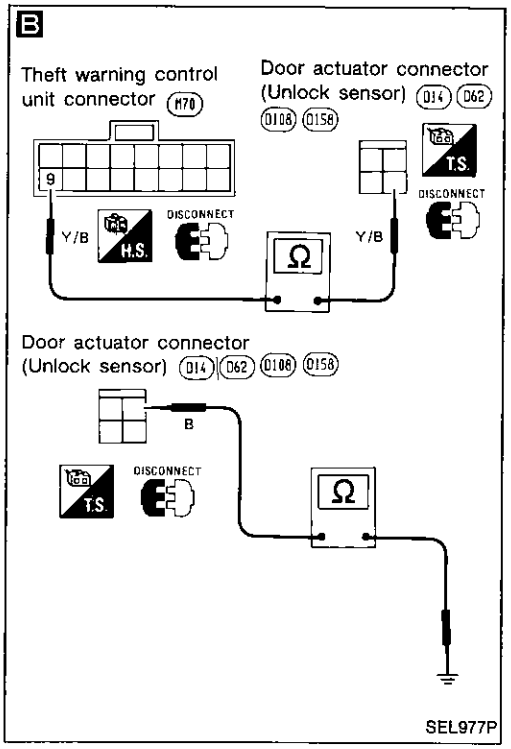
CHECK THE CONNECTIONS AT EACH CONNECTOR.

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
Locked	No
Unlocked	Yes

O.K. → Go to Diagnostic Procedure 4.

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 and door actuator terminal.
- Check harness continuity between door actuator terminal and body ground.

Continuity should exist.

N.G. → Repair harness or connectors.

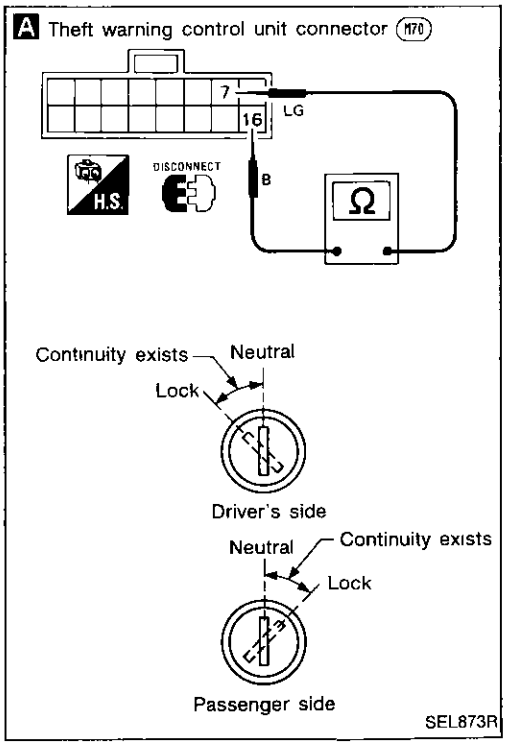
O.K. →

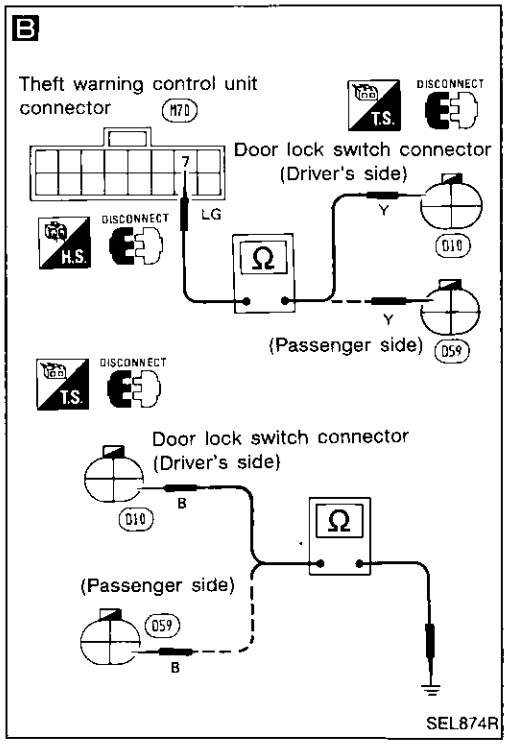
CHECK THE CONNECTIONS AT EACH CONNECTOR.

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.

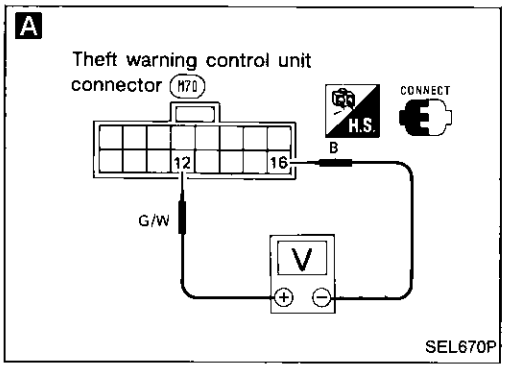
O.K.

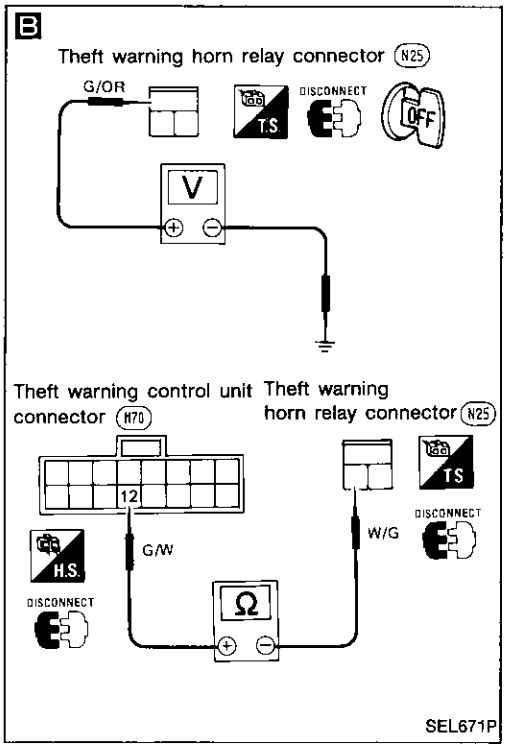
CHECK THE CONNECTIONS AT EACH CONNECTOR.

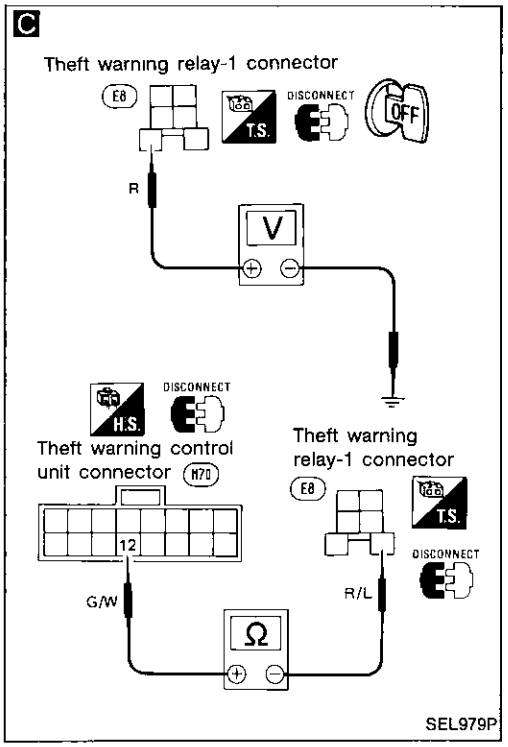
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 5

SYMPTOM: Alarm does not operate.







A

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. ↓

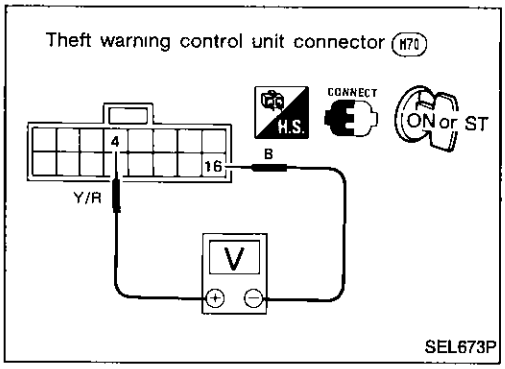
Does headlamp come on when turning lighting switch "ON"?

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)

Approx. 12V

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".

→ Replace control unit.

↓ Approx. 0 V

Check theft warning relay-2.

→ N.G. → Replace theft warning relay-2.

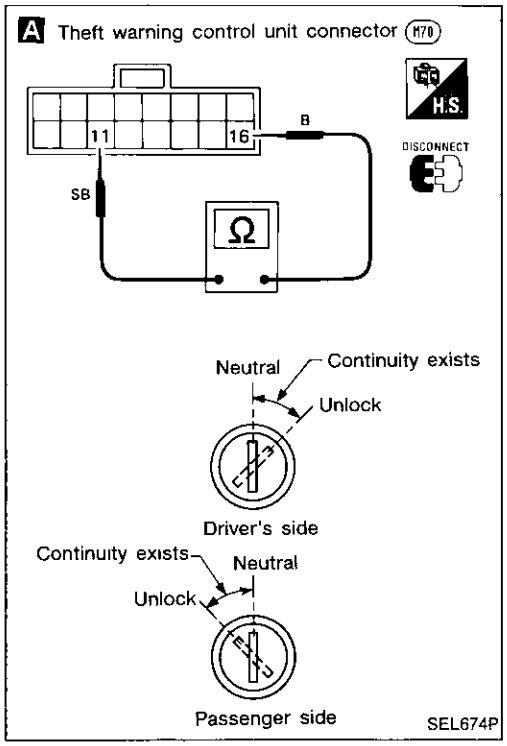
↓ O.K.

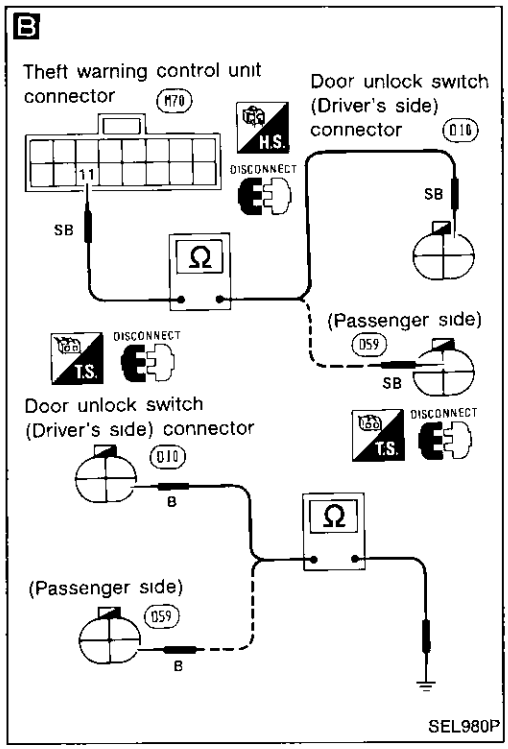
Repair harness between control unit and theft warning relay-2.

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.

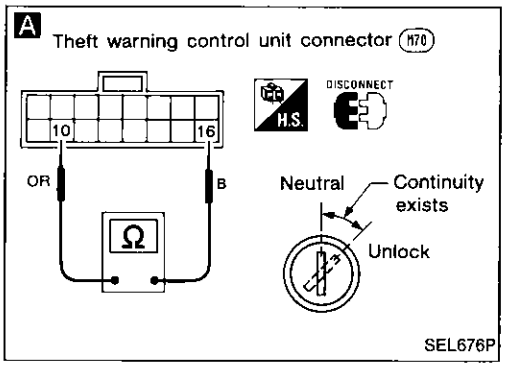
O.K. ↓

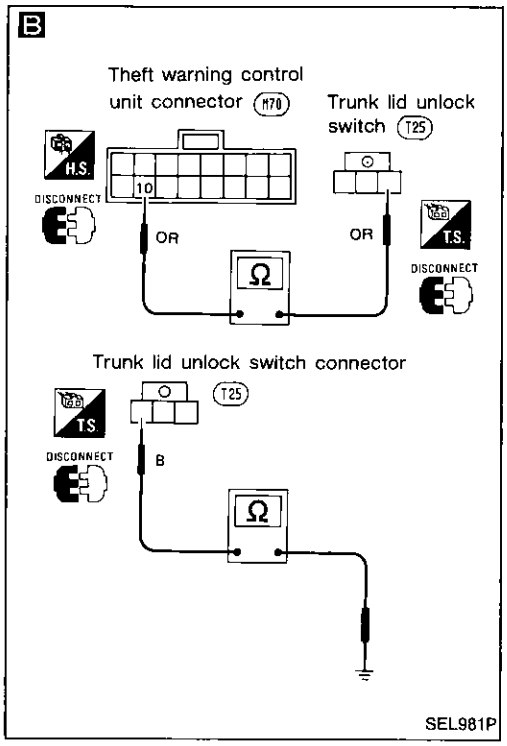
CHECK THE CONNECTIONS AT EACH CONNECTOR.

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 ⑯.

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.

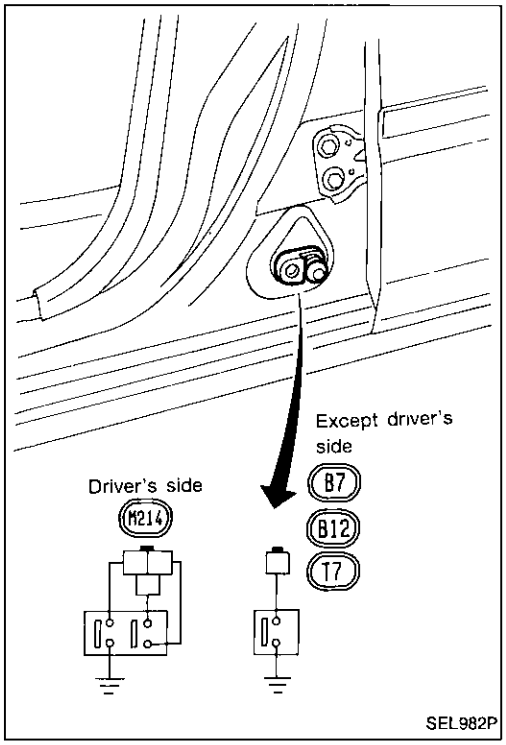
N.G. → Repair harness or connectors.

O.K.

CHECK THE CONNECTIONS AT EACH CONNECTOR.

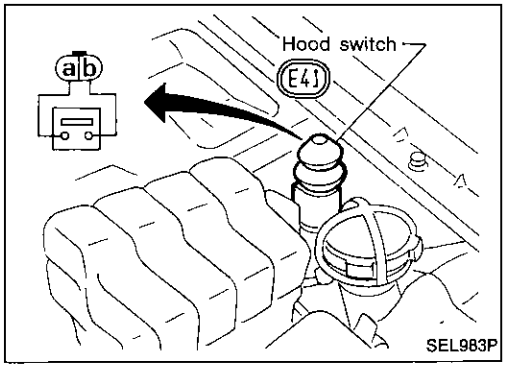
Trouble Diagnoses (Cont'd)

ELECTRICAL COMPONENTS INSPECTION



Door switches

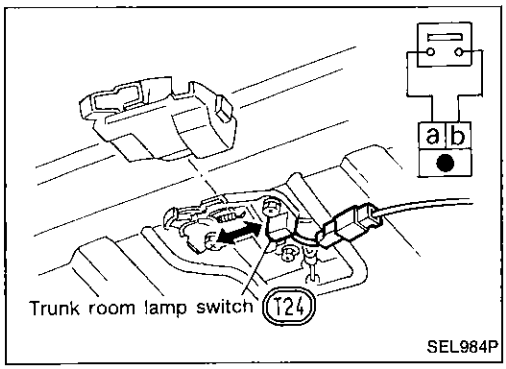
Check continuity between terminal and switch body.



Hood switch

Check continuity between terminals when hood switch is pushed and released.

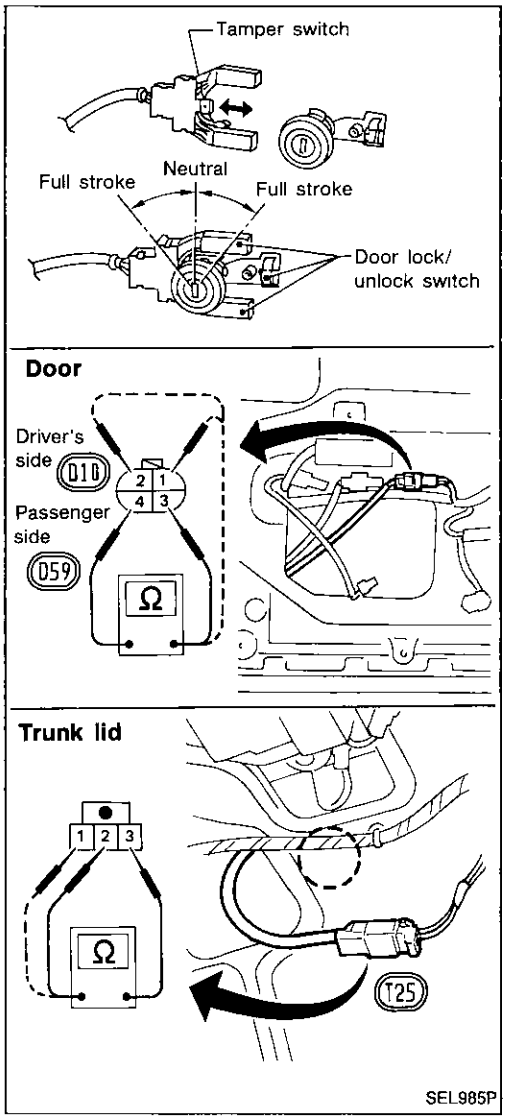
Terminal	Pushed	Released
a		○
b		○

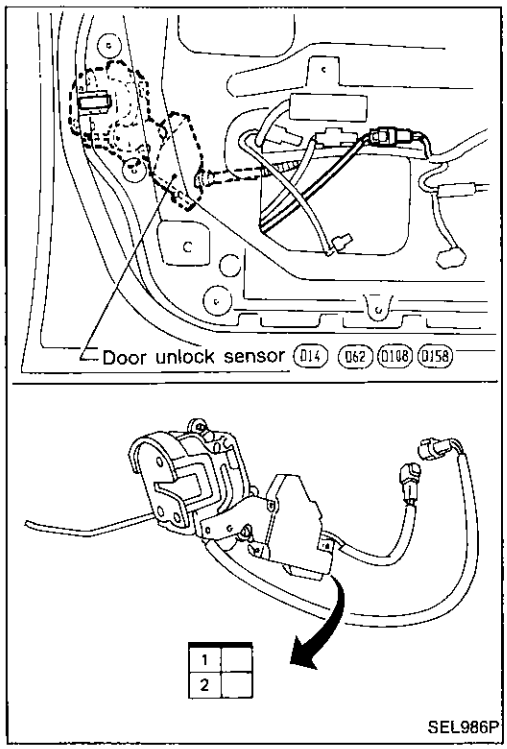


Trunk room lamp switch

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		○		○		○	

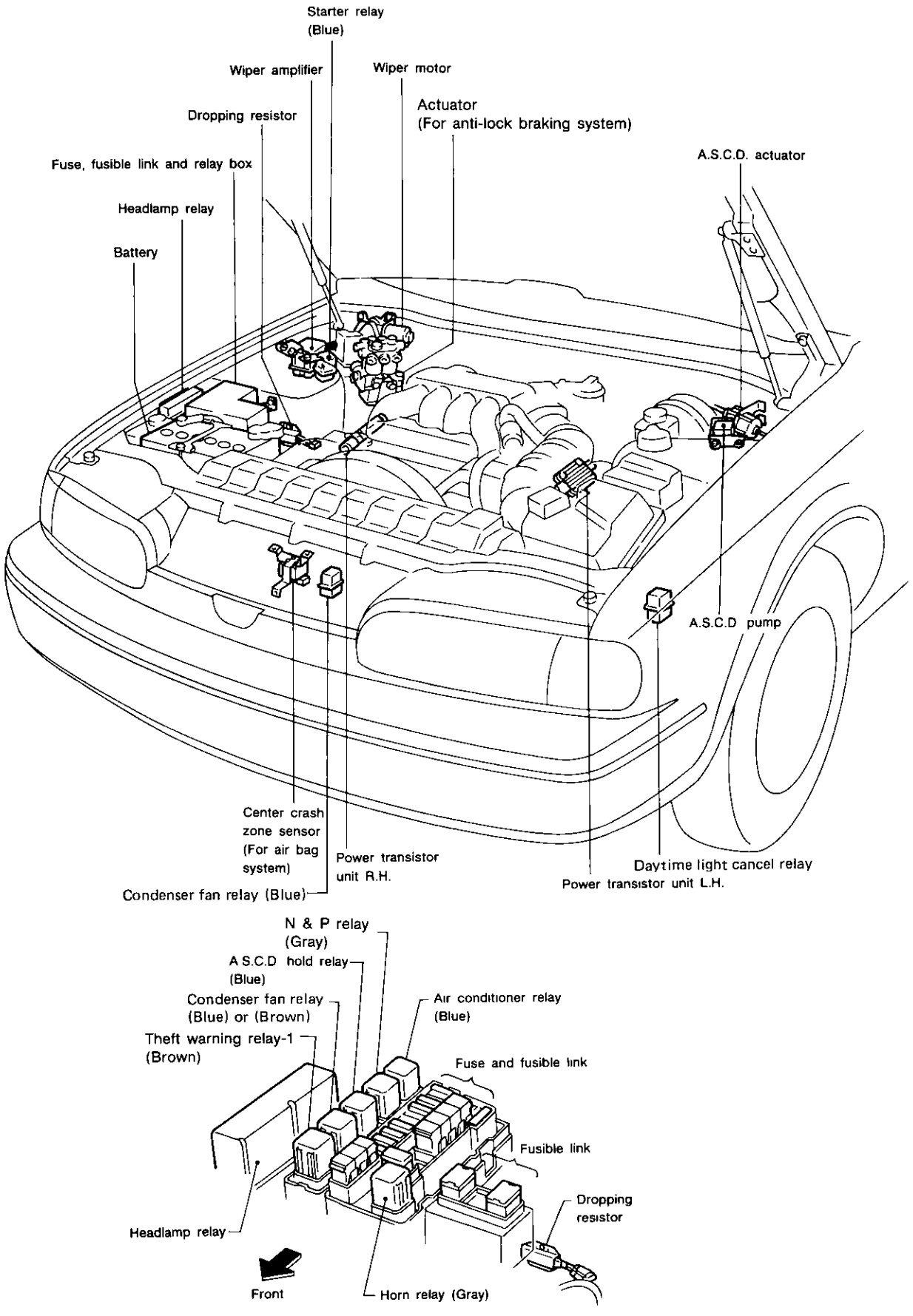
Trunk lid

	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

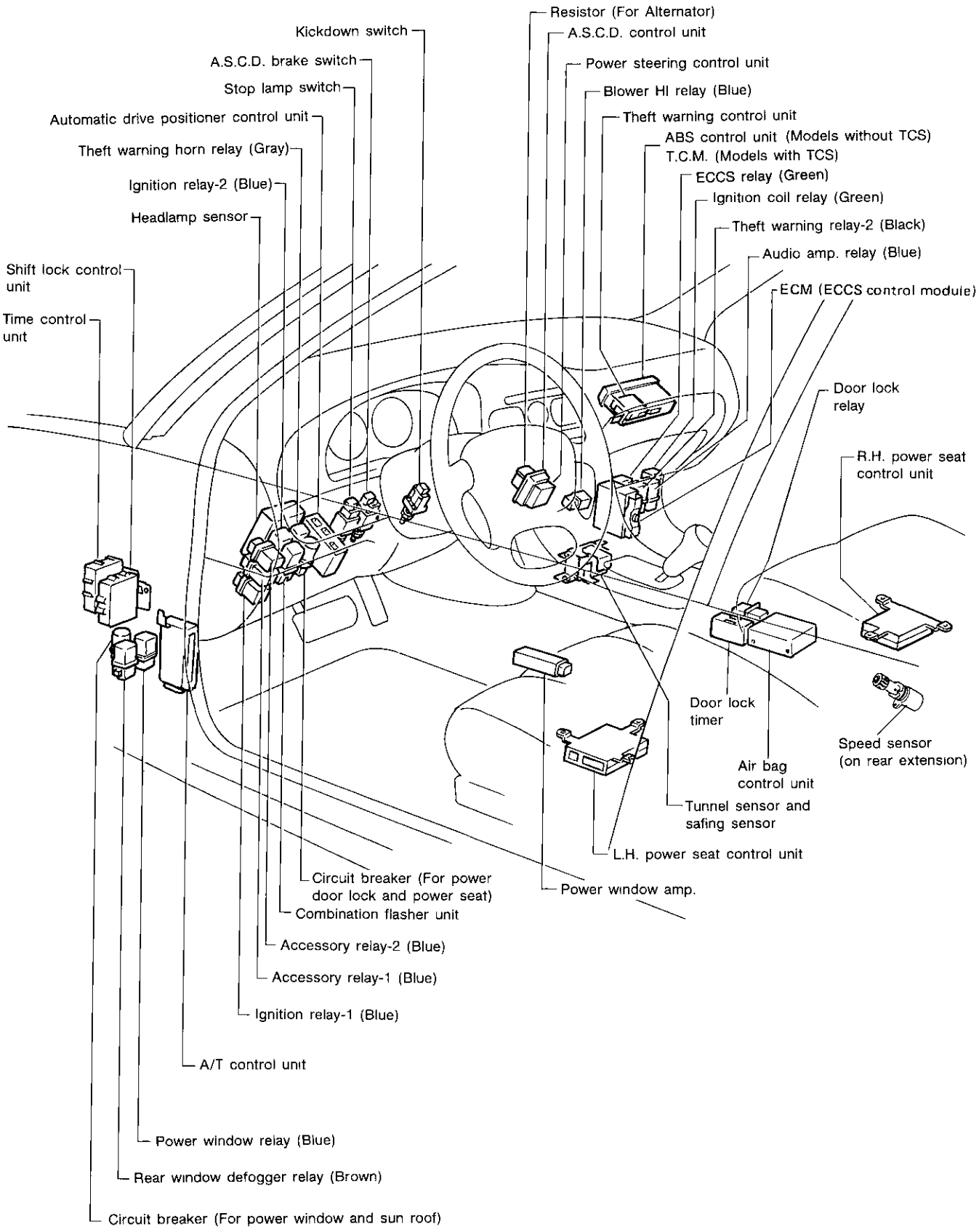
	LOCK	UNLOCK
1		○
2		○

Engine Compartment



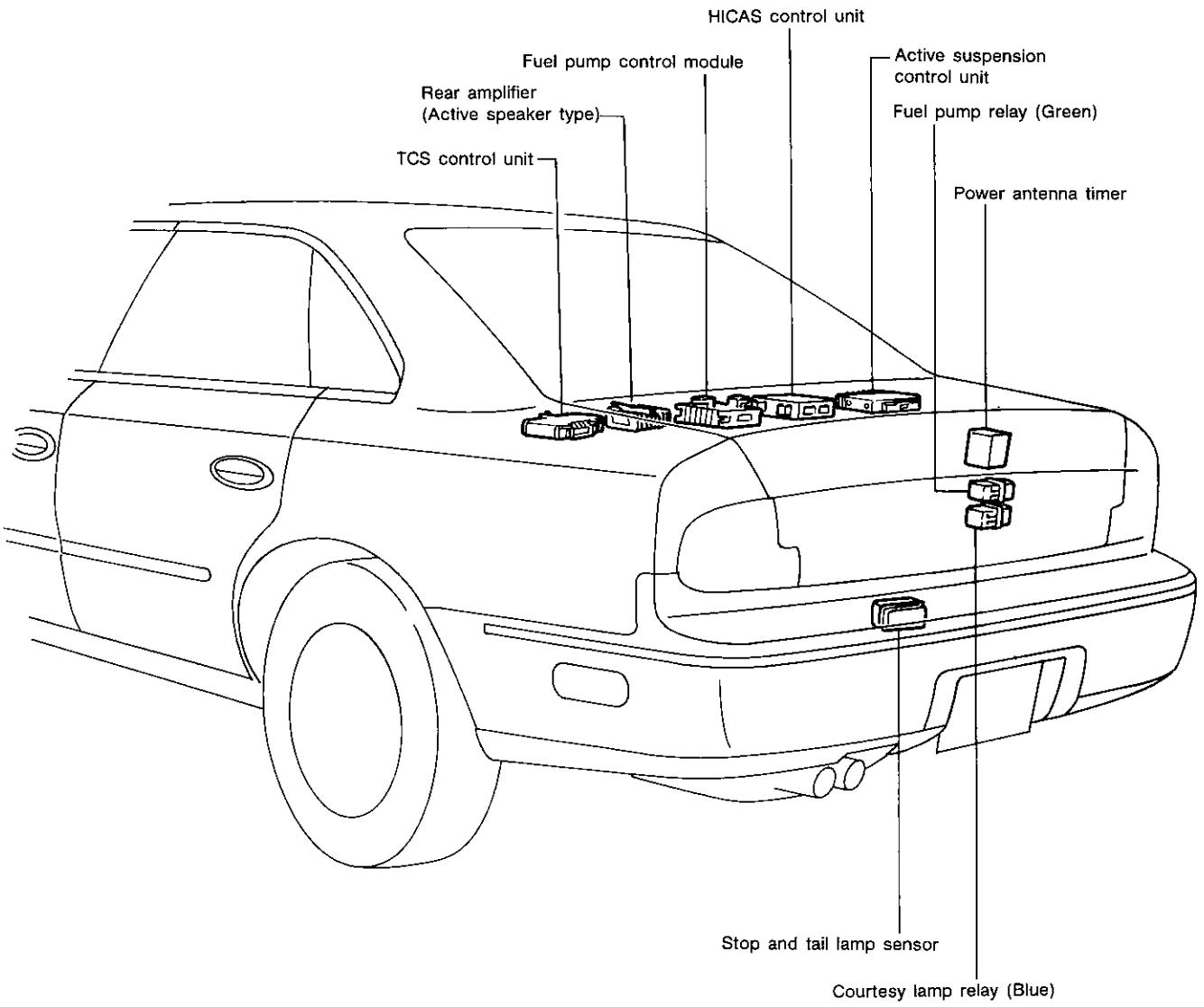
MEL788B

Passenger Compartment



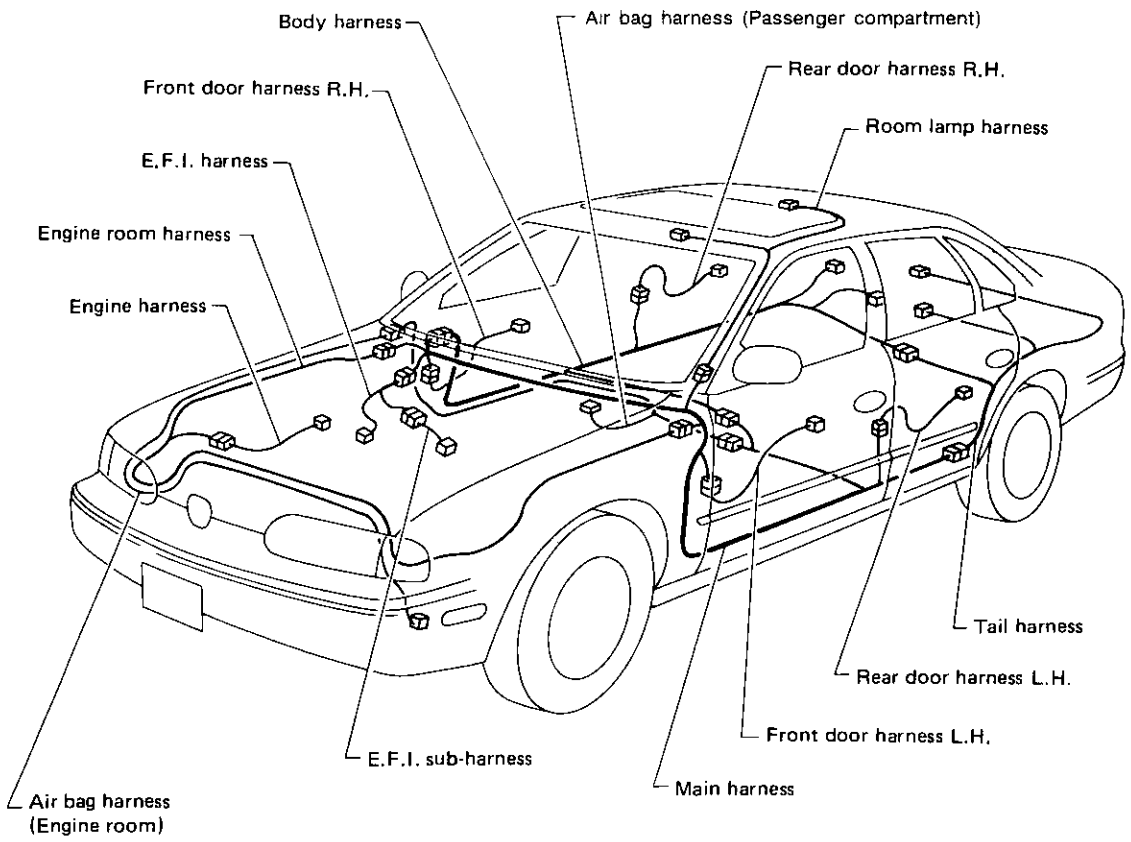
MEL803B

Luggage Compartment

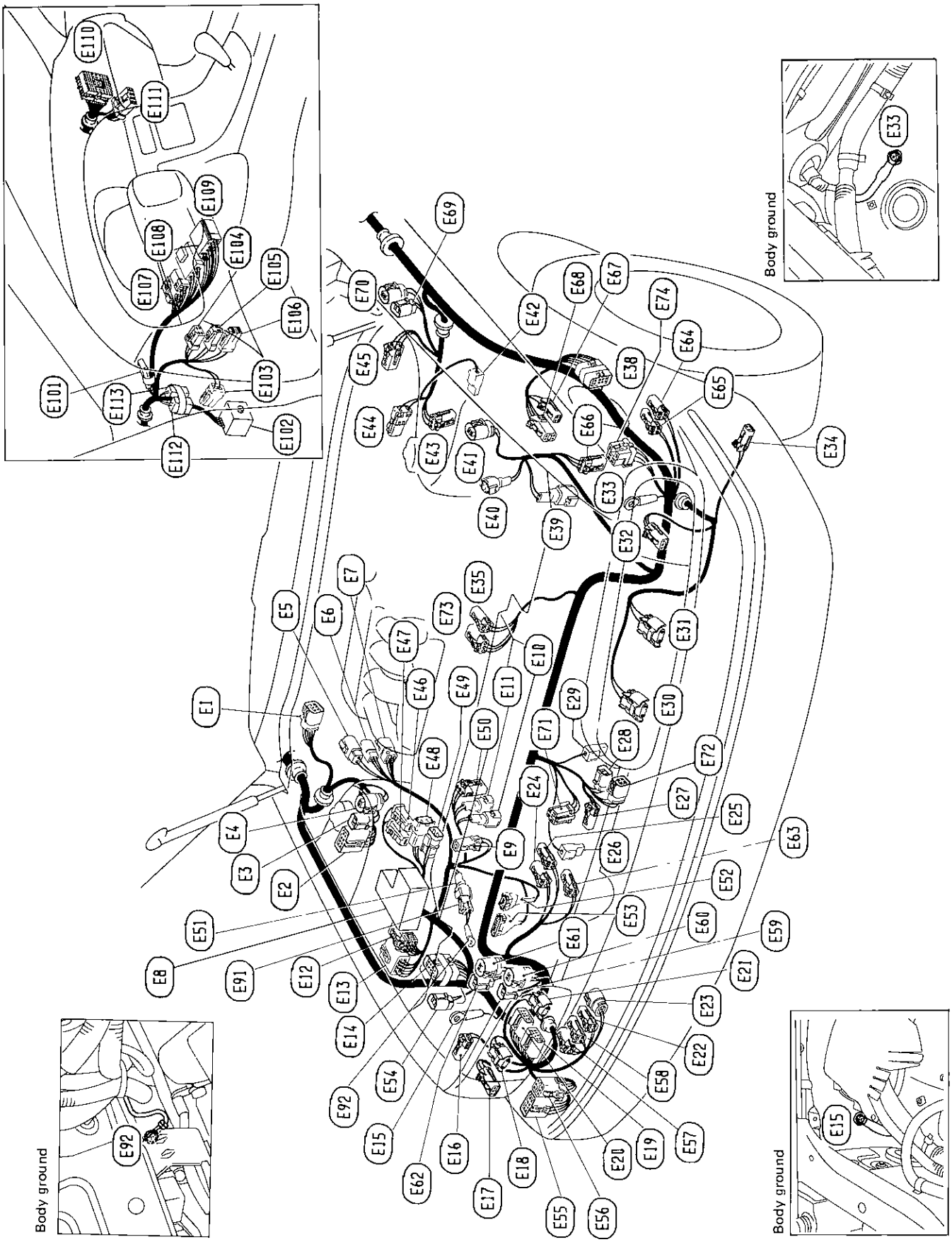


MEL565A

Outline


Body harness
Air bag harness (Passenger compartment)
Front door harness R.H.
Rear door harness R.H.
Room lamp harness
E.F.I. harness
Engine room harness
Engine harness
Tail harness
Rear door harness L.H.
Front door harness L.H.
E.F.I. sub-harness
Main harness
Air bag harness
(Engine room)
SEL757N

Engine Room Harness



Engine Room Harness (Cont'd)

E1 : Wiper motor
E2 : Wiper amplifier
E3 : Starter relay
E4 : Starter relay
E5 : Actuator (Anti-lock braking system)
E6 : Actuator (Anti-lock braking system)
E7 : Actuator (Anti-lock braking system)
E8 : Relay, fusible link and fuse box (Refer to "LOCATION OF ELECTRICAL UNITS".)
E9 : Dropping resistor
E10 : Brake pad sensor (Brown)
E11 : Front sensor R.H. (Anti-lock braking system) (Gray)
E12 : Headlamp relay unit
E13 : Headlamp relay unit
E14 : Joint connector
E15 : Body ground
E16 : Front side marker lamp R.H.
E17 : Front combination lamp R.H.
E18 : Headlamp R.H. (DIM.) (Brown)
E19 : Joint connector
E20 : Joint connector
E21 : Headlamp R.H. (MAIN) (Black)
E22 : Washer sensor
E23 : Washer motor
E24 : Dual-pressure switch (A/C) (Gray)
E25 : A/C pressure switch (A/C) (Brown)
E26 : Horn R.H.
E27 : Ambient sensor (A/C)
E28 : Condenser fan motor (For Canada)
E29 : Horn L.H.
E30 : Headlamp L.H. (MAIN) (Black)
E31 : Headlamp L.H. (DIM.) (Brown)

E32 : Front combination lamp L.H.
E33 : Body ground
E34 : Front side marker lamp L.H.
E35 : Thermoswitch (For Canada)
E36 : Joint connector
E39 : Front sensor L.H. (Anti-lock braking system)
E40 : Power steering oil level switch
E41 : Hood switch (Theft warning system)
E42 : Theft warning horn
E43 : HICAS solenoid
E44 : Brake fluid level switch
E45 : A.S.C.D. pump
E46 : Battery
E47 : Battery
E48 : To (N3)
E49 : To (N2)

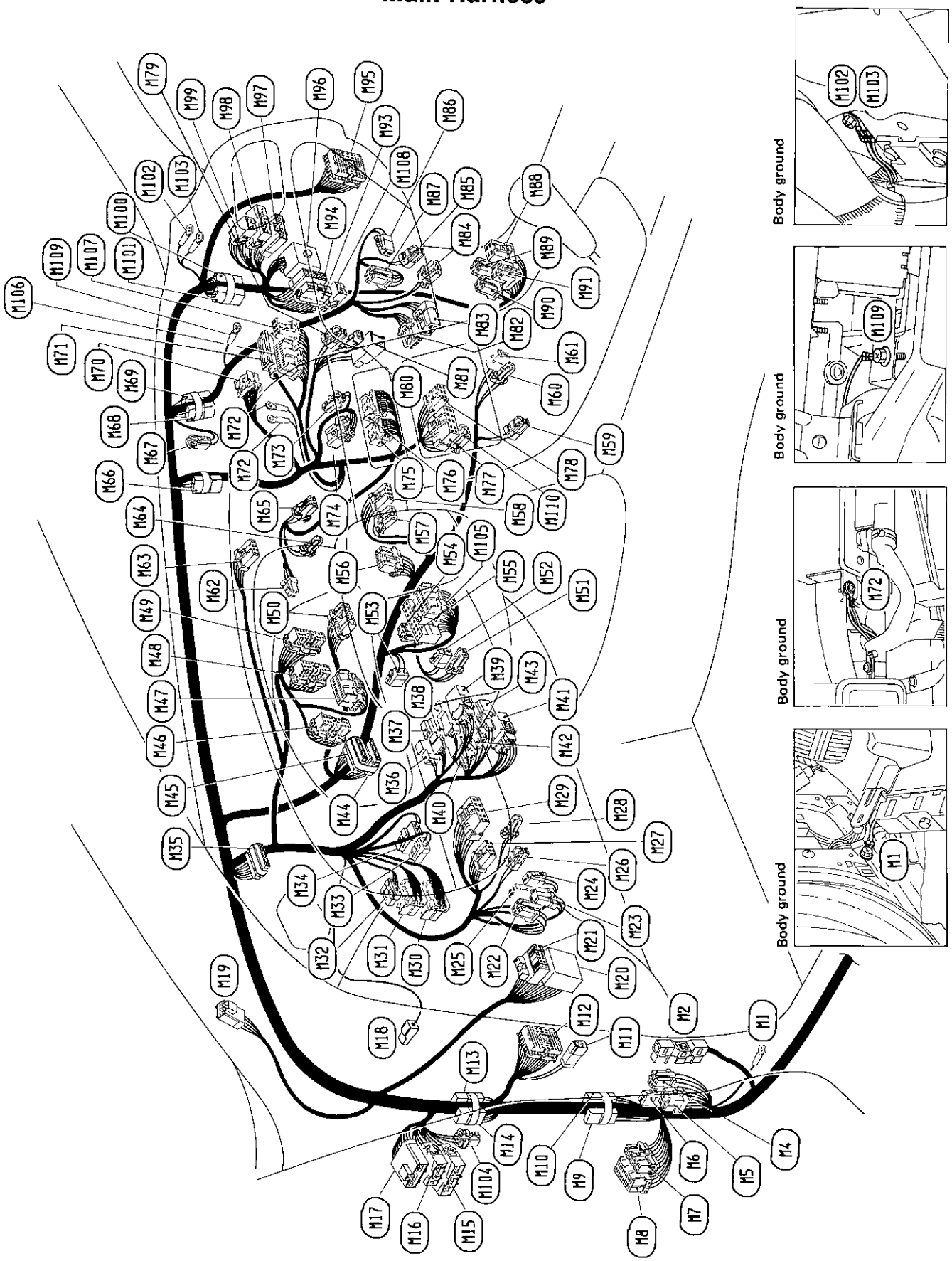
Passenger compartment

E100 : Joint connector
E102 : To (M12)
E103 : To (M11)
E104 : Fuse block
E105 : Fuse block
E106 : Fuse block
E107 : Headlamp sensor
E108 : Ignition switch
E109 : Combination switch
E110 : To (M96)
E111 : To (826) (Models with T.C.S.)
E112 : Diode (For Canada)
E113 : Diode (For Canada)

E50 : Front R.H. vehicle height sensor (Models with active suspension)
E51 : To (E91) (Models with T.C.S.)
E52 : T.C.S. actuator
E53 : T.C.S. actuator
E54 : Loading pump for T.C.S.
E55 : Daytime light control unit (For Canada)
E56 : Daytime light control unit (For Canada)
E57 : Front pressure control unit
E58 : (Models with active suspension)
E59 : T.C.M. relay (Models with T.C.S.)
E60 :
E61 : T.C.S. relay (Models with T.C.S.)
E62 :
E63 : Oil pressure switch (Models with active suspension)
E64 : Oil temperature sensor (Models with active suspension)
E65 : Oil level switch (Models with active suspension)
E66 : Front L.H. vehicle height sensor (Models with active suspension)
E67 : Oil cooler fan motor (Models with active suspension)
E68 : Multi-valve unit (Models with active suspension)
E69 : Oil cooler fan relay
E70 : (Models with active suspension)
E71 : Condenser fan relay (Blue) (For U.S.A.)
E72 : Condenser fan motor (For U.S.A.)
E73 : Thermoswitch (For U.S.A.)
E74 : Daytime light cancel relay (For Canada)
E91 : To (E51) (Models with T.C.S.)
E92 : Body ground (Models with T.C.S.)

MEL789B

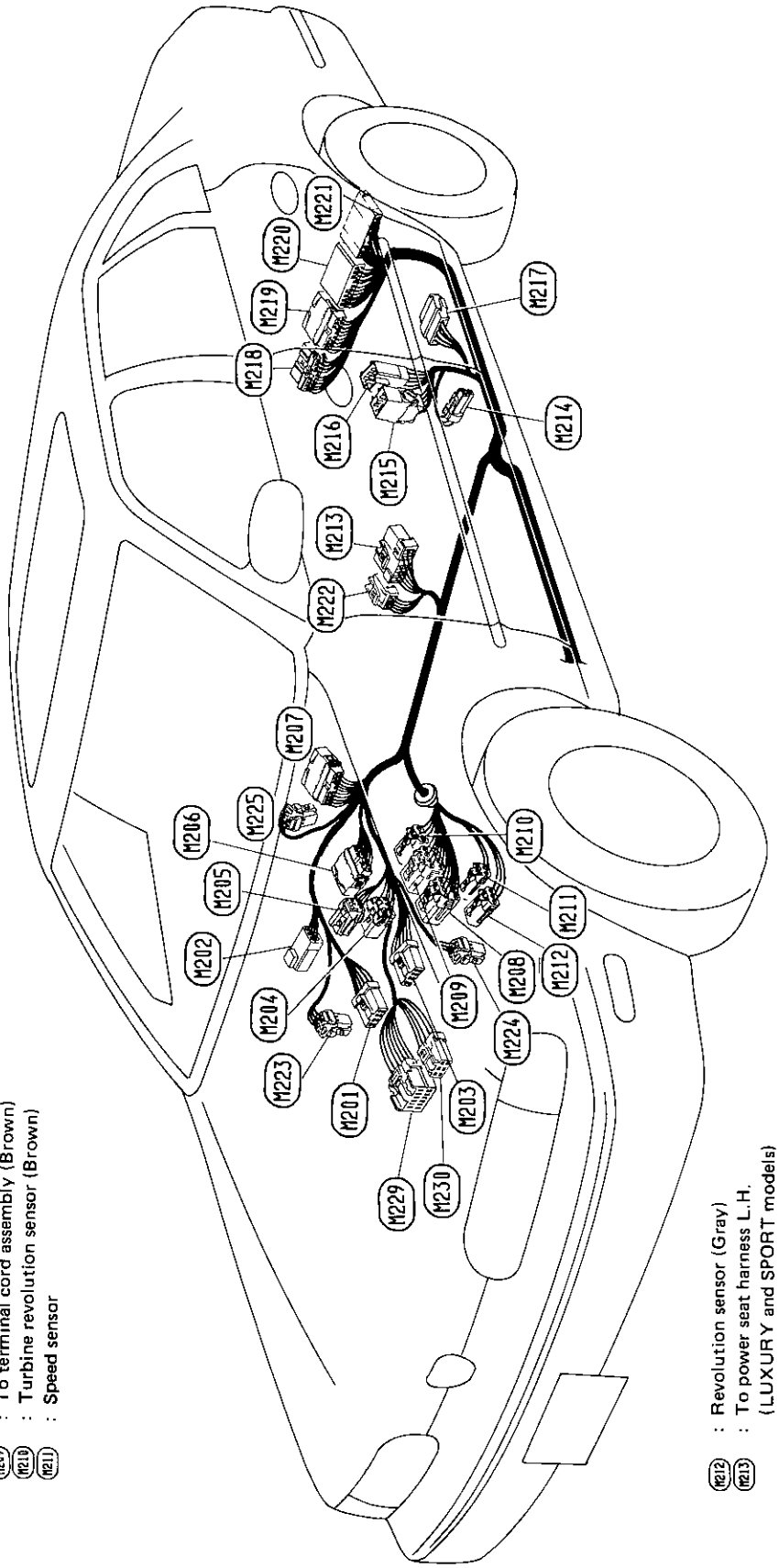
Main Harness



Main Harness (Cont'd)

MEL790B

Main Harness (Cont'd)



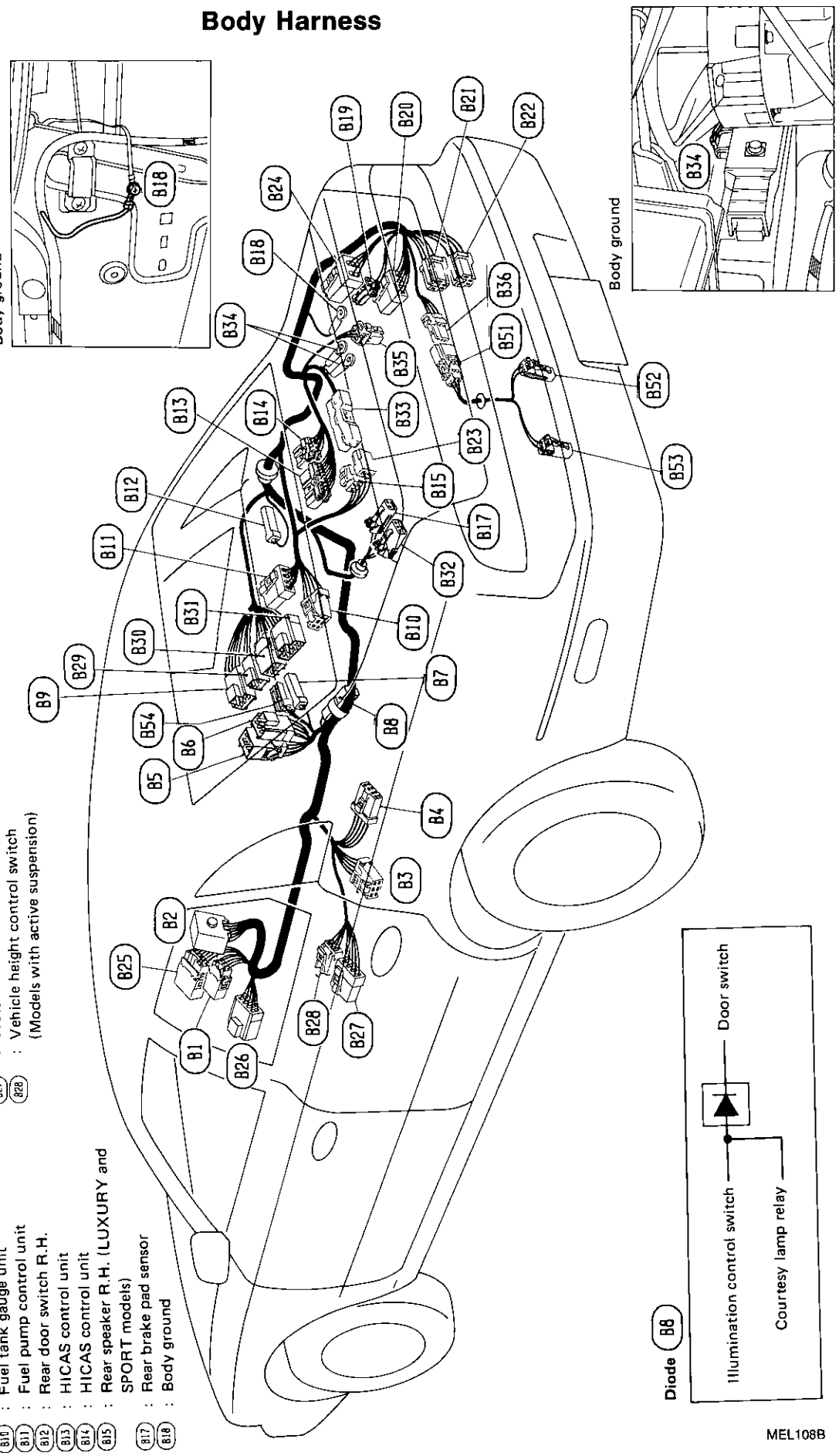
(M201) : Power window console switch R.H.
(M202) : To (B3)
(M203) : Power window console switch L.H.
(M204) : Shift lock solenoid & detention switch
(M205) : 1st position switch
(M206) : To (A1)
(M207) : Handset & speaker (For telephone)
(M208) : Inhibitor switch (Gray)
(M209) : To terminal cord assembly (Brown)
(M210) : Turbine revolution sensor (Brown)
(M211) : Speed sensor

(M212) : Revolution sensor (Gray)
(M213) : To power seat harness L.H. (LUXURY and SPORT models)
(M214) : Front door switch L.H.
(M215) : To (D102)
(M216) : To (D101)
(M217) : Joint connector (Black)
(M218) : To (T4) (Black)
(M219) : To (T3) (White)
(M220) : To (T2) (Black)
(M221) : To (T1) (White) (Models with T.C.S.)
(M222) : To power seat harness L.H. (STD model)

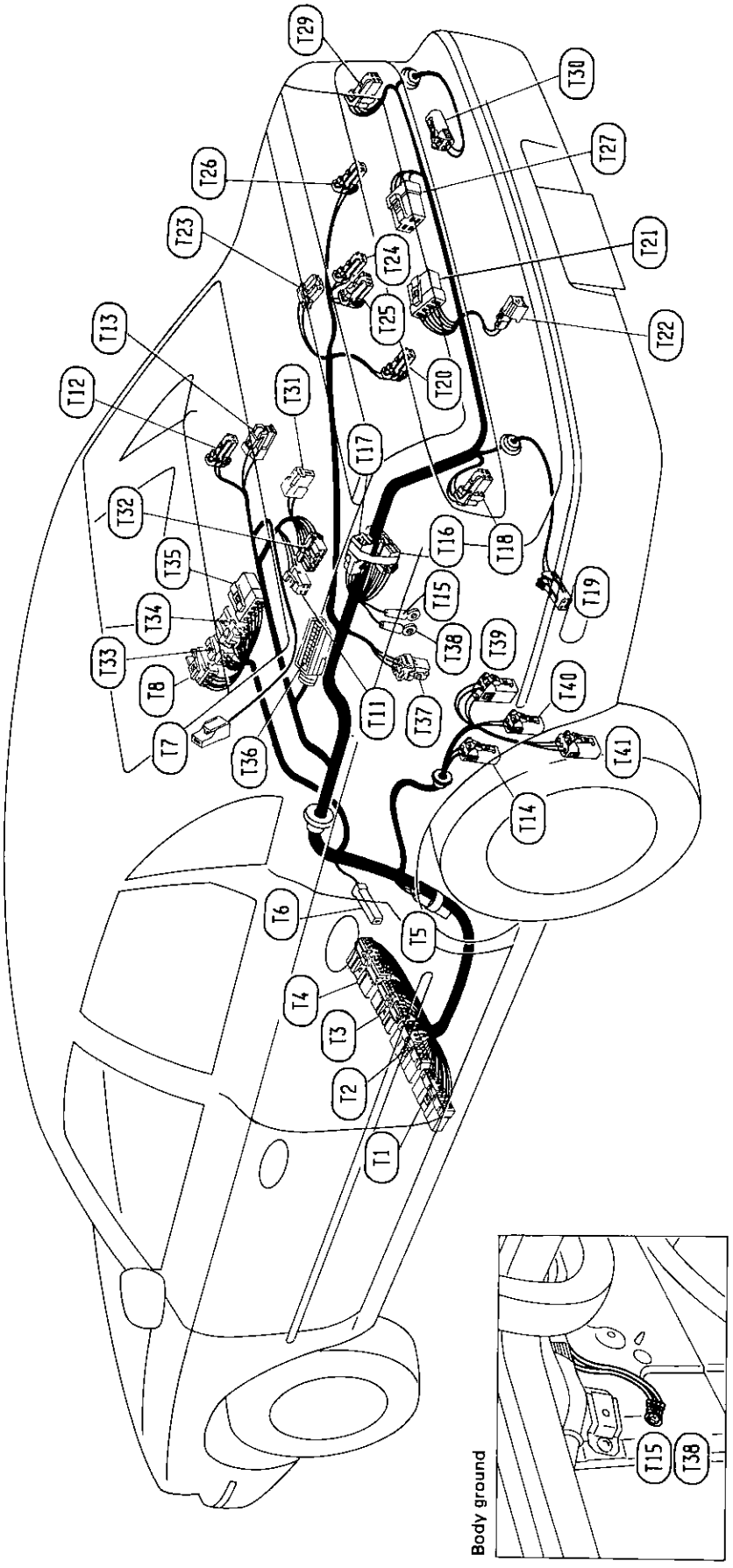
(M223) : Fore & aft G sensor (Models with active suspension)
(M224) : Lateral G sensor-1 (Models with active suspension)
(M225) : Lateral G sensor-2 (Models with active suspension)
(M229) : Door lock timer
(M230) : Door lock timer

MEL791B

Body Harness



Tail Harness

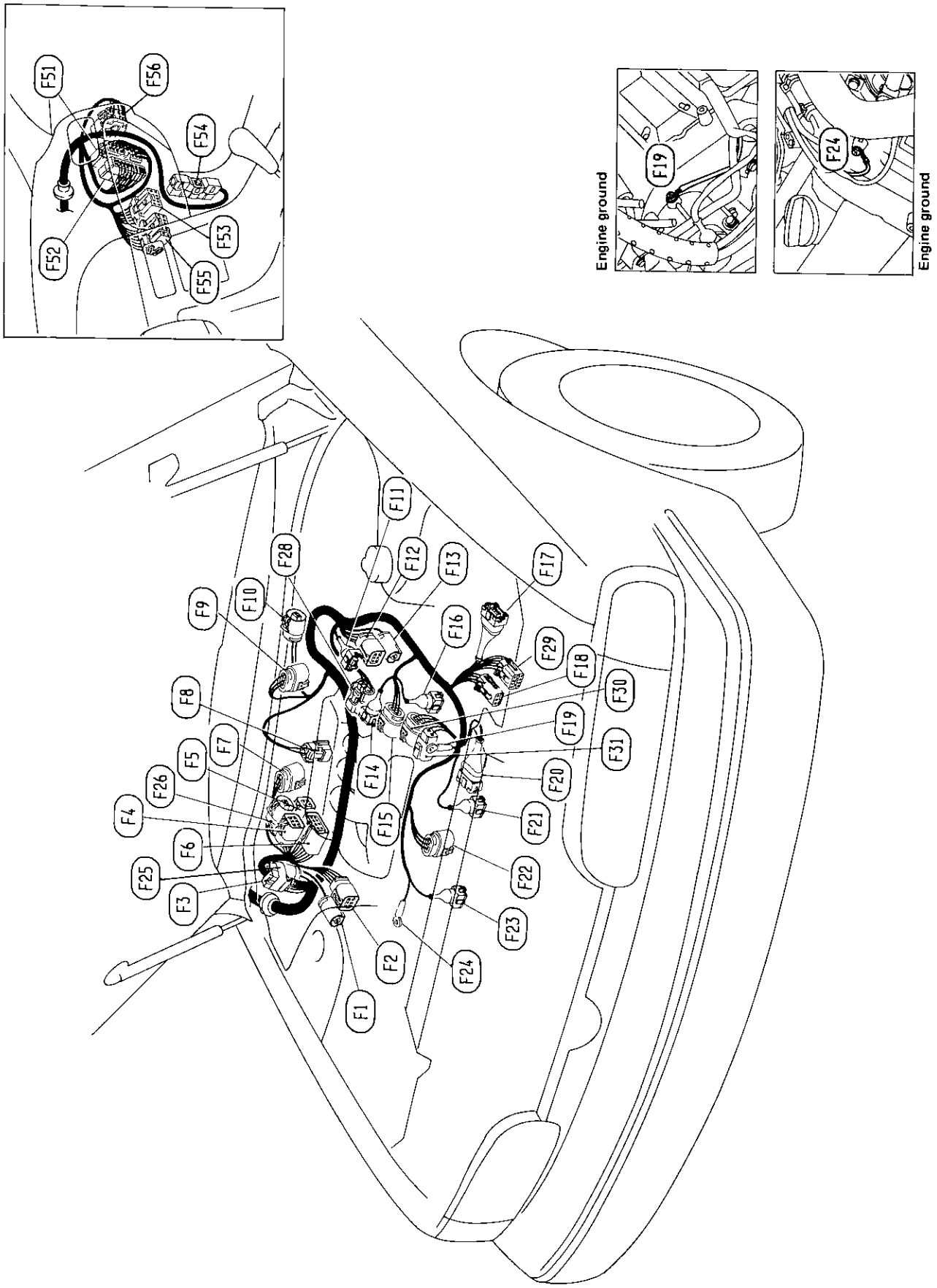


Tail Harness (Cont'd)

(T1) : To (M22) (White)
(T2) : To (M20) (Black)
(T3) : To (M19) (White)
(T4) : To (M18) (Black)
(T5) : Diode
(T6) : Rear door switch L.H.
(T7) : Rear window defogger
(T8) : To (B9) (Models without T.C.S.)
(T11) : Rear speaker L.H. (LUXURY and SPORT models)
(T12) : High-mounted stop lamp
(T13) : Trunk room lamp
(T14) : Fail-safe valve
(T15) : Body ground
(T16) : Receiver (For telephone)
(T17) : Receiver (For telephone)
(T18) : Rear combination lamp L.H.
(T19) : Rear side marker lamp L.H.
(T20) : Back-up lamp L.H.
(T21) : Stop and tail lamp sensor
(T22) : To license lamp harness
(T23) : High-mounted stop lamp (With rear air spoiler)
(T24) : Trunk room lamp switch
(T25) : Trunk lid unlock switch
(T26) : Back-up lamp R.H.
(T27) : Trunk lid opener actuator
(T29) : Rear combination lamp R.H.
(T30) : Rear side marker lamp R.H.
(T31) : Rear speaker L.H. (STD model)
(T32) : Rear amplifier (STD model)
(T33) : To (B29) (Models with T.C.S.)
(T34) : To (B30) (Models with T.C.S.)
(T35) : To (B31) (Models with T.C.S. and active suspension)
(T36) : T.C.S. control unit
(T37) : Rear L.H. vertical G sensor (Models with active suspension)
(T38) : Body ground (Models with T.C.S.)
(T39) : Rear skid sensor (Models with T.C.S.)
(T40) : Rear skid sensor (Models without T.C.S.)
(T41) : Rear L.H. vehicle height sensor (Models with active suspension)

MEL525A

E.F.I. Harness


F51
F56
F54
F52
F53
F55
F19
Engine ground
F24
Engine ground
F11
F28
F12
F13
F17
F9
F10
F16
F29
F18
F30
F8
F19
F7
F5
F31
F14
F20
F26
F4
F15
F21
F6
F22
F25
F3
F23
F2
F24
F1

(F1) : To (38)
(F2) : Power transistor unit R.H.
(F3) : Check connector
(F4) : To (31)
(F5) : To (351)
(F6) : To (352)
(F7) : Heated oxygen sensor R.H.
(F8) : IACV-AAC valve
(F9) : Heated oxygen sensor L.H.
(F10) : EGR temperature sensor
(F11) : EGRC-solenoid valve
(F12) : Power transistor unit L.H.
(F13) : To (369)
(F14) : Throttle position switch
(F15) : Throttle position sensor-1 (Models without T.C.S.)
(F16) : Canister control solenoid valve
(F17) : Mass air flow sensor
(F18) : To (331) (Models without active suspension)
(F19) : Engine ground
(F20) : Crankshaft position sensor
(F21) : V.T.C. solenoid valve L.H.
(F22) : Sub-Crankshaft position sensor
(F23) : V.T.C. solenoid valve R.H.
(F24) : Engine ground
(F25) : Check connector
(F26) : To (321) (Models with T.C.S.)
(F28) : Throttle position sensor-2 (Models with T.C.S.)
(F29) : To (332) (Models with active suspension)
(F30) : Throttle position sensor-1 (Models with T.C.S.)
(F31) : Throttle motor (Models with T.C.S.)

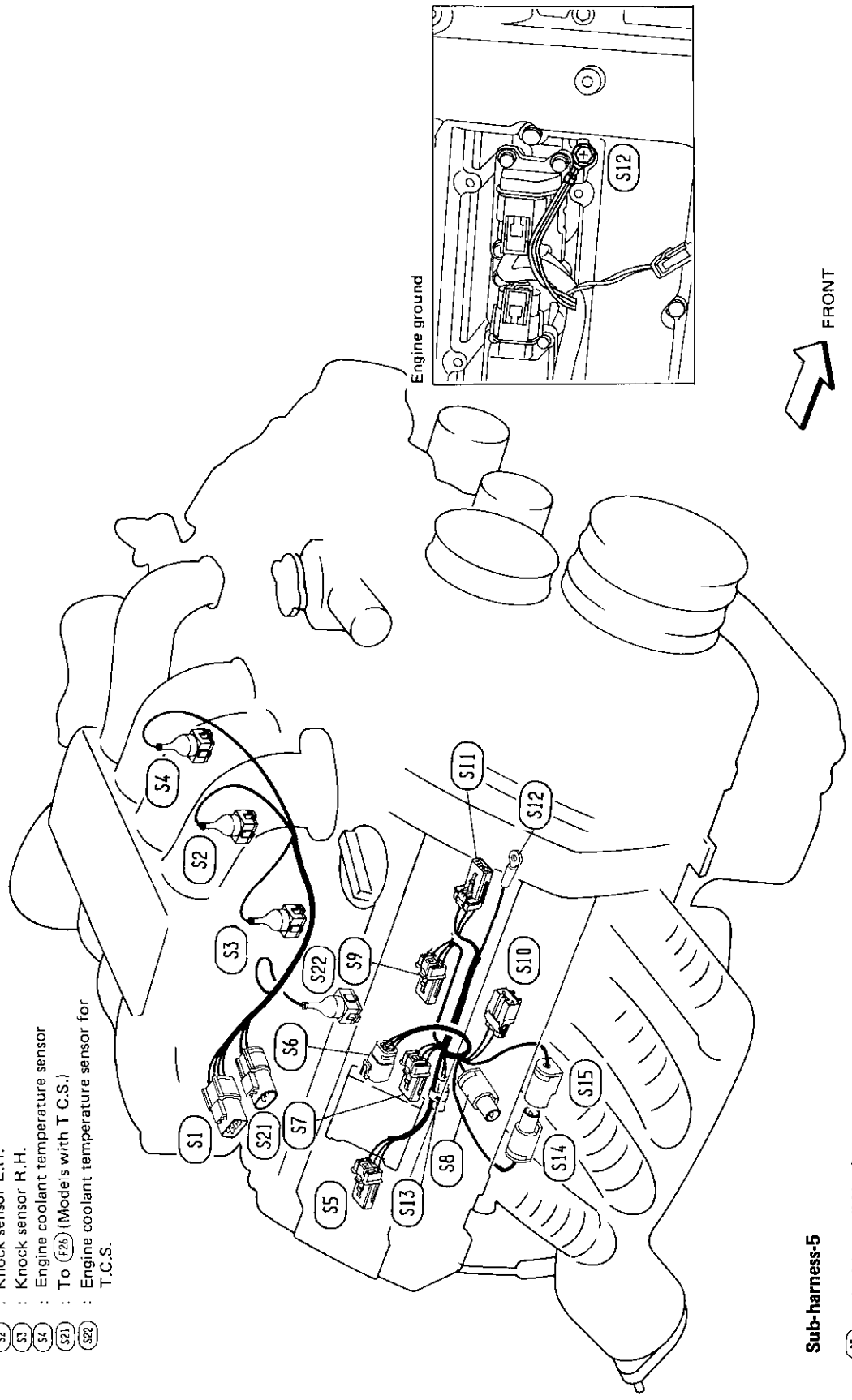
Passenger compartment

(F51) : To (M93)
(F52) : To (M94)
(F53) : To (81) (Models without T.C.S. and active suspension)
(F54) : ECM (ECCS control module)
(F56) : To (825) (Models with T.C.S. and active suspension)
(F57) : To (M118) (Models with T.C.S.)

GI
MA
EM
LC
EF & EC
FE
AT
PD
FA
RA
BR
ST
BF
HA
EL

MEL804B

E.F.I. Sub-harness



Sub-harness-2

- S1 : To F4
- S2 : Knock sensor L.H.
- S3 : Knock sensor R.H.
- S4 : Engine coolant temperature sensor
- S21 : To F26 (Models with T.C.S.)
- S22 : Engine coolant temperature sensor for T.C.S.

Sub-harness-5

- S5 : Ignition coil No. 8
- S6 : Power transistor unit R.H.
- S7 : Ignition coil No. 6
- S8 : To F1
- S9 : Ignition coil No. 4
- S10 : Check terminal 2
- S11 : Ignition coil No. 2
- S12 : Engine ground
- S13 : Resistor (Model with T.C.S.)
- S14 : Check connector (Models with T.C.S.)
- S15 : Check connector (Models with T.C.S.)

MEL805B

Sub-harness-1

- (S51) : To (F5)
- (S52) : To (F6)
- (S53) : Thermal transmitter
- (S54) : Injector No. 2
- (S55) : Injector No. 4
- (S56) : Injector No. 6
- (S57) : Injector No. 8
- (S58) : Injector No. 1
- (S59) : Injector No. 3
- (S60) : Injector No. 5
- (S61) : Injector No. 7

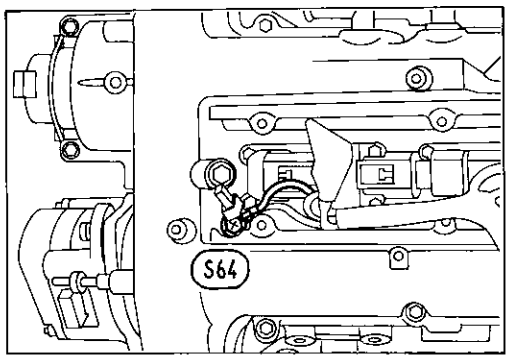
Sub-harness-3

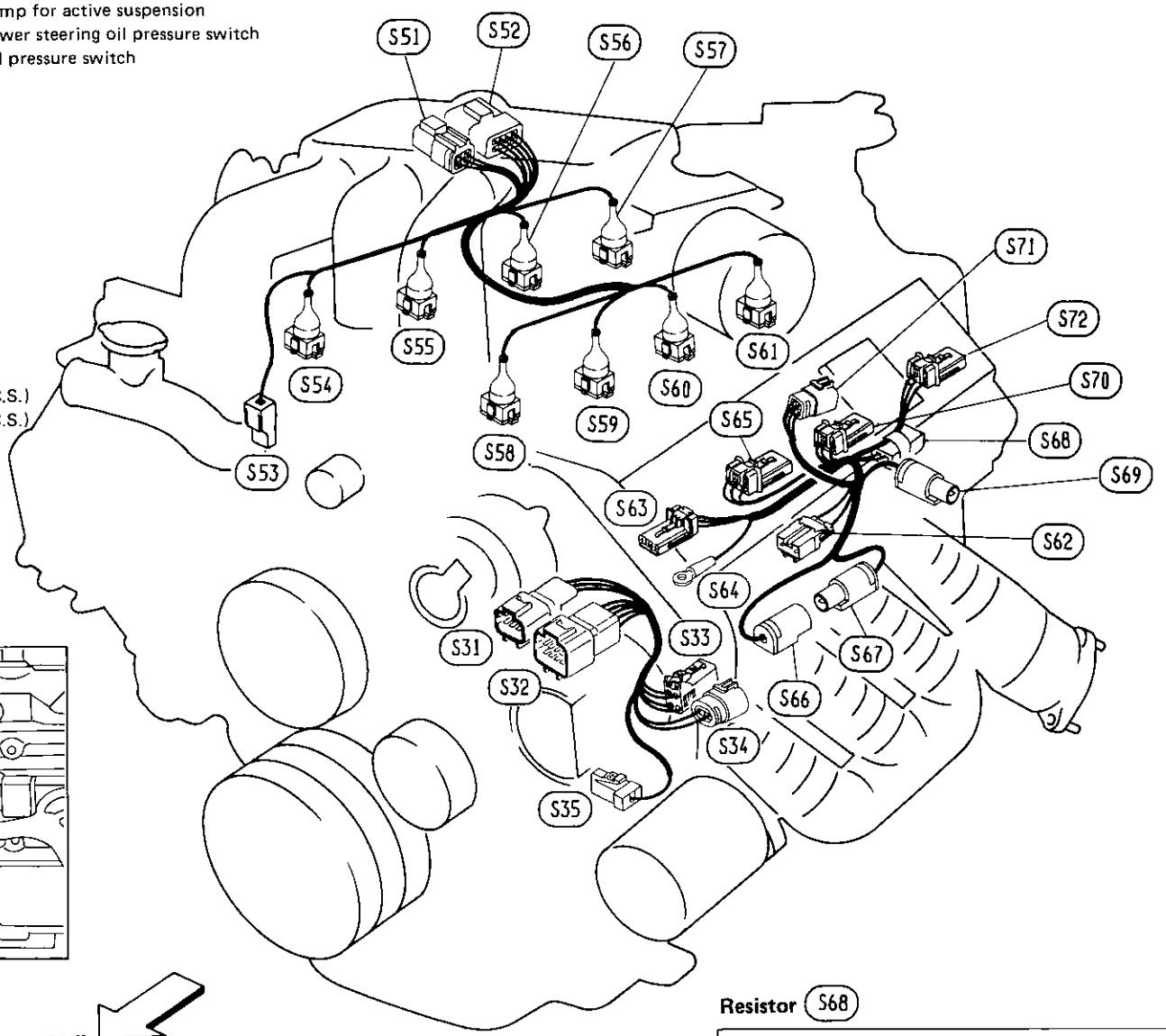
- (S31) : To (F18) (Models without active suspension)
- (S32) : To (F29) (Models with active suspension)
- (S33) : Pump for active suspension
- (S34) : Power steering oil pressure switch
- (S35) : Oil pressure switch

Sub-harness-4

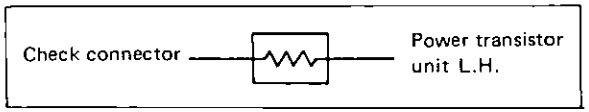
- (S62) : Check terminal 1
- (S63) : Ignition coil No. 1
- (S64) : Engine ground
- (S65) : Ignition coil No. 3
- (S66) : Check connector (Models without T.C.S.)
- (S67) : Check connector (Models without T.C.S.)
- (S68) : Resistor (Models without T.C.S.)
- (S69) : To (F13)
- (S70) : Ignition coil No. 5
- (S71) : Power transistor unit L.H.
- (S72) : Ignition coil No. 7

Engine ground



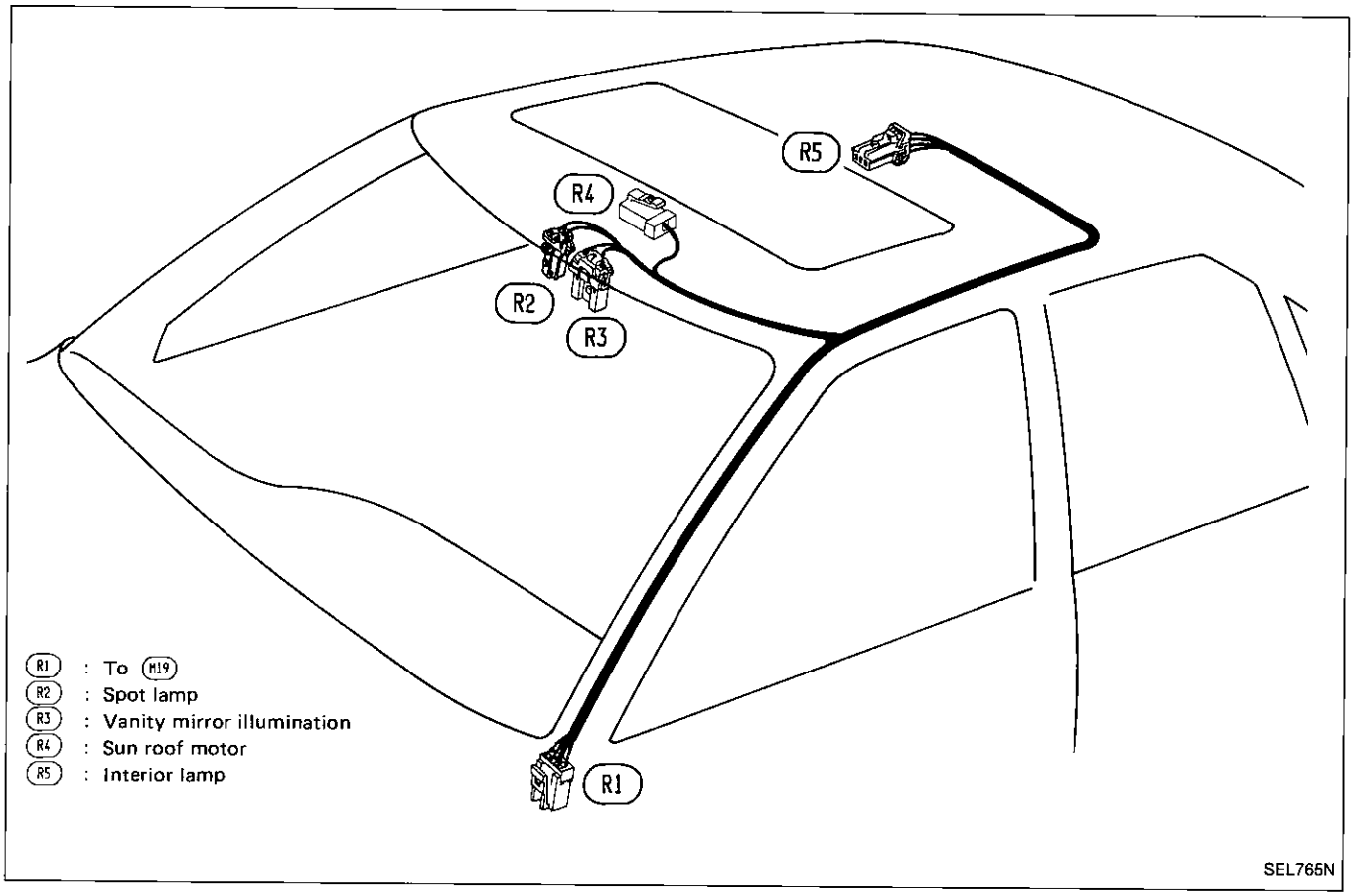


Resistor (S68)



MEL110B

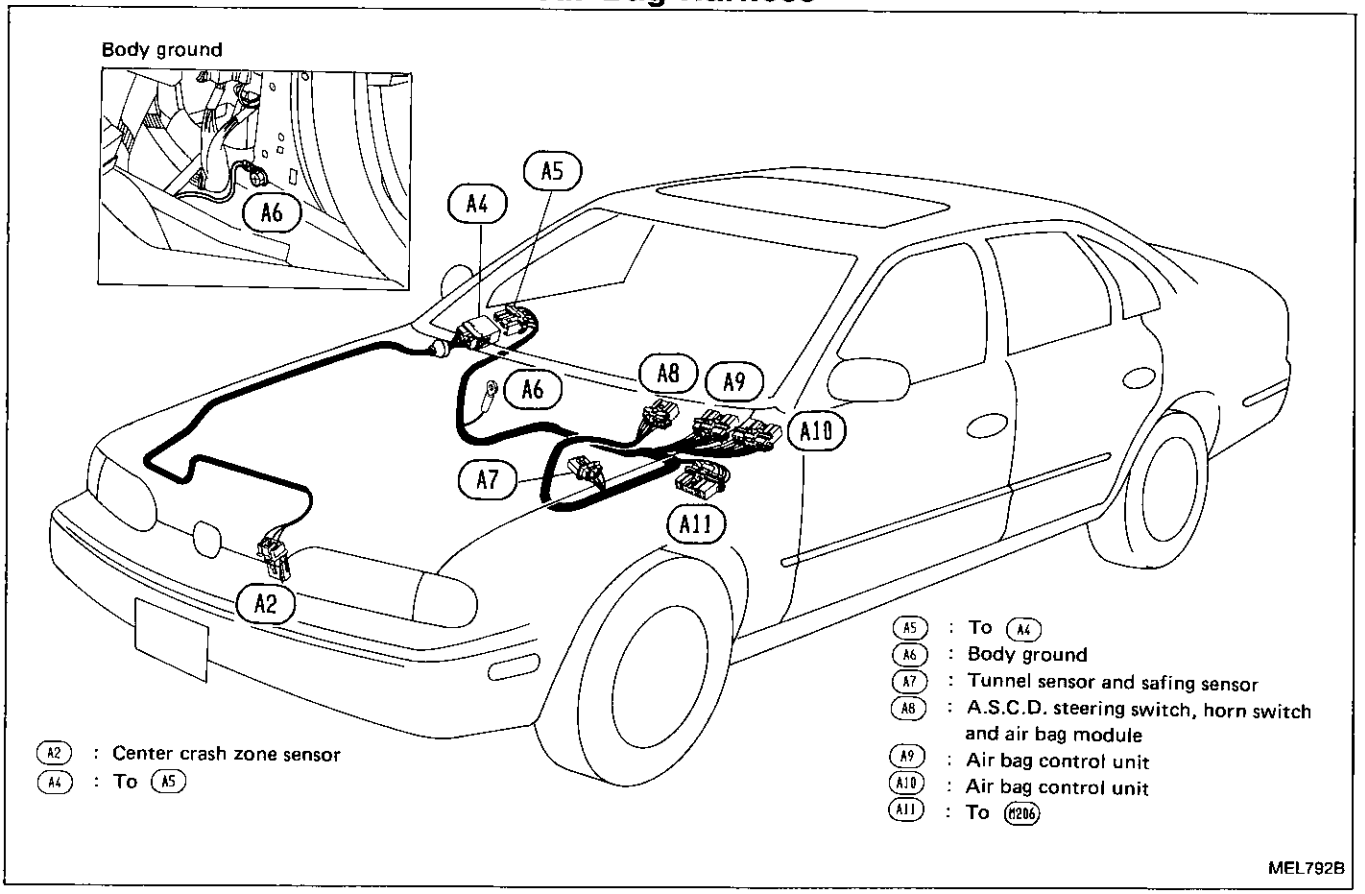
Room Lamp Harness



(R1) : To (M19)
(R2) : Spot lamp
(R3) : Vanity mirror illumination
(R4) : Sun roof motor
(R5) : Interior lamp

SEL765N

Air Bag Harness

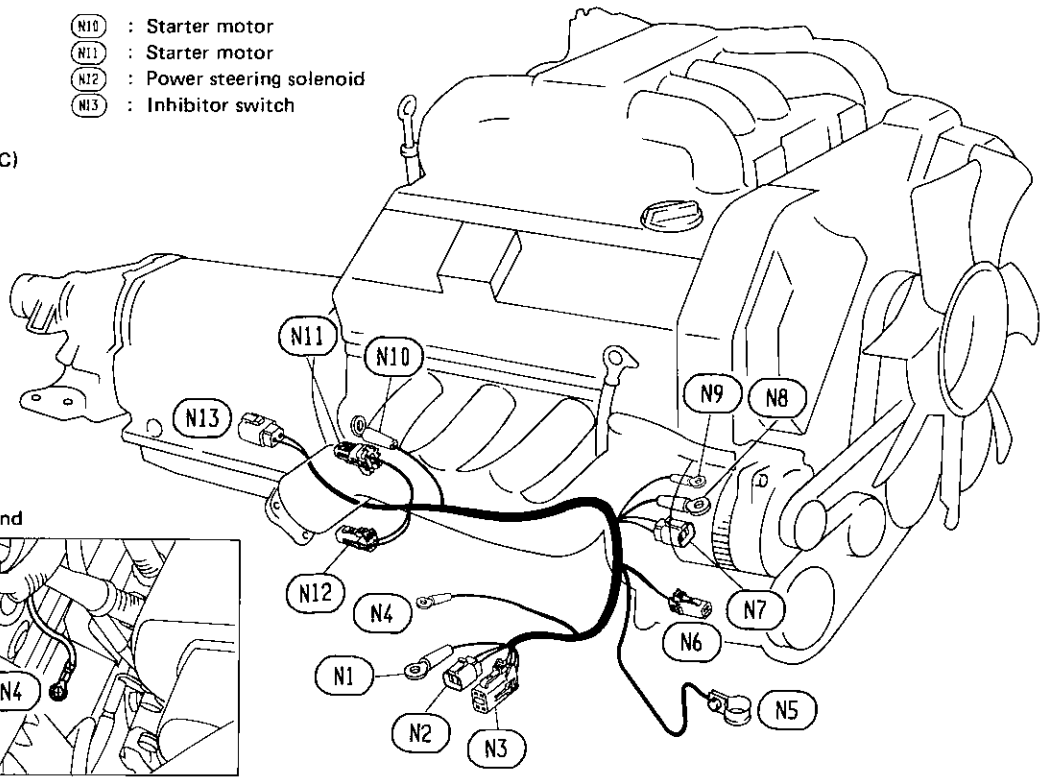


(A2) : Center crash zone sensor
(A4) : To (A5)
(A5) : To (A4)
(A6) : Body ground
(A7) : Tunnel sensor and safing sensor
(A8) : A.S.C.D. steering switch, horn switch and air bag module
(A9) : Air bag control unit
(A10) : Air bag control unit
(A11) : To (M206)

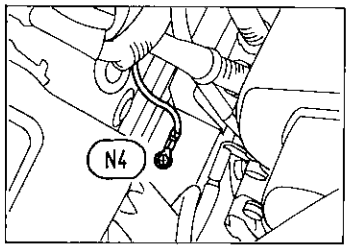
MEL792B

Engine Harness

(N1) : Fusible link box
(N2) : To (E49)
(N3) : To (E48)
(N4) : Body ground
(N5) : Battery
(N6) : Compressor (A/C)
(N7) : Alternator
(N8) : Alternator
(N9) : Alternator
(N10) : Starter motor
(N11) : Starter motor
(N12) : Power steering solenoid
(N13) : Inhibitor switch



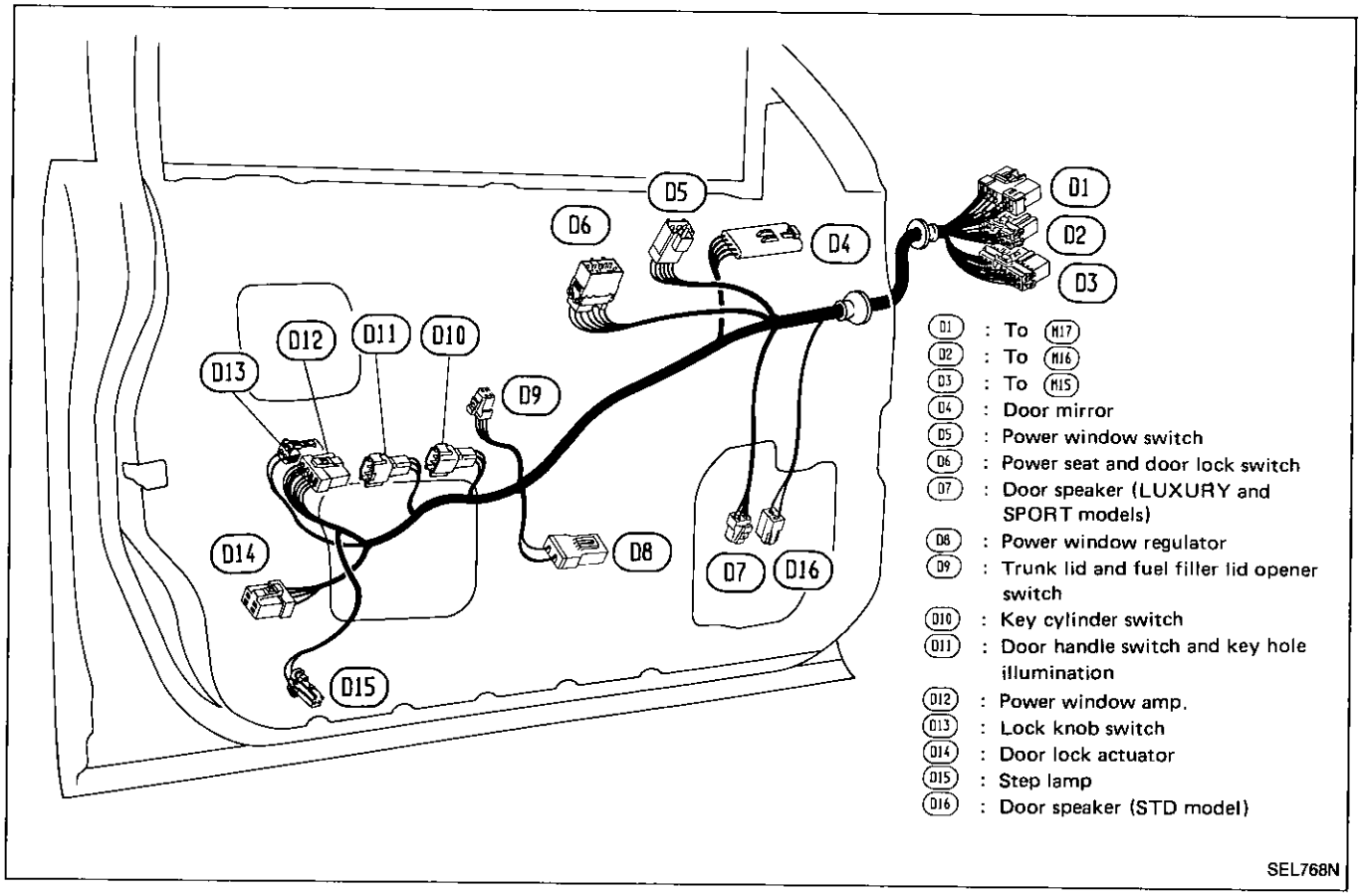
Body ground



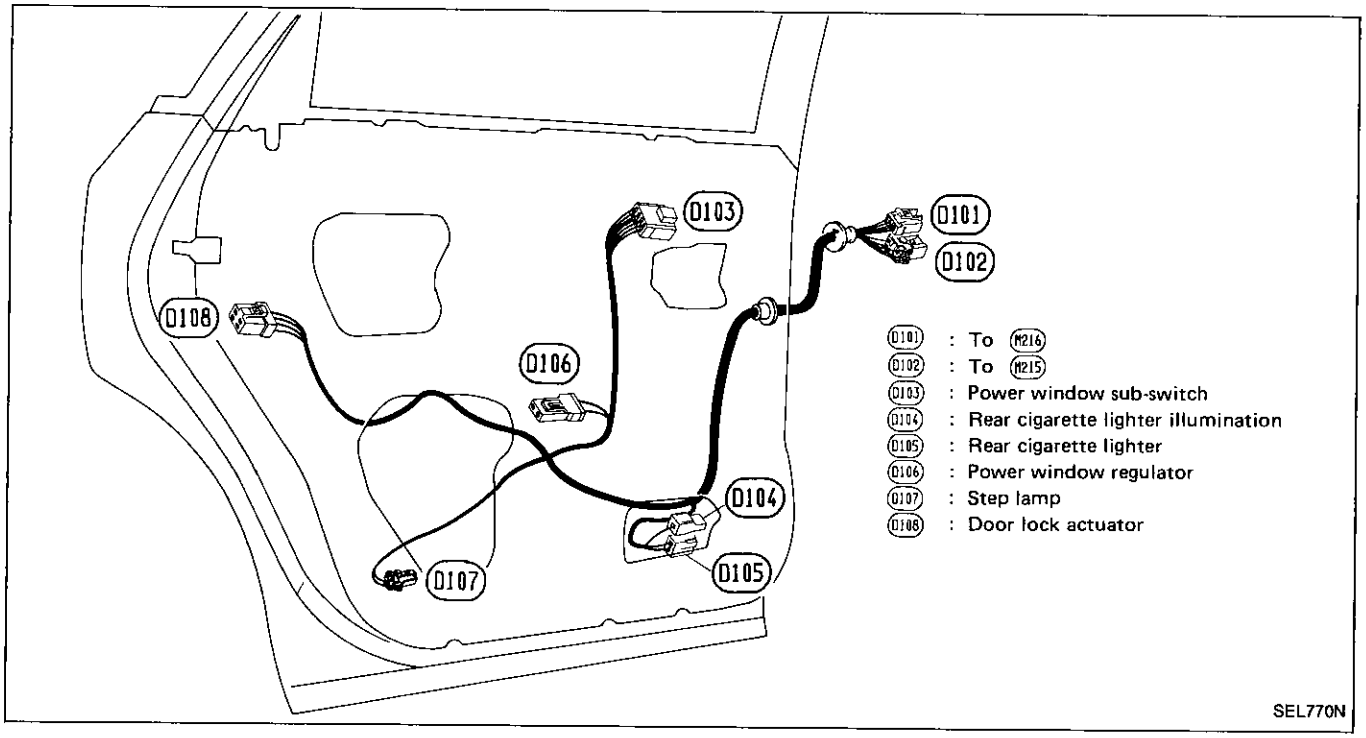
SEL767N

Door Harness (L.H. side)

FRONT

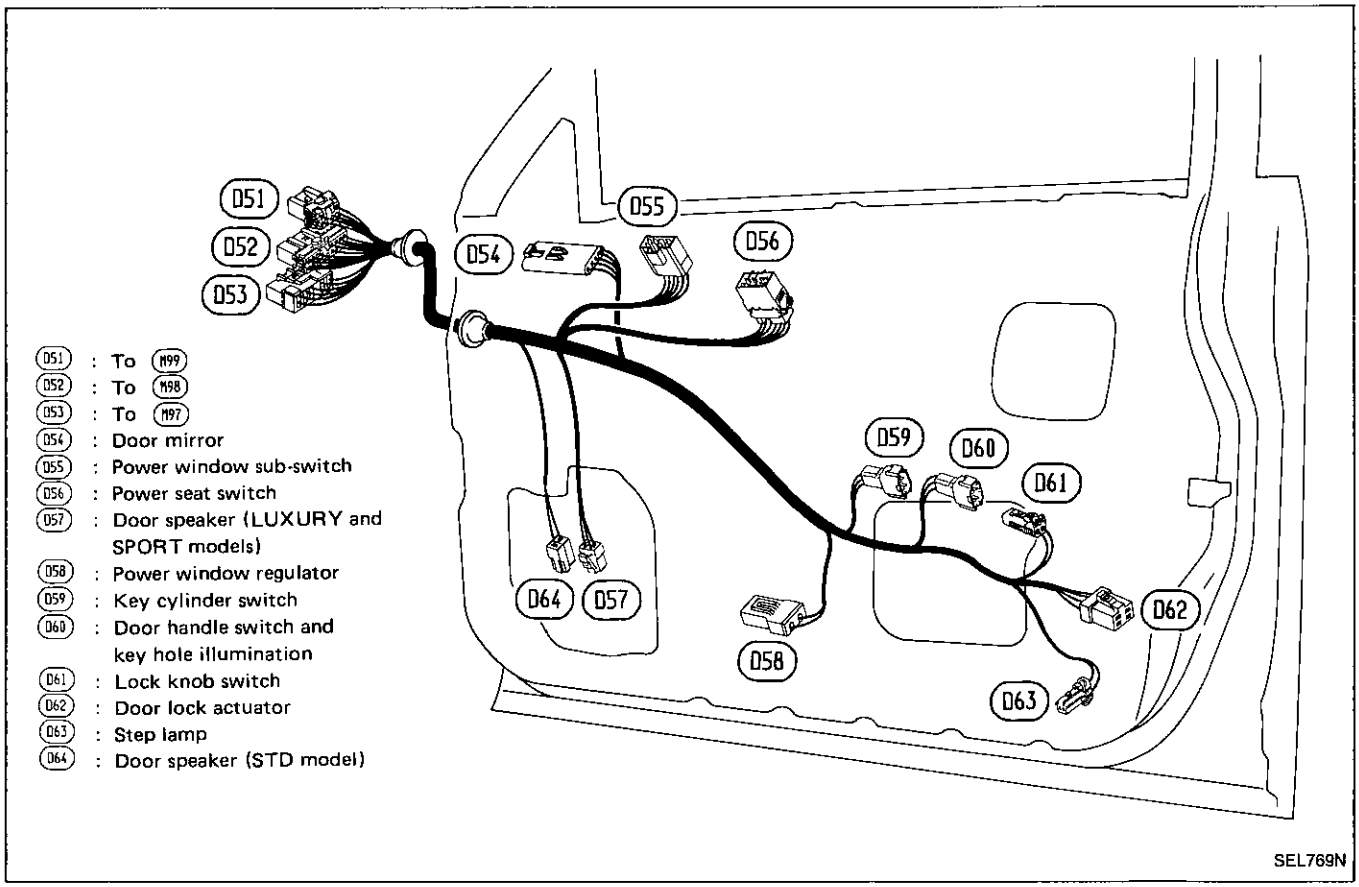


REAR



Door Harness (R.H. side)

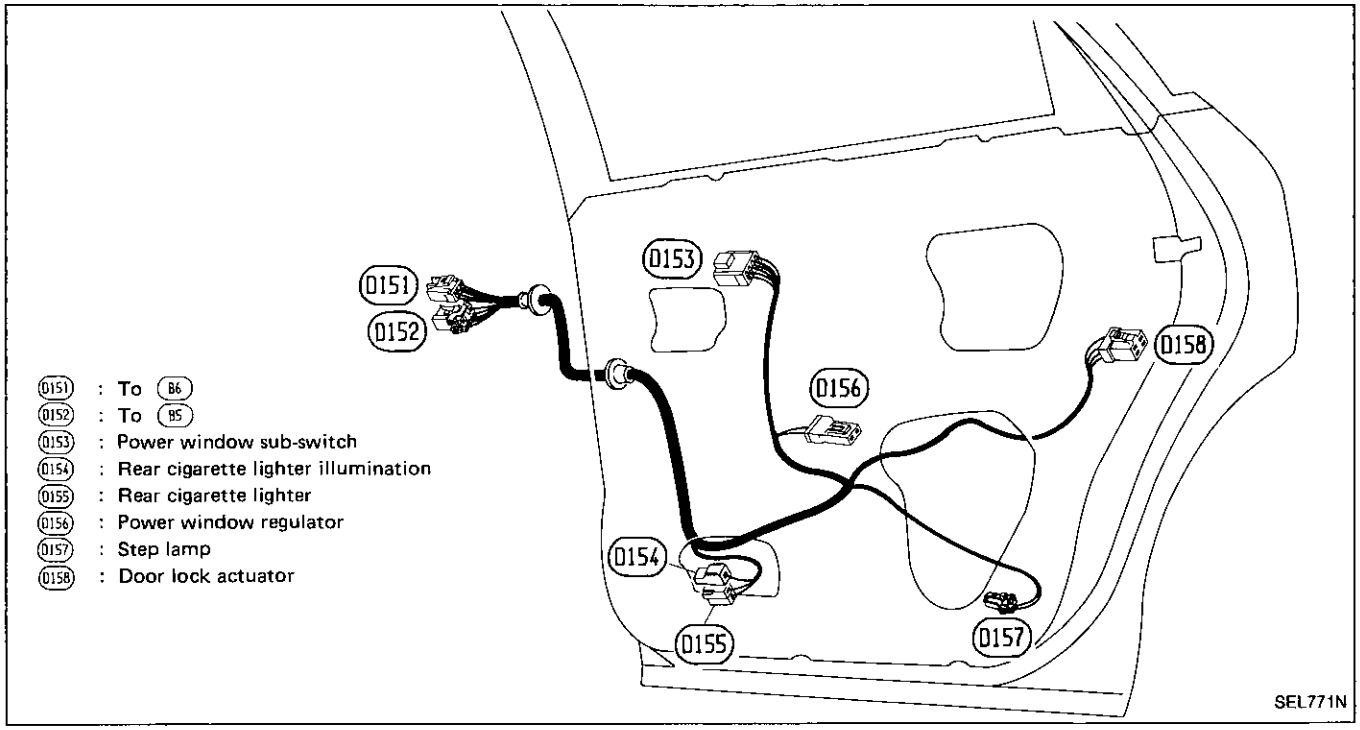
FRONT



D51 : To M99
D52 : To M98
D53 : To M97
D54 : Door mirror
D55 : Power window sub-switch
D56 : Power seat switch
D57 : Door speaker (LUXURY and SPORT models)
D58 : Power window regulator
D59 : Key cylinder switch
D60 : Door handle switch and key hole illumination
D61 : Lock knob switch
D62 : Door lock actuator
D63 : Step lamp
D64 : Door speaker (STD model)

SEL769N

REAR



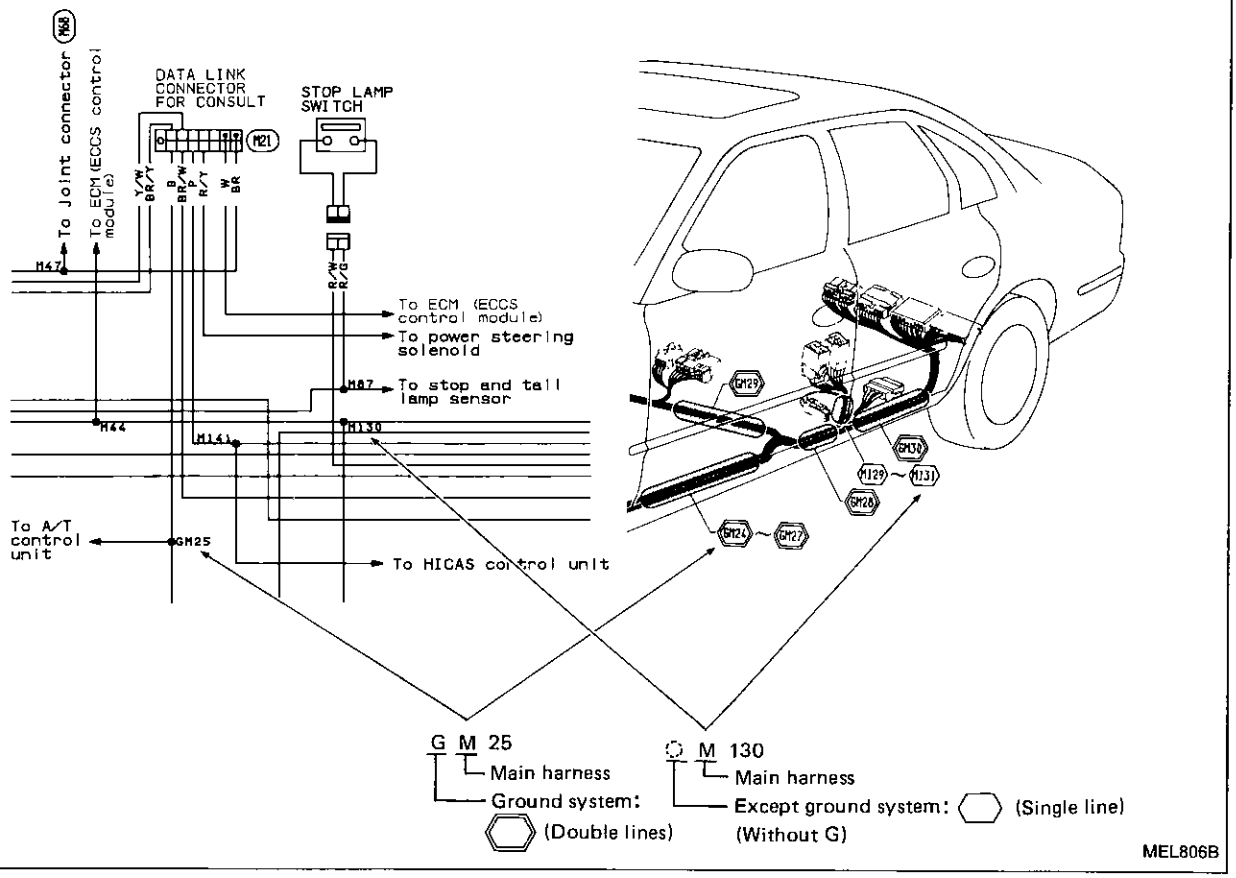
D151 : To B6
D152 : To B5
D153 : Power window sub-switch
D154 : Rear cigarette lighter illumination
D155 : Rear cigarette lighter
D156 : Power window regulator
D157 : Step lamp
D158 : Door lock actuator

SEL771N

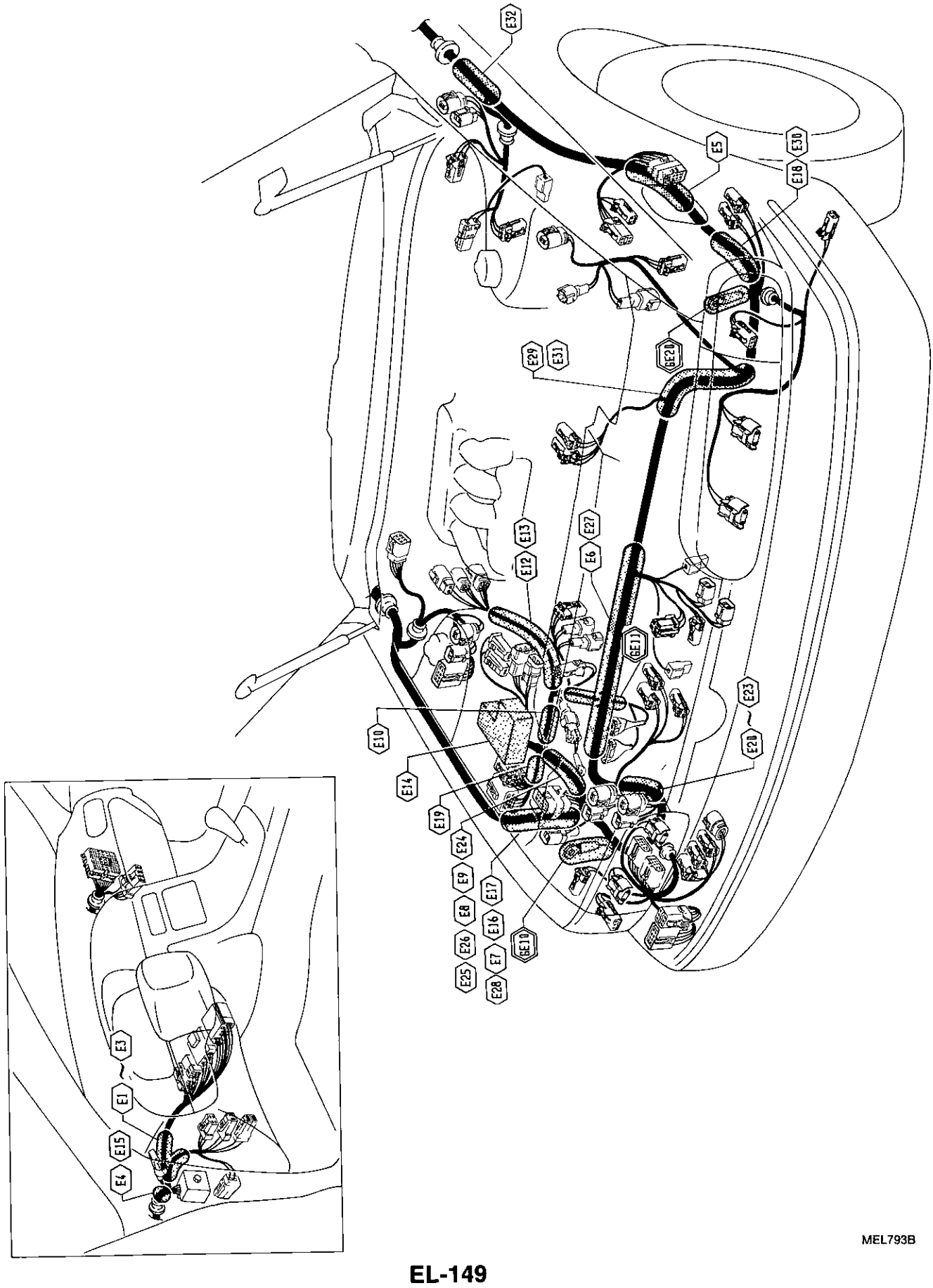
How to Read Splice Location

- "GM25", "M130" etc., which are shown in the wiring diagram, refer to wiring harness splice points. These points are located in shaded areas " GM25 ", " M130 ", etc. in illustrations under the title "SPLICE LOCATION".
- Wiring harness splice points are subject to change without prior notice.

Example

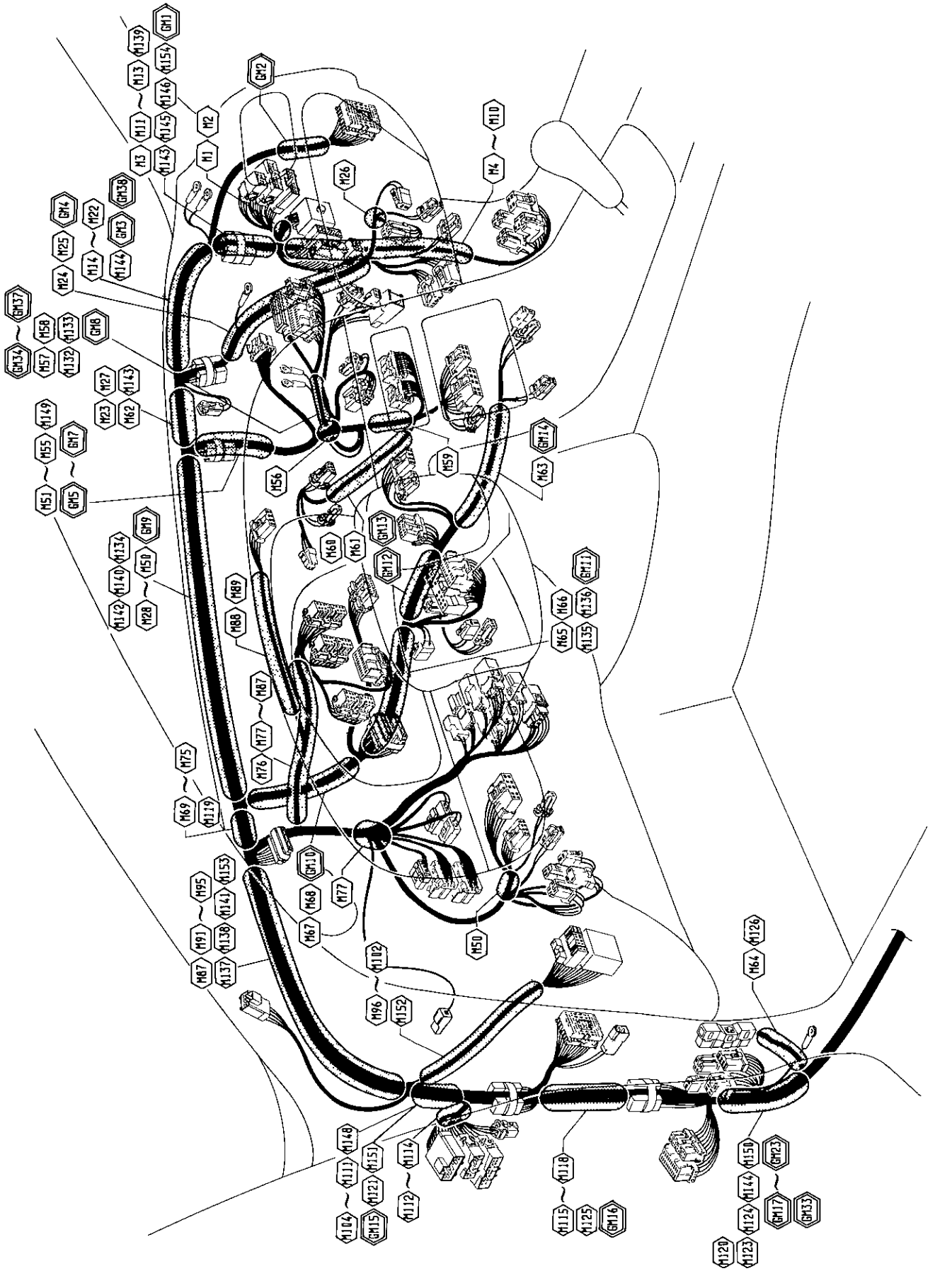


Engine Room Harness



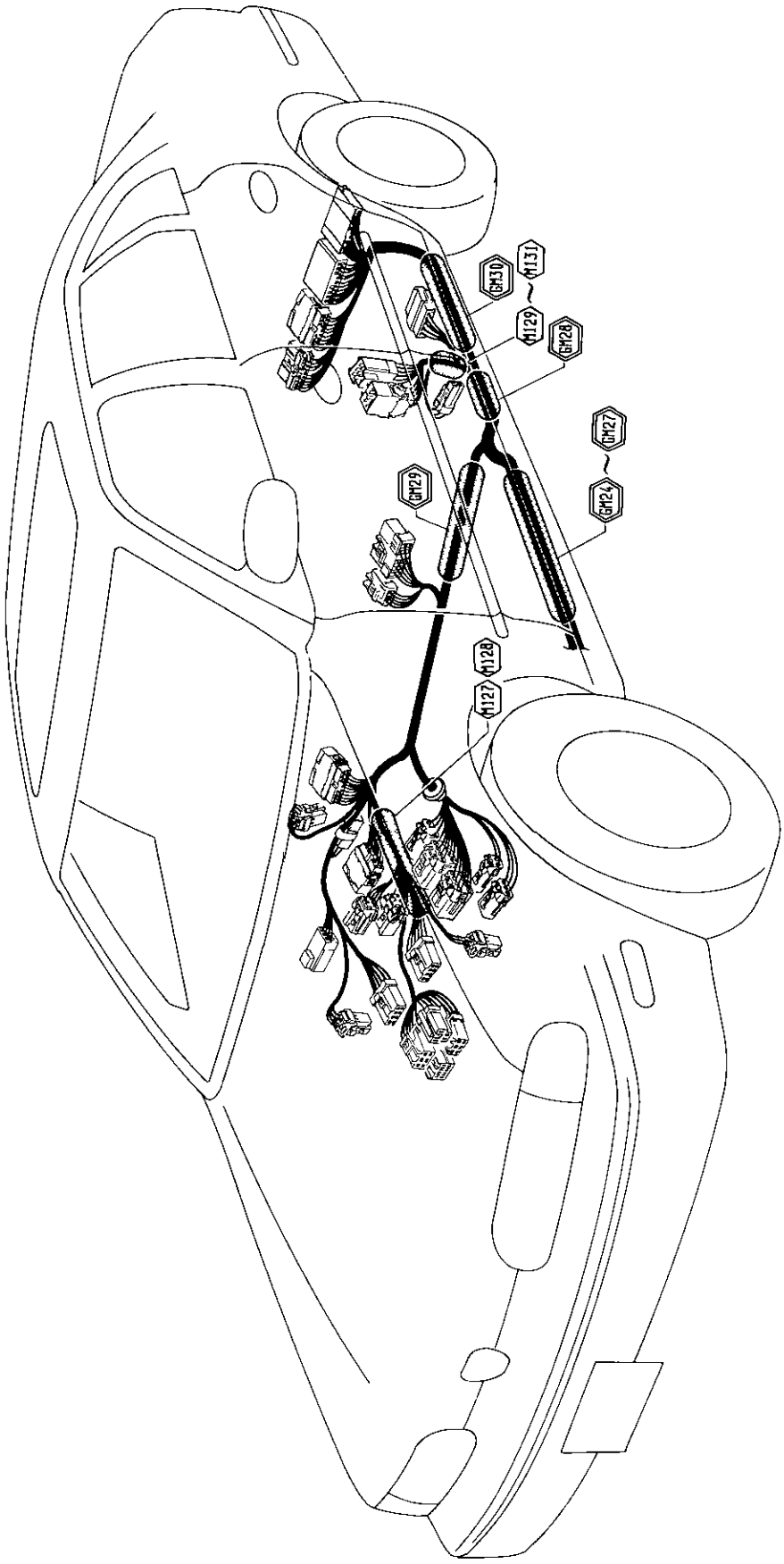
MEL793B

Main Harness



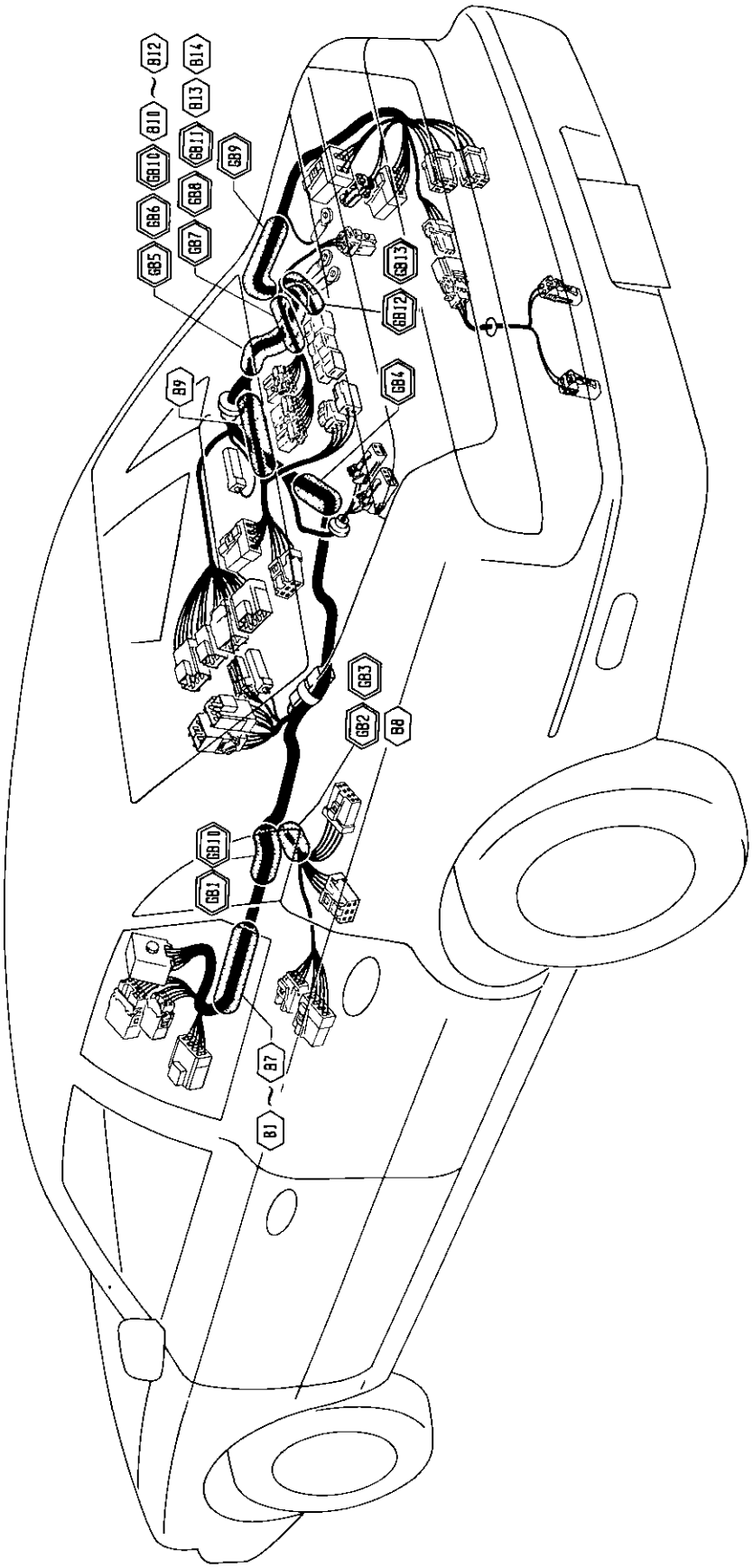
MEL794B

Main Harness (Cont'd)



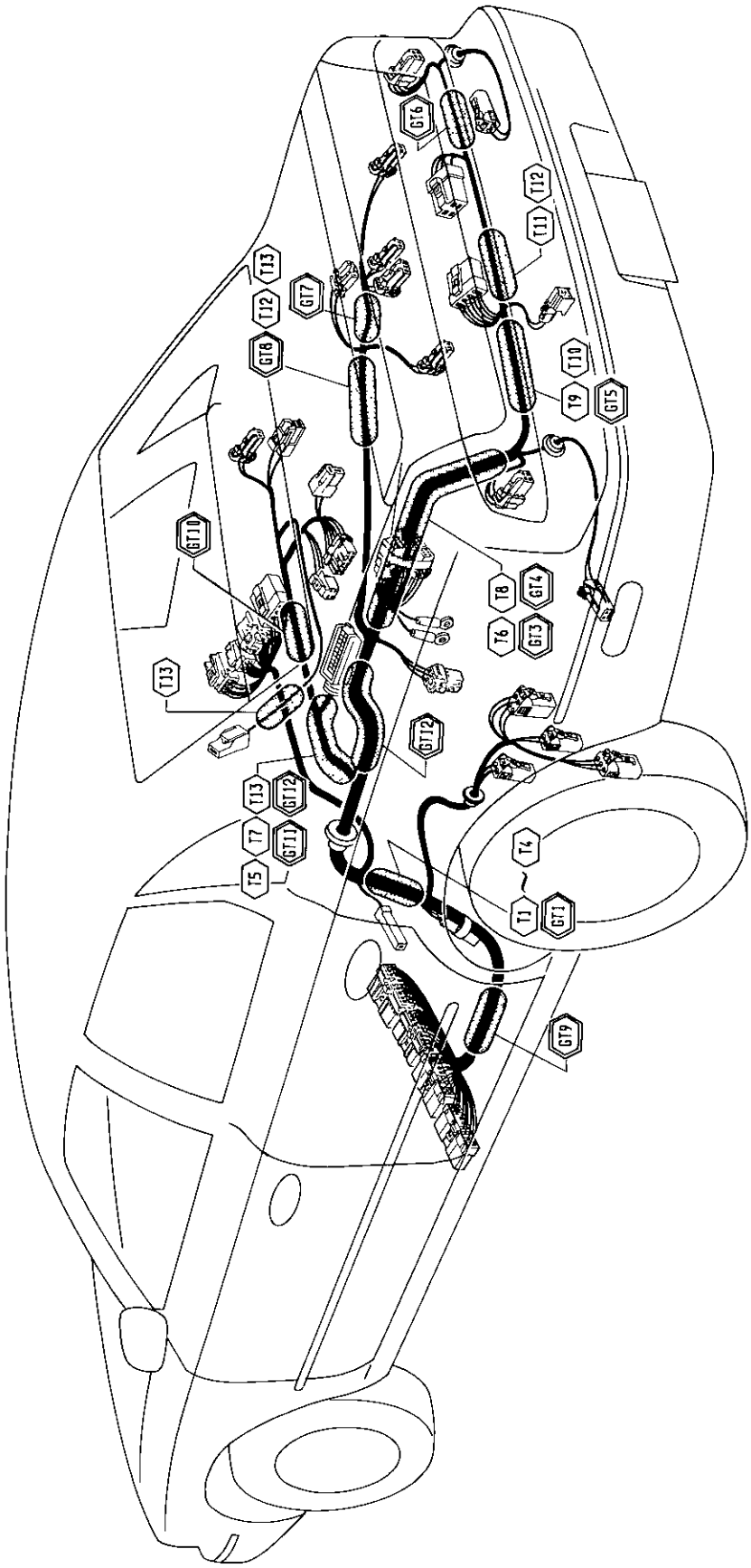
SEL594Q

Body Harness

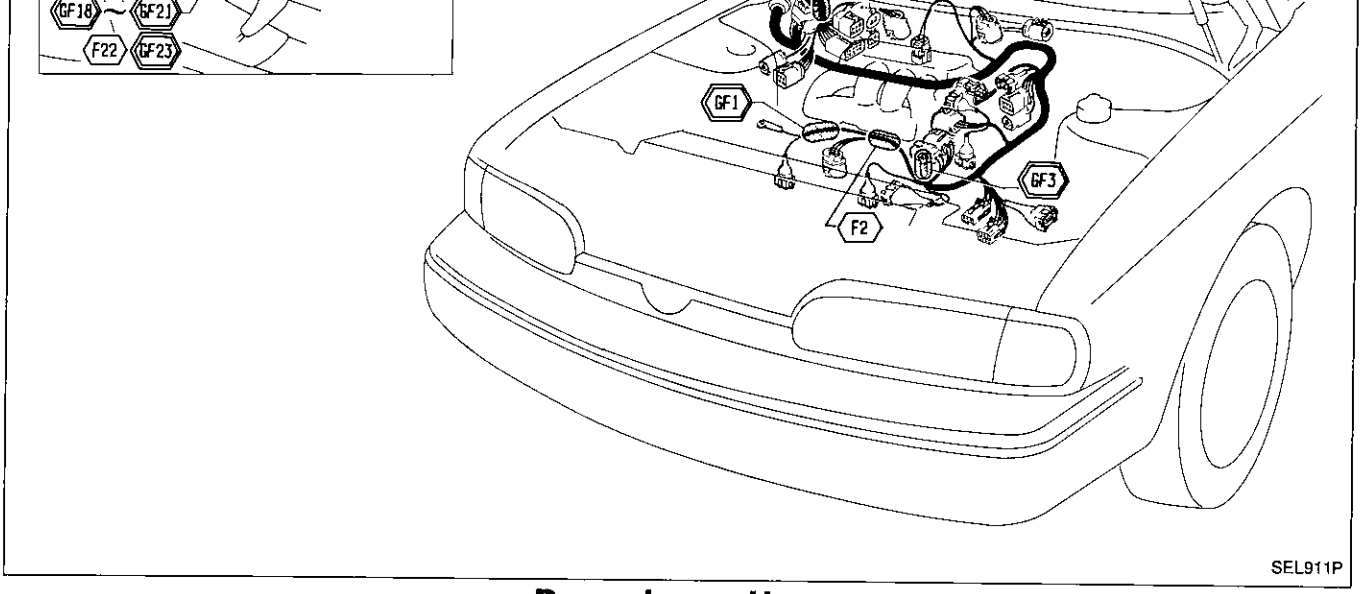


SEL595Q

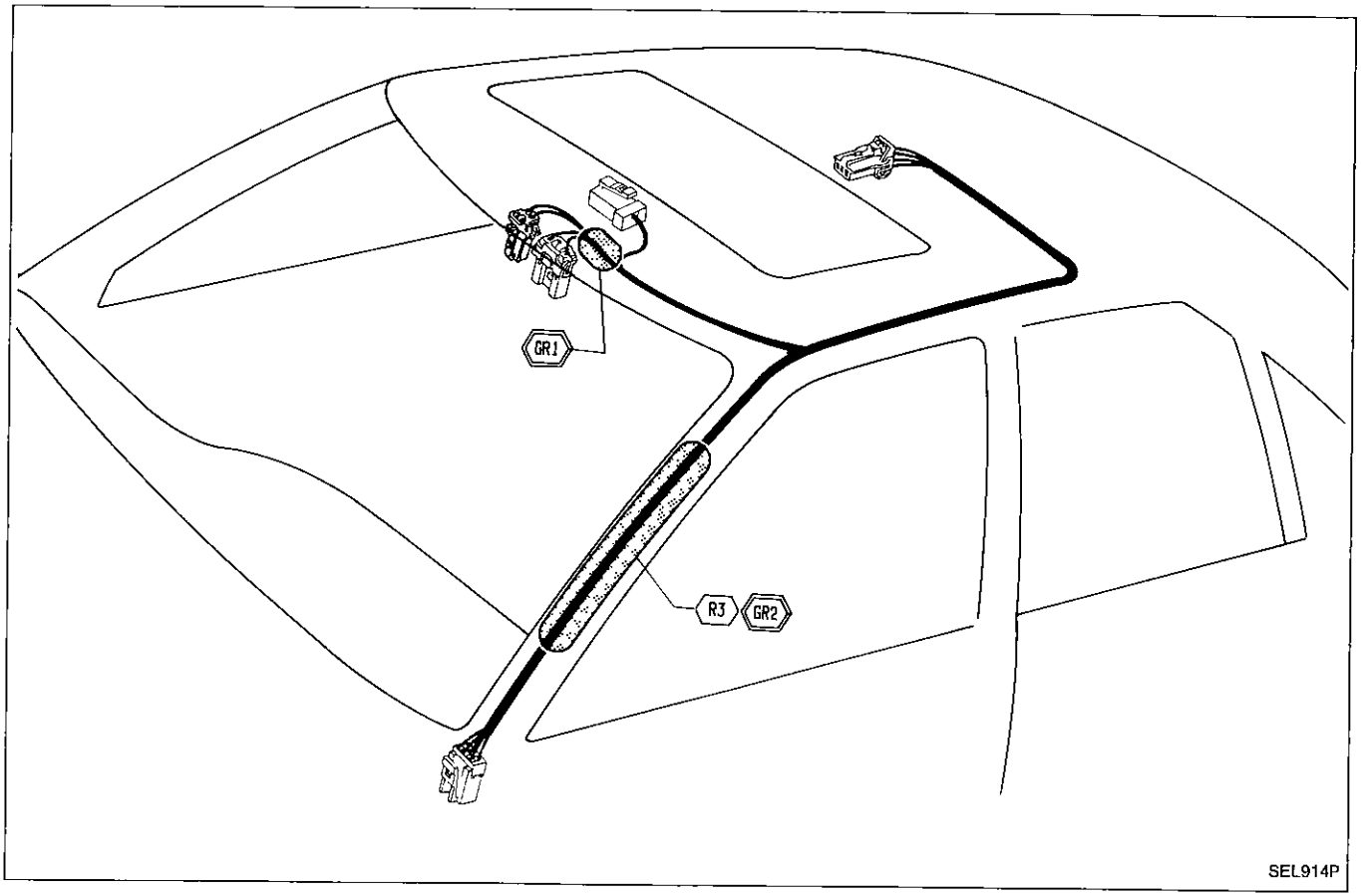
Tail Harness

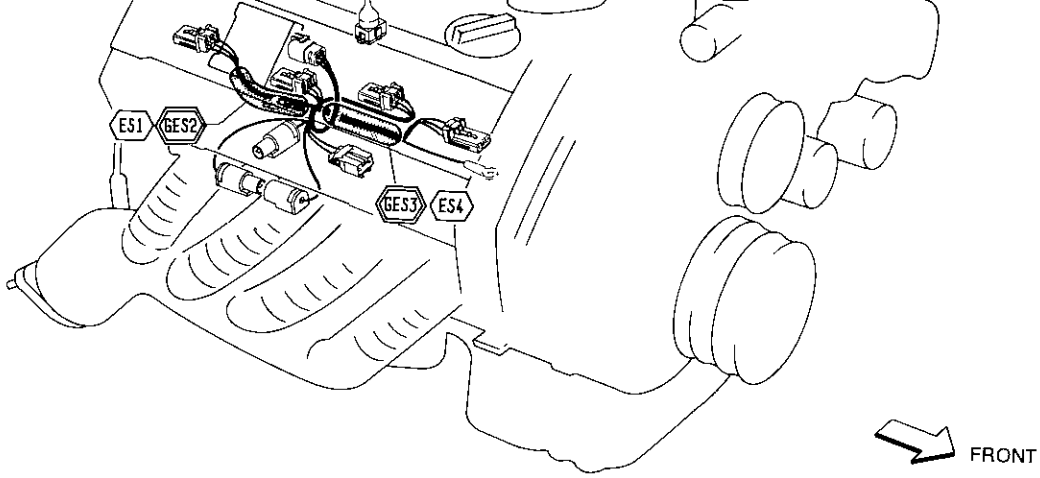


SEL910P

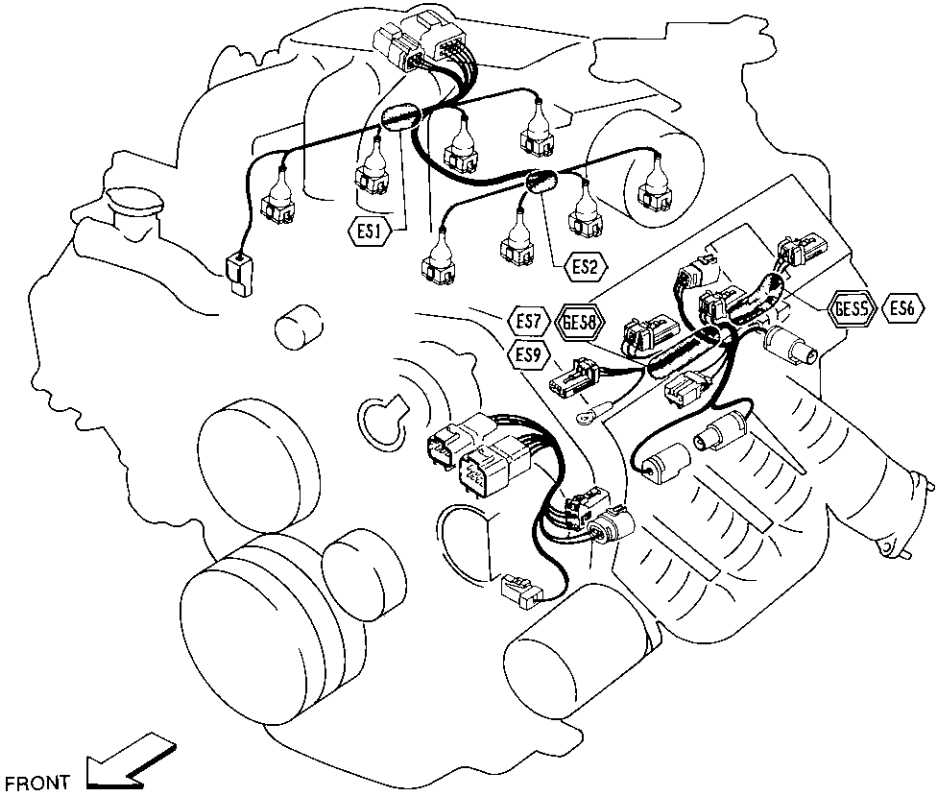


Room Lamp Harness





SEL596Q

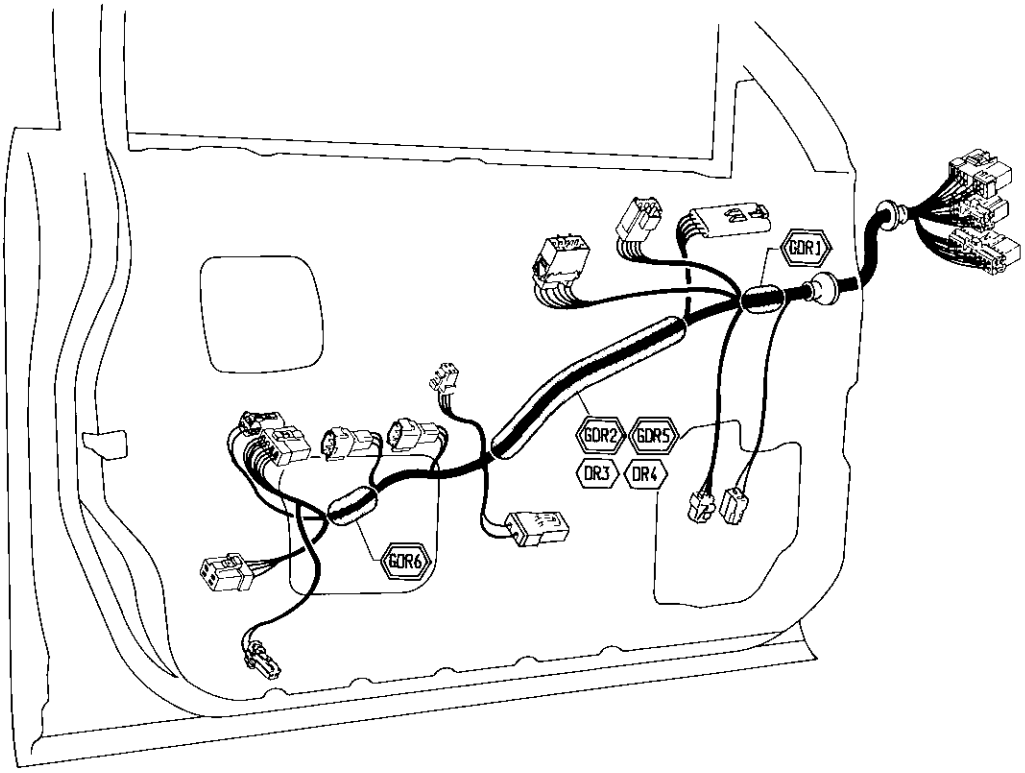


SEL913P

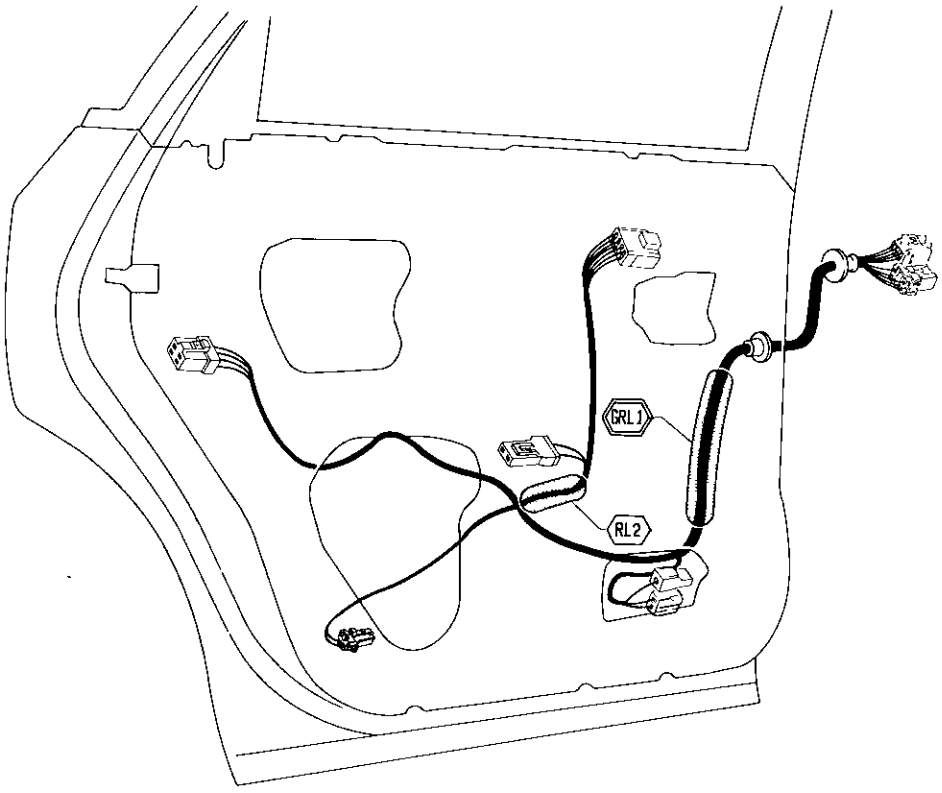
Door Harness

L.H. SIDE

Front



Rear

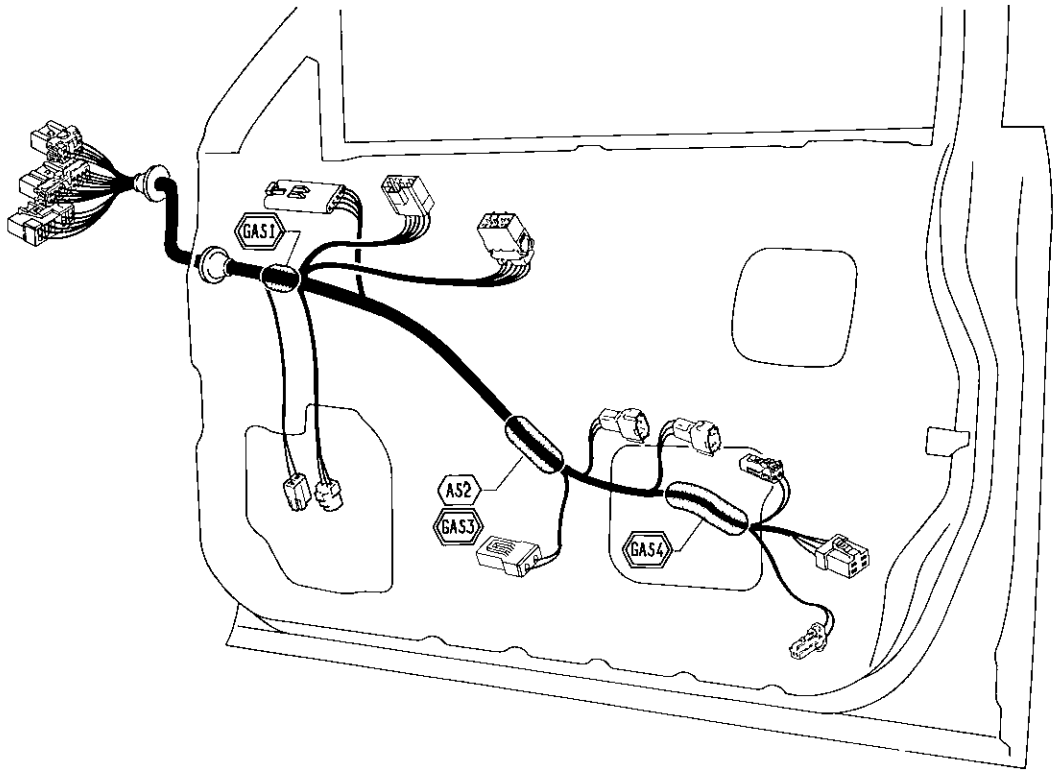


SEL915P

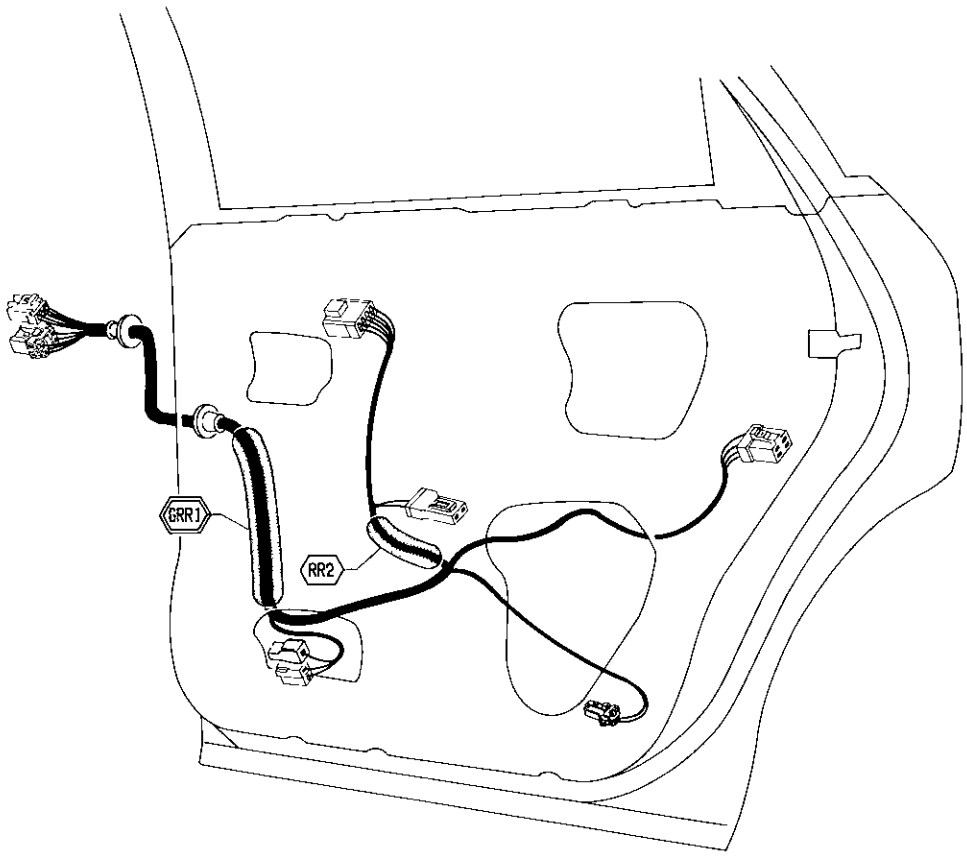
Door Harness (Cont'd)

R.H. SIDE

Front



Rear

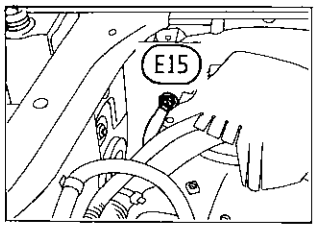


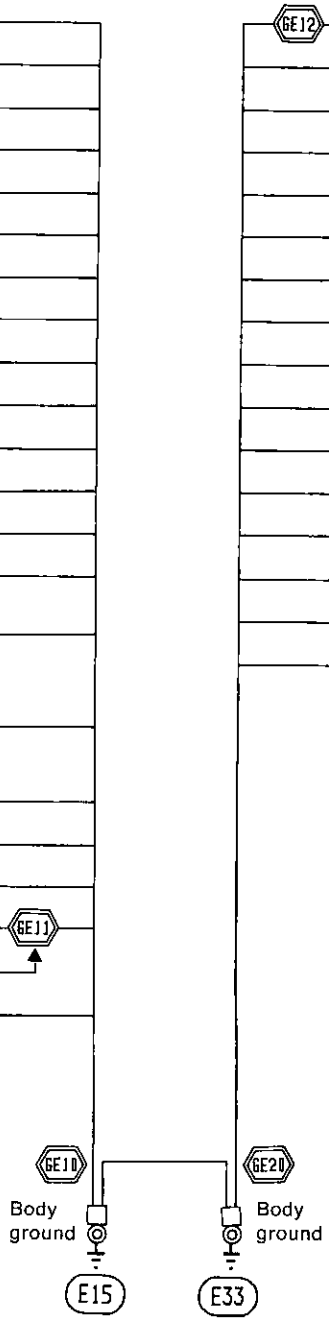
SEL191Q

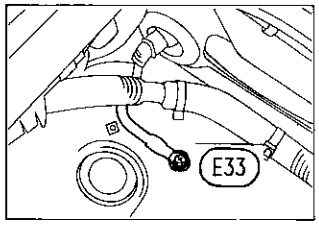
Engine room harness

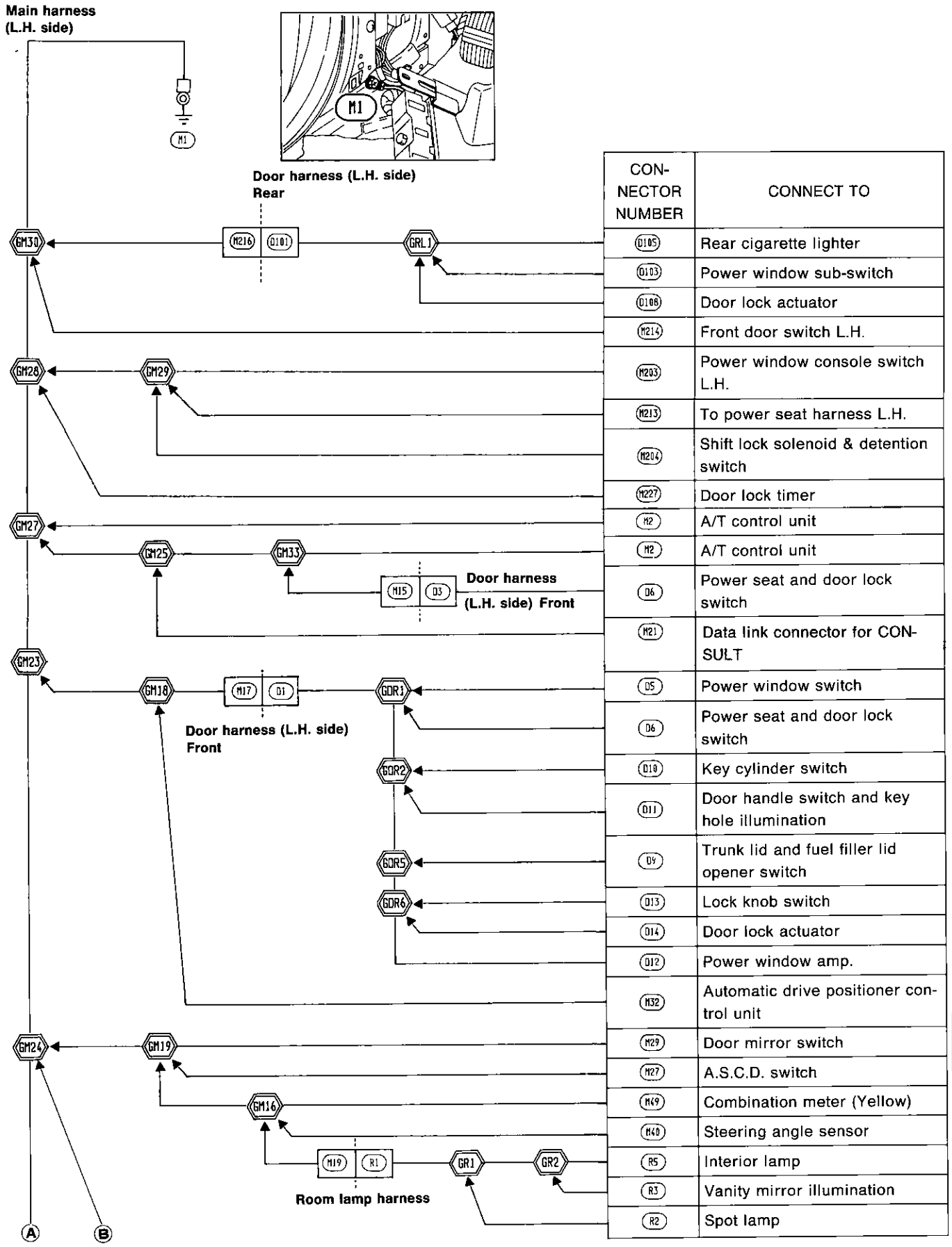
CONNECT TO	CON-NECTOR NUMBER
Loading pump for T.C.S.	E54
Actuator (For A.B.S.)	E7
To engine harness	E48
N&P relay	E8
N&P relay	E8
Starter relay	E8
A.S.C.D. hold relay	E8
Radiator fan relay	E8
A/C pressure switch	E25
Front combination lamp R.H.	E17
Front side marker lamp R.H.	E16
Washer sensor	E22
Wiper motor	E1
Wiper amplifier	E2
Oil pressure switch (For active suspension)	E63
To main harness (For active suspension)	E110 M96 M95 B2 B33
Front pressure control unit	E58
Front pressure control unit	E57
Daytime light control unit	E55
T.C.S. actuator	E53
T.C.S. sub harness	E51
Front sensor R.H.	E11

CON-NECTOR NUMBER	CONNECT TO
E35	Thermoswitch
E109	Combination switch
E109	Combination switch
E109	Combination switch
E32	Front combination lamp L.H.
E34	Front side marker lamp L.H.
E44	Brake fluid level switch
E41	Hood switch
E28	Condenser fan motor resistor
E107	Headlamp sensor
E107	Headlamp sensor
E105	Fuse block
E65	Oil level switch
E67	Oil cooler fan motor
E68	Multi valve unit
E39	Front sensor L.H.

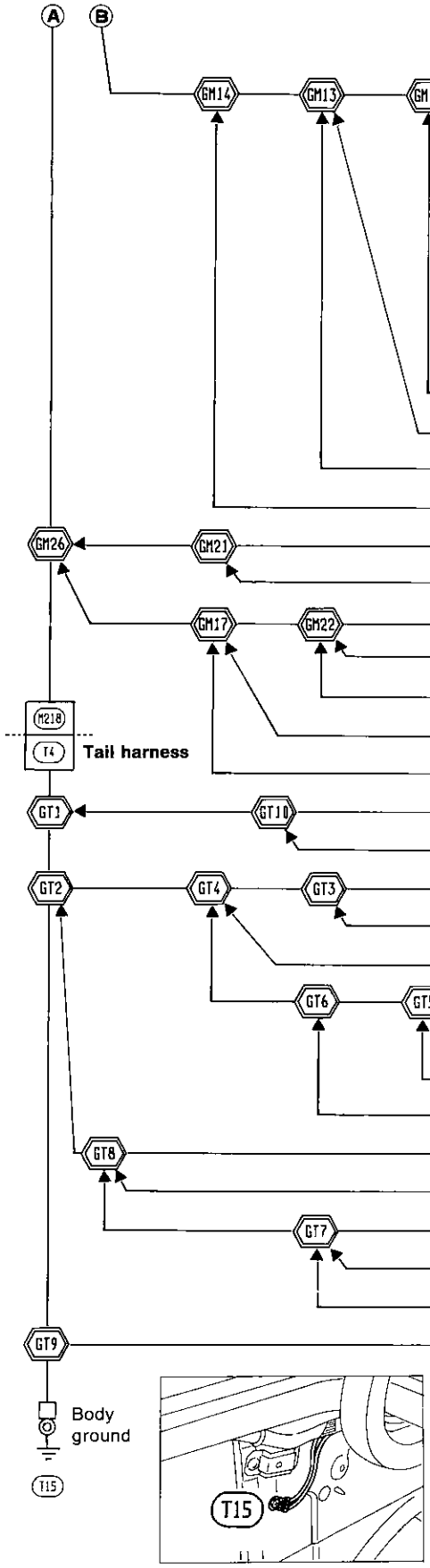




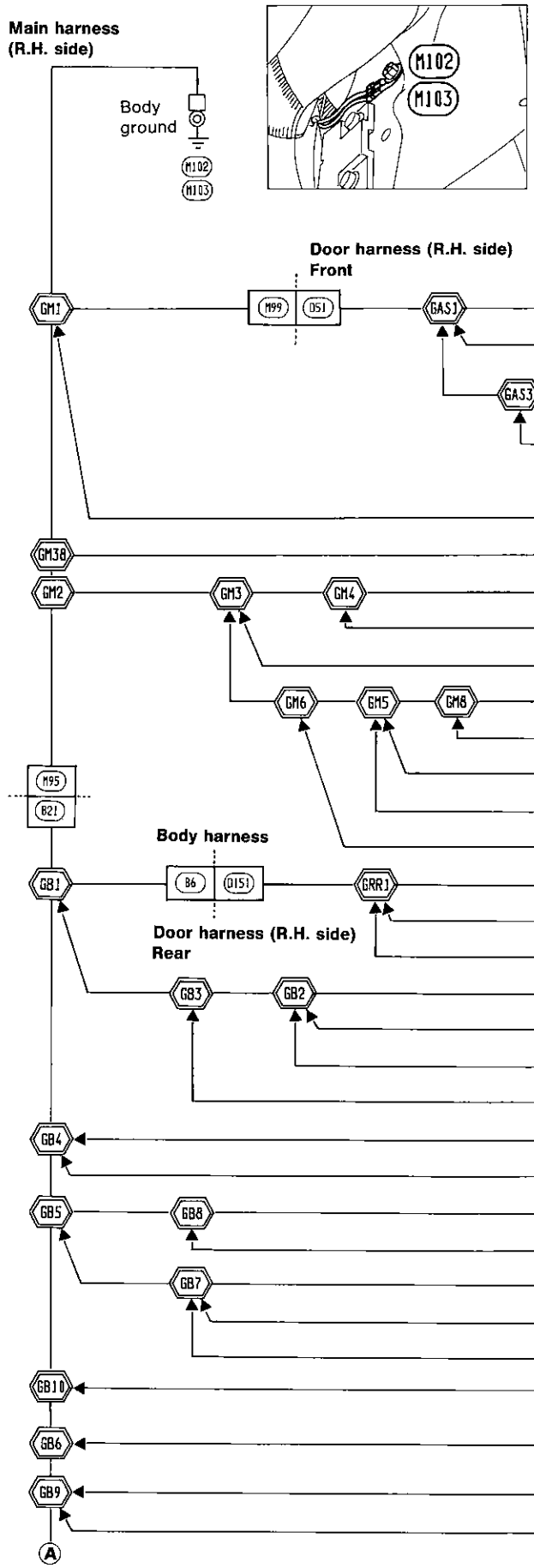




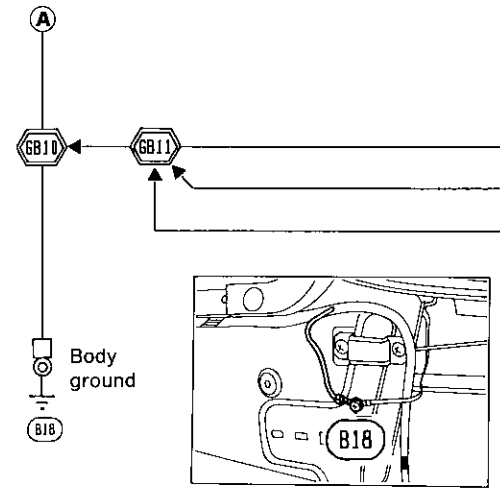
CONNECTOR NUMBER	CONNECT TO
D105	Rear cigarette lighter
D103	Power window sub-switch
D108	Door lock actuator
M214	Front door switch L.H.
M203	Power window console switch L.H.
M213	To power seat harness L.H.
M204	Shift lock solenoid & detention switch
M227	Door lock timer
M2	A/T control unit
M2	A/T control unit
D6	Power seat and door lock switch
M21	Data link connector for CONSULT
D5	Power window switch
D6	Power seat and door lock switch
D10	Key cylinder switch
D11	Door handle switch and key hole illumination
D9	Trunk lid and fuel filler lid opener switch
D13	Lock knob switch
D14	Door lock actuator
D12	Power window amp.
M32	Automatic drive positioner control unit
M29	Door mirror switch
M27	A.S.C.D. switch
M49	Combination meter (Yellow)
M48	Steering angle sensor
R5	Interior lamp
R3	Vanity mirror illumination
R2	Spot lamp



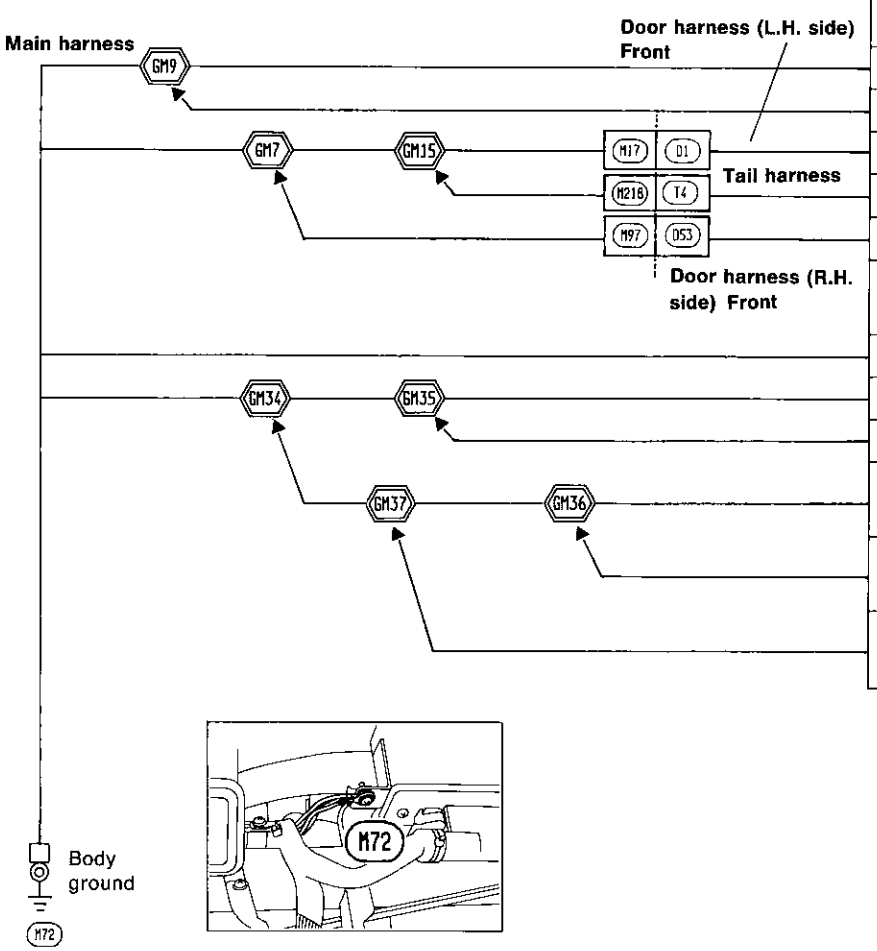
CON-NECTOR NUMBER	CONNECT TO
M61	Cigarette lighter
M47	Diagnostic information display
M22	Ignition relay-2
M55 M105	A.S.C.D. control unit
M56	Power steering control unit
M56	Power steering control unit
M53	Kickdown switch
M50	Mode door motor
M58	Rear window defogger switch
M58	Rear window defogger switch
M59	Ashtray illumination
M7	Shift lock control unit
M48	Combination meter (Black)
M8	Time control unit
M23	Combination flasher unit
M4	Power window relay
M41	Wiper switch
M41	Wiper switch
T12	High-mounted stop lamp
T32	Rear amplifier
T18	Rear combination lamp L.H.
T17	Receiver
T19	Rear side marker lamp L.H.
T29	Rear combination lamp R.H.
T22	To license lamp harness
T21	Stop and tail lamp sensor
T30	Rear side marker lamp R.H.
T20	Back-up lamp L.H.
T23	High-mounted stop lamp
T26	Back-up lamp R.H.
T24	Trunk room lamp switch
T25	Trunk lid unlock switch
T14	Fail-safe valve



CONNECTOR NUMBER	CONNECTOR TO
D56	Power seat switch
D59	Key cylinder switch
D60	Door handle switch and key illumination
D61	Lock knob switch
D62	Door lock actuator
M88	Audio amp. relay
M62	Illumination control switch
M83	Fan control amp.
M87	Blower HI relay (A/C)
M76	Auto amp. (A/C)
M65	Clock
	Shield wire
	Shield wire
M80	Glove box lamp switch
M70	Theft warning control unit
D155	Rear cigarette lighter
D153	Power window sub-switch
D158	Door lock actuator
B4	To power seat harness R.H.
B28	Vehicle height control switch
B28	Vehicle height control switch
B27	TCS switch
B17	Rear brake pad sensor
B10	Fuel tank gauge unit
B33	Active suspension control unit
B33	Active suspension control unit
B33	Active suspension control unit
B33	Active suspension control unit
B33	Active suspension control unit
B7	Door switch (Passenger side)
B36	To B51 (For rear pressure control unit)
B20	Power antenna timer
B22	Courtesy lamp relay



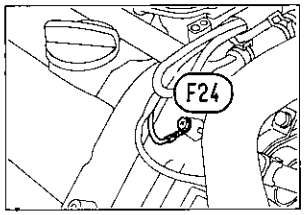
CON-NECTOR NUMBER	CONNECTOR TO
B13	HICAS control unit
B14	HICAS control unit
B14	HICAS control unit

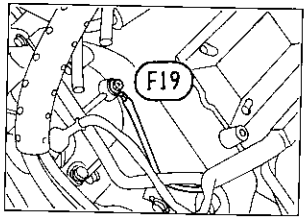


CON-NECTOR NUMBER	CONNECTOR TO
M46	Combination meter (White)
M49	Combination meter (Yellow)
D7	Door speaker L.H.
T31	Rear speaker L.H.
D57	Door speaker R.H.
M71	ABS control unit
M71	ABS control unit
M71	ABS control unit
	To M96 (Shield wire: For front wheel sensor R.H.)
	To M11 (Shield wire: For front wheel sensor L.H.)
	To M95 (Shield wire: For rear wheel sensor)

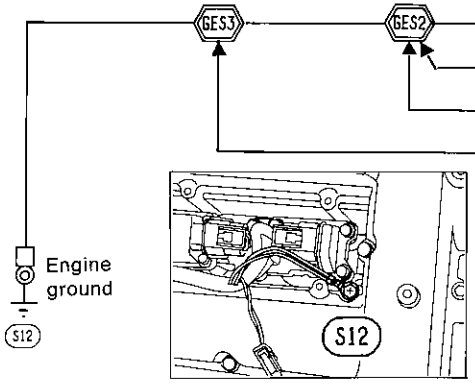
(shield wire)	
Sub-crankshaft position sensor (shield wire)	F22
Sub-crankshaft position sensor	F22
Crankshaft position sensor (shield wire)	F20
Knock sensor — L.H. (shield wire)	S2
Knock sensor — R.H. (shield wire)	S3
Mass air flow sensor (shield wire)	F17
Throttle position sensor (shield wire)	F15
Crankshaft position sensor	F20
ECM (ECCS control module)	F54 (No. 50)

(No. 108)	
F54 (No. 107)	ECM (ECCS control module)
F54 (No. 10)	ECM (ECCS control module)
F2	Power transistor unit — R.H.
F12	Power transistor unit — L.H.



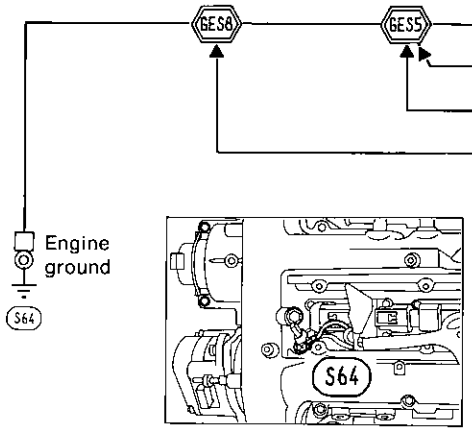


Sub-harness-3



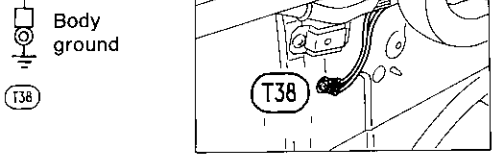
CONNECTOR NUMBER	CONNECT TO
S5	Ignition coil No. 8
S7	Ignition coil No. 6
S9	Ignition coil No. 4
S11	Ignition coil No. 2

Sub-harness-4



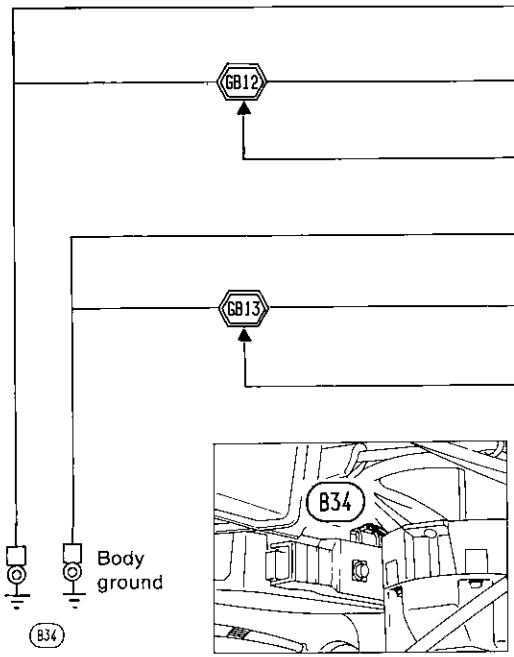
CONNECTOR NUMBER	CONNECT TO
S72	Ignition coil No. 7
S70	Ignition coil No. 5
S65	Ignition coil No. 3
S67	Check connector

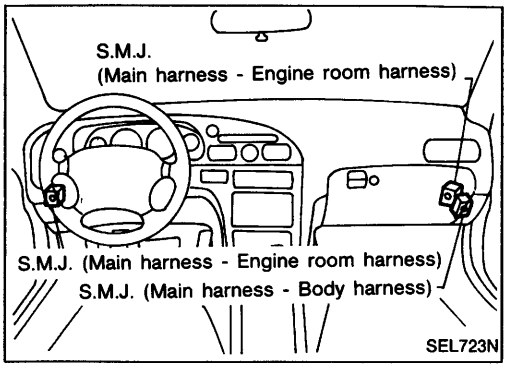
	To (T36) (Shield wire: TCS control unit)
	To (T36) (Shield wire: TCS control unit)

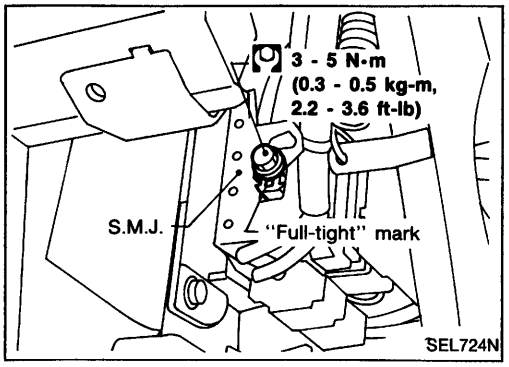


Body harness

CONNECTOR NUMBER	CONNECTOR TO
	To (M224) (Shield wire: Lateral G sensor-1 front)
	To (M223) (Shield wire: Fore & aft G sensor)
	To (M225) (Shield wire: Lateral G sensor-2 rear)
	To (B35) (Shield wire: Vertical G sensor rear right)
	To (M104) (Shield wire: Vertical G sensor front)
	To (T37) (Shield wire: Vertical G sensor rear left)







INSTALLATION

To install S.M.J., tighten bolts until orange "full-tight" mark appears and then retighten to specified torque as required.

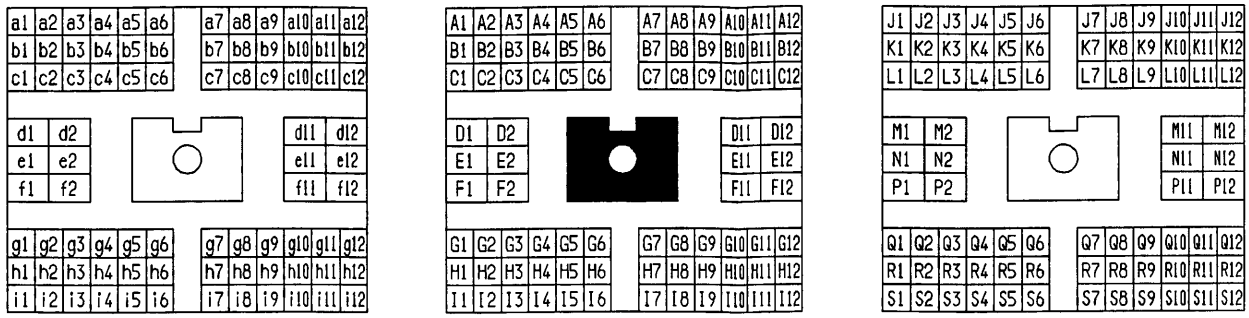
: 3 - 5 N·m (0.3 - 0.5 kg-m, 2.2 - 3.6 ft-lb)

CAUTION:

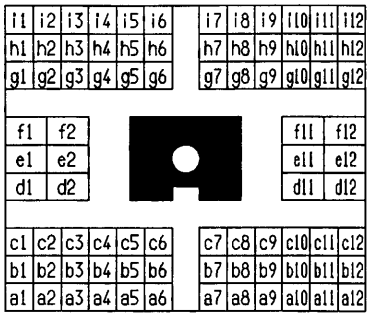
Do not overtighten bolts, otherwise, they may be damaged.

Terminal Arrangement

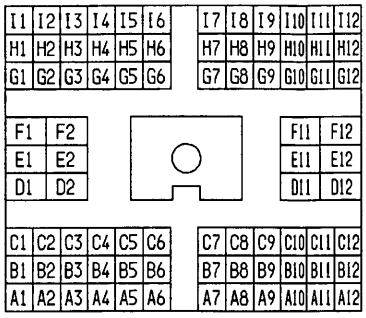
MAIN HARNESS



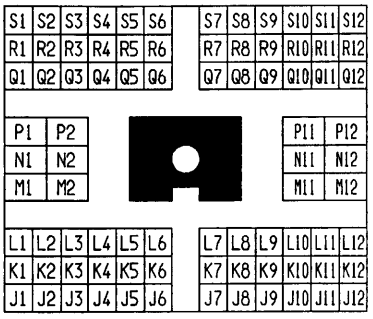
ENGINE ROOM HARNESS (L. H)



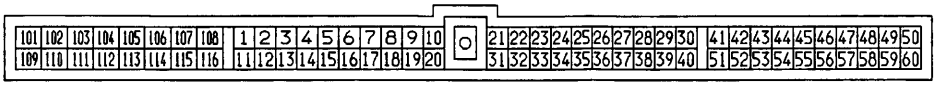
ENGINE ROOM HARNESS (R. H)



BODY HARNESS

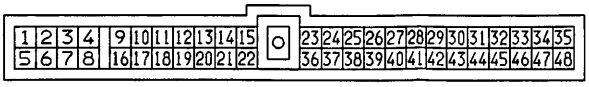


ECM (ECCS CONTROL MODULE) AND FULL-ACTIVE SUSPENSION CONTROL UNIT



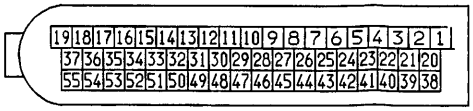
View from harness side

A/T CONTROL UNIT



View from harness side

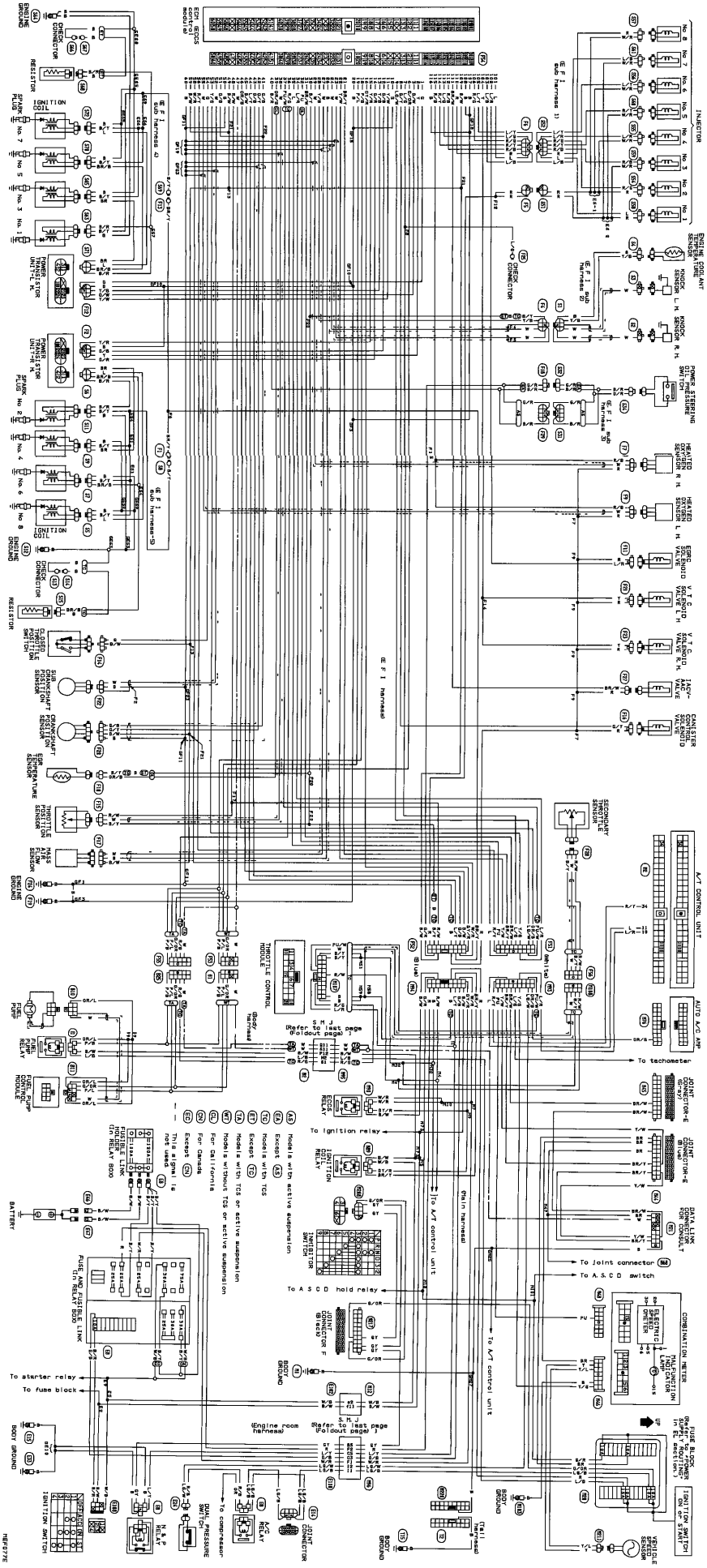
TCS CONTROL UNIT



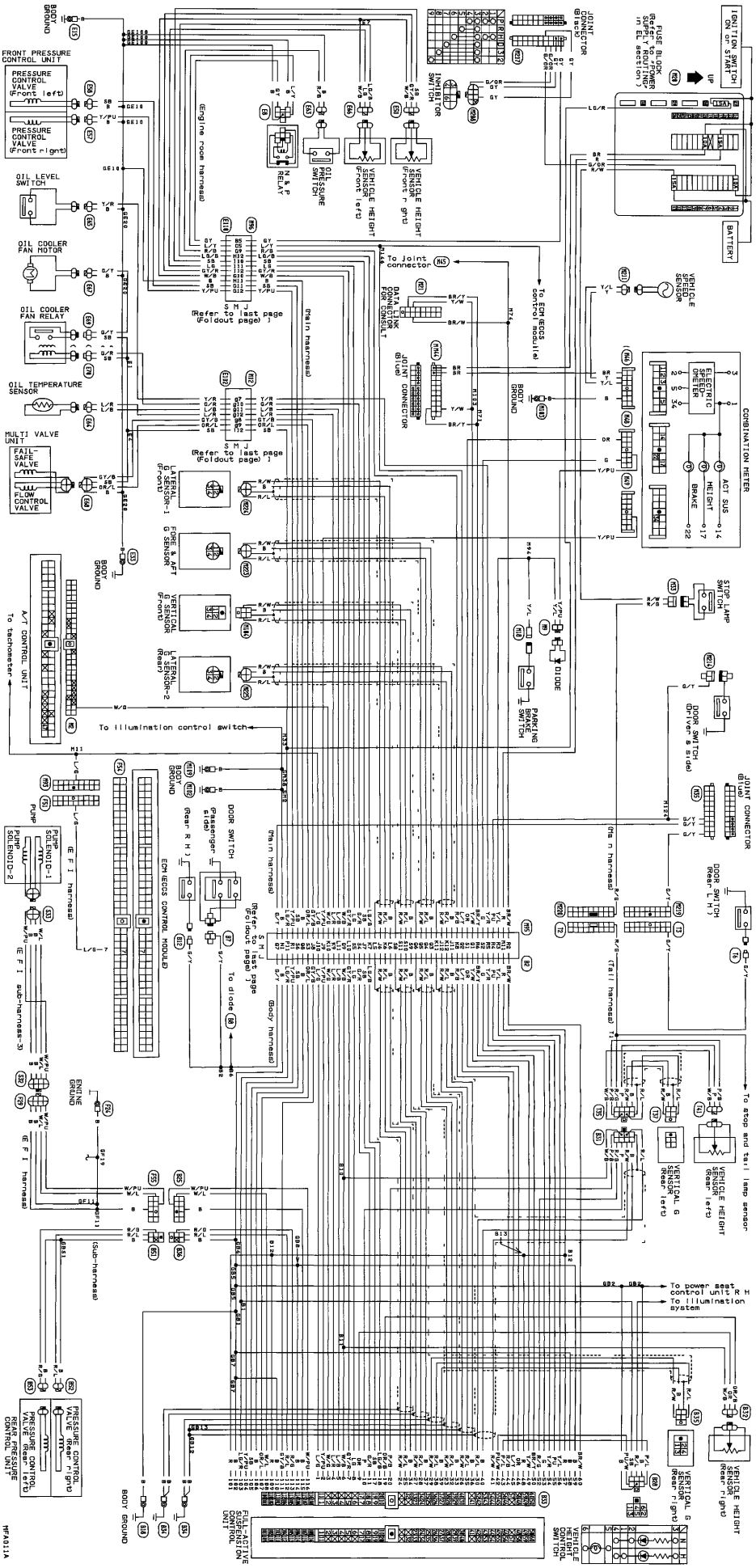
View from terminal side

MEL807B

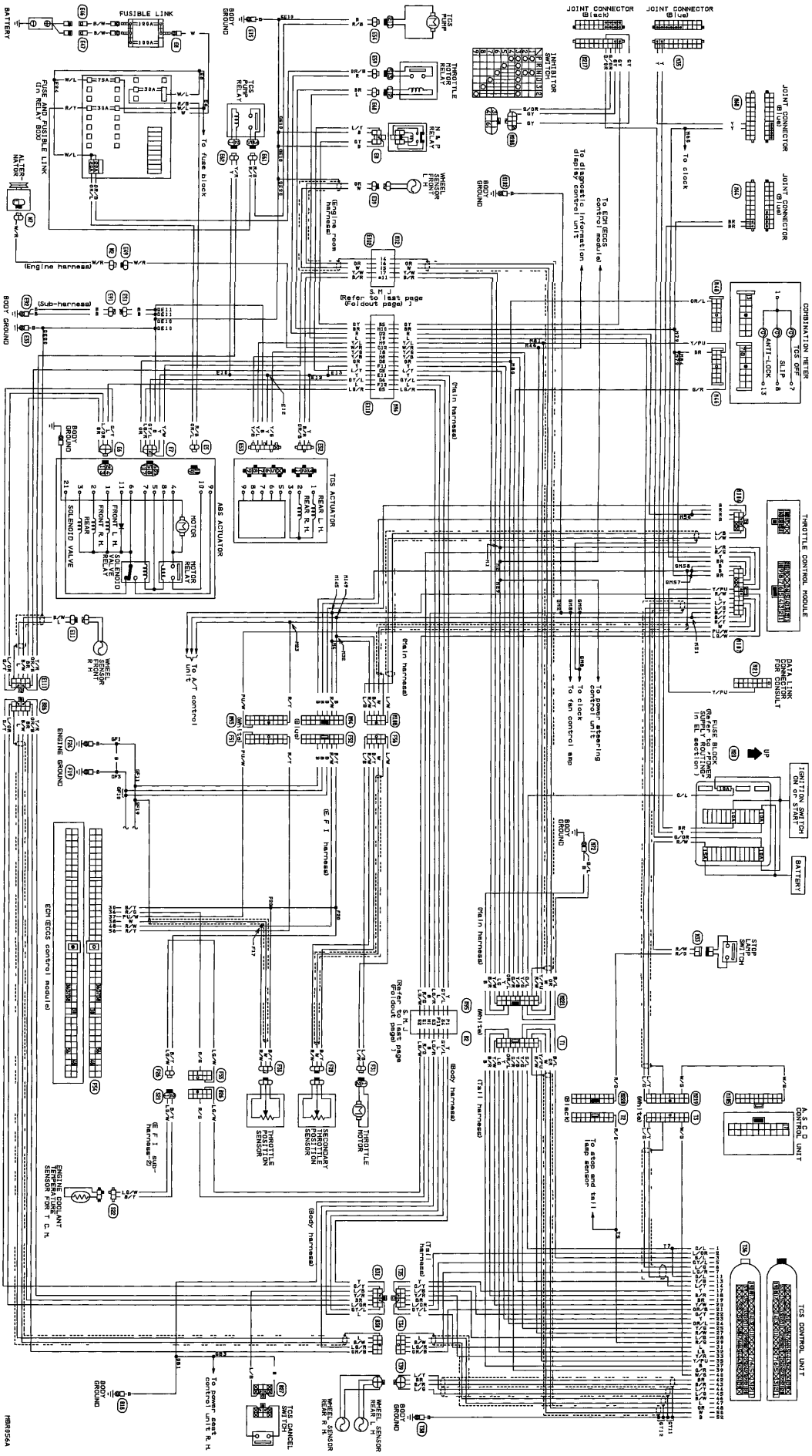
1993 INFINITI Q45
ECCS WIRING DIAGRAM



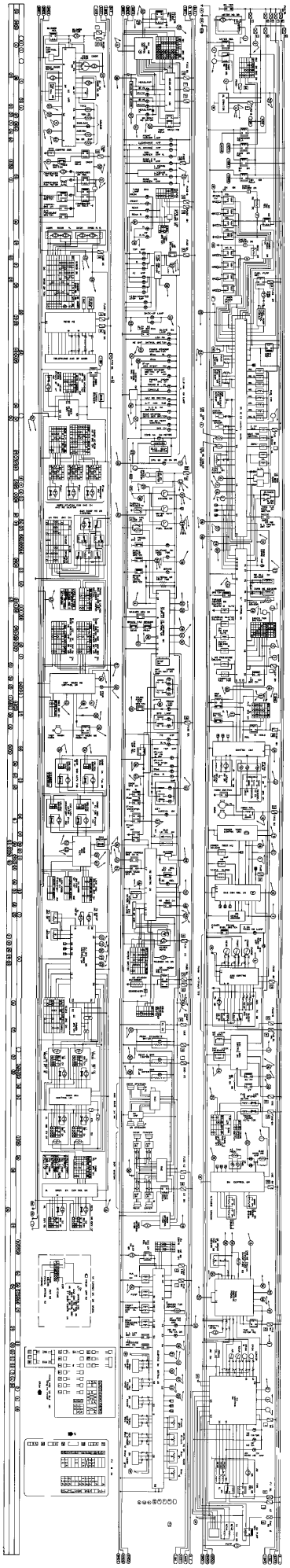
1993 INFINITI Q45
FULL-ACTIVE SUSPENSION WIRING DIAGRAM



1993 INFINITI Q45
TCS WIRING DIAGRAM



1993 INFINITI Q45
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